

BC92 Reference Design

NB-IoT Module Series

Rev. BC92_Reference_Design_V1.1

Date: 2020-04-29

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 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	2020-02-27	Glenn GE	Initial
1.1	2020-04-29	Clifton HE	Changed pins of audio interface to RESERVED.

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1 Reference Design

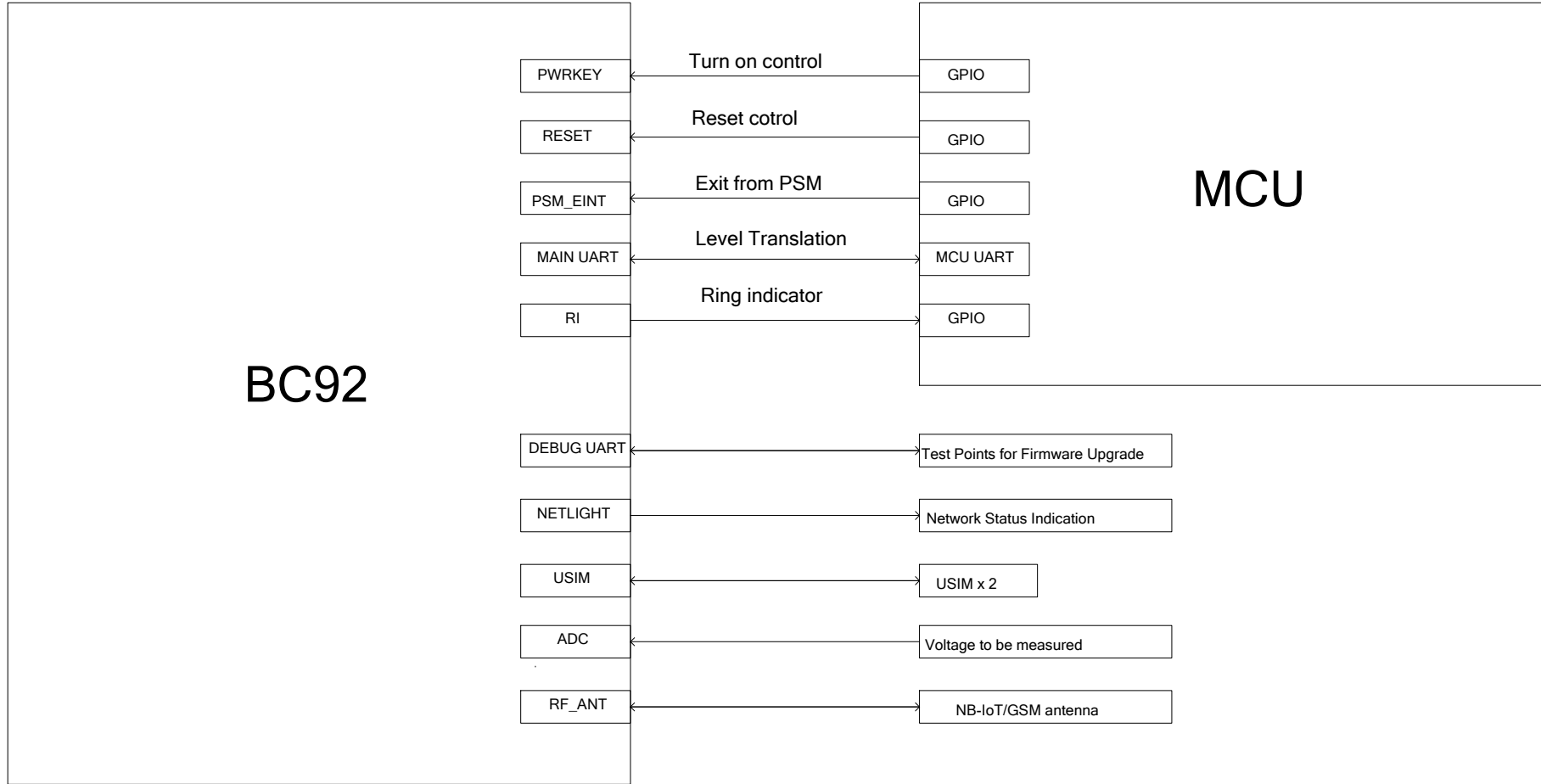
1.1. Introduction

This document provides the reference design for Quectel BC92 module.

