PRELIMINARY

Notice This is not a final specification.
Some parametric limits are subject to change.

MITSUBISHI (OPTICAL DEVICES)

MF-156DS-T12-070/080/090/100/110

2nd GENERATION SONET/SDH TRANSCEIVER

DESCRIPTION

MF-156DS-T12-070/080/090/100/110 are designed to provide transmitter with high optical performance for SDH STM-1 and SONET OC-3 application.
such as ;
Intra and Inter office links
Subscriber loop
Metropolitan area network
The requiring power is a single power (−5.2V).
The operating temperature is a range of 0 to +70℃ (indoor) and −40 to +85℃ (outdoor).

FEATURES

- Extremely compact package by monolithic specific technology
- Low power consumption
- Single −5.2V power supply
- Laser failure alarm
- Laser degrade alarm
- Transmitter disable option
- ECL logic interface

APPLICATION

Trunk Line

Stress below listed absolute maximum rating may cause permanent damage to the module.
This is a stress only and functional operation of the module 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.

ABSOLUTE MAXIMUM RATINGS (Ta = 25℃)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{EE}	−6 to +0.4	V
ECL high output current		−50 to 0	mA
ECL low input voltage		V_{EE} to +0.4	V
Alarm output current		−0.04 to +10	mA
Storage temperature (indoor)	T_{stgi}	−20 to 70	℃
Storage temperature (outdoor)	T_{stgo}	−40 to 85	℃
Operating temperature (indoor)	T_{opi}	0 to 70	℃
Operating temperature (outdoor)	T_{opo}	−40 to 85	℃
Soldering temperature		+260	℃
Soldering time		10	sec
Relative humidity (non condensation)		10 to 90	%
Fiber bend radius from package		40	mm

(outdoor) : Air flow is needed over 70℃.

PRELIMINARY

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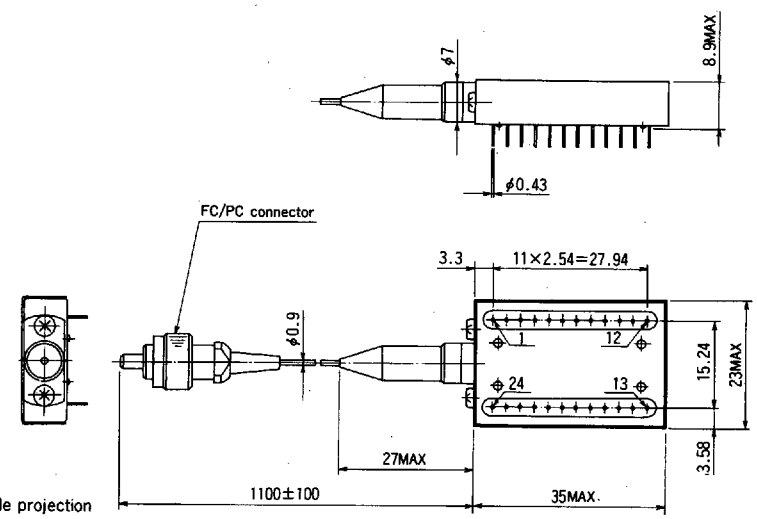
MF-156DS-T12-070/080/090/100/110

2nd GENERATION SONET/SDH TRANSCEIVER

OUTLINE DIAGRAM

(Unit : mm)

