

| Parameter/Equipment | Range | CMC ^{2, 5} (\pm) | Comments |
|--|--|--|-------------|
| Capacitance ³ – Generate | (0.19 to 0.3999) nF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 32.9999) nF (33 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 99) μ F (1.1 to 3.299 99) μ F (3.3 to 10.9999) μ F (11 to 32.9999) μ F (33 to 109.999) μ F (110 to 329.999) μ F (0.33 to 1.099 99) mF (1.1 to 3.299 99) mF (3.3 to 10.9999) mF (11 to 32.9999) mF (33 to 109.999) mF | 0.37 % + 8.0 pF 0.42 % + 7.9 pF 0.40 % + 7.8 pF 0.20 % + 8.3 pF 0.20 % + 77 pF 0.20 % + 83 pF 0.21 % + 0.21 nF 0.23 % + 0.63 nF 0.21 % + 2.3 nF 0.33 % + 0.90 nF 0.33 % + 22 nF 0.41 % + 45 nF 0.37 % + 0.23 μ F 0.32 % + 1.3 μ F 0.35 % + 2.5 μ F 0.36 % + 7.6 μ F 0.59 % + 22 μ F 0.85 % + 77 μ F | Fluke 5520A |
| Electrical Simulation of Thermocouples ³ – Generate | Type E (-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C Type J (-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C | 0.41 °C 0.13 °C 0.11 °C 0.13 °C 0.23 °C 0.22 °C 0.13 °C 0.11 °C 0.14 °C 0.21 °C | Fluke 5520A |

| Parameter/Equipment | Range | CMC ² (\pm) | Comments |
|---|---|---|-------------|
| Electrical Simulation of Thermocouples ³ – Generate (cont) | | | |
| Type K | (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C | 0.27 °C 0.15 °C 0.13 °C 0.23 °C 0.35 °C | Fluke 5520A |
| Type R | (0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C | 0.47 °C 0.29 °C 0.28 °C 0.34 °C | |
| Type S | (0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C | 0.38 °C 0.31 °C 0.33 °C 0.38 °C | |
| Type T | (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C | 0.51 °C 0.20 °C 0.13 °C 0.12 °C | |
| Type N | (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C | 0.33 °C 0.18 °C 0.16 °C 0.15 °C 0.24 °C | |

| Parameter/Range | Frequency | CMC ^{2, 5} (±) | Comments |
|------------------------------------|---|--|-------------|
| AC Voltage ³ – Generate | | | |
| (1 to 33) mV | (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz | 0.062 % + 4.9 µV 0.013 % + 4.9 µV 0.016 % + 4.9 µV 0.11 % + 3.8 µV 0.39 % + 25 µV 0.94 % + 57 µV | Fluke 5520A |
| (33 to 330) mV | (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz | 0.023 % + 6.6 µV 0.011 % + 6.7 µV 0.012 % + 7.8 µV 0.034 % + 13 µV 0.088 % + 51 µV 0.22 % + 0.13 mV | |
| (0.33 to 3.3) V | (10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz | 0.024 % + 38 µV 0.012 % + 46 µV 0.015 % + 46 µV 0.026 % + 48 µV 0.072 % + 0.43 mV 0.28 % + 2.1 mV | |
| (3.3 to 33) V | (10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz | 0.023 % + 0.51 mV 0.012 % + 0.46 mV 0.021 % + 0.20 mV 0.031 % + 0.58 mV 0.094 % + 6.0 mV | |
| (33 to 330) V | (0.045 to 1) kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz | 0.015 % + 1.5 mV 0.016 % + 4.6 mV 0.50 % + 27 mV 0.026 % + 2.5 mV | |
| (330 to 1020) V | (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz | 0.024 % + 6.9 mV 0.018 % + 23 mV 0.024 % + 8.3 mV | |

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|--|---|--|------------------------|
| Phase ³ – Generate (+/-)179.99 ($\Delta\Phi^\circ$) | | | |
| V vs. V V vs I | (10 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz (1 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz | 0.22° 0.28° 0.43° 2.0° 0.22° 0.28° 0.43° 2.0° | Fluke 5520A |
| AC Power ³ – Generate (45 to 65) Hz PF = 1 | | | |
| 330 mV, 20.5 A 1020 V, 20.5 A | 0.01 W to 6.5 kW 0.01 W to 20.9 kW | 0.53 mW/W + 0.45 W 0.71 mW/W + 97 mW | Fluke 5520A |
| Oscilloscopes ³ – Level Sine Amplitude 50 kHz Reference | 5 mV to 5.5 V | 1.6 % + 0.23 mV | Fluke 5520A/ SC1100 |
| Level Sine Amplitude 5 mV to 5.5 V (Relative to 50 kHz Reference) | 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz | 1.4 % + 77 μ V 1.8 % + 79 μ V 3.2 % + 79 μ V 4.0 % + 80 μ V | |
| Square Wave Amplitude Into 1 M Ω Load Into 50 Ω Load | 1 mV to 130 V 1 mV to 6.6 V | 0.078 % + 32 μ V 0.20 % + 32 μ V | |

