

LPHKLE45(54)-K80C

SFP+ 10Gb/s T14/R15(T15/R14) 80km DDML

PRODUCT FEATURES

- Up to 10.3125Gbps Data Links
- 1490nm /1550 Cooled EML laser transmitter and APD/TIA receiver
- Maximum link length of 80km on 9/125um SMF
- Hot-pluggable SFP+ footprint
- LC receptacles
- Low power dissipation <2W
- RoHS compliant and lead-free
- Support Digital Diagnostic Monitor interface
- Single +3.3V power supply
- Compliant with SFF-8472
- Case operating temperature

Commercial: 0°C to +70°C

APPLICATIONS

- 10GBASE-ZR/ZW 10G Ethernet
- C8G/10G Fibre Channel
- CPRI option 7A, option 8
- Other Optical Links

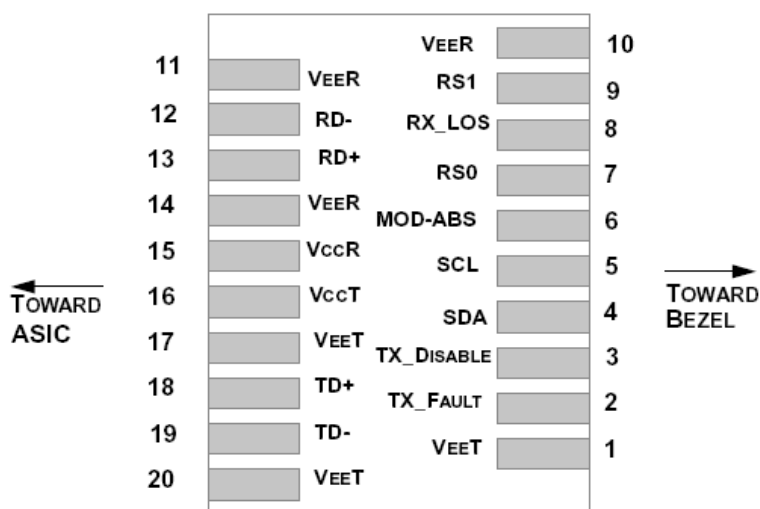
Compliance

- SFP MSA
- SFF-8472
- IEEE802.3ae
- ROHS

Ordering information

Part No.	Bit Rate (Gbps)	Laser (nm)	Distance (km)	Fiber Type	DDMI	Connector	Temp
LPHKLE45-K80C	10.3125	1550	80	SMF	YES	LC	0°C~70°C
LPHKLE54-K80C	10.3125	1490	80	SMF	YES	LC	0°C~70°C

I. Pin Diagram



Pinout of Connector Block on Host Board

II. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault.	2
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	No connection required	
8	LOS	Loss of Signal indication. Logic "0" indicates normal operation.	5
9	RS1	No connection required	
10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	

16	V _{CCT}	Transmitter Power Supply	
17	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. T_{FAULT} is an open collector/drain output, which is pulled up with a 4.7kΩ – 10kΩ resistor on the host board, but is grounded inside the SFP+ cable plug.
3. Laser output disabled on T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.
4. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pull line low to indicate module is plugged in.
5. LOS is open collector output. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

III. Absolute Maximum Ratings

Parameter	Symbol	Min	Type	Max	Unit	Ref.
Maximum Supply Voltage	V _{CC}	-0.5		3.6	V	
Storage Temperature	T _S	-40		85	°C	
Case Operating Temperature	T _{OP}	0		70		Commercial
Relative Humidity	RH	0		85	%	1

Note 1s: Non-condensing.

IV. Optical Characteristics (T_{OP} = 0°C to 70°C, V_{CC} = 3.3 ± 5% Volts)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Transmitter						
Center Wavelength	λ_c	1480	1490	1500	nm	ESHKLE45-K80
		1540	1550	1560		ESHKLE54-K80
Spectral Width(-20dB)	P _m			1	nm	
Side-mode Suppression Ratio	SMSR	30			dB	
Average Output Power	P _{avg}	-1		4	dBm	
Extinction Ratio	ER	7.5			dB	
Return Loss		12			dB	
Transmitter OFF Output Power	P _{Off}			-30	dBm	

Receiver						
Center Wavelength	λ_c	1540	1550	1560	nm	ESHKLE45-K80
		1480	1490	1500		ESHKLE54-K80
Sensitivity@10.3125Gbps	P _{min}			-23	dBm	1
Sensitivity(SM 80KM)@10.3125Gbps	P _{min}			-20	dBm	1
Receiver Saturation Power	P _{sat}			-8	dBm	
Loss of Signal Assert	P _A	-38			dBm	
Loss of Signal De-assert	P _D			-24	dBm	
LOS Hysteresis	P _D - P _A	0.5			dB	

Notes1.Measured with a PRBS 2³¹-1 test pattern, @10.3125Gb/s, BER<1E-12 .

