

RM530N-GL

Reference Design

5G Module Series

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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

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About the Document

Revision History

Version	Date	Author	Description
-	2022-04-08	Juriyi XIE	Creation of the document
1.0	2022-11-30	Wynna SHU	First official release
1.1	2023-03-15	Archibald JIANG	Updated the value of R0202, R0204, R0205, R0206, R0207, R0208, C0212, L0201, Vstart, Vstop and Vref (Sheet 2).

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1 Reference Design

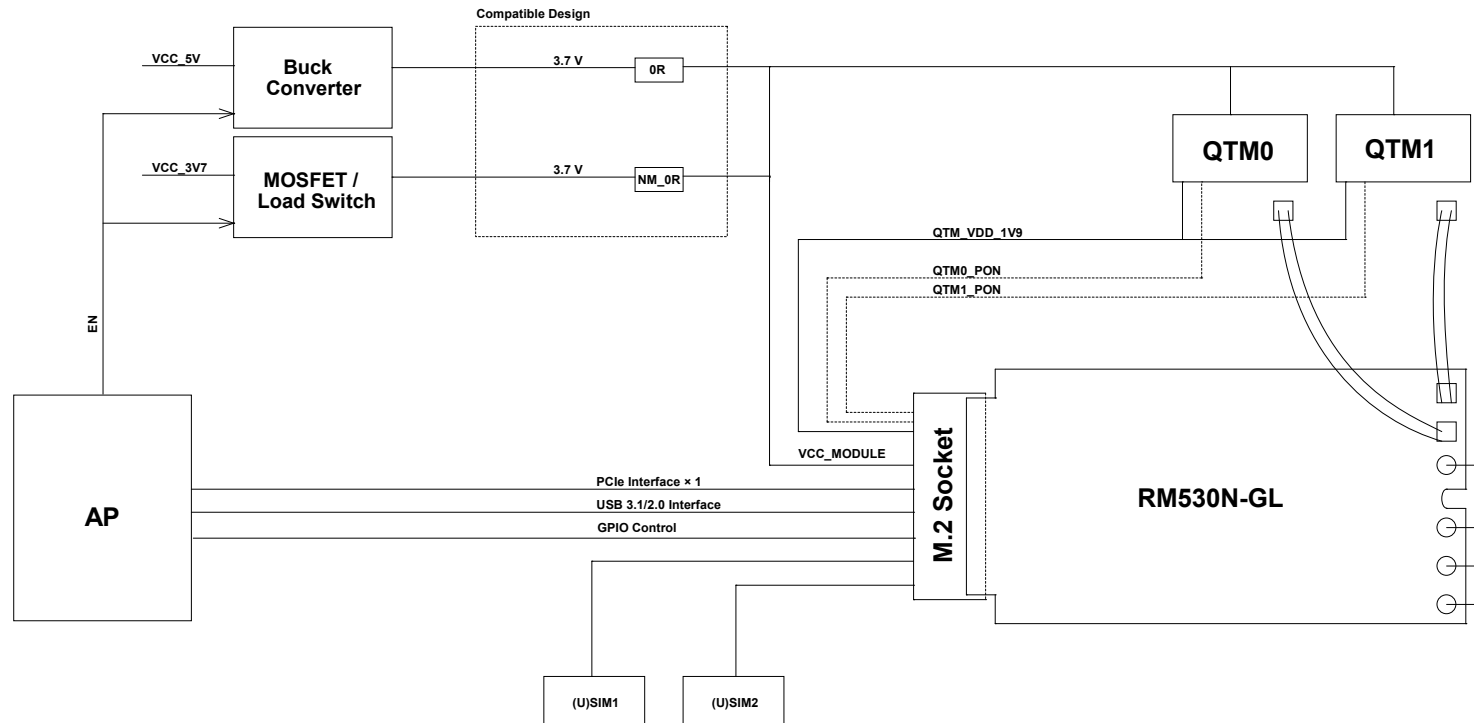
1.1. Introduction

This document provides the reference design for RM530N-GL module, including the power supply design, module interfaces, AP interfaces, (U)SIM interfaces and mmWave IF interfaces.

