

Product Overview

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Product Overview

This chapter provides an overview of the features available for the Cisco Catalyst IR1101 Rugged Series Router and its Expansion Module. It contains the following sections:

Note Prior to installing this device read the Regulatory Compliance and Safety Information .

General Description

The Cisco IR1101 Industrial Integrated Services Router is a next generation modular industrial router which has a base module with additional Pluggable Modules that can be added. The Pluggable Module provides the flexibility of adding different interfaces to the IR1101 platform, for example, a cellular module.

Details on the Pluggable Modules can be found in the chapter Pluggable Modules.

The IR1101 also has Expansion Modules that adds key capabilities such as dual LTE Pluggables, mSATA SSD FRU, SFP, additional L2 ethernet interfaces, additional RJ45 serial ports, and Digital GPIO connections.

Figure 1: The Cisco Catalyst IR1101 Rugged Series Router



SKU Information

The following table lists the different SKUs available for the Cisco IR 1101.

Table 1: Supported SKUs for Cisco IR1101

SKU ID	Description
IR1101-K9	IR1101 Base Unit
IRM-1100-4S8I	Expansion Module with 4x GE SFP, and 1 Digital I/O Connector.
IRM-1100-SPMI	Expansion Module with 1 GE SFP, 1 Pluggable Module, 1 Digital I/O Connector, and 1 mSATA SSD Slot.
IRM-1100-SP	Expansion Module with 1 GE SFP and1 Pluggable Module.
IRM-1100-4A2T	Expansion Module with an additional four asynchronous serial ports and two Ethernet interfaces.
IR1100-SSD-100G	100 GB mSATA SSD
PWR-IE50W-AC	Optional AC power adapter with 110/220V AC and 88-300V DC input (Temperature: -40C to 60C)
IR1101-DINRAIL(=)	Din rail kit and mounting screws for horizontal and vertical mounting

SKU ID	Description
IRM-1100-DINRAIL	Din rail kit for the Expansion Module
IR1101-WALLMNT(=)	Wall mount kit

Cisco IR1101 Series Platform Features

This section describes the different components of the router.

Cisco IR1101 Base Router

The following lists the hardware platform features for the Cisco IR1101.

- External Power Entry
  - Nominal: 12 to 48VDC
  - Absolute min/max: 9.6 to 60VDC
  - Typical current: 0.82A to 0.22A
  - Maximum current: 0.91A to 0.28A
  - 4-pin 3.8 mm EURO power connector
- External Reset/Recovery Push Button
- Gigabit Ethernet Combo RJ45+SFP connector.
  - RJ45 connector will support IEEE802.3 Ethernet over copper wiring standards of 10Base-T, 100Base-TX, and 1000Base-T
  - SFP port will support 1000Base-X or 100Base-FX Fiber Ethernet standard SFP
- LAN Ports
  - 4x RJ45 10/100 Fast Ethernet
- Serial Port
  - 1 x RJ45 RS232 Port (DTE)
- USB Ports
  - 1x USB 2.0 Type A Host Port
  - 1x USB 2.0 mini USB Type B console port
- Compliance
  - Class A EMC or better
  - IP30 compliant when vertical and ports downward

- Industrial temperature [-40ºC to +60ºC, 13.8Kft (operating), 15Kft (non-operating)]
- One alarm input

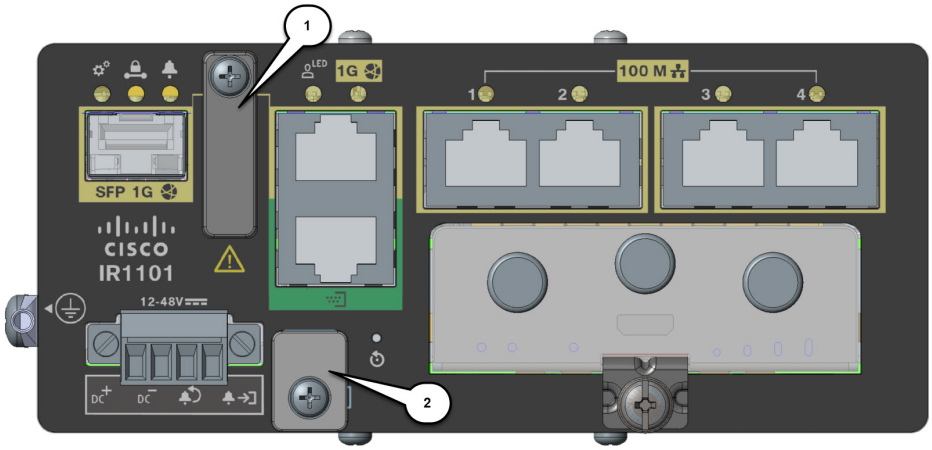
The following graphic shows the IR1101 base router.

