

407-BBRC-LEG
DELL 40GBASE-LM4 QSFP+ MMF
1270-1330NM 150m LC DOM



407-BBRC-LEG

40GE Universal LM4 QSFP+ Transceiver

Features

- Hot-pluggable QSFP+ form factor
- Operates over duplex multimode and single fiber with dual LC receptacles
- Supports 41.2 Gb/s aggregate bit rate
- Power dissipation < 3.5W
- Commercial case temperature range 0°C to 70°C
- Maximum Link length of 140m on OM3, 160m on OM4, and 1km on SMF
- Uncooled 4x10Gb/s CWDM transmitter
- XLPPI electrical interface
- Built-in digital diagnostic functions, including Tx/Rx power monitoring
- RoHS-6 compliant



Applications

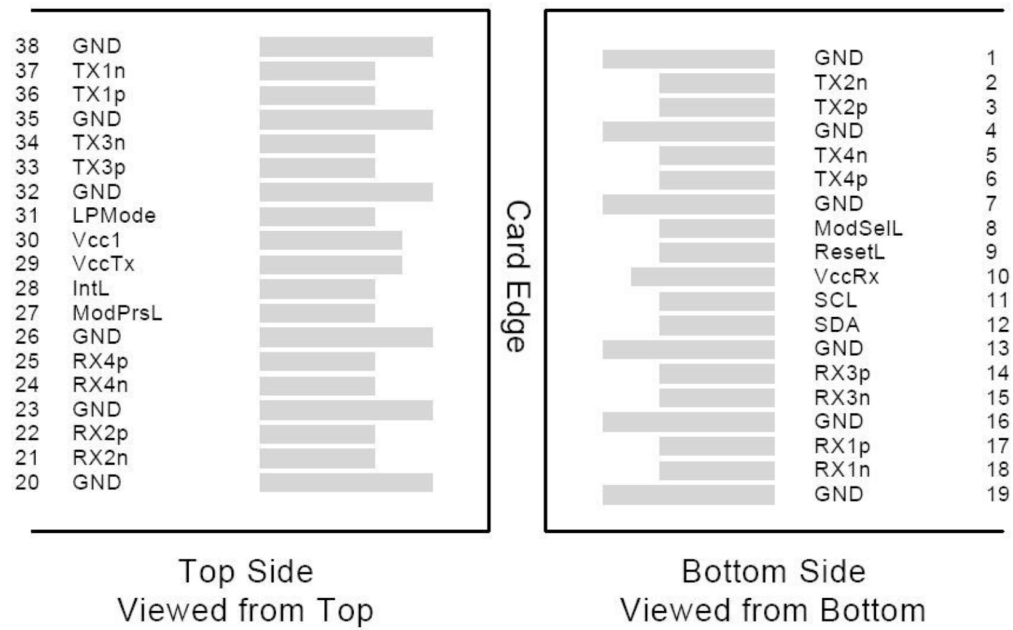
- 40G Ethernet over MMF and SMF

Product Description

Legrand's 407-BBRC-LEGQuad Small Form Factor Pluggable (QSFP+) transceivers are designed for use in 40 Gigabit Ethernet links over duplex multimode or single mode fiber. They are compliant with the QSFP+ MSA^{1,2} and represent a multimode adaptation of IEEE 802.3ba 40GBASE-LR4 referred to as LM4. Digital Diagnostics functions are available via an I2C interface, as specified by the QSFP+ MSA.

Legrand's QSFP+ transceivers are RoHS compliant and lead-free.

Electrical Pin-out Details



Pin Descriptions

Pin	Logic	Symbol	Name/Descriptions	Ref.
1		GND	Module Ground	1
2	CML-I	Tx2-	Transmitter inverted data input	
3	CML-I	Tx2+	Transmitter non-inverted data input	
4		GND	Module Ground	1
5	CML-I	Tx4-	Transmitter inverted data input	
6	CML-I	Tx4+	Transmitter non-inverted data input	
7		GND	Module Ground	1
8	LVTTL-I	MODSEIL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		VCCRx	+3.3v Receiver Power Supply	
11	LVC MOS-I	SCL	2-wire Serial interface clock	
12	LVC MOS-I/O	SDA	2-wire Serial interface data	
13		GND	Module Ground	1
14	CML-O	RX3+	Receiver non-inverted data output	
15	CML-O	RX3-	Receiver inverted dta output	
16		GND	Module Ground	1
17	CML-O	RX1+	Receiver non-inverted data output	

