SPECIFICATION

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SPEC. NO.: PS-51281-XXXXX-XXX **REVISION:** C

PRODUCT NAME: 3.96 mm PITCH WIRE TO BOARD WAFER CONNECTOR

PRODUCT NO: 51281 SERIES 51282 SERIES 51318 SERIES

PREPARED:	CHECKED:	APPROVED:
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DATE: **2023.07.21**	DATE: **2023.07.21**	DATE: **2023.07.21**

1 Revision History

Rev.	ECN NO.	Revision Description	Prepared	Date
1	ECN-1502105	NEW SPEC FOR 51281，51282	TANGENHUI	2015.01.03
O	ECN-1507350	RELEASE	TANGENHUI	2015.07.24
A	ECN-1511256	ADD 2 PIN MATING/UNMATING FORCES	TANGENHUI	2015.11.16
B	ECN-1612421	ADD 18/20AWG CURRENT RATING CHANGE GRAMP DIMENTION	ECGO	2017.03.16
C	ECN-007948	ADD 24AWG CURRENT RATING CHANGE GRIMP DIMENTION	HUSHUIHONG	2023.07.21

2 SCOPE

This specification covers performance, tests and quality requirements for 3.96 mm pitch WTB connector .

3 APPLICABLE DOCUMENTS

EIA-364: ELECTRONICS INDUSTRIES ASSOCIATION

4 REQUIREMENTS

4.1 Design and Construction

4.1.1 Product shall be of design, construction and physical dimensions specified on applicable product drawing.
4.1.2 All materials conform to R.o.H.S. and the standard depends on TQ-WI-140101.

4.2 Materials and Finish

4.2.1 Contact: High performance copper alloy.
Finish: (a) Contact Area: Refer to the drawing.
(b) Under plate: Refer to the drawing.
(c) Solder area: Refer to the drawing.
4.2.2 Housing: Thermoplastic., UL94V-0
4.2.3 Fitting Nail: Copper Alloy,
Finish: Refer to the drawing.

4.3 Ratings

4.3.1 Working Voltage less than 36 Volts AC (per pin)
4.3.2 Voltage: 250 V AC ,DC
4.3.3 Current Rating: AWG#16: 10 Amperes (per pin)
AWG#18: 7 Amperes (per pin)
AWG#20: 6 Amperes (per pin)
AWG#22: 4 Amperes (per pin)
AWG#24: 3 Amperes (per pin)
4.3.4 Operating Temperature : -40℃ to +85℃

5 Performance

5.1. Test Requirements and Procedures Summary

Item	Requirement	Standard
Examination of Product	Product shall meet requirements of applicable product drawing and specification.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Item	**Requirement**	**Standard**
Low Level Contact Resistance	20 m Ω Max.(initial)per contact △R 20 m Ω Max.	Mate connectors, measure by dry circuit, 20mV Max., 100mA Max. (EIA-364-23)
Insulation Resistance	500 M Ω Min.	Unmated connectors, apply 1500 V DC between adjacent terminals. (EIA-364-21)
Dielectric Withstanding Voltage	No discharge, flashover or breakdown. Current leakage: 1 mA max.	300V AC Min. at sea level for 1 minute. Test between adjacent contacts of unmated connectors. (EIA-364-20)
Temperature rise	30℃ Max. Change allowed	Mate connector: measure the temperature rise at rated current until temperature stable. The ambient condition is still air at 25℃ (EIA-364-70,METHOD1,CONDITION1)
MECHANICAL		
Item	**Requirement**	**Standard**
Durability	30 cycles.	The sample should be mounted in the tester and fully mated and unmated the number of cycles specified at the rate of 25.4 ± 3mm/min.
Mating / Unmating Forces	Please see Item 7	Operation Speed： 25.4 ± 3 mm/minute.. Measure the force required to mate/unmate connector. (EIA-364-13)
Contact Retention Force (Board Side)	1.00 Kgf Min.	Operation Speed： 25.4 ± 3 mm/minute. Measure the contact retention force with tester.
Crimping Terminal / Housing Retention Force (Cable Side)	0.5 Kgf MIN.	Apply axial pull out force at the speed rate of 25.4 ± 3 mm/minute. On the terminal assembled in the housing.
Crimping Pull Out Force	1.0Kgf Min.	Operation Speed： 25.4 ± 3 mm/minute. Fix the crimped terminal, apply axial pull out force on the wire.

