

IM11

RFID Reader Module

Integration Guide

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Before You Begin

This section provides you with safety information, technical support information, and sources for additional product information.

Safety Information

Your safety is extremely important. Read and follow all warnings and cautions in this document before handling and operating Intermec equipment. You can be seriously injured, and equipment and data can be damaged if you do not follow the safety warnings and cautions.

This section explains how to identify and understand warnings, cautions, and notes that are in this document. You may also see icons that tell you when to follow ESD procedures.



Warning

A warning alerts you of an operating procedure, practice, condition, or statement that must be strictly observed to avoid death or serious injury to the persons working on the equipment.



Caution

A caution alerts you to an operating procedure, practice, condition, or statement that must be strictly observed to prevent equipment damage or destruction, or corruption or loss of data.



Note: Notes either provide extra information about a topic or contain special instructions for handling a particular condition or set of circumstances.

Global Services and Support

Warranty Information

To understand the warranty for your Intermec product, read the Intermec supply agreement.

Disclaimer of warranties: The sample code included in this document is presented for reference only. The code does not necessarily represent complete, tested programs. The code is provided “as is with all faults.” All warranties are expressly disclaimed, including the implied warranties of merchantability and fitness for a particular purpose.

Web Support

Visit the Intermec website at www.intermec.com to download our current manls (in PDF).

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- Taiwan OEM Sales: +886-936-934-366

Who Should Read This Manl

This integration guide explains how to integrate the IM11 module into a computer or other device. It is written for the person who will be integrating the module into any product that needs to be UHF RFID-enabled.

Before you install and configure the module, you should be familiar with Intermec RFID systems and how to implement them. You should also be familiar with your network and general networking terms, such as IP address.

Related Documents

This is a list of related Intermec documents:

- *Basic Reader Interface Programmer Reference Manual*
- *Intermec RFID System Manual*

The Intermec website at www.intermec.com contains our documents (as PDF files) that you can download for free.

To download documents

- 1 Visit the Intermec website at www.intermec.com.
- 2 Click the Products tab.
- 3 Using the Products menu, navigate to your product page. For example, to find the 70 Series RFID Computer product page, click **Computers > Handheld Computers > 70 Series RFID Computers**.
- 4 Click the **Manls** tab.

If your product does not have its own product page, click **Support > Manls**. Use the **Product Category**, the **Product Family**, and **Product** to find your documentation.

Patent Information

There may be U.S. and foreign patents pending.

Regulatory Information



Note: Regulatory compliance of the end product is the responsibility of the module integrator. Upon request, Intermec will provide proprietary module documentation using non-disclosure agreements (NDAs) or directly to the certifying agency.

Safety

The module is tested and compliant according to:

- CB Report IEC 60950-01 for international product safety
- FCC OET Bulletin 65, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields*, for general population/uncontrolled exposure when installed per Intermec instructions using Intermec-approved antennas
- CENELEC EN50364/EN50357, European RF Exposure standard

Electromagnetic Compatibility

This module is certified according to:

- FCC Part 15/Industry Canada ICES-003 Class B digital emissions
- EN 301 489-1 and -3, European transmitter immunity

Radio Frequency Device Approval

By default, the module is configured for FCC transmission.

- EN 302-208 V 1.4.1 Declaration of Conformity
- FCC Part 15.247 (915 MHz band operation) Certification
- RSS-210 (915 MHz band operation) Certification

Recycling

The module incorporates principles for ease of disassembly to facilitate recovery and recycling of printed circuit board assemblies and base materials.

Restriction of Hazardous Substances (RoHS) Directive

The module complies with the RoHS Directive.

About the IM11

The Intermec IM11 RFID Reader Module is designed for quick integration into computers, printers, and any other products that need to be RFID-enabled. The IM11 includes these features:

- Allows the RFID-enabled product to read and write to tags used in most worldwide applications:
 - The IM11 can comply with the regulatory requirements for ETSI 4 channels in Europe, USA, Taiwan, Australia, Thailand, Brazil, Hong Kong, Malaysia, Singapore, China, Philippines, South Africa, Israel, South Korea, and New Zealand. For the latest, contact your Intermec sales representative.
 - The IM11 cannot comply with regulatory requirements for Japan.
- Operates across the entire frequency band. The country code defines the frequency bands of operation, the power levels, the hop tables, and other country-specific parameters. The default country code is defined by the location where the module is delivered.
- Covers UHF bands from 865 to 928 MHz. Supports four channel operation over the 865 to 868 MHz band.
- Supports 50 channels in the FCC band from 902 to 928 MHz.
- Supports the ISO 18000-6c protocol (EPC Class 1, Gen 2)
- Supports the BRI (Basic Reader Interface) host communication protocol.

Technical Overview

Specifications

Physical Specifications

Specification	Values
Physical	50.95 mm long x 30 mm wide x 4.76 mm thick
Weight	

Environmental Specifications

Specification	Values
Operating Temperature	-20 °C to +60 °C
Storage Temperature	-40 °C to +70 °C
Humidity	25 °C to 60 °C, 0% to 95% relative humidity, non-condensing process
Shock	2000 g, 0.5 ms pulse, 10 times on each axis
Vibration	GRMS. 10 to 500 Hz, in 3 axis
ESD	Passes CE mark requirements. 4 kV contact discharge and 8 kV air discharge, while unpowered.

