

MD2000

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MD2000 User's manual / Integration Guide

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Regulatory Compliance

This section summarizes the responsibilities and actions required of manufacturers and integrators who incorporate OEM versions of the Inseego Corp. MD2000 module device into their products. In certain situations and applications, these products will require additional FCC or other regulatory approvals prior to sale or operation.

Appropriate instructions, documentation and labels are required for all products. For more information concerning regulatory requirements, please contact Inseego Corp.

FCC CERTIFICATION

Inseego Corp. certifies that the MD2000 Radio Module FCC ID: PKRISGMD2000 complies with the RF requirements applicable to broadband PCS equipment operating under the authority of 47 CFR Part 22, Part 24, and Part 27 of the FCC Rules and Regulations. This certification is contingent upon installation, operation and use of the MD2000 module device and its host product in accordance with all instructions provided to both the OEM and end user. When installed and operated in a manner consistent with the instructions provided, the MD2000 module device meets the maximum permissible exposure (MPE) limits for general population / uncontrolled exposure as defined in Section 1.1310 of the FCC Rules and Regulations.

The MD2000 modem device is designed for use in a variety of host units, "enabling" the host platform to perform wireless data communications. However, there are certain criteria relative to integrating the modem into a host platform such as a PC, laptop, hand-held, monitor and control unit, etc. that must be considered to ensure continued compliance with FCC compliance requirements.

Important Information for Integrators

This section provides guidance for using the MD2000 in host devices through the FCC Permissive Change process. When utilizing the permissive change process, Inseego Corp., the grantee, is responsible for all integrations and must be consulted on all regulatory matters involving the MD2000.

The MD2000 module device is granted with FCC modular approval for mobile¹ applications, and may be installed as a standalone² transmitter in final products meeting the following conditions. If the following conditions are followed, it may be used in final products without additional FCC-certification. Otherwise, additional FCC approvals must be obtained.

- The transmitter antenna connected to the MD2000 module device must be installed to provide at least 20cm separation from the human body at all times.
- The MD2000 module device and transmitter antenna must not be co-located with any other transmitter or antenna within a host device.
- A label containing the FCC ID must be permanently affixed to the exterior of the host device into which the MD2000 module device is installed. The label may also be under a panel or battery pack if it is readily accessible and cannot be separated from the host device itself. The label must contain a statement similar to the following;

➤ Contains FCC ID: PKRISGMD2000

If any of these conditions are not met, then additional information should be sought from the FCC or an FCC qualified test laboratory.

If the MD2000 module device is intended for use in a portable device, the OEM integrator is responsible for approval to satisfy FCC-SAR requirements. Refer to FCC OET Bulletin 65 Supplement C for information about FCC RF exposure compliance requirements for mobile and portable devices. The system user manuals and other documentation must clearly indicate operating conditions that must be observed to ensure compliance with FCC-RF exposure guidelines and also include appropriate caution and warning statements and information.

The host device containing the MD2000 module device may also require compliance to FCC Part 15 Subpart B – Unintentional Radiators.

Insego Corp. has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the device. See 47 CFR Sec. 15.21. The 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. See 47 CFR Sec. 15.19.

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.

If the FCC ID of the module is not visible when installed in the host platform, then a permanently attached or marked label must be displayed on the host unit referring to the module.

The label should contain wording such as:

Contains FCC ID:XXXXXXXX

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.

ISED CERTIFICATION

IC: 3229A-MD2000

ISED RSS-Gen Notice

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-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.

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Les dispositifs fonctionnant dans la bande de 5 150 à 5 250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

ISED Canada ICES-003 Compliance

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

A label containing the ISED Certification number must be permanently affixed to the exterior of the host device into which the MD2000 module device is installed. The label may also be under a panel or battery pack if it is readily accessible and cannot be separated from the host device itself. The label must contain a statement similar to the following; Contains IC: 3229A-MD2000

When integrating into a host the transmitter for this device shall be installed at a minimum distance of 20cm from the end user. All Rf exposure requirements shall also be satisfied at the host level.

Integration Antenna Gain

- To ensure continued compliance when integrating this module into host a host device, the maximum antenna gain shall be as listed in table 1. Higher gain antennae shall not be used without reduction/reevaluation of output power at the host level.

Table 1

Device	Band	Maximum Conducted Power (dBm)	Standalone Maximum Antenna Gain (dBi)	Collocated Maximum Antenna Gain (dBi)
MD2000	WCDMA Band 2	24.0	6.0	6.0
	WCDMA Band 4	24.0	6.0	5.8
	WCDMA Band 5	24.0	4.0	3.6
	LTE Band 2	24.0	6.0	6.0
	LTE Band 4	24.0	6.0	5.8
	LTE Band 5	24.0	4.0	3.6
	LTE Band 7	24.0	7.0	7.0
	LTE Band 12	24.0	3.2	3.2
	LTE Band 13	24.0	3.5	3.5
	LTE Band 14	24.0	3.6	3.6
	LTE Band 17	24.0	3.2	3.2
	LTE Band 25	24.0	6.0	6.0
	LTE Band 26	24.0	4.0	3.6
	LTE Band 30	24.0	-0.6	-0.6
	LTE Band 38	24.0	7.0	7.0
	LTE Band 41	26.0	5.0	5.0
	LTE Band 42	19.5	3.5	3.5
	LTE Band 43	19.5	3.5	3.5
	LTE Band 48	24.0	-1.0	-1.0
	LTE Band 66	24.0	6.0	5.8
	LTE Band 71	24.0	3.1	3.1
	5G FR1 n2	24.0	6.0	6.0
	5G FR1 n5	24.0	4.0	3.6
	5G FR1 n7	24.0	7.0	3.6
	5G FR1 n12	24.0	3.2	3.2
	5G FR1 n25	24.0	6.0	6.0
	5G FR1 n38	26.0	5.0	5.0
	5G FR1 n41	26.0	5.0	5.0
	5G FR1 n66	24.0	6.0	5.8
	5G FR1 n71	24.0	3.1	3.1
5G FR1 n78	19.5	3.5	3.5	
2.4GHz WLAN	17.0	17.0	6.0	
5GHz WLAN	17.0	13.0	6.0	

