SAMSUNG

UMTS TELEPHONE
SGH-Z100

SERVICE Manual

UMTS TELEPHONE

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ELECTRONICS

1. SGH-Z100 Specification

1. GSM General Specification

	GSM900 Phase 1	EGSM 900 Phase 2	DCS1800 Phase 1
Freq. Band[MHz] Uplink/Downlink	890~915 935~960	880~915 925~960	1710~1785 1805~1880
ARFCN range	1~124	0~124 & 975~1023	512~885
Tx/Rx spacing	45MHz	45MHz	95MHz
Mod. Bit rate/ Bit Period	270.833kbps 3.692us	270.833kbps 3.692us	270.833kbps 3.692us
Time Slot Period/Frame Period	576.9us 4.615ms	576.9us 4.615ms	576.9us 4.615ms
Modulation	0.3GMSK	0.3GMSK	0.3GMSK
MS Power	33dBm~13dBm	33dBm~5dBm	30dBm~0dBm
Power Class	5pcl ~ 15pcl	5pcl ~ 19pcl	0pcl ~ 15pcl
Sensitivity	-102dBm	-102dBm	-100dBm
TDMA Mux	8	8	8
Cell Radius	35Km	35Km	2Km

2. GSM TX power class

TX Power control level	GSM900
5	33±2 dBm
6	31±2 dBm
7	29±2 dBm
8	27±2 dBm
9	25±2 dBm
10	23±2 dBm
11	21±2 dBm
12	19±2 dBm
13	17±2 dBm
14	15±2 dBm
15	13±2 dBm
16	11±3 dBm
17	9±3dBm
18	7±3 dBm
19	5±3 dBm

TX Power control level	DCS1800
0	30±3 dBm
1	28±3 dBm
2	26±3 dBm
3	24±3 dBm
4	22±3 dBm
5	20±3 dBm
6	18±3 dBm
7	16±3 dBm
8	14±3 dBm
9	12±4 dBm
10	10±4 dBm
11	8±4dBm
12	6±4 dBm
13	4±4 dBm
14	2±5 dBm
15	0±5 dBm

1. SGH-Z100 Specification

3. WCDMA General Specification

	WCDMA (FDD)
Freq. Band[MHz] Uplink/Downlink	1920~1980 2110~2170
ARFCN range Uplink/Downlink	9612~9888 10562~10838
Tx/Rx spacing	190MHz
Mod. Bit rate	3.84Mcps
Time Slot Period/Frame Period	667us 10ms
Modulation	QPSK/HPSK
MS Power (Class3)	24dBm~-50dBm
Power Class	3
Sensitivity	-106.7dBm
Modulatin filter	RRC(α=0.22)
Voice codec	AMR

2. WCDMA TX power class

TX Power class	**WCDMA**
1	33(+1/-3) dBm
2	27(+1/-3) dBm
3	24(+1/-3) dBm
4	21(+1/-3) dBm

2. SGH-Z100 Circuit Description

1. SGH-Z100 RF Circuit Description

1. Antenna Switch Module (U100)

The antenna switch module allows multiple operating bands and modes to share the same antenna. A common antenna connects to one of five paths: 1) UMTS-2100 Rx/Tx, 2) EGSM-900 Rx, 3) EGSM-900 Tx, 4) DCS-1800 Rx, and 5) DCS-1800 Tx. UMTS operation requires simultaneous reception and transmission.

2. Filter

To convert Electromagnetic Field Wave to Acoustic Wave and then pass the specific frequency band.

- GSM Rx FILTER (F100) → For filtering the frequency band between 925 ~ 960 MHz
- DCS Rx FILTER (F101) → For filtering the frequency band 1805 and 1880 MHz.
- WCDMA Rx FILTER (F203) → For filtering the frequency band 2110 and 2170 MHz.
- WCDMA Tx FILTER (F200) → For filtering the frequency band 1920 and 1980 MHz.

3. TCVCXO (OSC200)

To generate the 19.2MHz reference clock to drive the logic and RF.

4. Duplexer (F202)

A duplexer splits a single operating band into receive and transmit paths.

5. Isolator (MIS1)

An isolator between the Power Amplifier and the duplexer is highly recommended to provide constant load and source impedances (respectively) to those devices.

