SFP28-25G-SR

- Hot-pluggable SFP28 form factor
- Supports 25.78125Gb/s bit rate
- Maximum link length of 70m on OM3 MMF and 100m on OM4 MMF
- 850nm VCSEL laser and PIN photo detector
- Internal CDR on both Transmitter and Receiver channel
- Operating environment temperature range: 0 ~ +70℃
- Single 3.3V power supply
- Low power dissipation: ＜1.0W

Applications

- Data Center
- 25GBASE-SR Ethernet
- Infiniband EDR Applications
- 32G Fiber Channel Applications
- Servers, Switches, Storage and Host Card Adapters

Standards

- Compliant with SFF-8024、SFF-8431、SFF-8432
- Compliant with IEEE802.3by
- Compliant with SFF-8472
- RoHS complaint

Specification

Absolute Maximum Ratings				
Parameter	**Symbol**	**Min**	**Max**	**Unit**
Storage Ambient Temperature	T_{STG}	-40	85	℃
Storage Humidity	H_S	5	90	%
Operating Humidity	H_O	5	85	%
Power Supply Voltage	V_{CC}	0	+3.6	V
Receiver Damaged Threshold		+3		dBm

Recommended Operating Conditions					
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Operating Case Temperature	T_C	0		70	℃
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Supply Current	I_{CC}			300	mA
Power Consumption	P_W			1	W
Data Rate	BR		25.78125		Gbps

Electrical Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Transmitter Differential Input Voltage		95		900	mV	
Receiver Differential Output Voltage		300		900	mV	
Transmit Fault Voltage	V_{OH}	2.0		V_{CC}	V	LVTTL
	V_{OL}	0		0.8	V	LVTTL
Transmit Disable Voltage	V_{OH}	2.0		V_{CC}	V	LVTTL
	V_{OL}	0		0.8	V	LVTTL
Input Differential Impedance			100		Ω	
Transmit Disable Assert Time	T_{OFF}			100	us	
LOS	V_{OH}	2.0		V_{CC}	V	LVTTL
	V_{OL}	0		0.8	V	LVTTL

Optical transmitter Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Launched Power (avg.)	P_{OUT}	-8.4		2.4	dBm	
Optical Power OMA	P_{OMA}	-6.4		3	dBm	
Operating Wavelength Range	λ_C	840	850	860	nm	
Spectral Width (RMS)	$\Delta\lambda$			0.6	nm	
Extinction Ratio	ER	2			dB	
Transmitter and Dispersion Penalty	TDP			4.3	dB	
Optical Output Power after TX Disable	P_{DIS}			-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Optical Return Loss Tolerance	ORL			12	dB	
Optical Receiver Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Wavelength Range	λ_C	840	850	860	nm	
Average Receiver Power	P_{max}	-10.3		2.4	dBm	
Receiver Sensitivity (Average power)	P_{sen}			-10.3	dBm	1,2
LOS De-Assert	LOS_D			-13	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis		0.5			dB	
Receiver Reflectance	R_r			-12	dB	

Notes:

1. Measured with a PRBS 2^{31}-1 test pattern, @25.78125Gb/s, BER<5E-5.
2. Minimum value is informative, equals min Tx OMA with infinite ER and max channel insertion loss.

Digital Diagnostic Monitoring Information

Parameter	Units	Min	Max	Accuracy	Calibration	Note
Temperature	°C	0	+70	±3°C	Internal	
Voltage	V	3.135	3.465	±3%	Internal	
Bias Current	mA	0	15	±10%	Internal	1
TX Power	dBm	-8.4	2.4	±3dB	Internal	
RX Power	dBm	-10.3	2.4	±3dB	Internal	

Notes:

1. Accuracy of Measured Tx Bias Current is 10% of the actual Bias Current from the laser driver to the laser.

Pin definition

The SFP28 modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP28 host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8431, or stacked connector with equivalent electrical performance. SFP28 module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 1 and the contact sequence order listed in Table 1.