Figure 2: Cisco Catalyst IR1101 Rugged Series Router



The following graphics show the IR1101 Base Module Front.

Figure 3: Cisco Catalyst IR1101 Rugged Series Router with USB covers in place



Item	Details
1	USB 2.0 Port Cover
2	Mini-USB Console Cover

The following graphic shows the front panel details of the Cisco IR1101.

Figure 4: Cisco IR1101 Front Panel

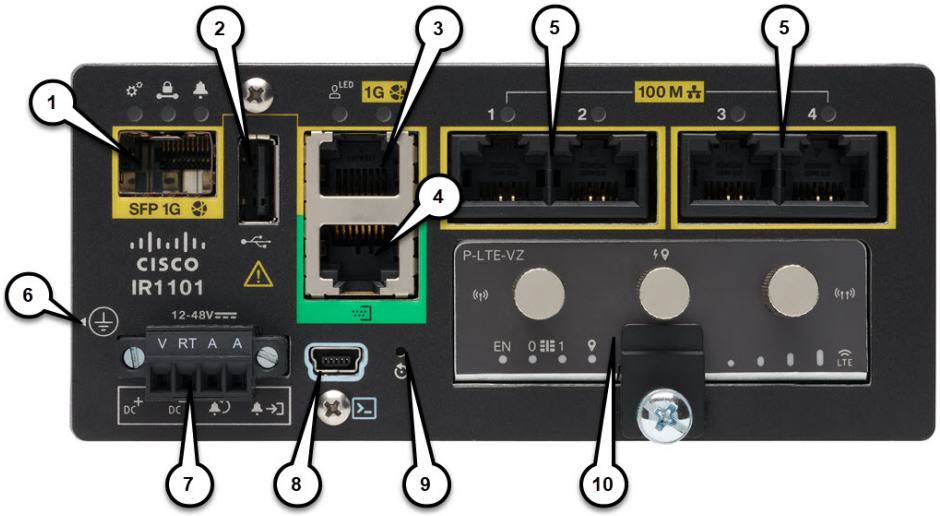


Table 2:

1	SFP GE WAN
2	USB 2.0
3	RJ45 GE WAN
4	Serial Port
5	FE LAN Ports 1-4
6	Grounding Point (on side of device)
7	DC Power and Alarm Input
8	Mini-USB Console
9	Reset Button

10	Pluggable Module

Cisco IRM-1100-4S8I Expansion Module

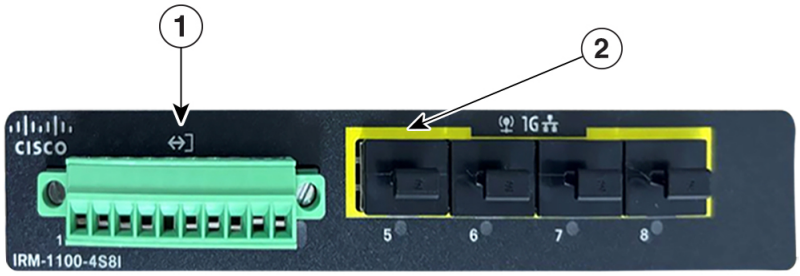
The IRM-1100-4S8I expansion module supports 4x 1G SFP ports and 8x GPIO dry/wet contact ports.

Note The Cisco IRM-1100-4S8I module is not a hot swapable module.

Note For more information, see IRM-1100-4S8I Expansion Module Installation section.

The following illustration shows the IR-1100-4S8I Expansion Module.

