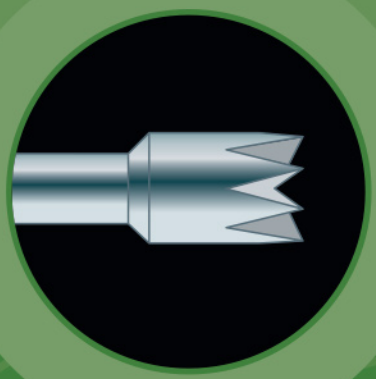
CONTACT PRODUCTS GROUP

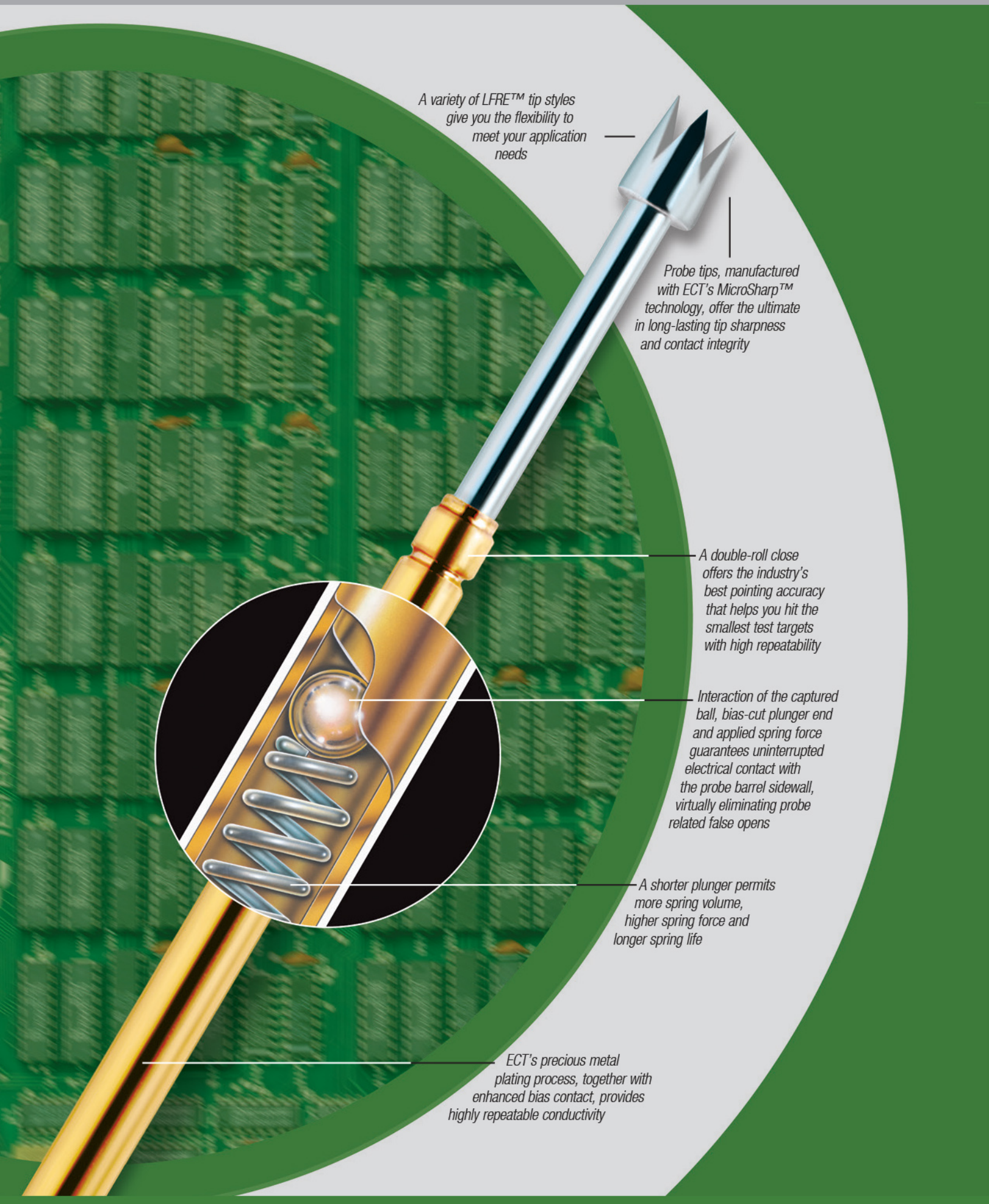
LFRE™



Lead-Free POGO® Spring Probes

Contact Products
Everett Charles Technologies
A Cohu Company

WWW.ETC-CPG.COM


A variety of LFRE™ tip styles give you the flexibility to meet your application needs
Probe tips, manufactured with ECT's MicroSharp™ technology, offer the ultimate in long-lasting tip sharpness and contact integrity
A double-roll close offers the industry's best pointing accuracy that helps you hit the smallest test targets with high repeatability
Interaction of the captured ball, bias-cut plunger end and applied spring force guarantees uninterrupted electrical contact with the probe barrel sidewall, virtually eliminating probe related false opens
A shorter plunger permits more spring volume, higher spring force and longer spring life
ECT's precious metal plating process, together with enhanced bias contact, provides highly repeatable conductivity

ECT® LFRE: Spring Probes - Cleaner Environment

The Lead Free Challenge

Lead free solder can cause many problems in-circuit testing. Lead free solder has a higher reflow temperature, which can result in harder and stickier solder flux resin and a thicker, harder oxide layer. This thicker layer of resin and oxide is more difficult to penetrate and increases wear on the pogo pin. Lead free solder resin and oxides can also increase debris transfer to spring probes. These are many of the issues found in OSP and No-Clean applications. ECT has developed a test probe, specifically designed to solve these problems.

