LG

Service Manual
LG-P990

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1. INTRODUCTION

1.1 Purpose

This manual provides the information necessary to repair, calibration, description and download the features of this model.

1.2 Regulatory Information

A. Security

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services. System users are responsible for the security of own system. There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common-carrier telecommunication service of facilities accessed through or connected to it.

The manufacturer will not be responsible for any charges that result from such unauthorized use.

B. Incidence of Harm

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

C. Changes in Service

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the this phone or compatibility with the network, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

D. Maintenance Limitations

Maintenance limitations on this model must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs expect as specifically noted in this manual. Therefore, note that unauthorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

E. Notice of Radiated Emissions

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

F. Pictures

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

G. Interference and Attenuation

Phone may interfere with sensitive laboratory equipment, medical equipment, etc.Interference from unsuppressed engines or electric motors may cause problems.

H. Electrostatic Sensitive Devices

ATTENTION

Boards, which contain Electrostatic Sensitive Device (ESD), are indicated by the sign. Following information is ESD handling:

• Service personnel should ground themselves by using a wrist strap when exchange system boards.

• When repairs are made to a system board, they should spread the floor with anti-static mat

  which is also grounded.

• Use a suitable, grounded soldering iron.

• Keep sensitive parts in these protective packages until these are used.

• When returning system boards or parts like EEPROM to the factory, use the protective

  package as described.

1.3 Abbreviations

For the purposes of this manual, following abbreviations apply:

APC	Automatic Power Control
BB	Baseband
BER	Bit Error Ratio
CC-CV	Constant Current – Constant Voltage
DAC	Digital to Analog Converter
DCS	Digital Communication System
dBm	dB relative to 1 milli watt
DSP	Digital Signal Processing
EEPROM	Electrical Erasable Programmable Read-Only Memory
ESD	Electrostatic Discharge
FPCB	Flexible Printed Circuit Board
GMSK	Gaussian Minimum Shift Keying
GPIB	General Purpose Interface Bus
GSM	Global System for Mobile Communications
IPUI	International Portable User Identity
IF	Intermediate Frequency
LCD	Liquid Crystal Display
LDO	Low Drop Output
LED	Light Emitting Diode
OPLL	Offset Phase Locked Loop

PAM	Power Amplifier Module
PCB	Printed Circuit Board
PGA	Programmable Gain Amplifier
PLL	Phase Locked Loop
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RLR	Receiving Loudness Rating
RMS	Root Mean Square
RTC	Real Time Clock
SAW	Surface Acoustic Wave
SIM	Subscriber Identity Module
SLR	Sending Loudness Rating
SRAM	Static Random Access Memory
PSRAM	Pseudo SRAM
STMR	Side Tone Masking Rating
TA	Travel Adapter
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
UART	Universal Asynchronous Receiver/Transmitter
VCO	Voltage Controlled Oscillator
VCTCXO	Voltage Control Temperature Compensated Crystal Oscillator
WAP	Wireless Application Protocol

2. PERFORMANCE

2.1 Product Name

P990 : WCDMA900/1900/2100+EGSM/GSM850/DCS/PCS
(HSUPA 5.7Mbps/HSDPA 7.2Mbps / GPRS Class 10 / EDGE Class 10)

2.2 Supporting Standard

Item	Feature	Comment
Supporting Standard	WCDMA(FDD1,2,8)/EGSM/GSM850/DCS1800/PCS1900 with seamless handover Phase 2+(include AMR) SIM Toolkit : Class 1, 2, 3, C-E	
Frequency Range	WCDMA(FDD1) TX : 1920 – 1980 MHz WCDMA(FDD1) RX : 2110 – 2170 MHz WCDMA(FDD2) TX : 1850 – 1910 MHz WCDMA(FDD2) RX : 1930 – 1990 MHz WCDMA(FDD8) TX : 880 – 915 MHz WCDMA(FDD8) RX : 925 – 960 MHz EGSM TX : 880 – 915 MHz EGSM RX : 925 – 960 MHz GSM850 TX : 824 – 849 MHz GSM850 RX : 869 – 894 MHz DCS1800 TX : 1710 – 1785 MHz DCS1800 RX : 1805 – 1880 MHz PCS1900 TX : 1850 – 1910 MHz PCS1900 RX : 1930 – 1990 MHz	
Application Standard		

2.3 Main Parts : GSM Solution

Item	Part Name	Comment
Digital Baseband	PMB9801 : Infineon	
Analog Baseband	PMB9801 : Infineon	One chip
RF Chip	PMB5703: Infineon	

2.4 HW Features

Item		Feature	Comment
Form Factor		DOP type	
Battery		1) Capacity Standard : Li-Ion Polymer, 1500mAh	
		2) Packing Type : Soft Pack	
Size		Standard :123.9 x 63.2 x 10.9mm	
Weight		139g	With Battery
Volume		TBD	
PCB		L1B1 type, 10 Layers , 0.8t	
Stand by time		2G Up to 350 hrs 3G Up to 350 hrs	@ Paging Period 9 (2G) @ DRX 7 (3G)
Charging time		3 hrs	@ Power Off / 1500mAh
Talk time		2G Up to 250mins 3G Up to 250 mins	@ Tx=Max(2G) @ Tx = 12dBm (3G)
RX sensitivity		WCDMA(FDD1) : -106.7 dBm WCDMA(FDD2) : -106.7 dBm WCDMA(FDD8) : -106.7 dBm EGSM : -105 dBm GSM850 : -105 dBm DCS 1800 : -105 dBm PCS 1900 : -105 dBm	
TX output power	WCDMA/ GSM/ GPRS	WCDMA : 24dBm/3.84MHz,+1/-3dBm EGSM : 33dBm GSM850 : 33 dBm DCS 1800 : 30 dBm PCS 1900 : 30 dBm	Class3(WCDMA) Class4 (EGSM) Class4 (GSM850) Class1 (PCS) Class1 (DCS)
	EDGE	GSM 900 : 27 dBm DCS 1800 : 26 dBm PCS 1900 : 26 dBm	E2 (GSM900) E2 (PCS) E2 (DCS)
GPRS compatibility		GPRS Class 10	
EDGE compatibility		EDGE Class 10	
SIM card type		Plug-In SIM 2.85V /1.8V	

Display	Main LCD(HVGA) TFT Main LCD(4.0", 480X800)	
Built-in Camera	8M CMOS Camera, 1.3M secondary	
Status Indicator	No	
Keypad	Function Key : 4 Side Key : 3	Function Key: Home,Back, menu, serach Side Key : Volume up,down, power key
ANT	Main : LDS(Laser Direct Structure) type Sub : DPA type(Directed Print Antenna)	
System connector	5 Pin Micro USB	
Ear Phone Jack	3.5Phi, 4 Pole, Stereo	
PC synchronization	Yes	
Memory(AP)	eMMC : 8GB LP-DDR2 : 512MB	
Speech coding	FR, EFR, HR, AMR	
Data & Fax	Built in Data & Fax support	
Vibrator	Built in Vibrator	
BlueTooth	V2.1 + EDR	
MIDI(for Buzzer Function)	SW Decoded 72Poly	
Music Player	MP3/ WMA/AAC/HE-AAC/eAAC+	
Video Player	MPEG4, H.263, H.264, WMV9/VC-1, DiVX	
Camcorder	MPEG4, H.264, H.263	
Voice Recording	Yes	
Speaker Phone mode Support	Yes	
Travel Adapter	Yes	
CDROM	No	
Stereo Headset	Yes	
Data Cable	Yes	
T-Flash (External Memory)	Yes	Upto 32GB

2.5 SW Features

Item	Feature	Comment
RSSI	0 ~ 4 Levels	
Battery Charging	0 ~ 6 Levels	
Key Volume	0 ~ 7 Level	
Audio Volume	1 ~ 15 Level	
Time / Date Display	Yes	
Multi-Language	Yes	CZECH , DUTCH , FRENCH , GERMAN , GREEK , ITALIAN , PORTUGUESE , SPANISH , ARABIC , HEBREW , T CHINESE TW , S CHINESE , ROMANIAN , HUNGARIAN , SLOVAK , CROATIAN , BULGARIAN , MACEDONIAN , ICELANDIC
Quick Access Mode	Phone / Contacts / Messaging / Menu	
PC Sync	Yes	
Speed Dial	Yes	Voice mail center -> 1 key
Profile	Yes	not same with feature phone setting
CLIP / CLIR	Yes	
Phone Book	Name / Number / Email / Chat Id / Website / Postal addresses / Organizations / Groups / BirthdayNotes / Ringtone	There is no limitation on the number of items. It depends on available memory amount.
Last Dial Number	Yes	There is no limitation on the number of items. It depends on available memory amount.
Last Received Number	Yes	There is no limitation on the number of items. It depends on available memory amount.
Last Missed Number	Yes	There is no limitation on the number of items. It depends on available memory amount.
Search by Number / Name	Name / N	

Group	Yes	There is no limitation on the number of items. It depends on available memory amount.
Fixed Dial Number	Yes	
Service Dial Number	No	
Own Number	Yes	Read only (add/edit/delete are not supported)
Voice Memo	Yes	Support voice recorder
Call Reminder	Yes	Missed call popup
Network Selection	Automatic	
Mute	Yes	
Call Divert	Yes	
Call Barring	Yes	
Call Charge (AoC)	Yes	
Call Duration	Yes	
SMS (EMS)	There is no limitation on the number of items. It depends on available memory amount.	EMS does not support.
SMS Over GPRS	No	
EMS Melody / Picture	No	
Send / Receive / Save	No	
MMS MPEG4	Yes	
Send / Receive / Save	Yes	
Long Message	MAX 459 characters	SMS 3pages
Cell Broadcast	Yes	
Download	Over the Web	
Game	Yes	
Calendar	Yes	
Memo	Yes	There is no limitation on the number of items. It depends on available memory amount.
World Clock	Yes	
Unit Convert	No	

Stop Watch	Yes	
Wall Paper	Yes	
WAP Browser	No	WAP stack and wml are not supported.
Download Melody / Wallpaper	Yes	Over web browser
SIM Lock	Yes	Operator Dependent
SIM Toolkit	Class 1, 2, 3, C, D	
MMS	Yes	
EONS	Yes	
CPHS	Yes	V4.2
ENS	Yes	
Camera	Yes	8M AF / Digital Zoom : x8
JAVA	No	Android do not support JAVA
Voice Dial	No	
IrDa	No	
Bluetooth	Yes	Ver. 2.1+EDR (GAP, A2DP, AVRCP, DUN, FTP, GAVDP, GOEP, HFP, HSP, OPP, SDAP, SPP)
FM radio	Yes	
GPRS	Yes	Class 10
EDGE	Yes	Class 10
Hold / Retrieve	Yes	
Conference Call	Yes	Max. 6
DTMF	Yes	
Memo pad	No	
TTY	No	
AMR	Yes	
SyncML	Yes	
IM	Yes	Gtalk
Email	Yes	

2.6 HW SPEC.

2.6.1 GSM transceiver specification

Item	Specification
Phase Error	Rms : 5° Peak : 20 °
Frequency Error	GSM : 0.1 ppm DCS/PCS : 0.1 ppm
EMC(Radiated Spurious Emission Disturbance)	GSM/DCS : < -28dBm
Transmitter Output power and Burst Timing	GSM : 5dBm – 33dBm ± 3dB DCS/PCS : 0dBm – 30dBm ± 3dB
Burst Timing	<3.69us
Spectrum due to modulation out to less than 1800kHz offset	200kHz : -36dBm 600kHz : -51dBm/-56dBm
Spectrum due to modulation out to larger than 1800kHz offset to the edge of the transmit band	GSM : 1800-3000kHz :< -63dBc(-46dBm) 3000kHz-6000kHz : <-65dBc(-46dBm) 6000kHz < : < -71dBc(-46dBm) DCS : 1800-3000kHz :< -65dBc(-51dBm) 6000kHz < : < -73dBc(-51dBm)
Spectrum due to switching transient	400kHz : -19dBm/-22dBm(5/0), -23dBm 600kHz : -21dBm/-24dBm(5/0), -26dBm
Reference Sensitivity – TCH/FS	Class II(RBER) : -105dBm(2.439%)
Usable receiver input level range	0.012(-15 - -40dBm)
Intermodulation rejection – Speech channels	± 800kHz, ± 1600kHz : -98dBm/-96dBm (2.439%)

AM Suppression
  – GSM : -31dBm
  - DCS : -29dBm
	-98dBm/-96dBm (2.439%)

Timing Advance	± 0.5T

2.6.2 WCDMA transmitter specification

Item	Specification
Transmit Frequency	BD1: 1920MHz ~ 1980 MHz BD2: 1850~1910 MHz BD8: 880 MHz ~ 915 MHz
Maximum Output Power	+24 dBm / 3.84 MHz, +1 / -3 dB
Frequency Error	within ±0.1 PPM
Open Loop Power Control	Normal Conditions : within ±9 dB, Extreme Conditions : within ±12 dB
Minimum Transmit Power	< -50 dBm /3.84 MHz
Occupied Bandwidth	< 5 MHz at 3.84 Mcps (99% of power)
Adjacent Channel Leakage Power Ratio (ACLR)	> 33 dB @ ±5 MHz, > 43 dB @ ±10 MHz
Spurious Emissions |f-fc| > 12.5 MHz	< -36 dBm / 1 kHz RW @ 9 kHz ≤ f < 150 kHz < -36 dBm / 10 kHz RW @ 150 KHz ≤ f < 30 MHz < -36 dBm / 100 kHz RW @ 30 MHz ≤ f < 1 GHz < -30 dBm / 1 MHz RW @ 1 GHz ≤ f < 12.75 GHz < -60 dBm / 3.84 MHz RW @ 869 MHz ≤ f ≤ 894 MHz < -60 dBm / 3.84 MHz RW @ 1930 MHz ≤ f ≤ 1900 MHz < -60 dBm / 3.84 MHz RW @ 2110 MHz ≤ f ≤ 2155 MHz < -67 dBm / 100 kHz RW @ 925 MHz ≤ f ≤ 935 MHz < -79 dBm / 100 kHz RW @ 935 MHz < f ≤ 960 GHz < -71 dBm / 100 kHz RW @ 1805 MHz ≤ f ≤ 1880 MHz < -41 dBm / 300 kHz RW @ 1884.5 MHz < f < 1919.6 MHz
Transmit Intermodulation	< -31 dBc @ 5 MHz & < -41 dBc @ 10 MHz when Interference CW Signal Level = -40 dBc
Error Vector Magnitude	< 17.5 %, when Pout ≥ -20 dBm
Peak Code Domain Error	< -15 dB at Pout ≥ -20 dBm

2.6.3 WCDMA receiver specification

Item	Specification
Receive Frequency	BD1: 2110 MHz ~2170 MHz BD2: 1850~1910 MHz BD8: 925 MHz ~ 960 MHz
Reference Sensitivity Level	Band1 : BER < 0.001 when Îor = -106.7 dBm / 3.84 MHz Band2 : BER < 0.001 when Îor = -106.7 dBm / 3.84 MHz Band8 : BER < 0.001 when Îor = -106.7 dBm / 3.84 MHz
Maximum Input Level	BER < 0.001 when Îor = -25 dBm / 3.84 MHz
Adjacent Channel Selectivity (ACS)	ACS > 33 dB where BER < 0.001 when Îor = -92.7 dBm / 3.84 MHz & Ioac = −52 dBm / 3.84 MHz @ ±5 MHz
Blocking Characteristic	BER < 0.001 when Îor = -103.7 dBm / 3.84 MHz & Iblocking = -56 dBm / 3.84 MHz @ Fuw(offset) = ±10 MHz or Iblocking = -44 dBm / 3.84 MHz @ Fuw(offset) = ±15 MHz
Spurious Response	BER < 0.001 when Îor = -103.7 dBm / 3.84 MHz & Iblocking = -44 dBm
Intermodulation	BER < 0.001 when Îor= -103.7 dBm / 3.84 MHz & Iouw1 = -46 dBm @ Fuw1(offset) = ±10 MHz & Iouw2 = -46 dBm / 3.84 MHz @ Fuw2(offset) = ±20 MHz
Spurious Emissions	< -57 dBm / 100 kHz BW @ 9 kHz ≤ f < 1 GHz < -47 dBm / 1 MHz BW @ 1 GHz ≤ f ≤ 12.75 GHz
Inner Loop Power Control In Uplink	Adjust output(TPC command) cmd 1dB 2dB 3dB +1 +0.5/1.5 +1/3 +1.5/4 0 -0.5/+0.5 -0.5/+0.5 -0.5/+0.5 -1 -0.5/-1.5 -1/-3 -1.5/-4 group(10equal command group) +1 +8/+12 +16/+24

2.6.4 HSDPA transmitter specification

Item	Specification
Transmit Frequency	BD1: 1920MHz ~ 1980 MHz BD2: 1850~1910 MHz BD8: 880 MHz ~ 915 MHz
Maximum Output Power	Sub-Test 1=1/15, 2=12/15 21~25dBm / 3.84 MHz 3=13/15 4=15/8 20~25dBm / 3.84 MHz 5=15/7 6=15/0 19~25dBm / 3.84 MHz

HS-DPCCH	Sub-test in table C.10.1.4	Power step	Power step slot boundary	Power step size, P [dB]	Transmitter power step tolerance [dB]
	5	1	Start of Ack/Nack	6	+/- 2.3
		2	Start of CQI	1	+/- 0.6
		3	Middle of CQI	0	+/- 0.6
		4	End of CQI	5	+/- 2.3

Spectrum Emission Mask

Sub-Test : 1=1/15,   2=12/15, 3=13/15, 4=15/8, 5=15/7,   6=15/0

Frequency offset from carrier $\triangle$f	Minimum requirement	Measurement Bandwidth
2.5 ~ 3.5 MHz	-35-15×($\triangle$f-2.5)dBc	30 kHz
3.5 ~ 7.5 MHz	-35-1×($\triangle$f-3.5)dBc	1 MHz
7.5 ~ 8.5 MHz	-35-10×($\triangle$f-7.5)dBc	1 MHz
8.5 ~ 12.5 MHz	-49dBc	1 MHz

Adjacent Channel Leakage Power Ratio (ACLR)	Sub-Test : 1=1/15, 2=12/15, 3=13/15, 4=15/8, 5=15/7, 6=15/0 > 33 dB @ ±5 MHz > 43 dB @ ±10 MHz
Error Vector Magnitude	< 17.5 %, when Pout ≥ -20 dBm

2.6.5 HSDPA receiver specification

Item	Specification
Receive Frequency	BD1: 2110 MHz ~2170 MHz BD2: 1850~1910 MHz BD8: 925 MHz ~ 960 MHz
Maximum Input Level (BLER or R), 16QAM Only	Sub-Test : 1=1/15, 2=12/15, 3=13/15, 4=15/8, 5=15/7, 6=15/0 BLER < 10% or R >= 700kbps

2.6.6 HSUPA Tx, Rx specification

Item	Specification		
Maximum Output Power	Sub-Test 1=11/15 21~24dBm / 3.84 MHz 2=6/15 19~22dBm / 3.84 MHz 3=15/9 20~23dBm / 3.84 MHz 4=2/15 20~25dBm / 3.84 MHz 5=15/15 19~25dBm / 3.84 MHz		
Spectrum Emission Mask	Sub-Test : 1=11/15, 2=6/15, 3=15/9, 4=2/15, 5=15/15		
	Frequency offset from carrier $\triangle f$	Minimum requirement	Measurement Bandwidth
	2.5 ~ 3.5 MHz	$-35-15\times(\triangle f-2.5)$dBc	30 kHz
	3.5 ~ 7.5 MHz	$-35-1\times(\triangle f-3.5)$dBc	1 MHz
	7.5 ~ 8.5 MHz	$-35-10\times(\triangle f-7.5)$dBc	1 MHz
	8.5 ~ 12.5 MHz	-49dBc	1 MHz
Adjacent Channel Leakage Power Ratio (ACLR)	Sub-Test : 1=11/15, 2=6/15, 3=15/9, 4=2/15, 5=15/15 > 33 dB @ ±5 MHz > 43 dB @ ±10 MHz		

2.6.7 WLAN 802.11b transceiver specification

Item	Specification
Transmit Frequency	2400 MHz ~ 2483.5 MHz (CH1~CH13)
Tx Power Level	≤ 20dBm under (Europe), ≤ 30dBm under (USA)
Frequency Tolerance	within ±25 PPM
Chip clock Frequency Tolerance	within ±25 PPM
Spectrum Mask	≤ -30 @ fc-22MHz< f <fc-11MHz and fc+11MHz< f <fc+22MHz ≤ -50 @ f < fc-22MHz and f > fc+22MHz
Power ramp on/off time	≤ 2us
Carrier Suppression	≤ -15dB
Modulation Accuracy (Peak EVM)	≤ 35%
Spurious Emissions	< -36 dBm @ 30MHz ~ 1GHz < -30 dBm above @ 1GHz ~ 12.75GHz < -47 dBm @ 1.8GHz ~ 1.9GHz < -47 dBm @ 5.15GHz ~ 5.3GHz
Rx Min input Sensitivity	≤ -76dBm(1Mbps,2Mbps,5.5Mbps,11Mbps) @ FER ≤ 8%
Rx Max input Sensitivity	≥ -10dBm(1Mbps,2Mbps,5.5Mbps,11Mbps) @ FER ≤ 8%
Rx Adjacent Channel Rejection	≥ 35dB @FER ≤ 8%, interference input signal -70dBm@fc±25MHz(11Mbps)

2.6.8 WLAN 802.11g transceiver specification

Item	Specification
Transmit Frequency	2400 MHz ~ 2483.5 MHz (CH1~CH13)
Tx Power Level	≤ 20dBm under (Europe), ≤ 30dBm under (USA)
Frequency Tolerance	within ±25 PPM
Chip clock Frequency Tolerance	within ±25 PPM
Spectrum Mask	≤ -20 @ ±11MHz offset (9Mhz ~ 11MHz) ≤ -28 @ ±20MHz offset (11MHz ~ 20Mhz) ≤ -40 @ ±30MHz offset (20MHz ~ 30Mhz)
Transmitter constellation error (rms EVM)	≤ -5dB@6Mbps, ≤ -8dB@9Mbps, ≤ -10dB@12Mbps, ≤ -13dB@18Mbps, ≤ -16dB@24Mbps, ≤ -19dB@36Mbps, ≤ -22dB@48Mbps, ≤ -25dB@54Mbps
Spurious Emissions	< -36 dBm @ 30MHz ~ 1GHz < -30 dBm above @ 1GHz ~ 12.75GHz < -47 dBm @ 1.8GHz ~ 1.9GHz < -47 dBm @ 5.15GHz ~ 5.3GHz
Rx Min input Sensitivity	PER ≤ 10% -82dBm@6Mbps, -81dBm@9Mbps, -79dBm@12Mbps -77dBm@18Mbps, -74dBm@24Mbps, -70dBm@36Mbps -66dBm@48Mbps, -65dBm@54Mbps
Rx Max input Sensitivity	≥ -20dBm(6,9,12,18,24,36,48,54Mbps) @ PER ≤ 10%
Rx Adjacent Channel Rejection	PER ≤ 10%, ACR ≥ 16dB@6Mbps, ACR ≥ 15dB@9Mbps, ACR ≥ 13dB@12Mbps, ACR ≥ 11dB@18Mbps, ACR ≥ 8dB@24Mbps, ACR ≥ 4dB@36Mbps ACR ≥ 0dB@48Mbps, ACR ≥ -1dB@54Mbps ※ACR shall be measured by setting the desired signal's strength 3 dB above the rate-dependent sensitivity specified in min input sensitivity

2.6.9 WLAN 802.11n transceiver specification

Item	Specification
Transmit Frequency	2400 MHz ~ 2483.5 MHz (CH1~CH13)
Tx Power Level	≤ 20dBm under (Europe), ≤ 30dBm under (USA)
Frequency Tolerance	within ±25 PPM
Chip clock Frequency Tolerance	within ±25 PPM
Spectrum Mask	≤ -20 @ ±11MHz offset (9Mhz ~ 11MHz) ≤ -28 @ ±20MHz offset (11MHz ~ 20Mhz) ≤ -45 @ ±30MHz offset (20MHz ~ 30Mhz)
Transmitter constellation error (rms EVM)	≤ -5dB@6.5Mbps, ≤ -10dB@13Mbps, ≤ -13dB@19.5Mbps, ≤ -16dB@26Mbps, ≤ -19dB@39Mbps, ≤ -22dB@52Mbps, ≤ -25dB@58.5Mbps, ≤ -28dB@65Mbps
Spurious Emissions	< -36 dBm @ 30MHz ~ 1GHz < -30 dBm above @ 1GHz ~ 12.75GHz < -47 dBm @ 1.8GHz ~ 1.9GHz < -47 dBm @ 5.15GHz ~ 5.3GHz
Rx Min input Sensitivity	PER ≤ 10% -82dBm@6.5Mbps, -79dBm@13Mbps, -77dBm@19.5Mbps -74dBm@26Mbps, -70dBm@39Mbps, -66dBm@52Mbps -65dBm@58.5Mbps, -64dBm@65Mbps
Rx Max input Sensitivity	≥ -20dBm(6.5,13,19.5,26,39,52,58.5,65Mbps) @ PER ≤ 10%
Rx Adjacent Channel Rejection	PER ≤ 10%, ACR ≥ 16dB@6.5Mbps, ACR ≥ 13dB@13Mbps, ACR ≥ 11dB@19.5Mbps, ACR ≥ 8dB@26Mbps, ACR ≥ 4dB@39Mbps, ACR ≥ 0dB@52Mbps ACR ≥ -1dB@58.5Mbps, ACR ≥ -2dB@65Mbps ※ACR shall be measured by setting the desired signal's strength 3 dB above the rate-dependent sensitivity specified in min input sensitivity

2.6.10 GPS receiver specification

Item	Specification
Receive Frequency	1574.42 MHz ~ 1576.42 MHz
Minimum Sensitivity	1 satellite ≥-142dBm, 7 satellites ≥ -147dBm at coarse time aiding

2.6.11 Current consumption

	Stand by		Voice Call	VT
	Bluetooth Off	Bluetooth Connected		
WCDMA Only	4.0 mA under (DRX=1.28)	7 mA under (DRX=1.28)	350 mA under (Tx=12dBm)	NA
GSM Only	4.0 mA under (Paging=5 period)	7 mA under (Paging=5 period)	350 mA under (Tx=Max)	

2.6.12 Battery life time

	Stand by	Voice Call	VT
WCDMA	350 hours over (DRX = 1.28)	250 min over (TX = 12dBm, Low Pwr mode)	NA
GSM	350 hours over (Paging Period = 9)	250 min over (TX Level = Max)	

2.6.13 Charging hour

3.5hour under (1500mAh battery, 1A TA)

Data No.	2050	4410	2360
Relative Time	01:08:20.000	02:27:00.000	01:18:40.000
Channel	Value A	Value B	Value B-A
CH01 [V] Max	4.118	4.200	0.082
CH01 [V] Min	4.117	4.199	0.082
CH02 [mA] Max	94.90	24.81	-70.09
CH02 [mA] Min	94.89	24.77	-70.12
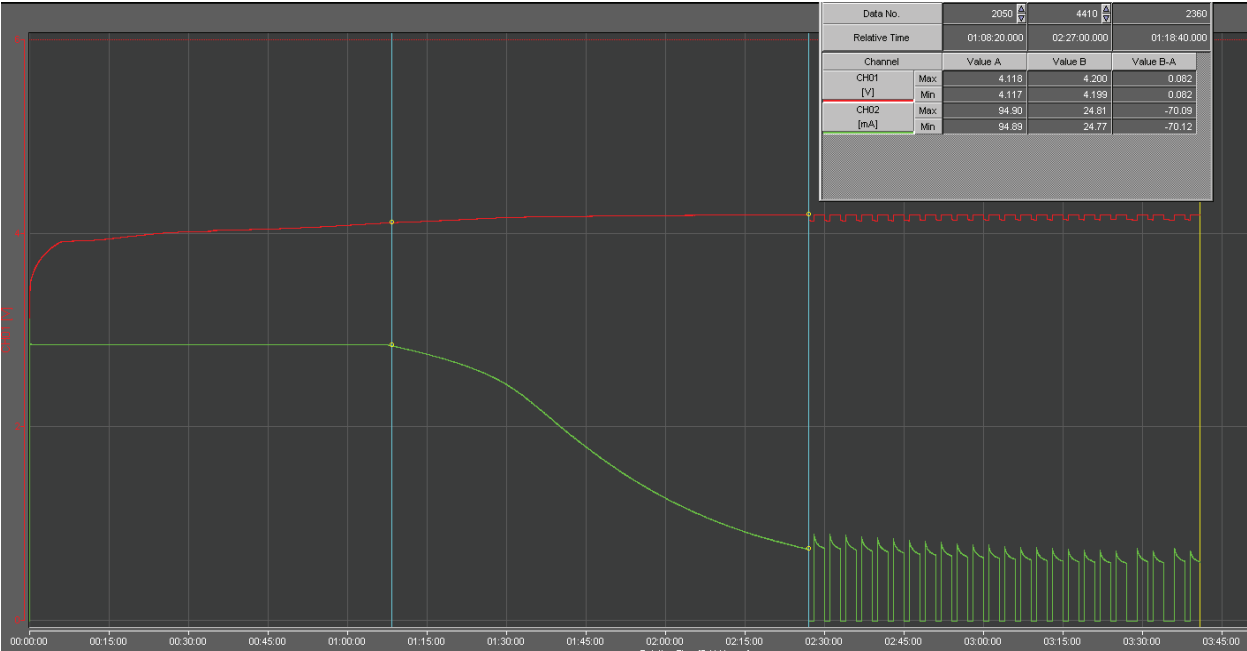
2.6.14 RSSI indicator (Based on Cell power)

BAR	WCDMA	GSM/DCS/PCS
4	Over -90±2dBm	Over -90 ±2dBm
4◊3	-90 ±2dBm	-90 ±2dBm
3◊2	-96 ±2dBm	-97 ±2dBm
2◊1	-102 ±2dBm	-103 ±2dBm
1◊0	-110 ±2dBm	-107 ±2dBm

2.6.15 Battery indicator

Battery Bar	Specification	
BAR 6 (Full)	90% over	
BAR 6 --> 5	90% ◊ 89%	
BAR 5 --> 4	70% ◊ 69%	
BAR 4 --> 3	50% ◊ 49%	
BAR 3 --> 2	30% ◊ 29%	remain%
BAR 2 --> 1	15% ◊ 14%	
BAR 1 --> 0	5% ◊ 4%	
Low Battery Pop-up	4% ~ 15% : One Time popup (No call)	
Critical Low Battery Pop-up	0% ~ 3% : Every Level change popup (No call)	
POWER OFF	0%	

2.7 P990 Figures

3. TECHNICAL BRIEF

3.1 GENERAL DESCRIPTION

The LG-P990 supports UMTS-900, UMTS-1900, UMTS-2100, GSM-850, GSM-850, GSM-900, GSM-1800, and GSM-1900 based GSM/GPRS/EDGE/UMTS. All receivers and the UMTS transmitter use the radioOne1Zero-IF architecture to eliminate intermediate frequencies, directly converting signals between RF and baseband. The quad-band GSM transmitters use a baseband-to-IF upconversion followed by an offset phase-locked loop that translates the GMSK-modulated or 8-PSK-modulated signal to RF.
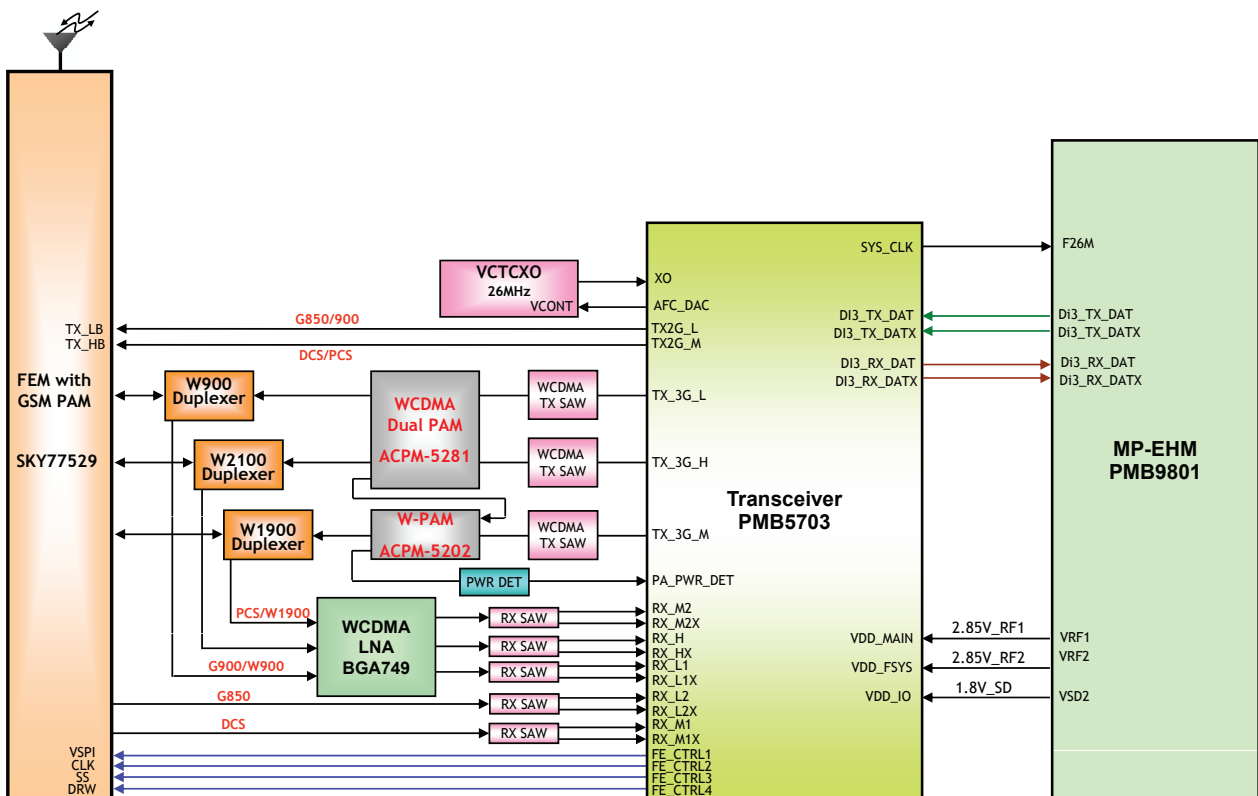
[Figure 1-1] Block diagram of RF part

General

SMARTi™ UE is a highly integrated UMTS/GSM-transceiver, with all necessary features to enable multi mode,multi band telephone applications. It incorporates a fully integrated dual mode receiver, multi band TX outputs,TCVCXO control, a measurement interface, DigRF V3.09 compliant high speed data and control interface, a multi   mode timer unit and all necessary front end signals for the complete RF Engine control. Overall the IC directly supports RF engines with up to 4 GSM bands and typ. 3 UMTS (can be less or more depending on engine setup) bands without additional discrete RF path switches.

Receiver Section

For the RX section the IC features 5 RX inputs, 4 of those might be used for multi mode receive, this means they can be used for GSM and UMTS (the IC can be reconfigured to achieve in spec performance) operation. The band I input is for UMTS operation only. The multi mode inputs may alternatively be configured to be first LNA (for GSM) or LNA2 (UMTS) when an additional external LNA and interstage filter is used. The receiver structure is optimized for compressed mode operation, thus only a single base band chain is used, saving area and optimizes power consumption.The receiver AGC can be aligned to the UMTS frame structure with the TAS macro **SYNC3G**.

Transmitter Section

The TX features 6 RF outputs, which are directly matched to 50 Ω impedance for easy connection to external power amplifiers, which reduces significantly external component count. 2 outputs are high power, small signal polar modulated outputs for the GSM system, with low sensitivity to PA harmonics. They are capable to perform GMSK or 8-PSK modulation signals with excellent noise performance, thus no interstage filter in between transceiver and PA is required. The low band output covers the 850 and the 900 MHz GSM bands, the mid band output covers the 1800 and 1900 MHz bands.

The UMTS outputs are vector modulated single ended high output power driver amplifiers, with excellent EVM and adjacent channel leakage performance. Together with external UMTS power amplifier modules all bands except band VII can be addressed. There is one driver for all low bands (850 and 900 MHz bands), two drivers for the mid bands (1700 - 1900 MHz bands) and one driver for the high band (2100 MHz band). Thus many band combinations can be supported by the transceiver.

The IC features additionally closed loop power control for GSM and for UMTS, thus supporting TRP requirements in cooperation with the power amplifier and the antenna design. There is one input pin for the power detector voltage coming from the PA, the complete loop circuits are implemented in the digital domain, which enables a high reliability of the loop performance for both standards.

Interfaces

The base band is connected via a DigRF V3.09 high speed data interface with a maximum clock frequency of 312 MHz. The pure digital interface enables the digital baseband to shrink efficiently, as all the analog functionality is within the RFIC. All data and control traffic is multiplexed via the RX and TX interface lines. The IC features a high level programming model enabling the complete compressed mode operation of the device in an RF engine environment.It handles RX and TX power control, also incorporating the calibration data. The complete timing is optimized for compressed mode operation of the transceiver, it controls the front end components of the engine (PA´s, switches, LNA´s). Additionally a SPI control bus for front end component control is available in the IC, which also enables the readback of data from external components, thus the handling of functions like PA saturation, mismatch detection, overheating (incorporated in the closed loop power control) can be adopted.

AFC Control

The AFC control is maintained by providing a voltage generated by a 12-Bit DAC to the external TCVCXO module, which means the reference clock is synchronized to the system frequency.

3.2 GSM MODE

3.2.1 GSM RECEIVER

The GSM-850/GSM-1800, receiver inputs of PMB5703 are connected directly to the transceiver front-end Module. The GSM-900/GSM-1900 receiver inputs are using the Rx path with WCDMA1900 and WCDMA900 bands. The GSM-850, GSM-900, GSM-1800, and GSM-1900 receiver inputs use differential configurations to improve common-mode rejection and second-order non-linearity performance.

Figure 3-1 shows the line-up for the 2G receiver chain for bands serving only GSM. The RX digital front-end (DFE) contains all digital signal processing. Blue arrows show gain switching inputs of the signal processing stages. The signal path splits at the mixer input into an in-phase and an identical quadrature path. For simplicity the 2nd path is not shown in the figure. The quadrature downconverter translates the useful signal directly to baseband (zero-IF).
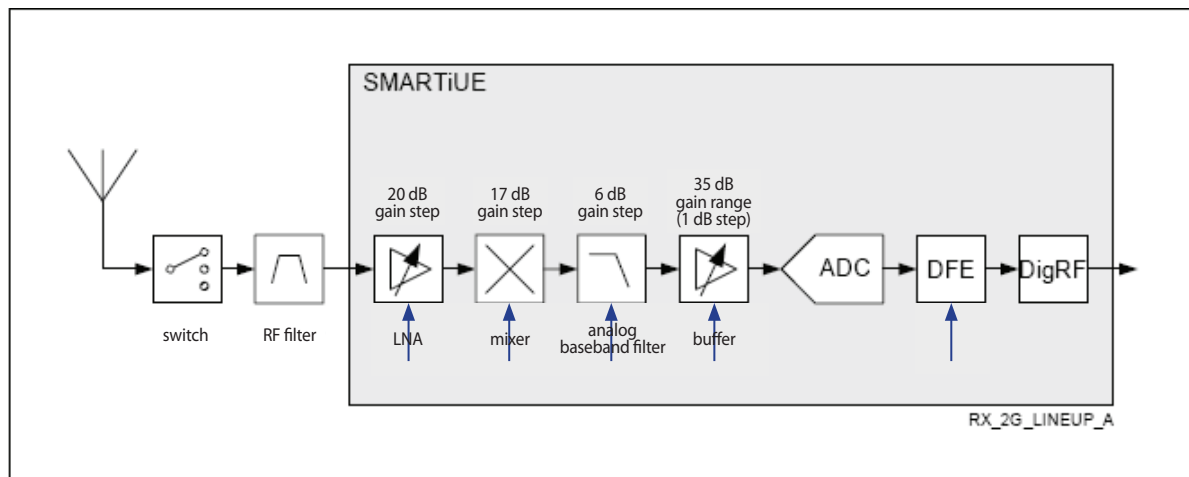
[Figure 2-1] 2G Receiver Line Up-GSM Single Mode Setup

Figure3-2 shows the 2G receiver line-up in a multimode band. Note the gain step given for the external LNA may vary from the given value. The chain is basically identical to the 3G line-up but many stages in analog and digital domain are switched into a different operation mode.
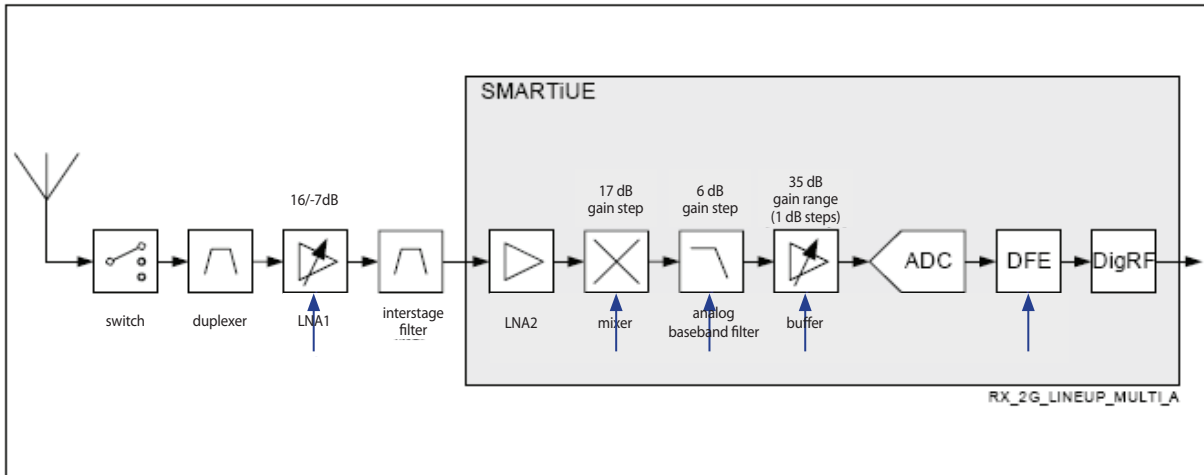
[Figure 2-2] 2G Receiver Line Up-GSM Multi Mode Setup

Since GSM-850, GSM-900, GSM-1800, and GSM-1900 signals are time-division duplex (the handset can only receive or transmit at one time), switches are used to separate Rx and Tx signals in place of frequency duplexers – this is accomplished in the switch module. The GSM-850, GSM-900, GSM-1800, and GSM-1900 receive signals are routed to the PMB5703 through band selection filters and matching networks that transform single-ended 50-Ω sources to differential impedances optimized for gain and noise figure. The PMB5703 input uses a differential configuration to improve second-order intermodulation and common mode rejection performance.

The downconverted baseband outputs are multiplexed and routed to lowpass filters (one I and one Q) having passband and stopband characteristics suitable for GMSK or 8-PSK processing. These filter circuits include DC offset corrections.

Group	Yes	There is no limitation on the number of items. It depends on available memory amount.
Fixed Dial Number	Yes	
Service Dial Number	No	
Own Number	Yes	Read only (add/edit/delete are not supported)
Voice Memo	Yes	Support voice recorder
Call Reminder	Yes	Missed call popup
Network Selection	Automatic	
Mute	Yes	
Call Divert	Yes	
Call Barring	Yes	
Call Charge (AoC)	Yes	
Call Duration	Yes	
SMS (EMS)	There is no limitation on the number of items. It depends on available memory amount.	EMS does not support.
SMS Over GPRS	No	
EMS Melody / Picture	No	
Send / Receive / Save	No	
MMS MPEG4	Yes	
Send / Receive / Save	Yes	
Long Message	MAX 459 characters	SMS 3pages
Cell Broadcast	Yes	
Download	Over the Web	
Game	Yes	
Calendar	Yes	
Memo	Yes	There is no limitation on the number of items. It depends on available memory amount.
World Clock	Yes	
Unit Convert	No	

3.3 UMTS MODE

3.3.1 UMTS RECEIVER

Figure 3-4 shows the line-up for the 3G receiver chain. Note that the high gain / low gain figures for external LNA1 are given as an example. The blue arrows indicate the gain control inputs for the AGC subsystem. The quadrature path is a simple copy of the chain from mixer to DigRF and is not shown in the diagram.
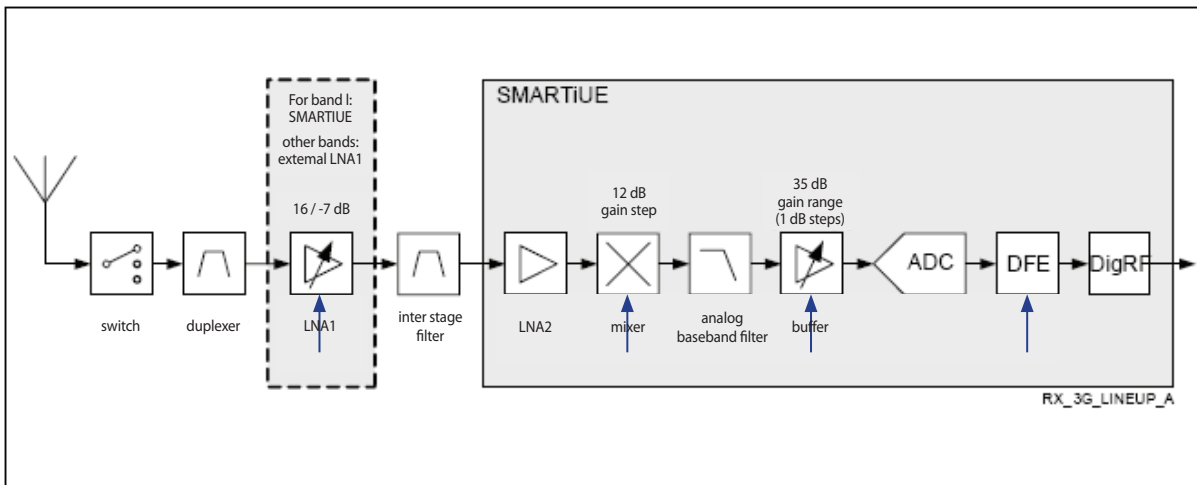
[Figure 3-1] 3G Receiver Line Up

After quadrature downconversion to baseband(Zero-IF) the signal is fed to the analog baseband filter. The range and gain step of the following buffer amplifier is actually determined by the needs of the AGC in 3G mode.

3.3.2 UMTS TRANSMITTER

Figure 3-4 shows a functional overview of the 3G transmitter chain implemented for RF signal processing. The IQ-chips, which are transferred via the digital interface, are stored in a FIFO. Then it depends on the setting of three signals how samples are consumed from the FIFO Buffer.

Then the samples are fed into a CORDIC, which is used to shift the phase of the complex signal. The root-raisedcosine (RRC) filter performs the pulse shaping according to 3GPP. As the system clock is no integer multiple of the UMTS chip rate a fractional sample rate conversion (FSRC) is necessary. In the amplitude correction / offset correction (AC/OC) block the amplitude and the offset of the IQ-signal are modified. The final sample rate at the output of the digital front end is achieved in the interpolation / noise shaping block, where also the word length is reduced in order to fit to the D/A-converter resolution. After the DAC a post-filter reduces the level of the repetition spectrum and the analog noise in order to supply a clean signal to the IQ-modulator. The frequency conversion to the wanted TX-channel is done in a direct-up conversion IQ-modulator which is followed by a gain stage with a single ended high power output.
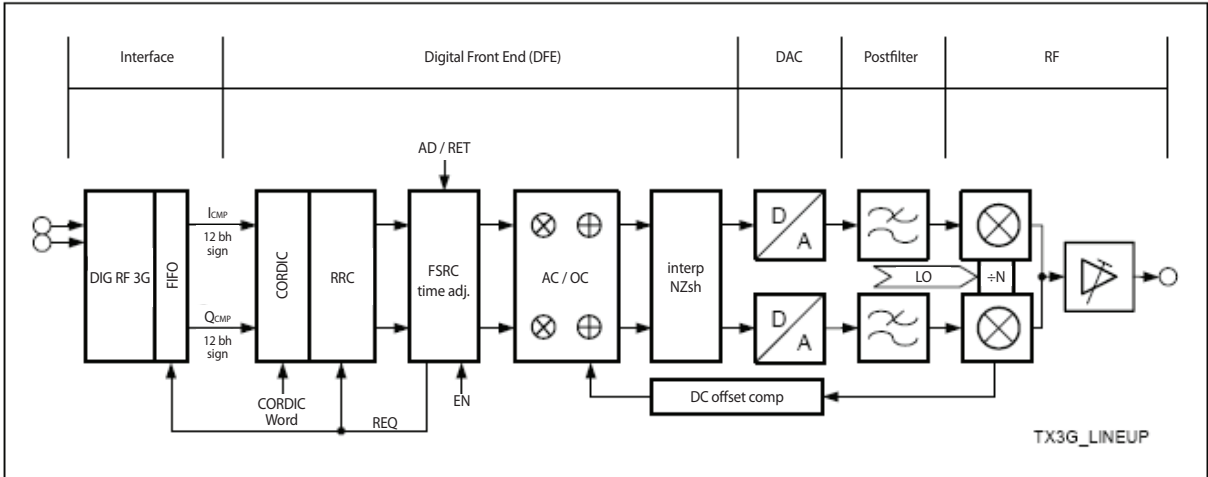
[Figure 3-2] 3G Transmitter Line Up

3.4 GPS RECEIVER

The GPS receiver input employs a single-ended connection realized by this pin. The GPS input is routed from the GPS antenna switch, through a band pass filter and then an impedance transformer circuit that optimally matches the impedance looking into the GPS LNA. The impedance transformer circuit topology is shown in Figure 1-6.
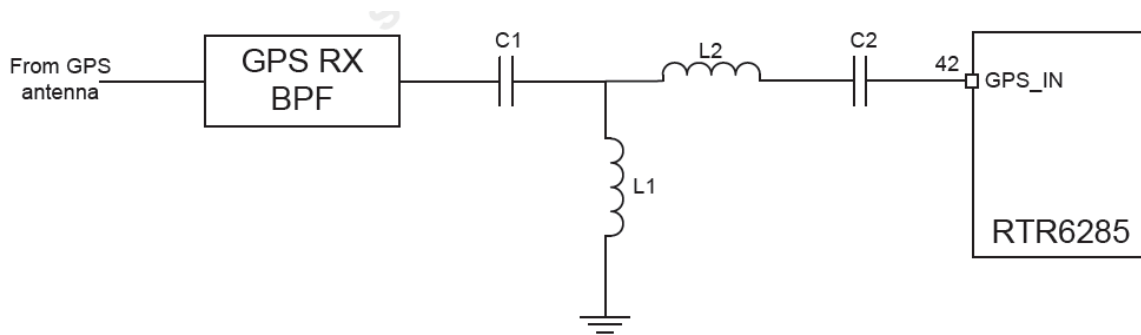
[Figure 1.6] GPS Input Network Topology

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3.5 LO GENERATION and DISTRIBUTION CIRCUIT

The PMB 5703 contains two synthesizer blocks (see Figure3-6). Depending on UMTS or GMSK/8-PSK mode different VCOs, LF and CPs settings are used. In GMSK/8-PSK mode only the TRX PLL loop with the 2G TRX VCO is working, which is available in the TX synthesizer block (left). In UMTS TX/RX mode, two separate synthesizer blocks are available. The TX synthesizer is in the UMTS TX block (left), where the loop is working with the 3G TX VCO. The RX synthesizer is in UMTS RX block working with the 3G RX VCO.
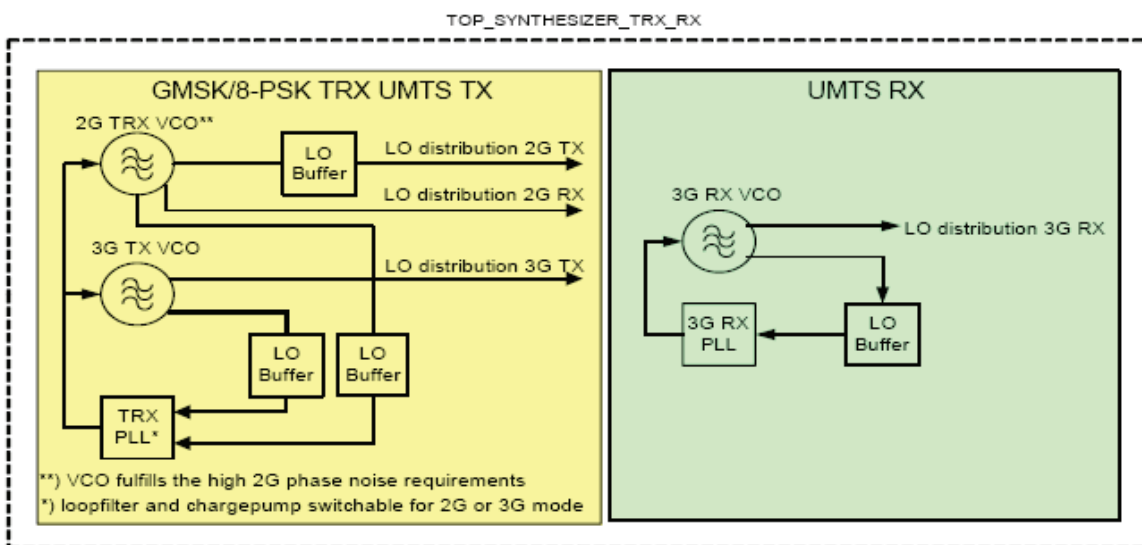
[Figure 3-6] RF Synthesizer (GMSK/8-PSK and UMTS)

In the PMB 5703 the receiver and the transmitter contain each a complete fractional-N sigma-delta synthesizer with fast locking. For GMSK/8-PSK RX operation mode a fractional-N sigma-delta synthesizer for the frequency synthesis is used. For GMSK/8-PSK TX operation mode the fractional-N sigma-delta synthesizer is used as a Sigma-Delta modulation loop to process the phase/frequency signal. A 26 MHz reference signal (provided by an internal clock generation block) serves as comparison frequency of the phase detector. In GMSK/8-PSK mode the divider in the feedback path of the synthesizer is carried out as a multi-modulus divider (MMD). The GMSK/8-PSK loop filter is fully integrated and the loop bandwidth is about 100 kHz to allow the transfer of the phase modulation during GMSK/8-PSK operation. The open loop gain is automatically adjusted prior to each GMSK/8-PSK slot . To overcome the statistical spread of the loopfilter element values an automatic loopfilter adjustment is performed before each GMSK/8-PSK synthesizer startup.

The fully integrated GMSK/8-PSK quad-band VCO is designed for the four GMSK/8-PSK bands (850, 900, 1800,1900 MHz) and operates at double (for GSM1800 and GSM1900 band) or four times (for GSM850 and GSM900 band) of the transmit or receive frequency. To cover the wide frequency range the VCO is automatically aligned by a binary automatic band selection before the settling process of the synthesizer starts. In UMTS TX and RX mode a fractional-N sigma-delta synthesizer for the frequency synthesis is used. The implemented divider in the feedback path of the synthesizer is carried out as a multi-modulus divider (MMD). Also the 26 MHz reference signal serves as comparison frequency of the phase detector. The UMTS loop filter is fully integrated and the loop bandwidth is about 180 kHz. The open loop gain is automatically adjusted prior each UMTS channel programming.

The two fully integrated UMTS VCOs are designed for the UMTS bands (I, II, III, IV, V, VI, VIII, IX and X) and operates at double (for bands I, II, III, IV, IX and X) or four times (for bands V, VI and VIII) of the transmit or receive frequency. To cover the wide frequency range the VCOs are automatically aligned by a binary automatic band selection before the settling process of the synthesizer starts.

3.6 OFF-CHIP RF COMPONENTS

3.6.1 UMTS PAM

3.6.1.1 W2100,W900 (U105, ACPM-5281), W1900(U103, ACPM-5202)

The ACPM-5281 is a dual-band PAM (Power Amplifier Module) designed for UMTS Band1 and Band8. The ACPM-5281 meets stringent UMTS linearity requirements. The 4mmx5mm form factor 14-pin surface mount package is self contained, incorporating 50ohm input and output matching networks.

The ACPM-5202 is a fully matched 10-pin surface mount module developed for UMTS Band2. This power amplifier module operates in the 1850-1910MHz bandwidth. The ACPM-5202 meets stringent UMTS linearity requirements up to 28dBm output power (Rel99). The 3mmx3mm form factor package is self contained, incorporating 50ohm input and output matching networks

The ACPM-5281 and ACPM-5202 feature 5th generation of CoolPAM circuit technology which supports 3 modes – bypass, mid and high power modes. The CoolPAM is stage bypass technology which enables power amplifier to lower power consumption. Active bypass feature is added to 5th generation to enhance power added efficiency at low output range and this technology extends talk time of mobiles more by further saving power amplifier's current consumption. The power amplifier is manufactured on an advanced InGaP HBT (hetero-junction Bipolar Transistor) MMIC (microwave monolithic integrated circuit) technology offering state-of-the-art reliability, temperature stability and ruggedness.
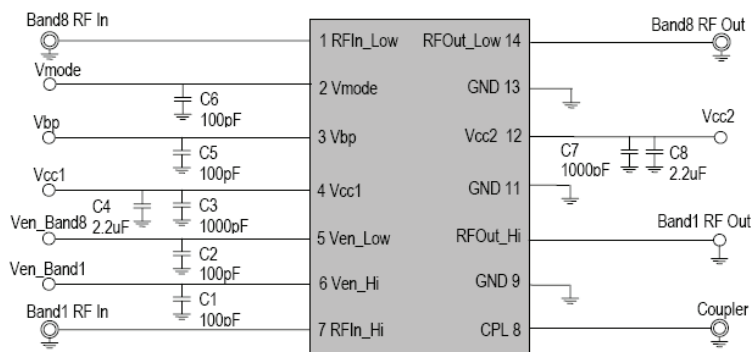
[Figure 6-1] ACPM5281 (W2100,W900)
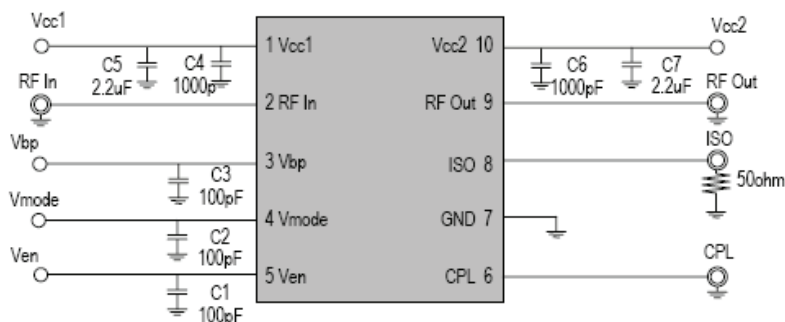
3.6.2   26MHz VCTCXO (X101, DSA221SCL)

The Voltage Controlled Temperature Compensated Crystal Oscillator (VCTCXO) provides the reference frequency for all RFIC synthesizers as well as clock generation functions within the PMB5703 IC. The oscillator frequency is controlled by the PMB5703 ICs.

TRK_LO_ADJ pulse density modulated signal in the same manner as the transmit gain control TX_AGC_ADJ. A two-pole RC lowpass filter is recommended on this control line.

The PM7540 IC controls the handset power-up sequence, including a special VCTCXO warm-up interval before other circuits are turned on. This warm-up interval (as well as other TCXO controller functions) is enabled by the MSM TCXO_EN line . The PM7540 IC VREG_TCXO regulated output voltage is used to power the VCTCXO and is enabled before most other regulated outputs. Any GSM mode power control circuits within the MSM7227 IC require a reference voltage for proper operation and sufficient accuracy. Connecting the PM7540 IC REF_OUT directly to the MSM7227 IC GSM_PA_PWR_CTL_REF provides this reference. This sensitive analog signal needs a 0.1 µF low frequency filter near to MSM side, and isolate from digital logic and clock traces with ground on both sides, plus ground above and below if routed on internal layers.

ELECTRICAL CHARACTERISTICS
(Ta=25+/-2deg.C, Vcc=2.8V+/-5%)

ITEMS	MIN.	TYP.	MAX.	UNIT	CONDITIONS	REMARKS
Nominal Frequency	---	19.200000	---	MHz	Vcc=2.8V+/-5%, Vcon=0.4 to 2.4V ⟨2⟩	
Output Voltage(Peak to Peak)	0.8	---	---	V	Load:40pF/5kohm	Ta=-30 to +85deg.C, DC Bias
Power Supply Current ⟨1⟩	---	---	1.6	mA		
Frequency Tolerance	-1.5	---	+1.5	ppm	Preset Frequency and after 2times reflow soldering	Ta=25+/-2deg.C, Vcon=1.4V
Frequency Stability	-2.0	---	+2.0	ppm	Ta=-30 to +85deg.C	ref.:Ta=25deg.C,
	-0.2	---	+0.2	ppm	Load:40pF+/-10%, 5kohm+/-10%	
	-0.2	---	+0.2	ppm	Voltage 2.8V+/-5%	
Frequency Stability Slope	-0.15	---	+0.15	ppm/deg.C	Ta=-10 to +60deg.C	
	-0.3	---	+0.3	ppm/deg.C	Ta=-30 to -10deg.C, +60 to +85deg.C	
Frequency Aging Rate	-0.7	---	+0.7	ppm/Y	Ta=25+/-2deg.C	One Year
Voltage Control Range	-12.0	---	-7.8	ppm	Vcon=0.4V	ref.:Vcon=1.4V
	7.8	---	12.0	ppm	Vcon=2.4V	
Start up Time	---	---	3.0	msec	90%*Vp-p	Ta=-30 to +85deg.C
	---	---	3.0		Within +/-0.5ppm	
Duty Cycle	40	---	60	%		
Harmonics	---	---	-5.0	dBc		Ta=-30 to +85deg.C
SSB Carrier Noise	---	---	-86	dBc/Hz	@10Hz offset	Ta=25+/-2deg.C
	---	---	-110	dBc/Hz	@100Hz offset	
	---	---	-130	dBc/Hz	@1kHz offset	
	---	---	-144	dBc/Hz	@10kHz offset	
	---	---	-144	dBc/Hz	@100kHz offset	

3.6.3 FEM + GSM PAM (U104, SKY77529)

The SKY77529 Tx Front End Module (FEM) is designed in a compact form factor for quad-band cellular handsets comprising GSM850/900, DCS1800, PCS1900, supporting GMSK and linear EDGE modulation. Class 12 General Packet Radio Service (GPRS) multi-slot operation is also supported.

The module consists of a GSM850/900 PA block and a DCS1800/PCS1900 PA block, a printed directional coupler for each block impedance-matching circuitry for 50 Ω input and output impedances, a multifunction power amplifier control (MFC) block, low pass harmonic rejection filters, and an SP8T Antenna T/R switch. Two separate Hetero junction Bipolar Transistor (HBT) PA blocks are fabricated onto an InGaP die; one supports the GSM850/900 bands, the other supports the DCS1800 and PCS1900 bands. The InGaP PA die, the silicon MFC die, PHEMT switch die, and the passive components are mounted on a multi-layer laminate substrate. The assembly is encapsulated with plastic overmold.

The FEM incorporates full support for a Serial Peripheral Interface (SPI) bus function. The SPI controller shall accept SPI telegrams with data fields that support PA and switchplexer-related functions. All FEM operating modes and switch states shall be determined by the SPI telegram. The Multi-function Control (MFC) provides pin out for interoperation with a specified transceiver that will establish a closed loop power control mechanism. The external circuit uses the Linear Detector output to set a fixed bias point for 8PSK (EDGE) mode and a variable bias point for GMSK (GSM) mode.

The power control loop together with the MFC will reduce sensitivity to antenna load, input drive, temperature, power supply, and process variation. The combined circuit configures the PA for fixed gain in 8PSK mode while providing the ability to optimize the PA bias at different power levels to maximize efficiency.
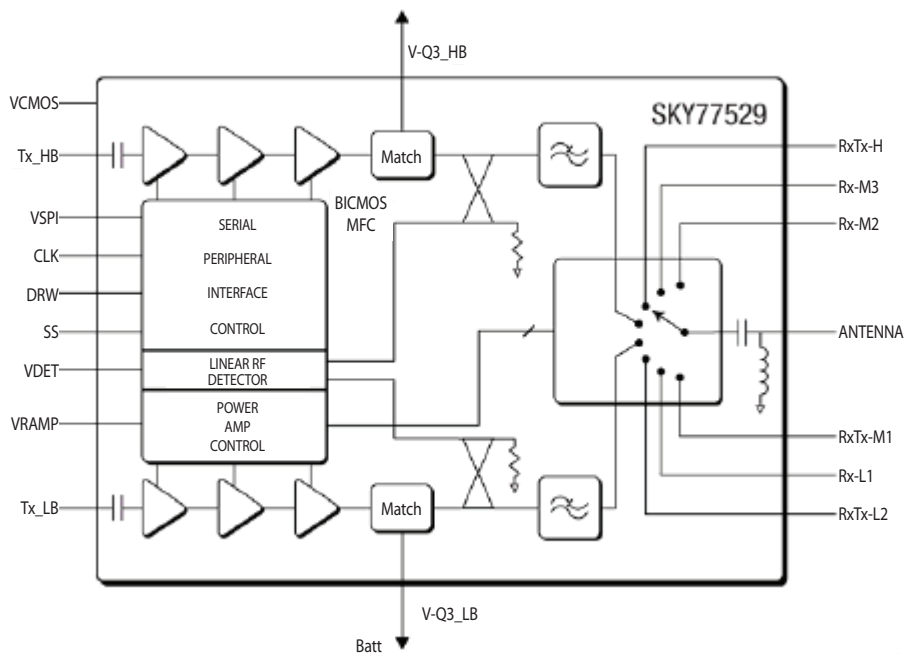
[Figure 6-3] SKY77529 Block Diagram

D0	Band Select		D10	D9	Sensor Configuration
0	Low band		0	0	Current sensor FB Off
1	High band		0	1	Current sensor FB Off
D1	Mode Select		1	0	Current sensor FB On
0	GMSK		1	1	Current sensor FB On
1	8PSK				
D2	Tx Enable		D15	FE Boost Converter	
0	PA Off		0	Off	
1	PA On		1	On	

D5	D4	D3	Current Sensor		D14	D13	D12	D11	FE Status
			Mode = GMSDK	Mode = 8PSK					
0	0	0	1.6 A	0.6 A	0	0	0	0	Off
0	0	1	1.7 A	0.7 A	0	0	0	1	TX-M GMSK ANT1
0	1	0	1.8 A	0.8 A	0	0	1	0	TX-L GMSK ANT1
0	1	1	1.9 A	0.9 A	0	0	1	1	Reserved
1	0	0	2.0 A	1.0 A	0	1	0	0	RX-L1
1	0	1	2.1 A	1.1 A	0	1	0	1	RX-M2
1	1	0	2.2 A	1.2 A	0	1	1	0	RX-M3
1	1	1	2.3 A	1.3 A	0	1	1	1	Reserved
D8	D7	D6	Not Assigned to Specific Function		1	0	0	0	Rx/Tx-L2
0	0	0	Default		1	0	0	1	Rx/Tx-M1
0	0	1			1	0	1	0	Rx/Tx-H
0	1	0			1	0	1	1	Reserved
0	1	1			1	1	0	0	Reserved
1	0	0			1	1	0	1	Tx-M GMSK ANT2
1	0	1			1	1	1	0	Tx-L GMSK ANT2
1	1	0			1	1	1	1	Reserved
1	1	1							

[Figure 6-4] SPI Write Programming Truth Table

3.6.4 GPS LNA (U1004, RF2815)

The RF2815 is a GPS Low Noise Amplifier with an integrated SAW filter at the output. Low noise figure, along with high gain, achieved by the RF2815 makes it ideal for GPS recievers requiring high sensitivity. This module builds upon RFMD's leading edge pHEMT process and integrates input matching and low loss high rejection SAW filter at the output. This results in high performance and a reduced solution size. The ease of implementation simplifies the reciever design.

The RF2185 is packaged in a compact 3.3 mm x 2.1 mm x 1.0 mm package with low external component count required to achieve the best-in-class performance.

3.7 Digital Baseband(AP20)

NVIDIA® Tegra™ 200 Series Mobile web Processor (MWP) is a complete applications and digital media system built around the following processing elements:
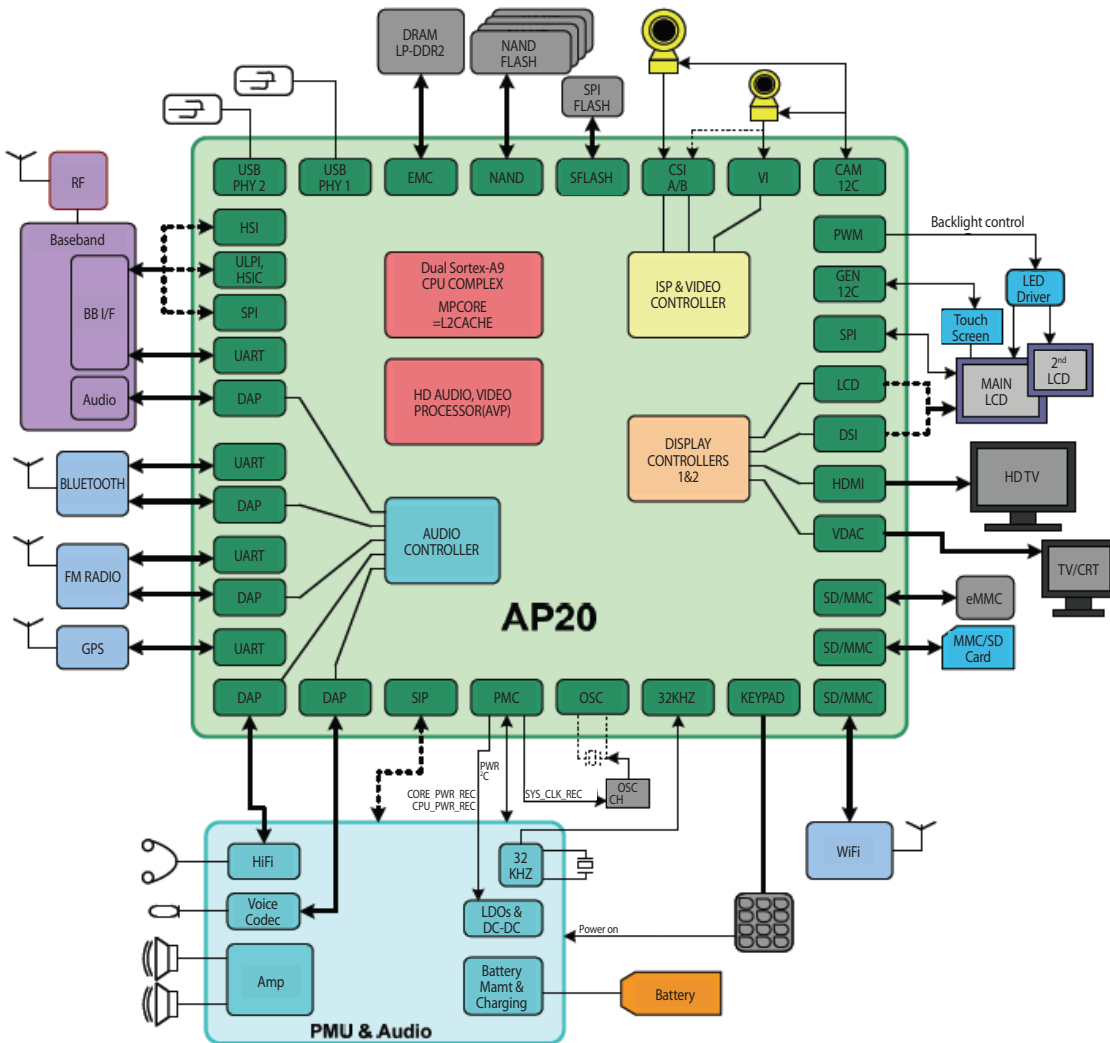
AP20 Block Diagram(Typical Connections Shown)

Dual-core ARM® Cortex-A9 MPCore™ processor

HD AVP (2.0) High-definition Audio-video processor

The HD AVP Processor handles audio-video processing and supports H.264, VC-1, and MPEG-4 video standards. High definition video playback and capture are accelerated with dedicated hardware. Baseline JPEG encoding and decoding are also supported.

Ultra Low-power NVIDIA® GeForce® Graphics Processing

The ULP GeForce GPU handles 2D graphics rendering and 3D pixel and vertex shading.

Imaging System

Accepts still images in Bayer and YUV formats, converts the various input formats, and writes the data to memory as indicated by software.

Display Controller Complex

The Display Controller Complex contains dual display controllers with various external interface options for LCD panels, CRTs, and televisions, including HDMI output at 1080p.

In addition to its processing elements, an extensive set of peripheral interfaces enables communication with all necessary external devices. This high level of integration minimizes system BOM and enables compact form factor design.
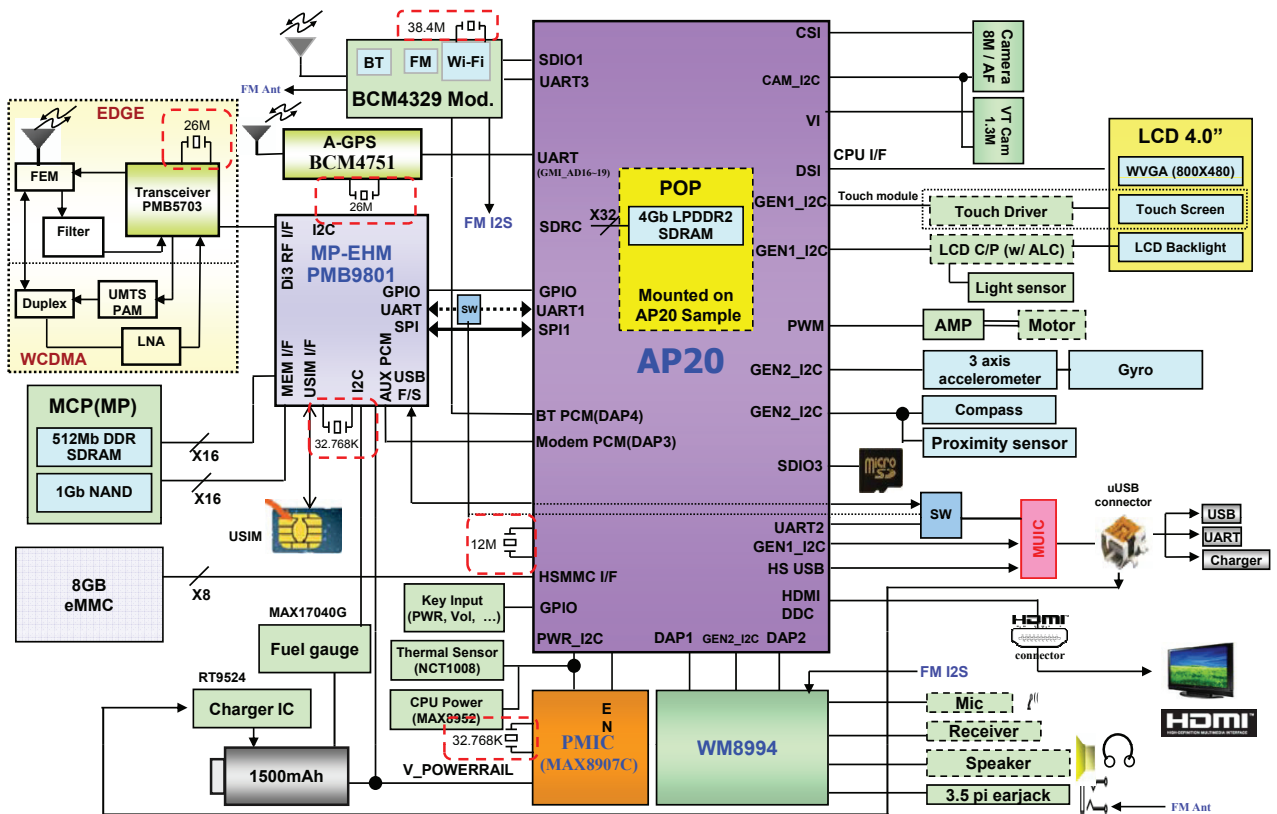
3.8 Hardware Architecture

<System HW Block>

Figure. Block Diagram

3.9 Subsystem (PMB9801_X-GOLD™616)

3.9.1 ARM Microprocessor Subsystem

The ARM1176JZ-S incorporates an integer unit that implements the ARM11 ARM architecture v6. The core supports the 32-bit ARM and 16-bit Thumb instruction sets, Jazelle technology to enable direct execution of Java byte codes and a range of SIMD DSP instructions that operate on 16-bit or 8bit values in 32-bit registers.

3.9.2 WCDMA Subsystem

The 3.5G cellular modem is implemented as an independent Layer1 subsystem including a separate microcontroller. The X-GOLDTM616 Modem core acts as a master controlling the 3.5G cellular Modem slave via the Layer1 host controller interface.

3.9.3 GSM Subsystem

The X-GOLDTM616 is suited for mobile stateons operating in the GSM850/900/1800/1900 band. In the receiver path the antenna input signal is converted to the base band, filtered, and amplified to target level by the RF transceiver chip set. Tne modem processor performs for both, GMSK and 8-PSK, the complex baseband signal equalization with soft-output recovery and the channel decoding supported by a Viterbi hardware accelerator.

3.9.4 RF Interface

The RF interface communicates with the mobile station's external RF and analog baseband circuits. Signals to these circuits control signal gain in the Rx and Tx signal path and maintain The system's frequency reference.

3.9.5 SPI based IPC

The XMM™6160 platform supports the serial connection via SPI. The command flow of the IPC is independent from the HW solution and the IPC protocol. It is implemented using a logical channel multiplexer and AT commands.

The IPC hardware interface consists of a serial SPI interface and two control signals, and one additional optional control signal. The SPI is implemented using the USIF2 of the X-GOLD™616, with the GPIO's implementing sleep mode and readiness handling

3.9.6 Audio function

Audio Processing on ARM Core

The ARM™1176 core is mainly in charge of "audio application" tasks, including audio playback, audio streaming and audio recording if required. This implies the usage of codec algorithms such as MP3, WMA, AAC etc., which must be implemented as decoder and/or encoder software on the ARM core. Decoded audio streams are transmitted as PCM samples to the DSP core via a shared memory. Audio streams to be encoded are transmitted by the DSP to the ARM core via a shared memory. The ARM can also generate ring tones and service tones to notify an incoming call, an incoming message or any audio notification of a phone´s event (warning, error, confirmation, battery low, etc.). Another activity on the audio side for the ARM is the streaming of compressed audio data over the UART interface to the Bluetooth chip for A2DP usage (Advanced Audio Distribution Profile: audio playback over Bluetooth). Via the same interface it communicates with the Bluetooth chip (this is not restricted to audio activities). The ARM core is managing the configuration of the AFE by sending commands to the DSP over shared memory to activate various configurations of the AFE. Note that the activities of the ARM remain purely digital audio processing.

