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1.0 GENERAL

- 1.1 Scope This specification covers the Tri-Pin™ .025"/0.63mm square pin for use in single or double-sided printed wiring boards. The specification is composed of the following sections:

<u>Paragraph</u>	<u>Title</u>
1.0	GENERAL
1.1	Scope
1.2	Type
1.3	Classification
1.4	Banned/Restricted Substances
2.0	APPLICABLE DOCUMENTS
3.0	REQUIREMENTS
3.1	Qualifications
3.2	Materials
3.3	Finish
3.4	Design and Construction
3.5	Electrical Characteristics
3.6	Mechanical Characteristics
3.7	Environmental Conditions
4.0	QUALITY ASSURANCE PROVISIONS
4.1	Responsibility for Inspection
4.2	Equipment Calibration
4.3	Inspection Conditions
4.4	Qualification Inspection
4.5	Inspection Lot and Sampling Plan
5.0	PACKAGING AND MARKING
6.0	NOTES AND DEFINITIONS

- 1.2 Type The Tri-Pin™ shall be available in one of the following types, as limited by the appropriate product drawing.

<u>Type</u>	<u>Plating</u>
I	30u"/0.76u gold over 50u"/1.27u minimum nickel
II	50u"/1.27u gold over 50u"/1.27u minimum nickel
III	15u"/0.38u gold over 50u"/1.27u minimum nickel
IV	120u"/3.05u tin-lead
V	30u"/0.76u GXT (palladium alloy) over 50u"/1.27u minimum nickel
VI	15u"/0.38u GXT (palladium alloy) over 50u"/1.27u minimum nickel
VII	100u"/2.54u tin

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1.3 Classification Tri-Pin™ shall be classified as follows:

Class I: Reeled Tri-Pin™ suitable for automatic or semiautomatic application.
 Class II: Loose-piece Tri-Pin™ suitable for handtool application.

Unless otherwise specified herein, all requirements are applicable to both classes of Tri-Pin™.

1.4 Banned/Restricted Substances All product where the part number ends in "LF" meet the European Union directives and other country regulations as described in GS-22-008. The part numbers that do not end in "LF" meet all regulations except for Pb in SnPb plating, if available. Tin plated "LF" product has 100% tin plating in the interface and has not been tested for whisker growth in all interconnect environments.

2.0 APPLICABLE DOCUMENTS

2.1 Issues of Documents The following documents, of the issue in effect on the date of the latest revision of this specification, shall form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

QQ-N-290	Nickel Plating (Electrodeposited)
QQ-W-343	Wire Electrical and Nonelectrical, copper, (Uninsulated)
QQ-B-613	Brass, Leaded and Non-leaded
QQ-B-750	Bronze, Phosphor: Bar, Plate, Rod, Sheet, Strip, Flat Wire, and Structural and Special-Shaped Sections.


MILITARY

MIL-F-14256	Flux, Soldering, Liquid (Rosin Base), Activated
MIL-P-13949	Plastic sheet, Laminated, Metal-Clad (for printed wiring) General Specification for
MIL-G-45204	Gold Plating, Electrodeposited
MIL-P-55110	Printed Wiring Boards
MIL-P-81728	Plating, Tin-Lead (Electrodeposited)
MIL-P-45209	Palladium Plating, (Electrodeposited)

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-202	Test Methods for Electrical and Electronic Parts
MIL-STD-275	Printed Wiring for Electronic Equipment
MIL-STD-1130	Connections, Electrical Solderless Wrapped
MIL-STD-1344	Test Methods for Electrical Connectors
MIL-STD-45662	Calibration Systems Requirements


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- 2.2 Other Publications. The following documents form a part of this specification to the extent specified herein:

American Society for Testing and Materials (ASTM) ASTM B-159-Phosphor Bronze Wire

