Intermec

Integration Guide

IM11   **Module**

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Document Change Record

This page records changes to this document. The document was originally released as version 001.

Version Number	Date	Description of Change

Contents

Before You Begin

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

Safety Icons

This section explains how to identify and understand cautions and notes within this document.

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, refer to your OEM 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 web site at **www.intermec.com** to download our current documents (in PDF). To order printed versions of the Intermec manuals, contact your local Intermec representative or distributor.

Visit the Intermec technical knowledge base (Knowledge Central) at **intermec.custhelp.com** to review technical information or to request technical support for your Intermec product.

Telephone Support

These services are available from Intermec Technologies Corporation.

Services	Description	In the USA and Canada call 1-800-755-5505 and choose this option
Order Intermec products	• Place an order. • Ask about an existing order.	1 and then choose 2
Order Intermec media	Order printer labels and ribbons.	1 and then choose 1
Order spare parts	Order spare parts.	1 or 2 and then choose 4
Technical Support	Talk to technical support about your Intermec product.	2 and then choose 2
Service	• Get a return authorization number for authorized service center repair. • Request an on-site repair technician.	2 and then choose 1
Service contracts	• Ask about an existing contract. • Renew a contract. • Inquire about repair billing or other service invoicing questions.	1 or 2 and then choose 3

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Outside the U.S.A. and Canada, contact your local Intermec representative. To search for your local representative, from the Intermec web site, click Contact.

Who Should Read This Document?

This **IM11** *Module Integration Guide* (P/N 944-**xxx**-xxx) explains how to integrate the IM__ module into a computer or other device. It is written for the person who will be evaluating the IM__ to integrate into their device or for the person who will be engineering the device to accommodate the **IM11.**
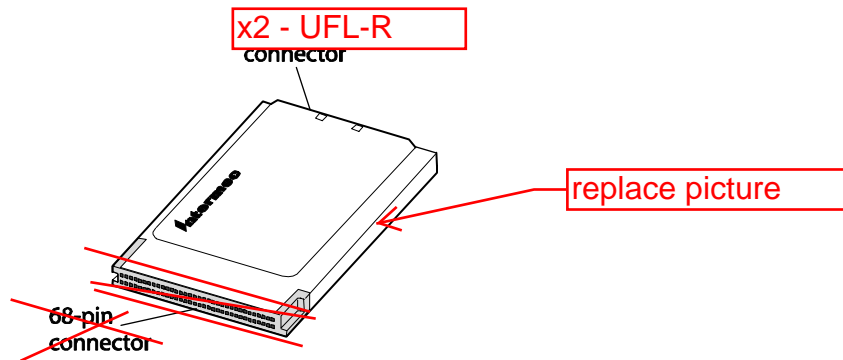
IM11

Before you install and configure the IM__, 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.

Where you see IM__ fill in with IM11.

About the IM11

The Intermec IM__ module is designed to let you easily incorporate reading and writing RFID tags into your computers, printers, and other mobile devices.

x2 - UFL-R connector

replace picture

68-pin connector

IM11 *Module*

m-PCI = mini PCI

The IM__ is a mini-PCI card package with a standard ? -pin connector. You can use the IM__ in most worldwide RFID applications. Intermec versions of the IM__ cover the UHF band from 865 MHz to 928 MHz.

When integrated into your computer, the IM__ connector functions as either a m-PCI module (default) or as a serial module.

Note that the IM11:

- has different pinouts functioning as a m-PCI module versus a serial module. To use the IM__ as a serial module, you need to tie to ground pins TBD

Pin 34   Pin 1

replace picture

m-PCI

Pin 68   Pin 35
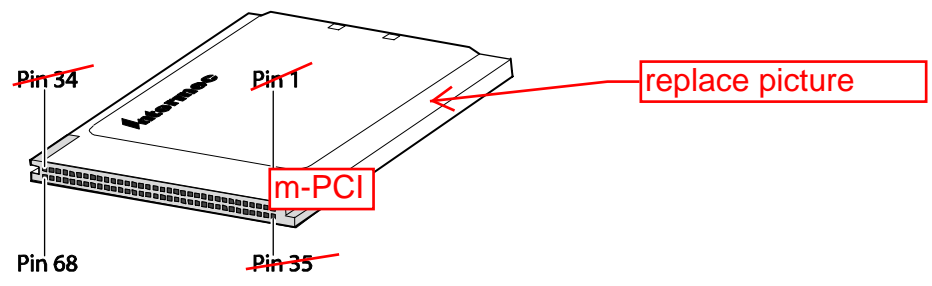
- may have heat dissipation requirements. In most situations, the Overtemperature mode adequately protects against very high temperatures. However, if you use the IM__ in a high duty-cycle application, you may want to attach a heatsink.

