Touchstone® DOCSIS 3.0 Upgradeable 16x4 Telephony Modem

TM1602

PRODUCT OVERVIEW:

The Touchstone DOCSIS 3.0 16x4 Embedded Multimedia Terminal Adaptor (E-MTA) TM1602 delivers two lines of primary line Voice over IP (VoIP), ultra-high speed data access, and multiple battery pack options to support telephony service during power outages. Designed as an upgradeable solution for advanced users, the TM1602 enables both home and small businesses the speed and performance achievable with a 24x8 bonded channel cable environment along with industry-leading ARRIS voice and battery back-up features. With the TM1602, cable operators can maintain competitive position against VDSL and fiber to the home services by offering subscriber data services as high as 960Mbps.

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GENERAL SPECIFICATIONS

Physical

Operating Temperature °F (°C)	32 to 104 (0 to 40)
Operating Relative Humidity (Min-Max)	5-95% (non-condensing)
Storage Temperature °F (°C)	-40 to 158 (-40 to 70)
Dimensions (H x W x D) in. (cm) (excluding F-connector)	**TM1602A:** 7.1x1.8x7.1 (18.1x4.6x18.0) **TM1602G:** 9.1x2.2x7.0 (23.1x5.5x17.9) **TM1602G w/ 8-cell:** 9.7x2.2x7.0 (24.7x5.5x17.9)
Unit Weight in lbs (kg)	**TM1602A:** 1.11 (0.50) **TM1602G:** 1.39 (0.63) – not including battery
Battery Pack Weights in lbs (kg)	**4-Hr Pack:** Li-ion 2.2 AH Capacity, 0.25 (0.11) **8-Hr Pack:** Li-ion 4.4 AH Capacity, 0.50 (0.22) **12-Hr Pack:** Li-ion 6.6 AH Capacity, 0.75 (0.33) **16-Hr Pack:** Li-ion 8.8 AH Capacity, 1.0 (0.44)
Battery Storage Temperature °F (°C)	-4 to 140 (-20 to 60) *Storage above 77°F (25°C) reduces battery life*
Battery Telemetry (TM1602 only)	AC Fail, Battery Low, Battery Missing, Replace Battery
Diagnostic LEDs	Power, US/DS, Online, Tel1, Tel2, Battery (TM1602G only)

Interfaces

RF Interface	External 75 ohm 'F' type connector
Data Interface	10/100/1000 Base-T Ethernet RJ-45
Telephony Interface	Two (2) RJ-11 jacks
Battery Interface	Custom male connector, rectangular, 2mm
Input Voltage (nominal)	115 VAC, 60 Hz

Telephony

Supervisory Voltage	48 VDC nominal
Maximum Loop Length to CPE	1000 ft (305M) of 26 AWG (0.4 mm) wire
Ringing Load Capacity	10 REN total; 5 per line
Provisionable High Loop Current Mode	Yes (40mA constant current source)
Telcordia™ GR 1089 Tested	Yes
Programmable Country Interface	Yes (support for multiple country templates)

RF Downstream

Frequency Range (MHz)	108-1002 (edge-to-edge)
Bonded Channels	Up to 16 (24 with separate downstream license)
Tuner Configuration	Full capture tuning range
Modulation (QAM)	64 or 256
Data Rate (Mbps, Theoretical)	Up to 640 (960 with 24 downstream license) *Max raw DOCSIS rate; actual throughput is less due to overhead, configuration, and RF conditions*
RF Input Sensitivity Level (dBmV)	-15 to +15
Carrier Bandwidth	6 MHz
MoCA® Immunity Filter	Yes

RF Upstream

Frequency Range (MHz)	5-42 (A/NA, G/NA) or 5-85 (G/NA-85 versions)
Bonded Channels	Up to 4 (8 with separate upstream license)
Modulation	QPSK, 8QAM, 16QAM, 32QAM, 64QAM, 128QAM (S-CDMA only)
Modulation Bandwidth (KHz)	**TDMA:** 200, 400, 800, 1600, 3200, 6400 **S-CDMA:** 1600, 3200, 6400
Data Rate (Mbps, Theoretical)	up to 120 (240 with 8 upstream license) *Max raw DOCSIS rate; actual throughput is less due to overhead, configuration, and RF conditions*

