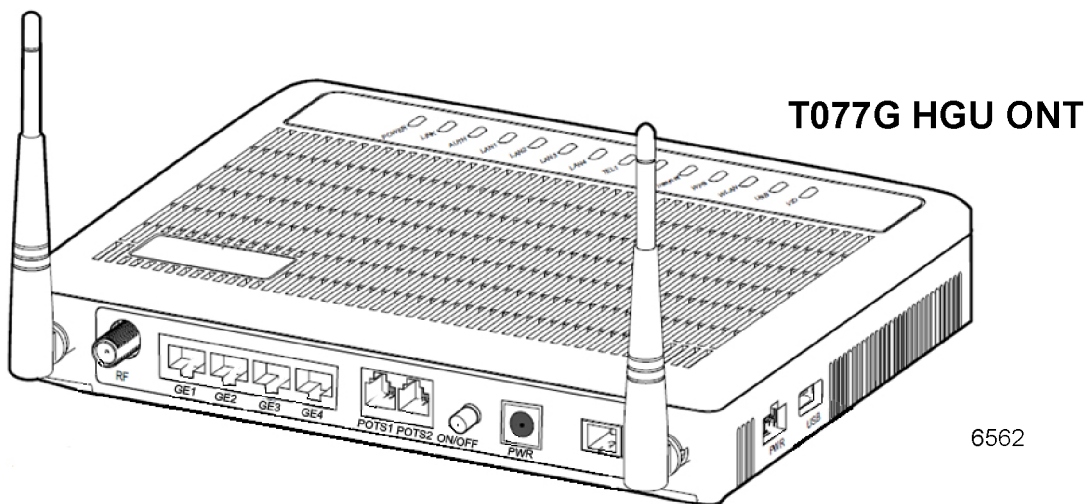




# User Guide

## T077G HGU ONT

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# 1 Product Description

## 1.1 Introduction

The T077G Optical Network Terminal (ONT) is an ITU-T G.984 compliant device that receives voice, data, and video traffic in the form of optical signal from the service provider Passive Optical Network (PON) and transmits it to the desired format at residential or business premises.

Upstream traffic is likewise transmitted to the PON network through the fiber optic cable. A single optical fiber carries both upstream and downstream traffic.

## 1.2 Services

The T077G is equipped with ITU-T G.984 compliant 2.5 Gbps Downstream and 1.25 Gbps Upstream interface, and the following service ports:

- Four 10/100/1000 Base-T Gigabit Ethernet ports for high speed internet access and IPTV/VOD services
- Two POTS (VoIP) service ports for voice services
- Integrated IEEE 802.11b/g/n wireless
- One coaxial port for RF overlay video services
- One USB host port

## 1.3 Features

The ONT incorporates the following features:

- Single fiber GPON interface with 1244 Mbps upstream and 2488 Mbps downstream data rates
- Advanced data features such as VLAN tag manipulation, classification, and filtering
- Traffic classification and QoS capability
- SIP-based Analog Telephone Adapter (ATA) function, which provides the different classification services, and supports caller display, call waiting, call transfer, and call forwarding.
- 5 REN per line
- Multiple voice Codec

- Rich set of LED indications for alarming and maintenance
- Built-in capability for remote management like supervision, monitoring, and maintenance

## 1.4 Specifications

Table 1 lists the physical specification. Table 2 lists the electrical specification. Table 3 lists the environmental specification. Table 4 lists the optical specification.

*Table 1 Physical Specifications*

Dimensions	<ul style="list-style-type: none"> <li>• Height: 47 mm (1.85 inch)</li> <li>• Width: 229 mm (9 inch)</li> <li>• Depth: 174 mm (6.85 inch)</li> </ul>
Weight	700 g
GPON interface	SC/APC angled optical connector
POTS interface	RJ-11 connector
Ethernet interface	RJ-45 connector
RF interface	Type F connector

*Table 2 Electrical Specification*

Input Power	+12V DC power input
Power Supply	AC power supply with included power adapter
Power Consumption	<16.8 W

