



# Linecard

France, Spain, Belgium, Netherlands, Switzerland, Luxemburg

**Protec GmbH**  
*High-Rel Electronic Components*



**Protec GmbH** was founded in 1976 and is successful in the sales of High Reliability components.

We are particularly specialised in highly qualified components for industrial, military and space applications.

In instances of obsolescence and supply problems, we can also offer our customers effective solutions with our extensive product and market knowledge.

Our customer orientated warehouse, equipped with a modern ESD protection system, guarantees reliable component supply.

With our design-in and market orientated expertise, we can provide long term support for your projects and applications.

Through our distributor and rep strategy, we are the "extended arm" of our Manufacturers. When required we will put you directly in touch with our manufacturer's specialists.

Our first priority is a long term, successful partnership with our customers and manufacturers.



Protec GmbH is a specialized distributor of high quality products for the electronics industry, particularly for the Space, Avionic, High Voltage, High Temperature and niche industrial markets.

**We support customers and manufacturers with our expertise in:**

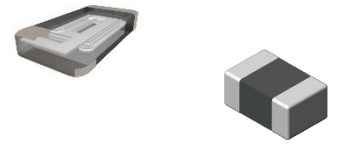
- EUS requirements and licensing processes
- CoC requirements
- Design in support
- Export classifications and rules
- Product trainings

Support and understanding of terms like SLDC, LOT acceptance, PIND, TID, ELDRS, SEE, SEU, SEL, Proton testing and many more industry specific terms.

Responsibilities by Country / Manufacturer	Switzerland	France	Spain	Portugal	Belgium	Luxembourg	Netherlands
AEM Inc.	•	•	•	•	•	•	•
AirBorn	•	•			•		
Arquimea	•	•	•	•	•	•	•
Apogee	•	•	•	•	•	•	•
Avalanche Techn.	•	•	•	•	•	•	•
Axtal	•	•			•	•	•
BAE Systems	•			•			
TAS DPC	•	•	•	•	•	•	•
EPC Space	•	•	•	•	•	•	•
FLUX	•	•	•	•	•	•	•
Honeywell	•	•	•	•	•	•	•
GSI Technology	•	•	•	•	•	•	•
NanoXplore	•	•	•	•	•	•	•
Macom	•	•	•	•	•		•
Q-Tech	•		•	•	•	•	•
Semicoa (OSI location)	•	•	•	•	•	•	•
Skyworks DS	•						
Smiths Canada	•	•	•	•	•	•	•
SSSI	•	•	•	•	•	•	•
Teledyne e2v	•	•	•	•	•	•	•
Teledyne HighRel	•	•	•	•	•	•	•
VMI / CalRamic							•
Viking Technologies	•	•	•	•	•	•	•
VPT Components	•	•	•	•	•	•	•
VPT	•						
ZES	•	•	•	•	•	•	•



HighRel Fuses	50 - 180 V	125mA - 20A
HighRel Chip Beads	30 - 1000Ω	200mA - 4A
TWM	RoHs to Tin Lead Conversion	



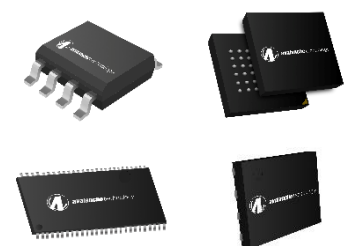
Nano D	Rugged Nano-D metal shell - exceed MIL-DTL-32139	9-91 contacts
Micro D / High Speed	Rugged Micro-D metal shell - exceed MIL-DTL-32139	9-128 contacts
Macro D	Rugged (3A up to 42A per contact)	8-150 contacts
High Speed Rectangular	Rugged - vertical board-mount, right angle board-mount, cable I/O, and flex circuit mounting	40-500 contacts
SInergy	Rugged - modular hybrid solution 1-5 configurable bays	up to 25Gbps
Stackable	high-density, board-to-board stacking	28-200 contacts
Rectangular R&Z Series	PCB Connectors	10-604 contacts
Z-Axis Interposer	high-density, board-to-board or flex circuit stacking	20-175 contacts
Circular	Rugged - micro-miniature circular - similar performance as D38999 connectors more compact & lighter package	up to 10G
Flexible Assemblies	highly reliable, flexible, printed circuit assembly single-sided, double-sided, multi-layer, rigid-flex	
Cable / Harness	copper, RF and more — terminated with any connector	
Active Optical Cables	fully-qualified, Space-Rated Active Optical Cable (SAOC®) & a Rugged Active Optical Cable (RAOC®)	



