Test Plan and Report Header and Units Under Test Table

Test Plan Number: 1. 0167

Test Plan Level: PV - Production Validation

Objective: Validate MX150 Receptacle CS tin terminal

Product Description : MX150 Receptacle Cable Seal Terminal

DVP&R Date (Original): 21-Dec-2005

Customer: General Market

Product (Vehicle(s)): Standard Product

Year of Introduction (Model Year(s)): Standard Product

Customer Approval:

Engineering Manager Approval: Brian Moser

Reliability Engineering Lab Manager: John Wallace

DVP&R Prepared By: Ajay Dhir

Reporting Engineer: Ajay Dhir

Phone #: 248-371-9825

Project Test Engineer: Dan Judson

Classification Temperature: Class 3

Classification Vibration: NA

Classification Sealing: NA

Unit Under Test Type	Description	Manufacturer	Part Number	Part Rev.	Customer Part #
Units Under Test	MX150 RECPT CABLE SEAL TIN 14/16	Molex	34083-2001/3001		
Units Under Test	MX150 RECPT CABLE SEAL TIN 18/20	Molex	34083-2002/3002		
Units Under Test	MX150 RECPT CABLE SEAL TIN 22	Molex	34083-2003/3003		
Other Parts for Test	MX150 BLADE CABLE SEAL TIN 14/16	Molex	34080-0001		
Other Parts for Test	MX150 BLADE CABLE SEAL TIN 18/20	Molex	34080-0002		
Other Parts for Test	PINK CABLE SEAL	n/a	97BG-10C930-SBA		
Other Parts for Test	YELLOW CABLE SEAL	n/a	XW43-14603-FA		
Other Parts for Test	GREEN CABLE SEAL	n/a	XW4T-14603-AA		
Other Parts for Test	YAZAKI LIGHT GRAY CABLE SEAL	n/a	XW4T-14603-MA		
Other Parts for Test	YAZAKI 1.5 CABLE SEAL MALE	Yazaki	n/a		7114-4103-02
Other Parts for Test	RECEPTACLE CONNECTOR 3-WAY	Molex	34250-0051		
Other Parts for Test	BLADE CONNECTOR 3-WAY	Molex	34091-0003		

Test Plan and Report

Test Plan Number: 1. 0167

Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
USCAR-2 Revision 5, November 2007 - 5.3.3/5.3.4 (Maximum Test Current Capability)/(1008 Hour Current Cycling)	TE1	MX150 CS Receptacle grip Rcpt. Term. 14grip TXL wire	PV	Pre-Test Visual Examination	Visually examine each test specimen, noting in detail any manufacturing or material defects such as cracks, tarnishing, flash, etc. When specified in the test request/order, take photographs and/or video recordings of representative samples to be tested and keep a properly labeled control sample.	Sec. 5.1.8		40	MX150 Receptacle Cable Seal 14/16 grip									MET		
				Terminal Cycling	None, mate each terminal pair 11 times	Sec. 5.1.7														
				Maximum Test Current Capability	The temperature of any test sample may not exceed a 55°C above ambient. The total connection resistance of any 1.50 mm terminal pair may not exceed 10 milliohms.	Sec. 5.3.3	The current that produced a ³ 55°C rise above ambient was 22.6 Amperes The maximum test current capability is 21 Amperes.			10								NA		
				1008 Hour Current Cycling	The temperature of any test sample may not exceed a 55°C above ambient. The total connection resistance of any 1.50 mm terminal pair may not exceed 10 milliohms.	Sec. 5.3.3	All samples met the specified criteria with a test current of 21 Amperes.			30				43.90 1.56	51.60 2.02	46.6 1.72		MET		
				Post Test Visual Examination	Re-examine each test sample and note in detail any observable changes, such as swelling, corrosion, discoloration, contact plating wear, physical distortions, cracks, etc. Compare the tested and/or conditioned samples to the control samples, the videos, and/or the photographs, recording any differences in the test report. The Authorized Person will need to provide an additional sample for this purpose. ACCEPTANCE CRITERIA: All terminals must	Sec. 5.1.8												MET		

Test Plan Number: 1. 0167

Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
					not show (with the aid of 10x magnification) any evidence of deterioration, cracks, deformities that could affect their functionality. No base material should be exposed due to plating or coating wear through.																
USCAR-2 Revision 5, November 2007 - 5.3.3 (Maximum Test Current Capability)	TE1a	MX150 CS Receptacle Term. 0.35mm^2 FLR2X-A3ZHA	PV	Pre-Test Visual Examination	Visually examine each test specimen, noting in detail any manufacturing or material defects such as cracks, tarnishing, flash, etc. When specified in the test request/order, take photographs and/or video recordings of representative samples to be tested and keep a properly labeled control sample.	Sec. 5.1.8		10	MX150 Receptacle Cable Seal 22 grip	10								MET		
				Terminal Cycling	None, mate each terminal pair 11 times	Sec. 5.1.7														
				Maximum Test Current Capability	The temperature of any test sample may not exceed a 55°C above ambient. The total connection resistance of any 1.50 mm terminal pair may not exceed 10 milliohms.	Sec. 5.3.3	The current that produced a ³ 55°C rise above ambient was 11.9 Amperes The maximum test current capability is 11.5 Amperes.											NA		
				Post Test Visual Examination	Re-examine each test sample and note in detail any observable changes, such as swelling, corrosion, discoloration, contact plating wear, physical distortions, cracks, etc. Compare the tested and/or conditioned samples to the control samples, the videos, and/or the photographs, recording any differences in the test report. The Authorized Person will need to provide an additional sample for this purpose. ACCEPTANCE CRITERIA: All terminals must not show (with the aid of 10x magnification) any evidence of deterioration, cracks, deformities that could affect their functionality. No base material should be exposed due to plating or	Sec. 5.1.8												MET		