6. UMTS PAM (U200)

This is a key component in the transmitter chain and must complement the RTR6200 IC precisely; jointly they dominate the UMTS transmitter performance characteristics. Parameters such as gain, output power level, ACLR, harmonics, Rx-band noise, and power supply current are critical.

7. GSM/DCS PAM (U102)

The PAM is a key component in any transmitter chain and must complement the rest of the transmitter precisely. For GSM and DCS operation, the closed-loop transmit power control functions add even more requirements relative to the UMTS PA. In addition to gain control and switching requirements, the usual RF parameters such as gain, output power level, several output spectrum requirements, and power supply current are critical.

8. GSM/DCS Dual Tx VCO (OSC100)

The dual Tx VCO outputs, one for EGSM and one for DCS, drive a resistive network that splits the active signal into two signals: 1) the input to the active PAM – this is the low loss path, and 2) the OPLL feedback signal.

9. Dual VCO (OSC201)

The dual-band UHF VCO is a key component within its phase-locked loop; VCO performance directly impacts PLL and transceiver performance. GSM/DCS Rx/Tx LO & UMTS Rx LO signal is generated from this dual VCO's output.

10. RFL6200 (U201)

The RFL6200 includes an LNA circuit optimized for UMTS-2100 operation. The LNA is separated from all other receive functions contained within the RFR6200 receiver IC to improve mixer LO to RF isolation – a critical parameter in the Zero-IF architecture.

11. RFR6200 (U202)

The RFR6200 provides the Zero-IF receiver signal path, from RF to analog baseband, for UMTS-2100 applications. The RFR6200 accepts its UMTS input signal from the handset RF front-end design. The UMTS input is configured differentially to optimize second-order inter-modulation and common mode rejection performance, and implements MSM-controlled gain adjustments to extend the receiver dynamic range.

12. RTR6200 (U101)

The RTR6200 supports multi-band, multi-mode phones with two receiver signal paths and three transmitter signal paths:

1) Receiver paths
- EGSM-900
- DCS-1800

2) Transmitter paths
- EGSM-900 (using OPLL technique)
- DCS-1800 (using OPLL technique)
- UMTS-2100

Numerous secondary functions are integrated on-chip as well:

3) Phase-locked loop circuits
- PLL#1 and an on-chip VCO supports UMTS Tx
- PLL#2 and an external VCO supports EGSM Rx and Tx, DCS Rx and Tx, and UMTS Rx

4) Transceiver LO generation and distribution circuits
- EGSM-900 Rx and Tx
- DCS-1800 Rx and Tx
- UMTS-2100 Tx

2. Baseband Circuit description of SGH-Z100

1. PM6050

1.1. Power Management

Ten low-dropout regulators designed specifically for GSM applications power the terminal and help ensure optimal system performance and long battery life. It provides seven LDO support for 2.6V, 2.8V while a self-resetting, electronically fused switch supplies power to external accessories. Ancillary support functions, such as RTC module and RTC charger, Clock Buffer, aid in reducing both board area and system complexity.

SBI BUS serial interface provides access to control and configuration registers. This interface gives full control of the MSM6200 and enables system designers to maximize both standby and talk times.

Supervisory functions. including a reset generator, an input voltage monitor, and a ADC Conertte support reliable system design. These functions work together to ensure proper system behavior during start-up or in the event of a fault condition(low microprocessor voltage, insufficient battery energy, or excessive die temperature)

1.2. Keypad Backlight

The Keypad backlight driver output is at pin 17 (KEYBD_DRV) and is designed to drive parallel connected LEDs directly. Its output current level is SBI-programmable and meets the performance specified below. Input parameters are not specified since they are internal.

1.3. TCXO Controller and Buffers

The PM6050 IC includes circuits for controlling the TCXO warm-up and buffering its signal for distribution throughout the handset. Performance specifications are presented below.

2. Connector

2-1. LCD Connector

LCD is consisted of main LCD(color 65K TFT LCD) and small LCD(Mono LCD). Chip select signals in the U300, LCD_CS- can enable small LCD. WLED_ON signal enables white LED of main LCD, EN_EN signal enables EL of small LCD.

"RESET-, TFT_RESET_N" signal initiates the Reset process of the LCD.

