

Datasheet

Gigabit Ethernet CWDM SFP Transceivers



Features

- Data rates from 1.062 to 1.25 Gbps
- 120 km, 80 km, and 50 km reach models
- Single 3.3 V supply
- CWDM wavelengths, DFB laser
- APD receiver (SFP-GDCWEZX-xx)
- Dual LC connector
- Digital Diagnostic SFF-8472 compliance
- Telcordia GR-468 compliance
- RoHS and China RoHS compliance
- SFP MSA SFF-8074i compliance
- RoHS compliance

General Operating

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	V _{CC}	3.135	3.3	3.465	V
Total Current	I _{CC}	-	-	300	mA
Power Supply Noise Rejection ^a	PSR	100	-	-	mV _{p-p}
Operating Temperature	T _{Op}	-5	-	70	°C
Storage Temperature	T _{St}	-40	-	85	°C
Data Rate GbE	DR	-	1250	-	Mbps
Data Rate FC	DR	-	1062.5	-	Mbps

a) 20 Hz to 155 MHz

Transmitter Specifications (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Optical Power:					
SFP-GDCWDXxx	P _{Op}	-5	-2.5	0	dBm
SFP-GDCWZXxx	P _{Op}	0	2.5	5	dBm
SFP-GDCWEZXxx	P _{Op}	0	2	5	dBm
Average Launch Power Of Off Tx:					
SFP-GDCWDXxx	P _{Off}	-	-	-30	dBm
SFP-GDCWZXxx	P _{Off}	-	-	-30	dBm
SFP-GDCWEZXxx	P _{Off}	-	-	-45	dBm
Extinction Ratio (Dynamic)	ER	9	-	-	dB
Eye Mask	IEEE 802.3z compliant				
Optical Jitter Random	J _R	-	-	147	ps
Optical Jitter Deterministic	J _D	-	-	80	ps
Total Jitter	T _J	-	-	200	ps
Optical Rise Time (20% to 80% values)	t _r	-	-	260	ps
Optical Fall Time (20% to 80% values)	t _f	-	-	260	ps
Mean Wavelength	λ	1xx1 - 6.5 nm	1xx1	1xx1 + 6.5 nm	nm
Spectral Width (20 dB)	Δλ	-	-	1	nm
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Optical Path Penalty at 50 km ^b and 80 km ^b	dp	-	0.5	1	dB
Optical Path Penalty at 120 km ^b	dp	-	1	2	dB
Relative Intensity Noise	RIN	-	-	-120	dB/Hz
Reflection Tolerance ^c	rp	-24	-	-	dB

b) Measured at BER 10⁻¹², PRBS 2⁷-1, at eye center

c) 1 dB degradation of receiver sensitivity

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Transmitter Specifications (Electrical)

Parameter	Symbol	Min	Typical	Max	Unit
Input Differential Impedence	R_{in}	80	100	120	Ω
PECL Single Ended Data Input Swing	$V_{in,p-p}$	250	-	1200	mV
TxFault_Fault	V_{fault}	2	-	V_{cc}	V
TxFault_Normal	V_{normal}	V_{ee}	-	$V_{ee}+0.5$	V
TxDisable_Disable	V_d	2	-	V_{cc}	V
TxDisable_Enable	V_{en}	V_{ee}	-	$V_{ee}+0.8$	V

Receiver Specifications (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Receive Power Low ^d : SFP-GDCWDXxx	$R_{sens,low}$	-	-26	-24	dBm
SFP-GDCWZXxx	$R_{sens,low}$	-	-26	-24	dBm
SFP-GDCWEZXxx	$R_{sens,low}$	-	-34	-32	dBm
Receive Power High ^d	$R_{sens,high}$	-3	0	-	dBm
Link Budget: SFP-GDCWDXxx	-	19	23.5	-	dB
SFP-GDCWZXxx	-	24	28	-	dB
SFP-GDCWEZXxx	-	32	36	-	dB
Damage Threshold For Receiver	$P_{in,damage}$	6	-	-	dBm
Wavelength	λ	1200	-	1625	nm
Maximum Reflectance Of Receiver: SFP-GDCWDXxx	RX_r	-	-	-12	dB
SFP-GDCWZXxx	RX_r	-	-	-12	dB
SFP-GDCWEZXxx	RX_r	-	-	-14	dB
LOS Assert: SFP-GDCWDXxx	-	-34	-	-	dBm
SFP-GDCWZXxx	-	-34	-	-	dBm
SFP-GDCWEZXxx	-	-45	-	-	dBm
LOS De-assert: SFP-GDCWDXxx	-	-	-	-24	dBm
SFP-GDCWZXxx	-	-	-	-24	dBm
SFP-GDCWEZXxx	-	-	-	-32	dBm
LOS Hysteresis	-	0.5	-	-	dB

d) Measured at 10^{-12} BER, 2^{7-1} PRBS, nominal wavelength

Receiver Specifications (Electrical)

Parameter	Symbol	Min	Typical	Max	Unit
PECL Single Ended Data Output Swing	$V_{out,p-p}$	185	-	800	mV
Data Output Rise Time: SFP-GDCWDXxx	t_r	-	-	320	ps
SFP-GDCWZXxx	t_r	-	-	360	ps
SFP-GDCWEZXxx	t_r	-	-	175	ps
Data Output Fall Time: SFP-GDCWDXxx	t_f	-	-	320	ps
SFP-GDCWZXxx	t_f	-	-	360	ps
SFP-GDCWEZXxx	t_f	-	-	175	ps