Test Plan Number: 1. 0167

Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
					coating wear through.															
Terminal to Terminal Engage/Disengage Force- USCAR-2 Rev. 4 (May 2004) page 18	TM1	Terminal Mechanical	PV	Pre-Test Visual Examination	See General Notes 1a.	Sec. 5.1.8		10	MX150 Receptacle Cable Seal 18/20 grip	10										
				Terminal - Terminal Engage Force	The terminal-terminal engage force for reference only	Sec. 5.2.1								2.90	3.30	3.1		MET		
				Terminal - Terminal Disengage Force	The terminal-terminal disengage force for reference only	Sec. 5.2.1								1.20	1.80	1.4		MET		
				Post Test Visual Examination	See General Notes 1b and 1d.	Sec. 5.1.8														
Terminal Bend Resistance - USCAR-2 Rev. 4 (May 2004)/Rev. 5 (Nov 2007) page 19	TM2	Terminal Mechanical, 18grip TXL wire	PV	Pre-Test Visual Examination	See General Notes 1a.	Sec. 5.1.8		15	MX150 Receptacle Cable Seal 18/20 grip											
				Terminal Bend Resistance (Location 1, Orientation 0°)	Must meet post test visual inspection and record all observations during the test.	Sec. 5.2.2				5								MET		
				Terminal Bend Resistance (Location 1, Orientation 90°)	Must meet post test visual inspection and record all observations during the test.	Sec. 5.2.2				5								MET		
				Terminal Bend Resistance (Location 1, Orientation 180°)	Must meet post test visual inspection and record all observations during the test.	Sec. 5.2.2				5								MET		
				Post Test Visual Examination	See General Notes 1b and 1d.	Sec. 5.1.8														
	TM2a	Terminal Mechanical, 0.35mm^2	PV	Pre-Test Visual Examination	See General Notes 1a.	Sec. 5.1.8		15	MX150 Receptacle Cable Seal 22 grip											
				Terminal Bend Resistance (Location 1, Orientation 0°)	Must meet post test visual inspection and record all observations during the test.	Sec. 5.2.2				5								MET		
				Terminal Bend Resistance (Location 1, Orientation 90°)	Must meet post test visual inspection and record all observations during the test.	Sec. 5.2.2				5								MET		
				Terminal Bend Resistance (Location 1, Orientation 180°)	Must meet post test visual inspection and record all observations during the test.	Sec. 5.2.2				5								MET		
				Post Test Visual Examination	See General Notes 1b and 1d.	Sec. 5.1.8														
Thermal Shock - USCAR-2 Rev. 4 (May 2004) page 50	CE1	Connector ELECTRICAL	PV	Pre-Test Visual Examination	See General Notes 1a and 1c.	Sec. 5.1.8		30	MX150 RECPT CABLE SEAL 18awg TXL	30										
				Connector and/or Terminal Cycling	None, mate each connector pair 11 times	Sec. 5.1.7														
				Dry Circuit Resistance	TOTAL CONNECTION RESISTANCE" for	Sec. 5.3.1								0.85	1.25	0.96		MET		

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
					1.50mm system shall be equal or less than 10 milliohm															
				Circuit Continuity Monitoring	None, a minimum of ten terminals and five connector pairs must be monitored.	Sec. 5.1.9														
				Thermal Shock	No discontinuities > 7 Ohms for more than 1 mS.	Sec. 5.6.1														
				Dry Circuit Resistance	TOTAL CONNECTION RESISTANCE" for 1.50mm system shall be	Sec. 5.3.1								1.10	3.53	1.68		MET		
				Voltage Drop	TOTAL CONNECTION RESISTANCE" for 1.50mm system shall be	Sec. 5.3.2								1.18	4.20	1.73		MET		
				Post Test Visual Examination	See General Notes 1b and 1c.	Sec. 5.1.8														
Field Correlated Life Test (125°C) - SAE/USCAR-20 Rev. 1 (June 2004)	CE2	Connector ELECTRICAL	PV	Pre-Test Visual Examination	See General Notes 1a and 1c.	USCAR-2 Rev. 4 Sec. 5.1.8		30	MX150 RECPT CABLE SEAL 18awg TXL	30										
				Dry Circuit Resistance	TOTAL CONNECTION RESISTANCE" shall be equal or less than 20 milliohm	SAE/USCAR-20 - Sec. 6								0.85	1.07	1		MET		
				Thermal Age - 72 hours @ 125C	None, environmental conditioning only.	SAE/USCAR-20 - Sec. 7.1.1														
				Random Vibration - 12 hrs (4 hrs / plane) - 3.2g rms. Ref Table 1 for Vibration Profile	None, environmental conditioning only.	SAE/USCAR-20 - Sec. 7.1.2														
				Thermal Shock: 72 - 1 hr cycles -40 to 125 C	None, environmental conditioning only.	SAE/USCAR-20 - Sec. 7.1.3														
				Temperature Humidity - 24 hours	None, environmental conditioning only.	SAE/USCAR-20 - Sec. 7.1.4														
				Dry Circuit Resistance	TOTAL CONNECTION RESISTANCE" shall be equal or less than 20 milliohm	SAE/USCAR-20 - Sec. 6								1.36	11.73	2.71		MET		
				Thermal Age - 72 hours @ 125C	None, environmental conditioning only.	SAE/USCAR-20 - Sec. 7.1.1														
				Random Vibration - 12 hrs (4 hrs / plane) - 3.2g rms. Ref Table 1 for Vibration Profile	None, environmental conditioning only.	SAE/USCAR-20 - Sec. 7.1.2														
				Thermal Shock: 72 - 1 hr cycles -40 to 125 C	None, environmental conditioning only.	SAE/USCAR-20 - Sec. 7.1.3														
				Temperature Humidity - 24 hours	None, environmental conditioning only.	SAE/USCAR-20 - Sec. 7.1.4														
				Dry Circuit Resistance	TOTAL CONNECTION RESISTANCE" shall be equal or less than 20 milliohm	SAE/USCAR-20 - Sec. 6								1.63	14.27	4.46		MET		

