

Capabilities

Custom high reliability solutions for harsh environments



Who we are.

TT Electronics is a global provider of leading expertise in highly engineered electronics components that operate in harsh environments for critical applications.

We provide engineering support and expertise through our global network

We develop products for regulated markets in specialist areas

We deliver reliable products for harsh environment applications

We help our customers solve difficult problems and to meet their needs

TT Electronics' power products portfolio brings together experience and expertise across power modules, hybrid microcircuits, RF transistors and discrete semiconductors to support customer applications for harsh environments.

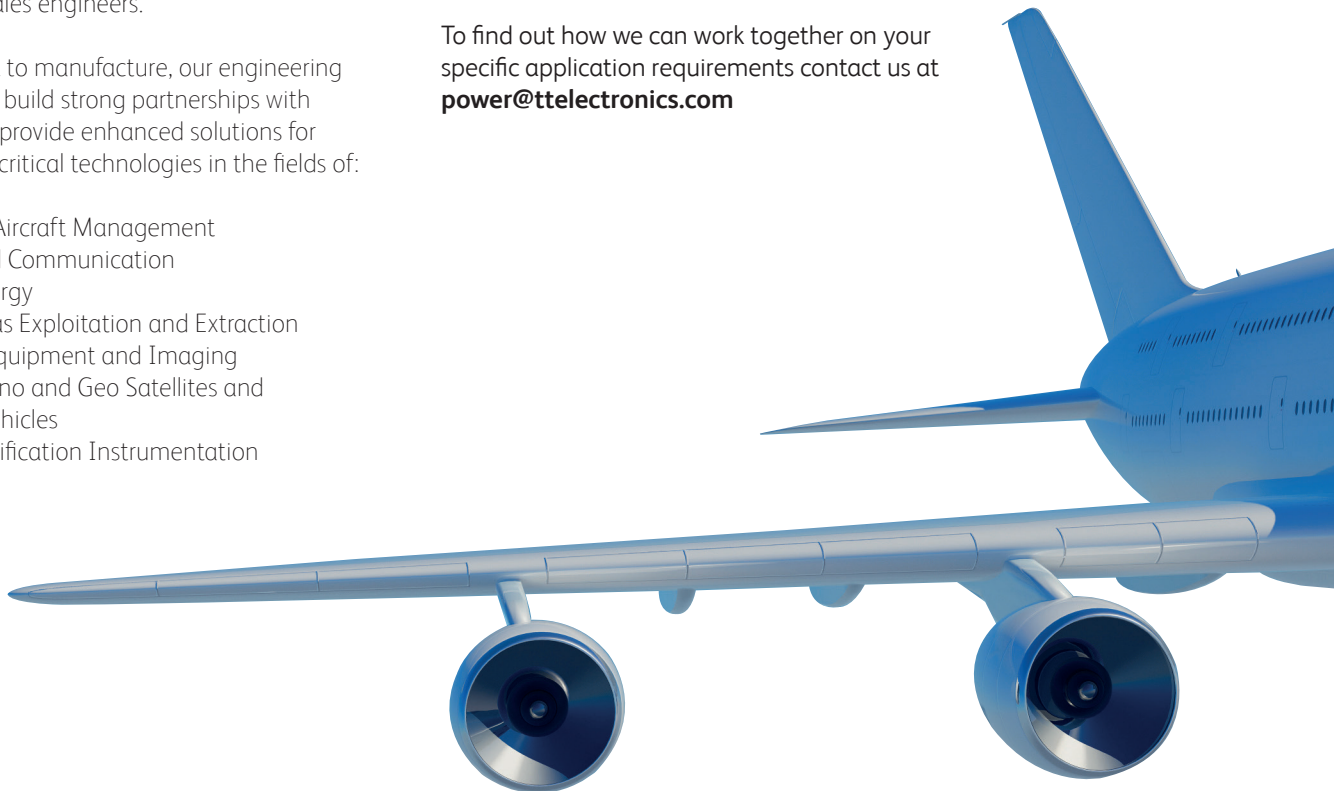
Our customers are supported by a global network of application sales engineers.