3.0 REQUIREMENTS

- 3.1 Qualification Panel assemblies produced using Tri-Pin™ furnished under this specification shall be capable of meeting the qualification test requirements specified here. (See 4.0)
- 3.2 Material The material for each part shall be as specified herein, or equivalent. Substitute material shall meet the performance requirements of this specification.
- 3.2.1 Tri-Pin™. The pin shall be drawn wire phosphor bronze alloy UNS C-51000, in accordance with ASTM B-159.
- 3.2.2 Carrier The separable carrier (wire version only) shall be brass alloy UNS C-26000, in accordance with QQ-B-613.
- 3.3 Finish The finish on the pin shall be as specified herein for the particular (see paragraph 1.2) of Tri-Pin™ under consideration.
- 3.3.1 Types I, II and III. The pin shall be gold plated with the specified minimum thickness (see paragraph 1.2). The plated deposits shall be in accordance with MIL-G-45204, Type II, Grade Cover 50u"/1.27u minimum of nickel. The plated deposits shall be in accordance with QQ-N-290, Class I. Noncritical areas such as the sheared tips may have exposed base metal.
- 3.3.2 Type IV. The pin shall be plated with 120u"/3.05u minimum of 93/7 tin-lead. The plated deposits shall be in accordance with MIL-P-81728. Noncritical areas such as the sheared tips may have exposed base metal.
- 3.3.3 Types V and VI. The pin shall be plated with 30u"/0.76u or 15u"/0.38u minimum of palladium alloy and a thin soft gold flash over 50u"/1.27u minimum of nickel. The plated deposits shall be in accordance with MIL-P-45209. The plated deposits of nickel shall be in accordance with QQ-N-290, Class I. Noncritical areas such as the sheared tips may have exposed base metal.
- 3.3.4 Type VII. The pin shall be plated with 100u"/2.54u tin. The plated deposits shall be in accordance with GS-46-001 (Confidential). Noncritical areas such as the sheared tips may have exposed base metal.
- 3.4 Design and Construction The Tri-Pin™ shall be available in various above- and below-board lengths suitable for use as .025"/0.63mm square male disconnects or as similarly configured wrapposts for solderless wrapped connections, in accordance with MIL-STD-1130. The pin shall incorporate a formed staking area, known as a tri, providing mechanical stability of the free-standing pin in a plated-through-hole, until the Pin-Board assembly is soldered. The Tri-Pin™ shall have .047"±.002"/1.19±.05mm tri diagonal.

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3.4.1 Pin Lengths. The pin is available in a variety of installed lengths as follows:

		Length – inches/mm	
Pin	Related to Board	Minimum	Maximum
Tri-Pin™	Above	.220/5.59	.745/18.92
	Below	.058/1.47	.733/18.62

/1 Based upon .125/3.18mm thick board.

3.4.2 Installation The Tri-Pin™ shall be installed in a plated-through-hole having a finished diameter of .039"±.003"/0.99±0.076 for .125"/3.18mm printed wiring board. The pin shall be capable of installation on minimum centers of .100"/2.54mm on PWB per Paragraph 6.2. The Tri-Pin™ shall be soldered in accordance with good industry techniques that insure a sound solder bond in order to meet the specifications called herein. The breakout of termination holes should be no greater than .005"/.127mm x 45° or .005"/.127mm radius.

3.4.3 Wrappost The wrappost geometry shall be in accordance with paragraph 5.2 of MIL-STD-1130. The tip of the wrappost shall be beveled to facilitate insertion onto the bit of the wire wrap tooling.

3.4.4 Workmanship Pins shall be uniform in quality and shall be free from burrs, scratches, cracks, voids, chips, sharp edges, and other defects that will adversely affect life or serviceability.


3.5 Electrical Characteristics

3.5.1 Operating Temperature. Unless otherwise specified, the pins shall have an operating temperature of +85°C maximum and -40°C minimum.

3.5.2 Low-Level Circuit Resistance The low-level circuit resistance between the pin and the plated-through-hole after soldering shall not exceed 0.2 milliohms when measured in accordance with MIL-STD-1344, Method 3002. The following details shall apply:

- A. Test Current-100 ma, maximum (short-circuit)
- B. Open Circuit voltage- 20 mv D.C., maximum
- C. Method of Connection-attach current and voltage leads as shown in Figure 1

3.5.3 Current Rating. The pin provides the electrical resistance equivalent of AWG 29 wire and In a balanced system would be rated at approximately 3.0 Amperes D.C.

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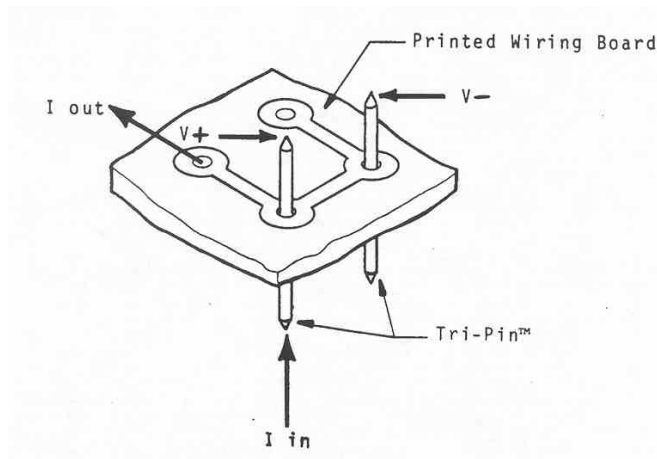