Power Supply Specifications

Specification	Minimum	Typical	Maximum	Unit	Notes
Operating Voltage	3.15	3.8	5.2	V	All internal voltages regulated on module
Deep Sleep			100	µA	Vbatt current when enable low powers Real-Time Clock
Standby Current		30		mA	At 3.8 V, USB connection in Suspend mode, no GPIO loading

Power Supply Specifications (continued)

Specification	Minimum	Typical	Maximum	Unit	Notes
Read Current		1.3		A	Tx/Rx circuits, VCO, temperature sense
Ripple			100	mV	Peak-to-peak
Timing					
• Power on to Enable					
• Enable to Active		5		S	Only at initial power up
• Standby to Active		1.5	2	mS	An internal time, not seen by the host
• Channel Switching			30	μS	Tx on a channel to Tx on any other channel

Transmitter Specifications

Specification	Minimum	Typical	Maximum	Unit	Notes
Frequency Stability	-20		+20	PPM	
Spurious Emissions - FCC	-55			dBc	In band
	-50			dBc	Out of band
Spurious Emissions - ETSI	-54			dBm	Out of band
Thermal Shutdown		85		°C	As measured by sensor on module
Thermal Recovery		75		°C	

Transceiver Specifications

Specification	Values
Output Power Control	29.5 dBm. User adjustable in 1 dBm down to 10.5 dBm. Tolerance drift from +0.5 to -0.7.

Transceiver Specifications (continued)

Specification	Values
Bus Interface (USB or serial)	USB 2.0 compliant client 12 Mbps (full speed) Serial 115.2 Kbps
RF Output Impedance	50 Ohms with better than 10 dB return loss
Modulation	PR-ASK
Data Encoding	DRM or FM0
RF Sensitivity	DRM: Monostatic 15 dB S/N Power [dBm] ON: -70 dBm RF sensitivity is the minimum RF conducted power for measuring a given 15 dB return loss on the antenna port.
Tags/Protocols Supported	EPC Class 1 Gen 2, UHF Version 1.2.0 ISO 18000-6C NXP SL3ICS1002 G2XM, can read 512-bit extended user memory and custom commands Fujitsu FJ64 Kb Impinj Monza 4QT
Tag Data Rate	EPC Class 1 Gen2, ISO 18000-6C DRM back link frequency up to 320 KHz FM0 back link frequency 160 KHz
Read Range	>6 m (20 ft), provided that the module: <ul style="list-style-type: none">• is using DRM operation mode.• is connected to an antenna system with 9 dBiC gain (circular polarized).• has no occurrence of multipath or other environmental interference.
Read Speed	>200 tags per second (using 32 conducted tags) 50 tags per second (using over air tags)
Performance Testing	AD 223 tags on cardboard

Receiver Specifications

Receiver Input	Values
Sensitivity	Typical: -70 dBm 15 dB return loss
Maximum Reverse Input Power	Maximum: +20 dBm

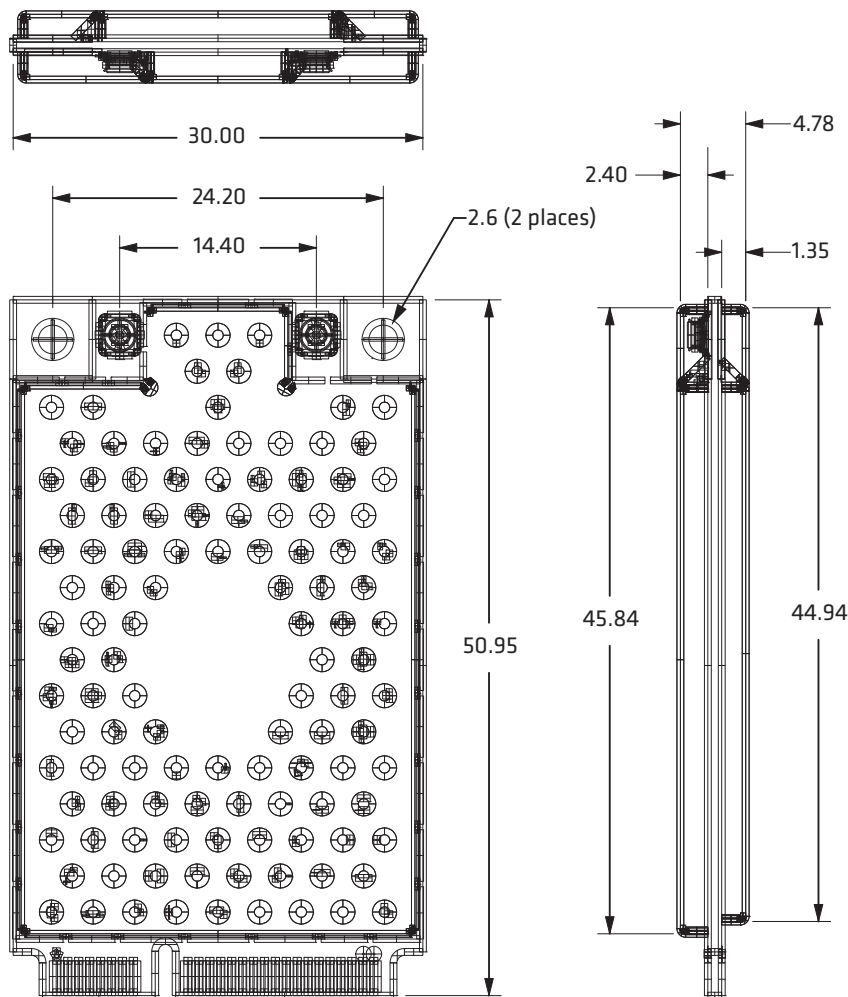
EPC Compliance and Certification

The module is compliant to:

- EPCglobal® RFID Air Interface Specification, Version 1.0.8.
- Single Reader Mode: Operates in an EPC Class 1 Gen 2 single interrogator environment.
- Multiple Reader Mode: Operates in an EPC Class 1 Gen 2 multiple interrogator environment.
- Dense Reader Mode: Operates in an EPC Class 1 Gen 2 dense interrogator environment. May require reducing power output to 27 dBm to meet EPC DRM guidelines.

