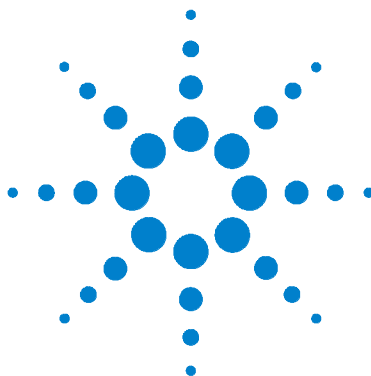




Agilent
U1731A/U1732A
Dual Display Handheld
LCR Meter

Quick Start Guide



Agilent Technologies

Safety Information

The Agilent U1731A and U1732A are safety-certified in compliance with the following safety and EMC requirements:

- IEC 61010-1:2001/EN 61010-1:2001 (2nd Edition)
- CISPR 11:2003+A1:2004
- IEC 61000-4-2:1995+A1:1998 +A2:2000
- IEC 61000-4-3:2006
- IEC 61000-4-4:2004
- IEC 61000-4-5:2005
- IEC 61000-4-6:2003+A1:2004+A2:2006
- IEC 61000-4-11:2004
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS CISPR11:2004

Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

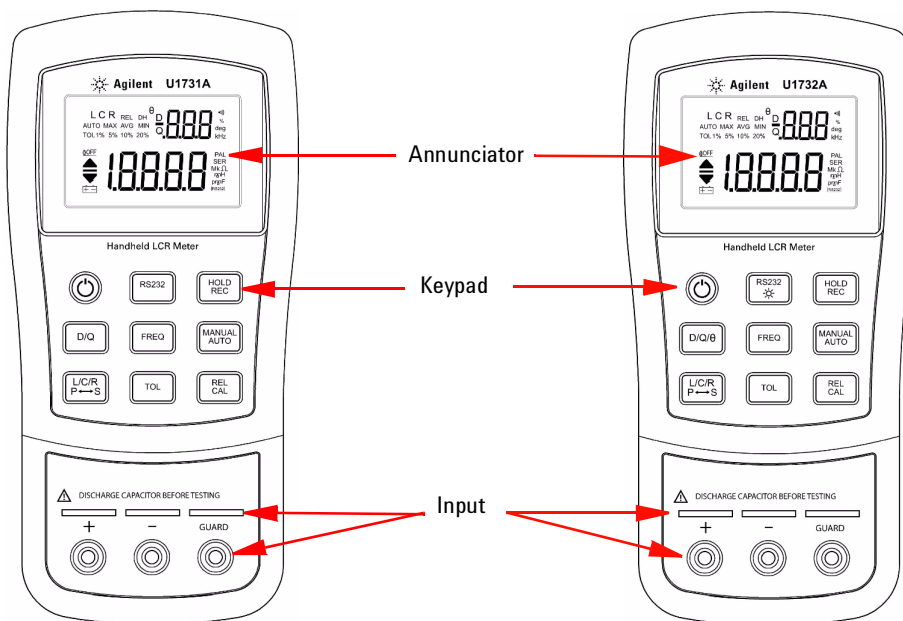
WARNING

WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

Safety Symbols

	Direct current
	Alternating current
	Three-phase alternating current
	Both direct and alternating current
	Earth (ground) terminal
	Equipotentiality
	Caution: hot surface
	Off (supply)
	On (supply)
	Protective conductor terminal
	Caution: risk of electric shock
	Out position of a bi-stable control
	In position of a bi-stable control
	Frame or chassis terminal
	Equipment protected throughout by double insulation or reinforced insulation
	Caution: risk of danger (refer to this manual for specific Warning or Caution information)