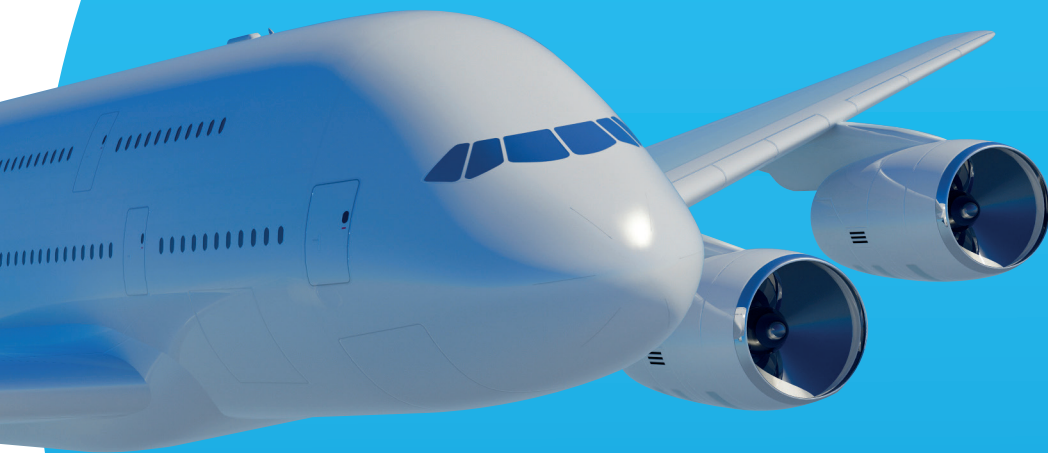
From concept to manufacture, our engineering teams aim to build strong partnerships with customers to provide enhanced solutions for performance critical technologies in the fields of:

- Electrical Aircraft Management
- Wideband Communication
- Green Energy
- Oil and Gas Exploitation and Extraction
- Medical Equipment and Imaging
- Space, Nano and Geo Satellites and Launch Vehicles
- High-Specification Instrumentation

TT Electronics' power products are manufactured at several of our global facilities and, as part of TT Electronics, our customers have the security of knowing we have the expertise and resources to meet their exacting environmental performance and quality requirements.

To find out how we can work together on your specific application requirements contact us at [**power@ttelelectronics.com**](mailto:power@ttelelectronics.com)





High Reliability

Harsh Environments

Matching to Mission Profile

More Electrical Aircraft

VAVE Strategic Agreements

Close Engineering Collaboration

Fast Switching

Silicon Carbide

Transient Suppression

Double Sided Cooling

Aerospace Pedigree

Hermetic Packaging

Light Weight

Low Profile

Flight Surface Actuation

Fuel Management

Advanced Materials for High Reliability

Power Electronics

High Frequency

Wide Bandgap

Wing Ice Protection

Inertial Navigation

Radiation Tolerance

Engine Controls

Space Pedigree

Thrust Vector Actuation

Gallium Nitride

Ultra Reliability

Materials Expertise

Obsolescence Management

Power Distribution

Innovative Development of Power Modules.

By applying our engineering expertise and innovative design approach we have developed a number of standard platforms to achieve improved product characteristics, including:

- Increased thermal management
- Higher temperature performance
- Lower mass and size
- Low profile
- Reduced cost
- Improved longevity of life-cycle

Features and benefits

These improved characteristics, whose modular nature can be applied in combination, provide the following real life benefits:

CTE matched construction

- Increased reliability
- Extended product life

State-of-the-art wideband devices

- Higher temperature
- Low loss performance

Standard baseplate design

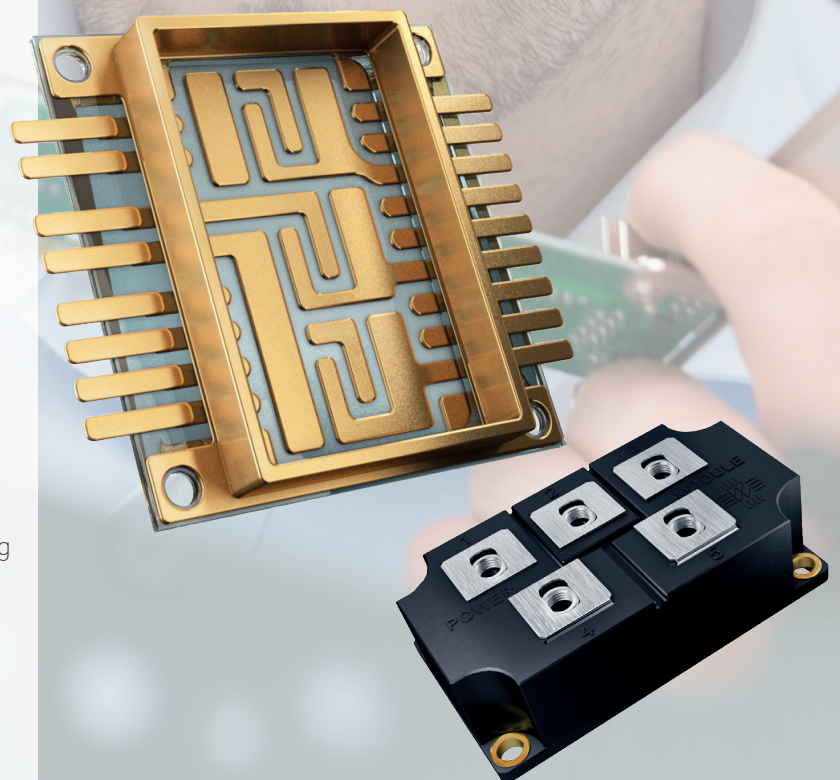
- Reduced cost of ownership
- Lower NRE's

