

## DATA SHEET

### Product Specification

#### Features

- UP to 1.25Gbps data rate
- Serial ID module on MOD(0-2)
- Duplex LC receptacle optical interface compliant
- International Class 1 laser safety certified
- single +3.3V power supply
- Transmitter disable input
- DDM function implemented
- Operating temperature range 0 to+70°C (Commercial); -40~85°C (Industry)
- HOT-Pluggable
- Receiver loss of Signal Output
- AC coupling of PECL signals
- RoHS Compliance

#### Application

- Gigabit Ethernet
- Gigabit Fiber Channel
- Switch to switch interface
- Switched backplane applications

#### Standards

- Compliant with SFP MSA (INF-8074i)
- Compliant with SFF-8472 v9.3
- Compliant with IEEE802.3z Gigabit Ethernet
- Compliant with ITU-T G.695
- Compliant with FC-PI v2.0

## Ordering information

Part NO.	Specifications									Application
	Pack	Rate	Tx(nm)	Pout(dBm)	Rx	S(dBm)	Top	Reach	Others	
UYS01SRD	SFP	1.25G	850	-9.5~-3	VCSEL	≤-18	-10~70°C	550m	DDM, RoHS	SDH L-1.1
UYS01L2D	SFP	1.25G	1310 FP	9~-3	PIN	< -20	-10~70°C	20km	DDM, RoHS	SDH L-1.1
UYS01L4D	SFP	1.25G	1310 FP	-5 ~ 0	PIN	< -23	-10~70°C	40km	DDM, RoHS	SDH L-1.1
UYS01E4D	SFP	1.25G	1550 DFB	-4 ~-1	PIN	< -20	-10~70°C	40km	DDM, RoHS	SDH L-1.1
UYS01Z8D	SFP	1.25G	1550 DFB	-2~+3	PIN	< -23	-10~70°C	80km	DDM, RoHS	SDH L-1.1
UYS01B2D	SFP	1.25G	1550 DFB	0~+3	APD	< -31	-10~70°C	120km	DDM, RoHS	SDH L-1.1

**Absolute Maximum Ratings**

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	T <sub>s</sub>	°C	-40	+85
Relative Humidity	RH	%	5	95
Power Supply Voltage	V <sub>cc</sub>	V	-0.5	+4

**Recommended Operating Conditions**

Parameter	Symbol	Unit	Min	Typ	Max
Case Operating Temperature Range	T <sub>c</sub>	°C	-10		70
Power Supply Voltage	V <sub>cc</sub>	V	3.135	3.3	3.465
Data rate	Gb/s		-	1.25/1.0625	-

**Specifications (tested under recommended operating conditions ,unless otherwise noted)**

Parameter	Symbol	Unit	Min	Typ	Max	Notes			
<b>Electrical Characteristics</b>									
Supply Current	Tx Section	I <sub>cc</sub>	mA	-	-	300	1		
	Rx Section								
Single Ended Data Input Swing			mV	150	-	1100			
Single Ended Data Output Swing			mV	300	-	600			
TX_fault /LOS output (TTL)	VOH	V		2.0	-	V <sub>cc</sub>			
	VOL							0	-
TX_disable input (TTL)	VOH	V		2.0	-	V <sub>cc</sub>			
	VOL							0	-
<b>Optical transmitter Characteristics</b>									
Launch Optical Power	P <sub>o</sub>	dBm		-9.5	-6	-3	550m 850nm VCSEL-LD		
				-9	-5	-3	20km 1310nm FP-LD		
				-5	-3	0	40km 1310nm FP-LD		
				-4	-1	+1	40km 1550nm DFB-LD		
				-2	0	+3	40km 1310nm DFB-LD		
				-2	0	+3	80km 1550nm DFB-LD		
				0	+1	+3	120km 1550nm DFB-LD		
				830	850	860	VCSEL LD		
				1270	1310	1355	FP-LD		
				1280	1310	1340	DFB-LD		
Center Wavelength Range	λ <sub>c</sub>	nm		1500	1550	1580	DFB-LD		
									DFB-LD
									DFB-LD
									DFB-LD
Extinction Ratio	EX	dB	9						
Spectral Width	Δλ	nm			0.85	VCSEL LD			
					4	FP-LD			
					1	DFB-LD			

