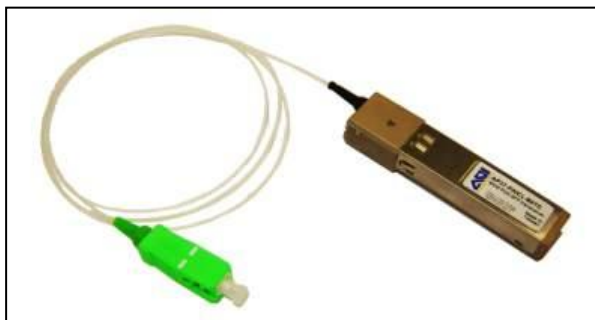




**AP67-FWCL-C6LA Transceiver**

**Pluggable OC-24 WDM-PON SFP Transceiver with Fiber Pigtail**

**Description**



The AP67-FWCL-C6LA Small Form Factor Pluggable (SFP) transceivers are intended for use in “colorless” ONT applications for WDM-PON networks operating up to 125 Mbps or 1.25 Gbps. Detailed ID information is available via the 2-wire serial bus specified in the SFP MSA.

The AP67-FWCL-C6LA Small Form Factor Pluggable transceivers incorporate a specially designed injection-lockable FP LD transmitter operating in the C-band, receiver for signals across the L-band, and an integrated WDM to separate C- and L- band signals. It can achieve data transmission up to 1.25 Gbps over 20km on a single mode (9/125µm) optical fiber.

**Features**

- ❑ Standard SC/APC fiber pigtail Optical Interface
- ❑ Suitable for injection locking
- ❑ Single power supply 3.3 V
- ❑ ROHS compliant
- ❑ Serial I.D. and optional DDM (per SFF-8472)
- ❑ APD-TIA photodetector
- ❑ MSA compliant height and width mechanical dimensions

**Ordering Information**

AOI Part Number	Description
AP67-FWCL-C6LA	BIDI WDM-PON SFP, C-band Tx, L-band Rx, -10 to 50°C, 20 km



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## AP67-FWCL-C6LA Transceiver

### Absolute Maximum Ratings

Parameter	Symbol	Conditions	Min	Max	Unit
Storage Temperature	$T_S$	--	-40	85	°C
Supply Voltage	$V_{CC}$	--	0	3.6	V
Storage Relative Humidity	RH	--	0	85	%

### Recommended Operating Conditions

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Case Operating Temperature	$T_C$	--	-10	--	50	°C
Supply Voltage	$V_{CC}$	--	3.1	--	3.5	V
Supply Current	$I_{TX} + I_{RX}$	--	--	180	300	mA
Data Rate	BR	--	--	1.25	--	Gbps

### Transmitter Electro-Optical Interface

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Transmitter Differential Input Voltage	TD +/-	peak-to-peak	500	--	2400	mV
Transmit Disable Voltage	$V_{dis}$	--	2.0	--	$V_{CC}$	V
Transmit Enable Voltage	$V_{en}$	--	$V_{EE}$	--	0.5	V
Fault Assert Voltage	$V_{oh}$	--	2.0	--	$V_{CC}$	V
Fault Deassert Voltage	$V_{ol}$	--	$V_{EE}$	--	$V_{EE} + 0.5$	V
Disable Assert Delay	$t_{off}$	--	--	--	10	μs
Disable Deassert Delay	$t_{on}$	--	--	--	1	ms
Optical Output Power	$P_o$	Coupling into a 9/125μm SM fiber	-12	--	-5	dBm
Optical Extinction Ratio	$E_R$	--	9	--	--	dB
Center Wavelength	$\lambda_c$	--	1533	--	1560	nm
Spectral Width (-10 dB)	$\Delta\lambda$	--	--	--	1	nm
Side Mode Suppression Ratio	SMSR	Injection seed power = -19 dBm/0.2nm though 100 GHz AWG	15	--	--	dB
Optical Rise / Fall Time	$t_r / t_f$	20% to 80% value	--	--	0.3	ns
Injection locking power	$P_{il}$	Input to optical connector	-19	--	--	dBm/0.2nm
Bit Error Rate	BER	measured at 30% eye opening with 2 <sup>7</sup> -1 PRBS measured with FEC	--	10 <sup>-8</sup> 10 <sup>-10</sup>	--	--

### Receiver Electro-Optical Interface

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Differential Data Output Swing	$V_{out}$	peak-to-peak	800	--	1200	mV
Receiver Overload	$P_{INMAX}$	--	-8	--	--	dBm
Receiver Sensitivity	$P_{INMIN}$	measured with 1590nm DFB laser @ 1.25 Gbps, 2 <sup>7</sup> -1 PRBS, BER= 10 <sup>-10</sup>	--	--	-35.0	dBm
Operating Wavelength	$\lambda_c$	--	1573	--	1600	nm
LOS Assert Voltage	$V_{fault}$	--	2.0	--	$V_{CC}$	V
LOS Deassert Voltage	$V_{normal}$	--	$V_{EE}$	--	$V_{EE} + 0.5$	V
LOS Assert (TTL-High)	$P_{RX\_LOS\_A}$	--	-39	--	--	dBm
LOS Deassert (TTL-Low)	$P_{RX\_LOS\_D}$	--	--	--	-23	dBm

