Test Report

SPE T1 Industrial M8 Hybrid IP67 Connector

TE Connectivity. (Shanghai) Co., Ltd.

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1. INTRODUCTION

1.1 Purpose

Testing was performed on SPE T1 Industrial M8 Hybrid IP67 Connector to determine its conformance to the requirements to product specification 108-137521.

1.2 Scope

This specification covers performance, test and quality requirements for SPE T1 Industrial M8 Hybrid IP67 Connector. Testing was performed at TE Connectivity Shanghai Electrical Test Laboratory.

1.3 Product Description

Part Number	Description	Type	Cable
T4040110044-000 T4040110044-010	SPE T1 Industrial M8 Hybrid IP67 Rear Panel Mount, Female, PCB Solder, Shielded	Panel Mounting	-
T4041110044-000 T4041110044-010	SPE T1 Industrial M8 Hybrid IP67 Rear Panel Mount, Male, PCB Solder, Shielded	Panel Mounting	-
TB1141D4722-XXX TB1147D4722-XXX TB1141D4732-XXX TB1147D4732-XXX	SPE T1 Industrial M8 Hybrid IP67 connectors, cable assembly, Male straight	Straight, Cable assembly	PUR (18/22AWG)
TB1143D4722-XXX TB1143D4732-XXX TB114CD4722-XXX TB114CD4732-XXX	SPE T1 Industrial M8 Hybrid IP67 connectors, cable assembly, Female straight	Straight, Cable assembly	PUR (18/22AWG)
XXX-Cable length			

1.4 Product Qualification Test Sequence

TEST OR EXAMINATION	TEST GROUP								
	P(a)	AP	BP	CP	DP	EP	FP	GP	HP
	Test Sequence								
Examination of product	1	15	10	7	6	2,7			2
Withstanding voltage	4	3,12	9	5	5	6			
Insulation resistance	3	4,13	8	4	4	5			
LLCR	2	5,11	3,5,7	3	3	4			
Derating Temperature Rising									1
Impacting water		9							
Dust (IP6X)		10(b)							
Durability			2(c),6(c)		1				
Mating and Un-mating Force		1,14	1	1,6					
Sinusoidal vibration						1			
Mechanical shock						3			
Polarizing method		16							
Rapid change in temperature		2							
Dry heat		6						1	
Humidity/Temperature cycling		7						2(c)	
Damp heat, steady state				2					
Cold		8							
Mixed flowing gas			4						
Electrical load and temperature					2				
Insertion loss							1		
Return loss							2		
Transverse conversion loss							3		
Transverse conversion transfer loss							4		
Transfer Impedance							5	3	
Coupling attenuation							6	4	
Input to output resistance							7		

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Input to output resistance unbalance							8		
Test specimens	20	3	3	6	3	3	2	2	2

Note:
(a) When the initial test group P has been completed, the specimens are divided in the 6 groups AP, BP, CP, DP, EP, HP, All connectors in each group shall undergo the tests specified for the relevant group numbers indicate sequence in which tests are performed.
(b) It's allowed to perform with an additional specimen, extending the total number of specimens to group P.
(c) Half of specimens

1.5 Environmental Conditions

Unless otherwise specified, the following environmental conditions prevailed during testing:
1.5.1 Temperature: 15 to 35°C
1.5.2 Relative Humidity: 20 to 80%

2. SUMMARY OF TESTING

2.1 Initial Examination of Product

All specimens were visually examined and no evidence of physical damage detrimental to product performance was observed to group P