Audio Processing on DSP Core

The DSP core is in charge of "speech audio" and mixing tasks and its activities remain - as the ARM - purely digital audio. The DSP can also execute some "audio application" tasks. It ensures the simultaneous encoding and decoding of speech audio frames during telephone conversation. It uses different sets of vocoders as specified by the applicable standards for the ongoing telephone conversation. On the audio out path (i.e. towards the speaker) it mixes "audio application" received over shared memory with decoded speech audio. On this path it can also mix some audio samples coming from the microphone to enable the feedback loop to the speaker (Sidetone generation, as specified in 3GPP/ TS 43.050, chapter 3.10). On the audio in path (i.e. from the microphone to the transmission of the encoded audio samples over the air) the DSP can also mix speech audio samples with any other digital audio source and analogue FM radio as well. The mixing capabilities are extremely broad as the cases mentioned above are only examples. These mixing capabilities also include the ability to execute a sample rate conversion to bring all samples to the same rate before mixing. The DSP also can execute some audio application tasks such as PCM, ADPCM, SB-ADPCM audio playback and recording. Simple Tone (sine tones, DTMF, key click) can be generated as well.

The next activity of the DSP is transferring data to and from the hardware peripherals (AFE, I2S0 and I2S1). Asmentioned in **Figure 1** a fifo buffer is used to exchange stereo audio samples between the DSP and the AFE on the microphone path and speaker path. When receiving a command from the ARM the DSP directly configures the different modes of the AFE. The DSP also manages the I2S interfaces I2S0 and I2S1. I2S0 interface, configured as master interface, is used to exchange speech audio samples at a rate of 8 or 16 kHz mono on both directions with the Bluetooth chip in the case of a speech call using a Bluetooth headset. The I2S1 interface can be used as slave or master interface, enabling the exchange of audio stereo samples at any common rate between 8 and 48 kHz, potentially asymmetrically between RX and TX. This is to act as an audio bridge with an external audio chip (application processor, audio processor,etc.). Note that the activities of the DSP - like the ARM - remain purely digital audio processing. Refer to the document "system requirements specification" for more details on the different audio application features supported by the chip.

Audio Processing on Audio Front End

The AFE is used as a playback and capture device, i.e. exchanging digital audio stereo samples on both directions (from microphone to DSP and from ARM/DSP to speaker). On audio-in path analog to digital conversion and amplification is executed. On the audio-out path digital to analog conversion and power amplification is performed. Additionally, the AFE physically selects the correct audio analog paths and is directly managing the analog inputs and outputs.

3.9.7 Vocoder Subsystem

FR, HR, EFR speech channels (TCH/FS, TCH/HS, TCH/EFS)

• NAMR/WAMR speech channels over GMSK and 8PSK

• Mandatory sub-functions for speech channels:

– Discontinous transmission (DTX)

– Voice activity detection (VAD)

– Background noise calculation

• Fullrate and halfrate data channels (F14.4, F9.6, F4.8, F2.4, H4.8, H2.4)

3.9.8 Memory Subsystem

The X-GOLD™616 can use the general term SDRAM as a shortcut for Mobile DDR SDRAM. A total of up to four external memories is supported, chip selects can be dynamically allocated to one of the two external memory controllers of X-GOLD™616. Only two memory devices can be connected to the SDRAM controller if DDR support is required.

3.9.9 Battery Management – Hardware Configurations

The X-GOLD™616 chip has an internal PMU that will provide power supply for the chip itself, memory and the attached RF. The X-GOLD also holds a measurement unit that can perform all necessary battery measurements through external HW. This is sufficient for a modem only design where charging is controlled by another chip

3.9.10 Clocking

The clocking system is based on 2 different clocks, a 26 MHz reference clock generated within the RF Engine and a 32 kHz real-time clock (RTC) generated in the baseband.The 26 MHz clock provided by the RF engine is the main reference clock for the RF circuit and the X-GOLD™616. Also other system components may be supplied with 26 MHz reference clocks. A 32 kHz oscillator located at the X-GOLD™616 supplies the RTC with the reference clock for the real time clock application, as well as provides a low power standby clock for system sleep mode operation. This clock is available
also for other system components like GPS.

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3.9.11 USB

The XMM™6160 platform provides two USB interfaces compliant to the USB2.0 standard:

• High speed interface (480 Mbps) for communication with external devices acting both as host or device

• Full speed interface (12 Mbps) for communication with the UICC using the IC-USB standard acting as host

The USB solution is based on USB controller hardware IP, which is integrated in the X-GOLD™616 baseband chip including both USB transceivers for high and full speed and the USB Stack software that implements the different USB device classes and features.

The HS OTG USB component supports the following features:

• Modem connection for DialUp Networking and AT command interface (CDC-ACM)

• Tracing over USB (CDC-ACM)

• Suspend/Resume and Remote Wakeup (for power saving)

• Software download

Optional features (not included in the XMM™6160 platform):

• Support for isochronous transfers

The IC-USB component supports the following features:

• UICC-Terminal USB interface according to ETSI TS 102 600 (ICCD only)
•Suspend/Resume and Remote Wakeup (for power saving)

3.10 Power Block

3.10.1 General

Since P990 uses two individual chips, XMM6160 (IFX Modem) uses integrated PMIC and AP20 uses MAX8907 as a main PMIC.

3.10.2 XMM6160 (IFX Modem)

X-GOLD™616 is a single integrated circuit UMTS/GPRS/EDGE Baseband Controller with integrated mixed signal audio and measurement subsystem and modem power management unit. This system on chip designed in Infineon's low power 65nm CMOS process technology provides the performance to meet the ever increasing demands of the cellular subscriber market for feature rich terminals at lowest power consumption and a very competitive cost position.
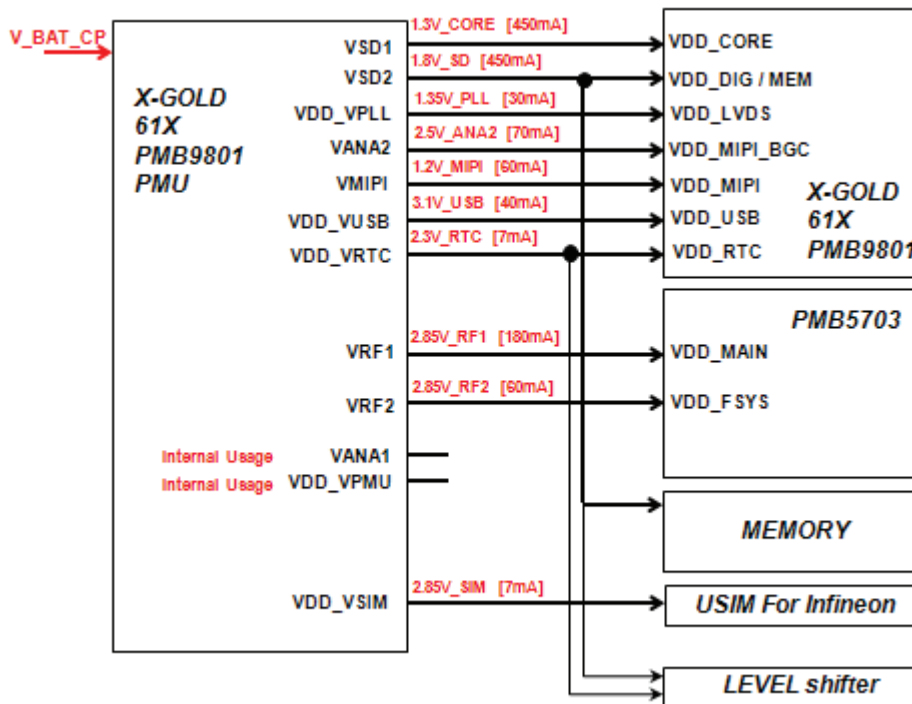
Figure. LGP990 Modem Power Block Diagram

3.10.3 MAX8907

The MAX8907C is a complete power management IC (PMIC) for mobile devices that use the nVidia's application processors (AP), or other similar application processors. The MAX8907C includes three high efficiency step-down regulators and 22 LDOs to power the application processor, internal Logic, I/O, memory, and system accessories. An additional step-up converter drives up to 14 white LED with controlled current for display backlighting. All power and WLED outputs are set via an I2C interface.
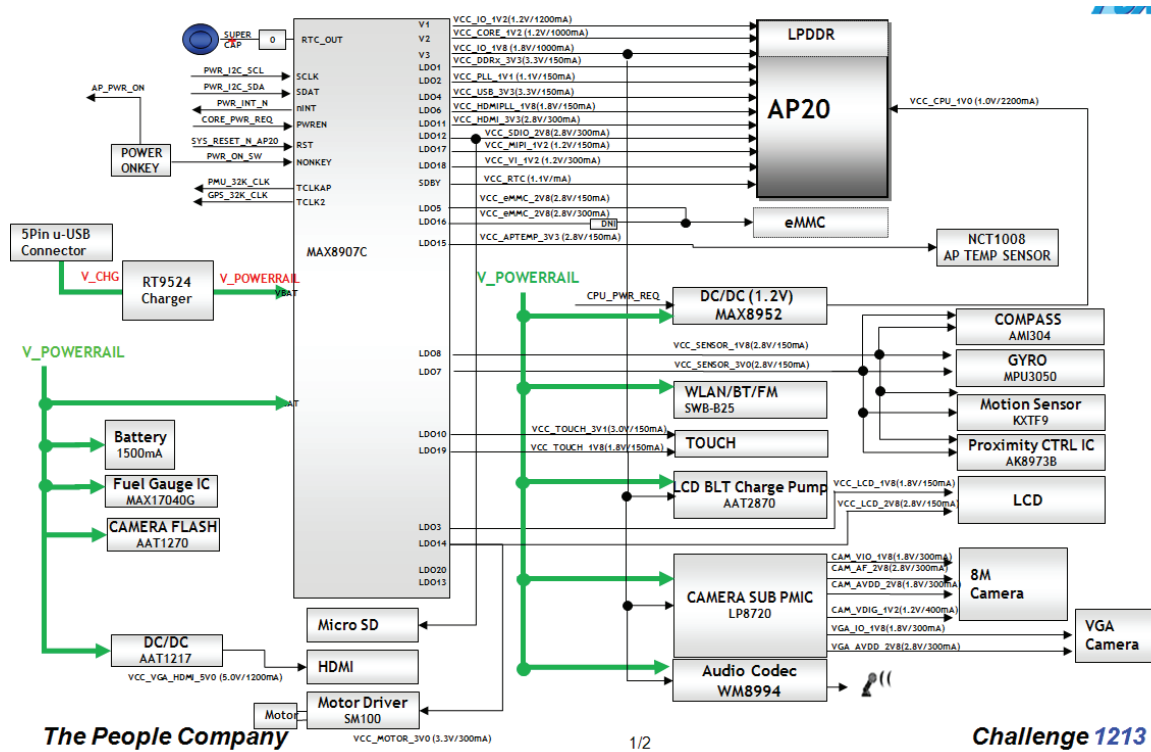
Figure. MAX8907 functional block diagram

3.10.3.1 Charging control

P990 uses individual Charger IC which is RT9524.

Features

- 30V Maximum Rating for DC Adapter
- Internal Integrated Power MOSFETs
- Support 4.2V/2.3A Factory Mode
- 50mA Low Dropout Voltage Regulator
- Status Pin Indicator
- Progrmmed Chaeging Current
- Under Voltage Lockout
- Over Voltage Protection
- Thermal Feedback Optimized Charge Rate
- RoHS Compliant and Halogen Free

Typical Application Circuit
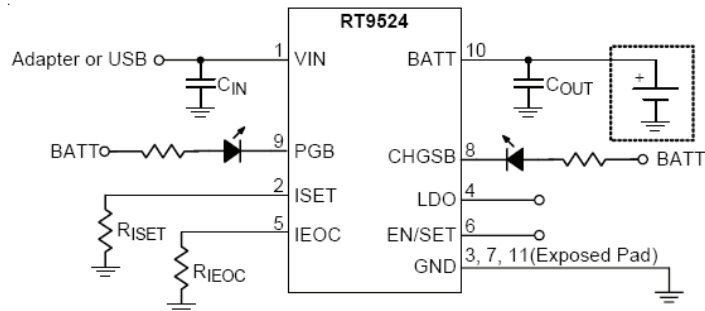
Functional Pin Description

Pin No.	Pin Name	Pin Function
1	VIN	The Input Power Source.
2	ISET	Charging Current Setting.
3, 7, 11 (Exposed Pad)	GND	Ground. The exposed pad must be soldered to a large PCB and connected to GND for maximum power dissipation.
4	LDO	LDO Output (4.9V). This pin provides 50mA output current.
5	IEOC	End-of-Charge Current Setting. The I_{EOC} is from 5% to 50% Ichg-fast which is programmed by the ISET pin.
6	EN/SET	Enable and Operation Mode Setting.
8	CHGSB	Indicator Output for Charging Status.
9	PGB	Indicator Output for Power Status.
10	BATT	Battery Charge Current Output.

3.3.10.2 Constant Current Charging

Battery Pre-Charge Current

During a charge cycle, if the battery voltage is below the pre-charge threshold, the PT9524 enters the pre-charge mode. This feature revives deeply discharged cells and protects battery. Under USB 100 Mode, the pre-chaege current is internally set to 95mA. When the RT9524 is under USB500 and ISET Mode, the pre-charge current is 20% of fast-charge current set by external resistor R_{ISET}.

Battery Fast-Charge Current

ISET Mode

The RT9524 offers ISET pin to program the charge cyrrent. The resistor R_{ISET} is connected to ISET and GND. The parameter K_{ISET} is specified in the specification table.

$$I_{charge} = \frac{530}{R_{ISET}}$$
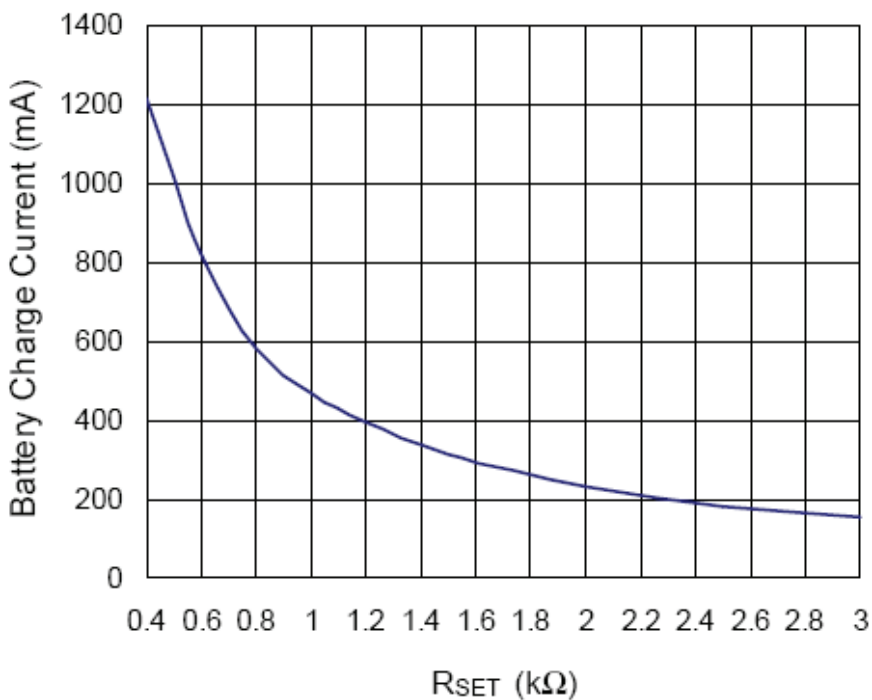
Battery Voltage Regulation (CV Mode)

The battery voltage regulation feedback is through BATT pin. The RT9524 monitors the battery valrage vetween BATT and GND pins. When the battery voltage closes to battery regulation voltage threshold, the voltage regulation phase begins and the charging current falls below the programmed end-of-charge current threshold, the CHG_S pin gose high to indicate the termination of charge cycle.

The end-of-charge cyrrent threshold is set by the IEOC pin. The resistor R_{IEOC} is connected to IEOC and GND.

The parameters K_{IEOC} and IEOC are specified in the specification table.

$$I_{EOC}(\%) = \frac{RIEOC}{200}$$

The current threshold of IEOC (%) is defined as the percentage of fast-charge current set by R_{ISET}. After the CHGSB pin pulled to high, the RT9524 still monitors the vattery voltage. Charge current is resymed when the battery voltagr goes to lower then the battery regulation voltage threshold.

3.10.3.3 Constant Voltage Charging

Constant voltage charging begins when the battery voltage reaches a target voltage, 4.2V. The end of constant voltage charging is commonly detected around 240mA from Travel adaptor.

3.10.3.4 LGP990 Charging Specification

-Charging Method : CC & CV (Constant Current & Constant Voltage)

-Maximum Charging Voltage : 4.2V

-Maximum Charging Current : 948mA

-Nominal Battery Capacity : 1500mAh

-Charging time : Max. 3h 30m

- Full charge indication current (icon stop current) : 248mA

3.10.3.5 LGP990 battery bar icon display

Battery Bar Number	Specification	
BAR 6 (Full)	90% over	
BAR 6 --> 5	90% → 89%	
BAR 5 --> 4	70% → 69%	
BAR 4 --> 3	50% → 49%	
BAR 3 --> 2	30% → 29%	
BAR 2 --> 1	15% → 14%	Remain %
BAR 1 --> 0	5% → 4%	
Low Battery Pop-up	4% ~ 15% : One Time popup	
Critical Low Battery Pop-up	0% ~ 3% : Popup at every level change	
POWER OFF	0%	

Table. LGP990 battery bar specification

3.11 External memory interface

3.11.1 Introduction

Since LGP990 contains communication and application processor, memory is dedicated only for each processor. XMM6160 (IFX modem) uses MCP (Multi Chip Package) 1Gb nand / 512Mb LPDDR1 and AP20 uses POP (Package on Package) 512MB LPDDR2 and 8GB eMMC nand memory.

3.11.2 LGP990 XMM6160 (IFX Modem) memory Interface

-Multi Chip Package : DDR SDRAM and NAND Flash merged 1 package
-512Mbit Mobile DDR SDRAM / 1Gbit NAND Flash

Interface Spec				
Part Name	Product Gr	Maker	Operation Voltage	Speed
H8BCS0QG0MMR-	NAND	Hynix	1.8V	45ns
46M	SDRAM		1.8V	166MHz

3.11.3 LGP990 AP20 memory Interface

- Package on Package on AP20: DDR2 SDRAM
- 8GB eMMC 4.4 version

LPDDR2

Interface Spec				
Part Name	Product Gr	Maker	Operation Voltage	Speed
H8TBR00U0MLR-0DM	SDRAM	Hynix	1.8V/1.2/1.2/1.2	DDR2 800 (400MHz)

8GB NAND

Interface Spec				
Part Name	Product Gr	Maker	Operation Voltage	Speed
THGBM2G6D2FBAI9	NAND	Toshiba	2.8V	31MB/s for read 20MB/s for write

3.11.4 External SD card memory Interface

AP20 supports external SD card which supports up to 32GB (SDHC compatible)

3.12 Audio and sound

3.12.1 Overview of Audio path
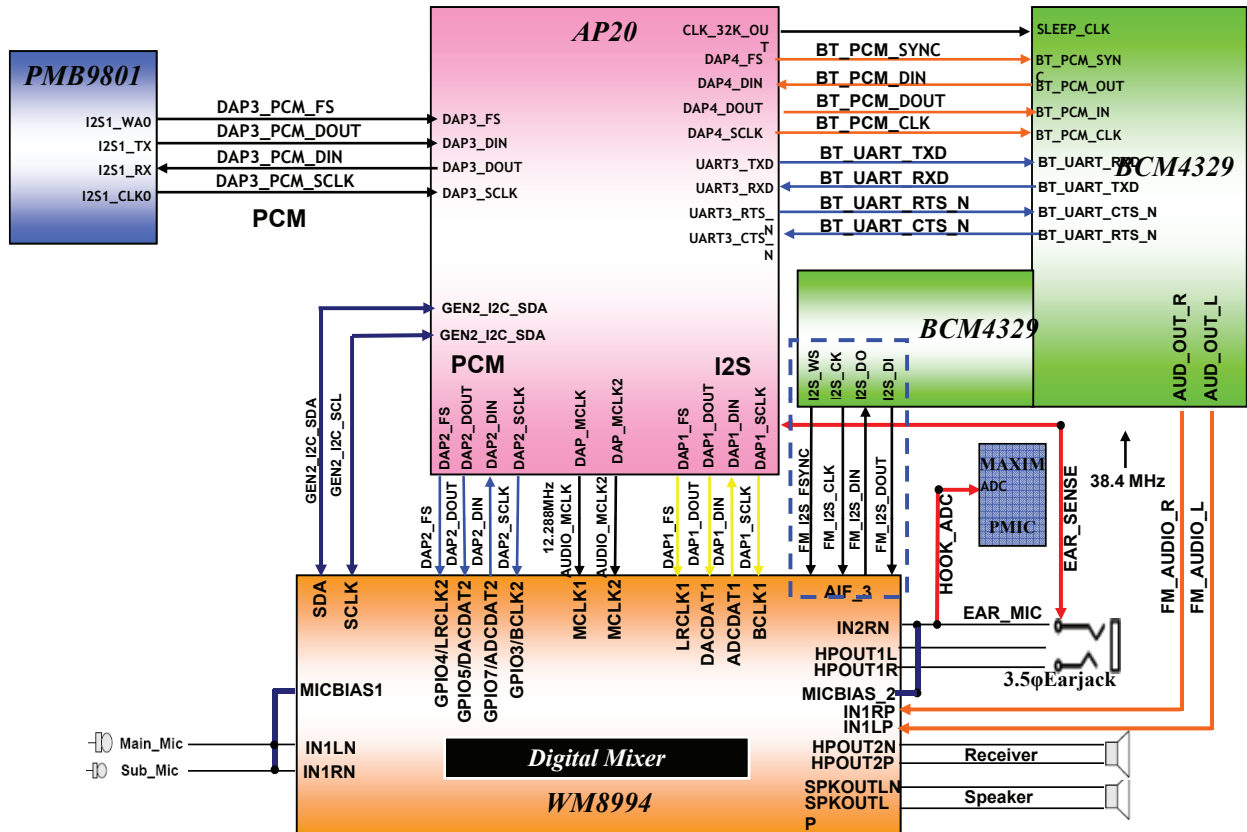
Figure. Block diagram of Audio & Sound path

3.12.2 Audio Processing Architecture Concept(Infineon)

This section describes the overall processing of audio signals inside the X-GOLD™618.

An overview can be found in **Figure 1**.

The three main entities relevant for the audio processing are

• ARM™1176 Embedded Microcontroller core (ARM)

• Embedded Digital Signal Processor core (DSP)

• Audio front end (AFE)
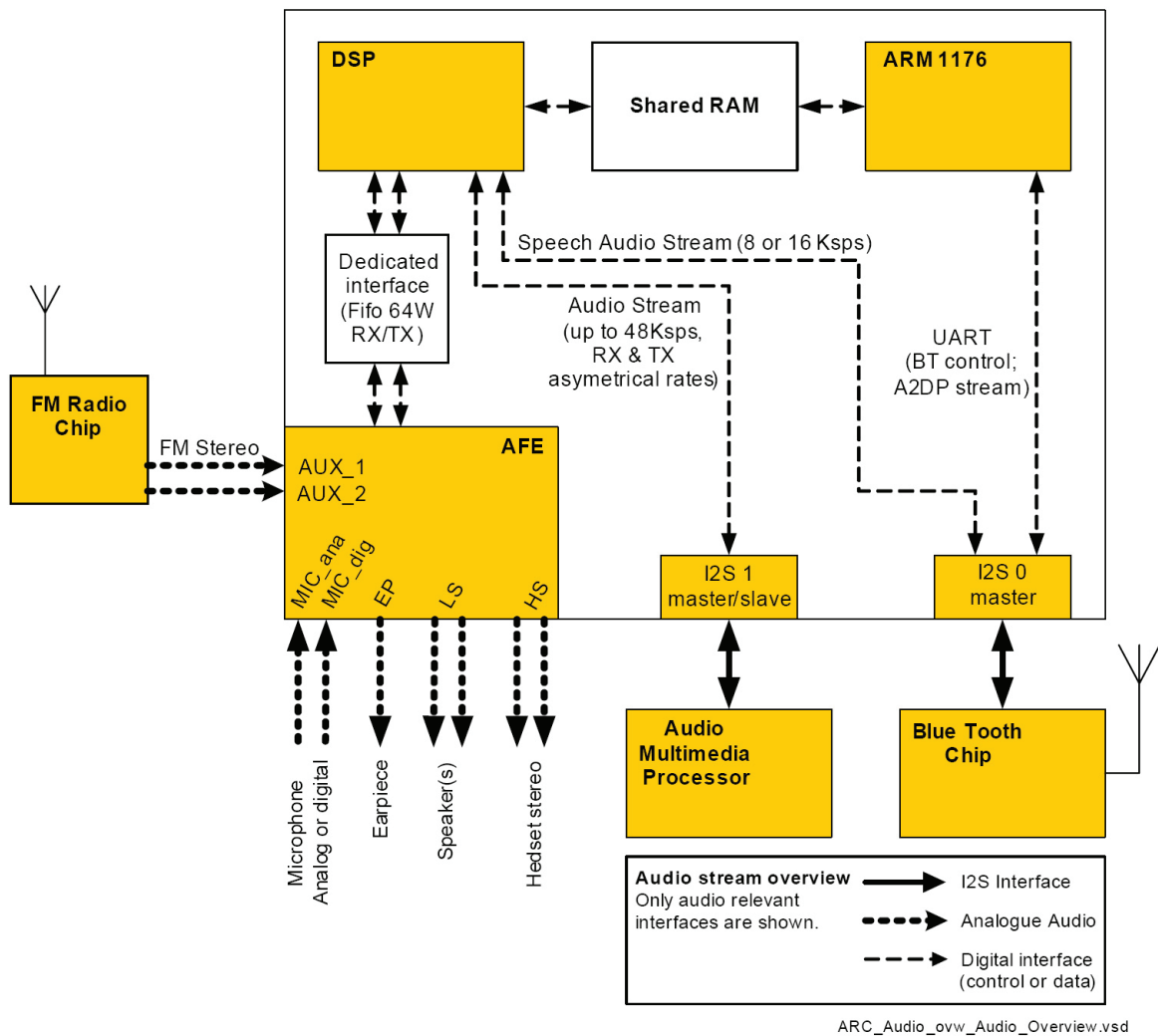
Figure 1. Audio Block diagram

3.12.3 Audio codec(Wolfson_wm8994)

The WM8994is a highly integrated ultra-low power hi-fi CODEC designed for smart phones and other portable devices rich in multimedia features.

An integrated stereo class D/AB speaker driver and class W headphone driver minimize power consumption during audio playback.

The device requires only two voltage supplies, with all other internal supply rails generated from integrated LDOs.

Stereo full duplex asynchronous sample rate conversion and multi-channel digital mixing combined with powerful analogue mixing allow the device to support a huge range of different architectures and use cases.

A fully programmable parametric EQ provides speaker compensation and a dynamic range controller can be used in the ADC or DAC paths for maintaining a constant signal level, maximizing loudness and protecting speakers against overloading and clipping.

A smart digital microphone interface provides power regulation, a low jitter clock output and decimation filters for up to four digital microphones. A MIC activity detect with interrupt is available.

Active ground loop noise rejection and DC offset correction help prevent pop noise and suppress ground noise on the headphone outputs.
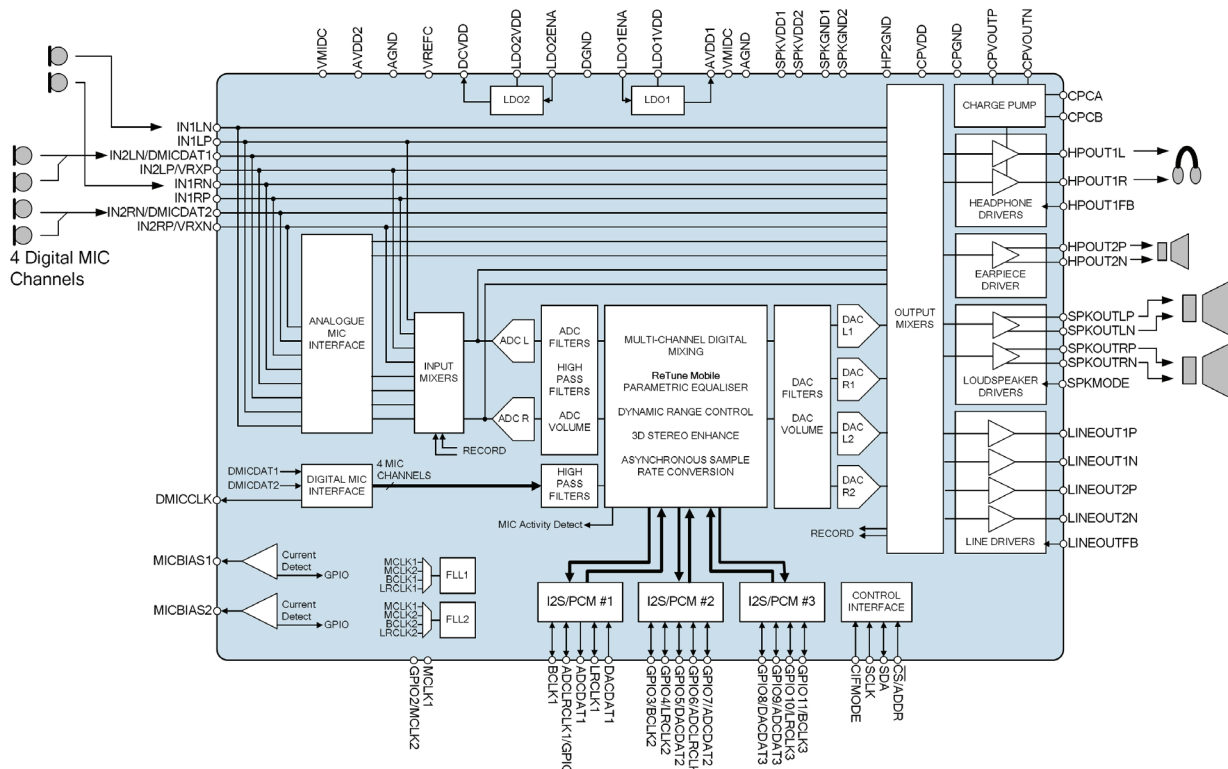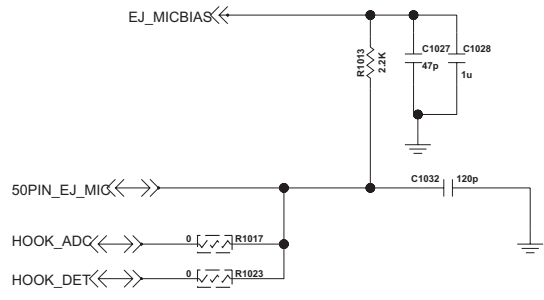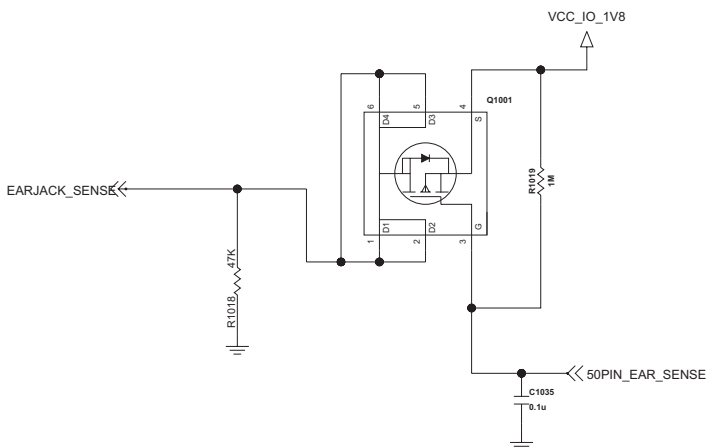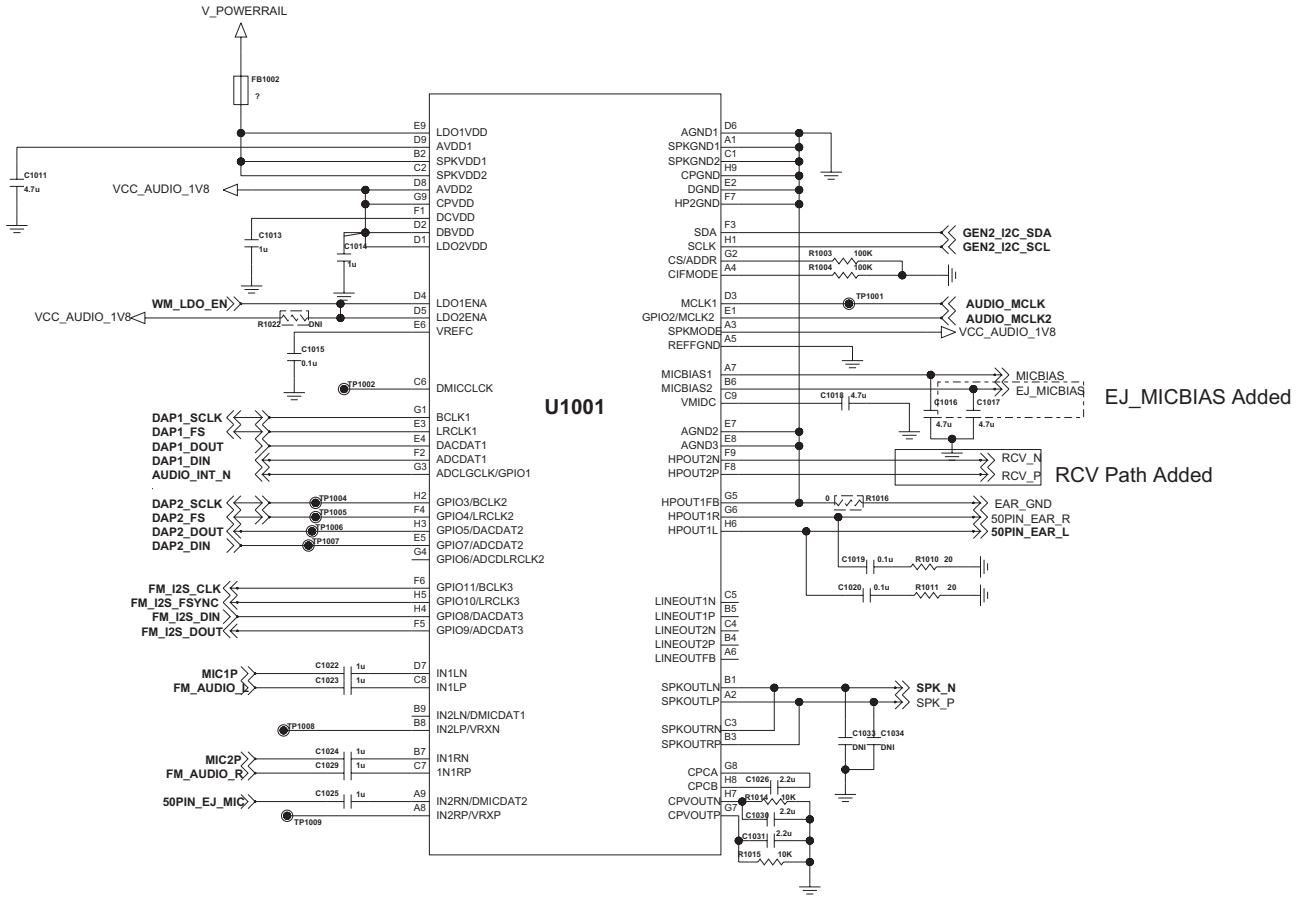
3.13 Main (8M pixels) & Sub (1.3M pixels) Camera

LG-P990 supports two cameras. One is 8M pixels, main camera, the other is 1.3M pixels, sub camera used VT & self camera scene.

Figure. Main 8M Camera Schematic

Figure. Camera Sub PMIC Schematic
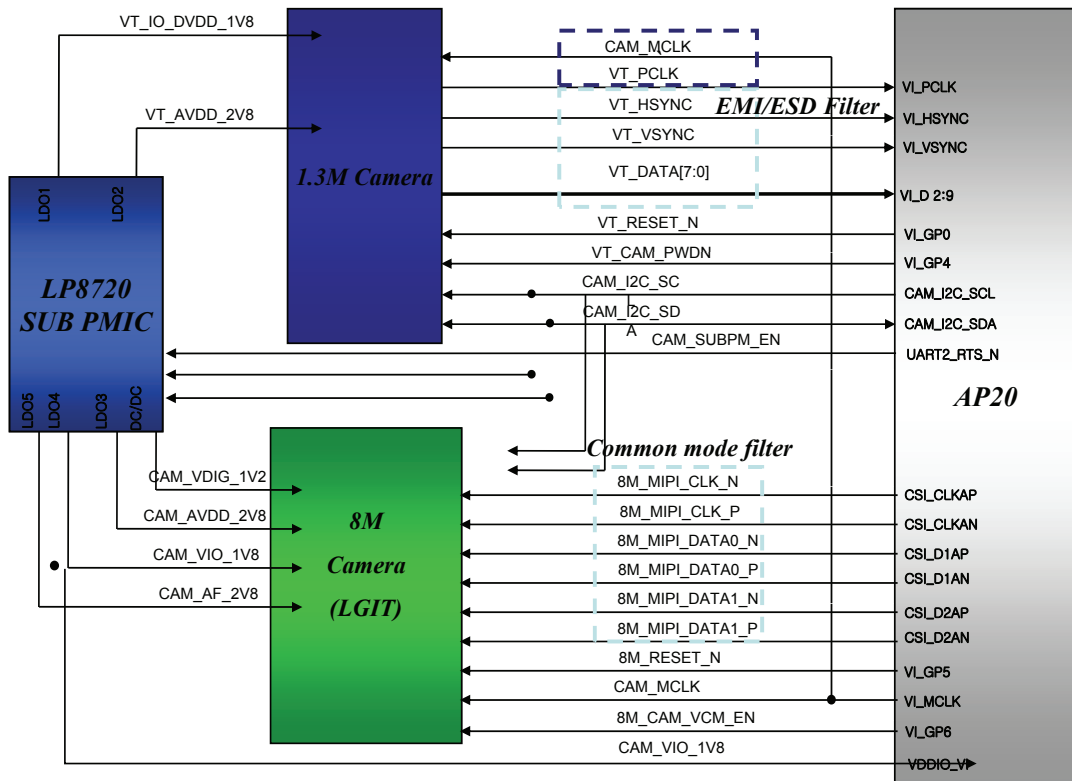
Figure. Camera Block diagram

3.14 Display

LCD module is connected to Main PCB with 50-pin connector.

The LCD is controlled by   CPU Interface in AP20.
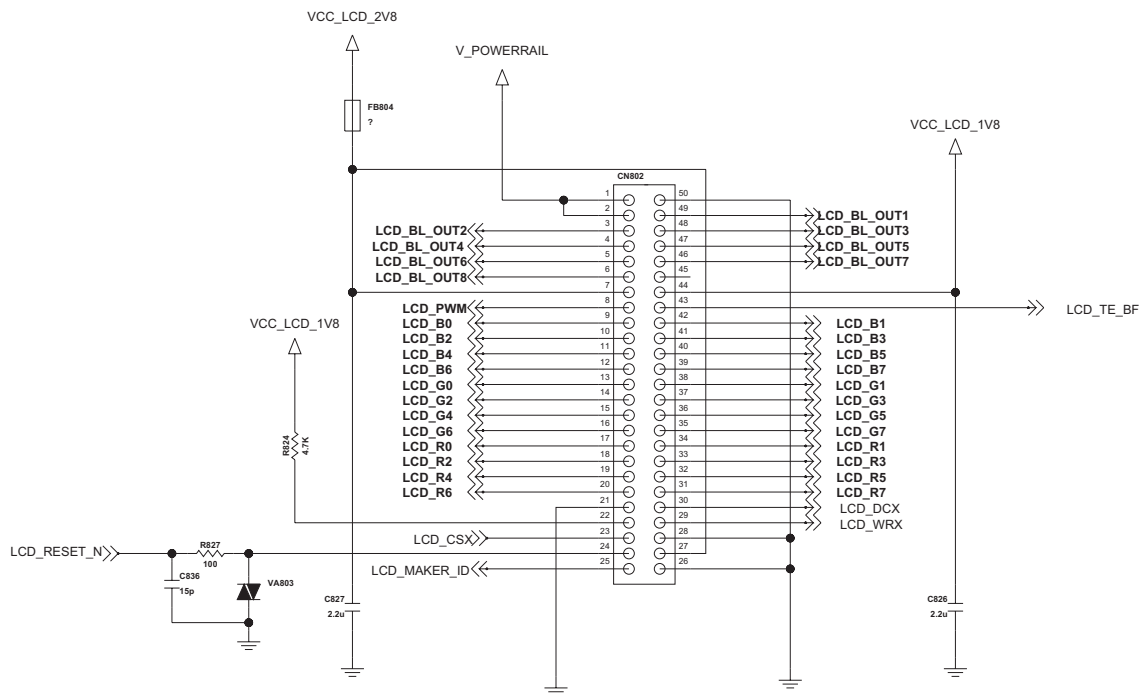
Figure. Schematic of LCD connector (Main Board)

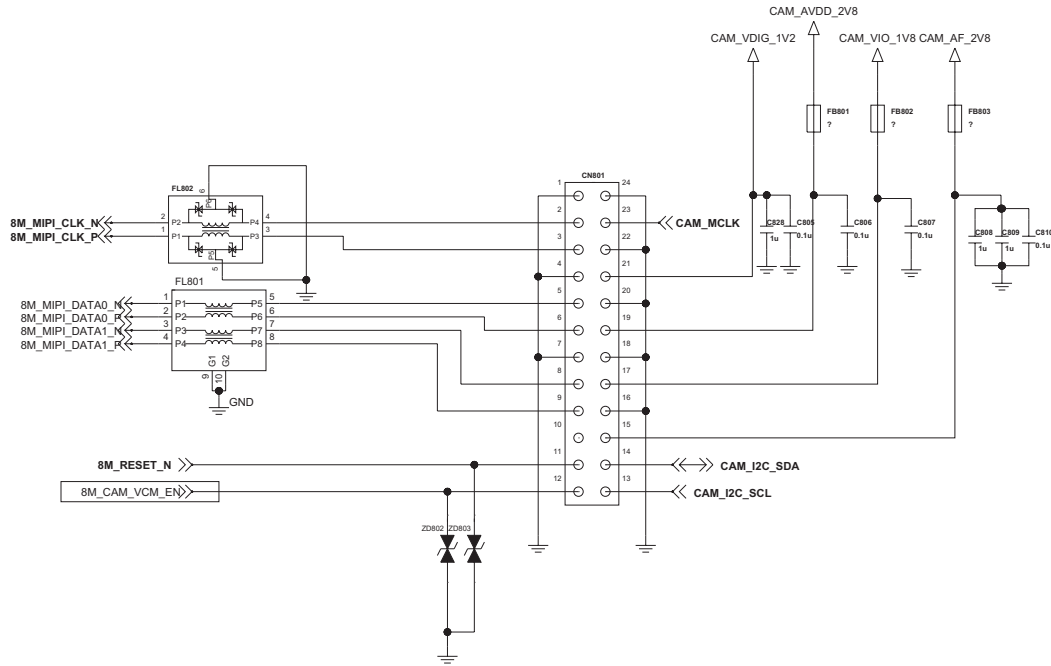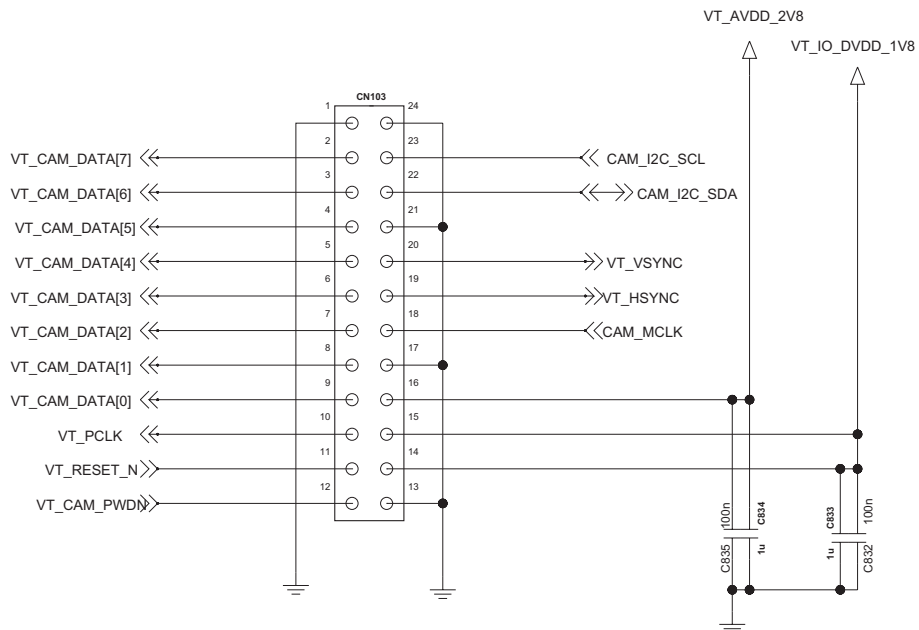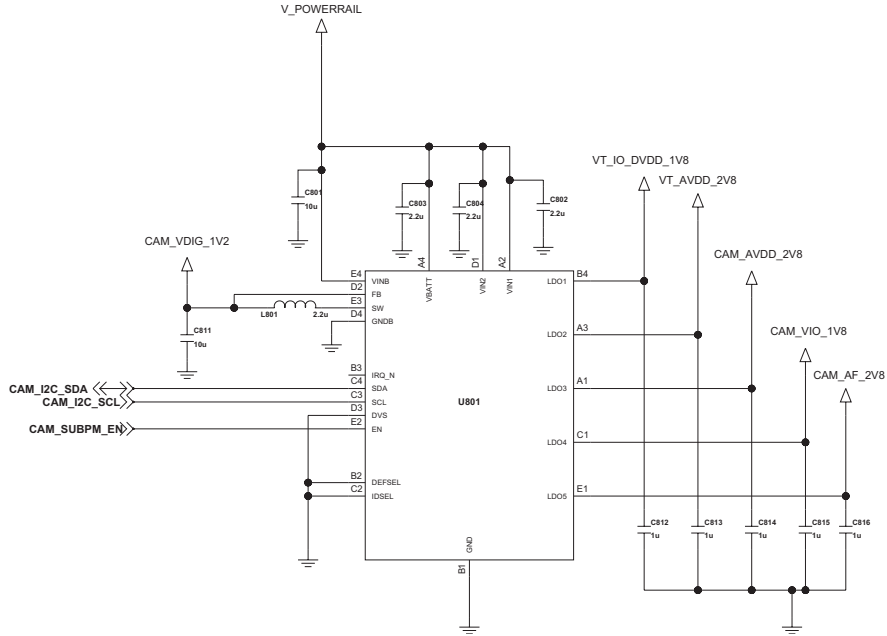| Pin No.	Signal	I/O	Function	Pin No.	Signal	I/O	Function
1	LED_A	-	Power Supply for LED	26	GND	-	Ground
2	LED_A	-	Power Supply for LED	27	SVCI(2.8V)	I	Power Supply for Analog circuit
3	LEDC_2	-	Ground for LED	28	IFSEL_1	I	Interface mode Select (24-bit: GND)
4	LEDC_4	-	Ground for LED	29	WRX	I	Write Enable
5	LEDC_5	-	Ground for LED	30	DCX	I	Data command
6	LEDC_6	-	Ground for LED	31	DB23	I/O	Data Bus (Instruction & Display Data)
7	AVCI(2.8V)	I	Power Supply for Analog circuit	32	DB21	I/O	Data Bus (Instruction & Display Data)
8	PWM0	O	Back Light Control of LED Driver	33	DB19	I/O	Data Bus (Instruction & Display Data)
9	DB0	I/O	Data Bus (Instruction & Display Data)	34	DB17	I/O	Data Bus (Instruction & Display Data)
10	DB2	I/O	Data Bus (Instruction & Display Data)	35	DB15	I/O	Data Bus (Instruction & Display Data)
11	DB4	I/O	Data Bus (Instruction & Display Data)	36	DB13	I/O	Data Bus (Instruction & Display Data)
12	DB6	I/O	Data Bus (Instruction & Display Data)	37	DB11	I/O	Data Bus (Instruction & Display Data)
13	DB8	I/O	Data Bus (Instruction & Display Data)	38	DB9	I/O	Data Bus (Instruction & Display Data)
14	DB10	I/O	Data Bus (Instruction & Display Data)	39	DB7	I/O	Data Bus (Instruction & Display Data)
15	DB12	I/O	Data Bus (Instruction & Display Data)	40	DB5	I/O	Data Bus (Instruction & Display Data)
16	DB14	I/O	Data Bus (Instruction & Display Data)	41	DB3	I/O	Data Bus (Instruction & Display Data)
17	DB16	I/O	Data Bus (Instruction & Display Data)	42	DB1	I/O	Data Bus (Instruction & Display Data)
18	DB18	I/O	Data Bus (Instruction & Display Data)	43	TE	O	VSYNC-OUT
19	DB20	I/O	Data Bus (Instruction & Display Data)	44	IOVCC	I	Interface I/O Power
20	DB22	I/O	Data Bus (Instruction & Display Data)	45	NC	-	No connection (VPP)
21	GND	-	Ground	46	IEDC_7	-	Ground for LED
22	RDX	I	Read Enable	47	IEDC_5	-	Ground for LED
23	CSX	I	Chip Select	48	IEDC_3	-	Ground for LED
24	RESB	I	Reset	49	IEDC_1	-	Ground for LED
25	MAKER_ID(Low)	O	Maker ID(Low; GND level)	50	GND	-	Ground

Table. Interface between LCD Module and MAIN Board

3.15 Vibrators

The ERM motor, also distinguished as 'Q-coin Motor' creates a certain kind of vibration controlled and defined uniquely by LG Electronics. The followings are the certain examples of conditions that the users may feel the vibration from the phone: Incoming Call (in Silence Mode), Google Keys Pressed, Turn-on / -off, Dialing, and Text Messaging.
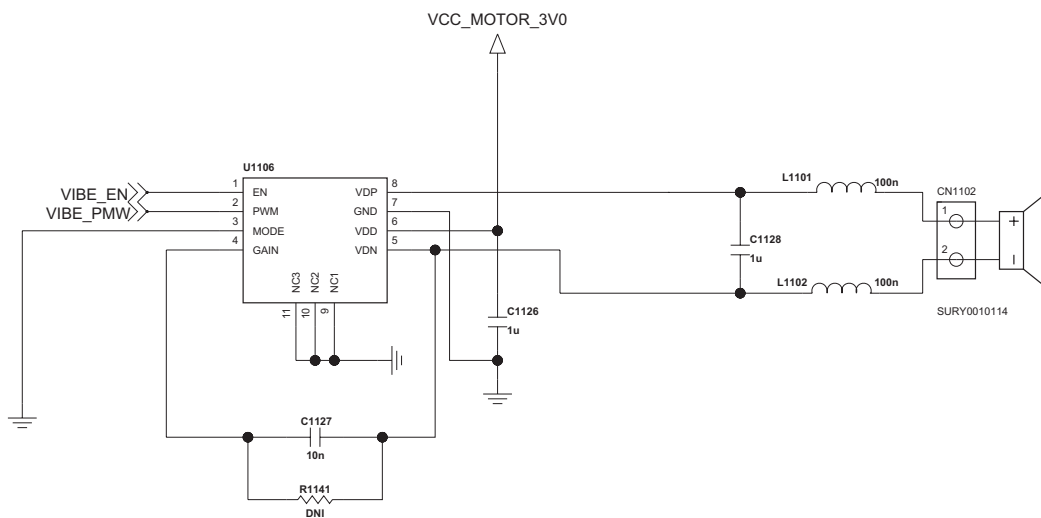
Figure 1 Vibrator Schematic
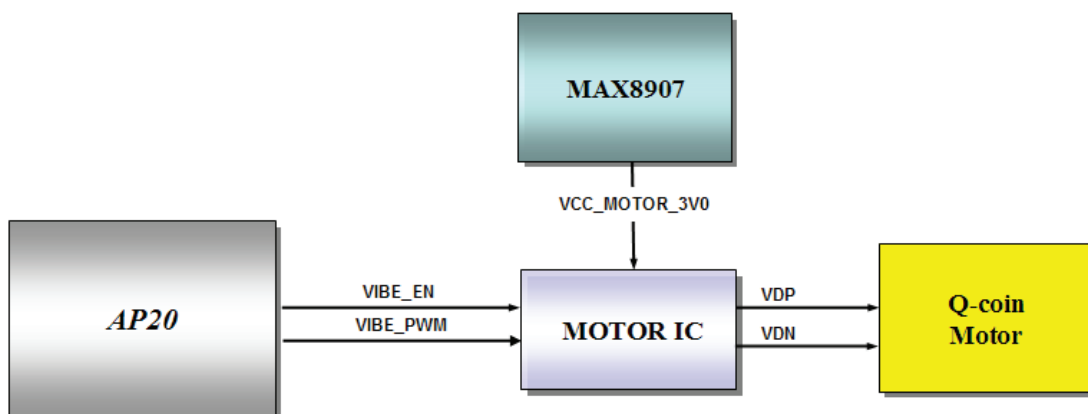
Figure 2 Vibrator Block Digram

3.16 HDMI

When the users desire to output video signals onto the outer display, they are supposed to open the cap first and connect the suitable cable, which has to be HDMI type-D compatible, to the socket placed at the upper center of the phone. It will automatically display the video contents on the desired display
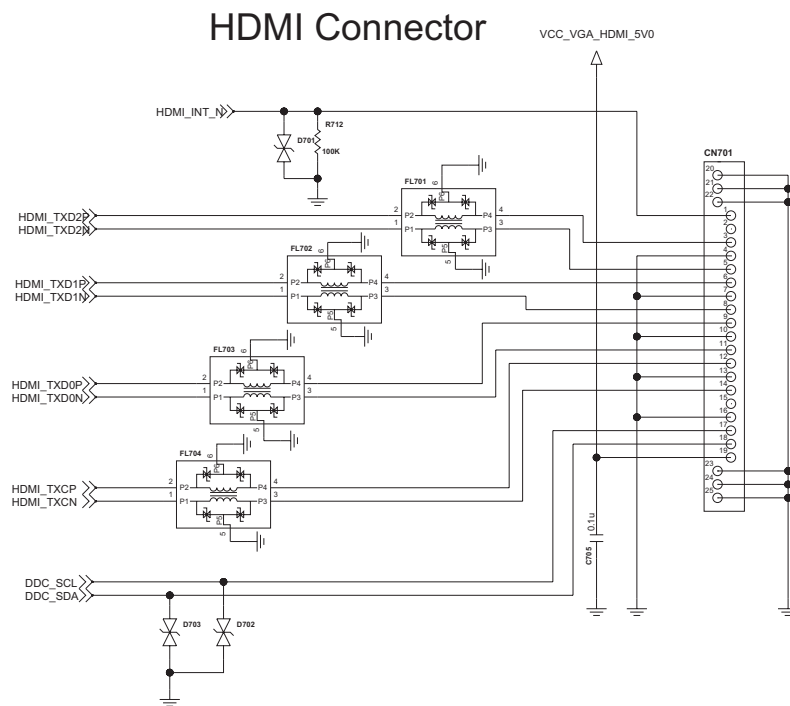
Figure 1 HDMI Type D Connector Schematic

PIN	Signal Assignment	PIN	Signal Assignment
1	Hot Plug Detect	2	Utility
3	TMDS Data2+	4	TMDS Data2 Shield
5	TMDS Data2-	6	TMDS Data1+
7	TMDS Data1 Shield	8	TMDS Data1-
9	TMDS Data0+	10	TMDS Data0 Shield
11	TMDS Data0–	12	TMDS Clock+
13	TMDS Clock Shield	14	TMDS Clock–
15	CEC	16	DDC/CEC Ground
17	SCL	18	SDA
19	+5V Power		

Figure 2 HDMI Type D Connector Pin Assignments

3.17 Compass Sensor

If a customer buy the application SW, The Sensor provides user with a Electric Compass function.

U1107 (AMI304) IC is interfaced to AP20(U401) using I2C interface.
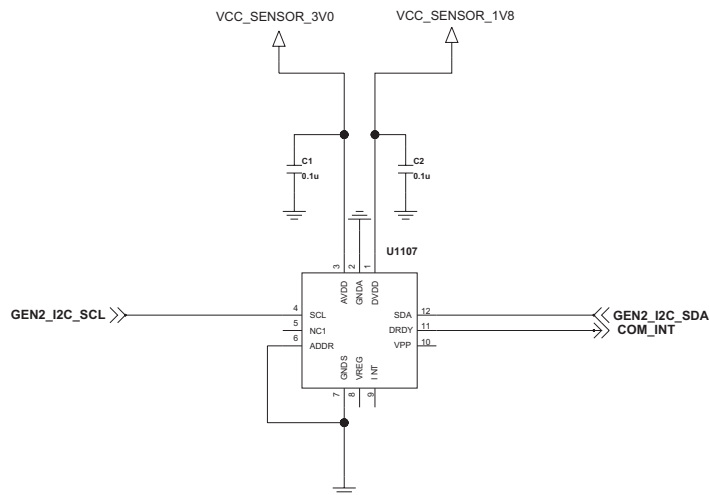
Figure. Compass Sensor Schematic
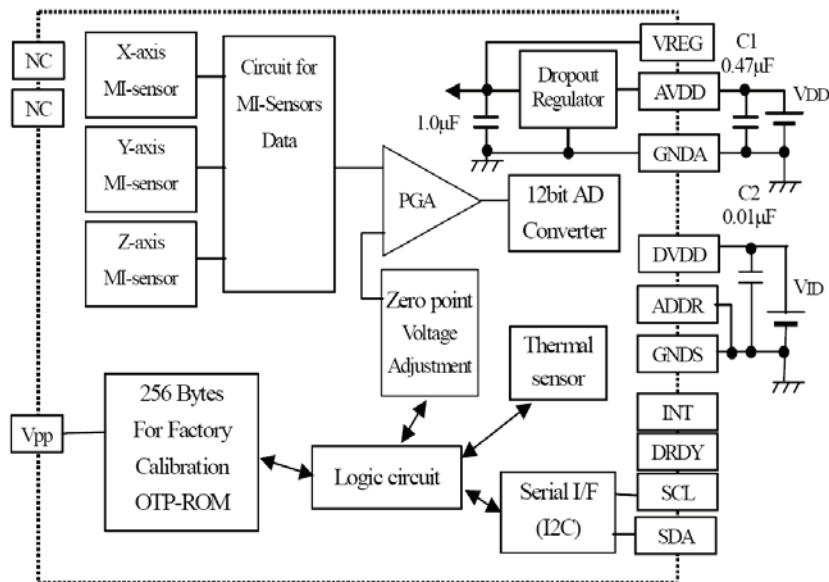
Figure. Compass Sensor Block Diagram

3.18 Motion Sensor

The motion sensor can sense gravity & accelerated motion. Therefore according to the direction of cell phone, the phone screen is rotated automatically. And the motion sensor is connected with a gyro sensor to supplement each data.

U1105 : KXTF9 IC is interfaced to AP20(U401) using I2C interface.
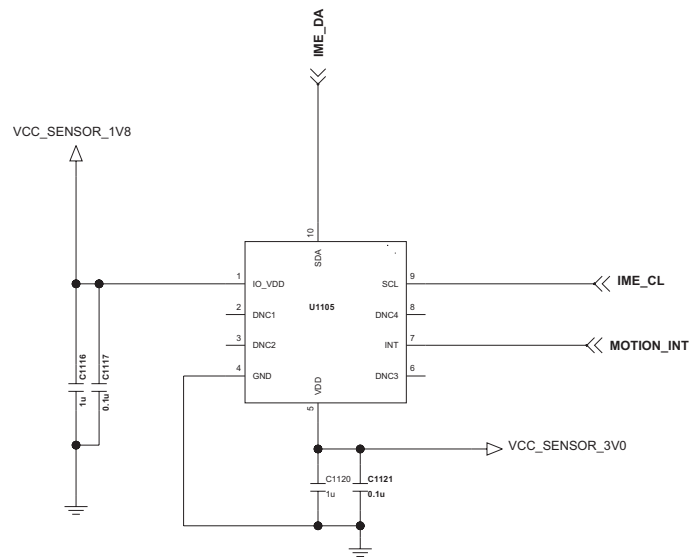
Figure. Motion Sensor Schematic
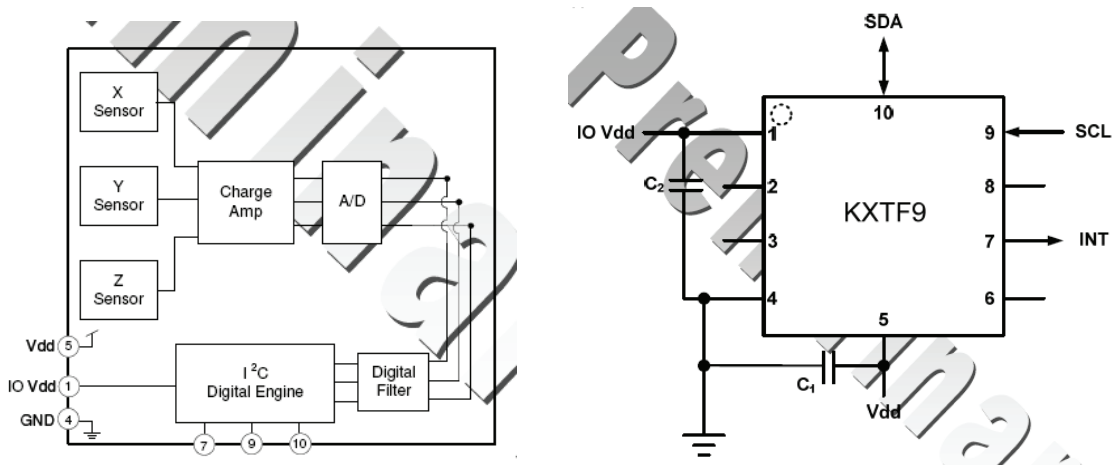
Figure. Motion Sensor Block Diagram

3.19 Gyro Sensor

The gyro sensor(MPU3050) can sense angular velocity not gravity and accelerated motion. The gyro sensor applied in LG- P990 can detect 3-axis rotation force sensing X,Y and Z angular velocity.   And the gyro sensor data is supplemented by the motion sensor data. It make possible user to development application SW using gyro sensor data like that motion games.

U1: MPU3050 IC is interfaced to Gyro sensor(U1) using I2C interface.
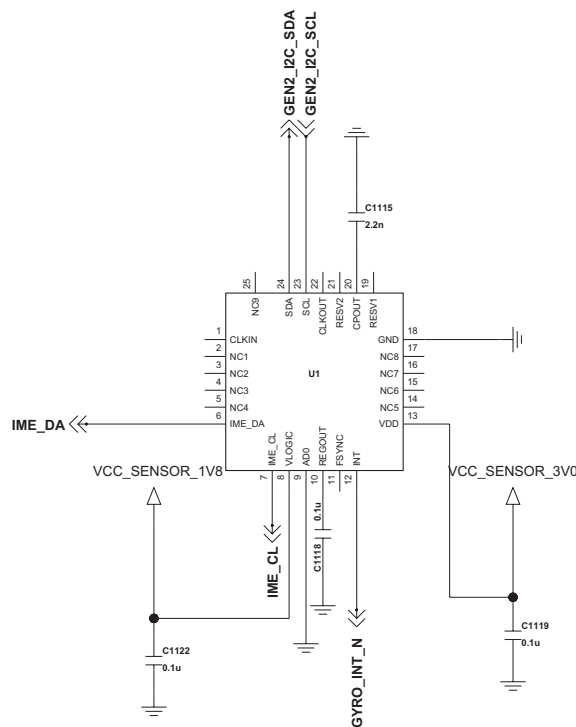
Figure. Gyro Sensor Schematic
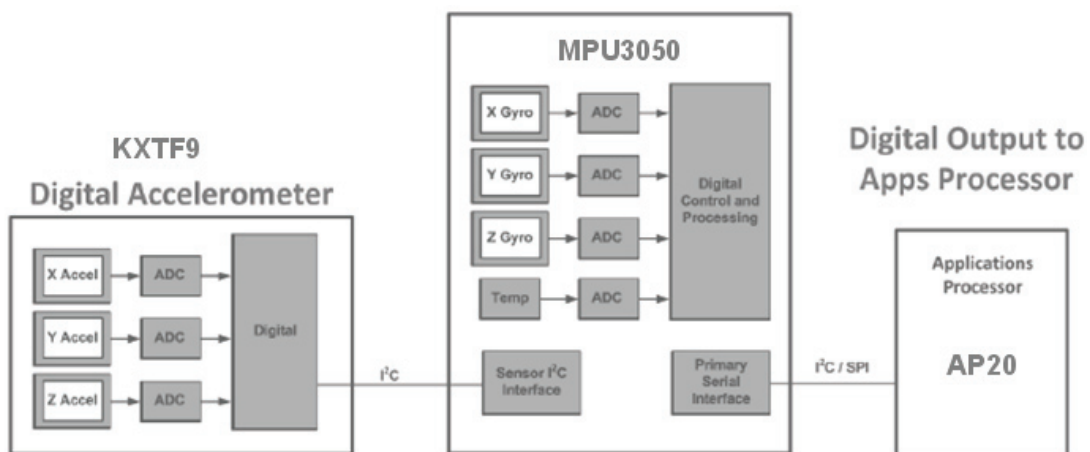
Figure. Gyro Sensor Block Diagram

3.20 Proximity Sensor

When the call is connected and the object close to the proximity sensor,

LCD backlight and Touch screen are disable operation automatically.

U101 : GP2AP002S00F IC used I2C interface to AP20H
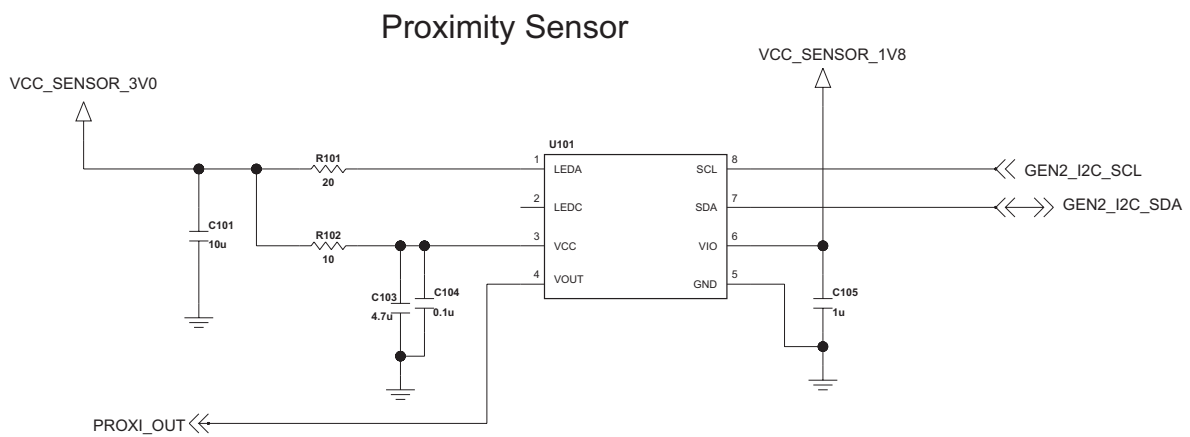
Figure. Proximity Sensor Schematic
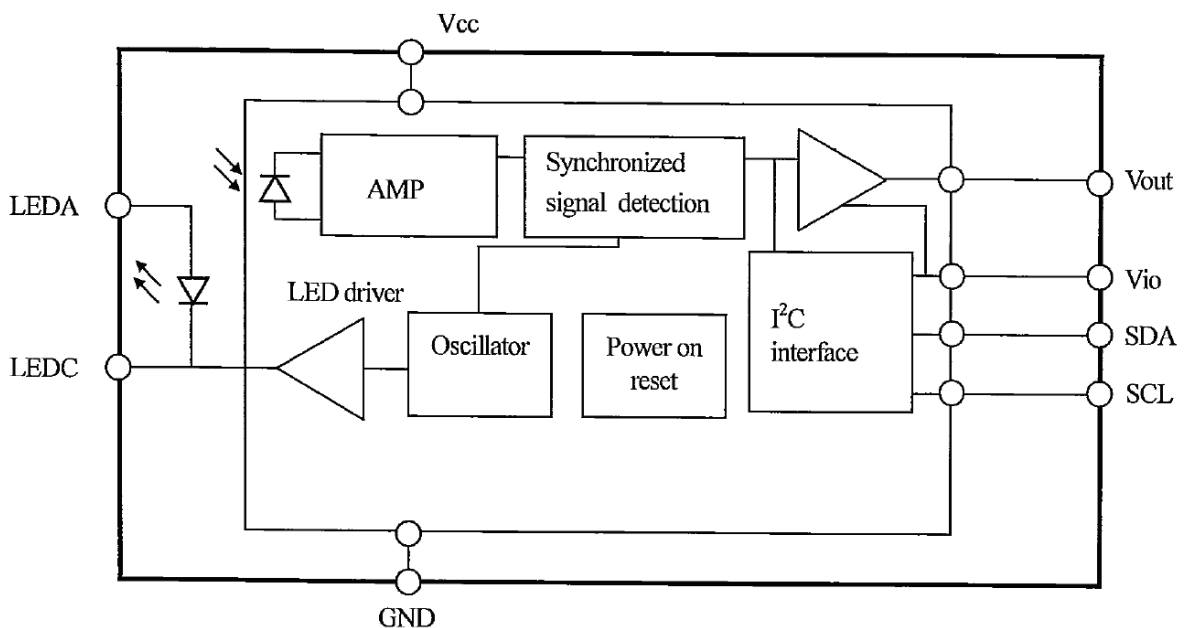
3.21 Illumination Sensor

Illumination Sensor adjusts LCD backlight current by detecting the surrounding brightness.

If user checks the automatic brightness menu, LCD backlight current adjusting is to be enable automatically.

U102 : BH1621 IC interface to AAT2870

Ambient Light Sensor
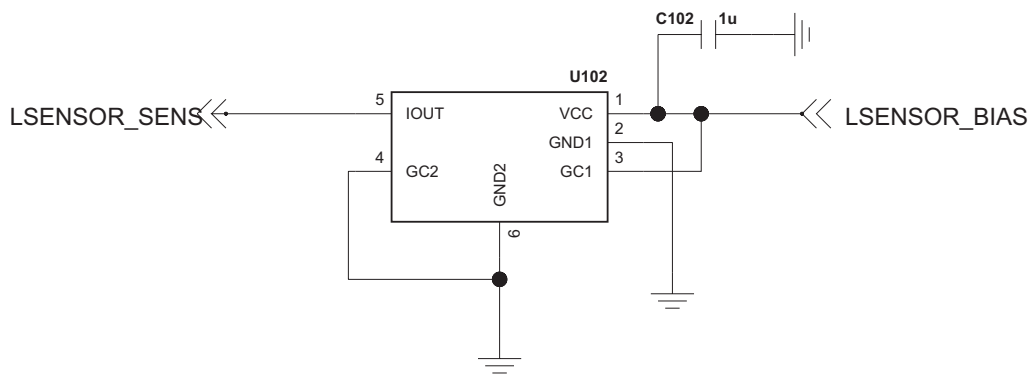
Figure. Illumination Sensor Schematic
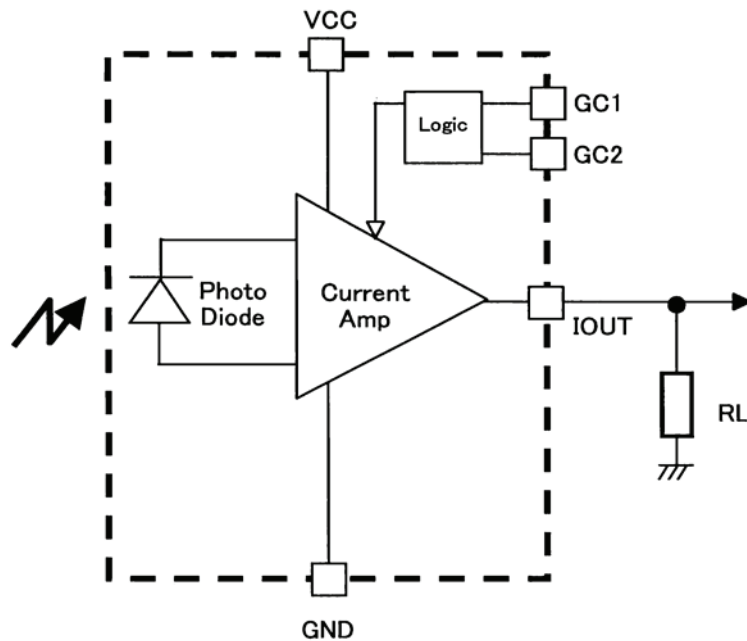
Figure. Illumination Sensor Block Diagram

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3.22 Touch Module

Touch module is connected to Main PCB with 10-pin connector.

