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Huawei GTM900 GSM/GPRS Wireless Module
Product Description

V100R001

Huawei GTM900 GSM/GPRS Wireless Module

Product Description

Manual Version	T2-032598-20050320-C-1.10
Product Version	V100R001
BOM	31250298

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Summary of Updates

This section provides the update history of this manual and introduces the contents of subsequent updates.

Update History

This manual is updated for a major product version to maintain consistency with system hardware or software versions and to incorporate customer suggestions.

Manual Version	Notes
T2-032598-20050320-C-1.10	Initial field trial release

Relevant Documents

The manuals related to Huawei GTM900 GSM/GPRS Wireless Module are introduced in the table below:

Manual name	Description
Huawei GTM900 GSM/GPRS Wireless Module Product Description	Introduces Huawei GTM900 GSM/GPRS Wireless Module in terms of specifications and interface signals
Huawei GTM900 GSM/GPRS Wireless Module AT Command Set	Describes the AT commands related to Huawei GTM900 GSM/GPRS Wireless Module

Updates of Contents

None

About This Manual

Release Notes

The product version that corresponds to the manual is GTM900 V100R001.

Organization

The manual consists of six chapters.

Chapter 1 Overview of GTM900 presents physical specifications, functional architecture and application of GTM900.

Chapter 2 Interface Signals describes the interface signals of GTM900.

Chapter 3 Electrical Characteristics of Interfaces presents the electrical characteristics of the interfaces, including absolute maximum ratings, recommended operating conditions and power supply characteristics.

Chapter 4 Interface Application presents the application of the interfaces, including UART interface, SIM interface, audio interface, ringer interface and power supply interface.

Chapter 5 Operating Process presents the operating process of GTM900, including powering on/off, software upgrade and data services.

Chapter 6 Acronyms and Abbreviations

Intended Audience

The manual is intended for the following readers:

- Anyone who are interested in Huawei GTM900 GSM/GPRS Wireless Module, regarding its features, applications, structure and specifications.

Conventions

The manual uses the following conventions:

I. General conventions

Convention	Description
Arial	Normal paragraphs are in Arial.
Arial Narrow	Warnings, Cautions, Notes and Tips are in Arial Narrow.
Boldface	Headings are in Boldface.
Terminal Display	Terminal Display is in Courier New; message input by the user via the terminal is in boldface.

II. Symbols

Eye-catching symbols are also used in the manual to highlight the points worthy of special attention during the operation. They are defined as follows:

⚠ **Caution**, **Warning**, **Danger**: Means reader be extremely careful during the operation.

📖 **Note**, **Comment**, **Tip**, **Knowhow**, **Thought**: Means a complementary description.

Table of Contents

Chapter 1 Overview of GTM900

1.1 About This Chapter

This chapter presents the GTM900 GSM/GPRS wireless module from the following aspects:

- Intended Use of GTM900
- Physical specifications of GTM900
- Functions and Services Supported by GTM900
- Functional Architecture of GTM900
- Application of GTM900

1.2 Intended Use of GTM900

Huawei GTM900 is a type of tri-band wireless module supporting both GSM and GPRS. The module supports both standard AT commands and enhanced AT commands, and provides a variety of voice services and data services. It is an ideal solution to high-speed data transmission.

1.3 Physical specifications of GTM900

The physical specifications of GTM900 are listed in Table 1-1.

Table 1-1 Physical specifications of GTM900

Item	Index	
Weight	10 g	
Dimensions (including the shielding box)	Height	56.5 mm
	Width	36 mm
	Depth	3 mm

Figure 1-1 shows the appearance of GTM900.
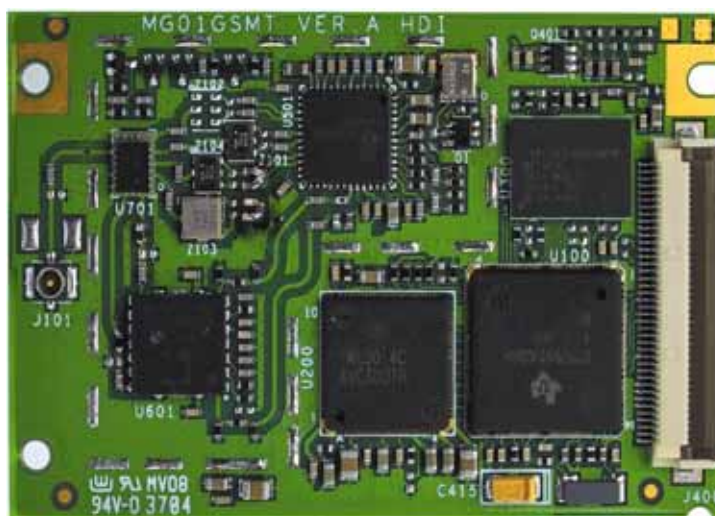
Figure 1-1 Appearance of GTM900

