MCON-1.2 One-Piece Contact System

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PRODUCT INFORMATION 1-800-522-6752

1 SCOPE

1.1 Content

This specification describes the characteristic, tests and quality requirements for the

MCON-1.2 One-Piece Contact

1.2 Qualification

When testing the named products the following specified specifications and standards shall be used. All tests have to be done using the applicable inspection plan and product.

1.3 Application Sector

The contact is designed to carry medium currents in motor vehicles, in which vibration and mechanical stress may affect the reliability of conventional contacts.

2 APPLICABLE DOCUMENTS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1 TE Connectivity Documents

A 109-1: General Requirements for Test Specifications

B Customer Drawings and Naming

2321538 MCON-1.2 CB, Male Terminal, Sn plate, SWS
2321973 MCON-1.2 CB, Male Terminal, Ag plate, SWS
2321539 MCON-1.2 CB, Female Terminal, Sn plate, SWS
2321537 MCON-1.2 CB, Female Terminal, Ag plate, SWS

CB - Clean Body
SWS - Single Wire Seal

C **108-32199** Product Specification

D **114-32121** Application Specification

2.2 General Documents

A	DIN IEC60512	Electromechanical components for electronic equipment, basic testing procedures and methods in engagement.
B	EWCAP-001	Terminal Blade Detail. 120-T Terminal Blade Configuration http://www.uscar.org/guest/teams/10/Electrical-Wiring-Component-Applications-Partnership
C	DIN EN60068	Environmental tests
D	DIN IEC 68	Electrical engineering, basic environmental testing procedures
E	SAE/USCAR2 Revision 6	Performance Specification for Automotive Electrical Connector Systems Copyright © 2013 USCAR
F	SAE/USCAR21 Revision 3	Performance Specification for Cable-to-Terminal Electrical Crimps Copyright © 2014 USCAR
G	GMW3191 June 2012	Connector Test and Validation Specification Copyright © 2012 General Motors Company

3 REQUIREMENTS

3.1 Design and construction

The male and female crimped terminal must correspond with the product drawing, concerning the design and the physical dimensions. In the event that the female terminal is being mated to a device or a header then the male blade construction shall comply with the geometry defined on USCAR/EWCAP Drawing EWCAP-001, blade detail 120-T.

3.2 Materials

Information on this can be found on the production drawings.

3.3 Technical data

A Nominal voltage
12Vdc

B See applicable current carrying capability
See Diagrams 1 - 4

C Temperature range
-40 to 125°C (tin plated)
-40 to 125°C (silver plated)

D Cable size
0.35mm^2 -- 1.0mm^2

E Vibration level
On Body or Chassis – GMW3191-June 2012 - V1
Target Life 2

3.4 Performance and test description

The product satisfies the electrical, mechanical and environmental performance requirements specified in paragraph 3.5 All tests are performed at ambient environmental conditions unless otherwise specified

3.4.1 General Requirements

All tests meet the test procedures and test guidelines.

- Number of samples: see test group.
- The specified tools must be used for the mechanical tests.
- The specimen must be free of visible damage.

- The specimen must comply with the actual drawings.

- Parts used for testing shall be production level only.
- Test result are pertinent to the tested combination only (contact, TAB, Housings), other designs (geometry, material…) must be tested separately.

- The wires used must be water tight and have sufficient heat resistance, if applicable. The wires used must be free of damage, holes and grooves.

- Application of the contacts per Spec. 114-32121
- Vibration examinations are valid only for the to the specific plastic housings which were subject to testing, Other housing designs should be examined separately.