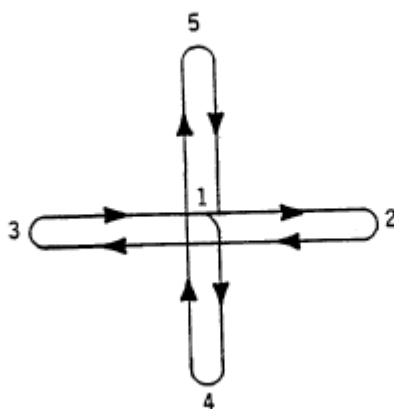


FIGURE 1-LOW-LEVEL CIRCUIT RESISTANCE

3.6 Mechanical Characteristics

- 3.6.1 Contact Retention Depending upon pin to plated-through-hole interference, the pin could have 2 to 10 lbs. (8.9 to 44.5 N) of retention force before the assembled boards are soldered.
- 3.6.2 Wrappost Torque A torque of 2.0 ounce-inches (0.014 N.m) applied to the tip of the installed soldered wrappost shall not cause yielding of this member, when tested in accordance with MIL-STD-202, Method 211, Condition E.
- 3.6.3 Tail Straightening The soldered Tri-Pin™, after tail straightening of either end shall exhibit no change in position on the opposite end and shall meet all electrical and mechanical requirements of this specification. The following details shall apply:
- Deflection - .035"/0.89mm (in any direction)
 - Plane of Bending – parallel to sides of wrappost
 - Pattern – see Figure 2
 - Tooling Bar Location - .150"/3.81mm from board

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Sequence: 1-2-1-3-1-4-1-5-1

FIGURE 2- TAIL STRAIGHTENING PATTERN

3.7 Environmental Conditions. The tests in the following sections shall be conducted after the Tri-Pin™ is soldered in the sample boards.

3.7.1 Thermal Shock After exposure of the assembly to alternate periods of extreme high and low temperatures, the contact retention shall be not less than 10 pounds (44.40N) (see Paragraph 3.4.1). The test shall be in accordance with MIL-STD-1344, Method 1003, Condition A ; the following details shall apply:

- A. Temperature Range - -55°C to +85°C
- B. Time at Temperature - 30 minutes each per cycle
- C. Transfer Time - 5 minutes, maximum
- D. Number of Cycles - 5

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3.7.2 High-Temperature Life After exposure of the non-operating assembly to a high-temperature environment, the low-level circuit resistance shall not exceed 0.2 milliohms (see Paragraph 3.5.2) and the contact retention shall not be less than 10 pounds (44.40N) (see Paragraph 3.4.1). The test shall be in accordance with MIL-STD-1344, Method 1005, Test Condition 3, Time Condition D; the following details shall apply:

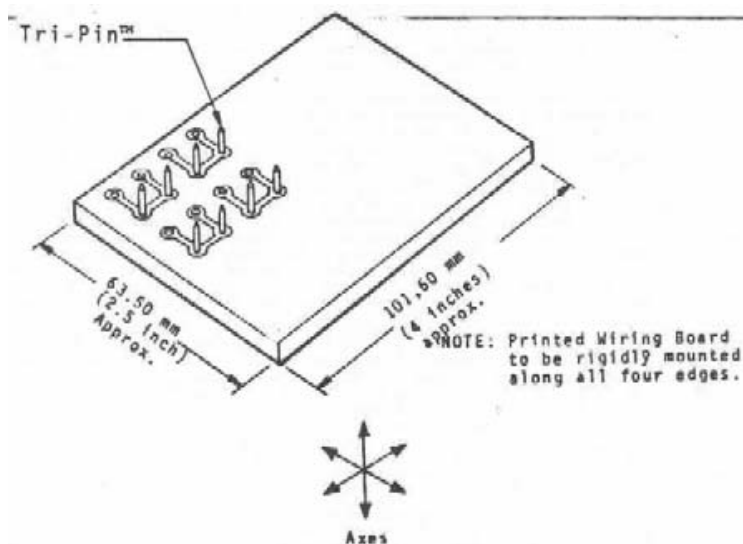
- a. Exposure Temperature - + 85°C
- b. Exposure Time - 1000 hours

3.7.3 Shock There shall be no evidence of damage when the assembly is subjected to transient accelerations. The test shall be in accordance with MIL-STD-1344, Method 2004.1, Condition A; the following details shall apply:

- a. Shock Pulse- 50g peak, 11 millisecond, half-sine
- b. Number of Shocks - 3 shocks in each direction along three orthogonal axes (18 total)
- c. Mounting - see Figure 3
- d. Pin shall be soldered on P.C. Board.

