8G Fiber Channel SFP+ 850nm 150m DOM LC MMF Transceiver Module

AJ718A-LL

Application

- 10GBASE-SR/SW Ethernet
- SONET OC-192 / SDH STM-64
- 10G Fibre Channel

Features

- Supports 8.5 to 11.3Gb/s bit rates
- Hot-Pluggable
- Duplex LC connector
- 850nm VCSEL transmitter, PIN photo-detector
- Maximum link length of 300m on 2000 MHZ-km MMF
- 2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface
- Power Supply :+3.3V
- Power consumption<1W
- Temperature Range: 0~ 70° C RoHS compliant

Description

The SFP+ Module is a very compact 10Gb/s optical transceiver module for serial optical communication applications at 10Gb/s. The converts a 10Gb/s serial electrical data stream to 10Gb/s optical output signal and a 10Gb/s optical input signal to 10Gb/s serial electrical data streams. The high speed 10Gb/s electrical interface is fully compliant with SFI specification.

The high performance 850nm VCSEL transmitter and high sensitivity PIN receiver provide superior performance for Ethernet applications at up to 300m links.

The SFP+ Module compliants with SFF-8431, SFF-8432 and IEEE 802.3ae 10GBASE-SR. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

The fully SFP compliant form factor provides hot pluggability, easy optical port upgrades and low EMI emission.

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
StorageTemperature	TS	-40		+85	° C
CaseOperatingTemperature	TA	0		70	° C
MaximumSupplyVoltage	Vcc	-0.5		4	V
RelativeHumidity	RH	0		85	%

II. Electrical Characteristics (TOP = 0 to 70 ° C, VCC = 3.0 to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	Vcc	3.135		3.465	V	
SupplyCurrent	Icc			250	mA	
PowerConsumption	P			1	W	
Transmitter Section						
Inputdifferentialimpedance	Rin		100		Ω	1
TxInputSingleEndedDCVoltageTolerance(RefVeeT)	V	-0.3		4	V	
Differentialinputvoltageswing	Vin,pp	180		700	mV	2
TransmitDisableVoltage	VD	2		Vcc	V	3
TransmitEnableVoltage	VEN	Vee		Vee+0.8	V	
Receiver Section						
SingleEndedOutputVoltageTolerance	V	-0.3		4	V	
RxOutputDiffVoltage	Vo	300		850	mV	

RxOutputRiseandFallTime	Tr/Tf	30			ps	4
LOS Fault	VLOS fault	2		VccHOST	V	5
LOSNormal	VLOSnorm	Vee		Vee+0.8	V	5

Note:
1.Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2.Per SFF-8431 Rev 3.0
3.Into 100 ohms differential termination.
4.20%～80%
5.LOS is an open collector output. Should be pulled up with 4.7k – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

III. Optical Parameters(TOP = 0 to 70° C, VCC = 3.00 to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section						
CenterWavelength	λt	840	850	860	nm	
RMSspectralwidth	λRMS			4	nm	
AverageOpticalPower	Pavg	-6		-1	dBm	1
OpticalPowerOMA	Poma		-1.5		dBm	
LaserOffPower	Poff			-30	dBm	
ExtinctionRatio	ER	3.5			dB	
TransmitterDispersionPenalty	TDP			3.9	dB	2
RelativeIntensityNoise	Rin			-128	dB/Hz	3
OpticalReturnLossTolerance		20			dB	
Receiver Section						
CenterWavelength	λr	790		870	nm	
ReceiverSensitivity(OMA)	Sen			-11.1	dBm	4
StressedSensitivity(OMA)	SenST			-7.5	dBm	4
LosAssert	LOSA	-30		-	dBm	
LosDessert	LOSD			-12	dBm	
LosHysteresis	LOSH	0.5			dB	
Overload	Sat	0			dBm	5
ReceiverReflectance	Rrx			-12	dB	

Note:
1.Average power figures are informative only, per IEEE802.3ae.
2.TWDP figure requires the host board to be SFF-8431compliant. TWDP is calculated using the Matlab code provided in clause 68.6.6.2 of IEEE802.3ae.
3.12dB reflection.
4.Conditions of stressed receiver tests per IEEE802.3ae. CSRS testing requires the host board to be SFF-8431 compliant.
5.Receiver overload specified in OMA and under the worst comprehensive stressed condition.

