

# 700GE Optical Network Terminals



## DESCRIPTION

Calix 700GE optical network terminals (ONTs) are 2.5 Gbps GPON and 1.0 Gbps Active Ethernet (AE) ONTs that deliver a wide array of information, communication and entertainment services over fiber. These high-performance ONTs set the standard with two or four Gigabit Ethernet (GE) interfaces that provide unmatched IPTV video and data services. The versatile 700GE line of ONTs also features optional 1 GHz RF video with RF return, HomePNA 3.1 networking and two or four POTS lines via integrated VOIP or VoIP Gateway (for TDM POTS). Calix 700GE ONTs incorporate extensive Internet protocol (IP) functionality into seven ONT models that can be deployed indoors or outdoors.

The 700GE ONTs are designed for the industry-leading Calix C-Series, E-Series and B-Series platforms. Calix 700GE ONTs terminate a GPON or AE fiber link at the subscriber's location and provide industry-standard interfaces for the customer premises equipment. The ONTs enable subscribers to receive broadband data, IP or RF video, and VOIP or VoIP Gateway (for TDM POTS) on a single fiber. At the ONT, the optical signal is converted to the appropriate electrical signals for transmission over the residence's existing twisted pair, CAT5, and coaxial cables. Selecting a Calix ONT with integrated HomePNA 3.1 technology allows the home's existing coaxial cables to operate as a high-speed LAN.

700GE ONTs are easy to install, activate, and maintain. Innovative software management tools allow the service provider to quickly configure, activate and upgrade the ONTs from a remote location. Extensive troubleshooting capabilities, remote software downloads, and easy-to-use service profile menus ensure that services are delivered and ONTs are maintained without needless truck rolls and hardware upgrades.

Smart Activate is the most recent example of an innovative software tool from Calix. Smart Activate simplifies installation and turn-up by using a laptop or phone to configure and activate the ONT at the premises. The craftsman can install and turn up an ONT without assistance from the central office or use of special equipment.

The Calix 725GE ONT offers an RF return feature for GPON deployments that allows two-way communication between the video headend and the consumer set-top box. RF return path signaling enables many advanced features such as Video on Demand, Impulse Pay-Per-View, and Internet gaming over an RF overlay network. Calix RF return operates in the 5 to 42 MHz RF frequency range and supports set-top boxes meeting Out-of-Band SCTE 55-1, SCTE 55-2, and DOCSIS Set-Top Gateway (DSG) return path standards.

Calix is also expanding the reach of GPON beyond the traditional 20 km boundary. Extended reach GPON supports links between the ONT and OLT of up to 40 km. This additional coverage allows service providers to edge-out their GPON networks and economically serve sparsely populated outlying locales without adding remote cabinets.

Calix outdoor ONTs are hardened to withstand a full range of outdoor temperatures. When placed outside, the ONT is housed in an environmentally sealed enclosure that protects it from the elements. For an indoor installation, the ONT can be mounted on a bracket specially designed for wall-mount and structured wiring enclosure applications.

Outdoor and indoor installations use a 120 Volt, 60 Hz AC power supply that provides battery backup of lifeline POTS in the event of local AC power loss. Battery charge and battery life are monitored and reported through the Calix Management System (CMS).

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## KEY ATTRIBUTES

- Standards-based Full Service Access Network (FSAN), ITU-T GPON and IEEE AE compliant
- 2.5 Gbps GPON and 1.0 Gbps AE, with auto-detect optics enables a seamless transition between WAN interfaces
- Two or four Gigabit Ethernet (GE) interfaces with symmetrical GE bandwidth for IPTV and data services
- RF video bandwidth to 1 GHz for extended digital programming
- RF return for reverse path communication — GPON only
- A variety of configuration options provide:
  - POTS, Two or four lines via integrated VoIP SIP IAD or H.248 MG, MGCP, or VoIP Gateway (for TDM POTS) via GR-303, GR-08 (TR-08 Mode I), TR-08 mode II, GR-57 TDM Gateway
  - Two or four 10/100/1000 BaseT Ethernet interfaces; fully independent for service separation, auto-negotiating
  - Integrated HomePNA 3.1 networking over the home's existing coaxial cables
- Indoor and outdoor applications:
  - Outdoor installation features a small, environmentally hardened enclosure that withstands the rigors of the outside plant environment; Telcordia GR-49 compliant
  - Indoor installation offers a range of mounting options including: the standard enclosure for added security and protection; a wall-mount bracket for indoor cabinets and indoor wall mounts; a multi-ONT enclosure that houses up to four 700GE ONTs and can be used for indoor or outdoor applications
- Lifeline service power source with in-home battery backup and alarm monitoring
- Complete Operations, Administration, Maintenance, and Provisioning (OAM&P) support via Calix Management System (CMS)
- Supports multiple data service profiles
- Traffic Management and Quality of Service (QOS):
  - 802.1Q VLANs
  - 802.1P Service Prioritization
  - Q-in-Q Tagging
  - Multiple VLANs
  - Per-Port Rate Shaping
  - Rate Limiting
- MEF-UNI support for Ethernet demarcation applications:
  - MEF EVCs for E-Line and E-LAN
  - L2-VPNs using MEF service models

## SERVICES SUPPORTED

Calix 700GE ONTs deliver high-speed data, POTS, IPTV, and RF video.