U1731A/U1732A Dual Display Handheld LCR Meter

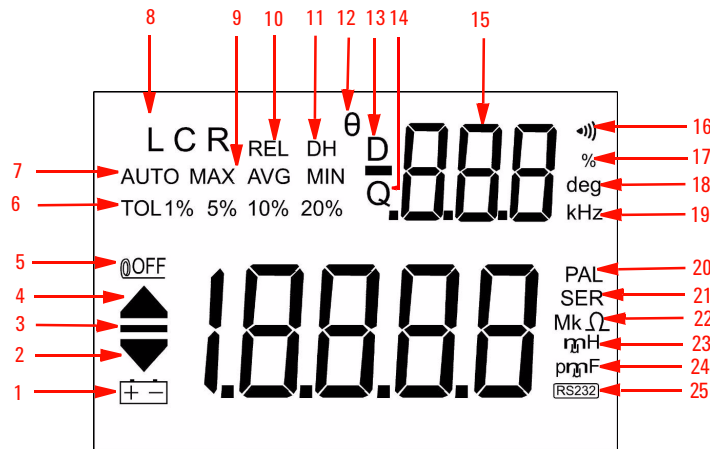


Special indication characters	
SrL	Indicates short connectors
OPn	Indicates open connectors
CAL	Indicates calibration mode
FUSE	Indicates damaged or open fuse

WARNING

To avoid damaging this instrument, do not exceed the input limit.

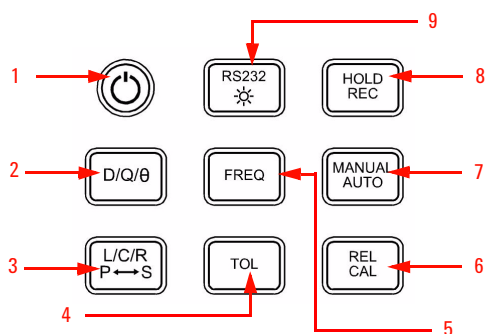
Display Annunciators



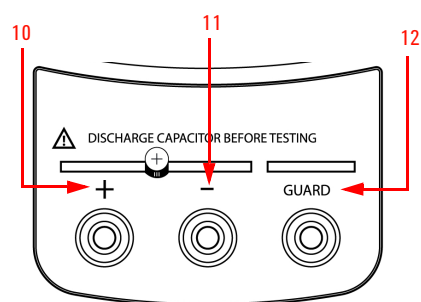
No.	Descriptions
1	Low battery indicator
2	Reading out of LO limit
3	Primary display -18888
4	Reading out of HI limit
5	Auto power off indicator
6	Tolerance mode, to set 1%, 5%, 10%, and 20% for sorting capacitance
7	AUTO range
8	Inductance, Capacitance, or Resistance (L,C, or R) function indicator
9	Static recording mode for MAX, MIN, AVG and Present (MAXAVGMIN)
10	Relative mode
11	Data hold to hold the displayed digital value
12	Phase angle indicator (only applicable for U1732A)
13	Dissipation factor indicator

No.	Descriptions
14	Quality factor indicator
15	Secondary display -888
16	Audible alert for tolerance and compare mode
17	Unit for tolerance display (percentage)
18	Unit for phase angle (degree) (only applicable for U1732A)
19	Unit for Beeper Frequency as setup mode
20	Parallel mode indicator
21	Series mode indicator
22	Unit for resistance (k Ω and M Ω)
23	Unit for inductance (μ H and mH)
24	Unit for capacitance (pF, nF, μ F, and mF)
25	Remote control

Keypad Operations



Terminals



No.	Keys	Functions
1	Power	To turn ON/OFF the instrument
2	D/Q/θ	To select dissipation factor, quality factor, and phase angle display (only applicable for U1732A)
3	L/C/R P↔S	To select inductance, capacitance, and resistance measurement To toggle parallel and series mode
4	TOL	Tolerance mode
5	FREQ	To select test frequency
6	REL CAL	Relative mode Calibration mode
7	Manual AUTO	Manual range Auto range
8	HOLD REC	Data hold Static recording mode
9	RS232 ☀	To toggle ON/OFF the remote function Backlight display (only applicable for U1732A)

No.	Terminals	Functions
10	+	Positive terminal/socket
11	-	Negative terminal/socket
12	GUARD	Guard terminal/socket

WARNING

To avoid damaging this instrument, do not exceed the input limit. Do not apply voltage to input terminals. Discharge the capacitor before testing.

