

Cascade Microtech, Inc.

SPECIFICATION SHEET



Certified, accurate flicker noise measurements from 1 Hz to 40 MHz

EDGE™

Flicker Noise Measurement System and Module

By addressing the entire measurement path — from probe tip to data acquisition — the EDGE is the world's first and only measurement solution that delivers accurate $1/f$ flicker noise measurements from 1 Hz up to 40 MHz. As a module or a complete system, the EDGE achieves high-precision flicker noise measurements and provides unprecedented noise immunity over an industry-leading 40 MHz band. Unlike traditional flicker noise measurement equipment, the EDGE is a single-vendor solution, where every component, cable and instrument has been optimized to ensure accurate, repeatable and reliable flicker noise data for today's demanding device characterization and process development. Both the EDGE module and the EDGE system also enable a seamless transition to measurement modes for both $1/f$ flicker noise and DC parameter extraction, and support over-temperature (-60°C to 300°C) testing. In addition, a comprehensive support package is available for all EDGE flicker noise measurement solutions, which includes on-site evaluation, pre-and post-installation training, all from a single vendor - Cascade Microtech.

- EDGE system - Complete, integrated measurement system (1 Hz to 40 MHz)
- EDGE module - Upgrade module for existing station (1 Hz to 10 MHz)

:: EDGE MODULE SPECIFICATIONS

The EDGE flicker noise measurement module includes:

- Signal acquisition unit
- Noise processing unit
- Computer accessories and LCD monitor
- System cables and SMU cables
- EDGE flicker noise measurement software
- Low noise interconnect module (Required for S300 and Summit 12000™ (AP/M) probe stations)



SIGNAL ACQUISITION UNIT NOISE SPECIFICATION

SMU noise rejection	> 6 dB @ 1 Hz, > 25 dB @ 10 Hz, > 80 dB up to 20 MHz, > 70 dB @ 20 - 40 MHz
LNA noise floor	1.0 nV/ $\sqrt{\text{Hz}}$ @ 10 KHz
Wafer-mounting chuck spectral noise floor	-170 dBVrms/ $\sqrt{\text{Hz}}$ up to 1 MHz (Typical)

SIGNAL ACQUISITION UNIT CAPACITANCE SPECIFICATION

Load (without probe and cable)	< 65 pF
Source (without probe and cable)	< 30 pF
Load (with probe* and cable)	< 100 pF
Source (with probe* and cable)	< 75 pF

*DCP-HTR series probes

MEASUREMENT DC RANGE

Force voltage and current range (maximum)	$\pm 50 \text{ V}$, $\pm 100 \text{ mA}$
Force current accuracy (minimum)	$1 \mu\text{A} \pm 3 \%$

MEASUREMENT R_{LOAD} AND R_{IN} RANGE

R_{load} range and selection	8.33 Ω to 1 M Ω , 20 selections
R_{in} range and selection	0 Ω to 100 M Ω , 21 selections
R_{load} and R_{in} accuracy	1 %