8-bit data lines(AD(0)~AD(7)) transfers data and commands to Small LCD through by pass capacitor. Data and commands use "RS" signal. If this signal is high, Inputs to LCD are commands. If it is low, Inputs to LCD are data. The signal which informs the input or output state to LCD, is required. But this system is not necessary this signal.

Power signals for LCD are "VDD_LP" and "2.8VDV". "SPK_P" and "SPK_N" from U533 are used for audio speaker. And "Vibrator" from Q313 enables the motor.

2-5. Key

This is consisted of key interface pins among U300, KEYSENSE_N(0:7). These signals compose the matrix. Result of matrix informs the key status to key interface in the U300. Power on/off key is seperated from the matrix. So power on/off signal is connected with U300 to enable U501. twelve key LED use the "VBAT" supply voltage.

"KEY_LED_ON" signal enables LEDs with current control. "HALL_SW" informs the status of folder (open or closed) to the. This uses the hall effect IC, A3210ELH. A magnet under main LCD enables A3210ELH.

2-5. EMI ESD Filter

This system uses the EMI ESD filter, SMF05 to protect noise from IF CONNECTOR part.

2-6 IF connetor

It is 24-pin connector. They are designed to use VBAT, CF, TXD0, RXD0, RTS0, CTS0, JIG_ON, HFK_DETECT, RXD1, TXD1, HFK_MIC+, HFK_MIC-, HFK_SPK+, HFK_SPK- and GND. They connected to power supply IC, microprocessor and signal processor IC.

3. Audio

EAR1O_P and EAR1O_N from U300 are connected to the main speaker. AUXOP and AUXON are connected to the Hands free kit. MIC_P and MIC_N are connected to the main MIC. And AUX MIC_P and AUX MIC_N are connected

YMU762MA3 is a LSI for portable telephone that is capable of playing high quality music by utilizing FM synthesizer and ADPCM decoder that are included in this device.
As a synthesis, YMU762MA3 is equipped 32 voices with different tones. Since the device is capable of simultaneously generating up to synchronous with the play of the FM synthesizer, various sampled voices can be used as sound effects. Since the play data of YMU762MA3 are interpreted at anytime through data bus, the length of the data(playing period) is not limited, so the device can flexibly support application such as incoming call melody music distribution service.

The hardware sequence built in this device allows playing of the complex music without giving excessive load to the CPU of the portable telephones. Moreover, the registers of the FM synthesizer can be operated directly for real time sound generation, allowing, for example, utilization of various sound effects when using the game software installed in the portable telephone.
YMU762 includes a speaker amplifier with high ripple removal rate whose maximum output is 550mW (SPVDD=3.6V). For the headphone, it is provided with a stereophonic output terminal.

4. Memory

The signals in the MSM6200 enable two memories. They use only one volt supply voltage, VDD_LP from the PM6050. This system uses AMD's memory, AM50DL128BG. It is consisted of 128M bits flash NOR memory and 32M bits SRAM memory. It has 16 bit data line, AD[0~15] which is connected to MSM6200. It has 22 bit address lines, A[1~22]. ROM_CS and RAM_CS signals is chip select.
In the multi-media processor, it has three type memories. One is 256Mbit Nor Flash memory another is 256Mbit NAND Flash memory and the other is 128Mbit SDRAM memory. Multi-media processor doesn't have a NAND memory interface. But we make a software algorithm use for NAND memory.

5. Multi-media processor MA55133

MA55133 is an LSI, which is designed on 3GPP 3G-324M Standard for a video telephone system.
Since protocol software is external, MA55133 can run with another protocol like H.323 by changing its software.
Because of small power consumption - Typ.140mW and very small package - FPBGA, it is suitable to use 3G-324M LSI for portable apparatus.
Feature

- Based on 3GPP 3G-324M standard
- Video MPEG-4 (simple profile level1) or H263 (baseline)
- Audio AMR, G723.1, MP3 or AAC (program downloadable)
- Multiplexing H.223 (Level 0, 1, 2, processed by CPU with assistant hardware)
- Control H.245 (Processed all by CPU)
- Built-in 32bit RISC CPU(ARM7TDMI) for control, including H.245 and H.223
- Built-in 16bit DSP for audio CODEC
- Built-in SD card I/F
- Video input Rec601 YUV = 4:2:2, 8 bit I/F
- Video output Rec601 YUV = 4:2:2(8bit) / RGB 18bit
  Built-in Picture-In-Picture Image Displaying Functions

