Test Report

Industrial M12 Panel Mount Series Connector

1. INTRODUCTION

1.1 Purpose

Testing was performed on M12 Series Circular Connector with Panel Mount type to determine its conformance to the requirements of product specification 108-137350.

1.2 Scope

This specification covers performance, test and quality requirements for Industrial M12 Series Circular Connector with cable assembly. Testing was performed at TE Connectivity Shanghai Electrical Test Laboratory.

1.3 Product Description

Part Number	Interface	Type	Code	Poles	Cable Assembly
T414XXXXXXX-XXX Solder PCB Type	M12 Plug M12 Receptacle	Straight Rear	L-Code	5 Pins 4 Pins 3 Pins	PUR(14AWG) for 3P to 5P

1.4 Product Qualification Test Sequence

Test Examination	Test Group					
	A(a)	B	C	D	E(e)	F
	Test Sequence					
Examination of product	1	2,9,18,23	5	8	1	6
Voltage proof (withstanding voltage)	4	8,17,22	4	4,7		5
Insulation resistance	3	7,11,16,21	3	3,6		4
LLCR	2	4,6,15,20	2	2	2,6	2
Temperature Rising				5(d)		
Durability					4	
Mating and Un-Mating Force					3,5	
Sinusoidal vibration		1				
Mechanical Shock		3				
Rapid change in temperature		5		1		
Dry heat		10				
Damp heat, cyclic		12(b),14(c)				
Impacting water		19				3
Dust (IP6X)						1
Cold		13				
Mixed flowing gas			1			

(a) When the initial test group A has been completed, the specimens are divided in the 5 groups B, C, D, E, F All connectors in each group shall undergo the tests specified for the relevant group numbers indicate sequence in which tests are performed.
(b) First cycle
(c) Remaining cycles
(d) Test with additional specimen for over-molding type cable assembly
(e) This test group should be tested without the screw nut and locking latch

*** Notes:**

Numbers indicate the sequence in which the tests are performed.

1.5 Environmental Conditions

Unless otherwise specified, the following environmental conditions prevailed during testing:

- Temperature: 15 to 35°C
- 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.

2.2 Test Group

2.2.1 Group A+B

Group	Test Item	Sample Number	Requirement	Test Condition and Result	Conclusion
A	LLCR	4	5 m Ω Max. (Initial)	<5 m Ω	meet spec.
	Insulation resistance	4	100MΩ Min	>100MΩ	meet spec.
	Voltage Proof	4	No breakdown or flashover	No breakdown and flashover	meet spec.
B	Sinusoidal vibration	4	No physical damage; No electrical discontinuity greater than 1μs	See 2.3.1 Fig.1	meet spec.
	Examination of product	4	No defect would impair normal operation	Normal	meet spec.
	Mechanical shock	4	No physical damage; No electrical discontinuity greater than 1μs	See 2.3.2 Fig.2	meet spec.
	LLCR	4	Δ10mΩ max.	ΔR <10 mΩ	meet spec.
	Rapid change in temperature	4	No physical damage	See 2.3.3 Fig.3	meet spec.
	LLCR	4	Δ10mΩ max.	ΔR <10 mΩ	meet spec.
	Insulation resistance	4	100MΩ Min	>100MΩ	meet spec.
	Voltage proof (withstanding voltage)	4	No breakdown or flashover	No breakdown and flashover	meet spec.

	Examination of product	4	No defect would impair normal operation	Normal	meet spec.
	Dry heat	4	No physical damage	Normal	meet spec.
	Insulation resistance	4	100MΩ Min	>100MΩ	meet spec.
	Damp heat, cyclic	4	No physical damage	See 2.3.2 Fig.4	meet spec.
	Cold	4	No physical damage	Normal	meet spec.
	Damp heat, cyclic	4	No physical damage	See 2.3.2 Fig.4	meet spec.
	LLCR	4	Δ10mΩ max.	ΔR <10 mΩ	meet spec.
	Insulation resistance	4	100MΩ Min	>100MΩ	meet spec.
	Voltage proof (withstanding voltage)	4	No breakdown or flashover	No breakdown and flashover	meet spec.
	Examination of product	4	No physical damage	Normal	meet spec.
	Impacting water	4	No water ingress	No water ingress	meet spec.
	LLCR	4	Δ10mΩ max.	ΔR <10 mΩ	meet spec.
	Insulation resistance	4	100MΩ Min	>100MΩ	meet spec.
	Voltage proof (withstanding voltage)	4	No breakdown or flashover	No breakdown and flashover	meet spec.
	Examination of product	4	No physical damage	Normal	meet spec.