1.4 Functions and Services Supported by GTM900

1.4.1 Functional Characteristics of GTM900

GTM900 has the following functional characteristics:

- Supporting the single band operation at 800 MHz
- Supporting the dual band operation at 900 MHz and 1800 MHz
- Supporting the tri-band operation at 800 MHz, 900 MHz, and 1800 MHz
- Easy switchover between the above three bands through software
- Supporting 850MHz and 1900 MHz through hardware replacement
- Providing the UART interface
- Supporting the maximum rate of the serial interfaces at 115.2 kbps
- Supporting the packet data services of GPRS CLASS 10
- Supporting speech encoding in the modes of FR, HR, EFR, and AMR
- Supporting both standard AT command sets and enhanced AT command sets
- Providing interfaces, including UART, Audio, SIM, Power, Control and ADC

1.4.2 Services Supported by GTM900

GTM900 supports the following services:

- High quality voice services and speech encoding in the modes of FR, HR, EFR, and AMR
- Wireless data services, including CS data services and PS data services
- Packet data services of GPRS CLASS 10
- SMS with MT and MO supported
- Supplementary Services, including call display, call transfer, call forward, call hold, call wait, and three-party conversation

- Trunking services, including voice group call, point-to-point communications, and private call.

1.5 Functional Architecture of GTM900

Figure 1-2 illustrates the functional architecture of GTM900.
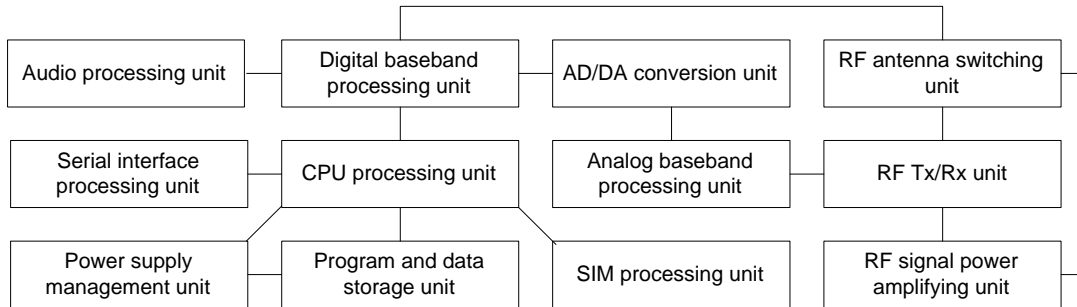
Figure 1-2 Functional architecture of GTM900

Through AT command sets, GTM900 communicates with the external CPU over the URAT interface, performing such functions as radio transmit and receive, baseband processing, and audio processing. The peripheral equipment like keyboard and LCD is controlled by the external CPU.

The realization in the above way features:

- Simple interfaces
- A variety of terminal products developed by the user with different types of keyboards and LCDs

1.6 Application of GTM900

1.6.1 Application to Terminal-Type Fixed Stations

When applying GTM900 to a terminal-type fixed station, you need an external CPU. The CPU performs:

- Configuration of the subscriber line interface circuit (SLIC) chip
- Power supply management
- Communications at the serial interfaces

GTM900 performs the other functions.

See Figure 1-3 for the functional architecture of the terminal-type fixed station.
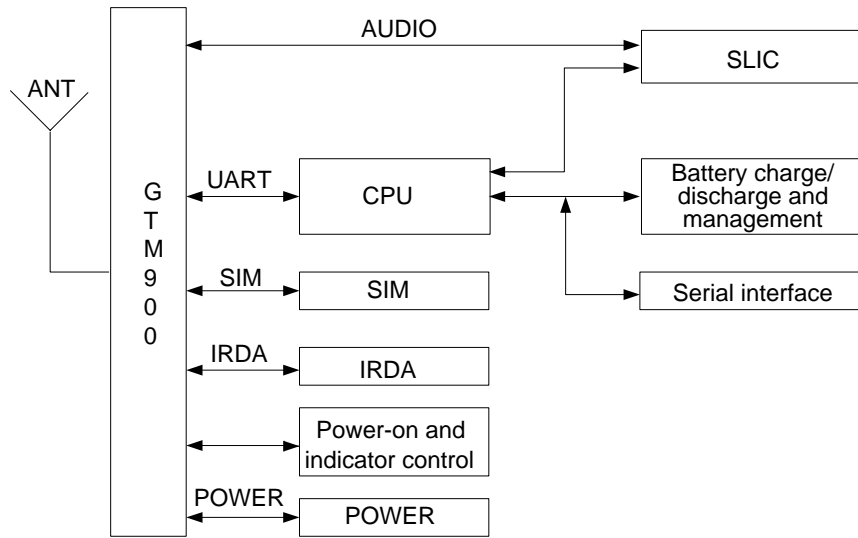
Figure 1-3 Functional architecture of terminal-type fixed station

1.6.2 Application to Phone-Type Fixed Stations

When applying GTM900 to a phone-type fixed station, you need a keyboard and LCD. The external CPU controls the keyboard and LCD.

