



Description

The A56L-LN13-ADGA is specifically designed for the high performance integrated duplex data transmission over single mode optical fiber. This transceiver module is compliant with the Small Form-factor Pluggable (SFP) Multisource Agreement (MSA).

The A56L-LN13-ADGA SFP transceivers incorporate a 1310nm FP laser diode and can achieve data transmission up to 10km on a single mode (9/125 μ m) optical fiber.

Features

- ❑ Hot pluggable
- ❑ SFP Multi-Source Agreement compliant
- ❑ Serial ID functionality support
- ❑ IEEE 802.3z compliant
- ❑ Low power dissipation
- ❑ 10km reach
- ❑ Digital diagnostic SFF-8472 compliant

Applications

- ❑ Gigabit Ethernet
- ❑ High speed I/O for file server
- ❑ Mass storage system I/O
- ❑ Host adapter I/O
- ❑ Bus extension application
- ❑ CPRI 2 (1228.8 Mbit/s)



SFP 1.25G MMF 10Km 1310nm Transceiver

A56L-LN13-ADGA

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Min	Max	Unit
Storage Temperature	T_S	--	-40	+85	°C
Supply Voltage	V_{CCT} V_{CCR}	--	-0.5	4.5	V
Storage Relative Humidity	RH	--	5	95	%

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Case Operating Temperature	T_C		-40	--	85	°C
Supply Voltage	V_{CC}		3.13	3.3	3.47	V
Supply Current	$I_{TX} + I_{RX}$			200	300	mA

Transmitter Electro-Optical Interface

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Transmitter Differential Input Voltage	TD +/-	--	500	--	2400	mV
Tx_Fault - High	V_{Fault_H}	--	2	--	V_{CC}	V
Tx_Fault - Low	V_{Fault_L}	--	V_{EE}	--	$V_{EE} + 0.8$	V
Tx_Disable -High	$V_{Disable_H}$	--	2	--	V_{CC}	V
Tx_Disable - Low	$V_{Disable_L}$	--	V_{EE}	--	$V_{EE} + 0.8$	V
Optical Output Power	P_o	Coupling into a 9/125µm single-mode fiber	-9	--	-3	dBm
Optical Extinction Ratio	E_R	--	9.0	--	--	dB
Center Wavelength	λ_c	--	1270		1360	nm
Spectral Width (-20 dB)	$\Delta \lambda$	--	--		3	nm
Relative Intensity Noise	RIN	--	--	--	-120	dB
Optical Rise / Fall Time	t_r / t_f	20% to 80% value	--	--	260	ps
Total Contributed Jitter	TJ_{p-p}		--	--	227	psec

Receiver Electro-Optical Interface

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Receiver Differential Output Voltage	RD +/-	--	370	--	2000	mV
Receiver Overload	P_{INMAX}	1	0	--	--	dBm
Receiver Sensitivity	P_{INMIN}	1	--	--	-20	dBm
Operating Center Wavelength	λ_c	--	1200	--	1620	nm

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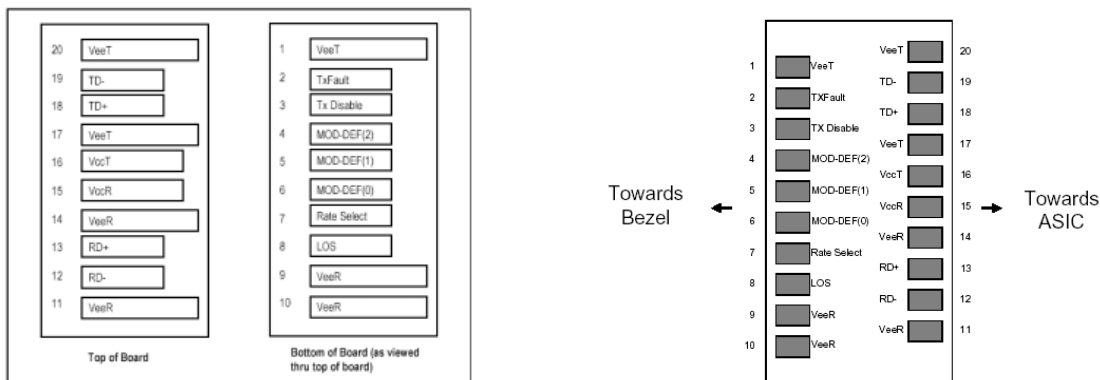
A56L-LN13-ADGA

