

UC15&EC20

Comparison Document

UMTS/LTE Module Series

Rev. UC15&EC20_Comparison_Document_V1.0

Date: 2015-07-21



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About the Document

History

Revision	Date	Author	Description
1.0	2015-07-21	Winter Chen	draft

Contents

About the Document.....	2
Contents	3
Table Index.....	4
Figure Index	5
1 Introduction	6
2 General Descriptions.....	7
2.1. Product Description	7
2.2. Pin Assignment.....	8
3 Pin Description.....	9
3.1. Common Pins	9
3.2. Different Functional Pins	12
4 Hardware Reference Design	14
4.1. RESET Circuit	14
4.2. Operating Status Indication.....	15
4.3. UART Interface	16
4.4. ADC Interface	17
5 Appendix A	19

Table Index

TABLE 1: MODULE FREQUENCY BANDS.....	7
TABLE 2: MODULE GENERAL INFORMATION.....	8
TABLE 3: PARAMETERS.....	9
TABLE 4: COMMON PINS.....	9
TABLE 5: DIFFERENT FUNCTIONAL PINS.....	12
TABLE 6: ADC VOLTAGE RANGE.....	18
TABLE 7: RELATED DOCUMENTS.....	19

Figure Index

FIGURE 1: UC15&EC20 PIN ASSIGNMENT	8
FIGURE 2: DRIVING CIRCUIT OF RESETTING THE MODULE	14
FIGURE 3: TIMING OF RESETTING UC15	15
FIGURE 4: TIMING OF RESETTING EC20	15
FIGURE 5: REFERENCE CIRCUIT OF THE STATUS.....	15
FIGURE 6: REFERENCE DESIGN OF UART INTERFACE.....	16
FIGURE 7: REFERENCE CIRCUIT WITH TRANSISTOR CIRCUIT	17
FIGURE 8: 3.3V LEVEL MATCH CIRCUIT FOR UC15.....	17

1 Introduction

This document briefly describes the differences between UC15 and EC20. This document can help you quickly understand module interface specifications, electrical, mechanical details and related product information.

2 General Descriptions

2.1. Product Description

Both EC20 and UC15 modules have some serial products. The following tables show the frequency bands and module general information.

Table 1: Module Frequency Bands

Module	LTE-FDD	LTE-TDD	WCDMA	TD-SCDMA	GSM	GNSS
EC20-A	B2/B4/B5/ B12/B17		B2/B4/B5		850/1900	GPS+ GLONASS
EC20-C	B1/B3/B8	B38/B39/ B40/B41	B1/B8	B34/B39	900/1800	GPS+ GLONASS
EC20-E	B1/B3/B5/B7/ B8/B20		B1/B5/B8		850/900 /1800/1900	GPS+ GLONASS
UC15-A			B2/B5		850/900 /1800/1900	
UC15-E			B1/B8		900/1800	
UC15-T			B1/B5		850/900 /1800/1900	

Table 2: Module General Information

Module Name	Appearance	Packaging	Dimensions	Description
UC15		68-pin LCC+40 other pads	29 x 29 x 2.5mm	UMTS/HSDPA module (UC15-A, UC15-E and UC15-T)
EC20		76 LCC pads + 64 LGA pads	29 x 32 x 2.4mm	LTE module (EC20-A, EC20-C and EC20-E)

2.2. Pin Assignment

The following figure shows the pin assignment of UC15 and EC20.