Locking Force	2kgf MIN	While withdrawing plug & receptacle Without terminal at speed 25.4 ± 3 mm/minute
Vibration	1 μs Max.	The electrical load condition shall be 100 mA maximum for all contacts. Subject to a simple harmonic motion having amplitude of 0.76mm (1.52mm maximum total excursion) in frequency between the limits of 10 and 55 Hz. The entire frequency range, from 10 to 55 Hz and return to 10 Hz, shall be traversed in approximately 1 minute. This motion shall be applied for 2 hours in each of three mutually perpendicular directions. (EIA-364-28 Condition I)
Shock (Mechanical)	1 μs Max.	Subject mated connectors to 50 G's (peak value) half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen (18 shocks). The electrical load condition shall be 100mA maximum for all contacts. (EIA-364-27, test condition A)

ENVIRONMENTAL

Item	Requirement	Standard
Resistance to **Wave** Soldering Heat (Board Side)	See Product Qualification and Test Sequence Group 10 **(Lead Free)**	Solder Temp. : 265±5℃, 10±0.5sec.
Thermal Shock	See Product Qualification and Test Sequence Group 4	Mate module and subject to follow condition for 5 cycles. 1 cycles: -55 +0/-3 ℃, 30 minutes +85 +3/-0 ℃, 30 minutes (EIA-364-32, test condition I)
Humidity	See Product Qualification and Test Sequence Group 4	Mated Connector 40℃, 90~95% RH, 96 hours. (EIA-364-31,Condition A, Method II)
Temperature Life	See Product Qualification and Test Sequence Group 5	Subject mated connectors to temperature life at 85℃ for 96 hours. (EIA-364-17, Test condition A)
Salt Spray (Only For Gold Plating)	See Product Qualification and Test Sequence Group 6	Subject mated/unmated connectors to 5% salt-solution concentration, 35℃ (I) Gold flash for 8 hours (II) Gold plating 5 u" for 96 hours. (EIA-364-26)

Solder ability (Board Side)	Tin plating: Solder able area shall have minimum of 95% solder coverage. Gold plating: Solder able area shall have minimum of 75% solder coverage	And then into solder bath, Temperature at 245 ±5℃, for 4-5 sec. (EIA-364-52)
Hand Soldering Temperature Resistance (Board Side)	Appearance: No damage	T≧350℃, 3sec at least.

Note. Flowing Mixed Gas shell be conduct by customer request.

6 Product qualification and test sequence

Test or Examination	Test Group										
	1	2	3	4	5	6	7	8	9	10	
	Test Sequence										
Examination of Product				1、7	1、6	1、4				1	
Low Level Contact Resistance		1、5	1、4	2、10	2、9	2、5					
Insulation Resistance				3、9	3、8						
Dielectric Withstanding Voltage				4、8	4、7						
Temperature Rise	1										
Mating / Unmating Force		2、4									
Durability		3									
Contact Retention Force (Board Side)									2		
Vibration			2								
Shock (Mechanical)			3								
Thermal Shock				5							
Humidity				6							
Temperature Life					5						
Salt Spray (Only For Gold Plating)						3					
Solder ability (Board Side)							1				
Crimping Pull Out Force								1			
Crimping Terminal / Housing Retention Force (Cable Side)									1		
Hand Soldering Temperature Resistance (Board Side)										2	
Sample Size	2	4	4	4	4	4	2	4	4	4	

