

M08-R

Reference Design

GSM/GPRS Module Series

Rev. M08-R_Reference_Design_V1.0

Date: 2019-10-31

Status: Released



Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local office. For more information, please visit:

<http://www.quectel.com/support/sales.htm>

For technical support, or to report documentation errors, please visit:

<http://www.quectel.com/support/technical.htm>

Or email to: support@quectel.com

GENERAL NOTES

QUECTEL OFFERS THE INFORMATION AS A SERVICE TO ITS CUSTOMERS. THE INFORMATION PROVIDED IS BASED UPON CUSTOMERS' REQUIREMENTS. QUECTEL MAKES EVERY EFFORT TO ENSURE THE QUALITY OF THE INFORMATION IT MAKES AVAILABLE. QUECTEL DOES NOT MAKE ANY WARRANTY AS TO THE INFORMATION CONTAINED HEREIN, AND DOES NOT ACCEPT ANY LIABILITY FOR ANY INJURY, LOSS OR DAMAGE OF ANY KIND INCURRED BY USE OF OR RELIANCE UPON THE INFORMATION. ALL INFORMATION SUPPLIED HEREIN IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

COPYRIGHT

THE INFORMATION CONTAINED HERE IS PROPRIETARY TECHNICAL INFORMATION OF QUECTEL WIRELESS SOLUTIONS CO., LTD. TRANSMITTING, REPRODUCTION, DISSEMINATION AND EDITING OF THIS DOCUMENT AS WELL AS UTILIZATION OF THE CONTENT ARE FORBIDDEN WITHOUT PERMISSION. OFFENDERS WILL BE HELD LIABLE FOR PAYMENT OF DAMAGES. ALL RIGHTS ARE RESERVED IN THE EVENT OF A PATENT GRANT OR REGISTRATION OF A UTILITY MODEL OR DESIGN.

Copyright © Quectel Wireless Solutions Co., Ltd. 2019. All rights reserved.

About the Document

History

Revision	Date	Author	Description
1.0	2019-10-31	Vane WANG	Initial

Contents

About the Document	1
Contents	2
1 Reference Design.....	4
1.1. Introduction	4
1.2. Power-on/off Scenarios	4
1.3. Schematics	5

Figure Index

FIGURE 1: TIMING OF TURNING ON THE MODULE	4
FIGURE 2: TIMING OF TURNING OFF THE MODULE	5
FIGURE 3: TIMING OF RESTARTING THE MODULE	5

1 Reference Design

1.1. Introduction

This document provides reference designs for Quectel M08-R module. These designs include block diagram, module design, power supply, audio interfaces, (U)SIM interface, UART interfaces, etc.

1.2. Power-on/off and Restart Scenarios

The timing of turning on the module is illustrated below.

