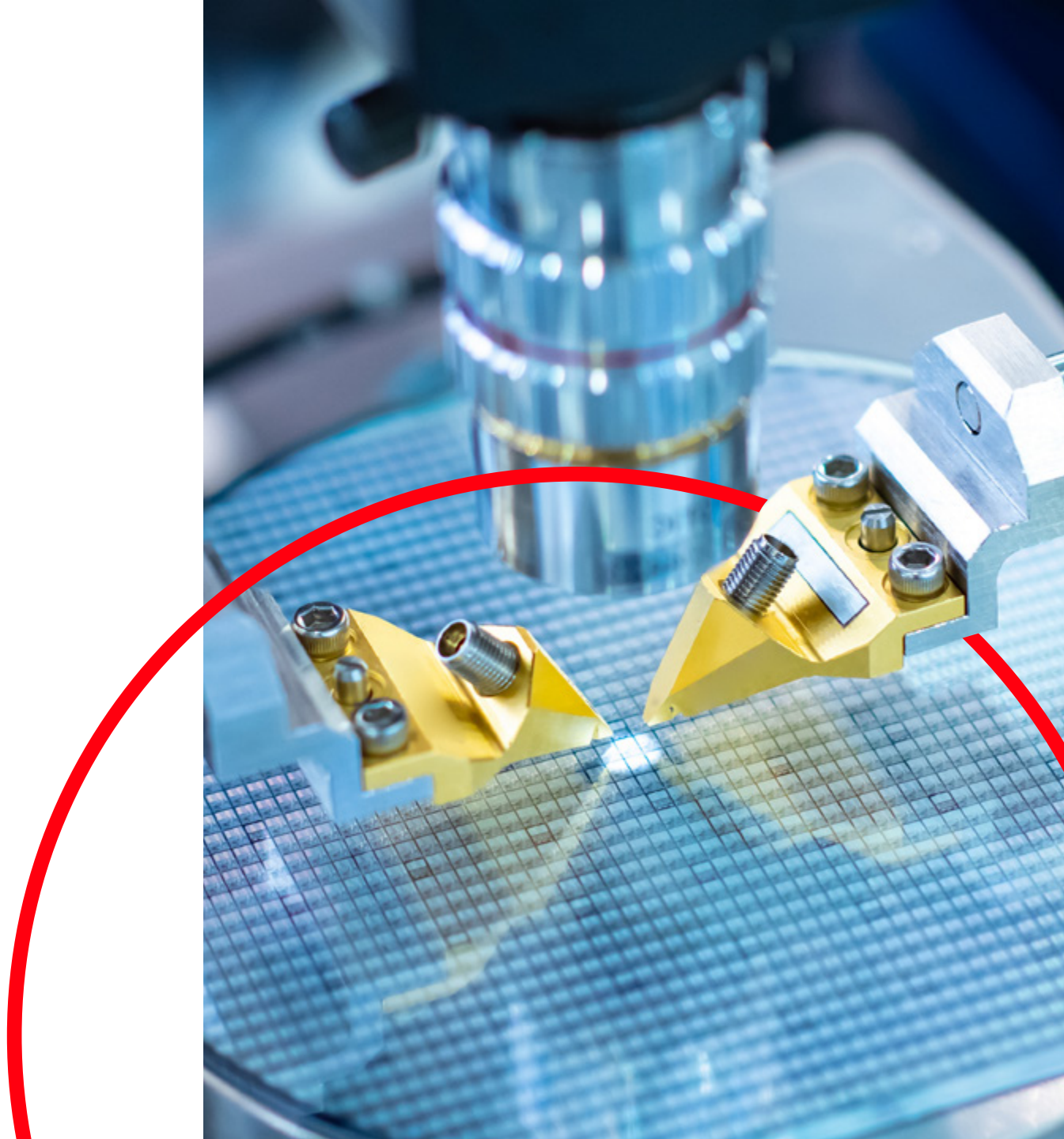




Semiconductor & Electronics

Back-end test & electronic fixturing solutions

Worlds' broadest portfolio of
polymer solutions for use in
IC chip test & fixturing applications