Side Mode Suppression Ratio	SMSR	dB	30	DFB-LD
Contributed Total Jitter added at TP2	TJ	UI	0.284	2
Relative Intensity Noise	RIN	dB/Hz	-120	3
Eye Diagram	Complies with IEEE802.3z eye masks when filtered			
Dispersion Penalty		dB	1	
Optical Rise/Fall Time	Trise/Tfall	ps	260	4
<b>Optical receiver Characteristics</b>				
			-18	550m 5
			-20	1310nm 20km 1550nm 40km
Receiver Sensitivity	S	dBm	-23	1310nm 40km 1550nm 80km
			-31	1550nm 120km APD
			0	550m
Overload Input Optical Power	Pin	dBm	-3	15km ~80km
			-9	120km APD
	Optical Dessert		S	
LOS	Optical Assert	dB	-35	15km ~80km PIN
		dB	-45	120km APD
	LOS Hysteresis	dB	0.5 3 5	6

**Note1.** The supply current includes SFP module's supply current and test board working current.

**Note2.** TP refers to the compliance point specified in IEEE802.3z, section 38.2.1.

**Note3.** RIN is the laser noise, integrated over a specified bandwidth, measured relative to average optical power with 12dB return loss. For multimode application, the RIN is better than -117dB/Hz.

**Note4.** Optical transition time is the time interval required for the rising or falling edge of an optical pulse to transition between the 20% and 80% amplitudes relative to the logical 1 and 0 levels

**Note5.** Measured with a PRBS 223-1 test pattern, @1.25Gb/s, EX=10dB, BER<10<sup>-12</sup>.

**Note6.** The LOS Hysteresis to minimize "chatter" on the output line. In principle, Hysteresis alone does not guarantee chatter-free operation

## Timing and Electrical

### Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	μs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	μs
Tx Disable To Reset	t_reset	10			μs
LOS Assert Time	t_loss_on			100	μs
LOS De-assert Time	t_loss_off			100	μs
Serial ID Clock Rate	f_serial_clock			400	KHz
MOD_DEF (0:2)-High	V <sub>H</sub>	2		V <sub>cc</sub>	V
MOD_DEF (0:2)-Low	V <sub>L</sub>			0.8	V