LVDS	EPPL → Quad Driver / Receiver and Dual Transceiver	ESA Qualified
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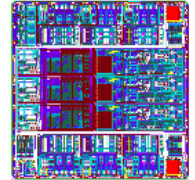
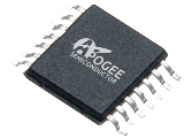



Parallel x32 (Gen 3)	1Gb / 4Gb	75krad
Serial D-QSPI (Gen 3)	1Gb / 2Gb / 4Gb / 8Gb	75krad
Serial QSPI (Gen 1)	4Mb / 8Mb	75krad
Serial (Gen 2)	16Mb	75krad
Parallel x16 (Gen 2)	16MB / 32Mb / 64Mb	75krad

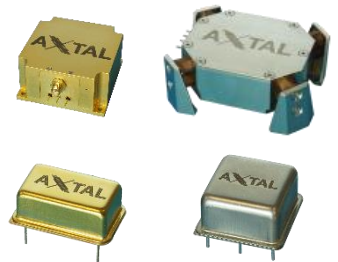




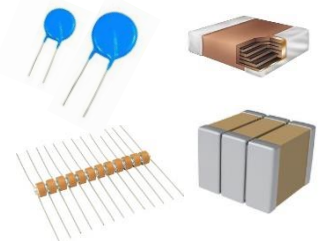
<b>Logic - AND</b>	Quad 2-input / Triple 3-input	300kRad / 80MeV
<b>Logic - NAND</b>	Quad 2-input / Quad Schmitt 2-input / Triple 3-input	300krad / 80MeV
<b>Logic - OR</b>	Quad 2-input	300krad / 80MeV
<b>Logic - NOR</b>	Quad 2-input / Triple 3-input	300krad / 80MeV
<b>Logic - XOR</b>	Quad 2-input	300krad / 80MeV
<b>Logic - Inverter</b>	Hex Inverter / Hex Schmitt Inverter / Hex Open-drain Inverter	300krad / 80MeV
<b>Logic - Voter</b>	Dual 3-input Majority Voter with Error Output	300krad / 80MeV
<b>Logic – Flip-Flop</b>	Dual D Flip-Flop with Async. Clear	300krad / 80MeV



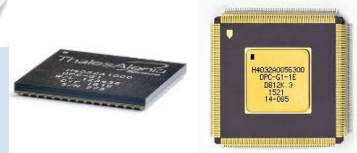
<b>OCXO</b> 	±0,005ppm / Ultra Low Noise	10MHz to 150MHz
<b>TCXO</b>	±0,5ppm	1MHz to 2,5GHz
<b>VCXO</b>	±5ppm / Low Noise	1MHz to 1,5GHz
<b>SAW Oscillator</b>	±350ppm	500MHz to 1,6GHz
<b>Quartz Filter</b>	±1ppm	10MHz to 100MHz
<b>PRECISION CRYSTALS</b>	SC, IT and AT-cut crystals for frequency control, instrumentation , military, space and other markets	Compliant to ESCC3501



<b>High Voltage Disc</b>	3kV to 20kV/ MIL-PRF-49467 Option	X7R / X5R / X5U / Z5U / NPO
<b>High Voltage Multilayer</b>	500V to 10kV / MIL-PRF-49467 Option	X7R / NPO