Mechanical Integration

The module fits within the MiniPCI Express specifications. For physical dimensions, see the illustration.



IM11 RFID Reader Module Physical Specifications: 50.95 mm long x 30 mm wide x 4.78 mm thick. Exceptions to the MiniPCI Express form factor: top shield side thickness is 2.4 mm (instead of 2.01 mm) and bottom shield side thickness is 1.35 mm (instead of 1.75 mm).

About the Connectors

The module mounts on a PC board and connects to it using a mini-PCI connector, P/N JAE MM60-52B1-E1 or equivalent. Intermec recommends using the higher profile connector, because the low profile connector does not fit flush to the PCB with the low profile connection.

The antenna receptacle is a Hirose U.FL connector (50 ohm, coaxial).

Supported Antennas

The module has been tested to work with a variety of antenna types. Antenna systems, combination antenna and cables, are restricted to +6 dBi linear gain in North, Central, and South America. Europe have a maximum antenna system gain restriction of 2 Watt effective radiated power.

Radio communications regulatory agencies in each country has restrictions for antenna gain or transmitter power. Consult with your Intermec OEM Sales Representative or Professional Wireless /RFID Installer for details.

These antennas are approved to work with the IM11:

- Antenna primary linear (0 dBi linear, omni)
- PIFA omni yagi (5.5 dBi linear)
- Ceramic patch antenna (2.5 dBi, circular polarized)
- Cross polar linear (dual pole antenna)
- High gain circular polarized panel 11 dBiC (8 dBi linear)
- High gain linear panel (8 dBi)
- RFID printer coupler (-30 dBi)
- NeWave N7 (5.5 dBi, multi axis dipole)

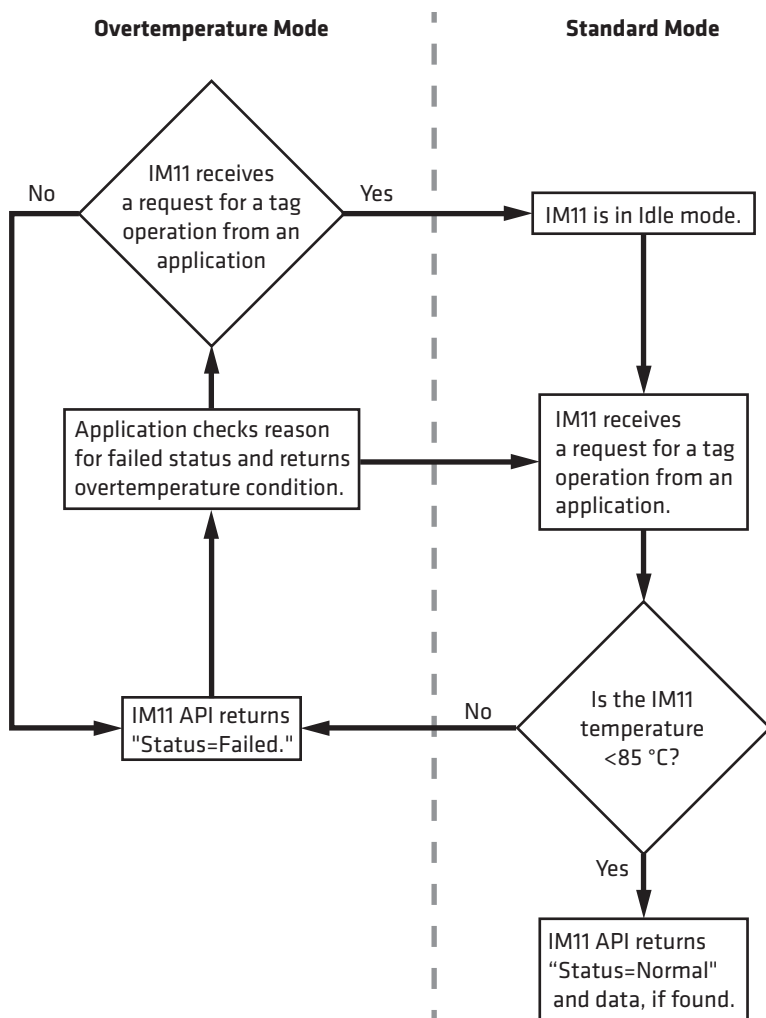


Note: To use the 8 dBi antennas, the module integrator needs to reduce the output power to 29 dBm.

You can use any antenna with similar construction to one of the approved antennas, as long as it has equal or less gain. The module integrator is responsible for final regulatory approvals.

Operating Modes

This illustration shows the module Overtemperature and Standard operating modes.



The IM11's ability to return to normal status depends on the ability of the card to dissipate the heat.

The IM11 is designed to operate at 1 Watt of continuous power between -20 °C and +60 °C. These limits are not user programmable.

The module has a temperature sensor. If overtemperature is detected (nominally 85 °C), the module sends an overtemperature message. No RF output occurs until the temperature falls below the recovery threshold (nominally 75 °C).

In most situations, Overtemperature mode adequately protects the module against very high temperatures. However, if you use the module in a high duty-cycle operation for extended periods of time at elevated temperatures, you may want to attach a heatsink to the perforated top shield of the IM11. For proper placement, refer to the illustration of the page 14

For optimal thermal performance, connect the top shield of the module to a metal surface with good air flow or access to the lower temperature case exterior. To connect these surfaces, use a low thermal resistance material, such as thermal grease or a thermally-conductive spacer.