Built-in On Screen Display(OSD) Functions

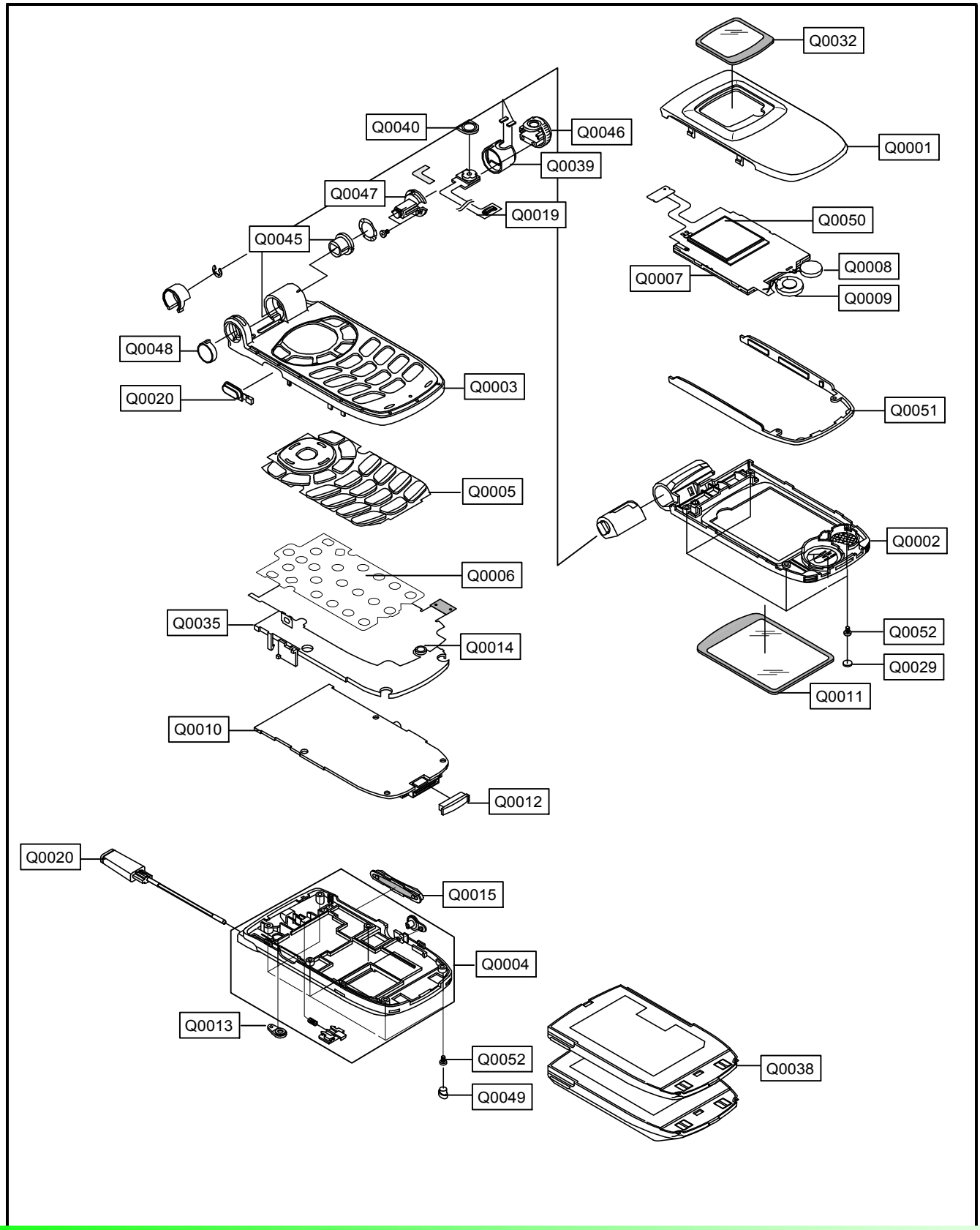
- Video CODEC 15fps for both encode and decode in QCIF size is possible.
- Program on SDRAM is executable without ROM (optional).
- Power supply VDDI=2.0V to 2.7V (internal), VDDO=2.7 to 3.6V (I/O)

6.Camera (OM6802)

The OM6802 is a highly integrated compact CMOS color camera module with embedded Camera Signal Processor (CSP) that supports up to VGA resolution formats in a small package including a focused optical system. It uses Philips See MOSTM technology for high sensitivity and low noise. The device is programmable via an I2C serial interface. The CIR656 compliant YUV output stream enables easy integration into mobile phones or PDAs.

