



The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.

HF FAKRA 90°, PLUG CONTACT KIT

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1. SCOPE

1.1 Content

This specification covers performance, tests and quality requirements for the TE system FAKRA-II 90-degree cable plug terminals designed to be used with 50 Ohms coaxial cables listed in 114-18623. The mechanical values are valid for terminal assemblies in one-way housings.

1.2 Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. As mating parts TE system HF Fakra 180-degree jack terminals designed for the specific cable were used (see details in Application Specification 114-18622 for details). All inspections shall be performed using the applicable inspection plan and product drawing.

2. REFERENCED 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 TE Documents

- ◆ 114-18623:
Application Specification for FAKRA-II 90 degree; General guidelines
- ◆ 114-18925:
Application Specification; Extra guidelines
- ◆ TEC 109-18079:
Standard crimp validation

2.2 Commercial Standards

- ◆ SAE/USCAR-2; Revision 6, Feb 2013:
Performance Standard for Automotive Electrical connector systems
- ◆ SAE/USCAR-17; Revision 5, Dec 2016:
Performance Specification for Automotive RF Connector Systems
- ◆ SAE/USCAR-21; Revision 3, Nov 2014:
Performance Specification for cable-to-terminal electrical crimps
- ◆ SAE/HES D 3217-06; Revision 6:
Quality and test methods for connectors
- ◆ ISO 20860-1; Oct 2008:
Dimensions and electrical requirements
- ◆ VW 75174-1; Apr 2010:
Motor vehicle connector
- ◆ DIN 72594-1 (2006); DIN 72594-2 (2009):
Allgemeine Anforderungen; Prüfungen
- ◆ VW LAH V03.825; Nov 2011:
Line-Assembled Coaxial Lines

For Connector Kit Part Number overview see table 1.

Table 1. – The Connector Kit Part Number overview.

Part Number	Cable Type	Commercial Standards *
1719252-1	RTK031	SAE/USCAR-2; SAE/USCAR-21; SAE/USCAR-17
1719252-5	RTK031, Low Loss	VW 75174-1 (~LV214); DIN 73594-1; DIN 73594-2; TEC 109-18079; VW LAH V03.825; ISO 20860-1
1719655-1	RG174	SAE/USCAR-2; SAE/USCAR-21; SAE/USCAR-17
1719655-5	RG174, Dacar 462	VW 75174-1 (~LV214); DIN 73594-1; DIN 73594-2; TEC 109-18079; VW LAH V03.825; ISO 20860-1
1718080-1	RTK031, Low Loss	SAE/USCAR-2; SAE/USCAR-21; SAE/USCAR-17
1718080-2	RTK031	VW 75174-1 (~LV214); DIN 73594-1; DIN 73594-2; TEC 109-18079; VW LAH V03.825; ISO 20860-1
2112466-1	1.5DS	SAE/USCAR-2; SAE/USCAR-21; SAE/USCAR-17
2112466-2	1.5DS	SAE/USCAR-17; SAE/HES D 3216-06; ISO 20860-1
2141946-1	1.5DS	SAE/USCAR-2; SAE/USCAR-21; SAE/USCAR-17
2141946-3	RG58LL	SAE/USCAR-2; SAE/USCAR-21; SAE/USCAR-17
2297873-1	4.0mm Shikoku	SAE/USCAR-2; SAE/USCAR-21; SAE/USCAR-17

* The valid norm revision is seen in relevant Test Report. For details contact responsible engineer.

