

# L70-R Series

# Reference Design

**GPS Module Series**

Rev. A

Date: 2016-05-31



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# About the Document

## History

Revision	Date	Author	Description
1.0	2014-05-07	King HAO	Initial
A	2016-05-31	Storm BAO	1. Incorporated related information of L70-RL 2. Changed the document name from Qectel_L70-R_Reference_Design to Qectel_L70-R_Series_Reference_Design

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# 1 Introduction

## 1.1. Introduction

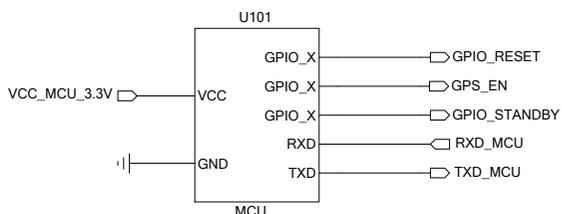
This document is a reference design for L70-R series module, including L70-R and L70-RL. The schematics included in this document are preliminary and are subject to change without prior notice.

## 1.2. Schematics

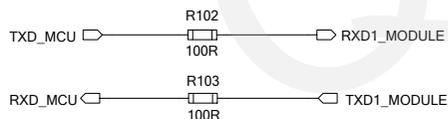
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# 3.3V Power Supply and UART Circuit

## Customer's MCU

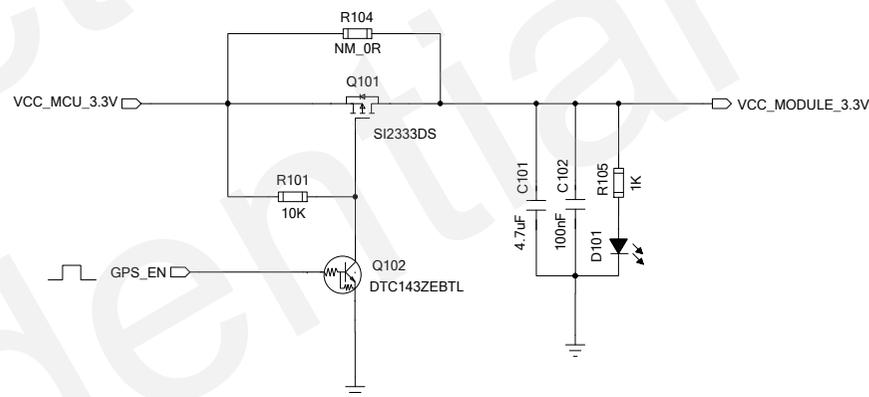


## UART Circuit



R102, R103 are reserved for debugging the waveform of UART, and they are also beneficial to ESD protection. Generally, 100R for R102 and R103 is recommended, but 0R also works well.

## Power Management Circuit

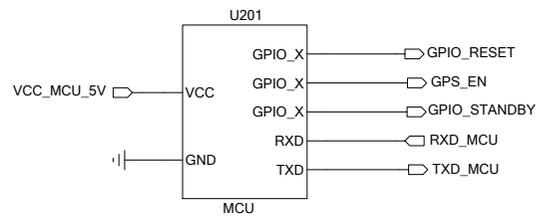


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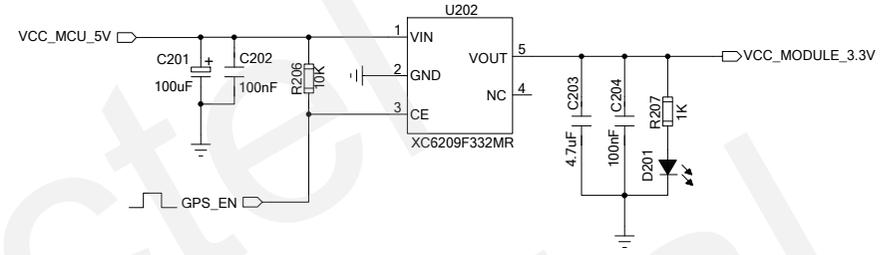
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CHECKED BY Tony GAO	SIZE A2	VER A
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# 5V Power Supply and UART Circuit

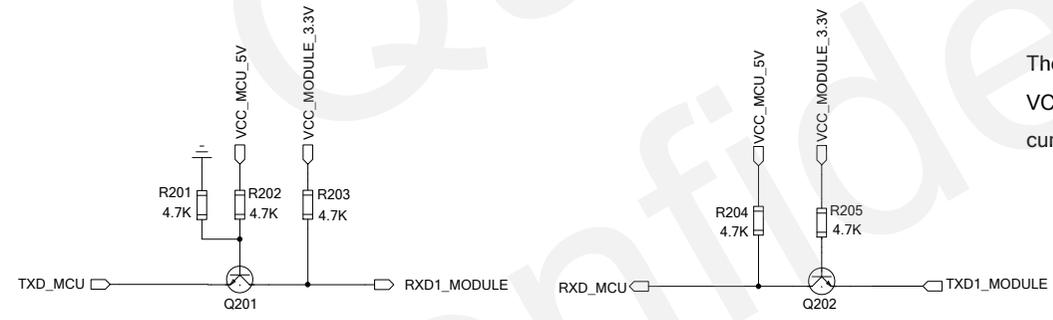
## Customer's MCU



## LDO Circuit



## Level Shifting for UART

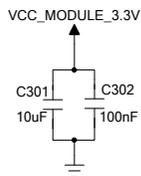
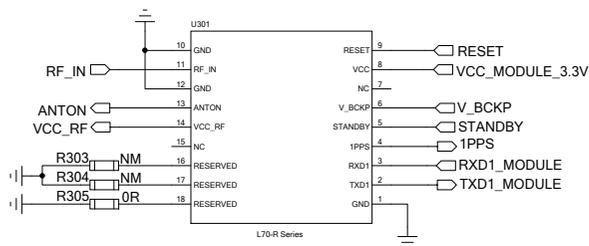


The transistor circuit will realize the voltage level shifting between VCC\_MCU\_5V and VCC\_MODULE\_3.3V, and block the leakage current from one power-on device to another power-off device.

