UG95&M95

Compatible Design

UMTS/HSPA Module Series

Rev. UG95&M95_Compatible_Design_V1.0

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About the Document

History

Revision	Date	Author	Description
1.0	2013-03-20	Huik LI	Initial

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1 Introduction

UG95 module is compatible with M95 module. This document briefly describes the compatible design of UG95 and M95. UG95 and M95 can be substituted with each other in your design and manufacturing.

2 General Descriptions

2.1. Product Description

The M95 is a Quad-band GSM/GPRS module which works at frequencies of GSM850, EGSM900, DCS1800 and PCS1900. The UG95 is an UMTS/HSPA module that includes two series, UG95-A and UG95-E. The following table shows frequency bands of two modules. UG95 and M95 are designed as compatible products. You can choose the right module for your applications. Under the help of the compatible design guideline, you can migrate your products from M95 2G engine to UG95 3G module smoothly.

Table 1: Module Frequency Bands

Module	Frequency Bands
UG95-A	UMTS850/1900
UG95-E	GSM900/1800, UMTS900/2100
M95	GSM850/900/1800/1900

Table 2: Module General Information

Module	Appearance	Packaging	Dimensions	Description
UG95		102-pin LGA	19.9 x 23.6 x 2.3mm	UMTS/HSPA module (UG95-A and UG95-E)
M95		42-pin LCC	19.9 x 23.6 x 2.65mm	GSM/GPRS module

2.2. Pin Assignment

The following figure shows the pin assignment of UG95 and M95.

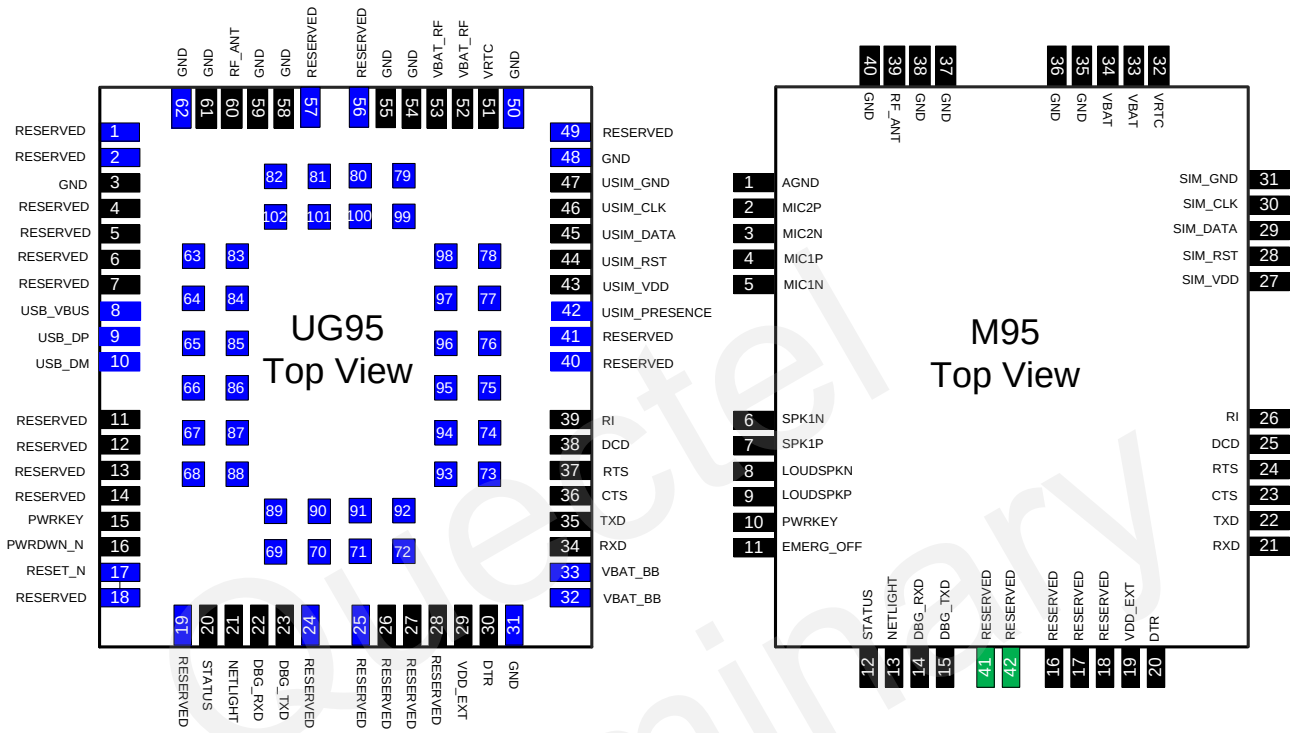

Figure 1: UG95&M95 Pin Assignment

NOTES

1， The blue pins of UG95 are the additional pins compared with M95.
2， The green pins are reserved pins of M95.