The Touch module is controlled by I2C Interface in AP20.
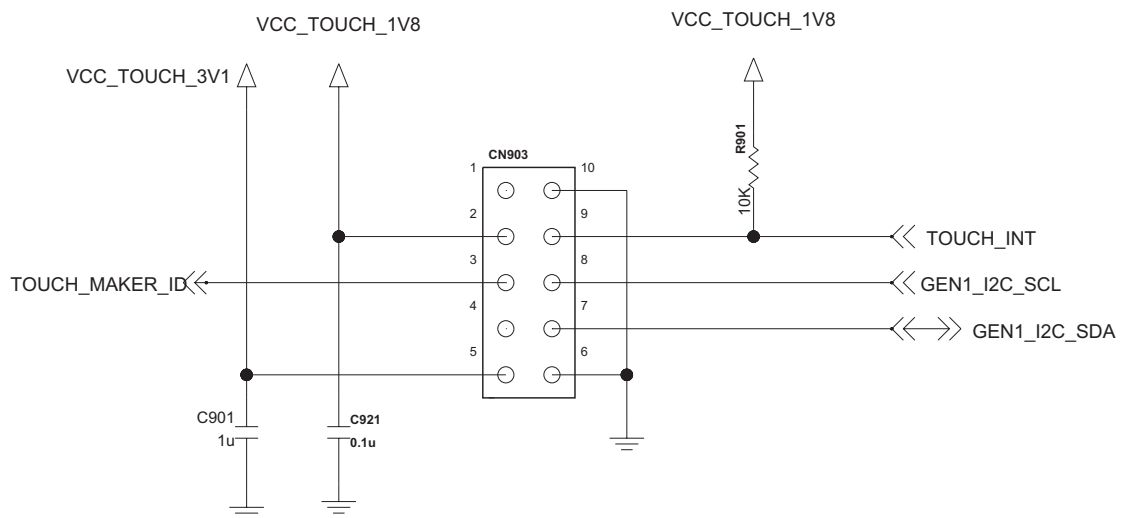
Figure. Schematic of Touch connector (Main Board)

Pin No.	Signal	description
1	NC	–
2	VCC_TOUCH_1V8	Power supply for Interface I/O
3	TOUCH_ MAKER_ID	Maker ID (Low : GND level)
4	NC	–
5	VCC_TOUCH_3V1	Power supply for driver IC
6	GND	–
7	GEN1_I2C_SDA	I2C Data
8	GEN1_I2C_SCL	I2C Clock
9	TOUCH_INT	Interrupt
10	GND	–

Table. Interface between Touch Module and MAIN Board

3.23 Main Features

3.23.1 LG-P990 Main Features

- DOP Type design

- UMTS 2100 + UMTS 1900 + UMTS900+ GSM 900 + DCS 1800 + PCS 1900 + GSM850 based

   GSM/GPRS/EDGE/UMTS

- HSDPA 7.2Mbps, HSUPA 5.7Mbps

- Main LCD(HVGA)

   TFT Main LCD(4.0", 480X800)

- Capacitive/Electrostatic Touch Window

- 8M AF Camera, 1.3M secondary camera

- 3.5Phi Stereo Headset & Speaker phone

- Mobile XMF –Mobile DLS / Scaleable Polyphony

- MP3/AMR/AAC/AAC/WAV/WMA decoder and play

- MPEG4 encoder/decoder and play/save

- JPEG en/decoder

- Supports Bluetooth and HS-USB

- Supports WLAN(802.11b, 802.11g, 802.11n)

- Supports FM Radio

- 1500 mAh (Li-Ion)

4. TROUBLE SHOOTING

4.1 RF Component
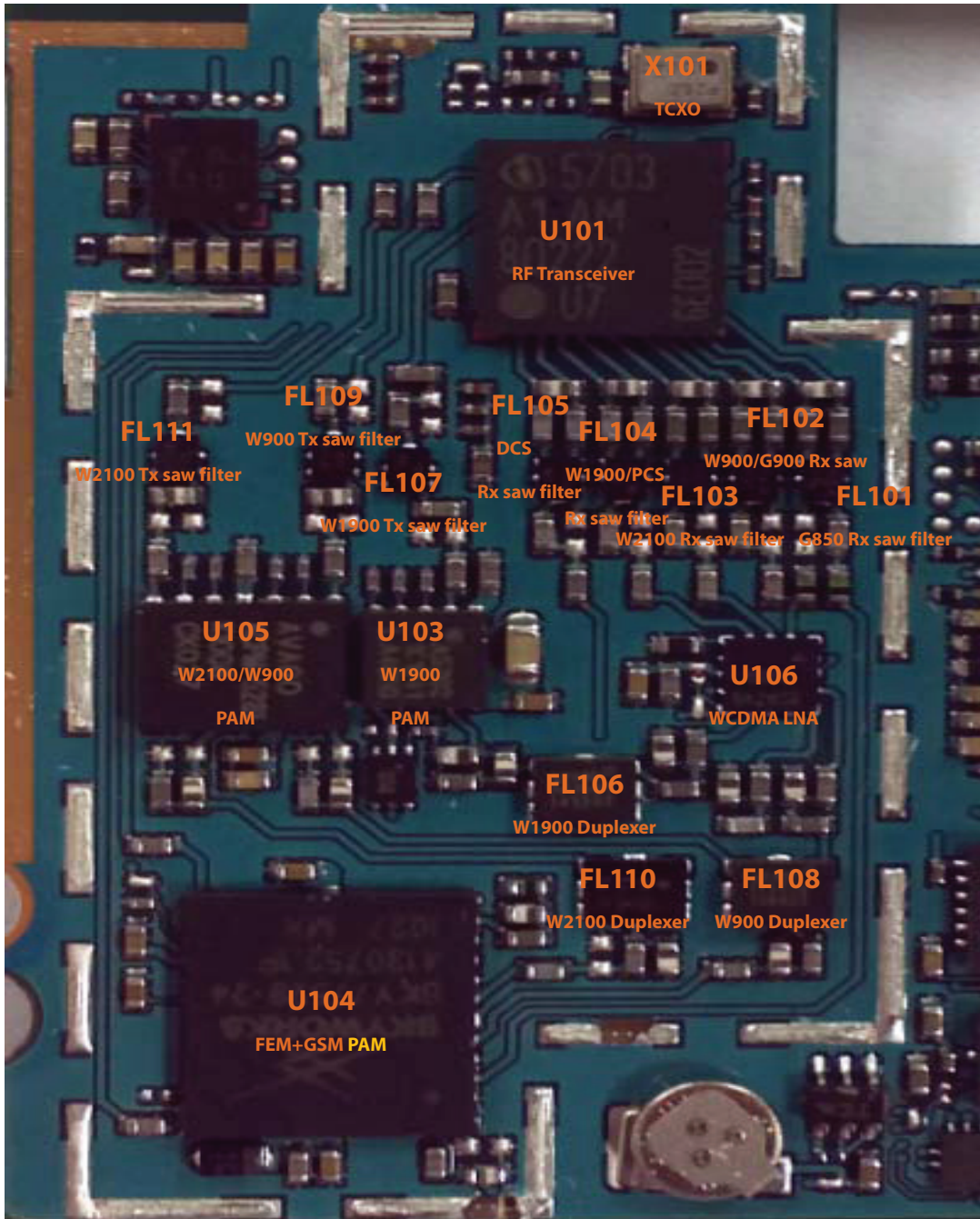
RF component (WCDMA / GSM)

Reference	Description	Reference	Description
U101	PMB5703(Transceiver)	FL108	WCDMA (VII) Duplexer
U104	GSM TX Module (FEM + GSM/EDGE PAM)	FL102	W900/GSM900 RX SAW Filter
U105	WCDMA Dual (I,VIII) PAM	FL101	GSM850 RX SAW Filter
U103	WCDMA Single (II) PAM	FL103	W2100 RX SAW Filter
FL111	WCDMA (I) TX SAW Filter	FL104	W1900/PCS RX SAW Filter
FL107	WCDMA (II) TX SAW Filter	FL105	DCS RX SAW Filter
FL109	WCDMA (VIII) TX SAW Filter	U106	WCDMA (I,II, VIII) LNA
FL110	WCDMA (I) Duplexer	X101	TC-VCXO(26MHz)
FL106	WCDMA (II) Duplexer		

4.2 SIGNAL PATH
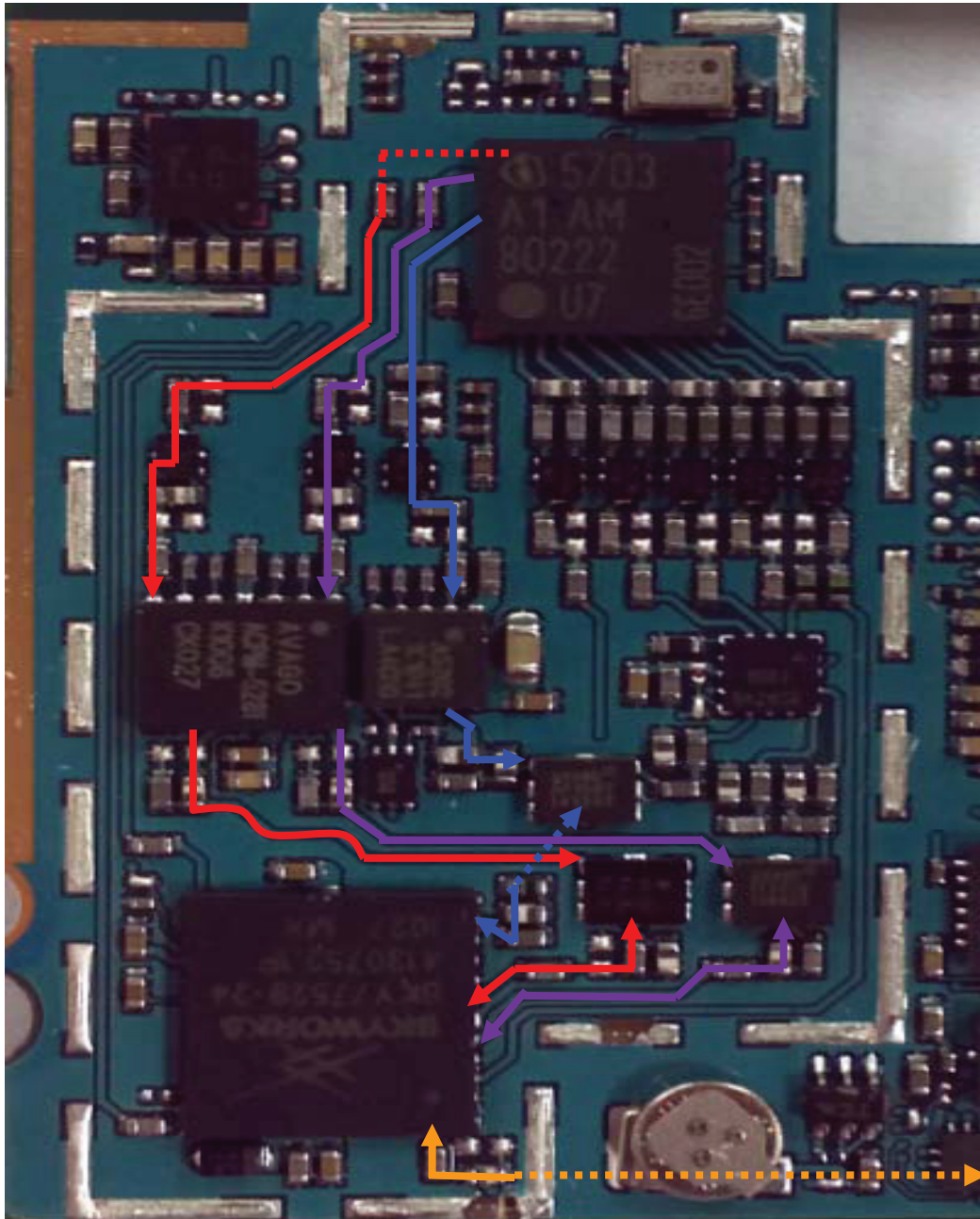
WCDMA I, II and VIII Band TX Signal PATH

A. WCDMA 2100 TX PATH

B. WCDMA 1900 TX PATH

C. WCDMA 900 TX PATH
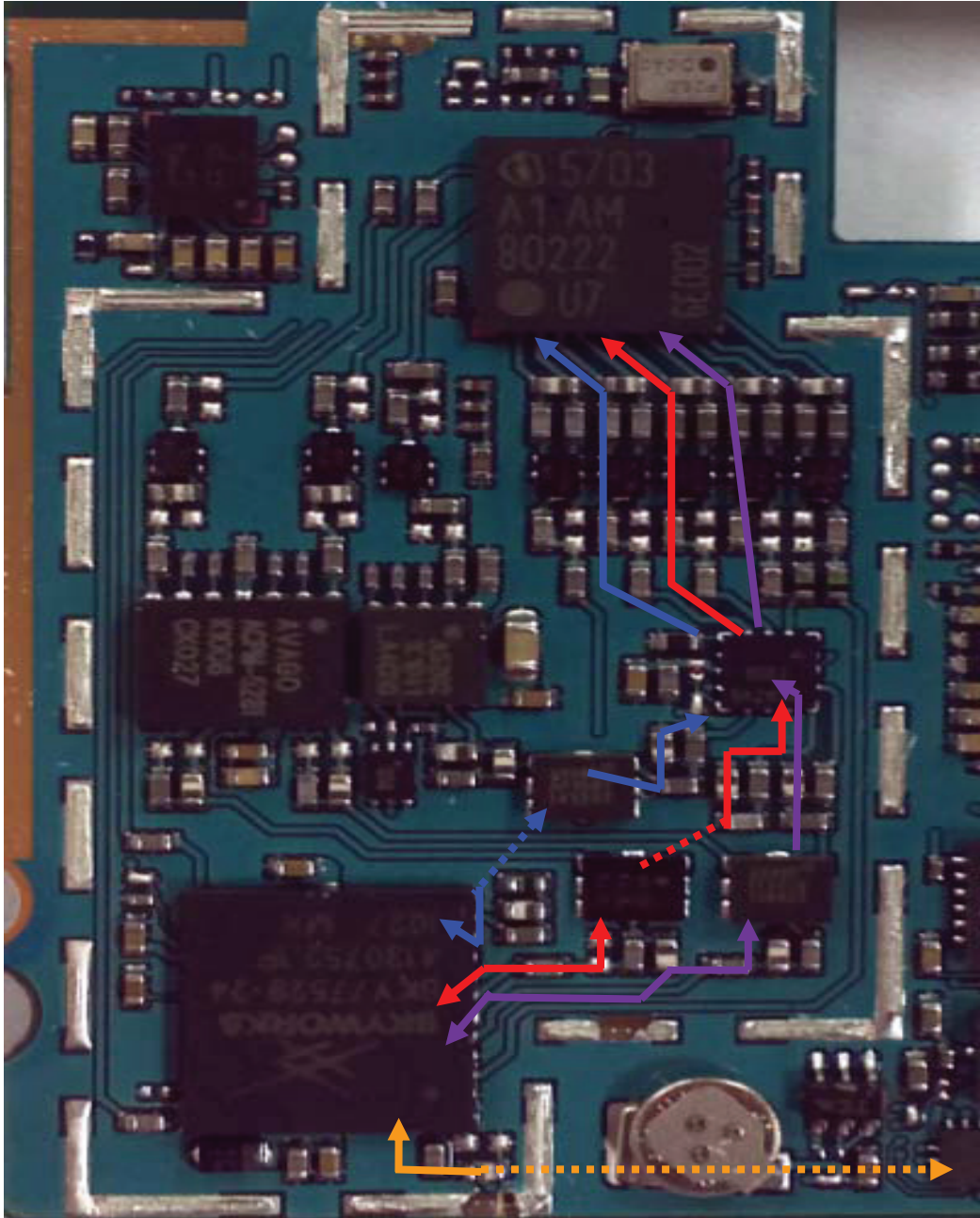
D. COMMON TX/RX PATH

WCDMA BAND I and VIII RX Signal PATH

A. WCDMA 2100 RX PATH

B. WCDMA 1900 RX PATH

C. WCDMA 900 TX PATH
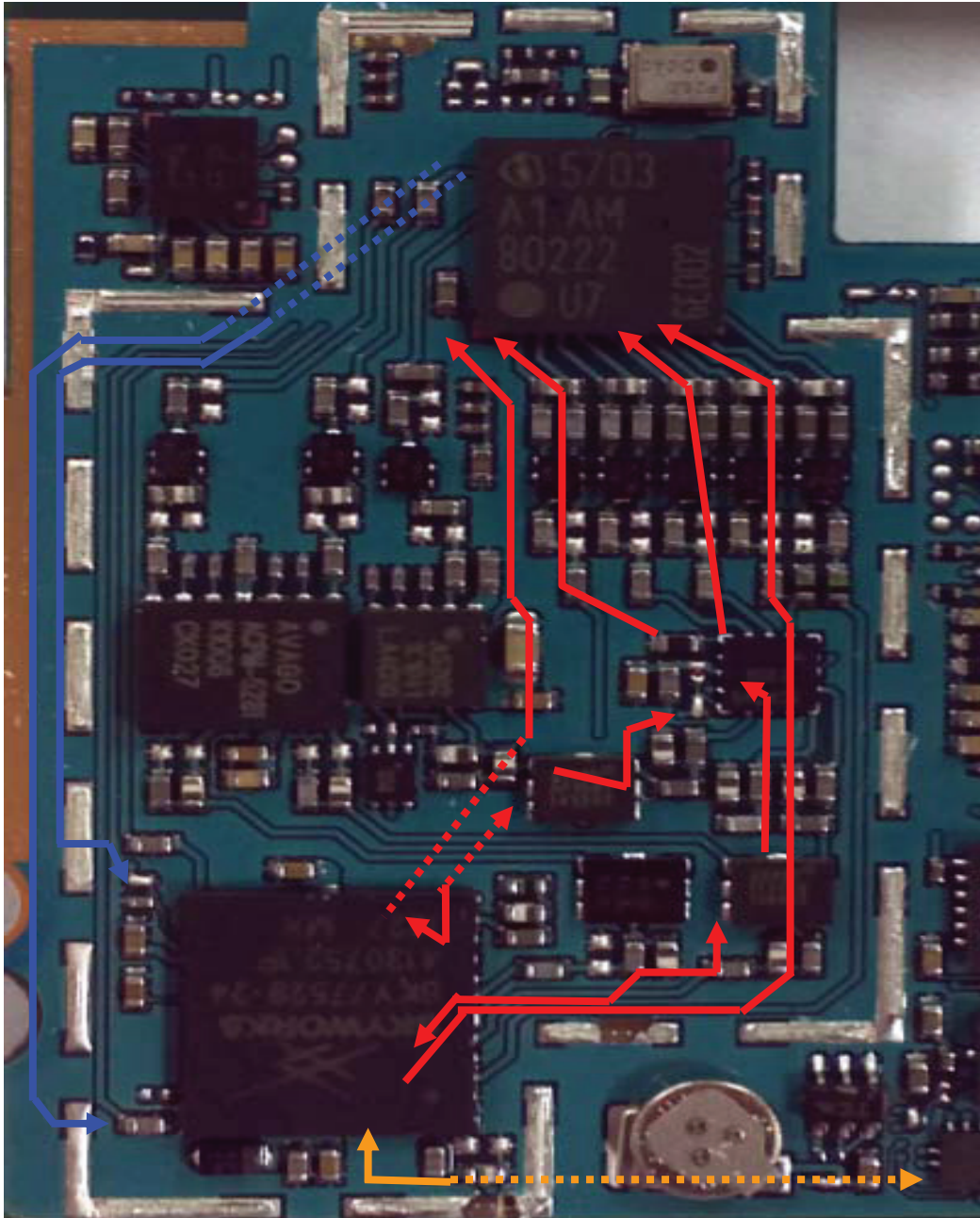
D. COMMON TX/RX PATH

GSM850/GSM900/DCS/PCS's RX/TX Signal PATH

A. GSM850/GSM900/DCS1800/PCS1900 RX PATH

B. GSM850/GSM900/DCS1800/PCS1900 TX PATH

C. COMMON TX/RX PATH

4.3 Checking TCXO Block

The output frequency (26MHz) of TCXO (X101) is used as the reference one of PMB5703
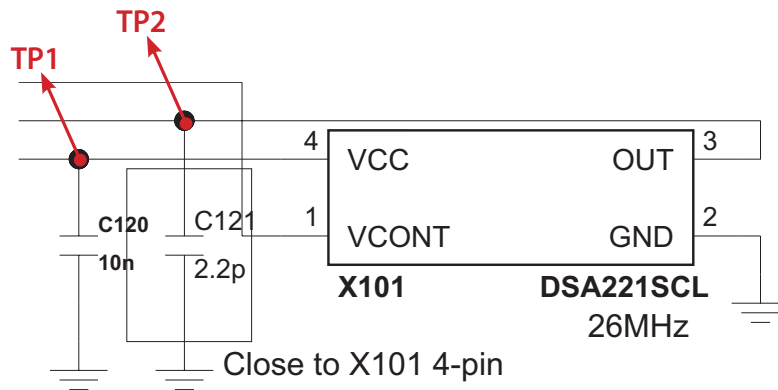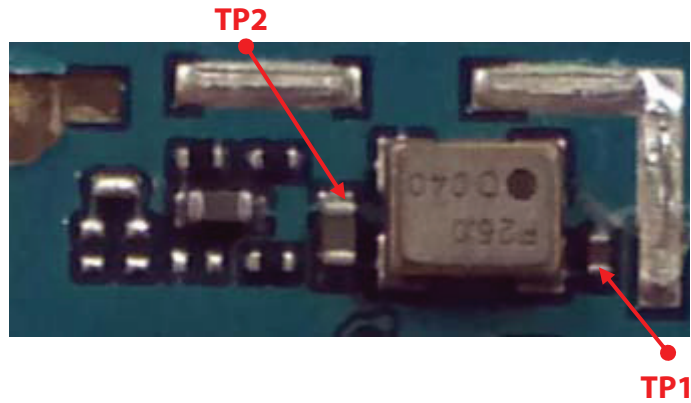
Schematic of the Crystal Part (26MHz)

```
┌─────────────────────┐
│   Check TP1         │
│   VCC of TCXO       │
└─────────────────────┘
          │
          ▼
     ╱─────────────╲                No      ┌──────────────────────┐
    ╱ 2.45V ≥ VCC ≥ ╲ ──────────────────────▶│  Check the PMB5703   │
    ╲    2.6V      ╱                          └──────────────────────┘
     ╲─────────────╱
          │ Yes
          ▼
┌─────────────────────┐
│   Check TP2         │
└─────────────────────┘
          │
          ▼
     ╱─────────────╲                No      ┌──────────────────────┐
    ╱  26 MHz Signal ╲ ─────────────────────▶│  Check soldering and │
    ╲               ╱                        │     components        │
     ╲─────────────╱                         └──────────────────────┘
          │ Yes
          ▼
┌─────────────────────┐
│   TCXO is OK        │
└─────────────────────┘
```
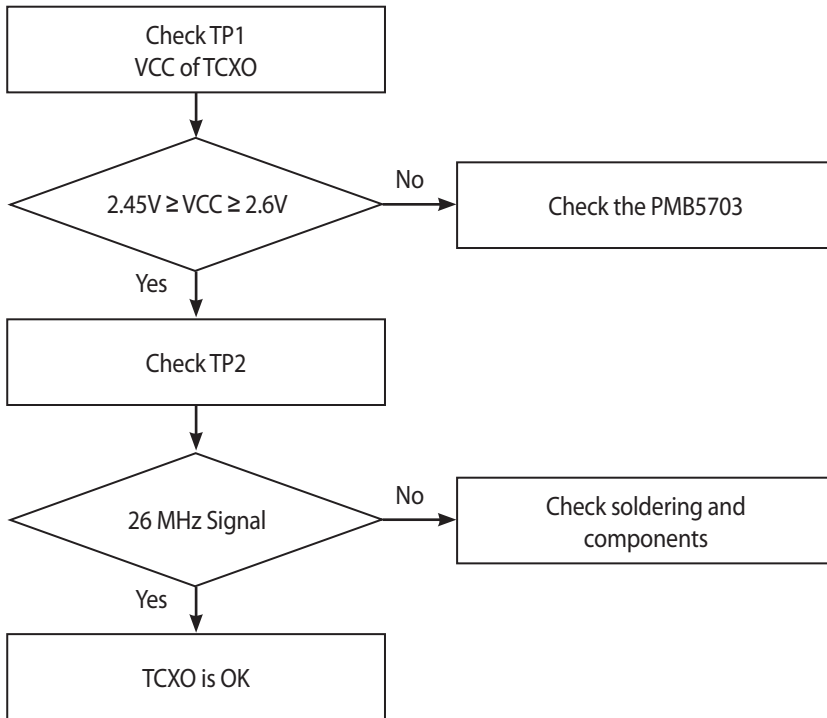
4.4 Checking GSM TX Module(GSM PAM + FEM) Block
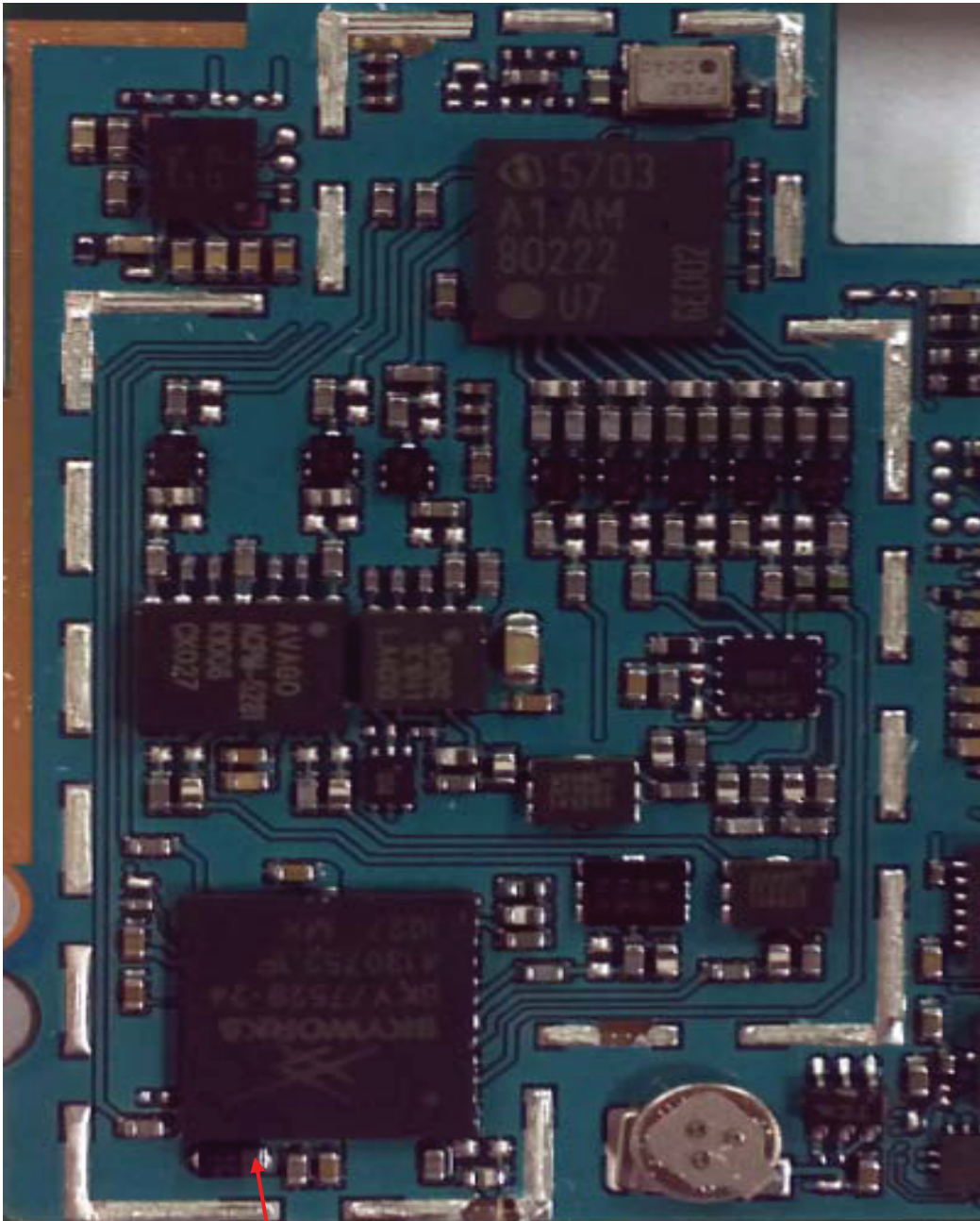
VBATT(TP1)
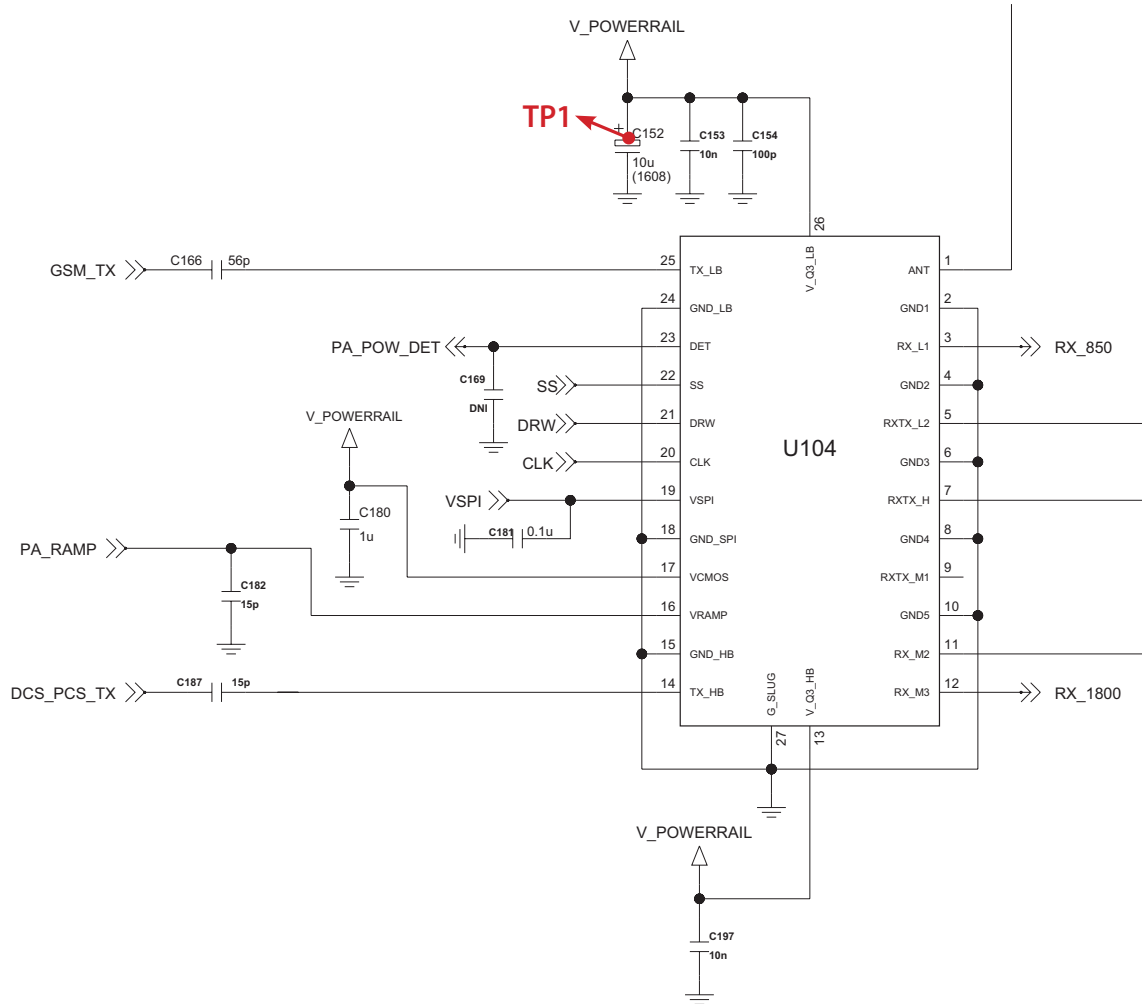
Schematic of the Antenna Switch Block

D0			Band Select		D10	D9		Sensor Configuration		
0			Low band		0	0		Current sensor FB Off		
1			High bond		0	1		Current sensor FB Off		
D1			Mode Select		1	0		Current sensor FB Off		
0			GMSK		1	1		Current sensor FB Off		
1			SPSK							
D2			Tx Enable		D15			FE Bcost Comenter		
0			PA off		0			Off		
1			PA On		1			On		
D5	D4	D3	Current Sensor		D14	D13	D12	D11	FE Status	
			Mode-GMSDK	Mode-SPSK						
0	0	0	1.6A	0.6A	0	0	0	0	Off	
0	0	1	1.7A	0.7A	0	0	0	1	Tx-M GMSK ANT1	
0	1	0	1.8A	0.8A	0	0	1	0	Tx-L GMSK ANT1	
0	1	1	1.9A	0.9A	0	0	1	1	Reserved	
1	0	0	2.0A	1.0A	0	1	0	0	Rx-L1	
1	0	1	2.1A	1.1A	0	1	0	1	Rx-M2	
1	1	0	2.2A	1.2A	0	1	1	0	Rx-M3	
1	1	1	2.3A	1.3A	0	1	1	1	Reserved	
D8	D7	D6	Not Assigned to Specifiic Runction		1	0	0	0	Rx/Tx-L2	
0	0	0	Defaut		1	0	0	1	Rx/Tx-M1	
0	0	1			1	0	1	0	Rx/Tx-H	
0	1	0			1	0	1	1	Reserved	
0	1	1			1	1	0	0	Reserved	
1	0	0			1	1	0	1	Tx-M GMSK ANT2	
1	0	1			1	1	1	0	Tx-L GMSK ANT2	
1	1	0			1	1	1	1	Reserved	
1	1	1								

Checking Switch Block Power Source

```
┌─────────────────────────┐
│   PAM Vbatt of Check TP1 │
└─────────────────────────┘
             │
             ▼
         ◇─────────◇           No   ┌──────────────────────────────┐
        2.9V < VCC < 5V  ──────────▶│ Replace the GSM Module(U104)  │
         ◇─────────◇                └──────────────────────────────┘
             │
            Yes
             │
             ▼
┌─────────────────────────┐
│ Check the Logic in each mode │
└─────────────────────────┘
```

4.5 Checking WCDMA Block

```
      ╭─────────────────────╮
      │        START         │
      ╰─────────────────────╯
                │
                ▼
            ◇─────────◇
      1. Check TCXO 26MHz
            ◇─────────◇
                │
                ▼
            ◇─────────◇
        2. Check FEM Block
          Refer to 1.4
            ◇─────────◇
                │
                ▼
            ◇─────────◇
        3. Check RF Tx Level
            ◇─────────◇
                │
                ▼
            ◇─────────◇
        4. Check PAM Block
          Refer to 1.5.4
            ◇─────────◇
                │
                ▼
            ◇─────────◇
        5. Check RF Level
            ◇─────────◇
                │
                ▼
      ┌─────────────────────┐
      │ 6. Ro-download SW & Cal. │
      └─────────────────────┘
```
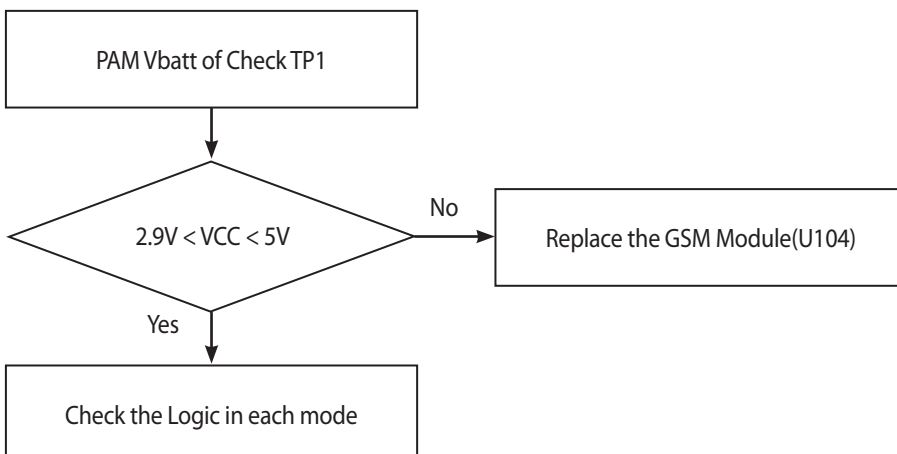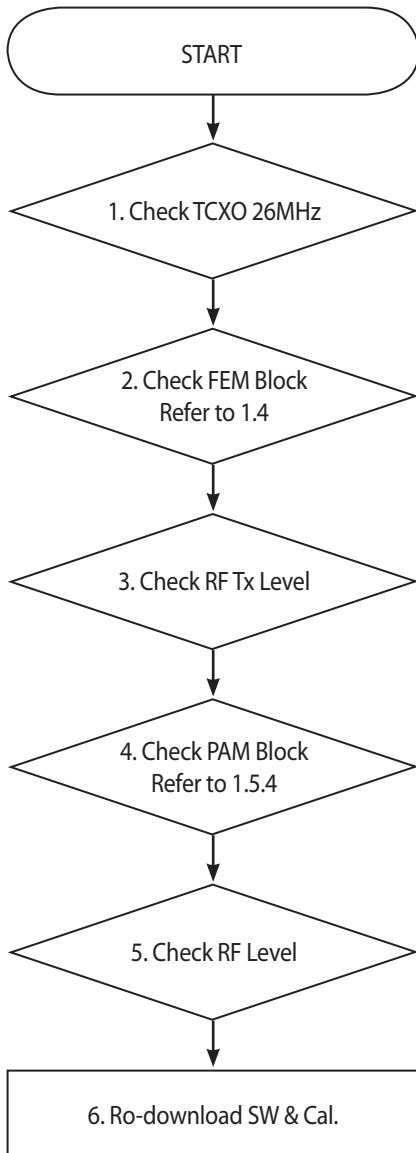
4.5.1 Checking TCXO Block

Refer to 1.3

4.5.2. Checking FEM Block

Refer to 1.4

4.5.3. Checking RF TX Level
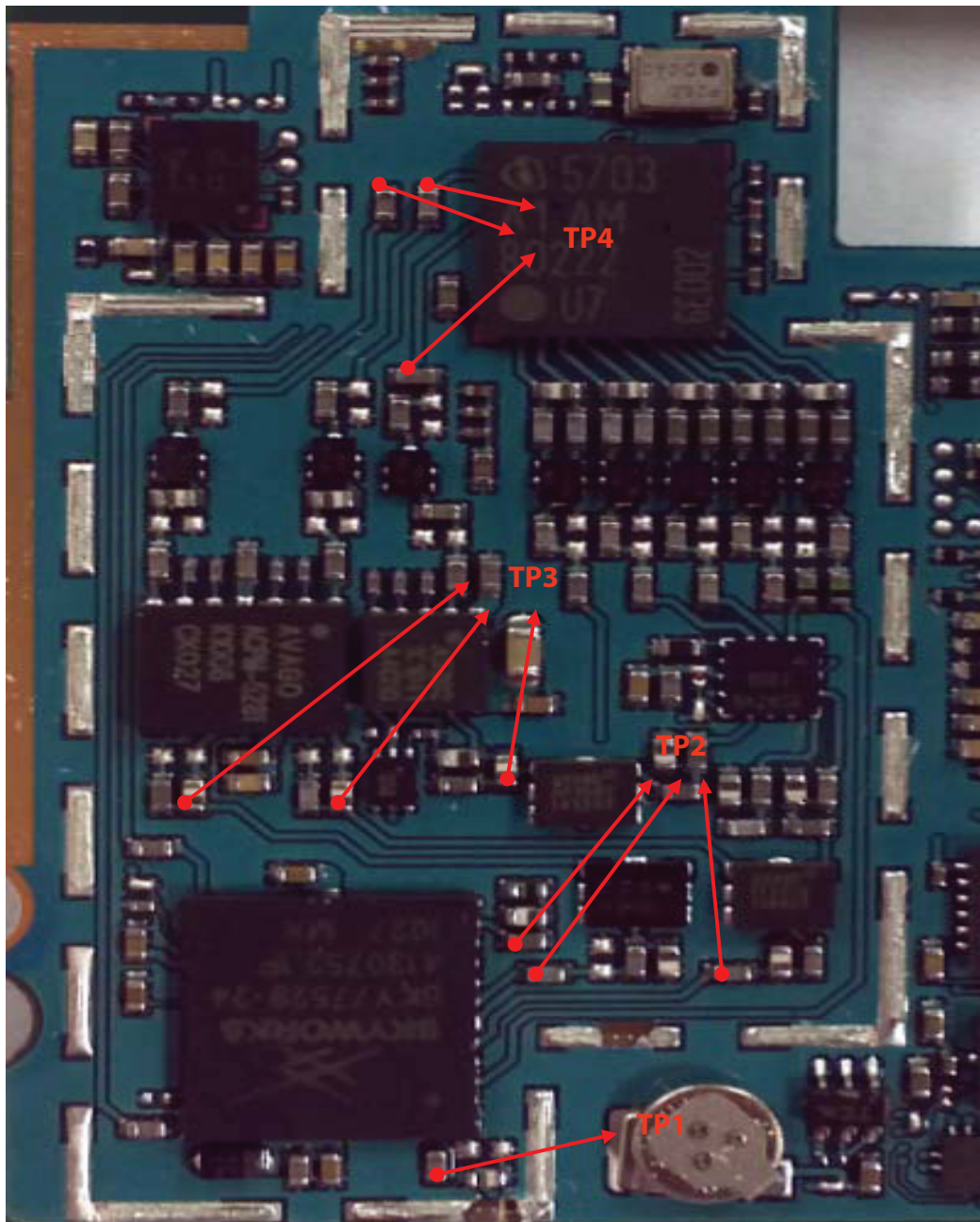
Test Point (TX Level)
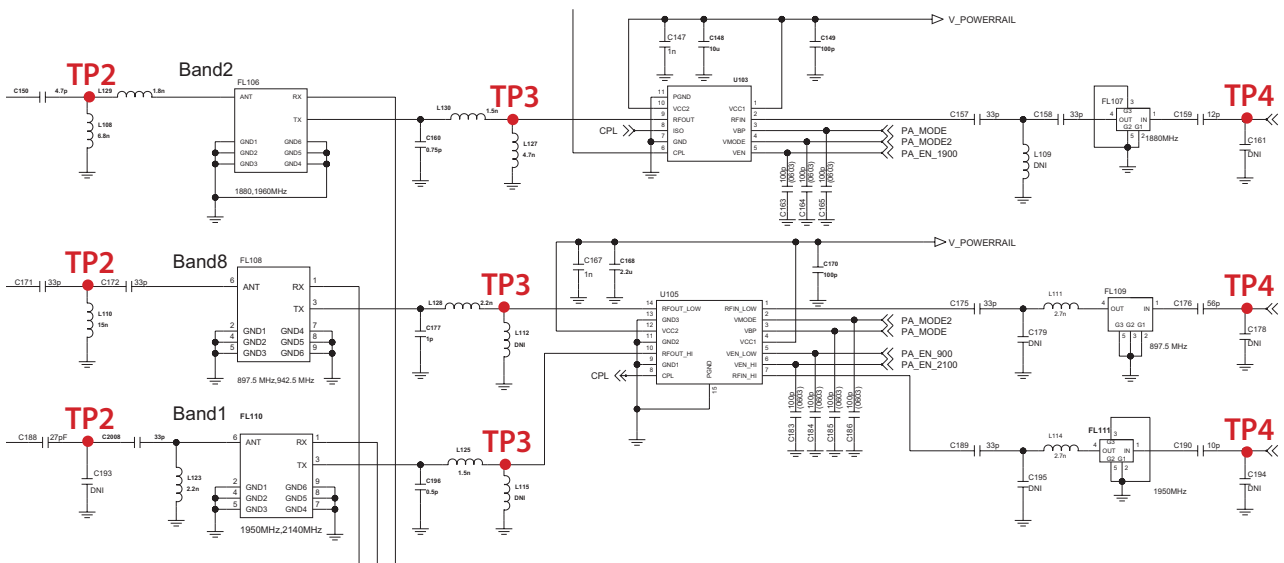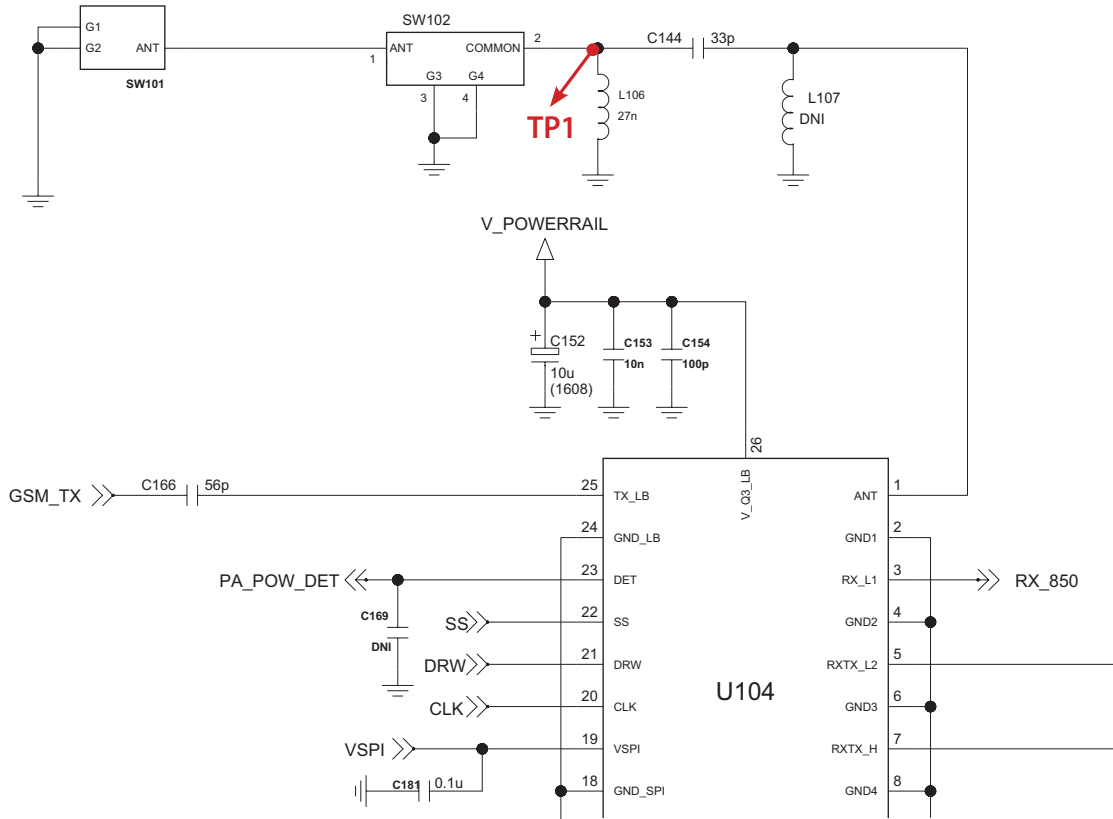
For testing, Max power output is needed.

```
┌──────────────────────────┐
│     Check Power Level     │
└──────────────────────────┘
              │
              ▼
        ╱────────────╲          Yes      ┌──────────────────────────┐
       ╱ Check TP1     ╲ ─────────────────▶│     RF Tx Level is OK     │
       ╲ Over 21dBm?   ╱                   └──────────────────────────┘
        ╲────────────╱
              │ No
              ▼
        ╱────────────╲          Yes      ┌──────────────────────────┐
       ╱ Check TP2     ╲ ─────────────────▶│     Check TX Module       │
       ╲ Over 21dBm?   ╱                   └──────────────────────────┘
        ╲────────────╱
              │ No
              ▼
        ╱────────────╲          Yes      ┌──────────────────────────┐
       ╱ Check TP3     ╲ ─────────────────▶│      Check Duplexer       │
       ╲ Over 21dBm?   ╱                   └──────────────────────────┘
        ╲────────────╱
              │ No
              ▼
        ╱────────────╲          Yes      ┌──────────────────────────┐
       ╱ Check TP4     ╲ ─────────────────▶│      Check PMB5703        │
       ╲ Over 7dBm?    ╱                   └──────────────────────────┘
        ╲────────────╱
              │ No
              ▼
┌──────────────────────────┐
│     Check PAM Block       │
│     Refer to 1.5.4        │
└──────────────────────────┘
```
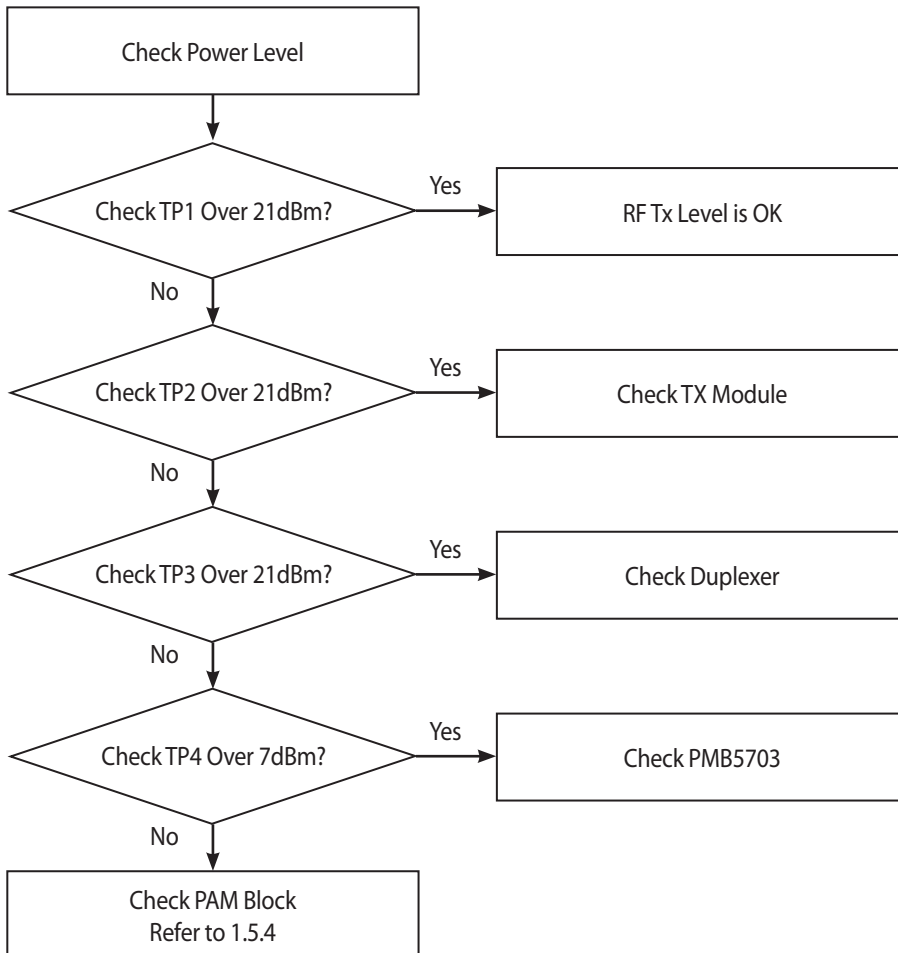
PMB5703 Maximum output Power = 7 dBm
PMB5703 minimum output Power = -73 dBm

4.5.4 Checking PAM Block

PAM control signal

W_PA_EN (W_900_PA_EN(C184),W_1900_PA_EN(C163) W_2100_PA_EN(C183) and) : PAM Enable

W_PA_MODE1,2: PAM Gain Control

W_PA_EN must be HIGH (over 2.6V)

PAM IN/OUT Signal :

When PAM is under the operation of high power mode

(WCDW_PA_Mode(C165,C185):Low,   WCDMA_PA_Mode2(C164,C186):Low),

PAM OUT power must be over 21 dBm

PAM IN power must be under 10 dBm

```
┌─────────────────────────┐
│  Set the phone Tx is ON and │
│       AGC is 700         │
└─────────────────────────┘
              │
              ▼
         ◇ Check TP3 Over 21dBm? ◇ ──Yes──▶ ┌──────────────────┐
              │                              │  RF Tx Level is OK │
              No                             └──────────────────┘
              ▼
         ◇ Check TP2 PA_MODE2 ≥ 0.5 V ◇ ──Yes──▶ ┌──────────────┐
              │                                   │ Check PMB5703 │
              No                                  └──────────────┘
              ▼
         ◇ Check TP1 Over 10 dBm? ◇ ──Yes──▶ ┌──────────────┐
              │                               │ Check PMB5703 │
              No                              └──────────────┘
              ▼
       ┌──────────────────┐
       │  Change the board │
       └──────────────────┘
```
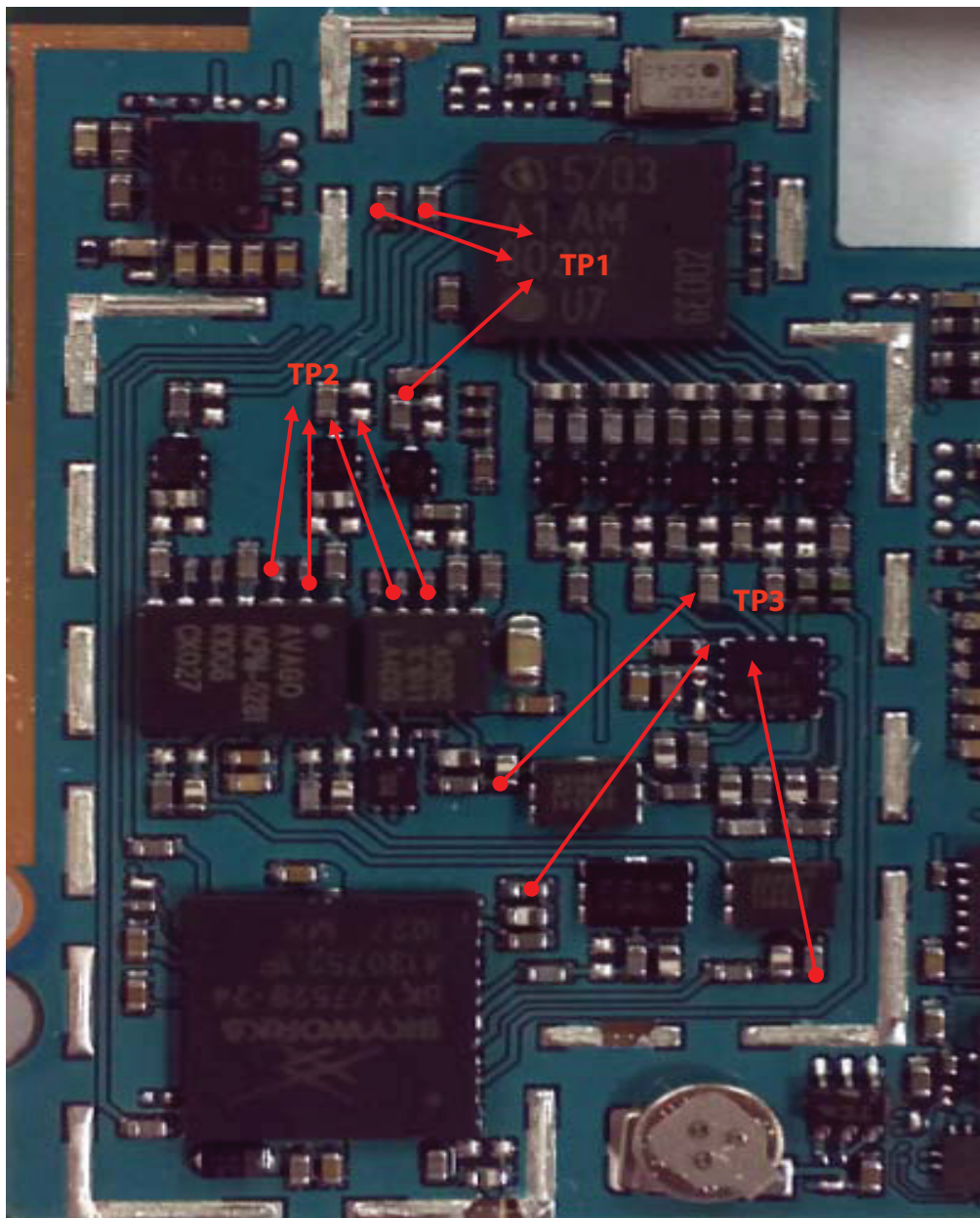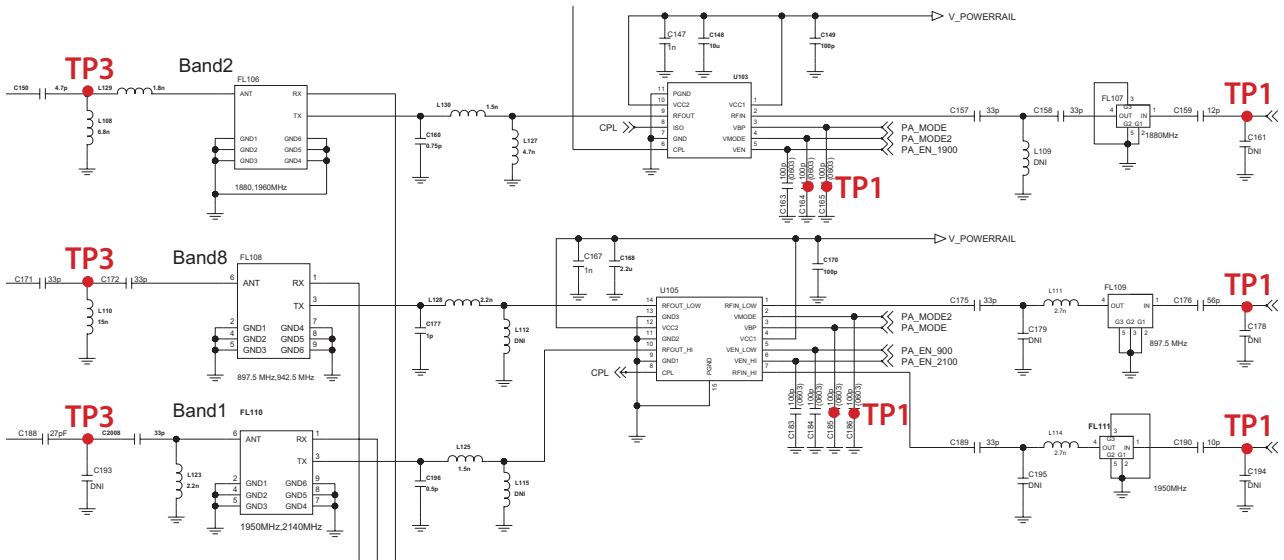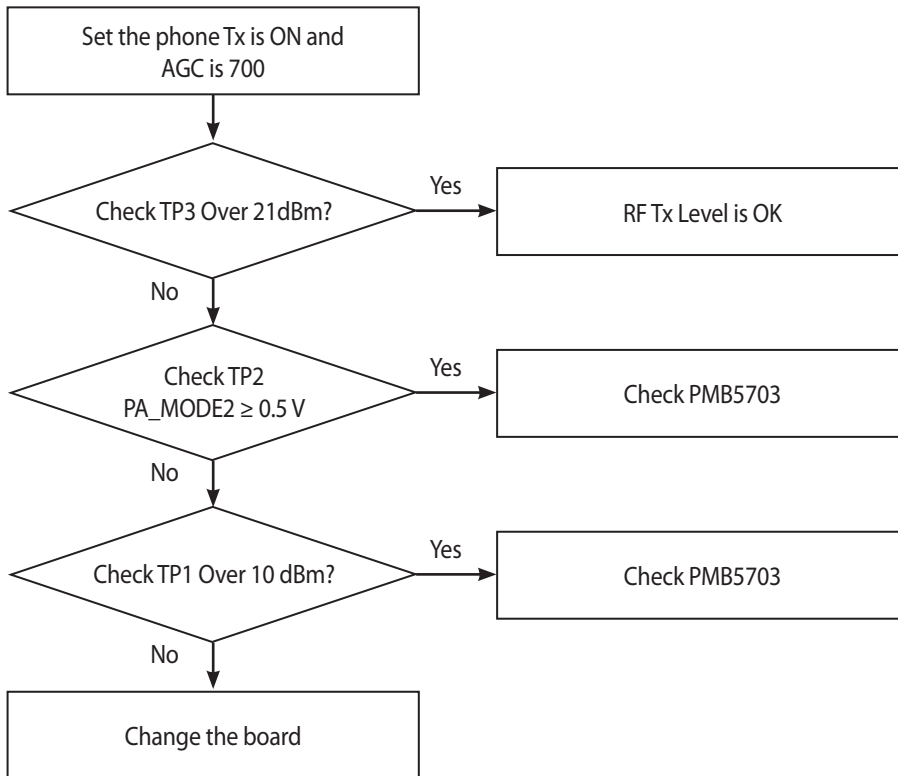
4.5.5. Checking RF Rx Level

Test Point (RF Rx Level)

2.85V_RF1

Bias

C198 2.4p   C199 8.2p
TP3
L116 2.7n

C2000 10n   C2001 10p

LNA_CTRL3

R125 DNI
U106

LNA_CTRL4

9	VON	RFGND4	VCC	VGS	RREF	5	R121 27K (1%)	RFOUTM
10	RFIN2				RFOUT2	4		
11	RFIN1				RFOUT1/4	3		RFOUTH
12	RFGND1/2				RFOUT5	2		RFOUTL
13	RFIN4				NC	1		
		RFIN5	VEN2	VEN1	GND	17		

8 7 6
14 15 16

C2003 4.3p   C2004 18p
TP3
L118 2.7n

LNA_CTRL1

C2005 2p   C2007 18p
TP3
L120 8.2n

LNA_CTRL2

TP5
C106 8.2p
RFOUTL   C107   33p **TP4** C108 47pF   FL102   RX_900_L1X
L124 8.2n   C112 DNI   2 3 G1 O1 G2 O2 1   L102 12n
5 4
942.5MHz   C111 8.2p
RX_900_L1

Band8/GSM900

TP5
C114 8.2pF
RFOUTH   C115 47pF **TP4** C116 47pF   FL103   RX_2100_HX
C117 DNI   2 3 G1 O1 G2 O2 1   L103 5.6n
5 4
2140MHz   C118 8.2pF
RX_2100_H

Band1

TP5
FL104   C119 2.5p
RFOUTM   C122 56p **TP4** C123 47p   IN O2 O1 G1G2   RX_1900_M2
C125 DNI   1 4 3   L104 5.6n
1960MHz 2 5   C126 2.5p
RX_1900_M2X

Band2/PCS

```
┌─────────────────────────┐
│   Set the phone Rx is On │
└─────────────────────────┘
             │
             ▼
         ╱───────────╲              No    ┌──────────────────────────┐
        ╱  Check BIAS  ╲ ──────────────────│ Check bias block soldering│
        ╲  over 2.85 V ╱                   └──────────────────────────┘
         ╲───────────╱
             │ Yes
             ▼
         ╱───────────╲              No    ┌──────────────────────────┐
        ╱ Check TP1    ╲ ──────────────────│   Check RF Switch (M/S)   │
        ╲ Signal exist?╱                   └──────────────────────────┘
         ╲───────────╱
             │ Yes
             ▼
         ╱───────────╲              No    ┌──────────────────────────┐
        ╱ Check TP2    ╲ ──────────────────│  Check TX Module Refer 1.4│
        ╲ Signal exist?╱                   └──────────────────────────┘
         ╲───────────╱
             │ Yes
             ▼
         ╱───────────╲              No    ┌──────────────────────────┐
        ╱ Check TP3    ╲ ──────────────────│      Check Duplexer       │
        ╲ Signal exist?╱                   └──────────────────────────┘
         ╲───────────╱
             │ Yes
             ▼
         ╱───────────╲              No    ┌──────────────────────────┐
        ╱ Check TP4    ╲ ──────────────────│        Check LNA          │
        ╲ Signal exist?╱                   └──────────────────────────┘
         ╲───────────╱
             │ Yes
             ▼
         ╱───────────╲              No    ┌──────────────────────────┐
        ╱ Check TP5    ╲ ──────────────────│ Check PMB5703 and Rx SAW  │
        ╲ Signal exist?╱                   │         filter            │
         ╲───────────╱                     └──────────────────────────┘
             │ Yes
             ▼
┌─────────────────────────┐
│     Change the board     │
└─────────────────────────┘
```

4.6 Checking GSM Block

```
         ┌─────────────────┐
         │      START      │
         └─────────────────┘
                  │
                  ▼
          ◇ 1. Check TCXO Block ◇
                  │
                  ▼
          ◇ 2. Check ANT.SW Module ◇
                  │
                  ▼
          ◇ 3. Check RF TRX Level ◇
                  │
                  ▼
         ┌─────────────────────────┐
         │ 4. Ro-download SW & Cal. │
         └─────────────────────────┘
```

4.6.1 Checking TCXO Block

Refer to 1.3

4.6.2 Checking FEM Block

Refer to 1.4

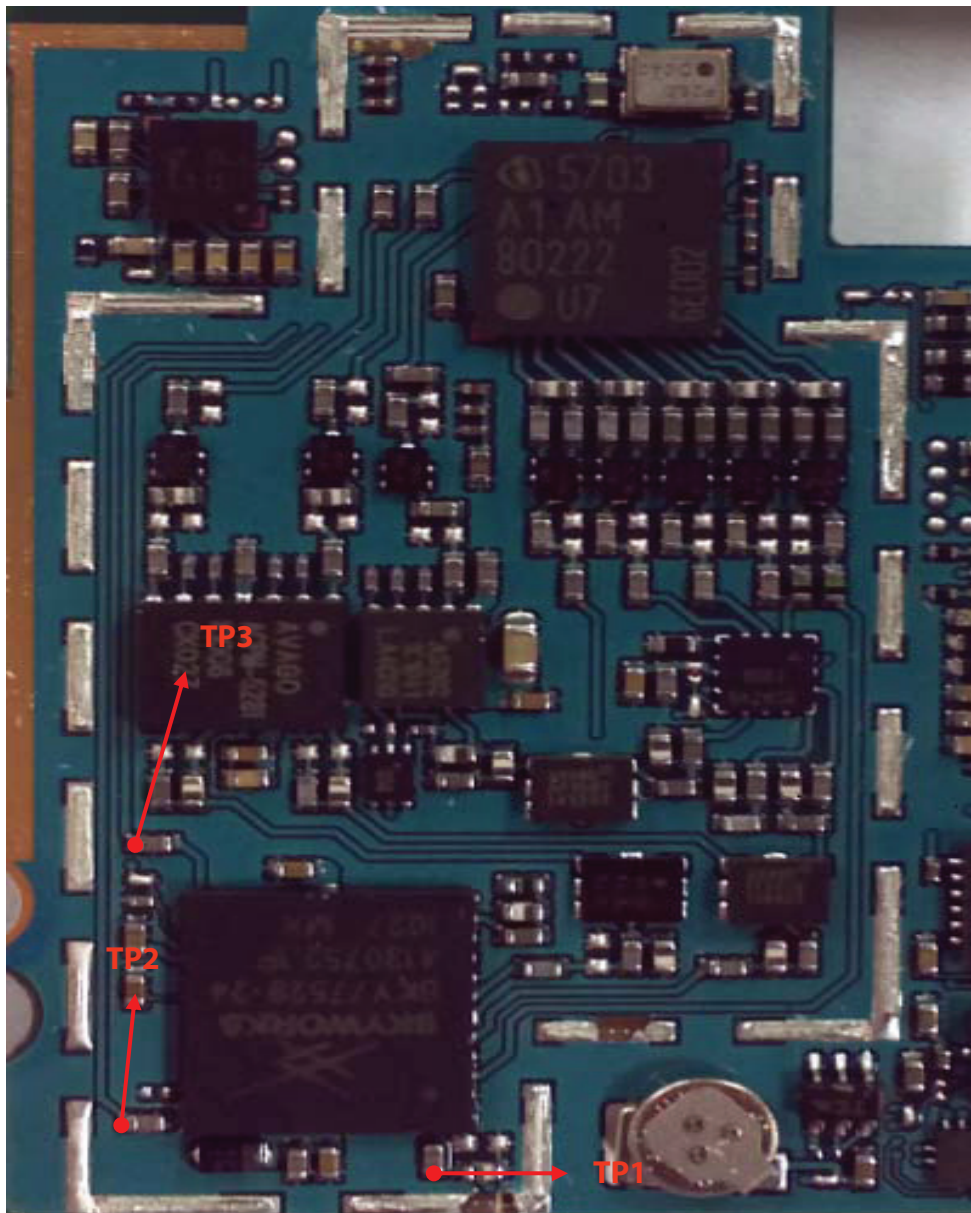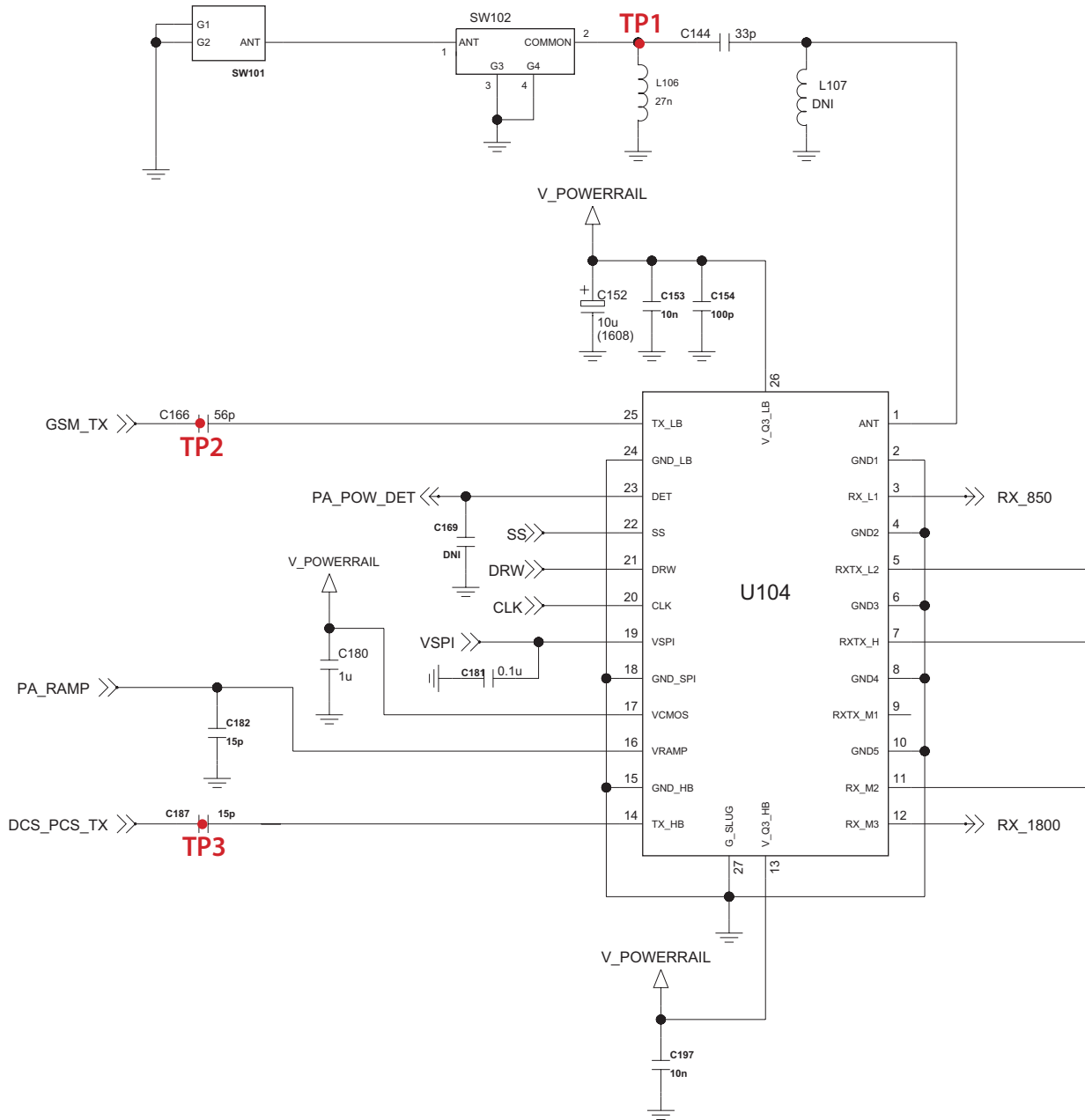### 4.6.3 Checking RF TX level

Schematic of GSM/DCS/PCS Tx Block

START

↓

Check TCXO Block Refer to 1.3

No ↓

Check TP1
If GSM over 31 dBm?
If DCS/PCS over 28 dBm? —— Yes →

GSM/DCS/PCS Tx is OK
Check other part

No ↓

Check TP2, 3
If GSM(TP2) under 7 dBm?
If DCS/PCS(TP3) over 7 dBm? —— Yes →

Check ANT.SW Block (ASM+EDGR PAM)
Refer to 1.4

No ↓

Check PMB5703 & PAD —— No Problem →

Check soldering and components

Still exist Problem ↓

Change the board

4.6.4 Checking RF Rx Block

```
┌─────────────────────────────┐
│     Set the phone Rx is On   │
└─────────────────────────────┘
              │
              ▼
         ╱─────────╲           No    ┌─────────────────────────────┐
        ╱ Check TP1  ╲ ───────────▶  │    Check RF Switch (M/S)     │
        ╲ Signal exist? ╱            └─────────────────────────────┘
         ╲─────────╱
           │ Yes
           ▼
         ╱─────────╲           No    ┌─────────────────────────────┐
        ╱ Check TP2  ╲ ───────────▶  │   Check FEM Block Refer 1.4  │
        ╲ Signal exist? ╱            └─────────────────────────────┘
         ╲─────────╱
           │ Yes
           ▼
┌─────────────────────────────┐
│       Change the board       │
└─────────────────────────────┘
```
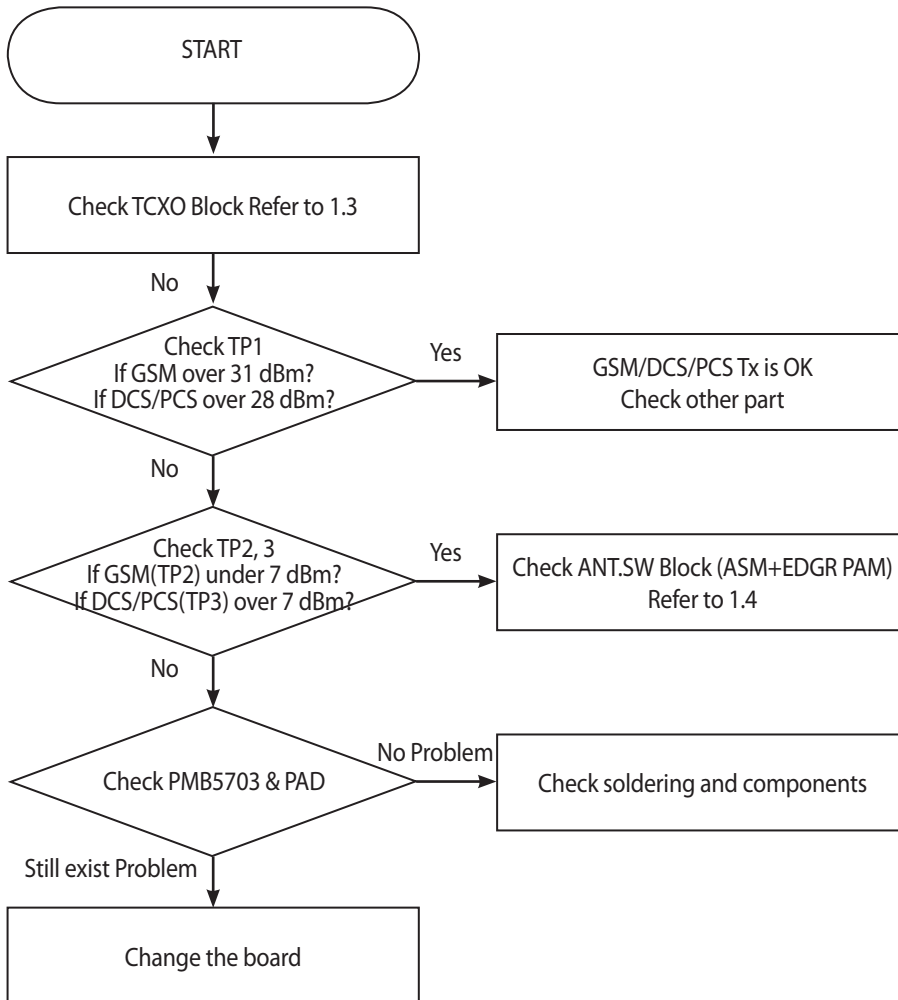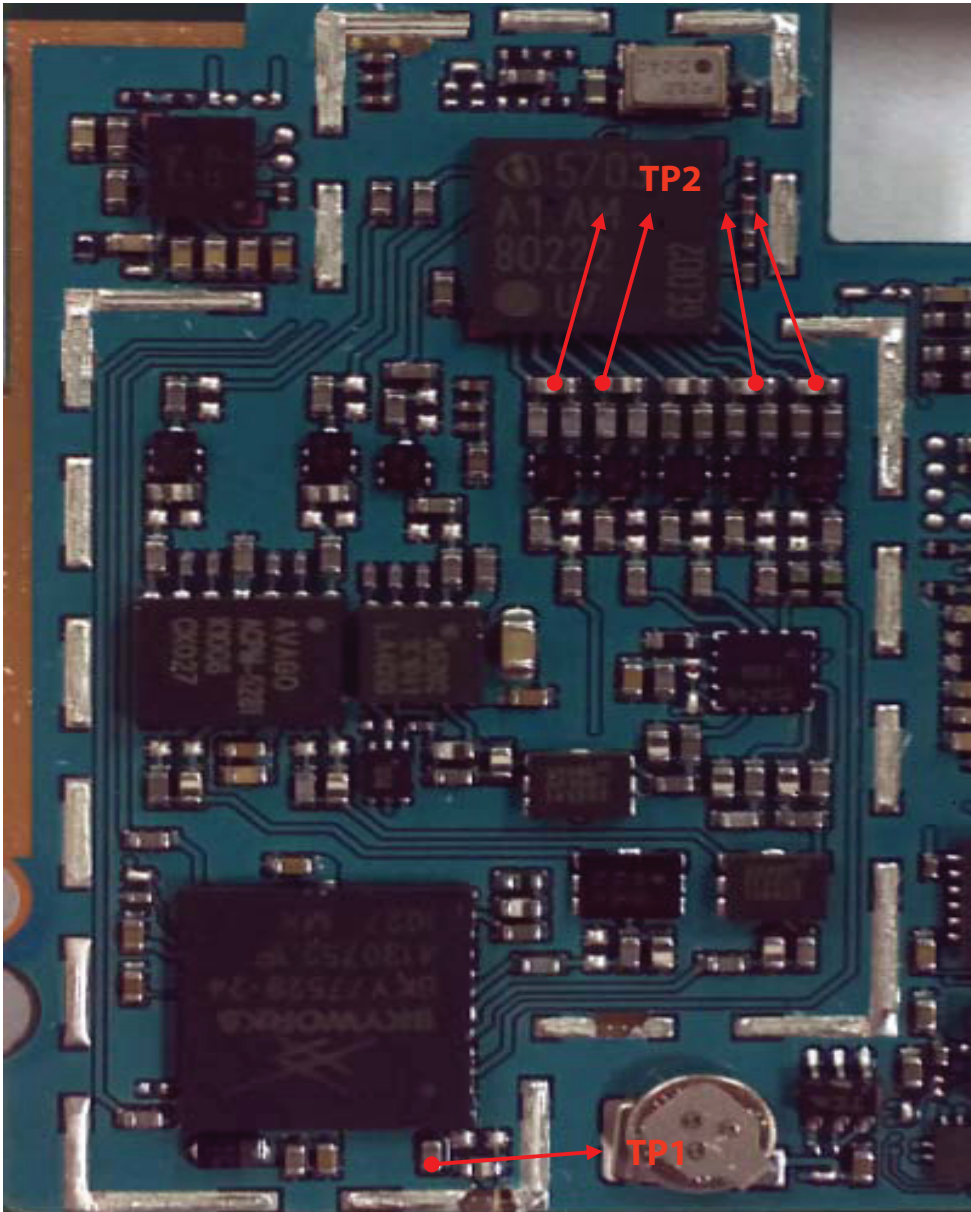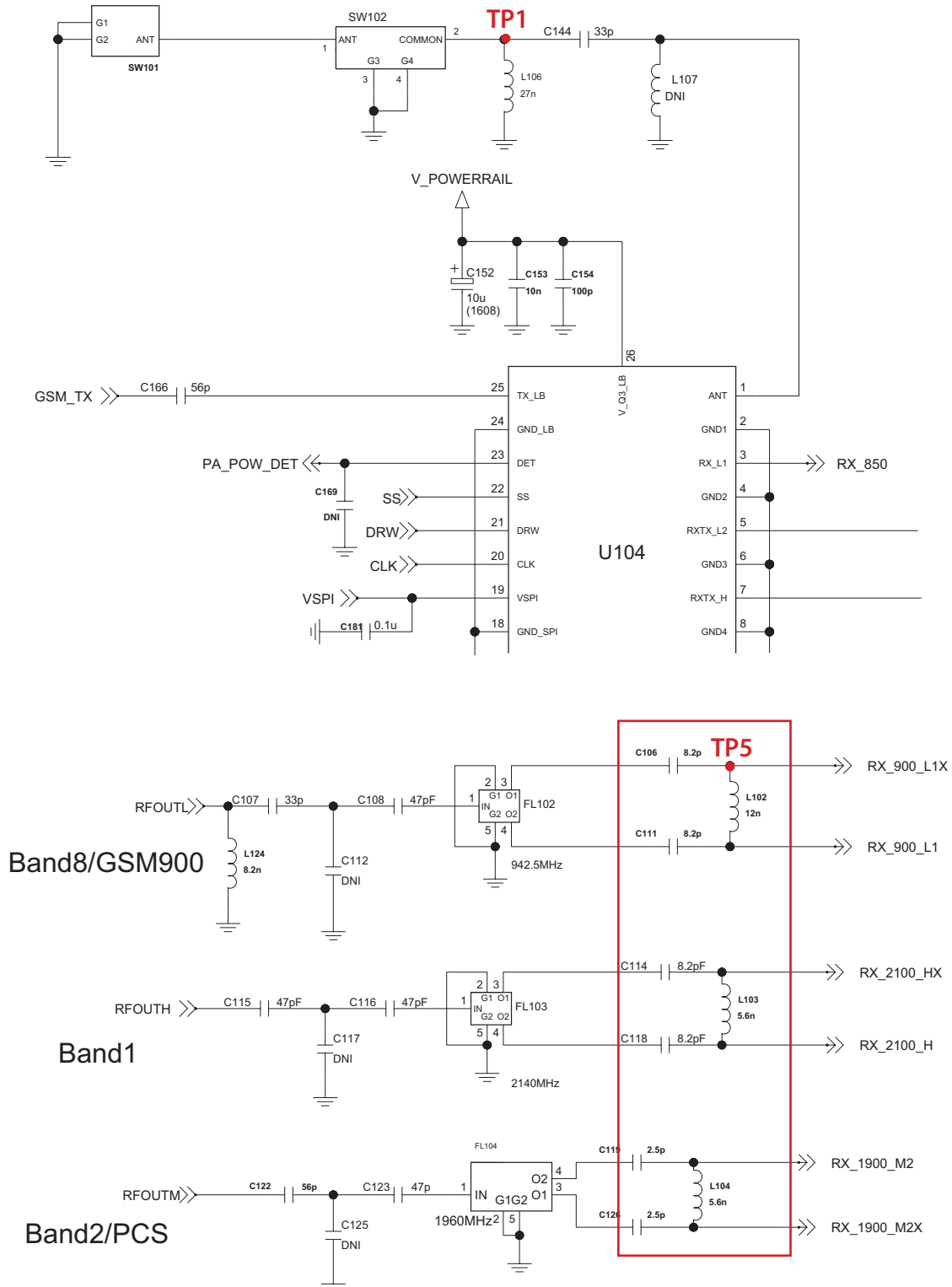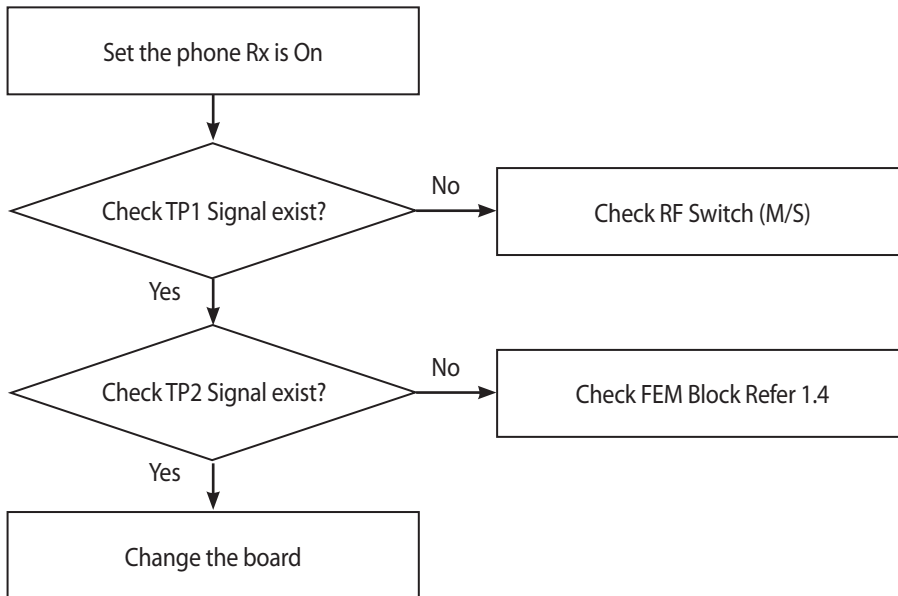
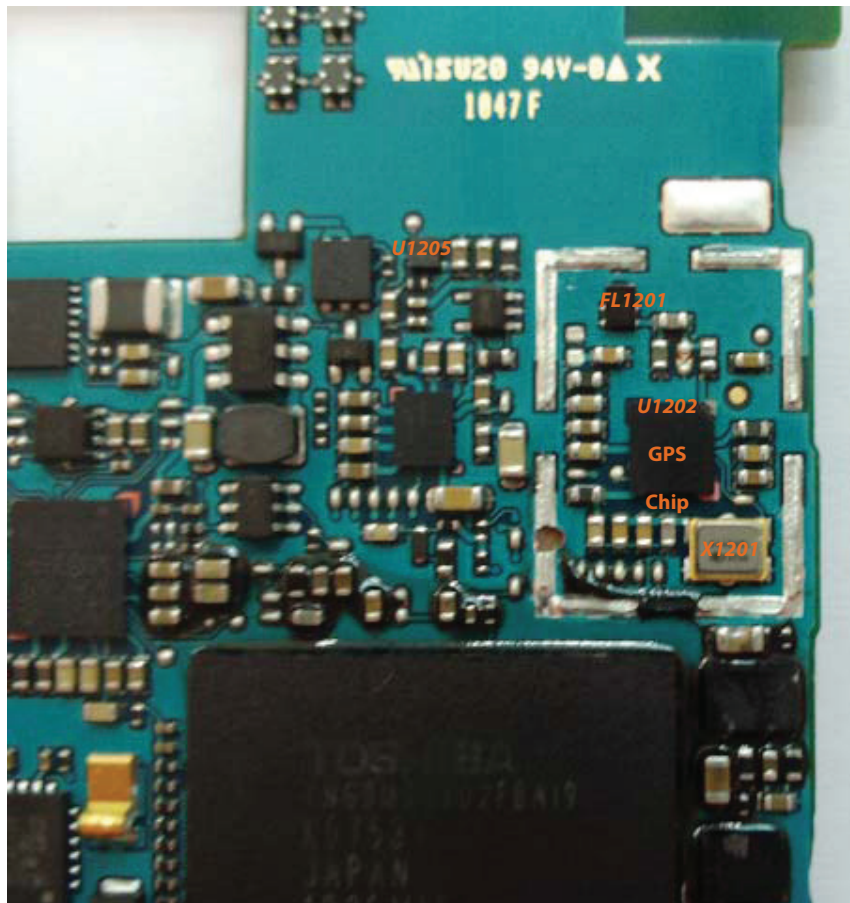## 4.7. GPS/WIFI/BT RF components
4.7.1 GPS Module