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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	2	-	100	KHz
RX_LOS Voltage (High)	RX_LOS _H	2	-	V _{cc}	V
RX_LOS Voltage (Low)	RX_LOS _L	-	-	0.8	V
Receiver Jitter Deterministic	JD, receive	-	-	170	ps
Receiver Jitter Random	JR, receive	-	-	96	ps
MOD_DEF (0:2)-High	V _H	2	-	V _{cc}	V
MOD_DEF (0:2)-Low	V _L	V _{ee}	-	V _{ee} +0.5	V
LOS Output Voltage-Fault	V _{LOS} fault	2	-	V _{cc}	V
LOS Output Voltage-Normal	V _{LOS} normal	V _{ee}	-	V _{ee} +0.5	V

Ordering Information

Model	Description	Data Rate (Mbps)	Wavelength (nm)	Distance Range (km)
SFP-GDCWDXx*	CWDM SFP Transceiver	Gigabit Ethernet/ Fibre Channel	1200/1625	0 - 50
SFP-GDCWZXx*	CWDM SFP Transceiver	Gigabit Ethernet/ Fibre Channel	1200/1625	0 - 80
SFP-GDCWEZXx*	CWDM SFP Transceiver	Gigabit Ethernet/ Fibre Channel	1200/1625	0 - 120

*See Wavelength Guide below for “xx” values

λc Wavelength Guide

Code	λc	Unit	Bail Latch Color	Code	λc	Unit	Bail Latch Color
31	1311	nm	Yellow	47	1471	nm	Grey
33	1331	nm	Yellow	49	1491	nm	Purple
35	1351	nm	Yellow	51	1511	nm	Blue
37	1371	nm	Yellow	53	1531	nm	Green
39	1391	nm	Yellow	55	1551	nm	Yellow
41	1411	nm	Yellow	57	1571	nm	Orange
43	1431	nm	Yellow	59	1591	nm	Red
45	1451	nm	Yellow	61	1611	nm	Brown

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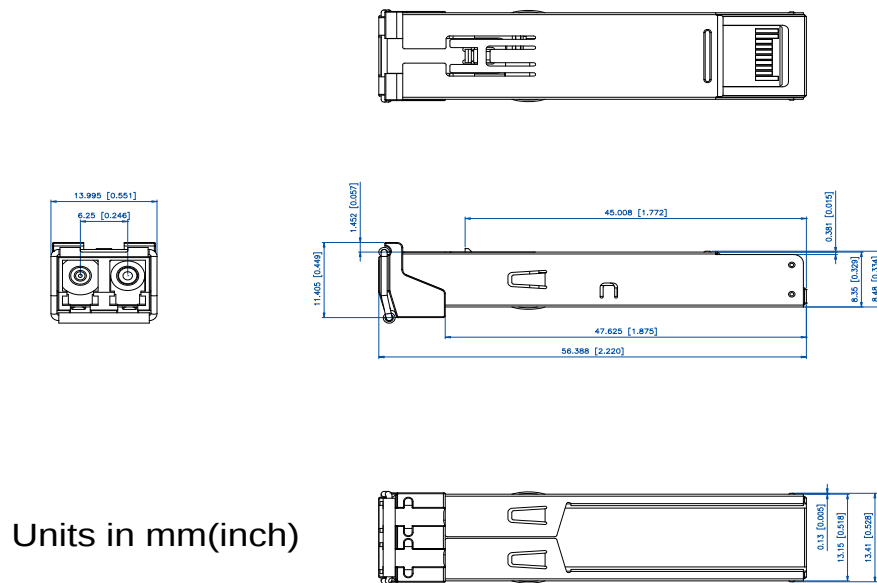
Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Formula
Temperature	-5 to 70	± 3	° C	Internal	$T_c(C) = T_{slope} * T_{ad}$ (16 bit signed twos complement value) + Toffset
Voltage	0 to V_{cc}	0.1	V	Internal	$V(Volts) = V_{slope} * V_{ad}$ (16 bit unsigned integer) + Toffset
Bias Current	0 to 120	5	mA	External	$I(mA) = I_{slope} * I_{ad}$ (16 bit unsigned integer) + Ioffset
TX Power: SFP-GDCWDXxx	-5 to 0	±3 dB	dBm	External	$TX_PWR(\mu W) = TX_PWR_{slope} * TX_PWR_{ad}$ (16 bit unsigned integer) + TX_PWRoffset
SFP-GDCWZXxx	-2 to 3	±3 dB	dBm	External	$TX_PWR(\mu W) = TX_PWR_{slope} * TX_PWR_{ad}$ (16 bit unsigned integer) + TX_PWRoffset
SFP-GDCWEZxx	0 to 5	±3 dB	dBm	External	$TX_PWR(\mu W) = TX_PWR_{slope} * TX_PWR_{ad}$ (16 bit unsigned integer) + TX_PWRoffset
RX Power: SFP-GDCWDXxx	-24 to -3	±3 dB	dBm	External	$RX_PWR(\mu W) = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3 + A_4 * x^4$
SFP-GDCWZXxx	-24 to -3	±3 dB	dBm	External	$RX_PWR(\mu W) = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3 + A_4 * x^4$
SFP-GDCWEZxx	-32 to -3	±3 dB	dBm	External	$RX_PWR(\mu W) = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3 + A_4 * x^4$

Pin	Function	Notes
1	V_{eeT}	TX GND
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	V_{eeR}	RX Ground
10	V_{eeR}	RX Ground
11	V_{eeR}	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	V_{eeR}	RX GND
15	V_{ccR}	RX Power
16	V_{ccT}	TX Power
17	V_{eeT}	TX GND
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	V_{eeT}	TX GND

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Outline Drawing



Regulatory and Industry Compliances

RoHS directive; China RoHS; USA and Canada UL listing; 21CFR 1040.10, MSA SFF-8074i; SFF-8472; Telecordia GR-468;

Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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