1.2. Schematics

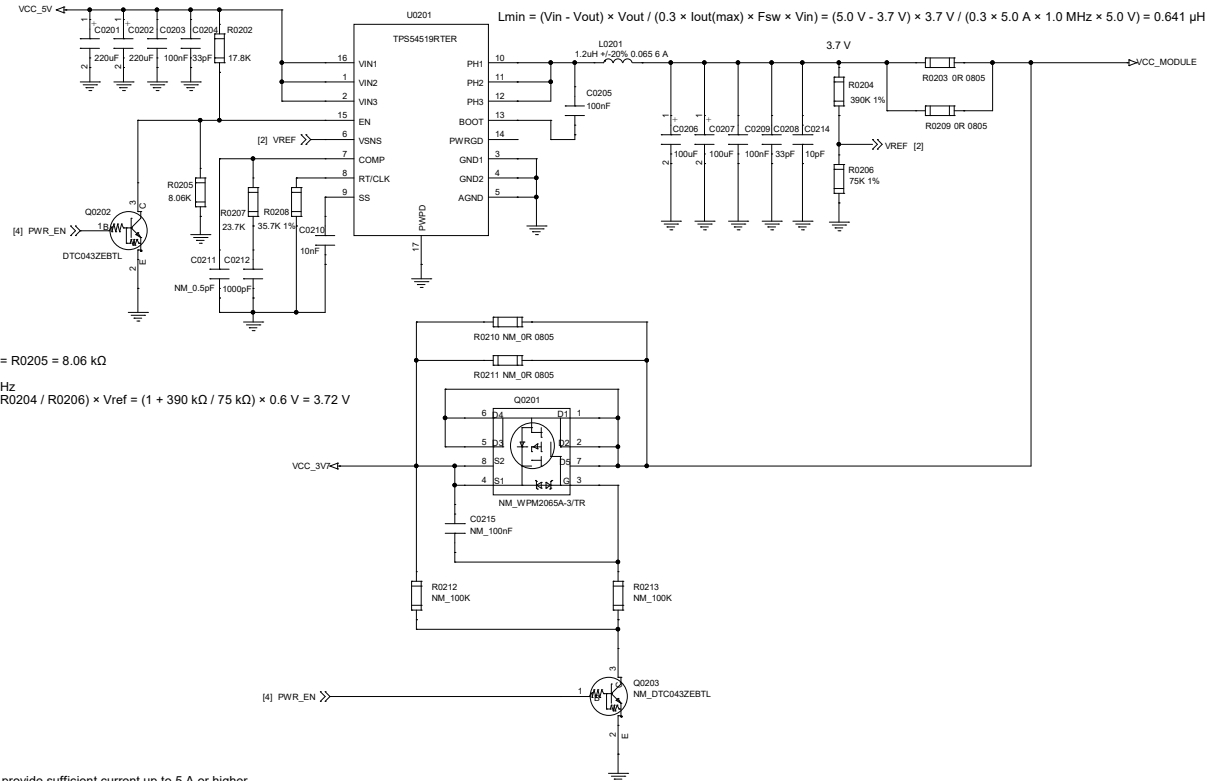
The schematics illustrated in the following pages are provided for reference only.

Block Diagram



NOTE:
The location of antenna connectors is for reference only.

