ORDER NO. PMCE041201C8

Service Manual

Digital Cellular Phone

GSM

EB-X700
EB-X701

	900 MHz	1800 MHz	1900 MHz
Tx Frequency Range:	880 - 915MHz	1710 -1785 MHz	1850 - 1910 MHz
Rx Frequency Range:	925 - 960 MHz	1805 -1880 MHz	1930 - 1990 MHz
Tx / Rx separation	35 MHz	75 MHz	60 MHz
RF Channel Bandwidth	200 kHz		
Number of RF channels	174	374	299
Speech coding	Full rate/Half rate/Enhanced Full rate		
Operating temperature	-10 °C to +55 °C		
Type	Class 4 Handheld	Class 1 Handheld	Class 1 Handheld
RF Output Power	2 W maximum	1 W maximum	1 W maximum
Modulation	GMSK (BT = 0.3)		
Connection	8 ch / TDMA		
Voice digitizing	13 kbps RPE-LTP / 13 kbps ACLEP / 5.6 kbps CELP / VSLEP		
Transmission speed	27		
Signal Reception	Direct conversion		
Antenna VSWR	< 2.5 : 1		
Dimensions (excluding antenna)	Height: 97 mm Width: 49 mm Depth: 24 mm		
Volume	89 cc		
Weight	107 g		
Main Display Sub Display	LCD, 176 x 208 pixels, 65,000 colours LCD, 64 x 96 pixels, 56,000 colours		
Illumination	16 LEDs for Keypad Backlighting (14 Blue & 2 White) 4 LEDs for LCD Backlighting (White) 2 LEDs for Sub LCD (White)		
Keys	21-key Keypad, Navigation key, 1 memo key		
SIM	1.8 V & 3 V Plug-in type only		
External DC Supply Voltage	5.8 V		
Battery	3.7 V nominal, 780mAh, Li-Ion		
Standby Time	250 hrs		
Talk Time	6 hrs		

Talk and standby time will be dependent on network conditions, SIM card, backlight usage and network condition.

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

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Revision : 00

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1. INTRODUCTION

WARNING

The equipment described in this manual contains polarised capacitors utilising liquid electrolyte. These devices are entirely safe provided that neither a short-circuit nor reverse polarity connection is made across the capacitor terminals. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN DAMAGE TO THE EQUIPMENT OR, AT WORST, POSSIBLE INJURY TO PERSONNEL RESULTING FROM ELECTRIC SHOCK OR THE AFFECTED CAPACITOR EXPLODING. EXTREME CARE MUST BE EXERCISED AT ALL TIMES WHEN HANDLING THESE DEVICES.

WARNING

A Naphthalene-based resin paste is used to bond underfill components on this phone. When heated, this paste may give off traces of Naphthalene.

Therefore, it is recommended that work on the PCB be carried out in a well-ventilated area, especially when using hot air blowers or soldering irons.

The following components are bonded using the paste:

OMAP310 (U200) ; S-Gold (U100) ; Bluetooth IC (U201)

Caution

The equipment described in this manual contains electrostatic devices (ESDs). Damage can occur to these devices if the handling procedures described in Section 4 are not adhered to.

Caution

This equipment may contain an internal battery in addition to the external battery packs. These batteries are recyclable and should be disposed of in accordance with local legislation. They must not be incinerated, or disposed of as ordinary rubbish.

1.1. Purpose of the Manual

This Service Manual contains the information and procedures required for installing, operating and servicing the Panasonic GSM Personal Cellular Mobile Telephone system operating on GSM Digital Cellular Networks.

1.2. Structure of the Manual

The manual is structured to provide service engineering personnel with the following information and procedures:

1. General and technical information - provides a basic understanding of the equipment, kits and options, together with detailed information for each of the major component parts.

2. Installation and operating information - provides instructions for unpacking, installing and operating the equipment.

3. Servicing information - provides complete instructions for the testing, disassembly, repair and reassembly of each major component part. Step-by-step troubleshooting information is given to enable the isolation and identification of a malfunction, and thus determine what corrective action should be taken. The test information enables verification of the integrity of the equipment after any remedial action has been carried out.

4. Illustrated parts list - provided to enable the identification of all equipment components, for the ordering of spare/replacement parts.

1.3. Servicing Responsibilities

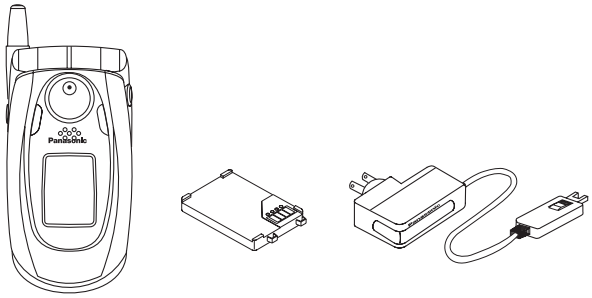
The procedures described in this manual must be performed by qualified service engineering personnel, at an authorised service centre.
The service engineering personnel are responsible for fault diagnosis and repair of all equipment described in this manual.

2. GENERAL DESCRIPTION

2.1. General

This section provides a general description and kit composition details for the Digital Cellular Phone and optional kits.

2.2. Telephone Handset Main Kit



1 2 3

Figure 2.1: Telephone Handset Main Unit Kit Contents

Item	Description	Model Number
1	Main Unit	EB-X700
2	Battery, Standard	EB-BSX700EU EB-BSX700US EB-BSX700CN
3	Travel Charger	EB-CAX70EU EB-CAX70US EB-CAX70CN EB-CAX70UK EB-CAX70AU

2.3. Features

The Panasonic Phone Model EB-X700 and EB-X701 are high performance, small, light, telephone handsets for business and domestic use on General Packet Radio Service (GPRS) running on GSM networks. The following features are provided:

- Triple Band, EGSM 900, GSM 1800 and GSM 1900 operation.
- Triple Rate, which includes Full Rate, Half rate and Enhanced Full Rate (EFR) speech, codec.
- GPRS-compatible (Class 10).
- 65,000-color Thin Film Transistor (TFT) Main Display and 56,000-colour LCD Sub-Display.
- Integrated Digital Camera.
- Multimedia Message Service (MMS) and Short Message Service (SMS) messaging.
- POP3-compliant email client.
- Tegic T9 Text Entry.
- Bluetooth connectivity.
- Infrared communications port (IrDA).
- Voice Recorder.
- WAP 2.0 and WAP 1.2.1 compliant Browser.
- Backup Battery.
- 40-voice polyphonic ringtones.
- Downloadable pictures, animations and polyphonic melody ring tones.
- Clock, Calculator and Unit Converter.

Unless stated otherwise, references in this manual to X700 also apply to X701.

3. OPERATING INSTRUCTIONS

3.1. General

This section provides a brief guide to the operation and facilities available on the telephone handset. Refer to the Operating Instructions supplied with the telephone for full operational information.

3.2. Controls and Indicators

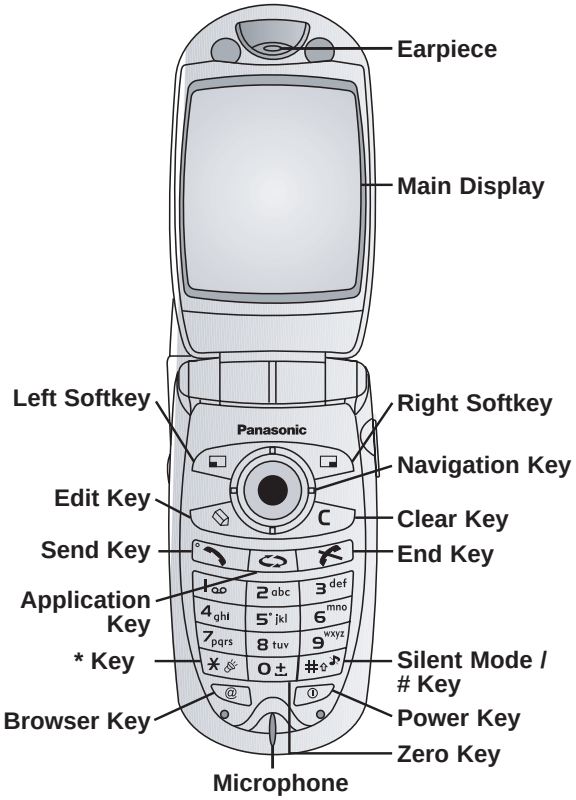


Figure 3.1: Phone overview; Open-view

Left Softkey
- Perform action named in lower left of display.
- Shortcut to open preset application in standby mode.
- To lock the keypad, press , then press .
- To unlock the keypad, press , then press .

Edit Key
- Select Dictionary for predictive text including insert and edit word, or alpha mode or number mode.
- Insert numbers and symbols.
- Change writing language.
- Mark multiple items in a list.

Send Key
- Make a call.
- Recall recently dialled numbers.
- Press and hold in standby mode to activate Voice commands.

Send Key
- Make a calls.

*** Key**
- In standby mode, press and hold to switch Photolight on or off.
- In edit mode, press to open special character table.
- In numeric and standby modes, press repeatedly for *, p, w, and + characters.
- In dictionary mode, scroll to other word choices when word is underlined.

Applications Key
- Enter the main applications menu area.
- Return to standby mode.
- Press and hold to view currently open applications.

Navigation Key
- Press outside edges to scroll up▲, down▼, left ◀ or right ▶ to move through menus and text.
- Press canter ◉ to select option.
- Take a picture in Camera mode by pressing ◉.

Right Softkey
- Perform action named in lower right of display.
- Shortcut to open preset application in standby mode.

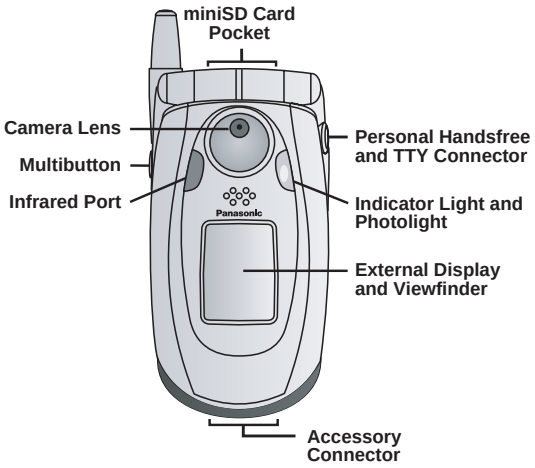
Clear Key
- Erase character in edit mode.
- Delete highlighted entered item.

End Key
- Ends call. Return to standby mode.

Silent Mode Key
- From standby mode, press and hold to switch Silent mode on/off.
- In edit mode, shift to upper and lower case letters, or press twice briefly to turn on/off Dictionary for predictive text.

Power Key
- Press and hold to switch phone on or off.
- Press to choose different ringtones, lock the keypad, lock the phone, or eject miniSD card.

Zero Key
- In standby mode, press and hold to enter + character for dialling.
- In edit mode, enter space.



Camera Lens
- Point at subject of photo.

Multibutton
- From external display, turns on backlight for 15 seconds, or if backlight is already on, brings up status icons.
- Turns off ringer during an incoming call.
- Take a picture.

Infrared Port
- Transfer data between the phone and other devices with an infrared connection.

Accessory Connector
- Plug in most EB-X700 accessories here.

Personal Handsfree and TTY Connector
- Plug in Personal Handsfree Headset and TTY accessory here.

Indicator Light
- Remains on during charging.
- Flash to indicate incoming calls.

Photolight
- In standby mode, press and hold to switch Photolight on or off.

External Display and Viewfinder
- Displays clock. Press Multibutton twice to view status icons.
- In Camera mode, acts as viewfinder if flip is closed.

Figure 3.2: Phone Overview; External View

3.3. Liquid Crystal Displays

The telephone handset has two liquid Crystal Displays - a colour display for main operation and a colour sub-display for a quick review of phone status.

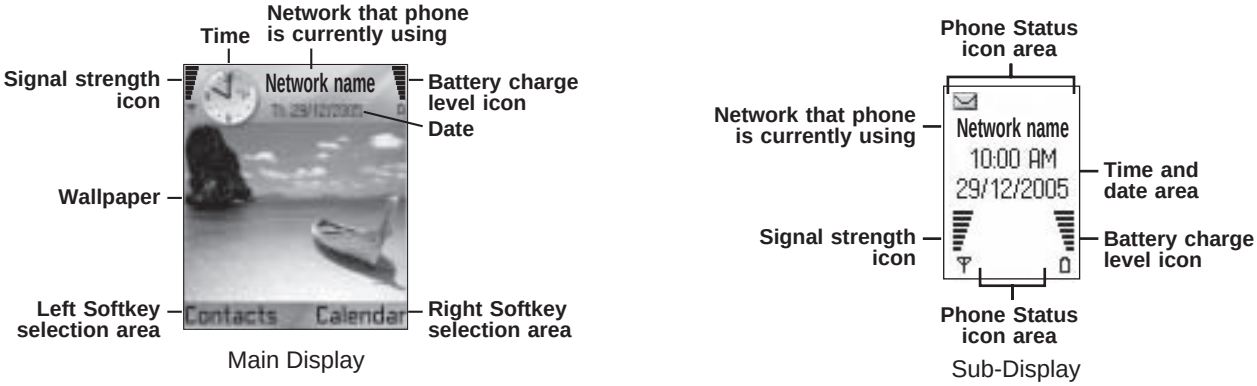


Figure 3.3: Main & Sub Liquid Crystal Displays

3.4. Alpha Mode Entry

3.4.1. Character Set / Key Assignments

Alpha Mode entry is used to enter alphanumeric characters in to the Phonebook, Short Messages and Greeting Message areas.

Each time a key is pressed, it will display the next character. When another key is pressed, or no key is pressed for a short time, the cursor will move to the next position.

In alpha mode choose from:

First letter capital All capitals

Lower case

To enter symbols, press Edit key and select **Insert symbol**.

To enter text at a flashing cursor:

1. Press the number keys associated with the planned letters repeatedly until the planned letters appear on screen.
2. Editing actions for each key and shortcuts:

Enter space.	
Enter punctuation by pressing repeatedly.	
Erase a character.	
Press and hold to switch between text and number modes. Press to scroll through upper case, lower case, and first letter capital mode.	
Switch to number mode. Insert symbols. Change writing language.	
Press outer edges to scroll up, down, left, and right through text.	

3.4.2. Editing Alpha Entry

Press outer edges to scroll up, down, left, and right through text.

Pressing will delete the character to the left of the cursor.

3.5. Features Menu Structure

Note that some features are SIM and/or Network dependent.

Vodafone	Orange	Generic
Games	**N/A**	**Games**
More Games	(games under 'Extras' menu)	Micro Golf
Micro Golf		Balloon Headed Boy
Ballon Headed Boy		More Games
Vodafone live!	**Orange Menu**	**N/A**
Vodafone live!	Orange World	
Enter URL	Backup	
Bookmarks	Update	
What's New	Help	
Games	SIM Tool Kit	
Ringtones	PacketVideo	
Pictures		
Themes		
News		
Sports		
Media Album		
Applications	**Extras**	**Tools**
Postcards	QuickOffice	Calculator
SIM Tool Kit	Calculator	Converter
App. Manager	Micro Golf	Notepad
Calculator	File Manager	Recorder
Converter	Converter	To-Do
Recorder	Ballon Headed Boy	miniSD
File Manager	Help	App Manager
QuickOffice	Recorder	File Manager
Photobase	**Chat**	Help
Voice Commands	...Conversations	Photolight (Flashlight)
RealOne Player	...Friends	SIM Tool Kit (if applicable)
Shortcuts	...Chat Rooms	
Help	Notepad	
	To-Do	
	Photolight (Flashlight)	
Messages	**Messaging**	**Messages**
Create Message	**Voice Mail**	**Voice Mail**
Inbox	**Messages**	**Messages**
Drafts	...Write Message	...Write Message
Sent	...Inbox	...Inbox
Email Inbox	...Documents (My Folders)	...Documents (My Folders)
Vodafone Messenger	...Mailbox	...Mailbox
Voicemail	...Drafts	...Drafts
My Folders	...Sent items	...Sent items
Media Album / Live! Studio	...Outbox	...Outbox
Outbox	...Delivery Report	...Delivery Report
Delivery Report	**Chat**	**Chat**
	...Conversations	...Conversations
	...Friends	...Friends
	...Chat Rooms	...Chat Rooms
Camera	Camera	Camera
Take Picture	(lauches Camera app)	(lauches Camera app)
Record Video		
Photolight		
My Items	**Media**	**Media**
Pictures	**Gallery**	**Media Gallery**
….GMS Pictures	**Pictures**	**Pictures**
…….individual picture file (uncorrupted)	….GMS Pictures	….GMS Pictures
created - processing)	…….individual picture file (uncorrupted)	…….individual picture file (uncorrupted)
…….individual picture file (corrupted)	processing)	processing)
….MMS background images	…….individual picture file (corrupted)	…….individual picture file (corrupted)
….Wallpaper	….MMS background images	….MMS background images
Sounds	….wallpaper	….wallpaper
…Digital Tones	**Videos**	**Videos**
……..individual audio file	….individual video file	….individual video file
…Simple Tones	**Sounds**	**Sounds**
……..individual audio file	….individual audio file	….individual audio file
Videos	**Photobase**	**Real One**
….individual video file	**RealOne**	**Photobase**
	Video Recorder	**Video Recorder**
Organiser	**Calendar**	**Calendar**
Calendar	(Launches Calendar app)	(Launches Calendar app)
Alarm Clock		
To-Do		
Notes		

Figure 3.4: Features Menu Structure (continued on next page)

Contacts	**Address Book**	**Contacts**
Contacts List	(Launches Contacts app)	(Launches Contacts app)
Create Contact		
Call Log		
Speed Dial		
Settings	**Settings**	**Settings**
Profiles	**Ringtones**	**Ringtones**
Themes	**Phone**	**Themes**
General	...Device	**General Settings**
...Phone	...Call	...Device
...Call	...Connection	...Call
...Date & Time	...Date & Time	...Connection
...Connection	...Security	...Date & Time
...Security	...Call Divert	...Security
...Call Diverts	...Barrings	...Call Divert
...Call Barring	...GSM Network	...Barrings
...Network	...Accessories	...GSM Network
...Enhancement	**miniSD**	...Accessories
Connectivity	**Themes**	**Clock**
...Infrared	**SpeedDial**	**SpeedDial**
...Bluetooth	**App Manager**	**Voice Commands**
...Modem	**Clock**	**About**
...Conn Mgr	**Voice Mail**	
...SyncML	**Voice Commands**	
...Dev Mgr	**About**	
...Conn Test		
...USB		
miniSD		
Voice Commands		
About		
N/A	**Connectivity**	**Connectivity**
(Connectivity options under 'Settings' menu	Bluetooth	Browser
	Infrared	Operator
	FaxModem	Bluetooth
	Conn Mgr	Infrared
	SyncML	SyncML
	Dev Mgr	Dev Mgr
	USB	Conn Mgr
		FaxModem
		USB
VF Messenger	**N/A**	**N/A**
Conversations	(Chat found under 'Messaging' menu)	(Chat found under 'Messages' menu)
Friends		
Chat Rooms		
Shortcuts	**Favourites**	**Favourites**
Inbox	Notes	Notes
Notes	Calendar	Calendar
Calendar	Inbox	Inbox
Vodafone Live!	Download more games	
Ringtones	Download more ringtones	
Pictures	Download more pictures	
Games	Download more videos	
	Download more applications	
N/A	**Browser**	**N/A**
(Browser found under 'Vodafone Live!' menu)	portal)	(Browser found under 'Connectivity' menu)
N/A	**Call Logs**	**Call Logs**
(Call Logs found under 'Contacts' menu)	Call Register	Call Register
	Call Timers	Call Timers
	GPRS Counter	GPRS Counter
N/A	**N/A**	**QuickOffice**
(QuickOffice found under 'Applications' menu)	(QuickOffice found under 'Options' menu)	(Launches QuickOffice app)

Figure 3.5: Features Menu Structure

3.6. IMEI and Software Identification

To check the IMEI number of the phone:

Press: *** # 0 6 #**

To identify the software version installed on the phone:

Press: *** # 9 9 9 9 #** within five seconds of switching on.

3.7. SIM Personalisation

3.7.1 Introduction

SIM personalisation will limit the use of the telephone to a single SIM, a SIM supplied by one Network / Sub-network / Service Provider or a SIM purchased by a company (corporation). If a personalised handset contains a SIM that is from a different source, it will display the message “SIM ERROR” when switched on. This personalisation is sometimes referred to as SIM lock or SIM latch.

3.7.2 Testing

To test a personalised handset when the user has not supplied the SIM, a SIM configured for test purposes (e.g. test SIM or soft SIM) should be used. The mobile will recognise that the SIM is for testing purposes only and operate as normal.

3.7.3 Personalisation Function

Personalisation is activated during manufacture. Enabling / disabling is available by entering a special key sequence immediately after power on. Once the enable / disable menu is shown it is possible to select the type of personalisation. When personalisation is enabled it is only possible to disable it if the mobile contains a SIM and the 8 or 16 digit Control Key (CK) is known. For security reasons, when CK is enabled, it cannot be read by the user.

There are two special key sequences to enter the enable / disable menu:

Key Sequence	Notes
7 pqrs 4 ghi 6 mno	Can only disable personalisation
5 jkl 2 abc 8 tuv 2 abc 4 ghi	Can both enable and disable personalisation

3.7.4 Disabling Procedure

1. Press 7 pqrs 4 ghi 6 mno or 5 jkl 2 abc 8 tuv 2 abc 4 ghi
2. Scroll up / down to select:

   "SIM" for SIM Personalisation
   "Network" for Network Personalisation
   "Sub-Network" for Sub-Network Personalisation
   "ServiceProvider" for Service Provider Personalisation, or
   "Corporate" for Company Personalisation.
3. Press
4. Enter the 8 or 16 digit Control Key and press
5. Confirm by entering the 8 or 16 digit Control Key again and press

The display will confirm which type of Personalisation has been disabled.

3.7.5 Enabling Procedure

1. Press 
2. Scroll up / down  to select:

   "SIM" for SIM Personalisation
   "Network" for Network Personalisation
   "Sub-Network" for Sub-Network Personalisation
   "ServiceProvider" for Service Provider Personalisation, or
   "Corporate" for Company Personalisation.

3. Press 
4. Enter the 8 or 16 digit Control Key and press 
5. Confirm by entering the 8 or 16 digit Control Key again and press 

The display will confirm which type of Personalisation has been enabled.

4. TECHNICAL DESCRIPTION

4.1. RF Overview

4.1.1 General Specifications

The telephone is a triple band product incorporating three switchable transceivers, GSM 900 (EGSM 900) band, GSM 1800 (DCS 1800) band, and GSM 1900 (PCS 1900) band. The transmit and receive bands are given in the table below:

	Tx	Rx
EGSM 900	880-915 MHz	925-960 MHz
DCS 1800	1710-1785 MHz	1805-1880 MHz
PCS 1900	1850-1910MHz	1930-1990MHz

Other notable technical features are as follows:

	EGSM 900	GSM 1800	GSM 1900
Rx Bandwidth	35 MHz	75 MHz	60MHz
Tx Bandwidth	35 MHz	75 MHz	60MHz
Duplex Spacing	45 MHz	95 MHz	80MHz
Number of Channels	174	374	299
ARFCN (Channel Numbers)	975 - 1023 0 - 124	512 - 885	512 - 810
1st Tx Channel	880.2 MHz (Ch 975)	1710.2 MHz (Ch 512)	1850.2MHz (Ch 512)
Last Tx Channel	914.8 MHz (Ch 124)	1784.8 MHz (Ch 885)	1909.8MHz (Ch 810)
1st Rx Channel	925.2 MHz (Ch 975)	1805.2 MHz (Ch 512)	1930.2MHz (Ch 512)
Last Rx Channel	959.8 MHz (Ch 975)	1879.8 MHz (Ch 512)	1989.8MHz (Ch 810)
Maximum calibrated Tx Power, Voice Call	32.25 dBm (Class 4) (PL5)	29.25 dBm (Class 1) (PL0)	29.25 dBm (Class 1)
Minimum calibrated Tx Power, Voice Call	5.0 dBm (PL19)	0.0 dBm (PL15)	0.0 dBm (PL15)

4.1.2 Description of PCBs

The handset, which is in the form of a clamshell, contains three printed circuit boards. The main PCB is based on an 8 layer methodology, constructed using ALIVH-G material. It carries all the RF components on the top half and the baseband components (Logic circuits) on the lower half. The key pad is mounted on the reverse side of the main PCB. The RF circuit area is shielded by two metal screens. One compartment contains the Antenna Switch Module (ASM), Power Amplifier Module (PAM), TX SAW filter and limiter amplifier. The other shielded compartment contains the transceiver IC (Smarti-DC +), TCXO, 3rd Harmonic (H3) filters, and the RX SAW filters. The logic and Bluetooth circuits are shielded by one screen each. The second PCB is a flexible printed circuit. One side of its assembly consists of all the components and connectors required for the sub LCD module, camera and main display. The third is a 4 layer PCB constructed using FR4 material. This board contains the mini-SD and SIM card holders, as well as the vibrator.

4.1.3 Block Diagram

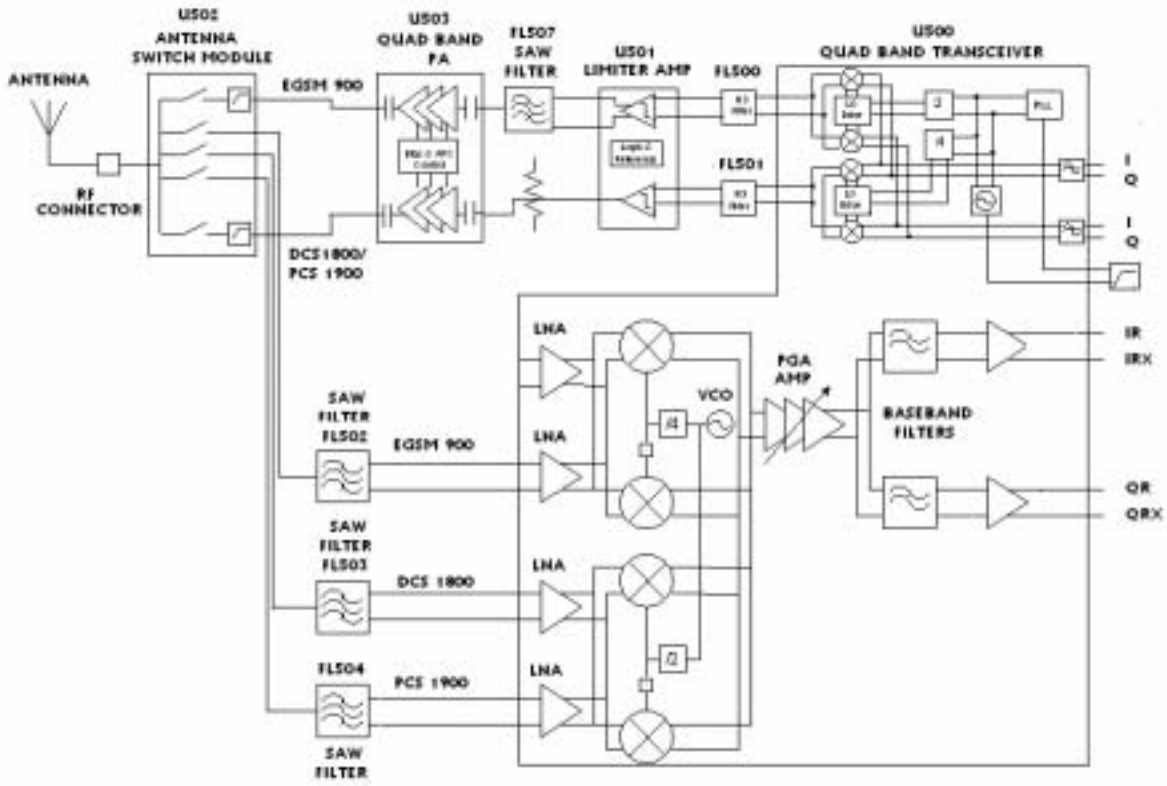


Figure 4.1: RF Block Diagram

4.1.4 Frequency Plan

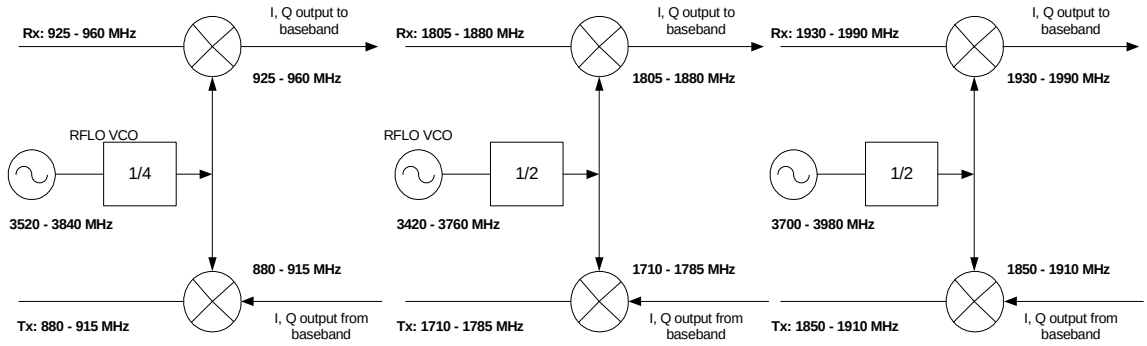


Figure 4.2: Frequency Plan

4.1.5 Synthesiser

The transceiver IC U500 is capable of supporting quad-band operation (GSM 850, EGSM 900, DCS 1800, and PCS 1900), but X700 only supports EGS 900, DCS 1800, and PCS 1900. GSM 850 is not used. The transceiver IC has a synthesizer and VCO for generating appropriate signals for the transmitter and receiver. Channel data is transferred to U500 from the baseband IC by three-wire bus (Data, Clock and Strobe). Signal output is divided by 4 for EGSM 900 and by 2 for DCS 1800/ PCS 1900. Synthesizer lock time is approximately 130 µs. An external TCXO is used to generate a 26 MHz reference signal for the transceiver and logic blocks. Automatic Frequency Control (AFC) is employed to maintain stability over changes in temperature.

4.1.6 Antenna

The antenna is a fixed helical type and is designed for a triple band operation (EGSM 900, DCS 1800 and PCS 1900).

4.2. Transmitter

4.2.1 Functional Description

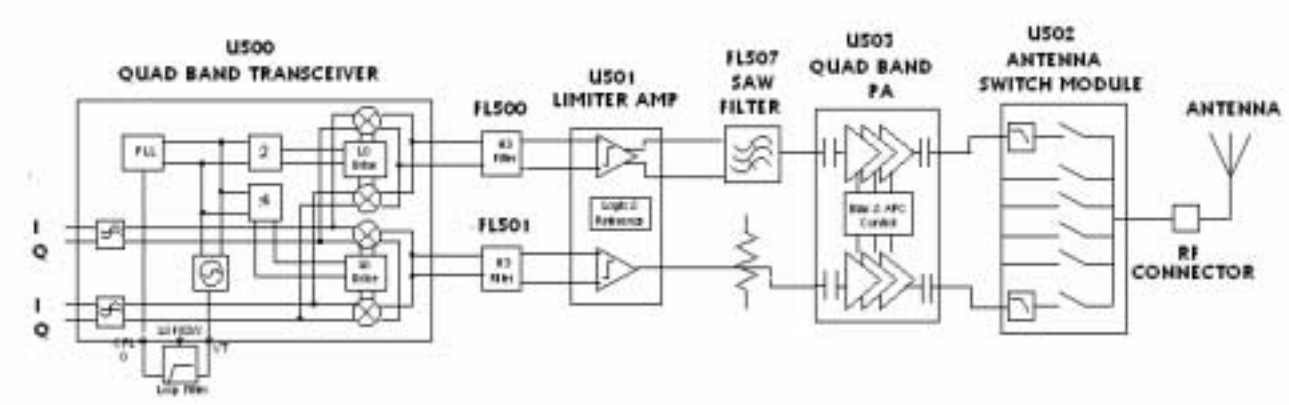


Figure 4.3: Transmitter Block Diagram

The transceiver IC U500 supports quadrature modulation and employs direct modulation. The differential I/Q inputs from thebaseband circuit are up-converted to the transmit frequency by the quadrature modulator. The required signal path is selected (EGSM 900 or DCS 1800/ PCS 1900). The transceiver output level is approximately 0 dBm.

The modulated outputs pass through third harmonic filters, FL500 and FL501, to the quad band limiter amplifier U501. In EGSM operation, the differential outputs from the limiter amplifier pass into the TX SAW filter where they are converted into a single-ended signal. The SAW filter also attenuates the Tx noise. In the case of PCS and DCS, the differential to single-ended conversion takes place in the limiter amp and the output is passed into the input of the PAM U503. The PAM contains an integrated power control function and therefore does not require any additional external components to implement the Automatic PowerControl (APC) loop. The TX output from the PAM is applied to the ASM U502 which provides a connection path via the RFconnector to the external antenna.

4.3. Receiver

4.3.1. Functional Description

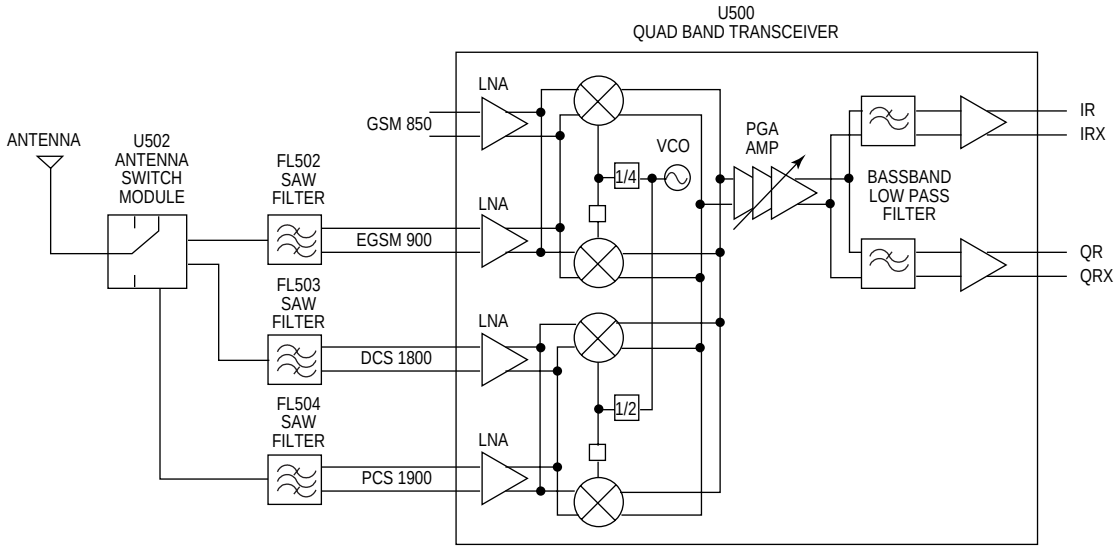


Figure 4.4: Receiver Block Diagram

The main building block for the receiver is the transceiver IC U500 which includes a direct conversion receiver with in-phase and quadrature demodulation. The antenna passes the received signal to the antenna port of the Antenna Switch Module U502. The U502 switches the signal to the corresponding receive port (EGSM 900, DCS 1800 or PCS 1900). The unbalanced output signal from the U502 is routed through a 50 ohm PCB trace to the appropriate Rx SAW filter, FL502, FL503 or FL504.
The SAW filter converts the unbalanced signal to a balanced signal and also attenuates any out-of-band blocking signals. The balanced output from the SAW filter are routed through 75 ohm balanced PCB traces to the LNA input of the transceiver U500. A balanced matching network has been provided between the Rx SAW output and the LNA input in order to provide an optimum LNA noise figure (NF). The output of the LNA is then converted directly to baseband frequency by a quadrature demodulator mixer. The local oscillator (LO) signal presented to the mixer is provided by an internal VCO and it's frequency is either divided by four (EGSM 900) or by two (DCS 1800 and PCS 1900) before reaching the mixer. After the RF signal is converted into a baseband signal, the resulting in-phase and quadrature signals are fed into two baseband low pass filters. These filters provide suppression of in-band blocking signals and adjacent channel interferers. The passband of the filters is optimized for low group delay ripple. The baseband signal is then amplified by a Programmable variable Gain Amplifier (PGA) within U500. The in-phase and quadrature baseband signals are then offset to a DC offset level of 1.35 V.

4.4. Baseband Overview

4.4.1 Introduction

The X700 architecture consists of two main sections; a GSM Modem to handle the speech coding and air interface protocol, and an Applications Processor to provide the MMI, peripherals support and to execute software applications. Here the GSM Modem is described, also commonly known as the Baseband section:

The functionality of the GSM Modem is primarily implemented by the Infineon S-Gold ASIC (PMB8870), supported by the Infineon Power Management IC (PMIC) called S/M-Power (PMB86811), with functionality extended by the Panasonic Companion IC (AN32061A). The PMIC and the Companion IC are discussed separately in a later section.

S-Gold's Baseband circuits in the X700 architecture perform the following functions:

GSM Channel Equalization

- GSM Channel Coding / Decoding
- Speech Coding / Decoding
- GPRS (Packet) Support
- Data Encryption
- Basestation Synchronization & Frequency Locking (AFC)
- RF Scheduler and Transmit Power Control
- Real Time Clock (for Day/Date & Idle-Mode Power Saving)
- Audio and Tone Synthesis/Generation (except Ring-Tones, Music & Audio Samples)
- PCM Audio Routing to/from Application Processor & Bluetooth Module
- SIM Interface and Management
- Power Supply and Battery Management (including Charging)
- PWM Generation (Control of the Main & Sub-Display Backlights, and Camera Photolight Intensity)
- IPC Communication with the Application Processor (running the Man-Machine Interface)
- Provision of Application Processor 13MHz Clock, Reset and Handshaking Signals
- Miscellaneous Support (Clamshell Flip Sensor, Headset Detect & HS Send/End, Battery Temperature)

The GSM Modem (S-Gold) can be viewed as a module, performing the aforementioned tasks, generally under the control of the Application Processor. S-Gold executes its own locally stored code from 4MB of Flash, with 1MB of SRAM provided in a stacked Flash & RAM package to save PCB area. S-Gold receives instructions at UART1 from the ApplicationProcessor via the Primary Inter-Processor Communication (IPC-PRIMARY) serial link. The Application Processor is discussed separately.

At phone power-up, S-Gold boots from its external Flash memory, initializes the Modem as a whole into an idle state, and supplies the divided-by-2 system clock to the Application Processor, which then boots-up after reset is released by S-Gold. Once the Application Processor has booted, it then takes overall control of the entire system.

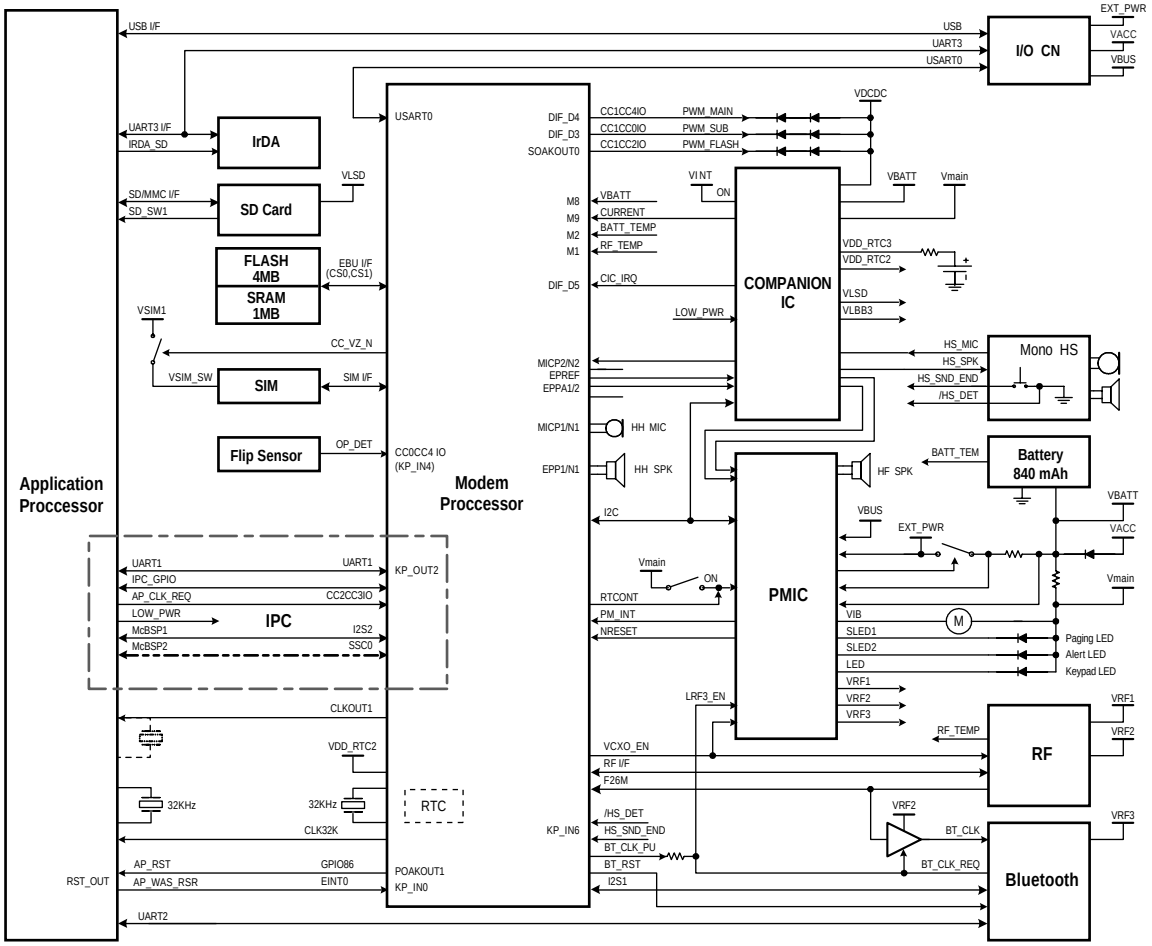


Figure 4.5: Baseband Block Diagram

4.5. Modem

4.5.1. Base-Station Synchronisation & AFC

The Modem attempts to locate valid network service by monitoring the received RF signals to "**camp-on**" an available network. In this "**Idle**" mode the Modem only receives at precise intervals (paging channel time slots), listening for incoming voice calls and data packets; at all other times the Modem RF sub-system is powered-down to conserve battery life.
The base-station network signals to the Modem the exact intervals at which any incoming transmission may be expected. Frequency tuning (channel selection and frequency-drift correction) is achieved by the Automatic Frequency Control system by slightly adjusting the frequency of the 26 MHz Voltage-Controlled Temperature-Compensated Crystal Oscillator (the VCTCXO is located in the RF section and not shown in the block diagram above). The VCTCXO is the master clock reference from which the RF frequencies are generated and most of the Modem logic is clocked, and is located in the RF section of the design, having the part reference Y500.

