EG91xQ Series
Reference Design

LTE Standard Module Series

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About the Document

Revision History

Version	Date	Author	Description
-	2023-02-10	Lex LI	Creation of the document
1.0	2023-03-14	Lex LI	First official release
1.1	2023-09-22	Lex LI	1. Added the applicable module EG916Q-GL. 2. Updated the following pins: pin 25: from SPI_CS to RESERVED; pin 26: from SPI_CLK to RESERVED; pin 27: from SPI_MOSI to GNSS_TXD; pin 28: from SPI_MISO to GNSS_RXD; pin 49: from RESERVED to ANT_GNSS; pin 51: from RESERVED to GNSS_PPS; pin 84: from RESERVED to USIM2_CLK; pin 85: from RESERVED to USIM2_RST; pin 86: from RESERVED to USIM2_DATA; pin 87: from RESERVED to USIM2_VDD; pin 109: from RESERVED to GNSS_DBG_TXD; pin 110: from RESERVED to GNSS_DBG_RXD; pin 112: from RESERVED to GNSS_RST; pin 117: from RESERVED to GNSS_PWR_EN; pin 118: from RESERVED to GNSS_VBCKP. 3. Added GNSS related reference design. 4. Added notes 6 to 11 (Sheet 3). 5. Added the reference design of USIM2 interface (Sheet 7).
1.2	2024-08-07	Fanny CHEN/ Lem JIN	1. Added the applicable modules EG915Q-AF and EG915Q-JP. 2. Updated the current that is provided to the module from 2.0 A to 1.5 A (Sheets 1 & 5). 3. Added Wi-Fi Scan function (Sheets 1 and 8).

4.   Updated test points (Sheets 1 & 9).

5.   Added two notes about GNSS design guidelines;
     Added the reference design of ADC interfaces (Sheet 3).

6.   Updated the reference design of antenna interfaces (Sheet 8).

4.   Updated test points (Sheets 1 & 9).

Contents

1 Reference Design

1.1. Introduction

This document provides the reference design for Quectel EG91xQ series. The reference design mainly includes the block diagram, power system block diagram, module interfaces, MCU interfaces, power supply design, UARTs and USIM interface design, antenna interface design and other designs.

This document is applicable to the following modules:

- EG915Q Series (EG915Q-NA, EG915Q-AF and EG915Q-JP)
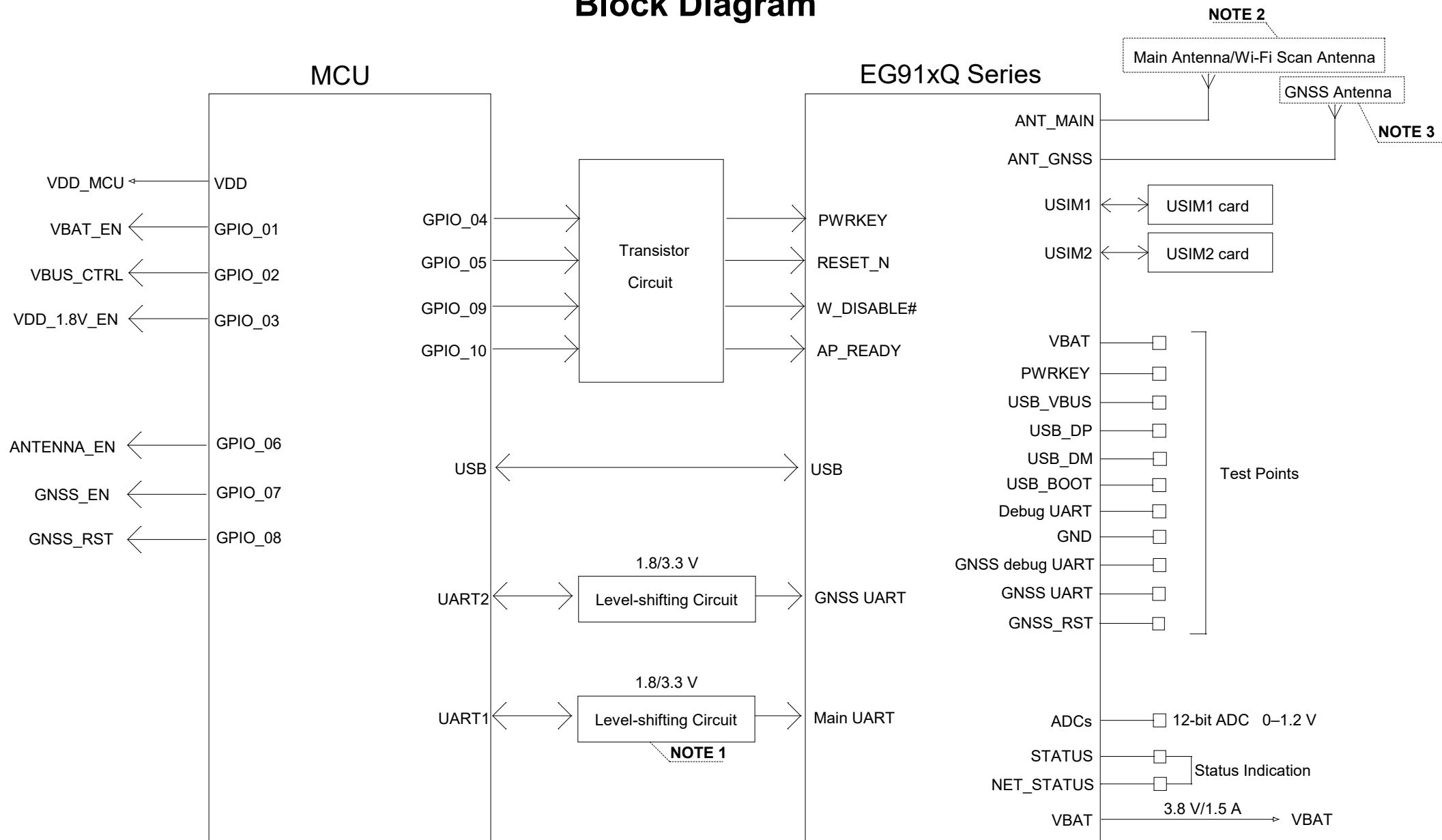- EG916Q-GL

1.2. Schematics

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

> **NOTE**
>
> It is required to confirm the applicability and price from the supplier about the IC involved in the reference design.

