



# Application Note

**SIM928A&SIM908\_Compatible Design**



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## Revision History

Data	Version	Description of change	Author
2014-10-30	1.01	Original	Chengbing.wu

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## 1 Introduction

This document describes the differences between the SIM928A and SIM908 in great detail. It could help users understand and develop SIM928A or SIM908 quickly.

## 2 Pin Configuration

The following figure shows the pin assignment of SIM928A and SIM908.

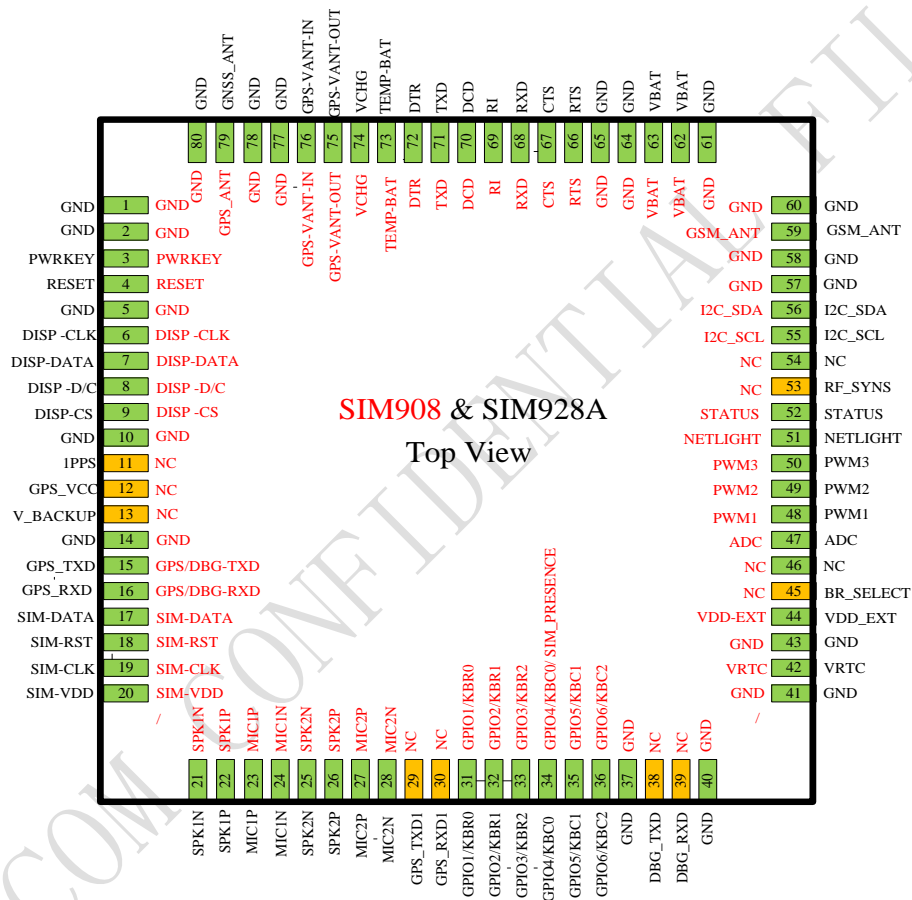


Figure 1: SIM928A and SIM908 Pins Assignment

**NOTE:**

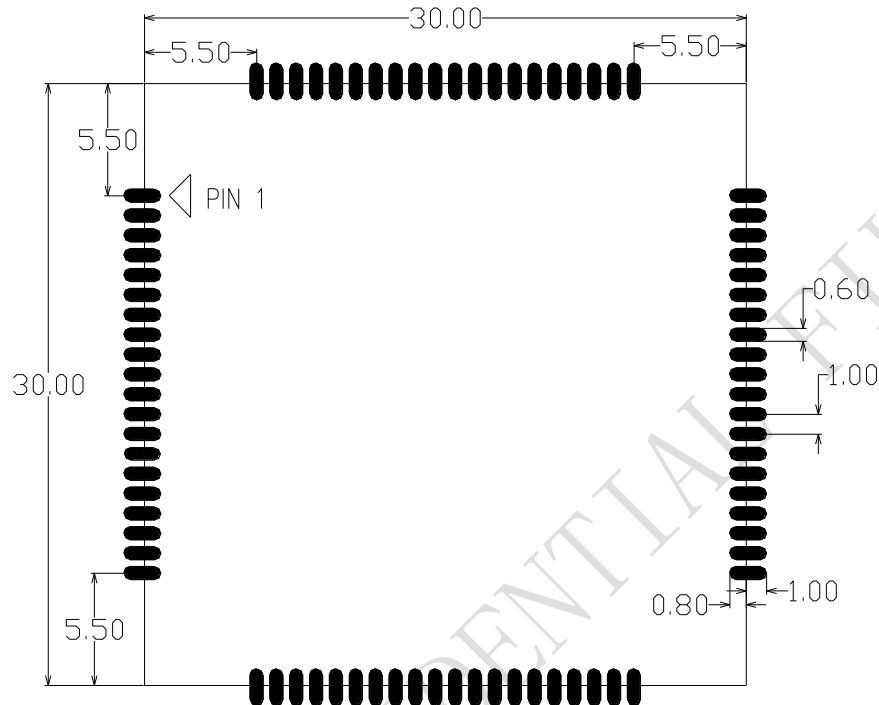
- 1、The pin names marked in red in the inside area are SIM908.
- 2、The pin names marked in black in the outside area are SIM928A.
- 3、The pin numbers marked in orange in the inside area are different function interfaces between SIM928A and SIM908
- 4、The pin numbers marked in green in the inside area are same function interfaces between SIM928A and SIM908

