Finisar

Product Specification

OC-12 SR-1/STM I-4 or OC-12 IR-1/STM S-4.1 2x10 SFF Transceiver

FTLF1322S2xTR

PRODUCT FEATURES

- Up to OC-12/STM-4 bi-directional data links
- Standard 2x10 pin SFF footprint (MSA compliant)
- Analog diagnostics functions
- Uncooled 1310nm FP laser transmitter
- Duplex LC connector
- Very low jitter
- Metal enclosure, for lower EMI
- Single 3.3V power supply
- Low power dissipation <700 mW typical
- Extended operating temperature range: -40°C to 85°C



APPLICATIONS

- SONET OC-12 SR-1 / SDH STM I-4
- SONET OC-12 IR-1 / SDH STM S-4.1

Finisar's FTLF1322S2xTR Small Form Factor (SFF) transceivers are compatible with the Small Form Factor Multi-Sourcing Agreement (MSA)[1]. They comply with SONET OC-12 SR-1/IR-1 (SDH STM I-4/S-4.1) standards[2]. The transceivers are RoHS compliant and lead-free per Directive 2002/95/EC[5] and Finisar Application Note AN-2038[6]

PRODUCT SELECTION

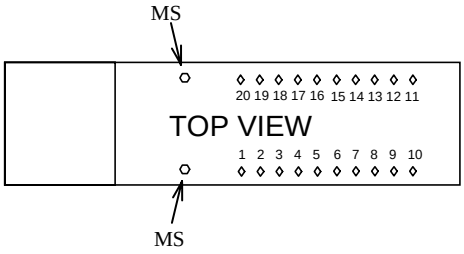
FTLF1322S2xTR

x	G	2 Grounding Pins, Short EMI shield
	M	6 Grounding Pins, Short EMI shield
	K	2 Grounding Pins, Long EMI shield
	H	6 Grounding Pins, Long EMI shield

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I. Pin Descriptions

Pin	Symbol	Name/Description	Logic Family
MS	MS	Mounting Studs for mechanical attachment. **Chassis ground is internally isolated from circuit ground.** Connection to chassis ground is recommended.	NA
1	NC	Not Connected	
2,3,6	V_{EER}	Receiver Ground (Common with Transmitter Ground)	NA
4,5	NC	Not Connected.	
7	V_{CCR}	Receiver Power Supply	NA
8	SD	Signal Detect. Logic 1 indicates normal operation.	LVTTL
9	RD-	Receiver Inverted DATA out. AC Coupled	CML
10	RD+	Receiver Non-inverted DATA out. AC Coupled	CML
11	V_{CCT}	Transmitter Power Supply	NA
12,16	V_{EET}	Transmitter Ground (Common with Receiver Ground)	NA
13	T_{DIS}	Transmitter Disable	LVTTL
14	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	CML ECL
15	TD-	Transmitter Inverted DATA in. AC Coupled.	CML ECL
17	Bmon-	Laser Bias Monitoring (-).	Analog Voltage
18	Bmon+	Laser Bias Monitoring (+) .(Bmon+ - Bmon-) = 10Ω x laser bias current.	Analog Voltage
19	Pmon-	Laser Power Monitoring (-). Current implementation connects this pin to ground	Analog Voltage
20	Pmon+	Laser Power Monitoring (+) .(Pmon+ - Pmon-) = 200Ω x mon. photodiode current.	Analog Voltage



II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		4.5	V	
Storage Temperature	T_S	-40		100	°C	
Case Operating Temperature	T_{OP}	-40		85	°C	
Relative Humidity	RH	0		85	%	1
Lead Soldering Temperature/Time				260/10	°C/s	