1.2. Schematics

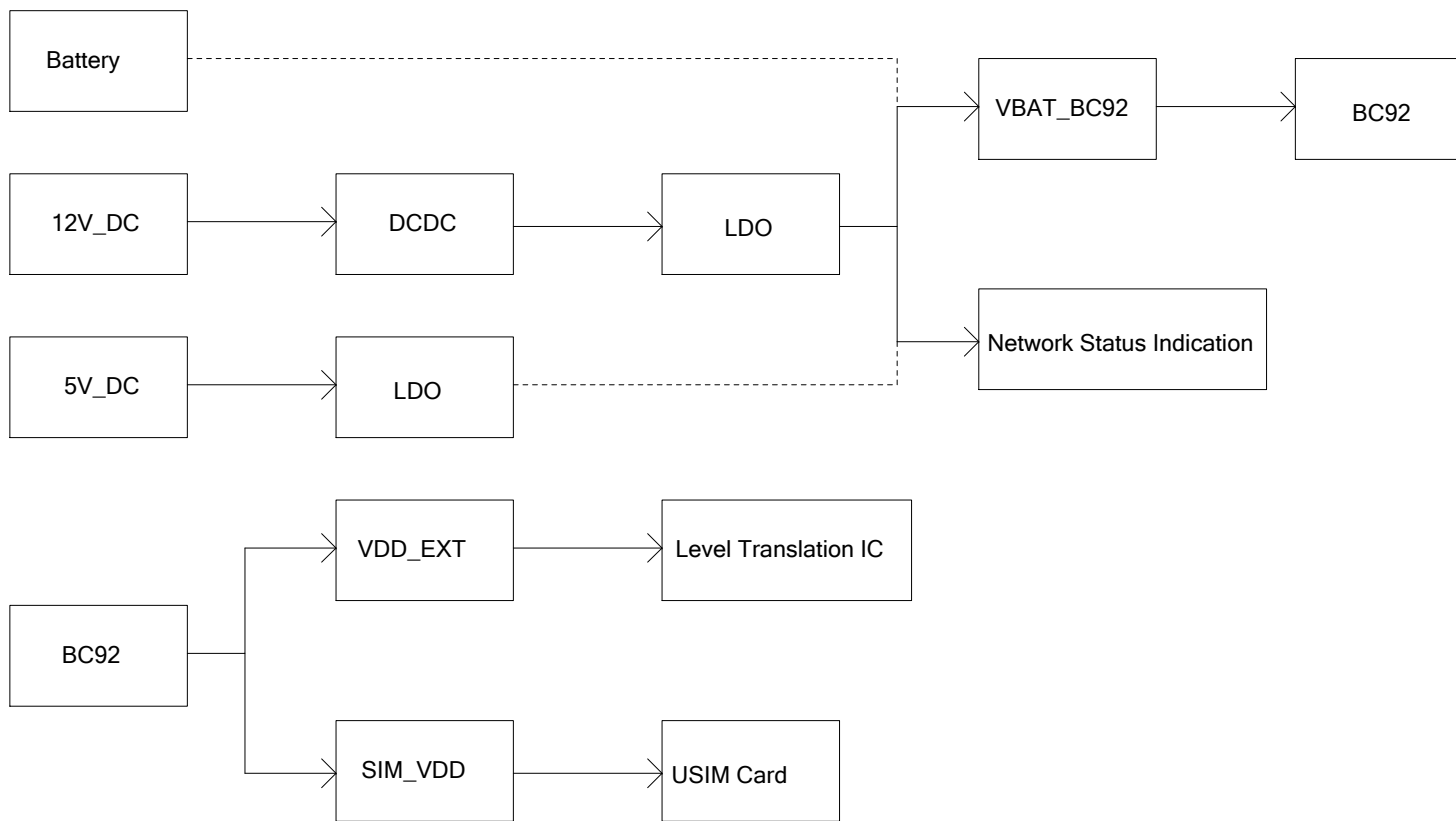
The schematics illustrated in the following pages are provided for your reference only.

