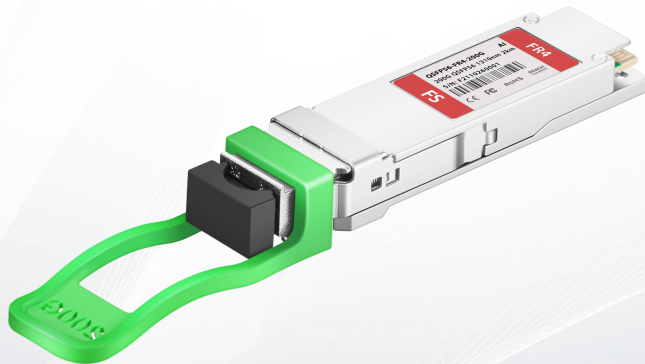**FS**

QSFP56 200GBASE-FR4 1310nm 2km Transceiver

QSFP56-FR4-200G

Application

- 200GBASE-FR4 Ethernet
- Switch & Router Connections
- Data Centers
- Other 200G Interconnect Requirements

Features

- Up to 50Gbps data rate per channel by PAM4 modulation
- 4 duplex channels transmitters and receivers
- Integrated CWDM LD and PD array

- LC/UPC connecting interface compliant
- Single +3.3V power supply
- DDM function implemented
- Hot-pluggable QSFP56 form factor

- Maximum link length of 2km via SMF fiber
- Low power dissipation:<6.5W
- International class 1 laser safety certified
- Operating temperature range: 0℃ ~ +70℃
- Compliant with ROHS 10

Description

The 200G QSFP56 FR4 Transceiver is designed to transmit and receive optical data links 50 Gb/s bit rate per channel with PAM4 modulation format via up to 2km single mode fiber. It is hot pluggable transceiver with QSFP56 package. The module comprises high performance LD PIN DSP etc.

Product Specifications

I. Optical Characteristics

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Transmitter (per Lane)						
Signaling Speed per Lane		GBd		26.5625		
Modulation format				PAM4		
Center wavelength	WL	nm	1264.5	1271	1277.5	
			1284.5	1271	1297.5	
			1304.5	1311	1317.5	
			1324.5	1331	1337.5	
Side-mode suppression ratio	SMSR	dB	30			
Average Launch Power per Lane	TXPx	dBm	-4.2		4.7	
Tx OMA per lane	TxOMAdBm		-1.2		4.5	
Optical Extinction Ratio	ER	dB	3.5			
Transmitter and dispersion eye closure for PAM4 per Lane	TDECQ	dB			3.3	
Optical return loss tolerance	ORL	dB			16.5	
Relative Intensity Noise	RIN	dB/Hz			-132	
Receiver(per Lane)						
Signaling Speed per Lane		GBd		26.5625		
Center wavelength	WL	nm	1264.5	1271	1277.5	
			1284.5	1271	1297.5	
			1304.5	1311	1317.5	
			1324.5	1331	1337.5	
Damage Threshold	DT	dBm	5.7			
Average receive Power per Lane	RXPx	dBm	-8.2		4.7	
Receiver reflectance	Rfl	dB			-26	
Difference in receive power between any two lanes		dB			4.1	
Receiver sensitivity (OMAouter)		dBm			-6	
Stressed receiver sensitivity (OMAouter)		dBm			-3.6	

II. Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	+85
Relative Humidity	RH	%	5	85
Power Supply Voltage	Vcc	V	-0.5	+4.0

III. Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature Range	Tc	oC	0	/	70
Power Supply Voltage	Vcc	V	3.135	3.3	3.465
Baud Rate(Per channel)	BR	GBd		26.5625	

