5G M.2 Module
User Manual

FCC-ID: GKRRXMG1
IC: 2533B-RXMG1
Module name: RXM-G1

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1. Foreword

1.1 Introduction

This document describes the hardware of the COMPAL® 5G RXM-G1 M.2 Module products. It helps you quickly retrieve interface specifications, electrical and mechanical details, and information on the requirements to be considered for integrating further components.

1.2 Safety Information

The following safety precautions must be observed during all phases of operation, such as usage, service or repair of any cellular terminal or mobile incorporating with 5G RXM-G1 M.2 module. Manufacturers of the cellular terminal should send the following safety information to users and operating personnel, and incorporate these guidelines into all manuals supplied with the product. If not so, Compal assumes no liability for customers' failure to comply with these precautions.

Full attention must be given to driving at all times in order to reduce the risk of an accident. Using a mobile while driving (even with a hands free kit) causes distraction and can lead to an accident. Please comply with laws and regulations restricting the use of wireless devices while driving.

Switch off the cellular terminal or mobile before boarding an aircraft. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. If the device offers an Airplane Mode, then it should be enabled prior to boarding an aircraft. Please consult the airline staff for more restrictions on the use of wireless devices on boarding the aircraft.

Wireless devices may cause interference on sensitive medical equipment, so please be aware of the restrictions on the use of wireless devices when in hospitals, clinics or other healthcare facilities.

Cellular terminals or mobiles operating over radio signals and cellular network cannot be guaranteed to connect in all possible conditions (for example, with unpaid bills or with an invalid (U) SIM card). When emergent help is needed in such conditions, please remember using emergency call. In order to make or receive a call, the cellular terminal or mobile must be switched on in a service area with adequate cellular signal strength.

The cellular terminal or mobile contains a transmitter and receiver. When it is ON, it receives and transmits radio frequency signals. RF interference can occur if it is used close to TV set, radio, computer or other electric equipment.

In locations with potentially explosive atmospheres, obey all posted signs to turn off wireless devices such as your phone or other cellular terminals. Areas with potentially explosive atmospheres include fueling areas, below decks on boats, fuel or chemical transfer or storage facilities, areas where the air contains chemicals or particles such as grain, dust or metal powders, etc.

2. Overview

2.1 Introduction

5G RXM-G1 M.2 MODULE is a highly integrated 5G NR wireless communication module that adopts standard PCIe RXM-G1M.2 interface and backward supports with LTE/WCDMA system. It is applicable to most broadband communication networks of the mobile operator across the world.

RXM-G1 has capability on 5G NR Sub6 and mmWave on HW design and using SW to inactive on 5G NR mmWave function.

2.2 Specification

Table 2-1 RXM-G1 5G M.2 module features

Specification		
Platform	QCT SDX55 Cortex-A7 up to 1.5 GHz	
Memory	4Gb NAND Flash (ONFI) with 4Gb LPDDR4X(1.8GHz) MCP	
Operating Band	5G NR_ Sub6 : n2, n5, n41, n48, n66, n71	
	5G NR_mmWave: n258, n260, n261 (Using SW to inactive 5G mmWave fuction)	
	LTE FDD: B2, B4, B5, B7, B12, B13, B14, B25, B26[1], B30, B66, B71 LTE FCC Downlink only: B29	
	LTE TDD: B41, B48 LTE TDD Downlink only: B46	
	WCDMA/HSPA+: B1, B2, B4, B5, B8	
	Simultaneous GPS L1, GLONASS(GLO), Galileo(GAL) and BeiDou(BDS)	
Network option	SA	Option 2
	NSA	Option 3x/3a
Downlink	LTE	LTE CAT20
	5G sub-6	1CC; Max BW 100MHz; MIMO 4x4
	5G mmWave	8CC; Max BW 800MHz;MIMO 2x2

[1] In Canada region, LTE Band 26 is unable by SW.