*Table 3 Environmental Specification*

Temperature	Operating: 0° to +40° C (32° to 104° F)
Humidity	5% to 95% Relative Humidity (RH), non-condensing

*Table 4 Optical Specification*

	Minimum	Nominal	Maximum	Notes
Transmitter				
Wavelength	1260 nm	1310 nm	1360 nm	
Transmit power	0.5 dBm		+5 dBm	
Digital receiver				

	<b>Minimum</b>	<b>Nominal</b>	<b>Maximum</b>	<b>Notes</b>
Wavelength	1480 nm	1490 nm	1500 nm	
Sensitivity	-27 dBm			Minimum received power for BER<10 <sup>-10</sup>
Overload			-8 dBm	Maximum received power for BER<10 <sup>-10</sup>

## 2 Safety

Read and follow all warning notices and instructions marked on the product or included in its packaging, and observe all safety instructions listed in this guide while handling any ONT.

### 2.1 Electrical Safety

- Always use caution when handling live electrical connections.
- Do not install electrical equipment in wet or damp conditions.
- Ensure that the power source for the system is adequately rated to assure safe operation and provides current overload protection.
- Do not allow anything to rest on the power cable, and do not place this product where people will stand or walk on the power cable.
- To avoid electric shock of user which caused by over-voltage from PSTN. DO NOT connect the POTS port on this unit directly to external PSTN line.
- This unit can only be used with the certified adaptor model inside the package, which complies with the requirement of limited power source.

### 2.2 Laser Safety



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#### **Caution!**

Use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

Invisible laser radiation may be emitted from the ends of un-terminated fiber cables or connectors. Never look directly into an un-terminated cable or connector.

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**Note:** This ONT uses a class 1 laser device.





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**Danger!**

Personnel handling fiber optic cables must be trained for laser safety.

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**Caution!**

Do not bend the fiber optic cable to a diameter smaller than 7.5 cm (3 inches). Doing so may damage the fiber or prevent the signal from passing through properly.

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## 3 Installation

### 3.1 Get to Know the ONT

The figures below show the overview of the ONT.