4.5.2. RF Scheduler and Transmit Power Control

S-Gold has a GSM System Interface Block which incorporates in hardware a GSM Timer which is programmed by the Modem software to activate sections of the RF sub-system when required for reception during the paging channel timeslots, and an RF Ramp Controller which additionally switches-on and ramps-up the transmit RF power amplifier when in a voice call sending data packets. By only activating the necessary parts of the system when required, battery life is extended considerably.
The table below shows how these circuits are connected:

System Timer	Signal Name	Description	Notes
T_OUT0	TX_ON_PA	TX Power Amp On/Off Control	
T_OUT1	TX_ON_DRV	Alternate source for Driver Enable, primary source is SmartiDC+.	
T_OUT2	VC1	Antenna Switch Control 1.	
T_OUT3	VC2	Antenna Switch Control 2.	
T_OUT4	VC3	Antenna Switch Control 3.	
T_OUT5			Not currently connected.
T_OUT6 (R)	(MODE)	Future use for EDGE.	Reserved - Not currently connected.
T_OUT7	BAND_SELECT	Alternate source for Band Select, primary source is SmartiDC+.	
T_OUT8 (R)	(TX-EDGE)	Future use for EDGE.	Reserved - Not currently connected.
T_OUT9			Not currently connected.
T_OUT10			Not currently connected.
T_OUT11	BT_CLK_REQ	Used as GPIO for Pull Up.	When BT module powers up, the BT_CLK_REQ is an input with weak pulldown. This PU is needed to provide the clock to BT module to boot-strap the clock enable. Used as a GPIO function only.
T_OUT12 (R)	(CRAM_MODE)	Future use for CRAM mode selection.	GPIO function – not currently connected.

4.5.3. Real Time Clock (RTC)

The Real Time Clock block (located inside S-Gold) performs several functions. It is used to time the intervals between paging slots when the handset is otherwise shut-down, to save power, and also to maintain the current date and time. Since the RTC Block is clocked by its own low frequency (32,768 Hz) crystal, it consumes very little power, and is relied upon to keep track of elapsed time whenever the handset is in power saving mode (when the main 26 MHz VCTCXO is switched-off).
Prior to being used to accurately time successive paging slots, it is calibrated against the very accurate 26 MHz VCTCXO to ± 1 count (± 1/32768 s), thus allowing a low-cost low-accuracy crystal to accurately time short intervals.

The Power Management sub-system (discussed separately) incorporates a small 3V battery (button-type cell) which is kept charged to allow the RTC to continue to maintain the current date and time during recharging or replacement of the main handset battery. A 2.1 V regulator then provides a constant voltage to the RTC Block, with the 3V battery voltage providing sufficient headroom for the battery to discharge over while providing the required RTC back-up time.

4.5.4. Audio & Tone Synthesis/Generation

The DSPs inside S-Gold also generate the DTMF (Dual-Tone-Multi-Frequency) signalling tones used to communicate over the air interface with the POTs network or other equipment, in addition to performing voice encoding & decoding, and channel encoding & decoding.
The Modem S-Gold also incorporates an analog audio block, which provides an analog electrical interface for connecting the microphone, speakers and headset to. Note that the audio transducers are actually indirectly connected via the Power Management Block, since this allows multiple audio transducers to be multiplexed to S-Gold, and for the signals to the speakers to be buffered and amplified.

4.5.5. PCM Audio Routing to/from Application Processor & Bluetooth

Although the Modem handles the speech audio to and from the microphone and handset / hands-free loudspeakers, MP3-decoding, voice-recognition, high-quality ring-tones and other synthesised audio are handled or generated by the Application Processor. These are passed between the Modem and Application Processor via the dedicated digital PCM bus called IPCAUDIO (Inter-Processor Communication - Audio). This is a 4 line bus (IPCAUD-CLK, IPCAUD-TX, IPCAUD-RX and IPCAUDSYNC), with the Modem always being the IPCAUD Bus Master. Various sample rates are supported, depending upon the quality of the audio, from 8kSamples/s to 48kSamples/s.

Bluetooth audio support is also provided by the separate, highly-integrated Bluetooth ASIC (U504). Audio at Samples/s is passed between S-Gold and the Bluetooth ASIC in digital PCM format via PCM-CLK, PCM-IN, PCM-OUT and PCM- SYNC. The Bluetooth ASIC is always the PCM Bus Master.

4.5.6. Subscriber Identity Module (SIM)

The Modem supports the SIM Card (Subscriber Identity Module) interface. The Power Management Sub-System has been designed to provide 2.8 V or 1.8 V supplies to the SIM, although the software may only support 2.8 V SIMs. The power to the SIM can be switched off by S-Gold's CC_VZ_N output, which allows additional power savings, while the rest of the Modem remains powered-up and operational.

4.5.7. Power Supply and Battery Management (inc. Charging)

The Modem handles the battery charging algorithm, which is started when a charger is inserted into the handset. It also provides an indication of the battery voltage (and hence an estimate of the remaining capacity) for display to the User. It automatically switches between fast charging and trickle charging (battery full maintenance).

4.5.8. PWM Generation (Main & Sub-Display Backlights & Photolight)

Since S-Gold incorporates a set of Capture-Compare (CAPCOM) functions, these are utilised to produce Pulse-Width-Modulated digital logic-level outputs, each with a variable duty-cycle. These outputs can be used to vary the intensity of the LCD backlights, and operate at a high frequency with an increasing proportion of the time at a high logic level corresponding to an increased drive provided to each respective backlight:

The PWM signal controlling the brightness of the Main LCD backlight is provided by CC1CCIO4;
The PWM signal controlling the brightness of the Sub LCD backlight is provided by CC1CCIO0;
The PWM signal controlling the brightness of the Camera Photo-light is provided by CC1CCIO2.

The camera photolight is provided in the handset so that images may be captured at low light levels. The Photolight drive level is variable so that the appropriate amount of illumination may be selected for the best quality low-light image capture.

4.5.9. IPC Communication

The Modem and Application Processor systems communicate via the asynchronous serial IPC-PRIMARY bus (Inter-Processor Communication - Primary), over lines IPCPRI-TX, IPCPRI-RX, IPCPRI-RTS and IPCPRI-CTS.

4.5.10. Application Processor Clock, Reset & Hand-shaking

In the EB-X700 architecture, the Modem is responsible for providing the Application Processor with a 13 MHz clock, and the necessary reset and control handshaking signals. At initial power-up, the Modem (S-Gold) boots itself, while holding the Application Processor in reset. After a short time, the Modem provides the 13 MHz clock to the Application Processor, and releases the reset line (AP-RST). The Application Processor then boots, and assumes control of the handset (including the Modem).

A handshaking mechanism is provided to allow the Application Processor to signal to the Modem that it no longer requires the 13 MHz clock (via line AP-CLK-REQ), allowing the Modem to switch-off the VCTCXO for power-saving, if the Modem also does not require the system clock.

A further hand-shaking mechanism is provided for the Application Processor to signal to the Modem that an error and reset event occurred in the Application Processor, requiring an overall system reset to recover (via line AP-WAS-RST). This allows the handset to take the appropriate automatic reset and reboot action necessary to return functionality to the User.

4.5.11. Miscellaneous Support

The Flip Sensor (U400) is a magneto-resistive device which changes its output logic level in the presence of a magnetic field. When the clamshell is closed, a magnet in the upper part of the handset aligns with U400 mounted on the main PCB, causing the logic level to change to High. This is sensed by S-Gold at KP-IN4, and this information is relayed to the Application Processor to switch off the Main LCD and its backlight to save power (while switching on the Sub-LCD), as well causing the S-Gold to disable the handset audio circuits to prevent acoustic feedback. Note that S-Gold's keypad interface function is not used, and instead purely functions as General-Purpose Input/Output (GPIO).

Insertion or removal of a personal Handsfree (ear-bud & microphone) is detected by S-Gold via a logic level change on HSDET. This accessory incorporates a headset cord-mounted switch, which when pressed shorts HS-SEND/END to ground, signalling to S-Gold that a call is to be answered or ended, as appropriate.

S-Gold also has an internal analogue-to-digital conversion block. This is used for a number of analogue sensing functions, such as charge current monitoring (for charging status detection), battery temperature monitoring (for safety), and RF system temperature monitoring (for calibration adjustment for accuracy).

4.5.12. Modem Memories

The Modem has dedicated non-volatile NOR Flash and volatile asynchronous SRAM memories, separate from the Application Processor memories. The Flash is needed to retain and execute the Modem software, which is primarily used to control Modem reception and transmission across the RF air interface.

Upon initial power-up of the Modem, S-Gold boots from an internal boot memory, determining whether to continue to boot from the external Flash for normal handset operation, or whether to initiate re-programming.

Both the individual Flash and SRAM silicon die are located in a single stacked Multi-Chip Package (MCP) in order to save PCB area, with the (joint) component designation U102. The MCP is organised as 32 Mbits of Flash (2M address locations x 16 bits wide data) plus 8Mbits SRAM (512k locations x 16 bits wide data). The Flash supports 52MHz burst operation for speed. Both memories operate at 1.8 V for low power.

4.6. Baseband Overview (Application Processor)

4.6.1. AT Command Communication with GSM Modem S-GOLD

The Application Processor and Modem processor communicate via the asynchronous serial IPC-PRIMARY bus (Inter-Processor Communication - Primary), over lines IPCPRI-TX, IPCPRI-RX, IPCPRI-RTS and IPCPRI-CTS, a part of IPC communication link. AT commands are transferred between two processors to link the smart phone software running on the application processor side with the Modem software running on the Modem processor side.

4.6.2. PCM Audio Routing to/from S-GOLD

In the EB-X700 architecture design, the Modem is responsible for providing the Application Processor with a 13 MHz clock, and the necessary reset control handshaking signals. At initial power-up, the Modem (S-Gold) boots itself, while holding the Application Processor in reset. After a short time, the Modem provides the 13 MHz clock to the Application Processor, and releases the reset line (AP-RST). The Application Processor then boots, and assumes control of the handset (including the Modem).
A reset handshaking mechanism is provided for the Application Processor to signal to the Modem that an error and reset event occurred in the Application Processor, requiring an overall system reset to recover (via line AP-WAS-RST). This allows the handset to take the appropriate automatic reset and reboot action necessary to return functionality to the User.

4.6.3. Reset and Sleep/Wakeup Handshaking Signals with Modem

In the EB-X700 architecture design, the Modem is responsible for providing the Application Processor with a 13MHz clock, and the necessary reset control handshaking signals. At initial power-up, the Modem (S-Gold) boots itself, while holding the Application Processor in reset. After a short time, the Modem provides the 13 MHz clock to the Application Processor, and releases the reset line (AP-RST). The Application Processor then boots, and assumes control of the handset (including the Modem).

A reset handshaking mechanism is provided for the Application Processor to signal to the Modem that an error and reset event occurred in the Application Processor, requiring an overall system reset to recover (via line AP-WAS-RST). This allows the handset to take the appropriate automatic reset and reboot action necessary to return functionality to the User.

A sleep/wakeup hand-shaking mechanism is also provided to allow the Application Processor go to sleep mode and signals the Modem that it no longer requires the 13 MHz clock (via line AP-CLK-REQ), then the Modem will switch off the 13 MHz clock but maintains 32 kHz clock to the Application processor. The Modem will also switch-off the VCTCXO for power-saving if the Modem does not require the system clock. Furthermore, the IPCPRI-RTS line is also used for Modem processor to wakeup the application processor, and the IPCPRI-CTS line is also used for the application processor to wakeup the Modem processor.

4.6.4. Memory Management

The Application processor has dedicated non-volatile NOR Flash and volatile SDRAM memories, separate from the Modem memories. The Flash is needed to retain and execute the smart phone software and desired user data. Upon initial power-up of the EB-X700 phone, the Application processor boots from the boot-loader in the Flash memory once the 13 MHz clock is supplied and the reset line is released by the Modem processor.

Both the individual Flash and SDRAM silicon die are located in a single stacked Multi-Chip Package (MCP) in order to save PCB area, with the (joint) component designation U203. The MCP is organized as 48-Mbyte of Flash (32-Mbyte is enabled by CS0 and 16-Mbyte is enabled by CS3) plus 16-Mbyte SDRAM.

4.6.5. Keypad

The keypad interface supports up to 6 columns by 5 rows, but only a 5 x 5 keypad matrix is used for EB-X700 design. The keypad scanning algorithm and de-bounce time is software controlled for event detection on both key press and key release. The keypad is managed under 32 kHz clock to allow a keypad interrupt to be detected even in the sleep mode. Besides 6 x 5 keypad matrix, a dedicated on/off key is also provided for powering up (short key press) or powering down (long key press) the EB-X700 phone.

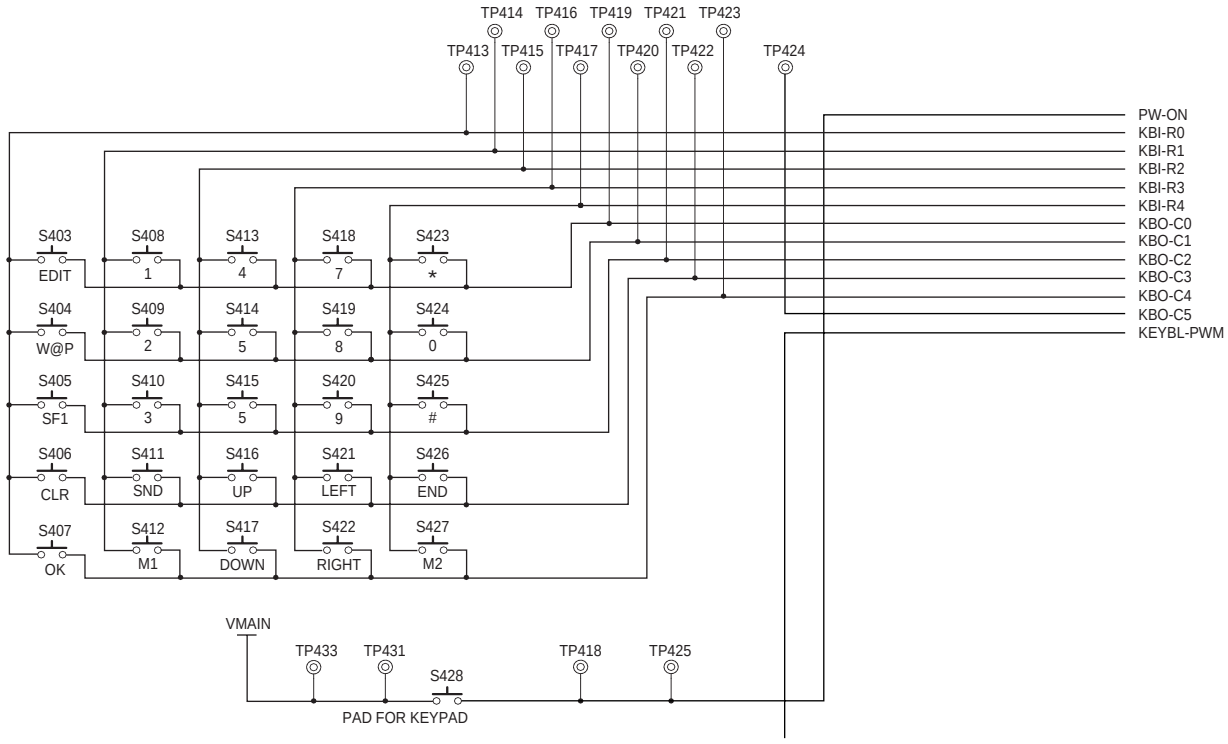


Figure 4.6: Keypad

4.6.6. Bluetooth Module

The bluetooth module U201 provides short range (typical 10 meters or less) connectivity from the hanset to bluetooth-enabled devices such as headsets, car kits, and personal computers for transfer of voice and data.
The Application processor controls the initialization of the bluetooth module through the UART2 interface (BT-RX, BT-TX, Bt-RTS and BT-CTS) and a reset line (GPIO13) BT-RST controls bluetooth reset.

Bluetooth system clock is supplied by a buffered 26MHz source built in to the RF chip SMARTI DC+, which has an on/off function controlled by the BT-CLK-REQ signal line.
A PCM audio connection from U201 connects via the 4-wire I2S1 port of Modem processor S-GOLD, which uses 13-bit linear PCM.

4.6.7. IrDA

The IrDA transceiver interface is provided by the UART3 port of the Application processor to support the slow IrDA with data rate from 2.4kbps to 115.2kbps (IrDA-1.0 standard). The IrDA transceiver module can be set to low power mode using GPIO8 IrDA-SD-MODE control line.

4.6.8. SD Card

The SD interface of the Application processor supports Mini SD card operation at either 1-bit bus mode or 4-bit bus mode.
The Mini SD card used for X700 handset provides a convenient compact storage device for saving the data files, such as pictures taken from the camera or the video clips loaded from PC and play back to the main LCD of the handset.
Mini SD card interface supports SD card hot insertion and removal, which is implemented by a mechanical switch built-in to the Mini SD connector.

4.6.9. Main LCD Module

The main LCD module has 176 x 208 pixels TFT display with 65K colour resolution. The Application processor provides 16-bit interface for RGB pixel data transfer and a 3-wire (LCD-SCL, LCD-SDO and MAINLCD-CS/GPIO12) serial interface (McBSP3) for the module register settings.

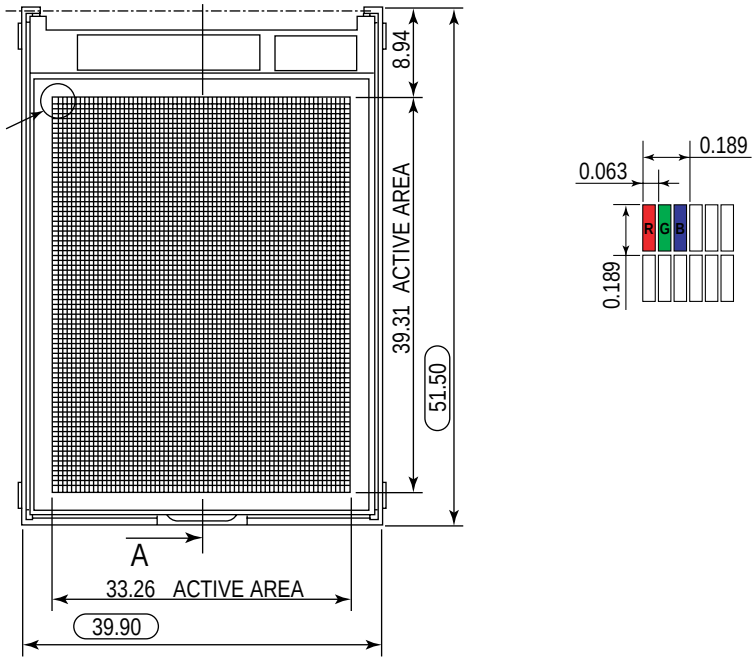


Figure 4.7: Main LCD Dimensions

The backlighting for the main LCD module is provided by +13 V DCDCOUT voltage of Companion IC, which has an on/off function programmed by an I2C link provided by the Modem processor.
The partial display mode is supported by the main LCD module to reduce the power consumption of the display.
Shown below is of all four configurations the LCD driver is capable.
The main LCD module can be set to standby mode by programming the main LCD register to turn-off/reset mode for the best power savings whenever it is not in use.

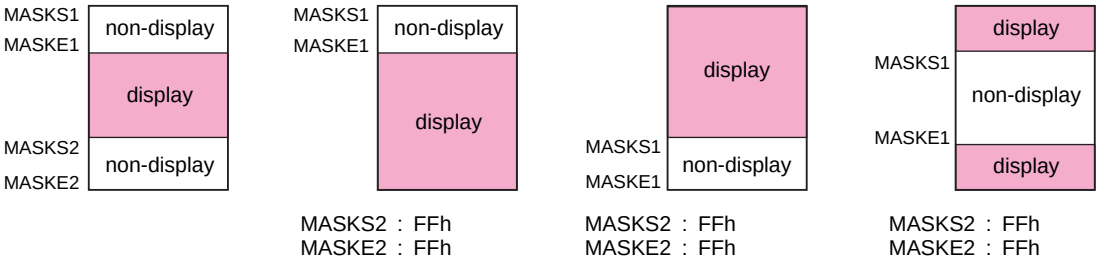


Figure 4.8: LCD Module Standby Mode

4.6.10. Sub-LCD Module

The Sub LCD module has 96x64 pixel CSTN display with 65K colour resolution. The Application processor provides a 3-wire (LCD-SCL, LCD-SDO and SUBLCD-CS/GPIO6) serial interface (McBSP3) for the 16-bit RGB pixel data transfer or the module register settings.
The backlighting for the Sub LCD module is provided by +13 V DCDCOUT voltage of Companion IC, which has an on/off function programmed by an I2C link provided by the Modem processor. The Sub LCD module can be set to standby mode by programming the Sub LCD register to turn-off and then pull the LCD-NRST/GPIO11 line to logic low for the best power savings whenever it is not in use.

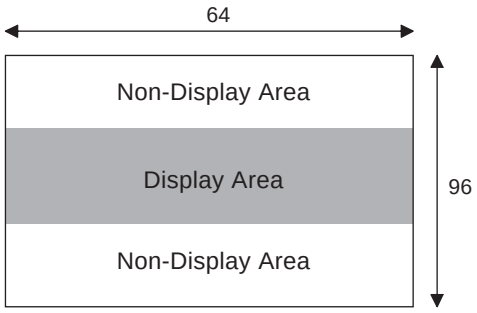


Figure 4.9: Sub-LCD Dimensions

4.6.11. Camera Module

The camera module is uses a 13MHz clock that is supplied by the camera interface of Application Processor. The camera interface also provides 8-bit parallel interface to receive the RGB or YCrCb pixel data from the camera module, and an I2C interface to read or write the registers of the camera module.
The full resolution of the camera module is VGA 640x480 pixels, which is YCrCb data format used for snapshot and required by JPEG compress and store. The image resizing can be done by programming the related registers for QVGA (320 x 240), CIF (352 x 288) or QCIF (176 x 144) decimation. QCIF is used for camera viewfinder mode.
Whenever the Sub LCD module is used for camera viewfinder mode, the QQQVGA (80 x 60) resizing should be done by the Application processor.
Whenever the camera module is not used, the camera sensor readout function should be disabled and the STANDBY pin should be set for power saving.
The following image processing can be done in the camera module:

Colour recovery and correction	Auto white balance and auto black
Sharpening	Auto flicker detection
Gamma correction	On the fly defect correction
Lens shading correction	Digital zoom (2 x)
Aperture correction and interpolation	Auto color saturation and control
Auto exposure	

4.6.12. USB

The Application processor supports full speed (12 MHz) USB functionality as a Client USB Function Peripheral as defined in USB 1.1 standard. The USB host uses USB Type A connector to connect to the USB data cable accessory. When USB cable is connected to the X700 handset, the USB function controller of the Application processor shall detect the VBUS voltage provided by the host USB, and start running the USB program to support the USB communication link with the USB host.

4.7. Bluetooth Module

The X700 handset contains a Bluetooth module centered on Cambridge Silicon Radio's (CSR) BlueCore3-ROM IC (U201).This provides short range (typically 10 meters or less) connectivity from the handset to Bluetooth-enabled devices such asheadsets, car kits, and personal computers in order to transfer voice and/or data. Shown below is the block diagram of the X700 Bluetooth interface.

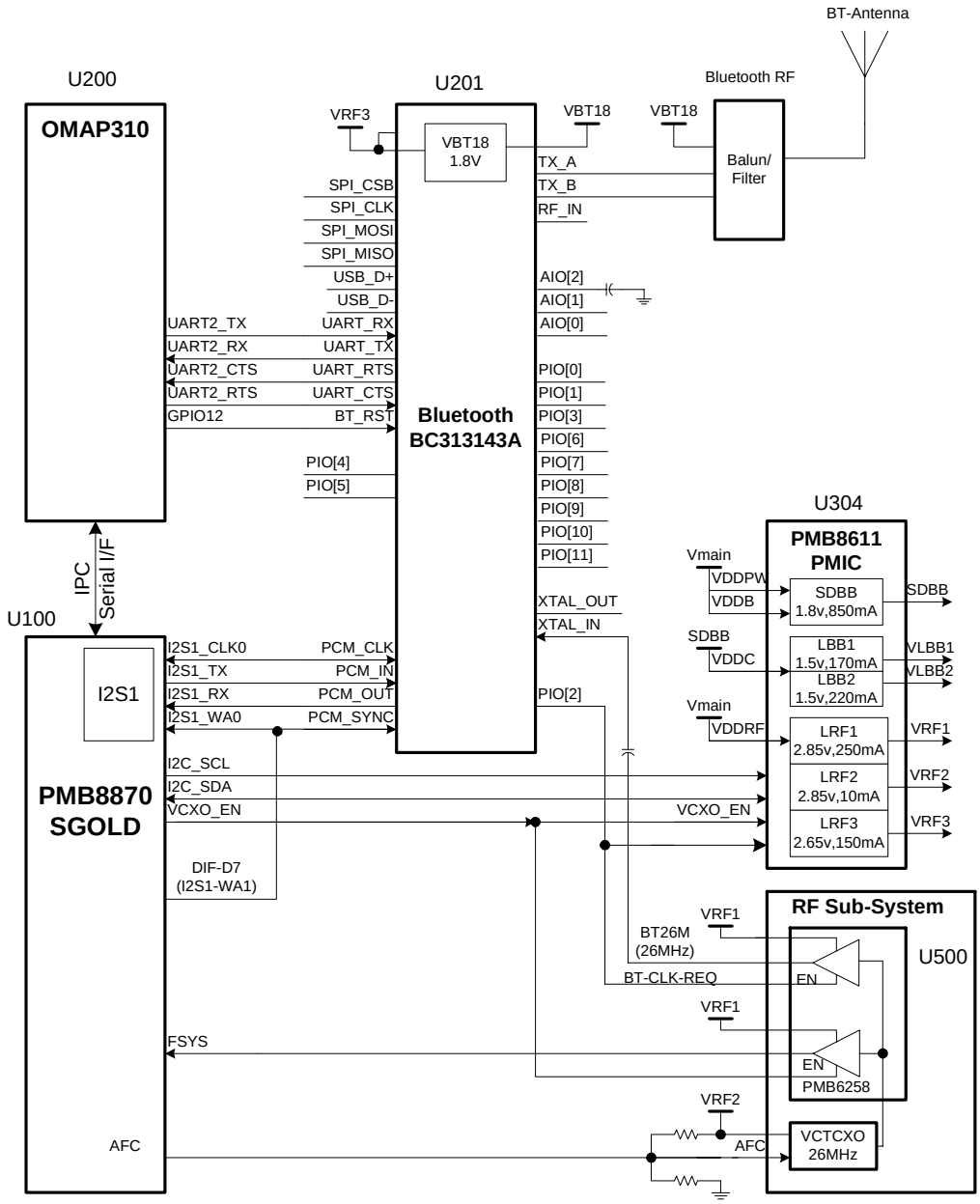


Figure 4.10: Bluetooth Module

The Bluetooth IC connects to the UART2 interface on OMAP which provides the control and data interface to the application processor.The 4-wire UART connection (TXD, RXD, RTS, CTS) uses the BlueCore Serial Protocol (H5) with error detection and re-transmission.

The PCM audio connection from Bluetooth is connected to the I2S1 port on SGOLD. The PCM interface (with BT as the Master) is configured for a 256kHz bit-clock and an 8kHz sync rate.

The Bluetooth chip is powered by the VRF3 (2.65v @ 150mA) regulator supplied by the SM-PWR IC. VRF3 supplies the I/O block as well as an integrated 1.8v @ 100mA regulator (VBT18). This (VBT18) is used to power the RF portion, analog section, core and memory of the Bluetooth sub-system.

The BT chip requires a 26MHz clock that is provided by an internal buffer in the RF Smarti DC+ IC. The buffer receives the 26MHz signal from a VCTCXO and is enabled by BT_CLK_REQ (PIO2). Once the BT IC is powered-up, the BT-CLK-REQ signal will be pulled high by an internal pull-up. The BT-CLK-REQ line also goes to the SM-Power IC where it is used to turnon the VRF2 supply (power for VCTCXO).

The Bluetooth IC reset is generated by the application processor (GPIO13). This is a logic low signal (~2.7V when high).

After power-up, Persistent Store-Key (PS-Keys) settings are sent to the Host Controller Interface (HCI) firmware to initialize BLUETOOTH. These settings (PCM configuration, BT address, etc.…) are stored in the OMAP memory and downloaded to the BT IC upon initialization. The 6-byte Bluetooth Address will be programmed during manufacture.

The CSR Bluetooth IC has a Deep Sleep mode. In this mode, the 26MHz clock (BT-CLK-REQ goes low) and much of the analog circuitry is shut down to save power. The BT IC will automatically enter this mode when idle (no BT activity detected). The device's timing is maintained by an internal, 1kHz slow clock. The chip will wake every 1.28 seconds to check for BT activity. When the host sends a packet to the BlueCore3 while it is in Deep Sleep, the activity on the UART will wake the IC. Then, with the BCSP protocol, the packet is resent after a delay.

4.8. Power Supplies

4.8.1 Introduction

The power management block primarily consists of SM-PWR (U304) and Companion IC (U300). U304 is a highly integrated power management ASIC with a complete on/off logic and charging control, regulators, LED drivers, 8-ohm speaker and vibrator driver. The companion IC is an ASIC that complements U304 providing the additional functionality like back-up battery charging, audio switching including stereo/mono headset, boost converter and additional regulators.

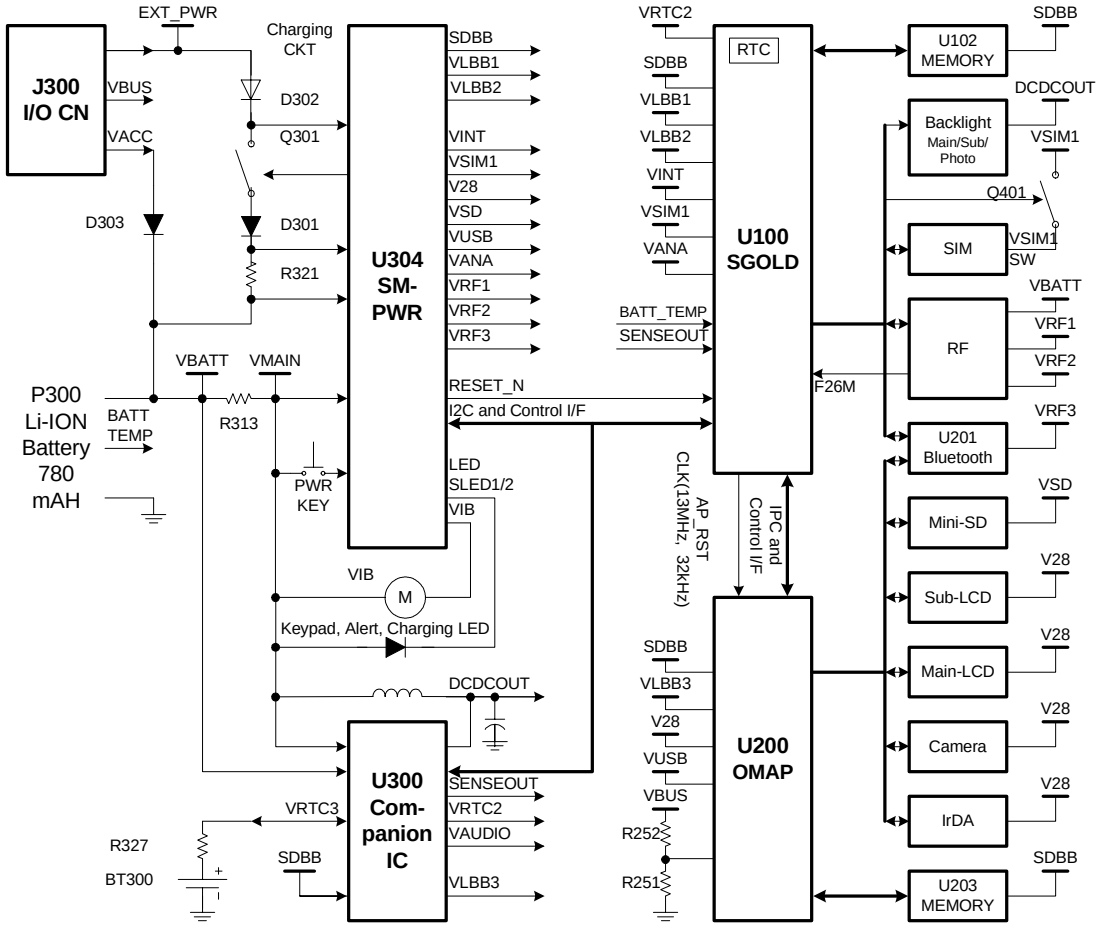


Figure 4.11: Power Supply and Related Sub-System Block Diagram

The Power Management Block consists of the following sections:

1. Power Source
2. Power Control Logic
3. System Power Supply
4. Battery Charging & Monitoring
5. Accessory Detection

4.8.2 Power Source

The main battery is a single Lithium-Ion 780mAH(Li-Ion) cell with 3.7v nominal voltage. The RTC back-up battery is a Lithium-Ion 0.5mAH coin cell with 3.0v nominal voltage. The charger supported is a 5.6v±0.4v, 700mAH

4.8.3 Power Control Logic

The power on sequence can be initiated when a valid battery voltage is applied (VBATT>3.1).

One of following conditions start the Power Up sequence.

1. Power key is pushed for more than 1,000 ms
2. Application of a charger voltage EXT_PWR > 4.0V
3. Real Time Clock alarm generated by U100 (SGOLD) RTCOUT=1

The Power Up sequence is as follows:

1. U304 band gap reference is activated.
2. U304 checks VBATT voltage. If VBATT > 3.1 then power-up, Else check for VBATT while power-up event is valid.
3. The following U304 regulators are enabled in sequence: VRF2, SDBB, VLBB2, VLBB1, VINT, VANA, VSIM1, V28, VSD, VUSB.
4. After U304 VINT is enabled, U300 VLBB3 is also enabled.
5. After U304 VUSB is enabled, U304-41 (INTOUT) will go low followed by U304-48 (RESET_N) going high releasing U100 SGOLD from reset.
6. U100 boot code will determine if the power-up sequence is valid. If valid then provide clock to U200 (13MHz and 32kHz) and release U100 from reset (AP_RST); Else send ALL_OFF command to U304 to power-down the system.
7. U200 power-up to complete the turn-on sequence.

The power-down sequence of the phone is as follows:

1. Power-down sequence is initiated by the detection of a valid SW428 ON/OFF key press or a low battery voltage condition has been detected.
2. U200 determines that a valid power-down sequence was detected.
3. U200 disables both active hardware and software application.
4. After U200 power-down sequence is completed, a command to U100 is sent to disable U304.
5. U100 initiates its power-down sequence then resets U200 and remove clock.
6. After U100 power-down sequence is completed, an ALL_OFF command to U304 is sent to disable all regulators.

4.8.4. System Power Supply

The following is the summary of the power supplies provided by SM-PWR (U304).

Power Supply	Description	Input Supply	Rating
SDBB	Memory core and I/O Supply (U102, U203)	VMAIN	1.80 V ± 0.12 V, 850 mA
VLBB1 VLBB2	U100 DSP core supply U100 ARM core supply	SDBB SDBB	1.50 V ± 0.09 V, 170 mA 1.50 V ± 0.09 V, 300 mA
VINT	U100 I/O and peripheral supply	VMAIN	2.72 V ± 0.10 V, 135 mA
VANA	U100 Analog circuit supply	VMAIN	2.65 V ± 0.09 V, 220 mA
VSIM1	U100 SIM I/O and SIM card supply	VMAIN	2.85 V ± 0.10 V or 1.80 V ± 0.09 V, 22 mA
VSIM1_SW	Switched SIM card supply (On/off control by U100)	VSIM1	
V28	U200 I/O and peripheral supply (Main/Sub LCD, Camera, IrDA)	VMAIN	2.85 V ± 0.09 V, 200 mA
VSD	Mini-SD power supply (serially set to 2.85v after powerup)	VMAIN	2.85 V ± 0.10 V, 135 mA
VUSB	U200 USB I/F supply	VMAIN	3.10 V ± 0.10 V, 45 mA
VRF1	RF regulated supply (serially enabled after power-up)	VMAIN	2.70 V ± 0.10 V, 260 mA
VRF2	Y500 (26MHz) VCXO supply	VMAIN	2.70 V ± 0.10 V, 10 mA
VRF3	U201 Bluetooth supply (serially enabled after power-up)	VMAIN	2.7 V ± 10 V, 150 mA

The following is the summary of the power supplies provided by Companion IC (U300).

Power Supply	Description	Input Supply	Rating
VLBB3	U200 ARM core supply	SDBB	1.50 V ± 0.09 V, 300 mA
DCDCOUT	13 V Boost Converter for driving Main/Sub backlight LED and Camera Photo-light	VMAIN	13.00 V ± 0.09 V, 170 mA
VAUDIO	U300 Audio circuit supply	VMAIN	2.70 V ± 0.08 V, 100 mA
VRTC3	Back-up battery charging supply	VMAIN	3.00 V ± .09 V, 10 mA
VRTC2	U100 RTC supply	VRTC3	2.10 V ± 0.06 V, 2 mA

4.8.5. Battery Charging and Monitoring

The estimated battery capacity is displayed as a LCD battery icon. It is derived from battery voltage and current consumption measurements made by U100 as shown below:

Icon Status VBATT

Icon Status	VBATT
7	4.07 V < VBATT < 4.20 V
6	3.95 V < VBATT < 4.07 V
5	3.85 V < VBATT < 3.95 V
4	3.70 V < VBATT < 3.85 V
3	3.65 V < VBATT < 3.70 V
2	3.60 V < VBATT < 3.65 V
1	3.45 V < VBATT < 3.60 V
Low Voltage Alarm	3.35 V < VBATT < 3.45 V
HW Shutdown	VBATT < 2.9 V ± 0.06 V

When a deeply discharged battery is used, a pre-charging circuit is automatically enabled for trickle charging when a charger is connected. Also the charging (RED) LED is automatically enable even though the unit is not active. Only after the battery has sufficient charge that it will automatically enter normal charging operation.

Only approved chargers can be used with the handset. By using only approved chargers and the unique Panasonic J300 connector no additional circuitry is provided within the unit to protect from charger voltage exceeding the design limit of 7.0 V.

4.8.6. Accessory Detection

The phone supports detection of an USB data cable through the presence of VBUS in the I/O connector.

5. DISASSEMBLY / REASSEMBLY INSTRUCTIONS

5.1. General

This section provides disassembly and reassembly procedures for the main components of the phone.
These assemblies MUST be performed by qualified service personnel at an authorised service centre.
The following Warnings and Cautions MUST be observed during all disassembly / reassembly operations:

WARNING

The equipment described in this manual contains polarised capacitors utilising liquid electrolyte. These devices are entirely safe provided that neither a short-circuit nor a reverse polarity connection is made across the capacitor terminals. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN DAMAGE TO THE EQUIPMENT OR, AT WORST, POSSIBLE INJURY TO PERSONNEL RESULTING FROM ELECTRIC SHOCK OR THE AFFECTED CAPACITOR EXPLODING. EXTREME CARE MUST BE EXERCISED AT ALL TIMES WHEN HANDLING THESE DEVICES.

Caution

The equipment described in this manual contains electrostatic devices (ESDs). Damage can occur to these devices if the appropriate handling procedure is not adhered to.

5.1.1 ESD Handling Precautions

A working area where ESDs may be handled safely without undue risk of damage from electrostatic discharge, must be available. The area must be equipped as follows:

Working Surfaces

All working surfaces must have a dissipative bench mat, safe for use with live equipment, connected via 1M resistor (usually built into the lead) to a common ground point.

Wrist Strap

A quick release skin contact device with a flexible cord, which has an integral safety resistor of between 5k and 1M , shall be used.

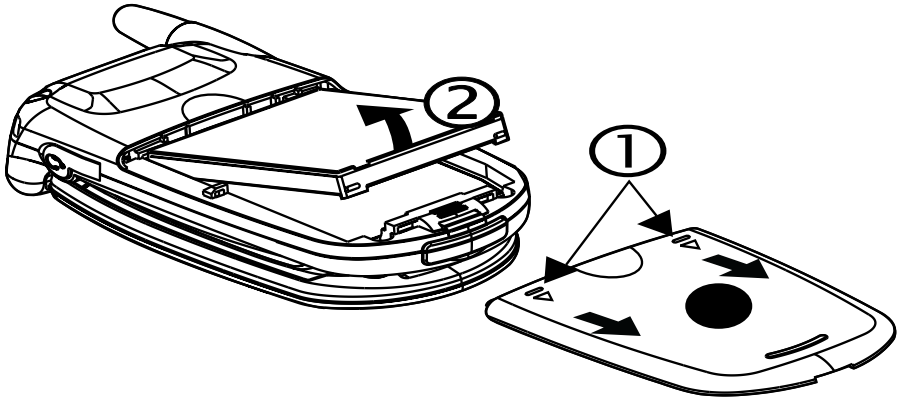
Containers

All containers and storage must be of the conductive type.

