



Application

- Data center & Networking Equipment
- Servers/Storage Devices
- High Performance Computing (HPC)
- Switches/Routers
- Telecom Central Offices (CO)
- Test and Measurement Equipment

Standards Compliance

- Compliant with SFP-DD MSA
- Compliant with IEEE 802.3ck
- Compliant with IEEE 802.3cd
- I2C for EEPROM Communication
- Compliant with CMIS 5.x and SFF-8636
- SFF-TA-1031, FF-8665, SFF-8661, SFF-8679, SFF-8636

Highlight

- Support 53.125G PAM4
- 50G to 50G Data Rate
- 3.3V Power Supply
- Hot Pluggable
- BER $< 10^{-6}$ (pre FEC)
- BER $< 10^{-15}$ (post FEC)
- Excellent SI performance
- RoHS Compliance

1.0 General Description

This datasheet pertains to the **SFP56 to SFP56 50G Direct Attached Cable Assembly**, meticulously designed for application in the telecommunications and data center sectors. It helps carry 50Gb of traffic per cable in both directions. The cable adheres to the standardized SFP2 form factor and complies rigorously with Multi-Source Agreement (MSA) specifications.

2.0 Product Specification

2.1 Absolute Maximum Ratings

Parameter	Unit	Min.	Max.	Notes
Supply Voltage	V	-0.3	3.6	
Data Input Voltage	V	-0.3	3.6	
Control Input Voltage	V	-0.3	3.6	
Operating Temperature	°C	0	70	
Storage Temperature	°C	-40	+85	
Relative Humidity (Non-Condensing)	%	5	85	

2.2 Operational Specification

Parameter	Unit	Min	Typical	Max	Notes
Supply Voltage (Vcc)	V	3.135	3.3	3.465	Per End
Power Consumption	W			1.5	Per End
Operating Case Temperature	°C	0		70	
Operating Relative Humidity	%	0		85	
Modulation Format		56G PAM-4			
Bit Rate	Gbps		50		

2.3 Electrical Characteristics

Parameter	Unit	Min	Typical	Max	Notes
Characteristic Impedance	ohm	90	100	110	
Time Propagation Delay (Informative)	ns	4.9	

2.4 SI performance

Item	Parameter	Require	Reference
1	ILdd Insertion loss at 26.56 GHz	19.75 dB (Max.)	IEEE 802.3ck Section 162.11.2
2	ILdd Insertion loss at 26.56 GHz	11 dB (Min.)	IEEE 802.3ck Section 162.11.2
3	ERL Minimum cable assembly	>8.25 dB*.	IEEE 802.3ck Section 162.11.3
4	RLcd Differential-mode to common-mode return loss	0.01GHz – 40GHz Equation (162-20)	IEEE 802.3ck Section 162.11.4
5	ILcd Differential-mode to common-mode insertion loss	0.01GHz – 40GHz Equation (162-21)	IEEE 802.3ck Section 162.11.5
6	RLcc Common-mode to common-mode return loss	0.01GHz – 40GHz Equation (162-22)	IEEE 802.3ck Section 162.11.6
7	COM	3dB (Min.)	IEEE 802.3ck Section 162.11.7
*Cable assemblies with a com greater than 4 dB are not required to meet minimum ERL			

