SFP+ Evaluation Board

Application Note 5509

SFP+ Evaluation Board

The purpose of this SFP+ evaluation board is to provide the designer with a convenient means for evaluating SFP+ fiber optic transceiver such as 16GFC AFBR-57F5PZ compliant with ANSI Fibre Channel FC-PI-5 for high speed electrical and optical specifications. This document describes the details of the evaluation printed circuit board and the test methods for evaluating SFP+ modules.

I. Equipment included in the evaluation board kit AFCT-5716Z

1. SFP+ Evaluation PCB
2. DC Power supply cable assembly
3. SFP viewer setup CD-ROM. Please refer to the document included in the CD-ROM for the use of SFP viewer GUI.

II. Equipment not included in this kit

1. 3.3 V DC power supply
2. Fiber optic cables
3. DCA-J 86100C
4. DCA-J plug in 86105C, 86112A
5. J-BERT N4903B
6. Fiber optic attenuator
7. EEPROM Reader(i-Port or similar), RJ-45 cable
8. PC

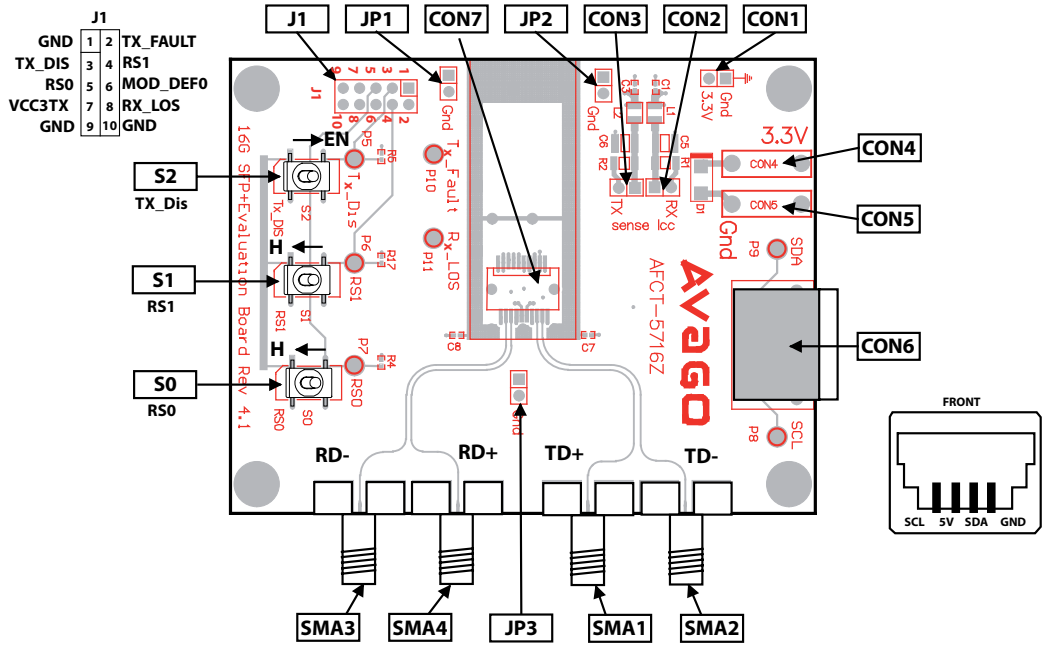

Figure 1. SFP+ Evaluation Board Top Views

III. SFP+ Evaluation board description

The top view of the evaluation PCB is shown in Figure 1. RS0, RS1 and TX_Dis can be controlled with on board toggle switches S0, S1 and S2. P5~P11 provide probing points to monitor low speed control i/o signals. Apply 3.3 V power supply to CON4 with CON5 GND. CON2 and CON3 can be used to monitor the current to the SFP+ module's RXVCC and TXVCC supplies respectively. Measure the voltages and divide by 0.05 Ω sensing resistors. Use CON6 to access the SFP+ module's two-wire serial signals, SCL and SDA. JP1, JP2 and JP3 are all tied to the evaluation board's common circuit GND.

A description of all of the I/O interfaces on the PCB is shown in Table 1. The evaluation board is a 6-layer design with Nelco N4000-13 core material.

