



XS5G03/XS5G04 M.2 Module

Hardware Guide (Datasheet)

Issue 01.2

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About This Document

Revision History

Document Version	Date	Chapter	Descriptions
V01			V1.0 Initial release
V01.1	2022/8/29	7	Add FCC/NCC/CE statement. - 7.3 Federal Communication Commission Interference Statement - 7.4 Europe – EU Declaration of Conformity - 7.5 NCC Notice
V01.2	2022/9/15	7	Update FCC/NCC/CE statement. - 7.3 FCC Notice - 7.4 CE Notice

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1

Introduction

1.1 About This Chapter

This document describes the hardware application interfaces and air interfaces which developers need while developing product with XSquare XS5G03 and XS5G04 module.

Through this document, hardware engineers can understand the interface specifications, electrical features and related product information of the XSquare XS5G03 and XS5G04 module.

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2

Overall Description

2.1 About This Chapter

This chapter mainly describes the function and feature of the module, as well as the circuit blockdiagram and application block diagram with specific explanation, comprising parts including:

- Function Overview
- Specification
- Circuit Block Diagram
- Application Interface

2.2 Function Overview

Table 2-1 Features

Features	Description
Physical Dimensions	Dimensions (L × W × H): 52 mm × 30 mm × 2.4 mm (Max) Weight: 8.7g
Operating Conditions	
Voltage	3.135V ~3.63V, typical 3.3V
Operating Temperature	-30 ~ 70°C
Operating Humidity	less than 85% R.H.
Storage Temperature	-40 ~ 85°C
Storage Humidity	less than 60% R.H.
Extend Temperature	-30 ~ 80°C

 **NOTE**

- Thermal solutions are necessary to be put on module, so that module can work smoothly in operating temperature range. For example, thermal pad, heat sink, fan.

2.3 Specification

XS5G03 has two SKU products.

- XS5G03-GBO is standard version with GPS function.
- XS5G03-EUI is designed especially for Europe and Asian region. Removing part of NR/LTE/ WCDMA band support and GPS.

XS5G04 is special version with SA capability, and NSA is not supported.

The comparison of XS5G03 two SKU and XS5G04 are listed in Table 2-2

Table 2-2 XS5G03-GBO & XS5G03-EUI & XS5G04-GBO spec comparison

Model	XS5G03-GBO	XS5G03-EUI	XS5G04-GBO
5G NR	Standard	3GPP Release 15	3GPP Release 15
	SA Bands	n1/2/3/5/7/8/20/25/28/30/38/40/41/48/66/71/77/78/79	n1/3/5/7/8/20/28/38/40/41/77/78/79
	NSA Bands	n1/2/3/5/8/20/28/38/41/66/71/77/78/79	n1/3/5/8/20/28/38/41/77/78/79
	Sub-6 CA	FDD/TDD+FDD/TDD DL CA*	FDD/TDD+FDD/TDD DL CA*
	DL 4x4 MIMO	n1/2/3/7/25/30/38/40/41/48/66/77/78/79	n1/2/3/7/25/30/38/40/41/48/66/77/78/79
	UL 2x2 MIMO	n41/77/78/79	n41/77/78/79
4G LTE	LTE Category	Cat 12	Cat 12
	LTE Bands	B1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/29/30/32/34/38/39/40/41/42/43/46/48/66/71	B1/3/5/7/8/20/28/32/38/40/41/42/43
	DL CA	4x4 MIMO, 3CC	4x4 MIMO, 3CC
	UL CA	2CC	2CC
3G UMTS/ WCDMA	Bands	B1/2/4/5/8	B1/2/4/5/8
GPS	Standard	GPS/GLONASS/BeiDou/Galileo	-
	Frequency Band	L1	-
			GPS/GLONASS/BeiDou/Galileo
			L1

2.4 Circuit Block Diagram

The circuit block diagram is shown in Figure 2-1.

The major functional units are listed below:

- Power Management
- Baseband Controller
- MCP (4Gb LPDDR4X+4Gb Nand Flash)
- RF Circuit
- eSIM (option)

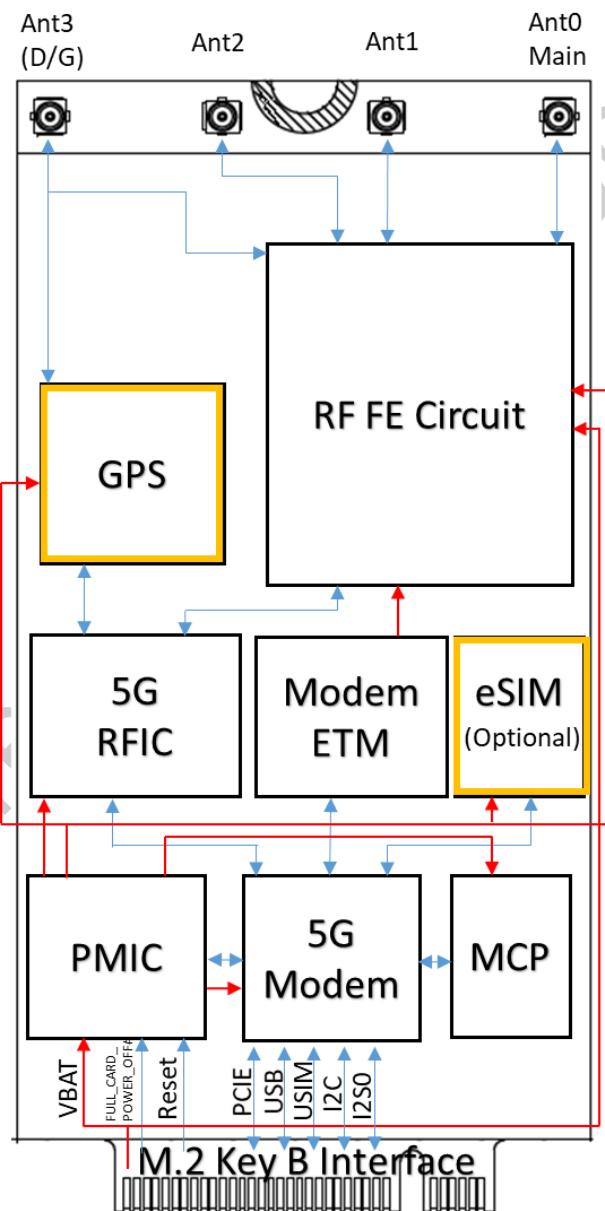


Figure 2-1 Circuit block diagram of the module

2.5 Application Interface

Table 2-3 Application Interface

Feature	Description
External Power Supply:	DC 3.3V Typical
PCIE Interface:	PCIE3.0 1L × 1
USB Interface:	USB3.1 Gen1 x 1, USB2.0 x 1
Audio Interface:	I2S x 1
I2C Interface:	I2C x 1
USIM Interface:	USIM x 1, eSIM x 1 (optional)
RF Ipxe4 connector:	RF Ipxe4 connector × 4

3

Description of the Application Interfaces

3.1 About This Chapter

This chapter mainly describes the external application interfaces of the module, including:

- M.2 Key B Interface
- Power Interface
- Control Signal Interface
- PCIE Interface
- USB Interface
- USIM Interface
- I2C Interface
- I2S Interface
- RF Interface
- Configuration Interface
- LED Signal

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3.2 M.2 Key B Interface

Pin No.	The XS5G03/XS5G04 M.2 module uses standard key B interface		Pin No.
74	+3.3V	CONFIG_2 (GND)	75
72	+3.3V	VIO_CFG	73
70	+3.3V	GND	71
68	NC	CONFIG_1 (GND)	69
66	SIM Detect (I) (1.8V)	RESET# (I) (1.8V)	67
64	COEX1 (IO) (1.8V)	ANTCTL3 (O) (1.8V)	65
62	COEX2 (IO) (1.8V)	ANTCTL2 (O) (1.8V)	63
60	COEX3 (IO) (1.8V)	ANTCTL1 (O) (1.8V)	61
58	MIPI2_D_SDATA (IO) (1.8V)	ANTCTL0 (O) (1.8V)	59
56	MIPI2_D_SCLK (O) (1.8V)	GND	57
54	PEWAKE# (IO) (3.3/1.8V)	REFCLKP	55
52	CLKREQ# (IO) (3.3/1.8V)	REFCLKN	53
50	PERST# (IO) (3.3/1.8V)	GND	51
48	NC	PERp0	49
46	NC	PERn0	47
44	I2C_IRQ# (I) (1.8V)	GND	45
42	I2C_SDA (IO) (1.8V)	PETp0	43
40	I2C_SCL (O) (1.8V)	PETn0	41
38	NC	GND	39
36	USIM1_PWR (O)	USB3.0_RX+	37
34	USIM1_DATA (IO)	USB3.0_RX-	35
32	USIM1_CLK (O)	GND	33
30	USIM1_RESET (O)	USB3.0_TX+	31
28	I2S0_LRCK (IO) (1.8V)	USB3.0_TX-	29
26	W_DISABLE2# (I) (3.3/1.8V)	GND	27
24	I2S0_DO (O) (1.8V)	DPR (I) (1.8V)	25
22	I2S0_DI (I) (1.8V)	WOWWAN# (IO) (1.8V)	23
20	I2S0_BCK (IO) (1.8V)	CONFIG_0 (GND)	21
	Notch	Notch	
10	LED1# (O) (3.3V)	GND	11
8	W_DISABLE1# (I) (3.3/1.8V)	USB_D-	9
6	FULL_CARD_POWER_OFF# (I) (3.3/1.8V)	USB_D+	7
4	+3.3V	GND	5
2	+3.3V	GND	3
		CONFIG_3 (NC)	1

Figure 3-1 XS5G03/XS5G04 Pin Map

Table 3-1 Definitions of the pins on the M.2 interface

Pin No	Pin Name	Description	Voltage	Type
1	CONFIG_3	Setting vale: NC The interface of XS5G03/XS5G04 module is configured as the WWAN – PCIe Gen3, USB3.1 Gen1	NC	DO
2	+3.3V	Power supply for Module	3.135-3.63V	PI
3	GND	Module ground pin		
4	+3.3V	Power supply for Module	3.135-3.63V	PI
5	GND	Module ground pin		
6	FULL_CARD_POWER_OFF#	Pull high to 1.4V~module input voltage to enable power of the module	3.3/1.8V	DI
7	USB_D+	USB2.0 differential data – plus		AIO
8	W_DISABLE1#	The pin use for WWAN disable, active low	3.3/1.8V	DI
9	USB_D-	USB2.0 differential data – minus		AIO
10	LED1#	Open drain, active low signal. The signal is used to allow the add-in card to provide status indicators via LED devices that will be provided by the system.	3.3V	DO
11	GND	Module ground pin		
12	Notch	Notch		
13	Notch	Notch		
14	Notch	Notch		
15	Notch	Notch		
16	Notch	Notch		
17	Notch	Notch		
18	Notch	Notch		
19	Notch	Notch		
20	I2S0_BCK	I2S interface	1.8V	DIO
21	CONFIG_0	Setting vale: GND The interface of XS5G03/XS5G04 module is configured as the WWAN – PCIe Gen3, USB3.1 Gen1	0V	DO
22	I2S0_DI	I2S interface	1.8V	DI
23	WOWWAN#	Used to wake the platform by the WWAN device	1.8V	DIO
24	I2S0_DO	I2S interface	1.8V	DO
25	DPR	This signal is an input directly to the WWAN module from a suitable SAR sensor. The specific implementation will be determined by the module vendor and their customer	1.8V	DI
26	W_DISABLE2#	The pin use for GNSS disable, active low, Reserved	3.3/1.8V	DI
27	GND	Module ground pin		
28	I2S0_LRCK	I2S interface	1.8V	DIO

