

DL-ISO
High Voltage Optically Isolated Probes

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935237-00 Rev A

The DL-ISO probes enable the highest confidence in GaN and SiC device characterization with highest accuracy, best signal fidelity and comprehensive connectivity for testing servers, motherboards, mobiles, lighting and building automation, residential inverters, UPS, switch-mode power supplies and motors. With up to 1 GHz bandwidth, 2500 V differential input range and 60 kV common mode range, they provide an industry-leading 1.5% system accuracy when used with 12-bit High Definition Oscilloscopes.

For the complete manual, visit:
teledynelecroy.com/probes/high-voltage-optically-isolated-probes

Compatibility

Use only with compatible Teledyne LeCroy instruments running Windows 10 and 64-bit MAUI firmware v.10.1.x.x or higher. For a current list of compatible instruments, visit:
teledynelecroy.com/probes/high-voltage-optically-isolated-probes

Standard Parts

DL-ISO Probe
Optical probe head and control module connected by integrated fiber-optic cable, transmits appropriately attenuated voltage to the oscilloscope input.

External AC to DC Adapter
Provides appropriately isolated and floating output voltage to power the probe. From CUI, Inc., Part Number: SMI36-24.

Tripod Probe Mount
Secures probe above circuit in a stationary test setup.

Soft Storage Case
Soft case with custom foam insert.

Tips

At least one attenuating tip is required for operation.

MMCX Tips High-quality coaxial attenuating tips reject unwanted noise while terminating into standard MMCX connectors.	
DL-ISO-2V-TIP	2 Vpp input dynamic range 50 V (DC+Peak AC) max. non-destruct*
DL-ISO-10V-TIP	10 Vpp input dynamic range 100 V (DC+Peak AC) max. non-destruct*
DL-ISO-40V-TIP	40 Vpp input dynamic range 250 V (DC+Peak AC) max. non-destruct*
DL-ISO-200V-TIP	200 Vpp input dynamic range 300 V (DC+Peak AC) max. non-destruct*
High Voltage Square Pin Tips HV safe attenuating tips connect to square-pin headers.	
DL-ISO-1000V-Tip	1000 Vpp input dynamic range 1250 V (DC+Peak AC) max. non-destruct*
DL-ISO-2500V-Tip	2500 Vpp input dynamic range 3300 V (DC+Peak AC) max. non-destruct*

** Refer to the tip derating graph below for values to 1 GHz maximum.*

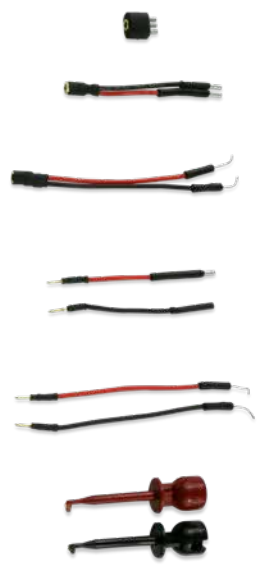
Tip Accessories

WARNING: The probe, tips and accessories are classified No Rated Measurement Category per IEC/EN 61010-2-030:2021 definitions. No Rated Measurement Category applies to circuits not directly connected to the mains supply. The measurement terminals of the probe as well as all accessories are **to be used only for measurements on circuits not directly connected to the mains.** The probe and accessories are **not rated for CAT II, III or IV measurements.**

WARNING: The Measurement Category and voltage rating is the **lower** of the probe tip or accessory used. **Do not exceed the CAT, voltage or current rating of the lowest rated individual component.**

Tip Accessory Kit Includes all the following to extend the probe tip connection to the DUT. Part Number: DL-ISO-ACC-KIT.	
MMCX to Square-pin Adapter	250 V (DC+Peak AC) max. operating* 300 V (DC+Peak AC) max. non-destruct*
2" MMCX to Y-lead Socket	
3" MMCX to Y-lead Solder-in	
2" Socket	2500 V (DC+Peak AC) max. operating* 3300 V (DC+Peak AC) max. non-destruct*
3" Solder-in	
Grabbers	

** Input dynamic range is tip dependent. Accessories derate the same as the tip used. Refer to the tip derating graph below.*



Probe Assembly and Connection

1. Connect the supplied AC to DC adapter to the DC inlet port on the control module, then connect to AC power.

   CAUTION: Use only the adapter shipped with the probe. The probe must be powered from a supply that provides appropriately isolated and floating output voltage (i.e., no Earth connection).