Figure 5: IRM-1100-4S8I Expansion Module



1	8 GPIO and 2 common Return (Digital I/O)
2	4x SFP Connector

The hardware platform features for the Cisco IR-1100-4S8I:

- 4x 1GE L2/L3 SFP ports
- 8x Digital I/O connector

IR-1100-4S8I Expansion Module LEDs

There are 12 LEDs in the Expansion Module. Eight LEDs show the status of digital I/O. Four LEDs shows the SFP port status. The LED behavior is shown in the following table.

Table 3: IR1100-4S8I Expansion Module LEDs

LED	Color	Definition
SFP	Off	No Link
	Solid Yellow	Port link, no activity
	Blinking Yellow	Link active with activity
Digital I/O as Input	Off	Inactive
	Yellow	Active

Cisco IRM-1100-SPMI Expansion Module

The following graphic shows the IR-1100-SPMI Expansion Module.

Figure 6: IRM-1100-SPMI Expansion Module



The following lists the hardware platform features for the Cisco IR-1100-SPMI:

- 1 GE SFP
- 1 Pluggable slot
- 1 Digital I/O connector
- 1 mSATA SSD slot

Figure 7: IRM-1100-SPMI Expansion Module Details



1	4 GPIO + 1 Return (Digital I/O)
2	SFP Connector
3	Pluggable Module
4	mSATA SSD Slot
5	Digital I/O LEDs

Digital I/O Connector

The Digital I/O connector has 4 GPIO connections plus 1 Return connection. The Digital I/O supports Both Dry and Wet contacts up to 60Volts.

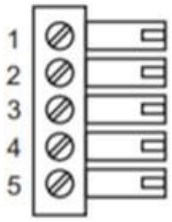
- Dry contact is isolated from a voltage source (or “No Volt”), with an embedded relay function (NPN transistor), usually used to indicate an event. For example: open/close, alarm.
- Wet contact is a contact with external power (+3.3V to +60V, max 150mA of current allowed at high voltage) applied, usually used to energize something. For example: solenoid, light.

The following graphic shows the connector.

Note Digital I/O is only supported on IOS-XE version 16.12.1 and above.

Note The default state of the Digital I/O is input, the open-collector is open (off).

Figure 8: Digital I/O connector



The pinouts for the Digital I/O are described in the following table.

Table 4: Digital I/O Pinouts

Pin #	Name	Direction	Description
1	DIO1	I/O	Digital IO 1
2	DIO2	I/O	Digital IO 2
3	DIO3	I/O	Digital IO 3
4	DIO4	I/O	Digital IO 4
5	Return	Return	Digital IO Common Return

Digital Input and Output Specifications are described in the following tables.

Digital Input Specification is considered “dry contact”, and Digital Output Specification is considered “wet contact”.

Table 5: Digital Input Specification

Specification	Minimum	Maximum	Unit
Input Voltage High	2.2	60	Volts
Input Voltage Low	—	1.2	Volts
Input Current	—	0.68mA **Note1**	uA

Note Current is flowing out of the terminal although it is an input, i.e. sourcing. The current is flowing in the terminal for the output, i.e. sinking.

Table 6: Digital Output Specification

Specification	Minimum	Maximum	Unit	Notes
Output Voltage High	2.5		Volts	No external voltage applied.
Output Voltage Low	—	0.4	Volts	No external voltage applied.
Internal Pull-up Resistance	3.3K – 1%	3.3K – 1%	Ohms	—
Internal Pull-up Voltage	—	3	Volts	—
External Pull-up Voltage	3.3	60	Volts	External resistance required to limit current to 200mA.
Sink Current	—	200	mA	—

Common features of the Digital I/O are:

- Withstands up to 60V applied at the terminal.
- Reverse voltage protected and causes no damage to the equipment.
- Digital input and output can coexist on different channel.
- LED Indicator: provision-able, On: Active, Off: Non-active.
- Electrical isolation: 2000 VDC.
- 4kV Surge protected (IEC 61000-4-5).

IR-1100-SPMI Expansion Module LEDs

There are 6 LEDs in the Expansion Module. Four LEDs show the status of digital input and output. One LED shows the SFP port status and one LED shows the mSATA status. The LED behavior is shown in the following table.

