

Optical Module Specifications [All measurements made using FC/SPC connectors at 25°C (77°F)]

Models	4415	4414	4413
Center Wavelength	1310 nm ± 20 nm 1550 nm ± 30 nm	1550 nm ± 30 nm	1310 nm ± 20 nm
Fiber Type	Singlemode 9/125μ	Singlemode 9/125μ	Singlemode 9/125μ
Spectral Width (RMS)	1310 nm: ≤ 10 nm 1550 nm: ≤ 10 nm	1550 nm: ≤ 10 nm	1310 nm: ≤ 10 nm
Dynamic Range ¹ (SNR = 1)	1310 nm: 30 dB 1550 nm: 28 dB	1550 nm: 28 dB	1310 nm: 30 dB
Initial Reflective Deadzone ²	1310 nm: 3 meters (typical) 1550 nm: 3 meters (typical)	1550 nm: 3 meters (typical)	1310 nm: 3 meters (typical)
Initial Non-Reflective Deadzone ²	1310 nm: 10 meters (typical) 1550 nm: 12 meters (typical)	1550 nm: 12 meters (typical)	1310 nm: 10 meters (typical)
Pulsewidth	10 ns to 10μs		
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi		
Distance Sampling	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)		
Distance Accuracy	0.0025% of distance measurement ± distance resolution ± index uncertainty		
Distance Range Setting	2/4/8/16/32/64/128/256 km		
Loss Resolution	0.001 dB		
Laser Safety	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR		

Models	4425	4424	4423
Center Wavelength	1310 nm ± 20 nm 1550 nm ± 20 nm	1550 nm ± 20 nm	1310 nm ± 20 nm
Fiber Type	Singlemode 9/125μ	Singlemode 9/125μ	Singlemode 9/125μ
Spectral Width (RMS)	1310 nm: ≤ 10 nm 1550 nm: ≤ 10 nm	1550 nm: ≤ 10 nm	1310 nm: ≤ 10 nm
Dynamic Range ¹ (SNR = 1)	1310 nm: 36 dB 1550 nm: 34 dB	1550 nm: 34 dB	1310 nm: 36 dB
Initial Reflective Deadzone ²	1310 nm: 3 meters (typical) 1550 nm: 3 meters (typical)	1550 nm: 3 meters (typical)	1310 nm: 3 meters (typical)
Initial Non-Reflective Deadzone ²	1310 nm: 10 meters (typical) 1550 nm: 12 meters (typical)	1550 nm: 12 meters (typical)	1310 nm: 10 meters (typical)
Pulsewidth	10 ns to 10μs		
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi		
Distance Sampling	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)		
Distance Accuracy	0.0025% of distance measurement ± distance resolution ± index uncertainty		
Distance Range Setting	2/4/8/16/32/64/128/256 km		
Loss Resolution	0.001 dB		
Laser Safety	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR		

Models	4438	4436	4534
Center Wavelength	1550 nm ± 20 nm	1310 nm ± 20 nm 1550 nm ± 20 nm	1550 nm ± 20 nm
Fiber Type	Singlemode	Singlemode 9/125μ	Singlemode 9/125μ
Spectral Width (RMS)	≤15 nm	1310 nm: ≤ 10 nm 1550 nm: ≤ 10 nm	1550 nm: ≤ 10 nm
Dynamic Range ¹ (SNR = 1)	46.0 dB	1310 nm: 40 dB 1550 nm: 40 dB	1550 nm: 40 dB
Initial Reflective Deadzone ²	3 meters	1310 nm: 3.5 meters (typical) 1550 nm: 3.5 meters (typical)	1550 nm: 3.5 meters (typical)
Initial Non-Reflective Deadzone ²	5 meters	1310 nm: 6 meters (typical) 1550 nm: 6 meters (typical)	1550 nm: 6 meters (typical)
Pulsewidth	10 ns to 20μs (wavelength dependent)		
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.001 mi		
Distance Sampling	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)		
Distance Accuracy	0.0025% of distance measurement ± distance resolution ± index uncertainty		
Distance Range Setting	2/4/8/16/32/64/128/256 km		
Loss Resolution	0.001 dB		
Laser Safety	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR		

Notes:

1. Subtract approximately 2 dB of range to 98% peak noise. Bellcore TR-TSY-000196 Issue 2
2. Using Bellcore TR-TSY-000196 Issue 2. Deadzones measured on -45 dB reflections.

