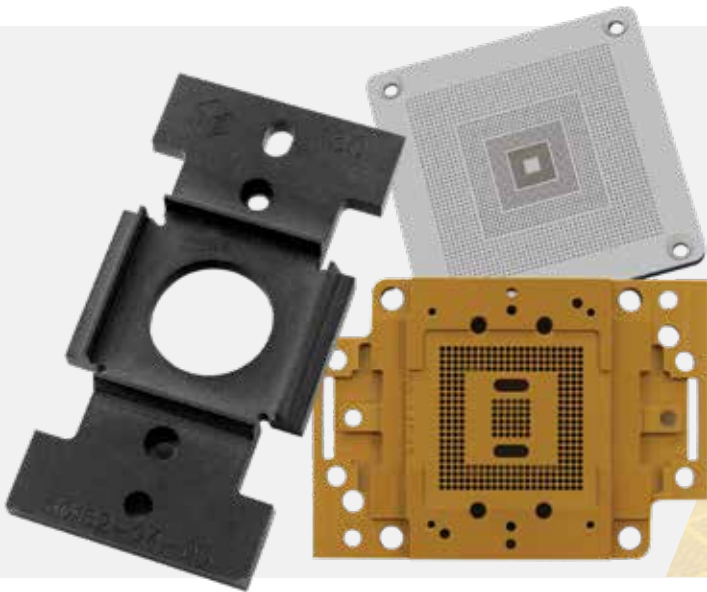




# Back-End Test and Electronic Fixturing Solutions

Worlds' broadest portfolio of polymer solutions for use in IC Chip test and fixturing applications



## Applications - Burn-In, Test Sockets, and Electronic Fixturing

### Standard Materials

- 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)

A = Anti-Static  
D = Static Dissipative  
C = Conductive

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

Typical Decreasing Features Over Time

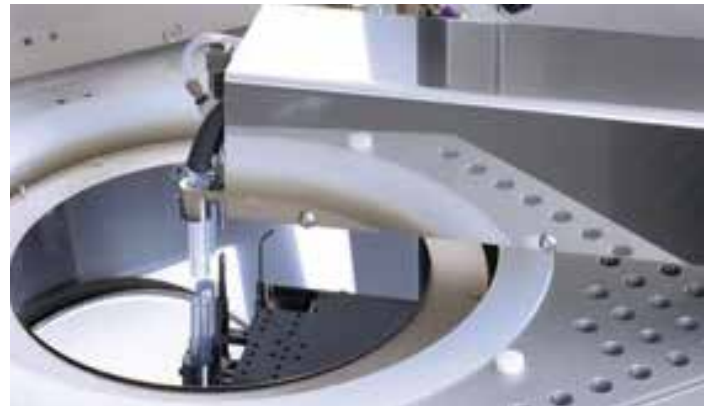
## General Trends

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 and Pitch Size
- Thinner Cross Sections

Mitsubishi Chemical Advanced Materials' proprietary material technologies are opening the doors for new design advancements!



## 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 through holes during drilling.

### Moisture Absorption

Critical for maintaining dimensional stability.