III. Electrical Characteristics (T_{OP} = -40 to 85 °C, V_{CC} = 3.00 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.00		3.60	V	
Supply Current	Icc		190	300	mA	
Transmitter						
Input differential impedance	R_{in}		100		Ω	2
Single ended data input swing	Vin,pp	250		1200	mV	
Transmit Disable Voltage	V_D	Vcc – 1.3		Vcc	V	
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	3
Transmit Disable Assert Time				10	μs	
Receiver						
Single ended data output swing	Vout,pp	300	400	800	mV	4
Data output rise/fall time	t_r			1250	ps	5
SD Assert	$V_{SD\ assert}$	2.4		Vcc	V	6
SD De-Assert	$V_{SD\ deassert}$	Vee		0.5	V	6
Power Supply Rejection	PSR	100			mVpp	7
Total Generated Receiver Jitter (peak to peak)	J_{RX}p-p			0.07	UI	
Total Generated Receiver Jitter (rms)	J_{RX}rms			0.007	UI	

Notes:
1. Non condensing.
2. AC coupled.
3. Or open circuit.
4. Into 100 ohm differential termination.
5. 20 – 80 %
6. Signal Detect is LVTTL. Logic 1 indicates normal operation; logic 0 indicates no signal detected.
7. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver MultiSource Agreement (MSA), September 14, 2000.

IV. Optical Characteristics (T_{OP} = -40 to 85 °C, V_{CC} = 3.00 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Pwr: 9/125 SMF	P_{OUT}	-15		-8	dBm	1
Optical Wavelength	λ	1274		1356	nm	2
Spectral Width	σ			2.5	nm	2
Optical Extinction Ratio	ER	8.2			dB	
Optical Rise/Fall Time	t_r/ t_f			500	ps	3
Relative Intensity Noise	RIN			-120	dB/Hz	
Total Generated Transmitter Jitter (peak to peak)	J_{TX}p-p			0.07	UI	
Total Generated Transmitter Jitter (rms)	J_{TX}rms			0.007	UI	
Receiver						
Rx Sensitivity @ OC-12	R_{SENS1}	-28		-8	dBm	4
Optical Center (Input) Wavelength	λ_C	1260		1600	nm	
SD Assert	SD_A			-34	dBm	
SD De-Assert	SD_D	-45			dBm	
SD Hysteresis		0.5			dB	

Notes:
1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. Also specified to meet curves in FC-PI 13.0 Figures 18 and 19, which allow trade-off between wavelength, spectral width and OMA.
3. Unfiltered, 20 – 80%
4. With worst-case extinction ratio. Measured with a PRBS 2^{23}-1 test pattern.

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V. General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Data Rate	BR		622		Mb/sec	1
Bit Error Rate	BER			10^{-10}		2
Max. Supported Link Length on 9/125µm SMF @ OC-12	L_{MAX5}		15		km	4

Notes:
1. SONET OC-12 SR/SDH STM I-4 and SONET OC-12 IR-1/SDH STM S-4.1 compliant.
2. Tested with a PRBS 2^{31}-1 test pattern.
3. Attenuation of 0.55 dB/km is used for the link length calculations (per GR-253 CORE). Distances are indicative only. Please refer to the Optical Specifications in Table IV to calculate a more accurate link budget based on specific conditions in your application.

VI. Environmental Specifications

Finisar 1310nm SFP transceivers have an extended operating temperature range from –40°C to +85°C case temperature.

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	T_{op}	-40		85	°C	
Storage Temperature	T_{sto}	-40		100	°C	

VII. Regulatory Compliance

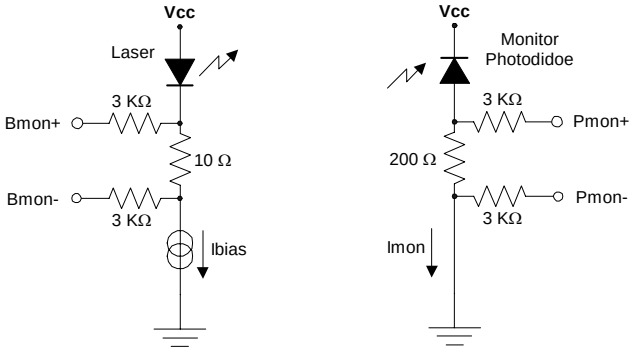
Finisar transceivers are Class 1 Laser Products and comply with US FDA regulations. These products are certified by TÜV and CSA to meet the Class 1 eye safety requirements of EN (IEC) 60825 and the electrical safety requirements of EN (IEC) 60950. Copies of certificates are available at Finisar Corporation upon request.

