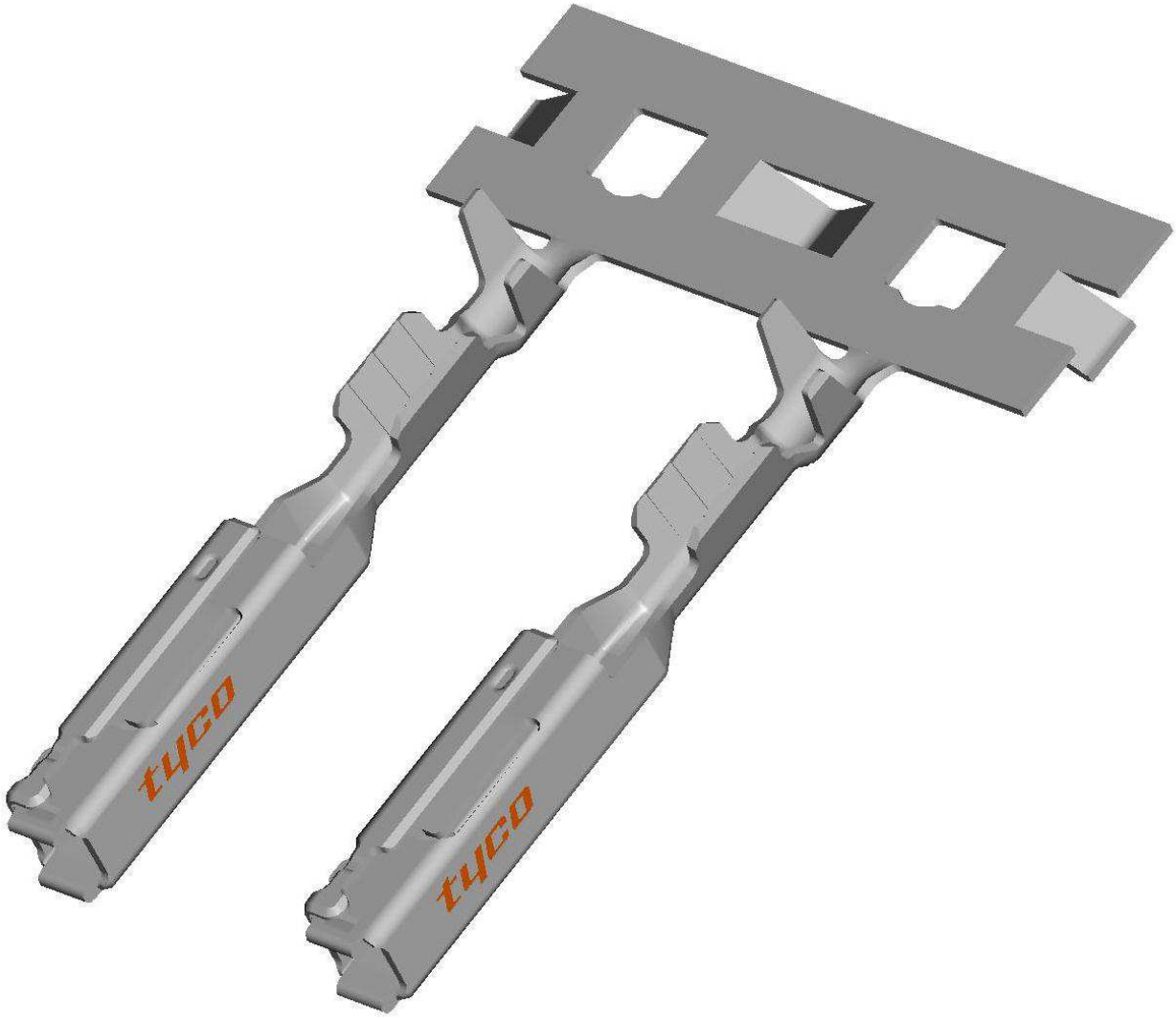
GET Second Generation Female Contact



Tyco Electronics Part Numbers:

1564880-1 for wire size **0.13**mm²
1719957-1 for wire size **0.22-0.35**mm²
1719958-1 for wire size **0.5-0.75**mm²

* Trademark
| Indicates change

CONTENT

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the Tyco Electronics GET Second Generation female terminal

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 16oct08. This detailed documentation is on file at and available from Product Engineering.

