

Acer March(D66) Mobile Phone

Service Manual

**Acer Communications & Multimedia
Inc.
Wireless Business Unit**

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Preface

This service manual is for the customers who purchase of Acer **March** handset . It has several main parts of our handset that include hardware/software and simple disassembly/assembly procedure introduction. If you don' t understand some of these sections or any query about it please kindly use our service manual feedback form and send it back to our Customer Service Department and we' ll response your query as soon as possible.

Specifications

Table 1: Radio Frequency

Radio Frequency (900 MHz)	
Frequency Range	TX 880-915 MHz; RX 925-960 MHz
Channel Spacing	200 KHz
Number of Channels	174 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	45 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	33 dBm Class 4 (2 W peak)
Receiver Level	< -102 dBm (Wireless)
Radio Frequency (1800 MHz)	
Frequency Range	TX 1710-1785 MHz; RX 1805-1880 MHz
Channel Spacing	200 KHz
Number of Channels	374 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	95 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	30 dBm – 0 dBm
Receiver Level	< -102 dBm (Wireless)
Operating Temperature Range	-10 to +55 °C

Table 2: Voltage Operation

Voltage Operation	
Li-ion Battery	DC 3.3-4.2 V
Ni-MH Battery	DC 3.3-4.2 V

Table 3: Power Consumption

Power Consumption	
Working Current Average	< 270 mAH
Standby Current	6 +/-0.2 mAH
Talking Time*	120 ~300 min (With Ni-MH 550 mAH)
Standby Time*	50~120 hours (With Ni-MH 550 mAH)
DTX / DTR	Yes

Table 4: Appearance

Handset Appearance	
Dimensions	106 x 40 x 16 mm
Volume	68 c.c.
Handset Weight	99 g

Table 5: Basic Services

Tele Service	Telephony (Speech)
	Emergency Call
Short Message Service	Delivery Report
	Short Message Service MT/MO
	Cell Broadcast
Bearer Service	Data circuit duplex asynchronous up to 14400 bit/sec

Scope of Manual

This manual is intended for use by experienced technicians familiar with similar types of equipment. It is intended primarily to support electrical and mechanical repairs. Repairs not covered in the scope of this manual should be forwarded to Motorola's regional Cellular Subscriber Support Centers.

Theory of Operation

GSM System Description

General Cellular Concept

The cellular systems are used to provide radiotelephone service in the frequency range 890-960 MHz. A cellular system provides higher call handling capacity and system availability than would be possible with conventional radiotelephone systems (those which require total system area coverage on every operating channel) by dividing the system coverage area into several adjoining sub-areas or cells.

Each cell contains a base station (cell site) which provides transmitting and receiving facilities, for an allocated set of duplex frequency pairs (channels). Since each cell is a relatively small area, both the cell site and the radiotelephone that it supports can operate at lower power levels than would be used in conventional systems.

Using this technique, radiation on a given channel is virtually contained in the cell operating on that channel and, to some extent, those cells directly adjacent to that cell.

Since the coverage area of a cell on a given channel is limited to a small area (relative to the total system coverage area), a channel may be reused in another cell outside the coverage area of the first. By this means, several subscribers may operate within the same geographic area, without interference with each other, on a single channel.

GSM Description

Unlike previous cellular systems, GSM uses digital radio techniques. The GSM system has the following advantages over previous analogue systems:

◆ **International Roaming** - Due to international harmonization and standardization, it will be possible to make and receive calls in any country which supports a GSM system.

•• **Digital Air Interface** - The GSM phone will provide an entirely digital link between the telephone and the base station, which is, in turn, digitally linked into the switching subsystems and on into the PSTN.

◆ **ISDN Compatibility** - ISDN is a digital communications standard that many countries are committed to implementing. It is designed to carry digital voice and data over existing copper telephone cables. The GSM phone will be able to offer similar features to the ISDN telephone.

◆ **Security and Confidentiality**– Telephone calls on analogue systems can very easily be overheard by the use of a suitable radio receiver. GSM offers vastly improved confidentiality because of the way in which data is digitally encrypted and transmitted.

◆ **Better Call Quality** - Co-channel interference, handover breaks, and fading will be dealt with more effectively in the digital system. The call quality is also enhanced by error correction, which reconstructs lost information.

◆ **Efficiency** - The GSM system will be able to use spectral resources in a much more efficient way than previous analogue

Systems

In the figure below, the area bounded by bold lines represents the total coverage area of a hypothetical system. This area is divided into several cells, each containing a cell site (base station) operating on a given set of channels which interfaces radiotele- phone subscribers to the telephone switching system.

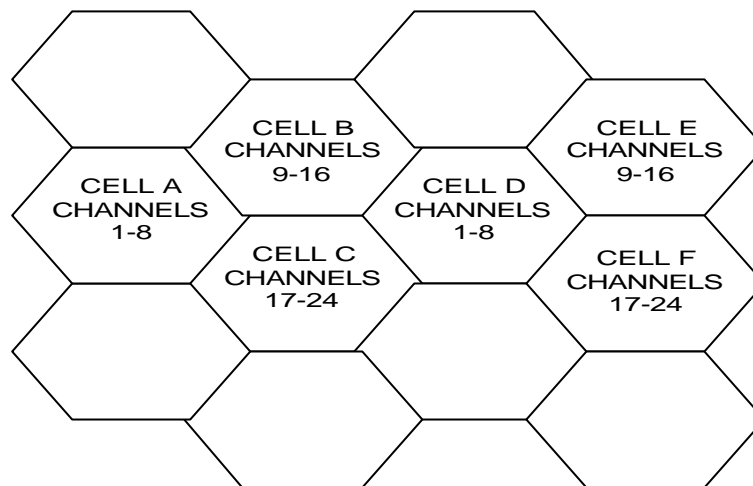


Figure 2: Hypothetical

The radiotelephones themselves are capable of operation on any channel in the system, allowing them to operate in any cell. Due to the low power requirements for communications between radiotelephones in a particular cell and the cell site, operating channels may be repeated in cells which are outside the coverage area of each other.

For example, presume that cell A operates on channels arbitrarily numbered 1 through 8, cell B operates on channels 9 through 16, cell C operates on channels 17 through 24 and cell D operates on channels 1 through 8 (repeating the usage of those channels used by cell A). In this system, subscribers in cell A and subscribers in cell D could simultaneously operate on channels 1 through 8.

The implementation of frequency re-use increases the call handling capability of the system, without increasing the number of available channels. When re-using identical frequencies in a small area, co-channel interference can be a problem. The GSM system can tolerate higher levels of co-channel interference than analogue systems, by incorporating digital modulation, forward error correction and equalization. This means that cells using identical frequencies can be physically closer, than similar cells in analogue systems. Therefore the advantage of frequency re-use can be further enhanced in a GSM system, allowing greater traffic handling in high use areas.

By incorporating Time Division Multiple Access (TDMA) several calls can share the same carrier. The carrier is divided into a continuous stream of TDMA frames, each frame is split into eight time slots. When a connection is required the system allocates the subscriber a dedicated time slot within each TDMA frame. User data (speech/data) for transmission is digitized and sectioned into blocks. The user data blocks are sent as information bursts in the allocated time slot of each TDMA frame.

The data blocks are modulated onto the carrier using Gaussian Minimum Shift Keying (GMSK), a very efficient method of phase modulation.

Each time an information burst is transmitted, it may be transmitted on a different frequency. This process is known as frequency hopping. Frequency hopping reduces the effects of fading, and enhances the security and confidentiality of the link. A GSM radiotelephone is only required to transmit for one burst in each frame, and not continually, thus enabling the unit to be more power efficient.

Each radiotelephone must be able to move from one cell to another, with minimal inconvenience to the user. The mobile itself carries out signal strength measurements on adjacent cells, and the quality of the traffic channel is measured by both the mobile and the base station. The handover criteria can thus be much more accurately determined, and the handover made before the channel quality deteriorates to the point that the subscriber notices.

When a radiotelephone is well within a cell, the signal strength measured will be high. As the radiotelephone moves towards the edge of the cell, the signal strength and quality measurement decreases.

Signal information provides an indication of the subscriber's distance from the base station. As the radiotelephone moves from cell to cell, its control is handed from one base station to another in the new cell.

This change is handled by the radiotele-phone and base stations, and is completely transparent to the user.

Service Area

The area within which calls can be placed and received is defined by the system operators. (Because this is a radio system, there is no exact boundary that can be drawn on a map.) If the telephone is outside a coverage area, the (no service) indicator will illuminate and calls will be unable to be placed or received. If this happens during a conversation, the call will be lost. There may also be small areas within a particular service area where communications may be lost.

The radiotelephone's identity information is held by its local GSM system in its Home Location Register (HLR) and Visitor Location Register (VLR). The VLR contains identity information on all local active radiotelephones. Should you roam to another area, system or country the radiotelephone's identity information is sent to the VLR in the new system. The new system will then check the radiotelephone's details with your home system for authenticity. If everything is in order it will be possible to initiate and receive calls whilst in the new area.

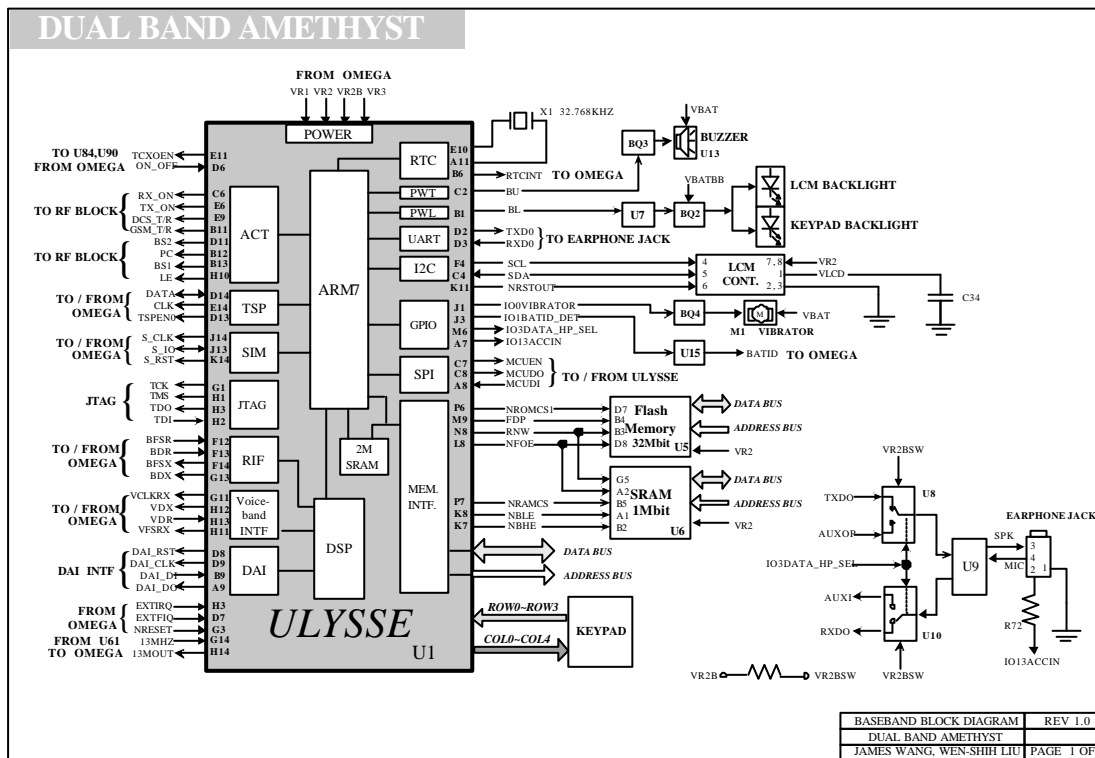
Baseband function Descriptions

1. Introduction:

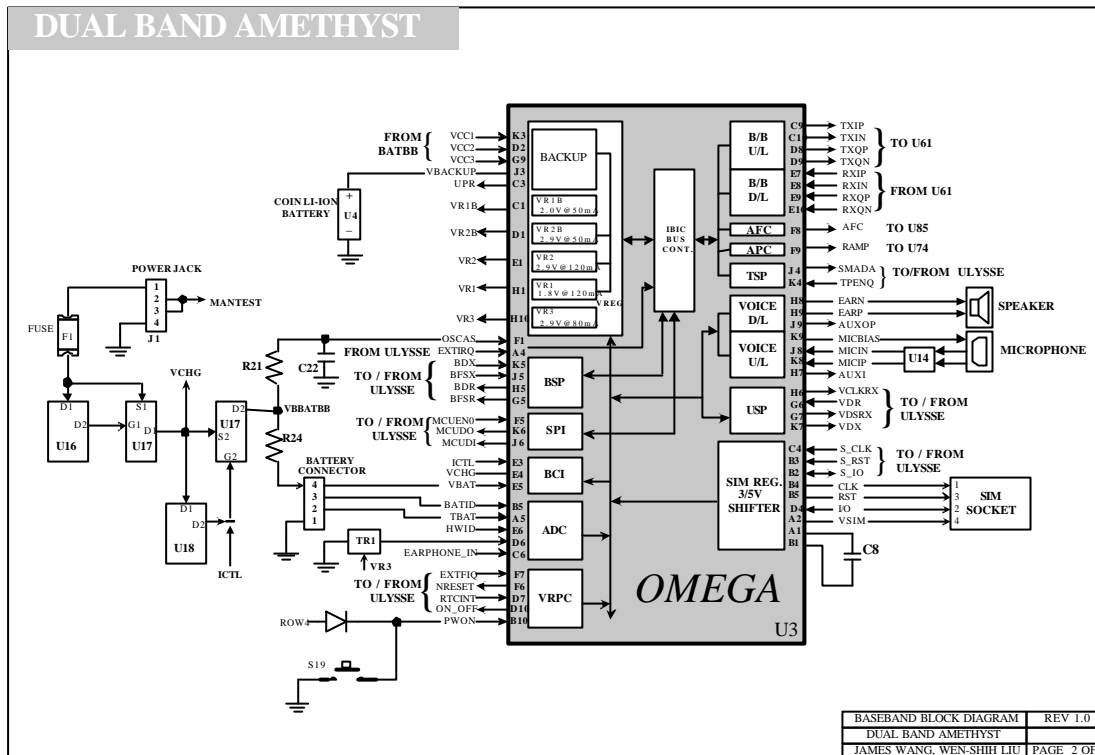
March(T191) utilizes TI' s chipsets (Ulysse and Nausica) as base-band solution. Base-band is composed with two potions: Logic and Analog/Codec. Ulysse is a GSM digital base-band logic solution included microprocessor, DSP, and peripherals. Nausica is a combination of analog/codec solution and power management which contain base-band codec, voice-band codec, several voltage regulators and SIM level shifter etc. In addition, 56D66 integrates with other features such as LED backlight, LCD display, vibration, buzzer and charging etc. The following sections will present the operation theory with circuitry and descriptions respectively.

2. Block Diagram

2.1 Ulysse (Hercules)



2.2 Nausica (Omega)



3. Theory:

3.1 Ulysse

ULYSSE (HERCROM200) is a chip implementing the digital base-band processor of a GSM mobile phone. This chip combines a DSP M16L80 mega-module (LEAD2 CPU) with its program and data memories, a Micro-Controller core with emulation facilities (ARM7TDMIE) and an internal 2M-bit RAM memory, a clock squarer cell, several compiled single-port or 2-ports RAM and 120K equivalent CMOS gates.

Major functions of this chip are as follows:

3.1.1 Real Time Clock (RTC)

3.1.2 Pulse Width Tones (PWT)

The function of the PWT is to generate a modulated frequency signal for the external buzzer.

3.1.3 Pulse Width Light (PWL)

This module allows the control of the backlight of LCD and keypad by employing a 4096 bit random sequence.

3.1.4 MODEM-UART

3.1.5 I2C master serial interface (I2C)

In 56D66, we employ I2C bus to control LCD module.

I2C_SCL: programmed to the fast transmission mode (400KHz)

I2C_SDA: the serial bi-directional data of the LCM controller

3.1.6 General Purposes I/O (GPIO)

Ulysse provides 16 GPIOs configurable in read or write mode by internal registers. In 56D66, we utilize 5 of them as follows:

I00 : to control vibrator; ' L ' : idle, ' H ' : activate vibrator

I01 : to identify legal NiMH battery

I03 : to control phone jack configuration; ' L ' : data cable, ' H ' : hands-free

I08 : to support one-wire protocol for Li-Ion battery

I013 : to detect accessory plug-in at phone jack; ' H ' : idle, ' L ' : plug-in

3.1.7 Serial Port Interface (SPI)

3.1.8 Memory Interface and internal Static RAM

A 2Mbit SRAM is embedded on the die and memory mapped on the chip-select CS6 of the memory interface.

3.1.9 SIM Interface

3.1.10 JTAG

3.1.11 Time Serial Port (TSP)

3.1.12 TSP Parallel interface (ACT)

In 56D66, we employ 8 of them to control RF activity.

TSPACT1: Band selection 1 (BS1)

TSPACT2: Power control enable (PC)

TSPACT3: Band selection 2 (BS2)

TSPACT4: GSM TR switch on/off (GSM_TR)

TSPACT5: DCS TR switch on/off (DCS_TR)

TSPACT8: RX VCO on/off (RX_ON)

TSPACT9: TX VCO on/off (TX_ON)

TSPACT10: Latch enable (LE)

3.1.13 Radio Interface (RIF)

3.2 Nausica (Omega)

Together with a digital base-band device (Ulysse), OMEGA is part of a TI DSP solution intended for digital cellular telephone applications including GSM 900, DCS 1800 and PCS 1900 standards (dual band capability).

It includes a complete set of base-band functions to perform the

interface and processing of voice signals, base-band in-phase (I) and quadrature (Q) signals which support single-slot and multi-slot mode, associated auxiliary RF control features, supply voltage regulation, battery charging control and switch ON/OFF system analysis.

OMEGA interfaces with the digital base-band device through a set of digital interfaces dedicated to the main functions of Ulysse, a base-band serial port (BSP) and a voice-band serial port (VSP) to communicate with the DSP core (LEAD), a micro-controller serial port to communicate with the micro-controller core and a time serial port (TSP) to communicate with the time processing unit (TPU) for real time control.

OMEGA includes also on chip voltage reference, under voltage detection and power-on reset circuits.

Major functions of this chip are as follows:

- 3.2.1 Baseband Codec (BBC)**
- 3.2.2 Automatic Frequency control (AFC)**
- 3.2.3 Automatic Power Control (APC)**
- 3.2.4 Time serial port (TSP)**
- 3.2.5 Voice band Codec (VBC)**
- 3.2.6 Micro-controller serial port (USP)**
- 3.2.7 SIM card shifters (SIMS)**
- 3.2.8 Voltage Regulation (VREG)**

Linear-regulation performed by several low dropout (LDO) regulators to supply analog and digital baseband circuits.

- (1) LDO R1 generates the supply voltage (2.5V, 1.8V, 1.4V and 1.2V) for the digital core of Ulysse. In 56D66, it is programmed to 1.8V. This regulator takes power from the battery voltage and it has a backup through BBS system.
- (2) LDO R1B generates the supply voltage 2.0V for the digital core of OMEGA. It is supplied by the battery.
- (3) LDO R2B generates the supply voltage 2.9V for the digital I/O' s of Ulysse and Omega. It is supplied from battery voltage and has a backup through BBS system.
- (4) LDO R2 generates the supply voltages 2.9V for Ulysse memory interfaces I/O' s. It has a backup through BBS system.
- (5) LDO R3 generates the supply voltage 2.9V for the analog

functions of OMEGA.

The backup battery switch (BBS) generates at its output an uninterrupted power rail (UPR) of which purpose is to supply continuously the minimum necessary circuitry of the power-control functions either from the main battery or from the backup battery

3.2.9 Baseband Serial Port (BSP)

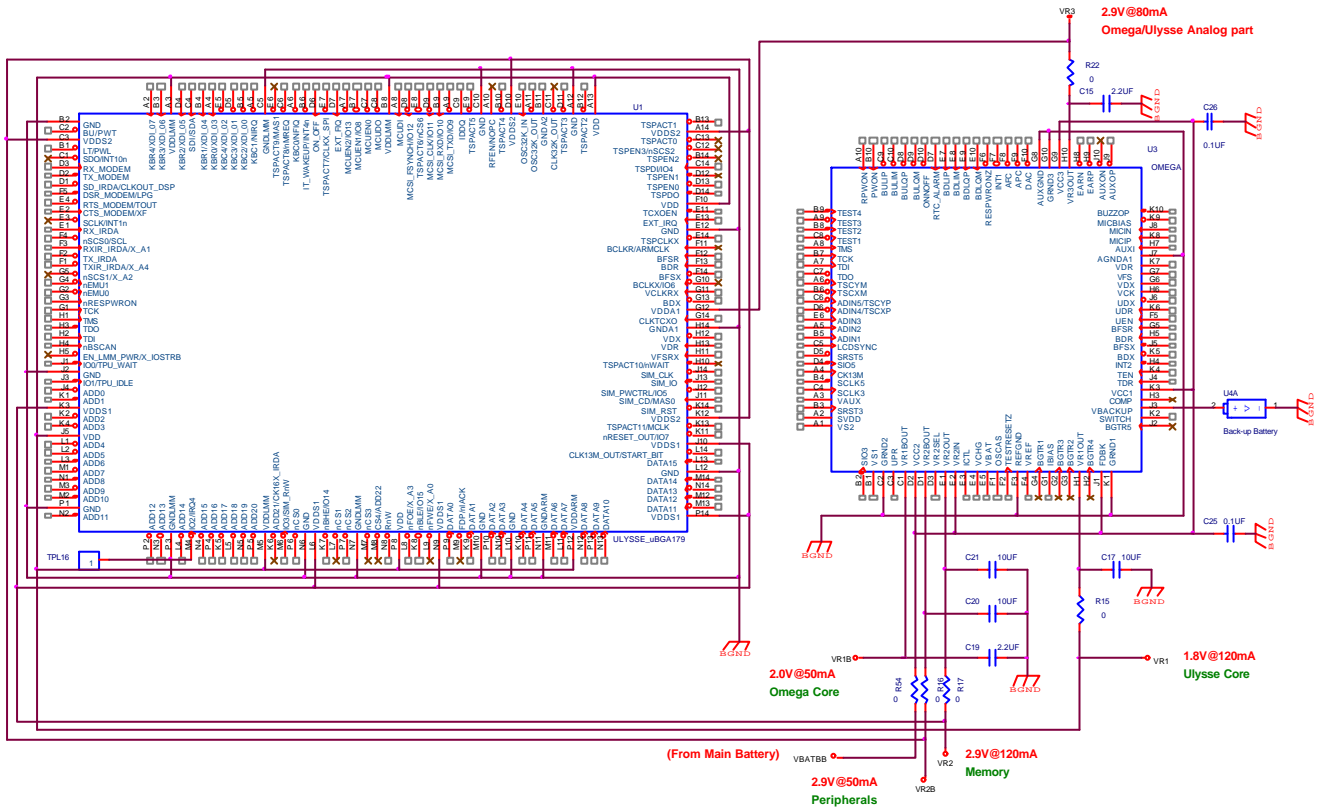
3.2.10 Battery charger Interface (BCI)

3.2.11 Monitoring ADC (MADC)

3.2.12 Reference Voltage / Power on Control (VRPC)

3.2.13 Internal bus and interrupt controller (IBIC)

3.3 Power Supply circuit



The phone is mainly supplied from the main battery (VBAT) which is divided into two routes: VBAT is for RF block, vibrator and buzzer; VBATBB is for baseband block.

The input power (VBATBB) to Nausica is divided into 4 blocks:
 VCC1: to provide power for DC/DC and regulator R1 (VR1)
 VCC2: to provide power for regulator R1B (VR1B), R2B (VR2B) and charger pump
 VCC3: to provide power for regulator R3 (VR3)

VR2IN: to provide power for regulator R2 (VR2)

NAUSICA provides five low drop-out voltage regulators.

R1 (VR1): 1.8V@50mA; to supply ULYSSE digital core, RTC, 32KHz and the internal SRAM

R2 (VR2): 2.9V@120mA; to supply 13MHz clock, external memory devices and LCD display

R2B (VR2B):2.9V@50mA; to supply peripheral devices, I/O to NAUSICA

R1B (VR1B):2.0V@50mA; to supply the digital part of NAUSICA

R3 (VR3): 2.9V@80mA; to supply analog part of NAUSICA.

Among these 5 LDOs, only R1, R2 and R2B are support with back-up mode.

The power of Ulysse is supplied by these LDOs:

VDD: supplied by VR1 and used for core logic

VDDS1: supplied by VR2 and used for I/Os to memory devices

VDDS2: supplied by VR2B and used for I/Os to Omega and peripherals

VDDLMM: supplied by VR1 and used for Lead MegaModule (DSP)

VDDARM: supplied by VR1 and used for ARM

3.4 System power on/off Sequence

3.4.1 Power on

There are three conditions that system can power on.