Electrical Integration

The module communicates either over USB or through serial:

- The USB client communication follows the CDC profile (a Microsoft standard driver) and is USB 2.0-compliant, operating at 12 Mbps (full speed). For more information, see **“Open a USB Connection” on page 32.**
- In Serial mode, the module communicates as a standard PC COM port, operating at 115.2 Kbps. It has eight general purpose inputs and outputs for monitoring and controlling external signals. For more information, see **“Open a Serial Connection” on page 31.**

A Digital Signal Processor (DSP) controls the radio functions and provides communication with the host. This interface allows direct reprogramming and updating of the on-board FLASH memory. It has 64 MB of DDR and 4 MB of SPI FLASH available.

Power Requirements

The module operates off power input from 3.15 VDC to 5.2 VDC. If the input is 3.3 V DC or less, you must account for significant increased current demand. If the input drops below 3.15 VDC, 1 Watt output is not possible.

The module handles its own power management and goes into Standby mode automatically when there are no outstanding commands. However, even in Standby mode, the IM11 immediately responds to host activity, eliminating any potential host timeout conditions.

To achieve an even lower power Standby mode, the host needs to support USB suspend and remote wakeup.

To reduce power, the module duty cycles its transmitter. The duty cycling happens according to the read commands that the application executes. To achieve the lowest power, after all tags are read, the transmitter turns off. After a period of time, the transmitter activates to identify new tags in the field. After all new tags are read, the transmitter turns off for the rest of the period.

Also, the module automatically reduces the power out if the input voltage is too low or the temperature of the module is too high.

For more information about low power read commands, see the [*Basic Reader Interface Programmer Reference Manual*](#).

Reader Power States

There are four different power states for the RFID module.

Reader Power States and Levels of Consumption

Power State	Level of Consumption
Off	0 (3.3 V turned off to the module)
Deep Sleep	<ul style="list-style-type: none">• 3.3 V on• RF enable = Off• < 1 mA• Real Time Clock (RTC) = On (< 100 μA to power RTC)*• Enable (Pin 20) is low
Idle	<ul style="list-style-type: none">• 3.3 V on• RF enable = On• No USB activity• About 35 mA• Enable (Pin 20) is high
Read	Max current during tag read about 1.5 A

* You cannot turn off the RTC unless you remove power Pin 2 (VBATT) on the mini-PCI connector.

Transition Times Between Reader Power States

Transition State	Transition Time
Off to Deep Sleep	100 ms
Deep Sleep to Tag Read	< 6 ms*
Idle to Tag Read	<ul style="list-style-type: none">• Time for USB device to respond to USB wakeup is about 10 ms.• Time for serial to respond is about 100 ms for a 10 byte command will take 100 ms at 115.2 kbps.

* < 6 ms required to load the software to load the module. After loading the software, the module stays idle (~ 110 mW) until a read is requested. When a read is finished, the unit returns to idle. Duty cycling is employed to quiet tags that have already been read and to ensure the host system transmitter does not stay on all the time.

Reader Power Draw

This section explains the power draw of the IM11 under various operating conditions. These are the four tests that were conducted:

- **Test A: READ REPORT=EVENT:** This test uses default values and starts a continuous read. It takes advantage of the duty cycle to save power, and resets the tags after every inventory round so the tags keep responding.
- **Test B: ATTRIB UNSELTRIES=0, READ REPORT=EVENT:** This test uses the default values of the reader except for UNSELTRIES. The continues read takes advantage of the duty cycle to save power. Setting UNSELTRIES=0 prevents the reader from resetting the tags. After the initial inventory round, the tags remain quiet until session 2 persistence wears off. This is the recommended configuration for reading large tag populations in continuous mode.

- **Test C: Repeated READ:** This test uses the default values of the reader and repeatedly issues a single READ command, and does not allow the reader to duty cycle the radio. The tags are reset at the beginning of every inventory round so they can respond to every read command.
- **Test D: ATTRIB UNSELTRIES=0, Repeated READ:** This test is the same as Test C, but UNSELTRIES is set to 0. The tags respond the first time and then only responds when their persistences wears off.

Supply Voltage 3.35 V
Conducted Quad Tag, 20 dB Antennuation

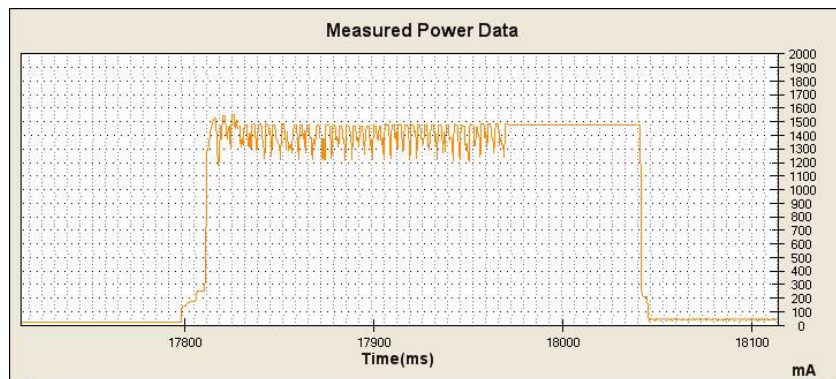
Field Strength	Test A	Test B	Test C	Test D
30 dB	153	72	536	354
27 dB	124	65	420	296
24 dB	110	61	348	260
21 dB	96	59	302	234
18 dB	60	57	272	220
15 dB	55	56	251	217