Block Diagram

MCU

VDD_MCU ← VDD

VBAT_EN ← GPIO_01

VBUS_CTRL ← GPIO_02

VDD_1.8V_EN ← GPIO_03

GPIO_04 →
GPIO_05 →
GPIO_09 →
GPIO_10 →

ANTENNA_EN ← GPIO_06

GNSS_EN ← GPIO_07

GNSS_RST ← GPIO_08

USB ↔

UART2 ↔

UART1 ↔

Transistor Circuit

EG91xQ Series

NOTE 2

Main Antenna/Wi-Fi Scan Antenna

GNSS Antenna

ANT_MAIN

NOTE 3

ANT_GNSS

USIM1 ↔ USIM1 card

USIM2 ↔ USIM2 card

PWRKEY

RESET_N

W_DISABLE#

AP_READY

VBAT ☐
PWRKEY ☐
USB_VBUS ☐
USB_DP ☐
USB_DM ☐
USB_BOOT ☐
Debug UART ☐
GND ☐
GNSS debug UART ☐
GNSS UART ☐
GNSS_RST ☐

Test Points

USB ↔ USB

1.8/3.3 V

Level-shifting Circuit → GNSS UART

1.8/3.3 V

Level-shifting Circuit → Main UART

NOTE 1

ADCs ☐ 12-bit ADC   0–1.2 V

STATUS ☐
NET_STATUS ☐
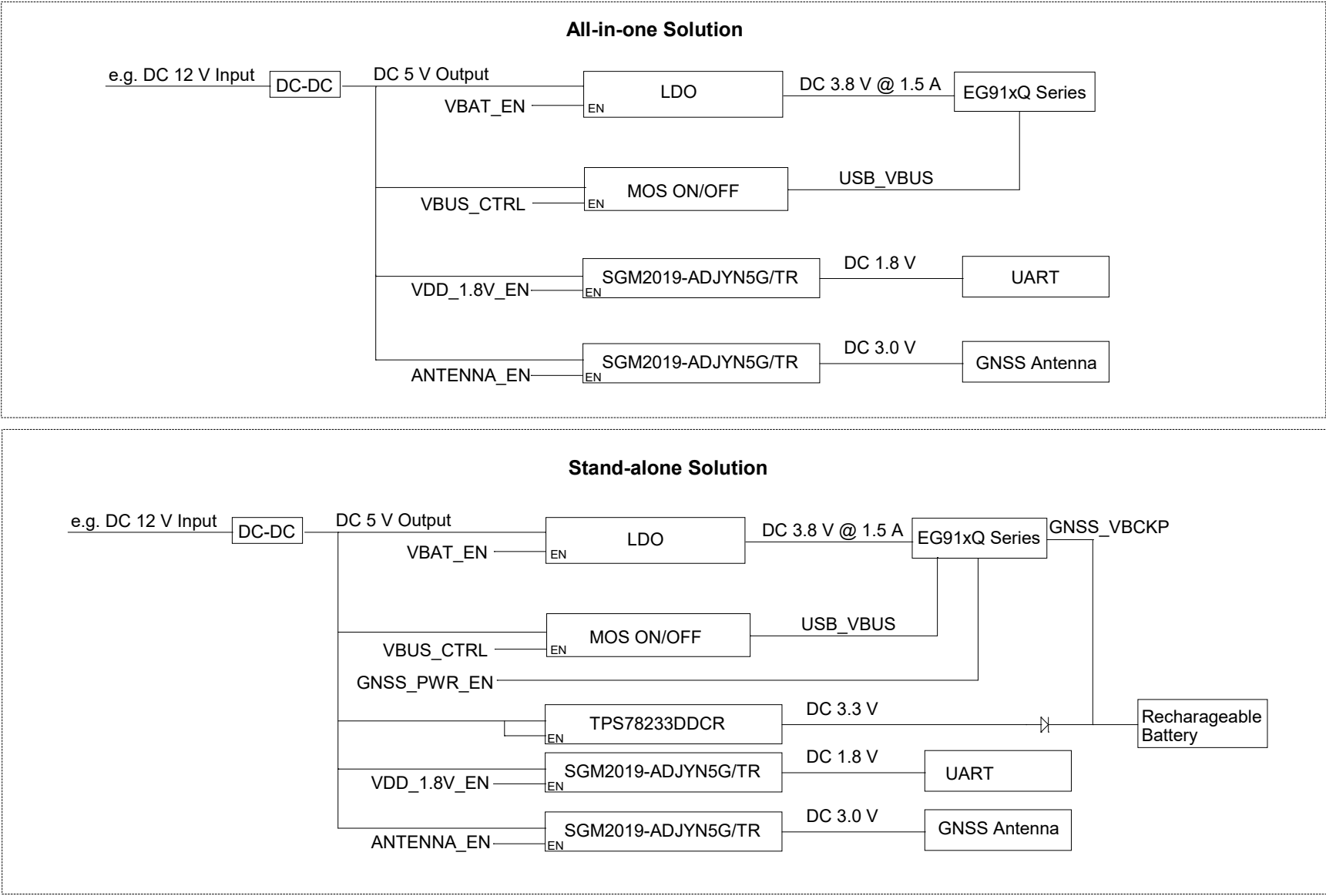
Status Indication

VBAT   3.8 V/1.5 A → VBAT

NOTE:

1. A transistor solution or an IC solution TXS0108EPWR provided by Texas Instruments is recommended.

2. Wi-Fi scan function is optional. This function and LTE network cannot be used simultaneously since they share the same antenna interface.