VIII. Analog Diagnostics Functions (T_{op} = -40 to 85 °C, V_{CC} = 3.00 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Monitor photodiode current monitor	Pmon+, Pmon-	0		Vcc	V	1
Laser bias current monitor	Bmon+, Bmon-	0		Vcc	V	2

Notes:

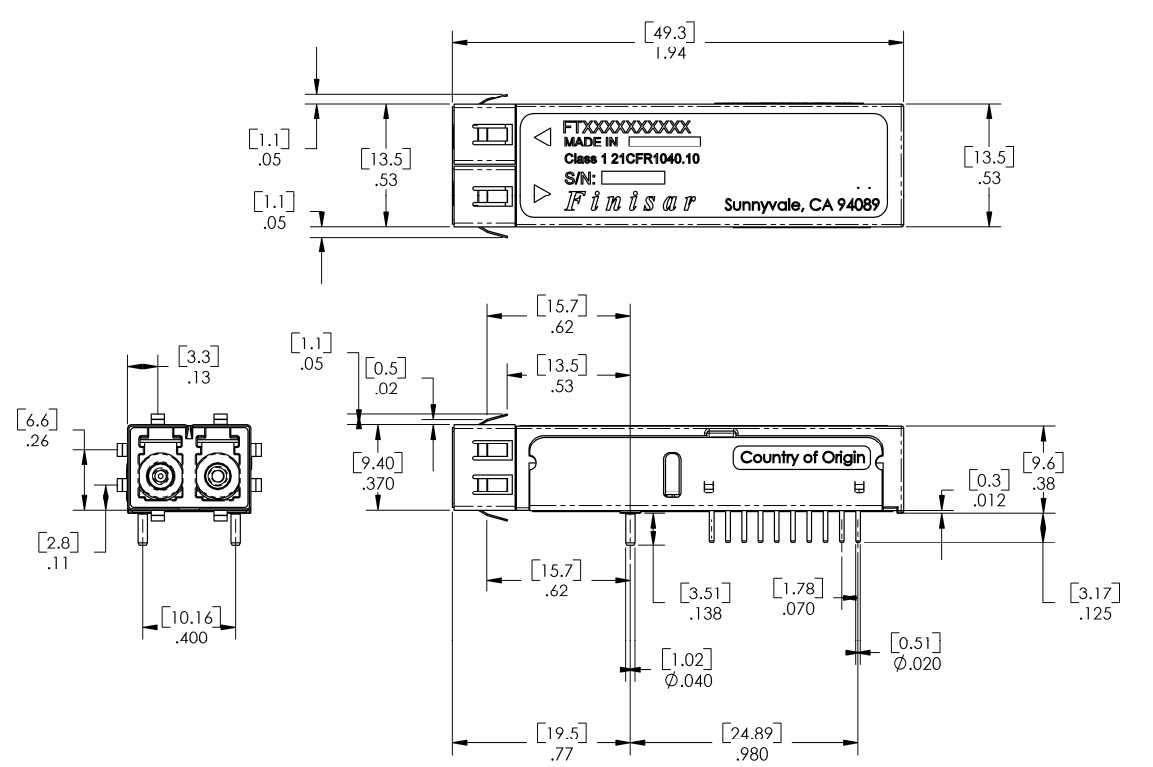
1. Pins 19 and 20 provide an analog voltage output proportional to the monitor photodiode current, per the following formula: I_{BIAS} = .V(Pmon+ - Pmon-) / 200Ω. The figure below shows the equivalent circuit.
2. Pins 17 and 18 provide an analog voltage output proportional to the laser bias current, per the following formula: I_{BIAS} = .V(Bmon+ - Bmon-) / 10Ω. The figure below shows the equivalent circuit.
3.