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				Post Test Visual Examination	See General Notes 1b, 1c, and 1d.	USCAR-2 Rev. 4 Sec. 5.1.8														
Pressure/Vacuum Leak - USCAR-2 Rev. 4 (May 2004) page 61	SC1	Sealed Connector ENVIRONMENTAL	PV	Pre-Test Visual Examination	See General Notes 1a and 1c.	Sec. 5.1.8		30	MX150 Receptacle Cable Seal 22awg	30										
				MAT Seal Conditioning	Ten cavities, remove and re-insert terminals in cavities specified in TR.	Sec. 5.6.5.3 Line 2														
				Connector and/or Terminal Cycling	None, mate each connector pair 11 times	Sec. 5.1.7														
				Isolation Resistance	Isolation resistance shall exceed 100 M W @ 500VDC	Sec. 5.5.1														
				Pressure (48 kPa)	Pressure: No loss of applied pressure and no bubbles visible exiting any test sample.	Sec. 5.6.6												MET		
				Vacuum (48 kPa)	Vacuum: Must meet Isolation Resistance test and mid test visual Inspection.													MET		
				Isolation Resistance	Isolation resistance shall exceed 100 M W @ 500VDC	Sec. 5.5.1														
				Mid Test Visual Examination	See General Notes 1b and 1c.	Sec. 5.1.8														
				Seventy Hour Heat Soak	None, maximum temperature per CUT classification	Sec. 5.6.6														
				Pressure (48 kPa)	Pressure: No loss of applied pressure and no bubbles visible exiting any test sample.	Sec. 5.6.6												MET		
				Vacuum (48 kPa)	Vacuum: Must meet Isolation Resistance test and post test Visual Inspection.													MET		
				Isolation Resistance	Isolation resistance shall exceed 100 M W @ 500VDC	Sec. 5.5.1														
				Post Test Visual Examination	See General Notes 1b and 1c.	Sec. 5.1.8														
MECHANICAL - USCAR-21 (May 2002) page 11, 15	CO1a	Cable-to-Terminal Mechanical, 14grip TXL wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		63	MX150 Receptacle Cable Seal 14/16 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 1.60 mm						1										
				CCH 1.65 mm						1										
				CCH 1.70 mm						1										

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 180 N	USCAR-21, Sec. 4.4														
				CCH 1.60 mm						20				316	358	344		MET		
				CCH 1.65 mm						20				324	370	348		MET		
				CCH 1.70 mm						20				313	359	342		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Cable-to-Terminal Electrical ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO1b	Crimp Optimization, 14grip TXL wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		30	MX150 Receptacle Cable Seal 14/16 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH 1.60 mm						10				0.13	0.29	0.21		MET		
				CCH 1.65 mm						10				0.10	0.28	0.17		MET		
				CCH 1.70 mm						10				0.10	0.29	0.21		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													

Test Plan Number: 1. 0167

Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.60 mm						10				0.22	0.48	0.38		MET		
				CCH 1.65 mm						10				0.13	0.40	0.24		MET		
				CCH 1.70 mm						10				0.18	0.54	0.30		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.33 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.60 mm						10				0.09	0.23	0.17		MET		
				CCH 1.65 mm						10				0.02	0.19	0.07		MET		
				CCH 1.70 mm						10				0.02	0.25	0.09		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, MECHANICAL - USCAR-21 (May 2002) page 11, 15	CO2a	Cable-to-Terminal Mechanical, 16grip TXL wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		105	MX150 Receptacle Cable Seal 14/16 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 1.25 mm						1										
				CCH 1.30 mm						1										
				CCH 1.35 mm						1										
				CCH 1.40 mm						1										
				CCH 1.45 mm						1										