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

114-18774: Application Specification (GET Second Generation female Contact)
DVP&R latest version on file at and available from Product Engineering.

2.2 Industry Standards

SAE/USCAR-2 (Rev 4, 5/04): Performance Specification For Automotive Electrical Connector Systems
SAE/USCAR-20 (Rev 1, 10/02): Field Correlated Life Test Supplement to SAE/USCAR-2
SAE/USCAR-21 (Rev 1, 4/04): Performance Specification for Cable-to-Terminal Electrical Crimps

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: 12 volts DC
Free Air Current Rating see Figure 4.

3.4. Test Requirements, Results and Procedures Summary (Figure 1)

Product is designed to meet the electrical, mechanical and environmental performance requirements specified below. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

Test	Summary Test Results	Procedure Description
Visual inspection. SAE/USCAR-2, 5.1.8.3.	All specimens submitted for testing were representative of normal production lots. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.	The requestor submitted the crimp inspection forms certifying that all measured crimps met the required print dimensions, and a Certificate of Conformance with the test package certifying that the specimens were produced, inspected and accepted as conforming to product drawing requirements, and manufactured using the same core manufacturing processes and technologies as the production parts. A visual examination of the crimped terminals was performed under fluorescence lighting with the naked eye examining for the correct wire size, wire brush, burrs on the terminal, insulation in wire crimp, insulation tears, and bulging of insulation or penetration of the insulation crimp.
Connector/terminal cycling. SAE/USCAR-2, 5.1.7.4.	No physical damage occurred as a result of manually mating and unmating the specimens 10 times.	Specimens were manually mated and unmated 10 times.

Terminal-to-terminal engaging/disengaging force. SAE/USCAR-2, 5.2.1.3.	All terminal engaging force measurements were less than 3.7 N. All terminal disengaging force measurements were greater than 1.0 N.	Receptacles held in a chuck attached to the crosshead of a compression/ tensile testing machine were inserted into blades held in a floating vise attached to the base of the compression/ tensile testing machine. After the receptacle was fully inserted it was then disengaged by the crosshead changing from compression to tensile mode which returned the receptacle back to its original starting position. Each specimen was engaged and disengaged 10 times with readings being taken for each cycle. Test speed was 50 mm per minute in the cycling mode.
Terminal bend resistance. SAE/USCAR-2, 5.2.2.3, Figure 3.	No physical damage occurred as a result of subjecting the terminals to a 4 N load in 3 directions, initial, rotated 90 degrees, and rotated 180 degrees.	A pin held in a chuck attached to the crosshead of a compression/ tensile testing machine was used to bend the terminals in the 3 required directions. Terminals were held by a steel device imitating a contact cavity. Test speed was 50 mm per minute in the compression mode.
Terminal crush resistance. Ford SDS EL-0041	No physical damage occurred as a result of subjecting the top and side of the terminal box to a 70 N load for 2 minutes and side of the terminal box to a 70 N load for 2 minutes.	A square pin held in a chuck attached to the crosshead of a compression/ tensile testing machine was used to apply a static force of 70 N on all surfaces perpendicular to the line of engagement. Test speed was 50 mm per minute in the compression mode.
TERMINAL ELECTRICAL		
Dry circuit resistance SAE/USCAR-2, 5.3.1.3.	All low level contact resistance measurements, taken at 100mA maximum and 20mV maximum open circuit voltage were less than 20mΩ.	Specimens were subjected to a 20mA maximum open circuit voltage at 100mA. Measurements were taken using a 4 wire method. Current was forward and reversed bias for each reading. A voltage and current probe were attached to each end of a bus wire used to connect the specimens. The contacts at the other end of each specimen were hand probed individually. The total resistance included wire, crimp interface, and terminal bulk material. The resistance of a soldered crimp deduct specimen was subtracted from the total resistance leaving only the crimp interface resistance.