IV. Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_DisableAssertTime	t_off			10	us
TX_DisableNegateTime	t_on			1	ms
TimetoInitializeIncludeResetofTX_FAULT	t_int			300	ms
TX_FAULTfromFaulttoAssertion	t_fault			100	us
TX_DisableTimetoStartReset	t_reset	10			us
ReceiverLossofSignalAssertTime	TA,RX_LOS			100	us
ReceiverLossofSignalDeassertTime	Td,RX_LOS			100	us
Rate-SelectChageTime	t_ratesel			10	us
SerialIDClockTime	t_serial-clock			100	kHz

V. General Specifications

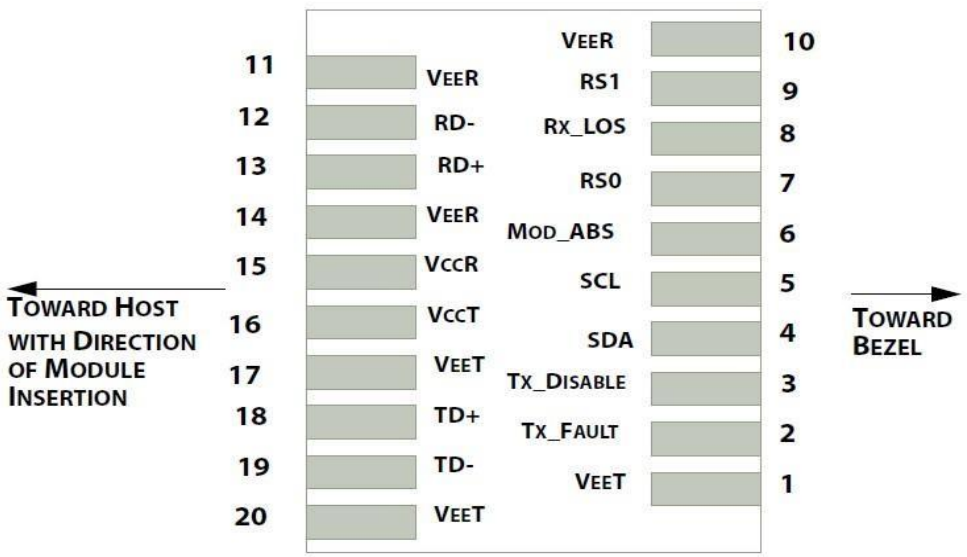
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
BitRate	BR	9.95		11.3	Gb/s	
BitErrorRatio	BER			10-12		
Maximum Supported Distances						
FiberType	850nmOFLBandwidth					
62.5μm	160MHz-km			26	m	
	OM1200 MHz-km			33	m	
50μm	400MHz-km			66	m	
	OM2500 MHz-km			82	m	
	OM32000 MHz-km			300	m	
	OM34700 MHz-km			500	m	

VI. Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_DisableAssertTime	t_off			10	us
TX_DisableNegateTime	t_on			1	ms
Time to Initialize Include Reset ofTX_FAULT	t_int			300	ms
TX_FAULTfromFaulttoAssertion	t_fault			100	us
TX_DisableTimetoStartReset	t_reset	10			us
ReceiverLossofSignalAssertTime	TA,RX_LOS			100	us
ReceiverLossofSignalDeassertTime	Td,RX_LOS			100	us
Rate-SelectChageTime	t_ratesel			10	us
SerialIDClockTime	t_serial-clock			100	kHz

VII. Pin Assignment

Diagram of Host Board Connector Block Pin Numbers and Name



VIII. Pin Function Definitions

PIN	Logic	Symbol	Name/ Description	Note
1		VeeT	ModuleTransmitterGround	1
2	LVTTL-O	TX_Fault	ModuleTransmitterFault	2
3	LVTTL-I	TX_Dis	TransmitterDisable;Turnsofftransmitterlaseroutput	3
4	LVTTL-I/O	SDA	2-WireSerialInterfaceDataLine	
5	LVTTL-I	SCL	2-WireSerialInterfaceClock	
6		MOD_DEF0	ModuleDefinition,Groundedinthemodule	2

7	LVTTL-I	RS0	ReceiverRateSelect	
8	LVTTL-O	RX_LOS	Receiver LossofSignalIndicationActiveLOW	4
9	LVTTL-I	RS1	TransmitterRateSelect(notused)	
10		VeeR	ModuleReceiver Ground	1
11		VeeR	ModuleReceiver Ground	1
12	CML-O	RD-	ReceiverInvertedDataOutput	
13	CML-O	RD+	ReceiverDataOutput(notused)	
14		VeeR	ModuleReceiver Ground	1
15		VccR	ModuleReceiver 3.3VSupply	
16		VccT	ModuleReceiver 3.3VSupply	
17		VeeT	ModuleTransmitterGround	1
18	CML-I	TD+	TransmitterNon-InvertedDataInput	
19	CML-I	TD-	TransmitterInvertedDataInput	
20		VeeT	ModuleTransmitterGround	1

Notes:
1.The module ground pins shall be isolated from the module case.
2.This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.
3.This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
4.This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

IX. SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information (A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, "Digital Diagnostic Monitoring Interface for Optical Transceivers". The DDM parameters have been internally calibrated.