ECT Lead Free POGO® Spring Probe Series

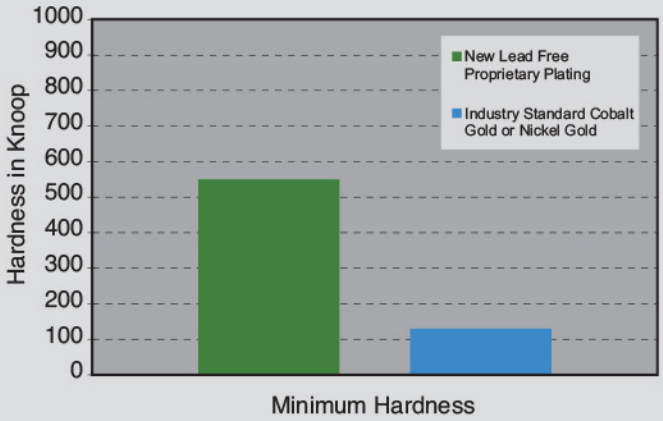
ECT's Lead Free probe line incorporates a number of features that will significantly reduce the issues that arise when switching to lead free solder as well as those contact issues that arise with OSP and No-Clean solder flux.

- **Proprietary Plating**
  Our Lead Free probe incorporates a harder and slicker plating that not only resists wear but also reduces solder and debris transfer.
- **POGOPlus™ Bias Ball Design**
  The POGOPlus internal bias ball design guarantees uninterrupted electrical contact with the probe sidewall virtually eliminating probe related false opens.
- **Range of Spring Force Choices**
  Compared to competitors' products, which offer limited spring force options, ECT's LFRE POGO spring probes are available in a variety of spring force choices in 100 mil, 75 mil, 50 mil and 39 mil centers.
- **Pointing Accuracy**
  ECT's Lead Free probe incorporates a double roll close, which offers the industries best pointing accuracy. Increased pointing accuracy is of benefit when using Lead Free solder and/or No-Clean as the probe is less likely to touch the edge of the pad where the solder flux accumulates.