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2.2 Test Group and result

2.2.1 Test Group AP

Group	Test Item	Sample Number	Requirement	Test Condition and result	Conclusion
AP	Mating and Un-mating Force	3	50N Max.	≤50N	Meet Spec.
	Rapid change in temperature		No physical damage	See Fig. 1	Meet Spec.
	Withstanding voltage		1000VDC, pin to pin 2250VDC, signal pin to shield	No breakdown or flashover	Meet Spec.
	Insulation resistance		500MΩ Min	≥500 MΩ	Meet Spec.
	LLCR		Δ20mΩ Max.	≤20mΩ	Meet Spec.
	Dry heat		No physical damage	See Fig. 2	Meet Spec.
	Humidity/Temperature cycling		No physical damage	See Fig. 2	Meet Spec.
	Cold		No physical damage	See Fig. 2	Meet Spec.
	Impacting water		No water ingress	No water ingress	Meet Spec.
	Dust (IP6X)		No dust ingress	No dust ingress	Meet Spec.
	LLCR		Δ20mΩ Max.	≤20mΩ	Meet Spec.
	Withstanding voltage		1000VDC, pin to pin 2250VDC, signal pin to shield	No breakdown or flashover	Meet Spec.
	Insulation resistance		500MΩ Min	≥500 MΩ	Meet Spec.
	Mating and Un-mating Force		50N Max.	≤50N	Meet Spec.
	Examination of product		No physical damage	Normal operation	Meet Spec.
	Polarizing method		1.5 x total insertion force but 50 N Min.	Impossible to mate connectors in other than correct manner.	Meet Spec.

2.2.2 Test Group BP

Group	Test Item	Sample Number	Requirement	Test Condition and result	Conclusion
BP	Mating and Un-mating Force	3	50N Max.	≤50N	Meet Spec.
	Durability		No physical damage	Normal operation	Meet Spec.
	LLCR		Δ20mΩ Max.	≤20mΩ	Meet Spec.
	Mixed flowing gas		No physical damage	See Fig.3	Meet Spec.
	LLCR		Δ20mΩ Max.	≤20mΩ	Meet Spec.
	Durability		No physical damage	Normal operation	Meet Spec.
	LLCR		Δ20mΩ Max.	≤20mΩ	Meet Spec.
	Insulation resistance		500MΩ Min	≥500 MΩ	Meet Spec.
	Withstanding voltage		1000VDC, pin to pin 2250VDC, signal pin to shield	No breakdown or flashover	Meet Spec.
	Examination of product		No physical damage	Normal operation	Meet Spec.

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2.2.3 Test Group CP

Group	Test Item	Sample Number	Requirement	Test Condition and result	Conclusion
CP	Mating and Un-mating Force	6	50N Max.	≤50N	Meet Spec.
	Damp heat, steady state		No physical damage	Normal operation	Meet Spec.
	LLCR		Δ20mΩ Max.	≤20mΩ	Meet Spec.
	Insulation resistance		500MΩ Min	≥500 MΩ	Meet Spec.
	Withstanding voltage		1000VDC, pin to pin 2250VDC, signal pin to shield	No breakdown or flashover	Meet Spec.
	Mating and Un-mating Force		50N Max.	≤50N	Meet Spec.
	Visual examination		No physical damage	Normal operation	Meet Spec.

2.2.4 Test Group DP

Group	Test Item	Sample Number	Requirement	Test Condition and result	Conclusion
DP	Durability	3	No physical damage	Normal operation	Meet Spec.
	Electrical load and temperature		No physical damage	Normal operation	Meet Spec.
	LLCR		Δ20mΩ Max.	≤20mΩ	Meet Spec.
	Insulation resistance		500MΩ Min	≥500 MΩ	Meet Spec.
	Withstanding voltage		1000VDC, pin to pin 2250VDC, signal pin to shield	No breakdown or flashover	Meet Spec.

2.2.5 Test Group EP

Group	Test Item	Sample Number	Requirement	Test Condition and result	Conclusion
EP	Sinusoidal vibration	3	No electrical discontinuity greater than 1μs	See Fig.4	Meet Spec.
	Examination of product		No physical damage	Normal operation	Meet Spec.
	Mechanical shock		No electrical discontinuity greater than 1μs	See Fig.4	Meet Spec.
	LLCR		Δ20mΩ Max.	≤20mΩ	Meet Spec.
	Insulation resistance		500MΩ Min	≥500 MΩ	Meet Spec.
	Withstanding voltage		1000VDC, pin to pin 2250VDC, signal pin to shield	No breakdown or flashover	Meet Spec.
	Examination of product		No physical damage	Normal operation	Meet Spec.

