

407-BBQV-LEG
DELL 40GBASE-PSM4 QSFP+ SMF
1310NM 10KM REACH MPO DOM



407-BBQV-LEG

40Gbase QSFP+ Transceiver

Features

- 4 independent full-duplex channels
Up to 11.2Gbps data rate per wavelength
- MTP/MPO optical connector
- QSFP+ MSA compliant
- Digital diagnostic capabilities
- Links up to 10 km using single mode fiber
- Single +3.3V power supply
- Operating case temperature: 0°C~70°C
- XLPPI Electrical Interface Compliant with IEEE 802.3ba-2010
- RoHS compliant
- Compliant with QSFP+MSA: SFF-8436
- Support optical interoperability with IEEE 802.3ae 10GBASE-LR modules

Applications

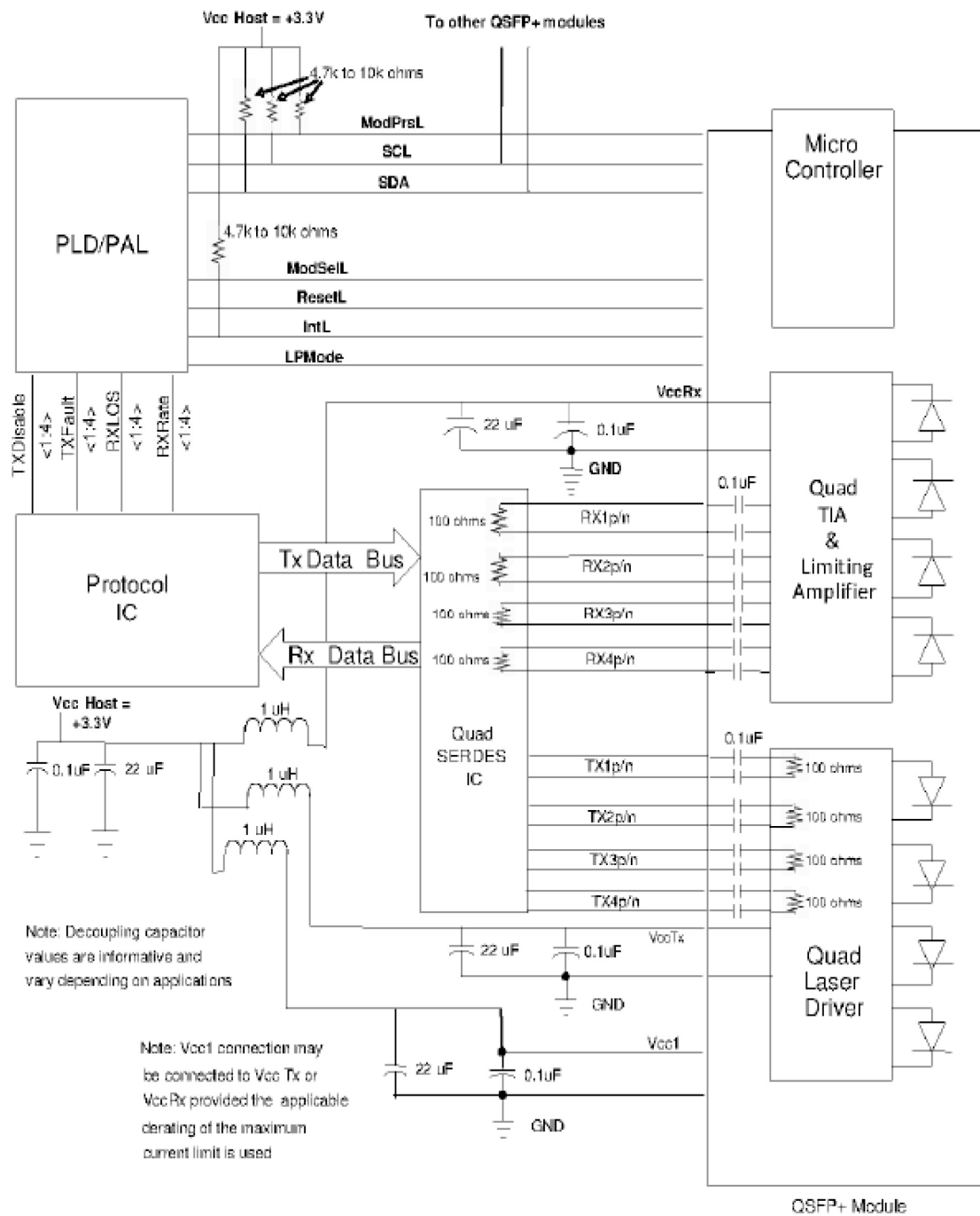
- 40G Ethernet
- Infiniband 4X SDR DDR QDR
- 40G Telecom connections

