Agilent 4287A RF LCR Meter
1 MHz - 3 GHz
Data Sheet

Agilent Technologies
Innovating the HP Way

Specifications

Specifications describe the instrument's warranted performance over the temperature range of 5 °C to 40 °C (except as noted). Supplemental performance characteristics are intended to provide helpful information for using certain non-warranted performance parameters with the instrument. These are denoted as SPC (supplemental performance characteristics), typical, or nominal. Warmup time must be greater than or equal to 30 minutes after power on for all specifications.

Basic Measurement Characteristics

Measurement Parameters

Impedance parameters	|Z|, |Y|, Ls, Lp, Cs, Cp, Rs, Rp, X, G, B, D, Q, θz [°], θz [rad], θy [°], θy [rad] (A maximum of four parameters can be displayed at one time.)

Measurement Range

Measurement range	200 mΩ to 3 kΩ (Frequency = 1 MHz, Averaging factor = 8, Oscillator level ≥ –33 dBm, Measurement uncertainty ≤ ± 10 %, Calibration is performed within 23 °C ± 5 °C, Measurement is performed within ± 5 °C from the calibration temperature

Source Characteristics

Frequency

Range	1 MHz to 3 GHz
Resolution	100 kHz
Uncertainty	± 10 ppm (23 ± 5 °C) ± 20 ppm (5 °C to 40 °C)

Basic Measurement Characteristics

Oscillator Level

Range	
Cable length: 1m	
Power (when 50Ω LOAD is connected to the test port)	–40 dBm to 1 dBm (Frequency ≤ 1 GHz) –40 dBm to 0 dBm (Frequency > 1 GHz*1)
Current (when SHORT is connected to the test port)	0.0894 mA_{rms} to 10 mA_{rms} (Frequency ≤ 1 GHz) 0.0894 mA_{rms} to 8.94 mA_{rms} (Frequency > 1 GHz*1)
Voltage (when OPEN is connected to the test port)	4.47 mV_{rms} to 502 mV_{rms} (Frequency ≤ 1 GHz) 4.47 mV_{rms} to 447 mV_{rms} (Frequency > 1 GHz*1)
Cable length: 2m	(when Option 002 is used)
Power	Subtract the following attenuation from the power (setting value) at 1 m cable length: Attenuation [dB] = $0.37 \times \sqrt{F}$ (F: Frequency [GHz])
Resolution	0.1 dB*2
Uncertainty	
Cable length: 1 m	
Power (when 50Ω LOAD is connected to the test port)	
Frequency ≤ 1 GHz	± 2 dB(23 ± 5 °C) ± 4 dB(5 °C to 40 °C)
Frequency > 1 GHz	± 3 dB(23 ± 5 °C) ± 5 dB(5 °C to 40 °C)
Cable length: 2 m	(when Option 002 is used)
Power	Add 1 dB to the uncertainty at 1 m cable length.

*1. It is possible to set more than 0 dBm (447 mV, 8.94 mA) oscillator level at frequency > 1 GHz. However, the characteristics at this setting are not guaranteed.
*2. When the unit is set at mV or mA, the entered value is rounded to 0.1 dBm resolution.

Output Impedance

Output Impedance	50Ω (nominal)

Measurement Accuracy

Conditions of Accuracy Specifications

Temperature	23 ± 5 °C
Accuracy-specified plane	7-mm connector of 3.5-mm-7-mm adapter connected to 3.5-mm terminal of test heads

Measurement Uncertainty

When OPEN/SHORT/LOAD calibration is performed:	
|Z|,|Y|	$\pm(E_a + E_b)$ [%]
θ	$\pm\frac{(E_a + E_b)}{100}$ [rad]
L, C, X, B	$\pm(E_a + E_b) \times \sqrt{(1 + D_x^2)}$ [%]
R, G	$\pm(E_a + E_b) \times \sqrt{(1 + Q_x^2)}$ [%]
D	
at $\left\lvert D_x \tan\left(\frac{E_a + E_b}{100}\right)\right\rvert < 1$	$\pm\frac{(1 + D_x^2)\tan\left(\frac{E_a + E_b}{100}\right)}{1 \pm D_x \tan\left(\frac{E_a + E_b}{100}\right)}$
at $D_x \leq 0.1$	$\pm\frac{E_a + E_b}{100}$
Q	
at $\left\lvert Q_x \tan\left(\frac{E_a + E_b}{100}\right)\right\rvert < 1$	$\pm\frac{(1 + Q_x^2)\tan\left(\frac{E_a + E_b}{100}\right)}{1 \pm Q_x \tan\left(\frac{E_a + E_b}{100}\right)}$
at $\frac{10}{E_a + E_b} \geq Q_x \geq 10$	$\pm Q_x^2 \frac{E_a + E_b}{100}$

When OPEN/SHORT/LOAD/LOW-LOSS C calibration is performed (SPC):	
|Z|,|Y|	$\pm(E_a + E_b)$ [%]

Basic Measurement Characteristics

θ	$\pm\frac{E_c}{100}$ [rad]
L, C, X, B	$\pm\sqrt{(E_a + E_b)^2 + (E_c D_x)^2}$ [%]
R, G	$\pm\sqrt{(E_a + E_b)^2 + (E_c Q_x)^2}$ [%]
D	
$\left\lvert D_x \tan\left(\frac{E_c}{100}\right)\right\rvert < 1$	$\pm\frac{(1 + D_x^2)\tan\left(\frac{E_c}{100}\right)}{1 \pm D_x \tan\left(\frac{E_c}{100}\right)}$
$D_x \leq 0.1$	$\pm\frac{E_c}{100}$
Q	
$\left\lvert Q_x \tan\left(\frac{E_c}{100}\right)\right\rvert < 1$	$\pm\frac{(1 + Q_x^2)\tan\left(\frac{E_c}{100}\right)}{1 \pm Q_x \tan\left(\frac{E_c}{100}\right)}$
$\frac{10}{E_c} \geq Q_x \geq 10$	$\pm Q_x^2 \frac{E_c}{100}$

Definition of Each Parameter

$D_x =$	Measurement value of D
$Q_x =$	Measurement value of Q
$E_a =$	(Within ± 5 °C from the calibration temperature. Measurement accuracy applies when the calibration is performed at 23 °C ± 5 °C. When the calibration is performed beyond 23 °C ± 5 °C, the measurement accuracy decreases to half that described.)
Oscillator level ≥ −33 dBm	
Frequency ≥ 1 MHz, ≤ 100 MHz	± 0.65 [%]
Frequency > 100 MHz, ≤ 500 MHz	± 0.8 [%]
Frequency > 500 MHz, ≤ 1 GHz	± 1.2 [%]
Frequency > 1 GHz, ≤ 1.8 GHz	± 2.5 [%]

