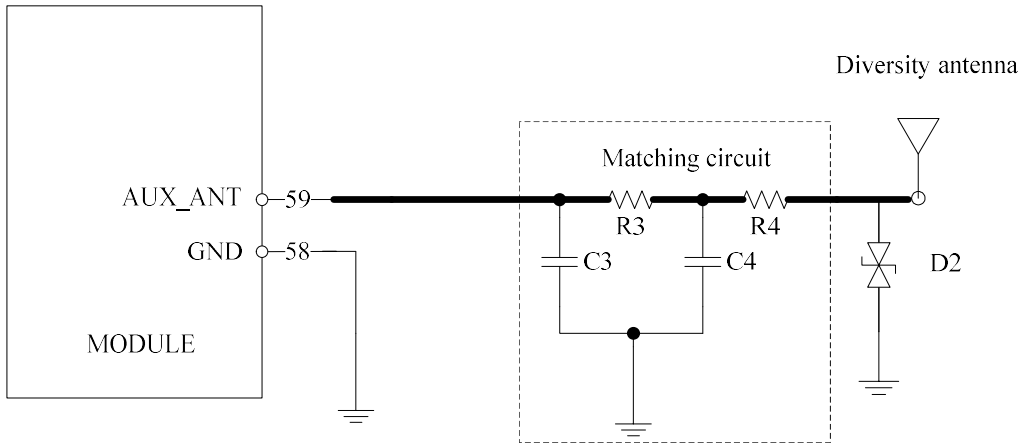

Figure 266: Antenna matching circuit (AUX_ANT)

In above figure, R3, C3, C4 and R4 are used for auxiliary antenna matching. By default, the R3, R4 are 0Ω resistors, and the C3, C4 are reserved for tuning. D2 is a TVS for ESD protection, and it is optional for users according to application environment.
Two TVS are recommended in the table below.

Table 22: Recommended TVS

Package	Part Number	Vender
0201	LXES03AAA1-154	Murata
0402	LXES15AAA1-153	Murata

Note：SIMCom suggests the LTE auxiliary antenna to be kept on, since there are many high bands in the designing of LTE-TDD, such as band38, band40 and band41. Because of the high insert loss of the RF cable and layout lines, the receiver sensitivity of these bands above will have risk to meet the authentication without the diversity antenna. For more details about auxiliary antenna design notice, please refer to document [25].

4.3 GNSS

MODULE merges GNSS (GPS/GLONASS/BD) satellite and network information to provide a high-availability solution that offers industry-leading accuracy and performance. This solution performs well, even in very challenging environmental conditions where conventional GNSS receivers fail, and provides a platform to enable wireless operators to address both location-based services and emergency mandates.

4.3.1 GNSS Technical specification

- Tracking sensitivity: -159 dBm（GPS）/-158 dBm（GLONASS）/-159 dBm（BD）
- Cold-start sensitivity: -148 dBm
- Accuracy (Open Sky): 2.5m (CEP50)
- TTFF (Open Sky) : Hot start <1s, Cold start<35s
- Receiver Type: 16-channel, C/A Code
- GPS L1 Frequency: 1575.42±1.023MHz
- GLONASS: 1597.5~1605.8 MHz
- BD: 1559.05~1563.14 MHz
- Update rate: Default 1 Hz
- GNSS data format: NMEA-0183
- GNSS Current consumption : 100mA (GSM/UMTS/LTE Sleep ,in total on VBAT pins)
- GNSS antenna: Passive/Active antenna

Note: If the antenna is active type, the power should be given by main board because there is no power supply on the GPS antenna pad. If the antenna is passive, it is suggested that the external LNA should be used.

4.3.2 GNSS Application Guide

Users can adopt an active antenna or a passive antenna to MODULE. If using a passive antenna, an external LNA is a must to get better performance.
The following figures are the reference circuits.

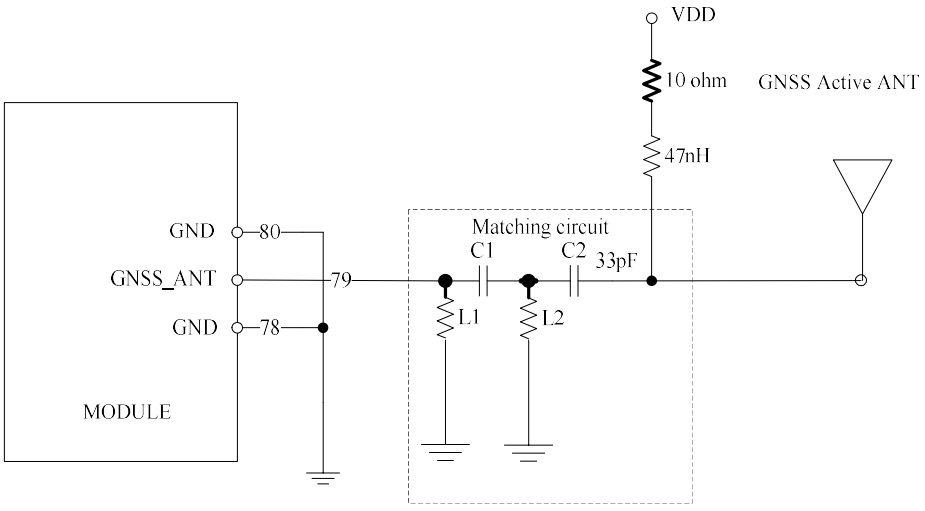

Figure 277: Active antenna circuit

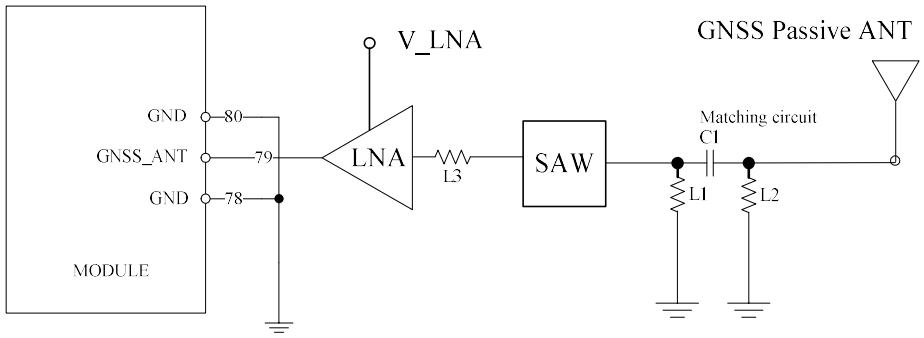

Figure 288: Passive antenna circuit (Default)

In above figures, the components C1, L1 and L2 are used for antenna matching. Usually, the values of the components can only be achieved after antenna tuning and usually provided by antenna vendor. C2 is used for DC blocking. L3 is the matching component of the external LNA, and the value of L3 is determined by the LNA characteristic and PCB layout. Both VDD of active antenna and V_LNA need external power supplies which should be considered according to active antenna and LNA characteristic. LDO/DCDC is recommended to get lower current consuming by shutting down active antennas and LNA when GNSS is not working.

