Single-Mode 2.5Gbps SDH/SONET & 2.125Gbps 2xFC Duplex SFF Transceiver

Features

- Small Form Factor 2X5 pin Package
- Duplex LC Single-Mode Transceiver
- Operating data rate up to 2.5Gbps
- 850nm VESCL Transmitter, 300m with 50/125μm or 62.5/125um MMF
- 1310nm FP Laser Transmitter, 2km with 50/125μm or 62.5/125um MMF
- 1310nm DFB Laser Transmitter
  15km with 9/125μm SMF
  40km with 9/125μm SMF
- 1550nm DFB Laser Transmitter,
  40km with 9/125μm SMF
  80km with 9/125μm SMF
- Single 3. 3V Power supply
- DC/AC Coupled Signal Input / Output
- LVTTL Transmitter Disable Input
- LVTTL Signal Detect Output
- Operating Case Temperature
  Standard: 0℃ ~+70℃
  Industrial:-40℃ ~+85℃

Applications

- Fiber Channel Links
- 2x Fiber Channel Links
- Other Optical Link

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Ordering information

Table-1 Ordering information

Part No.	Data Rate	Distance	Laser	Laser	Optical Interface	Fibre Type	Temp	DDMI
LFF -8524-02DS	2.5Gbps	300m	850VESCL	VESCL	LC	MMF	C	No
LFF -8524-02IDS	2.5Gbps	300m	850VESCL	VESCL	LC	MMF	I	No
LFF -1324-02	2.5Gbps	2Km	1310FP	FP	LC	MMF	C	No
LFF -1324-02I	2.5Gbps	2Km	1310FP	FP	LC	MMF	I	No
LFF -1324-15	2.5Gbps	15Km	1310DFB	FP	LC	SMF	C	Yes
LFF -1324-15I	2.5Gbps	15Km	1310DFB	FP	LC	SMF	I	Yes
LFF -1324-40	2.5Gbps	15Km	1310DFB	DFB	LC	SMF	C	No
LFF -1324-40I	2.5Gbps	15Km	1310DFB	DFB	LC	SMF	I	No
LFF -1524-40	2.5Gbps	40Km	1550DFB	DFB	LC	SMF	C	Yes
LFF -1524-40I	2.5Gbps	40Km	1550DFB	DFB	LC	SMF	I	Yes
LFF -1524-80	2.5Gbps	80Km	1550DFB	DFB	LC	SMF	C	No
LFF -1524-80I	2.5Gbps	80Km	1550DFB	DFB	LC	SMF	I	No

[Notes1]: xx is transmitter optical output close or open and Optical receiver Input indicated.
Transmitter optional as below:
B= Tx-BEN (0- close the laser 1- open the laser)
D=Tx-DIS (0-open the laser 1-close the laser)
Receiver optional as below:
S=RX-SD （0-signal loss 1-signal valid)
L=Rx-LOS (0- signal valid 1-signal loss)
So complete Part No. is LFF-1324-15DS

Absolute Maximum Ratings

Table-2 Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Supply Voltage	Vcc	-0.5	-	+3.6	V	
Storage Temperature	TS	-40	-	85	℃	
Operating Relative Humidity	RH	+5	-	+95	%	
Lead Solder Temperature	-	-	-	260	℃	
Lead Solder Duration	-	-	-	10	Sec	

Recommended Operating Conditions

Table-3 Recommended Operating Conditions

Parameter	Symbol		Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	TA	GACF-xx24-xx	0		+70	℃	
		GACF-xx24-xxIx	-40		+85		

Power Supply Voltage	V_{CC}	3.15	3.3	3.45	V	
Power Supply Current	I_{CC}			300	mA	
Surge Current	I_{Surge}			+30	mA	
Baud Rate			2.5		GBaud	

