ORDER NO. OMTD040902C8

Service Manual

Personal Cellular Telephone

GSM

EB-X100

	900 MHz	1800 MHz
Tx Frequency Range	880 - 915 MHz	1710 -1785 MHz
Rx Frequency Range	925 - 960 MHz	1805 -1880 MHz
Tx / Rx separation	45 MHz	95 MHz
RF Channel Bandwidth	200 kHz	
Number of RF channels	174	374
Speech coding	Full rate / Half rate / Enhanced Full rate	
Operating temperature	-10 °C to +55 °C	
Type	Class 4 Handheld	Class 1 Handheld
RF Output Power	2 W maximum	1 W maximum
Modulation	GMSK (BT = 0.3)	
WAP / GPRS	WAP 2.0 / GPRS Class 4	
Connection	8 ch / TDMA	
Voice digitizing	13 kbps RPE-LTP / 13 kps ACLEP / 5.6 kps CELP / VSLEP	
Transmission speed	270.833 kbps	
Signal Reception	Direct conversion	
Antenna Impedance (External Connector)	50 Ω	
Antenna VSWR	< 2.1 : 1	
Dimensions (Excluding antenna)	Height : 90 mm Width : 44 mm Depth : 18 mm	
Volume	69 cc	
Weight	79 g	
Main Display	LCD : 128 x 128 pixels, 65,536 colours	
Illumination	8 LEDs for Keypad Backlighting (Blue)	
Keys	16-key Keypad, Navigation key	
SIM	3 V Plug-in type only	
External DC Supply	5.5 V	
Voltage Battery	3.7 V nominal, 730 mAh, Li-Ion	
Standby Time	200 hrs	
Talk Time	9 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.

Panasonic®

COMPANY LIABILITY

Every care has been taken to ensure that the contents of this manual give an accurate representation of the equipment. However, Panasonic Mobile Communications Co., Ltd. accepts no responsibility for inaccuracies which may occur and reserves the right to make changes to the specification or design without prior notice. The information contained in this manual and all rights in any design disclosed therein, are and remain the exclusive property of Panasonic Mobile Communications Co., Ltd.
Other patents applying to material contained in this publication:
CP8 PATENTS

Comments or correspondence concerning this manual should be addressed to:
Panasonic Mobile Communications Co., Ltd.
600, Saedo-cho, Tsuzuki-ku, Yokohama, 224-8539, Japan

CONTENTS

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.

Caution

The equipment described in this manual contains electrostatic devices (ESDs). Damage can occur to these devices if the handling procedures are described in Section 6.

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, and reassembly of the product. 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 enable 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 cosmetic and some electrical components, for the ordering of replacement parts.

1.3. Servicing Responsibilities

The procedures described in this manual must 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 GSM Handportable Telephone system and optional kits.

2.2. Features

The Panasonic Telephone Model EB-X100 is a high performance, small, light, handset for business and domestic use.

The following features are provided:

1. Triple Rate, which includes Full Rate, Half rate and Enhanced Full Rate (EFR) speech, codec.
2. Dual Band, E-GSM 900 and GSM 1800 operation.
3. Tegic T9 Text Entry.
4. Voice Ringer.
5. Desktop Hand free function comprising integral echo cancellation and noise suppression.
6. Wireless Application Protocol (WAP) Browser.
7. Backup Battery.
8. Downloadable polyphonic melody ring tones.
9. Clock, Calculator and Currency Converter.

2.3. Handportable Main Kit

Figure 2.1: Handportable Main Unit Kit Contents

Item	Description	Model Number
1	Main Unit	**EB-X100**
2	Battery, Standard	**EB-BSX500**
3	Travel Charger	**EB-CAX500**

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. Liquid Crystal Display

The telephone handset has a graphical chip on glass display. The following icons are available:

Figure 3.1. : Liquid Crystal Display

	Indicates received signal strength: strong signal area; weak signal area
	Indicates that it is possible to make an emergency call.
Menu Number	The number of the feature indicated by the pointer. To access a feature enter the menu number on the key
	Display battery charge level: Battery is at full charge Battery requires charging The battery icon flashes during charging
Status Pane Icon	Displays a small icon related to the current status of the telephone: Telephone is roaming on a non-home network. To use the "Call Divert" feature or the telephone has Call-Diert set; Shows there is a Voicemail incoming. Shows that vibration alert is switched on; **Indicates that the phone is in silent mode - no tones;** Flashes to indicate an incoming call; Indicates the alarm is set. Indicates that there are unread text (SMS) messages. Lit when SMS area is full; MMS Notification Icon Shows that the Telephone is connecting by GPRS Shows that the Telephone is connecting GPRS online with no secure Icon Indicates that the Java Application has been terminated. Indicates the telephone is locked; Wap Push Icons
Control Pane Icons	Phone Icon Message Icon Alarm Calculator Icon Scheduler Icon Sound Recorder Icon Browser Icon Camera Icon

Camera Control Icons	 Capture Icon (Portrait) Sub Menu Icon (Portrait) Clear Icon (Portrait) Store Icon (Portrait) Capture Icon (Landscape) Sub Menu Icon (Landscape) Clear Icon (Landscape) Store Icon (Landscape)
Message Control Icons	 Unread SMS/EMS Icon on **SIM** Read SMS/EMS Icon on **SIM** Read SMS/EMS Icon Unread SMS/EMS Icon on **Mobile Phonebook** Read SMS/EMS Icon on **Mobile Phonebook** Unread MMS Icon Read MMS Icon Input characters varied by following methods:  shows that the normal character set has been selected; shows that the Greek character set has been selected; shows that the Extended character set has been selected; T9 indicates that Tegic T9R® predictive text mode is selected
Information Icon	Displays a small icon according to the current menu level:  Indicates the current Phonebook is sourced from the **SIM Phonebook.** Name (Personal) Icon Location Number Icon on SIM Indicates the current Phonebook is sourced from the **Mobile Phonebook** Name (Personal) Icon Tel Number 1 Icon Tel Number 2 Icon Tel Number 3 Icon E-Mail 1 Icon E-Mail 2 Icon Ring (Alert) Type Icon Group Icon Hotkey Dial Icon Location Number Icon on Mobile Phonebook

Following some operations, the display will clear automatically after three seconds or after pressing any key except.

3.3. Location of Controls

External connector: Used to connect to external accessories or to charging equipment.

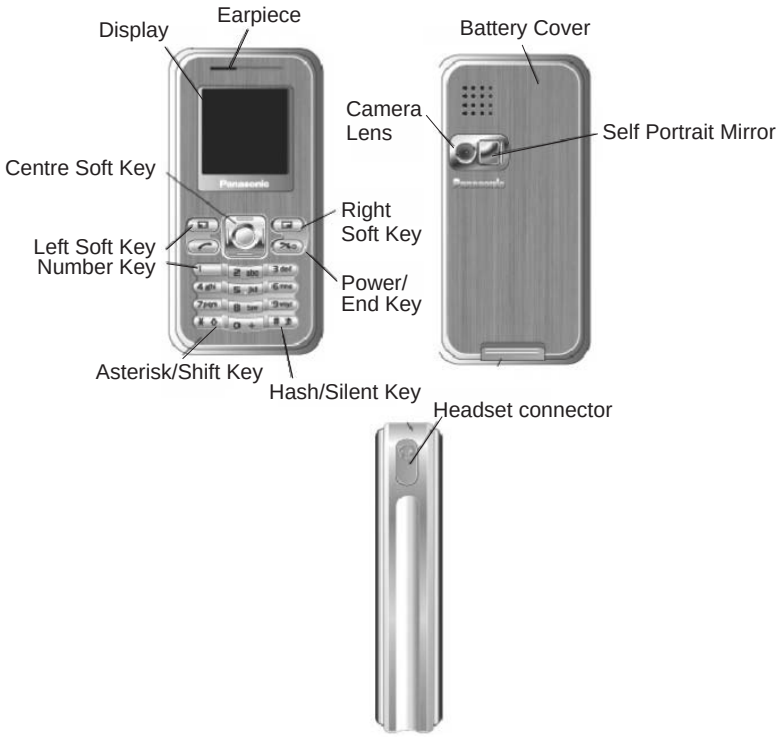
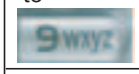


Figure 3.2. : Location of Controls

The keypad of Type A

	Navigation Key. Scrolls through options or features menu and increases or decreases volume.
	Cancel Key. Used mainly to cancel the current operation and return to the previous menu level. In some menus it has other functions.
	Option key. Primarily used for accessing the Phonebook or switching character types.
	Send Key. Makes a call.
	End Key. Ends a call or switches the telephone on/off when pressed and held.
 to 	Digit keys. Enter wild numbers or pauses when pressed and held. Where appropriate the 0 key scrolls up or down through abbreviated control names and then select to reveal the international access code "+".
	Vibrate enable/disable Key. Press and hold to enable or disable the vibrate alert.

The keypad of Type B

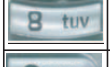
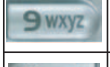
	Navigation Key. Scrolls through options or features menu and increases or decreases volume.
	Cancel Key. Used mainly to cancel the current operation and return to the previous menu level. In some menus it has other functions.
	Option key. Primarily used for accessing the Phonebook or switching character types.
	Send Key. Makes a call.
	End Key. Ends a call or switches the telephone on/off when pressed and held.
 to 	Digit keys. Enter wild numbers or pauses when pressed and held. Where appropriate the 0 key scrolls up or down through abbreviated control names and then select to reveal the international access code "+".
	Vibrate enable/disable Key. Press and hold to enable or disable the vibrate alert.

3.4. Alpha Entry

3.4.1. Character Set / Key Assignments

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

The keypad of Type A

Key		Character / Operation			
T9®		Normal	Greek	Extended	Numeric
	Alternatives	+ -	+ -	+ -	0+P_
	Punctuation	" @ – , . ; : ! ¡ ? ¿ ( ) ' & % + – / < > = £ $ ¥ ¤ §			1
	abc	A B C a b c	Α Β Γ	A Ä Å Æ B C Ç a ä å æ à b c	2
	def	D E F d e f	Δ E Z	D E É F d e é è f	3
	ghi	G H I g h i	Η Θ Ι	G H I g h i ì	4
	jkl	J K L j k l	Κ Λ Μ	J K L j k l	5
	mno	M N O m n o	Ν Ξ Ο	M N Ñ O Ö o m n ñ o ö ø	6
	pqrs	P Q R S p q r s	Π Ρ Σ	P Q R S p q r s É¿	7
	tuv	T U V t u v	Τ Υ Φ	T U U V t u ü ù v	8
	wxyz	W X Y Z w x y z	Χ Ψ Ω	W X Y Z w x y z	9
	Shift / Lock	*	*	*	*
	Space	#	#	#	#

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.

To cycle between Greek characters (Α Β Γ), extended characters (A Ä Å), numerals (0-9) and normal characters (A B C) press  .

The keypad of Type B

Key		Character / Operation			
T9®		Normal	Greek	Extended	Numeric
0 +	Alternatives	+ -	+ -	+ -	0+P_
1	Punctuation	" @ – , . ; : ! ¡ ? ¿ ( ) ' & % + – / < > = £ $ ¥ ¤ §			1
2 abc	abc	A B C a b c	Α Β Γ	A Ä Å Æ B C Ç a ä å æ à b c	2
3 def	def	D E F d e f	Δ Ε Ζ	D E É F d e é è f	3
4 ghi	ghi	G H I g h i	Η Θ Ι	G H I g h i ì	4
5 jkl	jkl	J K L j k l	Κ Λ Μ	J K L j k l	5
6 mno	mno	M N O m n o	Ν Ξ Ο	M N Ñ O Ö o m n ñ o ö ø	6
7 pqrs	pqrs	P Q R S p q r s	Π Ρ Σ	P Q R S p q r s É¿	7
8 tuv	tuv	T U V t u v	Τ Υ Φ	T U U V t u ü ù v	8
9 wxyz	wxyz	W X Y Z w x y z	Χ Ψ Ω	W X Y Z w x y z	9
* ⇧	Shift / Lock	*	*	*	*
# ␣	Space	#	#	#	#

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.

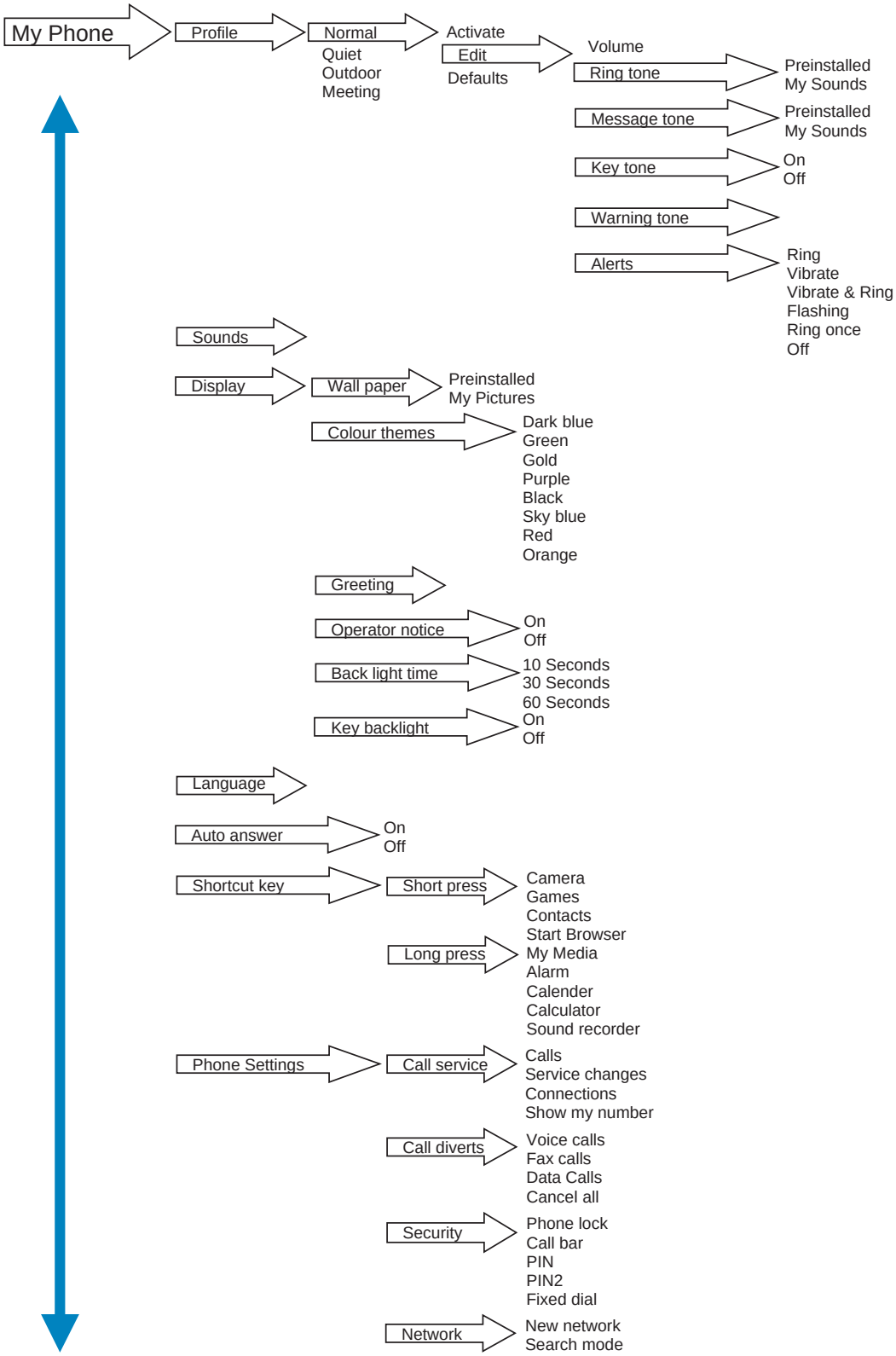
To cycle between Greek characters (Α Β Γ), extended characters (A Ä Å), numerals (0-9) and normal characters (A B C) press  .

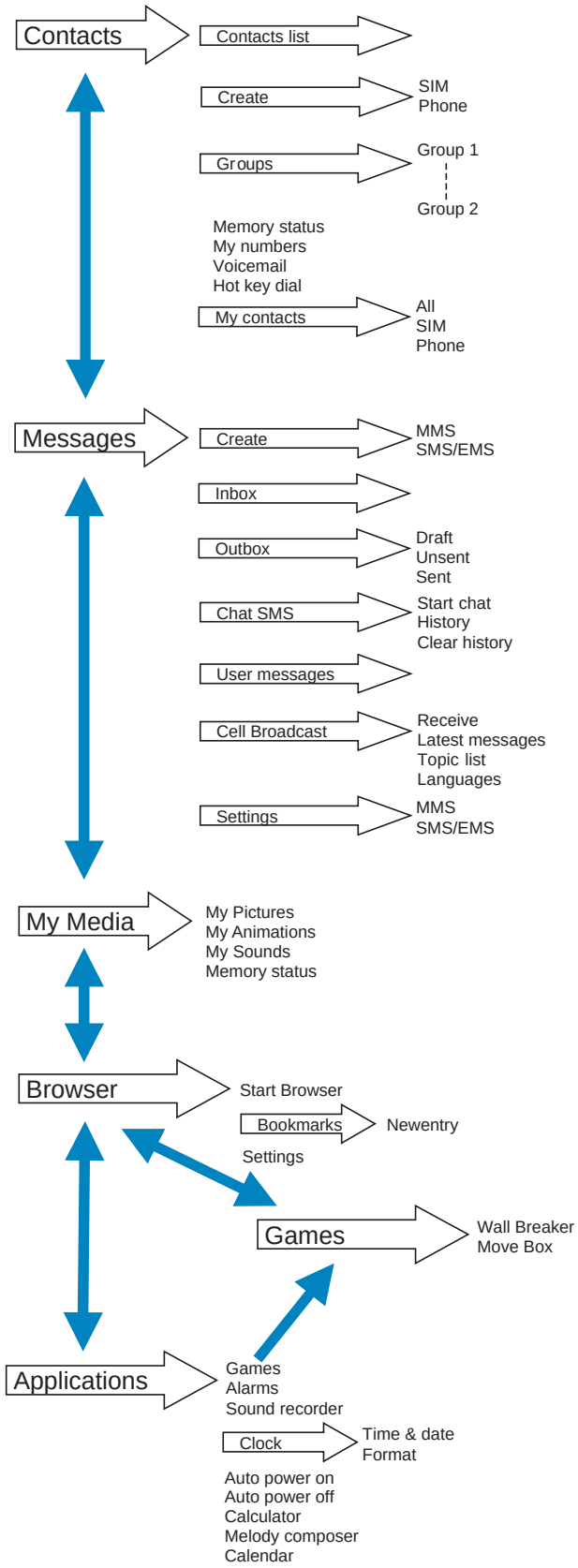
3.4.2. Character Set / Key Assignments

Pressing  will move the cursor up or down or left or right. When the cursor is moved over a character and another key pressed this will insert the new character.

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

3.5. Features Menu Structure




Contacts
Contacts list
Create
SIM
Phone
Groups
Group 1
Group 2
Memory status
My numbers
Voicemail
Hot key dial
My contacts
All
SIM
Phone
Messages
Create
MMS
SMS/EMS
Inbox
Outbox
Draft
Unsent
Sent
Chat SMS
Start chat
History
Clear history
User messages
Cell Broadcast
Receive
Latest messages
Topic list
Languages
Settings
MMS
SMS/EMS
My Media
My Pictures
My Animations
My Sounds
Memory status
Browser
Start Browser
Bookmarks
Newentry
Settings
Games
Wall Breaker
Move Box
Applications
Games
Alarms
Sound recorder
Clock
Time & date
Format
Auto power on
Auto power off
Calculator
Melody composer
Calendar

4. TECHNICAL SPECIFICATIONS

4.1. Tx Characteristics

All data is applicable to E-GSM 900 and GSM 1800 except where stated.

4.1.1. Frequency Error

±0.1 ppm max., relative to base station frequency.

4.1.2 Modulation Phase Error

RMS: Equal to or less than 5 °

Peak: Equal to or less than 20 °

4.1.3. Output RF Spectrum due to Modulation

Offset from Centre Frequency (kHz)	Maximum Level Relative to Carrier (dB)
±100	+0.5
±200	–30
±250	–33
±400	–60
±600 to 1800	–60

4.1.4. Output RF Spectrum due to Switching Transients

Offset from Centre Frequency (kHz)	Maximum Level (dBm)	
	E-GSM 900	GSM 1800
±400	–19	–22
±600	–21	–24
±1200	–21	–24
±1800	–24	–27

Measurement conditions for output RF spectrum measurements:

Frequency Span	0 Hz
Measurement Bandwidth:	30 kHz
Video Bandwidth:	30 kHz (modulation) 100 kHz (switching)
Average (Modulation)	over 200 burst
Peak Hold (Switching)	over 10 burst

4.1.5. Spurious Emissions at Antenna Connector

Frequency Range	Frequency offset	Filter Bandwidth	Approx Video B/W	Limits (dBm)	
				E-GSM 900	GSM1800
100 kHz to 50 MHz	–	10 kHz	30 kHz	–36	–36
50 MHz to 500 MHz	–	100 kHz	300 kHz	–36	–36
500 MHz to 1 GHz	0 to 1 MHz	100 kHz	300 kHz	–36	–36
1 GHz to 12.75 GHz Excl. relevant TX band E-GSM : 880 MHz to 915 MHz DCS : 1710 MHz to 1785 MHz -and the Rx bands 925 MHz - 960 MHz 1805 MHz - 1880 MHz	0 to 10 MHz > 10 MHz > 30 MHz (off from edge of relevant Tx band)	100 kHz 300 kHz 3 MHz	300 kHz 1 MHz 3 MHz	–30 –30 –30	–30 (1.0 - 1.710 GHz) –36 (1.710 - 1.785 GHz) –30 (1.785 - 12.75 GHz)
Relevant TX band: E-GSM : 880 MHz to 915 MHz DCS : 1710 MHz to 1785 MHz	1.8 to 6.0 MHz > 6.0 MHz	30 kHz 100 kHz	100 kHz 300 kHz	–36 –36	–36 –36

4.1.6. Residual Peak Power

Equal to or less than 70 dBc (BW = 300 kHz)

4.2. Rx Characteristics

4.2.1. Sensitivity

■ E-GSM 900 Full Rate Speech

The reference sensitivity performance in terms of frame erasure, bit error, or residual bit error rates (whichever is appropriate) is specified in the following table, according to the propagation conditions.

Channels	Propagation conditions TU high		Propagation conditions RA		Propagation conditions HT		Static Conditions	
	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples
TCH/FS FER	6.742* α	8,900					0.122* α	164,000
class Ib (RBER)	0.42/ α	1,000,000					0.41/ α	20,000,000
class II (RBER)	8.333	120,000	7.5	24,000	9.333	60,000	2.439	8,200

The reference sensitivity level is < –104 dBm.

NOTE : $1 < \alpha < 1.6$. The value of a can be different for each channel condition but must remain the same for FER and class 1b RBER measurements for the same channel condition.

■ E-GSM 900 Half Rate Speech

The reference sensitivity performance in terms of frame erasure, bit error, or residual bit error rates (whichever is appropriate) is specified in the following table, according to the propagation conditions.

Channels	Propagation conditions TU high		Propagation conditions RA		Propagation conditions HT	
	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples
TCH/FS (FER)	4.598	13,050				
TCH/FS class Ib (BFI = 0)	0.404	148,500				
TCH/FS class II (BFI = 0)	7.725	25,500	8.500	20,000	7.600	20,000
TCH/FS (UFR)	6.250	9,600				
TCH/FS class Ib ((BFI or UFI) = 0)	0.269	227,000				

■ GSM 1800 Full Rate Speech

The reference sensitivity performance in terms of frame erasure, bit error, or residual bit error rates (whichever is appropriate) is specified in the following table, according to the propagation conditions.

Channels	Propagation conditions TU high		Propagation conditions RA		Propagation conditions HT		Static Conditions	
	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples
TCH/FS FER	4.478* α	13,400					0.122* α	164,000
class Ib (RBER)	0.32/ α	1,500,000					0.41/ α	20,000,000
class II (RBER)	8.333	600,000	7.5	24,000	9.333	30,000	2.439	8,200

The reference sensitivity level is < –103 dBm.

NOTE: $1 < \alpha < 1.6$. The value of a can be different for each channel condition but must remain the same for FER and class 1b RBER measurements for the same channel condition.

■ GSM 1800 Half Rate Speech

The reference sensitivity performance in terms of frame erasure, bit error, or residual bit error rates (whichever is appropriate) is specified in the following table, according to the propagation conditions.

Channels	Propagation conditions TU high		Propagation conditions RA		Propagation conditions HT	
	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples	Test Limit error rate %	Minimum No of samples
TCH/FS (FER)	4.706	12,750				
TCH/FS class Ib (BFI = 0)	0.426	141,000				
TCH/FS class II (BFI = 0)	7.725	25,500	8.735	20,000	7.600	20,000
TCH/FS (UFR)	6.383	9,400				
TCH/FS class Ib ((BFI or UFI) = 0)	0.291	206,000				

■ Blocking:

Frequency	Small MS level in dBμVemf( )	
	E-GSM 900	GSM 1800
FR ± 600 kHz to FR ± 800 kHz	70	70
FR ± 800 kHz to FR ± 1,6 MHz	70	70
FR ± 1,6 MHz to FR ± 3 MHz	80	80
915 MHz to FR - 3 MHz	90	–
FR ± 3 MHz to FR 980 MHz	90	–
FR ± 600 KHz to FR ± 800 KHz	–	87
1785 MHz to FR - 3 MHz	–	87
835 MHz to < 915 MHz	113	–
> 980 MHz to 1000 MHz	113	–
100 KHz to < 835 MHz	90	–
> 1000 MHz to 12.75 GHz	90	–
100 KHz to 1705 MHz	_	113
> 1705 MHz to < 1785 MHz	_	101
> 1920 MHz to 1980 MHz	_	101
> 1980 MHz to 12.75 GHz	_	90

Measurement Conditions:

Wanted carrier is 3 dB above reference sensitivity.

Interferer is CW.

Spurious response exceptions:

Six exceptions are permitted IN band 915 - 980 MHz.

24 exceptions are permitted OUTSIDE band 915 - 980 MHz.

■ Intermodulation Characteristics

Interferer Level (f1& f2) dBm	Interferer Frequencies (f1&f2)
49	Wanted frequency= 2f1 - f2, and [f1 - f2] = 800 kHz

5. TECHNICAL DESCRIPTION

5.1. RF Overview

5.1.1. Introduction

■ General Specifications

The telephone is a Dual Band product incorporating two switch able transceivers, one for the E-GSM 900 band and another for the GSM 1800 (DCS 1800) band. The transmit and receive bands for the mobile are given in the table below:

	Tx	Rx
EGSM 900	880 MHz - 915 MHz	925 MHz - 960 MHz
GSM 1800	1710 MHz - 1785 MHz	1805 MHz - 1880 MHz
GSM 850	824 MHz - 849 MHz	869 MHz - 894 MHz
GSM 1900	1850 MHz - 1910 MHz	1930 MHz - 1990 MHz

Other salient technical features are as follows:

	E-GSM 900	GSM 1800	GSM 850	GSM 1900
RX Bandwidth	35 MHz	75 MHz	25 MHz	60 MHz
TX Bandwidth	35 MHz	75 MHz	25 MHz	60 MHz
Duplex Spacing	45 MHz	95 MHz		
Number of Channels	174	374	124	299
AFRCN (Channel Numbers)	0 - 124 975 - 1023	512 - 885	128 - 251	512 - 810
1st TX Channel	880.2 MHz (Ch 975)	1710.2 MHz (Ch 512)	824.8 MHz (Ch 128)	1850.2 MHz (Ch 512)
Last TX Channel	914.8 MHz (Ch 124)	1784.8 MHz (Ch 885)	848.8 MHz (Ch 251)	1909.8 MHz (Ch 810)
1st RX Channel	925.2 MHz (Ch 975)	1805.2 MHz (Ch 512)	869.2 MHz (Ch 128)	1930.2 MHz (Ch 512)
Last RX Channel	959.8 MHz (Ch 124)	1879.8 MHz (Ch 885)	893.8 MHz (Ch 251)	1989.8 MHz (Ch 810)
Maximum TX Power	33.0 dBm {Class 4}(PL 5)	30.0 dBm {Class 1}(PL 0)	29.0 dBm {Class 5}(PL 7)	30.0 dBm {Class 1}(PL 0)
Minimum TX Power	5.0 dBm (PL 19)	0.0 dBm (PL 15)	5.0 dBm (PL 19)	0.0 dBm (PL 15)

5.1.2. RF Function Block

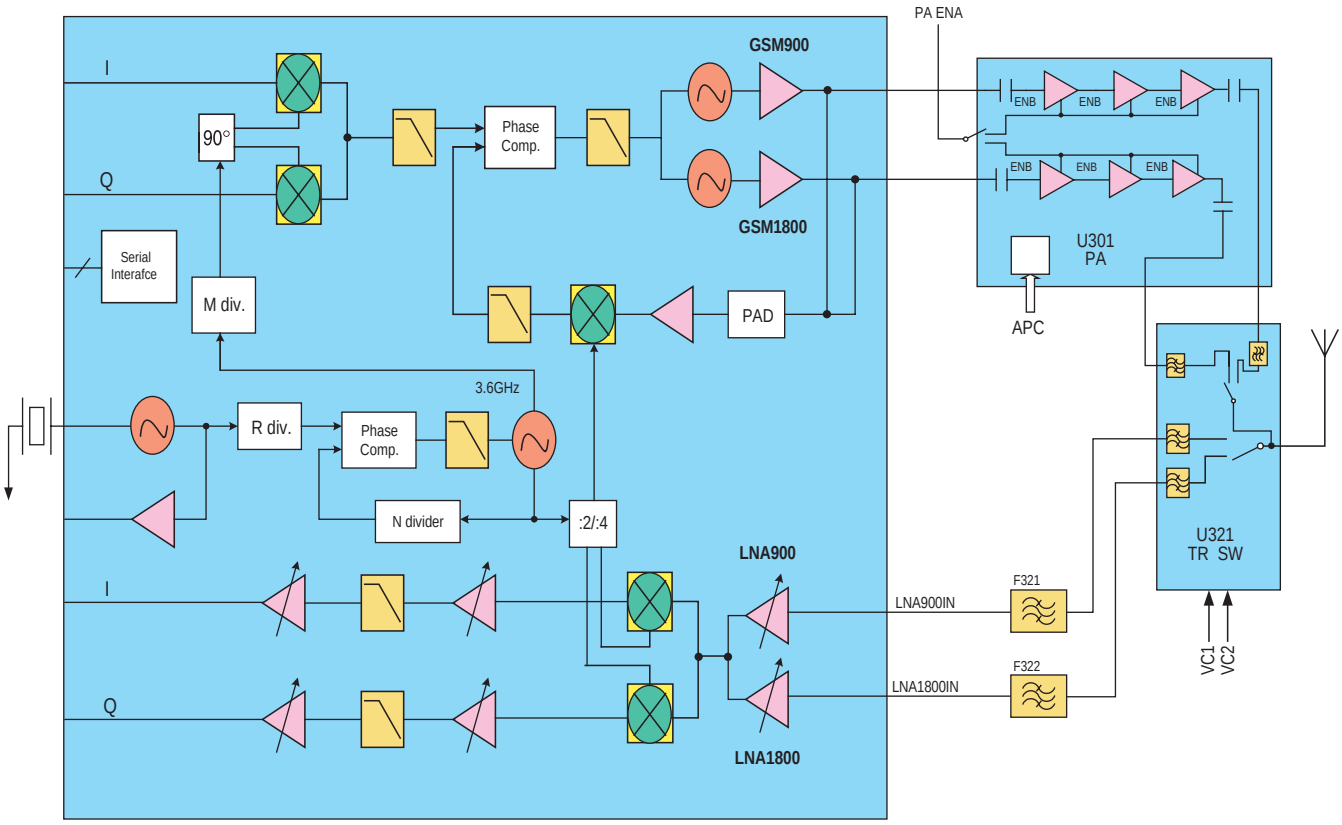


Figure 5.1. : RF Function Block Diagram

5.1.3. Functional Description

■ Frequency Plan

The frequency plan is shown below:

	TX Frequency	TX IF	TX UHF LO
E-GSM 900	880 MHz - 915 MHz	98.3 MHz - 114.4 MHz	1474.3 MHz -1543.8 MHz
GSM 1800	1710 MHz - 1785 MHz	90.3 MHz - 104.8 MHz	1354.7 MHz - 1414.5 MHz
GSM 850	824 MHz - 849 MHz	82.42 MHz - 105.55 MHz	1359.93 MHz - 1424.922 MHz
GSM 1900	1850 MHz - 1910 MHz	97.37 MHz - 112.34 MHz	1460.68 MHz - 1516.606 MHz

	RX	RX LO
E-GSM 900	925 MHz - 960 MHz	925.2 MHz -959.8 MHz
GSM 1800	1805 MHz - 1880 MHz	1805.2 MHz - 1879.8 MHz
GSM 850	869 MHz - 894 MHz	869.2 MHz - 839.8 MHz
GSM 1900	1930 MHz - 1990 MHz	1930.2 MHz - 1989.8 MHz

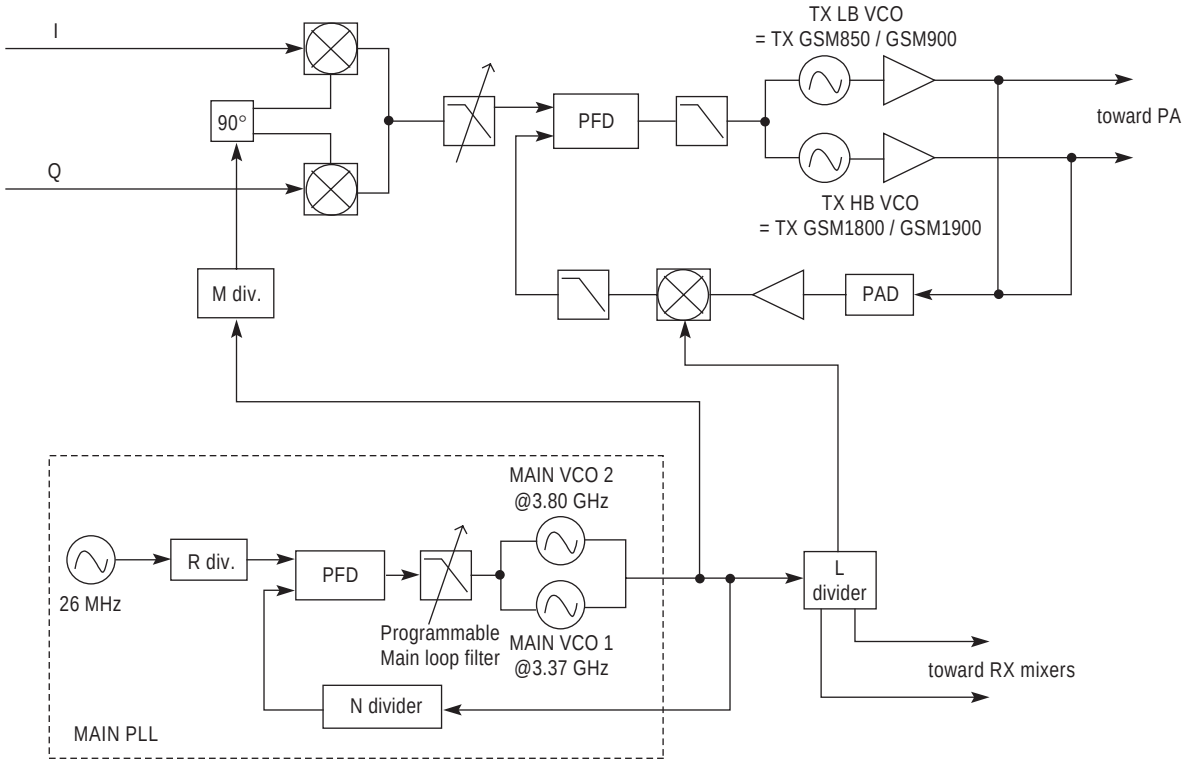


Figure 5.2. Synthesizer Block Diagram

5.1.4. Transmitter

■ Introduction

This section provides a technical description of the transmitter circuits of the Main PCB. A circuit diagram of the whole system is provided in the Service Manual.

❑ Functional Description

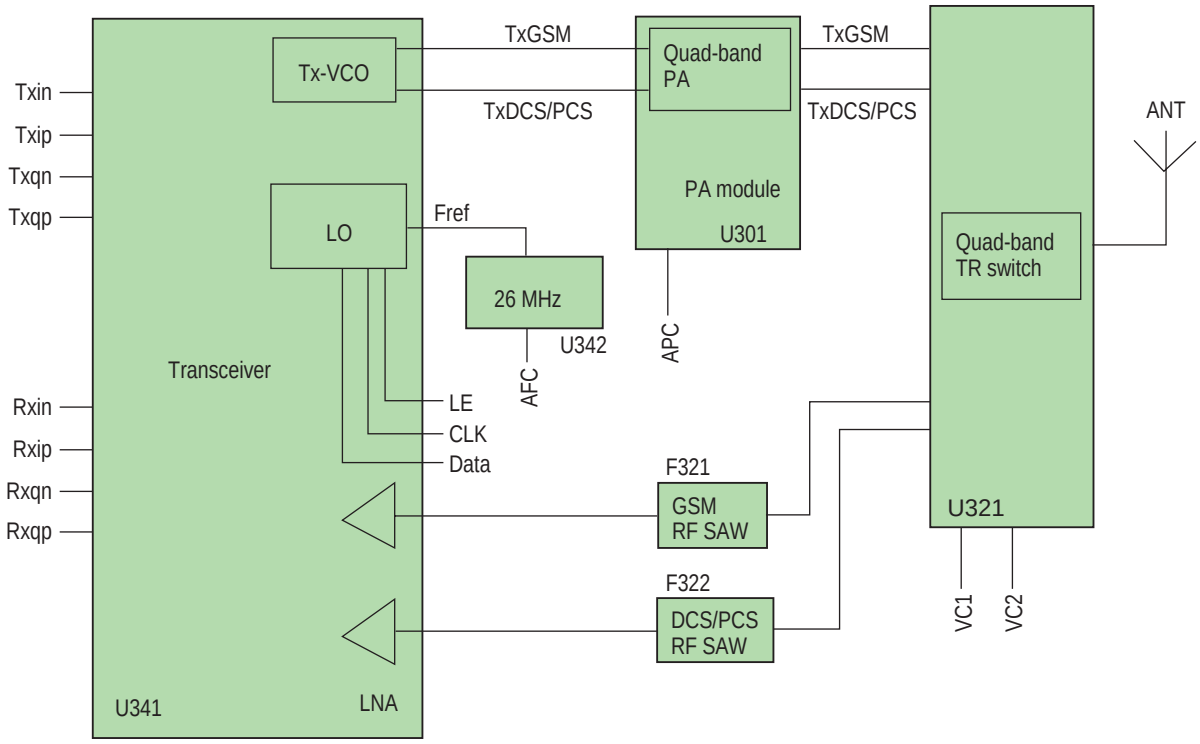


Figure 5.3. Functional block diagram

Switch Mode	VC1	VC2
GSM-TX	0.0 V – 0.2 V	2.4 V – 2.8 V
DCS-TX	2.4 V – 2.8 V	0.0 V – 0.2 V
GSM/DCS-RX	0.0 V – 0.2 V	0.0 V – 0.2 V

5.2. Baseband Overview

The Baseband circuits of the phone are required to perform the following functions:

- Equalisation
- Channel coding / decoding
- Speech coding / decoding
- Data Encryption
- Layer 1, 2 and 3 software tasks
- Man Machine interface (MMI)
- System Interface
- SIM Interface and Management
- Audio and 32 Strings Melody Generation
- Power supply and battery management
- RF power control
- Synchronization
- Real time clock
- Camera

5.2.1. Baseband Block Diagram

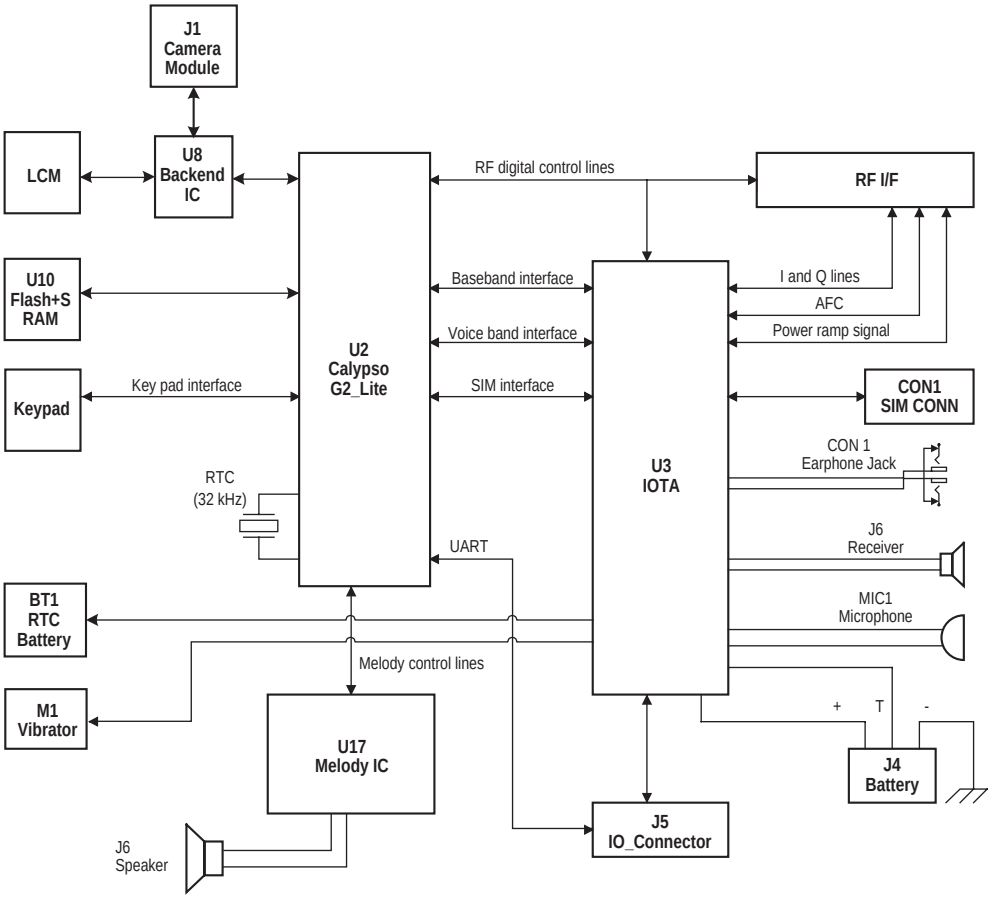


Figure 5.4. Baseband Block Diagram

The EB-X100 Baseband is built around a U2 GSM baseband LSI. One chip (Calypso_G2) carries out signal processing with DSP and CPU, and the U3 (IOTA) provides the analogue interface. The highly integrated nature of the chips means that each can contain a large number of functions.

5.3. Keypad

The Keypad has a 5 x 4 matrix, allowing 20 keys to be scanned. When a key being pressed, a keypad interrupt is generated.
To find which key has been pressed, the software scans each column in turn and reads which row is active.
Because of key bounce, the key press is confirmed twice at approximately 20 ms intervals.

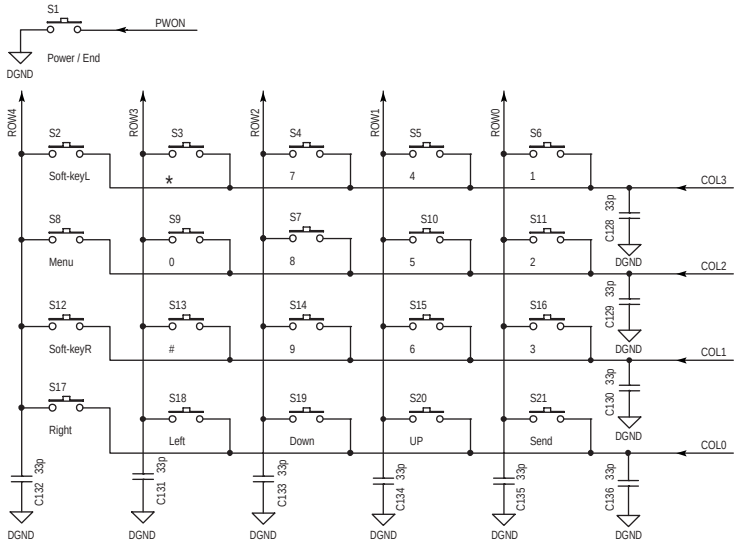


Figure 5.5. Keypad Circuit Diagram

Keyboard scanning is controlled by software. "Key pressed" is indicated by an interrupt, but "key released" is monitored by software.

5.4. Subscriber Identity Module (SIM)

To allow the use of a 3 V SIM card type, a SIM level-shifter module in the IOTA device interfaces the SIM signals (DBBSRST, DBBSIO, and DBBSCK) at a constant VRIO level from the DBB device with the SIM card (SIMRST, SIMIO, and SIMCK) at a 3 V level, depending on SIM type.

5.5. Timed Processing Unit (TPU)

The TPU is a real time sequencer dedicated to the monitoring of GSM baseband processing. Working from an event table referring to a GSM TDMA time base, the TPU activates tasks to control DSP peripherals with respect to the time constraints related to GSM sequencing (one quarter of bit time accuracy). The types of events that are controlled in this way are 'Open TX window', Close RX Window, etc.

TPU Timing output signal assignments of G2			
Name	PIN No.	Function	Connection
TSPACT 1	M14	PAENA	RF
TSPACT 2	L12	NC	N/A
TSPACT 3	L13	NC	N/A
TSPACT 4	J10	NC	N/A
TSPACT 5	K11	NC	N/A
TSPACT 6	K13	TRENA	RF
TSPACT7:CLKX_SPI	K12	NC	N/A
TSPACT 8:nMREQ	K14	GSM_TXEN	RF
TSPACT 9:MAS1	J11	NC	N/A
TSPACT 10:nWAIT	J12	NC	N/A
TSPACT 11:MCLK	J13	NC	N/A

5.6. Memory

The ROM/RAM capacity of the EB-X100 external memory U10 is 64-Mbit Flash + 32-Mbit SRAM.

5.7. Power Source

EB-X100 uses a 730 mAh Lithium-Ion battery pack.

5.8. Battery Temperature (BATTEMP)

The battery packs used for EB-X100 contain a negative temperature coefficient thermistor.

5.9. Liquid Crystal Display (LCD)

The LCD module consists of a LCD glass and driver chip connection to the Main PCB via a flexible PCB strip.
A 128 x RGB x 128 pixels graphical display is used which can display up to 17 characters x 6 rows-plus two rows of icons. It can accommodate Chinese and large character sets.
Features:

- Colour Silicon TFT 1.4 inch display module for mobile phones, or handy electrical equipments.
- Transmission type
- TN mode.
- Line inversion mode
- 18bit CPU interface.
- Constructions:
- Display format: Colour TFT Transmission type
- Display mode: Normally White
- Display composition: 128 x RGB x 128 pixels
- Drive system: a-Si TFT active matrix
- Liquid Crystal: TN mode
- Back light: LED x 2

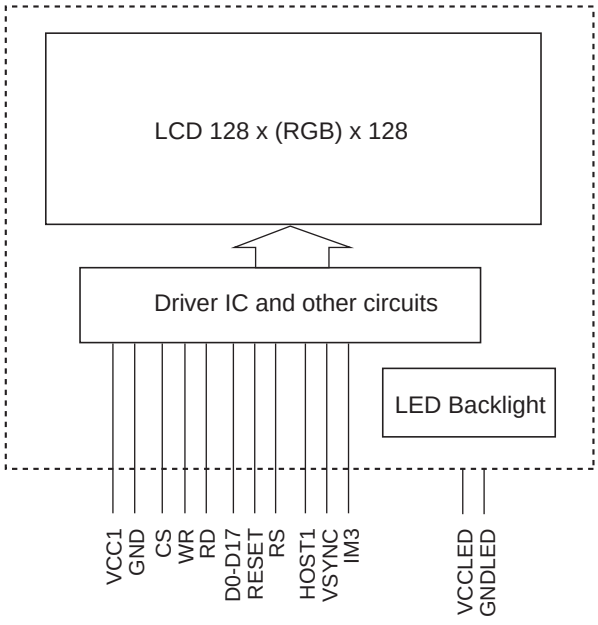


Figure 5.6. LCD Block Diagram

Dimension and weight

Item	Dimension	Unit
Module size	24.8 (W) X 33.5 (H) X 4.18 (D)	mm
Viewing area	24.384 (W) X 24.384 (H)	mm
weight	5.76	g

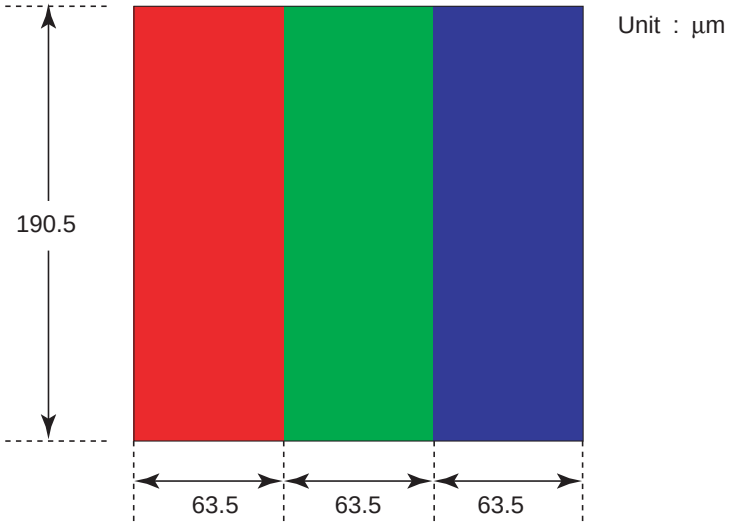


Figure 5.7. Pixel dimension

The LCD driver is controlled by setting the command register through the G2_Lite u-wire interface and an I/O line, which distinguishes between command or data. To send data or a command to the display driver, the nCS2 line is used for chip select. LCDA0 (I/0 3) is set high to send data and set low to send commands.

5.10. Real Time Clock (RTC)

Clock Functions are provided by the Real Time Clock is built into G2_Lite. The module is synchronic by a 32.768 kHz crystal and has a backup power source provided by a button capacitor.
G2_Lite has a clock auto compensation function to take into account any inaccuracies of the crystal. This is able to calibrate out crystal tolerance / drift by writing to the compensation registers. This calibration can provide adjustments ± 555.6ppm in 0.0085 ppm increments.

5.11. Microphone

The microphone is a noise cancelling type to provide improved speech pick-up, noise immunity and reduced echo. The GSM Standard requires that when in handheld mode, the transmitter audio frequency response must fit within the mask shown below:

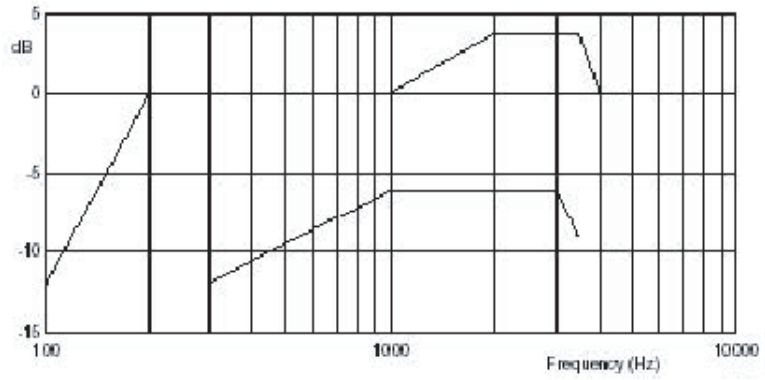


Figure 5.8. Handheld GSM Transmit Audio Frequency Response Mask

5.12. Receiver

5.12.1. Handheld Mode

Because IOTA is powered from a 2.85 V supply, a low impedance (dynamic) speaker must be used. The GSM Standard requires that the receiver audio frequency response must fit within the mask shown below:

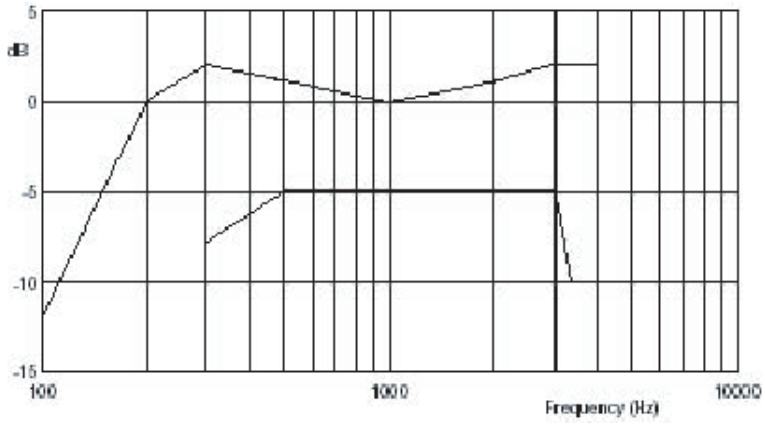


Figure 5.9. Handheld GSM Receive Audio Frequency Response

The phone is designed to meet requirements with a Type 1 artificial ear.

Volume Levels			
Volume Level	PGA	Volume	Total Gain
1	-6 dB	-12 dB	+2.21 dB
2	-3 dB	-18 dB	-1.12 dB
3	-6 dB	-18 dB	-4.32dB
4	-3 dB	-24 dB	-7.23 dB
5	-6 dB	-24 dB	-10.16 dB

5.12.2. Handsfree Mode

A second speaker is mounted in the rear case for speaker operation.
Ring tones and melodies are played via the speaker. The volume level of ring and melody tones are defined by Melody Generator IC, and the voice volume is defined IOTA. Timer 1 in G2_Lite is used to time the period between switching the ringing on and off to make the tone. For complex ringing tones, the speaker volume can be altered after each time-out of Timer 1.

5.13. Timers

There is a watchdog timer and two 16 bit general-purpose timers which can be used either as auto reload or one-shot timers to provide interrupts to the ARM CPU. A pre-scaler and 16 bits register define the timer clock duration.
The watchdog timer receives a 928 kHz clock signal from the G2_LITE clock module. A combination of pre-scaler and timer register gives a time range of 1.078 μs to 9.039 s. The general-purpose timers receive a 812.5 kHz clock signal. Timer range is between 2.4615 μs and 20.649 s.

Timer 1 Function = Buzzer Timer
Setting = Tone frequency
Timer 2 Function = N/A
Setting = N/A

The timer unit registers are as follows:

5.14. UART

G2_LITE has two UART ports, UART modem and UART / IrDA. The UART / modem port is used for optional accessories. The UART / IrDA port is used for software debug purposes.

UART / MODEM PORT ASSIGNMENT			
G2 SIGNAL	PIN No.	FUNCTION	I/O
TX_MODEM	B9	Transmit Data	O
RX_MODEM	A9	Receive Data	I
DSR_MODEM	D9	Data Set Ready	I
RTS_MODEM	E8	Request To Send	O
CTS_MODEM	C9	Clear To Send	I

5.15. Power Supplies

5.15.1. Introduction

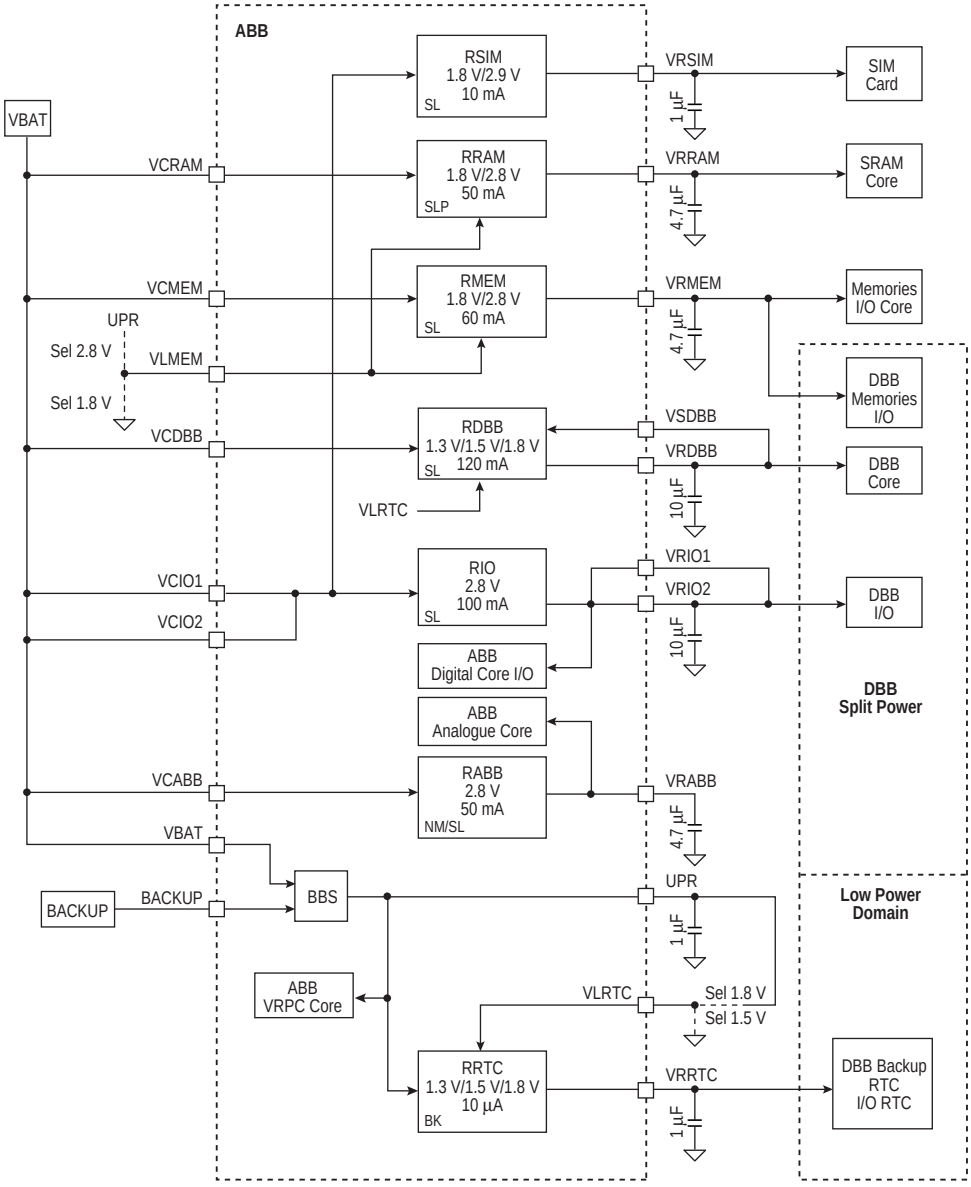


Figure 5.10. Power Management Block Diagram

The Power Management Block consists of six parts as follows:

1. Power Source
2. Power On/Off Control
3. Power Source Failure detection
4. Voltage Regulation
5. Battery Charging & Monitoring
6. Accessory Control

5.15.2. Power Source

The battery comprises a single Lithium-Ion (Li-Ion) cell with a nominal voltage of 3.7 V and 730 mAh capacities. This type of battery has an advantage in weight and size over Nickel Metal Hydride (Ni-MH) cells.

5.15.3. Power ON/OFF Control

The power on sequence can begin when VBAT > 2.8 V or VBACKUP > 2.8 V. In this state IOTA (U8) is in Power On Condition and internal supply UPR is active. RESPWRONZ signal to G2_Lite (U3) is released high.
If IOTA is in the Power On Condition, one of following conditions starts the Power Up sequence.

- Power key is pushed for more than 30 ms.
- RPWON input goes high to low for more than 30 ms (e.g. accessory is connected or external RTC signal is activated).
- EXTPWR voltage is higher than (VBAT+0.4) V.
- G2_Lite RTC ALARM signal goes high.

The Power Up sequence is as follows:

1. Local Oscillator OSCAS is started (if not already active for debouche operation).
2. IOTA internal band gap reference is activated.
3. If VBAT < 3.2 V after a timeout of 51.2 ms OSCAS is stopped and Power Up sequence is aborted.
4. Charge pump is enabled.
5. All regulators are enabled.
6. Power Up status bit and internal Reset bits are set.
7. ONnOFF signal is set to activate G2_Lite.
8. ARM in G2_Lite starts running software using 32 kHz clock, and also starts 13 MHz clock.

The following Power Down sequence can only be started by G2_Lite setting the DEVICE_OFF bit in IOTA or, in emergency case, when VBAT < 2.7 V (or VBAT < Vbackup & VBAT < 2.8 V):

1. If emergency case INT1 is set low by IOTA.
2. IOTA starts an internal 150 μs watchdog timer to allow G2_Lite to shutdown.
3. ONNOFF signal is reset to deactivate G2.
4. All regulators are disabled.
5. IOTA internal band gap reference is deactivated.
6. OSCAS is stopped.

5.15.4. Voltage Regulation

Each power source is specified as follows.

- VRDBB: Power supply for G2_Lite
  - Voltage 1.5 V
  - Current 120 mA max
  - Dropout 100 mV max (load max)
- VRRAM: Power supply for SRAM and G2_Lite
  - Voltage 2.8 V
  - Current 50 mA max
  - Dropout 100 mV max (load max)
- VRMEM: Power supply for flash memory, LCD and G2_Lite
  - Voltage 2.8 V
  - Current 60 mA max
  - Dropout 100 mV max (load max)
- VRIO: Power supply for Melody and G2_Lite
  - Voltage 2.8 V
  - Current 100 mA max
  - Dropout 100 mV max (load max)
- VRABB: Power supply for G2_Lite
  - Voltage 2.8 V
  - Current 50 mA max
  - Dropout 100 mV max (load max)
- VRSIM: Power supply for SIM
  - Voltage 2.85 V
  - Current 10 mA max
  - Dropout 100 mV max (load max)

- VRRTC: Power supply for SRAM and G2
  Voltage 1.8 V
  Current 30 µA max
  Dropout 100 mV max (load max)

5.16. Battery Charging and Monitoring

5.16.1. Charging Current

The status of the LCD battery icon is determined by the value of VBATREG returned from IOTA, as indicated in the table:

Icon	Status Battery Pack	
3 bar	3.795 V <	
2 bar	3.727 V <	< 3.795 V
1 bar	3.619 V <	< 3.727 V
0 bar (Low voltage alarm)	3.53 V <	< 3.619 V

The phone will be power down two minutes after generating a Low battery Alarm. The CPU within the phone controls Battery charging. If external power is detected and the temperature is within specified limits, the charger starts the rapid charge algorithm.
When the battery is fitted, the charging algorithm is determined by constant voltage and constant current control with time, temperature and voltage safeguards. A current limit not greater than the maximum charge current for any battery option must be provided by the external power source.

