

solaredge

SolarEdge

GSM

Installation Guide

Version 1.1

About This Guide

SolarEdge offers the GSM communication option for connection of the SolarEdge inverter to the SolarEdge monitoring server.

This guide assumes that the SolarEdge power harvesting system is already installed and commissioned. For additional information about how to install and commission the SolarEdge power harvesting system, refer to the relevant installation guide.

This guide includes the following chapters:

- Chapter 1: *Installation Guidelines* on the next page, provides guidelines for installing the GSM modem with or without data plan according to your system configuration.
- Chapter 2: *System Compatibility Check and Upgrade* on page 6, describes the hardware and firmware requirements for using the GSM modem.
- Chapter 3: *GSM Modem and Antenna Installation* on page 9, describes how to mount and verify the connection of the GSM modem and antenna.
- Chapter 4: *Configuring GSM Communication* on page 17, describes how to set up the GSM communication option in the inverter, and check the communication.
- Appendix A: *Technical Specifications* on page 26, provides the electrical and mechanical specifications of the SolarEdge GSM modem.

For further information, datasheets and the most up-to-date certifications for various products in different countries, please visit the SolarEdge website: www.solaredge.com.

Chapter 1: Installation Guidelines

Inverters may be supplied with or without a GSM modem, and with or without a SIM card. Check your inverter configuration and follow the guidelines in the table below:

If your inverter includes:	Do this:
No GSM modem	<p>One of the following:</p> <ul style="list-style-type: none"> ○ If you purchased a GSM Cellular Modem kit <i>including a SolarEdge data plan</i> - Mount the antenna, install the GSM modem and SIM card and configure GSM, as described herein. ○ If you purchased a GSM Cellular Modem kit <i>without a data plan</i> - A data plan with SIM card is available from SolarEdge, or you may use your own card (refer to the requirements in "Guidelines for installing a non-SolarEdge SIM Card" on the next page). Mount the antenna, install the GSM modem and SIM card and configure GSM, as described herein. ○ If you purchased a <i>Communication Board kit including a GSM modem (without data plan)</i> - install the communication board according to the supplied manual. A data plan with SIM card is available from SolarEdge, or you may use your own card (refer to the requirements in "Guidelines for installing a non-SolarEdge SIM Card" on the next page). Mount the antenna, install the SIM card and configure GSM, as described herein. <p>The GSM Cellular Modem kit and the Communication Board kit are supplied with an upgrade card with a firmware version supporting GSM.</p>

If your inverter includes:	Do this:
A built-in GSM modem <i>without</i> a SIM card	Insert a SIM card and configure the data plan as described herein. A data plan with SIM card is available from SolarEdge, or you may use your own plan (refer to the requirements in "Guidelines for installing a non-SolarEdge SIM Card" on the next page).
A built-in GSM <i>with</i> a SIM card (data plan)	Mount the supplied antenna as described herein. No configuration is required. Data plan is pre-configured.

Guidelines for installing a non-SolarEdge SIM Card

Activating and using the GSM connection requires a SIM card (purchased separately from a SIM provider), which is inserted into a designated slot on the GSM modem. A SIM card is required in each GSM modem.

If using a non- SolarEdge SIM card:

- Calculate the data required (refer to *Technical Specifications* on page 26). For example, if the installation comprises one inverter, 16 power optimizers, and one production meter - the data plan required for Low BW configuration is: $2.6 + 16 * 0.05 + 0.1 = 3.5$ MB per month
- Select a SIM card with the following specifications:
 - μ SIM
 - Supports SMS
 - Works with the 3G GSM network
- Obtain the following details from your operator:
 - SIM phone number
 - PIN (Personal Identification Number)
 - APN (Access Point Name)
 - User name

When using multiple SolarEdge inverters in the same site, depending on the system operation mode (high or low bandwidth), a GSM modem must be installed as follows:

- Low bandwidth - in each inverter
- High bandwidth (up to 32 devices) - in one device (master inverter)

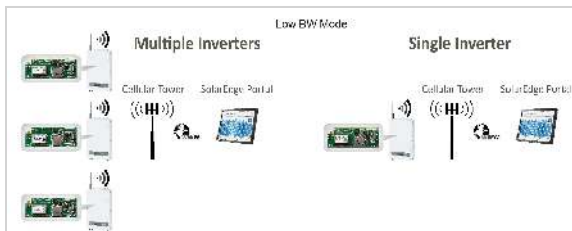


Figure 1: GSM modem low BW mode connection diagram

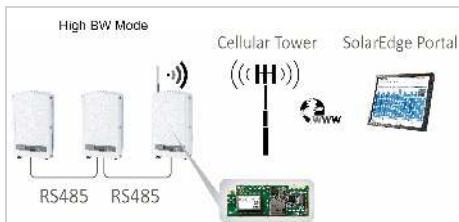


Figure 2: GSM modem high BW mode connection diagram

Chapter 2: System Compatibility Check and Upgrade

Hardware Requirements

To use the GSM communication option, the communication board must include a designated modem connector, as shown in the following figure. If required, replace the communication board using the kit available from SolarEdge.

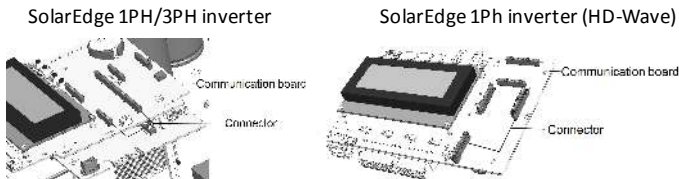


Figure 3: Communication board with GSM connector

Software Requirements

To use the GSM communication option, the communication board firmware (CPU) version must be 3.16xx or higher. To use the SolarEdge data plan, the version must be 3.18xx or higher.

The GSM Cellular kit package is supplied with an upgrade card with a firmware version supporting GSM.

▶ To check the inverter CPU version:

1. Verify that the inverter has been activated using the activation card supplied with the inverter.

- Short-press the LCD light button (in HD-Wave press the up/down buttons) until the following screen is displayed.

```

ID : ##### ##
DSP 1 / 2 : x . x x x x / x . x x x x
CPU : 0 0 0 3 . 1 6 0 0
Country : X X X X X
  
```

- Check the CPU version number. If lower than 3.16xx, upgrade the inverter software as described below; otherwise close the inverter cover and proceed with configuration.



NOTE

Only inverters with version 3.xxxx can be upgraded.

▶ To upgrade the inverter software:

- Disconnect the AC power to the inverter and wait 5 minutes.
- Open the inverter cover as described in its manual.
- Insert the firmware upgrade card supplied with the kit into the card slot on the communication board.

SolarEdge 1Ph/3Ph inverters

SolarEdge 1Ph inverter (HD-Wave)

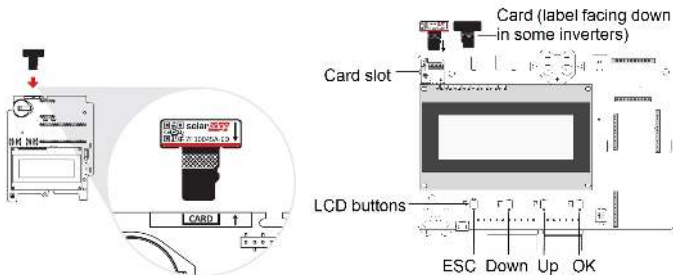


Figure 4: Communication board and activation card

4. Turn the AC ON.

**WARNING!**

ELECTRICAL SHOCK HAZARD. Do not touch uninsulated wires when the inverter cover is removed.

5. If upgrade is required, it starts automatically. Wait for the message "Done" to be displayed on the LCD.
6. Verify the correct version as described above.
7. Remove the card from the inverter.