**Table 1: The Difference of Pins in SIM928A and SIM908**

Pin	SIM928A Pin name	SIM908 Pin name	I/O	Description
11	1PPS	NC	O	SIM928A: Time Mark outputs timing pulse related to receiver time SIM908: NC
12	GPS_VCC	NC	I	SIM928A:GPS Power supply (2.8V~4.3V) SIM908: NC
13	V_BACKUP	NC	O	SIM928A:Power supply for GPS RTC,It is recommended to connect with a battery or LDO(2.3V~4.3V) SIM908: NC
29	GPS_TXD1	NC	O	SIM928A: Serial communication for RTCM SIM908: NC
30	GPS_RXD1	NC	I	
38	DBG_TXD	NC	O	SIM928A: For GSM/GPRS debugging and upgrading firmware SIM908: NC
39	DBG_RXD	NC	I	
45	BR_SELECT	NC	I	SIM928A: GPS NMEA baud rate set 0:115200, NC:9600 default=NC SIM908:NC
53	RF_SYNS	NC	O	SIM928A:RF synchronization



### 3 Recommended Footprint



**Figure 2: Footprint recommendation (Unit: mm)**

**NOTE:**

*There should be Solder Mask, and avoid via and trace in the keep out area.*

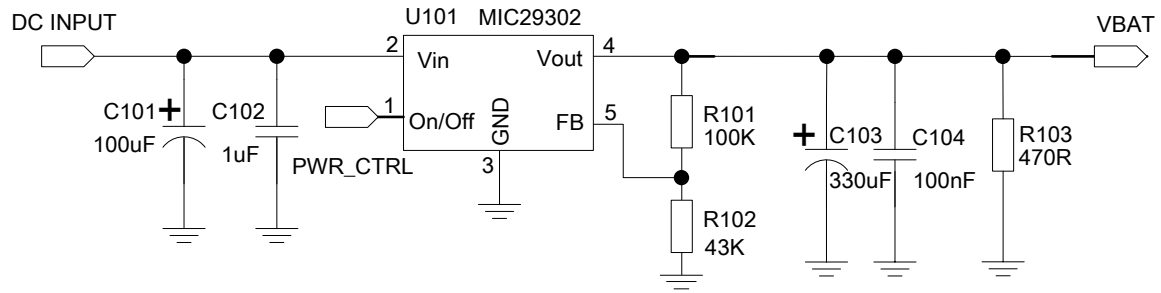
### 4 Hardware Reference Design

The following chapters describe compatible design of SIM928 A and SIM908 on main functionalities.