GNSS can be tested by NMEA port. NMEA sentences can be obtained through UART or USB automatically. NMEA sentences include GSV, GGA, RMC, GSA, and VTG. Before using GNSS, user should configure MODULE in proper operating mode by AT command. Please refer to related documents for details. MODULE can also get position location information through AT directly.

Note: GNSS is closed by default and can be started by AT+CGPS. The AT command has two parameters, the first is on/off, and the second is GNSS mode. Default mode is standalone mode. AGPS mode needs more support from the mobile telecommunication network. Please refer to document [24] for more details.

5 Electrical Specifications

5.1 Absolute maximum ratings

Absolute maximum rating for digital and analog pins of MODULE are listed in the following table:

Table 23: Absolute maximum ratings

Parameter	Min.	Typ.	Max.	Unit
Voltage at VBAT	-0.5	-	6.0	V
Voltage at USB_VBUS	-0.5	-	5.85	V
Voltage at digital pins (RESET,SPI,Keypad,GPIO,I2C,UART,PCM)	-0.3	-	2.1	V
Voltage at digital pins (SD,USIM)	-0.3	-	3.05	V
Voltage at PWRKEY	-0.3	-	1.8	

5.2 Operating conditions

Table 24: Recommended operating ratings

Parameter	Min.	Typ.	Max.	Unit
Voltage at VBAT	3.4	3.8	4.2	V
Voltage at USB_VBUS	3.0	5.0	5.25	V

Table 25: 1.8V Digital I/O characteristics*

Parameter	Description	Min.	Typ.	Max.	Unit
V_{IH}	High-level input voltage	1.17	1.8	2.1	V
V_{IL}	Low-level input voltage	-0.3	0	0.63	V
V_{OH}	High-level output voltage	1.35	-	1.8	V
V_{OL}	Low-level output voltage	0	-	0.45	V
I_{OH}	High-level output current(no pull down resistor)	-	2	-	mA
I_{OL}	Low-level output current(no pull up resistor)	-	-2	-	mA
I_{IH}	Input high leakage current (no pull down resistor)	-	-	1	uA
I_{IL}	Input low leakage current(no pull up resistor)	-1	-	-	uA

Note: These parameters are for digital interface pins, such as SPI, GPIOs (NETLIGHT, FLIGHTMODE, STATUS, USIM_DET, SD_DET), SDIO, I2C, UART, PCM, COEXn, and BOOT_CFG0.

The operating temperature of MODULE is listed in the following table.

Table 26: Operating temperature

Parameter	Min.	Typ.	Max.	Unit
Normal operation temperature	-30	25	80	℃
Extended operation temperature*	-40	25	85	℃
Storage temperature	-45	25	+90	℃

Note: Module is able to make and receive voice calls, data calls, SMS and make GSM/ UMTX/LTE traffic in -40℃ ~ +85℃. The performance will be reduced slightly from the 3GPP specifications if the temperature is outside the normal operating temperature range and still within the extreme operating temperature range.

5.3 Operating Mode

5.3.1 Operating Mode Definition

The table below summarizes the various operating modes of MODULE product.

Table 27: Operating mode Definition

Mode		Function
Normal operation	GSM /UMTS/LTE Sleep	In this case, the current consumption of MODULE will be reduced to the minimal level and the MODULE can still receive paging message and SMS.
	GSM/UMTS/LTE Idle	Software is active. Module is registered to the network, and the MODULE is ready to communicate.
	GSM/UMTS/LTE Talk	Connection between two subscribers is in progress. In this case, the power consumption depends on network settings such as DTX off/on, FR/EFR/HR, hopping sequences, and antenna.
	GPRS/EDGE/ UMTS/LTE Standby	Module is ready for data transmission, but no data is currently sent or received. In this case, power consumption depends on network settings.
	GPRS/EDGE/ UMTS/LTE Data transmission	There is data transmission in progress. In this case, power consumption is related to network settings (e.g. power control level); uplink/downlink data rates, etc.
Minimum functionality mode		AT command “AT+CFUN=0” AT+CSCLK=1 can be used to set the MODULE to a minimum functionality mode without removing the power supply. In this mode, the RF part of the MODULE will not work and the USIM card will not be accessible, but the serial port and

	USB port are still accessible. The power consumption in this mode is lower than normal mode.
Flight mode	AT command "AT+CFUN=4" or pulling down the FLIGHTMODE pin can be used to set the MODULE to flight mode without removing the power supply. In this mode, the RF part of the MODULE will not work, but the serial port and USB port are still accessible. The power consumption in this mode is lower than normal mode.
Power off	Module will go into power off mode by sending the AT command "AT+CPOF" or pull down the PWRKEY pin, normally. In this mode the power management unit shuts down the power supply, and software is not active. The serial port and USB are is not accessible.

5.3.2 Sleep mode

In sleep mode, the current consumption of MODULE will be reduced to the minimal level, and MODULE can still receive paging message and SMS.
Several hardware and software conditions must be satisfied together in order to let MODULE enter into sleep mode:
1. UART condition
2. USB condition
3. Software condition
Note: Before designing, pay attention to how to realize sleeping/waking function and refer to Document [26] for more details.

5.3.3 Minimum functionality mode and Flight mode

Minimum functionality mode ceases a majority function of MODULE, thus minimizing the power consumption. This mode is set by the AT command which provides a choice of the functionality levels.

