



PRODUCT SPECIFICATION
WIRE TO BOARD 1.50 MM PITCH
CKM PN: 1503 SERIES

REVISION HISTORY:

REV	REVISION DESCRIPTION	DATE	CREATED/REVISED
A	INTERIM EDITION	2015/05/15	Rock
B	UPGRADE TEST GROUP	2015/07/01	Rock
C	UPGRADE ITEM 6.8 and 6.11 DESCRIPTION.	2015/07/03	Rock
D	UPGRADE OPERATING TEMPERATURE	2022/03/08	Jimmy

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DOCUMENT NUMBER: SP-1503-001		CREATED/REVISED Rock	CHECKED BY Sun lee
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1.0 SCOPE

This specification contains the test requirement of subject connectors when tested under the condition and procedure with terminals crimped on the specified maximum size wire.

2.0 APPLICABLE STANDARDS

MIL - STD - 202 Methods for test of connectors for electronic equipment
JIS C0025, C0041, C5402
JIS C60068

3.0 APPLICABLE SERIES NO: 1503 SMT TYPE SERIES

Header P/N: 1503WVS-XP-AX-HF & 1503WRS-XP-AX-HF
Housing P/N: 1503H-XP-X-HF
Terminal P/N: 1503T0X-X

4.0 REQUIREMENTS

4.1 Material:

- A. Post Header Housing: Thermoplastic, UL 94V-0.
B. Receptacle Crimp Housing: Thermoplastic, UL 94V-0.
C. Receptacle Crimp Contact: Copper Alloy, Tin Plated over Nickel under plated all over.

4.2 Ratings:

- A. Current Rating: 2.0A AC, DC (AWG #24)
1.5A AC, DC (AWG #26)
1.0A AC, DC (AWG #28)
B. Voltage Rating: 100V AC, DC
C. Operating Temperature: -40°C to +105°C

4.3 Applicable Printed Circuit Board:

- A. Thickness: 0.6 mm (.024 ")~1.2mm (.047 "), 1.6 mm (.063 ")

4.4 Applicable Wire: AWG #24 to #28, Insulation O.D.: 0.78~1.28mm.

5.0 PERFORMANCE REQUIREMENTS AND TEST DESCRIPTIONS

The product is designed to meet the electrical, mechanical and environmental performance Requirements as specifics in 6.0 REQUIREMENTS.

Table with 4 columns: REVISION, ECR/ECN INFORMATION, TITLE, SHEET No. and 3 columns: DOCUMENT NUMBER, CREATED/REVISED, CHECKED BY, APPROVED BY.

**6.0 TEST REQUIREMENTS AND PROCEDURES SUMMARY**

TEST ITEM		REQUIREMENT	PROCEDURE
6.1	Examination of Product	Meets requirements of product drawing. No physical damage.	Per EIA-364-18 Visual inspection
ELECTRICAL REQUIREMENT			
6.2	Contact Resistance	20mΩ Max.	Mate connectors and measured by dry circuit, 20mV MAX., 10mA. (JIS C5402-2-1)
6.3	Insulation Resistance	500MΩ Min	Mate connectors and apply 250V DC between adjacent terminal or ground. (JIS C5402-3-1/MIL-STD-202 Method 302)
6.4	Dielectric Withstanding Voltage	No Breakdown	Mate connectors and apply 500V AC (rms) for 1 minute between adjacent terminal or ground. Trip current 2mA. (JIS C5402-4-1/MIL-STD-202 Method 301)
6.5	Contact Resistance on Crimped Portion	5mΩ Max.	Crimp the applicable wire to the terminal, measured by dry circuit, 20mV MAX., 10mA.
MECHANICAL REQUIREMENT			
6.6	Crimping Pull out Force	AWG # 24: 29.4N (3.0kgf) Min. AWG # 26: 19.6N (2.0kgf) Min. AWG # 28: 9.8N (1.0kgf) Min.	Fix the crimped terminal, apply axial pull out force on the wire at the speed rate of 25±3mm/minute. (JIS C5402-16-4) ※Crimping specification refer to paragraph 8
6.7	Terminal Insertion Force	9.8N (1.0Kgf) Max.	Insert the crimped terminal into the housing.