#### 4.1 Power Supply

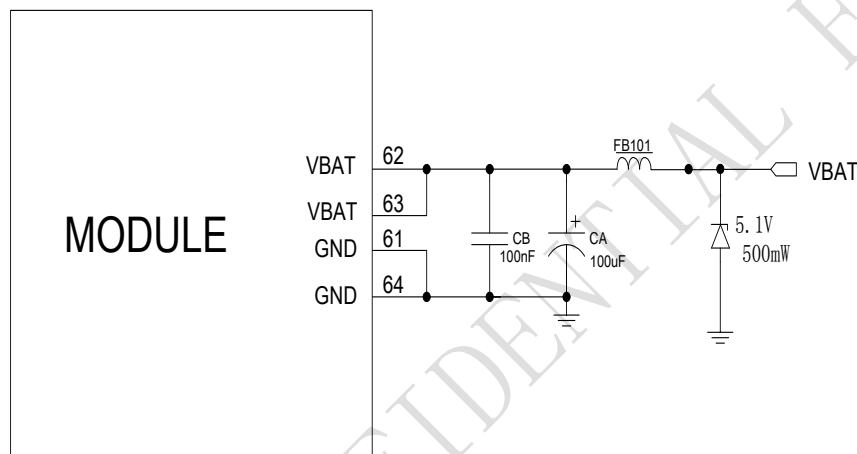
The power supply pins of SIM928A and SIM908 include two VBAT pins (pin 62&63). VBAT directly supplies the power to RF circuit and baseband circuit. The figure 4 is the reference design of SIM928A VBAT power supply.

The following figure is the reference design of +5V input power supply. The designed output for the power supply is 4.1V; here a linear regulator can be used.



**Figure 3: Reference circuit of the LDO power supply**

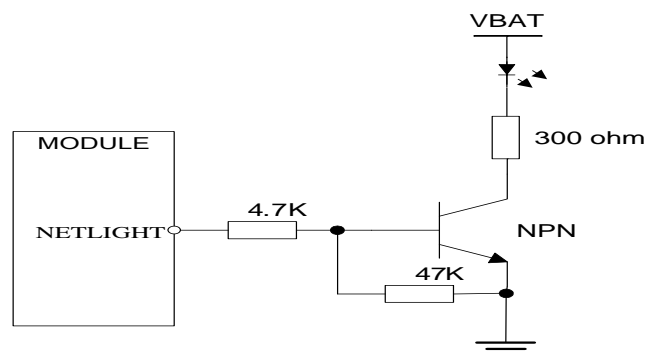
Additionally, in order to get a stable power source, it is suggested to use a zener diode of which reverse zener voltage is 5.1V and dissipation power is more than 500mW.



**Figure 4: Reference Circuit of SIM928A&SIM908**

## 4.2 Network Status Indication

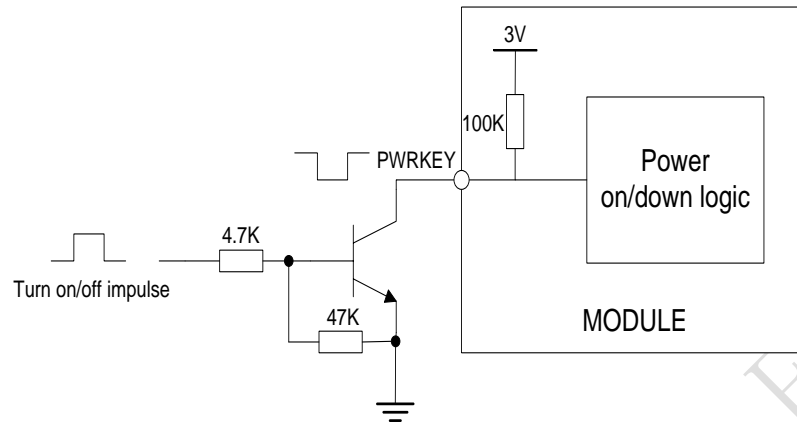
The NETLIGHT pin can be used to drive a network status indicator LED. The following circuit is the reference design.



**Figure 5: Application circuit**

### 4.3 Power on/off circuit

The following circuit is a reference design for SIM928A and SIM908 power-on/off circuit.



