Technical Specification
for
Small Form Factor Pluggable (SFP)

SCP6828-GL

☐ 155.52Mbps	☐ 622.08Mbps	☑ other 2488.32Mbps
☐ Short Haul Intermediate Reach	☐ Long Haul Long Reach	☑ other Intra office Short Reach
☐ Single 5.0 V	☑ Single 3.3 V	☐ other _____
☑ 1.3 µm	☐ 1.55 µm	☐ other _____
☐ Transmitter	☐ Receiver	☑ Transceiver
	(☐ 2R / ☐ 3R)	(☑ 2R / ☐ 3R)

SUMITOMO ELECTRIC

Sumitomo Electric reserves the right to make changes in this specification without prior notice.

#Safety Precaution Symbols This specification uses various picture symbols to prevent possible injury to operator or other persons or damage to properties for appropriate use of the product. The symbols and definitions are as shown below. Be sure to be familiar with these symbols before reading this specification.

⚠ Warning	Wrong operation without following this instruction may lead to human death or serious injury.
⚠ Caution	Wrong operation without following this instruction may lead to human injury or property damage.

Example of picture symbols ❗ indicates prohibition of actions. Action details are explained thereafter.

⃠ indicates compulsory actions or instructions. Action details are explained thereafter.

1. General

Features and applications of SCP6828-GL are listed below.

Features

* Compliant with MSA SFP Specification
* Multi Bit Rate Operation 155.52Mbps ~ 2.48832Gbps
* Power Supply Voltage Single +3.3V
* Compact Package Size 56.5 X 13.7 X 8.6 mm
* Electrical Interface AC coupled for DATA and LVTTL for LOS, Tx Disable and Tx Fault
* Fiber Coupled Power -3 ~ -10dBm (SMF)
* Input Power Range -3 ~ -18dBm (SMF)
* Connector Interface LC Duplex Connector
* Serial ID Functionality

Applications

*Telecommunications
> SONET/SR, SDH/IO Application
> ATM Application
> Shelf-to-Shelf Multi Bit Rate Application
> Subscriber Loop
> Metropolitan Area Network

*Data communications
>High Speed Rack-to-Rack Data Links

2. Block Diagram

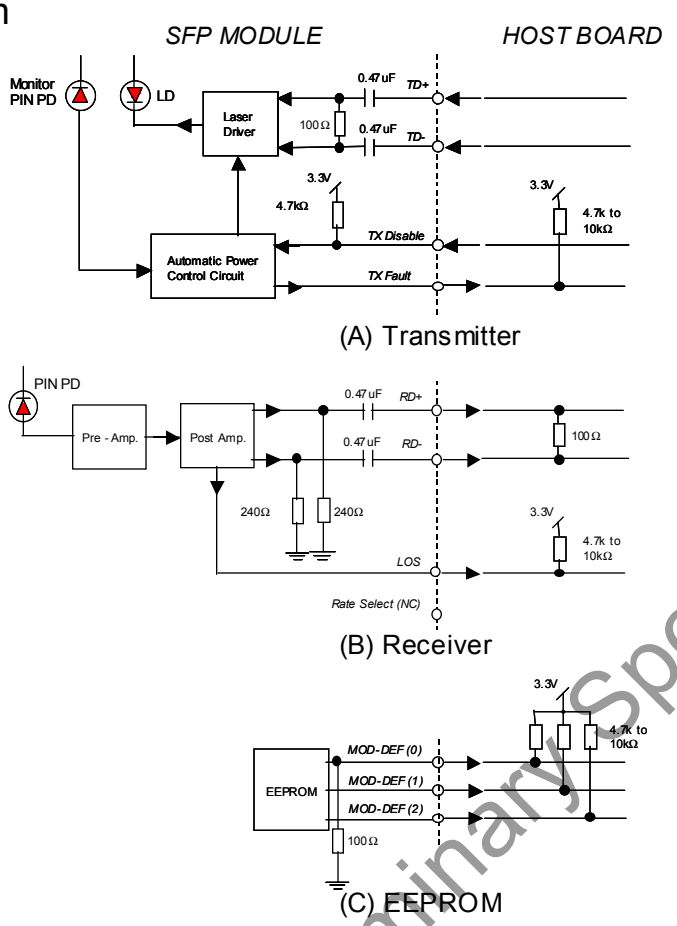


Figure 1. Block Diagram

⚠Caution
⃠ Do not disassemble this product. Otherwise, failure, electrical shock, overheating or fire may occur. Handle the lead pins carefully. Use assisting tools or prospective aids as required.