See Figure 1-4 for the functional architecture of the phone-type fixed station.
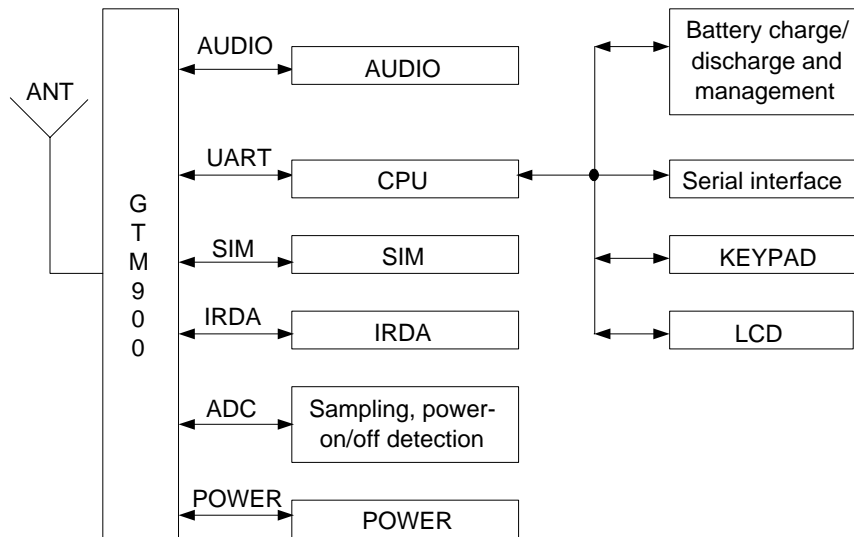
Figure 1-4 Functional architecture of phone-type fixed station

1.6.3 Application to Vehicle-Mounted Stations and Public Telephones

The application of GTM900 to a vehicle-mounted station or a public telephone is the same to the above two applications. You may develop the wanted keyboards, LCDs, and other devices.

Chapter 2 Interface Signals

2.1 About This Chapter

This chapter presents the interface signals of GTM900 from the following aspects:

- Interfaces of Signal Connector on GTM900
- Antenna Interface

2.2 Interfaces of Signal Connector on GTM900

2.2.1 Interface Signals

Table 2-1 lists the detailed description of the interface signals of GTM900.

Table 2-1 Interface signals

No.	Signal	I/O	Interface level	Function	Note
1	Batt+	I	4.0 V	Supplying power	--
2	Batt+	I	4.0 V	Supplying power	--
3	Batt+	I	4.0 V	Supplying power	--
4	Batt+	I	4.0 V	Supplying power	--
5	Batt+	I	4.0 V	Supplying power	--
6	GND	O/I	--	Providing working ground	--
7	GND	O/I	--	Providing working ground	--
8	GND	O/I	--	Providing working ground	--
9	GND	O/I	--	Providing working ground	--
10	GND	O/I	--	Providing working ground	--
11	RXD2 at the infrared serial interface	O	3.0 V	Serial interface for traffic control, supporting adaptive rate	--
12	TXD2 at the infrared serial interface	I	3.0 V	Serial interface for traffic control, supporting adaptive rate	--
13	VDD	O	--	Signal indication of normally started GTM900	--
14	ADC	I	--	A/D conversion	10bits 0-3V

No.	Signal	I/O	Interface level	Function	Note
15	PWON	I	3.0 V	Power-on control signals triggered only at low level	--
16	UART_DSR	O	3.0 V	Indicating whether the serial interface is ready	--
17	UART_RI	O	3.0 V	Ringer indication of the serial interface for use as call display and hang-up indication	--
18	UART_RXD	O	3.0 V	Receive signals at PC serial interfaces	--
19	UART_TXD	I	3.0 V	Transmit signals at PC serial interfaces	--
20	UART_CTS	O	3.0 V	Receive Request message delivered over the PC serial interface for traffic control	--
21	UART_RTS	I	3.0 V	Transmit Ready message delivered over the PC serial interface for traffic control	--
22	UART_DTR	I	3.0 V	Signal indication that the PC serial interface is ready	--
23	UART_DCD	O	3.0 V	Carrier detection	--
24	SIM_CD	I	3.0V	Input signals indicating whether the SIM card is configured	--
25	SIM_RST	O	3.0 V	Output signals to reset the SIM card	--
26	SIM_DATA	I/O	3.0 V	Input interface and output interface of the SIM card	--
27	SIM_CLK	O	3.0 V	Clock signals of the SIM card provided by the baseband chip	--
28	SIM_VCC	O	3.0 V	Output signals supplying power to the SIM card	--
29	SIM_GND	O/I	--	Earth signal of SIM card	--
30	Vbackup	O/I	3.0 V	Standby battery of GTM900	--
31	RST	I	--	Reset signal	--
32	LPG	O	--	Mainly controls the status of the indicator.	--
33	AUXO+	O	--	Hands-free audio output signals+	--
34	AUXO-	O	--	Hands-free audio output signals–	--

