CAMBRIDGE INDUSTRIES (GROUP) CO LTD. CIG

ONT G-25E

Hardware Installation Manual

August 2007

313-12201-02 Rev. B

Notice

Document History

Part Number	Summary of Changes
-01, Rev. A	Initial release
-02, Rev. B	Bug fixing

Product Information

To learn more about this product or CIG, contact your local sales representative or contact CIG Marketing at:

Address:

Hong Kong

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Ordering

To order CIG components and documents, contact your local sales representative, or contact CIG at the address, telephone, fax number or e-mail address listed above.

Technical Support

CIG offers technical support 24 hours a day, 7 days a week. To contact the CIG technical assistance center, use one of the following methods:

NOTE: For urgent support requests, please contact CIG by telephone. Delays caused by e-mail may result in a longer response time.

Telephone: +86 21 6121 3299

Email: support@cambridgeig.com

When you contact CIG, please have the following information ready:

- Product model name, part number, and serial number
- List of system hardware and software, including version
- Diagnostic error messages, if any
- Details about recent configuration changes, if applicable

Compliance with CE Marking Certification (Class B)

The equipment was tested and found to comply with **EN 60950-1:2001**. The equipment is tested and only used with power adaptor included in the package.

The equipment complies with the requirements according to the following standard:

ETSI EN 300 386 V1.3.3: 2005 Electromagnetic compatibility and radio spectrum Matters (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements

EN 61000-6-1:2001: Electromagnetic compatibility (EMC) — Part 6-1: Generic standards Immunity for residential, commercial and light-industrial environments.

EN 61000-6-3:2001: Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments, which refers to the following basic standards:

EN 55 022+A1:2000+A2:2003: Information technology equipment – Radio disturbance characteristics Limits and methods of measurement.

EN 61000-4-2: 1995/+A1:1998/+A2:2001: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 2: electrostatic discharge immunity test

EN 61000-4-3: 2002/+A1:2002: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 3: radiated, radio frequency, electromagnetic field immunity test

EN 61000-4-4: 2004: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 4: electric fast transient/burst immunity test

EN 61000-4-5: 1995/+A1: 2001: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 5: surge immunity test

EN 61000-4-6: 1996/+A1:2001: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 6: immunity to conducted disturbance, induced by radio frequency field.

EN 61000-4-11:2004: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 11: voltage dips, short interruption and voltage variations immunity test

EN 61000-3-2:2000/+A2:2005: Limits for harmonic current emissions (equipment input current <=16A per phase)

EN 61000-3-3:1995/+A1:2001/+A2:2005: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current <=16A

Table of Contents

About This Document

Purpose

This guide describes how to install the CIG optical network termination unit (ONT) at the customer premises.

Intended Audience

This document is intended for technicians responsible for:

- Unpacking and mounting the ONT and power supply
- Connecting the ONT to the PON network
- Connecting services to the ONT

Chapter Overview

This manual is organized as follows:

Chapter 1: Product Description

Provides an introduction to the ONT including physical, electrical, environmental and optical specifications. Compliance information is also provided.

Chapter 2: Safety

Provides electrical, electrostatic, and laser safety information; fiber optic cable handling techniques are also discussed.

Chapter 3: Installing the ONT

Describes installation procedures including site preparation, unpacking and mounting the ONT, connecting power and fiber optic and cables, connecting service cables, activating the ONT, and verifying the installation.

Chapter 4: Troubleshooting

Explains ONT LED behavior and provides basic troubleshooting guidelines.

1. Product Description

1.1 Introduction

Optical Network Terminal (ONT) model G-25E 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's passive optical network (PON) and transmitted it to the desired format - voice, data, or video - at residential or business premises.

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

1.2 Services

Equipped with ITU-T G.984 compliant 2.5G Downstream and 1.25G Upstream GPON UPLINK interface, ONT G-25E supports the full Triple Play of services including voice, video (IPTV/VOD), and high speed internet access.