# 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.

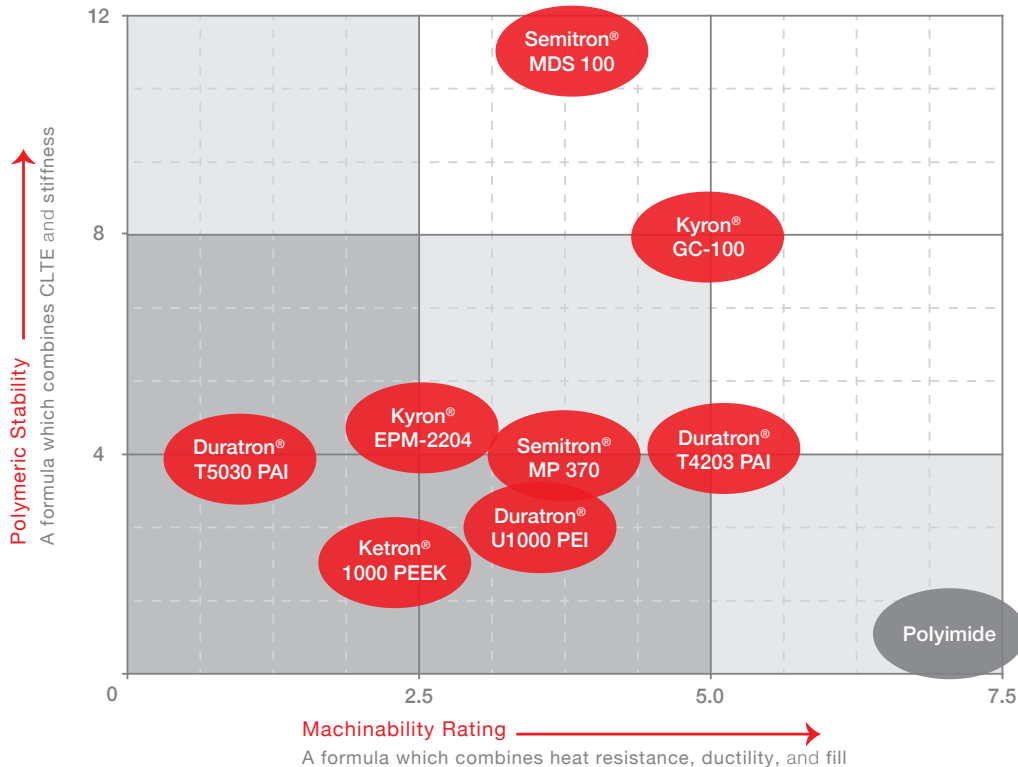
## Semitron® MDS 100

- 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.

## Test Socket Material Selection Grid

Polymeric Stability vs. Machinability of Fine Features

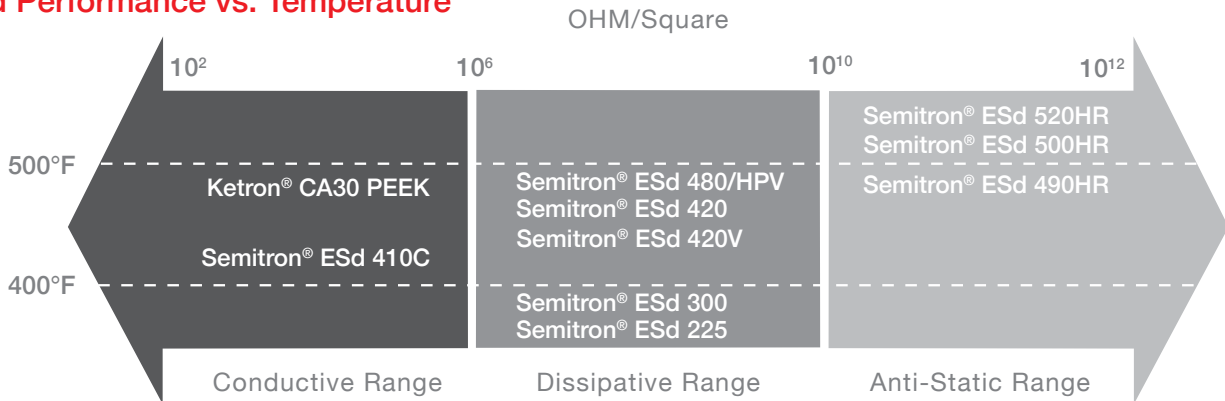
Socket Type	Basic	Challenging	Demanding
Hole Size	>0.4 mm	0.2-0.35 mm	<0.18 mm
Pitch Size	>0.6 mm	0.25-0.5 mm	<0.25 mm



The key components in next generation socket design!



## 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 <sup>-5</sup> )	E-831 (TMA)	2.5	2.5	2.0	1.9	1.7	0.9
	Moisture Absorption 24hrs @73°F (%)	D570 <sup>(1)</sup>	0.11	0.10	0.37	0.10	0.40	0.30
Thermal Prop.	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, 10 <sup>6</sup> Hz	D150	4.13	3.37	3.50	3.39	4.20	4.40
	Dissipation Factor, 10 <sup>6</sup> Hz	D150	0.004	0.007	0.005	0.005	0.026	0.050
	Surface Resistivity Ω/sq.	ANSI/ESd STM 11.11	>10 <sup>13</sup>	>10 <sup>13</sup>	>10 <sup>14</sup>	>10 <sup>13</sup>	>10 <sup>13</sup>	>10 <sup>13</sup>
	Dielectric Strength	D149	376	-	400	347	580	700

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

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