3. GNSS interface is optional. If you need this function, please contact Quectel Technical Support.
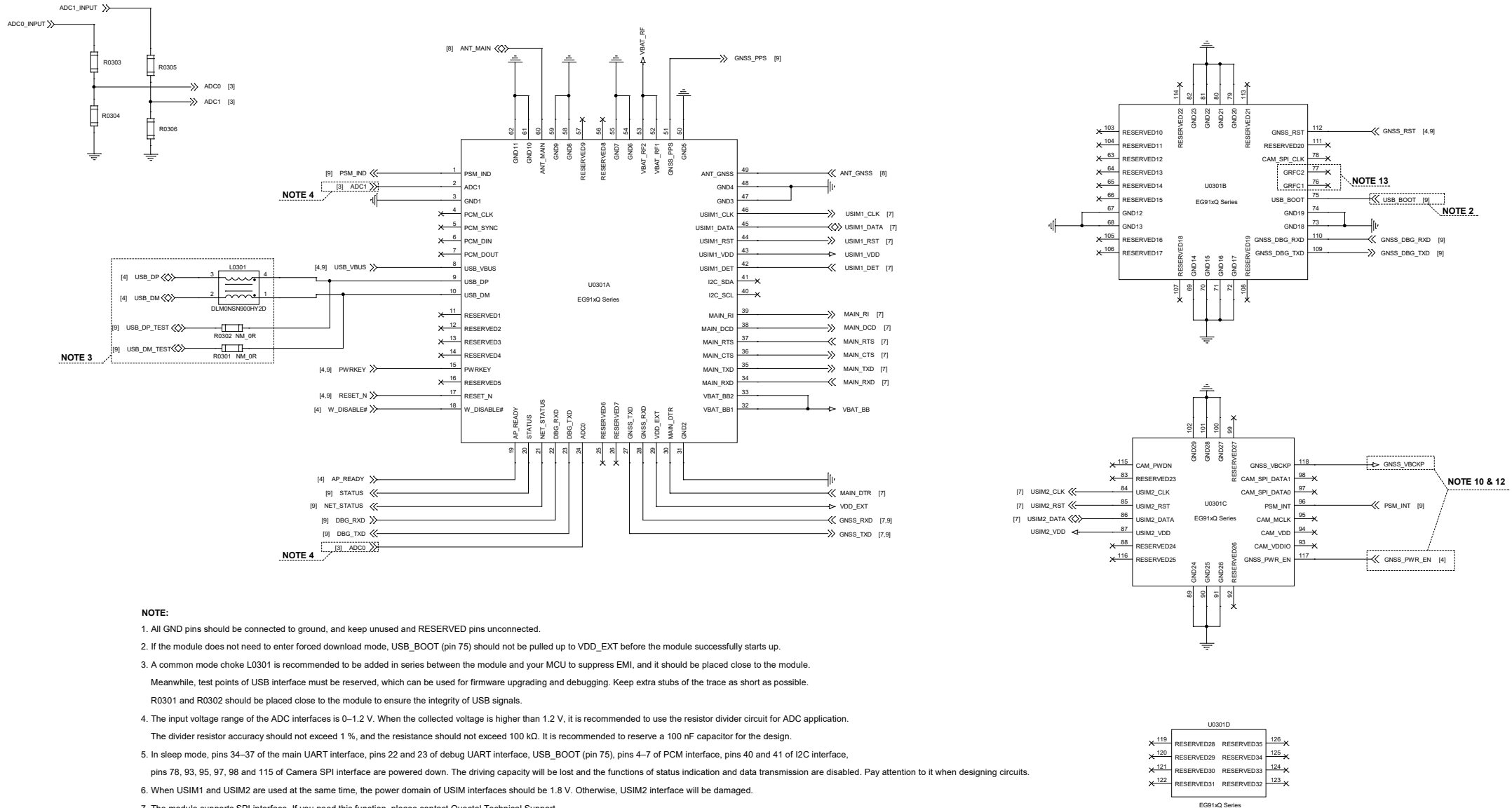
Power System Block Diagram

All-in-one Solution

e.g. DC 12 V Input → **DC-DC** → DC 5 V Output

LDO (EN ← VBAT_EN) → DC 3.8 V @ 1.5 A → **EG91xQ Series**

MOS ON/OFF (EN ← VBUS_CTRL) → USB_VBUS → EG91xQ Series

SGM2019-ADJYN5G/TR (EN ← VDD_1.8V_EN) → DC 1.8 V → **UART**

SGM2019-ADJYN5G/TR (EN ← ANTENNA_EN) → DC 3.0 V → **GNSS Antenna**

Stand-alone Solution

e.g. DC 12 V Input → **DC-DC** → DC 5 V Output

LDO (EN ← VBAT_EN) → DC 3.8 V @ 1.5 A → **EG91xQ Series** → GNSS_VBCKP

MOS ON/OFF (EN ← VBUS_CTRL) → USB_VBUS → EG91xQ Series

GNSS_PWR_EN

TPS78233DDCR (EN) → DC 3.3 V → **Rechargeable Battery**

SGM2019-ADJYN5G/TR (EN ← VDD_1.8V_EN) → DC 1.8 V → **UART**

SGM2019-ADJYN5G/TR (EN ← ANTENNA_EN) → DC 3.0 V → **GNSS Antenna**

NOTE:

EG91xQ series integrates both LTE and GNSS engines which can work as a whole (All-in-one solution) unit or

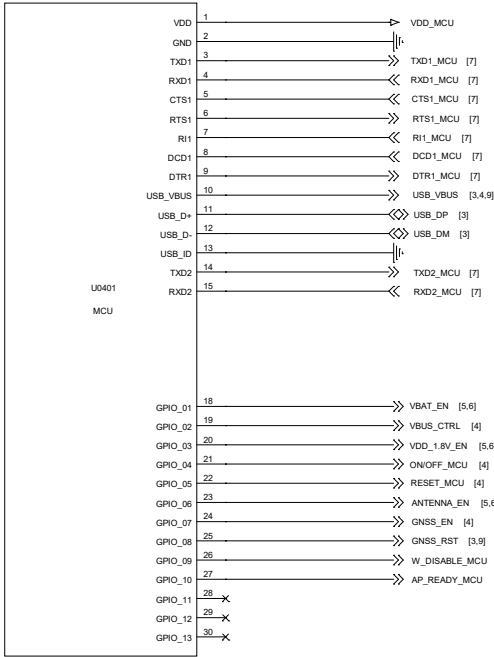work independently (Stand-alone solution) according to your demands.

Module Interfaces

ADC1_INPUT
ADC0_INPUT
R0303 R0305
ADC0 [3]
ADC1 [3]
R0304 R0306

[8] ANT_MAIN
VBAT_RF
GNSS_PPS [9]

GND11 62
GND10 61
ANT_MAIN 60
GND9 59
GND8 58
RESERVED9 57
RESERVED8 56
GND7 55
GND6 54
VBAT_RF2 53
VBAT_RF1 52
GNSS_PPS 51
GND5 50

[9] PSM_IND   1 PSM_IND
[3] ADC1   2 ADC1
NOTE 4   3 GND1
    4 PCM_CLK
    5 PCM_SYNC
    6 PCM_DIN
    7 PCM_DOUT
[4,9] USB_VBUS   8 USB_VBUS
[4] USB_DP   9 USB_DP
[4] USB_DM   10 USB_DM
    11 RESERVED1
    12 RESERVED2
    13 RESERVED3
    14 RESERVED4
[4,9] PWRKEY   15 PWRKEY
    16 RESERVED5
[4,9] RESET_N   17 RESET_N
[4] W_DISABLE#   18 W_DISABLE#

L0301
DLM0NSN900HY2D
R0302 NM_0R
R0301 NM_0R
NOTE 3
[9] USB_DP_TEST
[9] USB_DM_TEST

U0301A
EG91xQ Series

ANT_GNSS 49 ANT_GNSS [8]
GND4 48
GND3 47
USIM1_CLK 46 USIM1_CLK [7]
USIM1_DATA 45 USIM1_DATA [7]
USIM1_RST 44 USIM1_RST [7]
USIM1_VDD 43 USIM1_VDD
USIM1_DET 42 USIM1_DET [7]
I2C_SDA 41
I2C_SCL 40
MAIN_RI 39 MAIN_RI [7]
MAIN_DCD 38 MAIN_DCD [7]
MAIN_RTS 37 MAIN_RTS [7]
MAIN_CTS 36 MAIN_CTS [7]
MAIN_TXD 35 MAIN_TXD [7]
MAIN_RXD 34 MAIN_RXD [7]
VBAT_BB2 33
VBAT_BB1 32 VBAT_BB