Voltage drop. **SAE/USCAR-2, 5.3.2.3.**	All voltage drop measurements were less than 20 m Ω.	Specimens were read for voltage drop at a current of 1.0A. Measurements were taken after specimens had stabilized at room ambient conditions for 30 minutes, prior to recording resistance values using a four wire measurement technique. Raw data recorded consisted of 75 mm of terminated wire on the receptacle and 75 mm of terminated wire length on the male blade, the receptacle crimp resistance, the bulk resistance of the receptacle, the mating resistance of the receptacle/blade, and the bulk resistance of the blade. The bulk wire resistance of 150mm per each wire size was subtracted from the raw data. Thus the data summary data reported in this report captures the receptacle's crimp resistance, the blade's resistance, and the mating resistance of the receptacle/blade.
Maximum current rating. **SAE/USCAR-2, 5.3.3.3.**	See Figure 4 for temperature rise and the derating curve.	Terminated and crimped specimens were arranged in a draft free enclosure in a horizontal attitude. An ambient probe was placed 30-60mm from the specimens on the same horizontal attitude. Specimens were energized at a current level and allowed to maintain thermal stability. Thermal stabilization was achieved when temperature rise of 3 consecutive readings taken at 5 minute intervals differed at most by 2°C. Once the specimen was stable at that current level, the current was increased to the next level. This was repeated until a 55°C temperature rise was reached and the maximum current level noted.

1008 hour current cycling. SAE/USCAR-2, 5.3.4.3.	All specimens had a temperature rise of less than 55°C above ambient when tested using the specified current. All voltage drop measurements were less than 20mΩ.	Terminated and crimped specimens were energized by the determined maximum current value less 10%. Current was applied for 45 minutes and then removed for 15 minutes. This was considered to be 1 cycle and was repeated for a total of 1008h. Temperature rise readings were taken at 24 hour intervals.
Thermal shock. SAE/USCAR-2, 5.6.1.3.	No evidence of physical damage was visible as a result of exposure to thermal shock. All low level contact resistance and voltage drop measurements were less than 20mΩ.	Specimens were subjected to 72 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40 and 125°C. The transition between temperatures was less than 5 minutes.
Stand alone pressure/vacuum leak SAE/USCAR-2, 5.6.6.3.	No evidence of physical damage was visible as a result of exposure to stand alone pressure/vacuum. Pressure/vacuum exceeded 7 psi initially and 4 psi after heat soak.	Mated specimens were immersed in a 5% saltwater solution at 25°C with ultraviolet dye added to assist in leak detection. Pressure was slowly increased to the proper value (7 psi initial and 4 psi final) and held for 15 seconds, while noting any air bubbles. The proper vacuum (14.2 in/hg initial and 8.1 in/hg final) was applied for 15 seconds.

<table>
<tr>
<td>Field correlated life test.
SAE/USCAR-20</td>
<td>No evidence of physical damage was visible as a result of exposure to the field correlated life test. All low level contact resistance measurements were less than 20mΩ before and after testing.</td>
<td>Specimens were subjected to the following sequence twice.
1. A visual examination performed by the naked eye for evidence of cracks, deformities, etc. that would impair function.
2. Dry circuit resistance. Specimens were attached to a non-conductive surface. Data was collected using a Data Acquisition System utilizing a 4 wire probe method and forward/reverse current biasing. A maximum of 20mV at 100mA full scale was applied for a dry circuit condition. The overall resistance consisted of 150mm crimp, female bulk terminal, terminal interface and male header pin. The wire and header pin bulk were subtracted out after testing was completed.
3. Heat age. Specimens were subjected to a temperature of 125°C for 72 hours.
4. Random vibration. Specimens were subjected to the following vibration profile for 4 hours per plane.
<table>
<tr><th>Hz</th><th>(g^2/Hz)</th></tr>
<tr><td>10</td><td>0.070</td></tr>
<tr><td>20</td><td>0.070</td></tr>
<tr><td>40</td><td>0.020</td></tr>
<tr><td>350</td><td>0.020</td></tr>
<tr><td>550</td><td>0.005</td></tr>
<tr><td>700</td><td>0.001</td></tr>
<tr><td>750</td><td>0.0001</td></tr>
<tr><td>2000</td><td>0.0001</td></tr>
<tr><td colspan="2">RMS g level 3.2 g's</td></tr>
</table>
5. Thermal shock. Specimens were subjected to 72 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40 and 125°C. The transition between temp. was less than 5 minutes.
6. Temperature/humidity cycling. Specimens were subjected to the following 24 hour temperature/humidity cycle:
16 hours at 95 to 98% relative humidity at 65/C
2 hours at -40/C
2 hours at 85/C
4 hours at 25/C</td>
</tr>
</table>

