S630 Automatic Parametric Wafer Testing System Specifications

System Overview

Instrumentation Functions:

- DC current source, current measurement, voltage source, and voltage measurement in any combination.
- Differential voltage measurement
- Capacitance and conductance measurement
- Pulse source
- Frequency measurement

Instrumentation Configuration:

Base System:

- 8 to 64 pins (installed in groups of 4) all pins Kelvin and guarded to probe needles
- 2 to 8 SMUs (optional preamp expansion boards required for pins using SMU 5–8)
- High frequency switch matrix with 8 BNC inputs

Options:

- High speed 100kHz capacitance meter
- Multifrequency capacitance meter
- Pulse generators (single or dual channel)
- Pulse control unit
- Frequency counter
- Spectrum analyzer
- System reference unit
- Automatic probe card ID

SYSTEM CONTROLLER: SUN UltraSPARC or Blade workstations with Solaris operating system, two Ethernet ports, 19″ monitor, and optional tape drive.

PROBER SUPPORT: All major semiconductor wafer probers are supported, including the EG 4080/4090/5l300, EG2001/4085, TSK APM-90A, TSK UF190/200/300, TEL P-8/P-12XL, and Cascade Microtech PS21. To check if your particular prober is supported, please contact your local sales representative.

PROBE CARDS: Three types of probe cards are available: 60237-PCE Coax Epoxy, 60238-PPC Epoxy Ring, and 60239-PCC Ceramic Blade. A test probe card assembly, Model 60239-PCA, is provided with the system for diagnostics.

PROBER CHUCK CONNECTION: The S630 test head is linked to most prober chucks with a pair of dedicated guarded triax connections for force and measure. Internal switching allows connection to an SMU, a capacitance-meter driver circuit, high frequency matrix pathway, or ground. If connected to an SMU, the 100µA–1A source and measure ranges can be utilized. The specifications for this configuration are the same as those for normal SMU operation. For specifications of multi-frequency capacitance meter with chuck connection, consult factory.

CAMERA: A camera can be placed on the top of the test head to view the probe area of the wafer under test. Refer to the S600 Site Preparation and Installation Manual for details.

System Hardware Specifications

All listed specifications are system level specifications to the probe needle on supported probers unless otherwise noted. [19]

Current/Voltage Measure[1]

The S630 has one type of SMU which, together with preamps, covers a wide dynamic range and provides both full Kelvin remote sense (high and low terminals) and guard on every pin.

MEASUREMENT OVERRANGE: 101% of range.

INTEGRATION TIME PROGRAMMABILITY: 0.01–10PLC (Power Line Cycle).

FLOATING MEASURE: SMU low measure terminal can be floated up to ±50V from ground (GND).

SMU LOW MEASURE INPUT IMPEDANCE: $>10^{10}\ \Omega$.

Voltage Measurement (remote sense)

RANGE	MAXIMUM RESOLUTION	ACCURACY (1 Year) [2,3] ±(% reading + volts)	NOISE[4] (STD) 1 PLC Integration
200.0000 mV	100 nV	0.02 % + 250 µV + (120 µV * I_O/I_{FS})	< 10 µV
2.000000 V	1 µV	0.02 % + 250 µV + (120 µV * I_O/I_{FS})	< 10 µV
20.00000 V	10 µV	0.025% + 2.5 mV + (1.2 mV * I_O/I_{FS})	< 50 µV
200.0000 V	100 µV	0.025% + 25 mV + (12 mV * I_O/I_{FS})	< 500 µV

I_O = Output Current. I_{FS} = Full Scale Current

Current Measurement

RANGE	MAXIMUM RESOLUTION	ACCURACY (1 Year) ±(% reading + amps)	NOISE[4] (STD) 1 PLC Integration
100.0000 pA	100 aA	1.2 % + 150 fA[12]	< 7.5 fA @ 10PLC
1.000000 nA	1 fA	0.8 % + 400 fA[12]	< 20 fA @ 10PLC
10.00000 nA	10 fA	0.7 % + 3.0 pA	< 300 fA
100.0000 nA	100 fA	0.25% + 30 pA	< 1.0 pA
1.000000 µA	1 pA	0.2 % + 300 pA	< 6.0 pA
10.00000 µA	10 pA	0.2 % + 3.0 nA	< 30 pA
100.0000 µA	100 pA	0.04% + 15 nA	< 300 pA
1.000000 mA	1 nA	0.04% + 150 nA	< 3.0 nA
10.00000 mA	10 nA	0.04% + 1.5 µA	< 30 nA
100.0000 mA	100 nA	0.05% + 15 µA	< 300 nA
1.000000 A	1 µA	0.1 % + 1.0 mA	< 10 µA

Current/Voltage Source

MAXIMUM OUTPUT POWER PER SMU: 20W (four quadrant source or sink operation).