3. Package Dimensions

All dimensions are in mm.

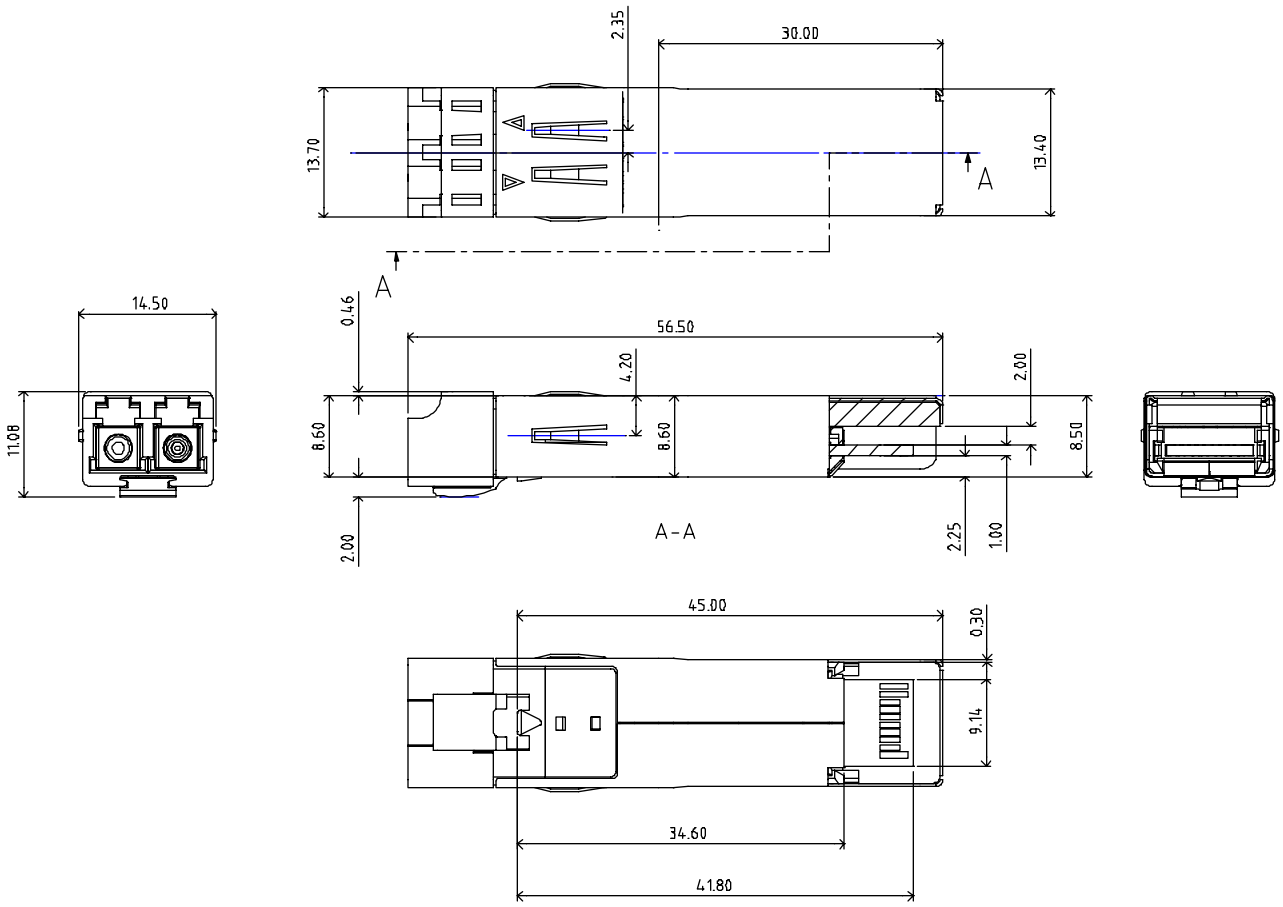


Figure 2. Outline Dimensions

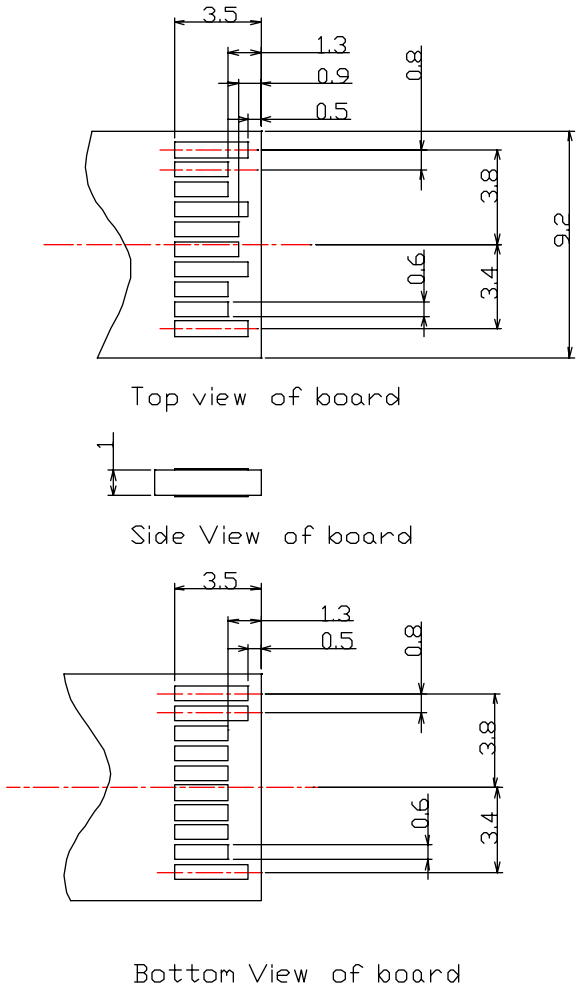


Figure 3. Pattern Layout for SFP Printed Circuit Board

4. Pin Assignment

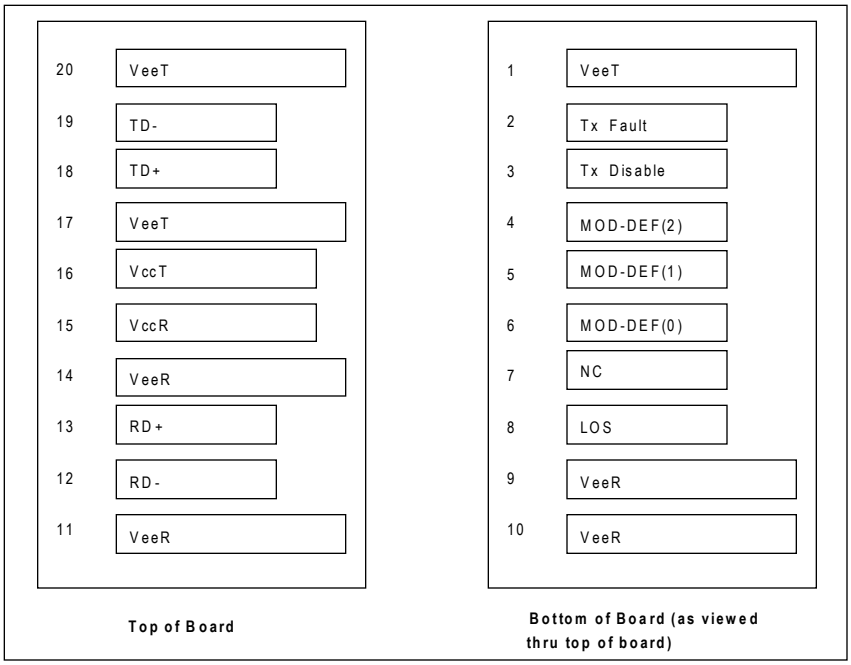


Figure 4. Pin Difinitions

Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2 Module disables on high or open
4	MOD-DEF2	Module Definition 2	3	Note 3, 2 wire serial ID interface
5	MOD-DEF1	Module Definition 1	3	Note 3, 2 wire serial ID interface
6	MOD-DEF0	Module Definition 0	3	Note 3 Grounded internally via 100Ω
7	NUC	NUC	3	No User Connection, reserved for future function.
8	LOS	Loss of Signal	3	Note 4
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	VeeR	Receiver Ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	VeeR	Receiver Ground	1	
15	VccR	Receiver Power	2	3.3 ± 5%
16	VccT	Transmitter Power	2	3.3 ± 5%
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	VeeT	Transmitter Ground	1	

Note

Plug Seq.: Pin engagement sequence during hot plugging.

