Agilent 4285A
Precision LCR Meter

Technical Data

Specifications

The complete Agilent Technologies 4285A specifications are listed below. These specifications are the performance standards or limits against which the instrument is tested. When shipped from the factory, the 4285A meets the specifications listed in this section. The specification test procedures are covered in *Agilent 4285A Maintenance Manual* (Agilent Part Number 04285-90030).

Measurement Functions

Measurement Parameters

|Z| = Absolute value of impedance
|Y| = Absolute value of admittance
L = Inductance
C = Capacitance
R = Resistance
G = Conductance
D = Dissipation factor
Q = Quality factor
R_s = Equivalent series resistance
R_p = Parallel resistance
X = Reactance
B = Suceptance
θ = Phase angle

Combinations of Measurement Parameters

|Z|, |Y|	L, C	R	G
θ (deg), θ (rad)	D, Q, R_s, R_p, G	X	B

Mathematical Functions

The deviation and the percent of deviation of measurement values from a programmable reference value.

Equivalent Measurement Circuit

Parallel and Series

Ranging

Auto and Manual (Hold/Up/Down)

Trigger

Internal, External, BUS (GPIB), and Manual.

Delay Time

Programmable delay from the trigger command to the start of the measurement, 0 to 60.000 s in 1 ms steps.

Measurement Terminals

Four-terminal pair

Test Cable Length

0 m, 1 m, and 2 m selectable

Integration Time

Short, Medium, and Long selectable (Refer to *Supplemental Performance Characteristics* (see page 14) for the measurement time.)

Averaging

1 to 256, programmable

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Test Signal

Frequency

75 kHz to 30 MHz, 100 Hz solution.

Frequency Accuracy

±0.01%

Signal Modes

Normal—Program selected voltage or current at the measurement terminals when they are opened or shorted, respectively.

Constant—Maintains selected voltage or current at the device under test (DUT) independent of changes in the device's impedance.

Signal Level

The following test signal level accuracy is specified for an ambient temperature range of 23 °C ± 5 °C and the test cable length is 0 m.

	Mode	Range	Setting Accuracy
Voltage	Normal	5 m V_{rms} to 2 V_{rms}	$\pm\{(8 + 0.4\ f_m)\% + 1\ m\ V_{rms}\}$
	Constant[1]	10 mV_{rms} to 1 V_{rms}	$\pm\{(6 + 0.2\ f_m)\% + 1\ m\ V_{rms}\}$
Current	Normal	200 μA_{rms} to 20 mA_{rms}	$\pm\{(8 + 1\ f_m)\% + 40\ \mu A_{rms}\}$
	Constant[1]	100 μA_{rms} to 20 mA_{rms}	$\pm\{(6 + 0.2\ f_m)\% + 40\ \mu A_{rms}\}$

1. When the ALC function is set to ON

For the temperature range of 0 °C to 55 °C, multiply the temperature induced setting error listed in Figure 1-5 to the test signal setting accuracy. When test cable length is 1 m or 2 m, add the following error due to test cable length.

$$0.2 \times f_m \times L\ [\%]$$

where:

f_m = Test frequency [MHz]
L = Test cable length [m]

Output Impedance

The following output impedance is specified for the test cable length of 0 m:

$$(25 + 0.5\ f_m)\ \Omega \pm \left(10 + \frac{2}{3} f_m\right)\%$$

where:

f_m = Test frequency [MHz]

Test Signal Level Monitor

The following test signal level monitor accuracy is specified for an ambient temperature range of 23 °C ± 5 °C and the test cable length is 0 m.

Mode	Range	Monitor Accuracy
Voltage	0.01 mV_{rms} – 2.000 V_{rms}	$\pm\left\{S_{mon}\frac{4 + 0.2\ f_m}{100} + \frac{S_{set}}{500}\right\}[V]$
Current	0.001 μA_{rms} – 20.00 mA_{rms}	

For the temperature range of 0 °C to 55 °C, multiply the temperature induced setting error listed in Figure 1-5. When test cable length is 1 m or 2 m, add the following error due to test cable length.

$$S_{mon} \times 0.2 \times f_m \times L\ [V]$$

where:

f_m = Test frequency [MHz]
L = Test cable length [m]
S_{mon} = Readout value of test signal level
S_{set} = Setting value of test signal level

For example,

Test frequency:	1 MHz
Test signal level:	1 V_{rms}
Monitor readout value:	500 mV_{rms}
Cable length:	1 m
Ambient temperature:	25 °C

Then, Voltage level monitor accuracy V_{ma} is

$$\Delta V_{ma} = 0.5 \times \frac{4 + 0.2 \times 1}{100} + \frac{1 \times 0.2}{100} + 0.5 \times \frac{0.2}{100} \times 1 \times 1$$

$$= 0.024 \text{ [V]}$$

$$V_{ma} = \frac{0.024}{0.5}$$

$$\approx 4.8 \text{ [\%]}$$

Display Range

Parameter	Range
|Z|, R, X	0.00001 Ω to 99.9999 MΩ
|Y|, G, B	0.00001 μS to 99.9999 S
C	0.00001 pF to 999.999 μF
L	0.001 nH to 99.9999 H
D	0.000001 to 9.99999
Q	0.01 to 99999.9
θ	-180.000° to 180.000°
Δ	-999.999% to 999.999%

Measurement Accuracy

The measurement accuracy includes stability, temperature coefficient, linearity, repeatability, and calibration interpolation error. The measurement accuracy is specified when all of the following conditions are satisfied:

- Warm-up time: ≥30 minutes
- Test cable length: 0 m, 1 m (Agilent 16048A), or 2 m (Agilent 16048D). For the 1 m or 2 m cable length operation (with Agilent 16048A/D), CABLE CORRECTION has been performed
- OPEN and SHORT corrections have been performed.
- The optimum measurement range is selected by matching the DUT's impedance to the effective measuring range shown in Figure 1-1 and Figure 1-2. (For example, if the DUT's impedance is 3 kΩ and oscillator level is less than or equal to 1 V, the optimum range is the 500 Ω range.)
- Measurement accuracy is specified at the following reference planes:
  - Test frequency ≤1 MHz
    At the UNKNOWN terminals on the Agilent 4285A front panel or at the end of the standard test leads (Agilent 16048A/D).
  - Test frequency ≥1.001 MHz
    At the 1-port terminal of the Agilent 16085B Terminal Adapter, which should be connected to the UNKNOWN terminals of the Agilent 4285A or to the end of the standard test leads (Agilent 16048A/D).

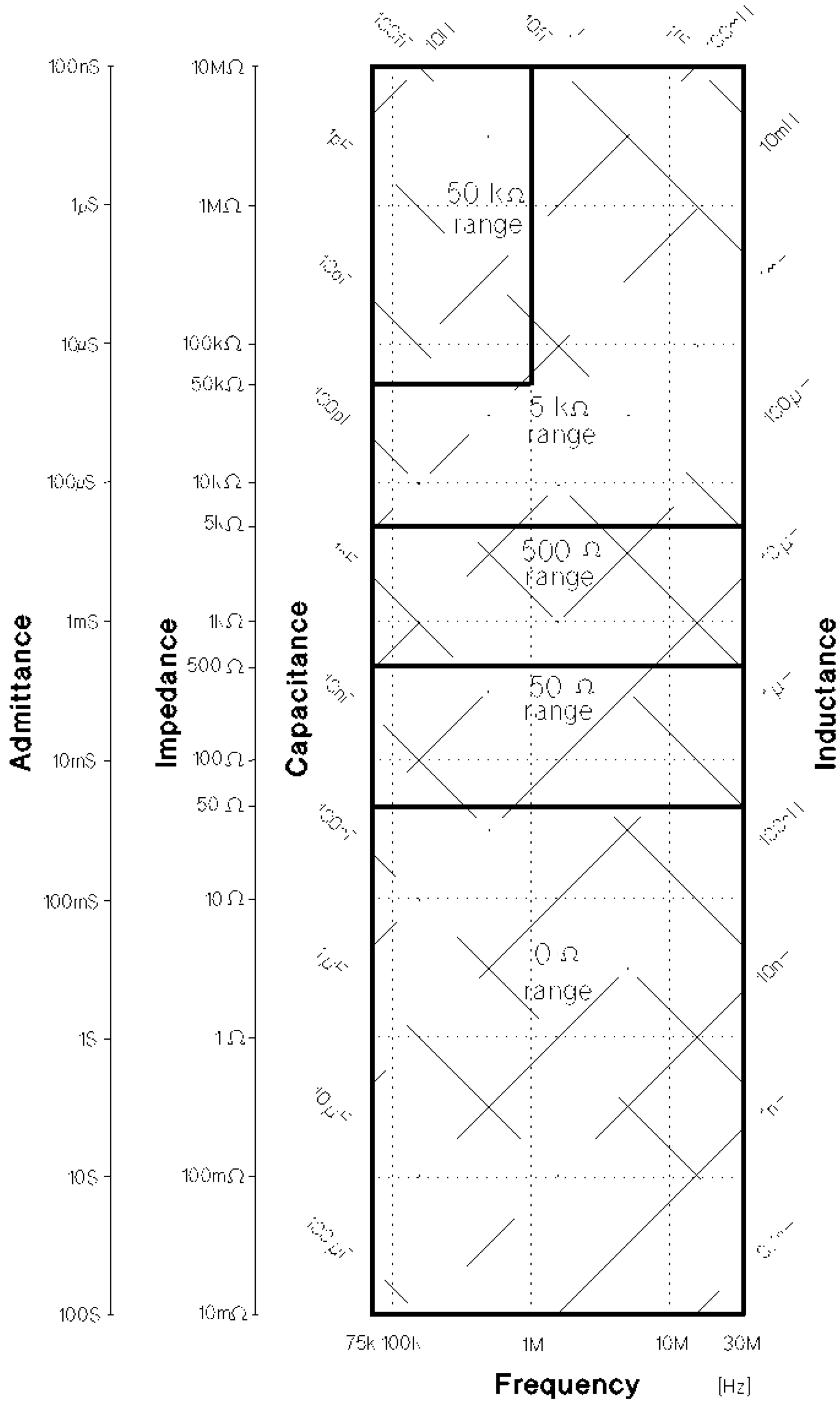

Figure 1-1. Effective Measurement Range (Oscillator Level ≤1 V_{rms})