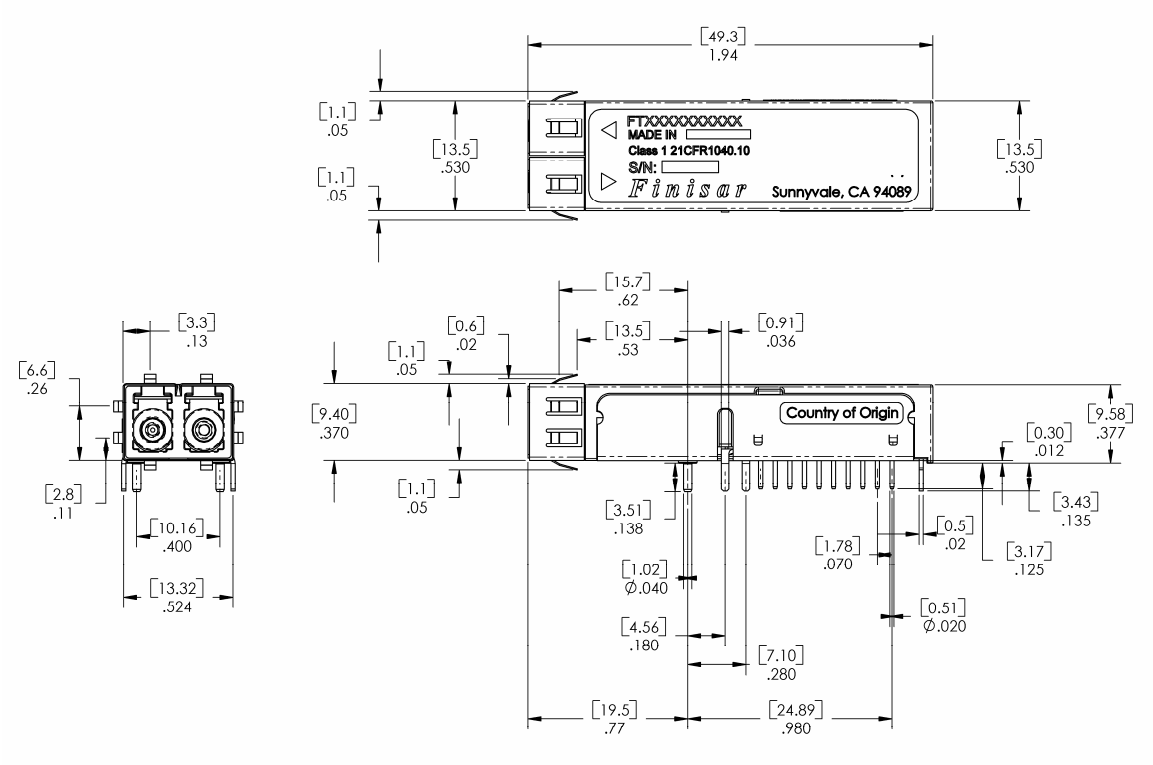
Analog monitoring function connections.

IX. Mechanical Specifications

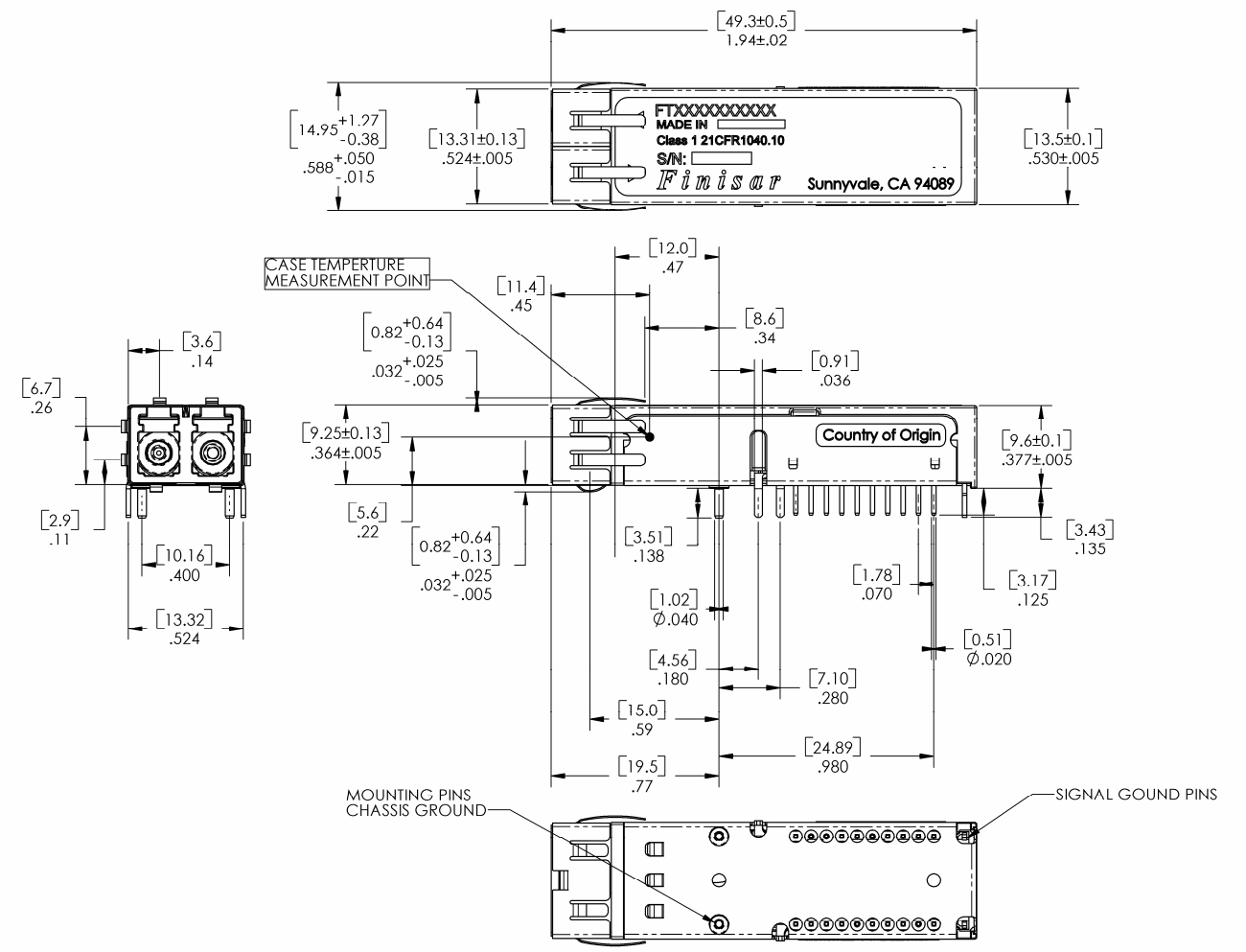
Finisar's OC-12/STM-4 Small Form Factor (SFF) transceivers comply with the standard dimensions defined by the Small Form Factor Multi-Sourcing Agreement (MSA).