18	CML-O	RX1-	Receiver inverted data output	
19		GND	Module Ground	1
20		GND	Module Ground	1
21	CML-O	RX2-	Receiver inverted data output	
22	CML-O	RX2+	Receiver non-inverted data output	
23		GND	Module Ground	1
24	CML-O	RX4-	Receiver inverted data output	
25	CML-O	RX4+	Receiver non-inverted data output	
26		GND	Module Ground	1
27	LVTTTL-O	ModPrsL	Module Present, internal pulled down to GND	
28	LVTTTL-O	IntL	Interrupt output, should be pulled up on host board	
29		VCCTx	+3.3v Transmitter Power Supply	
30		VCC1	+3.3v Power Supply	
31	LVTTTL-I	LPMODE	Low Power Mode	
32		GND	Module Ground	1
33	CML-I	Tx3+	Transmitter non-inverted data input	
34	CML-I	Tx3-	Transmitter inverted data input	
35		GND	Module Ground	1
36	CML-I	Tx1+	Transmitter non-inverted data input	
37	CML-I	Tx1-	Transmitter inverted data input	
38		GND	Module Ground	1

Note:

1. Circuit ground is internally isolated from chassis ground.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Maximum Supply Voltage	V _{cc} I, V _{cc} Tx, V _{cc} Rx	-0.5		36	V
Storage Temperature	T _S	-40		85	°C
Case Operating Temperature	T _{op}	0		70	°C
Relative Humidity (non-condensing)	R _h	0		85	%
Damage Threshold, per Lane	DT	3.4			dBm

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V
Power Supply Current	I _{CC}			100	mA
Case Operating Temperature	T _C	-5		70	°C

Optical Characteristics (Top = 0°C to 70°C, V_{CC} = 3.1 to 3.47 Volts, OM3 or OM4)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Signaling Speed per Lane				10.3125	GBd	1
Lane center wavelengths (range)		1264.5 – 1277.5 1284.5 – 1297.5 1304.5 – 1317.5 1324.5 – 1337.5			nm	
Total Average Launch Power	P _{OUT}			10.3	dBm	
Transmit OMA per Lane, MMF	TxOMA	-3		4.8	dBm	
Transmit OMA per Lane, SMF	TxOMA	-6		3.5	dBm	
Average Launch Power per Lane, MMF	TXP _x	-7		4.3	dBm	2
Average Launch Power per Lane, SMF	TXP _x	-10		2.3	dBm	2
Optical Extinction Ratio	ER	3.5			dB	
Transmitter Dispersion Penalty, MMF	TDP			4.7	dB	
Transmitter Dispersion Penalty, SMF	TDP			2.6	dB	
Transmitter OMA – TDP, MMF	TxP-TDP			-7.2	dBm	3
Transmitter OMA – TDP, SMF	TxP-TDP			-6.8	dBm	3
Sidemode Suppression ratio	SSR _{MIN}	30			dB	
Average Launch Power OFF Transmitter, each Lane				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	4
Optical Return Loss Tolerance				20	dB	

Transmitter Reflectance				-12	dB	
Transmitter Eye Mask Definition X1, X2, X3, Y1, Y2, Y3	Specification Values 0.25, 0.4, 0.45, 0.25, 0.28, 0.4					
Receiver						
Signaling Speed per Lane				10.3125	GBd	5
Lane center wavelength (range)		1264.5 – 1277.5 1284.5 – 1297.5 1304.5 – 1317.5 1324.5 – 1337.5			nm	
Receiver Power (OMA) per Lane, MMF	RxOMA			4.8	dBm	
Receiver Power (OMA) per Lane, SMF	RxOMA			3.3	dBm	
Average Receiver Power per Lane, MMF	RXPx	-10		4.3	dBm	6,7
Average Receiver Power per Lane, SMF	RXPx	-13.7		2.3	dBm	
Receiver Sensitivity (OMA) per Lane, MMF	Rxsens			-10.5	dBm	
Receiver Sensitivity (OMA) per Lane, MMF	Rxsens			-10.5	dBm	7
Stressed Receiver Sensitivity (OMA) per Lane, MMF	SRS			-5	dBm	
Stressed Receiver Sensitivity (OMA) per Lane, SMF	SRS			-8.5		6
Damage Threshold per Lane	P _{MAX}			5.5	dBm	
Return Loss	RL			-20	dB	
Vertical eye closure penalty, per Lane				3.6	dB	
Receiver Electrical 3 dB upper Cutoff Frequency, each Lane				12.3	GHz	
LOS Assert	LOSA	-28		-12	dBm	7
LOS De-assert	LOSD				dBm	7
LOS Hysteresis	LOSH		2		dB	

Note:

1. Transmitter consists of 4 lasers operating at 10.3Gb/s each.
2. Minimum value is informative.
3. Even if TDP < 0.5 dB, TxP – TDP must be greater than this value.
4. RIN is scaled by 10*log (10/4) to maintain SNR outside of transmitter.

5. Receiver consists of 4 photodetectors operating at 10.3Gb/s each.
6. Minimum value is informative, equals min TxOMA with infinite ER and max channel insertion loss.
7. SMF receiver sensitivity guaranteed by design, but not measured in production.
8. LOS Assert and De-Assert values are informative and may vary between MMF and SMF uses.