Frequency > 1.8 GHz, ≤ 3 GHz	± 5 [%]
Oscillator level < –33 dBm	
Frequency ≥ 1 MHz, ≤ 100 MHz	± 1 [%]
Frequency > 100 MHz, ≤ 500 MHz	± 1.2 [%]
Frequency > 500 MHz, ≤ 1 GHz	± 1.2 [%]
Frequency > 1 GHz, ≤ 1.8 GHz	± 2.5 [%]
Frequency > 1.8 GHz, ≤ 3 GHz	± 5 [%]
E_b =	$\pm\left(\frac{Z_s}{\lvert Z_x\rvert} + Y_o \bullet \lvert Z_x\rvert\right) \times 100$ [%] (|Z_x|: Measurement value of |Z|)
E_c =	$\pm\left(0.06 + \frac{0.08 \times F}{1000}\right)$ [%] (F: Frequency [MHz])
Z_s =	(Within ± 5 °C from the calibration temperature. Measurement accuracy applies when the calibration is performed at 23 °C ± 5 °C. When the calibration is performed beyond 23 °C ± 5 °C, the measurement accuracy decreases to half that described.)
Oscillator level ≥ –33 dBm, Averaging factor ≥ 8	± (20 + 0.5 × F) [mΩ] (F: Frequency [MHz])
Oscillator level ≥ –33 dBm, Averaging factor < 7	± (50 + 0.5 × F) [mΩ] (F: Frequency [MHz])
Oscillator level < –33 dBm	± (100 + 0.5 × F) [mΩ] (F: Frequency [MHz])
Y_o =	(Within ± 5 °C from the calibration temperature. Measurement accuracy applies when the calibration is performed at 23 °C ± 5 °C. When the calibration is performed beyond 23 °C ± 5 °C, the measurement accuracy decreases to half that described.)
Oscillator level ≥ –33 dBm, Averaging factor ≥ 8	± (30 + 0.15 × F) [µS] (F: Frequency [MHz])
Oscillator level ≥ –33 dBm, Averaging factor < 7	± (50 + 0.15 × F) [µS] (F: Frequency [MHz])
Oscillator level < –33 dBm	± (100 + 0.15 × F) [µS] (F: Frequency [MHz])

NOTE

At the following points, measurement error may exceed the specifications described here due to the 4287A's spurious characteristics:

109.7 MHz, 153.6 MHz, 177.2 MHz, 256.0 MHz, 329.1 MHz, 460.8 MHz, 768.0 MHz

Examples of Calculated Impedance Measurement Accuracy

Figure 1 **Oscillator Level ≥ –33 dBm, Averaging Factor ≥ 8, Temperature Deviation ≤ 5 °C**

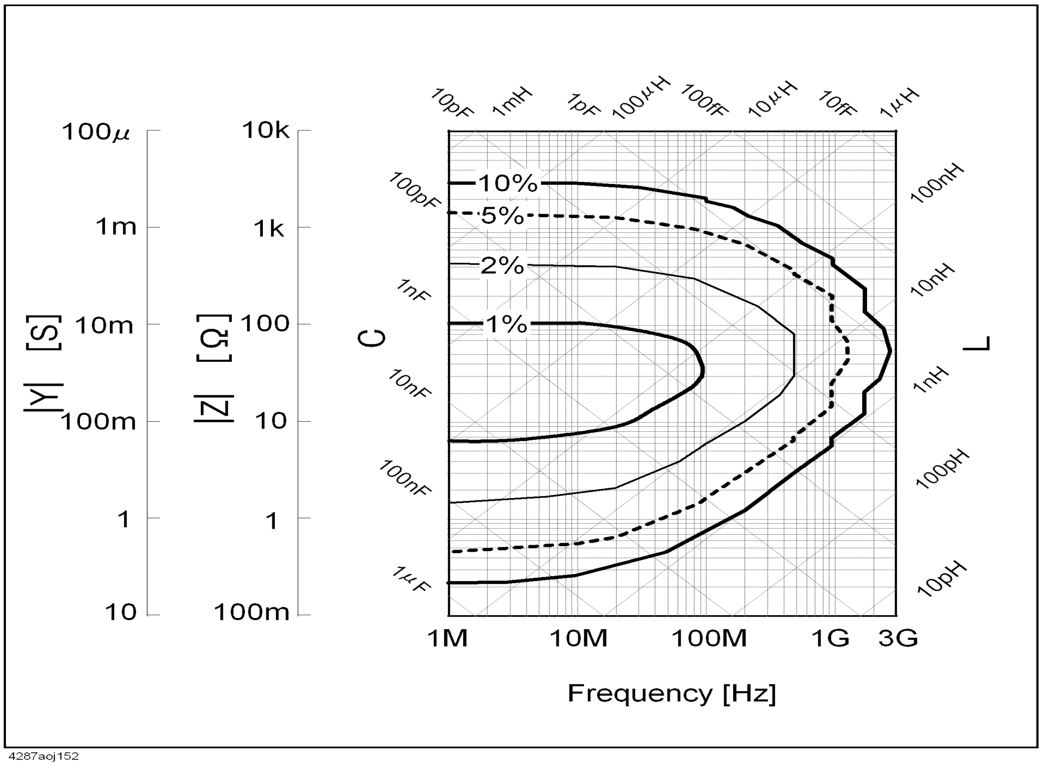

Figure 2 **Oscillator Level ≥ –33 dBm, Averaging Factor ≤ 7, Temperature Deviation ≤ 5 °C**