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 120 N	USCAR-21, Sec. 4.4														
				CCH 1.25 mm						20				218	259	241		MET		
				CCH 1.30 mm						20				227	264	245		MET		
				CCH 1.35 mm						20				224	256	245		MET		
				CCH 1.40 mm						20				231	269	250		MET		
				CCH 1.45 mm						20				254	285	267		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2												MET		
Crimp Optimization, ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO2b	Cable-to-Terminal Electrical, 16grip TXL wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		50	MX150 Receptacle Cable Seal 14/16 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH 1.25 mm						10				0.10	0.17	0.12		MET		
				CCH 1.30 mm						10				0.13	0.18	0.15		MET		
				CCH 1.35 mm						10				0.08	0.16	0.12		MET		
				CCH 1.40 mm						10				0.07	0.15	0.12		MET		
				CCH 1.45 mm						10				0.09	0.16	0.12		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
							Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.25 mm						10				0.10	0.17	0.13		MET		
				CCH 1.30 mm						10				0.12	0.18	0.15		MET		
				CCH 1.35 mm						10				0.11	0.18	0.13		MET		
				CCH 1.40 mm						10				0.09	0.17	0.14		MET		
				CCH 1.45 mm						10				0.10	0.17	0.14		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.33 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.25 mm						10				0.01	0.03	0.01		MET		
				CCH 1.30 mm						10				0.03	0.03	0.00		MET		
				CCH 1.35 mm						10				0.03	0.06	0.01		MET		
				CCH 1.40 mm						10				0.01	0.03	0.02		MET		
				CCH 1.45 mm						10				0.03	0.08	0.01		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization MECHANICAL - USCAR-	CO3a	Cable-to-Terminal	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		105	MX150 Receptacle											

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
21 (May 2002) page 11, 15		Mechanical, 18grip TXL wire							Cable Seal 18/20 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 1.15 mm						1										
				CCH 1.20 mm						1										
				CCH 1.25 mm						1										
				CCH 1.30 mm						1										
				CCH 1.35 mm						1										
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 90 N	USCAR-21, Sec. 4.4														
				CCH 1.15 mm						20				138	155	148		MET		
				CCH 1.20 mm						20				153	167	161		MET		
				CCH 1.25 mm						20				164	184	173		MET		
				CCH 1.30 mm						20				167	189	179		MET		
				CCH 1.35 mm						20				164	191	183		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO3b	Cable-to-Terminal Electrical, 18grip TXL wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		50	MX150 Receptacle Cable Seal 18/20 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH 1.15 mm						10				0.05	0.17	0.09		MET		
				CCH 1.20 mm						10				0.07	0.16	0.12		MET		
				CCH 1.25 mm						10				0.03	0.19	0.11		MET		
				CCH 1.30 mm						10				0.03	0.17	0.11		MET		
				CCH 1.35 mm						10				0.07	0.13	0.10		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
							consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.15 mm						10				0.04	0.12	0.08		MET		
				CCH 1.20 mm						10				0.06	0.16	0.11		MET		
				CCH 1.25 mm						10				0.01	0.20	0.10		MET		
				CCH 1.30 mm						10				0.06	0.16	0.10		MET		
				CCH 1.35 mm						10				0.07	0.33	0.13		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.33 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													

Test Plan Number: 1. 0167

Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.15 mm						10				0.05	0	-0.02		MET		
				CCH 1.20 mm						10				0.05	0.01	-0.01		MET		
				CCH 1.25 mm						10				0.03	0.01	-0.01		MET		
				CCH 1.30 mm						10				0.03	0.03	-0.01		MET		
				CCH 1.35 mm						10				0.01	0.20	0.03		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, MECHANICAL - USCAR-21 (May 2002) page 11, 15	CO4a	Cable-to-Terminal Mechanical, 20grip TXL wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		105	MX150 Receptacle Cable Seal 18/20 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 1.05 mm						1										
				CCH 1.10 mm						1										
				CCH 1.15 mm						1										
				CCH 1.20mm						1										
				CCH 1.25 mm						1										
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 75 N	USCAR-21, Sec. 4.4														
				CCH 1.05 mm						20				107	115	111		MET		
				CCH 1.10 mm						20				112	123	118		MET		
				CCH 1.15 mm						20				111	134	124		MET		
				CCH 1.20mm						20				119	136	130		MET		
				CCH 1.25 mm						20				119	140	132		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO4b	Cable-to-Terminal Electrical, 20grip TXL wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		50	MX150 Receptacle Cable Seal 18/20 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH 1.05 mm						10				0.12	0.28	0.18		MET		