GPS chip is made by Broadcom and name is BCM4751

Reference	Description
U1202	BCM4751 GPS Module
FL1201	GPS Saw filter
X1201	TCXO 26MHz
U1205	150mA LDO

4.7.2 Wifi/BT/FM Module

LGP990 has Wifi/BT/FM integrated chip which is SWB-B25
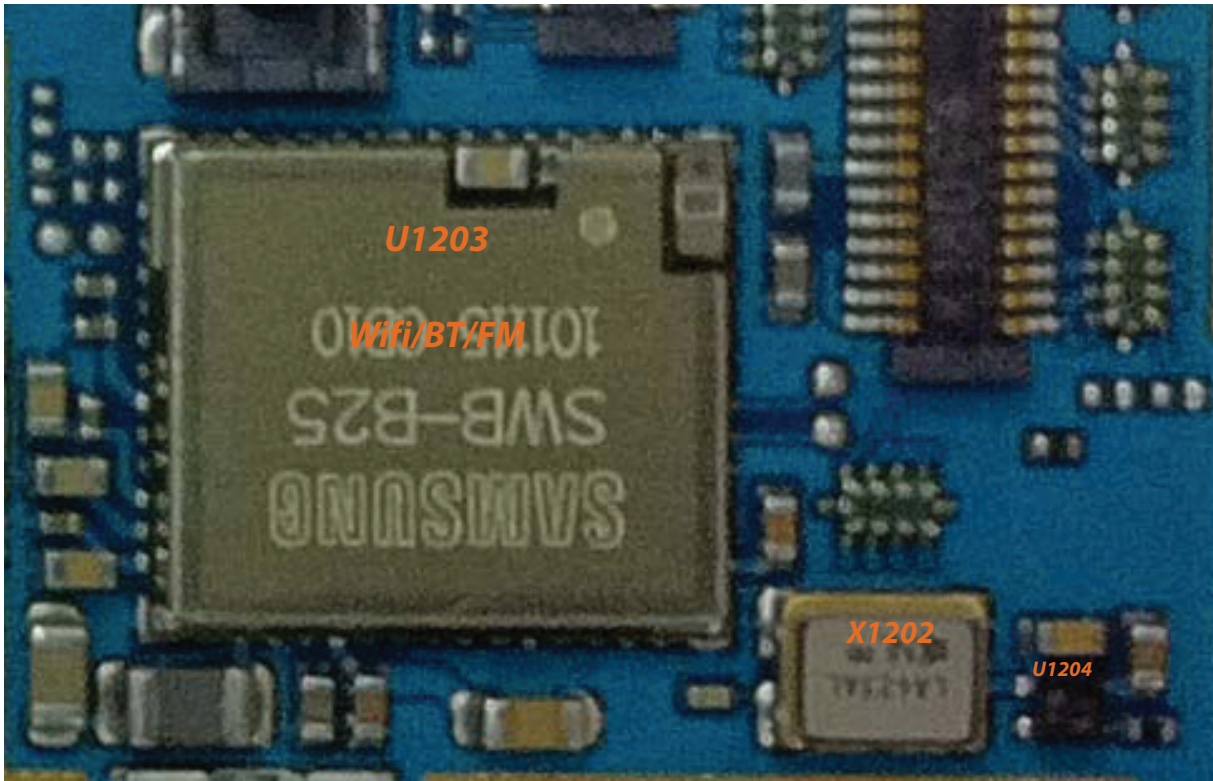
Reference	Description
U1203	SWB-B25 Wifi/BT/FM Module
X1202	TCXO 38.4MHz
U1205	150mA LDO for TCXO

4.8 GPS/WIFI/BT SIGNAL PATH
4.8.1 GPS Signal Path
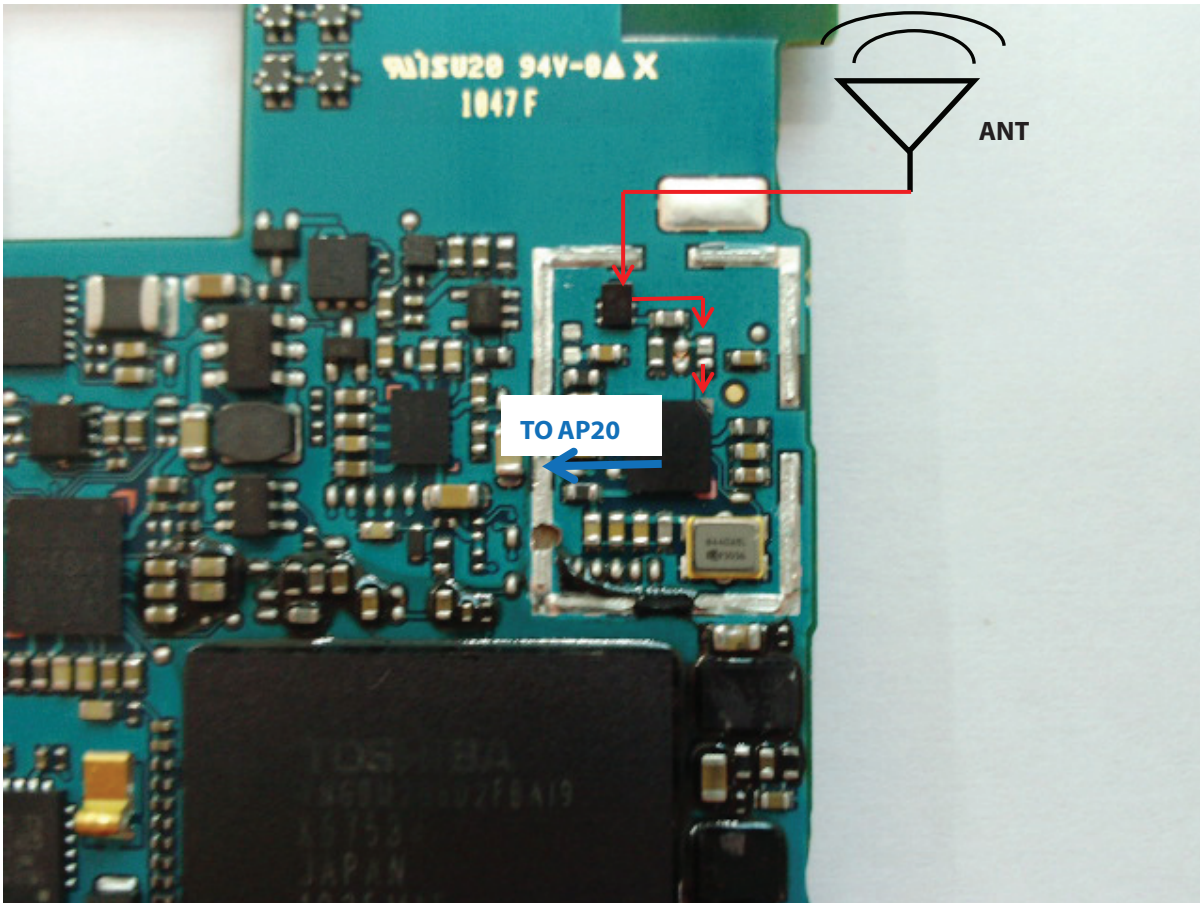
4.8.2 Wifi/BT/FM Signal Path

Wifi SDIO to AP20

BT PCM & UART to AP20

FM L/R to WM8994

ANT

FM ANT via

Earphone GND
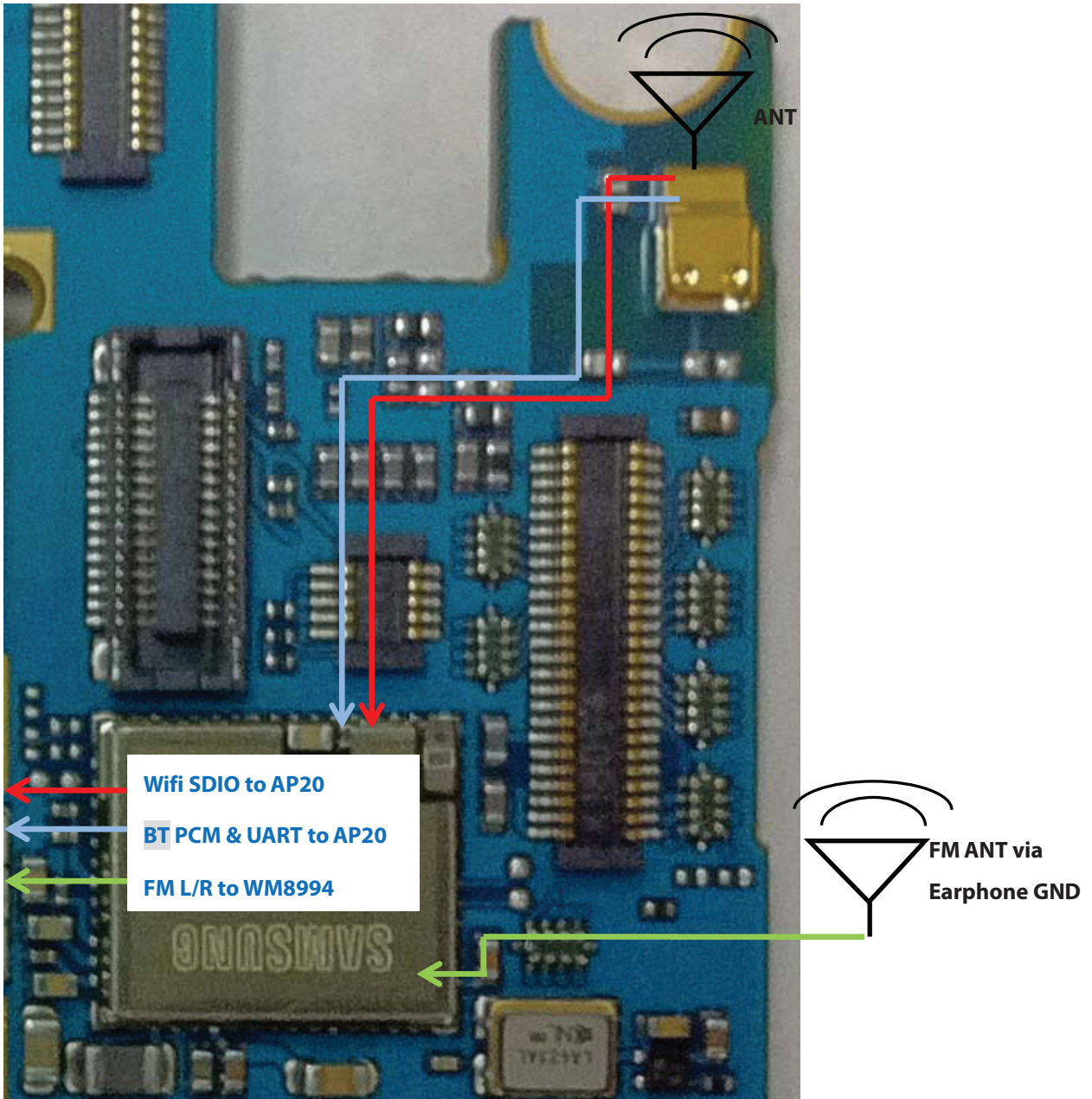
--- **Wifi Signal**

--- **BT Signal**

--- **FM Signal**

4.9 Power ON Troubleshooting

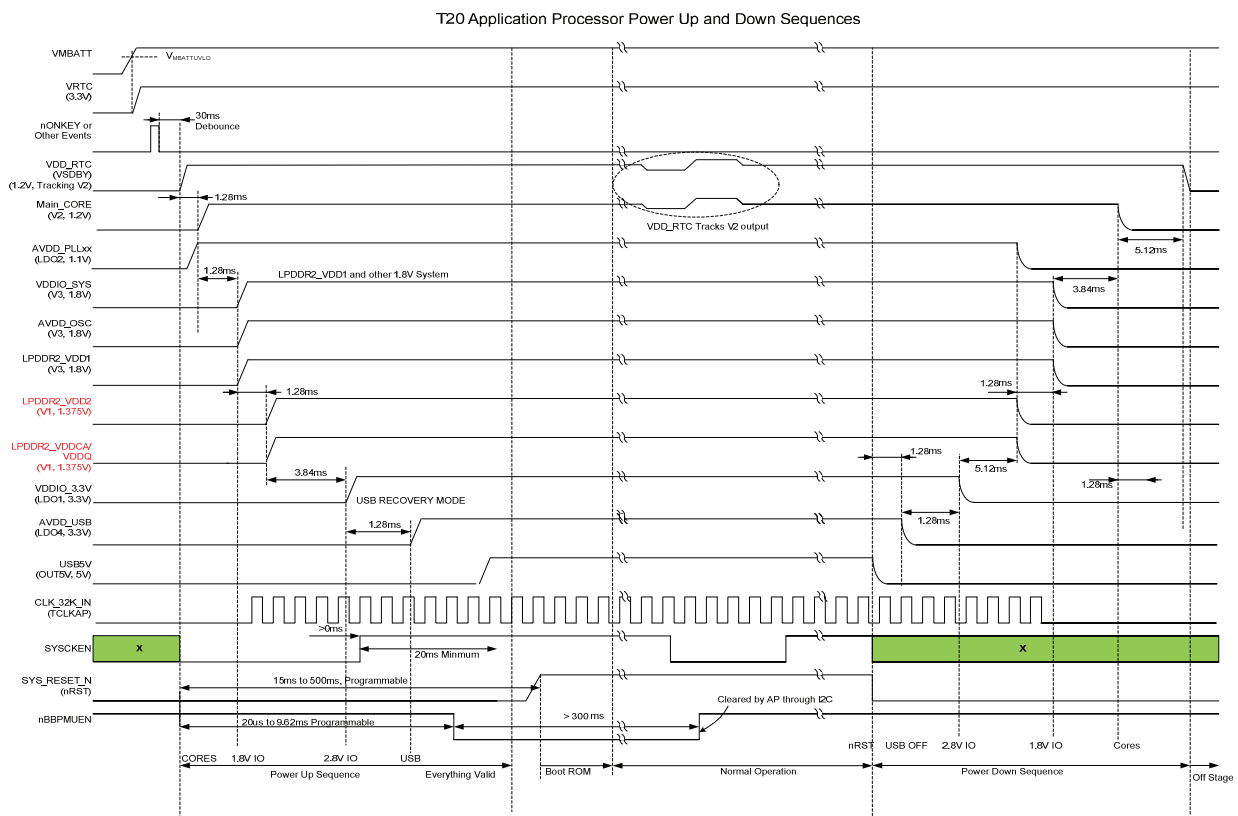The main power source of LGP990 is provided by 3 chips which are MAX8907C, MAX8252 and XMM6160 (Communication processor). Since XMM6160 only powers up normally when AP20 is properly powered therefore, MAX8907C and MAX8252 are the actual ones to take look at.

Power ON sequence of LGP990 is,

PWR key press → PM_ON_SW_N go to low (R628, MAX8907C ONKEY_ pin(H6)) → MAX8907C Power Up → MAX 8252 Power Up (U601, L601) → VCC_RTC(C658) → VCC_CORE_1V2 (L603), VCC_IO_1V8(L602), VCC_IO_1V2(L604) → VCC_DDRx_3V3(C643) → USB_OUT_5V(C647) → SYS_RESET_N_AP20 goes high

T20 Application Processor Power Up and Down Sequences

START

Battery voltage higher than 3.5V? — No → Change or charging the Battery

Yes

Press PWR Key R628 high to low — No → Check the Upper FPCB

Yes

Power Key is damaged? — No → Change Upper FPCB

Yes

VCC_CPU_1V0, VCC_IO_1V2, VCC_CORE_1V2, VCC_IO_1V8, VCC_DDRX_3V3 Power up? — No → Change the Main board

Yes

is clock OK? X601:32.768Khz — No → Change the TCXO and X-tal

Yes

Change the main board
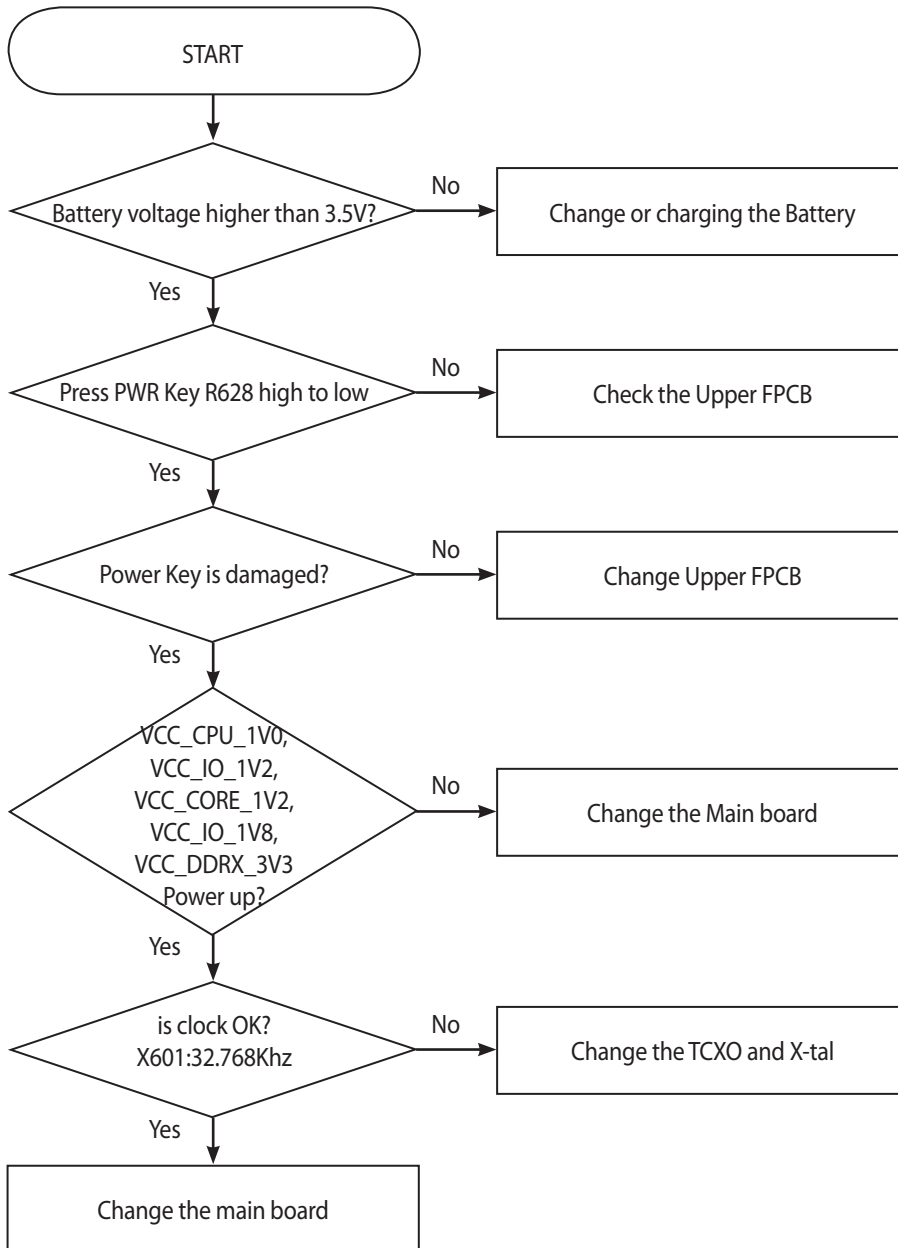
BOTTOM view of LGP990
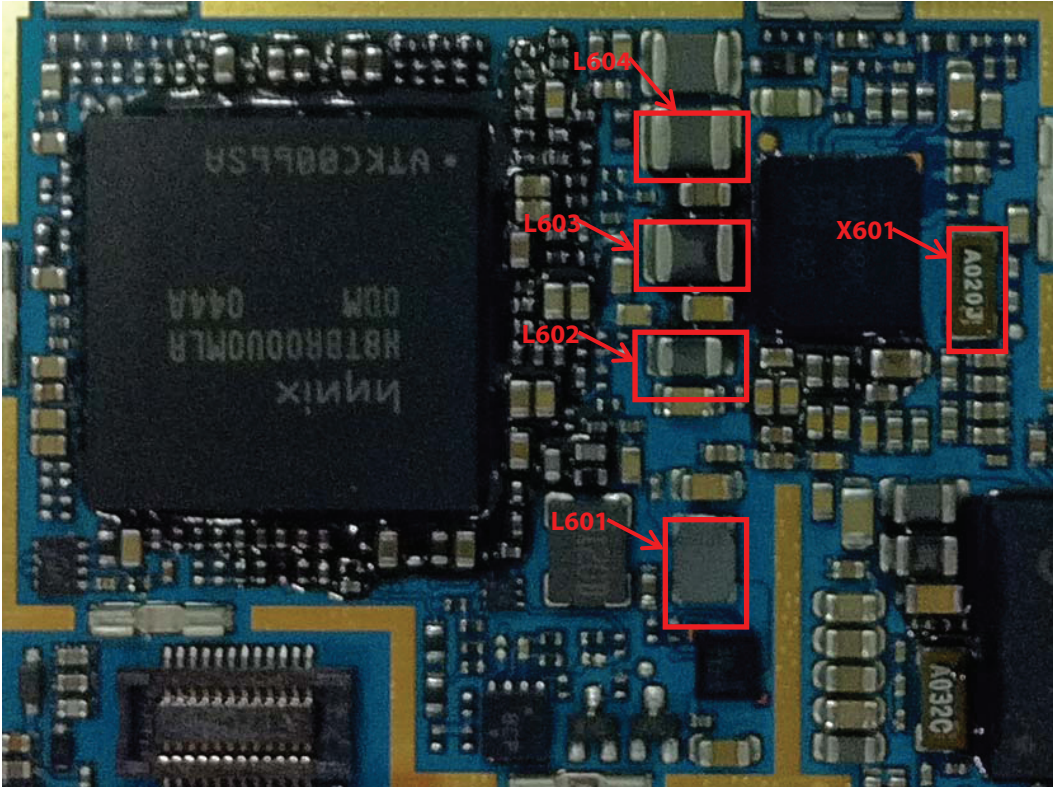
TOP view of LGP990
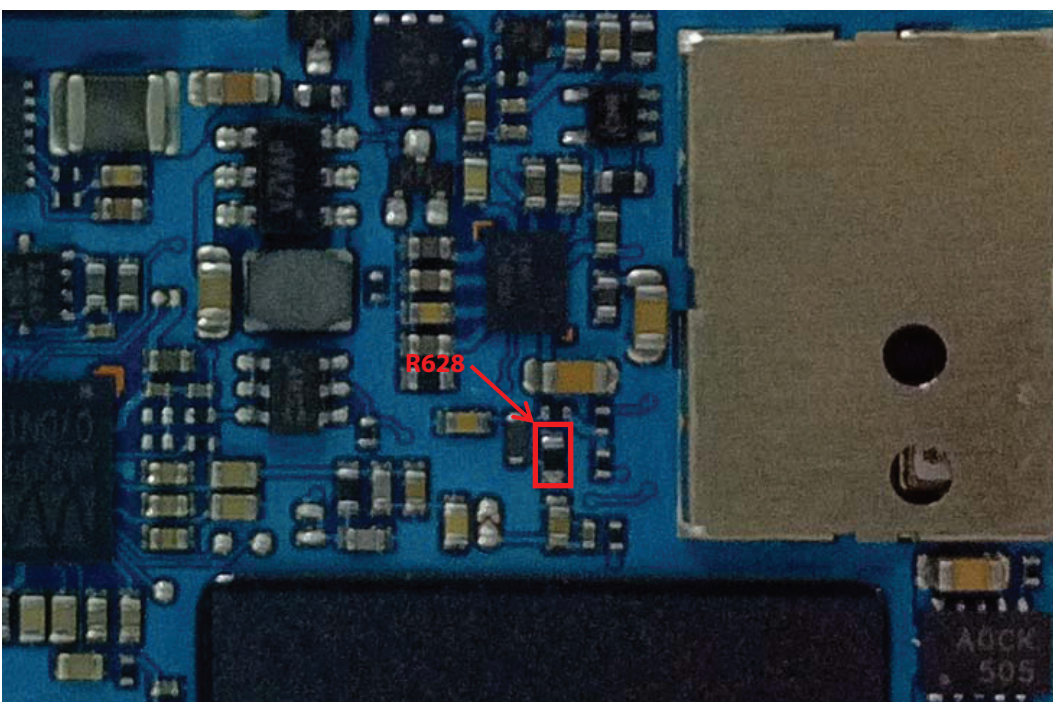
4.10 Charger Troubleshooting

Micro USB   CHARGER IC   **Main Battery**

Close to batt. connector
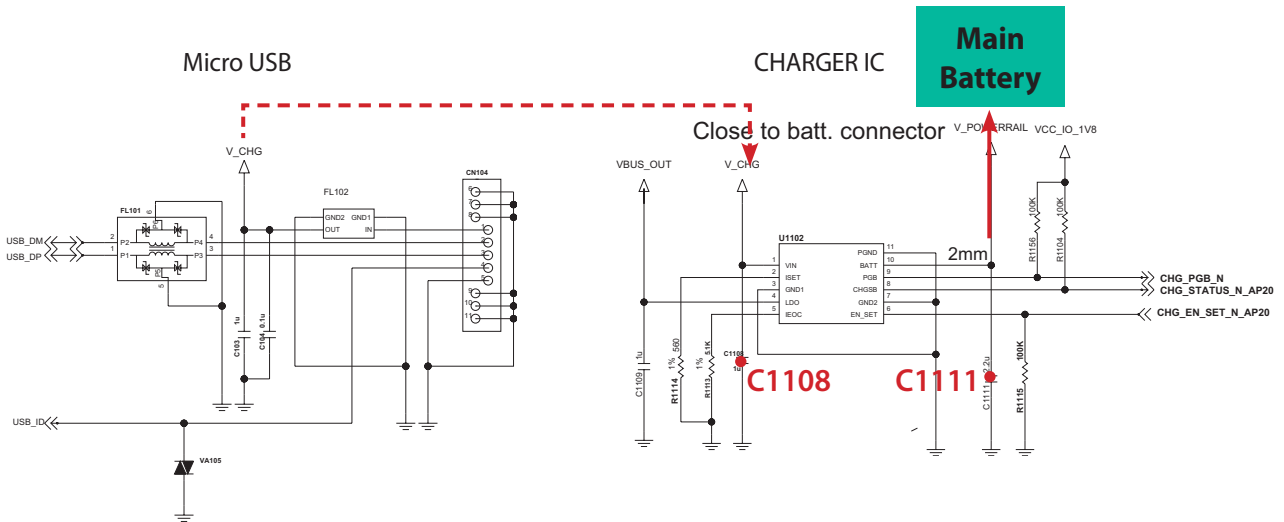
Charging Current Flow

Charging Procedure

- Connect TA or u-USB Cable
- Control the charging current by RT9524 IC
- Charging current flows into the battery

Check Point

- Connection of TA or USB Cable
- Charging current path(RT9524)
- Battery

Troubleshooting Setup

- Connect TA and battery to the phone

Troubleshooting Procedure

- Check the charger (TA or USB Cable) connector

START

Check the pin and battery
Connect terminals of I/O connector

Connection OK? —No→ Change I/O connector

Yes

Is the u- USB Cable)
voltage 4.8V (or 5.0V)? —No→ Change TA (or u-USB cable)

Yes

Is it charging properly
After turning on? —Yes→ END

No

Check PMIC SMT status by X-ray
Exchange PMIC or Change the
main board and Retest

- 110 -
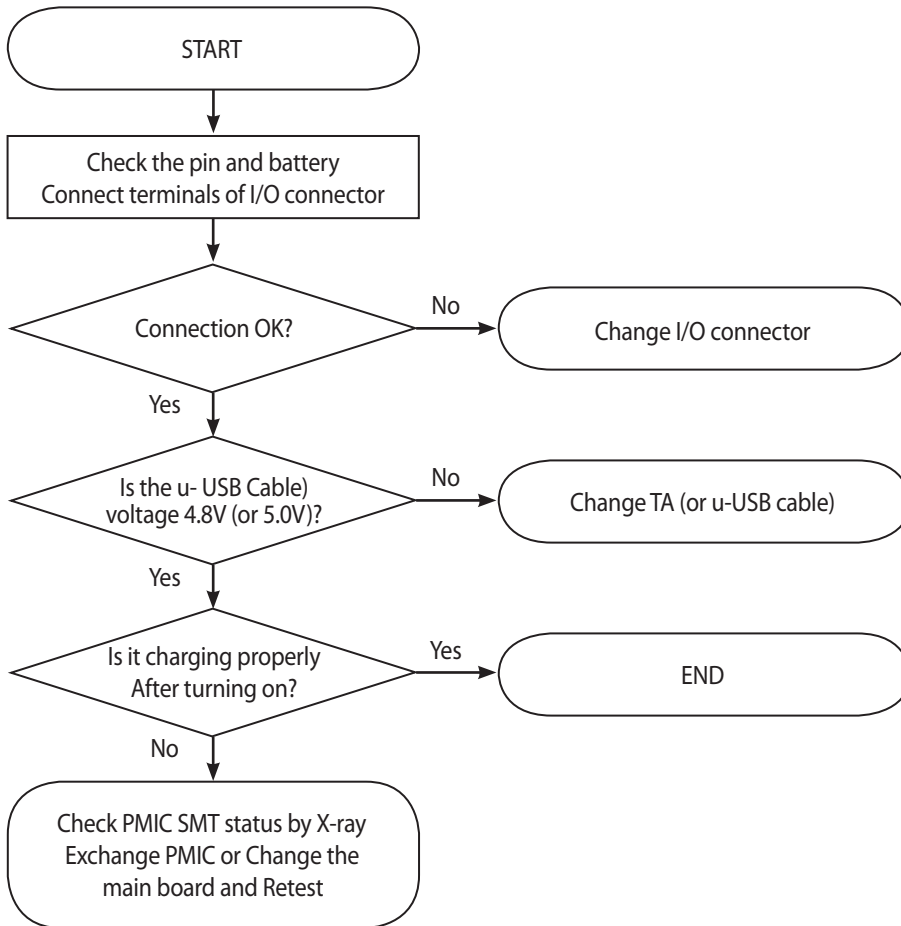
TOP view of LGP990
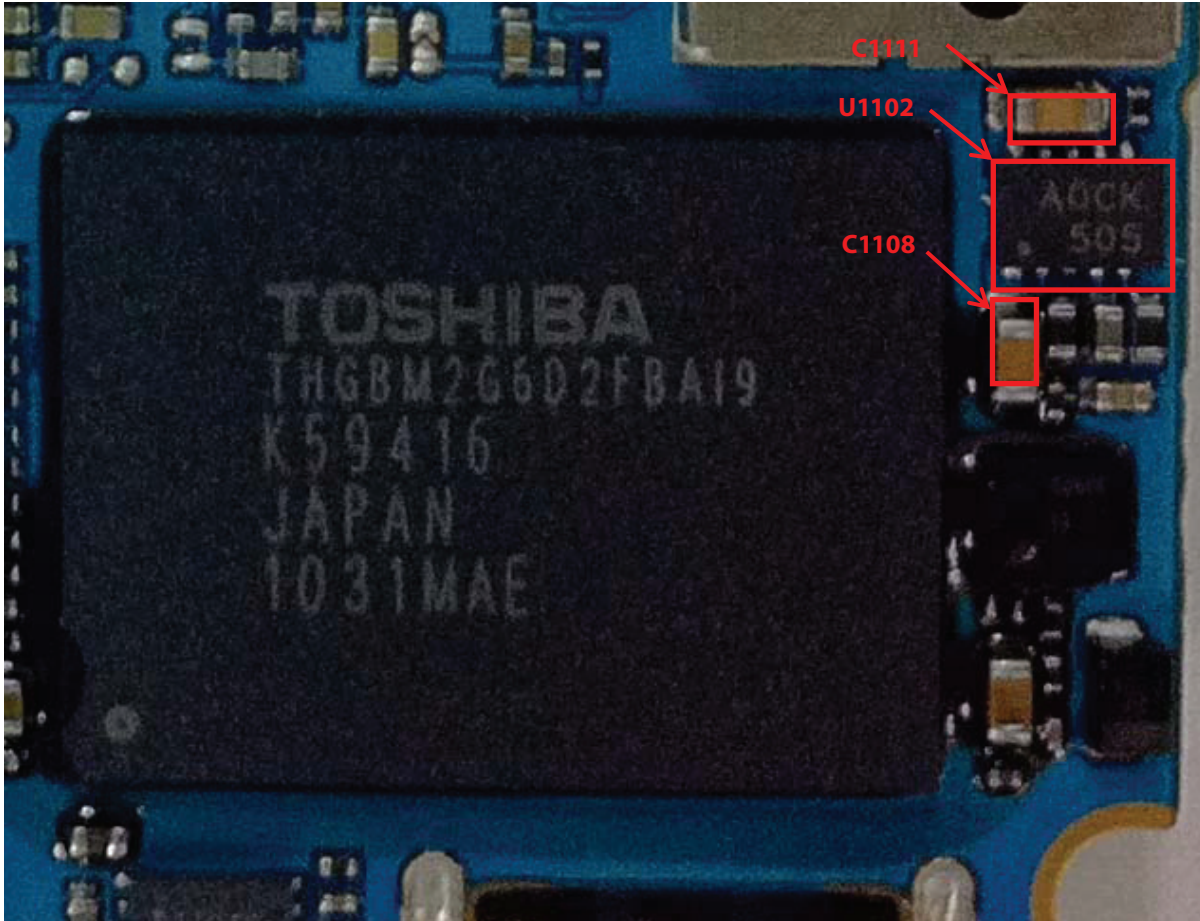
4.11 USB Trouble shooting

The sequence of LGP990USB is,

USB connected to LGP990 → USB_OUT_5V(C647) goes to 5V → USB_D+ go to 3.3V → USB_DATA is triggered → USB work

Block Diagram of USB & UART connection is shown below
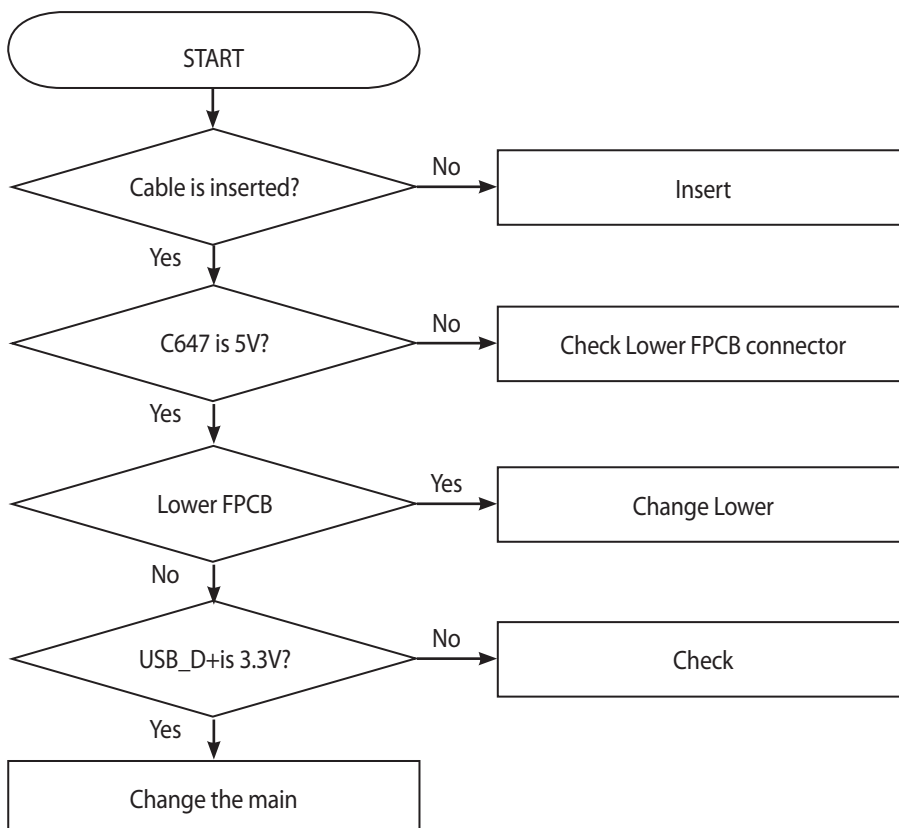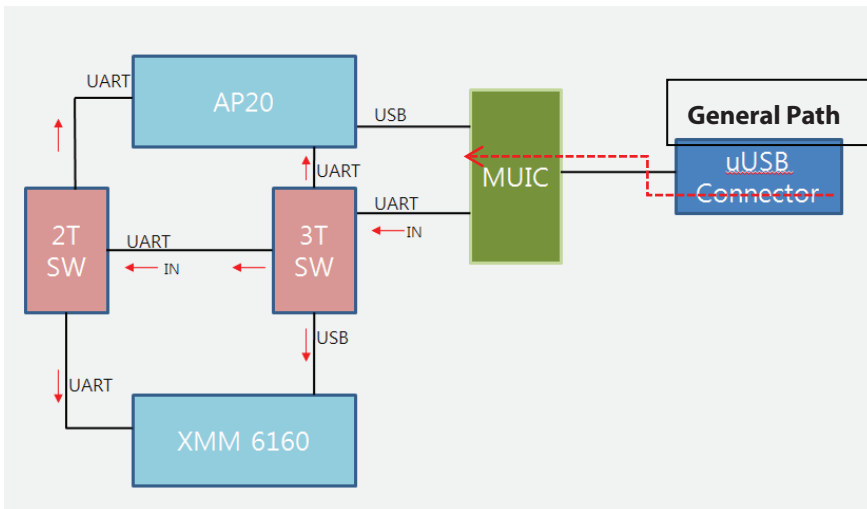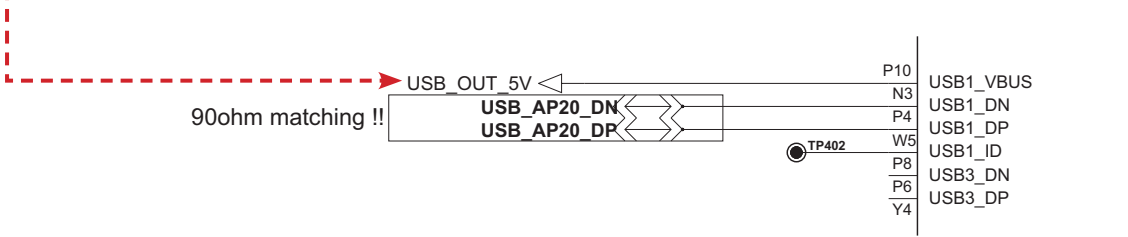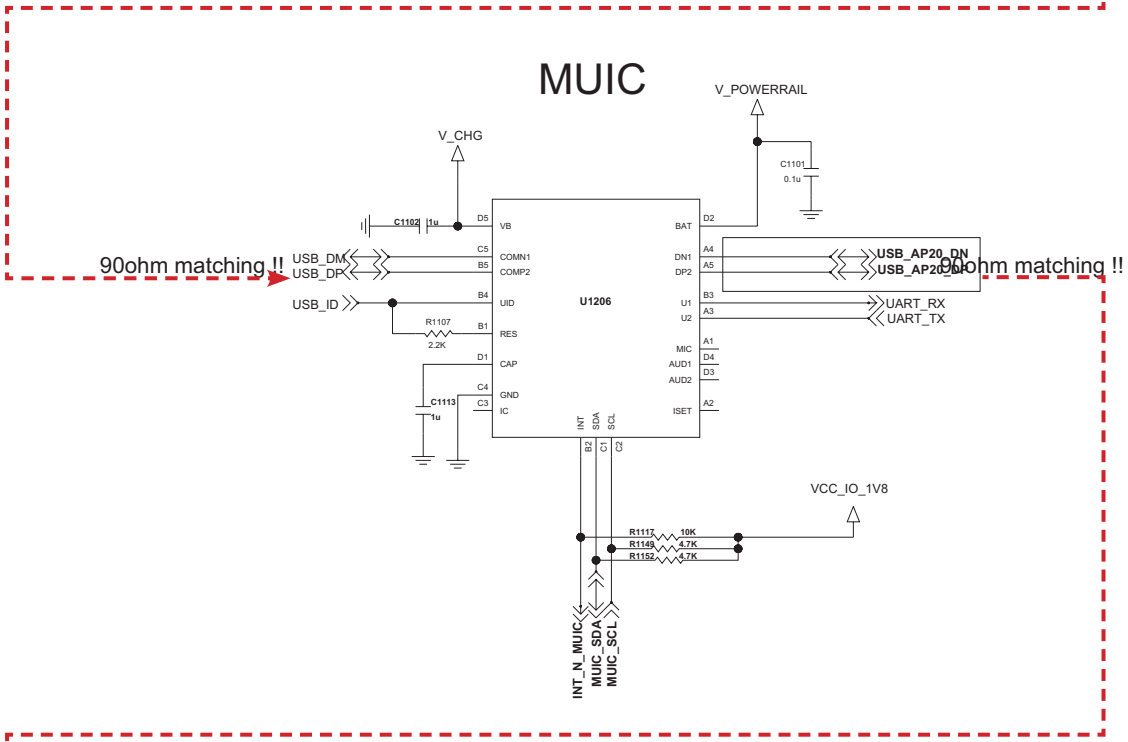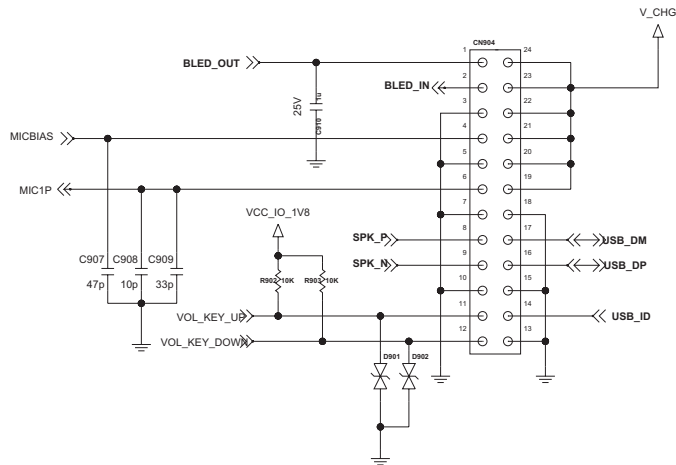
MUIC

C647 (USB_VBUS)
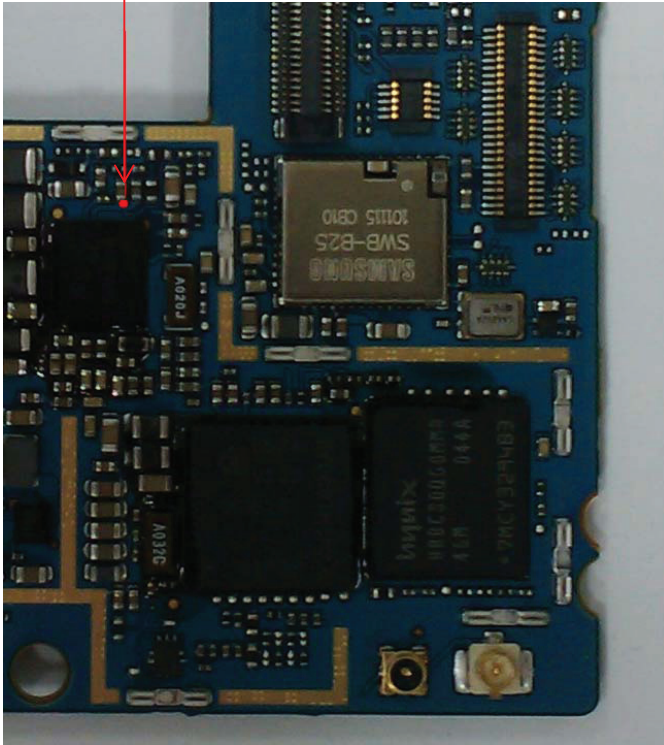
LOWER FPCB Connector (CN904)
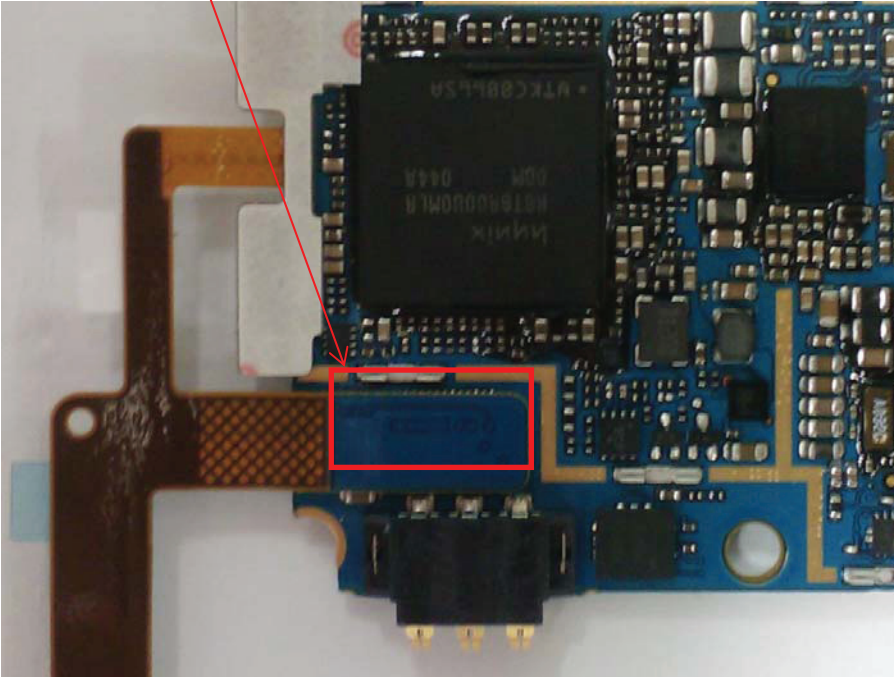
LOWER FPCB

Check if FPCB is cut or damaged

U1206 (MUIC – MAXIM14526)

- 115 -
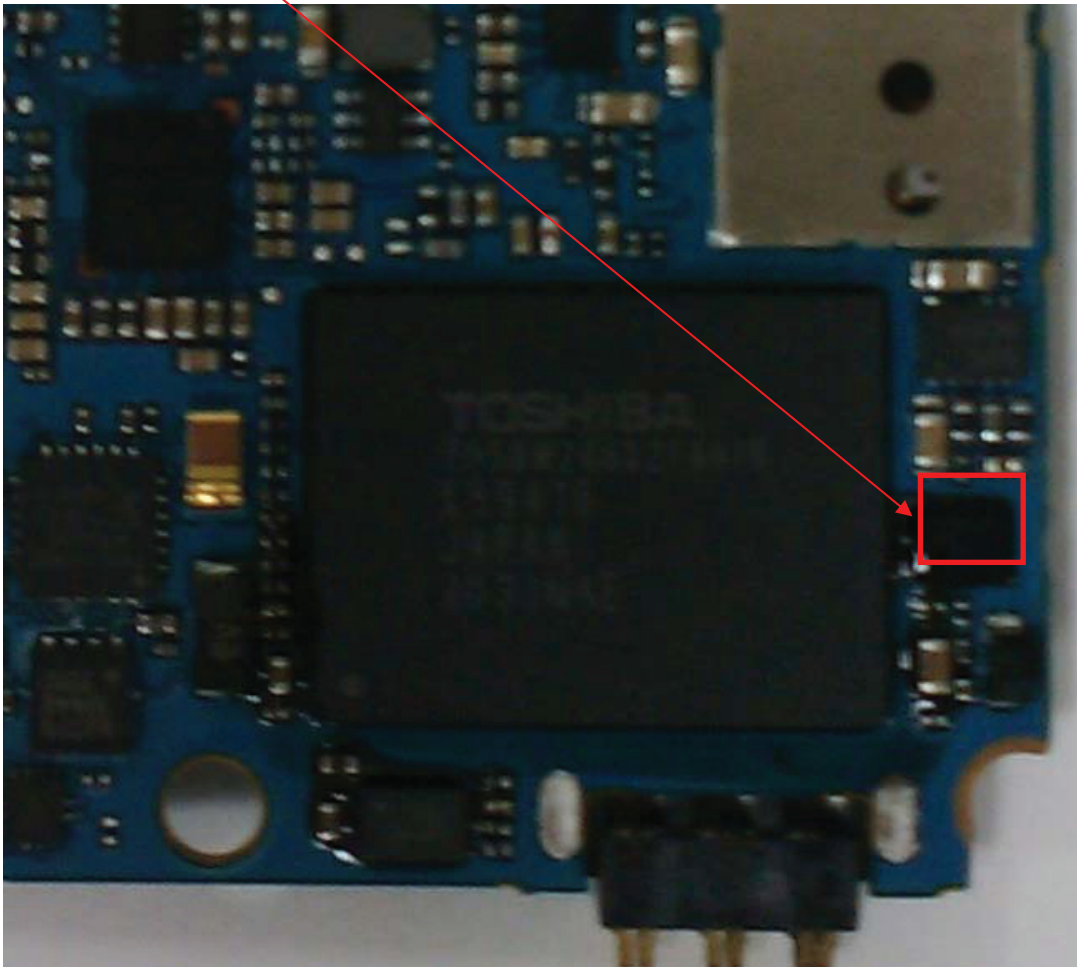
4.12 Audio trouble

4.12.1 Speaker troubleshooting

Speaker control signals are generated by WM8994(U1001), and Power is supplied by MAX8907C(U602).

SPKOUTLN   B1

SPKOUTLP   A2

SPKOUTRN   C3

SPKOUTRP   B3

CPCA   G8

CPCB   H8

CPVOUTN   H7

CPVOUTP   G7

TP1(C1033)

SPK_N

SPK_P

C1033 C1034

DNI   DNI

C1026 2.2u

R1014 10K

C1030 2.2u

C1031 2.2u

R1015 10K
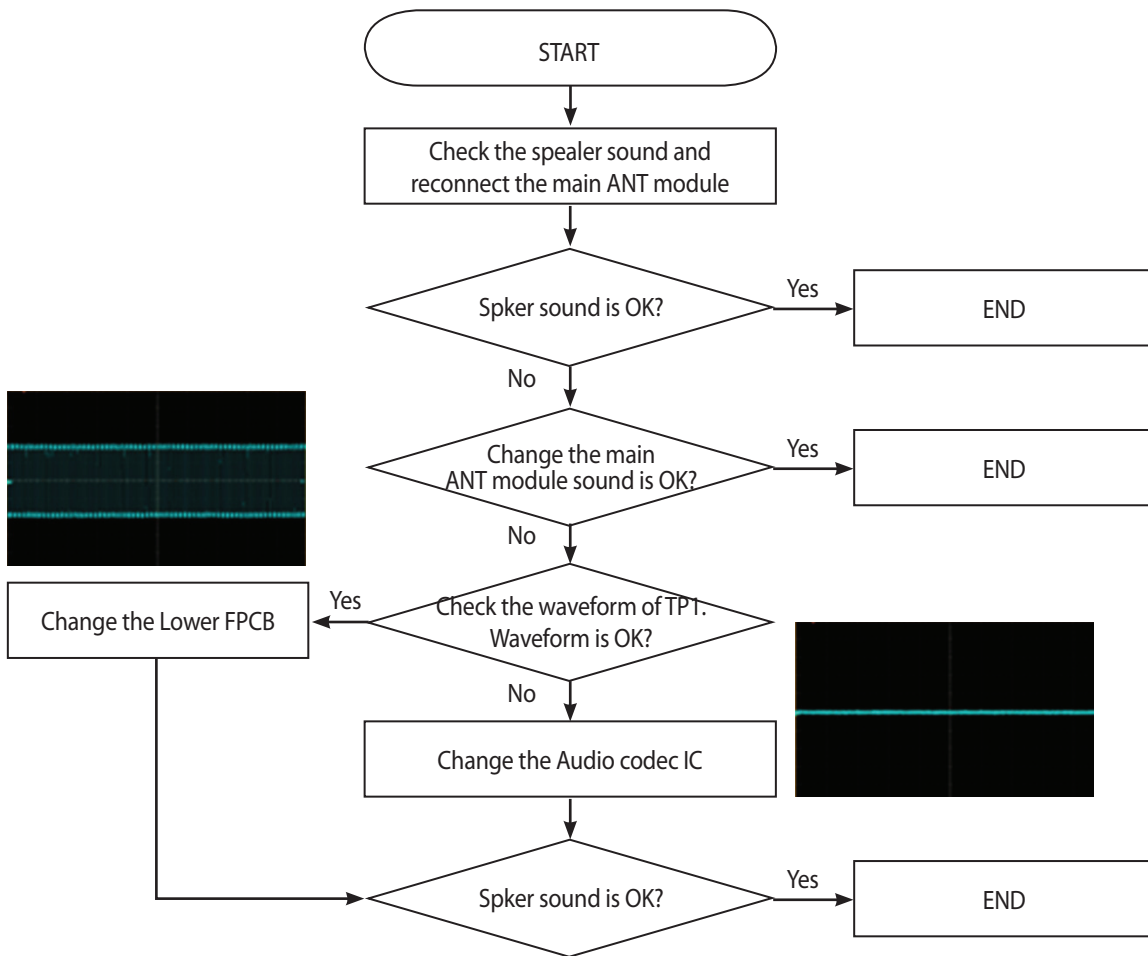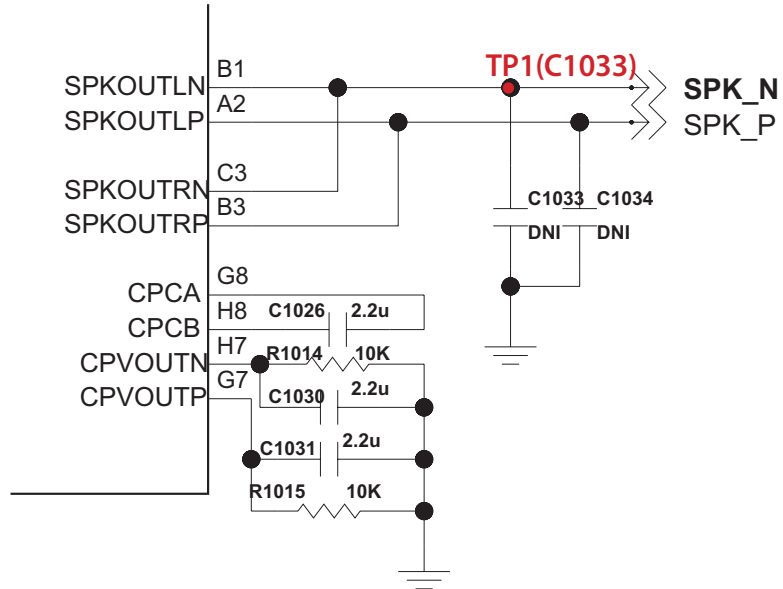
4.12.2 Receiver troubleshooting

Receiver control signals are generated by WM8994(U1001), and Power is supplied by MAX8907C(U602).

- 118 -

VCC_SENSOR_1V8   VCC_SENSOR_3V0

CN901

1	24
2	23
3	22
4	21
5	20
6	19
7	18
8	17
9	16
10	15
11	14
12	13

50PIN_FM_ANT

FB900   1800   50PIN_EJ_MIC   C911   L900
24p   270n

VA903   EAR_GND

LSENSOR_BIAS

FB902   1800   50PIN_EAR_L

LSENSOR_SENS   C924
DNI

GEN2_I2C_SCL

GEN2_I2C_SDA   FB903   1800   50PIN_EAR_R

PWR_ON_SW   50PIN_EAR_SENSE

FB904   1800   RCV_P   VA902

PROXI_OUT   FB901   1800   RCV_N

TP1(FB901)

C916   C917
0.1u   0.1u
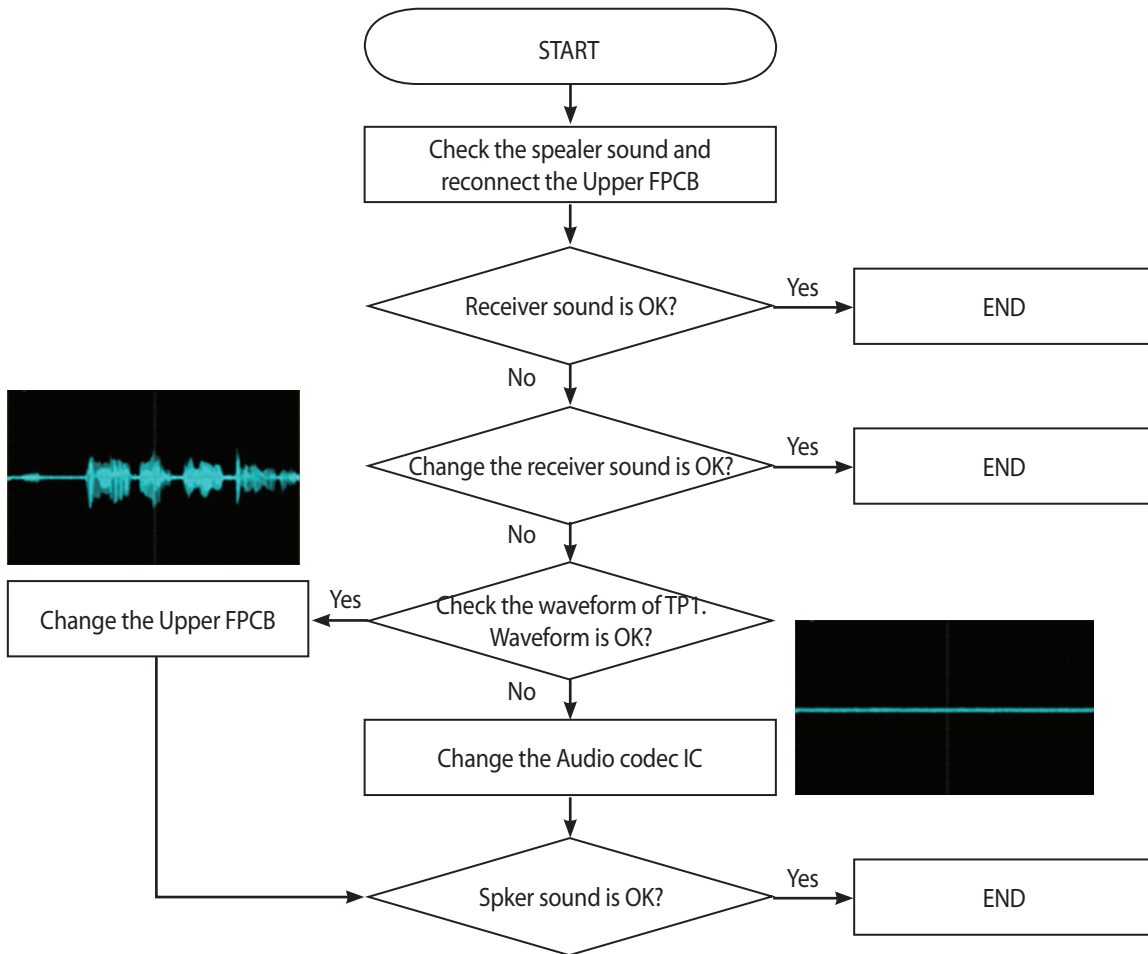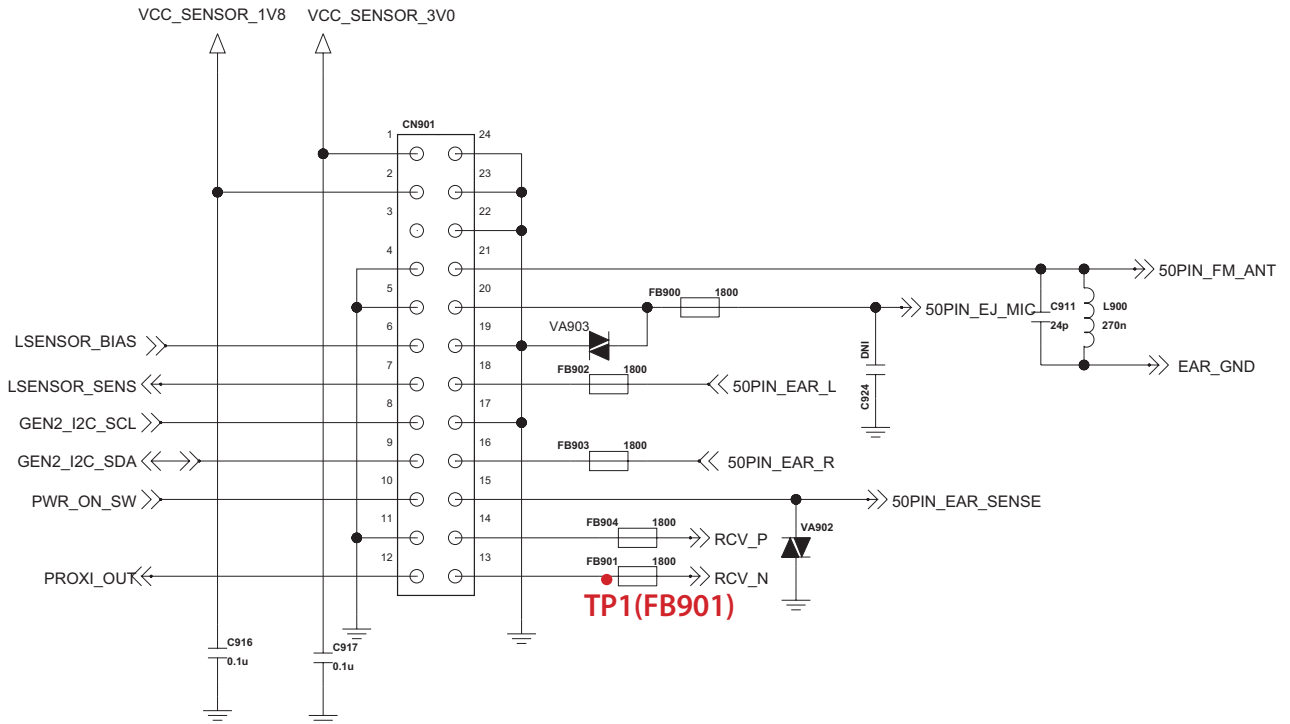
4.12.3 Main MIC troubleshooting

Main MIC control signals are generated by WM8994(U1001), and Power is supplied by MAX8907C(U602).

```
                    ┌─────────────────────┐
                    │        START        │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │ Check the main MIC and │
                    │ reconnect the Lower FPCB │
                    └─────────────────────┘
                              │
                              ▼
                        ◇ Voice recording is OK? ◇ ──Yes──▶ ┌─────────┐
                              │                              │   END   │
                              No                             └─────────┘
                              ▼
                        ◇ Check the MICBIAS(TP1) ◇
                              │
                              ▼
  ┌─────────────────┐  Yes   ◇ MICBIAS voltage is 2V? ◇
  │ Change the Lower │ ◀───────
  │      FPCB        │        │
  └─────────────────┘        No
         │                    ▼
         │          ┌─────────────────────┐
         │          │ Change the Audio codec IC │
         │          └─────────────────────┘
         │                    │
         │                    ▼
         └──────────▶  ◇ Voice recording is OK? ◇ ──Yes──▶ ┌─────────┐
                                                            │   END   │
                                                            └─────────┘
```

V_CHG

BLED_OUT

CN904

BLED_IN

TP1(C907)

MICBIAS

25V
1u
C910

MIC1P

VCC_IO_1V8

C907 C908 C909
47p   10p   33p

R902 10K   R903 10K

SPK_P

SPK_N

USB_DM

USB_DP

USB_ID

VOL_KEY_UP

VOL_KEY_DOWN

D901 D902

4.12.4 SUB MIC troubleshooting

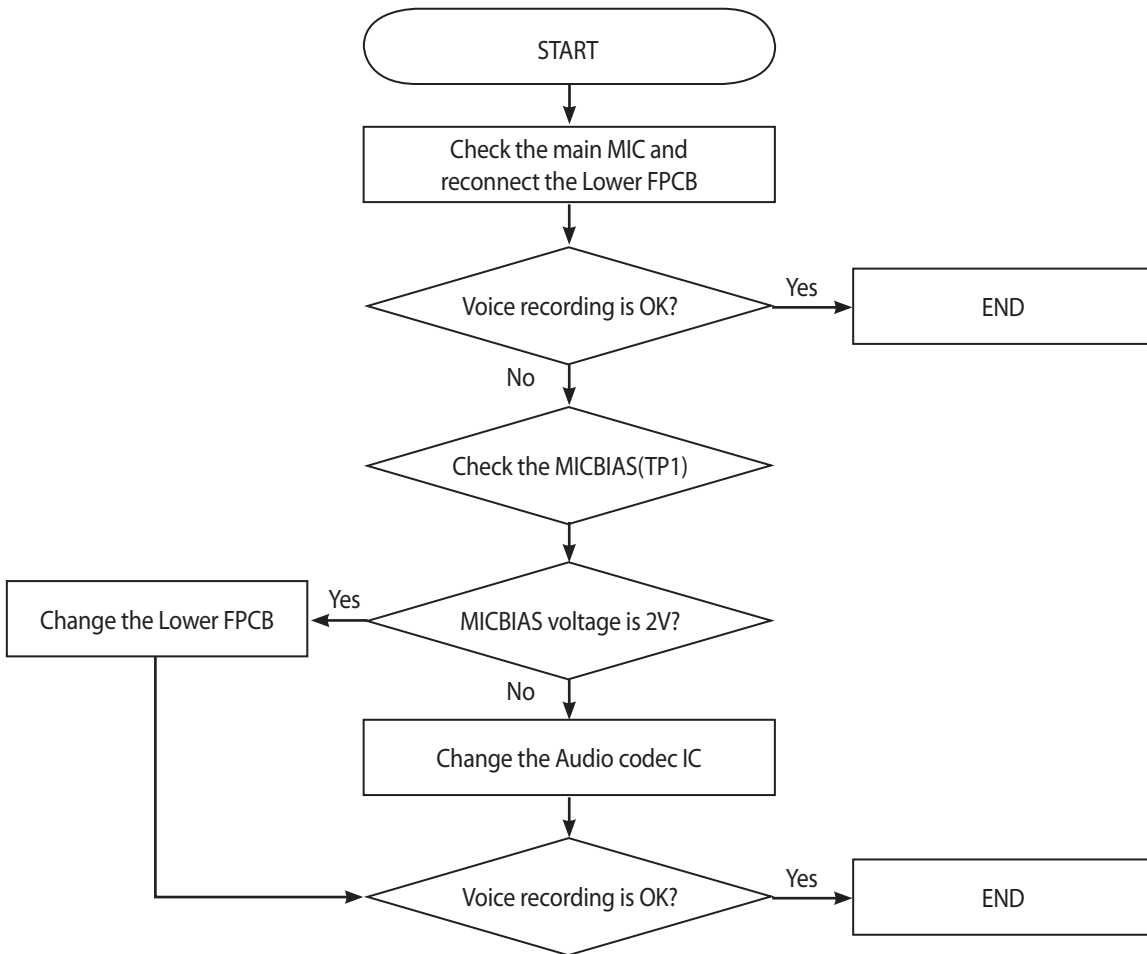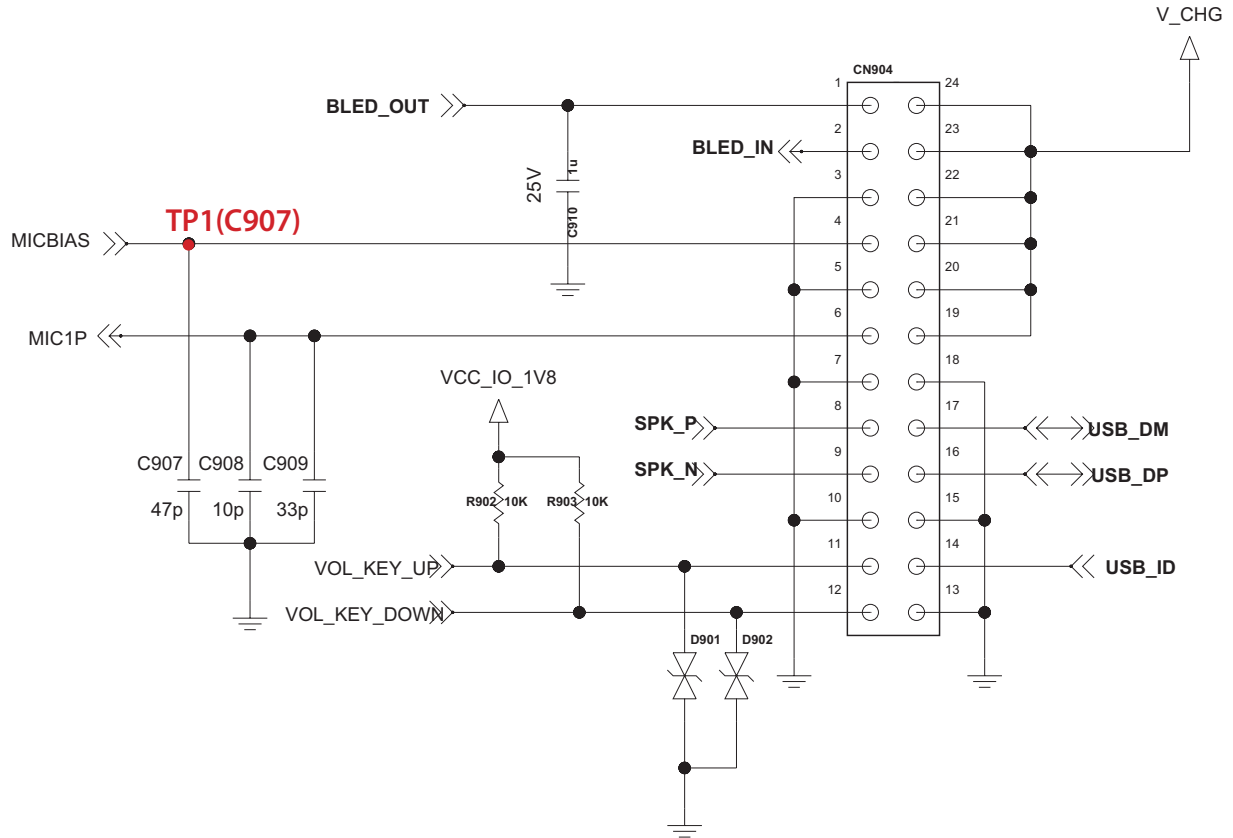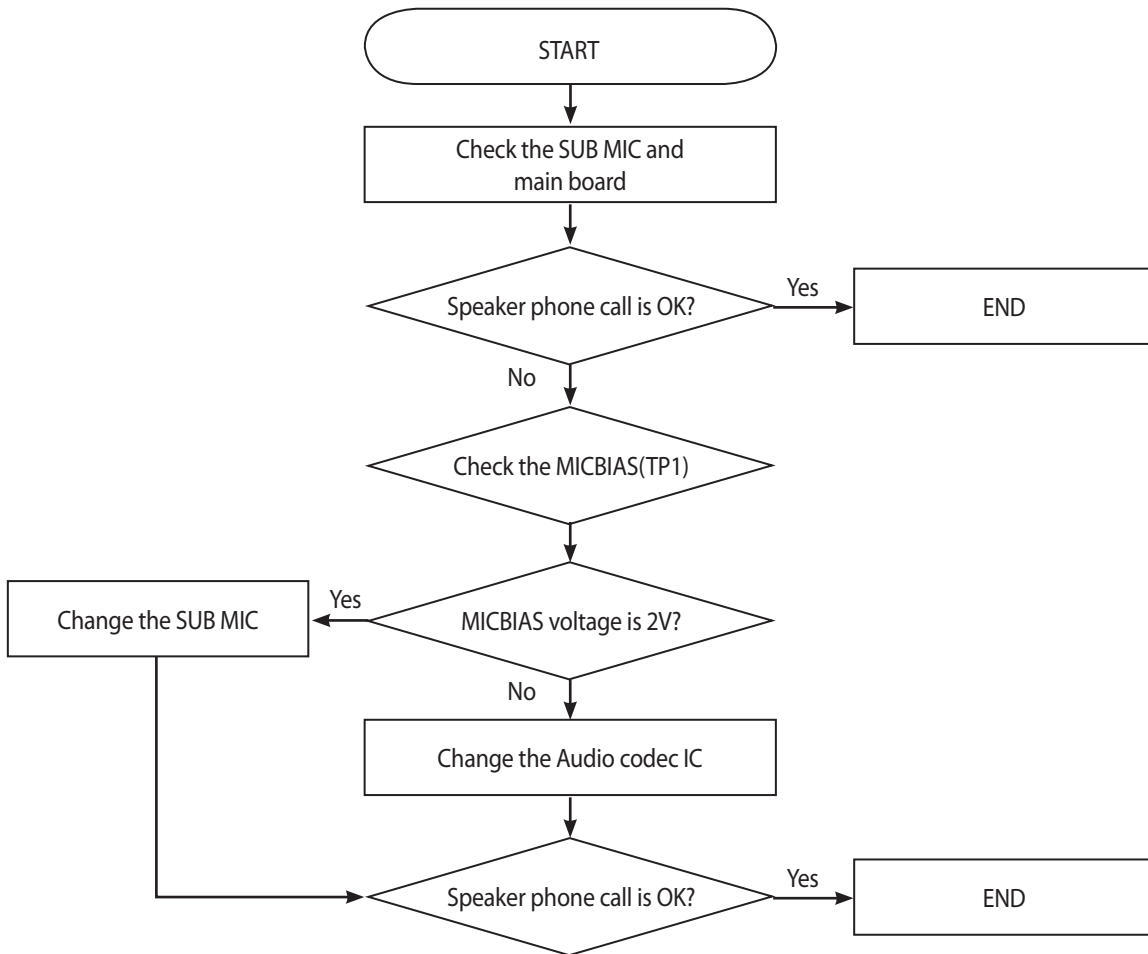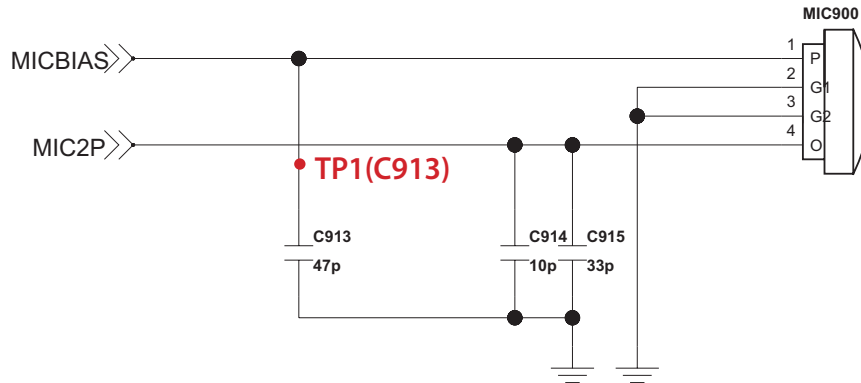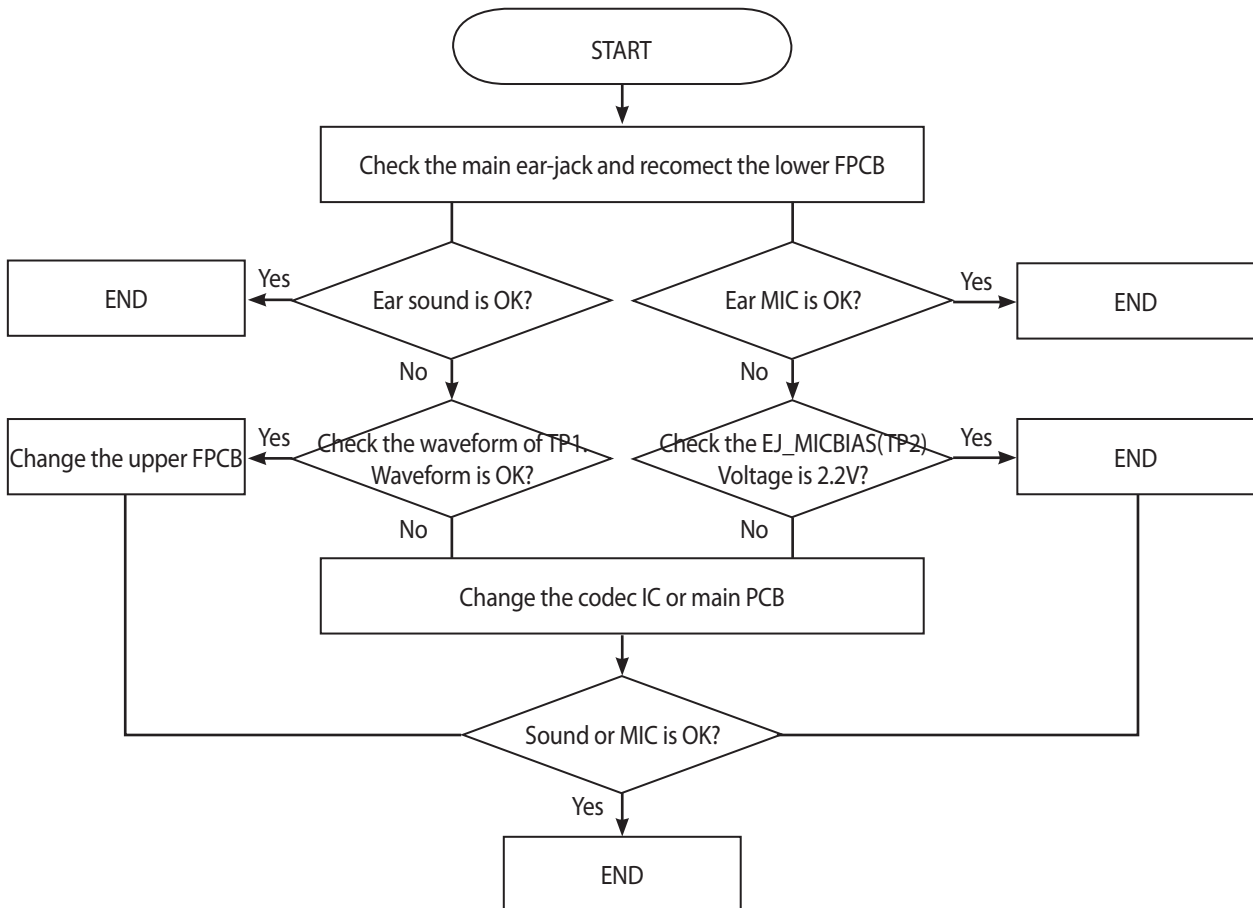SUB MIC control signals are generated by WM8994(U1001), and Power is supplied by MAX8907C(U602).

```
                        ┌──────────────────┐
                        │      START       │
                        └──────────────────┘
                                 │
                                 ▼
                     ┌───────────────────────┐
                     │  Check the SUB MIC and │
                     │       main board       │
                     └───────────────────────┘
                                 │
                                 ▼
                    ◇───────────────────────◇        ┌──────────────┐
                    │  Speaker phone call is OK? │ Yes │     END      │
                    ◇───────────────────────◇───────▶└──────────────┘
                                 │ No
                                 ▼
                    ◇───────────────────────◇
                    │   Check the MICBIAS(TP1)   │
                    ◇───────────────────────◇
                                 │
                                 ▼
  ┌───────────────────┐    ◇───────────────────────◇
  │ Change the SUB MIC │ Yes │  MICBIAS voltage is 2V?  │
  └───────────────────┘◀────◇───────────────────────◇
           │                        │ No
           │                        ▼
           │            ┌───────────────────────┐
           │            │  Change the Audio codec IC │
           │            └───────────────────────┘
           │                        │
           │                        ▼
           │            ◇───────────────────────◇        ┌──────────────┐
           └──────────▶│  Speaker phone call is OK? │ Yes │     END      │
                        ◇───────────────────────◇───────▶└──────────────┘
```