1) Tx Fault shall be pulled up with a 4.7k - 10kΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

2) Tx Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7kΩ resistor.

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k - 10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.

   Mod-Def 0 indicates that the module is present
   Mod-Def 1 is the clock line of two wire serial interface for serial ID
   Mod-Def 2 is the data line of two wire serial interface for serial ID

4) LOS (Loss of Signal) shall be pulled up with a 4.7k - 10kΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

5) RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

6) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

5. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Case Temperature	Ts	-40	-	85	℃	1
Operating Case Temperature	Tc	-5	-	70	℃	1
Supply Voltage	Vcc	0.0	-	4.0	V	
Input Voltage	Vi	0	-	Vcc+0.5	V	2

Notes
1. No condensation allowed.
2. For Tx Disable input.

⚠ Warning

Use the product with the rated voltage described in the specification. If the voltage exceeds the maximum rating, overheating or fire may occur.

⚠ Caution

Do not store the product in the area where temperature exceeds the maximum rating, where there is too much moisture or dampness, where there is acid gas or corrosive gas, or other extreme conditions. Otherwise, failure, overheating or fire may occur.

6. Electrical Interface

(Unless otherwise specified, Vcc = 3.135 to 3.465 V and all operating temperature shall apply.)

6-1. Transmitter side

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc	3.135	3.30	3.465	V	
Supply Current		Idtx		85	180	mA	1
Differential Input Voltage Swing (TD+,TD-)		Vin	0.4		2.00	Vp-p	2
Jitter, Intrinsic					0.1	Ulp-p	3
					0.01	Ulrms	3
Tx Fault	Fault		1.8		Vcc+0.3		
	Normal		Vee		Vee+0.5		
Tx Disable	Disable		2.00		Vcc		4
	Enable		Vee		0.80		

Notes
1. Input bias current is not included. 50% duty cycle data. 2488.32Mbps
2. Vcc=+3.3V
3. Filter bandwidth from 12KHz to 20MHz according to ITU-G813.
4. Tx Disable input is internally terminated to Vcc via 4.7 kΩ resistor. If pin3 is left open, Tx is disable.

6-2. Receiver side

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc	3.135	3.30	3.465	V	
Supply Current		Idrx		95	150	mA	
Differential Output Voltage Swing (RD+,RD-)		Vout	0.80		1.90	Vp-p	1
LOS Output Voltage	High	Vloh	1.8		Vcc+0.3	V	
	Low	Vlol	Vee		Vee+0.5		
Data Rise / Fall Time		tr / tf		140 / 120		psec	2
MOD_DEF(0:2)	High	Vh	2.5		Vcc	V	
	Low	Vl	0		0.4	V	

Notes
1. Vcc=+3.3V, Output load resistance Rdif=100Ω.
2. 20~80%

6-3. Module Definition

Module Definition	MOD_DEF0 (pin6)	MOD_DEF1 (pin5)	MOD_DEF2 (pin4)	Interpretation by Host
4	TTL LOW	SCL	SDA	Serial module definition protocol

*Note:Details of the Serial Identification Protocol is contained in the SFP MultiSource Agreement.

7. Optical Interface

(Unless otherwise specified, Vcc = 3.135 to 3.465 V and all operating temperature shall apply.)

7-1. Transmitter side

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	Po	-10.0		-3.0	dBm	1
Extinction Ratio	Er	8.2			dB	1
Center Wavelength	λc	1266		1360	nm	
Spectral Width (RMS)	Δλ			4	nm	
Eye Mask for Optical Output	Refer to Figure 5					

Note 1. Measured at 2488.32Mbps, PRBS2^23-1, 50% duty cycle, NRZ.

