



# Lead Free Probe Series





# INTERCONNECT DEVICES, INC.

## Introducing the LF Probe Series for Lead Free Test

Probing boards manufactured with lead-free materials and processes can prove challenging. Contact can be difficult and degrade rapidly, as probe tips wear and become contaminated with metallic oxides. To combat these problems within a single probe series, IDI combines a number of innovations in the new LF Probes Series.

## ICT Probe Series

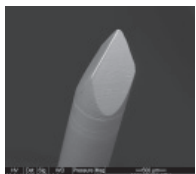
The LF Series is based around IDI’s revolutionary ICT probe. The ICT probes feature a bifurcated barrel with four separate fingers. Because the barrel is compliant, it can be formed against the plunger eliminating any “gap” between the plunger and barrel. Probes featuring the ICT modification are thus more accurate, more stable in resistance, and less prone to contamination than conventional probes.



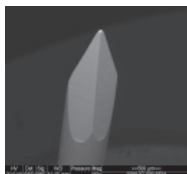
## Optimized Tip Geometry

IDI invested significantly in the discovery of the ideal tip for lead-free applications. IDI’s research laboratory, the industry’s most advanced, developed a special test system which permitted IDI to compare the performance of various tip styles when cycled against matte tin, the most aggressive test contact material in terms of rapid tip wear and contamination. Through this process, the obtuse blade (‘LF’) tip showed itself to be by far the most reliable – its rugged shape retains its integrity far longer than more acute designs.

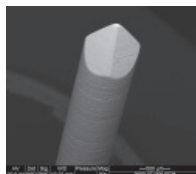
### Tip Geometries



15° 3-sided Chisel

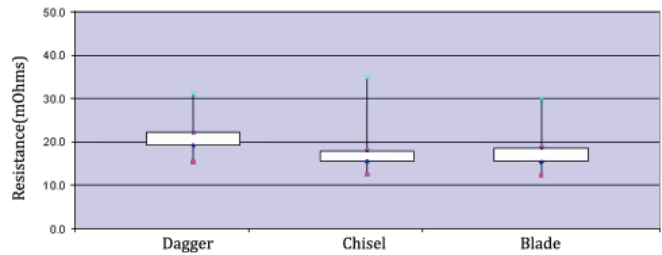


Acute Dagger



Obtuse Blade

## Lead Free Simulation Test Against Matte Tin For 100k Cycles

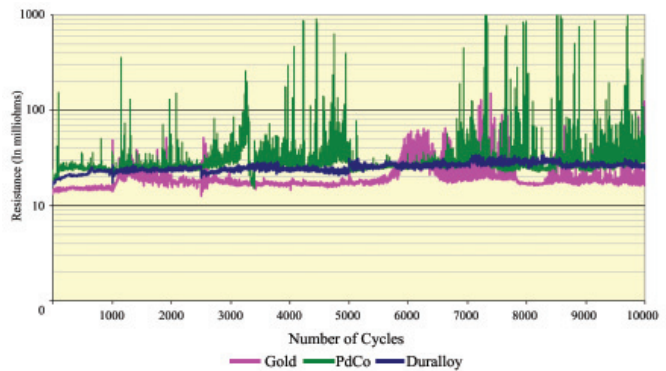


## Optimized Tip Plating

IDI applied the same technology to the process of discovering the optimum plating to be used. Gold plating does little to protect the probe tip from wear, and has the aforementioned vulnerability to intermetallic contamination. While palladium cobalt has been advanced as a good alternative, it tends to be too hard; it fractures when it is repeatedly cycled against a hard material, resulting in the exposure of the base material of the plunger.