3. SGH-Z100 Exploded View and its Parts list

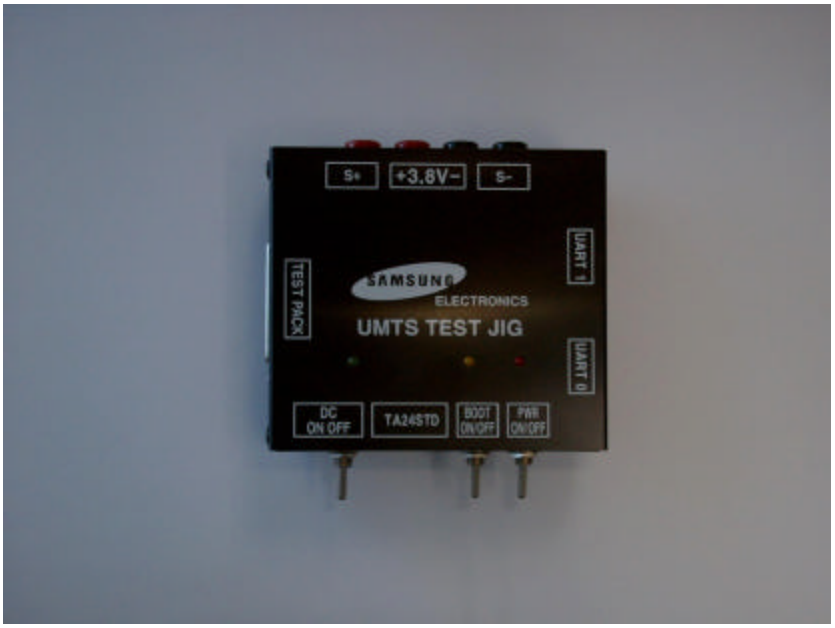
1. Cellular phone Exploded View



2. Cellular phone Parts list

Location NO.	Description	SEC CODE	Remark
Q0046	NDC-CAMERA COVER	GH71-02131A	
Q0039	PMO-CAMERA HOUSING	GH72-09657A	
Q0019	UNIT-CAMERA	GH59-01027A	
Q0040	PCT-CAMERA WINDOW	GH72-09666A	
Q0047	NDC-CAMERA SHAFT	GH71-02656A	
Q0045	PMO-CAMERA HINGE DUMMY	GH72-11107A	
Q0048	FRONT SIDE DUMMY	GH72-04603A	
Q0020	MEC-KEY VOD(VOD)	GH75-02693A	
Q0003	MEC-FRONT COVER(VOD)	GH75-02683A	
Q0005	MEC-KEY PAD	GH75-02700A	
Q0006	UNIT-KEY PCB	GH59-01058A	
Q0035	MEC-SHIELD COVER	GH75-04003A	
Q0014	MIC-CONDENSOR	3003-001090	
Q0010	MAIN PBA	GH92-01417A	
Q0012	PMO-IF COVER	GH72-11110A	
Q0020	ANTENNA	GH42-00345A	
Q0015	MEC-KEY VOLUME(VOD)	GH75-02691A	
Q0004	MEC-REAR COVER(VOD)	GH75-02685A	
Q0013	PMO-RF CAP	GH72-11109A	
Q0052	SCREW	6001-001155	
Q0049	PMO-REAR SCREW CAP	GH72-11291A	
Q0032	PCT-UPPER WINDOW	GH72-09664A	
Q0001	MEC-FOLDER UPPER(ORA)	GH75-02687B	
Q0050	LCD- FPCB	GH07-00187A	
Q0008	MOTOR	3101-001341	
Q0007	MAIN LCD	GH07-00154A	
Q0009	SPEAKER	3001-001332	
Q0051	PMO-FOLDER BELT DUMMY	GH72-06518A	
Q0002	MEC-FOLDER LOWER(VOD)	GH75-02689A	
Q0052	SCREW-MACHINE	6001-001155	
Q0029	MPR-SCREW CAP	GH74-06227A	
Q0011	PCT-MAIN WINDOW(ORA)	GH72-11687A	
Q0038	BATTERY	GH43-01085A	1300MAH
		GH43-01086A	900MAH