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)

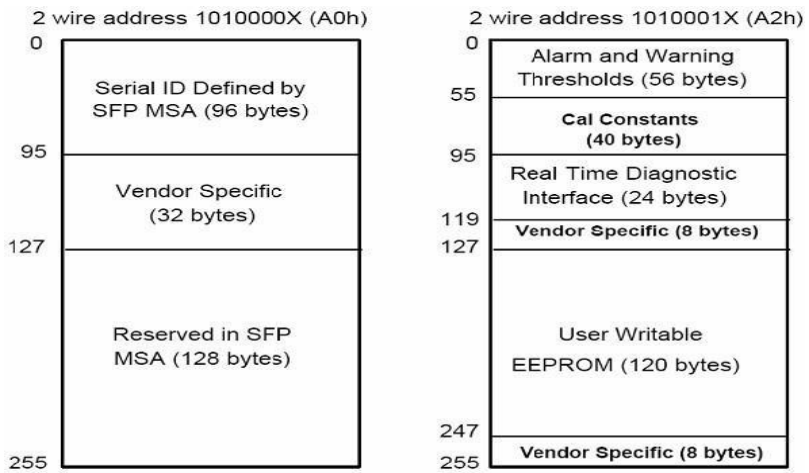


Table 2 - EEPROM Serial ID Memory Contents (A0h)

DataAddress	Length(Byte)	Name ofLength	DescriptionandContents
		Base ID Fields	
0	1	Identifier	TypeofSerialtransceiver(03h=SFP)
1	1	Reserved	Extendedidentifieroftypeserialtransceiver(04h)
2	1	Connector	Codeof optical connectortype(07=LC)
3-10	8	Transceiver	10GBase-SR
11	1	Encoding	64B/66B
12	1	BR,Nominal	Nominal baudrate, unitof100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Linklengthsupportedfor9/125umfiber,unitsof100m
16	1	Length(50um)	Linklengthsupportedfor50/125umfiber,unitsof10m
17	1	Length(62.5um)	Linklengthsupportedfor62.5/125umfiber,unitsof10m
18	1	Length(Copper)	Linklengthsupportedforcopper,unitsofmeters
19	1	Reserved	
20-35	16	VendorName	SFPvendorname:FS
36	1	Reserved	
37-39	3	VendorOUI	SFPtransceivervendorOUIID
40-55	16	VendorPN	PartNumber:""(ASCII)
56-59	4	Vendorrev	Revisionlevelforpartnumber
60-62	3	Reserved	
63	1	CCID	Leastsignificant byteof sumofdata inaddress0-62
		Extended ID Fields	
64-65	2	Option	IndicateswhichopticalSFPsignalsareimplemented(001Ah=LOS,TX_FAULT,TX_DISABLEallsupported)
66	1	BR,max	Upperbitratemargin,unitsof%
67	1	BR,min	Lowerbitratemargin,unitsof%
68-83	16	VendorSN	Serialnumber(ASCII)
84-91	8	Date code	Longline's Manufacturingdatecode
92-94	3	Reserved	
95	1	CCEX	Checkcode fortheextended IDFields (addresses64to 94)
		Vendor Specific ID Fields	
96-127	32	Readable	Longline specificdate,readonly
128-255	128	Reserved	ReservedforSFF-8079

X. Digital Diagnostic Monitor Characteristics)

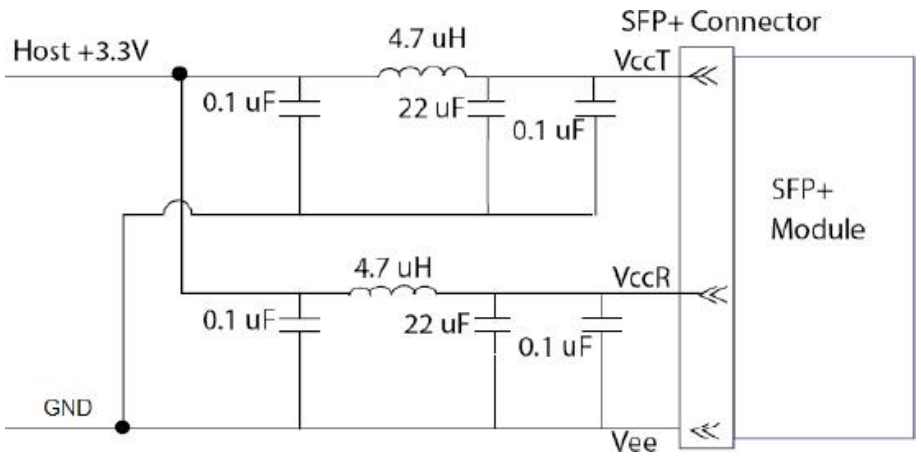
DataAddress	Parameter	Accuracy	Unit
96-97	TransceiverInternalTemperature	±3.0	° C
98-99	VCC3Internal SupplyVoltage	±5.0	%
100-101	LaserBias Current	±10	%
102-103	TxOutput Power	±3.0	dBm
104-105	RxInput Power	±3.0	dBm