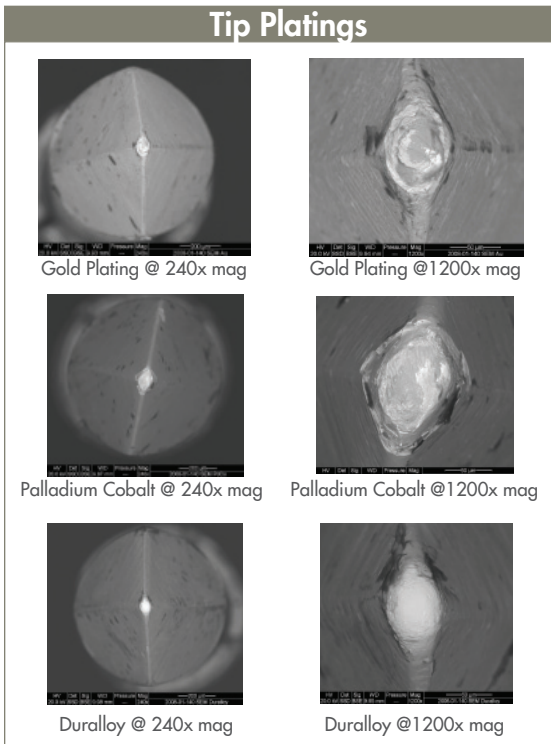
IDI’s proprietary Duralloy plating material has shown through testing to be the most durable and at the same time to be nearly immune to intermetallic contamination. Duralloy has a long history of successful application to extremely rugged test conditions, such as IDI’s patented Rotator test probes. It is the optimal final coating for our LF probes.

## Lead Free Simulation Test Average Resistance



# Lead Free Test Probes

## Tip Plating Debris Build Up Comparison



## Optimized Spring Force

A spring force of significance, seven to eight ounces, was demonstrated to provide the best combination of high penetration and low board stress. The selection of a more moderate force of seven to eight ounces also permits a greater security of tip integrity.

## Comprehensive Lead Free Testing Solutions

*"With the introduction of the LF series, IDI continues to be the most comprehensive probe supplier for functional and in-circuit test." Discover how IDI can help you. Call us today at 913-342-5544.*

## Challenges of Lead Free Test

Lead free printed circuit boards differ primarily from their conventional counterparts in the materials used to protect the solderability of the board's interconnect features. Specifically, the tin/lead alloy which has been traditionally applied to lands, plated through holes, and test pads through the hot air solder leveling (HASL) process is no longer applicable.

While HASL can be performed with tin compounds not containing lead, matte tin pad and land finishes can present problems for the precise and reliable soldering of devices. Alternatives include the plating of boards with partially noble materials, such as gold, silver, and palladium; and the use of organic solderability preservatives (OSPs) such as Entek Plus™.

Some of these alternatives can create serious problems in the creation of a viable and sustainable test contact strategy. Matte tin is very hard, causing tips to wear quickly. Further, the tin tends to exchange with the gold plating of conventional probes, causing the formation of an intermetallic bond on the surface of the probe. This oxidizes, and the resulting contamination is as non-conductive as it is difficult to remove.

OSPs create two separate problems. Left in their natural state, they present a nearly impenetrable barrier to contact in the form of a thin film of organic compound. If solder paste is applied to test pads and reflowed in an attempt to overcome this tendency, the pads tend towards an irregular topography and extensive flux contamination. Rotators™ applied to unreflowed OSP pads produce remarkably long probe life and high yields. If pads are reflowed, IDI's LF series is recommended.

