SV-CFP4-100G-ER4F

100GBase aggregating 4 x duplex LWDM (1295.6 nm, 1300.1 nm, 1304.6 nm, and 1309.1nm) wavelengths SM (LC) with DDM, distance up to 32km with Forward Error Correction (FEC) supporting 100GE and OTU-4

Features

- Hot pluggable CFP4 MSA form factor
- Compliant to Ethernet 100GBASE-ER4 Lite, OTN OTU4 4L1-9C1F Lite, and CFP-MSA- HW-Specification
- Supports 103.1Gb/s and 112Gb/s aggregate bit rates
- Up to 25km reach for G.652 SMF without FEC
- Up to 32km reach for G.652 SMF with FEC
- Single +3.3V power supply
- Operating case temperature: 0~70°C
- Transmitter: cooled 4x28Gb/s LAN WDM EML TOSA (1295.56, 1300.05, 1304.58, 1309.14nm)
- Receiver: 4x28Gb/s APD ROSA
- 4x28G electrical interface (OIF CEI-28G-VSR)
- Maximum power consumption 5.0W
- Duplex LC receptacle

Applications

- 100GBASE-ER4 100G Ethernet
- OTN OTU4 4L1-9C1F

Ordering Information

Part number	Description
SV-CFP4-100G-ER4F	Starview CFP4 100Gbps module 100GBase aggregating 4 x duplex LWDM (1295.6 nm, 1300.1 nm, 1304.6 nm, and 1309.1nm) wavelengths SM (LC) with Digital Diagnostic Monitoring (DDM), distance up to 32km with Forward Error Correction (FEC) supporting 100GE and OTU-4

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		85	°C	
Relative Humidity (non-condensation)	RH			85	%	
Operating Case Temperature	T_{OP}	0		70	°C	
Supply Voltage	Vcc	-0.5		3.6	V	
Voltage on LVTTL Input	Vilvttl	-0.5		Vcc3+0.3	V	
LVTTL Output Current	Iolvttl			15	mA	
Voltage on Open Collector Output	Voco	0		6	V	
Damage Threshold, each Lane	TH_d	-3.0			dBm	1

Note(1): PIN receiver

Recommended Operating Conditions and Supply Requirements

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Case Temperature	T_{OP}	0		70	°C	
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Data Rate, each Lane (100GE)					25.78125	
Data Rate Accuracy (100GE)		-100		100	ppm	
Data Rate, each Lane (OTU4)			27.95249		Gb/s	
Data Rate Accuracy (OTU4)		-20		20	ppm	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Power Supply Noise	Vrip			2	%	DC-1MHz
				3	%	1-10MHz
Link Distance with G.652	D1			25	km	
Link Distance with G.652 (with FEC)	D2			32	km	

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Power Consumption				5.0	W	
Supply Current	Icc			1.51	A	
Low Power Mode Power Dissipation				2	W	
Transmitter (each Lane)						
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (Vcm)	TP1	-350		2850	mV	1
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to	TP1			See CEI-28G-VSR	dB	

Common Mode conversion (SDC11, SCD11)			Equation 13-20		
Stressed Input Test	TP1a	See CEI-28G-VSR Section 13.3.11.2.1			
Receiver (each Lane)					
Differential Voltage, pk-pk	TP4		900	mV	
Common Mode Voltage (Vcm)	TP4	-350	2850	mV	1
Common Mode Noise, RMS	TP4		17.5	mV	
Differential Termination Resistance Mismatch	TP4		10	%	At 1MHz
Differential Return Loss (SDD22)	TP4		See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22, SCD22)	TP4		See CEI-28G-VSR Equation 13-21	dB	
Common Mode Return Loss (SCC22)	TP4		-2	dB	2
Transition Time, 20 to 80%	TP4	9.5		ps	
Vertical Eye Closure (VEC)	TP4		5.5	dB	
Eye Width at 10^{-15} probability (EW15)	TP4	0.57		UI	
Eye Height at 10^{-15} probability (EH15)	TP4	228		mV	

Note(1): Vcm is generated by the host. Specification includes effects of ground offset voltage.

Note(2): From 250MHz to 30GHz.

Optical Characteristics

Optical Characteristics for IEEE 802.3 100GBASE-ER4 Lite

CFP 100GBASE-ER4 Lite						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Lane Wavelength	L0	1294.53	1295.56	1296.59	nm	
	L1	1299.02	1300.05	1301.09	nm	
	L2	1303.54	1304.58	1305.63	nm	
	L3	1308.09	1309.14	1310.19	nm	
Transmitter						
SMSR	SMSR	30			dB	
Total Average Launch Power	P_T			10.5	dBm	
Average Launch Power, each Lane	P_{AVG}	-1.9		4.5	dBm	1
OMA, each Lane	P_{OMA}	0.1		4.5	dBm	2
Difference in Launch Power between any Two Lanes (OMA)	Ptx,diff			3.6	dB	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		-0.65			dBm	
TDP, each Lane	TDP			2.5	dB	
Extinction Ratio	ER	7			dB	
$RIN_{20}OMA$	RIN			-130	dB/Hz	
Optical Return Loss Tolerance	TOL			20	dB	
Transmitter Reflectance	R_T			-12	dB	

