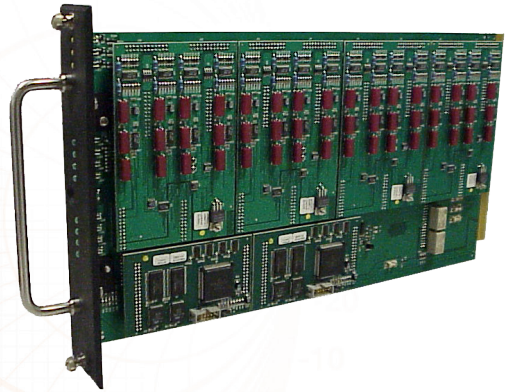


# HAEM

High-Accuracy EM  
25 mA / 10 V



DATA SHEET

Cascade Microtech's High Accuracy Electromigration Module (HAEM) is designed for electromigration (EM) and stress migration (SM) testing of copper and aluminum interconnects which typically have geometries of 90 nm and smaller.

The HAEM Module's high-rate measurement system reliably captures DUT failures with excellent time precision, describes pre-breakdown behavior in detail, and can even log short duration resistance changes in order to evaluate 'self-healing' voiding behavior.

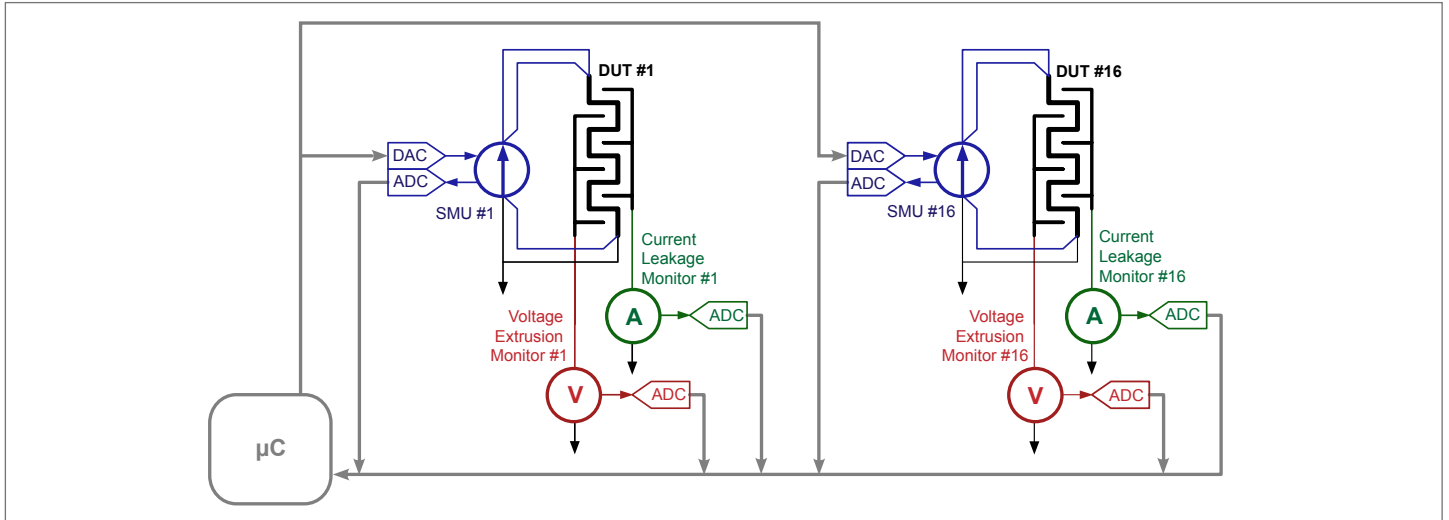
With an intuitive, full-featured test suite, EM and SM experiment data is analyzed quickly to determine DUT failure times. The data analysis tools offer full Black's Equation evaluation for accurate lifetime projections with confidence intervals. All data can easily be exported to other applications for analysis.

## FEATURES / BENEFITS

Flexibility	Compatible with both 1164 and Symphony™ reliability test systems Broad measurement range, setpoints as low as 10 $\mu$ A Accurate source/measurement system Two types of extrusion monitors per DUT Full-featured test suite, including EM, TCR, and SM
Full parallel measurements	Dedicated high-accuracy SMU for each DUT Continuous monitoring of all DUTs — no scanning Instant capture of momentary DUT behavior Quick disconnect upon DUT failure 4-wire Kelvin connections
Maximum efficiency	Industry's best package-level test throughput with 1164 Highly parallel wafer-level reliability testing with 1164 or Symphony

## FULL PARALLEL MEASUREMENT

16 SMUs	<p>One per DUT</p> <p>Including current source, ammeter, and voltmeter</p> <p>To independently source current for each device</p> <p>Continuously measure the current through and voltage across each DUT without scanning through a switch matrix</p> <p>Provide 4-wire Kelvin bias and measurement</p> <p>Each DUT may have different current, or current density, set points</p>
16 voltage extrusion monitors	<p>One voltmeter per DUT</p> <p>To continuously monitor voltage on an optional extrusion monitor line</p>
16 current leakage monitors	<p>One ammeter per DUT</p> <p>To continuously monitor current leakage to an optional extrusion monitor line</p>



Full parallel measurement system: dedicated SMUs, voltage extrusion monitors and current leakage monitors, one each per DUT.

## SPECIFICATIONS

Parameter	Specification	Current Leakage Monitor	Voltage Extrusion Monitor
Capacity	Up to 16 DUTs		
Maximum current	+25 mA per DUT	5 µA per DUT	-
Source resolution	400 nA (250 µA - 25 mA) 4 nA (below 250 µA)	-	-
Source accuracy	0.1 % ± 2.5 µA (250 µA - 25 mA) 0.1 % ± 25 nA (below 250 µA)	-	-
Maximum voltage	+10 V	-	10 V
Measure resolution	10 µV (625 mV - 10 V) 600 nV (below 625 mV) 25 nA (250 µA - 25 mA) 250 pA (below 250 µA)	5 pA	10 µV
Measure accuracy	0.1 % ± 200 µV (625 mV - 10 V) 0.1 % ± 20 µV (below 625 mV) 0.1 % ± 1 µA (250 µA - 25 mA) 0.1 % ± 50 nA (below 250 µA)	0.1 % ± 1 nA	0.1 % ± 600 µV
Sampling interval	<0.1 sec	<0.1 sec	<0.1 sec

\*Data, design and specification depend on individual process conditions and can vary according to equipment configurations.  
Not all specifications may be valid simultaneously.

## RECOMMENDED OPERATING RANGE

Current set-point range	10 $\mu$ A ~ 25 mA
Voltage measurement range	400 $\mu$ V ~ 10 V
DUT resistance measurement range	1 $\Omega$ ~ 100 k $\Omega$
DUT power range	Up to 2 W per package

## REGULATORY COMPLIANCE

Certification	CE, SEMI S2
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## WARRANTY

Warranty*	Fifteen months from date of delivery or twelve months from date of installation (whichever comes first)
Service contracts	Single- and multi-year programs available to suit your needs

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

## ORDERING INFORMATION

Consult factory for more detailed specifications, additional options, suitability of configuration for intended usage, part numbers, pricing, and delivery.

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