

MTX510E Series

10Gb/s 1550nm Electro-absorption Modulated Laser (EML)

7 Pin Package with GPO™ RF Input



The MTX510E (EML) series is a cost-effective solution for 10 Gb/s digital optical signal transmission. The modules consist of a multi-quantum-well DFB laser device with 1550nm nominal emission wavelength and a monolithically integrated electro-absorption (EA) modulator.

The MTX510E series modules are optimized to operate at a bit-rate of 10Gb/s for OC-192 and metro transmission with an excellent pedigree of reliability. The MTX510E module is well suited for short, intermediate and extended reach applications up to 20, 40 and 80 km respectively. Careful control of the output signal for minimum “chirp” allows the MTX510E to provide superior performance and long reach over spans of standard single mode fiber.

The hermetically sealed 7 pin package with a GPO connector contains a high-speed EML, optical isolator, back facet monitor diode, thermistor and thermoelectric cooler (TEC) for precise control. The incorporated TEC keeps the laser chip at a well-controlled temperature. This allows the device to operate over a case temperature range of 0°C to +70°C.

The MTX510 series comes with a standard 1.0 meter single-mode fiber pigtail and an FC/PC connector. Other pigtails fiber types, lengths and terminations may be specified as options.

Applications:

- MTX510E series is designed for high-speed telecom and datacom transmissions over spans up to 80km in length in compliance with Telcordia GR-253-CORE (issue 3) LR-2 specifications.

Features:

- Industry standard precision GPO package.
- Available for C-band ITU Channels 13 through 60 on 50GHz and 100GHz spacing.
- High-speed design optimized for modulation at 9.95328Gb/s.
- 50 Ohm input impedance match.
- Integrated optical isolator.

Compliance:

- Conforms to the requirements of the European Union Directive 2002/95/EC for the Restriction of Hazardous Substance (RoHS)

Optical and Electrical Characteristics

All modules are tested to pass the SONET OC-192 eye-mask criteria.

PARAMETER	SYMBOL	CONDITION	MIN	MAX	UNIT
DFB Laser:					
Set temperature for laser operation	T _{SET}	Temperature set for TEC	20	35	°C
Threshold Current	I _{TH}	At T _{SET} , CW operation, BOL		30	mA
Operating Current	I _{op}	At T _{SET} , BOL	40	100	mA
		At T _{SET} , EOL	60	150	
Operating Wavelength	λ	At T _{SET} , I _{OP}	1529.16	1567.13	nm
			See Page 5.		
Side-Mode Suppression Ratio	SMSR	At T _{SET} , I _{OP} , 9.95328Gb/s, 2 ³¹ - 1 PRBS NRZ modulated.	35		dB
Peak Wavelength stability		APC operation 20 yrs and over case temperature	-0.08	+0.08	nm
Wavelength stability over temperature	dλo/dTc	Change with case temperature 0°C to +70°C	-0.5	+0.5	pm/°C
EA Modulator:					
Mark Offset Voltage ¹	V _{MARK}	DC (on level modulator voltage)	-1.0	-0.1	V
Peak-to-Peak RF Drive Voltage	V _{PP}		2.0	2.7	V
Input Impedance	Z _{IN}		45	55	Ω
Module:					
Extinction Ratio	E _R	V _{MARK} biased, modulated with V _{pp} 20km 40km 80km	8.2 10 10		dB
Monitor Photodiode Current	I _{MOD}		10	1500	μA
Modulated Output Power (EOL)	P _{MOD}	20km 40km 80km	-6 -1 0	-1 2 4	dBm
Optical Isolation		From output fiber to device, module at T _{SET}	30		dB
Operating Case Temperature	T _{CASE}		0	70	°C
Chromatic Dispersion Penalty	DP	20km at 9.95328 Gb/s, 2 ³¹ - 1 PRBS NRZ modulated, 400 ps/nm dispersion. BER = 10 ⁻¹²		2.0	dB
		40km at 9.95328 Gb/s, 2 ³¹ - 1 PRBS NRZ modulated, 800 ps/nm dispersion. BER = 10 ⁻¹²		2.0	
		80km at 9.95328 Gb/s, 2 ³¹ - 1 PRBS NRZ modulated, 1600 ps/nm dispersion. BER = 10 ⁻¹²		2.0	
High Frequency Cut-Off	F _{3db}		10		GHz
Low Frequency Cut-Off	F _{LC}			100	kHz

RF Return Loss, 50Ω	S_{11}	0.1 to 8GHz		-10	dB
Rise / Fall Time, 10% - 90%	T_R-T_F			40	ps
TEC thermal capacity ³	ΔTEC	At T_{set} , I_{op} $\Delta TEC = T_{case} - T_{set}$	-30	45	°C
TEC current	I_{tec}	At T_{set} , I_{op} EOL	-	1.2	A
TEC voltage	V_{tec}	At T_{set} , I_{op} EOL	-	2.5	V
TEC AC resistance	R_{tec}	At T_{set} , I_{op} EOL		1.7	Ω
TEC power dissipation	P_{tec}	At T_{set} , I_{op} EOL		1.0	W
Thermistor Resistance	R_{th}	At 25 °C	9.5	10.5	kΩ
Thermistor B Constant			3800	4000	
Lead Soldering time	t	Soldering temperature 260 °C,		10	s

Table Notes: 1. Vmark is the top rail DC voltage applied to the modulator.

