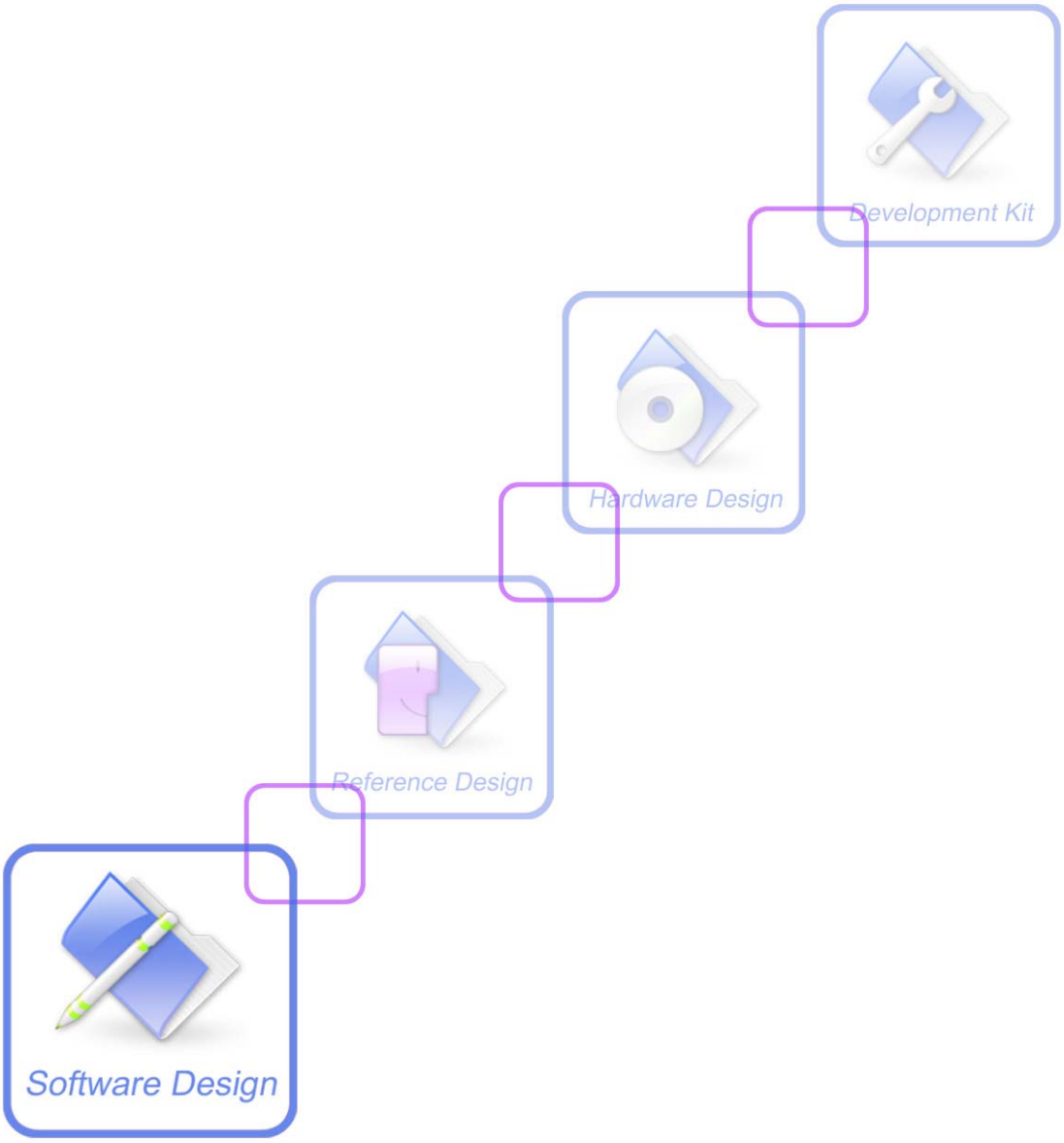
CE 0678

SIMCom

A company of SIM Tech

SIM800C_User Manual_ V1.00



Compliance Information

FCC Compliance Statement: This device complies with Part 15 of the FCC Rules . Operation is subject to the following two conditions: 1. This device may not cause harmful interference, and 2. This device must accept any interference received, including interference that may cause undesired operation. This device must accept any interference received, including interference that may cause undesired operation. Product that is a radio transmitter is labeled with FCC ID.

FCC Caution

(1) Exposure to Radio Frequency Radiation. This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

(2) Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.
(3) This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
(4) Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.
(5) The modules FCC ID is not visible when installed in the host, or
(6) If the host is marketed so that end users do not have straight forward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module: Contains Transmitter Module FCC ID: UDV-SIM800C or Contains FCC ID: UDV-SIM800C must be used.

General Notes

SIMCom offers this information as a service to its customers, to support application and engineering efforts that use the products designed by SIMCom. The information provided is based upon requirements specifically provided to SIMCom by the customers. SIMCom has not undertaken any independent search for additional relevant information, including any information that may be in the customer’s possession. Furthermore, system validation of this product designed by SIMCom within a larger electronic system remains the responsibility of the customer or the customer’s system integrator. All specifications supplied herein are subject to change.