Test Plan Number: 1. 0167

Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.10 mm						10				0.07	0.20	0.14		MET		
				CCH 1.15 mm						10				0.10	0.28	0.17		MET		
				CCH 1.20mm						10				0.06	0.19	0.13		MET		
				CCH 1.25 mm						10				0.09	0.24	0.16		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.37 milliohm													
				CCH 1.05 mm						10				0.11	0.32	0.19		MET		
				CCH 1.10 mm						10				0.08	0.20	0.14		MET		
				CCH 1.15 mm						10				0.09	0.65	0.19		NOT MET		
				CCH 1.20mm						10				0.05	0.19	0.13		MET		
				CCH 1.25 mm						10				0.09	0.26	0.16		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.37 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
							criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.37 milliohm														
				CCH 1.05 mm						10				-0.03	0.06	0.01		MET		
				CCH 1.10 mm						10				-0.03	0.01	0.00		MET		
				CCH 1.15 mm						10				-0.07	0.37	0.03		MET		
				CCH 1.20mm						10				-0.01	0.01	0.00		MET		
				CCH 1.25 mm						10				-0.09	0.02	-0.01		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, MECHANICAL - USCAR-21 (May 2002) page 11, 15	CO5a	Cable-to-Terminal Mechanical, 22grip TXL wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		105	MX150 Receptacle Cable Seal 22 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 0.90 mm						1										
				CCH 0.95 mm						1										
				CCH 1.00 mm						1										
				CCH 1.05 mm						1										
				CCH 1.10 mm						1										
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 50 N	USCAR-21, Sec. 4.4														
				CCH 0.90 mm						20				67.50	74.40	70.9		MET		
				CCH 0.95 mm						20				64.90	75.20	70.1		MET		
				CCH 1.00 mm						20				67.80	78.80	74.4		MET		
				CCH 1.05 mm						20				72.10	83.50	78.2		MET		

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.10 mm						20				71.60	85.20	81.8		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO5b	Cable-to-Terminal Electrical, 22grip TXL wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		50	MX150 Receptacle Cable Seal 22 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH 0.90 mm						10				0.18	0.34	0.25		MET		
				CCH 0.95 mm						10				0.18	0.28	0.24		MET		
				CCH 1.00 mm						10				0.16	0.26	0.20		MET		
				CCH 1.05 mm						10				0.15	0.28	0.22		MET		
				CCH 1.10 mm						10				0.12	0.34	0.20		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.46 milliohm													
				CCH 0.90 mm						10				0.21	0.36	0.27		MET		
				CCH 0.95 mm						10				0.21	0.31	0.25		MET		

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.00 mm						10				0.20	0.30	0.23		MET		
				CCH 1.05 mm						10				0.18	0.31	0.24		MET		
				CCH 1.10 mm						10				0.18	0.49	0.26		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.46 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.46 milliohm													
				CCH 0.90 mm						10				0.02	0.04	0.02		MET		
				CCH 0.95 mm						10				-0.01	0.03	0.02		MET		
				CCH 1.00 mm						10				0.02	0.04	0.02		MET		
				CCH 1.05 mm						10				0.02	0.04	0.02		MET		
				CCH 1.10 mm						10				0.03	0.15	0.06		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, MECHANICAL - USCAR-21 (May 2002) page 11, 15	CO6a	Cable-to-Terminal Mechanical, 2.0mm^2 wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		147	MX150 Receptacle Cable Seal 14/16 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 1.50 mm						1										
				CCH 1.55 mm						1										
				CCH 1.60 mm						1										

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.65 mm						1										
				CCH 1.70 mm						1										
				CCH 1.75 mm						1										
				CCH 1.80 mm						1										
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 180 N	USCAR-21, Sec. 4.4														
				CCH 1.50 mm						20				257	289	269		MET		
				CCH 1.55 mm						20				257	294	272		MET		
				CCH 1.60 mm						20				236	280	266		MET		
				CCH 1.65 mm						20				245	290	266		MET		
				CCH 1.70 mm						20				237	264	251		MET		
				CCH 1.75 mm						20				224	252	239		MET		
				CCH 1.80 mm						20				233	262	248		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO6b	Cable-to-Terminal Electrical, 2.0mm^2 wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		70	MX150 Receptacle Cable Seal 14/16 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH 1.50 mm						10				0.08	0.39	0.22		MET		
				CCH 1.55 mm						10				0.11	0.24	0.17		MET		
				CCH 1.60 mm						10				0.10	0.27	0.18		MET		
				CCH 1.65 mm						10				0.07	0.40	0.19		MET		
				CCH 1.70 mm						10				0.08	0.24	0.18		MET		
				CCH 1.75 mm						10				0.10	0.20	0.13		MET		
				CCH 1.80 mm						10				0.06	0.23	0.12		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
							consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.50 mm						10				0.10	0.27	0.18		MET		
				CCH 1.55 mm						10				0.03	0.20	0.13		MET		
				CCH 1.60 mm						10				0.08	0.23	0.16		MET		
				CCH 1.65 mm						10				0.06	0.37	0.17		MET		
				CCH 1.70 mm						10				0.07	0.35	0.19		MET		
				CCH 1.75 mm						10				0.08	0.36	0.15		MET		
				CCH 1.80 mm						10				0.03	0.35	0.12		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.33 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
							resistance = 0.33 milliohm													
				CCH 1.50 mm						10				0.15	0.04	-0.04		MET		
				CCH 1.55 mm						10				0.08	0	-0.04		MET		
				CCH 1.60 mm						10				0.06	0.02	-0.02		MET		
				CCH 1.65 mm						10				0.07	0	-0.03		MET		
				CCH 1.70 mm						10				0.04	0.11	0.01		MET		
				CCH 1.75 mm						10				0.03	0.26	0.02		MET		
				CCH 1.80 mm						10				0.04	0.11	0.00		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, MECHANICAL - USCAR-21 (May 2002) page 11, 15	CO7a	Cable-to-Terminal Mechanical, 1.5mm^2 wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		147	MX150 Receptacle Cable Seal 14/16 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 1.30 mm						1										
				CCH 1.35 mm						1										
				CCH 1.40 mm						1										
				CCH 1.45 mm						1										
				CCH 1.50 mm						1										
				CCH 1.55 mm						1										
				CCH 1.60 mm						1										
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 150 N	USCAR-21, Sec. 4.4														
				CCH 1.30 mm						20				221	271	240		MET		
				CCH 1.35 mm						20				244	273	262		MET		
				CCH 1.40 mm						20				265	309	285		MET		
				CCH 1.45 mm						20				279	312	299		MET		
				CCH 1.50 mm						20				290	343	313		MET		
				CCH 1.55 mm						20				277	327	309		MET		