2.5 Pin Assignments

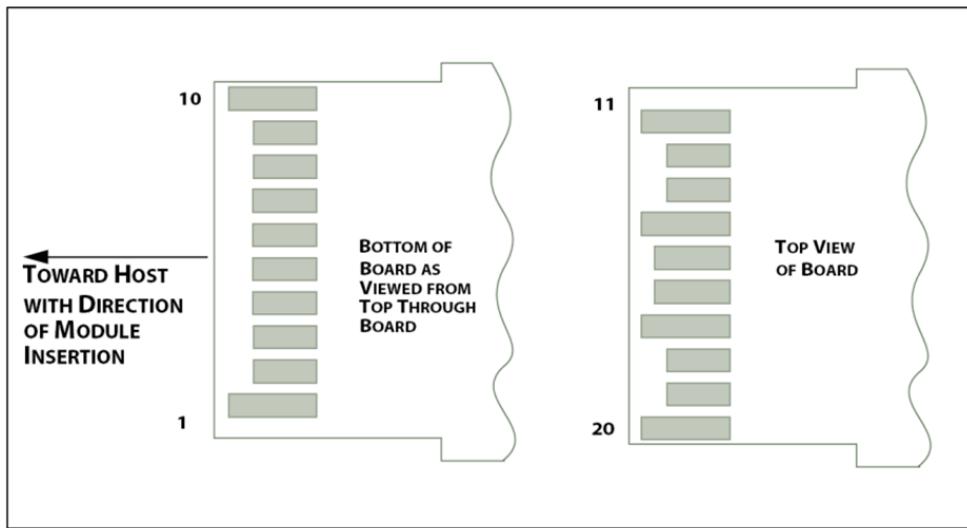


Figure 1 SFP56 Module Contact Assignment

2.6 Pin Description

Table 1 SFP56 Module Pin Description

Contacts	Logic ¹	Symbol	Power Sequence Order	Name/Description	Note
case		case	See2	Module case	
1		VeeT	1st	Module Transmitter Ground	3
2	LVTTL-O	Tx_Fault	3rd	Module Transmitter Fault	4
3	LVTTL-I	Tx_Disable	3rd	Transmitter Disable; Turns off transmitter laser output	5
4	LVTTL-I/O	SDA	3rd	2-wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i)	6
5	LVTTL-I/O	SCL	3rd	2-wire Serial Interface Clock (Same as MOD-DEF1 in INF-8074i)	6
6		Mod_ABS	3rd	Module Absent, connected to VeeT or VeeR in the module	7
7	LVTTL-I	RS0	3rd	Rate Select 0, optionally controls SFP+ module receiver.	8
8	LVTTL-O	Rx_LOS	3rd	Receiver Loss of Signal Indication (In FC designated as Rx_LOS and in Ethernet designated as Signal Detect)	4

9	LVTTL-I	RS1	3rd	Rate Select 1, optionally controls SFP+ module transmitter	8
10		VeeR	1st	Module Receiver Ground	3
11		VeeR	1st	Module Receiver Ground	3
12	CML-O	RD-	3rd	Receiver Inverted Data Output	
13	CML-O	RD+	3rd	Receiver Non-Inverted Data Output	
14		VeeR	1st	Module Receiver Ground	3
15		VccR	2nd	Module Receiver 3.3 V Supply	
16		VccT	2nd	Module Transmitter 3.3 V Supply	
17		VeeT	1st	Module Transmitter Ground	3
18	CML-I	TD+	3rd	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	3rd	Transmitter Inverted Data Input	
20		VeeT	1st	Module Transmitter Ground	3

Note1:

Labeling as inputs (I) and outputs (O) are from the perspective of the module

Note2:

The case makes electrical contact to the cage before any of the board edge contacts are made.

Note3:

The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.

Note4:

Tx_Fault is a module output that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. If Tx_Fault is not implemented, the Tx_Fault contact signal shall be held low by the module and may be connected to Vee within the module.

Rx_LOS when high indicates an optical signal level below that specified in the relevant standard. Rx_LOS is an open drain/collector output, but may also be used as an input by supervisory circuitry in the module.

Note5:

Tx Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.

Note6:

The SFP+ 2-wire interface specifications are given in 4.2 2-WIRE ELECTRICAL SPECIFICATIONS. This specification ensures compatibility between host masters and SFP+ SCL/SDA lines and compatibility with I2C. All voltages are referenced to VeeT.

Note7:

Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to 10 kΩ. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot. In the SFP MSA (INF-8074i) this contact has the same function but is called MOD_DEF0.

Note8:

RS0 and RS1 are module inputs and are pulled low to VeeT with $> 30\text{ k}\Omega$ resistors in the module. RS0 optionally selects the optical receive signaling rate coverage. RS1 optionally selects the optical transmit signaling rate coverage.