Copyright

1. SIM800C Description

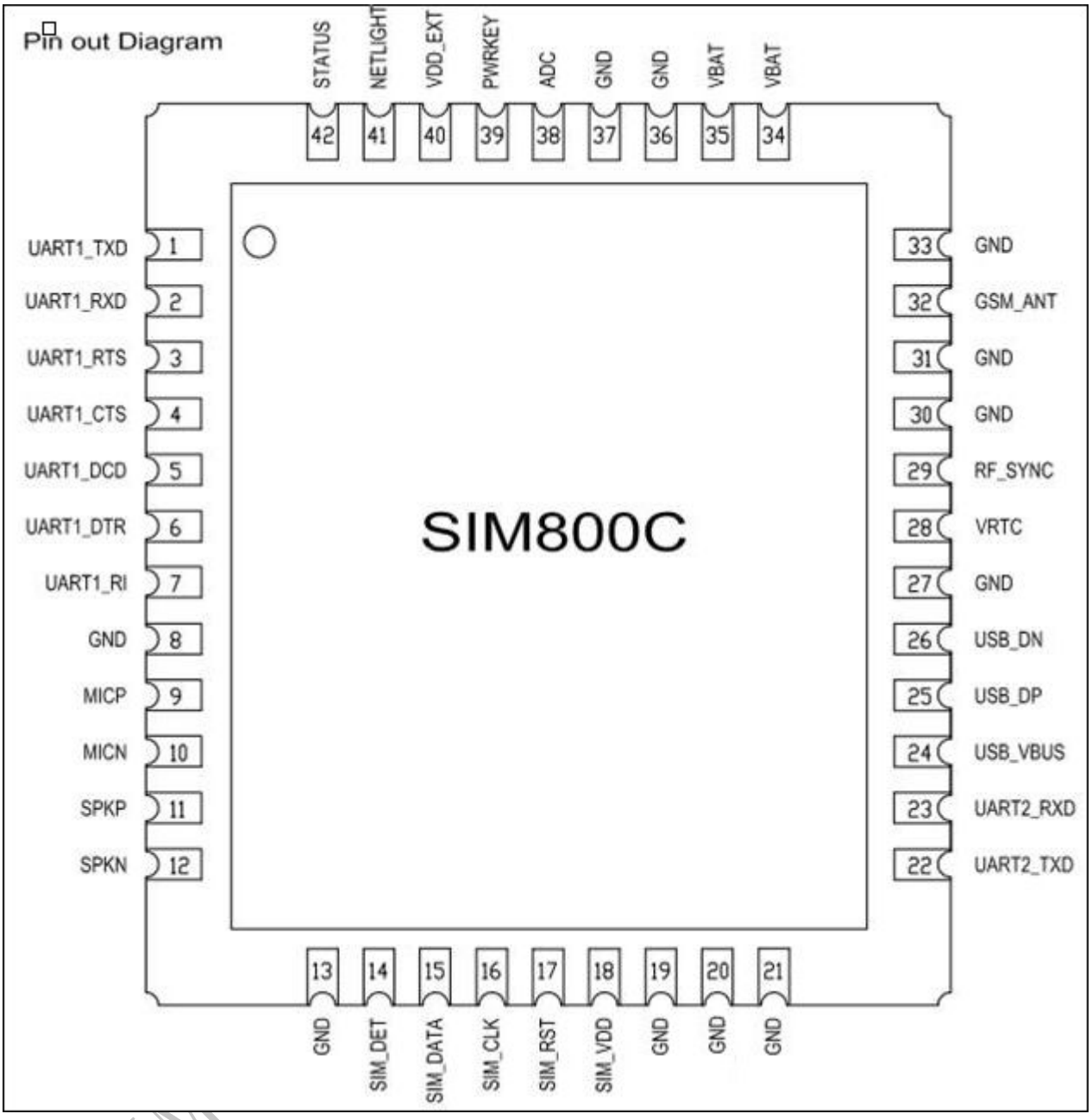
1.1. Summarize

SIM800C designed by SIMCom is a quad band module which supports GSM/GPRS. The baseband circuit is based on MTK and RF circuit is based on RFMD. It works at quad bands------GSM850, EGSM900, DCS1800, and PCS1900. The main IC include MT6261M and RF7198.

1.2. Feature

- Quad-band 850/900/1800/1900MHz
- GPRS multi-slot class 12/10
- GPRS mobile station class B
- Compliant to GSM phase 2/2+
- ‐ Class 4 (2 W @ 850/900MHz)
- ‐ Class 1 (1 W @ 1800/1900MHz)
- Dimensions: 17.6*15.7*2.3mm
- Weight: 1.3g
- Control via AT commands (3GPP TS 27.007, 27.005 and SIMComenhanced AT Commands)
- Supply voltage range 3.6 ~ 4.2V
- Low power consumption
- Operation temperature:-30℃~80℃
- 42 SMT pins including
  - Analog audio interface
  - RTC backup
  - USB interface
  - Serial interface
  - Interface to external SIM 3V/1.8V
  - GPIO
  - ADC
  - GSM Antenna pad

1.3. Pin


Pin out Diagram
SIM800C
1 UART1_TXD
2 UART1_RXD
3 UART1_RTS
4 UART1_CTS
5 UART1_DCD
6 UART1_DTR
7 UART1_RI
8 GND
9 MICP
10 MICN
11 SPKP
12 SPKN
13 GND
14 SIM_DET
15 SIM_DATA
16 SIM_CLK
17 SIM_RST
18 SIM_VDD
19 GND
20 GND
21 GND
22 UART2_TXD
23 UART2_RXD
24 USB_VBUS
25 USB_DP
26 USB_DN
27 GND
28 VRTC
29 RF_SYNC
30 GND
31 GND
32 GSM_ANT
33 GND
34 VBAT
35 VBAT
36 GND
37 GND
38 ADC
39 PWRKEY
40 VDD_EXT
41 NETLIGHT
42 STATUS