Supply Voltage 3.35 V
Radiated, 50 Tags Cardboard Box in Front of Antenna

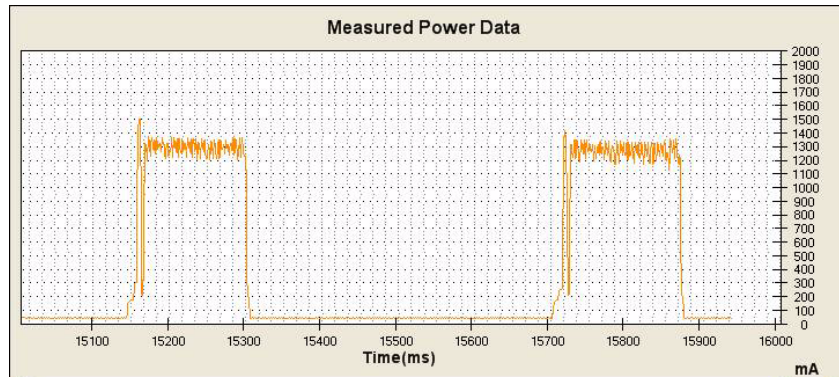
Field Strength	Test A	Test B	Test C	Test D
30 dB	490	124	950	378
27 dB	290	96	616	303
24 dB	182	74	451	265
21 dB	110	64	337	238
18 dB	83	58	266	222
15 dB	79	58	264	220

Supply Voltage 4.45 V
Conducted Quad Tag, 20 dB Anttenuation

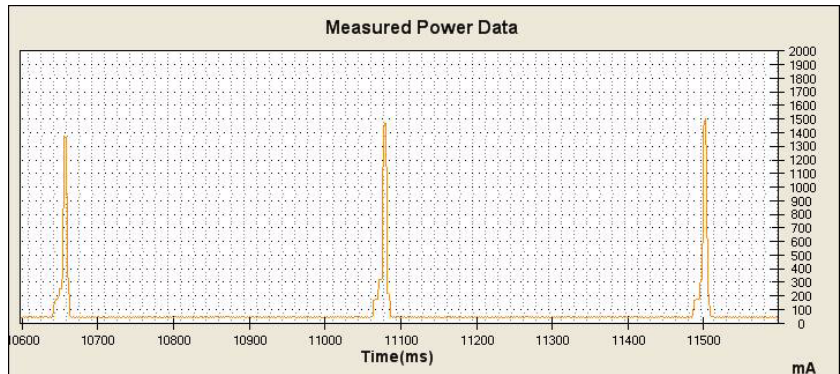
Field Strength	Test A	Test B	Test C	Test D
30 dB	456	57	369	252
27 dB	101	54	299	214
24 dB	88	52	252	193
21 dB	78	49	223	173
18 dB	49	49	204	164
15 dB	49	49	188	162



BRI, Default Attributes, 32 Conducted Tags, READ: The long, flat CW period after the inventory round is caused when the BRI reports the tags before shutting off RF.



BRI, Default Attributes, 32 Conducted Tags, READ REPORT=EVENT: All tags respond every time.



BRI, Default Attributes, ATTRIB UNSELTRIES=0, 32 Conducted Tags, READ REPORT=EVENT: UNSELTRIES=0 causes the tags to remain quiet, they rarely respond after the first time.

Mini-PCI Connector Pin Descriptions

Pin Descriptions

Pin	Pin Name	Description
1	Reserved	Do NOT connect
2	+V_BATT	Power input
3	Reserved	Do NOT connect
4	GND	Ground

Pin Descriptions (continued)

Pin	Pin Name	Description
5	No Connect	Not connected
6	GPIO2	
7	No Connect	Not connected
8	No Connect	Not connected
9	GND	Ground
10	No Connect	Not connected
11	No Connect	Not connected
12	No Connect	Not connected
13	Reserved	Do NOT connect
14	No Connect	Not connected
15	GND	Ground
16	GPIO0	
17	Reserved	Do NOT connect
18	GND	Ground
19	Reserved	Do NOT connect
20	ENABLE	Input. Logic high level turns on power to IM11
21	GND	Ground
22	UART_SEL_L	Input. Low level activates UART instead of USB (at Enable active)
23	Reserved	Do NOT connect
24	+V_BATT	Power input
25	Reserved	Do NOT connect
26	GND	Ground
27	GND	Ground
28	GPIO1	
29	GND	Ground
30	GPIO3	
31	Reserved	Do NOT connect
32	GPIO4	
33	RESET_L	Logic low level resets IM11
34	GND	Ground

Pin Descriptions (continued)

Pin	Pin Name	Description
35	GND	Ground
36	USB_DM	USB data minus
37	GND	Ground
38	USB_DP	USB data plus
39	+V_BATT	Power input
40	GND	Ground
41	+V_BATT	Power input
42	No Connect	Not connected
43	GND	Ground
44	GPIO5	
45	HOST_CTS1	Future use
46	GPIO6	
47	HOST_RTS1	Future use
48	GPIO7	
49	HOST_RX1	Output. Rx data output to host
50	GND	Ground
51	HOST_TX1	Input. Tx data input from host
52	+V_BATT	Power input

Notes:

- GPIOx: General purpose inputs/outputs. The pins are high impedance inputs when initially powered, following a module reset. You can configure all pins as inputs or outputs under software control.
- Host TX1/RX1 and host RTS1/CTS1: Standard logic levels. No RS-232 transceiver.
- USB_DP: If UART_SEL_L is low, pull up to wake up. If logic level is low, IM11 is in Sleep mode.
- All signals are 3.3 V logic levels (5 V tolerant inputs).

