025(0.64)/187(4.8)/375(9.5) HYBRID Connector

1. Scope:

1.1 Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of 025(0.64)/187(4.8)/375(9.5) HYBRID I/O Connector.

Applicable product description and part numbers are as shown in Appendix 1 and Appendix 2 and Appendix 3 and Appendix 4.

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 TYCO Specifications:

A.	109-5000	Test Specification, General Requirements for Test Methods
B.	114-5250	Application Specification: Crimping of 025 Receptacle Contact
C.	114-5329	Application Specification: Crimping of 0.64III Receptacle Contact
D.	501-5495	Test Report (Applicable product : Appendix 1,3,4)
E.	501-5654	Test Report (Applicable product : Appendix 2)

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

2.3 Other Specifications:

See instruction sheet of each contact maker about application specification of 187(4.8)/375(9.5) receptacle contact.

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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
025(0.64)Tab(Male)	Brass	Selective Tin plating over Ni under plating, Selective Gold plating over Ni under plating, Pre-Tinned
187(4.8)Tab(Male)	Copper	Selective Tin plating over Ni under plating
375(9.5)Tab(Male)	Copper	Selective Tin plating over Ni under plating
025(0.64)Receptacle(Female)	Copper Alloy	Selective Gold plating over Ni under plating, Selective Tin plating over Ni under plating, Pre-Tinned

Fig.1

B. Housing: PBT, SPS

C. Wire

Contact	Wire Size
025(0.64)	0.22～0.5mm^2
187(4.8)	0.3～3.0mm^2
375(9.5)	0.85～8.0mm^2

Fig.2

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.3 and Fig4. 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	Confirmation of Product	Meets requirements of product drawing and AMP Specification.	Visually, dimensionally and functionally inspected per applicable quality inspection plan
		Electrical Requirements	
3.5.2	Termination Resistance (Low Level)	025(0.64) 8mΩ Max.(Initial) 16 mΩ Max. (Final)	Subject mated contacts assembled in housing to 20 mV Max. open circuit at 10 mA. Fig. 5 AMP Spec. 109-5311-1
		187(4.8) 2mΩ Max.(Initial) 10 mΩ Max. (Final)	
		375(9.5) 1mΩ Max. (Initial) 3 mΩ Max. (Final)	
3.5.3	Termination Resistance (Specified Current)	025(0.64) 8mΩ Max.(Initial) 16 mΩ Max. (Final)	Subject mated contacts assembled in housing to 12 V Max. open circuit at 1A. Fig.5 AMP Spec. 109-5311-2
		187(4.8)2mΩ Max.(Initial) 10 mΩ Max. (Final)	
		375(9.5) 1mΩ Max. (Initial) 3 mΩ Max. (Final)	
3.5.4	Dielectric Withstanding Voltage	No creeping discharge or flashover shall occur.	Impressed voltage 1kVAC for 1 min. Mated connector. Fig.6 AMP Spec. 109-5301
3.5.5	Insulation Resistance	100 MΩ Min. (Initial) 100 MΩ Min. (Final)	Impressed voltage 500VDC Mated connector. Fig.6 AMP Spec. 109-5302
3.5.6	Current Leakage	3mA Max.	Impressed voltage 14VDC Fig.7 AMP Spec. 109-5312
3.5.7	Temperature Rise	60℃ Max.	Measure temperature rising at wire crimped by applied current to all positions. Fig.11 AMP Spec. 109-5310
3.5.8	Over Current Loading	No ignition is allowed during the test.	Apply the current to only one position. Applied Current : Fig. 8
		Physical Requirements	
3.5.9	Vibration (High Frequency)	No electrical discontinuity greater than 1 μ sec. shall occur. Satisfy requirements of test item on the "3.6 sequence".	Vibration Frequency : 20→200→20Hz/3min. Acceleration : 44.1 m / s^2 Vibration Direction : X, Y, Z Duration: 3hours each Mounting: Fig. 9

Fig.3 (To be continued)