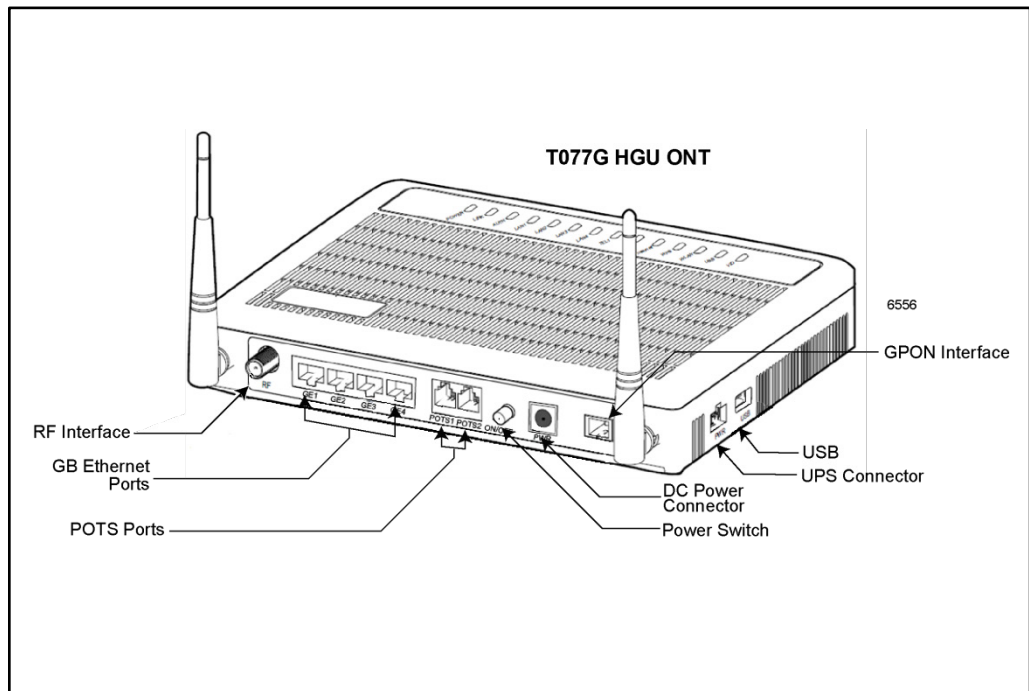


Figure 1 T077G Back and Right-Side Overview

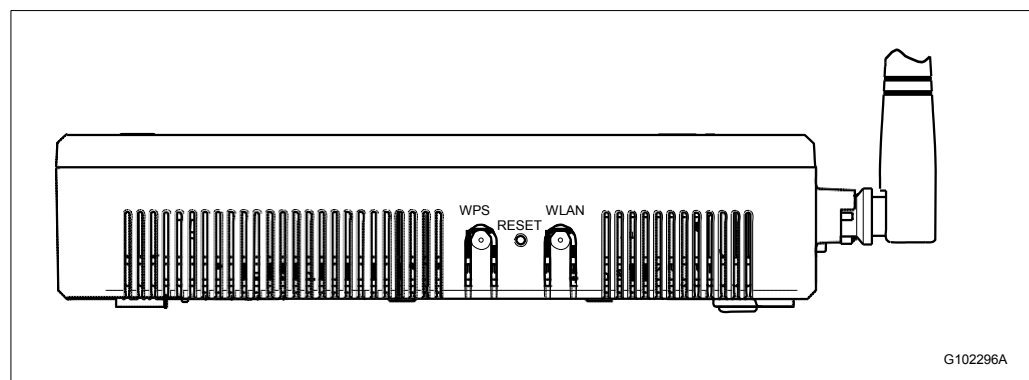
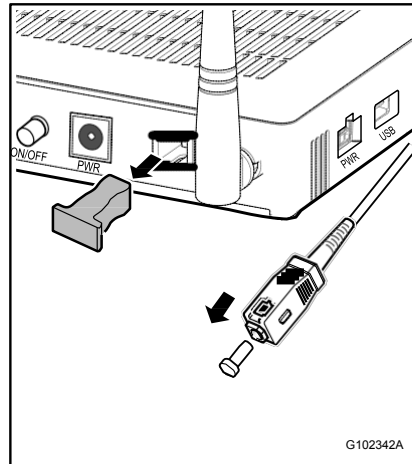


Figure 2 T077G Left-Side Overview

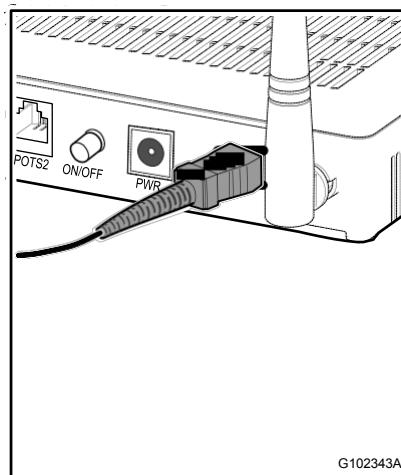
### 3.2 Connecting to the PON Network

1. Locate a safe and accessible site for installation.

2. Remove the dust covers from the SC/APC optical connector. Clean the connectors if necessary.



3. Plug in the fiber connector to connect the ONT to the network.



### 3.3 Connecting Power

The T077G can be powered by the AC power adapter or by an UPS power. This section describes how to power the ONT by both.

**Note:** Do not connect the enclosed power supply adapter and an external UPS simultaneously, as this might cause unwanted behavior.

### 3.3.1 Connecting to the AC Power Adapter



#### Warning!

Do not use any other power supply adapter except the one that accompanies the units. Use of other adapters could result in damage to the unit. To prevent electrical shock, please do not open the cover.

To connect the power cable to the ONT, do the following:

1. Plug the circle two pin 12V DC power connector of power adapter to ONT power port.
2. Plug the input of power adapter into a live AC outlet.
3. Push the **Power Switch** button on the back of the ONT.
4. Verify that the **POWER** LED on the ONT is lit green indicating that local power is on and voltage is good.