7 Mating / Unmating Forces

NO. OF Ckt.	At Initial		At 30th
	Mating(kgf max)	Un-mating(kgf min)	Un-mating(kgf min)
2	1.50	0.30	0.20
3	2.00	0.30	0.20
4	2.50	0.30	0.20
5	3.50	0.30	0.30
6	4.00	0.30	0.30
7	5.00	0.30	0.30
8	6.00	0.40	0.40
9	7.00	0.40	0.40
10	8.00	0.40	0.40
12	9.00	0.40	0.40
14	10.00	0.50	0.50
16	12.00	0.50	0.50

8 Applicable wires

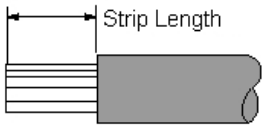
It will depend on selected terminals. Please refer to terminal specification to select wires. (Refer to sec 17.0)

9 Wire strip (Insulation)

Please be careful when cut wire insulation. If some stranded conductors were cut, the termination may not meet the specified pull force.

10 Strip length

Strip length depends on wire barrel size. Please refer to terminal specification to cut correct strip length. (Refer to sec 17.0)



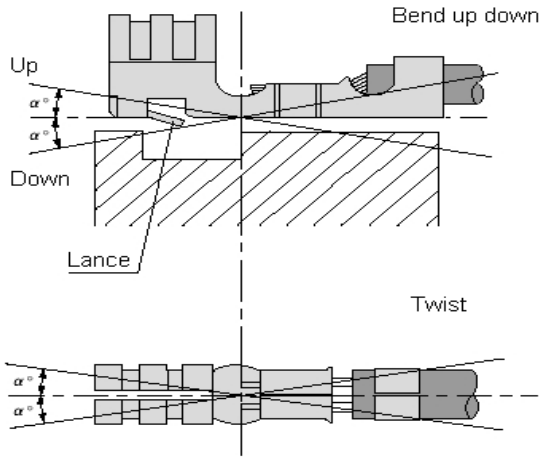
11 Bend and twist

11.1 BEND UP AND DOWN

Maximum bend up down angles please refer to terminal specification. If bend angles larger than specified, terminals will difficult insert to housing or retention force (terminal and housing) may not meet the specified. (Refer to sec 16.0)

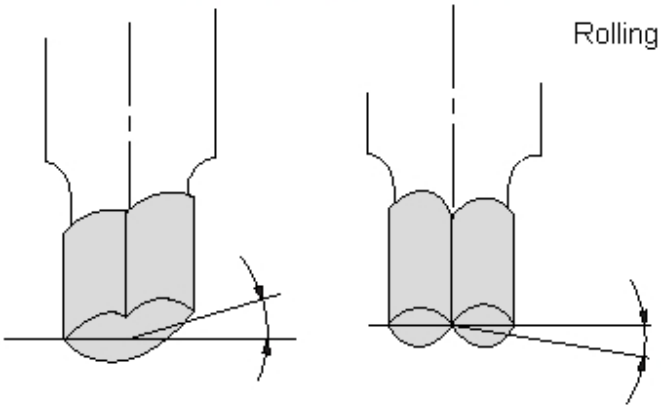
11.2 TWIST

Maximum twist angles please refer to terminal specification. If larger than specified, terminals will difficult insert to housing or retention force (terminal and housing) may not meet the specified.
(Refer to sec 16.0)



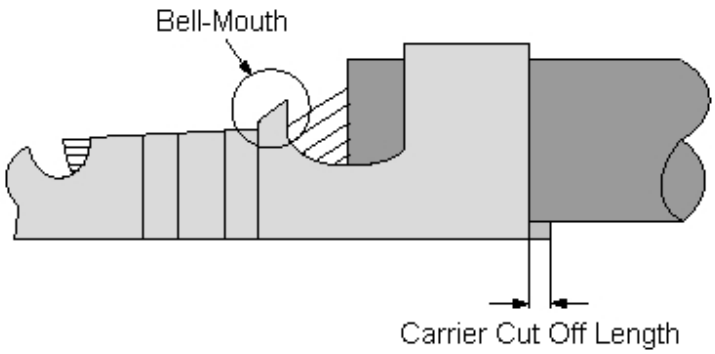
12 Rolling

Centerline of wire crimped should be near contact centerline. If twisted, the termination may not meet the specified pull force or non-stable. (Refer to sec 16.0)