The SFP+ module provides two inputs RS0 and RS1 that can optionally be used for rate selection. RS0 controls the receive path signaling rate capability, and RS1 controls the transmit path signaling rate capability

2.7 Cable Wiring

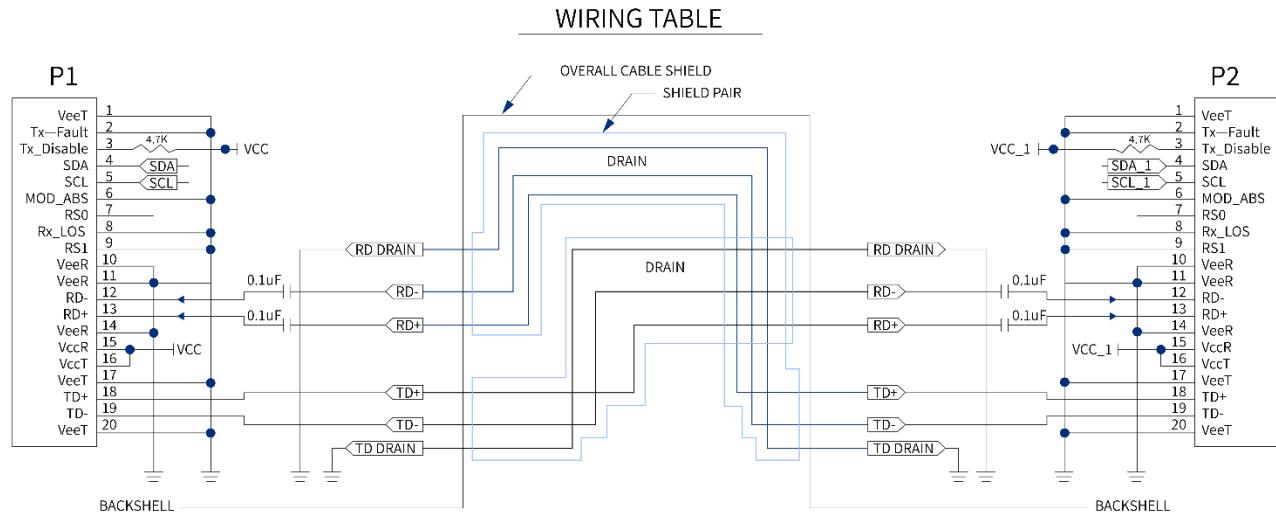


Figure 2 SFP56 to SFP56 Direct Attached Cable Assembly Wiring

2.8 Memory Map information (CMIS Version)

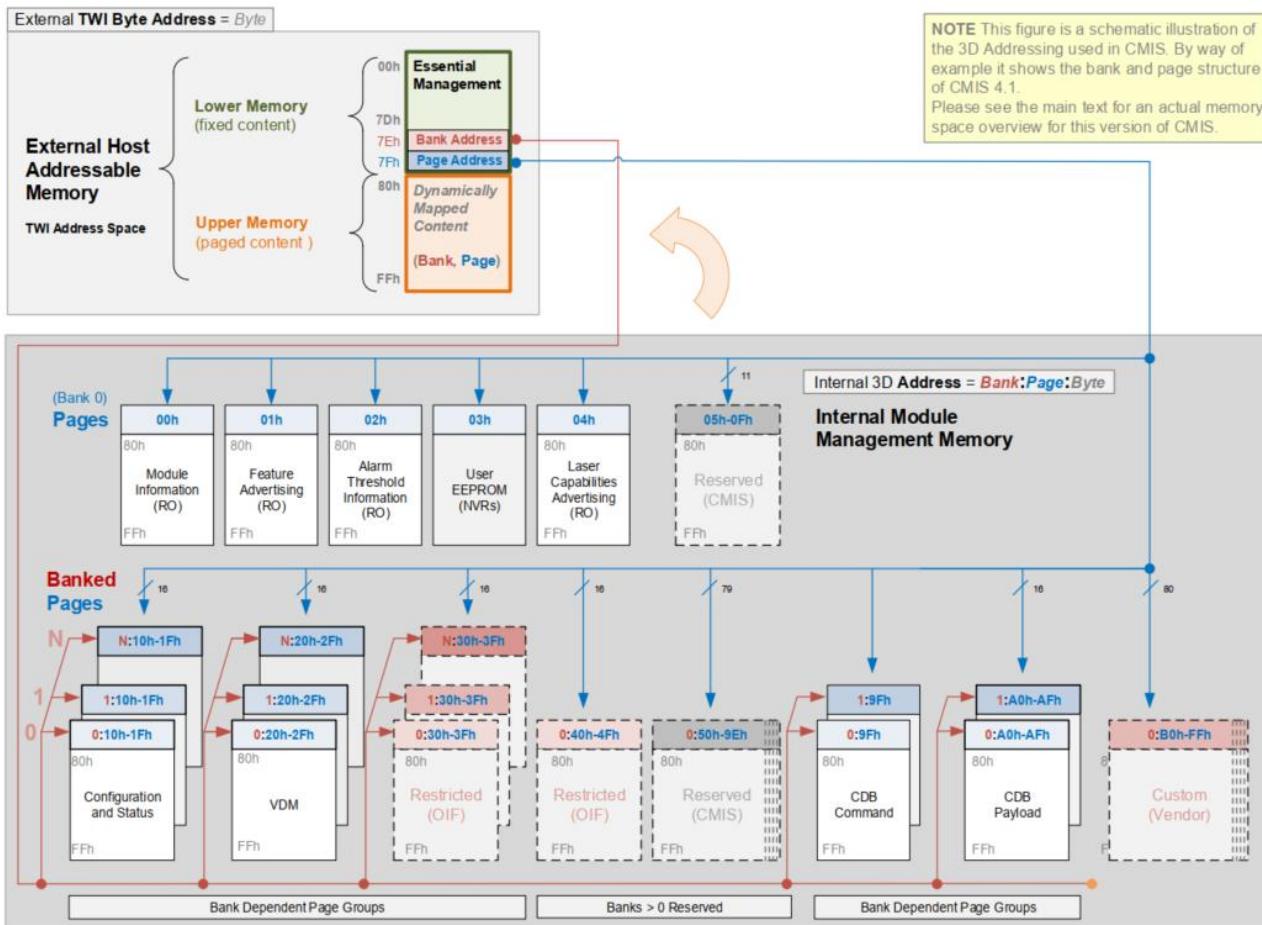


Figure 3 CMIS Module Memory Map (Conceptual View)

■ Lower Memory Overview

Address	Size	Subject Area	Description
0-3	4	ID and Status Area	Module ID from SFF-8024 list, version number, Type and status
			Flat mem indication, CLEI present indicator, Maximum TWI speed, Current state of Module, Current state of the Interrupt signal
4-7	4	Lane Flag Summary	Flag summary of all lane flags on pages 10h-1Fh
8-13	6	Module-Level Flags	All flags that are not lane or data path specific
14-25	12	Module-Level Monitors	Monitors that are not lane or data path specific
26-3	5	Module Global Controls	Controls applicable to the module as a whole
31-36	6	Module-Level Flag Masks	Masking bits for the Module-Level flags
37-38	2	CDB Status Area	Status of most recent CDB command
39-40	2	Module Firmware Version	Module Firmware Version
41-63	23	Reserved Area	Reserved for future standardization