ONT G-25E is equipped with the following service interfaces[1]:

- Four 10/100 Base-T Ethernet ports for high speed internet access and IPTV/VOD services
- Two POTS (VoIP) service ports for voice services

ONT G-25E has built-in capability for remote management like supervision, monitoring, and maintenance.

1.3 Features

The ONT incorporates the following features:

- Single fiber GPON interface with 1244Mbit/s upstream and 2488Mbit/s downstream data rates
- Advanced data features such as VLAN tag manipulation, classification, and filtering.
- Traffic classification and QoS capability
- Analog Telephone Adapter (ATA) function integrated based on SIP (RFC3261), with various CLASS services supported - Caller ID, Call Waiting, Call Forwarding, Call Transfer, etc.[2]
- 5 REN per line
- Multiple voice Codec
- Rich set of LED indications for alarming and maintenance

[1] Some customized models may only provide a subset of service interfaces mentioned in this manual, for example, only four 10/100 Base-T Ethernet ports are provided.
[2] These services may be unavailable within a specific carrier network and may require additional subscription.

1.4 Specifications

ONT physical, electrical, optical, and environmental specifications and compliance information are listed in the following tables.

Dimensions	127mm (height) by 170mm (width) by 39mm (depth)
Weight	0.4 KG excluding power adaptor
GPON interface	SC/APC angled optical connector
POTS interface	RJ-11 connector
Ethernet interface	RJ-45 connector

Table 1 Physical specification

Input Power	+12V DC power input
Power Supply	AC power supply with included power adapter
Power Consumption	< 7.5W

Table 2 Electrical specification

Temperature	0 ~ 40° C
Humidity	5 ~ 85% relative humidity

Table 3 Environmental specification

PON	ITU-T G.984.1, G.984.2, G.984.2 amd1, G.984.3, G.984.4, G.983.2
EMC	ETSI EN 300386, EN 55022 (Class B)
Safety	EN 60950
Laser	● ITU-T Rec.G.984.2 (Class B+), G983.3 ● FCC 47 CFR Part 15, Class B ● FDA 21 CFR 1040.10 and 1040.11, Class I ● IEC 60825, Class I

Table 4 Compliance

	Minimum	Nominal	Maximum	Notes
Transmitter				
Wavelength	1260 nm	1310 nm	1360 nm	
Transmit power	0.5 dBm		+5 dBm	
Digital receiver				
Wavelength	1480 nm	1490 nm	1500 nm	
Sensitivity	-27 dBm			Minimum received power for BER<10-10
Overload			-8 dBm	Maximum received power for BER<10-10

Table 5 Optical specification

2. Safety

CAUTION: Product installation should be performed only by trained service personnel.

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.

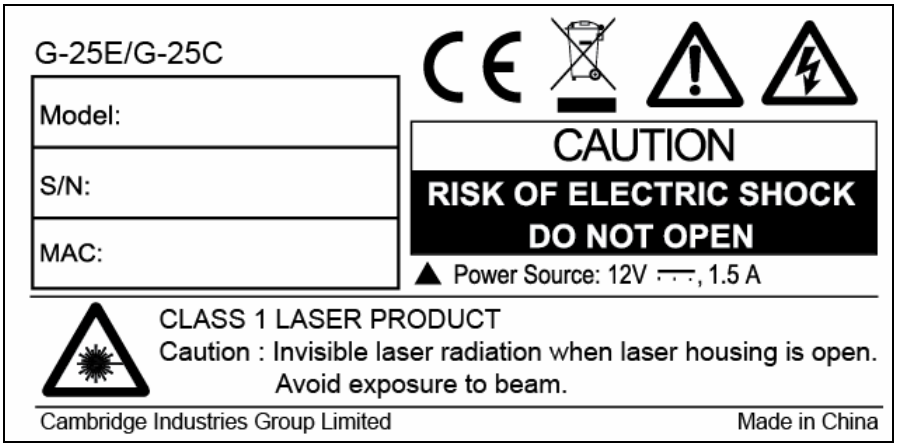

Figure 1 ONT G-25E product label

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 included inside the package, which complies with the requirement of limited power source.

DANGER: Do not open the enclosure without CIG's permission and technical support, which is dangerous and voids the warranty.

