RM50xQ Series
Ethernet Reference Design

5G Module Series

Version: 1.0

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Status: Released

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About the Document

Revision History

Version	Date	Author	Description
-	2021-02-07	Jared WANG/ Hogan SHENG	Creation of the document
1.0	2021-03-02	Jared WANG/ Hogan SHENG	First official release

Contents

1 Reference Design

1.1. Introduction

This document provides ethernet reference design for RM50xQ series module, including the designs for ethernet (with RTL8111H/RTL8125B), power supply, module interfaces, AP interfaces, and (U)SIM interfaces.

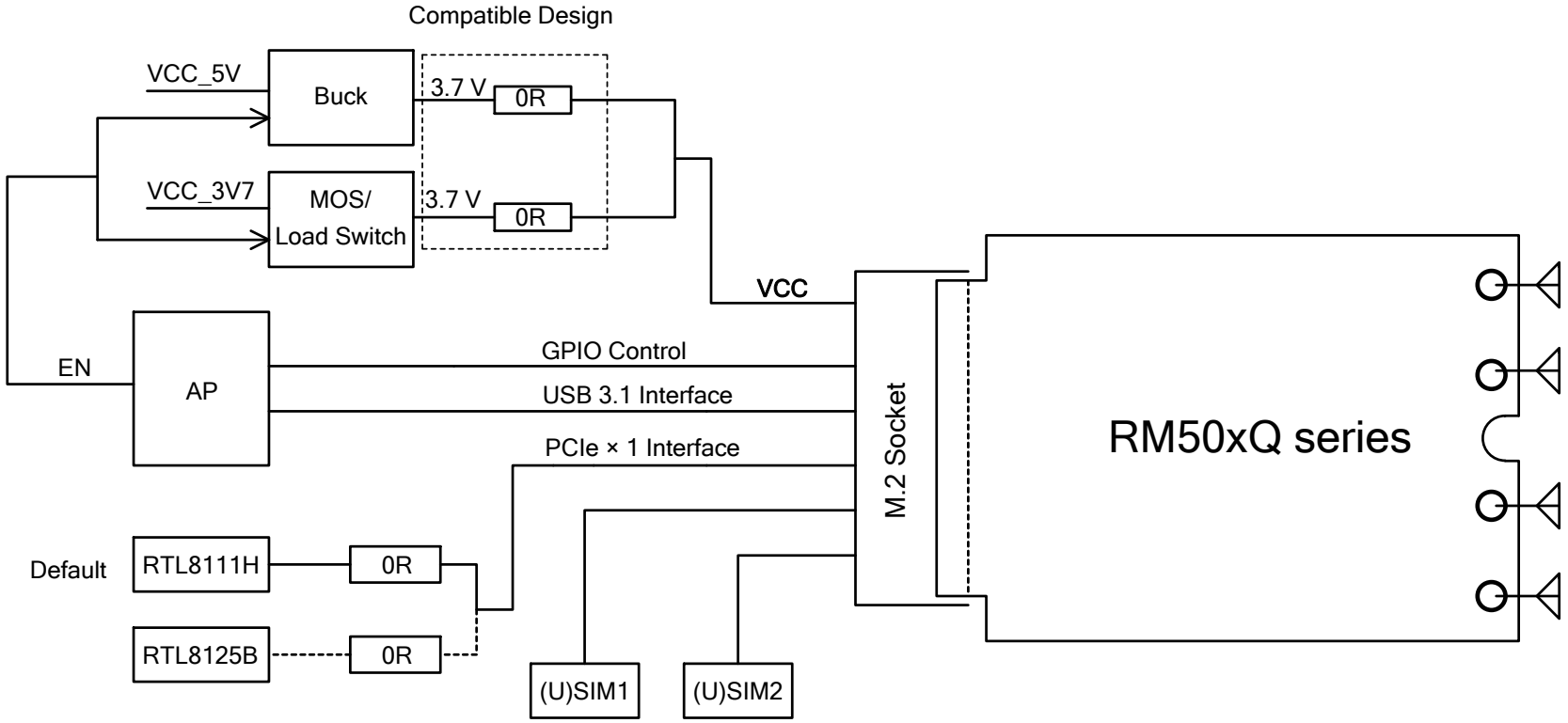
The document is applicable to the following modules:

- RM500Q series: RM500Q-GL, RM500Q-AE
- RM502Q series: RM502Q-GL, RM502Q-AE
- RM505Q-AE