3.5 Test requirements and procedures by test guideline for motor vehicle connectors

Test Description	Requirement	Procedure
Terminal-to-Terminal Engagement Force	Maximum average of 4N per terminal. NOTE: This infers that the terminal-to-terminal engagement force in, for example, a five position connector, can contribute, on average, 20N toward the connector-to-connector mating force. Applicable to Sn and Ag plated terminals	Per SAE/USCAR2, revision 6, paragraph 5.2.1.3 Applicable to Female terminal 2321537 or 2321539 mated to Male terminal 2321538 or 2321973 or to a stamped blade that satisfies USCAR/EWCAP drawing EWCAP-001, T-120 blade detail.
Terminal Bend Resistance	Shall not bend with an applied force of 4.0N applied to the insulation crimp area.	Per SAE/USCAR2, revision 6, paragraph 5.2.2.3 Terminal Design Style "A" Mounted as shown in figure 5.2.2.3-2 in SAE/USCAR2, revision 6.
Mating cycles	Terminal shall be capable of 10 engage / disengage cycles#) Applicable to Sn and Ag	Applicable to Female terminal 2321537 or 2321539 mated to Male terminal 2321538 or 2321973 or to a stamped blade that satisfies USCAR/EWCAP drawing EWCAP-001, T-120 blade detail.
Temperature Rise versus Current Curves	See applicable current versus temperature rise graphs. Appendix A. Diagrams 1 – 2.	Per SAE/USCAR2, revision 6, paragraph 5.3.3.3
Terminal Free-air Current De-rating Curves (not in housing).	See applicable Current De-rating graphs. Appendix A. Diagrams 1 – 2.	According to DIN IEC 60512-3 Test 5a and 5b MAY1994
Mechanical Shock	No loss of continuity greater than 7 ohms for more than 1 µs.	♦ GMW3191, June 2012, Table 10 ♦ SAE/USCAR2, revision 6, Table 5.4.6.3A, Vibration Class, V1

#) The maximum number of mating cycles is dependent on the tribological properties of the surfaces used in each case. Use of male terminals with harsh tip transitions, rough surfaces, inferior plating, or burrs can decrease the durability of the terminal.

Test Description	Requirement	Procedure
Vibration with Thermal Shock	No loss of continuity greater than 7 ohms for more than 1 µs.	♦ GMW3191, June 2012, T3, V1 Target Life 2.0 for Tin terminals. ♦ GMW3191, June 2012, T3, V1 Target Life 2.0 for Silver terminals.
Thermal Shock	♦ There shall be no loss of electrical continuity greater than 7 ohms for 1µs. ♦ Dry circuit resistance shall not exceed 10.4mΩ‡	GMW3191, June 2012 Paragraph 4.4.2.4 (300 cycles) SAE/USCAR2, revision 6 Paragraph 5.2.1.3 (100 cycles) For Sn plated terminals -40°C to 125°C For Ag plated terminals -40°C to 125°C
Thermal Aging (High Temp Exposure)	Dry circuit resistance shall not exceed 10.4mΩ‡	GMW3191, June 2012 Paragraph 4.4.1. SAE/USCAR2, revision 6 Paragraph 5.6.3.3 Expose mated connector pair to 1008 hours at maximum ambient temperature for that temperature class. For Sn plated terminals 125°C For Ag plated terminals 125°C
Humid Heat Cyclic (HHC)	Dry circuit resistance shall not exceed 10.4mΩ‡	GMW3191, June 2012, Paragraph 4.4.3.4., Figure 22. Humidity should be at 93 ±3% at 65°C and 25°C. During transition between 65°C to 25°C humidity drops to 80%. Humidity is uncontrolled when temperature is less than 25°C. Total of 10 days.

‡ Based on GMW3191, June 2012, table 11 and linear interpolation for a 1.2mm wide male terminal.