Para.	Test Items	Requirements		Procedures
3.5.10	Physical Shock	No electrical discontinuity greater than 1 μ sec. shall occur.		Acceleration : 980m/s^2 Waveform : Half sine wave Duration : 6msec.Velocity Number of Drops: 3 drops each directions of X,-X, Y,-Y,Z and -Z axes, totally 18 drops Mounting : Fig. 9 AMP Spec. 109-5208
3.5.11	Connector Mating Force	70N Max.		Operation Speed: 100mm/min. Measure the force required to mate connectors. AMP Spec. 109-5206
3.5.12	Connector Unmating Force	70N Max.		Operation Speed: 100mm / min. Measure the force required to unmate connectors. (without housing lock) AMP Spec. 109-5206
3.5.13	Connector Locking Strength	100N Min.		Apply an axial pull-off load to one of the mated housing, measure locking strength. Operation Speed: 100mm/min. AMP Spec. 109-5210
3.5.14	025(0.64)Contact Insertion Force	10N Max. per contact		Measure the force required to insert contact into housing. AMP Spec. 109-5211
3.5.15	025(0.64) Contact Retention Force (Secondary Lock)	100N Min.		Measure contact retention force with secondary lock set it effect. Operation Speed: 100mm/min. AMP Spec. 109-5212
3.5.16	Crimp Tensile Strength	Wire Size (mm2)	Tensile Strength (N) Min.	Apply an axial pull-off load to crimped wire of contact secured on the tester. Operation speed: 100mm/min. AMP spec. 109-5205 Condition B
		0.5	Initial: 90 Final: 80	
3.5.17	Retention force of Post	Contact	Retention force (N) Min.	Measure the retention force between housing and tab contact. Push-off Tab from PCB side to connector interface. Operation speed: 100mm/min
		025(0.64)	20 (PBT) 15 (SPS)	
		187(4.8) 375(9.5)	50	

Fig.3 (To be continued)

Para.	Test Items	Requirements	Procedures
3.5.18	Resistance to "Kojiri"	Satisfy requirements of test item on the "3.6 sequence".	Repeated mating-unmating by hand in up-down and right-left directions for 10 cycles. AMP Specification, 109-5215
3.5.19	Fasting Torque for Screw	No crack and compression buckling of housing permissible.	Operation torque value on customer drawing.
3.5.20	Solderability	Wet Solder Coverage : (Plated area only) 95 % Min. (with substrate area) 50% Min. (without substrate area)	Solder bath : Sn-40Pb Solder Temperature :235±5℃ Immersion Duration :5±0.5sec. Flux : Alpha100 AMP Spec.109-5203 Matte tin plating only Solder bath : Sn-3Ag-0.5Cu Solder Temperature : 250±5℃ Immersion Duration :5±0.5sec. Flux : ULF-300R
3.5.21	Handling Ergonomics	No abnormalities allowed in manual mating/unmating handling.	Manually operated.
3.5.22	Resistance to Soldering heat	Application to SPS housing only. No gap with PCB and omission of screw. Retention Force of Post : 15N Min.	Test connector solder dipper after mounted on PCB with screw. It should be checked and measured after test connector become room temperature. Solder Temperature : 260±5℃ Immersion Duration :10±1sec. AMP Spec. 109-5204 Condition B
		Environmental Requirements	
3.5.23	Thermal Shock	Satisfy requirements of test item on the "3.6 sequence".	-40℃/30min., 100℃/30min. Making this a cycle, repeat 1000 cycles. Monitor resistance-variation at closed circuit current of 10mA during the test. AMP Spec. 109-5103
3.5.24	Humidity (Steady State)	Satisfy requirements of test item on the "3.6 sequence". Current Leakage : 3mA Max.	90～95%R. H. , 60℃ , 96hours Monitor current leakage during the test. AMP Spec. 109-5105

Fig.3 (To be continued)