Performance specifications-Electrical

Table-4 Performance specifications-Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
LVPECL Inputs(Differential)	Vin	400		2500	mVp	1
Input Impedance (Differential)	Zin	85	100	115	ohms	2
Tx_DISABLE Input Voltage -High		2		3.45	V	
Tx_DISABLE Input Voltage -Low		0		0.8	V	
Tx_FAULT Output Voltage --High		2		Vcc+0.3	V	
Tx_FAULT Output Voltage --Low		0		0.5	V	Io = -4.0mA
Receiver						
LVPECL Outputs (Differential)	Vout	400	800	1200	mVpp	AC coupled outputs
Output Impedance (Differential)	Zout	85	100	115	ohms	
Rx_LOS Output Voltage -High		2		Vcc+0.3	V	Io = 400μA; Host Vcc
Rx_LOS Output Voltage -Low		0		0.8	V	Io = -4.0mA

Notes1:AC coupled intputs
Notes2: Rin > 100 kohms @ DC
Notes3: Io = 400μA; Host Vcc
Notes4: Io = -4.0mA

Optical and Electrical Characteristics

Table-5.1 LFF-8524-02XX(SFF 2X5 850nm 300m)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						

Average Output Power	P_{0UT}	-10		-3	dBm	1
Mean Wavelength	λ	820	850	870	nm	
Extinction Ratio	ER	8.2	-	-	dB	
Spectral Width(RMS)	Δλ	-	-	1	nm	
P_{0ut}@TX Disable Asserted	P_{0UT}	-	-	-45	dB	
Rise/Fall Time (20%~80%)	T_r/T_f			260	ps	
Receiver						
Receiver Power	Pin		-	-18	dBm	2
Centre Wavelength	λC	830	850	870	nm	
Receiver Overload	Rsens,high	-3	-	-	dBm	
Damage Threshold For Receive	Pin, damage	0				
Signal Detect	SD Assert	-	-	-19	dB	
	SD De-Assert	-29	-	-	dB	
SD Hysteresis		0.5		-	dB	

Note:

1. **Coupled into 50/125 um fiber.**
2. **Measured with PRBS 223-1 test pattern @2.488Gbps.BER=10E-12**

Table-5.2 LFF-1324-02XX(SFF 2X5 1310nm 2km,FP and PIN)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
9μm Core Diameter SMF			2		Km	1
Data Rate			2.5		Gbps	
Transmitter						
Centre Wavelength	λ_C	1260	1310	1360	nm	
Spectral Width (RMS)	σ			1	nm	
Average Output Power	P_{0ut}	-10		-3	dBm	1
Extinction Ratio	EX	9			dB	3
Rise/Fall Time(20%_80%)	tr/tf			2	ns	
Output Optical Eye	IUT-T G.957 Compliant					
TX_Disable Assert Time	t_off			10	us	5
Receiver						
Centre Wavelength	λ_C	1100		1600	nm	
Sensitivity	PIN			-18	dBm	4
Rise/Fall Time	Tr/tf			2.2	ns	
SD De-Assert	SDD	-35		-	dBm	

SD Assert	SDA			-19	dBm	
LOS Hysteresis		0.5			dB	

Note1: Output power is measured by coupling into a 50/125μm MMF
Note2: Output power is measured by coupling into a 9/125 μm Single-mode fiber.
Note3: Filtered, measured with a PRBS 223-1 test pattern @2500Mbps.
Note4: Minimum average optical power measured at BER less than 1E-12, with a 223-1 PRBS and ER=9 dB.