- has certain power requirements. The m-PCI slot must be able to supply power for the card. Most mini-PCI slots do not supply enough power.

- has antenna connector requirements, see IM11 865 or 900 MHz Radio Compliance Inserts

Configuring the IM11 as a mini-PCI Module (Default)

In m-PCI mode, the IM☐ interface emulates a standard 16C550 UART. To your PC, the IM☐ appears as a serial port. You can use a communications program, such as HyperTerminal, to communicate with the IM☐ using the Basic Reader Interface (BRI). For more information on the BRI, see the *Basic Reader Interface (BRI) Programmer's Reference Guide* (P/N 937-000-xxx).

All signals are 3.3 V logic levels (5 V tolerant inputs).

	Low	High	Notes
Inputs	0 V to 0.8 V	2.4 V to 5.5 V	Input current is ±10 µA max
Outputs	0.4 V Max @ 8 mA	2.9 V min @ -8 mA	

Note: Pins with a # in the pin name indicate an active low signal.

Pins TBD determine if the IM11 operates in m-PCI mode or in Serial mode. If the three signals are not grounded, the IM☐ operates in m-PCI mode.

PC Card Module Pinout

Pin No.	Pin Name	Definition	Pin No.	Pin Name	Definition
1	to be . determined	Ground V...	35	to be . determined	
2			36		
3			37		
4			38		
5			39		
6			40		
7			41		
8			42		
9			43		
10			**44**		
11			**45**		
12			46		
13			47		
14			48		
15			49		
16			50		
17			51		
18		voltage	52		ge (not

mini-PCI *Module Pinout (continued)*

Pin No.	Pin Name	Definition	Pin No.	Pin Name	Definition
19	to be . determined		53	to be . determined	
20			54		
21			55		
22			56		
23			57		connected)
24			58		
25			59		
26			60		lge
27			61		O enable
28			62		m
29			63		
30			64		
31			65		
32			66		
33		Memory 16-bit in	67		)
34			68		

Configuring the IM11 as a Serial Module

In Serial mode, the IM_ interface provides two 16C850 UART channels, one SPI channel, eight auxiliary inputs, and eight auxiliary outputs. The IM·_appears as a serial port and you can use a communications program, such as HyperTerminal, to communicate with it using the Basic Reader Interface (BRI). For more information on the BRI, see the *Basic Reader Interface (BRI) Programmer's Reference Guide* (P/N 937-000-xxx).

All signals are 3.3 V logic levels (5 V tolerant inputs).

Serial Module Voltage Levels

	Low	High	Notes
Inputs	0 V to 0.8 V	2.4 V to 5.5 V	Input current is ±10 µA max
Outputs	0.4 V Max @ 8 mA	2.9 V min @ -8 mA	

Note: Pins with a # in the pin name indicate an active low signal.

Pins ? (NC), ? (IORD#), and ? (IOWR#) determine if the IM_ operates in m-PCI mode or in Serial mode. If the three signals are grounded, the ? operates as a serial module.

These pins are a carryover from the m-PCI interface. These signals are mutually exclusive for any m-PCI application. In order for the IM☐ to operate in Serial mode, you must ground all three of these signals, which keeps the card from driving signals defined for serial operation into a regular m-PCI socket.

Serial Module Pinouts

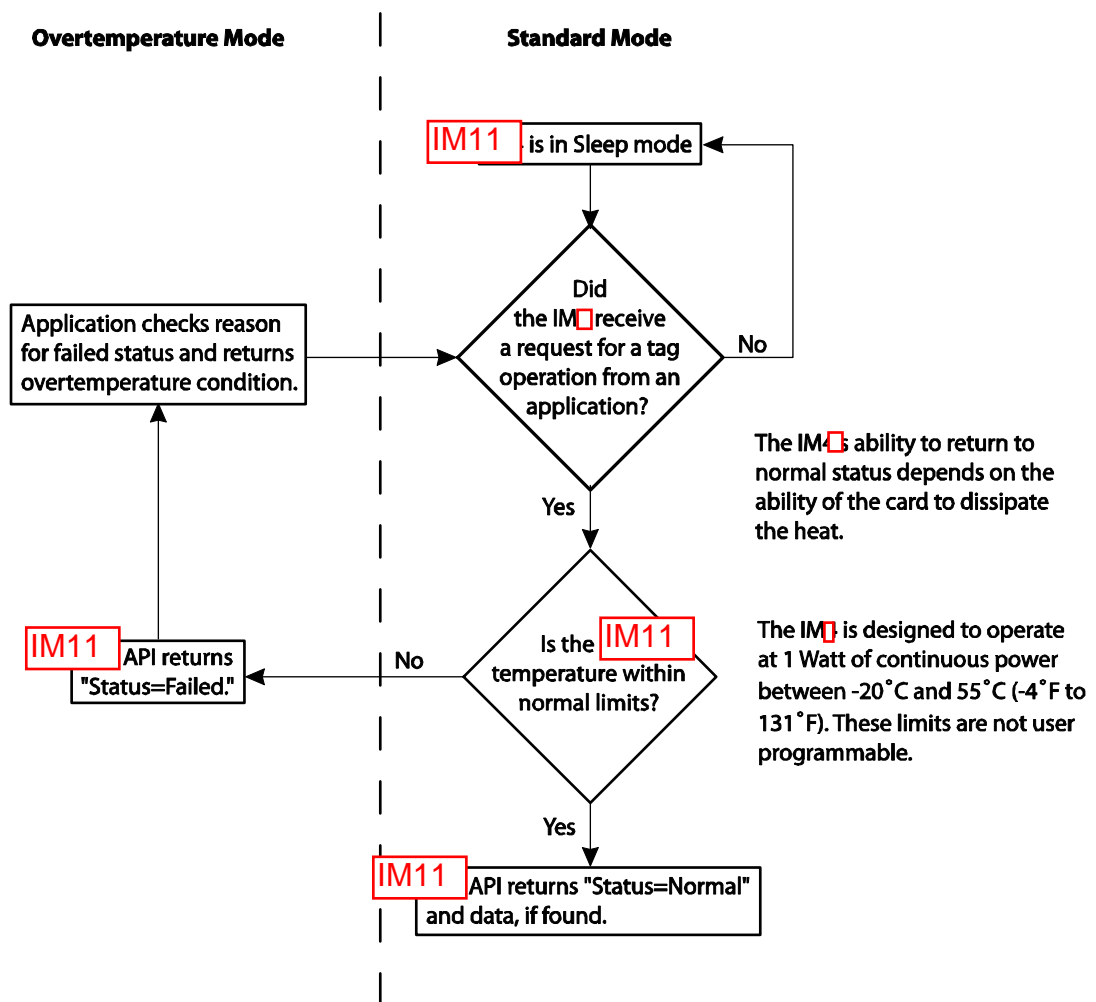| Pin No.	Pin Name	Definition	Pin No.	Pin Name	Definition
1	to be .determined		35	to be .determined	
2			36		
3			37		
4			38		
5			39		
6		ost	40		
7			41		
8			42		
9			43		
10			44		
11			45		
12			46		st
13			47		
14			48		
15			49		
16			50		
17			51		
18			52		
19			53		
20			54		
21			55		
22			56		
23			57		
24			58		ost (open drain)
25			59		
26			60		
27			61		
28			62		
29			63		
30		14	64		
31			65		
32			66		
33			67		
34		Ground +66	68		

[1] You must use software to enable an SPI channel. Until you enable this channel, inputs to it are ignored and outputs to it are 3-stated.

[2] The Debug signals are intended for use during any debug efforts. You can also configure these signals for use as a second UART channel.

[3] The Auxiliary outputs are 3-stated on power-up until they are written to the first time. During this condition, you should provide pull-ups or pull downs to keep any external logic disabled.

Understanding the IM11 Operating Modes

This illustration shows the IM_ Overtemperature and standard operating modes.

Overtemperature Mode   **Standard Mode**

IM11 is in Sleep mode

Did the IM□ receive a request for a tag operation from an application? — No

Application checks reason for failed status and returns overtemperature condition.

Yes

The IM□s ability to return to normal status depends on the ability of the card to dissipate the heat.

IM11 API returns "Status=Failed." — No — Is the IM11 temperature within normal limits?

The IM□ is designed to operate at 1 Watt of continuous power between -20˚C and 55˚C (-4˚F to 131˚F). These limits are not user programmable.

Yes

IM11 API returns "Status=Normal" and data, if found.

Heat Dissipation Requirements

In most usage scenarios, the IM 11 uses a maximum of ? W of power from its host device. Since its RF transmit power is 1W, the IM 11 must dissipate up to ? W of heat.

Normally, the host dissipates this heat. However, under high ambient temperature conditions or in a high duty cycle application, this heat may need to be conducted outside the host to prevent the IM 11 from entering Overtemperature mode.