- AT+CFUN=0: Minimum functionality
- AT+CFUN=1: Full functionality (Default)
- AT+CFUN=4: Flight mode

If MODULE has been set to minimum functionality mode, the RF function and USIM card function will be closed. In this case, the serial port and USB are still accessible, but RF function and USIM card will be unavailable.
If MODULE has been set to flight mode, the RF function will be closed. In this case, the serial port and USB are still accessible, but RF function will be unavailable.
When MODULE is in minimum functionality or flight mode, it can return to full functionality by the AT command "AT+CFUN=1".

5.4 Current Consumption

The current consumption is listed in the table below.

Table 28: Current consumption on VBAT Pins (VBAT=3.8V)

GNSS	
GNSS supply current (AT+CFUN=0,with USB connection)	@ -140dBm，Tracking Typical:38ma
GSM sleep/idle mode	
GSM/GPRS supply current (GNSS off，without USB connection)	Sleep mode@ BS_PA_MFRMS=2 Typical: 2.307ma Idle mode@ BS_PA_MFRMS=2 Typical: 17ma
UMTS sleep/idle mode	
WCDMA supply current (GNSS off，without USB connection)	Sleep mode @DRX=1.28S Typical: 1.819ma Idle mode @DRX=1.28S Typical: 16.845ma
LTE sleep/idle mode	
LTE supply current (GNSS off，without USB connection)	Sleep mode Typical: 2.04ma Idle mode Typical: 17.3ma
GSM Talk	
GSM850	@power level #5 Typical: 307ma
EGSM900	@ power level #5 Typical: 295ma
DCS1800	@power level #5 Typical: 200 ma
PCS1900	@power level #5 Typical: 227 ma
UMTS Talk	
WCDMA B1	@Power 24dBm Typical: 661ma
WCDMA B2	@Power 24dBm Typical: 668 ma
WCDMA B4	@Power 24dBm Typical: 599 ma
WCDMA B5	@Power 24dBm Typical: 558 ma
WCDMA B6	@Power 24dBm Typical: 554 ma
WCDMA B8	@Power 24dBm Typical: 634ma
WCDMA B19	@Power 24dBm Typical: 561 ma
GPRS	
GSM850(1 Rx,4 Tx)	@power level #5 Typical: 586 ma
EGSM900(1 Rx,4 Tx)	@power level #5 Typical: 540 ma
DCS1800(1 Rx,4 Tx)	@power level #0 Typical: 382 ma
PCS1900(1 Rx,4 Tx)	@power level #0 Typical: 416 ma
GSM850(3Rx, 2 Tx)	@power level #5 Typical: 438 ma
EGSM900(3Rx, 2 Tx)	@power level #5 Typical: 419 ma
DCS1800(3Rx, 2 Tx)	@power level #0 Typical: 291 ma
PCS1900(3Rx, 2 Tx)	@power level #0 Typical: 328 ma
EDGE	
GSM850(1 Rx,4 Tx)	@power level #8 Typical: 523ma
EGSM900(1 Rx,4 Tx)	@power level #8 Typical: 477ma
DCS1800(1 Rx,4 Tx)	@power level # 2 Typical: 380ma
PCS1900(1 Rx,4 Tx)	@power level #2 Typical: 414ma
GSM850(3Rx, 2 Tx)	@power level #8 Typical: 298ma
EGSM900(3Rx, 2 Tx)	@power level #8 Typical: 273ma

DCS1800(3Rx, 2 Tx)	@power level #2 Typical: 246ma
PCS1900(3Rx, 2 Tx)	@power level #2 Typical: 268ma
LTE data	
LTE-FDD B1	@5MHz 22.3dBm Typical: 711 ma @10MHz 22.4dBm Typical: 718 ma @20MHz 22.4dBm Typical: 756 ma
LTE-FDD B2	@5MHz 22.1dBm Typical: 676 ma @10MHz 22.4dBm Typical: 723 ma @20MHz 22.3dBm Typical: 759 ma
LTE-FDD B3	@5MHz 22.2dBm Typical: 666 ma @10MHz 22.1dBm Typical: 662 ma @20MHz 22.1dBm Typical: 682 ma
LTE-FDD B4	@5MHz 22.0dBm Typical: 709 ma @10MHz 22.1dBm Typical:769 ma @20MHz 22.6dBm Typical: 896 ma
LTE-FDD B5	@5MHz 22.2dBm Typical: 619 ma @10MHz 22.1dBm Typical: 628 ma
LTE-FDD B7	@5MHz 22.2dBm Typical: 599 ma @10MHz 22.1dBm Typical: 611 ma @20MHz 22.1dBm Typical: 680ma
LTE-FDD B8	@5MHz 22.8dBm Typical: 699 ma @10MHz 22.8dBm Typical: 751 ma
LTE-FDD B12	@5MHz 22.7dBm Typical: 600 ma @10MHz 22.7dBm Typical: 607 ma
LTE-FDD B13	@5MHz 21.9dBm Typical: 685 ma @10MHz 22.0dBm Typical: 653 ma
LTE-FDD B18	@5MHz 21.3dBm Typical: 702 ma @10MHz 22.5dBm Typical: 711 ma @15MHz 22.6dBm Typical: 747 ma
LTE-FDD B19	@5MHz 22.4dBm Typical: 616 ma @10MHz 22.3dBm Typical: 622 ma @15MHz 22.5dBm Typical: 679 ma
LTE-FDD B20	@5MHz 21.8dBm Typical: 658 ma @10MHz 21.8dBm Typical: 668 ma @20MHz 21.8dBm Typical: 767 ma
LTE-FDD B25	@5MHz 22dBm Typical: 634 ma @10MHz 22dBm Typical: 702 ma @20MHz 22dBm Typical: 781 ma
LTE-FDD B26	@5MHz 22.4dBm Typical: 615 ma @10MHz 22.7dBm Typical:664 ma @15MHz 22.3dBm Typical:713 ma
LTE-FDD B28	@5MHz 22.4dBm Typical: 811ma @10MHz 22.5dBm Typical: 879 ma @20MHz 22.4dBm Typical: 773 ma
LTE-FDD B66	@5MHz 22dBm Typical: 707ma @10MHz 22dBm Typical: 728ma @20MHz 22dBm Typical: 795 ma
LTE-TDD B34	@5MHz 22dBm Typical: 555 ma @10MHz 22dBm Typical: 546 ma
LTE-TDD B38	@5MHz 21.8dBm Typical: 799ma @10MHz 21.8dBm Typical: 759ma @20MHz 21.8dBm Typical: 779ma
LTE-TDD B39	@5MHz 22dBm Typical:575 ma

	@10MHz @20MHz	22dBm 22dBm	Typical: 627 ma Typical: 681 ma
LTE-TDD B40	@5MHz @10MHz @20MHz	21.5dBm 21.7dBm 21.7dBm	Typical: 727 ma Typical: 715 ma Typical: 703 ma
LTE-TDD B41	@5MHz @10MHz @20MHz	21.6dBm 21.7dBm 21.7dBm	Typical:803 ma Typical: 771 ma Typical: 793 ma

5.5 ESD Notes

MODULE is sensitive to ESD in the process of storage, transporting, and assembling. When MODULE is mounted on the users' mother board, the ESD components should be placed beside the connectors which human body may touch, such as USIM card holder, audio jacks, switches, keys, etc. The following table shows the MODULE ESD measurement performance without any external ESD component.

Table 29: The ESD performance measurement table (Temperature: 25℃, Humidity: 45%)

Part	Contact discharge	Air discharge
VBAT,GND	+/-5K	+/-10K
Antenna port	+/-4K	+/-8K
Other PADs	+/-0.5K	+/-1K

6 SMT Production Guide

6.1 Top and Bottom View of MODULE

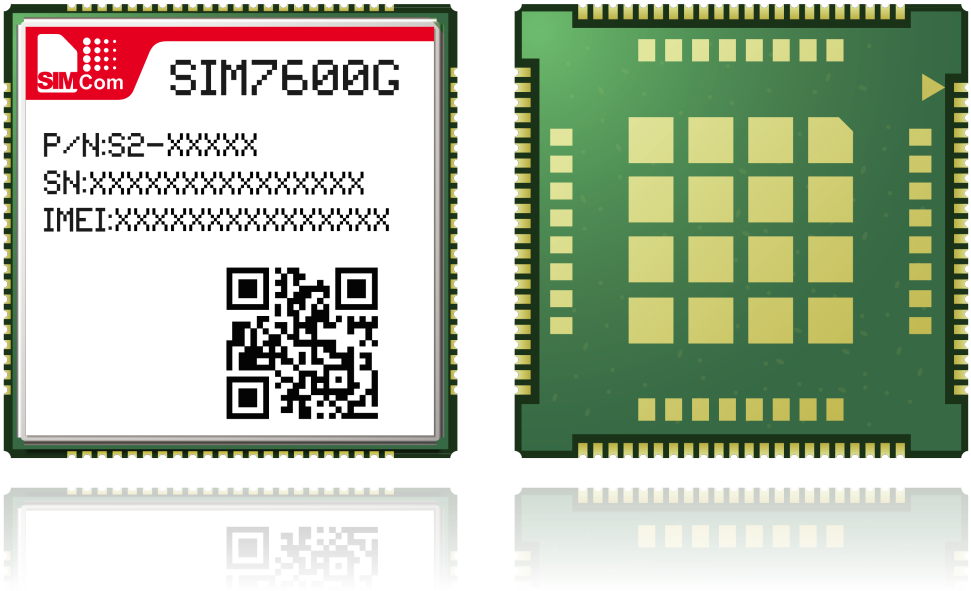

Figure 299: Top and bottom view of MODULE

6.2 Label Information

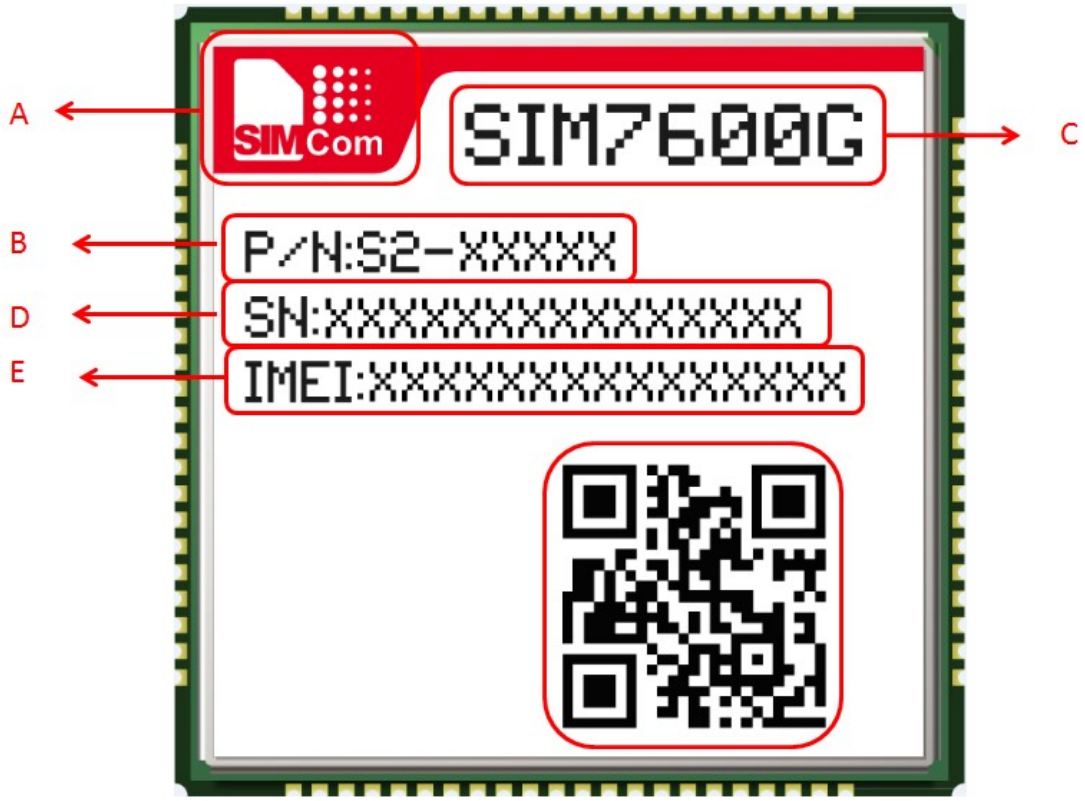

Figure 40: Label information

Table 30: The description of label information

No.	Description
A	LOGO
B	Module part number
C	Project name
D	Serial number
E	International mobile equipment identity

6.3 Typical SMT Reflow Profile

SIMCom provides a typical soldering profile. Therefore the soldering profile shown below is only a generic recommendation and should be adjusted to the specific application and manufacturing constraints.