5.16.2. Deeply Discharged Batteries

In the case of deeply discharged batteries, there may not be enough power in the battery to initiate charging. In this case, the charging circuit automatically starts to trickle charge the battery until there is enough power to switch on the phone.

5.17. Camera Module

The handset features an integrated CIF (352 x 288 pixels) size CMOS camera module.
The CMOS sensor includes:

- Image Sensor Array (352 x 288 resolution)
- Timing Generator
- Analog Processing Block
- A/C Converters
- Output Formatter
- Digital Video Port
- SCCB Interface

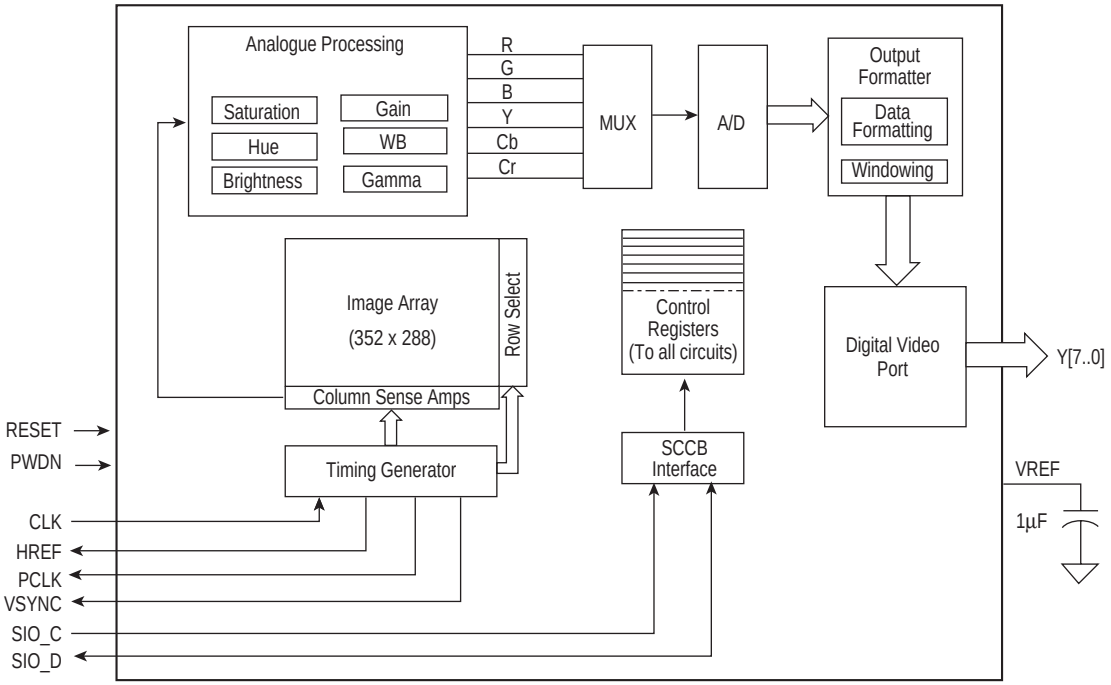


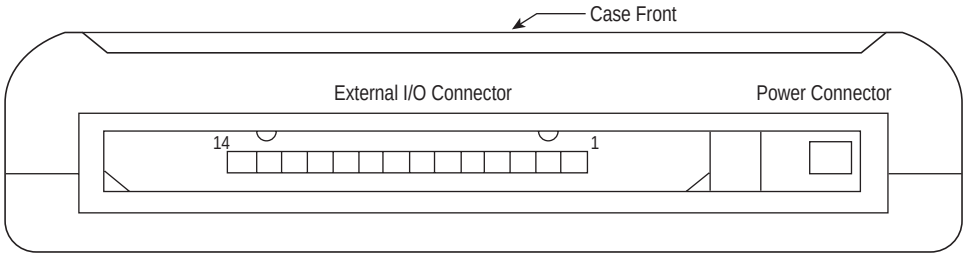
Figure 5.11. CMOS Sensor Block Diagram

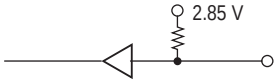
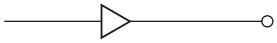
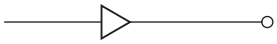
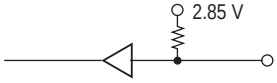
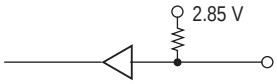
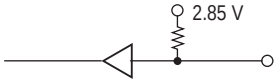
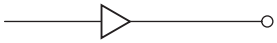
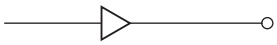
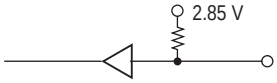
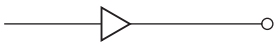
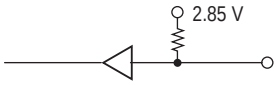
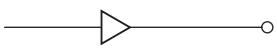
GA-8228A lens

Optical	
Lens	Genius 8228A
Composition	2 Plastic+ 1 Glass , 3 elements , IR Coating
Effective Focal Length	3.73 mm
BFL	1.98 mm
F No.	2.4 (Infinite)
View Angle	670
Distortion	-0.92%
Relative illumination	54% (> 70% after backend compensation)
Module Dimension	8 x 8 x 6.12mm (Approximation)
Weight	0.7g (Approximation)
Resolution 300	TV Line (Center) 250 TV Line (Corner)

5.18. Interfaces and Test Points

5.18.1. External I/O



No.	Name	H/H ⇔ EXT	Function	H/H Circuit
1	TDI	←	Data In	
2	TX_IrDA	→	Transmit data	
3	TCK	→	Clock	
4	RX_IrDA	←	Receive data	
5	CTS	←	Clear to send	
6	RXD	←	Receive data	
7	TXD	→	Transmit data	
8	RTS	→	Request to send	
9	DSR	←	Data set ready	
10	TMS	→	TMS	
11	ACC_PWR	←	Power Supply	
12	VACCID	←	Analogue Input	
13	TDO	→	Data out	
14	GND	—	Power supply and digital signal ground	

5.18.2. LCD Module Interface Signals

No.	Name	PCB ⇔ LCD	Function	Connection
1	VCC1	➡	IC Power supply	DC 2.8 V
2	/CS	➡	Chip Select at "L". Selected and Accessible	SPCA552A#C2
3	WR	➡	Write	SPCA552A#D3
4	RD	➡	Read	SPCA552A#C1
5	GND	—	Power supply ground	DGND
6	D0	➡	Data bus	No Connect
7	D1	➡	Data bus	SPCA552A#D1
8	D2	➡	Data bus	SPCA552A#E1
9	D3	➡	Data bus	SPCA552A#E2
10	D4	➡	Data bus	SPCA552A#E3
11	D5	➡	Data bus	SPCA552A#F1
12	D6	➡	Data bus	SPCA552A#F2
13	D7	➡	Data bus	SPCA552A#F3
14	D8	➡	Data bus	SPCA552A#G1
15	D9	➡	Data bus	No Connect
16	D10	➡	Data bus	SPCA552A#G2
17	D11	➡	Data bus	SPCA552A#H1
18	D12	➡	Data bus	SPCA552A#J1
19	D13	➡	Data bus	SPCA552A#H2
20	D14	➡	Data bus	SPCA552A#J2
21	D15	➡	Data bus	SPCA552A#G3
22	D16	➡	Data bus	SPCA552A#H3
23	D17	➡	Data bus	SPCA552A#J3
24	/RESET	➡	System Reset	SPCA552A#G6
25	RS	➡	Select Register at "H". Index/status Control at "L".	SPCA552A#D2
26	GND LED	—	Power Supply Ground for LED	68 Ω to GND
27	HOST1	⬅	IM1. 80 system at "H", 68 system at "L".	DC 2.8 V
28	VCC LED	➡	Power Supply for LED	DC 2.8 V
29	YSYNC	➡	Frame synchronizing signal	DC 2.8 V
30	IM3	➡	18 or 19 bits interface at "H" 16 or 8 bits interface at "L"	DGND

5.18.3. Camera Module Interface

No.	Name	OV ⇔ PCB	Function	Connection
1	GND	—	System Ground	DGND
2	HREF	➡	HREF Output	SPCA552A#A1
3	VSYNC	➡	Vertical Sync Output	SPCA552A#B2
4	PWDN	⬅	Input (()) Power Down Mode Selection:	220 KΩ to DGND
5	PCLK	➡	Pixel Clock Output	SPCA552A#B1
6	AVDD2V5	⬅	Analogue Power Supply	DC 2.5 V
7	DVDD3V3	⬅	Analogue Power Supply	DC 2.5 V
8	SIO_D	⬅ ➡	SCCB Serial Interface Data I/O	SPCA552A#A2
9	XCLK	⬅	Crystal Clock input	SPCA552A#C3
10	SIO_C	⬅	SCCB Serial Interface Clock Input	SPCA552A#B3
11	Y0	➡	YUV Video Component Output bit [0]	SPCA552A#C6
12	Y1	➡	YUV Video Component Output bit [1]	SPCA552A#B6
13	Y2	➡	YUV Video Component Output bit [2]	SPCA552A#A6
14	Y3	➡	YUV Video Component Output bit [3]	SPCA552A#A5
15	GND	—	System Ground	DGND
16	Y4	➡	YUV Video Component Output bit [4]	SPCA552A#B5
17	Y5	➡	YUV Video Component Output bit [5]	SPCA552A#C5
18	Y6	➡	YUV Video Component Output bit [6]	SPCA552A#A4
19	Y7	➡	YUV Video Component Output bit [7]	SPCA552A#B4
20	RESET	⬅	Clear all registers and resets to their default value.	SPCA552A#C4
21	LED+	⬅	For LED+	DC 8.2 V
22	LED–	—	For LED–	FLED–

5.18.4. SIM Interface

Pin	Signal
1	SIM_CLK
2	SIM_IO
3	SIM_RST
4	SIMPWR
5	SIMPWR
6	Ground

5.18.5. Battery Connector

Pin	Signal
1	VBAT
2	BAT_TEMP
3	Ground

5.18.6. Test Points

TP No.	Signal Name
Main PCB	
TP1	XTALOUT
TP2	Nbscan
TP3	CLK32K_OUT
TP4	RPWON
TP5	TESTV
TP6	BS_TDO
TP7	RESPWRONZ
TP8	SWITCHONOFF
TP9	CLK13M_OUT
TP10	PWON
TP11	VRTC
TP12	VCHG
TP13	RTS
TP14	CTS
TP15	MMI_INT
TP16	RX
TP17	TX
TP18	DSR
TP19	TDI
TP20	TDO
TP21	TCK
TP22	TMS
TP23	VBAT
TP24	BATTEMP
TP25	RnW
TP26	nCS2
TP27	MSCI_FSY
TP28	MSCI_CLK
TP29	MSCI_TXD
TP30	MSCI_RXD
TP31	TPU-WAIT
TP32	BYPASS
TP33	GPIO2
SUB PCB	
TP34	SP+
TP35	SP-
TP36	EARP
TP37	EARN

6. DISASSEMBLY / REASSEMBLY INSTRUCTIONS

6.1. General

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

WARNING

The equipment described in this manual contains polarized capacitors utilizing 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 handling procedures described are not adhered to.

6.1.1. 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 1M2 resistor (usually built into the lead) to a common ground point.

Wrist Strap

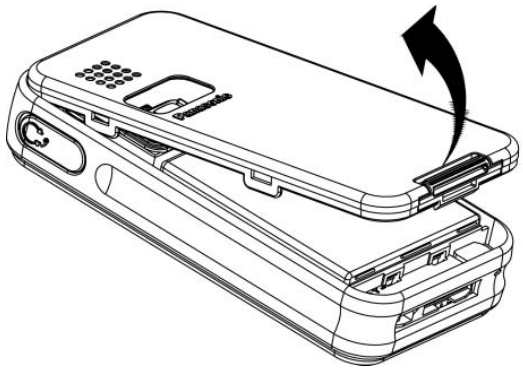
A QUICK RELEASE SKIN CONTACT DEVICE WITH A FLEXIBLE CORD, WHICH HAS AN INTEGRAL SAFETY RESISTOR OF BETWEEN 5.2 kΩ AND 1.2 MΩ, SHALL BE USED.

Containers

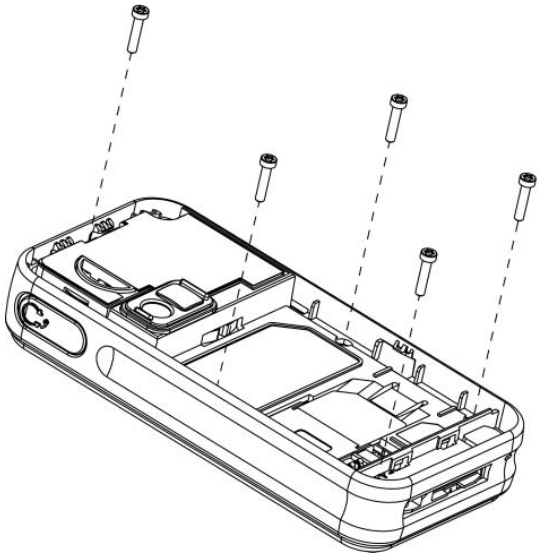
All containers and storage must be of the conductive type.

6.2. Disassembly

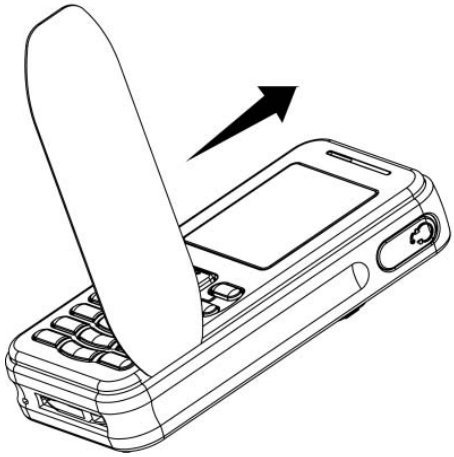
1. Push the battery latch away from the handset and lift out the Battery Cocer.
   The Battery Pack may now be removed from the back of the handset.



2. Use the T5 screwdriver to remove the five case screws located inside the lower-case.

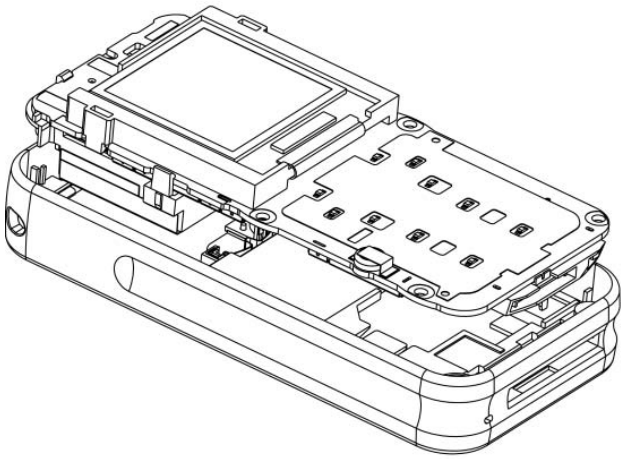


3. Carefully prize apart the Upper Case, Lower Case, creating a gap at the base I/O connector.
   Insert the Case Separation Tool into the gap created, and gently slide the tool until the hooks are separated.

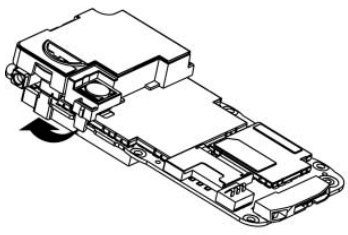


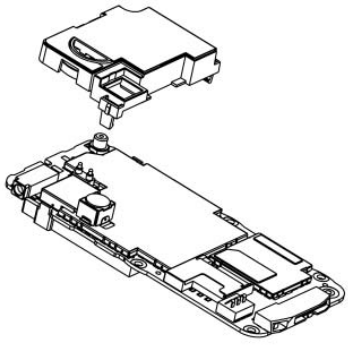
4. Separate by gently twisting the Upper Case, Lower Case.

5. Lift the PCB Board from the Lower Case.

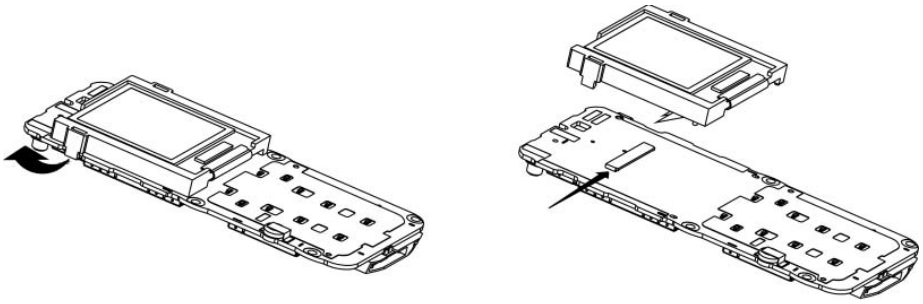


6. Push the hook and lift the internal Antenna Box from the PCB Board.

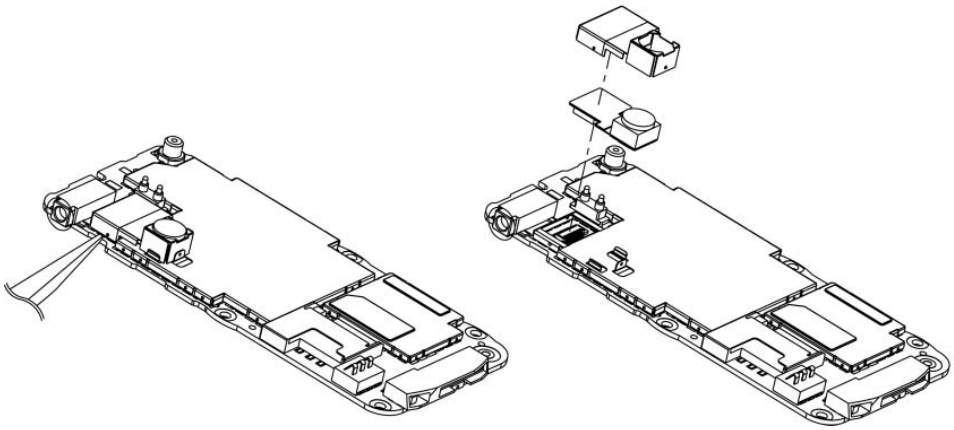




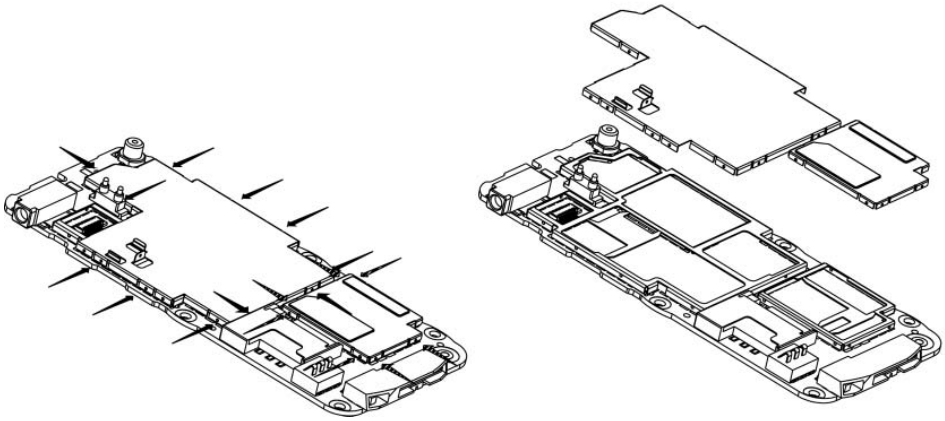
7. Unclip the LCD Module hook from the Main PCB. Using tweezers, open the cover of the FPC connector before removing the LCD Module from the PCB.



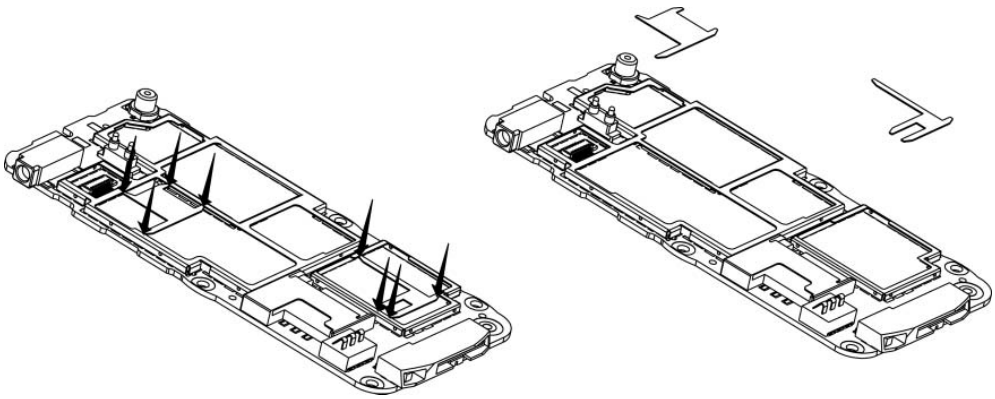
8. Remove the Camera Module and Shielding Cover from the PCB Board using tweezers.



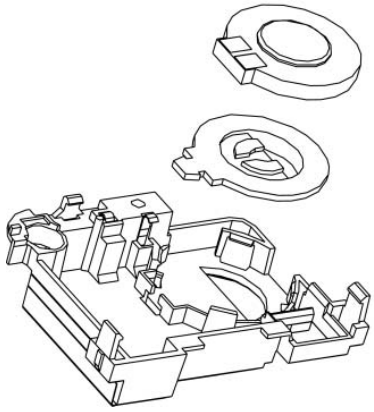
9. Remove the Shielding Cover from PCB Board using tweezers.



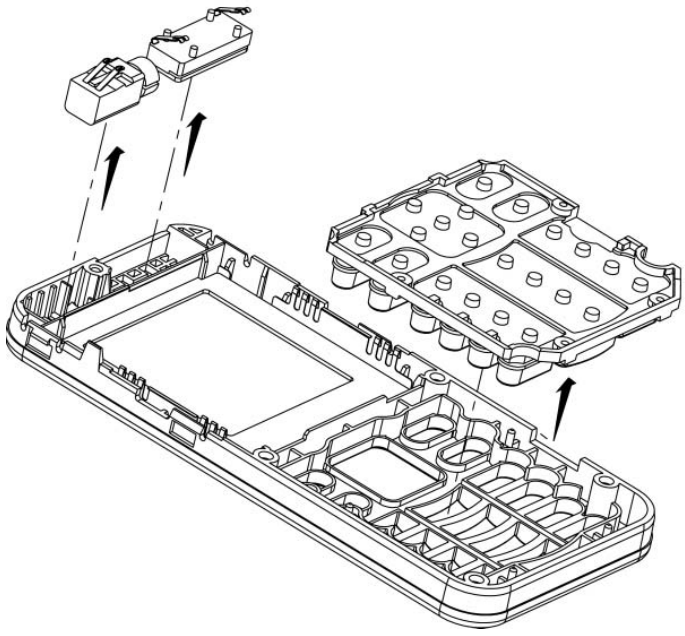
10. Remove the Frame of the Shielding Case as picture shown below.



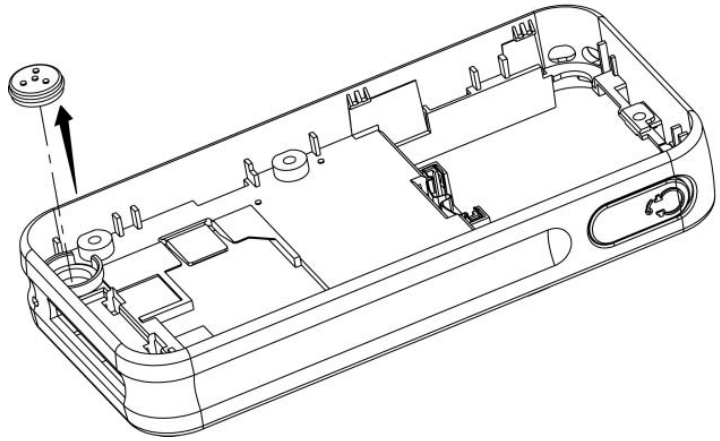
11. Remove Speaker and speaker cushion from internal Antenna Box.



12. Remove the Vibrator, Receiver and Keypad from Upper Case using tweezers.

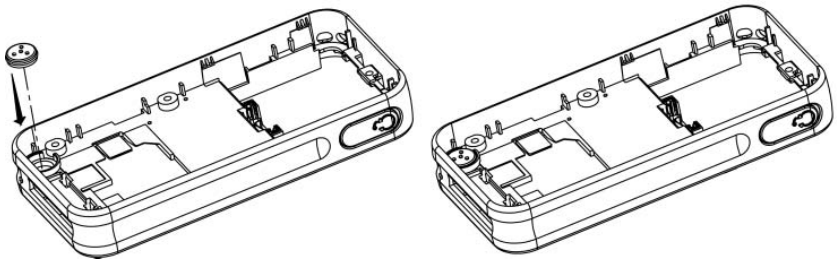


13. Using tweezers, remove the Microphone from the Lower Case.

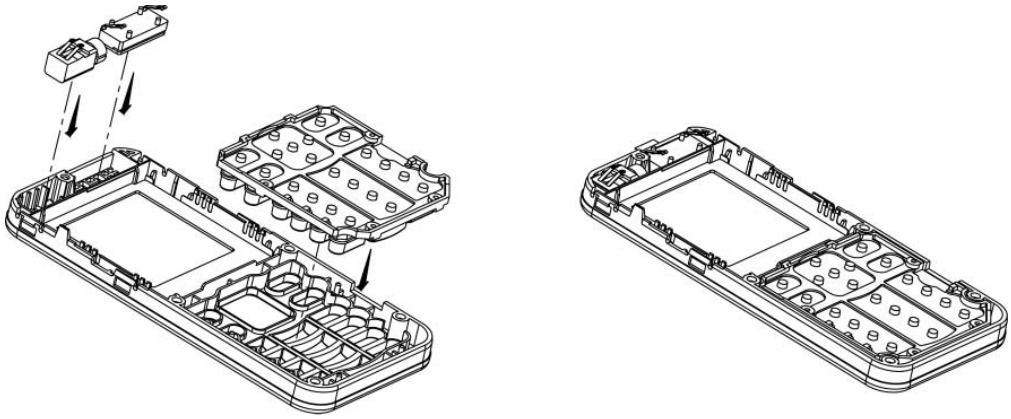


6.3. Reassembly

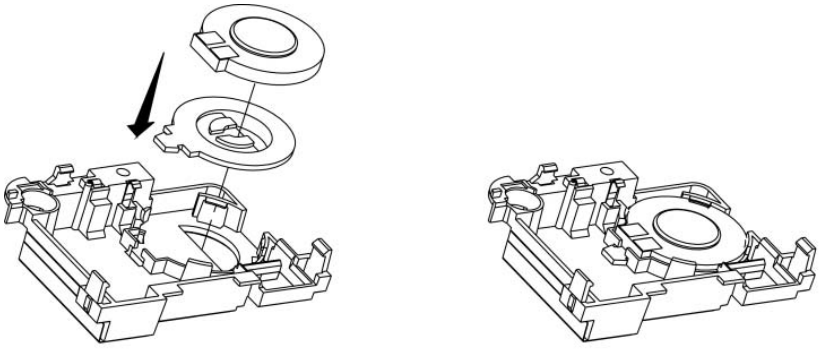
1. Locate the Microphone into the Lower Case.



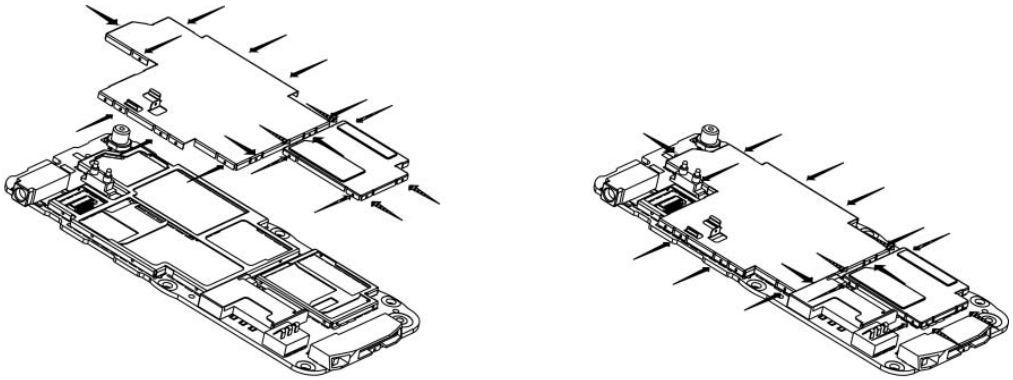
2. Fit the Vibrator, Receiver and Keypad into the Upper Case.



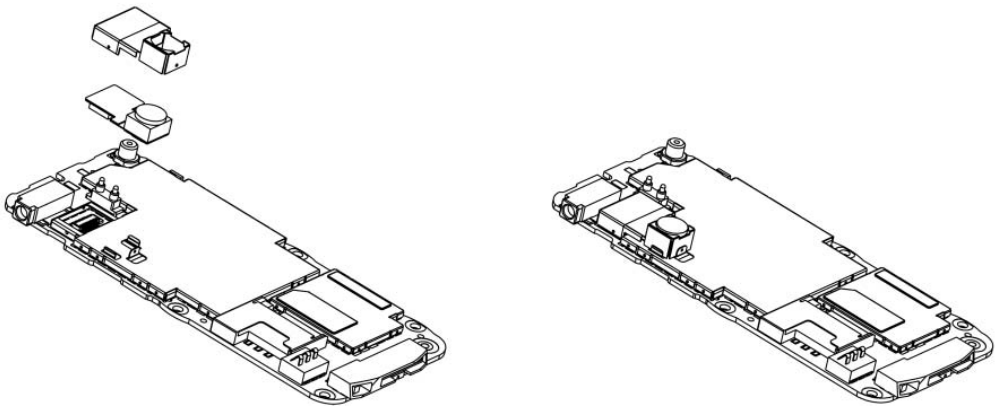
3. Put the Speaker Cushion , Speaker into Antenna Box, press the Speaker from left to right side.



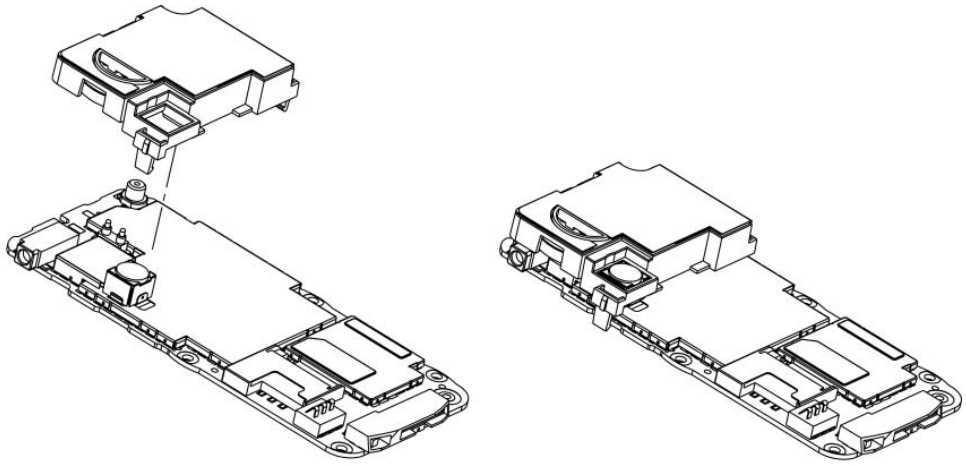
4. Reassemble Shielding Cover into PCB Board.