1.2. Schematics

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

Block Diagram



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CHECKED BY Oscar LIU	SIZE A2	VER 1.0
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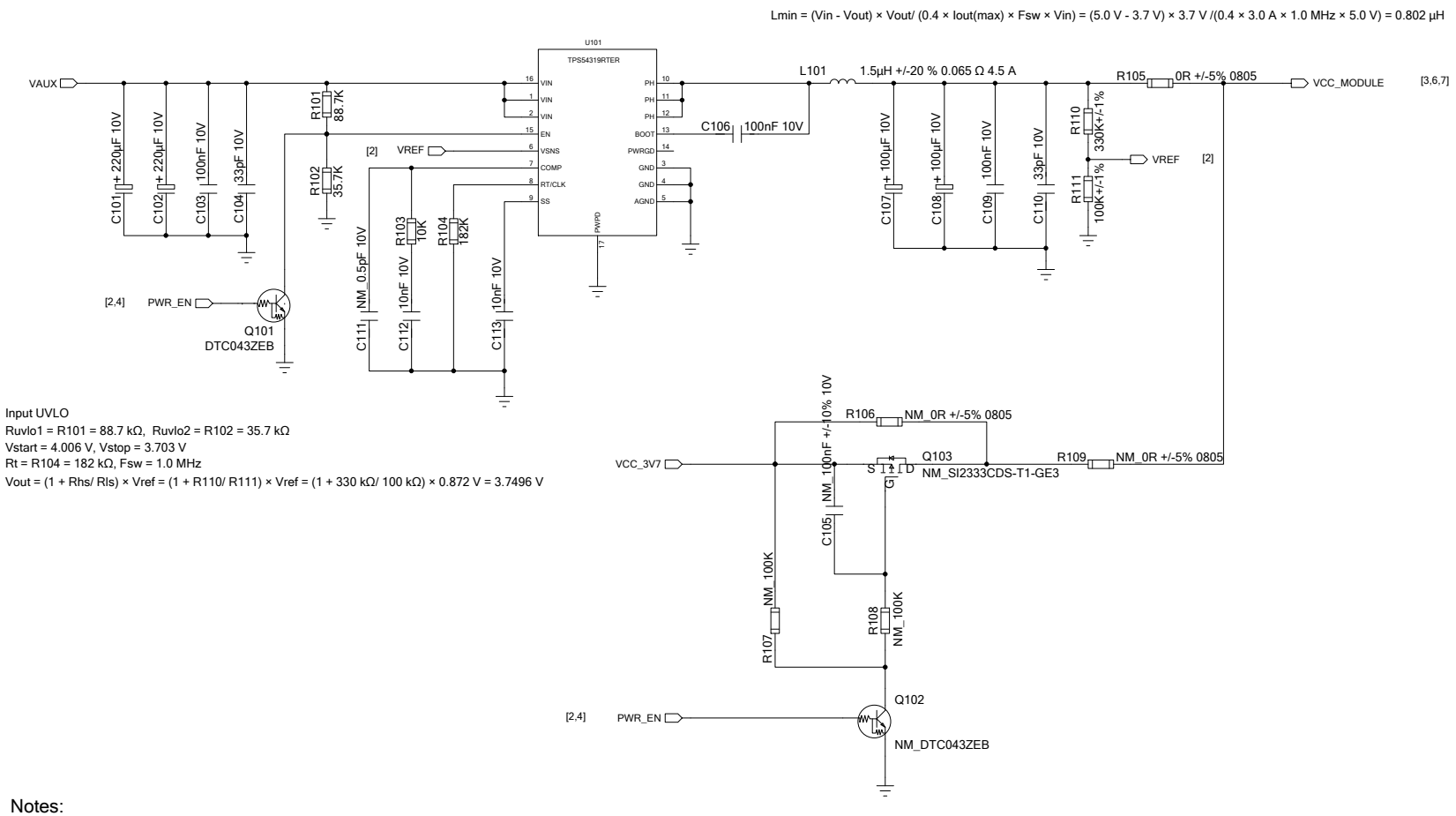
Power Supply Design



Notes:

1. The power supply must be able to provide sufficient current up to 3 A or higher.
2. A compatible design is recommended for VCC power supply.

