

DC Power connector

1. SCOPE

1.1. CONTENTS

This specification covers the performance, tests and quality requirements for the DC Power connector (Jack and Plug) consisting of 1 detect contact and 2 power contacts.

1.2. QUALIFICATION

When tests are performed on the subject product line, the procedures specified in TE 109 series specifications shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENT

The following TE documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. TE SPECIFICATIONS

A.109-5000: Test Specification, General Requirement for Test Methods

B.109-197: TE Test Specification cross reference EIA and IEC Test Methods.

C.501-99041: Test Report

2.2. COMMERCIAL STANDARD

EIA-364: Electrical connector/Socket Test Procedures Including Environmental Classifications.

3. REQUIREMENTS

3.1. DESIGN AND CONSTRUCTION

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

3.2. MATERIALS

Housing

Receptacle Housing

Material: High Temperature Thermoplastics, Glass Filled UL94 V-0.

Plug Housing

Material: Thermoplastics, Glass Filled UL94 V-0.

Power & Ground Contact

Material: Copper Alloy

Finish: Gold plating on contact area

Matte Tin plating on solder area

All over Nickel under plating

DR Stanley Huang	DATE 09-JUN-17	APVD Vincent Peng	DATE 09-JUN-17
---------------------	-------------------	----------------------	-------------------

Detect Contact

Material: Copper Alloy
 Finish: Gold plating on contact area
 Matte Tin plating on solder area
 All over Nickel under plating

Shell

Material: Copper Alloy
 Finish: Matte Tin plating on solder area
 All over Nickel under plating

3.3. RATINGS

Signal and Power contacts

- A. Voltage: 30V DC.
- B. Current: 12.5A max per power contact for Plug, 12.5A max per 2 power contacts for Jack; 12.5A max per ground contact for Plug, 12.5A max per 2 ground contacts for Jack; 1A max per detect contact for Plug, 1A max per detect contact for Jack.
- C. Temperature: -40°C to +85°C (inclusive of temperature rise)

3.4. PERFORMANCE REQUIREMENT AND TEST DESCRIPTION

The product is designed to meet the electrical, mechanical and environmental performance requirement specified in Figure 1.

3.5. TEST REQUIREMENTS AND PROCEDURES SUMMARY

PARA	TEST ITEMS	REQUIREMENTS	PROCEDURES
3.5.1	Examination of Product	Meet requirements of product drawing.	Visually, dimensionally and functionally inspected per applicable inspection plan per EIA-364-18.
ELECTRICAL REQUIREMENTS			
3.5.2	Insulation Resistance	500 MΩ min	Subject a voltage of 500V DC for 1 minute between adjacent contacts per EIA-364-21.
3.5.3	Dielectric withstanding Voltage	No breakdown or flashover, leakage current in excess of 2mA.	Subject a voltage of 150V rms for 1 minute between adjacent contacts per EIA-364-20B, Method B.

Figure 1 (CONT.)

PARA	TEST ITEMS	REQUIREMENTS	PROCEDURES
3.5.4	Low Level Contact Resistance	(1). Ground contact 7 mΩ max. initial, 10mΩ max. final (2). Detect contact 10 mΩ max. initial, ΔR=10mΩ max. final (3). Power contact 7 mΩ max. initial, ΔR=10mΩ max. final (4). Between Jack Shell and Jack Ground contact : 100 mΩ max. at the initial and final.	Subject a voltage of 20mV max open circuit at a current of 100mA max on mated connectors assembled per EIA 364-23. (Measuring point see Figure 3, 4, 5 & 6)
3.5.5	Temperature Rise	Temperature rise about ambient shall not exceed 30°C at any point in the connector when contact positions are powered. The ambient condition is still air at 25°C (Wire size see Figure 7 & 8) (PCB pattern see Figure 9)	Contact series-wired, apply test current of loaded rating current to the circuit, and measure the temperature rising by probing on soldered areas of contacts, after the temperature becomes stabilized deduct ambient temperature from the measured value per EIA 364-70.
MECHANICAL REQUIREMENTS			
3.5.6	Solderability	Solderable area shall have a solder coverage of 95% min.	Solder Temperature: 245°C±5°C Immersion Duration: 3±0.5 seconds Flux: Alpha 100 (NON- active rosin base) EIA-364-52
3.5.7	Resistance to Soldering Heat (Receptacle PCB type only)	See note(a)	Solder Temp. : 260 +0/-5°C, 5+2/-0 sec. Test spec. 109-202, Condition C.
3.5.8	Mating Force	3.0Kgf Max.	Mate connectors assembled at a rate of 12.5mm per minute per EIA 364-13.
3.5.9	Unmating Force	0.7Kgf Min.	Mate connectors assembled at a rate of 12.5mm per minute per EIA 364-13.