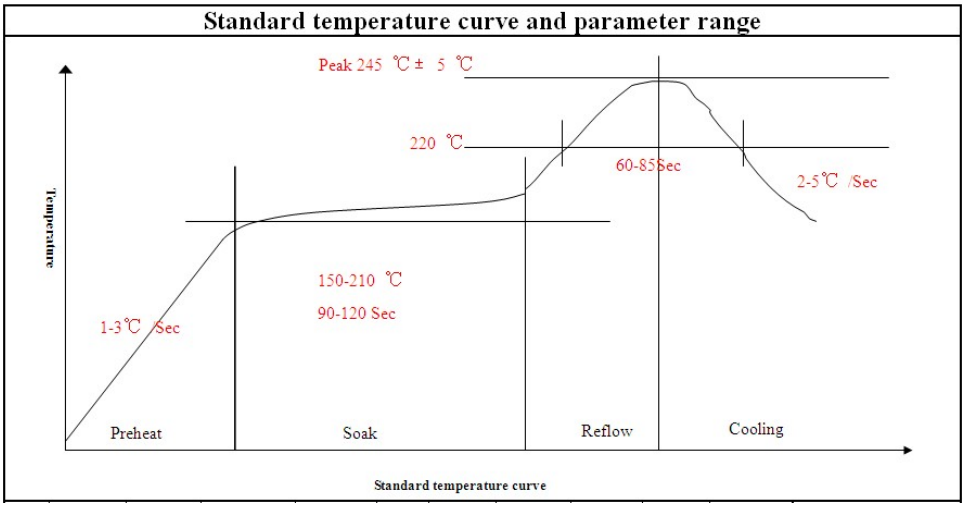

Figure41: The ramp-soak-spike reflow profile of MODULE

Note: For more details about secondary SMT, please refer to the document [21].

6.4 Moisture Sensitivity Level (MSL)

MODULE is qualified to Moisture Sensitivity Level (MSL) 3 in accordance with JEDEC J-STD-033. If the prescribed time limit is exceeded, users should bake MODULE for 192 hours in drying equipment (<5% RH) at 40+5/-0°C, or 72 hours at 85+5/-5°C. Note that plastic tray is not heat-resistant, and only can be baked at 45° C.

Table 31: Moisture Sensitivity Level and Floor Life

Moisture Sensitivity Level (MSL)	Floor Life (out of bag) at factory ambient≤30°C/60% RH or as stated
1	Unlimited at ≦30℃/85% RH
2	1 year
2a	4 weeks
3	168 hours
4	72 hours
5	48 hours
5a	24 hours
6	Mandatory bake before use. After bake, it must be reflowed within the time limit specified on the label.

NOTE: IPC / JEDEC J-STD-033 standard must be followed for production and storage.

6.5 Stencil Foil Design Recommendation

The recommended thickness of stencil foil is more than 0.15mm.