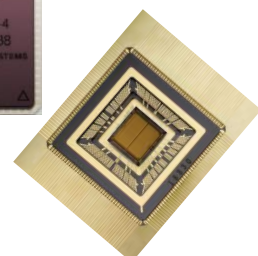
<b>DPC G1</b>	16bit openMSP430 – Digital Programmable Controller >60krad / SEL >72.2MeV / SEU >40MeV 16 ADCs / 3DAC / 108 IO / PLL / PWM / Low Power 3x 30MIPS / MIL-1553 / CAN / UART / -55 to 125°C	µController
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**BAE SYSTEMS**

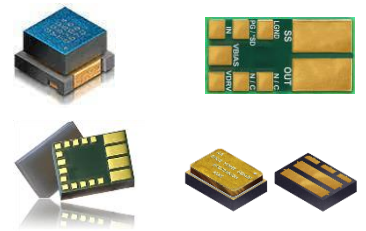
INSPIRED WORK

<b>SRAM</b>	4M / 16M / 20M / 64M / 320M	100 / 300krad
<b>PROM</b>	256k	100 / 300krad
<b>C-RAM</b>	2M / 4M	100 / 300krad
<b>Processor</b>	RAD750 Power PC & RAD55xx SoC	100 / 200krad



**EPC · SPACE**

<b>GaN FETs</b>	40V to 300V	$R_{on}$ 4 to 400m $\Omega$
<b>GaN Driver</b>		
<b>GaN Power Stages</b>		



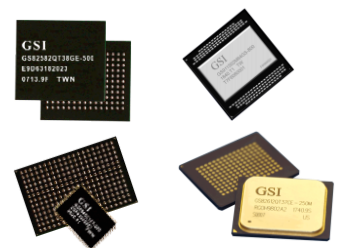
**FLUX**

<b>Chokes</b>	ESA Technology Flow Qualified	
<b>Transformers</b>	ESA Technology Flow Qualified	
<b>Inductors</b>	ESA Technology Flow Qualified	



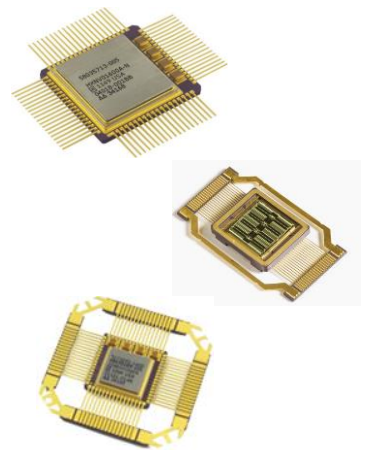
**GSI TECHNOLOGY**

<b>SRAM RT and RadHard</b>	SigmaQuad-II+ (x18 / x32 configuration)	350 MHz	288M / 144M / 72M
<b>SRAM RT and RadHard</b>	SyncBurst & NBT (x18 / x32 configuration)	333 MHz	144M / 72M / 36M
<b>APU</b>	High Speed Paralell Computing for SAR, Imaging and AI Applications		



**Honeywell**

<b>SRAM</b>	QML-Q and V (x8 or x32 configurations)	256k to 64M
<b>MRAM</b>	QML-Q and V (x8 or x16 configuration)	16M / 1M
<b>SER/DES</b>	1-4 Lines or 1-8 Lines	up to 3,125GB/s
<b>RS422</b>	Quad Driver and Reciever	20Mb/s
<b>LVDS</b>	Quad Driver and Reciever	100MHz
<b>Processors</b>	HX1750 & HXRHPPC Microprocessor	
<b>Logic</b>	Quad 2-input NAND	
<b>ADC</b>	12 Bit Monolithic / Low Power	20 MSPS
<b>DAC</b>	12 Bit Monolithic	
<b>Comparator</b>	Common mode 0V to 5V / Input Offset Voltage +/-24mV	
<b>Analog MUX</b>	8-Channel	$R_{ON} < 60\Omega$