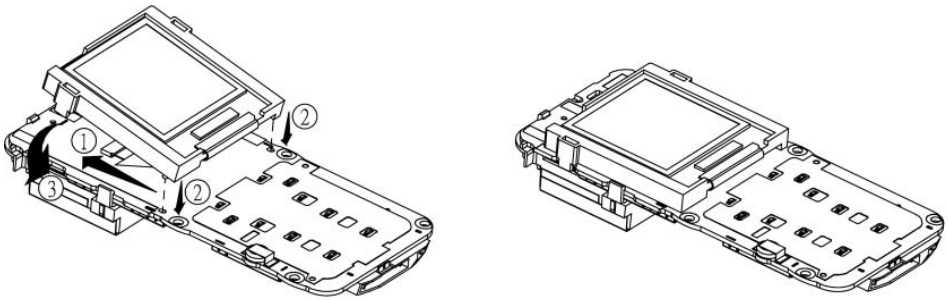
5. Reassemble the Camera Module and Shielding Cover into PCB Board.



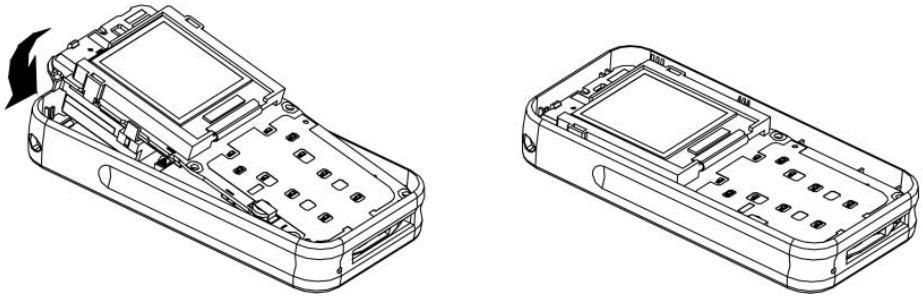
6. Reassemble the Antenna Box Assy into the PCB Board.



7. Use the tweezers to open the FPC connector then insert the LCD flexi-strip. Close the FPC connector and hook the side of PCB Board. Assemble the LCD module to the PCB Board.

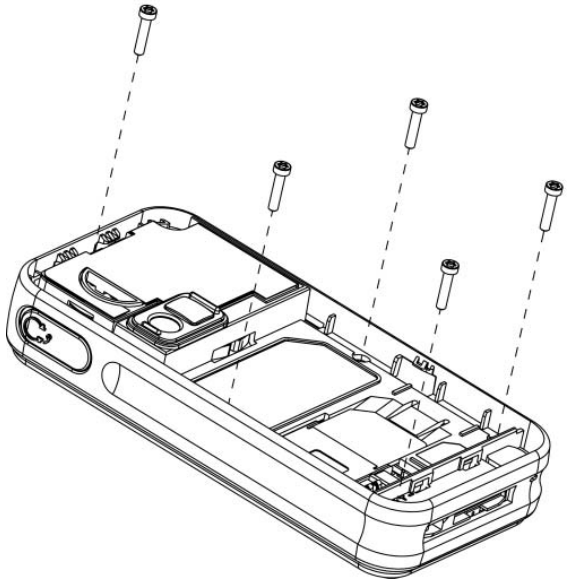


8. Locate the PCB Board inside the Lower Case.

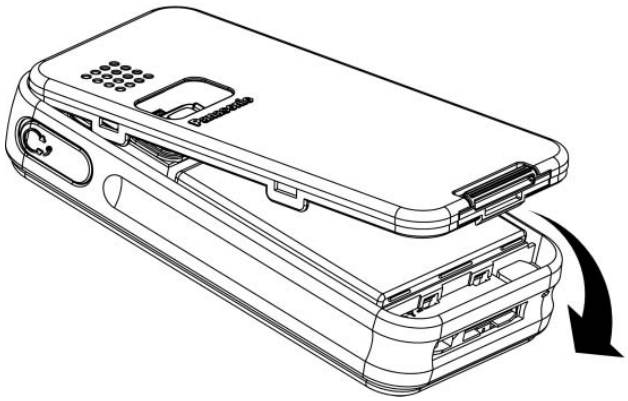


9. Re-attach the Upper Case to the Lower Case.

10. Fit the five screws inside the Lower Case as shown, and tighten with the T5 screwdriver.



11. Put in the Battery Pack and close the Battery Cover.



7. REPAIR PROCEDURES

7.1. Introduction

This section provides information on testing the telephone. The layout is as follows:

Section 7.2. : Lead Free (PbF) solder: Identification and repair of PCBs using PbF solder.
Section 7.3. : External testing: describes equipment requirements and general set up procedure.
Section 7.4. : Complete Unit Test Setup: Describes how the items of test equipment are used together and general set up procedure.
Adjustment Procedures are described in Section 8.

7.2. Lead Free (PbF) Solder

CAUTION

The Printed Circuit Board (PCB) used in this telephone has been manufactured using Lead Free solder.
(SPARKLE ECO SOLDER : Part No. ESC F3 M705 0.3)

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).

7.3. External Testing

7.3.1. General Information

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 and 1800 MHz).

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 performed.

Power Supply

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

Dummy Battery (Part No. PS2G66DUMBAT)

The Dummy Battery via power supply equipment to provide stable power for the phone. It is required for software download.

Figure 7.1. : Dummy Battery

PCB Repair Jig (Part No. G66PCBAJIG)

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

Figure 7.2. : PCB Repair Jig

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 **0.5 dBm (GSM 900) and 0.7 dBm (GSM 1800)**.
A replacement RF Probe for the Repair Jig is available as a spares item.

RF Test Jig (Part No. PS2G66RFJIG)

The RF Test Jig provides the connections between the test equipment and the phone for unit testing.
It also provides power supply for the phone.
A replacement RF Probe for the Repair Jig is available as a spares item.

Figure 7.3. : RF Test Jig

RF Cable (Part No.73PV104001W)

The RF cable provides the necessary connections between the PCB Repair Jig/RF Adapter and external test equipment.

Figure 7.5. : RF Cable

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 Jig to the service equipment. Cable losses for the RF connection are **0.5 dBM (GSM 900) and 0.7 dBM (GSM 1800)**.

Data Cable (Part No.733PS20301W)

The data cable is used for calibration and downloading software.

Figure 7.6. : Data Cable

Power Cable (Part No. 3WZ001130AAA)

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

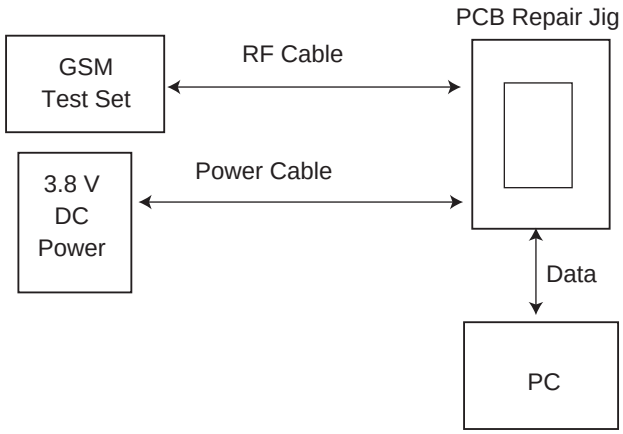
Figure 7.7. : Power Cable

GSM Test Set

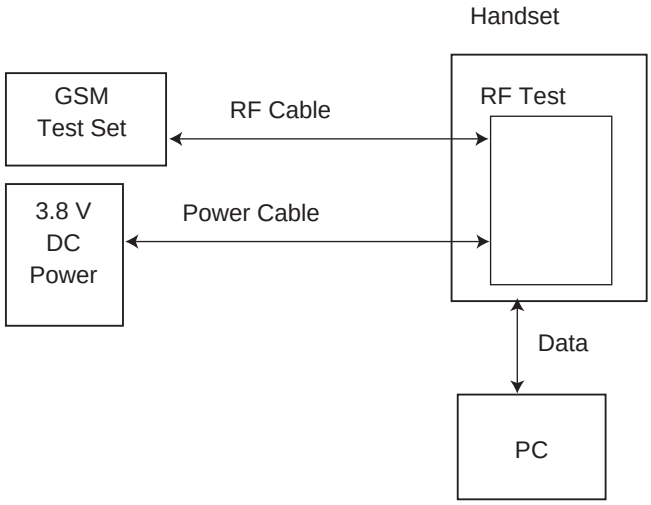
This unit acts as a base station providing all the necessary GSM signalling requirements and also provides GSM signal measuring facilities.

7.4. Test Equipment Setup

7.4.1. Equipment Required



PCB TEST SETUP



COMPLETE UNIT TEST SETUP

Figure 7.6. : Test Connection Diagram

IMPORTANT NOTE

To allow accurate measurement of the complete unit, the test equipment must be connected as shown.
For testing the handheld unit the following equipment is required:
1. PCB Repair Jig
2. Power Cable
3. Download Cable
4. RF Cable
5. 12 V power supply
6. Personal computer with RS232 interface and running Microsoft Windows® 95, 98, XP or 2000
7. GSM test station
8. EB-X100 Service software

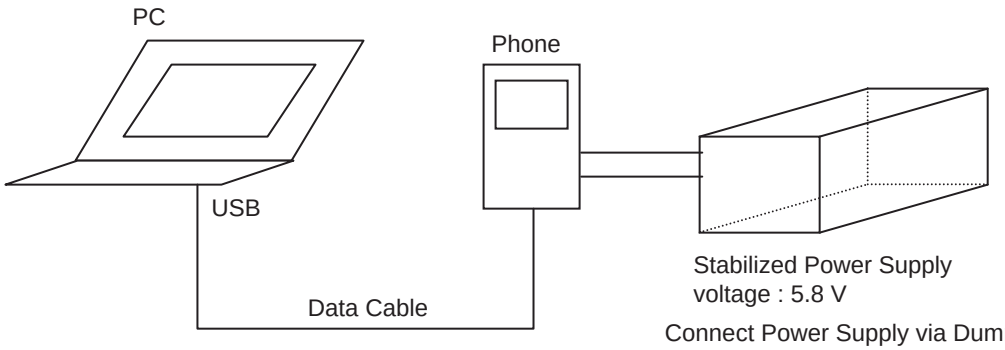
The EB-X100 Service software should be installed onto the main drive of the personal computer.
The RF cable is connected to the GSM test station via suitable adaptor. The 3.8 V supply is connected to the RF Adaptor and PCB Repair Jig with power cable.
NOTE: A suitable test SIM card compatible with the GSM test station will be required.

8. SOFTWARE DOWNLOAD & ADJUSTMENT PROCEDURE

8.1. Introduction

The purpose of this document is to describe the operation of the Dmtool V8.x.xx.1

■ System overview



Stabilized Power Supply
voltage : 5.8 V

Connect Power Supply via Dummy Battery to ensure steady voltage to phone.

■ Overview

Service Tool is an application that integrates the following functions:

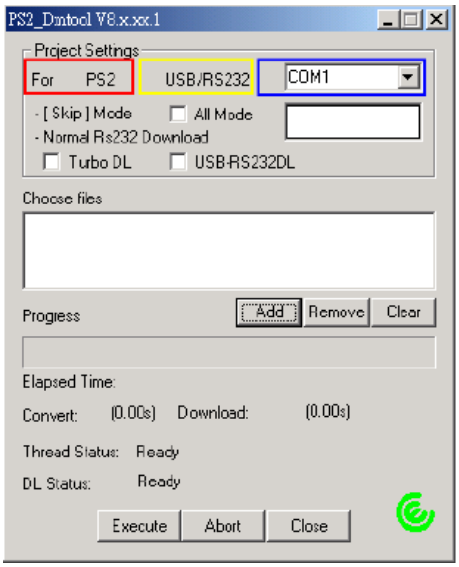
1. Data Reserve function:
   Some data fields (like Phone books, Calibration data . . . etc.) can be stored into files with this function. If data is lost, use use this function to restore the original data back to the handset.
2. Re-Flash function:
   Use to download the new versions of the core software and flex file, either individually or together.
3. Calibration function:
   Use to calibrate RF parameters, ADC values, or NTC values.
4. The Service Tool runs on Microsoft Win95, Win98 (1st & 2nd edition), WinNT 4.0, Win2K and WinXP platforms.

8.2. Procedure

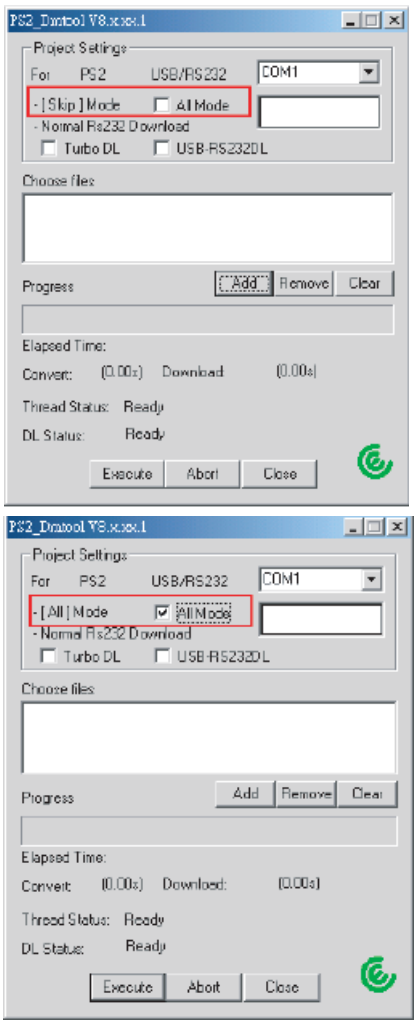
1. Open Dmtool_V8.x.xx.1.exe

Dmtool_v8.x.xx.1

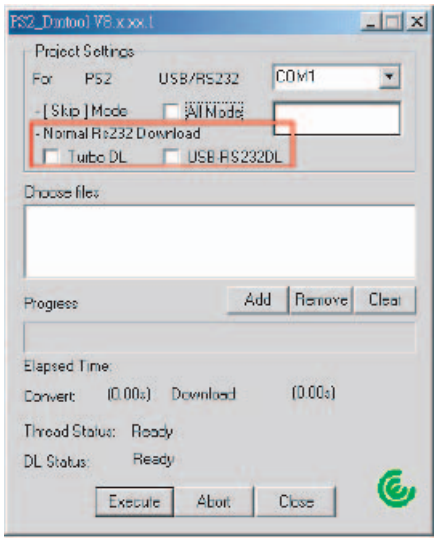
2. Select the Project Settings as appropriate:
   (a) The Tool is for PS2.
   (b) Download path is RS232 or USB_RS232
   (c) User can select COM port (COM1, COM2, . . .).



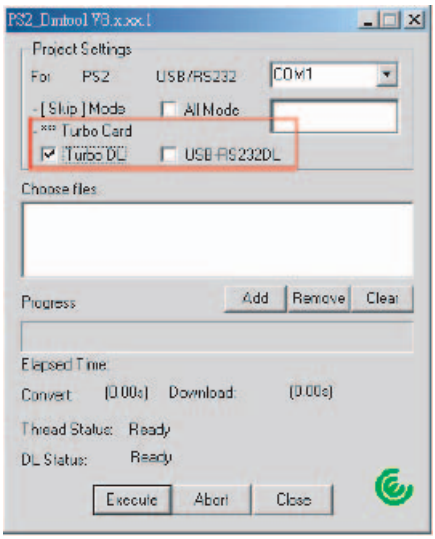
3. Select the "**All Mode**" Check-Box ➡ Dmtool will update the BootCode Region (flash block 0) when the user download the MainCode to the handset. (Default setting is the "**Skip Mode**", this will not update the BootCode Region).



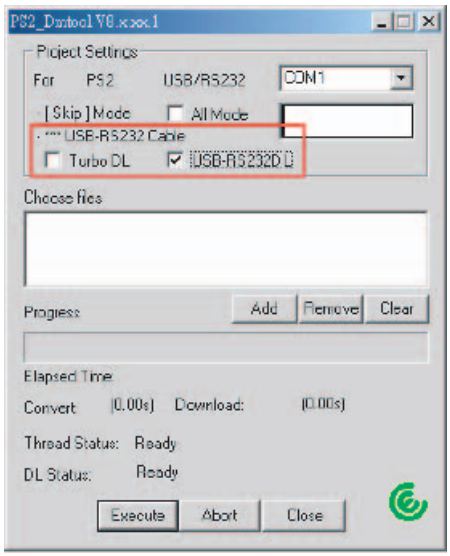
4. Select the download path. Up to three download paths can be selected. The default setting is RS232.



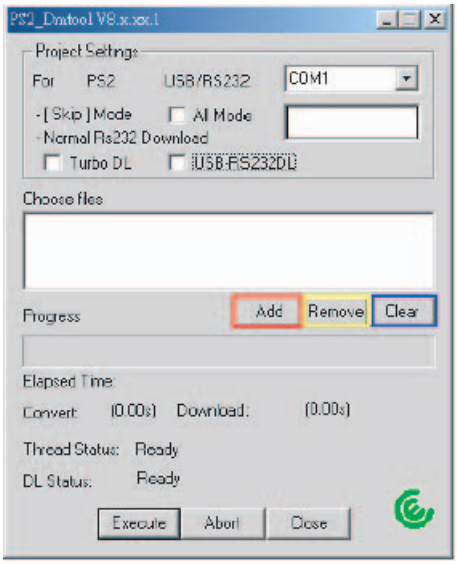
Turbo DL



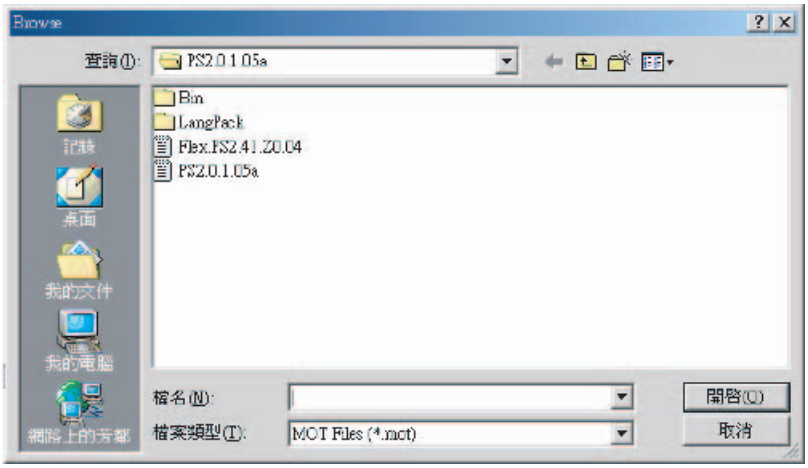
USB_RS232 DL



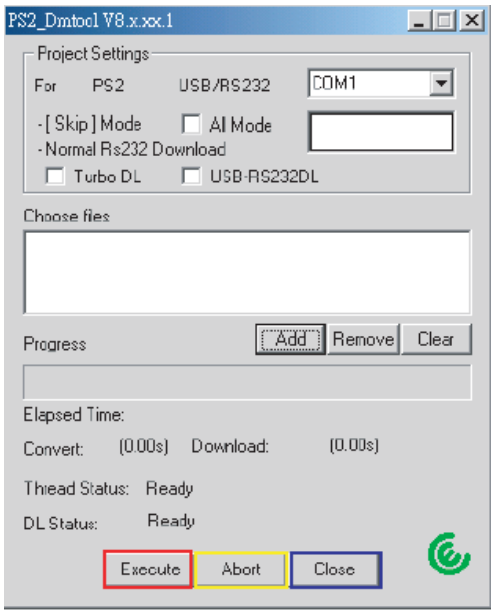
5. Click the "**Add**" Icon ➡ To add a select-download-mot-file to the download-list.
   Click the "**Remove**" Icon ➡ To remove one select-download-mot-file from the download-list.
   Click the "**Clear**" Icon ➡ To clear all download-mot-file from the download-list.



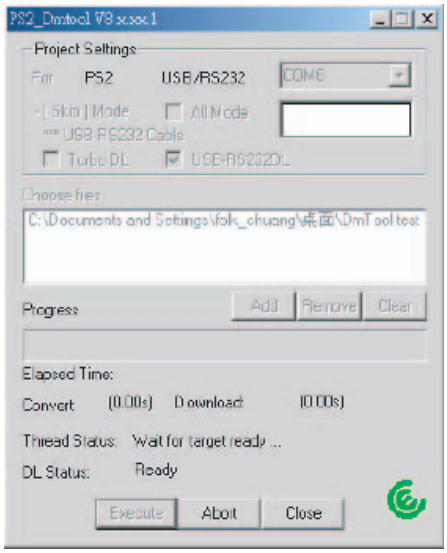
Clicking the "**Add**" button will open a Browse window which is used to select the download file.

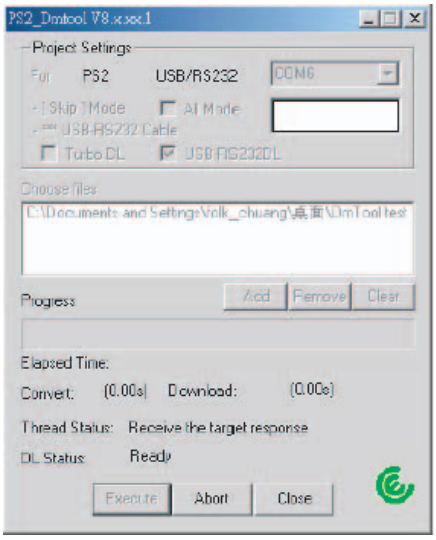


6. Click the "**Execute**" Icon ➡ Start the download process.
   Click the "**Abort**" Icon ➡ Abort the download process.
   Click the "**Close**" Icon ➡ Abort the download process and close the application.

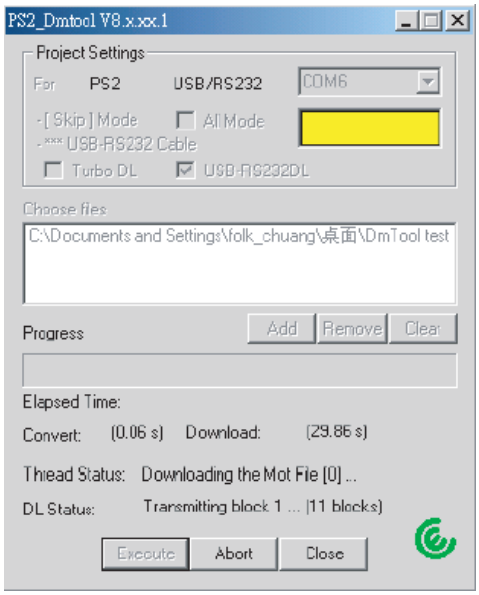


7. Add mot file to the tool and press Execute button. After that press the power key in handset the Interface shows as below.

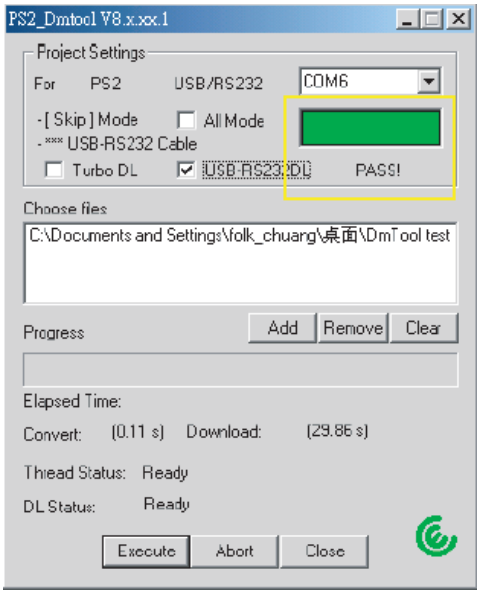




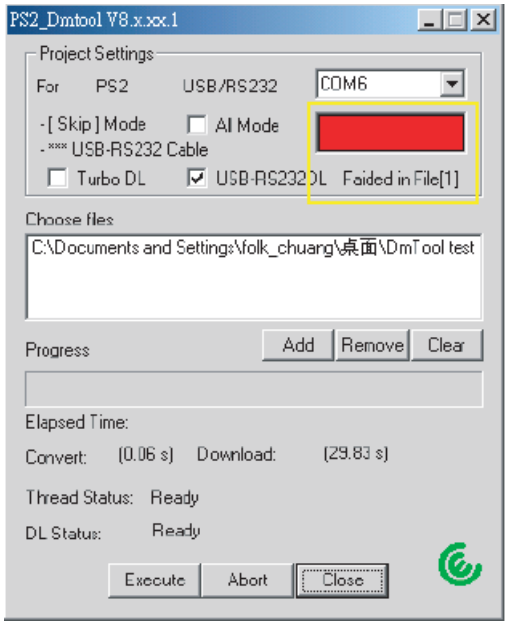
8. While downloading, the status window (top right) will flash yellow.



9. When the download process is complete, the target sector information data will be compared with the binary data in the PC RAM buffer. If the data in these two buffers is identical, the status window will change green and the message "**PASS!**" will be displayed below it. This indicates the download was successful with no errors occurring.



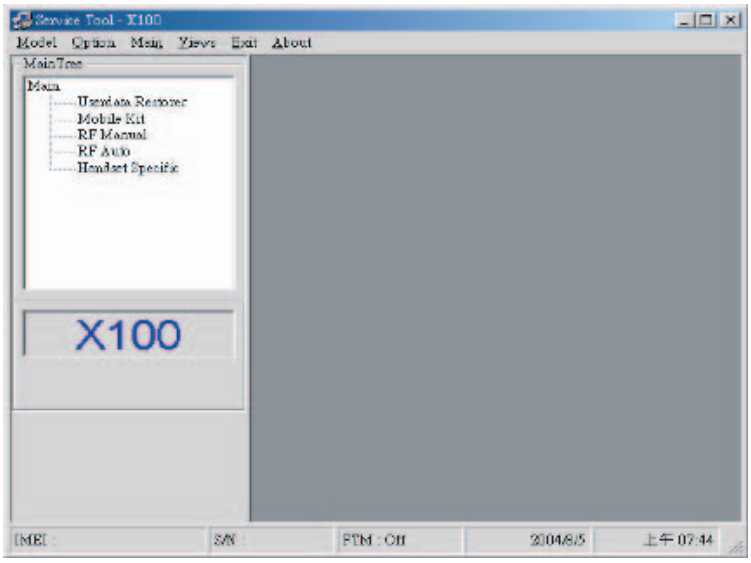
10. If any errors were found (i.e. there were differences in data between the two buffers) the Dmtool will report in which block of code the error was found.



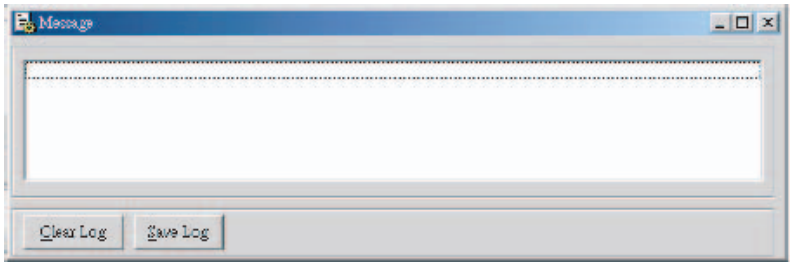
8.3. Calibration Procedure

8.3.1. Getting Started

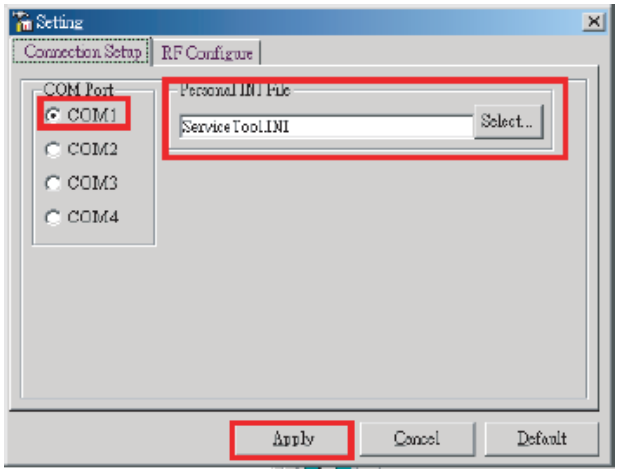
1. To run the program, execute the Service Tool icon on the desktop. The following window will appear:



2. A message log window also appears at the bottom of the main window to display the processing and status information.

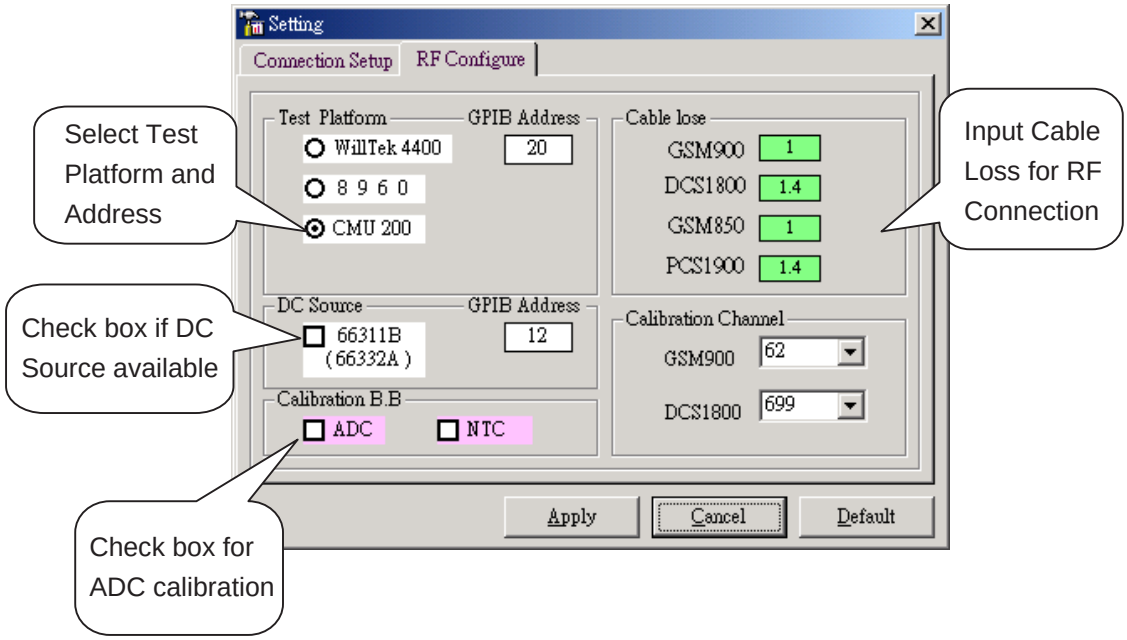


3. Click on "**option**" to change the COM port. The function is password protected to prevent accidental change to settings. The password is "**Compal_PV1**" and is case sensitive. The password must be entered before any changes to the configuration can be made.
   1) Connection Setup: COM Port
      Select the COM port to which the data cable is connected. Default is COM1.
   2) Select Personal INI File



   After selecting the correct COM port and Personal INI File, click "**Apply**" to enable the setting.