13 Bell-mouth

Bell-mouth is needed, please be care. If no or undersized bell-mouth after crimped, it will cause some of stranded conductors broken and the termination may not meet the specified pull force. Recommended bell-mouth size approximate 2X material thickness. (Refer to sec 16.0)

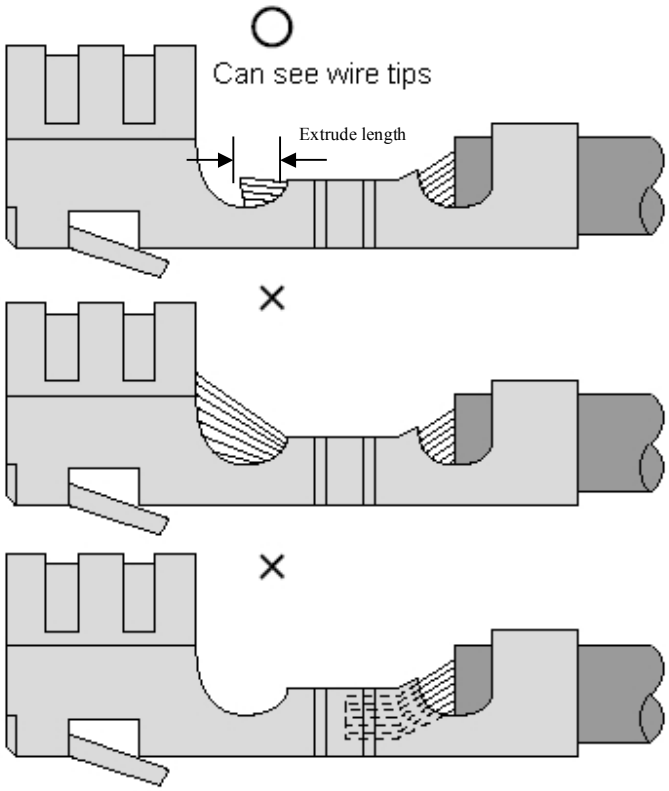


14 Carrier cut off length

It is possible cause performance lower if cut length is too long. Carrier cut length as above figure shown. Recommended cut off length approximate 1.5X material thickness maximum. (Refer to sec 17.0)

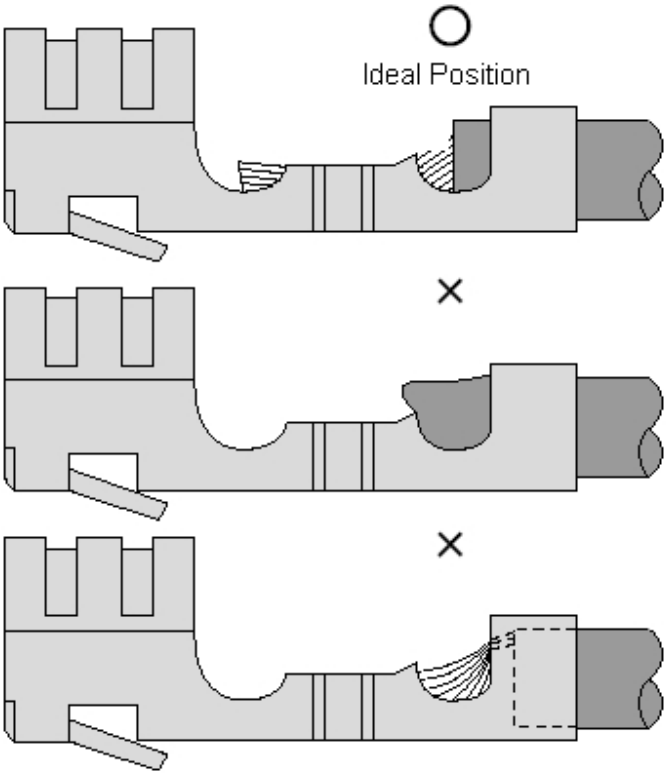
15 Stranded conductors inserted length

If stranded conductors are inserted too far into the crimp sections, this may cause some problems when terminal inserted into housing.
If stranded conductor's inserted length is too short, the termination may not meet the specified pull force because the metal-to-metal contact between the wire and the terminal is reduced.