2.2 Laser Safety

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.

This ONT uses a class I laser device.

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

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.

3. Installation

3.1 Site Preparation

3.1.1 Environmental Requirements

The ONT will operate in temperatures ranging from 0° C to 40° C, relatively humidity ranging from 0° C to 85° C.

3.1.2 Power Requirements

The ONT will be shipped with a universal power adaptor. However, before installation, check if the AC power input matches the specification printed on the power adaptor (input voltage, current, etc.)

CAUTION: Please use the power adaptor within the package only, or the replacement unit that provided by CIG. Other power adaptor may cause damage to the ONT and other disasters.

3.2 Connecting to Network

1. Remove the Laser Lock Door (Figure 2).

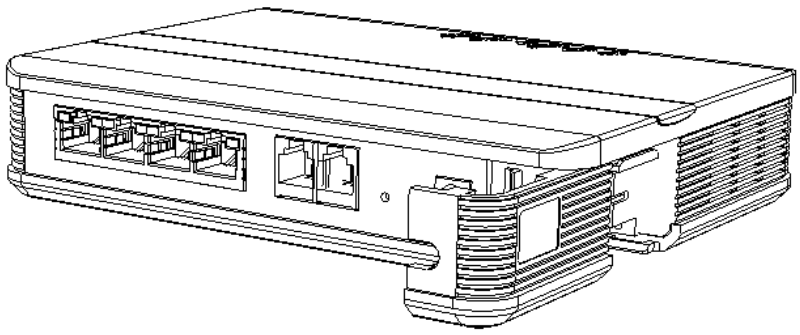

Figure 2 Remove the Laser Lock Door

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

3. Plug in the fiber connector to connect the ONT to the network (Figure 3).

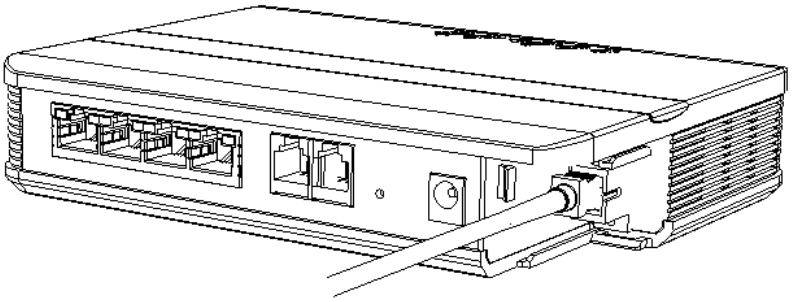

Figure 3 Plug in the fiber connector

4. Attach the Laser Lock Door to the ONT (Figure 4).

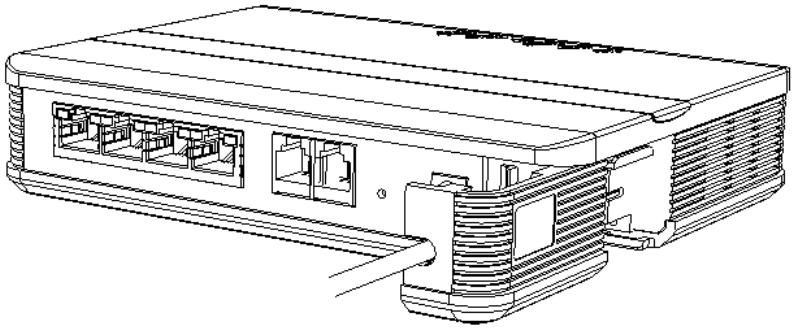

Figure 4 Attach the Laser Lock Door

5. Finally it looks like figure below (Figure 5).

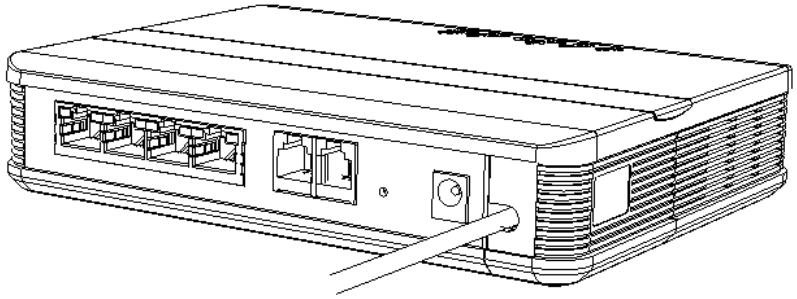

Figure 5 Connect to network: final view

3.3 Connecting Power

1. Plug the circle two pin 12V DC power connector of power converter to ONT power port
2. Plug the input of power converter into a live AC outlet
3. Verify that the power (POWER) LED on the ONT is lit green indicating that local power is on and voltage is good.

3.4 Connecting Telephone (POTS) Service

1. Locate the premises' telephone wire pair.
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.

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

Table 6 POTS RJ-11 connector wiring pattern

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 premises' Ethernet LAN cable.
2. If the cable is not terminated, follow local practices to attach an RJ-45 connector. Table shows Ethernet RJ-45 connector wiring information.