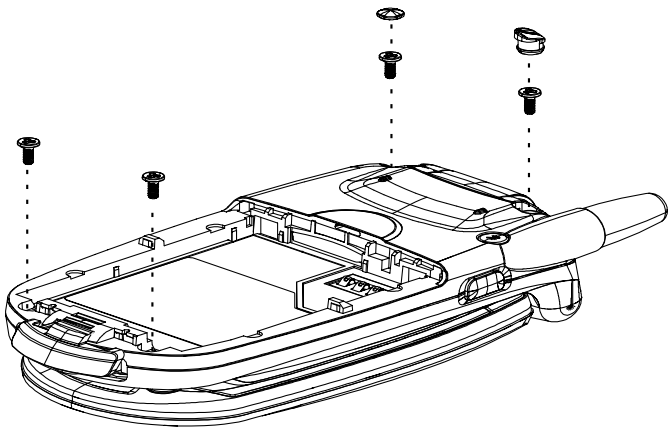
5.2. Disassembly

5.2.1. Lower case assembly and main PCB board removal

1. Place thumbs at outer edges of battery cover, press down, then slide the battery cover towards the bottom of the phone.
2. Lift and remove battery, using the tabs at the bottom of the battery.



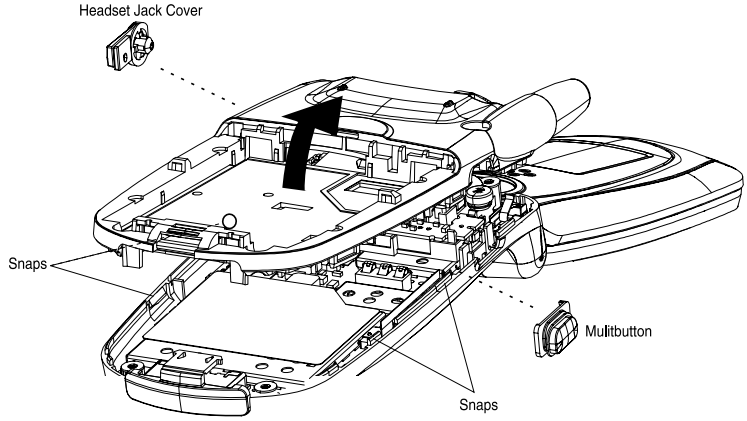
3. Remove both screw caps located on the top of the phone. Using a Trident screwdriver, remove the two screws at top of the phone. Remove the two screws at the bottom of the phone. Retain the screws for re-use.
4. If necessary, remove the I/Ocover.



5. Set the phone into the ‘Open’ position.
6. Separate the lower case from the lower cover using a plastic strip (of credit card thickness).

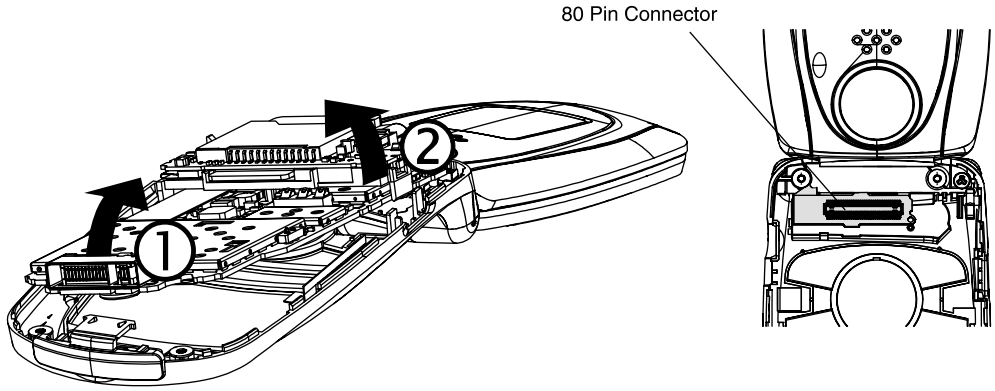
   Note: When separating the lower case and lower cover the mulitbutton (side key) and headset jack cover will disengage.

   Note: There are two snaps on both sides of the phone.



7. Using the edge of a plastic strip (of credit card thickness) carefully separate the connector from the case. Remove the Main by lifting the bottom end up first, then gently twisting (pivot) until the PCB separates from the 80 pin connector. If the Main PCB is connected to the 80 pin connector, carefully use edge of plastic strip (of credit card thickness) to separate.

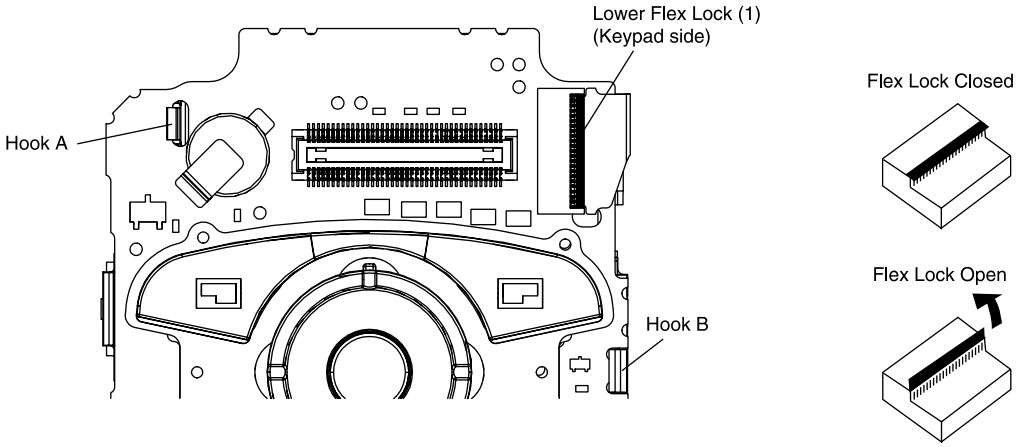
   Caution: Separate carefully to prevent damage to the connector or flex containing the 80 pin connector.



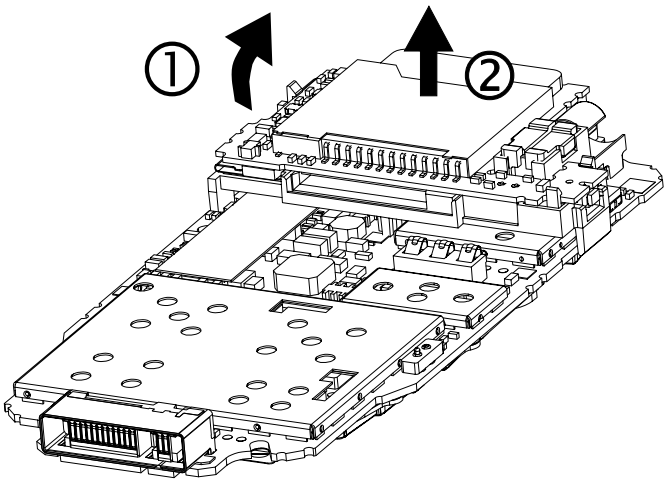
5.2.2 Main PCB

1. With Keypad facing up, rotate lower flex lock (1) and remove flex from top flex connector. Unhook the two hooks.

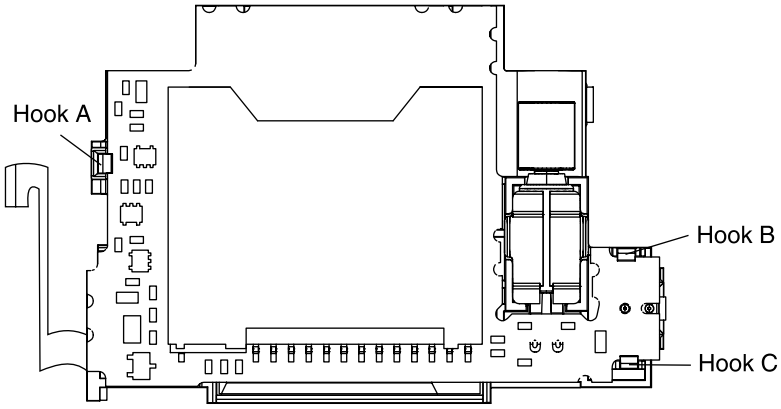
   Caution: Lift up (open) or push down (close) flex lock carefully. If damaged, a new connector must be placed on PCB.



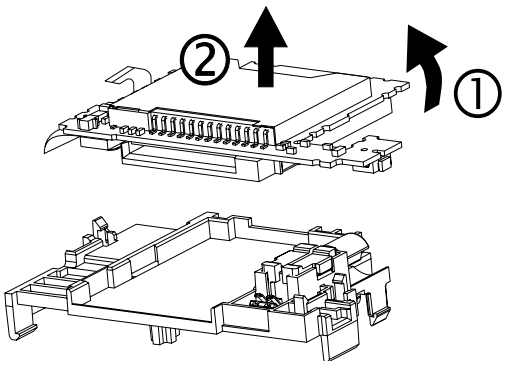
2. Turn main PCB over if necessary pivot (1) to release chassis from PCB. Lift up (2) and remove.



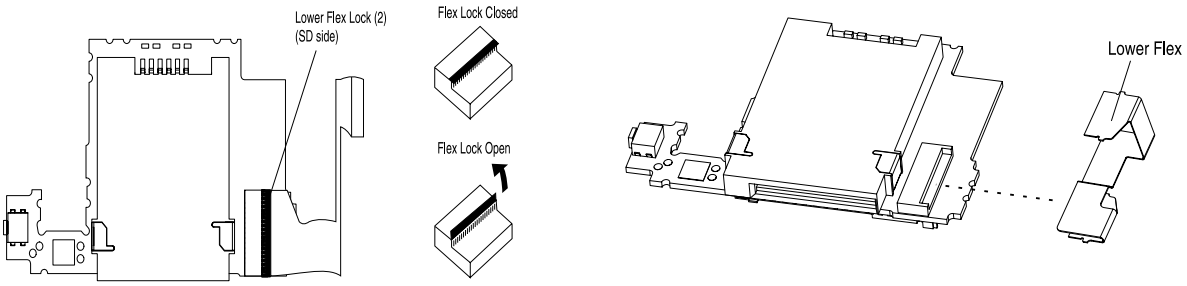
3. Release hooks A, B, then C.
   Caution: Use minimum force to release hooks. The hooks can break or can be easily damaged.



4. Pivot (1), lift (2) and remove sub PCB.

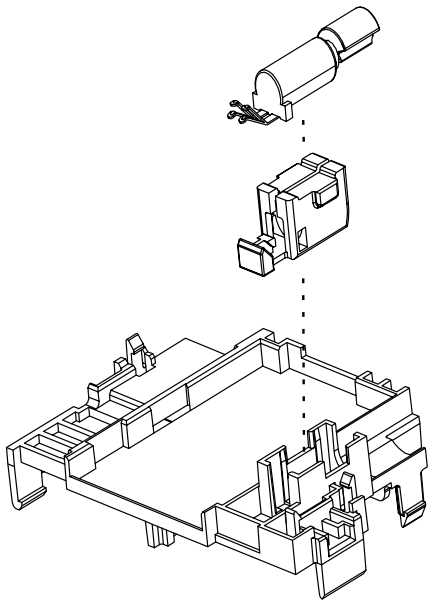


5. Rotate lower flex lock (2) and remove flex from bottom connector. Remove lower flex from sub PCB.
   Caution: Lift up (open) or push down (close) flex lock carefully. If damaged, a new connector must be placed on PCB.



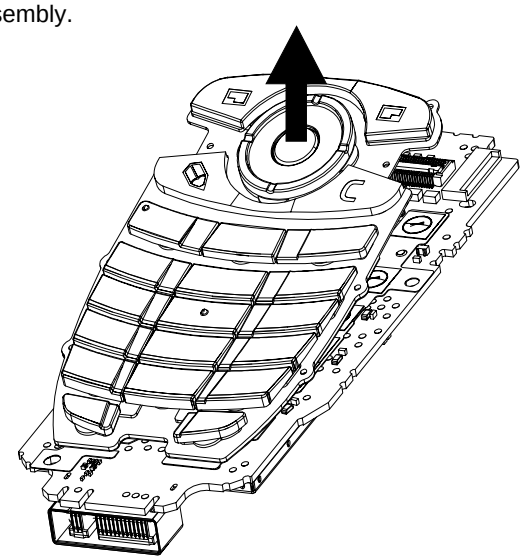
5.2.3 Vibrator Removal

1. Gently lift and remove vibrator unit.



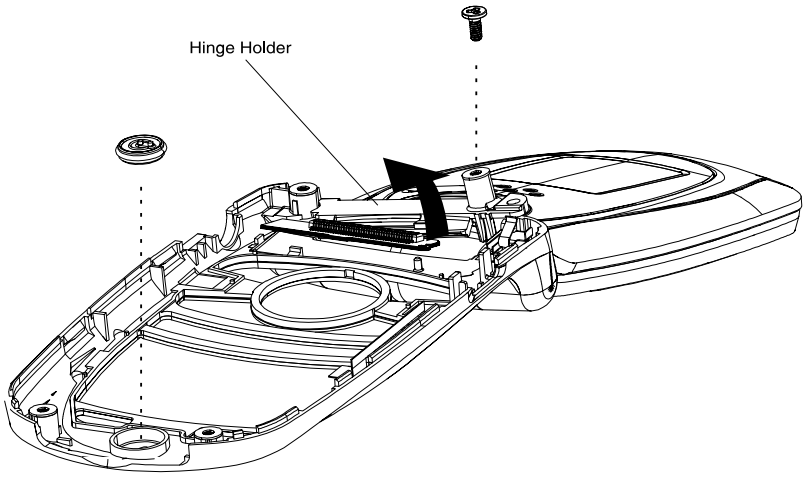
5.2.4 Keypad Removal

1. Lift up and remove keypad.
   Note: If the keypad is to be reused, carefully lift it from the PCB. If the adhesive is damaged, new keypad will be required for reassembly.



5.2.5 Microphone and hinge holder removal

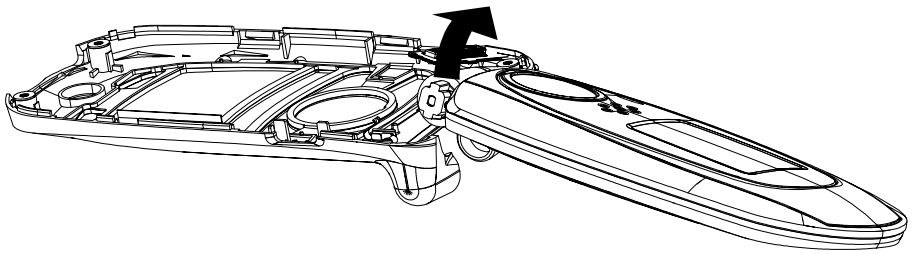
1. Lift the microphone insert from its recess on the lower case cover. Using a Trident screwdriver, remove the single screw securing the hinge holder. Retain the screw for reassembly. Gently lift up and remove the hinge holder. Retain for reassembly.



5.2.6. Upper Case Assembly, Flex Board and Display Removal

1. Gently pull on the left-hand side of the case to remove hinge from lower cover.

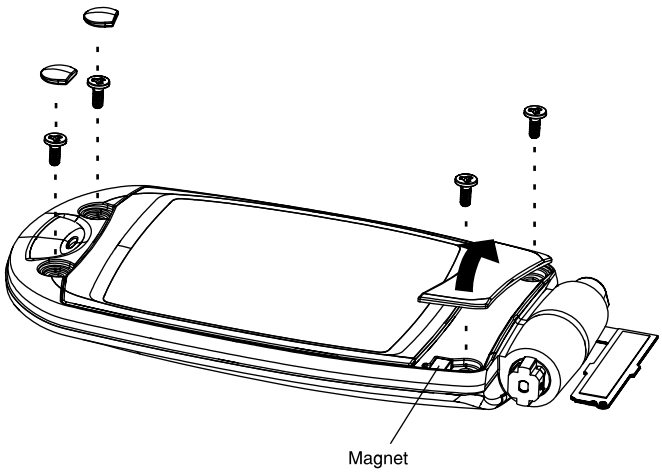
   Caution: Take care not to damage the flex during disassembly.



2. Using a strip of plastic (of credit card thickness) gently lift up and remove the logo panel. Remove the two screw caps. Use a Trident screwdriver to remove the four screws securing the logo panel. Retain the screws for reassembly.

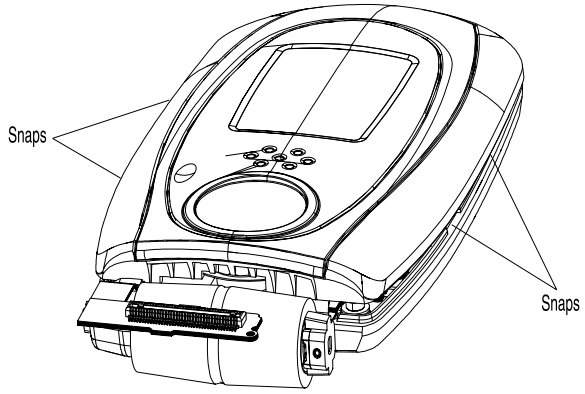
   Note: A magnet is located under the logo panel. If when removing the logo panel the magnet separates from the upper cover, place back into the recessed area in the upper cover. If necessary, replace magnet with new adhesive.

   Note: The logo panel and the two screw caps must be replaced with new parts for reassembly.

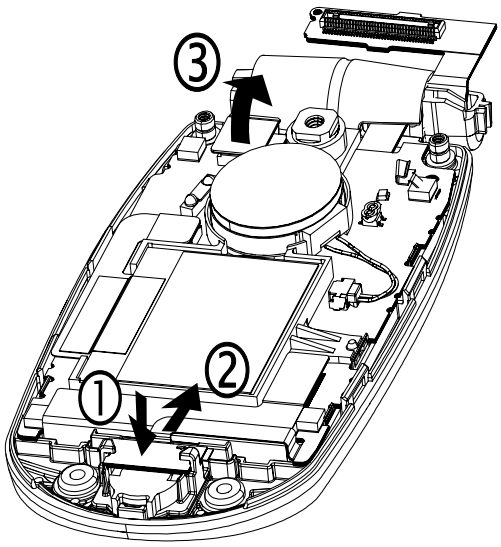


3. Separate the upper cover and upper case using a plastic strip (of credit card thickness).

   Note: There are two snaps on both sides of the phone.

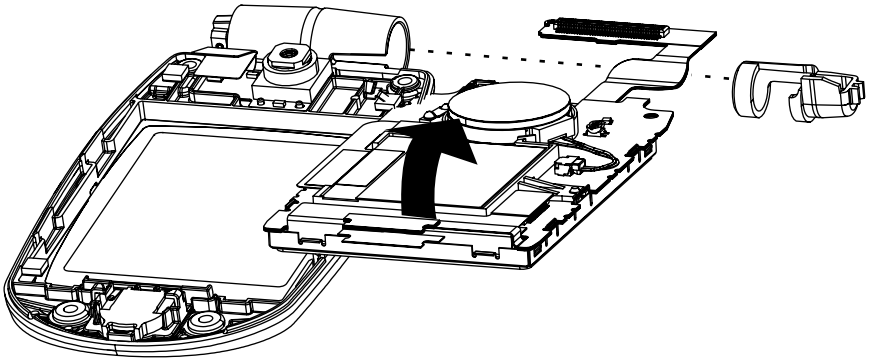


4. Gently press down (1) and slide the flex circuit towards the top of the phone (2). This will remove the flex connection from the brackets. Gently lift up camera connection flex (3).



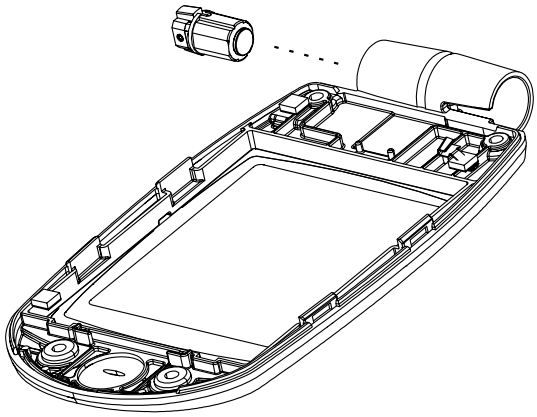
5. Lift bottom end of flex PCB board and slide right until board clears the camera and is free from the upper cover. The hinge pivot will exit the hinge compartment while removing the flex PCB board.

   Caution: Do not damage the flex while clearing camera and removing flex PCB.



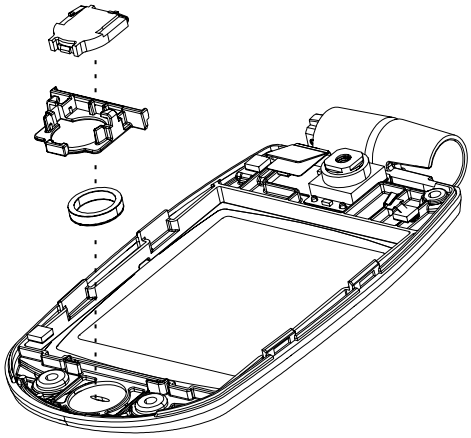
5.2.7 Hinge Removal

1. Remove hinge. Retain for reassembly.



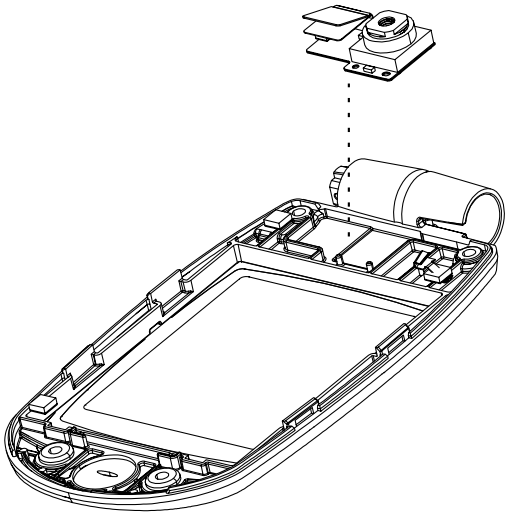
5.2.8 Receiver, receiver holder and receiver cushion removal

1. Lift and remove the receiver, receiver holder and receiver cushion from its recess in the upper cover.



5.2.9. Camera removal

1. Gently insert a small screwdriver blade or blunt instrument under the camera module, lift up and remove the camera module. Replace the double-sided adhesive pad when refitting the camera module.

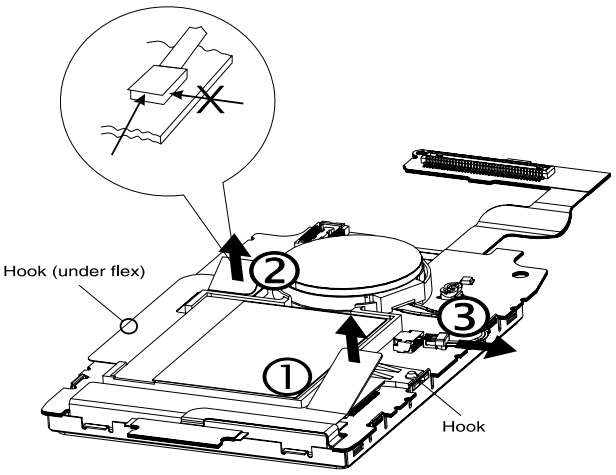


5.2.10 Removal of LCD module

1. Gently lift up main LCD connector (1), gently lift up sub LCD connector (2), unplug the DTHF speaker. Gently slide the LCD module to disengage from the two hooks.

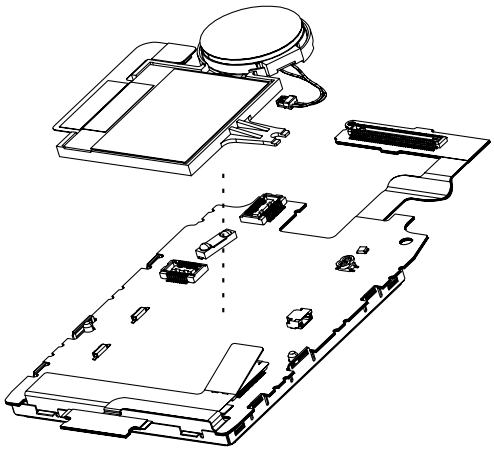
   Caution: Use extreme care when disconnecting sub-LCD connector. Use a straight edge of a plastic strip to gently separate connector in the direction shown. Do not twist, but lift the entire edge uniformly. The connector may separate from the flex if the correct procedure is not followed. The Flex cannot be repaired.

   Caution: Use minimal force to release the PCB. Hooks may be damaged and may not be used again.

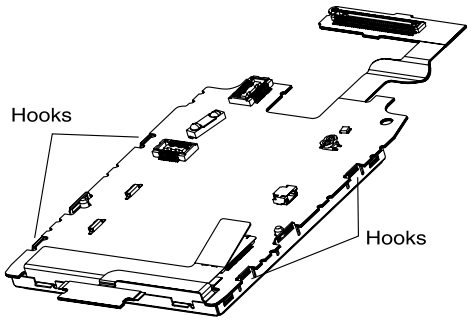


2. Lift and remove sub LCD module.

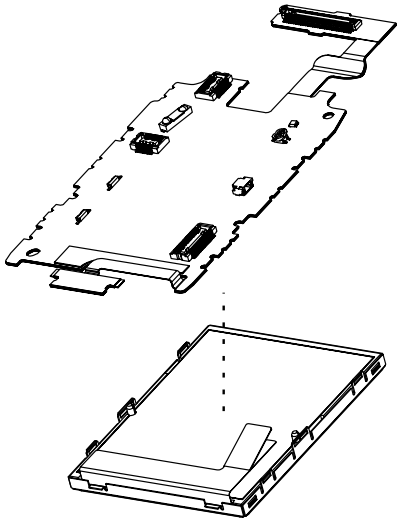
   Caution: Use mininmal force to release the PCB, otherwise hooks may become damaged or broken.



3. Unhook the four hooks.

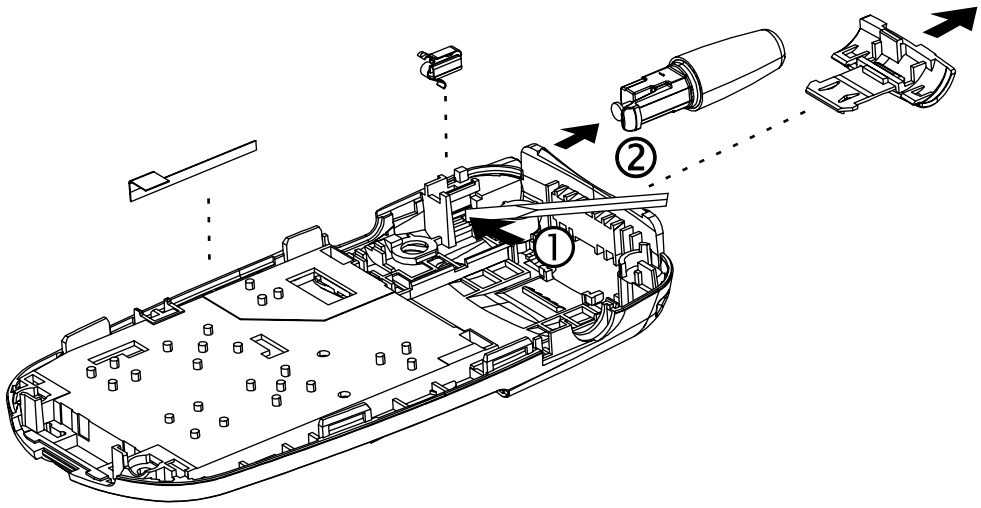


4. Remove main LCD module.



5.2.11 RF Antenna, Bluetooth Antenna and SD Cover Removal

1. It is only necessary to remove the antenna if the antenna or antenna contact is damaged.
2. Using a small screwdriver blade or blunt instrument, apply pressure to the antenna snap in the direction shown (1) while pulling the antenna away from the case (2). Remove Bluetooth antenna and antenna terminal with tweezers. Remove SD cover. Retain for reassembly.
3. To replace, push the antenna into its receptacle until it locks in position.



5.3. Reassembly

CAUTION

IF ANY OF THE RF, BLUETOOTH OR BASEBAND SHIELDS ARE REMOVED FROM THE PCB AT ANY TIME, THEY MUST BE REPLACED BY NEW ITEMS. ONCE REMOVED, THE SHIELDS MUST NOT BE REUSED.

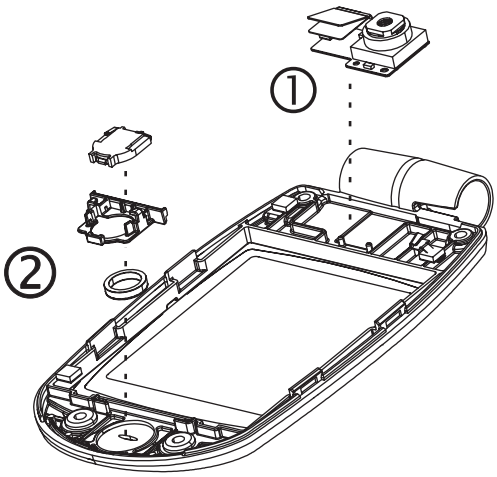
NOTES: *IIf the case assemblies have been disassembled and reassembled more than three times, they should be replaced with new items.*
Examine all case and cover parts before reassembly. If any scratches or defects are found in their finish, they should be replaced by new items.

5.3.1. Upper Housing Reassembly

To be advised.

5.3.2. Upper Cover Reassembly

1. Upper cover reassembly includes the upper cover with following: 1) lower camera gasket, camera and 2) receiver holder, receiver cushion, receiver and magnet.

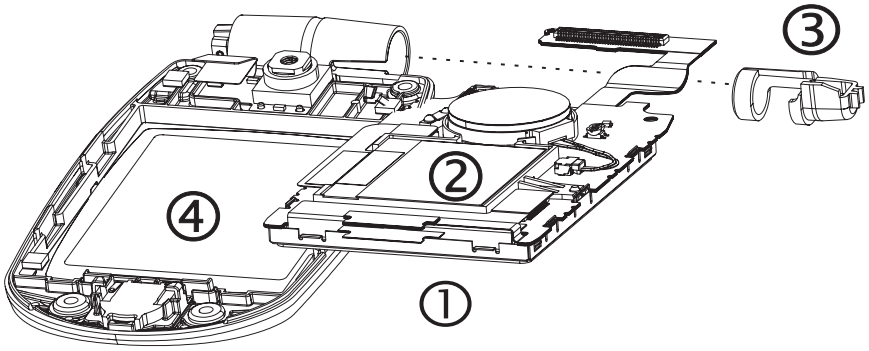


5.3.3. Upper Flex PCB Reassembly

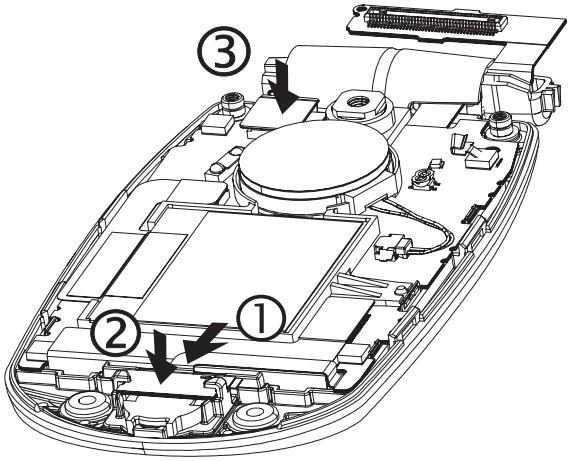
1. Upper flex PCB reassembly includes the following: main LCD assembly which includes the main LCD, main LCD bezel, main LCD adhesive, main LCD gasket and four conductive cushions. Sub LCD reassembly which includes the sub LCD frame and handsfree assembly. Ensure that all the components are securely attached and that all connectors are fully and properly seated.

2. Have the hinge pivot ready to complete the upper flex PCB reassembly. Carefully slide the flexible portion of the upper flex into the hinge pivot with the closed side of the hinge pivot facing away from the upper cover. When tilting the PCB, take care not to damage the camera or flex. Carefully slide the upper flex PCB and hinge pivot together so that the flex stays in the slot of the upper cover while it is inserted into the upper cover.

3. Place the main LCD bezel into the opening of the upper cover.

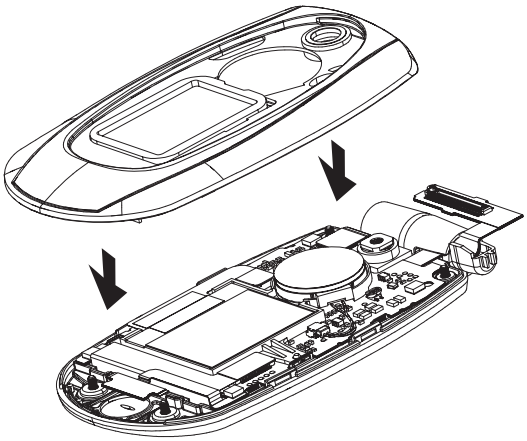


4. Attach the PCB connector into the receiver (1) and (2).
   Attach the camera connector to the connector on the PCB (3).
   Caution: Damage to the flex circuit portion of the upper flex PCB is NOT repairable. The flex circuit may be easily stretched or cut during this operation, causing a small tear which can grow with use and render the circuit unusable. Handle this assembly with care to avoid damage.

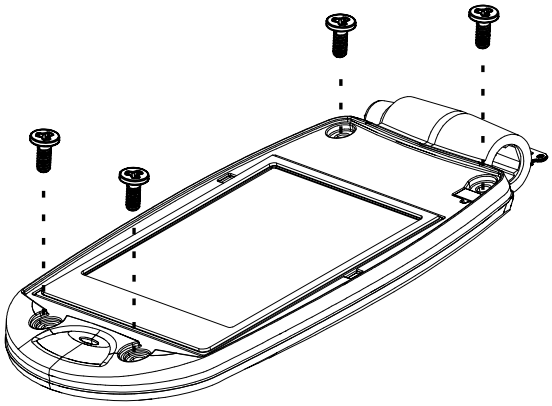


5.3.4. Upper case reassembly

1. Correctly align the upper case assembly over the upper cover assembly. Press down until the four snaps engage. Insert the sub LCD cushion and the camera cushion.



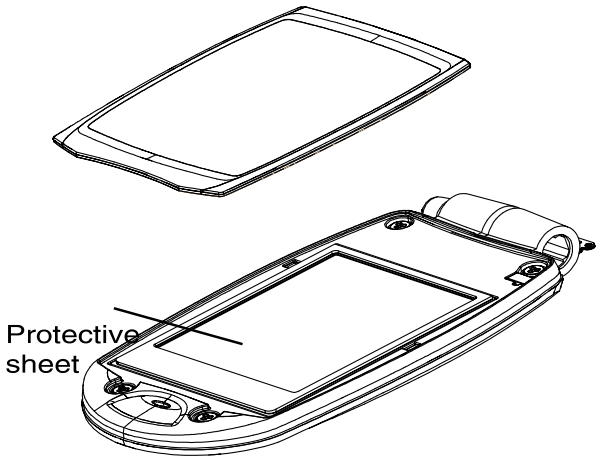
2. Locate the four screws and torque to 1.3 KGF-CM using a #3ULR0 Trident screwdriver tip.



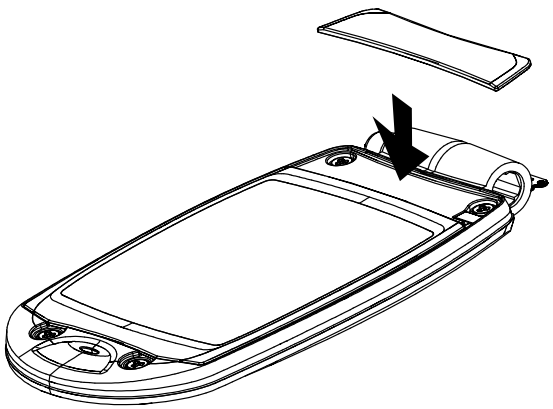
Note: Several parts come with protective sheets. Do not remove. Take care not to let the tabs of a protective sheet get trapped between pieces. Do not let the tabs become attached to any adhesive.

5.3.5 Main LCD and Logo Panel Reassembly

1. Remove the main LCD panel from the liner sheet, and inspect for foreign objects or fingerprints on the interior surface. If necessary, clean the main LCD glass surface and the interior of the main LCD panel with an ionized air spray. Align the panel to the correct orientation, and place in the upper cover, starting as close to the top (scalloped) edge as possible. Press and hold the adhesive areas (around the perimeter) with moderate (not excessive) force to the upper cover for ten seconds.

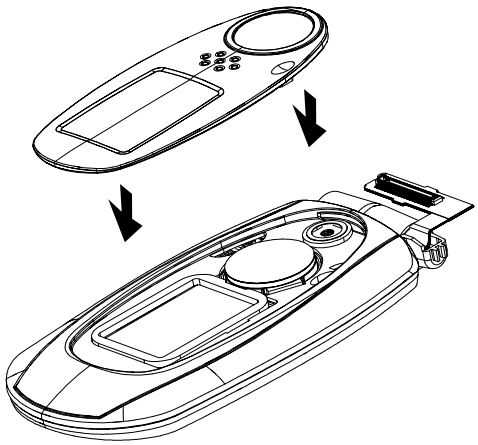


2. Place the logo panel in the recess as shown. Ensure that the logo panel is seated correctly. Press and hold the adhesive areas (at each end) with moderate (not excessive) force to the upper cover for ten seconds



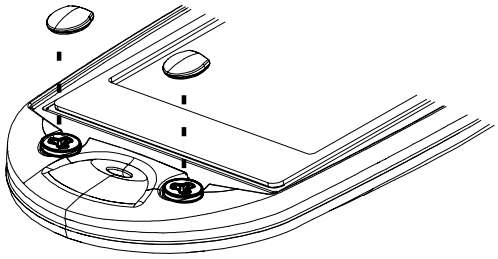
5.3.6 Sub LCD Panel Reassembly

1. Remove the panel from the liner sheet, and inspect for foreign objects or fingerprints on the interior surface. If necessary, clean the sub LCD glass surface and the interior of the sub LCD panel with an ionized air spray. Align the panel to the correct orientation, and locate in the upper case. Press and hold the adhesive areas (around the perimeter) with moderate (not excessive) force to the upper case for ten seconds



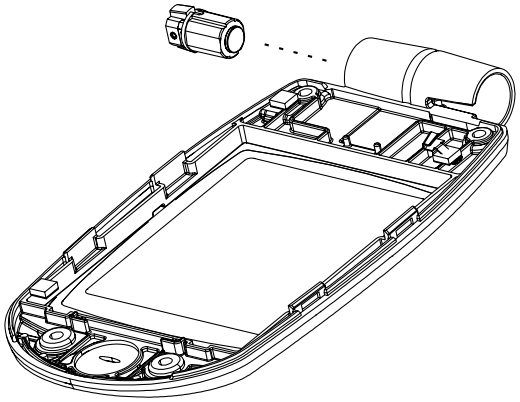
5.3.7 Upper Cover Screw Covers Replacement

1. Locate the screw covers in the two recesses at the top of the upper cover.



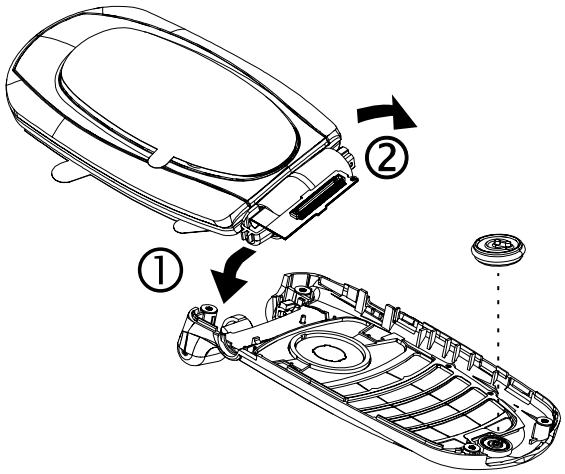
5.3.8 Upper Housing Reassembly to the Lower Cover

1. Insert the hinge in the upper cover as shown.

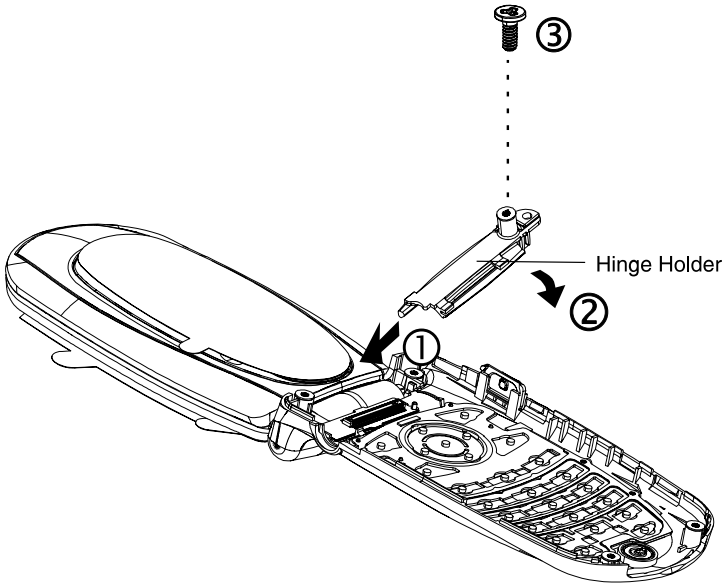


2. 1) Rotate and align the hinge pivot with the open area facing upward and carefully insert into the main area of the lower cover assembly, taking care to tilt the upper housing assembly without causing damage to the flex circuit during reassembly. 2) Push down gently until the upper housing assembly is full engaged into the lower cover. Insert microphone.

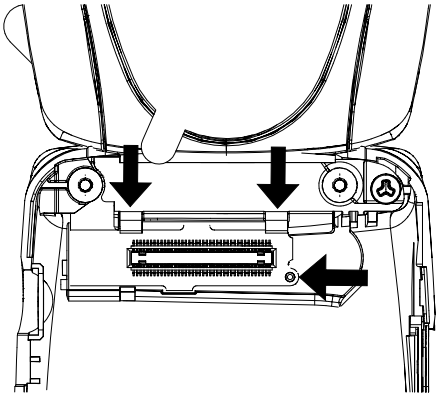
   Caution: Damage to the flex circuit portion of the upper flex PCB is not repairable. The flex circuit may be easily damaged during this operation, causing a small tear which can grow with use and render the circuit unusable.



3. 1) Insert hinge holder into the lower cover in the direction shown. 2) Gently lower the other side of the hinge holder into the lower cover. Insert the retaining screw and torque to 1.3 KGF-CM using a #3ULR0 Trident screwdriver tip.