Inductance/Capacitance/Resistance Measurement

Procedure:

- 1 Press the **L/C/R** key to select inductance (L), capacitance (C), or resistance (R) measurement.
- 2 Connect the red test clip or SMD tweezers to the + terminal and the black test clip to the - terminal.
- 3 Connect both the test clips to the component leads as required or use the SMD tweezers to measure SMD components.
- 4 Press the **FREQ** key to select the testing frequency.
- 5 Press the **D/Q/θ** key to select Q or D factor for secondary display as required.
- 6 Ensure that your hands are not touching the clips before taking the readings on the display.
- 7 The LCR measurements setup are shown in [Figure 1-1](#) to [Figure 1-1](#).

CAUTION

Degradation of some product specifications can occur in the presence of ambient electromagnetic (EM) fields and noise that affects the product's power line or I/O cables. The product self-recovers and operates to all specifications when:

- the source of the ambient EM field and noise is removed,
 - the product is protected from the ambient EM field, or
 - the product cabling is shielded from the ambient EM noise.
-

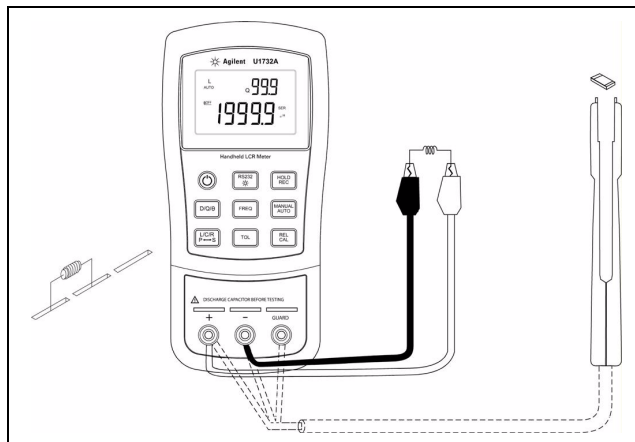


Figure 1-1 Inductance measurement

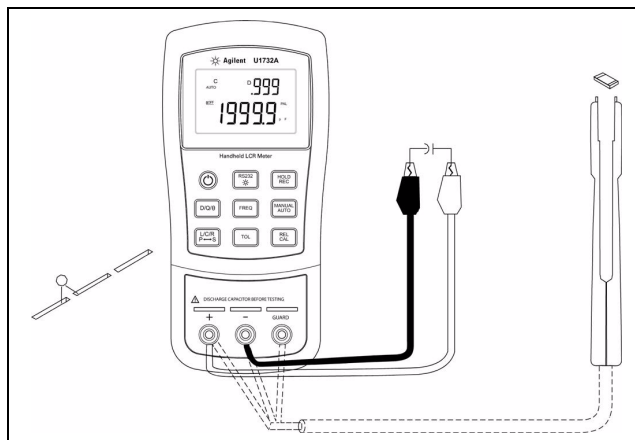


Figure 1-1 Capacitance measurement

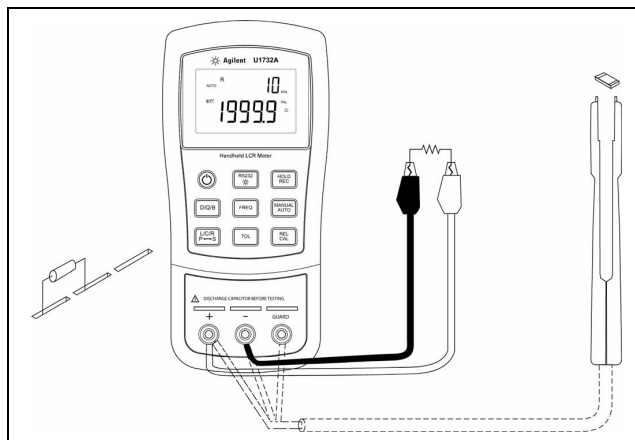


Figure 1-1 Resistance measurement

General Specifications

Parameter	U1731A	U1732A
Power supply	Single standard 9 V battery (Alkaline) External DC adaptor (DC 12 V _{MIN} — 15 V _{MAX} , Load 50 mA minimum)	
Display	L/C/R: Maximum display 19999 D/Q: Maximum display 999 (Auto Range)	
Measurements	L/C/R/D/Q	L/C/R/D/Q/θ
Measuring circuit mode	Inductance (L): Defaults to series mode Capacitance/Resistance (C/R): Defaults to parallel mode	
Ranging mode	Auto & Manual	
Measuring terminals	Three terminals with sockets	
Tolerance mode	1%, 5%, 10%	1%, 5%, 10%, 20%
Test signal level	~0.6 V _{RMS}	
Test frequency accuracy: ±0.1%	120 Hz = 120 Hz 1 kHz = 1010 Hz	100 Hz = 100 Hz 120 Hz = 120 Hz 1 kHz = 1010 Hz 10 kHz = 9.6 kHz
Measuring rate	1 time/s, nominal	
Response time	~1 s/ (manual range)	
Auto power-off	~5 mins without operations	
Low battery indicator	~6.8 V	
Operating temperature	0 °C – 40 °C	
Storage temperature	–20 °C – 60 °C (without battery)	
Storage humidity	0 – 80% R.H.	
Relative Humidity (R.H.)	0 – 70% R.H.	