2. Connect the probe to the oscilloscope through the ProBus interface.
3. Insert the probe tip into the connector on the probe head. Be sure the arrows on the connectors align.
4. Connect the tip to a de-energized circuit.



Connecting Tips

MMCX tips can be used for low-voltage signals up to their rated amplitude. Seat MMCX tips directly into MMCX connectors on the circuit.



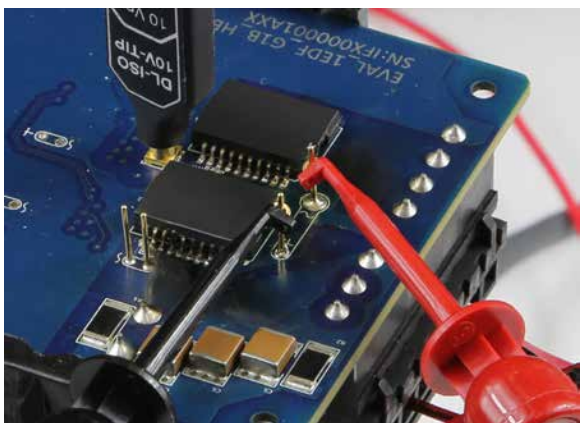
To connect MMCX tips to square-pin headers, attach the MMCX to square-pin adapter to the tip, then press it onto the pins.

Note: The order of the three pins in the adapter is reference-signal-reference.



HV square-pin tips connect to differential +ve and -ve signals on circuits. On the tip, you will see a red + and a white - indicating which side connects to signal and which to reference.

Most tip accessories have a red and a black interface. Red connects to signal and black connects to reference.



Operation

When the probe is connected to an oscilloscope, the DLxx-ISO probe dialog is displayed behind the input channel setup dialog (C*n*). It shows the connected probe's attributes.

Use the buttons for **Precision Gain Calibration** and **Auto Zero** to initiate those procedures.

Calibration Status indicator shows whether the Gain Calibration in use is valid (green checkmark Pass) or is invalid and should be repeated (red X Fail).

Warming Up indicator shows whether probe is still in warm-up phase or ready for use.

Use the **External Power On/Off** checkbox to turn off power from the AC to DC adapter without physically disconnecting it from the probe.



DLxx-ISO probe dialog.