Power Supply Design

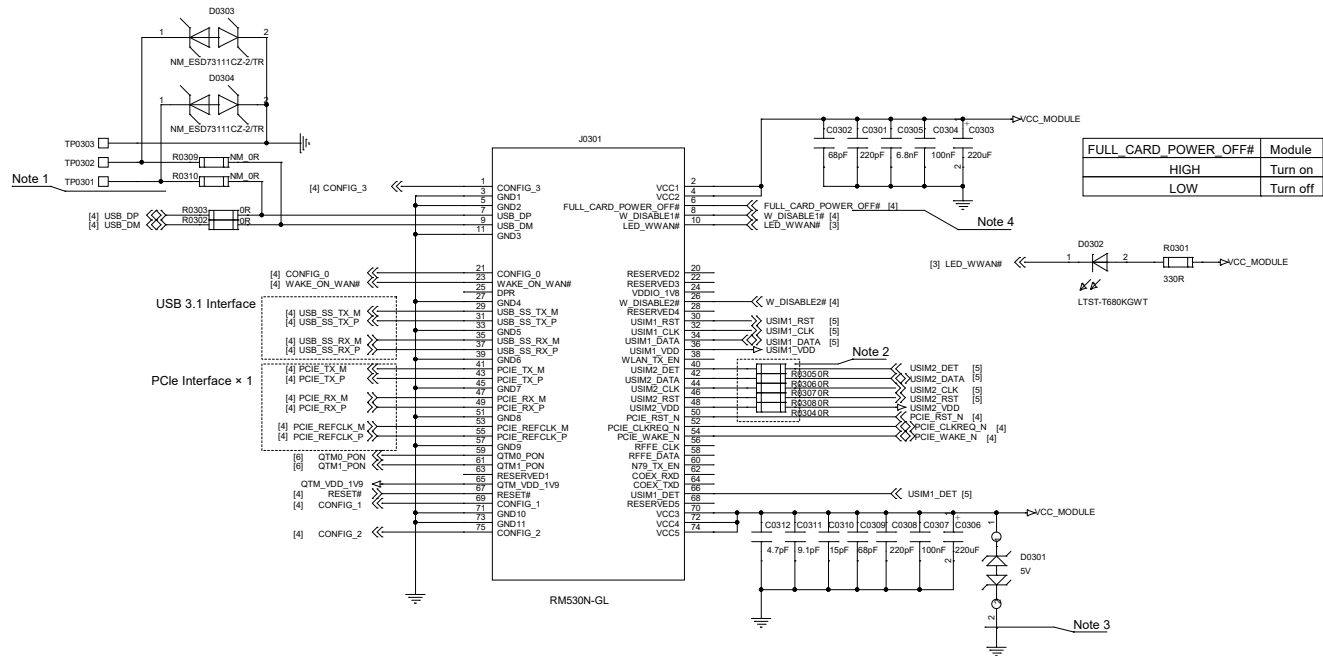


Input UVLO
 $R_{uvlo1} = R_{0202} = 17.8 \text{ k}\Omega$, $R_{uvlo2} = R_{0205} = 8.06 \text{ k}\Omega$
 $V_{start} = 3.95 \text{ V}$, $V_{stop} = 3.73 \text{ V}$
 $R_t = R_{0208} = 35.7 \text{ k}\Omega$, $F_{sw} = 1.0 \text{ MHz}$
 $V_{out} = (1 + R_{hs} / R_{is}) \times V_{ref} = (1 + R_{0204} / R_{0206}) \times V_{ref} = (1 + 390 \text{ k}\Omega / 75 \text{ k}\Omega) \times 0.6 \text{ V} = 3.72 \text{ V}$

NOTE:

1. The power supply must be able to provide sufficient current up to 5 A or higher.
2. A compatible power supply design for the module is recommended.

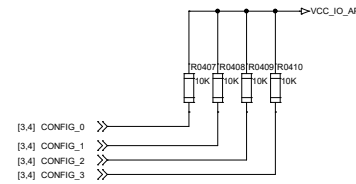
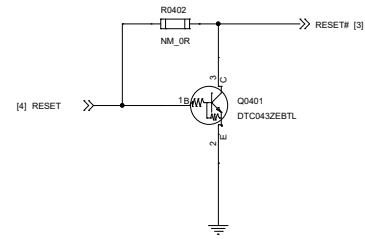
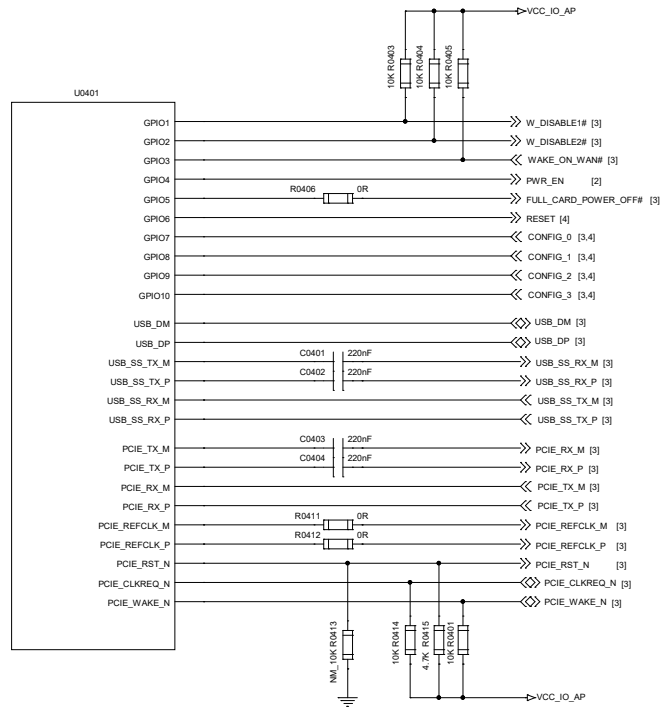
Module Interfaces



NOTE:

1. Test points must be reserved for the firmware upgrade over USB 2.0 interface and to minimize the stub length of USB test signals.
2. R0304 to R0308 should be placed close to the M.2 socket. If the module has a built-in eSIM, R0304 to R0308 should not be mounted.
3. It is recommended to use a TVS with working peak reverse voltage of 5 V and it should be placed close to the M.2 socket.
4. Use an AP GPIO to control FULL_CARD_POWER_OFF# of the module.