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6.8	Plug Terminal Retention Force	9.8N (1.0Kgf) Min.	Apply axial pull out force at the speed rate of 25±3mm/minute on the plug terminal assembled in the plug housing.
6.9	Mating & Un-mating force	Refer to paragraph 9	Insert and withdraw connector at speed of 25 ±3 mm per minute
6.10	Durability	Contact resistance: 40mΩ Max.	When mated up to 30 cycles repeatedly by the rate of 10 cycles per minute with hand.
6.11	Rec. Terminal Retention Force	2.94N (0.3Kgf) Min.	Apply axial pull out force at the speed rate of 25±3mm/minute on the rec. terminal assembled in the rec. housing.
6.12	Housing Lock Strength (Positive Lock)	29.4N (3.0Kgf) Min.	Mated connectors, and apply axial pull out force at the speed rate of 25±3mm/minute.

ENVIRONMENTAL REQUIREMENTS

6.13	Temperature rise	30°C max.	All crimp-style terminal shall be connected in a direct series by minimum AWG. The temperature rise shall be measured by thermocouple when the terminal reaches terminal equilibrium under rated voltage / rated current. (However with resistive load)
6.14	Vibration	Appearance: No damage. Contact resistance: 40mΩ Max. Discontinuity: 1 μ second max.	Mate connectors and subject to the following vibration conditions, for a period of 2 hours in each of 3 mutually perpendicular axes, passing DC 1mA during the test. Amplitude: 1.52mm P-P Frequency: 10~55~10 Hz in 1 minute. Duration: 2 hours in each X.Y. Z. axes. (JIS C60068-2-6 / MIL-STD-202 Method 201)

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6.15	Mechanical Shock	Appearance: No damage. Contact resistance: 40mΩ Max. Discontinuity: 1 μ second max.	Mate connectors and subject to the following shock conditions. 3 shocks shall be applied along 3 mutually perpendicular axes, passing DC 1 mA current during the test. (Total of 18 shocks) Test pulse : Half Sine Peak value : 490 m/s ² (50 G) Duration : 11 ms (JIS C60068-2-27 / MIL-STD-202 Method 213)
6.16	Heat Resistance	Appearance: No damage. Contact resistance: 40mΩ Max.	Mate connectors and expose to 105±2 °C for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 hour , after which the specified measurements shall be performed. (JIS C60068-2-2 / MIL-STD-202 Method 108)
6.17	Cold Resistance	Appearance: No damage. Contact resistance: 40mΩ Max.	Mate connectors and expose to -40±3°C for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 hour, after which the specified measurements shall be performed. (JIS C60068-2-1)
6.18	Humidity	Appearance: No damage. Contact resistance: 40mΩ Max. Insulation Resistance: 100MΩ Min. Dielectric withstanding voltage: Must meet 6-6.4	Mate connectors and expose to 40±2°C, relative humidity 90 to 95% for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1~2 hours, after which the specified measurements shall be performed. (JIS C60068-2-78 / MIL-STD-202 Method 103)

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6.19	Temperature Cycling	Appearance: No damage. Contact resistance: 40mΩ Max.	Mate connectors and subject to the following conditions for 5 cycles. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2hours, after which the specified measurements shall be performed. 5 cycles of : a) $-40 \pm 3^{\circ}\text{C}$ 30 minutes b) $+105 \pm 2^{\circ}\text{C}$ 30 minutes (JIS C60068-2-14)
6.20	Salt spray	Appearance: No damage. Contact resistance: 40mΩ Max.	Mate connectors and expose to the following salt mist conditions. Upon completion of the exposure period, salt deposits shall be removed by a gentle wash or dip in running water, after which the specified measurements shall be performed. NaCl solution Concentration : $5 \pm 1 \%$ Spray time : 48 ± 4 hours Ambient temperature : $35 \pm 2^{\circ}\text{C}$ (JIS 60068-2-11/MIL-STD-202 Method 101)
6.21	SO ₂ Gas	Appearance: No damage. Contact resistance: 40mΩ Max.	Mated connectors and expose to the conditions of 50 ± 5 ppm SO ₂ gas ambient temperature $40 \pm 2^{\circ}\text{C}$ for 24 hours.
6.22	NH ₃ Gas	Appearance: without damage such as cracks or other breaks. Contact resistance: 40mΩ Max.	Mated connectors and expose to the conditions of NH ₃ Gas evaporating from 28% Ammonia solution for 40 minutes.

