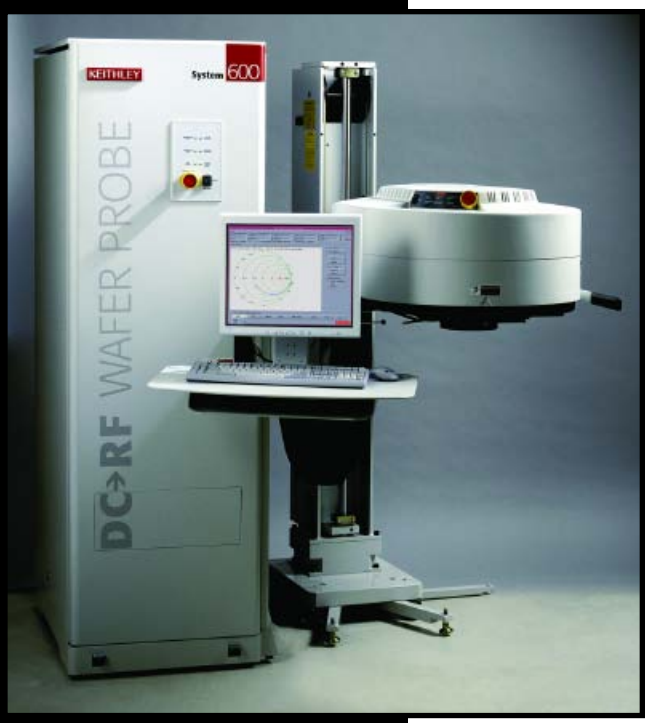
S680

DC/RF Parametric Test System



The S680 is designed for sensitive high speed testing. The measurement instruments are located in the system cabinet, while the preamplifiers are located in the test head. The preamplification technology used boosts low level signals within centimeters of the probe needles, then transmits the boosted signals over cables to the measurement instruments in the system cabinet. This approach eliminates the speed and sensitivity losses that typically result from cable and switch matrix effects. A single type of SMU covers a wide dynamic range. External instruments can be directly connected to the probe needles using the eight general-purpose pathways.

The S680 is operated by the Keithley Test Environment (KTE) software package. It relies on a data-driven execution engine to collect the test results. Tools that utilize a graphical user interface (GUI) are provided to enter and modify wafer descriptions and probe patterns, test structure descriptions, test conditions, test sequences, sampling plans and results limits. All test plan information is stored in ASCII files to permit easy manipulation. An interactive tool is supplied for developing and verifying simple test sequences. These sequences can incorporate math functions and conditional execution. A tool to develop and manage algorithm libraries is also provided, along with a number of common measurement functions.

Test plans developed within KTE feature wafer and cassette level test plans that allow flexible test coverage within a wafer or lot. For example, a 100% parametric screen can be performed on a subset of the wafers and a reduced test set can be performed on the remaining wafers or a WLR test can be performed on a subset of the sites per wafer. The test execution engine also provides a mechanism to integrate custom user code easily into the test plan to facilitate interaction with other software tools (such as CAM packages) or the operator or to customize the test flow.

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

Test results are stored in a flat ASCII file to allow loading them into fab databases or data analysis software systems. A tabular report generator provides wafer and lot level results, along with basic statistical information. A simple customizable operator interface provides operator instructions and displays testing status. A separate SECS/GEM package allows integration into factory automation systems.

Electrical precision and mechanical stability ensure highly repeatable RF parametric measurements.

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S680

DC/RF Parametric Test System

Ordering Information

S680 **DC/RF Parametric Test System**

This product is available with an Extended Warranty.

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 manager
- 40GHz RF S-parameter measurements