SUB MIC

MICBIAS

MIC2P

TP1(C913)

MIC900

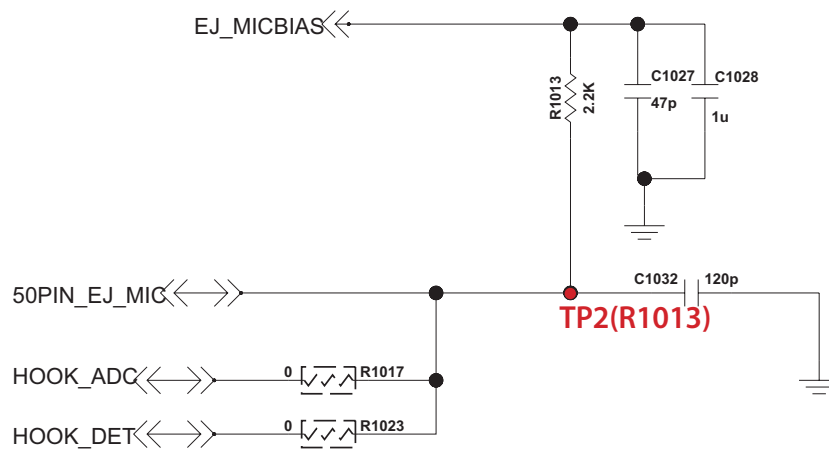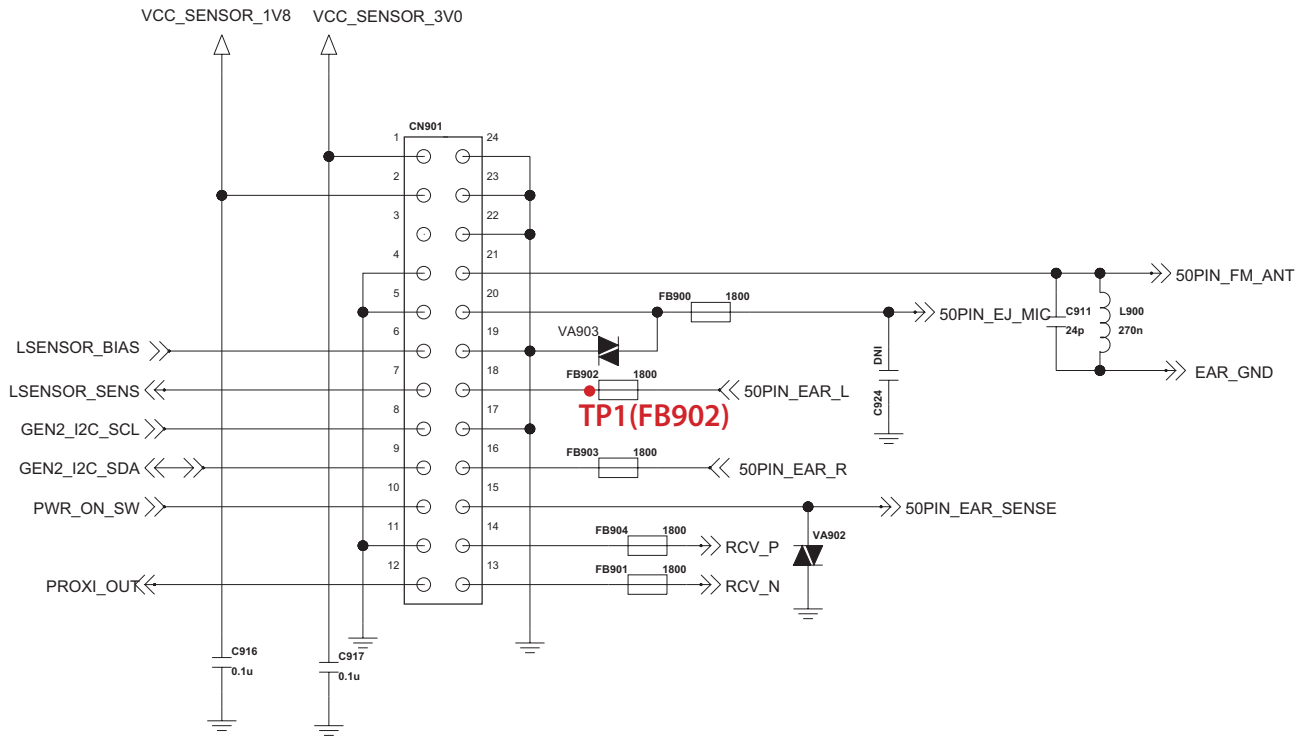| 1 | P |
2	G1
3	G2
4	O

C913
47p

C914
10p

C915
33p

4.12.5 Ear-MIC troubleshooting
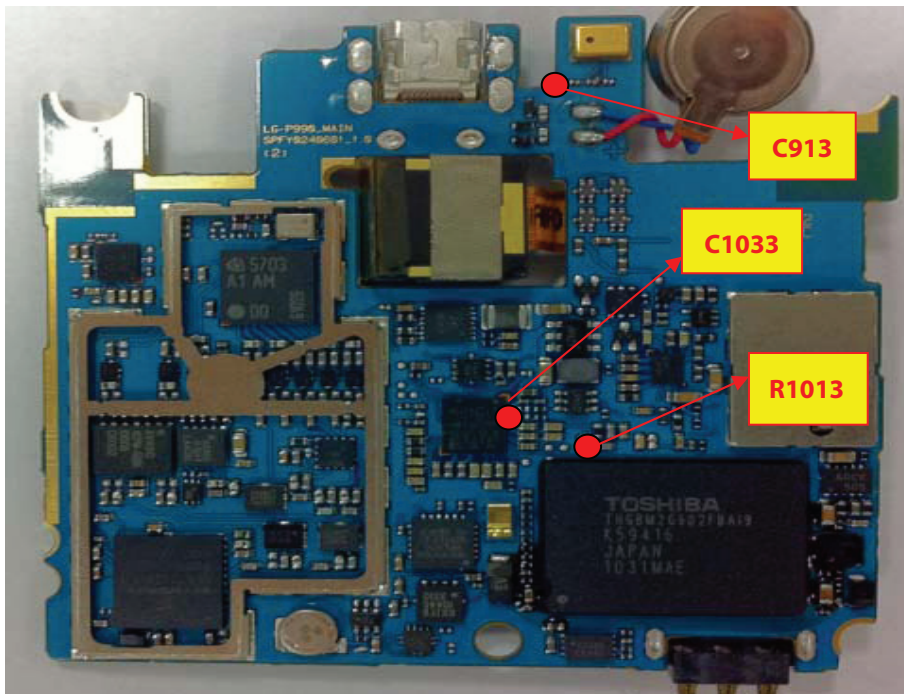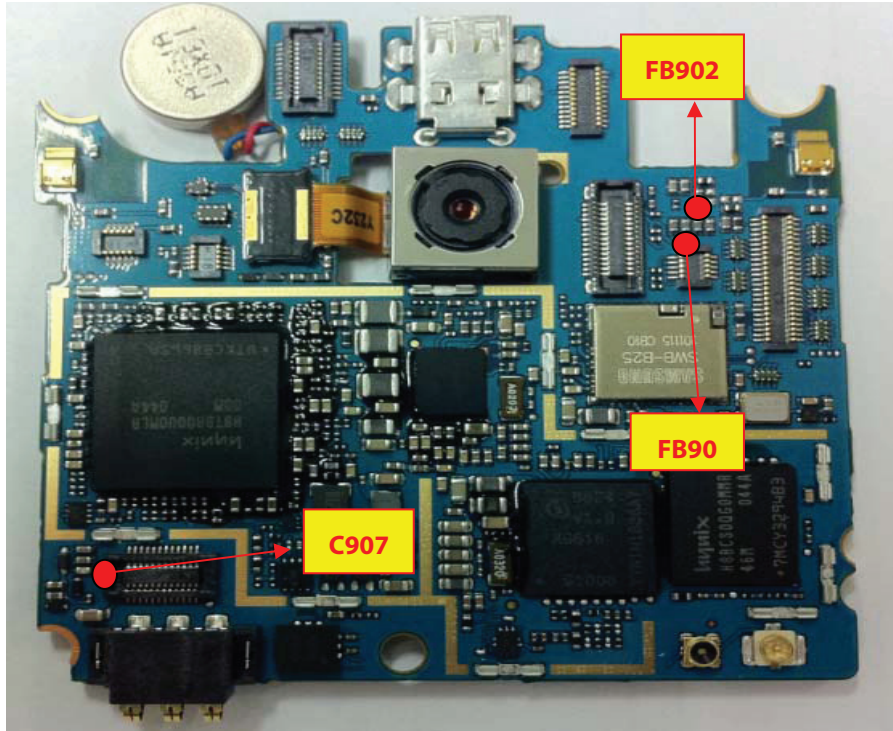
Ear MIC control signals are generated by WM8994(U1001), and Power is supplied by MAX8907C(U602).

```
                        ┌──────────────┐
                        │    START     │
                        └──────┬───────┘
                               │
              ┌────────────────▼──────────────────┐
              │ Check the main ear-jack and        │
              │ recomect the lower FPCB            │
              └────┬──────────────────────┬────────┘
                   │                      │
  ┌───────┐  Yes   ◇                      ◇   Yes  ┌───────┐
  │  END  │◄───── Ear sound is OK?    Ear MIC is OK? ─────►│  END  │
  └───────┘        ◇                      ◇        └───────┘
                   │ No                   │ No
  ┌─────────────┐ Yes ◇                  ◇ Yes  ┌───────┐
  │ Change the  │◄── Check the waveform  Check the EJ_MICBIAS(TP2) ──►│  END  │
  │ upper FPCB  │   of TP1.              Voltage is 2.2V?            └───────┘
  └──────┬──────┘   Waveform is OK?       ◇
         │           ◇                    │ No
         │           │ No                 │
         │     ┌─────▼────────────────────▼─────┐
         │     │ Change the codec IC or main PCB│
         │     └──────────────┬─────────────────┘
         │                    │
         │                    ◇
         └────────── Sound or MIC is OK?
                             ◇
                             │ Yes
                        ┌────▼────┐
                        │   END   │
                        └─────────┘
```
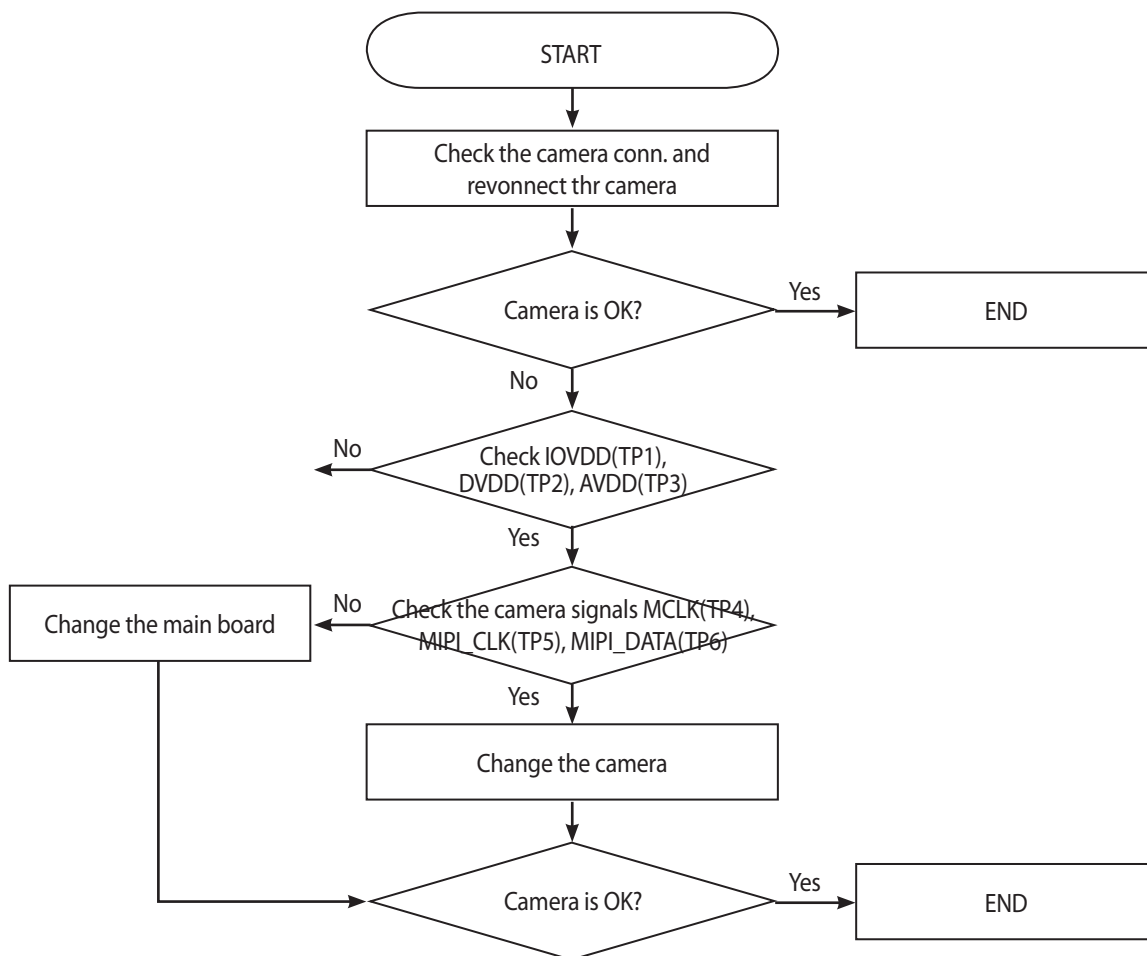
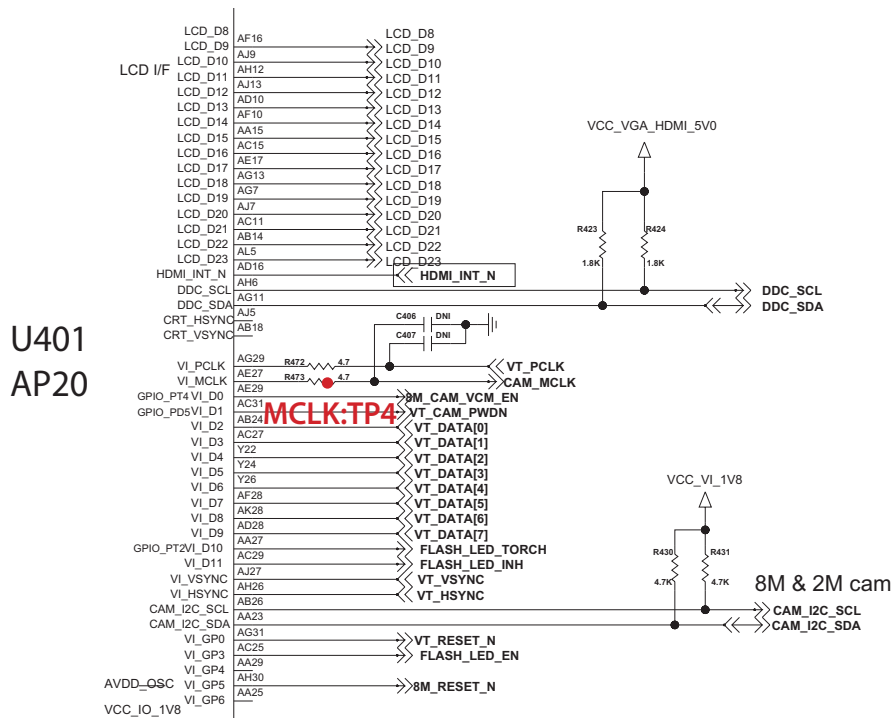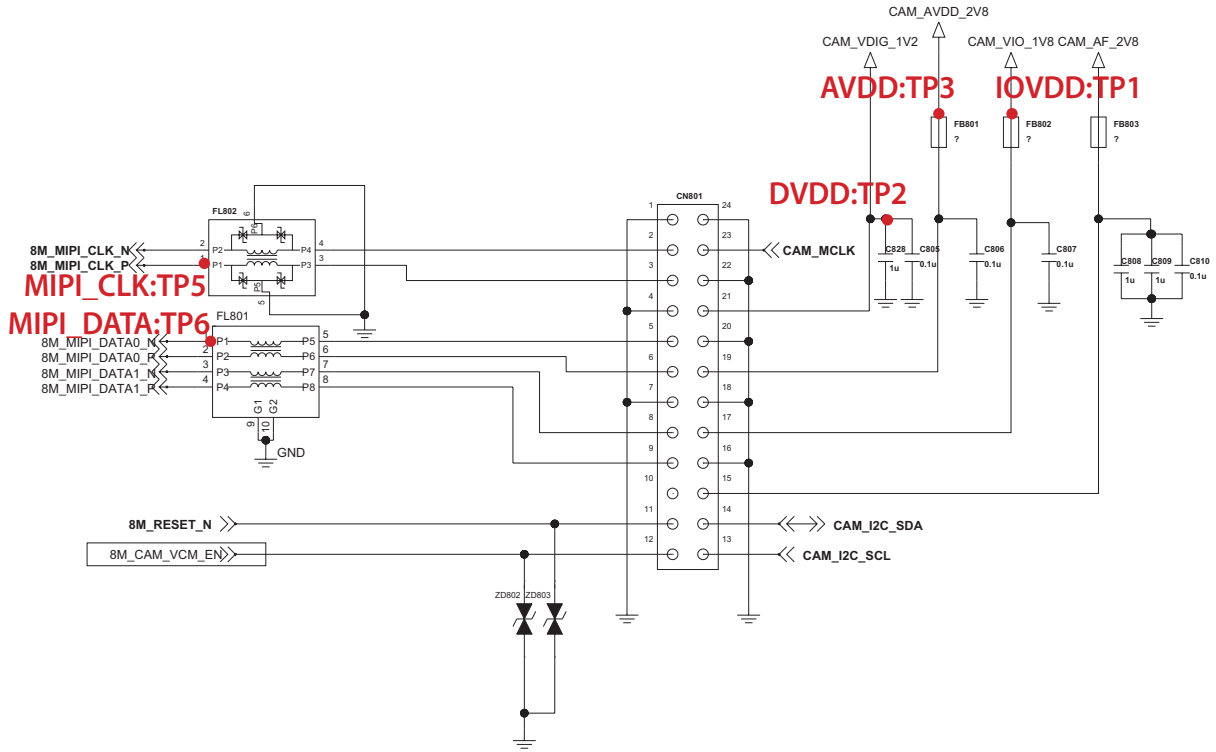|	1	2	3	4	5	6
Ref. No	C1033	FB901	C907	C913	FB902	R1013

4.13 Camera trouble(8M/1.3M)

4.13.1 Main 8M AF Camera troubleshooting

8M camera control signals are generated by AP20(U401), and Power is supplied by LP8720(U801)

```
                          ┌─────────────┐
                          │    START    │
                          └─────────────┘
                                 │
                                 ▼
                    ┌───────────────────────┐
                    │ Check the camera conn. and │
                    │  revonnect thr camera  │
                    └───────────────────────┘
                                 │
                                 ▼
                         ╱───────────╲         Yes    ┌─────────┐
                        ╱ Camera is OK? ╲────────────▶│   END   │
                         ╲───────────╱              └─────────┘
                                 │ No
                                 ▼
         No           ╱──────────────────────╲
      ◀───────────── ╱  Check IOVDD(TP1),      ╲
                     ╲  DVDD(TP2), AVDD(TP3)   ╱
                      ╲──────────────────────╱
                                 │ Yes
                                 ▼
┌─────────────────────┐  No  ╱──────────────────────────╲
│ Change the main board │◀──── Check the camera signals MCLK(TP4),
└─────────────────────┘     ╲ MIPI_CLK(TP5), MIPI_DATA(TP6) ╱
           │                 ╲──────────────────────────╱
           │                            │ Yes
           │                            ▼
           │                 ┌───────────────────────┐
           │                 │   Change the camera   │
           │                 └───────────────────────┘
           │                            │
           │                            ▼
           │                   ╱───────────╲        Yes   ┌─────────┐
           └──────────────────╱ Camera is OK? ╲──────────▶│   END   │
                               ╲───────────╱             └─────────┘
```
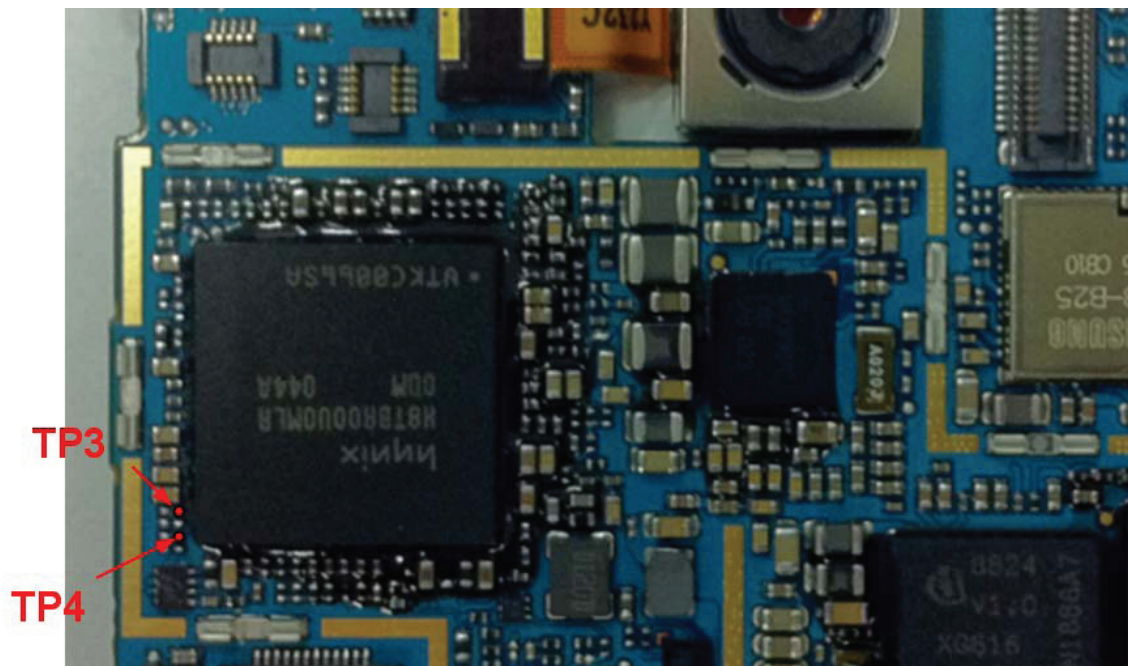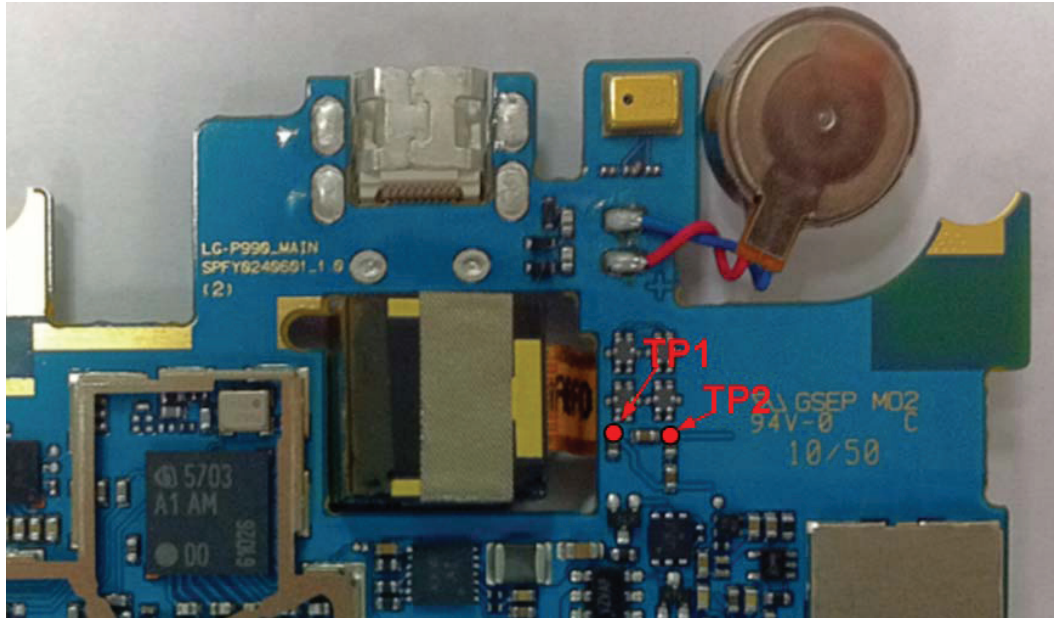
4.13.2 Sub 1.3M Camera troubleshooting

8M camera control signals are generated by AP20(U401), and Power is supplied by LP8720(U801)

- 130 -
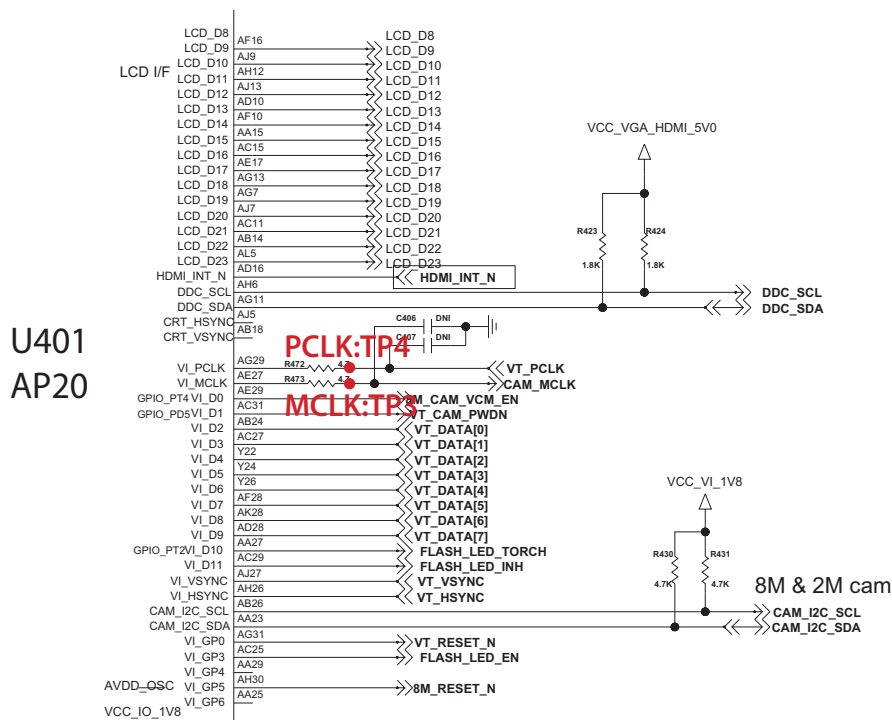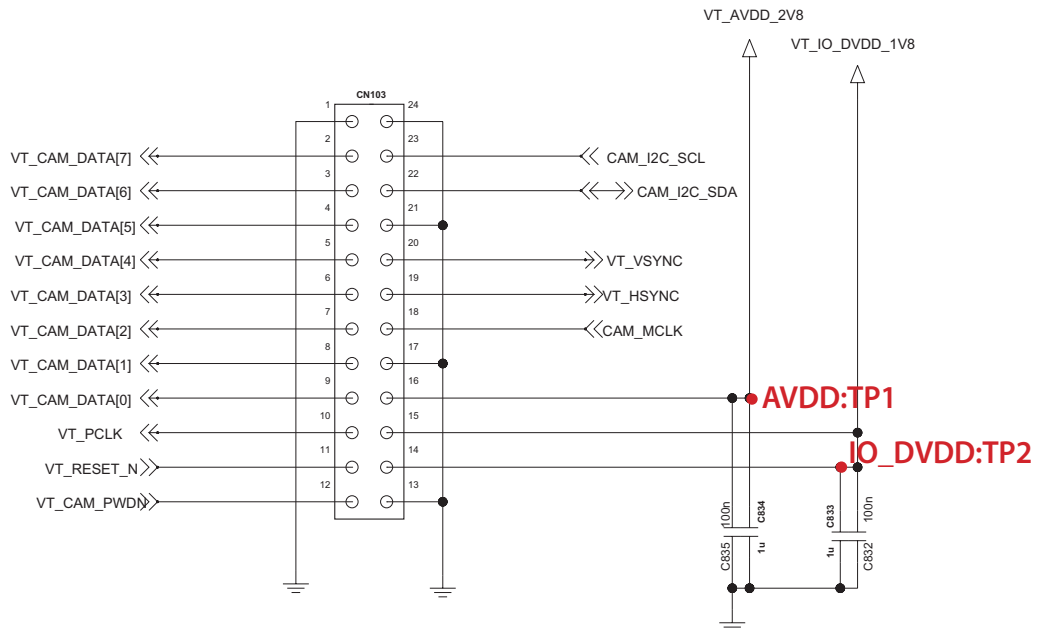
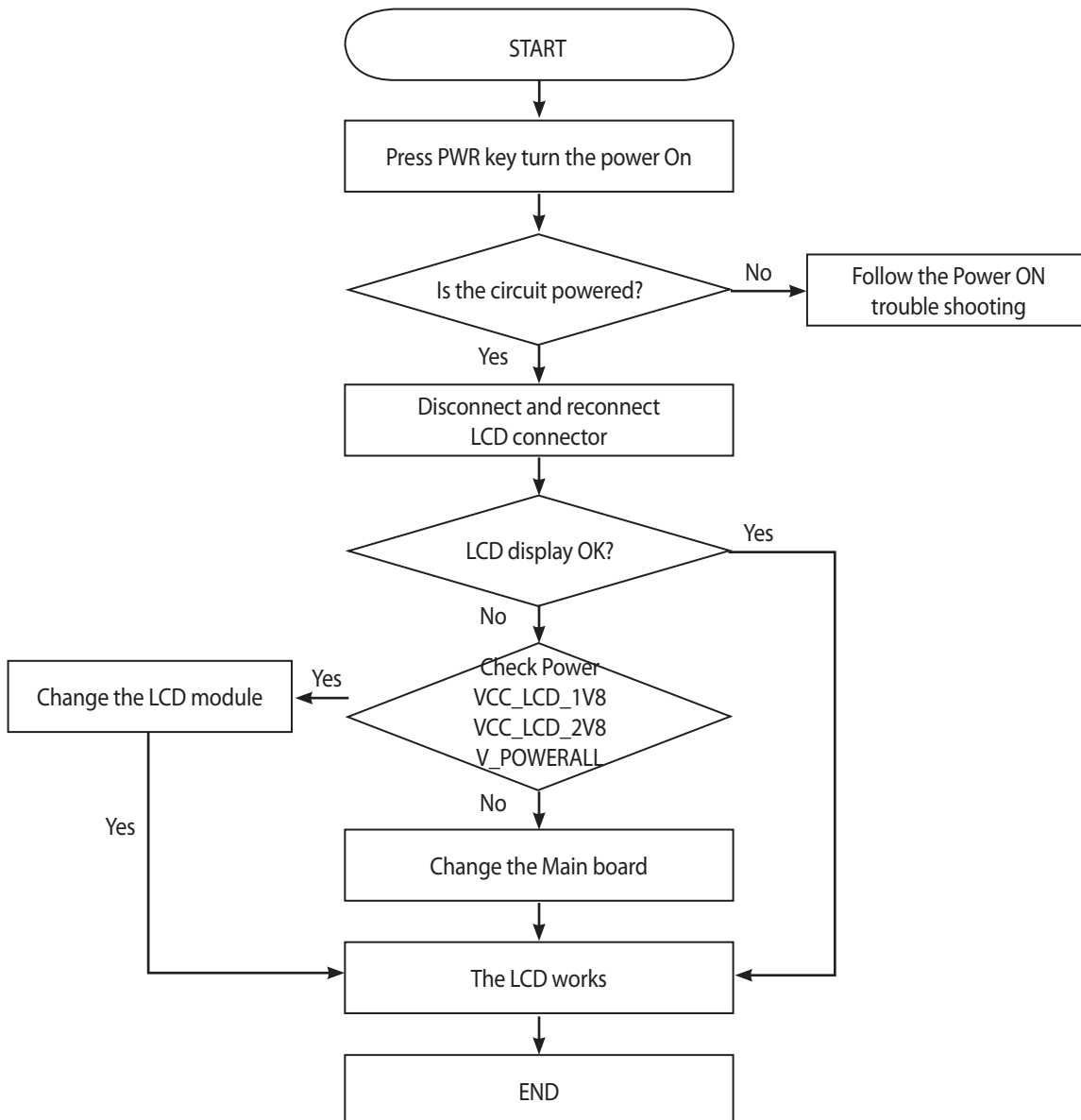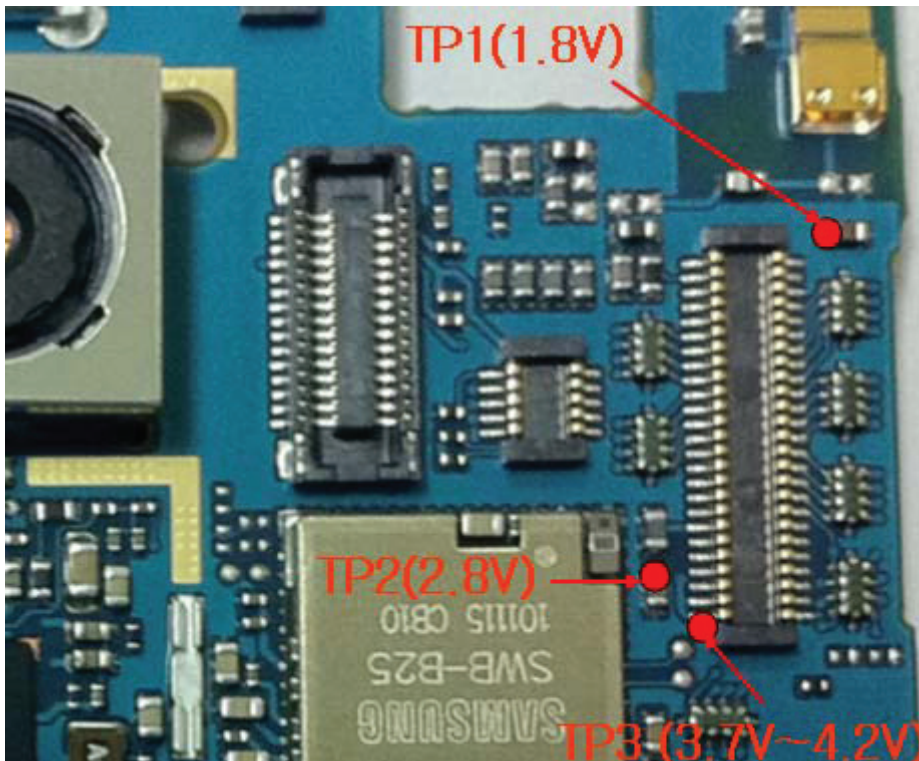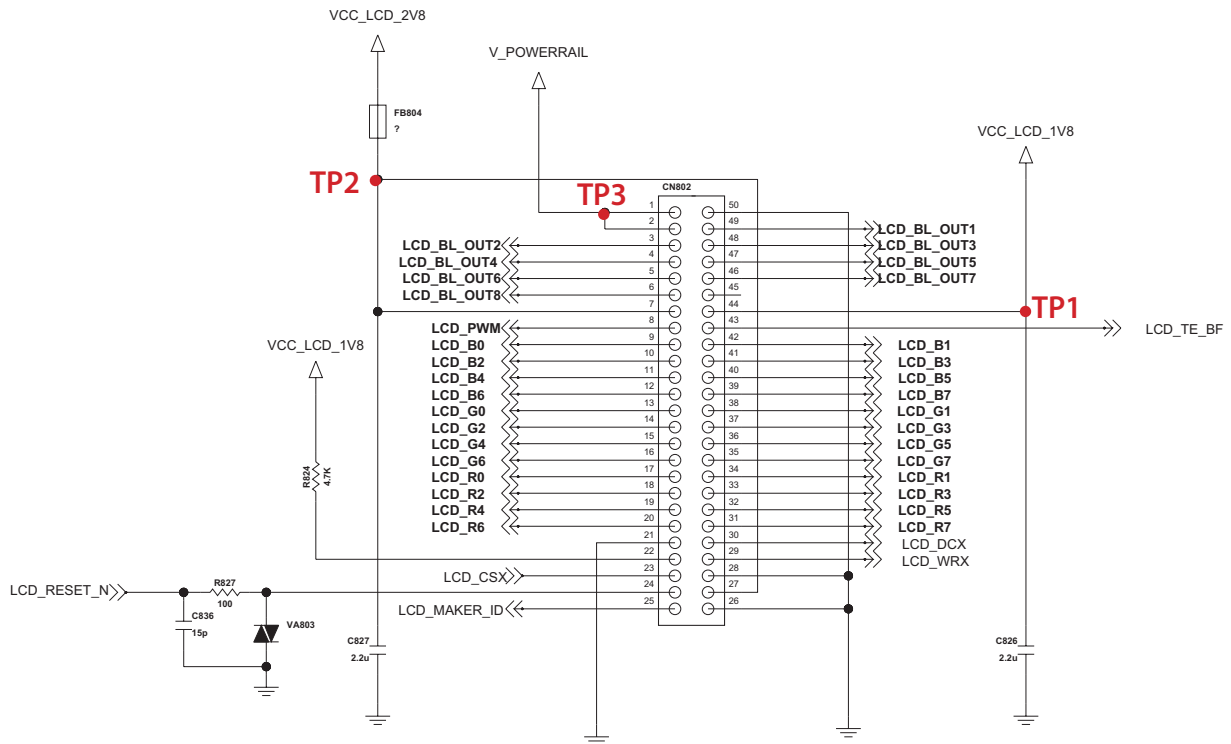## 4.14 Main LCD trouble

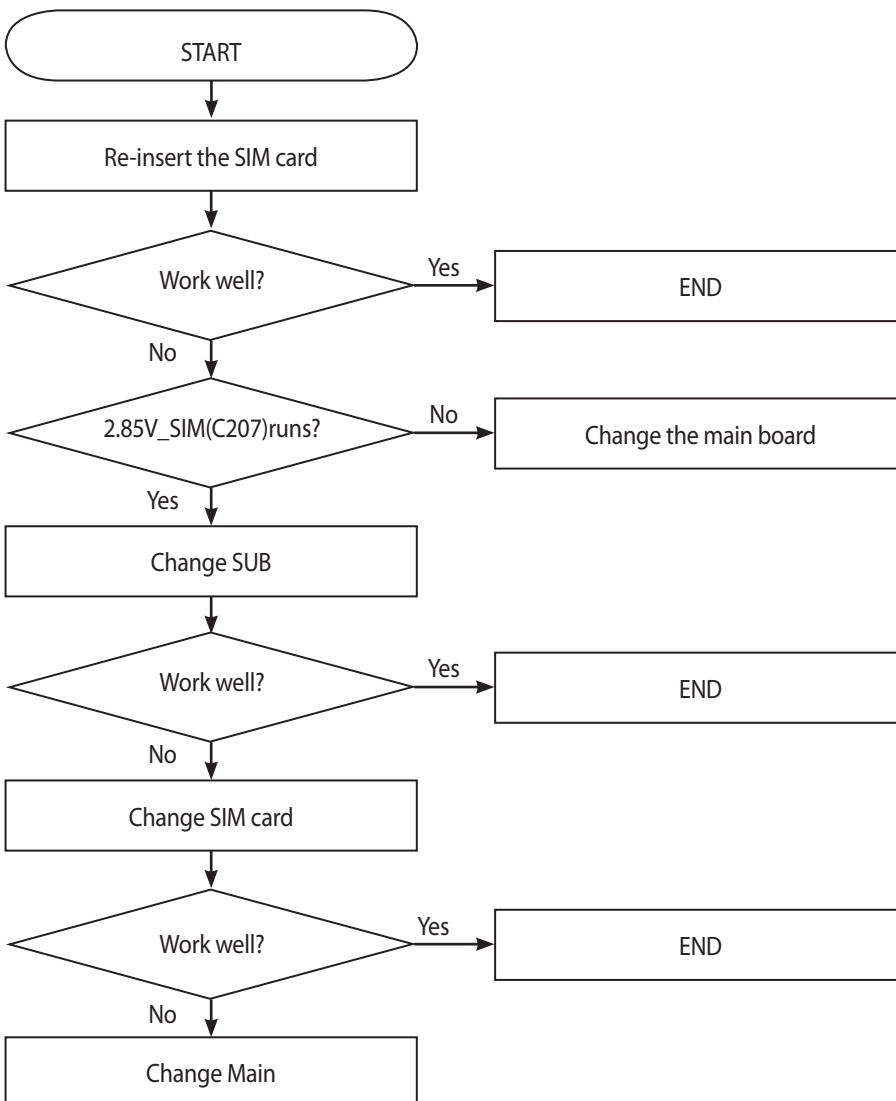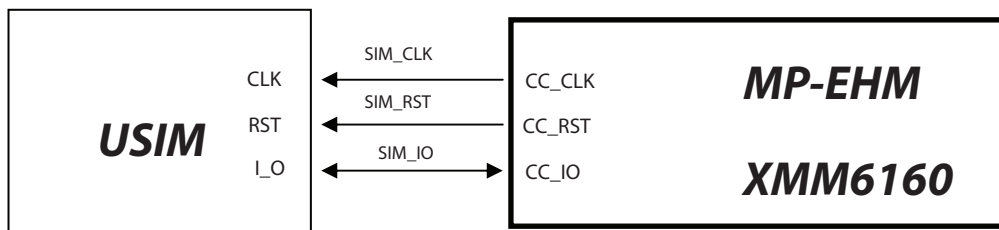Main LCD control signals are generated by AP20. Those signal's path are : AP20 -> LCD Module

```
                        ┌─────────────────┐
                        │      START      │
                        └────────┬────────┘
                                 ↓
                  ┌──────────────────────────────┐
                  │  Press PWR key turn the power On │
                  └───────────────┬──────────────┘
                                  ↓
                         ╱ Is the circuit ╲        No    ┌──────────────────────┐
                        ◇    powered?      ◇──────────→│ Follow the Power ON   │
                         ╲                 ╱            │   trouble shooting    │
                          ↓ Yes                        └──────────────────────┘
                  ┌──────────────────────────┐
                  │  Disconnect and reconnect  │
                  │      LCD connector         │
                  └───────────────┬──────────┘
                                  ↓
                         ╱ LCD display OK? ╲      Yes
                        ◇                   ◇──────────┐
                         ╲                 ╱           │
                          ↓ No                         │
  ┌───────────────────┐  Yes   ╱ Check Power ╲         │
  │ Change the LCD    │←──────◇  VCC_LCD_1V8  ◇        │
  │     module        │        ╲ VCC_LCD_2V8 ╱         │
  └─────────┬─────────┘         ╲V_POWERALL╱          │
            │                       ↓ No              │
            │Yes          ┌──────────────────────┐    │
            │             │  Change the Main board │   │
            │             └───────────┬──────────┘    │
            │                         ↓               │
            │             ┌──────────────────────┐    │
            └────────────→│    The LCD works      │←───┘
                          └───────────┬──────────┘
                                      ↓
                          ┌──────────────────────┐
                          │         END           │
                          └──────────────────────┘
```
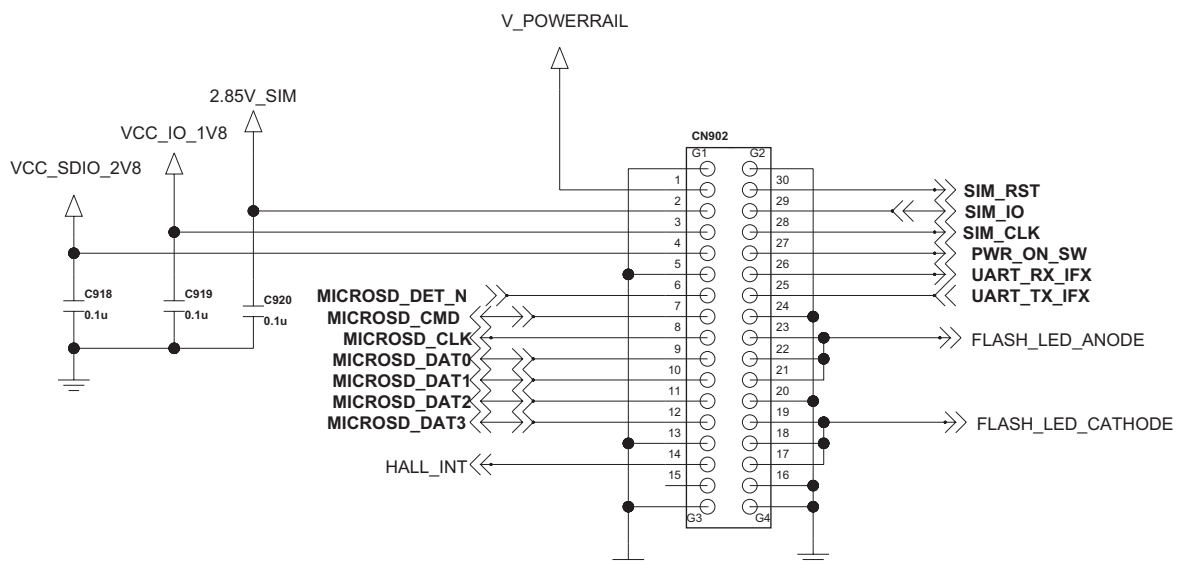
4.15 SIM detect Trouble shooting

The sequence of detecting LGP990 SIM is,

SIM inserted to LGP990 → 2.85V_SIM(C207) goes to 2.85V → Triggers SIM clock, reset and data.

Block Diagram of USB & UART connection is shown below

```
                   SIM_CLK
  USIM    CLK  ◄──────────── CC_CLK       MP-EHM
                   SIM_RST
          RST  ◄──────────── CC_RST
                   SIM_IO
          I_O  ◄──────────►  CC_IO       XMM6160
```

```
        ┌──────────────┐
        │    START     │
        └──────┬───────┘
               ▼
   ┌────────────────────────┐
   │  Re-insert the SIM card │
   └───────────┬─────────────┘
               ▼
        ◄ Work well? ►──── Yes ──►  END
               │ No
               ▼
   ◄ 2.85V_SIM(C207)runs? ►── No ──► Change the main board
               │ Yes
               ▼
   ┌────────────────────────┐
   │       Change SUB        │
   └───────────┬─────────────┘
               ▼
        ◄ Work well? ►──── Yes ──►  END
               │ No
               ▼
   ┌────────────────────────┐
   │     Change SIM card     │
   └───────────┬─────────────┘
               ▼
        ◄ Work well? ►──── Yes ──►  END
               │ No
               ▼
   ┌────────────────────────┐
   │       Change Main       │
   └────────────────────────┘
```
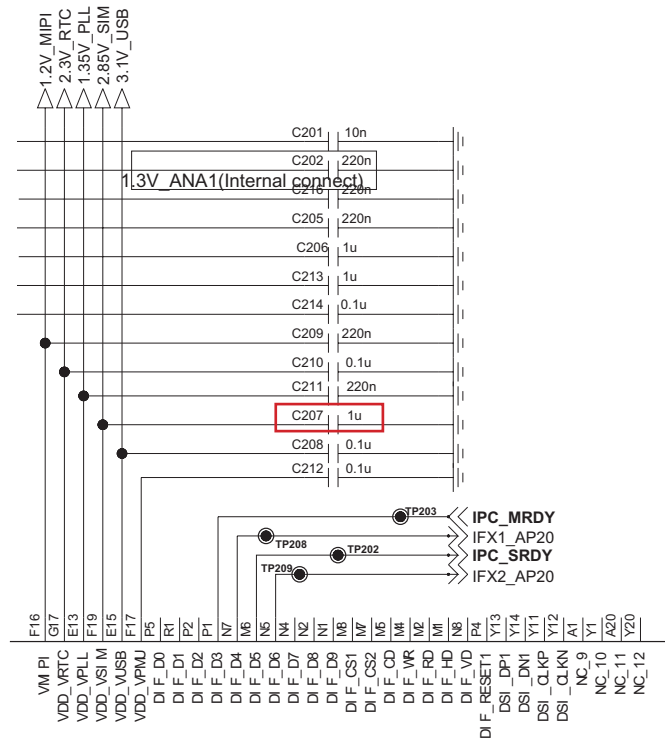
C207 (2.85V_SIM)
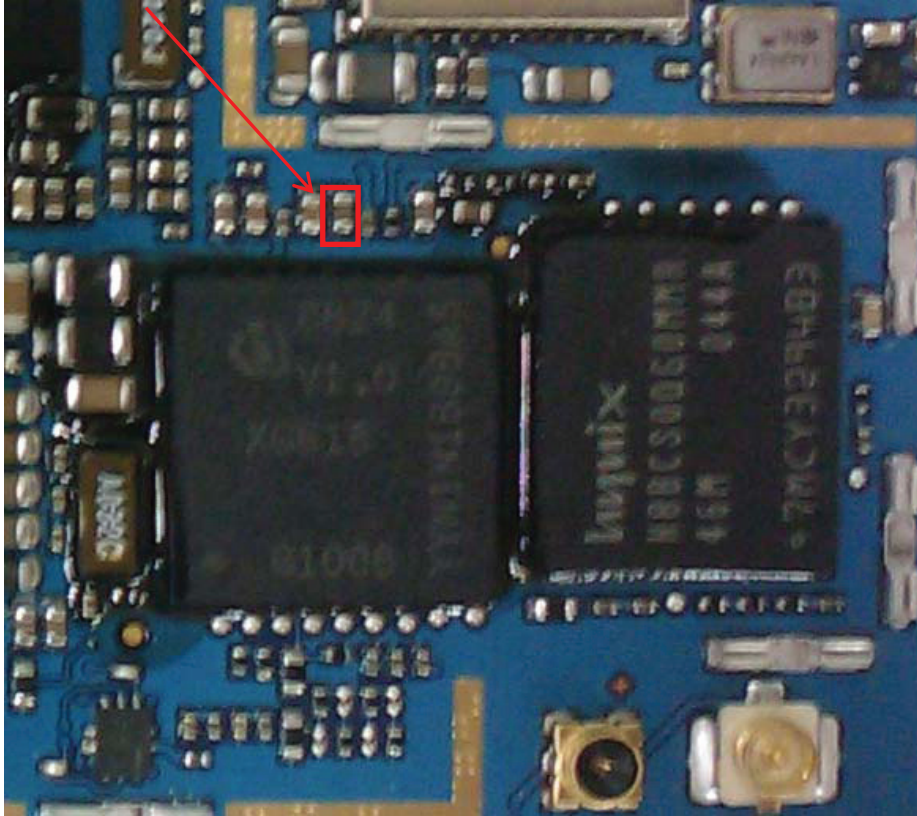
P990 SUB FPCB

USIM For Infinieon
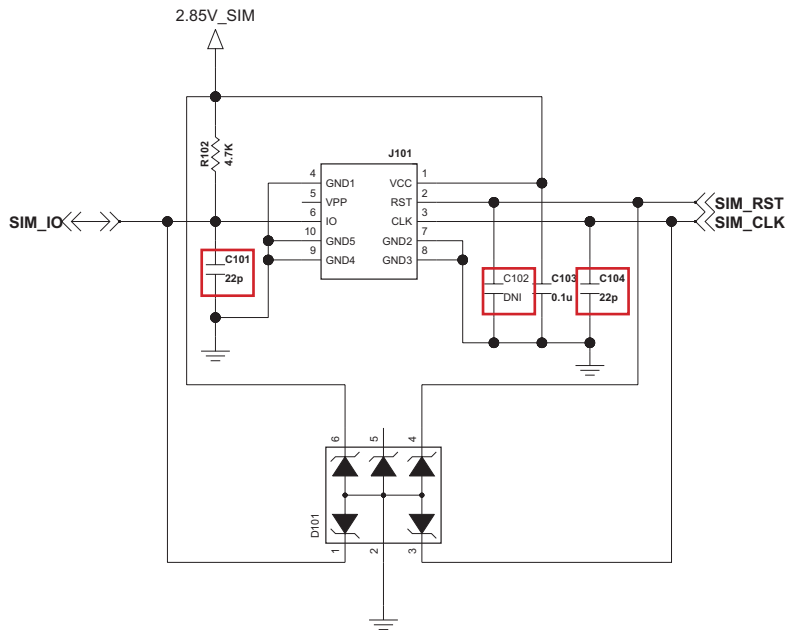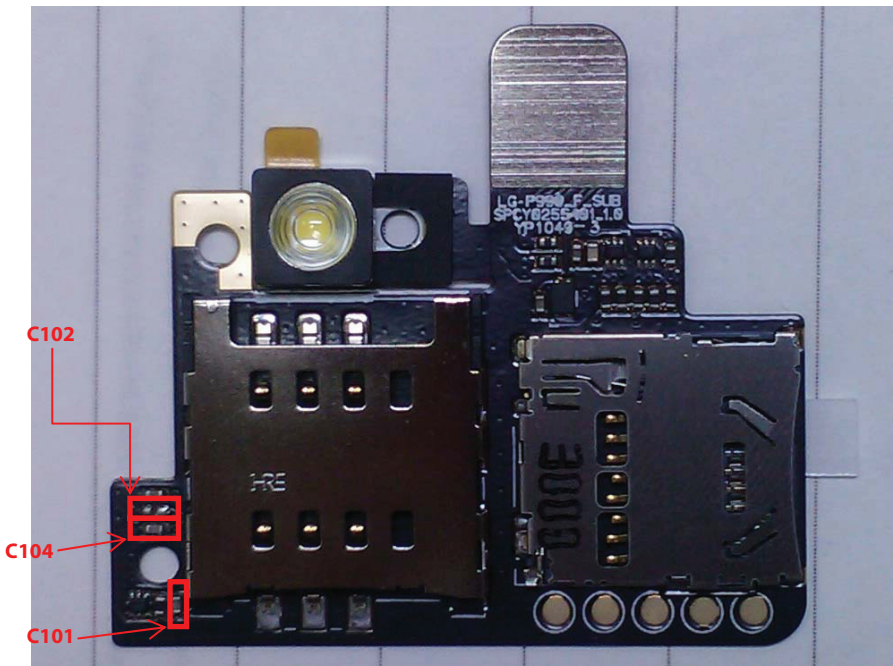
P990 SUB FPCB

Check if SUB FPCB is damaged

4.16 Side Key Trouble shooting

The sequence of detecting LGP990 Side key is,

Side key pressed on LGP990 → VOL_KEY_UP, VOL_KEY_DOWN goes low

Block Diagram of Side key connection is shown below

VOL_KEY_UP ← GMI_AD1

VOL_KEY_DOWN ← GMI_AD0 | *AP20*

START

Press the key

Side key works? → Yes → END

No

D901, D902 goes low when the key is pressed? → END

No

Lower FPCB damaged? → Yes → Change Lower FPCB

No

Change the Main board
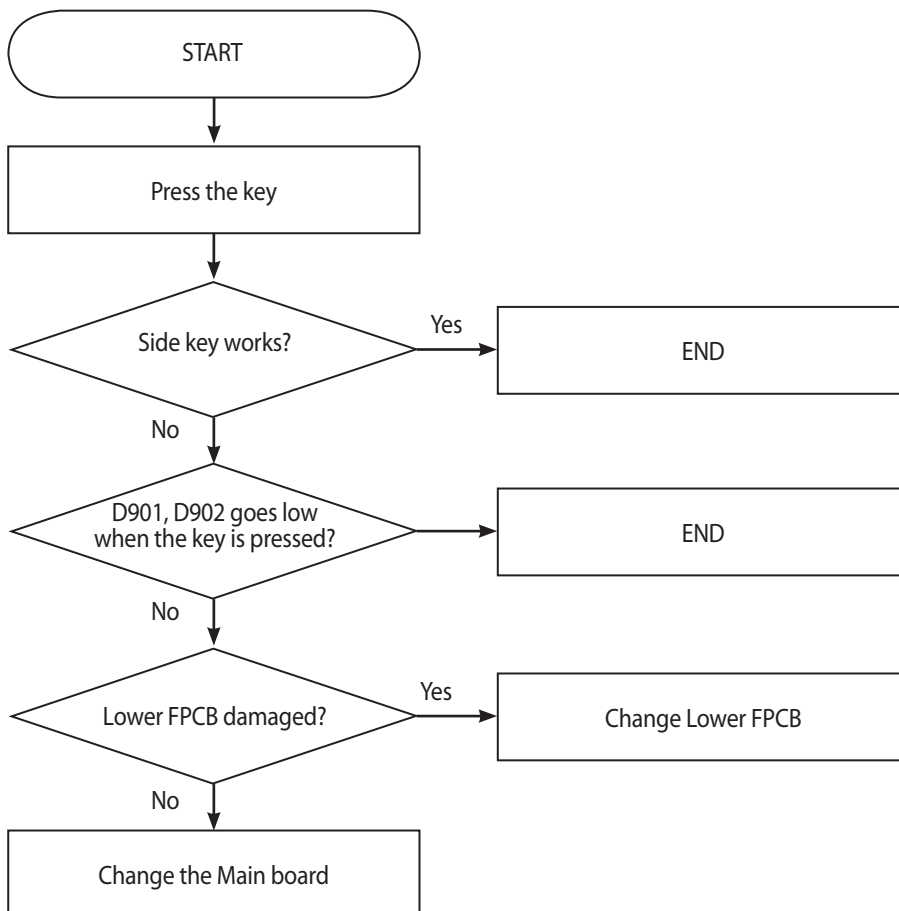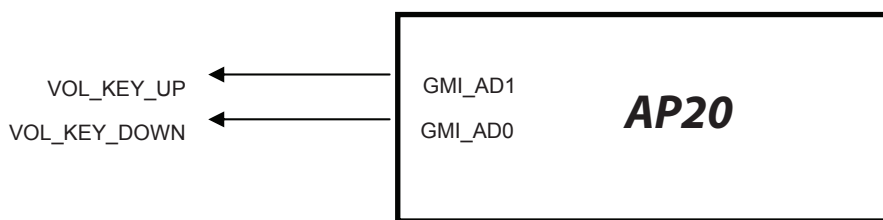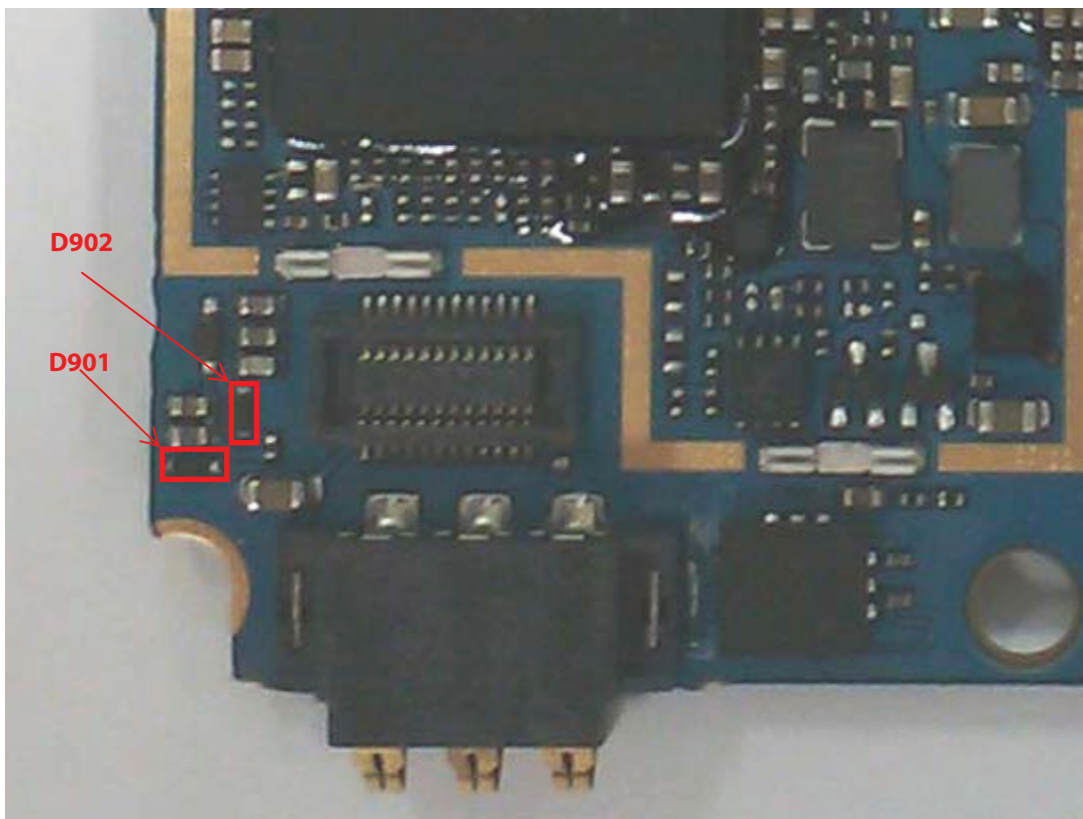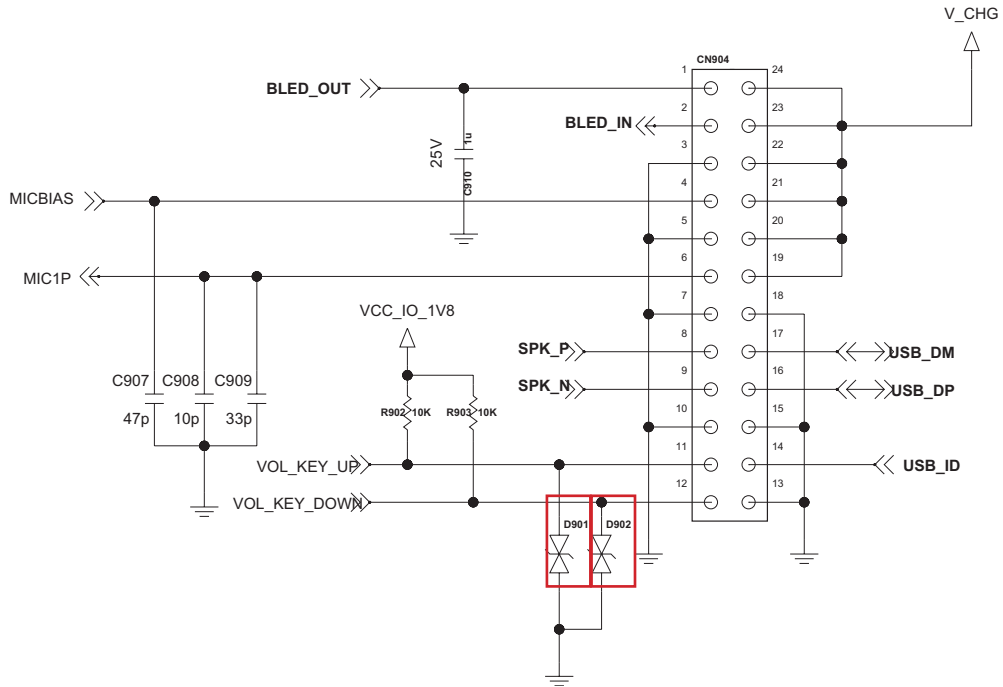
4.17 Vibrator Troubleshooting

Check out the setting menu on the phone. If not, check Test points shown on the pictures.

```
                    ╭─────────────────╮
                    │      START      │
                    ╰─────────────────╯
                             │
                             ▼
                    ┌─────────────────┐
                    │ Turn on the phone│
                    └─────────────────┘
                             │
                             ▼
                         ╱────────╲              No    ┌──────────────────┐
                    ◇ Is the circuit ◇ ─────────────▶ │ Follow the power-on│
                         ╲ powered? ╱                  │  trouble shooting  │
                             │                         └──────────────────┘
                            Yes
                             │
                             ▼
                      ╱───────────────╲         Yes
                    ◇ Check IOVDD(TP1), ◇ ───────────┐
                      DVDD(TP2), AVDD(TP3)            │
                         ╲───────────╱                │
                             │                        │
                             ▼                        │
┌──────────────────┐  Yes ╱──────────╲                │
│Change the vibrator│◀────◇ Check TP1, 2,3 ◇          │
└──────────────────┘      ╲──────────╱                │
         │                    │                       │
         │                   No                       │
         │                    ▼                        │
         │           ┌─────────────────┐              │
         │           │Change the main board│          │
         │           └─────────────────┘              │
         │                    │                       │
         │                    ▼                        │
         │           ┌─────────────────┐              │
         └──────────▶│  Vibrator works │◀─────────────┘
                     └─────────────────┘
                             │
                             ▼
                    ╭─────────────────╮
                    │       END       │
                    ╰─────────────────╯
```
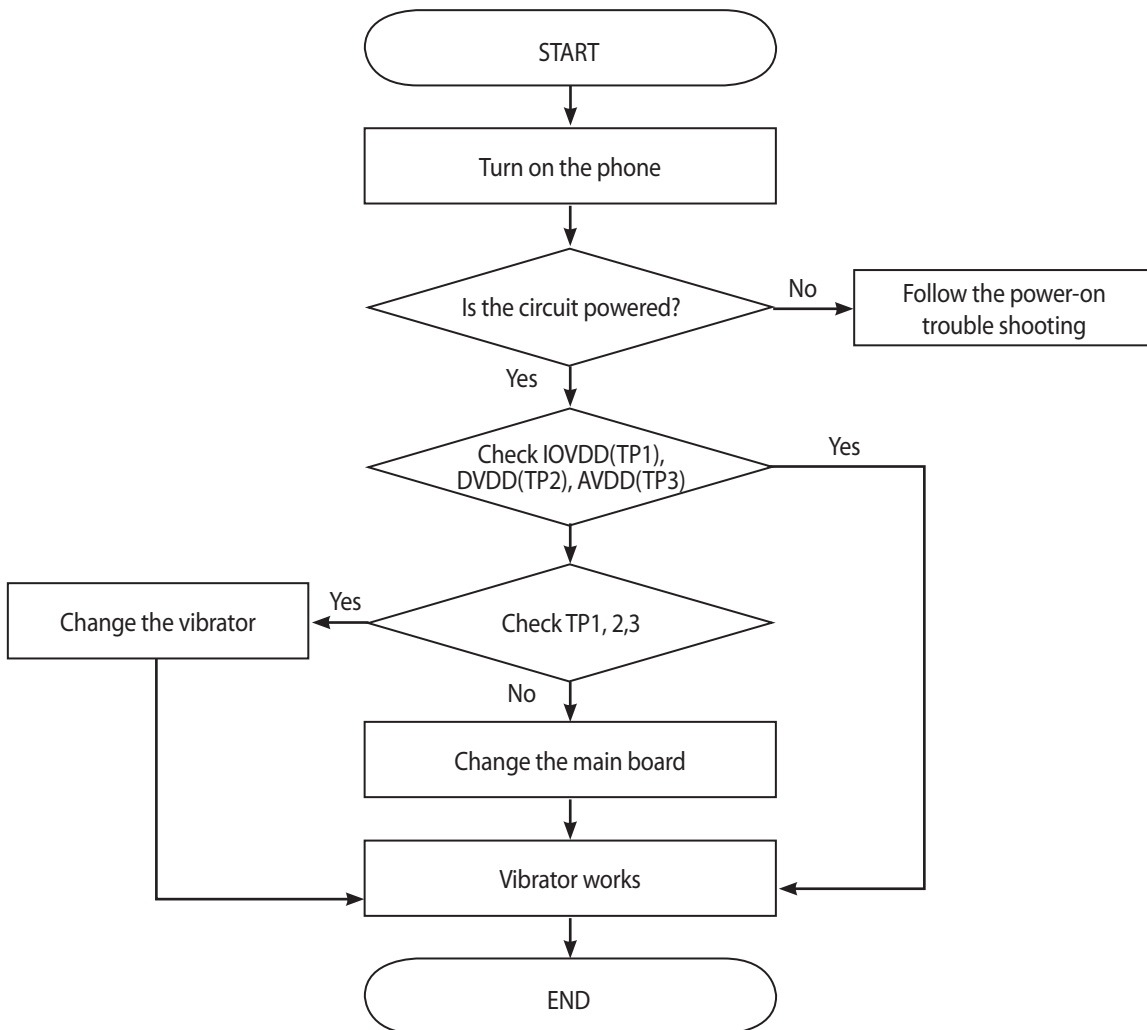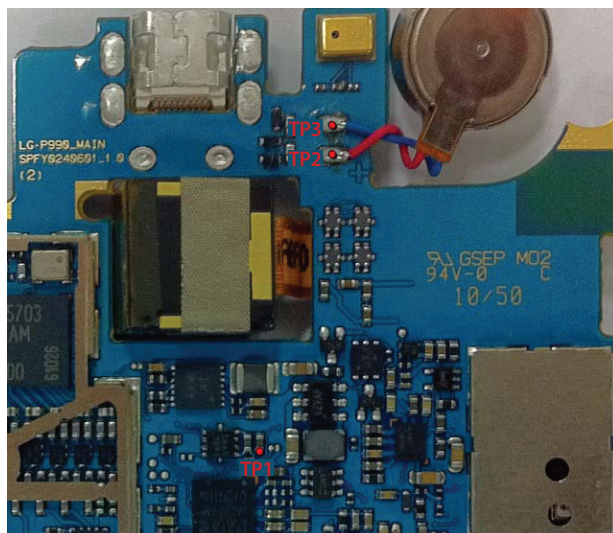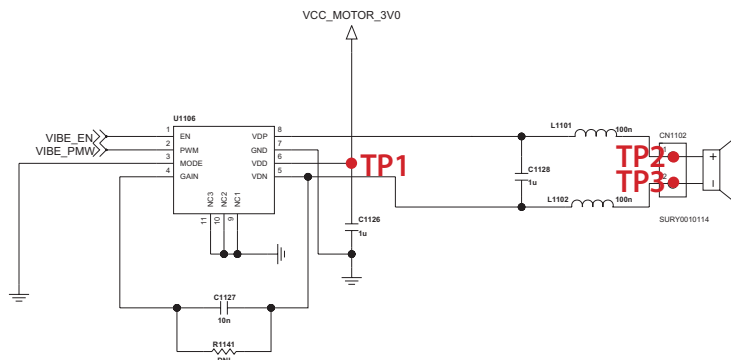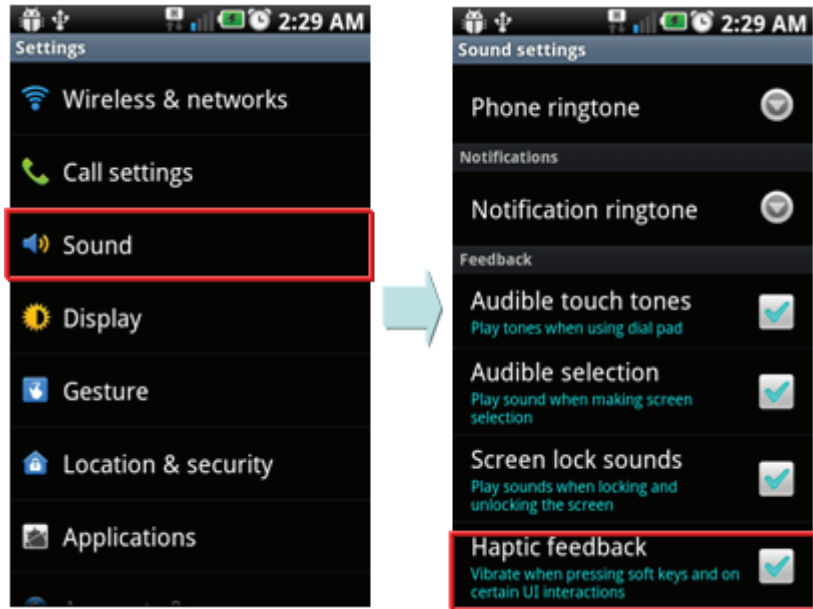
4.18 HDMI Troubleshooting

Check out the setting menu on the phone and then set the proper resolution for the outer display as shown below

```
                    ┌─────────────────────┐
                    (       START          )
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │   Turn on the phone  │
                    └─────────────────────┘
                              │
                              ▼
                        ╱─────────╲                No   ┌──────────────────────┐
                   ┌───Is the circuit powered?─────────▶│  Follow the power-on │
                        ╲─────────╱                      │   trouble shooting   │
                              │ Yes                      └──────────────────────┘
                              ▼
                    ┌─────────────────────┐
                    │ Connect the HDMI cable│
                    └─────────────────────┘
                              │
                              ▼
                        ╱─────────╲                Yes
                   ┌───Video ouput OK?──────────┐
                        ╲─────────╱              │
                              │                  │
                              ▼                  │
 ┌──────────────────┐  Yes  ╱─────────╲          │
 │ Set the resolution│◀─────Check the setting on menu
 │suitable for the display│  ╲─────────╱         │
 └──────────────────┘        │ No                │
          │                  ▼                   │
          │        ┌─────────────────────┐       │
          │        │ Change the main board│       │
          │        └─────────────────────┘       │
          │                  │                   │
          │                  ▼                   │
          │        ┌─────────────────────┐       │
          └───────▶│     HDMI woeks       │◀──────┘
                   └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    (        END           )
                    └─────────────────────┘
```
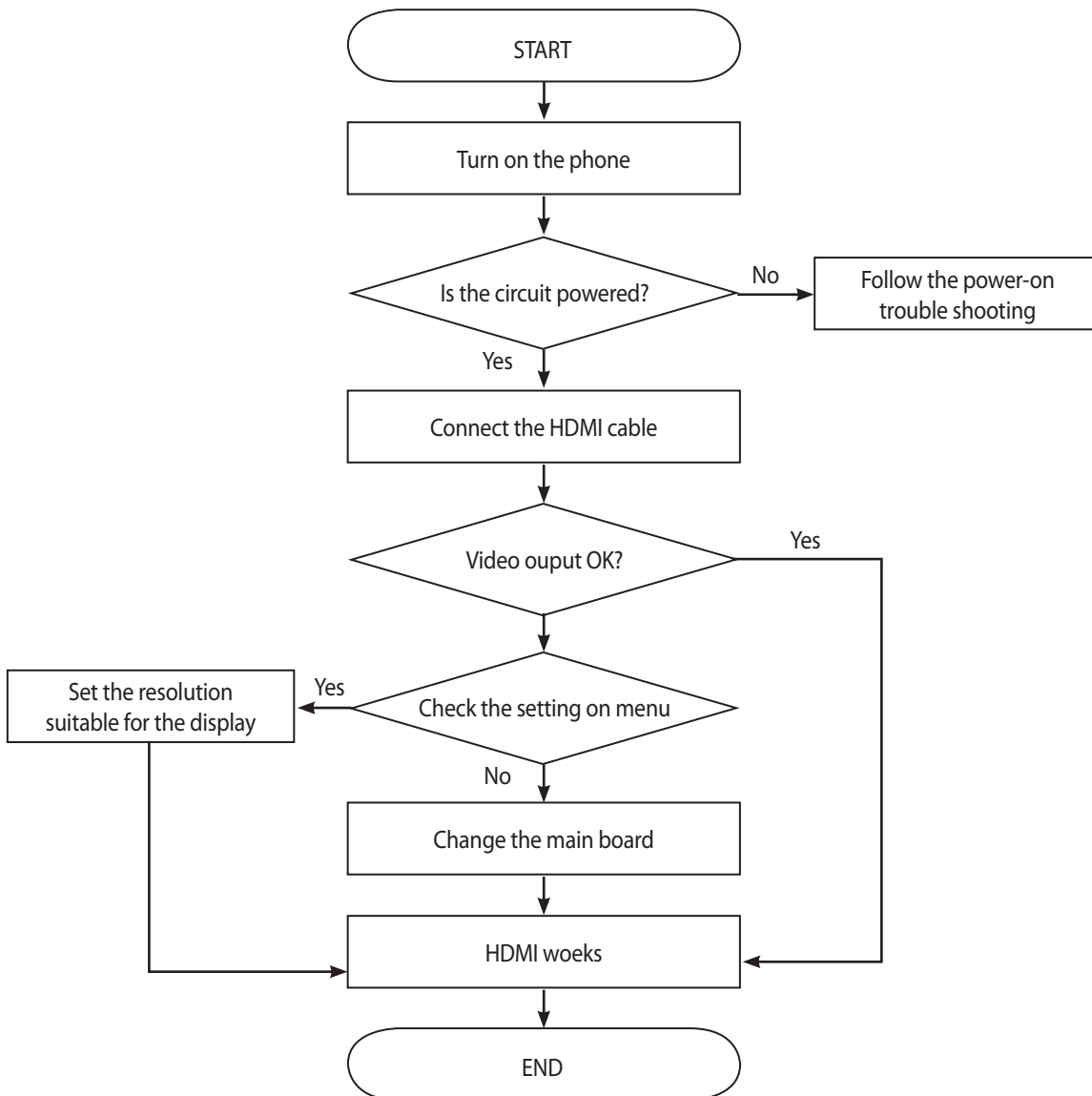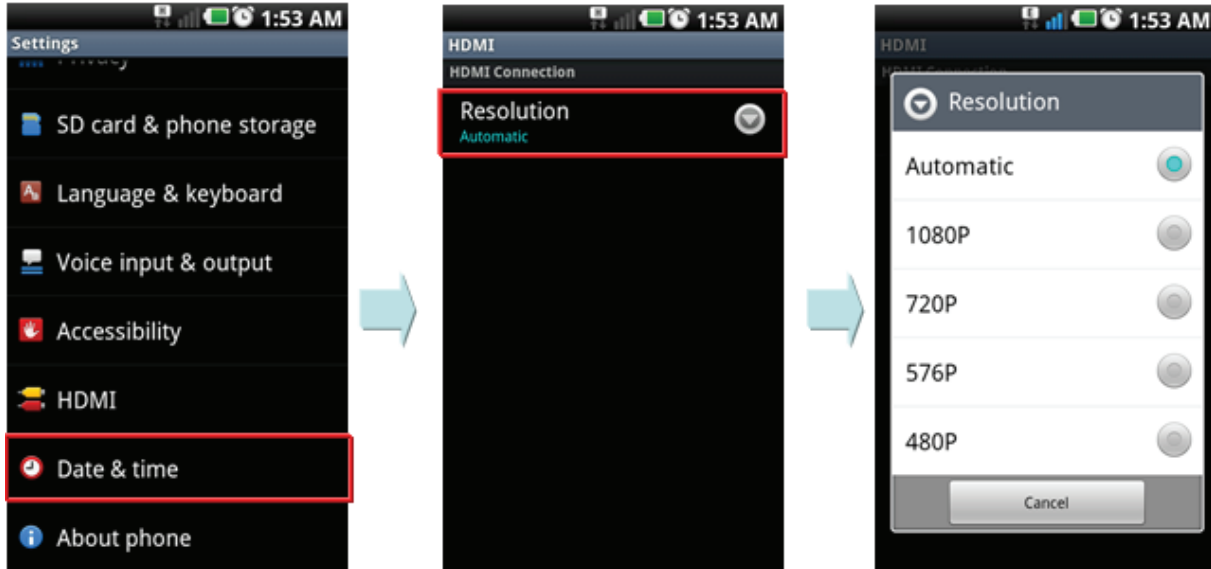
4.19 Motion Sensor on/off trouble