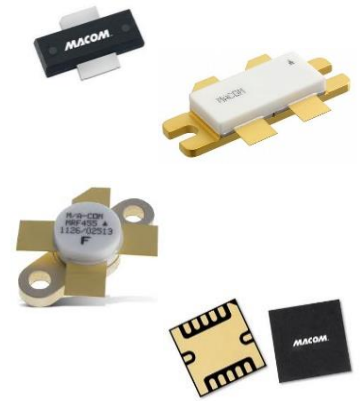
**EPSON**

<b>Inertial Measurement Unit (IMU)</b>	Low Noise, High Stability, Wide Dynamic Range (New Space)
<b>Vibration sensor</b>	High performance Vibration sensors (New Space)
<b>Accelerometer</b>	High dynamic range, low drift & digital output (New Space)

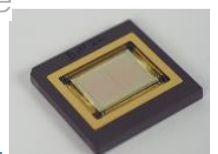




<b>RF - Amplifiers</b>	Gain Blocks, Low Noise, RF Power, Linear, Transimpedance	
<b>RF - Attenuators</b>	Digital, Fixed, Voltage Variable	
<b>RF - Capacitors</b>	Beam Lead, Binary Chip, Bypass, HighQ, MNS, MNOS	
<b>RF - Couplers</b>	Hybrid, Stripline, Broadband	
<b>RF - Diodes</b>	PIN, Step Recovery, Schottky, Varactor Tuning	
<b>RF - Filters</b>	Band Pass, MoCA, Horizontal & Vertical, Low Pass, Duplex, Triplex Filters	
<b>RF - Frequency Conversions</b>	Down Converter, Up Converter, Multipliers, Mixer, Receivers, Transceivers	
<b>RF - Frequency Generation</b>	Comb, Voltage Controlled	
<b>RF - Limiters</b>	C-Band to V-Band	
<b>RF - Switches</b>	Drivers, DPDT, Limiter, SPST, SPDT to SP8T	
<b>RF - Magnetics</b>	Inductors, Baluns, Transformers	
<b>Optical - Clock and Data Recovery</b>	VCEL Driver, DML Driver with CDR / TIA / EML	
<b>Optical - Receiver Modules</b>	APD Photoreceivers, PIN Photoreceivers, HighSpeed Photodetectors and Receivers	
<b>Optical - Laser</b>	Distributed Feedback Lasers, Fabry-Perot Lasers	2,5G, 10G, 25G
<b>Optical - Modulator Drivers</b>	NRZ, PAM, Coherent	Up to 58Gbps
<b>Optical - Post Amplifiers</b>	Limiting Amplifier	
<b>Optical - Photodiodes</b>	APD Photodiode, PAM4 PIN Photodiodes	10G, 25G, 50G, 100G
<b>Optical - Transimpedance</b>	Client Side, Coherent	
<b>Networking - Crosspointswitch</b>	Crosspoint Switches and Signal Conditioners	
<b>Networking - Equalizers</b>	Linear Equalizers 56 / 112 Gbps	2 and 4 Channel
<b>Networking - Processors</b>	Single or Dual-Core Power™ Processor	



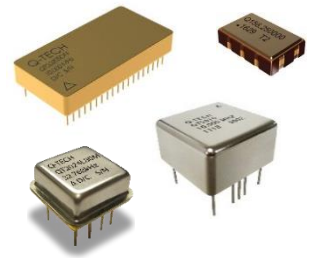
<b>NG-Medium</b>	SpW & DDR 2 PHY	34KLUT / 112 DSP
<b>NG-Ultra</b>	Quadcore ARM R52 @ 600MHz 32 HSSL @ 12.5 Gbps / SpW & DDR 3&4 PHY	500KLUT / 1344 DSP
<b>NG-Ultra300</b>	16 HSSL @ 12.5 Gbps / SpW & DDR 3&4 PHY Embedded ADCs & DACs	290KLUT / 896 DSP







<b>XO</b>	CMOS, TTL, LVDS, LVPECL	Single & Multiple Outputs
<b>TCXO</b>	HCMOS, Sine	±0,5ppm
<b>VCXO</b>	HCMOS, Sine	
<b>OCXO</b>	CMOS, Sine	±10ppb
<b>SAW</b>	Sine 400MHz to 1,3GHz - low phase noise	300krad
<b>MCXO</b>	CMOS or Sine 5 to 80MHz 1pps	50krad
<b>New Space XO</b>	QT780, QT723 and QT735 Series	50krad
<b>Specialty Oscillators</b>	combined OCXO, MCXO, TCXO, SO, VCSO, PLL & crystal filters in modules	