Product Description

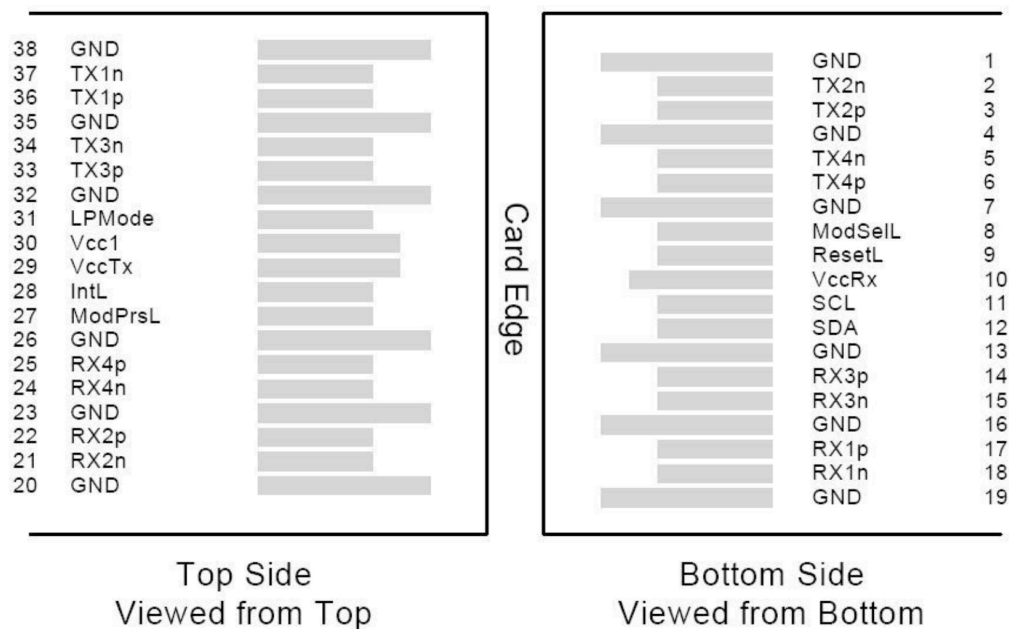
Legrand 407-BBQV-LEG Quad Small Form Factor Pluggable (QSFP+) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The QSFP+ transceivers are high performance, cost effective modules supporting 40 Gigabit Ethernet and up to 10km transmission distance with SMF.

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

Recommend Circuit Schematic



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	2
9	LVTTL-I	ResetL	Module Reset	2
10		VCCRx	+3.3v Receiver Power Supply	
11	LVC MOS-I	SCL	2-wire Serial interface clock	2
12	LVC MOS-I/O	SDA	2-wire Serial interface data	2
13		GND	Module Ground	1
14	CML-O	RX3+	Receiver non-inverted data output	
15	CML-O	RX3-	Receiver inverted data output	
16		GND	Module Ground	1
17	CML-O	RX1+	Receiver non-inverted data output	