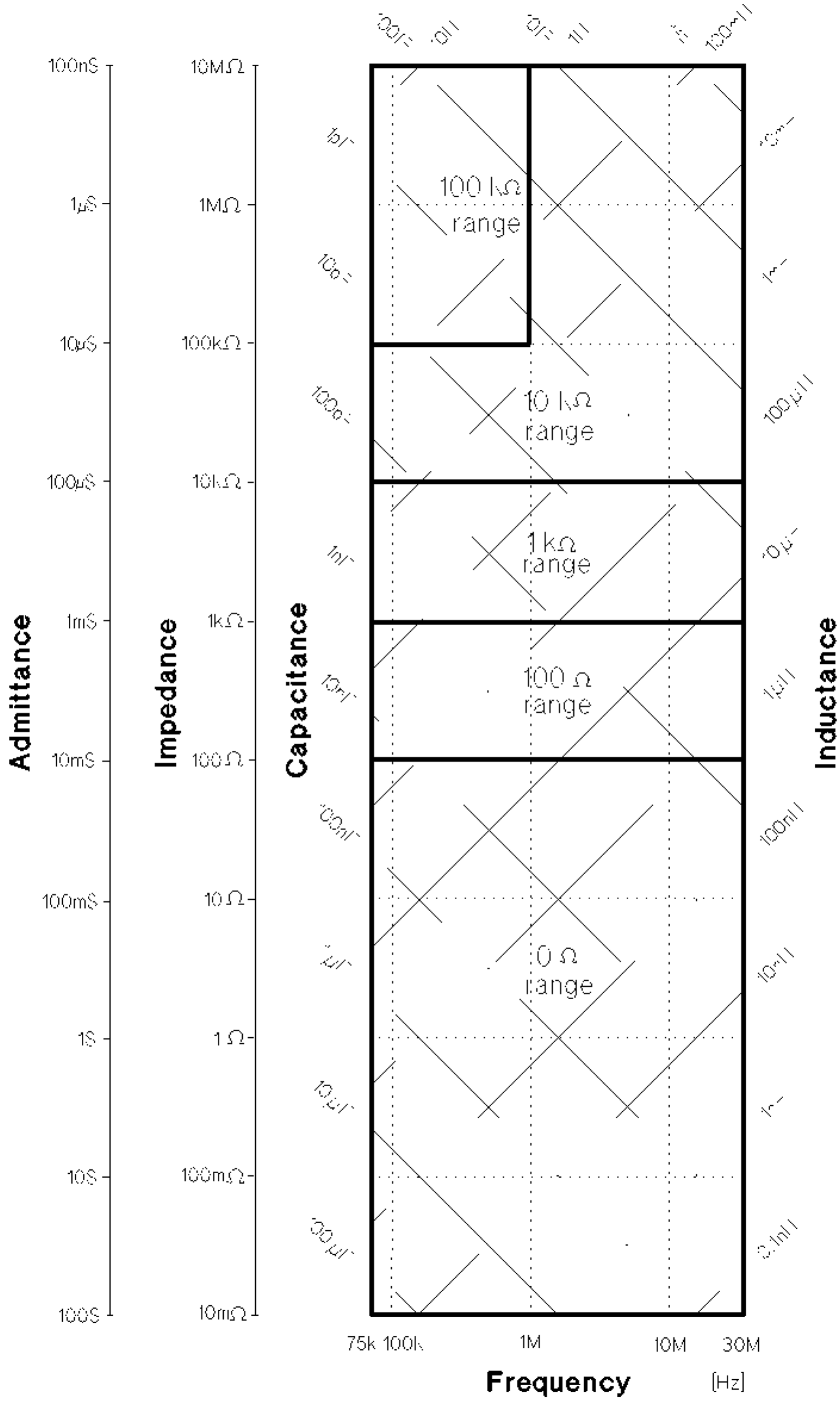

Figure 1-2. Effective Measurement Range (Oscillator Level >1 V_{rms})

|Z|, |Y|, L, C, R, X, G, and B Accuracy

|Z|, |Y|, L, C, R, X, G, and B accuracy A_e is given as

$$A_e = \pm(A_n + A_c) \times K_t \ [\%]$$

where:

A_n = Basic accuracy equation given from the A_1 to A_{16} shown in Table 1-1. The applicable frequency range and impedance range of equations A_1 to A_{16} are shown in Figure 1-3 and Figure 1-4. (Refer to *Basic Accuracy Equations* on page 7.)

A_c = Cable Length Factor (Refer to *Cable Length Factor* on page 10.)

K_t = Temperature Factor (Refer to *Temperature Factor* on page 10.)

L, C, X, and B accuracies apply when D_x (measured D value) ≤0.1.

When D_x >0.1, multiply A_e by $\sqrt{1 + D_x^2}$ for L, C, X, and B accuracies.

R and G accuracies apply when Q_x (measured Q value) ≤0.1.

When Q_x >0.1, multiply A_e by $\sqrt{1 + Q_x^2}$ for R and G accuracies. G accuracy given by the equation above applies to the G-B combination only.

D Accuracy

D accuracy D_e is given as

$$D_e = \pm \frac{A_e}{100}$$

where:

A_e = |Z|, |Y|, L, C, R, X, G, and B accuracy

D accuracy applies when D_x (measured D value) ≤0.1.

When D_x >0.1, multiply D_e by $(1 + D_x)$.

Q Accuracy

Q accuracy Q_e is given as

$$Q_e = \pm \frac{Q_x^2 \times D_e}{1 \mp Q_x \times D_e}$$

where:

Q_x = Measured Q value

D_e = D accuracy

Q accuracy applies when $Q_x \times D_e < 1$.

θ Accuracy

θ accuracy θ_e is given as

$$\theta_e = \pm \frac{180 \times A_e}{\pi \times 100} \quad [deg]$$

where:

A_e = |Z|, |Y|, L, C, R, X, G, and B accuracy

G Accuracy

G accuracy *Ge* is given as

$$G_e = \pm B_x \times D_e \qquad [S]$$

$$\left(B_x = 2\pi f C_x = \frac{1}{2\pi f L_x} \right)$$

where:

B_x = Measured B value [S]

C_x = Measured C value [F]

L_x = Measured L value [H]

D_e = D accuracy

f = Test frequency [Hz]

G accuracy applies when D_x (measured D value) ≤0.1.

G accuracy given by the equation above applies to the C_p-G and L_p-G combinations only.