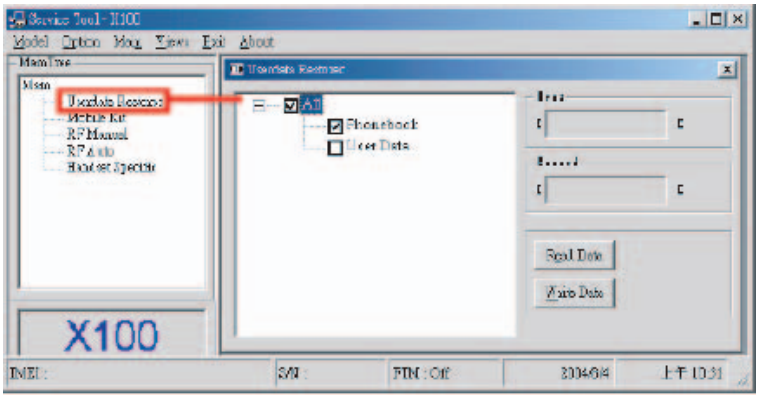
3) Click "**RF Configure**" to enter the proper parameters for your RF calibration and test environment, and click "**Apply**".



8.4. Function Description

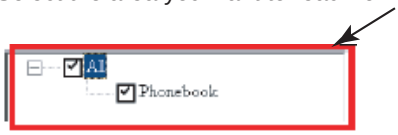
8.4.1. Userdata Restorer

1. To Read / Write User data between MS and PC. Currently only phonebook data is available.



❑ Read

1. Select the area you want to read from the "**Tree view**".



If "**All**" is ticked, it means all of the items on the tree will be selected automatically for reading. Otherwise select the required items individually.

2. Ensure the handset is connected correctly to the PC. Switch on the handset and click on "**Read Data**".
It will automatically enter Factory Test Mode and start to read data.

Wait for "**Reading Data finish**" shown on the log list.
The status of the process can be viewed on the progress bar.

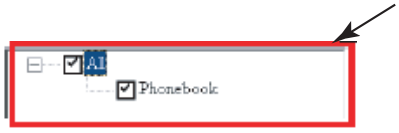
NOTE

Before performing any Service Tool function (except reflash, reflexing), switch on the handset first.
If a SIM card is inserted, wait until the Network searching is complete and then start the Service Tool function.
If the Network search takes a long time to complete, the handset may enter sleep mode and
will not receive commands from the PC. In this instance, press any key to "wake up" the handset.

3. All the data that has been read from the handset will be saved automatically as a file in the assigned folder.

❑ Write

1. Select the area to be read from the "**Tree view**".



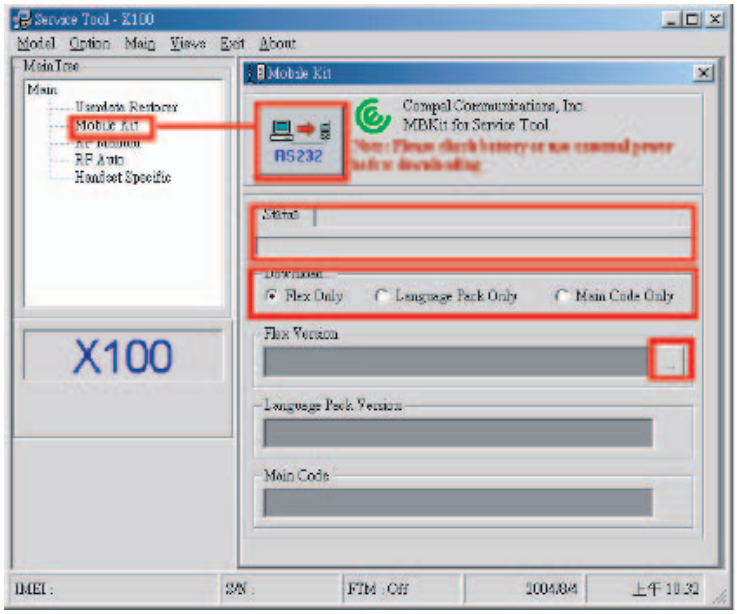
If "**All**" is ticked, it means all of the items on the tree will be selected automatically for writing purpose. Otherwise, can select the required items individually.

2. Ensure the handset is connected correctly to the PC. Switch on the handset and click on "Write Data". It will automatically enter Factory Test Mode..

Wait for "**Writing Data finish**" shown on the log list.
The status of the process can be seen on the progress bar.

3. Restart the handset to ensure that user data has been written back.

8.4.2. Mobile Kit



1. In "**Download**" frame, the options Flex Only, Language Pack Only, or Main Code Only, can be selected.
2. Click "**. . .**" to select the desired version of flex file, language pack file, or main code. Note that the selected flex language pack, and main code should all have the same version number. Unmatched versions could make the handset operate abnormally.
3. To start the download, first check that the phone is connected to the PC and then switch off the phone. Click button"**RS232**" to start downloading. The status of the process can be seen from the progress bar.

8.4.3. RF Manual

■ Function Purpose :

ADC : Calibration of battery voltage.

NTC : Calibration of battery temperature.

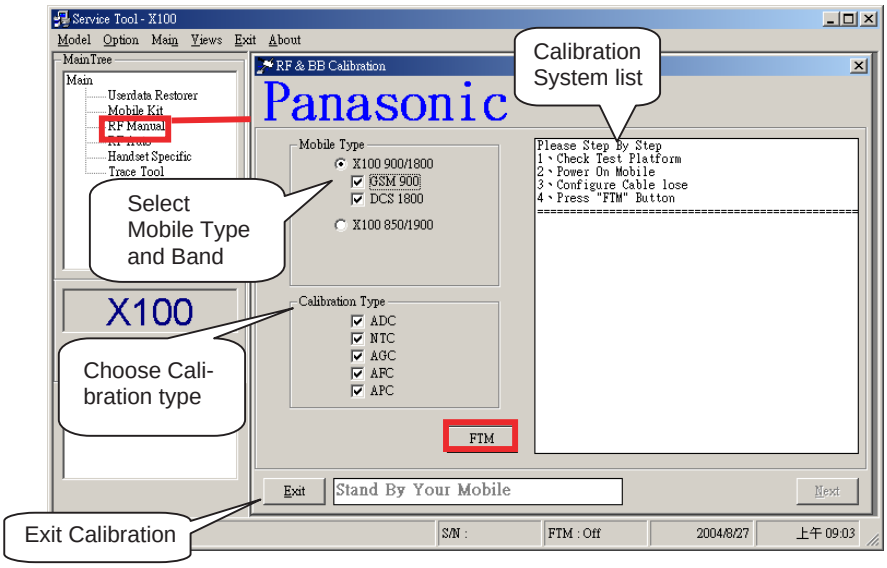
AGC : Calibration of gain value.

AFC : Calibration of frequency error and slope.

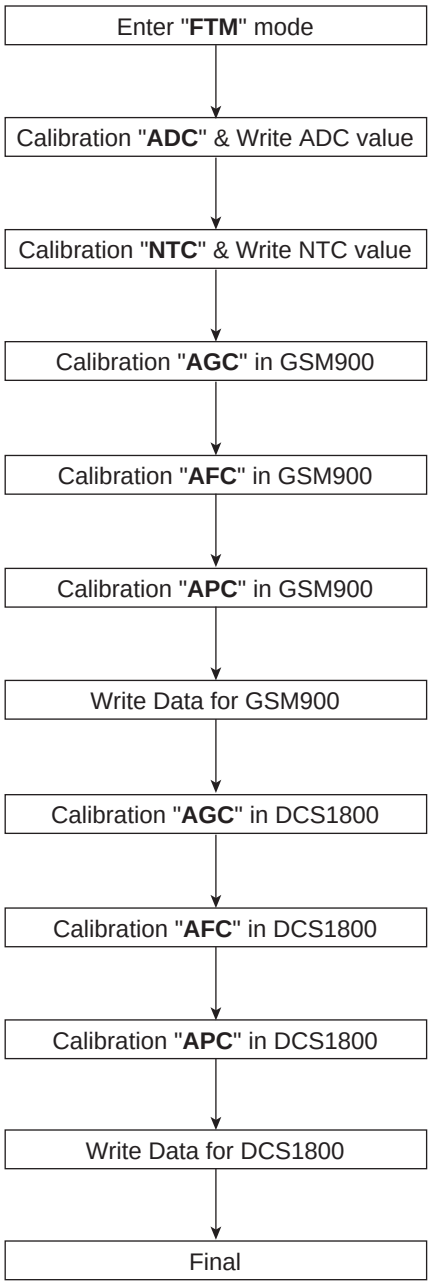
APC : Calibration of power for each level.PC :

> CAUTION
>
> Before calibration, you must check parameter of instrument. Is it correct?

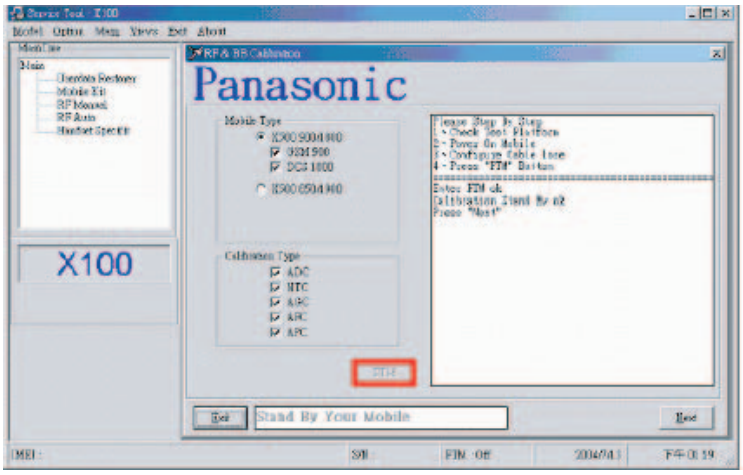
1. Snapshot of Calibration Screen



2. Example for Calibration
   In this case, Dual Band (900/1800) and calibration all (ADC, NTC, AGC, AFC, APC) is selected.
   Procedure :

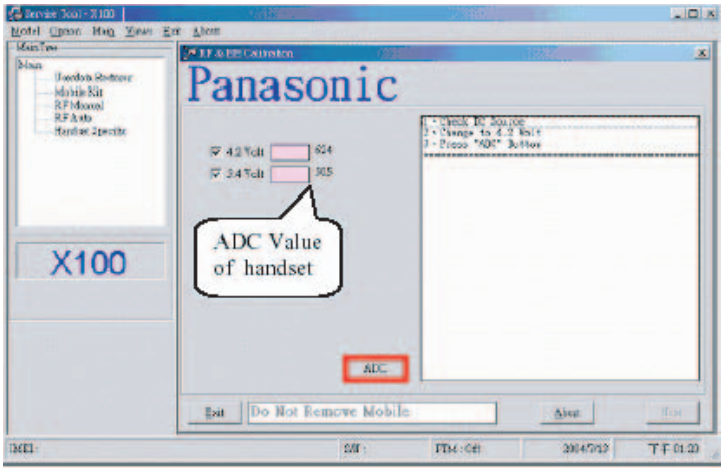


Step 1 : Check that the handset is connected correctly to the PC. Switch on the handset and click on "**FTM**". It will automatically enter Factory Test Mode and start to read data for calibration.

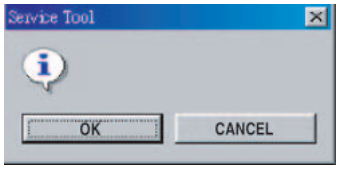


Step 2 : Press "**Next**" to continue.

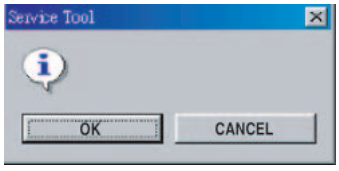
Step 3 : Click "**ADC**".



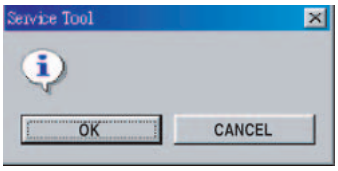
Step 3.1 : Select 4.2 V and click "**OK**".



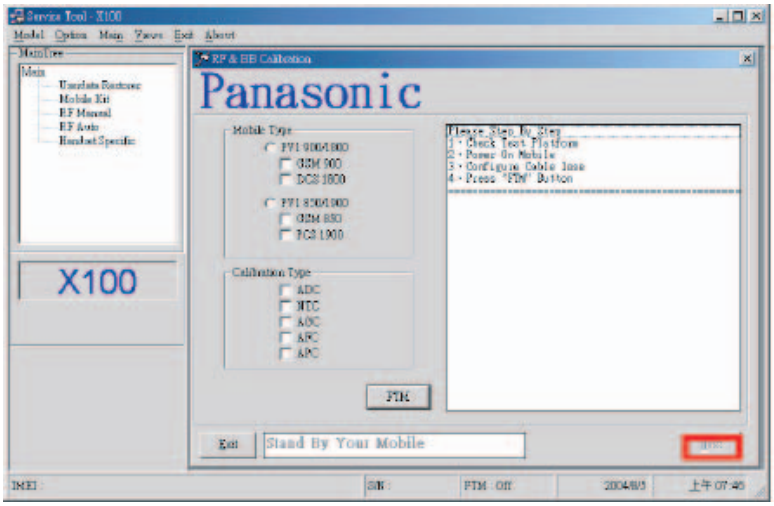
Step 3.2 : Select 3.4 V and click "**OK**".



Step 3.3. : On completion of tests, reselect 3.8 V.

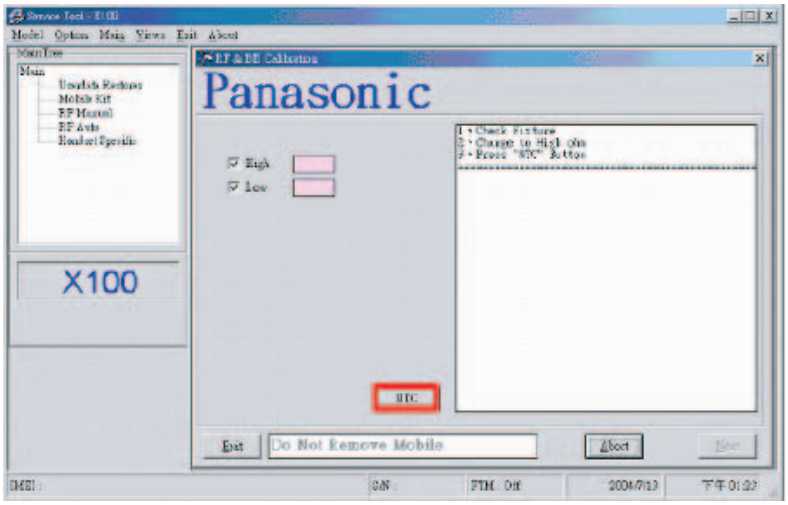


Step 3.4 : ADC is complete.

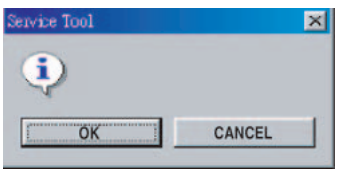


Step 4 : Press "**Next**" to continue.

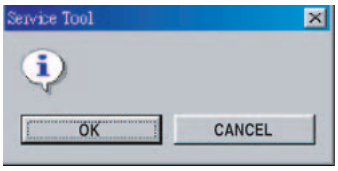
Step 5 : Click on "**NTC**" for battery temperature calibration. The purpose of NTC is to prevent the battery temperature becoming too high or too low.
NTC-High (40 °C) approve of range in 233 to 170 (6.9 5KΩ – 4.83 KΩ).
NTC-Low (0 °C) approve of range in 965 to 671(33.9 KΩ – 21.6 KΩ).



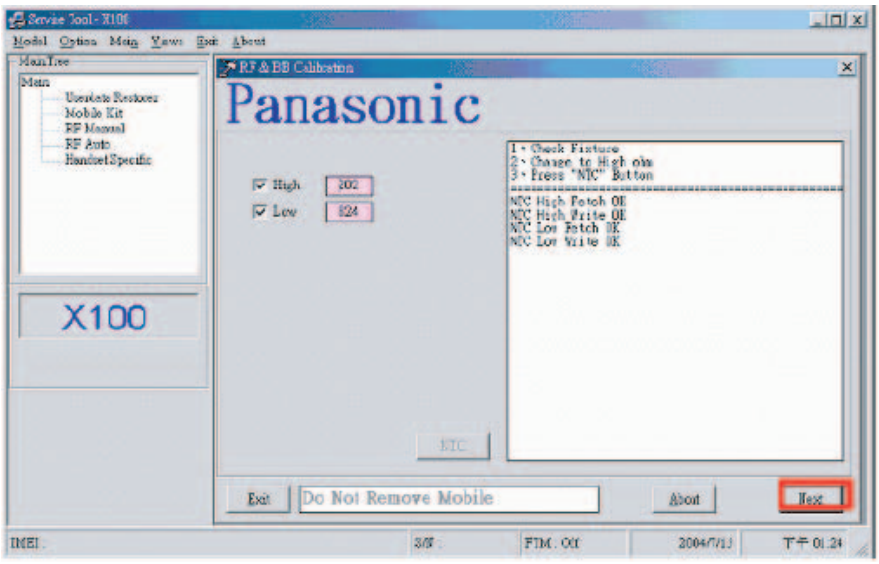
Step 5.1 : Change to NTC-High (40 °C) and click "**OK**" to start calibration temperature of battery in NTC-High (40 °C).



Step 5.2 : After calibration battery in NTC-High, set to 0 °C and click "**OK**".

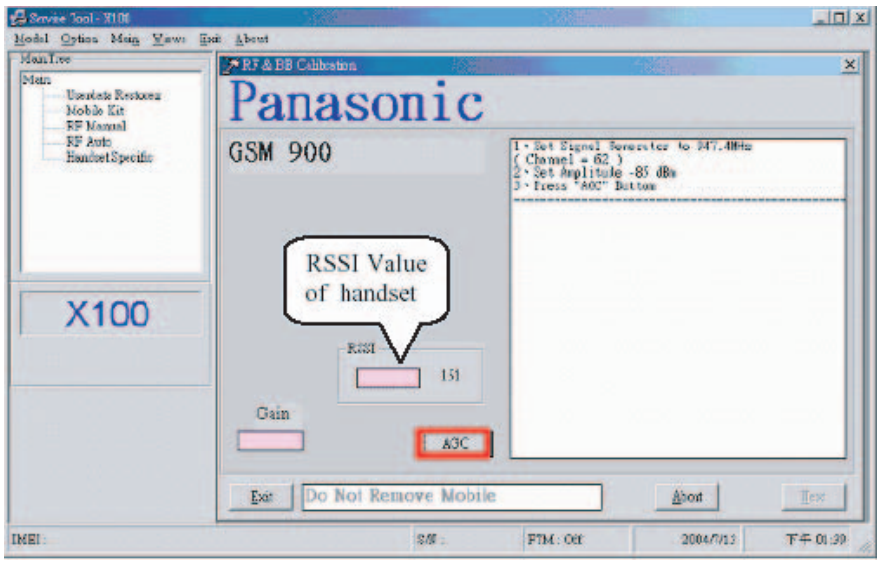


Step 5.3 : After calibration NTC-Low, NTC is complete.



Step 6 : Press "**Next**" to continue.

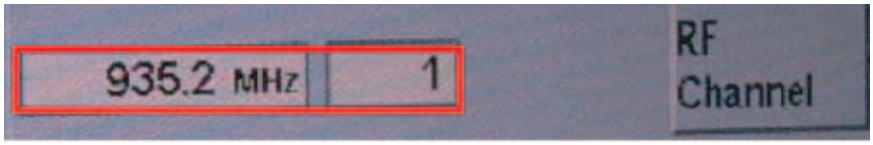
Step 7 : Before proceeding with Gain and RSSI check, configure the GSM Test Set as follows:
If a CMU200 is used, refer to Annex notex2-1 for Configuration.
If an HP8960 is used, refer to Annex notes2-2 for Configuration.



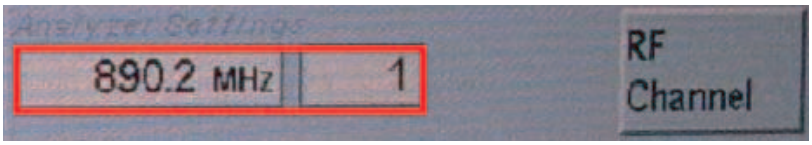
Click on "AGC".

Step 8 : Change channel (Generator and Analyser channel) to RSSI value, press "**OK**" to next channel.
(In this case, channel 1, channel 49, channel 85, channel 975).

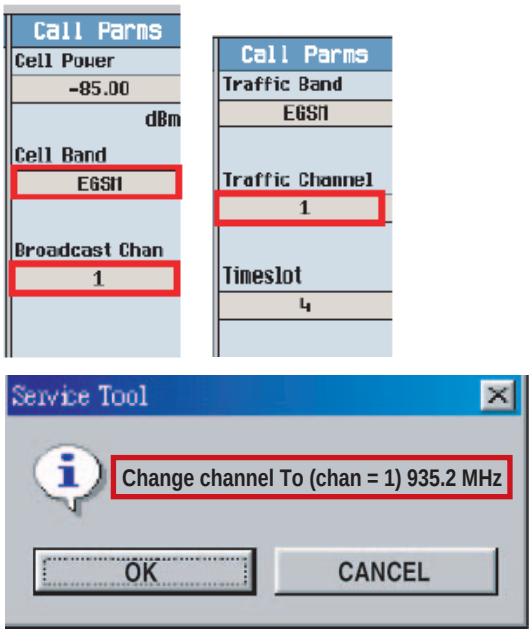
Generator setting for Cmu200



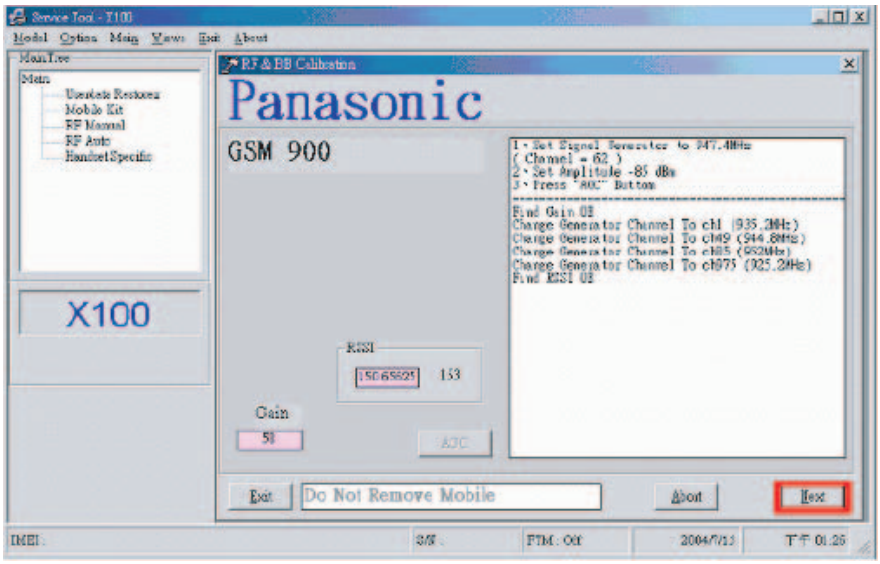
Analyser setting for Cmu200



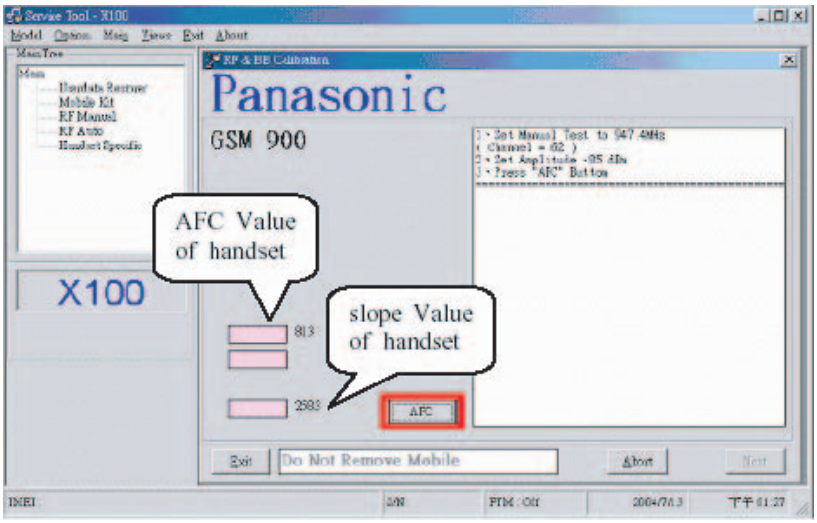
Setting for HP8960



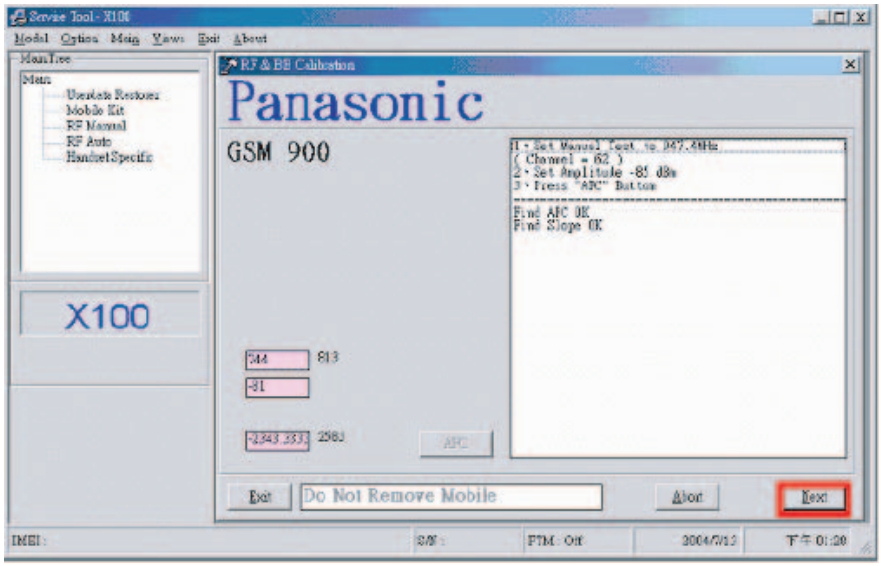
Step 9 : AGC calibration is complete, press "**Next**" to continue.



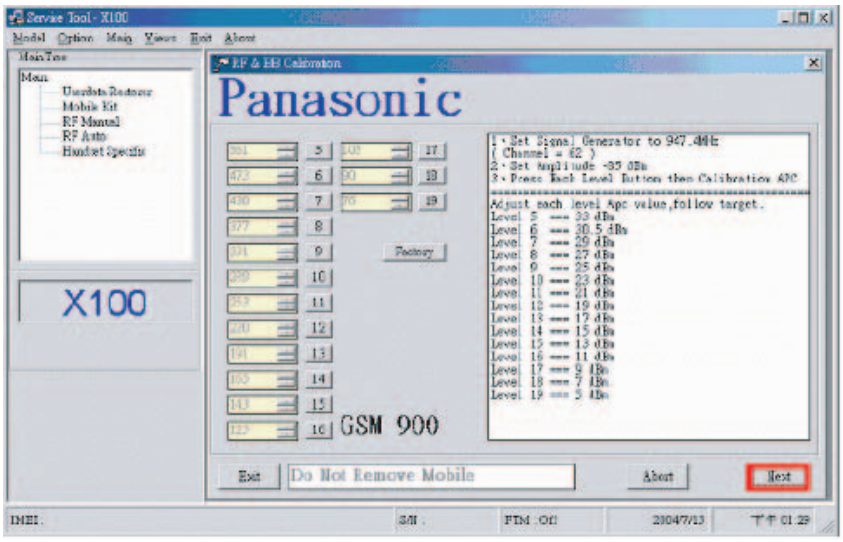
Step 10 : Click "**AFC**" to start AFC calibration.
If a CMU200 is used, refer to Annex notex2-1 for Configuration.
If an HP8960 is used, refer to Annex notes2-2 for Configuration.



Step 11 : AFC calibration is complete, press "**Next**" to continue.



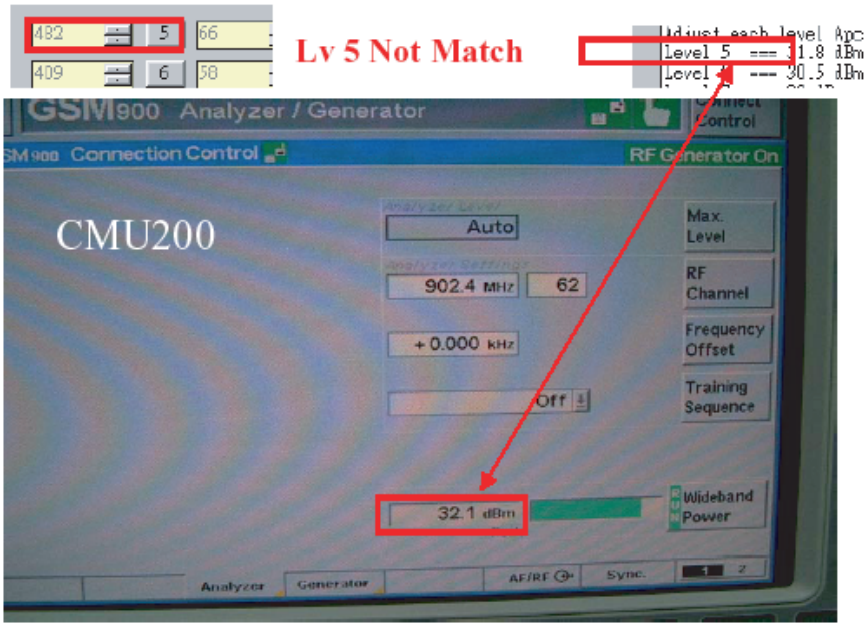
Step 12 : Click "**APC**" to start APC calibration. ("**factory**" key : Return APC value each level of the handset.)
If a CMU200 is used, refer to Annex notex2-1 for Configuration.
If an HP8960 is used, refer to Annex notes2-2 for Configuration.

