

ZMC Test Document: **Part Number 1306-W18 Wire-to-Board Connector**

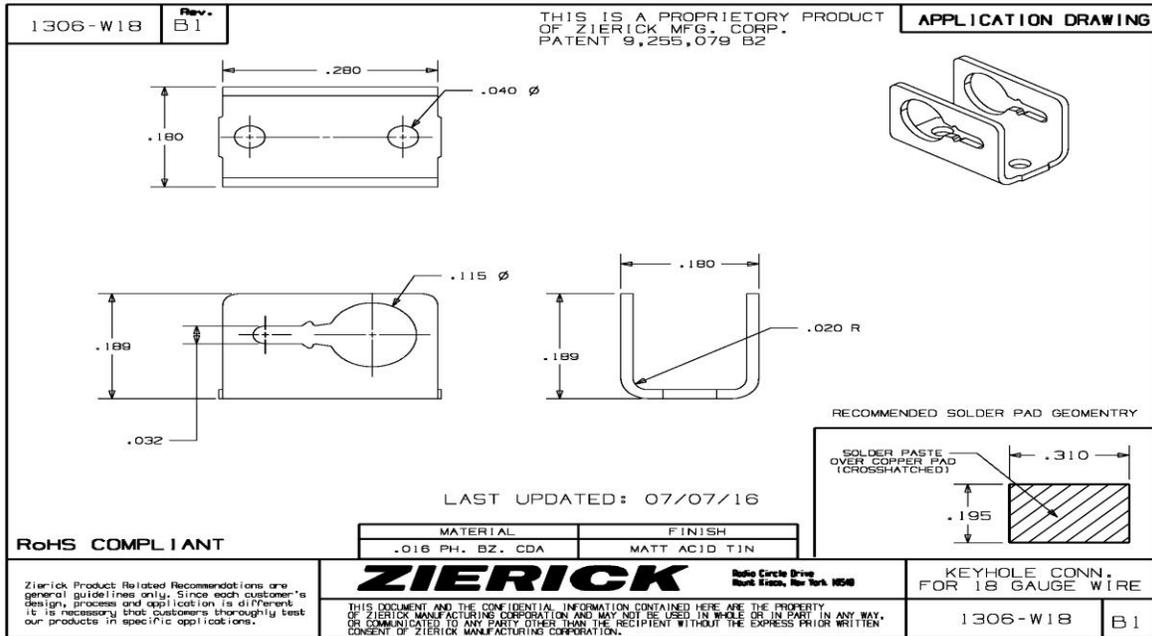
A patented “Keyhole” design SMT electronic connector for 18 AWG wire. Other wire sizes are under development



Uses and Advantages

- This unique SMT Connector features a patented design that allows easy wire insertion and a sideways wire seating action
- Wire is BOTH Removable and Replaceable for field maintenance
- A two-flange design offers excellent strain relief
- Zierick offers an easy to use hand-held “seating” and “removal” tool for this part
- Available in loose piece (PN 1306-W18), strip form (PN 6306-W18) or pocket tape (PN 1306-W18-T)

Zierick Part Number: 1306-W18 Surface Mount Wire-to-Board, Connector for 18-AWG wire



Scope of This Document

This document contains the following test data:

X	Contact Resistance Before and After Thermal Shock
X	Heat Rise
X	Pull Force, X-Y Axes
X	Insertion Force

Executive Summary

- Data indicate low Contact Resistance both before and after Thermal Shock exposure. There was no visible degradation on any part as per specifications after the Thermal Shock test. This connector was tested for 25 Thermal Shock cycles. (Table 1)
- Heat Rise Testing indicates the connector is suitable for applications of 15 amperes. (Table 2)
- The Pull-force tests show relatively high force is required to pull the wire from the connector in the X direction and a lower force in the Y direction. (Table 3)
- Insertion Force is extremely low (Table 4), and can easily be done with the available hand tool.

