

L89 Reference Design

GNSS Module Series

Rev. L89_Reference_Design_V1.1

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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 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

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

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About the Document

Revision History

Version	Date	Author	Description
1.0	2019-04-12	Gobber HU/ Gene LI	Initial
1.1	2020-04-15	Ronnie HU	1. R206 is changed to D204; 2. The block diagram is added.

Contents

About the Document.....	2
Contents	3
1 Reference Design.....	4
1.1. Introduction	4
1.2. Schematics	4

1 Reference Design

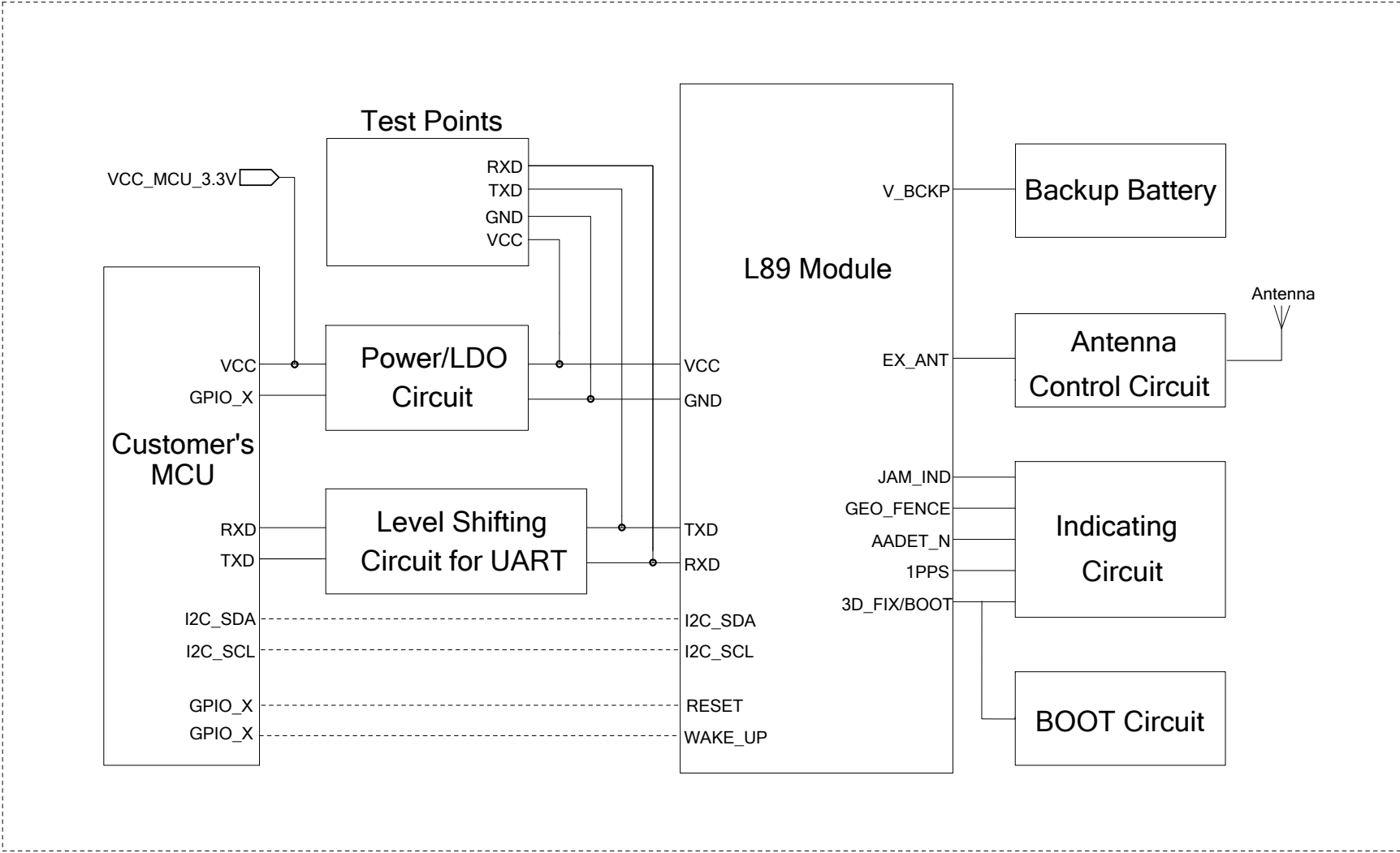
1.1. Introduction

This document provides the reference design for Quectel L89 module.