Models	4442	4441	4440
Center Wavelength	850 nm ± 20 nm 1300 nm ± 20 nm	1300 nm ± 20 nm	850 nm ± 20 nm
Fiber Type	Multimode	Multimode	Multimode
Spectral Width (RMS)	850 nm: ≤ 10 nm 1300 nm: ≤ 10 nm	1300 nm: ≤ 10 nm	850 nm: ≤ 10 nm
Dynamic Range ¹ (SNR = 1)	850 nm: 23 dB 1300 nm: 26 dB	1300 nm: 26 dB	850 nm: 23 dB
Initial Reflective Deadzone ²	850 nm: 3.5 meters (typical) 1300 nm: 3 meters (typical)	1300 nm: 3 meters (typical)	850 nm: 3.5 meters (typical)
Initial Non-Reflective Deadzone ²	850 nm: 6.5 meters (typical) 1300 nm: 7 meters (typical)	1300 nm: 7 meters (typical)	850 nm: 6.5 meters (typical)
Pulsewidth	4 ns to 1 μs (wavelength dependent)		
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi		
Distance Sampling	0.25, 0.5, 1, 2, 4, 8 meters (range dependent)		
Distance Accuracy	0.0025% of distance measurement ± distance resolution ± index uncertainty		
Distance Range Setting	2/4/8/16/32/64 km		
Loss Resolution	0.001 dB		
Laser Safety	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR		

Models	4456	4457
Center Wavelength	850 nm ± 20 nm 1300 nm ± 20 nm 1310 nm ± 20 nm 1550 nm ± 20 nm	850 nm ± 20 nm 1300 nm ± 20 nm 1310 nm ± 20 nm 1550 nm ± 30 nm
Fiber Type	Multimode and Singlemode	Multimode and Singlemode
Spectral Width (RMS)	850 nm: ≤ 10 nm 1300 nm: ≤ 10 nm 1310 nm: ≤ 10 nm 1550 nm: ≤ 10 nm	850 nm: ≤ 10 nm 1300 nm: ≤ 10 nm 1310 nm: ≤ 10 nm 1550 nm: ≤ 10 nm
Dynamic Range ¹ (SNR = 1)	850 nm: 23 dB 1300 nm: 26 dB 1310 nm: 21.5 dB 1550 nm: 21 dB	850 nm: 21 dB 1300 nm: 24 dB 1310 nm: 32 dB 1550 nm: 30 dB
Initial Reflective Deadzone ²	850 nm: 3.5 meters (typical) 1300 nm: 2.5 meters (typical) 1310 nm: 3 meters (typical) 1550 nm: 3 meters (typical)	850 nm: 3.5 meters (typical) 1300 nm: 2.5 meters (typical) 1310 nm: 3 meters (typical) 1550 nm: 3 meters (typical)
Initial Non-Reflective Deadzone ²	850 nm: 6.5 meters (typical) 1300 nm: 7 meters (typical) 1310 nm: 10 meters (typical) 1550 nm: 12 meters (typical)	850 nm: 6.5 meters (typical) 1300 nm: 7 meters (typical) 1310 nm: 15 meters (typical) 1550 nm: 20 meters (typical)
Pulsewidth	4 ns to 10 μs (wavelength dependent)	
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	
Distance Sampling	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)	
Distance Accuracy	0.0025% of distance measurement ± distance resolution ± index uncertainty	
Distance Range Setting	2/4/8/16/32/64/128/256 km (wavelength dependent)	
Loss Resolution	0.001 dB	
Laser Safety	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR	

Notes:

1. Subtract approximately 2 dB of range to 98% peak noise. Bellcore TR-TSY-000196 Issue 2
2. Using Bellcore TR-TSY-000196 Issue 2. Deadzones measured on -45 dB reflections.

Models	4461	4462
Center Wavelength	1240 nm ± 6 nm	1240 nm ± 6 nm 1310 nm ± 20 nm
Fiber Type	Singlemode	Singlemode
Spectral Width (RMS)	1240 nm: ≤ 15 nm	1240 nm: ≤ 15 nm 1310 nm: ≤ 15 nm
Dynamic Range ¹ (SNR = 1)	1240 nm: 36 dB	1240 nm: 34 dB 1310 nm: 34 dB
Initial Reflective Deadzone ²	1240 nm: 3 meters (typical)	1240 nm: 3 meters (typical) 1310 nm: 3 meters (typical)
Initial Non-Reflective Deadzone ²	1240 nm: 10 meters (typical)	1240 nm: 10 meters (typical) 1310 nm: 10 meters (typical)
Pulsewidth		
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi
Distance Sampling	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)
Distance Accuracy	0.0025% of distance measurement ± distance resolution ± index uncertainty	0.0025% of distance measurement ± distance resolution ± index uncertainty
Distance Range Setting	2/4/8/16/32/64/128/256 km	2/4/8/16/32/64/128/256 km
Loss Resolution	0.001 dB	0.001 dB
Laser Safety	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR

Models	4463	4464
Center Wavelength	1240 nm ± 6 nm 1550 nm ± 20 nm	1240 nm ± 6 nm 1625 nm ± 10 nm
Fiber Type	Singlemode	Singlemode
Spectral Width (RMS)	1240 nm: ≤ 15 nm 1550 nm: ≤ 15 nm	1240 nm: ≤ 15 nm 1625 nm: ≤ 15 nm
Dynamic Range ¹ (SNR = 1)	1240 nm: 36 dB 1550 nm: 34 dB	1240 nm: 36 dB 1625 nm: 36 dB
Initial Reflective Deadzone ²	1240 nm: 3 meters (typical) 1550 nm: 3 meters (typical)	1240 nm: 3 meters (typical) 1625 nm: 3.5 meters (typical)
Initial Non-Reflective Deadzone ²	1240 nm: 10 meters (typical) 1550 nm: 12 meters (typical)	1240 nm: 10 meters (typical) 1625 nm: 15 meters (typical)
Pulsewidth		
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi
Distance Sampling	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)
Distance Accuracy	0.0025% of distance measurement ± distance resolution ± index uncertainty	0.0025% of distance measurement ± distance resolution ± index uncertainty
Distance Range Setting	2/4/8/16/32/64/128/256 km	2/4/8/16/32/64/128/256 km
Loss Resolution	0.001 dB	0.001 dB
Laser Safety	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR

Models	4471	4472
Center Wavelength	1625 nm ± 10 nm	1310 nm ± 20 nm 1625 nm ± 10 nm
Fiber Type	Singlemode	Singlemode
Spectral Width (RMS)	1625 nm: ≤ 10 nm	1310 nm: ≤ 10 nm 1625 nm: ≤ 10 nm
Dynamic Range ¹ (SNR = 1)	1625 nm: 36 dB	1310 nm: 36 dB 1625 nm: 36 dB
Initial Reflective Deadzone ²	1625 nm: 4 meters (typical)	1310 nm: 3 meters (typical) 1625 nm: 4 meters (typical)
Initial Non-Reflective Deadzone ²	1625 nm: 12 meters (typical)	1310 nm: 10 meters (typical) 1625 nm: 12 meters (typical)
Pulsewidth		
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi
Distance Sampling	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)
Distance Accuracy	0.0025% of distance measurement ± distance resolution ± index uncertainty	0.0025% of distance measurement ± distance resolution ± index uncertainty
Distance Range Setting	2/4/8/16/32/64/128/256 km	2/4/8/16/32/64/128/256 km
Loss Resolution	0.001 dB	0.001 dB
Laser Safety	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR

Models	4473
Center Wavelength	1550 nm ± 20 nm 1625 nm ± 10 nm
Fiber Type	Singlemode
Spectral Width (RMS)	1550 nm: ≤ 10 nm 1625 nm: ≤ 10 nm
Dynamic Range ¹ (SNR = 1)	1550 nm: 34 dB 1625 nm: 36 dB
Initial Reflective Deadzone ²	1550 nm: 4 meters (typical) 1625 nm: 4 meters (typical)
Initial Non-Reflective Deadzone ²	1550 nm: 12 meters (typical) 1625 nm: 12 meters (typical)
Pulsewidth	
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi
Distance Sampling	0.25, 0.5, 1, 2, 4, 8, 16 meters (range dependent)
Distance Accuracy	0.0025% of distance measurement ± distance resolution ± index uncertainty
Distance Range Setting	2/4/8/16/32/64/128/256 km
Loss Resolution	0.001 dB
Laser Safety	Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR

Notes:

1. Subtract approximately 2 dB of range to 98% peak noise. Bellcore TR-TSY-000196 Issue 2
2. Using Bellcore TR-TSY-000196 Issue 2. Deadzones measured on -45 dB reflections.

Multi-Test Functions

Dual Source (441X and 442X optics only; factory installed)

Wavelength	1310/1550 ± 20 nm (except 4457 module 1550 ± 30 nm)
Output	-10 dBm (typical)
Transmission Mode	CW, 1 KHz and 2 KHz
Output Fiber	9/125µm SM fiber
Optical Connector	Same as OTDR
Modes of Operation	CW, 1 KHz and 2 KHz
Stability	± 0.2 dB (8 hours)
Spectral Width	Same as OTDR
Safety	Same as OTDR

Optical Meter (factory installed)

Detector Type	2 mm Ge PIN photodiode
Wavelength	800 - 1800 nm
Range	+10 to -55 dBm or +20 to -45 dBm with AM460 filter
Calibrated Wavelengths	3 total: 850, 1310, 1550
Universal Connector	Yes (use AM-430-xx adapter caps)
Resolution	0.01 dB, dBm, 0.01% Watts
Store Reference Mode	Yes
Accuracy ¹	± 4% (± 0.18 dB) @ +5 dBm to -50 dBm ± 8% (± 0.36 dB) @ + 10 dBm to +5 dBm and @ -50 dBm to -55 dBm
Linearity	± 0.04 dB, +5 dBm to -50 dBm