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

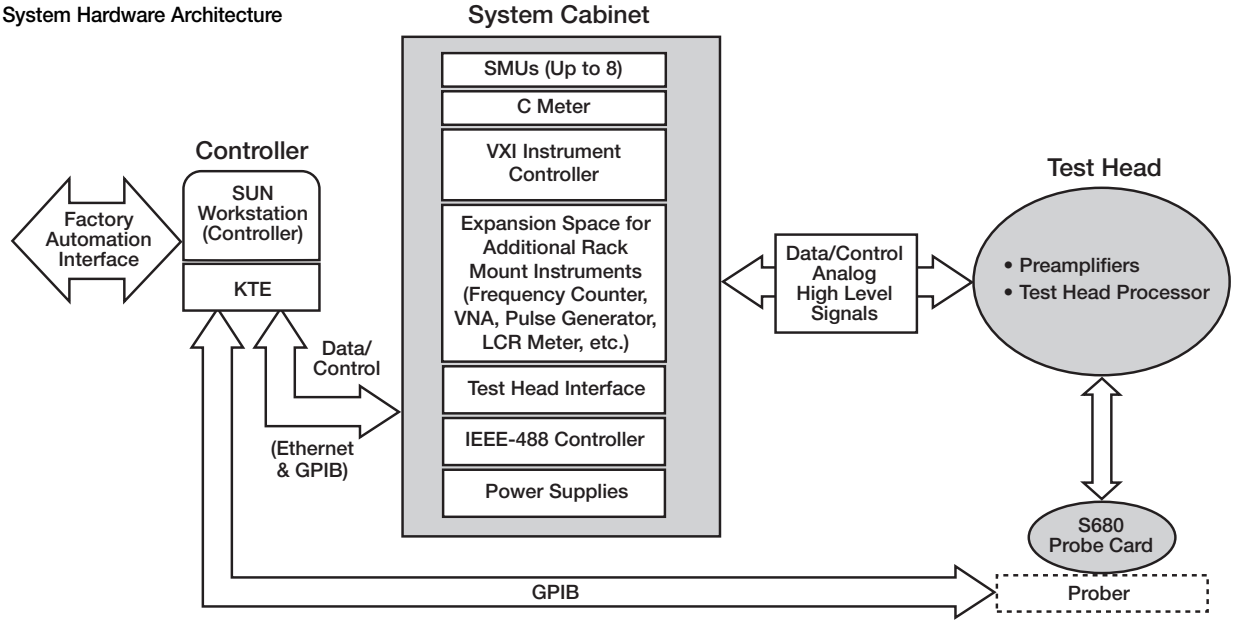
PROBER SUPPORT: All major semiconductor wafer probers are supported, including the EG 4080/4090/5|300, EG2001/4085, TSK APM-90A, TSK UF190/200/300, and TEL P-8/P-12XL. To check if your particular prober is supported, please contact your local sales representative.

PROBE CARDS: Five types of probe cards are available: 60237-PCE Coax Epoxy, 60238-PPC Epoxy Ring, 60238-PPC2 Epoxy Ring, 60239-PCC Ceramic Blade, and 60236-MPC Membrane Probe Card. A test probe card assembly, Model 60239-PCA, is provided with the system for diagnostics.

PROBER CHUCK CONNECTION: The S680 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 multifrequency 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 Series Site Preparation and Installation Manual for details.

S680 System Hardware Architecture



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S680 DC/RF Parametric Test System

System Hardware Specifications

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

CURRENT/VOLTAGE MEASURE[1]

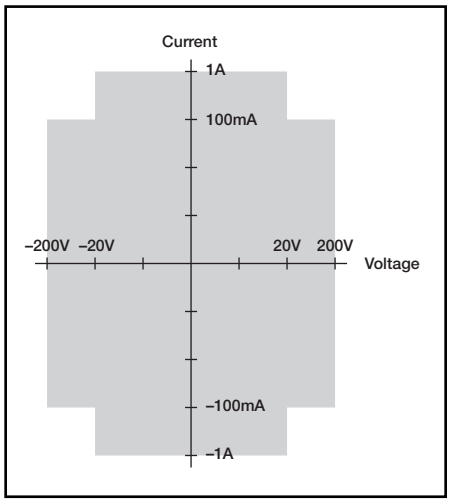
The S680 has one type of SMU which, together with preamps, covers a wide dynamic range and provides both full Kelvin remote sense (high and low terminals), guard, and differential voltage measurements on every pin.

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: $>10^{10}\,\Omega$.



SMU Dynamic Range—Force and Measure

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 ($V_O \leq 20V$) 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]
200.000 mV	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 $V_O \leq 10V$: 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 S680 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: ±100V @ 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

NOTE: Open and Short compensations must be performed to achieve the specified accuracy for 1MHz and other areas deemed necessary.

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 S680 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 SWITCHING VOLTAGE: ±10V.

MAXIMUM SWITCHING CURRENT: 10mA.

MAXIMUM CARRY VOLTAGE: ±100V.

MAXIMUM CARRY CURRENT: 400mA.

PATHWAY ON RESISTANCE: 2.5Ω typical.

1GHz Matrix Bypass Option

The S680 supports optional direct connection to DUT pins (in groups of 4) for ring oscillator measurements up to 1GHz (typical, @ –3dB). Consult factory.

Frequency Counter Option

The S680 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.

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Spectrum Analyzer Option

The S680 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.

Pulse Generator Option

The S680 supports single and dual channel pulse generators. Each channel uses one BNC input on the high frequency matrix.