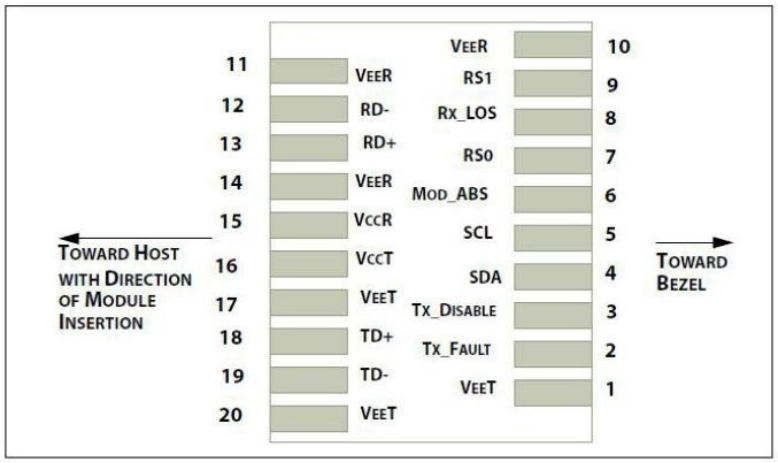


Figure 1 SFP28 Pad Assignment Top View

Pin No	Symbol	Name/Description	Power Seq.	Note
1	VeeT	Transmitter Ground	1st	1
2	TX_Fault	Transmitter Fault	3rd	2
3	TX_Disable	Transmitter Disable	3rd	3
4	SDA	2-Wire Serial Interface Data Line	3rd	4
5	SCL	2-Wire Serial Interface Data Line	3rd	4
6	Mod_ABS	Module Absent, Connect to VeeT or VeeR in Module	3rd	5
7	RS0	No connection required	3rd	6
8	RX_LOS	Receiver Loss of Signal indication	3rd	7
9	RS1	No connection required	3rd	8
10	VeeR	Receiver Ground	1st	1
11	VeeR	Receiver Ground	1st	1
12	RD-	Receiver Inverted DATA out. AC Coupled. CML-O	3rd	9
13	RD+	Receiver Non-inverted DATA out. AC Coupled. CML-O	3rd	9
14	VeeR	Receiver Ground	1st	1
15	VccR	Receiver Power Supply	2nd	10
16	VccT	Transmitter Power Supply	2nd	10
17	VeeT	Transmitter Ground	1st	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled. CML-I	3rd	11
19	TD-	Transmitter Inverted DATA in. AC Coupled. CML-I	3rd	11
20	VeeT	Transmitter Ground	1st	1

Power Seq.: Pin engagement sequence during hot plugging.

Notes:

1. The module signal ground contacts.
2. This pin is an open drain/collector and should be pulled up to Vcc-host in the host with a 4.7k~10k Ohm resistor.
3. This pin should be pulled up to VccT with a 4.7k~10k Ohm resistor in modules.
4. SDA&SCL (IIC) are needed pull up 4.7k~10k Ohm resistors on host board.
5. Mod_ABS is connected to VeeT or VeeR in the SFP28 module.
6. Rate Select 0, no connection required.
7. Module RX_Los of signal indication need pull up 4.7k~10k Ohm resistor on host board.
8. Rate Select 1, no connection required.
9. RD -/+: These are the differential receiver outputs. They are CML AC-coupled with 100 Ohm terminal resistor matching internal.
10. VccR and VccT are the receiver and transmitter power supplies.
11. TD-/+: These are the differential transmitter inputs. They are CML AC-coupled with 100 Ohm terminal resistor matching internal.