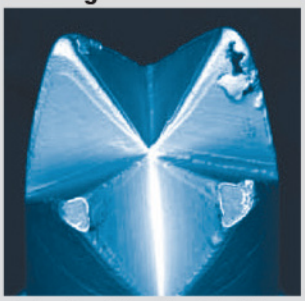
ECT's Proprietary Lead Free Plating vs. the Industry Standard

The industry standard for plated spring pins is gold electroplate alloyed either with cobalt of nickel to enhance its hardness. Hardness is increased from 90 Knoop for 99.7% pure electroplated gold to 130 to 200 Knoop when alloyed with nickel or cobalt. ECT's proprietary lead free plating is significantly harder than the industry's standard gold plating. Our proprietary plating has a hardness range of 550 to 650 Knoop. This makes the probe tips more durable and less susceptible to solder and material transfer.

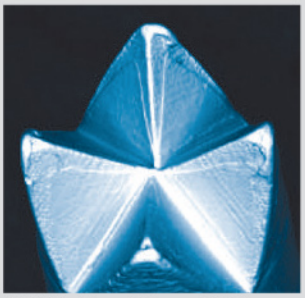
Hardness Comparison of Lead Free Proprietary Plating to the Industry Standard



Plating Wear

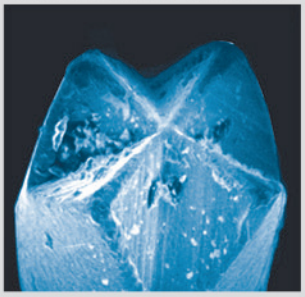


Industry Standard Gold

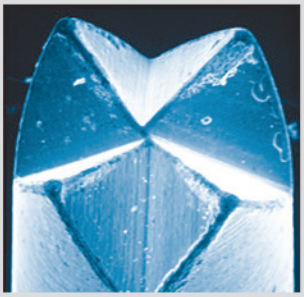


ECT's Proprietary Plating

Contaminant Transfer



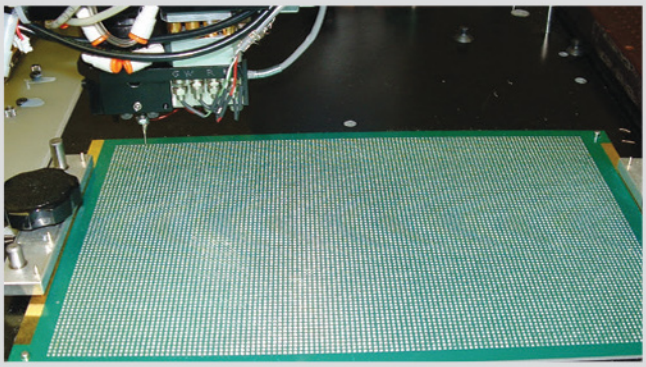
Industry Standard Gold



ECT's Proprietary Plating

In House Testing

ECT has performed numerous in house tests on our Lead Free probe in order determine its wear properties and its life against lead free solder and no clean solder flux. The following is a resistance graph of the average resistance of a group of Lead Free probes and Equivalent POGOPlus™ Steel probes cycled and dragged .010" across pads covered with lead free (SAC) solder with no clean solder flux.



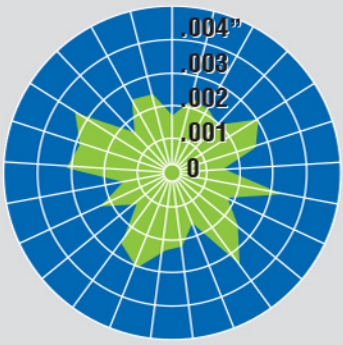
Lead-Free Solder Panel

Lead-Free POGOPlus Benefits vs. Conventional Bias Probes

ECT's Lead Free spring probes are designed with the same great performance benefits as our POGOPlus probes.

POGOPlus Bias Design The enhanced bias-ball design forces contact between plunger and barrel wall at all times, virtually eliminating probe-related false opens.