| Parameter/Equipment | Range | CMC ^{2, 5} (±) | Comments |
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| Oscilloscopes ³ – (cont) | | | |
| DC Level | Up to 130 V into 1 MΩ Up to 6.6 V into 50 Ω | 0.054 % + 32 μV 0.24 % + 30 μV | Fluke 5520A/ SC1100 |
| Time Marker Output into 50 Ω | 1 ns to 20 ms 50 ms to 5 s | 0.12 % + 2.5 ps 0.39 % + 0.18 ms | |
| Edge Transition Time | 1 kHz to 10 MHz | 82 ps | |
| DC Voltage ³ – Measure | Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (0.1 to 1) kV | 5.9 μV/V + 0.30 μV 4.6 μV/V + 0.30 μV 4.6 μV/V + 0.50 μV 7.0 μV/V + 30 μV 44 μV/V + 0.10 mV | Keysight 3458A/002 |
| DC Resistance ³ – Measure | (0 to 10) Ω (10 to 100) Ω (100 to 1000) Ω (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (100 to 1) GΩ | 18 μΩ/Ω + 50 μΩ 15 μΩ/Ω + 0.5 mΩ 12 μΩ/Ω + 0.5 mΩ 12 μΩ/Ω + 5 mΩ 12 μΩ/Ω + 50 mΩ 18 μΩ/Ω + 2 Ω 59 μΩ/Ω + 0.1 kΩ 0.58 mΩ/Ω + 1 kΩ 5.8 mΩ/Ω + 10 kΩ | Keysight 3458A/002 |
| DC Current ³ – Measure | (0 to 100) nA (0.1 to 1) μA (1 to 10) μA (10 to 100) μA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A | 0.19 mA/A + 0.04 nA 36 μA/A + 0.04 nA 24 μA/A + 0.1 nA 23 μA/A + 0.8 nA 23 μA/A + 5 nA 23 μA/A + 50 nA 41 μA/A + 0.5 μA 0.13 mA/A + 10 μA | Keysight 3458A/002 |

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| DC High Current ³ – Measure | (1 to 15) A (15 to 100) A | 1.3 mA/A + 0.50 mA 2.8 mA/A + 5.3 mA | Agilent 3458A/002 w/ L&N 15A shunt w/ Weston 100A shunt |
| DC High Voltage ³ – Measure | (1 to 4) kV (4 to 30) kV | 1.0 V/kV + 0.60 V 0.98 V/kV + 8.0 V | Ross Engineering VD30-8.3-A-K-AAA & Fluke 87 III |

IV. Electrical – RF/Microwave

| Parameter/Range | Frequency | CMC ^{2, 4, 7} (±) | Comments |
|--|----------------|---|---|
| Power Sensor Calibration Factor ³ – Measure | 10 µW to 10 mW | 2.4 % CF 0.71 % CF 0.67 % CF 0.66 % CF 0.65 % CF 0.47 % CF 0.43 % CF 0.53 % CF 0.54 % CF 0.55 % CF 0.59 % CF 0.63 % CF 0.72 % CF 0.73 % CF | Direct comparison transfer method Keysight 8482A/H84 11667A power splitter |

| Parameter/Range | Frequency | CMC ^{2, 4, 7} (±) | Comments |
|---|----------------|--|---|
| Power Sensor Calibration Factor ³ – Measure (cont'd) | 10 µW to 10 mW | 0.77 % CF 0.48 % CF 0.41 % CF 0.43 % CF 0.44 % CF 0.52 % CF 0.49 % CF 0.51 % CF 0.59 % CF 0.79 % CF 0.79 % CF 0.70 % CF 0.72 % CF 0.92 % CF 0.99 % CF 0.91 % CF 0.78 % CF 0.90 % CF 1.3 % CF 2.3 % CF | Direct comparison transfer method Keysight 8481A/H84 11667A power splitter |

IV. Mechanical

| Parameter/Equipment | Range | CMC ^{2, 4, 7} (±) | Comments |
|---|--|--|---|
| Pressure ³ – Measure and Measuring Equipment | (-12 to 0) psi (0 to 10) in.H ₂ O (0 to 1) psi (1 to 5) psi (5 to 12) psi (12 to 30) psi (30 to 100) psi (100 to 300) psi (300 to 750) psi (750 to 3000) psi (3000 to 5000) psi (5000 to 10 000) psi | 0.025 psi 0.0031 in.H ₂ O 0.00062 psi 0.0014 psi 0.0040 psi 0.0086 psi 0.027 psi 0.0039 % + 0.074 psi 0.036 % 0.025 % + 0.086 psi 0.0072 % + 1.4 psi 0.076 % + 2.1 psi | Fluke 718 100G Fluke 700P01 Fluke 700P02 Fluke 700P03 Fluke 700P05 Fluke 718 100G Fluke 718 300G Crystal 3KPSIXP2I w/ Omega HPP-10K Crystal 10KPSIXP2I w/ Omega HPP-10K |