Para.	Test Items	Requirements	Procedures
3.5.25	Industrial Gas (SO_2)	Satisfy requirements of test item on the "3.6 sequence".	Unmated connector SO_2 Gas: 25ppm, 75% R. H. 25℃, 96 hours AMP Spec. 109-5107
3.5.26	Temperature Life (Heat Aging)	Satisfy requirements of test item on the "3.6 sequence".	120℃, 120hours AMP Spec. 109-5104
3.5.27	Resistance to Cold	Satisfy requirements of test item on the "3.6 sequence".	-40℃, 120hours AMP Spec. 109-5108
3.5.28	Humidity-Temperatur e Cycling	Satisfy requirements of test item on the "3.6 sequence".	Condition : Fig. 10 Making this condition a cycle, repeat 10 cycles. Monitor resistance-variation at closed circuit current of 10mA during the test.
3.5.29	Dust Bombardment	Satisfy requirements of test item on the "3.6 sequence".	Subject JIS R 5210 cement blow of 1.5kg per 10 seconds in 15 minutes intervals for 8 cycles, with mating/unmating per 2 cycles. AMP Spec. 109-5110
3.5.30	Compound Environment Resistance	Satisfy requirements of test item on the "3.6 sequence". No electrical discontinuity greater than 1 μ sec. shall occur.	Temperature : 80℃ Vibration Frequency : 20→200→20Hz/3Min. (Log) Acceleration : 44.1m/s^2 Vibration Direction : X, Y, Z Duration : 300hours Test Current : Fig. 12 Mounting : Fig. 9 Monitor resistance-variation, and after this test check if instant cutoff occurs for an hour on "3.5.9 vibration".
3.5.31	Condensation	Satisfy requirements of test item on the "3.6 sequence".	0℃/10min.,80℃/90~95%/30min. Making this a cycle, repeat 48 cycles. Monitor current leakage during the test.

Fig.3 (End)

3.6 Product Qualification Test Sequence

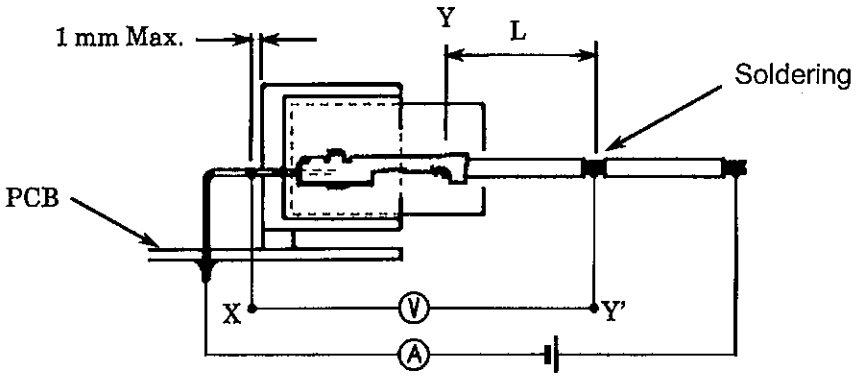
No.	Test Examination	Test Group																
		1	2	3	4[b]	5	6	7	8	9	10[b]	11	12	13	14	15[c]	16[c]	17[c]
		Test Sequence[a]																
3.5.1	Confirmation of Product	1	1,5	1,6	1,6	1,5	1,5	1,5	1,5	1,6	1,3	1,5	1,6	1,6	1,3	1,3	1,4	1,3
3.5.2	Termination Resistance (Low Level)	4	2,6	2,7	2,7	2,6	2,6	2,6	2,6	2,7		2,6	2,7	2,7				
3.5.3	Termination Resistance (Rated Current)	5	3,7	3,8	3,8	3,7	3,7	3,7	3,7	3,8		3,7	3,8	3,8				
3.5.4	Dielectric withstanding Voltage	7						9				9						
3.5.5	Insulation Resistance	6						8				8			4			
3.5.6	Current Leakage							4							2			
3.5.7	Temperature Rise	8								4,9				4				
3.5.8	Over Current Loading		4															
3.5.9	Vibration (High Frequency)			5										5				
3.5.10	Physical Shock				5											3		
3.5.11	Connector Mating Force	3																
3.5.12	Connector Unmating Force	9																
3.5.13	Connector Locking Strength	10					9	11		11	5	11						
3.5.14	Contact Insertion Force	2																
3.5.15	Contact Retention Force (Secondary Lock)	11					10	12		12	6	12					5	
3.5.16	Crimp Tensile Strength	12					11		8	13								
3.5.17	Retention Force of Post	14																4
3.5.18	Resistance to "Kojiri"					4												
3.5.19	Fasten Torque for Screw	16					12			14		13						
3.5.20	Solderability	13																
3.5.21	Handling Ergonomics	15					8	10		10	4	10					4	
3.5.22	Resistance to soldering heat.																	2
3.5.23	Thermal Shock						4											
3.5.24	Humidity (Steady State)							4										
3.5.25	Industrial SO_2 Gas								4									
3.5.26	Temperature Life (Heat Aging)			4	4					5			4			2		
3.5.27	Resistance to Cold										2						2	
3.5.28	Humidity-Temperature Cycling											4						
3.5.29	Dust Bombardment												5					
3.5.30	Compound Environment Resistance													4				
3.5.31	Condensation														2			

Fig.4

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

(b) Application to Appendix No.1,3 only.