2.2.2 Group A+C

Group	Test Item	Sample Number	Requirement	Test Condition and Result	Conclusion
A	LLCR	2	5 m Ω Max. (Initial)	<5 m Ω	meet spec.
	Insulation resistance	2	100MΩ Min	>100MΩ	meet spec.
	Voltage Proof	2	No breakdown or flashover	No breakdown and flashover	meet spec.
C	Mixed Flowing Gas	2	No corrosion and defect	See 2.3.5 Fig.5	meet spec.
	LLCR	2	Δ10mΩ max.	ΔR <10 mΩ	meet spec.
	Insulation resistance	2	100MΩ Min	>100MΩ	meet spec.
	Voltage proof (withstanding voltage)	2	No breakdown or flashover	No breakdown and flashover	meet spec.
	Examination of product	2	No defect would impair normal operation	Normal	meet spec.

2.2.3 Group A+D

Group	Test Item	Sample Number	Requirement	Test Condition and Result	Conclusion
A	LLCR	3	5 m Ω Max. (Initial)	<5 m Ω	meet spec.
	Insulation resistance	3	100MΩ Min	>100MΩ	meet spec.
	Voltage Proof	3	No breakdown or flashover	No breakdown and flashover	meet spec.

D	Rapid change in temperature	3	No physical damage	See 2.3.3 Fig.3	meet spec.
	LLCR	3	Δ10mΩ max.	ΔR <10 mΩ	meet spec.
	Insulation resistance	3	100MΩ Min	>100MΩ	meet spec.
	Voltage proof (withstanding voltage)	3	No breakdown or flashover	No breakdown and flashover	meet spec.
	Temperature Rising	3	ΔT 30° C Max.	Normal	meet spec
	Insulation resistance	3	100MΩ Min	>100MΩ	meet spec.
	Voltage proof (withstanding voltage)	3	No breakdown or flashover	No breakdown and flashover	meet spec.
	Examination of product	3	No defect would impair normal operation	Normal	meet spec.

2.2.3 Group E

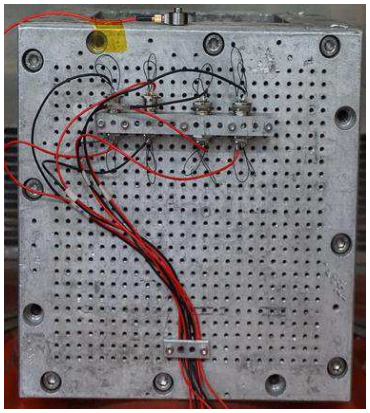
Group	Test Item	Sample Number	Requirement	Test Condition and Result	Conclusion
E	Examination of product	3	No defect would impair normal operation	Normal	meet spec.
	LLCR	3	5 m Ω Max. (Initial)	<5 m Ω	meet spec.
	Mating and Un-Mating Force	3	15N/15N Max. for 2-5pins 23N/30N Max. for 6-12pins	Normal	meet spec.
	Durability	3	100 cycles for gold plating 50 cycles for silver plating 20 cycles for tin plating	Normal	meet spec.
	Mating and Un-Mating Force	3	15N/15N Max. for 2-5pins 23N/30N Max. for 6-12pins	Normal	meet spec.
	LLCR	3	Δ10mΩ max.	ΔR<10 m Ω	meet spec.