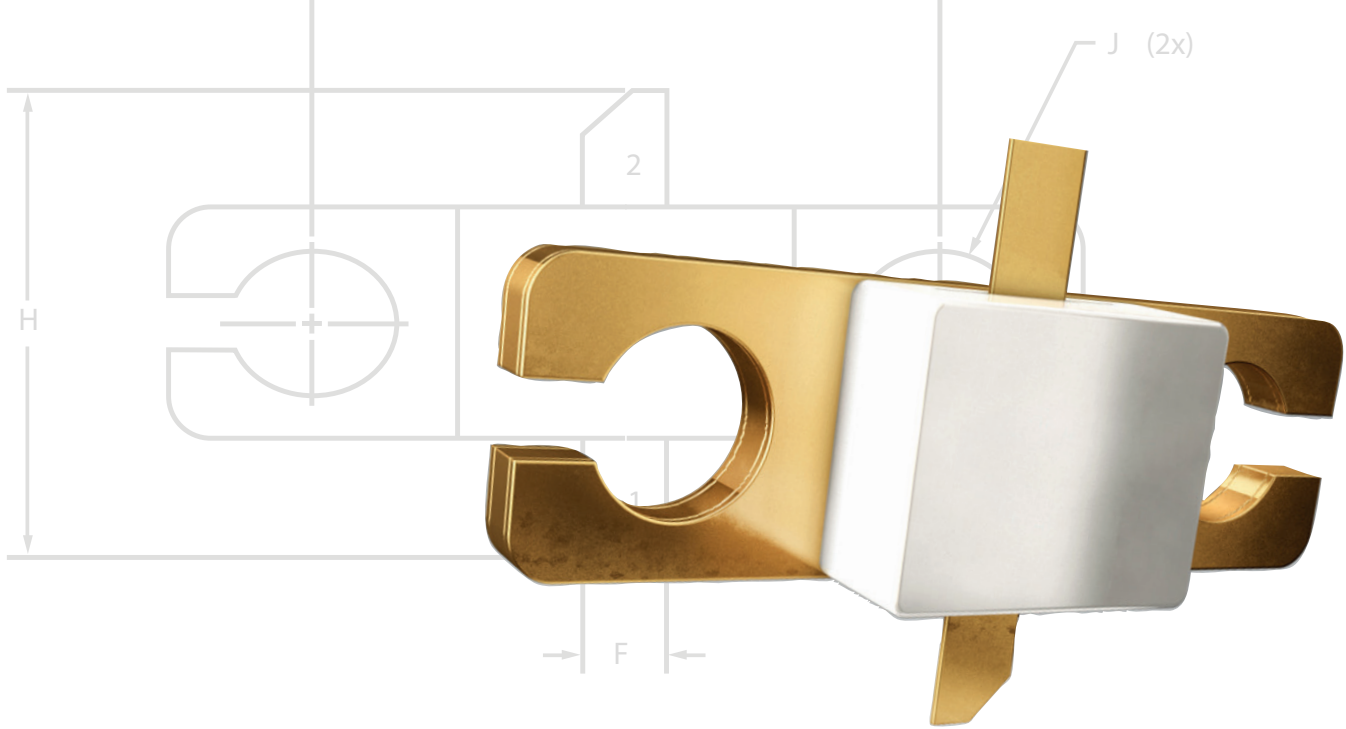
Continued development

Given the importance of components reliability in critical and challenging conditions, we are continuing to develop new processes to provide measurable improvements in system reliability, including:

- Double sided cooling
- Advanced die-attach
- Wire-bonding

“We are developing new processes to provide measurable improvements in system reliability.”





RF GaN Technology.

Based on over twenty years' experience with no product obsolescence, we are proud to introduce our new range of specially designed RF GaN transistors for pulsed and CW applications.

Features and benefits

The new RF GaN product range has been developed to meet the challenges of current and future application requirements with the following improvements:

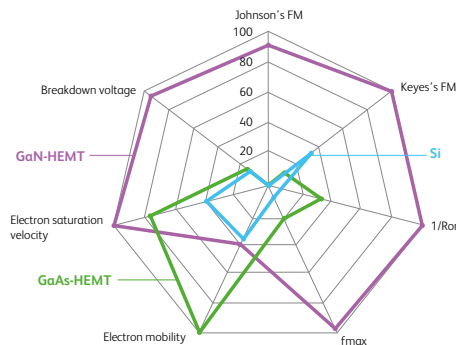
- Higher frequency up to 6GHz
- High efficiency: small heat sync, lower operating cost, less PA cooling
- High power density, reduced size and weight
- Wider frequency range achieved using wideband gap devices
- Increased linearity
- Lower capacitance

- Reduced system cost
- European source avoiding US export regulations
- All parts fully RoHS compliant, environmentally friendly

Applications

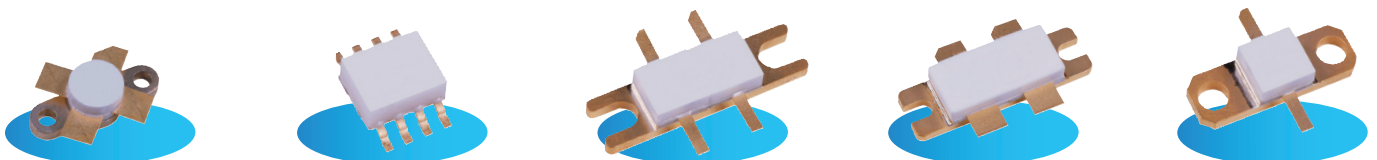
Our RF GaN range is suitable for the following applications:

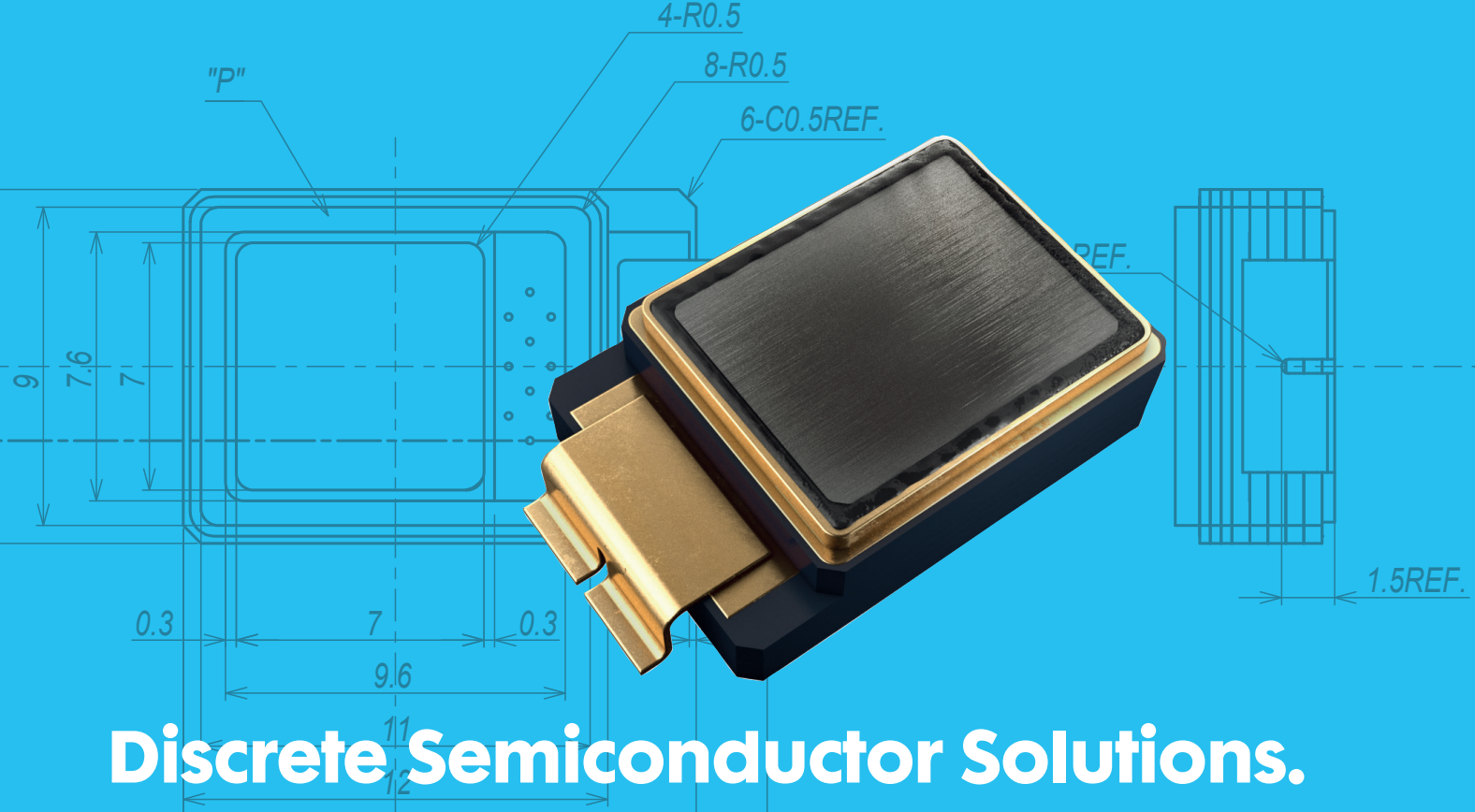
- Avionics: beacons, radar, transceivers, navigation equipment
- Satellite communications: transponders
- Industrial: induction heating, DME
- Military communications: jammers



Our standard range

We also offer an extensive range of VDMOS RF products, with devices from 750mW to over 400W, and for frequencies up to 1GHz, available in a range of industrial standard packages.





Discrete Semiconductor Solutions.

To counter the threat of lightning strikes on modern airframes due to the increasing use of composite materials, we have partnered with leading industrial companies to develop current limiting devices, which are designed to protect, at source, the specialist and safety-critical circuits within an aircraft.

This same technology can be applied to other susceptible high voltage industrial fields in various other applications.