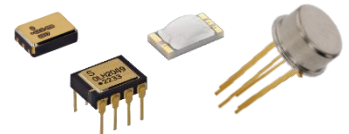
<b>SpaceABLE 28G SL Series</b>	4TRX, 12TX, and 12RX	FM
<b>SpaceABLE 10G SL Series</b>	4TRX, 12TX, and 12RX	FM
<b>SpaceABLE 10G SM Series</b>	4TRX, 12TX, and 12RX	FM
<b>LightABLE 28G LL Series</b>	4TRX, 12TX, and 12RX	EM
<b>LightABLE 10G LL Series</b>	4TRX, 12TX, and 12RX	EM
<b>LightABLE 10G LM Series</b>	4TRX, 12TX, and 12RX	EM



<b>Transistors</b>	2N3810, 2N2920, 2N2857, 2N2369, 2N3637 and more	up to JANSR/F
<b>Diodes</b>	1N5802, 1N5804, 1N5806, 1N5614, 1N5615	JANS & HC / KC die



<b>Optocouplers</b>	Many different types available like (OLS049 or OLS249) Screening per MILPRF19500 or MILPRF38534	
<b>RF Diodes</b>	PIN, Schottky, Varactor, Limiter	up to JANS equiv.
<b>SPDT</b>	SPDT and ST4T	up to 5GHz
<b>RF Amplifiers LNA</b>	Small QFM Packages 2x2mm	up to 6GHz
<b>Other RF parts</b>	Combined LNA with switch in one package, Gain Blocks	



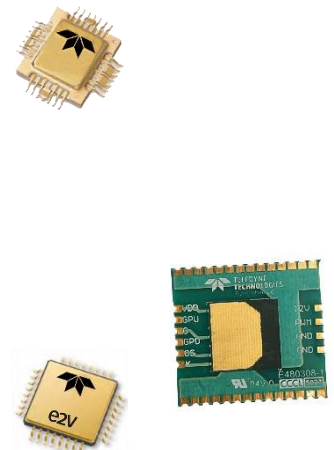




<b>ADC</b>	Base-Band up to Ka-Band	35GHz 12.8GSps
<b>DAC</b>	Base-Band up to Ka-Band	12b 12GSps
<b>DDR4</b>	4GB and 8GB, 100krad >60MeV	Up to ECSS Class 1
<b>Processors</b>	LS1046-Space (ARM A72 @ 1.8GHz) Power PC P2020 and P8548	
<b>SiP Modules</b>	QLS1046 and DDR4 Module	



<b>Amplifiers</b>	LNAs, Driver Apms, Power Apms, Gain Blocks	
<b>SPDT</b>	1MHz to 60GHz	
<b>Radiation Dosimeters</b>	hybrid microcircuit measures (TID)	
<b>DSA</b>	PE94302 - 0.25MHz to 4MHz (6Bits / 64 states)	
<b>Freq. Multiplier</b>	TDFM001000 25GHz MMIC Freq. Doubler	
<b>Limiters</b>	MMIC 10MHz to 6GHz / 100W	Rad Tolerant
<b>Mixers</b>	double-balanced passive mixer MMIC 18-46 GHz	
<b>Prescalers</b>	RF prescaler family divide ratio 2, 4 or 8 / dc to 13.5GHz	
<b>PLLs / Synthesizers /VCO</b>	integer-N and fractional-N	
<b>Power Modules</b>	Load Switch (isolated Driver) 650V – 60A – 25mOhm	46MeV/100krad
<b>POLs 2A to 10A</b>	Vin 4.6-6V / Vout 1-3.6V	



<b>HV Diodes</b>	2 to 20kV / 30 to 3000ns / 10mA to 3.5A / Axial & SMD	QPL available
<b>HV Assemblies</b>	HV Stacks & Bridges	
<b>HV Opto</b>	10kV and 15kV Optodiode & Optocouplers up to 25kV	