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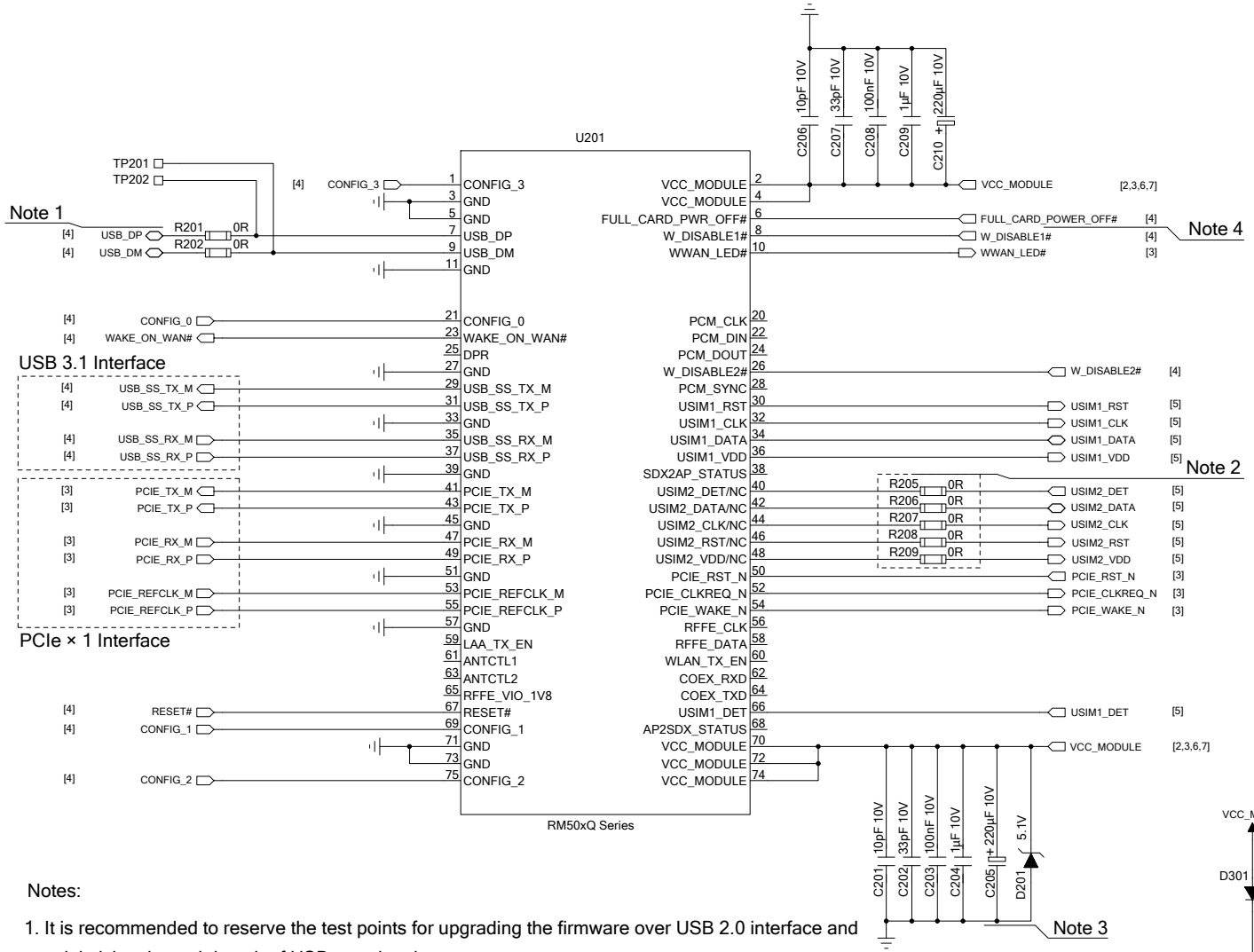
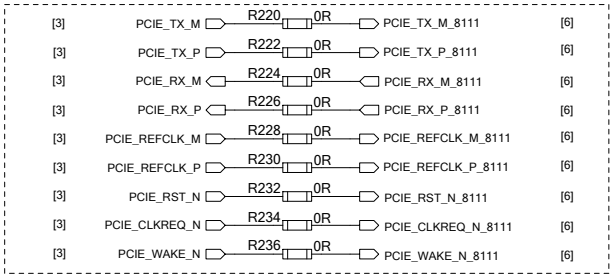
Module Interfaces



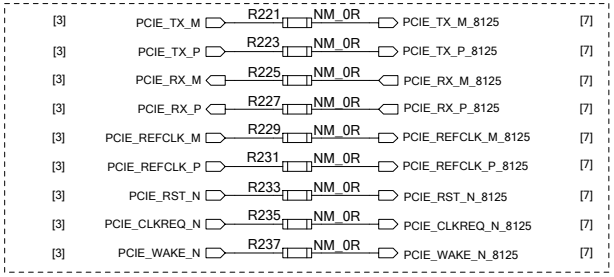
FULL_CARD_POWER_OFF#	Module
H	Turn On
L	Turn Off