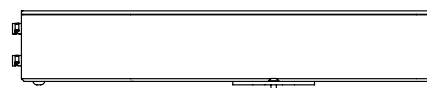
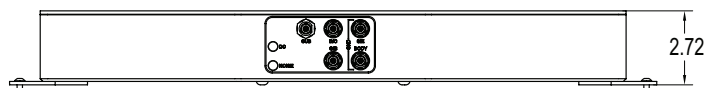
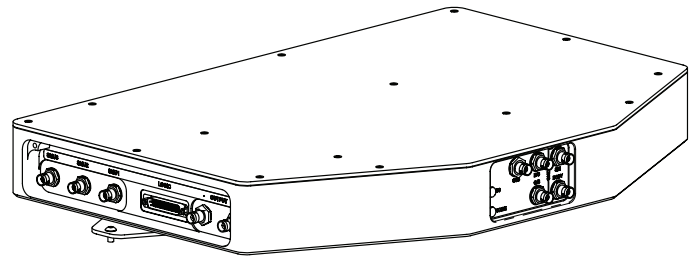
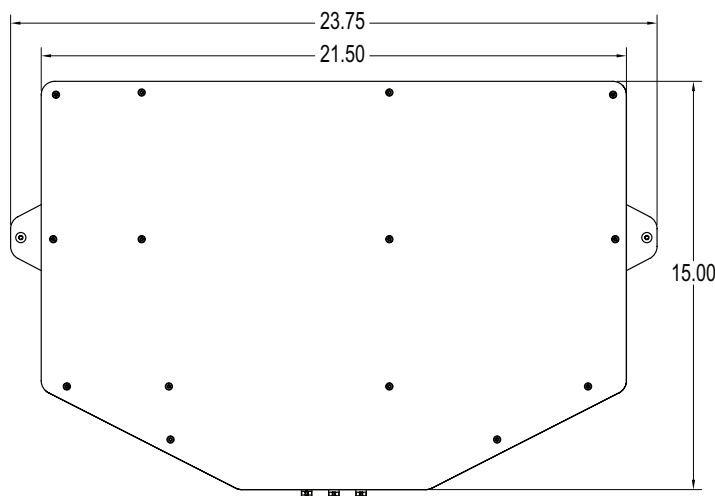
SIGNAL ACQUISITION UNIT LEAKAGE SPECIFICATION

DC mode	40 fA/V (guarded) after 40 seconds delay (typical)
Noise mode	40 nA/V (unguarded) after 40 seconds delay (typical)

SIGNAL ACQUISITION UNIT PHYSICAL DIMENSION

Weight 14.5 kg (32 lb.)

Dimensions



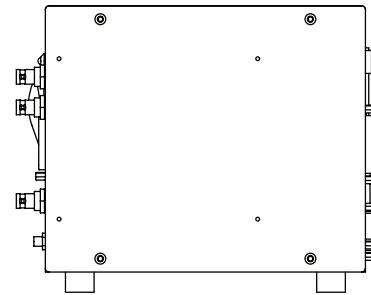
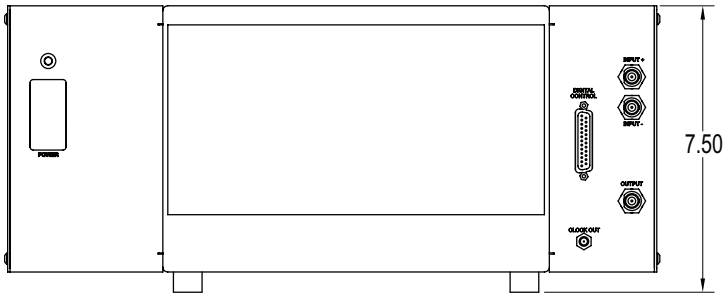
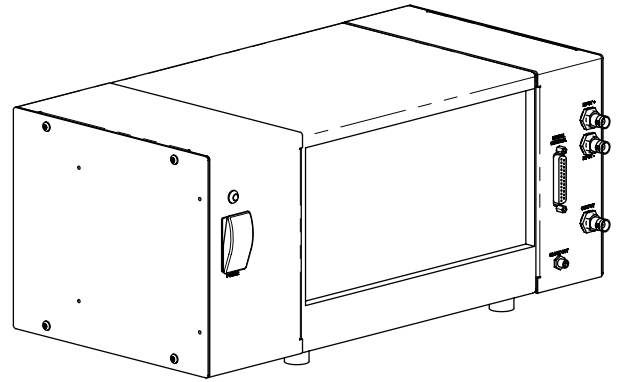
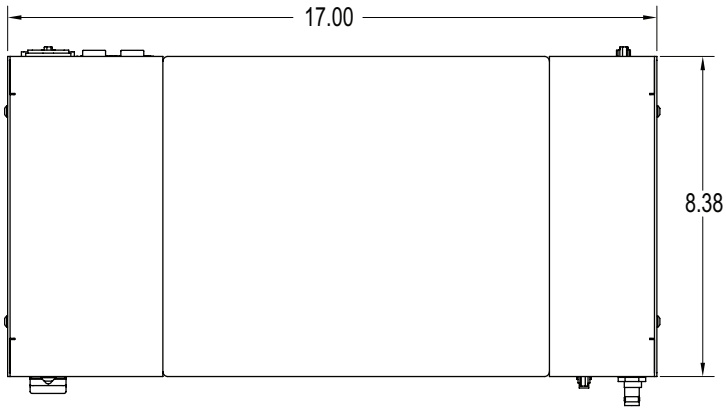
NOISE PROCESSING UNIT SPECIFICATIONS