**Figure 6: Power on/off circuit for SIM908 and SIM928A**

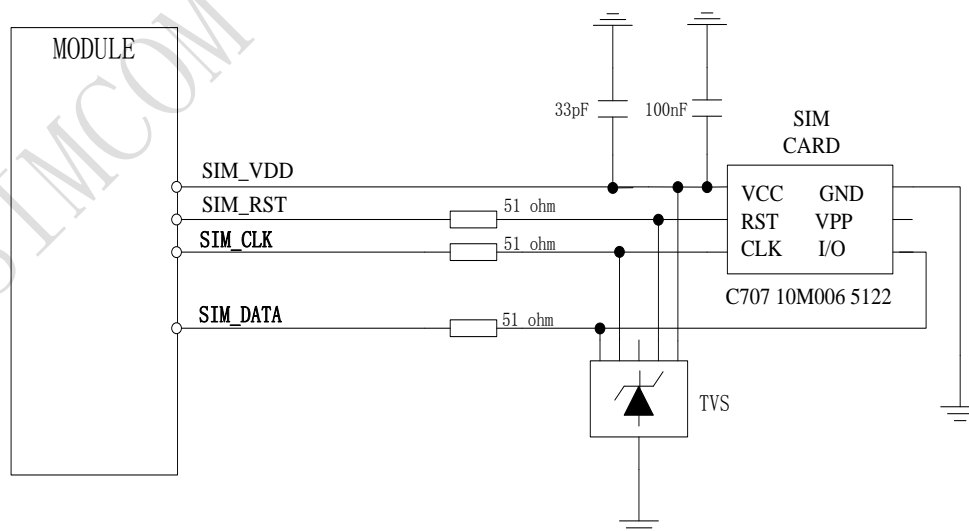
**NOTE:** It is recommended to cut off the VBAT power supply directly instead of using external reset pin when SIM928A can not respond to the AT command “AT+CPOWD=1” and PWRKEY pin.

### 4.4 SIM Interface

The SIM provides the required subscription verification information to allow the mobile equipment to attach to a GSM or UMTS network. Both 1.8V and 3.0V SIM Cards are supported.

It is recommended to use an ESD protection component such as ST ([www.st.com](http://www.st.com)) ESDA6V1W5.

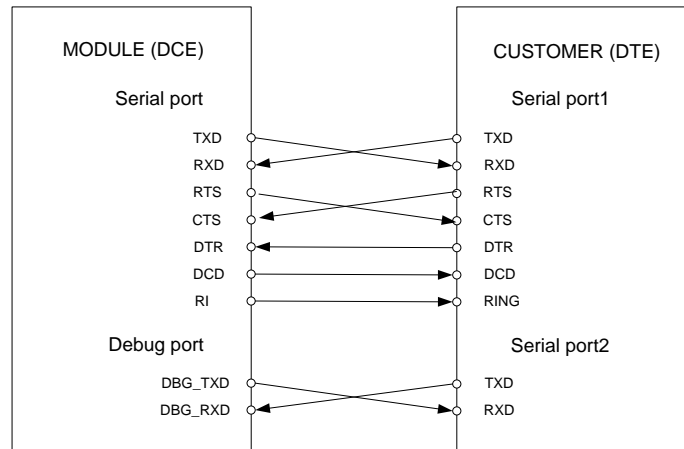
The following circuit is a reference design for SIM928 Aand SIM908 SIM circuit.



**Figure 7: SIM interface reference circuit**

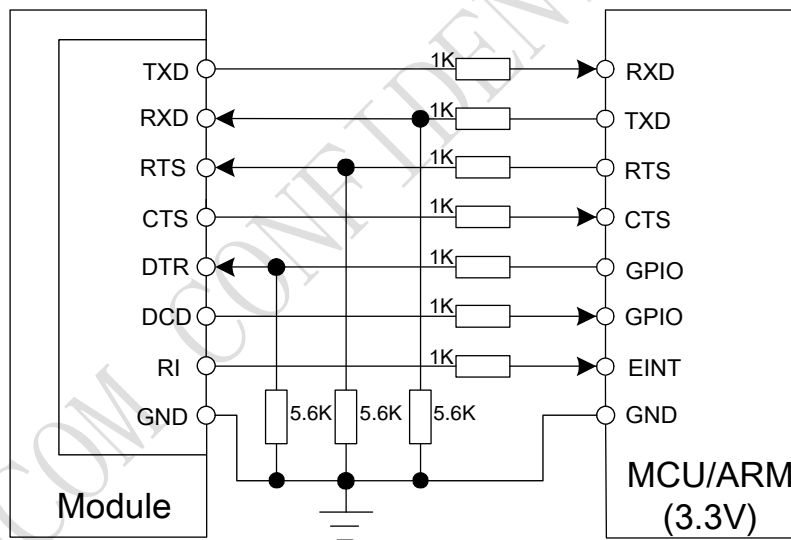
## 4.5 GPRS UART Interface

The following figure shows the connection between module and client (DTE).