IV. Optical Interface
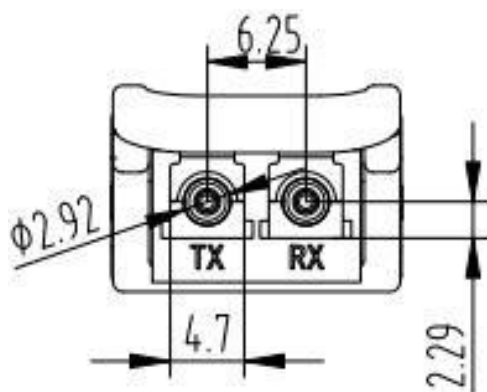
V. Principle diagram
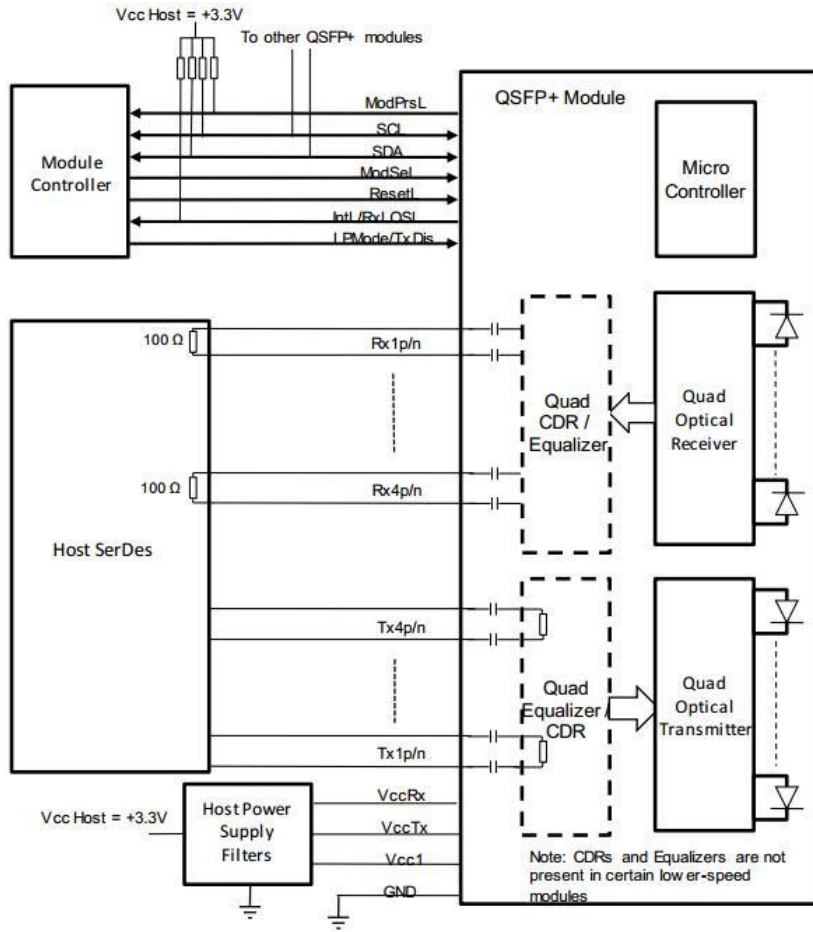
VI. Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Supply Voltage	VCC VCC3.3-Tx VCC3.3-Rx	V	3.135	3.3	3.465	
Power Consumption	Pc	W			6.5	
Transceiver Power-on Initialize Time		ms			2000	
Transmitter						
Differential peak-to-peak input voltage tolerance		mV	900			
Differential termination mismatch		%			10	
Differential input return loss(SDD11)		dB			See CEI-56G -VSR	

Common-mode to differential conversion and differential to common-mode conversion(SCD11,SDC11)		dB			See CEI-56G-VSR	

Receiver

Differential peak-to-peak output voltage	.	mV			900	
DC Common Mode Voltage	Vcm	mV	-0.35		2.85	
AC Common Mode Noise, RMS		mV			17.5	
Differential termination mismatch		%			10	
Differential output return loss(SDD22)		dB			See CEI-56G-VSR	
Common-mode to differential conversion and differential to common-mode conversion(SCD22,SDC22)		dB			See CEI-56G-VSR	

IIC communication

IIC Clock frequency	-	KHZ	/		400	1000
clock stretching	-	us	/	/	500	
Data hold time	-	ns	/	/	/	

VII. Pin Definitions

PIN	Logic	Symbol	DESCRIPTION	NOTE
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Dataoutput	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	

