TT Electronics

New Space Electronics®

Tackling the challenges of new space flights with traceable, innovative solutions

The New Space Challenge

Higher volume satellite constellations in low earth orbit are driving a requirement for increasingly cost effective components. TT's New Space Electronics® offer a solution that delivers reduced screening but fully traceable and proven space grade heritage.

Just some of our notable Missions

In December 2017, Voyager 2, 11 billion miles from Earth, fired its thrusters leaving our Solar System for interstellar space, joining its sister probe Voyager 1.

Voyager 1 also fired its thrusters recently after 37 years of laying dormant; a demonstration of the reliability of our electromagnetics, made in Medina, Ohio.

VOYAGER 1 AND 2

LAUNCH DATE 1977

Cassini saw Europe and the US align to revolutionise human understanding of Saturn and where life might be found elsewhere in the Solar System.

Our small signal transistors travelled amongst Saturn's rings for 20 years until the spacecraft was destroyed in 2017 to prevent contamination of Saturn's moons.

CASSINI - HUYGENS

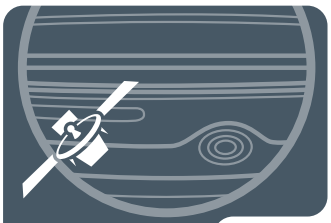
SATURN OBSERVATION LAUNCH DATE 1997

Our UK Lutterworth facility supplied mission critical power supply componentry for the travelling wave tubes used in the communications system on Rosetta.

In one of the last systems remaining operational, the parts helped beam back data and photos from over 8 billion km away as the satellite crashed into comet 67P.

ROSETTA

COMET CHASER LAUNCH DATE 2004



Juno explored the biggest and baddest planet in the solar system - Jupiter. During its scientific exploration, our devices in mission critical applications endured exceptionally challenging environmental conditions.

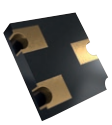
Upon entering Jupiter's gravitational pull, the spacecraft was accelerated to around 130,000 mph, a little faster than your average family saloon!

JUNO

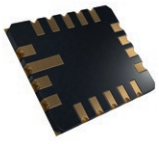
JUPITER EXPLORATION LAUNCH DATE 2007

1970 1980 1990 2000

Product Introduced



LCC1



MCA

Low Profile Hermetic Power Module

ARIANE VEGA

LAUNCH VEHICLE FIRST LAUNCH 2011

TT Electronics have developed thrust vector actuation control systems for the European small satellite launch system known as Ariane Vega.

The same control system has been trialled on IXV, the experimental re-entry vehicle that may ensure astronaut survivability in the event of operational rescue requirements.

ONGOING

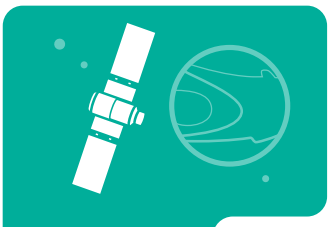
ALTIKA

EARTH OBSERVATION LAUNCH DATE 2013

TT Electronics developed the first Si_3N_4 packaging to fly within the space environment. Our solutions for AltiKa improved the PCB real-estate usage and lowered overall component weight.

Over the course of its three year lifespan, AltiKa observed ocean wave height, aiding early anticipation of climatic change and natural disasters.

END OF MISSION 2016



BEPI COLUMBO

MERCURY EXPLORATION PLANNED LAUNCH 2018

Our critical components for the solar vein current conditioning circuitry must survive extremes of temperature change when arriving at Mercury in late 2025.

The satellite will see conditions in excess of 350°C when conducting its exploration of the smallest and least explored terrestrial planet in our Solar System.

ONGOING

GALILEO F.O.C

LAUNCH DATE 2019

Enhancing the performance of the European Global Satellite Navigation system, TT Electronics multi-chip arrays will be used in key applications to help Galileo reach Full Operational Capability (FOC).

The 30 satellites orbiting at 23,222 km altitude above the Earth's surface will enable location identification to within 1m anywhere in the world.

ONGOING

ONGOING NEAR END OF LIFE

ONGOING

END OF MISSION 2017

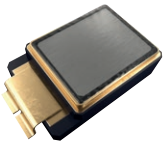
END OF MISSION 2017

ONGOING

2010 **2020**

DLCC

Cryogenic Cooler Coil



SMHVHT

Discretes

Readily available packages and die with space heritage.
Other options available on request.