When the motion sensor does not work, the reason is chip problem. If the motion sensor IC is damaged, it will do not work even thought power is supplied and AP20 controls normally. Therefore if the motion sensor is damaged, change the motion sensor IC or main borad.

```
                    ┌──────────────────┐
                    │      START       │
                    └──────────────────┘
                             │
                             ▼
          ┌──────────────────────────────────────┐
          │ Moeion sensor function check (Screen  │
          │ rotation function is working or not?) │
          └──────────────────────────────────────┘
                             │
                             ▼
                  ◇ Function is OK? ◇ ──Yes──▶ │ END │
                             │
                             ▼
          ┌──────────────────────────────────────┐
          │         Change the IC(U1105)          │
          └──────────────────────────────────────┘
                             │
                             ▼
                  ◇ Function is OK? ◇ ──Yes──▶ │ END │
                             │
                             ▼
          ┌──────────────────────────────────────┐
          │         Change the main board         │
          └──────────────────────────────────────┘
                             │
                             ▼
                  ◇ Fnction is OK? ◇ ──Yes──▶ │ END │
```

VCC_SENSOR_1V8

IME_DA

•TP1

Pin	Signal		Pin	Signal
1	IO_VDD		10	SDA
2	DNC1	U1105	9	SCL — IME_CL
3	DNC2		8	DNC4
4	GND		7	INT — MOTION_INT
		VDD 5	6	DNC3

C1116 1u
C1117 0.1u

VCC_SENSOR_3V0

C1120 1u
C1121 0.1u
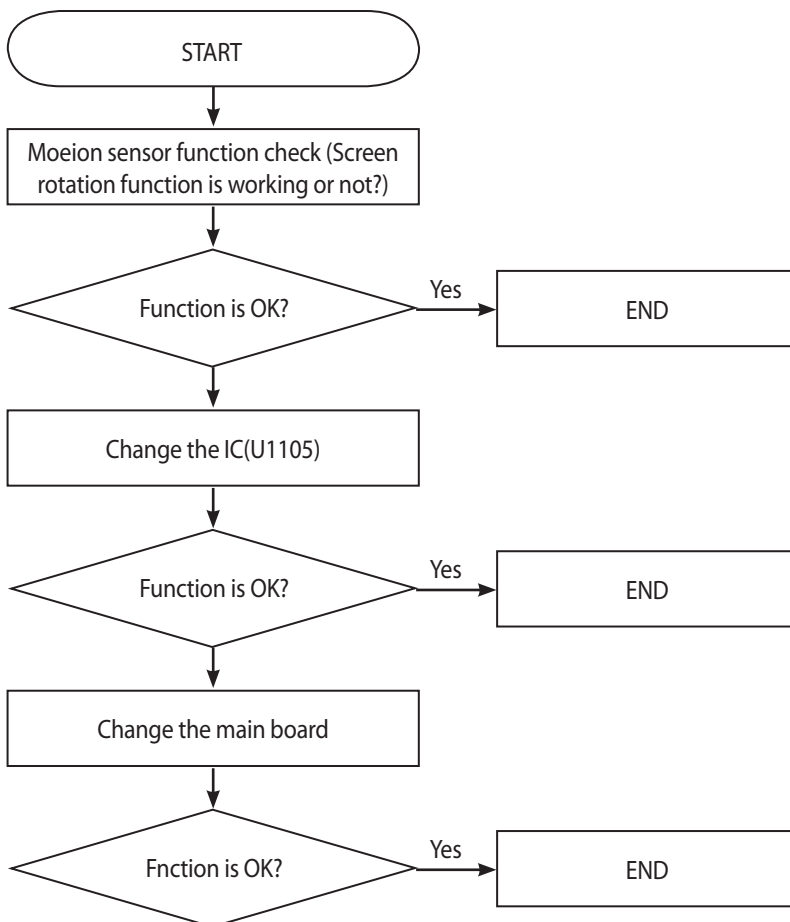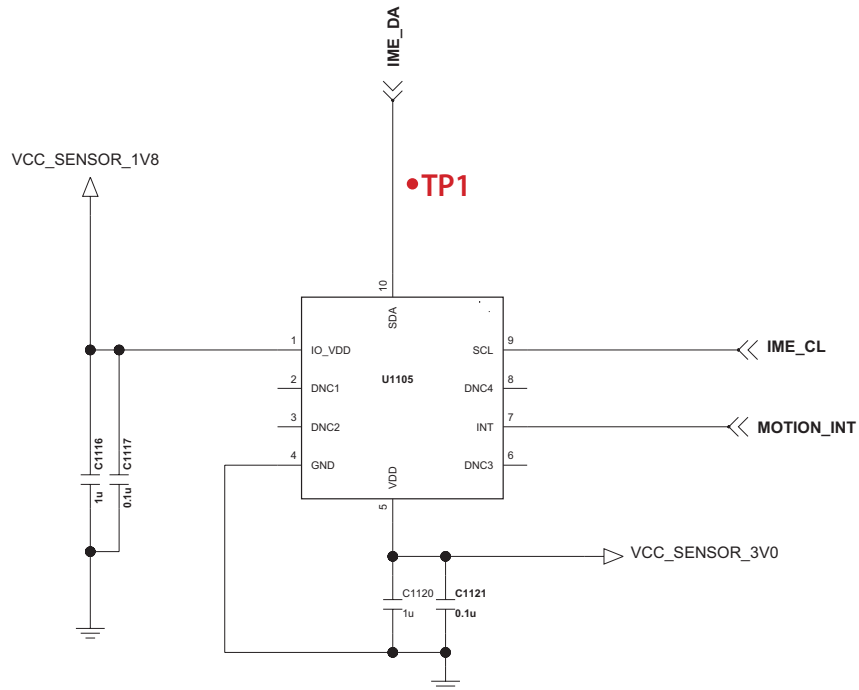
U1105 KXTF9
Motion sensor
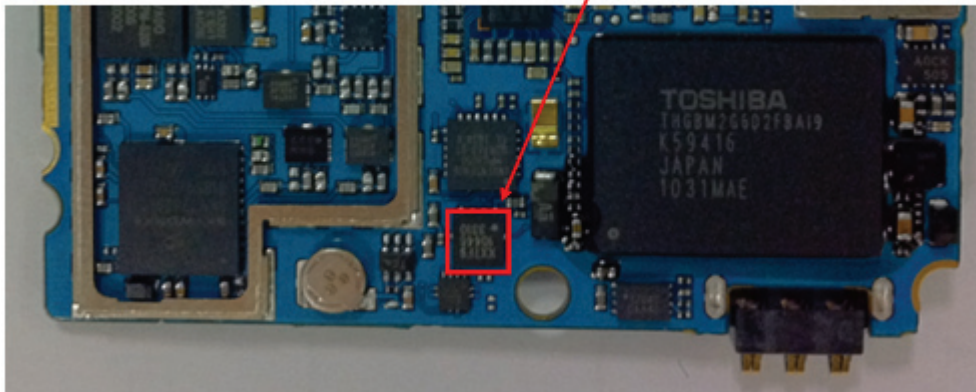
4.20 Gyro/Compass sensor troubleshooting

The compass sensor is calibrated by the gyro sensor data using SW algorithm. Therefore Gyro sensor error makes the compass sensor malfunction.

```
                          ┌─────────────────────┐
                          │        START        │
                          └─────────────────────┘
                                    │
                          ┌─────────────────────────────┐
                          │ Gyro & compass sensor function check │
                          └─────────────────────────────┘
                                    │
                          ◇ Gyro & compass function is OK? ──Yes──▶ [ END ]
                                    │ No
                                    ▼
  [Change the Gyro sensor IC(U1)] ◀──Yes── ◇ Gyro-NG compass-OK?
                                    │ No
                                    ▼
                          ◇ Gyro-OK compass-NG? ──Yes──▶ [ END ]
                                    │ No
                                    ▼
                          [ Change the compass sensor IC(U1) ]
                                    │
                          ◇ Function is OK? ──Yes──▶ [ END ]
                                    │ No
                                    ▼
                          [ Change the Gyro sensor IC(U1) ]
                                    │ No
                                    ▼
                          ◇ Function is OK? ──Yes──▶ [ END ]
                                    │ No
                                    ▼
                          [ Change the main board ]
                                    │
                          ◇ Function is OK?
                                    │
                          ┌─────────────────────┐
                          │        END          │
                          └─────────────────────┘
```

GEN2_I2C_SDA
GEN2_I2C_SCL

C1115
2.2n

25	24	23	22	21	20	19
NC9	SDA	SCL	CLKOUT	RESV2	CPOUT	RESV1

U1

1	CLKIN		GND	18
2	NC1		NC8	17
3	NC2		NC7	16
4	NC3		NC6	15
5	NC4		NC5	14
6	IME_DA		VDD	13

IME_DA

VCC_SENSOR_1V8

VCC_SENSOR_3V0

7	8	9	10	11	12
IME_CL	VLOGIC	AD0	REGOUT	FSYNC	INT

IME_CL

C1118
0.1u

GYRO_INT_N

C1122
0.1u

C1119
0.1u

VCC_SENSOR_3V0

VCC_SENSOR_1V8

C1
0.1u

C2
0.1u

U1107

3	2	1
AVDD	GNDA	DVDD

4	SCL		SDA	12
5	NC1		DRDY	11
6	ADDR		VPP	10

GEN2_I2C_SCL

GEN2_I2C_SDA
COM_INT

7	8	9
GNDS	VREG	INT

U1 MPU3050 Gyro
sensor

U1107 AMI304 Compass sensor
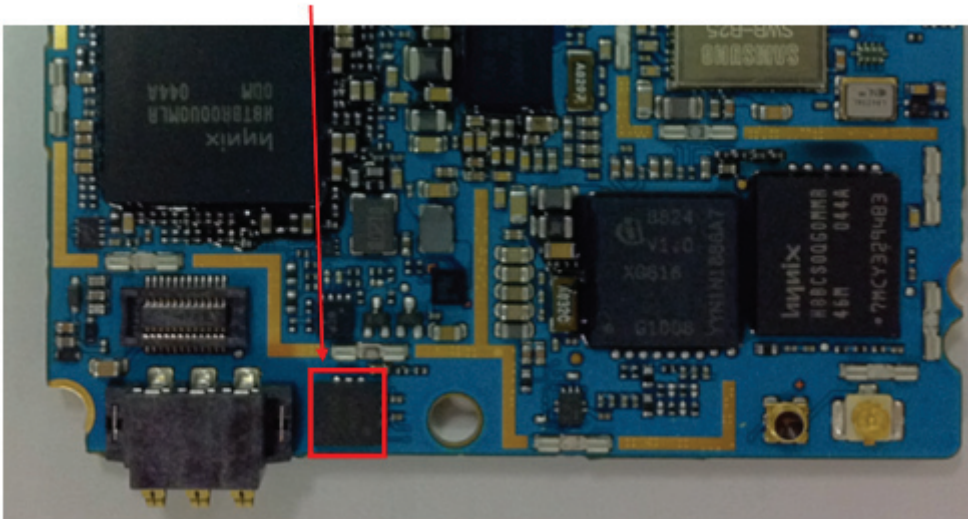
4.21 Proximity Sensor on/off trouble

Proximity Sensor is worked as below:

Send Key click ➔ Phone number click ➔ Call connected ➔ Object moved at the sensor

➔ Control the screen's on/off operation automatically

```
            ┌──────────────────┐
            │      START        │
            └────────┬──────────┘
                     │
         ┌───────────▼─────────────┐
         │ Send Key click & call   │
         │      connected          │
         └───────────┬─────────────┘
                     │
         ┌───────────▼─────────────┐
         │ Object moved at the     │
         │   Proximity Sensor      │
         └───────────┬─────────────┘
                     │
    Yes      ◇───────▼───────◇
  ◄──────────     LCD off?
                 ◇───────────◇
                     │ No
         ◇───────────▼─────────────◇      No   ┌──────────────────┐
             Check PROXI_SDA /        ─────────►│ Change the upper │
             SCL output & Prox_out              │      FPCB        │
         ◇─────────────────────────◇            └──────────────────┘
                     │ Yes
         ◇───────────▼───────◇      No   ┌──────────────────┐
              Work well?       ──────────►│ Change the main  │
         ◇───────────────────◇            │      board        │
                     │ Yes               └──────────────────┘
            ┌────────▼─────────┐
            │      END          │
            └──────────────────┘
```
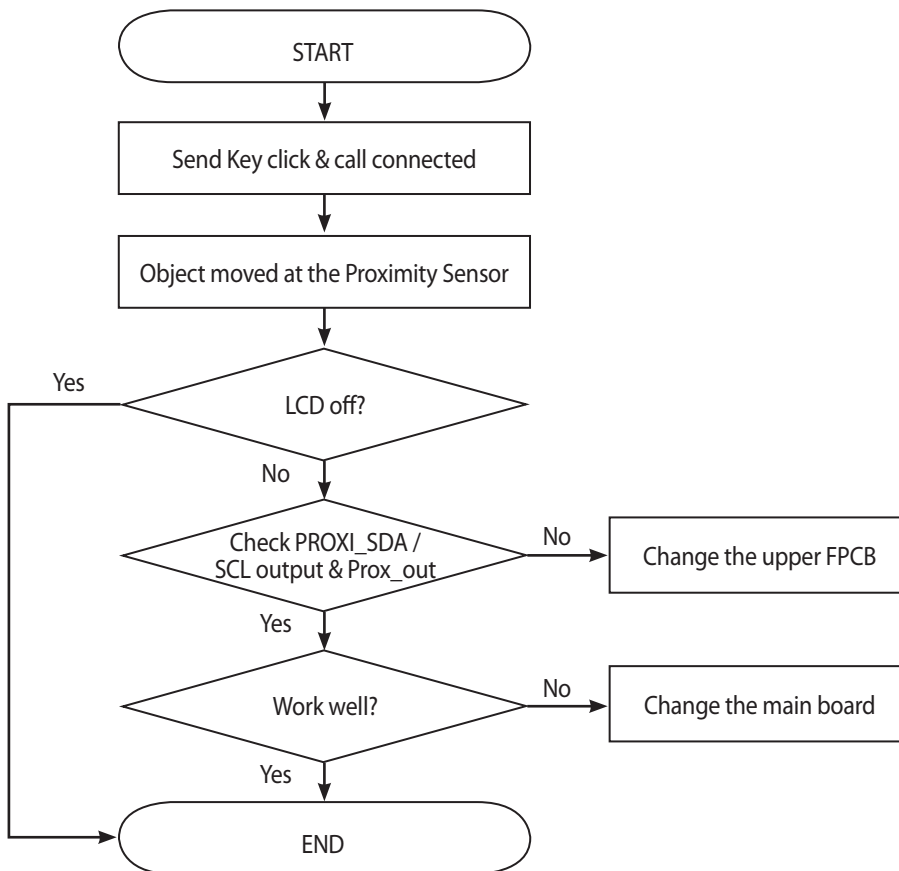
Measurement

VCC_SENSOR_3V0

VCC_SENSOR_1V8

PROX_OUT

GEN2_I2C_SCL

GEN2_I2C_SDA

Proximity Sensor

VCC_SENSOR_1V8

VCC_SENSOR_3V0

U101		
1 LEDA	SCL 8	**TP1** GEN2_I2C_SCL
2 LEDC	SDA 7	**TP2** GEN2_I2C_SDA
3 VCC	VIO 6	
4 VOUT	GND 5	

R101
20

R102
10

C101
10u

C103
4.7u

C104
0.1u

C105
1u

TP3

PROXI_OUT

TP2 TP1

TP3
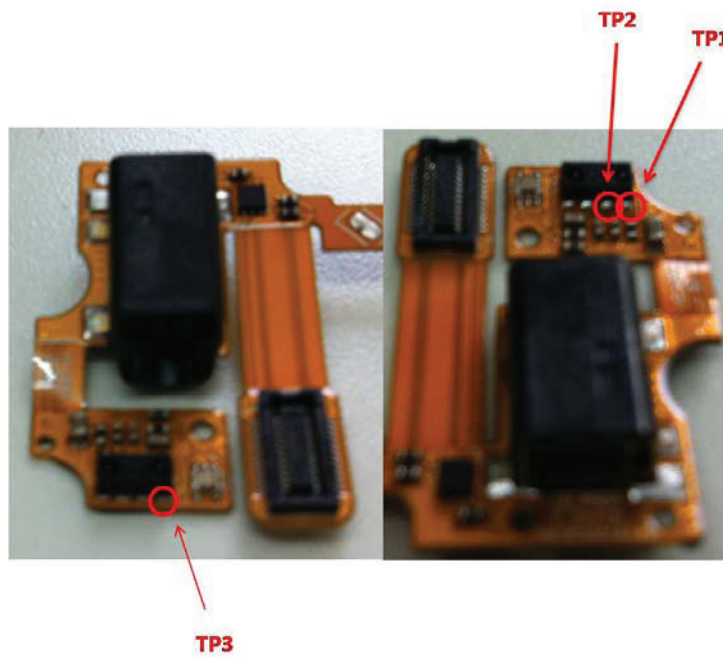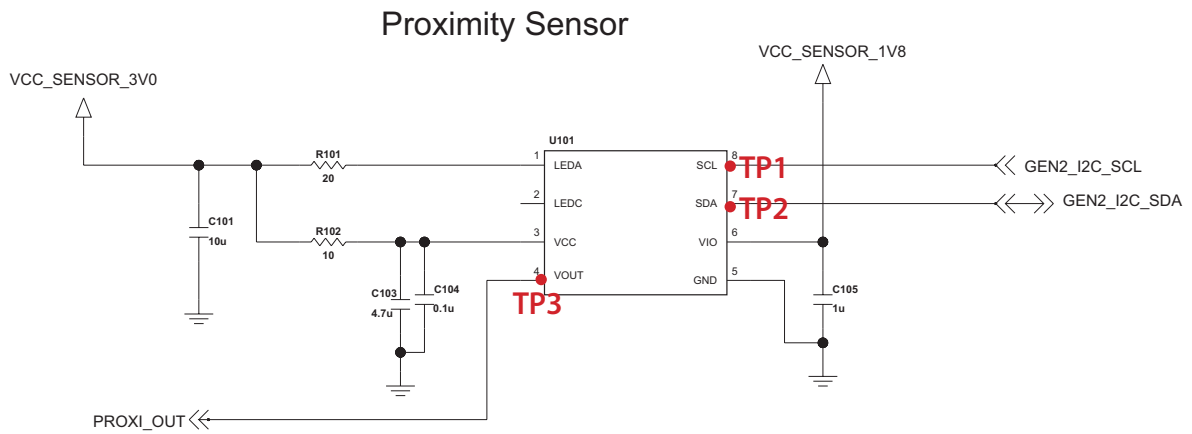
4.22 Illumination Sensor on/off trouble

Illumination Sensor is worked as below:

Menu Key click ➜ Settings click ➜ Display click ➜ Brightness click ➜ Automatic brightness click

```
                        ┌──────────────────────┐
                        │        START         │
                        └──────────────────────┘
                                  │
                        ┌──────────────────────┐
                        │ Automatic brightness │
                        │        click         │
                        └──────────────────────┘
                                  │
                        ┌──────────────────────┐
                        │ Hide Illumination    │
                        │  sensor by hand      │
                        └──────────────────────┘
                                  │
        Yes            ◇──────────────────────◇
   ┌─────────────────── LCD brightness change? ◇
   │                   ◇──────────────────────◇
   │                           │ No
   │                           ▼
   │                   ◇──────────────────────◇   No   ┌──────────────────────┐
   │                   ◇ Check LSENSOR_BIAS/SENS├──────►│ Change the upper FPCB │
   │                   ◇──────────────────────◇        └──────────────────────┘
   │                           │ Yes
   │                           ▼
   │                   ◇──────────────────────◇   No   ┌──────────────────────┐
   │                   ◇     Work well?        ├──────►│ Change the main board │
   │                   ◇──────────────────────◇        └──────────────────────┘
   │                           │ Yes
   │                           ▼
   │                   ┌──────────────────────┐
   └──────────────────►│        END           │
                       └──────────────────────┘
```
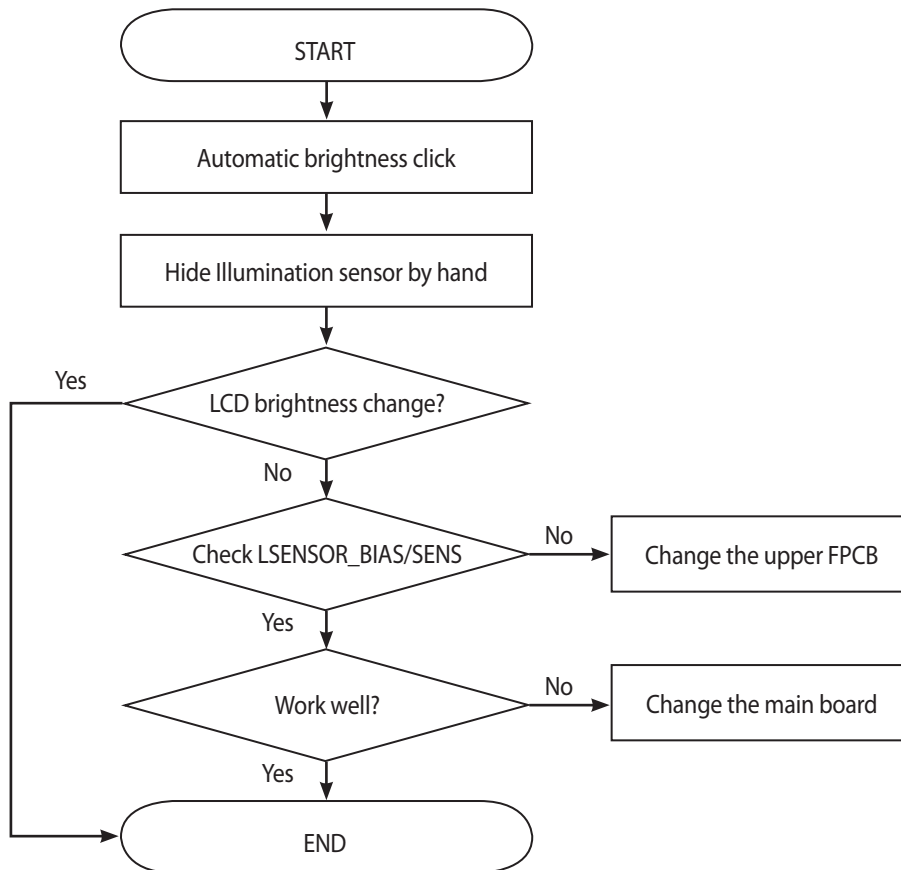
Measurement

LSENSOR_BIAS

LSENSOR_SENS

Ambient Light Sensor
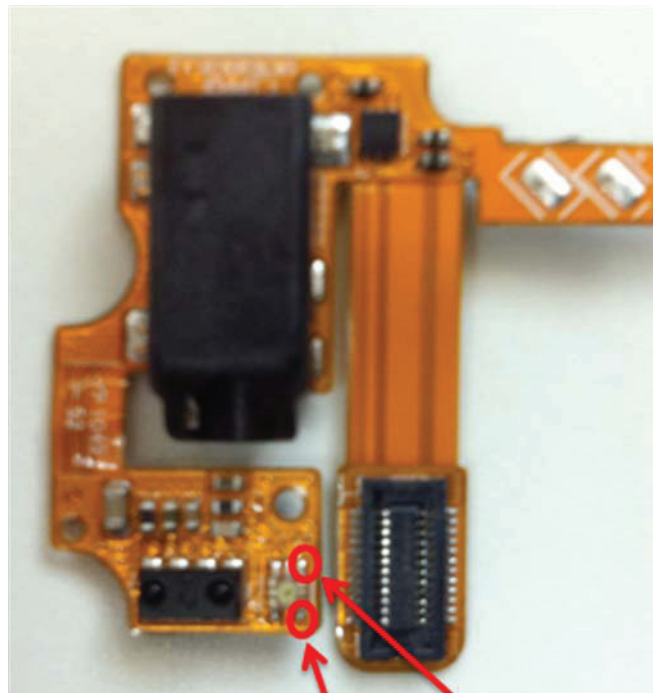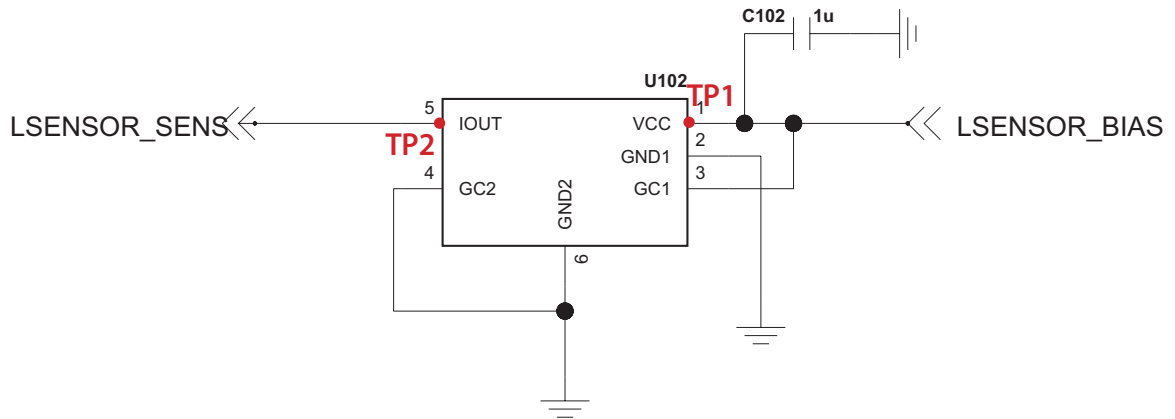
4.23 Touch trouble

Touch control signals are generated by AP20. Those signal's path are : AP20 -> Touch Module

```
                    ┌──────────────────┐
                    │      START       │
                    └──────────────────┘
                             │
                             ▼
                ┌────────────────────────────┐
                │  Check the touck connector and  │
                │  reconnect the touck connector  │
                └────────────────────────────┘
                             │
                             ▼
                    ◇ Touch is OK? ◇ ──Yes──► [ END ]
                             │
                             │ No
                             ▼
            ◇ Check power                ◇ ──No──► [ Change the main board ]
              VCC_TOUCH_3V1(TP1)
              VCC_TOUCH_1V8(TP2)
                             │ Yes
                             ▼
                    ◇ Work well? ◇ ──No──► [ Change the touch module ]
                             │ Yes
                             ▼
                    ┌──────────────────┐
                    │       END        │
                    └──────────────────┘
```
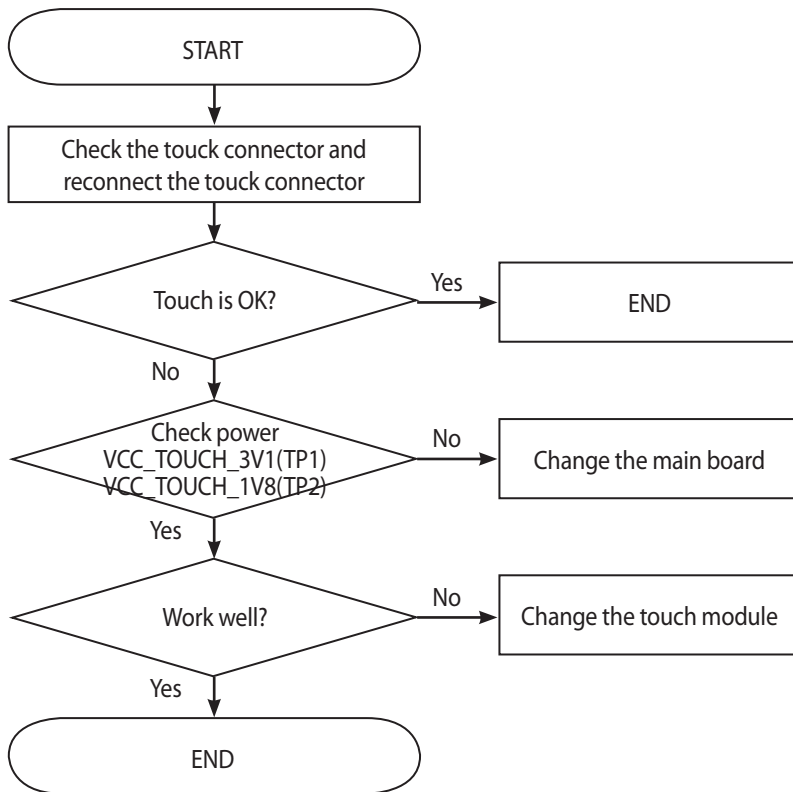
Measurement

VCC_TOUCH_3V1(TP1)

VCC_TOUCH_1V8(TP2)

VCC_TOUCH_1V8

VCC_TOUCH_1V8

VCC_TOUCH_3V1

CN903

1   10
2   9
3   8
4   7
5   6

TP2

TP1

TOUCH_MAKER_ID

R901

10K

TOUCH_INT

GEN1_I2C_SCL

GEN1_I2C_SDA

C901
1u

C921
0.1u

5. DOWNLOAD

- 158 -

- 163 -

[DLL Selection]

C:\DOWNLOAD\Model\LG-P990 \LG-P990 _090923_MP.dll   ...

Download Configuration   ✕

BIN(dz) : C:\DOWNLOAD\Model\LG-P990 \ORE\GU28(...

Click   **1** OK   Cancel

[DLL Information]

PATH_BIN : C:\DOWNLOAD\Model\LG-P990 \ORE\LG-P990 _V10b_Final_ORG_ES_200

Click   **2** OK   Cancel

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 **23** 24 25 26   stop ■

LGDP2 v36 UMTS - [MANUAL] (Mon Aug 24 17:30:33 2009)

File(F)   Operation(C)   Start Choice   Help(H)

1 **Click**

START   STOP   **LG-P990** : DZ_LG-P990AT-00-V10a-262-02-MAR-02-2010+0.dz

COM8

IDLE...

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 **24** 25 26   stop ■

6.Block diagram

System HW
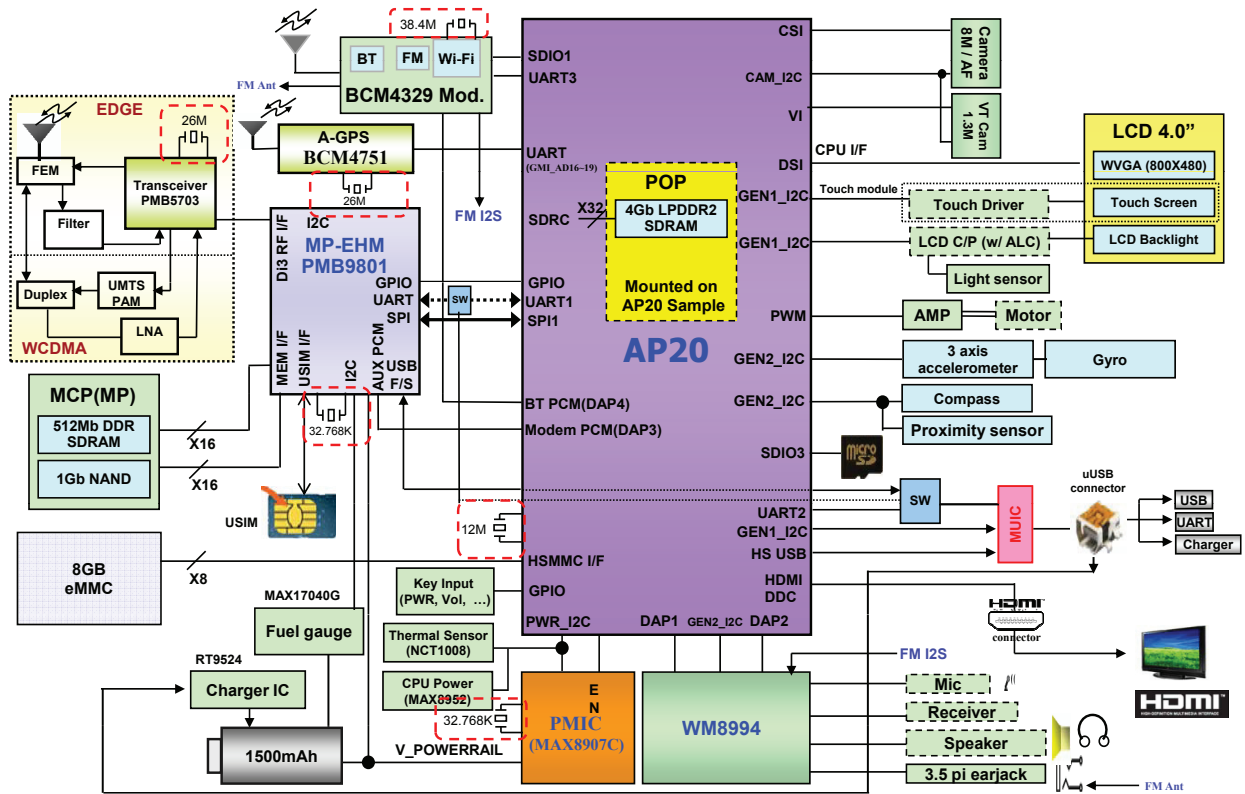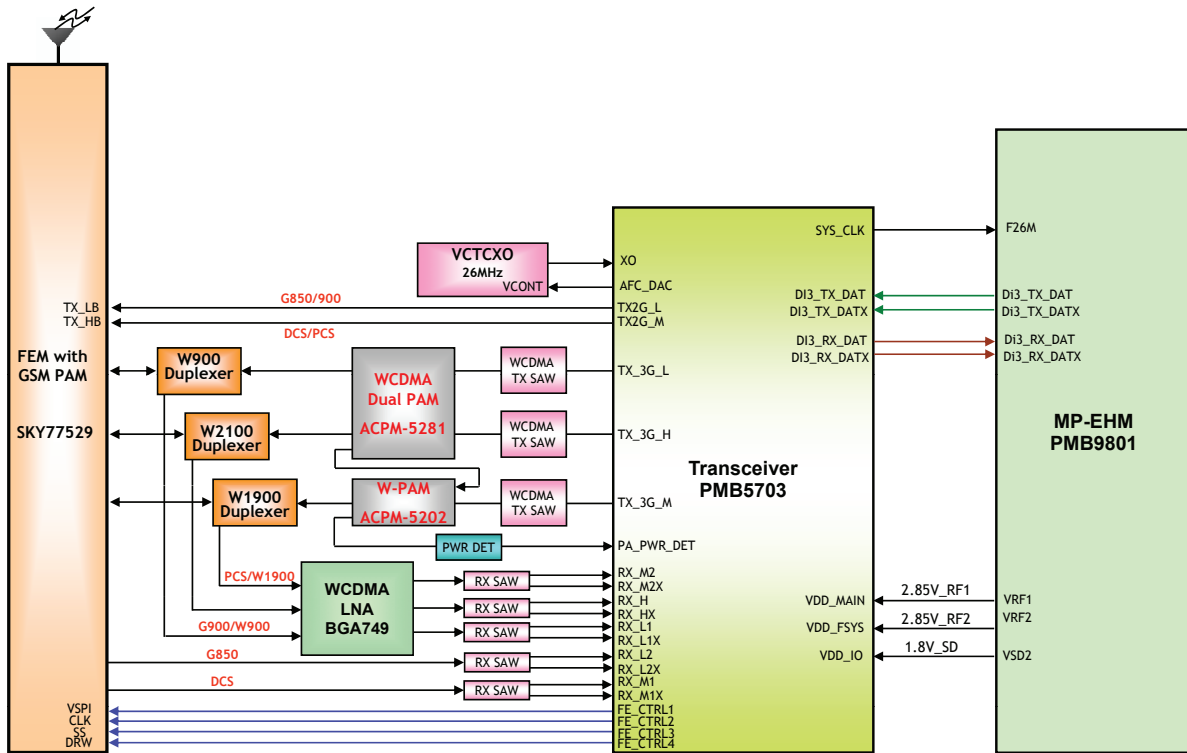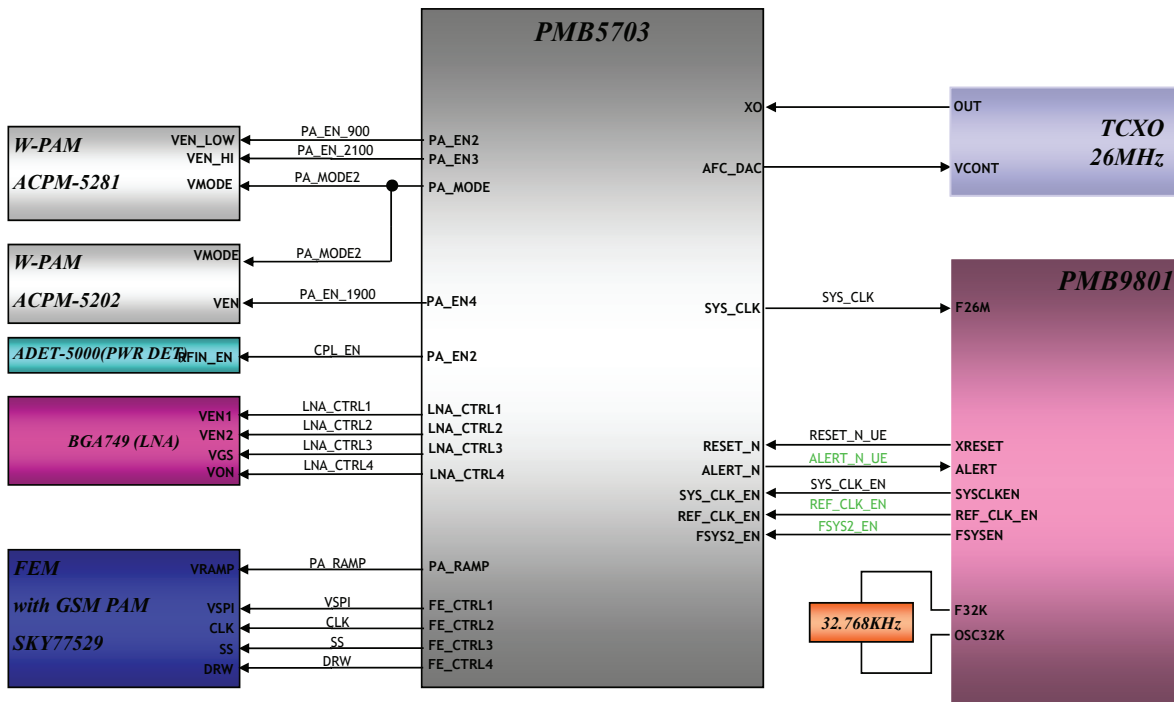
RF part

RF <Control signals and Clocks>

AP20 , PMB9801
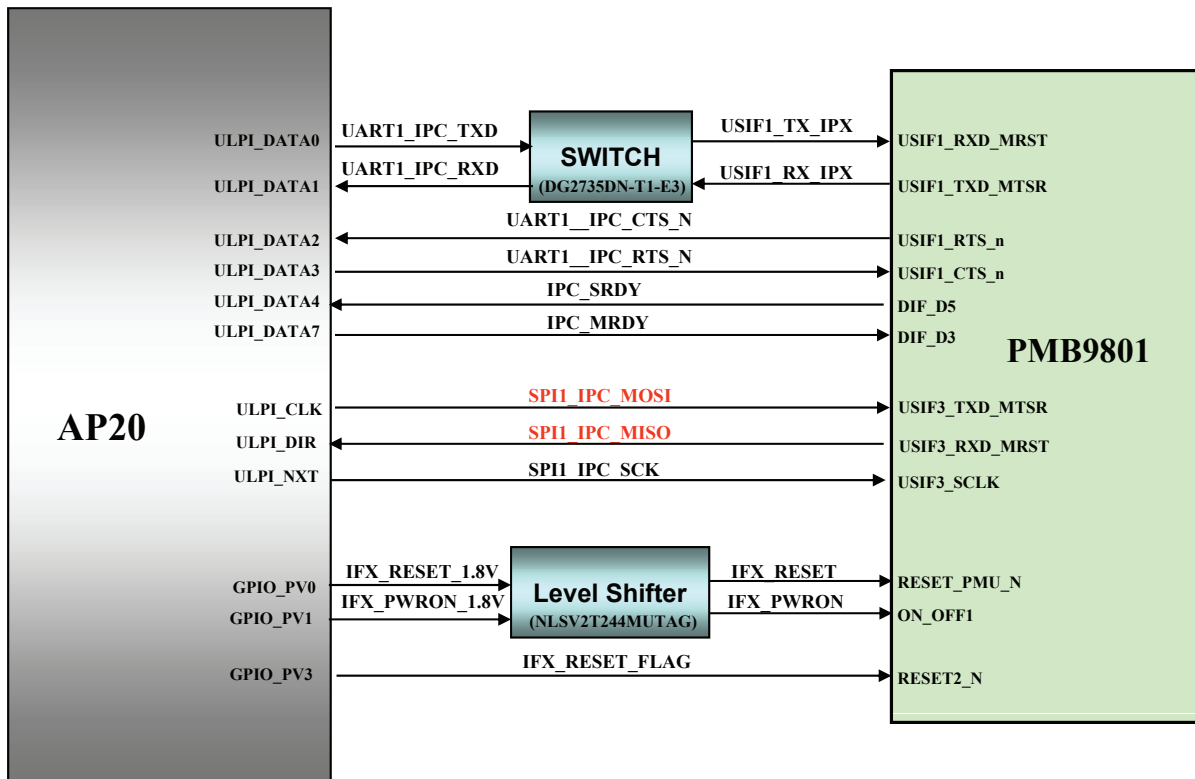
BLUETOOTH & WIFI & FM RX

GPS

7. CIRCUIT DIAGRAM

BASE BAND PROCESSOR

V_POWERRAIL   V_BAT_CP

PMIC

U202

ON BOARD JTAG(CP)

TRSTN
TDI
TMS

TCK
TRIG_IN
TDO

RESET1_N

BOOT CONFIGURATION

DSP_AUDIO_IN1
HW_MON1
HW_MON2
TRIG_IN

	DSP_AUDIO_IN1	HW_MON1	HW_MON2	TRIG_IN
16-bit NAND boot	0	1	1	0
Flashless boot	1	1	1	0
NOR boot	0	0	1	0

Analog switch for USIF1

USIF1_SW
UART1_IPC_RXD

V_BAT_CP
UART_RX_SW

VBUS_OUT

IFX_USB_VBUS

IFX_USB_VBUS_EN
(Active high connected to default pull down GPIO of AP20H)

Close to X101

SYS_CLK

INFINEON MEMORY
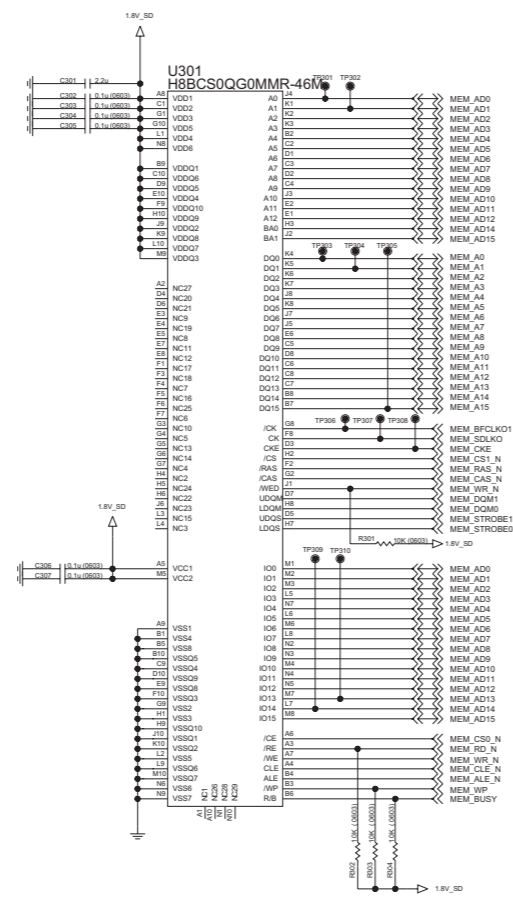
POP memory
Pin1 check!!!
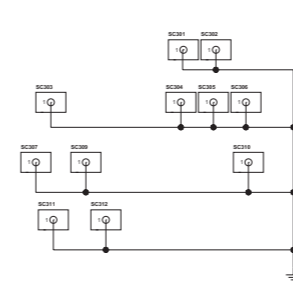
Shield CAN clip_TOP   C-Clip_Main to SUS

Shield CAN
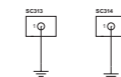
I2C port usage

Port	Usage
CAM_I2C	Camera(8M,1.3M), CAM SubPMIC
PWR_I2C	Maxim PMIC, Thermal Sensor
GEN1_I2C	TOUCH, LCD BL DCDC, MUIC
GEN2_I2C	Motion, Gyro, Compass, Proximity, Wolfson, FUEL gauge
IFX_I2C (FX)	FUEL gauge, GPS

SPI port usage

Port	Usage
SPI1	IPC
SPI2	
SPI3	
SPI4	

DAP port usage

Port	Usage
DAP1	WM8994
DAP2	WM8994
DAP3	IPC
DAP4	BT
DAP5	FM

UART port usage

Port	Usage
UART1	IPC
UART2	AP20
UART3	BT
UART4	GPS

LEVEL SHIFTER

Array TP
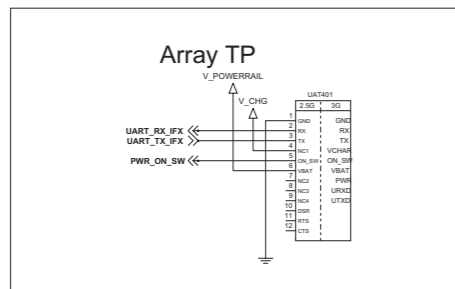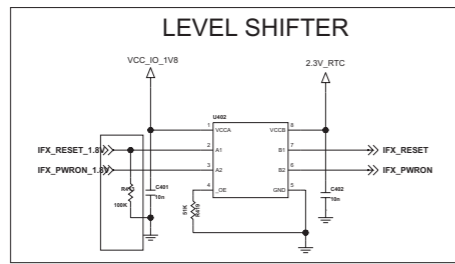
ON BOARD ARM11 JTAG INTERFACE
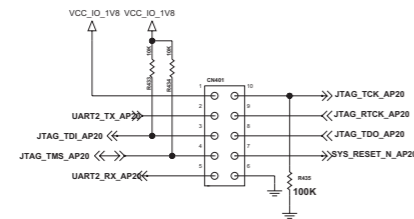
BOOT CONFIGURATION

GMI_OE_N	USB_RECOVERY
0	USB Recovery Mode
1	Boot from secondary device

ARM_JTAG[1:0]	Usage(GMI_CLK : ARM_JTAG1 / GMI_AVD_N : ARM_JTAG0)
2'b00	SERIAL JTAG CHAIN CPU (ARM7) and COP (Coresight DAP)
2'b01	Coresight DAP only JTAG
2'b10	ARM7 only JTAG
2'b11	Bypass ARM JTAG disabled

U401
AP20 SIGNAL

AP20 PWR

U401

AP CORE TEMP SENSE CIRCUIT

BYPASS CAPs

MAX8907C

PMIC FOR AP20H

PWR ON

RTC SUPERCAP

U602

Place Load Caps Close to PMIC

DCDC for CPU 1.0V

Hair to CPU Power

BATT conn.

Resistane depending on PCB revision
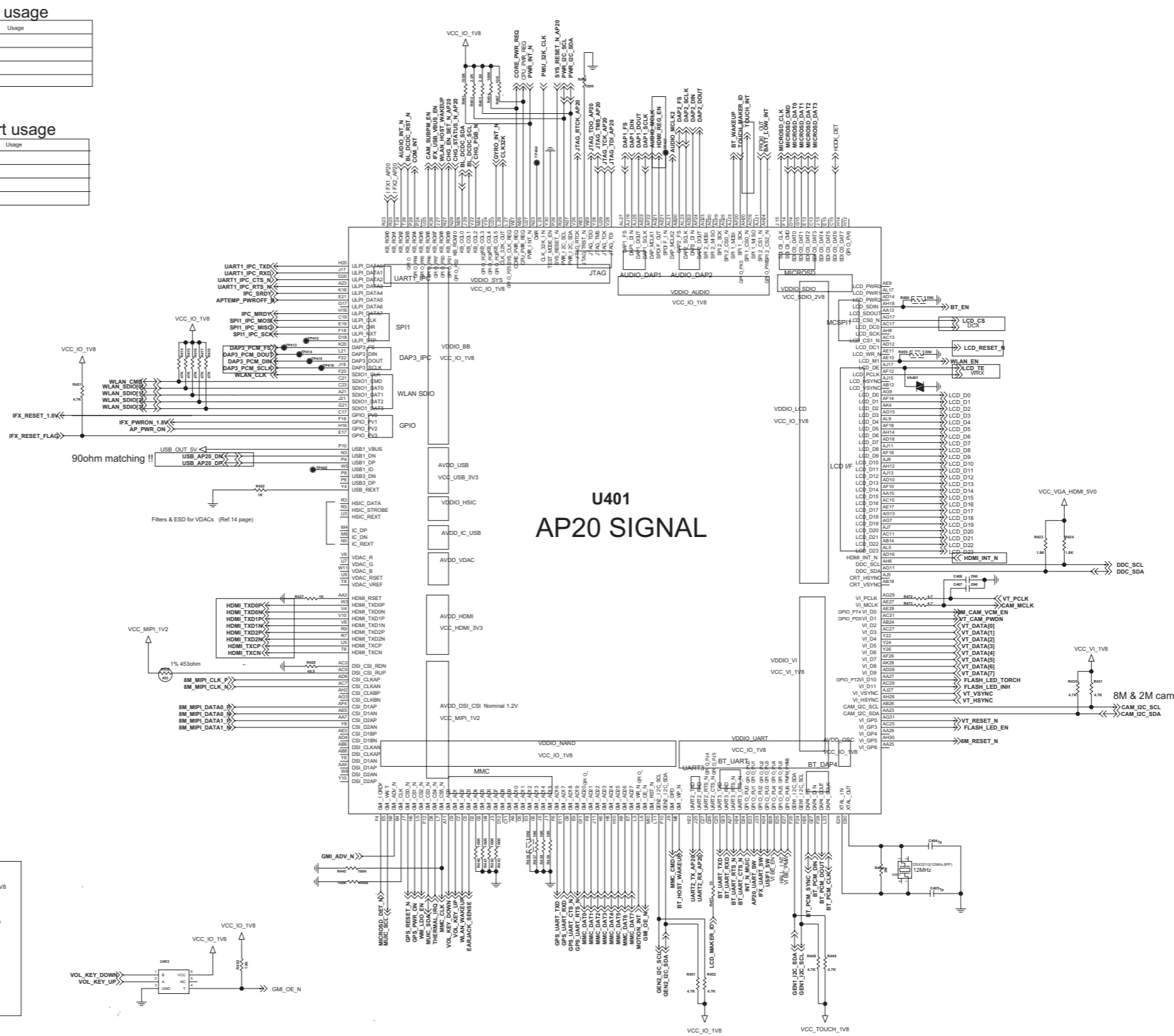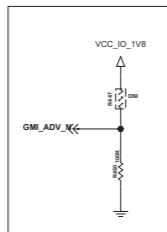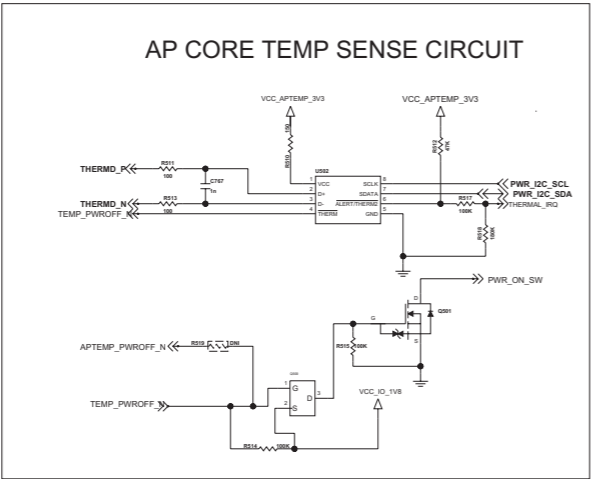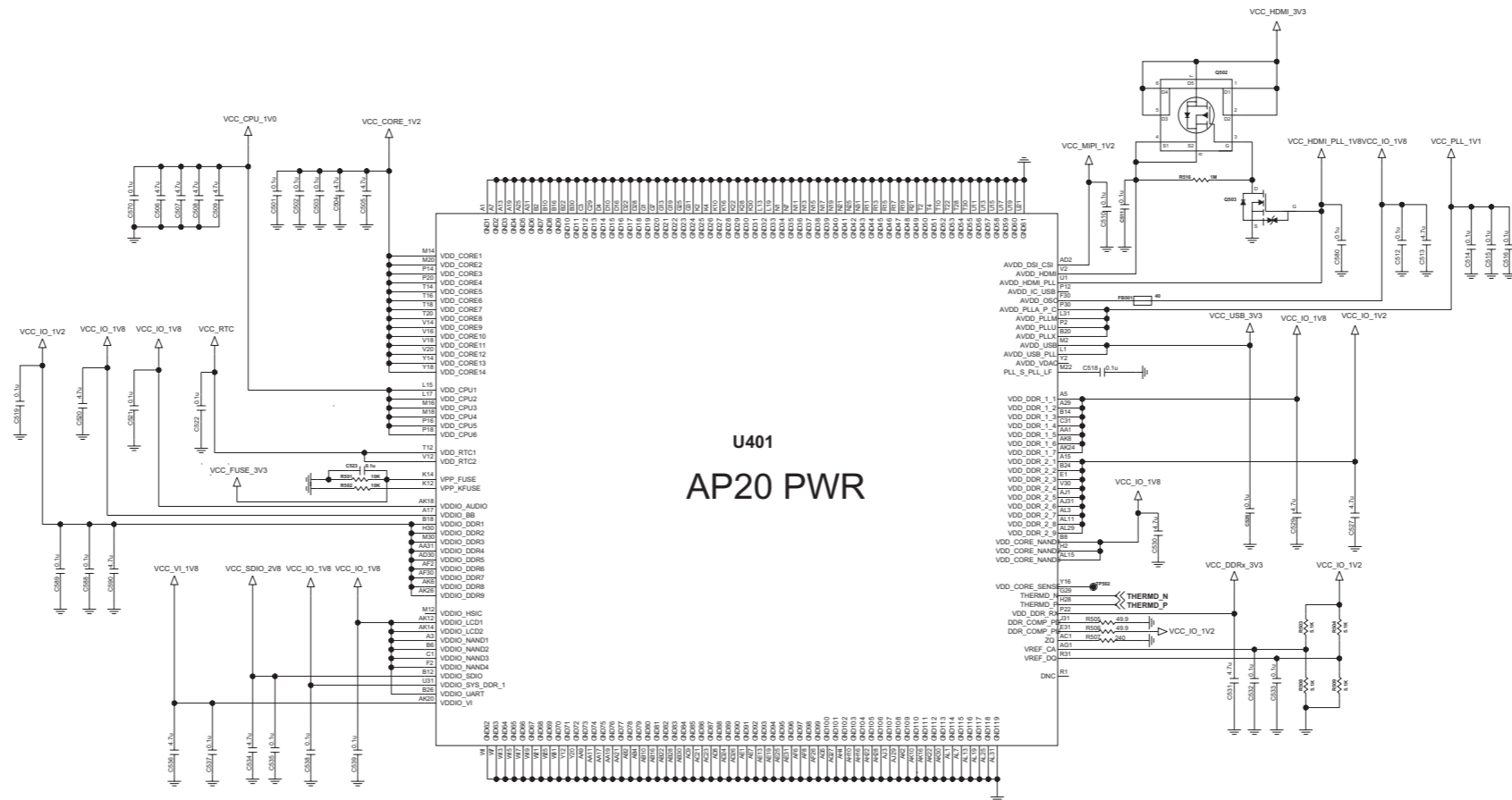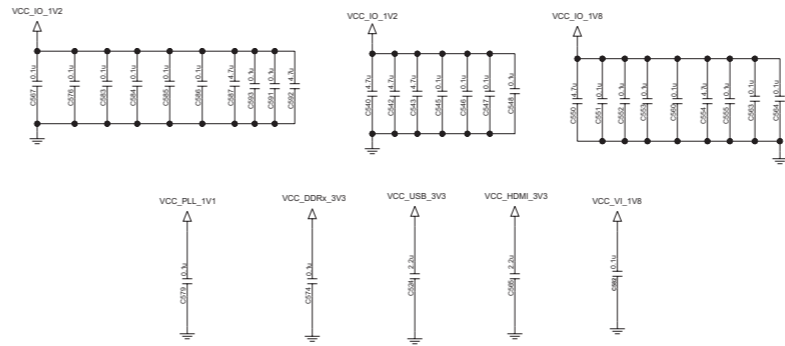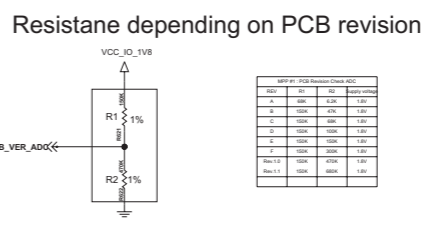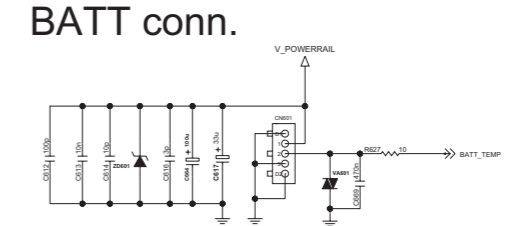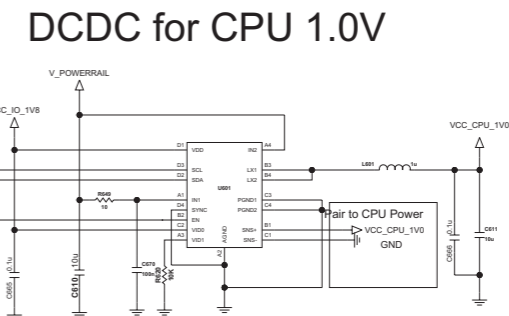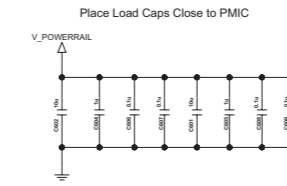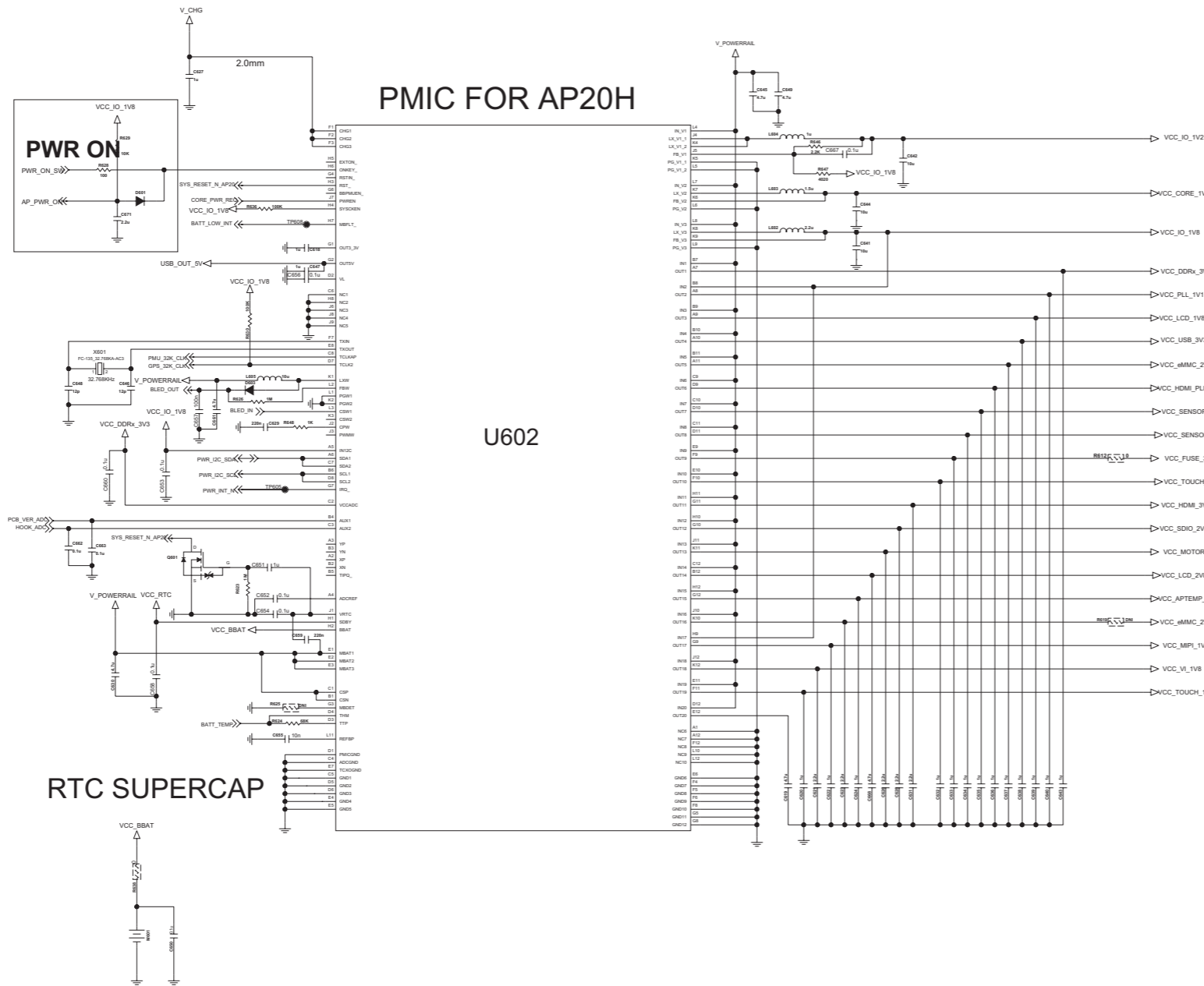
USER MEMORY_eMMC I/F
Toshiba 8GB

HDMI Connector

U701
THGBM2G6D2FBAI9
EUSY0413602
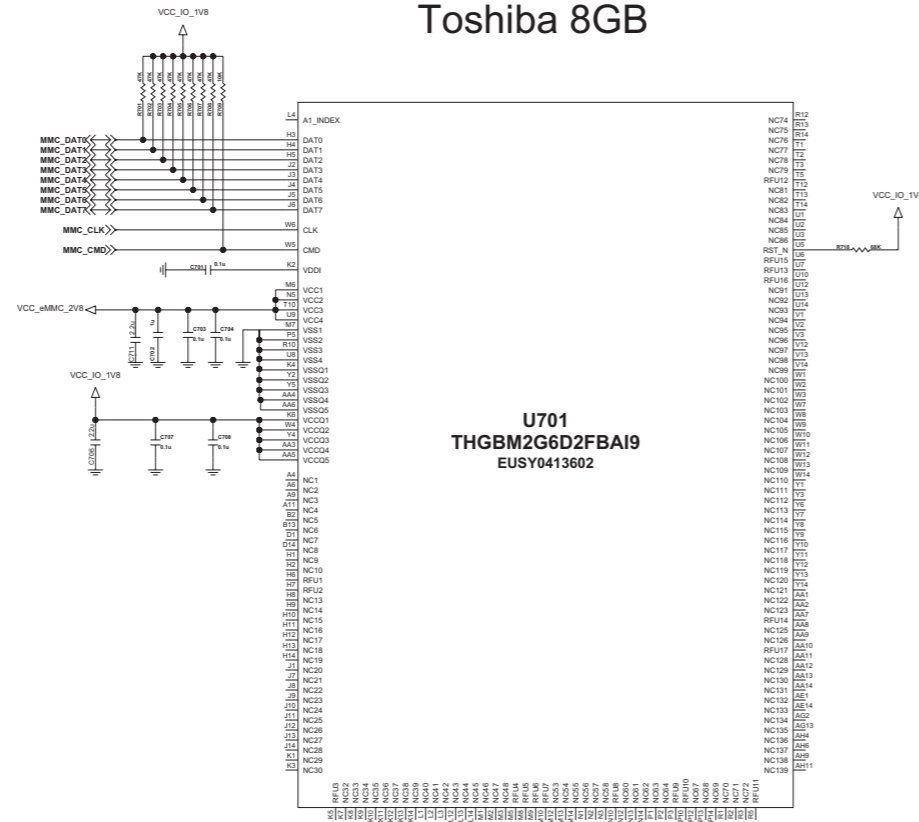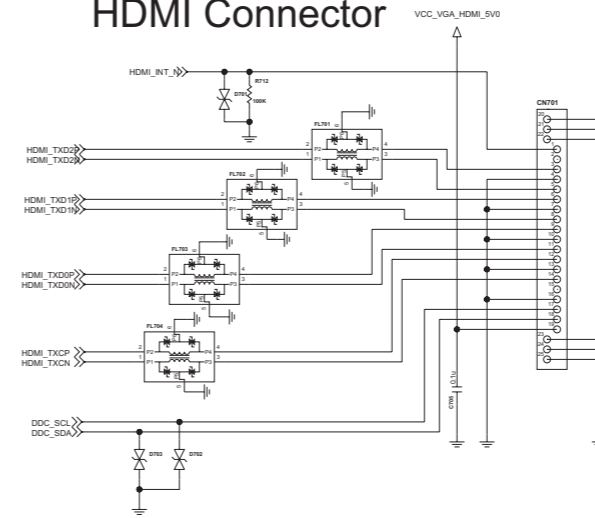
HDMI BOOST Converter
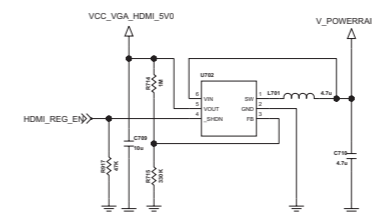
8M_MIPI_CAMERA
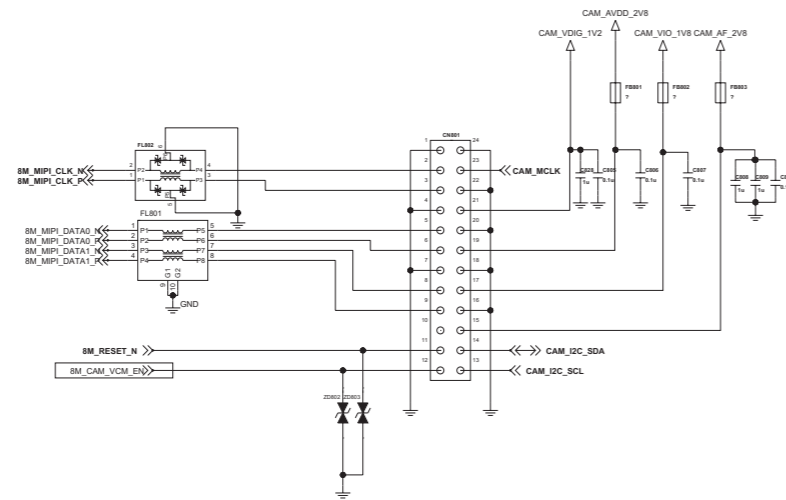
1.3M_VT CAMERA
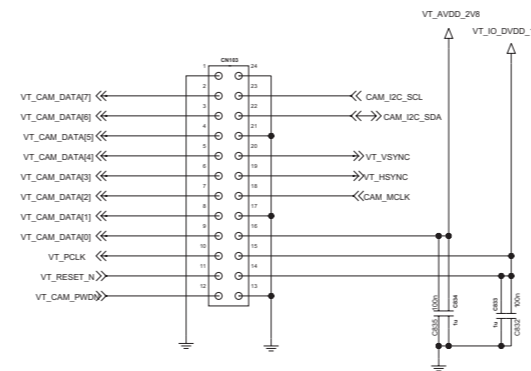
SUB PMIC-CAM POWER

CAMERA FLASH LED DRIVER

CAMERA FLASH LED

Flash Mode : 810mA
Movie Mode : 111mA
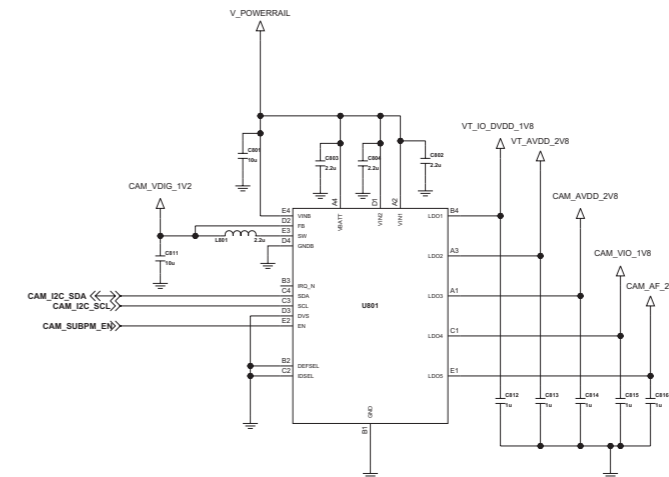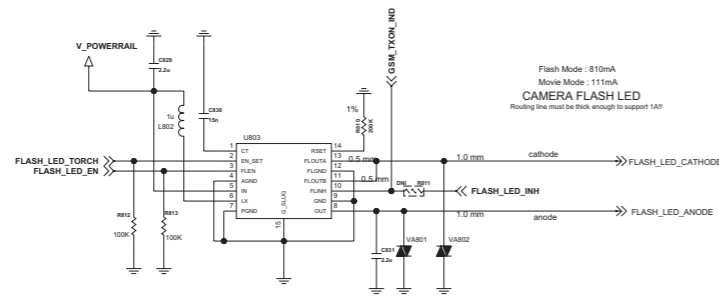
LCD (CPU)

4.0" LCD Backlight Charge pump

LCD_PWM

SUB MIC
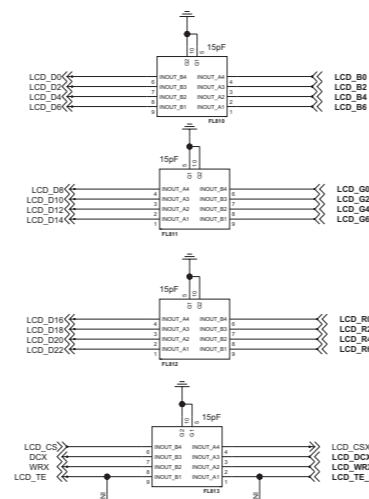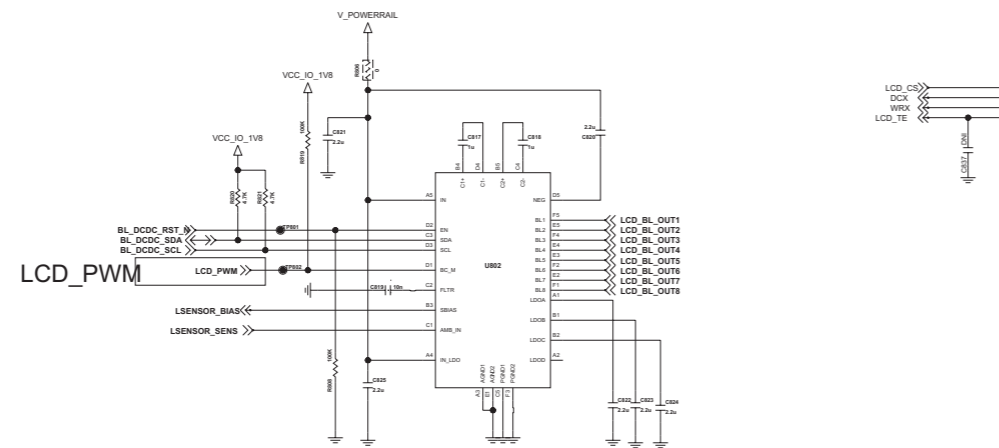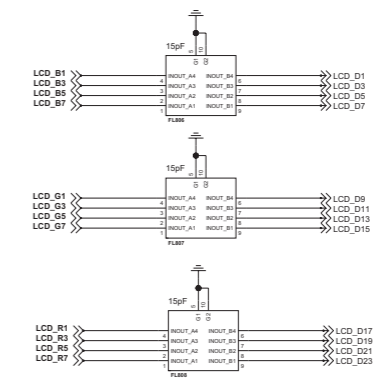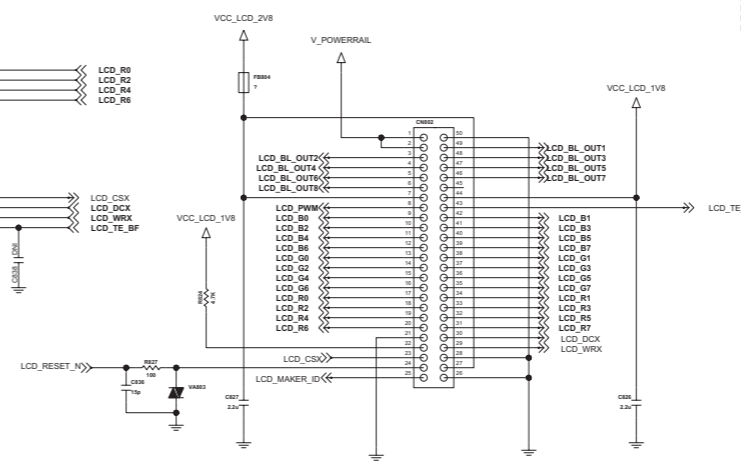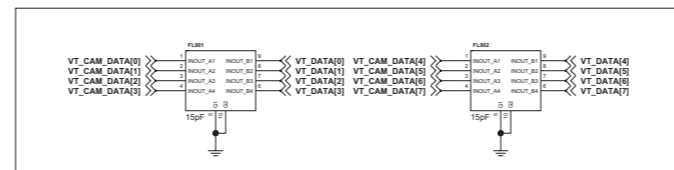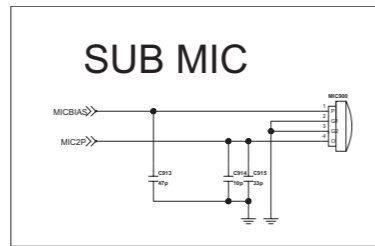
Main to Upper_FPCB connector
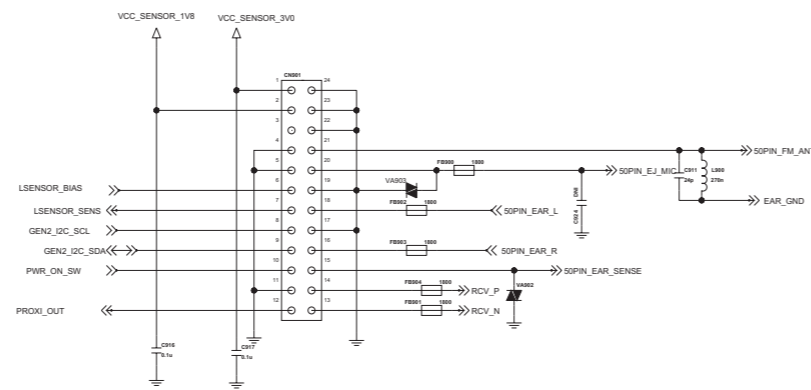
Main to Sub connector
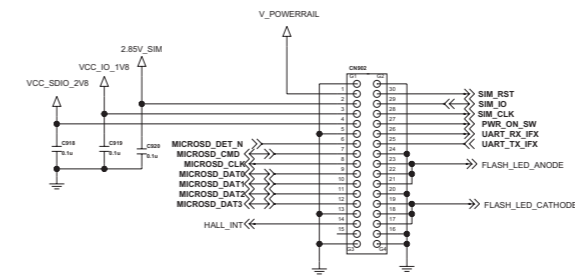
Main to Lower_FPCB connector
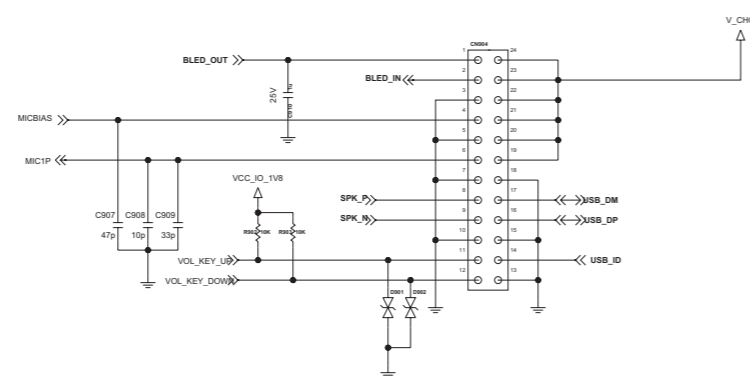
TOUCH CONNECTOR

Wolfson WM8994

3.5Phi EARJACK Detect

3.5Phi MIC Detect

EJ_MICBIAS Added

RCV Path Added

FUEL Gauge

Close to batt. connector

CHARGER IC

Close to batt. connector

2mm

CHG_PGB_N
CHG_STATUS_N_AP20
CHG_EN_SET_N_AP20

IFX_I2C_SDA
IFX_I2C_SCL

MUIC

90ohm matching !!

USB_AP25_DN
USB_AP25_DP 90ohm matching !!

