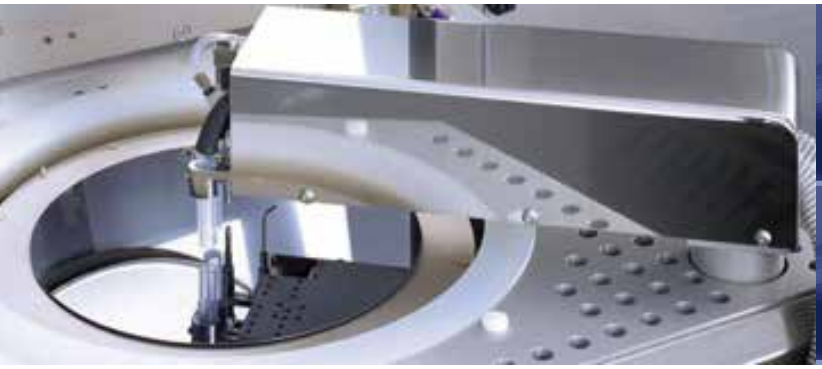
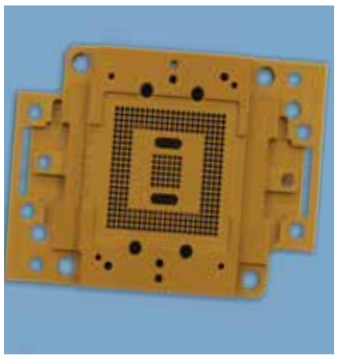
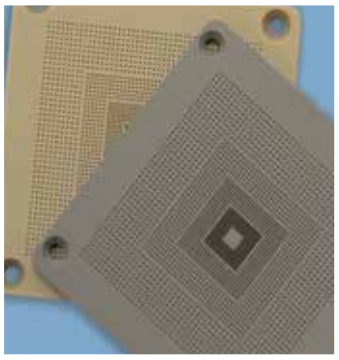


SEMICONDUCTOR

BACK END TEST & ELECTRONIC FIXTURING SOLUTIONS

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





Applications: Burn-In, Test Sockets & Electronic Fixturing

STANDARD MATERIALS

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

ESD MATERIALS

- Semitron® ESd 520HR PAI (A)
- Semitron® ESd 500HR PTFE (A)
- Semitron® ESd 490HR PEEK (A)
- 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)

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

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BACK END TEST

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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
2000	130 nm	0.8 mm	1.0 mm
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
2017+	7 nm	0.10 mm	0.15 mm

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.

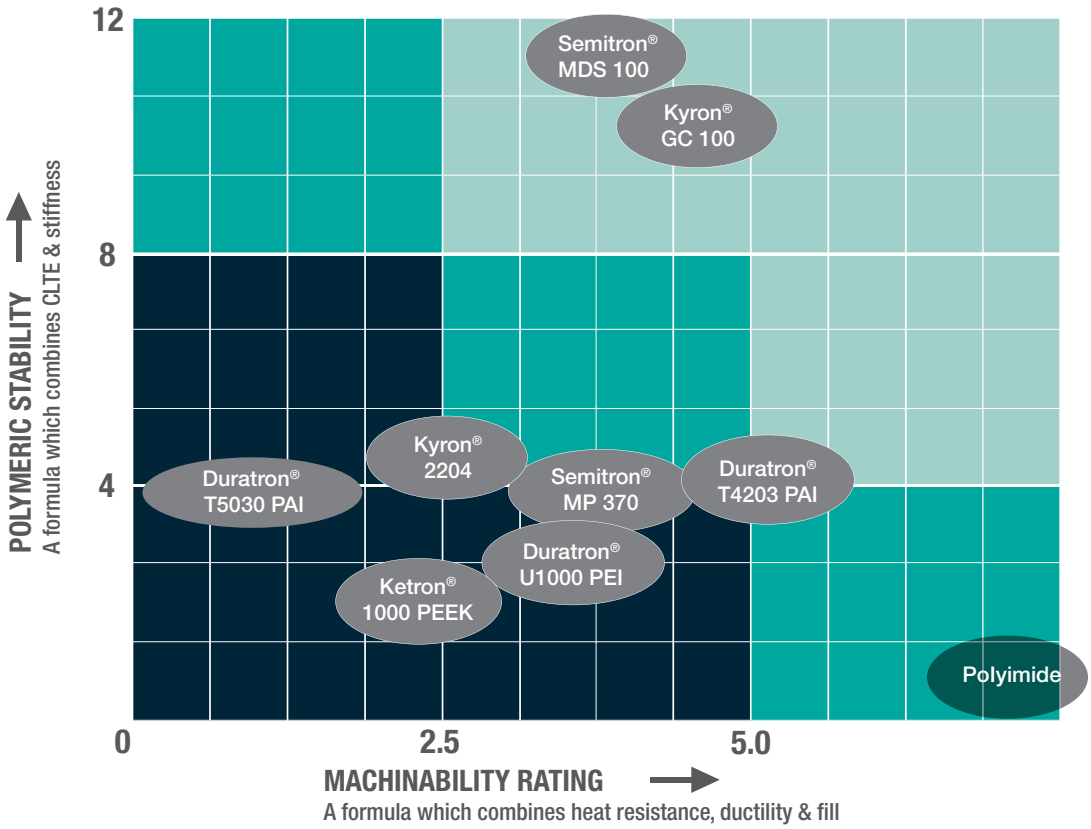
/ **Flexural Modulus:**	Critical for managing the robustness of the finished socket under test conditions
/ **Tensile Elongation:**	Critical for controlling the accuracy of holes during machining
/ **CLTE:**	Critical for providing dimensional stability over a varied temperature range during usage
/ **Polymer Melting Point:**	Critical for clean thru holes during drilling
/ **Moisture Absorption:**	Critical for maintaining dimensional stability