Electrical Characteristics (Top = 0°C to 70°C, Vcc = 3.1 to 3.47 Volts)

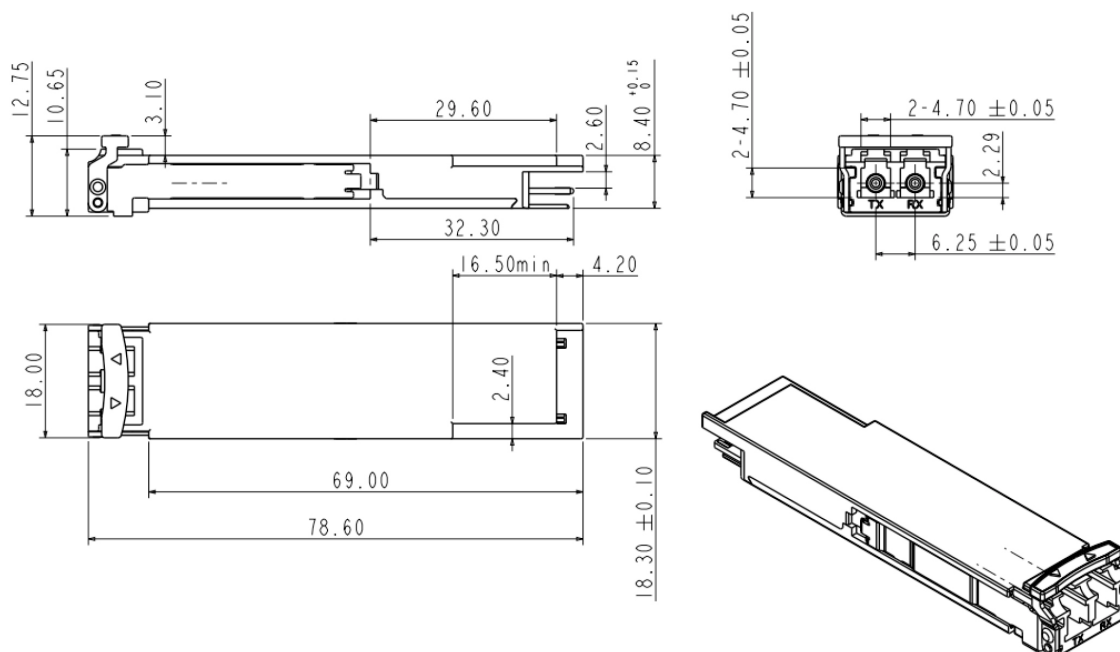
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage	Vccl, VccTx, VccRx	3.1		3.47	V	
Supply Current	Icc			1.13	A	
Link Turn-on time						
Transmit turn-on time				2000	ms	2
Transmitter						
Single Ended Input Voltage Tolerance	VinT	-0.3		4	V	
Differential data input swing	Vin,pp	120		1200	mVpp	3
Differential input threshold			50		mV	
AC Common mode Voltage Tolerance (RMS)		15			mV	
Differential input return loss		Per IEEE P802.3ba, Section 86A.4.1.1			dB	4
J2 Jitter Tolerance	Jt2	0.17			UI	
J9 Jitter Tolerance	Jt9	0.29			UI	
Data Dependent Pulse Width Shrinkage	DDPWS	0.07			UI	
Eye Mask Coordinates {X1, X2, Y1, Y2}	0.11. 0.31 95, 350				UI mV	5
Receiver (XLPPI)						
Single Ended Output Voltage Tolerance		-0.3		4	V	
Differential data output swing	Vout,pp	0		800	mVpp	6
AC Common mode Voltage Tolerance (RMS)				7.5	mV	
Termination Mismatch at 1MHz				5	%	
Differential Output Return Loss	Per IEEE P802.3ba, Section 86A.4.2.1				dB	4
Common-mode Output Return Loss	Per IEEE P802.3ba, Section 86A.4.2.2				dB	4
Output transition time 20% to 80%		28			ps	
J2 Jitter Tolerance	Jo2			0.42	UI	
J9 Jitter Tolerance	Jo9			0.65	UI	

Eye Mask Coordinates {X1, X2, Y1, Y2}	0.29, 0.5 150, 425				UI mV	5
Power Supply Ripple Tolerance	PSR	50			mVpp	

Note:

1. Maximum total power value is specified across the full temperature and voltage range.
2. From power-on and end of any fault conditions.
3. After internal AC coupling. Self-biasing 100Ω differential input.
4. 10 MHz to 11.1 GHz range.
5. Hit ratio= 5×10^{-5} /
6. AC coupled with 100Ω differential output impedance.

Mechanical Specifications



Data Communications

125 Eugene O'Neill Drive
New London, CT 06320
800.934.5432
www.legrand.us

570 Applewood Crescent
Vaughan, Ontario L4K 4B4
905.738.9195
www.legrand.ca