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6.23	Solder ability	95% of immersed area must show no voids, pin holes.	Dip soldertails into the molten solder [held at 245±5 degree centigrade] up to 0.5mm from the bottom of the housing for 4~5 seconds.
6.24	Resistance to Soldering Heat	Appearance: No damage.	Reflow soldering method Reference reflow condition at 7.0 clause.
			Soldering iron method 0.2mm from terminal tip Solder Temperature : 350±10°C Soldering Time : 3~4 seconds MAX.

7.0 RECOMMENDED IR REFLOW TEMPERATURE PROFILE

7.1 REFLOW CONDITION

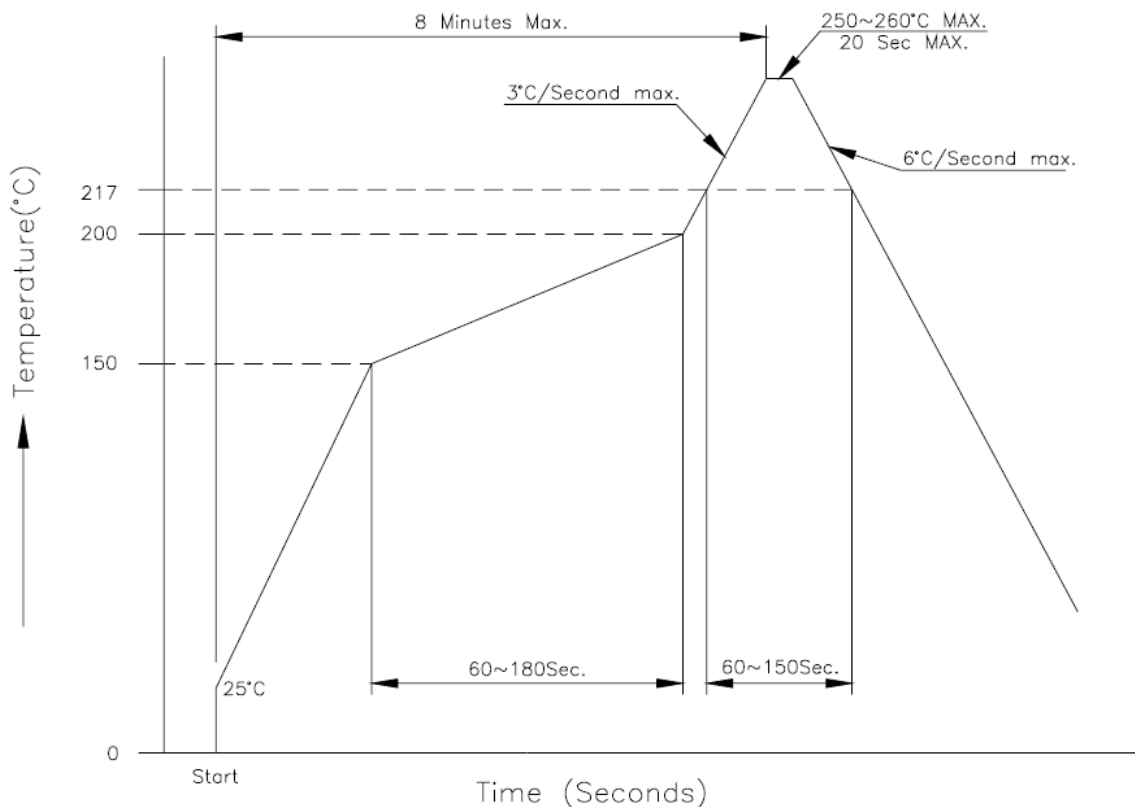


Figure 1

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8.0 CRIMPING SPECIFICATION

1503TOP-X				
Wire Size (AWG)		#24	#26	#28
1. CONDUCTOR (mm)	CRIMP WIDTH	0.90±0.05		
	CRIMP HEIGHT	0.70~0.78	0.65~0.73	0.60~0.68
2. INSULATION (mm)	CRIMP WIDTH	1.05±0.05		
	CRIMP HEIGHT	1.40	1.30	1.20
CRIMP STRENGTH		3.0 Kgf (MIN)	2.0Kgf (MIN)	1.0Kgf (MIN)

