TELEDYNE TEST TOOLS
Everywhereyoulook™

T3LCR1002, T3LCR1100, T3LCR1300

Precision LCR Meters

Quick Start Guide

SAFETY INSTRUCTIONS

Safety Symbols

These safety symbols may appear in the quick start guide or on the instrument.

⚠ WARNING	Warning: Identifies conditions or practices that could result in injury or loss of life.
⚠ CAUTION	Caution: Identifies conditions or practices that could result in damage to the instrument or to other properties.

When you notice any of the unusual conditions listed below, immediately terminate operation and disconnect the power cable.

Please contact the Teledyne service center representative for repair of the instrument. If you continue to operate without repairing the instrument, there is a potential fire or shock hazard for operators.

The instrument is operating abnormally if:

- The instrument emits abnormal noise, smell, smoke, or a spark-like light during the operation.
- The instrument generates high temperature or electrical shock during operation.
- The power cable, plug, or receptacle on the instrument is damaged.
- Foreign substances or liquid has fallen into the instrument.

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.

Disclaimer	Teledyne assumes no liability for the customer's failure to comply with these requirements.
Ground The Instrument	To avoid electric shock hazards, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.
DO NOT Operate In An Explosive Atmosphere	Do not operate the instrument in the presence of inflammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
Keep Away From Live Circuits	Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable is removed. To avoid injuries, always disconnect the power and discharge the circuits before touching them.
DO NOT Service Or Adjust Alone	Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
DO NOT Substitute Parts Or Modify Instrument	Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Teledyne authorized service center for service and repair to ensure that safety features are maintained.

GETTING STARTED

This chapter describes names and functions of the front panel, rear panel, and screen display and provides the basic procedures for operating the T3LCR series.

Overview

The Teledyne T3LCR series is a general-purpose LCR meter for incoming inspection of components, quality control, and laboratory use.

The T3LCR series is used for evaluating LCR components, materials, and semiconductor devices over a wide range of frequencies (10 Hz to 300 kHz) and test signal levels (10.00mV to 2.00V & 100.0uA to 20.00mA).

With its built-in comparator, the T3LCR series can output comparison/decision results for sorting components into a maximum of ten bins. Furthermore, by using the handler interface, the T3LCR series can be easily combined with a component handler, and a system controller to fully automate component testing, sorting, and quality- control data processing.

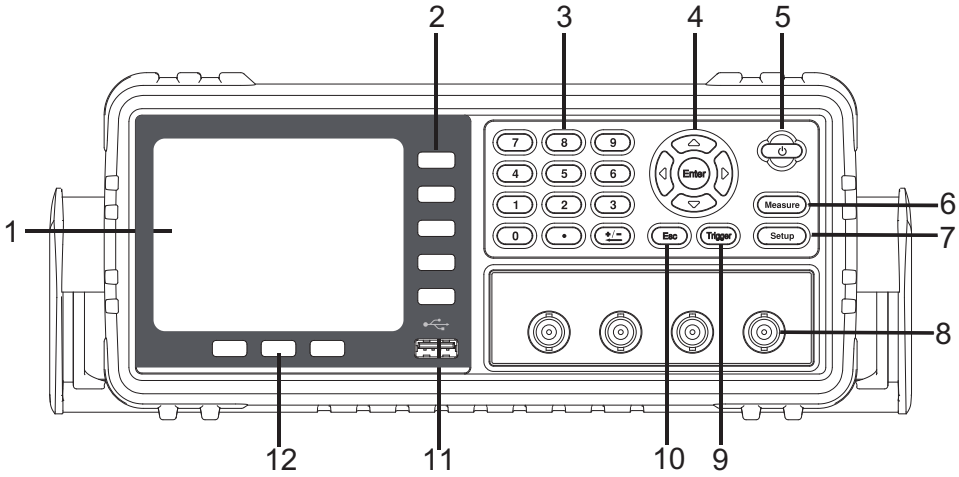
The list *Meas* function permits entry of up to 10 frequencies or test signal levels points to be automatically measured.

Main Features

Correction Function	• OPEN/SHORT correction Eliminates measurement errors due to stray parasitic impedance in the test fixtures.
Comparator Function (Sorting)	• Bin sort The primary parameter can be sorted into BIN1- BIN9, AUX, OUT and HI/IN/LO for each of the primary measurement parameters. The sequential mode or tolerance mode can be selected as the sorting mode.