"Quadrant's proprietary material technologies are opening the doors to new design advancements"

TEST SOCKET MATERIAL SELECTION GRID

Polymeric Stability vs. Machinability of Fine Features

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



"The key components in next generation socket design"

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, and 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

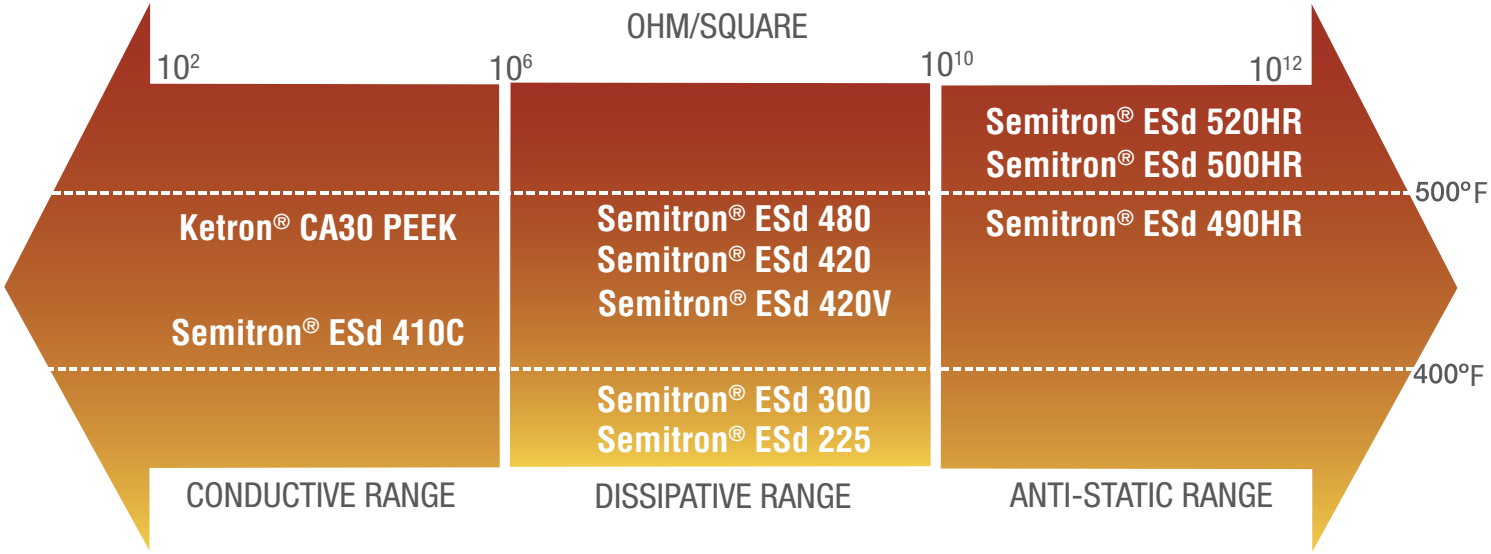
Semitron® MDS 100:

- / 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

BACK END TEST

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

ESd PERFORMANCE VS TEMPERATURE



MATERIAL COMPARISON GUIDE

	Property	Test Method	Semitron® MP370	Kyron® 2204	Kyron® GC-100	Duratron® T4203 PAI	Duratron® T5030 PAI	Semitron® MDS 100
Mechanical Properties	Color		medium gray	white or gray	white	mustard	yellowish/brown	white
	Tensile Modulus (psi)	D638	640,000	720,000	1,100,000	600,000	1,000,000	1,500,000
	Flexural Modulus (psi)	D790	625,000	750,000	1,100,000	600,000	980,000	1,420,000
	Tensile Elongation (%)	D638	3	21	3	10	4	1.5
	CLTE (in/in/°F, X 10^{-5})	E-831(TMA)	2.5	2.0	1.85	1.7	0.9	2.5
	Water Absorption 24hrs @ 73°F (%)	D570(1)	0.11	0.37	0.09	0.4	0.30	0.10
Thermal Prop.	Tg Glass Transition (°F)	D3418	320	289	N/A	527	527	N/A
	Heat Deflection Temperature @ 264psi (°F)	D648	300	599	445	532	530	410
Electrical Properties	Dielectric Constant, 10^6 Hz	D150	4.13	3.5	3.39	4.2	4.4	3.37
	Dissipation Factor, 10^6 Hz	D150	0.004	0.005	0.005	0.026	0.05	0.007
	Surface Resistivity Ω/sq	ANSI/ESd STM 11.11	>10^{13}	1.0 x 10^{14}	>10^{13}	>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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