AP_READY 19
STATUS 20
NET_STATUS 21
DBG_RXD 22
DBG_TXD 23
ADC0 24
RESERVED6 25
RESERVED7 26
GNSS_TXD 27
GNSS_RXD 28
VDD_EXT 29
MAIN_DTR 30
GND2 31

[4] AP_READY
[9] STATUS
[9] NET_STATUS
[9] DBG_RXD
[9] DBG_TXD
[3] ADC0
NOTE 4

MAIN_DTR [7]
VDD_EXT
GNSS_RXD [7,9]
GNSS_TXD [7,9]

RESERVED10 103
RESERVED11 104
RESERVED12 63
RESERVED13 64
RESERVED14 65
RESERVED15 66
GND12 67
GND13 68
RESERVED16 105
RESERVED17 106

GND23 114
RESERVED22 82
GND22 81
GND21 80
GND20 79
RESERVED21 113

U0301B
EG91xQ Series

GNSS_RST 112 GNSS_RST [4,9]
RESERVED20 111
CAM_SPI_CLK 78
GRFC2 77 NOTE 13
GRFC1 76
USB_BOOT 75 USB_BOOT [9] NOTE 2
GND19 74
GND18 73
GNSS_DBG_RXD 110 GNSS_DBG_RXD [9]
GNSS_DBG_TXD 109 GNSS_DBG_TXD [9]

RESERVED18 69
GND14 70
GND15 71
GND16 72
RESERVED19 108
107

CAM_PWDN 115
RESERVED23 83
[7] USIM2_CLK 84 USIM2_CLK
[7] USIM2_RST 85 USIM2_RST
[7] USIM2_DATA 86 USIM2_DATA
USIM2_VDD 87 USIM2_VDD
RESERVED24 88
RESERVED25 116

GND29 102
GND28 101
GND27 100
RESERVED27 99

U0301C
EG91xQ Series

GNSS_VBCKP 118 GNSS_VBCKP
CAM_SPI_DATA1 96
CAM_SPI_DATA0 97
PSM_INT 96 PSM_INT [9]
CAM_MCLK 95
CAM_VDD 94
CAM_VDDIO 93
GNSS_PWR_EN 117 GNSS_PWR_EN [4]

NOTE 10 & 12

GND24 89
GND25 90
GND26 91
RESERVED26 92

U0301D
RESERVED28 119   RESERVED35 126
RESERVED29 120   RESERVED34 125
RESERVED30 121   RESERVED33 124
RESERVED31 122   RESERVED32 123
EG91xQ Series

NOTE:

1. All GND pins should be connected to ground, and keep unused and RESERVED pins unconnected.

2. If the module does not need to enter forced download mode, USB_BOOT (pin 75) should not be pulled up to VDD_EXT before the module successfully starts up.

3. A common mode choke L0301 is recommended to be added in series between the module and your MCU to suppress EMI, and it should be placed close to the module.

   Meanwhile, test points of USB interface must be reserved, which can be used for firmware upgrading and debugging. Keep extra stubs of the trace as short as possible.

   R0301 and R0302 should be placed close to the module to ensure the integrity of USB signals.

4. The input voltage range of the ADC interfaces is 0–1.2 V. When the collected voltage is higher than 1.2 V, it is recommended to use the resistor divider circuit for ADC application.

   The divider resistor accuracy should not exceed 1 %, and the resistance should not exceed 100 kΩ. It is recommended to reserve a 100 nF capacitor for the design.

5. In sleep mode, pins 34–37 of the main UART interface, pins 22 and 23 of debug UART interface, USB_BOOT (pin 75), pins 4–7 of PCM interface, pins 40 and 41 of I2C interface,

   pins 78, 93, 95, 97, 98 and 115 of Camera SPI interface are powered down. The driving capacity will be lost and the functions of status indication and data transmission are disabled. Pay attention to it when designing circuits.

6. When USIM1 and USIM2 are used at the same time, the power domain of USIM interfaces should be 1.8 V. Otherwise, USIM2 interface will be damaged.

7. The module supports SPI interface. If you need this function, please contact Quectel Technical Support.

8. GNSS interface (pins 27, 28, 49, 51, 109, 110, 112, 117, 118) is optional. If you need this function, please contact Quectel Technical Support.

9. USIM2 and Camera SPI interfaces cannot be used at the same time.

10. In All-in-one solution, GNSS_PWR_EN, GNSS_VBCKP can be unconnected.

11. Whether in Stand-alone or All-in-one solution, to facilitate updating GNSS firmware, it is highly recommended to reserve test points for GNSS UART (pins 27 and 28) and GNSS_RST (pin 112).

12. In the Stand-alone or All-in-one solution, if the GNSS chip is powered externally, the GNSS firmware cannot be upgraded through the LTE network because LTE cannot reset the GNSS chip. If you want to upgrade the GNSS firmware

    through the LTE network, you need to disconnect GNSS_PWR_EN (pin 117) and GNSS_VBCKP (pin 118) from the outside or set both pins to low.

13. If you need GRFC function, please contact Quectel Technical Support for the related reference design.
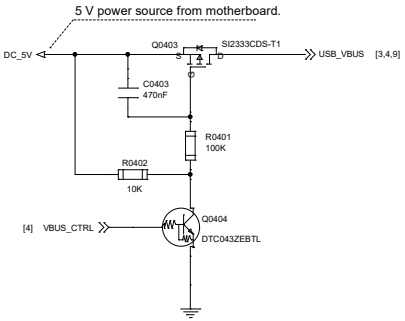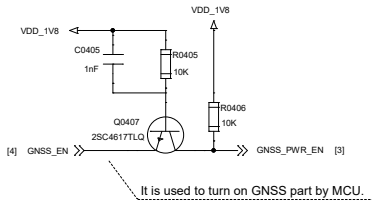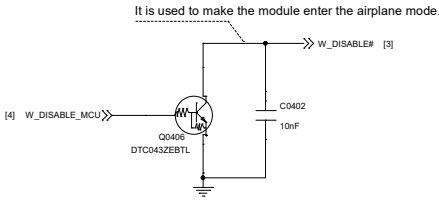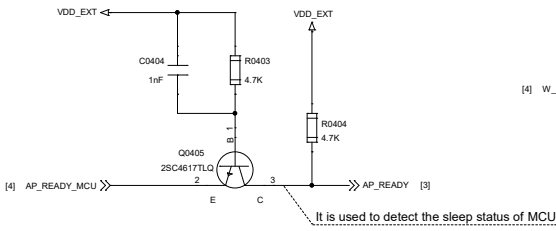
MCU Interface Design

It is used to turn on/off the module.