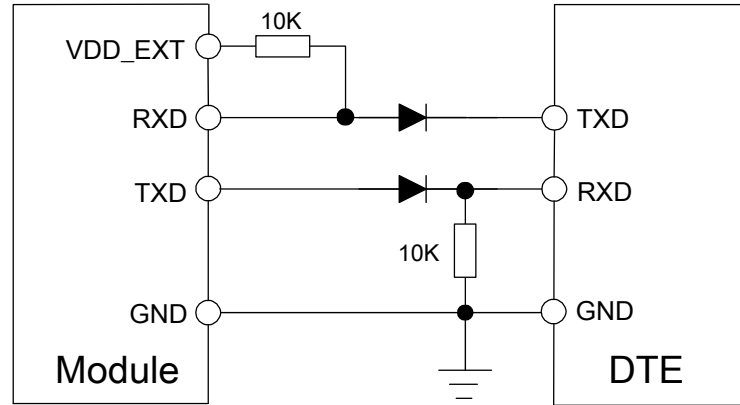
**Figure 8: Connection of the serial interfaces**

If the voltage of UART is 3.3V, the following reference circuits are recommended. If the voltage is 3.0V, please change the resistors in the following figure from 5.6K to 14K.



**Figure 9: Resistor matching circuit**

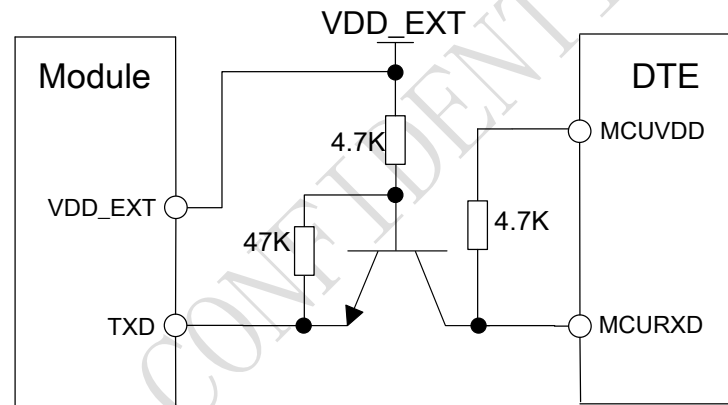
If the voltage of UART is 3V or 3.3V, the following reference circuits are recommended:



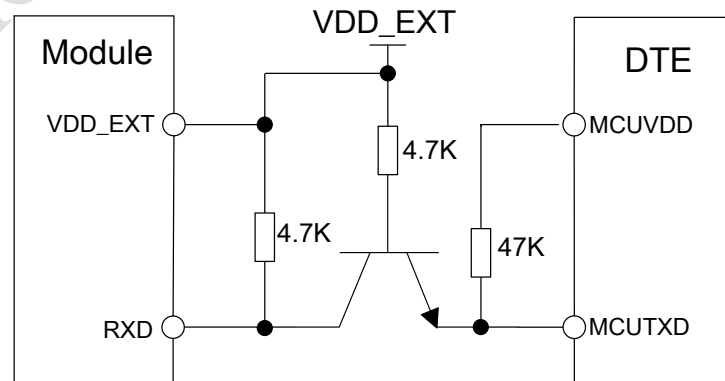
**Figure 10: Diode isolation circuit**

*Note: please make sure the minimum of client high limit should be less than 2.8V minus the diode drop.*

If the voltage of UART is 5V, the following reference circuits are recommended:



**Figure 11 TX level matching circuit**



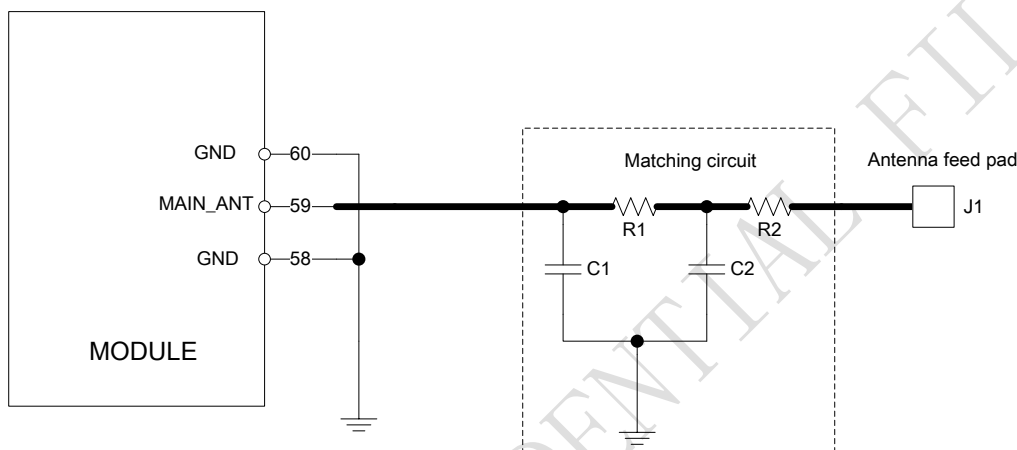
**Figure12: RX level matching circuit**

*Note: When Figure 11 and Figure 12 are used for electrical level isolation, if customers use serial port to upgrade SW, please note VDD\_EXT has no voltage output during the upgrading process, LDO output could be used as VDD\_EXT in the figure, upgrading through USB port is recommended.*