Important Safety Information

The following information applies to the devices described in this manual. Always observe all standard and accepted safety precautions and guidelines when handling any electrical device.

- Save this manual: it contains important safety information and operating instructions.
- Do not expose the MD2000 product to open flames.
- Ensure that liquids do not spill onto the devices.
- Do not attempt to disassemble the product: Doing so will void the warranty. This product does not contain consumer-serviceable components.

The MD2000 module device may not be used in an environment where radio frequency equipment is prohibited or restricted in its use. This includes aircrafts, airports, hospitals, and other sensitive electronic areas.

Do not operate RF devices in an environment that may be susceptible to radio interference resulting in danger, specifically;

- Areas where prohibited by the law.
 - Follow any special rules and regulations and obey all signs and notices. Always turn off the host device when instructed to do so, or when you suspect that it may cause interference or danger.
- Where explosive atmospheres may be present.
 - Do not operate your modem in any area where a potentially explosive atmosphere may exist. Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death. Be aware of and comply with all signs and instructions.
- Users are advised not to operate the modem while they are at a refueling point or service station.
 - Users are reminded to observe restrictions on the use of radio equipment in fuel depots (fuel storage and distribution areas), chemical plants or where blasting operations are in progress.
- Areas with a potentially explosive atmosphere are often but not always clearly marked.
 - Potential locations can include gas stations, below deck on boats, chemical transfer or storage facilities, vehicles using liquefied petroleum gas (such as propane or butane), areas where the air contains chemicals or particles, such as grain, dust or metal powders, and any other area where you would normally be advised to turn off your vehicle engine.
- Near Medical and life support equipment.
 - Do not operate your modem in any area where medical equipment, or life support equipment may be located, or near any equipment that may be susceptible to any form of radio interference. In such areas, the host communications device must be turned off. The modem may transmit signals that could interfere with this equipment.
- On an aircraft, either on the ground or airborne.
 - In addition to FAA requirements, many airline regulations state that you must suspend wireless operations before boarding an airplane. Please ensure that the host device is turned off prior to boarding an aircraft in order to comply with these regulations. The modem can transmit signals that could interfere with various on-board systems and controls.
- While operating a vehicle
 - The driver or operator of any vehicle should not operate a wireless data device. Doing so will detract from the driver or operator's control and operation of that vehicle. In some countries, operating such communication devices while in control of a vehicle is an offense.

Disclaimer

The information and instructions contained within this publication comply with all FCC, GCF, PTCRB, IMEI and other applicable codes that are in effect at the time of publication. Inseego Corp. disclaims all responsibility for any act or omissions, or for breach of law, code or regulation, including local or state codes, performed by a third party.

Inseego Corp. strongly recommends that all installations, hookups, transmissions, etc., be performed by persons who are experienced in the fields of radio frequency technologies. Inseego Corp. acknowledges that the installation, setup and transmission guidelines contained within this publication are guidelines, and that each installation may have variables outside of the guidelines contained herein. Said variables must be taken into consideration when installing or using the product, and Inseego Corp. shall not be responsible for installations or transmissions that fall outside of the parameters set

forth in this publication.

Inseego Corp. shall not be liable for consequential or incidental damages, injury to any person or property, anticipated or lost profits, loss of time, or other losses incurred by Customer or any third party in connection with the installation of the Products or Customer's failure to comply with the information and instructions contained herein.

Product Overview

This document provides a high-level description of the circuits and their operation that could be used to interface to external device for connectivity:

- 3G WCDMA for Global Networks.
- Wi-Fi 2.5 GHz, 5GHz Networks
- 4G LTE Networks for North American and Global Networks
- 5G Sub 6 New Radio (NR) Access Technology for North American and Global Networks
- Global Navigation Satellite System GNSS

1 Interface Overview

Below are MD2000 Hardware interface ports to external devices.

1.1 Power Input (30pin connector)

MD2000 input power provided thru 30pin connector

1.2 Interfaces to external devices (56pin connector)

1.3 Interfaces

MD2000 has 3 types of external interfaces for connection to other devices.

- Power supply via 30pin connector
- 56pin connector to support UIM card

1.4 SIM Card

- supports UIM card interfaces.
- Support dual voltage operation

1.5 RF Board to Board Connections Interface

The RF connectors below are U.FL Connector

Note: Bands and Frequencies of operation guaranteed by design and cannot be altered by the end-user.