PCIe Ethernet	Default Status
RTL8111H	Connected
RTL8125B	Not connected

RTL8111H



RTL8125B



Module	Pin 40, 42, 44, 46, 48
RM500Q-GL	(U)SIM2 Interface
RM502Q-GL	(U)SIM2 Interface
RM500Q-AE	NC
RM502Q-AE	NC
RM505Q-AE	(U)SIM2 Interface

Notes:

1. It is recommended to reserve the test points for upgrading the firmware over USB 2.0 interface and minimizing the stub length of USB test signals.
2. R205 to R209 should be placed close to the M.2 socket. If the module has a built-in eSIM, R205 to R209 should not be mounted. RM500Q-AE&RM502Q-AE do not suppport (U)SIM2 interface.
3. It is recommended to use a zener diode D201 with a reverse zener voltage of 5.1 V and it should be placed close to the module pin.
4. Use an AP GPIO to control FULL_CARD_POWER_OFF# of the module.
5. Unused pins may be differently defined for each module. For more details, see the corresponding Hardware Design document.

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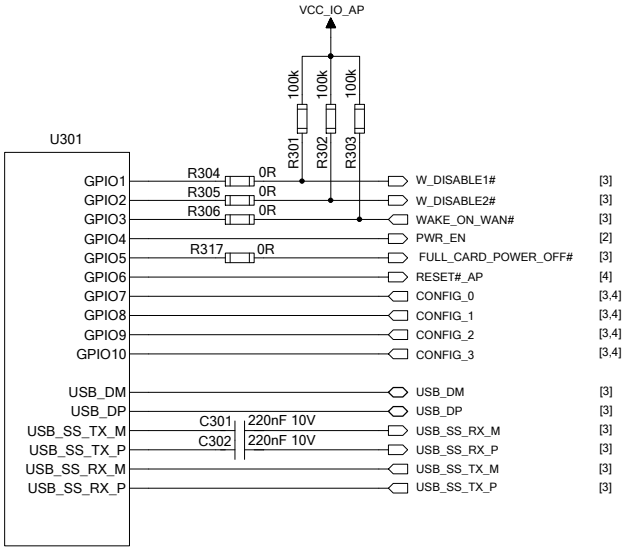
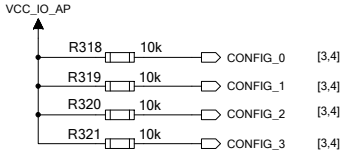
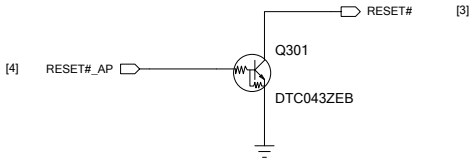
AP Interfaces







Notes:

1. U301 represents the customer's host.
2. Keep C301-C302 to the host as close as possible.
3. The differential impedance of USB 3.1 signal traces should be controlled to 90 Ω.
4. If a USB connector is used, please keep ESD protection components to the USB connector as close as possible.

