

## Intelimax+4G | M2M 4G CAT1 Serial Modem | MA-2020-4G



# TABLE OF CONTENTS

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TABLE OF CONTENTS ..... 2

DISCLAIMERS ..... 3

RF EXPOSURE AND ELECTRICAL SAFETY ..... 4

CONTACT INFORMATION ..... 7

REVISION HISTORY ..... 8

PRODUCT OVERVIEW ..... 9

EXTERNAL FEATURES & LEDS ..... 13

SPECIFICATIONS ..... 20

# DISCLAIMERS

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Some features outlined in this manual may require an updated firmware and/or GUI to work. Please contact RF Industries for more information.

# RF EXPOSURE AND ELECTRICAL SAFETY

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The use of this modem in any other type of host configuration that may not comply with the RF exposure requirements should be avoided. During operation, a minimum of 20 cm (8 inches) should be maintained between the antenna, whether extended or retracted, and the user's/bystander's body (excluding hands, wrists, feet, and ankles) to ensure RF exposure compliance in accordance with ARPANSA guidelines. The modem is not designed, nor intended, for use in applications within 20 cm (8 inches) of the body of the user. Continued operational compliance of the modem relies upon it being used with an AS/NZS 60950.1 approved SELV power supply.

## Cautions

This modem has been tested and found to comply with the limits pursuant to relevant ACMA Standards. These limits are designed to provide reasonable protection against harmful interference in an appropriate installation. This modem generates, uses, and can radiate radio frequency energy and, if not used in accordance with instructions, can cause detrimental interference to other radio communication networks and devices. Use only the supplied or approved antenna. Unauthorized antennas, modifications, or attachments could impair performance, damage the modem, or result in violation of RF exposure regulations.

There is no guarantee that electromagnetic interference will not occur in a particular installation. If the modem does cause detrimental interference in radio and television reception, which can be verified by turning the modem on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving radio or TV antenna
- Increase the separation between the modem and the receiver
- Contact RF Industries Maxon Technical Support for assistance.

Changes or modifications to the modem that are implemented without the express consent of RF Industries Pty. Ltd. void the product warranty and terminate the user's authority to use the modem.

## General Safety

**RF Interference Issues:** Avoid possible radio frequency (RF) interference by carefully following safety guidelines below:

- Switch OFF the modem when in an aircraft. The use of cellular devices in an aircraft is illegal. It may endanger the operation of the aircraft and/or disrupt the cellular network. Failure to observe this instruction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Switch OFF the modem in the vicinity of gasoline or diesel fuel pumps or before filling a vehicle with fuel.
- Switch OFF the modem in hospitals and any other places where medical equipment may be in use.
- Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or in areas of blasting operations.
- There may be hazards associated with the operation of your modem in the vicinity of inadequately protected personal medical devices such as hearing aids and pacemakers. Please consult the manufacturers of the medical device to determine if it is adequately protected.
- Operation of the modem in the vicinity of other electronic equipment may cause interference to the equipment if it is inadequately protected. Observe any warning signs and manufacturers' recommendations.
- The modem contains sensitive electronic circuitry. Do not expose the modem to any liquids, high temperatures or shock. The modem is not waterproof. Please keep it dry and store it in a cool, dry place.
- Only use original accessories or accessories that are authorized by the manufacturer. Using unauthorized accessories may affect your modem's performance, damage your modem and violate related national regulations.
- Always handle the modem with care. There are no user serviceable parts inside the modem. Unauthorized dismantling or repair of the modem will void the warranty.

### NOTE:



- \* The product needs to be supplied by a limited power source or the power supply provided. Otherwise, safety will not be ensured.
- \* Do not affix the modem in an open area where it is liable to lightning-strike hazard.

## Vehicle Safety

- Do not use the modem whilst driving.
- Respect national regulations on the use of cellular devices in vehicles. Road safety always comes first.
- If incorrectly installed in a vehicle, the operation of the modem could interfere with the correct functioning of vehicle electronics. To avoid such problems, ensure that the installation has been carried out by qualified personnel.
- Verification of the protection and interference-free performance of vehicle electronics should be a part of the installation procedure

## Potentially Unsafe Areas

**Posted Facilities:** Turn off the modem in any facility or area when posted notices require you to do so.

**Blasting Areas:** Turn off the modem where blasting is in progress. Observe restrictions and follow any regulations or rules.