Resolution	14 bit
Maximum sampling frequency	102.4 MHz
Number of spectrum/band	400, 800, 1600 [selectable]
Averaging range	1 - 100 times

NOISE PROCESSING UNIT PHYSICAL DIMENSIONS

Weight 8.2 kg (18 lb.)

Dimensions



EDGE SOFTWARE SPECIFICATIONS

Supported device types	Bulk MOSFETs, SOI MOSFETs, BJTs, diodes, resistors, varactors
Supported 1/f models	BSIM3/4, BSIMSOI, PSP, MOSVAR, R-MODEL
Advanced features	Automatic R_{load} , R_{in} switching Automatic multi-die testing (including subsite) Statistical analysis Automatic report generation (.pdf, .ppt, .html, .doc, .xls format)
Output file formats	ICCAP, BSIMPro, MBP, Excel
Computer requirements	Windows XP, Pentium IV or better. 2 GB RAM. IEEE-488 (GPIB) control card and driver for Windows (NI USB to GPIB interface acceptable)
Supported SMUs	Agilent B1500, 4142, 4155A/B/C, 4156B/C, Keithley 2600, 4200
Supported Cascade Microtech probe stations	Summit 11000, Summit 12000B (AP/M), S300 and ELITE300™ (AP/M)
Required prober control software	Nucleus™ 4.0 Prober Control Software

AVAILABLE ACCESSORIES

	ELITE300 (AP/M)	S300	Summit 12000 (AP/M)	Summit 11000
EDGE module mounting kit	●	●	N/A	N/A
Low noise interconnect module	N/A	●	●	N/A
LNA calibration kit	●	●	●	●
Low noise triaxial SMU cables (3 m)	●	●	●	●
EDGE software additional license	●	●	●	●
Thermal system filter*	●	●	●	●

*ERS thermal system required.

THERMAL MEASUREMENT SUPPORT

	ELITE300 (AP/M)	S300	Summit 12000 (AP/M)	Summit 11000
1 Hz - 10 MHz (non-thermal)	●	●	●	●
1 Hz - 1 MHz (thermal, without thermal system filter)*	●	●	●	●
1 Hz - 10 MHz (thermal, with thermal system filter)**	●	●	●	●

*ERS or ESPEC thermal systems required.

**ERS thermal system required.

AVAILABLE MODULES

Part number	149-450	149-450-S
Probe station	ELITE300 (AP/M), Summit 11000	S300, Summit 12000 (AP/M)
Frequency	1 Hz - 10 MHz	1 Hz - 10 MHz
Configuration		
Signal acquisition unit	●	●
Noise processing unit	●	●
Computer accessories and LCD monitor	●	●
System cables and SMU cables	●	●
EDGE flicker noise measurement software	●	●
Low noise interconnect module	N/A	●

::: EDGE SYSTEM SPECIFICATIONS

Fully integrated EDGE system includes:

- Cascade Microtech's low-noise 300mm semi-automatic probe station
- Thermal chuck optimized for low noise with high-performance thermal controller and chiller system
- Flicker noise measurement software and hardware
- Measurement instrument
- Digital imaging system
- Associated accessories
- Instrument rack
- Site survey and user training



P/N EDGE-301 EDGE SYSTEM FOR 1 HZ TO 40 MHZ

Measurement frequency range	1 Hz to 40 MHz
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Configuration includes

- Signal acquisition unit
- Noise processing unit
- Computer accessories and LCD monitors
- System cables and SMU cables
- EDGE flicker noise measurement software
- Thermal filter unit
- Power line filter unit
- Agilent 4156C
- Low noise 300mm probe station with eVue™-III Pro package, automatic scope transport and full range [-60° C to 300° C] thermal controller (detailed station specifications shown below)
- Site survey and user training
- Calibration kit

PROBE STATION PHYSICAL DIMENSIONS

Station dimensions	128 cm (W) x 99 cm (D) x 165 cm (H) (50 in. x 39 in. x 65 in.)
Weight	1,090 kg (2,400 lbs.)
Height: standard	Standard height for EDGE system with floor-to-platen height of 104 cm (41 in.)
Height: low profile	Lowers EDGE system by 127 mm (5.0 in.) for floor-to-platen height of 91 cm (36 in.)