Test Description	Requirement	Procedure
Humid Heat Constant (HHCO)	Dry circuit resistance shall not exceed 10.4mΩ‡	GMW3191, June 2012, Paragraph 4.4.4.4 Temperature 85±3°C, with Relative Humidity of 90±5% for 10 days.
Terminal 1008 Hour Current Cycling	Measured temperature shall not exceed 130° C and the total resistance shall not exceed 10.4 mΩ* *Based on GMW3191, June 2012, table 11 and linear interpolation for a 1.2mm wide male terminal.	GMW3191, June 2012, Paragraph 4.3.4.4 1008 hours at maximum current* allowed at ambient temperature. *See Current Derating curves for current at ambient temperature.
Conductor Pull-out Force (Crimp tensile)	Force, as defined by Average minus 3 standard deviations (X-3s) , shall be equal to or greater than: Wire Size (mm^2) Force (N) 0.35 50 0.50 75 0.75 90 1.0 120	SAE/USCAR21, revision 3, Paragraph 4.4.4
Accelerated Electrical Exposure test (ENV)	Initial Crimp Resistance shall be less than or equal to maximum total resistance value indicated below before testing. After testing Crimp Resistance shall be less than or equal to the maximum total resistance value OR the maximum resistance change value. FEMALE TERMINAL Wire Size (mm^2) Max Total / Max Change 0.35 0.55mΩ / 0.46mΩ 0.50 0.55mΩ / 0.39mΩ 0.75 0.55mΩ / 0.33mΩ 1.0 0.55mΩ / 0.33mΩ MALE TERMINAL Wire Size (mm^2) Max Total / Max Change 0.35 0.91mΩ / 0.82mΩ 0.50 0.77mΩ / 0.69mΩ 0.75 0.63mΩ / 0.56mΩ 1.0 0.55mΩ / 0.49mΩ	SAE/USCAR21, revision 3, Paragraph 4.5.2.4 Thermal Shock 72 cycles, One cycle is 30 minutes at +125°C 30 minutes at -40°C . Temp/Humidity 4 cycles, One cycle is 16 hours @ +65°C and 95-98% R.H. 2 hours @ -40°C (R.H. not controlled) 2 hours @ +85°C (R.H. not controlled) 4 hours @ +23°C (R.H. not controlled)
Applied Cable Seal Retention	Force required to pull the terminal off of the seal neck shall be equal to or greater than: Wire Size (mm^2) Force (N) 0.35 8 0.50 8 0.75 10 1.0 10	SAE/USCAR21, revision 3 Paragraph 4.6.4

‡ Based on GMW3191, June 2012, table 11 and linear interpolation for a 1.2mm wide male terminal.

3.6 Qualification and re-qualification sequence

3.6.1 Terminal and Terminal / Connector testing

Test	Test group							
	Terminal Testing				Terminal / Connector Testing			
	Terminal Bend Strength	Terminal -to-Terminal Engage Force	Maximum Current Rating	1008 Hour Current Cycling	Thermal Shock	Thermal Aging (High Temp Exposure)	Heat Humid Cyclic	Heat Humid Constant
	Test Sequence							
Visual and dimensional inspection	1,3	1	1	1	1,8	1,6	1,6	1,6
10 mate cycles / Conditioning		2		2	2	2	2	2
Dry Circuit resistance				3	3,5,7	3,5	3,5	3,5
Terminal Bend Strength	2							
Terminal-to-terminal Engagement force								
Maximum Current Rating			2					
1008 Hour Current Cycling				3				
Mechanical Shock					4			
Vibration with Thermal Shock					6			
Thermal Aging (High Temperature Exposure)						4		
Humid Heat Cyclic (HHC)							4	
Humid Heat Constant (HHCO)								4

NOTE

(a) Specimens shall be prepared in accordance with applicable product drawings using crimp applicators and crimp heights defined in 114-32121 and shall be selected at random from current production.

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

3.6.2 SAE/USCAR21 Testing

Test	Test group			
	SAE/USCAR21 Testing			
	Conductor Pull-out Strength	Crimp Cross-section	Accelerated Environmental Exposure	Applied Cable Seal Retention
	Test Sequence			
Visual and dimensional inspection	1	1	1,5	1
Dry Circuit resistance			2,6	
Conductor pull-out strength	2			
Applied Cable Seal Retention				2
Crimp Cross-section		2		
Thermal Shock			3	
Temp/Humidity			4	