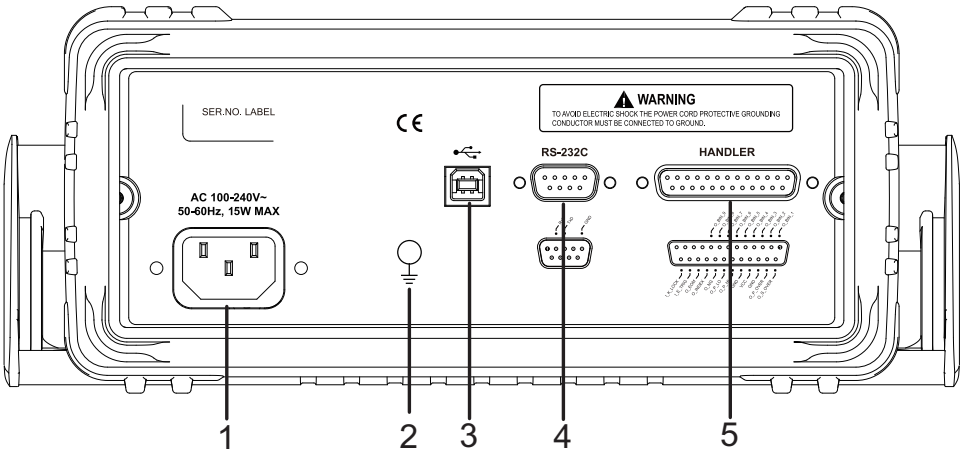
	• Limit Setup Absolute value, deviation value, and % deviation value can be used for setup. • BIN count Countable from 0 to 999999
Files	• Up to 10 setup conditions can be written to/read from the built-in non-volatile memory.
Key Lock	• The front panel keys can be locked.
RS-232	• Complies with SCPI.

Front Panel



Description	
1. LCD Display	2. Soft-key
3. Number Key	4. Cursor Key
5. Power Switch	6. Measure key
7. Setup Key	8. BNC Terminal
9. Trigger Key	10. ESC Key
11. USB Disk Port (USB-Host)	12. System Soft-key

Rear Panel



Description
1. Power Cable Receptacle(Outlet)
2. Frame Terminal
3. USB Interface (Type B)
4. RS-232 Interface
5. Handler Interface

Power On

Press the power key for at least 2 seconds. Release power key when the POWER LED is lit.

Power Off

Press the power key at least 2 seconds. LCR down when you release the power key.

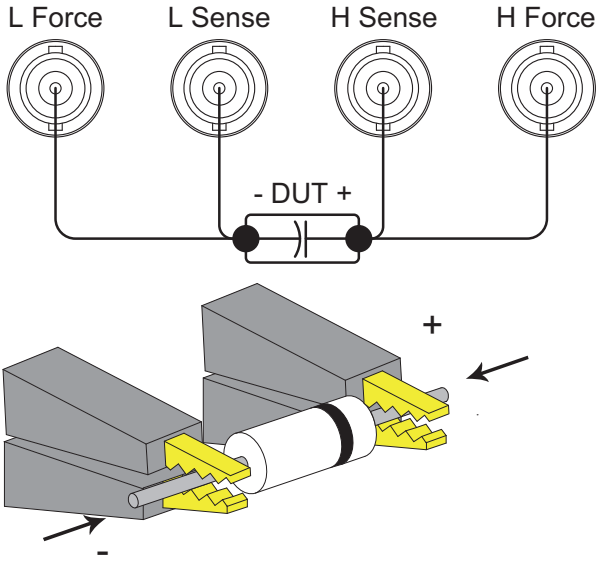
Warm-up Time

T3LCR series is ready to be used as soon as the power-up sequence has completed. However, to achieve the specification accuracy, first warm up the instrument for 30 minutes.

Connect to the Device Under Test (DUT)

The T3LCR series uses a four terminal measurement configuration that provides easy, accurate and stable measurements and avoids mutual inductance, interference from measurement signals, noise and other factors inherent with other types of connections.

Connect to DUT



WARNING

Identifies conditions or practices that could result in injury or loss of life. Do not apply DC voltage or current to the UNKNOWN terminals. Applying a DC voltage or current may lead to device failure. Connect the measurement sample (DUT) to the test port (or the test fixture, cables, etc. after the DUT has been completely discharged.

