

Specifications

Parameters Measured: Series or parallel L and Q or C and D, series C and R, parallel C and G, series X and R, or parallel B and G.

Parameter Units Displayed: L in μH , C in pF, X and R in Ω or k Ω , B and G in μS or mS (Ω or k Ω , μS or mS automatically selected for best display resolution of measured values).

Measurement Rates: SLOW (3 per second typical) and FAST (5 per second typical); key selectable (refer to accuracy statement for specifications).

Test Frequency: 1.000 MHz $\pm 0.01\%$.

Measurement Ranges:

L = 0.001 to 99999 μH

C = 0.001 to 99999 pF

Q = .0001 to 999.9

D = .0001 to 999.9

X = 0.01 Ω to 999.99 k Ω

B = 0.01 μS to 999.99 mS

R = 0.01 Ω to 999.9 k Ω

G = 0.01 μS to 999.9 mS.

Main Displays: Key selectable.

- Measured Values: Ls and Q, Cs and D, Cs and Rs, Xs and Rs, Lp and Q, Cp and D, Cp and Gp, or Bp and Gp. Five full digits for L, C, X, and B. Four full digits for Q, D, R, and G. Completely autoranging, decimal points included, negative sign indicated for L, C, X, and B quantities as required by measurement.

- Bin number: Identifies bin for tested component.
- Programmed limits for any bin.
- $\Delta\%$ for L, C, X, or B. Percentage deviation from entered nominal value.

Measurement Modes: CONTinuous, AVErage (of 10 measurements), or SINGLE. Key selectable.

External Bias: Up to 60 V dc can be applied to capacitors. On-off switch on keyboard; indicator light shows when bias is applied. Bias source must be capable of supplying 15 mA dc with ripple less than 1 mV peak-to-peak. External discharge circuit recommended.

Applied Voltage: Nominal 0.1 V with 1687-9603 Probe (supplied), 10 mV with 1687-9607 Probe, or 1 V with 1687-9604 Probe (available). Actual voltage is $\pm 20\%$ for high-Z DUT ($C < 100$ pF) and is loaded down by low-Z DUT (to 1/10 of nominal for $C = 1600$ pF).

Accuracy: Following specifications apply at SLOW measurement rate when standard 0.1-V probe (1687-9603) or optional 10-mV probe (1687-9607) is used. For optional 1-V probe (1687-9604), multiply overall accuracy values given by 2. Additionally, multiply by 2 for FAST measurement rate. The expressions for Q and D give the absolute tolerance ranges rather than percentage-of-value tolerances.

BASIC L ACCURACY:

$$\pm 0.14\% \left[1 + \frac{15}{L_{\mu\text{H}}} + \frac{L_{\mu\text{H}}}{4000} \right],$$

where $L_{\mu\text{H}}$ is measured L in units of μH . Multiply basic L accuracy by $(1 + 1/Q)$ for overall L accuracy.

BASIC C ACCURACY:

$$\pm 0.07\% \left[1 + \frac{10}{C_{\text{pF}}} + \frac{C_{\text{pF}}}{1000} \right],$$

where C_{pF} is measured C in units of pF. Multiply basic C accuracy by $(1 + D)$ for overall C accuracy.

Q ACCURACY:

$$\pm .001 \left[1 + (1 + Q) Q \right] \frac{\text{Basic L Accuracy}}{0.2\%}$$

D ACCURACY:

$$\pm .001 \left[1 + (1 + D) D \right] \frac{\text{Basic C Accuracy}}{0.1\%}$$

BASIC X AND R ACCURACY:

$$\pm 0.07\% \left[1 + \frac{200}{X \text{ or } R_{\Omega}} + \frac{X \text{ or } R_{\Omega}}{12,000} \right],$$

where X or R_{Ω} is measured X or R in ohms. Multiply basic X accuracy by $(1 + D)$ and basic R accuracy by $(1 + 1/D)$ for overall accuracy.

BASIC B AND G ACCURACY:

$$\pm 0.07\% \left[1 + \frac{83}{B \text{ or } G_{\mu\text{S}}} + \frac{B \text{ or } G_{\mu\text{S}}}{5000} \right],$$

where B or $G_{\mu\text{S}}$ is measured B or G in microsiemens. Multiply basic B accuracy by $(1 + D)$ and basic G accuracy by $(1 + 1/D)$ for overall accuracy.

Accuracy specifications apply after one hour warm-up for one year after complete recalibration, provided that the ambient temperature is within 0 to 50°C, 0 to 85% relative humidity, and within $\pm 3^\circ\text{C}$ of previous (daily) open and short circuit recalibration and within $\pm 10^\circ\text{C}$ of previous full recalibration.