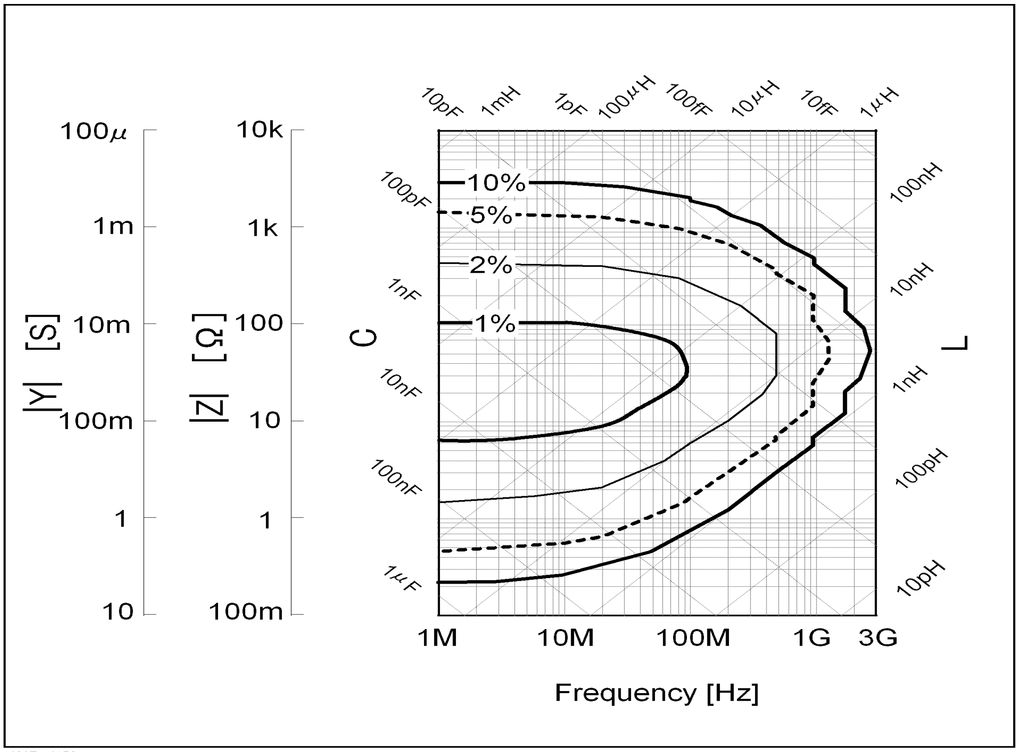

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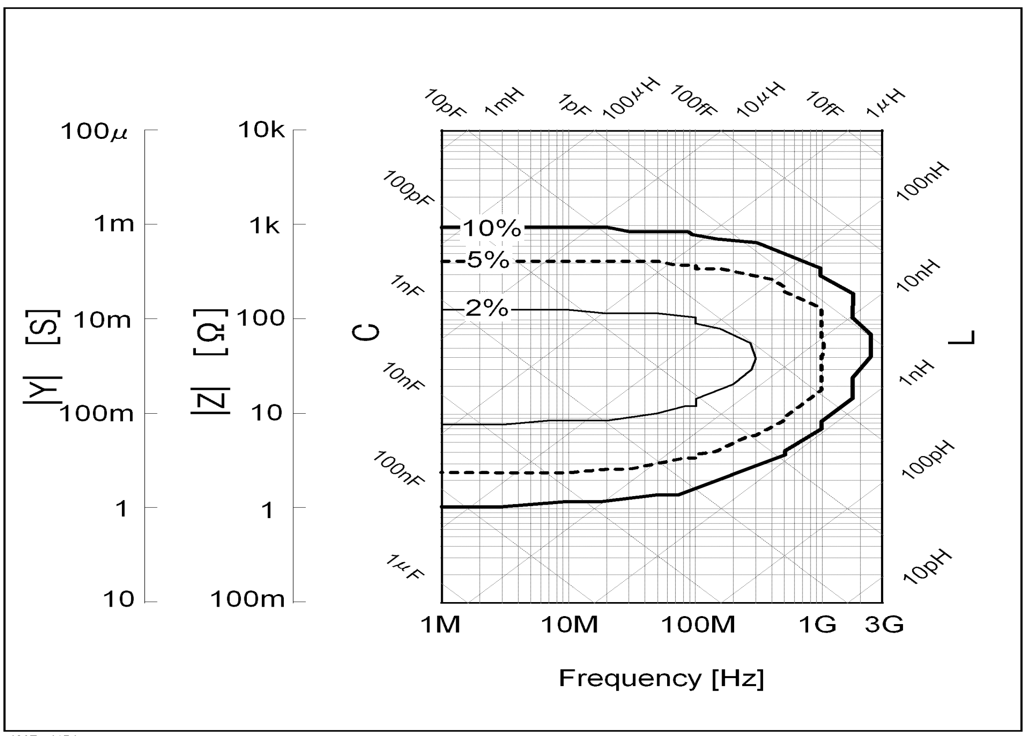
Figure 3 **Oscillator Level < –33 dBm, Temperature Deviation ≤ 5 °C**



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Timing Chart and Measurement Time (SPC)

Timing Chart of Handler Interface Signal (SPC)

Figure 4 **Timing Chart of Handler Interface**

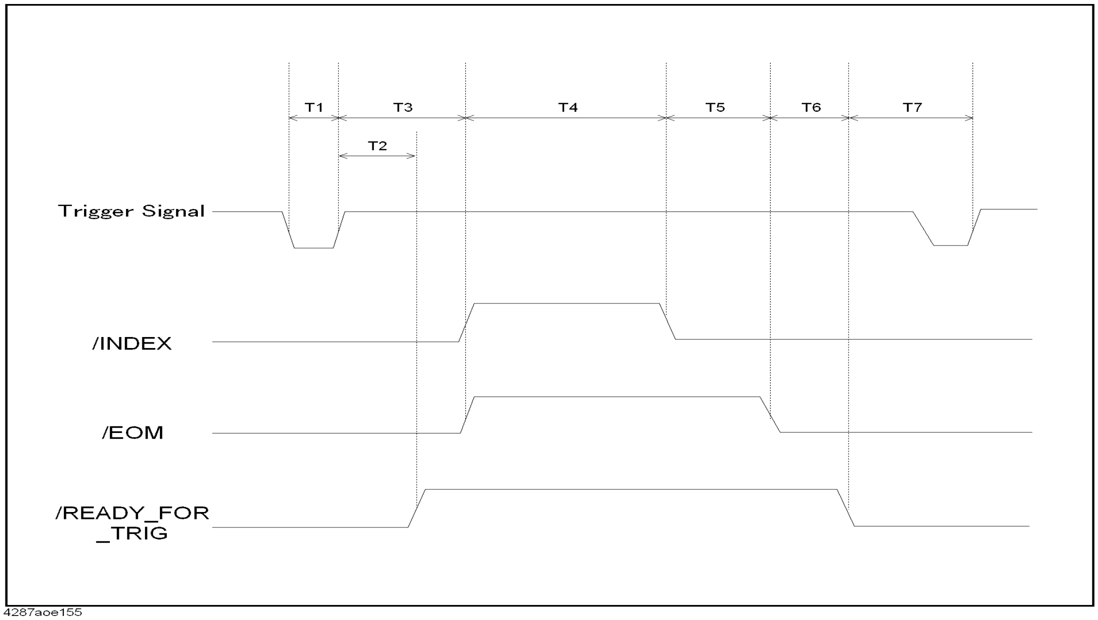


Table 1 **Value T1 through T7**

Name		Time		Conditions (not affected)			
		Min.	**Max.**	**Display**	**R_{dc} Meas.**	**Com -parator**	**Other**
T1	Trigger pulse width	2 µs	∞	-	-	-	
T2	Trigger response time (READY_FOR_TRIG)	0.2 ms	1.1 ms	-	-	-	
T3	Trigger response time (INDEX, EOM)	0.2 ms	1.3 ms	-	-	-	
T4	Measurement time	5.6 ms	6.9 ms	-	OFF	-	1 point measurement, Trigger delay time = 0, Measurement delay time = 0
		7.6 ms	8.9 ms	-	ON	-	1 point measurement, Trigger delay time = 0, Measurement delay time = 0
T5	Measurement value calculation time	0.1 ms	0.9 ms	-	-	OFF	
		0.3 ms	1.1 ms	-	-	ON	

Table 1 Value T1 through T7

Name		Time		Conditions (not affected)			
		Min.	Max.	Display	R_{dc} Meas.	Com -parator	Other
T6	READY_FOR_TRIG setup time	0.3 ms	1.1 ms	OFF	-	-	
		10.3 ms	11.2 ms	ON	OFF	OFF	List measurement display, Ls-Q measurement, 1 point measurement
		12.1 ms	13.1 ms	ON	ON	ON	List measurement display, Ls-Q measurement, 1 point measurement
		14.5 ms	15.4 ms	ON	ON	ON	List measurement display, Ls-Q measurement, 2 point measurement
		16.8 ms	17.8 ms	ON	ON	ON	List measurement display, Ls-Q measurement, 3 point measurement
		18.4 ms	19.7 ms	ON	ON	ON	Single point measurement display, Ls-Q measurement, 1 point measurement
T7	Trigger waiting time	0	∞	-	-	-	