Applications

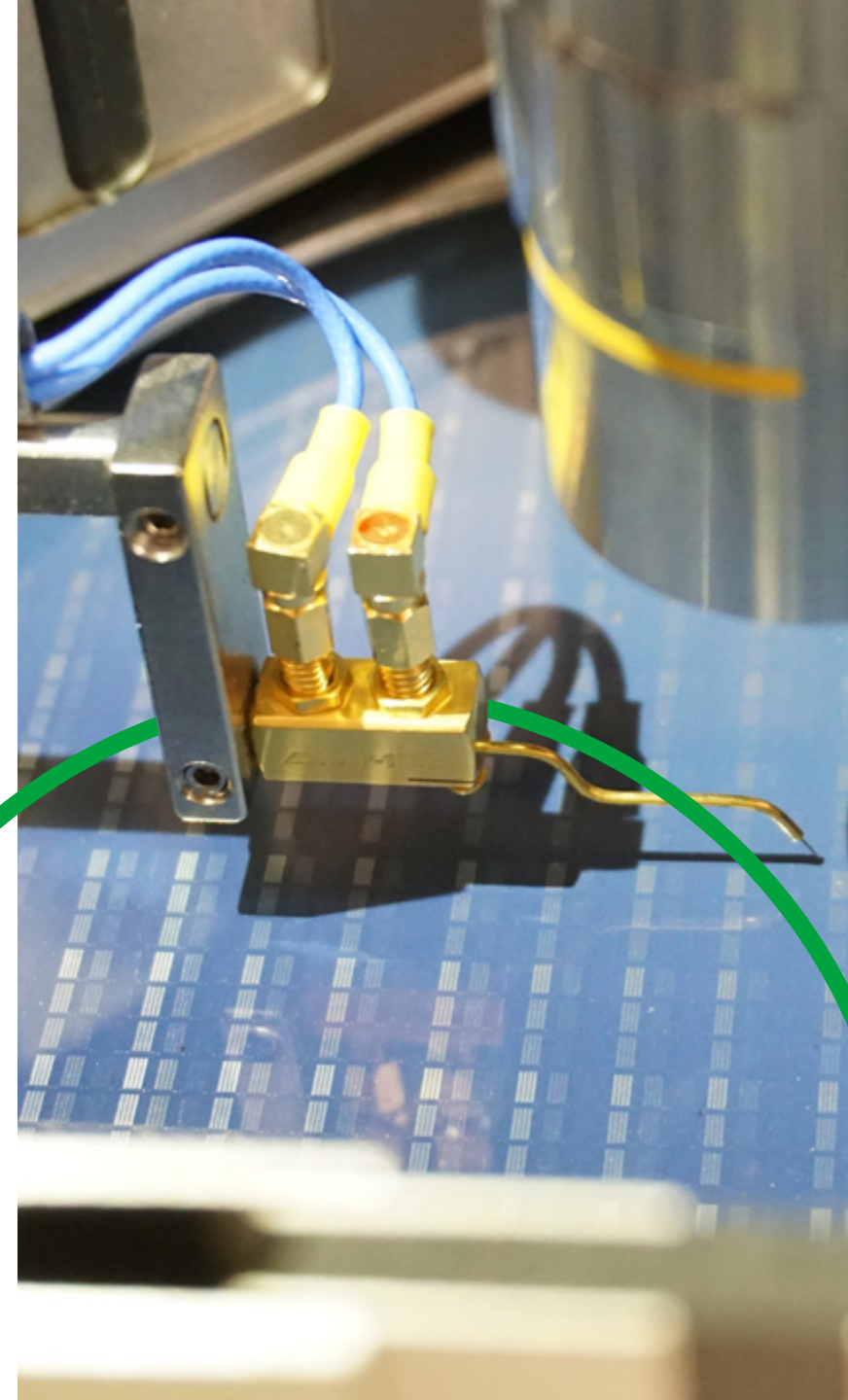
Burn-in, test sockets & electronic fixturing

- Semitron® MDS 100
- Semitron® MP 370
- Duratron® T4203 PAI
- Duratron® T5030 PAI
- Ketron® 1000 PEEK
- Duratron® U1000 PEI
- Kyron® EPM-2204
- Kyron® GC-100

Electrostatic dissipative materials

- Semitron® ESd 520HR PAI (A)
- Semitron® ESd 490HR PEEK (A)
- Semitron® ESd HPV PEEK (D)
- Semitron® ESd 480 PEEK (D)
- Semitron® ESd 420V PEI (D)
- Semitron® ESd 420 PEI (D)
- Semitron® ESd 410C PEI (C)
- Semitron® ESd 300 PET (D)
- Semitron® ESd 225 POM (D)
- Semitron® ESd POM CNT (D)
- Semitron® ESd PEEK-CNT

A = Anti-static D = Static dissipative C = Conductive



General trends

Driven by the miniaturization of IC devices, the back-end test industry is pushing material science to the brink of polymeric capability. The smaller IC device requires thinner cross sections, thinner cross sections then require stiffer materials to withstand the testing parameters.

