L76-LB

Reference Design

GNSS Module Series

Rev. L76-LB_Reference_Design_V1.0

Date: 2019-05-13

Status: Released

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About the Document

History

Revision	Date	Author	Description
1.0	2019-05-13	Jaden XIANG/ Gene LI	Initial

Contents

1 Reference Design

1.1. Introduction

This document provides the reference design for Quectel L76-LB module.

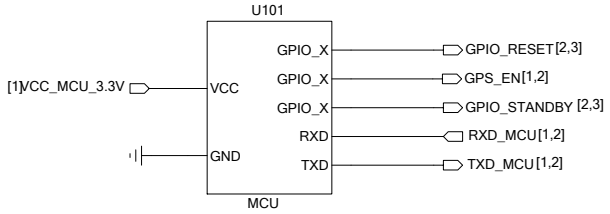
1.2. Schematics

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

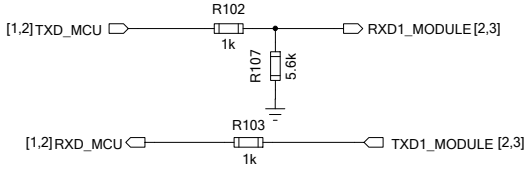
3.3V Power Supply and UART Circuit

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

Customer's MCU

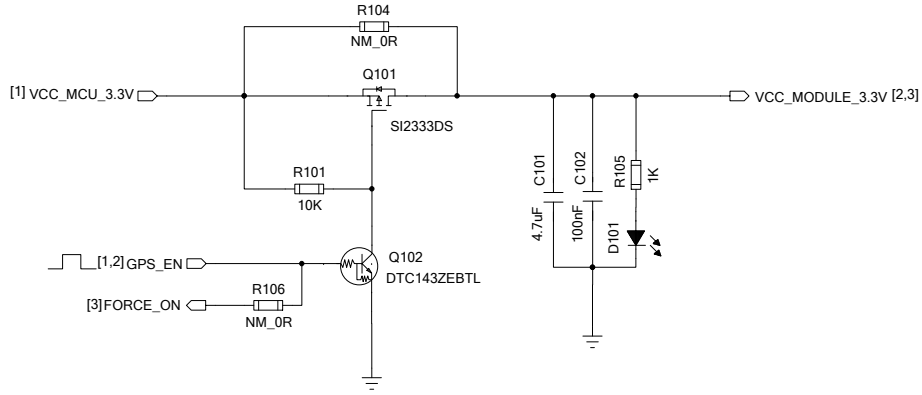


UART Circuit



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

Power Management Circuit (Optional)



Notes:
There are two ways to enter into backup mode and return to full on mode.

1. Send command “$PMTK225,4*2F” to enter into backup mode constantly. The only way to wake up the module is by pulling FORCE_ON pin high. In such case, Q101, Q102, R101 are not mounted; R104 and R106 are 0Ω
2. Cut off the power of VCC and keep V_BCKP powered to enter into backup mode from full on mode. As soon as the VCC pin is powered, the module will enter into full on mode immediately. In such case, Q101, Q102, R101 are mounted; R104 and R106 are not mounted.

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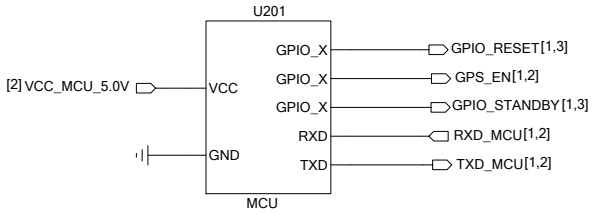
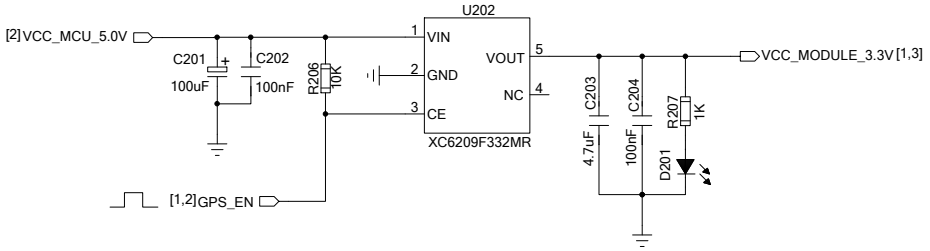
5.0V Power Supply and UART Circuit