**Potentially Explosive Atmospheres:** Turn off the modem when you are in any area with a potentially explosive atmosphere. Obey all signs and instructions. Sparks in such areas could cause an explosion or fire, resulting in bodily injury or death.

Areas with a potentially explosive atmosphere are often but not always clearly marked. They include:

- Fuelling areas such as gas or petrol stations
- Below deck on boats
- Transfer or storage facilities for fuel or chemicals
- Vehicles using liquefied petroleum gas, such as propane or butane
- Areas when the air contains chemicals or particles such as grain, dust or metal powders
- Any other area where you would normally be advised to turn off machinery of any kind

**Concentrated Electromagnetic Activity:** Avoid using the modem within areas of high electromagnetic wave activity or within enclosed metallic structures e.g. lifts.

# CONTACT INFORMATION

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In keeping with RF Industries' dedicated customer support policy, we encourage you to contact us.

## TECHNICAL:

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\* Public holidays excluded

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## REVISION HISTORY

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Product	Intelimax+4G M2M 4G CAT1 Serial Modem
Model	MA-2020-4G
Document Type	PDF
Current Version Number	1.01
Status of the Document	Release
Revision Date	March 2018
Total Number of Pages	21

### – Revision History

Level	Date	History
1.00	December 2017	Initial Release
1.01	March 2018	Updated Safety Statement



# PRODUCT OVERVIEW

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Breaking the industry benchmark, the top-of-the range Intelimax+4G is a unique and intelligent fusion of 4G LTE capabilities with advanced functionality of a modem/router.

## Complete Kit Package (contents)

Intelimax+4G Modem

Power/Serial Cable

SMA (Male) 4G Unity Gain Antenna

Side brackets

## Optional Accessories

USB Cable

AC power adapter

## General Features

LTE CAT1 Wireless Module (10 Mbps downlink, 5 Mbps uplink)

Supports Packet and Circuit Switched Data

RS232 and RS485 (half/full duplex) Software Configurable

2-Way SMS

Remote SMS diagnostics & reset

Embedded TCP/IP, UDP/IP STACK

Programmable periodic reset and other watchdog features

Save and restore modem configuration from a file

FOTA - Firmware upgrade over the air

External antenna connectivity to maximise coverage

External LED to show Signal Strength, Data Transfer and Connection status

## Extended Features

Remote CSD to IP Changeover

Programmable WAN connection scheduler

AT over IP, FTP Client , SSH and Telnet support

RSSI Logging

Ping check, Variable Periodic Resets and other network features

SNMPv2 and SNMPv3

SNTP

Modem Emulation

Dynamic DNS

PPP Server

## Security Features

Encrypted access and configuration control

Password Protected AT Commands

SNMPv3 supports SHA and AES

SSLv3 Encrypted Serial Socket

Secure Syslog Client RFC5425, RFC5425 and RFC6587

Login brute force detection and rejection

Login activity log

## Frequency Bands

FDD-LTE: B1/B3/B5/B7/B28

WCDMA: B1/B5

## Data Speeds

LTE CAT1: UL 5.2 Mbps / DL 10.2 Mbps

HSPA: UL 5.76 Mbps / DL 7.2 Mbps

WCDMA CS: UL 64 Kbps / DL 64 Kbps

## Physical

71mm x 55mm x 26mm (without side brackets and antenna port)

Side mounting brackets

Normal Operation Temperature: -30 to 60 °C

## Connections

RJ45 Connection

USB Connection

SIM Card Holder

Antenna connector: SMA female

## LED Lights

Power/RSSI – dual colour indicates RX data received from serial

Data – dual colour indicates TX data sent to serial

## Approvals / Compliance

ACA, RoHS (both modem and module)

GCF, PTCRB , CE (module only)

Carrier Approvals\* - (Please contact Maxon Australia for more information)

## Power Source

DC Input Voltage Range: 7 to 48 VDC

Idle Current @ 12V: 80mA

Maximum Current @ 12V: 150mA

## Operating Systems

Windows XP/ Vista / 7 / 8

## Hardware Features

Item	Specification	Comments
Processor	ARM Processor	
Program	eMMC Flash	
RAM	DDR3	
Reverse polarity protection	Supported	
USB port	Mini B connector Direct connect to modem or direct connect to processor (switched by the RJ-45 power)	1 USB port
LED	2 dual-colour LEDs	
Antenna connector	SMA Female	
RJ-45	Physical port to provide RS-232 interface and Power (power is used as USB port switch)	
RS-232	Full UART	
Dimensions	71mm x 55mm x 26mm (excluding mounting brackets)	
SIM socket	Push to lock, push to release	

## EXTERNAL FEATURES & LEDS

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### LED Functionality

The below shows the default LED flashing sequences. The excellent RSSI setting is configurable via modem GUI software, and all other levels change accordingly.