4. Position the 80 pin connector so that the boss in the lower case locates inside the hole in the flex, and the edge of the connector locates under the two tabs of the hinge holder. Take care to avoid damage to the exposed Flex Circuit during this step

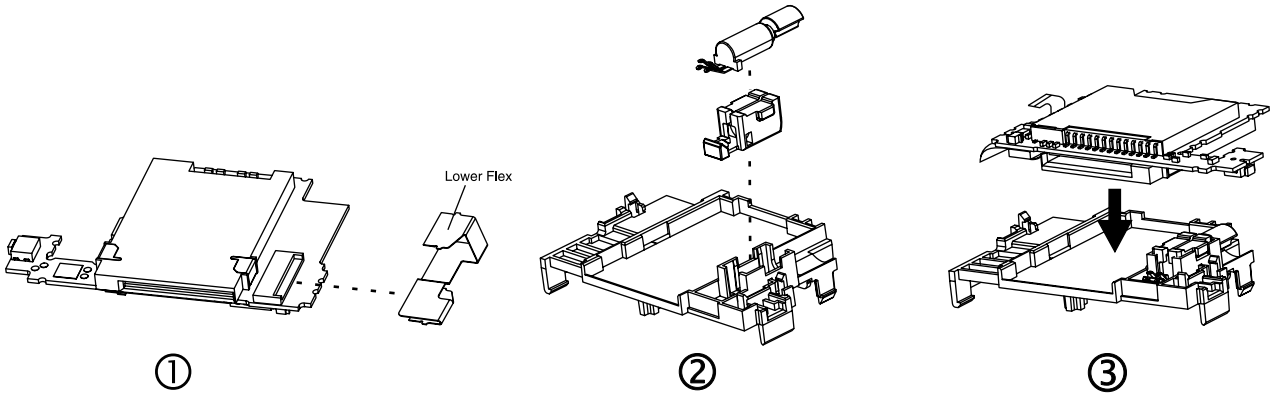


5.3.9 Reassembly of the Main PCB Assembly and SD PCB

To be advised.

5.3.10 SD PCB Reassembly

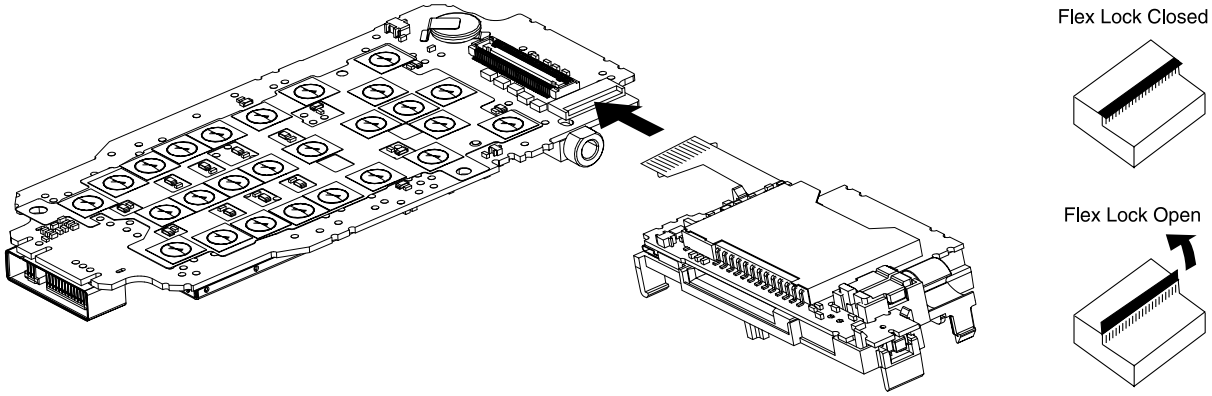
1. SD PCB assembly includes the following: SD flex connector, vibrator unit, SD PCB, chassis.



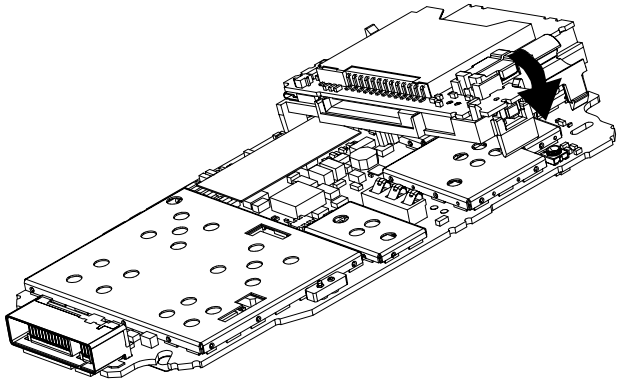
5.3.11 Main PCB Reassembly

1. Main PCB reassembly includes the following: main PCB, all soldered components, four shield covers, dome sheet and PCB ID label.
2. Carefully open the ZIF connector by rotating the black locking bar up. Orient the main PCB assembly with the dome sheet facing up and the ZIF connector in the upper right corner. Orient the SD PCB assembly with the SD PCB on top and the SD flex connector facing left. Insert the flex into the ZIF connector, aligned in the top and bottom slots and place as far into the connector as possible. Lock the SD flex connector.

   Caution: Use care to open and close the ZIF connector. Damage to or loss of the locking bar will require replacement of the complete Main PCB assembly.

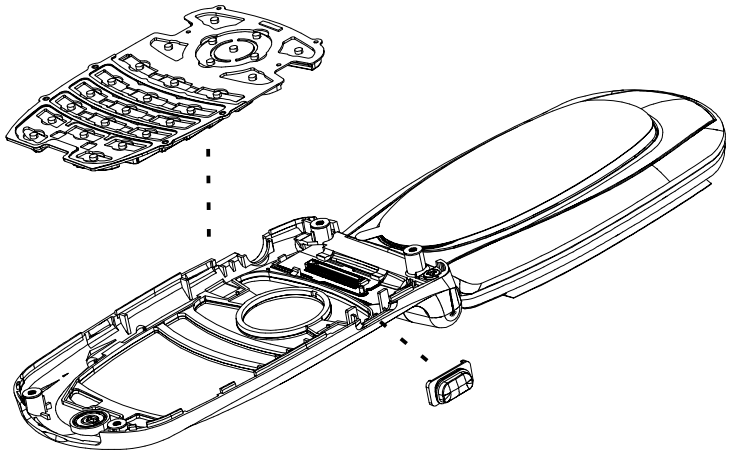


3. Carefully rotate the SD PCB assembly to the opposite side of the main PCB and align the three tabs. Take care not to damage the SD flex during this step. Press the SD PCB assembly and the main PCB together. Make sure that the two locking hooks properly engage.



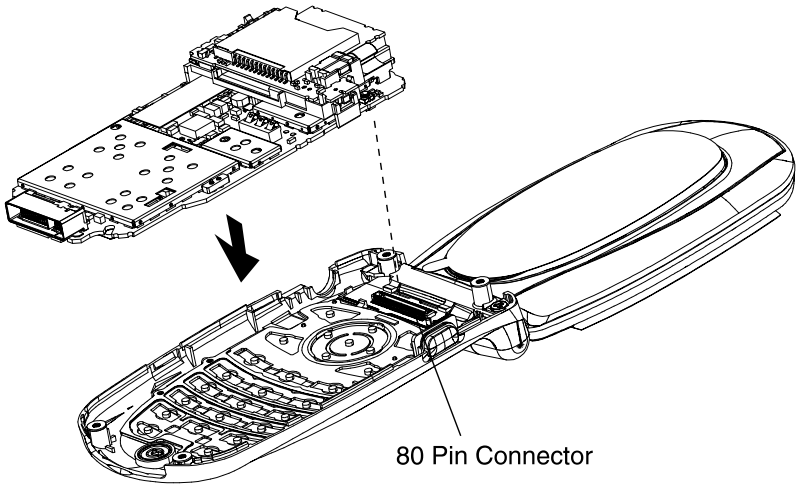
5.3.12 Completing the Assembly

1. Place the memo button in the slot on the lower cover. Align the keypad and place in the lower cover. Use tweezers to remove the adhesive liner.

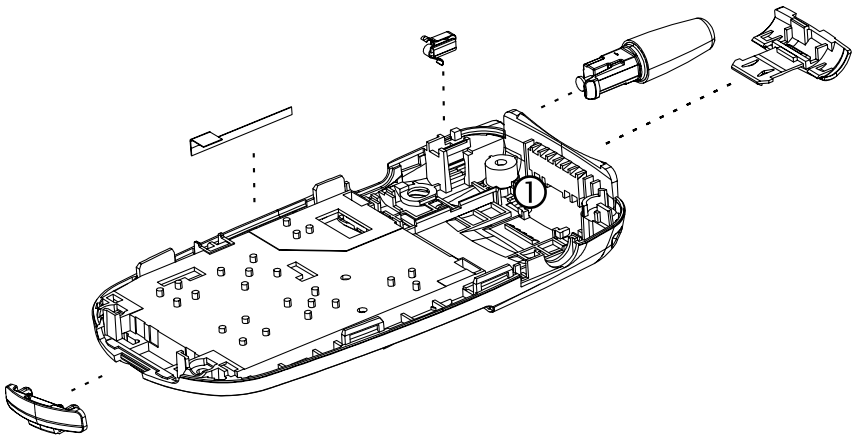


2. Place the upper housing into the lower cover assembly. Connect the 80 pin connector halves by using the thumb and forefingers to apply force to the exterior areas directly over the connector. A snap should be heard or felt to insure a secure connection.

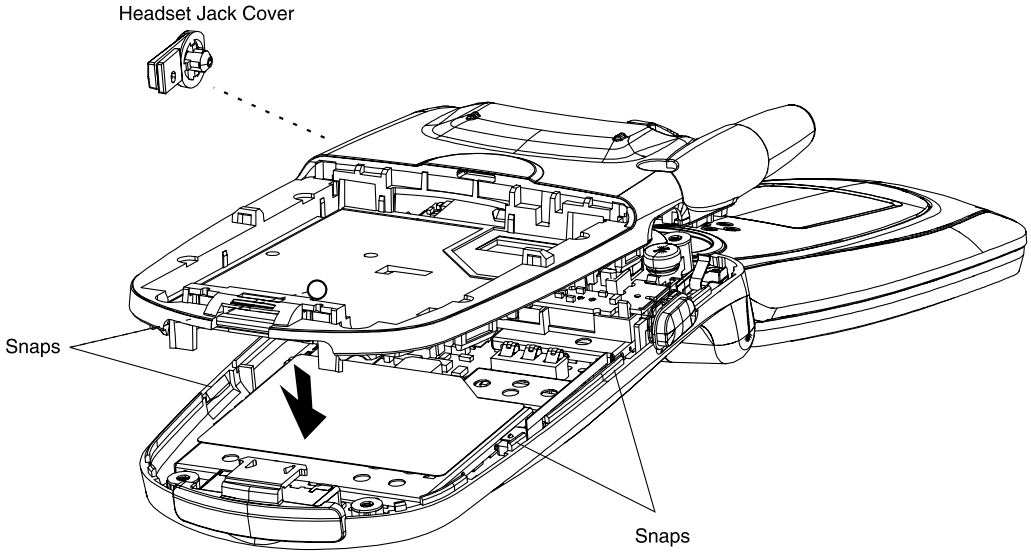
   Note: The keypad assembly will be fastened to the main PCB. If this process needs to be repeated due to poor alignment, the keypad assembly must be carefully removed from the main PCB. A new keypad assembly must be used if the adhesive is damaged or missing.



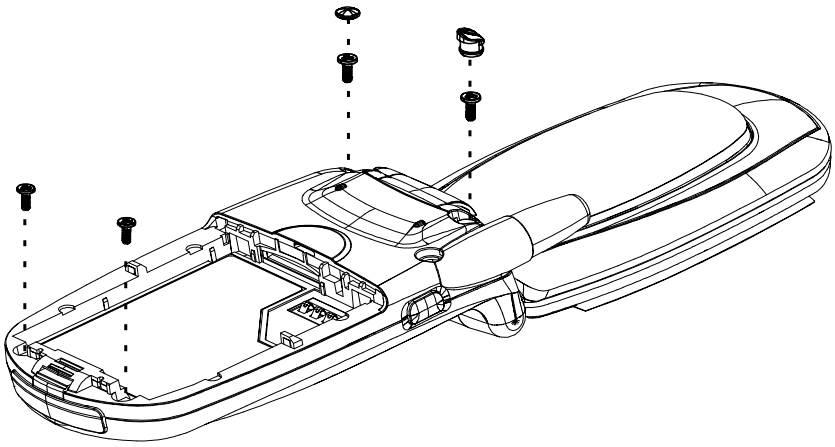
3. Reassemble the lower case assembly. Push the antenna in until it locks in position. Place the SD cover into the SD opening and rotate until snapped into place. If necessary replace the I/O cover.



4. Place the headset jack cover in the lower case cover. Assembly the lower case with the lower cover assembly. Close the four snaps making sure that both assemblies are connected.



5. Insert four screws and torque all screws to 1.3 KGF-CM using a #3ULR0 Trident screwdriver tip. Replace the two screw caps.



6. Replace battery and battery cover.

6. REPAIR PROCEDURES

6.1. Introduction

This section describes the equipment and software required to test and calibrate the phone.

Calibration Procedures are described in Section 8.

The handset can be connected to a compatible personal computer for electronic adjustment and fault diagnosis. This section provides a description of the equipment required to perform those tasks.

Prior to testing and adjustment, the unit should first be disassembled, as detailed in Section 6, and then the PCB connected to the PCB Repair Jig. Fault tracing can be performed on the PCB using suitable test equipment, such as spectrum analysers and oscilloscopes.

The unit must be tested and calibrated for all frequency bands (900 MHz, 1800 MHz and 1900 MHz).

6.2. Underfill Resin Paste

WARNING

A Naphthalene-based resin paste is used to bond underfill components on this phone. When heated, this paste may give off traces of Naphthalene.

Therefore, it is recommended that work on the PCB be carried out in a well-ventilated area, especially when using hot air blowers or soldering irons.

The following components are bonded using the paste:.

OMAP310 (U200)

S-Gold (U100)

Bluetooth IC (U201)

6.3. Lead Free (Pdf) solder

Caution

The Printed Circuit Board (PCB) used in this telephone has been manufactured using Lead Free solder.

Lead Free solder has a higher melting point than Lead solder - typically 30 - 40 ˚C higher. Always use a high temperature soldering iron When using a soldering iron with temperature control, it should be set to 370 ±10 ˚C (700 ± 20˚F).

When using lead solder, all PbF solder must be removed from the solder area. Where this is not possible, heat the PbF solder until it melts before applying lead solder.

Avoid overheating PbF solder as it has a tendency to splash at temperatures above 600 ˚C (1100 ˚F).

6.4. Jigs and Tools

6.4.1. Personal Computer (PC)

The PC (IBM compatible) is used as a Unit Under Test controller. This, in conjunction with the channel box software, allows all of the test facilities normally provided through the keypad of the Unit Under Test.
The Microsoft Windows® 98SE, 2000 or XP operating system must be installed on the PC.
A Universal Serial Bus (USB) port must be installed on the PC if automatic RF calibration is to be performed.

6.4.2. PCB Repair Jig (Part No. 3WZ001142AAA)

Caution

The power cable has a large capacitor across the positive and negative leads to reduce the loading effect on the power supply during RF calibration.
Therefore, it is important that the correct polarity of the cables is observed, otherwise serious damage will occur to the capacitor.

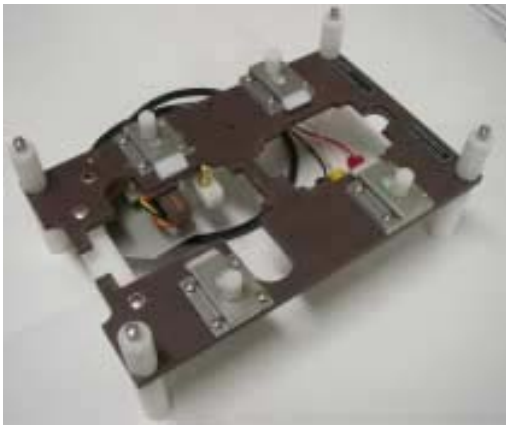


Figure 5.1: PCB Repair Jig

The PCB Repair Jig provides the necessary connections between the PCB Assembly and external test equipment. It is required for RF calibration. The following spares item is available for the PCB Repair Jig:

- RF Probe (Part No. : MS156HRMJ3)

A cable with SMA female connector is provided to make the RF connection. An SMA to N-Type male adaptor will be required to connect the Repair Jig to the service equipment. Cable losses for the RF connection are as follows:

Band	Offset
GSM 850 & 900	0.6 dB
GSM 1800	0.8 dB
GSM 1900	0.9 dB

A replacement RF Probe for the Repair Jig is available as a spares item.

6.4.3. RF Test Jig (Part No. 3WZ001141AAA)

The RF Test Jig provides the connections between the test and the phone for unit testing.
It also provides power supply for the phone. The following spares item is available for the RF Test Jig.

- RF Probe (Part No. : MS156HRMJ3)

Figure 5.2: RF Test jig

6.4.4. Power Cable (Part No. 3WZ001130AAA)

The power cable provides the necessary connections between the PCB repair jig / dummy battery and external power supply.

Figure 5.3: Power Cable

6.4.5. USB Data Cable Kit (Part No. WY80023A)

The data cable is used for software download and calibration.

Figure 5.4: USB Data Cable

6.4.6. Calibrated Torque Screwdriver

This screwdriver is required to secure the case screws on the phone. It must have settings for 1.3kgf and 2.5kgf.

6.4.7. Power Supply

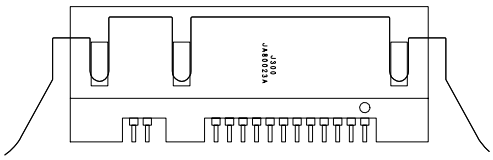
Two power supplies is required to provide power to the PCB via the PCB Repair Jig while a second unit is required to provide power baseband calibration and unit testing.

6.4.8. GSM Test Set

This unit acts as a base station providing all the necessary GSM signalling requirements and also provides GSM signal measuring facilities.

7. INTERFACES

7.1.1 External I/O (J300 on main board)



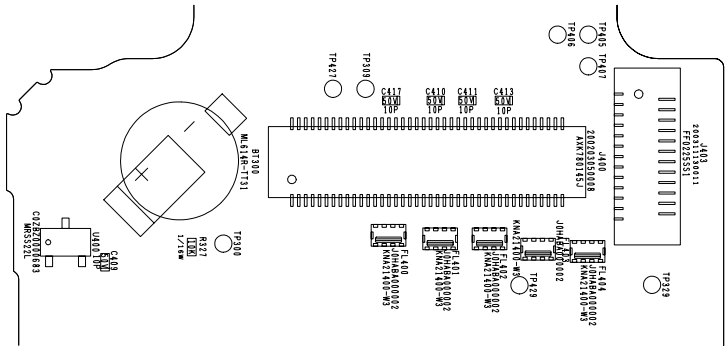
External I/O connector is a 14-pin user interface connector that provides external UART, USB, charger and other interface to the X700 handset.

Pin No.	Signal Name	HH ← → EXT	Function
1	GND		Ground
2	SERIAL-UP	←	TXD, UART data transfer to OMAP, or UARTS0-TXD, UART data transfer to S-GOLD
3	SERIAL-DOWN	→	RXD, OMAP UART data transfer to EXT, or UARTS0-RXD, S-GOLD UART data transfer to EXT
4	DTR/ PA-ON	← →	UART: Data Terminal ready/Accessory Recognition Or: PA control signal for test trigger
5	RTS	←	UART: Request to send to either OMAP or S-GOLD
6	CTS	→	UART: Clear to send from either OMAP or S-GOLD
7	nACC-SENSE	N/A	Not used
8	ACC-PWR/VBAT-IN	→	Peripheral power supply up to 100mA
9	DATAMODE /ACCY ID	←	Accessory identification (to M7 of S-GOLD ADC)
10	USB D-	←→	USB IO data -
11	USB D+	←→	USB IO data +
12	USB-VBUS	←	Power supply from USB host controller
13	EXT-PWR	←	Power supply for battery charge
14	GND		Ground

7.1.2 Board to Board Connector (J400 on main board)

The board to board connector is a 80-pin inner signal exchanging connector that connects the main board with the upper flex board for main LCD, Sub LCD, camera and other interfaces.

The signal names below are based on the signal names on the schematic of the upper flex board.



Pin No.	Signal Name	MAIN ←→ Upper Flex	Function
1	HH-SPK-	→	Handset speaker output -
2	HH-SPK+	→	Handset speaker output +
3	GND		Ground
4	SG-CAM-PWM	→	S-GOLD camera flash light PWM control
5	CAM-I2C-SDA	←→	Camera I2C data line
6	CAM-I2C-SCL	→	Camera I2C clock line
7	CAM-FLASH	→	Camera flash light enable from OMAP
8	CAM-RST	→	Camera reset control from OMAP
9	CAM-HSYNC	→	Camera horizontal sync signal from OMAP
10	CAM-VSYNC	→	Camera vertical sync signal from OMAP
11	CAM-PCLK	←	Camera pixel clock from camera module
12	CAM-STBY	→	Camera standby signal from OMAP
13	CAM-EXCLK	→	Camera external clock from OMAP
14	GND		Ground
15	RGBCLK	→	Main LCD pixel clock from OMAP
16	CAM-DATA0	←	Camera data line 0 from camera module to OMAP
17	CAM-DATA1	←	Camera data line 1 from camera module to OMAP
18	CAM-DATA2	←	Camera data line 2 from camera module to OMAP
19	CAM-DATA3	←	Camera data line 3 from camera module to OMAP
20	CAM-DATA4	←	Camera data line 4 from camera module to OMAP
21	CAM-DATA5	←	Camera data line 5 from camera module to OMAP
22	CAM-DATA6	←	Camera data line 6 from camera module to OMAP
23	CAM-DATA7	←	Camera data line 7 from camera module to OMAP
24	GND		Ground
25	RGBD0	→	OMAP pixel data line 0 to Main LCD

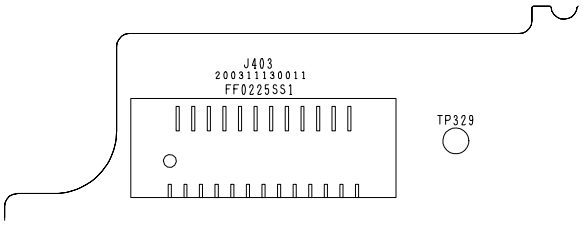
26	RGBD1	→	OMAP pixel data line 1 to Main LCD
27	RGBD2	→	OMAP pixel data line 2 to Main LCD
28	RGBD3	→	OMAP pixel data line 3 to Main LCD
29	RGBD4	→	OMAP pixel data line 4 to Main LCD
30	RGBD5	→	OMAP pixel data line 5 to Main LCD
31	RGBD6	→	OMAP pixel data line 6 to Main LCD
32	RGBD7	→	OMAP pixel data line 7 to Main LCD
33	RGBD8	→	OMAP pixel data line 8 to Main LCD
34	RGBD9	→	OMAP pixel data line 9 to Main LCD
35	RGBD10	→	OMAP pixel data line 10 to Main LCD
36	RGBD11	→	OMAP pixel data line 11 to Main LCD
37	RGBD12	→	OMAP pixel data line 12 to Main LCD
38	RGBD13	→	OMAP pixel data line 13 to Main LCD
39	RGBD14	→	OMAP pixel data line 14 to Main LCD
40	RGBD15	→	OMAP pixel data line 15 to Main LCD
41	PWM-MAIN	→	Main LCD backlighting control from S-GOLD
42	PWM-SUB	→	Sub LCD backlighting control from S-GOLD
43	IRDA-SD-MODE	→	IrDA module standby control from OMAP
44	IRDA-RX	←	IrDA data receiving from IrDA module to OMAP
45	IRDA-TX	→	IrDA data transmitting from OMAP to IrDA module
46	GND		Ground
47	GND		Ground
48	SUBLCD-CS	→	Sub LCD module chip select from OMAP
49	SCLK	→	OMAP serial clock for main LCD serial interface
50	SDATA	→	OMAP serial data for main LCD serial interface
51	MAINLCD-CS	→	Main LCD module chip select from OMAP
52	LCD-nRST	→	Sub LCD and main LCD module reset control from OMAP
53	VSYNC	→	Main LCD vertical sync signal from OMAP
54	RGBENA	→	Main LCD RGB data out enable signal from OMAP
55	GND		Ground
56	HSYNC	→	Main LCD horizontal sync signal from OMAP
57	GND		Ground
58	DCDCOUT	→	+15V DCDCOUT for LCD backlight and camera flash light from Companion IC
59	DCDCOUT	→	+15V DCDCOUT for LCD backlight and camera flash light from Companion IC
60	GND		Ground
61	VMAIN	→	VMAIN power supply
62	VMAIN	→	VMAIN power supply
63	VMAIN	→	VMAIN power supply
64	VMAIN	→	VMAIN power supply
65	VMAIN	→	VMAIN power supply
66	VMAIN	→	VMAIN power supply
67	VMAIN	→	VMAIN power supply
68	VMAIN	→	VMAIN power supply
69	V28	→	Power supply for 2.8V
70	GND		Ground
71	LED-PAGING	→	Paging LED control from S/M power
72	LED-ALERT	→	ALERT LED control from S/M power
73	VDD-LCD	→	Power supply for LCD module

74	VDD-IR	→	Power supply for IrDA module
75	GND		Ground
76	GND		Ground
77	GND		Ground
78	HF-SPK+	→	Hands free speaker output +
79	HF-SPK-	→	Hands free speaker output -
80	GND		Ground

7.1.3 Main Board to SD/SIM Board Connector (J403 on main board)

The main board to SD/SIM board connector is a 25-pin inner signal exchanging connector that connects the main board with the SD/SIM board for SD card, SIM card and other interface signals.

The signal names below are based on the signal names on the schematic of the main board.

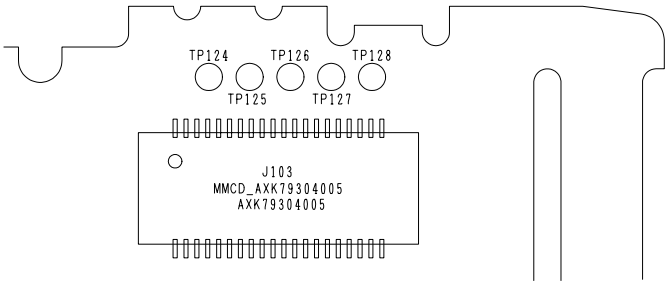


Pin No.	Signal Name	Main ←→ SD/SIM	Function
1	GND		Ground
2	GND		Ground
3	GND		Ground
4	GND		Ground
5	VMAIN	→	VMAIN power supply
6	VMAIN	→	VMAIN power supply
7	CC-CLK	→	SIM card clock from S-GOLD
8	CC-RST	→	SIM card reset control from S-GOLD
9	VSIM1-SW	→	SIM card power supply controlled by S-GOLD
10	CC-IO	←→	SIM card IO data from S-GOLD
11	MMC-DAT0-SPI-DI	←→	SD card data line 0 from OMAP
12	SD-SWI	←	SD card hot insertion/de-insertion detection line to OMAP
13	VSD	→	Power supply for SD card
14	MMC-DAT3	←→	SD card data line 3 from OMAP
15	MMC-DAT2	←→	SD card data line 2 from OMAP
16	MMC-DAT1	←→	SD card data line 1 from OMAP
17	VIB	→	Vibrator control line from S/M power
18	MMC-CMD-SPI-D0	←→	SD card command line from OMAP
19	KBI-R3	←	Keypad input line for row 3 to OMAP
20	MMC-CLK	→	SD card clock from OMAP
21	KBI-C5	→	Keypad output line for column 5 to OMAP
22	GND		Ground
23	GND		Ground
24	GND		Ground
25	GND		Ground

7.1.4 Main LCD Connector (J103 on upper flex board)

The main LCD connector is a 40-pin inner signal exchanging connector that connects to the main LCD module on the upper flex board.

The signal names below are based on the signal names on the schematic of the upper flex board

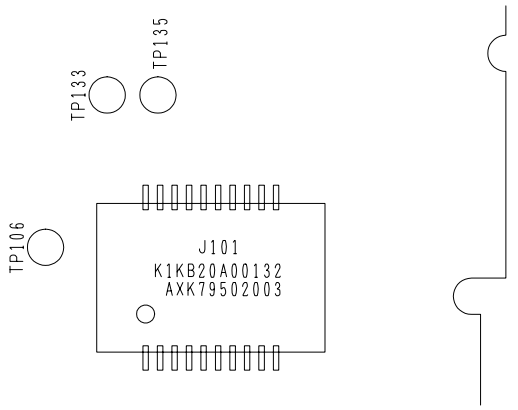


Pin No.	Signal Name	Upper Flex ←→ Main LCD	Function
1	ANODE-BL	→	+15V DCDCOUT for main LCD backlight
2	GND		Ground
3	Not used		Not used
4	GND		Ground
5	CATHODE-BL	→	Main LCD backlight control
6	RGB17		Not used, connects to GND
7	GND		Ground
8	RGB16		Not used, connects to GND
9	HSYNC	→	Main LCD horizontal sync signal from OMAP
10	RGBD15	→	OMAP pixel data line 15 to Main LCD
11	GND		Ground
12	RGBD14	→	OMAP pixel data line 14 to Main LCD
13	RGBCLK	→	Main LCD pixel clock from OMAP
14	RGBD13	→	OMAP pixel data line 13 to Main LCD
15	GND		Ground
16	RGBD12	→	OMAP pixel data line 12 to Main LCD
17	SCLK	→	OMAP serial clock for main LCD serial interface
18	VDD-LCD	→	Power supply for LCD module
19	GND		Ground
20	VDD-LCD	→	Power supply for LCD module
21	Not used		Not used
22	RGBD11	→	OMAP pixel data line 11 to Main LCD
23	VSYNC	→	Main LCD vertical sync signal from OMAP
24	RGBD10	→	OMAP pixel data line 10 to Main LCD
25	SDATA	→	OMAP serial data for main LCD serial interface
26	RGBD9	→	OMAP pixel data line 9 to Main LCD
27	MAINLCD-CS	→	Main LCD module chip select from OMAP
28	RGBD8	→	OMAP pixel data line 8 to Main LCD
29	RGBENA	→	Main LCD RGB data out enable signal from OMAP
30	VDD-LCD	→	Power supply for LCD module
31	RGBD0	→	OMAP pixel data line 0 to Main LCD
32	VDD-LCD	→	Power supply for LCD module
33	RGBD1	→	OMAP pixel data line 1 to Main LCD
34	LCD-nRST	→	OMAP LCD reset control to main LCD
35	RGBD2	→	OMAP pixel data line 2 to Main LCD
36	RGBD7	→	OMAP pixel data line 7 to Main LCD
37	RGBD3	→	OMAP pixel data line 3 to Main LCD
38	RGBD6	→	OMAP pixel data line 6 to Main LCD
39	RGBD4	→	OMAP pixel data line 4 to Main LCD
40	RGBD5	→	OMAP pixel data line 5 to Main LCD

7.1.5. Sub LCD Connector (J101 on upper flex board)

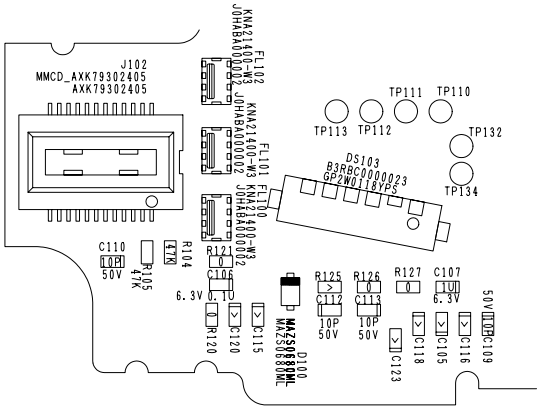
The Sub LCD connector is a 20-pin inner signal exchanging connector that connects to the Sub LCD module on the upper flex board.

The signal names below are based on the signal names on the schematic of the upper flex board.



Pin No.	Signal Name	Upper Flex ←→ Sun LCD	Function
1	SCLK	→	OMAP serial clock for main LCD serial interface
2	GND		Ground
3	GND		Ground
4	SDATA	→	OMAP serial data for main LCD serial interface
5	LCD-nRST	→	OMAP LCD reset control to Sub LCD
6	GND		Ground
7	GND		Ground
8	SUBLCD-CS	→	Sub LCD module chip select from OMAP
9	Not used		Not used
10	Not used		Not used
11	GND		Ground
12	Not used		Not used
13	GND		Ground
14	Not used		Not used
15	Not used		Not used
16	Not used		Not used
17	VDD-LCD	→	Power supply for LCD module
18	VDD-LCD	→	Power supply for LCD module
19	VDD-LCD	→	Power supply for LCD module
20	VDD-LCD	→	Power supply for LCD module

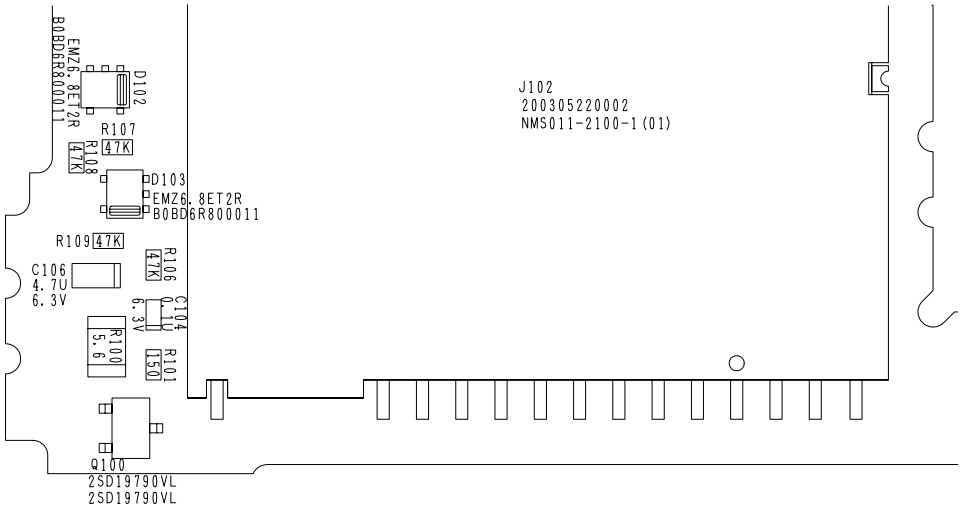
7.1.6. Camera Connector (J102 on upper flex board)



Pin No.	Signal Name	Upper Flex ←→ Camera	Function
1	CAM-I2C-SDA	←→	Camera I2C data line
2	CAM-I2C-SCL	→	Camera I2C clock line
3	CAM-EXCLK	→	Camera external clock from OMAP
4	CAM-VSYNC	→	Camera vertical sync signal from OMAP
5	CAM-HSYNC		Camera horizontal sync signal from OMAP
6	CAM-PCLK	→	Camera pixel clock from camera module
7	CAM-FLASH	←	Camera flash light control from OMAP
8	CAM-DATA0	←	Camera data line 0 from camera module to OMAP
9	CAM-DATA1	←	Camera data line 1 from camera module to OMAP
10	Not used	←	Not used
11	CAM-DATA2	←	Camera data line 2 from camera module to OMAP
12	CAM-DATA3	←	Camera data line 3 from camera module to OMAP
13	CAM-DATA4	←	Camera data line 4 from camera module to OMAP
14	CAM-DATA5	←	Camera data line 5 from camera module to OMAP
15	CAM-DATA6	←	Camera data line 6 from camera module to OMAP
16	CAM-DATA7	←	Camera data line 7 from camera module to OMAP
17	Pull low/GND		Camera output data enable
18	CAM-STBY	→	Camera standby control from OMAP
19	CAM-RST	→	Camera reset control from OMAP
20	VDD-CAM	→	Camera power supply
21	VDD-CAM	→	Camera power supply
22	GND		Ground
23	GND		Ground
24	Not used		Not used

7.1.7 Mini SD Connector (J102 on SD/SIM board)

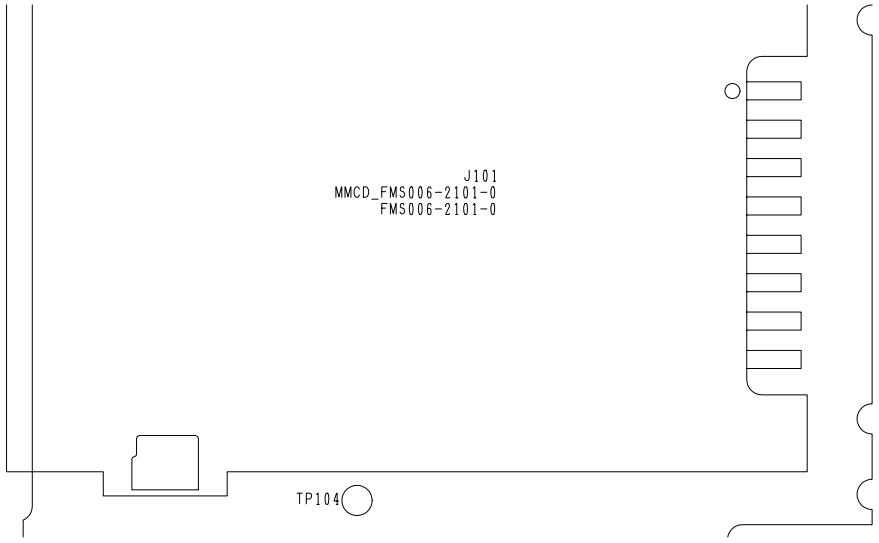
The Mini SD connector is a 11-pin inner signal exchanging connector that connects to the SD card on the SD/SIM board. The signal names below are based on the signal names on the schematic of the SD/SIM board.



Pin No.	Signal Name	SD/SIM Board ←→ SD	Function
1	MMC-DAT3/CD	←→	SD card data line 3 from OMAP
2	MMC-CMD-SPI-D0	←→	SD card command line from OMAP
3	VSD	→	Power supply for SD card
4	GND		Ground
5	MMC-CLK	→	SD card clock from OMAP
6	GND		Ground
7	MMC-DAT0-SPI-DI	←→	SD card data line 0 from OMAP
8	MMC-DAT1	←→	SD card data line 1 from OMAP
9	MMC-DAT2	←→	SD card data line 2 from OMAP
10	Not used		Not used
11	Not used		Not used
	SW1	←	SD card hot insertion/de-insertion detection line to OMAP
	SW2		Ground
	G1		Ground
	G2		Ground
	G3		Ground
	G4		Ground

7.1.8 SIM Card Connector (J101 on SD/SIM board)

The SIM card connector is a 7-pin inner signal exchanging connector that connects to the SIM card on the SD/SIM board. The signal names below are based on the signal names on the schematic of the SD/SIM board.