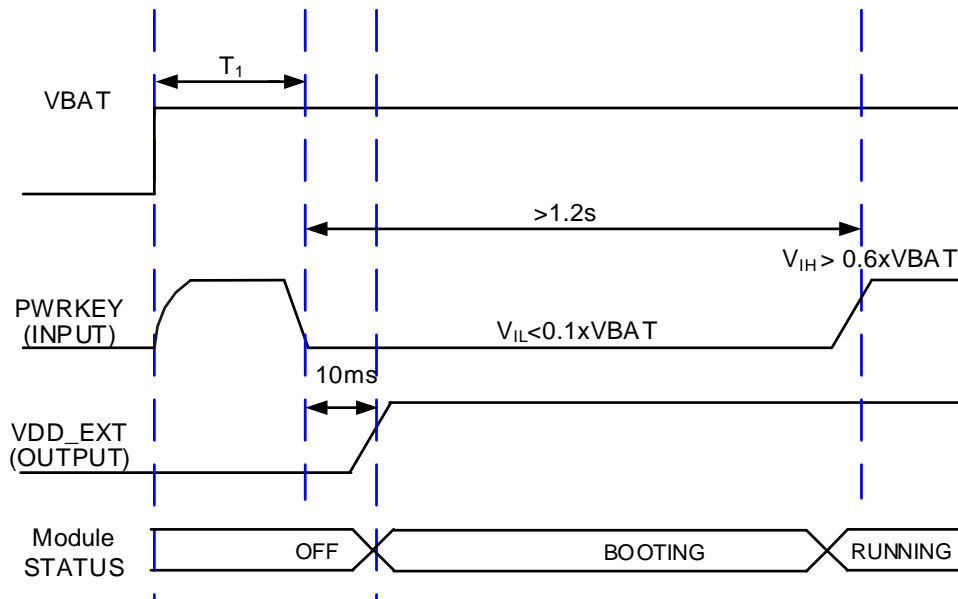


Figure 1: Timing of Turning on the Module

The timing of turning off the module is illustrated below.

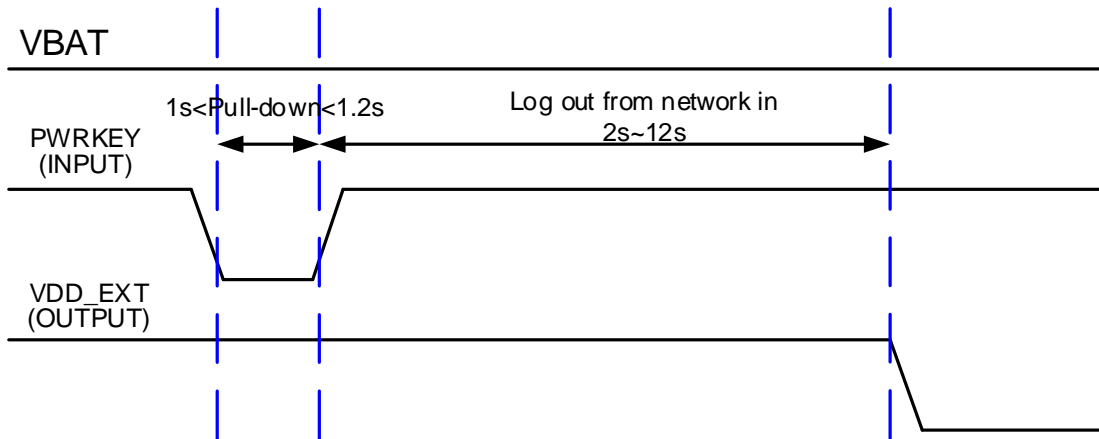


Figure 2: Timing of Turning off the Module

The timing of restart the module is illustrated below.