Figure 1 (CONT.)

PARA	TEST ITEMS	REQUIREMENTS	PROCEDURES
3.5.10	Durability	$\Delta R=15m\Omega$ max. final for Detect & Power contact, $10m\Omega$ max. final for Ground contact.	Repeated mating and unmating of the Connector for 5000cycles per EIA364-09 Test speed: 200cycles per hour Max.
3.5.11	Durability (Preconditioning)	See note(b)	No. of cycles: 50 cycles
3.5.12	Vibration (Random)	Discontinuity should not exceed 1 microsecond.	Mated connector to 10-55-10 Hz traversed in 1 minute at 1.52mm amplitude 2 hours each of 3 mutually perpendicular planes.
3.5.13	Physical Shock	Discontinuity should not exceed 1 microsecond.	Subject mated connectors assembled at 30g's with 1/2 sine wave(11ms)shock in x, y & z axis(total 18 shocks) per EIA364-27, condition H.
3.5.14	Reseating	See note (a).	Manually plug/unplug 3 time
3.5.15	Connector Strength	No function problem No mechanical problem	<ol style="list-style-type: none"> 1. Connect an applicable plug to its mate jack firmly. 2. By using push-pull gauge, push the connected plug down ward (perpendicular to the connecting direction), so that 10kgf.cm moment of force will be applied at joint portion of connected plug and jack. 3. Hold above condition 10 seconds, then release the force. 4. Check the mechanical and function problem. 5. Change the direction of force applied to connected plug, to upward, rightward and left ward, and execute the same operation 2 to 4 respectively.

Figure 1 (CONT.)

ENVIRONMENTAL REQUIREMENTS			
3.5.16	Humidity	See note(a)	Subject mated connectors assembled to 96 hours at 40°C with 90~95% relative humidity per EIA 364-31 Method, condition A.
3.5.17	Temperature Life	See note(a)	Subject mated connectors assembled to 85°C for 250 hours per EIA 364-17, Method A, condition III.
3.5.18	Thermal Shock	See note(a)	Subject mated connectors assembled to 10 cycles between -55°C and 85°C per EIA364-32, Condition I .
3.5.19	Industrial Gas	See note(a) $\Delta R=15m\Omega$ max. final	Mated connector H ₂ S Gas: 3ppm, 80%R.H 40 °C, 96hours

Figure 1 (End)

NOTE: (a) Shall meet visual requirements, show no physical damage, and shall meet requirements of additional tests as specified in the test sequence in Figure 2

(b) Preconditioning: Repeated Mating/Unmating 50 cycles.

The mating and Unmating Cycle is at the maximum rate of 200 cycles per hour.