MAXIMUM SYSTEM CURRENT OUTPUT FROM MULTIPLE SMUS: ±4.0A ($V_O \le 20V$) and ±0.4A ($V_O > 20V$), continuous up to 10min, 75% duty cycle >10min.

MAXIMUM CURRENT INTO GROUND (GND): ±1.0A per pin, ±4.0A total.

REMOTE SENSE: SMU low measure terminal can be floated up to ±50V from ground (GND).

COMPLIANCE: Compliance resolution and accuracy are determined by the corresponding range used.

LOAD IMPEDANCE: Stable into 20,000pF.

Voltage Source (remote sense)

RANGE	PROGRAMMING RESOLUTION	ACCURACY (1 Year) [2,3] ±(% reading + volts)	NOISE[4] (STD) 1 PLC INTEGRATION	MAX. OUTPUT SLEW RATE[5]
200.000mV	5 µV	0.04% + 300 µV + (120 µV * I_O/I_{FS})	< 10 µV	0.002 V/µs
2.00000 V	50 µV	0.025% + 500 µV + (120 µV * I_O/I_{FS})	< 10 µV	0.04 V/µs
20.0000 V	500 µV	0.025% + 5.0 mV + (1.2 mV * I_O/I_{FS})	< 50 µV	0.08 V/µs
200.000 V	5 mV	0.025% + 50 mV + (12 mV * I_O/I_{FS})	< 500 µV	0.33 V/µs

V_O = Output Voltage. I_O = Output Current. I_{FS} = Full Scale Current

SOURCE/SINK LIMITS: ±20V @ ±1.0A , ±200V @ ±100mA.

CURRENT LIMIT: Bipolar current limit (compliance) set with single value. Min. 0.5% of measure range.

OVERSHOOT: <50mV typical (full scale step, resistive load, 10mA range).

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Current Source

RANGE	PROGRAMMING RESOLUTION	ACCURACY (1 Year) ±(% reading + amps)	NOISE[4] (STD) 1 PLC INTEGRATION
100.000 pA	5 fA	1.2 % + 200 fA[12]	< 10 fA
1.00000 nA	50 fA	0.8 % + 600 fA[12]	< 50 fA
10.0000 nA	500 fA	0.7 % + 4.5 pA	< 300 fA
100.000 nA	5 pA	0.25 % + 45 pA	< 1.0 pA
1.00000 µA	50 pA	0.2 % + 450 pA	< 6.0 pA
10.0000 µA	500 pA	0.2 % + 4.5 nA	< 30 pA
100.000 µA	5 nA	0.045% + 30 nA	< 300 pA
1.00000 mA	50 nA	0.045% + 300 nA	< 3.0 nA
10.0000 mA	500 nA	0.045% + 3.0 µA	< 30 nA
100.000 mA	5 µA	0.05 % + 30 µA	< 300 nA
1.00000 A	50 µA	0.1 % + 1.0 mA	< 10 µA

CONTINUOUS LOAD RATING: For V_O ≥10V: 1.0A continuous. For V_O<10V: 800mA continuous; >800mA for 1 minute max @ 75% duty cycle.

SOURCE/SINK LIMITS: ±100mA @ 200V, ±1.0A @ 20V.

VOLTAGE LIMIT: Bipolar voltage limit (compliance) set with single value. Min. 0.5% of measure range.

Capacitance and Conductance

The S630 supports two capacitance measurement options: a high speed 100kHz capacitance meter and a multifrequency capacitance meter. Each uses two BNC inputs on the high frequency matrix, and both may be installed.

High Speed 100kHz Capacitance Meter Option

TEST SIGNAL FREQUENCY: 100kHz.

TEST SIGNAL LEVEL: 45mV rms.

BIAS SOURCE: Uses one system SMU, of SMU 1 through 4.

MAXIMUM BIAS: ±200V @ 10mA.