It is used to reset the module.

It is used to make the module enter the airplane mode.

It is used to detect the sleep status of MCU.

5 V power source from motherboard.

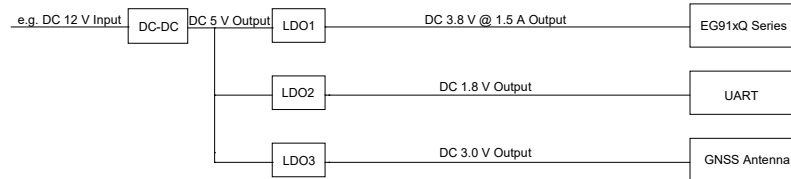It is used to turn on GNSS part by MCU.

NOTE:

1. U0401 represents your MCU. The power domain of GPIO interfaces of the module is 1.8 V.

   If the power domain of GPIO interfaces of U0401 is also 1.8 V, then the related level-shifting circuit is not needed.

2. The USB interface of the module only serves as a slave device and supports high-speed and full-speed modes of USB 2.0.

   To communicate with the USB interface, MCU needs to support USB host mode or OTG function.

   The USB_VBUS pin of the module should be powered by an external power system for USB detection, and VBUS_CTRL is used to turn on/off the USB_VBUS power supply.

3. It is recommended to select the GPIO pins of MCU, which are at low level by default, as the control pins for PWRKEY and RESET_N of the module.

   Ensure that the load capacitance does not exceed 10 nF on PWRKEY and RESET_N pins.

4. When the sleep function of the module is enabled, pulling down MAIN_DTR can wake up the module from the sleep mode.

   For details of the AT commands for configuration, see the hardware design document of the module.

   You can choose the level-shifting circuit on Sheet "UARTs and USIM Interface Design".
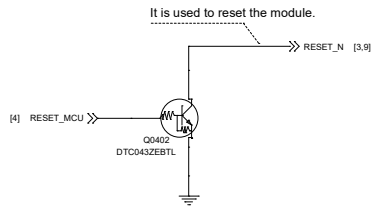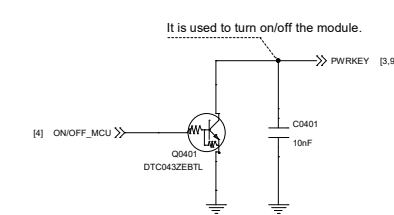
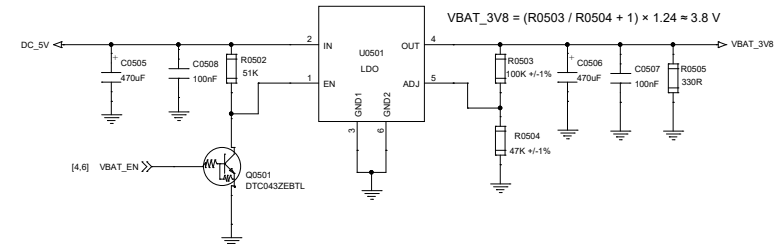# Power Supply Design (All-in-one Solution)

DC-DC Application

When the input voltage is above 7.0 V, use a DC-DC converter to convert the high input voltage to 5.0 V,

and then use LDOs to convert it to 3.8 V , 1.8 V and 3.0 V to power the module, UART interfaces and GNSS Antenna.
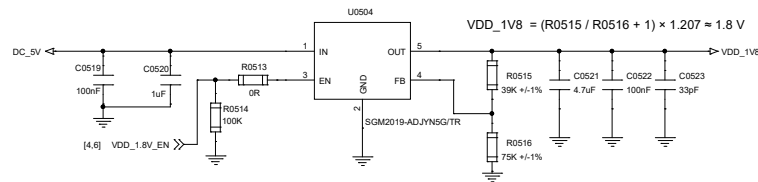
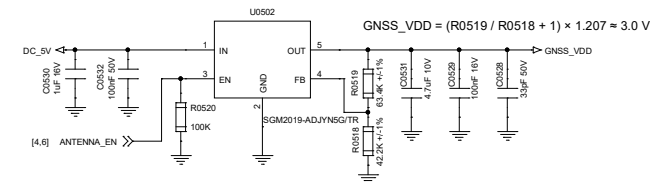e.g. DC 12 V Input → DC-DC → DC 5 V Output → LDO1 → DC 3.8 V @ 1.5 A Output → EG91xQ Series

LDO2 → DC 1.8 V Output → UART

LDO3 → DC 3.0 V Output → GNSS Antenna

LDO Application

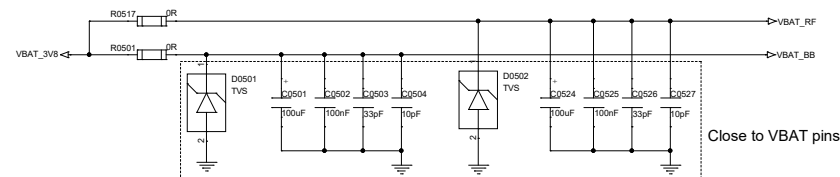When the input voltage is below 7.0 V, use an LDO to convert the input voltage to 3.8 V.

$VBAT\_3V8 = (R0503 / R0504 + 1) \times 1.24 \approx 3.8\ V$

DC_5V
C0505 470uF
C0508 100nF
R0502 51K
U0501 LDO
IN OUT EN ADJ GND1 GND2
R0503 100K +/-1%
C0506 470uF
C0507 100nF
R0505 330R
VBAT_3V8
R0504 47K +/-1%
[4,6] VBAT_EN
Q0501 DTC043ZEBTL

NOTE:

The recommended load current should be greater than 10 mA.

Power Supply for UART Interface

$VDD\_1V8 = (R0515 / R0516 + 1) \times 1.207 \approx 1.8\ V$

DC_5V
C0519 100nF
C0520 1uF
R0513 0R
R0514 100K
U0504
IN OUT EN FB GND
SGM2019-ADJYN5G/TR
R0515 39K +/-1%
C0521 4.7uF
C0522 100nF
C0523 33pF
VDD_1V8
R0516 75K +/-1%
[4,6] VDD_1.8V_EN

Power Supply for GNSS Antenna

$GNSS\_VDD = (R0519 / R0518 + 1) \times 1.207 \approx 3.0\ V$

DC_5V
C0530 1uF 16V
C0532 100nF 50V
R0520 100K
U0502
IN OUT EN FB GND
SGM2019-ADJYN5G/TR
R0519 63.4K +/-1%
R0518 42.2K +/-1%
C0531 4.7uF 10V
C0529 100nF 16V
C0528 33pF 50V
GNSS_VDD
[4,6] ANTENNA_EN

