Electronic Packaging and Thermal Management Solutions

CPS is the world leader in providing AlSiC thermal management materials and electronic packaging designs for microelectronics and power electronics.

CPS AlSiC Composites

Material Attributes:

- Isotropic Controlled Thermal Expansion (CTE) Values 7 – 12 ppm/°C
- High Thermal Conductivity 200 W/mK
- Light Weight
- High Strength
- High Stiffness
- Fully Dense, Hermetic
- Standard Aluminum Plating Compatible
- Certified EU RoHS Compliant Material
- Suitable Replacement for CuMo or CuW

Fabrication Attributes:

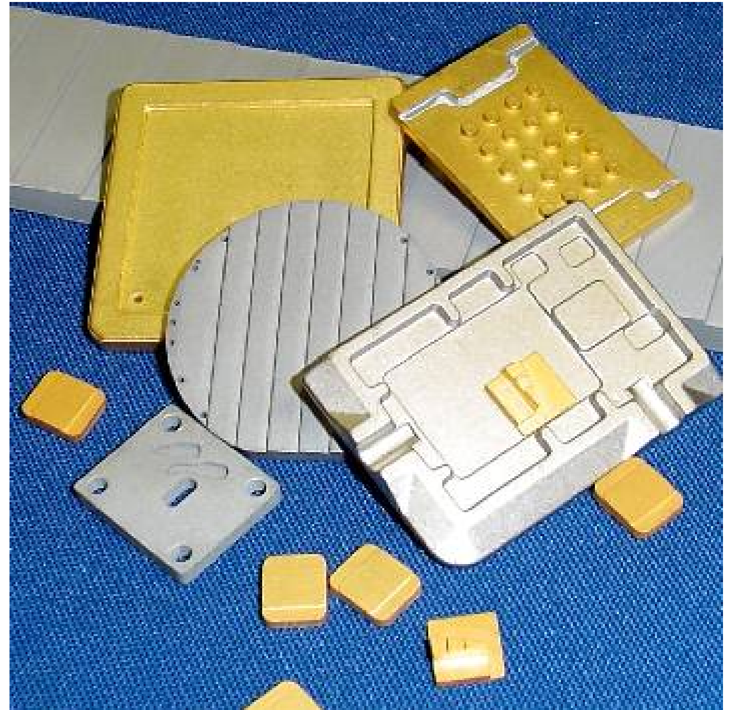
- Complex Net and Near Net-shape Fabrication
- Cost Effective Prototype & Low Cost High Volume Production
- Novel Concurrent Integration™ / Fabrication Schemes

Typical Applications:

- Microprocessor Lids/Heat Sinks
- ASIC/Flip Chip Lids
- Microwave Housings
- Optoelectronic Housings / Bases
- Power Substrates
- IGBT Baseplates
- Coolers – Active (liquid) and Passive (phase change material reservoirs)
- Heat Spreaders / Pin Fins
- Structural Applications

Advanced Applications:

- Concurrent Integration™ of high heat dissipation and spreading materials: Diamond, TPG.
- Integration of cooling tubes – functional components
- Integration of ceramic and metal inserts



CPS Technologies Corporation / 111 South Worcester Street / Norton, MA 02766
Phone 508 222 0614 / Fax 508 222 0220 / www.alsic.com
Certified to ISO 9001:2000

Data sheet 1.2008

AlSiC Based Material Properties[1]

	AlSiC-9	AlSiC-10	AlSiC-12
Aluminum Alloy A 356.2	37 vol%	45 vol%	63 vol%
Silicon Carbide (electronic grade)	63 vol%	55 vol%	37 vol%
Density (g/cm^3)	3.01	2.96	2.89
Thermal Conductivity (W/mK) @25°C	200 typical (190 W/mK min)	200 typical (190 W/mK min)	180 typical (170 W/mK min)
Specific Heat (J/gK) @ 25°C	0.741	0.786	0.808
Thermal Expansion (CTE) ppm/°C			
30 – 100°C	8.00 σ = 0.26	9.77 σ = 0.26	10.9 σ = 0.25
30 – 150°C	8.37 σ = 0.26	10.16 σ = 0.26	11.2 σ = 0.25
30 - 200°C	8.75 σ = 0.27	10.56 σ = 0.25	11.7 σ = 0.25
Youngs Modulus (GPa)	188	167	167
Shear Modulus (GPa)	76	67	69
Strength (MPa) a-bar 4pt-bend	488	450	471
Percent Elongation at Rupture	0.295	N/A	N/A
Fracture Toughness	11.3	11.7	N/A
Electrical Resistance (µOhm-cm)	20.7	20.7	20.7
Hermeticity ($atm\text{-}cm^3/s$ He)	$< 10^{-9}$	$< 10^{-9}$	$< 10^{-9}$

Material Compatibility[2]

Direct Device Attachment	GaAs, Si, InP	N/A	N/A
Seal Ring Materials[3]	Alloy 48 - 52	Alloy 52	SS 17-4PH
Substrate Materials[3]	Al_2O_3, AlN, Si_3N_4, DBC AlN	PCB, FR4, Duroid[4]	PCB, FR4, Duroid[5]
LTCC Materials[4]	Ferro A6M, A6S Heraeus CT2000 Kyocera GL560	Kyocera GL771	
Plating Schemes	Low & high phosphorus electroless Ni, Ni-Au, chromate, flame spray, etc.		
Concurrent Integration™ Schemes	dielectric substrates (design specific), coaxial ceramic feedthrus, seal rings, TPG, diamond, cooling tubes		

[1] Properties and data are typical and are believed to be accurate and reliable, but do not represent any type of warranty, either expressed or implied.
[2] Compatible materials based upon comparison of CTE over 30° - 150°C to AlSiC and current known designs and applications.
[3] Materials and systems are only suggested.
[4] TM of Rogers Corporation