Figure 2 shows the combination of pin assignment for UG95 and M95.

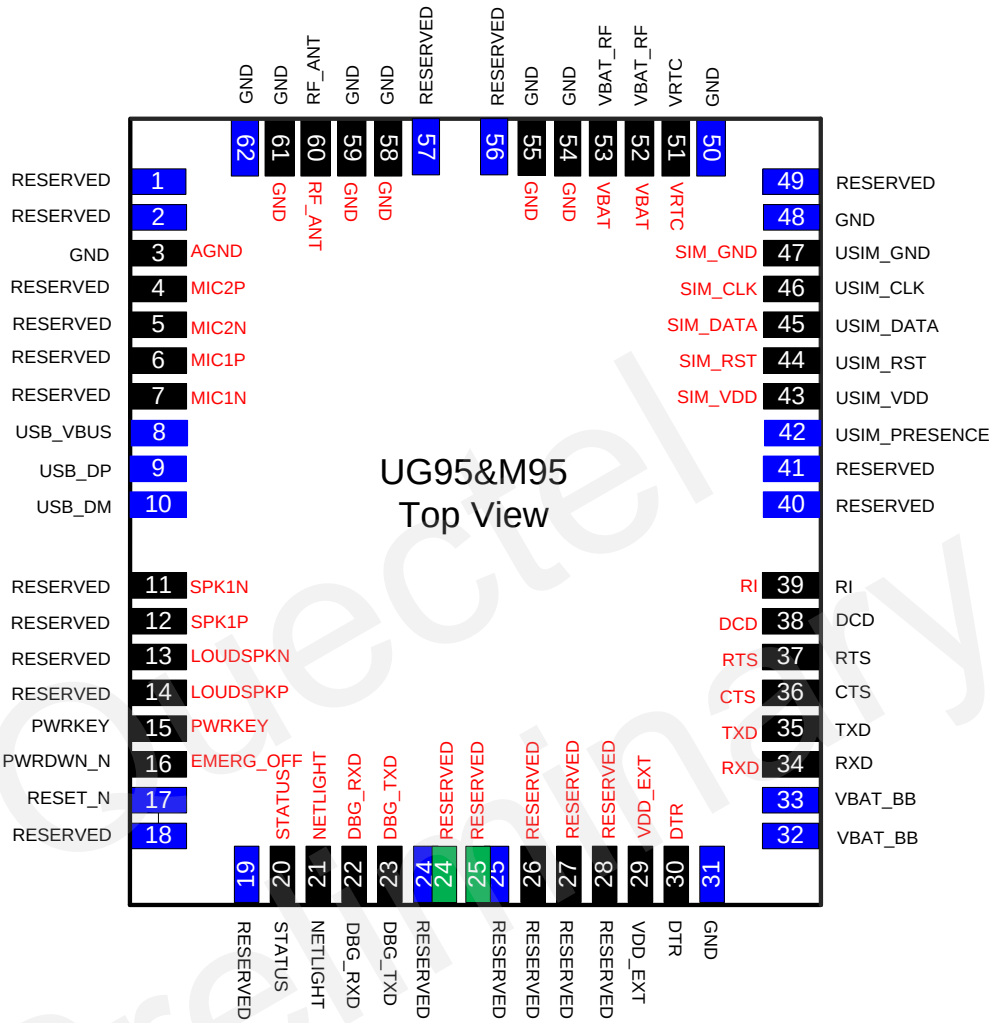

Figure 2: Combined Pin Assignment of UG95&M95

NOTES

1. The blue pins of UG95 are the additional pins compared with M95.
2. The pin names marked in red in the inside area are M95's.
3. UG95 and M95 are identical in size. The pins of UG95 and M95 are compatible on main functions.
4. The green pins are reserved pins of M95.

3 Pin Description

This chapter describes the pin definition and assignment of UG95 and M95.

Table 3: Parameters

Symbol	Description
IO	Bidirectional Input/Output
DI	Digital Input
DO	Digital Output
PI	Power Input
PO	Power Output
AI	Analog Input
AO	Analog Output

The following table shows the comparison of pins between UG95 and M95.