Signal Strength	Power / RSSI LED
SIGNAL > -84dBm (or excellent RSSI setting)	SOLID ON
-89dBm < SIGNAL ≤ -84dBm	200ms OFF 800ms ON
-96dBm < SIGNAL ≤ -89dBm	400ms OFF 600ms ON
-101dBm < SIGNAL ≤ -96dBm	600ms OFF 400ms ON
SIGNAL ≤ -101dBm	800ms OFF 200ms ON

Connection Status	Data LED
IP STACK IDLE SERIAL MODEM IDLE	OFF
IP STACK ONLINE SERIAL MODEM CONNECTED	1s ON 1s OFF

### Data Transfer Indication

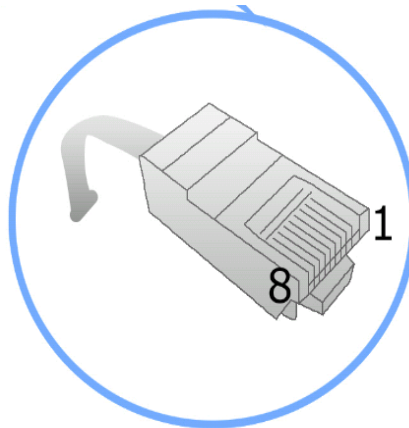
In addition to the LED flashing sequence the Intelimax+ will also display TX and RX activity on the LEDs. When data is received on the serial port and sent over the WAN the green LED in the PWR side will flash. When data is received over the WAN and sent over the serial port the green LED on the DATA side will flash. The result of this flashing will either be a green or an orange depending on current RED LED state.

## RS232 Pinouts



### RS232 Pinouts

Name	Description – RS232	Comment
1	VCC	6 ~ 48V DC input
2	DCD	Data Carrier Detect
3	DTR	Data Terminal Ready
4	GND	
5	RXD	Data from modem
6	TXD	Data to modem
7	RTS (CTS optional)	Ready to Send (Factory option for CTS)
8	CTS (RTS optional)	Clear to Send (Factory option for RTS)



[RJ45 Pin Description]

## RS485 Pinouts

The Intelimax+ supports a software configurable option for the use of RS485 either full or half duplex. Once this is configured through the Windows GUI, the below pin descriptions apply.

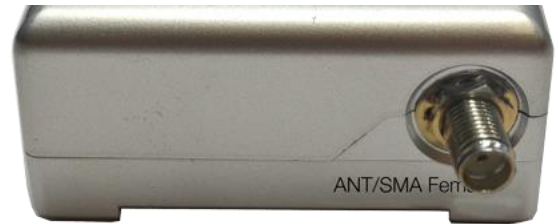
Name	Description – RS485 full duplex (RS422)	Description – RS485 half duplex	Comment
1	VCC	VCC	6 ~ 48V DC input
2	NA	NC	
3	NA	NC	
4	GND	GND	
5	TXD+ (from modem)	D+	
6	RXD+ (to modem)	NC	
7	RXD- (to modem)	NC	
8	TXD- (from modem)	D-	

## Mini USB and Reset Button

Name	Description
Mini USB	USB (mini B type)
Reset button	5 – 20 seconds – restores modem to profile settings 20 – 60 seconds – restores modem to factory settings

## Antenna Connector

Name	Description
Antenna	4G SMA female external antenna port



## SIM Connection

Name	Description
Sim Card slot	The SIM card slot uses a push in push out mechanism for SIM cards. The modem doesn't support a SIM tray and tools are not required for installing the SIM Card.