RANGE	FULL SCALE RESOLUTION	MAXIMUM ADMITTANCE	ACCURACY (1 Year)[1,6,8,10,11] ± (%rdg + offset)	NOISE (STD)[4,9] 1 PLC INTEGRATION (base + %rdg)
C: 20.000 pF	1 fF	14 µS	1.0% + (350 fF * G/G_{FS}) + 50 fF	5.0 fF + 0.05
G: 10.000 µS	1 nS	14 µS	1.0% + (60 nS * C/C_{FS}) + 50 nS	3.0 nS + 0.05
C: 200.00 pF	10 fF	140 µS	1.0% + (3.5 pF * G/G_{FS}) + 100 fF	18 fF + 0.05
G: 100.00 µS	10 nS	140 µS	1.0% +(600 nS * C/C_{FS}) + 100 nS	12 nS + 0.05
C: 2000.0 pF[7]	100 fF	1400 µS	1.5% + (35 pF * G/G_{FS}) + 1 pF	180 fF+ 0.05
G: 1000.0 µS[7]	100 nS	1400 µS	1.5% + (6.0 µS * C/C_{FS}) + 1 µS	120 nS + 0.05

G = Conductance Reading G_{FS} = Full Scale Conductance
C = Capacitance Reading C_{FS} = Full Scale Capacitance

Multifrequency Capacitance Meter Option

TEST SIGNAL FREQUENCY: Programmable from 20Hz to 1MHz. Accuracy specified at 1kHz, 10kHz, 100kHz, and 1MHz.

TEST SIGNAL LEVEL: Programmable from 5mV rms to 2V rms. Accuracy specified at 45mV rms.

MAXIMUM BIAS: ±40V using built-in bias source.

MEASUREMENT SPEED: SHORT, MEDIUM or LONG.

FREQUENCY	MEASUREMENT RANGE (Ω)	C RANGE	ACCURACY[14] ±(%rdg + offset)	G RANGE	ACCURACY[14] ±(%rdg + offset)
1 MHz	10,000	10 pF	1.0% + 200 fF typ.	63 µS	2.0% + 1 µS
	1,000	100 pF	1.0% + 1 pF	630 µS	2.0% + 10 µS
	100	1000 pF	2.0% + 20 pF	6300 µS	2.0% + 200 µS
100 kHz	100,000	10 pF	0.5% + 200 fF typ.	6.3 µS	0.5% + 100 nS
	10,000	100 pF	0.5% + 1 pF	63 µS	0.5% + 1 µS
	1,000	1000 pF	0.5% + 10 pF	630 µS	0.5% + 10 µS
	100	10 nF	0.5% +100 pF	6300 µS	0.5% + 200 µS
10 kHz	100,000	100 pF	0.5% + 1 pF	6.3 µS	0.5% + 100 nS
	10,000	1000 pF	0.5% + 10 pF	63 µS	0.5% + 1 µS
	1,000[20]	10 nF	0.5% +100 pF	630 µS	0.5% + 10 µS
	100[20]	100 nF	0.5% + 1 nF	6300 µS	0.5% + 200 µS
1 kHz	100,000	1000 pF	0.5% + 10 pF	6.3 µS	0.5% + 100 nS
	10,000[20]	10 nF	0.5% +100 pF	63 µS	0.5% + 1 µS
	1,000[20]	100 nF	0.5% + 1 nF	630 µS	0.5% + 10 µS

System DC Leakage and Isolation Resistance

CONNECTED PIN:

Leakage (Pin to Pin, 100pA to 10µA Ranges, Guard Driven): < (1ppm of range + 1 fA)/V.

Leakage (Pin to Ground, 100pA to 10µA Ranges, Guard Driven): < (1ppm of range + 10 fA)/V.

Leakage (Pin to Pin and Ground, 100µA to 1A Ranges, Guard Driven): < (1ppm of range + 100 pA)/V.

UNCONNECTED PIN WITH FLOATPIN() ENABLED:

Isolation Resistance (Pin to Pin, typical): $>10^{15}\Omega$.

Isolation Resistance (Pin to Ground, typical): $>10^{14}\Omega$.

UNCONNECTED PIN WITH FLOATPIN() DISABLED:

Leakage (Pin to Ground, typical): <3nA.

Isolation Resistance (Pin to Ground, typical): $>10^{8}\Omega$.