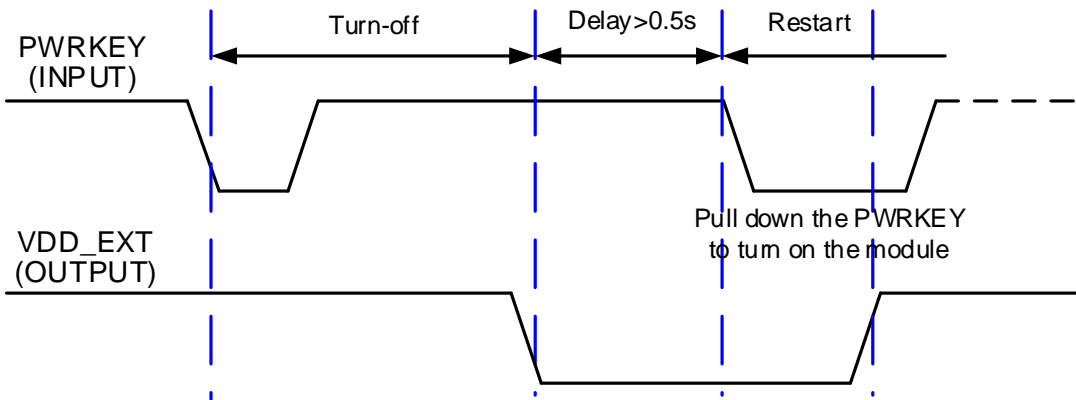
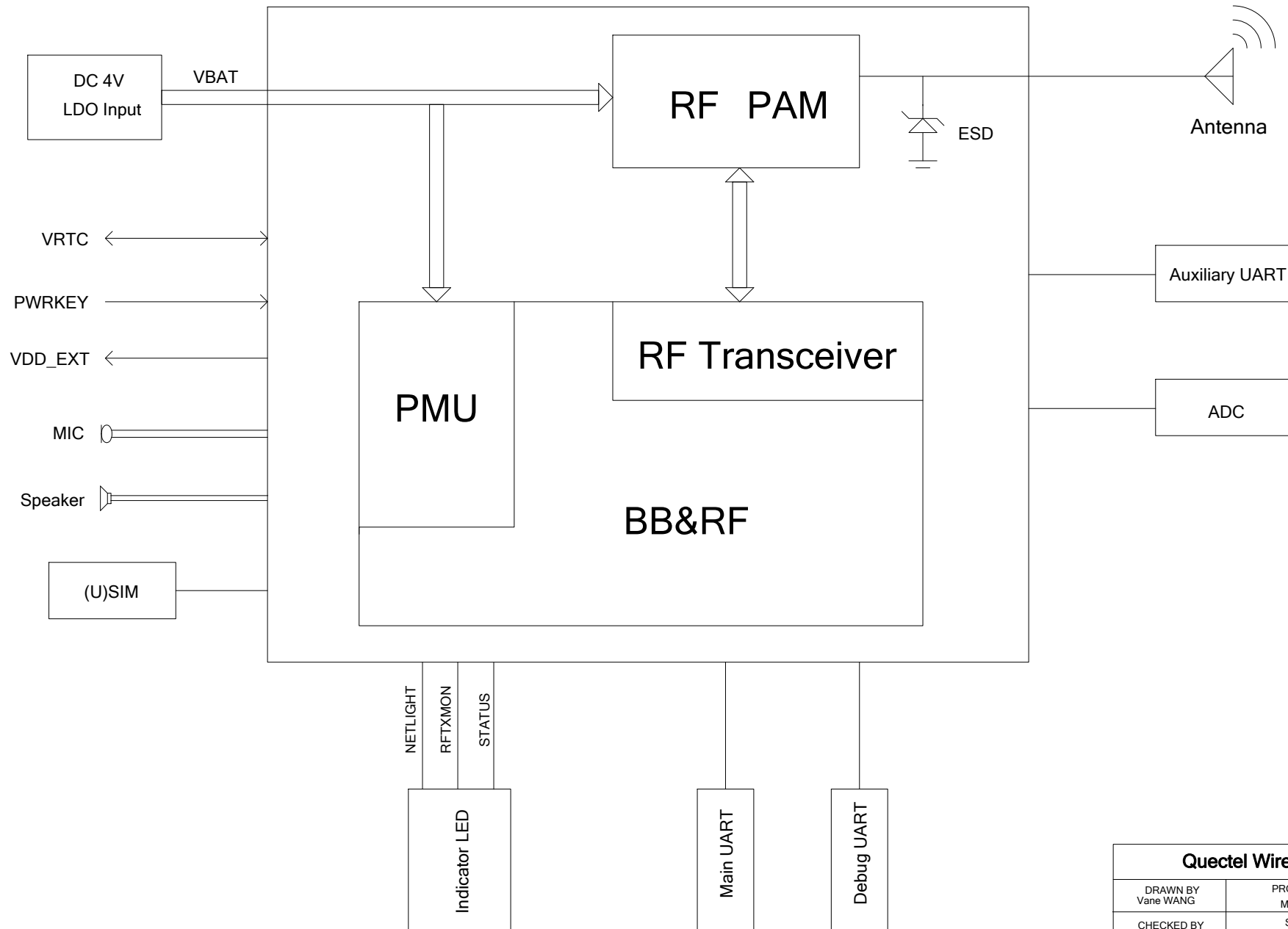