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

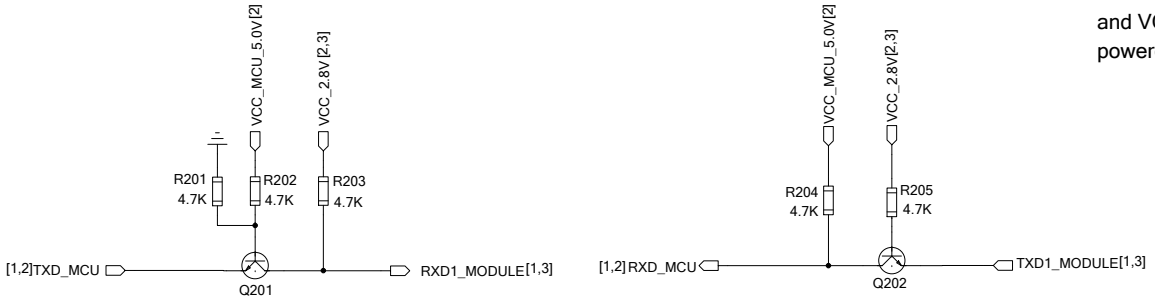
Customer's MCU



LDO Circuit



Level Shifting for UART



Note:
The transistor circuit will shift voltage level between VCC_MCU_5.0V and VCC_2.8V, and block the current leakage when the module is powered on/off.

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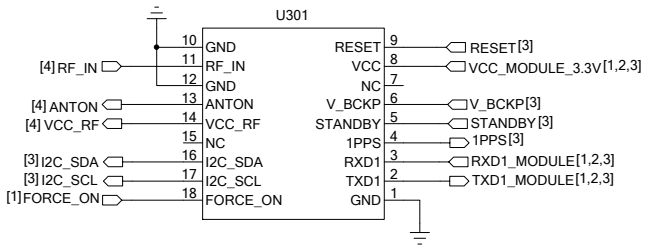
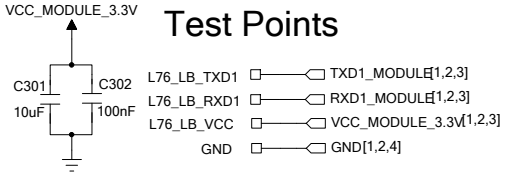
Module Interface

Module Interface



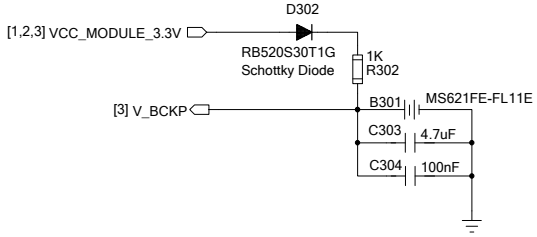
Test Points



Notes:

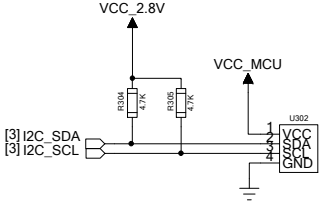
1. UART interface is used for NMEA output, PMTK/PQ commands input and firmware upgrade.
2. The test points are reserved for debugging the GNSS module.

Charge Circuit for RTC Logic



Note:
V_BCKP is designed to supply power for L76-LB RTC logic circuit when VCC_MODULE_3.3V is powered off.

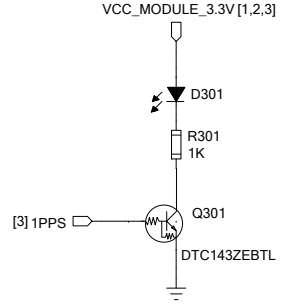
I2C Circuit for L76-LB



Notes:

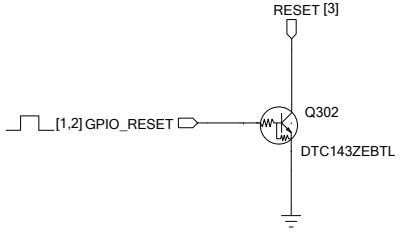
1. In L76-LB. I2C_SDA/I2C_SCL should be pulled up to 2.8V via an external pull-up resistor.
2. The voltage threshold of I2C is 2.8V. If the system voltage does not conform to it, a level shifter circuit must be used.