<b>DCDC – SV Series</b>	6W, 15W, 30W, 100W - Single & Dual Output	60krad / >44MeV
<b>DCDC – SVR Series</b>	1.5W, 6W, 15W, 30W, 100W - Single & Dual Output	100krad / 85MeV
<b>DCDC – SVL Series</b>	6W, 15W, 30W, 100W - Single & Dual Output	60krad / 85MeV
<b>POL – SVGA Series</b>	$I_{out} = 8, 10, 15A$ $V_{in} = 4,1 \text{ to } 7V$ $V_{out} = 0.8 \text{ to } 4V$	100krad / 85MeV
<b>POL – SVFA Series</b>	$I_{out} = 10A, 15A$ $V_{in} = 4,1 \text{ to } 7V$ $V_{out} = 0.8 \text{ to } 3,4V$	40krad / 85MeV
<b>POL – SVPL Series</b>	$I_{out} = 6, 9, 12A$ $V_{in} = 3 \text{ to } 5,5V$ $V_{out} = 0.8 \text{ to } 5V$	100krad / 86MeV
<b>GaN Converter</b>	400W $V_{in} = 100V \text{ or } 120V$ Custom Version available	100krad / 85MeV
<b>RF Receiver Power</b>	SLNP17-100CQ, Low-Noise, Quad-Output	100krad



<b>Transistors</b>	NPN and PNP Small Single and Power BJTs	up to JANSR/F
<b>Diodes</b>	Zener, TC Zener, Schottky, Ultra Fast, Rectifier	up to JANS
<b>MosFets</b>	RadHard 100V, 150V, 200V, 250V	up to 84MeV



(Non Space only no radiation guarantee)

<b>DRAM Modules</b>	DDR5 (coming soon), DDR4, DDR3, DDR2, DRAM	up to 32GB
<b>STORAGE (Flash/SSD)</b>	2.5 in. SSD, 1.8 in. SSD, M.2 SSD, slimSATA, etc.	
<b>Rugged Memory</b>	ParallelCell MCP, ParallelSSD	
<b>Persistent Memory</b>	DDR4 NVDIMM, Energy SubSystems (ESS)	



<b>3A PoL (Point of Load)</b>	$V_{in} 2,5 \text{ to } 5V$ / $V_{out} 0.8 \text{ to } V_{in} -0,5V$	100krad/110MeV
<b>ZES100 (LDAP)</b>	Latchup Detection and Protection / EP Package QFN32L	300krad/110MeV
<b>ZSOM-M01</b>	System on Module (ARM M0+ Module for LEO Missions)	RadTolerant
<b>ZES400 Quad Voter</b>	1,8 to 5V Supply / EP Package QFN28L	300krad/110MeV



<b>Service Provider</b>	Final Source Inspection or Pre-Cap Inspection	To combine with PO
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**UK & IRELAND  
LINECARD**

available here

[WWW.PROTEC-SEMI.COM](http://WWW.PROTEC-SEMI.COM)



**DACH SPACE  
LINECARD**

available here

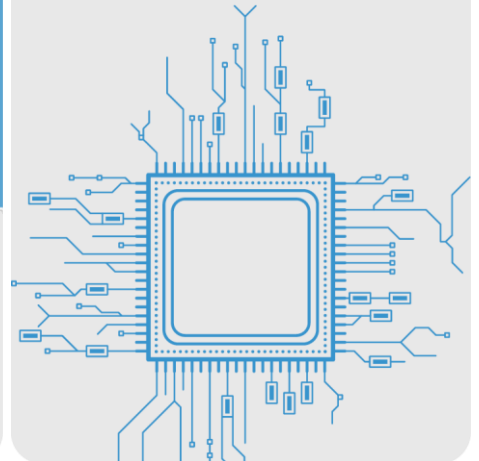
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**AVIONIC &  
INDUSTRIAL LINECARD**