Uplink	LTE	LTE CAT13
	5G sub-6	1CC; Max BW 100MHz;
	5G mmWave	8CC; Max BW 800MHz;MIMO 2x2
HPUE (Class 2)	B41	
DL 4x4 MIMO	B2, B4, B7, B25, B30, B41, B48, B66 n2, n41, n66	
Carrier aggregation	ULCA, DLCA and EN-DC	
SRS antenna switching	n41 : 1T2R(NSA)	
Power Supply	DC 3.135V～3.465V, Typical 3.3V	
Temperature	Operating temperature[1]:-10°C ～+55°C	
	Extended temperature[2] : -25°C ～+75°C	
	Storage temperature: -40°C ～+85°C	
Physical characteristics	Interface: PCIe M.2 Key B	
	Dimension: 30x52 mm, Thickness=2.25 mm(typ.)	
	Weight: 9.3g	
Interface		
Antenna Connector	3/4G/Sun6G Antenna x 4	
	mmWave Antenna x 3	
	Support 4x4 MIMO	
Function Interface	Single USIM 2.95V/1.8V	
	PCIe Gen3_1xlane	
	USB2.0 HS /USB3.1 SS	
	W_Disable#	
	Body Sar	
	LED control pin	
	Tunable antenna(1xMIPI)	
	I2S(Reserved)	
Software		

Driver	Windows 19H1 and later, Linux kernel v4.4 [3]
Protocol Stack	IPV4/IPV6
AT commands	3GPP TS 27.007 and 27.005
Firmware update	FOTA
Others feature	Windows MBIM support
	Windows update
	Support 5G NR NSA
	Multiple carrier aggregation
	AGNSS

2.3 Operating Band

The 5G RXM-G1 M.2 Module operating bands of the antennas are as follows:

Table 4-5

Band name	Tx (MHz)	Rx (MHz)	LTE	UMTS	5G NR
PCS (1900)	1850 - 1910	1930 - 1990	B2	B2	n2
AWS	1710 - 1755	2110 - 2155	B4	B4	–
Cell (850)	824 - 849	869 - 894	B5	B5	n5
IMT-E (2600)	2500 - 2570	2620 - 2690	B7		
700 lower A–C	699 - 716	729 - 746	B12		
700 upper C	777 - 787	746 - 756	B13		
700 D	788 - 798	758 - 768	B14		
PCS + G	1850 - 1915	1930 - 1995	B25		
B26	814 - 849	859 - 894	B26		
FLO	*N/A*	716 - 728	B29		
WCS	2305 - 2315	2350 - 2360	B30		
B41/B41-XGP	2496 - 2690		B41		n41
B46	5150 – 5925		B46		
B48	3550 - 3700		B48		n48
B66	1710 - 1780	2110 - 2200	B66		n66
B71	663 - 698	617 - 652	B71		n71

2.4 Transmitting Power

The transmitting power for each band of the RXM-G1 XX Module as shown in the following table:

Table 4-6 WCDMA

Mode	Band	Typical Value (dBm)	Note
WCDMA	Band 1	23	±2
	Band 2	23	±2
	Band 4	23	±2
	Band 5	23	±2
	Band 8	23	±2

Table 4-7 LTE FDD

Mode	Band	Typical Value (dBm)	Note
LTE FDD	Band 2	23	±2
	Band 4	23	±2
	Band 5	23	±2
	Band 7	23	±2
	Band 12	23	±2
	Band 13	23	±2
	Band 14	23	±2
	Band 25	23	±2
	Band 26	23	±2
	Band 30	23	±2
	Band 66	23	±2
	Band 71	23	±2

Table 4-8 LTE TDD

Mode	Band	Typical Value (dBm)	Note
LTE TDD	Band 41	26	±2
	Band 48	23	±2

Table 4-9 NR-FR1 FDD

Mode	Band	Typical Value (dBm)	Note
NR-FR1 FDD	n2	23	±2
	n5	23	±2
	n48	23	±2
	n66	23	±2
	n71	23	±2