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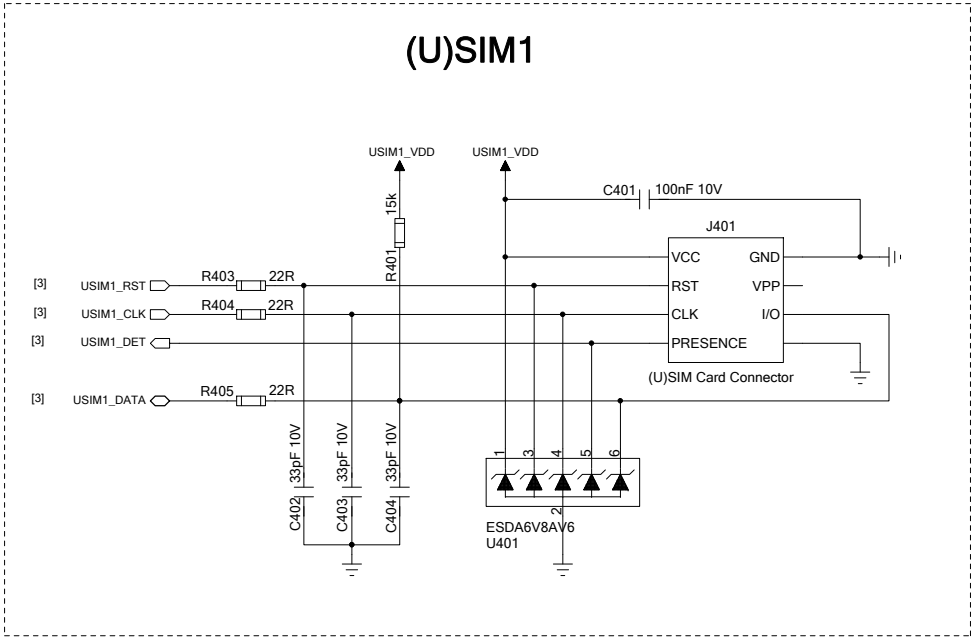
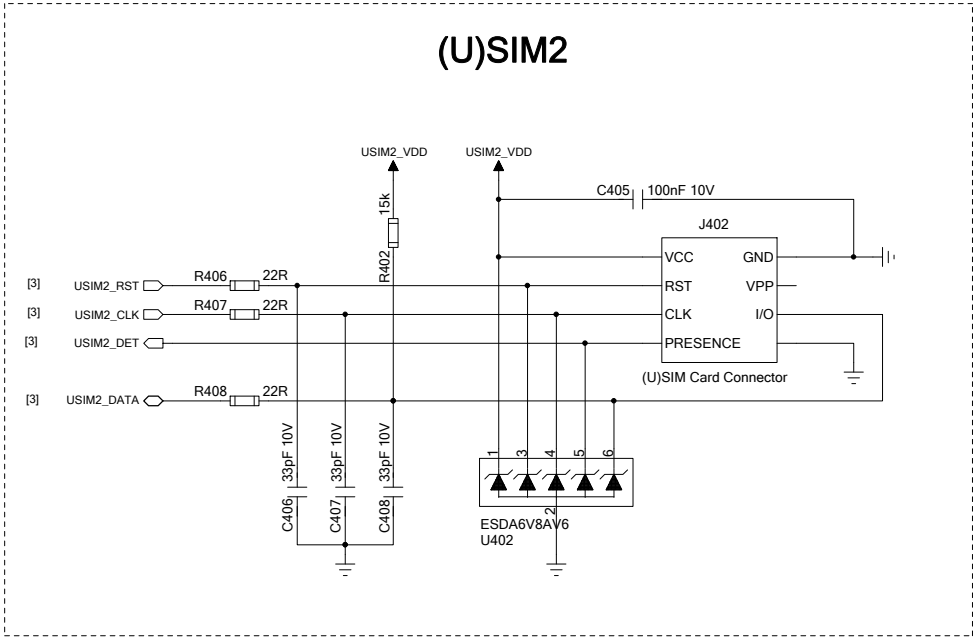
(U)SIM Interfaces Design

(U)SIM1



(U)SIM2



Notes:

1. The decoupling capacitors of USIM1_VDD (and USIM2_VDD) must be placed close to the (U)SIM card connector.
2. RM50xQ series module provides input pin(s) USIM1_DET (and USIM2_DET) to detect (U)SIM cards.
   1) A normally short-circuited (U)SIM card connector is used in this reference design, and high-logic-level detection is supported. For more details, see the corresponding Hardware Design documents.
   2) This pin is pulled up by software configuration when (U)SIM hot-plug is enabled by AT+QSIMDET.
3. R403-R408 are used to suppress the EMI such as spurious transmission and to enhance the ESD protection.
4. A TVS 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.
5. R401 and R402 improve anti-jamming capability of the (U)SIM card circuit and they should be placed close to the (U)SIM card connector.
6. 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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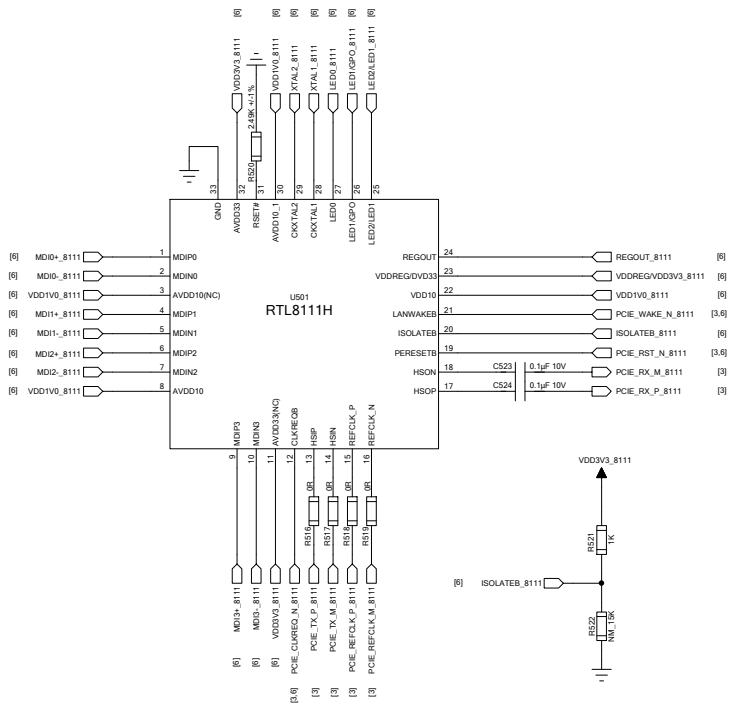
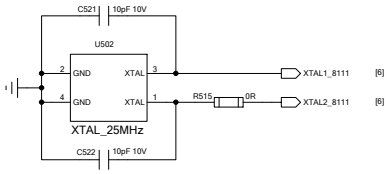
Ethernet (RTL8111H)