Recalibration: Semiautomatic; operator follows simple keyboard routines and connects known terminations as follows: for open and short recalibration, open and short circuits; for full recalibration, the same plus a 100-pF standard capacitor. Calibration kit recommended; see below. Coded keyboard-entry requirement prevents unskilled operators from altering calibration.

Sorting: Limit comparator sorts versus one QDRG limit and up to 8 pairs of LCXB limits into 10 bins, conveniently defined by keyboard entries. GO/NO-GO is indicated whether bin number, $\Delta\%$, or measured value is selected as main display.

Supplementary Displays: Function, subject of main display, mode, measurement rate, equivalent circuit, zero and calibration indicator, bias on, and remote control. Indicators are labeled lights on keyboard and display panel.

Keyboard Lock: Coded keyboard entry locks and unlocks keyboard to prevent unskilled operators from altering selected measurement parameters.

Interface Option: 2 Ports (1 with choice of 2 modes): A 24-pin connector for each port. IEEE-488 INTERFACE PORT: Functions are SH1, AH1, T5, L4, SR1, RL2, PP0, DC1, DT1, and C0. Refer to IEEE Standard 488-1978. Switch selection between 2 modes as follows: TALKER-LISTENER MODE: Input commands from system controller can disable keyboard and program all functions and set limits for sorting; any or all measurement results are available as outputs via bus. TALKER-ONLY MODE: Measured results are always output, for use in systems without controllers. HANDLER INTERFACE PORT: 1 input (start signal), 2 outputs (status signals), and set of 10 output lines (sorting

data); active low logic; for input, logic low is 0.0 to +0.4 V (current 0.4 mA maximum) and logic high is +2.4 to 5.0 V; for outputs, open collector drivers rated at +30 V maximum, and 40 mA maximum (sink), each, this port only. (External power supply and pull-up resistors required.)

Environment: Operating Temperature: 0 to +50°C. Operating Humidity: 0 to 85%. Storage: -40 to +75°C.

Supplied: 0.1-V measurement probe with cable (1687-9603), test fixture for axial and radial-lead parts, Kelvin connections (1687-9600), condensed operating instruction card, instruction manual, bias cable, and power cable for 125-V ac line.

Available: 10-mV measurement probe with plug-in cable. 1-V measurement probe with plug-in cable. Calibration kit, including 0900-9971 - 900-WN short-circuit termination, 0900-9981 - 900-WO open circuit termination, 1406-9704 100-pF coaxial capacitance standard, 1687-9602 reference standard adaptor, and carrying case. Reference standard adaptor for test fixture, to accept GR900®-series terminations and standards (included in calibration kit) and 1405, 1406-series capacitance standards. Interface option for handler and IEEE-488 bus (included in 1687-9703 or available separately). Replacement battery (life expectancy in use is five years).

Power: 90 to 125 V or 80 to 250 V, 48 to 62 Hz. Either range selected by rear-panel switch, 30 W maximum.

Mechanical: Bench model. Dimensions (w × h × d): 37.54 × 11.18 × 34.29 cm (14.78 × 4.4 × 13.5 in). Weight: 6.2 kg (13.5 lb) net, 8.2 kg (18 lb) shipping.

Description	Catalog Number
1687-B 1-Megahertz LC Digibridge	1687-9702
1687-B 1-Megahertz LC Digibridge with interface option	1687-9703
1687-B 10-mV Measurement Probe/Cable	1687-9707
1687 1-V Measurement Probe/Cable	1687-9704
1687 Calibration Kit	1687-9605

Replacement Parts:

1687	Probe Nose Assembly (supplied with 1687-9604, -9607, and -9603)	1687-9606
1687	Reference Standard Adaptor (supplied with 1687-9605)	1687-9602
1687	100-mV Measurement Probe/Cable (supplied with 1687-9702, -9703)	1687-9603

Other replacement parts: see Table 1-3.

Warranty



GenRad

We warrant that this product is free from defects in material and workmanship and, when properly used, will perform in accordance with GenRad's applicable published specifications. If within one (1) year after original shipment it is found not to meet this standard, it will be repaired or at the option of GenRad, replaced at no charge when returned to a GenRad service facility.

CHANGES IN THE PRODUCT NOT APPROVED BY GENRAD SHALL VOID THIS WARRANTY.

GENRAD SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES, EVEN IF NOTICE HAS BEEN GIVEN OF THE POSSIBILITY OF SUCH DAMAGES.

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SERVICE POLICY

Your local GenRad office or representative will assist you in all matters relating to product maintenance, such as calibration, repair, replacement parts and service contracts.

GenRad policy is to maintain product repair capability for a period of five (5) years after original shipment and to make this capability available at the then prevailing schedule of charges.