Table-5.3 LFF-1324-15XX(SFF 2X5 1310nm 15km,DFB and PIN)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
9μm Core Diameter SMF			15		Km	2
Data Rate			2.5		Gbps	
Transmitter						
Centre Wavelength	λ_C	1260	1310	1360	nm	
Spectral Width (RMS)	σ			1	nm	
Average Output Power	P_{0ut}	-10		-3	dBm	2
Extinction Ratio	EX	9			dB	3
Rise/Fall Time(20%_80%)	tr/tf			2	ns	
Output Optical Eye	IUT-T G.957 Compliant					5
TX_Disable Assert Time	t_off			10	us	
Receiver						
Centre Wavelength	λ_C	1100		1600	nm	
Sensitivity	PIN			-18	dBm	4
Rise/Fall Time	Tr/tf			2.2	ns	
SD De-Assert	SDD	-35		-	dBm	
SD Assert	SDA			-19	dBm	
LOS Hysteresis		0.5			dB	

Note1: Output power is measured by coupling into a 50/125μm MMF
Note2:Output power is measured by coupling into a 9/125 μm Single-mode fiber.
Note3: Filtered, measured with a PRBS 223-1 test pattern @2500Mbps.
Note4: Minimum average optical power measured at BER less than 1E-12, with a 223-1 PRBS and ER=9 dB.

Table-5.4 LFF-1324-40XX (SFF 2X5 1310nm 40km,DFB and APD)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
9μm Core Diameter SMF			40		Km	2
Data Rate			2.5		Gbps	

Transmitter						
Centre Wavelength	λ_C	1290	1310	1330	nm	
Spectral Width (RMS)	σ			1	nm	
Average Output Power	P_{0ut}	-5		0	dBm	2
Extinction Ratio	EX	9			dB	3
Rise/Fall Time(20%_80%)	tr/tf			2	ns	
Output Optical Eye	IUT-T G.957 Compliant					5
TX_Disable Assert Time	t_off			10	us	
Receiver						
Centre Wavelength	λ_C	1100		1600	nm	
Sensitivity	PIN			-28	dBm	4
Rise/Fall Time	Tr/tf			2.2	ns	
SD De-Assert	SDD	-42		-	dBm	
SD Assert	SDA			-32	dBm	
LOS Hysteresis		0.5			dB	

Note1: Output power is measured by coupling into a 50/125μm MMF
Note2:Output power is measured by coupling into a 9/125 μm Single-mode fiber.
Note3: Filtered, measured with a PRBS 223-1 test pattern @2500Mbps.
Note4: Minimum average optical power measured at BER less than 1E-12, with a 223-1 PRBS and ER=9 dB.

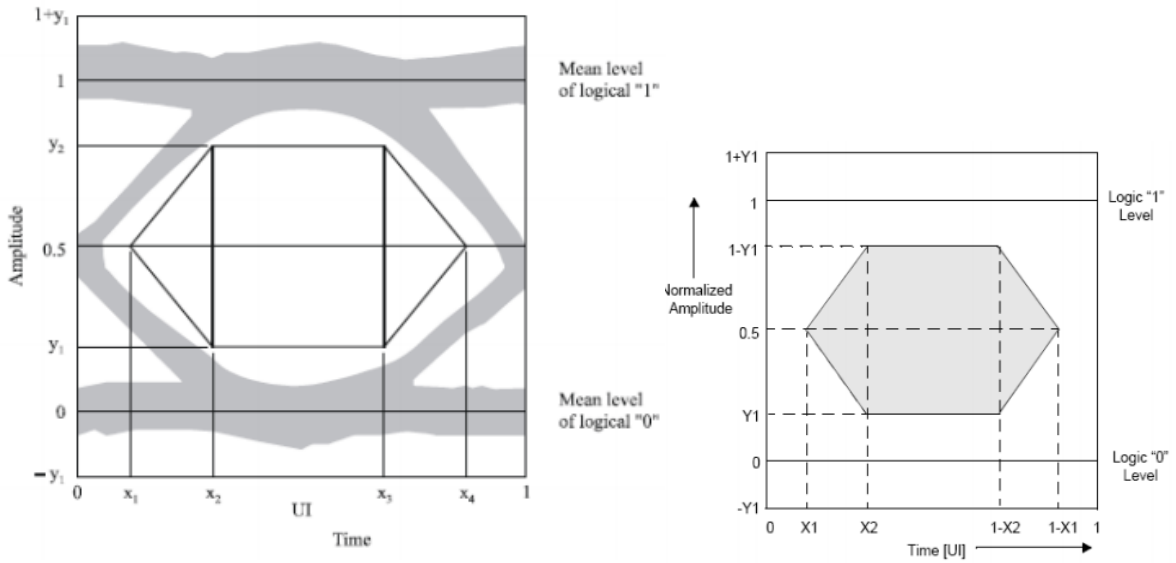
Table-5.5 LFF-1524-80XX(SFF 2X5 1550nm 80km,DFB and PIN)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
9μm Core Diameter SMF			80		Km	2
Data Rate			2.5		Gbps	
Transmitter						
Centre Wavelength	λ_C	1520	1550	1580	nm	
Spectral Width (RMS)	σ			1	nm	
Average Output Power	P_{0ut}	0		5	dBm	2
Extinction Ratio	EX	9			dB	3
Rise/Fall Time(20%_80%)	tr/tf			2	ns	
Output Optical Eye	IUT-T G.957 Compliant					5
TX_Disable Assert Time	t_off			10	us	