Table 4-10 NR-FR1 TDD

Mode	Band	Typical Value (dBm)	Note
NR-FR1 TDD	n41	23 (LTE+NR)	±2

2.5 Antennas (Maximum allowable gain)

Vendor	Modulation	Frequency (MHz)	Max. Allowable Antenna 1 Gain (dBi)	Max. Allowable Antenna 2 Gain (dBi)
Pulse	WCDMA / HSPA Band II	1852.4 ~ 1907.6	10.07	---
	WCDMA / HSPA Band IV	1712.4 ~ 1752.6	6.20	---
	WCDMA / HSPA Band V	826.4 ~ 846.6	9.42	---
	LTE Band 2 / NR n2	1850 ~ 1910	7.50	---
	LTE Band 4	1710 ~ 1755	6.14	---
	LTE Band 5 / NR n5	824 ~ 849	7.00	---
	LTE Band 7	2500 ~ 2570	8.00	---
	LTE Band 12	699 ~ 716	6.40	---
	LTE Band 13	777 ~ 787	7.00	---
	LTE Band 14	788 ~ 798	9.21	---
	LTE Band 25	1850 ~ 1915	8.39	---
	LTE Band 26	824 ~ 849	7.40	---
	LTE Band 26 (Part 90S)	814 ~ 824	7.40	---
	LTE Band 30	2305 ~ 2315	1.22	---
	LTE Band 41 / NR n41	2496 ~ 2690	7.68	---
	LTE Band 48/ NR n48	3550 ~ 3700	-2.00	-2.14
	LTE Band 66 / NR n66	1710 ~ 1780	7.50	---
	LTE Band 71 / NR n71	663 ~ 698	6.50	---

3. Legal Information

FCC Statement:
Any device incorporating this module must include an external, visible, permanent marking or label which states: "Contains FCC ID: GKRRXMG1"

The RXM-G1 modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) 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.

15.21
You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the 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 of the device.

This module has been tested and found to comply with the following requirements for Modular Approval.

Part 2.1046 – Measurements required: RF power output
Part 22H – Cellular radiotelephone service
Part 24E – Broadband PCS
Part 27C – Technical standards
Part 90S – Regulations governing licensing and use of frequencies in the 806-824, 851-869, 896-901, and 935-940 MHz Bands, 851-869, 896-901, and 935-940 MHz Bands
PART 96—CITIZENS BROADBAND RADIO SERVICE

FCC RF Exposure:
This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled

environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

ISED Notice

Required End Product Labeling
Any device incorporating this module must include an external, visible, permanent marking or label which states: “Contains IC : 2533B-RXMG1”

Obligation d'étiquetage du produit final:
Tout dispositif intégrant ce module doit comporter un externe, visible, marquage permanent ou une étiquette qui dit: "Contient IC : 2533B-RXMG1”

Test Modes
Compal Electronics, Inc. uses various test mode programs for test set up which operate separate from production firmware. Host integrators should contact Compal Electronics, Inc. for assistance with test modes needed for module/host compliance test requirements.

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/warming as shown in User manual.

In the end product, the antenna(s) used with this transmitter must not be co-located or operation in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures. User and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying the RF exposure compliance.

Canadian Notice

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. *This device may not cause interference.*
2. *This device must accept any interference, including interference that may cause undesired operation of the device.*

Avis Canadien

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. *L'appareil ne doit pas produire de brouillage;*
2. *L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

Caution: Exposure to Radio Frequency Radiation.

1. To comply with the Canadian RF exposure compliance requirements, this device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.
2. To comply with RSS 102 RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

Attention: exposition au rayonnement radiofréquence.

1. Pour se conformer aux exigences de conformité RF canadienne l'exposition, cet appareil et son antenne ne doivent pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.
2. Pour se conformer aux exigences de conformité CNR 102 RF exposition, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de cet appareil et toutes les personnes

RF Radiation Exposure Statement:

1. To comply with the Canadian RF exposure compliance requirements, this device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

2. For body worn operation, this device has been tested and meets RF exposure guidelines when used with an accessory that contains no metal. Use of other accessories may not ensure compliance with RF exposure guidelines.

Déclaration de l'exposition aux radiations RF:

1. Pour se conformer aux exigences de conformité RF canadienne l'exposition, cet appareil et son antenne ne doivent pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.
2. Pour le fonctionnement du corps, cet appareil a été testé et répond aux directives d'exposition RF lorsqu'il est utilisé avec un accessoire qui ne contient pas de métal. Utilisation d'autres accessoires peut ne pas assurer le respect des directives d'exposition RF.