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2.2.6 Test Group FP

Group	Test Item	Sample Number	Requirement	Test Condition and result	Conclusion
FP	Insertion loss	2	All pairs: ≤ 0,02 sqrt(f) dB from 0.1 MHz to 600 MHz And 0.1dB is minimum	IEC 60512-28-100, test 28a Mated connectors	Meet Spec.
	Return loss		≥ 74-20log (f) dB from 0.1 MHz to 600 MHz And 30dB is maximum	IEC 60512-28-100, test 28b Mated connectors	Meet Spec.
	Transverse conversion loss		≥ 68-20log (f) dB from 0.1 MHz to 600 MHz And 50dB is maximum	IEC 60512-28-100, test 28f Mated connectors	Meet Spec.
	Transverse conversion transfer loss		≥ 68-20log (f) dB from 0.1 MHz to 600 MHz And 50dB is maximum	IEC 60512-28-100, test 28g Mated connectors	Meet Spec.
	Transfer Impedance		$Z_T \leq 0.05 \times f^{0.3}$ Ω from 0.1 MHz to 10 MHz and ZT ≤0.01 x f Ω from 10 MHz to 80 MHz	IEC 60512-26-100, Test 26e Mated connectors	Meet Spec.
	Coupling attenuation		Fulfilled when transfer impedance and TCL are passing	-	Meet Spec.
	Input to output resistance		Signal contact resistance 50 mΩ maximum Screen resistance 100 mΩ max	IEC 60512-2-1, Test 2a Mated connectors Arrange according to Fig. 1	Meet Spec.
	Input to output resistance unbalance		Among all signal conductors, maximum difference between maximum and minimum 25 mΩ maximum	IEC 60512-2-1, Test 2a Mated connectors Arrange according to Fig.1	Meet Spec.

2.2.7 Test Group GP

Group	Test Item	Sample Number	Requirement	Test Condition and result	Conclusion
GP	Dry heat	2	No physical damage	Normal operation	Meet Spec.
	Humidity/Temperature cycling		No physical damage	Normal operation	Meet Spec.
	Transfer Impedance		$Z_T \leq 0.05 \times f^{0.3}$ Ω from 0.1 MHz to 10 MHz and ZT ≤0.01 x f Ω from 10 MHz to 80 MHz	IEC 60512-26-100, Test 26e Mated connectors	Meet Spec.
	Coupling attenuation		All types: ≥ 65–20log (f/100) dB, from 0.1 MHz to 600 MHz And 65dB is maximum	IEC 62153-4-15 For coupling attenuation with triaxial cell. Mated connectors	Meet Spec.

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2.2.8 Test Group HP

Group	Test Item	Sample Number	Requirement	Test Condition and result	Conclusion
HP	Derating Temperature Rising	2	De-rating curve	See Fig.5	Meet Spec.
	Examination of product		No physical damage	Normal operation	Meet Spec.