Details of Measurement Time (T4)

Figure 5 Measurement Time T4 at Single Point Measurement

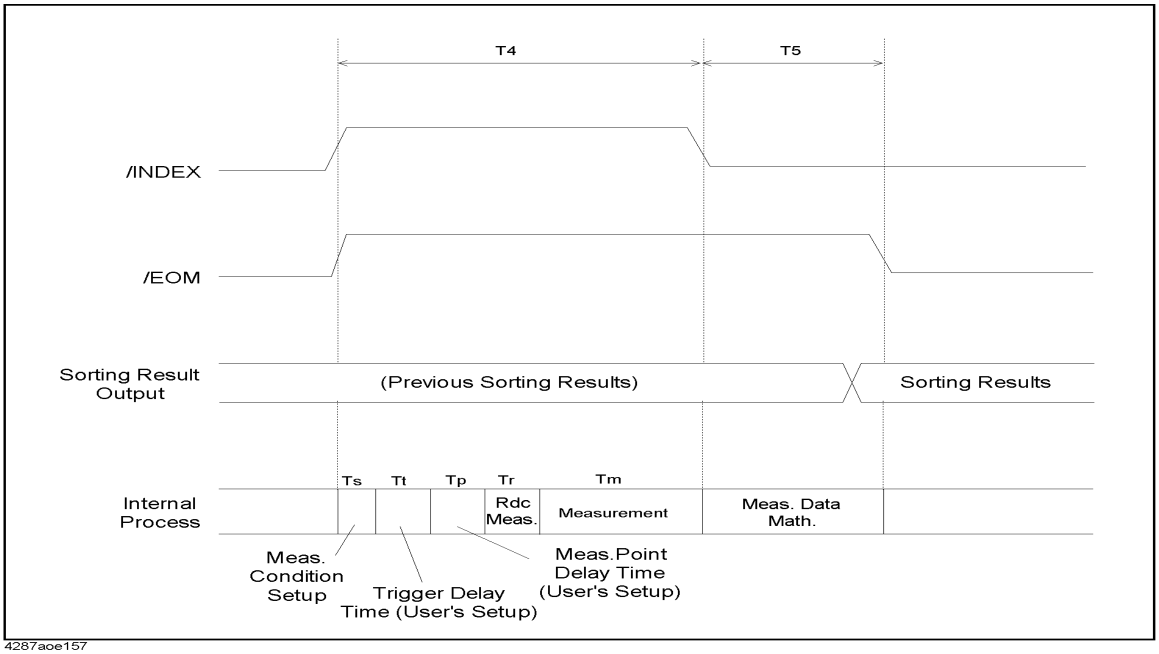


Figure 6 Measurement Time T4 at List Measurement

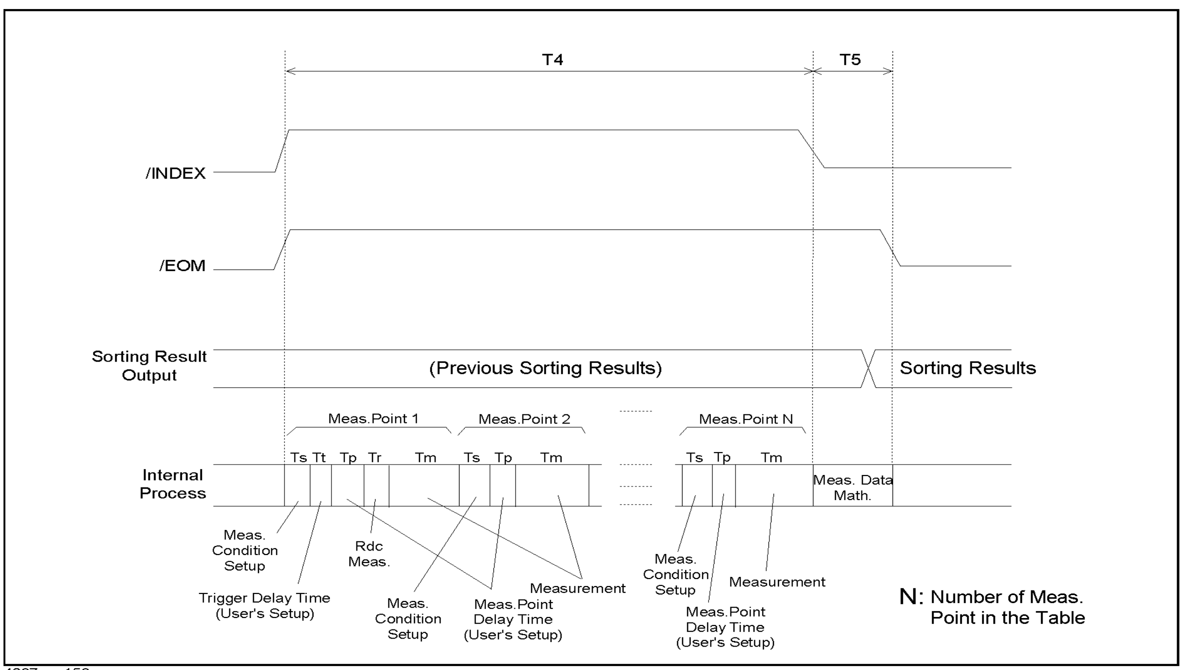


Table 2 **Value Ts,Tt,Tp,Tr and Tm (Typical)**

			Time [ms]
Ts	Trigger delay time		0.0 ms to 1000.0 ms[*1]
Tt	Rdc measurement time		2.0 ms
Tp	Measurement point delay time		0.0 ms to 1000.0 ms[*2]
Tr	Analog measurement time	Measurement condition setup time	•If the test signal level has changed[*3] crossing -12.95 dBm or -22.95 dBm since the last measurement cycle: 300 ms •If the test signal level has changed[*4] without crossing -12.95 dBm or -22.95 dBm or if there is no level change in the test signal: See table below.
Tm		Measurement data acquirement time	6.9 ms[*5]

*1. To set this, use the :TRIG:DEL command.
*2. To set this, use the :TRIG:SEQ2:DEL command.
*3. For example, this can be a level change from -15 dBm to -10 dBm.
*4. For example, this can be a level change from -20 dBm to -15 dBm.
*5. This applies when the averaging factor is 1. Add 3.9 [ms] with every increase of the averaging factor by 1.

NOTE Time settings Ts, Tt, Tp, Tr and Tm indicated in Figure 6 are the values taken when the instrument is making a measurement without receiving any external request (such as user actions through the front panel key, keyboard, or mouse) and without performing non-measurement tasks (such as printout and network connection handling) while the display of measurement results is off.

Table 3 **Value Ts (Typical)**

Change in test signal frequency since last measurement cycle		Ts [ms]
No change		0
Increase	Change in frequency crossing 1.73995 GHz[*1]	3.4 + 1 × (f - fp) / 1E9 [*2]
	Change in frequency without crossing 1.73995 GHz[*3]	1 × (f - fp) / 1E9 [*2]
Decrease	Change in frequency crossing 1.73995 GHz[*4]	1.7 + 2 × (fp - f) / 1E9 [*2]
	Change in frequency without crossing 1.73995 GHz[*5]	2 × (fp - f) / 1E9 [*2]

*1. For example, this can be a frequency change from 1.7 GHz to 1.8 GHz.
*2. f: Test signal frequency [Hz] currently in effect, fp: Test signal frequency [Hz] in the last measurement
*3. For example, this can be a frequency change from 1.8 GHz to 1.9 GHz.
*4. For example, this can be a frequency change from 1.8 GHz to 1.7 GHz.
*5. For example, this can be a frequency change from 1.7 GHz to 1.6 GHz.