- On button pushed: A falling edge is detected on PWON pin and the debouncing time is greater than 30ms.
- Set Alarm: A rising edge is detected on RTC_ALARM (RTCINT)
- Charger plugged: $V_{CHG} > V_{BAT} + 0.4V$ is detected

When these conditions occur in the power on state, the hardware power on sequence starts:

1. Enable local oscillator OSCAS (~ 100KHz)
2. Enable band-gap (VREF and IREF)
3. Check if Main Battery voltage is greater than 3.2V
4. Enable charge pump (VAUX ~ 5.8V)
5. Enable LDO regulators (R1, R1B, R2, R2B and R3)
6. Set ON_OFF pin to ' H' .
7. NRESET pin is set from ' L' to ' H'
8. 13MHz clock oscillator is enabled (Ulysse' s task)

3.4.2 Power off in normal mode

When system is powered off in normal mode by long pressing power-on key, the power off sequence will be executed:

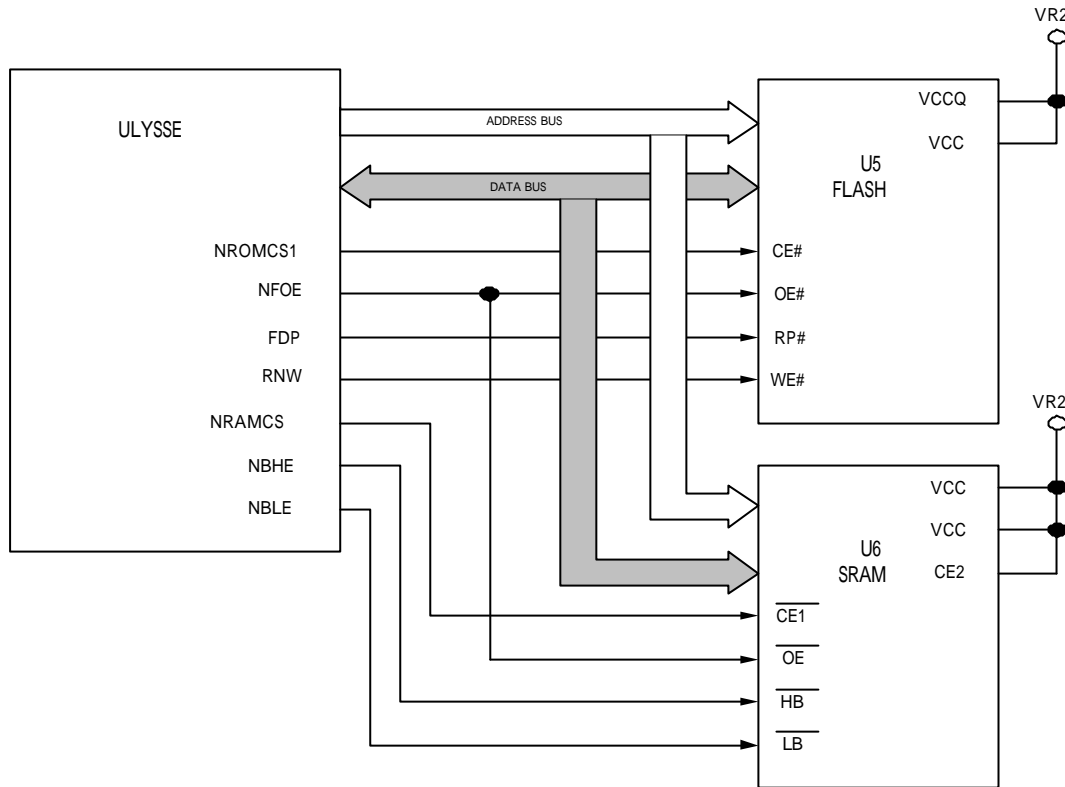
1. Start watchdog timer during 150us and disable DC/DC
2. Set ON_OFF pin to ' L'
3. Disable all the regulators
4. Disable the band-gap
5. Disable the local oscillator OSCAS

3.4.3 Power off in emergency mode

When the main battery voltage is detected lower than 2.7V, the following sequence is executed:

1. Set INT1 (FIQ) to ' L'
2. Start watchdog timer during 150us and disable DC/DC
3. Set ON_OFF pin to ' L'
4. Disable all the regulators
5. Disable the band-gap
6. Disable the local oscillator OSCAS

3.5 Memory circuit

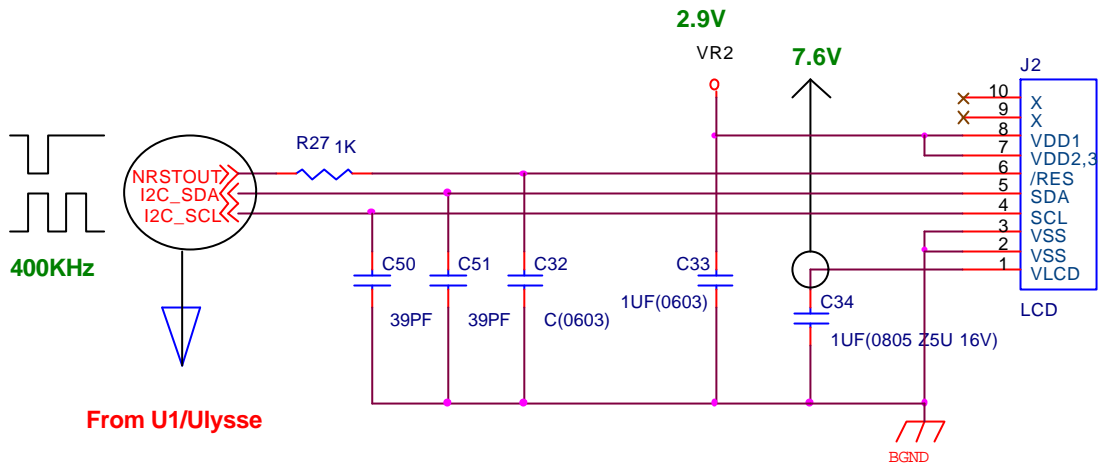


Description

Flash (U5) is a 32Mbit device, supported by VR2 and booted from top. The total 32Mbits are divided into two sections: 24Mbits is used for software program code and 8Mbits is used for EEPROM data. The access time of Flash is 100ns.

SRAM (U6) is a 1Mbit device, supported by VR2. The access time of SRAM is 70ns.

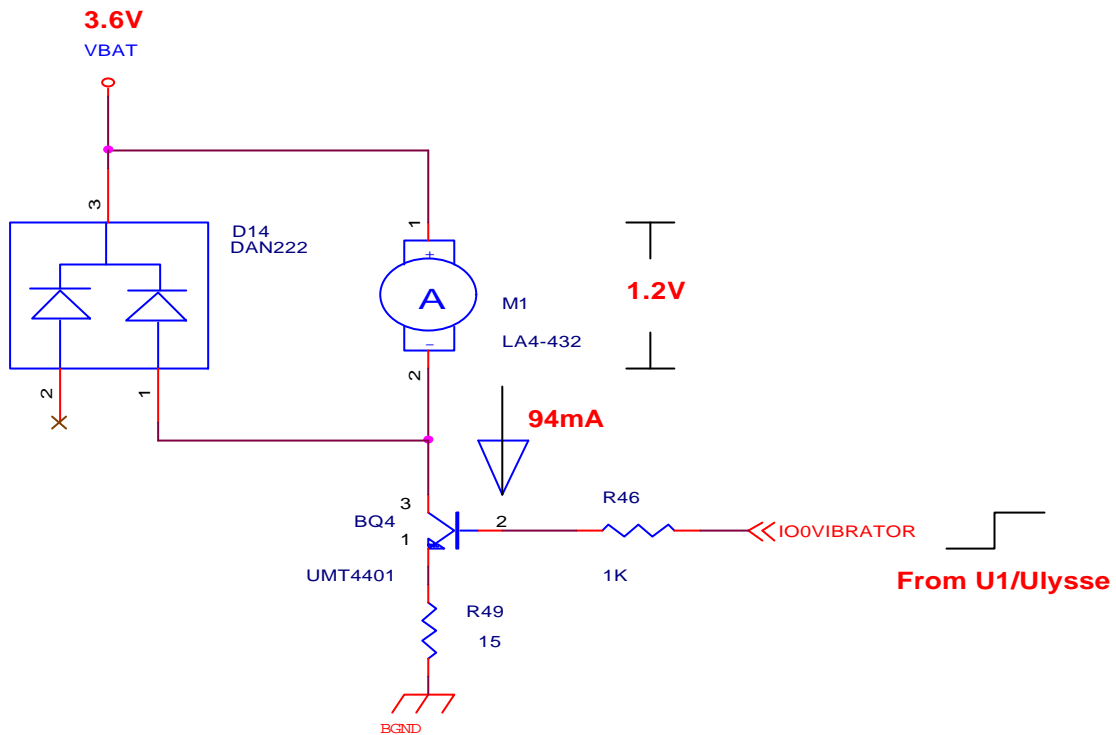
3.6 Display circuit



Description

Display circuit is composed of a 98*64 resolution LCD module and a display supply voltage bypass capacitor C34. The power of LCDM is supplied from VR2. It is controlled by U1 via I2C bus: SCL and SDA. The data rate of I2C is programmed to 400KHz. NRESTOUT is low active to reset all LCD registers. The LCD Module is adopted with COG (chip on glass) type, and default display supply voltage VLCD at normal temperature is 7.6V. R27 is used for ESD protection and C50, C51 are used for radiation suppression.

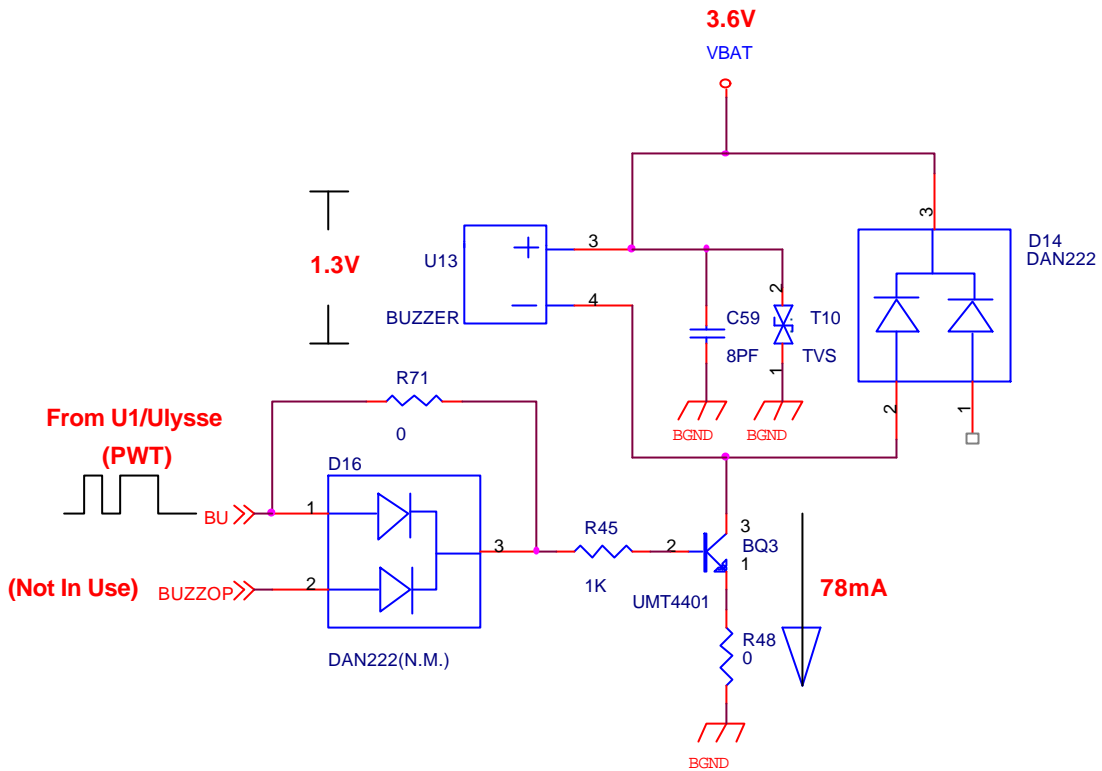
3.7 Vibrator circuit



Description

To enable vibration, Ulysse sets IO0VIBRATOR to 'H' to activate the motor. R46 and R49 are used to make BQ4 working in saturation area. D14 is used to feedback EMF. Under the condition of VBAT = 3.6V, the average voltage across the motor is about 1.2V and drain current is around 94mA.

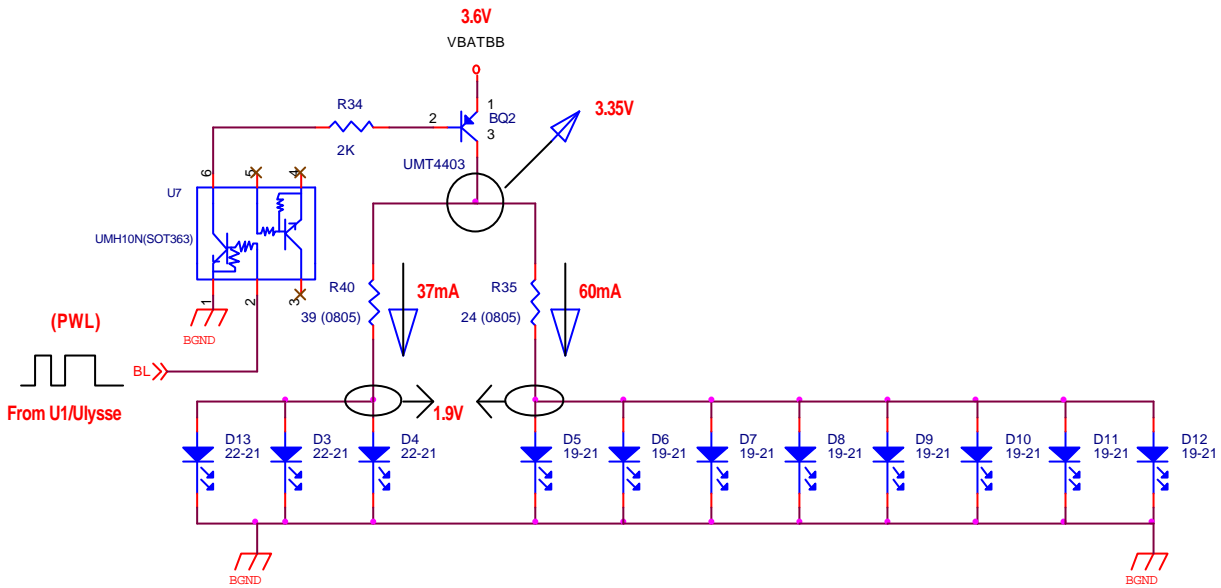
3.8 Buzzer circuit



Description

To alert the buzzer, Ulysse applies PWT (Pulse Width Tone) signal at BU to drive the buzzer. R45 and R48 are used to make BQ3 working in saturation mode. D14 is used to feedback EMF. Under the condition of VBAT = 3.6V, the average current is 78mA and terminal voltage of buzzer is about 1.3V.

3.9 LED circuit

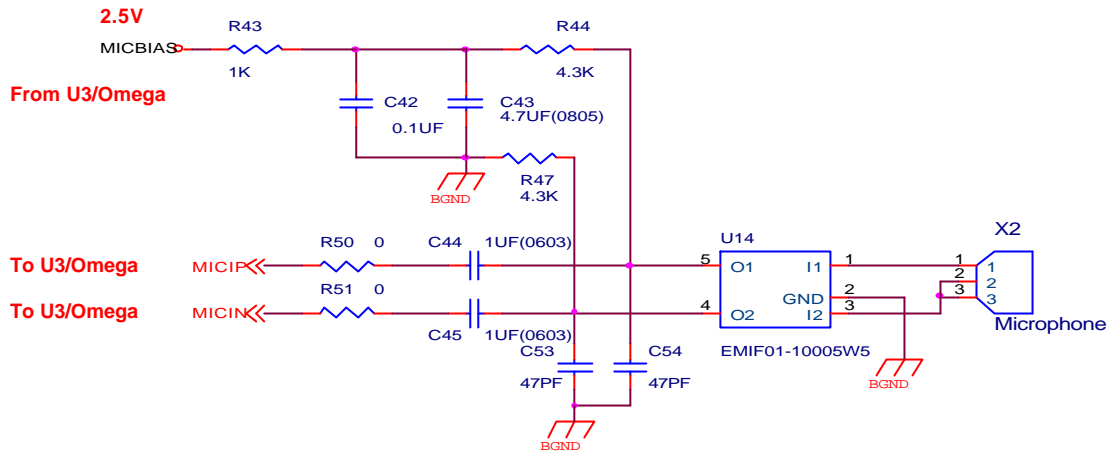


Description

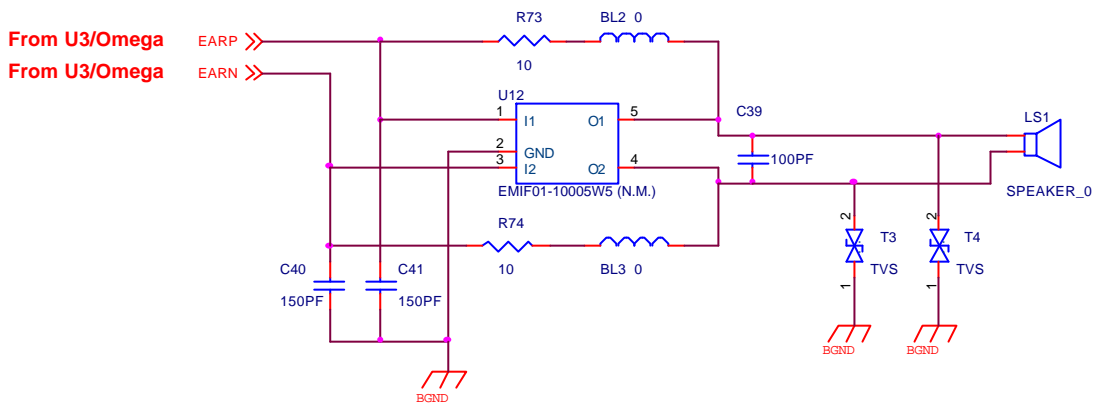
56D66 employs three LEDs for LCD module backlight and eight LEDs for keypad backlight. To light up the LEDs, Ulysse applies PWL (Pulse Width Light) at BL to drive LEDs. U7 is used as an inverter to enable BQ2. Under the default condition ($V_{BAT}=3.6V$), the average current of one LCD backlight LED is about 12mA and of one keypad backlight LED is about 7.5mA. In 56D66, all the LEDs are yellow-green color and forward voltage is 1.9V

3.10 Audio circuit

Uplink:



Downlink:



Description

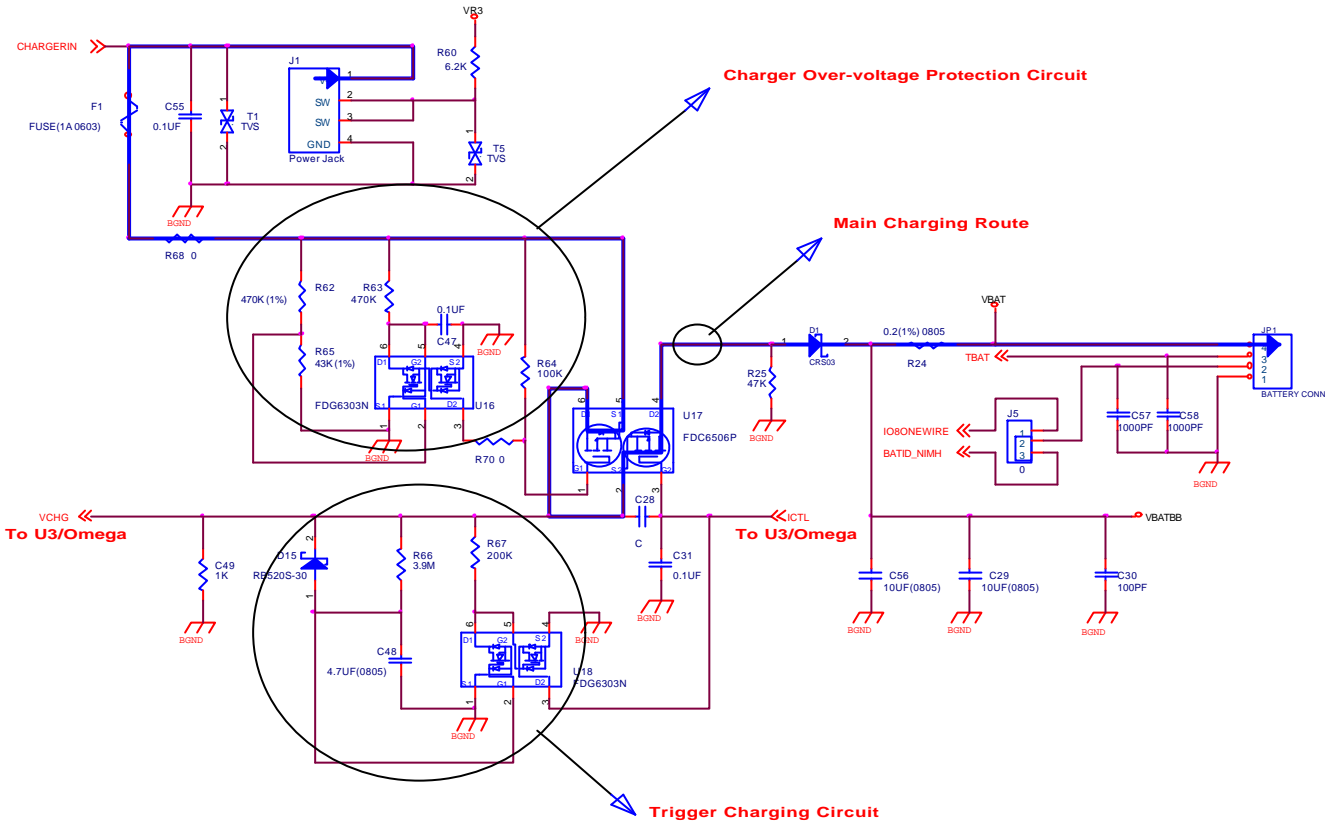
The audio circuit is divided into two parts, **uplink** and **downlink**.

For uplink path, the analog voice signals are fed into NAUSICA from the microphone differential input and then transmitted to Ulysse DSP via the voice-band series port (VSP). After being modulated, the signals go through the uplink I/Q path to the RF transceiver and transmitted from the antenna.

The microphone circuit is biased from Nausica MICBIAS (2.5V). The bias circuit R43, R44, R47 mainly provides the optimal operation point for the microphone signals, MICP and MICN.

For downlink path, the signals received from the antenna are down-converted to I/Q signals and then transmitted to Ulysse DSP. After being demodulated, the signals are fed to NAUSICA via voice-band interface and then amplified to drive the receiver.

3.11 Charging circuit



Description

The charging circuit of 56D66 is composed of charger over-voltage protection circuit, 3-sec trigger charging circuit and main charging circuit that are controlled by Omega (U3). 56D66's charging devices are standard linear 3.6V/600mA charger and switching VPA (cigarette charger) with 6V/400mA output.

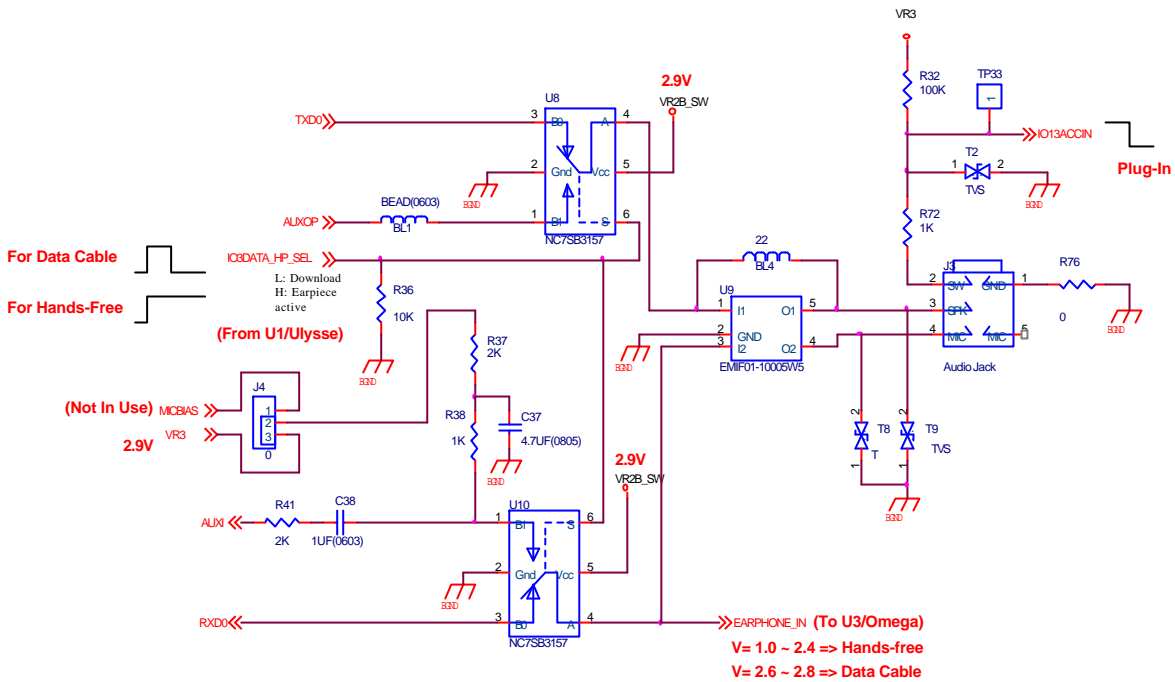
The group of R62, R65, R63 R64, R70, C47 and U16 compose the charger over-voltage protection circuit. The cut-off voltage is 8V. While the charger voltage is over 8V, the circuit will turn off U17 by latching U17.G1 to stop charging.