Block Diagram



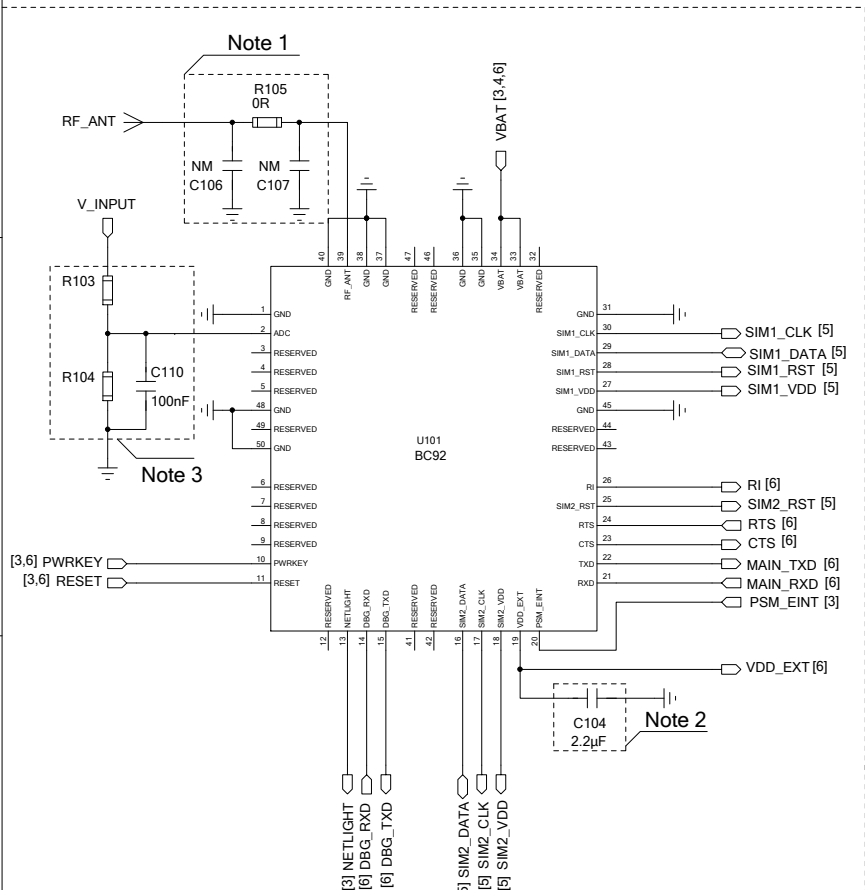
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Power Supply Block Diagram



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Module Interfaces

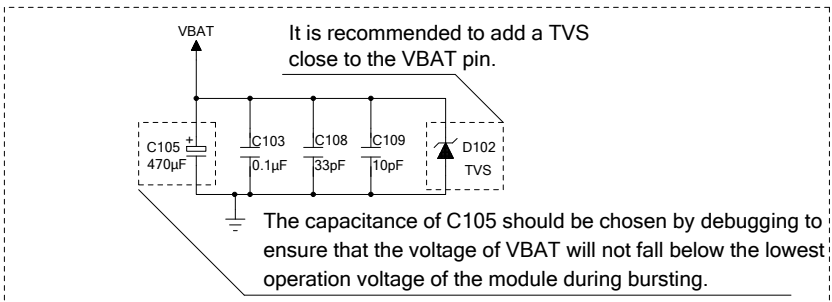


Note 1

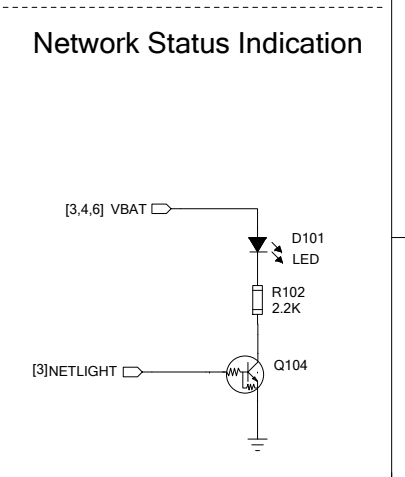
Note 3

Note 2

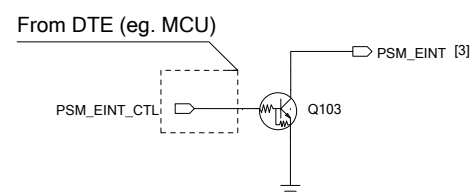
- Notes:
1. A Pi-type matching circuit is recommended. For more details about RF layout, please refer to *Quectel_RF_Layout_Application_Note*.
 2. It is recommended to use VDD_EXT as the external pull-up power supply for I/O and add a 2.2 μ F bypass capacitor in parallel.
 3. The voltage of ADC input channel ranges from 0 V to 1.8 V, so please select a high-precision voltage divider resistor.