29	USB3.0_TX-	USB3.1 Tx M		AO
30	USIM1_RESET	USIM1 card reset pin	1.8/3V	DO
31	USB3.0_TX+	USB3.1 Tx P		AO
32	USIM1_CLK	USIM1 card clock pin	1.8/3V	DO
33	GND	Module ground pin		
34	USIM1_DATA	USIM1 card data pin	1.8/3V	DIO
35	USB3.0_RX-	USB3.1 Rx M		AI
36	USIM1_PWR	USIM1 Power Supply	1.8/3V	PO
37	USB3.0_RX+	USB3.1 Rx P		AI
38	NC	No connection pin		
39	GND	Module ground pin		
40	I2C_SCL	I2C clock	1.8V	DO
41	PETn0	PCIE interface	1.8V	AO
42	I2C_SDA	I2C data	1.8V	DIO
43	PETp0	PCIE interface	1.8V	AO
44	I2C_IRQ#	I2C interrupt request	1.8V	I
45	GND	Module ground pin		
46	NC	No connection pin		
47	PERn0	PCIE interface	1.8V	AIO
48	NC	No connection pin		
49	PERp0	PCIE interface	1.8V	AIO
50	PERST#	PCIE interface, active low	3.3/1.8V	IO
51	GND	Module ground pin		
52	CLKREQ#	PCIE interface	3.3/1.8V	DIO
53	REFCLKN	PCIE interface	1.8V	AO
54	PEWALE#	PCIE interface, active low	3.3/1.8V	DO
55	REFCLKP	PCIE interface	1.8V	AO
56	MIPI2_D_SCLK	MIPI interface for antenna tuner	1.8V	DO
57	GND	Module ground pin		
58	MIPI2_D_SDATA	MIPI interface for antenna tuner	1.8V	DO
59	ANTCTL0	Antenna tuning interface	1.8V	DO
60	COEX3	Connsys Co-Ex interface	1.8V	DIO
61	ANTCTL1	Antenna tuning interface	1.8V	DO
62	COEX2	Connsys Co-Ex interface	1.8V	DIO

63	ANTCTL2	Antenna tuning interface	1.8V	DO
64	COEX1	Connsys Co-Ex interface	1.8V	DIO
65	ANTCTL3	Antenna tuning interface	1.8V	DO
66	SIM Detect	USIM1 card detect pin	1.8V	DI
67	RESET#	Module reset input pin	1.8V	DI
68	NC	No connection pin		
69	CONFIG_1	Setting vale: GND The interface of XS5G03/XS5G04 module is 0V configured as the WWAN – PCIe Gen3, USB3.1 Gen1	0V	DO
70	+3.3V	Power supply for Module	3.135-3.63V	PI
71	GND	Module ground pin		
72	+3.3V	Power supply for Module	3.135-3.63V	PI
73	VIO_CFG	Setting vale: NC NC (PCIE SIDEBAND 1.8V TOLERANT 3.3V) GND (PCIE SIDEBAND 3.3V)	0V/NC	DO
74	+3.3V	Power supply for Module	3.135-3.63V	PI
75	CONFIG_2	Setting vale: GND The interface of XS5G03/XS5G04 module is 0V configured as the WWAN – PCIe Gen3, USB3.1 Gen1	0V	DO

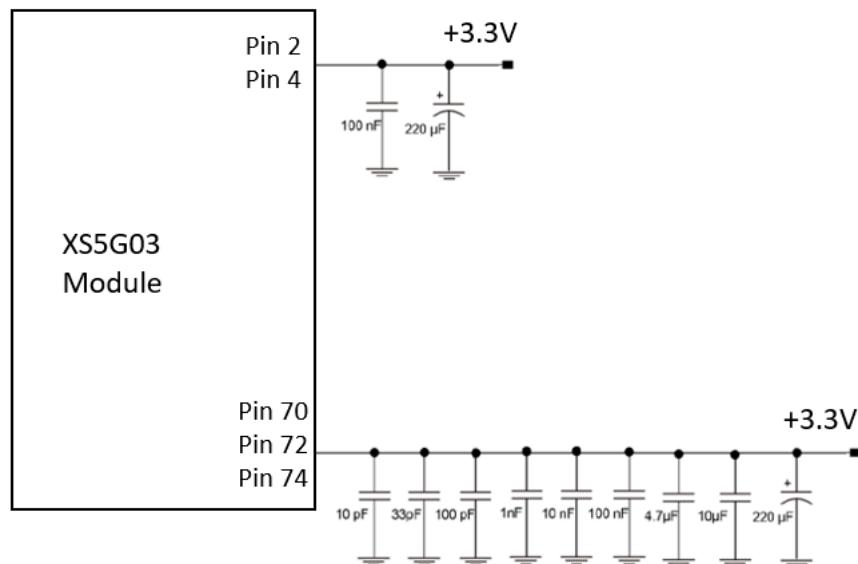
 **NOTE**

- **P** indicates power pins; **PI** indicates input power pins; **PO** indicates output power pins; **AI** indicates pins for analog signal input; **AO** indicates pins for analog signal output; **AIO** indicates pins analog bidirectional; **DI** indicates pins for digital signal input; **DO** indicates pins for digital signal output; **DIO** indicates pins digital bidirectional.

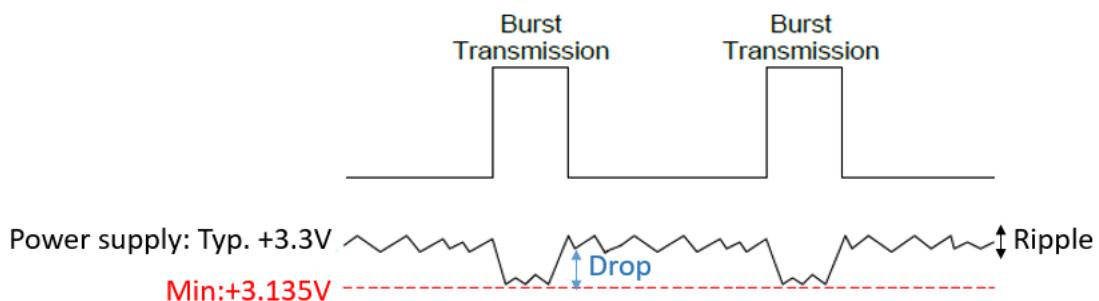
3.3 Power Interface

- +3.3V pins (pin 2,4,70,72,74) are the power supply for the module

The recommended +3.3V power supply circuit is shown in the figure blow:



When power source voltage lower than 3.135V, the module may shutdown or restart.

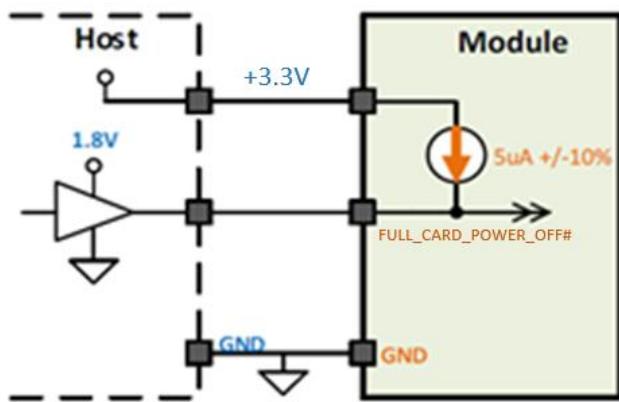


- USIM1_PWR pin is external USIM card power supply, which can provide 1.8 V or 3.0V power for the USIM card.

3.4 Control Signal Interface

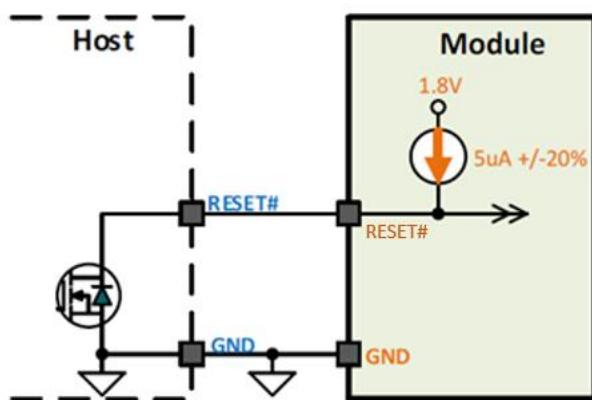
■ Pin 6 FULL_CARD_POWER_OFF#

- ◆ FULL_CARD_POWER_OFF# Pin Function: When module off, pull high this pin then the Module booting
 FULL_CARD_POWER_OFF# =0 →1: PMIC inside the module sequence power on
 FULL_CARD_POWER_OFF# =1 →0: PMIC inside the module sequence power off
- ◆ FULL_CARD_POWER_OFF# Pin Spec.
 VIH: $\geq 1.4V$
 VIL: $\leq 0.7V$
 De-bounce time: $\leq 0.31ms$
 Recommend FULL_CARD_POWER_OFF#=1.8V.



■ Pin 67 RESET#

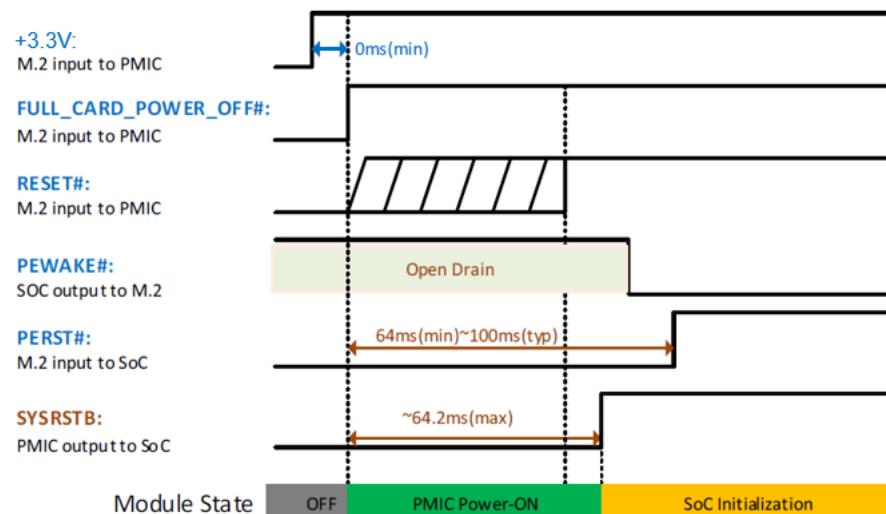
- ◆ RESET# Function: The RESET# pin is hardware reset pin used to reset the system of module.
 Active Low
 PU current: 5uA
 VIH: 1.45V
 VIL: 0.3V
 De-bounce time: $\leq 0.25ms$
- ◆ Layout notice
 RESET# need to keep far from noise trace. If it is possible, please adding "GND" shielding to avoid noise coupled.



