2G/3G Circuits Description

Model: LT5000Mist

Band: GSM850, GSM900, DCS1800, PCS1900, Wcma2100

1. Scope

This document shows and provides the basic information about the platform we used.The more detail information about RF section are also included.

M706r product is new Pad designed by HXMID .The base band circuit is base on MTK MT8312 and RF circuit is included Transceiver named MTK MT6166 , AP PA and skyworks PA, It works at five bands,GSM850,GSM900,DCS1800,PCS1900 wcma2100

2. Platform

MT8312 is based on RF band support GSM+gps+wifi+Bluetooth+FM.

The package supports dual-channel DDR2 using BGA package and EMMC flash device through SDIO interface.

The GNSS+WIFI+Bluetooth +FM is MT6627 core.

-Baseband functions,including mulitipe hareware cores

-Single platform that provides dedicated support for all mardet leading codecs and other multimedia formats to support carrier deploymetnts around the word.

-High-quality digital still image camera performance with up to 5-megarpixel resolution

-HS-USB and OTG-USB core with built-in PHY eliminates additional USB components.

-DC power reduction using innovative technique

-integarates multiple processors

-Supported two high speed DDR2 IC.

3. Tansceiver MT6166

The MT6166 is a RF transceiver targeted at high speed 2G multi-mod smart phone and tablet computers implanted in 40nm CMOS,The RF transceiver function is fully integrated. The document briefly introruces the RF mocros in MT6166

4. PA

GSM

AP6690 U616 is a transmit and receive Front End Module(FEM) designed is very low profile(0.9mm) and compact for factor for quad-band cellular handsets GSM850/GSM900/DCS1800/PC1900 operation –a complete transmit vco-to –Antenna and Antenna-to-receiver SAW filter solution.The FEM also supports Class 12 General Packet Radio Service(GPRS) multi-slot operation.

Modes of operation:

Mode	Input Control Bits			
	TxEN	MODE	BS1	BS2
Standby	0	0	0	0
LB_GMSK_Tx	1	0	0	1
HB_GMSK_Tx	1	0	1	1
LB_EDGE_Tx	1	1	0	1
HB_EDGE_Tx	1	1	1	1
TRx1	0	1	0	0
TRx2	0	1	1	0
TRx3	0	1	0	1
TRx4	0	1	1	1
TRx5	0	0	1	0
TRx6	0	0	0	1

Operating Parameters

GSM850/900 *GMSK Mode*						
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Unit**
Stability	Stab	All combinations of the following parameters: 5 dBm ≤ P_{OUT} ≤ 33 dBm −1 dBm ≤ P_{IN} ≤ 6 dBm Load VSWR = 15:1, all phase angles	No parasitic oscillation > −36 dBm			
Load Mismatch	Load	All combinations of the following parameters: 5 dBm ≤ P_{OUT} ≤ 33 dBm −1 dBm ≤ P_{IN} ≤ 6 dBm Load VSWR = 20:1, all phase angles.	No module damage or permanent degradation			
Noise Power	P_{NOISE_850}	f_0 + 20 MHz (869 MHz to 894 MHz) P_{OUT} ≤ 33 dBm V_{BATT} ≤ 3.5 V T_{CASE} = +25 °C RBW = 100 kHz	—	—	−83	dBm
	P_{NOISE_900}	f_0 + 20 MHz P_{OUT} ≤ 33 dBm V_{BATT} ≤ 3.5 V T_{CASE} = +25 °C RBW = 100 kHz	—	—	−83	
		f_0 + 10 MHz P_{OUT} ≤ 33 dBm V_{BATT} ≤ 3.5 V T_{CASE} = +25 °C RBW = 100 kHz	—	—	−79	
		f_0 − 1805 MHz to 1880 MHz P_{OUT} ≤ 33 dBm V_{BATT} ≤ 3.5 V T_{CASE} = +25 °C RBW = 100 kHz	—	—	−86	

Table 2. Recommended Operating Conditions

Unless otherwise specified: −20 °C ≤ T_{CASE} ≤ +85 °C; 3.0 V ≤ V_{BATT} ≤ 4.6 V.