VBAT Design

R0517 0R
VBAT_3V8
R0501 0R
VBAT_RF
VBAT_BB
D0501 TVS
C0501 100uF
C0502 100nF
C0503 33pF
C0504 10pF
D0502 TVS
C0524 100uF
C0525 100nF
C0526 33pF
C0527 10pF
Close to VBAT pins

NOTE:

1. It is recommended to provide 1.5 A current to the module.

2. The width of VBAT_BB and VBAT_RF traces should not be less than 1 mm and 2 mm respectively.
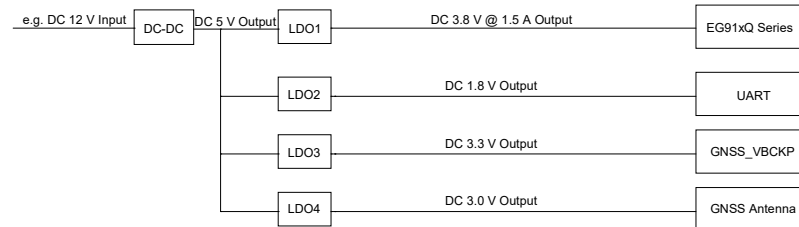
3. The typical operating voltage of VBAT is 3.8 V.

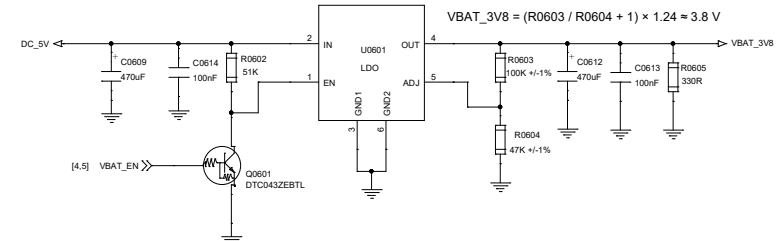# Power Supply Design (Stand-alone Solution)

DC-DC Application

When the input voltage is above 7.0 V, use a DC-DC converter to convert the high input voltage to 5.0 V,

and then use LDOs to convert it to 3.8 V,1.8 V,3.3 V and 3.0 V to power the module, UART interfaces, GNSS_VBCKP and GNSS Antenna.
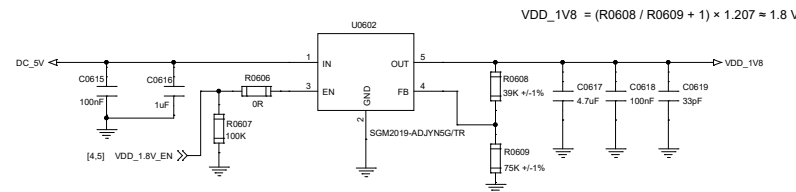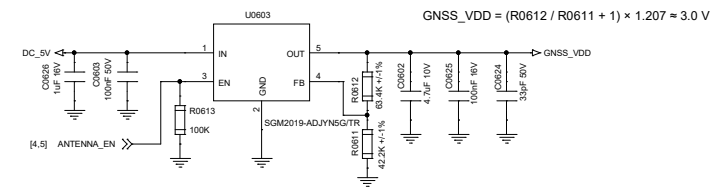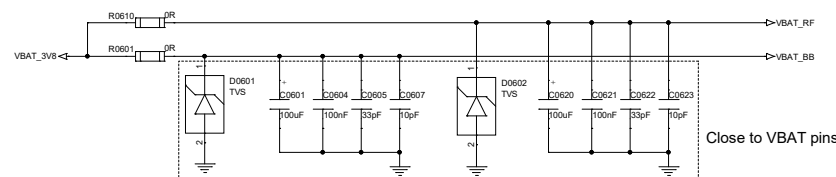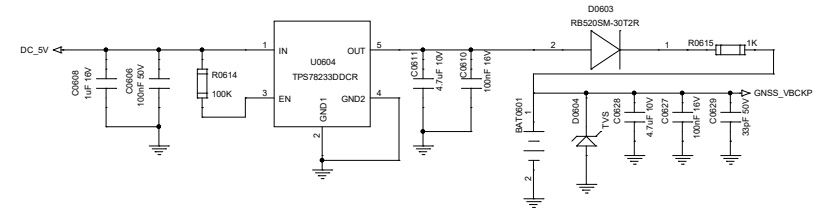
e.g. DC 12 V Input — DC-DC — DC 5 V Output

- LDO1 → DC 3.8 V @ 1.5 A Output → EG91xQ Series
- LDO2 → DC 1.8 V Output → UART
- LDO3 → DC 3.3 V Output → GNSS_VBCKP
- LDO4 → DC 3.0 V Output → GNSS Antenna

LDO Application

When the input voltage is below 7.0 V, use an LDO to convert the input voltage to 3.8 V.

$$VBAT\_3V8 = (R0603 / R0604 + 1) \times 1.24 \approx 3.8\ V$$

DC_5V, C0609 470uF, C0614 100nF, R0602 51K, U0601 LDO (IN, EN, OUT, ADJ, GND1, GND2), R0603 100K +/-1%, C0612 470uF, C0613 100nF, R0605 330R → VBAT_3V8

R0604 47K +/-1%

[4,5] VBAT_EN — Q0601 DTC043ZEBTL

NOTE:
The recommended load current should be greater than 10 mA.

Power Supply for UART Interface

$$VDD\_1V8 = (R0608 / R0609 + 1) \times 1.207 \approx 1.8\ V$$

DC_5V, C0615 100nF, C0616 1uF, R0606 0R, U0602 (IN, EN, OUT, GND, FB) SGM2019-ADJYN5G/TR, R0607 100K, R0608 39K +/-1%, C0617 4.7uF, C0618 100nF, C0619 33pF → VDD_1V8

R0609 75K +/-1%

[4,5] VDD_1.8V_EN

Power Supply for GNSS Antenna

$$GNSS\_VDD = (R0612 / R0611 + 1) \times 1.207 \approx 3.0\ V$$

DC_5V, C0626 1uF 16V, C0603 100nF 50V, U0603 (IN, EN, OUT, GND, FB) SGM2019-ADJYN5G/TR, R0613 100K, R0612 83.4K +/-1%, R0611 42.2K +/-1%, C0602 4.7uF 10V, C0625 100nF 16V, C0624 33pF 50V → GNSS_VDD

[4,5] ANTENNA_EN

VBAT Design

R0610 0R → VBAT_RF
VBAT_3V8 — R0601 0R → VBAT_BB

D0601 TVS, C0601 100uF, C0604 100nF, C0605 33pF, C0607 10pF, D0602 TVS, C0620 100uF, C0621 100nF, C0622 33pF, C0623 10pF

Close to VBAT pins

NOTE:

1. It is recommended to provide 1.5 A current to the module.
2. The width of VBAT_BB and VBAT_RF traces should be not less than 1 mm and 2 mm respectively.
3. The typical operating voltage of VBAT is 3.8 V.