1.4. Picture

Figure 1: Top and Bottom view of SIM800C

1.5. Dimension

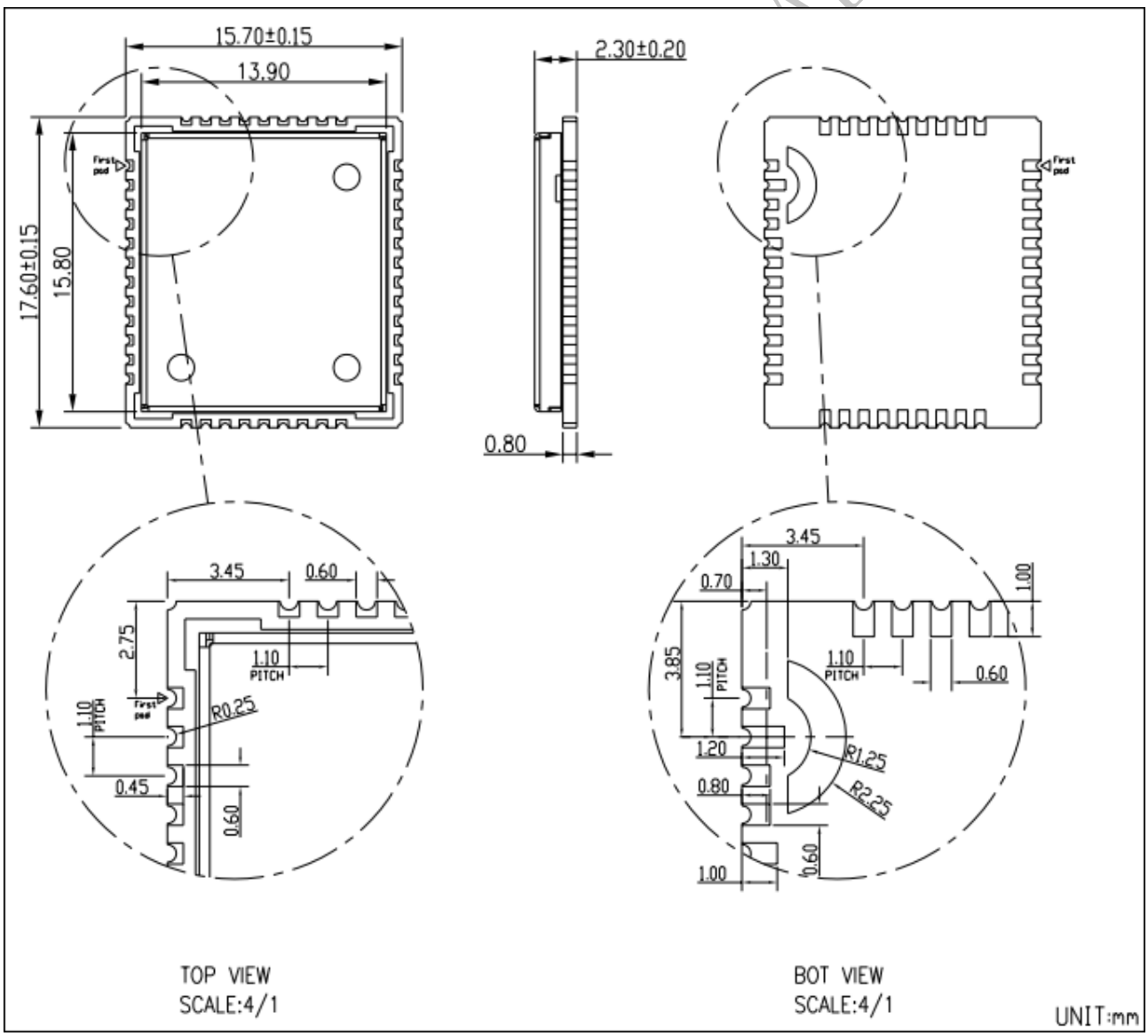


Figure 2: Dimention

2. Detail Block Diagram

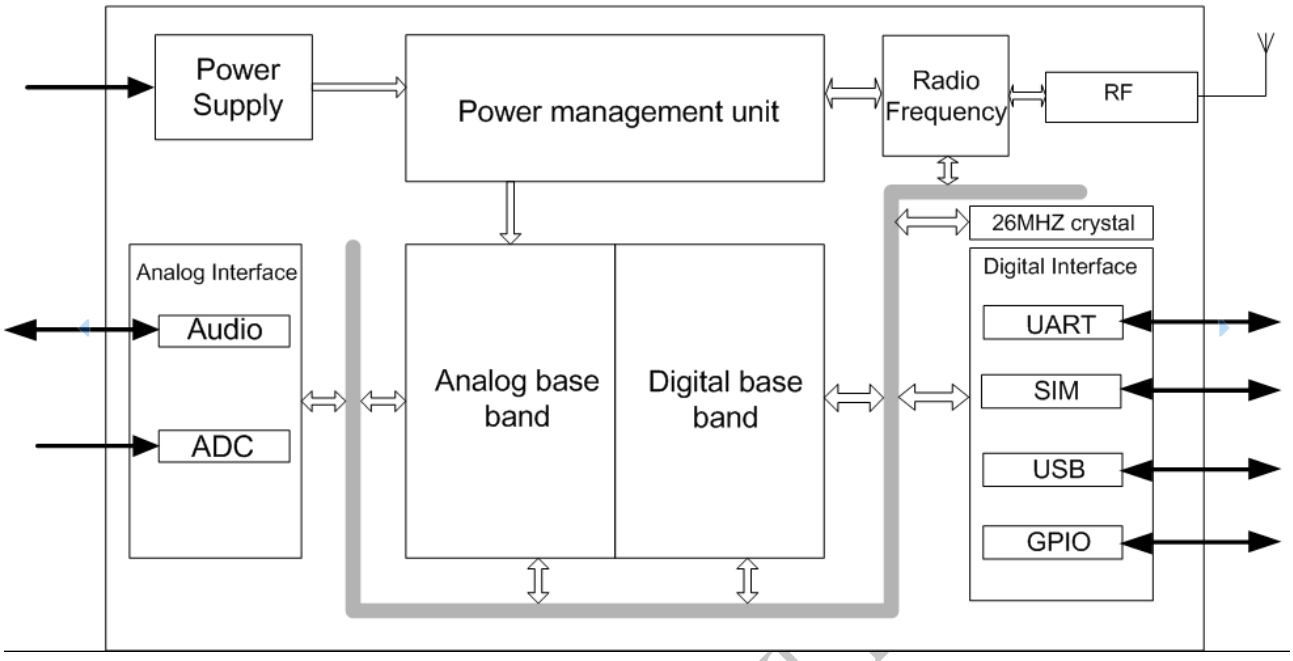


Figure 3: Block diagram of SIM800C

3. Electrical and Reliability Characteristics

3.1. Absolute Maximum Ratings

The absolute maximum ratings stated in following table are stress ratings under non-operating conditions. Stresses beyond any of these limits will cause permanent damage to SIM800C.