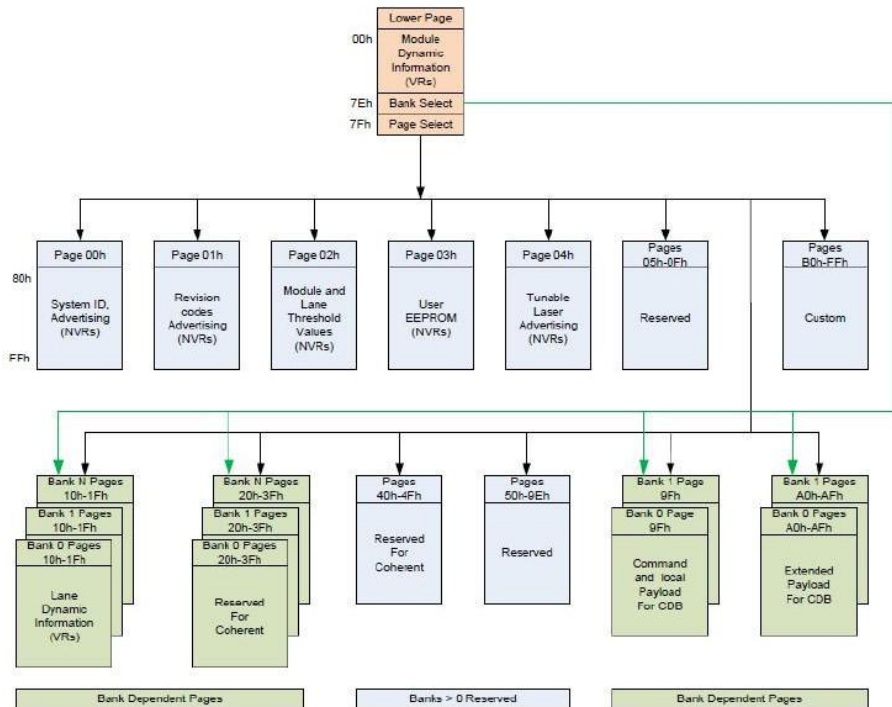| 6 | CML-I | Tx4p | Transmitter Non-Inverted Dataoutput | |
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVCOMS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVCOMS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	1
14	CML-0	Rx3p	Receiver Non-Inverted DataOutput	
15	CML-0	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-0	Rx1p	Receiver Non-Inverted DataOutput	
18	CML-0	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-0	Rx2n	Receiver Inverted Data Output	
22	CML-0	Rx2p	Receiver Non-Inverted DataOutput	
23		GND	Ground	1
24	CML-0	Rx4n	Receiver Inverted Data Output	
25	CML-0	Rx4p	Receiver Non-Inverted DataOutput	
26		GND	Ground	1
27	LVTTL-0	ModPrsL	Module Present	
28	LVTTL-0	IntL/RxLOSL	Interrupt. Optionally configurableas RxLOSL via the management interface (SFF-8636)	
29		VccTx	+3.3 V Power Supply transmitter	2
30		Vcc1	+3.3 V Power Supply	2
31	LVTTL-I	LPMode/TxDis	Low Power Mode. Optionally configurable as TxDis via the management interface(SFF-8636).	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Inverted Data Input	
34	CML-I	Tx3n	Transmitter Non-Inverted Dataoutput	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Inverted Data Input	
37	CML-I	Tx1n	Transmitter Non-Inverted Dataoutput	
38		GND	Ground	1

Notes:

1.GND is the symbol for signal and supply (power) common for the QSFP56 module. All are common within the module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
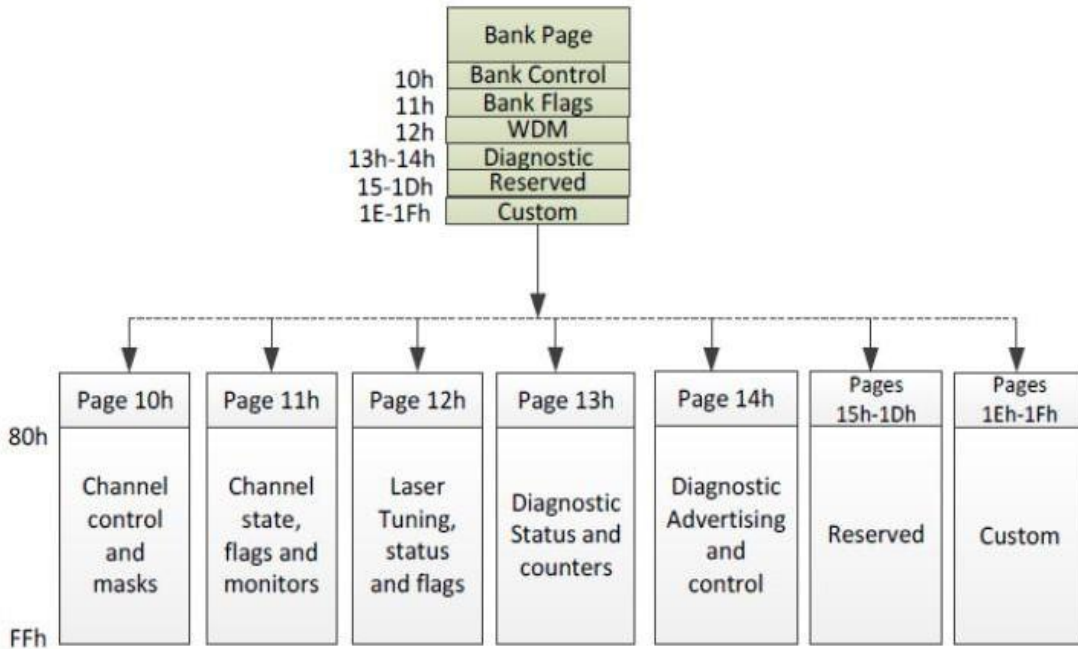
2.VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 3 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the module in any combination.