Features and benefits

The fundamental advantages of current limiting technology over existing TVS solutions include:

Wide-band gap semiconductors

- Higher temperature performance
- Low switching loss
- Reduced real-estate
- Full control capability

State-of-the-art packaging

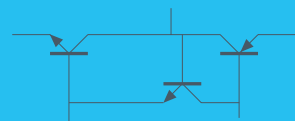
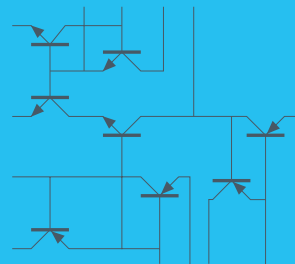
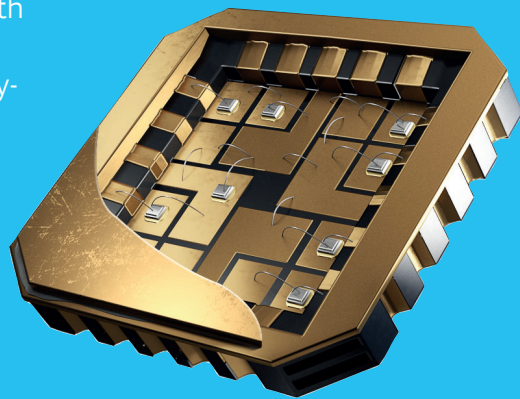
- Surface mount
- Through hole

Product technologies

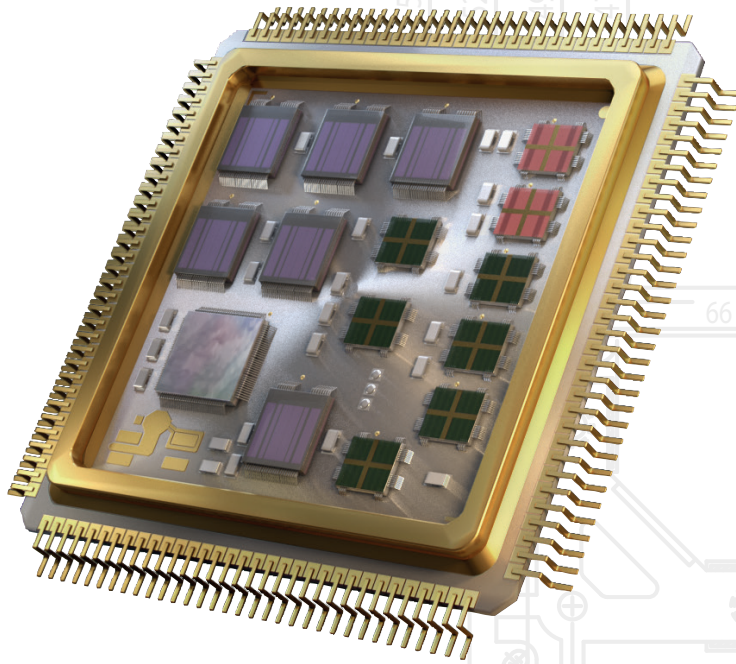
TT Electronics have a widely acknowledged industry pedigree in the Aerospace and Space communities, built on our long-standing reputation for providing core product solutions in the following technologies:

- MOSFETs
- BiPolar transistors
- Linear regulators
- Multi-chip arrays
- Diodes
- Hybrid microcircuits

We serve specialist needs with internationally recognised quality systems, including MIL Standards, European Space Agency and CECC requirements.



S18 (6 x NPN + 5 x PNP)



Hybrid Microcircuits Capabilities.

The engineering design teams at TT Electronics have successfully developed high reliability microelectronics to be space-saving and weight-saving; unusual from a single source. We have achieved this through the development of a number of key capabilities.

Key capabilities

Turnkey circuit layout and packaging design based on customers' electrical schematics, and performance and environmental requirements.

Design and manufacture in compliance with MIL-PRF-38534 Class H.

Engineering and program management support.