Temperature coefficient	0.15 x (Specified accuracy)/°C (0 °C – 18 °C or 28 °C – 40 °C)	
Battery type	Alkaline: ANSI/NEDA: 1604A/IEC: 6LR61	
Power consumption	~40 mA for operation 0.08 mA after auto power-off	
Protective fuse	0.1 A/250 V fuse (input protective)	
Battery life	5 to 7 hours typical (without backlight based on new alkaline)	
Backlight display	Not available	Available
Weight	330 g	
Dimension (W x L x H)	87 mm x 184 mm x 41 mm	
Safety	Designed in compliance with IEC 61010-1 for Pollution Degree 2	

Parameter	U1731A	U1732A
Warranty	3 years	
Standard accessories	• Agilent U1731A/U1732A Product Reference CD-ROM • Agilent U1731A/U1732A Quick Start Guide • Alligator clip leads • 9 V alkaline battery • Certificate of Calibration	
Optional accessories	• IR to USB cable (ordering option: U5481A-FG) • Power adaptor (ordering option: U1780A-FG) • SMD tweezers (ordering option: U1782-FG) • Soft carrying case (ordering option: U1174A-FG)	

U1731A Electrical Specifications

Accuracy is expressed as $\pm$ (% of reading + number of least significant digits) at 23 °C $\pm$ 5 °C and <75% R.H.

Resistance (Parallel Mode), Test Frequency = 120 Hz/1 kHz

Range	Maximum Display	Accuracy		Specified Note
		@ 120 Hz	@ 1 kHz	
10 M Ω	9.999 M Ω	2.0% + 8	2.0% + 8 ¹	After open cal.
2000 k Ω	1999.9 k Ω	0.5% + 5	0.5% + 5	After open cal.
200 k Ω	199.99 k Ω	0.5% + 3	0.5% + 3	-
20 k Ω	19.999 k Ω	0.5% + 3	0.5% + 3	-
2000 Ω	1999.9 Ω	0.5% + 3	0.5% + 3	-
200 Ω	199.99 Ω	0.8% + 5	0.8% + 5	After short cal.
20 Ω	19.999 Ω	1.2% + 40	1.2% + 40	After short cal.

1 This specification is based on the battery operation.

NOTE

- 1 This specification is based on the measurement performed at the test socket.
- 2 Device Under Test (DUT) and test leads need to be properly shielded to GUARD if necessary.

Capacitance (Parallel Mode), Test Frequency = 120 Hz

Range	Maximum Display	Accuracy		Specified Note
		Capacitance	DF	
10 mF	19.99 mF ¹	3.0% + 5 (DF<0.1)	10% + 100/Cx + 5 (DF<0.1)	After short cal.
1000 µF	1999.9 µF ²	1.0% + 5 (DF<0.1)	2.0% + 100/Cx + 5 (DF<0.1)	After short cal.
200 µF	199.99 µF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
20 µF	19.999 µF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
2000 nF	1999.9 nF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
200 nF	199.99 nF	0.7% + 5 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	After open cal.
20 nF	19.999 pF	1.0% + 5 (DF<0.1)	2.0% + 100/Cx + 5 (DF<0.1)	After open cal.