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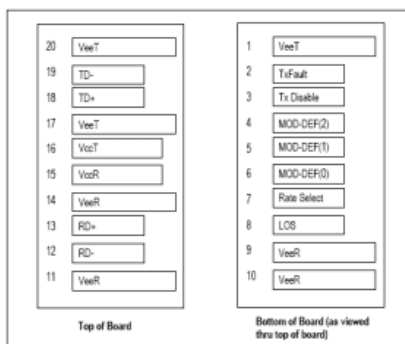
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**AP67-FWCL-C6LA Transceiver**

**Pin Description**

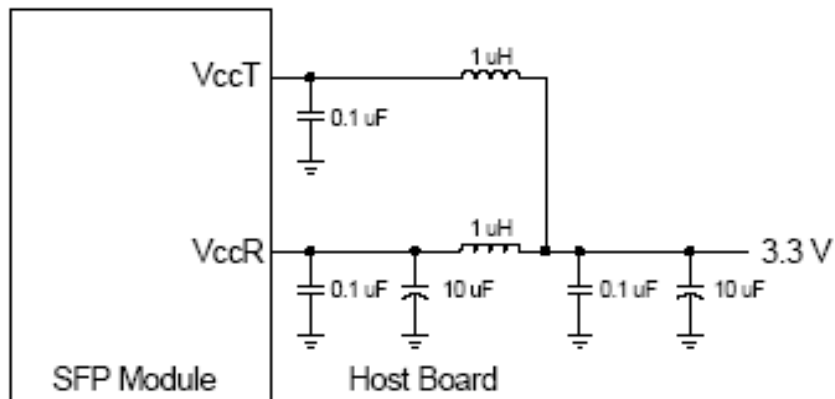


Pin Num.	Name	Function	Plug Seq.	Note
1	VeeT	Transmitter Ground	1	Note 7
2	Tx_Fault	Transmitter Fault Indication	3	Note 1
3	Tx_Disable	Transmitter Disable	3	Note 2 Module disables on high or open
4	MOD_DEF2	Module Definition 2	3	Note 3, 2 wire serial ID interface
5	MOD_DEF1	Module Definition 1	3	Note 3, 2 wire serial ID interface
6	MOD_DEF0	Module Definition 0	3	Note 3, Grounded in Module
7	Rate Select	Select between full or reduced receiver bandwidth	3	No Connection Required
8	Rx_LOS	Loss of Signal	3	Note 4
9	VeeR	Receiver Ground	1	Note 7
10	VeeR	Receiver Ground	1	Note 7
11	VeeR	Receiver Ground	1	Note 7
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	VeeR	Receiver Ground	1	Note 7
15	VccR	Receiver Power	2	3.3 ± 5%, Note 6
16	VccT	Transmitter Power	2	3.3 ± 5%, Note 6
17	VeeT	Transmitter Ground	1	Note 7
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 7

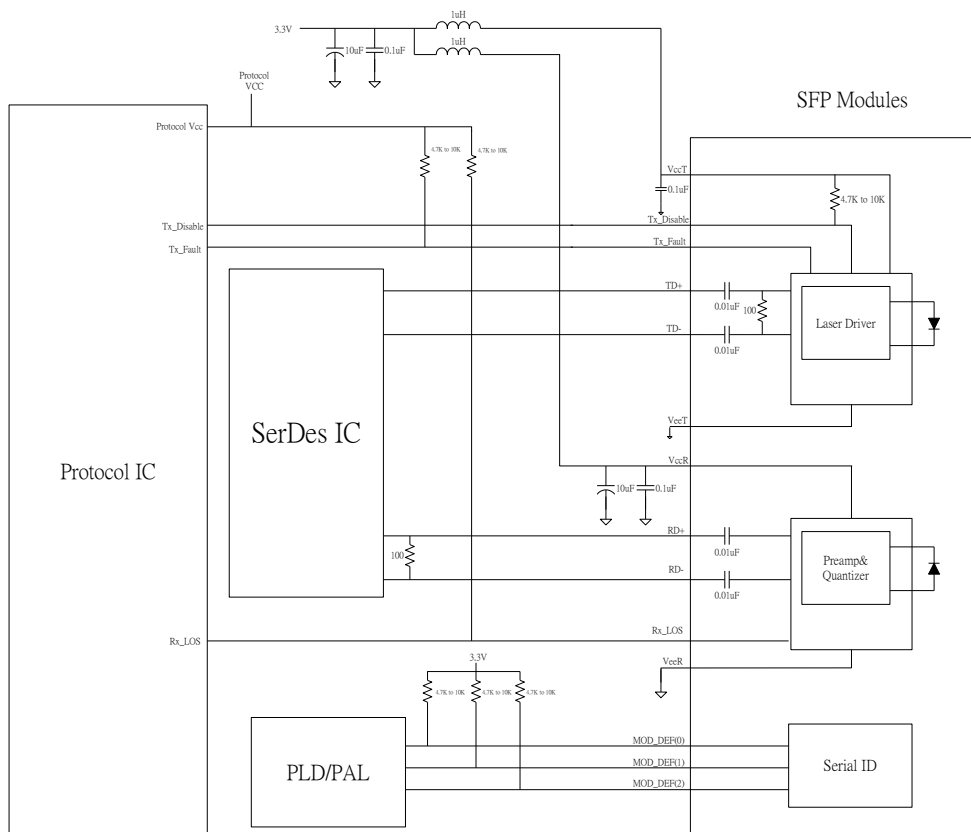
- Note 1:** Tx\_Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.5V.
- Note 2:** 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.
- Note 3:** 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.
- Note 4:** Rx\_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 VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity. Low indicates normal operation. In the low state, the output will be pulled to < 0.5V.
- Note 5:** These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- Note 6:** VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Recommended host board power supply filtering is shown below.
- Note 7:** VeeR and VeeT may be internally connected within the SFP module.
- Note 8:** These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module.