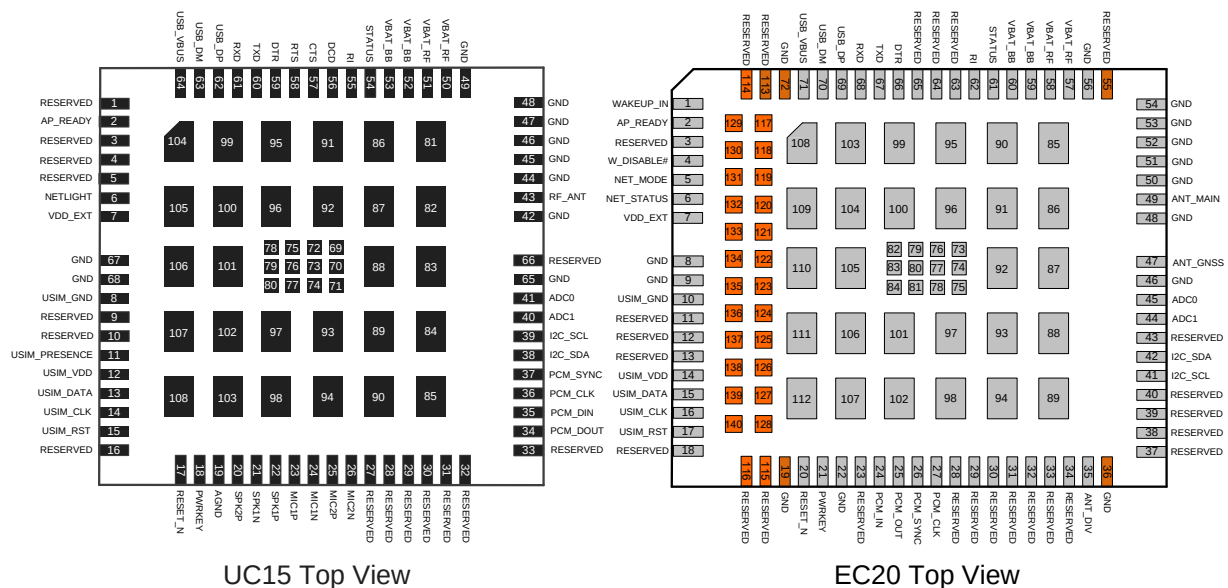


Figure 1: UC15&EC20 Pin Assignment

NOTE

- The orange pins of EC20 are the additional pins compared with UC15.
- EC20 PCB package is not compatible with UC15.

3 Pin Description

This chapter describes the pin definition and assignment of UC15 and EC20.

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
OD	Open Drain

3.1. Common Pins

The following table shows common pins with the same function of UC15 and EC20.

Table 4: Common Pins

UC15				EC20			
Pin NO.	Pin Name	IO	Power Domain	Pin NO.	Pin Name	IO	Power Domain
2	AP_READY	DI	2.6V	2	AP_READY	DI	1.8V
3	RESERVED	-	-	3	RESERVED	-	-

6	NETLIGHT	DO	2.6V	6	NET_STATUS	OD ⁴⁾	1.8V
7	VDD_EXT	PO	2.6V	7	VDD_EXT	PO	1.8V
67	GND	-	Ground	8	GND	-	Ground
68	GND	-	Ground	9	GND	-	Ground
8	USIM_GND	-	Ground	10	USIM_GND	-	Ground
9	RESERVED	-	-	11	RESERVED	-	-
10	RESERVED	-	-	12	RESERVED	-	-
12	USIM_VDD	PO	1.8/3.0V	14	USIM_VDD	PO	1.8/3.0V
13	USIM_DATA	IO	1.8/3.0V	15	USIM_DATA	IO	1.8/3.0V
14	USIM_CLK	DO	1.8/3.0V	16	USIM_CLK	DO	1.8/3.0V
15	USIM_RST	DO	1.8/3.0V	17	USIM_RST	DO	1.8/3.0V
16	RESERVED	-	-	18	RESERVED	-	-
17	RESET_N	DI	1.8V	20	RESET_N	DI	1.8V
18	PWRKEY	DI	1.8V	21	PWRKEY	DI	1.8V
19	AGND	-	Ground	22	GND	-	Ground
27	RESERVED	-	-	30	RESERVED	-	-
28	RESERVED	-	-	31	RESERVED	-	-
29	RESERVED	-	-	32	RESERVED	-	-
30	RESERVED	-	-	33	RESERVED	-	-
31	RESERVED	-	-	34	RESERVED	-	-
33	RESERVED	-	-	37	RESERVED	-	-
40	ADC1	AI	0~2.1V	44	ADC1	AI	0.3V~VBAT_BB
41	ADC0	AI	0~2.1V	45	ADC0	AI	0.3V~VBAT_BB ⁵⁾
65	GND	-	Ground	46	GND	-	Ground
42	GND	-	Ground	48	GND	-	Ground
43	RF_ANT	IO	-	49	ANT_MAIN	IO	-
44	GND	-	Ground	50	GND	-	Ground