Figure 2

9.0 MATING AND UN-MATING FORCE (REMOVE LATCH) :

No. of CKT	UNIT	Insertion (MAX.)			Withdrawal (MIN.)		
		1st	6th	30th	1st	6th	30th
2	N (kgf)	6.5 (0.66)	7.0 (0.72)	11.0 (1.12)	0.4 (0.04)	0.4 (0.04)	0.4 (0.04)
3	N (kgf)	9.7 (0.99)	10.5 (1.07)	15.1 (1.54)	0.6 (0.06)	0.6 (0.06)	0.6 (0.06)
4	N (kgf)	12.9 (1.32)	14.0 (1.43)	18.3 (1.87)	0.8 (0.08)	0.8 (0.08)	0.8 (0.08)
5	N (kgf)	16.2 (1.65)	17.5 (1.79)	21.8 (2.22)	1.0 (0.10)	1.0 (0.10)	1.0 (0.10)
6	N (kgf)	19.4 (1.98)	21.5 (2.20)	24.8 (2.53)	1.2 (0.12)	1.2 (0.12)	1.2 (0.12)
7	N (kgf)	22.6 (2.31)	24.5 (2.50)	28.6 (2.92)	1.4 (0.14)	1.4 (0.14)	1.4 (0.14)
8	N (kgf)	25.9 (2.64)	28.0 (2.86)	32.3 (3.30)	1.6 (0.16)	1.6 (0.16)	1.6 (0.16)
9	N (kgf)	29.1 (2.97)	31.5 (3.22)	35.9 (3.66)	1.8 (0.18)	1.8 (0.18)	1.8 (0.18)
10	N (kgf)	32.3 (3.30)	35.4 (3.61)	39.4 (4.02)	2.0 (0.20)	2.0 (0.20)	2.0 (0.20)
11	N (kgf)	35.6 (3.63)	38.9 (3.97)	42.9 (4.38)	2.2 (0.22)	2.2 (0.22)	2.2 (0.22)
12	N (kgf)	38.8 (3.96)	42.5 (4.33)	46.3 (4.72)	2.4 (0.24)	2.4 (0.24)	2.4 (0.24)
13	N (kgf)	42.0 (4.29)	46.4 (4.73)	49.6 (5.06)	2.5 (0.26)	2.5 (0.26)	2.5 (0.26)
14	N (kgf)	45.3 (4.62)	49.6 (5.06)	52.8 (5.39)	2.7 (0.28)	2.7 (0.28)	2.7 (0.28)
15	N (kgf)	48.5 (4.95)	53.1 (5.42)	56.6 (5.78)	2.9 (0.30)	2.9 (0.30)	2.9 (0.30)

※Note: Released lock, and measure.

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10. PRODUCT QUALIFICATION AND REQUALIFICATION TEST SEQUENCE

Test or Examination	Test Group												
	A	B	C	D	E	F	G	H	I	J	K	L	M
	Test Sequence (a)												
Examination of Product	1,6	1,3	1	1,3	1	1	1	1,3	1,5	1,5	1,5	1,5	1,9
Contact Resistance	2,5								2,4	2,4	2,4	2,4	2,8
Insulation Resistance													3,7
Dielectric withstanding Voltage													4,6
Contact Resistance on Crimped Portion		2											
Crimping Pull out Force			2										
Terminal Insertion Force				2									
Plug Terminal Retention Force					2								
Mating & Un-mating force	3												
Durability	4												
Rec. Terminal Retention Force						2							
Housing Lock Strength (Positive Lock)							2						
Temperature Rise								2					
Vibration									3				
Mechanical Shock										3			
Heat Resistance											3		
Cold Resistance												3	
Humidity													5
Sample Size	3	3	3	3	3	3	3	3	3	3	3	3	3

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Test or Examination	Test Group					
	N	O	P	Q	R	S
	Test Sequence (a)					
Examination of Product	1,5	1,5	1,5	1,5	1,3	1,3
Contact Resistance	2,4	2,4	2,4	2,4		
Temperature Cycling	3					
Salt spray		3				
SO ₂ Gas			3			
NH ₃ Gas				3		
Solder ability					2	
Resistance to Soldering Heat						2
Sample Size	3	3	3	3	3	3

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