High Frequency Matrix

The S630 has eight high frequency impedance matched paths through the system to all installed pins for supported instrument options.

NUMBER OF BNC INPUT CONNECTIONS: 8 (common shield).

NUMBER OF PATHWAYS: 4.

CHARACTERISTIC IMPEDANCE: 50Ω, nominal.

BANDWIDTH (–3dB, with 50Ω termination): 60MHz, from BNC input to probe card (reference data).

MAXIMUM STRAY CAPACITANCE BETWEEN DUT PINS: <2pF, exclusive of probe card.

SELECTABLE PATHWAY TERMINATION: 50Ω, nominal.

PULSE TRANSMISSION QUALITY[13] (from BNC input to probe card):

Pulse Overshoot: ±(5% of amplitude + 20mV) typical, at 30ns transition time.

Pulse Crosstalk: ±1% (at 20ns transition time).

MAXIMUM VOLTAGE: ±100V.

MAXIMUM CURRENT: 0.4A.

PATHWAY ON RESISTANCE: 2.5Ω typical.

1GHz Matrix Bypass Option

The S630 supports optional direct connection to DUT pins (in groups of 4) for ring oscillator measurements up to 1GHz (typical, @ –10dB). Consult factory.

Frequency Counter Option

The S630 supports the Keithley 776 Frequency Counter for frequency measurements. It uses one BNC input on the high frequency matrix.

FREQUENCY MEASUREMENT RANGE:[15]
DC Coupled: 0.1Hz to 225MHz.
AC Coupled: 1MΩ: 30Hz to 225MHz; 50Ω: 1MHz to 225MHz.

SENSITIVITY: 50mV rms sine wave at frequency counter input.

SIGNAL OPERATING RANGE: ±5VDC (×1 attenuator) to ±50VDC (×10 attenuator).

IMPEDANCE: 1MΩ or 50Ω, selectable.

ACCURACY: Consult Keithley 776 instrument specification and manual.

Spectrum Analyzer Option

The S630 supports the Tek/Advantest R3131 Spectrum Analyzer for frequency measurements. It uses one BNC input on the high frequency matrix.

FREQUENCY RANGE:[15] 9kHz to 3GHz.

FREQUENCY SPAN: 50kHz to 3GHz.

RESOLUTION BANDWIDTH: 1kHz to 1MHz (1, 3 sequence).

NOISE LEVEL (typical): <100µV (RBW 1MHz, attenuation 0dB, f >10MHz).

MAXIMUM INPUT LEVEL: 50VDC.

IMPEDANCE: 50Ω nominal.

ACCURACY: Consult instrument specification and manual.

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Pulse Generator Option

The S630 supports single and dual channel pulse generators. Each channel uses one BNC input on the high frequency matrix. Specifications valid with or without Pulse Control Unit.

	SPECIFICATION CONDITIONS	ACCURACY[13] ±(%setting + offset)
Pulse Width	50 ns to 999 ms	3% + 2 ns
Pulse Rise/Fall Time	20 ns to 200 ms	10% + 2 ns
Pulse Delay	0 to 998 ms	3% + 1 ns
Pulse Level (open load)	±20V	1% + 100 mV
Pulse Overshoot	30 ns rise/fall time	5% + 20 mV (typical)

Pulse Control Unit Option

The S630 supports the Pulse Control Unit (PCU), which is used in conjunction with pulse generators and the High Frequency Matrix in FLASH memory device characterization. The PCU uses long life solid state relays for endurance testing applications.

SWITCH CONFIGURATION: Six 1 Form A contacts (each has a BNC input and BNC output connection).

CONTACT CONFIGURATION: 1 Form A, "T" configuration.

ISOLATION (Channel Input to Channel Output): >1GΩ, <1pF.

ON RESISTANCE (Channel Input to Channel Output): <7Ω typical, 11Ω maximum.

RELAY CONTROL: Digital I/O under software control.

TRIGGER OUTPUTS: 4 channels (for enhanced pulse generator synchronization).

MAXIMUM VOLTAGE: ±20V.

MAXIMUM CURRENT: 200mA continuous.

Keithley Recipe Manager Option

This option allows all the component parts of a test plan to be collected into a test recipe that can then be managed as a single entity. Also includes an integrated version control system for the recipe and all components of the recipe. Enables ISO-9000 support for automated parametric test.