3. Plug the Ethernet cable into the ONT RJ-45 Ethernet port.
4. Repeat step 2-3 as needed to connect additional Ethernet cables.

Pin	Color	Signal	Pin	Color	Signal
1	Orange/White	Tx +	5	Blue/White	Unused
2	Orange	Tx —	6	Green	Rx —
3	Green/White	Rx +	7	Brown/White	Unused
4	Blue	Unused	8	Brown	Unused

Table 7 Ethernet RJ-45 connector wiring pattern

3.6 Verify the Installation

Check LED states to verify ONT status (Section 3.6.1).

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 3.6.2 for additional instructions.

3.6.1 Verifying ONT Status

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.

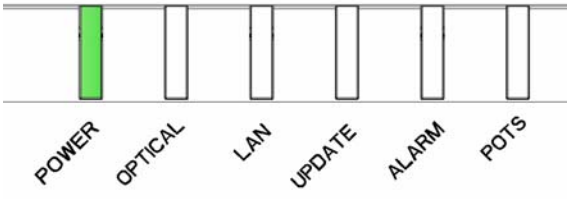

Figure 6 ONT has not yet been provisioned

Figure 7 ONT has already been provisioned

• Verify that the POWER LED lights green indicating that local power level is good.

• Verify that the OPTICAL LED lights green indicating that the ONT is operating normally.

- If the ONT has already been provisioned in the network, the OPTICAL LED lights green after the ONT boot sequence and PON ranging process is complete (approximately 1 minute after power up). During that ranging process, the OPTICAL LED flashes continually.

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 OPTICAL LED lights green, indicating that the ONT is communicating with the PON network, no further activation is necessary and you can proceed to Section 3.6.2: Verifying Services.

• If the OPTICAL LED does not light green, contact the NOC (Network Operation Center) 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 OPTICAL LED lights green, you can proceed to Section 3.6.2: Verifying Services.

3.6.2 Verifying Services

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

1. Connect to each active phone jack to verify telephone numbers and services. Verify that the POTS LED lights green when a line is off hook.

2. If Ethernet service is included in this installation, confirm that data is being received and transmitted normally. The LAN LED flashes during data transmission.

4. Troubleshooting

4.1 ONT Status LEDs

The ONT status LEDs located on the enclosure (Figure 8) assist with installation and maintenance procedures. These LEDs are described in detail in Table 8.