Visual Fault Locator (field installed)

Wavelength	635 ± 10 nm
Output	0 dBm
Transmission Mode	CW or 2 Hz
Output Fiber	9/125µm, SM fiber
Optical Connector	FC, SC, ST - fixed connector
Safety	IEC 825 Class 2, FDA (21 CFR 1040.10 class 2)

Note:

1. Specification applies to +10 dBm meter not to +20 dBm meter.

CMA4000 Optional Accessories (must be added as separate line item):

TD-400	Hard transit case	TD-459US	US style keyboard
TD-410	Deluxe soft case	TD-459GE	German CE style keyboard
TD-415	Soft carry bag	TD-459FR	French CE style keyboard
TD-405	Printer w/cable	TD-459SP	Spanish CE style keyboard
TD-309	Printer paper (5 rolls/pack)	TD-459IT	Italian CE style keyboard
TD-409	Case of paper (5 packs/case)	TD-30163	Additional User's Manual
TD-453	12 v lead acid battery	TD-30162	Additional Training Manual
TD-29621	12 v DC power adapter	TD-30711	Parallel cable - DB25M to DB25M
TD-30710	Serial cable DB9F to DB9F (null)	TD-30712	Serial cable DB9F to DB9M (straight)

CMA4000 Mainframe:

Control Unit: P/N TD-14XXX PC-based modular platform

Standard Accessories:

- 8-inch VGA LCD display
- Multi-tasking operating system
- User's & Training Manuals
- 1 VGA port
- Internal memory (up to 140 traces)
- 1 carry strap
- AC adapter/charger
- AC line cord (choose style - see below)
- 2 serial ports
- 1 parallel port
- 1 mouse port
- 1 PS/2 keyboard port
- 12 v rechargeable battery (qty 2)
- Floppy drive
- Built-in keyboard

AC Power Cord Options:

TD-11685	US power cord	TD-30362	Australian power cord
TD-30358	Euro power cord	TD-30359	UK power cord
TD-30361	Italian power cord	TD-30360	Swiss power cord

OTDR/Source Connector Adapter:

Adapters for PC and Ultra Polish:

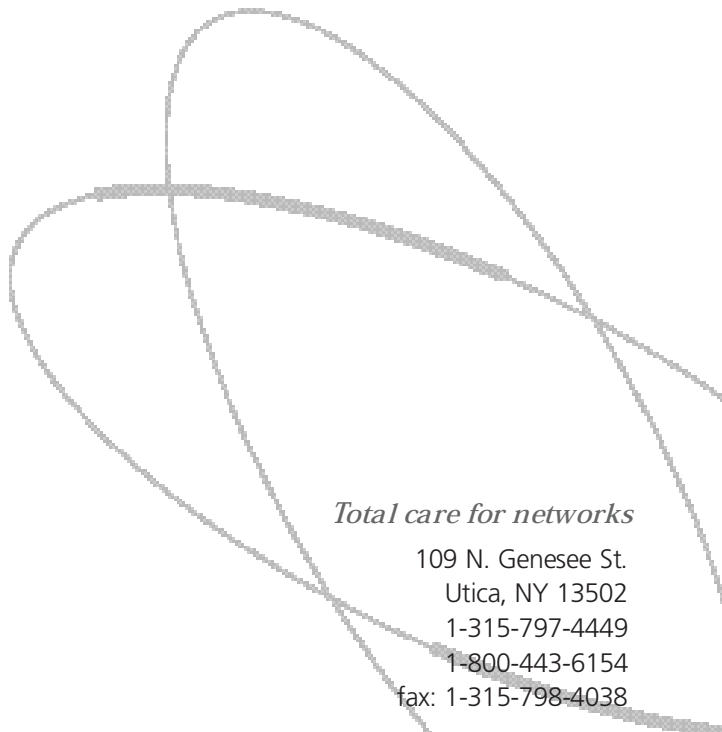
UC-130-10	Biconic	UC-130-35	SMA 905/906
UC-130-15	DIN 47256	UC-130-40	Diamond HP HMS-10
UC-130-20	D4	UC-130-45	Diamond HP HMS-0
UC-130-25	FC	UC-130-50	Diamond HP-HMS-10/A
UC-130-30	ST	UC-130-55	SC

Adapters for Angle Polish:

UC-130-60	FC NTT	UC-130-70	DIN/HRL-10
UC-130-60A	FC Seiko Giken	UC-130-75	ST
UC-130-65	SC	UC-130-80	Diamond E-2000

Meter Connector Adapter (select one when ordering power meter):

AM-430-10	Biconic	AM-430-50	ST
AM-430-15	D4	AM-430-75	VFO/PFO
AM-430-20	SMA 906	AM-430-85	DIN
AM-430-25	Diamond GFS-3	AM-430-90	SC
AM-430-45	FC	AM-430-100	FDDI



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