

L96 Reference Design

GNSS Module Series

Rev. L96_Reference_Design_V1.1

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About the Document

History

Revision	Date	Author	Description
1.0	2017-10-19	Brooke WANG/ Storm BAO	Initial
1.1	2018-08-15	Brooke WANG	<ol style="list-style-type: none">1. Updated the Power Management Circuit (Sheet 1).2. Updated the I2C Circuit and added the Backup Mode Circuit (Sheet 3).3. Updated the Antenna Interface (Sheet 4).4. Added the Indicating Circuits including 1PPS, 3D_FIX, Geo-fence and Jamming Indicator (Sheet 5).

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1 Reference Design

1.1. Introduction

This document provides a reference design for Quectel L96 module.

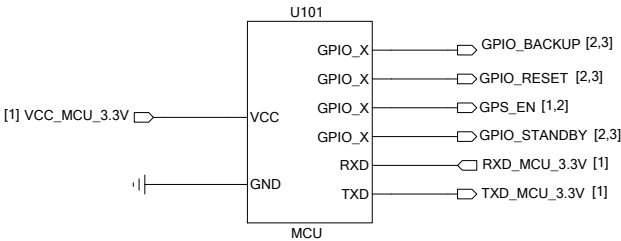
1.2. Schematics

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

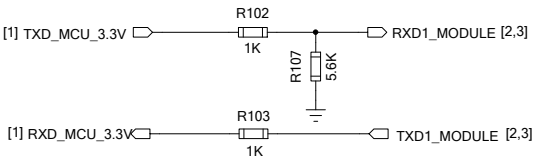
3.3V Power Supply and UART Circuit

If the MCU power supply is 3.3V, please refer to the reference designs as below.

Customer's MCU

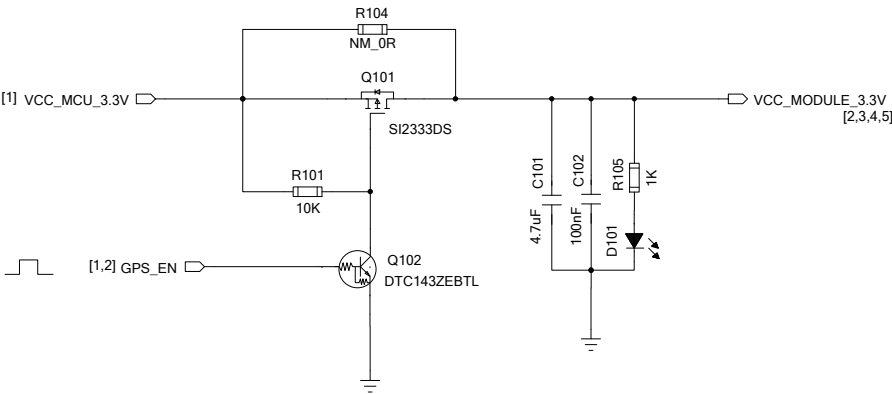


UART Circuit



Note:
R102, R103 and R107 are designed for 3.3V MCU level match.

Power Management Circuit (Optional)

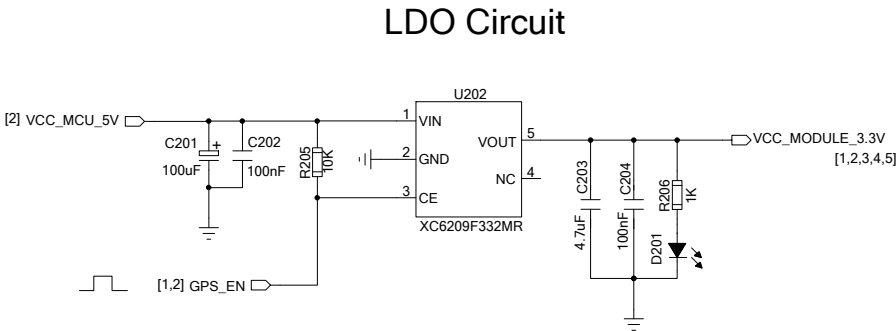
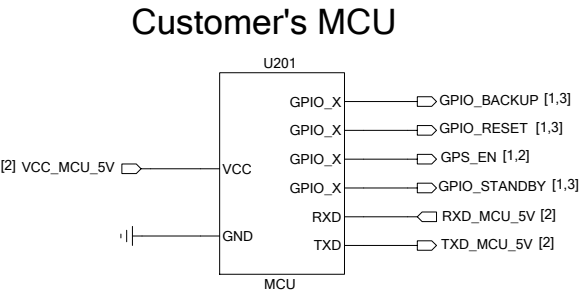