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.60 mm						20				291	346	320		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO7b	Cable-to-Terminal Electrical, 1.5mm^2 wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		70	MX150 Receptacle Cable Seal 14/16 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH 1.30 mm						10				0.06	0.16	0.09		MET		
				CCH 1.35 mm						10				0.06	0.16	0.08		MET		
				CCH 1.40 mm						10				0.06	0.11	0.08		MET		
				CCH 1.45 mm						10				0.05	0.12	0.07		MET		
				CCH 1.50 mm						10				0.06	0.15	0.09		MET		
				CCH 1.55 mm						10				0.06	0.12	0.09		MET		
				CCH 1.60 mm						10				0.05	0.14	0.10		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.30 mm						10				0.05	0.12	0.08		MET		
				CCH 1.35 mm						10				0.06	0.09	0.08		MET		
				CCH 1.40 mm						10				0.05	0.09	0.07		MET		
				CCH 1.45 mm						10				0.04	0.09	0.06		MET		
				CCH 1.50 mm						10				0.03	0.14	0.08		MET		
				CCH 1.55 mm						10				0.04	0.10	0.06		MET		
				CCH 1.60 mm						10				0.03	0.11	0.07		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.33 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.30 mm						10				0.10	0.01	-0.01		MET		
				CCH 1.35 mm						10				0.01	0.01	0.00		MET		
				CCH 1.40 mm						10				0.02	0	-0.01		MET		
				CCH 1.45 mm						10				0.02	0	-0.01		MET		
				CCH 1.50 mm						10				0.04	0	-0.02		MET		
				CCH 1.55 mm						10				0.08	0	-0.03		MET		
				CCH 1.60 mm						10				0.08	0.01	-0.04		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization,	CO8a	Cable-to-	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note	USCAR-21, Sec. 4.2		147	MX150											

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
MECHANICAL - USCAR-21 (May 2002) page 11, 15		Terminal Mechanical, 1.0mm^2 wire			2a).				Receptacle Cable Seal 18/20 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 1.15 mm						1										
				CCH 1.20 mm						1										
				CCH 1.25 mm						1										
				CCH 1.30 mm						1										
				CCH 1.35 mm						1										
				CCH 1.40 mm						1										
				CCH 1.45 mm						1										
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 120 N	USCAR-21, Sec. 4.4														
				CCH 1.15 mm						20				174	205	189		MET		
				CCH 1.20 mm						20				192	216	204		MET		
				CCH 1.25 mm						20				199	227	216		MET		
				CCH 1.30 mm						20				215	246	231		MET		
				CCH 1.35 mm						20				229	254	242		MET		
				CCH 1.40 mm						20				220	253	238		MET		
				CCH 1.45 mm						20				226	251	239		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO8b	Cable-to-Terminal Electrical, 1.0mm^2 wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		70	MX150 Receptacle Cable Seal 18/20 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH 1.15 mm						10				0.08	0.17	0.11		MET		
				CCH 1.20 mm						10				0.09	0.17	0.12		MET		
				CCH 1.25 mm						10				0.10	0.23	0.15		MET		
				CCH 1.30 mm						10				0.07	0.21	0.13		MET		

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.35 mm						10				0.10	0.24	0.15		MET		
				CCH 1.40 mm						10				0.11	0.34	0.20		MET		
				CCH 1.45 mm						10				0.08	0.21	0.12		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.15 mm						10				0.06	0.16	0.10		MET		
				CCH 1.20 mm						10				0.06	0.12	0.09		MET		
				CCH 1.25 mm						10				0.08	0.22	0.12		MET		
				CCH 1.30 mm						10				0.05	0.17	0.11		MET		
				CCH 1.35 mm						10				0.06	0.17	0.11		MET		
				CCH 1.40 mm						10				0.07	0.30	0.13		MET		
				CCH 1.45 mm						10				0.06	0.12	0.08		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.33 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
							following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.15 mm						10				0.02	0.03	-0.01		MET		
				CCH 1.20 mm						10				0.09	0	-0.03		MET		
				CCH 1.25 mm						10				0.10	0	-0.03		MET		
				CCH 1.30 mm						10				0.06	0.02	-0.02		MET		
				CCH 1.35 mm						10				0.09	0	-0.04		MET		
				CCH 1.40 mm						10				0.14	0.01	-0.07		MET		
				CCH 1.45 mm						10				0.13	0.01	-0.03		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, MECHANICAL - USCAR-21 (May 2002) page 11, 15	CO9a	Cable-to-Terminal Mechanical, 0.75mm^2 wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		147	MX150 Receptacle Cable Seal 18/20 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 1.05 mm						1										
				CCH 1.10 mm						1										
				CCH 1.15 mm						1										
				CCH 1.20 mm						1										
				CCH 1.25mm						1										
				CCH 1.30 mm						1										
				CCH 1.35 mm						1										
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be	USCAR-21, Sec. 4.4														