Parameter		Symbol	Minimum	Typical	Maximum	Unit
Supply Voltage[1]	GMSK	V_{BATT}	3.0	3.5	4.6	V
	EDGE		3.0	3.6	4.6	
		V_{CC}	2.5	—	4.6	
Supply Current		I_{BATT}	0	—	2.3	A
Operating Case Temperature[2]	1-Slot (12.5% duty cycle)	T_{CASE}	−20	—	+85	°C
	2-Slot (25% duty cycle)		−20	—	+85	
	3-Slot (37.5% duty cycle)		−20	—	+85	
	4-Slot (50% duty cycle)		−20	—	+85	

[1] V_{BATT} and V_{CC} should be commoned unless DC/DC is used and V_{CC} can be separately supplied.

[2] Case Operating Temperature refers to the temperature at the GROUND PAD on the underside of the package

5. WIFI/BT/FM/GPS operation block: MT6627

MT6627 is a 4-in-1 connectivity chip which contains a Wi-Fi/Bluetooth transceiver front-end, a GPS receiver front-end and a complete FM receiver, along with Integrated Passive Device (IPD) in a QFN40 pacakge. Simplified block diagram and how MT6627 is used in two different scenarios are shown in Figure 1-1. An always-on low-dropout regulator (ALDO) provides supply voltage to top control logics in MT6627. The top control logics controls each subsystem independently. Each subsystem also has dedicated LDOs. A thermal sensor and a low-speed ADC (Analog-to-Digital Converter) is provided to monitor MT6627's temperature variation. MT6627 does not have its dedicated crystal oscillator. It uses either an external (maybe temperature compensated) oscillator or clock source from companion chips in the platform such as MT6166.

For Wi-Fi and Bluetooth, MT6627 provides an advanced switching mechanism which allows fast switching between Wi-Fi and BT modes. Hardware sharing and reuse is maximized. The transceiver front-ends are on MT6627 while the ADC/DAC (Analog-to-Digital Converter/Digital-to-Analog Converter) are in the companion modem chip. The interface driver/receiver buffer is designed to drive PCB trace loading. The GPS IP in MT6627 is similar to Wi-Fi/Bluetooth such that the ADC/DAC is in the companion modem chip. In contrast, the FM system integrates the modem and ADC in MT6627, and no interface drivers/buffers are required.

WLAN

- Single-band (2.4GHz) single stream 802.11 b/g/n RF
- Supports Wi-Fi and Bluetooth TDD operation and single-antenna topology with integrated TR-switch
- Integrated PA with max. 19 dBm CCK output power
- Typical Rx sensitivity with companion chip modem: -75 dBm at 11g 54Mbps mode
- Supports external LNA with an auxiliary Rx input
- Integrated power detector to support per packet Tx power control
- Built-in calibrations for PVT variation
- One fully integrated frequency synthesizer for both Wi-FI/BT to support multiple crystal clock frequencies

Bluetooth

- Bluetooth specification v2.1+EDR
- Bluetooth specification 3.0+HS compliance
- Bluetooth v4.0 Low Energy (LE)
- Integrated PA with 6dBm (class 1) transmit power
- Typical Rx sensitivity with companion chip modem: GFSK -92.5dBm, DQPSK -91.5dBm, 8-DPSK -86dBm
- Low-power scan function to reduce power consumption in scan modes

1.2.2 FM

- 65 -108MHz with 50kHz step
- Supports RDS/RBDS
- Digital stereo modulator/demodulator
- Digital audio interface (I2S)
- Fast seek time 30ms/channel
- Stereo noise reduction
- Audio sensitivity 3dBμVemf (SINAD=26dB)
- Audio SINAD ≥ 60dB

1.2.3 GPS

- Typical tracking sensitivity of -163dBm
- Supports external LNA