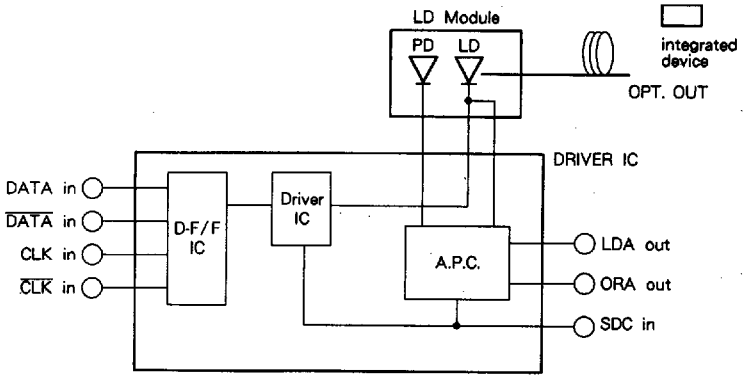


Notes 1. 3rd angle projection
2. DIM in mm

NO	SYMBOL	DESCRIPTION	NO	SYMBOL	DESCRIPTION
1	GND	GROUND	13	GND	GROUND
2	NUC	NO USER CONNECTION	14	GND	GROUND
3	LDA	LASER DEGRADATION ALARM	15	NUC	NO USER CONNECTION
4	NUC	NO USER CONNECTION	16	GND	GROUND
5	NUC	NO USER CONNECTION	17	VEE	NEGATIVE POWER SUPPLY
6	VEE	NEGATIVE POWER SUPPLY	18	Dob	FALSE DATA INPUT
7	GND	GROUND	19	Do	TRUE DATA INPUT
8	SDC	SHUT DOWN COMMAND	20	NIC	NO INTERNAL CONNECTION
9	NIC	NO INTERNAL CONNECTION	21	GND	GROUND
10	CK	TRUE CLOCK INPUT	22	ORA	OUT OF RANGE ALARM
11	CKb	FALSE CLOCK INPUT	23	NUC	NO USER CONNECTION
12	GND	GROUND	24	GND	GROUND

MF-156DS-T12-070/080/090/100/110

BLOCK DIAGRAM



MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS

(*) means optional spec.

Parameter	Symbol	Conditions	Limits		Unit
			Min.	Max.	
Supply voltage	V_{EE}		−5.45	−4.94	V
Power consumption	Pc		−	1.3	W
ECL input voltage		Note 1	ECL		
Data to clock setup/hold		Note 2	1000	−	Ps
Clock duty		Note 2	45	55	%
LDA/ORA output current		Note 3	−	4	mA
SDC deactivation time		Note 4, 5	−	450	ms
SDC activation time		Note 4, 5	−	5	ms

LDA ; Laser degradation alarm (TX degratedation), set when the bias current is at least 50% higher than the maximum initial value allowed. (*)
ORA ; Power out of range alarm (TX failure), set when the optical output power is 3dB ± 2dB less than the initial optical output level. (*)
SDC ; When high, this input disables the optical output power

OPTICAL CHARACTERISTICS

Parameter	Specification						Unit
ITU code	S-1.1		L-1.1		L-1.2		
	Min.	Max.	Min.	Max.	Min.	Max.	
Optical budget	0	14	10	29	10	29	dB
Wavelength	1261	1360	1280	1335	1480	1580	nm
Optical output power	−14	−8	−4	0	−4	0	dBm
Optical power when disable	−	−45	−	−45	−	−45	dBm
Spectral width (rms)	−	4	−	4	−	−	nm
Spectral width (−3dB)	−	−	−	−	−	1	nm
SMSR.	−	−	−	−	30	−	dB
Extinction ratio	8.2	−	10	−	10	−	dB
Optical wave form	ITU Mask compliant						
Path penalty	−	1	−	1		1	dB

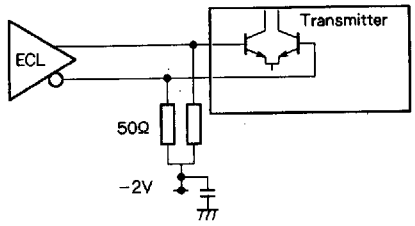
ORDERING INFORMATION

Application		Operating ambient temperature (℃)	Transmitter part number
S-1.1	(indoor)	0 to 70	MF-156DS-T12-070
	(outdoor)	−40 to 85	MF-156DS-T12-100
L-1.1	(indoor)	0 to 70	MF-156DS-T12-080
	(outdoor)	−40 to 85	MF-156DS-T12-110
L-1.2	(indoor)	0 to 70	MF-156DS-T12-090

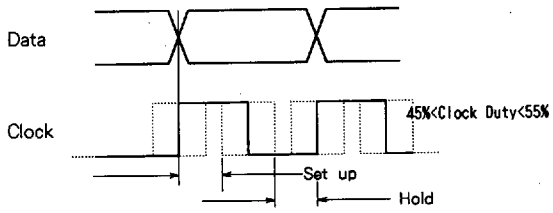
outdoor version ; The discussion with customer is needed.

NOTE

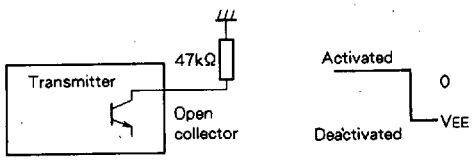
NOTE 1 ECL Input interface



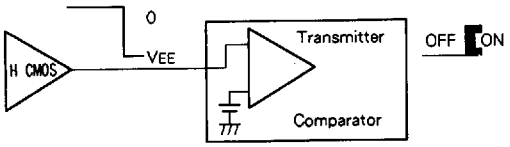
NOTE 2 Data and Clock relationship



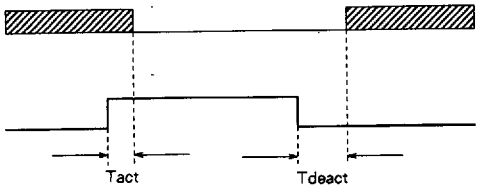
NOTE 3 ORA/LDA Interface



NOTE 4 SDC Interface



NOTE 5 SDC activation/deactivation time



Tact < 5msec.
Tdeact < 450msec.