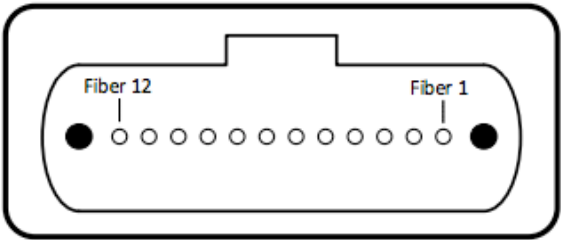
18	CML-O	RX1-	Receiver inverted data output	
19		GND	Module Ground	1
20		GND	Module Ground	1
21	CML-O	RX2-	Receiver inverted data output	
22	CML-O	RX2+	Receiver non-inverted data output	
23		GND	Module Ground	1
24	CML-O	RX4-	Receiver inverted data output	
25	CML-O	RX4+	Receiver non-inverted data output	
26		GND	Module Ground	1
27	LVTTL-O	ModPrsL	Module Present, internal pulled down to GND	
28	LVTTL-O	IntL	Interrupt output, should be pulled up on host board	2
29		VCCTx	+3.3v Transmitter Power Supply	
30		VCC1	+3.3v Power Supply	
31	LVTTL-I	LPMODE	Low Power Mode	2
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. Module circuit ground is isolated from module chassis ground with in the module.
2. Open collector; should be pulled up with 4.7k-10k ohms on host board to a voltage between 3.15V and 3.6V.

Optical Interface Lanes and Assignment

Shows the orientation of the multi-mode fiber facets of the optical connector. Table 1 provides the lane assignment.



OUTSIDE VIEW OF THE QSFP MODULE MPO

Lane Assignment

Fiber #	Logic
1	RX0
2	RX1
3	RX2
4	RX3
5	Not used
6	Not used
7	Not used
8	Not used
9	TX3
10	TX2
11	TX1
12	TX0

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Storage Temperature	TS	-40		85	°C
Relative Humidity	Rh	0		85	%
Supply Voltage	Vcc	-0.5		4.0	V

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Wavelength	L0	1264.5	1271	1277.5	nm	
	L1	1284.5	1291	1297.5	nm	
	L2	1304.5	1311	1317.5	nm	
	L3	1324.5	1331	1337.5	nm	
Transmitter						
Side-mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	P _T			8.3	dBm	
Average Launch Power, each Lane		-7		2.3	dBm	
Optical Modulation Amplitude, each Lane	OMA	-4		3.5	dBm	
Difference in launch Power between any two lanes (OMA)				6.5	dB	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		-4.8			dBm	
TDP, each Lane	TDP			2.3	dB	
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise	R _{in}			-128	dB/Hz	12dB reflection
Optical Return Loss Tolerance				20	dB	
Transmitter Reflectance	R _T			-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					
Average Launch Power OFF Transmitter, each Lane	P _{off}			-30	dBm	

Receiver						
Damage Threshold	TH _d	3.3			dBm	1
Average Power at receiver Input, each Lane		-13.7		2.3	dB	
Receiver Reflectance	R _R			-26	dB	
Receiver Power (OMA), each Lane				3.5	dBm	
Stressed Receiver Sensitivity in OMA, each Lane				-9.9	dBm	
Receiver Sensitivity, each Lane	S _R			-11.5	dBm	
Difference in Receive Power between any Lanes (OMA)				-7.5	dBm	
Condition of Stress Receiver Sensitivity Test						
Vertical Eye Closure Penalty, each Lane			1.6		dB	
Stressed Eye Jitter, each Lane			0.3		UI	

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.