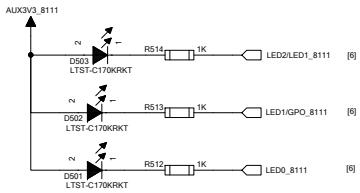
RTL8111H

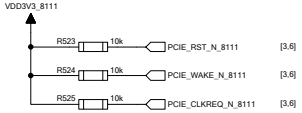


Oscillator

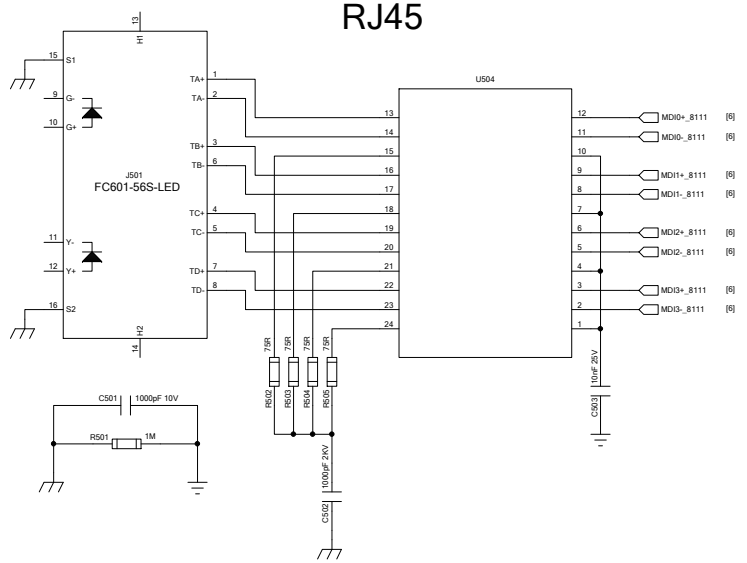


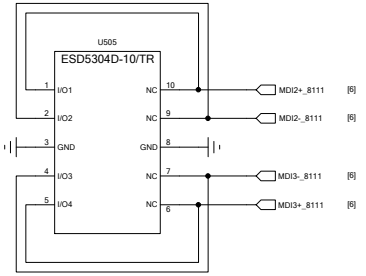
LED_NET

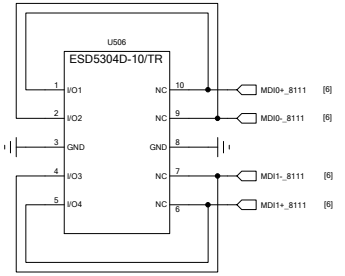