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
					greater/equal 90 N															
				CCH 1.05 mm						20				105	137	122		MET		
				CCH 1.10 mm						20				121	153	140		MET		
				CCH 1.15 mm						20				137	162	152		MET		
				CCH 1.20 mm						20				148	181	162		MET		
				CCH 1.25mm						20				155	180	162		MET		
				CCH 1.30 mm						20				145	182	165		MET		
				CCH 1.35 mm						20				155	187	171		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO9b	Cable-to-Terminal Electrical, 0.75mm^2 wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		70	MX150 Receptacle Cable Seal 18/20 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH 1.05 mm						10				0.12	0.16	0.14		MET		
				CCH 1.10 mm						10				0.10	0.17	0.14		MET		
				CCH 1.15 mm						10				0.10	0.17	0.13		MET		
				CCH 1.20 mm						10				0.07	0.20	0.13		MET		
				CCH 1.25mm						10				0.09	0.20	0.13		MET		
				CCH 1.30 mm						10				0.06	0.16	0.12		MET		
				CCH 1.35 mm						10				0.12	0.18	0.14		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
							circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.05 mm						10				0.12	0.16	0.16		MET		
				CCH 1.10 mm						10				0.10	0.17	0.16		MET		
				CCH 1.15 mm						10				0.09	0.15	0.12		MET		
				CCH 1.20 mm						10				0.07	0.15	0.11		MET		
				CCH 1.25mm						10				0.09	0.15	0.13		MET		
				CCH 1.30 mm						10				0.07	0.15	0.12		MET		
				CCH 1.35 mm						10				0.12	0.20	0.16		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.33 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.33 milliohm													
				CCH 1.05 mm						10				0	0.01	0.00		MET		
				CCH 1.10 mm						10				0	0.01	0.00		MET		
				CCH 1.15 mm						10				0.02	0	0.00		MET		

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.20 mm						10				0.08	0.01	-0.01		MET		
				CCH 1.25mm						10				0.06	0.02	0.00		MET		
				CCH 1.30 mm						10				0.02	0.01	0.00		MET		
				CCH 1.35 mm						10				0.04	0.03	-0.01		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, MECHANICAL - USCAR-21 (May 2002) page 11, 15	CO10a	Cable-to-Terminal Mechanical, 0.5mm^2 wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		126	MX150 Receptacle Cable Seal 22 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH 1.00 mm						1										
				CCH 1.05 mm						1										
				CCH 1.10 mm						1										
				CCH 1.15 mm						1										
				CCH 1.20 mm						1										
				CCH 1.25 mm						1										
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 75 N	USCAR-21, Sec. 4.4														
				CCH 1.00 mm						20				73	86	79		MET		
				CCH 1.05 mm						20				90	100	95		MET		
				CCH 1.10 mm						20				101	109	106		MET		
				CCH 1.15 mm						20				104	119	114		MET		
				CCH 1.20 mm						20				106	124	121		MET		
				CCH 1.25 mm						20				110	126	122		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Crimp Optimization, ENVIRONMENTAL - USCAR-21 (May 2002) page 20	CO10b	Cable-to-Terminal Electrical, 0.5mm^2 wire	PV	Pre-Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		60	MX150 Receptacle Cable Seal 22 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH 1.00 mm						10				0.06	0.20	0.12		MET		
				CCH 1.05 mm						10				0.08	0.17	0.11		MET		
				CCH 1.10 mm						10				0.05	0.22	0.15		MET		
				CCH 1.15 mm						10				0.09	0.22	0.15		MET		
				CCH 1.20 mm						10				0.13	0.25	0.19		MET		
				CCH 1.25 mm						10				0.09	0.28	0.18		MET		
				Thermal Shock Conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.37 milliohm													
				CCH 1.00 mm						10				0.08	0.26	0.15		MET		
				CCH 1.05 mm						10				0.11	0.25	0.16		MET		
				CCH 1.10 mm						10				0.13	0.43	0.23		MET		
				CCH 1.15 mm						10				0.12	0.29	0.19		MET		
				CCH 1.20 mm						10				0.08	0.27	0.16		MET		
				CCH 1.25 mm						10				0.11	0.38	0.22		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.37 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
							CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.37 milliohm														
				CCH 1.00 mm						10				0.07	0.15	0.03		MET		
				CCH 1.05 mm						10				0.02	0.14	0.05		MET		
				CCH 1.10 mm						10				0.08	0.26	0.08		MET		
				CCH 1.15 mm						10				0.06	0.11	0.03		MET		
				CCH 1.20 mm						10				0.11	0.08	-0.03		MET		
				CCH 1.25 mm						10				0.14	0.12	0.04		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														
Cable-to-Terminal Electrical Crimp Optimization: Visuals - USCAR-21 Rev.2 (Oct 2008) Page 13,17	CO11a	Cable-to-Terminal Mechanical, 0.35mm^2 FLR2X-A3ZHA wire	PV	Pre-test visual examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2a).	USCAR-21, Sec. 4.2		147	MX150 Receptacle Cable Seal 22 grip											
				Cross-Section Analysis	Per USCAR-21, Sec. 4.3.5	USCAR-21, Sec. 4.3														
				CCH = 0.89mm						1										
				CCH = 0.92mm						1										
				CCH = 0.95mm						1										
				CCH = 0.98mm						1										
				CCH = 1.01mm						1										
				CCH = 1.04mm						1										
				CCH = 1.07mm						1										