Conventional Bias Design Angle of spring coil end matches biased plunger end, compromising bias force and electrical contact.



Tighter Pointing Tolerances ECT POGO spring probes deliver superior pointing accuracy demonstrated by test results measuring sideload TIR.

Objective

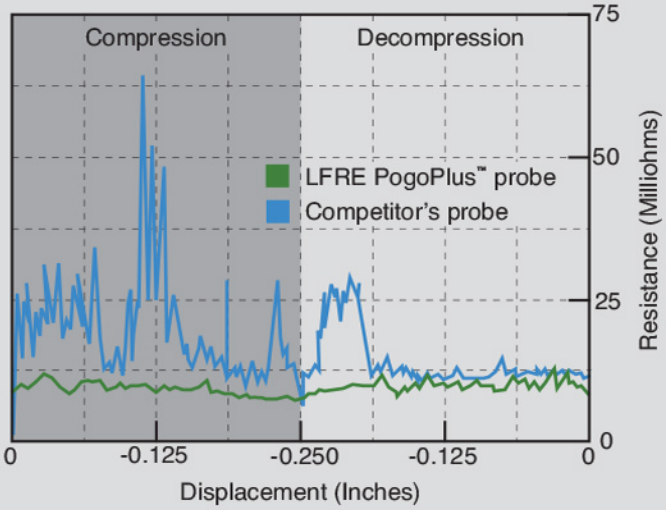
Measure the resistance of ECT's LFRE probes and a standard high performance probe as they are compressed and decompressed. For reliable results, a probe should have a resistance of less than 10 milliohms (with a standard deviation of <5 milliohms) throughout the compression/decompression cycle.

Method

Each probe is placed in a calibrated test station that dynamically measures resistance relative to probe displacement. Displacement resolution is 0.0001 inch. For each increment in displacement, resistance is simultaneously measured with a resolution of 1 milliohm.

Results

Test results of ECT's LFRE probes compared to conventional bias probe performance are shown in the graph below.



Resistance vs. displacement tests show the LFRE probe's more consistent resistivity performance resulting in significantly fewer probe false opens and tighter control of the test process.

Discussion

As the displacement vs. resistance graph clearly shows, the bias ball design of ECT's LFRE outperforms the competitor's probe by demonstrating more repeatable resistivity across its travel range. Because false opens occur when large changes in resistivity occur over short displacements, a steeper slope in the displacement/ resistivity curve indicates a greater likelihood of a false reject.

For a more detailed discussion of the test method and results, please ask your ECT salesperson for a copy of the complete test report.

HIGH-PERFORMANCE BIAS BALL PROBE

LFRE-25

Test Centers
100 mil (2.54mm)

Actual size

Specifications

Mechanical
Full Travel: .250 (6.35mm)
Recommended Travel: .167 (4.24mm)
Mechanical Life: 1,000,000 cycles

Operating Temperature -55˚C to +150˚C

Electrical (Static Conditions)
Current Rating: 8 amps

Average Probe Resistance < 8 mOhms

Materials and Finishes

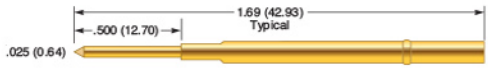
Plunger:	High Performance Alloy, LFRE proprietary plating
Barrel:	Work hardened Phosphor Bronze, Gold plated over Hard Nickel
Spring:	Stainless Steel
Ball:	Stainless Steel

*Note: Lead Free plating is also available on Long Travel 100 mil probes: LFLT-25

Spring Force in oz. (grams)

	Order Code	Preload	Rec. Travel
Light	-2	0.75 (21)	2.0 (57)
Standard	-4	1.50 (43)	4.0 (113)
Alternate	-6	2.58 (73)	6.0 (170)
Elevated	-6.5	2.65 (75)	6.5 (184)
High	-8	2.84 (81)	8.0 (227)
Ultra High	-10	1.77 (50)	10.0 (283)
Premium	-12	4.49 (127)	12.0 (340)
Super	-16	3.90 (111)	16.0 (454)

Receptacles: SPR & EPR
Note: EPR receptacles are non-finished versions.