- Supports voice, video and data services on a single fiber
- Voice: Two or four VOIP or VoIP Gateway (for TDM POTS) lines, via SIP IAD or H.248 MG, GR-303, TR-08, GR-57 TDM gateway, full lifeline telephony support (CLASS and E911)
- Video: IPTV—supports IGMP multicasting and proxy; RF video—supports analog and digital RF video to 1 GHz; optional RF return
- Data: Two or four 10/100/1000 BaseT Ethernet ports with service separation and GE bandwidth

## SPECIFICATIONS

# 700GE Optical Network Terminals

### MECHANICAL—OUTDOOR ENCLOSURE

Height: 12 in (30.48 cm)  
Width: 10 in (25.4 cm)  
Depth: 4 in (10.16 cm)  
Outdoor installed height: 50–60 in  
(1.3 to 1.5 m) above ground  
Installed weight: 4 lbs (1.76 kg)

### RECOMMENDED OUTDOOR CLEARANCES

Left side: 12 in (30.48 cm)  
Right side: 6 in (15.24 cm)  
Front: 36 in (91.44 cm)  
standing room  
Rear: None

### PON CHARACTERISTICS

Max. split: 64 GPON  
Max. reach: 58 km (36 miles) with  
C+/FEC  
Maximum Optical Distribution  
Network (ODN) Attenuation:  
GPON Class B+, 28 dB  
GPON Class C+, 32 dB  
1490 ± 10 nm optical receiver:  
–27.0 to –8.0 dBm  
1310 ± 20 nm optical transmitter:  
0.5 to 5.0 dBm

### POINT TO POINT (AE) CHARACTERISTICS

Max. reach: 50 km (31 miles)  
1490 nm optical receiver:  
–22.0 to –3.0 dBm  
1310 nm optical transmitter:  
–5.5 to 0.0 dBm

### INTERFACES

Telephony: Binding post  
Data/IPTV: 10/100/1000 BaseT  
Ethernet ports, RJ-45 connectors  
RF Video/HPNA: F-connector,  
75 Ohms  
AE/PON: Single 9/125 μm (single  
mode) fiber, SC/APC connector,  
minimum 50 dB return loss  
Power: Screw-down plug

### TELEPHONY

General: POTS via SIP IAD, H.248  
MG or TDM gateway, TR-08  
(Mode I & II)  
Number of lines: 2 or 4  
RENs per line: 5 maximum  
RENs per unit: 10 maximum  
Subscriber premises—physical  
connection: 22 or 24 AWG to  
twisted pair binding posts;  
premises isolating RJ-11 test jack  
(one per line)  
Drop length: Maximum 1000 feet  
(305 m) using 26 AWG wire  
Input impedance: 600 Ohms  
DSO Output: 25 mA  
Ring Voltage: 56–84 VAC

### DATA

Drop length: 328 feet (100 m)  
maximum using CAT5 cable  
Auto MDI/MDIX crossover for  
1000BASE-TX, 100BASE-TX,  
and 10BASE-T ports  
Traffic Management and QoS:  
802.1Q VLAN; 802.1P Voice,  
Video, Data and Management  
Priorities; Q-in-Q tagging; Per-Port  
Rate Shaping; Rate Limiting

### INTEGRATED HPNA 3.1

Embedded CG3210 chipset  
Software version: 1.9.4  
Data rate: Up to 180 Mbps simplex  
(PER < 10<sup>-7</sup>)  
Spectral mode B: RF signal: Fc = 12  
to 28 MHz  
Spectral mode E: RF signal: Fc = 12  
to 44 MHz  
Full-duplex  
Max loss budget: 42 dB

### VIDEO PON—OPTICAL INPUT (GPON)

Wavelength: 1555 ± 5 nm  
Signal strength at 3.4% OMI  
(AGC range): –5.0 to 2.0 dBm  
–4.5 to 2.5 dBm (725GE ONT)

### VIDEO PON—OPTICAL OUTPUT (GPON)

Wavelength: 1610 ± 5 nm  
Optical output power: –0.5 to  
2.5 dBm (725GE ONT)