Table 4: Comparison of Pins

UG95				M95			
Pin No.	Pin Name	IO	Power Domain	Pin No.	Pin Name	IO	Power Domain
1	RESERVED	/	/	/	/	/	/
2	RESERVED	/	/	/	/	/	/
3	GND	/	Ground	1	AGND	/	Ground
4	RESERVED	/	/	2	MIC2P	AI	/
5	RESERVED	/	/	3	MIC2N	AI	/

6	RESERVED	/	/	4	MIC1P	AI	/
7	RESERVED	/	/	5	MIC1N	AI	/
8	USB_VBUS	PI	2.5~5.25V	/	/	/	/
9	USB_DP	IO	/	/	/	/	/
10	USB_DM	IO	/	/	/	/	/
11	RESERVED	/	/	6	SPK1N	AO	/
12	RESERVED	/	/	7	SPI1P	AO	/
13	RESERVED	/	/	8	LOUDSPKN	AO	/
14	RESERVED	/	/	9	LOUDSPKP	AO	/
15	PWRKEY	DI	1.8V	10	PWRKEY	DI	Pulled up to VBAT
16	PWRDWN_N	DI	1.8V	11	EMEROG_OFF	DI	OD
17	RESET_N	DI	1.8V	/	/	/	/
18	RESERVED	DI	1.8V	/	/	/	/
19	RESERVED	DI	1.8V	/	/	/	/
20	STATUS	DO	1.8V	12	STATUS	DO	2.8V
21	NETLIGHT	DO	1.8V	13	NETLIGHT	DO	2.8V
22	DBG_RXD	DI	1.8V	14	DBG_RXD	DI	2.8V
23	DBG_TXD	DO	1.8V	15	DBG_TXD	DO	2.8V
24	RESERVED	/	/	/	/	/	/
/	/	/	/	41	RESERVED	/	/
/	/	/	/	42	RESERVED	/	/
25	RESERVED	/	/	/	/	/	/
26	RESERVED	/	/	16	RESERVED	/	/
27	RESERVED	/	/	17	RESERVED	/	/
28	RESERVED	/	/	18	RESERVED	/	/
29	VDD_EXT	PO	1.8V	19	VDD_EXT	PO	2.8V

30	DTR	DI	1.8V	20	DTR	DI	2.8V
31	GND	/	Ground	/	/	/	/
32	VBAT_BB	PI	3.3~4.3V	/	/	/	/
33	VBAT_BB	PI	3.3~4.3V	/	/	/	/
34	RXD	DI	1.8V	21	RXD	DI	2.8V
35	TXD	DO	1.8V	22	TXD	DO	2.8V
36	CTS	DO	1.8V	23	CTS	DO	2.8V
37	RTS	DI	1.8V	24	RTS	DI	2.8V
38	DCD	DO	1.8V	25	DCD	DO	2.8V
39	RI	DO	1.8V	26	RI	DO	2.8V
40	RESERVED	/	/	/	/	/	/
41	RESERVED	/	/	/	/	/	/
42	USIM_PRESENCE	DI	1.8V	/	/	/	/
43	USIM_VDD	PO	1.8/3.0V	27	SIM_VDD	PO	1.8/3.0V
44	USIM_RST	DO	1.8/3.0V	28	SIM_RST	DO	1.8/3.0V
45	USIM_DATA	IO	1.8/3.0V	29	SIM_DATA	IO	1.8/3.0V
46	USIM_CLK	DO	1.8/3.0V	30	SIM_CLK	DO	1.8/3.0V
47	USIM_GND	/	Ground	31	SIM_GND	/	Ground
48	GND	/	Ground	/	/	/	/
49	RESERVED	/	/	/	/	/	/
50	GND	/	Ground	/	/	/	/
51	VRTC	IO	1.8V	32	VRTC	IO	1.5~3.3V
52	VBAT_RF	PI	3.3~4.3V	33	VBAT	PI	3.3~4.6V
53	VBAT_RF	PI	3.3~4.3V	34	VBAT	PI	3.3~4.6V
54	GND	/	Ground	35	GND	/	Ground
55	GND	/	Ground	36	GND	/	Ground

56	RESERVED	/	/	/	/	/	/
57	RESERVED	/	/	/	/	/	/
58	GND	/	Ground	37	GND	/	Ground
59	GND	/	Ground	38	GND	/	Ground
60	RF_ANT	/	/	39	RF_ANT	/	/
61	GND	/	Ground	40	GND	/	Ground
62	GND	/	Ground	/	/	/	/
63~66, 75~78, 83~88, 92~99	RESERVED	/	/	/	/	/	/
67~74, 79~82, 89~91, 100~102	GND	/	Ground	/	/	/	/

NOTES

1. The blue pins of UG95 are the additional pins compared with M95.
2. The pins marked in red are compatible pins, but their functions are different.
3. The green pins are reserved pins of M95.
4. Keep all reserved and unused pins unconnected.
5. All GND pins should be connected to ground.