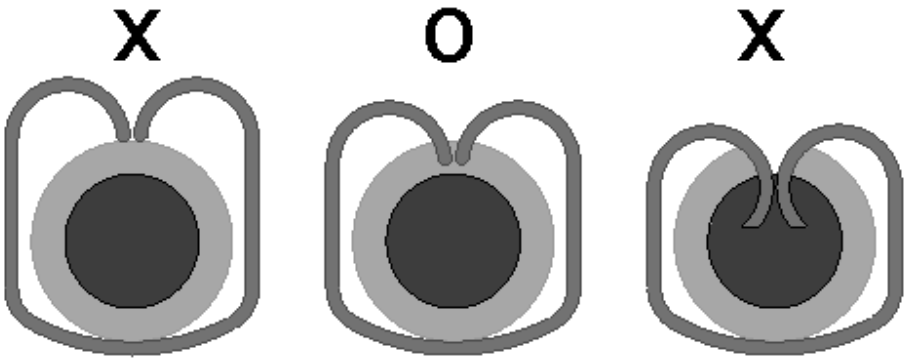


16 Insulation position

The ideal position of insulation tip is visible as following figure shown. If insulation were into crimp section, may cause unstable conduction. If too short, may not meet the specified pull force.



17 Standard insulation crimp



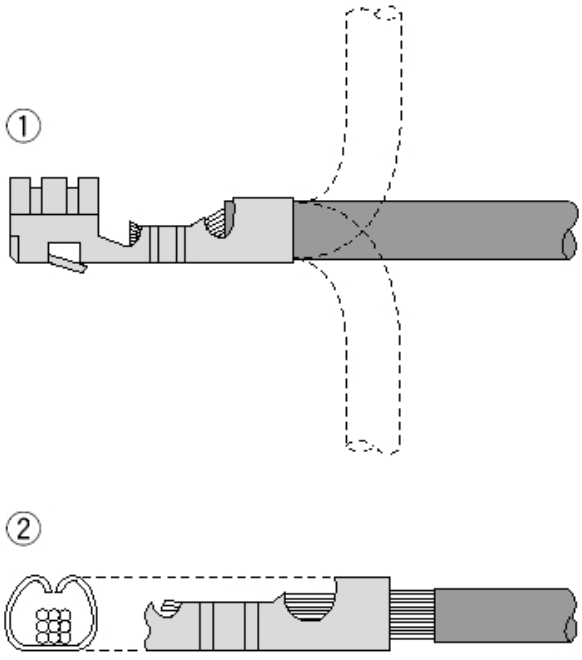
Not enough crimp Crimp too much

18 Insulation crimp height

Insulation crimp height depends on wire diameter.

5.1 As following figure 1 shown. It is no problem if wire bent up down 90 degrees 1 cycle and insulation position still in ideal position.

5.2 For longer strip length case, insulation crimp height as following figure 2 shown. The crimp height avoids stranded conductors be damaged.