A broad range of packaging and technologies, including:

- Hermetic and non-hermetic packaging
- Multi-layer thick film printing on ceramic (AIO and AIN)
- High and low temperature co-fired ceramic (HTCC and LTCC)
- Thin film
- Surface mount
- Bare die and wire bonding (or mixed SMT and With Chip & Wire)

State of the art 'lean' manufacturing facilities, including:

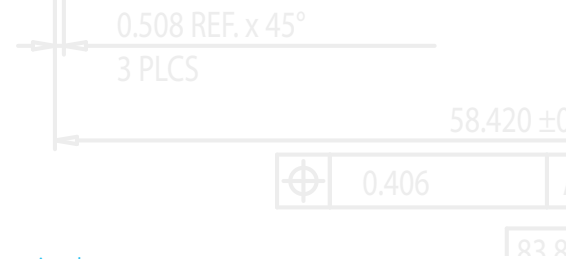
- Class 10,000 clean room facilities in the US and UK
- Fully automated SMT lines
- Fully automated die bonding and wire bonding
- Automated inspection (under development for wire bonding)
- Custom test systems including full temperature testing
- Environmental screening to MIL-STD-883, ESA ECSS-Q-ST-60-05 and BS9450

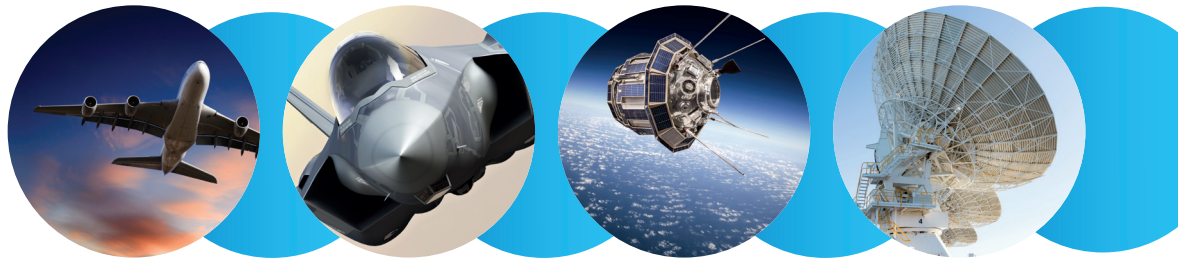
ISO9001:2008 and ISO14001:2004 quality management systems

Applications

Our diverse range of custom solutions have recently been adopted in the following applications:

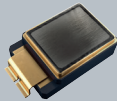

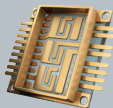
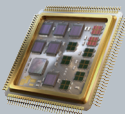
- Aircraft engine controls
- Airborne phased array radars
- Aerospace / space inertial measurement units
- Wing ice protection systems
- Electronic counter measures
- Missile fusing / seeker systems
- Helicopter mission computer systems
- Minesweeper sonar systems and beacons
- Suppressor circuits for aircraft lightning protection
- High voltage mass spectrometer circuits
- Optical test instrumentation
- Oil and gas exploration pressure and temperature logging modules





Product Applications.

“From concept to manufacture, our engineering teams aim to build strong partnerships with customers to provide enhanced solutions for performance critical technologies.”

Product segment	Applications	Features
Discrete semiconductors 	Flight Control Systems Lightning Strike Protection Wing/Engine De-Icing Down-Hole Drilling Space Power Systems Defence Aids Systems	Wide range of modern and traditional packages Screening to highest international standards Support long service life and/manage obsolescence
RF transistors 	Radar Arrays Aircraft Transceivers / Transmitters Beacons Jammers Point-To-Point Communication	High performance: high gain/excellent linearity Robust packaging for harsh environments Support long service life/manage obsolescence
Power modules 	Motor Drives For Flight Actuation Systems Power Distribution Switching Electrical Fuel Pumps Engine Starter Actuation Thrust Vector Actuation	Bespoke hermetic or plastic packaged modules Reduced size/high power density High reliability screening to highest standards Silicon/Silicon Carbide Technology
Hybrid microcircuits 	Engine Controls Fuel Management Control De-Icing Controls Proximity Sensors Inertial Navigation Down-Hole Data Logging	Screening to MIL-PRF-38534, Class H, MIL-STD-883 Turnkey solution, circuit layout and customer designs Enhanced thermal management for reliability

To find out how we can work together on your specific application requirements contact us at power@ttelectronics.com