R_p Accuracy

Rp accuracy *Rpe* is given as

$$R_{pe} = \pm \frac{R_{px} \times D_e}{D_x \mp D_e} \quad [\Omega]$$

where:

R_{px} = Measured Rp value [Ω]
D_x = Measured D value
D_e = D accuracy

R_p accuracy applies when D_x (measured D value) ≤0.1.

R_s Accuracy

R_s accuracy R_{se} is given as

$$R_{se} = \pm X_x \times D_e \quad [\Omega]$$

$$\left(X_x = 2\,\pi f L_x = \frac{1}{2\,\pi f C_x} \right)$$

where:

X_x = Measured X value [Ω]
C_x = Measured C value [F]
L_x = Measured L value [H]
D_e = D accuracy
f = Test frequency [Hz]

R_s accuracy applies when D_x (measured D value) ≤0.1.

Basic Accuracy Equations

The basic accuracy A_n is calculated from the following procedure:

1. Determine A_n equation from Figure 1-3 or Figure 1-4. In both charts, boundary line belongs to the better accuracy area.

When the oscillator level is ≤1 V_{rms}, determine A_n to be applied, value of K_i and value of K_{osc} from the Figure 1-3. If the determined K_{osc} ≤1, then round up K_{osc} to 1.

When the oscillator level is >1 V_{rms}, determine A_n to be applied and value of K_i from the Figure 1-4.

2. Calculate A_n from the formula to be applied. The n accuracy factor included in the A_n equation is shown in Table 1-2. Use K_i and K_{osc} factors determined in previous step.

Table 1-1. A_n Equations

$$A_1 = N_1\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{50}{|Z_m|}\,[0.02\% + \left(\frac{f_m}{30}\right) \cdot 0.1\%] \cdot K_i \cdot K_{osc}$$

$$A_2 = N_1\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{|Z_m|}{50}\,[0.02\% + \left(\frac{f_m}{30}\right) \cdot 0.05\%] \cdot K_i \cdot K_{osc}$$

$$A_3 = N_1\% + \left(\frac{f_m}{5}\right)^2 \cdot 0.1\% + \frac{|Z_m|}{500}\,[0.02\% + \left(\frac{f_m}{30}\right) \cdot 0.05\%] \cdot K_i \cdot K_{osc}$$

$$A_4 = 0.3\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{|Z_m|}{500}\,[0.05\% + \left(\frac{f_m}{30}\right) \cdot 0.1\%] \cdot K_i \cdot K_{osc}$$

$$A_5 = 0.18\% + \frac{|Z_m|}{5\,k} \cdot 0.02\% \cdot K_i \cdot K_{osc}$$

$$A_6 = 0.18\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{|Z_m|}{5\,k}\,[0.02\% + \left(\frac{f_m}{10}\right) \cdot 0.03\%] \cdot K_i \cdot K_{osc}$$

$$A_7 = 0.5\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{|Z_m|}{5\,k} \cdot \left(\frac{f_m}{30}\right) \cdot 0.2\% \cdot K_i \cdot K_{osc}$$

$$A_8 = 0.18\% + \frac{|Z_m|}{50\,k} \cdot 0.03\% \cdot K_i \cdot K_{osc}$$

$$A_9 = N_2\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{100}{|Z_m|}\,[0.02\% + \left(\frac{f_m}{30}\right) \cdot 0.1\%] \cdot K_i$$

$$A_{10} = N_2\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{|Z_m|}{100}\,[0.02\% + \left(\frac{f_m}{30}\right) \cdot 0.05\%] \cdot K_i$$

$$A_{11} = 0.18\% + \left(\frac{f_m}{5}\right)^2 \cdot 0.1\% + \frac{|Z_m|}{1\,k}\,[0.02\% + \left(\frac{f_m}{30}\right) \cdot 0.05\%] \cdot K_i$$

$$A_{12} = 0.3\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{|Z_m|}{1\,k}\,[0.05\% + \left(\frac{f_m}{30}\right) \cdot 0.1\%] \cdot K_i$$

$$A_{13} = 0.18\% + \frac{|Z_m|}{10\,k} \cdot 0.02\% \cdot K_i$$

$$A_{14} = 0.18\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{|Z_m|}{10\,k}\,[0.02\% + \left(\frac{f_m}{10}\right) \cdot 0.03\%] \cdot K_i$$

$$A_{15} = 0.5\% + \left(\frac{f_m}{30}\right)^2 \cdot 3\% + \frac{|Z_m|}{10\,k} \cdot \left(\frac{f_m}{30}\right) \cdot 0.2\%] \cdot K_i$$

$$A_{16} = 0.18\% + \frac{|Z_m|}{100\,k} \cdot 0.03\% \cdot K_i$$

$|Z_m|$: Absolute value of measured impedance in [Ω]
f_m: Test frequency in [MHz]

N Accuracy Factors

N_1 and N_2 in the A_n equations have the following values:

Table 1-2. N Accuracy Factors

Frequency(f)	N_1	N_2
75 kHz ≤f ≤200 kHz	0.15	0.15
200 kHz <f ≤3 MHz	0.08	0.15
3 MHz <f ≤5 MHz	.15	0.38
5 MHz <f ≤30 MHz	0.30	0.38