No.	Signal	I/O	Interface level	Function	Note
35	EAR+	O	--	Receiver audio output signals+	--
36	EAR-	O	--	Receiver audio output signals–	--
37	MIC+	I	--	Receiver audio input signals+	--
38	MIC-	I	--	Receiver audio input signals–	--
39	AUXI+	I	--	Hands-free audio input signals+	--
40	AUXI-	I	--	Hands-free audio input signals–	--

  Note:

The signals at the serial interfaces are named with PC as the DCE(Data Communications Equipment).

2.2.2 Design of Signal Connector

The signal connector assembled on GTM900 is a type of 40-pin FPC with the cross-pin distance of 0.5 mm and the cross-wire distance of 0.5 mm. The connector employs the single-row and surface-mounted structure with bend pins and the cable-locking device. It is type Hirose FH12-40S-0.5SH. See Figure 2-1 for its appearance.

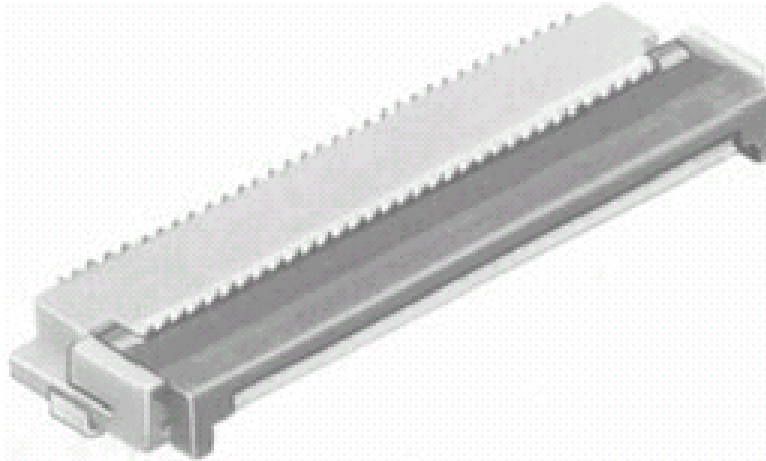**Figure 2-1** Appearance of signal connector

2.3 Antenna Interface

GTM900 uses a GSC connector to establish the RF connection to the relevant terminal. The external antenna connects to the connector through a cable. The connector with

the part number of MM9329-2700 is provided by Murata. See the dimensions illustrated in Figure 2-2.
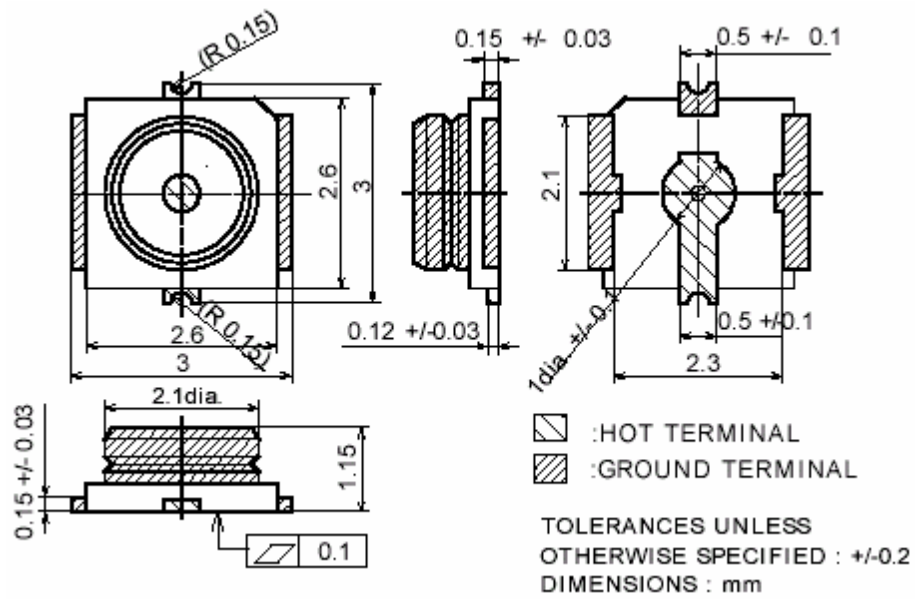

Figure 2-2 Dimensions of antenna connector (unit: mm)

Chapter 3 Electrical Characteristics of Interfaces

3.1 About This Chapter

This chapter presents the electrical characteristics of the interfaces of GTM900 from the following aspects:

- Absolute Maximum Ratings
- Recommended Operating Conditions
- Power Supply Characteristics

 Note:

This chapter focuses on the electrical characteristics of the interfaces on GTM900 for external services, not including the power supply part.