## 4.6 RF Interface

SIM928A and SIM908 provides RF antenna interface. Customer's antenna should be located in the host board and connected to module's antenna pad through micro-strip line or other types of RF trace and the trace impedance must be controlled in 50Ω.

The following circuit is a reference design for SIM928A and SIM908 RF antenna circuit.



**Figure 13: Main Antenna matching circuit**

In figure 9, the components R1, C1, C2 and R2 is used for antenna matching, the value of components can only be got after the antenna tuning, usually, they are provided by antenna vendor. By default, the R1, R2 are 0 ohm resistors, and the C1, C2 are reserved for tuning

## 5 GPS Application Interface

The GSM/GPRS engine of SIM928A and SIM908 is the same. The following chapters describe compatible design of SIM928A and SIM908 on GPS functionalities. Similarities and differences are as follows:

**Table 2: GPS in SIM928A and SIM908**

Difference	SIM928A	SIM908
GPS Power supply	GPS_VCC (2.8V to 4.3V), V_BACKUP(2.8V to 4.3V)	VBAT
GPS URATS	1、NMEA output and PMTK command input (GPS_RXD GPS_TXD)	1、NMEA output and AT command input (GPS/DBG_RXD)

	2、RTCM input (GPS_RXD1GPS_TXD1)	GPS/DBG_TXD)
GPS	Stand-alone	Host-based
Tracking Sensitivity	-165dBm	-160dBm
SBAS,QZSS, RTCM	Support	Not support
A-GPS	Support	Not support
Global Navigation Satellite System	Not support, only support GPS	Not support, only support GPS
UART for GPS and GSM level	2V8	2V8

## 5.1 Comparison of the Schematic

As shown above, besides the GPS Power supply, there could be two situations according to customer's application if they use sim928A to replace sim908;

1. Get NEMA information from GPS serial port..

In this case, the user only need to control the power supply of GPS\_VCC, SIM928A can completely replace the SIM908 shown in Figure 14 refer to the circuit diagram.

2. Obtain location information by AT commands through main serial port:

In this case, if the user to use sim928A instead of sim908, besides the control of GPS\_VCC power supply, also need to sim928A GPS\_TXD GPS\_RXD and DBG\_RXD DBG\_TXD together, ( shown in Figure 15), the need for further updates to sim928 software, to make sim928A fully compatible with sim908.

The following table shows schematic applicable to SIM908 module migration to SIM928A module.