Table 1: Absolute maximum ratings

Symbol	Min	Typ	Max	Unit
VBAT	-	-	4.5	V
Current	0	-	2.0	A
USB_VBUS	-	-	12	V
I_I*	-	4	16	mA
I_O*	-	4	16	mA

*These parameters are for digital interface pins, GPIO, and UART.

3.2. Digital Interface Characteristics

Table 2: Digital interface characteristics

Symbol	Parameter	Min	Typ	Max	Unit
V_{IH}	High-level input current	2.1	-	3.1	V
V_{IL}	Low-level input current	-0.3	-	0.7	V
V_{OH}	High-level output voltage	2.4	-	-	V
V_{OL}	Low-level output voltage	-	-	0.4	V

Note: These parameters are for digital interface pins, such as keypad, GPIO and UART.

3.3. SIM Card Interface Characteristics

Table 3: SIM card interface characteristics

Symbol	Parameter	Min	Typ	Max	Unit
I_{IH}	High-level input current	-1.0	-	1.0	uA
I_{IL}	Low-level input current	-1.0	-	1.0	uA
V_{IH}	High-level input voltage	1.4	-	-	V
		2.4	-	-	V
V_{IL}	Low-level input voltage	-	-	0.27	V
				0.4	V
V_{OH}	High-level output voltage	1.62	-	-	V
		2.7	-	-	V
V_{OL}	Low-level output voltage	-	-	0.36	V
		-	-	0.4	V

3.4. SIM_VDD Characteristics

Table 4: SIM_VDD characteristics

Symbol	Parameter	Min	Typ	Max	Unit
V_O	Output voltage	-	3.0	-	V
		-	1.8	-	
I_O	Output current	-	-	10	mA

3.5. VRTC Characteristics

Table 5: VRTC characteristics

Symbol	Description	Min	Typ	Max	Unit
V_{RTC-IN}	VRTC input voltage	1.2	2.8	3.0	V
I_{RTC-IN}	VRTC input current	-	3.0	5.0	uA
$V_{RTC-OUT}$	VRTC output voltage	-	2.8	-	V

$I_{RTC-OUT}$	VRTC output current	-		2.0	mA

3.6. Current Consumption (VBAT = 4.0V)

Table 6: Current consumption

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VBAT	Voltage		3.4	4.0	4.4	V
	Power drop	PCL=5			350	mV
	Voltage ripple	PCL=5 @ f<200kHz @ f>200kHz			 50 2.0	 mV mV
I_{VBAT}	Average currnet	Power down mode		130	150	uA
		Sleep mode (AT+CFUN=1): (BS-PA-MFRMS=9) (BS-PA-MFRMS=5) (BS-PA-MFRMS=2)		 0.98 1.12 1.25		 mA mA mA
		Idle mode (AT+CFUN=1): GSM850 EGSM900 DCS1800 PCS1900		 13.8 13.8 13.8 13.8		 mA mA mA mA
		Voice call (PCL=5): GSM850 EGSM900 Voice call (PCL=0): DCS1800 PCS1900		 197 207 130 140		 mA mA mA mA
		Data mode GPRS (1Rx,4Tx): GSM850 EGSM900 DCS1800 PCS1900		 394 416 271 285		 mA mA mA mA
		Data mode GPRS (3Rx,2Tx): GSM850 EGSM900 DCS1800 PCS1900		 323 330 212 227		 mA mA mA mA
		Data mode GPRS (4Rx,1Tx): GSM850 EGSM900 DCS1800 PCS1900		 213 210 150 162		 mA mA mA mA

I_{MAX}	Peak current	During Tx burst			2.0	A

3.7. Electro-Static Discharge

SIM800C is an ESD sensitive component, so more attention should be paid to the procedure of handling and packaging. The ESD test results are shown in the following table.

Table 7: The ESD characteristics (Temperature: 25℃, Humidity: 45 %)

Pin name	Contact discharge	Air discharge
VBAT	±5KV	±12KV
GND	±6KV	±12KV
UARTX_RXD, UARTX_TXD	±2KV	±8KV
Antenna port	±6KV	±12KV
SPKP/SPKN/MICP/MICN	±3KV	±6KV
PWRKEY	±4KV	±8KV

4. Radio Characteristics

4.1. Module RF Output Power

The following table shows the module conducted output power, it is followed by the 3GPP TS 05.05 technical specification requirement.

Table 8: SIM800C GSM 900 and GSM 850 conducted RF output power

GSM850,EGSM900			
PCL	Nominal output power (dBm)	Tolerance (dB) for conditions	
		Normal	Extreme
5	33	±2	±2.5
6	31	±3	±4
7	29	±3	±4
8	27	±3	±4
9	25	±3	±4
10	23	±3	±4
11	21	±3	±4
12	19	±3	±4
13	17	±3	±4
14	15	±3	±4
15	13	±3	±4

16	11	±5	±6
17	9	±5	±6
18	7	±5	±6
19-31	5	±5	±6

Table 9: SIM800C DCS 1800 and PCS 1900 conducted RF output power

DCS1800,PCS1900			
PCL	Nominal output power (dBm)	Tolerance (dB) for conditions	
		Normal	Extreme
0	30	±2	±2.5
1	28	±3	±4
2	26	±3	±4
3	24	±3	±4
4	22	±3	±4
5	20	±3	±4
6	18	±3	±4
7	16	±3	±4
8	14	±3	±4
9	12	±4	±5
10	10	±4	±5
11	8	±4	±5
12	6	±4	±5
13	4	±4	±5
14	2	±5	±6
15	0	±5	±6

For the module's output power, the following is should be noted:

At GSM900 and GSM850 band, the module is a class 4 device, so the module's output power should not exceed 33dBm, and at the maximum power level, the output power tolerance should not exceed +/-2dB under normal condition and +/-2.5dB under extreme condition.