3. REQUIREMENT

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: 800 V (AC)
- ◆ Current: 1 A maximum
- ◆ Temperature: -40 to 100°C, or rating of coaxial cable, whichever is less severe
- ◆ Characteristic Impedance: 50 Ohms
- ◆ Frequency Range: 0 to 6000 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	Acceptance Criteria	Procedure
Visual Inspection.	SAE/USCAR-2, 5.1.8.4 The connectors assemblies must not show, with the aid of 10x magnification, any evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Additional procedure-specific criteria may be listed under each test.	SAE/USCAR-2, 5.1.8.3.
ELECTRICAL		
Contact Resistance.	SAE/USCAR-17, 4.3.1.3 The total connection resistance of the inner conductor must not exceed 24 mΩ. The total connection resistance of the outer conductor must not exceed 5 mΩ initially and 6 mΩ after environmental testing.	SAE/USCAR-17, 4.3.1.2
Standing Wave Ratio (SWR) thus called Voltage Standing Wave Ratio (VSWR)	SAE/USCAR-17, 4.4.2.3 1.40 for frequency range [0 – 2 GHz] 1.50 for frequency range [> 2 – 3 GHz] 1.60 for frequency range [> 3 – 6 GHz]	SAE/USCAR-17, 4.4.2.2
Isolation Resistance.	SAE/USCAR-17, 4.4.1.3 Minimum 100 mΩ	SAE/USCAR-17, 4.4.1.2
Dielectric Withstanding Voltage	SAE/USCAR-17, 4.3.2.3 1-minute hold with no dielectric breakdown 800 V (AC)	SAE/USCAR-17, 4.3.2.2
RF Leakage (Shielding Effectiveness)	SAE/USCAR-17, 4.4.3.3 Maximum -45 dB up to 3 GHz Maximum -40 dB up to 6 GHz	SAE/USCAR-17, 4.4.3.2
RF insertion loss.	SAE/USCAR-17, 4.4.2.3 Maximum 0.30 dB up to 3 GHz Maximum 0.45 dB up to 6 GHz	SAE/USCAR-17, 4.4.2.2
MECHANICAL		
Vibration/ Mechanical Shock.	SAE/USCAR-2, 5.4.6.4 (omit 2 and 3) No discontinuities of 1 microsecond or longer duration. Class V1 (see table 5.1.4.3)	SAE/USCAR-2, 5.4.6.3
Polarization feature effectiveness.	SAE/USCAR-17, 4.2.3.3 Minimum mis-mating force to achieve center conductor electrical continuity is 80 N	SAE/USCAR-17, 4.2.3.2 SAE/USCAR-2, 5.4.4.3
Connector to Connector Mating Force. (<i>contact kit with plastic housing</i>)	SAE/USCAR-17, 4.2.2.1.3 Must meet the requirements of USCAR-25 Mating force must meet max 45N	SAE/USCAR-17, 4.2.2.1.2 SAE/USCAR-2, 5.4.2.3
Connector to Connector Unmating Force. (<i>contact kit with plastic housing</i>)	SAE/USCAR-17, 4.2.2.1.3 Must meet the requirements of USCAR-25 Less than 75 N with the primary lock disengaged	SAE/USCAR-17, 4.2.2.1.2 SAE/USCAR-2, 5.4.2.3
Terminal to Connector Insertion Force (<i>contact kit to plastic housing</i>)	SAE/USCAR-2, 5.4.1.4 Maximum 30N with the primary lock	SAE/USCAR-2, 5.4.1.1
Terminal to Connector Retention Force (<i>contact kit from plastic housing</i>)	SAE/USCAR-2, 5.4.1.4 Maximum 75N with the primary lock	SAE/USCAR-2, 5.4.1.1
Terminal to Terminal Engage Force (<i>contact kit to plastic housing</i>)	SAE/USCAR-2, 5.2.1.4 Section 5.1.8 any wear of the contact surfaces No base material should be exposed	SAE/USCAR-2, 5.2.1.3 (omit step 8)
Terminal to Terminal Disengage Force (<i>contact kit to plastic housing</i>)	SAE/USCAR-2, 5.2.1.4 Section 5.1.8 any wear of the contact surfaces No base material should be exposed	SAE/USCAR-2, 5.2.1.3 (omit step 8)
Connector to Connector Unmating Force with connector lock fully unengaged.	SAE/USCAR-2, 5.4.2.4 (omit 4) Minimum 110 N	SAE/USCAR-2, 5.4.2.3

Figure 1 (cont.)

Test Description	Acceptance Criteria	Procedure
ENVIRONMENTAL		
Thermal Shock - with continuity monitoring	SAE/USCAR-2, 5.6.1.4 (omit B). Specimens must not show any evidence of deterioration, cracks, deformities, etc. that could effect their appearance. No loss of continuity for center contact and shield conductors.	SAE/USCAR-2, 5.6.1.3 -40 to 100°C, 100 cycles. <i>NOTE: Be aware of cable thermal limitation!</i>
Temperature/ Humidity Cycling	SAE/USCAR-2, 5.6.2.4 (omit B and E) No loss of continuity for center contact and shield conductors. Class T1 (see table 5.1.4.1)	SAE/USCAR-2, 5.6.2.3 -40 to 100°C, 320 hours. <i>NOTE: Be aware of cable thermal limitation!</i>
Hight Temperature Exposure	SAE/USCAR-2, 5.6.3.4 (omit B and D) Class T1 (see table 5.1.4.1)	SAE/USCAR-2, 5.6.3.3 100°C for 1008 hours. <i>NOTE: Be aware of cable thermal limitation!</i>

Figure 1 (end)

3.6 Product Qualification and Regualification Test Sequence

Test or Examination	Test Group (a)												
	1	2	3	4	5a	5b	6a	6b	7a	7b	8a	8b	9
	Test Sequence (b)												
Visual inspection	1,3	1,3	1,5	1,3	1,7	1,7	1,7	1,7	1,9	1,7	1,9	1,7	1
Contact resistance					2,5		2,5		2,6		2,6		
Voltage standing wave ratio						2,5		2,5		2,5		2,5	
Insolation resistance									3,7		3,7		
Withstanding voltage					3,6		3,6		4,8		4,8		
Shielding effectiveness													2
RF insertion loss						3,6		3,6		3,6		3,6	
Vibration/mechanical shock					4	4							
Cable retention, electrical continuity													
Polarization feature effectiveness				2									
Mating force			2										
Unmating force			3										
Engage/disengage force	2												
extraction force (plug)		2											
Unmating force with connector lock fully engaged.			4										
Thermal shock							4	4					
Humidity-temperature cycling									5	4			
High temperature exposure											5	4	

(a) See paragraph 4.1.A.

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

Figure 2

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. The example of samples structure for each test group according to commercial standards USCAR-17 is shown in table 5.2 and 5.3 of SAE/USCAR 17 rev.5. For the rest see directly in other commercial standards.

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, requalification testing must be done. The test groups and the testing sequence must be communicated with development/product engineering.

4.3 Acceptance Criteria

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 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. The mating ability is guaranteed by a prescribed tumbling circle for the pin contact and catch circle for the socket contact (DIN 72594-1 released March 2006). This was checked with a tolerance calculation.

LTR	REVISION RECORD	DWN	APP	AQE	DATE
A4	Correction of section 2.2 and 4.1.A; Addition of table 1 (p. 3), German language removed; Update of section 3.5.	R. Novakova	V. Cech	D. Nagel	01-03-2019