



# RMM-G1 Module User Manual



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## 1. Foreword

### 1.1 Introduction

This document describes the hardware of the COMPAL® 5G RMM-G1 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 RMM-G1 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

The RMM-G1 devices are WWAN module in size 30x52mm. The module and device software combination deliver multi band, multi-mode WWAN connectivity in a single hardware configuration. RMM-G1 supports 5G Sub-6G n1/n2/ n3/ n5/ n7/ n8/ n20/ n25/ n28/ n30/ n38/ n40/ n41/ n48/ n66/ n71/ n77/ n78/ n79 , LTE 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, WCDMA Band B1/ B2/ B4/ B5/ B8. The RMM-G1 devices also have an internal GPS receiver that can operate standalone or in simultaneous operation with its WWAN radios.

The RMM-G1 device uses Qualcomm chipset components. It implements the 5G NR standard for sub-6 GHz bands. The MT6880 device is a highly-integrated multimode, multiband RF CMOS transceiver IC that interfaces with the MT6190 device through IQ interface; it is the integrated single-chip RFIC that supports 5G NR sub-6 /mm Wave together with 4G LTE.

RMM-G1 supported features for the NR FR1, Duplex mode: FDD (Frequency Division Duplex) and TDD ((Time Division Duplex)). MIMO (Multi-input Multi-output) capability: up to 4x4 DL MIMO; CA (Carrier Aggregation) capability: DLCA: inter-band, intra-band contiguous and intra-band non-contiguous DLCA; ULCA: inter-band. Modulation: UL: 256QAM; DL: 256QAM. Waveform: UL: CP-OFDM and DFT-S-OFDM; DL: CP-OFDM.



## 2.2 Transmitting Power

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

**Table 2-1 WCDMA**

| Mode  | Band   | Typical Value (dBm) | Note      |
|-------|--------|---------------------|-----------|
| WCDMA | Band 1 | 24.5                | +0.5/-0.2 |
|       | Band 2 | 24.5                | +0.5/-0.2 |
|       | Band 4 | 24.5                | +0.5/-0.2 |
|       | Band 5 | 24.5                | +0.5/-0.2 |
|       | Band 8 | 24.5                | +0.5/-0.2 |

**Table 2-2 LTE FDD**

| Mode    | Band    | Typical Value (dBm) | Note      |
|---------|---------|---------------------|-----------|
| LTE FDD | Band 1  | 24                  | +0.5/-0.2 |
|         | Band 2  | 24.5                | +0.5/-0.2 |
|         | Band 3  | 24                  | +0.5/-0.2 |
|         | Band 4  | 24.5                | +0.5/-0.2 |
|         | Band 5  | 24.5                | +0.5/-0.2 |
|         | Band 7  | 24.5                | +0.5/-0.2 |
|         | Band 8  | 24                  | +0.5/-0.2 |
|         | Band 12 | 24.5                | +0.5/-0.2 |
|         | Band 13 | 24.5                | +0.5/-0.2 |
|         | Band 14 | 24.5                | +0.5/-0.2 |
|         | Band 17 | 24.5                | +0.5/-0.2 |
|         | Band 18 | 24.5                | +0.5/-0.2 |
|         | Band 19 | 24.5                | +0.5/-0.2 |
|         | Band 20 | 24                  | +0.5/-0.2 |
|         | Band 25 | 24.5                | +0.5/-0.2 |
|         | Band 26 | 24.5                | +0.5/-0.2 |
|         | Band 28 | 24                  | +0.5/-0.2 |
|         | Band 30 | 22.48               | +0.5/-0.2 |
|         | Band 66 | 24.5                | +0.5/-0.2 |





|  |         |      |           |
|--|---------|------|-----------|
|  | Band 71 | 24.5 | +0.5/-0.2 |
|--|---------|------|-----------|

Table 2-3 LTE TDD

| Mode    | Band             | Typical Value (dBm) | Note      |
|---------|------------------|---------------------|-----------|
| LTE TDD | Band 34          | 24                  | +0.5/-0.2 |
|         | Band 38          | 24.5                | +0.5/-0.2 |
|         | Band 39          | 24.5                | +0.5/-0.2 |
|         | Band 40          | 24                  | +0.5/-0.2 |
|         | Band 41(HPUE)    | 27                  | +0.5/-0.2 |
|         | Band 41          | 24.5                | +0.5/-0.2 |
|         | Band 42          | 24                  | +0.5/-0.2 |
|         | Band 43          | 24                  | +0.5/-0.2 |
|         | Band 48 for FCC  | 22                  | +0/-0.2   |
|         | Band 48 for ISDE | 24.5                | +0.5/-0.2 |
|         |                  |                     |           |