UART_RX
UART_TX

VCC_IO_1V8
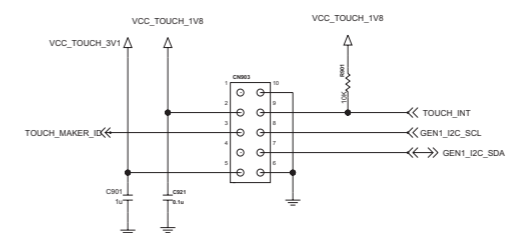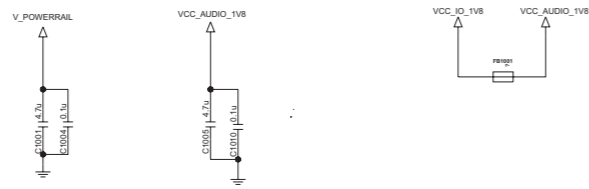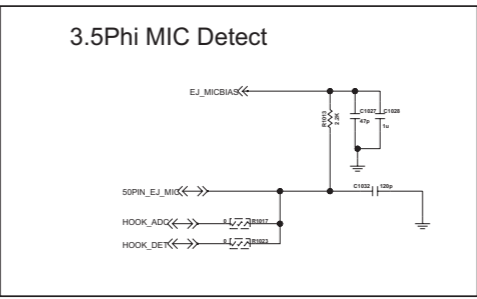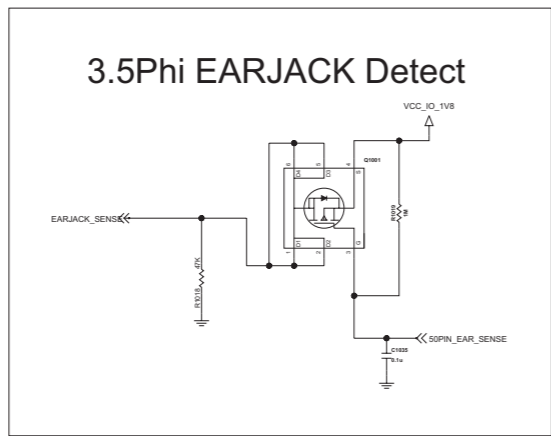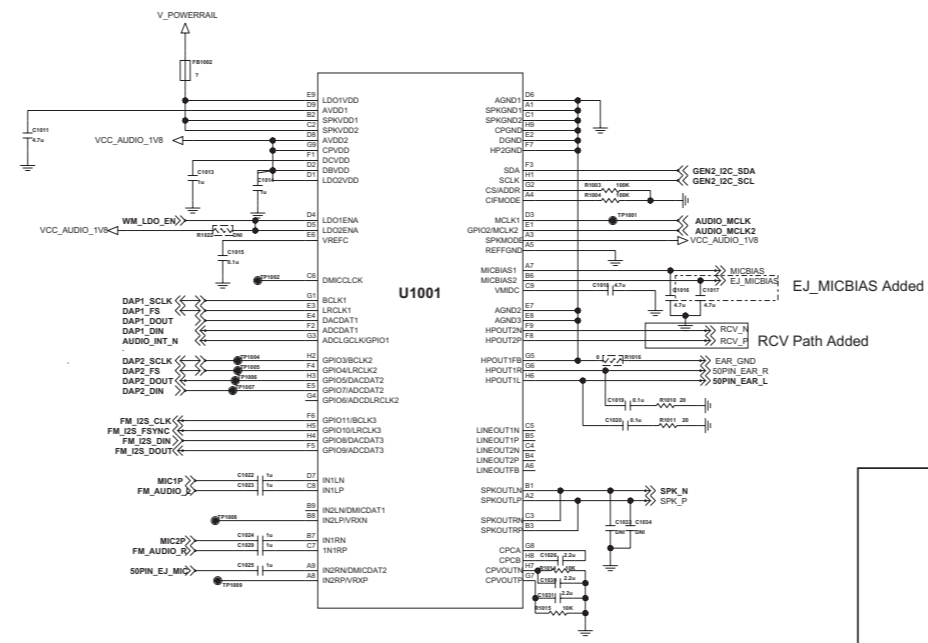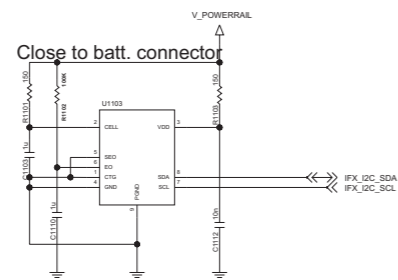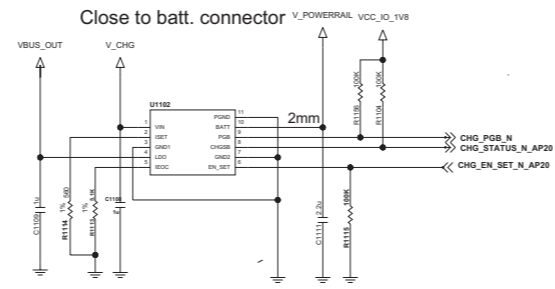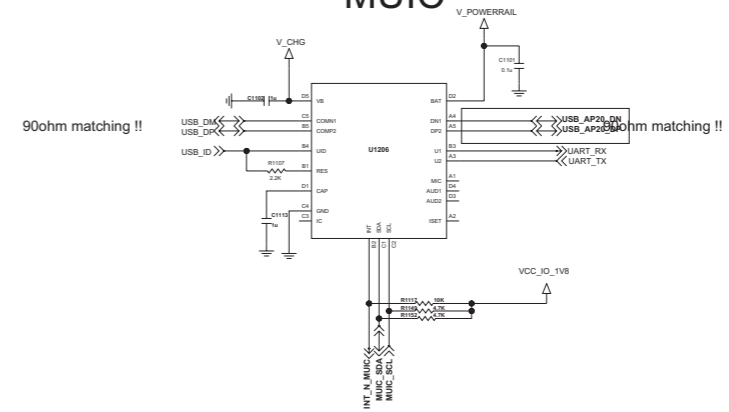
GND pad on the bottom of chip has to be connected to main GND trace through many vias for heat emission.

MOTOR DRIVER IC

VIBE_EN
VIBE_PWM

Compass Sensor

GEN2_I2C_SCL

GEN2_I2C_SDA
COM_INT

DP3T SWITCH

VCC_IO_1V8   UART2_TX_AP20
UART_TX_SW
USB_D+_IFX
UART2_RX_AP20
UART_RX_SW
USB_D-_IFX

UART_TX

UART_RX

AP20_UART_SW   IFX_UART_SW

Gyro Sensor

GEN2_I2C_SDA
GEN2_I2C_SCL

IME_DA

VCC_SENSOR_1V8   VCC_SENSOR_3V0

IME_CL

GYRO_INT_N

Motion Sensor

IME_DA

VCC_SENSOR_1V8

IME_CL

MOTION_INT

VCC_SENSOR_3V0
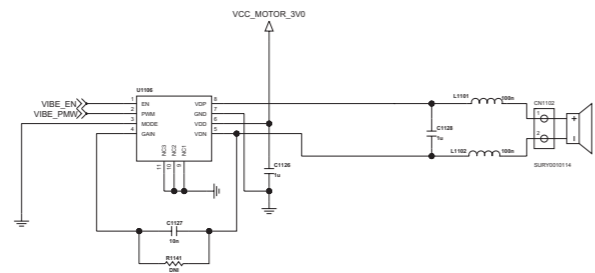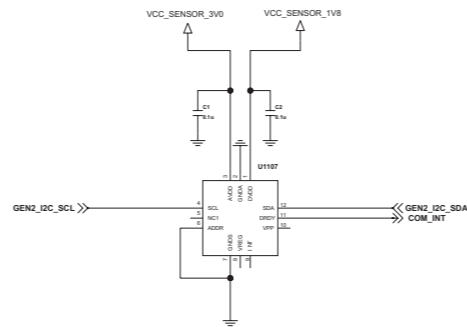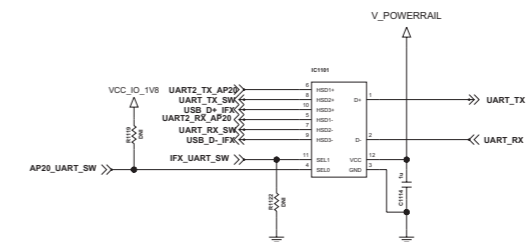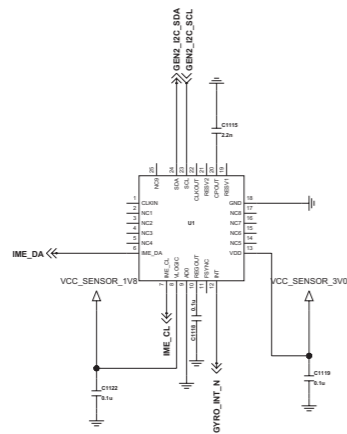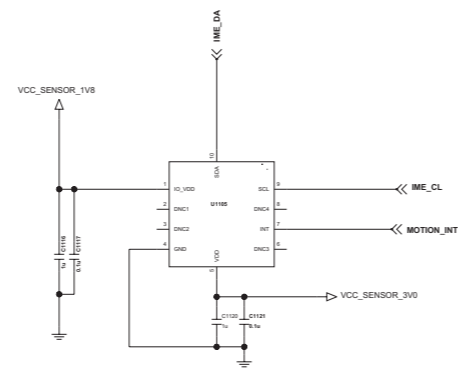
Boss GND contact

WLAN + BT + FMRadio

GPS

38.4MHz for WLAN

LDO for GPS

TCXO for GPS

Sub connector

Micro SD Card Interface

USIM For Infinieon

Array TP

TP gap 1mm!

Hall IC

Flash

RF_Mobile Switch

MAIN MIC

MIC1P
MIC_GND
MICBIAS

SPEAKER +/-

SPK_
SPK_

KEY LEDs

BLED_OUT
BLED_IN

Lower_FPCB

V_CHG

BLED_OUT
BLED_IN

MICBIAS
MIC_GND
MIC1P

SPK_P
SPK_N

VOL_KEY_UP
VOL_KEY_DOWN

USB_DM
USB_DP

USB_ID

MicroUSB

V_CHG

USB_DM
USB_DP

USB_ID

VOL UP/DOWN KEY

VOL_KEY_UP
VOL_KEY_DOWN
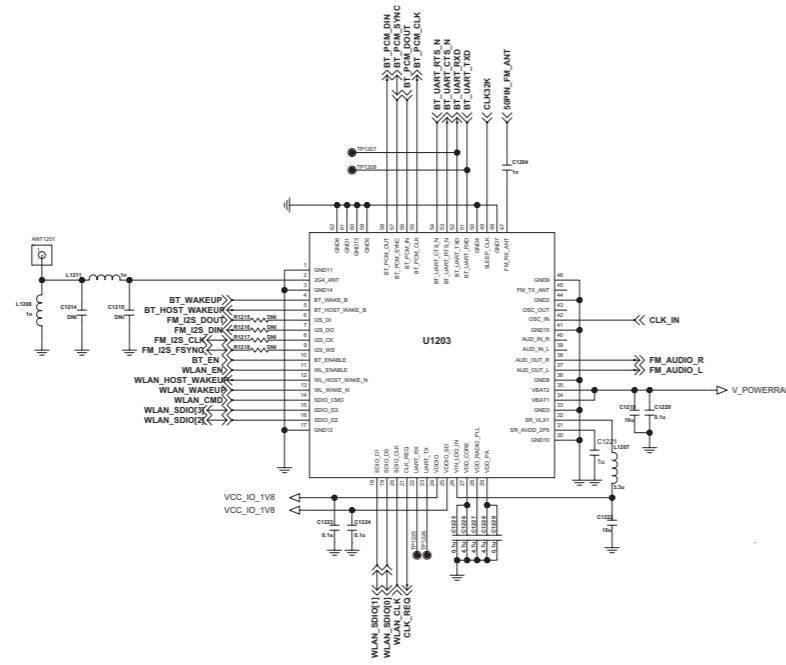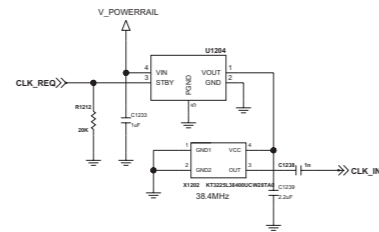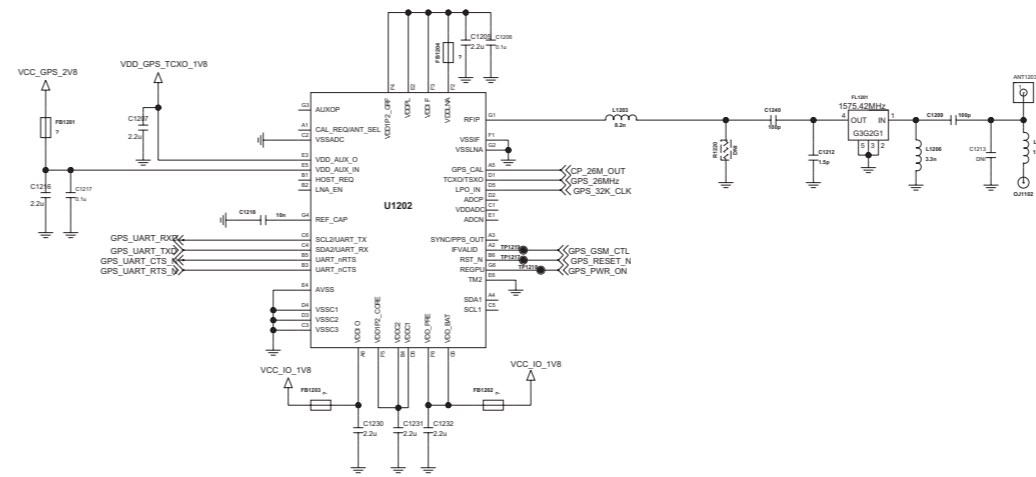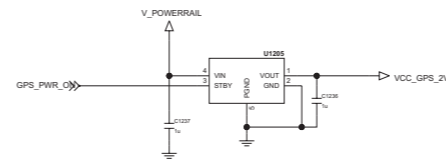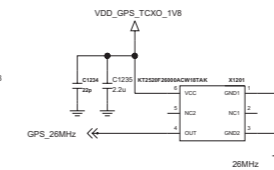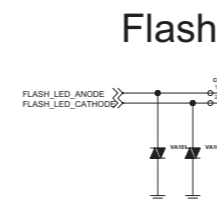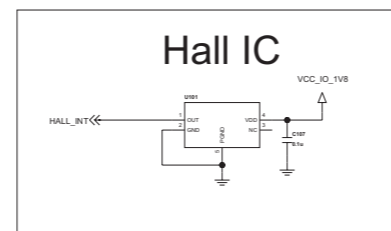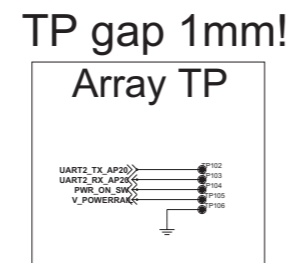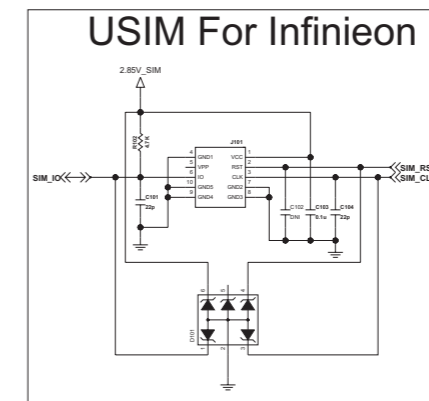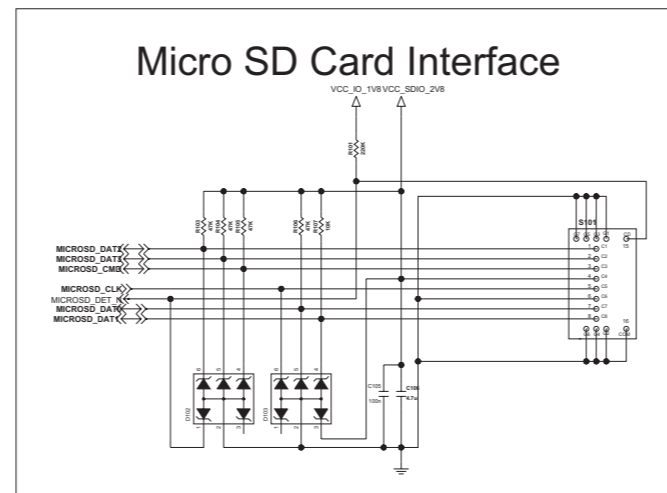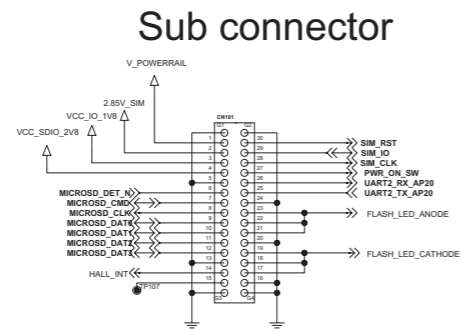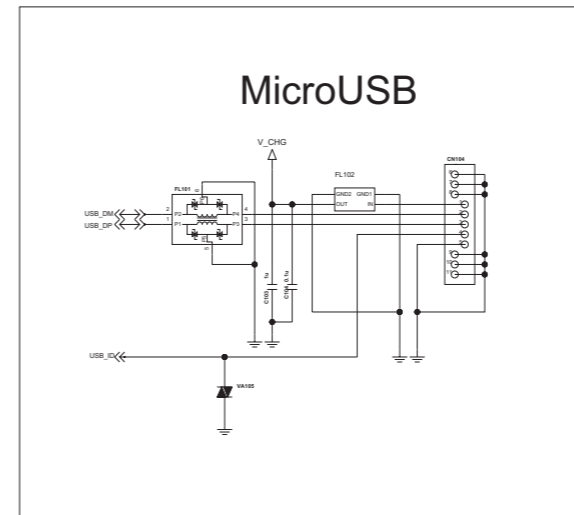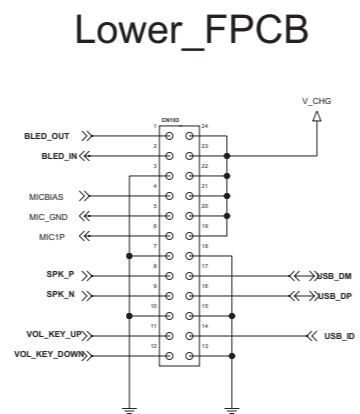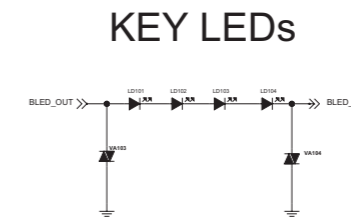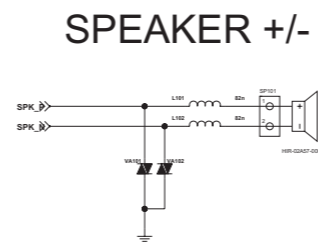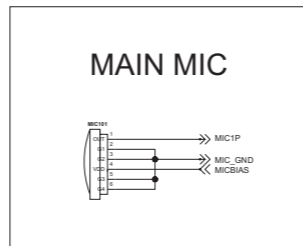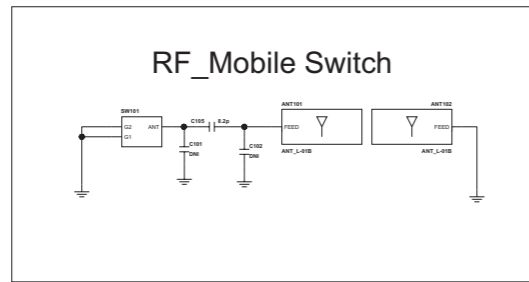
Upper_FPCB connector
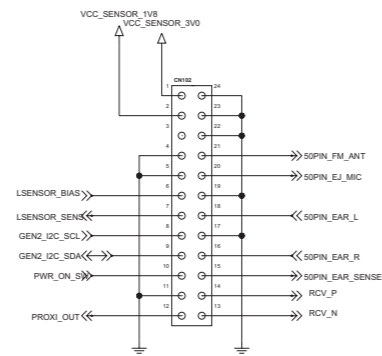
3.5pi Ear Jack Connector

Receiver

ENJE0007601-->ENJE0007602
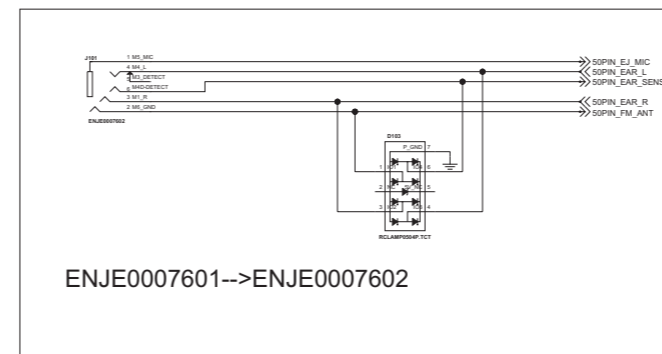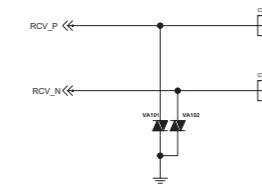
Proximity Sensor
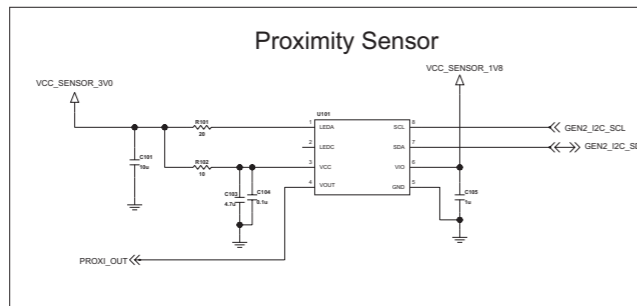
Ambient Light Sensor
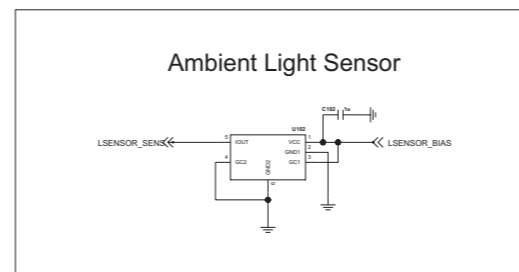
PWR_KEY
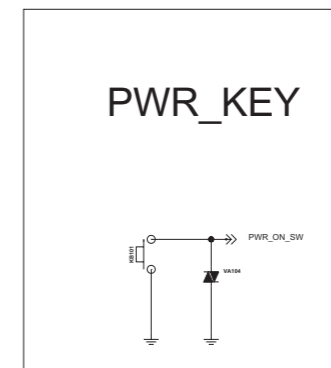
8. BGA PIN MAP

U101 PMB5703(Transceiver)
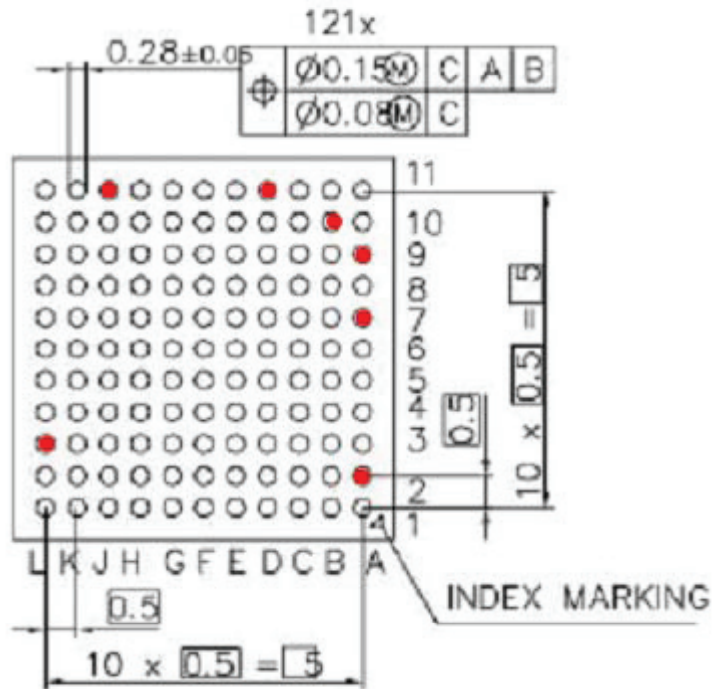
🔴 Not Used

⚪ Used

U202 PMB9801
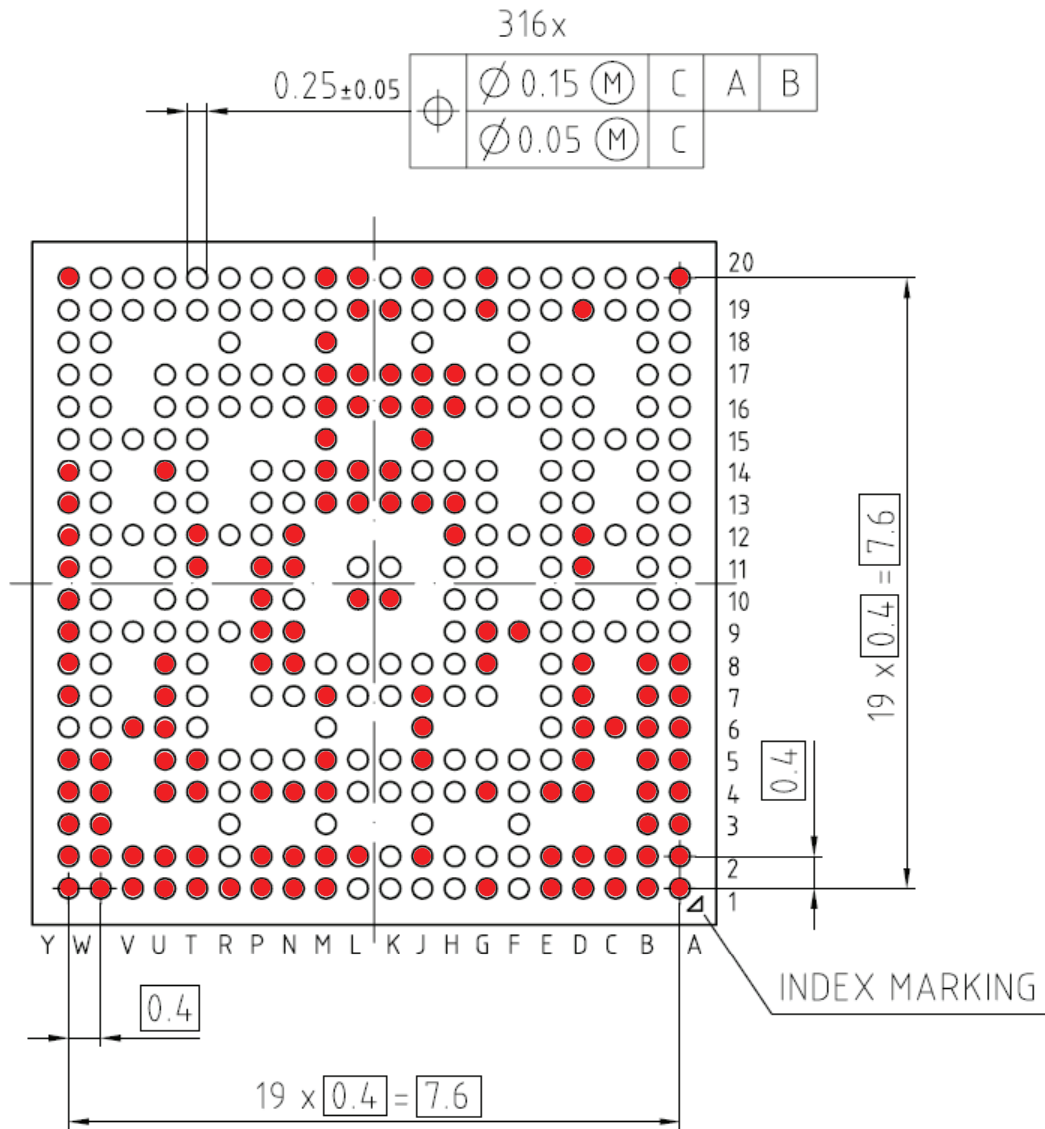
● Not Used
○ Used

U301 H8BCS0QG0MMR-46M

	1	2	3	4	5	6	7	8	9	10
A	NC	NC	/RE	CLE	VCC	/CE	/WE	VDD	VSS	NC
B	VSS	A4	/WP	ALE	VSS	R/B	DQ15	DQ14	VDDQ	VSSQ
C	VDD	A5	A7	A9	DQ9	DQ11	DQ13	DQ12	VSSQ	VDDQ
D	A6	A8	CKE	NC	UDQS	NC	UDQM	DQ10	VDDQ	VSSQ
E	A12	A11	NC	NC	NC	DQ8	NC	NC	VSSQ	VDDQ
F	NC	/RAS	NC	NC	NC	NC	NC	CK	VDDQ	VSSQ
G	VDD	/CAS	NC	NC	NC	NC	NC	/CK	VSS	VDD
H	VSS	/CS	BA0	NC	NC	NC	LDQS	LDQM	VSSQ	VDDQ
J	/WEd	BA1	A10	A0	DQ7	NC	DQ6	DQ4	VDDQ	VSSQ
K	A1	A2	A3	DQ0	DQ1	DQ2	DQ3	DQ5	VDDQ	VSSQ
L	VDD	VSS	NC	NC	I/O 3	I/O 5	I/o 14	I/o 7	VSSQ	VDDQ
M	I/O 0	I/O 1	I/O 2	I/O 10	VCC	I/O 6	I/O 13	I/o 15	VDDQ	VSSQ
N	NC	I/O 8	I/O 9	I/O 11	I/O 12	VSS	I/O 4	VDD	VSS	NC

NAND

DRAM

NC / DNU

U302 H8TBR00U0MLR : LPDDR2 memory(512MB), POP

Bottom View

🔴 Not Used
⚪ Used

U401 AP20

BOTTOM VIEW

🔴 Not Used
⚪ Used

U602 MAX8907C(PMIC)

BOTTOM VIEW

132-⌀0.26±0.03

⬤ Not Used

◯ Used

U701 Toshiba 8G NAND Flash

◯ Not Used

U802 LDO

Bottom View

● Not Used
○ Used

U1001(WM8994)

	1	2	3	4	5	6	7	8	9
A	SPKGND1	SPKOUT LP	SPKMODE	CIFMODE	REFGND	●	MICBIAS1	IN2RP/ VRXP	IN2RN/ DMICDAT2
B	SPKOUT LN	SPKVDD1	SPKOUT RP	●	●	MICBIAS2	IN1RN	IN2LP/ VRXN	●
C	SPKGND2	SPKVDD2	SPKOUT RN	●	●	DMICCLK	IN1RP	IN1LP	VMIDC
D	LDO2VDD	DBVDD	MCLK1	LDO1ENA	LDO2ENA	AGND	IN1LN	AVDD2	AVDD1
E	GPIO2/ MCLK2	DGND	LRCLK1	DACDAT1	GPIO7/ ADCDAT2	VREFC	AGND	AGND	LDO1VDD
F	DCVDD	ADCDAT1	SDA	GPIO4/ LRCLK2	GPIO9/ ADCDAT3	GPIO1/ BCLK3	HP2GND	HPOUT2P	HPOUT2N
G	BCLK1	CS/ADDR	ADC LRCLK1/ GPIO1	GPIO6/ ADC LRCLK2	HPOUT1FB	HPOUT1R	CPVOUTP	CPCA	CPVDD
H	GCLK	GPIO3/ BCLK2	GPIO5/ DACDAT2	GPIO8/ DACDAT3	GPIO10/ LRCLK3	HPOUT1L	CPVOUTN	CPCB	CPGND

TOP VIEW - WM8994

● Not Used
○ Used

U1206 MUIC

BOTTOM VIEW

● Not Used

○ Used

9. PCB LAYOUT

U803 : Flash LED D-IC
- no Flash

U1 : Gyro sensor
- no Gyro sensor
- no motion sensor
- no compass sensor

X101 : 26Mhz X-tal
- no Service

U802 : LCD Backlight charge pump
- no display

U101 : Transceiver
- no Service
- RF Sensitivity & TX Power

U106 : LNA.
- no WCDMA service
- no RF sensitivity

U105 : PAM(Band1/8)
- no Service
- RF Sensitivity & TX Power

U103 : PAM(Band2)
- no Service
- RF Sensitivity & TX Power

U104 : FEM & GSM PAM
- no Service
- RF Sensitivity & TX Power

Q201 : FET
 - no CP USB

M601 : BackupCap.
 - RTC Reset

IC1101 : DP3T S/W
- no CP USB/UART port
- no AP UART port

MIC900 : MIC
- no 2nd _mic.

CN1102 : Motor pad
 - no vibration

U1106 : Motor D-IC
- no vibration

FL701/FL702/FL703/FL704 :
HDMI filter
-no HDMI display

U1001 : Audio codec
- no sound

U702 : HDMI booster
- no HDMI display

U801 : Camera PMIC
- no 8M Camera
- no 1.3M Camera

U1202 : GPS chip
- no GPS

X1201 : 26Mhz X-tal
- no GPS

U1102 : Charger IC
- no charging

U701 : EMMC memory
- no booting
- no Service

U1206 : MUIC
- no USB/UART

Q1001 : FET
- no Ear-jack detect

U1103 : Fuel gauge
- Battery Bar accuracy declined

U1105 : Motion sensor
- no motion sensor
- no Gyro sensor
- no compss sensor

LG-P990_SPFY0240601_1.0_PLACE_TOP

CN901 : Upper FPCB Conn.
 - no Power on
 - no Ear-jack
 - no illumination sensor
 - no proximity sensor
 - no FM radio

CN103 : 1.3M Camera Conn.
- no 1.3M camera

CN701 : HDMI Conn.
- no HDMI diplay

ANT1203 : GPS Ant. Conn.
- no Radio with Intenna

ANT1201 : WiFi/Bluetooth antenna
- no WiFi/Bluetooth

CN801 : 8M Camera Conn.
- no 8M camera

CN902 : Sub FPCB Conn.
-no SIM
-no T-flash memory
-no Flash LED

CN903 : Touch Conn.
- no touch

CN802 : LCD Conn.
 –no display

U602 : PMIC
- no Booting
- no Power On
- no Service

U1203 : WiFi+BT+FM Radio Module
- no WiFi connection
- no BT Connection
- no FM Radio

U302 : POP memory(Top)
- no booting

X1202 : 38.4Mhz X-tal
- no WiFi connection
- no BT Connection
- no FM Radio

U401 : DBB(Bottom)
- no booting
- no Power On
- no Servive

X401 : 12Mhz X-tal
- no Power On
- no Booting

U301 : CP memory
- no service

CN904 : Lower FPCB Conn.
- no USB/UART
- no 4 key LED
- no side key
- no 1st MIC.

U202 : CP modem
- no service

CN601 : Battery Conn.
- no power On

SW102 : RF S/W
- no Service

U1107 : Compass sensor.
- no compass sensor

SW101 : Coaxial Conn.
- no Service

LG-P990_SPFY0240601_1.0_PLACE_BOT

CN101

CN102

LG-P990_F_SUB_SPCY0255401_1.0_TOP

LG-P990_F_SUB_SPCY0255401_1.0_BOT

LG-P990_RF_LOWER_SPCY0254701_1.0_TOP

LG-P990_RF_LOWER_SPCY0254701_1.0_BOT

U101

U102

CN102

C103
R101 C105 C104 C102
R102

C 1 0 1

KB101

J101

D103

VA101
VA102

VA104

CN100

CN101

LG-P990_F_UPPER_SPCY0255101_1.0_BOT

10. CALIBRATION

10.1 Configuration of Tachyon
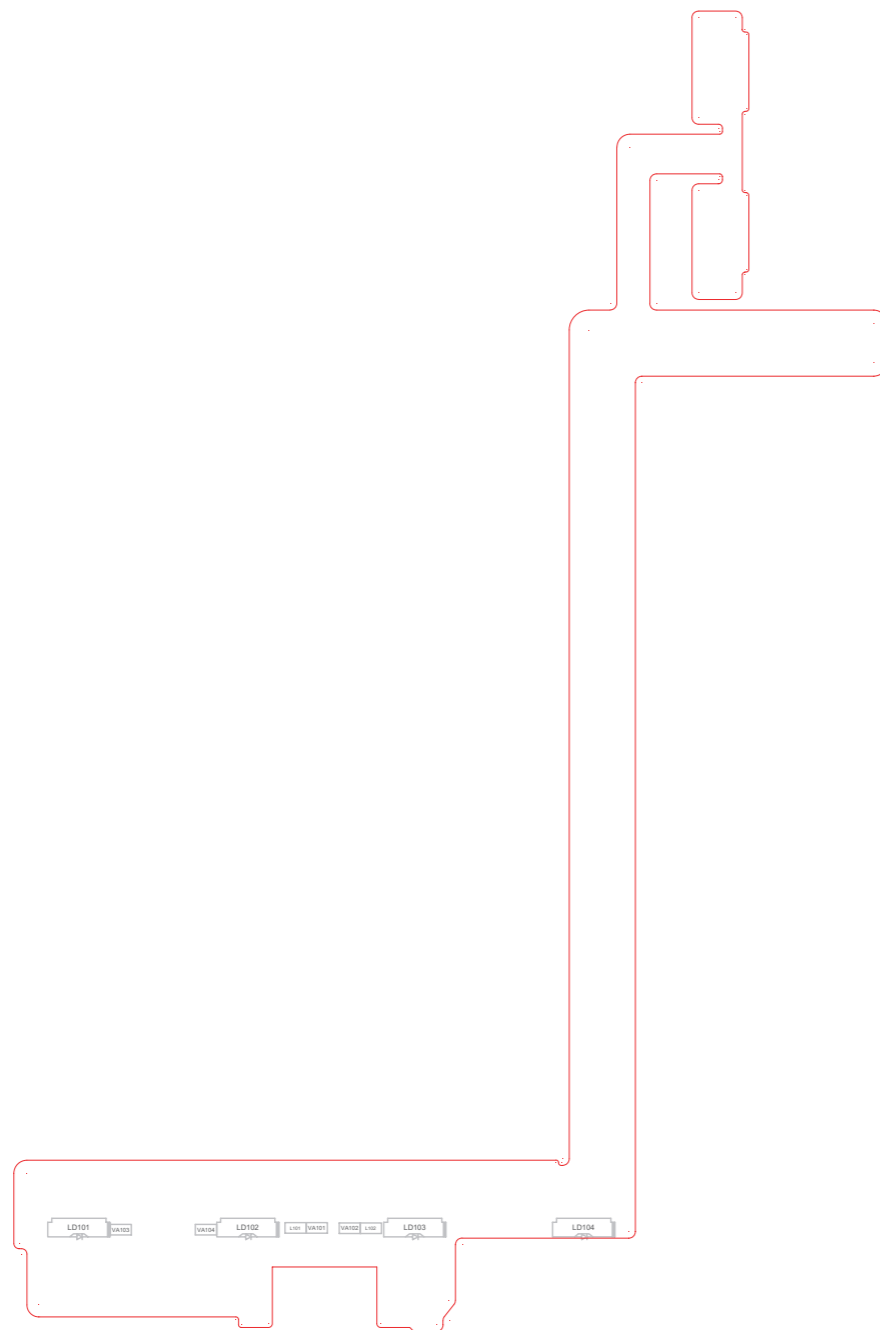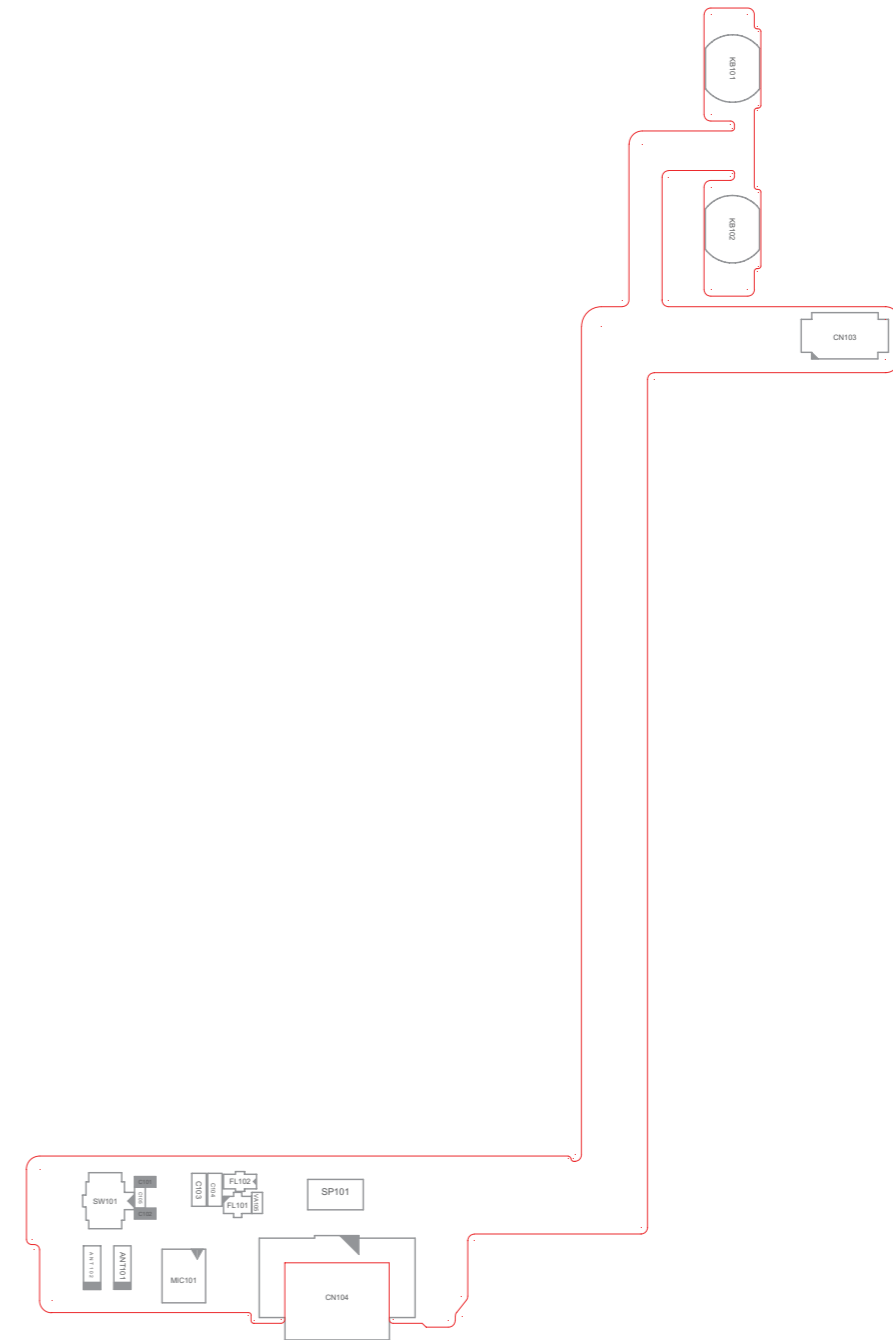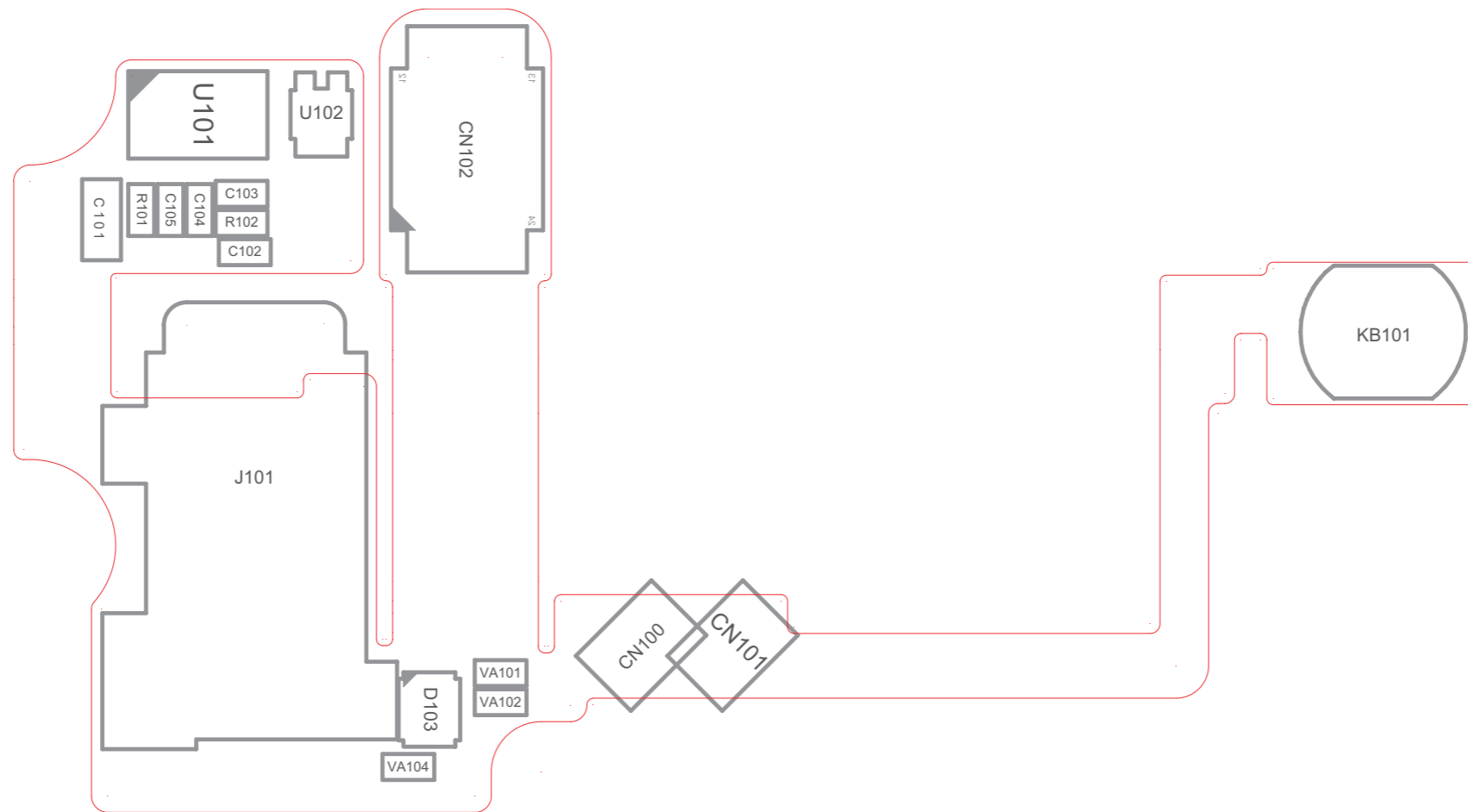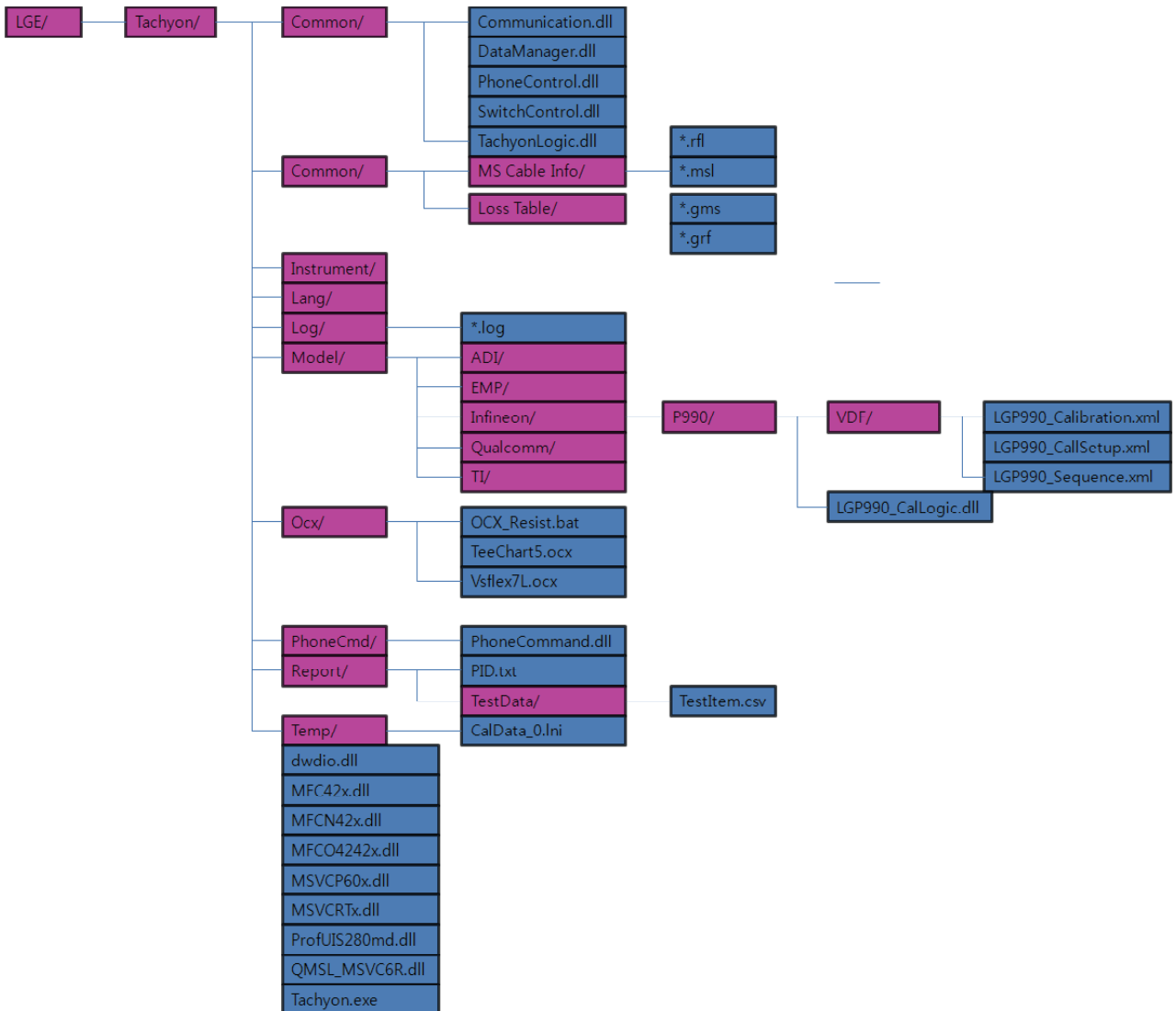
10.1.1 Configuration of directory

10.1.2 Description of basic folders

Folder	Description
Tachyon	Exe file and MFC dll, UI dll is present.
Common	Common dll files. (XML Data I/O , Auto Test Logic, Tachyon Logic Control, Communication)
Config	Envirement files. (Port configuration, Loss adjust)
Instrument	Tester control dll.
Model	Model files is present. (Model -> Solution (Qualcomm, EMP, ADI, INFINEON) -> MODEL NAME(LGGW620, LGSH470, ..) -> BUYER NAME(SKT, TEL, VIVO, …)
OCX	Conponent files.
PhoneCmd	Phone communication file
Report	Report Files is present. (Cal data, test data)

10.1.3 Description of configuration files

File	Description
'MODEL NAME'_Calibration.XML	There are imformations to calibrate. It consist of calibration items.
'MODEL NAME'_CallSetup.XML	There are imformations to call.
'MODEL NAME'_NV.INI	It consists of default values. It is written when 'cal&auto' is begun.
'MODEL NAME'_Sequence.XML	It is described a testing procedures.

10.2 How to use Tachyon

10.2.1 Model selection

Follow the procedure before start calibration & auto test

a. Click the icon, in tool bar. Then, you can see the below screen.
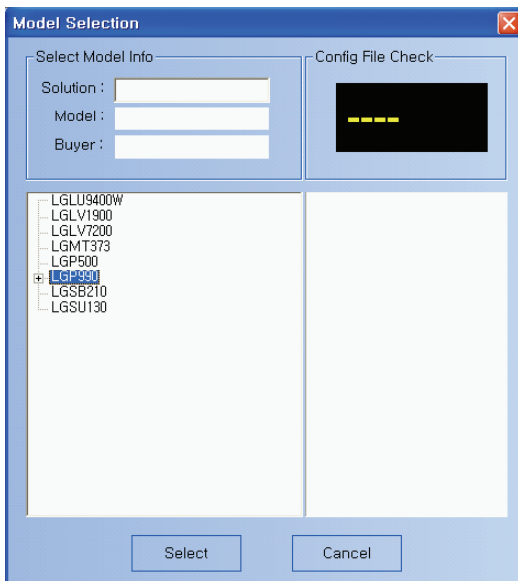
b. Select Model "LGP990"
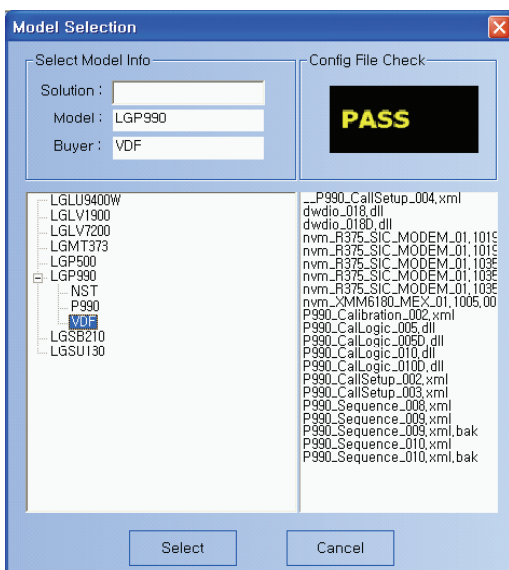
c. Select the model : You should select "LGP990"

d. Select the buyer (must be double clicked) Then, you can see "PASS" in Config File Check.

e. Click select button
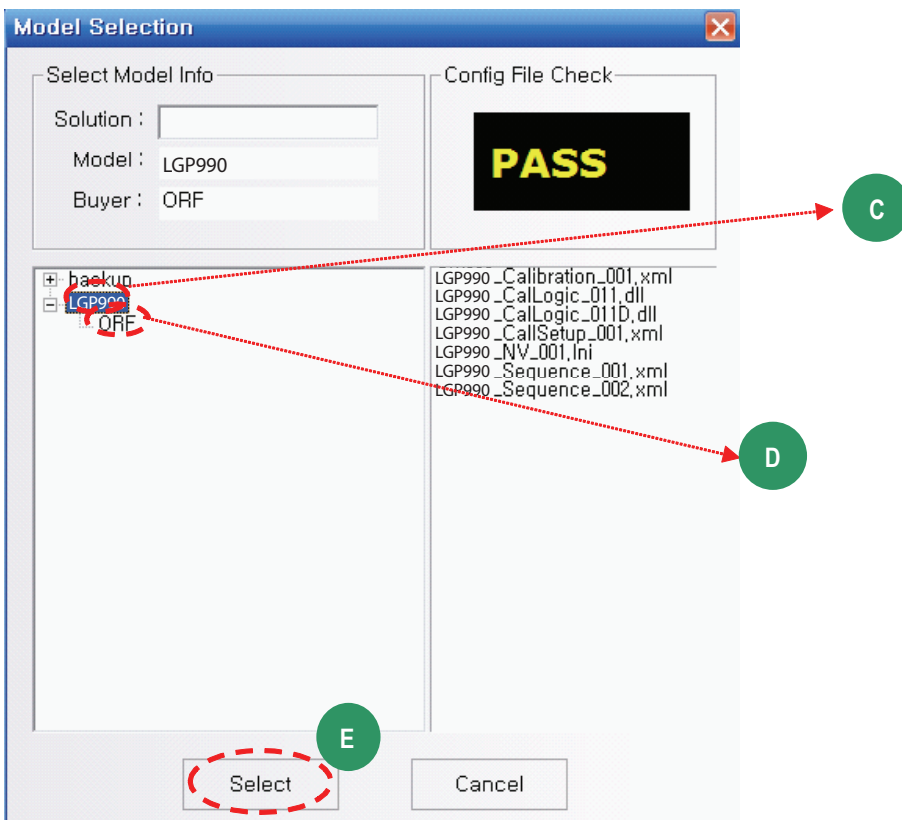
10.2.2 Start cal & auto
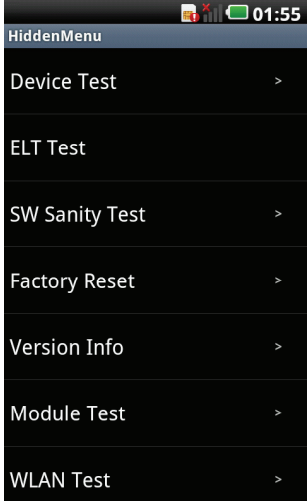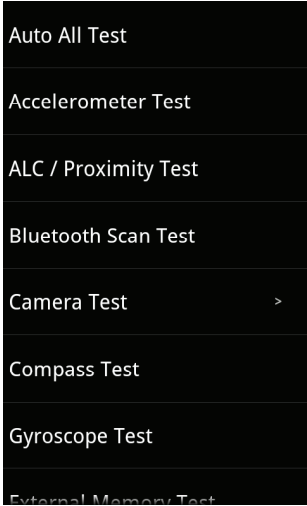
a. Click calibration & autotest button, ⏵ in Tool bar.
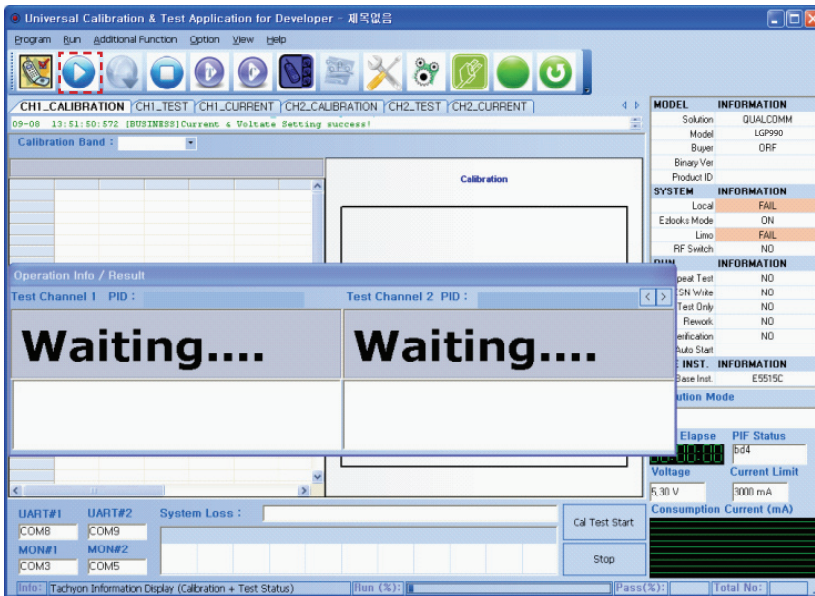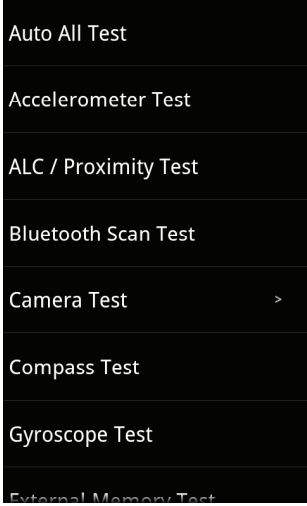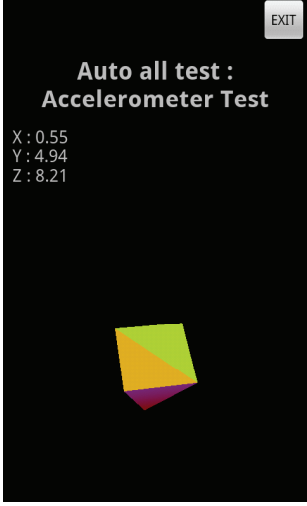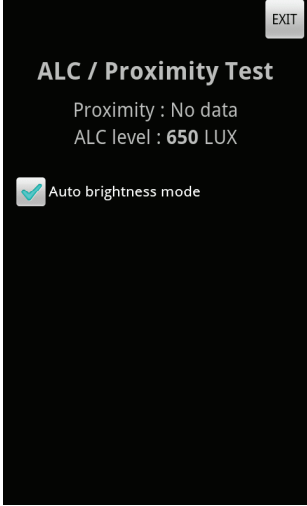
b. Calibration & autotest will be executed in order.

1) Precede Action.
   - NV write
   - Test command send.
2) Calibration
3) Auto test
4) After action
   - Phone reset
   - Change UE to AMSS
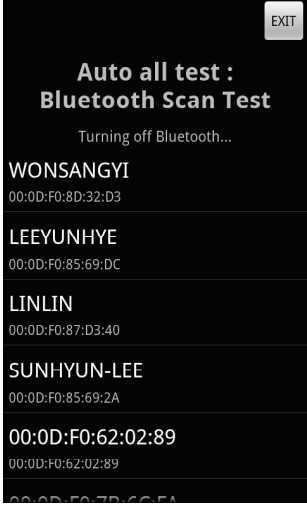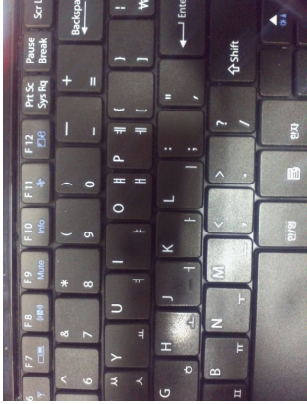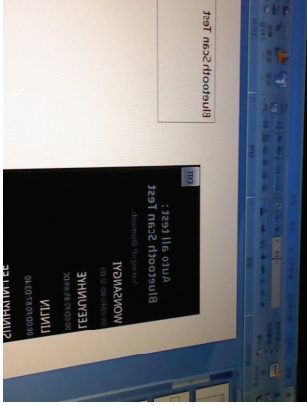
11. STAND ALONE TEST

HiddenMenu Device Test > ELT Test SW Sanity Test > Factory Reset > Version Info > Module Test > WLAN Test >	**Hidden Menu Start** Start shortcut keys:277634#*# **Hidden Menu List** Start the desired menu: Menu, click
Auto All Test Accelerometer Test ALC / Proximity Test Bluetooth Scan Test Camera Test > Compass Test Gyroscope Test External Memory Test	**Device Test** List: Auto all Test: Device functionality testing at the factory to use Accelerometer Test ALC/Proximity Test Bluetooth Scan Test Camera Test Compass Test Gyroscope Test External Memory Test Font Test Hall Sensor Test Key/Compass Test LCD Test RTC Test Sound Test Touch Test Vibrator Test Wifi Scan Test Gyro Cal Test EMI Test HDMI Test Touch LED Brightness
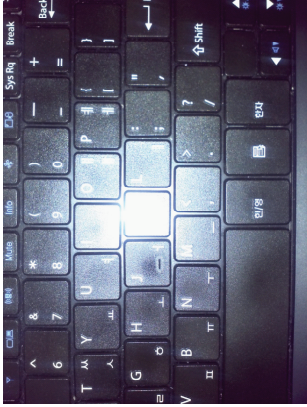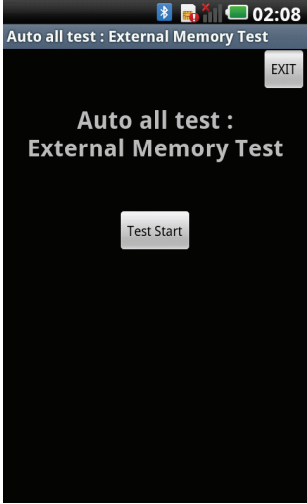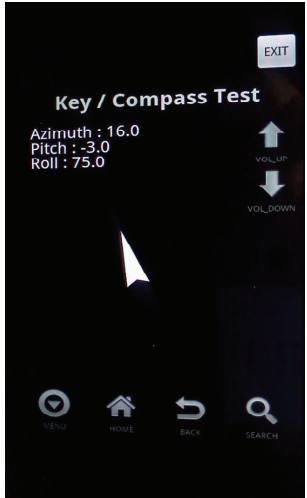
Auto All Test Accelerometer Test ALC / Proximity Test Bluetooth Scan Test Camera Test > Compass Test Gyroscope Test External Memory Test	**Device Test List** Auto All Test : -> Auto All Test menu click -> Continuous information on the menu, giving you ability test
EXIT **Auto all test :** **Accelerometer Test** X : 0.55 Y : 4.94 Z : 8.21	**Accelerometer Test**
EXIT **ALC / Proximity Test** Proximity : No data ALC level : **650** LUX ☑ Auto brightness mode	**Proximity Test** : Proximity Sensor Phone contact with your fingers in the top of the sensor determine the sensor response - Far 1.0 - Near 0.0 Check the "Auto brightness mode" - ALC level changed due to the brightness
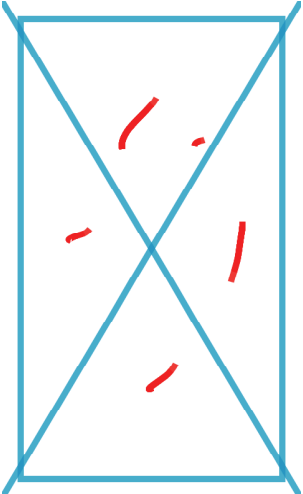
	Bluetooth Scan Test
	Camera Test Menu features disabled This feature is part of Auto All Test replaced by -> Auto All Test -> Primary Camera Preview -> Secondary Camera Preview -> Touch Flashlight Preview Camera Test 1 Primary Camera Preview
	Camera Test 2 Secondary Camera Preview
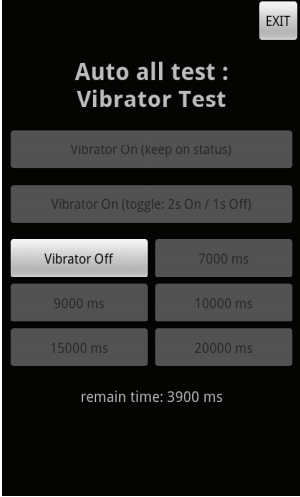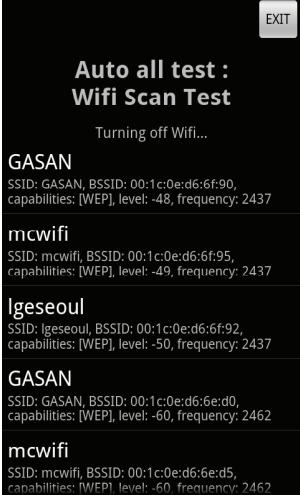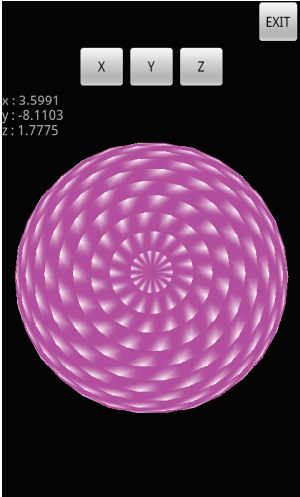
	Camera Test 3 Touch Flashlight Preview
	External Memory Test SD Card SD Card test -> Write a test check of the SD Card memory
	Key/Compass Test Up/Down key : Check Recognition Menu key : Check Recognition Home key : Check Recognition Back key : Check Recognition Search key : Check Recognition Compass test
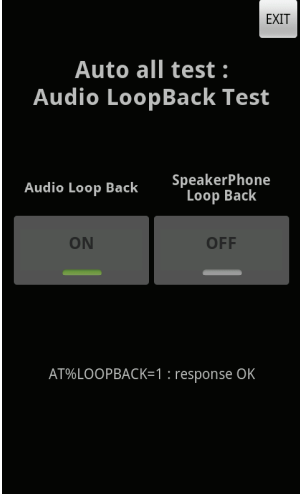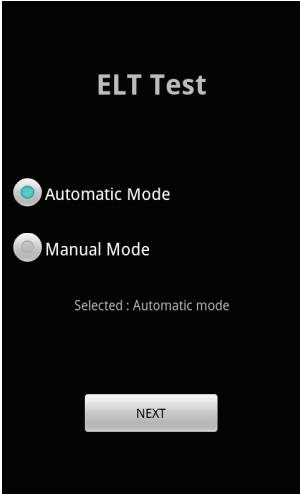
	LCD Test List Manual Test : Click on the following screen Automatic Test : Automatically, without clicking - Red Display - Green Display - Blue Display - White Display - Red, Green, Blue, White Display - Red ,Green, Blue, Black Display
	Touch window test Write with finger
	Ring test
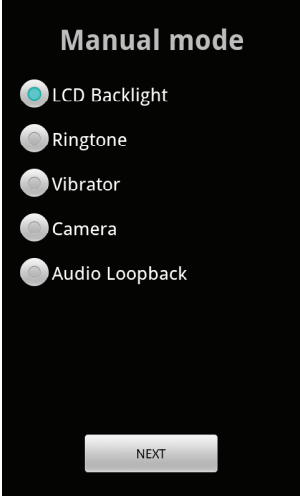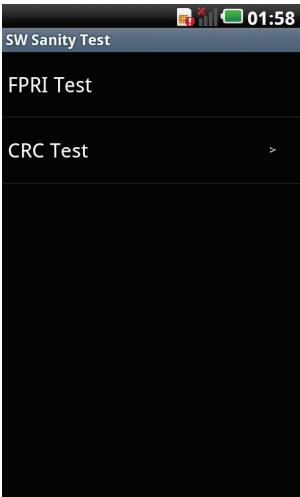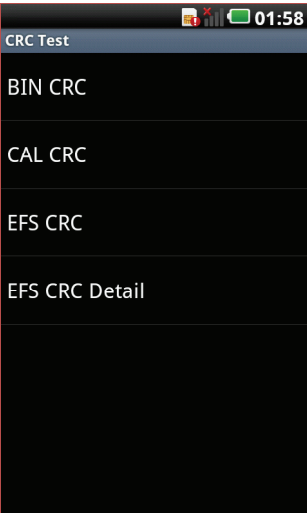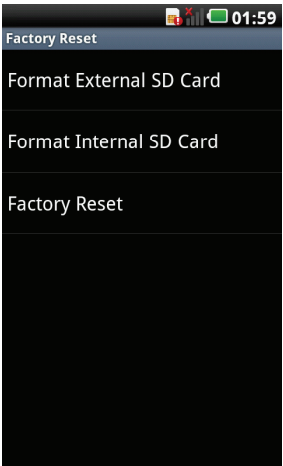
EXIT **Auto all test :** **Vibrator Test** Vibrator On (keep on status) Vibrator On (toggle: 2s On / 1s Off) Vibrator Off 7000 ms 9000 ms 10000 ms 15000 ms 20000 ms remain time: 3900 ms	**Vibrator test** A case-by-state vibration tests
EXIT **Auto all test :** **Wifi Scan Test** Turning off Wifi... **GASAN** SSID: GASAN, BSSID: 00:1c:0e:d6:6f:90, capabilities: [WEP], level: -48, frequency: 2437 **mcwifi** SSID: mcwifi, BSSID: 00:1c:0e:d6:6f:95, capabilities: [WEP], level: -49, frequency: 2437 **lgeseoul** SSID: lgeseoul, BSSID: 00:1c:0e:d6:6f:92, capabilities: [WEP], level: -50, frequency: 2437 **GASAN** SSID: GASAN, BSSID: 00:1c:0e:d6:6e:d0, capabilities: [WEP], level: -60, frequency: 2462 **mcwifi** SSID: mcwifi, BSSID: 00:1c:0e:d6:6e:d5, capabilities: [WEP], level: -60, frequency: 2462	**Wifi Scan test**
EXIT X Y Z x : 3.5991 y : -8.1103 z : 1.7775	**Gyro Sensor test**

EXIT **Auto all test :** **Audio LoopBack Test** **Audio Loop Back** **SpeakerPhone** **Loop Back** ON OFF AT%LOOPBACK=1 : response OK	**Audio Loop Back Test** Mic & Speak Phone loop Back test
ELT Test ◉ Automatic Mode ◯ Manual Mode Selected : Automatic mode NEXT	**ELT Test** Automatic Mode: Test Automatically Manual Mode : Test selectivity
Automatic mode ◉ 1 time ◯ 2 times ◯ 3 times ◯ 4 times ◯ 5 times ◯ 25 times ◯ 100 times ◯ infinate times NEXT	**ELT Test** Automatic Mode : LCD Automatic on/off test -> time setting
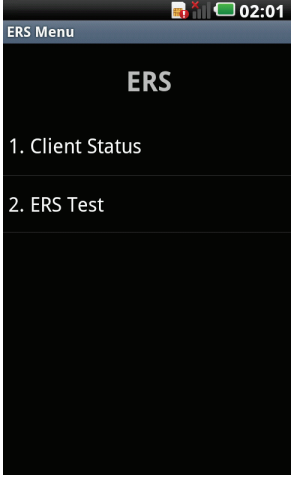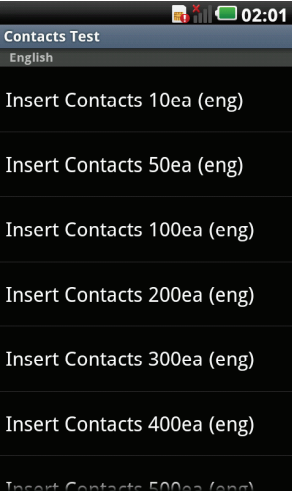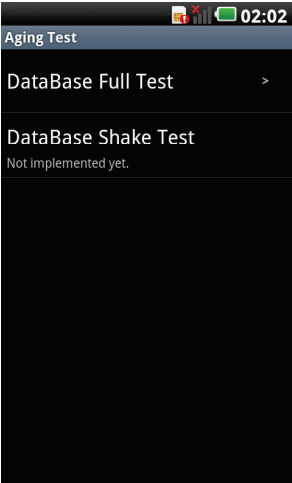
ELT Manual Test

LCD Backlight

Ringtone

Vibrator

Camera

Audio Loopback

-> test on the device is working

(The ability to use plant)

SW Sanity Test

FPRI Test

CRC Test: BIN CRC

CAL CRC

EFS CRC

EFS CRC Detail

Factory Reset

Format External SD card : External SD Card Data reset

Format Internal SD card : Internal SD Card Data reset

Factory Rest :Changing the Factory
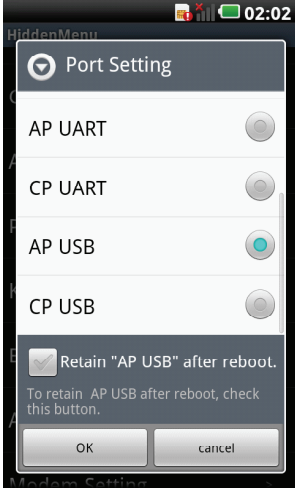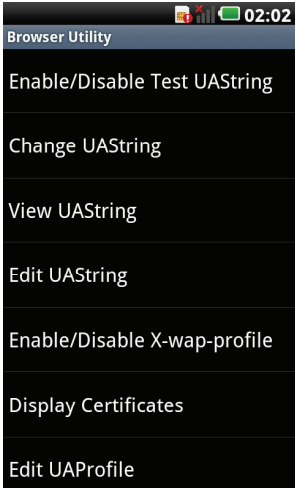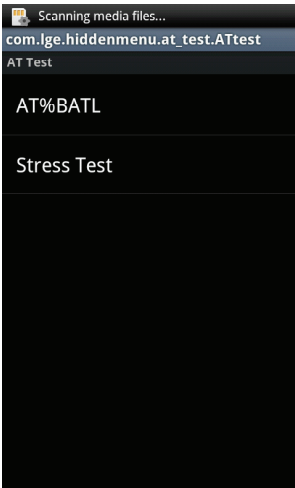
Scanning media files... **Version Info** SW Version Info > LG-P990-V08a **Firmware Version** 2.2.1 **Baseband Version** 1035.21_20101218_DV2 **Kernel Version** 2.6.32.9-dirty taewan.kim@madrid #3 **HW Version** Rev Rev.1.0 **Factory Version** LG-P990AT-00-V08a-450-00-DEC-13-2010	**Version Info** Classified Information representation
02:00 **Module Test** BT DUT Setting SMS Prefer Set LCD Always ON Hidden Reset USB mode selection Reboot CP/AP SMPL count	**Module Test** Module Test list: BT DUT setting SMS Prefer set LCD Always ON Hidden Reset USB mode selection Reboot CP/AP SMPL count Charging Test
02:01 **WLAN Test** Current Network Infomation Available Networks Saved Networks FTM Test FTM Test 11n OTA Setting	**WLAN Test** WLAN performance on SW

ERS Menu ERS Menu **ERS** 1. Client Status 2. ERS Test	**ERS Menu**
Contacts Test English Insert Contacts 10ea (eng) Insert Contacts 50ea (eng) Insert Contacts 100ea (eng) Insert Contacts 200ea (eng) Insert Contacts 300ea (eng) Insert Contacts 400ea (eng) Insert Contacts 500ea (eng)	**Contacts Test**
Aging Test DataBase Full Test > DataBase Shake Test Not implemented yet.	**Aging Test**

	Port Setting Select -> OK
	Browser Utility
	AT Test

Modem Setting Engineering Mode Band Selection Auto Call Answering RRC Version Setting Not implemented yet. (RIL) QCRIL/Android Log On/Off Not implemented yet. (RIL) PDP Setting Not implemented yet. (RIL) HSDPA Category Not implemented yet. (RIL)	**Modem Setting** Menu: Engineering Mode Band Selection Auto Call Answering RRC Version Setting QCRIL/Android Log On/Off PDP Setting HSDPA Category GSM A5 Algorithm Protocol Test GCF Flag Arm9 Log ON/Off
LocMgrPD **LocMgr Test Menu** Get Position To get the single or periodic location updates System Settings To set the system parameter values related with SUPL settings and etc.	**GPS Test**
Automatic Memfull Test EXIT **Automatic Memfull Test** Set memory full Reset memory full	**SMS Test** SMS Test ->Automatic Memfull Test

	Modem Setting Menu: Engineering Mode Band Selection Auto Call Answering RRC Version Setting QCRIL/Android Log On/Off PDP Setting HSDPA Category GSM A5 Algorithm Protocol Test GCF Flag Arm9 Log ON/Off
	WPS test
	SMS Test SMS Test ->Automatic Memfull Test

DRM Test DRM Cert Check Cert Type will be returned.. DRM Cert Info Cert Information will be returned..	**DRM Test**
Input Freq. (range:87500 ~ 108000) Freq Input volume. (range: 0 ~ 70) or use volume key Set Volume	**FM radio Test** Input the Freq. & Volume
VT menu 3G-324M video VT image quality VT Sensor Test VT DBG Level Set VT DUMP SETTING	**VT memu**