SPR-25W-2

LFRE-1

Test Centers
75 mil (1.91mm)

Actual size

Mechanical
Full Travel: .250 (6.35mm)
Recommended Travel: .167 (4.24mm)
Mechanical Life: 500,000 cycles

Operating Temperature -55˚C to +150˚C

Electrical (Static Conditions)
Current Rating: 6 amps

Average Probe Resistance <10 mOhms

Materials and Finishes

Plunger:	High Performance Alloy, LFRE proprietary plating
Barrel:	Work hardened Phosphor Bronze, Gold plated over Hard Nickel
Spring:	Stainless Steel
Ball:	Stainless Steel

*Note: Lead Free plating is also available on Long Travel 75 mil probes: LFLT-1

Spring Force in oz. (grams)

	Order Code	Preload	Rec. Travel
Light	-2	0.83 (24)	2.0 (57)
Standard	-4	0.62 (18)	4.0 (113)
Alternate	-6	2.39 (68)	6.0 (170)
Elevated	-7	1.68 (48)	7.0 (198)
High	-8	1.73 (49)	8.0 (227)
Ultra High*	-10	2.84 (81)	10.0 (283)

* May observe slight decrease in cycle life

Receptacles: LTR & ELTR
Note: ELTR receptacles are non-finished versions.

LTR-1W-2

LFRE-72

Test Centers
50 mil (1.27mm)

Actual size

Specifications

Mechanical
Full Travel: .250 (6.35mm)
Recommended Travel: .167 (4.24mm)
Mechanical Life: 500,000 cycles

Operating Temperature -55˚C to +150˚C

Electrical (Static Conditions)
Current Rating: 3 amps

Average Probe Resistance < 15 mOhms

Materials and Finishes

Plunger:	High Performance Alloy, LFRE proprietary plating
Barrel:	Work hardened BeCu, Gold plated over Hard Nickel
Spring:	Stainless Steel
Ball:	Stainless Steel

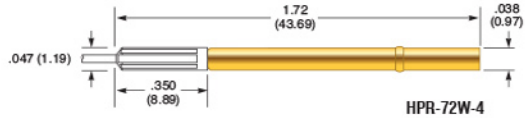
*Note: Lead Free plating is also available on Long Travel 50 mil probes: LFLT-72

Spring Force in oz. (grams)

	Order Code	Preload	Rec. Travel
Light	-2	0.60 (17)	2.0 (57)
Standard	-4	1.53 (43)	4.0 (113)
Alternate	-6	2.14 (61)	6.0 (170)
Elevated	-7	2.67 (76)	7.0 (198)
High	-8	3.12 (88)	8.0 (227)
Ultra High*	-10	3.83 (109)	10.0 (283)

* May observe slight decrease in cycle life

Receptacle: HPR



HPR-72W-4

LFRE-39

Test Centers
39 mil (1.0mm)

Actual size

Mechanical
Full Travel: .250 (6.35mm)
Recommended Travel: .167 (4.24mm)
Mechanical Life: 50,000 cycles

Operating Temperature -55˚C to +150˚C

Electrical (Static Conditions)
Current Rating: 2 amps

Average Probe Resistance < 50 mOhms

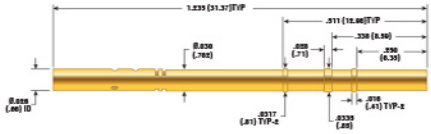
Materials and Finishes

Plunger:	High Performance Alloy, LFRE proprietary plating
Barrel:	Nickel Silver, Gold plated
Spring:	Stainless Steel

Spring Force in oz. (grams)

	Order Code	Preload	Rec. Travel
Standard	-5.4	0.62 (18)	5.4 (153)