The group of D15, R66, C48, R67 and U18 compose the 3-sec trigger charging circuit. At the very beginning of charging, the circuit will force to turn on U17 to full charge the battery which can prevent from long charging wake-up for deep discharge battery. After around 3 seconds, software will take over the charging task by controlling ICTL. F1 is a 1A fuse to assure charging current under limit.

The normal charging operation theory is that Omega monitors charger voltage via VCHG pin to decide whether charger plug in or out,

and control power P-MOSFET (U17) via ICTL pin. If phone enters into charging mode, Ulysse will follow the charging algorithm to control charging circuit and monitor charging current by detecting the terminal voltage of R24 (0.2 ohm). Omega control procedure is classified into two parts according to whether battery voltage is higher than 3.2V. Omega will execute trickle charge with 20mA to charge battery via VCHG pin if battery voltage is lower than 3.2V. On the other hand, the phone will proceed normal charging task following by the charging algorithm.

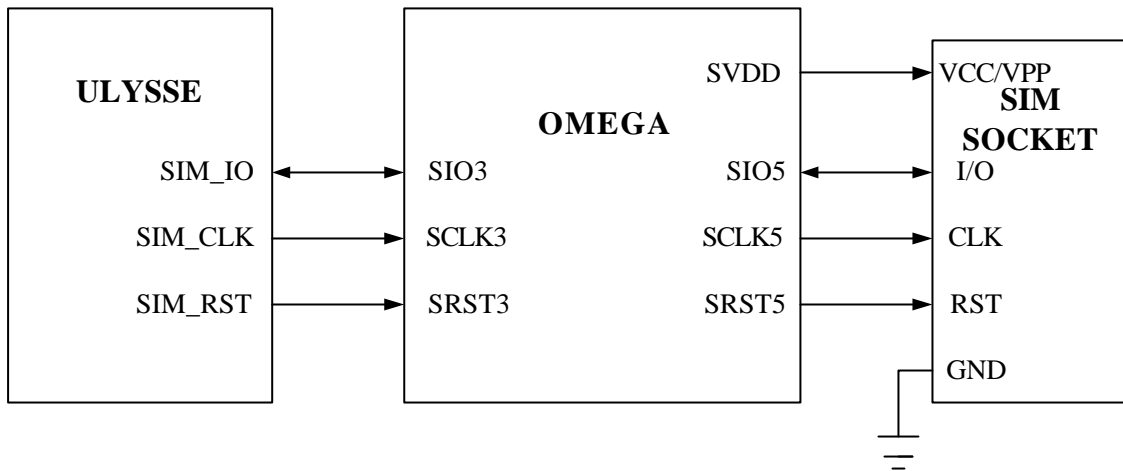
3.12 Earphone jack circuit



Description

The earphone Jack circuit is used either for the headset or the data service. The IO13ACCIN will be pulled to low level when headset or data cable is plugged in. Here, U8 and U10 are used as the switch between headset using or data service using which is controlled by the IO3DATA_HP_SEL. When IO13ACCIN is detected as low level, IO3DATA_HP_SEL is switched from low to high level to identify whether the headset or the data cable is plug-in by reading the voltage at EARPHONE_IN. If the voltage at EARPHONE_IN is in the range of 1.0V to 2.4V, the phone recognizes headset is plugged in and IO3DATA_HP_SEL stays at high to keep U8 and U10 as auxiliary audio path. If the voltage at EARPHONE_IN is in the range of 2.6V to 2.8V, the phone identifies data cable plugged in and IO IO3DATA_HP_SEL switches back to low to keep U8 and U10 as data service path.

3.13 Rader circuit



Description

The SIM follows the GSM and ISO specifications and works in 3 volts or in 5 volts with a minimum external logic.

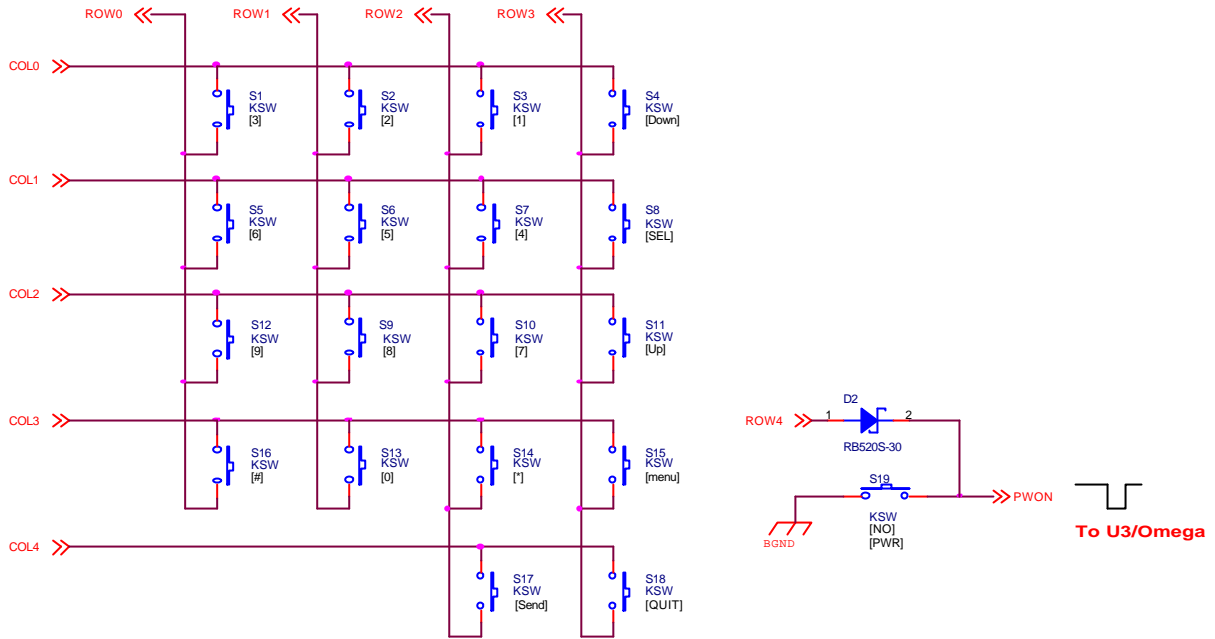
SIM_IO(I/O): Data

SIM_RST(O): Reset signal

SIM_CLK(O): Clock (1.6MHz/3.2MHz)

The SIM card digital interface insures the translation of logic levels between ULYSSE and SIM card. There is a level shifter embedded in Omega to support 5V SIM card.

3.14 Keyboard circuit



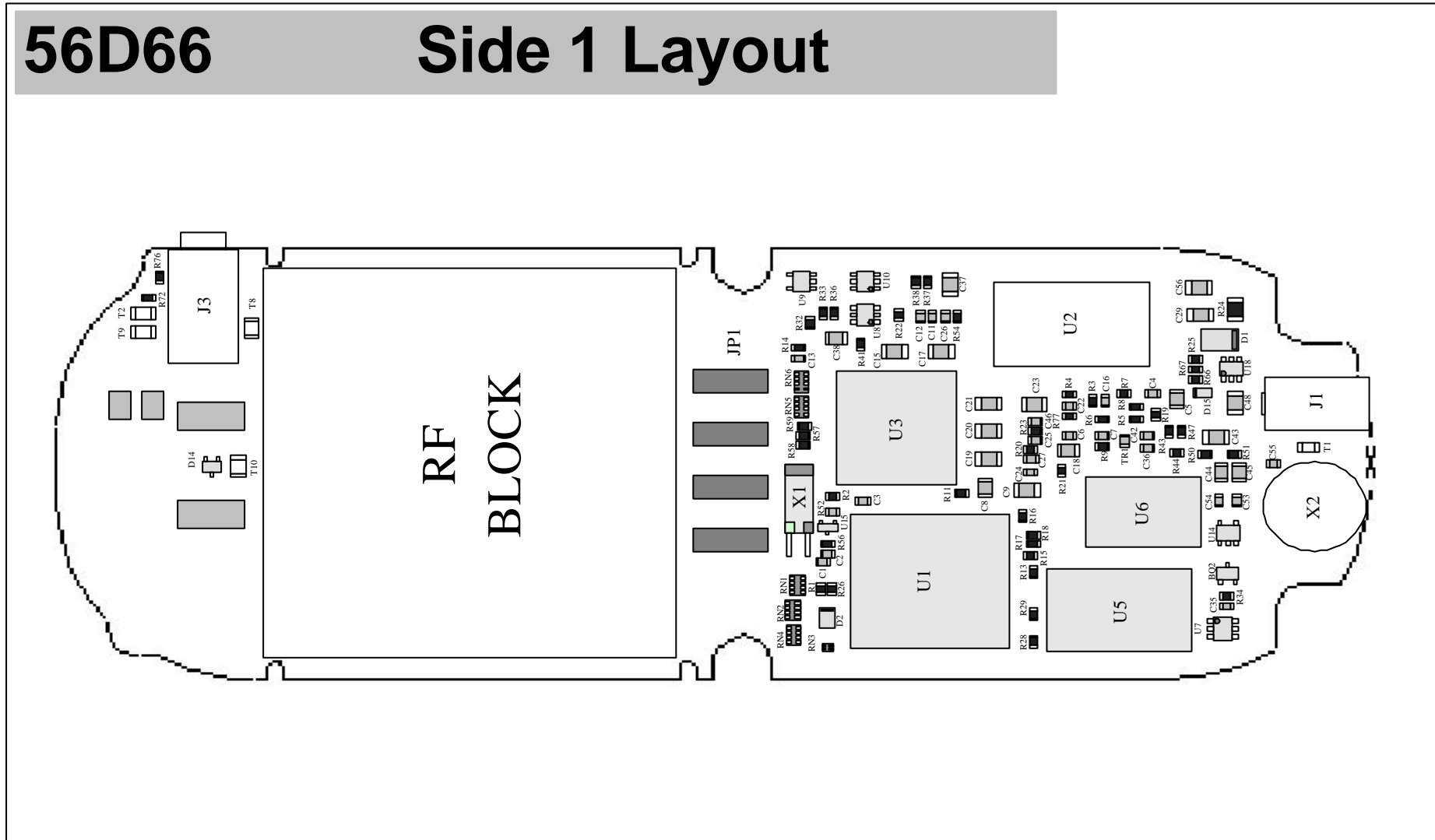
Description

1. The keypad is made of a 5 Column x 4 Row matrixes.
2. The keypad matrix is as follows:

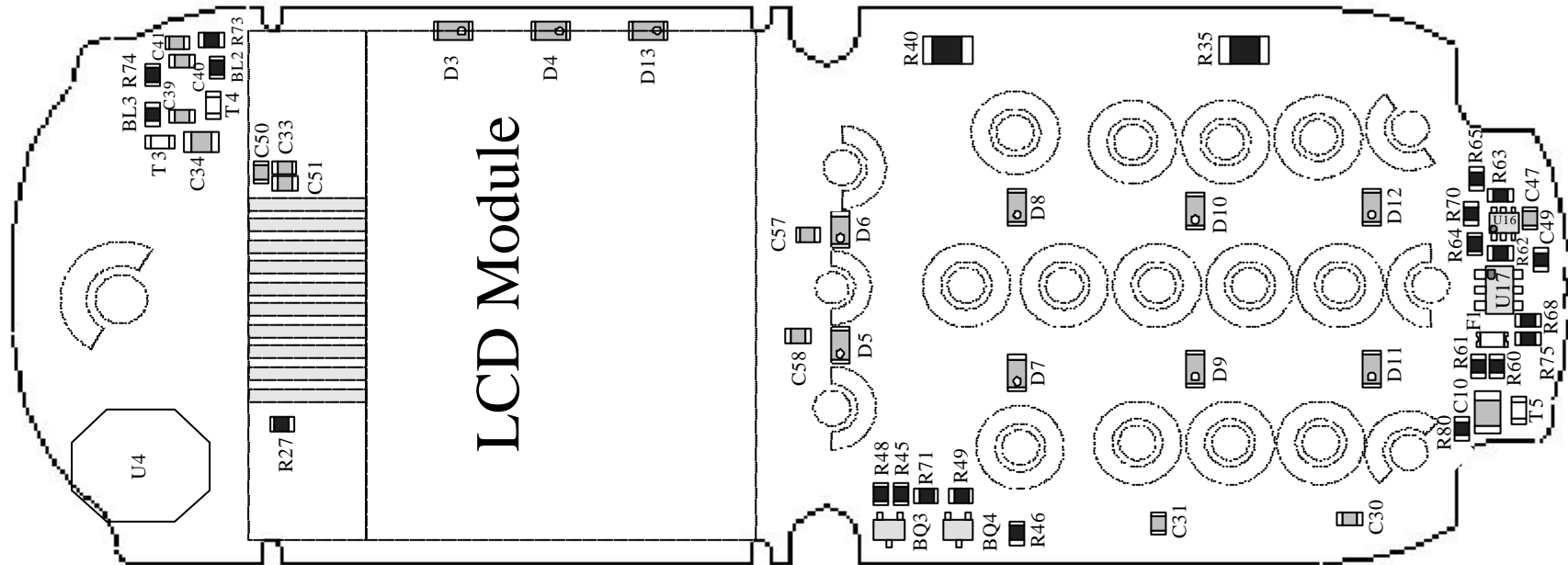
Function	Key	COL 0	COL 1	COL 2	COL 3	COL 4	ROW 0	ROW 1	ROW 2	ROW 3
3	S1	0					0			
2	S2	0						0		
1	S3	0							0	
DOWN	S4	0								0
6	S5		0				0			
5	S6		0					0		
4	S7		0						0	
SEL	S8		0							0
8	S9			0				0		
7	S10			0					0	
UP	S11			0						0
9	S12			0			0			
0	S13				0			0		
*	S14				0				0	
MENU	S15				0					0
#	S16				0		0			
SEND	S17					0			0	
QUIT	S18					0				0
NO/PWR	S19									

Reference Drawing:

56D66 Side 1 Layout

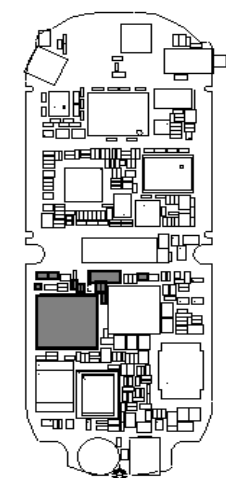
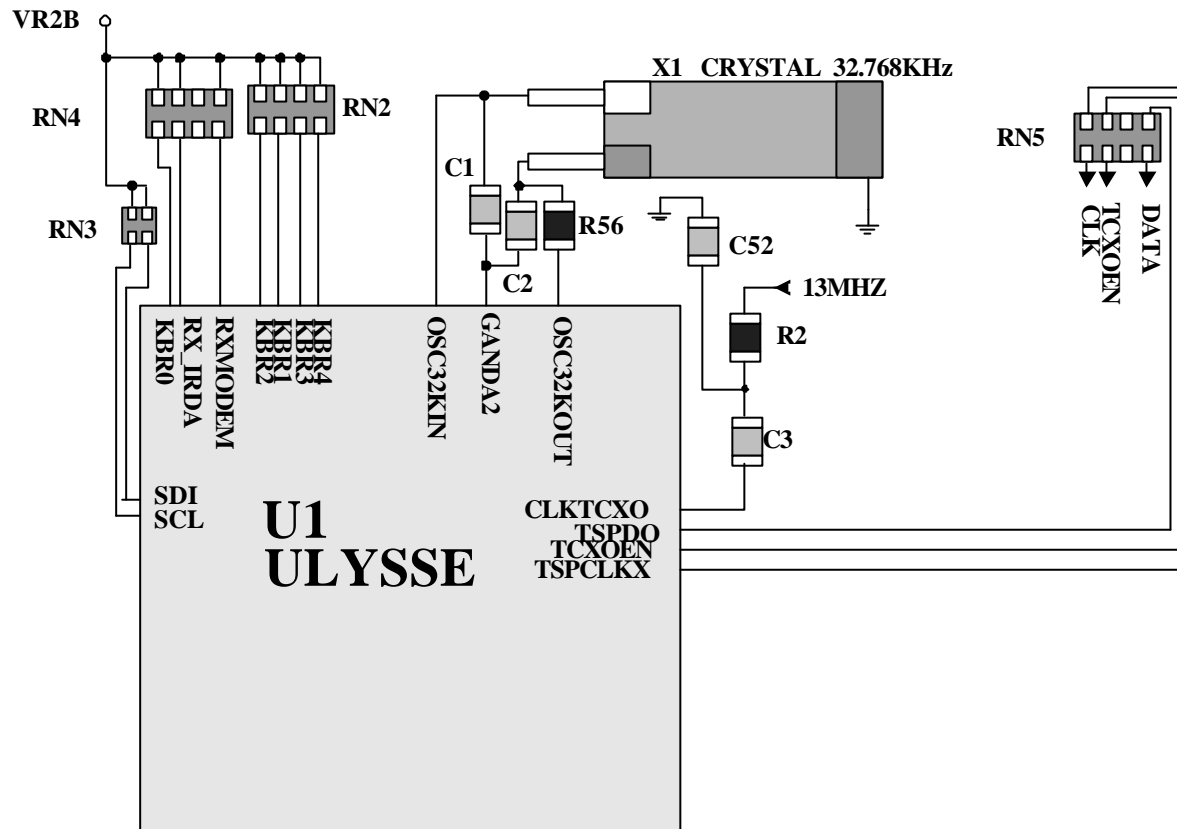


56D66 Side 2 Layout



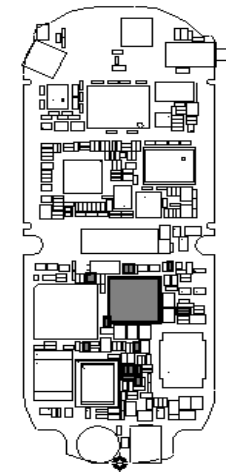
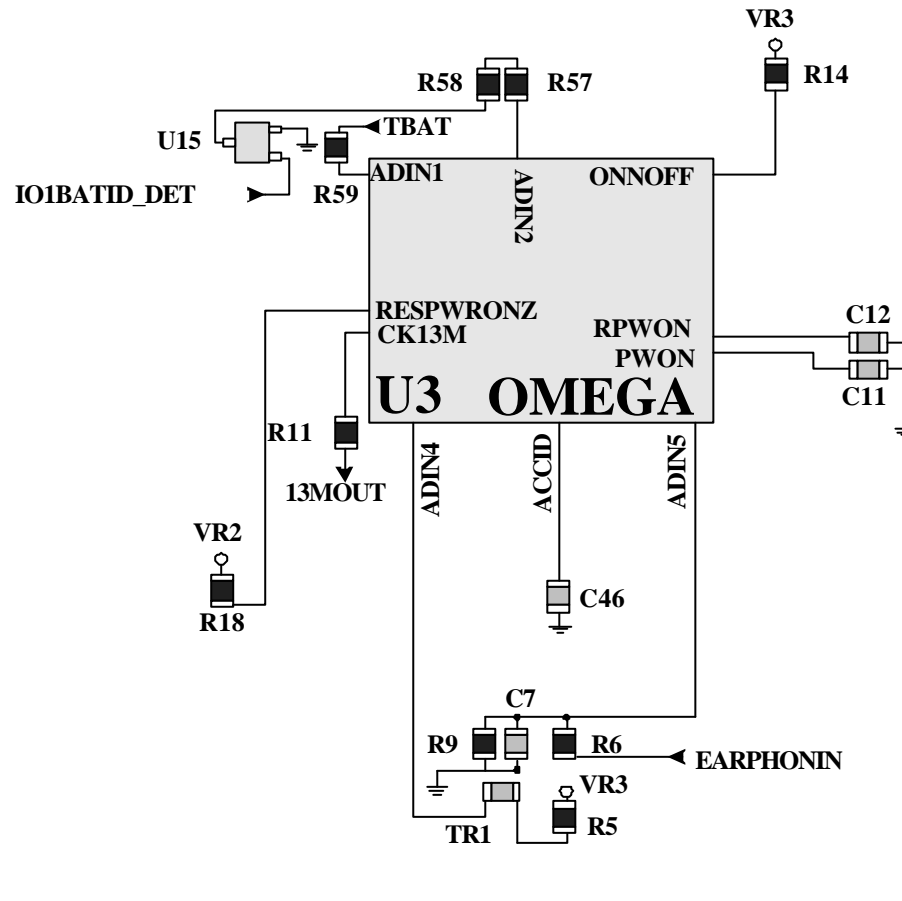
56D66