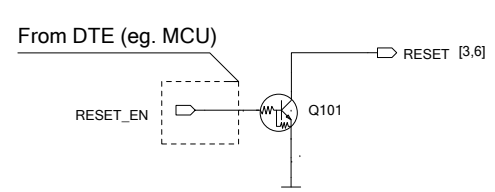
- Notes:
1. The input voltage of VBAT ranges from 3.4 V to 4.2 V.
 2. The module drains a maximum current of approx. 1.6 A during GSM burst, so the minimum width of VBAT trace should be 2 mm.
 3. These capacitors are arranged with capacitances in ascending order. Capacitors with the lowest capacitance should be placed near to the VBAT pin and all other capacitors should be placed as close to the VBAT pin as possible.



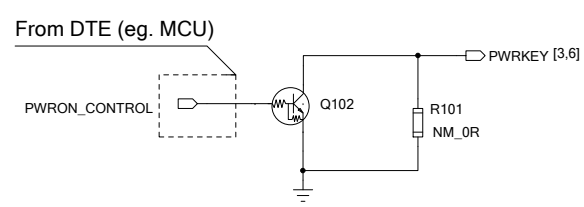
PSM_EINT Reference Circuit



Reset Reference Circuit



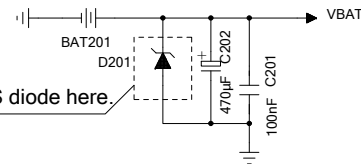
PWRKEY Reference Circuit



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Power Supply

Battery Application

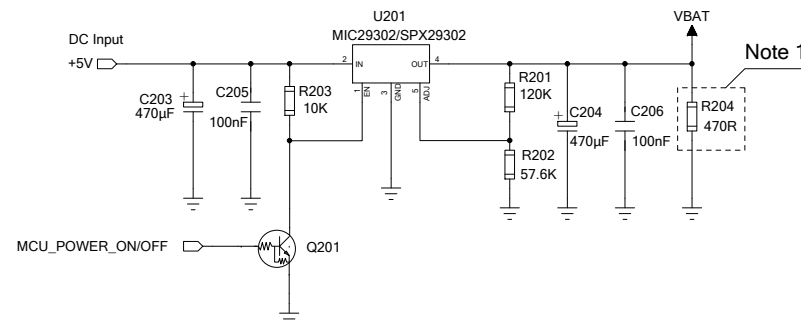


It is recommended to add a TVS diode here.

Notes:

1. Please select an appropriate battery according to the supply voltage range of module.
2. The battery should be able to provide an instantaneous current of 2 A.

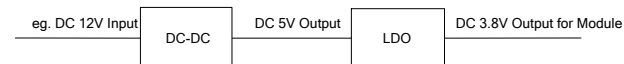
LDO Application



Notes:

1. For the minimum load current of U201 is 7 mA during normal operation, R204 must be mounted. If a low power design is needed, an LDO with lower power consumption should be selected.
2. The LDO application is used when the DC input voltage is lower than 7.0 V.

DC-DC Application



Notes:

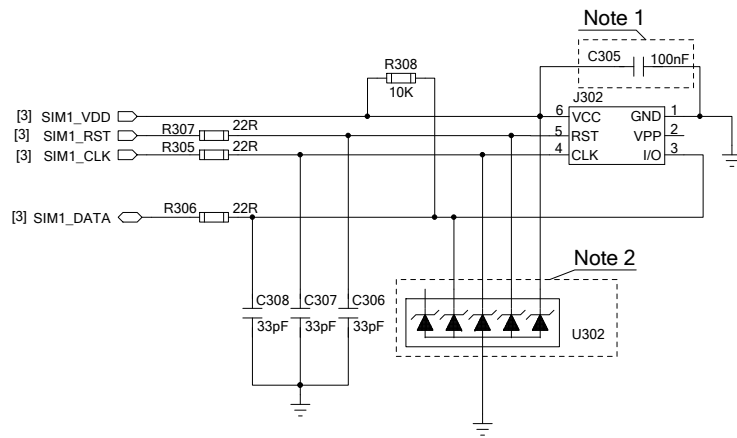
1. The DC-DC application can be used when the input voltage is above 7.0 V.
2. Use a DC-DC converter to convert the high input voltage into a 5.0 V output and then the LDO will generate 3.8 V typical voltage for the module.