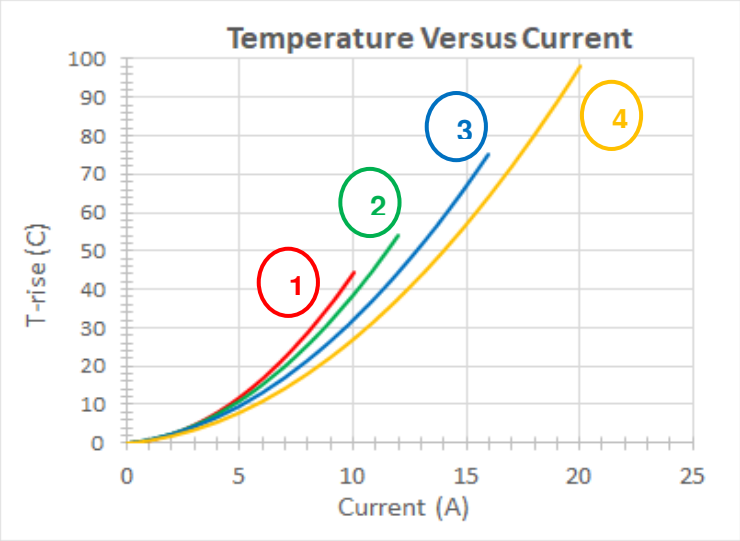
NOT

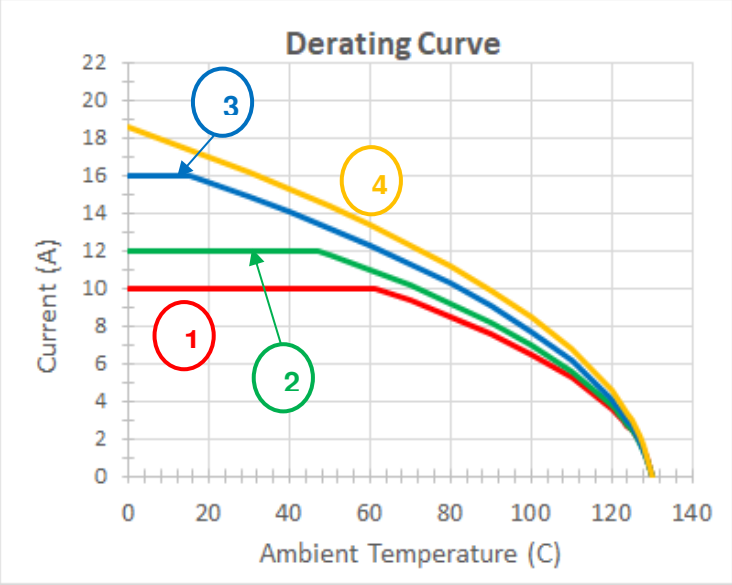
(a) Specimens shall be prepared in accordance with applicable product drawings using crimp applicators and crimp heights defined in 114-32121 and shall be selected at random from current production.

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

APPENDIX A. Diagram 1

Temperature rise / derating free in air [1]		**MCON 1.2 One-Piece, 0.35 – 1.0 mm² with Sn Plating**		
Wire: [2] *Used for Female and Male terminal*	MCON 1.2 One-Piece Female Material Body: CuNiSi / Sn	MCON 1.2 One Piece Male Material Body: CuSn4 / Sn	Note:	Graph
0.35 mm² FLR - A	2321539-3	2321538-3	**For T3 applications (-40°C to +125°C)**	1
0.50 mm² FLR - A	2321539-2	2321538-2		2
0.75 mm² FLR - A	2321539-1	2321538-1		3
1.00 mm² FLR - A	2321539-1	2321538-1		4





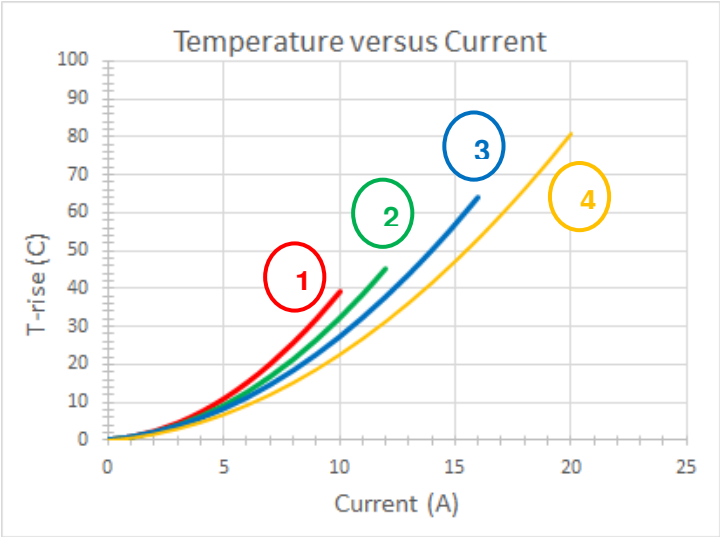
Temp.	Current (A)			
	0.35	0.5	0.75	1.0
(°C)	(mm^2)	(mm^2)	(mm^2)	(mm^2)
0	10	12	16	18.5
10	10	12	16	17.8
20	10	12	15.7	17.0
30	10	12	14.9	16.1
40	10	12	14.1	15.3
50	10	11.8	13.2	14.4
60	10	11.0	12.3	13.4
70	9.3	10.1	11.3	12.3
80	8.5	9.2	10.2	11.2
90	7.6	8.2	9.1	9.9
100	6.5	7.0	7.7	8.5
110	5.2	5.6	6.1	6.8
120	3.6	3.8	4.1	4.5
130	0.0	0.0	0.0	0.0