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				Conductor Crimp Pull-Out Force	The pull-out force (Average-3s) shall be greater/equal 50 N.	USCAR-21 §4.4														
				CCH = 0.89mm		USCAR-21 §4.4				20				63.70	76.10	73.0		MET		
				CCH = 0.92mm		USCAR-21 §4.4				20				73.90	80.10	78.2		MET		
				CCH = 0.95mm		USCAR-21 §4.4				20				66.40	82.50	78.1		MET		
				CCH = 0.98mm		USCAR-21 §4.4				20				67.50	83.90	80.4		MET		
				CCH = 1.01mm		USCAR-21 §4.4				20				68.70	88.20	81.9		MET		
				CCH = 1.04mm		USCAR-21 §4.4				20				74.20	87.60	84.5		MET		
				CCH = 1.07mm		USCAR-21 §4.4				20				73.80	88.40	84.9		MET		
				Post-Test Visual Examination	No mechanical damage (tearing or slipping of wire in the contact) to occur during/at end of testing															
Crimp Optimization, ENVIRONMENTAL - USCAR-21 Rev.2 (Oct 2008) Page 26	CO11b	Cable-to-Terminal Electrical, 0.35mm^2 FLR2X-A3ZHA wire	PV	Pre-test visual examination	See General Notes 1.	USCAR-21, Sec. 4.2		70	MX150 Receptacle Cable Seal 22 grip											
				Initial Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3														
				CCH = 0.89mm						10				0.06	0.12	0.09		MET		
				CCH = 0.92mm						10				0.03	0.07	0.05		MET		
				CCH = 0.95mm						10				0.04	0.10	0.08		MET		
				CCH = 0.98mm						10				0.04	0.09	0.06		MET		
				CCH = 1.01mm						10				0.05	0.13	0.10		MET		
				CCH = 1.04mm						10				0.06	0.12	0.08		MET		
				CCH = 1.07mm						10				0.05	0.12	0.09		MET		
				Thermal shock conditioning	None, 72 one hour cycles.	USCAR-21, Sec. 4.5.5														
				Accelerated Temperature / Humidity Cycling	None, 4 twenty-four hour cycles.	USCAR-21, Sec. 4.5.4														
				Final Dry Circuit Resistance	Crimp resistance shall be less than or equal 0.55 milliohm	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the													

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
							following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.47 milliohm													
				CCH = 0.89mm						10				0.05	0.09	0.07		MET		
				CCH = 0.92mm						10				0.05	0.15	0.10		MET		
				CCH = 0.95mm						10				0.05	0.13	0.09		MET		
				CCH = 0.98mm						10				0.06	0.10	0.09		MET		
				CCH = 1.01mm						10				0.06	0.11	0.08		MET		
				CCH = 1.04mm						10				0.08	0.12	0.10		MET		
				CCH = 1.07mm						10				0.10	0.15	0.12		MET		
				Delta Dry Circuit Resistance	Maximum change of 0.47 milliohm from initial dry circuit.	USCAR-21, Sec. 4.5.3	Per USCAR-21, 3 consecutive CCHs must satisfy one of the following criteria: Max final dry circuit resistance = 0.55 milliohm OR Allow delta dry circuit resistance = 0.47 milliohm													
				CCH = 0.89mm						10				0.06	0.02	0.01		MET		

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Test Description	Test Item	Item Description	Test Type	Test Sequence	Test Requirement	Test Paragraph	Test Remarks	Quantity Total	Sample Description	Quantity per Test Element	Terminal Size (mm)	Wire Size	Testing Completion Date	Test Results				Met/Not met	Other Measurements	Results Notes
														Min	Max	Mean	Acceptance Criteria			
				CCH = 0.92mm						10				0	0.09	-0.05		MET		
				CCH = 0.95mm						10				0.02	0.04	0.01		MET		
				CCH = 0.98mm						10				0.01	0.06	-0.04		MET		
				CCH = 1.01mm						10				0.05	0.03	0.03		MET		
				CCH = 1.04mm						10				0.01	0.05	0.00		MET		
				CCH = 1.07mm						10				0	0.07	0.01		MET		
				Post Test Visual Examination	Per USCAR-21, Sec. 4.2.5 (See General Note 2b).	USCAR-21, Sec. 4.2														

Test Plan Revision Log

Change	By	Date	Revision Number
Created in Stature and included 0.35mm^2 wire crimp opt test data	Ajay Dhir	12-Dec-2013	B1