Single-point measurement (Typical)

This section provides an example of measurement time calculation based on the conditions shown in the following table:

Measurement point settings	Test signal frequency	100 MHz
	Test signal level	0 dBm
	Averaging factor	2
Trigger delay time		3.0 ms
Measurement point delay time		0 ms
R_{dc} measurement		Off

The measurement time should be 0 + 3.0 + 0 + 0 + 10.8 = 13.8 ms based on the conditions:
Ts = 0 ms
Tt = 3.0 ms
Tp = 0 ms
Tr = 0 ms (R_{dc} measurement off)
Tm = 6.9 + 3.9 = 10.8 ms (averaging factor: 2)

NOTE When measurement cycles are repeated at the single point, Ts is normally 0 ms because the test signal settings do not change. However, Ts may not be 0 ms if you start a new measurement cycle with the measurement conditions shown in the table above immediately after performing measurement with different conditions.

List measurement (Typical)

This section provides an example of measurement time calculation for one cycle of list measurement based on the conditions shown in the following table:

Measurement condition table settings (with two measurement points defined)	Point 1	Test signal frequency	100 MHz
		Test signal level	0 dBm
		Averaging factor	2
	Point 2	Test signal frequency	800 MHz
		Test signal level	0 dBm
		Averaging factor	1
Trigger delay time			2.0 ms
Measurement point delay time			1.0 ms
R_{dc} measurement			On

For Tt, Tp, and Tr, these settings are applied regardless of the measurement point settings: Tt = 2.0 ms; Tp = 1.0 ms; Tr = 2.0 ms (R_{dc} measurement on).

- Ts and Tm at point 1

  Between point 2 (previous conditions) and point 1, the test signal changes in frequency from 800 MHz to 100 MHz but does not change in level. Thus, Ts is determined as follows:
  Ts = 2 $\times$ (0.8E9 - 0.1E9) / 1E9 = 1.4 ms

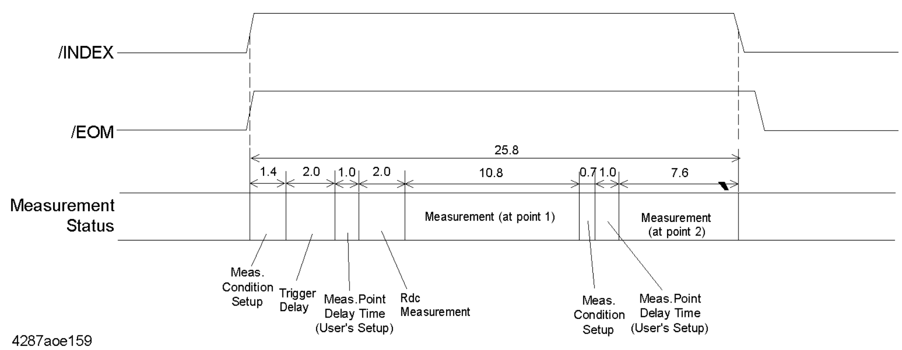
  The averaging factor is 2 for the point. This determines Tm as follows:
  Tm = 6.9 + 3.9 = 10.8 ms

- Ts and Tm at point 2

  Between point 1 and point 2, the test signal changes in frequency from 100 MHz to 800 MHz but does not change in level. Thus, Ts is determined as follows:
  Ts = 1 $\times$ (0.8E9 - 0.1E9) / 1E9 = 0.7 ms

  The averaging factor is 1 for the point. This determines Tm as follows:
  Tm = 6.9 ms

Thus, the measurement time is determined as follows:
Ts (at point 1) + Tt + Tp + Tr + Tm(at point 1) + Ts (at point 2) + Tp + Tm (at point 2) =
1.4 + 2.0 + 1.0 + 2.0 + 10.8 + 0.7 + 1.0 + 6.9 = 25.8 ms



Measurement Data Transfer Time through GPIB (Typical)

Conditions:

Host computer: HP9000 Series / Model 715
Display: OFF
Measurement mode: List measurement
Measurement parameters: Ls and Q
Evaluation method: Average value of 10,000 times repeated measurements

Table 4 Measurement Data Transfer Time through GPIB (Typical)

Number of measurement points	Required time for FETCH? command	
	Rdc measurement OFF	Rdc measurement ON
1	10.0 ms	10.0 ms
2	12.0 ms	13.5 ms
3	15.0 ms	15.0 ms

Switching Time for Setup Change by GPIB (Typical)

Conditions:

Host computer: HP9000 Series / Model 715
Display: OFF
Measurement mode: List measurement
Measurement parameters: Ls and Q
Evaluation method: Average value of 10,000 times repeated measurements

Table 5 Switching Time for Setup Change by GPIB (Typical)

Conditions	Time
Measurement table switching at list measurement (required time for executing :SOUR:LIST:TABL 1 command and *opc? command)	8.8 ms

Measurement Support Functions

Error Correction Function

Available Calibration and Compensation

OPEN/SHORT/LOAD Calibration	Connect OPEN, SHORT, and LOAD standards to the desired reference plane and measure each kind of calibration data. The reference plane is called calibration reference plane.
Low-Loss Capacitor Calibration	Connect the dedicated standard (Low-Loss Capacitor) to the calibration reference plane and measure the calibration data.
Port Extension Compensation (Fixture Selection)	When a device is connected to the terminal that is extended from the calibration reference plane, set the electrical length between the calibration plane and the device contact. Select a model number of the registered test fixtures in the 4287A's softkey menu or enter the electrical length for user's test fixture.
OPEN/SHORT Compensation	When a device is connected to the terminal that is extended from the calibration reference plane, make OPEN and SHORT states at the device contact and measure each kind of compensation date.

Calibration/Compensation Data Measurement Point

Data Measurement Points	Same as measurement points which is set in the measurement point setup display. (Changing the frequency or oscillator level settings after the calibration or compensation makes the calibration and compensation data invalid.)

Measurement Support Functions

DC Resistance (Rdc) Measurement

Measurement range	0.1Ω to 100Ω
Measurement resolution	1 mΩ
Test signal level	1 mA (maximum)
Error correction	OPEN/SHORT/LOAD Calibration, OPEN/SHORT Compensation. (Changing the frequency or oscillator level settings after the calibration or compensation makes the calibration and compensation data invalid.)
Measurement uncertainty	$\pm\left[1+\left(\frac{0.05}{R_{dut}}+\frac{R_{dut}}{10000}\right)\times 100\right]$ [%] R_{dut}: DC resistance measurement value [Ω] (Within ± 5 °C from the calibration temperature. Measurement accuracy applies when the calibration is performed at 23 °C ± 5 °C. When the calibration is performed beyond 23 °C ± 5 °C, the measurement accuracy decreases to half that described.)

