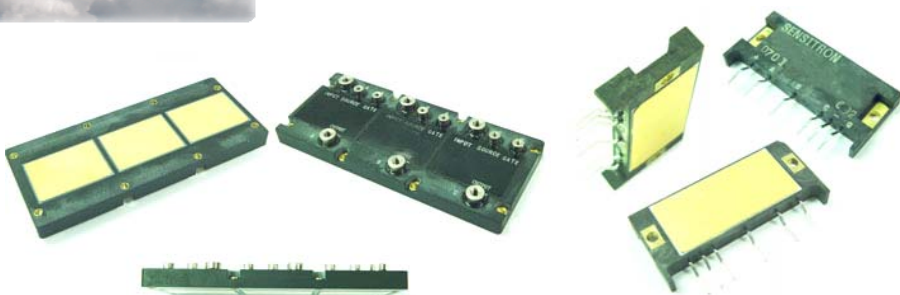
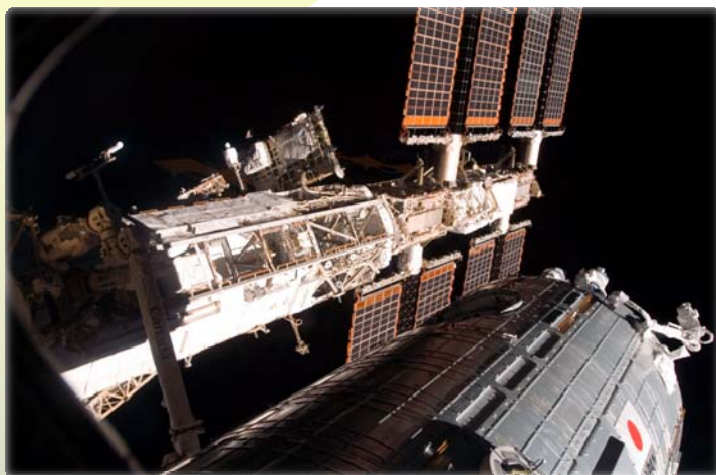


# SENSITRON SEMICONDUCTOR

*Powered by Sensitron*



## ADVANCED PACKAGING TECHNOLOGY

*For use in all Hi-Rel Applications-  
Space, Military, Medical, Aerospace*

Sensitron Semiconductor · 221 West Industry Court · Deer Park, NY 11729-4681  
Phone (631) 586 7600 · Fax (631) 242 9798 · [www.sensitron.com](http://www.sensitron.com) · [sales@sensitron.com](mailto:sales@sensitron.com)

152-1112

## Advanced Packaging Technology

Sensitron's Advanced Baseless Packaging Technology is a cost effective packaging solution that generates maximum weight savings with high thermal conductivity and fatigue resistance. Sensitron is positioned as a world leader in the advanced technology industry, with products that are designed, manufactured, tested, and qualified for high reliability applications where size, weight, and reliability are critical to mission success. From engineering design to finished product, our advanced simulation and modeling tools enable us to provide you with innovative product to meet your power solution requirements.

### Product Features

- ✓ Lower profile and light weight
- ✓ Lowest possible thermal resistance
- ✓ Higher temperature applications
- ✓ Removes CTE mismatch between substrate & baseplate
- ✓ Higher reliability
- ✓ Lower cost
- ✓ Automation friendly

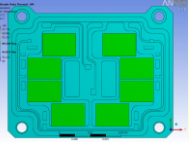
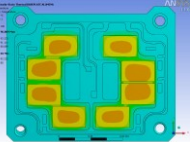
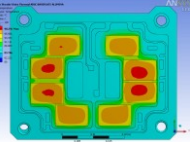
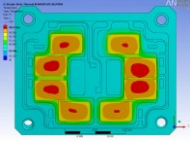
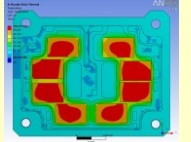
### Typical Applications

- ✓ Aircraft Power Electronics
- ✓ Severe Environment
- ✓ Weight Sensitive Applications
- ✓ Long Cycle Life

### Performance Options

- ✓ Low cost (*Alumina*)
- ✓ High thermal conductivity (*Aluminum Nitride*)
- ✓ High Strength (*Silicon Nitride*)