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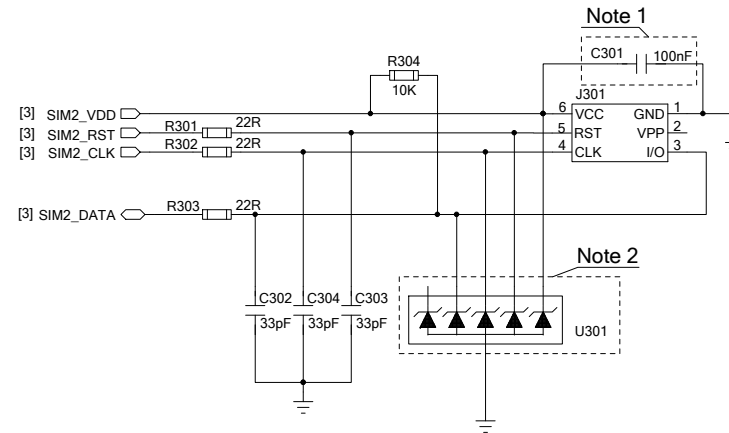
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(U)SIM Interfaces Design

(U)SIM1 Interface



(U)SIM2 Interface



Notes:

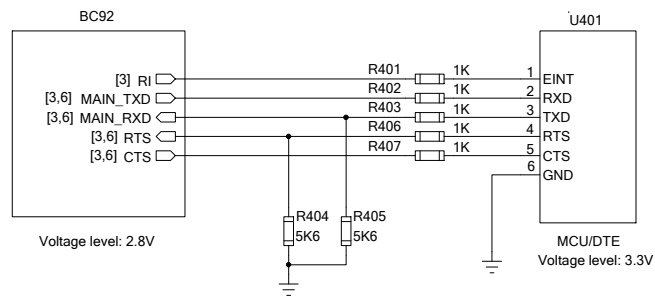
1. The value of C301/C305 should be less than 1 μ F.
2. U301/U302 is used to protect the (U)SIM card against ESD, and the junction capacitance should be less than 50 pF.
It should be placed near the (U)SIM card connector.
3. USIM1 interface supports both GSM and NB-IoT networks.
4. USIM2 interface only supports GSM network and it is still under development.
If it is not used, please keep these pins unconnected.

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MCU Connection

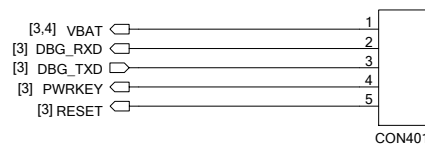
UART Interface



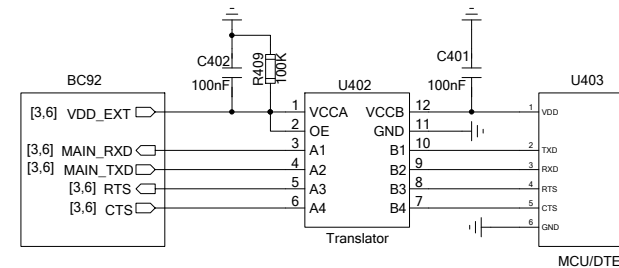
Notes:

1. CTS and RTS will be used for hardware flow control when mass data is sent.
2. When URC is received, the module will inform the DTE through RI pin.
3. When the module enters deep sleep mode, the power supply for external I/O ports will be disconnected. It is suggested to set the output pins of MCU at a low level to avoid current leakage.

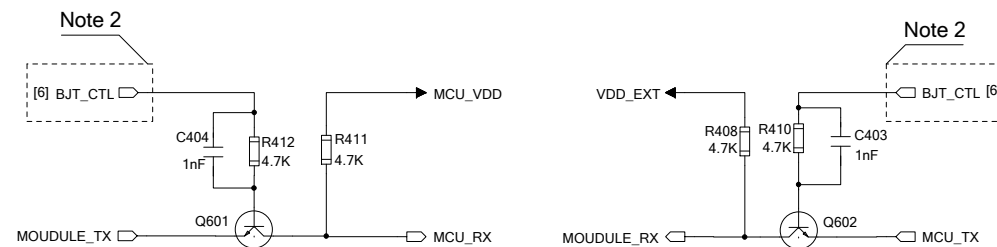
Recommended Test Points for Firmware Upgrade



Level Translation - IC Solution



Level Translation - Transistor Solution



Notes:

1. The transistor circuit solution is not suitable for applications with high baud rates exceeding 460 kbps. Please note that the voltage level translator requires $VCCA \leq VCCB$.
2. In order to ensure the effective operation of the transistor circuit, BJT_CTL needs to select the lower of the two levels:
When $MCU_VDD > VDD_EXT$, $BJT_CTL = VDD_EXT$;
When $MCU_VDD < VDD_EXT$, $BJT_CTL = MCU_VDD$.
3. If high baud rate is needed, it is highly recommended to install two 1 nF capacitors (C403/C404) on transistor circuits.

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