Absolute Maximum Operating Ratings

Optimal thermal contact between the GPO housing and the application heat-sink is required.

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device.

Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

PARAMETER	SYMBOL	CONDITION	MIN	MAX	UNIT
Operating Case Temperature Range	T_{CASE}		-5	75	°C
Storage Case Temperature Range	T_{STG}		-40	85	°C
Laser Forward Bias Current	I_{FL}	CW	-	150	mA
Laser Reverse Voltage	V_{RL}	CW	-	2	V
Optical Output Power	P	CW	-	10	mW
Laser Chip Temperature	T_{LD}		15	40	°C
Modulator Reverse Voltage	V_{MR}		-	5	V
Modulator Forward Voltage	V_{MF}		-	1	V
Photodiode Reverse Voltage	V_{PD}		-	10	V
Photodiode Forward Current	I_{FPD}		-	1	mA
Thermistor Voltage	V_{TH}		-	5	V
Thermistor Current	I_{TH}		-	2	mA
TEC Current	I_{TEC}		-1.5	1.5	A
TEC Voltage	V_{TH}		-	5	V

Ordering information:

MTX	X	XX	X	XXXX	XXX	XX	XX	-XX	-CXXX
	Wavelength:	Data Rate:	Laser Type:	Wavelength:	Package Style:	Fiber Pigtail Type:	Pigtail Connector:	Reach:	Customized Information:
	5=1550nm	10= 9.9538Gb/s	E= EML	WCxx= Fixed λ , C channel. WHxx= Fixed λ , H channel. W [blank] = Omitted for Non-ITU	B01=GPO	F5= SMF-900 F6= SMF-250 F7= PMF	SC= SC-UPC FC= FC-UPC LA= LC-APC MC= MC-UPC Other connectors are available upon request	S2=20km I2=40km L2=80km	Customized for specific customer requirements

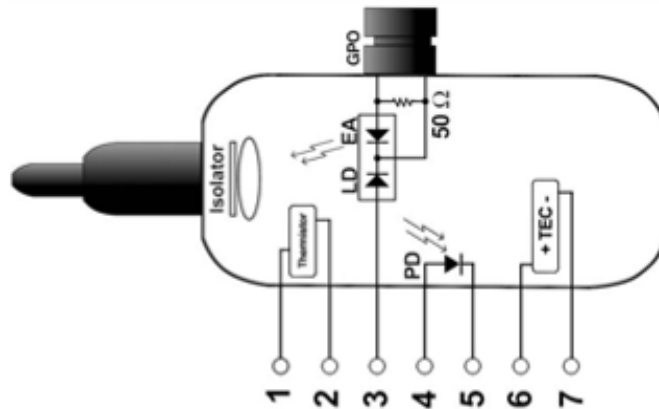
For example, MTX510EWC33B01F5SC-I2 has a wavelength 1550nm, Data Rate 9.95328Gb/s, EML Laser, ITU Channel C33, GPO Package, SMF-900 Fiber Pigtail with SC Connector fitted for a 40Km application.

ITU Grid Wavelengths, Frequencies, Channels and ordering codes

Note – actual ordering codes may change depending on the device configuration selected as per the table on page 4.