Receiver Loss of Signal-TTL Low	P _{RX_LOS D}	--	--	--	-20	dBm
Receiver Loss of Signal-TTL High	P _{RX_LOS A}	--	-32	--	--	dBm
Receiver Loss of Signal Hysteresis		--	0.5	--	5	dB

Notes:

1. With BER better than or equal to 1×10^{-12} , measured in the center of the eye opening with $2^7 - 1$ PRBS

Pin Description



SFP Transceiver Electric Pad Layout

Diagram of Host Board Connector Block Pin Numbers and Names

Pin No.	Pin Name	Function	Plug Seq.	Note
1	V _{eeT}	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable	3	4
4	MOD_DEF 2	Module Definition 2	3	3
5	MOD_DEF 1	Module Definition 1	3	3
6	MOD_DEF 0	Module Definition 0	3	3
7	Rate Select	Select between full or reduced receiver bandwidth	3	4
8	LOS	Loss of Signal	3	5
9	V _{eeR}	Receiver Ground	1	6
10	V _{eeR}	Receiver Ground	1	6
11	V _{eeR}	Receiver Ground	1	6
12	RD -	Inv. Receiver Data Out	3	7
13	RD +	Receiver Data Out	3	7
14	V _{eeR}	Receiver Ground	1	6
15	V _{ccR}	Receiver Power	2	8
16	V _{ccT}	Transmitter Power	2	8
17	V _{eeT}	Transmitter Ground	1	6



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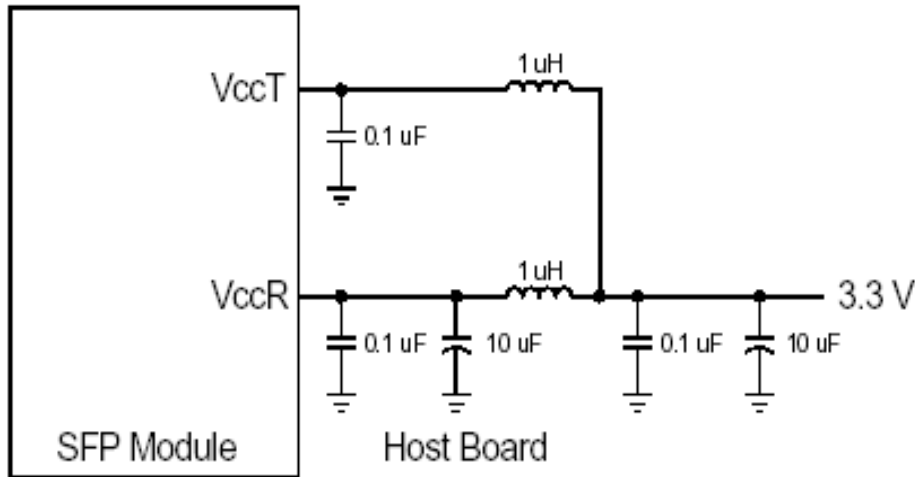
18	TD +	Transmitter Data In	3	9
19	TD -	Inv. Transmitter Data In	3	9
20	V _{ee} T	Transmitter Ground	1	6

Notes:

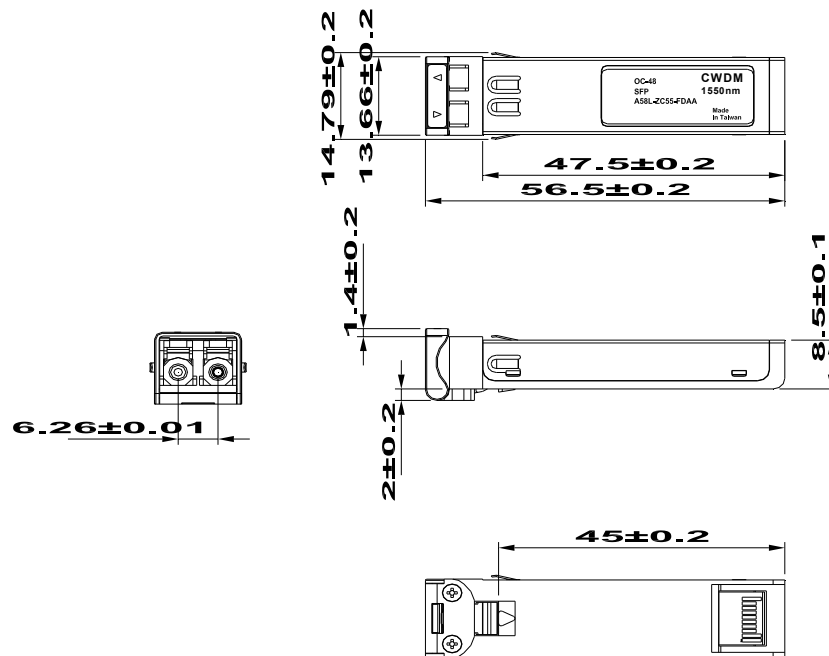
Plug Seq.: Pin engagement sequence during hot plugging.

- TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and V_{cc}T, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
- TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10 KΩ resistor. Its states are:
 - Low (0 – 0.8V): Transmitter on
 - (>0.8, < 2.0V): Undefined
 - High (2.0 – 3.465V): Transmitter Disabled
 - Open: Transmitter Disabled
- Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K - 10KΩ resistor on the host board. The pull-up voltage shall be V_{cc}T or V_{cc}R
 - Mod-Def 0 is grounded by the module to indicate that the module is present
 - Mod-Def 1 is the clock line of two wire serial interface for serial ID
 - Mod-Def 2 is the data line of two wire serial interface for serial ID
- This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:
 - Low (0 - 0.8V): Reduced Bandwidth
 - (>0.8 , < 2.0V): Undefined
 - High (2.0 V -3.465V): Full Bandwidth
 - Open: Reduced Bandwidth
- LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K -10KΩ resistor. Pull up voltage between 2.0V and V_{cc}T, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
- V_{ee}R and V_{ee}T may be internally connected within the SFP module.
- RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370 and 2000 mV differential (185 - 1000 mV single ended) when properly terminated.
- V_{cc}R and V_{cc}T are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300 mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value. V_{cc}R and V_{cc}T may be internally connected within the SFP transceiver module.
- TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 500 mV - 2400 mV (250 mV - 1200 mV single-ended), though it is recommended that values between 500 and 1200 mV differential (250 mV- 600 mV single-ended) be used for best EMI performance.

Recommended Host Board Supply Filtering Circuit



Mechanical Dimensions (mm)





Regulatory Compliance

Item	Standard
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
Electrostatic Discharge to the Electrical Pins (ESD)	MIL-STD-883E Method 3015.7
Electrostatic Discharge to the Receptacle (ESD)	IEC 61000-4-2
RoHS	2011/65/EU
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11
Component Recognition	UL and TUV

Laser Safety Information

All versions of this laser are Class 1 laser products per IEC¹/EN² 60825-1. Users should observe safety precautions such as those recommended by ANSI³ Z136.1-2000, ANSI Z36.2-1997 and IEC 60825-1.

This product conforms to FDA (CDRH) 21 CFR 1040.10 and 1040.11 except for deviations of laser safety class designation pursuant to [Laser Notice No.50](#)¹.

Product labeling:

Class 1 Laser Product
Compliance with 21 CFR
1040.10 and 1040.11

If labeling is not affixed to the module due to size constraints; then rather, labeling is placed on the outside of the shipping box.

This product is not shipped with a power supply.

Caution: use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Certifications

UL	60950-1 (E243407)
TUV	EN60950-1, EN 60825-1, EN 60825-2

Documentation is available upon request.

(1) IEC is a registered trademark of the International Electrotechnical Commission

(2) Within Europe the IEC standard has been adopted as a European Normative standard known as EN 60825, and each European country will have its own version of this standard, for example, the British Standards version known as BS EN 60825. There can be small differences between the different countries versions of EN 60825, and these are in part caused by the process of translating the standard into the native language of that country.

(3) ANSI is a registered trademark of the American National Standards Institute

Note : All information contained in this document is subject to change without notice.