1.2. Schematics

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

Block Diagram

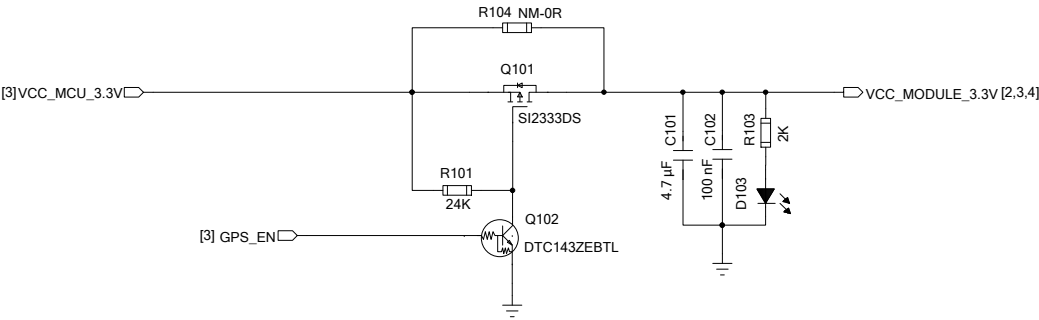


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SHEET	1 OF 5	DATE 2020/4/15

3.3V Power Supply

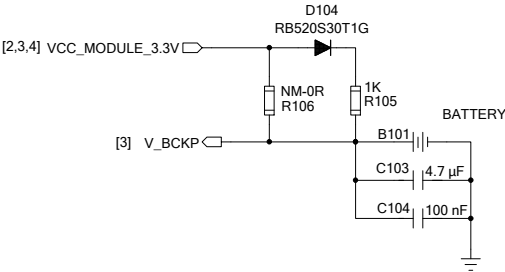
If the MCU power supply is 3.3 V, please refer to the reference designs as below.

Power Management Circuit



Note:
This circuit can control the power supply of the module through MCU. If the power management function is unused, R104 should be mounted, while Q101, Q102 and R101 should not be mounted.

Charging Circuit for RTC Logic



- Notes:**
- V_BCKP is designed to supply power for L89's RTC logic circuit when VCC_MODULE_3.3V is powered off.
 - If the V_BCKP is unused, it should be connected to the VCC_MODULE_3.3V directly.

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CHECKED BY Brooke WANG	SIZE A2	VER 1.1
SHEET	2 OF 5	DATE 2020/4/15

Module Interface Circuits

AADET_N Indicating Circuit

VCC_MODULE_3.3V [2,3,4]

R201
1K

D201

Q201

[3] GPIO_RESET

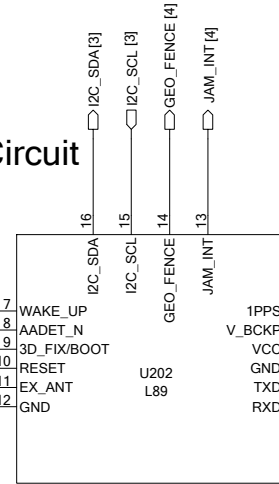
Q202

Reset Circuit

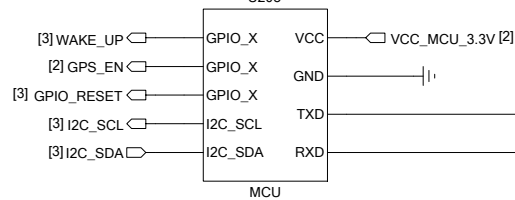
Test Points

L89_TXD □ TXD_MODULE
L89_RXD □ RXD_MODULE
L89_VCC □ VCC_MODULE_3.3V [2,3,4]
GND □ GND [2,4,5]

I2C Circuit



Customer's MCU



Indicating Circuit for 1PPS

VCC_MODULE_3.3V [2,3,4]

R204
1K

D202

Q203

VCC_MODULE_3.3V

C201
10 µF

C202
100 nF

D203
ESD

TXD_MODULE

R210
10K

D204

RB520S-30F-JTE61

R205
1K

Notes:

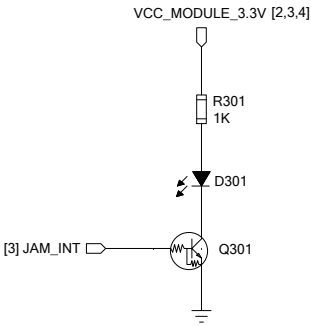
1. The WAKE_UP pin should be kept low in full on mode. Logic high of the pin will force the module to be woken up from backup mode.
2. R205, R210 and D204 are designed for 3.3 V MCU level match. The resistance of R210 is 10 kΩ.
3. UART port is used for NMEA output and firmware upgrade.
4. If the reset function is unused, the RESET pin can be left open.
5. D203 is an ESD device. It is recommended to put it near the VCC.
6. As RESET is 1.0 V voltage domain, please do not reserve any pull-up circuit for this pin, and an OC driver circuit is recommended.
7. I2C_SCL and I2C_SDA have been pulled up to 3.0 V internally with resistors of 4.7 kΩ.