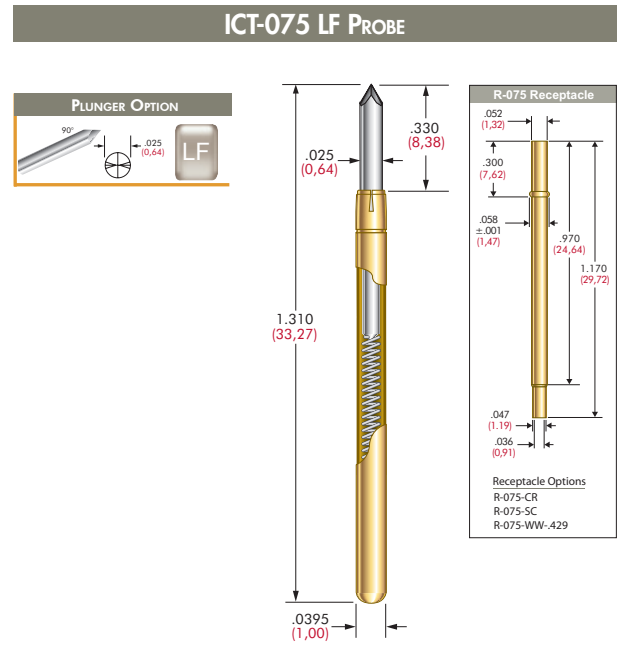
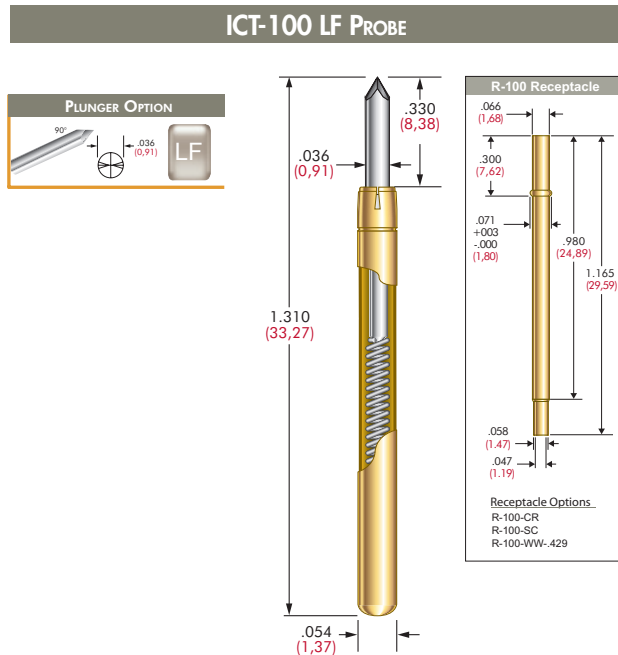
## Patented Rotator Probe



The Rotator probe series features a single-point tip with multiple side edges. The Rotator tip revolves axially up to 90° during the plunger compression, forcing the tip edges to wipe the test surface. Because of the aggressive nature of the rotating action, IDI developed a proprietary plating in 1990 called Duralloy™, specifically for use in the Rotator Probe series. Duralloy is harder and smoother than the conventional hard gold plating. It not only allows IDI's Rotator probes to survive the internal friction that is associated with the tip rotation, but also protects the sharpness of the tip.

IDI populated a fixture with Rotator Probes. The Rotators did not need to be double-cycled and ran for over 100,000 cycles. Test yields were significantly higher than the competitive rotating probes and even more significant compared to conventional probes. IDI supplies Rotators for 100, 75, and 50 mil test centers in a wide variety of spring forces.

# Lead Free Test Probes



## PROBE SPECIFICATIONS

Minimum Centers: .100 (2,54)  
 Current Rating: 3 amps continuous  
 Spring Force: 8.0 oz. @ .170 (4,32) travel  
 Typical Resistance: <30 mΩ against lead free surface  
 Working Travel: .170 (4,32)  
 Maximum Travel: .250 (6,35)

## MATERIALS

Barrel: G2  
 Spring: Music wire, nickel plated  
 Plunger: Steel, Duralloy™ plated  
 Receptacle: Nickel/silver, gold plated

## RECEPTACLE SPECIFICATIONS

Drill Size: #50  
 Mounting Hole Size: .068/.070 (1,73/1,78)  
 Recommended Wire: 22-26 gage

## HOW TO ORDER

ICT - 100 - LF - 8 - D - S

Specifications subject to change without notice.  
 Dimensions in inches (millimeters)

## PROBE SPECIFICATIONS

Minimum Centers: .075 (1,91)  
 Current Rating: 3 amps continuous  
 Spring Force: 7.0 oz. @ .170 (4,32) travel  
 Typical Resistance: <40 mΩ against lead free surface  
 Working Travel: .170 (4,32)  
 Maximum Travel: .250 (6,35)

## MATERIALS

Barrel: G2  
 Spring: Music wire, nickel plated  
 Plunger: Steel, Duralloy™ plated  
 Receptacle: Nickel/silver, gold plated