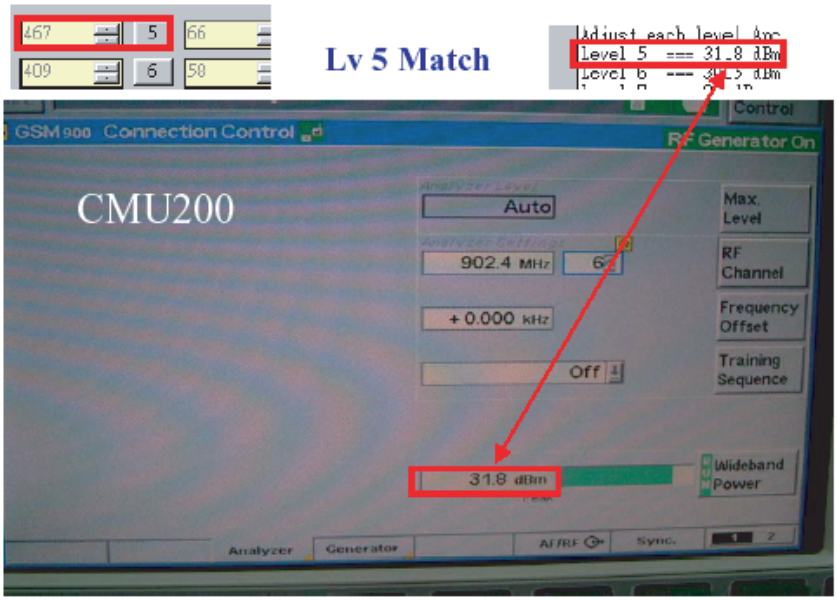


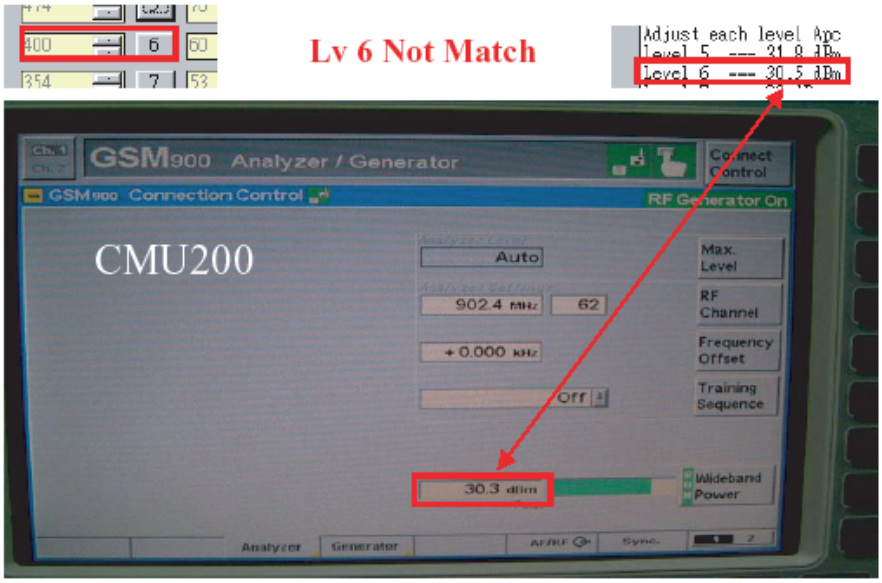
Step 13 : Click each button in turn for each power level. Referring to the table on the right of the screen, adjust the GSM Test Set (Analyzer/Generator) to the required value. When the parameter is set, press "**Next**" to continue.

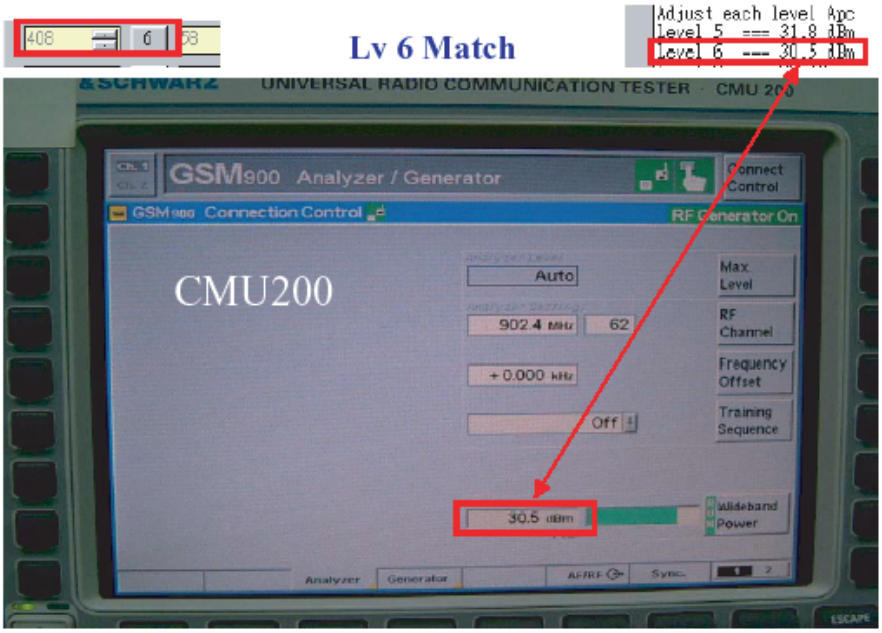
Operation Level 5 and Level 6 to examples

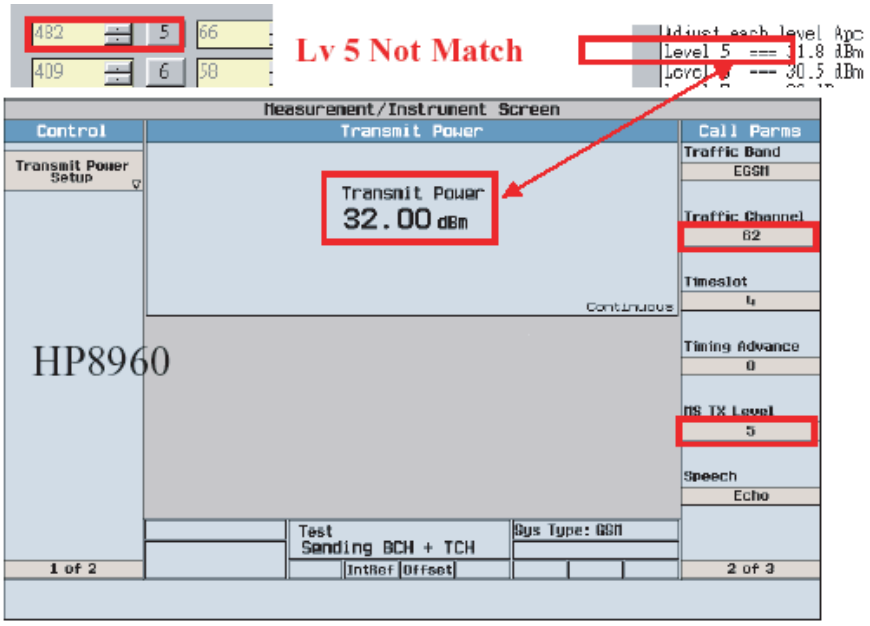
Note: Level 5 parameter value must be decreased.
Level 6 parameter value must be increased.

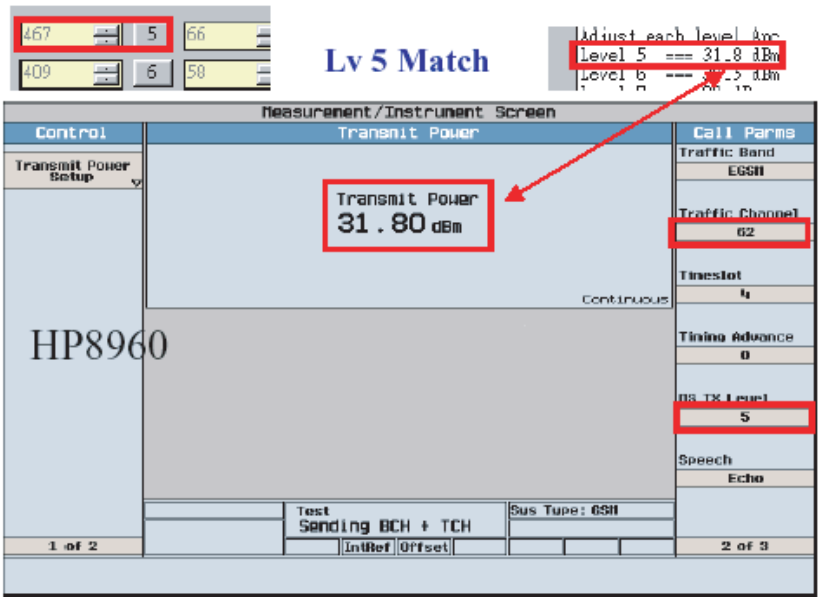


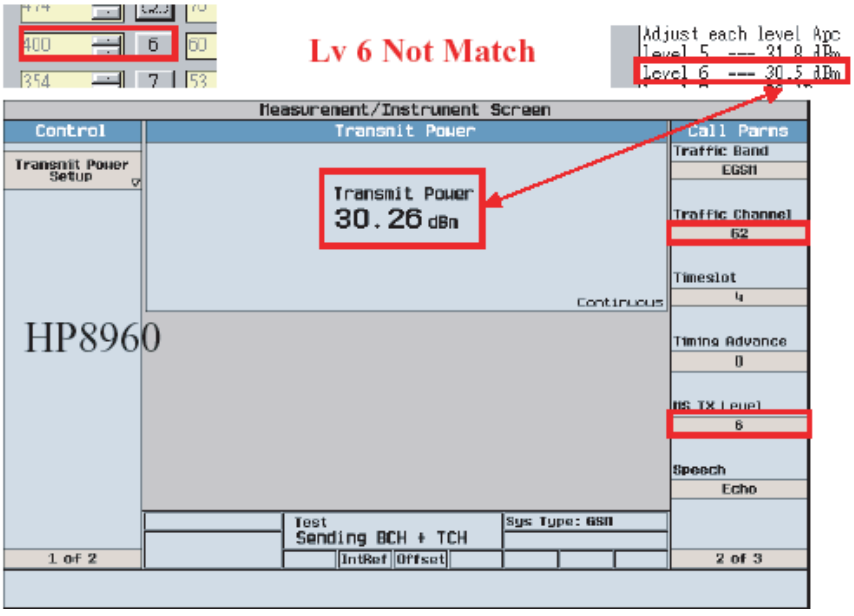

Lv 5 Match
Adjust each level Apc
Level 5 === 31.8 dBm
GSM900 Connection Control
RF Generator On
CMU200
Auto
Max. Level
902.4 MHz
62
RF Channel
+0.000 kHz
Frequency Offset
Off
Training Sequence
31.8 dBm
Wideband Power
Analyzer
Generator

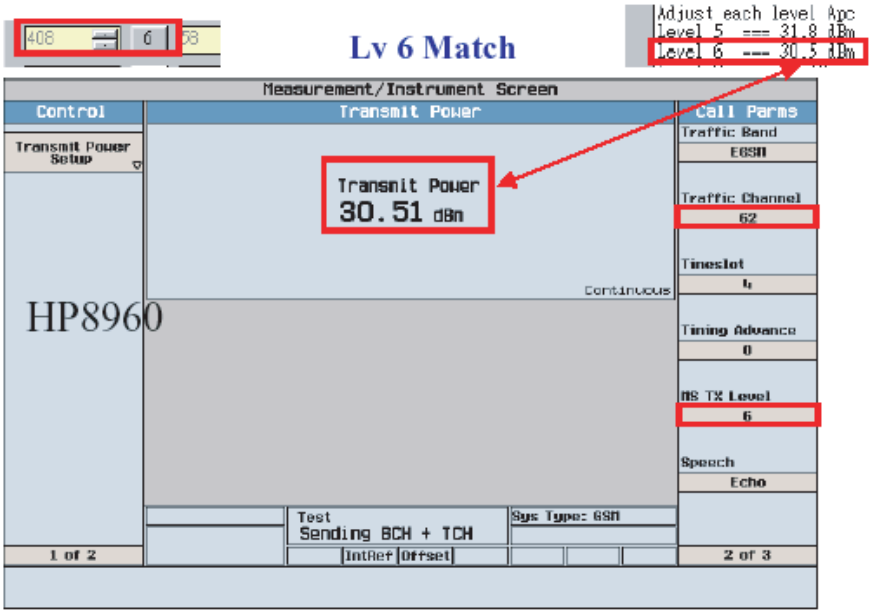

Lv 6 Not Match
Adjust each level Apc
Level 5 === 31.8 dBm
Level 6 === 30.5 dBm
GSM900 Analyzer / Generator
GSM900 Connection Control
RF Generator On
CMU200
Auto
Max. Level
902.4 MHz
62
RF Channel
+0.000 kHz
Frequency Offset
Off
Training Sequence
30.3 dBm
Wideband Power
Analyzer
Generator


Lv 6 Match
Adjust each level Apc
Level 5 === 31.8 dBm
Level 6 === 30.5 dBm
UNIVERSAL RADIO COMMUNICATION TESTER
GSM900 Analyzer / Generator
GSM900 Connection Control
RF Generator On
CMU200
Auto
Max. Level
902.4 MHz
62
RF Channel
+0.000 kHz
Frequency Offset
Off
Training Sequence
30.5 dBm
Wideband Power
Analyzer
Generator

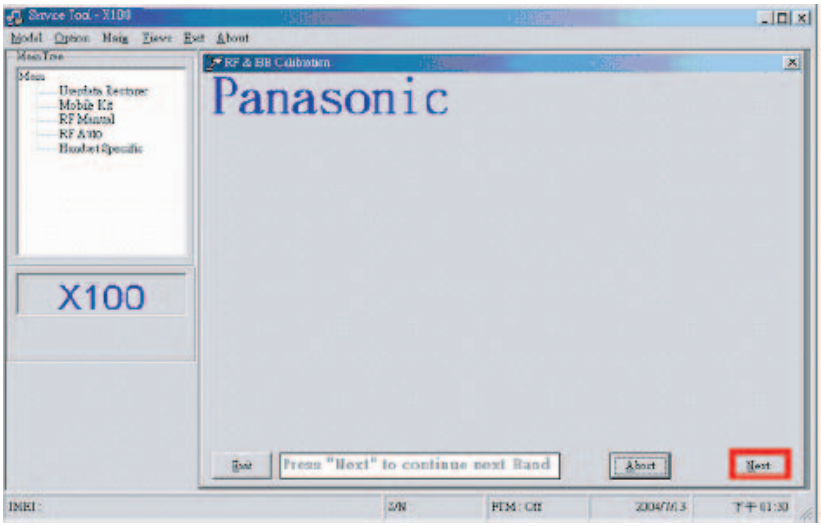

Lv 5 Not Match
Adjust each level Apc
Level 5 === 31.8 dBm
Measurement/Instrument Screen
Control
Transmit Power
Call Parms
Transmit Power Setup
Transmit Power
32.00 dBm
Continuous
Traffic Band
EGSM
Traffic Channel
62
Timeslot
Timing Advance
0
MS TX Level
5
Speech
Echo
HP8960
Test
Sending BCH + TCH
Sys Type: GSM
IntRef
Offset
1 of 2
2 of 3


Lv 5 Match
Adjust each level Apc
Level 5 === 31.8 dBm
Measurement/Instrument Screen
Control
Transmit Power
Call Parms
Transmit Power Setup
Transmit Power
31.80 dBm
Continuous
Traffic Band
EGSM
Traffic Channel
62
Timeslot
Timing Advance
0
MS TX Level
5
Speech
Echo
HP8960
Test
Sending BCH + TCH
Sys Type: GSM
IntRef
Offset
1 of 2
2 of 3

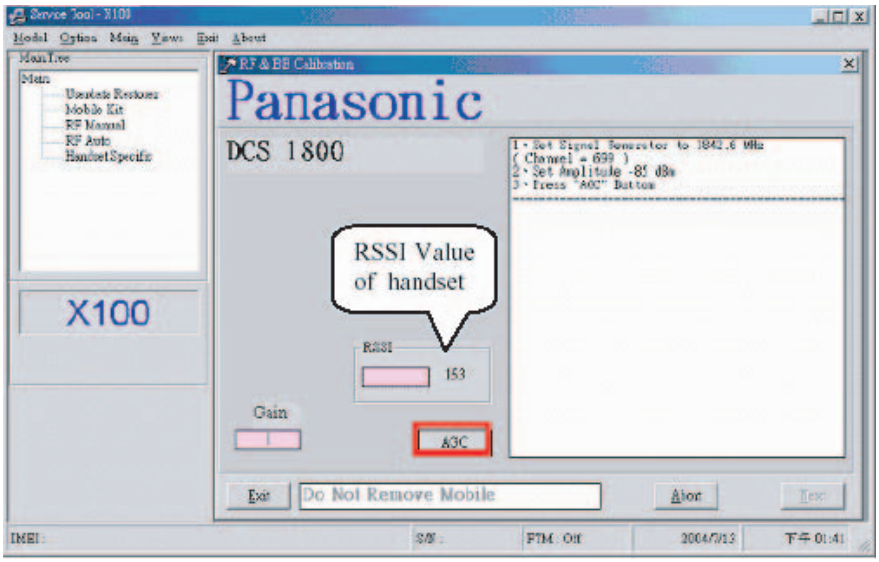

Lv 6 Not Match
Adjust each level Apc
Level 6 === 30.5 dBm
Measurement/Instrument Screen
Control
Transmit Power
Call Parms
Transmit Power Setup
Transmit Power
30.26 dBm
Continuous
Traffic Band
EGSM
Traffic Channel
62
Timeslot
Timing Advance
0
MS TX Level
6
Speech
Echo
HP8960
Test
Sending BCH + TCH
Sys Type: GSM
IntRef
Offset
1 of 2
2 of 3



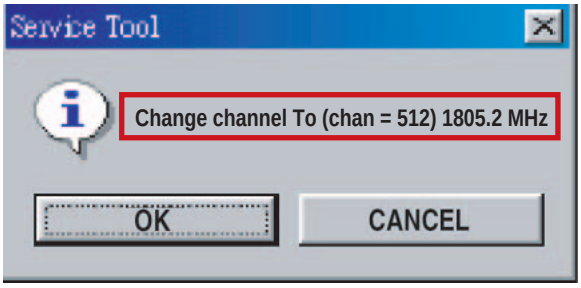
Step 14 : Write data (GSM900) to the handset and press "**Next**" to continue.



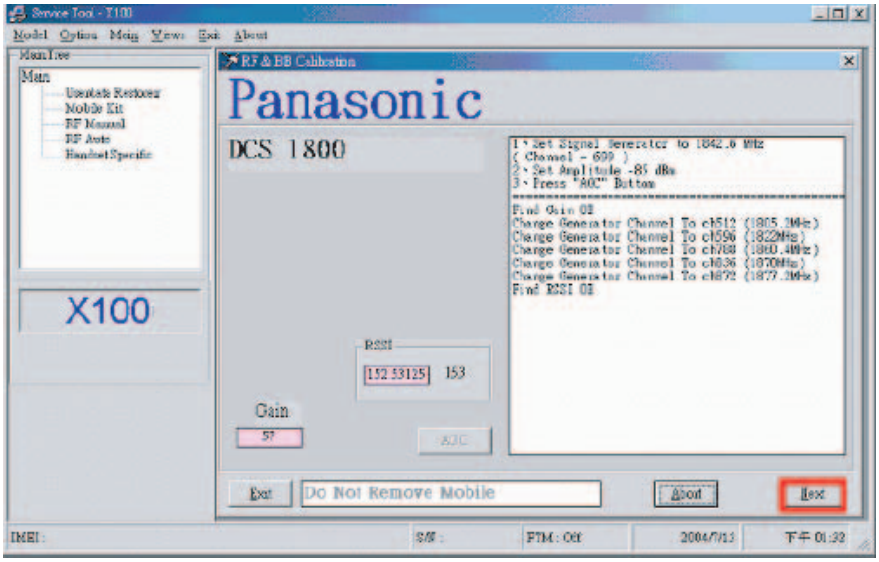
Step 15 : After configure parameter of instrument, click "**AGC**", find gain value and RSSI of full channel.



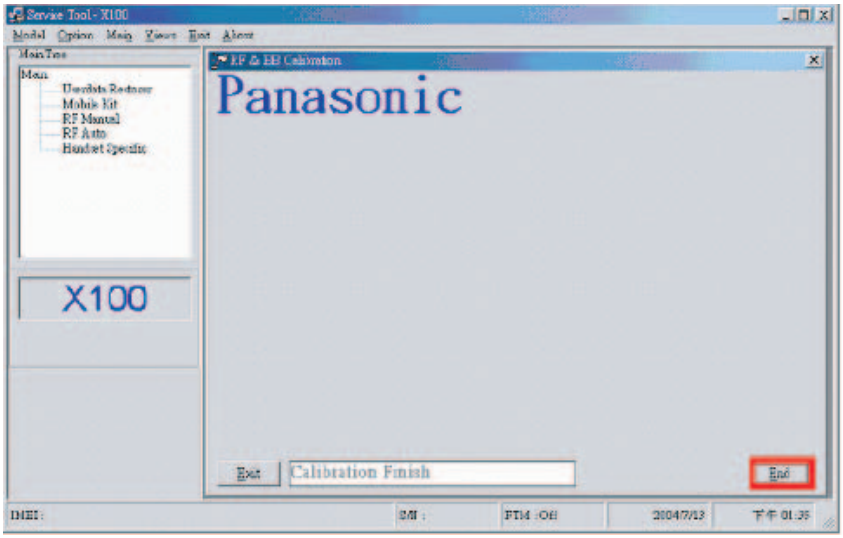
Step 16 : Change channel to RSSI value, press "**OK**" to next channel.
(In this case, channel 512, channel 596, channel 788, channel 836, channel 872,).



Step 17 : AGC calibration is complete, press "**Next**" to continue.



Step 18 : Write data (DCS1800) to the handset and press "**End**" to finish in this procedure.

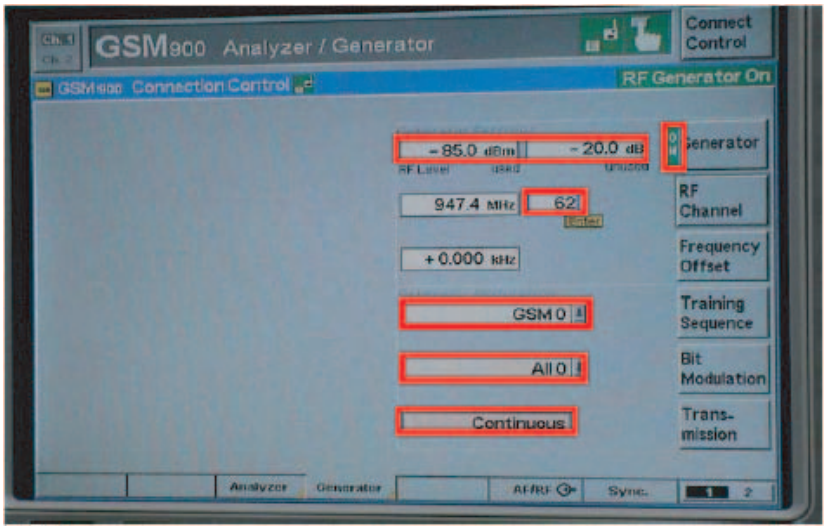


Annex notes1:

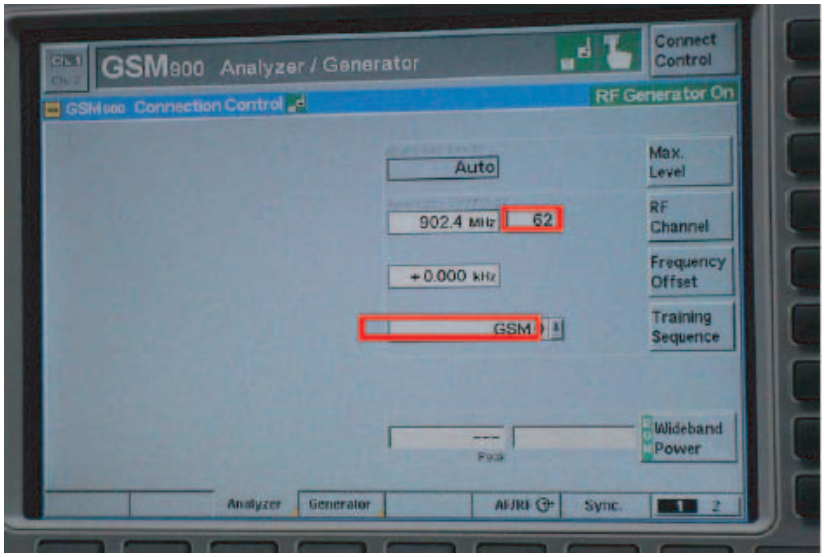
Test set	AGC	AFC	APC
HP8960	1. Test mode (Bch+Tch) 2. Cell power –85 dBm 3. Cell band 4. Broadcast channel 5. Cable lose	1. Test mode (Bch+Tch) 2. Cell power –85 dBm 3. Cell band 4. Broadcast channel 5. Cable lose	1. Test mode (Bch+Tch) 2. Cell power –85 dBm 3. Cell band 4. Cable lose 5. Broadcast channel 6. MS Tx level
CMU200	1. Analyser/Generator 2. RF level used –85 dBm Unused –20 dBm 3. RF Channel 4. Transmission : Continuous 5. Cable lose	1. Analyser/Generator 2. RF level used –85 dBm Unused –20 dBm 3. RF Channel 4. Transmission : Continuous 5. Cable lose	1. Analyser/Generator 2. RF level used –85 dBm Unused –20 dBm 3. RF Channel 4. Transmission: Burst 5. Cable lose 6. Bit modulation: Off

Annex notes2-1 : (AGC, AFC) Please Configure as follows (CMU200)

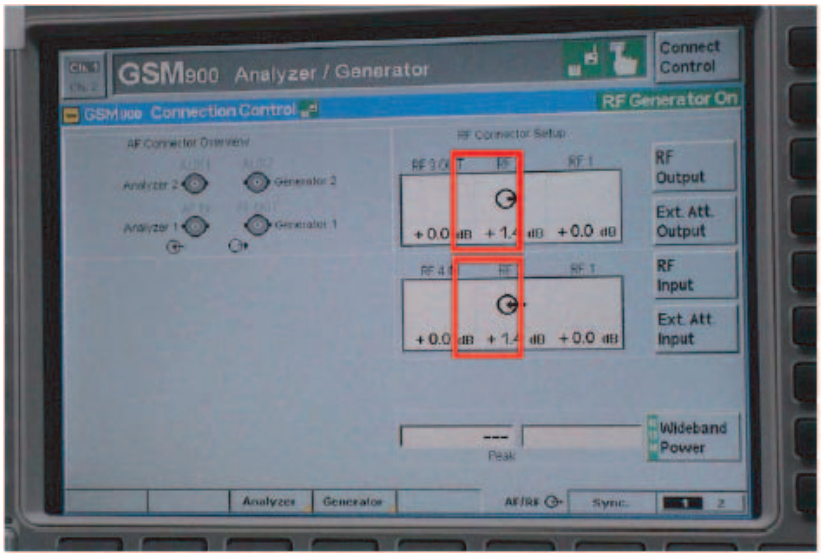
- Change to GSM900 Analyser/Generator (Non-Signalling mode).
- Change RF level Used TS –85 dBm and RF level Unused TS –20 dBm in Generator. Switch on Generator.
- Change channel to **ch62** in Generator (GSM850: ch190, GSM1800: ch699, GSM1900: ch662).
- Change Transmission mode to "**Continuous**" as below.



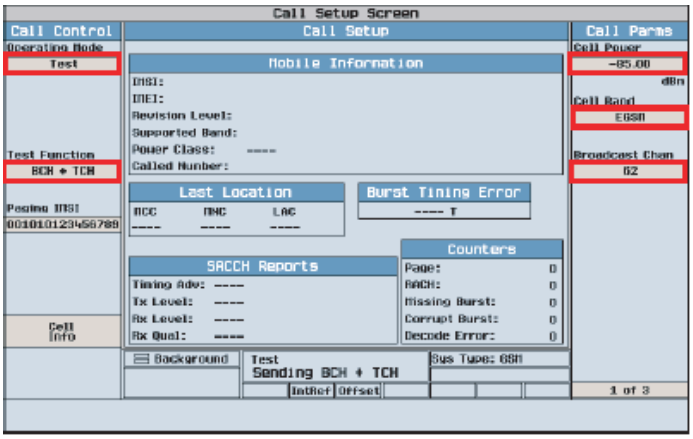
- Change channel to ch62 in Analyser. (GSM850 : ch190, GSM1800 : ch699, GSM1900 : ch662) as below:

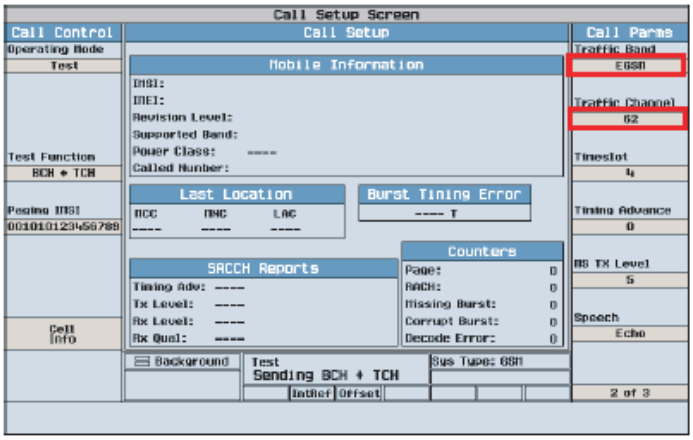


- Change cable lose of AF/RF as below:



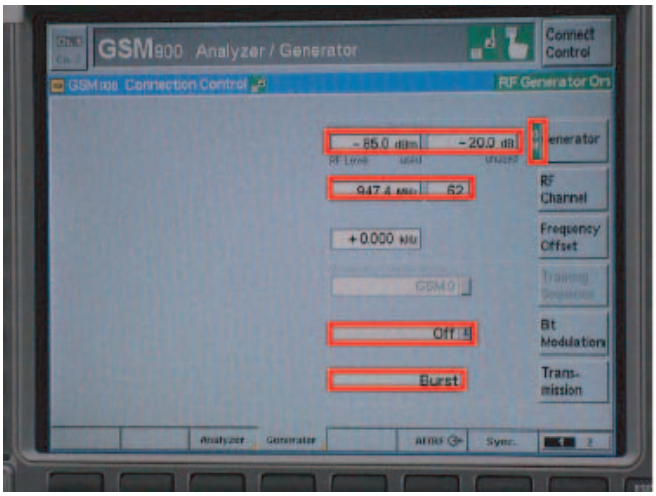
- Annex notes2-2 : (AGC, AFC) Configure as follows (HP8960):





Annex notes3-1 : (APC) Configure as follows (CMU200)

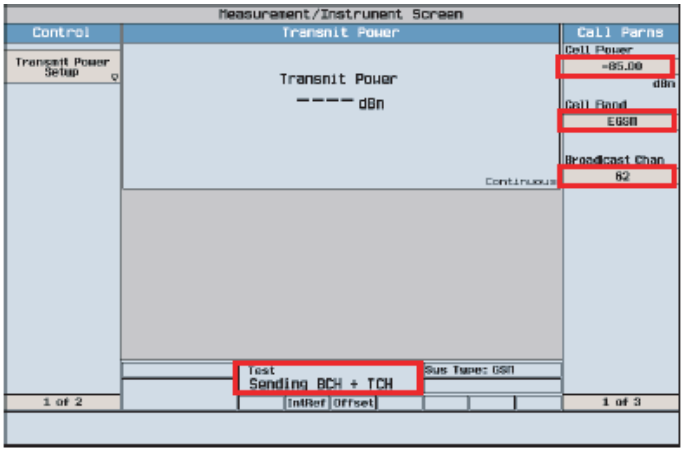
- Change to GSM900 Analyser/Generator (Non-Signaling mode).
- Change RF level Used TS –85dBm and RF level Unused TS –20dBm in Generator. Switch on Generator.
- Change channel to ch62 in Generator. (GSM850 : ch190, GSM1800 : ch699, GSM1900 : ch662)
- Change Transmission mode to "**Burst**".
- Change Bit modulation to "**OFF**" in Generator as below:

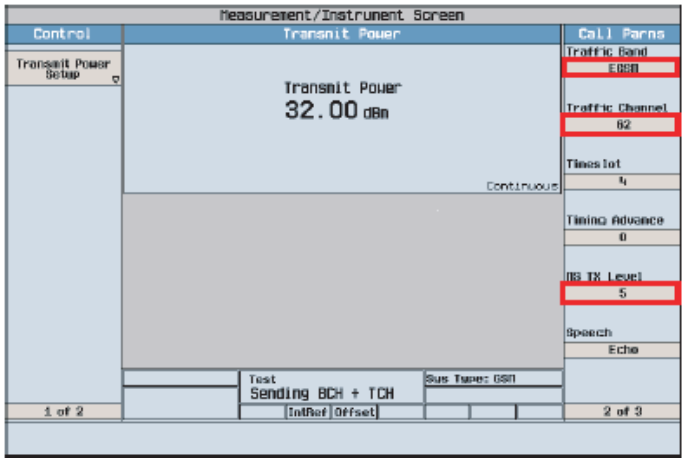


- Change channel to ch62 in Analyser. (GSM850 : ch190, GSM1800 : ch699, GSM1900 : ch662) as below:

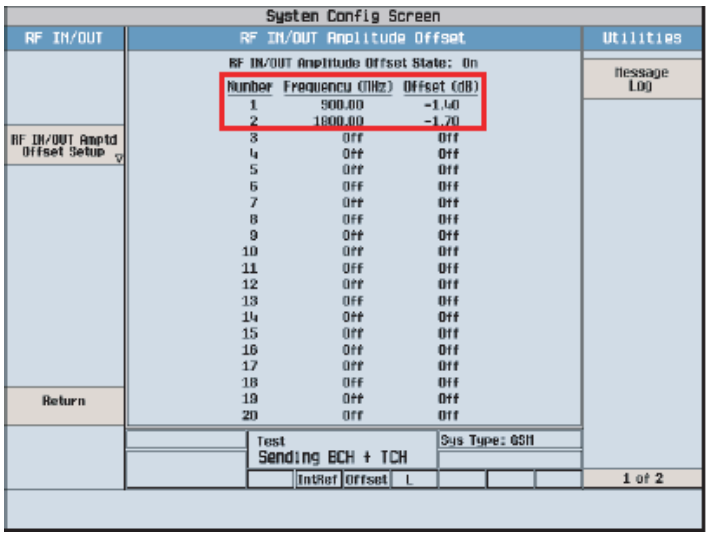
- Change cable lose of AF/RF as below:

Annex notes3-2 : (APC) Configure as follows (HP8960).