4 Recommended Footprint

The following figure shows the recommended compatible footprint of UG95 and M95.

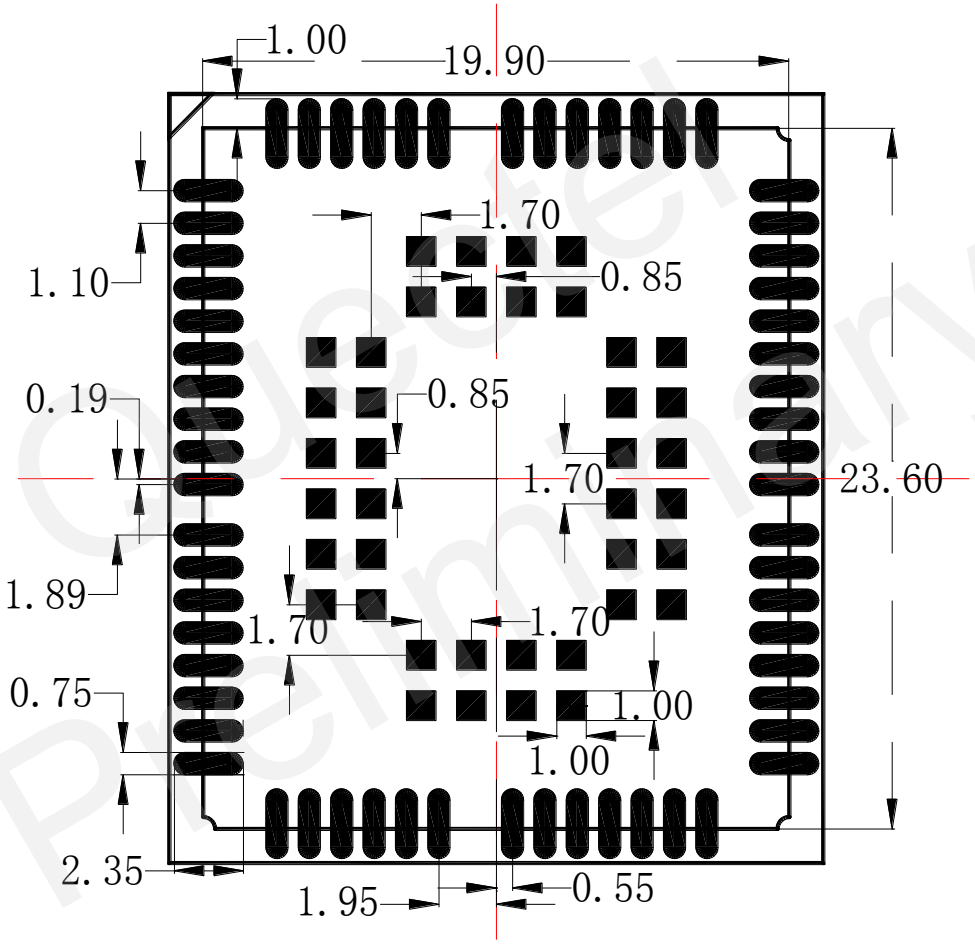

Figure 3: Recommended Footprint (Unit: mm)

The following figure shows the sketch map of installation between UG95 and M95.