Electrical Pin-out Details

|	Top Side Viewed From Top		Bottom Side Viewed From Bottom	
38	GND	GND	1	
37	Tx1n	Tx2n	2	
36	Tx1p	Tx2p	3	
35	GND	GND	4	
34	Tx3n	Tx4n	5	
33	Tx3p	Tx4p	6	
32	GND	GND	7	
31	LPMode/TxDis	ModselL	8	
30	Vcc1	ResetL	9	
29	VccTx	VccRx	10	
28	IntL/RxLOSL	SCL	11	
27	ModPrsL	SDA	12	
26	GND	GND	13	
25	Rx4p	Rx3p	14	
24	Rx4n	Rx3n	15	
23	GND	GND	16	
22	Rx2p	Rx1p	17	
21	Rx2n	Rx1n	18	
20	GND	GND	19	
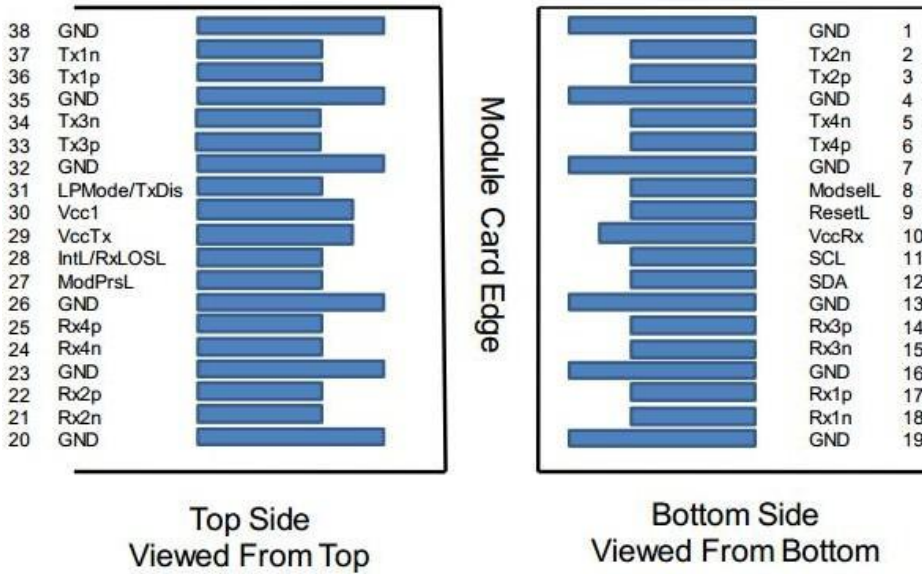
VIII. Module Memory Map

