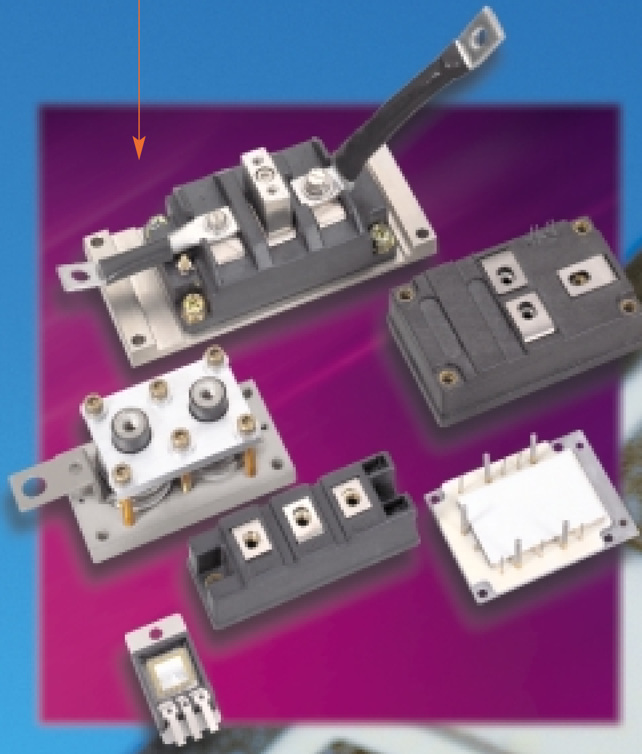
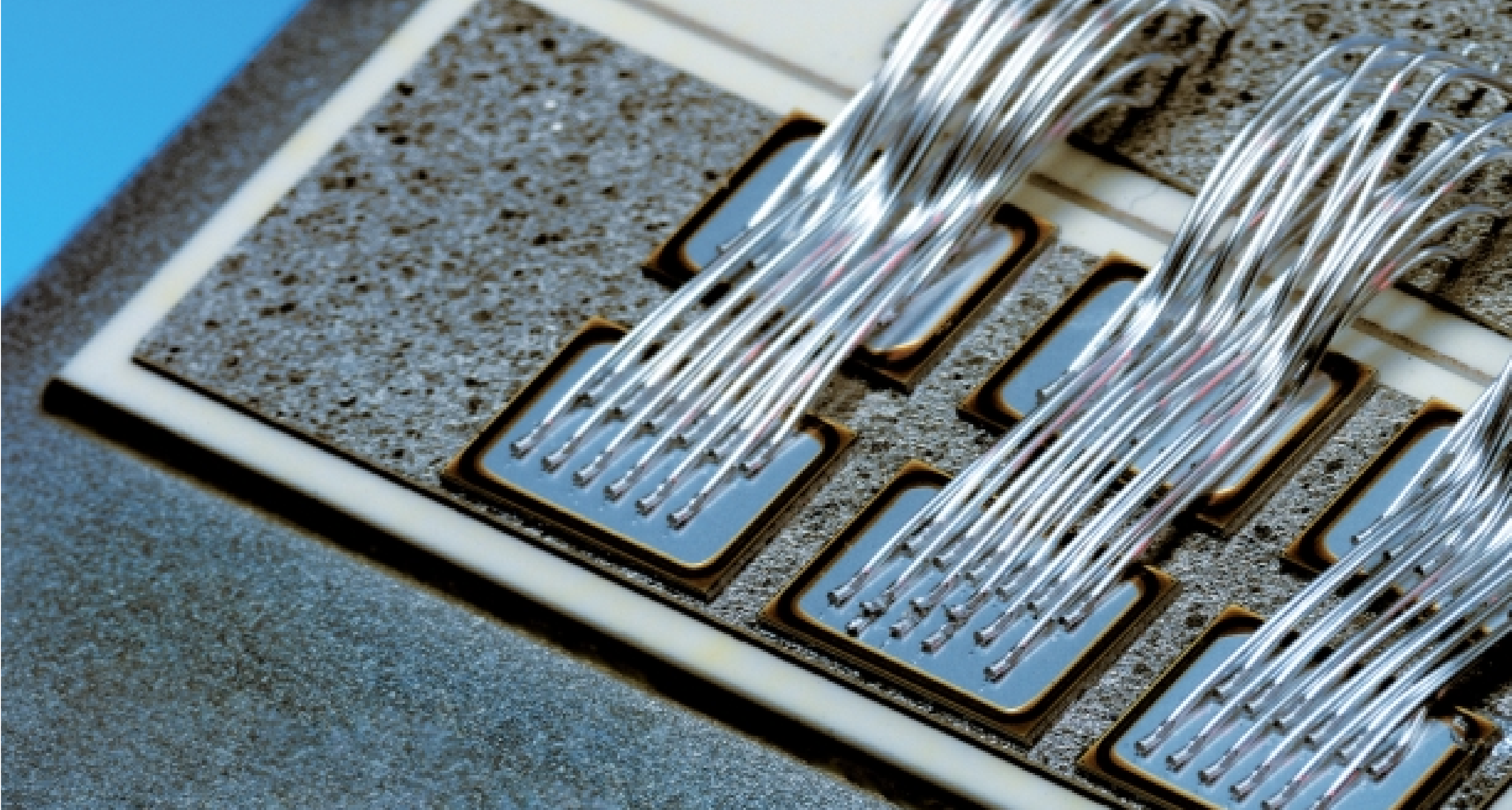
POWEREX

CUSTOM DESIGNED POWER MODULES

Solutions for High Power Applications





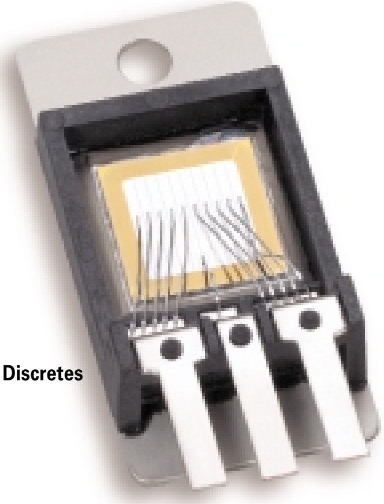
POWEREX

CUSTOM DESIGNED POWER MODULES

High Power Solutions in Custom Module Design

Powerex has addressed the need for application specific custom power modules with its Custom Power Products Division. Dedicated to the task of providing cost effective solutions to complex semiconductor applications, Powerex brings its formidable experience and knowledge to bear on chip manufacturing, electronic materials and design/engineering techniques.

- *Extended temperature range, -55° - 125°C*
- *Moisture resistance*
- *Hermetic modules*
- *Different circuit configurations – i.e. common emitter, chopper*
- *High voltage isolation*
- *Low module weight*
- *Larger free wheel diodes*
- *Package height, width and length*
- *Integrated heatsinks – both air and liquid cooled by eliminating the baseplate*
- *Over current shutdown*
- *Temperature and current sense*
- *Different termination styles – i.e. thicker bus bars, D-sub connectors, press on pins, etc.*



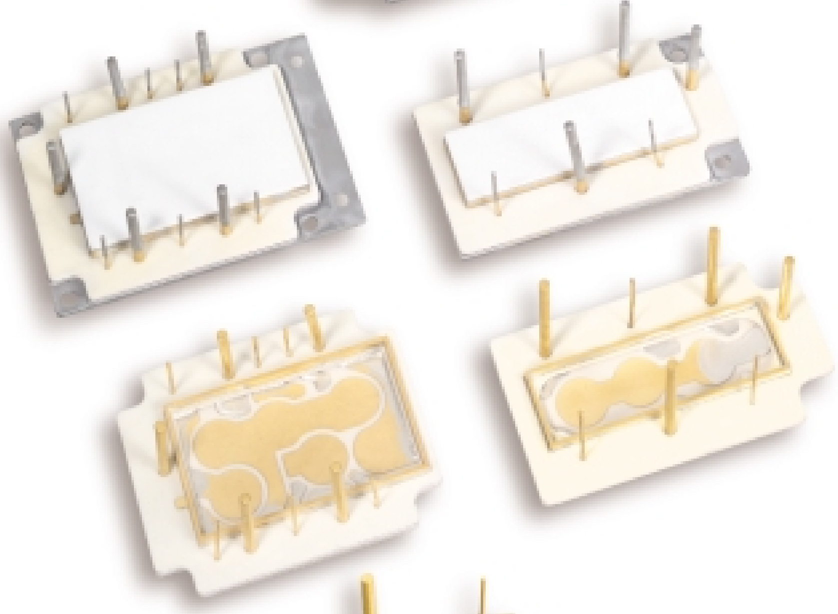
High Voltage Discretes

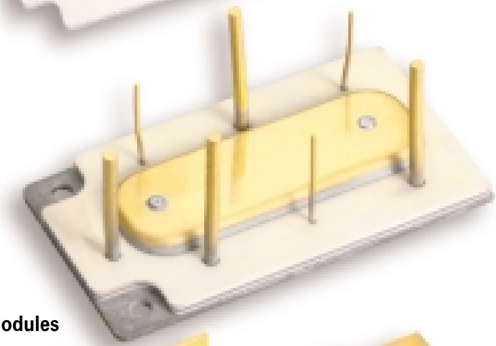
IGBT Modules

POWEREX AND MODULE TECHNOLOGY

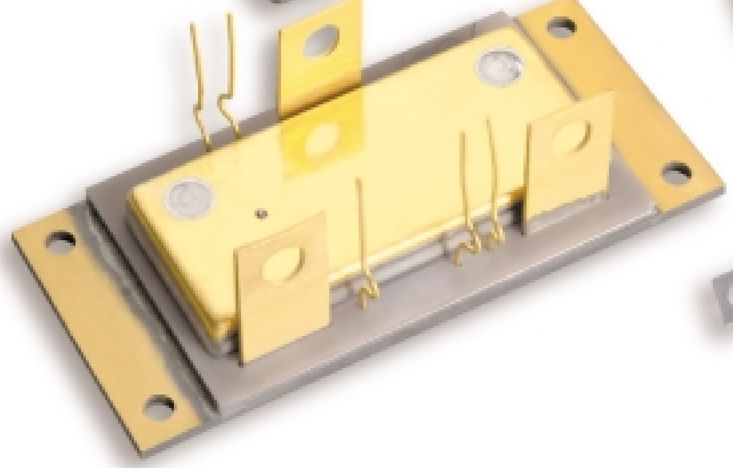
Customizing an electronic package specifically for your needs involves the precise selection of many components. High power IGBT's, MOSFETs, SCR's, Diodes and Darlington Transistors, along with driver circuits, isolated materials, packages and terminals, are the key elements in custom package design. Powerex has continuing access to the most advanced circuit and chip design.

Hermetic Modules

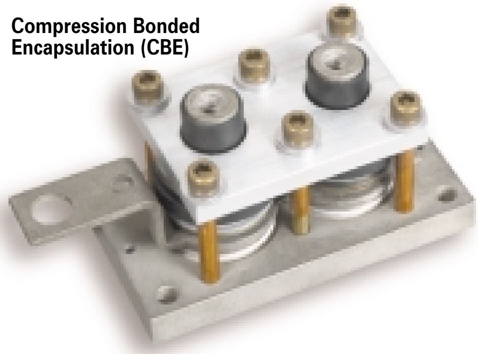




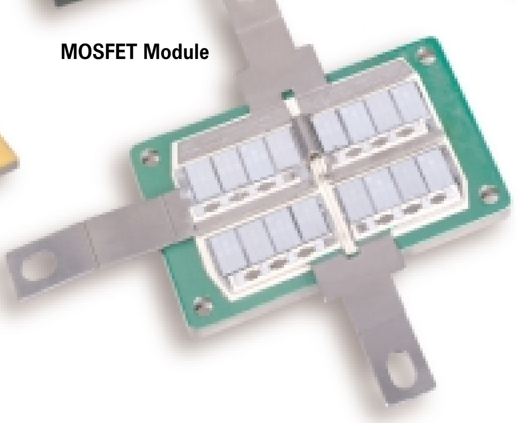
Hermetic Modules

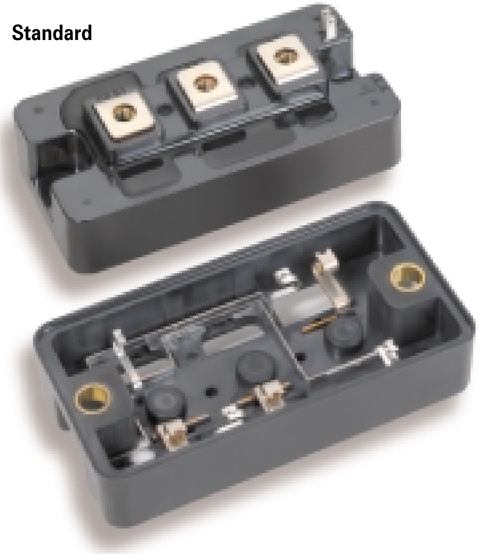


Compression Bonded Encapsulation (CBE)



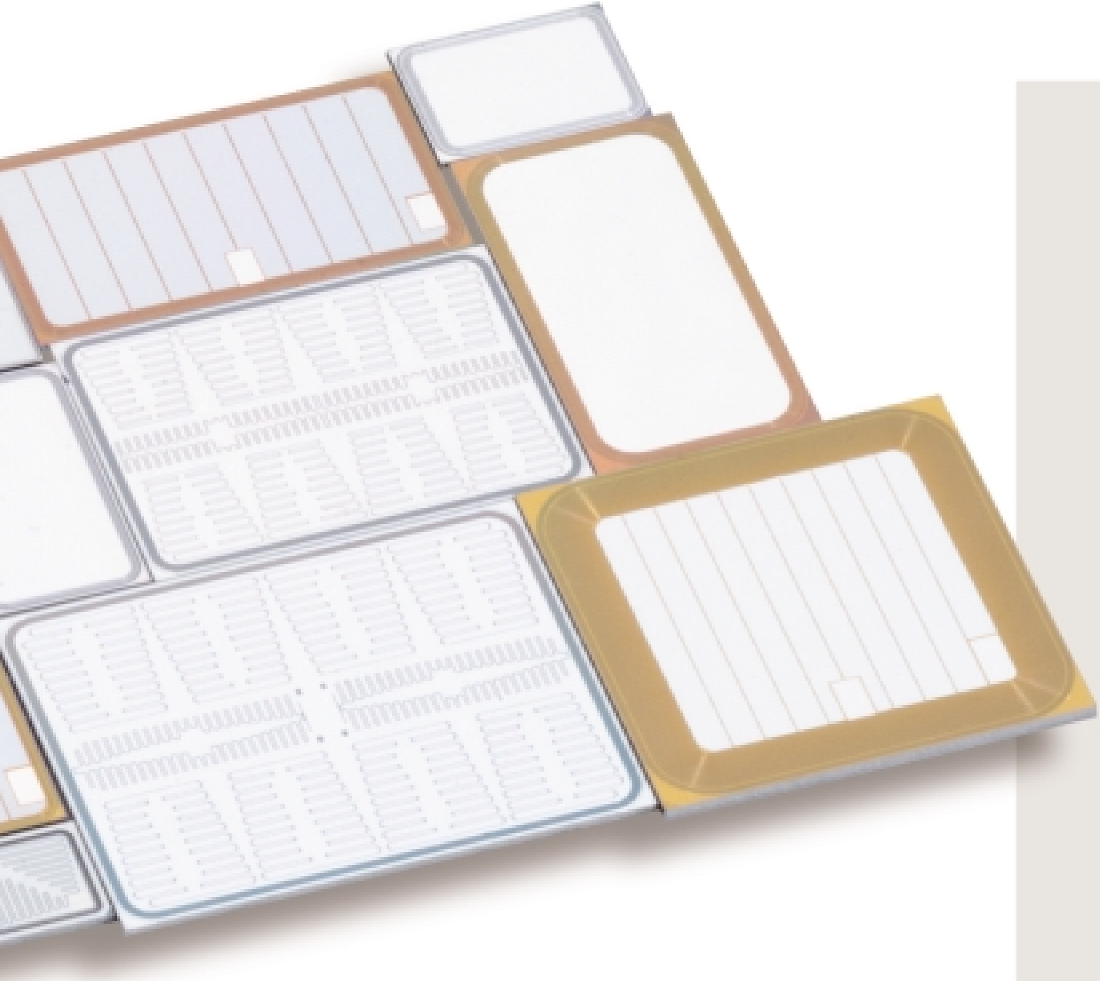
MOSFET Module





Packages

- *Standard Cases, including IGBT, IPM, CIB, HVIGBT*
- *Picture Frame*
- *Custom Package Development, including plastic and hermetic*



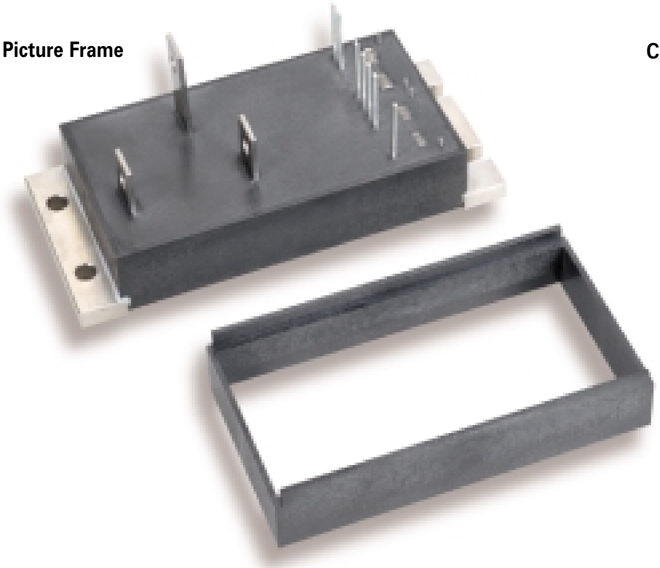
Die Selection

In addition to its exclusive access to IGBT, FWD, Bipolar, GTO chips manufactured by its strategic partner, and the Thyristor, Diode, and Darlington chips created in its own facility, Powerex can also use any other manufacturer's chip on the market.

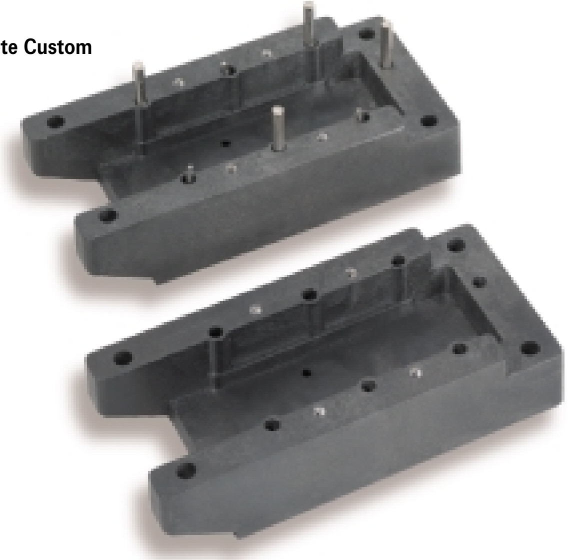
POWEREX

	Material	Composition
	Silicon	
SUBSTRATES	AlN	
	Alumina	
	BeO	
	IMS insul	
BASEPLATES	Copper	
	Aluminum	
	AlSiC	
	Molybdenum	
SOLDER	Braze	28Cu72Ag
	Solder High	95Pb 5Sn
	Solder Low	40Pb 60Sn
	Solder Low	63Pb 37Sn
	Solder Med	95Sn 5Sb
OTHER	Kovar	
	Chotherm	1646
	Steel	
	Tungsten	