### 3.3.2 Connecting to an External UPS

**NOTE:** UPS power is sold separately. It is not included with this package. Please contact Calix customer support for information.

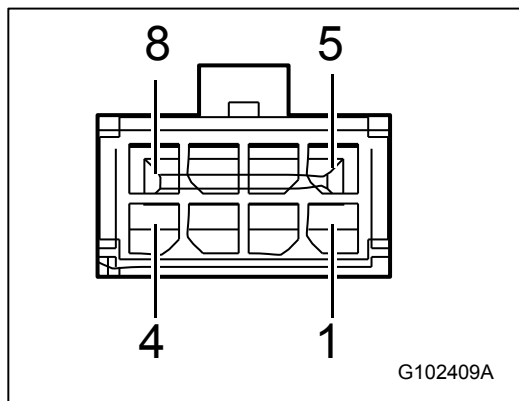


Figure 3 UPS PIN Numbering

Table 5 UPS PIN Signal Description

PIN	Color	Signal	Description
1	Red	+12 V	DC 12 V DC input
2	White	ON_BAT	On battery
3	Blue	BAT_MISSING	Battery missing

PIN	Color	Signal	Description
4	Green	NC	Unused
5	Black/Brown	GND	Power ground/Signal ground
6	Purple	REPLACE_BAT	Replace battery
7	Orange	LOW_BAT	Low battery
8	Yellow	NC	Unused

### 3.4 Connecting Telephone (POTS) Service

1. Locate the telephone wire pair of premise.
2. If the wire pair is not terminated, follow local practices to attach an RJ-11 connector.
3. Plug the wire pair with RJ-11 connector into one of the ONT RJ-11 phone jacks.
4. Repeat step 2-3 as needed to connect additional phone lines.

*Table 6 POTS RJ-11 Connector Wiring Pattern*

Pin	Signal	Pin	Signal
1	Unused	3	Tip
2	Ring	4	Unused



#### **Danger!**

Please make sure the wire pair connected is from/to the telephone. Using the wire pair from/to the PSTN network falsely may cause damage to user and the device.

### 3.5 Connecting Ethernet Service

1. Locate the Ethernet LAN cable of premise.
2. If the cable is not terminated, follow local practices to attach an RJ-45 connector.
3. Plug the Ethernet cable into the ONT RJ-45 Ethernet port.
4. Repeat step 2-3 as needed to connect additional Ethernet cables.

Table 7 Ethernet RJ-45 Connector Wiring Pattern

Pin	Color	Signal	Pin	Color	Signal
1	Orange/White	TX_D1+	5	Blue/White	BI_D3-
2	Orange	TX_D1-	6	Green	RX_D2-
3	Green/White	RX_D2+	7	Brown/White	BI_D4+
4	Blue	BI_D3+	8	Brown	BI_D4-

## 3.6 Connecting RF Overlay Video Service

1. Locate the premises' coaxial video cable.
2. If the cable is not terminated, follow local practices to attach a 75 Ohm Type F coaxial connector.
3. Plug the video cable into the ONT RF port.

## 3.7 Verifying the Installation

Check LED states to verify ONT status. Services are not available until the ONT is ranged and provisioned in the PON network. If services must be verified at the time of installation, refer to Section 3.7.2 Verifying Services on page 11 for additional instructions.

### 3.7.1 Activating the ONT

Once the ONT installation is complete, follow the procedure below for verifying ONT status. Figures below show the typical status LED display after the ONT boot sequence is complete.