3. Test Jig (GH80-02593A)



3-1. RF Test Cable
(GH39-00172A)

3-2. Test Cable
(GH39-00210A)

3-3. Serial Cable

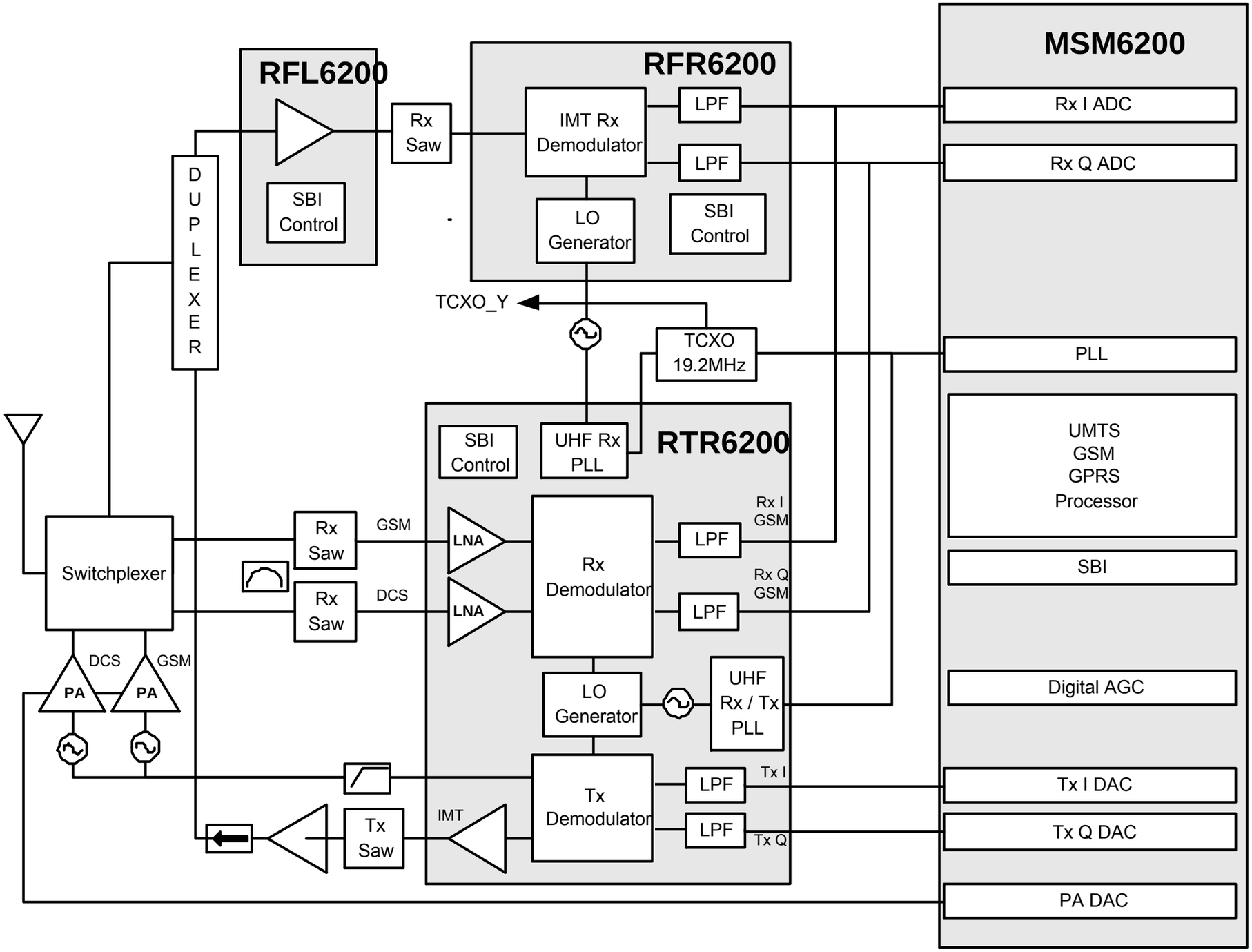
3-4. Power Supply Cable

3-5. DATA CABLE
(GH39-00242A)