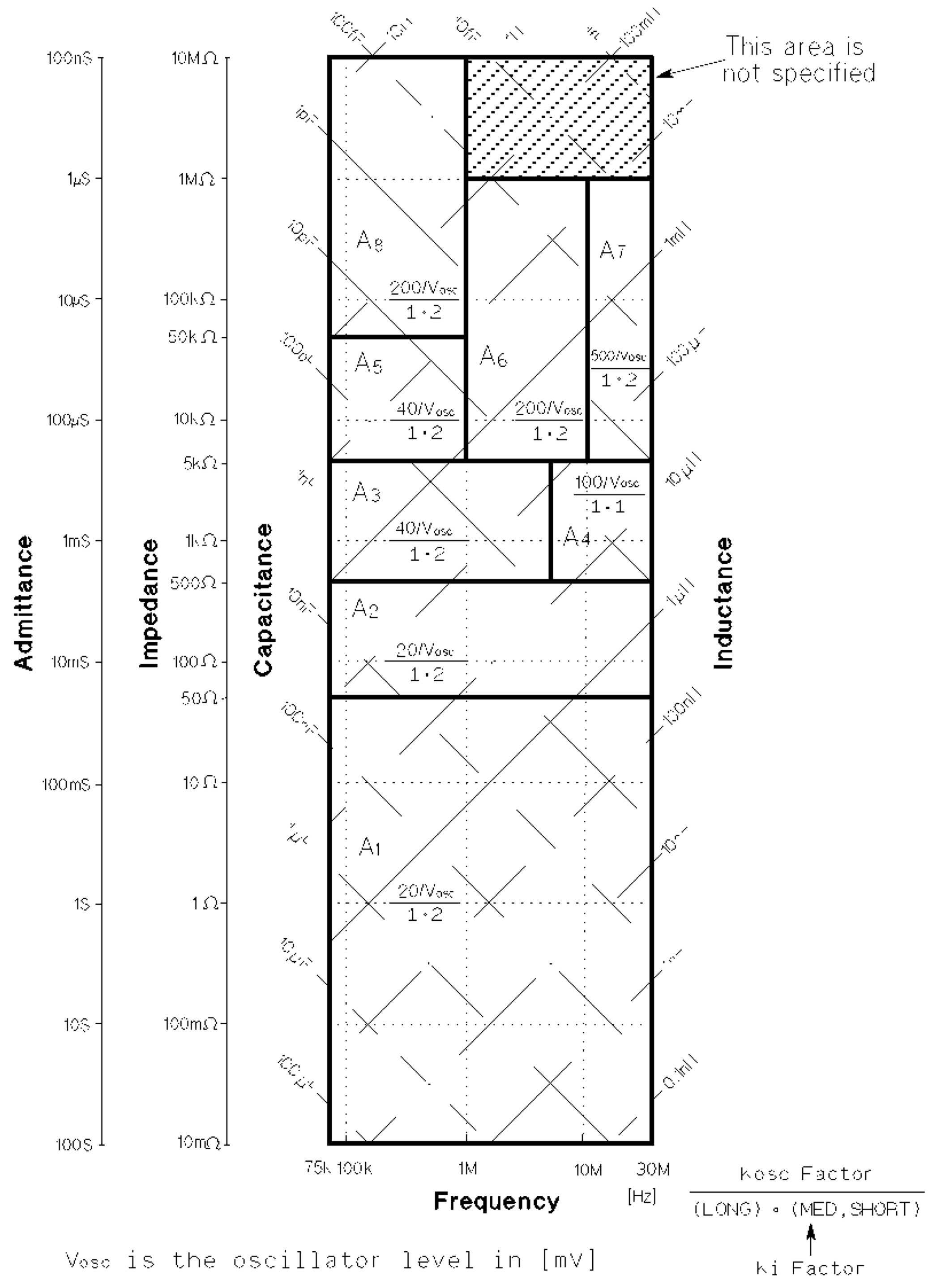

Figure 1-3. Accuracy Equations, K_i Factor, and K_{osc} Factor (Test Signal Level ≤1 V_{rms})