1 This reading can be extended up to 1999 MAX display with accuracy that is not specified.

2 This reading can be extended up to 19999 MAX display with accuracy that is not specified.

Capacitance (Parallel Mode), Test Frequency = 1 kHz

Range	Maximum Display	Accuracy		Specified Note
		Capacitance	DF	
1 mF	1.999 mF ¹	3.0% + 5 (DF<0.1)	10.0% + 100/Cx + 5 (DF<0.1)	After short cal.
200 µF	199.99 µF	1.0% + 5 (DF<0.1)	2.0% + 100/Cx + 5 (DF<0.1)	After short cal.
20 µF	19.999 µF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
2000 nF	1999.9 µF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
200 nF	199.99 nF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
20 nF	19.999 nF	0.7% + 5 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	After open cal.
2000 pF	1999.9 pF	1.0% + 5 (DF<0.1)	2.0% + 100/Cx + 5 (DF<0.1)	After open cal.

1 This reading can be extended up to 1999 MAX display with accuracy that is not specified.

NOTE

- 1 Q value is the reciprocal of DF.
- 2 This specification is based on the measurement performed at the test socket.
- 3 DUT and test leads need to be properly shielded to GUARD if necessary.
- 4 Cx = Counts of displayed C value, e.g. C = 88.88 µF then Cx = 8888.

Inductance (Series Mode), Test Frequency = 120 Hz

Range	Maximum Display	Accuracy		Specified Note
		Inductance	DF	
1000 H	999.9 H	$1.0\% + (Lx/10000)\% + 5$	$2.0\% + 100/Lx + 5$	After open cal.
200 H	199.99 H	$0.7\% + (Lx/10000)\% + 5$	$1.2\% + 100/Lx + 5$	-
20 H	19.999 H	$0.7\% + (Lx/10000)\% + 5$	$1.2\% + 100/Lx + 5$	-
2000 mH	1999.9 mH	$0.7\% + (Lx/10000)\% + 5$	$1.2\% + 100/Lx + 5$	-
200 mH	199.99 mH	$1.0\% + (Lx/10000)\% + 5$	$3.0\% + 100/Lx + 5$	After short cal.
20 mH	19.999 mH	$2.0\% + (Lx/10000)\% + 5$	$10.0\% + 100/Lx + 5$	After short cal.

Inductance (Series Mode), Test Frequency = 1 kHz

Range	Maximum Display	Accuracy		Specified Note
		Inductance	DF	
100 H	99.99 H	$1.0\% + (Lx/10000)\% + 5$	$2.0\% + 100/Lx + 5$	After open cal.
20 H	19.999 H	$0.7\% + (Lx/10000)\% + 5$	$1.2\% + 100/Lx + 5$	-
2000 mH	1999.9 mH	$0.7\% + (Lx/10000)\% + 5$	$1.2\% + 100/Lx + 5$	-
200 mH	199.99 mH	$0.7\% + (Lx/10000)\% + 5$	$1.2\% + 100/Lx + 5$	-
20 mH	19.999 mH	$1.0\% + (Lx/10000)\% + 5$	$3.0\% + 100/Lx + 5$	After short cal.
2000 μ H	1999.9 μ H	$2.0\% + (Lx/10000)\% + 5$	$10.0\% + 100/Lx + 5$	After short cal.

NOTE

- 1 Q value is the reciprocal of DF.
- 2 This specification is based on the measurement performed at the test socket.
- 3 DUT and test leads need to be properly shielded to GUARD if necessary.
- 4 Lx = Counts of displayed L value, e.g. $L = 88.88$ H then $Lx = 8888$.

U1732A Electrical Specifications

Accuracy is expressed as $\pm$ (% of reading + number of least significant digits) at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and $<75\%$ R.H.