Trigger Function

Trigger mode	Internal, External (external trigger input connector or handler interface), Bus (GPIB or LAN), Manual (front key)

Averaging Function

Setting range	1 to 100 (integer)

Display

Type/Size	Color LCD, 8.4 inch
Resolution	640 dots × 480 lines

List Measurement Function

Number of Measurement points	32 points for each table (maximum)
Number of tables	8 tables

Test Signal Level Monitor Function

Uncertainty of monitor value	$\pm\left[30+\left(10^{\frac{A}{20}}-1\right)\times 100+B\right]$ [%](SPC) A: Uncertainty of oscillator level [dB] B: Uncertainty of impedance measurement [%]

Mass Storage

Built-in flexible disk drive	3.5 inch, 720 KByte or 1.44 KByte, DOS format
Non-volatile memory size	
Option 010	2 GByte (minimum)
Option 011	30 MByte (minimum)

Interface

GPIB

Standard conformity	IEEE 488.1-1987,IEEE 488.2-1987
Available functions (function code)	SH1,AH1,T6,TE0,L4,LE0,SR1,RL0,PP0, DT1,DC1,C0,E2
Numerical data transfer format	ASCII
Protocol	IEEE 488.2-1987

Handler Interface

Connector type	36 pin D-SUB connector
Signal type	Negative logic, Opto-isolated, Open collector output
Output signal	• BIN sort result (BIN 1 to BIN 13, OUT_OF_GOOD_BINS) • DC resistance pass/fail (DCR_OUT_OF_RANGE) • Overload (OVLD) • Alarm (ALARM) • End of analog measurement (INDEX) • End of measurement (EOM) • Ready for trigger (READY_FOR_TRIG)
Input signal	• External trigger (EXT_TRIG) • Key lock (KEY_LOCK)
Pin location	See the following figure. Refer to *Programming Manual* for the definition of each pin.

LAN Interface

Standard conformity	10 Base-T or 100 Base-TX (automatically switched), Ethertwist, RJ45 connector
Protocol	TCP/IP
Functions	Telnet, FTP

Measurement Terminal (at Test Head)

Connector type	3.5-mm (female) connector (can be converted to 7-mm connector using the 3.5mm-7mm adapter)

Rear Panel Connectors

External Reference Signal Input Connector

Frequency	10 MHz ± 10 ppm (SPC)
Level	≥ 0 dBm (SPC)
Input impedance	50Ω (nominal)
Connector type	BNC (female)

Internal Reference Signal Output Connector

Frequency	10 MHz (nominal)
Uncertainty of frequency	Same as frequency uncertainty described in“Source Characteristics” on page 3
Level	+2 dBm (nominal)
Output impedance	50Ω (nominal)
Connector type	BNC (female)

External Trigger Input Connector

Level	LOW threshold voltage: 0.5 V HIGH threshold voltage: 2.1 V Input level range: 0 to +5 V
Pulse width (Tp)	≥ 2 µsec (SPC) See Figure 8 for definition of Tp
Polarity	Positive or Negative (selective)
Connector type	BNC (female)

Figure 7 **Pin Location of Handler Interface**

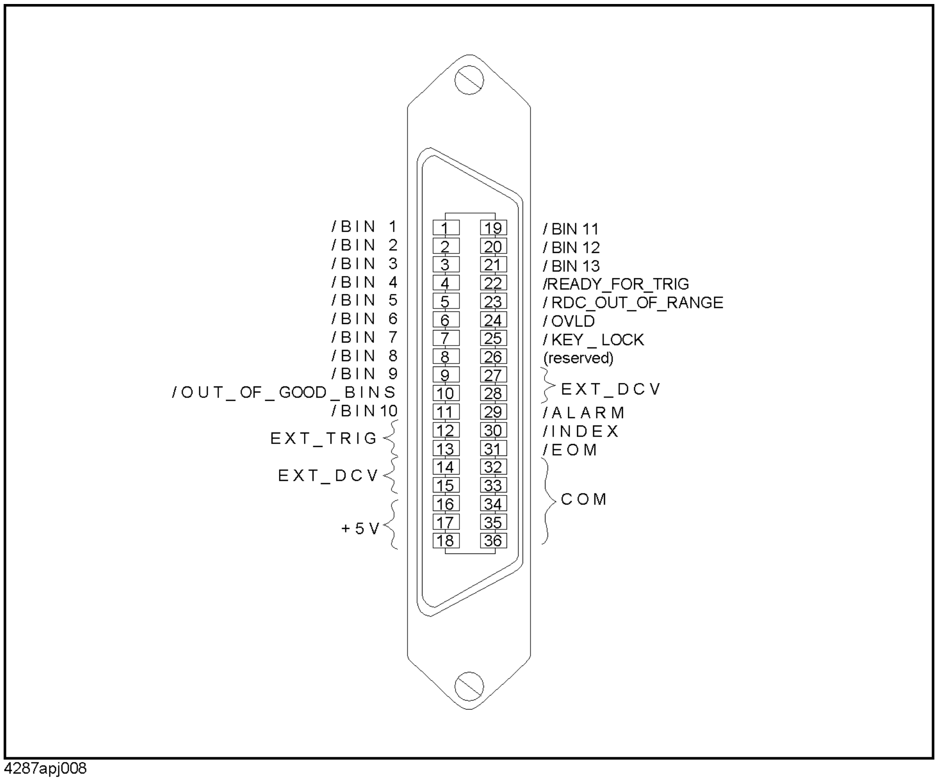
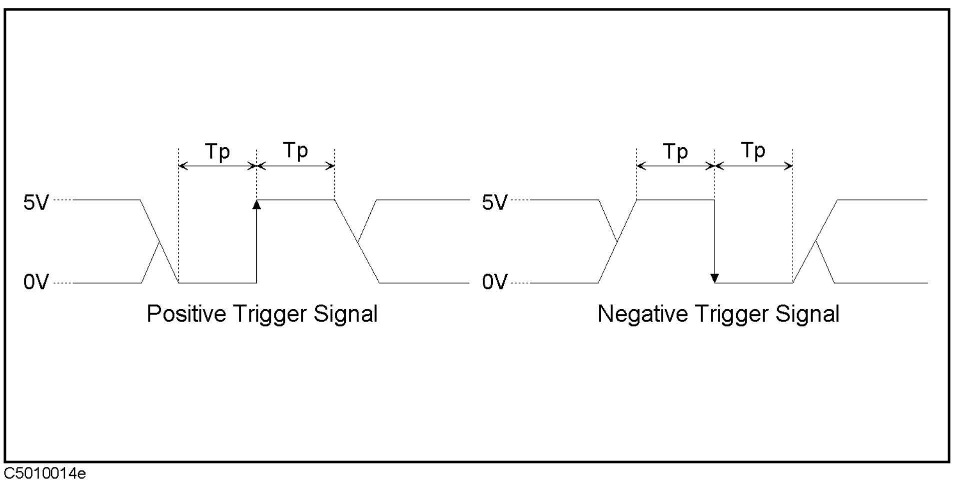