At DCS1800 and PCS1900 band, the module is a class 1 device, so the module's output power should not exceed 30dBm, and at the maximum power level, the output power tolerance should not exceed +/-2dB under normal condition and +/-2.5dB under extreme condition.

4.2. Module RF Receive Sensitivity

The following table shows the module's conducted receive sensitivity, it is tested under static condition.

Table 10: SIM800C conducted RF receive sensitivity

Frequency	Receive sensitivity（Typical）	Receive sensitivity(Max)
GSM850,EGSM900	< -109dBm	< -107dBm
DCS1800,PCS1900	< -109dBm	< -107dBm

4.3. Module Operating Frequencies

The following table shows the module's operating frequency range; it is followed by the 3GPP TS 05.05 technical specification requirement.

Table 11: SIM800C operating frequencies

Frequency	Receive	Transmit
GSM850	869 ～ 894MHz	824 ～ 849MHz
EGSM900	925 ～ 960MHz	880 ～ 915MHz
DCS1800	1805 ～ 1880MHz	1710 ～ 1785MHz
PCS1900	1930 ～ 1990MHz	1850 ～ 1910MHz

5. Antenna Interface

SIM800C provides GSM antenna named GSM_ANT, customer could use 50Ω microstrip line or stripline antenna connect to the module.

The maximum gain of the Main antenna gain should not exceed 3dBi considering the SAR radio. No antenna gain may be used that would exceed the 2W EIRP power limit in 1900MHz band.

It have according to reference trace and matching circuit testing all FCC items,and all items satisfy FCC requirements.Only the reference trace and matching circuit is certified, antenna design must refer to it, any other deviations require testing Class II applications as required by FCC.

The certified matching circuit as following:

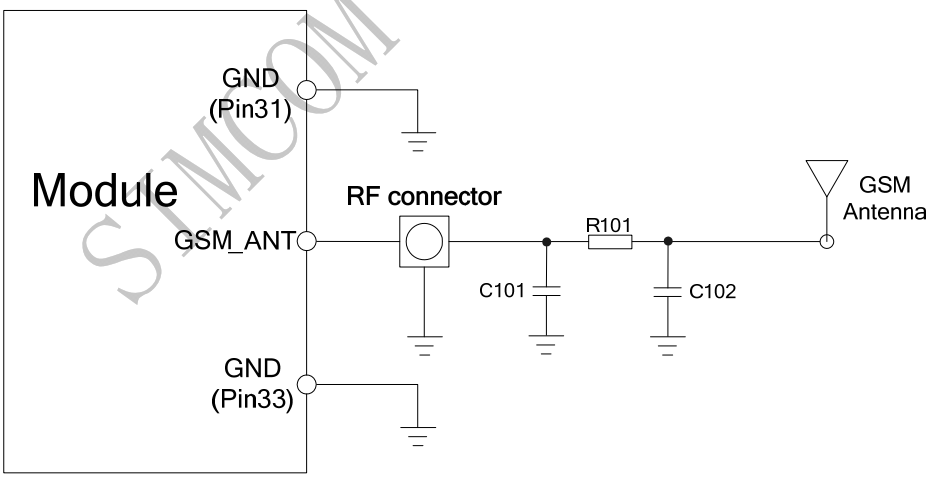


Figure4: GSM antenna matching circuit

R101，C101，C102 are the matching circuit, the value should be defined by the antenna design. Normally R101 is 0Ω, C101 and C102 are not mounted.

The RF connector is used for conduction test. If the space between RF pin and antenna is not enough, the matching circuit should be designed as in the following figure:

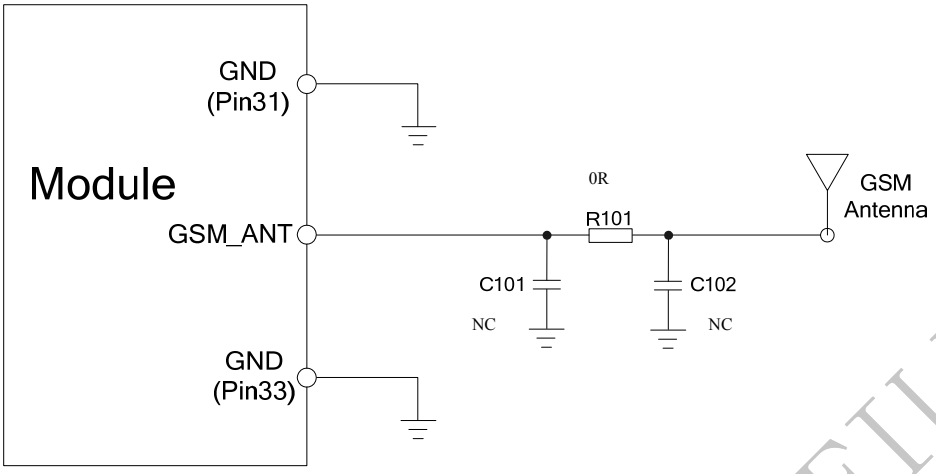
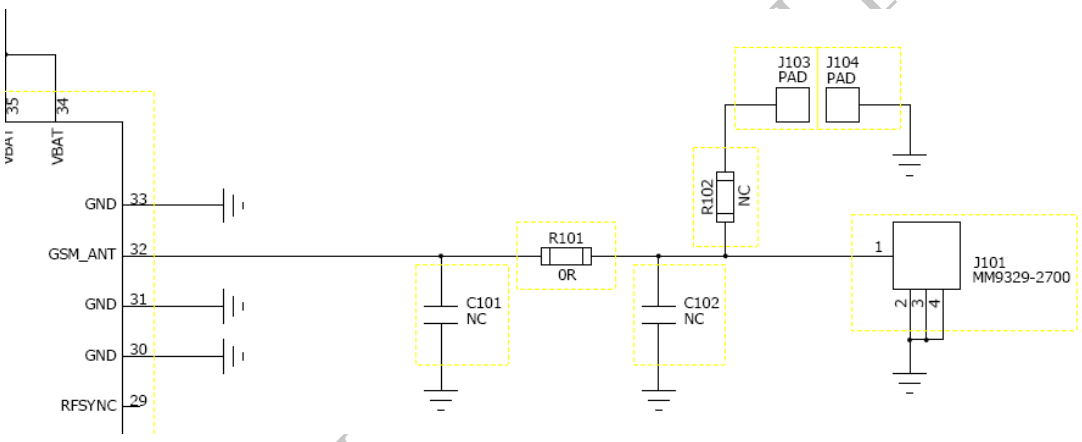
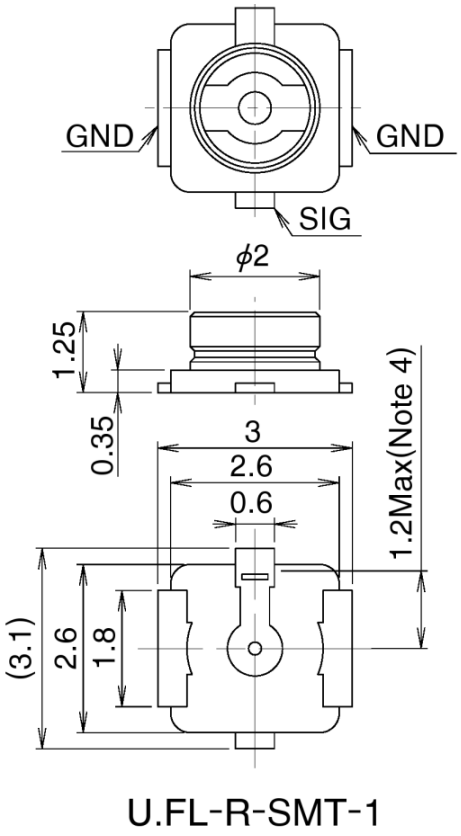


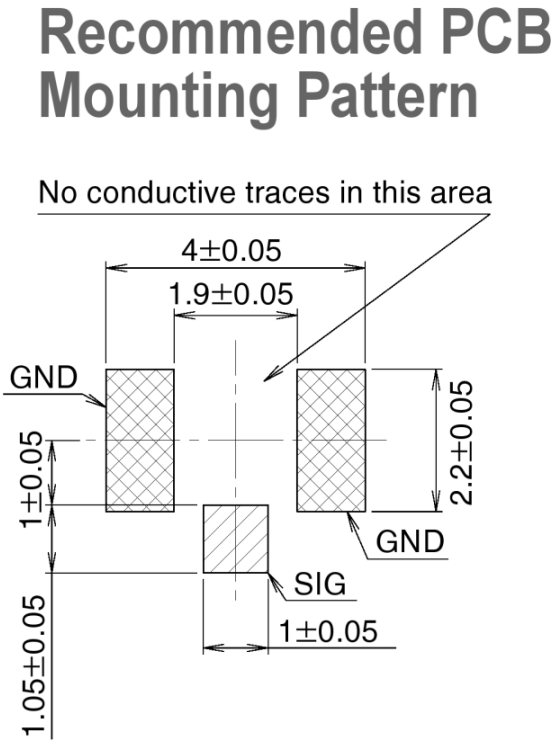
Figure5: GSM antenna matching circuit without RF connector

Normally R101 is 0Ω, C101 and C102 are not mounted.