Indicating Circuit



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

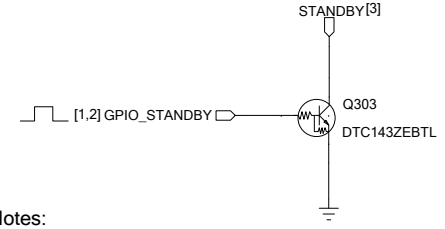
Reset Circuit



Notes:

1. If the reset function is unused, RESET pin can be connected to the VCC directly.
2. RESET has been pulled up internally.

Standby Circuit



Notes:

1. STANDBY has been pulled up internally.
2. Enter into standby mode: change STANDBY pin from high to low level.
3. Exit from standby mode: change STANDBY pin from low to high level.

For more details, please refer to *Quectel_L76-LB_Hardware_Design*.

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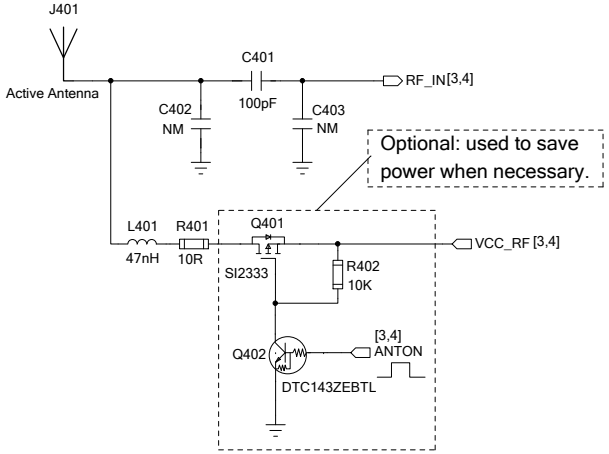
Antenna Interface

Active Antenna

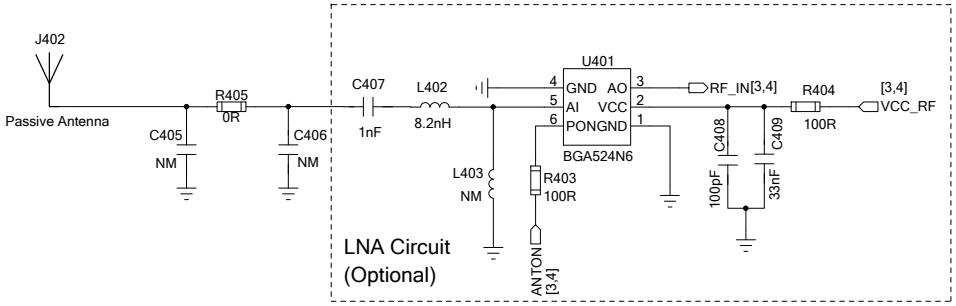


Notes:

1. Pi type circuit (C401, C402, C403) is reserved for impedance matching for antenna. By default, C402 and C403 are not mounted; C401 is 100pF.
2. VCC_RF can be used as power supply for active antenna. Its typical value is 3.3V, and the voltage ranges from 2.8V to 4.3V (VCC_RF=VCC). If it does not meet the requirement of the active antenna, an external LDO could be used.
3. The voltage level of ANTON will be pulled down in standby mode.
4. If the L76-LB module never enters into standby mode in the design, the ANTON pin should be kept floating.
5. Impedance of RF trace should be controlled as 50Ω and the trace length should be kept as short as possible.

For more details, please refer to *Quectel_L76-LB_Hardware_Design.*

Passive Antenna



Notes:

1. Pi type circuit (R405, C405, C406) is reserved for impedance matching for antenna. By default, C405 and C406 are not mounted; R405 is 0Ω.
2. If an external LNA is added between passive antenna and L76-LB module, the total sensitivity will be improved, which is beneficial for TTFF improvement.
3. One typical reference circuit with BGA524N6 is given in the left figure. Here, C407, L402 and L403 form a reserved matching circuit for the LNA BGA524N6. By default, C407 is 1nF; L402 is 8.2nH; and L403 is not mounted.
4. VCC_RF can be used as power supply for LNA. Its voltage range is from 2.8V to 4.3V, and its typical value is 3.3V (VCC_RF=VCC)
5. 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 LNA_EN pin (LNA ENABLE) to VCC to keep LNA always on.
6. Impedance of RF trace should be controlled as 50Ω and the trace length should be kept as short as possible.

For more details, please refer to *Quectel_L76-LB_Hardware_Design.*

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