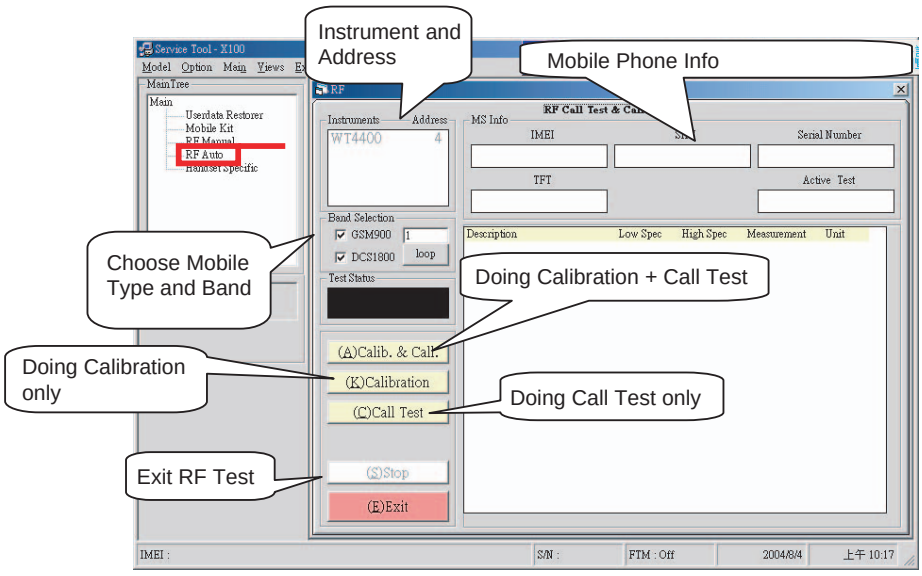




Modify Cable lose

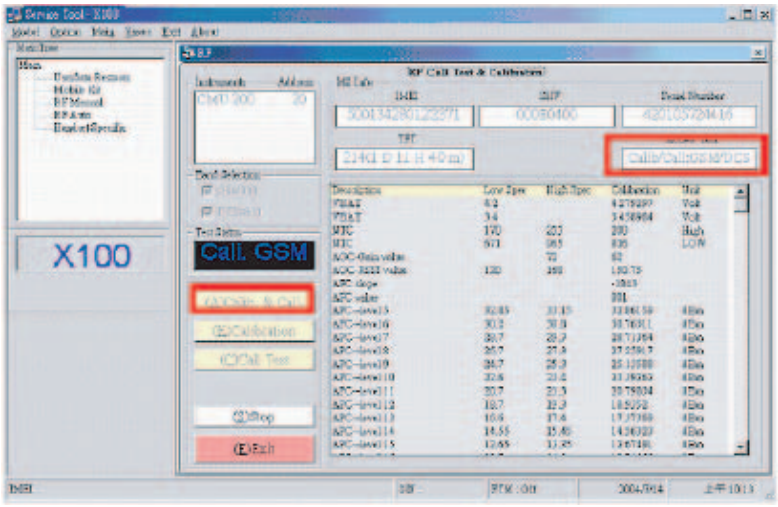


8.4.4. RF Auto

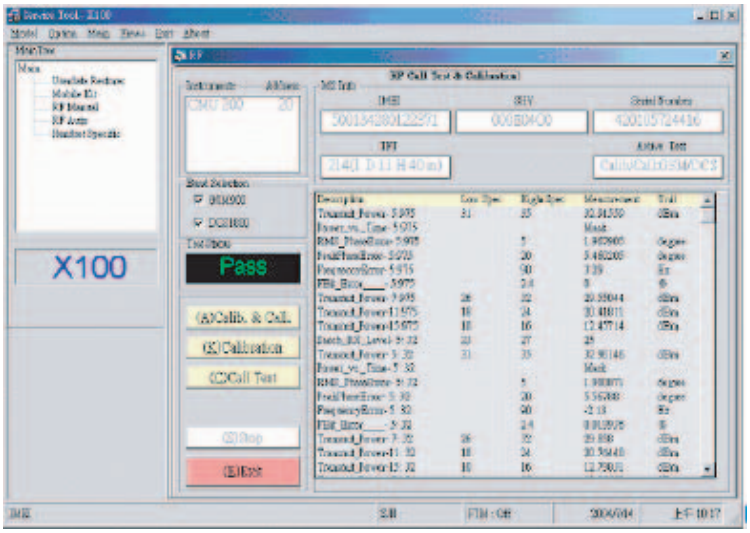


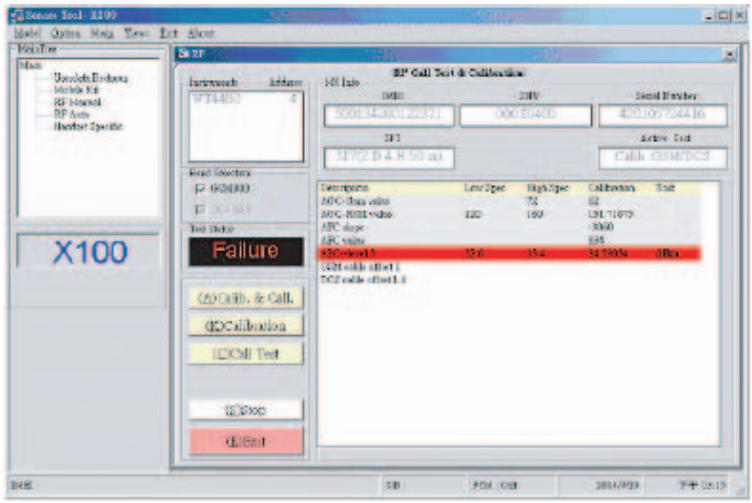
- To download calibration data and measurement data from handset: Click button "**(A)Calib. & Call.**".

  Calibration

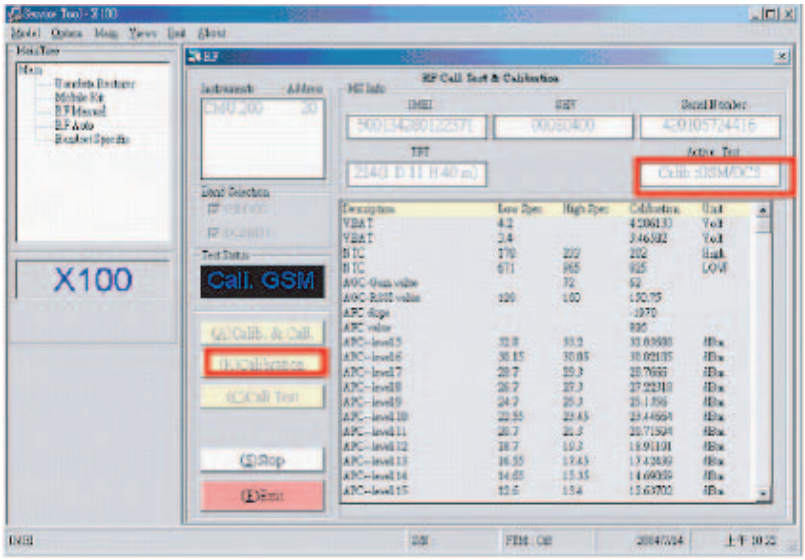


Measurement

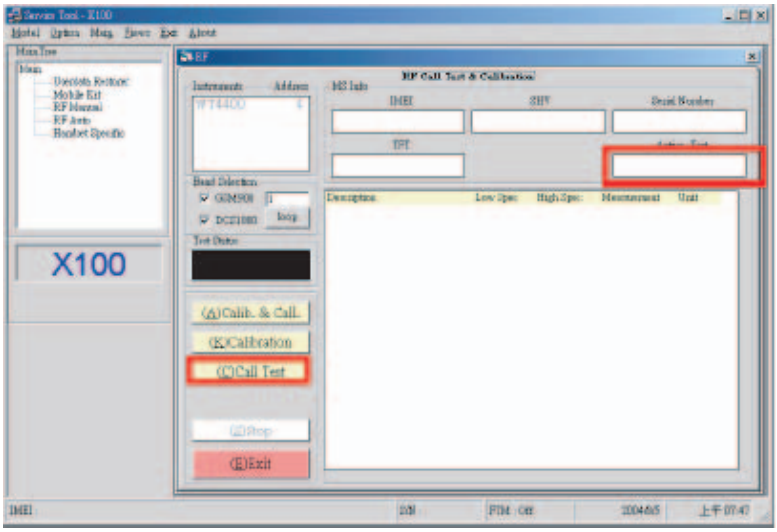




- To calibration data from handset: Click button "**(K)Calibration.**".



- To measurement data from handset: Click button "**(C)Call. Test.**"
  When making a Call Test, it is necessary for the handset to have a test SIM card inserted which takes extra time to search for the network and hence takes longer to enter Factory Test Mode (FTM). This calibration process saves time since a test SIM card is not required.

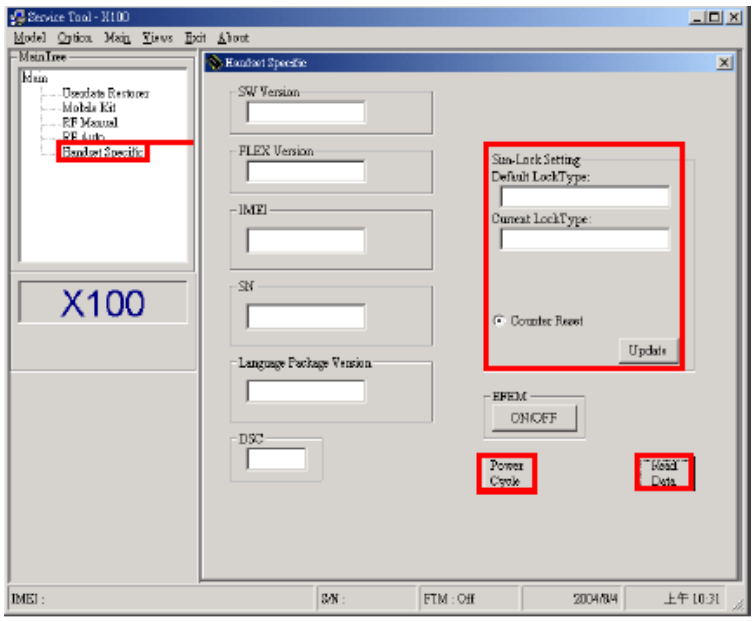


Error Message Table

	Error Message	Description
1	FTMx, FTMxx, FTMxxx	Can't Open FTM
2	Open FTM Fail (Time Out)	Open FTM Fail Time Out
3	Ka_init Bad (Ka_init Wrong)	Calibration initial fail
4	Null STR ret	Return Null Value
5	Null STR AFC	Return Null value for AFC Calibration
6	Ret null apc	Return Null Value for APC Calibration
7	wr eeprom err	EEPROM Error In Write or Read
8	GPIB Err Ka 11	GPIB On Error
9	connect fail	MS & BS Connect Fail For GSM or DCS
10	EGSM Bad	Measurement EGSM Fail or MS Offline
11	handover to dcs bad	Change EGSM To DCS Fail
12	DCS Bad	Measurement DCS Fail or MS Offline
13	SIM/SN Fail	Read SIM/SN Fail

8.4.5. Handset Specific Data

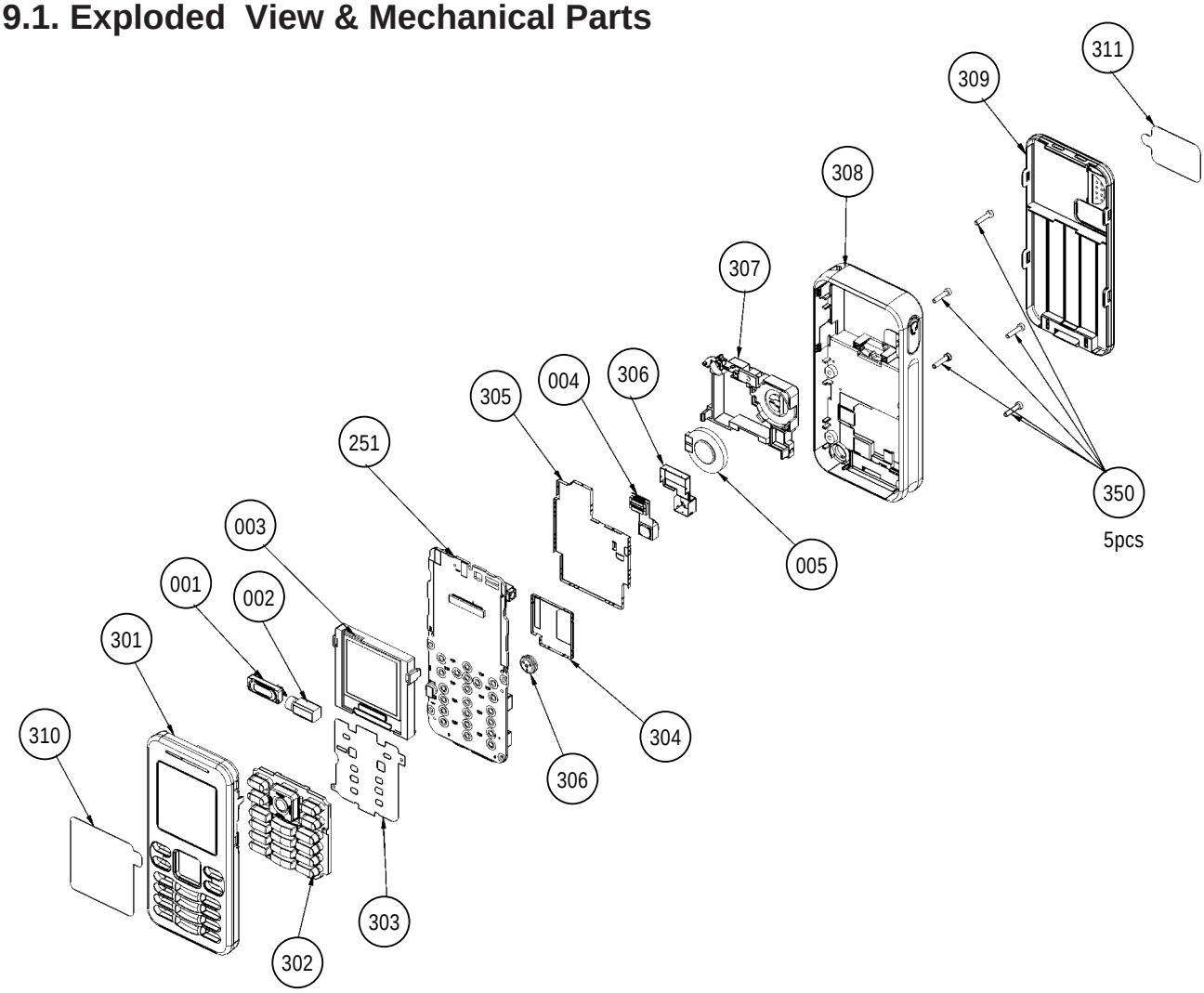
Before reading and updating handset specific data, check that the handset is connected to the PC. Switch on the handset.



- To read data from handset: Click button "**Read Data**".
- Sim-Lock Setting:
  - ❒ Default Lock Type: This field will show the default Lock type of the subsidy lock. (Read only)
  - ❒ Current Lock Type: This field will show the current Lock type of the subsidy lock. (Read only)
  - ❒ 1 option for SIM-lock update:
    Counter Reset: This is to reset the SIM Lock retry counter to the subsidy lock default setting. To reset, click the radio button "**Counter Reset**" and then click the "**Update**" button in "**Sim-Lock Setting**" area.
- EFEM: Can be toggled on and off by clicking the "**ON/OFF**" button.
- Phone Lock: If the phone has been locked by the user, click "**Unlock**" to unlock the phone and reset the password to the factory default "**0000**".
- Press "**Power Cycle**" to exit the Factory Test Mode and restart the handset.

9. REPLACEMENT PARTS LIST

9.1. Exploded View & Mechanical Parts



REF. NO.	PART NO.	DESCRIPTION
001	2240501003W	RECIEVER
002	3930509401W	SPEAKER VIBRATOR
003	7630001451W	LCD MODULE
004	7650451001W	CAMERA (CMOS)
005	2250111701W	SPEAKER CUSHION
006	2220061201W	MICROPHONE
251	91G660RA01W	MAIN PCB
301	2511G66001W	UPPER CASE ASSY SILVER
	2511G66002W	UPPER CASE ASSY CHAMPAGNE SILVER
	2511G66003W	UPPER CASE ASSY METALLIC BLACK
	2511G66004W	UPPER CASE ASSY LIGHT BLUE
302	3104G66001W	DIAL-KEY ENGLISH
	3104G66021W	DIAL-KEY BOPOMOFO
	3104G66031W	DIAL-KEY STROKE
	3104G66061W	DIAL-KEY RUSIAN
	3104G66071W	DIAL-KEY ARABIC
303	3109G66001W	MET DOME
304	3052G66004W	SHIELD CASE
305	3052G66003W	SHIELD CASE
306	3052G66005W	CAMERA SHIELD CASE

REF. NO.	PART NO.	DESCRIPTION
307	23A1G66001W	ANTENNA ASSY
308	2512G66001W	LOWER CASE ASSY SILVER
309	251AG66001W	BATTERY COVER SILVER
	251AG66002W	BATTERY COVER CHAMPAGNE SILVER
	251AG66003W	BATTERY COVER METALLIC BLACK
	251AG66004W	BATTERY COVER LIGHT BLUE
310	8610G66001W	LCD PROTECTIVE TAPE
350	3501650201W	SCREW

9.2. Main PCB Assembly

Ref. No.	Part No.	Part Name & Description		Grid
BT1	2211350001W	BATTERY		
BQ1	1810222202W	TRANSISTOR		
BQ2	1810222202W	TRANSISTOR		
C1	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C2	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C3	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C4	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C5	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C6	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C7	1310026111W	CERAMIC CAPACITOR	10pF 50V	
C8	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C9	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C10	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C11	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C12	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C14	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C15	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C16	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C17	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C18	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C19	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C20	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C21	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C22	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C23	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C24	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C25	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C26	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C27	1347562831W	CERAMIC CAPACITOR	10uF 10V	
C28	1347562831W	CERAMIC CAPACITOR	10uF 10V	
C29	1347562831W	CERAMIC CAPACITOR	10uF 10V	
C30	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C31	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C32	----------	Not used.		
C33	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C34	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C35	1312046111W	CERAMIC CAPACITOR	12pF 50V	
C36	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C37	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C38	1310146111W	CERAMIC CAPACITOR	100pF 50V	
C40	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C41	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C42	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C43	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C44	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C45	1310146111W	CERAMIC CAPACITOR	100pF 50V	
C46	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C48	1333373411W	CERAMIC CAPACITOR	33nF 16V	
C49	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C50	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C51	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C52	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C53	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C54	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C56	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C58	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C59	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C60	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C61	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C62	1310452211W	CERAMIC CAPACITOR	100nF 10V	

Ref. No.	Part No.	Part Name & Description		Grid
C64	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C65	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C66	0710414111W	FIXED RESISTOR	100K 1/16W	
C69	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C70	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C71	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C72	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C73	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C74	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C75	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C76	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C77	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C78	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C79	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C80	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C81	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C82	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C83	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C84	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C85	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C86	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C87	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C88	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C89	1315146111W	CERAMIC CAPACITOR	150pF 50V	
C90	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C91	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C92	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C93	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C94	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C95	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C96	1310146111W	CERAMIC CAPACITOR	100pF 50V	
C97	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C98	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C99	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C101	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C102	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C103	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C104	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C105	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C108	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C110	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C114	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C115	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C116	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C118	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C120	1333373411W	CERAMIC CAPACITOR	33nF 16V	
C121	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C123	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C128	2011001532W	VARISTOR	33pF 5.5V	
C131	1333373411W	CERAMIC CAPACITOR	33nF 16V	
C132	1333373411W	CERAMIC CAPACITOR	33nF 16V	
C133	1333373411W	CERAMIC CAPACITOR	33nF 16V	
C134	1333373411W	CERAMIC CAPACITOR	33nF 16V	
C135	1333373411W	CERAMIC CAPACITOR	33nF 16V	
C136	2011001532W	VARISTOR	33pF 5.5V	
C137	2011001532W	VARISTOR	33pF 5.5V	
C138	2011001532W	VARISTOR	33pF 5.5V	
C139	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C140	2011001532W	VARISTOR	33pF 5.5V	
C141	2011001532W	VARISTOR	33pF 5.5V	

Ref. No.	Part No.	Part Name & Description		Grid
C142	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C144	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C145	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C146	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C147	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C148	1322551221W	CERAMIC CAPACITOR	2.2uF 6.3V	
C149	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C150	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C152	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C153	1310562821W	CERAMIC CAPACITOR	1uF 10V	
C205	1310353311W	CERAMIC CAPACITOR	10nF 16V	
C206	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C207	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C208	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C209	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C210	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C211	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C212	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C213	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C214	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C215	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C216	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C217	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C218	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C240	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C241	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C242	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C245	1322551221W	CERAMIC CAPACITOR	2.2uF 6.3V	
C246	1315146111W	CERAMIC CAPACITOR	150pF 50V	
C247	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C301	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C302	134R716111W	CERAMIC CAPACITOR	4.7pF 50V	
C303	1410721226W	CERAMIC CAPACITOR	100uF 6.3V	
C304	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C305	1310146111W	CERAMIC CAPACITOR	100pF 50V	
C306	1310353311W	CERAMIC CAPACITOR	10nF 16V	
C307	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C308	131R016111W	CERAMIC CAPACITOR	1pF 50V	
C312	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C313	1368156311W	CERAMIC CAPACITOR	680pF 50V	
C314	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C315	134R716111W	CERAMIC CAPACITOR	4.7pF 50V	
C317	131R016111W	CERAMIC CAPACITOR	1pF 50V	
C318	132R716111W	CERAMIC CAPACITOR	2.7pF 50V	
C321	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C322	1315046111W	CERAMIC CAPACITOR	15pF 50V	
C323	1315046111W	CERAMIC CAPACITOR	15pF 50V	
C324	113R31N111W	COIL	3.3nH	
C325	131R016111W	CERAMIC CAPACITOR	1pF 50V	
C326	131R016111W	CERAMIC CAPACITOR	1pF 50V	
C327	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C328	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C329	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C330	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C331	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C332	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C341	1347561221W	CERAMIC CAPACITOR	4.7uF 6.3V	
C342	1310146111W	CERAMIC CAPACITOR	100pF 50V	
C343	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C344	1310146111W	CERAMIC CAPACITOR	100pF 50V	

Ref. No.	Part No.	Part Name & Description		Grid
C345	131R516111W	CERAMIC CAPACITOR	1.5pF 50V	
C346	1310146111W	CERAMIC CAPACITOR	100pF 50V	
C347	1310551211W	CERAMIC CAPACITOR	1uF 6.3V	
C348	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C349	1310551211W	CERAMIC CAPACITOR	1uF 6.3V	
C350	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C351	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C352	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C353	1310662831W	CERAMIC CAPACITOR	10uF 10V	
C354	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C355	1312046111W	CERAMIC CAPACITOR	12pF 50V	
C356	1310026111W	CERAMIC CAPACITOR	10pF 50V	
C357	137R016111W	CERAMIC CAPACITOR	7pF 50V	
C358	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C359	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C360	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C361	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C362	1347156311W	CERAMIC CAPACITOR	470pF 50V	
C363	1347156311W	CERAMIC CAPACITOR	470pF 50V	
C364	1310146111W	CERAMIC CAPACITOR	100pF 50V	
C365	1322551221W	CERAMIC CAPACITOR	2.2uF 6.3V	
C366	1322046111W	CERAMIC CAPACITOR	22pF 50V	
C367	1322551221W	CERAMIC CAPACITOR	2.2uF 6.3V	
C368	1322551221W	CERAMIC CAPACITOR	2.2uF 6.3V	
C369	1310452211W	CERAMIC CAPACITOR	100nF 10V	
C370	1310256311W	CERAMIC CAPACITOR	1nF 50V	
C371	1347046111W	CERAMIC CAPACITOR	47pF 50V	
C372	1312046111W	CERAMIC CAPACITOR	12pF 50V	
C373	137R016111W	CERAMIC CAPACITOR	7pF 50V	
C374	1333373411W	CERAMIC CAPACITOR	33nF 16V	
C400	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C401	1356046111W	CERAMIC CAPACITOR	56pF 50V	
C402	1333046111W	CERAMIC CAPACITOR	33pF 50V	
C403	1333044151W	CERAMIC CAPACITOR	33pF 25V	
C405	1333044151W	CERAMIC CAPACITOR	33pF 25V	
C406	1333044151W	CERAMIC CAPACITOR	33pF 25V	
C413	1333044151W	CERAMIC CAPACITOR	33pF 25V	
C420	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C421	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C422	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C423	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C424	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C425	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C426	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C427	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C428	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C429	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C430	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C431	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C432	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C343	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C344	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C435	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C436	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C437	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C438	1322044151W	CERAMIC CAPACITOR	22pF 25V	
C439	1322044151W	CERAMIC CAPACITOR	22pF 25V	
CON1	2304000061W	SIM CONNECTOR		
D1	1721793001W	DIODE		
D2	1720016001W	DIODE		

Ref. No.	Part No.	Part Name & Description		Grid
D3	1710051601W	BAS516 SOD523		
D4	1771921505W	LED		
D5	1771921505W	LED		
D6	1771921505W	LED		
D7	1771921505W	LED		
D8	1771921505W	LED		
D9	1771921505W	LED		
D10	1720055101W	DIODE		
D11	1771921505W	LED		
D12	1771921505W	LED		
EF1	2090220001W	EMIF ESD		
EF2	2090220001W	EMIF ESD		
F321	2020942019W	FILTER		
F322	2021842019W	FILTER		
J1	2308000051W	B TO B CONNECTOR		
J2	2306019302W	FPC CONNECTOR		
J3	2311030171W	AUDIO JACK		
J4	2303040411W	BATTERY CONNECTOR		
J5	2305033831W	SPEAKER CONNECTOR		
J6	2332350001W	RF CONNECTOR		
JP1	2302000301W	RF SWITCH		
L1	111012N111W	COIL	100nH	
L2	111012N111W	COIL	100nH	
L3	11220U3601W	COIL	22nH	
L301	111R21N111W	COIL	1.2nH	
L302	111R01N111W	COIL	1nH	
L323	111002N111W	COIL	10nH	
L326	111012N111W	COIL	100nH	
L330	111802N111W	COIL	18nH	
L342	111502N111W	COIL	15nH	
R1	0722414111W	FIXED RESISTOR	220KΩ 1/16W	
R2	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R3	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R4	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R5	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R6	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R7	0710314111W	FIXED RESISTOR	10KΩ 1/16W	
R8	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R9	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R10	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R11	0751214111W	FIXED RESISTOR	5.1KΩ 1/16W	
R12	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R13	0722414111W	FIXED RESISTOR	220KΩ 1/16W	
R15	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R16	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R18	0710314111W	FIXED RESISTOR	10KΩ 1/16W	
R19	0710314111W	FIXED RESISTOR	10KΩ 1/16W	
R20	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R21	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R22	0710314111W	FIXED RESISTOR	10KΩ 1/16W	
R24	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R25	0810031311W	FIXED RESISTOR	100KΩ 1/4W 1%	
R26	08R1501131W	FIXED RESISTOR	0.15Ω 1/4W 1%	
R27	0727012401W	FIXED RESISTOR	27Ω 1/4W	
R28	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R29	1010110411W	BLOCK RESISTOR	100Ω	
R30	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R32	0710414111W	FIXED RESISTOR	100KΩ 1/16W	
R34	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R35	0722414111W	FIXED RESISTOR	220KΩ 1/16W	