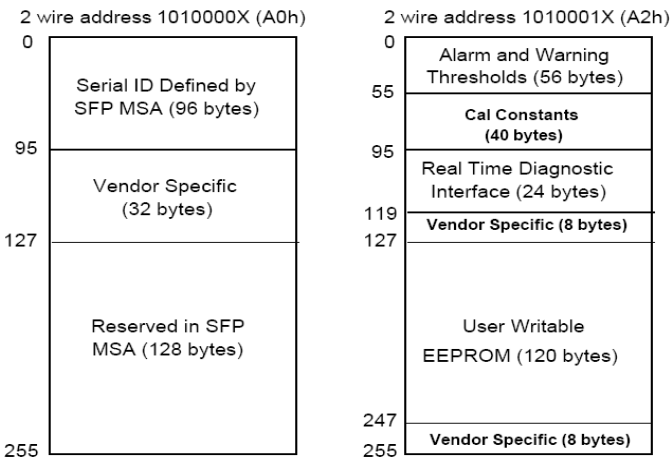
V. Electrical Characteristics (TOP = 0°C to 70°C, VCC = 3.3 ± 5% Volts)

Parameter	Symbol	Min	Type	Max	Unit	Ref.
Supply Voltage	V _{cc}	3.15	3.3	3.45	V	
Supply Current	I _{cc}			600	mA	
Power Dissipation	P			2	W	
Transmitter						
Input differential impedance	R _{in}		100			1
Differential data input swing	V _{in} , pp	200		1000	mV	
Transmit Disable Voltage	V _D	2		V _{CC}	V	
Transmit Enable Voltage	V _{EN}	V _{ee}		V _{ee} +0.8	V	
Receiver						
Differential data output swing	V _{out} , pp	200		850	mV	2
LOS Fault	V _{LOS_fault}	2		V _{cc}	V	3
LOS Normal	V _{LOS_norm}	V _{ee}		V _{ee} +0.8	V	3
Power Supply Noise Tolerance	V _{CCT} /V _{CCR}	Per SFF-8431			mVpp	

Notes:

1. Connected directly to TX data input pins.AC coupling from pins into laser driver IC.
2. Into 100Ω differential termination.
3. Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

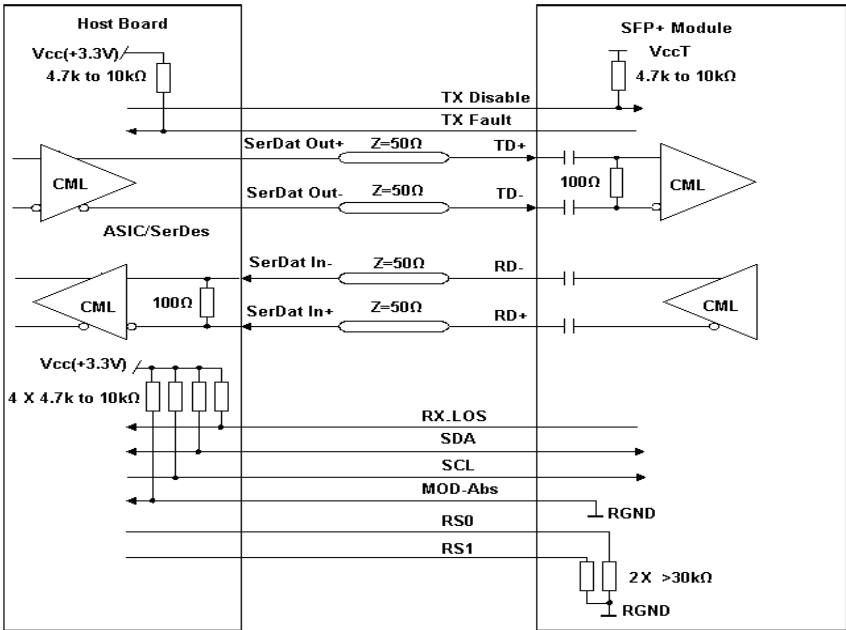
VI. Digital Diagnostic Memory Map



VII. Digital Diagnostic Monitoring Information

Parameter	Unit	Accuracy
Case Temperature	°C	±3
Supply Voltage	V	±3%
Tx Bias Current	mA	±10%
Tx Optical Power	dB	±3
Rx Optical Power	dB	±3

VIII. Recommended Interface Circuit



IX. Mechanical Dimensions