## Diagnostics

### Diagnostics Specification

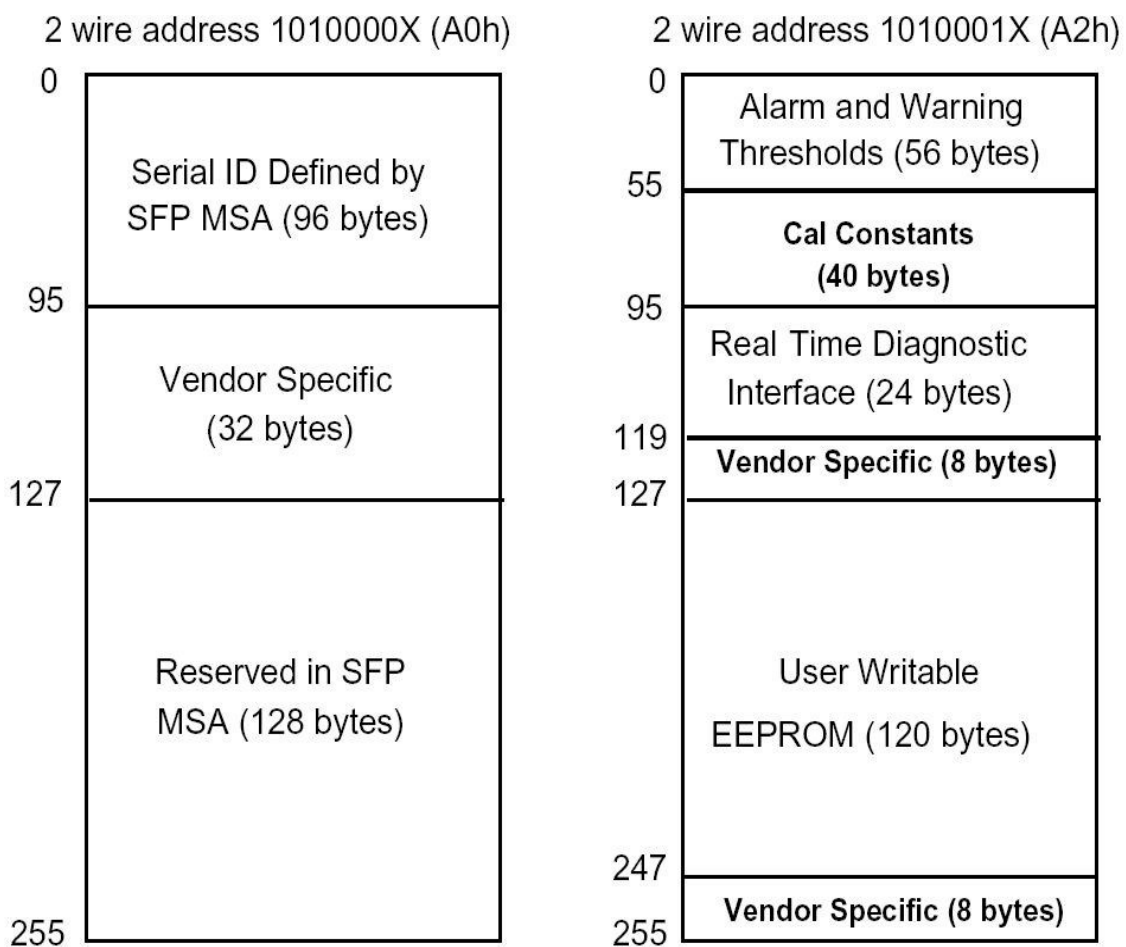
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	° C	±3° C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-5 to 0	dBm	±3dB	Internal / External
RX Power	-23 to -3	dBm	±3dB	Internal / External

## Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



## Pin Description

20	VccT	1	VccT
19	TD-	2	Tx_Fault
18	TD+	3	Tx_disable
17	Vcct	4	MOD-DEF(2)
16	Vcct	5	MOD-DEF(1)
15	VccR	6	MOD-DEF(0)
14	VccR	7	Rate Select
13	RD+	8	LOS
12	RD-	9	VccR
11	VccR	10	VccR

Top of Board

Bottom of Board  
(As Viewed Through Top of Board)

## Pin Descriptions

Pin	Signal	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V <sub>EER</sub>	Receiver ground	1	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V <sub>EET</sub>	Transmitter Ground	1	

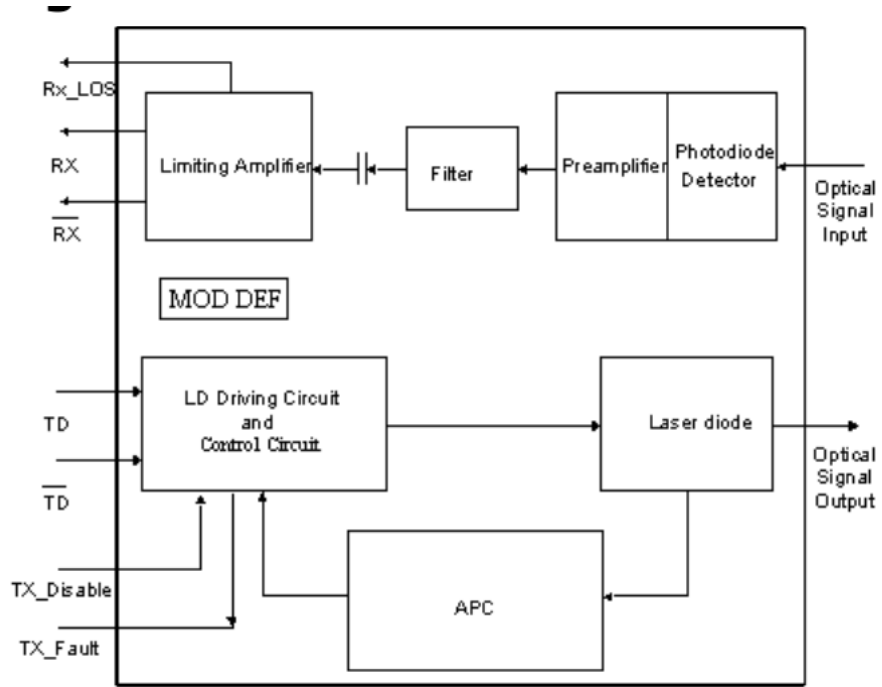
### Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- 1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and V<sub>cc</sub>+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 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 4.7k~10kΩ resistor. Its states are:
 