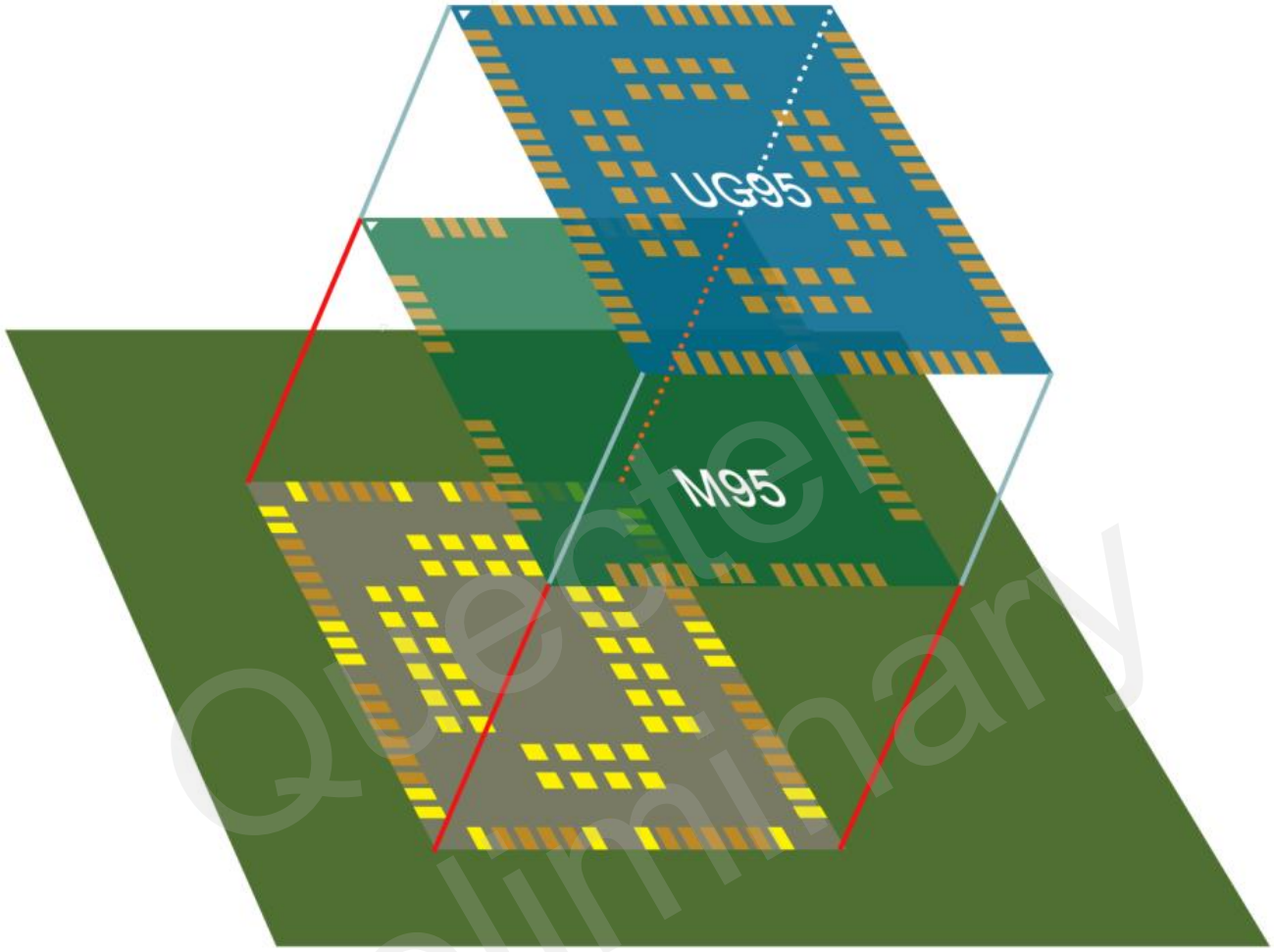

Figure 4: Renderings of Installation

5 Hardware Reference Design

The following chapters describe compatible design of UG95 and M95 on main functionalities.

5.1. Power on and off Circuit

The following circuit is a reference design for UG95 power-on circuit. M95 can also use this circuit for power-on and off.

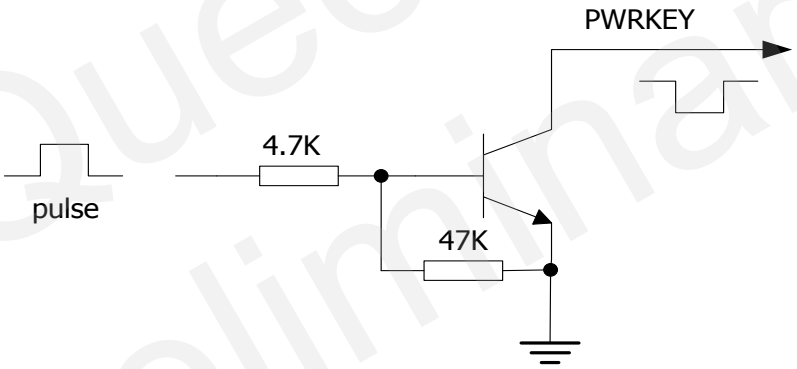

Figure 5: Driving Circuit of UG95 Power-on Circuit

The following circuit is a reference design for UG95 power-off.