3.2 Absolute Maximum Ratings

See Table 3-1 for the absolute maximum ratings of GTM900.

Table 3-1 Absolute maximum ratings of GTM900

Parameter	Description	Min.	Max.	Unit
Ts	Storage temperature	−40	+70	°C
Vi	Input or output signal voltage on any of the pins.	−0.5	3.5	V
I_{IN}	Input current	--	100	mA
VESD	Electrostatic voltage	--	±2000	V

 Note:

"Vi" in Table 3-1 refers to common I/O pins, not including the power supply pins. The maximum input voltage of a power supply pin is 4.8 V.

3.3 Recommended Operating Conditions

See Table 3-2 for the recommended operating conditions of GTM900.

Table 3-2 Recommended operating conditions of GTM900

Parameter	Description	Min.	Max.	Unit
V_{IH}	High level input voltage	1.85	3.14	V
V_{IH}	Low level input voltage	–0.3	0.9	V
I_{IH}	Leakage current of high level input voltage	--	2	uA
I_{IL}	Leakage current of low level input voltage	–2	--	uA
V_{OH}	High level output voltage	2.39	3.00	V
V_{OL}	Low level output voltage	0	0.45	V
C_{IN}	Input capacitance	--	15	pF

3.4 Power Supply Characteristics

3.4.1 Input Power

Table 3-3 lists the values for the input power of GTM900.

Table 3-3 Values for input power of GTM900

Parameter	Min.	Typical	Max.	Unit
VBatt+	3.3	4	4.8	V

3.4.2 Operating Current

Table 3-4 lists the values for the operating current of GTM900.

Table 3-4 Values for operating current of GTM900

Operating mode	Parameter	Min.	Max.	Unit
Idle	Ireg	--	4.0	mA
Conversation	Ireg	--	250	mA

Chapter 4 Interface Application

4.1 About This Chapter

This chapter presents the application of the interfaces from the following aspects:

- UART Interface
- SIM Interface
- Audio Interface
- Ringer Interface
- Power Supply Interface

4.2 UART Interface

The UART interface realizes serial communications with external devices, supporting level input and level output at 3.00 V (VDD_MSM_P).

All the signals over the UART interface are triggered at low level except RXD and TXD. The latter two are triggered at high level.

The UART interface supports both transmit FIFO (First In First Out) and receive FIFO at 512 byte, programmable data width, programmable data stop bit, and programmable parity check or non check. The maximum rate the UART interface supports is 115.2 kbps. The default rate is 9600 bps.

See Table 4-1 for detailed description of the UART interface signals.

Table 4-1 Signals over UART interface

No.	Signal name	Description	Characteristic	Direction
23	UART_DCD	Carrier detection	Data links already connected	DCE-DTE
17	UART_RI	Ringer indication	Notifying DTE of remote call-in	DCE-DTE
20	UART_RTS	Request transmit	DTE sends Request transmit message to DCE	DTE-DCE
18	UART_TXD	Transmit data	DTE transmits data	DTE-DCE
16	UART_DSR	Data services ready	DCE is ready for data services	DCE-DTE
22	UART_DTR	Data terminal ready	DTE is ready	DTE-DCE
21	UART_CTS	Clear transmit	DCE is switched to the Rx mode	DCE-DTE

No.	Signal name	Description	Characteristic	Direction
19	UART_RXD	Receive data	DTE receives serial data	DCE-DTE
6	GND	GND	--	--

For the output signals, GTM900 can be directly connected to an external drive device operating at 3.3 V. If the input signals exceed the value range of GTM900, they must undergo level alignment.

4.3 SIM Interface

GTM900 can be connected to an external SIM card operating at 3.0 V. See Table 4-2 for the signals over the SIM interface.