3.7.4 Vibration There shall be no evidence of damage when the assembly is subjected to prolonged mechanical vibration; after the test, the contact retention shall not be less than 10 pounds (44.40N) (see Paragraph 3.4.1). The test shall be in accordance with MIL-STD-1344, Method 2005, Condition III; the following details shall apply:

- A. Vibration Amplitude - .06" (1.52mm) DA or $\pm 15g$
- B. Frequency Range - 10 to 2000 Hz
- C. Test Duration - 4 hours along each of three orthogonal axes (12 hours total)
- D. Mounting - see Figure 3




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FIGURE 3 - MOUNTING FOR SHOCK AND VIBRATION

4.0 QUALITY ASSURANCE PROVISIONS

- 4.1 Responsibility for Inspection FCI will use its own or approved facilities suitable for the performance of the inspection requirements specified herein, unless negotiated by the procuring activity.
- 4.2 Equipment Calibration All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with MIL-STD-45662.
- 4.3 Inspection Conditions Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions:
- A. Temperature - + 25°C ±5 °C
 - B. Relative Humidity - 30 to 80 %
 - C. Barometric Pressure - local ambient
- 4.4 Qualification Inspection Qualification inspection shall be performed on sample units produced with equipment and procedures normally used in production.
- 4.4.1 Sample One hundred sixty (160) standard Tri-Pin™ of length suitable for tail straightening (see Paragraph 3.6.3), shall be subjected to the qualification inspection.
- 4.4.2 Preparation of Sample Boards
- 4.4.2.1 Printed Wiring Boards Two (2) test boards conforming to the applicable requirements of MIL-P-55110 and MIL-STD-275, shall be prepared as shown in Figure 4. Board thickness and finished hole size combinations, for the indicated sample board number, shall be in accordance with Table 1.

Table I - Board Configuration

Board Thickness	Finished Hole Diameter	
	Max.	Min.
.125 inches (3.18mm)	Board # 1	2

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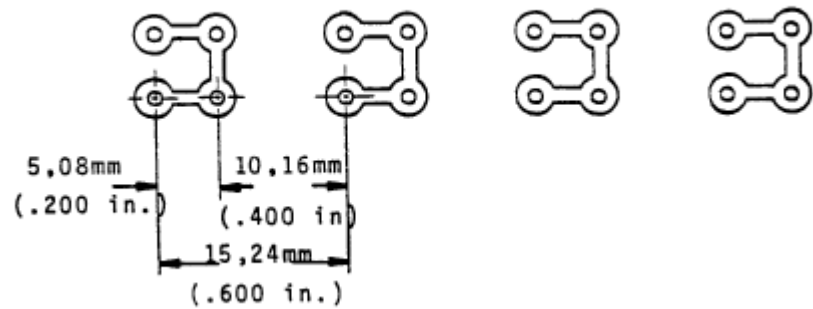



FIGURE 4 - PRINTED WIRING BOARD (TEST)

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4.4.2.2 Sample Installation Pins shall be installed and soldered in each printed wiring test board in two (2) rows of forty (40) each, as shown in Figure 5. One (1) row of pins shall be tail-straightened (see Paragraph 3.6.3).