2.3 Test illustration

2.3.1 Rapid Change In Temperature

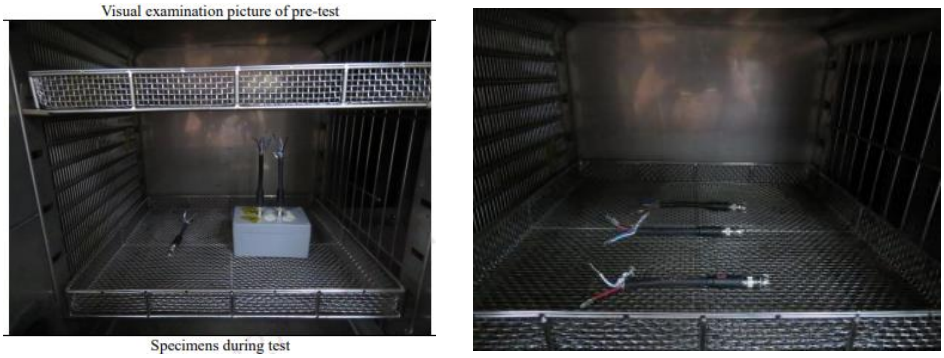

Fig.1

2.3.2 Dry heat

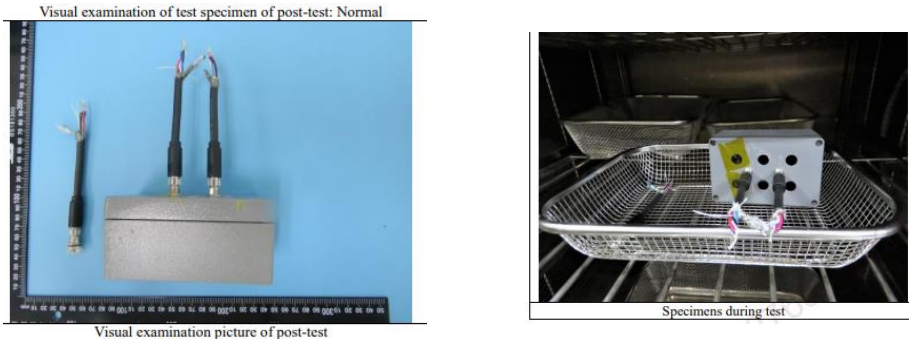

Fig.2

2.3.3 Mixed Flowing Gas

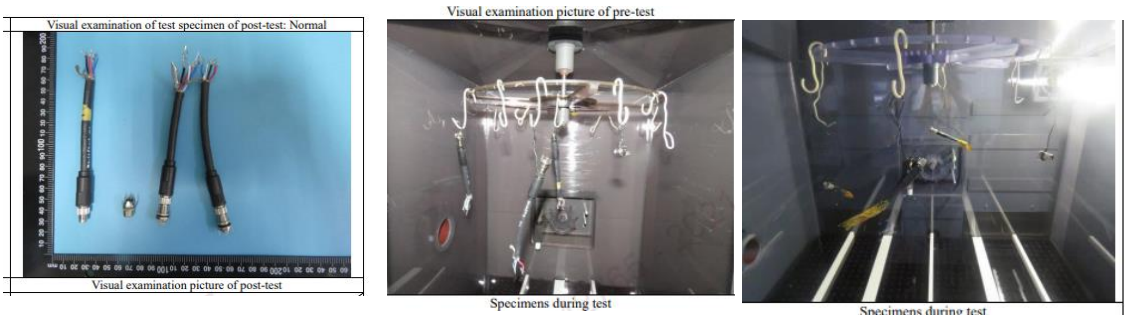

Fig.3

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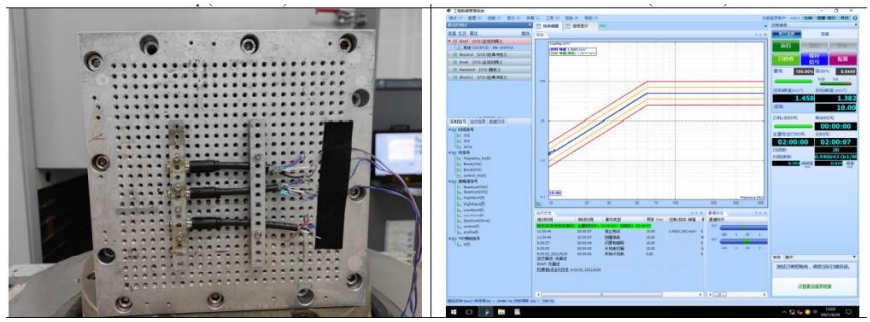
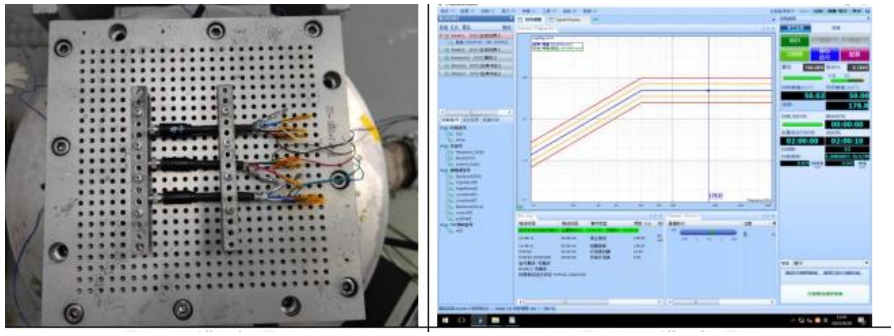
2.3.4 Vibration ans shock