Optitest™ Option

Optitest™ is an add-on to the KTE software tool set that provides significantly better throughput and process diagnostic capabilities. This option permits adaptive test programming at the instrument, site, die, and wafer levels: more sites, same tests on current wafer; same sites, more tests on current and future wafers; and random site probing within a zone. Also instrument intelligent autoranging.

Wafermap Option

This option enables wafer-centric visualization of parametric test data. Lot, wafer, or site results can be viewed in Pass/Fail mode or Analysis mode. Data can be viewed as 2D wafer maps, 3D surface maps, contour maps, histograms, 2D or 3D scatter plots, box plots, or line graphs with or without limits.

Probe Card Options

Three types of probe cards are available: 60237-PCE Coax Epoxy, 60238-PPC Epoxy Ring, and 60239-PCC Ceramic Blade (mechanically interchangeable).

MAXIMUM NUMBER OF PINS: 64.

MAXIMUM DIE SIZE: 10mm × 10mm (0.4″ × 0.4″).

	60237-PCE Coax Epoxy	60238-PPC Epoxy Ring	60239-PCC Ceramic Blade
Leakage: DC leakage (Guard Driven)			
Pin to Ground, Pin to Pin:	< 1.0 fA/V	< 0.2 pA/V typ.[19]	< 1.0 fA/V
Capacitance: (Guard Driven)			
Pin to Adjacent Pin:	1 pF typ.	5 pF typ.	1 pF typ.
Pin to Nonadjacent Pin:	200 fF typ.	1 pF typ.	200 fF typ.
Voltage:[16]			
Maximum Voltage			
Pin to Ground, Pin to Pin:	400 VDC	400 VDC	400 VDC
Maximum Carry Current:[16]	2.0A	2.0A	2.0A
Probe Card Size:			
Top Contact Board Diameter	6.0″	6.0″	6.0″
Bottom Probe Card Diameter	5.4″	5.4″	5.4″
Overall Height (including probes):	1.15″	1.55″[17]	1.15″
Chuck Temperature Range:[18]	–55°C to 200°C	Ambient to 200°C	Ambient to 200°C
Probe Technology Supported	Coax Probe in Epoxy Ring	Epoxy Ring or Standard Blade	Strip-line Ceramic Blade

Calibration—System Reference Unit Option

The System Reference Unit (SRU) is an external unit that mates to the test head to calibrate the SMUs, Preamps, and High Speed 100kHz Capacitance Meter. The SRU allows traceable calibration to National Institute of Standards and Technology (NIST) metrology standards. System specifications are based upon a one year calibration interval.

Probe Card Manager—Automatic Probe Card ID and Touchdown Count Option

This option includes a non-volatile memory device located on the probe card and hardware to read/write information from this device. The data stored on the probe card includes its type, ID and serial number, total number of touchdowns, and touchdowns since last rework.

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GENERAL SPECIFICATIONS

ENVIRONMENTAL

Operating Conditions: 15°C to 35°C. 5% to 50% RH, non-condensing.

Accuracy Specified: Between 18°C and 28°C, and within ±3°C of calibration temperature. 30% to 50% RH. After one hour warm-up time.

Calibration Conditions: 18°C to 28°C. 30% to 50% RH.

Heat Generated: 4100 BTU per hour (4,400kJ) (typical).

Clean Room: Designed for clean room compatibility.

Cabinet Air Flow: The default system configuration is top to bottom airflow. Bottom to top airflow can be specified at the time of order if required.

POWER/FACILITIES

Voltage: Absolute: 90–132V and 180–264V single phase (factory set). Nominal: 100V, 115V or 220V.

Frequency: 47Hz to 63Hz.

Consumption: Typical 1.2kVA, max. 1.7kVA.

Circuit Breaker: 15A for 90–132VAC. 7.5A for 180–264 VAC.

Line Cord: NEMA 5-15P for 90–132VAC. CEE 7/7 (Continental European) for 180–264VAC.

Air Pressure: Required only for calibration with System Reference Unit. 50 PSI (345×10^3Pa) to 90 PSI (620×10^3Pa) @ 0.1 CFM Clean Dry Air 1/4″ OD Tygon® hose.

System Controller Network Interface: Ethernet 10-Base T (RJ-45).