Power Supply for GNSS_VBCKP

DC_5V, C0608 1uF 16V, C0606 100nF 50V, R0614 100K, U0604 TPS78233DDCR (IN, EN, OUT, GND1, GND2), C0611 4.7uF 10V, C0610 100nF 16V, D0603 RB520SM-30T2R, R0615 1K → GNSS_VBCKP

BAT0601, D0604 TVS, C0628 4.7uF 10V, C0827 100nF 16V, C0629 33pF 50V

NOTE:

1. The rechargeable battery (BAT0601) is optional.
2. Since GNSS_VBCKP requires continuous power supply, it is recommended to use an LDO with small quiescent current. For example, TPS78233DDCR.
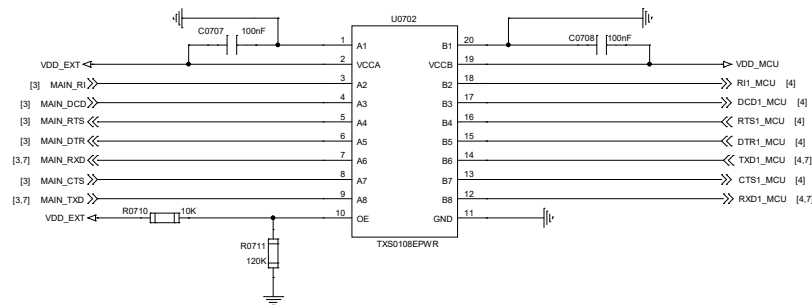3. GNSS_VBCKP must be powered before or simultaneously with the GNSS_PWR_EN.

UARTs and USIM Interface Design

UART Level-shifting Circuit - Transistor Solution
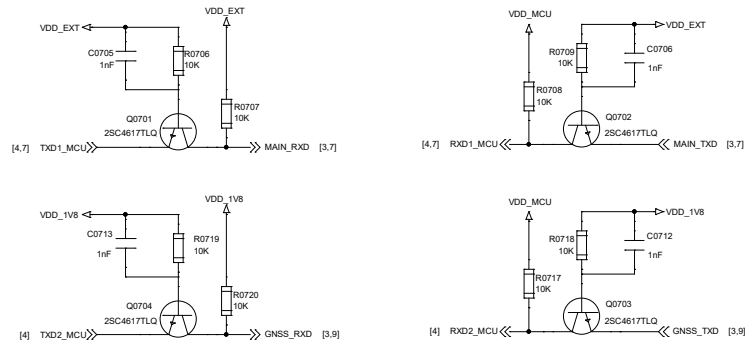

UART Level-shifting Circuit - IC Solution

NOTE:

1. There are two level-shifting solutions: transistor solution and IC solution, and it is recommended to select the latter one.

2. The power supply of TXS0108EPWR's VCCA should not exceed that of VCCB. For more information, see the datasheet of TXS0108EPWR.

3. The transistor solution is not suitable for applications with baud rates exceeding 460 kbps.

   The 1 nF capacitors can improve the signal quality.

4. The level-shifting circuit of MAIN_RTS is similar to that of MAIN_RXD.

   The level-shifting circuits of MAIN_CTS, MAIN_RI and MAIN_DCD are similar to that of MAIN_TXD.

5. To increase the stability of UART communication, it is recommended to add UART hardware flow control design.

## USIM Interface Design
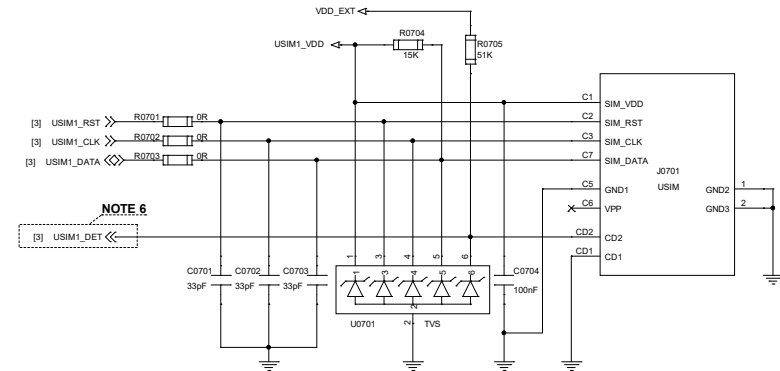
NOTE:
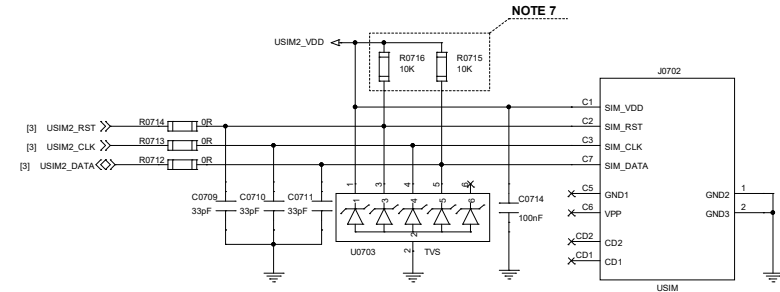
1. When USIM1 and USIM2 are used at the same time, the power domain of USIM interfaces should be 1.8 V. Otherwise, USIM2 interface will be damaged.

2. U0701 and U0703 is recommended to be used to offer good ESD protection, and the parasitic capacitance should be less than 15 pF.

3. The pull-up resistor R0704, R0715 and R0716 can improve anti-jamming capability, and should be placed close to the USIM card connector.

4. The capacitance of C0704 and C0714 should be less than 1 μF and it should be placed close to the USIM card connector.

5. R0701–R0703, R0712–R0714 are used for debugging, and C0701–C0703, C0709–C0711 are used for filtering out RF interference.

6. Only USIM1 supports hot-plug detection.

7. When only USIM1 interface is used, please make sure that these two 10K resistors are not mounted. Otherwise, USIM2 interface may be damaged.

8. USIM2 and Camera SPI interfaces cannot be used at the same time.

# Antenna Interface Design

LTE/Wi-Fi Scan Antenna Interface
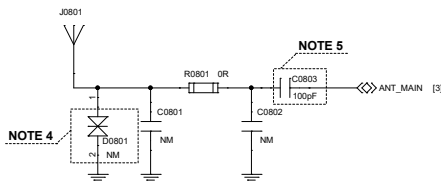
NOTE:

1. The single-ended impedance of the RF antenna is 50 Ω.

2. It is highly recommended to reserve a dual L-type matching circuit for main antenna for future debugging.

3. The impedance of RF signal traces must be controlled as 50 Ω when routing.

4. It is recommended to reserve an ESD protection component for the cellular antenna interface and the junction capacitance should not exceed 0.05 pF.