ULYSSE

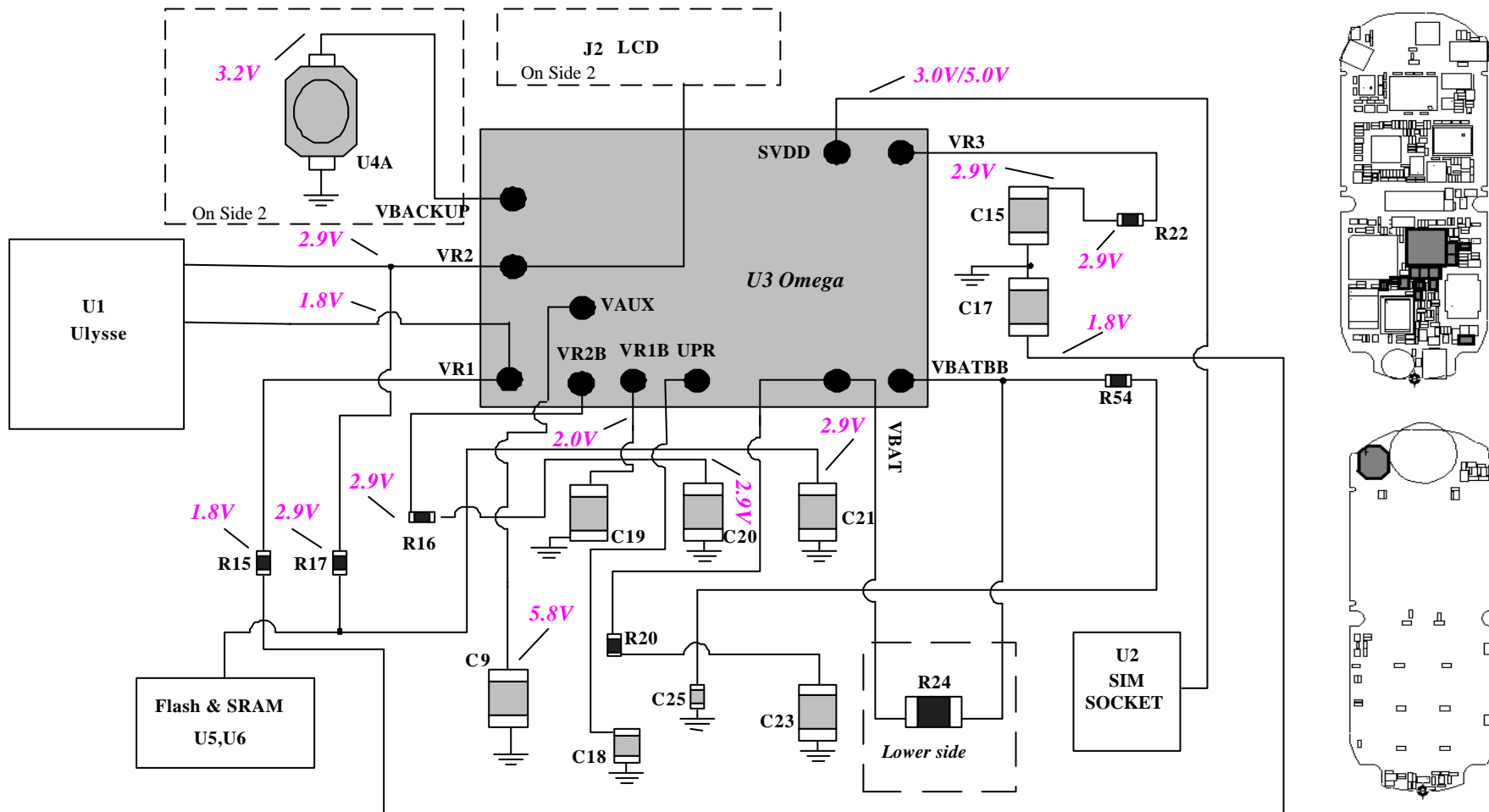


56D66

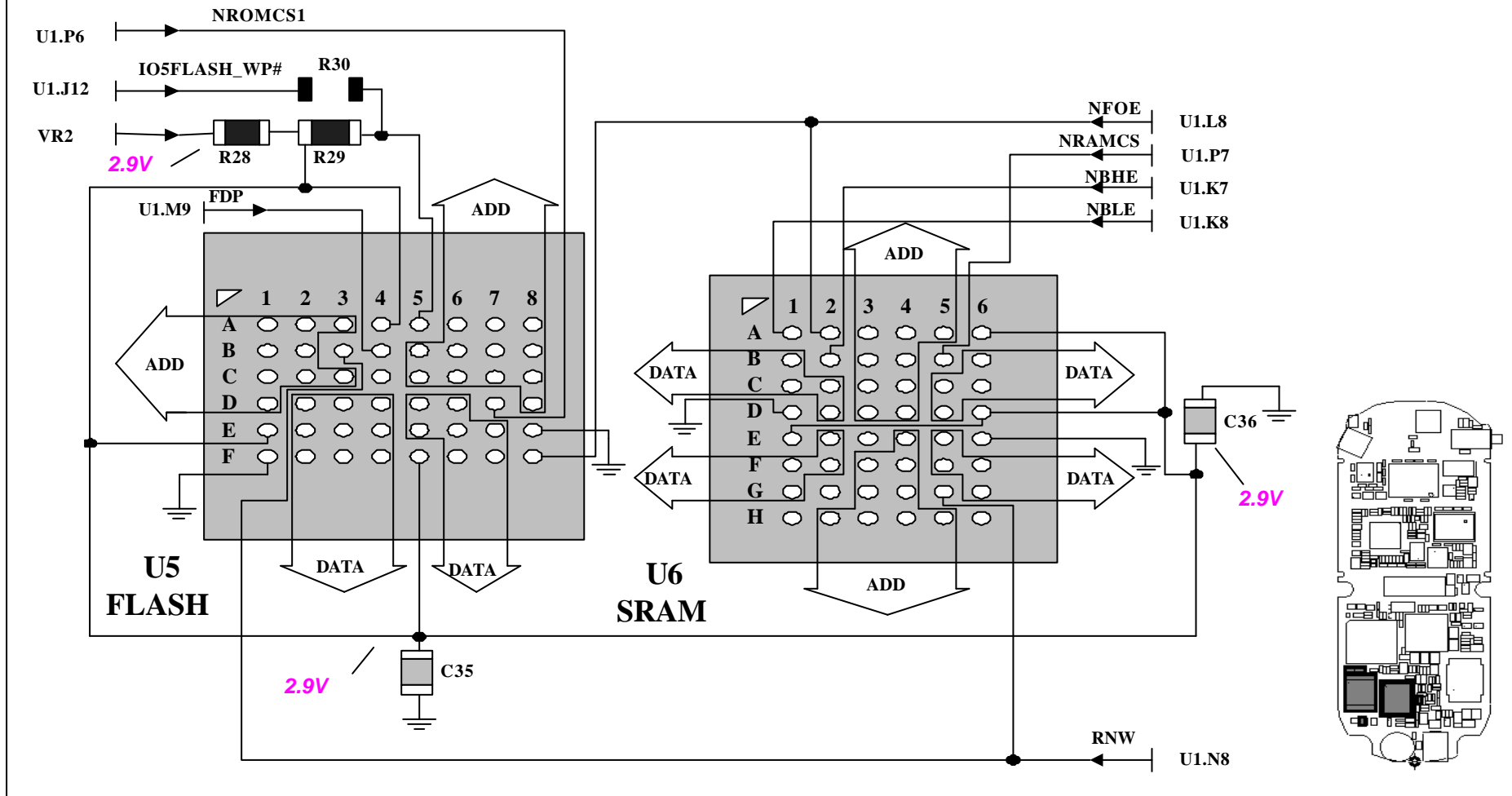
OMEGA



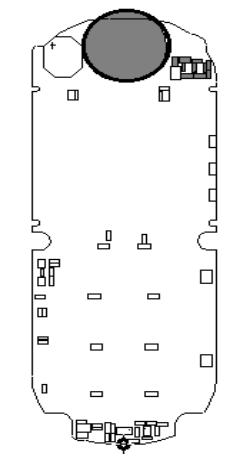
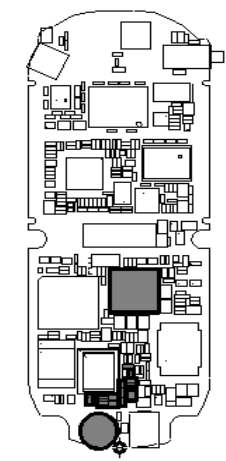
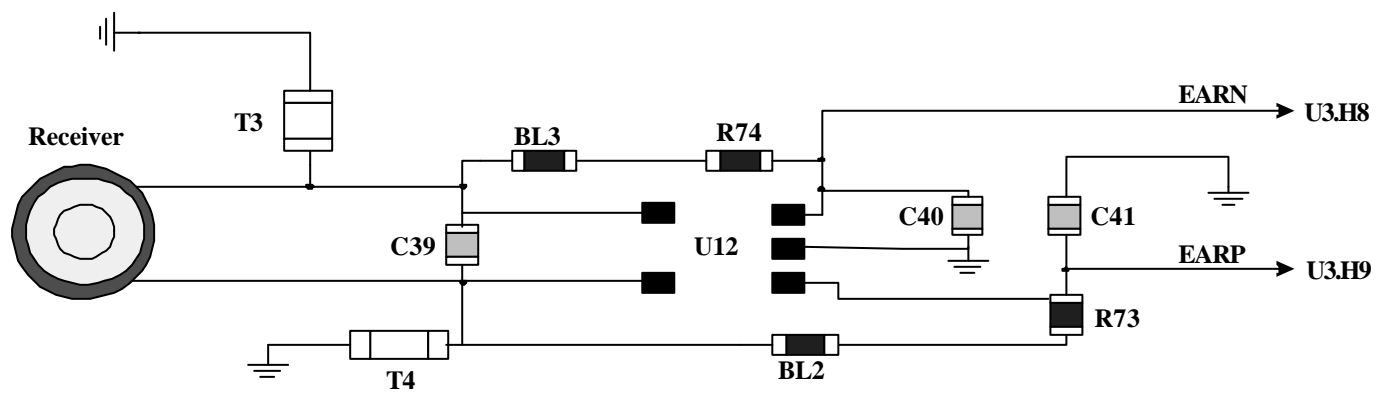
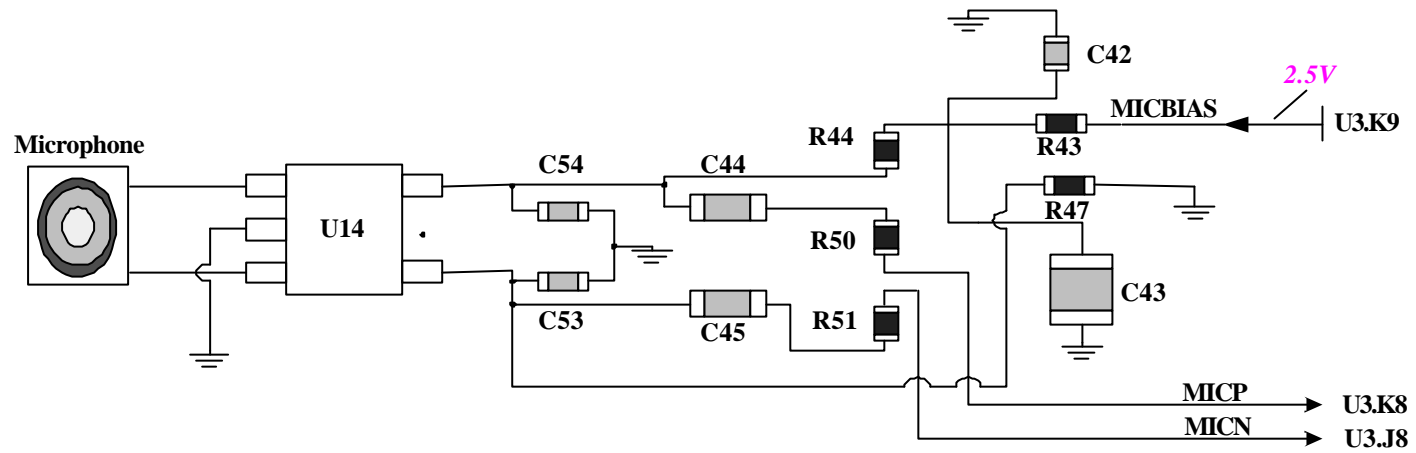
56D66 Power Supply Circuit



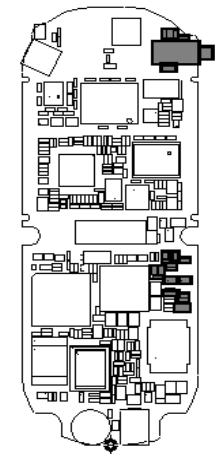
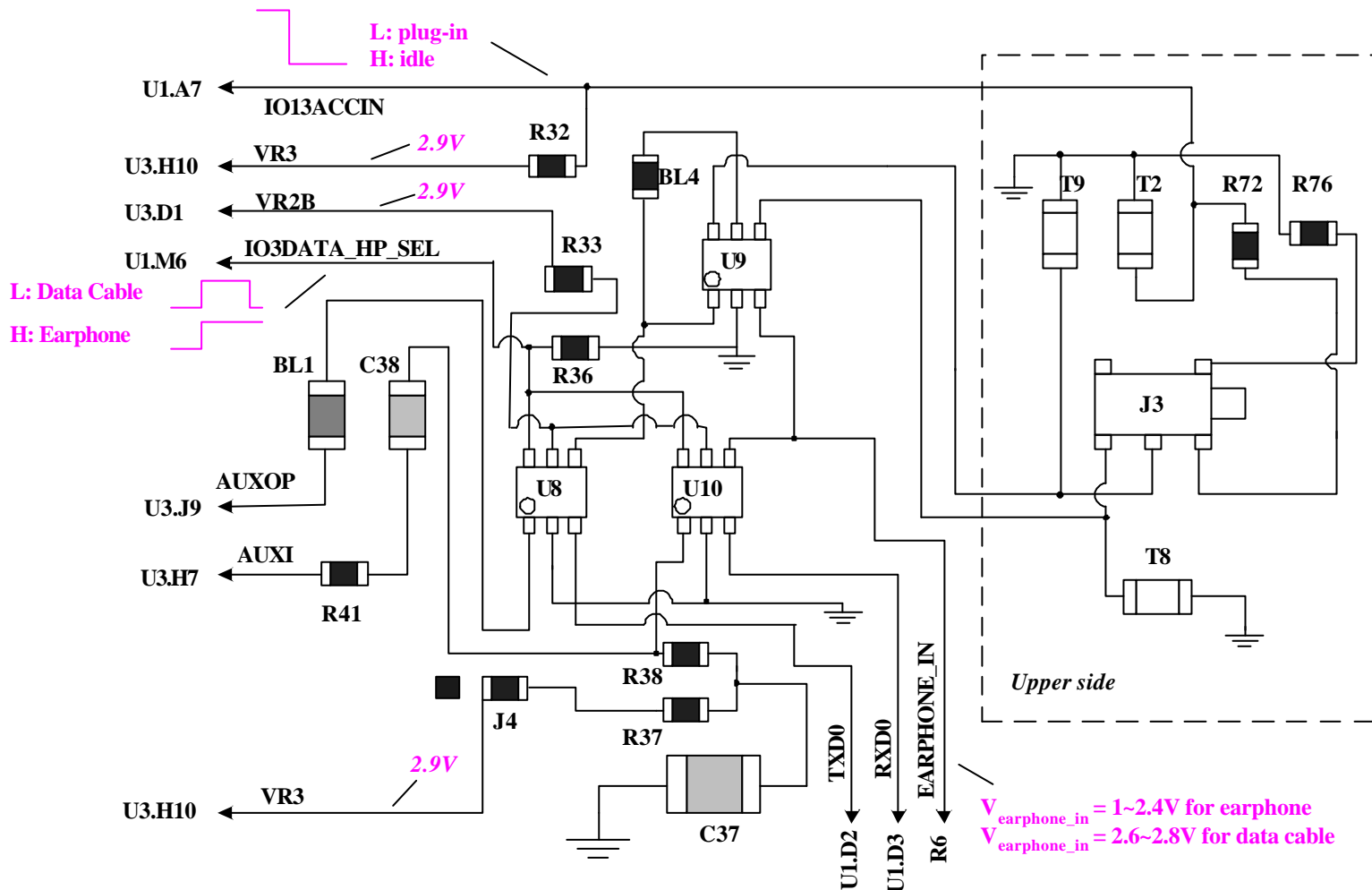
56D66 Memory Circuit



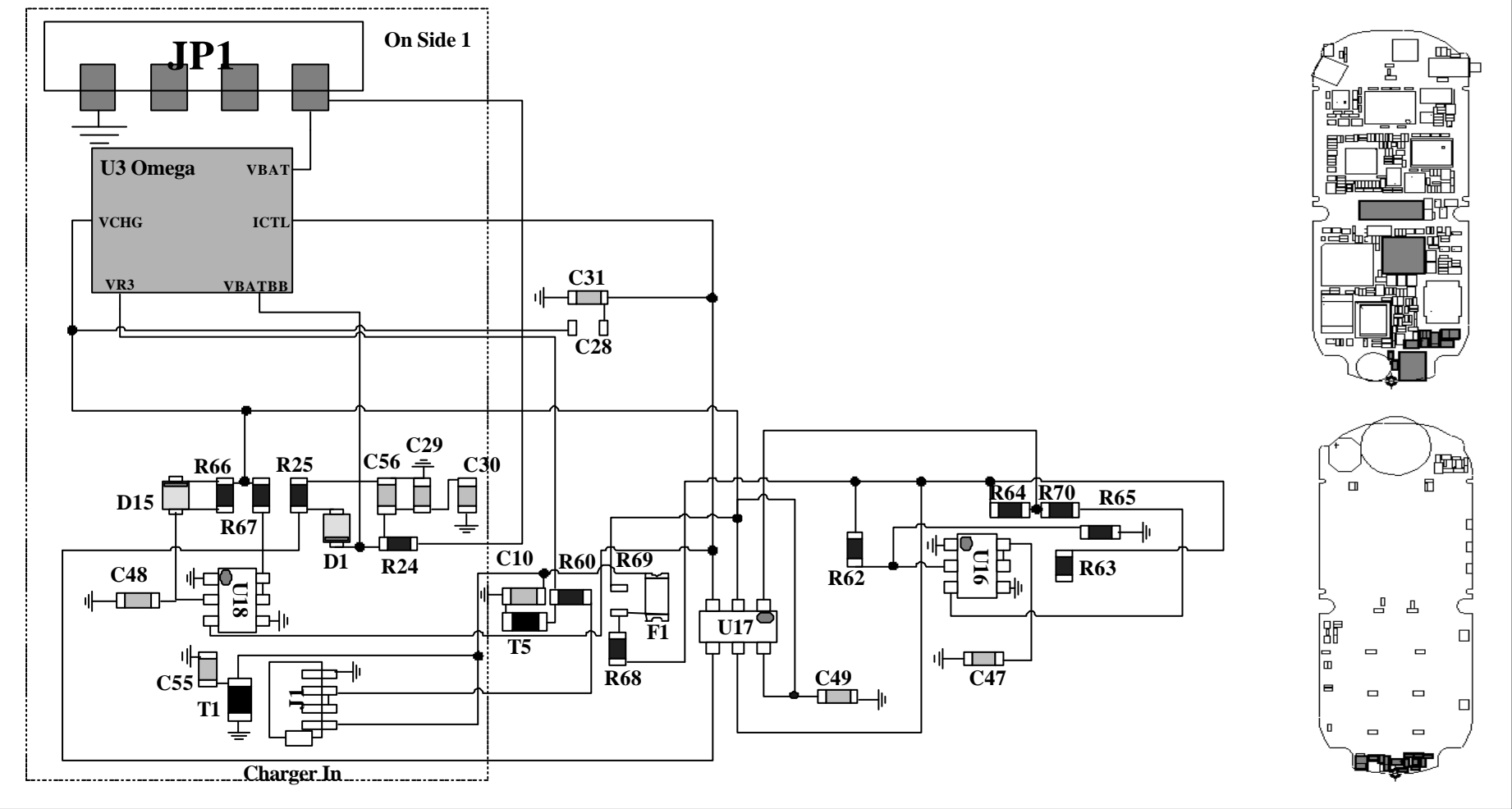
56D66 Audio Driver



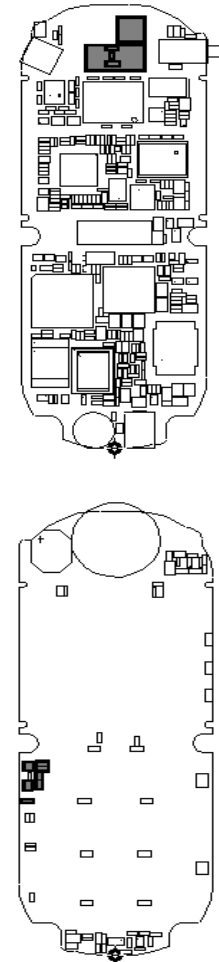
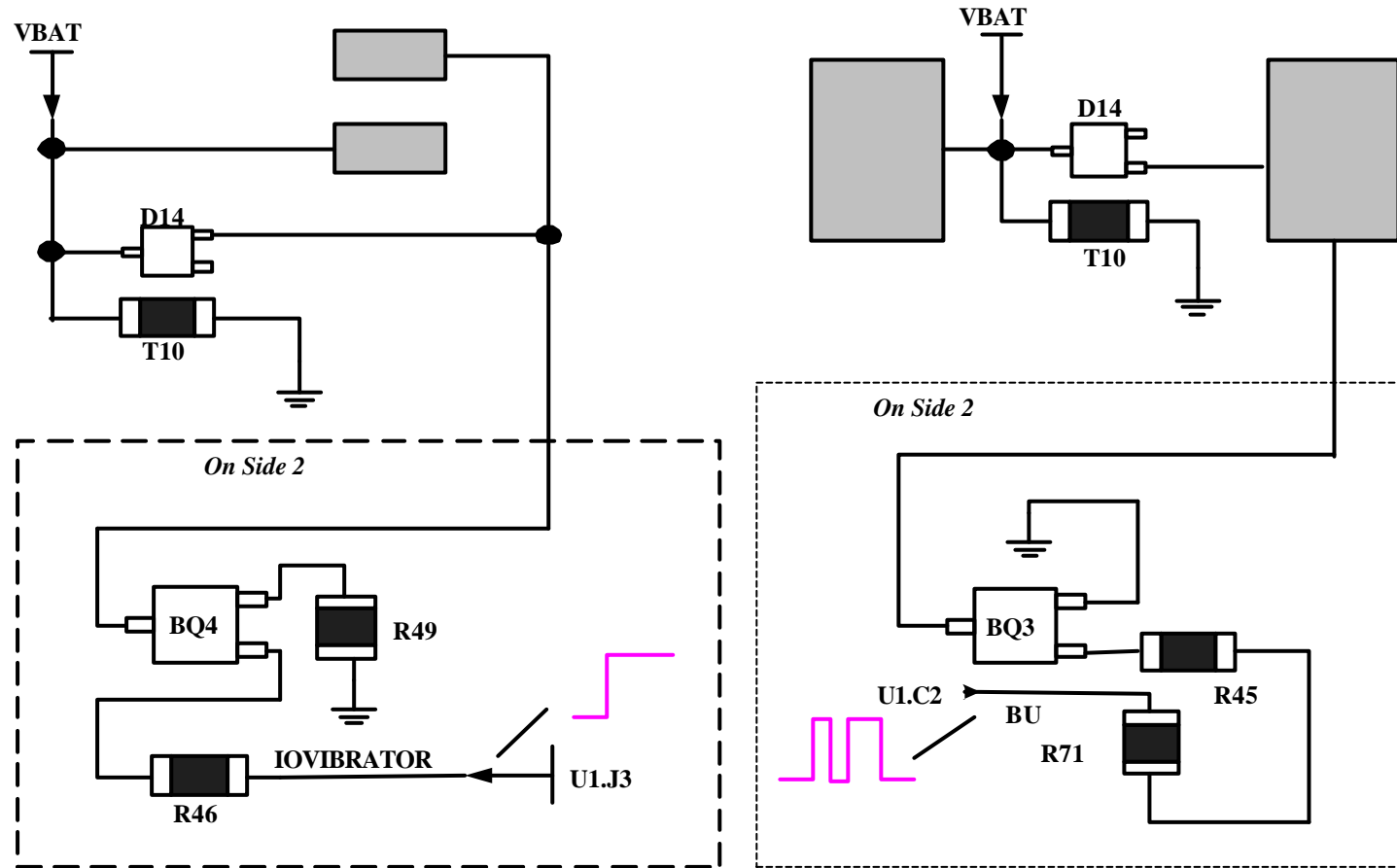
56D66 Earphone Jack



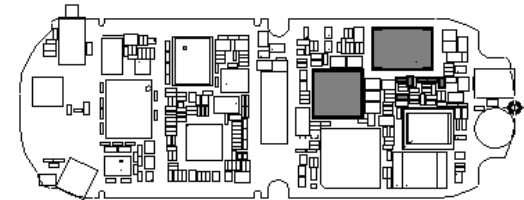
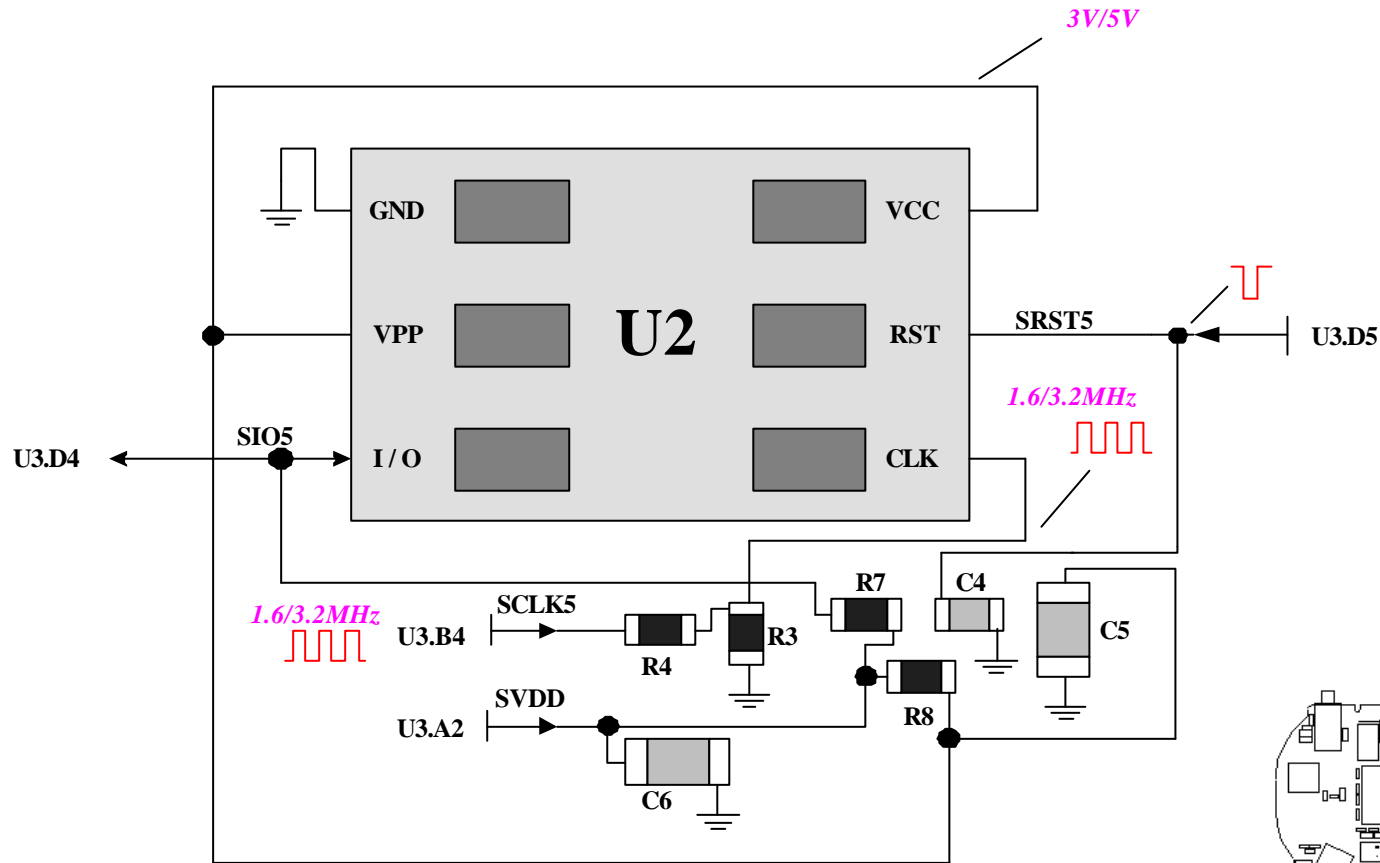
56D66 Charging Circuit