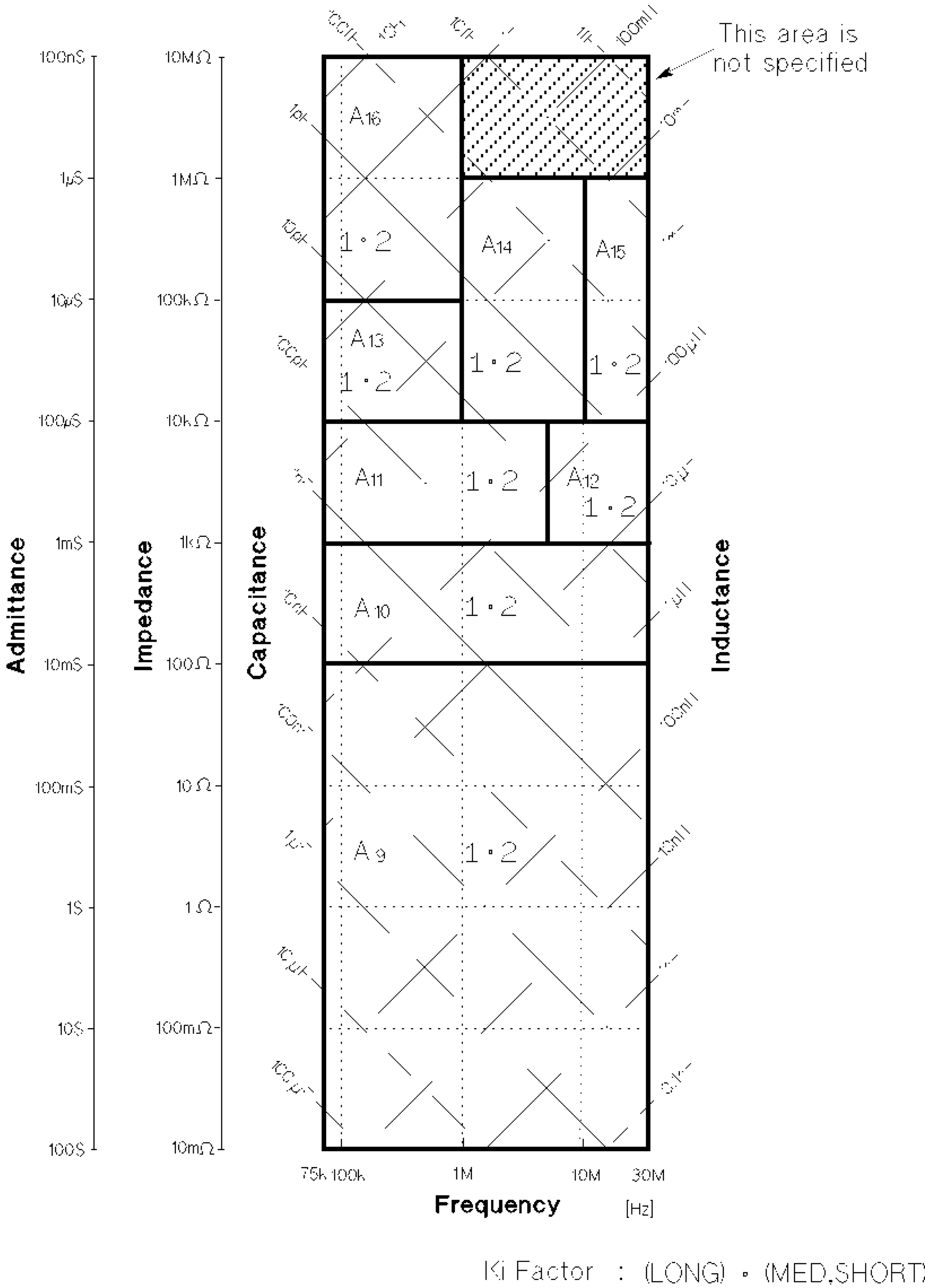

Figure 1-4. Accuracy Equations and K_i Factor (Test Signal Level >1 V_{rms})

Cable Length Factor

Add the following cable length factor A_c to the measurement accuracy when the cable length is set to 1 m (for 16048A) or 2 m (for 16048D) in *CABLE* field, after performing the cable correction and the OPEN/SHORT correction. When the cable length is 0 m, A_c is 0 percent.

$$A_c = \frac{f_m}{15} + A_{co} \ [\%]$$

A_{co} is the additional error when the impedance range is above 5 kΩ.

$$A_{co} = \frac{|Z_m| \cdot f_m \cdot K_t}{1000} \ [\%]$$

where:

f_m = Test frequency in [MHz]
Z_m = Absolute value of measured impedance in [kΩ]
K_l = Test cable length in [m]

Temperature Factor

Multiply the sum of the basic accuracy and the cable length factor by the following temperature induced error K_t, when the temperature range is 0 °C to 55 °C. The boundary belongs to the smaller multiplier.

Temperature (℃)	0	8	18	28	38	48	55
K_t	×3	×2	×1	×2	×3	×4	

Figure 1-5. Temperature Factor K_t

Measurement Accuracy Calculation Example

Example of L_s-Q Accuracy Calculation

Measurement Conditions

Measured inductance L_x of DUT:	220 nH
Measured Q value of DUT:	30
Test Signal Level:	1 V_{rms}
Test Frequency f_m:	25.2 MHz
Integration Time:	LONG
Cable Length:	0 m
Operating Temperature:	28 °C

Determine inductance measurement accuracy A_e

1. From *|Z|, |Y|, L, C, R, X, G, and B Accuracy* (see page 6), measurement accuracy A_e is determined as below:

$$A_e = \pm(A_n + A_c) \times K_t$$

2. First of all, to determine the measurement accuracy A_e, calculate the impedance value from the DUT's inductance value. So the measurement impedance Z_m is:

$$Z_m = 2\pi f_m L_x \approx 35 \ [\Omega]$$

where:

f_m = Test frequency [Hz]
L_x = Measured inductance value of the DUT [H]

3. Choose an accuracy chart from Figure 1-3 and Figure 1-4. The oscillator level is 1 V_{rms}, then Figure 1-3 is chosen for this measurement.

4. Find the frequency point of f_m (25.2 MHz) along the X axis in Figure 1-3. Both axes are in log format. Interpolation may be required.

5. Find the impedance point of Z_m (35 Ω) along the Y axis in Figure 1-3 determined in step 2. Both axes are in log format. Interpolation may be required.

6. Mark the intersection of above two steps and determine the basic accuracy equation A_n, integration factor K_i, and oscillator level factor K_{osc}.

From:

Test frequency f_m:	25.2 MHz
DUT's impedance Z_m:	35 Ω
Integration time:	LONG
Test signal level:	1 V_{rms}

Then, $A_n = A_1$, $K_i = 1$, and $K_{osc} = 1$ (rounded from 0.02).

7. From Table 1-1, the actual accuracy equation to be applied is determined as A_1.

Then,

$$A_1 = N_1\% + \left(\frac{f}{30}\right)^2 \cdot 3\% + \frac{50}{|Z_m|}\left[0.02\% + \left(\frac{f}{30}\right) \cdot 0.1\%\right] \cdot K_i \cdot K_{osc}$$

8. Determine N_1 from Table 1-2.

From frequency = 25.2 MHz, then, N_1 = 0.3.