IX. Host Board Power Supply Filtering

Any voltage drop across a filter network on the host is counted against the host DC set point accuracy specification. Inductors with DC resistance of less than 0.1 Ω should be used in order to maintain the required voltage at the host edge card connector.
It is recommended that the 22 uF capacitors each have an equivalent series resistance of 0.22 Ω.The specification of the host power supply filtering network is beyond the scope of this specification, particularly because of the wide range of QSFP56 module Power Classes.Figure is the suggested transceiver/host interface.
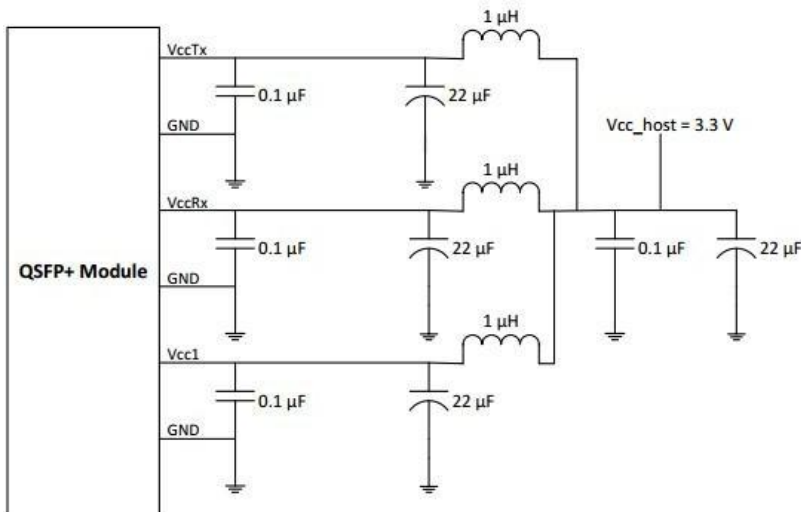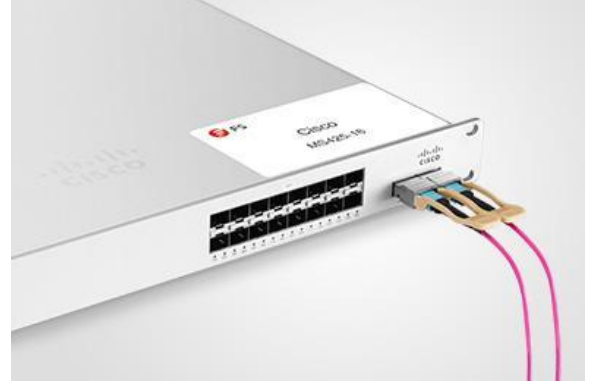
X. Mechanical Specifications
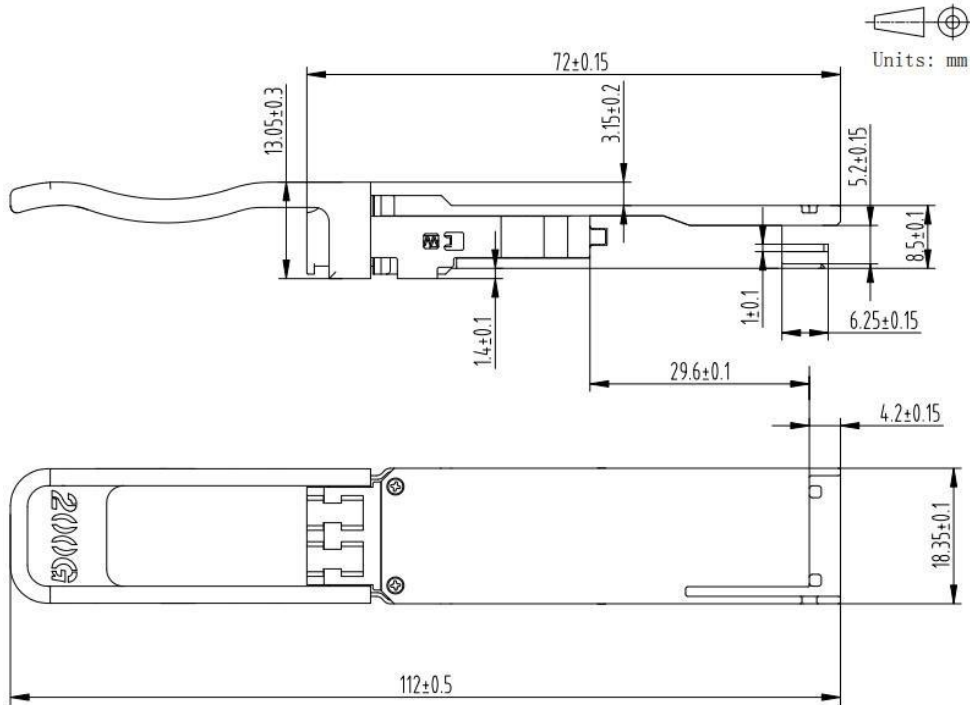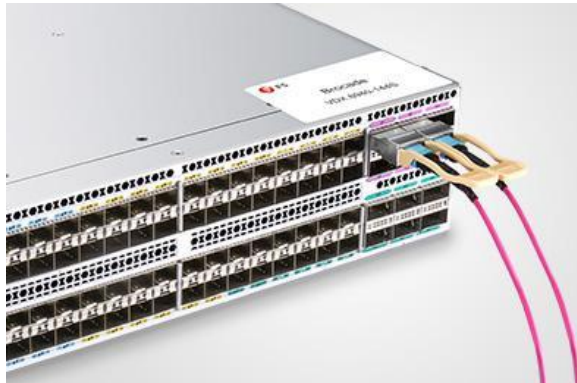
Test Center