(c) Application to Appendix No.2 ,4only.



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

Fig. 5

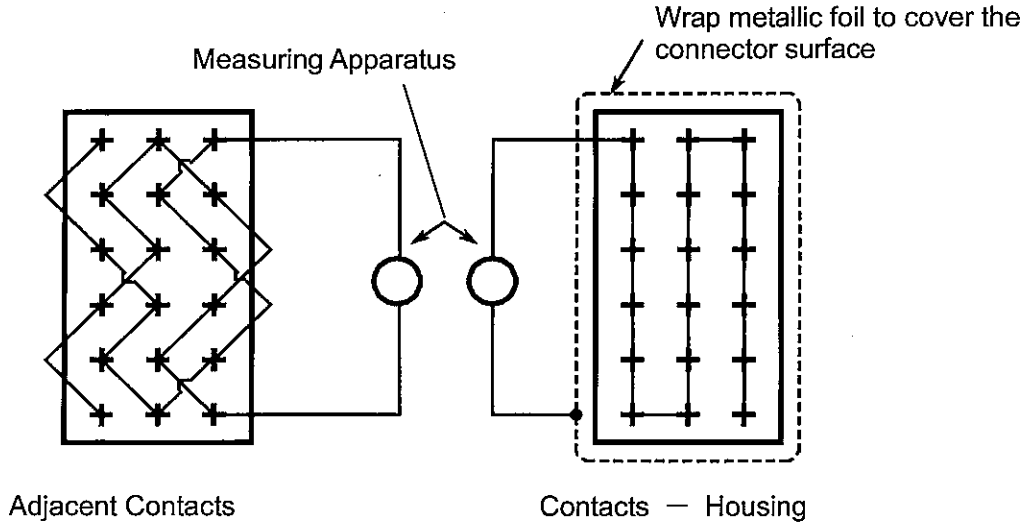


Fig. 6

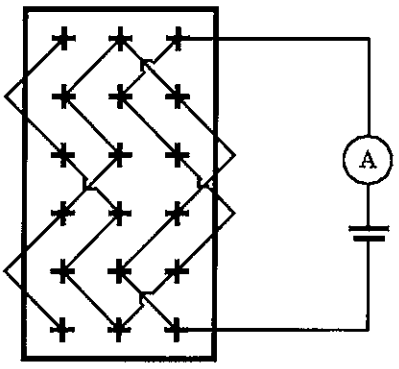


Fig.7

Wire Size (mm^2)	Current Type	Test Current (A)	Duration
0.5	①	16.5	60 min.
	②	20.2	200 sec.
	③	22.5	5 sec.
	④	30.0	1 sec.
3.0	①	54.0	60 min
	②	60.0	500 sec
8.0	①	108.0	400 sec.
	②	120.0	200 sec.
	③※	180.0	20 sec.

Fig.8

※ Application to Appendix No.2 only.