Table 7: Expansion Module LEDs

LED	Definition
Digital I/O as Input	Off - Inactive Solid Yellow- Active
Digital I/O as Output	Off - Inactive Solid Yellow- Active

LED	Definition
SFP	Off - No Link Solid Yellow - Port link with no activity Flashing Yellow - Port link healthy with activity
mSATA	Off - Not powered on or no activity Flashing Green - mSATA being accessed

Cisco IR-1100-SP Expansion Module

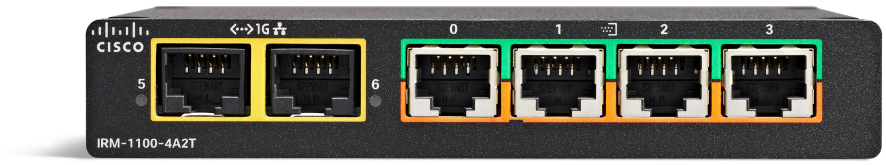
The IR-1100-SP Expansion Module is the same as the IR-1100-SPMI module, without the Digital I/O and mSATA components.

The following lists the hardware platform features for the Cisco IR-1100-SP:

- 1 GE SFP (see the supported list of SFP's here: SFP Module, page 26)
- 1 Pluggable slot

Cisco IRM-1100-4A2T Expansion Module

The IRM-1100-4A2T is an expansion module that can be attached to the IR1101. It offers an additional four asynchronous serial ports and two Ethernet interfaces to the IR1101. The following graphic shows the IRM-1100-4A2T.



The IRM-1100-4A2T Ethernet interfaces are Layer 2 RJ45 10/100/1000 Mbps ports.

The IRM-1100-4A2T serial ports are RJ45 combo ports (RS232/RS485/RS422).

The IR1101 has two sides that expansion modules mount to. The top is called the Expansion side, and the bottom is called the Compute side. If the additional module is connected to the top, then it is referenced as the Expansion Module (EM) side. If the additional module is connected on the bottom, then it is referenced as the Compute Module (CM) side. Functionality differs depending on which side the expansion module is attached to, and how many and type of expansion modules are in use.

Note For more information, see the IRM-1100-4A2T Expansion Module Installation section.

The IRM-1100-4A2T can be managed from the following tools:

- Cisco DNA Center
- WebUI

Router Switch Path

The switch path that is detected on the platform, is based on the type of additional module connected on the Expansion module (EM) side. Refer to the following table:

Additional Module	Switch Path
No Module Connected	IR1101-ES-5
IRM-1100-SPMI	IR1101-ES-6S
IRM-IR1100-4A2T	IR1101-ES-7G

Note When an IRM-IR1100-4A2T is connected on both sides of the IR1101-K9, there is a maximum of nine Async interfaces which can be enumerated. The switch path for the IR1101-K9 will be IR1101-ES-7G.

Serial Port Pinouts and Characteristics

The serial ports are intended as a DCE port, capable of both RS232 and RS485. RS485 can support full or half duplex.

The RJ45 pinouts are shown in the following figure and table:

Figure 9: Pinouts

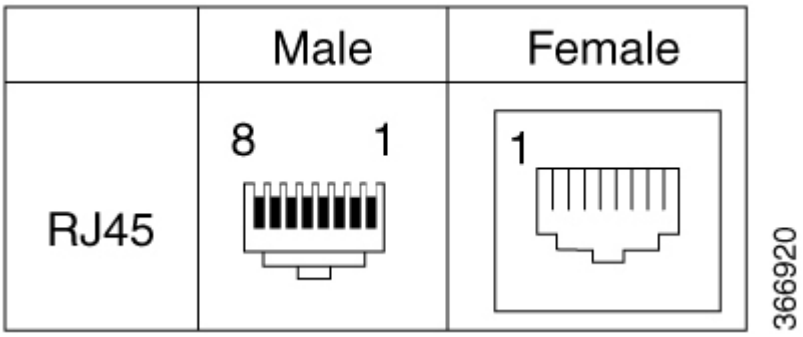


Table 8: Serial Port Characteristics

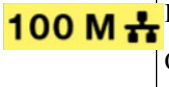
RS232					RS485 Full Duplex		RS485 Half Duplex	
Pin #	Signal Description	Abbr.	S0 (DTE)	S1 (DCE)	Signal	DIR	Signal	Direction
1	DCE ready. Used as DSR in Cisco IOS.	DSR/RI	Input	Output	TX-	Output	TX/RX+	<->