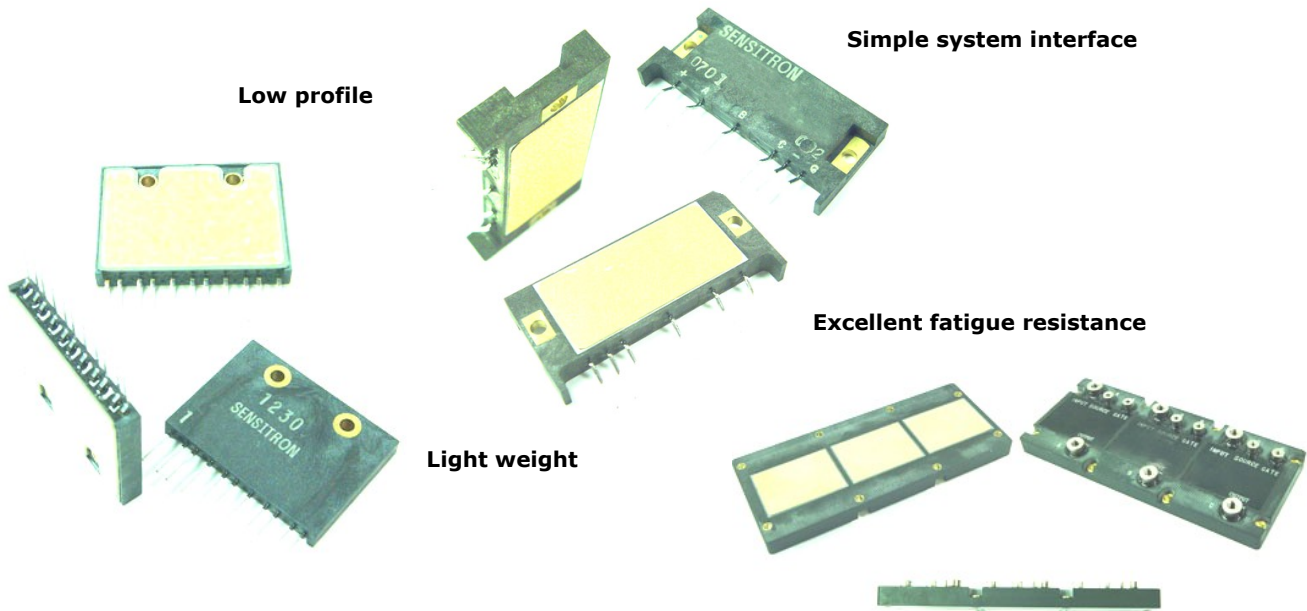
## Attribute Comparison by Compositon

	<i>Advanced</i>	<i>Traditional</i>			
	<i>Baseless Packaging Technology</i>	<i>Copper Baseplate</i>	<i>AlSiC Baseplate</i>	<i>Aluminum Baseplate</i>	<i>IMS Technology (Al)</i>
<i>Thermal Performance</i>					
<i>Thermal resistance index</i>	0.4	1.0	1.1	1.2	1.4
<i>Max usable temperature</i>	200°C	150°C	150°C	150°C	150 °C
<i>Fatigue resistance</i>	superior	fair	good	poor	excellent
<i>Flatness (per inch)</i>	<=0.003	>=0.005	N/A**	>= 0.005	>= 0.005
<i>Cost factor</i>	\$	\$\$\$\$	\$\$\$\$\$	\$\$\$	\$\$
<i>Weight index</i>	0.2	1.0	0.5	0.5	0.5
<i>Typical package height (for a comparable module)</i>	0.2 inch	0.325 inch	0.37 inch	0.325 inch	0.325 inch

\*\* Bottom surface of AlSiC baseplates is normally designed to have curvature.

# SENSITRON SEMICONDUCTOR

## Advanced Packaging Technology



### Baseless Material Options & Performance Characteristics

Characteristic	Alumina	Aluminum Nitride	Silicon Nitride
	Al <sub>2</sub> O <sub>3</sub> , 96%	AlN	Si <sub>3</sub> N <sub>4</sub> *
Thermal performance			
color	white	gray	pink
density	3.8 g/cc	3.3 g/cc	3.2 g/cc
flexural strength	320 MPa	290 Mpa	650 MPa
elastic modulus	300 GPa	330 GPa	300 GPa
Fracture toughness	3.5 MPa-m <sup>1/2</sup>	3.5 MPa-m <sup>1/2</sup>	6.7 MPa-m <sup>1/2</sup>
CTE	6.4 um/m-C	4.7 um/m-C	2.5 um/m-C
thermal conductivity	25 W/m-K	180 W/m-K	90 W/m-K
heat capacity	880 J/kg-C	740 J/kg-C	700 J/kg-C

\*Si<sub>3</sub>N<sub>4</sub>: higher strength and fracture toughness, better CTE match with silicon.

## Product Development Tools & Capabilities

### MTBF Computational Tool

- Relx Architect 2008

### Rapid Prototyping Tool

- ZCorp 3D Plus



### Mathematical Tools

- MathCAD 14
- Visual Basic
- APDL
- C++
- Origin 8.1

### Software Tools

- AutoCAD 2005
- Inventor 9
- Solidworks 2010
- Design Modeler
- ANSYS Mechanical v.13
- CFX v.13

### Product Development Equipment

- 4 Dual quadcore simulation workstations
- Dukane ultrasonic welder
- SST DAP sealer
- SSEC seam welder
- Sonix ultrasonic scanner
- BTU belt reflow furnaces
- Orthodyne 360 fully automatic wirebonder
- K&S 4526 semi-automatic wirebonder
- Dage bond pull tester
- Polaris percussion welder
- Trebor eutectic die bonder
- Trebor epoxy pick & place
- K&S semi-automatic pick & place
- ESPEC thermal cycling machine

Visit online at: [www.sensitron.com](http://www.sensitron.com)

**About Sensitron:** Sensitron is a leading manufacturer of high reliability power electronic solutions including motor controllers, diodes, smart power management and conversion, voltage protection components and embedded boards, with over 40 years heritage serving space, aerospace, and defense markets.