Precision Gain Calibration

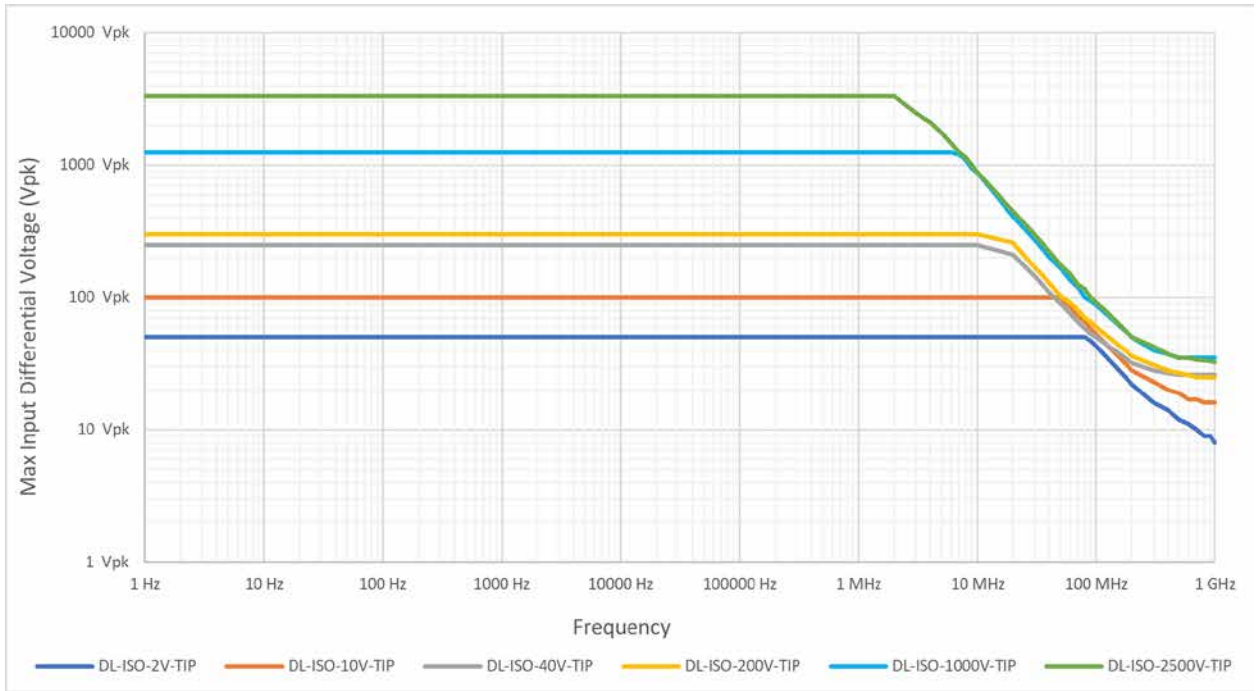
Perform a Precision Gain Calibration prior to each use to ensure specified gain accuracy for the current configuration. Calibration includes an Auto Zero procedure.

1. De-energize the circuit under test. It is not necessary to disconnect the probe.
2. Warm up oscilloscope and probe until the "warming up" indicator on the probe dialog disappears.
3. Touch the Precision Gain Calibration button.

Each calibration is valid for the same configuration and temperature (±5 °C) at which it was last performed. The temperature is polled to determine whether the probe is still in the ±5 °C valid temperature range.

Calibrations are not cached, they must be repeated whenever the temperature changes more than ±5 °C or the probe is disconnected and reconnected.

Non-destruct Input Voltage (tip derating)



Safety Symbols

These symbols appear on the probe or in documentation.

	**HIGH VOLTAGE WARNING.** Risk of electric shock or burn.
	**CAUTION** of damage to equipment, or **WARNING** of hazard to health. Refer to the accompanying information in the product manual to protect against personal injury or damage. Do not proceed until conditions are fully understood and met.
	**ESD CAUTION.** Risk of Electrostatic Discharge (ESD) that can damage equipment if anti-static measures are not taken.
	Laser Safety **WARNING.**

Terms

The terms *isolated* and *electrically floating* are used in documentation to indicate measurements where there is no direct conduction path to earth ground.

Compliance

The DL-ISO probes conform to the following standards:

IEC/EN 61010-1:2010/A1:2019 - Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements

IEC/EN 61010-2-030:2021 - Particular Requirements for Equipment Having Testing or Measuring Circuits

IEC/EN 60825–1 - Safety of Laser Products
Part 1: Equipment Classification and Requirements - Edition 3 (2014)

US 21CFR Part 1010 - Performance Standards for Electronic Products: General

US 21CFR Part 1040 - Performance Standards for Light-Emitting Products



The DL-ISO probes comply with the applicable European Union requirements to Directives 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE). For information about proper disposal and recycling of your Teledyne LeCroy product, visit: ***teledynelecroy.com/recycle.***

Unless otherwise specified, all materials and processes are compliant with RoHS Directive 2011/65/EU in its entirety, inclusive of any further amendments or modifications of said Directive.