RECOMMENDATION OF MOTHER BOARD DESIGN

Thermal design

Soldering all the foot pins to mother board is recommended, in the point of thermal diffusion from the module.
The module should be mounted as low on the mother board as possible.

Ground planes

Use of one ground plane for connection to both analog and digital grounds is recommended.

Power supply connections

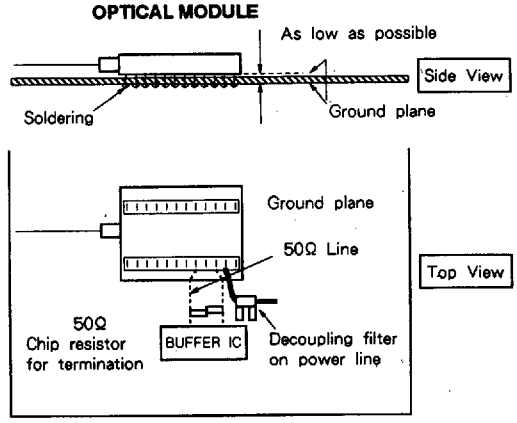
Use of the filter on the power line as shown figure below is recommended.
The filter should be placed as close to the optical module as possible.

Transmission lines

Use of 50Ω transmission line is recommended for ECL signals.

Terminations

Termination resistor should be used for ECL signals.
Metal, thick film, chip resistor is recommended.
Termination resistor for ECL should be placed at the end of the line.



PRELIMINARY

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MF-156DS-T12-070/080/090/100/110

2nd GENERATION SONET/SDH TRANSCEIVER

TYPICAL CHARACTERISTICS DATA

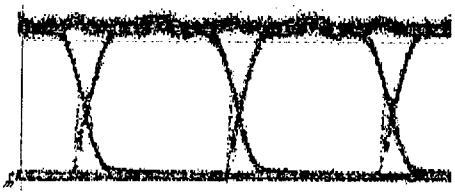

Fig. 1 Optical output

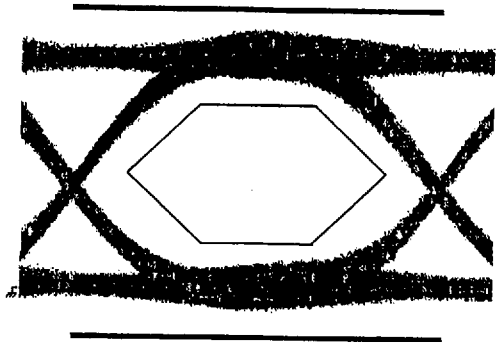

Fig. 2 Optical output with ITU mask

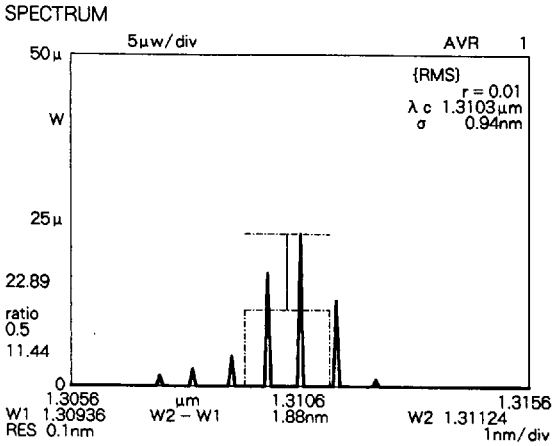

Fig. 3 Optical spectrum MLM-LD

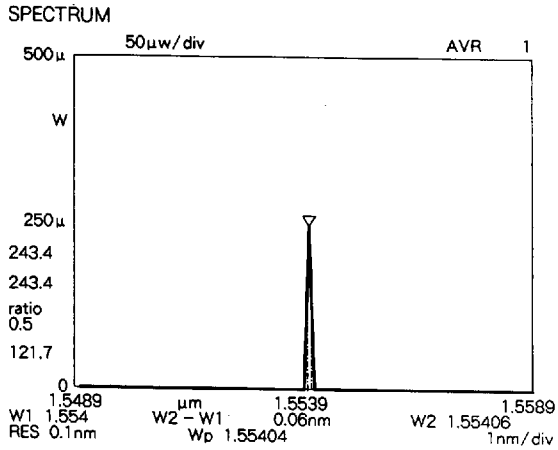

Fig. 4 Optical spectrum DFB-LD