Pin No.	Signal Name	SD/SIM Board ←→ SIM	Function
C1	VSIM1	→	SIM card power supply controlled by S-GOLD
C2	CC-RST	→	SIM card reset control from S-GOLD
C3	CC-CLK	→	SIM card clock from S-GOLD
C4	N/A		N/A
C5	GND		Ground
C6	Not used		Not used
C7	CC-IO	←→	SIM card IO data from S-GOLD
SW1	GND		Ground
SW2	GND		Ground
G1	GND		Ground
G2	GND		Ground

8 FAULT FINDING

8.1. RF Waveforms

NOTE: *The measurements shown below are by FET probe. When using a FET probe, it should be protected by a 10 dB pad. Some of the measurement points are non-50 Ω, therefore signal levels are approximate. Do not probe the output of the Power Amplifier or the Front-end Module's transmit path*

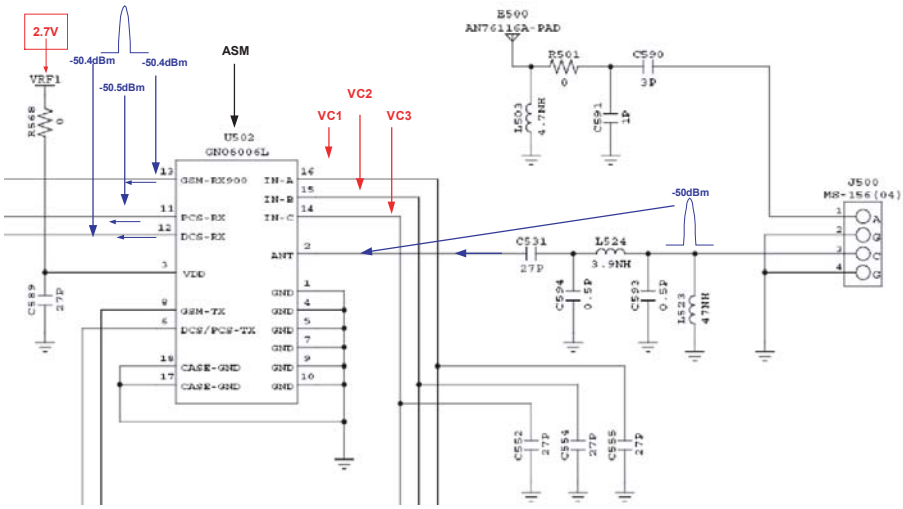


Figure 8.1: Front-end Module (U502), receive-path signals

PATH	VC1	VC2	VC3	Vdd
E-GSM-Rx	Low	High	Low	High
DCS-Rx	Low	Low	Low	High
PCS-Rx	Low	Low	High	High

Front-end Module control logic, receive mode. High = 2.7V; Low = 0V

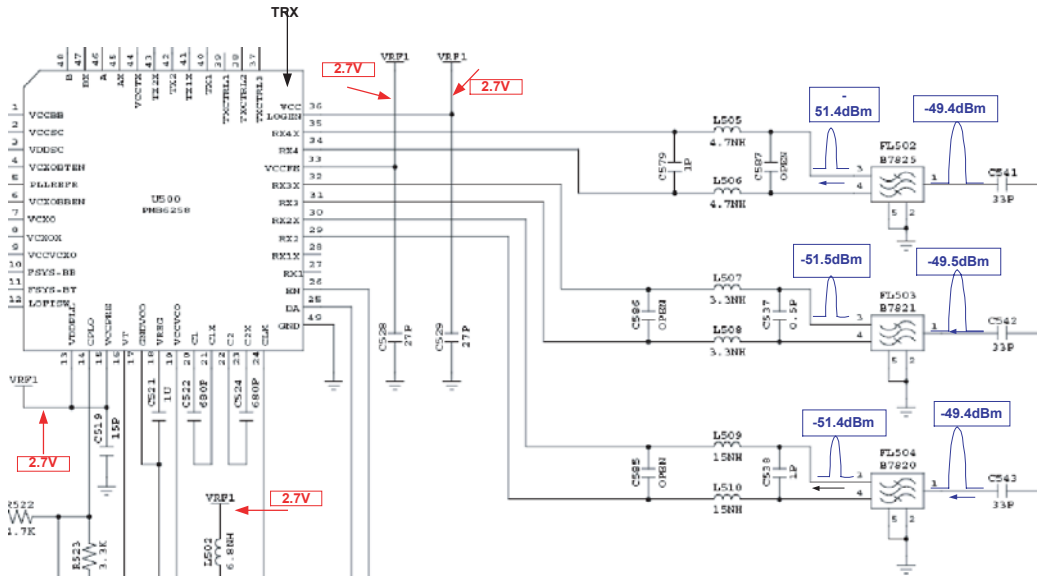


Figure 8.2: Transceiver IC (U500) and Rx band-pass filters (FL502, FL503, and FL504),receive-path signals

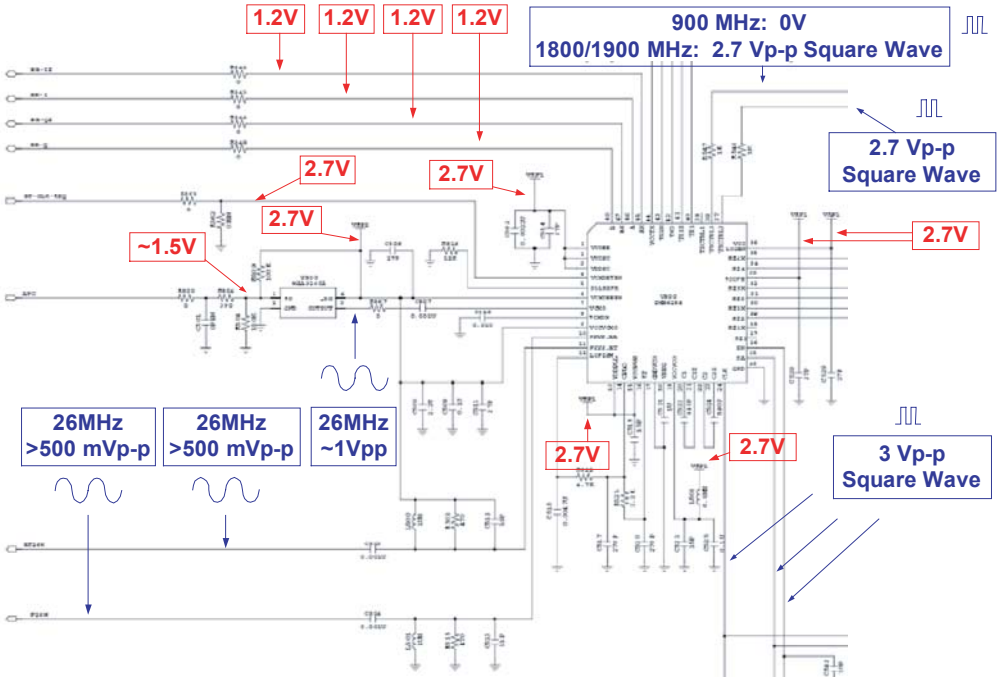


Figure 8.3: Transceiver IC (U500) and VCTCXO (Y500), clock and control signals

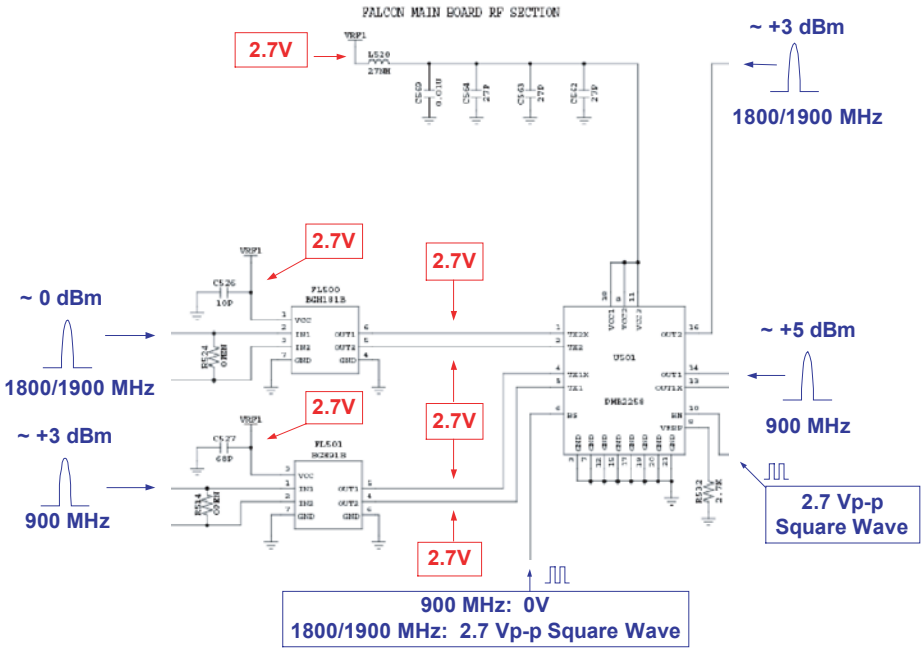


Figure 8.4: 3rd Harmonic (H3) filters (FL500 and FL501) and Limiter Amplifier (U501), transmit-path signals

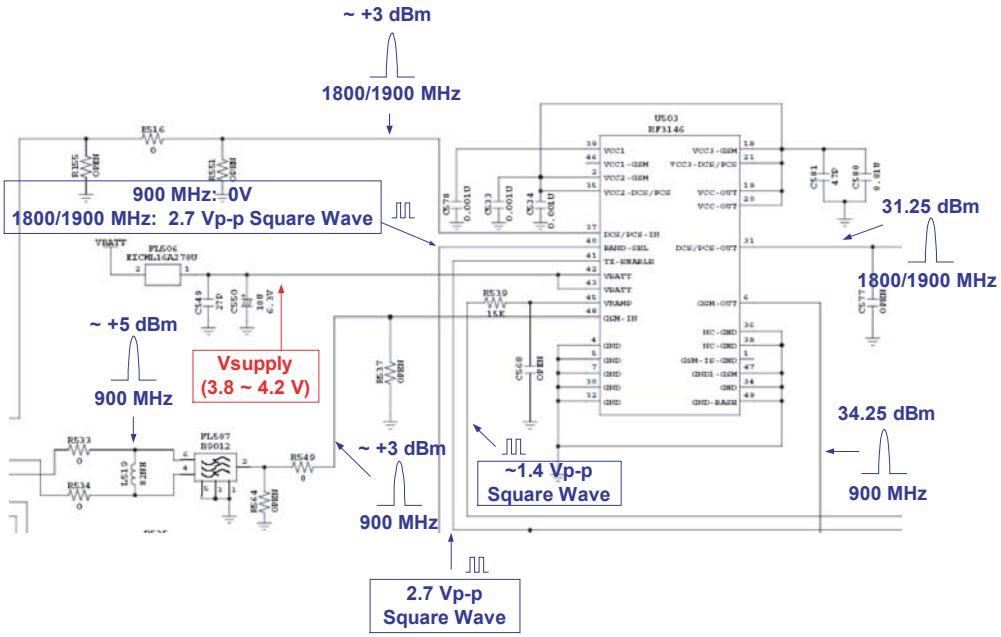


Figure 8.5: Tx SAW filter (UFL507) and Power Amplifier (U503), transmit-path signals

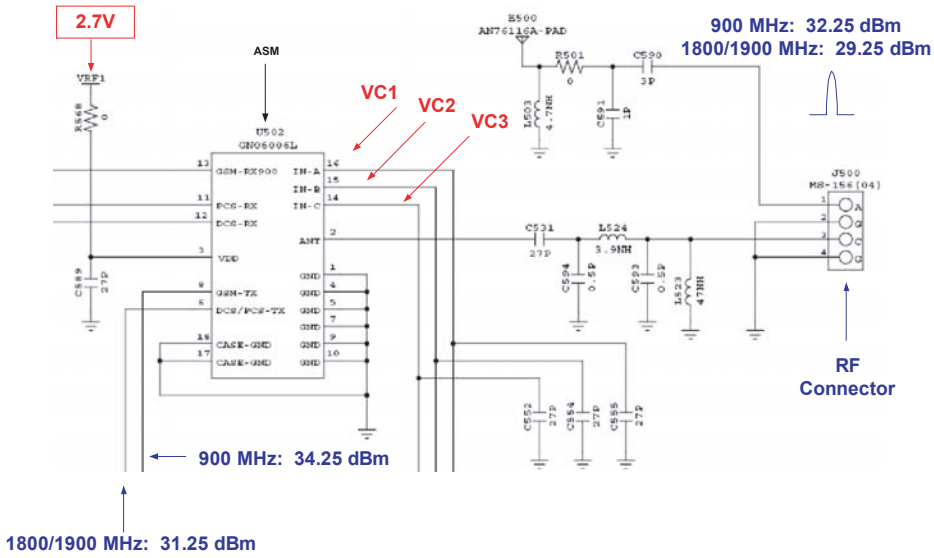


Figure 8.6: Front-end Module (U502), transmit-path signals

PATH	VC1	VC2	VC3	Vdd
E-GSM-Tx	High	High	Low	High
DCS-Tx	High	Low	Low	High
PCS-Tx	High	Low	Low	High

Front-end Module control logic, transmit mode. High = 2.7V; Low = 0V

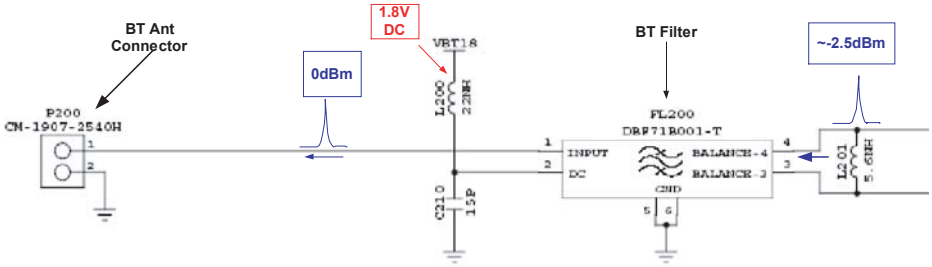


Figure 8.7: Bluetooth filter (FL200)

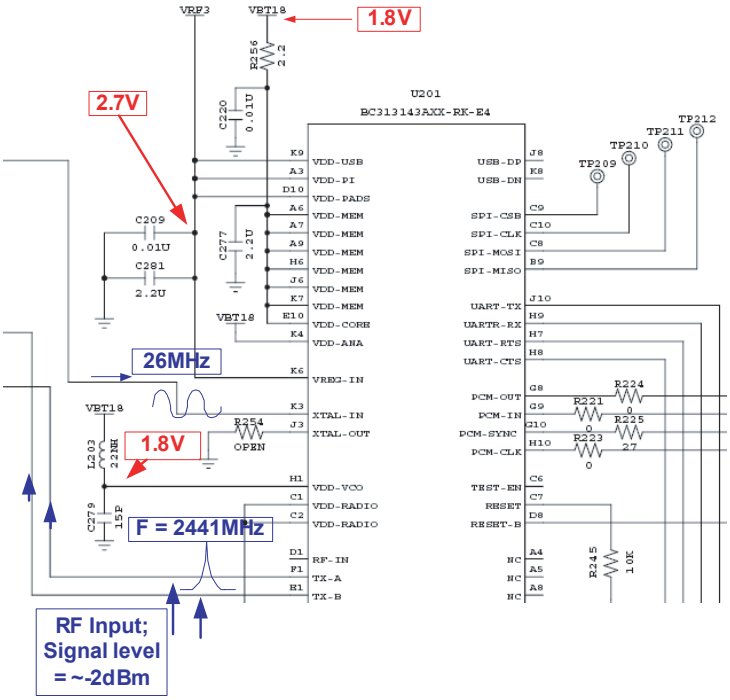


Figure 8.8: Bluetooth module (U201)

8.2. Baseband Fault Analysis

8.2.1 Major Power-on Fault Analysis

On the X700 handset, major power-on fault is defined as the failure of powering up the phone from the major hardware components or software code such as 26MHz system clock failure, S/M power failure, S-GOLD failure, and S-GOLD code corruption. Use the flow chart below to identify possible faults that could be attributed to a BGA device. Fault Codes should be debugged sequentially. The measurements shown below are by FET probe on non-50 Ω tracks, therefore signal levels are approximate.

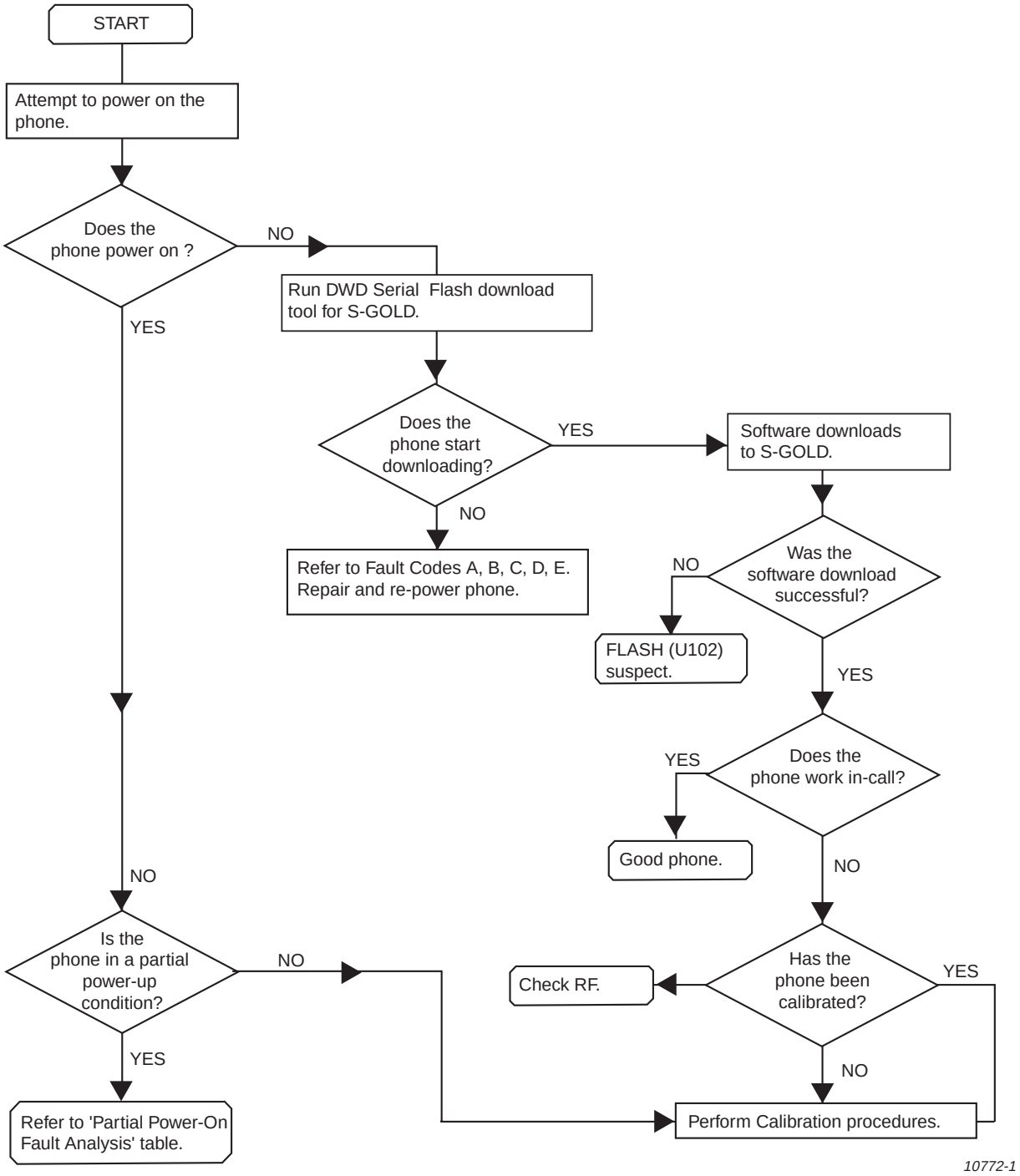


Figure 8.9: Major Power-on Fault Analysis Chart

Fault Code	Symptoms	Root Cause	Debugging Action
A	No 26MHz at C504	Bad Y500 or no VRF1 voltage	Check pin3 of Y500, replace Y500 if there is no 26MHz clock. Check VRF1/TP335 with Ohm meter, if <100 Ohm, debug the RF section; Otherwise, replace U304, S/M power.
B	No related default voltage supply to S-GOLD.	Battery input circuitry to the phone is broken, or Bad S/M power IC.	Check VDBB/TP324 (1.8V), VINT/TP328 (2.7V), VLBB2/TP326 (1.5V); Check VBATT input paths to the S/M power. If OK, replace S/M power IC U304.
C	RESET-N/TP323 is not logic high	Bad S/M power IC or soldering problem.	Check TP323 and R350, replace U304 if logic low at both end of R350.
D	S-GOLD is not working.	Bad S-GOLD IC or soldering problem.	Replace S-GOLD IC U100.
E	Failed to re-load the software to S-GOLD from either inner boot loader or flash boot loader.	Corrupted boot loader inside S-GOLD IC.	Replace S-GOLD IC U100 and reload the S-GOLD software.

8.2.2 Partial Power-on Fault Analysis

On the X700 handset, a partial power-on fault is defined as the major hardware components or main software code functioning correctly with no failures on Fault Codes A to E. However, the handset fails to power up completely because of some other hardware or software failure.

The possible partial power on fault can be divided to two categories as follows:

- S-GOLD controlled hardware circuits failed to completely power up or run up from initialization.
- OMAP controlled hardware circuits failed to completely power up or run up from initialization.

Use the two Fault Code tables below.are recommended to follow through for possible Fault Finding. The Fault Codes should be debugged sequentially.

8.2.3 GOLD Controlled Hardware Fault from Initialization

Fault Code	Symptoms	Root Cause	Debugging Action
F	S-GOLD does not supply 13 MHz / TP219 to OMAP or / and release AP-RST/TP109	Corrupted S-GOLD code; or unstable VRF1 supply causes 26MHz clock unstable.	Re-load the latest S-GOLD code; Check VRF1 / TP335 with Ohm meter. If < 100 Ω, debug the RF section. Check pin 2 of U204 for 13MHz clock; If problem persists, replace S/M power IC U304
G	Keypad backlighting is not turned on, or turns on much later than normal.	Corrupted S-GOLD code; or unstable VRF1 supply causes 26MHz clock instablity; or bad I2C link from SGOLD to S/M power IC.	Check VRF1/TP335 with Ohm meter, if <100 Ohm debug the RF section; Re-load the latest S-GOLD code; Check +15V/TP309, if present I2C link is OK; If problem persists, replace S/M power IC U304
H	DCDCOUT +15V/TP309 is not turned on.	Corrupted SGOLD code; or unstable VRF1 supply causes 26MHz clock instablity; or bad I2C link from S-GOLD to Companion IC	Check VRF1/TP335 with Ohm meter, if < 100 Ω, debug the RF section; Re-load the latest S-GOLD code; If keypad backlighting is on, I2C link is OK; Check D300 with an Ohm meter; Replace Q300; If problem persists, replace Companion IC U300.

8.2.4 OMAP Controlled Hardware Fault from Initialization

Fault Code	Symptoms	Root Cause	Debugging Action
I	No related default voltage supply to OMAP	Voltage supply shorting; or bad S/M power IC; or bad Companion IC	Check VDBB/TP324 (1.8V), V28/ TP330 (2.8V), VBB3/TP342 (1.5V); If one or more than one of above voltages are not present, use an Ohm meter to check possible shorting to GND. If no VBB3, replace U300 Companion IC; If no V28, replace U304 S/M power
J	OMAP fails to run up with 13MHz clock and AP-RST released.	32 kHz crystal failure; or OMAP flash code corrupted; or OMAP flash failure.	Check TP218 for 32KHz clock, replace 32kHz crystal Y200 if the clock is not present; Reload OMAP code to OMAP flash memory; If reloading failed, replace OMAP memory chip U203.
K	Phone fails to communicate with PhoneTool software via USB link.	OMAP flash code corrupted; or OMAP flash failure; or broken USB link.	Reload OMAP code to OMAP flash memory; If reloading failed, replace OMAP memory chip U203; Check VUSB/TP340 shorting and voltage, replace S/M power if no shorting and no VUSB voltage; Check possible broken USB physical link from External I/O to R250, R251 and R253 with an Ohm meter.
L	After the phone powers on, the main LCD displays a frozen image.	SIM card is not inserted or damaged or SD/SIM card board is damaged.	Check if SIM card is inserted. Insert a known good SIM card. Replace SD/ SIM card board.
M	Main LCD and Sub LCD backlighting not turned on	Refer to Fault Code H	Refer to the Fault Code H
N	Main LCD displays nothing or something unusual.	Bad main LCD module or bad LCD module connection.	Check for short circuits or damage to Main Board flexistrip connector to Main LCD. Check for shorts or damage to main LCD connector. If no damage found, replace LCD module.
O	Sub LCD display is blank or corrupt.	Bad Sub LCD module or connection.	Check for short circuits or damage to Main Board flexistrip connector to Sub LCD. Check for shorts or damage to Sub LCD connector. If no damage found, replace Sub LCD module.
P	Camera viewfinder mode displays unusual or unstable image.	Bad camera module or connection.	Check for short circuits or damage to Main Board flexistrip connector to camera. Check for shorts or damage to camera connector. If no damage found, replace camera module.
Q	SD card not working.	Bad SD card connection or damaged SD/SIM card board.	Check for shorting or damage on Main Board connector to SD/SIM board. Check for shorting or damage to SD/ SIM PCB. If no damage found, replace SD/SIM PCB.
R	IrDA is not working.	Bad IrDA connection or damaged IrDA module.	Check for shorting or damage to Main Board connector to IrDA module. If no damage found, replace IrDA module DS103.

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9 CALIBRATION PROCEDURES

9.1 Introduction

NOTE: For software download instructions, refer to the User Manual supplied with the Dragonfly software.

The following procedures MUST be performed after replacement or repair of the PCB. Failure to do so may result in incorrect operation of the telephone.
The following adjustments MUST be made to the complete unit using the appropriate Repair Jig. The applied voltage should be a constant 3.8V with a current limit of 2.5A.
There are four distinct calibration procedures to adjust RF performance. These procedures are: Carrier Power calibration (Section 9.2.)
RSSI (Section 9.3.) also
To ensure that the phone is within set SAR margins after a Peak Power Calibration has been performed, a power meter that is accurate to 0.2 dB MUST be used.The output power of the phone can be influenced by the RF/Logic shield covers, therefore all power calibration procedures MUST be performed with the shield frames and covers fitted.
IF ANY OF THE RF OR LOGIC SHIELDS ARE REMOVED FROM THE PCB AT ANY TIME, THEY MUST BE REPLACED BY NEW ITEMS. ONCE REMOVED, THE SHIELDS MUST **NOT** BE REUSED.

9.2 Carrier Power Calibration

9.2.1 General Information

Tx Calibration can be performed manually Manual Calibration is used to adjust or verify each calibration channel in turn.
To minimise the variation of Tx power with frequency due to component tolerance, each GSM band is split into sub-bands, which are calibrated separately. The calibration bands and channels used are as follows:

Band	Segment	Calibration Channel
EGSM 900	0	9
	1	67
	2	124
	3	975
GSM 1800	0	512
	1	636
	2	761
	3	885
GSM 1900	0	512
	1	612
	2	710
	3	810

9.2.2 Power Level Tables

The following tables show the measurement limits according to power level:

EGSM 900

Power Level (PL)	Output Power (dBm)		
	Nominal	Target	
		Min	Max
5	32.25	32.0	32.5
6	30.5	30.0	31.0
7	29.0	28.5	29.5
8	27	26.5	27.5
9	25	24.5	25.5
10	23	22.5	23.5
11	21	20.5	21.5
12	19	18.5	19.5
13	17	16.5	17.5
14	15	14.5	15.5
15	13	12.5	13.5
16	11	10.5	11.5
17	9	8.5	9.5
18	7	6.5	7.5
19	5	4.5	5.5

GSM 1800

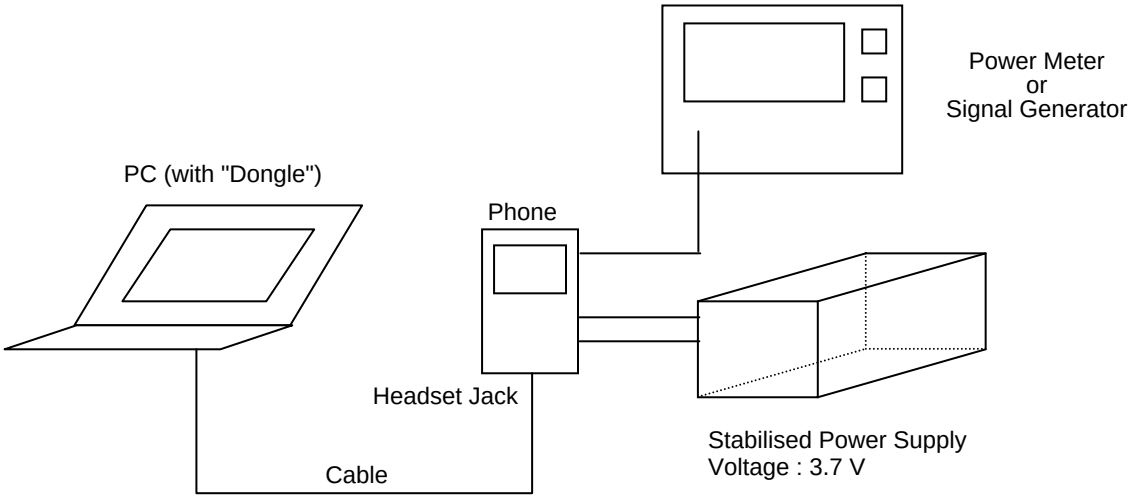
Power Level (PL)	Output Power (dBm)		
	Nominal	Target	
		Min	Max
0	29.25	29.0	29.5
1	27.5	27.0	28.0
2	26.0	25.5	26.5
3	24.0	23.5	24.5
4	22.0	21.5	22.5
5	20.0	19.5	20.5
6	18.0	17.5	18.5
7	16.0	15.5	16.5
8	14.0	13.5	14.5
9	12.0	11.5	12.5
10	10.0	9.5	10.5
11	8.0	7.5	8.5
12	6.0	5.5	6.5
13	4.0	3.5	4.5
14	2.0	1.5	2.5
15	0.0	-0.5	0.5

GSM 1900

Power Level (PL)	Output Power (dBm)		
	Nominal	Target	
		Min	Max
0	29.25	29.0	29.5
1	27.5	27.0	28.0
2	26.0	25.5	26.5
3	24.0	23.5	24.5
4	22.0	21.5	22.5
5	20.0	19.5	20.5
6	18.0	17.5	18.5
7	16.0	15.5	16.5
8	14.0	13.5	14.5
9	12.0	11.5	12.5
10	10.0	9.5	10.5
11	8.0	7.5	8.5
12	6.0	5.5	6.5
13	4.0	3.5	4.5
14	2.0	1.5	2.5
15	0.0	-0.5	0.5

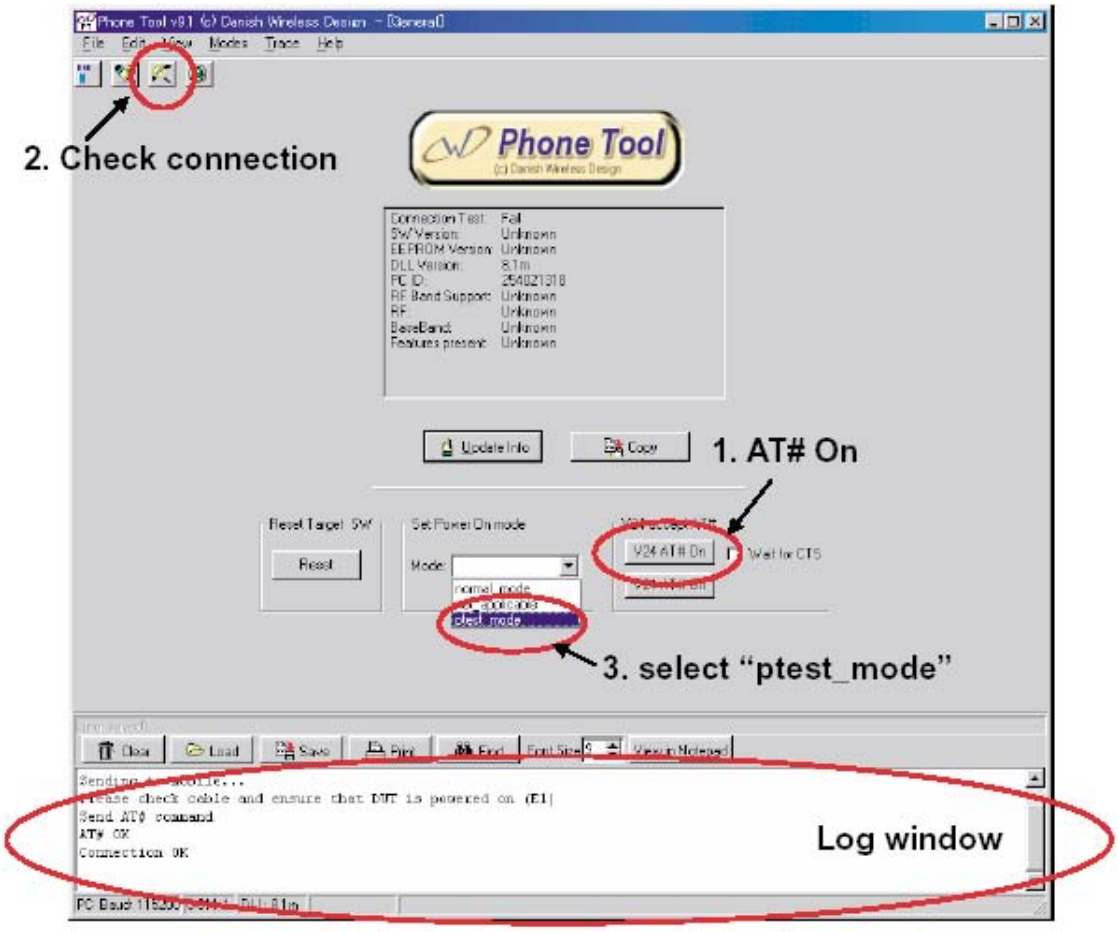
9.3 Baseband Calibration

9.3.1 System Overview



9.3.2 P-test Mode

Press the power key to turn on the mobile phone.
Start the PhoneTool program.
The following screen is then displayed:

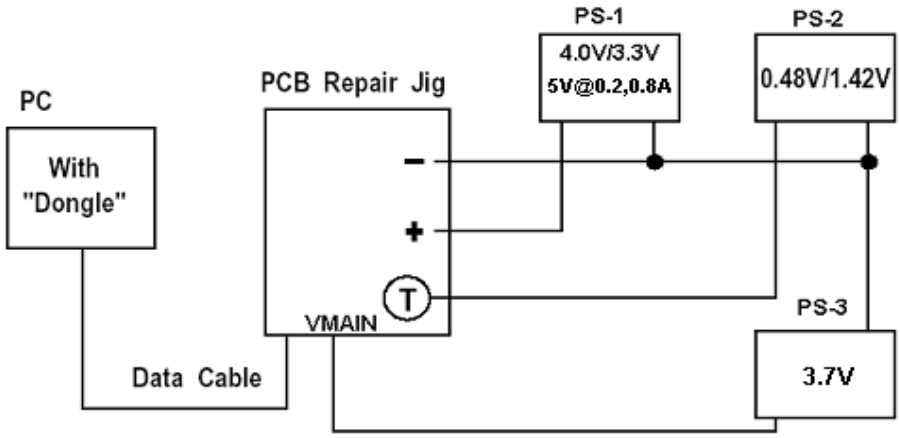


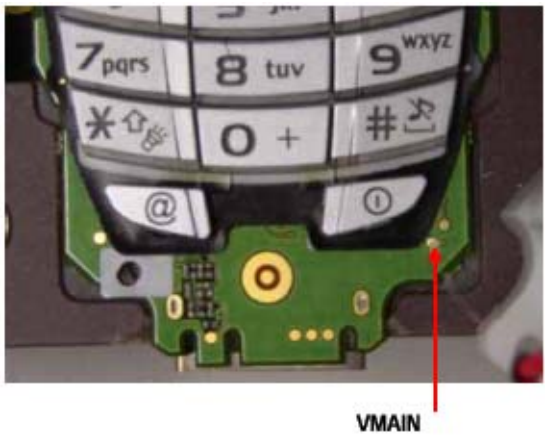
1. Click the "**V24 AT# On**", and check the log window. >>> "**AT# OK**"
2. Click the **Check Connection button**, and check the log window. >>> "**Connection OK**"

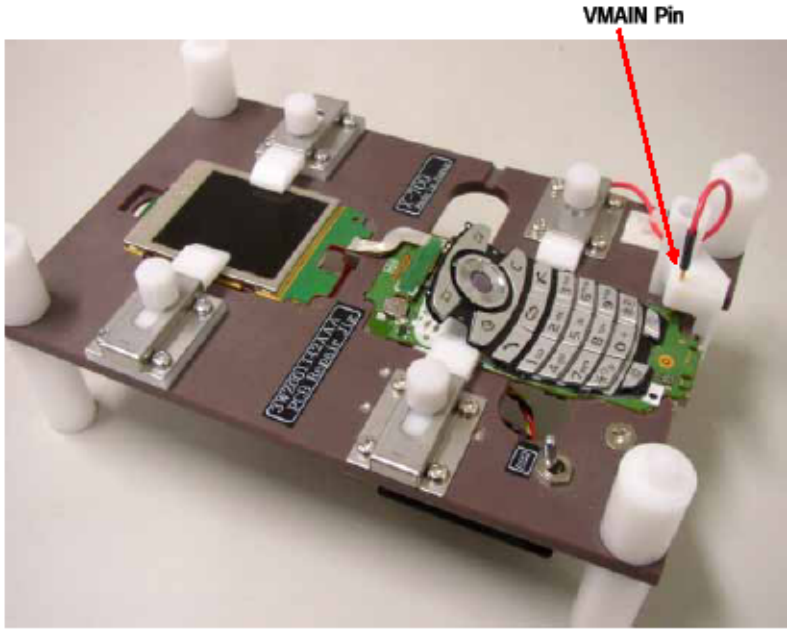
NOTE : If the message "**ERROR! No Connection**" is displayed, check the cable connections, the power supply and that the phone is switched on. Repeat steps 1 and 2.

3. Select "**ptest_mode**", and check the log window. >>> "**Sending to mobile...OK**".
The mobile is now in ptest_mode.

9.3.3 Battery Voltage AD / Temperature AD Calibration

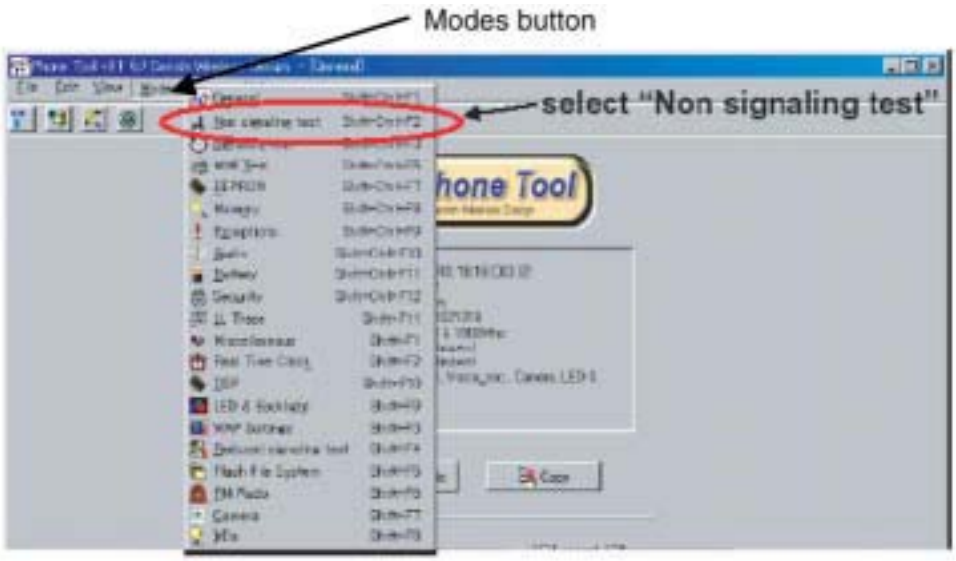


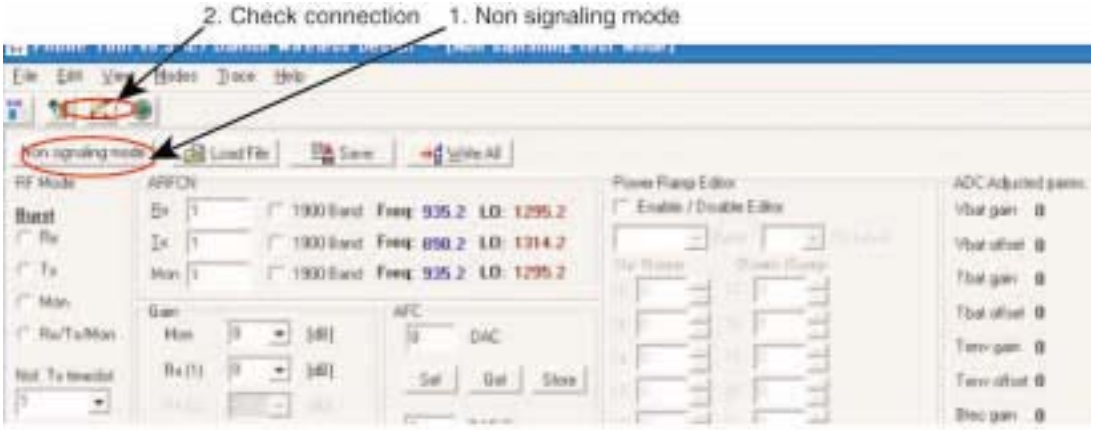




9.3.4 Battery Voltage AD Calibration

1. Click mode button and select "**Non signaling test**".





1. Click the "**Non signaling mode**" button.
2. Click the Check Connection button.

3. Check the "On" box located on the bottom of the ADC Meas(urement) box.
4. Change the power supply PS-1 voltage from 3.7 V to 4.0 V
5. Monitor the vbat ADC value in the ADC Meas. box.
   If this average value is outside the range of 3800 to 3400, then the unit has failed.
6. Enter the average vbat ADC value into the Battery ADJ Excel sheet in the vbat=4.0V field.
7. Change the power supply-1 voltage from 4.0v to 3.3v.
8. Monitor the vbat ADC value in the ADC Meas. box.
   If this average value is outside the range of 3100 to 3500, then the unit has failed.
9. Enter the average vbat ADC value into the Battery ADJ Excel sheet in the vbat=3.3V field.
10. Change the power supply voltage from 3.3v to 3.7v.

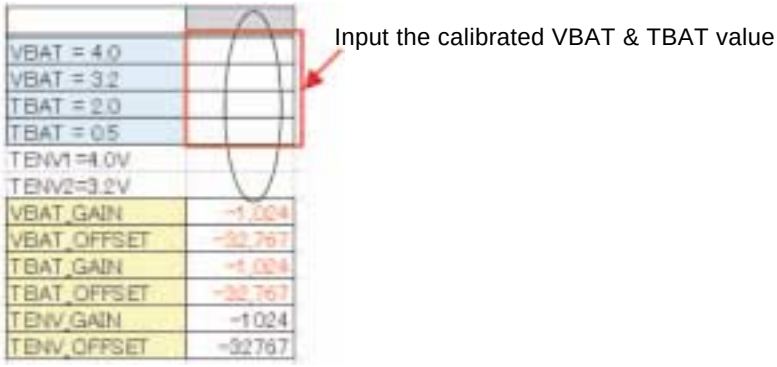
9.3.5 Current AD Calibration

Note: For this testing PS-3 must be able to sink current. PS-1 also needs to have an extremely accurate current sourcing capability. Agilent 66311B power supplies or equivalent are recommended for this calibration.

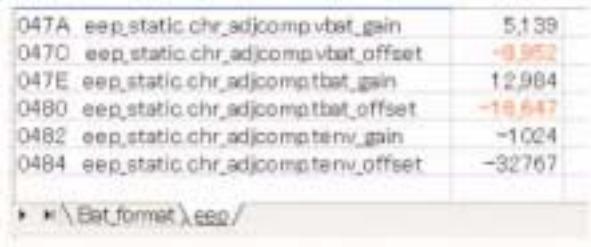
1. Connect power supply PS-3 so that it supplies 3.7V to VMAIN
2. Change PS-1 so that it is set to 5V with a current limit of 200mA.
3. Monitor the curr. ADC value in the ADC Meas. box.
   If this average value is outside the range of 2400 to 2900, then the unit has failed.
4. Enter the average curr. ADC value into the Battery ADJ Excel sheet in the curr=200mA field.
5. Change PS-1 so that it is current limited to 800mA.
6. Monitor the curr. ADC value in the ADC Meas. box.
   If this average value is outside the range of 3100 to 3600, then the unit has failed.
7. Enter the average curr. ADC value into the Battery ADJ Excel sheet in the curr=800mA field.
8. Change PS-1 back to 3.7V with a current limit of 3A. Disconnect PS-3.