Electrical Characteristics

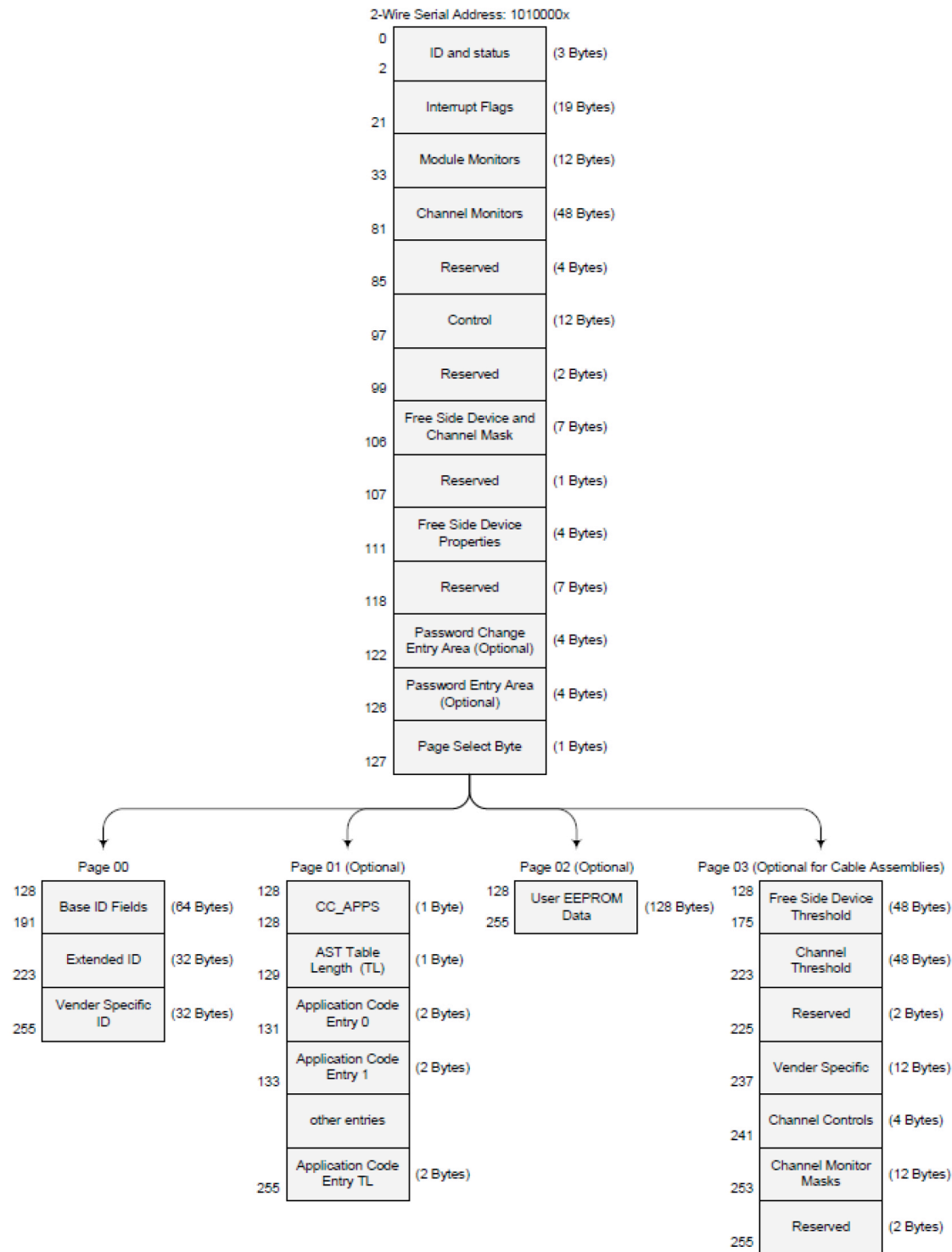
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Consumption (XLPPI)				1.5	W	
Supply Current	ICC		0.75	1.0	A	
Control I/O Voltage, High	VIH	2.0		VCC	V	
Control I/O Voltage, Low	VIL	0		0.7	V	
Inter-Channel Skew	TSK			150	ps	
RESETL Duration			10		us	
RESETL De-assert time				100	ms	
Power on time				100	ms	
Transmitter						
Single Ended Output Voltage Tolerance		-0.3		4	V	

