

Test Description	Requirement	Procedure
Precondition, durability.	No damage that affects form, fit or function.	Manually mate and unmate specimens 10 times at a rate not to exceed 600 mate/unmate cycles per hour.
ENVIRONMENTAL		
Thermal shock.	SAE/USCAR-2, 5.6.1.4. (omit B). Specimens must not show any evidence of deterioration, cracks, deformities, etc. that could affect their fit or function or distort their appearance. No loss of continuity for center or outer conductors.	SAE/USCAR-2, 5.6.1.3. -40 to 85°C for RG-174 cable. -40 to 100°C for RG-316 cable.
Temperature/humidity cycling.	SAE/USCAR-2, 5.6.2.4. (omit B and E). No loss of continuity for center or outer conductors.	SAE/USCAR-2, 5.6.2.3. -40 to 85°C for RG-174 cable. -40 to 100°C for RG-316 cable.
High temperature exposure.	SAE/USCAR-2, 5.6.3.4. (omit B and D).	SAE/USCAR-2, 5.6.3.3. 85°C maximum for RG-174 cable. 100°C maximum for RG-316 cable.

Figure 1 (end)

2.2. Commercial Standards

- IEC-60096-1: Radio Frequency Cables - Part 1: General Requirements and Measuring Methods
- SAE/USCAR-2: Performance Standard For Automotive Electrical Connection Systems - Revision 3 dated April 2001
- SAE/USCAR-17: Performance Specification for Automotive RF Connector Systems, dated 02Jan02
- SAE/USCAR-18: FAKRA SMB RF Connector Supplement - Revision 1 dated May 2002

2.3. Government Standard

MIL-C-17: General Specification for Flexible and Semi-rigid Radio Frequency Cables

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

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

- Voltage: 335 volts AC
- Current: 1 ampere maximum
- Temperature: -40 to 100°C or rating of coax cable, whichever is lowest
- Characteristic Impedance: 50 ohms
- Frequency Range: 0 to 3000 MHz (cable dependent)

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per EIA-364.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Visual examination.	SAE/USCAR-2, 5.1.6.4. Specimens must be free of defects that could affect the electrical or mechanical performance of the part or degrade the long term performance of the part.	SAE/USCAR-2, 5.1.6.3.

Figure 1 (cont)

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. All test groups shall each consist of a minimum of 5 specimens.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 2.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

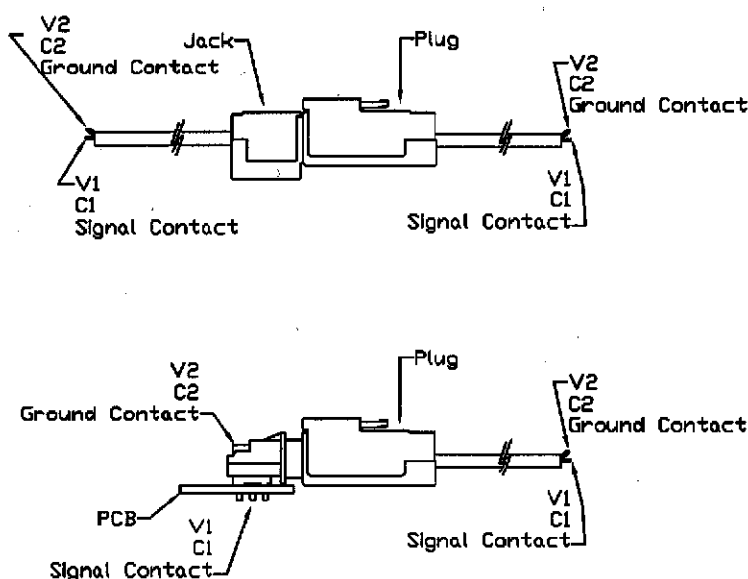


Figure 3
Dry Circuit Contact Resistance Measurement Points

FAKRA SMB 50 Ohm Die Cast Plug and Jack Connectors**1. SCOPE**

1.1. Content

This specification covers performance, tests and quality requirements for the Tyco Electronics die cast SMB 50 ohm 90 degree printed circuit board jack to in-line plug, and 180 degree in-line jack to in-line plug. These connectors are designed to meet or exceed the requirements of: SAE/USCAR-2, Rev .3 Performance Standard for Automotive Electrical Connector Systems for Class 1 and Body Profile; SAE/USCAR-17 Performance Specification for Automotive RF Connector Systems; and SAE/USCAR-18 FAKRA SMB RF Connector Supplement. This product uses a crimp or soldered termination to the center contact and outer shell for wire-to-wire plug and jack. The printed circuit board jack is solderable to the circuit board.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed on 30Jun02. The Qualification Test Report number for this testing is 501-539. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS

The following 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. Tyco Electronics Documents

- 109-197: AMP Test Specifications vs EIA and IEC Test Methods
- 114-13043: Application Specification (FAKRA SMB 50 Ohm PCB Jack Assemblies)
- 114-13069: Application Specification (FAKRA SMB 50 Ohm In-Line Connectors)
- 408-8414: Instruction Sheet (FAKRA SMB 50 Ohm Right Angle PCB 1 Position Jack Assembly 638817-())
- 408-8426: Instruction Sheet (FAKRA SMB 50 Ohm In-Line Jack Kit 638831-())
- 408-8427: Instruction Sheet (FAKRA SMB 50 Ohm Right Angle PCB 2 Position Jack Assembly 638818-())
- 408-8428: Instruction Sheet (FAKRA SMB 50 Ohm In-Line Plug Kits 638832-() and 1326159-())
- 501-539: Qualification Test Report