Table 2-4 NR-FR1 FDD

| Mode          | Band | Typical Value (dBm) | Note      |
|---------------|------|---------------------|-----------|
| NR-FR1<br>FDD | n1   | 24                  | +0.5/-0.2 |
|               | n2   | 24.5                | +0.5/-0.2 |
|               | n3   | 24                  | +0.5/-0.2 |
|               | n5   | 24.5                | +0.5/-0.2 |
|               | n7   | 24.5                | +0.5/-0.2 |
|               | n8   | 24                  | +0.5/-0.2 |
|               | n20  | 24                  | +0.5/-0.2 |
|               | n25  | 24.5                | +0.5/-0.2 |
|               | n28  | 24                  | +0.5/-0.2 |
|               | n30  | 22.48               | +0.5/-0.2 |
|               | n66  | 24.5                | +0.5/-0.2 |
|               | n71  | 24.5                | +0.5/-0.2 |

Table 2-5 NR-FR1 TDD

| Mode          | Band         | Typical Value (dBm) | Note      |
|---------------|--------------|---------------------|-----------|
| NR-FR1<br>TDD | n38          | 24.5                | +0.5/-0.2 |
|               | n40          | 24                  | +0.5/-0.2 |
|               | n41 (HPUE)   | 27                  | +0.5/-0.2 |
|               | n41          | 24.5                | +0.5/-0.2 |
|               | n48 for FCC  | 22                  | +0/-0.2   |
|               | n48 for ISDE | 24.5                | +0.5/-0.2 |
|               | n77 (HPUE)   | 26.5                | +0.5/-0.2 |
|               | n77          | 24.5                | +0.5/-0.2 |
|               | n78 (HPUE)   | 26.5                | +0.5/-0.2 |
|               | n78          | 24.5                | +0.5/-0.2 |
|               | n79 (HPUE)   | 27                  | +0.5/-0.2 |
|               | n79          | 24.5                | +0.5/-0.2 |



## 2.3 Antennas (Maximum allowable gain)

Table 2-4 Maximum allowable gain

| Modulation                             | Frequency (MHz) | Max. Allowable Antenna Gain (dBi) |
|--|-----------------|-----------------------------------|
| WCDMA B2/ LTE Band 2/FR1 Band n2       | 1850 ~ 1910     | 8                                 |
| WCDMA B4/ LTE Band 4                   | 1710 ~ 1755     | 5                                 |
| WCDMA B5/ LTE Band 5/ FR1 Band n5      | 824 ~ 849       | 6                                 |
| LTE Band 7/ FR1 Band n7                | 2500 ~ 2570     | 8                                 |
| LTE Band 12                            | 699 ~ 716       | 5.5                               |
| LTE Band 13                            | 777 ~ 787       | 5.5                               |
| LTE Band 14                            | 788 ~ 798       | 5.5                               |
| LTE Band 17                            | 704 ~ 716       | 5.5                               |
| LTE Band 25/ FR1 Band n25              | 1850 ~ 1915     | 8                                 |
| LTE Band 26                            | 814 ~ 849       | 6                                 |
| LTE Band 30/ FR1 Band n30              | 2305~2315       | 1                                 |
| LTE Band 38/ FR1 Band n38              | 2570 ~ 2620     | 5.5                               |
| LTE Band 41/ FR1 Band n41              | 2496 ~ 2690     | 5.5                               |
| LTE Band 48/ FR1 Band n48<br>For FCC   | 3550~3700       | 1                                 |
| LTE Band 48/ FR1 Band n48<br>For ISSED | 3550~3700       | 5                                 |
| LTE Band 66/ FR1 Band n66              | 1710~ 1780      | 5                                 |
| LTE Band 71/ FR1 Band n71              | 663 ~ 698       | 5                                 |
| FR1 Band n77 PC3                       | 3300~3980       | 5                                 |

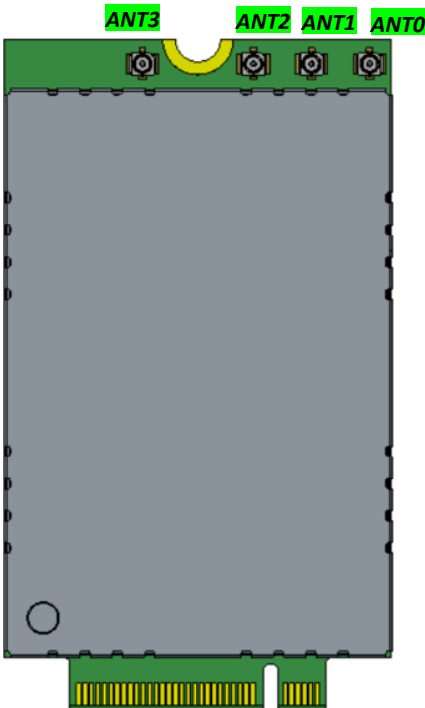


|                  |           |   |
|------------------|-----------|---|
| FR1 Band n77 PC2 | 3300~3980 | 3 |
| FR1 Band n78 PC3 | 3550~3700 | 5 |
| FR1 Band n78 PC2 | 3300~3450 | 3 |