Note:
Cutting off VCC and keeping V_BCKP powered will make the module enter into backup mode from full on mode. As long as the VCC pin is powered, the module will enter into full on mode immediately. In this case, Q101, Q102 and R101 should be mounted, while R104 should not be mounted.

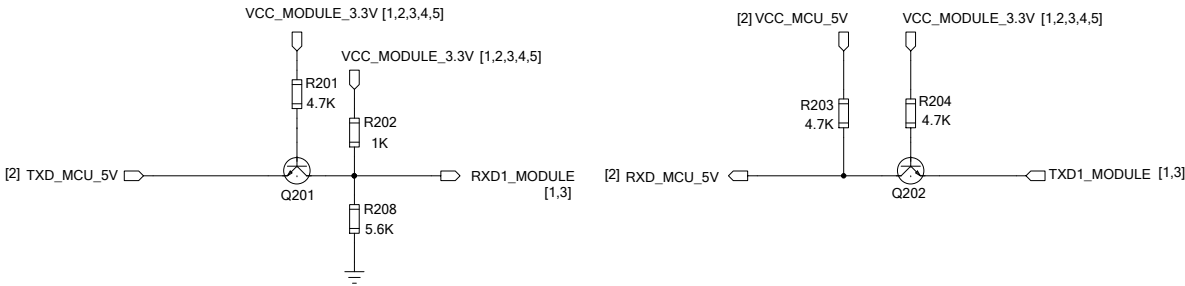
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5.0V Power Supply and UART Circuit

If the MCU power supply is 5.0V, please refer to the reference designs as below.



Level Shifting for UART

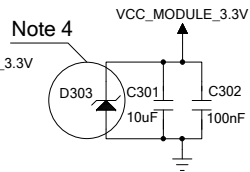
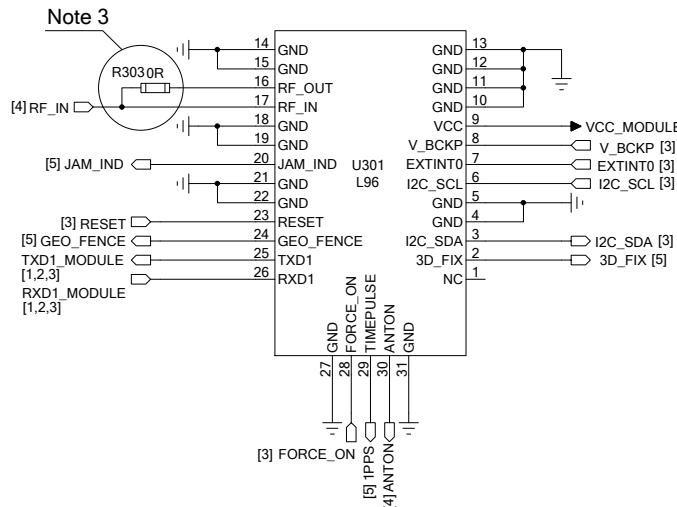


Note:

The transistor circuit will realize the voltage level shifting between 5.0V MCU and the module, and block the leakage current when the module is powered on/off.