Picture Frame



Complete Custom



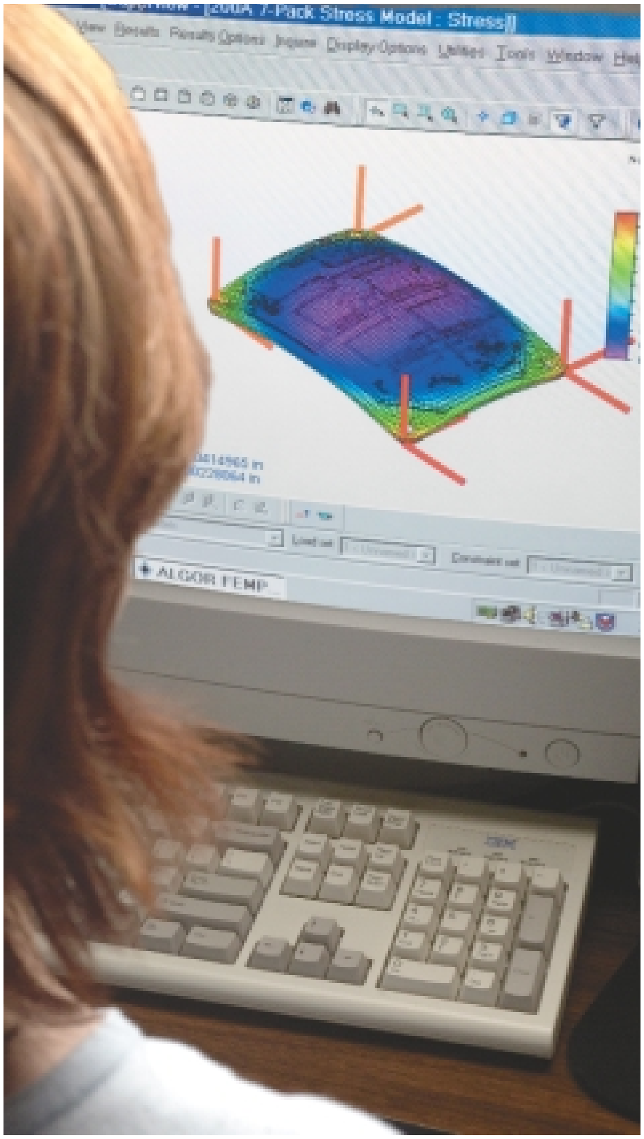
CUSTOM MODULE MATERIALS

Conductivity W/InchC	Conductivity W/mC	W/mmC	Density g/cm3	g/mm3	Specific Heat cal/gram	J/gm	TCE ppm/c	Solid (C)	Liquid (C)
3.8354	151	1.510E-01	2.4	2.400E-03	0.18	0.752741233	4.2	1410	
4.3180	170	1.700E-01	3.21	3.210E-03	0.16	0.669103318	4.5	2300	
0.8890	35	3.500E-02	3.7	3.700E-03	0.21	0.878198105	6.4	2030	
6.5786	259	2.590E-01	2.91	3.910E-03	0.25	1.045473934	6.7	2530	
0.0762	3	3.000E-03							
9.9822	393	3.930E-01	8.95	8.950E-03	0.092	0.384734408	16.8	1083	
5.1816	204	2.040E-0	2.69	2.690E-03	0.22	0.920017062	23.4	660	
4.3180	140-170	1.700E-01	2.9	2.900E-03	0.181	0.756923128	8.6-9.6	660	
3.5560	140	1.400E-01	10.22	1.022E-02	0.0599	0.250495555	5.3	2600	
	371		10.01	1.001E-02			19.6	780	780
0.9378	37	3.700E-02	10.96	1.096E-02			29.8	310	314
0.9100	35.82677165	3.583E-02	8.52	8.520E-03	0.0358	0.149711867	25.2	174	185
0.9100	50	3.593E-02	8.52	8.520E-03	0.0358	0.150	25	185	185
	28		7.25	7.250E-03			31.1	232	240
0.3556	14	1.400E-02	8.37	8.370E-03	0.105	0.439099052	4.9	1450	
0.1500	5.905511811	5.906E-03							
0.1000	3.937007874	3.937E-03							
3.2800	129.1338583	1.291E-01	17.6	1.7610E-02	0.031564632	0.132	4.5		

Powerex Custom Power Modules employ performance proven features. Soldered-down and wire bonding fabrication and compression bonded encapsulation (CBE) of SCR/Diode elements offer increased switching speeds, lower losses, more efficient cooling and higher power handling capabilities.

- *Thermal, Mechanical and Electro-Static Simulation using Algor Software – both Static and Dynamic Simulation*
- *Two Dimensional and Three Dimensional CAD*
- *Mechanical Desktop Tools*