Figure 3: Timing of Restarting the Module

1.3. Schematics

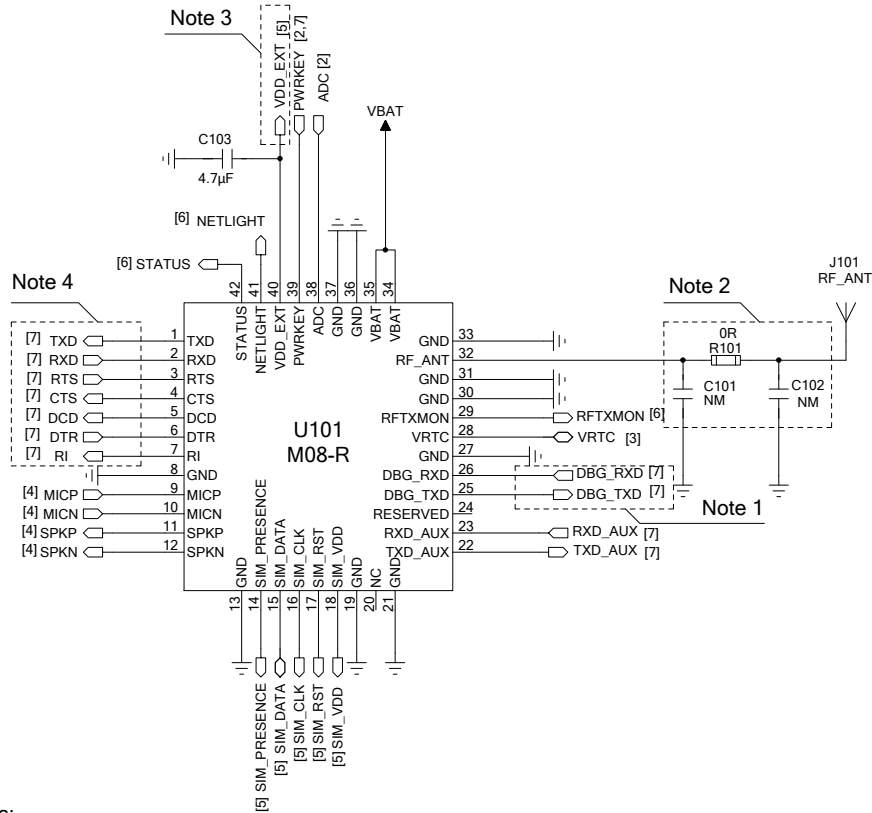
The schematics illustrated in the following pages are provided for reference only.

Block Diagram

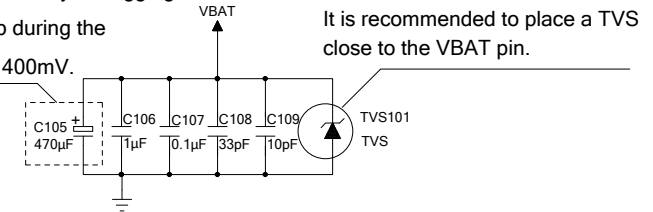


Quectel Wireless Solutions		
DRAWN BY Vane WANG	PROJECT M08-R	TITLE Reference Design
CHECKED BY Tiger CHENG	SIZE A2	VER 1.0
SHEET 1 OF 7	DATE 2019/10/31	

Module Interface



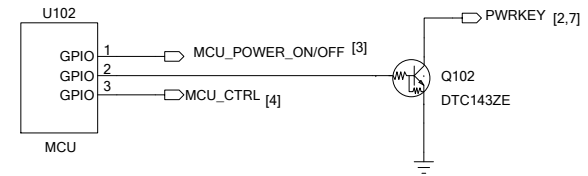
Capacitance of C105 should be selected by debugging to ensure the maximum voltage drop during the burst transmission does not exceed 400mV.



Notes:

- VBAT voltage ranges from 3.45V to 4.25V.
- The maximum current consumption of the module could reach 2.0A during a burst transmission. The trace width of VBAT should be more than 2mm.
- These capacitors are placed in ascending order of their capacitance values, and the smaller the capacitance value is, the closer the capacitor is to the VBAT pin.

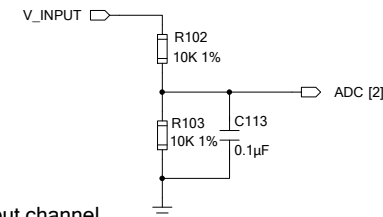
MCU Control Circuit



Notes:

- The debug UART is used for firmware debugging and upgrading with a fixed baud rate of 921600bps.
- It is recommended to reserve a PI match circuit near the RF interface. For RF layout, please refer to *Quectel_RF_Layout_Application_Note*.
- The maximum output current of VDD_EXT is 20mA. If it is used to supply power to external circuits, it is recommended to add a 2.2μF~4.7μF bypass capacitor.
- For more details about full-function UART interfaces, please refer to the Sheet of "UART Interfaces".

ADC Reference Circuit



Note:

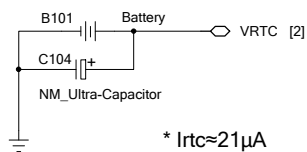
The voltage range of ADC input channel is 0V to 1.8V.

Quectel Wireless Solutions

DRAWN BY Vane WANG	PROJECT M08-R	TITLE Reference Design
CHECKED BY Tiger CHENG	SIZE A2	VER 1.0
SHEET 2 OF 7		DATE 2019/10/31

Power Supply

VRTC Reference Circuit

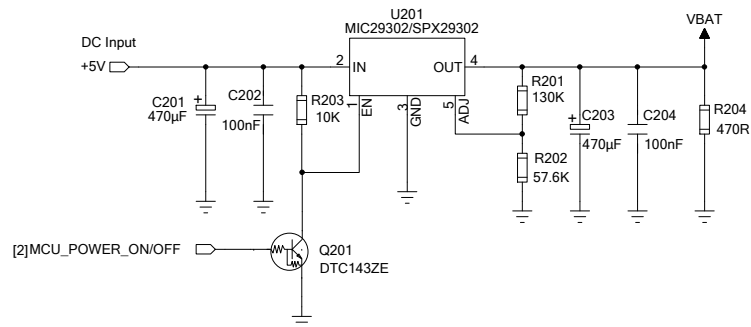


Note:

When VBAT is powered off, the VRTC pin is used to supply power to RTC domain of the module.
If unused, keep the pin open.

LDO Application

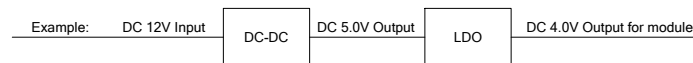
LDO can be used to provide a 4.0V power supply for the module when the input voltage is lower than 7.0V.



U201 requires a minimum load current of 7.0mA. When it is used, R204 must be mounted.
If low power design is needed, then an LDO with lower power consumption should be selected.
The voltage converter should provide a minimum current of 2.0A.

DC-DC Application

When the input voltage is above 7.0V, a DC-DC converter should be used to decrease high input voltage to 5.0V output. Then an LDO is used to convert voltage to 4.0V to power the module.
The maximum current supplied by the voltage converter should be no less than 2.0A.

