

50GBASE-ER BiDi QSFP28 Optical Transceiver, Hot Pluggable Single LC +3.3V (KWHG40-3131)

Description

50G ER bidi transceiver, designed for 5G Mid-haul and Back-haul application, which used single wavelength transceiver for downstream and upstream communication nodes in the optical network, so easy deployment and maintenance.

Features

- Compliant with QSFP28 Standard:
- SFF-8665 Revision 1.9, SFF-8636 Revision 2.9
- Compliant with IEEE 802.3cn 50GBASE-ER
- Compliant with IEEE802.3 50GAUI-2 C2M electrical interface
- Up to 40km transmission on G.652 SMF
- Single 3.3V supply voltage
- Maximum power consumption 4.5W
- 0-70 °C case operating temperature
- EML laser and APD receiver
- QSFP28 MSA package with single LC connector
- Two Wire serial interface with digital diagnostic monitoring
- RoHS 2.0 compliant

Order Information

Part No.	Application	Data Rate	Wavelength	Reach
KWHG40-3131	50GBASE-ER	53.125 Gb/s	Tx1311/Rx1311nm	40Km

Performance Specifications

1. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage temperature	T _s	-40	-	+85	°C	
Supply voltage	V _{CC}	-0.5	-	3.6	V	
Relative humidity (non-condensing)	RH	5	-	85	%	

2. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating case temperature	T _{OPR}	0	-	70	°C	
Power supply voltage	V _{CC}	3.135	3.3	3.465	V	
Steady state current	I _{supply}	-	-	1298.7	mA	

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Instantaneous peak current at hot plug	I _{CC_IP}	-	-	1800	mA	
Sustained peak current at hot plug	I _{CC_SP}	-	-	1485	mA	
Maximum power dissipation	P _D	-	-	4.5	W	
Maximum power dissipation, Low Power Mode	P _{DLP}	-	-	1.5	W	
Data rate	DRL	-	26.5625	-	GBaud/s	
		-	26.5625x2	-	Gbit/s	
Two wire serial interface clock frequency	-	-	-	400	kHz	
Module power supply noise tolerance 10 Hz to 10 MHz (peak-to-peak)	-	-	-	66	mVpp	
Operating distance	-	2	-	40,000	m	

3. Transmitter Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Wavelength	λ	1304.5	1311	1317.5	nm	
Side-mode suppression ratio	SMSR	30	-	-	dB	
Average launch power	P _{OUT}	0.4	-	6.6	dBm	
Average launch power of OFF transmitter	P _{OUT_OFF}	-	-	-15	dBm	
Outer optical modulation amplitude (OMA _{outer})	P _{OUTL}	3.4	-	7.4	dBm	
Extinction ratio	ER	6	-	-	dB	

Launch power in OMA _{outer} minus TDECQ	OMA-TDECQ	2	-	-	dBm	
Transmitter and dispersion eye closure for PAM4 (TDECQ)	TDECQ	-	-	3.2	dB	Note
RIN OMA		-	-	-132	dB/Hz	
Optical return loss tolerance		-	-	15	dB	
Transmitter reflectance		-	-	-26	dB	

Note: Measured with a PRBS2¹⁵-1 test pattern @53.125Gbps, 40km fiber.

4. Receiver Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Wavelength	λ	1304.5	1311	1317.5	nm	
Damage threshold	P _{damage}	-2.4	-	-	dBm	
Average receive power	-	-17.6	-	-3.4	dBm	
Receive power (OMA _{outer})	OMA	-	-	-2.6	dBm	

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Receiver reflectance	RXR	-	-	-26	dB	
Receiver sensitivity (OMA_{outer})		-	-	max(-15.1, SECQ - 16.5)	dBm	Note
Stressed receiver sensitivity (OMA_{outer})		-	-	-13.3	dBm	
Conditions of stressed receiver sensitivity test:						
Stressed eye closure for PAM4 (SECQ)		-	-	3.2	dB	

Note: Measured with a PRBS2³¹-1 test pattern @53.125Gbps, BER \leq 2.4E-4. IEEE 802.3cn clause 139 equation 139-3.