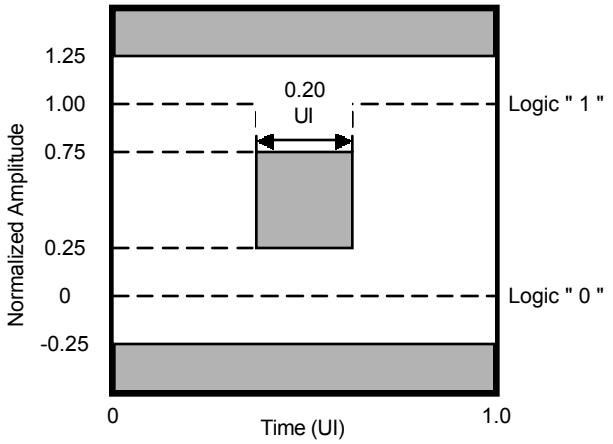


Figure 5. Eye Diagram Mask for Optical Output (ITU-T G.957)

⚠ Warning

Do not look at the laser beam projection area (e.g. end of optical connector) with naked eyes or through optical equipment while the power is supplied to this product. Otherwise, your eyes may be injured.

7-2. Receiver side

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Center Wavelength	-	1266		1360	nm	
Minimum Sensitivity	Pmin			-18.0	dBm	1, 2
Overload	Pmax	-3.0			dBm	1, 2
LOS Assert Level	Pa		-26		dBm	2
LOS Deassert Level	Pd		-23		dBm	
LOS Hysteresis	Phys	0.5	3		dB	
Optical Return Loss	ORLr		14		dB	

Note 1. BER=10^-10
2. Measured at 2488.32Mbps, PRBS 2^23-1, NRZ

7-3. Response time

Parameter	Symbol	Min.	Typ.	Max.	Unit
Tx Disable assert time	t-off			10	us
Tx Disable negate time	t-on			TBD	ms
Time to initialize	t-init			TBD	ms
Tx Fault Assert Time	t-fault			TBD	us
Tx Disable to reset	t-reset	TBD			us
LOS Assert Time	t-loss-on	2.3		100	us
LOS Deassert Time	t-loss-off	2.3		100	us
Serial ID Clock Rate	f-serial-clock			100	kHz