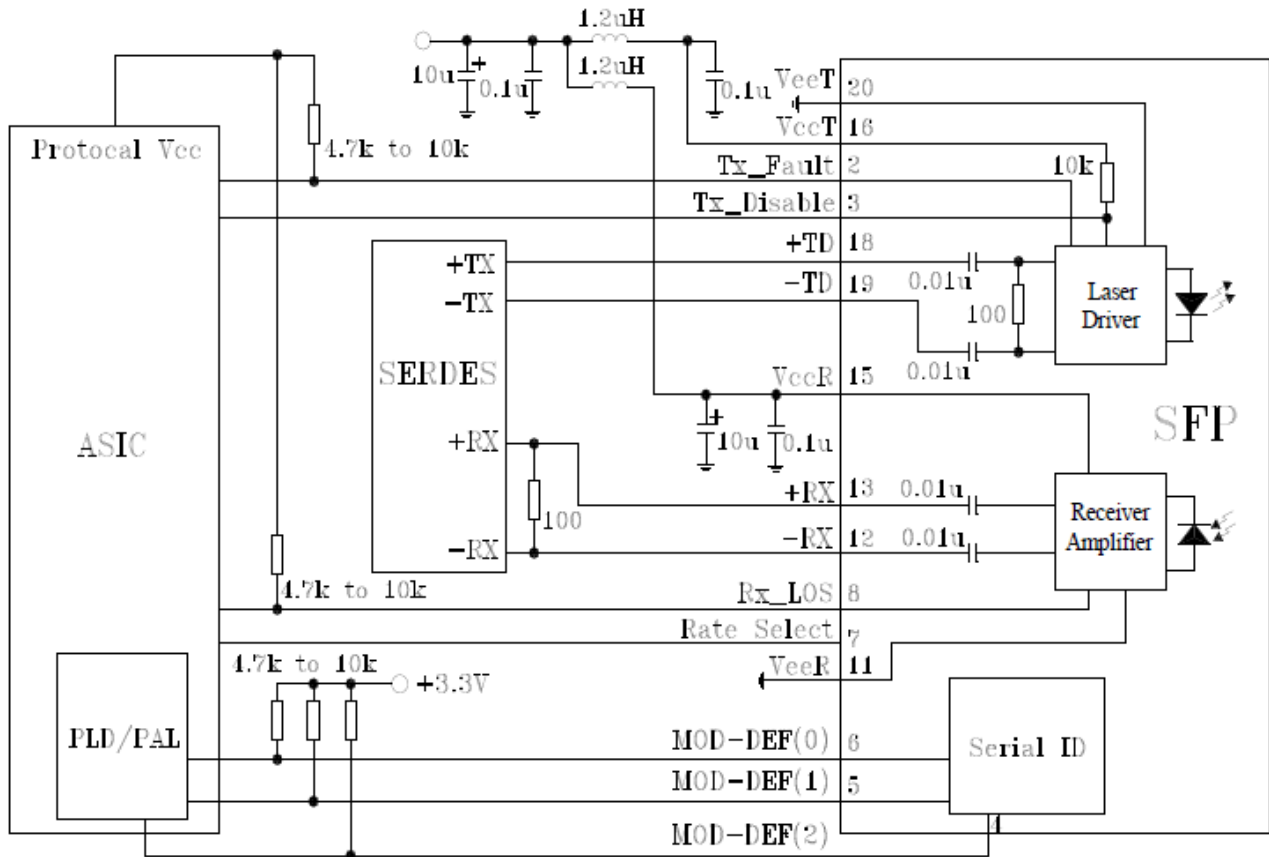
Low (0 to 0.8V):	Transmitter on
(>0.8V, < 2.0V):	Undefined
High (2.0 to 3.465V):	Transmitter
Disabled Open:	Transmitter
Disabled	
- 3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be V<sub>ccT</sub> or V<sub>ccR</sub>.  
 Mod-Def 0 is grounded by the module to indicate 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 is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and V<sub>cc</sub>+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
- 5) RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- 6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