available here

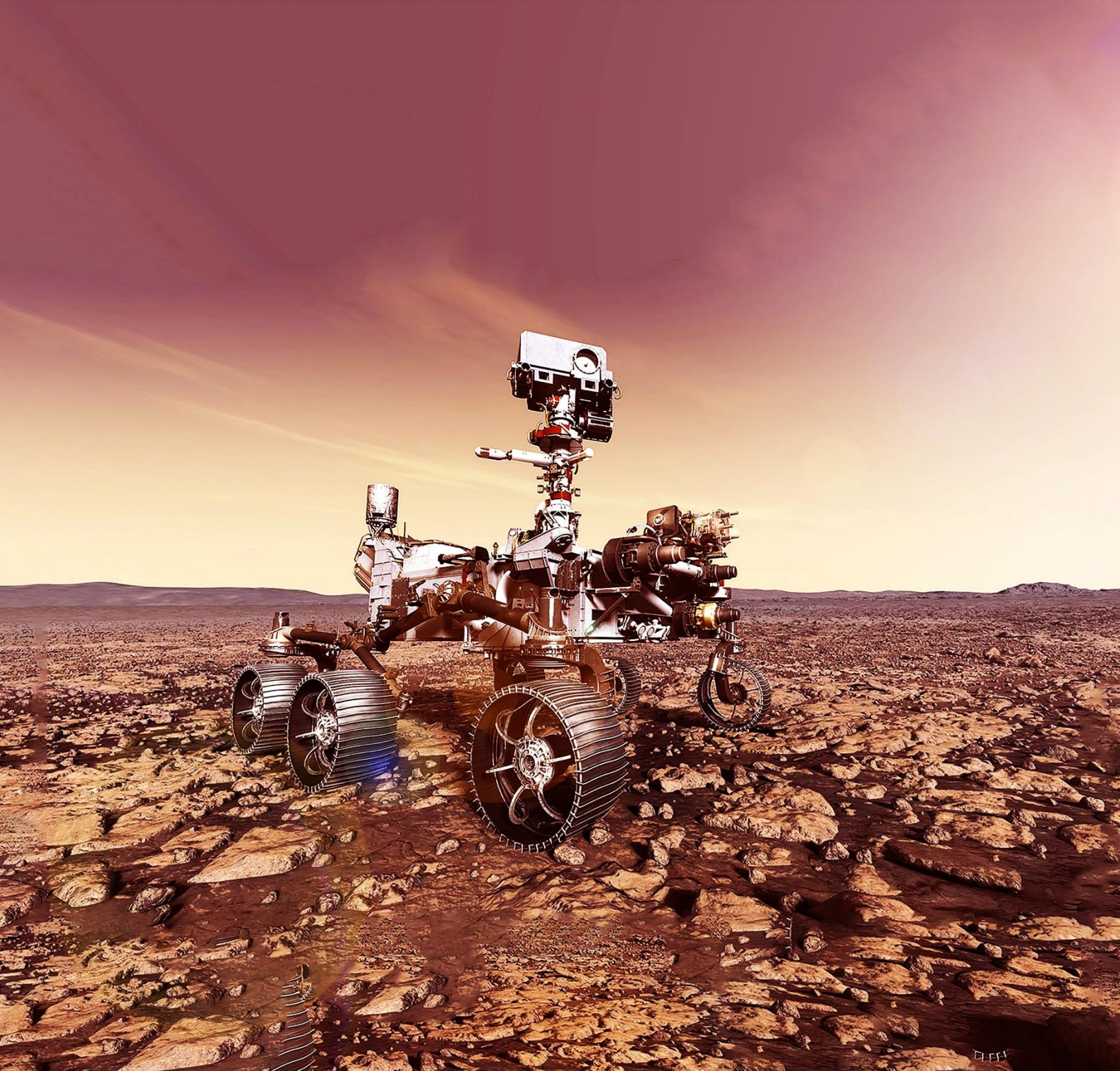
[WWW.PROTEC-SEMI.COM](http://WWW.PROTEC-SEMI.COM)



**HISTORICAL BRAND NAMES OF SUPPLIERS**

following Brands are still known, either sold or renamed, we might be able to help you





# Protec GmbH

*High-Rel Electronic Components*

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