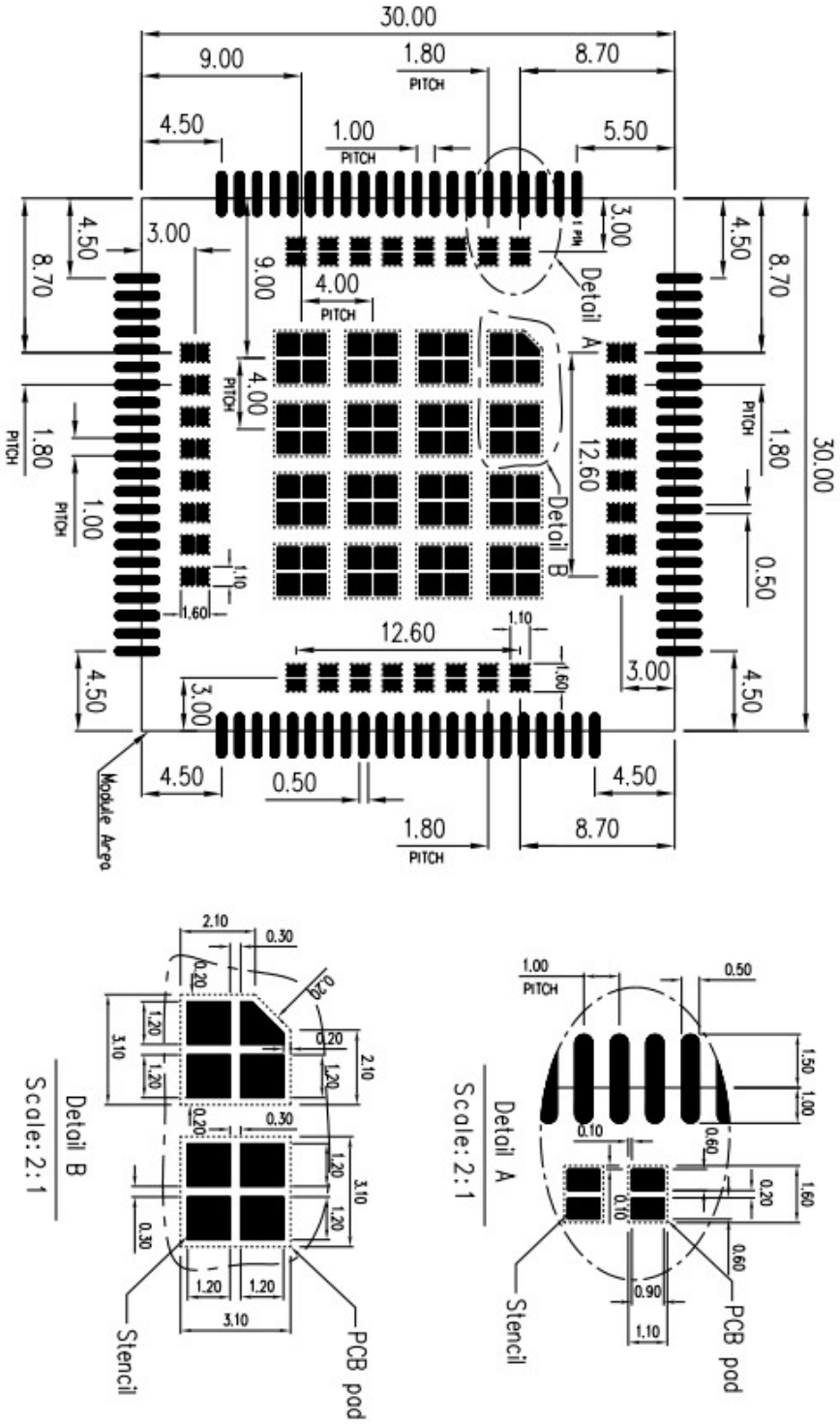

Figure 42 : Stencil Foil

7 Packaging

MODULE support tray packaging.

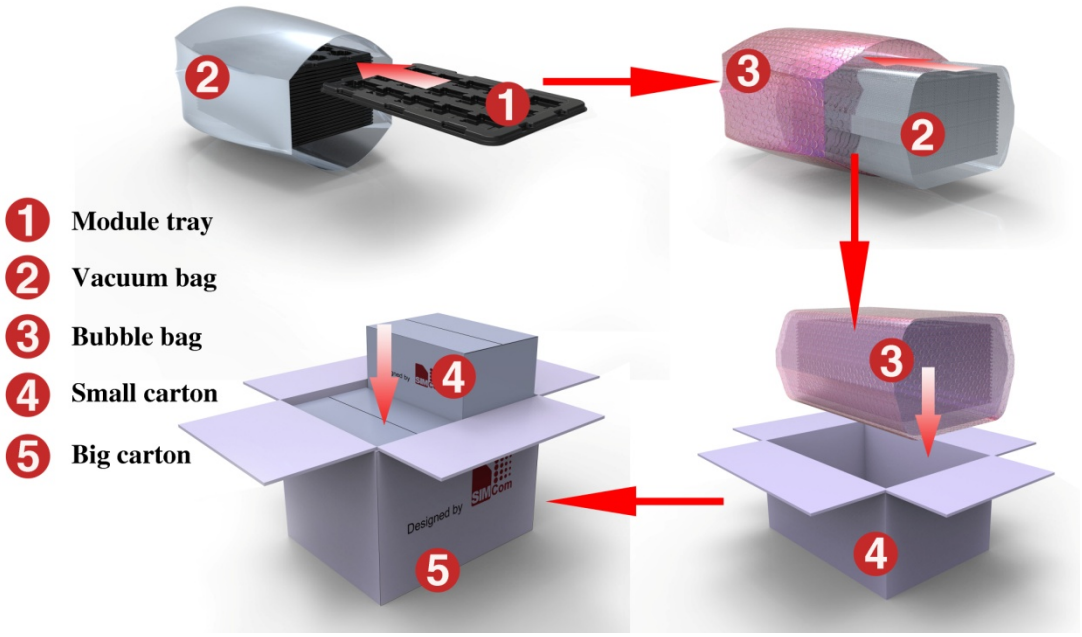

Figure43: packaging diagram

Module tray drawing:

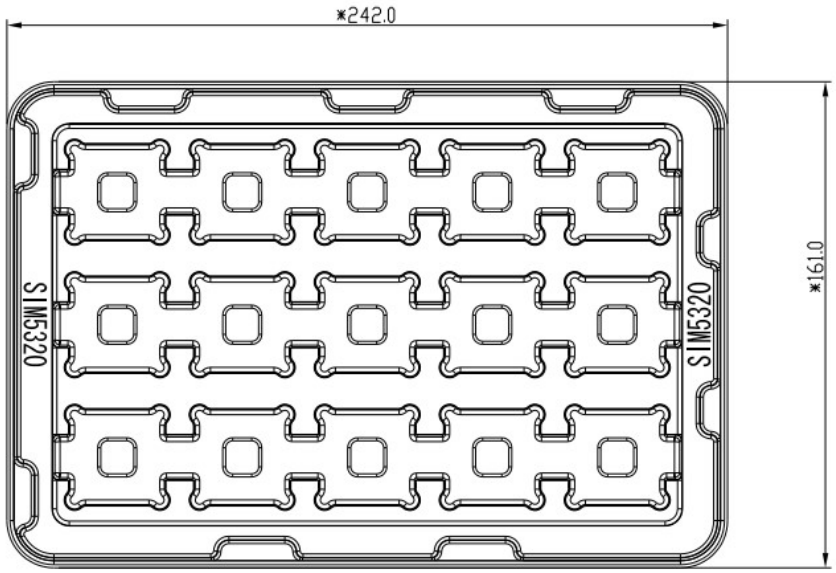

Figure 304: Tray drawing

Table 32: Tray size

Length（±3mm）	Width（±3mm）	Number
242.0	161.0	15

Small carton drawing：

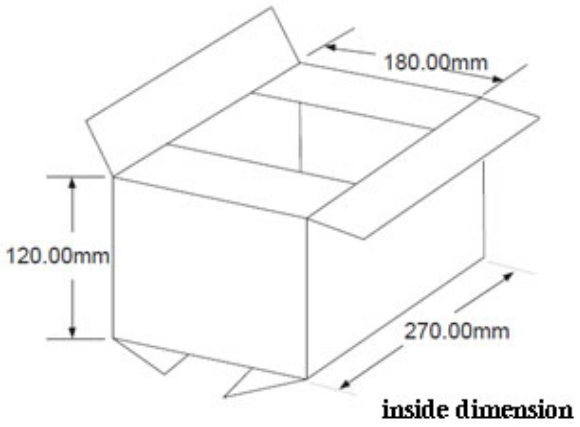

Figure 315: Small carton drawing

Table 33: Small Carton size

Length（±10mm）	Width（±10mm）	Height（±10mm）	Number
270	180	120	15*20=300

Big carton drawing：

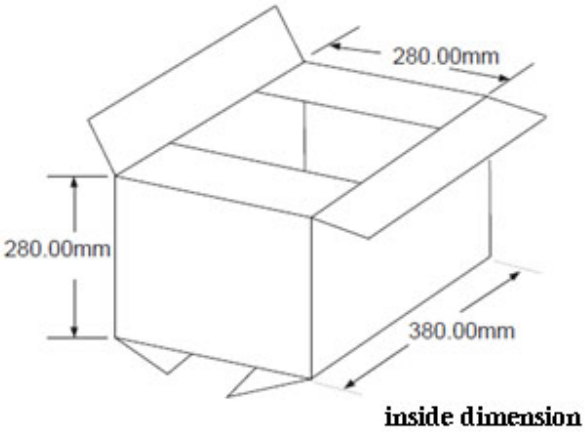

Figure 46: Big carton drawing

Table 34: Big Carton size

Length（±10mm）	Width（±10mm）	Height（±10mm）	Number

380	280	280	300*4=1200

Appendix

Ⅰ. Coding Schemes and Maximum Net Data Rates over Air Interface

Table 35: Coding Schemes and Maximum Net Data Rates over Air Interface

Multislot definition(GPRS/EDGE)			
Slot class	**DL slot number**	**UL slot number**	**Active slot number**
1	1	1	2
2	2	1	3
3	2	2	3
4	3	1	4
5	2	2	4
6	3	2	4
7	3	3	4
8	4	1	5
9	3	2	5
10	4	2	5
11	4	3	5
12	4	4	5
GPRS coding scheme	**Max data rata（4 slots）**		**Modulation type**
CS 1 = 9.05 kb/s / time slot	36.2 kb/s		GMSK
CS 2 = 13.4 kb/s / time slot	53.6 kb/s		GMSK
CS 3 = 15.6 kb/s / time slot	62.4 kb/s		GMSK
CS 4 = 21.4 kb/s / time slot	85.6 kb/s		GMSK
EDGE coding scheme	**Max data rata（4 slots）**		**Modulation type**
MCS 1 = 8.8 kb/s/ time slot	35.2 kb/s		GMSK
MCS 2 = 11.2 kb/s/ time slot	44.8 kb/s		GMSK
MCS 3 = 14.8 kb/s/ time slot	59.2 kb/s		GMSK
MCS 4 = 17.6 kb/s/ time slot	70.4 kb/s		GMSK
MCS 5 = 22.4 kb/s/ time slot	89.6 kb/s		8PSK
MCS 6 = 29.6 kb/s/ time slot	118.4 kb/s		8PSK
MCS 7 = 44.8 kb/s/ time slot	179.2 kb/s		8PSK
MCS 8 = 54.4 kb/s/ time slot	217.6 kb/s		8PSK
MCS 9 = 59.2 kb/s/ time slot	236.8 kb/s		8PSK
HSDPA device category	**Max data rate（peak）**		**Modulation type**
Category 1	1.2Mbps		16QAM,QPSK
Category 2	1.2Mbps		16QAM,QPSK
Category 3	1.8Mbps		16QAM,QPSK

Category 4	1.8Mbps	16QAM,QPSK
Category 5	3.6Mbps	16QAM,QPSK
Category 6	3.6Mbps	16QAM,QPSK
Category 7	7.2Mbps	16QAM,QPSK
Category 8	7.2Mbps	16QAM,QPSK
Category 9	10.2Mbps	16QAM,QPSK
Category 10	14.4Mbps	16QAM,QPSK
Category 11	0.9Mbps	QPSK
Category 12	1.8Mbps	QPSK
Category 13	17.6Mbps	64QAM
Category 14	21.1Mbps	64QAM
Category 15	23.4Mbps	16QAM
Category 16	28Mbps	16QAM
Category 17	23.4Mbps	64QAM
Category 18	28Mbps	64QAM
Category 19	35.5Mbps	64QAM
Category 20	42Mbps	64QAM
Category 21	23.4Mbps	16QAM
Category 22	28Mbps	16QAM
Category 23	35.5Mbps	64QAM
Category 24	42.2Mbps	64QAM
HSUPA device category	**Max data rate（peak）**	**Modulation type**
Category 1	0.96Mbps	QPSK
Category 2	1.92Mbps	QPSK
Category 3	1.92Mbps	QPSK
Category 4	3.84Mbps	QPSK
Category 5	3.84Mbps	QPSK
Category 6	5.76Mbps	QPSK
LTE-FDD device category (Downlink)	**Max data rate（peak）**	**Modulation type**
Category 1	10Mbps	QPSK/16QAM/64QAM
Category 2	50Mbps	QPSK/16QAM/64QAM
Category 3	100Mbps	QPSK/16QAM/64QAM
Category 4	150Mbps	QPSK/16QAM/64QAM
LTE-FDD device category (Uplink)	**Max data rate（peak）**	**Modulation type**
Category 1	5Mbps	QPSK/16QAM
Category 2	25Mbps	QPSK/16QAM
Category 3	50Mbps	QPSK/16QAM

Category 4	50Mbps	QPSK/16QAM

Ⅱ. Related Documents

Table 36: Related Documents

NO.	Title	Description
[1]	SIM7500_SIM7600 Series_AT Command Manual_V1.xx	AT Command Manual
[2]	ITU-T Draft new recommendationV.25ter	Serial asynchronous automatic dialing and control
[3]	GSM 07.07	Digital cellular telecommunications (Phase 2+); AT command set for GSM Mobile Equipment (ME)
[4]	GSM 07.10	Support GSM 07.10 multiplexing protocol
[5]	GSM 07.05	Digital cellular telecommunications (Phase 2+); Use of Data Terminal Equipment – Data Circuit terminating Equipment (DTE – DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
[6]	GSM 11.14	Digital cellular telecommunications system (Phase 2+); Specification of the SIM Application Toolkit for the Subscriber Identity Module – Mobile Equipment (SIM – ME) interface
[7]	GSM 11.11	Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module – Mobile Equipment (SIM – ME) interface
[8]	GSM 03.38	Digital cellular telecommunications system (Phase 2+); Alphabets and language-specific information
[9]	GSM 11.10	Digital cellular telecommunications system (Phase 2)； Mobile Station (MS) conformance specification； Part 1: Conformance specification
[10]	3GPP TS 51.010-1	Digital cellular telecommunications system (Release 5); Mobile Station (MS) conformance specification
[11]	3GPP TS 34.124	Electromagnetic Compatibility (EMC) for mobile terminals and ancillary equipment.
[12]	3GPP TS 34.121	Electromagnetic Compatibility (EMC) for mobile terminals and ancillary equipment.
[13]	3GPP TS 34.123-1	Technical Specification Group Radio Access Network; Terminal conformance specification; Radio transmission and reception (FDD)
[14]	3GPP TS 34.123-3	User Equipment (UE) conformance specification; Part 3: Abstract Test Suites.
[15]	EN 301 908-02 V2.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000. Third Generation cellular networks; Part 2: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive
[16]	EN 301 489-24 V1.2.1	Electromagnetic compatibility and Radio Spectrum Matters