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Module Interface



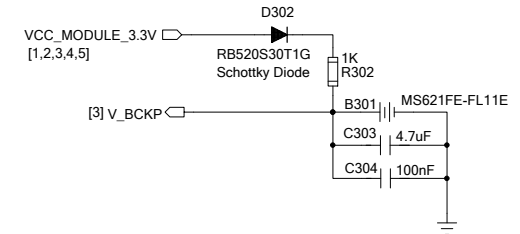
Test Points



Notes:

1. UART port is used for NMEA output, PMTK/PQ command input and firmware upgrade.
2. The test points are reserved for debugging the GNSS module.
3. When the built-in patch antenna is used, R303 should be mounted.
If an external antenna is used, R303 should not be mounted.
4. It is recommended to add a TVS near the VCC.

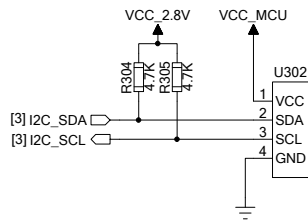
Charging Circuit for RTC Logic



Note:

V_BCKP is designed to supply power for L96's RTC logic circuit when VCC_MODULE_3.3V is powered off.

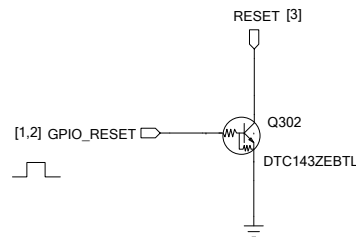
I2C Circuit



Notes:

1. In L96, I2C_SDA/I2C_SCL should be pulled up to 2.8V via an external pull-up resistor.
2. The voltage threshold of I2C is 2.8V. If the system voltage is not consistent with it, a level shifter circuit must be used.

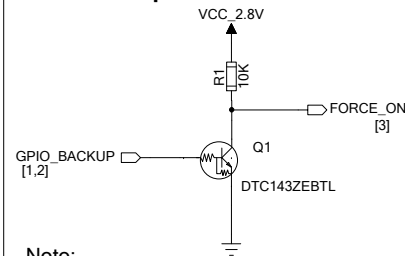
Reset Circuit



Note:

If the reset function is unused, the RESET pin can be connected to the VCC directly.

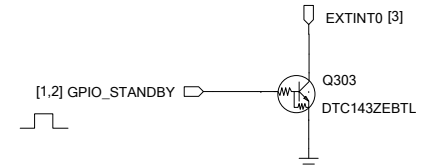
Backup Mode Circuit



Note:

Logic high of FORCE_ON will force the module to be woken up from backup mode. Please keep this pin open or pulled low before entering into backup mode.

Standby Mode Circuit



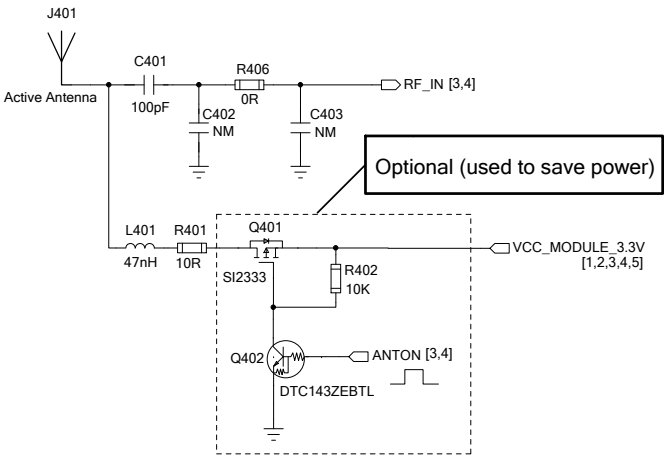
Notes:

1. EXTINT0 has been pulled up internally.
2. EXTINT0 is pulled up internally by default. Pulling it low will make the module enter into standby mode and then releasing it will make the module back to full on mode.
3. For more details, please refer to *Quectel_L96_Hardware_Design*.