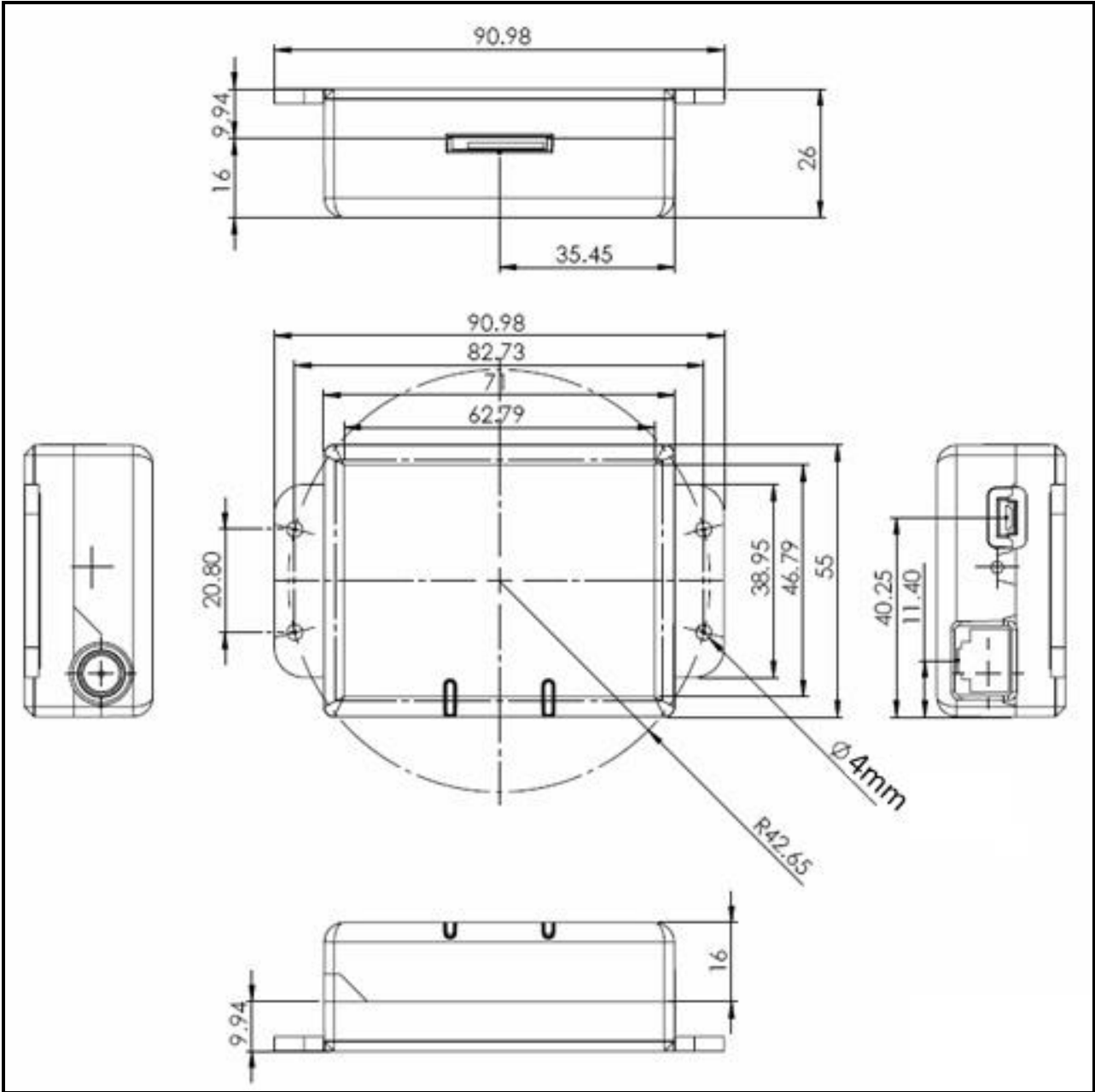
## Side Mounting Brackets

Name	Description
Side mounting brackets	The modem comes with two removable side mounting brackets. To be used to mount the modem.