64-82	19	Custom Area	Vendor or module type specific use
83-84	2	Inactive Firmware Version	Version Number of Inactive Firmware. Values of 00h indicates module supports only a single image.
85-117	33	Application Advertising	Combinations of host and media interfaces that are supported by module data path(s)
118-125	8	Password Entry and Change	
126	1	Bank Select Byte	Bank address of currently visible Page
127	1	Page Select Byte	Page address of currently visible Page

■ Page 00h Overview

Address	Size (bytes)	Name	Description
128	1	Identifier	Identifier Type of module
129-144	16	Vendor name	Vendor name (ASCII)
145-147	3	Vendor OUI	Vendor IEEE company ID
148-163	16	Vendor PN	Part number provided by vendor (ASCII)
164-165	2	Vendor rev	Revision level for part number provided by vendor (ASCII)
166-181	16	Vendor SN	Vendor Serial Number (ASCII)
182-189	8	Date Code	
190-199	10	CLEI code	Common Language Equipment Identification code
200-201	2	Module power characteristics	
202	1	Cable assembly length	
203	1	Media Connector Type	
204-209	6	Copper Cable Attenuation	
210-211	2	Cable Assembly Lane Information	
212	1	Media Interface Technology	
213-220	8	Reserved	
221	1	Custom	
222	1	Checksum	Includes bytes 128-221
223-255	33	Custom Info NV	

Note: For the above, refer to **Common Management Interface Specification Rev5.0**.