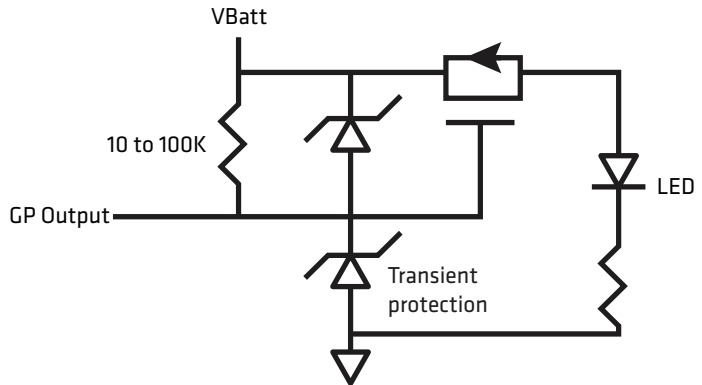
Input and Output Voltage Level Descriptions

Voltage Levels

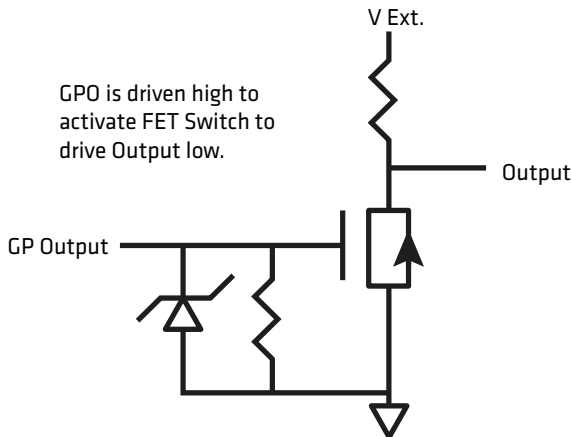
	Low	High	Notes
Inputs	0 to 0.8 V	2.4 to 5.5 V	± 10 µA max input current
Outputs	0.4 V max @ 4 mA	2.9 V min @ -4 mA	

Auxiliary outputs are 3-state inputs (high impedance) on power-up until they are written to for the first time. You should provide pullups or pulldowns to keep any external logic disabled during this condition.

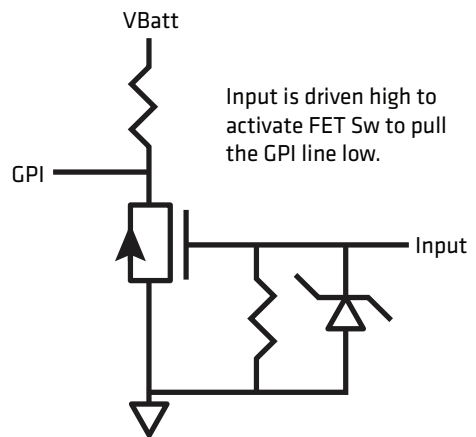
Typical output circuit.
GPO is driven low to
activate FET switch to
turn on LED.



GPO is driven high to
activate FET switch to
drive Output low.



Input is driven high to
activate FET Sw to pull
the GPI line low.



Typical I/O Circuits

Transmit Power

The module is able to adjust transmit power from 29.5 dBm to 10.5 dBm, configurable in 1 dBm steps with an accuracy (the measure of the power output for each level) of ± 0.5 dBm. The initial tolerance (the measure of the power output for each level) is ± 0.5 dBm. The output power is set on each of the antennas. Output power tolerance from the nominal setting is ± 0.75 dBm over an ambient temperature range of -20°C to 60°C .

The module supports PR-ASK modulation for EPC Class 1 Gen 2 tags only.

RF Integration

The module supports two antenna connections. You can use software to control the selection of either connection. The module switches from one antenna to the other in 5 ms or less. The switching time is defined from the 90% power point as the RF is turned off at the first port to the 90% power point as the RF is turned on at the second port.

The module uses an integrated RFID transceiver. It features autotuning on the antenna ports to match the antenna return loss dynamically. The system compensates for antennas with a VSWR of 2.0 or lower (a VSWR of <1.7 is optimum).

There are no termination requirements for the antenna ports. The module will not transmit to any open antenna ports.

Software Integration

In Serial mode, the module appears as a standard PC COM port. It has eight general purpose inputs and outputs. You can use a communications program, such as HyperTerminal, to communicate with the module using the Basic Reader Interface (BRI). For more information, see the [*Basic Reader Interface \(BRI\) Programmer Reference Manual*](#).

BRI Command Default Values

Command	Default Value
ANTS	1
ANTTIMEOUT	50
ANTTRIES	3
BROADCASTSYNC	0
CHKSUM	OFF
DENSEREADERMODE	ON
ECHO	OFF
EPCC1G2PARAMETERS	16
FIELDSEP	ASCII space character (0x20)
FIELDSTRENGTH	30dB, 30dB
IDREPORT	OFF

BRI Command Default Values (continued)

Command	Default Value
IDTIMEOUT	100
IDTRIES	1
INITIALQ	4
INITTRIES	1
LOCKTRIES	3
NOTAGRPT	OFF
QUERYSEL (new)	4
QUERYTARGET (new)	A
RDTRIES	3
RPTTIMEOUT	0
SCHEDULEOPT	0
SELTRIES	1
SESSION	2
TAGTYPE	EPCC1G2
TIMEOUTMODE	OFF
TTY	OFF
UNSELTRIES	1
UTCTIME	0
WRTRIES	3

From the Intermec website, you can also download a sample application (JRFID) to test, configure, and control the module.

To download the JRFID application

- 1** Go to www.intermec.com.
- 2** Click **Products** > **RFID** > **Fixed Readers** > **IF2**.
- 3** Click the **Downloads** tab.
- 4** Under Demo Software, download the JRFID Application.

About the Development Kit

The development kit comes with all the necessary hardware to connect it to your desktop PC. The kit contains:

- IM11 RFID Reader Module
- Development board
- Antenna and cables
- Power supply
- USB cable
- Serial cable
- RFID tags
- CD that contains software tools and this guide

Once connected, open a serial or USB connection to setup, test, configure, and control the module.

