





#### Scope

This document summarizes test methods, test conditions, and product performance requirements for 3M<sup>™</sup> 25G SFP28 and 100G QSFP28 Direct Attach Copper Cable Assemblies including straight, Y, and breakout assembly configurations. 1422, 1423, 9Q, and 9S 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 EIA TS-1000.01 SFF-8436, SFF-8661 SFF-8432, SFF-8083

3M™ 100G Direct Attach Copper Cable Assemblies				
Literature Code	Series	Document Title		
78-5100-2664-0	1422/1423	Customer Drawing, 3M™ 25G SFP28 Direct Attach Copper Cable Assemblies, 1422/1423 Series		
78-5100-2672-3	9Q	Customer Drawing, 3M™ 100G QSFP28 Direct Attach Copper Cable Assemblies, 9Q Series		
78-5100-2684-8	9\$	Customer Drawing, 3M™ 100G QSFP28 to 2x QSFP28 Direct Attach Copper Cable Assemblies, 9S Series		
78-5100-2679-8	78-5100-2679-8  9S  Customer Drawing, 3M™ 100G QSFP28 to 4x SFP28 Direct Attach Cop Cable Assemblies, 9S Series			

#### **Performance Testing**

Unless otherwise specified, all tests shall be performed on SFP28/QSFP28 headers mated to SFP28/QSFP28 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™ 25G/100G SFP28/QSFP28 Direct Attach Copper Cable Assemblies, 142/9Q/9S 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 – CL2 cable only	CL2 cable option only. Does not include connector ends. UL has tested cables to be Halogen Free per UL2885. UL PLCC file E118773.			

#### **Materials**

	3M™ 25G/100G SFP28/QSFP28 Direct Attach Copper Cable Assemblies, 142/9Q/9S Series			
	Component	Material		
Connector	Shell	Die Cast Zinc		
Connector	Pull Tab	Thermoplastic		
Connector	Latch	Stainless Steel		
Connector	Spring	Stainless Steel		
Connector	Paddle Card Flame Retardant PCB with 0.73um (30u") Au over 1.27um (50u")			
		min mating pad finish.		
Cable	Primary Cable	100 Ohm differential PO insulators		
Cable	EMI Shield	Copper Foil laminate		
Cable	Jacket	Flame retardant PVC or Halogen Free material. See Technical		
		Specification for details and ratings.		

#### **Regulatory Compliance**

For regulatory information, visit <u>3M.com/regs</u> or contact your 3M representative. See customer drawings for regulatory specifics on each connector.

#### **Electrical**

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

3M™ 25G/100G SFP28/QSFP28 Direct Attach Copper Cable Assemblies, 142/9Q/9S Series					
Description or	scription or Values and			<b>Test Standard or</b>	
Parameter	Units	Limits	Requirement or Conditions	Method	
Dielectric	V DC	300	EIA-364-20, Method B	EIA-364-20B	
Withstanding			Subject a voltage of 300 VDC for 1 minute at		
Voltage			sea level between adjacent contacts of		
			mated and unmated connector assemblies.		
Insulation	Mega	>1000	Measured between adjacent and opposing	EIA-364-21C	
Resistance	ohms		contacts with 300 V applied for 1 minute.		
Impedance	ohm	100+/-5	Measurement of a differential pair	IEEE8023bj	
Insertion Loss	db	> -22.48	SDD21 @ 12.89Ghz	IEEE8023bj	
Diff to Common	db	Formula	SCD21 - SDD21	IEEE8023bj	
Mode Conv. Loss					

#### Mechanical

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

Description or		Values and		<b>Test Standard or</b>
Parameter	Units	Limits	Requirement or Conditions	Method
QSFP28	Newtons	40N Max.	Refer to SFF8436 Spec. Tested without	EIA-364-13
Mating force			latch feature	
QSFP28	Newtons	30N Max.	Refer to SFF8436 Spec. Tested without	EIA-364-13
Unmating force			latch feature	
SFP28	Newtons	18N Max.	Refer to SFF8432 Spec. Tested without	EIA-364-13
Mating force			latch feature	
SFP28	Newtons	12.5N Max.	Refer to SFF8432 Spec. Tested without	EIA-364-13
Unmating force			latch feature	
Latched plug	Newtons	90N Min.	Refer to SFF8432 Spec. Tested with latch	EIA-364-98
retention force			feature	
Shock	G	50	Mated connectors shall exhibit no damage.	EIA-364-27B
	Sec	11ms	No significant change in SDD21 or SCD21-	Condition A
	Pulse	half sine	SDD21.	
Vibration	G	3.10	3.10G RMS between 20 and 500 Hz at 15	EIA-364-28
			minutes in each of 3 mutually	Condition VII D
			perpendicular directions. No damage. No	
			discontinuity longer than 1µsec allowed. No	
			significant change in SDD21 or SCD21-	
			SDD21.	
Durability	NA	Nil	Perform 50 unplug/plug cycles.	EIA-364-09
(preconditioning)			No evidence of physical damage.	
Durability	NA	Nil	Perform 250 unplug/plug cycles.	EIA-364-09
•			No evidence of physical damage.	
Reseating	NA	Nil	Perform 3 unplug/plug cycles.	EIA-364-09
			2 2p. 100 17 11 11 11 11 11 11 11 11 11 11 11 11	

#### **Environmental**

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

3M™ 25G/100G SFP28/QSFP28 Direct Attach Copper Cable Assemblies, 142/9Q/9S Series						
Description or Parameter	Units	Values and Limits	Requirement or Conditions	Test Standard or Method		
Temperature Life (Thermal Aging)	Degrees C Hours	85 250	No physical abnormalities. No significant change in SDD21 or SCD21-SDD21.	EIA-364-17B Method A Condition 3B		
Thermal Shock	Degrees C Cycles	-55 & 85 10	No physical abnormalities. No significant change in SDD21 or SCD21-SDD21.	EIA-364-32A Condition I		
Humidity- Temperature Cycling	Degrees C % RH Cycles	65 to 25 80 to 50% 24	1 cycle - 25°C, 80%RH to 65°C, 50RH to 25°C 80%. Ramp: 0.5 hour, Dwell: 1.0 hour. No significant change in SDD21 or SCD21-SDD21	EIA-364-31B Condition B Method III 24 cycles.		
Corrosivity of Contacts (Humidity)	Degrees C % RH Hours	40 90-96% 336	Steady stage Humidity. No significant change in SDD21 or SCD21-SDD21	EIA-364-113A Condition I		

#### **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™ 25G/100G SFP28/QSFP28 Direct Attach Copper Cable Assemblies, 142/9Q/9S Series						
		Test Group				
	EIA 364	1	2	3	4	
Test Description	TP No.		Test Se	quence		
Visual	18	0,5	0,17	0,7	0,10	
SI (SDD21, SCD21-SDD21)		1,4	1,6	1,4,6	1,9	
Durability (preconditioning)	09	2	2			
Durability (full)	09				5	
Reseating	09		5			
Mechanical Shock	27			2		
Mechanical Vibration	28			3		
Temperature Life	17	3				
Humidity Temperature Cycling	31		4			
Thermal Shock	32		3			
Humidity, Corrosivity of Contacts				5		
Dielectric Withstand Voltage	20				2,6	
Mating Force	13				3,7	
Unmating Force	13				4,8	
Latched Plug Retention Force	98				11	

For regulatory information, visit 3M.com/regs or contact your 3M representative.

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