CRIMP VALIDATION		
Appearance. SAE/USCAR-21, 4.2.4.	Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.	A visual examination of the housing assembly was performed under fluorescence lighting with the naked eye examining for cracks, delaminations, warpage, deformation, discoloration, latching and mating functions. A visual examination of the crimped terminals was performed under fluorescence lighting with the naked eye examining for the correct wire size, wire brush, burrs on the terminal, insulation in wire crimp, insulation tears, and bulging of insulation or penetration of the insulation crimp.
CCH, CCW, ICH and ICW. SAE/USCAR-21, Appendix E.	All measurements were within specifications.	Specimens were measured using calibrated instruments.
Cross-section. SAE/USCAR-21, 4.3.4.	No evidence of physical damage was visible in cross-sectioned specimens.	No defects were found.
Conductor crimp pull-out force. SAE/USCAR-21, 4.4.4.	All pull-out force measurements were greater than 33N for 0.13 mm² * 40N for 0.22 mm² 50N for 0.35 mm² 75N for 0.5 mm² 90N for 0.75 mm²	The force load was applied to each specimen using a compression/ tensile testing machine with the rate of travel at 50 mm per minute.
Accelerated environmental test sequence (ENV). SAE/USCAR-21, 4.5.2.4.	No evidence of physical damage was visible as a result of exposure to accelerated environmental test sequence. All low level contact resistance measurements were less than 20mΩ. Change in resistance was less than the values required by USCAR 21.	Specimens were subjected to the following sequence. 1. Visual inspection per paragraph 3.1. 2. Dry circuit resistance per paragraph 3.7. 3. Thermal shock per paragraph 3.11. 4. Dry circuit resistance per paragraph 3.7. 5. Temperature/humidity cycling per paragraph 3.13.6. 6. Visual inspection per paragraph 3.1. 7. Dry circuit resistance per paragraph 3.7.

* only with Delphi CuMg0.15 wire

Figure 1 end

3.5. Product Qualification Test Sequence

Test or Examination	Test Group (a)										
	1(b)	2(b)	3(b)	4(b)	5(c)	6(c)	7(c)	8(c)	9(b)	10(b)	11
	Test Sequence (d)										
Visual inspection	1,4	1,3	1,3	1,3	1,9	1,7	1,4				
Connector/terminal cycling					2	2	2				
Terminal-to-terminal engaging force	2										
Terminal-to-terminal disengaging force	3										
Terminal bend resistance		2									
Terminal crush resistance			2								
Robustness to test probe				2							
Dry circuit resistance					3,7	3,5					
Voltage drop					4,8	6					
Maximum current rating					5						
1008 hour current cycling					6						
Thermal shock						4					
Stand alone pressure/vacuum							3				
Field correlated life test								1			
Appearance									1	1	1,3
CCH, CCW, ICH and ICW									2		
Cross-section									3		
Conductor crimp pull-out force										2	
Accelerated environmental test sequence (ENV)											2

NOTE

(a) See paragraph 4.1.A.
(b) Tests on terminals only.
(c) Tests on terminals in connectors.
(d) Numbers indicate sequence in which tests are performed.