SPECIFICATIONS

The following are the basic specifications for the T3LCR series. For detailed specifications, please see the user manual

General Specification

Display	RGB color TFT-LCD, Size: 3.5" (320x240)
Test Function	Cs-Rs, Cs-D, Cp-Rp, Cp-D, Lp-Rp, Lp-Q, Ls-Rs, Ls-Q, Rs-Q, Rp-Q, R-X, DCR, Z-θr, Z-θd, Z-D, Z-Q
Monitor Parameter	Z, D, Q, Vac, Iac, Δ, Δ%, θr, θd, R, X, G, B, Y (2 Parameter)
	40 times/s, 10 times/s, 3 times/s
Test Frequency	T3LCR1300: 10Hz-300kHz T3LCR1100: 10Hz-100kHz T3LCR1002: 10Hz-2kHz

Frequency range and resolution

Frequency range(F)	Resolution
10.00Hz ≤ F ≤ 99.99Hz	0.01Hz
100.0Hz ≤ F ≤ 999.9Hz	0.1Hz
1.000Hz ≤ F ≤ 9.999Hz	1Hz
10.00kHz ≤ F ≤ 99.99kHz	10Hz
100.0kHz ≤ F ≤ 300.0kHz	100Hz

Frequency Accuracy

Frequency range(F) ±0.01% 4 digit resolution

Display Range

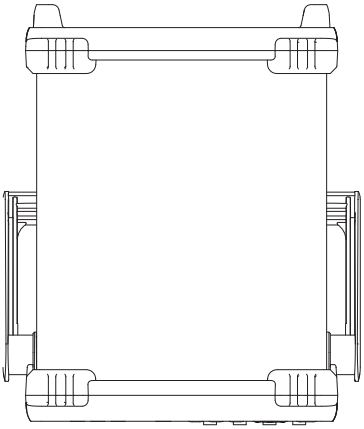
Parameter	Resolution
L	0.00001uH-9999.99H
C	0.00001pF-9999.99mF
R, X, |Z|	0.00001Ω-99.9999MΩ
G, B, |Y|	0.01nS-999.999S
D	0.00001-9.99999
Q	0.00001-99999.9
θd	-179.999°-179.999°
θr	-3.14159-3.14159
DCR	0.00001Ω-99.9999MΩ
Δ%	-999999%-999999%
AC Test signal level	10.00mV-2.00V (±10%) CV: 10.00mV-2.00V (±6%) 100.0uA-20.00mA (±10%) CC: 100.0uA-20.00mA(±6%) (@2VMax)
DCR Test signal level	+2V, 0.066A(Max.), Output impedance fixed 30Ω
DC Bias: Internal	±2.5V (0.5%+0.005V)
List Test	10Step (Frequency/Voltage/Current)
Output impedance	30Ω, 50Ω and 100Ω
Ranging	Auto, Hold and Nominal range. Total 9 Ranges.
Equivalent Circuit	Serial and Parallel
OPEN/SHORT Test	OPEN/SHORT Zeroing (ALL,SPOT)
Files	built-in 10 files and USB Disk 10 files, 9999 Log File, 999 Picture File, 10000 Data (.csv)
Beep Feature	OFF/PASS/FAIL
Trigger Mode	Internal, Manual, External and Bus Trigger.

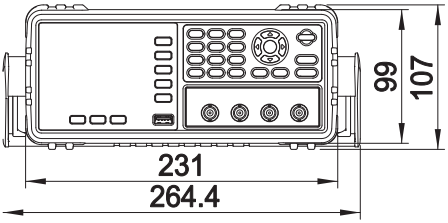
Interface	Handler interface and RS232/USB interface.

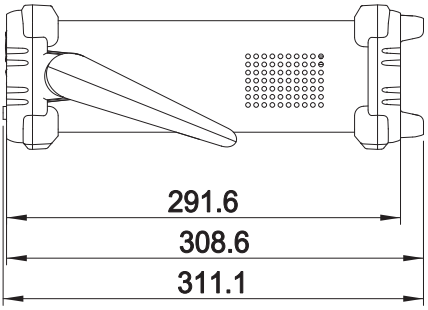
Environment

Specification Conditions	Temperature: 23˚C±5˚C, Relative Humidity: < 70%RH
Operating Environment	Temperature: 0~50˚C, Relative Humidity: <70%RH (Indoor use only, Altitude: 2000 meters)
Storage Conditions	Temperature: -10~70˚C, Relative Humidity: <80%RH
Power Source	AC 100V-240V, 50Hz-60Hz
Fuse	2A Slow-Blow
Maximum rated power	30W
Weight	3kg, net

DIMENSIONS







CERTIFICATIONS

Teledyne LeCroy certifies compliance to the following standards as of the time of publication. Please see the EC Declaration of Conformity document shipped with your product for current certifications.