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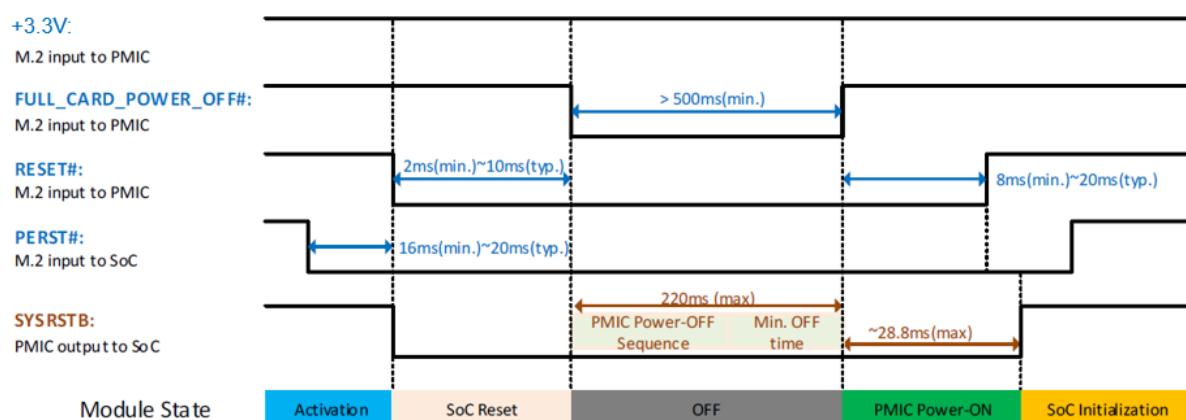
M.2 Module Timing Note

Normal Boot



M.2 Module Timing Note

Reboot (Power off → Power on)

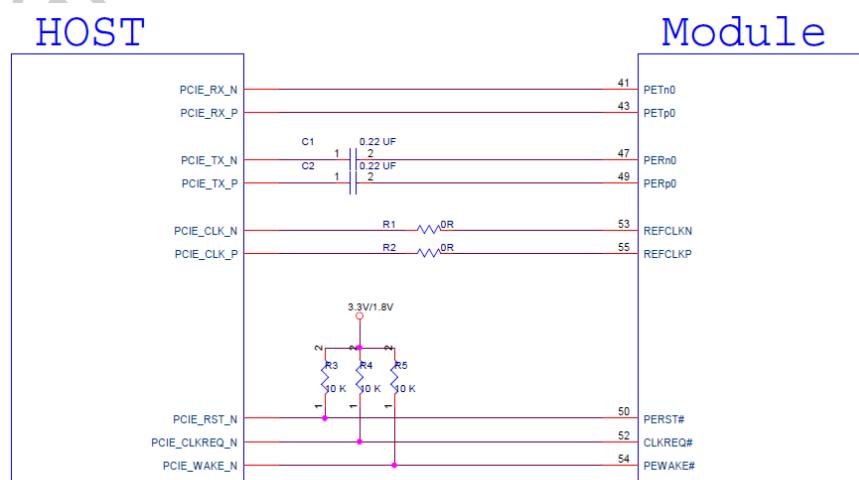


3.5 PCIE Interface

The below table is PCIe interface pin definition:

Pin No.	Pin Name	Pad Type	Description	Typ. (V)
41	PETn0	AO	PCIE Tx -	
43	PETp0	AO	PCIE Tx+	
47	PERn0	AI	PCIE Rx-	
49	PERp0	AI	PCIE Rx+	
53	REFCLKN	AI	PCIE Reference Clock -	
55	REFCLKP	AI	PCIE Reference Clock +	
50	PERST#	DI	PCIe Reset is a functional reset to the card as defined by the PCI Express Base Specification.	3.3/1.8V
52	CLKREQ#	DIO	PCIe Clock Request is a reference clock request signal as defined by the PCI Express Base Specification. This signal is also used by L1 PM Substates. Open Drain with pull up on Platform. Active Low.	3.3/1.8V
54	PEWAKE#	DIO	PCIe WAKE#. Open Drain with pull up on Platform. Active Low when used as PEWAKE#. When the Adapter supports wakeup, this signal is used to request that the system return from a sleep/suspend state to service a function-initiated wake event. When the Adapter supports OBFF mechanism, the PEWAKE# signal is used for OBFF signaling.	3.3/1.8V

PCIe-based Key B and Key B-M Adapters when biased from a locally generated 1.8 V voltage on the Adapter. Adapters based on a locally generated 1.8 V must be 3.3 V tolerant for such sideband signaling. Platforms that expect 1.8 V sideband signaling must protect themselves from legacy 3.3 V adapters.



Reference Circuit for PCIe Interface

- ◆ When PCIE feature is un-used, recommend follow the schematic design list below.

Pin	Unused state
Pin 53 REFCLKN/ Pin 55 REFCLKP	Float
Pin 41 PETn0 / Pin 43 PETp0	Float
Pin 47 PERn0 / Pin 49 PERp0	GND

■ PCIE Layout Notice

The characteristic impedance must be implemented in PCB layout.

- ◆ The characteristic impedance recommends **85** +/-10% Ohm.
 - Pin 41 PETn0 / Pin 43 PETp0
 - Pin 47 PERn0 / Pin 49 PERp0
- ◆ The characteristic impedance recommends **100**+/-20% Ohm.
 - Pin 53 REFCLKN/ Pin 55 REFCLKP
- ◆ PCIE differential pair trace length Must follow the rules as bellow:
 - ◊ | PETp0- PETn0 | <= 5mil;
 - ◊ | PERp0- PERn0 | <= 5mil ;
 - ◊ | REFCLKP - REFCLKN | <= 5mil
 - ◊ The maximum trace length should be less than 10000mils

PCIE trace length inside the module

PCIE	Module Pin	Trace Length(mil)
PETn0	41	347.80
PETp0	43	347.85
PERn0	47	341.60
PERp0	49	341.67
REFCLKN	53	384.44
REFCLKP	55	384.46

3.6 USB Interface

- USB Schematic Notice
- ◆ USB application circuit on HS/FS receptacle side
 - ✧ Reserve ESD protection device for USB differential pair (USB_D+/ USB_D-).
The equivalent capacitance loading of ESD protection device should be less than 3pF.
 - ✧ Beware the diode operate voltage for avoid the leakage current.
- ◆ USB application circuit on Super speed receptacle side
 - ✧ Pin USB 3.0_Tx+ and USB3.0_Tx- series 100nF capacitors and
Pin USB 3.0_Rx+ and USB3.0_Rx- series 330nF capacitors inside the module
 - ✧ Reserve ESD protection device for USB 3.0_Tx/Rx differential pair.
 - ✧ The equivalent capacitance loading of ESD protection device should be less than 0.5pF.
- ◆ When USB feature is un-used, recommend follow the schematic design list below.

Pin	Unused state
USB_D+	Float
USB_D-	Float
USB3.0_TX+	Float
USB3.0_TX-	Float
USB3.0_RX+	GND
USB3.0_RX-	GND

■ USB Layout Notice

The characteristic impedance must be implemented in PCB layout.

- ◆ The characteristic impedance recommends **90 +/-10% Ohm**.

USB 2.0

USB_D+ / USB_D-

USB 3.1

USB3.0_TX+/ USB3.0_RX-
USB3.0_RX+/ USB3.0_RX-

- ◆ USB differential pair trace length Must follow the rules as bellow:

USB2.0

✧ |USB_DP-USB_DM|<60mil

USB 2.0 trace length inside the module

Pin No.	Pin Name	Trace Length(mil)

7	USB_D+	547.10
9	USB_D-	547.10

USB 3.1

- ✧ | USB3.0_TX+ - USB3.0_TX- | <= 5mil;
- ✧ | USB3.0_RX+ - USB3.0_RX- | <= 5mil
- ✧ trace <5"

USB 3.1 trace length inside the module

Pin No.	Pin Name	Trace Length(mil)
31	USB3.0_TX+	350.44
29	USB3.0_TX-	350.34
37	USB3.0_RX+	332.84
35	USB3.0_RX-	332.93

3.7 I2C Interface

The module provides I2C interface. The I2C interface is open drain and requires external PU to 1.8 V.

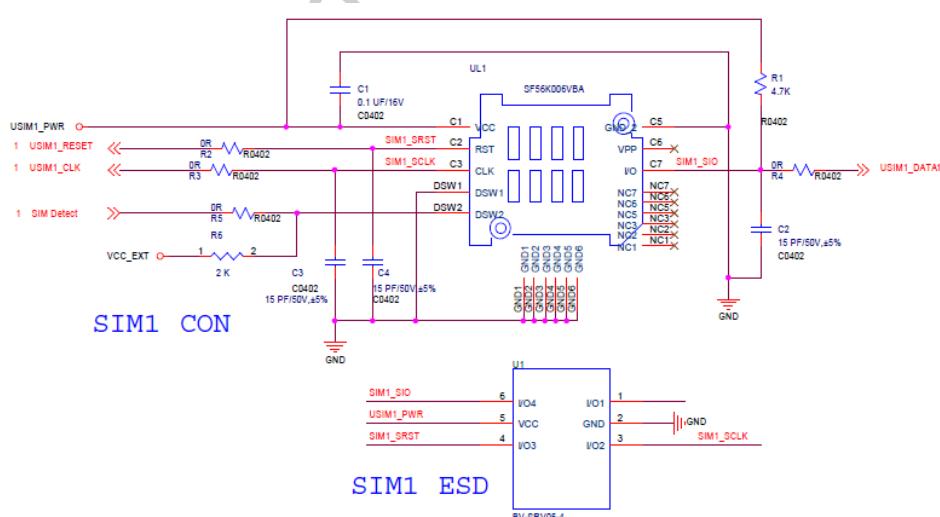
Pin No.	Pin Name	Pad Type	Description	Typ. (V)
40	I2C_SCL	DO	I2C clock	1.8
42	I2C_SDA	DIO	I2C data	1.8
44	I2C_IRQ#	DI	I2C interrupt request	1.8

3.8 USIM Interface

The module provides USIM card interface complying with ISO standard 7816-3 and supports Class B and Class C USIM cards.

Table 3-15 USIM card interface signals

Pin No.	Pin Name	Pad Type	Description	Typ. (V)
30	USIM1_RESET	DO	USIM1 card reset	1.8/3.0
34	USIM1_DATA	DIO	USIM1 card data, pull up to USIM1_PWR	1.8/3.0
32	USIM1_CLK	DO	USIM1 card clock	1.8/3.0
66	SIM Detect	DI	USIM detection, recommend to pull up to VCC_EXT	1.8V
36	USIM1_PWR	PO	Power supply for USIM card	1.8/3.0



3.9 I2S

I2S- Supports 8/11.025/12/16/22.05/24/32/44.1/48/88/96/176/192 kHz sampling rate

- Supports master/slave input mode and slave mode with ASRC
- Supports master/slave output mode and slave mode with ASRC
- Supports I2S input and I2S output share clock function (bi-direction)
- Supports 16/24/32-bit stereo data
- Supports I2S/EIAJ format

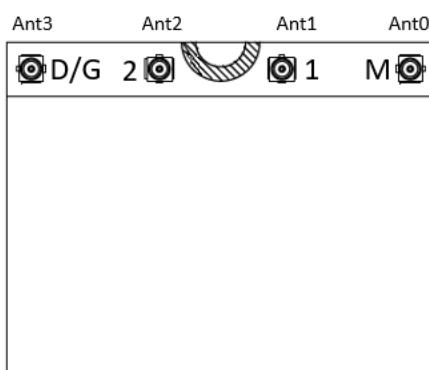
Pin No.	Pin Name	Pad Type	Description	Typ. (V)
20	I2S0_BCK	DIO	I2S interface	1.8
28	I2S0_LRCK	DIO	I2S interface	1.8
22	I2S0_DI	DI	I2S interface	1.8
24	I2S0_DO	DO	I2S interface	1.8

3.10 RF Interface

The XS5G03 and XS5G04 module use 4 ipex-4 RF connectors to connect external antenna. Connector “M” is for main antenna connection, used to transmit and receive RF signals. Connector “D/G” is for Diversity antenna connection, used to receive the diversity RF signals and L1 GNSS signal (optional). Connectors “1” and “2” are used for supporting 4x4 MIMO data transfer.