D

C

B

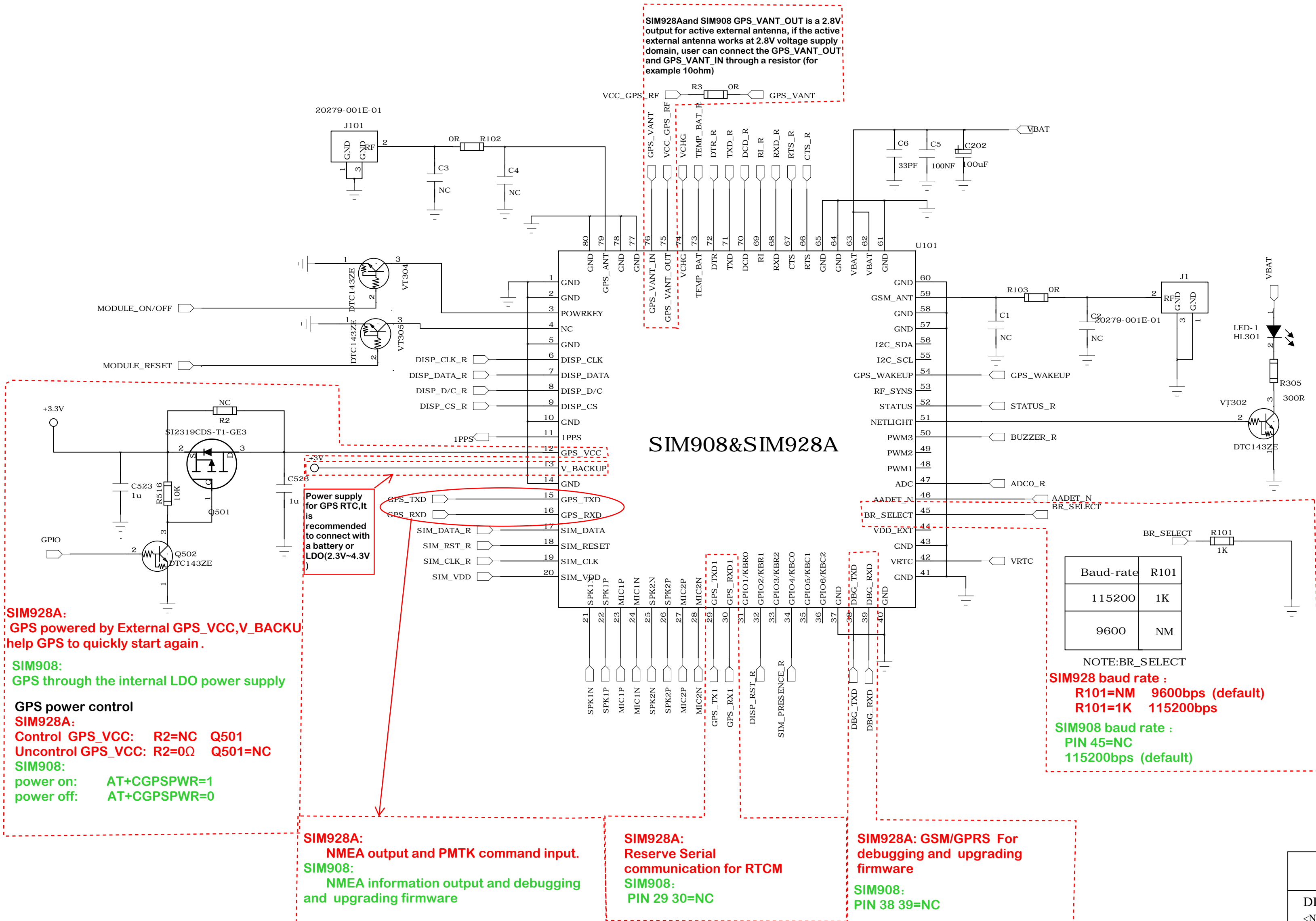
A

D

C

B

A



SIM Technology		
DRAWN BY <NAME HERE>	PORJECT SIM928-TE	TITLE <TITLE NAME HERE>
CHECKED BY <NAME HERE>	SIZE A2	VER <NO>
SHEET No of No		<DATE HERE>



**Figure 8: Directly obtain NEMA Design Schematics****NOTE:**

1. The words marked in **green** are SIM908.
2. The words marked in **red** are SIM928.
3. This recommendation schematic for customer directly obtain NEMA information from the GPS-TX GPS-RX, also compatible with SI908 and SIM928A
4. If the user is using the SIM928A module, please refer to the SIM928A\_Hardware\_Design