Electrical Specifications

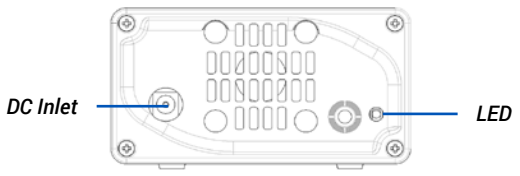
Bandwidth (probe + oscilloscope)	350 MHz, 700 MHz or 1 GHz
Input Dynamic Range, with	
DL-ISO-2V-TIP	2 Vpp
DL-ISO-10V-TIP	10 Vpp
DL-ISO-40V-TIP	40 Vpp
DL-ISO-200V-TIP	200 Vpp
DL-ISO-1000V-TIP	1000 Vpp
DL-ISO-2500V-TIP	2500 Vpp
Max. Common Mode Voltage (either input to ground)	± 60 kV (DC + peak AC)*
Max. Input Voltage to Earth (either input to ground)	± 60 kV (DC + peak AC)*

** Not rated for hand-held use. Maintain adequate spacing between probe components and earth ground.*

Environmental Specifications

Temperature, Operating Probe Head	5 °C to 40 °C
Temperature, Operating Control Module	10 °C to 35 °C
Temperature, Non-Operating	-20 °C to 70 °C
Relative Humidity	5% to 95% RH (non-condensing), 75% RH above 30 °C, 45% RH above 40 °C
Altitude, Operating	3,000 m (9,842 ft.) maximum
Altitude, Non-Operating	10,000 m
Pollution Degree	2, indoor use only. Per IEC/EN 61010-1:2010, this is an operating environment where normally only dry, non-conductive pollution occurs. Conductivity caused by temporary condensation should be expected.

LED Indicators



LED	Indicates
Steady Red	Probe is malfuctioning, contact Service
Steady Green	Probe is functional

Cleaning

Clean only the exterior surfaces of the probe using a soft cloth dampened with water or 75% isopropyl alcohol solution. Do not use harsh chemicals or abrasive cleansers. Dry the probe and accessories thoroughly before making voltage measurements.

CAUTION: The probe casing is not waterproof. Under no circumstances submerge the probe in liquid or allow moisture to penetrate it.

Factory Calibration

The recommended factory calibration interval is one year. For service, contact Teledyne LeCroy.

Warranty

For warranty information, visit our website at:
teledynelecroy.com/support/service.aspx

Contact

For assistance in the US, contact Technical Support at:

Ph: 800-553-2769 / 845-425-2000
Fax: 845-578-5985
support@teledynelecroy.com

A complete list of regional offices is available from:
teledynelecroy.com/support/contact.

High Voltage Safety

Not rated for hand-held use. Do not handle probe tip connectors, cables or any part of the probe head if there is any possibility >60 Vdc/30 Vrms is present in the circuit. The plastic case of the probe head and tip shields do not provide safe isolation.

Do not connect tips to an energized circuit. Always de-energize the circuit under test before installing or removing tips.

Beware when using with high-voltage or high-frequency signals. Read the manual thoroughly before use to understand how the probe and accessories are derated depending on use. Refer to the tip derating and RF burn limit graphs.

General Safety Precautions

The overall safety of any system incorporating this probe is the responsibility of the system owner.

For use only by trained personnel. Not for use in households or by children.

Use only as specified. Using the probe and/or the equipment it is connected to in a manner other than specified may impair the protection mechanisms.

Before use, test the probe with a known source to ensure it is operating correctly.

Do not overload; observe all terminal ratings. Do not connect the probe to any circuit that exceeds the CAT, voltage or current ratings of the oscilloscope terminal, probe or probe-accessory combination.