Connect the Development Kit

You can connect the development kit to your PC through serial or USB communications and use it to perform these tasks:

- Establish a BRI session.
- Use the JRFID application.
- Restore default settings.

Open a Serial Connection

Use a serial communications program, such as Hyperterminal, to communicate with the module.



Note: If you do not have a communications program, you can download a trial version of HyperTerminal for Windows 7 at www.hilgraeve.com/hyperterminal.

To open a serial connection

- 1 If you have Microsoft ActiveSync running on your desktop PC, disable ActiveSync to make the serial port available.
- 2 Connect the RFID module and antenna cables to the development board.
- 3 Connect the antenna to the first antenna port.
- 4 Connect the serial cable from the COM 1 port on the development board to the serial port on your PC.
- 5 Start the communications program.
- 6 Configure the communications parameters to:
 - Bits per second: 115200
 - Data bits: 8
 - Parity: None
 - Stop bit: 1
 - Flow control: None
 - Send line ends with line feeds: Enabled

- 7 Connect the development kit to power. The development kit boots as soon as you apply power. In about a minute, the message “Loading System” appears as the development kit initializes.



The serial connection is established.

Open a USB Connection

If you are opening a USB connection, you need to create a folder that includes a gserial.inf and a usbser.sys file.

To open a USB connection

- 1 On your desktop PC, create a new folder.
- 2 Click **Start > Programs > Accessories > Notepad**.
- 3 In Notepad, copy and paste this text:

```
[Version]
Signature="$Windows NT$"
Class=Ports
ClassGuid={4D36E978-E325-11CE-BFC1-08002BE10318}
Provider=%LINUX%
DriverVer=08/17/2004,0.0.2.0
; Copyright (C) 2004 Al Borchers (alborchers@steinerpoint.com)

[Manufacturer]
%LINUX%=GSerialDeviceList

[GSerialDeviceList]
%GSERIAL%=GSerialInstall, USB\VID_0525&PID_A4A7

[DestinationDirs]
DefaultDestDir=10,System32\Drivers

[GSerialInstall]
CopyFiles=GSerialCopyFiles
```



```

AddReg=GSerialAddReg

[GSerialCopyFiles]
usbser.sys

[GSerialAddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,usbser.sys
HKR,,EnumPropPages32,, "MsPorts.dll,SerialPortPropPageProvider"
[GSerialInstall.Services]
AddService = usbser,0x0002,GSerialService

[GSerialService]
DisplayName = %GSERIAL_DISPLAY_NAME%
ServiceType = 1 ; SERVICE_KERNEL_DRIVER
StartType = 3 ; SERVICE_DEMAND_START
ErrorControl = 1 ; SERVICE_ERROR_NORMAL
ServiceBinary = %10%\System32\Drivers\usbser.sys
LoadOrderGroup = Base

[Strings]
LINUX = "Linux"
GSERIAL = "Gadget Serial"
GSERIAL_DISPLAY_NAME = "USB Gadget Serial Driver"

```

- 4 Click **File > Save As**.
- 5 Browse to the folder you created in Step 1 and save the document as **gserial.inf**.
- 6 Browse to the C:\Windows\Driver Cache\i386 directory and locate the driver.cab file.
- 7 Open the driver.cab file with a .cab extraction tool, find the **usb.sys file**, and copy it to the folder you created in Step 1.
- 8 Connect the RFID module and antenna cables to the development board.
- 9 Connect the antenna to the first antenna port.
- 10 Connect the USB cable from the USB port on the development board to the USB port on your PC. The Found New Hardware Wizard appears.
- 11 Select **Install from a list or specific location (Advanced)**, and click **Next**.

- 12 Select **Include this location in the search**, browse to the folder you created in Step 1, and press **Enter**.
- 13 When the Windows Logo Testing screen appears, click **Continue Anyway**. The development kit is connected through USB.

Troubleshooting

Use the information in this section to fix problems with the IM11 module.

Problems While Working with RFID

Many problems you may encounter when working with your RFID system can be solved by carefully checking the RFID settings and changing them accordingly.

RFID Problems and Solutions

Problem	Solution
You cannot connect to the module using the serial port.	<ul style="list-style-type: none">• Verify that you are using a null-modem cable to connect to the desktop PC.• Verify that you are communicating through the correct serial port.• Verify that your PC is set to 115200, N, 8, 1, no flow control.
The module is unable to read RFID tags, or seems to read tags slow or inconsistently.	<p>Check these conditions:</p> <ul style="list-style-type: none">• Your RFID antennas must be connected correctly to the module and mounted in optimum locations. Make sure all antenna connections are tight and that the cables are in good condition.• To maximize performance, make sure you have chosen the correct tag types.

Restore Default Settings

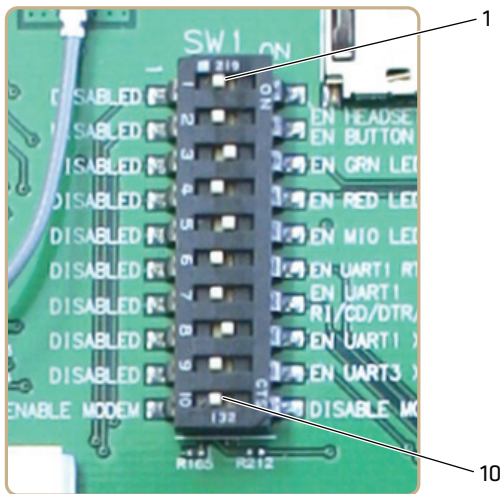
If you are having problems with the module, you can use a serial connection to restore the default settings to the module.