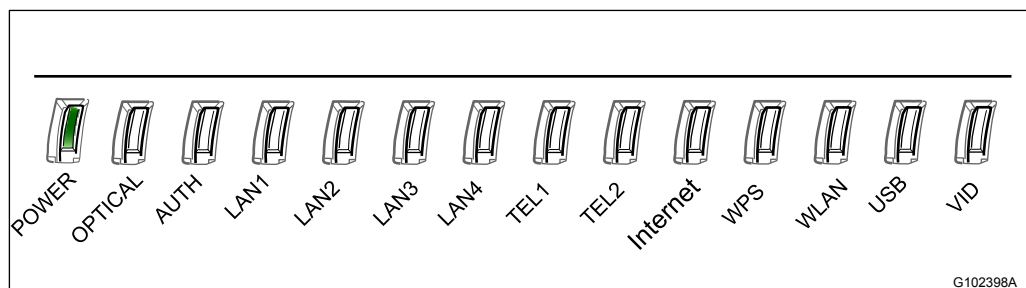
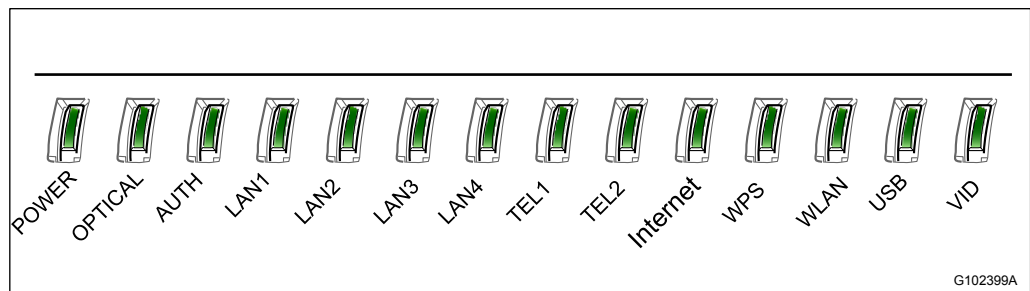


Figure 4 ONT Has not Been Provisioned



*Figure 5 ONT Has Already Been Provisioned*

- Verify that the **POWER** LED light is green, indicating that local power level is good
- Verify that the **AUTH** LED light is green, indicating that the ONT is operating normally.

The ONT is placed into service remotely through the OLT. Services to the ONT are likewise provisioned and turned up remotely through the PON network.

- If the **AUTH** LED is blinking, indicating that the ONT is communicating with the PON network, no further activation is necessary and you can proceed to Section 3.7.2 Verifying Services on page 11 for verifying services.
- If the **AUTH** LED does not light green, contact the Network Operation Center (NOC) to activate the line. You may be required to provide or confirm the following information about the ONT: vendor, model number, serial number. Once the ONT has been activated in the network, and the **AUTH** LED is lit green, you can proceed to Section 3.7.2 Verifying Services on page 11 for verifying services.

### 3.7.2 Verifying Services

Follow local practices to connect to each active service port in the ONT to confirm service activation.

- Connect to each active phone jack to verify telephone numbers and services. Verify that the **TEL1** or **TEL2** LED lights flash green when a line is off-hook.
- If Ethernet service is included in this installation, confirm that data is being received and transmitted normally. The **LAN1** or **LAN2** or **LAN3** or **LAN4** LED will be flashed during data transmission.
- If WLAN service is included in this installation, confirm that data is being received and transmitted on WLAN interface. Verify the **WLAN** LED is green when the WLAN is connected.

## 4 Troubleshooting

### 4.1 ONT Status LEDs

The ONT status LEDs assist with installation and maintenance procedures. These LEDs are described in Table 8.

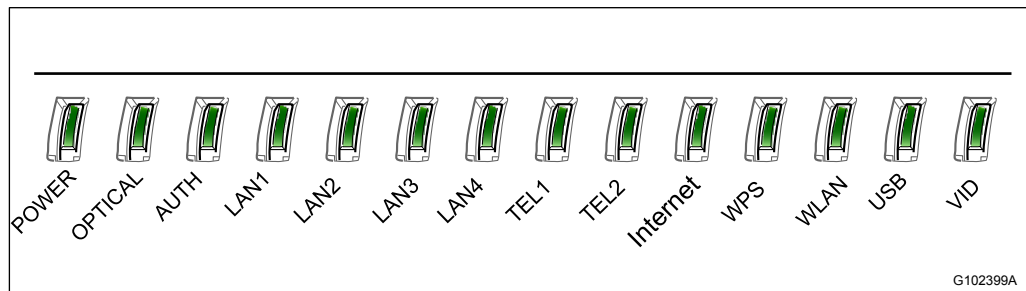


Figure 6 ONT Status LEDs Location

Table 8 T077G LED Description

LED	Color	Status	Indication
POWER	Green	Solid	ONT is operating from AC power
		Slow Blink	ONT is operating from UPS power
		Fast Blink	System Booting
	Red	Solid	UPS battery low
LINK	Green	Solid	Optical link is OK
		Off	Optical link is NOT OK
AUTH	Green	Solid	ONU is authorized
		Blink	ONU is registering
		Off	ONU is NOT authorized
LAN1/4	Green	Solid	LAN port connected, but no data transmission.
		Blink	LAN port has data transmission
		Off	LAN port is not connected to terminal device or system power is off



<b>LED</b>	<b>Color</b>	<b>Status</b>	<b>Indication</b>
TEL1/2	Green	Solid	Already register to soft-switch, but no service flow and the line is on-hook
		Blink	There is service flow on this port or the line is off-hook
		Off	System power is off, or is not registered to soft-switch
Internet	Green	Solid	Indicate PPPoE or DHCP sign up completed successfully. Internet is connected
		Blink	Indicate to be getting IP with PPPoE or DHCP
		Off	Indicate WAN is not configured
WPS	Green	Solid	Register successfully
	Yellow	Blink	Register is in progress
	Red	Blink	Session Overlap Detected or WPS Error
	Green	Off	WPS function is not enable, or system power is off
WLAN	Green	Solid	Wireless Interface enable
		Blink	Data transmitting at wireless interface
		Off	Wireless interface disable, or system power off
USB	Green	Solid	USB interface connected and working on host mode, but there is no data transmission
		Blink	USB interface has data transmission
		Off	USB interface has no connection, or system power is off
VID	Green	Solid	The received optical signal power level is above the prescribed limit
		Off	Indicates that the Video optical band being received by the ONT/ONU is lower a prescribed limit.

## 4.2 Troubleshooting Procedures

Table 9 provides the basic procedures for troubleshooting.

*Table 9 Troubleshoot Procedures*

<b>Problem</b>	<b>Procedure</b>
The <b>POWER</b> LED is off	<ul style="list-style-type: none"> <li>• Check whether the Power Switch button on the rear of the ONT is pressed</li> <li>• Check whether the power adapter matches the ONT</li> <li>• Check whether the power connection is correct</li> </ul>
The <b>LINK</b> LED is off	<ul style="list-style-type: none"> <li>• Check whether the optical fiber is connected correctly</li> <li>• Check whether there is dirt on the optical connector</li> </ul>
The <b>LINK</b> LED is on, but the <b>Internet</b> LED is off.	Contact with Network Operation Center (NOC)
The <b>LAN</b> LED is off	<ul style="list-style-type: none"> <li>• Check whether the Ethernet cable delivered with the device is used.</li> <li>• Check whether the Ethernet cable is connected correctly.</li> <li>• Check whether the indicator of the network adapter is on</li> <li>• Check whether the network adapter works normally: Check whether there are devices with the ? or ! mark under Network adapters. If there are such devices, uninstall and then re-install them, or insert the network adapter into another slot. If the problem remains, change the network adapter</li> </ul>
The <b>TEL</b> LED is off	<ul style="list-style-type: none"> <li>• Check whether the connection of the telephone cable is correct</li> <li>• Check whether the telephone is on-hook</li> </ul>
The <b>Internet</b> LED is off	Check if WAN port is configured correctly

<b>Problem</b>	<b>Procedure</b>
The <b>WPS</b> LED is off	Check whether the WPS service is enabled
The <b>WLAN</b> LED is off	Check whether the WLAN service is enabled
The <b>USB</b> LED is off	Check whether the cable is normal
The <b>VID</b> LED is off	Video power level is low, or video service is disabled. Contact NOC for verification

## **FCC 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 or more 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.

## **RF exposure warning**

- This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

**NOTE:** THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER' S AUTHORITY TO OPERATE THE EQUIPMENT.

## **Statement**

- This device PA02 doesn't support the function to modify the country code, and the channel 12 and 13 are closed in the device PA02.