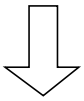
9.3.6 Battery Temperature AD Calibration

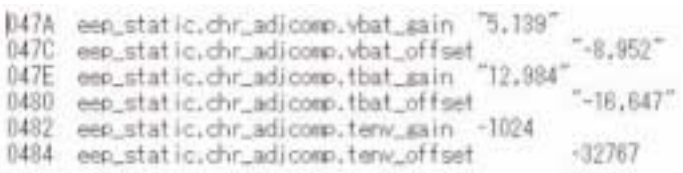
1. Connect PS-2 so that 1.42V is supplied to TBAT.
2. Monitor the average value of the tbat ADC reading.
   If this average value is outside the range of 3700 to 3300, then the unit has failed.
3. Enter the average tbat ADC value into the Battery ADJ Excel sheet in the tbat=1.42V field.
4. Change the power supply PS-2 voltage from 1.42 V to 0.48 V.
5. Monitor the average value of the tbat ADC reading.
   If this average value is outside the range of 2300 to 2800, then the unit has failed.
6. Enter the average tbat ADC value into the Battery ADJ Excel sheet in the tbat=1.42V field. The recorded VBAT/TBAT values will be used to automatically calculate the VBAT_GAIN/OFFSET and TBAT_GAIN/OFFSET. It will then be stored to the eep file of the BATT format Excel sheet.



7. Convert the Excel sheet of EEP data to TXT(text) format.
   File -> Save As -> Text(Tab delimited) -> Save





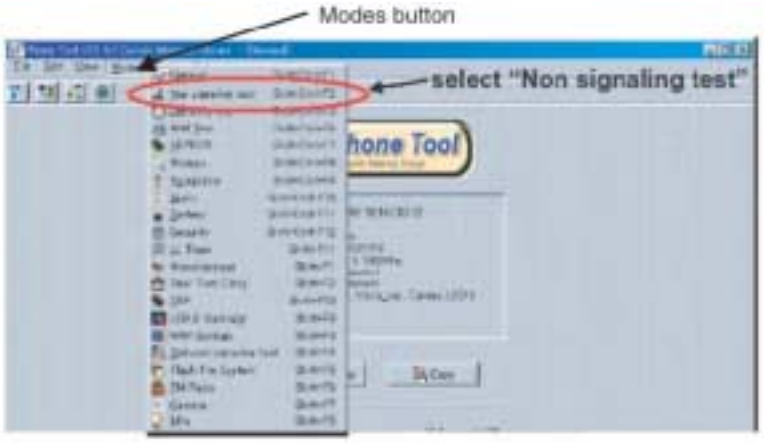


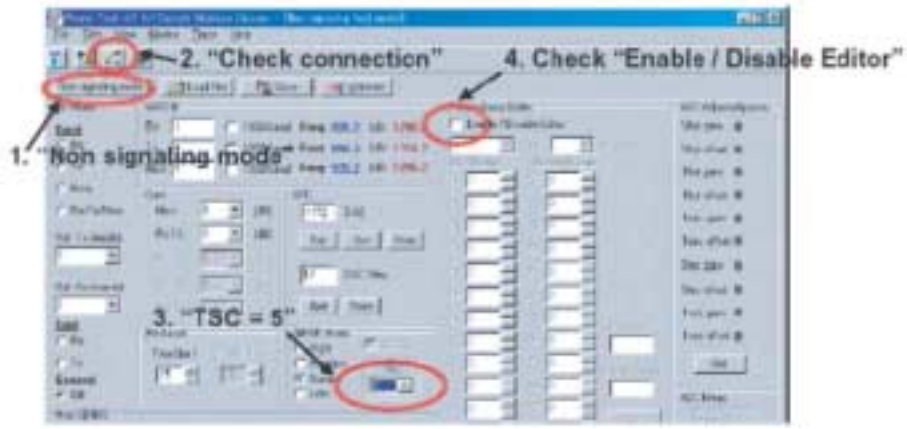
8. Rename the text file from the original filename and then save to PC.

9.4 Transmit Power Calibration

Note: Before calibrating the mobile, ensure that:

1. The latest version of Panasonic PhoneTool (Version 10.0) is being used.
2. The mobile has been placed in Test Mode.
3. The supply voltage is set to 3.8V with a current limit of 2.5A or higher.



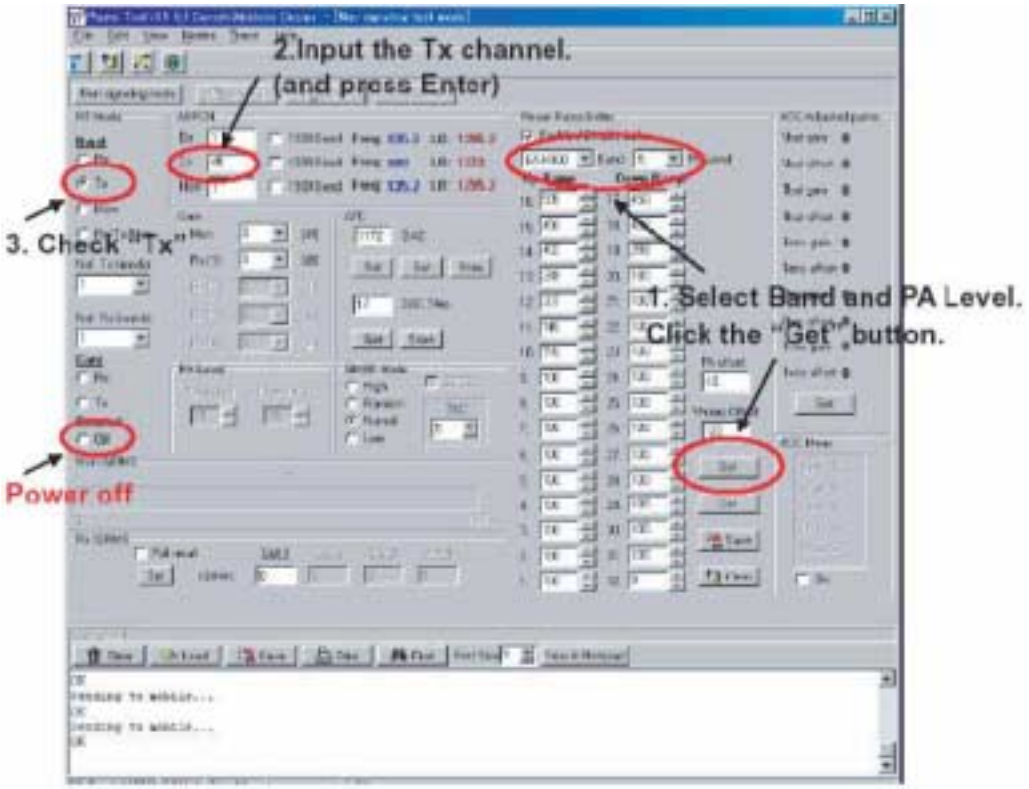


To begin calibration of the transmitter, select "**Non-Signaling Test**" from the "**Modes**" pull-down menu in PhoneTool and complete the following steps:

1. Click the "**Non-Signaling Mode**" button.
2. Click the "**Check Connection**" button.
3. Select **TSC = 5**. (Make sure the call box has the same setting for TSC)
4. Check "**Enable/Disable Editor**".

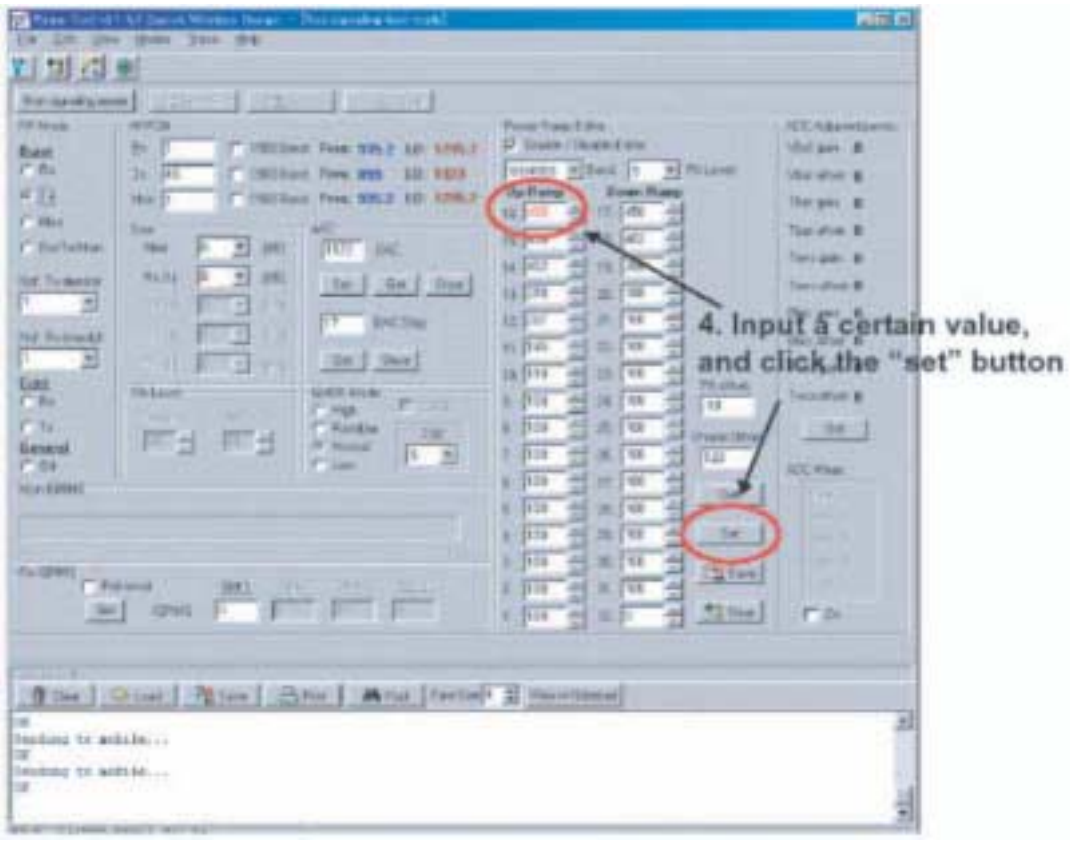
Power Level Calibration

Before starting the Power Level Calibration, the Power Ramp Editor should be enabled, as described above in Step 4. The mobile should be in a test fixture and connected to a calibrated power meter. It is recommended that a broadband 10dB attenuator be placed on the output of the test fixture (and included in the power meter offset) to insure a stable 50 ohm load is presented to the handset. Failure to do so may result in inaccurate power calibration.

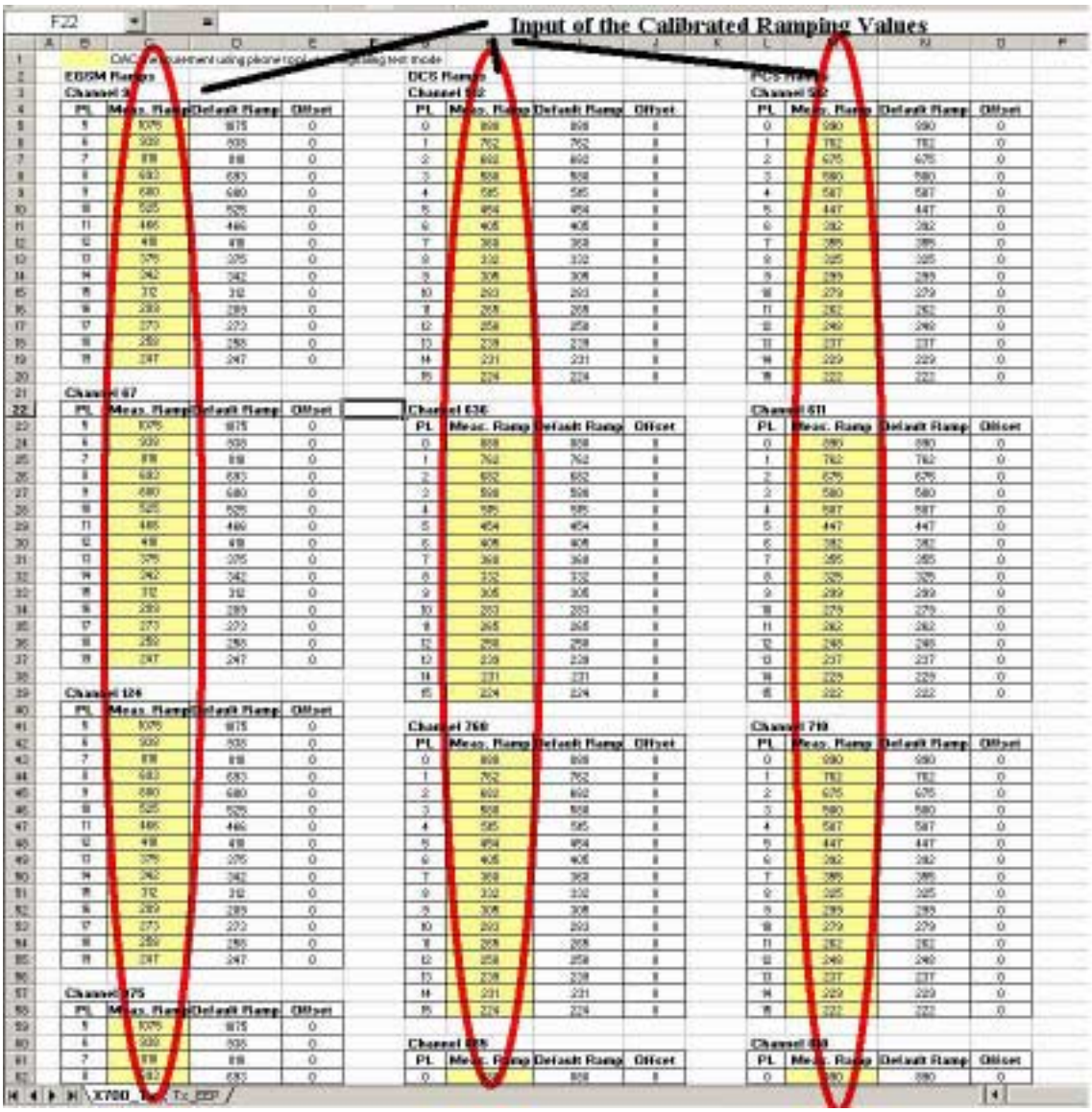


To adjust the DAC to obtain the desired Tx power level:

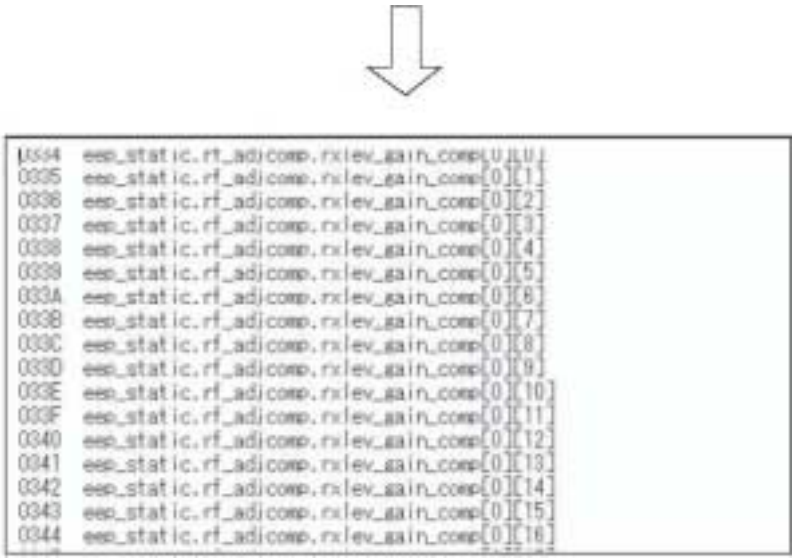
1. Select the required "**Band**" and "**PA Level**," and click the "**Get**" button. The default ramping value for the selected band and PA Level will be displayed.
2. Input the Tx ARFCN (see "Calibration Channels" at the end of this section for the input channel), and press Enter key. **NOTE**: If the PCS band is being calibrated, the "**1900 Band**" box must first be checked.
3. Under the "**RF Mode**" heading, check the "**Burst Tx**" box. The handset will transmit, and the power meter will display the default Tx power output.
4. Input an appropriate value for "**DAC16**", and click "**Set**". Check that the power meter registers a change in power level. **NOTE:** Before setting a new DAC16 value, turn off the transmitter by clicking "**General Off**"



5. Repeat Step 4 (input and set) until the target power level is displayed on the power meter. (Refer to the **Calibration Specification** tables at the end of this section for target power levels.)
6. Enter the final **DAC16** value from Step 5 into the TX Excel spreadsheet. The spreadsheet will automatically calculate the channel compensation value and place it in the appropriate eep memory location on the eep worksheet within the same Excel file.



7. To calibrate other PA Levels or Bands, repeat Steps 1 through 6.
8. When all channels, power levels, and bands are calibrated, save the Excel sheet of eep data using File -> Save As -> Text (Tab delimited) -> Save.



9. Proceed to Section 4.0 of this document if nothing else needs to be calibrated. Otherwise, continue with subsequent calibration sequences.

Calibration Channels

The following table shows the calibration channels. It is important to perform the calibration at these specific channels, as the software performs linear interpolation based upon these channels.

Band	Segment	Calibrating Channel
E-GSM (0)	0	9
	1	67
	2	124
	3	975
DCS (1)	0	512
	1	636
	2	761
	3	885
PCS (2)	0	512
	1	612
	2	710
	3	810

Calibration Limits

The following tables provide the target output power levels for calibration. For each power level, the target power is listed in the Nominal column. The calibrated power must always fall within the Target Min and Max ranges listed to the right of the Nominal target.

E-GSM 900

Power Level (PL)	Output (dBm)		
	Target	Limits	
		Min	Max
5	32.25	32.0	32.5
6	30.5	30.0	31.0
7	29.0	28.25	29.5
8	27.0	26.25	27.75
9	25.0	24.25	25.75
10	23.0	22.25	23.75
11	21.0	20.25	21.75
12	19.0	18.25	19.75
13	17.0	16.25	17.75
14	15.0	14.25	15.75
15	13.0	12.25	13.75
16	11.0	10.25	11.75
17	9.0	8.25	9.75
18	7.0	6.25	7.75
19	5.0	4.0	5.75

DCS1800

Power Level (PL)	Output (dBm)		
	Target	Limits	
		Min	Max
0	29.25	29.0	29.5
1	27.5	27.0	28.0
2	26.0	25.25	26.5
3	24.0	23.25	24.75
4	22.0	21.25	22.75
5	20.0	19.25	20.75
6	18.0	17.25	18.75
7	16.0	15.25	16.75
8	15.0	13.25	14.75
9	14.0	11.25	12.75
10	13.0	9.25	10.75
11	8.0	7.25	8.75
12	6.0	5.25	5.75
13	4.0	3.25	4.75
14	2.0	1.25	2.75
15	0.0	–1.0	0.75

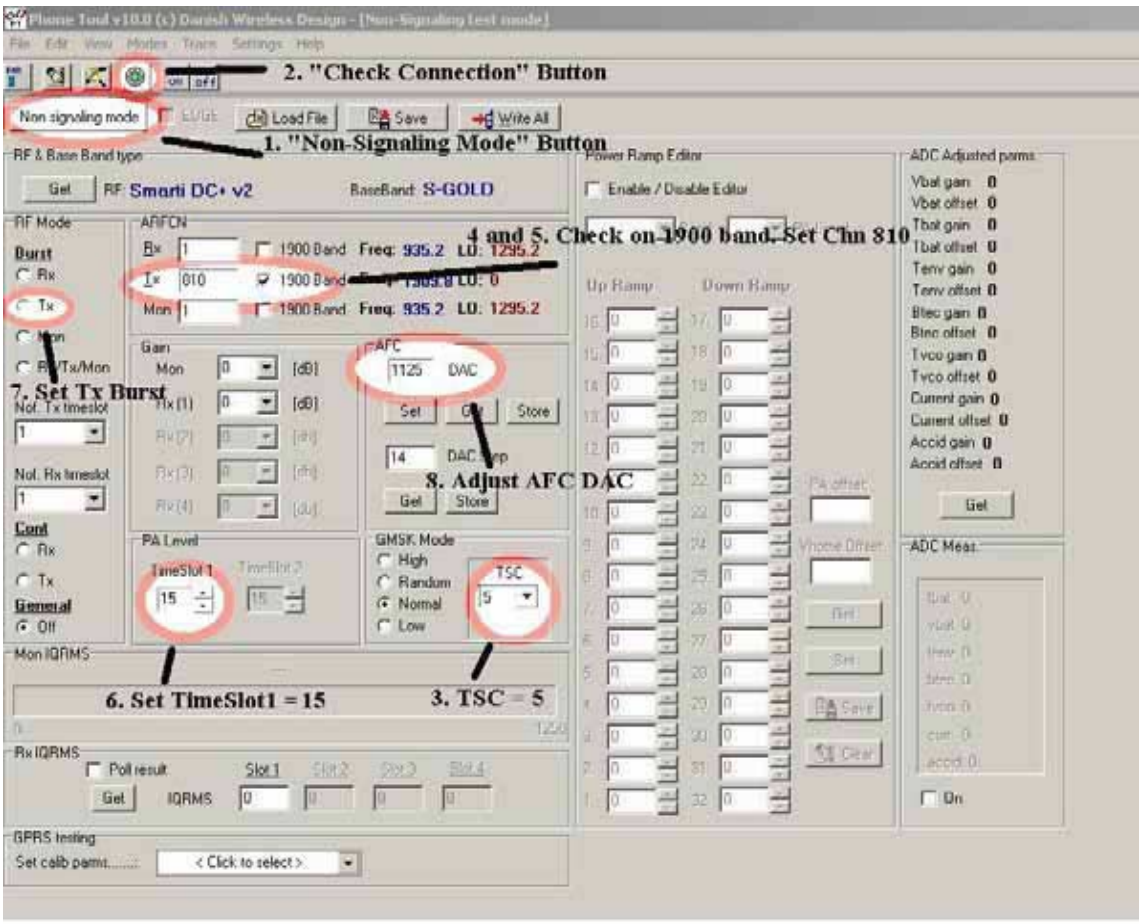
PCS1900

Power Level (PL)	Output (dBm)		
	Target	Limits	
		Min	Max
0	29.25	29.0	29.5
1	27.5	27.0	28.0
2	26.0	25.25	26.5
3	24.0	23.25	24.75
4	22.0	21.25	22.75
5	20.0	19.25	20.75
6	18.0	17.25	18.75
7	16.0	15.25	16.75
8	15.0	13.25	14.75
9	14.0	11.25	12.75
10	13.0	9.25	10.75
11	8.0	7.25	8.75
12	6.0	5.25	5.75
13	4.0	3.25	4.75
14	2.0	1.25	2.75
15	0.0	–1.0	0.75

9.5 VCTCXO (Frequency) Calibration

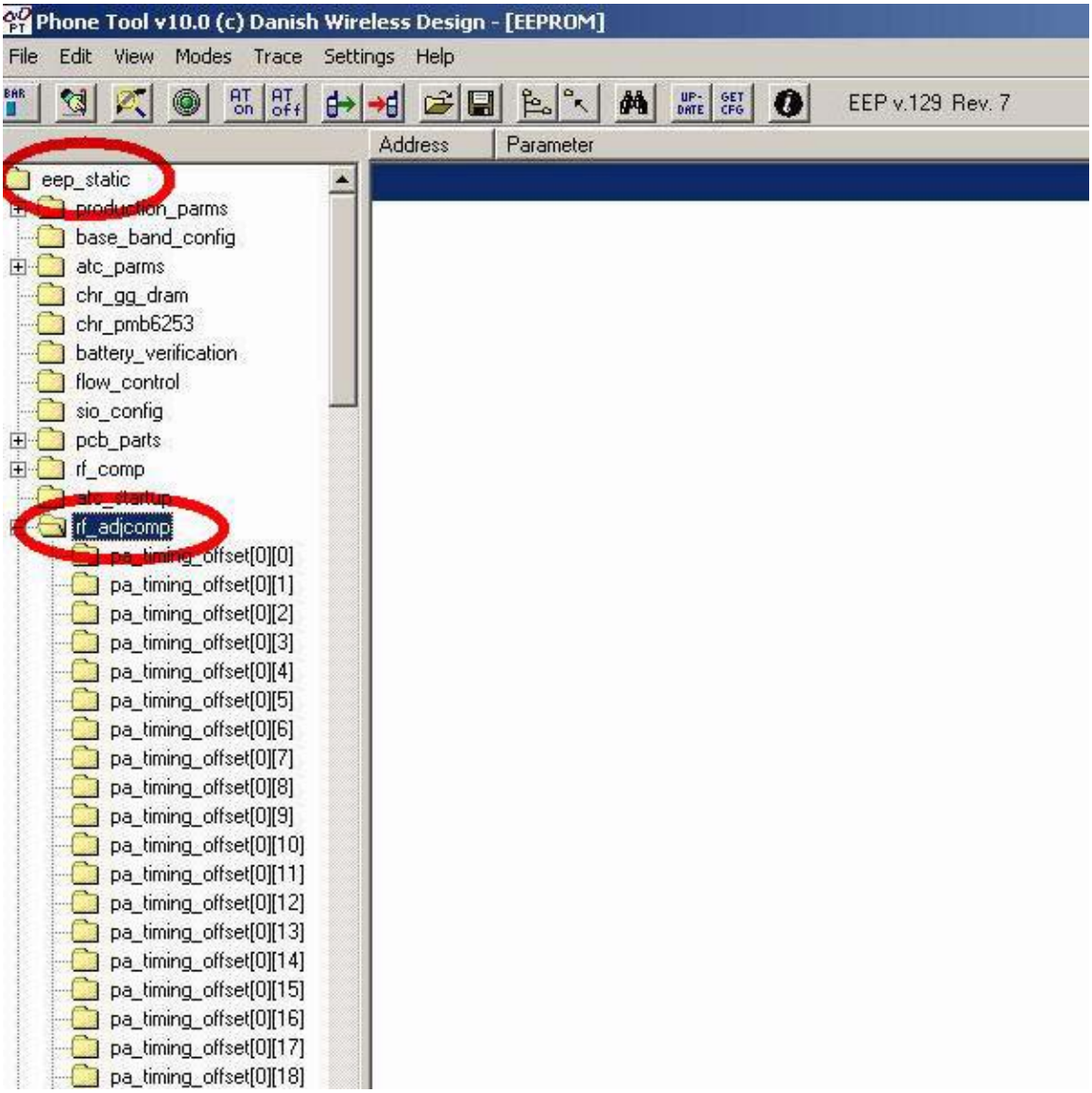
Note: Before calibrating the mobile, ensure that:

1. The latest version of Panasonic PhoneTool (Version 10.0) is being used.
2. The mobile has been placed in Test Mode.
3. The supply voltage is set to 3.8V with a current limit of 2.5A or higher.



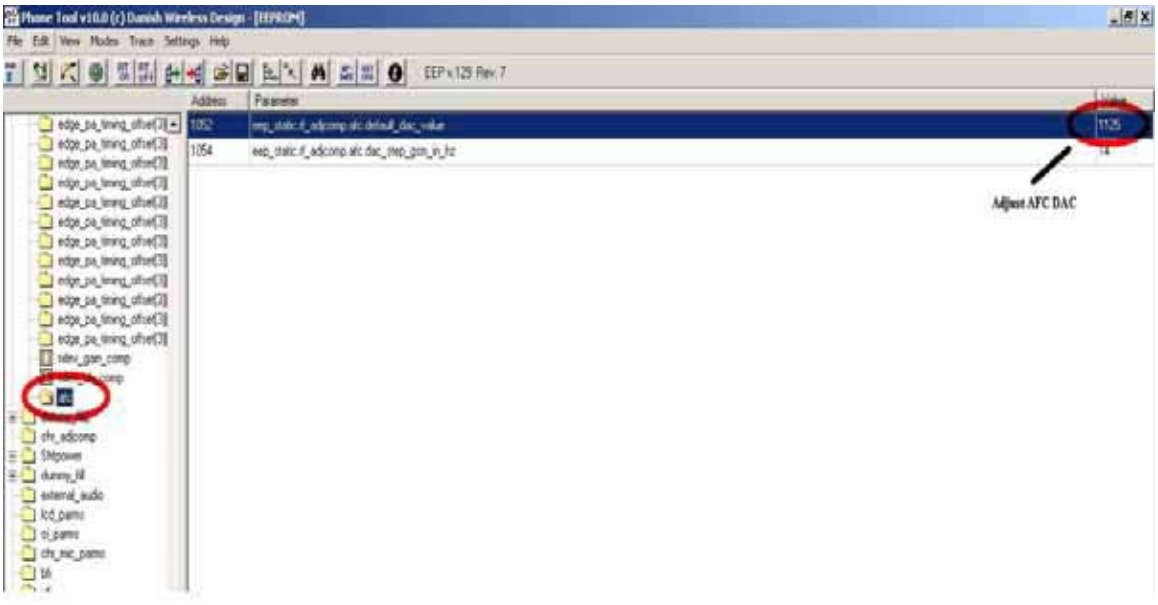
To begin calibration of the VCTCXO, select “Non-Signaling Test” from the “Modes” pull-down menu in PhoneTool and complete the following steps:

1. Click the "**Non-Signaling Mode**" button.
2. Click the “**Check Connection**” button.
3. Select **TSC = 5**. (Make sure the call box has the same setting for TSC)
4. Check the “**1900 Band**” box to the right of the TX ARFCN box. (Very important! Not checking this box will cause the phone to transmit in the DCS band instead of the required PCS band).
5. Type “**810**” in the TX ARFCN box and press ENTER (on the keyboard).
6. Type “**15**” in the “**TimeSlot 1**” box and press ENTER (on the keyboard).
7. Click the “**Burst Tx**” of the RF Mode. This enables the transmitter. Check that a Tx signal is seen on the GSM Test Set. Measure the frequency error. A calibrated VCTCXO should provide a frequency error within ±500Hz at room temperature.
8. The frequency (and therefore the VCTCXO) is adjusted by changing the **AFC DAC** value in PhoneTool. Adjust the AFC DAC value until the frequency error measured on the GSM Test Set is within ±500Hz. Note the DAC value required.
9. Click “**General Off**” to turn off the transmitter.
10. From the “**Modes**” pull-down menu, select “**EEPROM**.”
11. Click “Read Values From Phone”



12. After the values are downloaded into PhoneTool (this may take a few seconds), double-click the "eep_static" folder in the EEPROM window.

13. Under "eep_static," select the "rf_adjcomp" folder in the folders list



14. Scroll down to the “afc” value and double-click on it.
15. Go to the PhoneTool window on the right and click on the memory address “1052”.
16. Change the DAC value to the one found in Step 8 above.
17. Click “OK”.
18. Close PhoneTool and power down the phone.

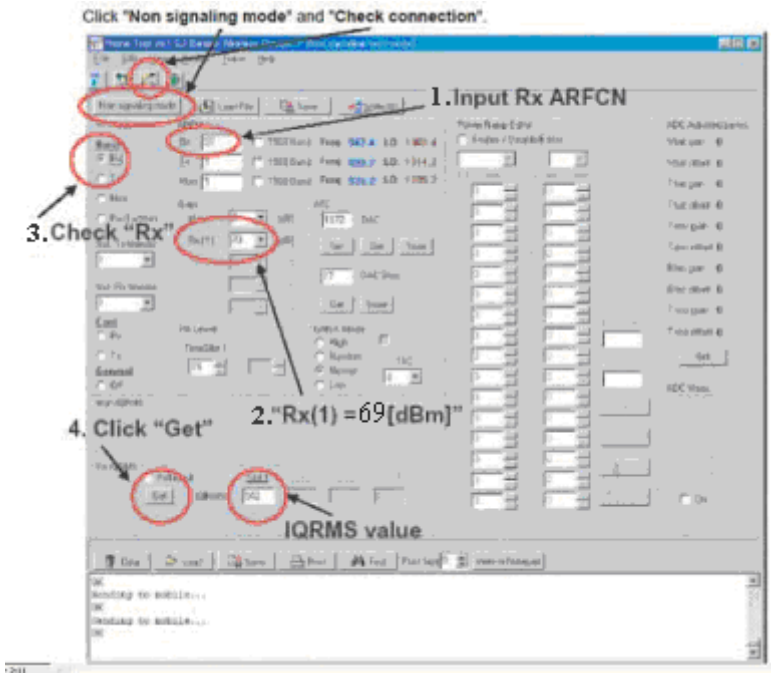
9.6 Rxlev Calibration

Note: Before calibrating the mobile, ensure that:

1. The latest version of Panasonic PhoneTool (Version 10.0) is being used.
2. The mobile has been placed in Test Mode.
3. The supply voltage is set to 3.8V with a current limit of 2.5A or higher.

Rxlev Gain Calibration

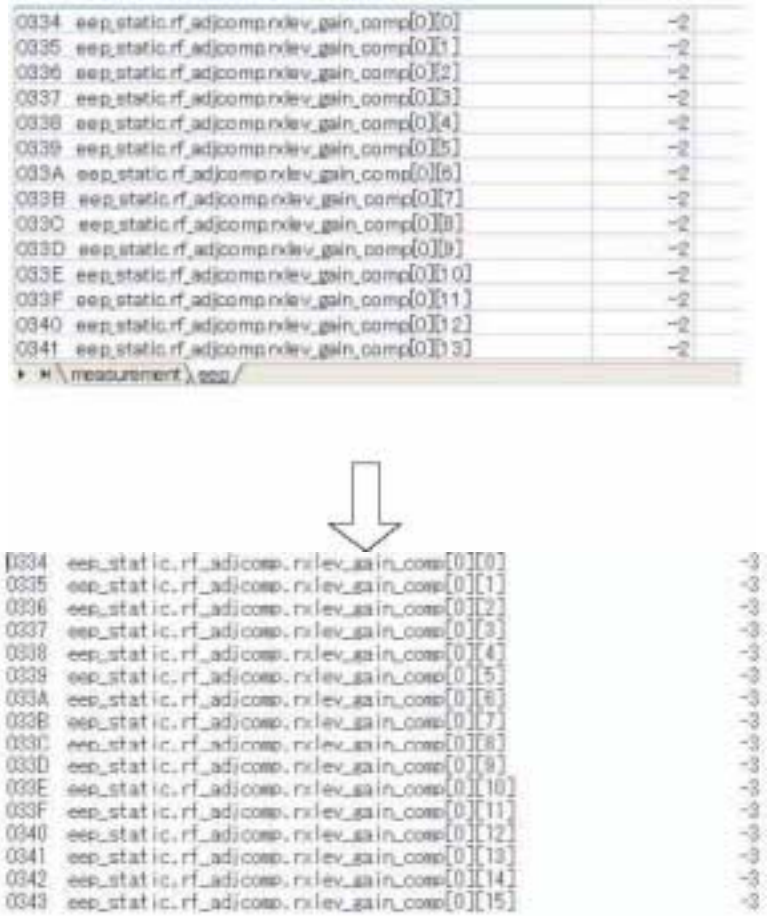
For RX Level calibration, the mobile must be connected to a GSM Test Set. The power into the mobile should be –90.5 dBm.



1. Input the Rx ARFCN (EGSM = 37 ch, DCS = 699 ch, PCS = 661ch) and press the Enter key. **NOTE**: If the PCS band is being calibrated, the "**1900 Band**" box must first be checked.
2. Use the pull-down menu to select the Gain "**Rx(1) = 69 dB**."
3. Check the "**Burst Rx**" of the RF Mode.
4. Click the "**Get**" button of Rx IQRMS. The value displayed at "**Slot1**" will be the "**IQRMS value**".
5. Enter the IQRMS value into the RX Excel sheet (below). The IQRMS value will be used to calculate the gain and channel compensation values. It will then be stored to the eep file of the RX Excel sheet.
6. Repeat Steps 1 through 5 for all calibration channels.
7. When all channels and bands are calibrated, save the Excel sheet of eep data using File -> Save As -> Text (Tab delimited) -> Save.

	measurement CH	meas FREQ	iqrms	RSSI	gain comp	ch comp
GSM900	12	937.4	918	22		0
	37	942.4	918	22	-2	0
	63	947.6	918	22		0
	95	954	918	22		0
	115	958	919	22		0
	1000	930.2	907	21		1
DCS1800	525	1808.6	891	20		1
	537	1810.2	891	20		1
	575	1829.2	899	20		1
	670	1838.8	907	21	-1	0
	736	1849.6	896	20		1
	776	1859	904	21		0
	825	1868.6	904	21		0
	887	1876.2	904	21		0

measurement eep



8. Proceed to Section 4.0 of this document.

9.2.7. Calibration Update Procedure

Before proceeding to Step 1 of the calibration update procedure, there are three update scenarios to consider.

A. Tx calibration only – Rename the text file to “falcon_delta00129.007.dep” and place it into the zip file located in the PhoneTool directory named “falcon_eep_cfg_dep.zip.” Overwrite the existing file if one already exists, e.g.:

falcon_delta00129
.007.dep

B. Rx calibration only – Rename the text file to “falcon_delta00129.007.dep” and place it into the zip file located in the PhoneTool directory named “falcon_eep_cfg_dep.zip.” Overwrite the existing file if one already exists, e.g.:

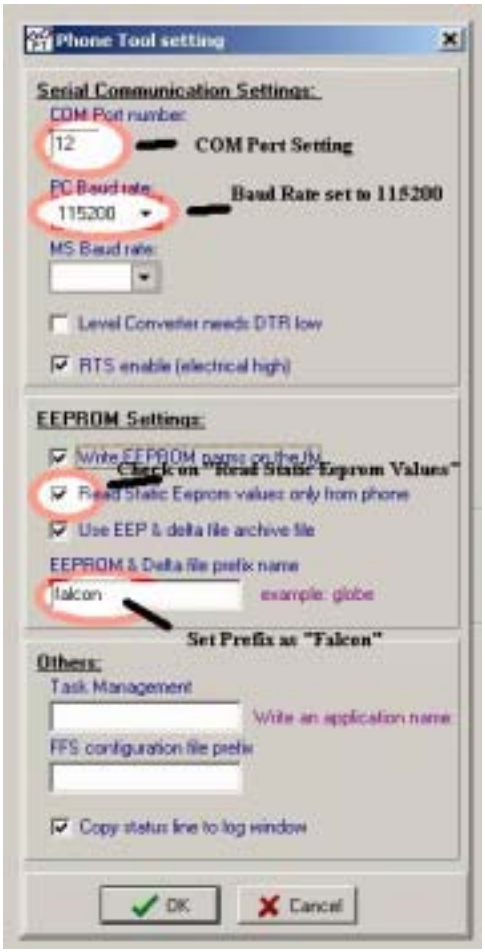
falcon_delta00129
.007.dep

C. Both Tx and Rx calibration – Merge the text files created during the transmitter and receiver calibration procedures into one text file and rename it to “falcon_delta00129.007.dep” and place it into the zip file located in the PhoneTool directory named “falcon_eep_cfg_dep.zip.” Overwrite the existing file if one already exists, e.g.:

falcon_delta00129
.007.dep

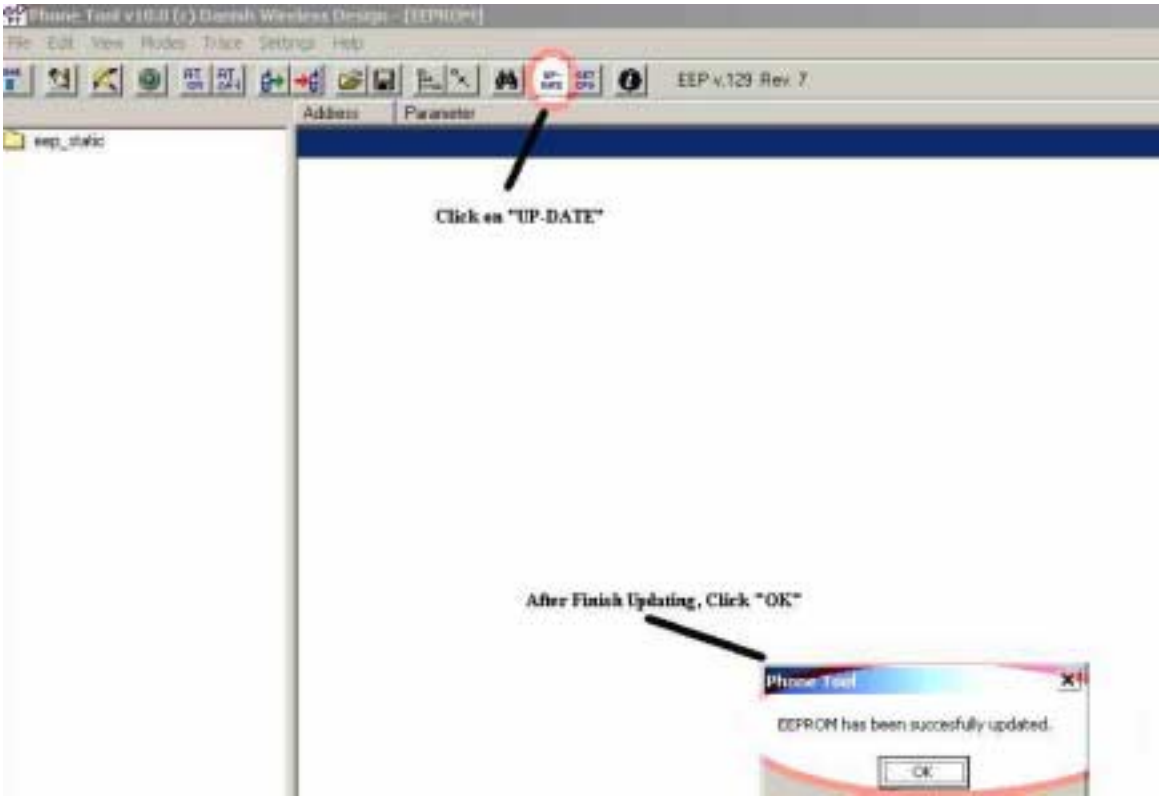
1. Press the power key to turn on the mobile phone (Assuming the handset is in “Test Mode”).
2. Start the PhoneTool program.
3. Click the "**V24 AT# On**".
4. Click the “**Check Connection”** button.