### VIDEO-ANALOG RF OUTPUT (GPON)

Bandwidth: 54 to 550 MHz  
Return loss: 10 dB minimum  
Signal strength (with AGC range):  
18 ± 2 dBmV  
Flatness: ± 1.0 dB  
Tilt: 1.0 dB ± 1.0 dB from 54 to  
550 MHz  
Channel loading: Analog RF CATV –  
up to 80 channels  
CNR: 48 dBc minimum  
CSO: –53 dBc maximum  
CTB: –53 dBc maximum  
Hum modulation: 1% maximum

### VIDEO-DIGITAL RF OUTPUT (GPON)

Bandwidth: 550 to 1003 MHz  
Return loss: 8 dB minimum  
Signal strength (within AGC range):  
12 ± 2 dBmV  
Flatness: ± 1.0 dB  
Tilt: 4.0 dB ± 1.0 dB from 550 to  
1003 MHz  
Channel loading: Digital Video – over  
740 channels (SD)  
Modulation error ratio (MER): 35 dB  
Group delay: 20 ns (6 MHz span)

### VIDEO—REVERSE PATH RF INPUT (GPON)

Bandwidth: 5 to 42 MHz  
Compatibility: SCTE 55-1, SCTE 55-2  
DOCSIS Set-Top Gateway (DSG)

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### ENVIRONMENTAL

Operating temperature: Indoor ambient temperature –40 to 149°F (–40 to 65° C) w/o solar load, Outdoor ambient temperature with Calix enclosure –40 to 114° F (–40 to 46° C) plus solar load  
 Rate of change in operating temp: 15°F (8.3° C) per hour maximum  
 Shipping and storage temperature: –40 to 140° F (–40 to 60° C)  
 Operating/storage relative humidity: 0 to 95 % non-condensing  
 Altitude: –200 to 10,000 feet (–61 to 3,048 m) above sea level  
 Misc: Salt fog resistant; wind-driven rain protection; anti-dust enclosure

### POWER

Screw-down terminal block plugs for 7-wire alarms and power interface

### CERTIFICATION AND COMPLIANCE

Emissions: FCC Part 15 Class B, IC ICES-003 Class B  
 Safety: UL 60950 and UL 1697 approved, CE Mark (711GE, 716GE and 717GE only)  
 Telcordia: GR-1089, GR-49  
 ITU-T: G.984.1, G.984.2, G.984.3, G.984.4  
 IEEE: 802.3, 802.3AB, 802.3U, 802.1P, 802.1Q  
 MEF: 9 and 14



### RESIDENTIAL BATTERY BACKUP

Residential battery backup source (local): UPS mounted at subscriber's home  
 Power termination: Maximum length of 70 feet (21.3 m) DC power and alarm cable with seven 16/24 AWG conductors connected to a UPS  
 Input voltage: 12 VDC (nominal)  
 Input voltage range: 10.5 to 16 VDC  
 Input current: 750 mA (nominal)  
 Battery backup time rated capacity: 8 hours based on Telcordia GR-909 calculation methods using recommended UPS. Contact Calix for recommended UPS.

## ORDERING INFORMATION

### Calix 700GE Optical Network Terminals

711GE ONT CE (100-03246).....	2 POTS, 2 Gigabit Ethernet -CE
712GE ONT (100-03247).....	2 POTS, 2 Gigabit Ethernet, 1 HPNA
716GE ONT CE (100-03248).....	2 POTS, 4 Gigabit Ethernet -CE
717GE ONT CE (100-03249).....	4 POTS, 4 Gigabit Ethernet -CE
721GE ONT CE (100-03250).....	2 POTS, 2 Gigabit Ethernet, 1RF Video
722GE ONT (100-03251).....	2 POTS, 2 Gigabit Ethernet, 1RF Video/HPNA
725GE ONT (100-01719).....	2 POTS, 2 Gigabit Ethernet, 1RF Video with RF Return
726GE ONT CE (100-03252).....	2 POTS, 4 Gigabit Ethernet, 1RF Video
727GE ONT CE (100-03253).....	4 POTS, 4 Gigabit Ethernet, 1RF Video

### Calix 700 ONT Enclosures and Wall Mount Bracket

SFU ENCL-ST (100-01578) .....	SFU ONT Enclosure with Splice Tray
SFU ENCL-ST-PP (100-01580) .....	SFU ONT Enclosure with Splice Tray and Primary Protection
SFU ENCL-OA (100-01579).....	SFU ONT Enclosure with OptiTap Adaptor
SFU ENCL-ST (100-01581) .....	SFU ONT Enclosure with OptiTap Adaptor and Primary Protection
700 SWEB (100-01409).....	700 ONT Wall Mount Bracket