A. Low-Level Contact Resistance (LLCR) Before and After Thermal Shock Environmental Testing

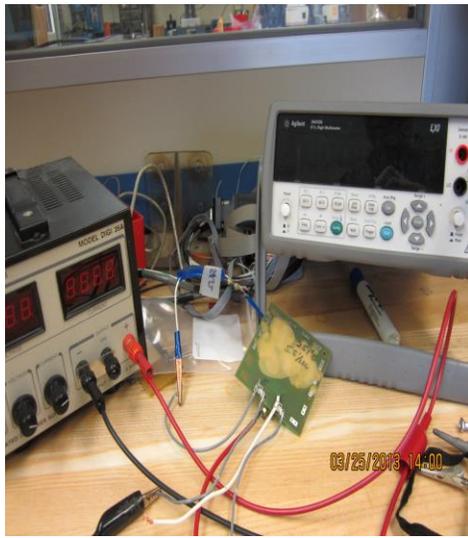
Test Specifications:	Part Number:	1306-W18
Description:	This test determines a baseline for LLCR and shows any degradation after Thermal Shock testing	
Follows		
Standards:	EIA-364-23 (LLCR), EIA-364-32C (Thermal Shock)	
Wire Gauge:	18 AWG	
Wire Type:	Stranded copper, tin plated, pvc insulation, UL 1569 CSA	
Temp Range:	-55° to 85° Celsius	
Cycles:	25	

Test Method

A lead wire and the terminal are soldered to pads on a standard FR-4 PCB. Wires of referenced size are installed in the connector.

Contact Resistance tests were performed per EIA specs before and after Thermal Shock testing at 25 cycles.

Test Setup



Test Table 1: 18 AWG

Sample Number	Baseline Low Level Contact Resistance, mΩ	Resistance After 25 Thermal Shock Cycles, mΩ
1	3.65	4.03
2	3.60	3.67
3	3.58	3.64
4	3.61	3.73
5	3.74	3.82
6	3.63	3.72
7	3.75	3.87
8	3.62	3.75
9	3.50	3.66
10	3.58	3.79
Average	3.6	3.8

Conclusions/Interpretations

- **LLCR:** Note that EIA specifies a 6" wire lead on each side of the test points and this wire contributes to the total resistance. The initial resistance is minimal and only shows a small increase after 25 Thermal Shock cycles.
- **Thermal Shock:** There were no mechanical failures observed (as described by EIA Standard) after Thermal Shock treatment.

B. Heat Rise

Test Specifications	Part Number:	1306-W18
Description:	Approximate Peak Ampacity	
Follows Standard:	EIA/ECA-364-70B, Test Condition 5, Test Method 3, Free Air	
Wire Gauge:	18 AWG	
Wire Type:	Stranded copper, tin plated, pvc insulation UL 1569	
Ambient Temp, degrees	21.4° C	

Test Method

As with the LLCR Tests, connectors are re-flowed to a pad on the PCB. One wire is soldered to a 2 oz. copper pad and the other is installed in the connector.

Test Setup



Table 2: 18 AWG

Current, Amps=	11A	15A
Sample Number	Temperature Rise, degrees C	Temperature Rise, degrees C
1	9.3	17.4
2	9.5	17.0
3	6.6	17.9
4	6.9	17.6
5	9.8	19.1
6	10.3	22.5
7	10.8	20.2
8	11.7	21.5
9	11.7	19.7
10	12.8	19.9
Max	12.8	22.5

Conclusions/Interpretations

The Heat Rise (Ampacity) test was conducted in open air. The test connectors did not exceed the accepted temperature increase of 30 degrees C.

C. Pull Force Test

Test Specifications	Part Number:	1306-W18
Description:	X, Y, Z axis pull force testing, using a certified gauge	
Follows Standard:	EIA 364-08	
Wire Gauge:	18 Gauge	
Wire Type:	Stranded copper, tin plated, PVC insulation, UL 1569 CSA	
Samples Tested:	5 per axis	

Test Method

The connector is soldered to a PCB using standard procedures then the wire is subjected to pull forces on the X and Y axes as pictured below. The X-axis test pulls the wire directly out the side of the connector. The Y-axis test pulls the wire out of the slot as inserted.