	Log service
Main log Disabled System log Disabled Radio log Disabled Events log Disabled Kernel log Disabled	
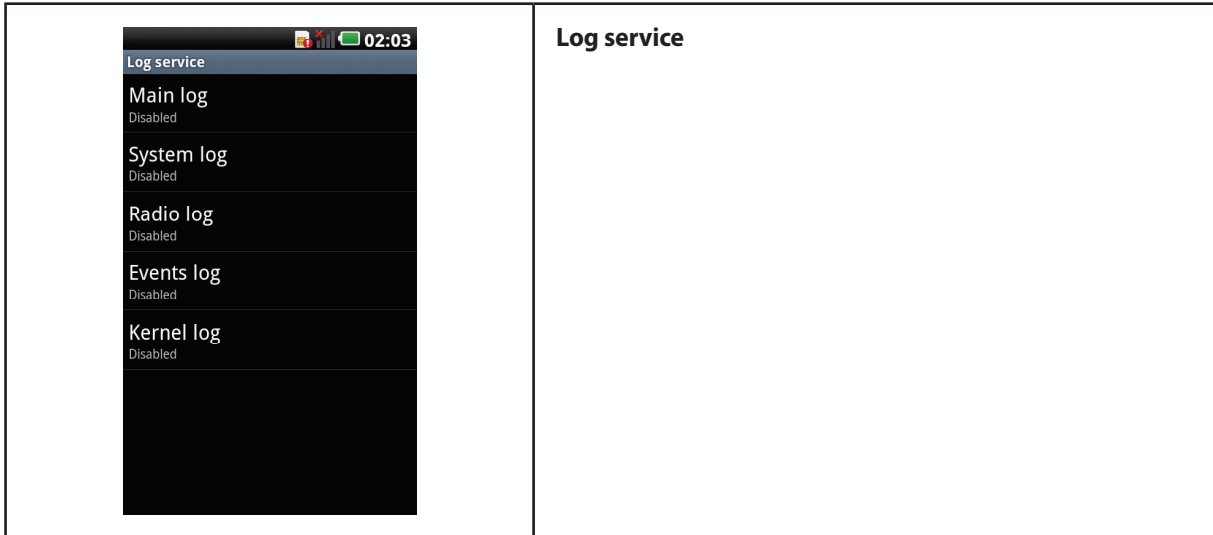
12. EXPLODED VIEW & REPLACEMENT PART LIST

12.1 EXPLODED VIEW
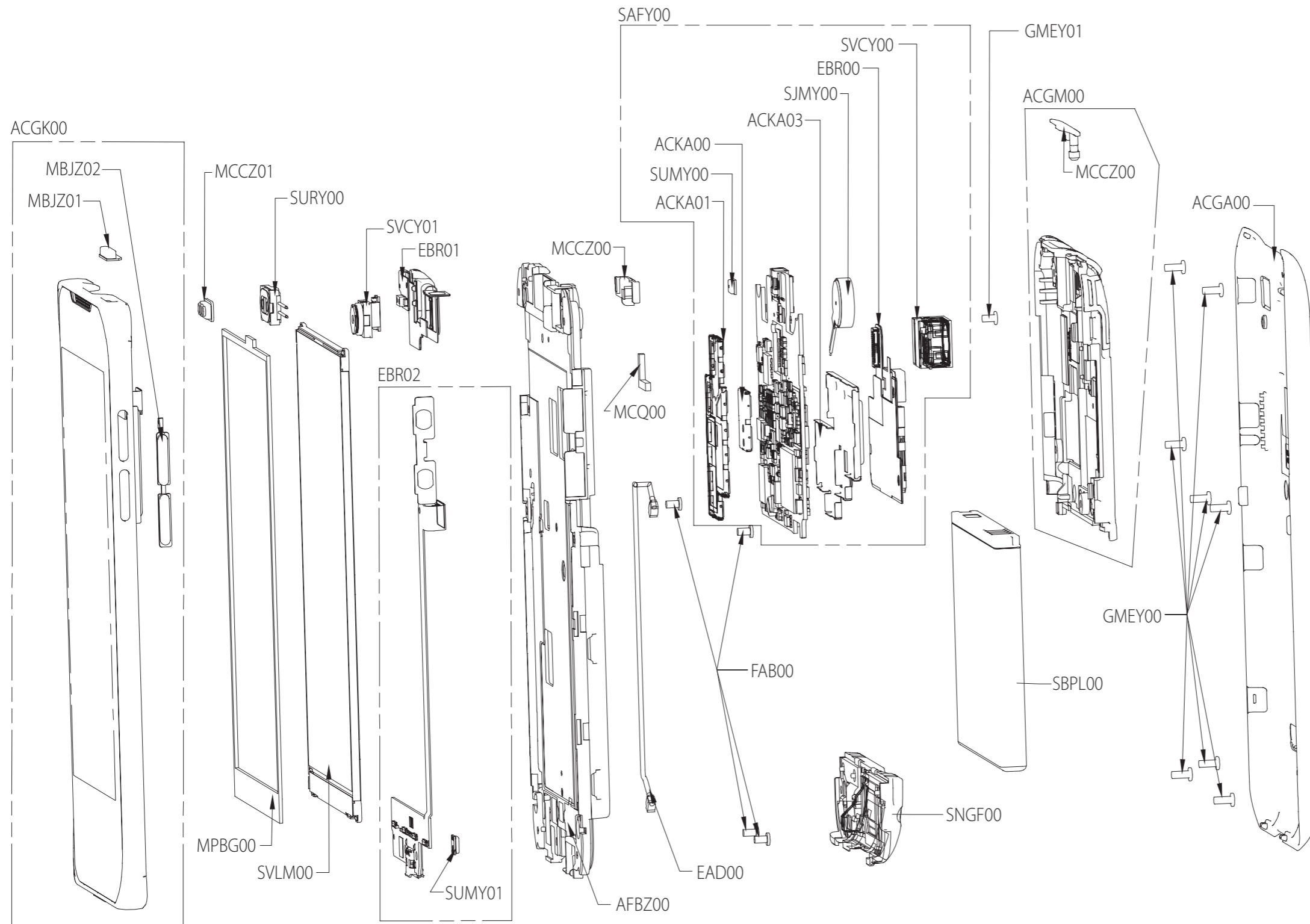
Location	Description
ACGM00	Cover Assembly,Rear
MCCZ00	Cap,HDMI
GMEY00	Screw,Machine
GMEY01	Screw,Machine
SAFY00	PCB Assembly,Main
SVCY00	Camera Module
SJMY00	Motor,DC
EBR00	PCB Assembly,Flexible
ACKA01	Can Assembly,Shield
ACKA03	Can Assembly,Shield
ACKA00	Can Assembly,Shield
SUMY00	Microphone,Condenser
MPBG00	Damper,LCD
EAD00	Cable,Assembly
EBR01	PCB Assembly,Flexible
MCQ00	Damper
MCCZ00	Cap
MCCZ01	Cap
GMEY00	Screw,Machine
FAB00	Screw,Machine
AFBZ00	Frame Assembly
SVLM00	LCD,Module-TFT
SVCY01	Camera Module
SURY00	Receiver
SNGF00	Antenna,Helical
EBR02	PCB Assembly,Flexible
SUMY01	Microphone,Condenser
ACGK00	Cover Assembly,Front
MBJZ01	Button
MBJZ02	Button
SBPL00	Rechargeable Battery,Lithium Ion
ACGA00	Cover Assembly,Battery

12.2 Replacement Parts
<Mechanic component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	LocationNo.	Description	PartNumber	Spec	Remark
1	AGQ000000	Phone Assembly	APEY0963003	LGP990.ASFRDW BR:Brown -	
2	MEZ002100	LABEL, APPROVAL	MLAA0062317	GU280 OREBK BK, ZZ, COMPLEX, (empty), , , , ,	
2	ACGY00	Cover Assembly, EMS	ACGY0070903	LGP990.ASFRDW BR:Brown -	
3	ACGM00	Cover Assembly, Rear	ACGM0171901	LGP990.AORFZY BR:Brown -	
4	MDS000000	Gasket	MDS63552101	COMPLEX LGP990.AORFZY ZZ:Without Color -	
4	EAA030100	PIFA Antenna, Multiple	EAA62504701	ACA-00149 DUAL -2DB 3:1 Planar Inverted F Type - MOBITECH CORPORATION	
4	MAZ000000	Bracket	MBFZ0059101	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MJN089300	Tape, Window	MTAD0137601	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MCQ000001	Damper	MPBZ0341701	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MCQ000002	Damper	MPBZ0341601	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MCQ000004	Damper	MPBZ0341501	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MCQ000003	Damper	MPBZ0341401	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MCQ049800	Damper, Motor	MPBJ0079601	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MHK000000	Sheet	MHK63327301	COMPLEX LGP990.AORFZY ZZ:Without Color -	
4	MCE000000	Contact	MCE62253001	COMPLEX LG-P990 ZZ:Without Color P990_PIN_DPA	
4	MCQ000000	Damper	MCQ66580701	COMPLEX LGP990.AORFZY BK:Black -	
4	MCQ015700	Damper, Connector	MCQ66484501	COMPLEX LGP999BN.ATMOBN ZZ:Without Color Pad_Conn_Touch	
4	MBL000001	Cap	MCCZ0047401	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MCCZ00	Cap, HDMI	MCCZ0047301	COMPLEX LG-P990 ORF ZZ:Without Color MOLD, PC LUPOY SC-1004ML, , , , ,	

Level	LocationNo.	Description	PartNumber	Spec	Remark
4	MBL049500	Cap, Mobile Switch	MCCF0072601	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MCJN00	Cover, Rear	MCJN0129601	COMPLEX LG-P990 ORF ZZ:Without Color MOLD, PC LUPOY SC-1004ML, , , , ,	
4	MWAE00	Window, Camera	MWAE0067001	COMPLEX LG-P990 ORF ZZ:Without Color CUTTING, Tempered Glass, , , , ,	
3	GMEY00	Screw, Machine	GMEY0009201	GMEY0009201 BH + 2.7mM 3.5mM MSWR3 FZB N N LG ELECTRONICS INC.	
3	GMEY01	Screw, Machine	GMEY0012901	GMEY0012901 FH + 1.4mM 2.5mM MSWR NI PLT N - LG ELECTRONICS INC.	
3	SAFY00	PCB Assembly, Main	SAFY0392801	LGP990.AORFZY 1.0 MAIN	
4	SAFB00	PCB Assembly, Main, Insert	SAFB0124001	LGP990.AORFZY 1.0 MAIN	
5	RAA050100	RESIN, PC	BRAH0001301	UF-1060, ; , , , , [empty]	
5	SVCY00	Camera Module	SVCY0025401	C8AA-Y232C C8AA-Y232C 8M AF, Sony(1/3.2"), 9.5x9.5x6.5t, MIPI, FPCB, 90degree LG INNOTEK CO., LTD	
5	SJMY00	Motor, DC	SJMY0007111	MVMF-A301A MVMF-A301A, 2 V, 40 mA, 10*3.0, Quick response 12mm LG INNOTEK CO., LTD	
5	EBR00	PCB Assembly, Flexible	EBR73315802	LGP990.AORFZY 1.0 Flexible	
6	EBR070100	PCB Assembly, Flexible, Insert	EBR73292301	LGP999DW.ATMODW 1.0 Flexible	
7	EAT030000	Module, Assembly	SMZY0029901	MP100OS LED 2 Vendor Managment TRAIS CO., LTD.	
7	MCQ000000	Damper	MCQ66505801	COMPLEX LGP990.AORFZY ZZ:Without Color -	
6	EBR070400	PCB Assembly, Flexible, SMT	EBR73315901	LGP999DW.ATMODW 1.0 Flexible	
7	EBR070200	PCB Assembly, Flexible, SMT Bottom	EBR73292401	LGP999DW.ATMODW 1.0 Flexible	
7	EAX010700	PCB, Flexible	SPCY0255401	SPCY0255401 LGP990.AORFZY G - - - - Flexible YOUNG POONG ELECTRONICS CO. LTD.	
7	EBR070300	PCB Assembly, Flexible, SMT Top	EBR73292501	LGP999DW.ATMODW 1.0 Flexible	
5	ACKA01	Can Assembly, Shield	ACKA0034901	LG-P990 ORF ZZ:Without Color COVER1	
6	MDS000000	Gasket	MGAZ0108501	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	MCBA00	Can, Shield	MCBA0093301	COMPLEX LG-P990 ORF ZZ:Without Color PRESS, STS, , , , ,	
5	ACKA03	Can Assembly, Shield	ACKA0035101	LG-P990 ORF ZZ:Without Color BOT	
6	MIDZ00	Insulator	MIDZ0273001	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
6	MCBA00	Can, Shield	MCBA0091001	COMPLEX LG-P990 ORF ZZ:Without Color PRESS, STS, , , , ,	
4	SAFF00	PCB Assembly, Main, SMT	SAFF0292301	LGP990.AORFZY 1.0 MAIN	
5	MEZ000000	Label	MLAZ0038301	COMPLEX LG-VX6000 ZZ:Without Color PID Label 4 Array PRINTING,	
5	SAFC00	PCB Assembly, Main, SMT Bottom	SAFC0158401	LGP990.AORFZY 1.0 MAIN	
5	SAFD00	PCB Assembly, Main, SMT Top	SAFD0155601	LGP990.AORFZY 1.1 MAIN	
6	ACKA00	Can Assembly, Shield	ACKA0035001	LG-P990 ORF ZZ:Without Color COVER2	
7	MBK070301	CAN, SHIELD	MCBA0090901	LG-P990 ORF ZY, ZZ, PRESS, STS, , , , ,	
7	MCBA00	Can, Shield	MCBA0093401	COMPLEX LG-P990 ORF ZZ:Without Color PRESS, STS, , , , ,	
6	SPFY	PCB, Main	SPFY0240601	SPFY0240601 LGP990.AORFZY F FR-4 - - 0.8mm MAIN LG Innotek.com	
6	SUMY00	Microphone, Condenser	SUMY0010609	SPU0410HR5H -PB SPU0410HR5H -PB, UNIT, 42 dB, 3.76*2.95*1.1, mems smd mic KNOWLES ACOUSTICS	
3	ACQ003400	Cover Assembly, Bar	ACGV0023502	LGP990.ASFRDW BK:Black -	
4	MPBG00	Damper, LCD	MPBG0115801	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MEZ000000	Label	MLAZ0038303	COMPLEX LG-LC3200 WA:White PRINTING, PPRI PRINTING	
4	MJN061101	Tape, Protect	MTAB0438501	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MJN061100	Tape, Protect	MTAB0435001	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	EAD00	Cable, Assembly	EAD61725901	80388-202B-80L-01 UFL-LP-066 UFL-LP-066 0.08M 2 BLACK none N I-PEX CO., LTD	
4	EBR01	PCB Assembly, Flexible	EBR73342701	LGP990.AORFZY 1.0 Flexible	

Level	LocationNo.	Description	PartNumber	Spec	Remark
5	EBR070400	PCB Assembly, Flexible, SMT	EBR73342801	LGP990.AORFZY 1.0 Flexible	
6	EAX010700	PCB, Flexible	SPCY0255101	SPCY0255101 LGP990.AORFZY G POLYI Multi - 0.25mm Flexible YOUNG POONG ELECTRONICS CO. LTD.	
6	EBR070300	PCB Assembly, Flexible, SMT Top	EBR73343001	LGP990.AORFZY 1.0 Flexible	
6	EBR070200	PCB Assembly, Flexible, SMT Bottom	EBR73342901	LGP990.AORFZY 1.0 Flexible	
4	MEZ087100	Label, Warning	MLAR0005301	COMPLEX KE970 FRA YL:Yellow COMPLEX, PCX COMPLEX	
4	MEV000000	Insulator	MIDZ0272901	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MDS000001	Gasket	MDS63650201	COMPLEX LGP990.AORFZY ZZ:Without Color -	
4	MDS000000	Gasket	MDS63631301	COMPLEX LGP990.ABUOZY ZZ:Without Color Gasket, LCD, Ground	
4	MCQ00	Damper	MCQ66592201	COMPLEX LGP999DW.ATMODW ZZ:Without Color P999_PAD_TOUCH_FPCB	
4	MCCZ00	Cap	MCCZ0048101	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	MCCZ01	Cap	MCCZ0047101	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
4	GMEY00	Screw, Machine	GMEY0009201	GMEY0009201 BH + 2.7mM 3.5mM MSWR3 FZB N N LG ELECTRONICS INC.	
4	FAB00	Screw, Machine	FAB31219601	BH + 1.4mM 2.5mM SWRCH18A ZN N A	
4	AFBZ00	Frame Assembly	AFBZ0022701	LG-P990 ORF ZZ:Without Color LCD	
5	MDS000002	Gasket	MDS63633801	COMPLEX LGP999DW.ATMODW ZZ:Without Color P999_GASKET_CAN_BOT	
5	MDS000000	Gasket	MDS63535501	COMPLEX LGP990.AORFZY ZZ:Without Color -	
5	MJN000002	Tape	MTAZ0381801	COMPLEX LG-P999BN TMOBN ZZ:Without Color COMPLEX, (empty),	
5	MJN000000	Tape	MTAZ0360401	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
5	MJN000001	Tape	MTAZ0360001	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
5	MEZ000900	Label, After Service	MLAB0006701	COMPLEX GS505 TMO ZZ:Without Color COMPLEX, (empty), , , , ,	
5	MDS000001	Gasket	MDS63552001	COMPLEX LGP990.AORFZY ZZ:Without Color -	

Level	LocationNo.	Description	PartNumber	Spec	Remark
5	MBFZ00	Bracket	MBFZ0058101	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
6	MDQ000000	Frame	MFEZ0041101	COMPLEX LG-P990 ORF ZZ:Without Color MOLD, PA 6 LUMID GP-2330A, , , , ,	
4	SVLM00	LCD, Module-TFT	SVLM0042001	TX10D07VM0BAA Main, 4.0", 480*800, 96.6*56.34*1.94T, 262K, TFT, TM, TA8851A, HITACHI DISPLAYS., LTD	
4	SVCY01	Camera Module	SVCY0026601	LM14MIFF HSIS-LM14MIFF 1.3M Wide View, Aptina(1/6"), 7x7x3.3t, FPCB(BtoB) HANSUNG ELCOMTEC CO., LTD.	
4	SURY00	Receiver	SURY0010114	BWBR1207L-04B-P 30mW 32OHM 105DB 0HZTO0HZ WIRE - BUJEON ELECTRONICS CO., LTD	
4	SNGF00	Antenna, Helical	SNGF0067102	HIR-02A57-0000AA 3.0, -2.0 dBd, GSM Quad/W-band1/4/5 LDS SPK Module, MULTI, -2.0, 50, 3.0 E.M.W CO., LTD.	
4	EBR02	PCB Assembly, Flexible	EBR73343101	LGP990.AORFZY 1.0 Flexible	
5	EBR070400	PCB Assembly, Flexible, SMT	EBR73343201	LGP990.AORFZY 1.0 Flexible	
6	EBR070200	PCB Assembly, Flexible, SMT Bottom	EBR73343301	LGP990.AORFZY 1.0 Flexible	
6	EAX010700	PCB, Flexible	SPCY0254701	SPCY0254701 LGP990.AORFZY 1.0 POLYI SBL 6L 0.5T FLEXIBLE YOUNG POONG ELECTRONICS CO. LTD.	
6	EBR070300	PCB Assembly, Flexible, SMT Top	EBR73343501	LGP990.AORFZY 1.0 Flexible	
4	ACGK00	Cover Assembly, Front	ACGK0173901	LG-P990 ORF BK:Black -	
5	MJN061100	Tape, Protect	MTAB0438301	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
5	MJN061101	Tape, Protect	MTAB0438401	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
5	MHK000000	Sheet	MSAZ0075001	COMPLEX LG-P999BN TMOBN ZZ:Without Color COMPLEX, (empty),	
5	MEV000000	Insulator	MIDZ0273201	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
5	MDJ000000	Filter	MFBZ0031301	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
5	AJX043300	Touch Window Assembly	SMZY0031102	3G401-40CC61 Capacitive TSM, 4.0inch, ITO Glass, Synaptics IC, Multi Touch , ; , Module Assembly Sintek Photronics	

Level	LocationNo.	Description	PartNumber	Spec	Remark
5	MBL000000	Cap	MBL64824001	COMPLEX LGP990.AORFZY ZZ:Without Color CAP(MIC, FRONT)	
5	MCQ000003	Damper	MCQ66475101	COMPLEX LGP990.AORFZY ZZ:Without Color Pad LED Protect	
5	MCQ074200	Damper, Speaker	MCQ66476301	COMPLEX LGP990.AORFZY ZZ:Without Color Pad Speaker	
5	MDJ000001	Filter	MFBZ0031401	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
5	MDJ000002	Filter	MDJ63106701	COMPLEX LGP999DW.ATMODW ZZ:Without Color FILTER(MIC)	
5	MCR000000	Decor Assembly	ACW73597401	LGSU660.ASKTBK BK:Black -	
6	MCR000000	Decor	MCR64430301	PRESS STS 0.3 LGSU660.ASKTDW BK:Black -	
6	MJN020800	Tape, Decor	MJN67712501	COMPLEX LGSU660.ASKTDW ZZ:Without Color -	
6	MJN020801	Tape, Decor	MJN67712601	COMPLEX LGSU660.ASKTDW ZZ:Without Color -	
5	MBJZ01	Button	MBJZ0045801	COMPLEX LG-P990 ORF ZZ:Without Color MOLD, PC LUPOY SC-1004ML, , , , ,	
5	MBJZ02	Button	MBJZ0045901	COMPLEX LG-P990 ORF ZZ:Without Color MOLD, PC LUPOY SC-1004ML, , , , ,	
5	MCJK00	Cover, Front	MCJK0137501	COMPLEX LG-P990 ORF ZZ:Without Color MOLD, ABS HI-153, , , , ,	
6	MET099501	Insert, Nut	MICE0016901	COMPLEX MECH_COMMON ZZ:Without Color -	
6	MET099500	INSERT, NUT	MICE0016908	MECH_COMMON ZY, ZZ, PRESS, STS, , , , ,	
5	MPBZ00	Damper	MPBZ0336001	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
5	MPBZ02	Damper	MPBZ0341301	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
5	MTAZ01	Tape	MTAZ0356201	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
1	AGF000000	Package Assembly	AGF76099701	LGP990.ASFRDW ZZ:Without Color LG-P990 SFR(GSP1/FRA Sleeve/SFR_CE!_LB/Seal)	
2	MAY084000	Box, Unit	MAY64851005	COMPLEX LGP990.ASFRDW ZZ:Without Color GSP1 Unit Box for LG-P990(STD)	
2	MHR007000	Sleeve, Box	MHR62113302	BOX Paper 160 59 120 5 COLOR LGP990.ASFRDW ZZ:Without Color LG-P990 FRA Sleeve(GSP1/French)	
2	AGJ000000	PALLET ASSY	APLY0003203	KE500 AREBK BK, ZZ, TDR TR1-1 ORG STD Palletizing	
3	MBEC00	Box, Carton	MBEC0003001	COMPLEX KU250 TMDBK ZZ:Without Color -	

Level	LocationNo.	Description	PartNumber	Spec	Remark
3	MCCL00	Cap, Box	MCCL0001701	COMPLEX KG270 AREBK ZZ:Without Color -	
3	MPBZ00	Damper	MPBZ0219601	COMPLEX KM500 ROMBB ZZ:Without Color -	
3	MPCY00	Pallet	MPCY0012403	COMPLEX KG800 FRABK DB:DARK BLUE -	
2	MCQ007000	Damper, Box	MPBA0007414	COMPLEX LGP990.ASFRDW ZZ:Without Color LG-P990 Phone Pad(GSP1/STD)	
2	MEZ003500	Label, Barcode	MLAC0004551	COMPLEX KM900 SFRSV ZZ:Without Color -	
2	MEZ084000	Label, Unit	MLAP0001138	COMPLEX LG-RD6100 RLC ZZ:Without Color -	
2	MBEE00	Box, Master	MBEE0059801	COMPLEX KS360 ACNRD ZZ:Without Color -	
2	MLAJ00	Label, Master Box	MLAJ0004402	COMPLEX CG300 CGR ZZ:Without Color LABEL, MASTER BOX(for CGR TDR 2VER. mbox_label)	
2	MLAZ00	Label	MLAZ0050901	COMPLEX KU990 GBRBK ZZ:Without Color -	
1	AAD000000	Addition Assembly	AAAY0494604	LGP990.ASFRDW BK:Black -	
2	ACGA00	Cover Assembly, Battery	ACGA0047804	LGP993.ABUODW DW:DARK BROWN -	
3	ACW000000	Decor Assembly	ADBY0021801	LG-P990 ORF BK:Black -	
4	MJN061100	Tape, Protect	MJN67708901	COMPLEX LGP990.AORFZY ZZ:Without Color -	
4	MDAY00	Decor	MDAY0090801	COMPLEX LG-P990 ORF ZZ:Without Color PRESS, STS, , , , ,	
3	MJN061100	Tape, Protect	MJN67759201	COMPLEX LGP999DW.ATMODW ZZ:Without Color TAPE, PROTECT(B/C)	
3	MKC009400	Window, Camera	MWAE0067601	COMPLEX LG-P990 ORF ZZ:Without Color CUTTING, Tempered Glass, , , , ,	
3	MEZ000000	Label	MLAZ0054601	COMPLEX GU280 ORF ZZ:Without Color -	
3	MHK000000	Sheet	MSAZ0075101	COMPLEX LG-P999BN TMOBN ZZ:Without Color COMPLEX, (empty),	
3	MJN020800	Tape, Decor	MTAA0232401	COMPLEX LG-P990 ORF ZZ:Without Color COMPLEX, (empty), , , , ,	
3	MCJA00	Cover, Battery	MCJA0122702	MOLD LUPOY GP-2102 LG-P990 ORF DW:DARK BROWN MOLD, PC LUPOY SC-1004ML, , , , ,	

12.2 Replacement Parts
<Main component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	LocationNo.	Description	PartNumber	Spec	Remark
8	R101	Resistor, Chip	ERHZ0000245	MCR01MZP5F2203 220KOHM 1% 1/16W 1005 R/TP - ROHM.	
8	D101, D102, D103	Diode, TVS	EDTY0009801	VSMF05LCC 5V 6V 12V 2A 25W SOT-963 R/TP 6P 5 PROTEK DEVICES INC.	
8	C106	Capacitor, Ceramic, Chip	ECCH0017601	CL05A475MQ5NRNC 4.7uF 20% 6.3V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
8	S101	Socket, Card	ENSY0023601	SCHA4B0402 Micro-SD 8P ANGLE SMD R/TP - ALPS ELECTRIC KOREA CO., LTD.	
8	R107	Resistor, Chip	ERHZ0000405	MCR01MZP5J103 10KOHM 5% 1/16W 1005 R/TP - ROHM.	
8	C103, C105	Capacitor, Ceramic, Chip	ECCH0000182	GRM155R61A104K 0.1uF 10% 10V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
8	U101	IC, Hall Effect Switch	EUSY0362601	BU52031NVX SSON004, 4, R/TP, Hall IC, IC, CMOSIC, CMOS - SSON R/TP 4P - ROHM.	
8	R103, R104, R105, R106	Resistor, Chip	ERHZ0000287	MCR01MZP5F4702 47KOHM 1% 1/16W 1005 R/TP - ROHM.	
8	C101, C104	Capacitor, Ceramic, Chip	ECCH0000115	MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
8	J101	Card Socket	ENSY0024301	KP09N-6S-2.54SF SIM 6P ANGLE SMD R/TP - HIROSE KOREA CO., LTD	
8	R102	Resistor, Chip	ERHZ0000286	MCR01MZP5F4701 4.7KOHM 1% 1/16W 1005 R/TP - ROHM.	
8	VA101, VA102	Varistor	SEVY0004401	ICVL0518400V500FR 18V 0% 40pF 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
8	C107	Capacitor, Ceramic, Chip	ECZH0003103	GRM36X7R104K10PT 100nF 10% 10V X7R -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
8	CN101	Connector, BtoB	ENBY0052101	55909-0374 30P 0.40MM STRAIGHT MALE SMD R/TP 1.5M - HANKOOK MOLEX	
6	C404, C405	Capacitor, Ceramic, Chip	ECCH0000108	C1005NP0709DGT 7pF 0.5PF 50V NP0 -55TO+125C 1005 R/TP - NEOTECH CO., LTD	
6	R622	Resistor, Chip	ERHZ0000288	MCR01MZP5F4703 470KOHM 1% 1/16W 1005 R/TP - ROHM.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C908	Capacitor, Ceramic, Chip	ECCH0000110	MCH155A100D 10pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C907	Capacitor, Ceramic, Chip	ECCH0000122	MCH155A470JK 47pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C1, C1223, C1224, C1225, C1229, C2, C208, C210, C212, C223, C224, C225, C226, C227, C228, C229, C302, C303, C304, C305, C306, C307, C501, C502, C503, C510, C512, C514, C515, C516, C518, C519	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R -55TO+85C 0603 R/TP - TDK CORPORATION	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C521, C522, C523, C532, C533, C535, C537, C538, C539, C545, C546, C547, C548, C551, C552, C553, C555, C560, C563, C564, C567, C570, C574, C576, C579, C580, C583, C584, C585, C586	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R -55TO+85C 0603 R/TP - TDK CORPORATION	
6	C588, C589, C591, C593, C652, C653, C656, C658, C660, C662, C663, C665, C666, C667, C805, C806, C807, C810, C916, C917, C918, C919, C920, C921	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R -55TO+85C 0603 R/TP - TDK CORPORATION	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C1239, C301, C621, C623, C626, C628, C631	Capacitor, Ceramic, Chip	ECCH0000198	CL05A225MQ5NSNC 2.2uF 20% 6.3V X5R -55TO+85C 1005 R/TP . SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	SC301, SC302, SC303, SC304, SC305, SC306, SC307, SC309, SC310, SC311, SC312	Clip	MCGY0003801	COMPLEX LG-KH3900 KTF ZZ:Without Color -	
6	C1220	Capacitor, Ceramic, Chip	ECCH0002001	C1005JB0J104KT000F 0.1uF 10% 6.3V Y5P -30TO+85C 1005 R/TP - TDK CORPORATION	
6	C604, C605, C618, C620, C622, C624, C632, C633, C634, C635, C636, C637, C638, C639, C640, C643, C647, C808	Capacitor, Ceramic, Chip	ECCH0004904	GRM155R60J105K 1uF 10% 6.3V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C611, C641, C644	Capacitor, Ceramic, Chip	ECCH0005604	GRM188R60J106M 10000000 pF, 6.3V, M, X5R, TC, 1608, R/TP, 0.8 mm MURATA MANUFACTURING CO., LTD.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	R401, R413, R435, R440, R441, R442, R443, R445, R514, R515, R630, R636, R712	Resistor, Chip	ERHY0009506	MCR006YZPJ104 100KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R503, R504, R508, R509	Resistor, Chip	ERHY0009312	MCR006YZPF5101 5.1KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	C524, C565, C826, C827	Capacitor, Ceramic, Chip	ECCH0007804	CL05A225MP5NSNC 2.2uF 20% 10V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C201, C401, C402, C655	Capacitor, Ceramic, Chip	ECCH0009106	C0603X7R1C103KT 10nF 10% 10V X7R -55TO+125C 0603 R/TP - TDK CORPORATION	
6	R301, R302, R303, R304, R433, R434, R437, R438, R439, R462, R501, R502, R901, R902, R903	Resistor, Chip	ERHY0009505	MCR006YZPJ103 10KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	C220, C221	Capacitor, Ceramic, Chip	ECCH0017501	CL10A226MQ8NRNE 22uF 20% 6.3V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C106	Capacitor, Ceramic, Chip	ECCH0017601	CL05A475MQ5NRNC 4.7uF 20% 6.3V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C1209	Capacitor, Ceramic, Chip	ECZH0000813	C1005C0G1H101JT 100pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C209, C211, C219, C230, C231, C629	Capacitor, Ceramic, Chip	ECCH0032801	GRM033R60J224M 0.00000022F 20% 6.3V X5R -55TO+85C 0603 R/TP 0.3MM MURATA MANUFACTURING CO., LTD.	
6	FB801, FB802, FB803	Filter, Bead	EAM62131001	CIM05J102NC 1000 ohm 1.0X0.5X0.5 25% 0.8 ohm 0.25 SMD R/TP 2P 0 SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C657, C670	Capacitor, Ceramic, Chip	ECZH0004402	CL05F104ZO5NNNC 0.1uF -20TO+80% 16V Y5V -30TO+85C 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C646, C648	Capacitor, Ceramic, Chip	ECZH0025911	GRM0335C1E120J 12pF 5% 25V C0G -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C107	Capacitor, Ceramic, Chip	ECZH0003103	GRM36X7R104K10PT 100nF 10% 10V X7R -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C911	Capacitor, Ceramic, Chip	ECZH0000901	C1005C0G1H240JT000F 24pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	R404, R450, R461, R468, R517	Resistor, Chip	ERHY0009536	MCR006YZPF1003 100KOHM 1% 1/20W 0603 R/TP -ROHM.	
6	C202, C205, C216, C222	Capacitor, Ceramic, Chip	ECZH0001216	C1005X5R1A224KT000E 220nF 10% 10V X5R -55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	ZD601	Diode, TVS	EDTY0008610	PLW0501H-LF 800mV 6V 12.5V 16A 250W SOD523 R/TP 2P 1 PROTEK DEVICES INC.	
6	FB804	Filter, Bead	EAM62150301	CIM05J600NC 60 ohm 1.0X0.5X0.5 25% 0.2 ohm 0.65A SMD R/TP 2P 0 SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R827	Resistor, Chip	ERHY0003301	MCR01MZP5J101 100OHM 5% 1/16W 1005 R/TP -ROHM.	
6	FL806, FL807, FL808, FL810, FL811, FL812, FL813, FL901, FL902	Filter, EMI/Power	SFEY0010501	ICVE10184E150R101FR ESD/EMI 0HZ 15pF 0H SMD R/TP INNOCHIPS TECHNOLOGY	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	L900	Inductor, Multilayer, Chip	ELCH0010402	LK1005 R27K-T 270NH 10% - 25mA 0.91OHM 120MHZ 10 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	R212, R215, R222, R223, R436, R447, R459, R460, R519, R625	PCB ASSY, MAIN, PAD OPEN	SAFO0000401	AX3100 ATL SV_SHIPBACK, MAIN, A, 0OHM DNI	
6	U301	IC, MCP, NAND	EUSY0425901	H8BCS0QG0MMR-46M NAND/1G SDRAM/512M 0VTO0V 8.0x9.0x1.0 TR 130P NAND+DRAM BGA - HYNIX SEMICONDUCTOR INC.	
6	L602	Inductor, Wire Wound, chip	ELCP0008013	MIPSZ2012D2R2 MIPSZ2012D2R2, 2.2 uH, N, 2.0X1.2X1.0, R/TP FDK CORPORATION.	
6	L605	Inductor, Wire Wound, Chip	ELCP0008016	MIPS2520D100 10UH 30% - 200mA 0.28OHM - - SHIELD 2.5X2X1MM NONE - FDK CORPORATION.	
6	ANT1201, ANT1203	Contact	MCE62252901	COMPLEX LGP999BN ZZ:Without Color LG-P999 CLIP_SUB	
6	L604	Inductor, Wire Wound, chip	ELCP0009408	LQM2HPN1R0MG0 LQM2HPN1R0MG0, 1 uH, N, 2X2.5X1.0, R/TP, Chip power MURATA MANUFACTURING CO., LTD.	
6	L1207, L201, L202	Inductor, Wire Wound, Chip	ELCP0012101	CIG21L3R3MNE 0H 20% - 800mA 0.22OHM - - SHIELD 2X1.25X1MM NONE - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R234, R237, R612	PCB ASSY, MAIN, PAD SHORT	SAFP0000401	LG-LU3000 LGTBK, MAIN, A,	
6	L603	Inductor, Wire Wound, chip	ELCP0012801	MIPS2520D1R5 1.6 uH, N, 2.5*2.0*1.0, R/TP, 0.0000015, 30%, 1.2A, 0.1 OHM, 2.5X2X1MM, NONE, R/TP, Inductor, Wire Wound, Chip FDK CORPORATION.	
6	C232, C233	Capacitor, Ceramic, Chip	ECCH0009504	MCH032A180JK 18pF 5% 25V NP0 -55TO+125C 0603 R/TP - ROHM.	
6	CN901	Connector, BtoB	ENBY0034101	GB042-24P-H10-E3000 24P 0.40MM STRAIGHT PLUG SMD R/TP 1M - LS Mtron Ltd.	
6	C1221, C1233, C206, C207, C213, C809, C828, C901	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R -55TO+85C 1005 R/TP - TDK KOREA COOPERATION	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	CN103, CN801, CN904	Connector, BtoB	ENBY0034201	GB042-24S-H10-E3000 24P 0.40MM STRAIGHT SOCKET SMD R/TP 1M - LS Mtron Ltd.	
6	CN802	Connector, BtoB	ENBY0040401	GB042-50P-H10-E3000 50P 0.4MM STRAIGHT PLUG SMD R/TP 1M - LS Mtron Ltd.	
6	VA601, VA902	Varistor	SEVY0008102	EVLC5S01015 5.5V 0% 15F 0.6*0.3*0.33 NONE SMD R/TP AMOTECH CO., LTD.	
6	CN902	Connector, BtoB	ENBY0052201	51338-0374 30P 0.40MM STRAIGHT FEMALE SMD R/TP 1.5M - HANKOOK MOLEX	
6	L1209	Inductor, Multilayer, Chip	ELCH0003847	LQG15HS1N8S02D 1.8NH 0.3NH - 300mA 0.1OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	CN701	Connector, I/O	ENRY0011201	78592-0001 19P 0.40MM ANGLE RECEPTACLE DIP R/TP - HANKOOK MOLEX	
6	SW101	connector, RF	ENWY0005501	20279-001E-01 NONE STRAIGHT SOCKET SMD R/TP AU 50OHM 400mDB I-PEX CO., LTD	
6	SW102	Connector, RF	ENWY0008701	MS-156C NONE STRAIGHT SOCKET SMD T/REEL AU 50OHM 400mDB HIROSE KOREA CO., LTD	
6	D901, D902	Diode, TVS	EDTY0008606	PRSB6.8C 4.7V 5.7 - - 10W - R/TP 2P 1 PROTEK DEVICES INC.	
6	C1219, C1222, C203, C215, C217, C218, C601, C602, C610, C642	Capacitor, Ceramic, Chip	ECCH0007803	CL10A106MP8NNNC 10uF 20% 10V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	CN601	Connector, Terminal Block	ENZY0029901	04-9254-003-032-829+ 3, 2.5 mm, ANGLE, Gold, Twin Side PCB cut 3.2 KYOCERA ELCO KOREA SALES CO., LTD.	
6	R428, R505, R506	Resistor, Chip	ERHY0000104	MCR01MZP5F49R9 49.9OHM 1% 1/16W 1005 R/TP - ROHM.	
6	R472, R473	Resistor, Chip	ERHY0040202	RC0201FR-074R7L 4.7OHM 1% 1/20W 0603 R/TP - YAGEO CORPORATION	
6	R231	Resistor, Chip	ERHY0008206	RC1005F430CS 43OHM 1% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R510	Resistor, Chip	ERHY0024601	RC0603J151CS 150OHM 5% 1/20W 0603 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C1238, C767	Capacitor, Ceramic, Chip	ECZH0025920	GRM033R71C102K 1nF 10% 16V X7R -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	R423, R424	Resistor, Chip	ERHY0009306	MCR006YZPF1801 1.8KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	R620	Resistor, Chip	ERHY0009303	MCR006YZPF1002 10KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	C836	Capacitor, Ceramic, Chip	ECCH0000112	MCH155C150J 15pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R648	Resistor, Chip	ERHY0009504	MCR006YZPJ102 1KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R626	Resistor, Chip	ERHY0009507	MCR006YZPJ105 1MOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R211	Resistor, Chip	ERHY0009518	MCR006YZPJ224 220KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R204, R511, R513	Resistor, Chip	ERHY0009503	MCR006YZPJ101 100OHM 5% 1/20W 0603 R/TP - ROHM.	
6	R213, R214, R216, R217, R218, R219, R220, R221, R224, R421, R430, R431, R448, R449, R451, R452, R824	Resistor, Chip	ERHY0009526	MCR006YZPJ472 4.7KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R414, R415, R416, R417, R418	Resistor, Chip	ERHY0009527	MCR006YZPJ473 47KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R457, R627, R649	Resistor, Chip	ERHY0009502	MCR006YZPJ100 10OHM 5% 1/20W 0603 R/TP - ROHM.	
6	R1212	Resistor, Chip	ERHY0009554	MCR006YZPF2002 20KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	U302	IC, MCP, NAND	EUSY0424401	H8TBR00U0MLR-0DM 4096MBIT 1.14VTO1.3V, 1.7VTO1.95V 12.0x12.0x0.86 TR 168P DRAM FBGA 4Gb LPDDR2 PoP (12x12/168ball/400MHz) HYNIX SEMICONDUCTOR INC.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	R429	Resistor, Chip	ERHY0039802	RC0402FR-07453RL 453OHM 1% 1/16W 1005 R/TP - YAGEO CORPORATION	
6	R202	Resistor, Chip	ERHZ0000203	MCR01MZP5F1002 10KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	D603	Diode, Switching	EAH61532901	BA891_ 1V 35V - - 0SEC 715mW SOD523 R/TP 2P 1 NXP Semiconductors	
6	C616	Capacitor, Ceramic, Chip	ECCH0000104	MCH155A030C 3pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R507	Resistor, Chip	ERHZ0000250	MCR01MZP5F2400 240OHM 1% 1/16W 1005 R/TP - ROHM.	
6	Q501	FET	EQFN0002901	2SK3019FPBTL N-CHANNEL MOSFET 30V +-20 100mA 8OHM 150mW SC75A R/TP 3P ROHM.	
6	R210	Resistor, Chip	ERHZ0000477	MCR01MZP5J394 390KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R419	Resistor, Chip	ERHZ0000493	MCR01MZP5J513 51KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R103, R104, R105, R106	Resistor, Chip	ERHZ0000287	MCR01MZP5F4702 47KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R226	Resistor, Chip	ERHZ0003001	MCR01MZP5F3002 30KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R444	Resistor, Chip	ERHZ0003601	MCR01MZSF2004 2MOHM 1% 1/16W 1005 R/TP - ROHM.	
6	U402	IC, I/O Support Chip	EUSY0342403	NLSV2T244MUTAG 0.9 To 4.5v 1uA NA 8P - UDFN R/TP 8P ON SEMICONDUCTOR	
6	U203	IC, Analog Switch	EUSY0186504	FSA2259UMX QFN , 8 , R/TP , Dual SPDT , ; , IC, Analog Switch FAIRCHILD SEMICONDUCTOR	
6	VA903	Varistor	SEVY0001001	EVLC14S02050 14V 0% 50F 1.0*0.5*0.6 NONE SMD R/TP AMOTECH CO., LTD.	
6	C669	Capacitor, Ceramic, Chip	ECZH0001210	C1005Y5V1A474ZT000F 470nF -20TO+80% 10V Y5V - 30TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	U602	IC, PMIC	EUSY0388301	MAX8907C , 132 , R/TP , , ; , IC, PMIC MAXIM INTEGRATED PRODUCTS INC.	
6	U601	IC, DC, DC Converter	EUSY0405402	MAX8952EWE+T 2.5 to 5.5V adj 1.6W CSP R/TP 16P - MAXIM INTEGRATED PRODUCTS INC.	
6	U1204	IC, LDO Voltage Regulator	EUSY0407101	BU28TD4WNVX SSON004, 4, R/TP, 2.8V 150mA Single LDO, IC, LDO Voltage RegulatorIC, LDO Voltage Regulator ROHM.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	U202	IC, Digital Baseband Processor, 3G	EUSY0409401	PMB9801 0 0 0 NONE NONE 316P - BGA R/TP 316P INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD.	
6	L1208, L1211	Inductor, Multilayer, Chip	ELCH0004703	1005GC2T1N0SLF 1NH 0.3NH - 300mA 0.12OHM 10GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	U401	IC, Application Processor	EUSY0415102	AP20H , 48, 481PIN, 12MP, HD, 3D, IC, Digital Signal Processors BGA R/TP 481P NVIDIA CORP	
6	U1107	IC, Geomagnetic Sensor	EUSY0418501	AMI304 QFN, 12, R/TP, Geomagnetic Sensor, IC, A/D ConverterIC, A/D Converter - QFN R/TP 12P - AICHI STEEL CORPORATION	
6	C909	Capacitor, Ceramic, Chip	ECZH0000830	C1005C0G1H330JT000F 33pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	CN201, CN401, CN903	Connector, BtoB	ENBY0050901	GB042-10P-H10-E3000 10P 0.4MM STRAIGHT MALE SMD R/TP 1M - LS Mtron Ltd.	
6	U502	IC, Temperature Sensor	EUSY0426201	NCT1008 DFN, 8, R/TP, Remote Temperature Sensor, IC, A/D Converter - DFN R/TP 8P - ON SEMICONDUCTOR	
6	U403	IC, Gate	EUSY0428401	XSON6 , 6 , R/TP , OR Gate , ; , IC, TTL	
6	X1202	Oscillator, TCXO	EXST0002201	KT3225L38400UCW28TA0 38.4MHZ 1.5PPM 2.8V 0.0x0.0x0.0MM NONE SMD R/TP KYOCERA CORP.	
6	X401	Crystal	EXXY0017801	DSX321G(12MHZ, 8PF) 12MHZ 50PPM 8PF 32*25 SMD R/TP DAISHINKU CORPORATION.	
6	X201	Crystal	EXXY0018701	FC-135(12.5PF, +-20PPM) 32.768KHZ 20PPM 12.5PF 32*15 SMD R/TP SEIKO EPSON CORP	
6	R624	Resistor, Chip	ERHY0009558	MCR006YZPF6802 68KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	VA101, VA102	Varistor	SEVY0004401	ICVL0518400V500FR 18V 0% 40pF 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
6	X601	Crystal	EXXY0026901	Q13FC1350000300 32.768KHZ 20PPM 0F NONE SMD R/TP EPSON TOYOCOM CORP	
6	R512	Resistor, Chip	ERHY0009550	MCR006YZPF4702 47KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	C627, C910	Capacitor, Ceramic, Chip	ECZH0003503	GRM188R61E105K 1uF 10% 25V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R647	Resistor, Chip	ERHY0042405	RC0201FR-074K02L 4.02KOHM 1% 1/20W 0603 R/TP - YAGEO CORPORATION	
6	FB203	Filter, Bead	SFBH0002302	BLM18PG121SN1J 120 ohm 1.6X0.8X0.8 25% 0.05 ohm 2A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	FB900, FB901, FB902, FB903, FB904	Filter, Bead	SFBH0008105	BLM15BD182SN1D 1800 ohm 1.0X0.5X0.5 25% 1.4 ohm 0.1A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	R402, R403, R646	Resistor, Chip	ERHY0009586	MCR006YZPF2201 2.2KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	FB501	Filter, Bead	SFBH0009302	MMZ1005Y400CT 40 ohm 1.0X0.5X0.5 25% 0.12 ohm 0.55A SMD R/TP 2P 0 TDK CORPORATION	
6	R422, R427	Resistor, Chip	ERHY0009302	MCR006YZPF1001 1KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	FL802	Filter, EMI/Power	SFEY0016301	ICMEF112P900M COMMON MODE NOISE FILTER 0HZ 0F 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	FL801	Filter, EMI/Power	SFEY0015901	ICMEF214P101MFR ICMEF214P101MFR, SMD, ESD Common mode Filter INNOCHIPS TECHNOLOGY	
6	U1203	Module, WLAN	SMZY0025001	SWB-B25 2.3VTO5.5V LGA 62P 9.0x7.8x1.2MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R621	Resistor, Chip	ERHZ0000222	MCR01MZP5F1503 150KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	ZD802, ZD803	Diode, TVS	EDTY0009601	Rclamp0521P.TCT 5V 6 5V 4A 100W - R/TP 2P 1 SEMTECH CORPORATION	
6	C614	Capacitor, Ceramic, Chip	ECCH0009514	MCH032A(AN)100DK 10pF 0.5PF 25V X7R -55TO+125C 0603 R/TP - ROHM.	
6	C1204	Capacitor, Ceramic, Chip	ECCH0000143	MCH155CN102KK 1nF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	L601	Inductor, Wire Wound, Chip	EAP61766701	VLS252010ET-1R0N 1UH 30% - 1.9A 0.07OHM - - SHIELD 2.5X2X1MM NONE R/TP TDK KOREA COOPERATION	
6	R518	Resistor, Chip	ERHZ0000231	MCR01MZP5F1803 180KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	Q500	FET	EQFP0000101	2SJ347 P-CHANNEL MOSFET -20V -7 -0.05A 40OHM 100mW SSM R/TP 3P TOSHIBA	
6	L1206	Inductor, Multilayer, Chip	ELCH0003826	LQG15HS3N3S02D 3.3NH 0.3NH - 300mA 0.17OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	C830	Capacitor, Ceramic, Chip	ECCH0000163	C1005X5R473KDT 47nF 10% 10V X5R -55TO+85C 1005 R/TP - NEOTECH CO., LTD	
6	CN101	Contact	MCIZ0008201	COMPLEX LG-VN530 VRZ DW:DARK BROWN PRESS, BeCu, , 3.0, 1.5, 1.5,	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C524, C565, C826, C827	Capacitor, Ceramic, Chip	ECCH0007804	CL05A225MP5NSNC 2.2uF 20% 10V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C1221, C1233, C206, C207, C213, C809, C828, C901	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R -55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	C101, C104	Capacitor, Ceramic, Chip	ECCH0000115	MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C188	Capacitor, Ceramic, Chip	ECCH0000117	CL05C270JB5NNNC 27pF 5% 50V NP0 -55TO+125C 1005 R/TP 0.5 SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C1, C1223, C1224, C1225, C1229, C2, C208, C210, C212, C223, C224, C225, C226, C227, C228, C229, C302, C303, C304, C305, C306, C307, C501, C502, C503, C510	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R -55TO+85C 0603 R/TP - TDK CORPORATION	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C512, C514, C515, C516, C518, C519, C521, C522, C523, C532, C533, C535, C537, C538, C539, C545, C546, C547, C548, C551, C552, C553, C555, C560, C563, C564, C567, C570, C574, C576	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R -55TO+85C 0603 R/TP - TDK CORPORATION	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C579, C580, C583, C584, C585, C586, C588, C589, C591, C593, C652, C653, C656, C658, C660, C662, C663, C665, C666, C667, C805, C806, C807, C810, C916, C917, C918, C919, C920, C921	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R -55TO+85C 0603 R/TP - TDK CORPORATION	
6	R212, R215, R222, R223, R436, R447, R459, R460, R519, R625	PCB ASSY, MAIN, PAD OPEN	SAFO0000401	AX3100 ATL SV_SHIPBACK, MAIN, A, 0OHM DNI	
6	C1032	Capacitor, Ceramic, Chip	ECCH0000129	MCH155A121JK 120pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	L111, L114, L116, L118	Inductor, Multilayer, Chip	ELCH0004708	1005GC2T2N7SLF 2.7NH 0.3NH - 300mA 0.17OHM 5.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C1204	Capacitor, Ceramic, Chip	ECCH0000143	MCH155CN102KK 1nF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C1218, C153, C197, C2000	Capacitor, Ceramic, Chip	ECCH0000155	MCH153CN103KK 10nF 10% 16V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R401, R413, R435, R440, R441, R442, R443, R445, R514, R515, R630, R636, R712	Resistor, Chip	ERHY0009506	MCR006YZPJ104 100KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	C1239, C301, C621, C623, C626, C628, C631	Capacitor, Ceramic, Chip	ECCH0000198	CL05A225MQ5NSNC 2.2uF 20% 6.3V X5R -55TO+85C 1005 R/TP . SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C2004, C2007	Capacitor, Ceramic, Chip	ECCH0000113	MCH155A180J 18pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C121	Capacitor, Ceramic, Chip	ECCH0000901	C1005C0G1H2R2CT000F 2.2pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C119, C126, C130, C135	Capacitor, Ceramic, Chip	ECCH0004906	GRM1555C1H2R5CZ01D 2.5pF 0.25PF 50V X7R -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C1111	Capacitor, Ceramic, Chip	ECCH0005603	GRM188R61A225K 2.2uF 10% 10V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R414, R415, R416, R417, R418	Resistor, Chip	ERHY0009527	MCR006YZPJ473 47KOHM 5% 1/20W 0603 R/TP - ROHM.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C1219, C1222, C203, C215, C217, C218, C601, C602, C610, C642	Capacitor, Ceramic, Chip	ECCH0007803	CL10A106MP8NNNC 10uF 20% 10V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C710	Capacitor, Ceramic, Chip	ECCH0007802	CL10A475KP8NNNC 4.7uF 10% 10V X5R -55TO+85C 1608 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C907	Capacitor, Ceramic, Chip	ECCH0000122	MCH155A470JK 47pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R234, R237, R612	PCB ASSY, MAIN, PAD SHORT	SAFP0000401	LG-LU3000 LGTBK, MAIN, A,	
6	U1206	IC, MUIC	EUSY0405401	MAX14526DEEWP MUIC , ; , IC, Analog Multiplexer CSP R/TP 20P MAXIM INTEGRATED PRODUCTS INC.	
6	L125, L130	Inductor, Multilayer, Chip	ELCH0004707	1005GC2T1N5SLF 1.5NH 0.3NH - 300mA 0.13OHM 7GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C146, C163, C164, C165, C183, C184, C185, C186, C612	Capacitor, Ceramic, Chip	ECCH0009103	C0603C0G1H101JT00NN 100pF 5% 50V X7R -55TO+125C 0603 R/TP - TDK CORPORATION	
6	C182	Capacitor, Ceramic, Chip	ECCH0009520	MCH032A150JK 15pF 5% 25V X7R -55TO+125C 0603 R/TP - ROHM.	
6	C106	Capacitor, Ceramic, Chip	ECCH0017601	CL05A475MQ5NRNC 4.7uF 20% 6.3V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C209, C211, C219, C230, C231, C629	Capacitor, Ceramic, Chip	ECCH0032801	GRM033R60J224M 0.00000022F 20% 6.3V X5R -55TO+85C 0603 R/TP 0.3MM MURATA MANUFACTURING CO., LTD.	
6	FB1001, FB1002	Filter, Bead	EAM62131201	CIM05J121NC 120 ohm 1.0X0.5X0.5 25% 0.3 ohm 0.5A SMD R/TP 2P 0 SAMSUNG ELECTRO-MECHANICS CO., LTD.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C152	Capacitor, TA, Conformal	ECTH0004807	TCM1A106M8R 10F 20% 10V 500mA -55TO+85C 15OHM - - SMD R/TP ROHM.	
6	C664	Capacitor, TA, Conformal	ECTH0002703	TCTAL1A107M8R 0.0001F 20% 10V 50UA -55TO+125C 0OHM 3.2x1.6x1.1 NONE SMD R/TP ROHM CO., LTD.	
6	C2003	Capacitor, Ceramic, Chip	ECCH0035301	GRM1555C1H4R3CA01 4.3 pF, 50V, C, C0G, TC, 1005, R/TP, 0.0000000000043, 0.25PF, 50V, C0G, -55TO+125C, 1005, R/TP, 0.5 mm MURATA MANUFACTURING CO., LTD.	
6	C836	Capacitor, Ceramic, Chip	ECCH0000112	MCH155C150J 15pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C113, C122, C131, C166, C176	Capacitor, Ceramic, Chip	ECZH0000841	C1005C0G1H560JT000F 56pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C617	Capacitor, TA, Conformal	ECTH0005203	TCTP1A336M8R , [empty] , [empty] , , [empty] , , [empty] , [empty] , [empty] , [empty] ROHM.	
6	C107	Capacitor, Ceramic, Chip	ECZH0003103	GRM36X7R104K10PT 100nF 10% 10V X7R -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C909	Capacitor, Ceramic, Chip	ECZH0000830	C1005C0G1H330JT000F 33pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C2005	Capacitor, Ceramic, Chip	ECZH0000803	C1005C0G1H020CT000F 2pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C201, C401, C402, C655	Capacitor, Ceramic, Chip	ECCH0009106	C0603X7R1C103KT 10nF 10% 10V X7R -55TO+125C 0603 R/TP - TDK CORPORATION	
6	C198	Capacitor, Ceramic, Chip	ECZH0000827	C1005C0G1H2R4CT000F 2.4pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	U1	IC, Gyro Sensor	EUSY0434601	MPU3050 1.8~3.6 Gyro Sensor - QFN R/TP 24P - INVENSENSE	
6	C101, C105, C106, C111, C114, C118, C199	Capacitor, Ceramic, Chip	ECZH0000846	C1005C0G1H8R2CT000F 8.2pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	D901, D902	Diode, TVS	EDTY0008606	PRSB6.8C 4.7V 5.7 - - 10W - R/TP 2P 1 PROTEK DEVICES INC.	
6	R1113	Resistor, Chip	ERHZ0000294	MCR01MZP5F5101 5.1KOHM 1% 1/16W 1005 R/TP - ROHM.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	C604, C605, C618, C620, C622, C624, C632, C633, C634, C635, C636, C637, C638, C639, C640, C643, C647, C808	Capacitor, Ceramic, Chip	ECCH0004904	GRM155R60J105K 1uF 10% 6.3V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C915	Capacitor, Ceramic, Chip	ECZH0025916	GRM0335C1E330J 33pF 5% 25V NP0 -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C913	Capacitor, Ceramic, Chip	ECZH0025917	GRM0335C1E470J 47pF 5% 25V NP0 -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C657, C670	Capacitor, Ceramic, Chip	ECZH0004402	CL05F104ZO5NNNC 0.1uF -20TO+80% 16V Y5V -30TO+85C 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	D601	Diode, Switching	EDSY0018101	RB521CS-30GJT2R 350mV 30V 100mA 0A 0SEC 200mW VMN2 R/TP 2P 1 ROHM.	
6	C908	Capacitor, Ceramic, Chip	ECCH0000110	MCH155A100D 10pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R714	Resistor, Chip	ERHZ0000205	MCR01MZP5F1004 1MOHM 1% 1/16W 1005 R/TP - ROHM.	
6	L1206	Inductor, Multilayer, Chip	ELCH0003826	LQG15HS3N3S02D 3.3NH 0.3NH - 300mA 0.17OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	R1220, R619	Wire Pad, Open	SAFO0000501	AX3100 ATL SV_SHIPBACK, MAIN, A, 0OHM_1005_DNI	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	R301, R302, R303, R304, R433, R434, R437, R438, R439, R462, R501, R502, R901, R902, R903	Resistor, Chip	ERHY0009505	MCR006YZPJ103 10KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	L103, L104, L105	Inductor, Multilayer, Chip	ELCH0004718	1005GC2T5N6SLF 5.6NH 0.3NH - 300mA 0.27OHM 3.2GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C109, C159	Capacitor, Ceramic, Chip	ECZH0000816	C1005C0G1H120JT000F 12pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	R624	Resistor, Chip	ERHY0009558	MCR006YZPF6802 68KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	L106	Inductor, Multilayer, Chip	ELCH0005005	HK1005 27NJ 27NH 5% - 300mA 0.7OHM 1.6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	L801	Inductor, Multilayer, Chip	ELCH0010401	LK1005 2R2K-T 2.2UH 10% - 20mA 1.15OHM 40MHZ 20 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	FB804	Filter, Bead	EAM62150301	CIM05J600NC 60 ohm 1.0X0.5X0.5 25% 0.2 ohm 0.65A SMD R/TP 2P 0 SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	L802	Inductor, Wire Wound, chip	ELCP0008008	MIPS2520D1R0M MIPS2520D1R0M, 1 uH, M, 2.0x2.5x1.0, R/TP, MLCI FDK CORPORATION.	
6	L701	Inductor, Wire Wound, Chip	ELCP0008019	VLS252010ET- 4R7M 4.7UH 20% - 800mA 0.332OHM - - NON SHIELD 2.5X2X1MM NONE - TDK CORPORATION	
6	R626	Resistor, Chip	ERHY0009507	MCR006YZPJ105 1MOHM 5% 1/20W 0603 R/TP - ROHM.	
6	Q201	FET	EQFP0003601	NTJD4105CT1G P-CHANNEL MOSFET 20V +-12 660mA 0.63OHM 270mW SC70 R/TP 6P ON SEMICONDUCTOR	
6	R121	Resistor, Chip	ERHY0000137	MCR01MZP5F2702 27KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	L1203	Inductor, Multilayer, Chip	ELCH0001426	LL1005-FHL8N2J 8.2NH 5% - 300mA 0.25OHM 4.7GHZ 9 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	L108	Inductor, Multilayer, Chip	ELCH0004713	1005GC2T6N8JLF 6.8NH 5% - 250mA 0.32OHM 3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	L1101, L1102	Inductor, Multilayer, Chip	ELCH0004727	1005GC2TR10JLF 100NH 5% - 100mA 2.3OHM 600MHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	R101	Resistor, Chip	ERHY0009301	MCR006YZPF1000 100OHM 1% 1/20W 0603 R/TP - ROHM.	
6	R648	Resistor, Chip	ERHY0009504	MCR006YZPJ102 1KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	C150	Capacitor, Ceramic, Chip	ECZH0000839	C1005C0G1H4R7CT000F 4.7pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	R827	Resistor, Chip	ERHY0003301	MCR01MZP5J101 100OHM 5% 1/16W 1005 R/TP - ROHM.	
6	Q502	FET	EQFP0011201	NTLJS2103P-D WDFN6, 1.9 W, -12 V, -5.9 A, R/TP, P-CHANNEL, MOSFET, -12 V, +-8 V, -4.2 A, 1.9 W, SC88, R/TP, 6P ON SEMICONDUCTOR	
6	R1107	Resistor, Chip	ERHY0009516	MCR006YZPJ222 2.2KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	C1209	Capacitor, Ceramic, Chip	ECZH0000813	C1005C0G1H101JT 100pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	R213, R214, R216, R217, R218, R219, R220, R221, R224, R421, R430, R431, R448, R449, R451, R452, R824	Resistor, Chip	ERHY0009526	MCR006YZPJ472 4.7KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	Q501	FET	EQFN0002901	2SK3019FPBTL N-CHANNEL MOSFET 30V +-20 100mA 8OHM 150mW SC75A R/TP 3P ROHM.	
6	R404, R450, R461, R468, R517	Resistor, Chip	ERHY0009536	MCR006YZPF1003 100KOHM 1% 1/20W 0603 R/TP - ROHM.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	R1010, R1011	Resistor, Chip	ERHY0009539	MCR006YZPF20R0 20OHM 1% 1/20W 0603 R/TP - ROHM.	
6	R510	Resistor, Chip	ERHY0024601	RC0603J151CS 150OHM 5% 1/20W 0603 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	L124	Inductor, Multilayer, Chip	ELCH0003838	LQG15HS8N2J02D 8.2NH 5% - 300mA 0.24OHM 3.7GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	R202	Resistor, Chip	ERHZ0000203	MCR01MZP5F1002 10KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	C1212	Capacitor, Ceramic, Chip	ECZH0000822	C1005C0G1H1R5CT000F 1.5pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	R1013	Resistor, Chip	ERHZ0000243	MCR01MZP5F2201 2.2KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	M601	Capacitor Assembly	SMZY0023501	PAS311HR-VG1 3.8 Backup Capacitor 0.03F, Module Assembly, KOREA TAIYO YUDEN.CO., LTD.	
6	R715	Resistor, Chip	ERHZ0000467	MCR01MZP5J334 330KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R1114	Resistor, Chip	ERHZ0000298	MCR01MZP5F5600 560OHM 1% 1/16W 1005 R/TP - ROHM.	
6	L1209	Inductor, Multilayer, Chip	ELCH0003847	LQG15HS1N8S02D 1.8NH 0.3NH - 300mA 0.1OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	R232	Resistor, Chip	ERHZ0000295	MCR01MZP5F5102 51KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R203	Resistor, Chip	ERHZ0000406	MCR01MZP5J104 100KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	L123, L128	Inductor, Multilayer, Chip	ELCH0004721	1005GC2T2N2SLF 2.2NH 0.3NH - 300mA 0.16OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C1115	Capacitor, Ceramic, Chip	ECCH0000147	MCH155CN222KK 2.2nF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM.	
6	R810	Resistor, Chip	ERHZ0000439	MCR01MZP5J204 200KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	U801	IC, MM PMIC	EUSY0227205	LP8720TLX 2.7 To 5.5V Adj 1.2W CSP R/TP 20P - NATIONAL SEMICONDUCTOR ASIA PACIFIC PTE. LTD.	
6	C614	Capacitor, Ceramic, Chip	ECCH0009514	MCH032A(AN)100DK 10pF 0.5PF 25V X7R -55TO+125C 0603 R/TP - ROHM.	
6	U1106	IC, Motor Driver	EUSY0238306	ISA1000 2.4~3.6V 150mV~300mV 0W DFN R/TP 8P -	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	Q1001	FET	EQFP0011401	SI1467DH-T1-GE3 SOT-363, 1.5 W, 20 V, 3 A, R/TP, P-CHANNEL, MOSFET, 20V, 8V, 3A, 0.15ohm, 1.5W, SOT363, R/TP, 6P VISHAY INTERTECHNOLOGY ASIA PTE LTD	
6	U1103	IC, Fuel Gauge	EUSY0242303	MAX17040G DFN, 8, R/TP, Fuel gauge, IC, CMOSIC, CMOS - - DFN R/TP 8P - MAXIM INTEGRATED PRODUCTS INC.	
6	U201	IC, CMOS	EUSY0245902	SN74LVC1G125DRLR 1.65~5.5 10uA BUFFER DRL R/TP 5P - TEXAS INSTRUMENTS KOREA LTD, HONGKONG BRANCH.	
6	U803	IC, DC, DC Converter	EUSY0264502	AAT1270IFO-T1 AAT1270IFO-T1, DFN, 14 PIN, R/TP, 700mA Boost converter Advanced Analogic Technologies HK Limited	
6	U702	IC, DC, DC Converter	EUSY0264505	AAT1217ICA-1.2-T1 SOT, 6, R/TP, Step up DCDC, IC, DC, DC ConverterIC, DC, DC Converter Advanced Analogic Technologies HK Limited	
6	U802	IC, Sub PMIC	EUSY0336503	AAT2870IUW-T1 CSP , 35 , R/TP , 3.1x2.6 , ; , IC, Sub PMIC Advanced Analogic Technologies HK Limited	
6	L120	Inductor, Multilayer, Chip	ELCH0004705	1005GC2T8N2JLF 8.2NH 5% - 250mA 0.37OHM 2.8GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	IC1101	IC, Analog Switch	EAN61871401	FSUSB63 2.7~4.3V 400NSEC 45NSEC 0W MLP R/TP 12P 1 FAIRCHILD SEMICONDUCTOR HONG KONG LTD.	
6	C627, C910	Capacitor, Ceramic, Chip	ECZH0003503	GRM188R61E105K 1uF 10% 25V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	U101	IC, RF Transceiver, 3G	EUSY0391101	PMB5703 2.68VTO3V 0W WF2SGA R/TP 143P INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD.	
6	U1204	IC, LDO Voltage Regulator	EUSY0407101	BU28TD4WNVX SSON004, 4, R/TP, 2.8V 150mA Single LDO, IC, LDO Voltage RegulatorIC, LDO Voltage Regulator ROHM.	
6	U1105	IC, Acceleration Sensor	EUSY0410101	KXTF9 1.8V to 3.6V 400KHZ 12BIT 1SPS 1W LGA R/TP 10P Accelerometer Sensor - LGA R/TP 10P - KIONIX, INC.	
6	R107	Resistor, Chip	ERHZ0000405	MCR01MZP5J103 10KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	U1102	IC, Charger	EUSY0410801	RT9524 DFN, 10, R/TP, DFN Cal Test Mode Single Charger IC for Micro USB, IC, ChargerIC, Charger RICHTEK TECHNOLOGY CORP.	
6	U1001	IC, Audio Codec	EUSY0415201	WM8994 0.95~5.5V 0W WLCSP R/TP 72P - WOLFSON MICROELECTRONICS PLC	
6	U1202	IC, GPS	EUSY0415301	BCM4751IUB2G , 42, BCM4750 Shrink version 65nm, IC, GPS WLBGA R/TP 42P BROADCOM CORP	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	U102	IC, Voltage Detector	EUSY0415801	ADET-5000 , 10, TP, Power detector for IFX SUE, IC, Voltage DetectorIC, Voltage Detector AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	U106	IC, RF Amplifier	EUSY0429801	BGA749N16 2.3*2.3*0.39 , 16 , R/TP , Quadband LNA for IFX , ; , IC, RF Amplifier INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD.	
6	L101, L110	Inductor, Multilayer, Chip	ELCH0004710	1005GC2T15NJLF 15NH 5% - 250mA 0.53OHM 2GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	X101	Oscillator, VCTCXO	EXSK0009601	1XXA26000FAA 26 MHz, 1 PPM, 10 pF, SMD, 2.5*2.0*0.8, Vctl 1.2+/-1.05V, 26, 1PPM, 2.5V, 2.5, 2.0, 0.8, SMD, R/TP DAISHINKU CORPORATION.	
6	SC313	CAN, SHIELD	MCBA0090801	LG-P990 ORF ZY, ZZ, PRESS, STS, , , , ,	
6	X1201	Oscillator, TCXO	EXST0002501	KT2520F26000ACW18TAK 26 MHz, 2 PPM, 10 pF, SMD, 2.5*2.0*0.8, 2ppm, 26, 1.8V, 2.5, 2.0, 0.8, SMD, R/TP KYOCERA CORP.	
6	FL110	Filter, Duplexer, IMT	SDMY0001901	SAYFP1G95AA0B00 SAYFP1G95AA0B00, 1950 MHz, 2140 MHz, 1.8 dB, 2.4 dB, 52 dB, 43 dB, 2.5*2.0*0.55, SMD, Band1, 2520size, SAW, Rx unbal MURATA MANUFACTURING CO., LTD.	
6	FL108	Filter, Duplexer, IMT	SDMY0003101	ACMD-7606 942500000 925 to 960 897500000 880 to 915 3 2.7 2.5*2.0*0.85 DUAL SMD R/TP - AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	FL106	Filter, Duplexer, PCS	SDPY0004701	ACMD-7407 ACMD-7407, 1880 MHz, 1960 MHz, 2.8 dB, 3.2 dB, 55 dB, 50 dB, 2.5*2.0*0.95, SMD, FBAR, Band2 Rx unbal. AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	PT201	Thermistor, NTC	SETY0006301	NCP15XH103J03RC 10KOHM 5% 0V 0A 3.35KK SMD P/TP 1005size MURATA MANUFACTURING CO., LTD.	
6	VA903	Varistor	SEVY0001001	EVLC14S02050 14V 0% 50F 1.0*0.5*0.6 NONE SMD R/TP AMOTECH CO., LTD.	
6	FL802	Filter, EMI/Power	SFEY0016301	ICMEF112P900M COMMON MODE NOISE FILTER 0HZ 0F 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	L102	Inductor, Multilayer, Chip	ELCH0004701	1005GC2T12NJLF 12NH 5% - 250mA 0.48OHM 2.1GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	FL102	Filter, Saw	SFSY0024301	SAFEB942MFL0F00 942.5 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	C160	Capacitor, Ceramic, Chip	ECCH0000196	MCH155A0R75C 0.75pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	

Level	LocationNo.	Description	PartNumber	Spec	Remark
6	FL105	Filter, Saw	SFSY0024302	SAFEB1G84FA0F00 1842.5 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	FL111	Filter, Saw	SFSY0028101	SAFEB1G95KA0F00 1950 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	FL103	Filter, Saw	SFSY0029201	SAFEB2G14FA0F00 2140 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	C177	Capacitor, Ceramic, Chip	ECZH0000802	C1005C0G1H010CT 1pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	FL101	Filter, Saw	SFSY0030003	SAFEB881MFL0F55 881.5MHz 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	U701	IC, MCP, NAND	EUSY0413602	THGBM2G6D2FBAI9 8Gbyte 0VTO0V 12.0x16.0x1.2 TR 169P MLC NAND BGA - TOSHIBA	
6	FL107	Filter, Saw	SFSY0034701	SAFEA1G88KB7F00 1880 1.4*1.1*0.5 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	FL109	Filter, Saw	SFSY0037501	SAFEB897MAM0F00 897.5MHz 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	FL104	Filter, Saw	SFSY0038701	SAFEB1G96FN0F00 SAFEB1G96FN0F00, 1960 MHz, 1.4*1.1*0.6, SMD, 1930M~1990M, IL 3.0, 5pin, U-B, 50-200, W-BAND II Rx MURATA MANUFACTURING CO., LTD.	
6	FL1201	Filter, Saw	SFSY0038902	SAFEA1G57KH0F00 1575.42MHz 1.4*1.1*0.5 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	U105	IC, Power Amplifier	SMPY0020101	ACPM-5281-TR1 dBm, %, A, dBc, dB, 4x5, SMD, 3G Dual PAM B1+8. Coupler Integrated, LGA, R/TP, AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	C196	Capacitor, Ceramic, Chip	ECZH0001002	C1005CH1H0R5BT000F 0.5pF 0.1PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	L127	Inductor, Multilayer, Chip	ELCH0004704	1005GC2T4N7SLF 4.7NH 0.3NH - 300mA 0.23OHM 3.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	U103	IC, Power Amplifier	SMPY0020802	ACPM-5202-LR1 dBm, %, A, dBc, dB, 3.0*3.0*1.1, SMD, WBAND 2, CPL, 3 MODE, BYPASS CLAMPING, SMD, R/TP, AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	U104	RF Module	SMRH0005501	SKY77529 MHz, MHz, EDGE Quad Tx Module for IFX Smarti UE. SPI Control, SKYWORKS SOLUTIONS INC.	
6	R512	Resistor, Chip	ERHY0009550	MCR006YZPF4702 47KOHM 1% 1/20W 0603 R/TP - ROHM.	
7	R101	Resistor, Chip	ERHZ0000240	MCR01MZP5F20R0 20OHM 1% 1/16W 1005 R/TP - ROHM.	

Level	LocationNo.	Description	PartNumber	Spec	Remark
7	VA101, VA102	Varistor	SEVY0004401	ICVL0518400V500FR 18V 0% 40pF 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
7	C604, C605, C618, C620, C622, C624, C632, C633, C634, C635, C636, C637, C638, C639, C640, C643, C647, C808	Capacitor, Ceramic, Chip	ECCH0004904	GRM155R60J105K 1uF 10% 6.3V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
7	R102	Resistor, Chip	ERHZ0000402	MCR01MZP5J100 10OHM 5% 1/16W 1005 R/TP - ROHM.	
7	C106	Capacitor, Ceramic, Chip	ECCH0017601	CL05A475MQ5NRNC 4.7uF 20% 6.3V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
7	U101	IC, Proximity	EUSY0376201	GP2AP002S00F GP2AP002S00F, 8, R/TP SHARP CORPORATION.	
7	CN103, CN801, CN904	Connector, BtoB	ENBY0034201	GB042-24S-H10-E3000 24P 0.40MM STRAIGHT SOCKET SMD R/TP 1M - LS Mtron Ltd.	
7	C1221, C1233, C206, C207, C213, C809, C828, C901	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R -55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
7	C611, C641, C644	Capacitor, Ceramic, Chip	ECCH0005604	GRM188R60J106M 10000000 pF, 6.3V, M, X5R, TC, 1608, R/TP, 0.8 mm MURATA MANUFACTURING CO., LTD.	
7	C107	Capacitor, Ceramic, Chip	ECZH0003103	GRM36X7R104K10PT 100nF 10% 10V X7R -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
7	U102	IC, Ambient Light Sensor	EUSY0388201	BH1621FVC BH1621FVC, WSOF6, 5, R/TP, 1.6*1.6 - WSOF6 R/TP 5P - ROHM Semiconductor KOREA CORPORATION	
7	J101	Jack, Phone	ENJE0007602	EJ56-35R-4PBA-6S 1P 4P ANGLE R/TP 4mM BLACK 6P - HIROSE KOREA CO., LTD	

Level	LocationNo.	Description	PartNumber	Spec	Remark
7	D103	Diode, TVS	EDTY0009201	Rclamp0504P.TCT 5V 7.82 0V 0A 10W TFSC R/TP 2P 1 SEMTECH CORPORATION	
7	C101, C105, C106, C111, C114, C118, C199	Capacitor, Ceramic, Chip	ECZH0000846	C1005C0G1H8R2CT000F 8.2pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
7	ANT101, ANT102	Contact	MCIZ0000701	COMPLEX L-01B NTTEW ZZ:Without Color -	
7	SW101	connector, RF	ENWY0005501	20279-001E-01 NONE STRAIGHT SOCKET SMD R/TP AU 50OHM 400mDB I-PEX CO., LTD	
7	CN901	Connector, BtoB	ENBY0034101	GB042-24P-H10-E3000 24P 0.40MM STRAIGHT PLUG SMD R/TP 1M - LS Mtron Ltd.	
7	C627, C910	Capacitor, Ceramic, Chip	ECZH0003503	GRM188R61E105K 1uF 10% 25V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
7	FL802	Filter, EMI/Power	SFEY0016301	ICMEF112P900M COMMON MODE NOISE FILTER 0HZ 0F 0H SMD R/TP INNOCHIPS TECHNOLOGY	
7	C104	Capacitor, Ceramic, Chip	ECZH0003504	GRM188R71E104K 100nF 10% 25V X7R -55TO+125C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
7	SUMY01	Microphone, Condenser	SUMY0010616	SUMY0010616 FPCB, dB, 1.1TO10V, KNOWLES ACOUSTICS	
7	FL102	Filter, EMI/Power	SFEY0015301	NFM18PC104R1C3 ESD/EMI 0HZ 0.1uF 0H SMD R/TP MURATA MANUFACTURING CO., LTD.	
7	VA101, VA102	Varistor	SEVY0004401	ICVL0518400V500FR 18V 0% 40pF 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
7	CN104	Connector, I/O	ENRY0011001	20-5151-005-102-883 5P 0.65MM ANGLE RECEPTACLE DIP R/TP - KYOCERA ELCO KOREA SALES CO., LTD.	
7	L101, L102	Inductor, Multilayer, Chip	ELCH0001425	LL1005-FHL82NJ 82NH 5% - 150mA 1.9OHM 1.15GHZ 10 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
7	VA101, VA102	Varistor	SEVY0004401	ICVL0518400V500FR 18V 0% 40pF 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
7	LD101, LD102, LD103, LD104	LED, Chip	EDLH0015107	99-218UMC/2229397/TR8 WHITE 2.95~3.25 30mA 1200~1600mcd x, y 110mW - R/TP 2P - EVERLIGHT ELECTRONICS CO., LTD.	

12.3 Accessory

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	LocationNo.	Description	PartNumber	Spec	Remark
2	EAY060000	Adapters	SSAD0034701	STA-U13ER 90Vac~264Vac 5.1V 1A 5060 CE NONE NONE - SUNLIN ELECTRONICS CO., LTD	
2	AFN053800	Manual Assembly, Operation	AFN75392901	LGP990.ASFRDW ZZ:Without Color LG-P990 Manual Assy for SFR	
3	MBM087200	CARD, WARRANTY	MCDF0010001	KE520 ORFBK BK, ZZ, PRINTING	
3	MFL053800	Manual, Operation	MFL67121801	PRINTING LGP990.ASFRDW ZZ:Without Color LG-P990 User Manual for SFR	
2	SBPL00	Rechargeable Battery, Lithium Ion	SBPL0103001	FL-53HN-TCD 3.7 V, 1500 mAh, 1 CELL, PRISMATIC, 534553, Frame Type Innerpack, WW, PRISMATIC, BLACK, TOCAD DONG-HWA CO., LTD	
2	EBX000000	Accessory, Data Cable	SGDY0018801	KCA-ET-5-0210 , 1.2M, MicroUSB5pin, BLACK, ID open, KSD CO., LTD	
2	EAB010200	Earphone, Stereo	SGEY0007612	EMB-LGE013STAC 3mW 16OHM 98DB 65HZTO112HZ 1.08M BLACK 3.5 L TYPE STEREO 4POLE PLUG - CRESYN CO., LTD	