Figure 2

3.6. Product Requalification Test Sequence

Test Sequence	USCAR/EWCAP SAE/USCAR-2	Terminal Testing		
		Tool Transfer	New/Capacity Tooling	Material Change (1)
A	Terminal-to-terminal engage/disengage force	X	X	X
B	Terminal bend resistance		X	X
C	Maximum/current cycling			X
D	Terminal-connector insertion/extraction		X	
M	Vibration/mechanical shock			(2)
N	Thermal shock			(2)
O	Temperature/humidity cycling			(2)
P	High temperature exposure			(2)

NOTE *(1) Material change includes: base material, hardness, plating, process and/or electrical lubricant.*
(2) USCAR-20 and test sequence N may be performed in place of these four tests.

Figure 3

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. Test groups 1, 3 and 4 shall each consist of 10 specimens. Test group 2 shall consist of 15 specimens of each wire size being tested. Test groups 5 and 11 shall each consist of 30 specimens of each wire size being tested. Test group 6 shall consist of 10 specimens of each wire size being tested. Test group 7 shall consist of 20 specimens.
Test group 8 shall consist of 8 specimens. Test group 9 shall consist of 3 specimens of each wire size being tested. Test group 10 shall consist of 60 specimens of each wire size being tested.

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 (see Figure 3).

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.

5 MAXIMUM CURRENT RATING

Free in air

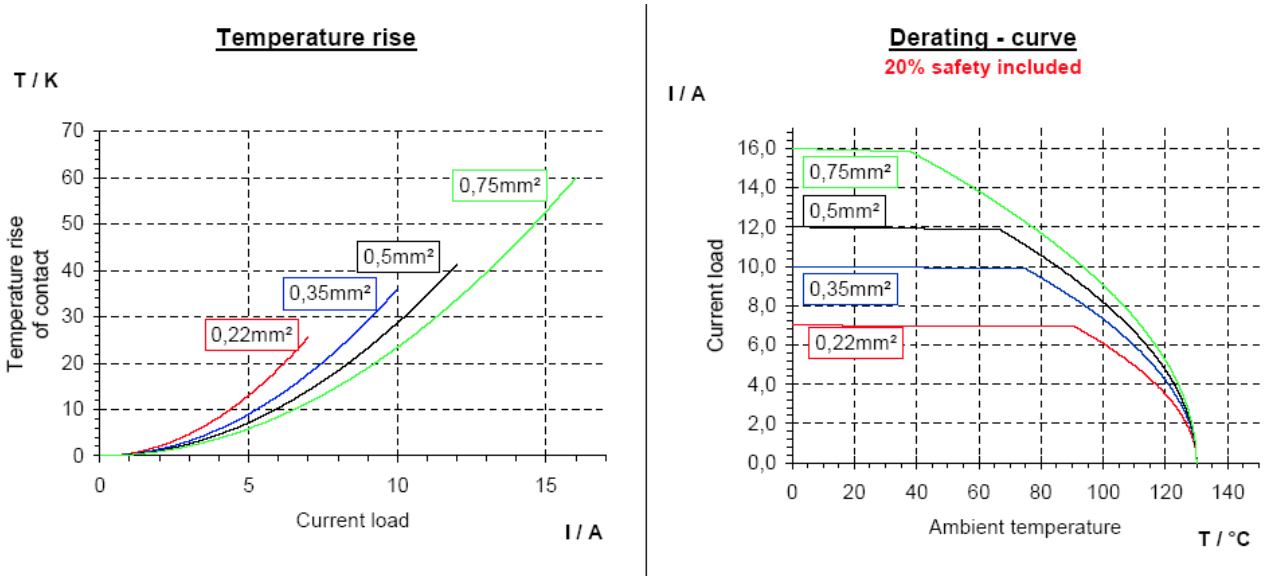


Figure 4

LTR	REVISION RECORD	DWN	APP	DATE
A	Initial	G. HOTEA	G. MUMPER	26 SEP 2008
B	Data for 0.13mm² crimp and TE-PN's added	G. HOTEA	G. MUMPER	08 JUL 2009