5. Electrical Specifications

High-Speed Signal: Compliant to 50GAUI-2 C2M (IEEE 802.3cd)

Low-Speed Signal: Compliant to SFF-8679

Transmitter (Module Input)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Differential Data Input Amplitude	$V_{IN,P-P}$	-	-	900	mVpp	Note 1
Differential Termination Mismatch		-	-	10	%	
LPMode, Reset and ModSelL	V_{IL}	-0.3	-	0.8	V	
	V_{IH}	2	-	$V_{CC}+0.3$	V	
Receiver (Module Output)						
Differential Data Output Amplitude	$V_{OUT,P-P}$	-	-	900	mVpp	Note 1
Differential Termination Mismatch		-	-	10	%	
Output Rise/Fall Time, 20%~80%	T_R	12	-	-	ps	
ModPrsL and IntL	V_{OL}	0	-	0.4	V	$I_{OL}=4mA$
	V_{OH}	$V_{CC}-0.5$	-	$V_{CC}+0.3$	V	$I_{OL}=-4mA$

Note 1: Amplitude customization beyond these specs is dependent on validation in customer system.

6. Digital Diagnostics

Parameter	Range	Accuracy	Unit
Case Temperature	0 to 70	± 3	$^{\circ}C$
Voltage	0 to V_{CC}	$\pm 3\%$	V
Tx Bias Current	0 to 100	$\pm 10\%$	mA
Tx Power	0.4 to 6.6	± 3	dB
Rx Power	-17.6 to -3.4	± 3	dB

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Hand Shake Specifications

1. Hand shake time < 10s
2. Hand shake time definition
 - 1) Hand shake method



After the module is powered on, the module will detect if incoming light is received,

- If not, the module is set to be mode A
- If yes, the module is set to be mode B

2) Hand shake time definition

In the link, the hand shake time is defined as the time interval between

- 2nd Module powered on after TX power of the module with mode A goes stable, and
- Received RSSI of the module with mode A goes stable

Pin Definitions

Pin	Logic	Symbol	Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3
7		GND	Ground	1
8	LVTTL-I	ModselL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		Vcc Rx	+3.3V Power Supply Receiver	2
11	LVC MOS-I/O	SCL	2-wire serial interface clock	
12	LVC MOS-I/O	SDA	2-wire serial interface data	
13		GND	Ground	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3
15	CML-O	Rx3n	Receiver Inverted Data Output	3
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	

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22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL/Rx LOS	Interrupt/Rx LOS	4
29		Vcc Tx	+3.3V Power supply transmitter	2
30		Vcc1	+3.3V Power supply	2
31	LVTTL-I	LPMMode/TxDis	Low Power Mode/Tx disable	4
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3
34	CML-I	Tx3n	Transmitter Inverted Data Input	3
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Input	
38		GND	Ground	1

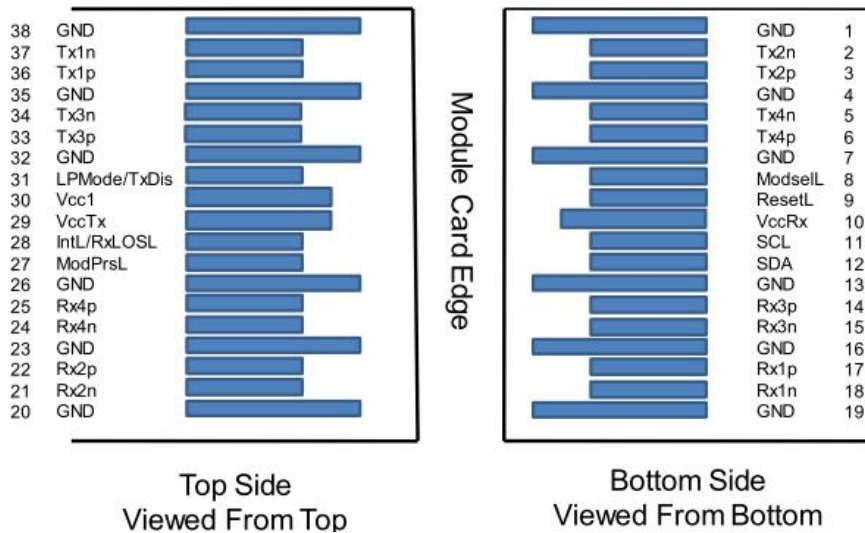
Note 1: GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

Note 2: Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently.

Note 3: Not used.

Note 4: Dual function pin as specified into SFF-8679.

Module Pad Layout



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Mechanical Diagram