Table 4-2 Signals over SIM interface

No.	Signal name	Description
27	SIM_CLK	Clock signals over the SIM interface
25	SIM_RST	Reset signals over the SIM interface
26	SIM_DATA	Data lines of the SIM card
28	SIM_VCC	Power supply to the SIM card
24	SIM_CD	SIM card configured
29	SIM_GND	SIM card grounded

4.4 Audio Interface

GTM900 supports two channels of audio input signals and audio output signals. The two types of signals are both differential ones. In practice, you may use one channel or both. See Figure 4-1 and Table 4-2 for the two channels of input signals and output signals.
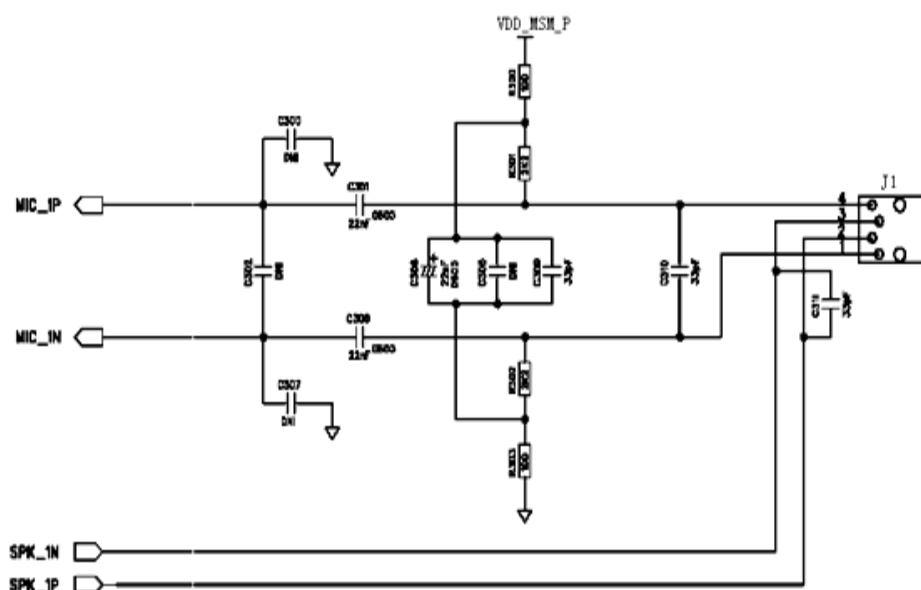
Figure 4-1 Connection between audio input signals and output signals on first channel
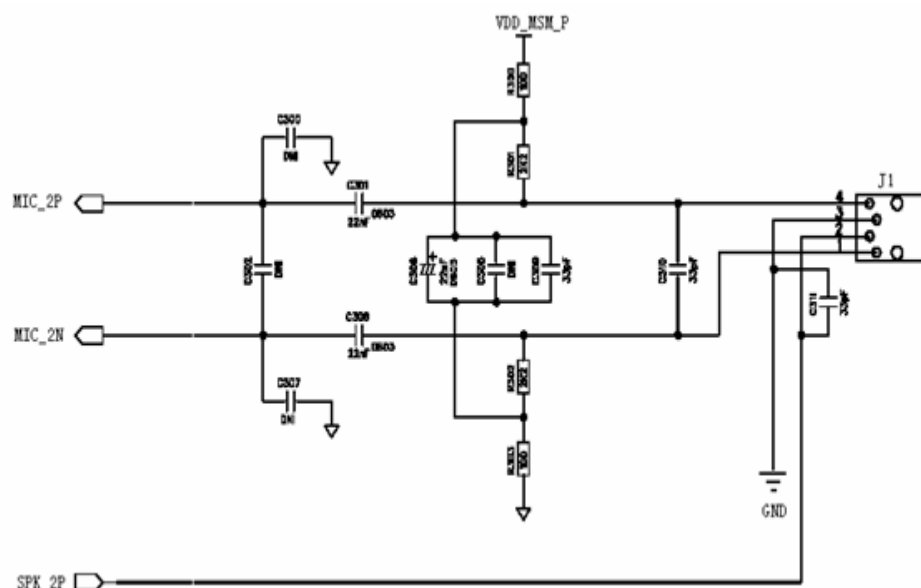

Figure 4-2 Connection between audio input signals and output signals on second channel

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 Note:

The maximum power of the audio signals output to the 32 Ω loudspeaker on the first channel is 33 mW, and that of the audio signals output to the 1 kΩ loudspeaker on the second channel is 4 mW.

See Table 4-3 for the signals over the Audio interface.

Table 4-3 Signals over Audio interface

No.	Signal name	Description
33	AUXO+	Handsfree audio output signal+
34	AUXO-	Handsfree audio output signal–
39	AUXI+	Handsfree audio input signal+
40	AUXI-	Handsfree audio input signal–
35	EAR+	Handheld audio output signal+
36	EAR-	Handheld audio output signal–
37	MIC+	Handheld audio input signal+
38	MIC-	Handheld audio input signal–

4.5 Ringer Interface

If you drive an external ringer with the Ringer signals, you shall need an external drive circuit. See Figure 4-3 for the drive circuit of the Ringer signals.
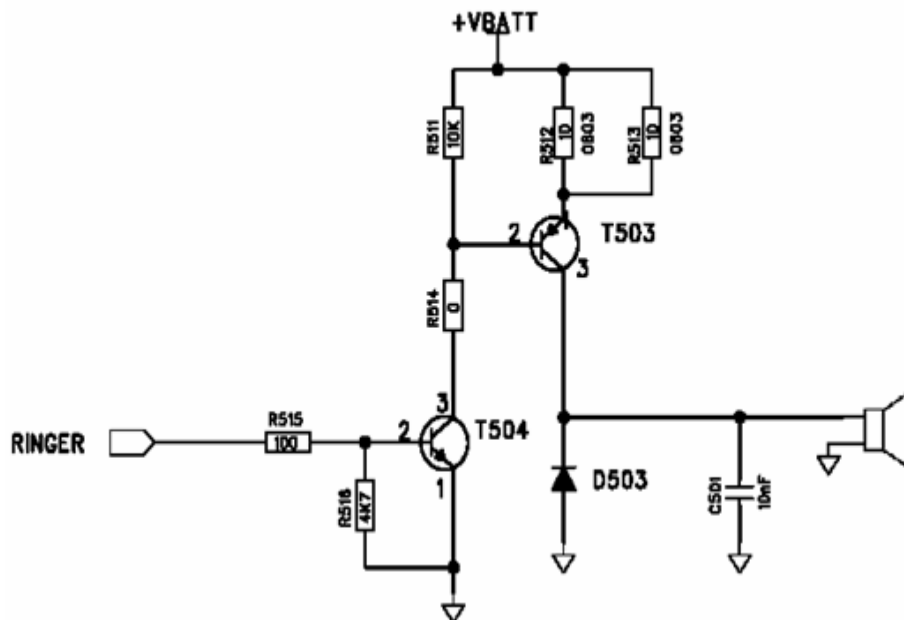

Figure 4-3 Drive circuit of Ringer signals

4.6 Power Supply Interface

The external power supply to GTM900 is 4.0 V. In practice, the voltage range can be from 3.3 V to 4.8 V.

Chapter 5 Operating Process

5.1 About This Chapter

This chapter presents the operating process of GTM900 from the following aspects:

- Powering on/off GTM900
- Software Upgrade of GTM900
- Data Services
- Services Presentation Diagram of GTM900

5.2 Powering on/off GTM900

5.2.1 Powering UP GTM900

When the power supply to GTM900 is higher than 3.3 V and the PWON signal is low level, GTM900 operates as illustrated in Figure 5-1.
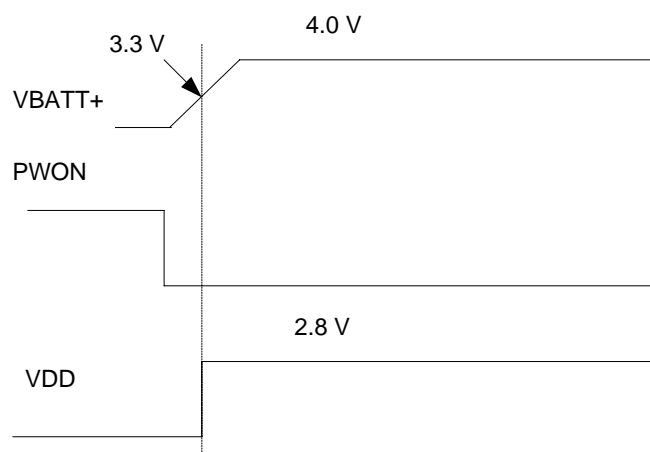

Figure 5-1 Relationship between VDD and PWON signal

5.2.2 Powering Down GTM900

GTM900 might be powered down in the two cases below:

I. Powering down GTM900 normally

During normal powering down of GTM900, the external CPU lowers the level of PWON signal level for 2 to 3 seconds to put GTM900 into normal powering down procedure. In this case, GTM900 can save relevant information and completes network deregistration.

II. Powering down GTM900 in emergencies

Through AT commands, the external CPU powers off GTM900 directly.

5.3 Software Upgrade of GTM900

GTM900 supports software upgrade. You may upgrade the software of GTM900 over the serial interface. For detailed operations, see the operation manual.

5.4 Data Services of GTM900

The data services provided by GTM900 are transmitted over the serial interface. See Figure 5-2 for the network access of GTM900.
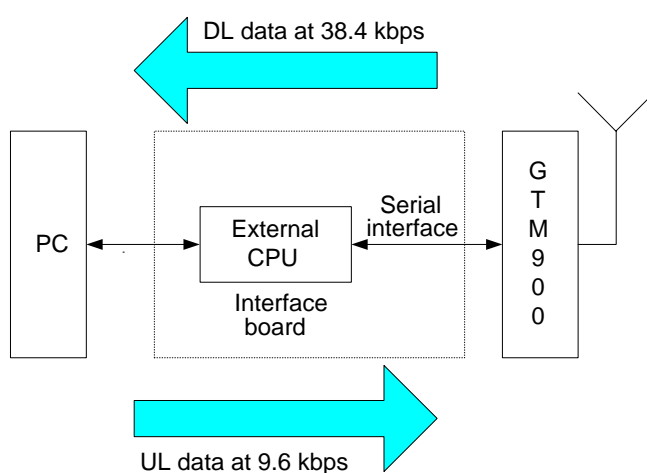

Figure 5-2 Data services of GTM900

For the downlink data,

- GTM900 transmits the data received from the network to the external CPU over the serial interface.
- The CPU then forwards the data to external data terminals, for example, computers.

For the uplink data, the process is similar. However, when providing data services, GTM900 does not process other AT commands delivered by external equipment.

5.5 Services Presentation Diagram of GTM900

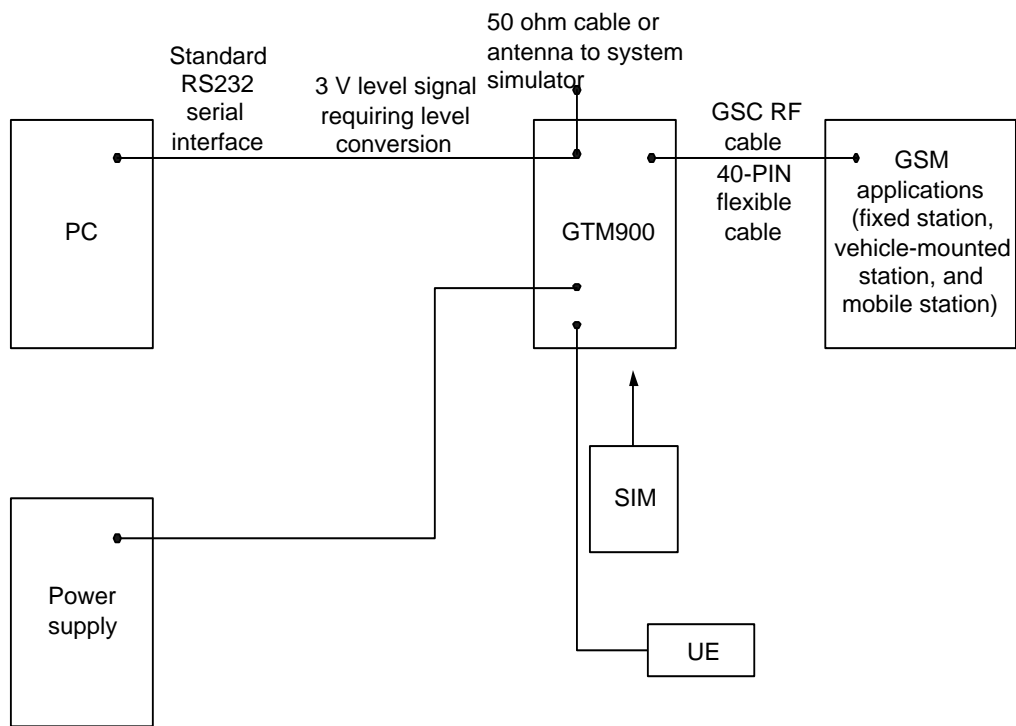See Figure 5-3 for the services presentation diagram of GTM900.

Figure 5-3 Functionality of GTM900

Chapter 6 Acronyms and Abbreviations

ADC	Analog-to-Digital Converter
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
ARFCN	Absolute Radio Frequency Channel Number
ARP	Antenna Reference Point
BER	Bit Error Rate
BTS	Base Transceiver Station
CS	Coding Scheme
CSD	Circuit Switched Data
CE	Conformité Européene (European Conformity)
DSP	Digital Signal Processor
DTR	Data Terminal Ready
DTX	Discontinuous Transmission
EFR	Enhanced Full Rate
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
GMSK	Gaussian Minimum Shift Keying
GPRS	General Packet Radio Service
HiZ	High Impedance
HR	Half Rate
IMEI	International Mobile Equipment Identity
FDMA	Frequency Division Multiple Access
ISO	International Standards Organization
ITU	International Telecommunications Union
LED	Light Emitting Diode
MO	Mobile Originated
MMI	Man Machine Interface
MT	Mobile Terminated
NTC	Negative Temperature Coefficient
PDU	Protocol Data Unit

PPP	Point-to-point protocol
RAM	Random Access Memory
SAR	Specific Absorption Rate
SELV	Safety Extra Low Voltage
UART	Universal asynchronous receiver-transmitter
ZIF	Zero Insertion Force
VSWR	Voltage Standing Wave Ratio