RS232					RS485 Full Duplex		RS485 Half Duplex	
Pin #	Signal Description	Abbr.	S0 (DTE)	S1 (DCE)	Signal	DIR	Signal	Direction
2	Received Line Signal Detector	DCD	Input	Output	TX+	Output	TX/RX-	<->
3	DTE Ready	DTR	Output	Input	RX-	Input	—	—
4	Signal Ground	COM	—	—	COM	—	COM	—
5	Received Data	RxD	Input	Output	—	—	—	—
6	Transmitted Data	TxD	Output	Input	RX+	Input	—	—
7	Clear To Send	CTS	Input	Output	—	—	—	—
8	Request To Send	RTS	Output	Input	—	—	—	—

Front Panel Icons and LEDs

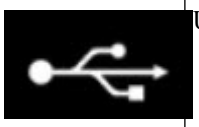
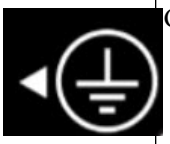
The IR1100 Series uses icons to show the different features of the device. The following two tables provide details.

Table 9: Icons with LEDs

Icon	Description/Activity	Icon	Description/Activity
	System - Power and System Status. Off — No power Green Steady on — Normal operation Green Flashing — Boot up phase or in ROM Monitor mode Amber Steady on — Power is OK but possible internal failure		Alarm - Alarm Input Status Off — Normal operation Red - Alarm State on the Alarm Input
	VPN Off — No VPN tunnel Steady Green — At least one VPN tunnel is up		Red, Green, and Blue User Configurable LED
	Gigabit Ethernet Combo Port Off — No Link Solid Green — Copper Link up, no activity Flashing Green — Copper Link up, with activity Solid Amber — SFP Link up, no activity Flashing Amber — SFP Link up, with activity		RJ45 Fast Ethernet Ports -Link Status 0:1 Off — No link Steady Green — Link is up Flashing — Transmitting and Receiving data

Icon	Description/Activity	Icon	Description/Activity
	mSATA Storage Off - Not powered on or no activityFlashing Green - mSATA being accessed		Digital I/O Off - InactiveSolid Yellow- Active

Table 10: Icons only

Icon	Description	Icon	Description
	USB 2.0 Console Mini-B Connector		USB 2.0 Type A Port for Storage and Networking
	Grounding point (located on side of device)		Reset Button
	DC Power Input (12V to 48V)		DC Power Return
	Alarm Return		Alarm IN
	Serial Ports		Warning
	Expansion Module (Top or Left side)		Expansion Module (Bottom or Right side)

Memory

The Cisco IR1101 uses flash memory and main memory. The flash memory contains the Cisco OS software image and the boot flash contains the ROMMON boot code. The memory includes:

- 4 GB DRAM (soldered down)

- 4 GB onboard flash memory

Reset Button

The Reset button resets the router configuration to the default configuration set by the factory. To restore the router configuration to the default configuration set by the factory, use a standard size #1 paper clip with wire gauge 0.033 inch or smaller and simultaneously press the reset button while applying power to the router.

Supported Cisco Antennas and Antenna Accessories

The IR1101 must have a Pluggable Module with antenna ports installed in order to connect antennas. The base unit does not have any wireless capabilities on its own.

The Antenna Selection and Installation chapter lists the supported Antennas and Accessories for the Cisco IR1101 with a wireless Pluggable Module. For detailed information about Cisco Antennas for the Industrial Routers, please refer to the following guide:

Cisco Industrial Routers and Industrial Wireless Access Points Antenna Guide

Modem Support

The Cisco IR1101 wireless Pluggable Module uses the Sierra Wireless series modems. The software download page can be found here:

https://software.cisco.com/download/navigator.html?mdfid=286288566&flowid=76082

The following tables provide the technology details for the modems.