D

C

B

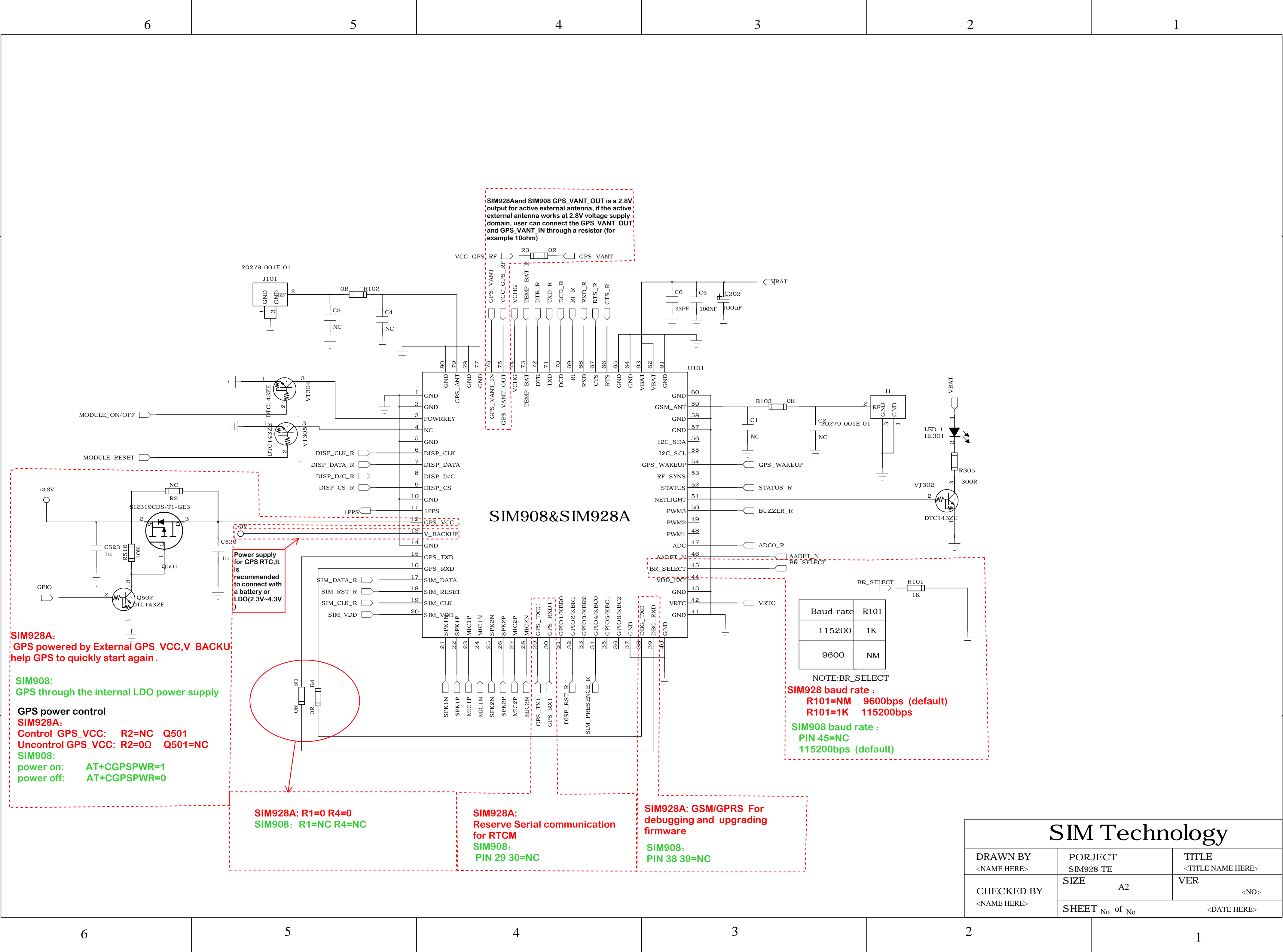
A

D

C

B

A



SIM Technology		
DRAWN BY <NAME HERE>	PORJECT SIM928-TE	TITLE <TITLE NAME HERE>
CHECKED BY <NAME HERE>	SIZE A2	VER <NO>
SHEET No of No		<DATE HERE>

**Figure 9: Directly obtain position information Design Schematics**

**NOTE:**

1. The words marked in **green** are SIM908.
2. The words marked in **red** are SIM928A.
3. This recommendation diagram for customer directly through the AT command directly obtain position information, also compatible with SI908 and SIM928A, but SIM928A needs to update software, please contact with SIMcom.
4. If the user is using the SIM928A module, please refer to the SIM928A\_Hardware\_Design

## 6 Appendix

### 6.1 Related documents

**Table 3: Related documents**

SN	Document name	Remark
[1]	SIM928A_Hardware_Design	SIM928AA Hardware Design Document
[2]	SIM908_Hardware_Design	SIM908 Hardware Design Document

### 6.2 Terms and Abbreviation

**Table 4: Terms and Abbreviations**

Abbreviation	Description
ADC	Analog-to-Digital Converter
A-GPS	Assisted Global Positioning System
AMR	Adaptive Multi-Rate
CS	Coding Scheme
CSD	Circuit Switched Data
CTS	Clear to Send
DTE	Data Terminal Equipment (typically computer, terminal, printer)
DTR	Data Terminal Ready
DTX	Discontinuous Transmission
DGPS	Difference Global Positioning System
EFR	Enhanced Full Rate
EGSM	Enhanced GSM
ESD	Electrostatic Discharge
ETS	European Telecommunication Standard
EPO	Extended Prediction Orbit
EGNOS	European Geostationary Navigation Overlay Service
FR	Full Rate
GPRS	General Packet Radio Service
GSM	Global Standard for Mobile Communications
GPS	Global Positioning System
GAGAN	The GPS Aided Geo Augmented Navigation

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