Use only accessories compatible with the probe. Use only accessories that are rated for the application. Using accessories other than those shipped with the probe may create an electrical hazard.

Connect and disconnect properly. Connect the probe to the oscilloscope before connecting to the circuit being measured. De-energize the test circuit before connecting/disconnecting probe tips.

Keep the probe head and fiber-optic cable away from the circuits being measured. Only tips are intended for contact with electrical sources.

Do not excessively bend cables. Avoid tight radius bends, crushing, crimping, twisting or otherwise stressing cables.

Do not remove the probe's casing. Touching exposed connections may result in electric shock.

Do not disassemble the probe or remove inside parts. Refer all service to Teledyne LeCroy personnel.

Use only indoors within the operational environment listed. Do not use in wet or explosive atmospheres.

Keep product surfaces clean and dry.

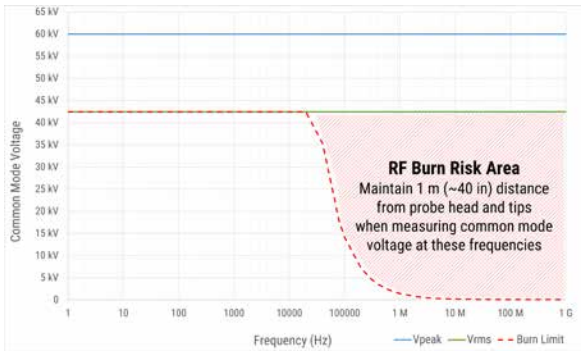
Do not use damaged cables. Before each use, check all cables for damage to the protective insulation.

Do not operate with suspected failures. Before each use, inspect the probe and accessories. If any part is damaged, cease operation immediately and secure the probe from inadvertent use.

Clearance Requirements

The unique common mode voltage range of the probe system allows it to be used in the presence of high-frequency/high-voltage common mode signals, but it is important to observe all precautions while using it.

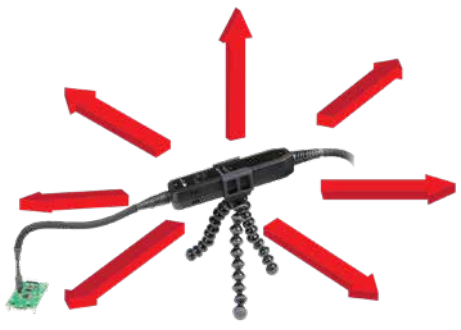
WARNING: RF burns or electric shock can occur when using the DL-ISO probes. The plastic case of the probe head and tip shields do not provide safe isolation from hazardous common mode voltages. Do not access the probe while measuring signals in the RF burn risk area.



Maximum safe handling limits for common mode voltages between the probe head and tips with respect to earth ground.

WARNING: Maintain 1m (~40 in) safe clearance of the probe head and tip in all directions when connected to an energized circuit. Place the oscilloscope and any equipment you need to access at least 1m away from the circuit and probe head.

Clear 1 meter in all directions



Laser Safety

CLASS 1 LASER PRODUCT

WARNING: The DL-ISO probes contain multiple lasers, exposing which may cause laser burns. Do not remove any plastic or metal covers or otherwise attempt to disassemble the probe.

Using controls, adjustments or procedures other than those specified in the product manual may result in exposure to hazardous levels of invisible radiation.

The probe uses optical fibers within a single cable between the probe head and control module. Therefore, standard optical fiber handling practices are required. **Avoid tight radius bends, crushing, crimping, twisting or otherwise stressing the fiber-optic cable.**

Minimum cable radius bend is 2 in (5.1 cm); avoid making loops smaller than 4 in (10.2 cm).

Before each use, inspect the fiber-optic cable for damage such as tears in the outer sleeve or other defects. If the corrugated plastic inner sleeve is visible or punctured, cease operation immediately and secure the probe from inadvertent use.



DL-ISO Fiber-optic Cable