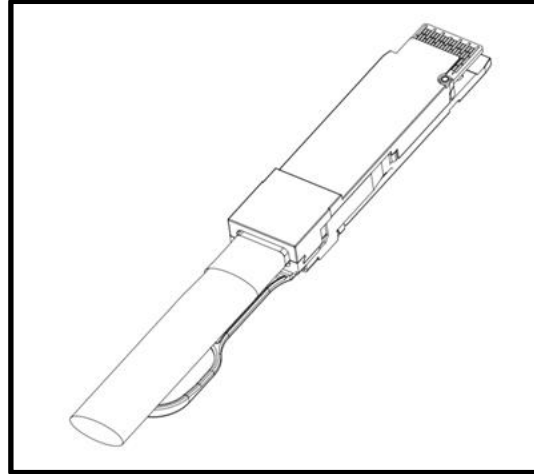
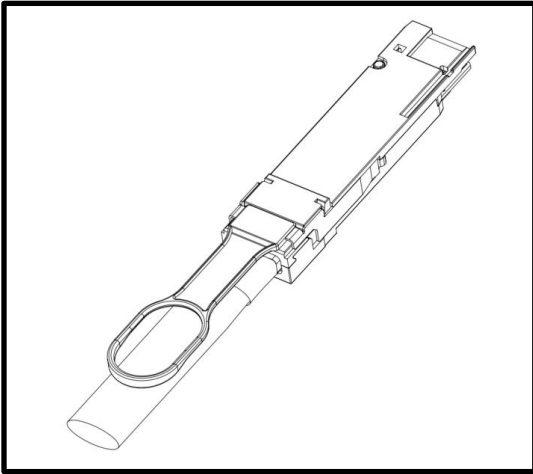




3M™ 400G QSFP-DD Direct Attach Copper Cable Assemblies



Scope

This document summarizes test methods, test conditions, and product performance requirements for 3M™ 400G QSFP-DD Direct Attach Copper Cable Assemblies, 9V Series.

Reference Documents

Note: Unless otherwise specified, latest edition of the reference documents applies. In the event of conflict between requirements of the references and 3M specification, 3M specification shall take precedence.
Commercial standards, specifications and report

EIA-364
QSFP-DD MSA
IEEE 802.3cd

3M™ 400G QSFP-DD Direct Attach Copper Cable Assemblies, 9V Series		
Literature Code	Series	Document Title
78-5100-2785-3	9V	Customer Drawing, 3M™ 400G QSFP-DD Direct Attach Copper Cable Assemblies, General Market
78-5100-2788-7	9V	Customer Drawing, 3M™ 400G QSFP-DD to 2X QSFP56 Direct Attach Copper Cable Assemblies, 9V Series, General Market

3M™ 400G QSFP-DD Direct Attach Copper Cable Assemblies, 9V Series

Performance Testing

Unless otherwise specified, all tests shall be performed on QSFP-DD headers mated to QSFP-DD sockets with 3M Twinax cable at conditions per EIA-364. Unless otherwise specified, all values and limits are typical of those obtained by qualification testing of the subject product. All specifications are subject to revision and change without notice from 3M.

Ratings

3M™ 400G QSFP-DD Direct Attach Copper Cable Assemblies, 9V Series	
Feature	Value
Impedance	100ohms
Operating Temperature	0°C to 70°C
Storage Temperature	-20°C to 85°C
Humidity	0% to 80% RH
Halogen Free ¹ – VW1 cable only	VW1 cable option only (UL file E42769). Does not include connector ends.

¹ Cable is UL Halogen Free (HF) Certified in accordance with UL 2885, "Outline of Investigation for Acid Gas, Acidity and Conductivity of Combusted Materials and Assessment of Halogens".

Materials

3M™ 400G QSFP-DD Direct Attach Copper Cable Assemblies, 9V Series		
	Component	Material
Connector	Shell	Die Cast Zinc
Connector	Pull Tab	Thermoplastic
Connector	Latch	Stainless Steel
Connector	Spring	Stainless Steel
Connector	Paddle Card	Halogen Free ² PCB with 0.73um (30u") Au over 1.27um (50u") Ni min mating pad finish.
Cable	Primary Cable	100 Ohm differential PO insulators
Cable	EMI Shield	Aluminum Foil laminate
Cable	Jacket	Braided Sleeve Halogen Free ² material.

²Halogen Free is defined as both 1) no halogen compounds that are intentionally added to the product or used in the manufacturing process for the product and 2) any impurities present are less than 900ppm bromine, less than 900ppm chlorine and/or less than 1500ppm total bromine and chlorine. The latter are the levels set forth in certain industry standards for printed circuit boards, such as the international electrotechnical commission (IEC) 61249-2-21 standards. This information represents 3M's knowledge and belief which may be based in whole or in part on information provided by 3rd party suppliers to 3M.