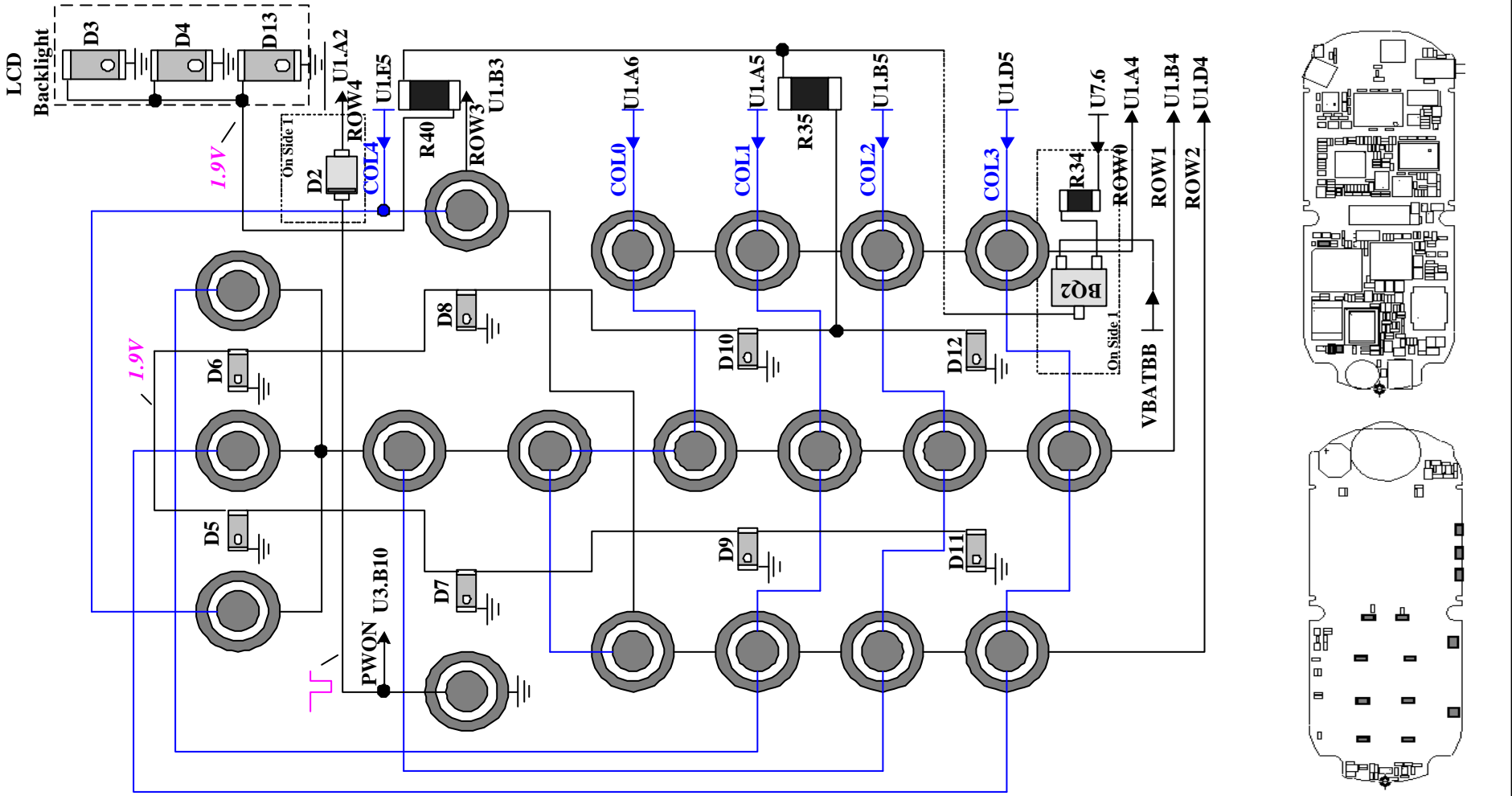
56D66 Vibrator & Buzzer



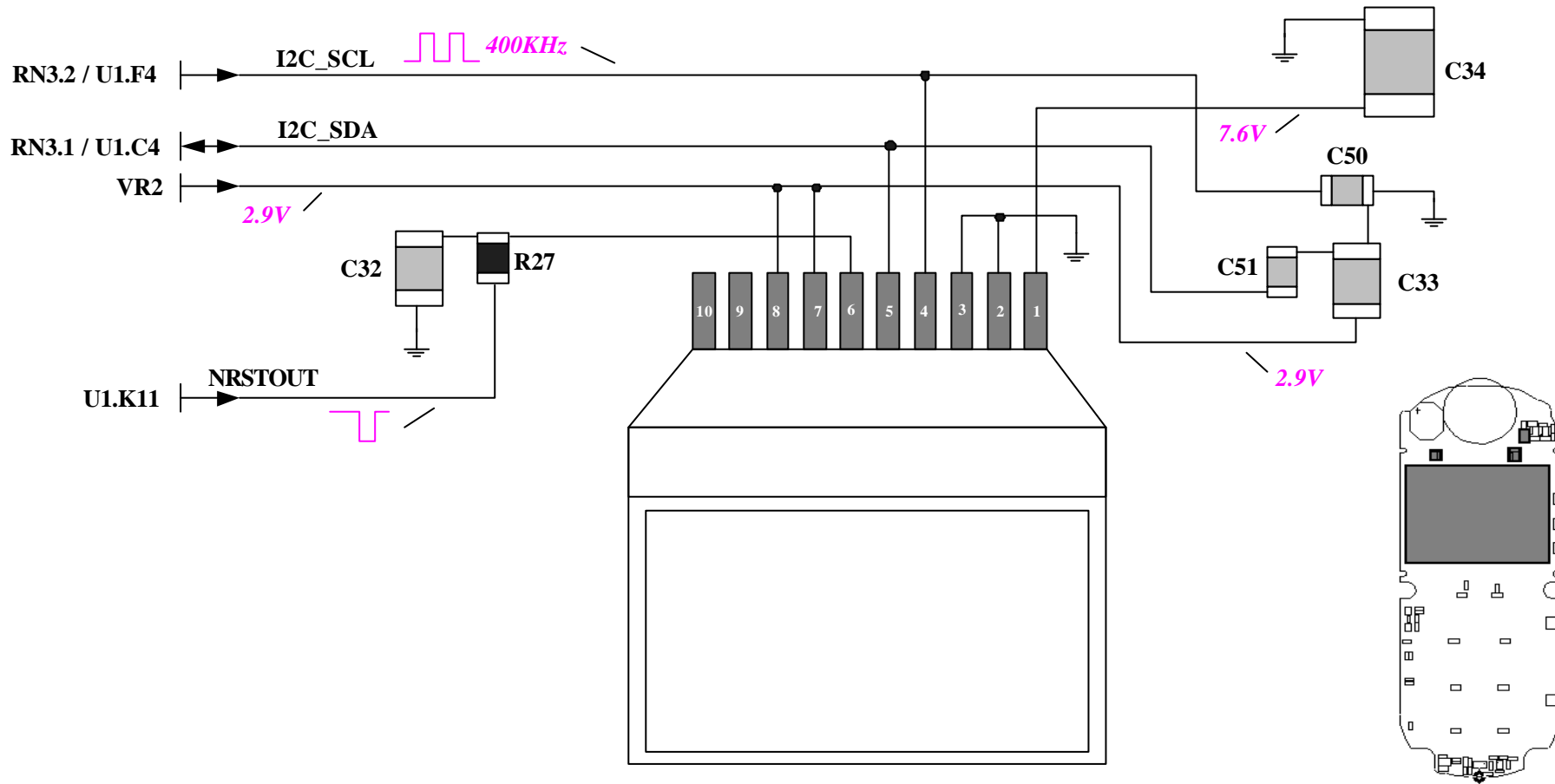
56D66 SIM Circuit



56D66 Keypad and LEDs

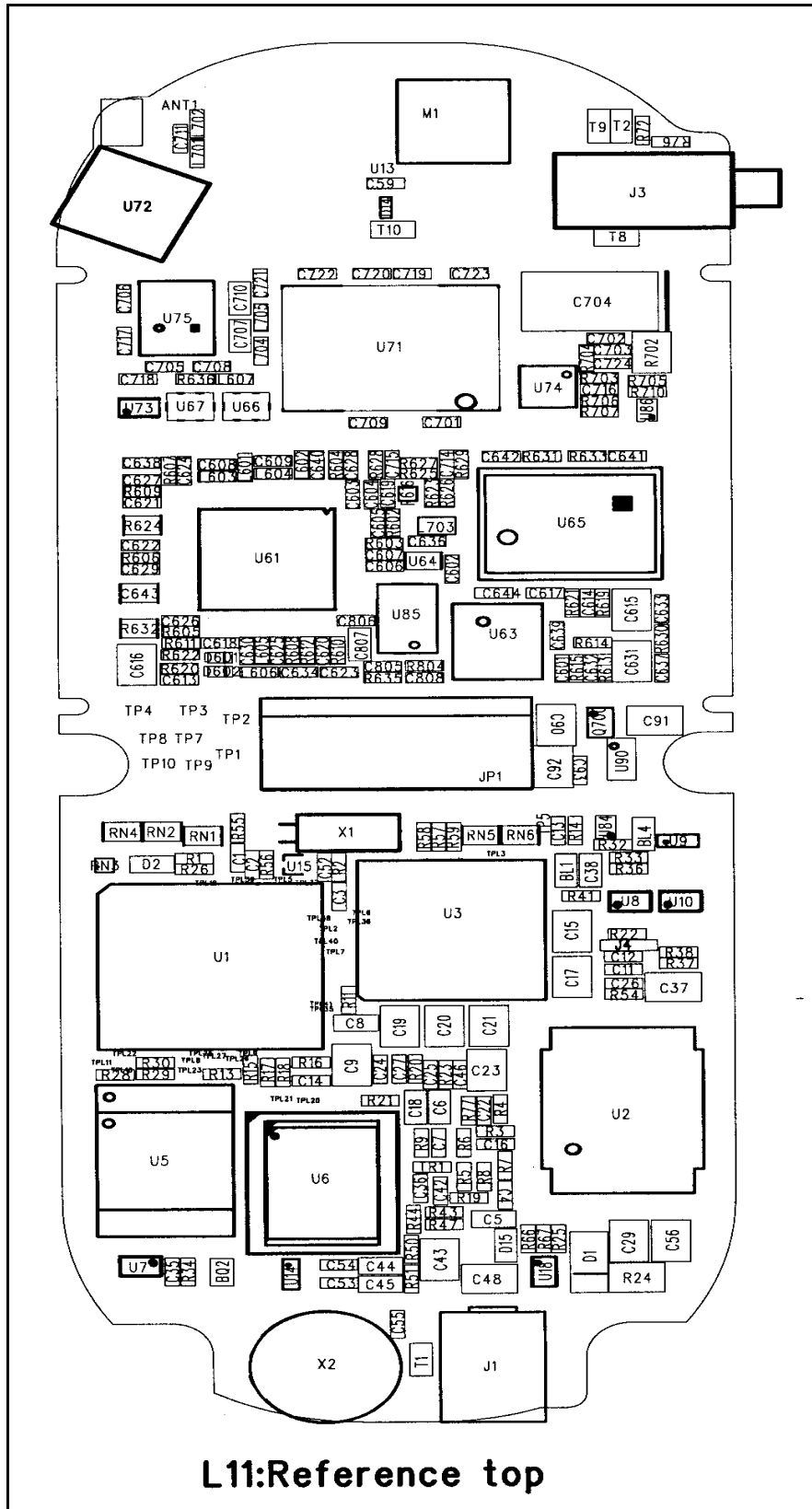


56D66 LCD Circuit

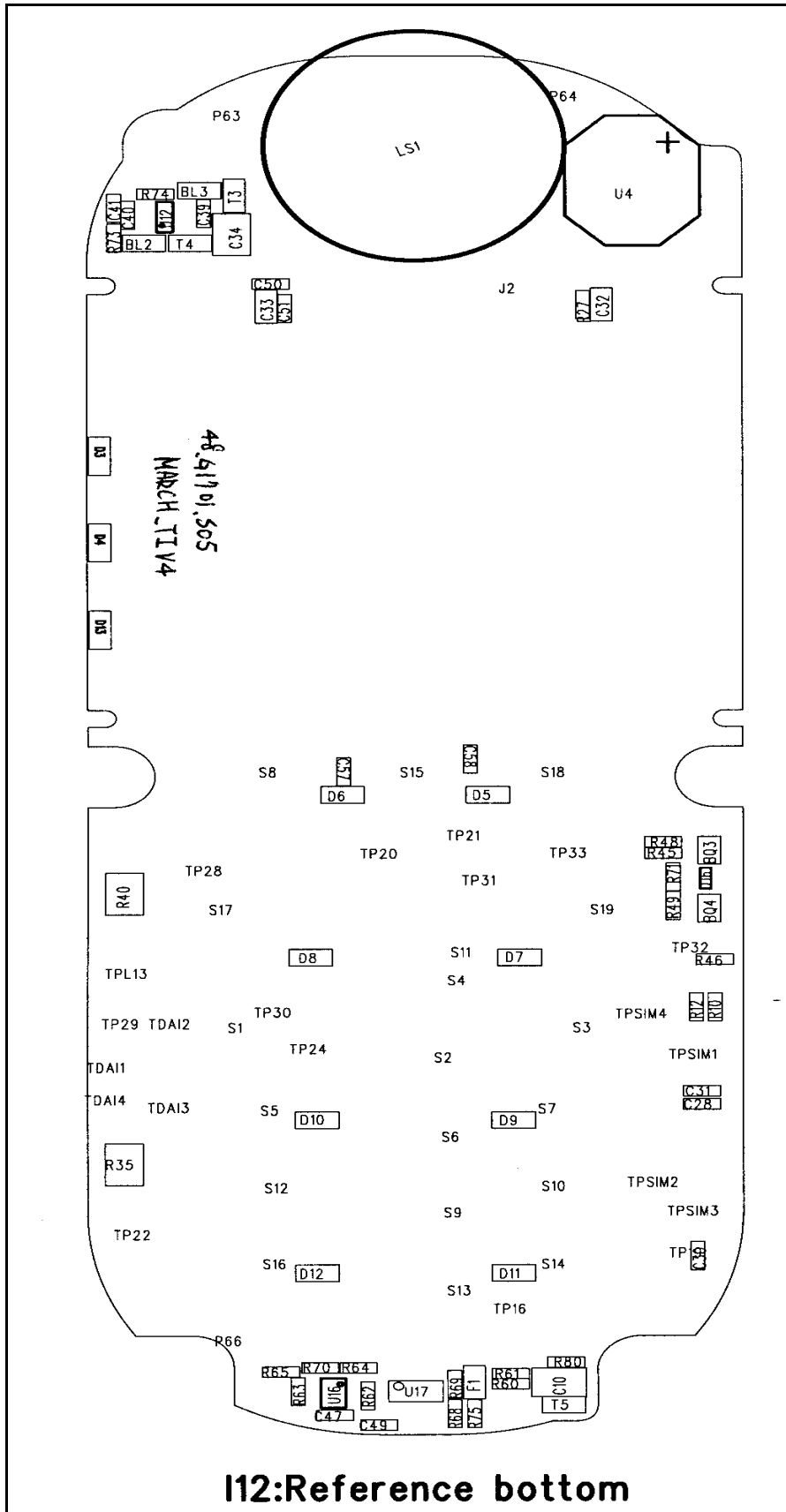


Radio Frequency function Descriptions

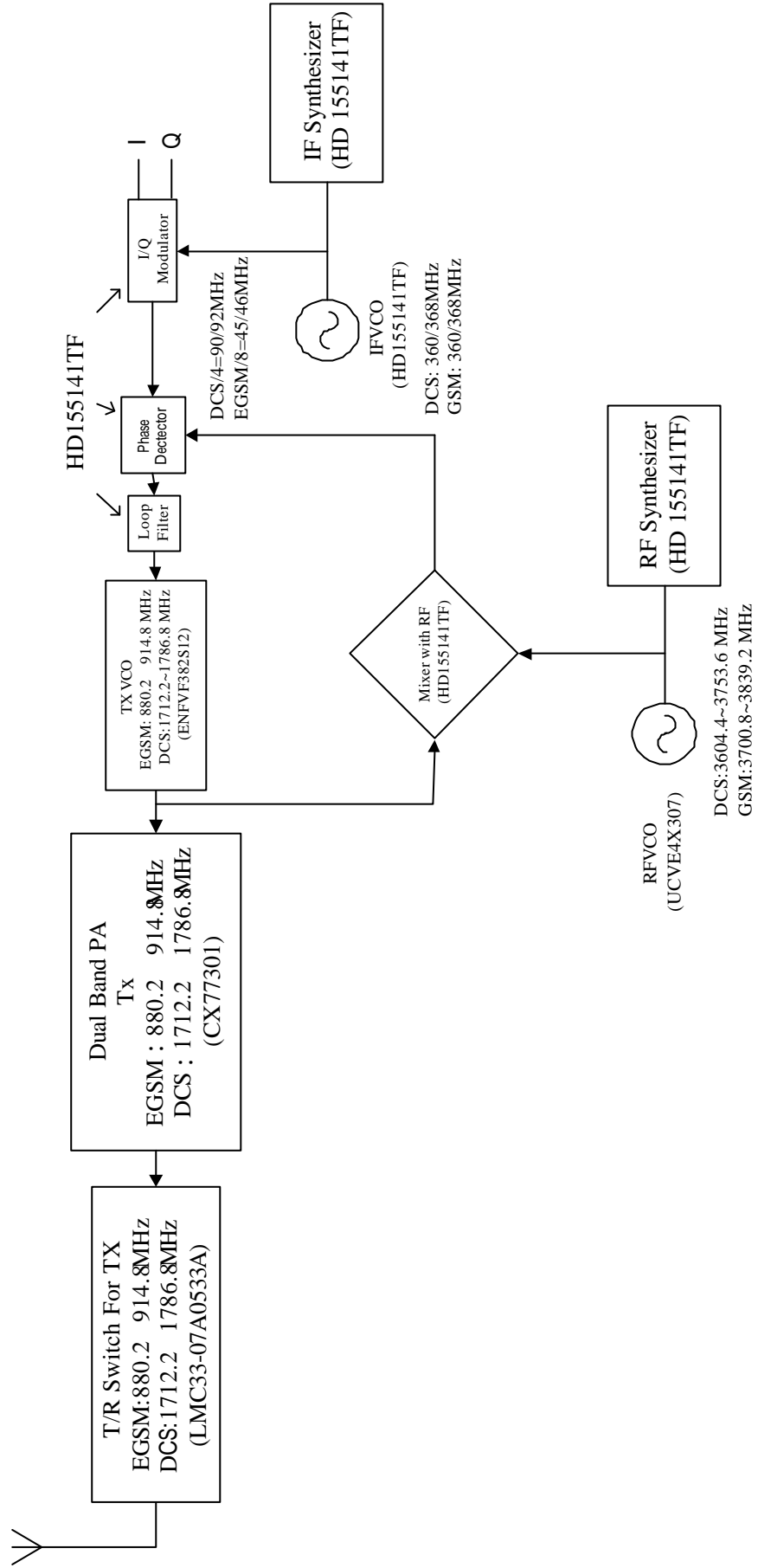
Top Side



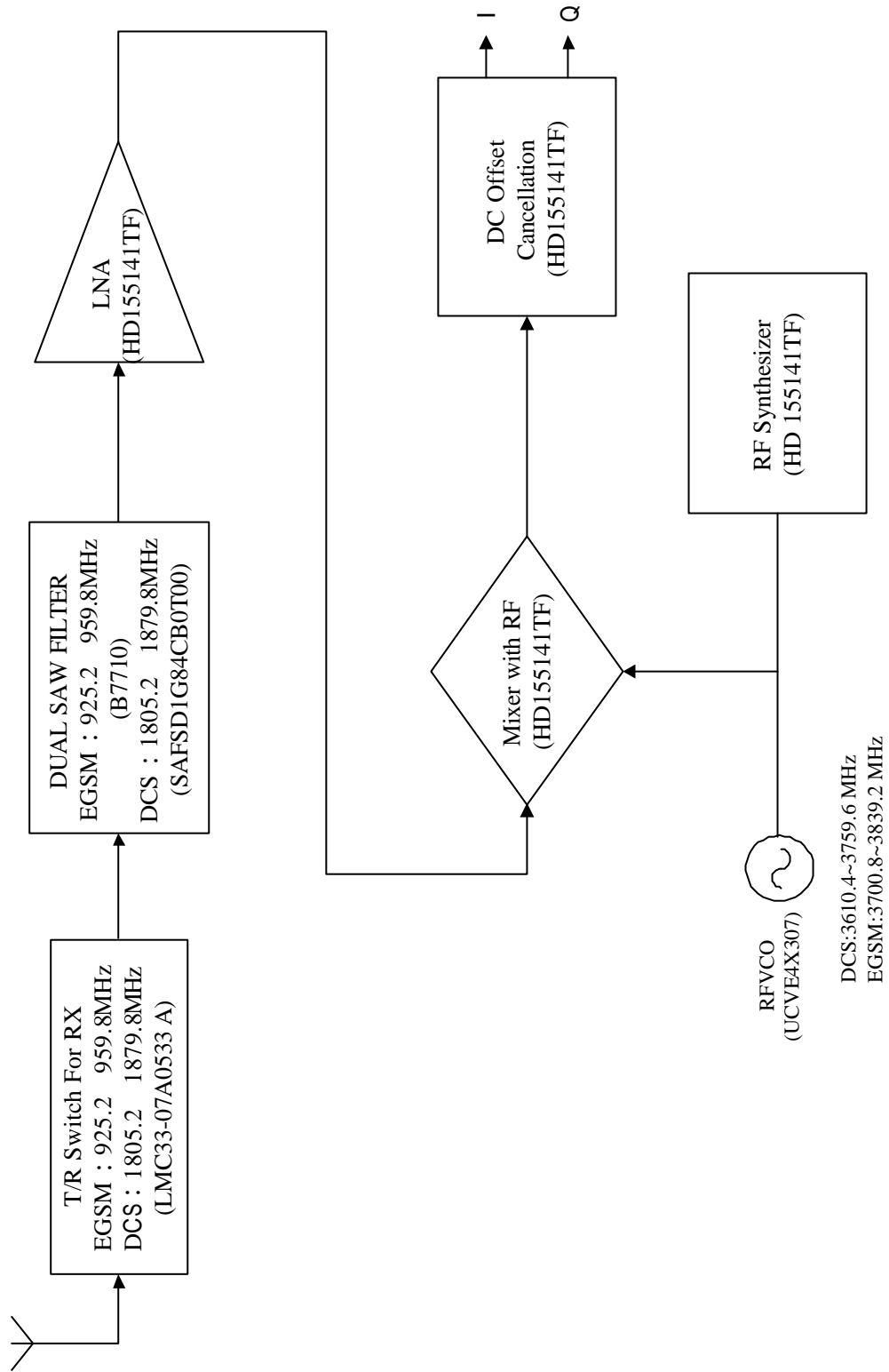
Bottom Side



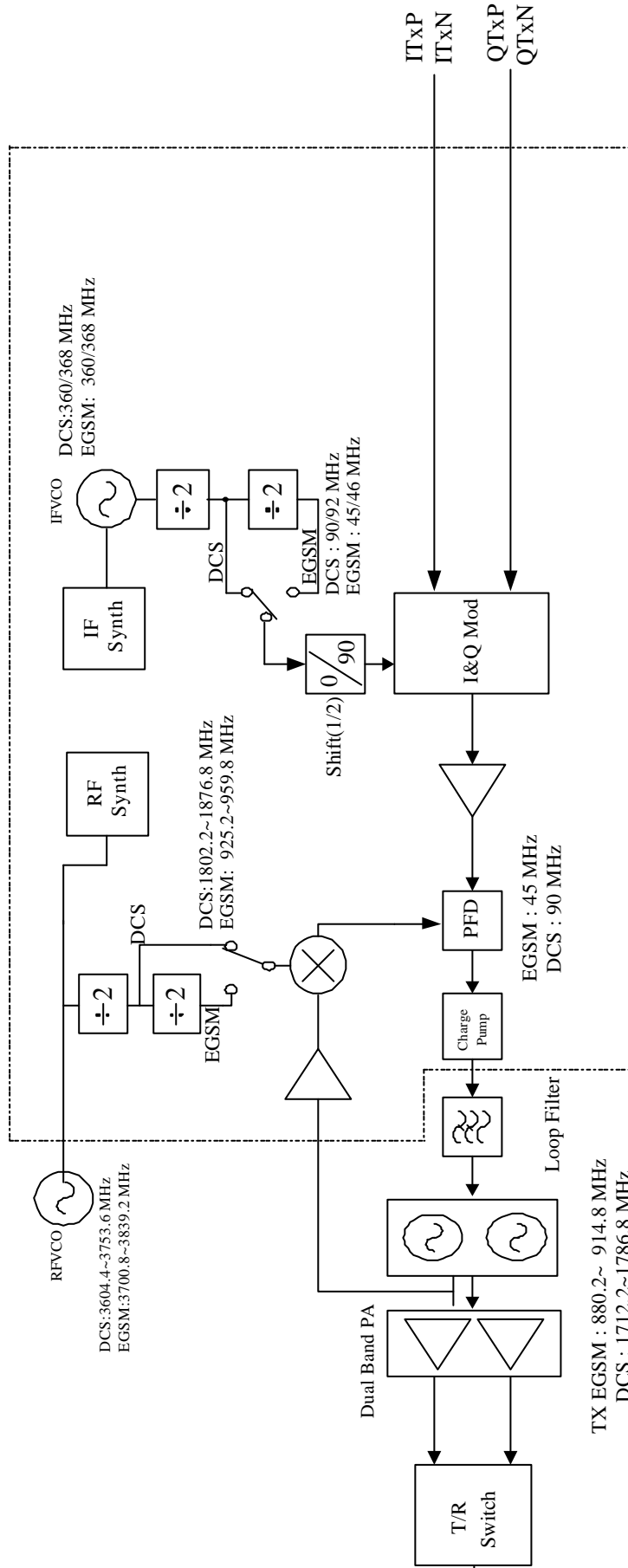
Tx Flow Chart



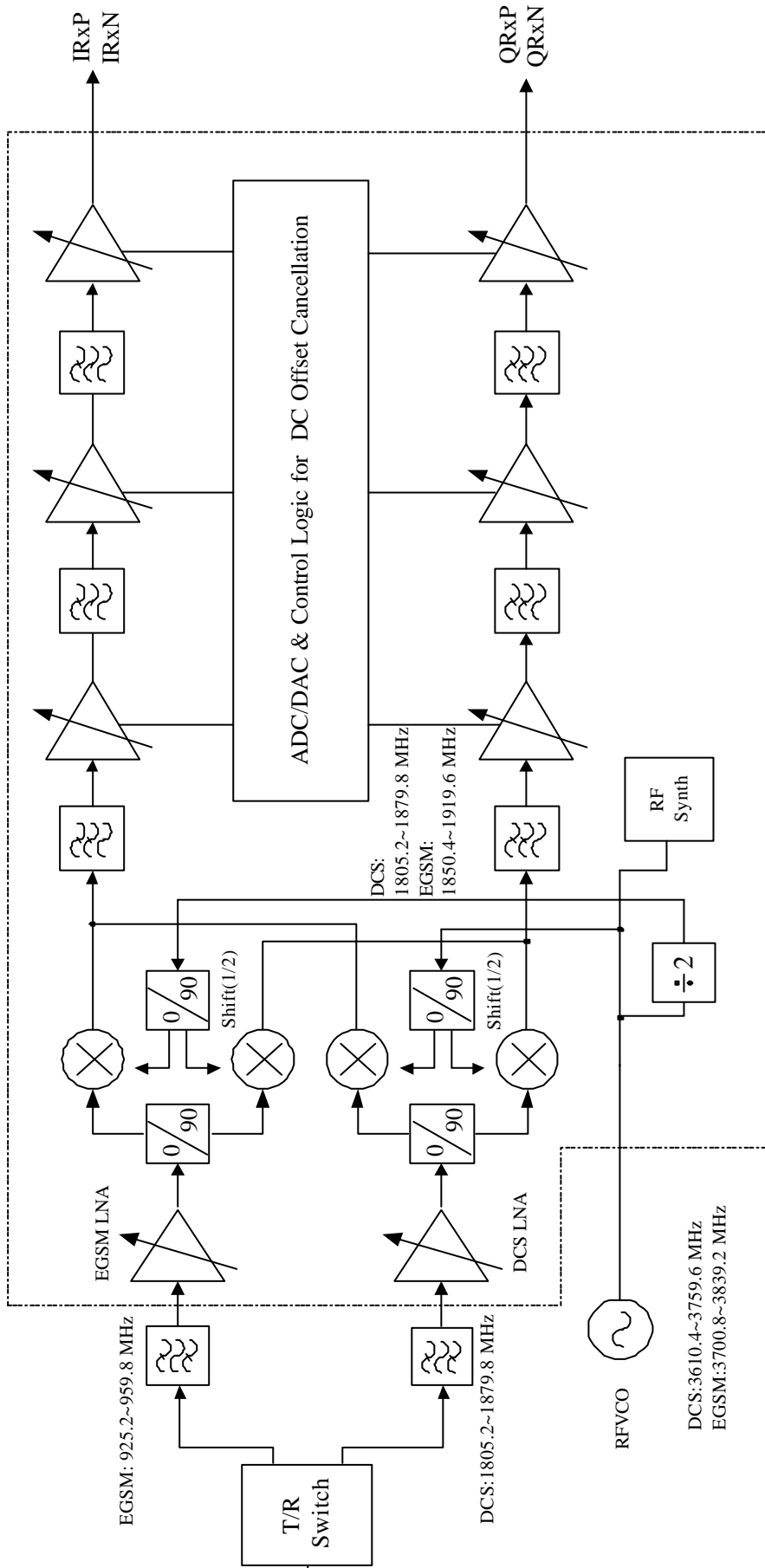