Typical application Circuit

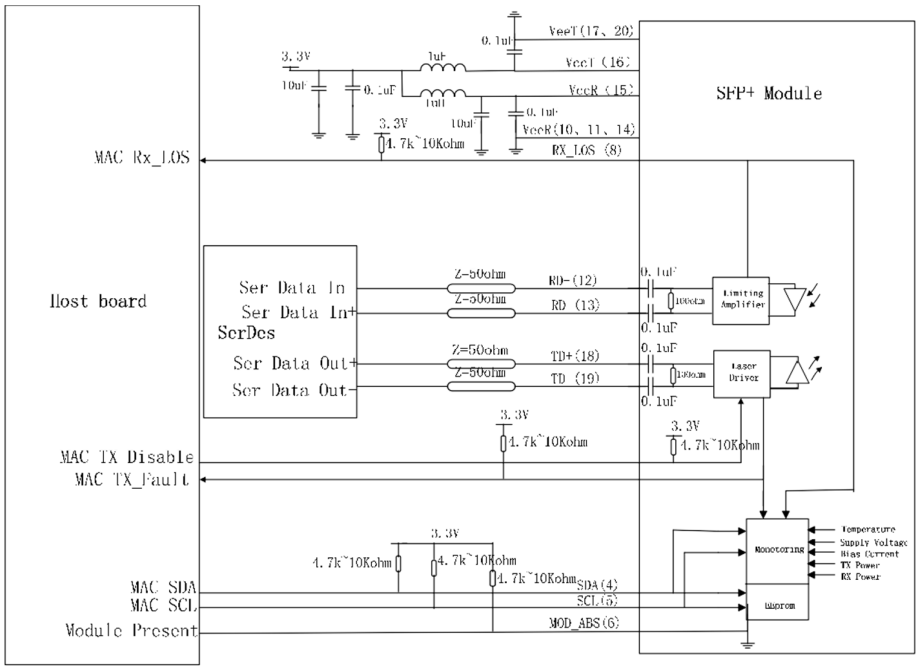
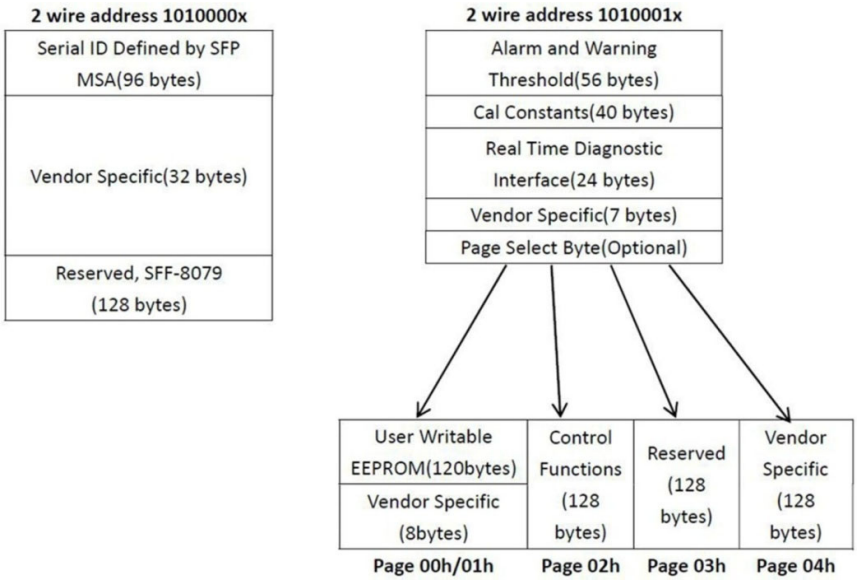


Figure 2 Typical Interface Circuit

EEPROM Memory Map



EEPROM Serial ID Memory Contents (2-Wire Address A0h)

Address	Name of field	Hex	Description
BASE ID Fields			
00	Identifier	03	SFP transceiver
01	Ext. Identifier	04	Serial ID module supported for SFP
02	Connector	07	LC
03-05	Transceiver Codes	00 00 00	Not defined
06	Transceiver Codes	00	Not defined
07-10	Transceiver Codes	00 00 00	Not defined
11	Encoding	03	Encoding codes
12	BR, Nominal	FF	
13	Rate Identifier	00	Not defined
14	Length(9um)-km	00	
15	Length(9um)-m	00	
16	Length(50um)	00	Transceiver transmit distance
17	Length(62.5um)	00	
18	Length(cable)	0A	
19	Length(OM3)	07	
20-35	Vendor Name	4F 45 4D	“OEM”(ASCII character)
36	Reserved	02	
37-39	Vendor OUI	00 00 00	Not defined
40-55	Vendor P/N	53 46 50 32 38 2D 32 35 47 2D 53 52	“SFP28-25G-SR”(ASCII character)
56-59	Vendor P/N Rev.	41 30	“A0”(ASCII character)
60-61	Laser Wavelength	03 52	850nm
62	Reserved	00	Not defined
63	CC_BASE	xx	Check sum of bytes 0-62
Extended ID Fields			
64-65	Options	18 1A	TX_Disable、TX_Fault and RX_SD are implemented
66	BR，max	67	Upper bit rate margin, units of %
67	BR，min	00	Lower bit rate margin, units of %
68-83	Vendor SN		Vendor Serial Number in ASCII character
84-91	Date Code		Vendor Date Code in ASCII character
92	Diagnostic Monitoring Type	68	Digital Diagnostic monitoring implemented “Internally calibrated” is implemented, RX measurement type is “Average Power”

93	Enhanced options	F0	Optional Alarm/warning flags, soft Tx_Disable control and monitoring, soft Tx_Fault monitoring are implemented
94	SFF-8472 compliant	08	SFF-8472 compliant with revision 10.2
95	CC-EXT	xx	Check sum of bytes 64-94
Vendor Specific ID Field			
96-127	Vendor Specific	00	Vendor specific EEPROM
128-255	Reserved	FF	Reserved for future use

Digital Diagnostic Monitoring Interface：Alarm and Warning Thresholds (2-Wire Address A2h)