45	GND	-	Ground	51	GND	-	Ground
46	GND	-	Ground	52	GND	-	Ground
47	GND	-	Ground	53	GND	-	Ground
48	GND	-	Ground	54	GND	-	Ground
49	GND	-	Ground	56	GND	-	Ground
50	VBAT_RF	PI	3.3~4.3V	57	VBAT_RF	PI	3.3~4.3V
51	VBAT_RF	PI	3.3~4.3V	58	VBAT_RF	PI	3.3~4.3V
52	VBAT_BB	PI	3.3~4.3V	59	VBAT_BB	PI	3.3~4.3V
53	VBAT_BB	PI	3.3~4.3V	60	VBAT_BB	PI	3.3~4.3V
54	STATUS	DO	2.6V	61	STATUS	OD	-
55	RI	DO	2.6V	62	RI	DO	1.8V
59	DTR	DI	2.6V	66	DTR	DO	1.8V
60	TXD	DO	2.6V	67	TXD	DI	1.8V
61	RXD	DI	2.6V	68	RXD	DI	1.8V
62	USB_DP	IO	-	69	USB_DP	IO	-
63	USB_DM	IO	-	70	USB_DM	IO	-
64	USB_VBUS	PI	Typ.5V	71	USB_VBUS	PI	Typ. 5V
69~ 80	RESERVED	-	-	73~ 84	RESERVED	-	-
81~ 108	GND	-	-	85~ 112	GND	-	Ground

NOTES

1. Keep all reserved and unused pins unconnected.
2. All GND pins should be connected to ground.
3. Please pay attention to the power domain between UC15 and EC20. GPIO pins of UC15 belong to 2.6V power domain. GPIO pins of EC20 belong to 1.8V power domain.
4. UC15's Status is a GPO pin, while EC20's Status is an open drain output.
5. Please pay attention to the differences of ADC power domain between UC15 and EC20.

3.2. Different Functional Pins

The following table shows the different functional pins of UC15 compared with EC20.

Table 5: Different Functional Pins

UC15				EC20			
Pin NO.	Pin Name	IO	Power Domain	Pin NO.	Pin Name	IO	Power Domain
1	RESERVED	-	-	1	WAKEUP_IN	DI	1.8V
4	RESERVED	-	-	4	W_DISABLE#	DI	1.8V
5	RESERVED	-	-	5	NET_MODE	DO	1.8V
11	USIM_PRESENCE	DI	2.6V	13	RESERVED	-	-
-	-	-	-	19	GND	-	-
20	SPK2P ⁵⁾	AO	-	23	RESERVED	-	-
21	SPK1N	AO	-	24	PCM_IN	DI	1.8V
22	SPK1P	AO	-	25	PCM_OUT	DO	1.8V
23	MIC1P	AI	-	26	PCM_SYNC	IO	1.8V
24	MIC1N	AI	-	27	PCM_CLK	IO	1.8V
25	MIC2P	AI	-	28	RESERVED	-	-
26	MIC2N	AI	-	29	RESERVED	-	-
32	RESERVED	-	-	35	ANT_DIV	AI	-
-	-	-	-	36	GND	-	-
34	PCM_DOUT	DO	2.6V	38	RESERVED	-	-
35	PCM_DIN	DI	2.6V	39	RESERVED	-	-
36	PCM_CLK	IO	2.6V	40	RESERVED	-	-
37	PCM_SYNC	IO	2.6V	41	I2C_SCL	OD	1.8V only
38	I2C_SDA	IO	2.6V	42	I2C_SDA	OD	1.8V only
39	I2C_SCL	DO	2.6V	43	RESERVED	-	-

66	RESERVED	-	-	47	ANT_GNSS	AI	
-	-	-	-	55	RESERVED	-	-
56	DCD	DO	2.6V	63	RESERVED	-	-
57	CTS	DO	2.6V	64	RESERVED	-	-
58	RTS	DI	2.6V	65	RESERVED ³⁾	-	-
-	-	-	-	72	GND	-	-
-	-	-	-	113	RESERVED	-	-
-	-	-	-	114	RESERVED	-	-

NOTES

1. Keep all reserved and unused pins unconnected..
2. All GND pins should be connected to ground.
3. EC20 does not support CTS/RTS/DCD pins currently.
4. For the hardware design of different functions between EC20 and UC15, please refer to EC20 Hardware Design and UC15 Hardware Design.
5. UC15 support both analog audio function and PCM function. EC20 only support PCM function.