2.2.4 Group F

Group	Test Item	Sample Number	Requirement	Test Condition and Result	Conclusion
F	Dust(IPX6)	3	No defect would impair normal operation	Normal	meet spec.
	LLCR	3	Δ10mΩ max.	ΔR <10 m Ω	meet spec.
	Impacting water	3	No water ingress	No water ingress	meet spec.
	Insulation resistance	3	100MΩ Min	>100MΩ	meet spec.
	Voltage Proof	3	No breakdown or flashover	No breakdown and flashover	meet spec.
	Examination of product	3	No defect would impair normal operation	Normal	meet spec.

2.3 Test Condition and results

2.3.1 Vibration test



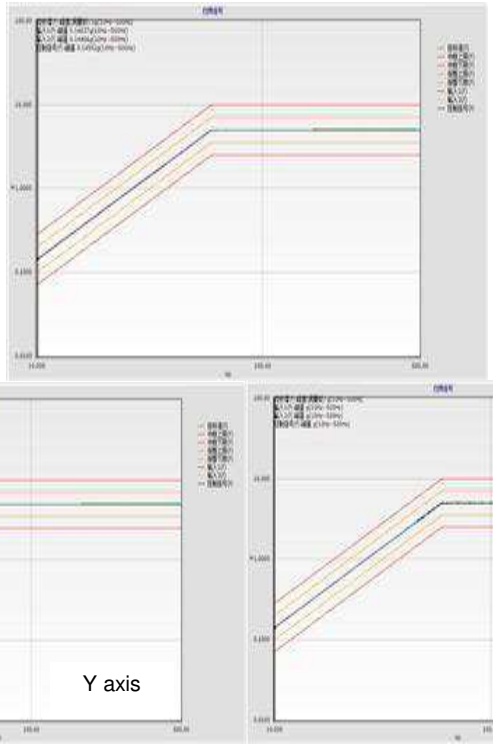
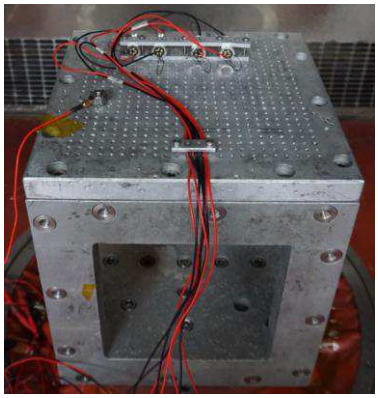