Address	#Bytes	Name	Real Value	Unit	Hex
00-01	2	Temp High Alarm	80	°C	
02-03	2	Temp Low Alarm	-10	°C	
04-05	2	Temp High Warning	70	°C	
06-07	2	Temp Low Warning	0	°C	
08-09	2	Voltage High Alarm	3.63	V	
10-11	2	Voltage Low Alarm	2.97	V	
12-13	2	Voltage High Warning	3.46	V	
14-15	2	Voltage Low Warning	3.13	V	
16-17	2	Bias High Alarm	14	mA	
18-19	2	Bias Low Alarm	2	mA	
20-21	2	Bias High Warning	13	mA	
22-23	2	Bias Low Warning	3	mA	
24-25	2	TX Power High Alarm	5.4	dBm	
26-27	2	TX Power Low Alarm	-11.4	dBm	
28-29	2	TX Power High Warning	2.4	dBm	
30-31	2	TX Power Low Warning	-8.4	dBm	
32-33	2	RX Power High Alarm	5.4	dBm	
34-35	2	RX Power Low Alarm	-13.3	dBm	
36-37	2	RX Power High Warning	2.4	dBm	
38-39	2	RX Power Low Warning	-10.3	dBm	
40-55	16	Reserved	Reserved		

Package Outline

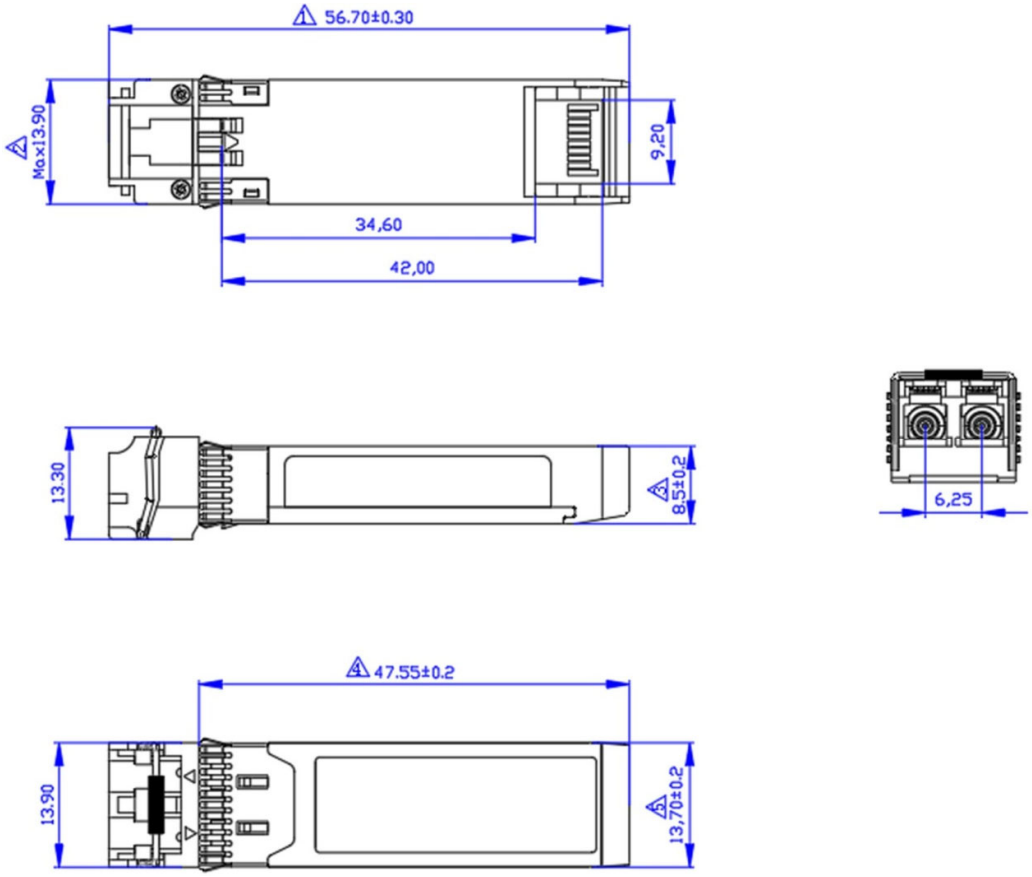


Figure 4 Package Outline (Unit: mm)

Ordering information

PART NO.	Specifications							
	Pack	Rate	Tx	Po	Sen	Temp	Reach	DDM
		(Gbps)	(nm)	(dBm)	(dBm)	(℃)	(m)	
SFP28-25G-SR	ssSFP28	25.78125	850	-8.4~2.4	<-10.3	0~70	100	Y

*Note：

1. Measured with a PRBS 2^{31}-1 test pattern, @25.78125Gb/s, BER<5E-5.
2. OM3 Cable length =<70m or OM4 Cable length =<100m.
3. More detail product selection and cable lengths, please contact Handar.