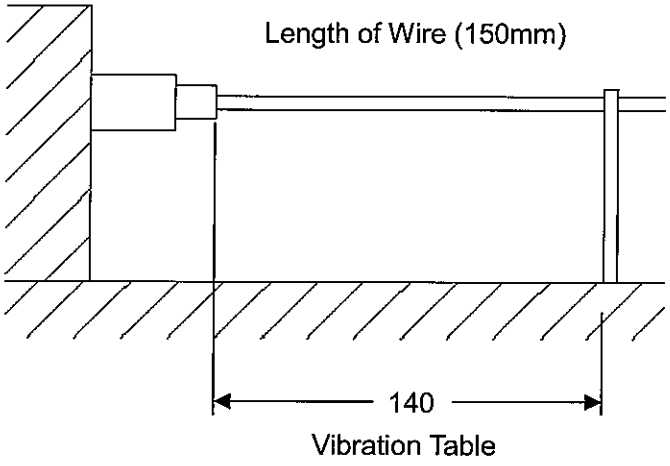


Fig. 9

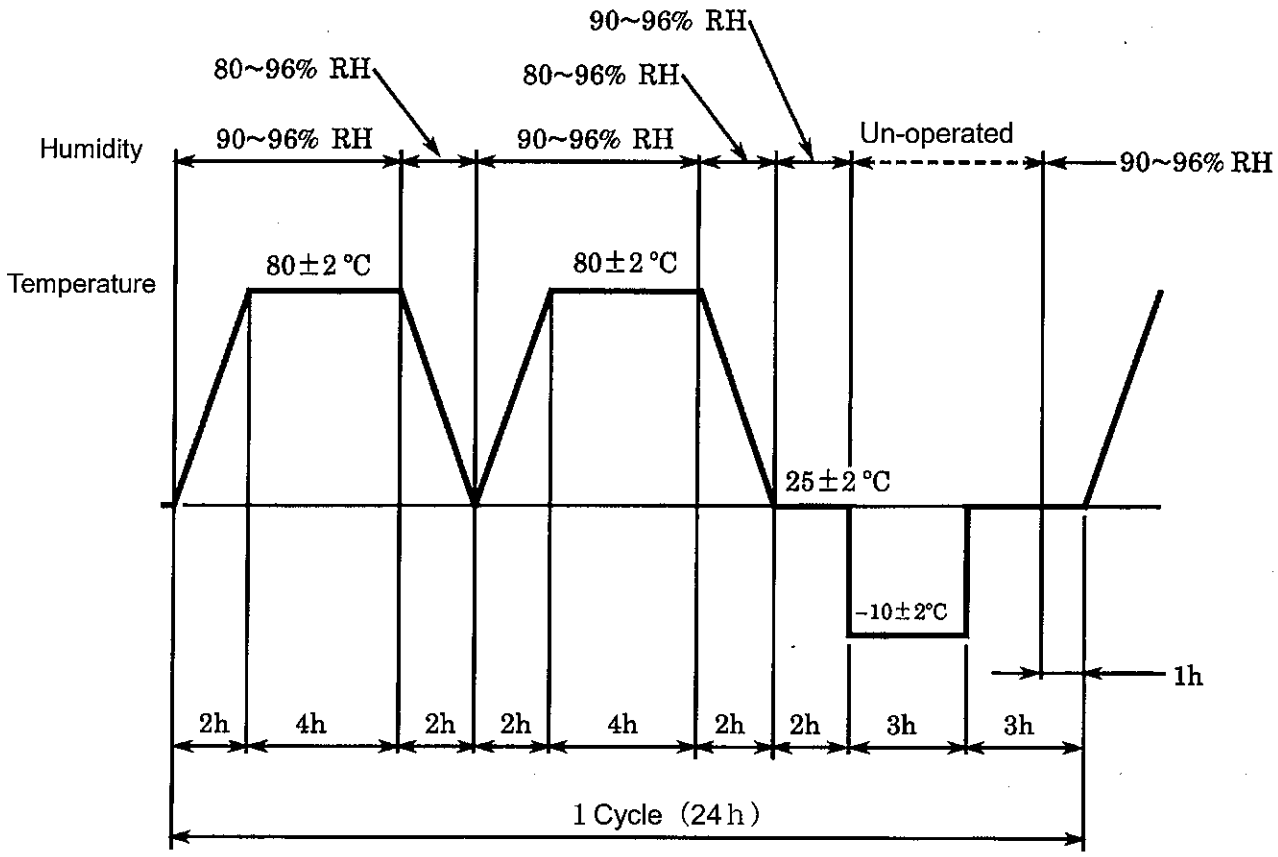


Fig. 10

Applicable product Appendix No.	Contact / POS.		Wire Size (mm^2)	Test Current (A)	Temperature Rise
1,4	025(0.64)		0.5	5.0	60℃ Max.
	375(9.5)		8.0	45.0	
2	025(0.64)	12P	0.5	5.5	
		14P		4.4	
	375(9.5)		8.0	45.0	
3	025(0.64)		0.5	5.0	
	187(4.8)		3.0	13.6	

Fig. 11

Applicable product Appendix No.	Contact / POS		Finish	Wire Size (mm^2)	Test Current (A)	Test Time
1,4	025(0.64)		Tin	0.5	3.0A	45min.ON, 15min.OFF 300cycles
			Selective Gold		10mA	
	375(9.5)		Tin	8.0	25.5A	
2	025(0.64)	12P	Tin and Selective Gold	0.5	3.0A	
		14P			2.4A	
	375(9.5)		Tin	8.0	25.5A	
3	025(0.64)		Tin	0.5	3.0A	
			Selective Gold		10mA	
	187(4.8)		Tin	3.0	7.6A	

Fig.12

The applicable product descriptions and part numbers are as shown in Appendix 1 and 2 and 3 and 4.