Resistance (Parallel Mode), Test Frequency = 100 Hz/120 Hz

Range	Maximum Display	Accuracy		Specified Note
		@ 100 Hz	@ 120 Hz	
10 M Ω	9.999 M Ω	2.0% + 8 ¹	2.0% + 8 ¹	After open cal.
2000 k Ω	1999.9 k Ω	0.5% + 5	0.5% + 5	After open cal.
200 k Ω	199.99 k Ω	0.5% + 3	0.5% + 3	-
20 k Ω	19.999 k Ω	0.5% + 3	0.5% + 3	-
2000 Ω	1999.9 Ω	0.5% + 3	0.5% + 3	-
200 Ω	199.99 Ω	0.8% + 5	0.8% + 5	After short cal.
20 Ω	19.999 Ω	1.2% + 40	1.2% + 40	After short cal.

1 This specification is based on the battery operation.

Resistance (Parallel Mode), Test Frequency = 1 kHz/10 kHz

Range	Maximum Display	Accuracy		Specified Note
		@ 1 kHz	@ 10 kHz	
10 M Ω	9.999 M Ω	2.0% + 8 ¹	3.5% + 10 ¹	After open cal.
2000 k Ω	1999.9 k Ω	0.5% + 5	2.0% + 10	After open cal.
200 k Ω	199.99 k Ω	0.5% + 3	1.5% + 5	-
20 k Ω	19.999 k Ω	0.5% + 3	1.5% + 5	-
2000 Ω	1999.9 Ω	0.5% + 3	1.5% + 5	-
200 Ω	199.99 Ω	0.8% + 5	2.0% + 10	After short cal.
20 Ω	19.999 Ω	1.2% + 40	2.5% + 200	After short cal.

1 This specification is based on the battery operation.

NOTE

- 1 This specification is based on the measurement performed at the test socket.
- 2 DUT and test leads need to be properly shielded to GUARD if necessary.

Capacitance (Parallel Mode), Test Frequency = 100 Hz/120 Hz

Range	Maximum Display	Accuracy		Specified Note
		Capacitance	DF	
10 mF	19.99 mF ¹	3.0% + 5 (DF<0.1)	10.0% + 100/Cx + 5 (DF<0.1)	After short cal.
1000 µF	1999.9 µF ²	1.0% + 5 (DF<0.1)	2.0% + 100/Cx + 5 (DF<0.1)	After short cal.
200 µF	199.99 µF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
20 µF	19.999 µF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
2000 nF	1999.9 nF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
200 nF	199.99 nF	0.7% + 5 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	After open cal.
20 nF	19.999 nF	1.0% + 5 (DF<0.1)	2.0% + 100/Cx + 5 (DF<0.1)	After open cal.

1 This reading can be extended up to 1999 MAX display with accuracy that is not specified.

2 This reading can be extended up to 19999 MAX display with accuracy that is not specified.

Capacitance (Parallel Mode), Test Frequency = 1 kHz

Range	Maximum Display	Accuracy		Specified Note
		Capacitance	DF	
1 mF	1.999 mF ¹	3.0% + 5 (DF<0.1)	10% + 100/Cx + 5 (DF<0.1)	After short cal.
200 µF	199.99 µF	1.0% + 5 (DF<0.1)	2.0% + 100/Cx + 5 (DF<0.1)	After short cal.
20 µF	19.999 µF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
2000 nF	1999.9 nF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
200 nF	199.99 nF	0.7% + 3 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	-
20 nF	19.999 nF	0.7% + 5 (DF<0.5)	0.7% + 100/Cx + 5 (DF<0.5)	After open cal.
2000 pF	1999.9 pF	1.0% + 5 (DF<0.1)	2.0% + 100/Cx + 5 (DF<0.1)	After open cal.