Rx Flow Chart



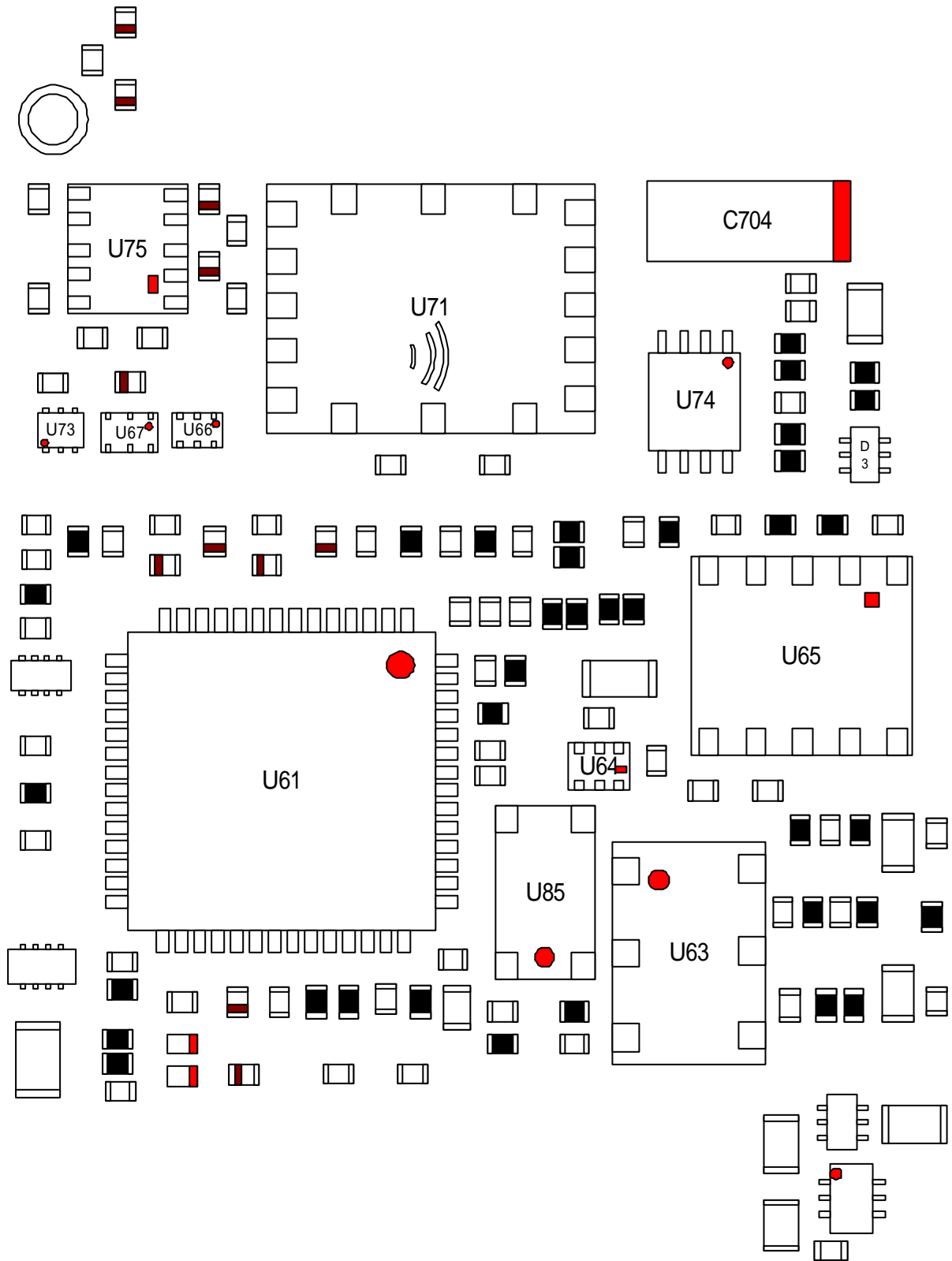
Tx Block Diagram



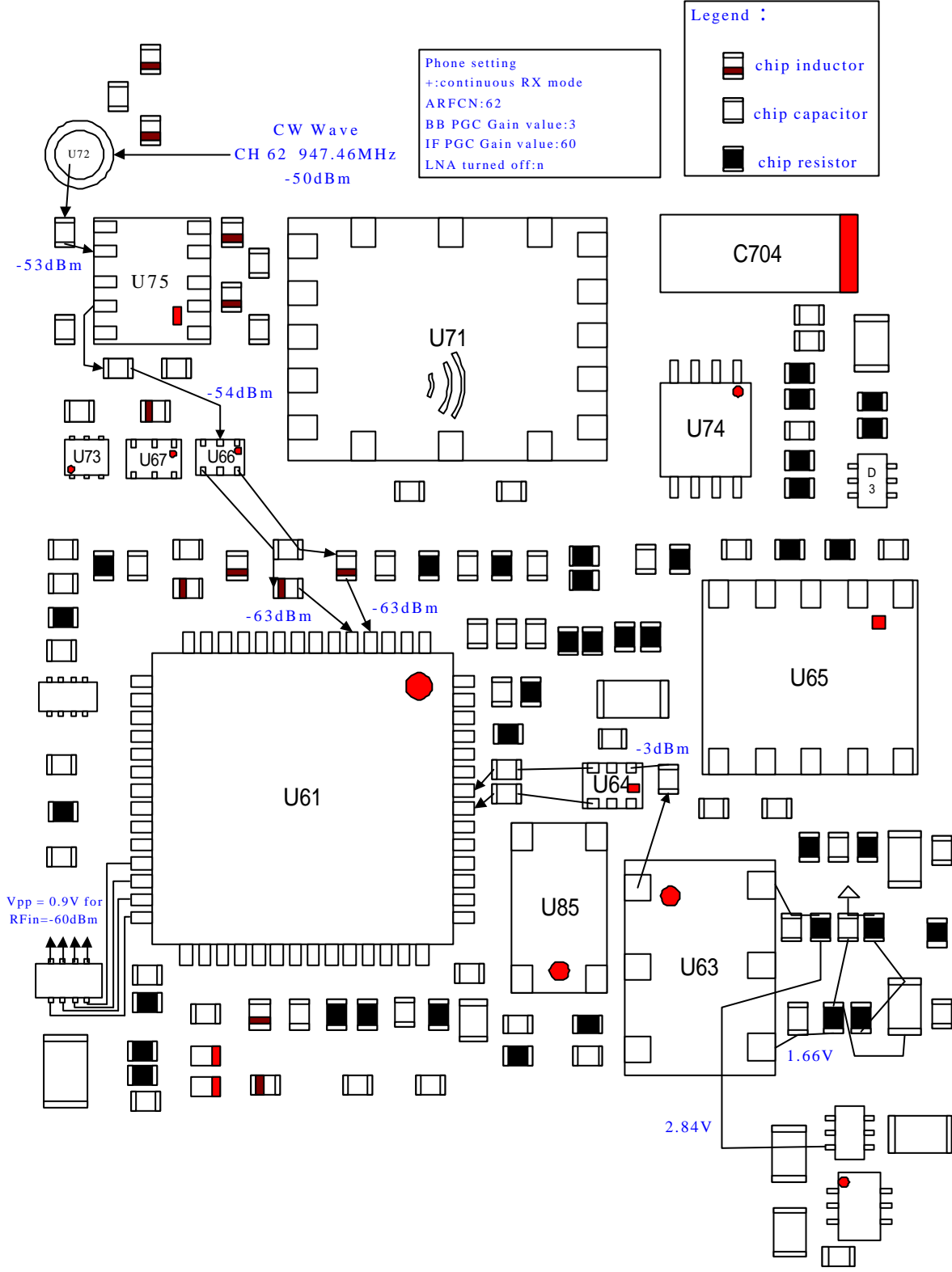
Rx Block Diagram



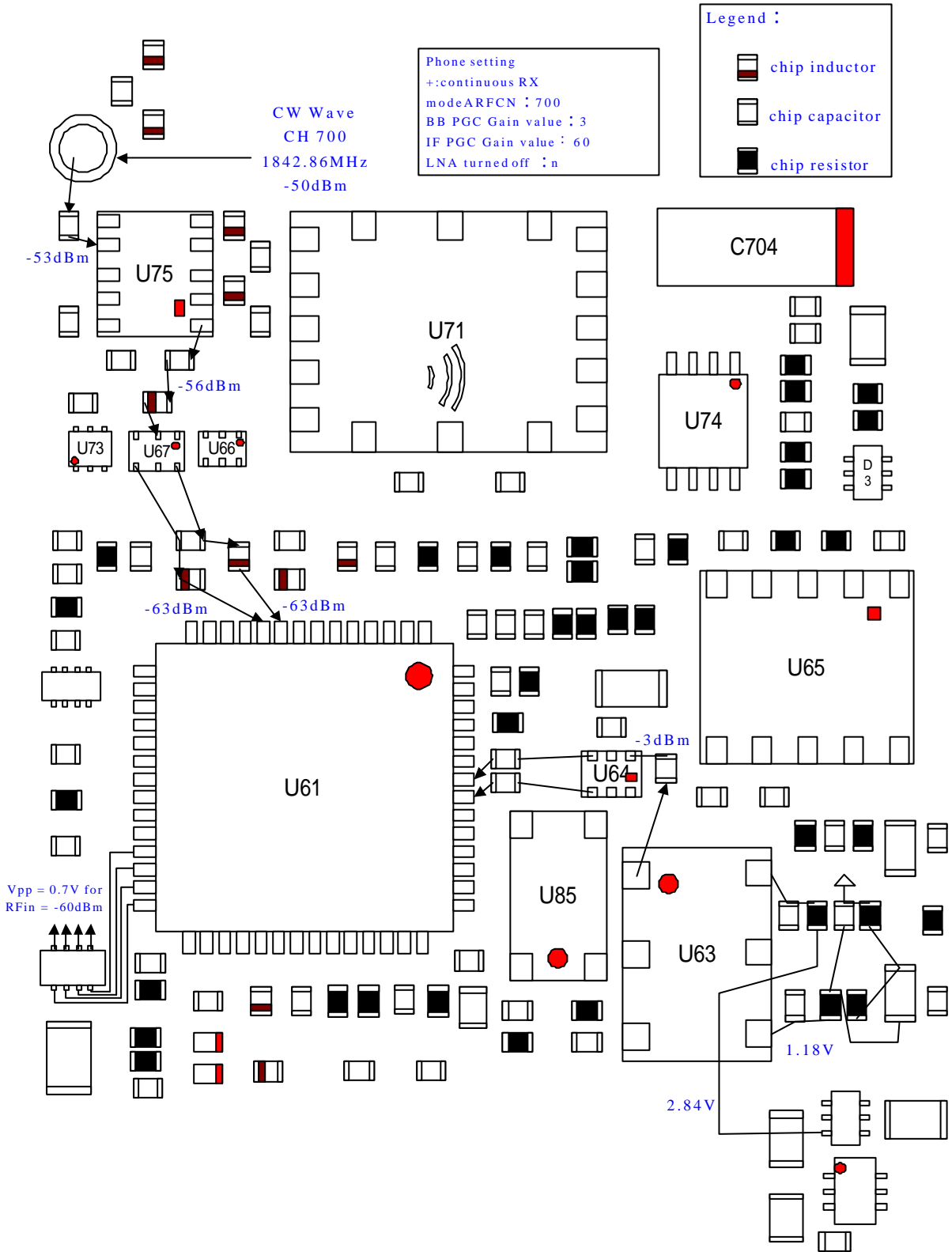
RF circuit element placement



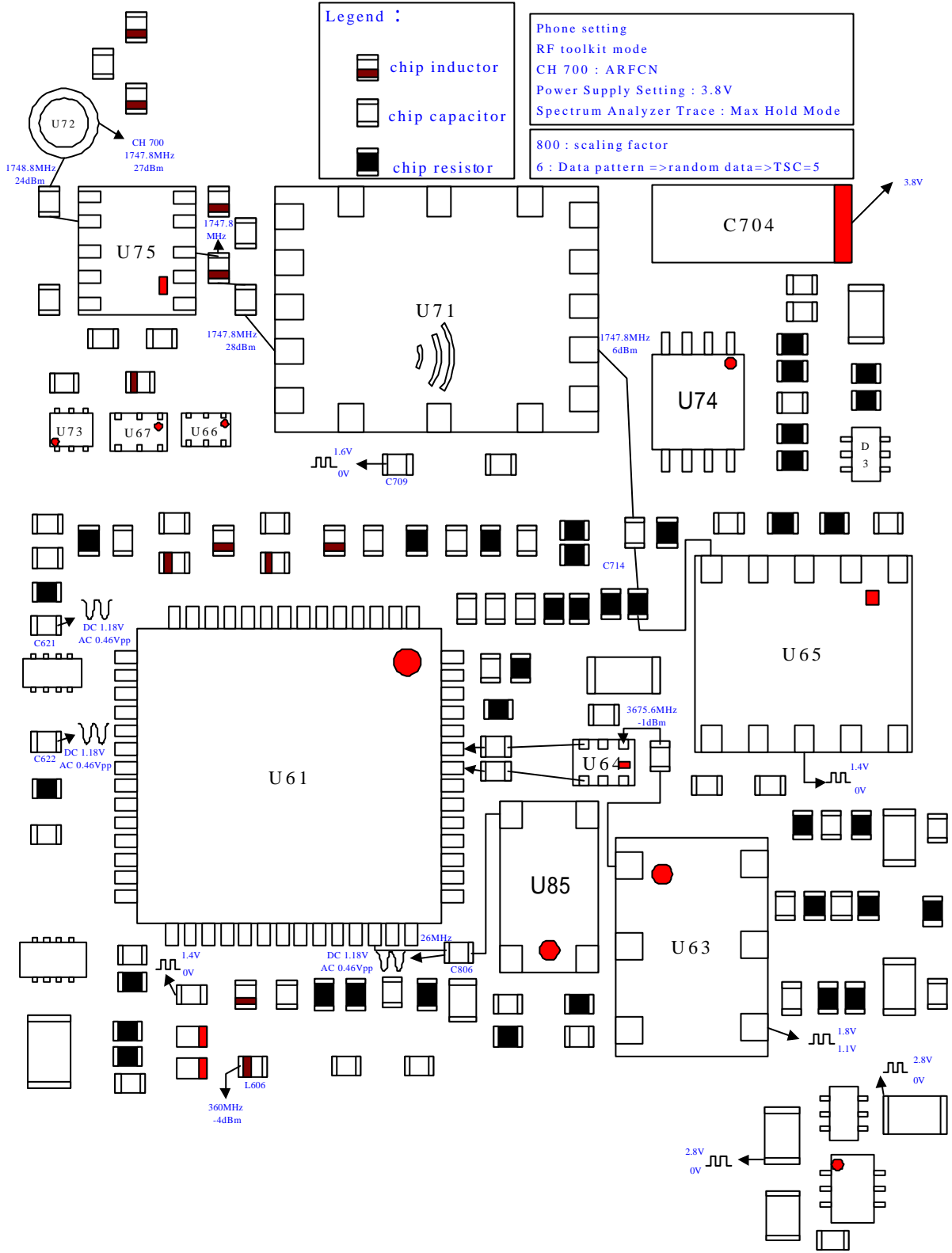
EGSM 900 Receive Signal Path Diagram



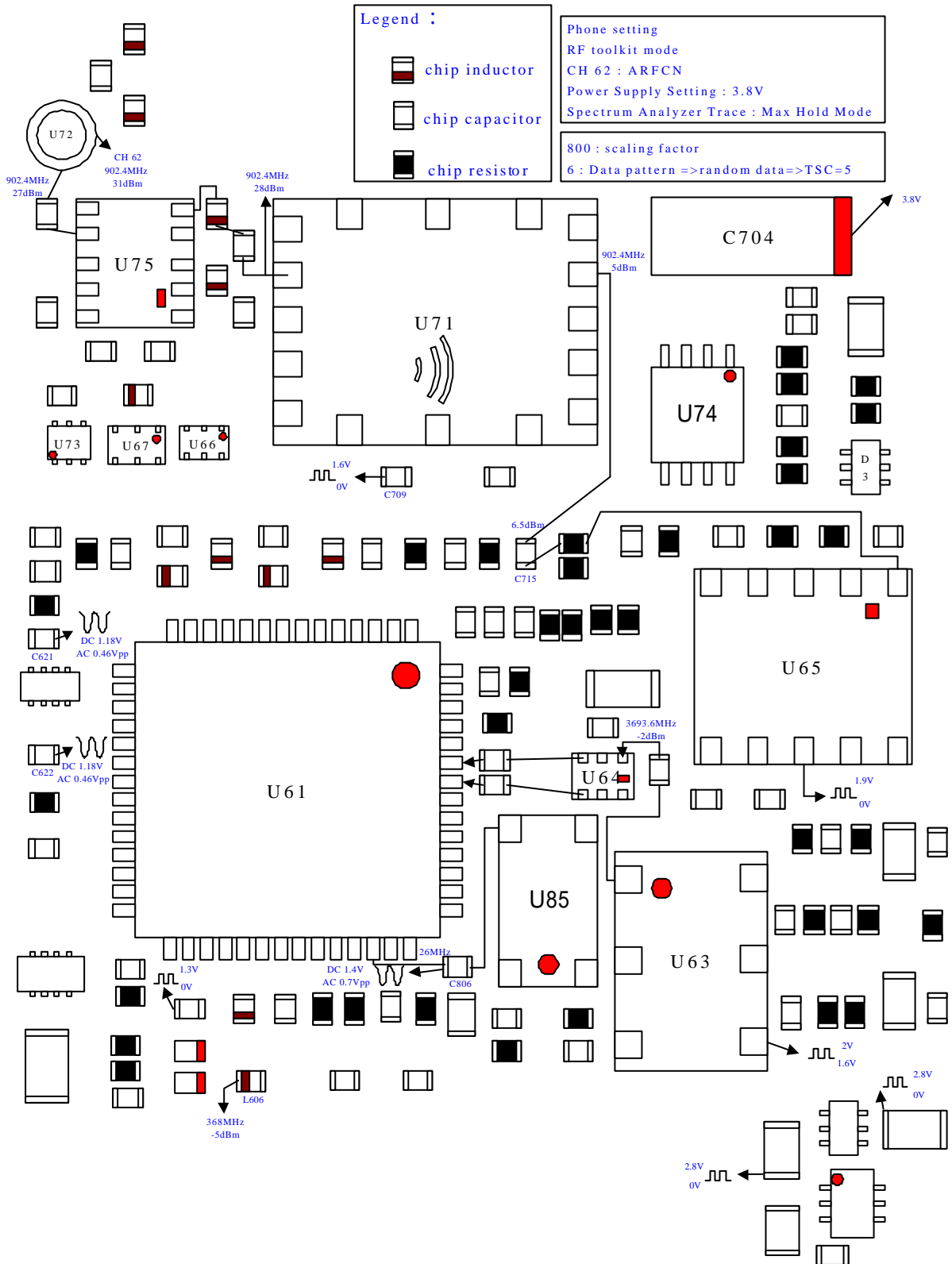
DCS 1800 Receive Signal Path Diagram



DCS 1800 Transmit Signal Path Diagram



EGSM 900 Transmit Signal Path Diagram



1.T/R switch:

U75 is a front-end switch device for GSM/DCS.