Figure 8 **Definition of Pulse Width (Tp)**



General Characteristics

Environment Conditions

Operating Condition

Temperature	5 °C to 40 °C
Humidity (at wet bulb temperature ≤ 29 °C, without condensation)	
Flexible disk drive non-operating condition	20% to 80% RH
Flexible disk drive operating condition	15% to 90% RH
Altitude	0 to 2,000 m (0 to 6,561 feet)
Vibration	0.5 G maximum, 5 Hz to 500 Hz
Warmup time	30 minutes

Non-Operating Storage Condition

Temperature	– 20 °C to + 60 °C
Humidity (at wet bulb temperature ≤ 45 °C, without condensation)	15% to 90% RH
Altitude	0 to 4,572 m (0 to 15,000 feet)
Vibration	1 G maximum, 5 Hz to 500 Hz

Other Specifications

EMC ISM 1-A N10149	European Council Directive 89/336/EEC IEC 61326-1:1997+A1 CISPR 11:1990 / EN 55011:1991 Group 1, Class A IEC 61000-4-2:1995 / EN 61000-4-2:1995 4 kV CD / 8 kV AD IEC 61000-4-3:1995 / EN 61000-4-3:1996 3 V/m, 27-1000 MHz, 80% AM IEC 61000-4-4:1995 / EN 61000-4-4:1995 1 kV power / 0.5 kV Signal IEC 61000-4-5:1995 / EN 61000-4-5:1995 0.5 kV Normal / 1 kV Common IEC 61000-4-6:1996 / EN 61000-4-6:1996 3 V, 0.15-80 MHz, 80% AM IEC 61000-4-11:1994 / EN 61000-4-11:1994 100% 1cycle NOTE-1: When tested at 3 V/m according to EN 61000-4-3:1996, the measurement accuracy will be within specifications over the full immunity test frequency range of 27 to 1000 MHz except when the analyzer frequency is identical to the transmitted interference signal test frequency. NOTE-2: When tested at 3 V according to EN 61000-4-6:1996, the measurement accuracy will be within specifications over the full immunity test frequency range of 0.15 to 80 MHz except when the analyzer frequency is identical to the transmitted interference signal test frequency. AS/NZS 2064.1/2 Group 1, Class A
Safety ISM 1-A LR95111C	European Council Directive 73/23/EEC IEC 61010-1:1990+A1+A2 / EN 61010-1:1993+A2 INSTALLATION CATEGORY II, POLLUTION DEGREE 2 INDOOR USE IEC60825-1:1994 CLASS 1 LED PRODUCT CAN/CSA C22.2 No. 1010.1-92
Power requirement	90 V to 132 V, or 198 V to 264 V (automatically switched), 47 Hz to 63 Hz, 350 VA max.
Weight	
Main unit	16 kg (SPC)
Test head	0.3 kg (SPC)
Dimensions	
Main unit	See Figure 9 through Figure 11
Test head	See Figure 12

Figure 9 **Main Unit Dimensions (front view, in millimeters, typical)**

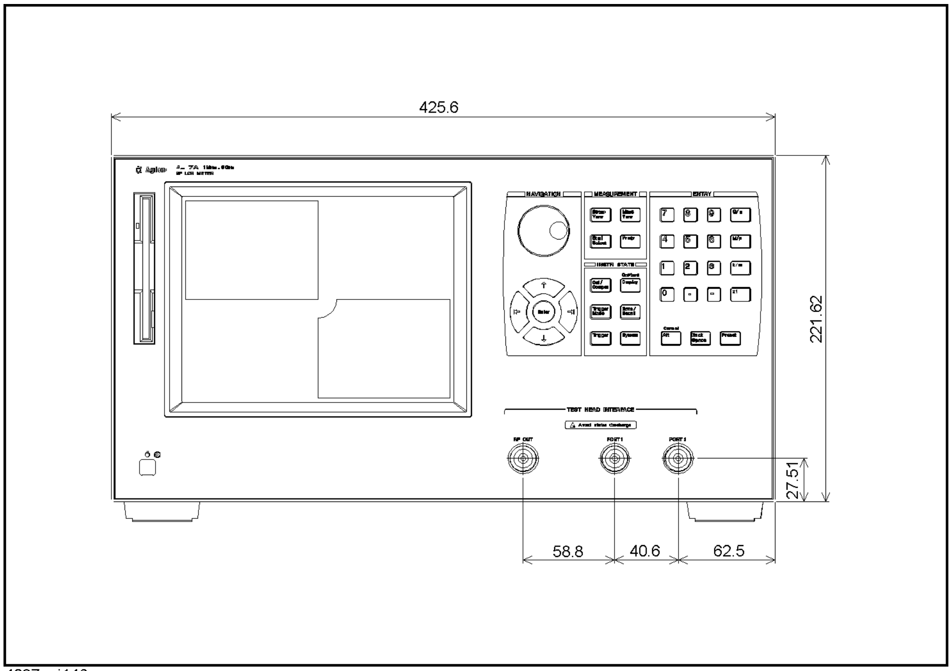


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Figure 10 **Main Unit Dimensions (rear view, in millimeters, typical)**

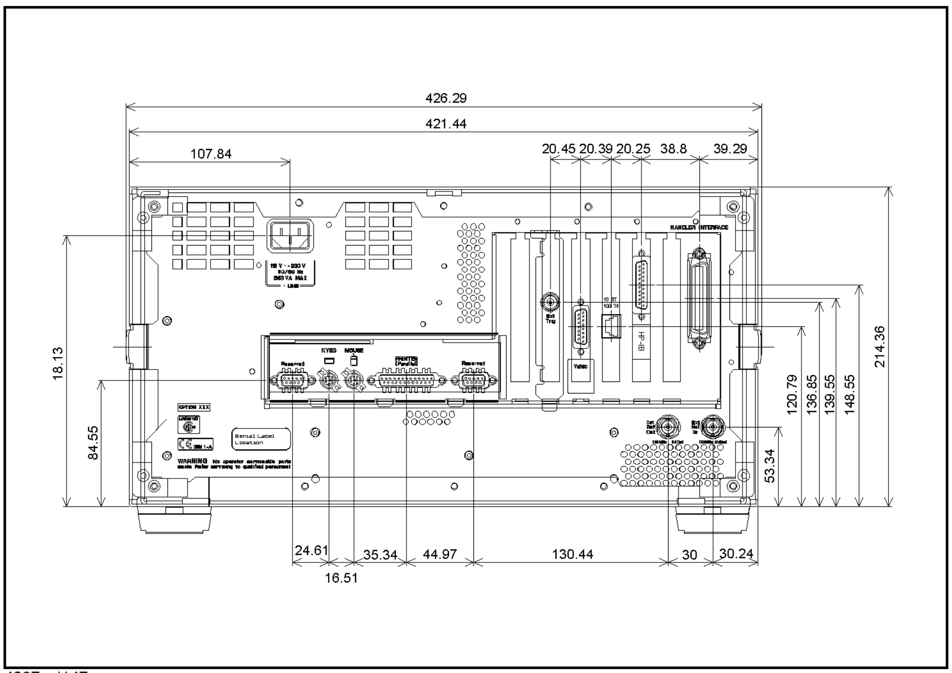

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Figure 11 Main Unit Dimensions (side view, in millimeters, typical)