Regulatory Compliance

For regulatory information, visit [3M.com/regs](https://www.3m.com/regs) or contact your 3M representative.

3M™ 400G QSFP-DD Direct Attach Copper Cable Assemblies, 9V Series

Electrical

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

3M™ 400G QSFP-DD, Direct Attach Copper Cable Assemblies, 9V Series				
Description or Parameter	Units	Values and Limits	Requirement or Conditions	Test Standard or Method
Dielectric Withstanding Voltage	V DC	100	Subject a voltage of 100 VDC for 1 minute at sea level between adjacent contacts of mated and unmated connector assemblies.	EIA-364-20, A-D
Insulation Resistance	Megaohms	>1000	Measured between adjacent and opposing contacts with 100 V applied for 1 minute.	EIA-364-21
Low Level Contact Resistance (LLCR)	Millohms	$\Delta R \leq 20$	Subject a voltage of 20 mV max open circuit at a current not exceeding of 100 mA max on mated connector assemblies.	EIA-364-23C

Mechanical

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

3M™ 400G QSFP-DD, Direct Attach Copper Cable Assemblies, 9V Series				
Description or Parameter	Units	Values and Limits	Requirement or Conditions	Test Standard or Method
QSFP-DD Mating force	Newtons	90N Max.	Refer to QSFP DD MSA. Tested without latch feature	EIA-364-13
QSFP-DD Un-mating force	Newtons	50N Max.	Refer to QSFP DD MSA. Tested without latch feature	EIA-364-13
Housing Latch Test	Newtons	90N Min.	Refer to QDFP DD MSA. Tested with latch feature	EIA-364-98
Mechanical Shock	G Sec Pulse	30 11ms half sine	Mated connectors shall exhibit no damage. No significant change in SI performance.	EIA-364-27C Method H
Vibration	Gn Acc (m/s ²)	10 98.1	Test II (10-500Hz, gn=10, 98.1m/s ²); Test VII with condition B (random vibration 0.005g ² /Hz, rms g=1.55); 15min/axis, all directions. No significant change in SI performance.	EIA-364-28 Test II, Test VII condition B
Durability (preconditioning)	mA	$\Delta R \leq 20$	Perform 50 unplug/plug cycles. Pass LLCR.	EIA-364-09
Durability	mA	$\Delta R \leq 20$	Perform 300 unplug/plug cycles. Pass LLCR.	EIA-364-09
Reseating	NA	Nil	Perform 3 unplug/plug cycles.	EIA-364-09
Cable Pull Out Test	Pounds	50 75	No interruption to continuity	EIA-364-38 Conditions A & B
Cable Flex Test	cycles	500	Circular cable – Method 1, Flat cable – Method 1 and Method 2 as applicable. Bend 90 deg, 60 deg and 45 deg. (no interruption to continuity)	EIA-364-41 MIL-STD-1344

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Environmental

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

3M™ 400G QSFP-DD, Direct Attach Copper Cable Assemblies, 9V Series				
Description or Parameter	Units	Values and Limits	Requirement or Conditions	Test Standard or Method
Temperature Life (Thermal Aging)	Degrees C Hours	85, -55 168 @ 85 168 @ -55	No physical abnormalities. No significant change in Signal Integrity.	EIA-364-17C Method A & C
Thermal Shock	Degrees C Cycles Min (dwell)	-55 & 85 25 5	No physical abnormalities. No significant change in Signal Integrity.	EIA-364-32A Condition I
Humidity Test	Degrees C % RH Hours	40 90 to 95 168	Steady State Humidity Test. No significant change in Signal integrity	EIA-364-31 Method II

Qualification Test Groups and Sequenced Tests

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

3M™ 400G QSFP-DD, Direct Attach Copper Cable Assemblies, 9V Series							
Test Description	EIA 364 TP No.	Test Group					
		1	2	3	4	5	6
		Test Sequence					
Visual	18	1,9	1,8	1, 7	1, 5	1,3	1,6
Signal Integrity		2,8		2,6	2,4		
Mechanical Vibration	28	7					
Mechanical Shock	27	6					
Thermal Shock	32	5					
Humidity Test (Steady State)	31	4					
Temperature Life	17C	3					
Low Level Contact Resistance	23C		2,4,7				
Durability (preconditioning)	09		3				
Durability (full)	09		5				
Mating Force	13			3			
Unmating Force	13			4			
Housing Latch Test	98						5
Reseating	09		6				
Insulation Resistance	21						4
Dielectric Withstand Voltage	20						3
Cable Pullout	38					2	
Cable Flex	41						2
Mechanical Clamp				5			
Bend and Loop					3		

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