Table 2-5: Antenna port mapping table

| Band        |  | Frequency    |  | Ant_0                   | Ant_1 | Ant_2                | Ant_3 |
|-------------|--|--------------|--|-------------------------|-------|----------------------|-------|
| LB          |  | 617-960MHz   |  | Tx0/PRx                 |       |                      | DRX   |
| MHB         |  | 1427-2690MHz |  | (Tx0/PRx) <sup>*1</sup> | PRx2  | (DRX2) <sup>*1</sup> | DRX   |
| n41         |  | 2496-2690MHz |  | Tx0/PRx                 | PRx2  | Tx1/DRx2             | DRX   |
| n77/n78/n79 |  | 3300-5000MHz |  | Tx0/PRx                 | PRx2  | Tx1/DRx2             | DRX   |
| LAA         |  | 5150-5825MHz |  | Tx0/PRx                 | PRx2  | Tx1/DRx2             | DRX   |
| GPS L1      |  | 1559-1607MHz |  |                         |       |                      | Rx    |





### 3. FCC Notice

Model: RMM-G1

#### **Important Notice to OEM integrators**

1. This module is limited to OEM installation ONLY.
2. This module is limited to installation in mobile or fixed applications, according to Part 2.1091(b).
3. The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations
4. For FCC Part 15.31 (h) and (k): The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part 15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions). The host manufacturer must verify that there are no additional unintentional emissions other than what is permitted in Part 15 Subpart B or emissions are compliant with the transmitter(s) rule(s).

#### **Antenna Installation**

- (1) The antenna must be installed such that 20 cm is maintained between the antenna and users.
- (2) The transmitter module may not be co-located with any other transmitter or antenna.
- (3) To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile exposure condition must not exceed:

In the event that these conditions cannot 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 cannot 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.



## Manual Information to the End User

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.

## Module Warning statements

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
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 or more 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.

## RF Exposure

This device has been tested and meets applicable limits for Radio Frequency (RF) exposure. The antenna(s) used for this transmitter should be installed and operated with minimum distance 20 cm between the radiator & your body.

## Label requirements

Any device incorporating this module must include an external, visible, permanent marking or label which states:

“Contains FCC ID: GKRRMMG1”



## Industry Canada Statement

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.

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.

CAN ICES-3(B)/ NMB-3(B)

## Radiation Exposure Statement

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

Cet équipement est conforme aux limites d'exposition aux rayonnements FCC/IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

To ensure RF exposure compliance under portable exposure conditions, the antenna(s) used with this module must be installed in host platforms to provide a 25 mm minimum separation distance from all persons, in all operating modes and orientations of the host platform. The antenna separation distance applies to both horizontal and vertical orientation of the antenna when installed in the host system. Any separation distances less than 25 mm will require additional evaluation and ISED authorization.

OEM integrators must identify all possible combinations of simultaneous transmission configuration for all transmitters and antennas installed in the host platform. When there are multiple transmitting devices installed in a host platform, an RF exposure evaluation for the simultaneous transmission condition must be performed.

## End Product Labeling

When the module is installed in the host device, the IC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text:

"Contains IC: 2533B-RMMG1"





## 4. Legal Information



Hereby, Compal Electronics, Inc., declares that this device is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: [www.compal.com](http://www.compal.com)



Hereby, Compal Electronics, Inc., declares that this device is in compliance with Radio Equipment Regulations 2017. The full text of the UK declaration of conformity is available at the following internet address: [www.compal.com](http://www.compal.com)

This device has been tested and meets applicable limits for Radio Frequency (RF) exposure. This equipment should be installed and operated to ensure a minimum of 20 cm spacing to any person at all times.



### Waste Electrical and Electronic Equipment (WEEE)

This symbol means that according to local laws and regulations your product and/or its battery shall be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. Proper recycling of your product will protect human health and the environment.

### 電磁波警語

減少電磁波影響，請妥適使用。

### WCDMA 頻段宣告

RMM-G1 支援 WCDMA B1/8

### LTE 頻段宣告

RMM-G1 支援 B1/3/7/8/28/38/41.

### 5G NR 頻段宣告

RMM-G1 支援 n1/n3/n7/n8/n38/n41/n78(3300~3570MHz)/n79

電波功率密度 MPE 標準值為：\_\_\_\_ mW/cm<sup>2</sup>，送測產品實測值為：\_\_\_\_ mW/cm<sup>2</sup>，  
建議使用時設備天線至少距離人體\_\_\_\_ 公分。

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