4 Hardware Reference Design

The following chapters describe different design of UC15 and EC20 on main functionalities.

4.1. RESET Circuit

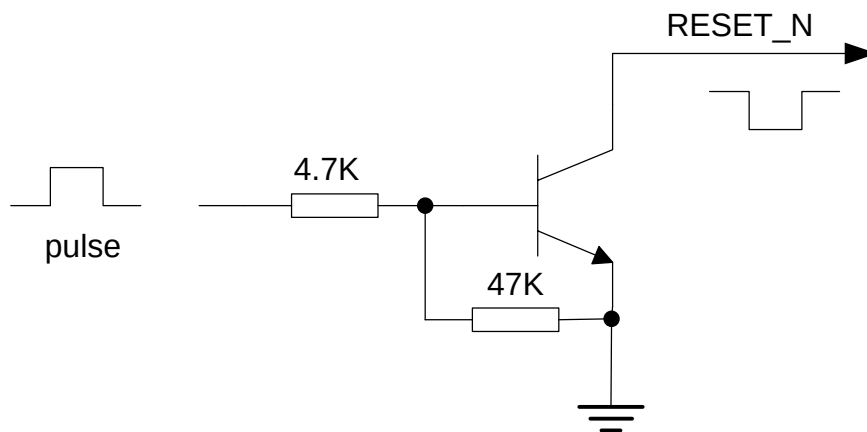


Figure 2: Driving Circuit of Resetting the Module

The reset scenario of UC15 is illustrated as the following figure.

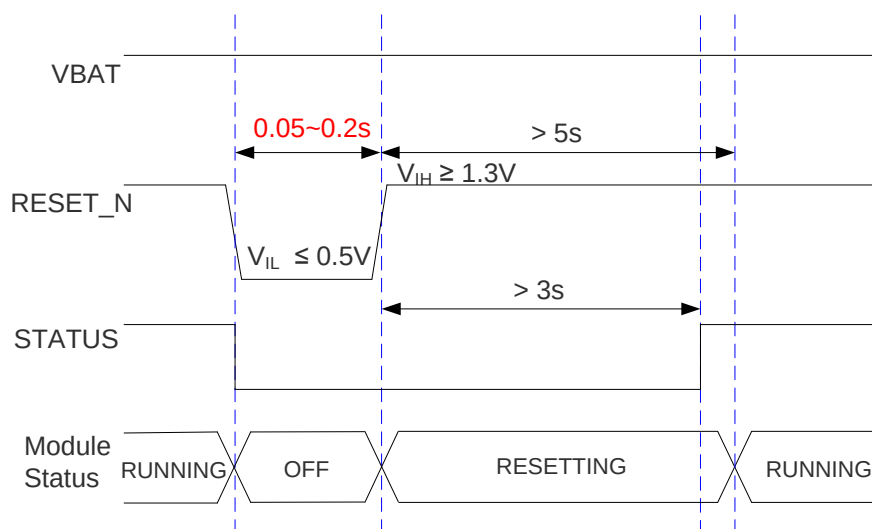


Figure 3: Timing of Resetting UC15

The reset scenario of EC20 is illustrated as the following figure.

