



■ Description

The MF-27WTA transmitters are designed for use in transmission systems and high-speed data communication applications. This transmitter operates from 155Mb/s up to 2.7Gb/s data rate. This device has a cooled DFB Laser Diode and ATC function for 100GHz grid WDM applications.



■ Features

- Data rates 155Mb/s to 2.7Gb/s
- ITU-T/SONET compliant STM-16 / OC-48
- Two adjacent wavelength selectable at 100GHz WDM spacing of C-Band
- Transmission target distance up to 90km / 160km (1800ps/nm / 3200ps/nm)
- Optical average power output +7dBm typical
- Operating case temperature range: -5 to +70 °C
- With Cooled-DFB-LD direct modulation
- Clocked-mode (using D-FF) and Non-clocked-mode available
- +5V , +3.3V power supply
- 24pin package
- Package size 73 × 51 × 12.7 mm
- Multi-source WDM Transmitter

■ Applications

- Telecommunications ITU-T/SONET STM-16/OC-48
- Metropolitan area networks
- High speed data communications

MITSUBISHI (OPTICAL DEVICES)
MF-27WTA-M0xMAxxx
 2.7Gb/s Multi-rate WDM Transmitter

■ **Ordering Information**

Type number	Output Power	Class	Target distance	Optical connector	Wavelength code (xxx)
MF-27WTA-M01MAxxx	+7dBm ave. (10mW peak)	L-16.2	90 km	MU / PC	See wavelength table
MF-27WTA-M02MAxxx		U-16.2	160 km		

Type number for sample	Output Power	Class	Target distance	Optical connector	Note
MF-27WTA-M0199999*	+7dBm ave (10mW peak)	L-16.2	90 km	MU / PC	for evaluation purpose only
MF-27WTA-M0299999*		U-16.2	160 km		

*:Please contact MITSUBISHI sales office for detail.

■ **Wavelength table**

Unit : nm

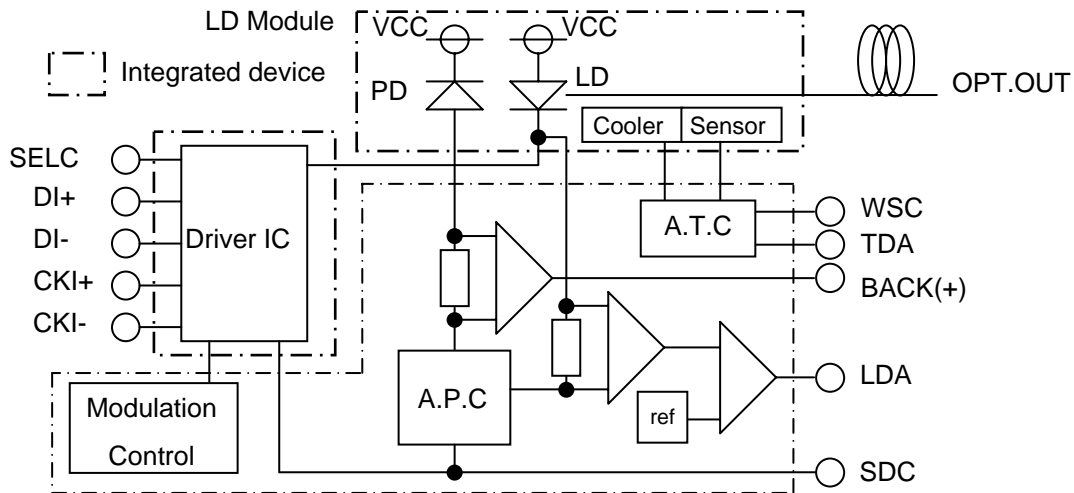
Code	Wavelength 1	Wavelength 2	Code	Wavelength 1	Wavelength 2	Code	Wavelength 1	Wavelength 2
007	1528.77	1529.55	037	1540.56	1541.35	067	1552.52	1553.33
009	1529.55	1530.33	039	1541.35	1542.14	069	1553.33	1554.13
011	1530.33	1531.12	041	1542.14	1542.94	071	1554.13	1554.94
013	1531.12	1531.90	043	1542.94	1543.73	073	1554.94	1555.75
015	1531.90	1532.68	045	1543.73	1544.53	075	1555.75	1556.55
017	1532.68	1533.47	047	1544.53	1545.32	077	1556.55	1557.36
019	1533.47	1534.25	049	1545.32	1546.12	079	1557.36	1558.17
021	1534.25	1535.04	051	1546.12	1546.92	081	1558.17	1558.98
023	1535.04	1535.82	053	1546.92	1547.72	083	1558.98	1559.79
025	1535.82	1536.61	055	1547.72	1548.51	085	1559.79	1560.61
027	1536.61	1537.40	057	1548.51	1549.32	087	1560.61	1561.42
029	1537.40	1538.19	059	1549.32	1550.12	089	1561.42	1562.23
031	1538.19	1538.98	061	1550.12	1550.92	091	1562.23	1563.05
033	1538.98	1539.77	063	1550.92	1551.72	093	1563.05	1563.86
035	1539.77	1540.56	065	1551.72	1552.52			

note : These values are center wavelengths. All values are referred to vacuum.