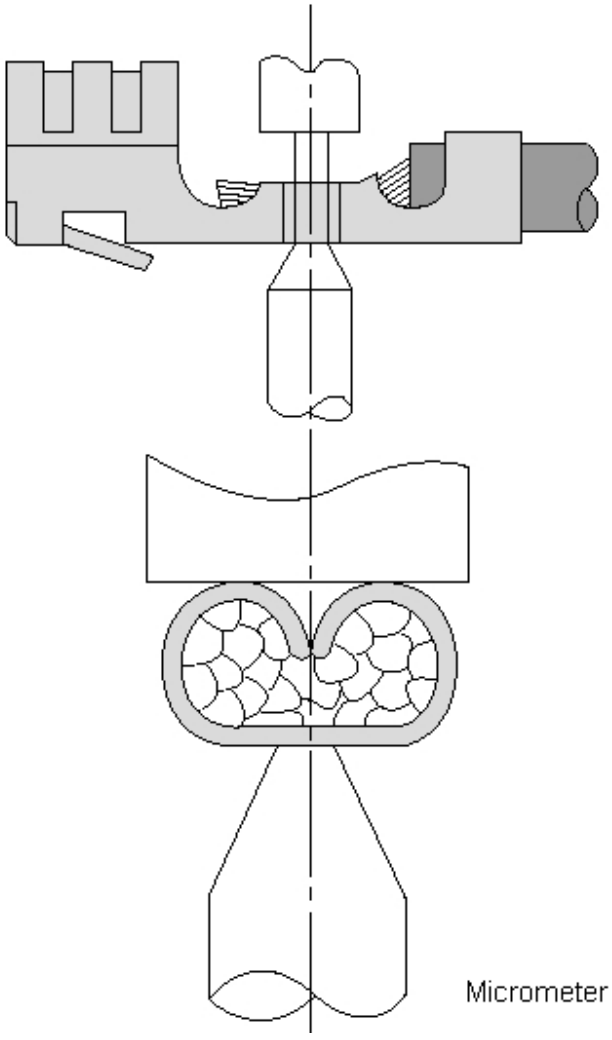


19 About crimp height (Conductors crimp section)

Crimp height is an important control dimension in the process. It depends on terminal types and applied wire sizes. Please refer to terminal specification for more detail. (Refer to sec 17.0)

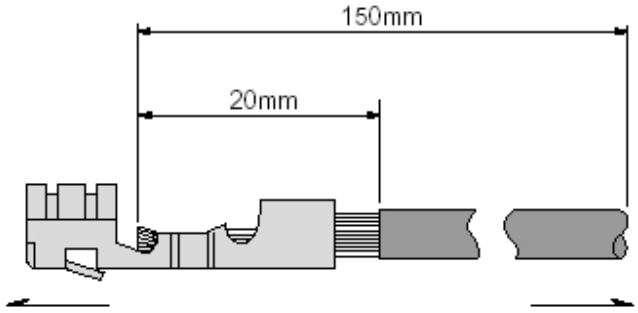
20 Crimp height measurement

Please use micrometer to measure crimp height as following figure shown. And selected crimp section center to measure.



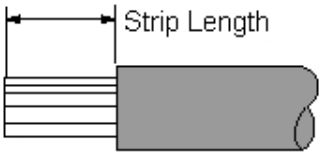
21 Pull force of crimp section measurement

Make some test samples as following figure shown. Use a typical tensile test machine or pull gage to pull cable at a speed 25mm/min. And read the force when cable withdrew from crimp section or braked.
Before test samples, please measure crimp height and do not crimp insulation.



22 Table of strip length, bend, twist, rolling angles, cut off, and extrude length

Product Description	Product No.	Strip length (mm)	Max. Bend		Max. Twist	Max. Rolling	Bell-Mouth (mm)	Cut Off (mm)	Extrude length (mm)
			Up	Down					
3.96 MM PITCH WTB Terminal	51282-Txxx	2.50~3.00	6°	6°	5°	7°	0.1 ~ 0.3	0.0 ~ 0.3	0.05 ~ 0.20



23 Table of applicable wires, crimp height, and crimp width

Product Description	Product No.	Wire		Crimp Height (mm)(REF.)		Crimp Width (mm) (REF.)	
		AWG Size	Insulation OD (mm)	Conductor A	Insulation B	Conductor W1	Insulation W2
3.96 MM PITCH WTB Terminal	51282-Txxx	UL10368 #16	2.10	1.70Max.	2.70 Max.	2.30 Max.	3.05 Max
		UL10368 #18	1.70	1.60Max.	2.60 Max.	2.30 Max	3.05 Max
		UL10368 #20	1.50	1.50Max.	2.50 Max.	2.30 Max.	3.05 Max
		UL10368 #22	1.30	1.40Max.	2.40 Max.	2.30 Max	3.05 Max
		UL10368 #24	1.10	1.00 Max.	2.20 Max.	1.60 Max	3.05 Max