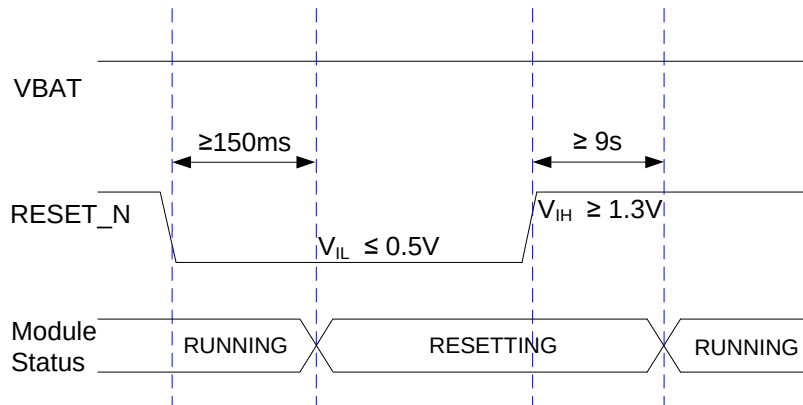


Figure 4: Timing of Resetting EC20

NOTE

As to UC15, the pulse time of reset must be between 50ms and 200ms, otherwise the module will be powered off.

4.2. Operating Status Indication

STATUS outputs high level after module is turned on successfully. UC15's STATUS is a GPO pin, while EC20's STATUS is an open-drain output. The following figures show the reference circuits of driving LED for UC15 and EC20 modules.

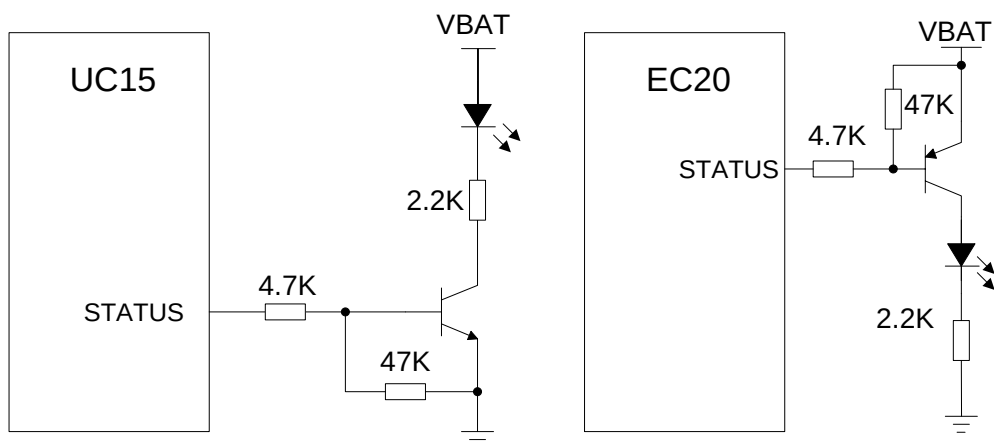


Figure 5: Reference Circuit of the STATUS

4.3. UART Interface

Because of the different power domain of the UART interface, you need to add level match circuit between UC15 or EC20 module and MCU.

Hardware flow control is not currently supported in EC20's UART, this interface of EC20 can be used for AT communication.

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

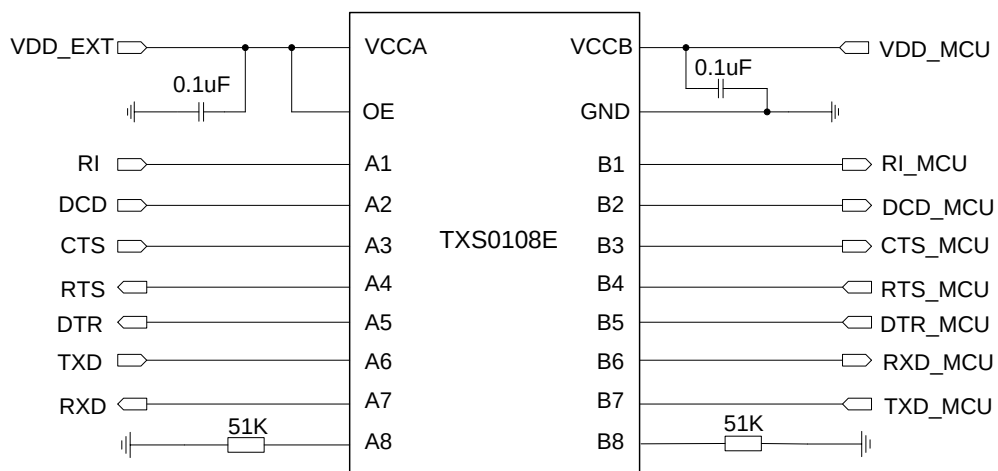


Figure 6: Reference Design of UART Interface

NOTES

1. UART pins of UC15 belong to 2.6V power domain.
2. UART pins of EC20 belong to 1.8V power domain.

Another example with transistor translation circuit is shown as below. The construction of dotted line can refer to the construction of solid line. Please pay attention to direction of connection. Input dotted line of module should refer to input solid line of the module. Output dotted line of module should refer to output solid line of the module.