9. Then,

$$A_n = 0.3\% + \left(\frac{25.2}{30}\right)^2 \cdot 3\% + \frac{50}{|35|}\left[0.02\% + \left(\frac{25.2}{30}\right) \cdot 0.1\%\right] \cdot 1 \cdot 1$$
$$\approx 2.6\ [\%]$$

10. Cable length is 0 m, then A_c = 0.

11. Operating temperature is 28 °C, then K_t = 1 (from Figure 1-5).

12. Therefore, inductance measurement accuracy A_e is:

$$A_e = \pm(A_n + A_c) \times K_t$$
$$= \pm(2.6 + 0) \times 1$$
$$= \pm 2.6\ [\%]$$

Determine Q measurement accuracy Q_e

1. From *Q Accuracy* (see page 6), Q measurement accuracy Q_e is determined as below:

$$Q_e = \pm \frac{Q_x^2 \times D_e}{1 \mp Q_x \times D_e}$$

2. Determine D accuracy D_e for calculating Qe. From the previous step *Determine inductance measurement accuracy* A^e (see page 10), Ae is 2.6 [%], then:

$$D_e = \pm \frac{A_e}{100}$$
$$= \pm 0.026$$

3. Therefore Q_e is:

$$Q_e = \pm \frac{Q_x^2 \times D_e}{1 \mp Q_x \times D_e}$$

$$Q_e = \pm \frac{30^2 \times 0.026}{1 \mp 30 \times 0.026}$$

$$\approx +106/-13$$

Correction Functions

Zero Open

Eliminates measurement errors due to parasitic stray admittance (C, G) of the test fixture.

Zero Short

Eliminates measurement errors due to parasitic residual impedances (L, R) of the test fixture.

Load

Improves the measurement accuracy by using a device whose value is accurately known (a working standard) as a reference.

List Sweep

A maximum of ten frequencies or test signal levels can be programmed. Single or sequential tests can be performed. When Option 001 is installed, DC bias voltages can also be programmed.

Comparator Function

Ten-bin sorting for the primary measurement parameter, and IN/OUT decision output for the secondary measurement parameter.

Sorting Modes

Sequential mode. Sorting into unnested bins with absolute upper and lower limits.

Tolerance Mode. Sorting into nested bins with absolute or percent limits.

Bin Count

0 to 999999

List Sweep Comparator

HIGH/IN/LOW decision output for each point in the list sweep table.

Other Functions

Store/Load

Ten instrument control settings, including comparator limits and list sweep programs, can be stored and loaded into and from the internal non-volatile memory. Ten additional settings can also be stored and loaded from each Memory Card.

GPIB

All control settings, measured values, comparator limits, and list sweep program can be controlled or monitored. Uses ASCII and 64-bit binary data format. GPIB buffer memory can store measured values for a maximum of 128 measurements and output packed data over the GPIB bus. Complies with IEEE-488.1 and 488.2. The programming language is Test and Measurement Systems Language (TMSL).

GPIB Interface Functions

SH1, AH1, T5, L4, SR1, RL1, DC1, DT1, C0, E1

Self Test

Softkey controllable. Provides a means to confirm proper operation.

Option 001 (Internal DC Bias)

Adds the variable DC bias voltage function.

DC Bias Level

The following DC bias level accuracy is specified for an ambient temperature range of 23 °C ± 5 °C. Multiply the temperature induced setting error, K_t listed in Figure 1-5 for the temperature range of 0 °C to 55 °C.

Voltage Range	Resolution	Setting Accuracy
±(0.000 to 4.000) V	1 mV	±(0.1% of setting +1 mV)
±(4.002 to 8.000) V	2 mV	±(0.1% of setting +2 mV)
±(8.005 to 20.000) V	5 mV	±(0.1% of setting +5 mV)
±(20.01 to 40.00) V	10 mV	±(0.1% of setting +10 mV)

A maximum DC bias current of 100 mA can be applied to the DUT.

DC Bias Monitor Terminal

DC bias voltage or current can be monitored at the rear panel BNC connector.

The following monitor accuracies are applied when the digital volt meter whose input impedance is ≥10 MΩ is used.

- DC Bias Voltage Monitor
  DC bias voltage across the DUT × 1

  Output Impedance: 11 kΩ
  Monitor Accuracy: ±(0.2% of reading + 2 + 0.8 × I_{dut}) mV

  where:

  I_{dut} is current flowing through the DUT in [mA].

- DC Bias Current Monitor
  DC bias current through the DUT × 10 Ω (1 V at 100 mA)

  Output Impedance: 10 kΩ
  Monitor Accuracy: ±(1% of reading + 0.3) mA

Other Options

Opt. 002	Accessory Control Interface Allows the 4285A to control the Agilent 42841A Bias Current Source or the Agilent 42851A Precision Q Adapter. The voltage ratio meaurement accuracy, when the 4285A is used with the 42851A Precision Q Adapter, is described in the 42851A's Operation Manual.
Opt. 008	Add Operation Manual (Japanese)
Opt. 009	Delete Operation Manual
Opt. 109	Delete GPIB Interface
Opt. 201	Handler Interface
Opt. 202	Handler Interface
Opt. 301	Scanner Interface
Opt. 907	Front Handle Kit
Opt. 908	Rack Mount Kit
Opt. 909	Rack Flange and Handle Kit
Opt. 910	Extra Operation Manual
Opt. 915	Add Service Manual
Opt. W30	Three Year Customer Return Repair Coverage
Opt. W32	Three Year Customer Return Calibration Coverage

Furnished Accessories

Operation Manual	Agilent P/N 04285-90000
Maintenance Manual	Agilent P/N 04285-90030
Memory Card	Agilent P/N 04278-89001
Power Cord	Depends on the country where the 4285A is being used
100 Ω Resistor Box	Agilent P/N 04285-61001
BNC Female-Female Adapter	Agilent P/N 1250-0080 (4 ea.)
Fuse	Only for Opt. 201, Agilent P/N 2110-0046 (2 ea.)