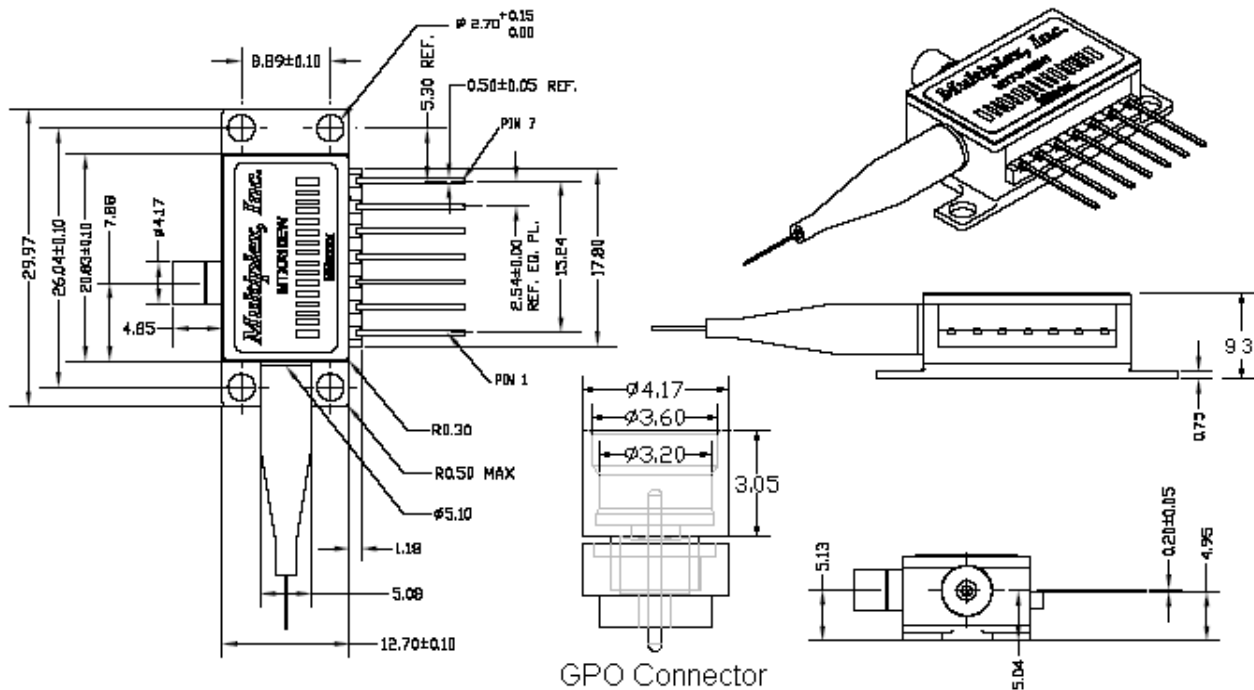
Channel	Wavelength (nm)	Frequency (THz)	Code	Channel	Wavelength (nm)	Frequency (THz)	Code
H60	1529.16	196.05	MTX510EH60B01F6SC-I2	C36	1548.51	193.60	MTX510EC36B01F6SC-I2
C60	1529.55	196.00	MTX510EC60B01F6SC-I2	H35	1548.91	193.55	MTX510EH35B01F6SC-I2
H59	1529.94	195.95	MTX510EH59B01F6SC-I2	C35	1549.32	193.50	MTX510EC35B01F6SC-I2
C59	1530.33	195.90	MTX510EC59B01F6SC-I2	H34	1549.72	193.45	MTX510EH34B01F6SC-I2
H58	1530.72	195.85	MTX510EH58B01F6SC-I2	C34	1550.12	193.40	MTX510EC34B01F6SC-I2
C58	1531.12	195.80	MTX510EC58B01F6SC-I2	H33	1550.52	193.35	MTX510EH33B01F6SC-I2
H57	1531.51	195.75	MTX510EH57B01F6SC-I2	C33	1550.92	193.30	MTX510EC33B01F6SC-I2
C57	1531.90	195.70	MTX510EC57B01F6SC-I2	H32	1551.32	193.25	MTX510EH32B01F6SC-I2
H56	1532.29	195.65	MTX510EH56B01F6SC-I2	C32	1551.72	193.20	MTX510EC32B01F6SC-I2
C56	1532.68	195.60	MTX510EC56B01F6SC-I2	H31	1552.12	193.15	MTX510EH31B01F6SC-I2
H55	1533.07	195.55	MTX510EH55B01F6SC-I2	C31	1552.52	193.10	MTX510EC31B01F6SC-I2
C55	1533.47	195.50	MTX510EC55B01F6SC-I2	H30	1552.93	193.05	MTX510EH30B01F6SC-I2
H54	1533.86	195.45	MTX510EH54B01F6SC-I2	C30	1553.33	193.00	MTX510EC30B01F6SC-I2
C54	1534.25	195.40	MTX510EC54B01F6SC-I2	H29	1553.73	192.95	MTX510EH29B01F6SC-I2
H53	1534.64	195.35	MTX510EH53B01F6SC-I2	C29	1554.13	192.90	MTX510EC29B01F6SC-I2
C53	1535.04	195.30	MTX510EC53B01F6SC-I2	H28	1554.54	192.85	MTX510EH28B01F6SC-I2
H52	1535.43	195.25	MTX510EH52B01F6SC-I2	C28	1554.94	192.80	MTX510EC28B01F6SC-I2
C52	1535.82	195.20	MTX510EC52B01F6SC-I2	H27	1555.34	192.75	MTX510EH27B01F6SC-I2
H51	1536.22	195.15	MTX510EH51B01F6SC-I2	C27	1555.75	192.70	MTX510EC27B01F6SC-I2
C51	1536.61	195.10	MTX510EC51B01F6SC-I2	H26	1556.15	192.65	MTX510EH26B01F6SC-I2
H50	1537.00	195.05	MTX510EH50B01F6SC-I2	C26	1556.55	192.60	MTX510EC26B01F6SC-I2
C50	1537.40	195.00	MTX510EC50B01F6SC-I2	H25	1556.96	192.55	MTX510EH25B01F6SC-I2
H49	1537.79	194.95	MTX510EH49B01F6SC-I2	C25	1557.36	192.50	MTX510EC25B01F6SC-I2
C49	1538.19	194.90	MTX510EC49B01F6SC-I2	H24	1557.77	192.45	MTX510EH24B01F6SC-I2
H48	1538.58	194.85	MTX510EH48B01F6SC-I2	C24	1558.17	192.40	MTX510EC24B01F6SC-I2
C48	1538.98	194.80	MTX510EC48B01F6SC-I2	H23	1558.58	192.35	MTX510EH23B01F6SC-I2
