

Professional high-speed optical transceiver

OPN-S3F133-LC2 / OPN-S3F133T-LC2 / OPN-S3F133E-LC2 / OPN-S3F133ET-LC2

3.3V / CWDM / 622 Mbps RoHS Compliant SFF LC SINGLE-MODE TRANSCEIVER

PRODUCT FEATURES

- Duplex LC Single Mode Transceiver
- SONET OC-12 LR / SDH STM-1 Compliant
- Small Form Factor, RJ-45 size, 2X5 pin Package
- 18-Wavelength CWDM DFB LD Transmitter from 1270 nm to 1610 nm with step 20 nm
 - 29 dB Link Power Budget at Least
 - LVPECL Signal Input / Output
 - LVTTTL Transmitter Disable Input
- LVPECL Signal Detection Output: OPN-S3F133E-LC2
- LVTTTL Signal Detection Output: OPN-S3F133ET-LC2
 - Single +3.3 V Power Supply
 - RoHS Compliant
 - 0 to 70°C Operation
- Wave Solderable and Aqueous Washable
- Class 1 Laser International Safety Standard IEC-60825 Compliant

APPLICATIONS

- ATM 622 Mbps Links
- SONET / SDH Equipment Interconnect
- Fiber Channel 533 Mb/s Links

PRODUCT DESCRIPTION

The OPN-S3F133E-LC2 series single mode transceivers are low power, high performance CWDM modules for bi-directional serial optical data communications such as long-reach SONET OC-12 LR / SDH STM-4 and Fiber Channel.

There are eighteen center wavelengths available from 1270 nm to 1610 nm, each step 20 nm. A guaranteed minimum optical link budget of 29 dB is offered. The transmitter section uses a multiple quantum well CWDM DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated

InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. A PECL logic interface simplifies interface to external circuitry.

ORDER INFORMATION

P/No.	Bit Rate (Mb/s)	SONET /SDH	Power Budget (dB)	Wavelength (nm)	Package	Temp. (°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
OPN-S3F133E-LC2	622	LR	> 29	CWDM*	2X5 LC	0 to 70	5 to 0	-29	Yes

CWDM Wavelength (0 to 70°C)

Central Wavelength	Min. (nm)	Typ. (nm)	Max. (nm)	Central Wavelength	Min. (nm)	Typ. (nm)	Max. (nm)
127	1264.5	1270	1277.5	145	1444.5	1450	1457.5
129	1284.5	1290	1297.5	147	1464.5	1470	1477.5
131	1304.5	1310	1317.5	149	1484.5	1490	1497.5
133	1324.5	1330	1337.5	151	1504.5	1510	1517.5
135	1344.5	1350	1357.5	153	1524.5	1530	1537.5
137	1364.5	1370	1377.5	155	1544.5	1550	1557.5
139	1384.5	1390	1397.5	157	1564.5	1570	1577.5
141	1404.5	1410	1417.5	159	1584.5	1590	1597.5
143	1424.5	1430	1437.5	161	1604.5	1610	1617.5

CWDM*: 18 Wavelengths from 1270 nm to 1610 nm, each step 20 nm.

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Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-50	85	°C	
Operating Temperature	Topr	0	70	°C	With air flow 1m/sec
Soldering Temperature	---		260	°C	10 seconds on leads only
Power Supply Voltage	Vcc	0	3.6	V	
Input Voltage	---	GND	Vcc	V	
Output Current	Iout	0	30	mA	

Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units / Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Operating Temperature	Topr	0		70	°C / air flow 1m/sec
Data Rate		50	622		Mb/s
Power Supply Current	Icc			280	mA

Transmitter Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Optical Transmit Power	Po	0	---	5	dBm	1
Output Center Wavelength	λ	$\lambda-5.5$	λ	$\lambda+7.5$	nm	2
Output Spectrum Width	$\Delta\lambda$	---	---	1	nm	-20 dB width
Side Mode Supression Ratio	SMSR	30			dB	
Extinction Ratio	ER	10	---	---	dB	
Output Eye	Compliant with Bellcore GR-253-CORE and ITU recommendation G.957					
Optical Rise Time	t _r			1.2	ns	10% to 90% Values
Optical Fall Time	t _f			1.2	ns	10% to 90% Values
Relative Intensity Noise	RIN			-120	dB/Hz	
Total Jiter	TJ			0.55	ns	3
Electrical						
Data Input Current – Low	I _{IL}	-350			μA	
Data Input Current – High	I _{IH}			350	μA	
Differential Input Voltage	V _{IH} - V _{IL}	300			mV	
Data Input Voltage – Low	V _{IL} - V _{CC}	-2.0		-1.58	V	4
Data Input Voltage -- High	V _{IH} - V _{CC}	-1.1		-0.74	V	4
Disable Input Voltage -- Low	V _{TDIS,L}	0		0.5	V	TX Output Enabled
Disable Input Voltage -- High	V _{TDIS,H}	Vcc – 1.3		Vcc	V	TX Output Disabled
Shut Off Time for TxDis	t _{DIS}			1	ms	

Notes: 1. Output power is power coupled into a 9/125 μm single mode fiber.
 2. ITU-T G694.2 CWDM wavelength from 1270 nm to 1610 nm, each step 20 nm.
 3. Measured with 2²³-1 PRBS with 72 ones and 72 zeros
 4. These inputs are compatible with 10K, 10KH and 100K ECL and PECL inputs.

