



VECTRON
INTERNATIONAL

A DOVER COMPANY

High Temp Electronics

Helping customers Innovate, Improve & Grow



High Temperature Electronics

- Electronic Module Products
- Frequency Control Products
- Packaged Quartz Crystals



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Package Selection

Microelectronic circuits and components that are exposed to all types of environments require hermetic packaging. In addition to providing mechanical protection and thermal dissipation, a hermetic package prevents the intrusion of atmosphere contaminants such as moisture, ionic contaminants, airborne particles and unwanted gases. Vectron has over 50 years of experience in the design and assembly of microcircuits with metal hermetic packages and co-fired ceramic packages.

Metal Package: Glass-to-metal seal and ceramic-to-metal seal are the common choices to produce metal-type hermetic packages. Typical metal enclosures are formed by stamping, deep drawing, brazing, photochemical etch and machining. The package sealing methods include projection weld, seam seal, cold weld, laser weld and E-beam seal. Metal package choices range from standard DIL, TO, FP, QFP to highly custom designed packages for Hi-temp, Hi-pressure and High Shock & Vibration environments used in Hi-Rel, Mil/Space and Downhole Applications.

Ceramic Package: In HTCC, LTCC technology, ceramic is processed in green tape form as a batch process. Layers are built by sequential operations of hole punching, metal filling, screening, cutting, stacking and laminating. The entire assembly is co-fired or sintering at temperatures as high as 1600°C. An electroless Nickel/Gold plating finish with a brazed-on KOVAR ring is Vectron's preferred configuration. Vectron is capable of assembling Microcircuits with standard LCC, CQFP, Side Brazed type and custom-design ceramic packages.

Assembly Process

Vectron offers the flexibility of applying a wide range of manufacturing processes, allowing us to accomplish unique product requirements and delivery of the highest quality workmanship to our customers. Vectron manufactures products with robust assembly techniques, intense process control and process automation.

Our assembly processes include:

- ◆ **Thick-Film Substrate**
 - Al_2O_3 , BeO, AlN, Multi-Layer
- ◆ **Component Attachment**
 - Flip Chip, Eutectic die mount, Epoxy die mount
- ◆ **Wirebonding**
 - Al and Au wirebonding
- ◆ **Hermetic Sealing with Metal and Ceramic Packages**
 - Projection, seam and cold welding



High Temperature Electronics

Extreme environment applications require system survival beyond the familiarized MIL-STD operating temperature range of -55°C to +125°C. Applications such as deep well logging tools (sensor, gauge and data acquisition etc.), geothermal logging, light weight ground and air vehicles and industrial process monitoring require robust electronic systems that can operate at 200°C and beyond. In addition, some of these applications also require survivability under high shock and vibration environments. Vectron has strong electronics packaging experience to handle such harsh environments. Our high-temperature electronics has been qualified and been deployed for 250°C downhole applications.

The benefits of deploying high-temperature electronics include:

- ◆ Increased device reliability and extended device life in the field
- ◆ Eliminating needs of auxiliary cooling with massive heat sinks or heat pipe design
- ◆ Lighter weight and smaller size
- ◆ Can integrate sensors and transducers along with electronics to operate in high temperature environments

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Our Strengths

Vectron International has sales of over \$200 million annually. With more than 50 years experience in custom design and manufacturing of microelectronics, Vectron provides a blend of hybrid, thin and thick film expertise and skill not common in the industry today. As part of Dover Corporation, Vectron has continued to build global manufacturing capabilities to include technical professionals at 6 locations world-wide. Vectron's staff are experts in Hybrid, High Temperature, Harsh Environment Electronics, multi-Chip Modules, Oscillator, SAW and Crystal design.

- ◆ State-of-the-art, high volume ceramic package and hybrid facility.
- ◆ Class 100, 1K and 10K clean rooms.
- ◆ Highly automated production lines.
 - *Production totals exceeding 2 million units per month*
- ◆ Fifty years experience in rugged & harsh environment products
 - *Military*
 - *Aerospace*
 - *Oil & Gas "Downhole" Tool*
 - *Industrial*
- ◆ ISO 9001, ISO 14000, QS 9000 and TS 16949 Certified
- ◆ Develop product concurrently with customer engineering and quality departments.

Technical Capabilities

- ◆ High Temperature hybrid packaging (-55°C to 250°C).
- ◆ Hybrid layout design for Hi-Rel applications.
- ◆ custom metal and ceramic (HTCC, LTCC) package designs.
- ◆ Multi-layer thick-film substrate fabrication (Al₂O₃, AlN, BeO)
- ◆ Hybrid microcircuit assembly and test in class 10K cleanroom environment.
- ◆ CSP, flip chip & BGA component mounting.
- ◆ Hermetic package sealing for Hi-Rel applications (projection, seam and cold welds).
- ◆ Bare die procurement and handling.
- ◆ Quartz BAW resonator design & fabrication (round, strip and HFF inverted mesa configurations)
- ◆ SAW wafer fabrication in class 100 cleanroom environment.
- ◆ Process and test equipment design.
- ◆ Environment MIL-PRF screening.

MIL-Spec Testing

Name	MIL-Spec	Method
Wirebond pull testing	MIL-STD-883	2001
Wirebond pull testing	MIL-STD-883	2023
Die shear testing	MIL-STD-883	2019
Temperature testing	MIL-PRF-55310	
Thermal shock-manual/automated	MIL-STD-883	1011
Thermal shock-manual/automated	MIL-STD-202	107
Temperature cycling	MIL-STD-883	1010
Constant acceleration	MIL-STD-883	2001
Constant Acceleration	MIL-STD-202	212
Fine/gross leak testing	MIL-STD-883	1014
Fine/gross leak testing	MIL-STD-202	112
PIND-particle impact noise detection	MIL-STD-883	2020
Vibration - random	MIL-STD-202	214
Vibration - sine	MIL-STD-202	204
Shock (half-sine & sawtooth)	MIL-STD-202	213
Humidity	MIL-STD-202	106
Solderability	MIL-STD-883	2003
Solderability	MIL-STD-202	208
Lead integrity	MIL-STD-883	2004
Terminal strength	MIL-STD-202	211

* Complete MIL-STD and custom harsh environment screenings are available. Vectron will work closely with customers to define screening requirements.

Vectron International

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