Product Part No.*1	Description
1473773	025(0.64)/375(9.5) SER 20POS CAP ASSY (MALE CONNECTOR)
1376352	025(0.64)I SER 8POS PLUG HSG ASSY (FEMALE CONNECTOR)
1565287	025(0.64)I SER 12POS PLUG HSG ASSY (FEMALE CONNECTOR)
	375(9.5) 2POS PLUG HSG ASSY (FEMALE CONNECTOR)*2
1123343	025(0.64)I RECEPTACLE CONTACT(Sn)
1123343	025(0.64)I RECEPTACLE CONTACT(Au)
	375(9.5) RECEPTACLE CONTACT (S)*2
	375(9.5) RECEPTACLE CONTACT (M)*2
	375(9.5) RECEPTACLE CONTACT (L)*2

Appendix.1

Product Part No.*1	Description
1747082	025(0.64)/375(9.5) SER 28POS CAP ASSY(MALE CONNECTOR)
1747080	025(0.64) SER 26POS CAP ASSY (MALE CONNECTOR)
1747088	025(0.64)III SER 2LOW 8POS PLUG HSG ASSY (FEMALE COONECTOR)
1747085	025(0.64)III SER 2LOW 6POS PLUG HSG ASSY (FEMALE CONNECTOR)
1747375	025(0.64)III SER 2LOW 12POS PLUG HSG ASSY (FEMALE CONNECTOR)
	375(9.5) 2POS PLUG HSG ASSY (FEMALE CONNECTOR)*2
1674311	025(0.64)III RECEPTACLE CONTACT(Sn)
1674311	025(0.64)III RECEPTACLE CONTACT(Au)
	375(9.5) RECEPTACLE CONTACT (S)*2
	375(9.5) RECEPTACLE CONTACT (M)*2
	375(9.5) RECEPTACLE CONTACT (L)*2

Appendix.2

Product Part No.*1	Description
1565221	025(0.64)/187(4.8) 20POS PLUG HSG ASSY(MALE CONNECTOR)
1376352	025(0.64) 8POS PLUG HSG ASSY (FEMALE CONNECTOR)
1565287	025(0.64) 12POS PLUG HSG ASSY(FEMALE COONECTOR)
1123343	025(0.64) RECEPTACLE CONTACT(Sn)
1123343	025(0.64) RECEPTACLE CONTACT(Au)
	187(4.8) 2POS PLUG HSG ASSY (FEMALE CONNECTOR) *2
	187(4.8) 2POS PLUG HSG ASSY (FEMALE CONNECTOR) *2
	187(4.8) RECEPTACLE CONTACT (S)*2
	187(4.8) RECEPTACLE CONTACT (M)*2
	375(9.5) RECEPTACLE CONTACT (L)*2

Appendix.3

Product Part No.*1	Description
1903399	025(0.64)/375(9.5) SER 20POS CAP ASSY (MALE CONNECTOR)
1717103	025(0.64)III SER 8POS PLUG HSG ASSY (FEMALE CONNECTOR)
1903563	025(0.64)III SER 8POS PLUG HSG ASSY HIGH LOCK TYPE(FEMALE CONNECTOR)
1747375	025(0.64)III SER 12POS PLUG HSG ASSY (FEMALE CONNECTOR)
	375(9.5) 2POS PLUG HSG ASSY (FEMALE CONNECTOR)*2
1674311	025(0.64)III RECEPTACLE CONTACT(Sn)
1674311	025(0.64)III RECEPTACLE CONTACT(Au)
	375(9.5) RECEPTACLE CONTACT (S)*2
	375(9.5) RECEPTACLE CONTACT (M)*2
	375(9.5) RECEPTACLE CONTACT (L)*2

Appendix.4

*1Note: Part number is consisted from listed base number and 1 digit numeric prefix and Suffix with dash. Refer to catalog or customer drawing for specific part numbers for each base number. When prefix is zero, zero and dash are omitted.

*2Note: See Manual of each maker about part number of 187(4.8)/375(9.5) receptacle contact and plug housing.