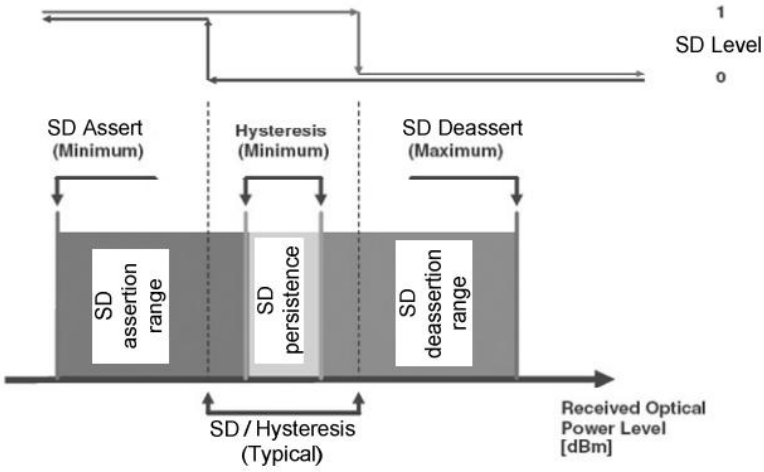
Receiver						
Centre Wavelength	λ_C	1100		1600	nm	
Sensitivity	PIN			-28	dBm	4
Rise/Fall Time	Tr/tf			2.2	ns	
SD De-Assert	SDD	-42		-	dBm	
SD Assert	SDA			-32	dBm	
LOS Hysteresis		0.5			dB	6

Note1: Output power is measured by coupling into a 50/125μm MMF
Note2:Output power is measured by coupling into a 9/125 μm Single-mode fiber.
Note3: Filtered, measured with a PRBS 223-1 test pattern @2500Mbps.
Note4: Minimum average optical power measured at BER less than 1E-12, with a 223-1 PRBS and ER=9 dB.
Note5: eye pattern mask
Note6:SD Hysteresis