Select your package → **Select your semiconductor** → **Select your required screening options**

Packages

Standard Ceramic Small Signal
LCC1 (UB) (3 or 4 Pad Variant)
LCC2 (U)
LCC3 (UA)

SMT Power Packages
LCC4 (U5)
SMD05 (U3)
SMD1 (U1)

Ceramic Diodes
DLCC2
DLCC3

Traditional Metal Can
TO18
TO5
TO39

Modern Metals
TO257
TO254
TO258

MCAs
LCC-18 Pad
LCC-20 Pad
LCC-28 Pad

Low Cost Packaging
TO220
TO247

Semiconductors

Small signal BJT
2N2222A
2N2907A
2N2369
2N5551
2N5401

Small Signal Diodes
1N4148
1N6642
BAT54
BZX55XXX

JFETs
2N4391
2N4392
2N4393
2N4416

Power Diodes
SiC-1A
SiC-2A
SiC-10A
1N5806
1N5811
1N5819

Power MOSFETs
Si N and P channel up to 50A
SiC-1200V 35A
SiC-650V 25A

Schottky Barrier
BYV32
SB30-45

Screening Options

Stabilising Bake

Pre-Cap Inspection

High Temperature Reverse Bias

High Temperature Gate Bias

Operation Life

Temperature Cycling

Acceleration

Particle Impact Noise Detection

Hermetic Seal Testing

Residual Gas Analysis

Radiography

Total Irradiated Dose

Single Event Upset

Buy-Off Inspection

Lot Validation and Group Testing

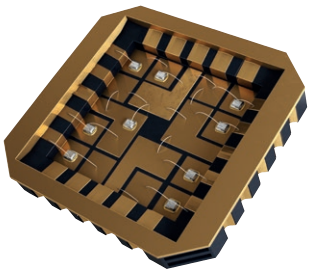
Details of our part number generator for our New Space Electronics® range can be found on our website at: www.ttelectronics.com/new-space-electronics

Multi Chip Arrays

Reference Designs

Key Advantages

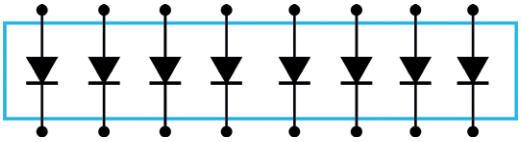
- PCB real-estate saving
- Light weight
- Improved reliability
- Lower cost
- Traceable
- Full customisation option available



MCA Reference Designs

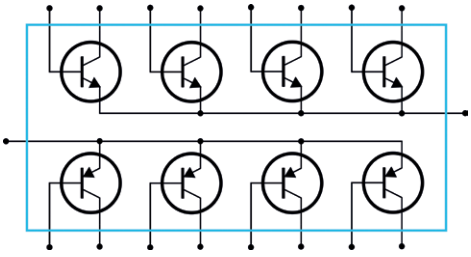
Applications

Diode Arrays



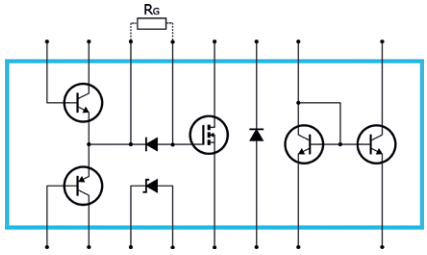
- Power rectification
- Voter circuits
- Dual redundancy

Transistor or MOSFET Arrays



- Individual switches or common junction arrays
- Bridge circuits
- Current multipliers
- High impedance switches
- Voltage rectifiers

Mixed Technology Arrays



- Amplifiers
- Drive circuits
- Protection circuits

Custom Design

Our multi-chip arrays are based on industrial standard leadless chip carriers to provide you, the customer, with the option to fully utilise the package in your required configuration, and with the ability to mix technologies or manufacturers die within the package.

Baseline Screening Options

Our suggested entry point for New Space Electronics® discrete semiconductors is shown in NS1 below. The sequence provides an assurance basis with manufacture utilising robust, controlled, space proven processes and designs, including traceability to all materials and operations. NS2 adds baseline mechanical and electrical screening to provide the next level of assurance.

New Space Screening requirements [1, 2]

Step	Screen	Condition	NS1	NS2
1	Internal visual inspection [5]		100%	100%
2	High temperature non-operating life (stabilization bake)	T_{STG} ≤ maximum rated storage temp t = as specified	100%	100%
3	Temperature cycling	5 cycles. -55°C to +125°C or as specified in maximum ratings		100%
4	Constant acceleration [4]	Y_1 direction		100%
5	Serialization		100%	100%
6	Initial electrical test	DC electrical attributes as specified		100%
7	Burn-in [3]	Operating or reverse biased as specified. 48 hours (minimum)		100%
8	Final electrical test	DC electrical attributes as specified	100%	100%
9	Hermetic seal [4]	Fine & Gross Leak Detection		100%
10	External visual examination		100%	100%

Notes:
1. All screening operations are performed in accordance with MIL-STD-750 or equivalent ESA methods.
2. All products can be screened in accordance with the full MIL-STD-19500 or ESA 5000 Generic standard flows – contact TT Electronics Sales.
3. Conditions for burn-in are set according to the device type and standard operating conditions for ambient or case rated devices.
4. Applicable for cavity devices, plastics excluded.
5. Internal visual inspection carried out by TT Electronics in accordance with appropriate standard – only on cavity devices.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www.ttelectronics.com