Vibration





Mechanical Shock

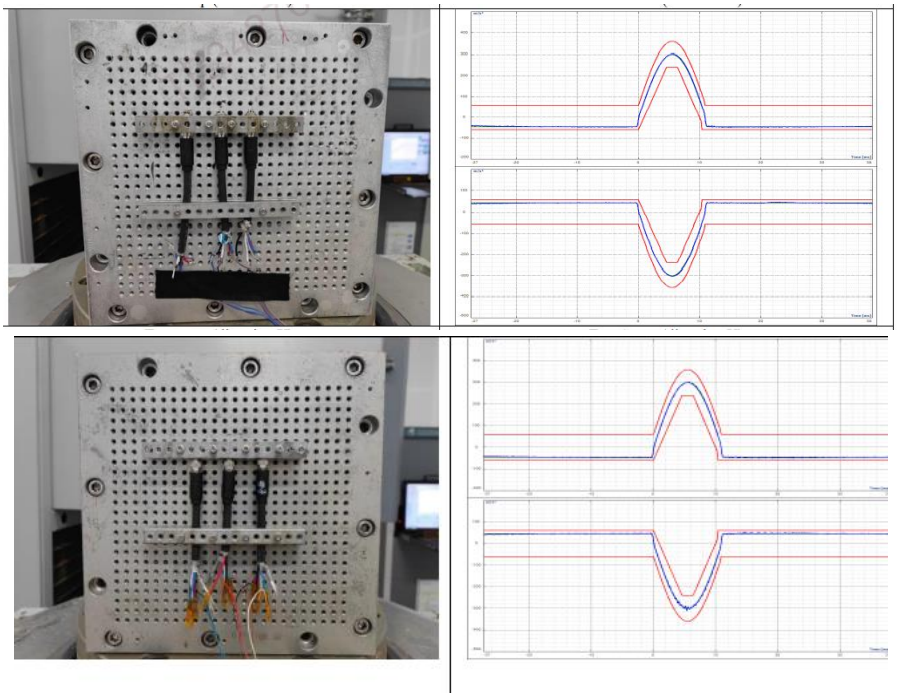


Fig.4

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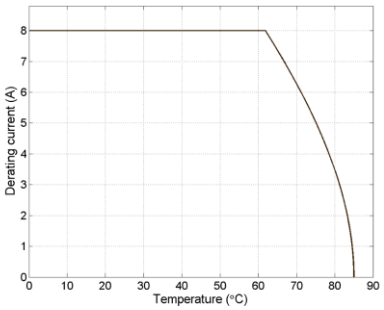
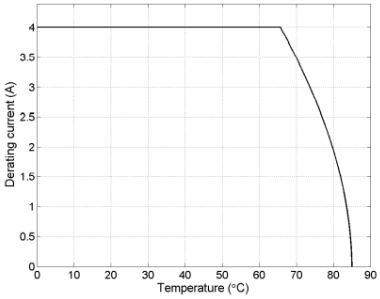
2.3.5 Current Temperature Derating Curve



Derating diagram for the 1mm power pin



Derating diagram for the 0.5mm data pin

Fig.5

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