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**Recommended Host Board Supply Filtering Network**

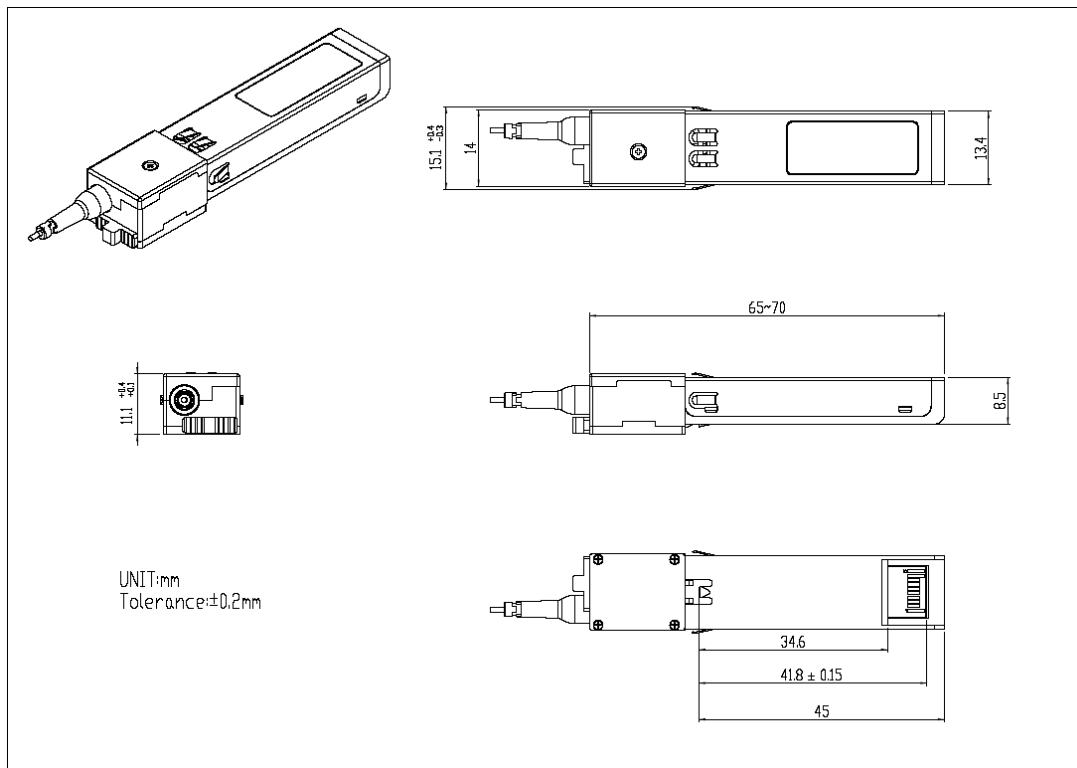


**Suggest Transceiver / Host Interface**



## AP67-FWCL-C6LA Transceiver

### Mechanical Dimensions



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**AP67-FWCL-C6LA Transceiver**

**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	2002/95/EC
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 1M laser products per IEC<sup>1</sup>/EN<sup>2</sup> 60825-1:2001-08. Users should observe safety precautions such as those recommended by ANSI<sup>3</sup> Z136.1-2000, ANSI Z36.2-1997 and IEC 60825-1:2001-08.

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](#)', dated June 24, 2007 i.e. IEC 60825-1 Class 1M equivalence to CDRH Class IIIb. This laser module is only intended for use as a component by manufacturers of electronic products and equipment.

Product labeling:

Class 1M 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**

<b>UL</b>	<b>60950-1 (E243407)</b>
<b>TUV</b>	<b>EN60950-1:2001+A11, EN 60825-1, EN 60825-2</b>

Documentation 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

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