These devices include 1 diplexer + 2 switches + 2 LPFs. The below table shows the three operating mode.

Mode	Vc1 (pin 2)	Vc2 (pin 11)
GSM TX	L	H
DCS TX	H	L
GSM Rx and DCS Rx	L	L

These four control signals are generated from U73 Dual Buffer, which controlled by GSM_T/R(U1 Pin B10) DCS_T/R(U1 pin E9).

2.PA and power control circuit:

PA (U71) is control by signal BS and APC (U74 Pin7). APC is generated from U74 (Operational Amplifier), which controlled by RAMP signal (U3 pin 47). The power control loop is a current sensor. U74 works as the error amplifier. It can compare the RAMP signal and feedback signal from R702 then amplify the error part to drive PA. U86 is a switch for power saving. Please refer to TX signal path chart for detailed signal waveform. Please refer to TX signal path chart for detailed signal waveform.

3.Transceiver:

U61 is the transceiver.

A>.Receiver Operation

The receiver employs a direct-conversion architecture. The incoming RF signals pass via a suitable front-end filter into the balanced LNA and a pair of Gilbert Cell mixers. The mixers convert the RF signal directly down to baseband frequencies. The I/Q local oscillator signals for the mixers are derived from a 3.6~3.84GHz RFLO, divided down by high-speed BiCMOS flip-flops. The receiver has 2 separate front-end blocks, optimized for 900MHz and 1.8GHz operation respectively. Each front-end block has 3 discrete gain settings. These settings allow the signal levels in the receiver to be optimized, particularly under high signal conditions. The I/Q baseband lowpass filters and programmable gain amplifiers follow the mixer. The baseband filtering is distributed in the PGA and comprises a single R/C

low-pass section and 2 second order Butterworth filters. The majority of the baseband filtering is implemented on-chip. Each 3 stage PGA is DC coupled and has a gain range. The base-band PGA has 2dB gain steps and 90dB control range. The baseband PGA includes a DC offset cancellation system.

The signal is then down converted by a demodulator to I and Q.

B>.Transmitter Operation

The transmitter chain converts differential IQ baseband signals to a suitable format for transmission by a power amplifier.

The common mode voltage range of the modulator inputs is 0.9V to 1.4V and they have 1.25V differential swing. The modulator circuit uses double-balanced mixer for the I and Q paths. The Local signals are generated by dividing the IFLO signals by 8 for GSM, and dividing IFLO signals by 4 for DCS, and then passed to the modulator through a phase splitter / shifter. The IF signals generated are then summed to produce a single modulated IF signal which is amplified and fed into the offset PLL block.

Within the offset PLL block there are a down converter, a phase comparator and a VCO driver. The down converter mixes the first local signal and the TXVCO (U65) signal to create a reference local signal for use in the offset PLL circuit. The phase comparator and the VCO driver generate an error current, which is proportional to the phase differential between the reference IF and the modulated IF signals. This current is used in a second order loop filter to generate a voltage, which in turn modulates the TXVCO.

4. Synthesizer:

A>.TCVCXO

U85 is a TCVCXO module which providing RF system clock (26 MHz). The 13MHz generated by dividing the 26 MHz by 2 provide Baseband system clock. U3 (Pin F8) can fine tune the clock frequency by AFC signal (U85 Pin1).

B>.RF VCO

U63 is a RF VCO module. The frequency band is 3610 3840 MHz for GSM / DCS TX / RX. The output frequency can be controlled by U61 pin 43,44.

C>.IF VCO

IF VCO consists of U61 pin 32, 33, D601, D602(varactor) and other RLCs. The operating frequency is 360 MHz, and 368MHz. The output frequency is controlled by U61 pin 34.

5.Regulator

U90 is the Dual regulator for RF circuit. The first regulator (pin 1) provides transceiver 2.85V and TXVCO (U65) 2.85V through Q700 pin6 which is a switch for power saving. The second regulator (pin 6) provides synthesizer of transmitter and RFVCO (2.85V) through Q700 pin3. All the Dual regulators can be shut down simultaneously by set TCXOEN signal (U1 pin E11).

Table A**Receiver Troubleshooting and Repair Chart**

Rx Symptom	Probable Cause	Verification and Remedy
1. Portable telephone exhibits poor reception and/or erratic operation (such as calls frequently dropping, weak and/or distorted audio, etc.).	a) Antenna assembly is defective.	<ol style="list-style-type: none"> 1. Check to make sure that the antenna is properly touched to the telephone Main Board pad. If not, substitute a known good antenna assembly. 2. If the fault is still present, proceed to b.
	b) Defective or misplaced telephone Main Board.	<ol style="list-style-type: none"> 1. Check for appropriate frequencies and power level gains/losses in the Rx path. 2. Replace malfunctioning components if listed in parts list. Likely fail components are : U75, C608, C609, L601, L602, L603, and L604. 3. If parts replacement doesn' t correct the fault, replace the SAW filter U66, U67, or transceiver U61.

Table B
Transmitter Troubleshooting and Repair Chart

<i>Tx Symptom</i>	<i>Probable Cause</i>	<i>Verification and Remedy</i>
1. Transmit audio is weak, (usually indicated by called parties complaining of difficulty in hearing voice from portable phone).	a) Microphone connections to Main Board defective.	1. Check connections and if OK, proceed to b.
	b) Microphone defective.	1. Substitute a known good microphone. 2. Place a call and Verify improvement in portable transmit signal as heard by called party. If good, re-assemble portable with new microphone 3. If microphone is not at fault, re-install original microphone and proceed to c.
	c) Main Board assembly defective.	1. Replace Main Board Assembly. 2. If Main Board Assembly is at fault, examine for improper solder and connections.

Download

Introduction:

This document describes all the functions in service DMtool.

System requirements and setup:

A. Minimum requirement:

Operation system:	Win95/ Win98 / WinNT / Win2000.
CPU:	Pentium 233 Mhz or higher.
Hard Disk:	Free 10MB space.
Memory:	64MB RAM.
Input Device:	Keyboard and mouse

B. Calibration requirement:

- 1.Instrument for calibration Hp8922M GSM/DCS/PCS MS Test Set
Hp8960 GSM/DCS/PCS RF Interface
- 2.GPIB interface card and cable For RF calibration
- 3.Power Supplies:
HpE3631, Hp66332A, Hp66311, Hp66111, Hp66309
- 4.Communication cables Rs232 and Acer Downloader
- 5.RF Cable 50 ohm cable for RF calibration.
- 6.Dummy battery For RF and battery calibration.

C. Setup in Windows:

In Windows 95/98/NT/2000, extract the Dmtool compress files to any temporary directory. It will create DISK1 this subdirectory. Please go into the DISK1 and double click the setup.exe. The Install shield will auto setup the Dmtool in your operating system.

Some necessary files are listed below :

Fixed Items:

=====

- (1) DMtool.exe (main application)
- (2) DL.dll (the dll for download)
- (3) CALDL.dll (the dll for calibration)
- (4) E2pMmi.dll (the dll for read/write e2p and mmitest)
- (5) AtStCom.dll (the dll for animation and melody download)
- (6) r_flash_xx.mot (Rs232 boot code file)
- (7) dmtool.hlp, dmtool.cnt (dmtool help file)
- (8) AutocalMarch.cfg (auto-calibration parameter reference file)

Volatile Items:

=====

The files you gotten may differ from the files listed below as the result of software upgraded for handsets. When the software of handsets release, you will get a handset program file and an eeprom database file.

- (9) mh1060.bin (eeprom database file, its file extension name must be "bin")
- (10) mh106010.mot (handset program file, its file extension name must be "mot")

Function descriptions:

There are several windows (views) in the DMtool application. Each view performs a special function.

A. Download:

Before you start a RS232 download, you must select a flash-load program file by pressing down the “Flash File” button or “Set Flash File” submenu button in “File” menu. Then you must select the correct com port in “Option” menu. When the Dmtool application setup completed, the default boot code will be assigned. You don't need to change the boot code yourself. You can change boot code by “Boot File” button or “Set Boot Code File” submenu button in “File” menu. If you assigned incorrect flash or boot code file, you may still encounter errors.

Before press “Download” button to start a RS232 download process, you must power off the handset. When the string “Wait for target ready” appears, power on the handset. Then the download process starts. It will take about 5 minutes for completing the download.

After undergoing a completed download process, the Dmtool will auto trigger a Set E2P Default dialog to execute set e2p default. There are two option, “Set E2P Default” or “Set E2P Default and Phone Book Initialize” in this dialog. You must select “Set E2p Default and Phone Book Initialize” and click the “OK” button. After the “Wait for target ready” message appears, power on the handset. If the handset receive the set e2p command form dmtool, it will start to execute set e2p command and send the ack message to dmtool. When the dmtool received the ack from handset it will display the message “Waiting for target Acknowledgment ...”. If the handset complete the set e2p command, it send the ack to dmtool. When the dmtool receive the ack message, it will display “Set e2p command success” message.

Remark:

1. It must be emphasized that never stop or remove the power supply (battery) when your handset is downloading the block 0

and block 1 program codes . It is writing critical boot codes at this time. If you terminate the download process at this moment, this handset not only can't power on but also can't re-download again. In this case , the only solution is using a special "Jtag interface and cable" to do a low-level download.

2. When the new vendor flash used in handset, the boot code r_flash_xxx.mot need upgrade to new version which support new vendor flash.

B. Set E2P:

There are several sub-options for this function. You can select these option from "Set E2p Mode" submenu in "Option" menu. You can see which set e2p mode you select current in the status bar (in the right-bottom) of the window. To execute those options, first power off the handset and click this "Set E2p" button. After the "Wait for target ready" message appears, power on the handset. Details for each sub-options are listed below.

- (1).Set EEPROM default will set a part of contents in EERPOM to factory default value. Phone books and calibration data won't be reset in this operation.
- (2).Set EEPROM Default Phone books initialize is similar to Set EEPROM default, but this option will erase all phone book data in EEPROM.

C. Read/Write FlexOption:

"Flex option" is used for modifying the handset' s flex option settings. Changing those options are straightforward, just click the individual enable/disable check button of every tree-item. The procedure to Read/Write FlexOption is:

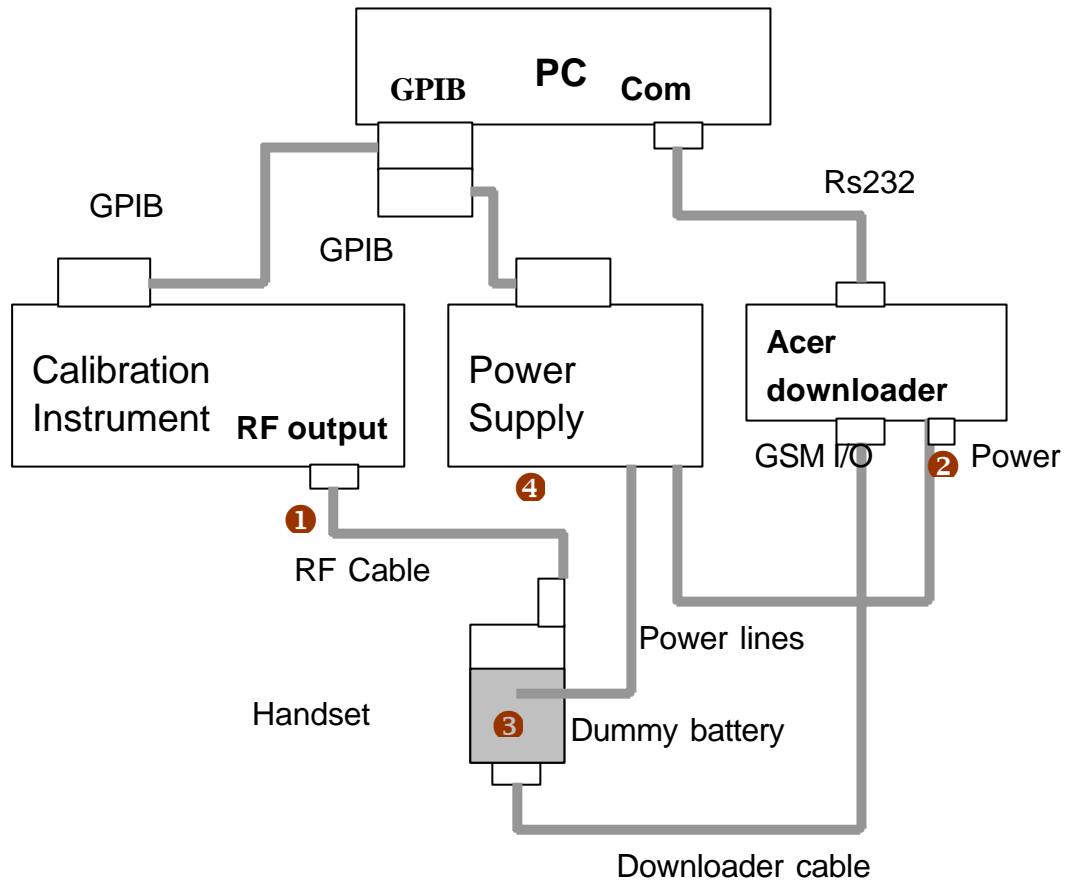
- (1).Set baud rate 115200 and select com port then connect RS232 communication.
- (2).Turn on the handset.
- (3).Check the database file are the same as software version. You can assign database file from menu "File" → "Set Database File" . You can verify software version by keypress "*#300#" in handset.
- (4).Click "Read Flex Option" to read flex option from handset.
- (5).Select the feature you want enable/disable by click check button

in option tree-item.

(6).Click “ Write Flex Option” to write flex option to handset.

D. Calibration:

(1).calibration connect cable:



PS:

1. In some calibration instrument, the RF output of GSM and DCS are different, so you must calibrate GSM and DCS each other. ①
2. If you have no connector with power supply and Acer downloader, you can get a travel charger and cut it, then divide the positive and negative electrode to connect into power supply. ②

(2). Calibration Item:

2-1.Configuration file:

The auto-calibration configure file contents some optimal value for some object in handset and some parameters dependent on calibration device and handset.

2-2.Auto-Power-Control:

If the flag is TRUE and the power supply is a supported type (please refer to System Requirement), the calibration will start automatically, or you must operate it manually.

2-3.Set Ramping Default:

Some measurement instruments do not support ramping calibration, you can set the ramping table by default values.

2-4.HW Version:

The hardware version of the target handset. It combined with major and minor hardware version. The major hardware version is indicates the type of PA, and the minor hardware version indicates the type of baseband or others.

Major version 1.x – **Conexant PA**

Major version 2.x -- **Hitachi PA**

2-5.PA Type Selection:

There are two kinds of PA, **Conexant PA** and **Hitachi PA**. Before you start to calibrate, you must select the correct PA type.

2-6.Auto-calibration selection:

Choose the items that you want to calibrate when running auto-calibration function.

AFC: Frequency. (Before calibrate AFC, you must select AGC Item)

AGC: RxGain

APC: TxPower

ADC: Battery is for battery A/D converter calibration

ARC: Ramping table calibration.

2-7.Band selection: Choose the frequency band for calibration.

GSM900

DCS1800

E. Start calibration:

Before start calibration you must check the following things:

- (1)Change your battery to dummy battery.
- (2)Check connect cable is OK?
- (3)Check GPIB interface is OK?
- (4)Power on power supply and set it to 3.8 V

Before Click the “ Auto-Calibration” button, make sure all listed

items are done:

- (1) Set the correct com port and baudrat in option menu
- (2) Choose Auto-calibration configure file. When you set up the program success, we had assigned the default configure file.

What you want to do is to check or set the value of the field **Board_Address** to your GPIB0 primary address.

*For example: Auto-calibration configure file [GPIB_DEVICE]
Board_Address=0 ← GPIB0 primary address.*

- (3) Check your target handset **software version**(you can input ***#300#** int the keypad)And assign the correct **database file** which dependent with the software version of target handset.
- (4) Check your target handset **hardware version**(you can input ***#300#** in the keypad). Then select your **PA Type** by your hardware version. 1.0 for **Conexant PA** and 2.0 for **Hitachi PA**. And input the **hardware version** of target handset in **HW Version** field of window.
- (5) Choose calibration items and frequency band in check box.

When all settings are done, just click the “Auto-Cal” button in main window to start the calibration process.

- (1) If the power supply is a supported type, the calibration will start automatically, or you must operate it manually: Turn off the power supply before the calibration start, and turn it on immediately when the message **Wait for target ready** show up. For details: If your power supply isn’ t supported by dmttool, then you must turn off the power supply (please refer the figure of “**Calibration Connect Cable**”), then the power of target handset and Acer downloader will turn off. when the message “ **Wait for target ready**” show up, you must turn on the power supply immediately. If your power supply is supported by dmttool and you check up the Auto Power Control check box, then the dmttool will auto do the all things in the above.
- (2) If the DmTool receive the signal from target handset , then it will start to identify calibration device, and show up **Identify Calibration device..**message. If the calibration device identified ok, then it will start the calibration.
- (3) And then the dmttool will start auto calibrate the target handset

with calibration instrument, and receive the result messages of calibration . You can see the result message of calibration in the Calibration Window.

(4) Calibration Notes:

There are 5 options for auto-calibration:

- AGC (RX)
- AFC (Frequency error)
- APC (TX)
- ARC (Ramping)
- ADC (Battery)

There is no correlation between AGC, APC, and ADC options ,therefore you can make any combinations when calibrate these options. However, AFC need some parameters gotten from AGC, you must select AGC when you want to calibrate AFC. Besides, GSM and DCS share the same parameters of AFC and AFC will be calibrated only in GSM band, you should select GSM band to calibrate AFC.

ARC requires some parameters gotten from APC, but these parameters can be retrieved from the E2P memory in target handset. Thus if you can guarantee these parameters are well-setup, you can calibrate ARC only without APC. If you know nothing about it, then calibrate both of them is a recommendation.

If your calibration instrument can only calibrate one band (GSM or DCS) at a time, you have to pay more attention about the combination of calibration options, recommended combinations are list below:

(1). GSM band :

AGC, ADC ,and APC can be calibrated separately.

AGC+AFC

APC+ARC

AGC+AFC+APC

AGC+AFC+APC+ARC

AGC+AFC+APC+ARC+ADC

(2). DCS band :

AGC, ADC, and APC can be calibrated separately.

APC+ARC
AGC+APC
AGC+APC+ARC
AGC+APC+ARC+ADC

If your calibration instrument can't support ramping calibration, we support **Set Ramping default** to set the ramping table to optimal default value.

F. E2p Clone:

"E2p Clone" is used for duplicating the data in the handset's EEPROM. It backup the Network-Lock, handset-feature settings, and phone book records to PC and enable users to restore them to handsets latter. The procedure to Read/Write FlexOption is:

- (1)Set baud rate 115200 and select com port then connect RS232 communication.
- (2)Turn on the handset.
- (3)Check the database file are the same as software version. You can assign database file from menu "File" → "Set Database File". You can verify software version by keypress "*#300#" in handset.
- (4)Select the e2p backup file and phonebook backup file.
- (5)Click "Backup" to backup e2p and phonebook from handset to file.
- (6)Click "Restore" to restore e2p and phonebook from file to handset.

FAQ:

1..How do I select a correct boot code file?

The boot code file plays an important role during a download procedure. It takes care of programming flash ROM and is responsible for data receiving/transmission. The boot code files for download vary as different MS models. For March model, it uses r_flash_xxx.mot. When the new vendor flash used in handset, the boot code r_flash_xxx.mot need upgrade to new version which support new vendor flash. Users just need to click the "Boot File" button in Download window or click the "Set Boot Code File" menu button in "File" menu to select this file.

2. Why can't I download/upgrade programs into the handset?

For RS232 download, verify the following procedures step by step:

1. Do you set the switch to left side in your downloader?
2. Do you assign a correct boot code file?
3. Do you select a correct COM port?
4. Dose the connection between the MS and PC setup properly?
5. Do you power off the MS before the download starts?
6. Do you power on the MS after the sentence "Wait for Target ready.." appear?
7. Have you ever terminated a download process when it was downloading the block 0 and 1 codes? If yes, then the boot-code area of this handset has been corrupted and can't use RS232 download.

3. Why can't set e2p ?

1. Do you select a correct COM port?
2. Dose the connection between the MS and PC setup properly?
3. Do you power off the MS before the Set E2p starts?
4. If the sentence "Wait for Target read.." dosen't appear, it may be some application occupied the com port now. Please terminate that application and execute set e2p again.

Disassembly

Introduction

Responsible care should be taken during the disassembly and reassembly of the units in order to avoid damaging or stressing the housing and internal components. Ensure that a properly grounded high impedance conductive wrist strap is used while performing these procedures on electronic units.

NOTE Many of the integrated circuit devices used in this equipment are vulnerable to damage from static charges. Ensure that adequate static protection is in place when handling, shipping, and servicing the internal components of this equipment.

Recommended Tools

The following tools (or similar tools with the same functions) are recommended for use during the disassembly and reassembly of the phone.

Anti-Static Mat (Ground Cord included)

Anti-Static Wrist Strap

Torque Screw Driver (T5 type, torque is set to 1.2kg-cm)

Tweezers

Disassembly Procedure

The following information describes the procedure for removing and accessing various parts of the phone.

Front Case Removal

1. Turn off the telephone.
2. Slide down the bottom cover, and remove the battery pack from the Rear housing.



3. Remove the bottom cover and nameplate from the rear housing.



4. Release the six screws and remove them.



5. Unclip the 2 snap fits from the left and right hand sides of the unit and separate the rear from the front housing



Main Board Removal

1. Carefully separate the main board from the front housing by lifting it upwards.



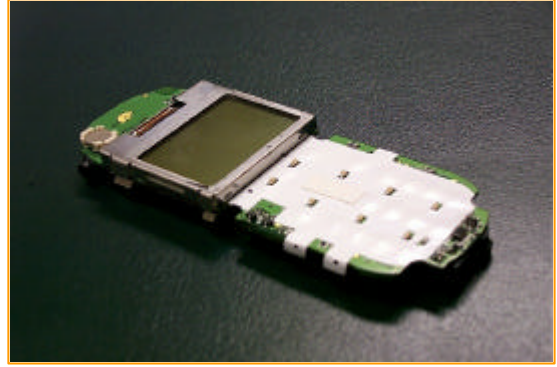
2. Carefully use a tweezers to remove the four corner of RF Shielding case.



3. Carefully use a tweezers to remove the four corner of BB Shielding case.

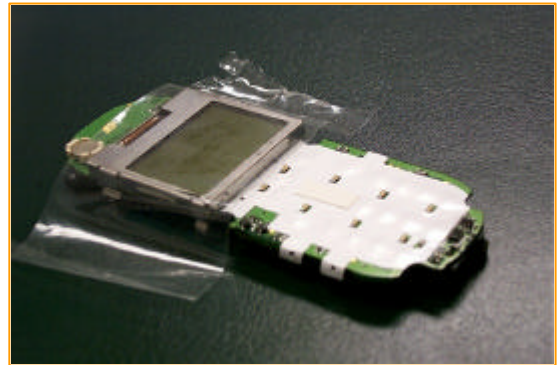


4. Place the main board facing upwards on an anti-static mat.



5. Place a protection tape over the LCD module.

NOTE Do not touch the LCD module with your hands!



6. Remove the Keypad from the front housing by lifting it upwards.



Assembly Procedure

Once the unit is disassembled and the repair is carried out, it then becomes obvious that to assemble the unit, the procedure is the reverse of that previously completed for disassembly.

Troubleshooting

Level 1 ~level 2 repair

Symptom	Probable Cause	Verification and Remedy
1. Unit doesn' t turn on	a). Battery either discharged or defective.	1. Measure battery voltage. If the battery voltage is <3.2V, recharge the battery using the appropriate battery charger. 2. If the battery can' t be recharge, replace the battery.
	b). Shield case short with components	1. Visually inspect the RF/BB shielding case. If they become deformed , replace the shielding case.
2. Keypad no function.	Keypad bottom short	1. Disassembly to replace the keypad metal dome.
3. Buzzer no function	Components shift	1. Disassembly to visually inspect the U13. If the spring of the U13 becomes deformed, replace the U13.
4. Vibrator no function	Components shift	1. Disassembly to visually inspect the M1. If the spring of the M1 becomes deformed and doesn' t contact well with PCB pads, replace the M1.
5. Speaker no function	Components shift	1. Disassembly to visually inspect the LS1. If the spring of the M1 becomes deformed and doesn' t contact well with PCB pads, replace the LS1.
6. Micphone no function	Components shift	1. Disassembly to visually inspect the X2. If the cover of the X2 is not matched with the micphone hole or micphone doesn' t contact well with PCB pads, replace the cover of the X2 or micphone.
7. Data cable no function	Components are at fault.	1. Measure voltage level if VR3 and VR2B_SW voltage level are equal 2.9V.
8. Can' t charge	Battery or charger is at fault	1. Use the correct battery and charger to check the charge function. 2. If charging function is ok, the battery or charger is illegal.