Vacuum Soldering



Thermal Mechanical and Electro-Static Simulation

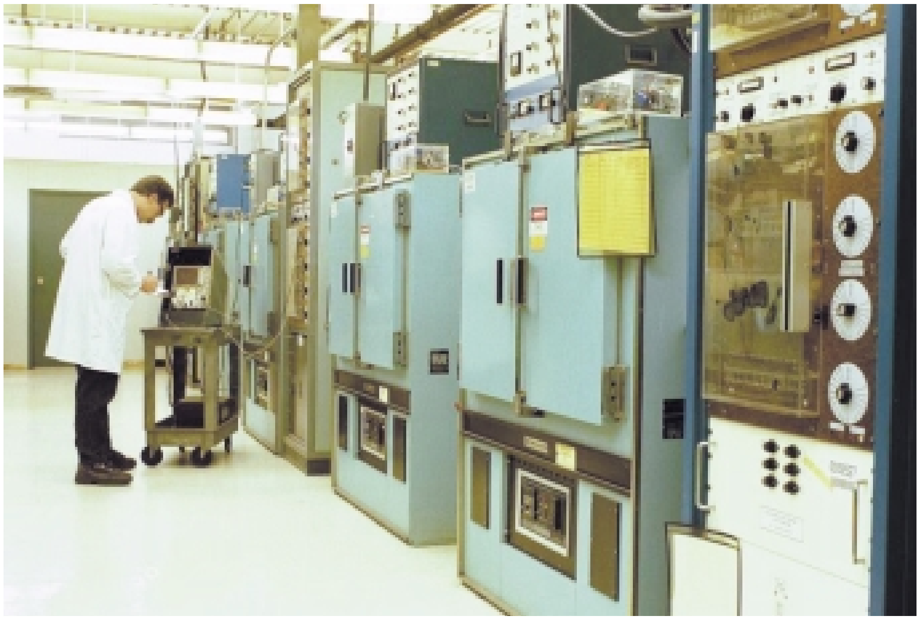
Wire Bonding

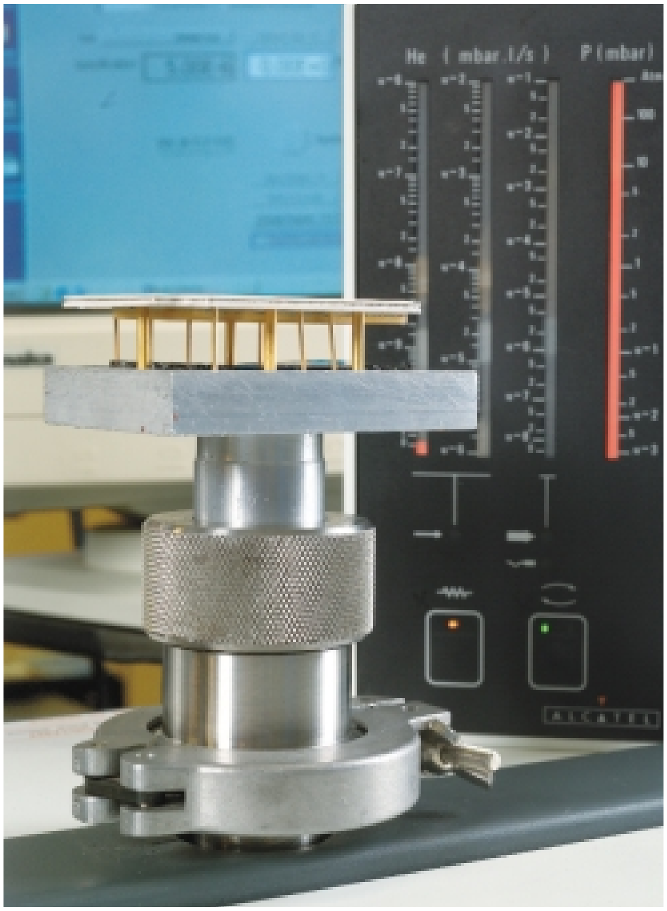
Two Dimensional and Three Dimensional CAD

RELIABILITY/ QUALIFICATION TESTING

Complete facility for Military and other high reliability testing.

Reliability and qualification testing can be performed in accordance to military specifications, including Group A, B and C and specific customer requirements.





Baseplate Flatness Verification

Highly Accelerated Stress Testing (H.A.S.T.) is also a part of the Powerex custom module design process.

The alliance between Powerex and its strategic partners continues the advancement of new classes of power semiconductor technology. Powerex's commitment to the discovery process is on-going and results in power semiconductor innovation that embraces customer system issues for decreased size, reduced costs, increased energy efficiency, switches that operate at higher frequencies, are more durable and offer integrated functions.

Anticipating future industry demands and proactive involvement with each customer results in the continued expansion of manufacturing facilities, research commitment and product development to meet customer power semiconductor needs for shortened product to market cycles.

Powerex is a leading producer to OEM's and component producers and supports many markets including: transportation, AC and DC motor controls, UPS, welding, industrial heating, electrical vehicles, aircraft, and communications.

Global

Power-Semiconductor

Solution

Provider

Call the Power Line at
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