RF Port (I-PEX4 connector)

RF Connector Name	Description	Typ. ohm
M(Ant0)	Main antenna (TRx/SRS)	50
1(Ant1)	MIMO antenna (Rx/SRS)	50
2(Ant2)	MIMO antenna (TRx/SRS)	50
D/G(Ant3)	Diversity and GNSS(optional) antenna (Rx/SRS)	50



■ Default Tx Port

WCDMA

Ant0

Band: B1, B3, B4, B5, B8

LTE

Ant0

Band: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B30, B34, B38, B39, B40, B41, B66, B71

Ant2

Band: B42, B43, B48

NR

Ant0

Band: n1, n2, n3, n5, n7, n8, n20, n25, n28, n30, n38, n40, n41, n66, n71

Ant2

Band: n48, n77, 78, n79

■ Rx Port

GNSS

Ant3: NT GPS L1 INPUT(Optional)

WCDMA

Ant0:

PRx Band: B1, B3, B4, B5, B8

Ant2:

DRx Band: B1, B3, B4

Ant3:

DRx Band: B5, B8

LTE

Ant0

PRx Band: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B29, B30, B32, B34, B38, B39, B40, B41, B46, B66, B71

DRx Band: B42, B43, B48

Ant1

MIMO Band: B1, B2, B3, B4, B7, B25, B30, B32, B34, B38, B39, B40, B41, B42, B43, B48, B66

Ant2

PRx Band: B42, B43, B48

DRx Band: B1, B2, B3, B4, B7, B25, B30, B32, B34, B38, B39, B40, B41, B66

Ant3

MIMO Band: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B29, B30, B32, B34, B38, B39, B40, B41, B42, B43, B46, B48, B66, B71

NR

Ant0

PRx Band: n1, n2, n3, n5, n7, n8, n20, n25, n28, n30, n38, n40, n41, n66, n71

DRx Band: n48, n77, n78, n79

Ant1

MIMO Band: n1, n2, n3, n7, n25, n30, n38, n40, n41, n48, n66, n77, n78, n79

Ant2

PRx Band: n48, n77, n78, n79

DRx Band: n1, n2, n3, n7, n25, n30, n38, n40, n41, n66

Ant3

MIMO Band: n1, n2, n3, n5, n7, n8, n20, n25, n28, n30, n38, n40, n41, n48, n66, n71, n77, n78, n79

3.11 Configuration Interface

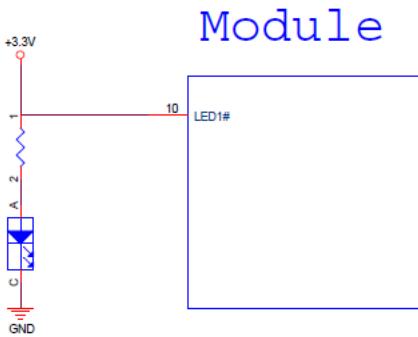
The XS5G03/XS5G04 module configuration as blow table:

CONFIG_0	CONFIG_1	CONFIG_2	CONFIG_3	Module Type and Main Host Interface
(Pin 21)	(Pin 69)	(Pin 75)	(Pin 1)	
GND	GND	GND	NC	WWAN – PCIe, USB3.1 Gen1

3.12 LED Signal

Pin 10 LED1# provide LED current sink channels for general LED indicator application.

LED1# supports up to 12mA and dropout voltage $\leq 225\text{mV}$.



4 RF Specifications

4.1 About This Chapter

This chapter describes the RF specifications of the module, including:

- Operating Frequencies
- Operating Band
- Conducted RF Measurement
- Conducted Rx Sensitivity
- Conducted Tx Power
- Bandwidth Specifications
- RF Antenna Connector Configuration
- UE Capability
- Maximum Throughput
- SRS (Sounding Reference Signal)
- DSS (Dynamic Spectrum Sharing)
- GPS Feature

XSquare Communications Corp.

4.2 Operating Frequencies

4.2.1 NR Operating Frequencies

Table 4-1: NR operating bands in FR1

NR operating band	Uplink (UL) operating band $F_{UL_low} - F_{UL_high}$	Downlink (DL) operating band $F_{DL_low} - F_{DL_high}$	Duplex Mode
n1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	FDD
n2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	FDD
n3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
n5	824 MHz – 849 MHz	869 MHz – 894 MHz	FDD
n7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
n8	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
n20	832 MHz – 862 MHz	791 MHz – 821 MHz	FDD
n28	703 MHz – 748 MHz	758 MHz – 803 MHz	FDD
n30	2305 MHz – 2315 MHz	2350 MHz – 2360 MHz	FDD
n38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
n40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	TDD
n41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD
n48	3550 MHz – 3700 MHz	3550 MHz – 3700 MHz	TDD
n66	1710 MHz – 1780 MHz	2110 MHz – 2200 MHz	FDD
n71	663 MHz – 698 MHz	617 MHz – 652 MHz	FDD
n77	3300 MHz – 4200 MHz	3300 MHz – 4200 MHz	TDD
n78	3300 MHz – 3800 MHz	3300 MHz – 3800 MHz	TDD
n79	4400 MHz – 5000 MHz	4400 MHz – 5000 MHz	TDD

4.2.2 LTE Operating Frequencies

Table 4-2: E-UTRA operating bands

E-UTRA Operating Band	Uplink (UL) operating band	Downlink (DL) operating band	Duplex Mode
	$F_{UL_low} - F_{UL_high}$	$F_{DL_low} - F_{DL_high}$	
1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	FDD
2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	FDD
3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	FDD
5	824 MHz – 849 MHz	869 MHz – 894 MHz	FDD
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
8	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
12	699 MHz – 716 MHz	729 MHz – 746 MHz	FDD
13	777 MHz – 787 MHz	746 MHz – 756 MHz	FDD
14	788 MHz – 798 MHz	758 MHz – 768 MHz	FDD
17	704 MHz – 716 MHz	734 MHz – 746 MHz	FDD
18	815 MHz – 830 MHz	860 MHz – 875 MHz	FDD
19	830 MHz – 845 MHz	875 MHz – 890 MHz	FDD
20	832 MHz – 862 MHz	791 MHz – 821 MHz	FDD
25	1850 MHz – 1915 MHz	1930 MHz – 1995 MHz	FDD
26	814 MHz – 849 MHz	859 MHz – 894 MHz	FDD
28	703 MHz – 748 MHz	758 MHz – 803 MHz	FDD
29	NA	717 MHz – 728 MHz	FDD
30	2305 MHz – 2315 MHz	2350 MHz – 2360 MHz	FDD
32	NA	1452 MHz – 1496 MHz	FDD
34	2010 MHz – 2025 MHz	2010 MHz – 2025 MHz	TDD
38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
39	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	TDD
40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	TDD
41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD
42	3400 MHz – 3600 MHz	3400 MHz – 3600 MHz	TDD
43	3600 MHz – 3800 MHz	3600 MHz – 3800 MHz	TDD
46	5150 MHz – 5925 MHz	5150 MHz – 5925 MHz	TDD
48	3550 MHz – 3700 MHz	3550 MHz – 3700 MHz	TDD
66	1710 MHz – 1780 MHz	2110 MHz – 2200 MHz	FDD
71	663 MHz – 698 MHz	617 MHz – 652 MHz	FDD

 **NOTE**

- B29, B32, B46 only to be SDL.
- B46 - The second variant of LTE-Unlicensed is Licensed Assisted Access (LAA) and has been standardized by the 3GPP in Rel-13.

4.2.3 WCDMA Operating Frequencies

Table 4-3 UTRA/FDD is designed to operate in either of the following paired bands

Operating Band	TX - UL Frequencies(MHZ)	RX- DL Frequencies(MHZ)
Band 1	1920 - 1980	2110 - 2170
Band 2	1850 -1910	1930 - 1990
Band 4	1710 -1755	2110 - 2155
Band 5	824 - 849	869 - 894
Band 8	880 - 915	925 - 960

4.3 Operating Band

4.3.1 Operating Band for different SKU

	XS5G03-GBO	XS5G03-EUI	XS5G04-GBO
NR band	n1/2/3/5/7/8/20/25/28/30/38/40/41/48/66/71/77/78/79	n1/3/5/7/8/20/28/38/40/41/77/78/79	n1/2/3/5/7/8/20/25/28/30/38/40/41/48/66/71/77/78/79
NR CA	42	25	X
EN-DC	583	336	X
LTE band	B1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/29/30/32/34/38/39/40/41/42/43/46/48/66/71	B1/3/5/7/8/20/28/32/38/40/41/42/43	B1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/29/30/32/34/38/39/40/41/42/43/46/48/66/71
LTE CA	997	415	997
WCDMA band	B1/2/4/5/8	B1/5/8	B1/2/4/5/8

4.3.2 Operating Band for EN-DC

The detail spec please refer to the excel file as below:

XS5G03-GBO	Please refer to XS5G03-GBO_EN-DC list_2022.0330_DL&UL.xlsx
XS5G03-EUI	Please refer to XS5G03-EUI_EN-DC list_2022.0322_DL&UL.xlsx

4.3.3 Operating Band for SA – NR CA

The detail spec please refer to the excel file as below:

XS5G03-GBO	Please refer to XS5G03-GBO_EN-DC list_2022.0330_DL&UL.xlsx
XS5G03-EUI	Please refer to XS5G03-EUI_EN-DC list_2022.0322_DL&UL.xlsx
XS5G04-GBO	Please refer to XS5G04-GBO_SA list_2022.0322_DL&UL.xlsx

4.3.4 Operating Band for LTE CA

The detail spec please refer to the excel file as below:

XS5G03-GBO	Please refer to XS5G03-GBO_LTE_CA list_2022.0324_DL&UL.xlsx
XS5G03-EUI	Please refer to XS5G03-EUI_LTE_CA list_2022.0322_DL&UL.xlsx
XS5G04-GBO	Please refer to XS5G04-GBO_LTE_CA list_2022.0324_DL&UL.xlsx

4.4 Conducted RF Measurement

4.4.1 Test Environment

Test instrument	Anritsu MT8821C, Anritsu MT8000A, Keysight UXM
------------------------	---

 **NOTE**

- The compensation for different frequency bands relates to the cable and the test environment.
- The instrument compensation needs to be set according to the actual cable conditions.

4.4.2 Test Standards

XSquare modules meet all 3GPP test standards relating to 3G, LTE and 5G.

NR supports most main features in 3GPP Release 15

LTE supports most main features in 3GPP Release 14

3G supports most main features in 3GPP Release 7 and Release 8

4.5 Conducted RX Sensitivity

The conducted receive sensitivity indicates the receiver performance of the module and refers to the weakest signal that the module can receive. The bit error rate (BER) must meet the 3GPP protocol requirements in the case of the minimum signal.

The **3GPP Protocol Claim** column in Table 4-2 lists the required minimum values, and the **Test Value** column lists the tested values of the module under 3.3 V voltage and normal temperature.

4.5.1 NR Conducted RX sensitivity

Table 4-7 NR Conducted RX sensitivity

NR Band	Duplex Mode	SCS (KHz)	Bandwidth (MHz)	3GPP QPSK Prefsens SIMO *2	Design Spec. (dBm) SIMO *1
n1	FDD	30	10	-97.1	-99
n2	FDD	30	10	-95.1	-98
n3	FDD	30	10	-94.1	-99
n5	FDD	30	10	-95.1	-101
n7	FDD	30	10	-95.1	-97.5
n8	FDD	30	10	-94.1	-101
n20	FDD	30	10	-94.1	-101
n25	FDD	30	10	-93.6	-97
n28	FDD	30	10	-95.6	-101.5
n38	TDD	30	10	-97.1	-98.6
n40	TDD	30	10	-97.1	-97.2
n41	TDD	30	10	-95.1	-98
n41	TDD	30	100	-84.7	-85.2
n48	TDD	30	10	-96.1	-100
n66	FDD	30	10	-96.6	-97.2
n71	FDD	30	10	-94.3	-101.2
n77	TDD	30	10	-95.6	-99.3
n77	TDD	30	100	-85.1	-89
n78	TDD	30	10	-96.1	-99.3
n78	TDD	30	100	-85.6	-89
n79	TDD	30	40	-89.7	-91.6
n79	TDD	30	100	-85.6	-87

NOTE

- SIMO is a smart antenna technology that uses a single antenna at the transmitter side and two antennas at the receiver side, which improves the RX performance.
- TS 138 101 v16.9.0 Reference sensitivity power level, The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories. The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels.