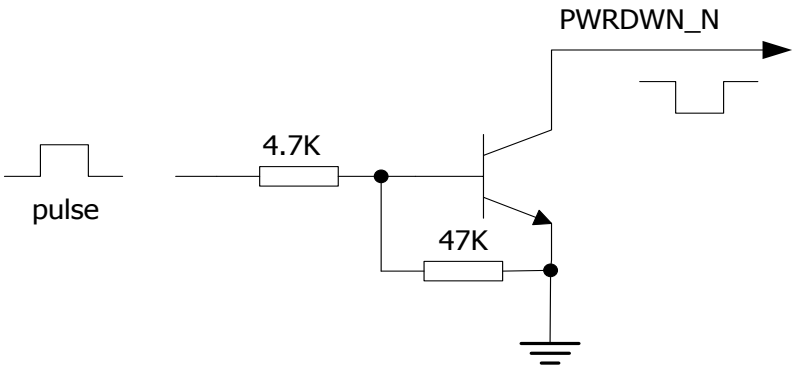

Figure 6: Driving Circuit of UG95 Power-off Circuit

5.2. Network Status Indication

The NETLIGHT pin can be used to drive a network status indicator LED. The following circuit is the reference design of NETLIGHT.

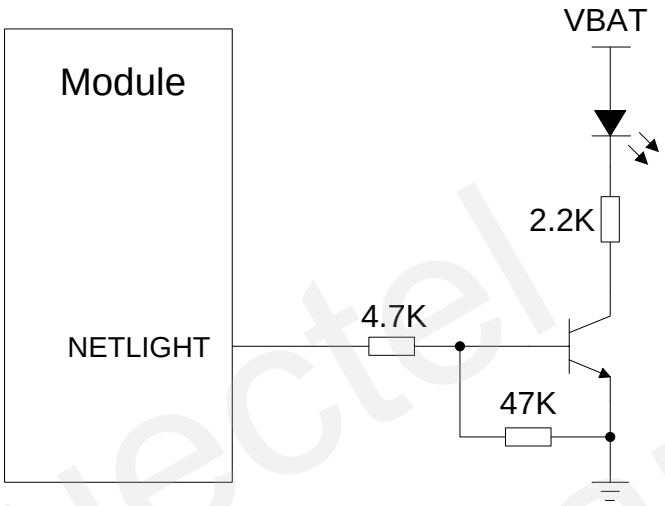

Figure 7: Reference Circuit of the NETLIGHT

5.3. Operating Status Indication

The STATUS pin is set as the module status indicator and can be used to judge whether the module is powered on or not. It will output high level when module works normally. The following figure shows the reference circuit of driving LED for STATUS.

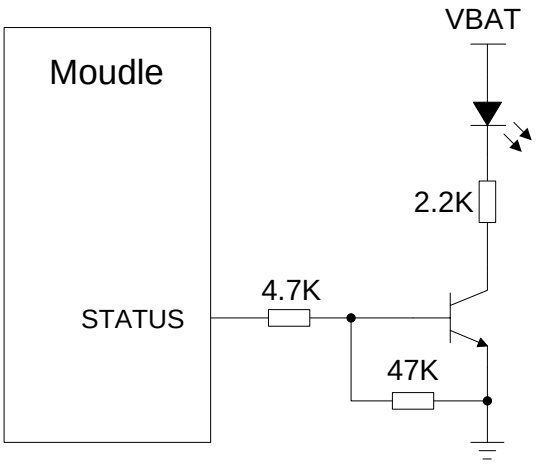

Figure 8: Reference Circuit of the STATUS

5.4. USIM Interface

USIM interface of UG95 and M95 supports 1.8V or 3.0V USIM/SIM cards by default. The following figure shows the USIM reference design with USIM card detection function.