When WSC pin is open (or low) module outputs wavelength 1.

When WSC pin is high module outputs wavelength 2.

■ **Block Diagram**



■ **Absolute Maximum Ratings**

Stress below listed absolute maximum rating may cause permanent damage to the module.
 This is a stress only and functional operation of the module is not implied at these or any other conditions in excess of those given in the operational sections of this data sheet.
 Exposure to Absolute Maximum Rating for extended periods may affect module reliability.

Parameter	Conditions	Symbol	min	max	unit
Operating Case Temperature Range	note 1	Tc	-5	+70	°C
Operating Relative Humidity	No condensation allowed	RHop	5	85	%
Storage temperature	No condensation allowed	Tstg	-40	+70 (note 2)	°C
Supply Voltage	-	Vcc	-0.3	+6.0	V
Supply Voltage	-	Vtec	-0.3	+3.65	V
Input Clock/Data DC Voltage	-	-	0	Vcc	V
Input Clock/Data Amplitude	Single-end	-	-	2	Vpp
Input Clock/Data Amplitude	Differential	-	-	1	Vpp
SDC, SELC, WSC Input Voltage	-	-	-0.3	Vcc	V
Minimum Fiber Bend radius	-	-	30	-	mm
Lead Soldering Temperature	10 sec max	-	-	250	°C

note 1 : Air flow 1.0m/sec (approximately 200 LFPM)
 note 2 : +85°C max is acceptable for 72hours.

■ **Optical characteristics**

All parameters are specified over the operating case temperature.
 Measurement conditions are at NRZ PN2²³-1 and 50% duty cycle data signal.

Parts Number		MF-27WTA-M01MAxxx			MF-27WTA-M02MAxxx			
	condition	min.	typ.	max.	min.	typ.	max.	units
SDH/SONET		L-16.2 / LR-2			U-16.2			-
Center wavelength	note 1	1528.77	-	1563.86	1528.77	-	1563.86	nm
Wavelength deviation	BOL	-50	-	+50	-50	-	+50	pm
Wavelength deviation	EOL	-100	-	+100	-100	-	+100	pm
Optical rise/fall time	20/80%	-	-	170	-	-	170	psec
Optical source	-	SLM			SLM			-
Optical output average power (BOL)	-	+6	+7	+8	+6	+7	+8	dBm
Shutdown optical power	-	-	-	-40	-	-	-40	dBm
Spectral width	note 2	-	0.3	1	-	0.3	1	nm
SMSR	-	30	-	-	30	-	-	dB
Extinction ratio	-	8.2	-	-	8.2	-	-	dB
Dispersion	-	1800	-	-	3200	-	-	ps/nm
Dispersion penalty	-	-	-	2	-	-	2	dB
Return loss	-	-	-	-24	-	-	-24	dB

note 1 : Wavelength is according to ITU-T G.692; 100GHz grid(+/- 0.1nm). See wavelength table.

note 2 : Based on maximum width of center wavelength peak.(measured 20 dB down from maximum amplitude under modulation condition PN2²³-1).

■ Electrical characteristics

All parameters are specified over the operating case temperature.

Measurement conditions are at NRZ PN2²³-1 and 50% duty cycle data signal.

Parameters	Cond	Symb	Min	Typ	Max	Unit
Positive supply voltage	note 3	V _{CC}	4.75	5	5.25	V
Positive supply current	-	I _{CC}	-	-	400	mA
TEC supply voltage	note 3	VTEC	3.1	3.3	3.5	V
TEC supply current	-	ITEC	-	-	1200	mA
Power dissipation	Total	-	-	-	5.2	W
Input sensitivity data & clock voltage	Single-ended note 4	SV	0.4	0.8	1.3	V _{pp}
Bit rate	note 5	-	0.155	-	2.7	Gb/s
SDC,SELC,WSC High level input	I _{source} =200uA	-	2	-	V _{CC}	V
SDC,SELC,WSC Low level input	I _{sink} =-10uA	-	0	-	0.8	V
LDA,TDA High level output	I _{source} =4mA	-	2.7	-	V _{CC}	V
LDA,TDA Low level output	I _{sink} =-0.5mA	-	0	-	0.5	V
Normalized back face voltage	note 6	-	-	500	-	mV
Normalized back face accuracy	note 6	-	- 10	-	+ 10	%
Logic level inputs	-	-	TTL compatible			-

note 3 : Tolerable broadband noise on the power rail is under 50mV_{pp} with frequency range of 50Hz to 1MHz.

note 4 : Internally, AC coupled with 50 Ω termination.

note 5 : If transmitter is used at more than 1.25Gb/s bit rate, Clocked-mode must be selected.

note 6 : Back face voltage is measured with a GND reference and normalized at the beginning of life relative to the initial optical output power.

For example, a 50% drift in output power correlates to a 50% variation on the detected back face voltage.