2.9 Mechanical Specifications

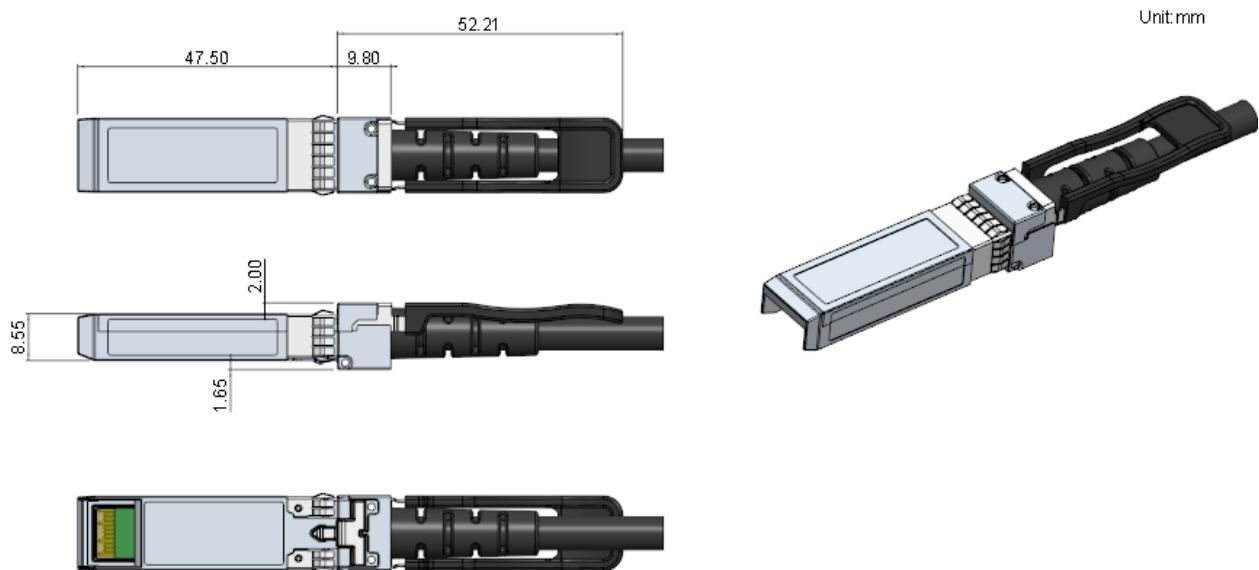
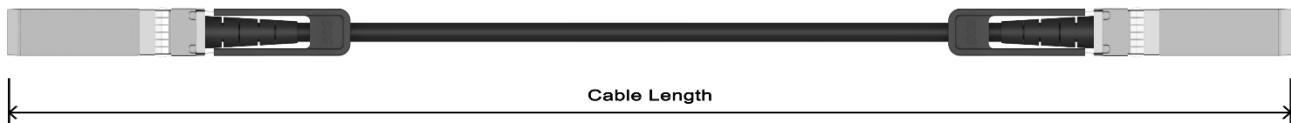


Figure 4 SFP56 Form Factor

3.0 Product Information

Unit:mm



Product ID	Product Description	Tolerance	AWG
SFP56-50G-DAC-3005	SFP56 50G Direct Attached Copper Cable, 30AWG-0.5M	±20	30
SFP56-50G-DAC-3010	SFP56 50G Direct Attached Copper Cable, 30AWG-1.0M	±30	30
SFP56-50G-DAC-3015	SFP56 50G Direct Attached Copper Cable, 30AWG-1.5M	±40	30
SFP56-50G-DAC-3020	SFP56 50G Direct Attached Copper Cable, 30AWG-2.0M	±40	30
SFP56-50G-DAC-2820	SFP56 50G Direct Attached Copper Cable, 28AWG-2.0M	±40	28
SFP56-50G-DAC-2825	SFP56 50G Direct Attached Copper Cable, 28AWG-2.5M	±50	28
SFP56-50G-DAC-2625	SFP56 50G Direct Attached Copper Cable, 26AWG-2.5M	±50	26
SFP56-50G-DAC-2630	SFP56 50G Direct Attached Copper Cable, 26AWG-3.0M	±50	26

Important Notice

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4.0 Revision Record

Rev.	Comments	Author	Date
A01	Initial Release	James Chen	10/01/2023