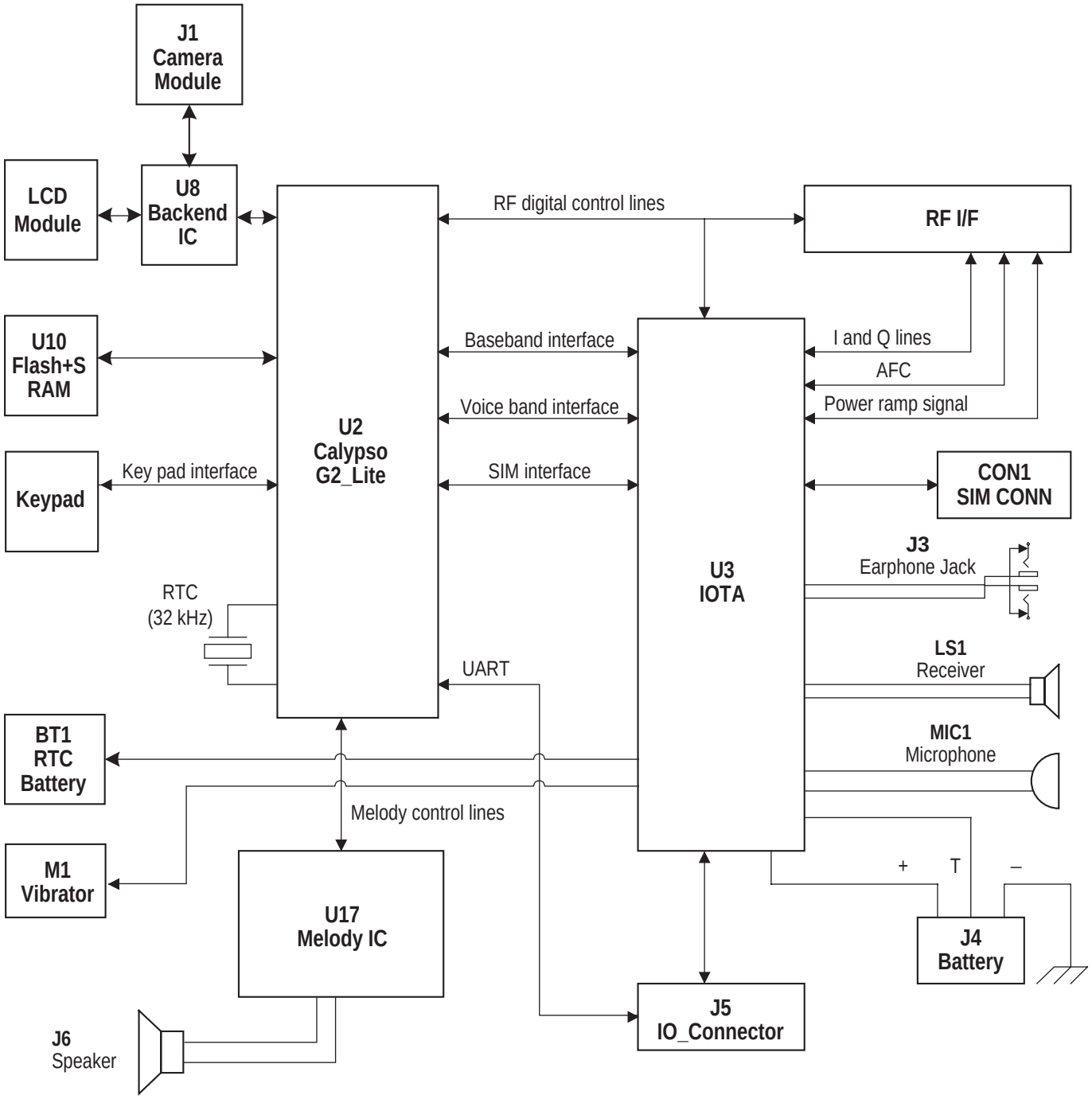
Ref. No.	Part No.	Part Name & Description		Grid
R36	0722214111W	FIXED RESISTOR	2.2KΩ 1/16W	
R37	0722214111W	FIXED RESISTOR	2.2KΩ 1/16W	
R38	0722414111W	FIXED RESISTOR	220KΩ 1/16W	
R40	0715014111W	FIXED RESISTOR	15Ω 1/16W	
R41	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R42	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R50	1010010411W	BLOCK RESISTOR	10Ω	
R51	0720118121W	FIXED RESISTOR	20Ω 1/10W	
R52	0733014111W	FIXED RESISTOR	33Ω 1/16W	
R53	0710314111W	FIXED RESISTOR	10KΩ 1/16W	
R54	0722414111W	FIXED RESISTOR	220KΩ 1/16W	
R55	0722314111W	FIXED RESISTOR	22KΩ 1/16W	
R56	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R57	0733214111W	FIXED RESISTOR	3.3KΩ 1/16W	
R58	0733114111W	FIXED RESISTOR	330Ω 1/16W	
R59	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R60	0733114111W	FIXED RESISTOR	330Ω 1/16W	
R61	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R64	116802N111W	COIL	68nH	
R65	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R66	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R67	116802N111W	COIL	68nH	
R69	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R70	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R71	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R74	0715214111W	FIXED RESISTOR	1.5KΩ 1/16W	
R75	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R76	084R701311W	FIXED RESISTOR	4.7Ω 1/16W	
R77	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R78	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R79	1020110411W	BLOCK RESISTOR	220Ω	
R80	1010010821W	BLOCK RESISTOR	10Ω	
R81	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R82	0739014111W	FIXED RESISTOR	39Ω 1/16W	
R83	0739014111W	FIXED RESISTOR	39Ω 1/16W	
R84	0710314111W	FIXED RESISTOR	10KΩ 1/16W	
R85	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R86	1020110411W	BLOCK RESISTOR	220Ω	
R87	0747314111W	FIXED RESISTOR	47KΩ 1/16W	
R88	0747314111W	FIXED RESISTOR	47KΩ 1/16W	
R89	0720314111W	FIXED RESISTOR	20KΩ 1/16W	
R90	0720314111W	FIXED RESISTOR	20KΩ 1/16W	
R93	0739014111W	FIXED RESISTOR	39Ω 1/16W	
R94	0710114111W	FIXED RESISTOR	100Ω 1/16W	
R96	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R97	----------	Not used.		
R205	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R206	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R208	0722214111W	FIXED RESISTOR	2.2KΩ 1/16W	
R220	----------	Not used.		
R301	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R302	1000210422W	PAT1010-2dB 50Ω		
R303	1000210422W	PAT1010-2dB 50Ω		
R304	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R321	0733214111W	FIXED RESISTOR	3.3KΩ 1/16W	
R322	0733214111W	FIXED RESISTOR	3.3KΩ 1/16W	
R323	0733214111W	FIXED RESISTOR	3.3KΩ 1/16W	
R342	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R343	0720114111W	FIXED RESISTOR	200Ω 1/16W	
R344	0720114111W	FIXED RESISTOR	200Ω 1/16W	

Ref. No.	Part No.	Part Name & Description		Grid
R345	07R0014111W	FIXED RESISTOR	0Ω 1/16W	
R346	0897611311W	FIXED RESISTOR	9.76K 1/16W 1%	
R347	0710314111W	FIXED RESISTOR	10KΩ 1/16W	
R348	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R349	0710314111W	FIXED RESISTOR	10KΩ 1/16W	
R350	0710214111W	FIXED RESISTOR	1KΩ 1/16W	
R351	0722414111W	FIXED RESISTOR	220KΩ 1/16W	
U1	1623276333W	CRYSTAL OSCILLATOR 32.768KHz		
U2	0100200001W	IC		
U3	0103014002W	IC		
U4	1820032601W	IC		
U5	0440002501W	IC		
U8	0100552001W	IC		
U13	0440002802W	IC		
U14	0440002801W	IC		
U16	0450500701W	IC		
U17	0510010002W	IC		
U301	0427732501W	IC		
U321	04B0615401W	IC		
U322	0470001102W	IC		
U323	1810011403W	IC		
U341	0410615101W	IC		
U342	1620026A22W	CRYSTAL OSCILLATOR 26MHz		
VR1	2011001532W	VARISTOR 5.5V 33pF		
VR2	2011001532W	VARISTOR 5.5V 33pF		
VR3	2011001532W	VARISTOR 5.5V 33pF		
VR4	2011001532W	VARISTOR 5.5V 33pF		
VR5	2012002931W	VARISTOR 9V 33pF		
VR6	2012002931W	VARISTOR 9V 33pF		
VR7	2011001532W	VARISTOR 5.5V 33pF		
VR8	2012002931W	VARISTOR 9V 33pF		
VR9	2011001532W	VARISTOR 5.5V 33pF		
VR10	2012002931W	VARISTOR 9V 33pF		
VR11	2011001532W	VARISTOR 5.5V 33pF		
VR12	2011001532W	VARISTOR 5.5V 33pF		
VR13	2011001532W	VARISTOR 5.5V 33pF		
VR14	2011001532W	VARISTOR 5.5V 33pF		
VR15	2011001532W	VARISTOR 5.5V 33pF		
VR16	2011001532W	VARISTOR 5.5V 33pF		
VR17	2011001532W	VARISTOR 5.5V 33pF		
VR18	2011001532W	VARISTOR 5.5V 33pF		
VR19	2011001532W	VARISTOR 5.5V 33pF		
VR20	2011001532W	VARISTOR 5.5V 33pF		
VR21	2011001532W	VARISTOR 5.5V 33pF		
VR22	2011001532W	VARISTOR 5.5V 33pF		
VR23	2011001532W	VARISTOR 5.5V 33pF		
VR24	2011001532W	VARISTOR 5.5V 33pF		
VR30	2011001532W	VARISTOR 5.5V 33pF		
VR341	1760037502W	VARIABLE CAPACITOR		

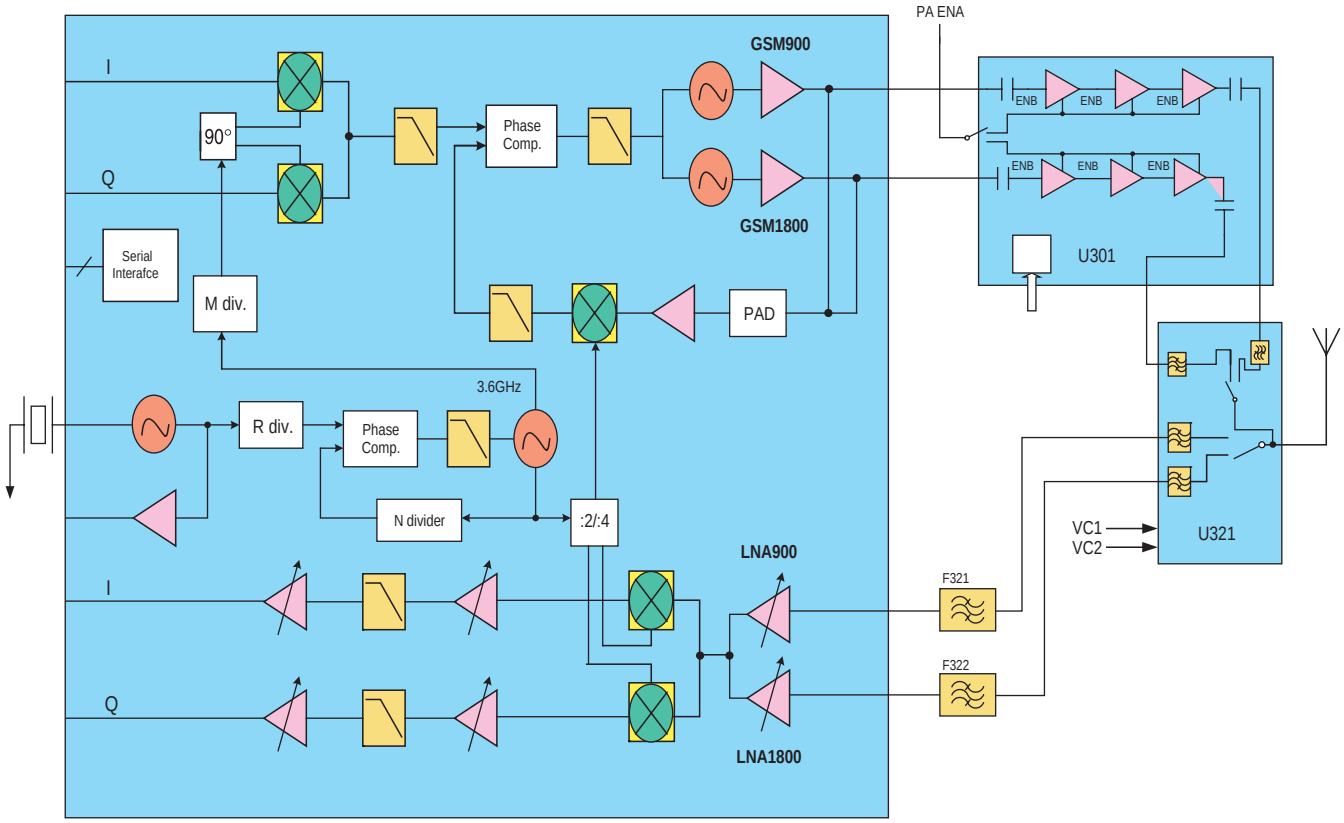
Ref. No.	Part No.	Part Name & Description	Grid

10. BLOCK DIAGRAMS

10.1. Baseband

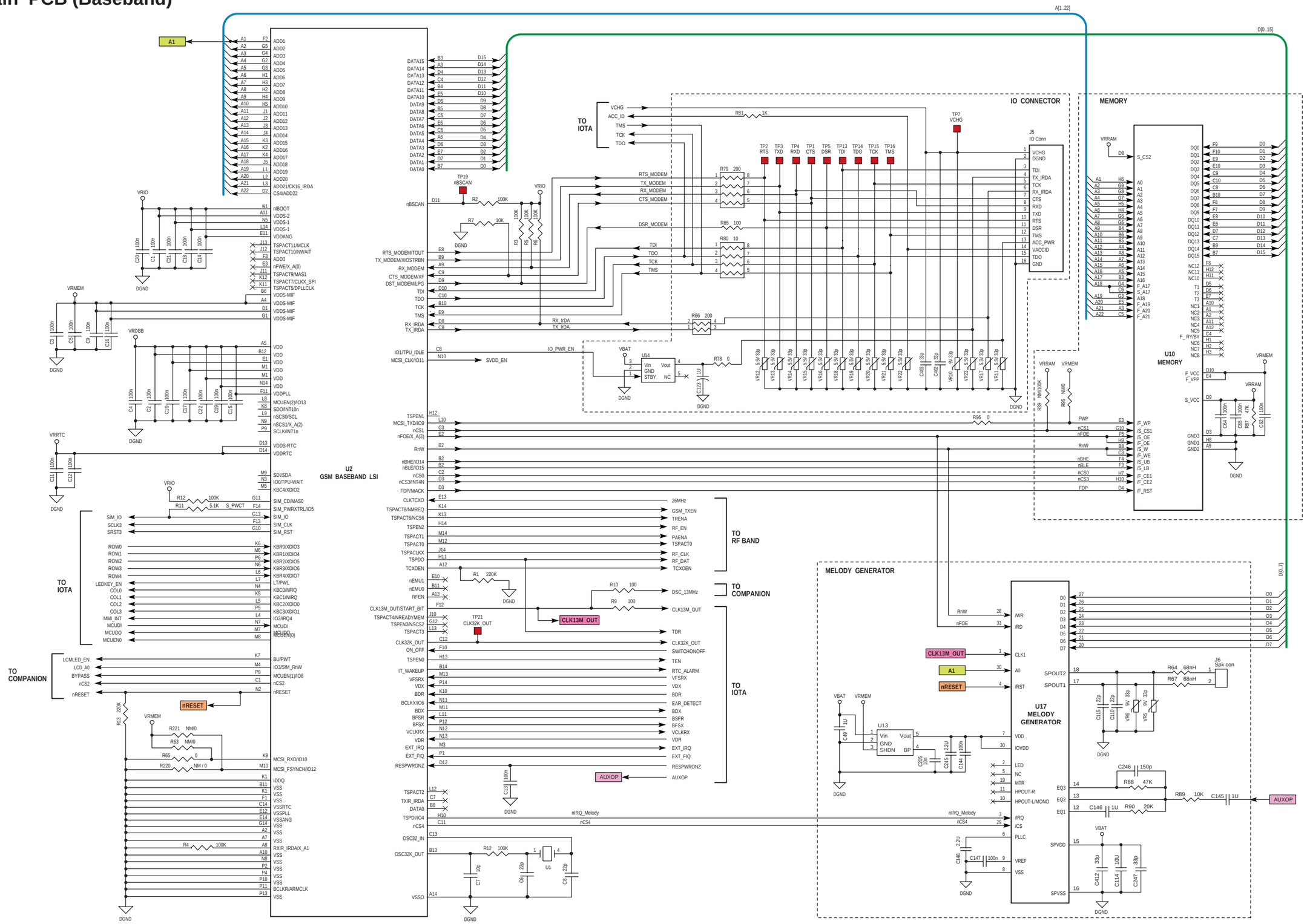


10.2. RF Band

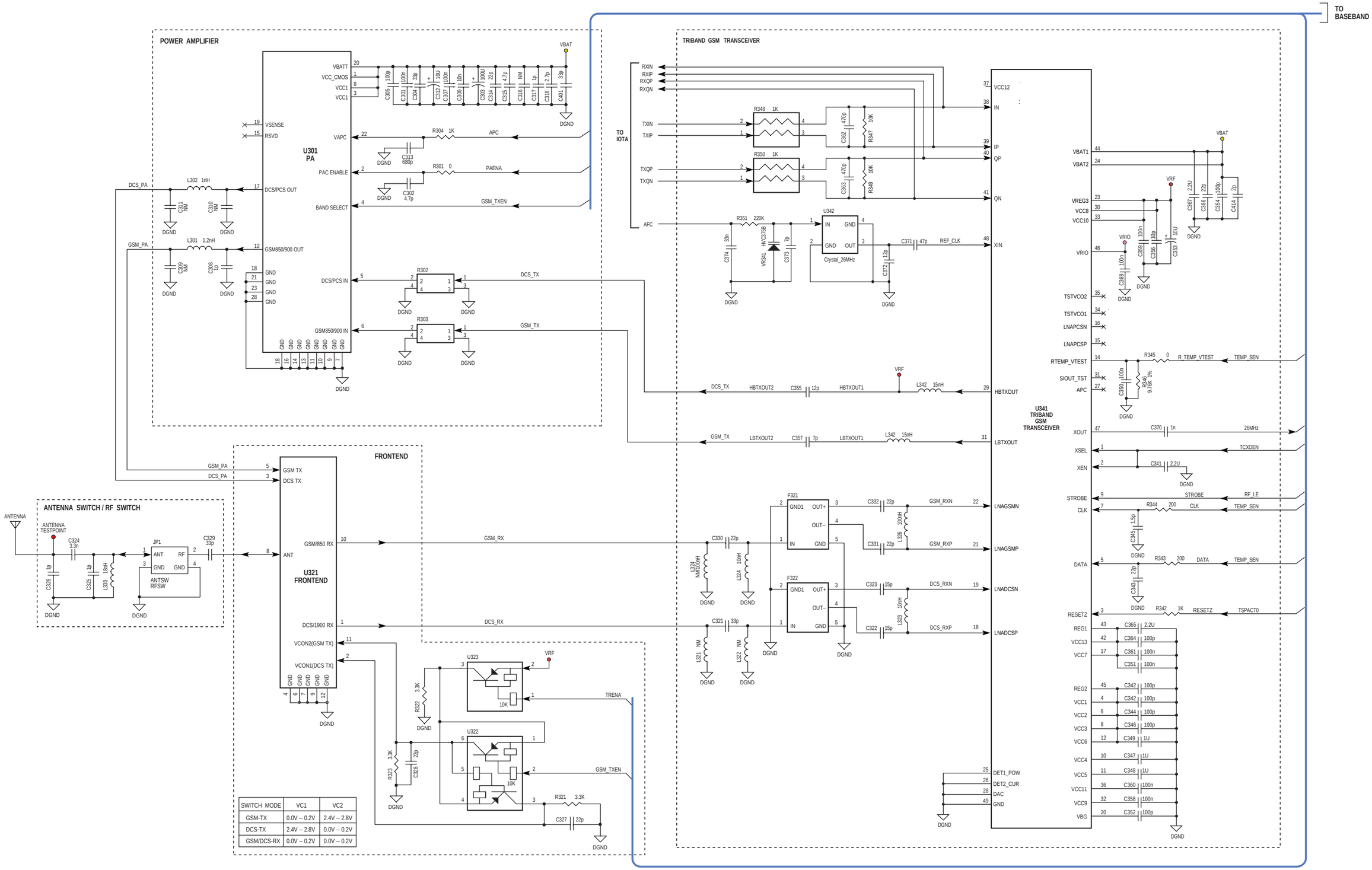

PA ENA
GSM900
GSM1800
I
Q
90°
Phase Comp.
Serial Interafce
M div.
PAD
ENB
ENB
ENB
ENB
ENB
ENB
U301
3.6GHz
R div.
Phase Comp.
N divider
:2/:4
LNA900
LNA1800
F321
F322
VC1
VC2
U321

11. CIRCUIT DIAGRAMS

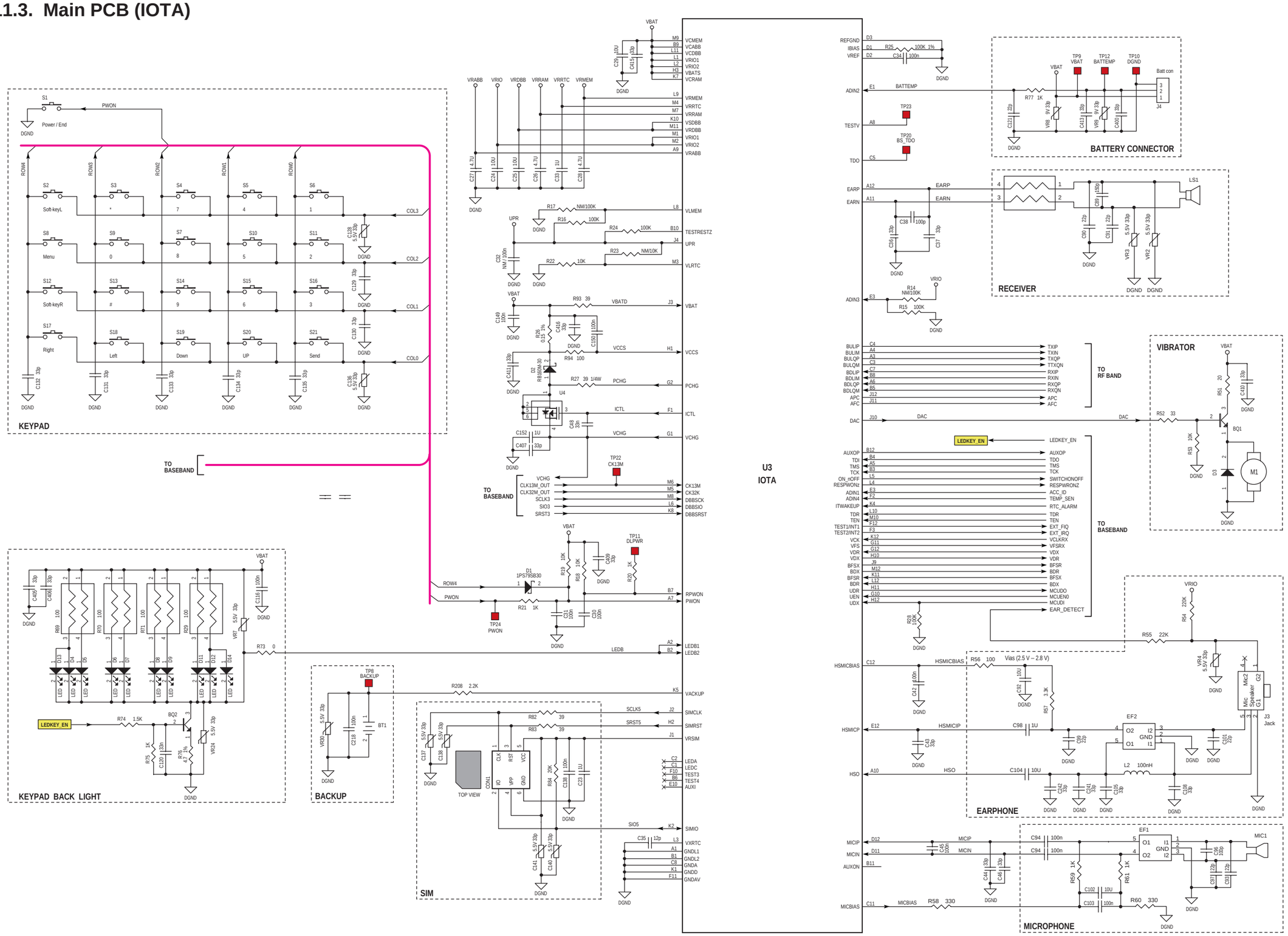
11.1. Main PCB (Baseband)



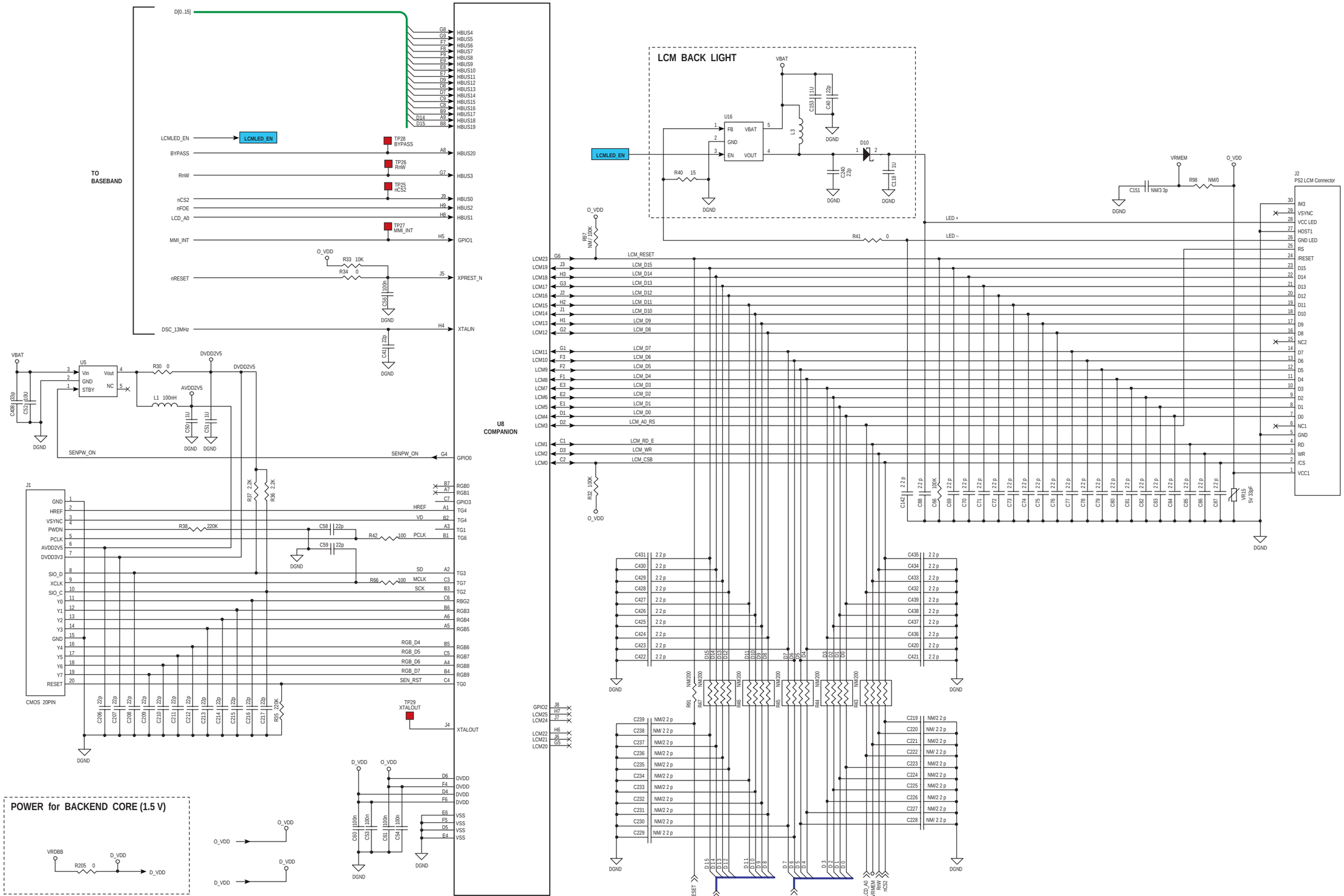
11.2. Main PCB (RF Band)



11.3. Main PCB (IOTA)

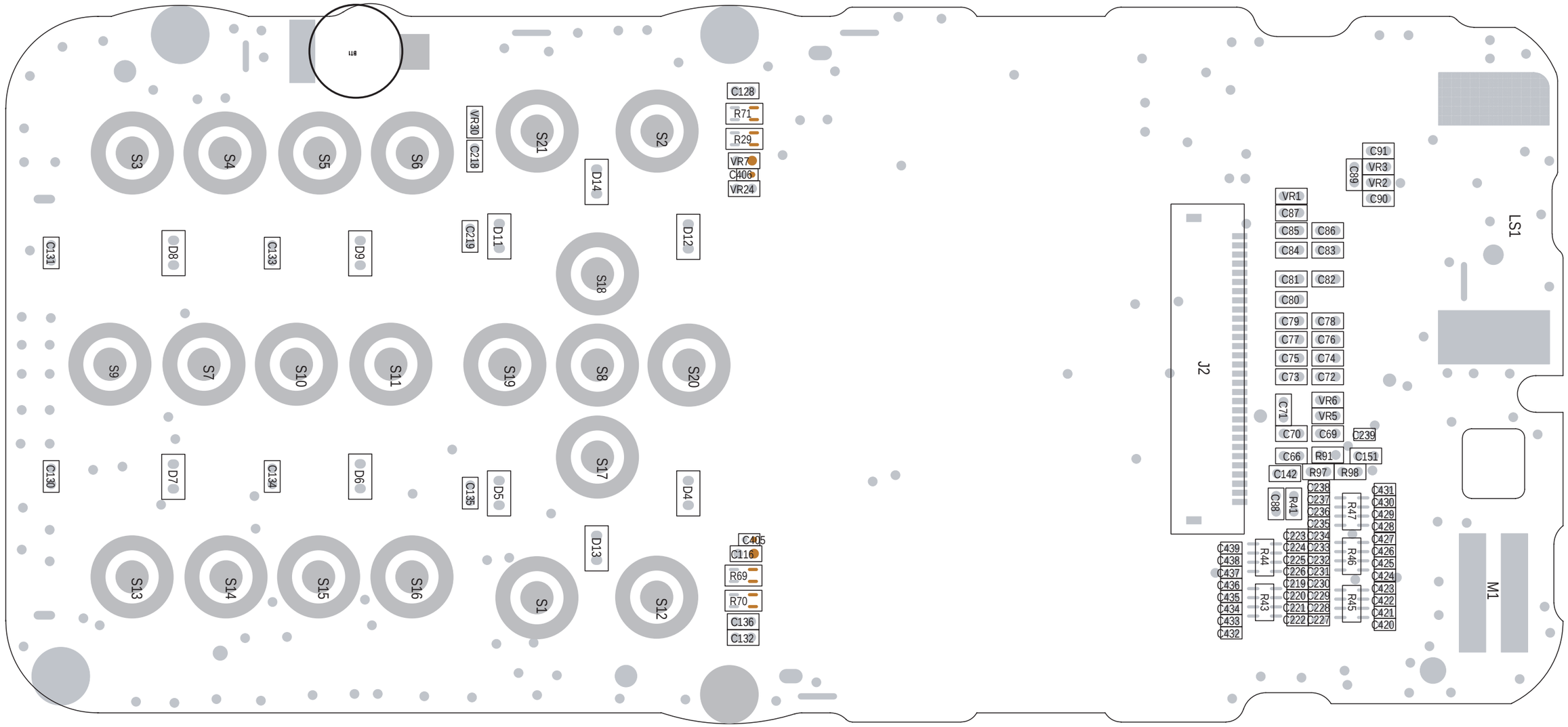


11.4. Main PCB (COMPANION)



12. LAYOUT DIAGRAMS

12.1. Main PCB (Top View)



12.2. Main PCB (Bottom View)