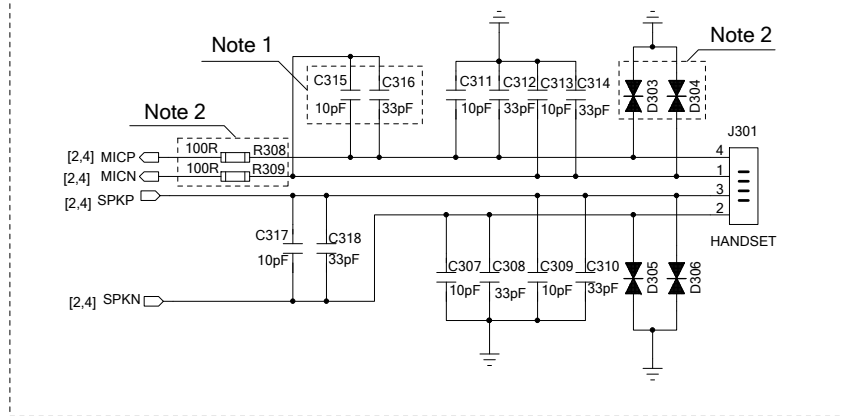


Quectel Wireless Solutions

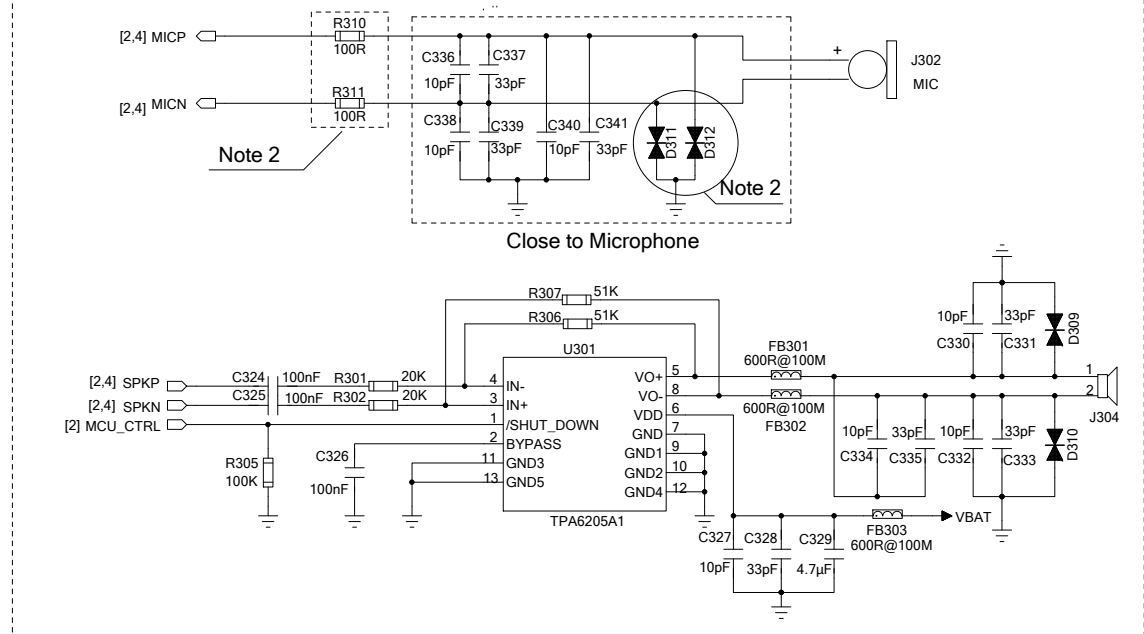
DRAWN BY Vane WANG	PROJECT M08-R	TITLE Reference Design
CHECKED BY Tiger CHENG	SIZE A2	VER 1.0
SHEET 3 OF 7	DATE 2019/10/31	

Audio Interfaces

Handset Application (AIN/AOUT)



Loud Speaker Application (AIN/AOUT)