■ Pin assignment and description

No.	Symbol	Description	No.	Symbol	Description
1	TEC_GND	Ground for TEC ⁴⁾	24	VCC	Positive power supply
2	BACK(+) ⁷⁾	Monitoring for back facet PD current (Analog-output)	23	GND	Ground
3	LDA ⁷⁾	Laser Degrade Alarm ⁵⁾ (TTL-output)	22	CKI-	False clock input
4	SDC	Shut Down Command ³⁾ (TTL-input)	21	GND	Ground
5	SELC	Clock mode select ²⁾ (TTL-input)	20	CKI+	True clock input ¹⁾
6	GND	Ground ⁴⁾	19	GND	Ground
7	TDA ^{6,7)}	Temperature Deviation Alarm (TTL-output)	18	DI-	False data input
8	NUC	No user connection	17	GND	Ground
9	NUC	No user connection	16	DI+	True data input
10	WSC ⁸⁾	Wavelength Selection Command (TTL-input)	15	GND	Ground
11	GND	Ground	14	VTEC	TEC supply voltage
12	NIC	No Internal Connection	13	VCC	Positive power supply

1) : The falling edge of CKI+ clock input signal is at the DI+ data eye pattern crossing point.

2) : When open (or low) the module operates in Clocked-mode. When high the module operates in Non-clocked-mode.

3) : When open (or low) the module is in the operating mode. When high the module is in the shut down mode (no optical output power).

4) : TEC_GND must be connected with GND.

5) : When provided a digital alarm indicates that the laser is degraded. The active level is a low level.

6) : Alarm indicating when the laser temperature exceeds the threshold level. The active level is a high level.

7) : BACK(+), LDA and TDA pin cannot drive capacitive load. Acceptable capacitance is less than 50pF.

8) : When open (or low) the module outputs wavelength 1. When high the module outputs wavelength 2. (See wavelength table.)

■ **Reliability reference**

- Telcordia GR-468-CORE for device level

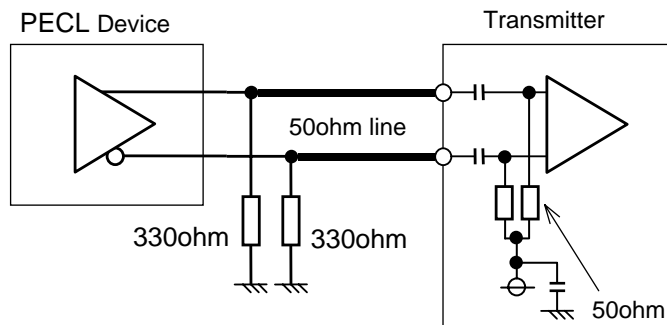
■ **Laser safety information**

- This product is classified Class 1M Laser Product according to IEC 60825-1.

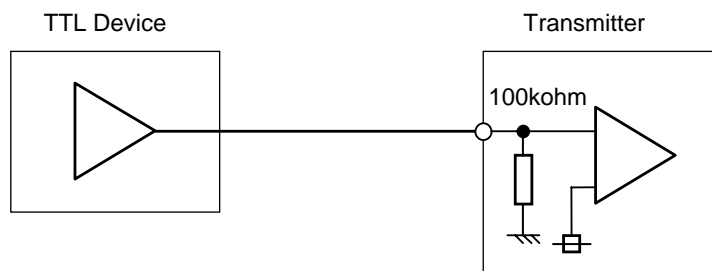
LASER RADIATION
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS
CLASS 1M LASER PRODUCT

■ **Input / Output interface equivalent circuit**

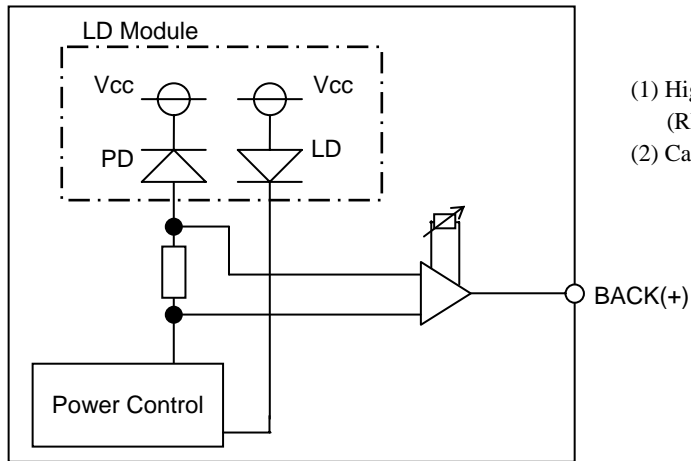
(1) Data / Clock input interface



(2) SDC, SELC, WSC input interface



(3) BACK(+) output interface



- (1) High Impedance Interface
($R_L > 100\text{kohm}$)
- (2) Capacitive Load Stability $< 50\text{pF}$

This product is sensitive to electrostatic discharge. Take precautions to prevent ESD; use wrist straps, grounded work surfaces and recognized anti-static techniques when handling.

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