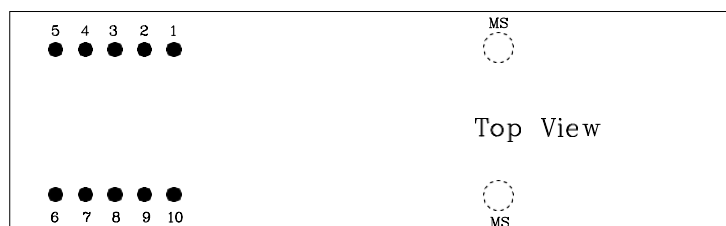
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Receiver Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Sensitivity	---	---	---	-29	dBm	1
Maximum Input Power	Pin	-5		---	dBm	
Signal Detect -- Asserted	Pa	---	---	-29	dBm	Transition: low to high
Signal Detect -- Deasserted	Pd	-43	---	---	dBm	Transition: high to low
Signal detect -- Hysteresis		1.0	---		dB	
Wavelength of Operation		1100	---	1620	nm	
Electrical						
Data Output Voltage – Low	V _{OL} - V _{CC}	-2.0		-1.58	V	2
Data Output Voltage – High	V _{OH} - V _{CC}	-1.1		-0.74	V	2
Signal Detect Output Voltage -- Low	V _{OL}	-2.0		-1.58	V	OPN-S3F133E-LC2
Signal Detect Output Voltage -- High	V _{OH}	-1.1		-0.74	V	
Signal Detect Output Voltage -- Low	V _{OL} - V _{CC}			0.8	V	OPN-S3F133ET-LC2
Signal Detect Output Voltage -- High	V _{OH} - V _{CC}	2.0			V	

Notes: 1. Minimum sensitivity and saturation levels at BER=1E-10 for a 2²³-1 PRBS with 72 ones and 72 zeros.

2. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

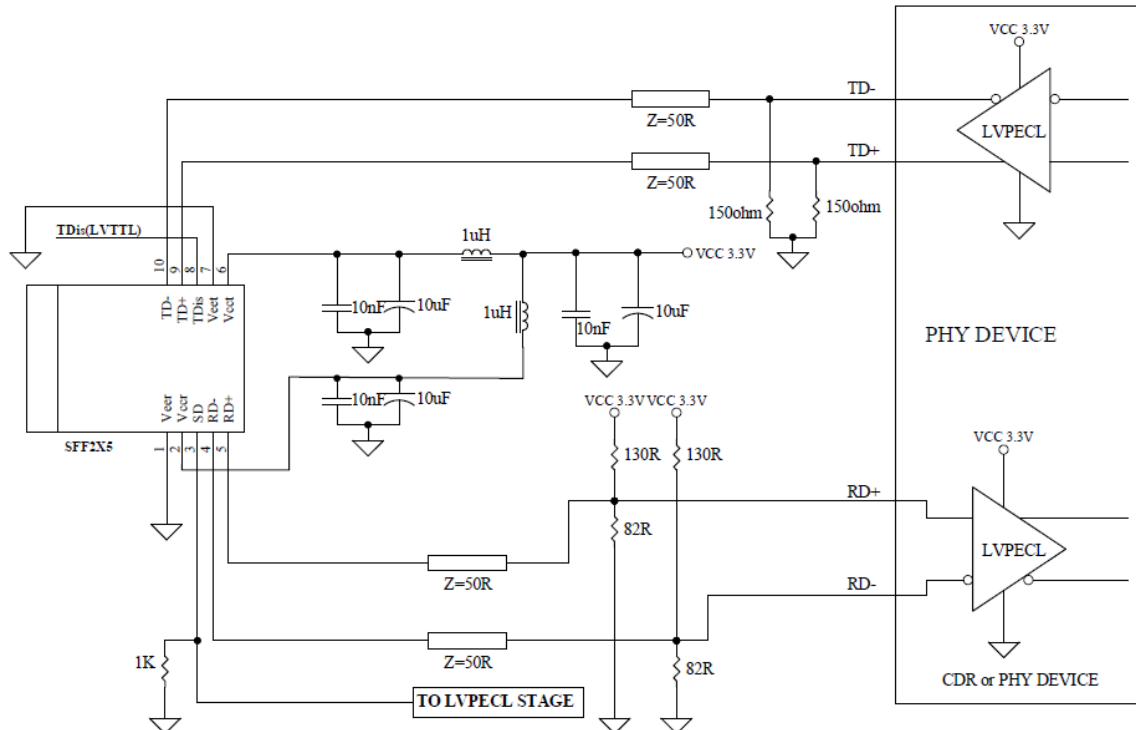
CONNECTION DIAGRAM



PIN	Symbol	Notes
1	V _{EEF}	Directly connect this pin to the receiver ground plane
2	V _{CC F}	+3.3V dc power for the receiver section
3	SD	Active high on this indicates a received optical signal.
4	RD-	Receiver Data out Bar. See recommended circuit schematic
5	RD+	Receiver Data out. See recommended circuit schematic
6	V _{CC t}	+3.3V dc power for the transmitter section
7	V _{EET}	Directly connect this pin to the transmitter ground plane
8	TDis	Transmitter Disable. Connect this pin to +3.3V TTL logic "1" to disable module To enable module connect to TTL logic low "0"
9	TD+	Transmitter Data In. See recommended circuit schematic
10	TD-	Transmitter Data In Bar. See recommended circuit schematic
MS	MS	Mounting Studs. Connect to Chassis Ground

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RECOMMENDED CIRCUIT SCHEMATIC

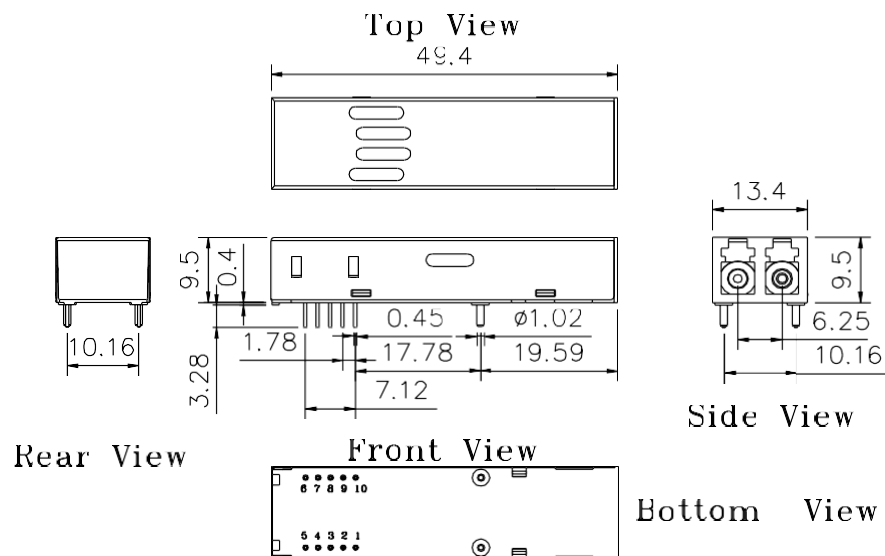


- Note: 1. 1000Ω SD Output pull-down resistor required for OPN-S3F133-LC2 (LVPECL SD Output).
 2. No pull-down resistor required for OPN-S3F133T-LC2 (LVTTTL SD Output)
 3. Veer and Veet are not internally connected to each other.
 4. 50 Ω line pattern and component placements on TD+/TD- and RD+/RD- lines shall be symmetrical for better impedance matching.

PACKAGE DIAGRAM

Units in mm

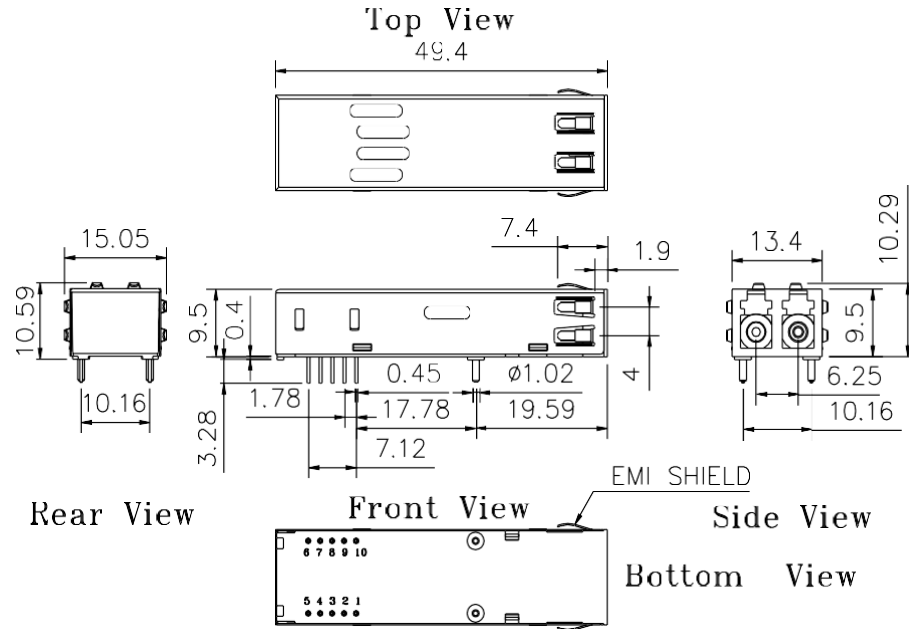
1) Standard Case



OPN-S3F133-LC2 / OPN-S3F133T-LC2

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2) Extended Case



OPN-S3F133E-LC2 / OPN-S3F133ET-LC2

Note: Specifications subject to change without notice.