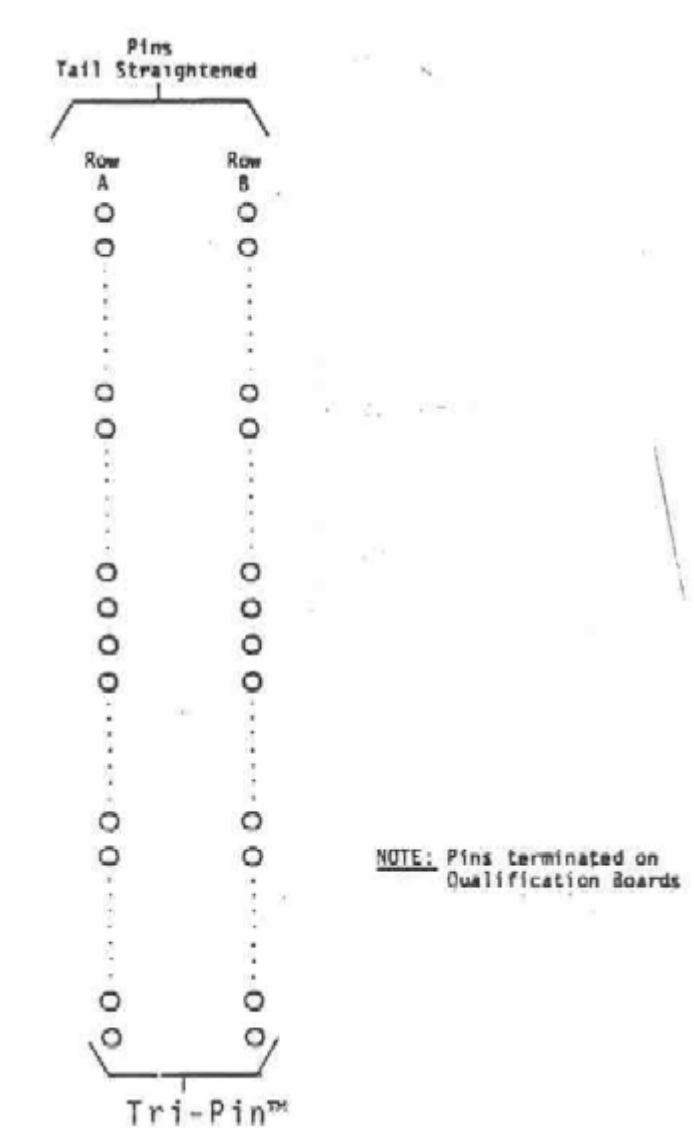



FIGURE 5 - TEST SAMPLE CONFIGURATION

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4.3.3 Test Sequence The assemblies shall be subjected to the inspections specified in Table II, in the order shown.

TABLE II - QUALIFICATION INSPECTION

Examination or Test	Paragraph	Sample Board Number	
		1	3
Thermal Shock	3.7.1	X	-
High Temperature Life	3.7.2	X	-
Shock	3.7.3	-	X
Vibration	3.7.4	-	X
Wrappost torque	3.6.2	*	*

* Pins in 1 to 10 in each row


4.5 Inspection Lot and Sampling Plan

- 4.5.1 Inspection Lot. An inspection lot shall consist of all pins produced under essentially the same conditions and offered for inspection at one time.
- 4.5.2 Sampling Plan. Statistical sampling and inspection shall be in accordance with MIL-STD-105, General Inspection Level II.
- 4.5.3 Rejection Lots. Rejected lots shall be screened to remove defective units and resubmitted for inspections.

5.0 PACKAGING AND MARKING


Unless the pins are specifically requested in the form of loose pins, they shall be held by a continuous brass bandolier for the convenience of packaging and automatic application on the printed circuit board. The loose pieces shall be packaged in a polyethylene bag in quantity of 1000 with a label 336129-xxx giving product number, quantity, date, code, operating and QC. The bandoliered pins shall be reeled in quantity of 12,500 at .200"/5.08mm lead on a 19 inch/48.3cm diameter corrugated pancake reel with 5.5 inch/14cm diameter hub and laced with interleaving paper. The reel shall have a label 336129-xxx giving FCI's product number, quantity, date, code, QC, and operator information.

- 5.1 Acceptance Inspection. Appropriate in-process inspection may, at the option of FCI, be substituted for the indicated lot sampling/inspection provided that the process output quality level is maintained.

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6.0 NOTES AND DEFINITIONS

- 6.1 Ordering Data. Procedure documents should specify:
- Title, number and date of this specification.
 - Title, number and date of the applicable product part number, the type number, the complete part number (see Table I and II).
 - State whether the Tri-Pins are to be bandoliered or loose per Paragraph 5.0
- 6.2 Printed Wiring Boards. The laminate used in the fabrication of printed wiring boards shall be Type GE*
 **** A1/1A A/1/B, in accordance with MIL-P-13949, or equivalent. The board shall exhibit good solderability in order for this specification to apply. Plated-through-holes shall be constructed as follows:
- Drilled Hole Diameter - .043±.001 inch / 1.09±0.025mm
 Copper Plated Thickness - .001 inch/0.025mm (minimum)
 Tin-Lead (60-40) Plating Thickness - .0003 inches/0.00762mm (minimum);
 .0007 inches/0.0178mm (maximum)
- *N or P is optional
 **** 0930 or 1250, as appropriate

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Revision Record

REV	PAGE	DESCRIPTION	EC #	DATE
A	All	Release Product Performance Spec.	13544	07/15/86
B	13	Para. 5.0 "Packaging & Marking" Change Qty. of Loose Piece Pins Per bag: From: 500 To: 1000	13917	02/09/87
C	All	Update/Retype as Word document, add information for LF parts.	V05-1122	12/15/05
D	All	Change logo	V06-0526	05/31/06

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