3.6 PRODUCT QUALIFICATION AND REQUALIFICATION TEST

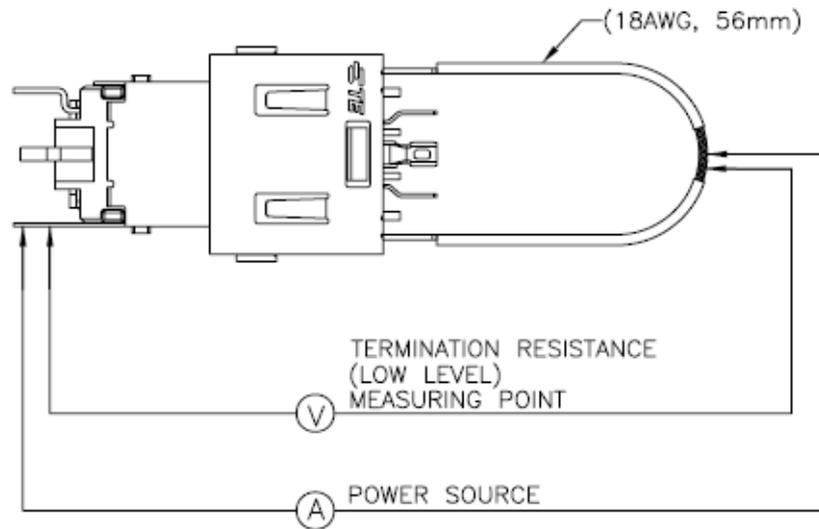
Test Item	Test Group									
	1	2	3	4	5	6	7	8	9	10
	Test Sequence (c)									
Examination of Product	1, 9	1, 10	1,9	1, 3	1,7	1, 7	1, 3	1, 3	1,5	1,6
Low Level Contact Resistance	2, 8	2,9	2,5, 8		2,4, 6				2,4	2,5
Insulation Resistance						2, 5				
Dielectric Withstanding Voltage						3, 6				
Temperature Rise				2						
Solderability								2		
Resistance to Soldering Heat							2			
Mating Force	3,6	3,6								
Unmating Force	4,7	4,7								
Durability	5									
Durability (preconditioning)			3(b)							
Vibration (Random)					5					
Physical Shock					3					
Reseating(manually plug/unplug 3 times)		8	7							4
Connector Strength									3	
Humidity			6			4				
Temperature Life		5								
Thermal Shock			4							
Industrial Gas										3
Sample Size per Test Group	5	5	5	5	5	5	5	5	5	5

Figure 2

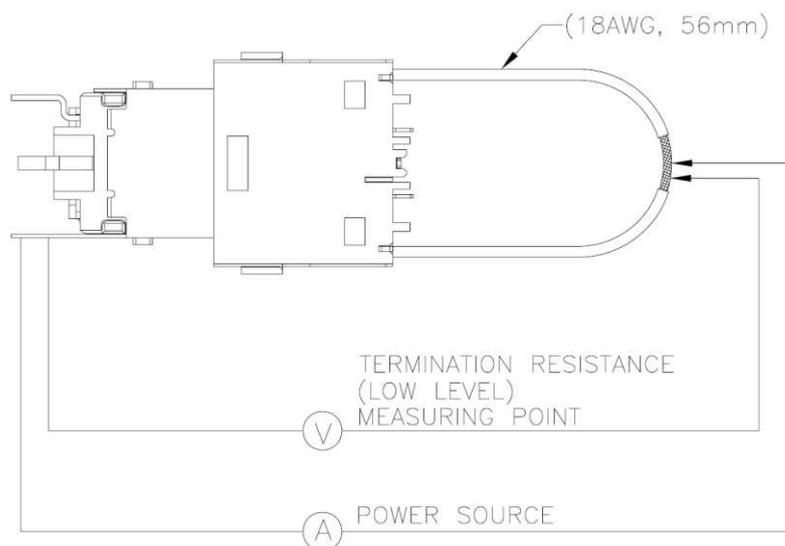
NOTE: (c) Numbers indicate sequence in which tests are performed.

3.7 CONTACT RESISTANCE MEASURING POINT

Terminating wire Resistance must be subtracted from measured result reading

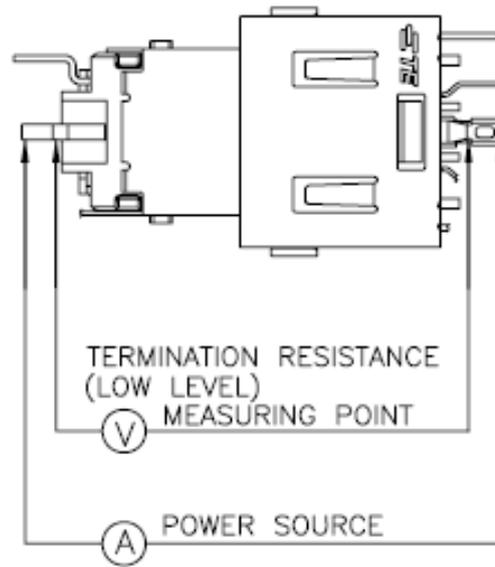


(2129567-1 measuring point of Ground contact)

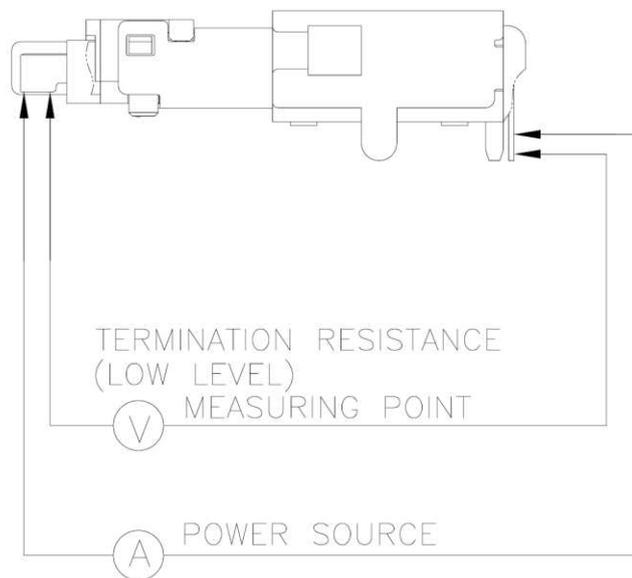


(1-2129458-1/-2 measuring point of Ground contact)

Figure 3

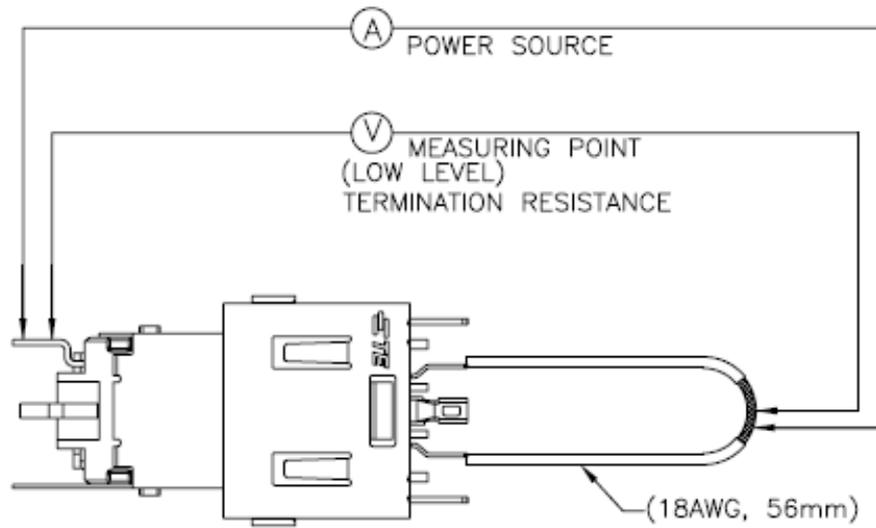


(2129567-1 measuring point of Detect contact)

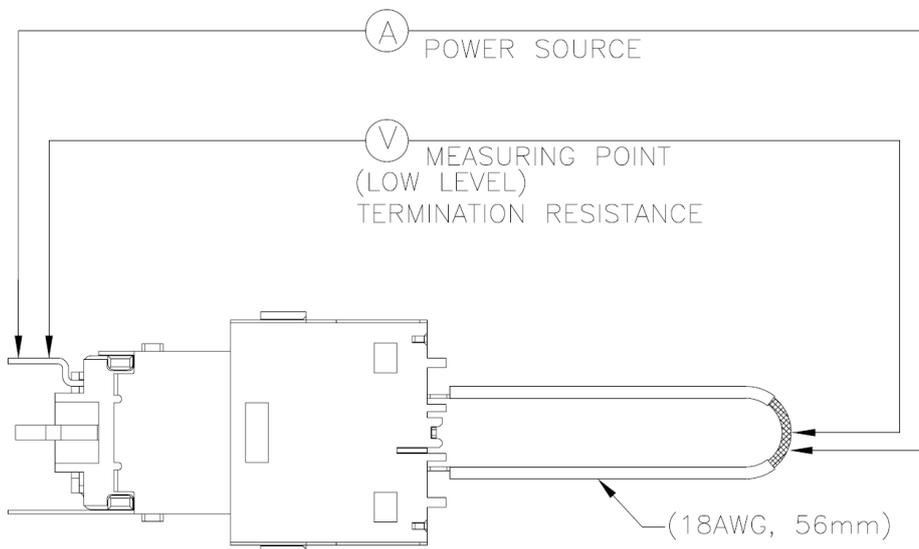


(1-2129458-1/-2 measuring point of Detect contact)

Figure 4

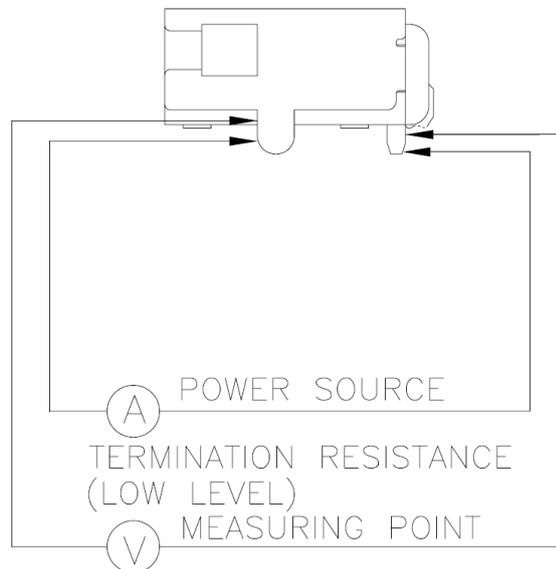


(2129567-1 measuring point of Power contact)



(1-2129458-1/-2 measuring point of Power contact)

Figure 5



(1-2129458-1/-2 measuring point of Ground Shell & Ground Contact)

Figure 6

3.8 CONTACT SEQUENCE

This Plug and DC Jack contact sequence must be met with below requirement.

- (1) Ground contact
- (2) Detect contact
- (3) Power contact

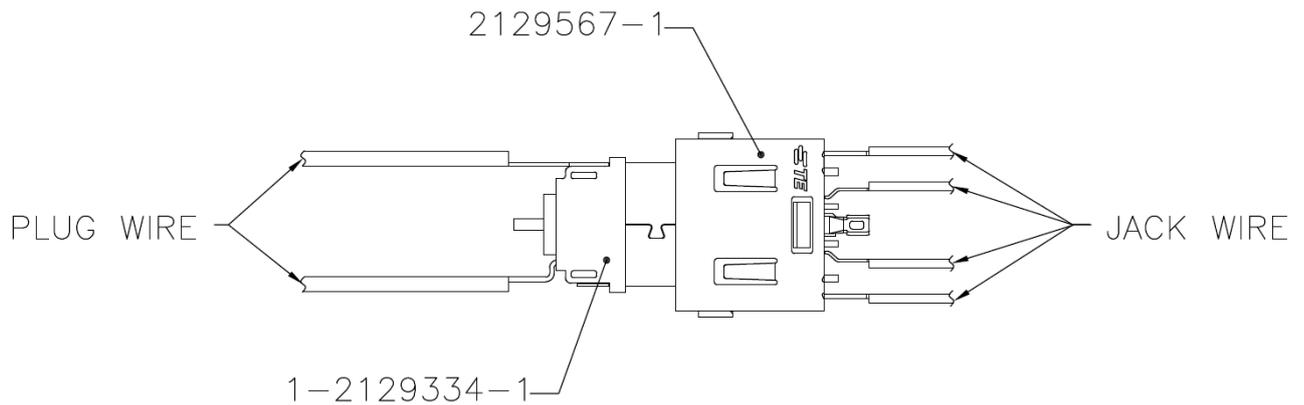
Insertion timing: (1) → (2) → (3)

Take out timing: (3) → (2) → (1)

3.9.1 Current rating VS. Wire size

Apply Current [A]	Wire Size (AWG)	
	Plug	Jack
10.7 [A]	AWG18	AWG22
12.5 [A]	AWG16	AWG22

(Figure 7)



(Figure 8)