		(ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment
[17]	IEC/EN60950-1(2001)	Safety of information technology equipment (2000)
[18]	3GPP TS 51.010-1	Digital cellular telecommunications system (Release 5); Mobile Station (MS) conformance specification
[19]	GCF-CC V3.23.1	Global Certification Forum - Certification Criteria
[20]	2002/95/EC	Directive of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
[21]	Module secondary-SMT-UGD-V1.xx	Module secondary SMT Guidelines
[22]	SIM7X00 Series_UART_Application Note_V1.xx	This document describes how to use UART interface of SIMCom modules.
[23]	SIM7100_SIM7500_SIM7600 Series_USB AUDIO_Application Note_V1.xx	USB AUDIO Application Note
[24]	SIM7X00 Series_GPS_Application Note_V1.xx	GPS Application Note
[25]	Antenna design guidelines for diversity receiver system	Antenna design guidelines for diversity receiver system
[26]	SIM7100 SIM7500 SIM7600 Sleep Mode_Application Note_V1.xx	Sleep Mode Application Note
[27]	7600CE-LAN-Reference Design V1.0	HSIC Application Note
[28]	SIM7600 Series SGMII-Reference_Design_V1.00	SGMII Reference Design

Ⅲ. Terms and Abbreviations

Table 37: Terms and Abbreviations

Abbreviation	Description
ADC	Analog-to-Digital Converter
ARP	Antenna Reference Point
BER	Bit Error Rate
BTS	Base Transceiver Station
CS	Coding Scheme
CSD	Circuit Switched Data
CTS	Clear to Send
DAC	Digital-to-Analog Converter
DRX	Discontinuous Reception
DSP	Digital Signal Processor
DTE	Data Terminal Equipment (typically computer, terminal, printer)
DTR	Data Terminal Ready
DTX	Discontinuous Transmission
EFR	Enhanced Full Rate
EGSM	Enhanced GSM
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
ETS	European Telecommunication Standard
EVDO	Evolution Data Only
FCC	Federal Communications Commission (U.S.)
FD	SIM fix dialing phonebook
FDMA	Frequency Division Multiple Access
FR	Full Rate
GMSK	Gaussian Minimum Shift Keying
GNSS	Global Navigation Satellite System
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global Standard for Mobile Communications
HR	Half Rate
HSPA	High Speed Packet Access
I2C	Inter-Integrated Circuit
IMEI	International Mobile Equipment Identity
LTE	Long Term Evolution
MO	Mobile Originated
MS	Mobile Station (GSM engine), also referred to as TE
MT	Mobile Terminated
NMEA	National Marine Electronics Association
PAP	Password Authentication Protocol
PBCCH	Packet Switched Broadcast Control Channel
PCB	Printed Circuit Board
PCS	Personal Communication System, also referred to as GSM 1900

RF	Radio Frequency
RMS	Root Mean Square (value)
RTC	Real Time Clock
SIM	Subscriber Identification Module
SMS	Short Message Service
SPI	serial peripheral interface
SMPS	Switched-mode power supply
TDMA	Time Division Multiple Access
TE	Terminal Equipment, also referred to as DTE
TX	Transmit Direction
UART	Universal Asynchronous Receiver & Transmitter
VSWR	Voltage Standing Wave Ratio
SM	SIM phonebook
NC	Not connect
EDGE	Enhanced data rates for GSM evolution
HSDPA	High Speed Downlink Packet Access
HSUPA	High Speed Uplink Packet Access
ZIF	Zero intermediate frequency
WCDMA	Wideband Code Division Multiple Access
VCTCXO	Voltage control temperature-compensated crystal oscillator
USIM	Universal subscriber identity module
UMTS	Universal mobile telecommunications system
UART	Universal asynchronous receiver transmitter

Ⅳ. Safety Caution

Table 38: Safety Caution

Marks	Requirements
	When in a hospital or other health care facility, observe the restrictions about the use of mobiles. Switch the cellular terminal or mobile off, medical equipment may be sensitive and not operate normally due to RF energy interference.
	Switch off the cellular terminal or mobile before boarding an aircraft. Make sure it is switched off. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. Forgetting to think much of these instructions may impact the flight safety, or offend local legal action, or both.
	Do not operate the cellular terminal or mobile in the presence of flammable gases or fumes. Switch off the cellular terminal when you are near petrol stations, fuel depots, chemical plants or where blasting operations are in progress. Operation of any electrical equipment in potentially explosive atmospheres can constitute a safety hazard.
	Your cellular terminal or mobile receives and transmits radio frequency energy while switched on. RF interference can occur if it is used close to TV sets, radios, computers or other electric equipment.
	Road safety comes first! Do not use a hand-held cellular terminal or mobile when driving a vehicle, unless it is securely mounted in a holder for hands free operation. Before making a call with a hand-held terminal or mobile, park the vehicle.
	GSM cellular terminals or mobiles operate over radio frequency signals and cellular networks and cannot be guaranteed to connect in all conditions, especially with a mobile fee or an invalid SIM card. While you are in this condition and need emergent help, please remember to use emergency calls. In order to make or receive calls, the cellular terminal or mobile must be switched on and in a service area with adequate cellular signal strength. Some networks do not allow for emergency call if certain network services or phone features are in use (e.g. lock functions, fixed dialing etc.). You may have to deactivate those features before you can make an emergency call. Also, some networks require that a valid SIM card be properly inserted in the cellular terminal or mobile.