5. From the “**Settings**” pull-down menu, select “**Phone Tool Settings**”



6. Check the COM port Setting
7. Set the "**PC Baud Rate**" to 115200
8. Select "**Read Static Eeprom Values Only**"
9. Set "**EEPROM & Delta file prefix name**" to "falcon"

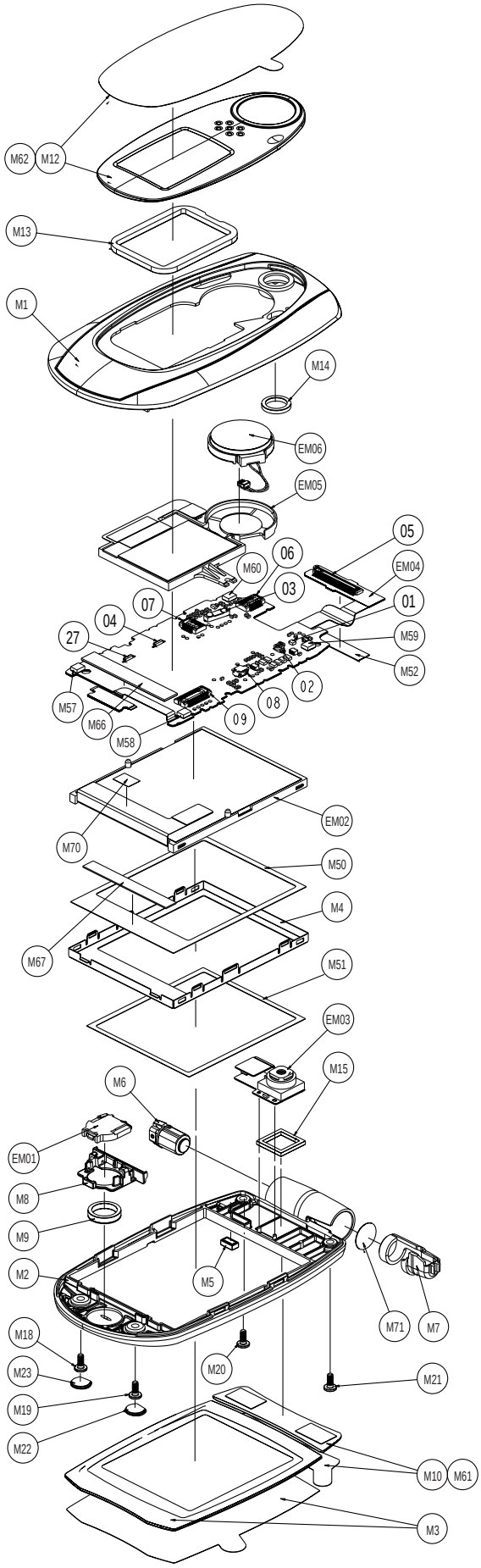
10. From the "**Modes**" pull-down menu, select "**EEPROM**"



11. Click the "**UPDATE**" button on the toolbar. It will take a few seconds to update the TX and RX calibration values. Click "**OK**" after the pop-up window that states "EEPROM has been successfully updated".
12. Tx and Rx calibration update is complete. Put the phone in Normal mode.

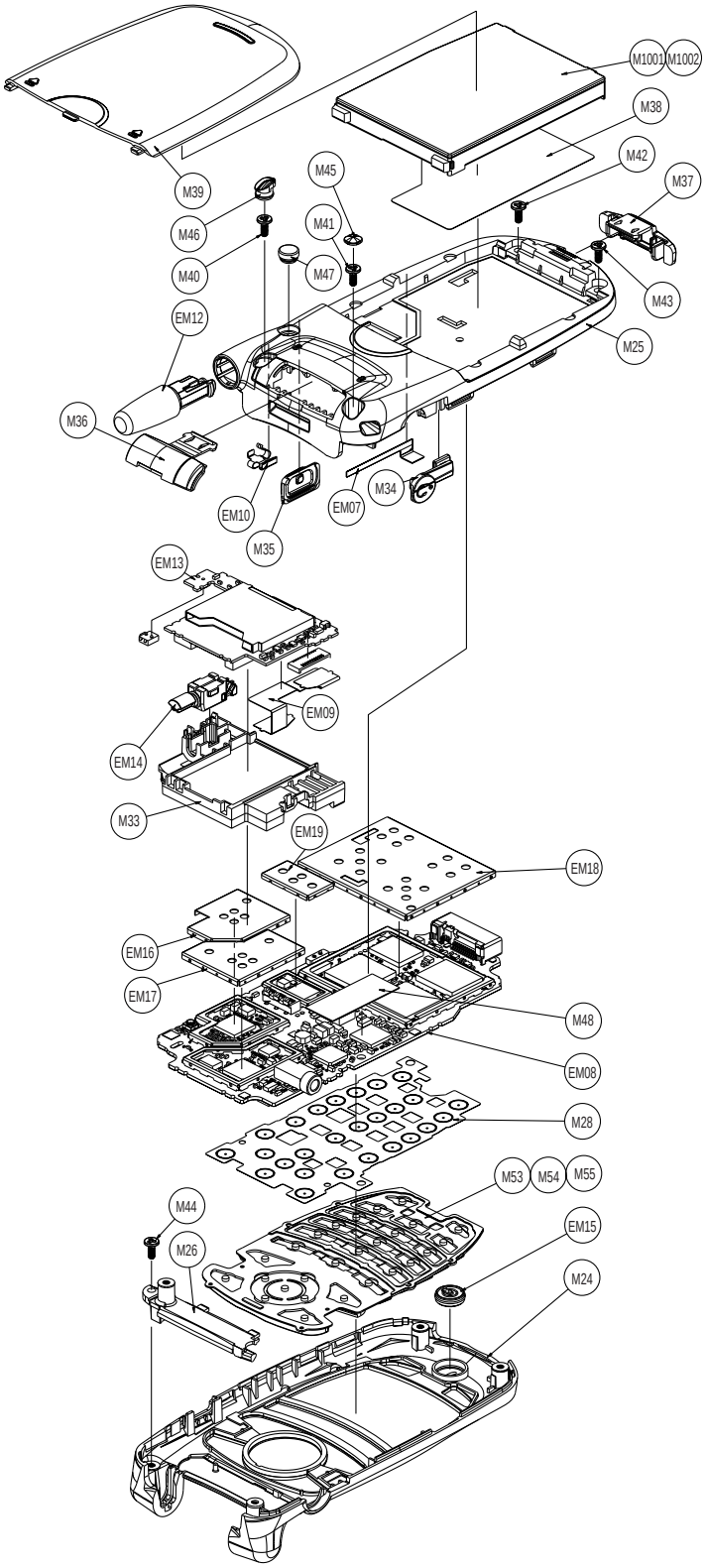
10. REPLACEMENT PARTS LIST

10.1. Upper Case



REF. NO.	PART NO.	DESCRIPTION
M1	9ZM027A	UPPER BACK COVER ASSY
M2	1GM008A	UPPER FRONT COVER ASSY
M3	2EM014A	LCD PANEL
M4	4BM002A	LCD HOLDER
M5	EY80014A	MAGNET
M6	9ZM034B	HINGE
M7	2RM017A	HINGE PIVOT
M8	2RM021A	RECIEVER CLIP
M9	6HM022A	CUSHION
M10	7GM010AAAA	LOGO PANEL STND
M12	2EM015BAAA	SUBLCD PANEL STD
M13	6HM021B	SUB-LCD CUSHION
M14	6HM019A	UPPER ASSY PART
M15	6HM023A	CAMERA CUSHION
M18	3AB001035AAA	SCREW
M19	3AB001035AAA	SCREW
M20	3AB001035AAA	SCREW
M21	3AB001035AAA	SCREW
M22	6RM017A	SCREW CAP
M23	6RM017A	SCREW CAP
M50	6HM024A	LCD CUSHION-1
M51	6HM018A	LCD CUSHION-2
M52	6HM025A	CUSHION
M57	6DM001A	SHIELD CUSHION
M58	6DM001A	SHIELD CUSHION
M59	6DM001A	SHIELD CUSHION
M60	6DM001A	SHIELD CUSHION
M61	7GM010AABA	ORANGE LOGO PANEL
M62	2EM015BABA	ORANGE SUB LCD PANEL
M66	6HM028A	CUSHION UPPER FPC
M67	6HM029A	CUSHION LCD BEZEL
M70	9ZM037A	ESD PROTECT TAPE
M71	9ZM038A	HINGE GUIDE SHIN
EM01	L0AZ01A00004	LOUDSPEAKERS
EM02	L5EDDYZ00004	LCD MODULE
EM03	L9ZZ00000212	CAMERA MODULE
EM04	EF80109Y	UPPER FLEX PCB
EM05	L5DZDCC00002	SIMPLE HOLDER
EM06	L0AZ01A00003	LOUDSPEAKERS
01	B3AGB0000020	ALERT LED
02	LNJ0F1C7F0MC	PHOTO LIGHT
03	B3RBC0000032	IRDA
04	LNJ025C6C0MC	LED (SUB LCD)
05	K1KA80A00110	B TO B CONNECTOR
06	K1KB24A00048	CAMERA CONNECTOR
07	K1KB20A00132	SUB LCD CONNECTOR
08	K1KB02B00014	SP CONNECTOR
09	K1KB40A00137	MAIN LCD CONNECTOR
27	LNJ025C6C0MC	LED (SUB LCD)

10.2. Lower Case



REF. NO.	PART NO.	DESCRIPTION
M24	1GM009A	LOWER FRONT COVER ASSY
M25	1HM009A	LOWER BACK COVER ASSY
M26	2RM020A	HINGE RETAINER
M27	6TM008A	KEY PAD
M28	SH80001A	KEY SHEET
M33	2FM004A	DS/VIB/ ASSY
M34	6RM019A	HEADSET CAP
M35	2CM005A	SIDE BUTTON
M36	9ZM033A	SD COVER
M37	6RM020A	I/O CONNECTOR CAP
M38	7HM007A	NAME PLATE
M39	2NM002A	BATTERY COVER
M40	3AB001035AAA	SCREW
M41	3AB001035AAA	SCREW
M42	3AB001035AAA	SCREW
M43	3AB001035AAA	SCREW
M44	3AB001035AAA	SCREW
M45	6RM022A	SCREW CAP
M46	6RM023A	SCREW CAP
M47	6RM024A	RF CAP
M48	7HM008A	BAR CODE LABEL
M53	6TM007BAA	KEYPAD STANDARD
M54	6TM007BAC	KEYPAD BOPOMOFO
M55	6TM007BAD	KEYPAD CHINA
M1001	BT80062AAA	BATTERY PACK (EU)
M1002	BT80062ABA	BATTERY PACK (CN)
EM07	AN80037A	ANTENNA
EM08	EG80453P	EB-X700 MAIN PCB
EM09	EF80108F	LOWER FLEX
EM10	4GM004A	ANTENNA METAL CONTACT
EM12	AN80034B	3-BAND STUB ANT
EM13	EG80465F	MINI-SD PCB
EM14	KHN4NZ3A	VIBRATE MOTOR UNIT
EM15	L0FZBA000002	MICROPHONE
EM16	4JM021A	RF CAN SHIELD COVER A
EM17	4JM022A	RF CAN SHIELD COVER B
EM18	4JM023B	BB CAN SHIELD COVER
EM19	4JM024B	BT CAN SHIELD COVER

10.3. Main PCB Assembly

Ref. No.	Part No.	Part Name & Description		Grid
BT300	N4ECD19A0001	BUTTON BATTERY		
C100	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C101	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C102	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C103	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C104	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C105	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C107	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C108	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C110	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C111	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C112	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C113	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C115	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C116	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C118	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C119	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C120	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C121	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C122	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C123	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C125	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C129	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C130	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C132	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C133	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C134	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C140	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C141	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C143	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C144	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C149	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C151	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C152	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C153	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C154	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C157	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C158	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C159	F1L1E180A057	CERAMIC CAPACITOR	18PF 25V	
C160	F1L1E180A057	CERAMIC CAPACITOR	18PF 25V	
C162	F1L0J152A018	CERAMIC CAPACITOR	1500PF 6.3V	
C200	ECJZEB0J103K	CERAMIC CAPACITOR	0.01UF 6.3V	
C203	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C204	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C205	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C206	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C207	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C208	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C209	ECJZEB0J103K	CERAMIC CAPACITOR	0.01UF 6.3V	
C210	F1L1E150A057	CERAMIC CAPACITOR	15PF 25V	
C211	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C212	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C213	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C214	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C215	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C216	ECJZEB0J103K	CERAMIC CAPACITOR	0.01UF 6.3V	
C217	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C218	ECJZEB0J103K	CERAMIC CAPACITOR	0.01UF 6.3V	
C219	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C220	ECJZEB0J103K	CERAMIC CAPACITOR	0.01UF 6.3V	

Ref. No.	Part No.	Part Name & Description		Grid
C221	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C222	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C225	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C228	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C229	F1L1E470A057	CERAMIC CAPACITOR	47PF 25V	
C232	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C234	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C235	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C236	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C237	F1J0J1060009	CERAMIC CAPACITOR	10UF 6.3V	
C238	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C239	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C240	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C241	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C243	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C244	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C245	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C246	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C247	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C248	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C249	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C250	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C251	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C252	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C253	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C254	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C255	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C256	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C257	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C258	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C259	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C262	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C265	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C266	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C273	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C274	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C275	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C276	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C277	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C279	F1L1E150A057	CERAMIC CAPACITOR	15PF 25V	
C280	F1L1E150A057	CERAMIC CAPACITOR	15PF 25V	
C281	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C300	ECJZEB0J103K	CERAMIC CAPACITOR	0.01UF 6.3V	
C301	F1H0J4750004	CERAMIC CAPACITOR	4.7UF 6.3V	
C302	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C303	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C306	ECJ3YB1E106M	CERAMIC CAPACITOR	10UF 25V	
C307	ECJHVB0J226M	CERAMIC CAPACITOR	22UF 6.3V	
C308	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C309	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C310	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C311	F1G0J4740003	CERAMIC CAPACITOR	0.47UF 6.3V	
C312	F1J0J1060009	CERAMIC CAPACITOR	10UF 6.3V	
C314	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C315	F1L1C391A027	CERAMIC CAPACITOR	390PF 16V	
C316	F1G1A6830003	CERAMIC CAPACITOR	0.068UF 10V	
C317	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C318	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C319	ECJHVB0J226M	CERAMIC CAPACITOR	22UF 6.3V	
C320	ECJHVB0J226M	CERAMIC CAPACITOR	22UF 6.3V	

Ref. No.	Part No.	Part Name & Description		Grid
C321	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C322	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C323	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C324	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C325	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C326	F1G1A473A032	CERAMIC CAPACITOR	0.047HF 10V	
C327	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C328	F1J1C1050014	CERAMIC CAPACITOR	1UF 16V	
C329	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C330	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C331	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C332	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C333	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C334	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C335	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C336	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C337	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C338	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C341	F1H1E104A029	CERAMIC CAPACITOR	0.1UF 25V	
C342	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C343	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C344	F1L1C391A027	CERAMIC CAPACITOR	390PF 16V	
C346	ECJHVB0J226M	CERAMIC CAPACITOR	22UF 6.3V	
C347	F1G1E472A086	CERAMIC CAPACITOR	4700PF 25V	
C348	F1H0J4750004	CERAMIC CAPACITOR	4.7UF 6.3V	
C349	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C350	F1L1C102A027	CERAMIC CAPACITOR	0.001UF 16V	
C351	F1G0J4740003	CERAMIC CAPACITOR	0.47UF 6.3V	
C352	F1G0J4740003	CERAMIC CAPACITOR	0.47UF 6.3V	
C353	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C354	F1J1A106A043	CERAMIC CAPACITOR	10UF 10V	
C355	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C356	F1L1C102A027	CERAMIC CAPACITOR	0.001UF 16V	
C357	ECJ3YB1E106M	CERAMIC CAPACITOR	10UF 25V	
C360	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C364	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C365	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C400	F1H1A224A006	CERAMIC CAPACITOR	0.22UF 10V	
C401	F1G1H270A565	CERAMIC CAPACITOR	27PF 50V	
C402	ECJHVB0J226M	CERAMIC CAPACITOR	22UF 6.3V	
C403	F1G1E1030005	CERAMIC CAPACITOR	0.01UF 25V	
C404	F1G1E1030005	CERAMIC CAPACITOR	0.01UF 25V	
C406	F1G1H270A565	CERAMIC CAPACITOR	27PF 50V	
C408	ECJ1VB0J225K	CERAMIC CAPACITOR	2.2UF 6.3V	
C409	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C410	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C411	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C412	F1G1H270A565	CERAMIC CAPACITOR	27PF 50V	
C413	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C414	F1G1H270A565	CERAMIC CAPACITOR	27PF 50V	
C415	F1G1H270A565	CERAMIC CAPACITOR	27PF 50V	
C417	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C418	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C419	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C420	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C421	F1L1E101A057	CERAMIC CAPACITOR	200PF 25V	
C422	F1L1E101A057	CERAMIC CAPACITOR	200PF 25V	
C424	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C425	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C503	F1L1C102A027	CERAMIC CAPACITOR	0.001UF 16V	

Ref. No.	Part No.	Part Name & Description		Grid
C504	F1L1C102A027	CERAMIC CAPACITOR	0.001UF 16V	
C506	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C507	F1L1C102A027	CERAMIC CAPACITOR	0.001UF 16V	
C508	F1J1A2250002	CERAMIC CAPACITOR	2.2UF 6.3V	
C509	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C510	ECJZEB0J103K	CERAMIC CAPACITOR	0.01UF 6.3V	
C511	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C512	F1L1E390A057	CERAMIC CAPACITOR	39PF 25V	
C513	F1L1E330A057	CERAMIC CAPACITOR	33PF 25V	
C514	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C515	ECHU1C472JX5	CERAMIC CAPACITOR	4700PF 16V	
C516	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C517	F1L1C271A027	CERAMIC CAPACITOR	270PF 16V	
C518	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C519	F1L1E150A057	CERAMIC CAPACITOR	15PF 25V	
C520	F1L1C271A027	CERAMIC CAPACITOR	270PF 16V	
C521	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C522	F1L1C681A027	CERAMIC CAPACITOR	680PF 16V	
C523	F1L1E150A057	CERAMIC CAPACITOR	15PF 25V	
C524	F1L1C681A027	CERAMIC CAPACITOR	680PF 16V	
C525	F1L0J1040002	CERAMIC CAPACITOR	0.1UF 6.3V	
C526	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C527	F1L1E680A057	CERAMIC CAPACITOR	68PF 25V	
C528	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C529	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C530	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C531	F1G1H270A565	CERAMIC CAPACITOR	27PF 50V	
C533	F1L1C102A027	CERAMIC CAPACITOR	0.001UF 16V	
C534	F1L1C102A027	CERAMIC CAPACITOR	0.001UF 16V	
C535	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C537	F1G1HR50A561	CERAMIC CAPACITOR	0.5PF 50V	
C538	F1G1H1R0A561	CERAMIC CAPACITOR	1PF 50V	
C541	F1G1H330A565	CERAMIC CAPACITOR	33PF 50V	
C542	F1G1H330A565	CERAMIC CAPACITOR	33PF 50V	
C543	F1G1H330A565	CERAMIC CAPACITOR	33PF 50V	
C546	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C549	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C550	F3E0J1060006	TANTALUM CAPACITOR	10UF 6.3V	
C552	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C554	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C555	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C560	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C562	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C563	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C564	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C569	ECJZEB0J103K	CERAMIC CAPACITOR	0.01UF 6.3V	
C578	F1L1C102A027	CERAMIC CAPACITOR	0.001UF 16V	
C579	F1G1H1R0A561	CERAMIC CAPACITOR	1PF 50V	
C580	ECJZEB0J103K	CERAMIC CAPACITOR	0.01UF 6.3V	
C581	F1L1E470A057	CERAMIC CAPACITOR	47PF 25V	
C582	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C583	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C584	F1L1E100A057	CERAMIC CAPACITOR	10PF 25V	
C589	F1L1E270A057	CERAMIC CAPACITOR	27PF 25V	
C590	F1G1H3R0A609	CERAMIC CAPACITOR	3PF 50V	
C591	F1G1H1R0A561	CERAMIC CAPACITOR	1PF 50V	
C592	F1G1H222A571	CERAMIC CAPACITOR	2200PF 50V	
C593	F1L1ER50A064	CERAMIC CAPACITOR	0.5PF 25V	
C594	F1L1ER50A064	CERAMIC CAPACITOR	0.5PF 25V	
D200	MA2S11100L	DIODE		

Ref. No.	Part No.	Part Name & Description		Grid
D201	B0JCCD000002	DIODE		
D300	B0JCMD000023	DIODE		
D301	B0JCMD000023	DIODE		
D302	B0JCMD000023	DIODE		
D303	B0JCMD000023	DIODE		
D304	MAZS0680ML	DIODE		
D305	B0BD6R800011	ZENER DIODE		
D306	B0BD6R800011	ZENER DIODE		
D307	MAZS0680ML	DIODE		
D30	MAZS0680ML	DIODE		
D311	MAZS0750ML	DIODE		
D312	MAZS0680ML	DIODE		
D401	MAZS0470GL	DIODE		
D402	MAZS0470GL	DIODE		
D404	MAZS0470GL	DIODE		
D405	MAZS0470GL	DIODE		
DS401	LNJ926W8C0MC	LED		
DS402	LNJ926W8C0MC	LED		
DS403	LNJ926W8C0MC	LED		
DS405	LNJ926W8C0MC	LED		
DS406	LNJ926W8C0MC	LED		
DS407	LNJ926W8C0MC	LED		
DS409	LNJ926W8C0MC	LED		
DS410	LNJ926W8C0MC	LED		
DS411	LNJ926W8C0MC	LED		
DS413	LNJ926W8C0MC	LED		
DS415	B3AAB0000161	LED		
DS418	LNJ926W8C0MC	LED		
DS419	B3ABB0000207	LED		
DS420	LNJ926W8C0MC	LED		
DS421	LNJ926W8C0MC	LED		
FL200	J0D2457B0004	FILTER		
FL300	J0JHC0000034	FILTER		
FL301	J0JHC0000034	FILTER		
FL400	J0HABA000002	FILTER		
FL401	J0HABA000002	FILTER		
FL402	J0HABA000002	FILTER		
FL403	J0HABA000002	FILTER		
FL404	J0HABA000002	FILTER		
FL405	J0JAC0000011	FILTER		
FL406	J0JAC0000011	FILTER		
FL500	J0ZZB0000047	FILTER		
FL501	J0ZZB0000046	FILTER		
FL502	J0C1967BA002	FILTER		
FL503	J0C1847B0007	FILTER		
FL504	J0C9426B0005	FILTER		
FL506	EXCML16A270U	COIL		
FL507	J0C8976B0001	FILTER		
J300	JA80036A	CONNECTOR		
J400	K1KB80A00105	CONNECTOR		
J402	K2HD105E0007	HEADSETJACK		
J403	K1MN25B00067	CONNECTOR		
J500	K1QZB1AD0014	CONNECTOR		
L200	G1C22NJ00010	COIL	22NH	
L201	G1C5N6Z00005	COIL	5.6NH	
L202	G1C22NJ00010	COIL	22NH	
L203	G1C22NJ00010	COIL	22NH	
L300	ELL5PM100M	COIL	10UH	
L301	ELL3GM120M	COIL	12UH	
L500	G1C1R0JA0021	INDUCTOR	1UH	

Ref. No.	Part No.	Part Name & Description		Grid
L501	G1C1R0JA0021	INDUCTOR	1UH	
L502	G1C6N8J00004	COIL	6.8NH	
L503	ELJRF4N7JFB	INDUCTOR	4.7NH	
L505	ELJRF4N7JFB	INDUCTOR	4.7NH	
L506	ELJRF4N7JFB	INDUCTOR	4.7NH	
L507	ELJRF3N3DFB	INDUCTOR	3.3NH	
L508	ELJRF3N3DFB	INDUCTOR	3.3NH	
L509	ELJRF15NJFB	INDUCTOR	15NH	
L510	ELJRF15NJFB	INDUCTOR	15NH	
L519	ELJRF82NJFB	INDUCTOR	82NH	
L520	ELJRF27NJFB	INDUCTOR	27NH	
L522	ELJRF1N0DFB	INDUCTOR	1NH	
L523	ELJRF47NJFB	INDUCTOR	47NH	
L524	ELJRF3N9JFB	INDUCTOR		
MP500	4JM020A	LOWER ASSY PART		
MP501	4JM019A	LOWER ASSY PART		
MP502	4JM017A	LOWER ASSY PART		
MP503	4JM018A	LOWER ASSY PART		
P200	K1ZZ00001281	CONNECTOR		
P300	K4CZ03000002	TERMINAL		
Q300	B1DFCD000015	TRANSISTOR		
Q301	B1DHDC000006	TRANSISTOR		
Q401	B1CHHC000006	TRANSISTOR		
R100	ERJ1GEJ223C	FIXED RESISTOR	22K 1/20W	
R102	ERJ2RKD394X	FIXED RESISTOR	390K 1/16W	
R103	ERJ2GEF104X	FIXED RESISTOR	100K 1/16W	
R104	ERJ1GEJ223C	FIXED RESISTOR	22K 1/20W	
R106	ERJ2RKF223X	FIXED RESISTOR	22K 1/16W	
R107	ERJ1GEJ152C	FIXED RESISTOR	1.5K 1/20W	
R108	ERJ2GEJ4R7X	FIXED RESISTOR	4.7 1/16W	
R109	ERJ1GEJ153C	FIXED RESISTOR	15K 1/20W	
R110	ERJ1GEJ103C	FIXED RESISTOR	10K 1/20W	
R111	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R112	ERJ1GEJ104C	FIXED RESISTOR	100K 1/20W	
R115	ERJ1GEJ104C	FIXED RESISTOR	100K 1/20W	
R116	ERJ1GEJ103C	FIXED RESISTOR	10K 1/20W	
R131	ERJ1GEJ220C	FIXED RESISTOR	22 1/20W	
R132	ERJ1GEJ220C	FIXED RESISTOR	22 1/20W	
R134	ERJ1GEJ332C	FIXED RESISTOR	3.3K 1/20W	
R135	ERJ1GEJ102C	FIXED RESISTOR	1K 1/20W	
R200	ERJ1GEJ222C	FIXED RESISTOR	2.2K 1/20W	
R201	ERJ1GEJ222C	FIXED RESISTOR	2.2K 1/20W	
R202	ERJ1GEJ222C	FIXED RESISTOR	2.2K 1/20W	
R204	ERJ1GEJ103C	FIXED RESISTOR	10K 1/20W	
R205	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R206	ERJ1GEJ152C	FIXED RESISTOR	1.5K 1/20W	
R207	ERJ1GEJ152C	FIXED RESISTOR	1.5K 1/20W	
R209	ERJ1GEJ104C	FIXED RESISTOR	100K 1/20W	
R210	ERJ1GEJ104C	FIXED RESISTOR	100K 1/20W	
R211	ERJ1GEJ104C	FIXED RESISTOR	100K 1/20W	
R212	ERJ1GEJ104C	FIXED RESISTOR	100K 1/20W	
R213	ERJ1GEJ104C	FIXED RESISTOR	100K 1/20W	
R217	ERJ1GEJ152C	FIXED RESISTOR	1.5K 1/20W	
R218	ERJ1GEJ222C	FIXED RESISTOR	2.2K 1/20W	
R219	ERJ2GEJ100X	FIXED RESISTOR	10 1/16W	
R221	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R223	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R224	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R225	ERJ1GEJ270C	FIXED RESISTOR	27 1/20W	
R228	ERJ1GEJ474C	FIXED RESISTOR	470K 1/20W	

Ref. No.	Part No.	Part Name & Description		Grid
R233	ERJ1GEJ103C	FIXED RESISTOR	10K 1/20W	
R245	ERJ1GEJ103C	FIXED RESISTOR	10K 1/20W	
R250	ERJ1GEJ152C	FIXED RESISTOR	1.5K 1/20W	
R251	ERJ1GEJ103C	FIXED RESISTOR	10K 1/20W	
R252	ERJ1GEJ103C	FIXED RESISTOR	10K 1/20W	
R253	ERJ2GEJ155X	FIXED RESISTOR	1.5M 1/16W	
R256	ERJ2GEJ2R2X	FIXED RESISTOR	2.2 1/16W	
R257	ERJ1GEJ472C	FIXED RESISTOR	4.7K 1/20W	
R258	ERJ1GEJ472C	FIXED RESISTOR	4.7K 1/20W	
R300	ERJ2RKF153X	FIXED RESISTOR	15K 1/16W	
R301	ERJ1GEJ474C	FIXED RESISTOR	470K 1/20W	
R302	ERJ2GEJ561X	FIXED RESISTOR	560 1/16W	
R303	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R304	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R305	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R306	ERJ1GEJ224C	FIXED RESISTOR	220K 1/20W	
R307	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R308	ERJ1GEJ152C	FIXED RESISTOR	1.5K 1/20W	
R309	ERJ1GEJ103C	FIXED RESISTOR	10K 1/20W	
R310	ERJ1GEJ152C	FIXED RESISTOR	1.5K 1/20W	
R311	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R312	ERJ2RKF823X	FIXED RESISTOR	82K 1/16W	
R313	ERJL03KF50MV	FIXED RESISTOR	50M 1/10W	
R315	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R316	ERJ1GEJ223C	FIXED RESISTOR	22K 1/20W	
R317	ERJ1GEJ223C	FIXED RESISTOR	22K 1/20W	
R318	ERJ1GEJ223C	FIXED RESISTOR	22K 1/20W	
R319	ERJ1GEJ223C	FIXED RESISTOR	22K 1/20W	
R321	ERJ6RSFR15V	FIXED RESISTOR	0.15 1/20W	
R327	ERJ2GEJ152X	FIXED RESISTOR	1.5K 1/16W	
R328	ERJ2GEJ561X	FIXED RESISTOR	560 1/16W	
R329	ERJ2GEJ561X	FIXED RESISTOR	560 1/16W	
R330	ERJ2GEJ561X	FIXED RESISTOR	560 1/16W	
R331	ERJ2GEJ561X	FIXED RESISTOR	560 1/16W	
R333	ERJ2GEJ561X	FIXED RESISTOR	560 1/16W	
R334	ERJ2GEJ270X	FIXED RESISTOR	27 1/16W	
R335	ERJ2GEJ270X	FIXED RESISTOR	27 1/16W	
R339	ERJ1GEJ823C	FIXED RESISTOR	82K 1/20W	
R343	ERJ3BQJR33V	FIXED RESISTOR	0.33 1/5W	
R350	ERJ1GEJ562C	FIXED RESISTOR	5.6K 1/20W	
R351	ERJ1GEJ273C	FIXED RESISTOR	27K 1/20W	
R355	ERJ2RKF913X	FIXED RESISTOR	91K 1/16W	
R356	ERJ2RKF105X	FIXED RESISTOR	1M 1/16W	
R360	ERJ1GEJ102C	FIXED RESISTOR	1K 1/20W	
R400	ERJ1GEJ222C	FIXED RESISTOR	2.2K 1/20W	
R401	ERJ2GEJ122X	FIXED RESISTOR	1.2K 1/16W	
R402	ERJ2GEJ122X	FIXED RESISTOR	1.2K 1/16W	
R403	ERJ1GEJ222C	FIXED RESISTOR	2.2K 1/20W	
R408	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R409	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R410	ERJ1GEJ100C	FIXED RESISTOR	10 1/20W	
R411	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R412	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R413	ERJ1GEJ104C	FIXED RESISTOR	100K 1/20W	
R414	ERJ1GEJ104C	FIXED RESISTOR	100K 1/20W	
R415	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R424	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R426	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R428	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R429	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	

Ref. No.	Part No.	Part Name & Description		Grid
R430	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R432	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R434	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R436	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R438	ERJ2GEJ221X	FIXED RESISTOR	220 1/16W	
R441	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R442	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R443	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R444	ERJ2GEJ330X	FIXED RESISTOR	33 1/16W	
R500	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R501	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R503	ERJ1GEJ471C	FIXED RESISTOR	470 1/20W	
R504	ERJ1GEJ391C	FIXED RESISTOR	390 1/20W	
R505	ERJ1GEJ102C	FIXED RESISTOR	1K 1/20W	
R506	ERJ1GEJ102C	FIXED RESISTOR	1K 1/20W	
R507	ERJ1GEJ102C	FIXED RESISTOR	1K 1/20W	
R515	ERJ1GEJ471C	FIXED RESISTOR	470 1/20W	
R516	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R518	ERJ1GEJ123C	FIXED RESISTOR	12K 1/20W	
R522	ERJ1GEJ472C	FIXED RESISTOR	4.7K 1/20W	
R523	ERJ1GEJ332C	FIXED RESISTOR	3.3K 1/20W	
R530	ERJ1GEJ102C	FIXED RESISTOR	1K 1/20W	
R532	ERJ1GEJ272C	FIXED RESISTOR	2.7K 1/20W	
R533	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R534	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R539	ERJ1GEJ153C	FIXED RESISTOR	15K 1/20W	
R542	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R543	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R544	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R545	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R546	ERJ1GEJ102C	FIXED RESISTOR	1K 1/20W	
R547	ERJ1GEJ102C	FIXED RESISTOR	1K 1/20W	
R549	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R563	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R567	ERJ1GE0R00C	FIXED RESISTOR	0 1/20W	
R568	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R570	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
RT500	D4CC11030016	THERMISTOR		
U100	C1CB00001766	IC		
U200	C1DB00001284	IC		
U201	C1CB00001773	IC		
U204	C0JBAE000319	LOGIC IC		
U300	AN32061A-VB	IC		
U301	C1BB00000930	IC		
U304	C1CB00001765	IC		
U400	C0ZBZ0000949	IC		
U500	C1CB00001642	IC		
U501	C1CB00001641	IC		
U502	GN06006L01MC	IC		
U503	C1CB00001881	IC		
Y100	H0J327200022	CRYSTAL OSCILLATOR		
Y500	H1D2605BA006	CRYSTAL OSCILLATOR		

10.4. LCD PCB Assembly

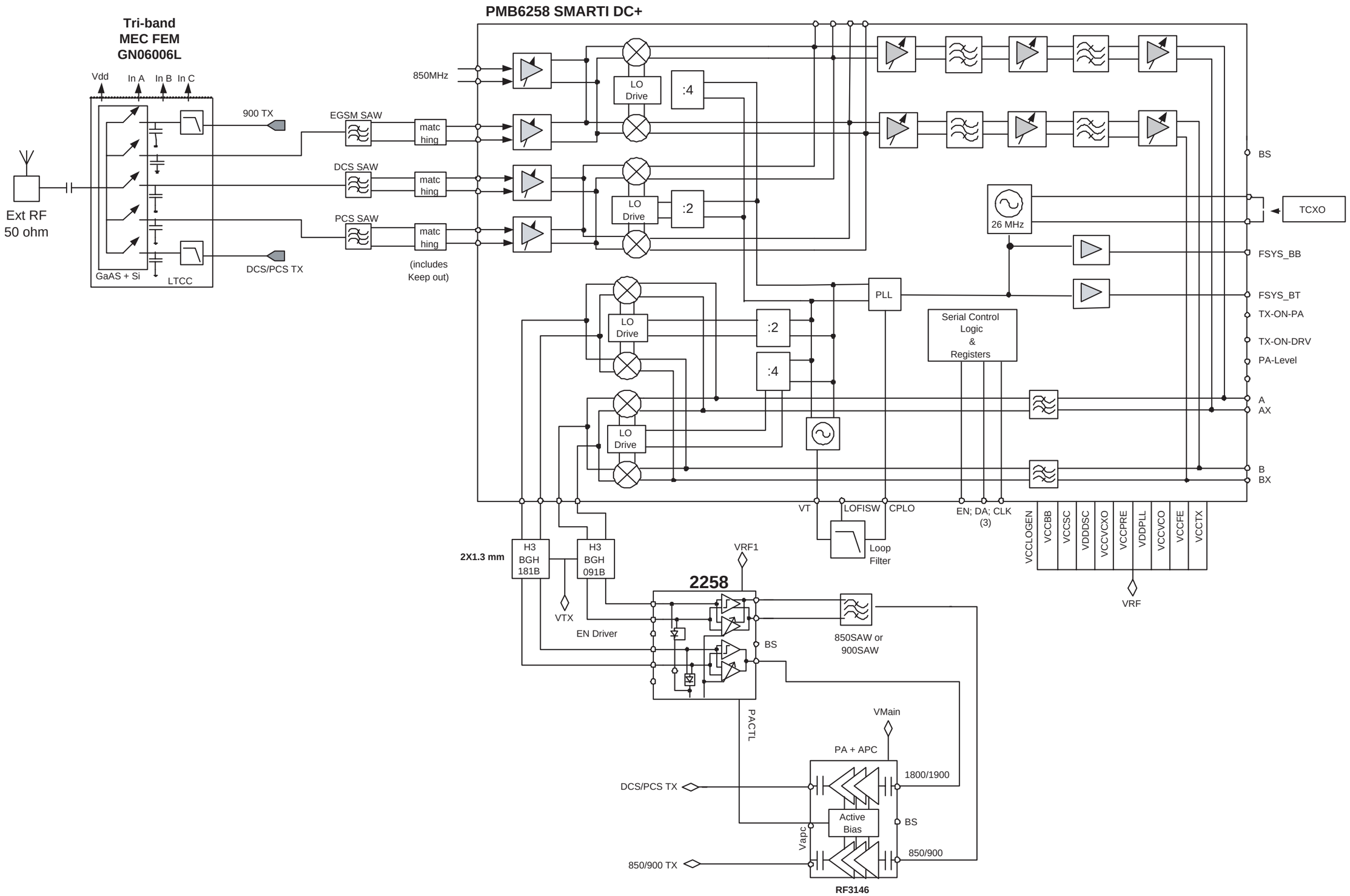
Ref. No.	Part No.	Part Name & Description		Grid
C106	F1G1A104A012	CAPACITOR	0.1UF 10V	
C107	ECJ0EB0J105M	CERAMIC CAPACITOR	1UF 6.3V	
C108	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C109	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C110	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C111	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C112	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C113	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C124	F1G1E1030005	CERAMIC CAPACITOR	0.01UF 25V	
C129	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C130	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
C131	F1G1H100A565	CERAMIC CAPACITOR	10PF 50V	
D100	MAZS0680ML	DIODE		
DS100	LNJ0F1C7F0MC	LED		
DS101	LNJ025C6C0MC	LED		
DS102	LNJ025C6C0MC	LED		
DS103	B3RBC0000032	IrDA		
DS104	B3AGB0000020	LED		
J100	K1KB02B00014	CONNECTOR		
J101	K1KB20A00132	CONNECTOR		
J102	K1KB24A00048	CONNECTOR		
J103	K1KB40A00137	CONNECTOR		
P100	K1KA80A00110	CONNECTOR		
Q101	B1CFGD000003	TRANSISTOR		
Q102	B1CFGD000003	TRANSISTOR		
Q103	B1CHHC000006	TRANSISTOR		
R100	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R101	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R102	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R103	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R104	ERJ2GEF473X	FIXED RESISTOR	47K 1/16W	
R105	ERJ2GEF473X	FIXED RESISTOR	47K 1/16W	
R107	ERJ2GEJ102X	FIXED RESISTOR	1K 1/16W	
R108	ERJ2GEJ273X	FIXED RESISTOR	27K 1/16W	
R110	ERJ2GEJ182X	FIXED RESISTOR	1.8K 1/16W	
R111	ERJ2GEJ182X	FIXED RESISTOR	1.8K 1/16W	
R112	ERJ2GEJ273X	FIXED RESISTOR	27K 1/16W	
R113	ERJ2GEJ182X	FIXED RESISTOR	1.8K 1/16W	
R114	ERJ6GEYJ751V	FIXED RESISTOR	0 1/10W	
R115	ERJ6GEYJ751V	FIXED RESISTOR	0 1/10W	
R116	ERJ6GEYJ301V	FIXED RESISTOR	300 125MW	
R117	ERJ2GEJ182X	FIXED RESISTOR	1.8K 1/16W	
R118	ERJ6GEYJ301V	FIXED RESISTOR	300 125MW	
R119	ERJ6GEYJ751V	FIXED RESISTOR	0 1/10W	
R122	ERJ2GEJ273X	FIXED RESISTOR	27K 1/16W	
R123	ERJ2GEJ301X	FIXED RESISTOR	0 1/16W	
R124	ERJ2GEJ301X	FIXED RESISTOR	0 1/16W	
R126	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R127	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R128	ERJ2GEJ101X	FIXED RESISTOR	100 1/16W	
R129	ERJ2GEJ220X	FIXED RESISTOR	22 1/16W	
R130	ERJ6GEYJ751V	FIXED RESISTOR	0 1/10W	