## RECEPTACLE SPECIFICATIONS

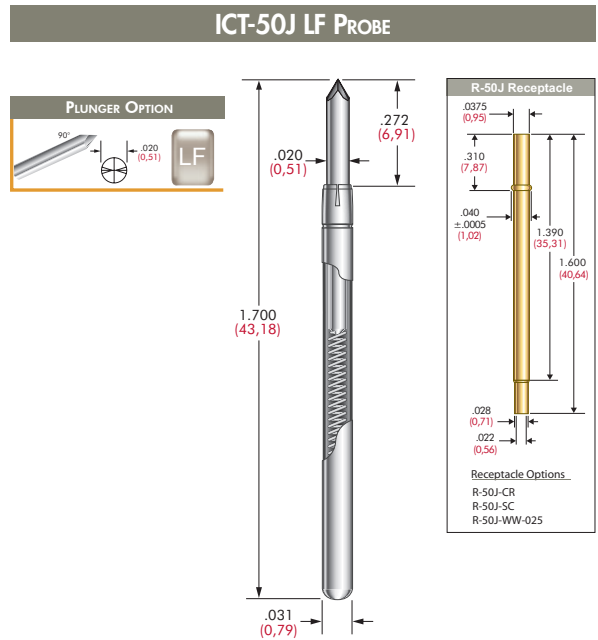
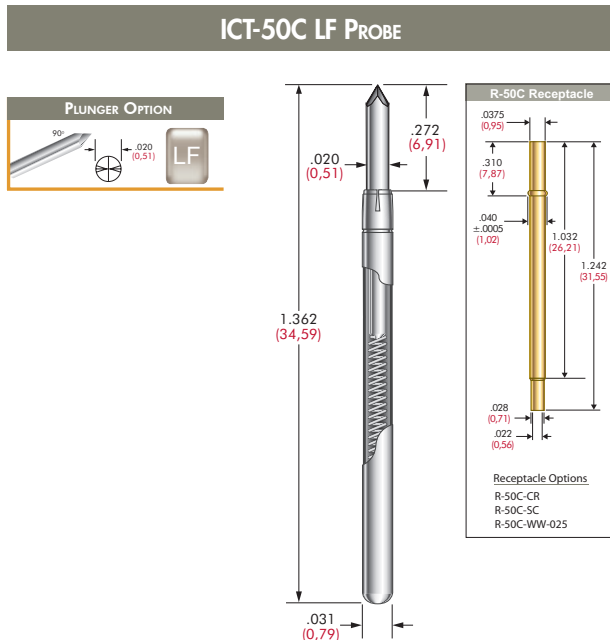
Drill Size: 1,45mm  
 Mounting Hole Size: .055/.057 (1,40/1,45)  
 Recommended Wire: 24-28 gage

## HOW TO ORDER

ICT - 075 - LF - 7 - D - S

Specifications subject to change without notice.  
 Dimensions in inches (millimeters)

# Lead Free Test Probes



## PROBE SPECIFICATIONS

Minimum Centers:  $.050$  (1,27)  
 Current Rating: 3 amps continuous  
 Spring Force: 5.6 oz. @  $.170$  (4,32) travel  
 Typical Resistance:  $<60$  m $\Omega$  against lead free surface  
 Maximum Travel:  $.250$  (6,35)  
 Working Travel:  $.170$  (4,32)

## MATERIALS

Barrel: DuraGold®  
 Spring: Music wire, nickel plated  
 Plunger: Steel, Duralloy™ plated  
 Receptacle: Beryllium copper, gold plated

## RECEPTACLE SPECIFICATIONS

Drill Size: #61  
 Mounting Hole Size:  $.0385/.0390$  (0,98/0,99)  
 Recommended Wire: 28-30 gage

## HOW TO ORDER

ICT - 50C - LF - 5.6 - DGD - S

Specifications subject to change without notice.  
 Dimensions in inches (millimeters)

## PROBE SPECIFICATIONS

Minimum Centers:  $.050$  (1,27)  
 Current Rating: 3 amps continuous  
 Spring Force: 7.0 oz. @  $.170$  (4,32) travel  
 Typical Resistance:  $<70$  m $\Omega$  against lead free surface  
 Maximum Travel:  $.250$  (6,35)  
 Working Travel:  $.170$  (4,32)

## MATERIALS

Barrel: DuraGold®  
 Spring: Music wire, nickel plated  
 Plunger: Steel, Duralloy™ plated  
 Receptacle: Beryllium copper, gold plated

## RECEPTACLE SPECIFICATIONS

Drill Size: #61  
 Mounting Hole Size:  $.0385/.0390$  (0,98/0,99)  
 Recommended Wire: 28-30 gage

## HOW TO ORDER

ICT - 50J - LF - 7 - DGD - S

Specifications subject to change without notice.  
 Dimensions in inches (millimeters)