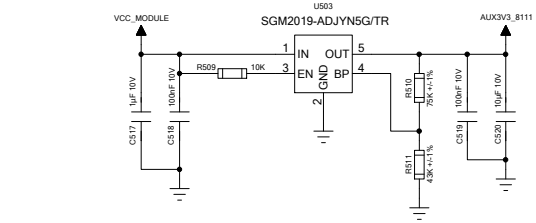
RJ45

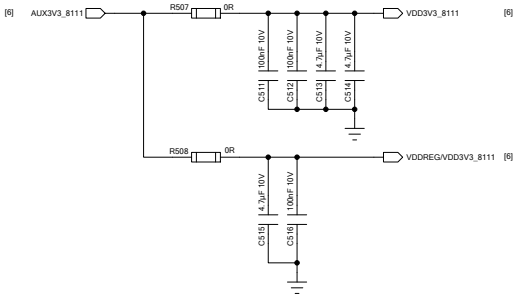


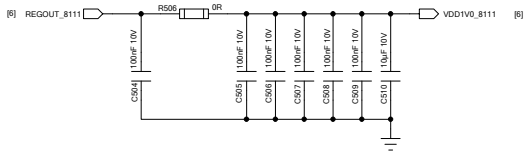




Power







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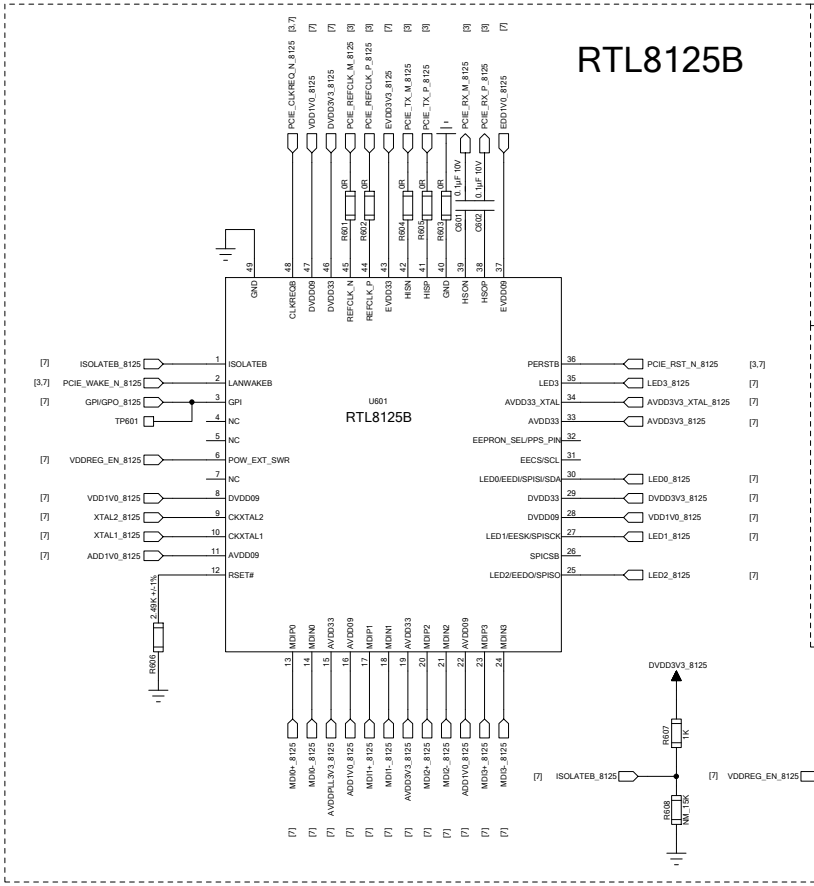