4.5.2 LTE Conducted RX sensitivity

Table 4-8 LTE Conducted RX sensitivity

LTE Band	Duplex Mode	Bandwidth (MHz)	3GPP QPSK Prefsens (dBm) SIMO *2	Design Spec. (dBm) SIMO *1
1	FDD	10	-97	-103
2	FDD	10	-95	-103
3	FDD	10	-94	-103
4	FDD	10	-97	-103
5	FDD	10	-95	-102.5
7	FDD	10	-95	-101.5
8	FDD	10	-94	-102
12	FDD	10	-94	-102
13	FDD	10	-94	-102.5
14	FDD	10	-94	-102.5
17	FDD	10	-94	-102.5
18	FDD	10	-97	-102.5
19	FDD	10	-97	-102
20	FDD	10	-94	-103
25	FDD	10	-93.5	-103
26	FDD	10	-94.5	-102
28	FDD	10	-95.5	-102
30	FDD	10	-96	-101.5
66	FDD	10	-96.5	-102.5
71	FDD	10	-94.2	-102
34	TDD	10	-97	-103
38	TDD	10	-97	-101.5
39	TDD	10	-97	-103.5
40	TDD	10	-97	-102
41	TDD	10	-95	-101.5
42	TDD	10	-96	-103.5
43	TDD	10	-96	-103.5
48	TDD	10	-97	-103

 **NOTE**

- SIMO is a smart antenna technology that uses a single antenna at the transmitter side and two antennas at the receiver side, which improves the RX performance.
- TS 136 101 v16.13.0 Reference sensitivity power level, The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories. The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels.

Table 4-8-1 LTE (CA with a SDL band) Conducted RX sensitivity

LTE Band	Duplex Mode	Bandwidth (MHz)	3GPP QPSK Prefsens (dBm) SIMO *2	Design Spec. (dBm) SIMO *1
29	FDD	10	-94	-102.3
32	FDD	10	-97	-101.3
46	FDD	10	-93	-95.7


NOTE

- TS 136 101 v16.13.0 Reference sensitivity power level, The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories. The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels.
- For band combinations including operating band 46 (Table 5.5-1), the requirements are specified in Table 7.3.1A-0eA for the uplink in any band other than band 46 with the uplink configuration specified in Table 7.3.1-2 and Table 7.3.1A-0eC.

TS 136 101 Table 7.3.1A-0eA: Reference sensitivity QPSK PREFSENS (CA with band 46 or Band 49)

Channel bandwidth								
EUTRA CA Configuration	EUTRA band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex mode
CA_1A-46A								
CA_1A-46C								
CA_1A-46D								
CA_1A-46E	46				-93		-90	TDD

TS 136 101 Table 7.3.1A-0d: Reference sensitivity QPSK PREFSENS (CA with a SDL band)

Channel bandwidth								
EUTRA CA Configuration	EUTRA band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex mode
CA_1A-3A-7A-20A-32A	1			-100	-97	-95.2	-94	FDD
	3 ^{5,6}			-94	-91	-90	-89	
	3 ⁷			-97	-94	-92.2	-91	
	7				-95	-93.2	-92	
	20			-97	-94	-91.2	-90	
	32			-100	-97	-95.2	-94	

Channel bandwidth								
EUTRA CA Configuration	EUTRA band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex mode
CA_2A-4A-5A-29A	2			-97.7	-94.7	-92.9	-91.7	FDD
	4			-99.7	-96.7	-94.9	-93.7	
	5			-98	-95			
	29			-97	-94			
CA_2A-4A-29A	2			-97.7	-94.7	-92.9	-91.7	FDD
	4			-99.7	-96.7	-94.9	-93.7	
	29			-97	-94			
CA_2A-4A-29A-30A	2			-97.6	-94.6	-92.8	-91.6	FDD
	4			-99.6	-96.6	-94.8	-93.6	
	29			-97	-94			
	30			-98.5	-95.5			
CA_2A-5A-29A	2			-98	-95	-93.2	-92	FDD
	5			-98	-95			
	29			-97	-94			
CA_2A-7A-29A CA_2A-7C-29A	2			-98	-95	-93.2	-92	FDD
	7			-95	-95	-93.2	-92	
	29			-97	-94			
CA_2A-7A-7A-29A	2			-98	-95	-93.2	-92	FDD
	7			-98	-95	-93.2	-92	
	29			-97	-94			

4.5.3 WCDMA Conducted RX sensitivity

Table 4-9 3G Conducted RX sensitivity

Band	Channel	3GPP Protocol Claim (dBm) SIMO	Cell Power Design Spec. (dBm) SIMO *1
1	9613	< -106.7	-107.8
1	9750	< -106.7	-108.7
1	9887	< -106.7	-107.9
2	9263	< -104.7	-107.4
2	9400	< -104.7	-108.7
2	9537	< -104.7	-107.3
4	1313	< -106.7	-108.1
4	1450	< -106.7	-108.5
4	1512	< -106.7	-108.6
5	4133	< -104.7	-111.2
5	4175	< -104.7	-110.9
5	4232	< -104.7	-110.7
8	2713	< -103.7	-110.8
8	2788	< -103.7	-110.6
8	2862	< -103.7	-110

 **NOTE**

- SIMO is a smart antenna technology that uses a single antenna at the transmitter side and two antennas at the receiver side, which improves the RX performance.

4.6 Conducted Transmit Power

The conducted transmit power is another indicator of the performance of the module and refers to the maximum power that the module tested at the antenna port can transmit. According to the 3GPP protocol, the required transmit power varies with the power class.

Table 4-3 list the required range of the conducted transmit power of the module under 3.3 V +10% -5% voltage and normal temperature. The tested values listed in the Test Value column must range from the minimum power to the maximum power.

4.6.1 NR Transmits Power

NR Conductive Maximum Transmits Power

Table 4-10 NR Conducted Maximum TX Power

5GNR (Sub 6G)	3GPP Standard (dBm)	Design Spec.(dBm)		
		Max.	Typ.	Min.
n1	23+/-2	25	22	21
n2	23+/-2	25	22	21
n3	23+/-2	25	22	21
n5	23+/-2	25	22	21
n7	23+/-2	25	22	21
n8	23+/-2	25	22	21
n20	23+/-2	25	22	21
n25	23+/-2	25	22	21
n28	23+2/-2.5	25	22	20.5
n30	23+/-2	25	22	21
n38	23+/-2	25	22	21
n40	23+/-2	25	22	21
n41	23+/-2	25	22	21
n41(HPUE)	26+2/-3	28	24~26	23
n48	23+2/-3	25	22.5	20
n66	23+/-2	25	23	21
n71	23+2/-2.5	25	23	20.5
n77	23+2/-3	25	22	20
n77(HPUE)	26+2/-3	28	N/A	23
n78	23+2/-3	25	22	20
n78(HPUE)	26+2/-3	28	24~26	23
n79	23+2/-3	25	22	20
n79(HPUE)	26+2/-3	28	24~26	23

NOTE

- n41, n77, n78, n79 support HPUE power class 2.
- n77 currently set to power class 3, can support power class 2 (HPUE).

Maximum power reduction (MPR) for power class 2 of SA

Maximum power reduction (MPR) for power class 2 of SA 5G NR should refer to should refer to 3GPP TS 38.101-1 V16.6.0 as below.

Table 4-11 Maximum power reduction (MPR) for power class 2

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5	≤ 0.5	0
	QPSK	≤ 3.5	≤ 1	0
	16 QAM	≤ 3.5	≤ 2	≤ 1
	64 QAM	≤ 3.5		≤ 2.5
	256 QAM		≤ 4.5	
CP-OFDM	QPSK	≤ 3.5	≤ 3	≤ 1.5
	16 QAM	≤ 3.5	≤ 3	≤ 2
	64 QAM		≤ 3.5	
	256 QAM		≤ 6.5	

Maximum power reduction (MPR) for power class 3 of NSA

Maximum power reduction (MPR) for power class 3 of NSA 5G NR should refer to should refer to 3GPP TS 38.101-1 V16.6.0 as below.

4-12 Maximum power reduction (MPR) for power class 3

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5 ¹	≤ 1.2 ¹	≤ 0.2 ¹
		≤ 0.5 ²	≤ 0.5 ²	0 ²
	Pi/2 BPSK w Pi/2 BPSK DMRS	≤ 0.5 ²	≤ 0 ²	0 ²
	QPSK		≤ 1	0
	16 QAM		≤ 2	≤ 1
	64 QAM		≤ 2.5	
	256 QAM		≤ 4.5	
CP-OFDM	QPSK		≤ 3	≤ 1.5
	16 QAM		≤ 3	≤ 2
	64 QAM		≤ 3.5	
	256 QAM		≤ 6.5	

NOTE 1: Applicable for UE operating in TDD mode with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and if the IE *powerBoostPi2BPSK* is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0 dB MPR is 26 dBm.

NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 with Pi/2 BPSK modulation and if the IE *powerBoostPi2BPSK* is set to 0 and if more than 40 % of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.

4.6.2 LTE Transmits Power

LTE Conductive Maximum Transmits Power

Table 4-13 LTE Conducted Maximum TX Power

LTE Band (FDD)	3GPP Standard (dBm)	Design Spec.(dBm)		
		Max.	Typ.	Min.
1	23+/-2	25	24	21
2	23+/-2	25	24	21
3	23+/-2	25	23.5	21
4	23+/-2	25	23.5	21
5	23+/-2	25	23.5	21
7	23+/-2	25	23	21
8	23+/-2	25	23	21
12	23+/-2	25	23.5	21
13	23+/-2	25	23	21
14	23+/-2	25	23	21
17	23+/-2	25	23.5	21
18	23+/-2	25	23	21
19	23+/-2	25	23	21
20	23+/-2	25	23	21
25	23+/-2	25	24	21
26	23+/-2	25	23	21
28	23+2/-2.5	25	23	20.5
30	23+/-2	25	24	21
66	23+/-2	25	22.5	21
71	23+2/-2.5	25	22.5	20.5

LTE Band (TDD)	3GPP Standard (dBm)	Design Spec.(dBm)		
		Max.	Typ.	Min.
34	23+/-2	25	23.5	21
38	23+/-2	25	23	21
39	23+/-2	25	23.5	21
40	23+/-2	25	24	21
41*	23+/-2	25	22.5	21
42	23+2/-3	25	22	20
43	23+2/-3	25	24	20
48	23+2/-3	25	24.5	20

 **NOTE**

1. B38, B40, B41, B42 currently set to power class 3, can support power class 2 (HPUE).
2. LTE power follow single band TX power spec.
3. LTE bandwidth: 10MHz

LTE Maximum Power Reduction (MPR)

Maximum Power Reduction (MPR) and Additional Maximum Power Reduction (A-MPR) of LTE should refer to 3GPP TS 36.521-1 as below.