The challenge is to offer increased stiffness while maintaining the machinability of the decreasing features such as hole size and pitch.

Test socket trends

- Increased I/O count
- Reduction in hole & pitch size
- Thinner cross sections

Typical decreasing features over time

Years	Device Size	Minimal Hole	Representative Pitch
2003	90nm	0.6mm	0.8mm
2006	65nm	0.4mm	0.5mm
2009	45nm	0.25mm	0.3mm
2012	22nm	0.18mm	0.2 mm
2015	14nm	0.12mm	0.15mm
2017	7nm	0.10mm	0.15mm
2018	10nm	0.08mm	0.08mm



Critical properties

In order to deliver a functional test socket under the changing conditions described, the engineer must pay particular attention to the most critical properties that effect the machinability and the stability of the test socket.

Flexural modulus

Critical for managing the robustness of the finished socket under test conditions

Tensile elongation

Critical for controlling the accuracy of holes during machining

CLTE

Critical for providing dimensional stability over a varied temperature range during usage

Polymer melting point

Critical for clean thru holes during drilling

Moisture absorption

Critical for maintaining dimensional stability

Mitsubishi Chemical Advanced Materials' proprietary material technologies are opening the doors to new design advancements.



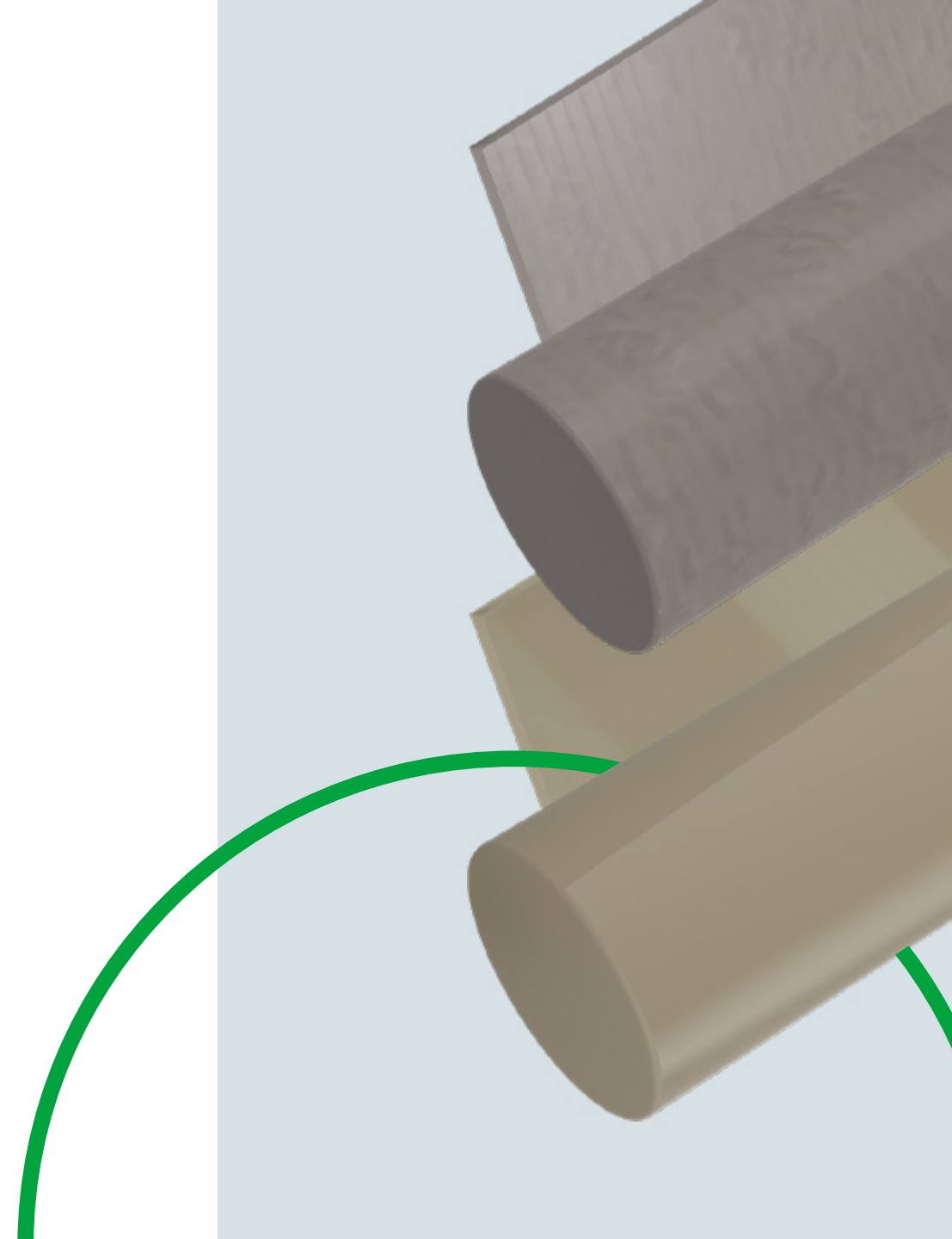
Featured products/materials

Kyron® GC-100

- Non fiber filled ultra-stiff polymer delivering exceptional dimensional stability
- Developed to complement Semitron® MDS-100 with thicker cross sections (6mm, 9mm, & 12mm)
- Low CTE provides stability over a wide range of test conditions
- Injection molded plate provides a low-cost alternative to expensive polyimides
- Low tensile elongation allows for increased accuracy in hole placement

Semitron® MDS 100

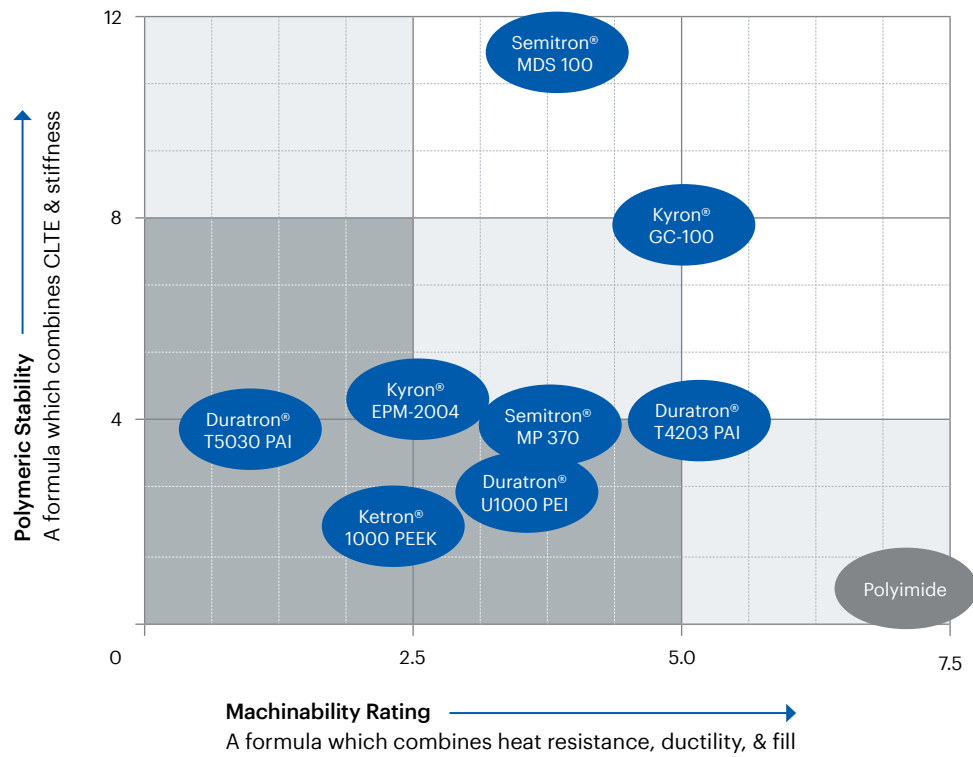
- Highest flexural modulus non fiber filled product
- Extremely low CLTE translates to excellent dimensional stability
- Available in thin cross sections ranging from 1mm to 6mm thick
- Very low moisture absorption allowing for excellent dimensional stability
- Excellent machinability for fine features