I. Compatibility Testing

Each fiber optical transceiver has been tested in host device on site in FS Assured Program to ensure full compatibility with over 200 vendors.

Cisco Catalyst C9500-24Y4C

Cisco MS425-16

Brocade VDX 6940-144S


Dell EMC Networking Z9100-ON

Force⑩tm S60-44T

HUAWEI S6720-30L-HI-24S

Above is part of our test bed network equipment. For more information, please click the Test Bed PDF. It will be updated in real time as we expand our portfolio.

FS

II. Performance Testing

Each fiber optical transceiver has been fully tested in FS Assured Program equipped with world's most advanced analytical equipment to ensure that our transceivers work perfectly on your device.
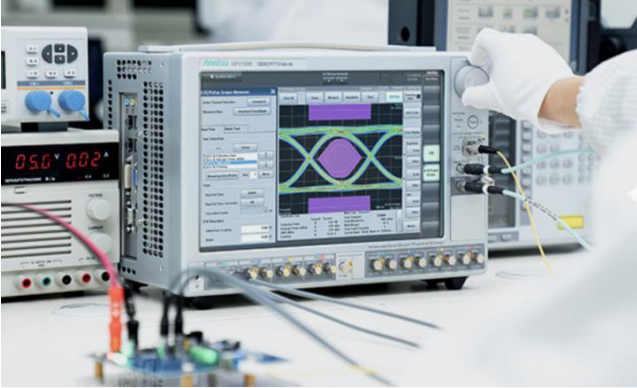
1. TX/RX Signal Quality Testing

Equipped with the all-in-one tester integrated 4ch BERT & sampling oscilloscope, and variable optical attenuator to ensure the input and output signal quality.

- Eye Pattern Measurements: Jitter, Mask Margin, etc
- Average Output Power
- OMA
- Extinction Ratio
- Receiver Sensitivity
- BER Curve

2. Reliability and Stability Testing

Subject the transceivers to dramatic changes in temperature on the thermal shock chamber to ensure reliability and stability of the transceivers.

- Commercial: 0 °C to 70 °C
- Extended: -5 °C to 85 °C
- Industrial: -40 °C to 85 °C

3. Transfer Rate and Protocol Testing

Test the actual transfer data rate and the transmission ability under different protocols with Network Master Pro.
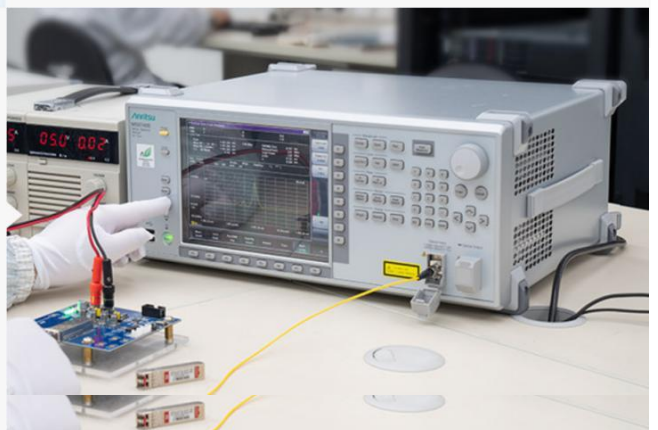
- Ethernet
- Fibre Channel
- SDH/SONET
- CPRI

4. Optical Spectrum Evaluation

Evaluate various important parameters with the Optical Spectrum Analyzer to meet the industry standards.

- Center Wavelength, Level
- OSNR
- SMSR
- Spectrum Width

Ordering Information

Part Number	Description
QSFP56-SR4-200G	200G QSFP56 850nm 100m DOM Transceiver
QSFP56-FR4-200G	200G QSFP56 1310nm 2km DOM Transceiver

FS

United Kingdom   Russia

Germany

United States

China

Singapore

Australia

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