Table 4-14: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM				≥ 1			≤ 5

4.6.3 WCDMA Transmits Power

Table 4-15 WCDMA Conducted Maximum TX Power

WCDMA Band	3GPP Standard (dBm)	Design Spec.(dBm)		
		Max.	Typ.	Min.
1	24+1/-3	25	21.7	21
2	24+1/-3	25	22.1	21
4	24+1/-3	25	21.8	21
5	24+1/-3	25	22.1	21
8	24+1/-3	25	22.0	21

4.7 Bandwidth Specifications

4.7.1 NR Bandwidth Specifications

Table 4-16 NR Bandwidth

Band	Mode	SCS (kHz)	Channel Bandwidths (MHz)											
			5	10	15	20	25	30	40	50	60	70	80	90
n1	FDD	15	5	10	15	20	25	30	40	50				
		30		10	15	20	25	30	40	50				
n2	FDD	15	5	10	15	20	R16*1	R16						
		30		10	15	20	R16	R16						
n3	FDD	15	5	10	15	20	25	30	40					
		30		10	15	20	25	30	40					
n5	FDD	15	5	10	15	20	R16	R16						
		30		10	15	20	R16	R16						
n7	FDD	15	5	10	15	20	25	30	40	50				
		30		10	15	20	25	30	40	50				
n8	FDD	15	5	10	15	20								
		30		10	15	20								
n20	FDD	15	5	10	15	20								
		30		10	15	20								
n25	FDD	15	5	10	15	20	25	30	40					
		30		10	15	20	25	30	40					
n28	FDD	15	5	10	15	20		30						
		30		10	15	20		30						
n30	FDD	15	5	10										
		30		10										
n66	FDD	15	5	10	15	20	25	30	40					
		30		10	15	20	25	30	40					
n71	FDD	15	5	10	15	20								
		30		10	15	20								
n38	TDD	15	5	10	15	20	25	30	40					
		30		10	15	20	25	30	40					
n40	TDD	15	*2	10	15	20	25	30	40	50				
		30		10	15	20	25	30	40	50	60		80	
n41	TDD	15		10	15	20		30	40	50				
		30		10	15	20		30	40	50	60		80	90
n48	TDD	15	*2	10	15	20			40	50				
		30		10	15	20			40	50	60		80	90
n77	TDD	15		10	15	20			40	50				
		30		10	15	20			40	50	60		80	90
n78	TDD	15		10	15	20		30	40	50				
		30		10	15	20		30	40	50	60		80	90
n79	TDD	15							40	50				
		30							40	50	60		80	

NOTE

- The default channel bandwidth is based on 3GPP spec 38.101-1 release 15.6.0
- *1 based on later spec version and need MTK library release.
- *2 3GPP TS 138.508-1. Test frequencies for NR operating band 40 and band 48, the channel 5MHz bandwidth can only be used as SCell.

4.7.2 LTE Bandwidth Specifications

Table 4-17 LTE Bandwidth

Band	Duplex Mode	Channel Bandwidths (MHz)					
		1.4	3	5	10	15	20
1	FDD			✓	✓	✓	✓
2	FDD	✓	✓	✓	✓	✓	✓
3	FDD	✓	✓	✓	✓	✓	✓
4	FDD	✓	✓	✓	✓	✓	✓
5	FDD	✓	✓	✓	✓		
7	FDD			✓	✓	✓	✓
8	FDD	✓	✓	✓	✓		
12	FDD	✓	✓	✓	✓		
13	FDD			✓	✓		
14	FDD			✓	✓		
17	FDD			✓	✓		
18	FDD			✓	✓	✓	
19	FDD			✓	✓	✓	
20	FDD			✓	✓	✓	✓
25	FDD	✓	✓	✓	✓	✓	✓
26	FDD	✓	✓	✓	✓	✓	
28	FDD		✓	✓	✓	✓	✓
29	SDL		✓	✓	✓		
30	FDD			✓	✓		
32	SDL			✓	✓	✓	✓
34	TDD			✓	✓	✓	
38	TDD			✓	✓	✓	✓
39	TDD			✓	✓	✓	✓
40	TDD			✓	✓	✓	✓
41	TDD			✓	✓	✓	✓
42	TDD			✓	✓	✓	✓
43	TDD			✓	✓	✓	✓
46	SDL				✓		✓
48	TDD			✓	✓	✓	✓
66	TDD	✓	✓	✓	✓	✓	✓
71	TDD			✓	✓	✓	✓

 **NOTE**

- B29, B32, B46 is SDL.

4.8 UE Capability

Table 4-18 LTE / NR hardware and software capability

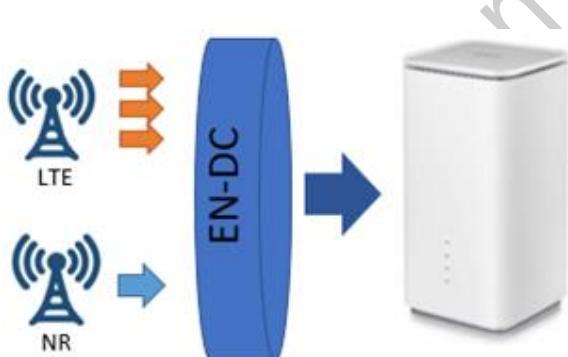
RAT	LTE		NR	
Throughput	DL	UL	DL	UL
BW per CC (MHz)	20		100	
CC number	3	2	2	2*
Band number	3	2	2	2
Subcarrier spacing (Hz)	15k		15k/30k	
Max MIMO layers per CC	4	1	4	2
Modulation	256 QAM	64 QAM	256 QAM	

 **NOTE**

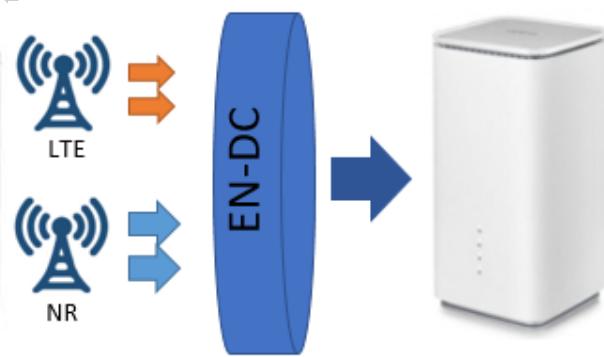
- *XS5G04 only support NR UL 1 CC.

- EN-DC HW limitation
 - LTE+NR CC number ≤ 4
 - NR CC number ≤ 4
 - LTE + NR total MIMO layers ≤ 10

Case 1: 3CC LTE + 1CC NR



Case 2: 2CC LTE + 2CC NR



4.9 Maximum Throughput

4.9.1 XS5G03-GBO/XS5G03-EUI Max Throughput

Table 4-19 XS5G03-GBO/EUI LTE / NR (SA) / ENDC maximum throughput

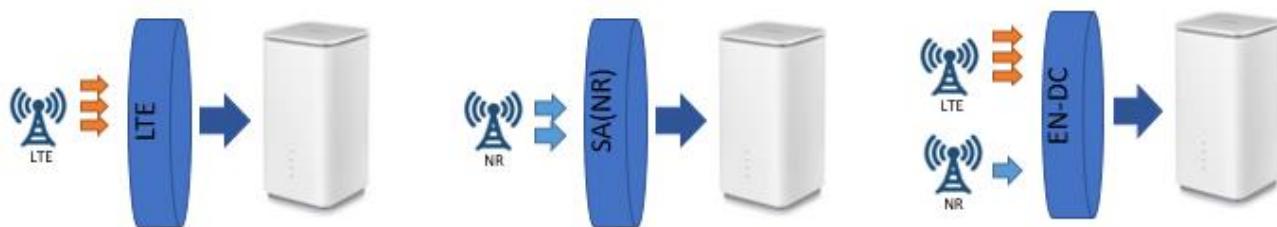
Throughput		Downlink		Uplink	
Chip/Module		MTK Chip	XS Module *2	MTK Chip	XS Module
LTE		600 Mbps (Cat 12)	600 Mbps (Cat 12)	150 Mbps (Cat 13)	150 Mbps (Cat 13)
NR(SA)		2.77 Gbps *1	2.38 Gbps(T+T) 2.57 Gbps(F+T)	1.25 Gbps	1150 Mbps *3
NSA	LTE	600 Mbps	390 Mbps	75 Mbps	75 Mbps
	NR	2.3 Gbps	219+2360 Mbps	625 Mbps	455 Mbps
	EN-DC	2.9 Gbps	2.97 Gbps *4	700 Mbps	530 Mbps

*1 120M (FDD 20M 4RX), 130M (FDD 30M 2RX)

*2 Module level (actual test data in MAC).

*3 The supplied voltage needs to be increased from 3.3V to 3.6V.

*4 B3 (20 MHz) + n28 (PCC, 20 MHz) + n78 (SCC, 100 MHz)



4.9.2 XS5G04-GBO Max Throughput

Table 4-19 XS5G04-GBO LTE / NR (SA) maximum throughput

Throughput		Downlink		Uplink	
Chip/Module		MTK Chip	XS Module	MTK Chip	XS Module *3
LTE		600 Mbps (Cat 12)	600 Mbps (Cat 12)	150 Mbps (Cat 13)	150 Mbps (Cat 13)
NR(SA)		2.3 Gbps	2.02 Gbps	1.25 Gbps	1150 Mbps *3

*1 The best supply voltage is 3.4v.

4.10 RF Antenna Connector Configuration

The module provides four antenna pads for connecting the external antennas.

Table 4-20 Antenna Function

Antenna Port	Function	Operating Frequencies
ANT0 (Main)	WCDMA/LTE/NR Primary TRX(SRS)	700 MHz ~ 2700 MHz
	NR Diversity TRX	2496 MHz ~ 5000 MHz
ANT1	MIMO (SRS)	1920 MHz ~ 5000 MHz
ANT2	NR Primary TRX (SRS)	2496 MHz ~ 5000 MHz
	LTE Diversity TRX(SRS)	1920 MHz ~ 5000 MHz
ANT3 (D/G)	MIMO(SRS)	700 MHz ~ 5000 MHz

Table 4-17 Antenna and Band Mapping

Antenna Port	TX	RX
ANT0 (Main)	LTE: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B29, B30, B32, B38, B39, B40, B41, B42, B43, B46, B48, B66, B71	LTE: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B29, B30, B32, B38, B39, B40, B41, B42, B43, B46, B48, B66, B71
	NR: n1, n2, n3, n5, n7, n8, n20, n25, n28, n30, n38, n39, n40, n41, n48, n66, n71, n77, n78, n79	NR: n1, n2, n3, n5, n7, n8, n20, n25, n28, n30, n38, n39, n40, n41, n48, n66, n71, n77, n78, n79
ANT1		
	LTE: B1, B2, B3, B4, B7, B25, B30, B32, B38, B39, B40, B41, B42, B43, B46 B48, B66	NR: n1, n2, n3, n7, n25, n30, n38, n39, n40, n41, n48, n66, n77, n78, n79
ANT2	LTE: B1, B2, B3, B4, B7, B25, B30, B32, B38, B39, B40, B41, B42, B43, B46, B48, B66	LTE: B1, B2, B3, B4, B7, B25, B30, B32, B38, B39, B40, B41, B42, B43, B46, B48, B66
	NR: n1, n2, n3, n7, n25, n30, n38, n39, n40, n41, n48, n66, n77, n78, n79	NR: n1, n2, n3, n7, n8, n25, n30, n38, n39, n40, n41, n48, n66, n77, n78, n79
ANT3 (G/D)		
	LTE: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26,	

		B28, B29, B30, B32, B38, B39, B40, B41, B42, B43, B46, B48, B66, B71
		NR: n1, n2, n3, n5, n7, n8, n20, n25, n28, n30, n38, n39, n40, n41, n48, n66, n71, n77, n78, n79

4.11 SRS (Sounding Reference Signal)

Sounding reference signals (SRS) are transmitted on the uplink and allow the network to estimate the quality of the channel at different frequencies.