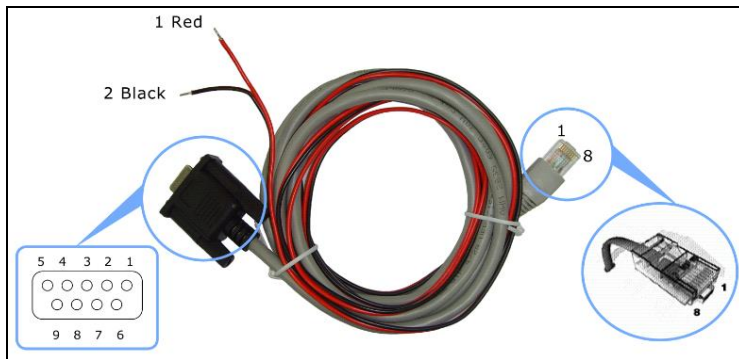
Mechanical Diagram



## Power & Serial Cable – RS232 use

### CAB-RJ45-DB9 Cable for RS232 use – Standard Intelimax+ serial interface cable

(Can be used for RS485 also with non-standard pin connections or Maxon can supply custom cable options)



#### DB9 Side Pin Connections

\*N.C means Not Connected

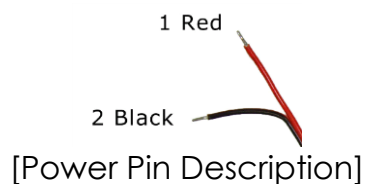
Name	Description	Comment
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	N.C
7	RTS	
8	CTS	
9	RI	N.C



[DSUB9 Pin Description]

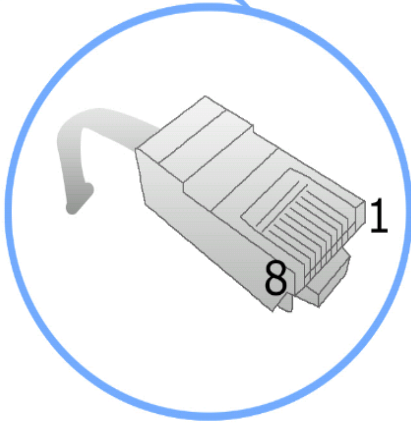
#### Power Input Connections

Name	Description	Comment
1	RED	VCC
2	BLACK	GND



[Power Pin Description]

## Intelimax+ RJ45 Pin Connections



[RJ45 Pin Description]

## RS232 Pinouts

Name	Description – RS232	Comment
1	VCC	Power Input
2	DCD	Carrier detect
3	DTR	Data terminal ready
4	GND	Ground
5	RXD	Data from modem
6	TXD	Data to modem
7	RTS (CTS optional)	Request to Send. CTS option please specify at ordering
8	CTS (RTS optional)	Clear to Send. RTS option please specify at ordering

# SPECIFICATIONS

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## Mechanical Specifications

Dimensions	75 x 55 x 26 mm
Weight	95g (Including cellular module, case, antenna, brackets)
Housing Material	Polycarbonate (plastics)

## Electrical specification (tested)

**Recommended VIN:** 7 ~ 48V

### Operating current (@ 25°C)

VIN	Active mode*	Dormant mode*	Sleep mode
7VDC	0.34A	0.1A	0.05A
12VDC	0.15A	0.08A	0.03A

\* Dependant on the RF conditions. (Tested at or around -75 dBm)

### Limiting values:

VIN supply range: 6.5V ~ 52V

USB port: 4.5V ~ 5.5V

RS-232 signal port: -15V ~ 15V

The modem has reverse polarity protection built in to the circuit. Powering the modem incorrectly, even for a short time could damage the modem if the power supply to the modem is wired incorrectly.

When repowering the modem ensure that the modem is powered down for at least 1 second before reestablishing the power connection to ensure that the internal circuitry can correctly reset.

## Environment Specification

Operating temperature range: -30°C ~ 60°C

Storage temperature range: -40°C ~ 85°C

## RF specification

Intelimax+ board RF loss is less than 1dB at 850MHz.

All the other RF related specification follows the 4G module.

## RoHS compliant

All components and production materials used in Intelimax+ is RoHS compliant.

## Hardware Specification

Product Name	Intelimax+4G CAT1 modem MA-2020-4G
Module	Multi-Band LTE/HSPA+ Module
LED	POWER / RSSI (Red / Green) DATA (Red / Green)
USB	Mini USB
Serial	RS-232 / RS485 over RJ45

## Technical Features

Operating Frequency	FDD-LTE: B1/B3/B5/B7/B28 WCDMA: B1/B5
Data Rates	LTE-FDD: 5 Mbps UL / 10 Mbps DL HSPA+: 5.76 Mbps UL / 42 Mbps DL
Data Options	Packet Switched data Circuit Switched data 2-way SMS Built in IPStack