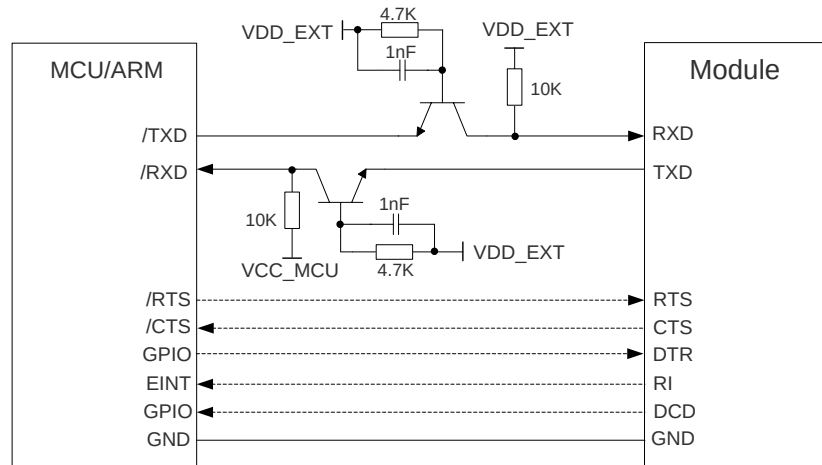


Figure 7: Reference Circuit with Transistor Circuit

The reference design of 3.3V level match for UC15 is shown as below. When the peripheral MCU/ARM system is 3V, the divider resistor should be changed from 3.6K to 6.8K.

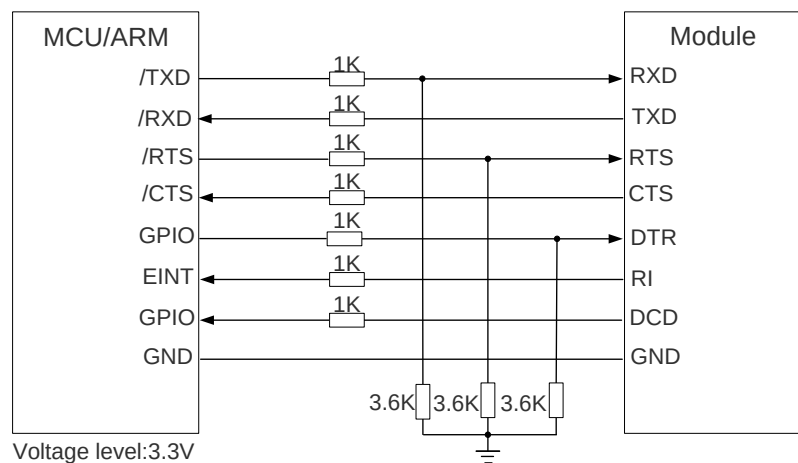


Figure 8: 3.3V Level Match Circuit for UC15

NOTES

This circuit is only applies to UC15. For EC20, please use level match circuit what was mentioned above.

4.4. ADC Interface

Both UC15 and EC20 have two ADC pins for general purpose analog-to-digital converter. UC15's ADC pins are compatible with EC20's. But there are some differences in their voltage range. The following

table shows the differences between UC15 and EC20.

Table 6: ADC Voltage Range

Channel	UC15	EC20
ADC0	0~2.1V	0.3~ VBAT_BB
ADC1	0~2.1V	0.3~ VBAT_BB

5 Appendix A

Table 7: Related Documents

SN	Document Name	Remark
[1]	UC15_Hardware_Design	UC15 Hardware Design
[2]	EC20_Hardware_Design	EC20 Hardware Design
[3]	UC15_Reference_Design	UC15 Reference Design
[4]	EC20_Reference_Design	EC20 Reference Design