Note5: Eye Pattern Mask



Note6:SD Hysteresis



Functional Description of Transceiver

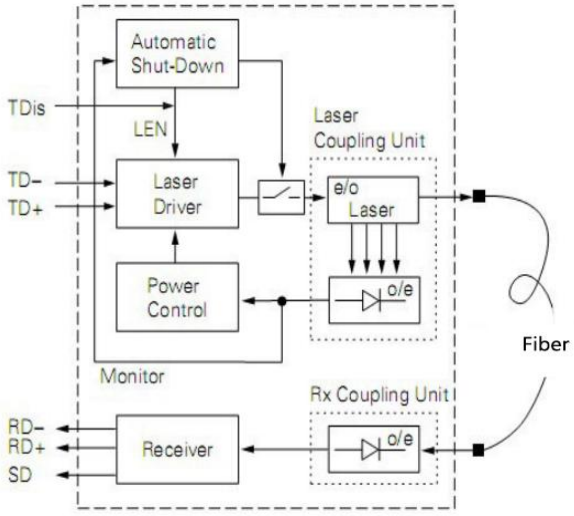


Figure 3, Functional Description of Transceiver

SFF Transceiver Electrical Pad Layout

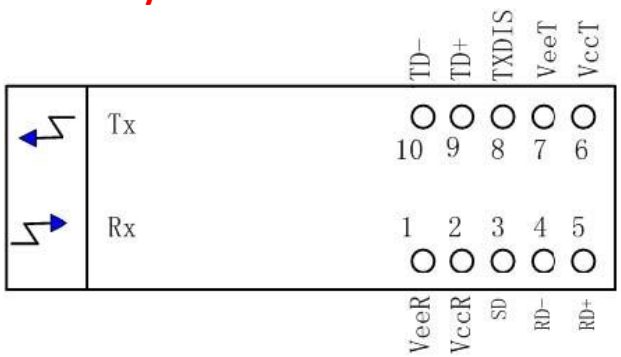


Figure 3, Case isolated from circuit ground

Pin Function Definitions

Pin No.	Name	Function
1	Veer	Receiver Signal Ground
2	Vccr	3.3V DC power for receiver section
3	SD	Signal Detect Output (LVTTL) “1” -“Signal valid”, “0” – “Lose of signal”
4	RD-	Received Data Out Bar (LVPECL), without termination inside
5	RD+	Received Data Out (LVPECL), without termination inside
6	Vcct	3.3V DC power for transmitter section
7	Veet	Transmitter Signal Ground
8	TDis	Transmitter Disable (LVTTL), “1” – Disable, “0” – Enable
9	TD+	Transmitter Data In (LVPECL), without termination inside
10	TD-	Transmitter Data In Bar (LVPECL), without termination insdie