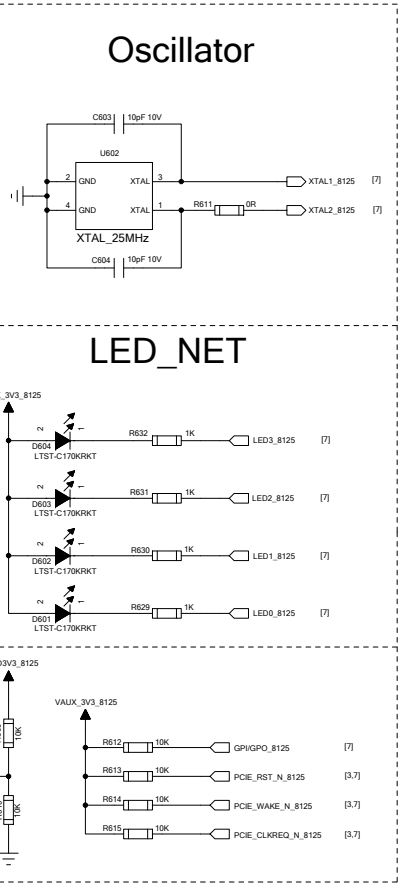
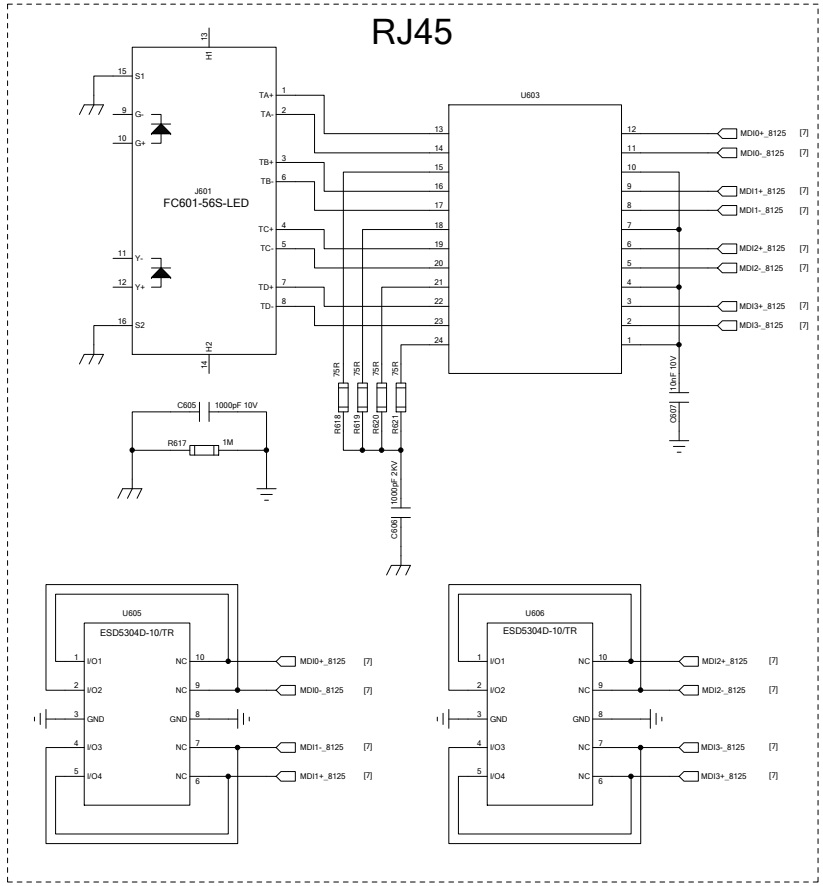
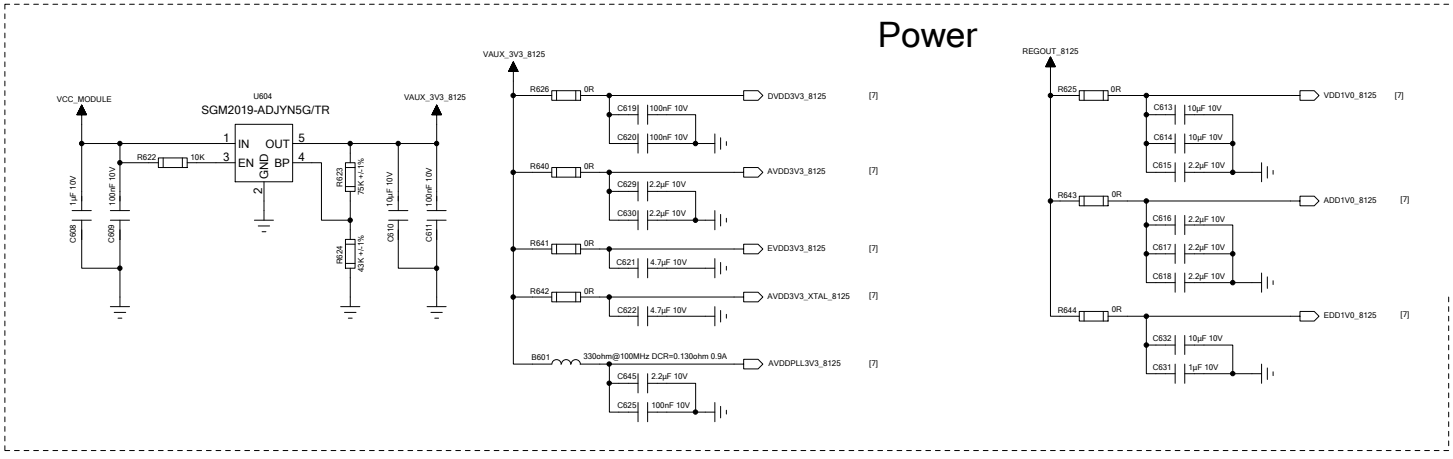
Ethernet (RTL8125B)









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