### Block Diagram

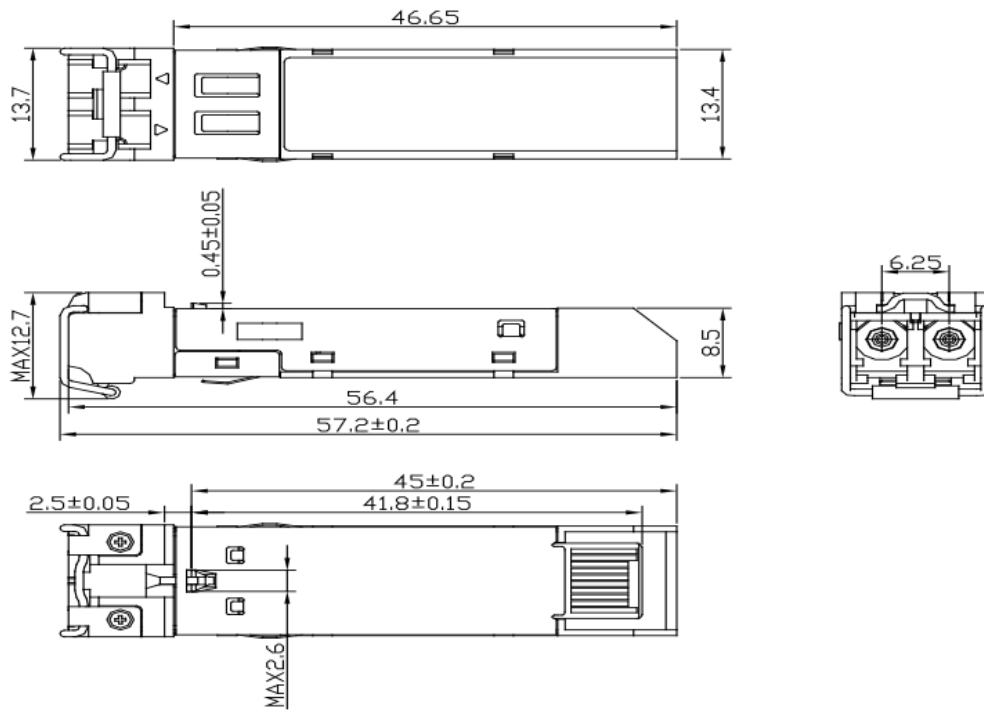




# Typical Application Circuit

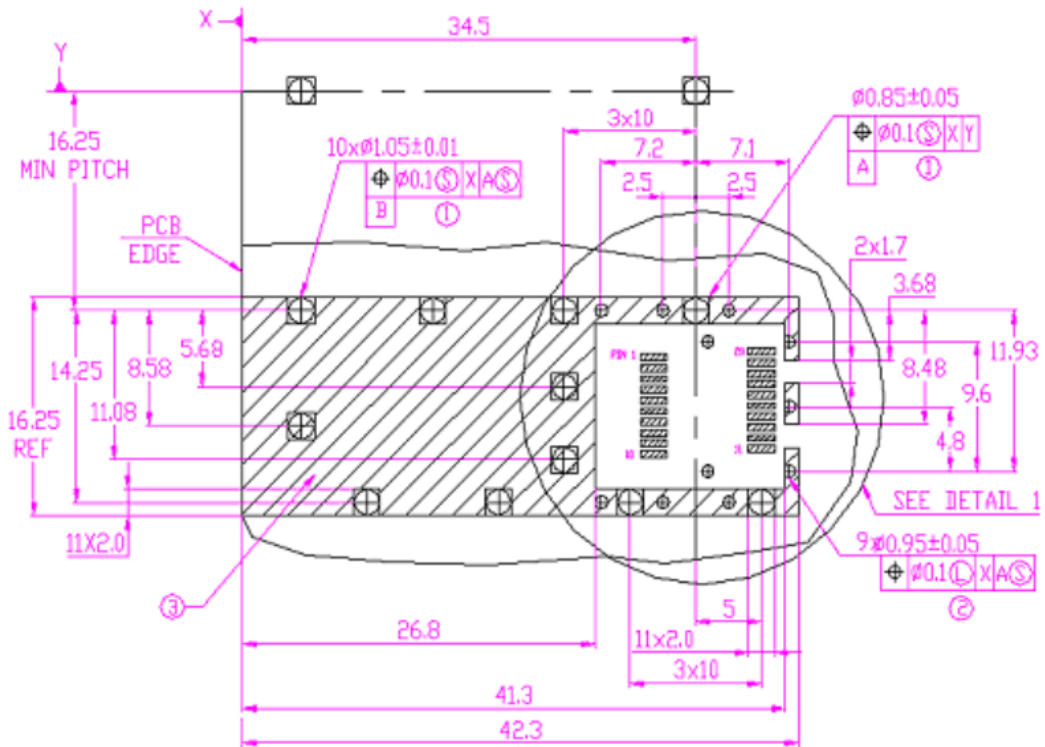


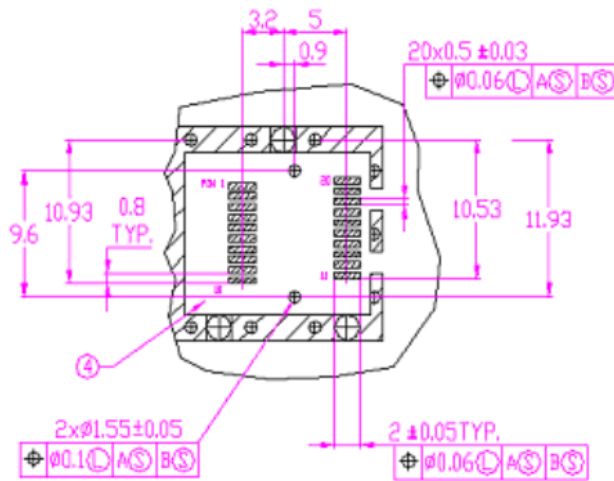
# Package Outline



Unit: mm  
Unspecified Tolerance: ±0.1mm

# PCB Layout Recommendation





NOTES:

- 1.PADS AND VIAS ARE CHASSIS GROUND.
- 2.THROUGH HOLES,PLATING OPTIONAL.
- 3.HATCHED AREA DENOTES COMPONENT AND TRACE KEEPOUT (EXCEPT CHASSIS GROUND).
- 4.AREA DENOTES COMPONENT KEEPOUT (TRACES ALLOWED).

DIMENSIONS IN MILLIMETERS

DETAIL 1

## Regulatory Compliance

Feature	Test Method	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1 (>1.5kV) – Human Body Model
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	Class 2 (>4.0kV)
Electromagnetic Interference (EMI)	CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1	Compliant with standard
Immunity	IEC61000-4-3 Class 2	Typically show no measurable effect from a 3 V/m field swept from 80 to 1000MHz applied to the transceiver without a chassis enclosure.
Safety		FDA 0322110-00
		CDRH 21-CFR 1040 Class 1
		UL E239070
		TUV-GS B0501 54481 001
		CE E8 0501 54481 004