5. If there is DC power at the antenna ports, C0803 must be used for DC-blocking to prevent short circuit to ground. The capacitance value is recommended to be 100 pF, which can be adjusted according to actual requirements. If there is no DC power in the peripheral design, C0803 should not be reserved.
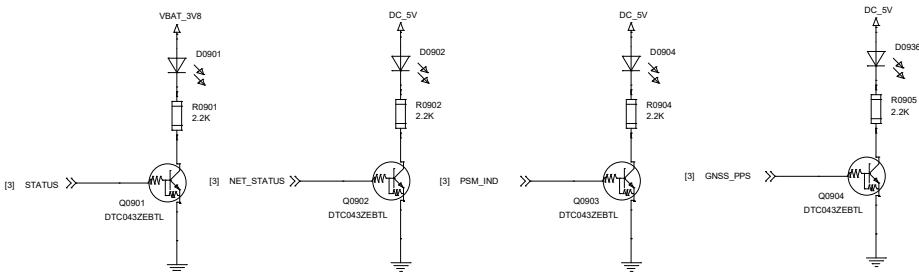
GNSS Antenna Interface
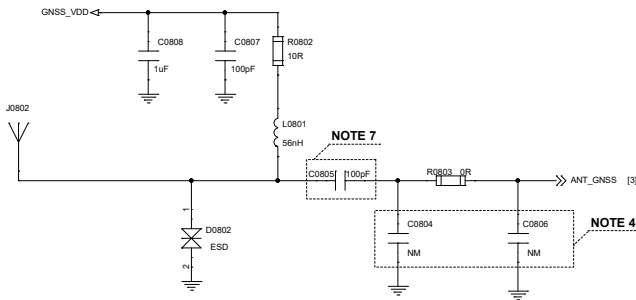
NOTE:

1. An external LDO can be selected according to the active antenna requirement.

2. If passive antenna is used, then C0808, C0807,R0802 and L0801 are not mounted.

3. The impedance of RF signal traces must be controlled as 50 Ω when routing.

4. C0804 and C0806 are reserved for impedance matching and attenuation circuits.

5. The module's GNSS function is optional.

6. It is recommended to reserve an ESD protection component for the antenna interface and the junction capacitance should not exceed 0.05 pF.

7. For passive antenna, if there is DC power at the antenna ports, C0805 must be used for DC-blocking to prevent short circuit to ground. The capacitance value is recommended to be 100 pF, which can be adjusted according to actual requirements. If there is no DC power in the peripheral design, C0805 should not be reserved.

Other Designs

Indicators

VBAT_3V8

D0901
R0901
2.2K
[3] STATUS
Q0901
DTC043ZEBTL

DC_5V

D0902
R0902
2.2K
[3] NET_STATUS
Q0902
DTC043ZEBTL

DC_5V

D0904
R0904
2.2K
[3] PSM_IND
Q0903
DTC043ZEBTL

DC_5V

D0936
R0905
2.2K
[3] GNSS_PPS
Q0904
DTC043ZEBTL

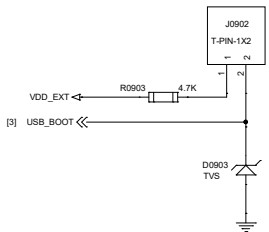**NOTE:**

If your device has low power consumption requirements in sleep mode, replace the power supplies (VBAT_3V8 and DC_5V) of

STATUS, NET_STATUS, PSM_IND and GNSS_PPS with external controllable ones. Turn off the power when the module is in
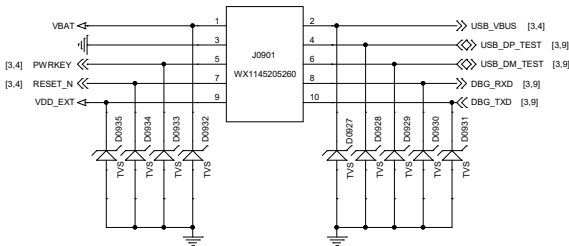
sleep mode to reduce the power consumption.

Download Interface

J0902
T-PIN-1X2
1 2
VDD_EXT
R0903   4.7K
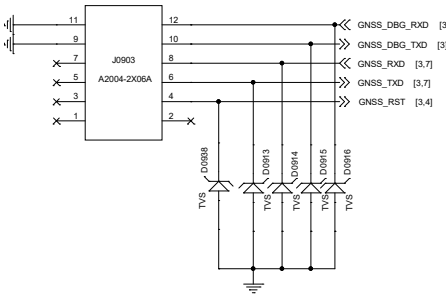[3] USB_BOOT
D0903
TVS

NOTE:

1. A test point for USB_BOOT must be reserved.

2. Pulling up USB_BOOT to VDD_EXT before turning on the module, and then the module will enter forced download mode,

   in which the module supports firmware upgrade over USB 2.0 interface.

Reserved Test Points

VBAT   1   2   USB_VBUS   [3,4]
3   4   USB_DP_TEST   [3,9]
[3,4] PWRKEY   5   6   USB_DM_TEST   [3,9]
[3,4] RESET_N   7   8   DBG_RXD   [3,9]
VDD_EXT   9   10   DBG_TXD   [3,9]
J0901
WX1145205260
D0935 D0934 D0933 D0932
TVS TVS TVS TVS
D0927 D0928 D0929 D0930 D0931
TVS TVS TVS TVS TVS

11   12   GNSS_DBG_RXD   [3]
9   10   GNSS_DBG_TXD   [3]
7   8   GNSS_RXD   [3,7]
5   6   GNSS_TXD   [3,7]
3   4   GNSS_RST   [3,4]
1   2
J0903
A2004-2X06A
D0938
TVS
D0913 D0914 D0915 D0916
TVS TVS TVS TVS

NOTE:

1. Test points of USB_VBUS, USB_DP/DM, debug UART, GNSS debug UART and USB_BOOT must be reserved.

   Test points of VBAT_BB, VBAT_RF, VDD_EXT, PWRKEY, GNSS UART and GNSS_RST are recommended to be reserved.

   A test point of RESET_N is recommended to be reserved if unused.

2. Test points of debug UART interfaces are reserved for the output of partial logs.

3. Test points of USB interface are used for firmware upgrading, debugging and output of partial logs.

4. The stray capacitance of the ESD protection components on USB data traces should be less than 2 pF for USB 2.0.

5. The debug UART interface supports 1.8 V power domain, and a level-shifting circuit should be used if the power domain of your application is 3.3 V.

6. Whether in Stand-alone or All-in-one solution, to facilitate GNSS firmware upgrade, it is recommended to reserve test points for GNSS UART (pins 27 and 28) and GNSS_RST (pin 112).