5.1. Dipole Antenna PCB Layout Requirements

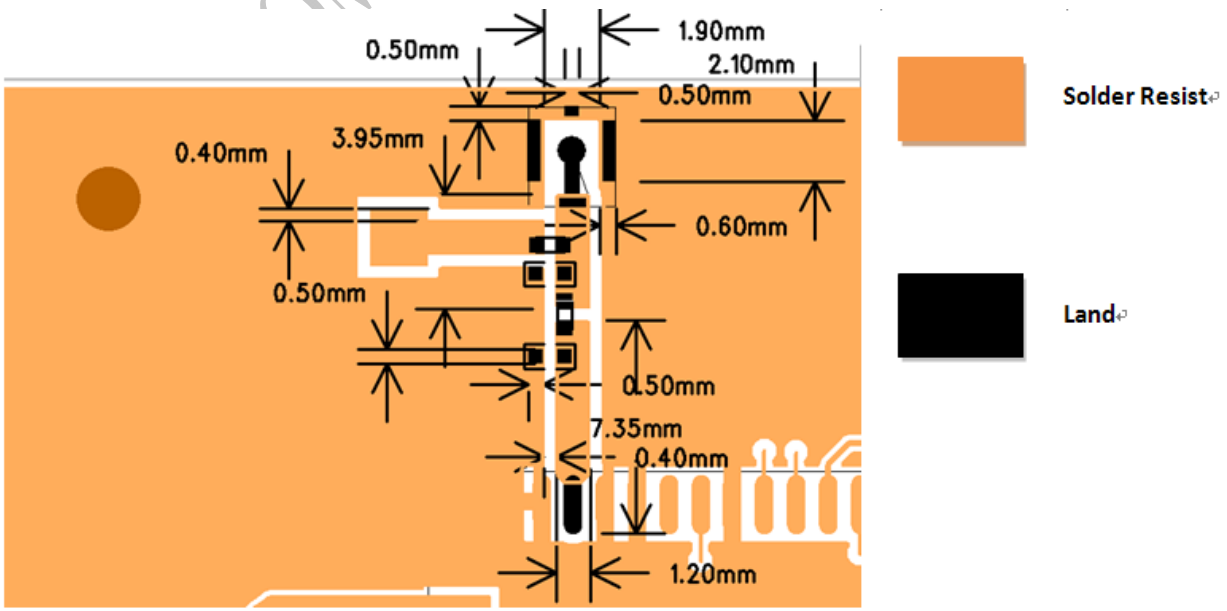


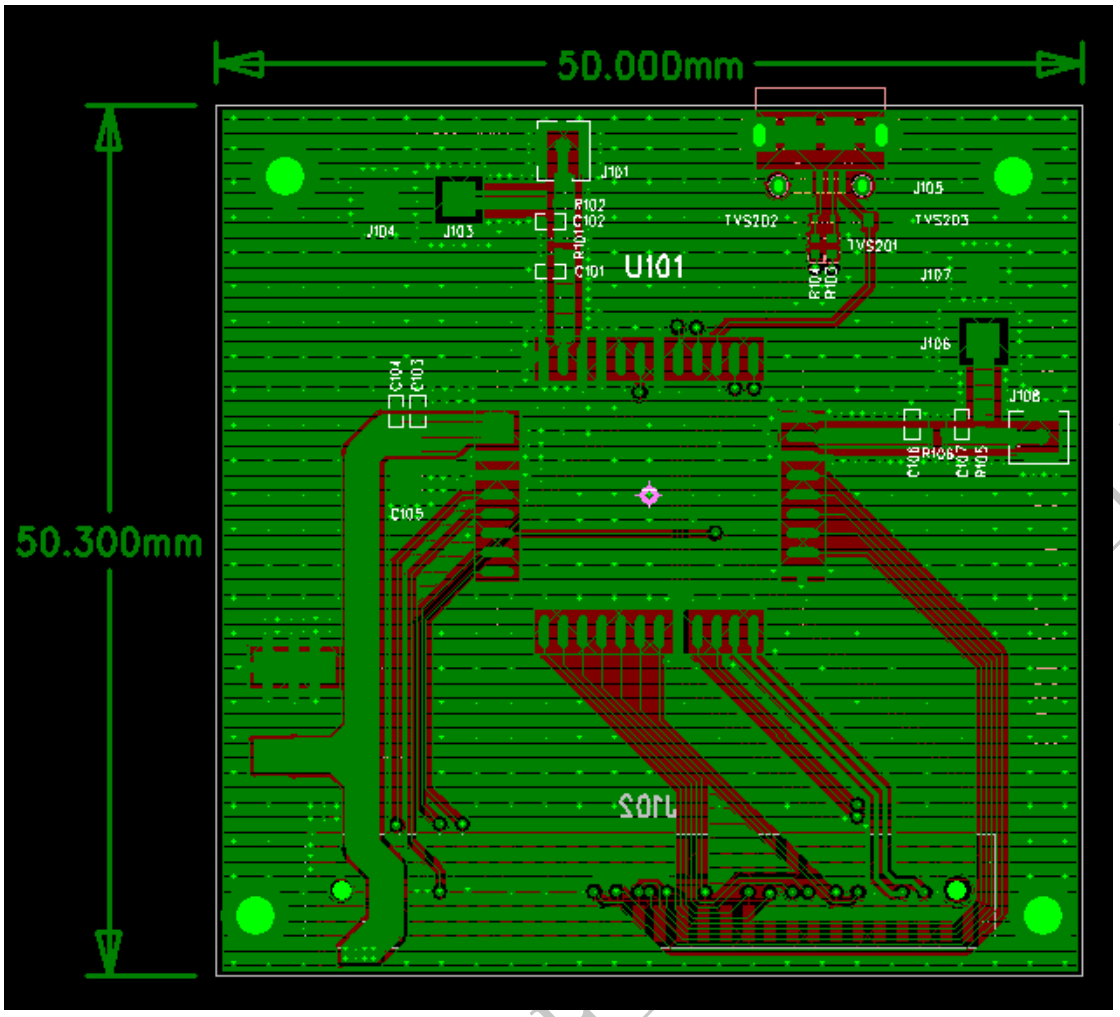


5.2. Dipole Antenna Reference Design PCB

Mount these devices with brown mark facing up. Units: mm

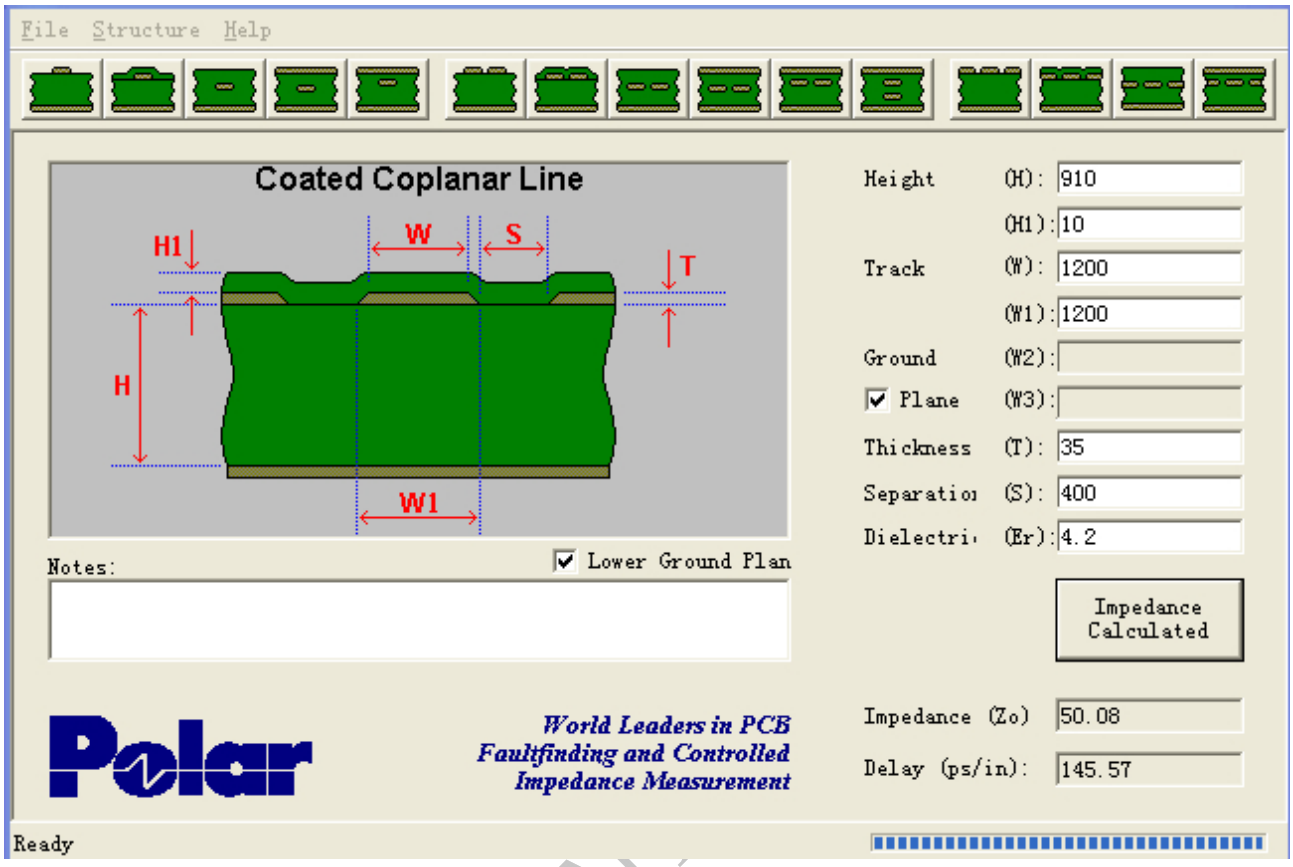