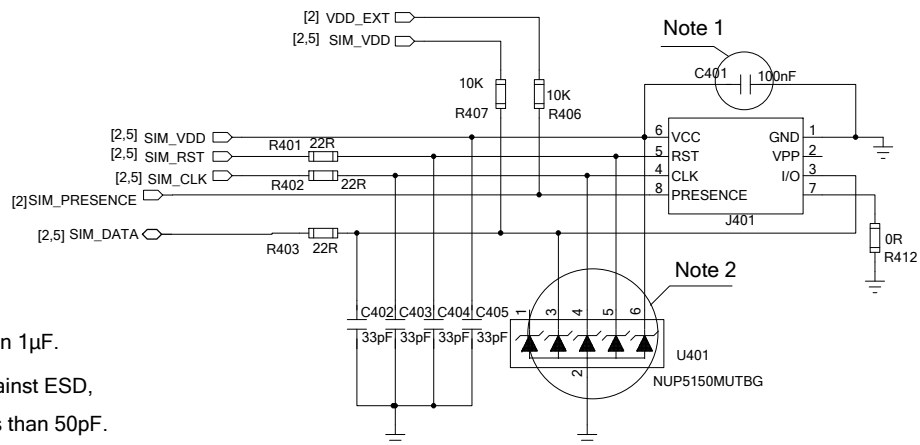
Notes:

1. 10pF and 33pF capacitors are used to filter TDD noise.
2. These TVS and resistors are used for ESD protection of MIC signal lines, so they should be reserved and these TVS should be placed close to connectors.
3. The differential audio traces must be routed according to the differential signal layout principles.
4. MICP and MICN can provide internal bias voltage for external electret microphone.
5. SPKP and SPKN are capable of driving 32Ω load.

Quectel Wireless Solutions		
DRAWN BY Vane WANG	PROJECT M08-R	TITLE Reference Design
CHECKED BY Tiger CHENG	SIZE A2	VER 1.0
SHEET 4 OF 7	DATE 2019/10/31	

(U)SIM Interface

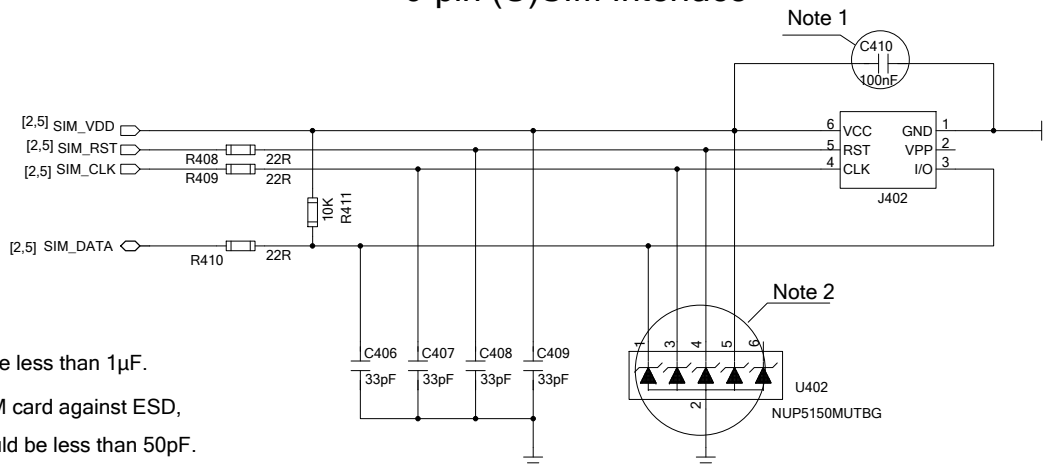
8-pin (U)SIM Interface



Notes:

- 1. The capacitance of C401 should be less than 1μF.
- 2. U401 is used for protecting (U)SIM card against ESD, and the junction capacitance should be less than 50pF. It should be placed near the (U)SIM card connector.