Quectel Wireless Solutions

DRAWN BY Gobber HU	PROJECT L89	TITLE Reference Design
CHECKED BY Brooke WANG	SIZE A2	VER 1.1
SHEET	3 OF 5	DATE 2020/4/15

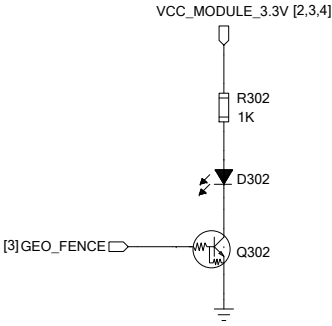
Indicating Circuits

Jamming Indicator



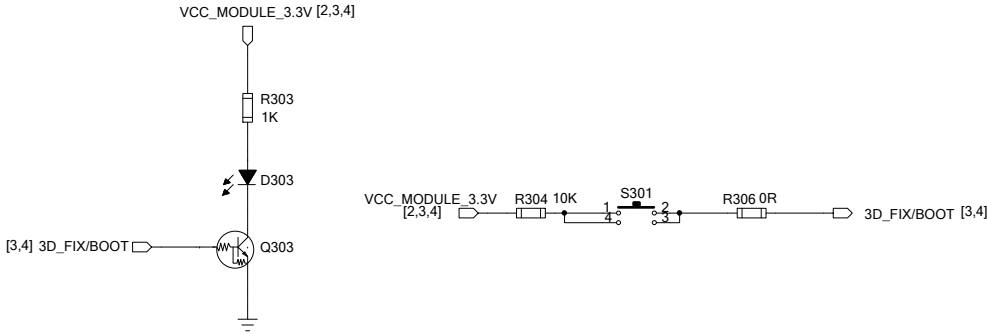
Note:
The module provides a jamming detection indicator to detect whether there are any jammers that may have impact on the module.

GEO_FENCE



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

3D_FIX/BOOT



Notes:
1. When the 3D_FIX/BOOT pin is at low level during startup, it will serve as a fix flag output, it will output a high voltage level to indicate successful positioning after the module is turned on.
2. Please pull the 3D_FIX/BOOT pin high to VCC_MODULE_3.3V by a resistor of 10 kΩ. when the pin is used for boot download.

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CHECKED BY Brooke WANG	SIZE A2	VER 1.1
SHEET	4 OF 5	DATE 2020/4/15

Antenna Interface

Internal Antennas

Notes:

1. Please keep the chip antenna at least 20 mm away from the nearest edge of the motherboard.

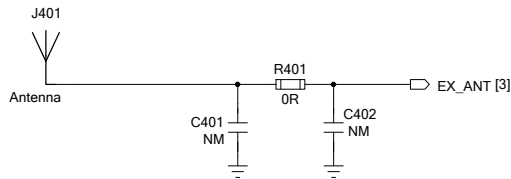
2. Please keep the patch antenna at least 10 mm away from other tall components (height > 6 mm).

3. To ensure good receiving performance, it is recommended to put the module on the top of customer devices and keep the antenna under open sky.
4. Other antennas such as BT/WiFi/GSM antennas should be kept at least 10 mm away from the embedded patch antenna of L89.

5. It is highly recommended to place the MCU, especially the MCU of STMicroelectronics, on the other side of the PCB, and keep it far way from the L89 module to ensure the antenna performance.

6. For more details about PCB design guide, please refer to *Quectel_L89_Hardware_Design*.

External Active Antenna



Notes:

1. The PI type circuit (C401, C402, R401) is reserved for antenna impedance matching.

By default, R401 is 0 Ω , while C401 and C402 are not mounted.

2. The impedance of RF trace should be controlled as 50 Ω and the trace length should be kept as short as possible.

3. Because EX_ANT pin has voltage bias, please do not use PIFA antenna.

4. For more details about external active antenna, please refer to *Quectel_L89_Hardware_Design*.

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CHECKED BY Brooke WANG	SIZE A2	VER 1.1
SHEET	5 OF 5	DATE 2020/4/15