SPECTRUM

SPECTRUM TRANSCEIVER

SP-SF-10G-150-040-DC

10G SFP+ Small Form Pluggable Plus

FEATURES

- Compliant with MSA SFP+ Specification SFF-8431.
- Operating data rate up to 10.3Gbps.
- Distance up to 40km.
- 1550nm DFB EA Transmitter.
- Single +3.3V Power Supply and TTL Logic Interface.
- Duplex LC Connector Interface.
- Hot Pluggable.
- Compliant with IEEE 802.3ae 10GBASE-ER.
- Compliant with IEEE 802.3ae 10GBASE-EW.

APPICATIONS

- 10GBASE-EW at 9.953Gbps.
- 10GBASE-ER at 10.3125Gbps.
- Other Optical Links.

SPECIFICATIONS

a) Electrical and Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
9μm Core Diameter SMF			40		Km	
Data Rate			9.953/10.3125		Gbps	
			Tansmitter			
Centre Wavelength	λc	1530	1550	1565	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Average Output Power	P_{out}	-1		+3	dBm	
Extinction Ratio	ER	3.5			dB	
Transmitter and Dispersion Penalty	TDP			2	dB	
Average Power of OFF Transmitter				-30	dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Input Differential Impedance	ZIN	90	100	110	Ω	
TX Disable (Disable)		2.0		Vcc+0.3	V	
TX Disable (Enable)		0		0.8	V	
TX_Fault (Fault)		2.0		Vcc+0.3	V	
TX_Fault (Normal)		0		0.8	V	
TX_Disable Assert Time	t_off			10	us	
			Receiver			
Centre Wavelength	λc	1260		1600	nm	
Sensitivity	P_{min}			-16	dBm	
Output Differential Impedance	Z_{OUT}	90	100	110	Ω	
Receiver Overload	P_{max}	0.5			dBm	
Receiver Reflectance	Rrx			-12	dB	
LOS De-Assert	LOSD			-15	dBm	
LOS Assert	LOSA	-25			dBm	
LOS (High)		2.0		Vcc+0.3	V	
LOS (Low)		0		0.8	V	

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SPECTRUM TRANSCEIVER

b) Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_{ST}	-40	+85	°C
Supply Voltage	VCC	-0.5	3.6	V

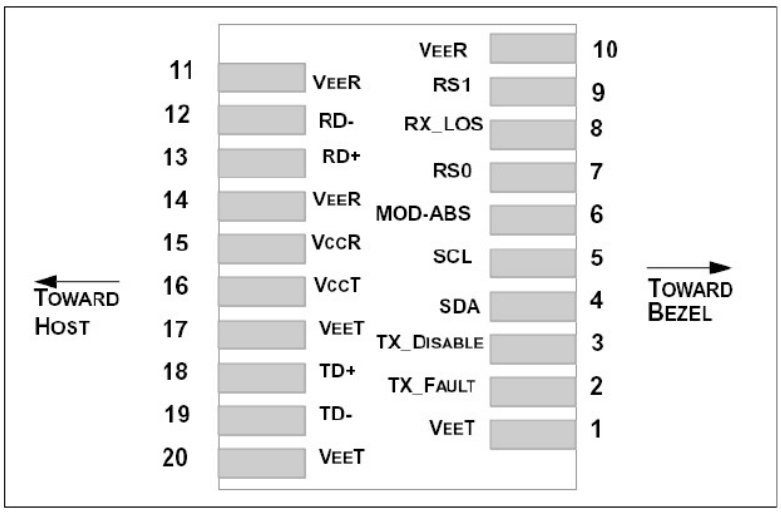
c) Recommended Operating Environment

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Power Supply Voltage	V_{CC}	+3.15	+3.3	+3.45	V	
Power Supply Current	I_{CC}			300	mA	
Operating Temperature	T_{OP}	0	-	+70	°C	
Surge Current	ISurge			+30	mA	
Baud Rate			9.953/10.3125		GBaud	

d) Performance Specifications - Electrical

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
			Tansmitter			
CML Inputs (Differential)	Vin	150		1200	mVpp	AC coupled inputs
Inputs Impedance (Differential)	Zin	85	100	115	Ohms	Rin > 100 kohms @ DC
Tx_DISABLE Input Voltage - High		2		Vcc+0.3	V	
Tx_DISABLE Input Voltage - Low		0		0.8	V	
Tx_FAULT Output Voltage - High		2		Vcc+0.3	V	Io = 400µA; Host Vcc
Tx_FAULT Output Voltage - Low		0		0.5	V	Io = -4.0mA
			Receiver			
CML Outputs (Differential)	Vout	350		700	mVpp	AC coupled outputs
Outputs Impedance (Differential)	Zout	85	100	115	Ohms	
Rx_LOS Output Voltage - High		2		Vcc+0.3	V	Io = 400µA; Host Vcc
Rx_LOS Output Voltage - Low		0		0.8	V	Io = -4.0mA
MOD_DEF (0:2)	VoH	2.5			V	With Serial ID
MOD_DEF (0:2)	VoL	0		0.5	V	With Serial ID

e) Pin Assignment



Pin out of Connector Block on Host Board

SPECTRUM TRANSCEIVER

f) Pin Description

Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indicator	3	1
3	TX Disable	Transmitter Disable	3	2, Module disables on high or open
4	SDA	Module Definition 2	3	Note 3, Data line for Serial ID
5	SCL	Module Definition 1	3	Note 3, Data line for Serial ID
6	MOD-ABS	Module Definition 0	3	Note 3, Grounded within the module
7	RS0	RX Rate Select (LVTTL).	3	This pin has an internal 30k pull down to ground. A signal on this pin will not affect module performance
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTL).	1	This pin has an internal 30k pull down to ground. A signal on this pin will not affect module performance
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3 ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3 ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Notes:

1. TX Fault is an open collector/drain output, which should 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 4.7 - 10 K Ω resistor. Its states are:
   Low (0~0.8V): Transmitter on (>0.8V, <2.0V): Undefined
   High (2.0~3.465V): Transmitter Disabled
   Open: Transmitter Disabled.
3. Modulation Absent, connected to VEET or VEER in the module.
4. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K - 10KM resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
5. VeeR and VeeT may be internally connected within the SFP module.
6. RD-/+: These are the differential receiver outputs. They are AC coupled 100M differential lines which should be terminated with 100M (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 350 and 700 mV differential (175 –350 mV single ended) when properly terminated.
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
8. 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. The inputs will accept differential swings of 150 – 1200 mV (75 – 600mV single-ended).