6-pin (U)SIM Interface



Notes:

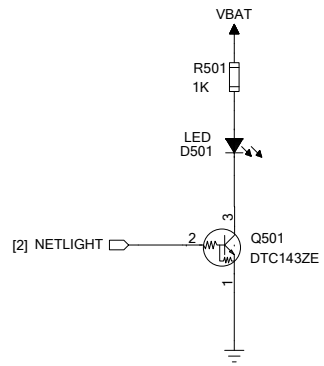
- 1. The capacitance of C410 should be less than 1μF.
- 2. U402 is used for protecting (U)SIM card against ESD, and the junction capacitance should be less than 50pF. It should be placed near the (U)SIM card connector.

Quectel Wireless Solutions

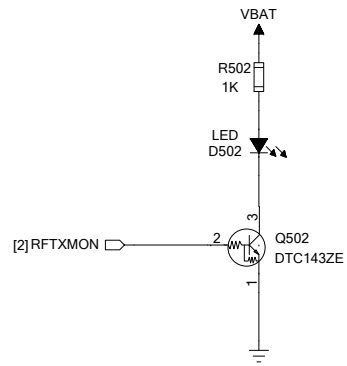
DRAWN BY Vane WANG	PROJECT M08-R	TITLE Reference Design
CHECKED BY Tiger CHENG	SIZE A2	VER 1.0
SHEET 5 OF 7		DATE 2019/10/31

LED Driver Circuits

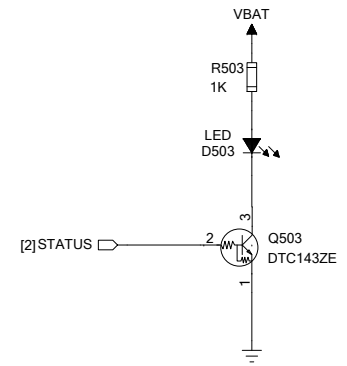
Network Status Indication



RF Transmitting Signal Indication



Module Status Indication

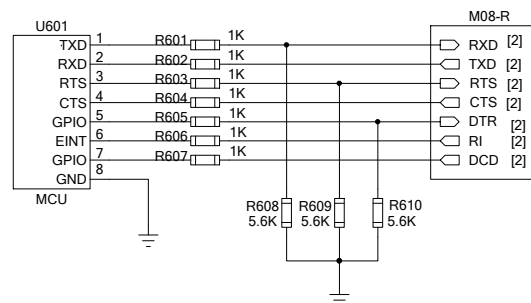


Quectel Wireless Solutions

DRAWN BY Vane WANG	PROJECT M08-R	TITLE Reference Design
CHECKED BY Tiger CHENG	SIZE A2	VER 1.0
SHEET	6 OF 7	DATE 2019/10/31

UART Interfaces

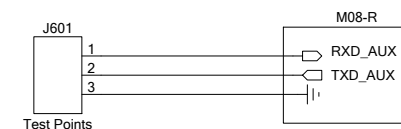
Connection of Full-function UART Port to a 3.3V Interface



Notes:

1. CTS&RTS are used for hardware flow control when mass data has been transmitted.
2. When the module is set by AT+QSCLK=1, customers can control the module to enter or exit from sleep mode through the DTR pin. When DTR is set to high level, and there is no hardware interrupt such as GPIO interrupt or data on UART port, the module will enter sleep mode automatically.
3. RI will output an indication signal when there is a voice call or a message.
4. DCD is mainly applied in modem communication (PPP), and the active status represents the communication link has been set up.
5. Please pay attention to the level match of UART in product application.

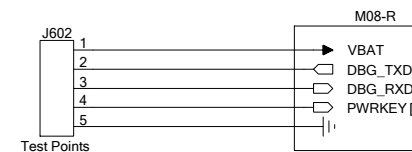
Test Points of Auxiliary UART Port



Note:

Please pay attention to the level match of UART in product application.

Test Points for Firmware Upgrade



Note:

Please pay attention to the level match of UART in product application.

Quectel Wireless Solutions

DRAWN BY Vane WANG	PROJECT M08-R	TITLE Reference Design
CHECKED BY Tiger CHENG	SIZE A2	VER 1.0
SHEET 7 OF 7		DATE 2019/10/31