H47	1539.37	194.75	MTX510EH47B01F6SC-I2	C23	1558.98	192.30	MTX510EC23B01F6SC-I2
C47	1539.77	194.70	MTX510EC47B01F6SC-I2	H22	1559.39	192.25	MTX510EH22B01F6SC-I2
H46	1540.16	194.65	MTX510EH46B01F6SC-I2	C22	1559.79	192.20	MTX510EC22B01F6SC-I2
C46	1440.56	194.60	MTX510EC46B01F6SC-I2	H21	1560.20	192.15	MTX510EH21B01F6SC-I2
H45	1540.95	194.55	MTX510EH45B01F6SC-I2	C21	1560.61	192.10	MTX510EC21B01F6SC-I2
C45	1541.35	194.50	MTX510EC45B01F6SC-I2	H20	1561.01	192.05	MTX510EH20B01F6SC-I2
H44	1541.75	194.45	MTX510EH44B01F6SC-I2	C20	1561.42	192.00	MTX510EC20B01F6SC-I2
C44	1542.14	194.40	MTX510EC44B01F6SC-I2	H19	1561.83	191.95	MTX510EH19B01F6SC-I2
H43	1542.54	194.35	MTX510EH43B01F6SC-I2	C19	1562.23	191.90	MTX510EC19B01F6SC-I2
C43	1542.94	194.30	MTX510EC43B01F6SC-I2	H18	1562.64	191.85	MTX510EH18B01F6SC-I2
H42	1543.33	194.25	MTX510EH42B01F6SC-I2	C18	1563.05	191.80	MTX510EC18B01F6SC-I2
C42	1543.73	194.20	MTX510EC42B01F6SC-I2	H17	1563.45	191.75	MTX510EH17B01F6SC-I2
H41	1544.13	194.15	MTX510EH41B01F6SC-I2	C17	1563.86	191.70	MTX510EC17B01F6SC-I2
C41	1544.53	194.10	MTX510EC41B01F6SC-I2	H16	1564.27	191.65	MTX510EH16B01F6SC-I2
H40	1544.92	194.05	MTX510EH40B01F6SC-I2	C16	1564.68	191.60	MTX510EC16B01F6SC-I2
C40	1545.32	194.00	MTX510EC40B01F6SC-I2	H15	1565.09	191.55	MTX510EH15B01F6SC-I2
H39	1545.72	193.95	MTX510EH39B01F6SC-I2	C15	1565.50	191.50	MTX510EC15B01F6SC-I2
C39	1546.12	193.90	MTX510EC39B01F6SC-I2	H14	1565.90	191.45	MTX510EH14B01F6SC-I2
H38	1546.12	193.85	MTX510EH38B01F6SC-I2	C14	1566.31	191.40	MTX510EC14B01F6SC-I2
C38	1546.92	193.80	MTX510EC38B01F6SC-I2	H13	1566.72	191.35	MTX510EH13B01F6SC-I2
H37	1547.32	193.75	MTX510EH37B01F6SC-I2	C13	1567.13	191.30	MTX510EC13B01F6SC-I2
C37	1547.72	193.70	MTX510EC37B01F6SC-I2	Non-ITU	1530.33 – 1564.68		MTX510EB01F6SC-I2

Internal Circuit:



Pin NumHer	Description
1	Thermistor (Resistance=10 kΩ)
2	Thermistor
3	Laser Anode
4	Detector Monitor Anode
5	Detector Monitor Cathode
6	Thermoelectric Cooler (+)
7	Thermoelectric Cooler (-)
GPO	RF and Case Ground

Mechanical:



WARRANTY

Multiplex warrants all standard laser products, when used within the operating limits, against defects in material and workmanship for a period of one year from date of shipment.

QUALITY

Multiplex is qualified to International Standard ISO 9001:2008.