The IM 11 has a built-in Overtemperature mode that provides sufficient protection against very high temperatures. When the IM 11 enters Overtemperature mode, the card shuts down until cool enough to resume operating.

The IM 11 transfers heat to the back side (non-label side) of its case. Any heat transfer mechanism (such as moving air, a metal heatsink, or a heat pipe) applied to this surface will help this dissipate the heat.

Ideally, the optimum temperature for the IM 11 is below 65°C (149°F).

Power Requirements

The mini-PCI must be able to supply enough current for the IM 11 in RF ON mode. There are three current modes: idle (quiescent), digital only, and RF ON. Each mode requires a different current draw.

Note: Most m-PCI card slots can supply enough current to support the IM 11 in RF ON mode.

Use the following table when calculating DC power requirements for your mini-PCI slot. .

Current Mode	Current Draw	Status
RF ON	TBD	Communicating with tags
Digital Only	TBD	Fully ready state ready to execute a command
Idle	TBD	No activity (quiescent)

The RF ON mode corresponds to the highest current mode when the reader is communicating with a tag. The IM 11 will not stay in Digital Only mode for any significant length of time before it switches to RF ON mode. The amount of time that the IM 11 is in RF ON mode is mostly affected by the number of RFID tags in the reading range.

Antenna Requirements

⚠ **Caution**

Government regulatory agencies require that the IM☐ use approved antennas only. Do not use antennas not approved for use with this module.

⚠ **Caution**

Failure to use Intermec-approved antennas may require your system to be approved by the appropriate regulatory agencies for the countries in which your devices are being used. Using an unauthorized antenna or other peripheral device may result in possible communications interference or radio safety hazards.

The antenna receptacle is [UFL-R-SMT-1(10)] (50 ohm, coaxial). Once the IM☐ is installed in a device, that device must not be co-located or operating in conjunction with any other antenna without regulatory agency approval. Co-location of antennas operating within 20 cm (7.9 inches) of each other requires co-location authorization.

The next two tables list the Intermec-approved antennas for use in the U.S.A. and in Canada. The antenna safe distances for all antennas (865 MHz and 900 MHz) is 25.4-cm (10 in). The cable length measurement is for antennas with an attached cable and is included in gain measurement. The cable loss measurement is for the cable that connects the antenna to the device.

IM11 · Intermec-Approved 865 MHz RFID Antennas

See IM11 865 MHz RFID Radio Compliance Insert

IM11· Intermec-Approved 900 MHz RFID Antennas

See IM11 900 MHz RFID Radio Compliance Insert

omit this page if possible

Specifications

General Specifications

Physical description	mini-PCI card, (dimensions lightly oversized from the standard)
Weight	34.0g ±2.8 g (1.2 oz ±0.2 oz)
Temperature	Operating: -20°C to 55°C (-4°F to 131°F) Storage: -40°C to +70°C (-40°F to 158°F)
Humidity (Operating Temperature)	0-95% relative humidity, non-condensing process

Transceiver Specification

Frequency range	Europe 865.7 - 867.5 MHZ set channel to 4, 7, 10 or 13
	U.S.A.: 902 to 928 MHz hopping , other countries contact Intermec sales.
Tari Return Data Rates	6.25 -25 µS ?
Modulation	PRASK
Coding	?
RF output impedance	50 Ohms with better than 10 dB return loss
Dwell time	50 mS
Bus interface	m-PCI or ASCII serial (16C650 serial port)
Air Interface protocol	? see spec. EPC1 Gen 2
FCC	Compliant to Part 15
ETSI	EN 302 208

Power Supply Specifications

Operating voltage	Minimum: ? V Maximum: 5.5V On IM digital regulated to 3.3V
Standby current	Typical: 2 mA Maximum: 5 mA
Read current	Typical: 1 ? 0 mA Maximum: 1 ? 0 mA Tx circuits, Rx circuits, VCO, temperature sensor
Ripple	Maximum: 100 mV Peak-to-peak
Timing	
• Standby to active	Typical 1.5 mS; Maximum: 2 mS Internal time not seen by the host
• Channel Switching	Maximum: 30 µS Tx on a channel to Tx on any other channel

Transmitter Specifications

900 /865 MHz	
Power output	Minimum: 588 mW Typical: 800 mW Maximum: 1000 mW
Frequency stability	Minimum: -30 PPM Maximum: 30 PPM
Phase noise	-60 dBc/Hz @ 30 kHz from carrier
Spurious emissions	-55 dBc in band
Overtemperature shutdown temperature	70°C (158°F) as measured on the power amplifier

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P/N TBD