PROBE STATION MICROCHAMBER ELECTRICAL SPECIFICATIONS

EMI isolation	≥ 15 dB @ DC – 5 GHz
Magnetic shielding attenuation	≥ 20 dB @ 50 Hz – 50 kHz
Light attenuation	≥ 120 dB
Spectral noise floor	≤ -170 dBVrms/ $\sqrt{\text{Hz}}$ (≤ 1 MHz)*
System AC noise	≤ 5 mVp-p (≤ 1 GHz)

*Test setup uses triaxial thermal chuck, 50 Ω termination, high-quality LNA, and DSA/DSO instrument

PROBE STATION MICROCHAMBER AIR PURGE MANAGEMENT

Purge	Dry air or nitrogen
Purge control	Manual or automatic (software controlled)
Purge flow rate	Standard: 0 to 1.9 liters/sec (0 to 4 SCFM), Quick purge: > 1.9 liters/sec (4 SCFM)

PROBE STATION MECHANICAL PERFORMANCE

X-Y Stage

Travel	301 mm x 301 mm (11.9 in. x 11.9 in.)
Resolution	0.1 μm (0.004 mils)
Repeatability	$\leq 1 \mu\text{m}$ (0.04 mils)
Accuracy	$\leq 2 \mu\text{m}$ (0.08 mils)
Speed	100 mm/sec (4 in./sec)
Bearings	Air
Motor drive system	Brushless linear servo motor

Z Stage

Travel	10 mm (.39 in.)
Resolution	0.1 μm (0.004 mils)
Repeatability	$\leq 1 \mu\text{m}$ (0.04 mils)
Accuracy	$\leq 2 \mu\text{m}$ (0.08 mils)
Speed	20 mm/sec (0.8 in./sec)
Lifting capacity	$\geq 20 \text{ kg}$ (44 lb.)
Probe force deflection	$\leq 0.001 \mu\text{m}/\mu\text{m}$ slope per 10 kg load (0.001 in./in. / 22 lb.)

Theta Stage

Travel	$\pm 7.5^\circ$
Resolution	0.65 μm (0.03 mils)*
Repeatability	$\leq 1 \mu\text{m}$ (0.04 mils)*
Accuracy, Standard Moves	$\leq 2 \mu\text{m}$ (0.08 mils)*
Accuracy, Large Moves	$\leq 5 \mu\text{m}$ (0.20 mils)*

*Measured at edge of 300mm chuck

PROBE STATION SYSTEM SPECIFICATIONS

Planarity	$\leq 10 \mu\text{m}$ (0.39 mils) @ 25° C
	$\leq 30 \mu\text{m}$ (1.2 mils) @ -60° C
	$\leq 30 \mu\text{m}$ (1.2 mils) @ 200° C
	$\leq 40 \mu\text{m}$ (1.6 mils) @ 300° C
Vibration control	$\geq 0 \text{ dB}$ @ 0 to 5 Hz
	-5 dB per octave @ 5 to 48 Hz
	$\geq 15 \text{ dB}$ @ > 48 Hz
Stage dampening	$\geq 15 \text{ dB}$ in less than 1500 ms
Move time	$\leq 0.75 \text{ sec}$ (200 μm Z down – 1000 μm X-Y – 200 μm Z up)