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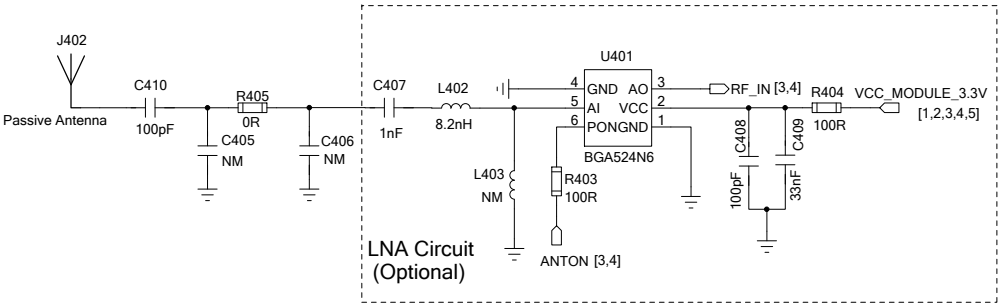
Antenna Interface

Active Antenna



- Notes:
1. The PI type circuit (C402,R406,C403) is reserved for antenna impedance matching. By default, C401 is 100pF, R406 is 0Ω, while C402 and C403 are not mounted.
 2. ANTON will be pulled down in standby mode.
 3. If customers do not need to make the module into standby mode, the ANTON pin should be kept open.
 4. The impedance of RF trace should be controlled as 50Ω and the trace length should be kept as short as possible.
 5. For more details, please refer to *Quectel_L96_Hardware_Design*.

Passive Antenna



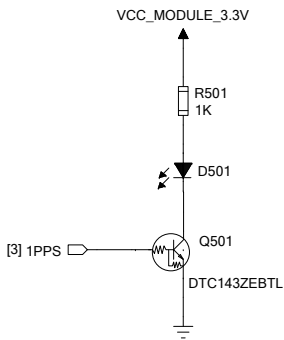
- Notes:
1. The PI type circuit (R405, C405, C406) is reserved for antenna impedance matching. By default, C410 is 100pF, R405 is 0Ω, while C405 and C406 are not mounted.
 2. If an external LNA is added between the passive antenna and L96 module, the total sensitivity will be improved by about 3dB, which is beneficial for improving TTFF.
 3. One typical reference circuit with BGA524N6 is given in the left figure. C407, L402 and L403 form a reserved matching circuit for the LNA BGA524N6. By default, C407 is 1nF, L402 is 8.2nH, while L403 is not mounted.
 4. ANTON is an optional pin which can be used to control the enable pin of an external LNA. If ANTON function is not used, please connect the pin to VCC to keep LNA always ON.
 5. The impedance of RF trace should be controlled as 50Ω and the trace length should be kept as short as possible.
 6. For more details, please refer to *Quectel_L96_Hardware_Design*.

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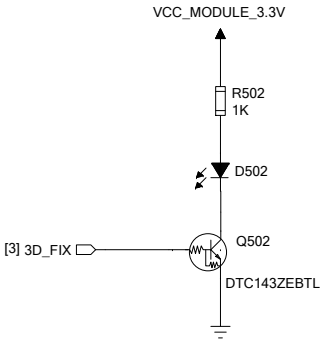
Indicating Circuits

1PPS



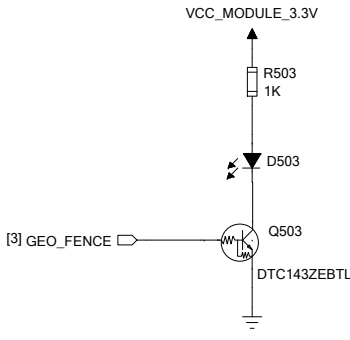
Note:
The 1PPS indicator will blink at 1Hz frequency after the module fixes the position.

3D_FIX



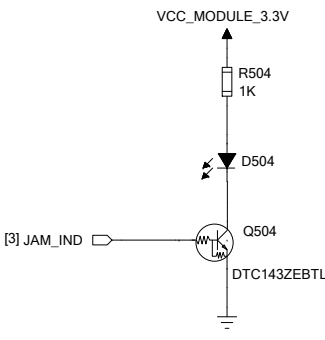
Note:
The 3D_FIX pin will output a high voltage level to indicate successful positioning.

Geo-fence



Note:
The module can be configured to indicate entering or exiting the geo-fence.

Jamming Indicator



Note:
The module provides a jamming detection indicator to detect whether there are any jammers that may have impact on the module.

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