Table 1. I/O descriptions

Reference Designator	Name	Description	Signal Level
SMA1	TD+	Differential Transmitter Input	Note 1
SMA2	TD-		
SMA3	RD-	Differential Receiver Output	Note 1
SMA4	RD+		
CON1	EXT_SUPPLY	3.3V External Power supply	Note 1, same potential as CON4
CON2	RX sense	RX ICC current sense	Rsense=0.05 ohm
CON3	TX sense	TX ICC current sense	Rsense=0.05 ohm
CON4	EXT_SUPPLY	3.3V External Power supply	Note 1, same potential as CON1
CON5	GND	GND	GND
CON6	I2C_CON	2 wire serial interface, SCL & SDA	LVTTL *
CON7	SFP+ 20pin connector	SFP+ Module plugs here	
J1	Header 5x2	Control signal access	
JP1	GND	TX and RX common GND	GND
JP2	GND		
JP3	GND		
P5	TX_Dis		
P6	RS1		
P7	RS0		
P8	SCL	Probe points	LVTTL *
P9	SDA		
P10	TX_Fault		
P11	RX_LOS		
S0	RS0 Switch	RS0=H when switch S0 set to H side	
S1	RS1 Switch	RS1=H when switch S1 set to H side	
S2	TX_Dis Switch	TX is enabled when switch S2 set to EN side	

Notes
1. See specific transeiver data sheet for recommended operating voltages and further information
* LVTTL defines a 3.3V level with transitions at 0.8 and 2.0V

IV. Electro-Optical Test Configurations

A basic test configuration for evaluating the SFP+ module is shown in Figure 2. The SFP+ module TX & RX optical/electrical characteristics such as eye diagram, rise/fall time, jitter can be tested. It is recommended that low loss, low dispersion and matched equal length RF cables be used to connect TD+/- and RD+/- signals to the test equipment. Representative TX and RX eye diagrams for a SFP+ module are shown in Figures 3 and 4.

V. EEPROM Test Configuration

The SFP+ MSA specifies an EEPROM internal to the transceiver. The standard two-wire serial protocol can be implemented to allow the user to read/write the user accessible area in the EEPROM by using the MOD_DEF(1), MOD_DEF(2) and GND connections on the Evaluation board. MOD_DEF(1) and MOD_DEF(2) are equal to SCL and SDA respectively as shown in the Figure 1 connector illustration. SFP viewer provided in this evaluation kit can be used to control SFP transceiver. Please refer to the documentation included in the CD-ROM for the use of GUI.

For more information about Avago Technologies SFP+ transceiver products, please contact your local sales representative or visit us at www.avagotech.com