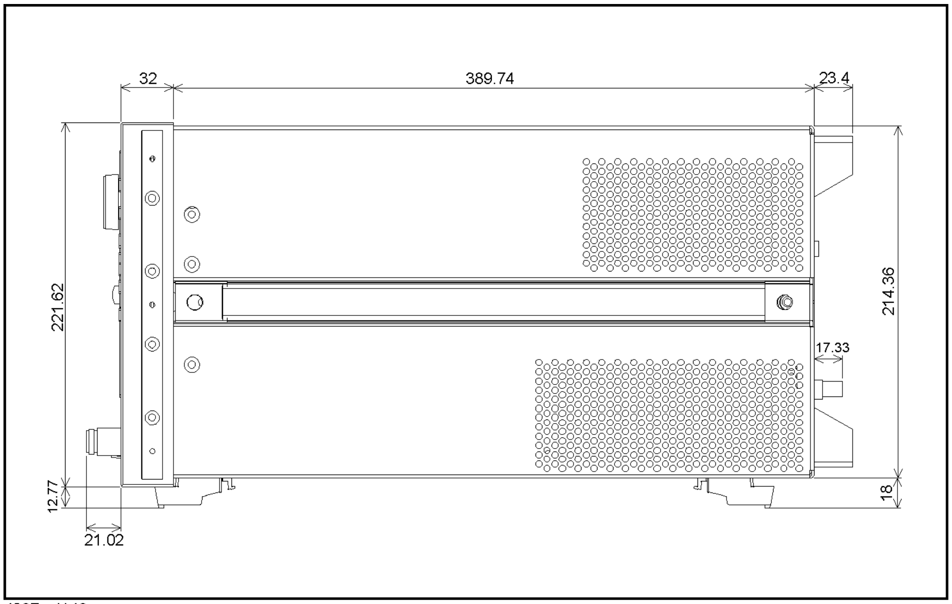

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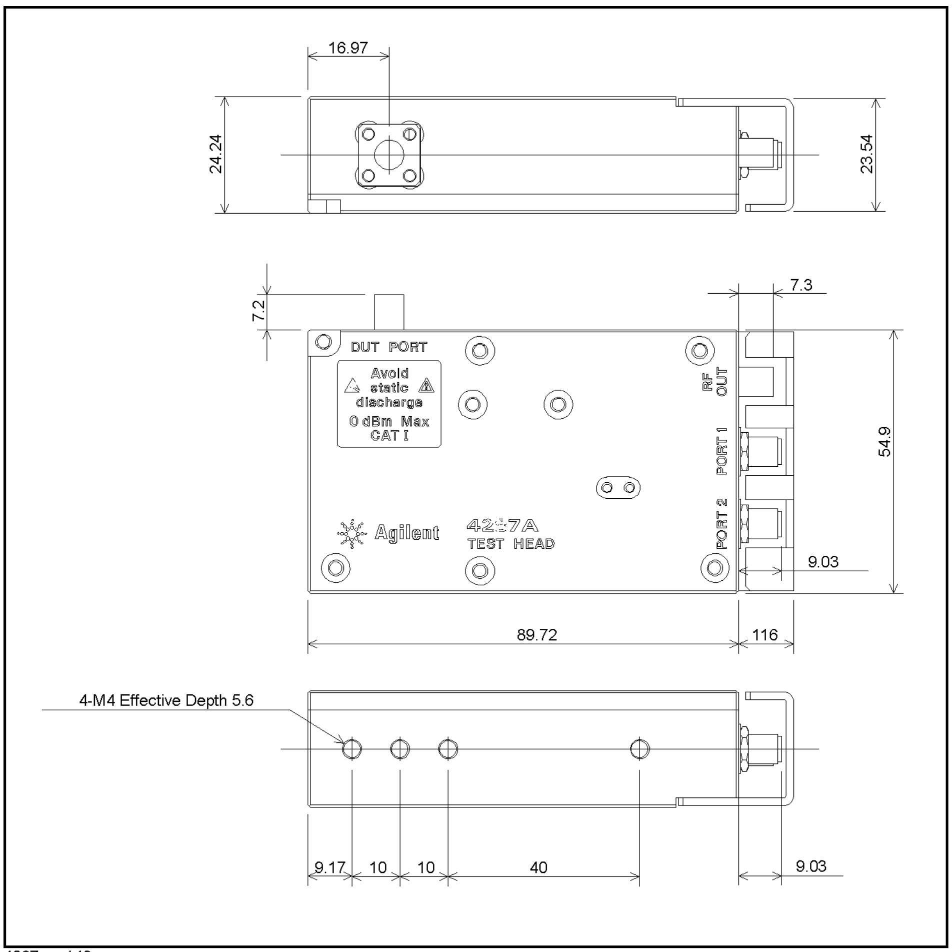
Figure 12 Test Head Dimensions (in millimeters, typical)



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Furnished Accessories

Order Model/ Option Number	Agilent Part Number	Description	Qty
Agilent 4287A	-	Agilent 4287A RF LCR Meter (Main Unit)	1
	-	Test Head (with 1 m cable)	1
	1250-2879	N(m)-SMA(f) Adapter	3
	-	Test Fixture Stand*1	1
	1250-1746	3.5 mm - 7 mm Adapter*2	1
	8720-0015	Wrench (for 3.5-mm/SMA connector)	1
	-	Agilent 16195B 7 mm Calibration Kit*3	1
	-	Mouse*4	1
	-	Keyboard*5	1
	-	Power Cable	1
Option ABJ	04287-900x0	Operation Manual*6	1
	04287-900x1	Programming Manual*6	1
	04287-180x0	Sample Program (3.5 inch floppy disk)*6	1
Option 004	-	Working Standard Set	1
Option 020	-	Test Head Extension Cable (1 m)	1
	1250-1158	SMA(f)-SMA(f) Adapter	3
Option 1CM	5063-9216	Rackmount Kit	1
Option 1CN	5063-9229	Handle Kit	1
Option 1CP	5063-9223	Rackmount & Handle Kit	1

*1. Not furnished if Option 002 (Without Test Fixture Stand) is designated.
*2. Not furnished if Option 003 (Without 3.5 mm - 7 mm Adapter) is designated.
*3. Not furnished if Option 001 (Without Agilent 16195B 7 mm Calibration Kit) is designated.
*4. Not furnished if Option 1CS (Without Mouse) is designated.
*5. Not furnished if Option 1A2 (Without Keyboard) is designated.
*6. The number indicated by "x" in the part number of each manual or sample program disk, 0 for the first edition, is incremented by 1 each time a revision is made. The latest edition comes with the product.

Option 004 Working Standard Set Characteristics

Furnished Devices

Short device	1.0 × 0.5 mm (part number: 16191-29005) 1.6 × 0.8 mm (part number: 16191-29006) 2.0 × 1.25 mm (part number: 16196-29007) 3.2 × 1.6 mm (part number: 16196-29008)
Resistor	1.0 × 0.5 mm (part number: 5182-0433) 1.6 × 0.8 mm (part number: 5182-0434) 2.0 × 1.25 mm (part number: 5182-0435) 3.2 × 1.6 mm (part number: 5182-0436)

DC Resistance

Resistor	51Ω ± 0.5 %

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