AC Common mode Voltage Tolerance (RMS)		15			mV	
Tx Input Diff Voltage	VI	90		1600	mV	
Tx Input Diff Impedance	ZIN	80	100	120	Ω	
Differential Input Return Loss	See IEEE 802.3ba 86A.4.11				dB	10MHz-11.1GHz
J2 Jitter tolerance	Jt2			0.18	UI	
J9 Jitter Tolerance	Jt9			0.26	UI	
Data Dependent Pulse Width Shrinkage	DDPWS			0.07	UI	
Eye Mask Coordinates X1, X2, Y1, Y2	0.1, 0.31, 95, 350					
Receiver (XLPII)						
Single Ended Output Voltage Tolerance		-0.3		4	V	Preferred to TP1 signal common
AC Common mode Voltage Tolerance (RMS)				7.5	mV	
Termination Mismatch at 1MHz				5	%	
Differential Output Return Loss	See IEEE 802.3ba 86A.4.2.1				dB	10MHz-11.1GHz
Common-mode Output Return Loss	See IEEE 802.3ba 86A.4.2.1				dB	10MHz-11.1GHz
Rx Output Diff Voltage	Vo		600	800	mV	
Rx Output Rise and Fall Time	Tr/Tf			35	ps	20% to 80%
J2 Jitter Tolerance	Jr2			0.46	UI	
J9 Jitter Tolerance	Jr9			0.63	UI	
Eye Mask Coordinates X1, X2, Y1, Y2	0.29, 0.5, 150, 425				UI mV	

Note:

1. The single ended input voltage tolerance is the allowable range of the instantaneous input signal

EEPROM Information

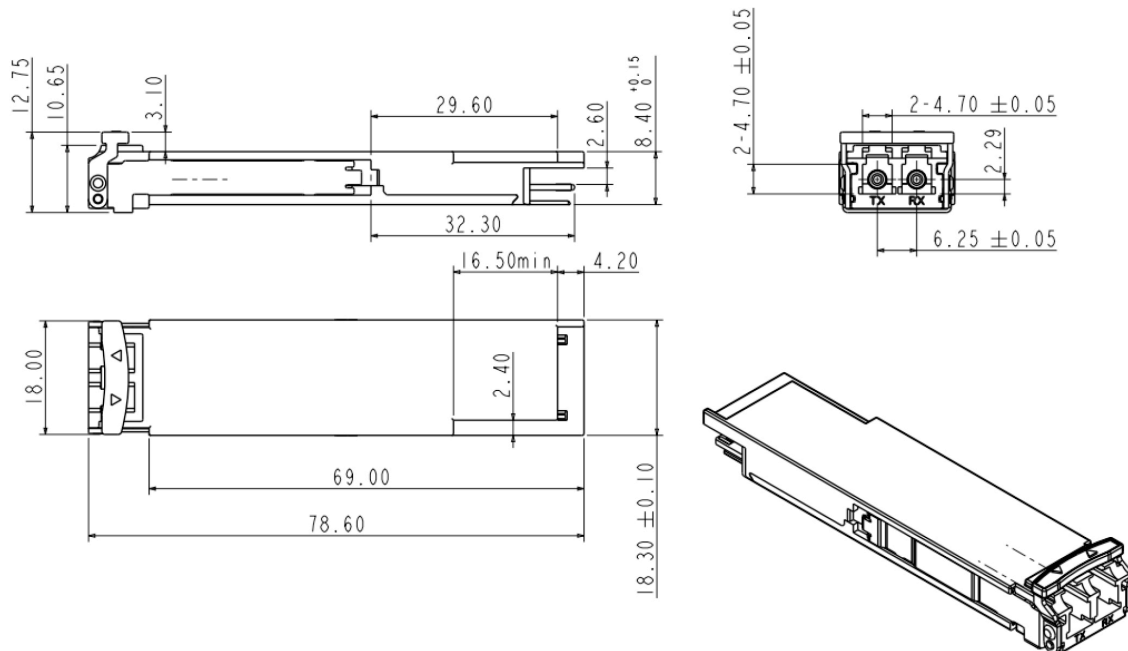


Digital Diagnostic Functions

Four transceiver parameter values are monitored. The following table defines the monitored parameter's accuracy.

Parameter	Range	Accuracy	Calibration
Temperature	0 to +70°C	±3°C	Internal
Voltage	2.97 to 3.63V	±3%	Internal
Bias Current	0 to 100mA	±10%	Internal
RX Power	-13 to 2.5dBm	±2dB	Internal

Mechanical Specifications



Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.7
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- RoHS compliant with 2002/95/EC 4.1&4.2 2005/747/EC