Chapter 3: GSM Modem and Antenna Installation

This chapter describes how to install a GSM modem and antenna in a SolarEdge device.

Package Contents

- GSM modem (optionally including a SolarEdge SIM card)



- Plastic holder (for 1Ph/3Ph inverters)



- Antenna and mounting clip with antenna cable



- Cable holder



- Firmware upgrade card



- Tie-wrap (for HD-Waave inverter)

Installing the Antenna and Cable

1. Connect the antenna to the mounting clip, and tighten by screwing the antenna to the clip.
2. Attach the mounting clip with the antenna vertically to the top of the inverter. You may attach the clip to the heat sink fins or the inverter side.

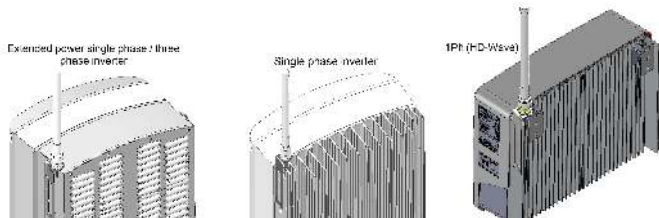


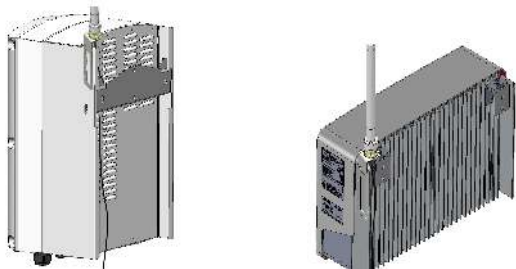
Figure 5: Antenna mounted on the inverter

If not mounting the antenna on the inverter, install the clip on the wall using two screws (not supplied). The antenna must be vertical and have a radial clearance of at least 2.7"/7 cm from metal surfaces.

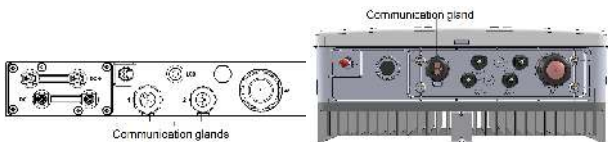
- Route the antenna cable along the inner fins or the inverter side, in the bracket. Make sure the cable is not hanging loose outside the inverter enclosure.

1Ph/3Ph inverter

SolarEdge 1Ph inverter (HD-Wave)

**Figure 6: Routing the antenna cable**

- Open the gland numbered 1 at the bottom of the inverter.

**Figure 7: Inverter communication glands**

- Remove the rubber seal from the gland and insert the cable through the gland body and the opened connection of the inverter.
- Push the cable into the cut opening of the rubber seal.

**Figure 8: Rubber seal**

7. Insert the rubber seal with the cable into the gland body and reconnect the gland to the inverter. Tighten the sealing gland.
8. Pull the excess cable into the inverter so that the cable can be attached to the inverter communication board (see *Figure 13*). The cable connects to the GSM modem as described in the next section.

Installing the Modem in the Inverter

NOTE



If the GSM modem is pre-installed in the inverter (with a SIM card), this step is not required.

NOTE



If you intend to use the RS485 communication, and termination is required, adjust the termination DIP switches on the inverter communication board before installing the modem, as the DIP switches are inaccessible when the modem is installed.

NOTE



Make sure that the inverter version is 3.1600/3.18xx for SolarEdge data plan or higher before installing the modem, otherwise the cellular communication may be inoperative and the inverter will not start up. If applicable, upgrade the inverter firmware using the supplied upgrade card.