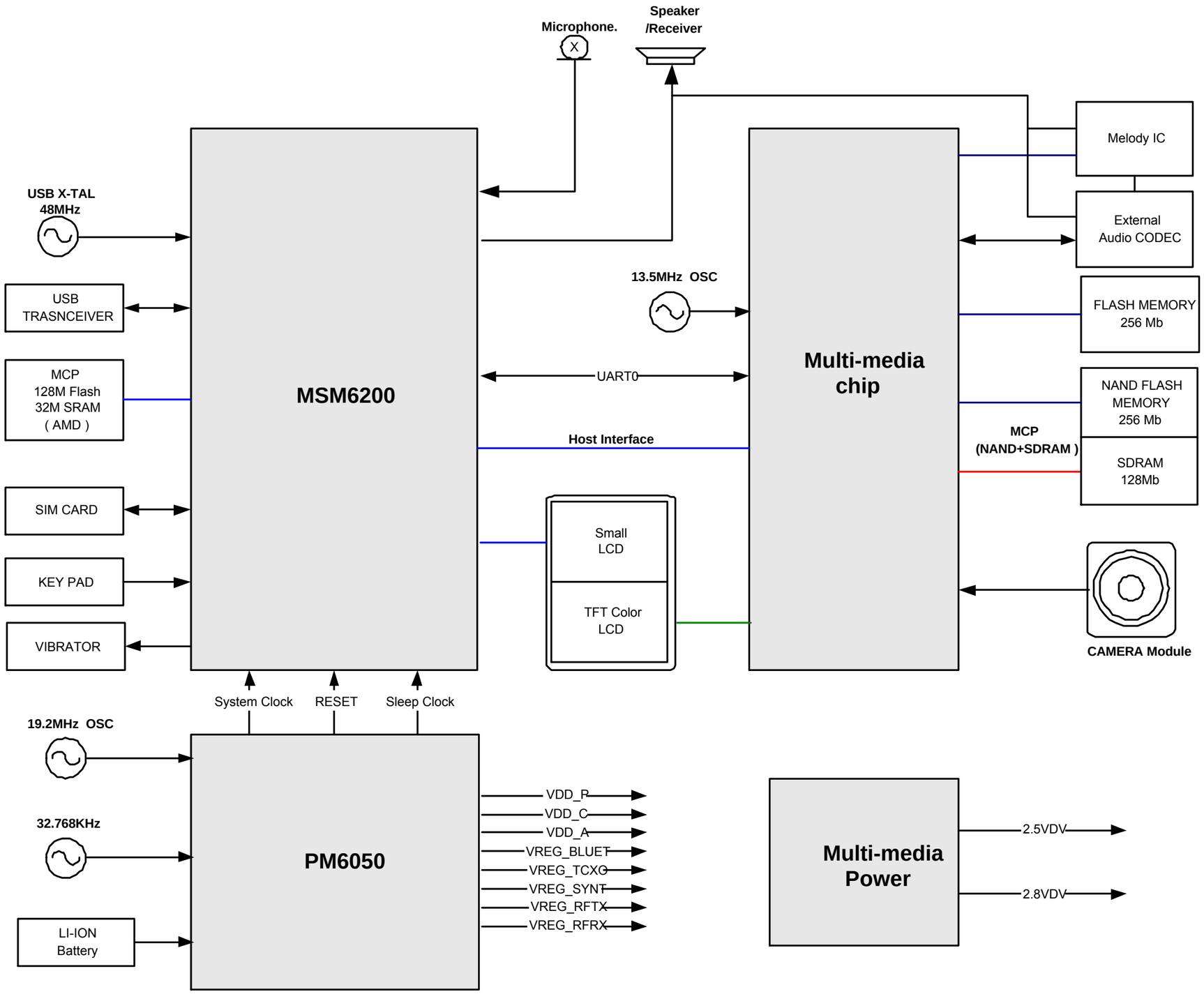
3-6. TC
(GH44-00556A)