8. Recommended Interface Circuit

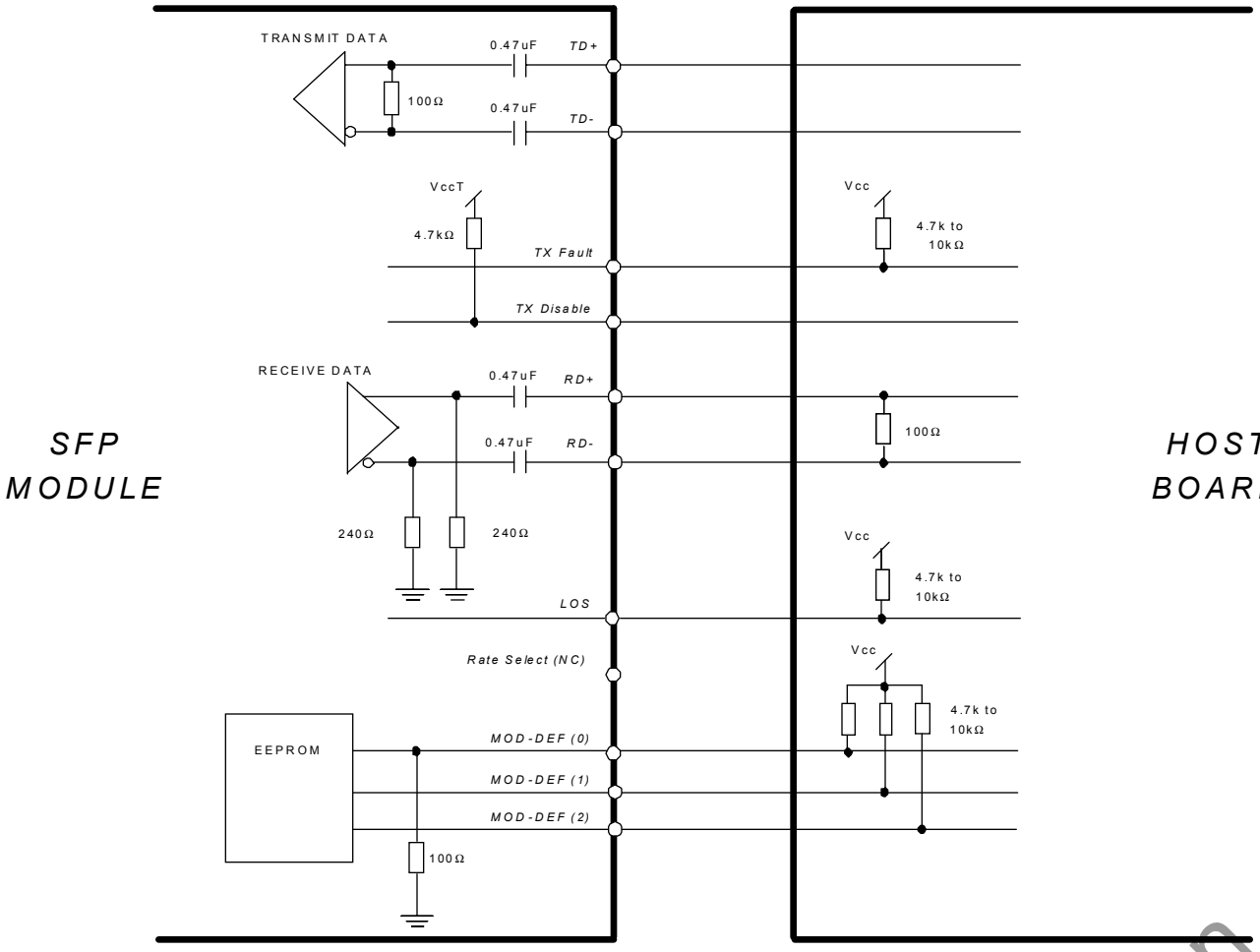


Figure 6. Recommended Interface Circuit

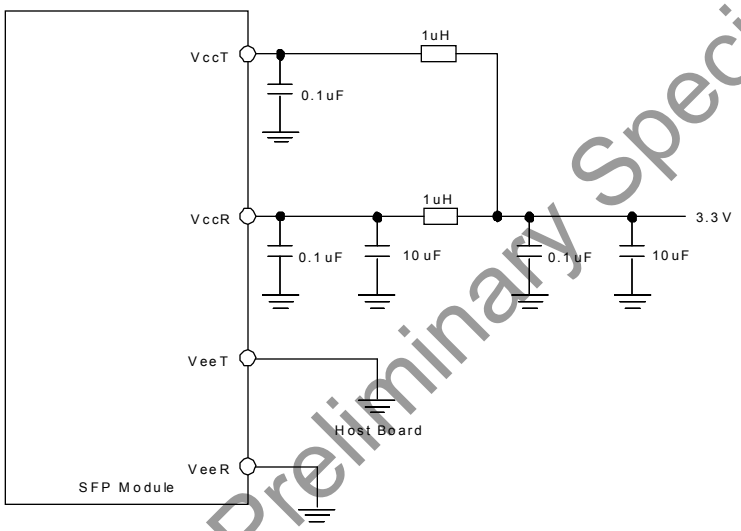


Figure 7. Recommended Supply Filtering Network

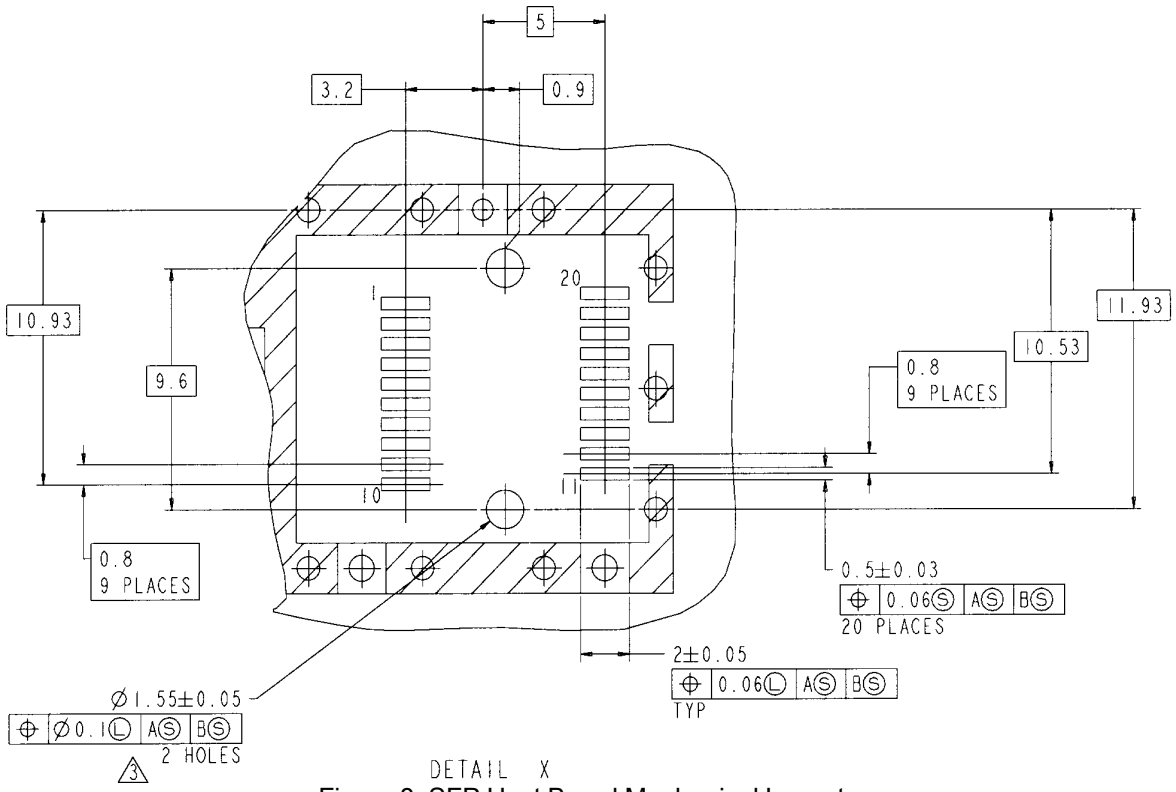


Figure 8. SFP Host Board Mechanical Layout

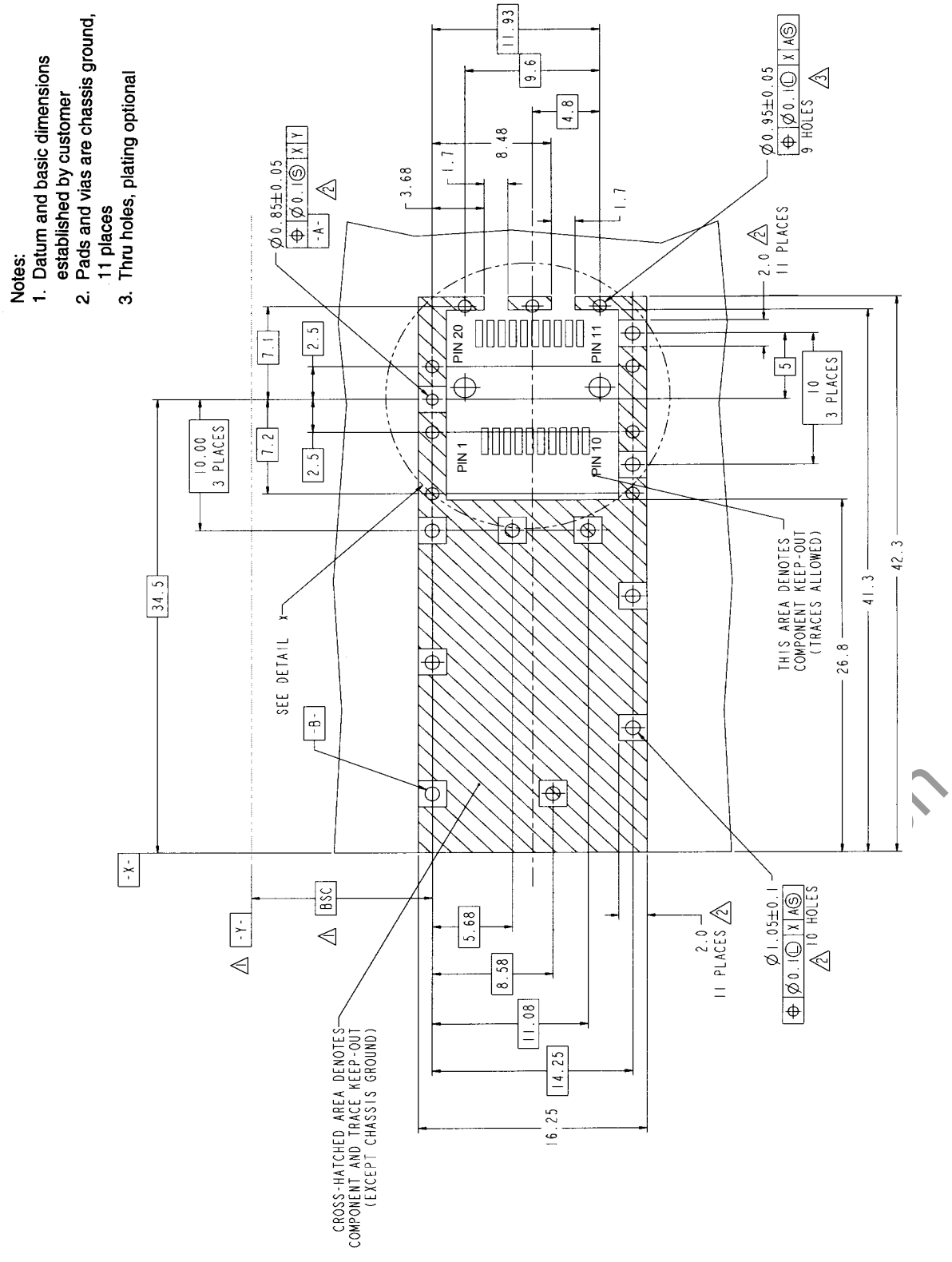


Figure 9. SFP Host Board Mechanical Layout (Cont.)

9. Reliability Test Program

GR-468-CORE Issue 1, December 1998 Laser Module

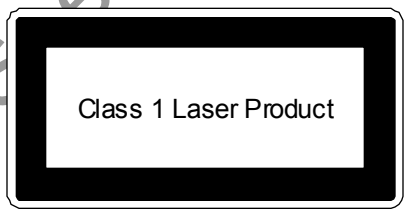
HEADING	TEST	REFERENCE	CONDITIONS	SAMPLING		
				LTPD	SS	C
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	5 times/axis 1,500G, 0.5ms	20	11	0
	Vibration	MIL-STD-883 Method 2007	Cond. A 20G, 20-2,000G Hz, 4min/cy, 4cy/axis	20	11	0
	Thermal Shock	MIL-STD-883 Method 1011	Delta T=100°C 0°C to 100°C	20	11	0
Endurance	Accel. Aging (High Temp.)	(R)-4-53 Section 5.18	85°C; rated power 1,000 hrs. for pass/fail 2,000, 5,000 hrs. for info.	-	25 10	-
	Low Temp. Storage	-	min. storage T 1,000 hrs. for pass/fail 2,000 hrs. for info.	20	11	0