4.11.1 Sounding Reference Signals

The SRS is used by the base station to estimate the quality of the uplink channel for large bandwidths outside the assigned span to a specific UE. This measurement cannot be obtained with the DRS since these are always associated to the PUSCH or PUCCH and limited to the UE allocated bandwidth. Unlike the DRS associated with the physical uplink control and shared channels the SRS is not necessarily transmitted together with any physical channel. If the SRS is transmitted with a physical channel, then it may stretch over a larger frequency band. The information provided by the estimates is used to schedule uplink transmissions on resource blocks of good quality.

The picture below shows the support for SRS function.

Picture 4-1: SRS support



4.12 DSS (Dynamic Spectrum Sharing)

DSS means that both NR & LTE have the same Band. Enabling DSS function can prevent LTE and NR from competing for resources.

DSS provides a very useful migration path from LTE to NR by allowing LTE and NR to share the same carrier.

The following picture is a DSS application example B2_N71 + B71 Interference (Enable DSS parameter)

Picture 4-2: DSS support, B71 + N71



Picture 4-3: DSS support, B71 + N71, downlink 135 Mbps. Can be stable transmission without NACK.



4.13 GPS Feature

4.13.1 Specification

The RF parts of GNSS are placed on chip MT6635. With GNSS technologies integrated on one chip, MT6880/MT6635 is the best and most convenient solution in the industry

4.13.2 Features

- Supports L1 (1575.42MHz)
GPS/GLONASS/Beidou/Galileo/QZSS concurrent reception
GPS/Galileo only (GPS only)
GPS/Galileo – GLONASS (G + G)
GPS/Beidou (G + B)
GPS/GLONASS/Beidou (G + G + B)
GPS/Galileo/GLONASS (G + G + G)
GPS/Galileo/GLONASS/Beidou (G + G + G + B)
- Support SBAS (Satellite Based Augmentation System)
WAAS/MSAS/EGNOS/GAGAN
- Full A-GPS capability
(E911/SUPL/EPO/HotStart)
- Active interference cancellation for up to 12 in-band tones
- 5 Hz update rate

4.13.3 Antenna Connector

I-PEX4 *1

4.13.4 Performance

- Time to First Fix (TTFF)

Description: Cold-start TTFF should be achieved in less than 45 seconds for 90% of the time. Cold-start is described as the following condition:

Test Result

TTFF	20 times average time
Cold start	35.7 sec
Warm start	32.8 sec
Hot start	1.2 sec

- Acquisition sensitivity

Test Result

Acquisition Sensitivity	-145dBm
-------------------------	---------

- Tracking sensitivity

Test Result

Tracking Sensitivity	-156dBm
----------------------	---------

5 Electrical Characteristics

5.1 About This Chapter

This chapter describes the electrical characteristics of the interfaces in the module, including:

- Absolute Maximum Ratings
- Recommended Operating Conditions
- DC Electrical Characteristics

5.2 Absolute Maximum Ratings

- Absolute maximum ratings for power supply

Pin Name	Description	Min.	Typ.	Max.
+3.3V	External power supply	3.135V	3.3V	6V

5.3 Recommended Operating Conditions

- Recommended operating conditions for power supply

Pin Name	Description	Min.	Typ.	Max.
+3.3V	External power supply	3.135V	3.3V	3.63V

5.4 DC Electrical Characteristics

■ Electrical characteristics of 1.8V Digital Pins

Parameter	Description	Min.	Typ.	Max.	Unit
VIH	Input logic low voltage	1.26		2.2	V
VIL	Input logic high voltage	-0.4		0.54	V
VOH	DC output logic low voltage	1.4			V
VOL	DC output logic high voltage			0.4	V

■ Electrical characteristics of 3.3V Digital Pins

Parameter	Description	Min.	Typ.	Max.	Unit
VIH	Input logic low voltage	2.31		3.63	V
VIL	Input logic high voltage	-0.4		0.99	V
VOH	DC output logic low voltage	2.9			V
VOL	DC output logic high voltage			0.4	V

■ USIM DC electrical characteristics

- USIM1_DATA
USIM1_PWR=1.8V

Parameter	Description	Min.	Typ.	Max.	Unit
VIH	Input logic low voltage	1.4	1.8	N/A	V
VIL	Input logic high voltage	N/A	0	0.27	V
VOH	DC output logic low voltage	1.4	1.8	1.9	V
VOL	DC output logic high voltage	N/A	0	0.27	V

● USIM1_CLK

USIM1_PWR=1.8V

Parameter	Description	Min.	Typ.	Max.	Unit
VIH	Input logic low voltage	1.4	1.8	N/A	V
VIL	Input logic high voltage	N/A	0	0.27	V
VOH	DC output logic low voltage	1.62	1.8	1.9	V
VOL	DC output logic high voltage	N/A	0	0.22	V

● USIM1_RESET

USIM1_PWR=1.8V

Parameter	Description	Min.	Typ.	Max.	Unit
VIH	Input logic low voltage	1.4	1.8	N/A	V
VIL	Input logic high voltage	N/A	0	0.27	V
VOH	DC output logic low voltage	1.62	1.8	1.9	V
VOL	DC output logic high voltage	N/A	0	0.36	V

● USIM1_DATA

USIM1_PWR =3.0V

Parameter	Description	Min.	Typ.	Max.	Unit
VIH	Input logic low voltage	2.6	3.0	N/A	V
VIL	Input logic high voltage	N/A	0	0.4	V
VOH	DC output logic low voltage	2.6	3.0	3.1	V
VOL	DC output logic high voltage	N/A	0	0.4	V

- USIM1_CLK
USIM1_PWR =3.0V

Parameter	Description	Min.	Typ.	Max.	Unit
VIH	Input logic low voltage	2.6	3.0	N/A	V
VIL	Input logic high voltage	N/A	0	0.4	V
VOH	DC output logic low voltage	2.7	3.0	3.1	V
VOL	DC output logic high voltage	N/A	0	0.4	V

- USIM1_RESET
USIM1_PWR =3.0V

Parameter	Description	Min.	Typ.	Max.	Unit
VIH	Input logic low voltage	2.6	3.0	N/A	V
VIL	Input logic high voltage	N/A	0	0.4	V
VOH	DC output logic low voltage	2.7	3.0	3.1	V
VOL	DC output logic high voltage	N/A	0	0.36	V

6

Process Specifications

6.1 About This Chapter

This chapter describes the process design and mechanical specification of the module, including:

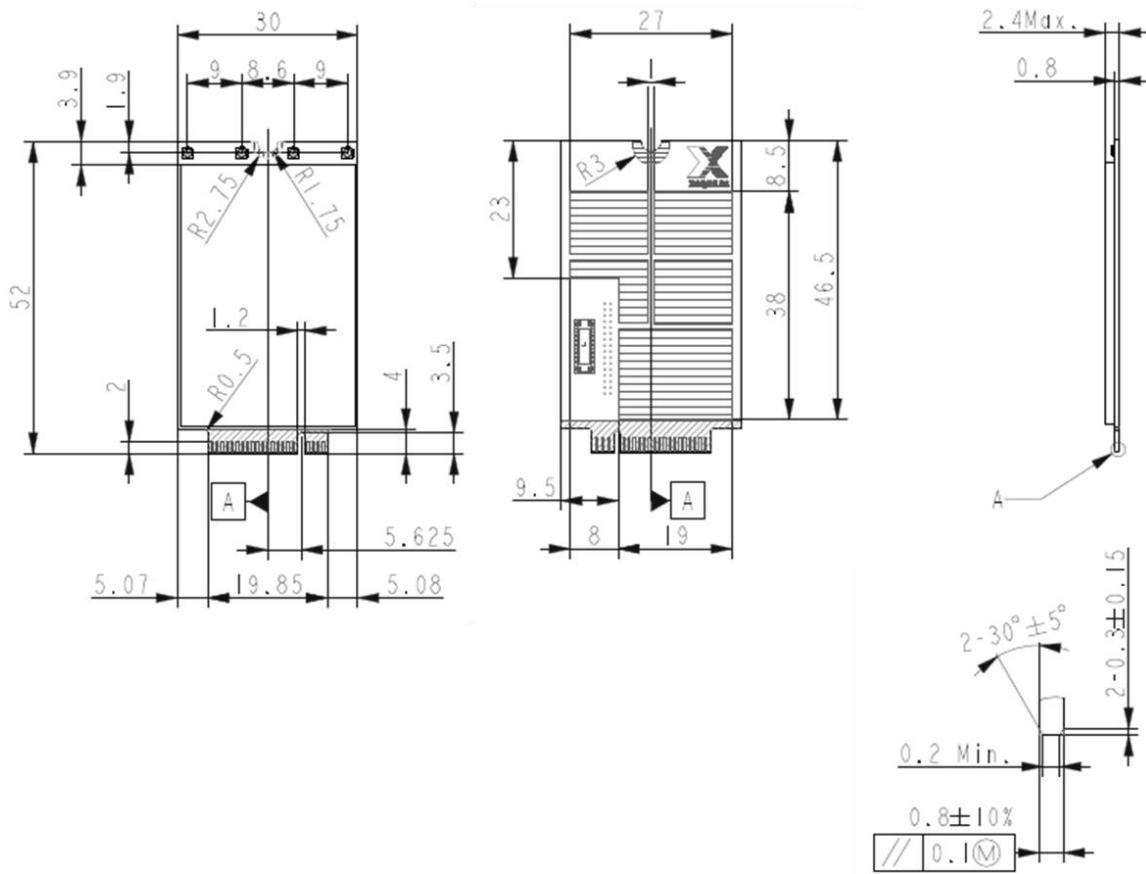
- Storage Requirement
- Moisture Sensitivity
- Dimensions
- Thermal Design Solution
- Assembly Processes

6.2 Storage Requirement

- The module must be stored by sealed antistatic PE bag with the TYVEK Clay desiccant inside, under a temperature below 40°C and the relative humidity less than 60%.

6.3 Dimensions

Picture 6-1



XSquare Co.

6.4 Thermal Design Solution

Package	SoC	PMIC	RF IC	ETM	GNSS
Model	MT6880	MT6330	MT6190	MT6308	MT6635
Package size (mm)	10.3x10.3	4.22x4.96	6.97x6.66	2.41x2.81	4.74x2.87
Package height (mm)	0.90	0.54	0.70	0.53	0.54
θ_{JC} (°C/W)	3.9	0.1	3.9	0.4	0.8
θ_{JB} (°C/W)	2.4	2.1	5.7	4.4	9.6
Recommended junction operating temp. range (°C)	-20~105	-30~125	-20~115	-20~125	-20~115
Absolute junction temp. range (°C)	-40 ~ 125	-65 ~ 150	-40 ~ 125	-40 ~ 150	-40 ~ 125

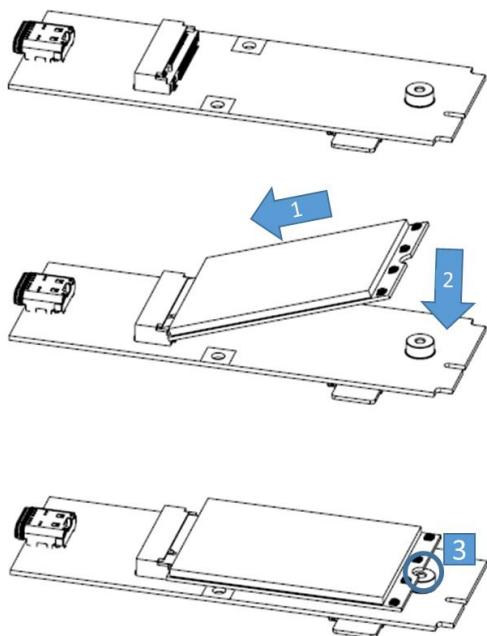
XSquare Communications

6.5 Assembly Processes

XS5G03/XS5G04 is M.2 module which follows PCI-express standard. Please follow the steps in Picture 6-2 to insert the module. Minimum two step insertion is desirable; intent is to minimize the insertion/extraction force.