Fig.1

2.3.2 Mechnical shock



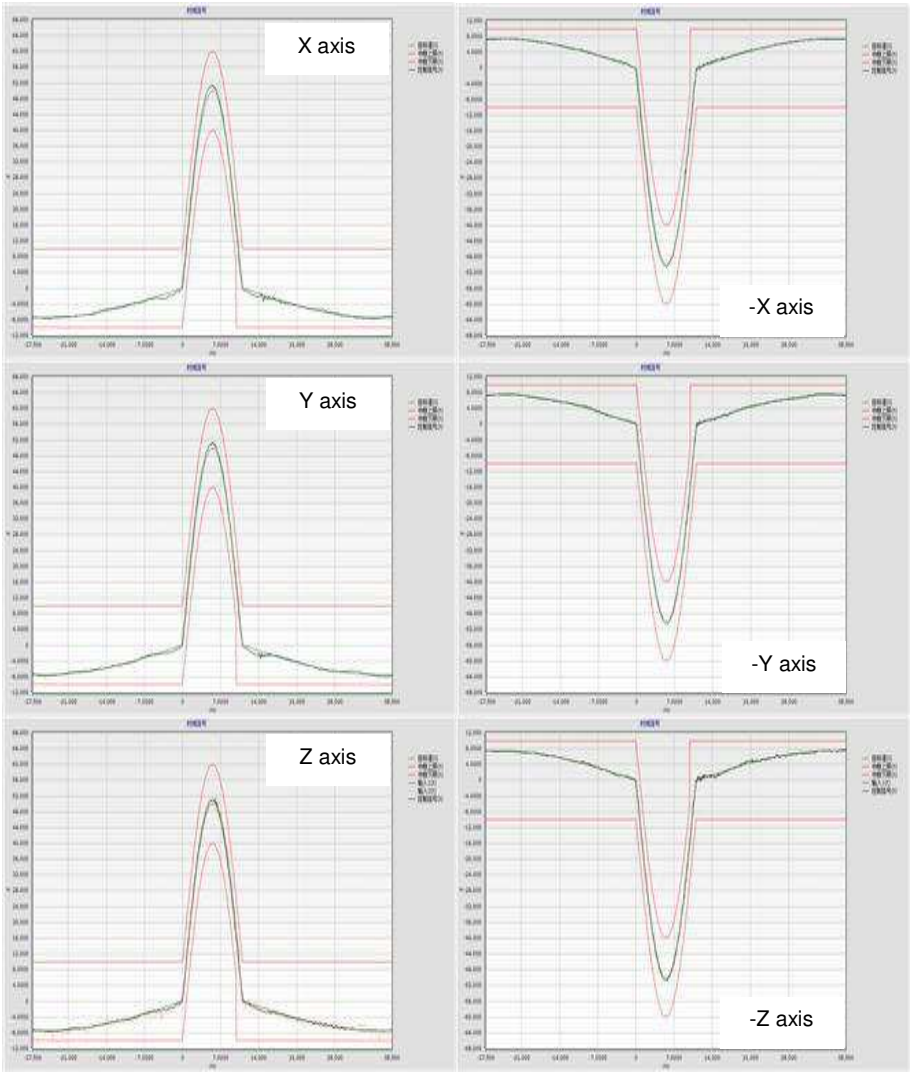
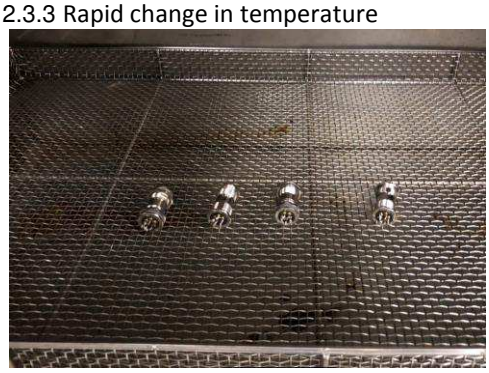


Fig.2

2.3.3 Rapid change in temperature



Test Step	Temperature	Period
1	-40℃	30Minutes
2	85℃	30 Minutes
Temperature transfer time: ≤5min Cycles: 5		

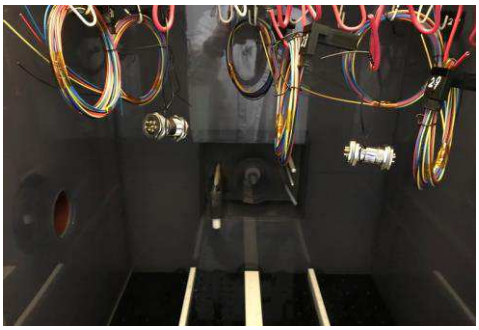
Fig.3

2.3.4 Damp heat, cyclic

Test Step	Initial	Final	Period
1	23℃/95%RH	40℃/95%RH	3h
2	40℃/95%RH	40℃/95%RH	9h
3	40℃/95%RH	23℃/95%RH	3h
4	23℃/95%RH	23℃/95%RH	9h
Cycles: 5			

Fig.4

2.3.5 Mixed Flowing Gas



Gas	Test Condition		Actual Gas Concentration				
	Source(S)	Test Spec.(Ct)	Data1 Set(q)	Data2 Set(q)	Data3 Set(q)	Data4 Set(q)	Data5 Set(q)
Cl_2	100ppm	10ppb	100 0.1	100 0.1	100 0.1		
NO_2	0.10%	200ppb	1000 0.2	1000 0.2	1000 0.2		
H_2S	99.5ppm	10ppb	100 0.1	100 0.1	100 0.1		
H_2S							
SO_2	0.1%	100ppb	1000 0.2	1000 0.2	1000 0.2		
SO_2							
Dry-bulb Temp.	25C°	25C°	25.0C°	25.1C°	25.0C°		
Wet-bulb Temp.	78%RH	21.5C°	21.5C°	21.5C°	21.5C°		
Tester							
Date			2018/8/17	2018/8/20	2018/8/21		

Fig.5