2.6. Shielding Effectiveness

Radiation was reduced a minimum of 45 dB for 0 to 3 GHz.

2.7. RF Insertion Loss

All insertion loss results were less than 0.30 dB from 0 to 3 GHz.

2.8. Vibration

No discontinuities were detected during vibration testing. Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible.

2.9. Mechanical Shock

No discontinuities were detected during mechanical shock testing. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

2.10. Connector-to-Connector Mating Force

All mating force measurements were less than 75 N.

2.11. Connector-to-Connector Unmating Force

All unmating force measurements were less than 75 N with the latch disengaged, and 110 N with the latch engaged.

2.12. Polarization Feature Effectiveness.

No mis-matched (rotated 180 degrees from normal mating position) specimens fully mated when subjected to a force of 220 N.

2.13. Cable Retention, Electrical Continuity

There was no loss of electrical continuity or physical damage as a result of applying a 110 N load to the cable for 5 seconds.

2.14. Precondition Durability

No physical damage occurred as a result of manually mating and unmating the specimens 10 times.

2.15. Thermal Shock

No evidence of physical damage was visible as a result of thermal shock testing. No discontinuities were detected during thermal shock testing.

2.16. Temperature/Humidity Cycling

No evidence of physical damage was visible as a result of temperature/humidity cycling. No discontinuities were detected during temperature/humidity cycling.

2.17. High Temperature Exposure

No evidence of physical damage was visible as a result of high temperature exposure.

1.6. Environmental Conditions

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

- Temperature: 15 to 35°C
- Relative Humidity: 25 to 75%

1.7. Qualification 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 1.5.
(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 (cont)

3.10. Connector-to-Connector Mating Force

The force required to mate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 50 mm per minute.

3.11. Connector-to-Connector Unmating Force

The force required to unmate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 50 mm per minute.

3.12. Polarization Feature Effectiveness

A force of 220 N was applied to mis-matched jacks and plugs (rotated 180 degrees from normal insertion direction) at a rate of 25 mm per minute.

3.13. Cable Retention, Electrical Continuity

Hook-up wires were soldered to the center conductor and the ground shield making 2 complete circuits. This hook-up wire was attached to a discontinuity meter set on 1 microsecond with 100 milliamperes F.S. applied. The assembly was then pulled at a rate of 20 mm per minute in an axial direction until a load of 110 N was reached, and then held for 5 seconds.

3.14. Precondition, Durability

Specimens were manually mated and unmated 10 times.

3.15. Thermal Shock

Specimens were subjected to 100 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40 and 85°C for RG174 cable, and -40 and 100°C for RG316 cable. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes F.S. maximum for both center and outer conductors.

3.16. Temperature/Humidity Cycling

Specimens were exposed to 13.3 days of temperature/humidity cycling variation between -40 and 85°C for RG174 cable, and -40 and 100°C for RG316 cable with 90 to 100% RH. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes F.S. maximum for both center and outer conductors.

3.17. High Temperature Exposure

Specimens were subjected to 1008 hours at 85°C for RG174 cable, and 100°C for RG316 cable.

FAKRA SMB 50 Ohm Die Cast Plug and Jack Connectors

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics FAKRA SMB 50 Ohm Die Cast Plug and Jack Connectors to determine their conformance to the requirements of Product Specification 108-2054 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the FAKRA SMB 50 Ohm Die Cast Plug and Jack Connectors. Testing was performed at the Global Automotive Division Product Reliability Center between 17Sep01 and 04Jul02. The test file numbers for this testing are 20020409ACS, 20020085ACL, 20010259ACL, 20020084ACL, 20020319ACS, 20020086ACL, 20010307ACL and 20020083ACL. This documentation is on file at and available from the Global Automotive Division Product Reliability Center.

1.3. Conclusion

The FAKRA SMB 50 Ohm Die Cast Plug and Jack Connectors listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2054 Revision A.

1.4. Product Description

These connectors are designed to meet or exceed the requirements of: SAE/USCAR-2, Rev .3; SAE/USCAR-17; 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.

1.5. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
Printed Circuit Board Jack to In-Line Plug			
1,3, 4b,5b,6b,7b	10 each	638817	Right angle FAKRA jack assembly
	10 each	638832	FAKRA plug kit
2	20	638817	Right angle FAKRA jack assembly
	20	638832	FAKRA plug kit
4a,5a,6a,7a	5 each	638817	Right angle FAKRA jack assembly
	5 each	638832	FAKRA plug kit
In-Line Jack to In-Line Plug			
1,3,8, 4b,c;5b,c;6b,c;7b,c	10 each	638831	FAKRA jack kit
	10 each	638832	FAKRA plug kit
2	20	638831	FAKRA jack kit
	20	638832	FAKRA plug kit
4a,5a,6a,7a	5 each	638831	FAKRA jack kit
	5 each	638832	FAKRA plug kit

Figure 1

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3. TEST METHODS

3.1. Visual Examination

Specimens were visually examined for physical defects that could affect the electrical or mechanical performance of the part or degrade the long term performance of the part.

3.2. Dry Circuit Contact Resistance

Dry circuit contact resistance measurements were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Voltage Standing Wave Ratio (VSWR)

VSWR was measured on using an S parameter network analyzer. The sweep range was 30 KHz to 6 GHz.

3.4. Isolation Resistance

Isolation resistance was measured between the center conductor and the ground shield. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured.

3.5. Dielectric Withstanding Voltage

A test potential of 800 volts AC was applied between the center conductor and the ground shield. This potential was applied for 1 minute and then returned to zero.

3.6. Shielding Effectiveness

The radiated response, from the shield of the specimen and the intercasement of the test fixture when excited between 0 and 3 GHz, was measured.

3.7. RF Insertion Loss

A transmitted power load measurement was taken at a frequency range between 30 KHz and 6 GHz. Following completion of the test sequence, calculations of all measurements per specimen were expressed in dB as the loss of load power due to the insertion of the plug and jack connectors, or the power received after the insertion of the plug and jack connectors.

3.8. Vibration

Specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 5 and 1000 Hz with a total spectral content of 1.81 GRMS. This was performed for 8 hours in each of 3 mutually perpendicular planes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes in the monitoring circuit.

3.9. Mechanical Shock

Specimens were subjected to a mechanical shock test having a half-sine waveform of 35 gravity units (g peak) and a duration of 10 milliseconds. Ten shocks in each direction were applied along the 3 mutually perpendicular planes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes in the monitoring circuit.

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 1.5.
(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 (end)

2. SUMMARY OF TESTING

2.1. Visual Examination

Specimens were visually examined and no evidence of physical defects that could affect the electrical or mechanical performance of the part or degrade the long term performance of the part were observed.

2.2. Dry Circuit Contact Resistance

All dry circuit contact resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 40 milliohms.

2.3. Voltage Standing Wave Ratio (VSWR)

All VSWR measurements were less than 1.40 for 0 to 2 GHz, and 1.50 for >2 to 3 GHz.

2.4. Isolation Resistance

All insolation resistance measurements were greater than 100 megohms.

2.5. Dielectric Withstanding Voltage

No dielectric breakdown or flashover occurred.