Receptacles: SPR & SPT



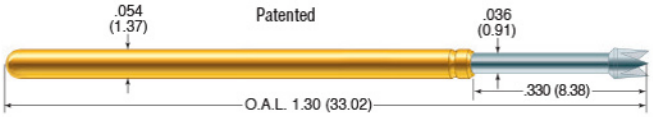
SPR-39W-S

HOW TO ORDER

1. For each probe, specify the probe model, tip style, and spring force as shown in example.

Example: LFRE-25T36-10
(probe model | tip style | spring force)

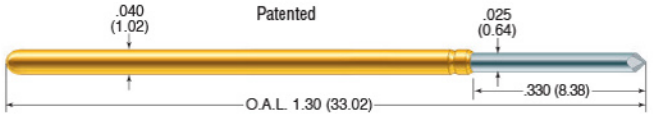
2. Place your order via phone or fax.
Phone: +1 909-625-9390 M – F, 7:30am to 4:30pm (PST)
Phone: +1 401-739-7310 M – F, 6am to 3pm (EST)
Email: info.ECT-CPG@Xcerra.com



A	B	H	H79	I
Ø .060 (1.52)	Ø .034 (0.86)	Ø .060 (1.52)	Ø .079 (2.01)	Ø .033 (0.84)

I8	I15	I35	I40	J	L	L18	L36	T	T1
Ø .033 (0.84)	Ø .033 (0.84)	Ø .034 (0.86)	Ø .033 (0.84)	Ø .025 (0.64)	Ø .050 (1.27)	Ø .018 (0.46)	Ø .034 (0.86)	Ø .060 (1.52)	Ø .030 (0.74)

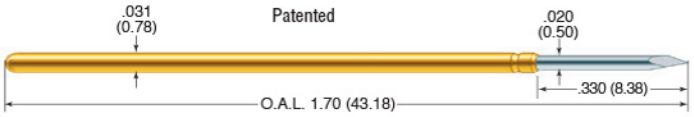
T30	T36	T79	UN	V	Z	Z1
Ø .034 (0.86)	Ø .034 (0.86)	Ø .079 (2.01)	Ø .025 (0.64)	Ø .055 (1.40)	Ø .060 (1.52)	Ø .051 (1.30)



A	B	H	I	I8
Ø .047 (1.19)	Ø .022 (0.56)	Ø .047 (1.19)	Ø .020 (0.51)	Ø .020 (0.51)

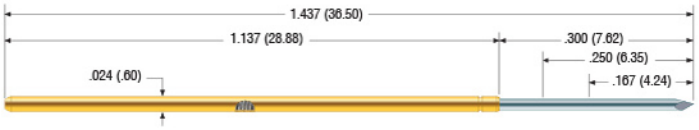
I15	I35	I40	J	L	L18	L24	T	T1	T24
Ø .021 (0.53)	Ø .022 (0.56)	Ø .021 (0.53)	Ø .022 (0.56)	Ø .033 (0.84)	Ø .018 (0.46)	Ø .022 (0.56)	Ø .047 (1.19)	Ø .022 (0.56)	Ø .022 (0.56)

T30	UN	V	Z	Z1
Ø .022 (0.56)	Ø .021 (0.53)	Ø .047 (1.19)	Ø .047 (1.19)	Ø .038 (0.97)



H	I	I8	I15	I40
Ø .035 (0.89)	Ø .017 (0.43)	Ø .017 (0.43)	Ø .017 (0.43)	Ø .017 (0.43)

J	T1	T20	T38	U
Ø .017 (0.43)	Ø .019 (0.48)	Ø .019 (0.48)	Ø .038 (0.97)	Ø .019 (0.48)



H	I	I15	L15	T15
Ø .028 (.711)	Ø .015 (0.38)	Ø .015 (0.38)	Ø .015 (0.38)	Ø .015 (0.38)

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EVERETT CHARLES TECHNOLOGIES

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