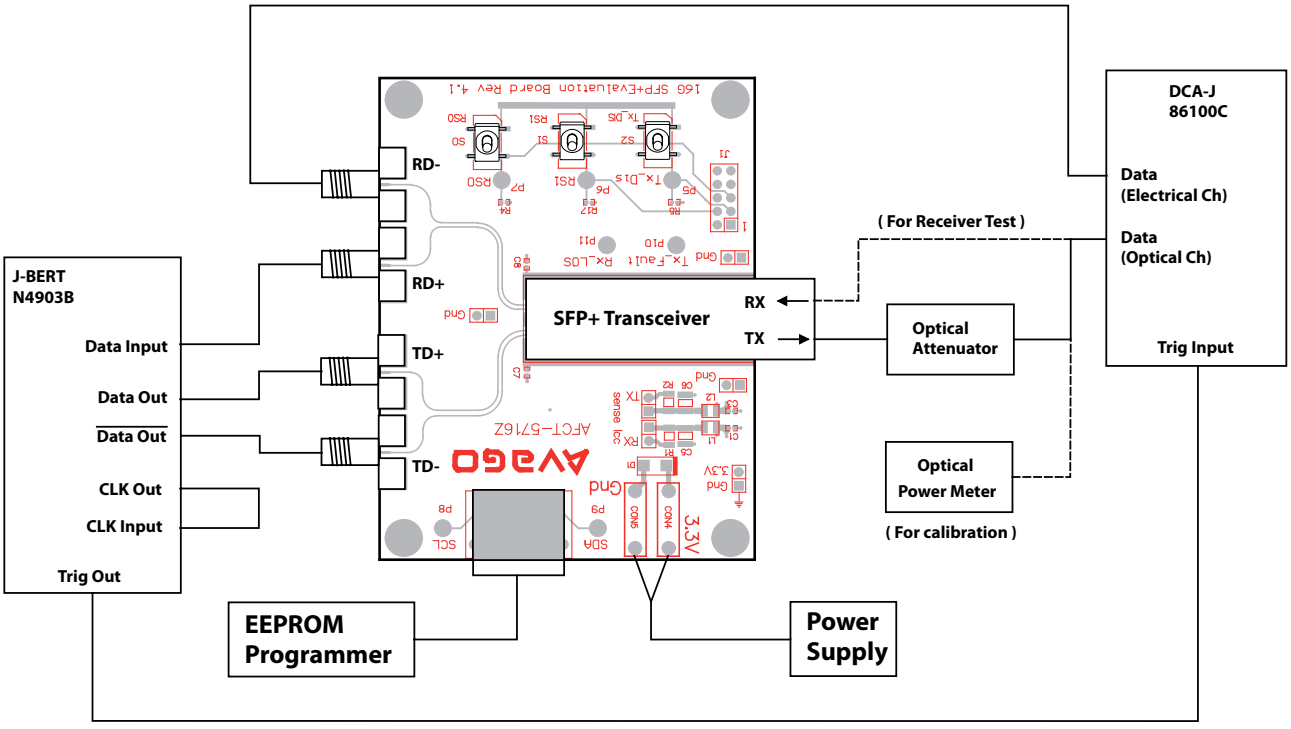

Figure 2. Basic Test Configuration of SFP+ Module

VI. Evaluation Board Schematic and Bill of Materials

The SFP+ evaluation board schematic is shown in Figure 3. Not all components in the schematic are fitted on the evaluation board. They are for optional functionality of the board. Table 2 shows the bill of materials.

VII. References

1. AFBR-57F5PZ Product Datasheets
2. SFF Committee SFF-8431, SFF-8472
3. AFBR-703SDZ(SR), AFBR-707SDZ(LRM), AFCT-701SDZ(LR) Product datasheets
4. Application Note "PCB Layout Guidelines for Designing with Avago SFP+ Transcievers" AV02-0725EN