1 This reading can be extended up to 1999 MAX display with accuracy that is not specified.

Capacitance (Parallel Mode), Test Frequency = 10 kHz

Range	Maximum Display	Accuracy		Specified Note
		Capacitance	DF	
50 μ F	50.0 μ F	3.0% + 8 (DF<0.1)	12.0% + 100/Cx + 10 (DF<0.1)	After short cal.
20 μ F	19.999 μ F	3.0% + 6 (DF<0.2)	5.0% + 100/Cx + 8 (DF<0.2)	After short cal.
2000 nF	1999.9 nF	1.5% + 5 (DF<0.5)	1.5% + 100/Cx + 6 (DF<0.5)	-
200 nF	199.99 nF	1.5% + 5 (DF<0.5)	1.5% + 100/Cx + 6 (DF<0.5)	-
20 nF	19.999 nF	1.5% + 5 (DF<0.5)	1.5% + 100/Cx + 6 (DF<0.5)	-
2000 pF	1999.9 pF	2.0% + 6 (DF<0.5)	3.0% + 100/Cx + 6 (DF<0.1)	After open cal.
200 pF	199.99 pF	3.0% + 8 (DF<0.1)	5.0% + 100/Cx + 8 (DF<0.1)	After open cal.

NOTE

- 1 Q value is the reciprocal of DF.
- 2 This specification is based on the measurement performed at the test socket.
- 3 DUT and test leads need to be properly shielded to GUARD if necessary.
- 4 Cx = Counts of displayed C value, e.g. C = 88.88 μ F then Cx = 8888.

Inductance (Series Mode), Test Frequency = 100 Hz/120 Hz

Range	Maximum Display	Accuracy		Specified Note
		Inductance	DF	
1000 H	999.9 H	1.0% + (Lx/10000)% + 5	2.0% + 100/Lx + 5	After open cal.
200 H	199.99 H	0.7% + (Lx/10000)% + 5	1.2% + 100/Lx + 5	-
20 H	19.999 H	0.7% + (Lx/10000)% + 5	1.2% + 100/Lx + 5	-
2000 mH	1999.9 mH	0.7% + (Lx/10000)% + 5	1.2% + 100/Lx + 5	-
200 mH	199.99 mH	1.0% + (Lx/10000)% + 5	3.0% + 100/Lx + 5	After short cal.
20 mH	19.999 mH	2.0% + (Lx/10000)% + 5	10.0% + 100/Lx + 5	After short cal.

Inductance (Series Mode), Test Frequency = 1 kHz

Range	Maximum Display	Accuracy		Specified Note
		Inductance	DF	
100 H	99.99 H	$1.0\% + (L_x/10000)\% + 5$	$2.0\% + 100/L_x + 5$	After open cal.
20 H	19.999 H	$0.7\% + (L_x/10000)\% + 5$	$1.2\% + 100/L_x + 5$	-
2000 mH	1999.9 mH	$0.7\% + (L_x/10000)\% + 5$	$1.2\% + 100/L_x + 5$	-
200 mH	199.99 mH	$0.7\% + (L_x/10000)\% + 5$	$1.2\% + 100/L_x + 5$	-
20 mH	19.999 mH	$1.0\% + (L_x/10000)\% + 5$	$3.0\% + 100/L_x + 5$	After short cal.
2000 μ H	1999.9 μ H	$2.0\% + (L_x/10000)\% + 5$	$10.0\% + 100/L_x + 5$	After short cal.

Inductance (Series Mode), Test Frequency = 10 kHz

Range	Maximum Display	Accuracy		Specified Note
		Inductance	DF	
1000 mH	999.9 mH	$2.0\% + (L_x/10000)\% + 8$	$2.0\% + 100/L_x + 10$	-
200 mH	199.99 mH	$1.5\% + (L_x/10000)\% + 8$	$2.0\% + 100/L_x + 10$	-
20 mH	19.999 mH	$1.5\% + (L_x/10000)\% + 10$	$3.0\% + 100/L_x + 15$	-
2000 μ H	1999.9 μ H	$2.0\% + (L_x/10000)\% + 10$	$8.0\% + 100/L_x + 20$	After short cal.

NOTE

- 1 Q value is the reciprocal of DF.
- 2 This specification is based on the measurement performed at the test socket.
- 3 DUT & test leads need to be properly shielded to GUARD if necessary.
- 4 L_x = counts of displayed L value, e.g. L = 88.88 H, then L_x = 8888.

www.agilent.com

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To obtain service, warranty or technical support assistance, contact us at the following phone numbers:

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(tel) 800 810 0189 (fax) 800 820 2816

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(tel) 31 20 547 2111

Japan:

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