Table 11: Modem Technology Supported

SKU ID	Modem Used	Description	Technology Supported
P-LTE-VZ	WP7601-G	U.S. (Verizon) Single Micro SIM	LTE CAT4: B4, B13
P-LTE-US	WP7603-G	North America (AT&T) Dual Micro SIM	LTE CAT4:B2,B4,B5,B12 3G UMTS DC-HSPA+, HSPA+, HSPA, WCDMA: B2,B4, B5
P-LTE-JN	WP7605-G	Japan	LTE CAT4: B1, B3, B8, B11, B18, B19, B21 3G UMTS HSPA+
P-LTE-GB	WP7607-G	Europe Dual Micro SIM	LTE CAT4: B1,B3, B7, B8, B20, B28 3G UMTS DC-HSPA+, HSPA+, HSPA, WCDMA GPRS/EDGE: 900/1800

SKU ID	Modem Used	Description	Technology Supported
P-LTE-IN	WP7608-G	India and China	LTE CAT4: B1, B3, B5, B8, B40, B41* 3G UMTS DC-HSPA+ * B41 supported frequency range: (2535–2655 MHz)
P-LTE-MNA	WP7610-G	North America	LTE CAT4: B2, B4, B5, B12, B13, B14, B17, B66 3G UMTS DC-HSPA+, HSPA+, HSPA, WCDMA
P-LTEA-LA	EM7430	APAC	Multimode LTE 3.0 for carriers that operate FDD LTE 700-MHz (band 28), 850-MHz (band 5 CLR), 850-MHz (bands 18 and 19 Low), 900-MHz (band 8), 1500-MHz (band 21), 1800-MHz (band 3), 2100-MHz (band 1), or 2600-MHz (band 7) networks; the multimode Cisco LTE Advanced 3.0 NIMs are backward-compatible with UMTS and DC-HSPA+: 800 MHz (band 19 Japan), 850 MHz (band 5), 850 MHz (band 6 Japan), 900 MHz (band 8), 1800 MHz (band 9), 2100 MHz (band 1), and TD-SCDMA 39. Multimode LTE Advanced 3.0 for carriers that operate TDD LTE 1900 MHz (band 39), 2300 MHz (band 40), 2500 MHz (band 41), or 2600 MHz (band 38). Multimode LTE Advanced 3.0 for carrier aggregation band combinations: 1+(8,18,19,21); 3+(5,7,19,28); 7+(5,7,28); 19+21, 38+38, 39+39, 40+40, and 41+41.

SKU ID	Modem Used	Description	Technology Supported
P-LTEA-EA	EM7455	USA, Canada, Europe, Latin America	Multimode LTE Advanced 3.0 for carriers that operate FDD LTE 700-MHz (band 12), 700-MHz (band 29), 800-MHz (band 20), 850-MHz (band 5 CLR), 850-MHz (bands 26 Low), 900-MHz (band 8), 1800-MHz (band 3), 1900-MHz (band 2), 1900-MHz (PCS band 25), 1700-MHz and 2100-MHz (band 4 AWS), 2100-MHz (band 1), 2300-MHz (band 30), or 2600-MHz (band 7) networks. The multimode Cisco LTE Advanced 3.0 NIMs are backward compatible with Universal Mobile Telecommunications Service (UMTS) and Dual-Carrier High-Speed Packet Access Plus (DC-HSPA+): 850-MHz (band 5), 900-MHz (band 8), 1800-MHz (band 3), 1900-MHz (band 2), 1700-MHz and 2100-MHz (band 4 AWS), and 2100-MHz (band 1). Multimode LTE Advanced 3.0 for carriers that operate TDD LTE 2500-MHz (band 41). Multimode LTE Advanced 3.0 for carrier aggregation band combinations: 1+8; 2+(2,5,12,13,29); 3+(7,20); 4+(4,5,12,13,29); 7+(7,20); 12+30, 5+30, and 41+41.
P-LTEAP18-GL, Cisco LTE Advanced Pro Pluggable 3GPP Category 18 **Note** Supported only in the IR1101 Base Unit. Not supported in the IRM-1100 Expansion Module. **Note** GNSS is not supported on the CAT18 module.	LM960AP18	United States, Europe, Canada, Japan, Australia and New Zealand.	LTE bands 1-5, 7, 8, 12-14, 17, 18-20, 25, 26, 28-30, 32, 38-43, 46, 48, 66, and 71. FDD LTE 600 MHz (band 71), 700 MHz (bands 12, 13, 14, 17, 28, and 29), 800 MHz (band 20), 850 MHz (bands 5, 18, 19, and 26), 900 MHz (band 8), 1500 MHz (band 32), 1700 MHz (bands 4 and 66), 1800 MHz (band 3), 1900 MHz (bands 2 and 25), 2100 MHz (band 1), 2300 MHz (band 30), 2600 MHz (band 7). TDD LTE 1900 MHz (band 39), 2300 MHz (band 40), 2500 MHz (band 41), 2600 MHz (band 38), 3500 MHz (bands 42 and 48), 3700 MHz (band 43), 5200 MHz (band 46).
P-LTEA7-NA	EM7411	North America	LTE CAT 7: B2, B4, B5, B7, B12, B13, B14, B25, B26, B41, B42, B43, B48, B66, B71 3G UMTS, WCDMA: B2, B4, B5