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# Module Interface

## Module Interface

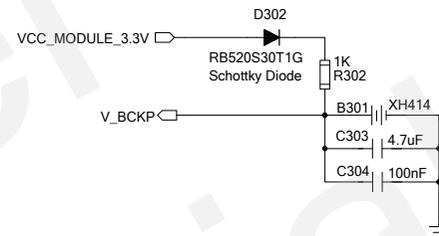


## Test Points

- L70-R\_SERIES\_TXD1 □ TXD1\_MODULE
- L70-R\_SERIES\_RXD1 □ RXD1\_MODULE
- L70-R\_SERIES\_VCC □ VCC\_MODULE\_3.3V
- GND □ GND

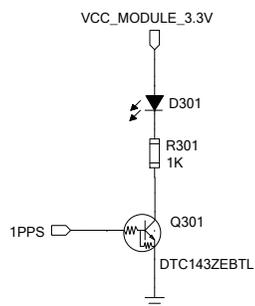
1. UART1 can be used to output NMEA message as well as to upgrade firmware.
2. The test points are reserved for debugging the GNSS module.

## Charge Circuit for RTC Logic



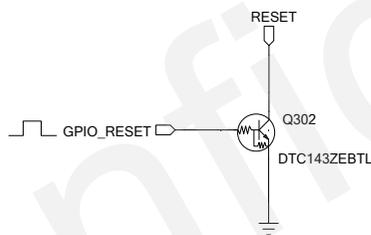
V\_BCKP is designed to supply power for L70-R series RTC logic circuit when VCC\_MODULE\_3.3V is powered off.

## Indicating Circuit



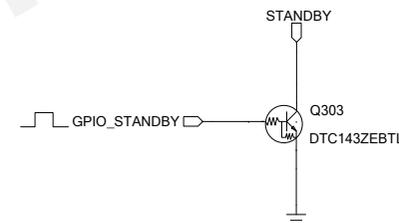
The 1PPS indicator will blink at 1Hz frequency after fixing the position.

## Reset Circuit



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

## Standby Circuit



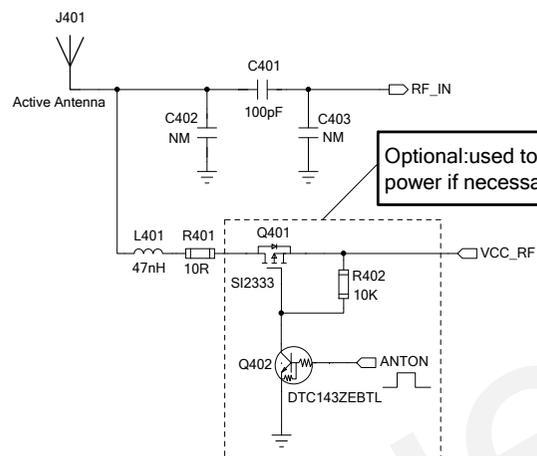
1. STANDBY has been pulled up internally.
  2. Enter into standby mode: change the STANDBY pin from high to low level.
  3. Exit from standby mode: change the STANDBY pin from low to high level.
- For more details, please refer to L70-R Series Hardware Design.

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# Antenna Interface

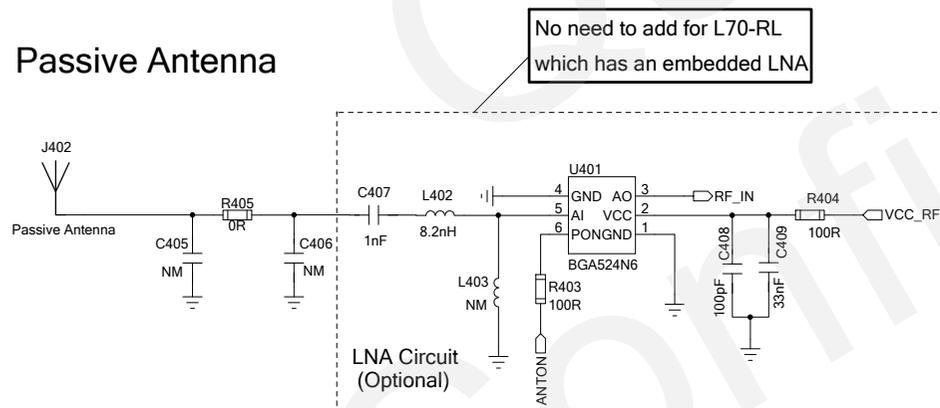
## Active Antenna



1. Pi 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 L70-R series module never enter into standby mode in the design, the ANTON pin should be kept floated.
5. Impedance of RF trace should be controlled as 50 ohm and the trace length should be kept as short as possible.

For more details, please refer to L70-R Series Hardware Design.

## Passive Antenna



1. There is no need to use an external LNA for L70-RL module because an embedded LNA is already used inside the module.
2. Pi circuit (R405, C405, C406) is reserved for impedance matching for antenna. By default, C405 and C406 are not mounted; R405 is 0R.
3. If an external LNA is added between passive antenna and L70-R module, the total sensitivity will be improved by about 3dB, which is beneficial for improving TTFF.
4. 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.
5. 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)
6. 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 "LNA ENABLE" to VCC to keep LNA always on.
7. Impedance of RF trace should be controlled as 50 ohm and the trace length should be kept as short as possible.

For more details, please refer to L70-R Series Hardware Design.

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