	Temperature Cycling	Section 5.20	-40°C to +85°C 500 for pass/fail 1,000 for info.	20 -	11 11	0 -
	Damp Heat	MIL-STD-202 Method 103 or IEC-60068-2-3	85°C/85%RH 1,000hrs.	20	11	0
	Cyc. Moist. Res.	Sec. 5.23	-	20	11	0
Special Tests	Internal Moisture	MIL-STD-883 Method 1018	Max. 5,000ppm water vapour	20	11	0
	ESD Threshold	Section 5.22		-	6	-

SS : Sample Size

C : Maximum number of failure allowed to pass the test.

10. Laser Safety

This product uses a semiconductor laser system and is a laser class 1 product acceptable FDA, complies with 21CFR 1040. 10 and 1040.11. Also this product is a laser class 1 product acceptable IEC 60825-1.



⚠ Caution

⃠ If this product is used under conditions not recommended in the specification or this product is used with unauthorized revision, classfication for laser product safety standard is invalid. Classify the product again at your responsibility and take appropriate actions.

11. Other Precaution

Under such a strong vibration environment as in automobile, the performance and reliability are not guaranteed.

The governmental approval is required to export this product to other countries. To dispose of these components, the appropriate procedure should be taken to prevent illegal exportation.

This module must be handled, used and disposed of according to your company's safe working practice.

⚠ Warning

Be sure to carry out correct soldering for connection to peripheral circuits in order to prevent contact failure or short-circuit. Otherwise, a strong laser beam may cause eye injury, overheating or fire.

Do not put this product or components of this product into your mouth. This product contaions material harmful to health.

⚠ Caution

Be sure to turn the power off when you touch this product connected to the printed circuit boards. Otherwise, electric shock may occur.

Dispose this product or equipment including this product properly as an industrial waste according to the regulations.

12. Ordering Information

Ordering Number	Connector Type	Operating Case Temperature
SCP6828-GL-ZN	LC Duplex	-5°C ~ 70°C

13. For More Information

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