1. If there is no SIM card installed in the modem, insert one into the slot on the GSM modem.



Figure 9: Inserting the card into the GSM modem

2. Remove the inverter cover as described in its manual.

► **To install the modem in the SolarEdge 1Ph/3Ph inverters:**

1. Loosen the upper-right screw attaching the communication board to the standoff.

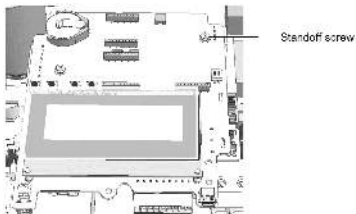


Figure 10: The communication board

2. Attach the supplied holder to the communication board and use the removed screw to fasten the holder to the board.

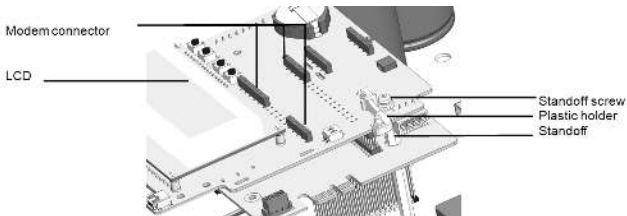


Figure 11: The holder installed on the communication board

3. Locate the modem in its place on the communication board, as shown in *Figure 12*. Follow these guidelines:
 - Use the supplied holder to position the modem with the correct orientation and stabilize it
 - Plug in the modem making sure that all pins are correctly positioned in the modem connector, and no pins are left out of the connector.
 - Make sure that the modem is firmly in place.

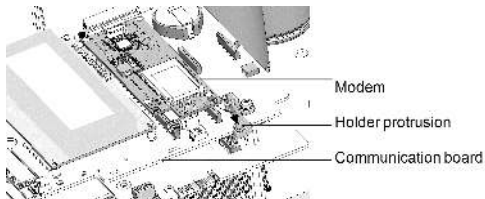


Figure 12: Installing the GSM modem on the holder

4. Connect the antenna cable to the cellular modem and tighten manually (see *Figure 13*).
5. Install the cable holder at the side of the communication board.

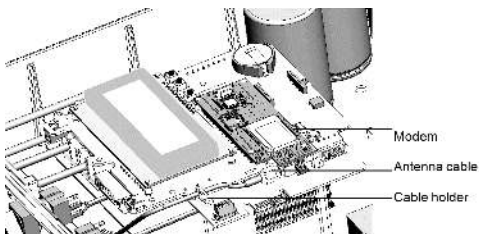


Figure 13: Installed modem and antenna cable

- Turn the AC ON.

**WARNING!**

ELECTRICAL SHOCK HAZARD. Do not touch uninsulated wires when the inverter cover is removed.

- Check that all the GSM modem LEDs are lit. If not, refer to *Troubleshooting* on page 21.

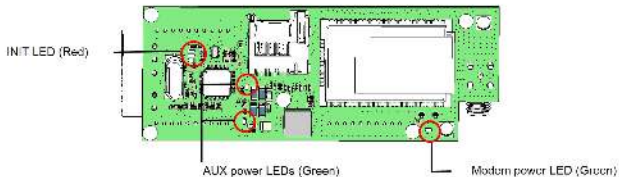


Figure 14: GSM modem LEDs

► **To install the modem in the SolarEdge 1Ph inverter (HD-Wave):**

1. Locate the modem in its place on the communication board. Make sure that the modem is firmly in place (see *Figure 15*).
2. Connect the antenna cable to the modem and tighten manually.
3. Use the tie-wrap to fasten the modem to the communication board.

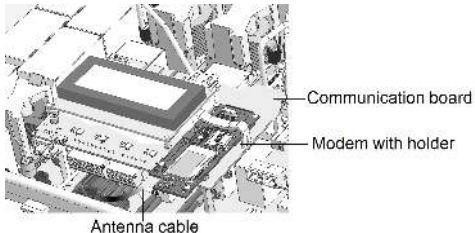


Figure 15: Installed modem

4. Verify that the ON/OFF switch and Safety Switch (if installed) are OFF.
5. Turn the AC ON.



WARNING!