Level 3~ level 4 repair

<i>Symptom</i>	<i>Probable Cause</i>	<i>Verification and Remedy</i>
1. Unit doesn't turn on	a) Battery connector open or misaligned.	<ol style="list-style-type: none"> 1. Visually inspect the battery connectors on both the battery pack and the unit. 2. Disassembly to check the battery connectors if it misaligned or short with the RF or Base-band shielding cases. If necessary, replace either the battery or battery connector. 3. If the battery connectors are not at fault, proceed to b.
	b) X1, R56, C1 or C2	<ol style="list-style-type: none"> 1. Use the power supply to supply the VBAT voltage. Then, press the power-on key. Visually inspect the current of the handset used. 2. Measure the waveform of the R56. 3. If the waveform isn't the 32KHz clock, replace the C3 and R2. 4. If they are not at fault, proceed to c.
	c).C3 or R2 is at fault.	<ol style="list-style-type: none"> 1. Measure the waveform of the R2. 2. If the waveform isn't the 13MHz clock, replace the X1, R56, C1 or C2. 3. If they are not at fault, proceed to f.
	d) U3 is at fault.	<ol style="list-style-type: none"> 1. If the current is under 100mA when power on, check the VR1 (2.5V), VR2 (2.9V), VR2B (2.9V), and VR3 (2.9V) voltage. 2. If they are not correct, maybe the U3 is at fault. Replace the U3.
2. LCD no display.	a) LCD module is at fault	<ol style="list-style-type: none"> 1. Disassembly to visually inspect the LCD module. If the glass is break on the LCD, replace the LCD module. 2. If the LCD module is not break, proceed to b

	b) LCD module has no power.	<ol style="list-style-type: none"> 1. Visually inspect the C34 or R27 is still on the board. If no, replace the C34 or R27. 2. Measure the voltage of C34. If it is not about 8V, the LCD driver IC is failed on the LCD module. Replace the LCD module. 3. If the LCD module is not break, proceed to c
	c) U1 is at fault	<ol style="list-style-type: none"> 1. Power on the handset. Then measure the waveforms of the J2.6, J2.4 and J2.5 pins. 2. If the J2.6 pin is always low or the other two pins (J2.4 and J2.5) are no data, the U1 is at fault. Replace the U1.
3.LED no display	a) Components shift	<ol style="list-style-type: none"> 1. Disassembly to visually inspect the U7, R34, BQ2, R40, R35. If any component is shifted, replace the components. 2. If they are not shifted, proceed to b
	b) U1 is at fault	<ol style="list-style-type: none"> 1. Measure the waveform of the U7.2. If the U7.2 doesn't output any signal when LED function is executed, U1 is at fault. 2. If it is not at fault, proceed to c.
	c) Other components are at fault.	<ol style="list-style-type: none"> 1. Measure the waveform of the U7.6, BQ2.2, and BQ2.3 when LED function is executed. 2. If any pin is no signal, replace the component relative to that pin.
4.Buzzer no function	a) Components shift	<ol style="list-style-type: none"> 1. Visually inspect the R48, BQ3, R45, and R71. If any component is shifted, replace the components. 2. If they are not shifted, proceed to b
	b) U1 is at fault	<ol style="list-style-type: none"> 1. Measure the waveform of the D16.1. If the D16.1 doesn't output any signal when Buzzer function is executed, U1 is at fault. 2. If it is not at fault, proceed to c.
	c) Other components are at fault.	<ol style="list-style-type: none"> 1. Measure the waveform of the BQ3.3, BQ3.2, and BQ3.1 when Buzzer function is executed. 2. If any pin is no signal, replace the component relative to that pin.

5.Vibrator no function	a) Components shifted	<ol style="list-style-type: none"> 1. Visually inspect the R46, BQ4, and R49. If any component is shifted, replace the components. 2. If they are not shifted, proceed to b
	b) U1 is at fault	<ol style="list-style-type: none"> 1. Measure the waveform of the R46. If the R46 pin doesn't output any signal when Vibrator function is executed, U1 is at fault. 2. If it is not at fault, proceed to c.
	c) Other components are at fault.	<ol style="list-style-type: none"> 1. Measure the waveform of the BQ4.3, BQ4.2, and BQ4.1 when Vibrator function is executed. 2. If any pin is no signal, replace the component relative to that pin.
6.Speaker no function	a) Components shifted	<ol style="list-style-type: none"> 1. Disassembly to visually inspect the LS1. If the spring of the M1 becomes deformed and doesn't contact well with PCB pads, replace the LS1. 2. Visually inspect the R73, BL2, BL3 and R74. If any component isn't contacted well, replace the components. 3. If they are not shifted, proceed to b
	b) U3 is at fault	<ol style="list-style-type: none"> 1. Measure the waveforms of the R73 and R74. If the R73 or R74 pins don't output any signal when speaker function is executed, U3 is at fault. 2. If it is not at fault, proceed to c.
	c) Other components are at fault.	<ol style="list-style-type: none"> 1. Measure the waveform of the BQ4.3, BQ4.2, and BQ4.1 when Vibrator function is executed. 2. If any pin is no signal, replace the component relative to that pin.
7.Micphone no function	a) Components shifted	<ol style="list-style-type: none"> 1. Visually inspect the R50, R51, C44, C45, R43, R44, R47, C42, C43, C53, C54 and U14. If any component isn't contacted well, replace the components. 2. If they are not shifted, proceed to b

	b) U3 is at fault	<ol style="list-style-type: none"> 1. Measure the waveforms of the R50, R51, and R43. If the R50 or R51 pins don't output any signal or Micbias voltage level is not equal 2~2.5V when microphone function is executed, U3 is at fault. 2. If it is not at fault, proceed to c.
	c) Other components are at fault.	<ol style="list-style-type: none"> 1. Measure the waveforms of U14.5, U14.1, U14.4 and U14.3 when microphone function is executed. 2. If any pin is no signal, replace the U14.
8.Handfree no function	a) Components shift	<ol style="list-style-type: none"> 1. Disassembly to visually inspect the J3. If audio jack (J3) pins don't contact well with PCB pads, solder the pins and pads together. 2. Visually inspect the R72, R32, U9, U8, U10, R36, BL1, R41, C38, R38, R37, C37 and J4. If any component isn't contacted well, replace the components. 3. If they are not shifted, proceed to b
	b) U3 is at fault	<ol style="list-style-type: none"> 1. Measure voltage level if VR3 and VR2B_SW voltage level are equal 2.9V. 2. Measure the waveforms of the BL1, R41, and J4. If the BL1 or R41 pins don't output any signal when handfree function is executed, U3 is at fault. 3. If it is not at fault, proceed to c.

	c) Other components are at fault.	<ol style="list-style-type: none"> 1. When handfree is plugged in, IO13ACCIN detect 0V. Then, IO3DATA_HP_SEL outputs high level, U8.1 pin connects to U8.4 pin and U10.1 pin connects to U10.4 pin. If not, maybe the U8 and U10 are at fault. Replace the U8 or U10. 2. After IO3DATA_HP_SEL outputs high level, measure the waveform of the U10.4 pin. If its voltage level doesn't drop to 1 ~ 2.6V and the voltage of the U3.C6 pin isn't equal to 0.5 ~ 1.3V, test it again by another handfree. If handfree is still no function, U9, R37, R38, R6 or R9 is at fault. Visually inspect the components. If any component isn't contacted well or wrong, replace the components. 3. Measure the waveforms of U9.5, U9.1, U9.4 and U9.3 when handfree function is executed. 4. If any pin is no signal, replace the U9.
9.Datacable no function	a) Components shift	<ol style="list-style-type: none"> 1. Disassembly to visually inspect the J3. If audio jack (J3) pins don't contact well with PCB pads, solder the pins and pads together. 2. Visually inspect the R72, R32, U9, U8, U10, R36, BL1, R41, C38, R38, R37, C37 and J4. If any component isn't contacted well, replace the components. 3. If they are not shifted, proceed to b

	b) Components are at fault.	<ol style="list-style-type: none"> 1. Measure voltage level if VR3 and VR2B_SW voltage level are equal 2.9V. 2. When datacable is plugged in, IO13ACCIN detect 0V. Then, IO3DATA_HP_SEL outputs high level about 1 ~ 2 sec, and switches to low level. U8.3 pin connects to U8.4 pin and U10.3 pin connects to U10.4 pin. Check if the U8.3 and U8.4 pins are short. If not, maybe the U8 is at fault. Replace the U8. 3. Check if the U10.3 and U10.4 pins are short. If not, maybe the U10 is at fault. Replace the U10. 4. After IO3DATA_HP_SEL outputs low level, measure the waveform of the U10.4 pin. If its voltage level isn't equal to 2.7 ~ 2.9V, maybe U9 is at fault. If U9 isn't contacted well or wrong, replace the component. 5. Measure the voltage of the U3.C6. If it isn't equal to 1.35 ~ 1.45V, maybe the R6 or R9 is at fault. Check their voltage value and replace the components. 6. If it is not at fault, proceed to c.
	c) U1 is at fault	<ol style="list-style-type: none"> 1. Measure the waveforms of U8.3 and U10.3 when datacable function is executed. 2. If any pin is no signal, maybe U1 is at fault then replace the U1.
10. Can't find SIM	a) Components shift	<ol style="list-style-type: none"> 1. Visually inspect the U2. If the pins of the SIM socket is at fault, Disassembly to replace the U2. 2. Disassembly to visually inspect the R8, R7, C5, C8, R4, C4 and R13. If any component isn't contacted well, replace the components. 3. If they are not shifted, proceed to b

	b) Components are at fault.	<ol style="list-style-type: none"> 1. Plug in the SIM card to power on the handset and measure the voltage of the TPSIM1. If it isn't equal to 3V or 5V, check the R8 and replace it. 2. If R8 is ok but TPSIM1 is still no voltage, proceed to c. 3. Measure the voltage of the TPSIM4 if it goes to high about 3V or 5V. If not, check the R7 and replace it. 4. If R7 is ok but TPSIM4 is still no voltage, proceed to c. 5. Measure the voltage of the TPSIM2 if it output a clock about 3V or 5V. If not, check the R4 and replace it. 6. If R4 is ok but TPSIM4 is still no voltage, proceed to c. 7. Measure the voltage of the TPSIM3 if it goes to high about 3V or 5V. If not, proceed to c.
	c) U3 or U1 is at fault	<ol style="list-style-type: none"> 1. If check the b steps and the TPSIM1, TPSIM2, TPSIM3 or TPSIM4 is still no signal, maybe the U3 or U1 is at fault. 2. Replace the U3 then re-check the step b. 3. If it is still no signal, replace the U1.
11.Can't charge	a) Battery or charger is at fault	<ol style="list-style-type: none"> 1. Use the correct battery and charger to check the charge function. 2. If charging function is ok, the battery or charger is illegal. 3. If it still can't charge, proceed to b

	b) Components shift	<ol style="list-style-type: none">1. Disassembly to visually inspect the J1. If the pins of the power jack (J1) aren't contacted well with the pads of the PCB, re-solder the pins.2. Visually inspect the R60, C55, F1, R68, R62, R63, R65, C47, R70, R64, U16, U17, D1, R24, D15, C48, R66, R67 and U18. If any component isn't contacted well, replace the components.3. Visually inspect the polarity of the U17, D1 and D15. If any component is wrong, replace the component.4. Check the F1. If it is open, replace the F1.5. If they are not wrong, proceed to c
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c) Peripheral components for charging are at fault.		<ol style="list-style-type: none"> 1. Use dummy battery to check the charging function. JP1.4 connected to V+ (3.6V) of the power supply. JP1.1 connected to V- (GND) of the power supply. JP1.3 connected to a resistor (10K ohm) to ground. JP1.2 connected to a resistor (47 ohm) to 1.2V of the power supply. 2. Plugged in the charger then check the voltage of the CHARGERIN pin and U17.5 pin. If their voltage isn't the same about 4~6V, R68 is at fault. Replace the R68. 3. Check the voltage of the U16.2 if it is under 0.6V. If not, check the resistor value of the R62 and R65. If anything is wrong, replace the components. 4. Check the voltage of the U16.5 if it is above 3V and the voltage of the U17.1 if it is under 0.6V. If not, maybe U16 is at fault. Replace the U16. 5. Check the voltages of the U17.2 and U17.4 if their voltages are above 4V. If not, maybe U17 is at fault. Replace the U17. 6. Check the voltage of the D1.2 if it is above 4V. If not, maybe D1 is at fault. Replace the D1. 7. Measure the current flowing across the R24. If not, maybe R24 is at fault. Replace the R24. 8. If they are not wrong, proceed to d
	d) U3 is at fault	<ol style="list-style-type: none"> 1. When the charger is plugged in, the voltage of the VCHG pin is 4~6V. And when charging, the ICTL pin will high/low to control charging pulse. 2. If not, maybe U3 is at fault. Replace the U3.
Note		

Replacement Parts

Exploded View

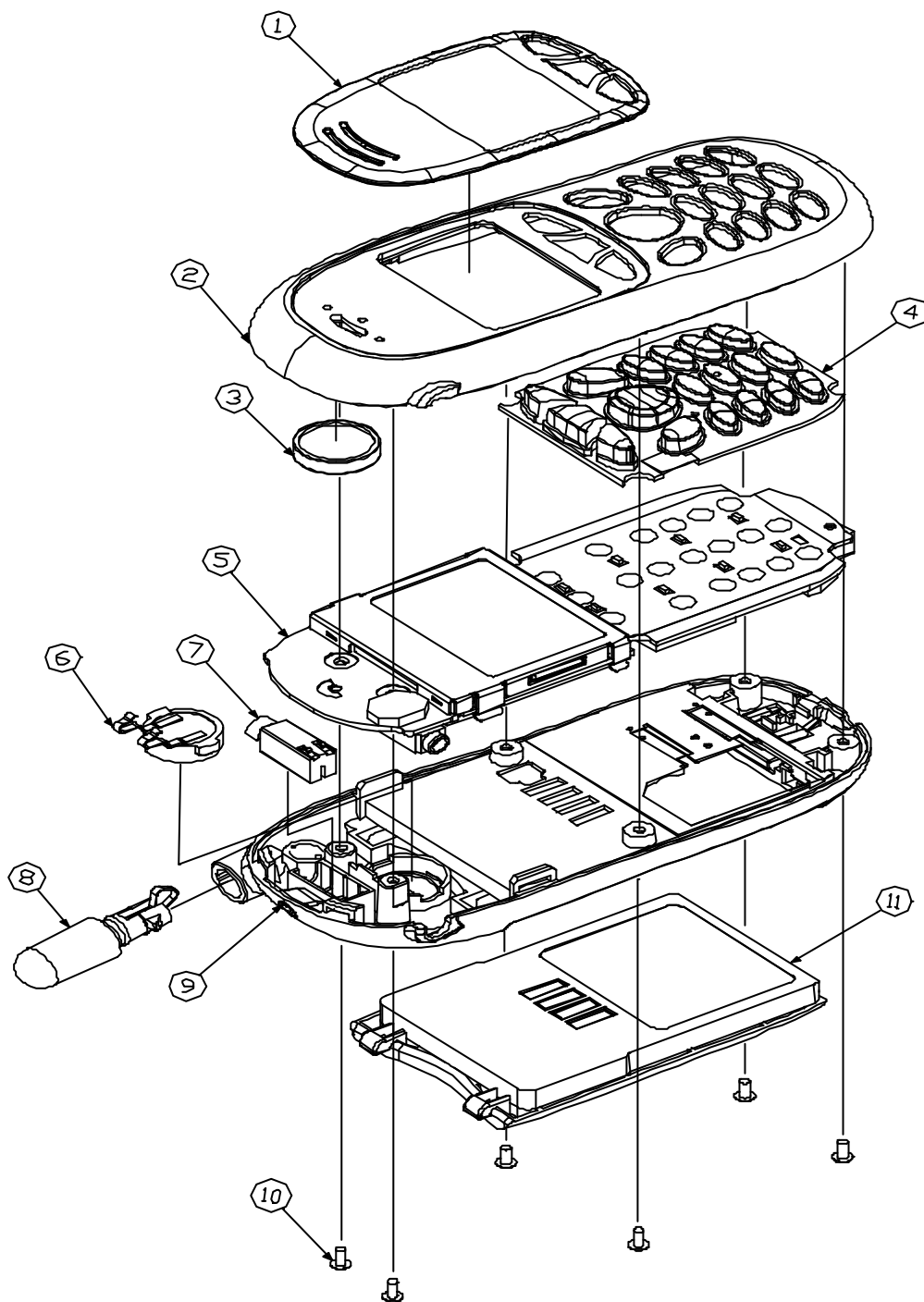


Fig 1. Mechanical Exploded View (I)

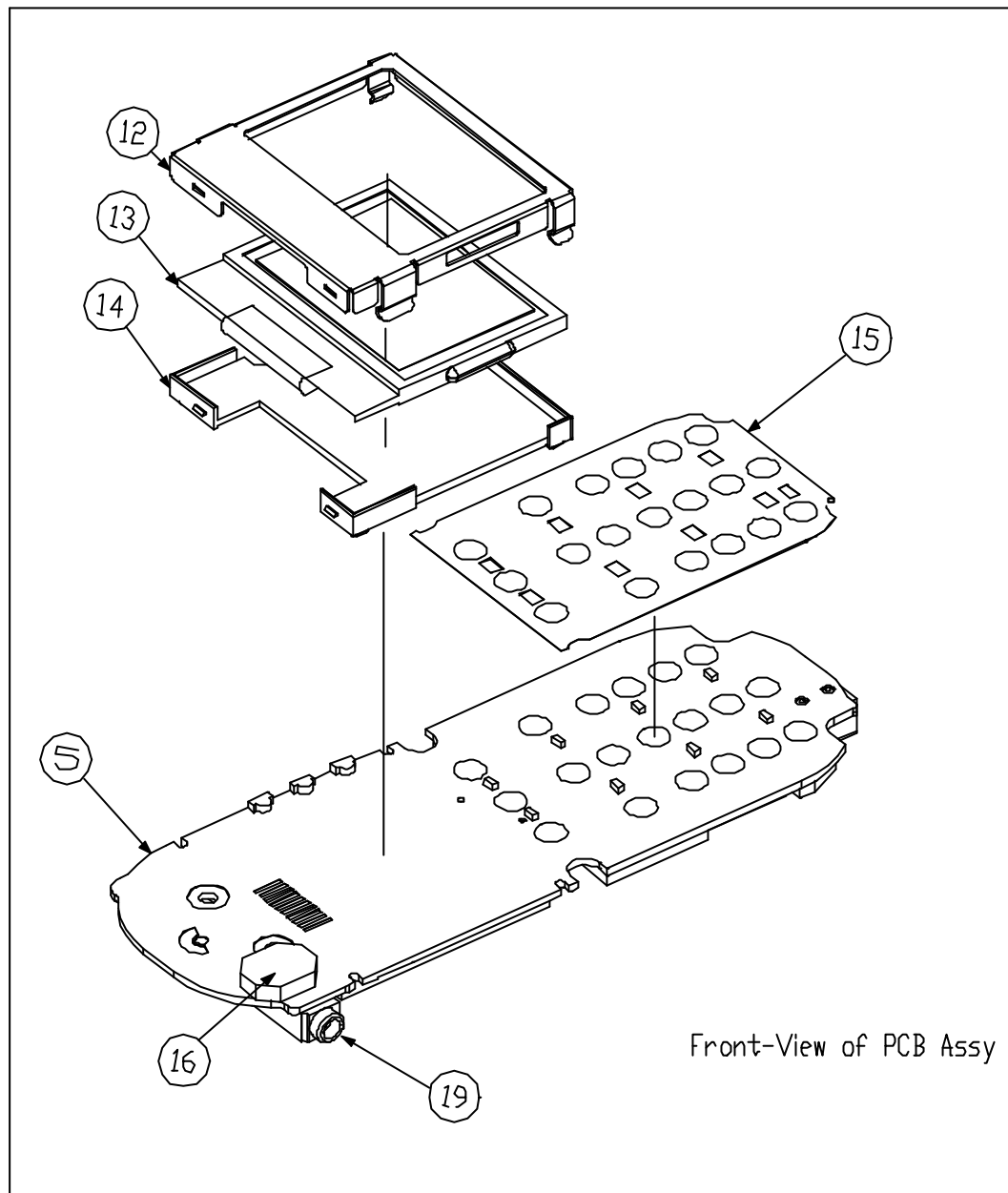


Fig 2. Mechanical Exploded View (II)

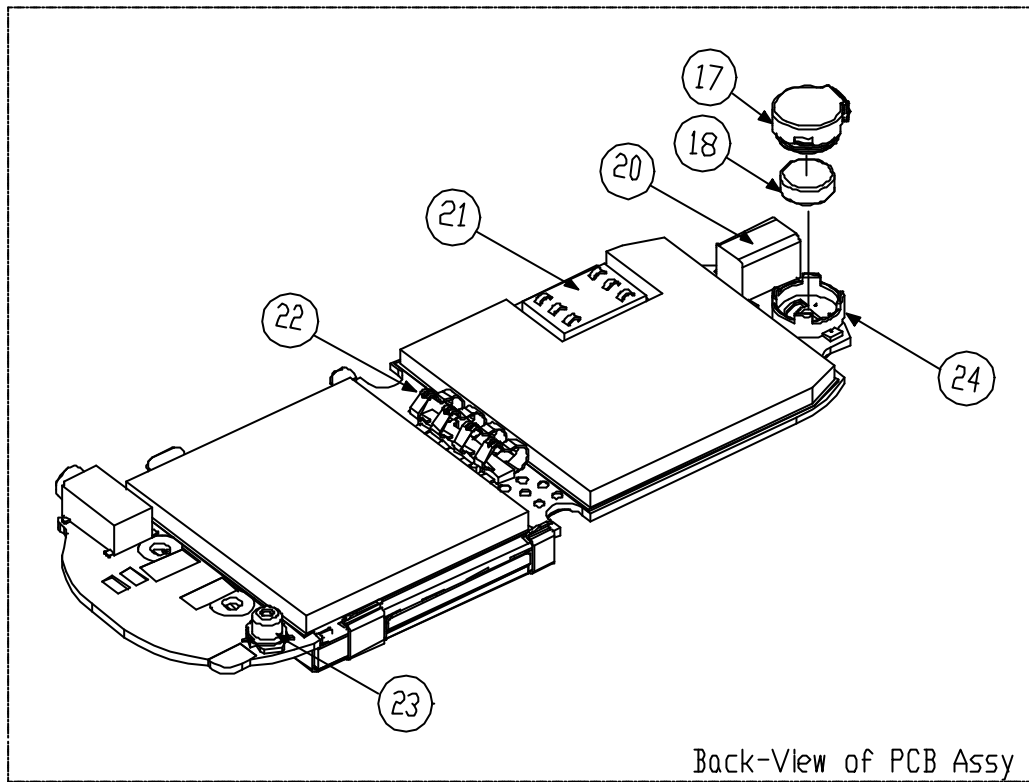


Fig 3. Mechanical Exploded View (III)

Spare Parts List

No.	Part Number	Description	Q' ty
1	42.G1701.001	Cover LCD	1
2	39.G1701.001	Assy Case Upper	1
3	23.40051.011	Speaker	1
4	47.G1701.001	Keypad	1
5	55.G1701.M01	Assy PCB	1
6	23.60021.001	Buzzer	1
7	23.46003.001	Vibrator	1
8	25.90020.001	Antenna	1
9	39.G1702.001	Assy Case Lower	1
10	86.1A52P.3R5	Screw March 3.5L	6
11	60.G1705.011	Assy Battery Pack	1
12	33.G1701.001	Frame LCD	1
13	56.07G17.001	LCD Module	1
14	42.G1703.001	Assy Holder LCD	1
15	34.G1701.001	Membrane Dial Pad	1
16	21.N0015.001	Lithium backup battery	1
17	47.G1703.001	Cap MIC	1
18	23.42007.031	Microphone	1
19	62.10036.001	Headset Jack	1
20	62.10039.001	DC Power Jack	1
21	22.10128.006	SIM connector	1
22	21.N0009.021	Battery contact	1
23	69.50017.001	RF connector	1
24	21.N0020.001	Mic Holder	1

Service Manual Feedback Form

To feedback any problem or omission to this manual

- 1. Mark/Photocopy the page.
- 2. Fill out the box below and give your query.
- 3. Fax/E-mail this form to Customer Service Dep. of Acer

Peripherals Inc. (FAX: +886-(0)2-2799-8800

E-Mail : PT_CS@api.com.tw)

Service Manual Number: _____ Revision : _____

Request Name: _____

Request address: _____

Request Phone Number: _____

Detail of problem or omission: (Specific section, page, diagram, remark .etc)