Accessories Available

Test Fixture/Test Leads

16034E	Test Fixture for SMD or Chip type DUT, f ≤40 MHz
16047A	Test Fixture for Axial or Radial DUT, f ≤13 MHz
16047C	Test Fixture for Axial or Radial DUT, f ≤40 MHz
16047D	Test Fixture for Axial or Radial DUT, f ≤40 MHz
16048A	Test Leads, Length 1 m (BNC connector)
16048D	Test Leads, Length 2 m (BNC connector)
16065A	External Voltage Bias Fixture
16334A	Tweezer-type Test Fixture for SMD or Chip type DUT, f ≤15 MHz
16451B	Dielectric Test Fixture
42842C	Bias Current Test Fixture
P/N 42851-61100	SMD Test Fixture (42842C Opt. 001)

DC Bias Source

42841A	Bias Current Source

Memory Card

P/N 04278-89001	Memory Card, 1 ea.
16470A	Memory Card Set, 10 ea.

GPIB Interconnection Cables

10833A	GPIB Cable, 1 m
10833B	GPIB Cable, 2 m
10833C	GPIB Cable, 4 m
10833D	GPIB Cable, 0.5 m

Handler Interface Connector for Mating with Opt. 201

P/N 1251-0084 AMPHENOL 36-pin Connector

Scanner Interface Connector for Mating with Opt. 301

P/N 1251-0142 AMPHENOL 14-pin Connector

Power Requirements

Line Voltage

100, 120, 220 Vac ±10%, 240 Vac +5% −10%

Line Frequency

47 to 66 Hz

Power Consumption

200 VA max.

Operating Environment

Temperature

0 °C to 55 °C

Humidity

≤95% R.H. at 40 °C

Dimensions

426 (W) by 177 (H) by 498 (D) (mm)

Weight

Approximately 16 kg (35.3 lb., standard)

Display

LCD dot-matrix display

Capable of Displaying

Measured values
Control settings
Comparator limits and decisions
List sweep tables
Self test message and annunciations

Number of Display Digits

6-digits, maximum display count 999999

Supplemental Performance Characteristics

The Agilent 4285A supplemental performance characterisics are listed below. These supplemental performance characteristics are not specifications, but are typical characteristics included as supplemental information for the operator.

Stability

When the following conditions are satisfied,

Integration time:	LONG
Operating temperature:	Constant operating temperature of 23 °C ± 5 °C

Parameter	≤1 MHz	30 MHz
|Z|, |Y|, L, C, R	<0.01%/day	<0.05%/day
D	<0.0001/day	<0.0005/day

Temperature Coefficient

When the following conditions are satisfied,

Integration time:	LONG
Test signal voltage:	≥20 mV_{rms}
Operating temperature:	23 °C ± 5 °C

Parameter	≤1 MHz	30 MHz
|Z|, |Y|, L, C, R	<0.004%/°C	<0.05%/°C
D	<0.00004/°C	<0.0005/°C

Settling Time

Frequency (f_m)

<50 msec.

Test Signal Level

<100 msec.

Measurement Range

<50 msec./range shift

Input Protection

Internal circuit protection, when a charged capacitor is connected to the UNKNOWN terminals.

The maximum capacitor voltage is:

$$V_{max} = \sqrt{\frac{1}{C}} \quad [V]$$

where:

V_{max} = ≤200 V
C = Capacitance value in Farads

Measurement Time

Typical measurement times from the trigger to the output of EOM at the Handler Interface. (EOM: End of Measurement)

Integration Time	Measurement Time
SHORT	30 ms
MEDIUM	65 ms
LONG	200 ms

In the following condition an additional measurement time, approx. 300 ms, is added to the measurement time.

Test signal voltage:	0.51 V – 2 V_{rms}
Measurement range:	0 Ω Range
Test signal current:	≥22 mA

Display Time

Display time for each display format is given as:

MEAS DISPLAY page	approx. 8 ms
BIN No. DISPLAY page	approx. 5 ms
BIN COUNT DISPLAY page	approx. 0.5 ms

GPIB Data Output Time

Internal GPIB data, processing time from EOM output to measurement data output on GPIB lines (excluding display time):

- Approx. 10 ms

Option 001 (internal DC bias)

Maximum DC bias current when the normal measurement can be performed is 100 mA.

DC Bias Settling Time

When DC bias is set to ON, add 5 ms to the measurement time. This settling time does not include the DUT charge time.

Sum of DC bias settling time plus DUT (capacitor) charge time is shown in the following figure.

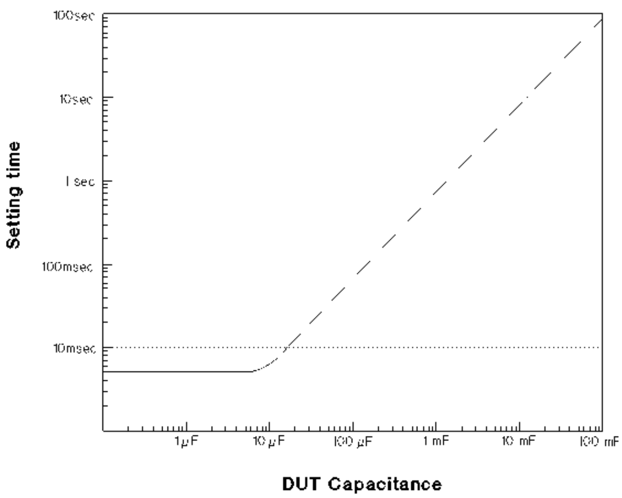

Figure 1-6. Sum of the DC Bias Settling Time and DUT (Capacitor) Charge Time

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