Test Setup

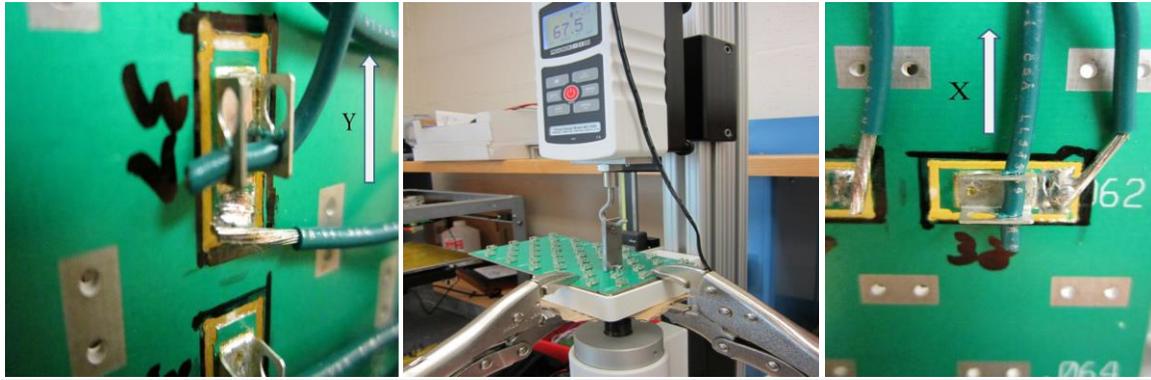


Table 3: 18 AWG

Sample Number	Force Withstood X-Axis, Lbs	Force Withstood Y-Axis, Lbs	Force Withstood Z-Axis, Lbs
1	17.50	10.30	67.50
2	15.60	11.80	93.00
3	15.20	11.30	79.00
4	15.30	13.10	92.00
5	16.60	11.70	81.50
Minimum	15.20	10.30	67.50

Conclusions/Interpretations

Tests show relatively high amounts of force are required to pull the wire from the connector in the X direction and a lower force required in the Y direction. Failure mode for the X-Axis was when the insulation pulled from the wire. Y-Axis data reflect the removable/replaceable capabilities of this part. Z-Axis failure was when the material broke away at the top of the large hole.

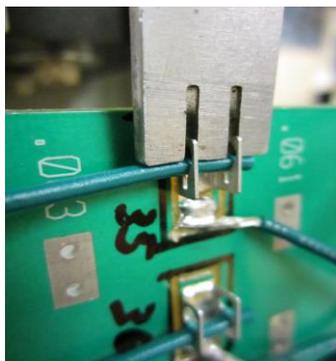
Test Specifications	Part Number: 1306-W18
Description:	Insertion force into keyhole
Follows Standard:	EIA 364-05B
Wire Gauge:	18 Gauge
Wire Type:	Copper stranded, tin plated, PVC insulation UL 1569 CSA
Samples Tested:	5

D. Insertion Force Test

Test Method

Connectors are soldered to a standard FR-4 board and wire is inserted. The force of insertion is measured with a calibrated force gauge.

Test Setup



Crimp Hand Tool In Use

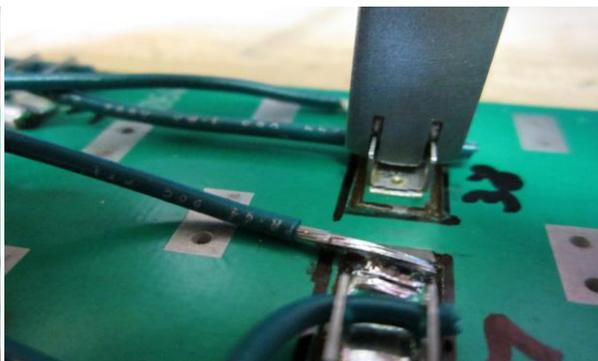


Table 4: 18AWG

Sample Number	Insertion Force, lbs
1	36.2
2	37.5
3	39.9
4	38.9
5	35.1
Maximum	39.9

Conclusions/Interpretations

The recorded insertion force will not stress a standard PCB, nor the wire. A “pliers-style” hand tool will easily provide this force. The specifically designed Zierick tool will both remove and re-install the wire.

E. Fact

All electronic connectors and components on a PCB are part of an engineered system. Variations in the wire, the type of board, proximity of other components and the soldering/manufacturing processes will influence test results.

Zierick's Engineers are available to discuss the specifics of your application.

F. Final Thoughts

The #1306-W18 is designed to provide a cost effective solution to terminate stranded copper wire to PCBs. This design offers wire insertion from either side, excellent retention, and wire removability/reconnection. Patented.

G. Contact Zierick

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