10.5. Mini SD/SIM PCB Assembly

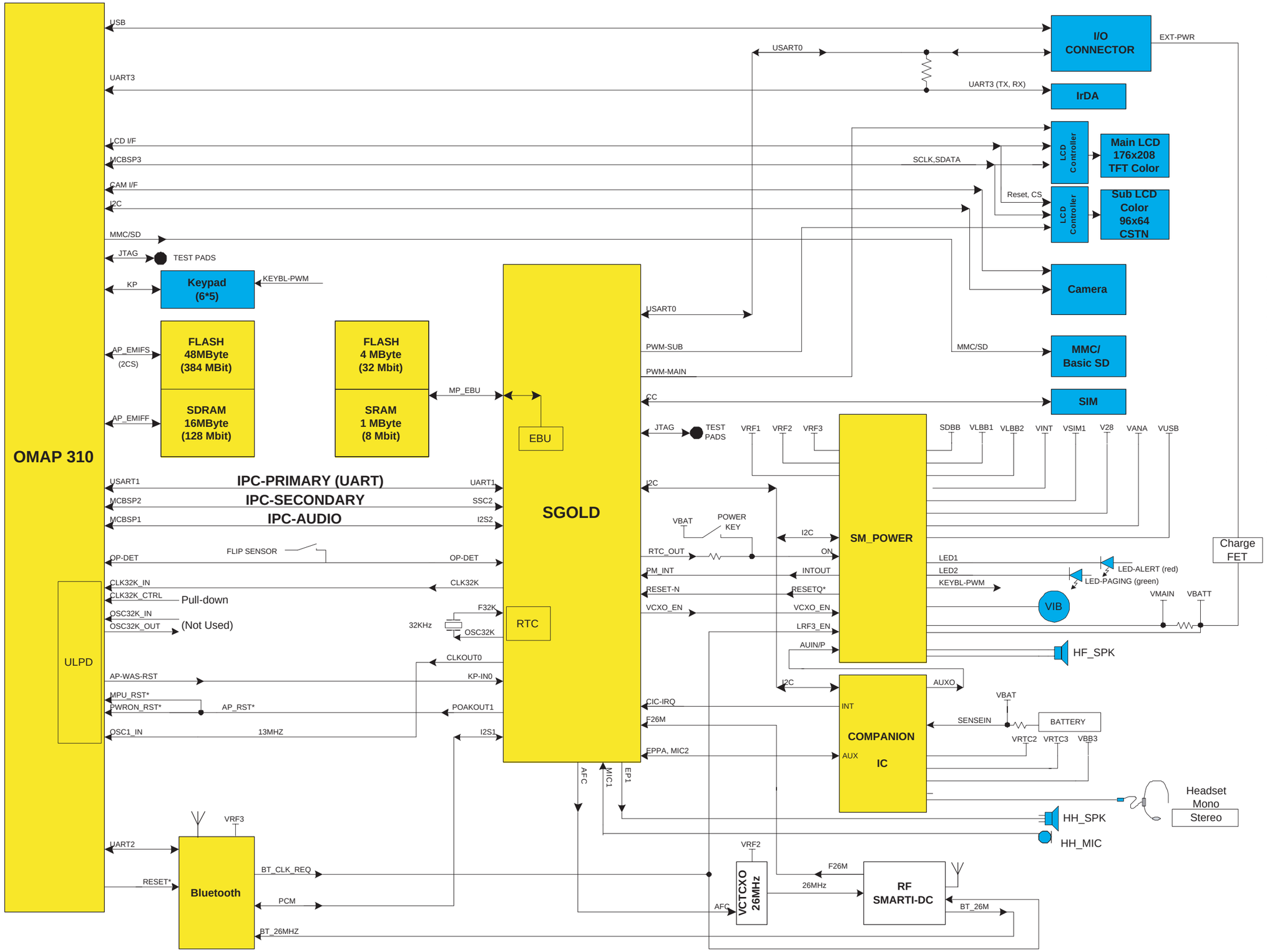
Ref. No.	Part No.	Part Name & Description		Grid
M1010	AP80048A	SD CARD ADAPTOR		
C113	F1G1H150A565	CERAMIC CAPACITOR	15PF 50V	
C114	F1G1H150A565	CERAMIC CAPACITOR	15PF 50V	
C115	F1G1H150A565	CERAMIC CAPACITOR	15PF 50V	
C116	F1G1H150A565	CERAMIC CAPACITOR	15PF 50V	
J100	K1MN25B00067	CONNECTOR		
J101	K1NA06E00005	CONNECTOR		
S100	EVQP7D01K	SWITCING DIODE		
D100	MA2S11100L	SWITCHING DIODE		
D101	B0BD6R800011	DIODE		
D102	B0BD6R800011	DIODE		
D103	B0BD6R800011	DIODE		
J102	K1NA11E00004	CONNECTOR		
L100	ELJRF27NJFB	COIL	27NH	
L101	ELJRF27NJFB	COIL	27NH	
Q100	2SD19790VL	TRANSISTOR		
R100	ERJ6GEYJ5R6V	FIXED RESISTOR	5.6 1/10W	
R101	ERJ2GEJ151X	FIXED RESISTOR	150 1/16W	
R102	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R103	ERJ2GE0R00X	FIXED RESISTOR	0 1/16W	
R105	ERJ2GEJ472X	FIXED RESISTOR	4.7K 1/16W	
R106	ERJ2GEF473X	FIXED RESISTOR	47K 1/16W	
R107	ERJ2GEF473X	FIXED RESISTOR	47K 1/16W	
R108	ERJ2GEF473X	FIXED RESISTOR	47K 1/16W	
R109	ERJ2GEF473X	FIXED RESISTOR	47K 1/16W	

11. BLOCK DIAGRAMS

11.1. RF Band



11.2. Baseband



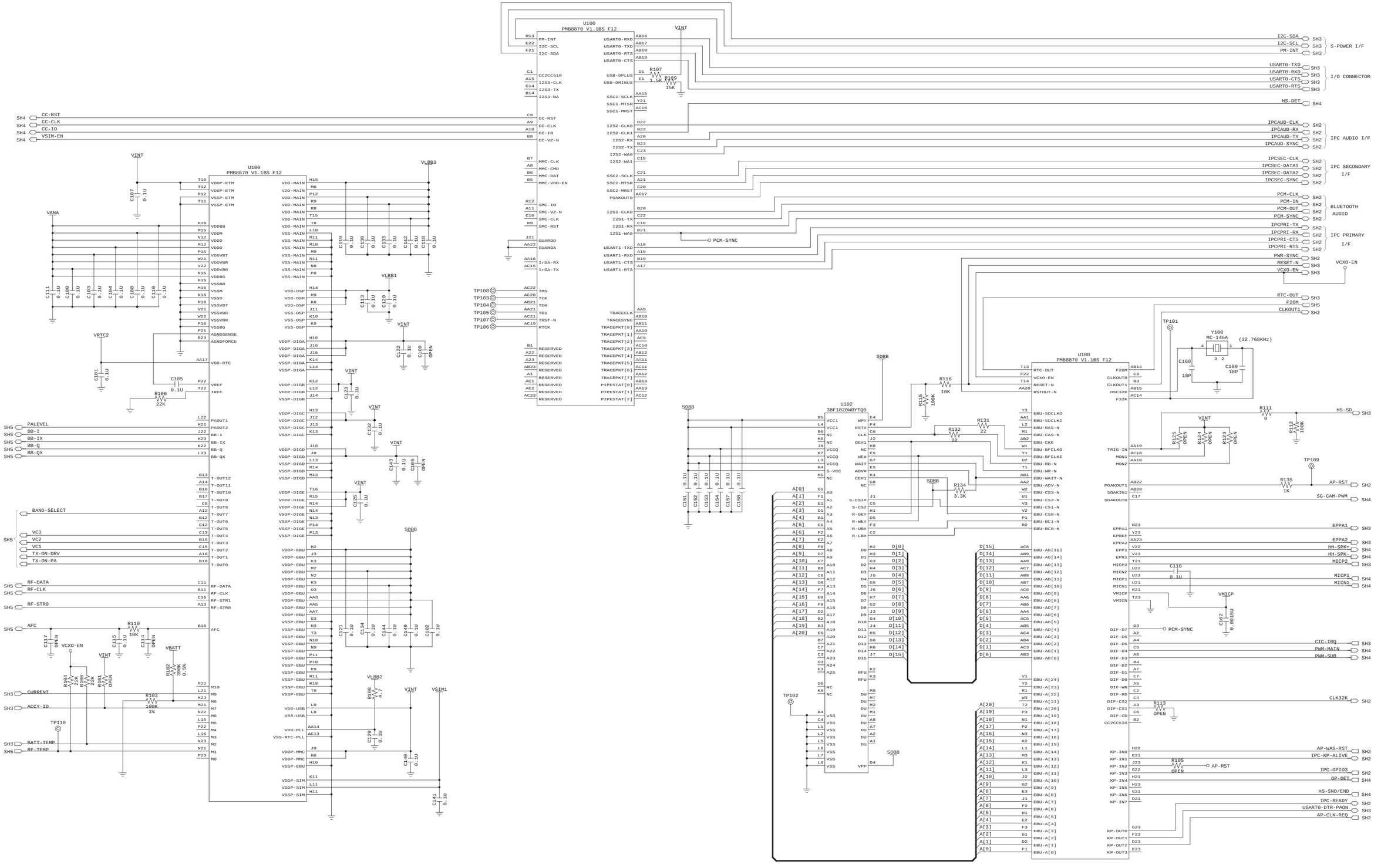
Regulator Nominal Voltages

VLBB1 (S-GOLD DSP) = 1.50V
VLBB2 (S-GOLD Core) = 1.50V
VINT (Interface supply) = 2.72V
VSIM1 (SIM Card & IF) = 2.85V
V28 (OMAP) = 2.85V
VANA (S-GOLD analog) = 2.65V
VRF1 (RF supply) = 2.70V
VRF2 (VCTCXO supply) = 2.70V
VRF3 (Bluetooth supply) = 2.65V
VUSB (S-GOLD USB supply) = 5V
SDBB (Memory Supply) = 1.8V

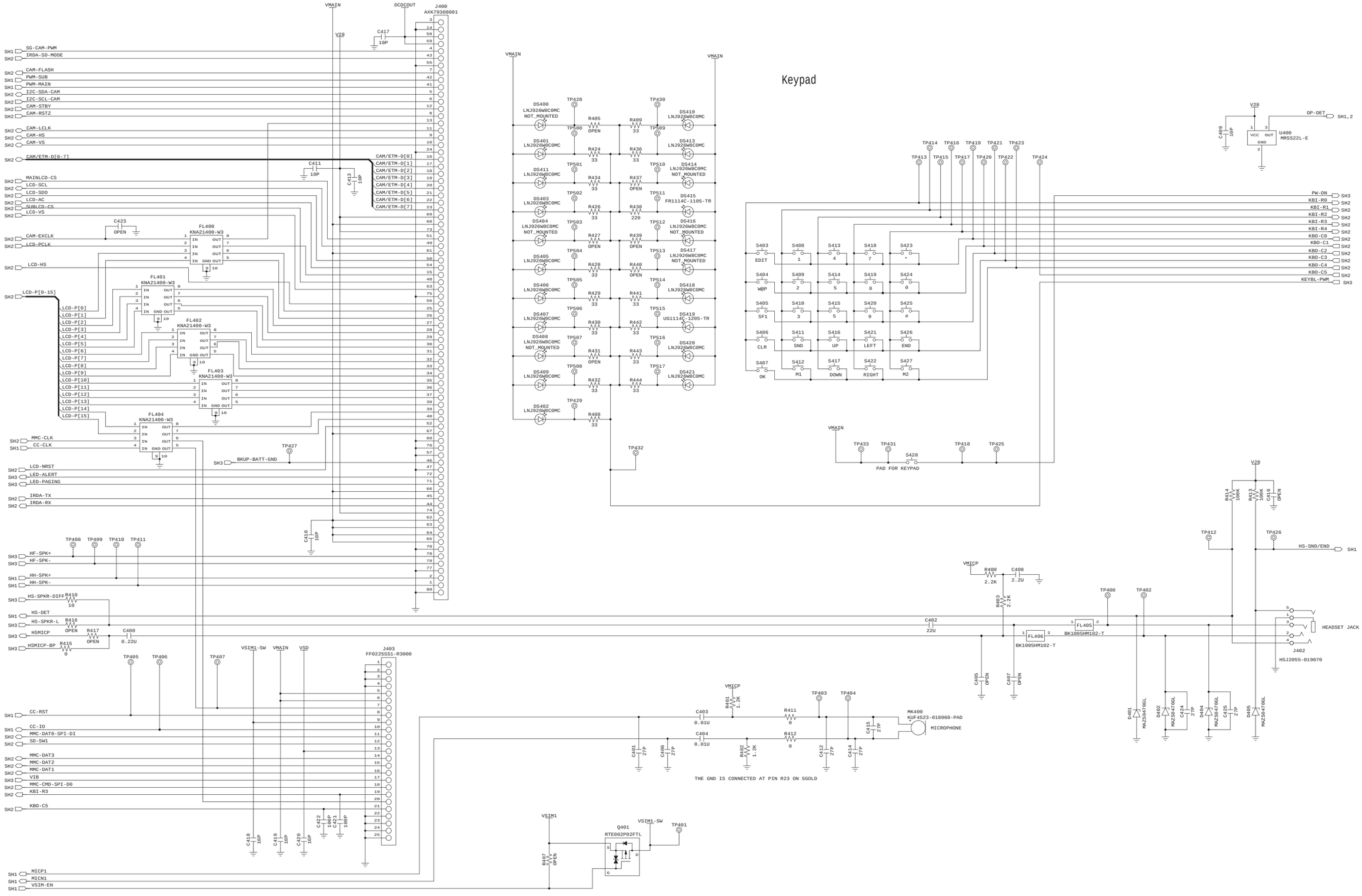
VRTC2 (S-GOLD RTC) = 2.1V
VRTC3 (Back-up Batt) = 3V
VBB3 (OMAP Core) = 1.5V

12. CIRCUIT DIAGRAMS

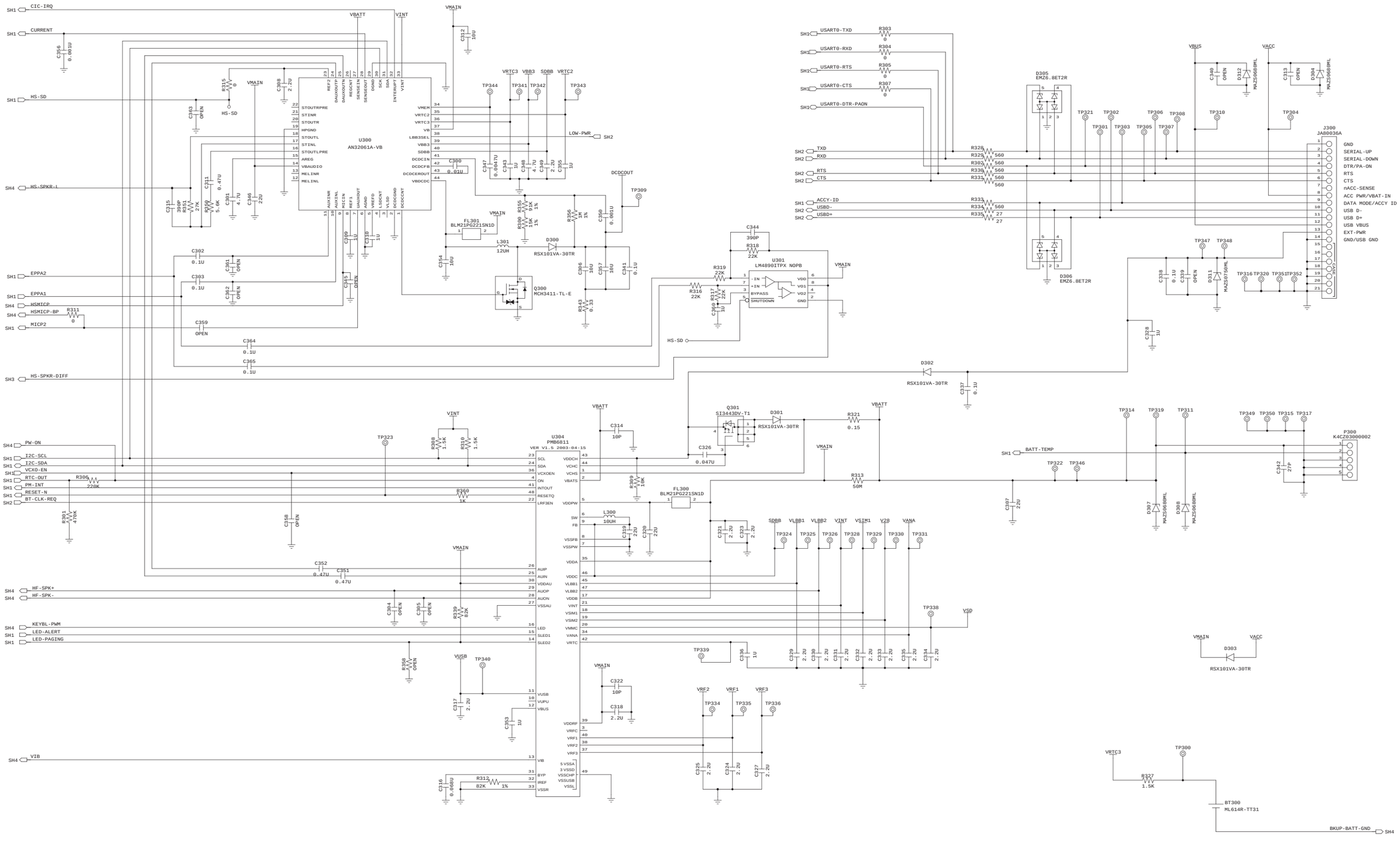
12.1. Main PCB (SGOLD MODEM PROCESSOR SECTION)



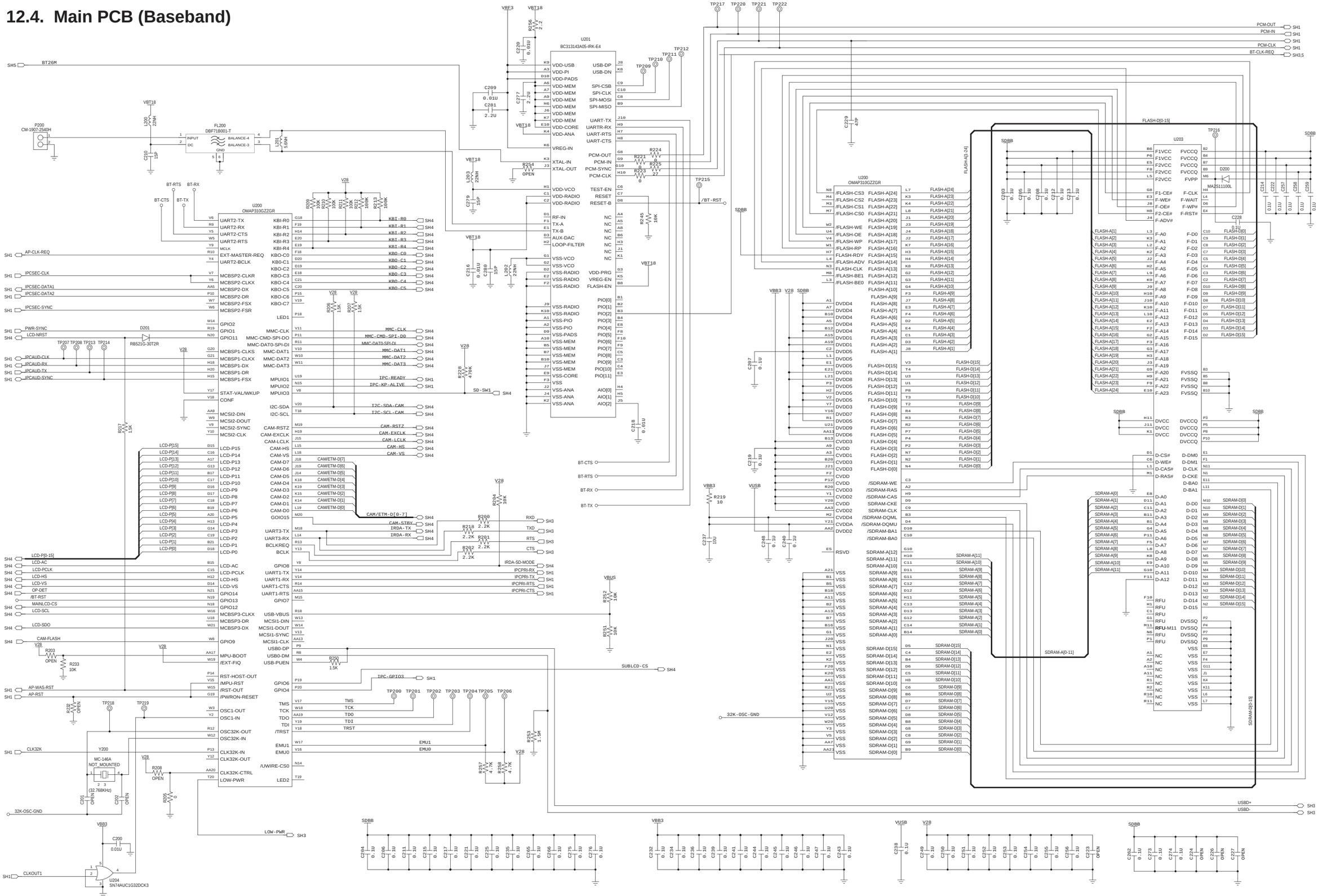
12.2. Main PCB (Board to Board Connector)



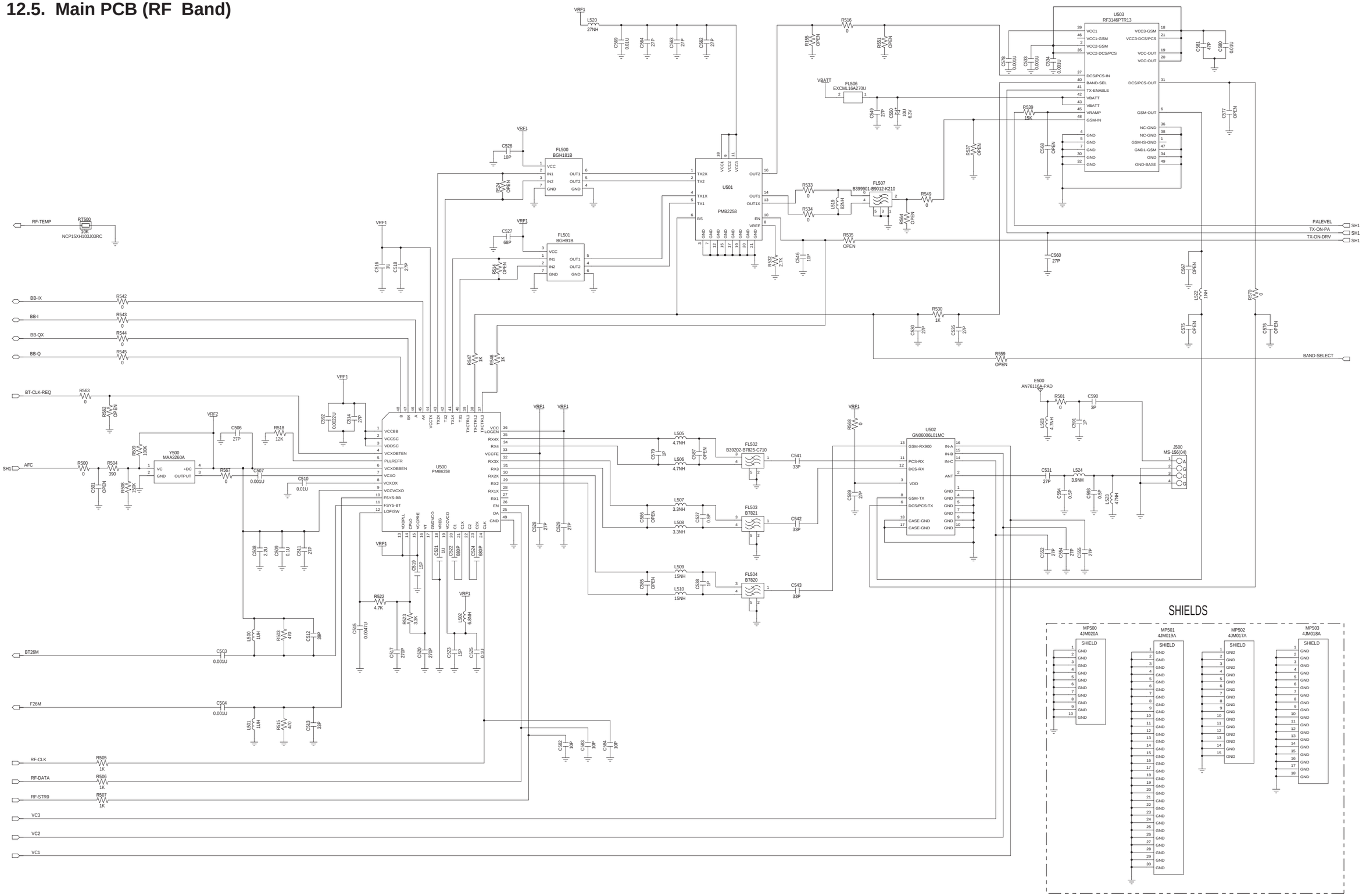
12.3. Main PCB (Power Management)



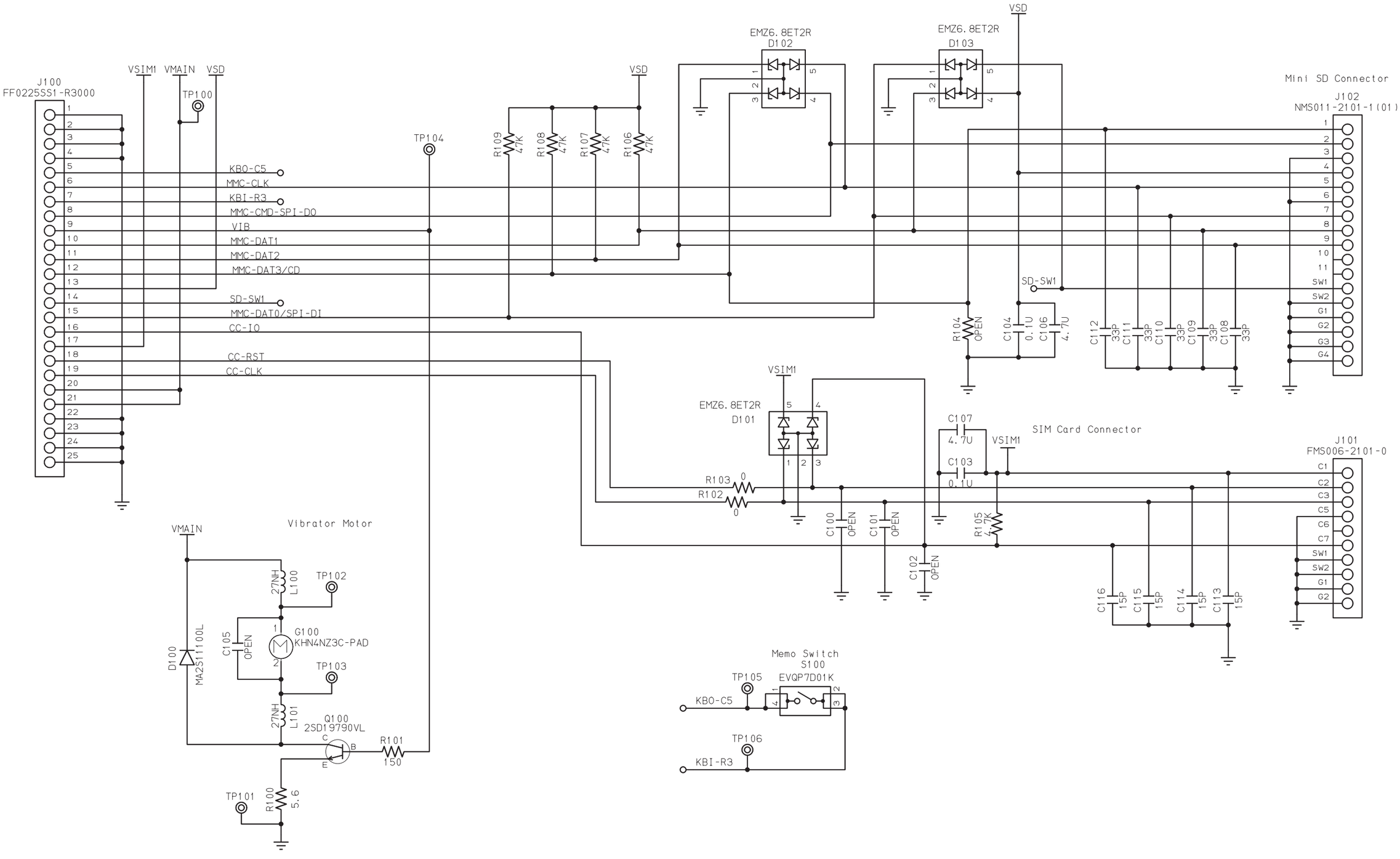
12.4. Main PCB (Baseband)



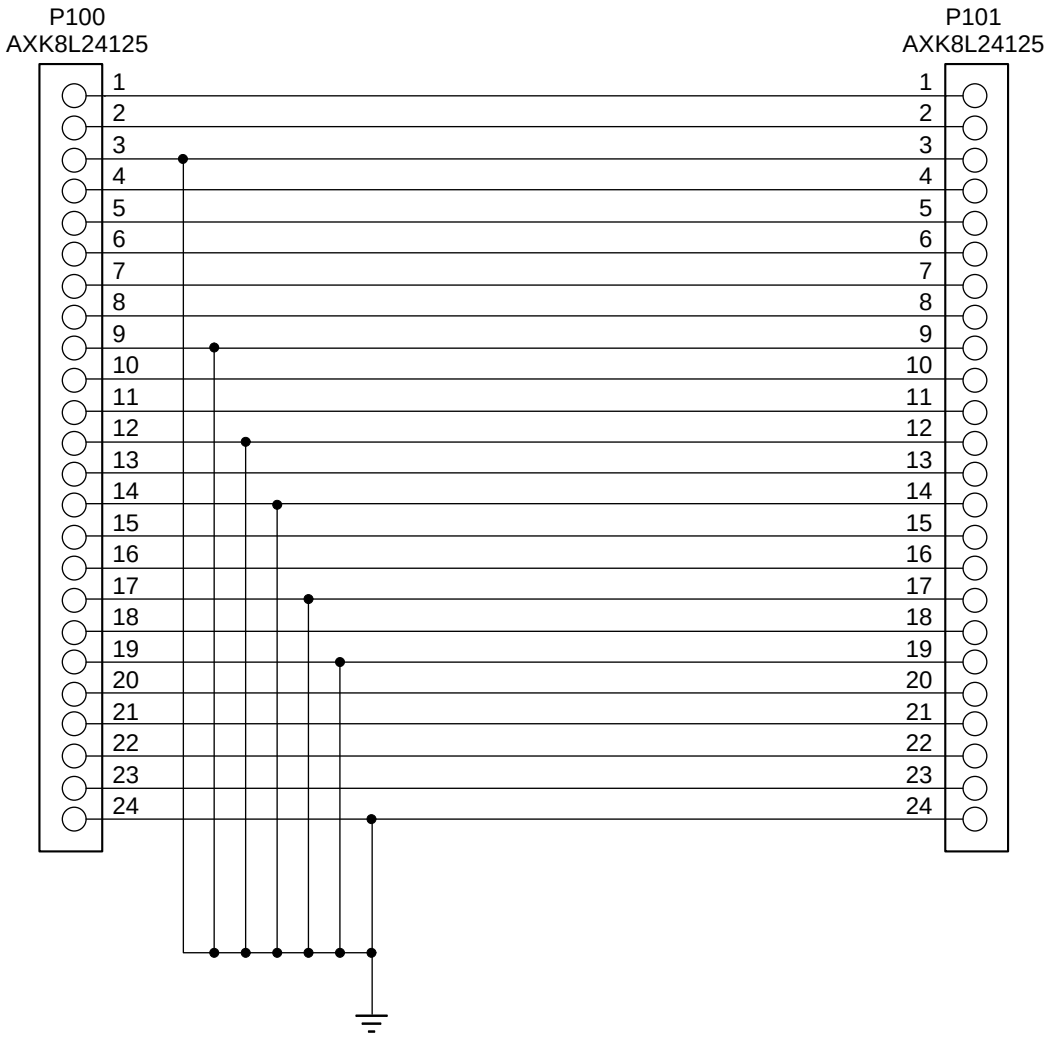
12.5. Main PCB (RF Band)



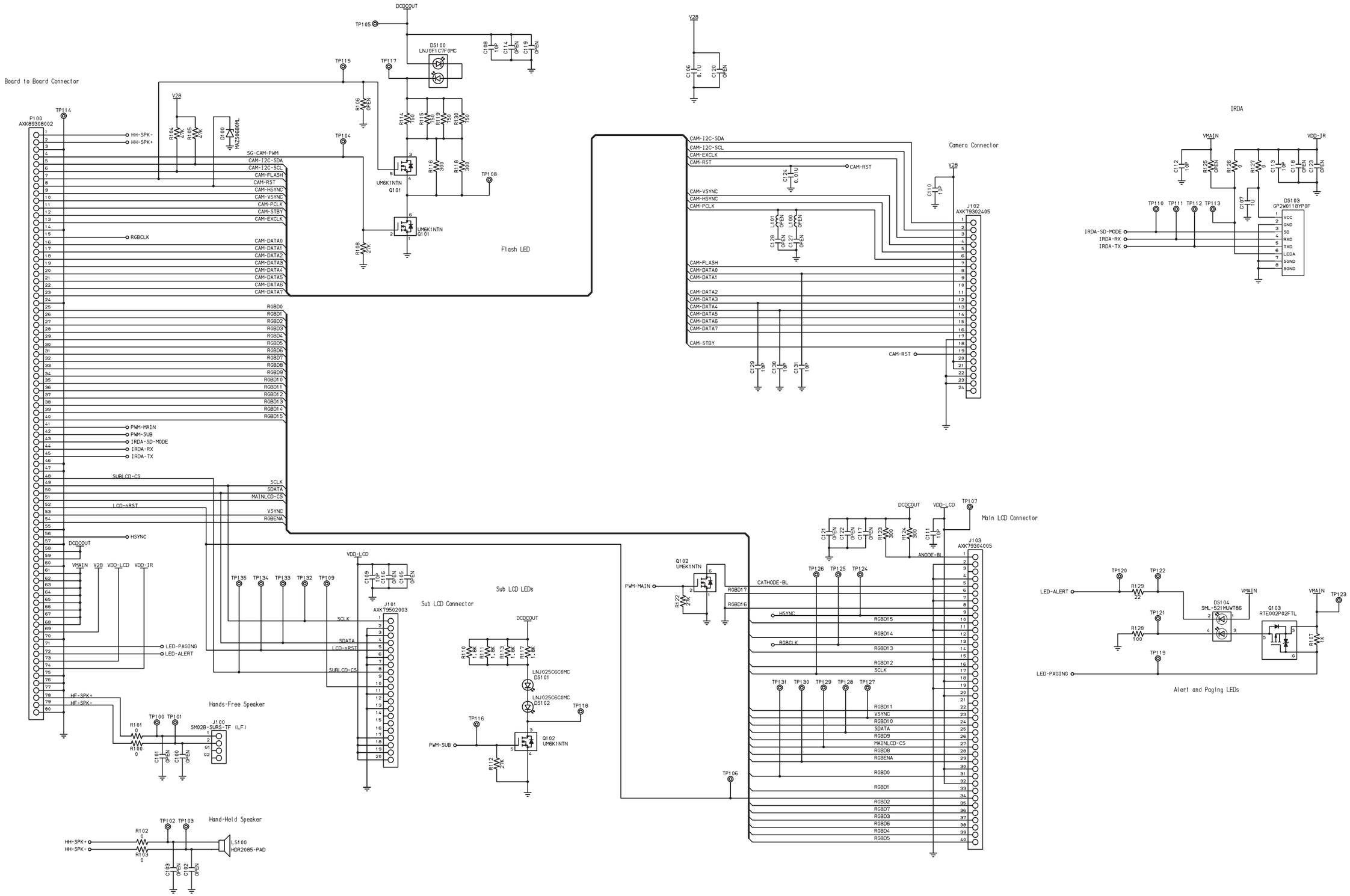
12.6. Mini SD/SIM PCB



12.7. Mini SD/SIM PCB Flex Tall



12.8. LCD PCB



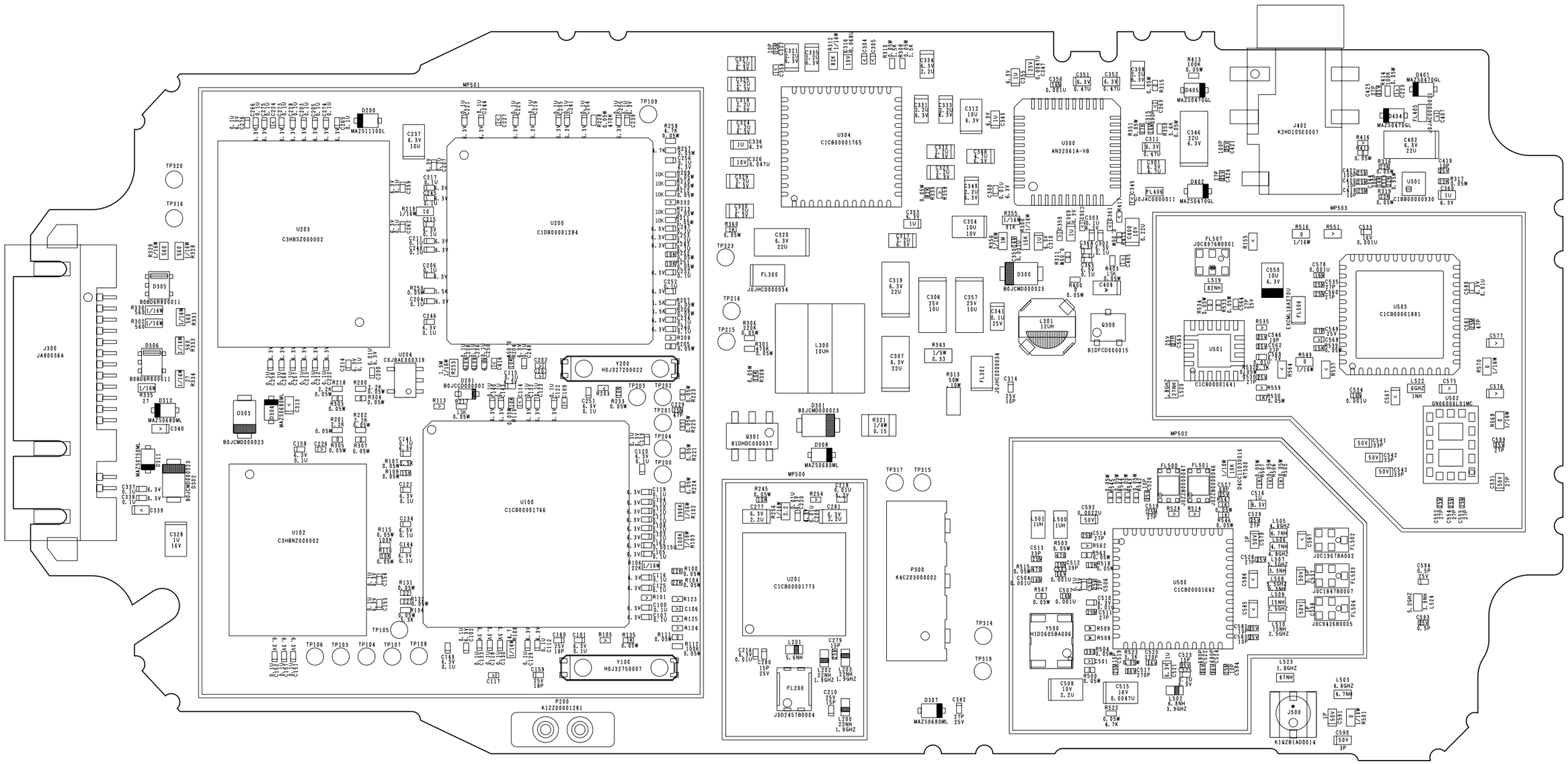
PROVISIONAL ISSUE

13. LAYOUT DIAGRAMS

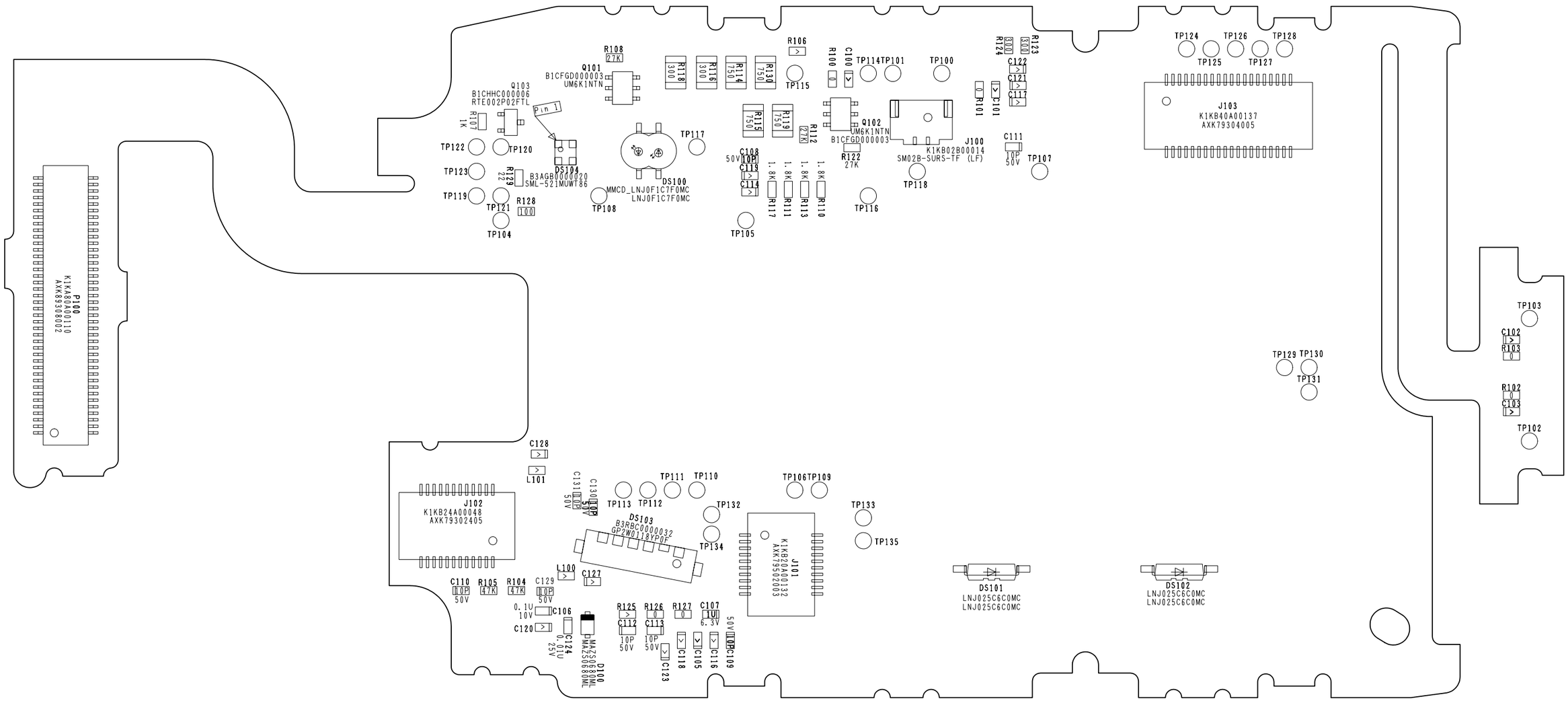
13.1. Main PCB (Top View)

PROVISIONAL ISSUE

13.2. Main PCB (Bottom View)



13.3. LCD PCB (Bottom View)



13.4. Mini SD/SIM PCB