AP Interfaces

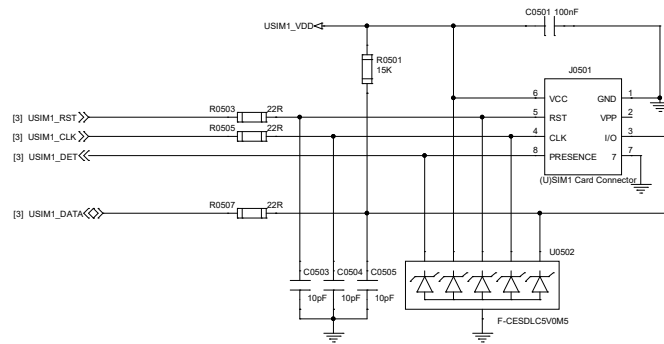


NOTE:

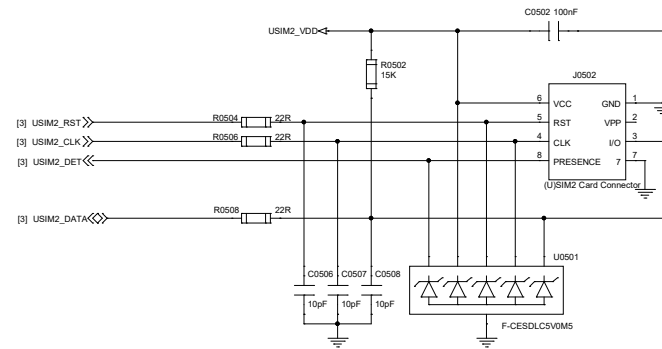
1. U0401 represents your host.
2. Keep C0401–C0404 to the host as close as possible.
3. The differential impedance of USB 2.0 and USB 3.1 signal traces should be controlled to 90 Ω.
4. The differential impedance of PCIe signal traces should be controlled to 85 Ω.
5. If a USB connector is used, please keep ESD protection components to the USB connector as close as possible.

(U)SIM Interfaces Design

(U)SIM 1



(U)SIM 2



NOTE:

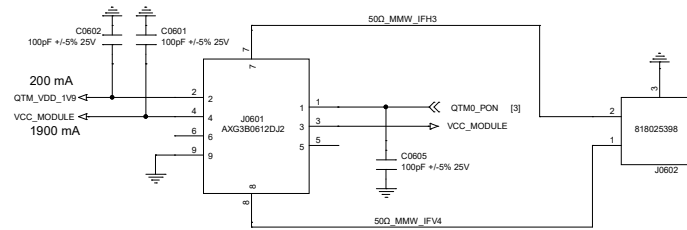
- The decoupling capacitors of (U)SIM signals and (U)SIM related resistors must be placed close to (U)SIM card connectors.
- The module provides the input pins USIM1_DET and USIM2_DET to detect (U)SIM cards.
 - In this reference design, a normally short-circuited (U)SIM card connector is used and high-logic-level detection is supported. For more details, see the corresponding Hardware Design document.
 - USIM1_DET and USIM2_DET are pulled LOW by default, and will be internally pulled up to 1.8 V by software configuration only when (U)SIM hot-plug is enabled by AT+QSIMDET.
- R0503–R0508 are used to suppress the EMI such as spurious transmission.
- An ESD diode array with a junction capacitance of lower than 10 pF should be placed as close to the (U)SIM card connector as possible for ESD protection.
- The (U)SIM card connector should be placed close to the M.2 socket, because a long PCB trace may lead to waveform distortion, which affects the signal quality.

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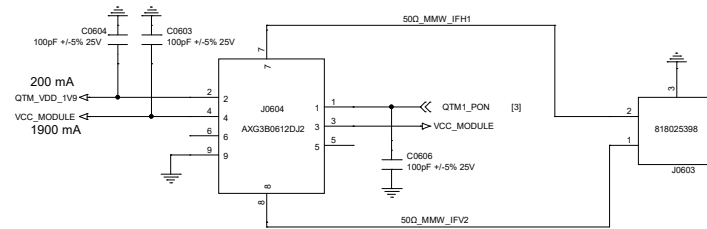
PROJECT	RMS30M-GL	VER	1.1
DRAWN BY	Archibald JIANG	CHECKED BY	Henry LIU
DATE	Wednesday, March 15, 2023	SHEET	5 OF 8

mmWave IF Interfaces

QTM0



QTM1



NOTE:

Typical value of mmWave VCC_MODULE is 3.7 V.