FTLF1323S2GTR – 2 pin version

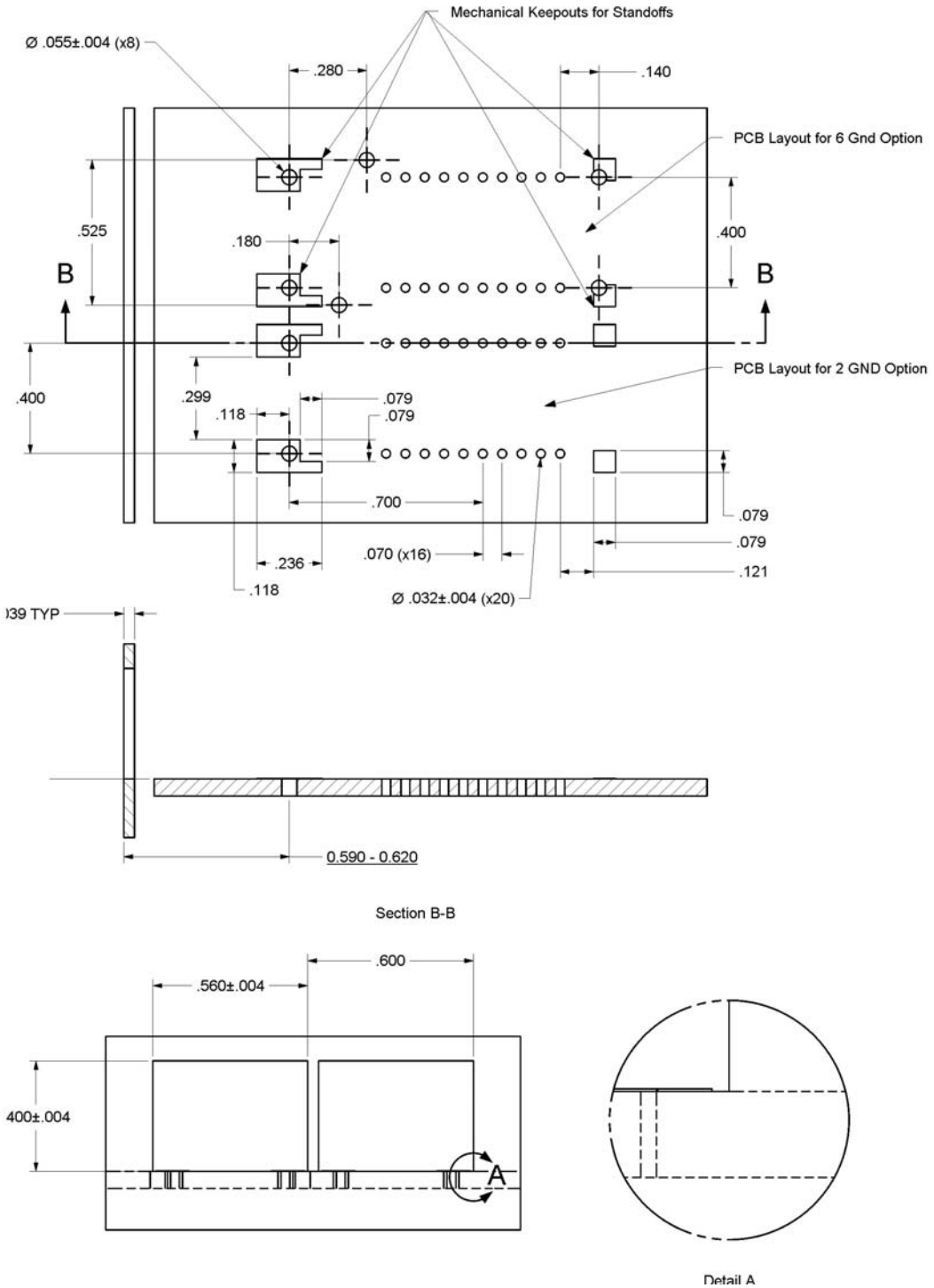


FTLF1323S2MTR – 6 pin version



FTLF1323S2HTR – 6 pin version (Long EMI Shield)

X. PCB Layout and Bezel Recommendations



Minimum Recommended Pitch is 0.600”

XI. References

1. Small Form Factor (SFF) Transceiver Multisource Agreement (MSA). January 1998.

2. Bellcore GR-253 and ITU-T G.957 Specifications (Transmitter Optical Output Power complies with SONET OC-48 requirements only).

3. IEEE Std 802.3, 2002 Edition, Clause 38, PMD Type 1000BASE-LX. IEEE Standards Department, 2002. (Transmit Optical Output has a minimum Extinction Ratio of 8.2 dB only).

4. Directive 2002/95/EC of the European Council Parliament and of the Council. "On the restriction of the use of certain hazardous substances in electrical and electronic equipment". January 27, 2003.

5. "Application Note AN-2038: Finisar Implementation of RoHS Compliant Transceivers: Finisar Corporation, January 21, 2005.

6. "Fibre Channel Draft Physical Interface Specification (FC-PI 13.0)". American National Standard for Information Systems. (*)

XII. For More Information

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