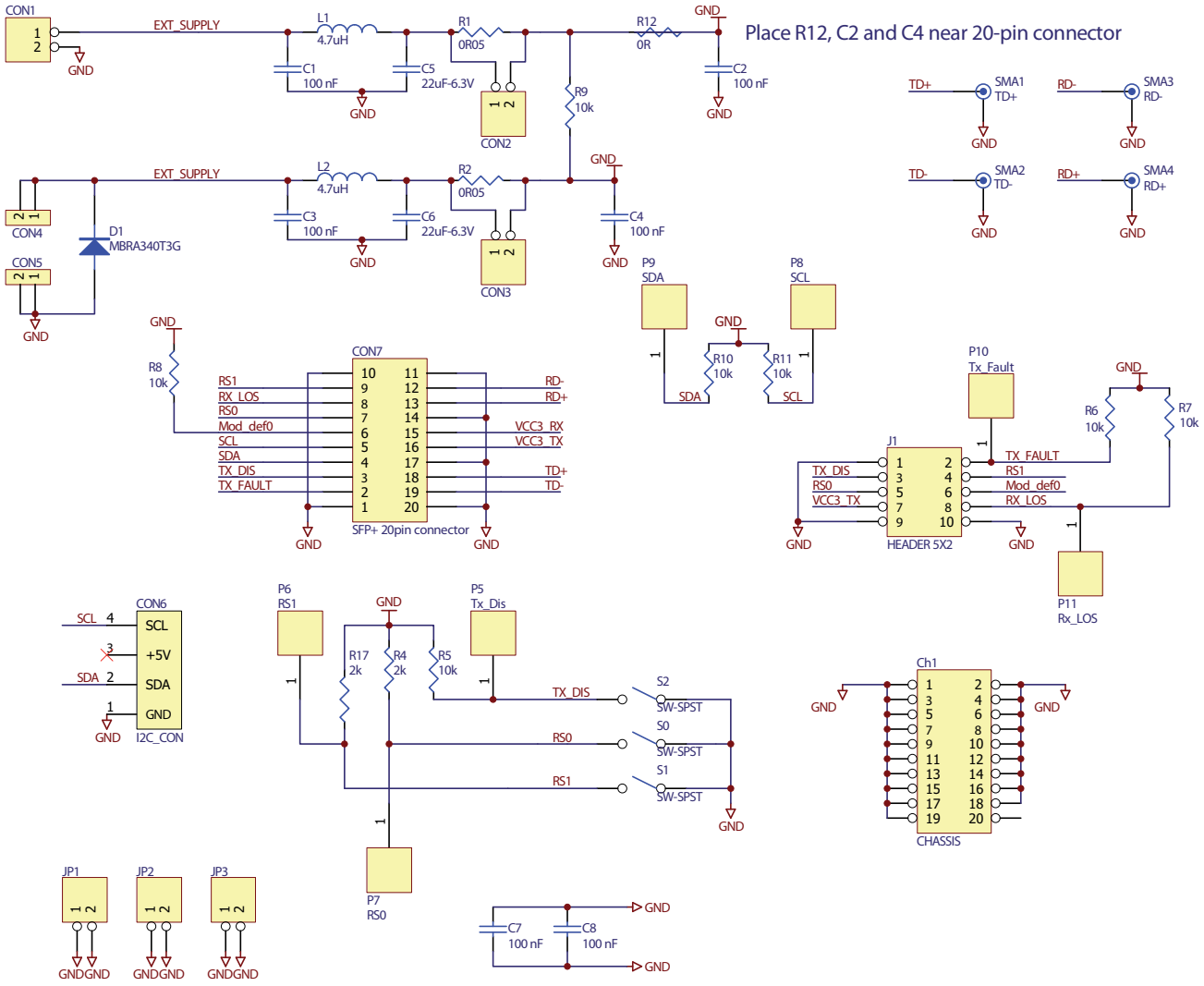

Figure 3. SFP+ Evaluation Board Schematics

Table 2. SFP+ Evaluation Board Bill of Materials

Part Type	Designator	Footprint	Description
100 nF	C1	0402	Capacitor
100 nF	C2	0402	Capacitor
100 nF	C3	0402	Capacitor
100 nF	C4	0402	Capacitor
22uF-6.3V	C5	1210	Capacitor
22uF-6.3V	C6	1210	Capacitor
100 nF	C7	0402	Capacitor
100 nF	C8	0402	Capacitor
CHASSIS	Ch1	SFP+ CHASSIS	SFP Cage
HEADER 2(not fitted)	CON1	SIP2	2 pin header
HEADER 2(not fitted)	CON2	SIP2	2 pin header
HEADER 2(not fitted)	CON3	SIP2	2 pin header
Banana RED	CON4	TESTP	Mini Banana Jack (Red)
Banana BLACK	CON5	TESTP	Mini Banana Jack (Black)
I2C_CON	CON6	I2C_CON	Molex, I2C connector, P/N/ 15-83-0064
16G SFP+ 20pin connector	CON7	SFF CONN	16G 20 pin SFP Host board connector
MBRA340T3G	D1	SOD-106	Diode
HEADER 5X2	J1	HDR2X5	10 pin header
HEADER 2	JP1	SIP2	2 pin header
HEADER 2	JP2	SIP2	2 pin header
HEADER 2	JP3	SIP2	2 pin header
4.7uH	L1	LQH32	Inductor
4.7uH	L2	LQH32	Inductor
Tx_Fault	P10	TP_TERMINAL	Stest Point jack
Rx_LOS	P11	TP_TERMINAL	Stest Point jack
Tx_Dis	P5	TP_TERMINAL	Stest Point jack
RS1	P6	TP_TERMINAL	Stest Point jack
RS0	P7	TP_TERMINAL	Stest Point jack
SCL	P8	TP_TERMINAL	Stest Point jack
SDA	P9	TP_TERMINAL	Stest Point jack
0R05	R1	1206	Resistor
10k	R10	0402	Resistor
10k	R11	0402	Resistor
0R	R12	0402	Resistor
2k	R17	0402	Resistor
0R05	R2	1206	Resistor
2k	R4	0402	Resistor
10k	R5	0402	Resistor
10k	R6	0402	Resistor
10k	R7	0402	Resistor
10k	R8	0402	Resistor
10k	R9	0402	Resistor
SW-SPST	S0	SW-SPST_SMT	Switch
SW-SPST	S1	SW-SPST_SMT	Switch
SW-SPST	S2	SW-SPST_SMT	Switch
TD+	SMA1	SMA_ROSENBERGER	Rosenberger Edge Mount SMA Connector
TD-	SMA2	SMA_ROSENBERGER	Rosenberger Edge Mount SMA Connector
RD-	SMA3	SMA_ROSENBERGER	Rosenberger Edge Mount SMA Connector
RD+	SMA4	SMA_ROSENBERGER	Rosenberger Edge Mount SMA Connector

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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