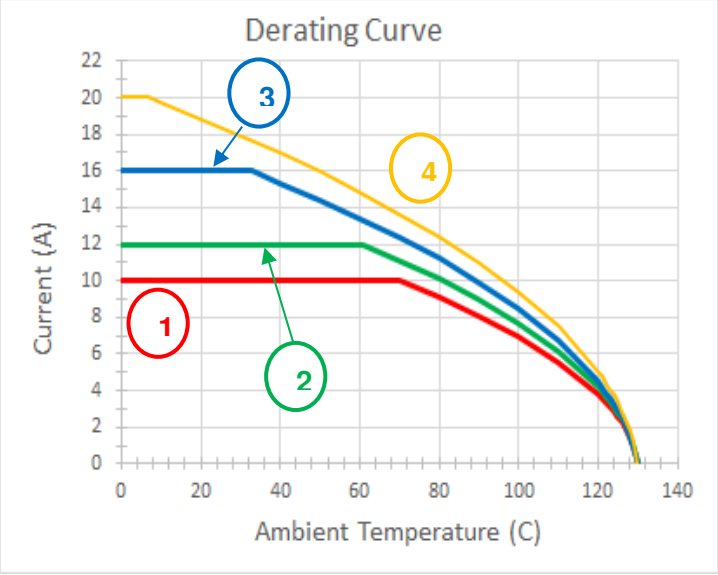
[1] This test is conducted on terminals alone, thus eliminating the variation that may be introduced by variations in the heat dissipating characteristics of differing connector housing designs, sizes, and current loading patterns.

[2] The limit temperatures as well as the maximum current carrying capacity of the wires have to be considered.

APPENDIX A. Diagram 2

Temperature rise / derating free in air [1]		**MCON 1.2 One-Piece, 0.35 – 1.0 mm² with Ag Plating**		
Wire: [2] *Used for Female and Male terminal*	MCON 1.2 One-Piece Female Material Body: CuNiSi / Ag	MCON 1.2 One Piece Male Material Body: CuSn4 / Ag	Note:	Graph
0.35 mm² FLR - A	2321537-3	2321973-3	**For T3 applications (-40°C to +125°C)**	1
0.50 mm² FLR - A	2321537-2	2321973-2		2
0.75 mm² FLR - A	2321537-1	2321973-1		3
1.00 mm² FLR - A	2321537-1	2321973-1		4





Temp.	Current (A)			
	0.35	0.5	0.75	1.0
(°C)	(mm^2)	(mm^2)	(mm^2)	(mm^2)
0	10	12	16	20
10	10	12	16	19.2
20	10	12	16	18.4
30	10	12	16	17.5
40	10	12	15.0	16.6
50	10	12	14.1	15.7
60	10	12	13.2	14.7
70	9.8	11.0	12.2	13.6
80	9.0	10.1	11.2	12.4
90	8.0	9.0	10.0	11.1
100	6.9	7.8	8.6	9.6
110	5.7	6.4	7.1	7.8
120	4.0	4.5	5.0	5.5
130	0	0	0	0

[1] This test is conducted on terminals alone, thus eliminating the variation that may be introduced by variations in the heat dissipating characteristics of differing connector housing designs, sizes, and current loading patterns.

[2] The limit temperatures as well as the maximum current carrying capacity of the wires have to be considered.