SKU ID	Modem Used	Description	Technology Supported
P-LTEA7-EAL	EM7421	Canada, Europe, Latin America, US	LTE CAT 7: B1, B3, B7, B8, B20, B28, B32, B38, B40, B41, B42, B43 3G UMTS, WCDMA: B1, B5, B8
P-LTEA7-JP	EM7431	Japan	LTE CAT 7: B1, B3, B5, B8, B18, B19, B39, B41, B42, B43 3G UMTS, WCDMA: B1, B5, B6, B19
P-5GS6-R16SA	EM9293	United States, Europe, Canada, Japan, Australia and New Zealand.	5G FR1 NR: n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n25, n26, n28, n29, n30, n38, n40, n41, n48, n66, n70, n71, n75, n76, n77, n78, n79 LTE bands: FDD LTE: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18,B19, B20, B25, B26, B28, B29,B30, B32, B66, and B71 TDD LTE: B34, B38, B39, B40, B41, B42, B43, B46, B48 3G UMTS, WCDMA: B1, B2, B4, B5, B8

Table 12: GNSS Technology Support

Technology	RF Band	Receive (Rx) Band MHz	Support
GNSS	GPS	1575.42 +/- 1.023	Supported
	GLONASS	1597.52 - 1605.92	Not Supported
	Galileo	1575.42 +/- 2.046	Not Supported
	BeiDou	1561.098 +/- 2.046	Not Supported

Power Supply

The Cisco IR1101 comes with an external DC power connector. The 4-pin power entry connector (receptacle) is mounted to the unit. The 4-pin power entry mating connector (plug) is attached to the receptacle. It is removed during installation and used to connect to the DC power source, then reattached to provide power to the unit.

Note The IR1101 may be connected to a Non-Cisco external power source provided that source meets the following requirements:

- 9.6V to 60V DC input range
- 12V/24V/48V (+/-20%) are the nominal voltages
- Minimum 3A current

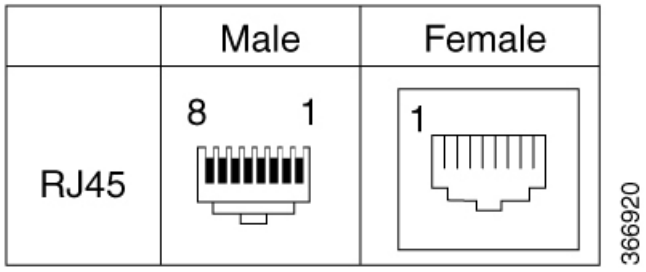
Connecting to a power supply is covered in Connecting to DC Power

RJ45 Ports

The IR1101 supports one **ISOLATED** RS232 port which conforms to EIA-561 standard.

The RJ45 pinouts are shown in the following graphic.

Figure 10: S0 Characteristics



The RS232 port is a DTE and its pin out is shown in the following table.

Table 13: S0 Details

Pin Number	Description	Abbreviation	DTE
1	DCE Ready, Ring Indicator	DSR/RI	<—
2	Received Line Signal Detector	DCD	<—
3	DTE Ready	DTR	—>
4	Signal Ground	COM	
5	Received Data	RxD	<—
6	Transmitted Data	TxD	—>
7	Clear To Send	CTS	<—
8	Request To Send	RTS	—>