Recommend Circuit Schematic

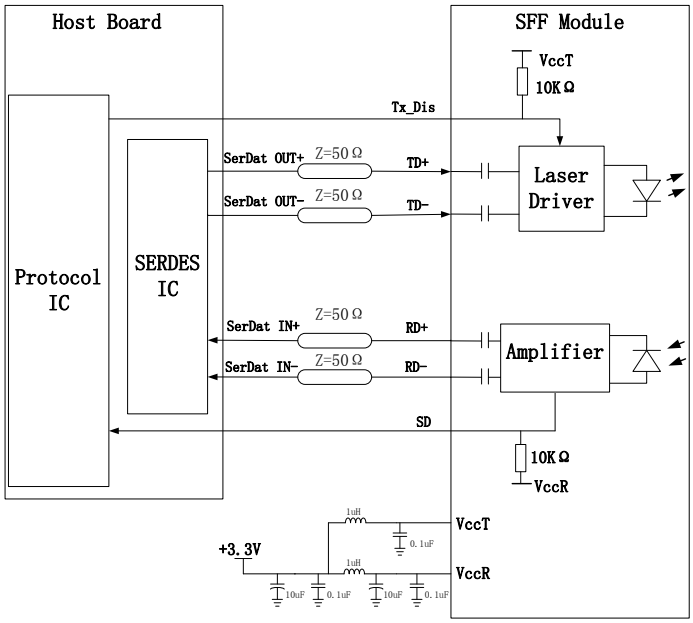


Figure 4, Recommended Interface Circuit

Mechanical Specifications

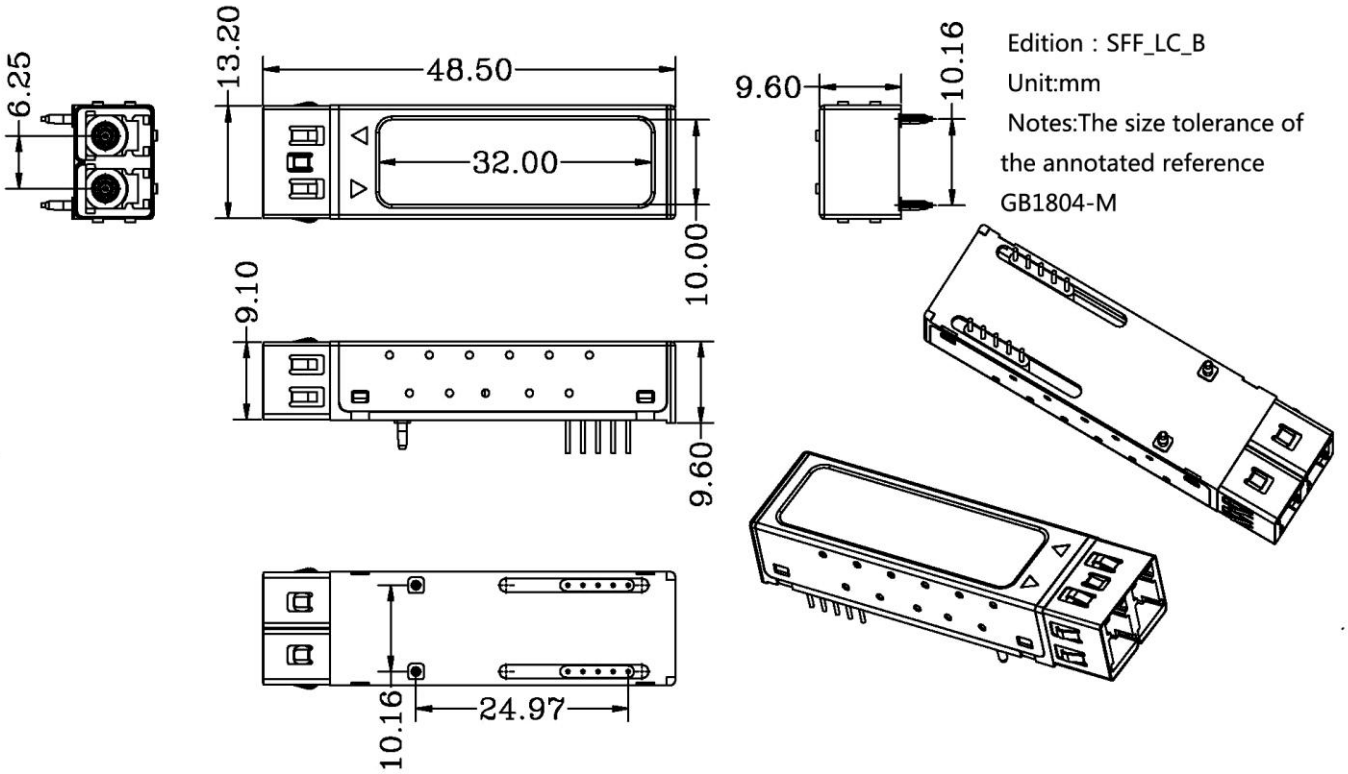


Figure 5, Package Outline

Eye Safety

This single-mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compatible with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.

Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compatible with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards*note2

Note1: For update of the equipments and strict control of raw materials, LINK-PP has the ability to supply the customized products since Jan 1, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union.
In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for LINK-PP's transceivers, because LINK-PP's transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

Notice:

LINK-PP reserves the right to make changes to or discontinue any optical link product or service identified in this publication, without notice, in order to improve design and/or performance. Applications that are described herein for any of the optical link products are for illustrative purposes only. LINK-PP makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Revision History:

Version	Initiated	Reviewed	Revision History	Release Date
A0	Code	simon	Initialization	2009-03-27
A1	Jim	Smith	Updated nomenclature and Contact information.	2011-04-25
A2	Code	Sandy	Modify some parameters	2013-10-8
A3	Code	Sandy	Modify the format and description	2015-03-8

For More Information

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