GENERAL SPECIFICATIONS

RF Upstream *(continued)*

RF Output Level (dBmV – one channel)	**TDMA:** +17-61 (QPSK); +17-58 (8QAM, 16QAM); +17-57 (32QAM, 64QAM) **S-CDMA:** +17 to +56 (all modulations) ***Note1****: A-TDMA max output reduced 3dB when transmitting 2 channels (6dB when transmitting 3+ channels). Extended US power compensates at higher bonding levels to ensure max output does not drop below +54dBmV.* ***Note2****: S-CDMA max output reduced 3dB when transmitting 2 or more channels.*
Automatic Level Adjust	Yes
Frequency Stability (KHz)	±5
Output Impedance (Ohms)	75

Standards

DOCSIS 3.0 Certified	UL® 60950 / CB	RoHS / WEEE
PacketCable 1.0, 1.5, 2.0 Compliant	FCC Part 15 Class B / ICES-003	G.711, 64 kbps, µ-law and A-law encoded speech
IEEE 802.3, 802.3ab	Telcordia™ GR-1089 Lightning/Surge	Enhanced codecs: G.722, G.726, G.728, G.729E
RFC3261 Legacy SIP	Telcordia™ GR-63 NEBS	T.38 Fax Relay
ITU-T K.21		

ORDERING INFORMATION

Part #	Description
1000179	TM1602AP2/NA, 16x4, DOCSIS 3.0 compliant 2-Line E-MTA, integrated 115 VAC 60 HZ power supply, 6 ft NEMA 1-15 power cord. Includes Quick Install Guide, and Ethernet cable. Incapable of battery support. Upgradeable to 24x8 operation with separate license (Part# 782204)
782369	TM1602G/NA-0, 16x4, DOCSIS 3.0 compliant, 2-Line E-MTA, integrated 115 VAC 60 HZ supply, 6 ft NEMA 1-15 power cord. Includes Quick Install Guide and Ethernet cable. Battery capable (no battery pack included). Upgradeable to 24x8 operation with separate license (Part# 782204)
783946	TM1602G/NA-8, 16x4, DOCSIS 3.0 compliant, 2-Line E-MTA, integrated 115 VAC 60 HZ supply, 6 ft NEMA 1-15 power cord. Includes 4-cell, 4.4 AH, Li-Ion Battery for up to 8 hrs of battery back-up, Quick Install Guide, and Ethernet cable. Upgradeable to 24x8 operation with separate license (Part# 782204)
783947	TM1602G/NA-16, 16x4, DOCSIS 3.0 compliant, 2-Line E-MTA, integrated 115 VAC 60 HZ supply, 6 ft NEMA 1-15 power cord. Includes 8-cell, 8.8 AH, Li-Ion Battery for up to 16 hrs of battery back-up, Quick Install Guide, and Ethernet cable. Upgradeable to 24x8 operation with separate license (Part# 782204)
783992	TM1602G/NA-85-0, 16x4, DOCSIS 3.0 compliant, 2-Line E-MTA, 5-85MHz US, integrated 115 VAC 60 HZ power, 6 ft NEMA 1-15 power cord. Includes Quick Install Guide and Ethernet cable. Battery capable (no battery pack included). Upgradeable to 24x8 operation with separate license (Part# 782204)
783991	TM1602G/NA-85-8, 16x4, DOCSIS 3.0 compliant, 2-Line E-MTA, 5-85MHz US, integrated 115 VAC 60 HZ supply, 6 ft NEMA 1-15 power cord. Includes 4-cell, 4.4 AH, Li-Ion Battery for up to 8 hrs of battery back-up, Quick Install Guide, and Ethernet cable. Upgradeable to 24x8 operation with separate license (Part# 782204)
783990	TM1602G/NA-85-16, 16x4, DOCSIS 3.0 compliant, 2-Line E-MTA, 5-85MHz US, integrated 115 VAC 60 HZ supply, 6 ft NEMA 1-15 power cord. Includes 8-cell, 8.8 AH, Li-Ion Battery for up to 16 hrs of battery back-up, Quick Install Guide, and Ethernet cable. Upgradeable to 24x8 operation with separate license (Part# 782204)
804015	Unit License for Upgrade from 16x4 to 24x8 on TM1602 CPE