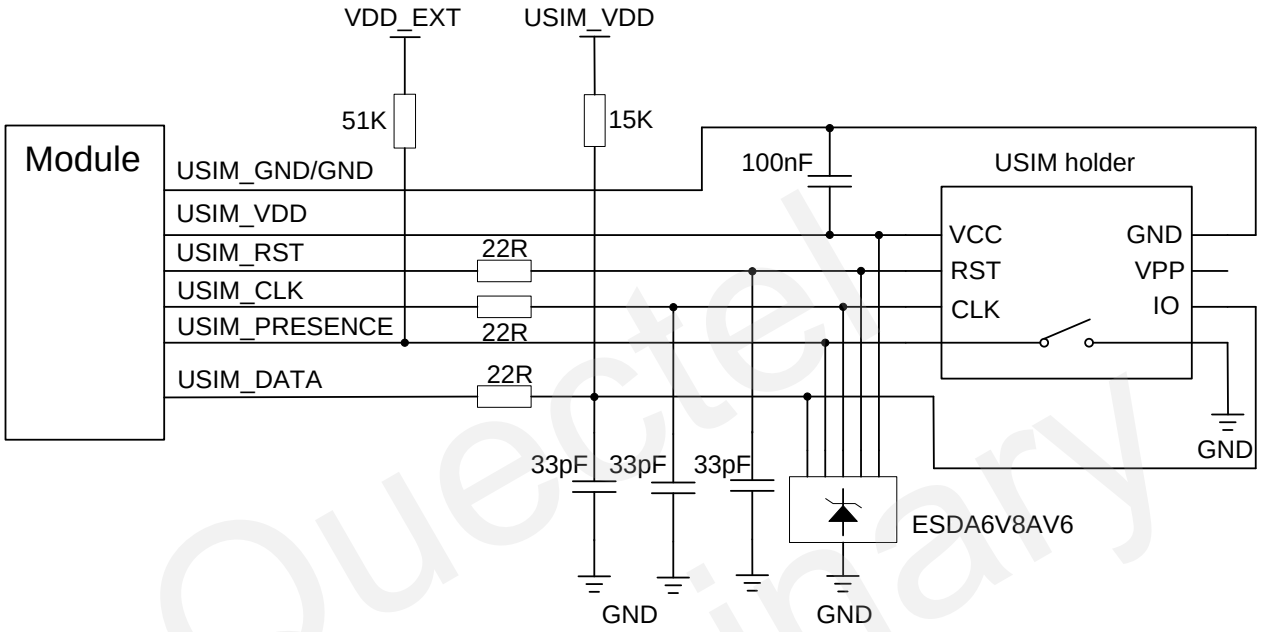

Figure 9: Reference Design of USIM Interface

5.5. UART Interface

Because of the different power domain of the UART interface, you need to add level match circuit between M95 or UG95 module and MCU.

The following circuit shows reference design of main UART interface level match.

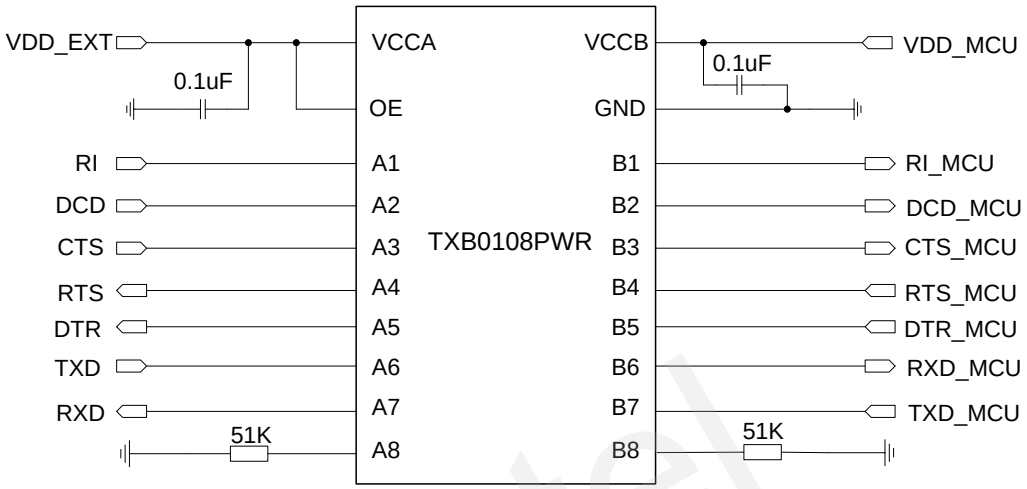

Figure 10: Reference Design of Main UART Interface

NOTES

1. M95's UART pins belong to 2.8V power domain.
2. UG95's UART pins belong to 1.8V power domain.

5.6. RF Interface

The RF interface has an impedance of 50Ω. A reference circuit is shown in the following figure. In order to adjust RF performance, it should reserve a π-type matching circuit. By default, the resistance of R1 is 0Ω and capacitors C1 and C2 are not mounted.