XI. Regulatory Compliance

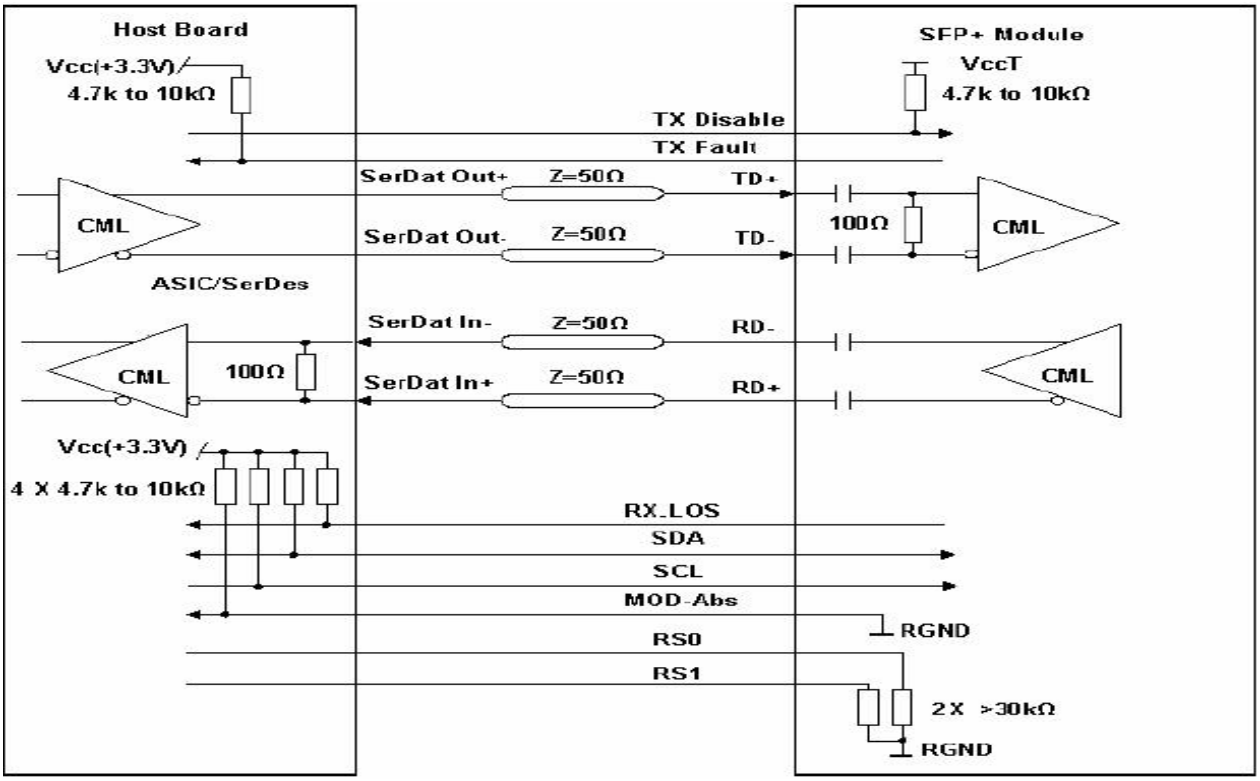
The complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

ElectrostaticDischarge(ESD)totheElectricalPins	MIL-STD-883EMethod3015.7	Class1(>1000V)
ElectrostaticDischarge(ESD)totheDuplexLCReceptacle	IEC61000-4-2GR-1089-CORE	Compatiblewithstandards
ElectromagneticInterference(EMI)	FCCPart15ClassBEN55022Class B(CISPR 22B)VCCIClassB	Compatiblewithstandards
LaserEye Safety	FDA21CFR1040.10and 1040.11EN60950,EN(IEC)60825-1,2	CompatiblewithClass1laserproduct.

XII. Recommended Circuit



Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

XIII. Mechanical Dimensions