5. SGH-Z100 Block Diagrams

1. RF Solution Block Diagram

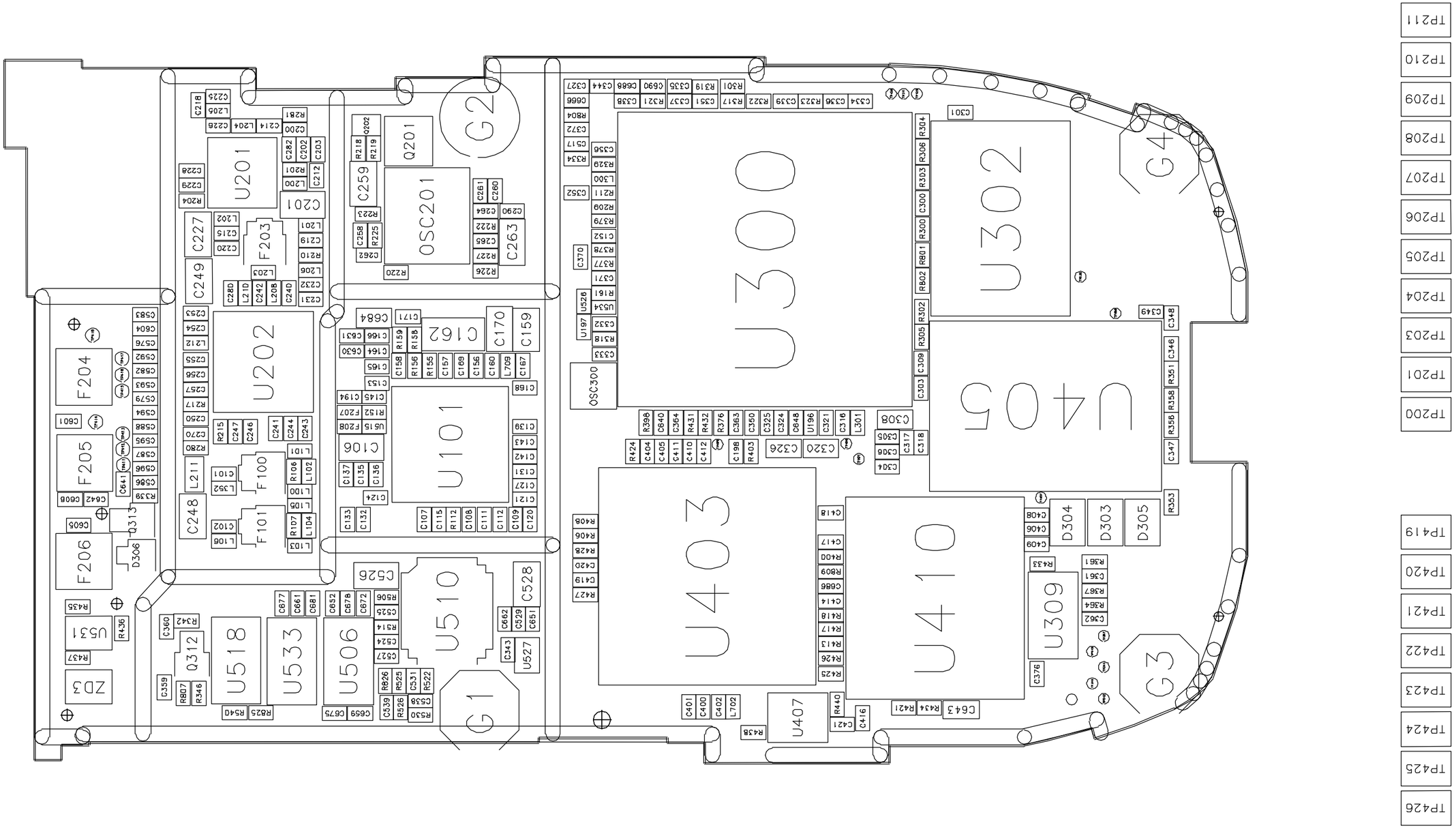


2. Base Band Solution Block Diagram



6. SGH-Z100 PCB Diagrams

1. Main PCB Top Diagram



2. Main PCB Bottom Diagram