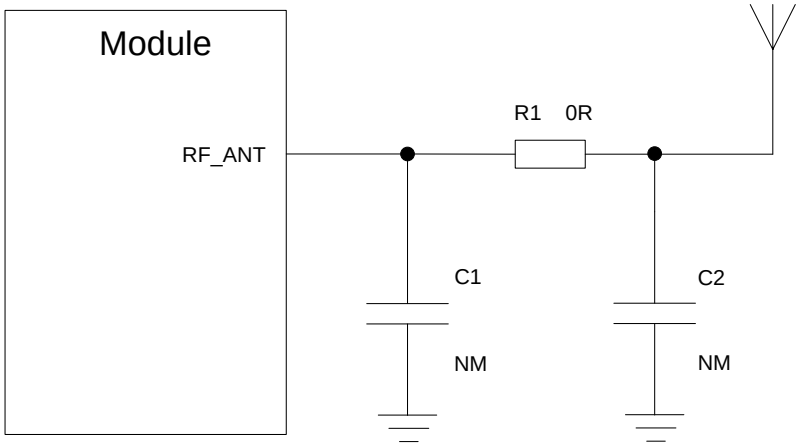

Figure 11: Reference Circuit of RF Interface

5.7. Power Supply

The power supply range of the M95 module is 3.3V to 4.6V and the power supply range of the UG95 is 3.3V to 4.3V. Attention should be paid in the range of the power source to make sure that the input voltage will never drop below 3.3V and never exceed 4.3V, and the typical power supply of UG95 is 3.8V. The following figure shows a reference design for +5V input power source. The designed output for the power supply is 3.88V and the maximum load current is 3A. The VBAT to UG95 VBAT_BB and VBAT_RF pins should be divided into two separated paths in star structure. It is also applicable to M95. In addition, in order to get a stable output voltage, it is suggested to use a zener diode whose reverse zener voltage is 5.1V and dissipation power is more than 0.5 watt.

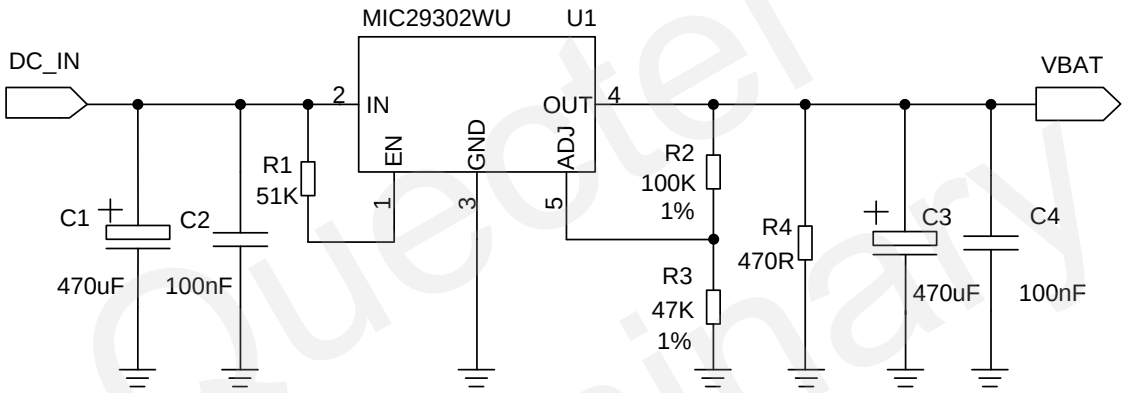

Figure 12: Reference Circuit of Power Supply

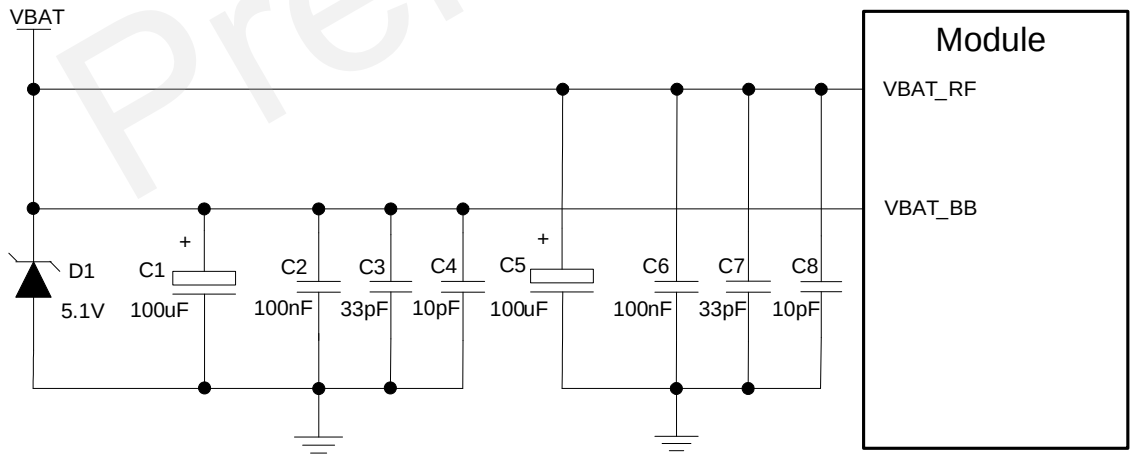

Figure 13: Reference Circuit of Star Structure

6 Appendix A

Table 5: Related Documents

SN	Document Name	Remark
[1]	UG95_Hardware_Design	UG95 Hardware Design
[2]	M95_Hardware_Design	M95 Hardware Design
[3]	UG95&M95_Reference_Design	UG95 and M95 Compatible Reference Design