PHYSICAL DIMENSIONS/WEIGHT

System Cabinet (with cable outlet): 25 in (63.5cm) wide × 33.5 in (85.1cm) deep × 76 in (193.0cm) high. **Approximate Weight:** 700 lb. (317kg).

Test Head (with power cables): 26 in (66.0cm) wide × 34.7 in (88cm) deep × 17 in (43.2cm) high. **Approximate Weight:** 100 lb. (45kg).

Manipulator for Test Head: 29.8 in (75.7cm) wide × 33.6 in (85.3cm) deep × 74.4 in (188.9cm) high. **Approximate Weight:** 500 lb. (226kg).

System Reference Unit: 15.3 in (38.9 cm) long × 13.3 in (33.7cm) wide × 9.19 in (23.4cm) high. Approximate Weight: 30 lb. (14kg).

SAFETY AND STANDARDS COMPLIANCE: The system is designed to power up in a safe state, with system interlock protection. All voltages above 42V are shut down by the interlock protection.

COMPLIANCE: The product carries the European Union CE mark.

SAFETY: Meets European Union Low Voltage Directive (73/23/EEC) as amended by (93/68/EEC). Meets safety standards: EN 61010-1:1993/A2:1995 (third party tested). Meets SEMI S2-93A (including ergonomics SEMI S8-95) with SEMATECH Application Guide 2.0 for SEMI S2-93 and SEMI S8-95 (third party tested).

ELECTROMAGNETIC COMPATIBILITY: Meets European Union EMC Directive (89/336/EEC) as amended by (93/68/EEC). Meets standards EN 55011:1991, EN 50081-1:1992, and EN 50082-2:1995 (competent body tested).

DIAGNOSTICS: Diagnostic routines are provided to monitor system health, increase system availability, and ensure data integrity. These routines check system leakage, switch matrix function, and the measurement and forcing functions. They also pinpoint the location of any faults to allow the user to take corrective action quickly.

Notes:

1 Measurement Specifications @ 1 PLC (Power Line Cycle) unless otherwise noted.

2 For voltage measuring or sourcing with the current range set from 10µA through 100pA, add 300µV of offset.

3 I_O = Output Current, I_{FS} = Full Scale Current

4 Noise specified is the standard deviation of 100 measurements at the stated integration time.

5 Slew Rate is measured from 10% to 90% of stepped voltage, no load.

6 Relative to calibration standard. For absolute accuracy numbers add 0.3% to all percent of reading numbers.

7 Range will measure up to 2000pF/1000µS but accuracy specified only up to 1000pF/500µS.

8 When the chuck connection is used, add 1% to all percent of reading numbers and 100fF/100nS to all offset numbers with a maximum chuck to ground capacitance of 1.0nF.

9 Capacitance and conductance noise are specified for pin to pin measurements only, filter on.

10 Specified for Q≥20. Typical for Q<20.

11 Specified accuracy is between any DUT pins exclusive of probes up offset, with filter on.

12 Typical Values. Add 350fA for maximum offset.

13 Specified with 50Ω terminator enabled unless otherwise noted.

14 When measurement speed is SHORT, add 0.25% of reading and 0.1% of range to stated accuracy.

15 Instrument specification. Application performance depends upon DUT drive capability, matrix performance, and probe card characteristics. Consult factory for measurements above the –3dB bandwidth of the High Frequency Matrix.

16 Printed circuit board layout is designed to meet published specifications for maximum voltage and current. Refer to probe card manufacturer to determine probe needle maximum voltage and current.

17 Including ejector clearance.

18 Special considerations are required when testing at chuck temperatures above or below the specified operating temperature range. Depending on the type of prober and thermal chuck used, system functionality, performance and reliability may be affected. Specialized hardware may be required when testing at different temperatures. In addition, probe cards are typically aligned at the temperature at which they are to be used for probing. Refer to the Keithley Instruments S630 temperature testing manual for details on temperature test requirements and S630 specification derating for the prober, thermal chuck, and temperature range chosen.

19 System Specifications are to the probe needle only for 60237-PCE, 60239-PCC, and 60239-PCA. Probe card leakage with epoxy ring probes is highly dependent on the characteristics of the epoxy material used and the spacing of the probe needles in the epoxy. Refer to the probe card manufacturer to determine the specification for the materials they use in their assembly process. Leakage specifications are only guaranteed for blade probe cards.

20 Reference data only.