ELECTRICAL SHOCK HAZARD. Do not touch uninsulated wires when the inverter cover is removed.

Check that all the GSM modem LEDs are lit (see *Figure 14*). If not, refer to .6 *Troubleshooting* on page 21.

Chapter 4: Configuring GSM Communication

This chapter describes how to activate the GSM modem (if using a non-solarEdge SIM card), configure the inverter to use GSM communication, verify the connection and troubleshoot problems.

Configuring the Inverter

1. Verify that the inverter ON/OFF switch is OFF.
2. Enter the inverter Setup mode:
 - SolarEdge 1Ph/3Ph inverters - Press the **Enter** button for 5-10 seconds and release. Enter the password **12312312**.
 - SolarEdge HD-Wave inverter - Press the **OK** button for 5-10 seconds and release. Enter the password **12312312** (Up=1, Down=2, OK=3: **Up** → **Down** → **OK** → **Up** → **Down** → **OK** → **Up** → **Down**).
1. Scroll down to the **Communication** sub-menu and press Enter to select it. The Communication menu is displayed (Some of the menu items may vary depending on configuration).

```
S e r v e r < L A N >
L A N   C o n f
R S 4 8 5 - 1   C o n f < S >
Z i g B e e   C o n f < S >
W i - F i   C o n f < N / A >
G P I O   C o n f   < M T R >
R S 2 3 2   C o n f
C e l l u l a r   C o n f
E x i t
```


2. Select **Server** → **Cellular**.

```
LAN
RS485
Zigbee
Wi-Fi
Cellular
RS232
None
```

3. If you are using a non- SolarEdge SIM card:
 - a. Select **Communication** → **Cellular Conf**. The following is displayed:

```
Set APN
Set User Name
Set Password
Data Plan <select>
Set Pin
```

- b. Select **Data Plan** to set the communication mode. The following options are displayed:



Low BW
High BW

Low Bandwidth - This mode utilizes a data plan for low-cost monitoring. In this mode, the data is sampled every 15 minutes and the server connection is established every 4 hours .

In a multiple inverter system, a GSM modem and a SIM card are required in every inverter. Configuring to Low BW is required in every inverter.

High Bandwidth - This mode utilizes a data plan for high resolution monitoring. In this mode the modem maintains a continuous connection with the server, and the data is sampled every 5 minutes. After optimizer pairing there is communication with the server for the first hour to simplify commissioning.

In a multiple device system (up to 32), a GSM modem and a SIM card are required in only one device. Configuring to High BW is required only in that device.

- c. Select the communication mode.

**NOTE**

If you selected **High BW**, you can later change to Low BW. If you selected **Low BW**, to change to High BW, contact SolarEdge Support.

- d. Do one of the following:

- If you selected High BW, a message is displayed: Significant cost may be incurred. Proceed?. If you select yes, the modem immediately attempts to establish communication with the monitoring server.
- If you selected Low BW, the following is displayed:

```
Auto Activation
Manual Activation
```

Select **Auto Activation**; The modem automatically initiates connection to the server.

The messages `Activating` and then `Activation Complete` are displayed when selecting and entering required information. If **Unidentified #** error appears, refer to *Troubleshooting* on the facing page.

4. Exit the Setup mode by selecting the **Exit** option in each submenu screen, or wait for the inverter to automatically exit Setup mode if no buttons are pressed for more than two minutes.

Verifying the Connection

1. Check the server communication status screen:

```
Server: Cell    <S_OK>
Status:        <OK>
MNO:  <xxxxxxx> Sig: 5
<Error message>
```

- **Server:** The method of communication to the SolarEdge monitoring portal. Should display **Cell**.
 - **Status:** Displays OK if the inverter established a successful physical connection to the GSM modem.
 - **S_OK:** The last communication to the SolarEdge monitoring portal was successful. If S_OK is not displayed, refer to *Troubleshooting* below.
 - **MNO:** The mobile network operator name
 - **Sig:** The signal strength, received from the GSM modem. A value between 0-5, (0 = no signal, 5 = excellent signal).
 - **Error message** per communication connection status failure (Refer to *Troubleshooting* below).
2. Close the inverter cover as described in its manual. Verify proper cover fastening to ensure sealing.