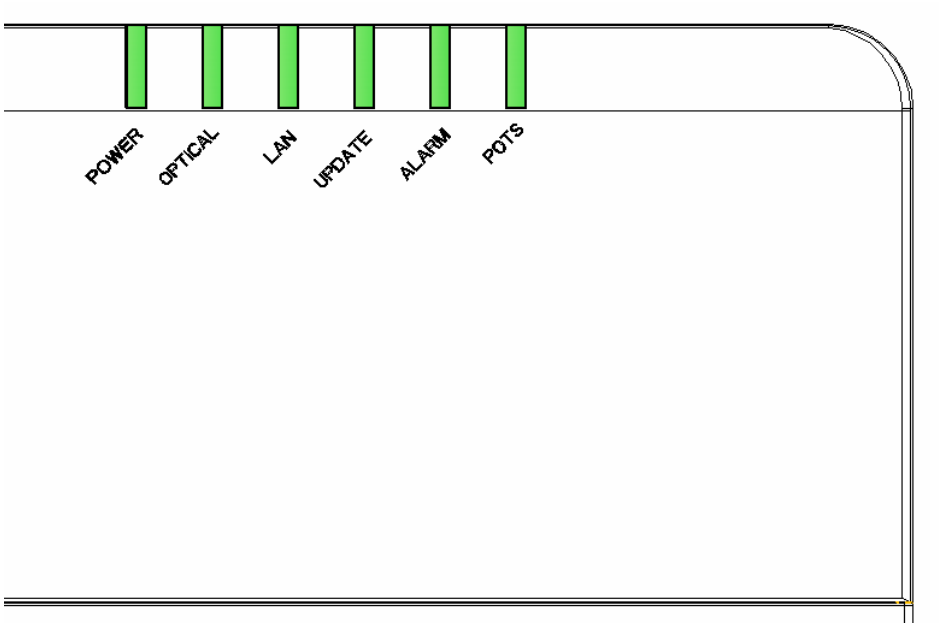

Figure 8 ONT Status LEDs location

LED Name	Color	Indicates
POWER	Green/Solid	ONT operating from AC power.
	Green/Quick Flash	System Booting.
	Green/Flash	ONT operating from battery power (applicable only for ONT equipped with UPS power interface).
OPTICAL	Red/Solid	Optical interface abnormal (LOS/LOF).
	Green/Solid	ONT working normally.
	Green/Flash	ONT in ranging and synchronization process.
LAN	Green/Solid	At least one of the Ethernet links at the ONT is up.
	Green/Flash	At least one of the Ethernet links at the ONT is up and there is activity of receiving and transmitting data.
	OFF	No Ethernet link is up at the ONT or the ONT is not ready for running Ethernet service.
UPGRADE	Green/Flash	In upgrading.
	Red/Solid	Upgrade failure.
	OFF	ONT working normally.
ALARM	Green/Solid	No alarm with local access enabled
	Red/Flash	Software out of order.
	Red/Solid	Hardware out of order.
	OFF	No alarm.
POTS	Green/Solid	At least one POTS interfaces is in off-hook condition.
	Green/Flash	At least one POTS interfaces is in off-hook condition for at least one hour.
	OFF	All POTS interfaces are in the on-hook condition or the ONT is not ready for running POTS service.

Table 8 ONT Status LEDs description

4.2 Troubleshooting Procedures

Problem	Possible Solutions
The POWER LED is off	Make sure the power cable connector is properly seated in the ONT power input.
	Verify that the power adapter is plugged into a live AC outlet.
	Check the power cable for shorts or breaks.
	Disconnect the power input connector at the ONT and use a voltmeter to verify that the proper voltage level is present on the 12 V pin (power and power return) from the power adapter.
The ALARM LED is red flashed or in red solid	Power cycle the ONT by unplugging it from the power adapter, then plugging it back in. If the ONT fails the self test a second time, replace the unit.
The OPTICAL LED is in red solid	Check the optical path. Reset the ONT by reset button. If the ONT fails again, replace the unit.
The OPTICAL LED is always green flashed	This is normal at boot-up and may take up to 1 minute to turn green. If this state persists, contact the NOC (Network Operation Center) to verify that the ONT serial number, password, and vendor ID match those provisioned in the network database. If provisioning is correct, have the NOC determine whether there are alarms on the PON feeding the ONT. If no alarms exist, use an optical power meter to troubleshoot the fiber network.
The UPGRADE LED is in red solid	Contact NOC.
The POTS LED is off when telephone off-hook	Check the telephone connection, or voice service is disabled. Contact NOC for verification.
The Data LED is off	Check the Ethernet connection, or data service is disabled. Contact NOC for verification.

Table 9 Troubleshoot procedures