THERMAL SYSTEM SPECIFICATIONS

Temperature range	-60° C to 300° C
Accuracy	±0.1° C (with calibrated controller)
Resolution	0.1° C
Thermal uniformity	≤ 0.5° C @ 25° C, ≤ 2.0° C @ -60° C, ≤ 3.0° C @ 300° C
Transition time	50 min [-60° C to 300° C], 100 min [300° C to -60° C]
Thermal chuck flatness	≤ 30 µm @ -60° C to 300° C
Supply air	380 liters/min (13 SCFM), -40° C dew point
Power consumption	950 VA (Controller), 2,300 VA (Chiller)
Audible noise	< 58 dB
Dimensions: Controller	483 mm (W) x 455 mm (D) x 144 mm (H), (19.0 in. x 17.9 in. x 5.7 in.) (19-inch rack mount)
Dimensions: Chiller	422 mm (W) x 500 mm (D) x 1030 mm (H), (16.6 in. x 19.7 in. x 40.6 in.)
Weight	Controller: 24 kg (53 lb.), Chiller: 80 kg (176 lb.)

MICROSCOPE BRIDGE MOUNT/TRANSPORT

Travel	76 mm (X) x 76 mm (Y) x 152 mm (Z), (3.0 in. x 3.0 in. x 6.0 in.)
Travel in top hat	13 mm x 13 mm (0.5 in. x 0.5 in.)
Z lift	152 mm (6.0 in.)
Resolution	X-Y axis: 0.4 µm (.02 mils), Z axis: 0.08 µm (0.003 mils)
Repeatability	X-Y axis: ≤ 2 µm (0.08 mils), Z axis: < 1 µm
Accuracy	X-Y axis: ≤ 5 µm (0.20 mils), Z axis: < 1 µm
Speed	5 mm/sec (0.2 in./sec)

SYSTEM FACILITY REQUIREMENTS

Vacuum	400 mm (15 in.) of Hg min.
Dry air purge	2.8 liters/sec (6 SCFM)
Compressed air	0.5 liters/sec (1 SCFM) @ 6 bar (85 psi) min.
Power	200-240 V single phase, 50 or 60 Hz. Two receptacles are required: receptacle 1, 10 A minimum, receptacle 2, 20 A minimum.

PROBE STATION PLATEN SYSTEM SPECIFICATION

Platen

Dimensions	101.6 cm (W) x 86.4 cm (D) x 25 mm (T) [40.0 in. x 34.0 in. x 1.0 in.]
Mounting system	Kinematic, thermally optimized
Platen-to-chuck height	40.0 ± 0.5 mm (1.575 ± 0.02 in.)
Lift range	3.0 mm (0.12 in.)
Lift repeatability	≤ 3 µm (0.12 mils)
Accessory mounting	Universal rail system: 53 cm (21 in.) Left / right rail, 71 cm (28 in.) Top rail

Platen Ring

Diameter	717.6 mm (28.25 in.)
Weight	43 kg (95 lb.)
Material	Steel for magnetic positioners
Surface finish	Fine ground for vacuum positioner high stability
Usability features	Removable and clockable in 45°

Platen Ring Insert

Diameter	342.9 mm (13.5 in.)
Standard interface	Probe card holders and custom adapters

WAFER CHUCK SPECIFICATION

Diameter	305 mm (12 in.)
Material	Nickel or gold plated aluminum
DUT sizes supported	Shards or wafers 50 mm (2 in.) through 300 mm (12 in.)
Vacuum rings	50, 130, 180, 280 mm (1.97, 5.12, 7.09, 11.02 in.)
Vacuum ring actuation	Software controlled

AUXILIARY CHUCKS

Quantity	Two
Max substrate size	15.2 mm x 22.1 mm (0.6 in. x 0.87 in.) ISS substrate 19 mm x 19 mm (0.75 in. x 0.75 in.) Square substrate
Material	Magnetically loaded, RF absorbing Eccosorb
Flatness	≤ 10 μm (0.39 mils)
Positional repeatability	≤ 2 μm (0.08 mils) after rollout event
Vacuum actuation	Independent software control

:: REGULATORY

Certification	NRTL and CE compliant
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:: WARRANTY*

Fifteen months from date of delivery or twelve months from date of installation

*See Cascade Microtech's Terms and Conditions of Sale for more details.

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Data subject to change without notice

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