EMC Compliance

EC DECLARATION OF CONFORMITY - EMC

The instrument meets intent of EC Directive 2014/30/EU for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications listed in the Official Journal of the European Communities:

EN 61326-1:2013, EN 61326-2-1:2013 EMC requirements for electrical equipment for measurement, control, and laboratory use.[1]

Electromagnetic Emissions:

EN 55011:2016+A1:2017, Radiated and Conducted Emissions Group 1, Class A [2] [3]

EN 61000-3-2:2014 Harmonic Current Emissions, Class A

EN 61000-3-3:2013 Voltage Fluctuations and Flickers, Pst = 1

Electromagnetic Immunity:

EN 61000-4-2:2009 Electrostatic Discharge, 4 kV contact, 8 kV air, 4 kV vertical/horizontal coupling planes [4]

EN 61000-4-3:2006+ A2:2010 RF Radiated Electromagnetic Field,

3 V/m, 80-1000 MHz; 3 V/m, 1400 MHz - 2 GHz; 1 V/m, 2 GHz - 2.7 GHz

EN 61000-4-4:2012 Electrical Fast Transient/Burst, 1 kV on power supply lines, 0.5 kV on I/O signal data and control lines [4]

EN 61000-4-5:2014+A1:2017 Power Line Surge, 1 kV AC Mains, L-N, L-PE, N-PE[4]

EN 61000-4-6:2014 RF Conducted Electromagnetic Field, 3 Vrms, 0.15 MHz - 80 MHz

EN 61000-4-11:2004+A1:2017 Mains Dips and Interruptions, 0%/1 cycle, 70%/25 cycles, 0%/250 cycles [4 5]

[1] To ensure compliance with all applicable EMC standards, use high-quality shielded interface cables.

[2] Emissions which exceed the levels required by this standard may occur when the instrument is connected to a test object.

[3] This product is intended for use in nonresidential areas only. Use in residential areas may cause electromagnetic interference.

[4] Meets Performance Criteria "B" limits of the respective standard: during the disturbance, product undergoes a temporary degradation or loss of function or performance which is self-recoverable.

[5] Performance Criteria "C" applied for 70%/25 cycle voltage dips and for 0%/250 cycle voltage interruption test levels per EN61000-4-11.

European Contact:*

Teledyne GmbH, European Division

Im Breitspiel 11c

D-69126 Heidelberg

Germany

Tel: + 49 6221 82700

AUSTRALIA & NEW ZEALAND DECLARATION OF CONFORMITY – EMC

The instrument complies with the EMC provision of the Radio Communications Act per the following standards, in accordance with requirements imposed by Australian Communication and Media Authority (ACMA):

AS/NZS CISPR 11:2015 Radiated and Conducted Emissions, Group 1, Class A.

Australia / New Zealand Contacts:*

RS Components Pty Ltd.	RS Components Ltd.
Suite 326 The Parade West	Units 30 & 31 Warehouse World
Kent Town, South Australia 5067	761 Great South Road
	Penrose, Auckland, New Zealand

* Visit teledynelecroy.com/support/contact for the latest contact information.

Safety Compliance

EC DECLARATION OF CONFORMITY – LOW VOLTAGE

The instrument meets intent of EC Directive 2014/35/EU for Product Safety. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use –

Part 1: General requirements

EN 61010-2:030:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use –

Part 2-030: Particular requirements for testing and measuring circuits

The design of the instrument has been verified to conform to the following limits put forth by these standards:

- Mains Supply Connector: Overvoltage Category II, instrument intended to be supplied from the building wiring at utilization points (socket outlets and similar).
- Measuring Circuit Terminals: No rated measurement category. Terminals not intended to be connected directly to the mains supply.

- Unit: Pollution Degree 2, operating environment where normally only dry, non-conductive pollution occurs. Temporary conductivity caused by condensation should be expected.

Environmental Compliance

END-OF-LIFE HANDLING

The instrument is marked with this symbol to indicate that it complies with the applicable European Union requirements of Directives 2012/19/EU and 2006/66/EC on Waste Electrical and Electronic Equipment (WEEE) and Batteries.

The instrument is subject to disposal and recycling regulations that vary by country and region. Many countries prohibit the disposal of waste electronic equipment in standard waste receptacles. For more information about proper disposal and recycling of your Teledyne LeCroy product, please visit teledynelecroy.com/recycle.