Average Launch Power OFF Transmitter, each Lane	Poff		-30	dBm	
Eye Mask{X1, X2, X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}			
Receiver					
Damage Threshold, each Lane	TH_d	-3.0		dBm	3
Average Receive Power, each Lane		-14.7	-4.9	dBm	for 25km Link Distance
Average Receive Power, each Lane		-17.7	-4.9	dBm	for 32km Link Distance
Receive Power (OMA), each Lane			-1.9	dBm	
Receiver Sensitivity (OMA), each Lane	SEN1		-13.45	dBm	for BER = $1x10^{-12}$
Stressed Receiver Sensitivity (OMA), each Lane			-11.45	dBm	for BER = $1x10^{-12}$
Receiver Sensitivity (OMA), each Lane	SEN2		-16.45	dBm	for BER = $5x10^{-5}$
Stressed Receiver Sensitivity (OMA), each Lane			-14.45	dBm	for BER = $5x10^{-5}$
Receiver reflectance			-26	dB	
Difference in Receive Power between any Two Lanes (Average and OMA)	Prx,diff		3.6	dB	
LOS Assert	LOSA		-26	dBm	
LOS Deassert	LOSD		-24	dBm	
LOS Hysteresis	LOSH	0.5		dB	
Receiver Electrical 3 dB upper Cutoff Frequency, each Lane	Fc		31	GHz	
Conditions of Stress Receiver Sensitivity Test (Note 4)					
Vertical Eye Closure Penalty, each Lane			1.5	dB	
Stressed Eye J2 Jitter, each Lane			0.3	UI	
Stressed Eye J9 Jitter, each Lane			0.47	UI	

Note(1): The minimum average launch power spec is based on ER not exceeding 9.5dB and transmitter OMA higher than 0.1dBm.
Note(2): Even if the TDP < 0.75 dB, the OMA min must exceed the minimum value specified here.
Note(3): The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.
Note(4): Vertical eye closure penalty, stressed eye J2 jitter, and stressed eye J9 jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

Optical Characteristics

Optical Characteristics for ITU G.959.1 OTU4 4L1-9C1F Lite

CFP4 OTU4 4L1-9C1F Lite						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Data Rate, each Lane			27.95249		Gb/s	
Data Rate Accuracy		-20		20	ppm	
Lane Wavelength	L0	1294.53	1295.56	1296.59	nm	
	L1	1299.02	1300.05	1301.09	nm	
	L2	1303.54	1304.58	1305.63	nm	
	L3	1308.09	1309.14	1310.19	nm	
Transmitter						
SMSR	SMSR	30			dB	
Total Average Launch Power	PT			10.5	dBm	
Average Launch Power,	PAVG	-1.1		4.5	dBm	

each Lane						
Difference in Launch Power between any Two Lanes (Average)	Ptx,diff			3.6	dB	
Extinction Ratio	ER	7			dB	
$RIN_{20}OMA$	RIN			-130	dB/Hz	
Optical Return Loss		20			dB	
Average Launch Power OFF Transmitter, each Lane	Poff			-30	dBm	
Eye Mask{X1, X2, X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				
Receiver						
Damage Threshold, each Lane	TH_d	-3.0			dBm	1
Average Receive Power, each Lane		-13.9		-4.9	dBm	for 25km Link Distance
Average Receive Power, each Lane		-16.9		-4.9	dBm	for 32km Link Distance
Equivalent Sensitivity (Average), each Lane	SEN1			-15.4	dBm	for BER = $1x10^{-12}$
Equivalent Sensitivity (Average), each Lane	SEN2			-18.4	dBm	for BER = $5x10^{-5}$
Optical Path Penalty				1.5	dB	
Receiver reflectance				-26	dB	
Difference in Receive Power between any Two Lanes (Average)	Prx,diff			3.6	dB	
LOS Assert	LOSA		-26		dBm	
LOS Deassert	LOSD		-24		dBm	
LOS Hysteresis	LOSH	0.5			dB	
Receiver Electrical 3 dB upper Cutoff Frequency, each Lane	Fc			31	GHz	

Note(1): The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.

Digital Diagnostic Functions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Temperature monitor absolute error	DMI_Temp	-3		3	°C	Over operating temperature range
Supply voltage monitor absolute error	DMI _VCC	-0.1		0.1	V	Over full operating range
Channel RX power monitor absolute error	DMI_RX_Ch	-2		2	dB	1
Channel Bias current monitor	DMI_Ibias_Ch	-10%		10%	mA	Ch1~Ch4
Channel TX power monitor absolute error	DMI_TX_Ch	-2		2	dB	1

Note(1): Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy