040 III High Density Connector

1. Scope :

1.1 Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of .040 III High Density Connector.

Applicable product description and part numbers are as shown in Appendix 1.

2. Applicable Documents :

The following documents form a part of this specification to the extent specified herein. 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 AMP Specifications :

A. 109-5000Test Specification, General Requirements for Test Methods

B. 114-5217Application Specification, Crimping of .040 III Unsealed Contact, Receptacle

C. 501-5258Test Report

2.2 Commercial Standards and Specifications.

A.	JASO D605	Multi-pole Connector for Automobiles
B.	JASO D7101	Test Methods for Plastic Molded Parts
C.	JIS C3406	Low Voltage Wires and Cables for Automobiles
D.	JIS D0203	Method of Moisture, Rain and Spray Test for Automobile Parts
E.	JIS D0204	Method of High and Low Temperature Test for Automobile Parts
F.	JIS D1601	Vibration Testing Method for Automobile Parts
G.	JIS R5210	Portland Cement
H.	MIL-STD-202	Testing Method 208 : Method of Soldering

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 :

A.Contact :

Description	Material	Finish
Tab(Male)	Copper alloy	Selective-Gold plating or Tin-Lead plating over Nickel under plating or Pre-Tinned
Receptacle(Female)	Copper alloy	Selective-Gold plating over Nickel under plating or Pre-Tinned

Fig.1

B.Housing : PBT

3.3 Ratings :

A.Voltage Rating : 12 V DC

B.Temperature Rating : −30℃ to 105℃

3.4 Performance Requirements and Test Descriptions :

The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Fig.2 and Fig3. All tests shall be performed in the room temperature, unless otherwise specified.

3.5 Test Requirements and Procedures Summary :

Para.	Test Items	Requirements			Procedures
3.5.1	Examination of Product	Meets requirements of product drawing and AMP Specification 114-5217.			Visually inspection. No physical damage
		Electrical Requirements			
3.5.2	Termination Resistance (Low Level)	3 mΩ Max. (Initial) 10 mΩ Max. (Final)			Subject mated contacts assembled in housing to 20 mV Max. open circuit at 10 mA. Fig. 3 AMP Spec. 109-5311-1
3.5.3	Termination Resistance (Specified Current)	Wire size (mm^2)	Test Current (A)	Resistance (mΩ) Max.	Measure mill volt drop of contact in mated connectors, Fig. 3. AMP Spec. 109-5311-2
		0.5	1	3 (Initial) 10 (Final)	
		1.25	1		
3.5.4	Dielectric withstanding Voltage	No creeping discharge nor flashover shall occur.			1 KV AC for 1 minute. Mated connector. Fig. 4. AMP Spec. 109-5301

Fig.2 (To be continued)

Para.	Test Items	Requirements			Procedures
3.5.5	Insulation Resistance	100 MΩ Min. (Initial) 100 MΩ Min. (Final)			Impressed voltage 500 V DC. Mated connector. Fig. 4. AMP Spec. 109-5302
3.5.6	Temperature Rising	Wire size (mm^2)	Test Current (A)	Temp. Rising (℃) Max.	Measure temperature rising at wire crimped by applied current to all positions. AMP Spec. 109-5310
		0.5	2.4	60	
		1.25	4.2		
3.5.7	Over current Loading	No ignition is allowed during the test.			Apply the current to only one position Applied Current : Fig. 6
3.5.8	Vibration (High Frequency)	No electrical discontinuity greater than 1 μsec. shall occur. 10 mΩ Max. (Final)			Vibration Frequency : 20→200→20 Hz /3 min. Accelerated Velocity : 44.1 m / s^2 Vibration Direction : X, Y, Z Duration: 1 hour Mounting: Fig. 7
3.5.9	Physical Shock	No electrical discontinuity greater than 1 μ sec. shall occur. Final 10 mΩ Max.			Accelerated Velocity : 980 m/s^2 Waveform: Half sine wave Duration: 6 m sec.Velocity Change: 3.75 m/s Number of Drops: 6 drops each directions of X, Y and Z axes, totally 18 drops AMP Spec. 109-5208 Condition D Mounting : Fig. 7
3.5.10	Connector Mating Force	Fig. 11			Operation Speed : 20 mm / min. Measure the force required to mate connectors. AMP Spec. 109-5206 Condition A
3.5.11	Connector Unmating Force	Fig. 11			Operation Speed : 100 mm / min. Measure the force required to unmate connectors. (without housing lock) AMP Spec. 109-5206 Condition A
3.5.12	Connector Locking Strength	100 N Min.			Apply an axial pull-off load to one of the mated housing. Measure locking strength. Operation Speed : 100 mm / min.
3.5.13	Contact Insertion Force	10 N Max. per contact			Measure the force required to insert contact into housing.
3.5.14	Contact Retention Force (Housing Lance only)	40 N Min.			Apply an axial pull-off load to crimped wire. Operation Speed : 100 mm / min.
3.5.15	Contact Retention Force (Secondary Lock)	100 N Min.			Measure contact retention force with secondary lock set it effect. Operation Speed : 100 mm / min.

Fig.2 (To be continued)

Para.	Test Items	Requirements		Procedures
		Mechanical Requirements		
3.5.16	Crimp Tensile Strength	Wire size (mm^2)	Tensile Strength (N) Min.	Apply an axial pull-off load to crimped wire of contact secured on the tester, Operation Speed : 100 mm / min. AMP Spec. 109-5205 Condition B
		0.3	70*	
		0.5	90	
		0.85	130	
		1.25	180	
		* Included the insulation grip.		
3.5.17	Post Retention Force	20 N Min.		Measure post retention force. Operation Speed : 100 mm / min
3.5.18	Resistance to "Kojiri"	Termination Resistance : 10 mΩ Max. (Final)		Hold one of mated connectors on bench, apply repeated torque motions of 1.96 N·m in front-rear, and right-left directions for 30 cycles each at the every depth of 1 mm graduation. This test may be alternatively performed manually. See Fig. 8. AMP Specification, 109-5215
3.5.19	Solderability	Wet Solder Coverage : Plated area only 95 % Min. (With substrate area) 50 % Min. (Without substrate area)		Solder Temperature :235±5℃ Immersion Duration :5±0.5 seconds Flux : Alpha 100 AMP Spec. 109-5203
3.5.20	Handling Ergonomics	No abnormalities allowed in manual mating / unmating handling.		Manually operated
3.5.21	Resistance to Soldering Heat	No physical damage shall occur. Post Retention Force 20 N Min. (Final)		Test connector on PCB. Solder Temperature:260±5℃ Immersion Duration :10±1 sec. AMP Spec. 109-5204 Condition B
		Environmental Requirements		
3.5.22	Thermal Shock	10 mΩ Max. (Final)		Mated connector -40℃/30 min., 100℃/30 min. Making this a cycle, repeat 1000 cycles.
3.5.23	Humidity, Steady State	Insulation resistance 100 MΩ Min. (Final) Termination resistance 10 mΩ Max. (Final) Current Leakage 1 mA Max.		Mated connector, 90～95 % R. H. 60±5℃ 96 hours 14 V applied. Fig. 5
3.5.24	Salt Spray	10 mΩ Max. (Final)		Mated connector, 5 ± 1 % salt concentration, 96 hours : AMP Spec. 109-5101 Condition B
3.5.25	Industrial Gas (SO_2)	10 mΩ Max. (Final)		Unmated connector SO_2 Gas : 25 ppm, 75 % R. H. 25℃, 96 hours
3.5.26	Temperature Life (Heat Aging)	10 mΩ Max. (Final)		Mated connector, 120℃, 120 hours AMP Spec. 109-5104-5 Condition B

Fig.2 (To be continued)

Para.	Test Items	Requirements	Procedures
3.5.27	Resistance to Cold	10 mΩ Max. (Final)	Mated connector -40℃, 120 hours AMP Spec. 109-5108 Condition D
3.5.28	Humidity-Temperature Cycling	Insulation resistance 100 MΩ Min. (Final) Termination resistance 10 mΩ Max. (Final)	Mated connector Condition : Fig. 9
3.5.29	Dust Bombardment	10 mΩ Max. (Final)	Mated connector Subject JIS R 5210 cement blow of 1.5 kg per 10 seconds in 15 minutes intervals for 8 cycles, with Unmate/Re-mating per 2 cycles. AMP Spec. 109-5110
3.5.30	Compound Environment Resistance	10 mΩ Max. (Final)	Temperature: 80℃ Vibration Frequency : 20→200→20 Hz/3 Min. (Log) Accelerated Velocity: 44.1 m/s^2 Vibration Direction: X, Y, Z Duration: 300 hours Test Current: Fig. 10 Mounting: Fig. 7

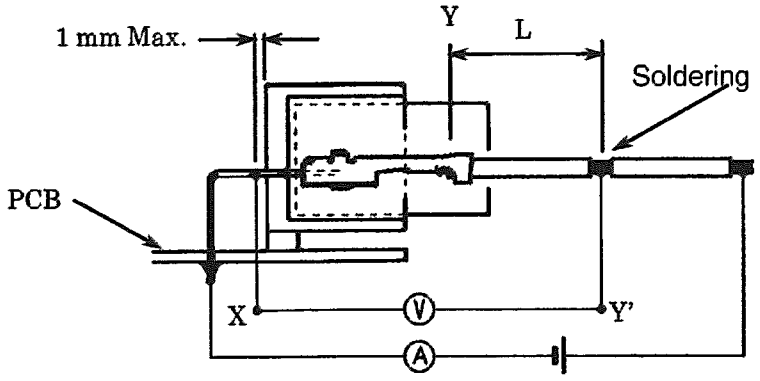
Fig. 2 (End)

3.6 Product Qualification Test Sequence

Test Examination	Test Group												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	Test Sequence [a]												
Examination of Product	1,6	1,6	1,7,9	1	1	1, 12	1,7	1,5	1,5	1,5	1,8	1,5	1,11
Termination Resistance (Low Level)	2	2,4			2,5	2,7, 13	2,8	2,6	2,6	2,6	2,5, 9	2,6	2,6,12
Termination Resistance (Rated Current)	3				3,6	3,8, 14	3,9	3,7	3,7		3,6, 10	3,7	3,7,13
Dielectric withstanding Voltage						4,9, 15	4,10						
Insulation Resistance						5,10, 16	5,11			3,7			
Temperature Rising	4												4,8, 14
Over Current Loading	5												
Vibration (High Frequency)													10
Physical Shock		5											
Connector Mating Force			2										
Connector Unmating Force			3										
Connector Locking Strength						18	12			9	12		
Contact Insertion Force				2									
Contact Retention Force			5										
Contact Retention Force(Double Lock)			4			19	13				13		
Crimp Tensile Strength						20			8	10			
Post Retention Force			10										
Resistance to "Kojiri"					4								
Solderability			6										
Handling Ergonomics						17				8	11		
Resistance to Soldering Heat			8										
Thermal Shock						11							
Humidity (Steady State)							6						
Salt Spray								4					
Industrial SO_2 Gas									4				
Temperature Life (Heat Aging)		3				6					4		5
Resistance to Cold										4			
Humidity-Temperature Cycling											7		
Dust Bombardment												4	
Compound Environment Resistance													9

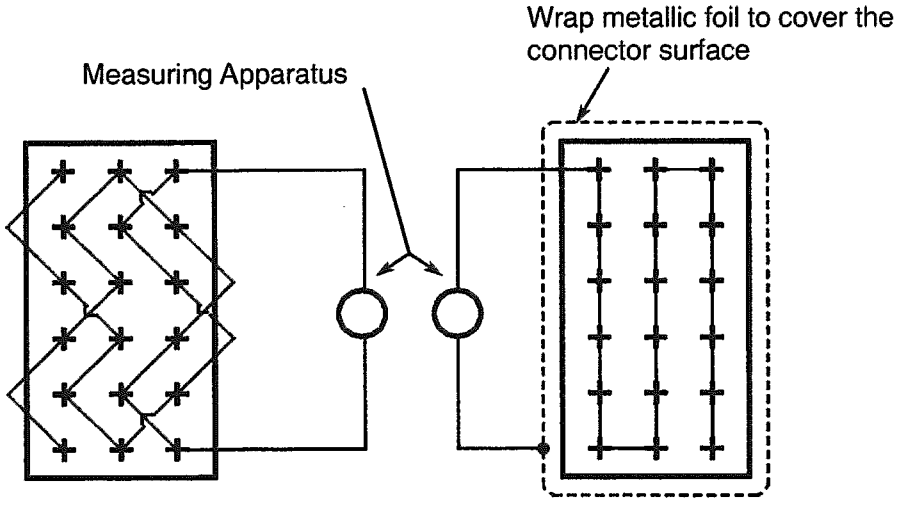
(a)Numbers indicates sequence in which tests are performed.

Fig. 2



Deduct resistance of Y-Y' (wire "L") from X-Y'

Fig. 3



Adjacent Contacts Contacts — Housing

Fig. 4

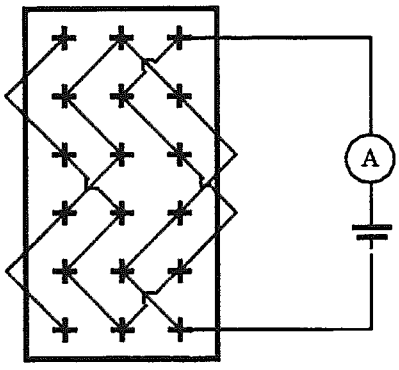


Fig. 5

Wire size (mm^2)	Sequence	Test Current (A)	Duration
0.5	①	16.5	60 minutes
	②	20.2	200 sec.
	③	22.5	5 sec.
	④	30.0	1 sec.
1.25	①	16.5	60 minutes
	②	20.2	200 sec.
	③	22.5	5 sec.
	④	30.0	1 sec.

Fig. 6 Over current loading

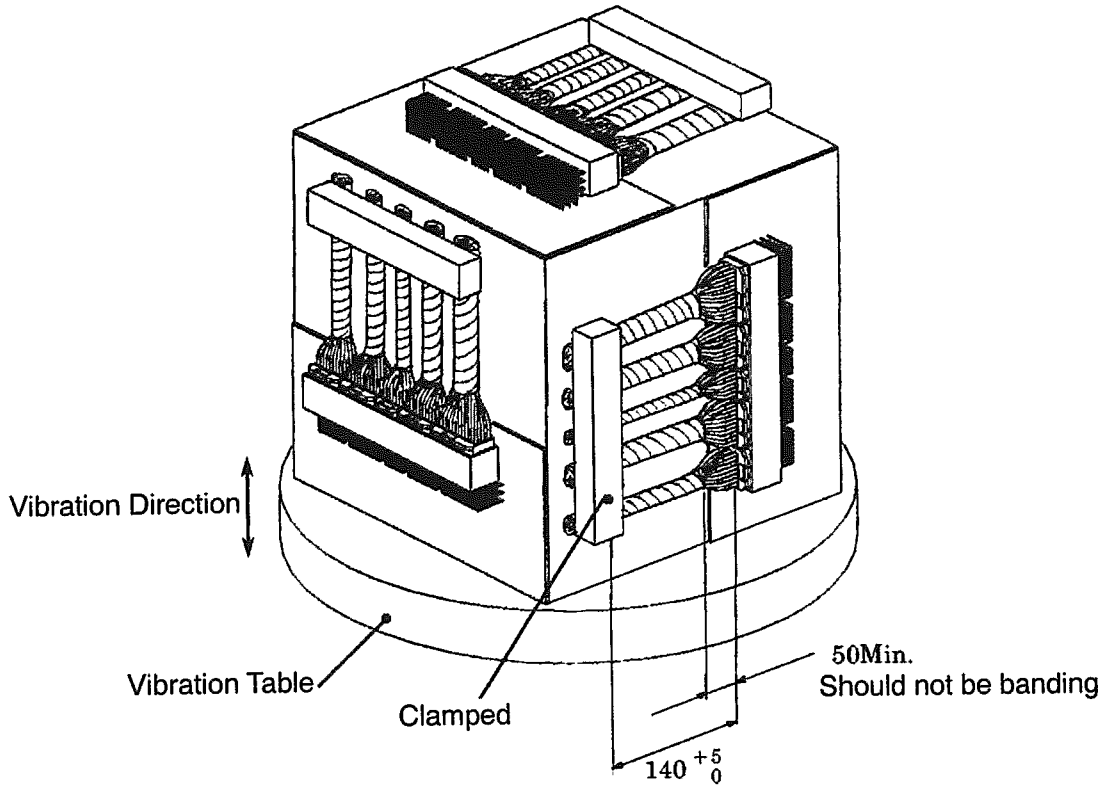


Fig. 7

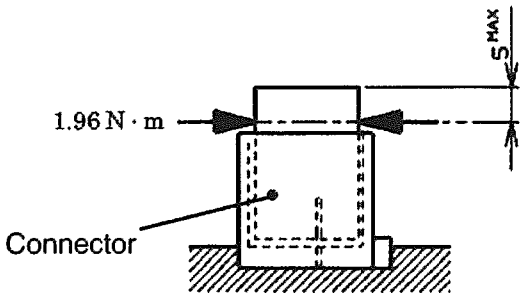


Fig. 8 Resistance to "Kojiri"

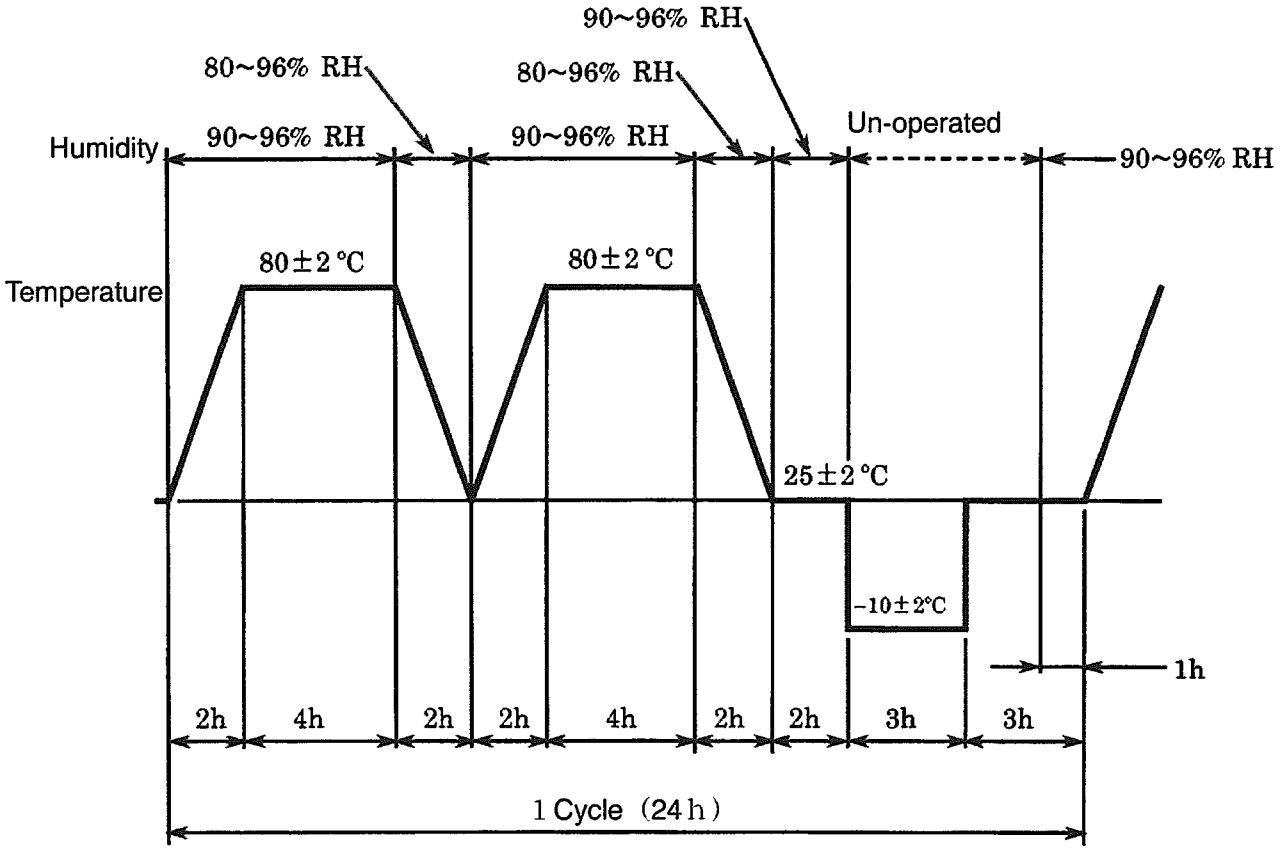
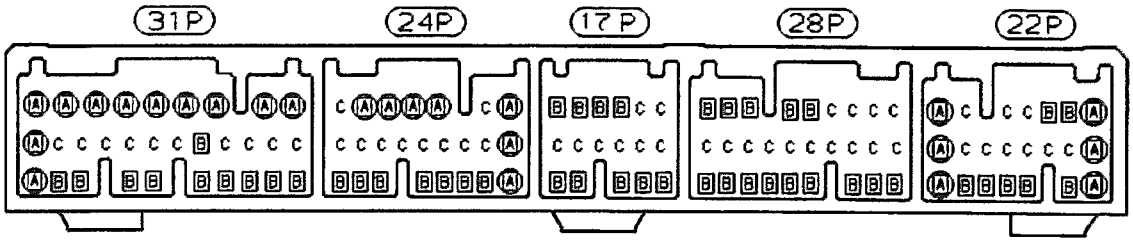


Fig. 9 Humidity-Temperature Cycling



Symbol	Wire size	Test Current	
A	1.25 mm^2	4 A	45 min. ON 15 min. OFF 300 cycles
B	0.5 mm^2	1 A	
C	0.5 mm^2	10 mA	

※TEST CURRENT =2.4A (P/N:1318219)

Fig. 10 Compound Environment Test Current

Cap Housing Assy Part No.	Connector Mating Force, Connector Unmating Force (N) Max					
	17 Pos.	22 Pos.	24 Pos.	28 Pos.	31Pos.	16Pos.
2-353015-□ 8-353015-□ 9-353015-□	70	80	90	100	100	——
2-353016-□ 9-353016-□	——	80	90	100	100	——
3-353016-□	——	135	155	130	175	——
4-353016-□	——	90	110	130	130	
2-353824-□	70	80	90	100	100	——
□-353830-□ 1123038-□	110	——	155	——	200	——
1123042-□ 1123043-□	——	——	155	——	200	——
1318429-□	80	90	110	130	130	——
3-1318429-□	80	90	110	100	100	——
1123794-2	80	90	110	——	130	——
2-1123794-□	110	140	155	——	200	——
1318219-□	——	——	——	——	——	80
□-1747962-□	110	——	——	——	200	——

Fig. 11 Connector Mating Force, Connector Unmating Force

The applicable product descriptions and part numbers are as shown in Appendix. 1.

Product Part No.	Description
□-353015-□	.040 III High Density Connector 122 Pos. Cap Housing Assy
□-1318429-□	.040 III High Density Connector 122 Pos. Cap Housing Assy(PRE-TIN TYPE)
□-353016-□	.040 III High Density Connector 105 Pos. Cap Housing Assy
□-353824-□	.040 III High Density Connector 105 Pos. Cap Housing Assy (Type B)
□-1123794-□	.040 III High Density Connector 94 Pos. Cap Housing Assy
□-353830-□ □-1123038-□	.040 III High Density Connector 72 Pos. Cap Housing Assy
□-1123042-□ □-1123043-□	.040 III High Density Connector 72 Pos. Cap Housing Assy (Without several contacts)
□-1747962-□	.040 III High Density Connector 48 Pos. Cap Housing Assy (Without several contacts)
□-1318219-□	.040 III High Density Connector 16 Pos. Cap Housing Assy
353027-□	.040 III High Density Connector 17 Pos. Plug Housing Assy
353028-□	.040 III High Density Connector 22 Pos. Plug Housing Assy
353029-□	.040 III High Density Connector 24 Pos. Plug Housing Assy
353030-□	.040 III High Density Connector 28 Pos. Plug Housing Assy
353031-□	.040 III High Density Connector 31 Pos. Plug Housing Assy
353826-□	.040 III High Density Connector 31 Pos. Plug Housing Assy (Type B)
1318221-□	.040 III High Density Connector 16 Pos. Plug Housing Assy
316836-1	.040 III Unsealed Contact, Receptacle (S) Sn
1565915-1	.040 III Unsealed Contact, Receptacle (S) Sn, LIF
316837-2	.040 III Unsealed Contact, Receptacle (S) Au
316838-1	.040 III Unsealed Contact, Receptacle (M) Sn
1565916-1	.040 III Unsealed Contact, Receptacle (M) Sn, LIF

Appendix. 1