Troubleshooting

The Inverter is not Starting Up


If the inverter is not starting up, the modem may have been installed in an inverter with an incompatible CPU software version.

Check if the modem is installed, remove it and upgrade the inverter as described in *System Compatibility Check and Upgrade* on page 6.

LCD Error Messages

Error message	Description	Troubleshooting
No modem detected	The internal modem is not communicating with the communication board.	Check that the GSM modem is installed properly: All the pins are inserted in the correct location and not shifted.
No SIM Card	The SIM card is not inserted or not recognized.	Insert a valid SIM card and check it is inserted correctly.
Enter PIN	Personal Identification Name (PIN) code is pending.	<ul style="list-style-type: none"> ○ Enter Setup mode ○ From Communication select Cellular Conf, and set the PIN code according to the MNO (Mobile Network Operator).
Enter APN	The Access Point Name (APN) parameter is empty.	<ul style="list-style-type: none"> ○ Enter Setup mode ○ From Communication select Cellular Conf, and set the APN according to the MNO.
Not registered	The GSM modem is not registered to a network provider.	<ul style="list-style-type: none"> ○ Check antenna connection or change antenna location. ○ Contact SolarEdge support.
Configuration error	Invalid APN, username or password.	<ul style="list-style-type: none"> ○ Enter Setup mode ○ From Communication select Cellular Conf.and set the APN/username/password according to the MNO. ○ If setting the APN/username/password according to the MNO generates a "Configuration Error", check with the carrier whether the SIM needs to be activated.

Error message	Description	Troubleshooting
No signal	No GSM signal is received.	<ul style="list-style-type: none">○ Check that the cable is connected properly to both modem and antenna.○ Check for any damage to the cable or connectors.○ Try relocating the antenna.○ Check that there is cellular coverage in your area.
Activate Plan	Data plan was not selected.	Select a data plan as described in <i>Configuring the Inverter</i> on page 17.
DNS Failure	The DNS request that was forwarded to the cellular network provider has failed, or there is a problem in the DNS registration on the SolarEdge server.	Contact SolarEdge support.
TCP Failure	Connection to the SolarEdge server has failed.	Contact SolarEdge support.

Error message	Description	Troubleshooting
SMS blocked	The SIM card does not support SMS capability	<p>Replace the SIM card.</p> <p>NOTE</p> <p>Replacing a SIM card requires system reconfiguration and activation.</p> <p>If the replaced SIM card was configured to Low BW, the new SIM can only be set to Low BW.</p> 
Unidentified #	The mobile number is blocked or incorrectly decoded.	<p>Activate the modem <i>manually</i>:</p> <p>Select Manual Activation. Enter "+", the country code, and the mobile number. For example, If your number is 732403100 and the country code is 972 - enter: +972732403100</p>
S_OK is not displayed	Communication with the SolarEdge monitoring server is not established.	Verify that none of the above errors appear.

Modem LED Indications

LED functionality	Description	Troubleshooting
All LEDs are OFF	The modem is not connected properly	Check that the modem is installed properly: All the pins are inserted in the correct location and not shifted.
	The modem is damaged	Contact SolarEdge support
The modem power LED is ON, but one or more of the other LEDs is OFF	The modem is damaged	Contact SolarEdge support

Appendix A: Technical Specifications

GSM modem for US systems:

DATA PLAN (for Non-SolarEdge SIM cards)	High Bandwidth	Low Bandwidth	
Number of Inverters Monitored With a Single GSM Kit	Up to 32	1	
Monitoring	Data sampled every 5 minutes and sent to SolarEdge server continuously	Data sampled every 15 minutes and sent to SolarEdge server every 4 hours	
Monthly Data - per Inverter	7.8	2.6	MB
Monthly Data - per Optimizer	0.15	0.05	MB
Monthly Data - per Revenue Grade Meter	0.3	0.1	MB
Data per Export or Consumption Meter	3	0.55	MB
Monthly Data - per Battery	3	0.7	MB
RF Performance			
Operating Frequency Min.-Max. 850	Modem transmit: 824-849		MHz
	Modem receive: 869-894		
Operating Frequency Min.-Max. 1900	Modem transmit: 1850 -1910		MH
	Modem receive: 1930 -1990		

Antenna	Included, 2dBi outdoor; Dual band antenna: 824-960 MHz / 1710-2170 MHz	
Maximum output power 850 MHz band	33	dBm
Maximum output power 1900 MHz band	30	dBm
Receiver Input Sensitivity (Downlink RF level @ BER Class II < 2.4 %)	Typical -109	dBm
Standard Compliance		
Emissions and Radio	FCC CFR Title 47 Part 15 Class B, Part 15.247	
Installation Specifications		
Dimensions (L x W)	3.55 x 1.35 / 90.5 x 34.5	in/mm
Operating Temperature	-40 to +185 / -40 to +85	°F/°C
Sim Card Holder		
Type	MicroSim	

GSM modem for worldwide systems:

DATA PLAN (for Non-SolarEdge SIM cards)	High Bandwidth	Low Bandwidth	Unit
Number of Inverters Monitored With a Single GSM Kit	Up to 32	1	
Monitoring	Data sampled every 5 minutes and sent to SolarEdge server continuously	Data sampled every 15 minutes and sent to SolarEdge server every 4 hour	
Monthly Data - per Inverter	7.8	2.6	MB
Monthly Data - per Optimizer	0.15	0.05	MB
Monthly Data - per Production Meter	0.3	0.1	MB
Monthly Data - per Export or Consumption Meter	3	0.55	MB
Monthly Data - per Battery	3	0.7	MB
RF Performance			
Operating Frequency Min.-Max. 900	Modem transmit: 880-915		MHz
	Modem receive: 925-960		
Operating Frequency Min.-Max. 1800	Modem transmit: 1710-1785		MHz
	Modem receive: 1805-1880		
Operating Frequency Min.-Max. 2100	Modem transmit: 1920 -1980		MHz
	Modem receive: 2110 -2170		

Antenna	Included, 2dBi outdoor; Dual band antenna: 824-960MHz / 1710-2170MHz	
Maximum output power: 900 MHz band	33	dBm
Maximum output power: 1800 MHz band	30	dBm
Maximum output power: 2100 MHz band	24	dBm
Receiver Input Sensitivity (Downlink RF level @BER Class II < 2.4 %)	Typical. -109	dBm
Standard Compliance		
Emissions and Radio	EN 301-489-1, EN 301-489-7, EN 301-511	
Installation Specifications		
Dimensions (L x W)	90.5 x 34.5 / 3.55 x 1.35	mm/in
Operating Temperature	-40 to +85 / -40 to +185	°C/°F
Sim Card Holder		
Type	MicroSim	

If you have technical queries concerning our products,
please contact our support through SolarEdge service portal:

<http://www.solaredge.com/groups/support/services>

Australia (+61)	1800-465-567
Belgium (+32)	0800-78889
China(+86)	186-0166-3934
France (+33)	0800-917410
Germany (+49)	089-45459730
Italy (+39)	800-784-824
Japan (+81)	03-6261-1274
United Kingdom (+44)	0800-028-1183
US & Canada (+1)	510-498-3200
Greece (+30)	00800-125574
Israel (+972)	073-240-3122
Netherlands (+31)	0800-022-1089
New Zealand (+64)	0800 144 875
Worldwide (+972)	073-2403118
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