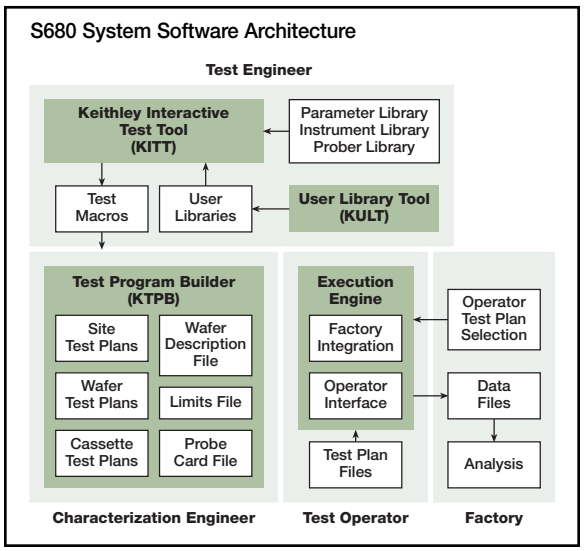
	SPECIFICATION CONDITIONS	ACCURACY[13] ±(%setting + offset)
Pulse Width	50 ns to 999 ms	3% + 2 ns
Pulse Rise/Fall Time	20 ns to 200 ms	10% + 2 ns
Pulse Delay	0 to 998 ms	3% + 1 ns
Pulse Level (open load)	20 peak-to-peak ±20V max.	1% + 100 mV
Pulse Overshoot	30 ns rise/fall time	5% + 20 mV (typical)

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. Supports ISO-9000 traceability for parametric test recipes.

AdapTest™ Option

AdapTest™ 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 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 includes electrically verified probe-to-pad contact.



Probe Card Options

Five types of probe cards are available: 60237-PCE Coax Epoxy, 60238-PPC Epoxy Ring, 60238-PPC2 Epoxy Ring, 60239-PCC Ceramic Blade (mechanically interchangeable), and 60236-MPC Membrane.

MAXIMUM NUMBER OF PINS: 64.

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

	60237-PCE Coax Epoxy	60238-PPC Epoxy Ring	60238-PPC/2 Epoxy Ring	60239-PCC Ceramic Blade	60236-MPC Membrane
Leakage: DC leakage (Guard Driven) Pin to Ground, Pin to Pin:	<1.0 fA/V	<0.2pA/V typ.[19]	<0.2pA/V typ.[19]	<1.0fA/V	<20fA/V typ.[19]
Capacitance: (Guard Driven) Pin to Adjacent Pin:	1 pF typ.	5 pF typ.	2.5 pF typ.	1 pF typ.	1 pF typ.
Pin to Nonadjacent Pin:	200 fF typ.	1 pF typ.	1 pF typ.	200 fF typ.	200 fF typ.
Voltage:[16] Maximum Voltage Pin to Ground, Pin to Pin:	400 VDC	400 VDC	400 VDC	400 VDC	400 VDC
Maximum Carry Current:[16]	2.0A	2.0A	2.0A	2.0A	2.0A
Probe Card Size: Top Contact Board Diameter	6.0″	6.0″	6.0″	6.0″	6.0″
Bottom Probe Card Diameter	5.4″	5.4″	5.4″	5.4″	5.4″
Overall Height (including probes):	1.15″	1.55″[17]	1.55"[17]	1.15″	1.15"
Chuck Temperature Range:[18]	–55°C to 200°C	Ambient to 200°C	Ambient to 200°C	Ambient to 200°C	–55°C to 125°C
Probe Technology Supported	Coax Probe in Epoxy Ring	Epoxy Ring or Standard Blade	Epoxy Ring	Strip-line Ceramic Blade	Membrane Probe

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.

SimulTest™ Option

The SimulTest option enables asynchronous parallel testing of up to 9 devices simultaneously within a single probe touchdown in a sub-site.

SECS/GEM Automation Option

Provides SEMI-compliant, single-wire 300mm automation for S600 Series systems, including HSMS-SS (E37, E37.1), SECS-II (E5), GEM (E30), object services (E39), carrier management (E87), substrate tracking capability (E90), human interface (E95), and pass-through of prober PGV, RGV, AGV handshake (E84).

RF Option

This option provides 2-port s-parameters up to 40GHz using a vector network analyzer for RF device modeling, process control and testing of sub-13Å advanced gate dielectrics. Refer to the RF Option for S600 Series Testers data sheet for details.

S680 DC/RF Parametric Test System

GENERAL SPECIFICATIONS

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): 23.67 in (60.12cm) wide × 37.45 in (95.13cm) deep × 75.6 in (192.02cm) high.

Approximate Weight: 533 lb. (241.76kg).

Test Head (with power cables): 27 in (68.58cm) wide × 34.7 in (88.13cm) deep × 17 in (43.18cm) high.

Approximate Weight: 90 lb. (40.82kg).

Manipulator for Test Head: 35 in (88.9cm) wide × 37.5 in (95.25cm) deep × 74.5 in (189.23cm) high.

Approximate Weight: 650 lb. (294.83kg).

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).

COMPLIANCE: The product carries the European Union CE mark.

SAFETY: Meets European Union Low Voltage Directive (73/23/EEC). Meets safety standards: EN 61010-1. Meets SEMI S2-0302

ELECTROMAGNETIC COMPATIBILITY: Meets European Union Directive 89/336/EEC, EN 61326-1.

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 S680 temperature testing manual for details on temperature test requirements and S680 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, and membrane probes are highly dependent on the characteristics of the materials used and the spacing of the probe needles. 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 and coax epoxy probe cards.

20 Reference data only.

KEITHLEY

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