- Step 1: As PCI-express standard, angled insertion is allowable and preferred. The recommend of angle of insertion is 20° . (minimum: 5°)
- Step 2 & 3: Push down XS5G03/XS5G04 and fix it with screw.

Picture 6-2



The RF connector on XS5G03/XS5G04 module is standard MHF 4 connector, the serial number is 20579-001E manufacture by I-PEX Corporation.

To prevent RF connector being damaged while install and uninstall RF cable, the recommend mating and unmating tool is I-PEX 90609-0001.

7 Certifications

7.1 About This Chapter

This chapter gives a general description of certifications of the module.

7.2 Certifications

[Table 7-1](#) shows certifications of the module has been implemented. For more demands, please contact us for more details about this information.

Table 7-1 Product Certifications

Certification	Model name
XG5G03-GBO / XS5G03-EUI / XS5G04-GBO	
CE	- Certification number: 2022Q3 ready
NCC	- XS5G03-GBO: CCAF22Y00750T2 - XS5G03-EUI: CCAF22Y0075AT4 - XS5G04-GBO: CCAF22Y00760T5
JRF/JPA	- 2022Q4 ready
FCC	- 2022Q3 ready

7.3 FCC Notice

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Integration instructions for host product manufacturers

Applicable FCC rules to module

FCC Part 22 / 24 / 27 / 90 / 96

Summarize the specific operational use conditions

The module is must be installed in mobile device.

This device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Limited module procedures

Not applicable

Trace antenna designs

Not applicable

RF exposure considerations

For mobile host

20 cm separation distance and co-located issue shall be met as mentioned in “Summarize the specific operational use conditions”.

Product manufacturer shall provide below text in end-product manual

“This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.”

For portable device

Antennas: Anjie (AELQ2S-B066L)

UMTS:

Band	Type	Connector	Gain
FDD II	Dipole	UFL	0.2
FDD V	Dipole	UFL	-1.2

LTE:

Band	Type	Connector	Gain
B2: 1850 MHz – 1910 MHz	Dipole	UFL	0.2
B4: 1710 MHz – 1755 MHz	Dipole	UFL	1.9
B5: 824 MHz – 849 MHz	Dipole	UFL	-1.2
B7: 2500 MHz – 2570 MHz	Dipole	UFL	-1.1
B12: 699 MHz – 716 MHz	Dipole	UFL	-0.7
B13: 777 MHz – 787 MHz	Dipole	UFL	-0.7
B14: 788 MHz – 798 MHz	Dipole	UFL	-0.7
B17: 704 MHz – 716 MHz	Dipole	UFL	-0.7
B18: 815 MHz – 830 MHz	Dipole	UFL	-1.2
B19: 830 MHz – 845 MHz	Dipole	UFL	-1.2
B25: 1850 MHz – 1915 MHz	Dipole	UFL	0.2
B26: 814 MHz – 849 MHz	Dipole	UFL	-1.2
B30: 2305 MHz – 2315 MHz	Dipole	UFL	-2.1
B66: 1710 MHz – 1780 MHz	Dipole	UFL	1.9
B38: 2570 MHz – 2620 MHz	Dipole	UFL	-1.1
B40: 2300 MHz – 2400 MHz	Dipole	UFL	-2.1
B41: 2496 MHz – 2690 MHz	Dipole	UFL	-1.1
B42: 3400 MHz – 3600 MHz	Dipole	UFL	-0.4
B46: 5150 MHz – 5925 MHz	Dipole	UFL	-0.8
B48: 3550 MHz – 3700 MHz	Dipole	UFL	-0.4

5G NR

Band	Type	Connector	Gain

N2	Dipole	UFL	0.2
N5	Dipole	UFL	-1.2

Label and Compliance Information

Product manufacturers need to provide a physical or e-label stating

“Contains FCC ID: 2A7G3XS5G0304” with finished product

Information on Test Modes and Additional Testing Requirements

Simulator is required to link up and set the module to transmit at specific frequency, output power level under operation mode.

Additional Testing, Part 15 Subpart B Disclaimer

The module is only FCC authorized for the specific rule parts listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed

7.4 CE Notice

Europe – EU Declaration of Conformity

This device complies with the essential requirements of the Radio Equipment directive: 2014 / 53 / EU. The following test methods have been applied in order to prove presumption of conformity with the essential requirements of the Radio Equipment directive: **2014 / 53 / EU**:

EN 303 413 V1.2.1
EN 301 908-1 V15.1.1
EN 301 908-2 V13.1.1
EN 301 908-13 V13.2.1
Draft ETSI EN 301 908-25 V15.1.1_0.0.9
EN IEC 62311:2020
EN 50665: 2017
EN 301 489-1 V2.2.3
EN 301 489-19 V2.1.1
EN 301 489-52 V1.2.1
EN 62368-1:2014 /A11:2017

Antennas: Anjie (AELQ2S-B0660)

UMTS:

Band	Type	Connector	Gain
FDD I	Dipole	UFL	2.4
FDD VIII	Dipole	UFL	1.7

LTE:

Band	Type	Connector	Gain
01: 1920 MHz – 1980 MHz	Dipole	UFL	2.4
03: 1710 MHz – 1785 MHz	Dipole	UFL	2.4
07: 2500 MHz – 2570 MHz	Dipole	UFL	2.4
20: 832 MHz – 862 MHz	Dipole	UFL	1.7
28: 703 MHz – 748 MHz	Dipole	UFL	-2.4

5G NR

Band	Type	Connector	Gain
N1	Dipole	UFL	2.4
N3	Dipole	UFL	2.4
N28	Dipole	UFL	-2.4
N78	Dipole	UFL	1.6
N41	Dipole	UFL	2.4
N77	Dipole	UFL	2.6

SW version:

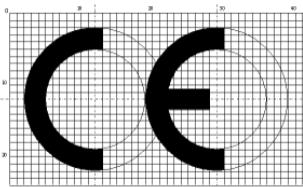
XS5G03: MD.XS.03.03.F

XS5G04: MD.XS.04.01

RF exposure statement

The minimum distance between the user and/or any bystander and the radiating structure of the

transmitter is 20cm.



7.5 NCC Notice

減少電磁波影響，請妥適使用

電波功率密度 MPE 標準值： 1 mW/cm^2 ，送測產品實測值： 0.091 mW/cm^2 ，建議使用時設備天線至少距離人體 20 公分

8 Safety Information

2022Q3 ready

EN 62368-1

XSquare Communications Corp.

9

Package

9.1 About This Chapter

This chapter gives a general description of the package of XS5G03 and XS5G04 module.

9.2 Packing Datasheet

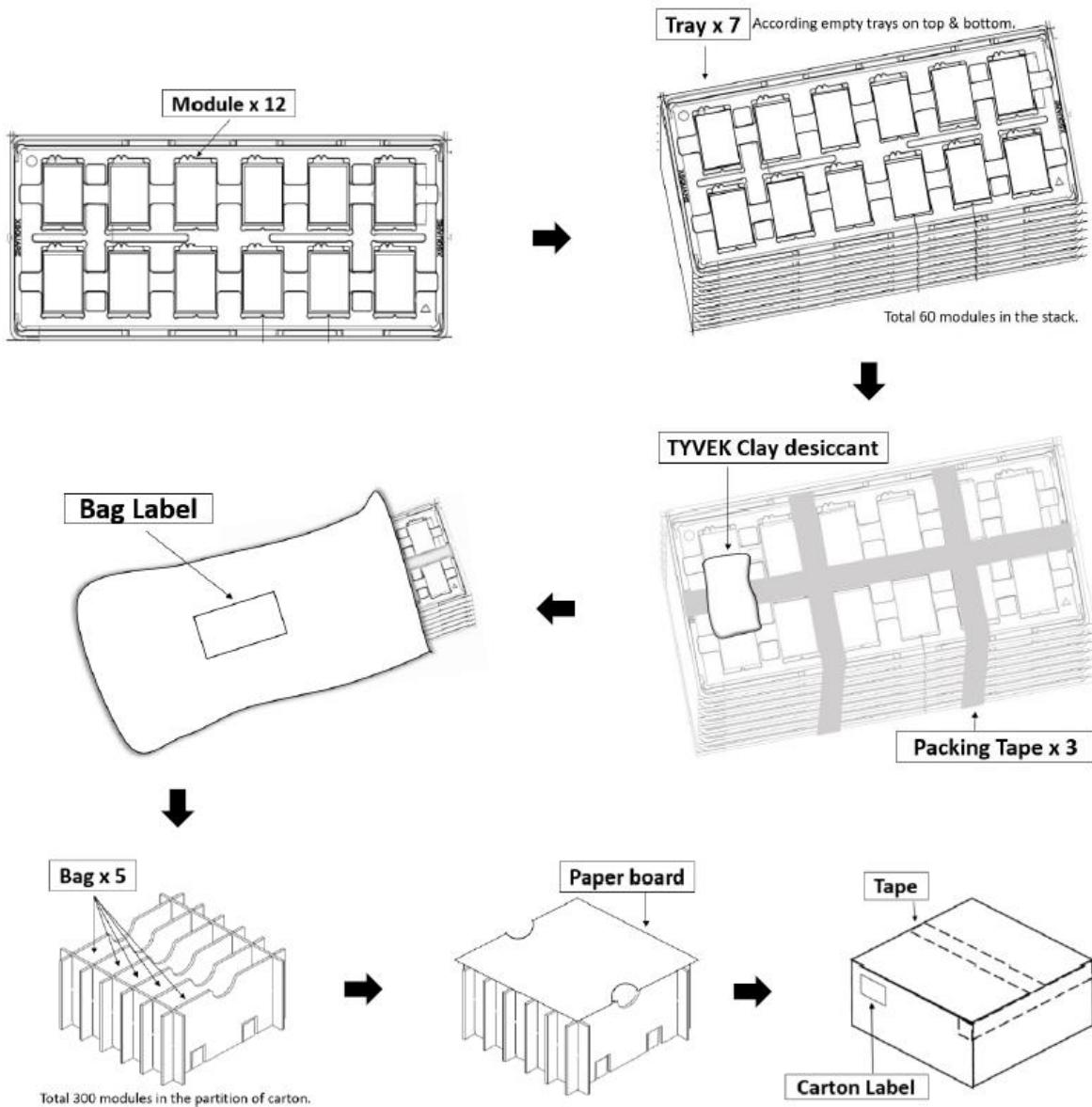
XS5G03 and XS5G04 module uses tray package, 12 pcs per tray, 7 trays per PE bag (including two empty trays on top and bottom), and 5 bags per carton, 16 cartons per pallet.

Picture 9-1 Tray size (unit: mm)



Full package process is shown as below:

1. 12 pcs module per tray, use 5 trays to package 60 modules at a time.
2. Place two empty trays on the top and bottom of 5-tray stack for protect module being damage while shipping.
3. Bundled the stack by packing tape x 3.
4. Pack the stack and the TYVEK Clay desiccant with antistatic PE bag, then seal it by hot pressing and stick a label on the PE bag.
5. Place the 5 bags and the IMEI document into partition of carton. (Carton: 429*429*240mm)
6. Paper board on top sides to prevent damage wile shipping.
7. Seal the carton and stick carton label.
8. Carton will be stacked 4x4 layers per pallet.

Picture 9-2 Tray Packaging Procedure


10 Appendix

XSquare Communications Corp.