Featured products/materials

Test socket material selection grid

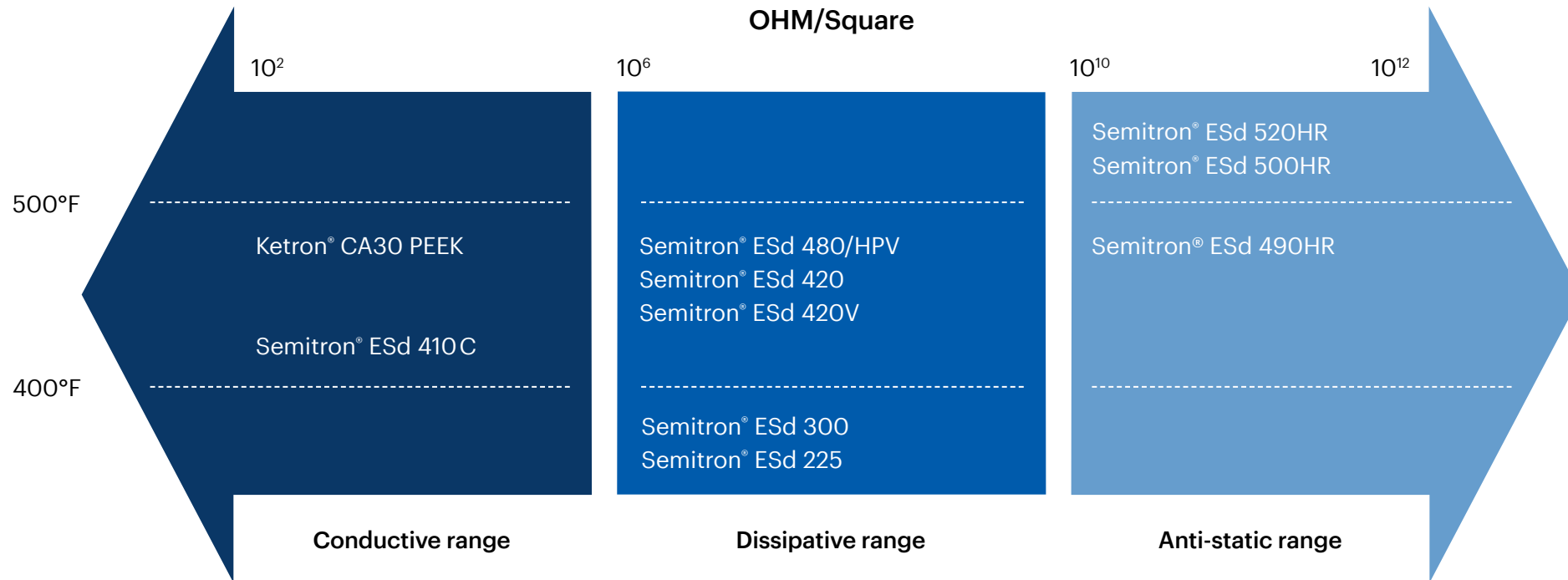
Polymeric stability vs. machinability of fine features



The key components in next generation socket design

Socket Type	Basic	Challenging	Demanding
Hole size	>0.4mm	0.2 - 0.35mm	<0.18mm
Pitch size	>0.6mm	0.25 - 0.5mm	<0.25mm

ESd Performance vs. temperature



Material comparison guide

		Semitron® MP370	Semitron® MDS 100	Kyron® EPM-2204	Kyron® GC-100	Duratron® T4203 PAI	Duratron® T5030 PAI
Mechanical properties							
Color	-	Grey	White	Grey	Tan	Mustard	Dark brown
Tensile modulus (psi)	D638	640,000	1,500,000	720,000	1,100,000	600,000	1,000,000
Flexural modulus (psi)	D790	625,000	1,420,000	750,000	1,100,000	600,000	980,000
Tensile elongation (%)	D638	3.0	1.5	21.0	3.0	10.0	4.0
CLTE (in./in./°F x 10 ⁻⁵)	E-831 (TMA)	2.5	2.5	2.0	1.9	1.7	0.9
Moisture absorption 24hrs @73°F (%)	D570 ⁽¹⁾	0.11	0.10	0.37	0.10	0.40	0.30
Tribological properties							
Tg Glass transition (°F)	D3418	320	-	289	-	527	527
Heat deflection temperature @264psi (°F)	D648	300	410	410	445	532	530
Electrical properties							
Dielectric constant, 106 Hz	D150	4.13	3.37	3.50	3.39	4.20	4.40
Dissipation factor, 106 Hz	D150	0.004	0.007	0.005	0.005	0.026	0.050
Surface resistivity Ω/sq.	ANSI/ESd STM 11.11	>10 ¹³	>10 ¹³	>10 ¹⁴	>10 ¹³	>10 ¹³	>10 ¹³
Dielectric strength	D149	376	-	400	347	580	700

(1) Specimens: 1/8" thick x 2" diameter or square.

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