RESTRICTION OF HAZARDOUS SUBSTANCES (RoHS)

EC DECLARATION OF CONFORMITY – RoHS

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

CHINA RoHS 2

Unless otherwise specified, all the materials and processes are compliant with the latest requirements of China RoHS 2. The hazardous substances contained in the instrument are disclosed in accordance with the standards SJ/T 11364-2014 (Marking for the restricted use of hazardous substances in electronic and electrical products) and GB/T 26572-2011 (Requirements on concentration

limits for certain restricted substances in electrical and electronic products). The instrument is marked with an appropriate Environmental Friendly Use Period (EFUP) symbol. The packaging materials include the appropriate recycling labels. The below substance disclosure tables (in Chinese and English languages) provide the required compliance information.

部件名称	有毒有害物质和元素					
	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
	(Pb)	(Hg)	(Cd)	(Cr6+)	(PBB)	(PBDE)
PCBAs	X	O	O	O	O	O
机械硬件	O	O	O	O	O	O
金属片	O	O	O	O	O	O
塑料部件	O	O	O	O	O	O
电缆组件	X	O	O	O	O	O
显示器	O	O	O	O	O	O
电源	O	O	O	O	O	O
风扇	O	O	O	O	O	O
电池	O	O	O	O	O	O
电源线	O	O	O	O	O	O
外部电源(如有)	X	O	O	O	O	O
探头(如有)	X	O	O	O	O	O
熔丝(如有)	O	O	O	O	O	O
产品外壳(如有)	O	O	O	O	O	O
适配器/模块(如有)	O	O	O	O	O	O
鼠标(如有)	O	O	O	O	O	O
O: 表明该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11364-2014 标准规定的限量要求之下。						
X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11364-2014 标准规定的限量要求。						

EFUP (对环境友好的使用时间): 30 年。

使用条件：参阅用户手册“环境条件”部分的规定。

探头 EFUP: 10 年。

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr6+)	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCBAs	X	O	O	O	O	O
Mechanical Hardware	O	O	O	O	O	O
Sheet Metal	O	O	O	O	O	O
Plastic Parts	O	O	O	O	O	O
Cable Assemblies	X	O	O	O	O	O
Display	O	O	O	O	O	O
Power Supply	O	O	O	O	O	O
Fans	O	O	O	O	O	O
Batteries	O	O	O	O	O	O
Power Cord	O	O	O	O	O	O
Ext Power Supply (if present)	X	O	O	O	O	O
Probes (if present)	X	O	O	O	O	O
Fuse (if present)	O	O	O	O	O	O
Product Case (if present)	O	O	O	O	O	O
Adapters/Modules (if present)	O	O	O	O	O	O
Mouse (if present)	O	O	O	O	O	O
O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement specified in SJ/T11364-2014.						
X: Indicates that this toxic or hazardous substance contained in at least one of the homogenous materials used for this part is above the limit requirement specified in SJ/T11364-2014.						

EFUP (Environmental Friendly Use Period): 30 years.

Use Conditions: Refer to the environmental conditions stated in the User Manual.

EFUP for Probes: 10 years.

ABOUT TELEDYNE TEST TOOLS

TELEDYNE TEST TOOLS
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Company Profile

Teledyne LeCroy is a leading provider of oscilloscopes, protocol analyzers and related test and measurement solutions that enable companies across a wide range of industries to design and test electronic devices of all types. Since our founding in 1964, we have focused on creating products that improve productivity by helping engineers resolve design issues faster and more effectively. Oscilloscopes are tools used by designers and engineers to measure and analyze complex electronic signals in order to develop high-performance systems and to validate electronic designs in order to improve time to market.

The Teledyne Test Tools brand extends the Teledyne LeCroy product portfolio with a comprehensive range of test equipment solutions. This new range of products delivers a broad range of quality test solutions that enable engineers to rapidly validate product and design and reduce time-to-market. Designers, engineers and educators rely on Teledyne Test Tools solutions to meet their most challenging needs for testing, education and electronics validation.

Location and Facilities

Headquartered in Chestnut Ridge, New York, Teledyne Test Tools and Teledyne LeCroy has sales, service and development subsidiaries in the US and throughout Europe and Asia. Teledyne Test Tools and Teledyne LeCroy products are employed across a wide variety of industries, including semiconductor, computer, consumer electronics, education, military/aerospace, automotive/industrial, and telecommunications.

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World wide support contacts can be found at:
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