Line width should be designed to provide 50 Ω impedance matching characteristics.



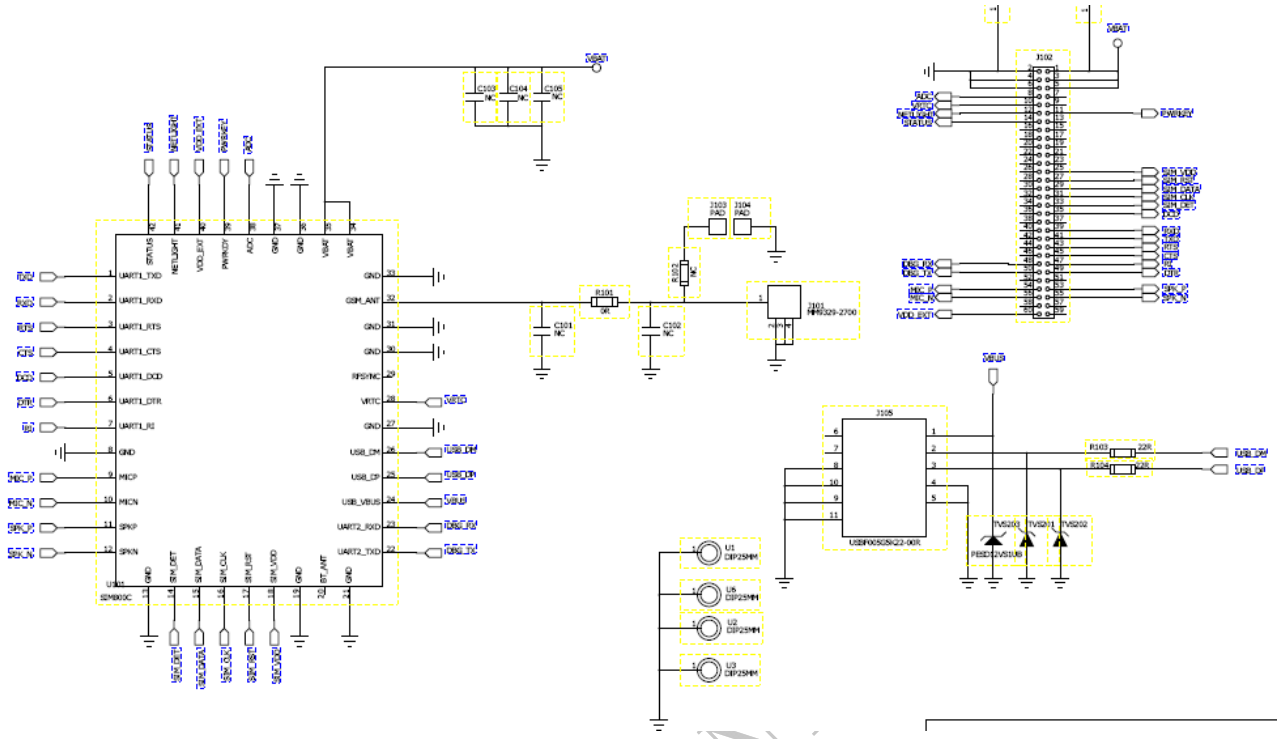


LAYER1 - TOP
LAYER2 - BOTTOM

MATERIAL BUILD-UP



5.3. Dipole Antenna Reference Design Schematic



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