3.6. Product Qualification and Requalification Test Sequence

A. Printed Circuit Board Jack To In-Line Plug

Test or Examination	Test Paths (a)										
	1	2	3	4a	4b	5a	5b	6a	6b	7a	7b
	Test Specimens (b)										
Visual examination	1,3	1,5	1,3	1,12	1,10	1,13	1,9	1,13	1,9	1,13	1,9
Dry circuit contact resistance				2,4,8,10		2,4,8,10		2,4,8,10		2,4,7,9	
Voltage standing wave ratio					2,4,7,9		2,4,6,8		2,4,6,8		2,4,6,8
Isolation resistance						5,11		5,11			
Dielectric withstanding voltage				5,11		6,12		6,12		5,10	
Vibration				7	6						
Mechanical shock				6	5						
Connector-to-connector mating force (c)		2									
Connector-to-connector unmating force (with latch disengaged) (c)		3									
Connector-to-connector unmating force (with latch engaged) (c)		4									
Polarization feature effectiveness			2								
Cable retention, electrical continuity	2										
Precondition, durability				3,9	3,8	3,9	3,7	3,9	3,7	3,8	3,7
Thermal shock						7	5				
Temperature/humidity cycling								7	5		
High temperature exposure										6	5

NOTE (a) See paragraph 4.1.A.
 (b) Numbers indicate sequence in which tests are performed.
 (c) For test group 2, a total of 20 specimens were mated, 10 were unmated with the latch engaged and 10 without the latch engaged.

B. In-Line Jack To In-Line Plug

Test or Examination	Test Paths (a)															
	1	2	3	4a	4b	4c	5a	5b	5c	6a	6b	6c	7a	7b	7c	8
	Test Specimens (b)															
Visual examination	1,3	1,5	1,3	1,12	1,10	1,10	1,13	1,9	1,9	1,13	1,9	1,9	1,11	1,9	1,9	1
Dry circuit contact resistance				2,4,8,10			2,4,8,10			2,4,8,10			2,4,7,9			
Voltage standing wave ratio					2,4,7,9			2,4,6,8			2,4,6,8			2,4,6,8		
Isolation resistance							5,11			5,11						
Dielectric withstanding voltage				5,11			6,12			6,12			5,10			
Shielding effectiveness																2
RF insertion loss						2,4,7,9		2,4,6,8				2,4,6,8			2,4,6,8	
Vibration				6	6	6										
Mechanical shock				7	5	5										
Connector-to-connector mating force (c)		2														
Connector-to-connector unmating force (with latch disengaged) (c)		3														
Connector-to-connector unmating force (with latch engaged) (c)		4														
Polarization feature effectiveness			2													
Cable retention, electrical continuity	2															
Precondition, durability				3,9	3,8	3,8	3,9	3,7	3,7	3,9	3,7	3,7	3,8	3,7	3,7	
Thermal shock							7	5	5							
Temperature/humidity cycling										7	5	5				
High temperature exposure													6	5	5	

NOTE (a) See paragraph 4.1.A.
 (b) Numbers indicate sequence in which tests are performed.
 (c) For test group 2, a total of 20 specimens were mated, 10 were unmated with the latch engaged and 10 without the latch engaged.

Figure 2

Test Description	Requirement	Procedure
ELECTRICAL		
Dry circuit contact resistance.	SAE/USCAR-17, 4.3.1.3. Total connection: 40 milliohms for center conductor. 40 milliohms for outer/ground conductor.	SAE/USCAR-17, 4.3.1.2. See Figure 3.
Voltage Standing Wave Ratio (VSWR).	SAE/USCAR-17, 4.4.2.3. 1.40 maximum for 0 to 2 GHz. 1.50 maximum for >2 to 3 GHz.	SAE/USCAR-17, 4.4.2.2. In-line specimen length shall be 500 ± 50 mm.
Isolation resistance.	SAE/USCAR-17, 4.4.1.3. 100 megohms minimum for center to outer contact.	SAE/USCAR-17, 4.4.1.2. 500 volts DC applied between center conductor and shield.
Dielectric withstanding voltage.	SAE/USCAR-17, 4.3.2.3. No dielectric breakdown.	SAE/USCAR-17, 4.3.2.2. 800 volts AC at sea level.
Shielding effectiveness (does not apply to printed circuit board connectors).	45 dB minimum for 0 to 3 GHz.	IEC-60096-1. Use 5 cm of cable with Connector Under Test.
RF insertion loss (does not apply to printed circuit board connectors).	SAE/USCAR-17, 4.4.2.3. (except as noted). 0.30 dB maximum from 0 to 3 GHz.	SAE/USCAR-17, 4.4.2.2.
MECHANICAL		
Mechanical shock/vibration.	SAE/USCAR-2, 5.4.5.4. (omit 2 and 3). No discontinuities of 1 microsecond or longer duration.	SAE/USCAR-2, 5.4.5.3. Use not coupled to engine profile. Perform mechanical shock, then vibration for 8 hours on plane 1. Then repeat for planes 2 and 3.
Connector-to-connector mating/unmating force.	SAE/USCAR-2, 5.4.2.4. (omit 4). 75 N maximum mating force. 75 N maximum unmating force with latch disengaged. 110 N minimum unmating force with latch engaged.	SAE/USCAR-2, 5.4.2.3.
Polarization feature effectiveness.	SAE/USCAR-2, 5.4.3.4. 220 N minimum mismating force.	SAE/USCAR-2, 5.4.3.3. Mismatch both keys and latch.
Cable retention, electrical continuity.	Maintain electrical continuity for both center and outer conductors under specified load.	Attach wires to the center conductor and the ground shield making 2 complete circuits. Attach these wires to a discontinuity meter set on 1 microsecond with 100 milliamperes F.S. applied. Pull the assembly at a rate of 20 mm per minute in an axial direction until a load of 110 N is reached, and then hold for 5 seconds.

Figure 1 (cont)