To restore the module default settings

- 1 open a serial connection to the module. For help, see “Open a Serial Connection” on page 31.
- 2 In the login field, type `restore_defaults`, and then press **Enter**. The module reboots and the default settings are restored.

DIP Switch Default Settings

If you are having problems with the module or development board, you may need to reset the dip switches back to their default settings.



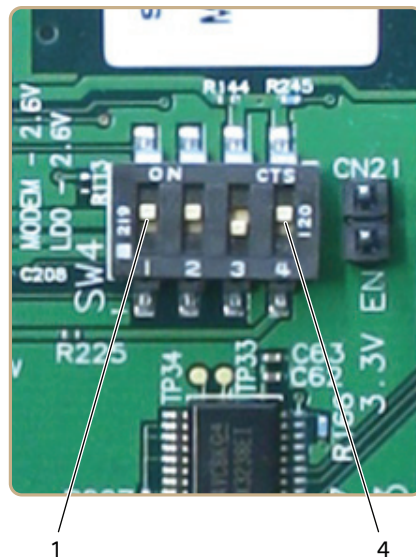
SW1 DIP Switch Default Settings

SW1 DIP Switch Default Settings

Dip Switch	Description	Default Setting
1	EN HEADSET DET	Disabled
2	EN BUTTON DET	Disabled
3	EN GRN LED	Enabled
4	EN RED LED	Disabled

SW1 DIP Switch Default Settings (continued)

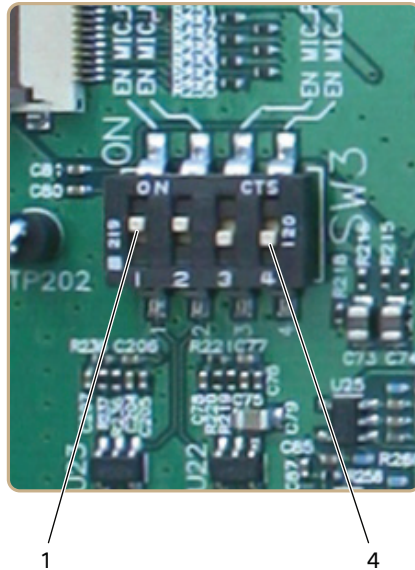
Dip Switch	Description	Default Setting
5	EN M10 LED	Enabled
6	EN UART 1 RTS/CTS	Disabled
7	EN UART 1 R1/CD/DTR/DSR	Disabled
8	EN UART 1 XCVR	Enabled
9	EN UART 3 XCVR	Disabled
10	DISABLE MODEM	Enabled



SW4 DIP Switch Default Settings

SW4 DIP Switch Default Settings

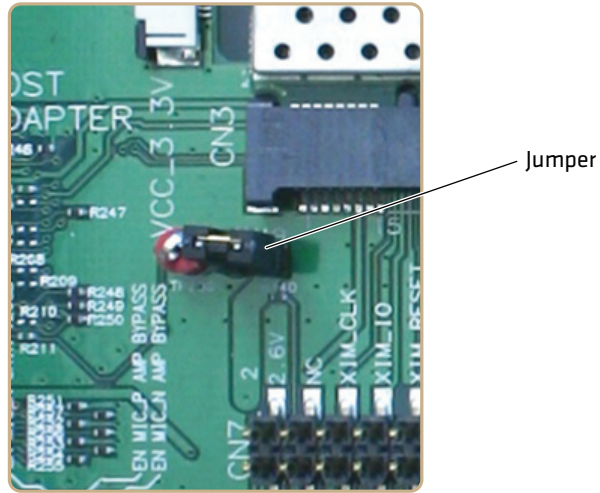
Dip Switch	Description	Default Setting
1	EN FIXED OUTPUT 3.3 V	On
2	EN BARREL JACK LDO	On
3	MODEM - 2.6 V	Off
4	LDO 2.6 V	On



SW3 DIP Switch Default Settings

SW3 DIP Switch Default Settings

Dip Switch	Description	Default Setting
1	EN MIC_P GAIN + 20 dB	On
2	EN MIC_N GAIN + 20 dB	On
3	EN MIC_P BYPASS	Off
4	EN MIC_N BYPASS	Off



J4 Jumper Default Setting

J4 Jumper Default Setting

Jumper Installed	Description	Default Setting
Yes	VCC_3.3 V	On

Federal Communication Commission Interference Statement

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.

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

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 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.
- 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.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: HD5-IM11PRT”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

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.

Industry Canada statement:

This device complies with ISSED’s licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d’ ISSED applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement:

This equipment complies with ISSED 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.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements ISSED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

DETACHABLE ANTENNA USAGE

This radio transmitter (IC: 1639B-IM11PRT/ Model: IM11-PRT) has been approved by ISSED to operate with the antenna type listed below with maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (IC: 1639B-IM11PRT/ Model: IM11-PRT) a été approuvé par ISSED pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types

d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Approved antenna(s) list

Type	Gain	Brand	Manufacturer
near-field	-30dBi	Honeywell	Honeywell

This device is intended only for OEM integrators under the following conditions: (For module device use)

- 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.

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.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

- 1) L'antenne doit être installée de telle sorte qu'une distance de 20 cm est respectée entre l'antenne et les utilisateurs, et
- 2) Le module émetteur peut ne pas être coimplanté avec un autre émetteur ou antenne.

Tant que les 2 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

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 Canada authorization is no longer considered valid and the IC 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 Canada authorization.

NOTE IMPORTANTE:

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC: **1693B-IM11PRT**".

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un dispositif où l'antenne peut être installée de telle sorte qu'une distance de 20cm peut être maintenue entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: **1693B-IM11PRT**".

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.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.



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IM11 RFID Reader Module Integration Guide



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