



*Europe's Leading
Distributor for
HighRel Components*

Space Linecard

50 Years
HighRel

 **Protec**
HighRel Components

Rev. 2.2 / Mai 2026

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 oriented warehouse, equipped with a modern ESD protection system, guarantees reliable component supply.

With our design-in and market oriented 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.



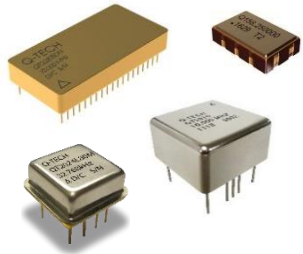
	DACH			Nordic				BeNeLux														
	Germany	Austria	Switzerland	Denmark	Sweden	Norway	Finland	France	Italy	Spain	Portugal	Greece	UK & Ireland	Belgium	Luxembourg	The Netherlands	Czech Republic	Hungary	Poland	Romania	Israel	Turkey
Infineon / IR HighRel	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Renesas / Intersil	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Avalanche Techn.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Q-Tech	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Semicoa (OSI)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Axtal	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
NanoXplore	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
VPT	•	•	•																			
VPT Components	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Smiths Canada	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
FLUX	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
BAE Systems	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Honeywell	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Macom	•	•	•			•		•		•		•	•		•							
Skyworks DS	•	•	•	•	•	•	•										•	•	•	•		
AEM Inc.	•	•	•	•	•	•	•	•		•	•			•	•	•	•	•	•	•		
Arquimea	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
VMI / CalRamic	•	•									•	•			•	•	•	•	•	•	•	•
TAS DPC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
GSI Technology	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Weeroc	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ZES	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SSSI	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
BEAMIDE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Magics	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Vorago	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

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

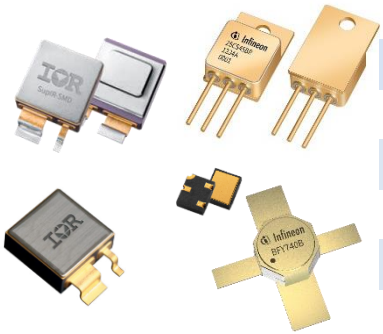
We support customers and manufacturers with our expertise in:

- 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.



XO	CMOS, TTL, LVDS, LVPECL	Single & Multiple Outputs
TCXO	HCMOS, Sine	±0,5ppm
VCXO	HCMOS, Sine	
OCXO	CMOS, Sine	±10ppb
SAW	Sine 400MHz to 1,3GHz - low phase noise	300krad
MCXO	CMOS or Sine 5 to 80MHz 1pps	50krad
New Space XO	QT780, QT723 and QT735 Series	50krad



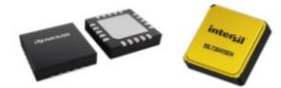
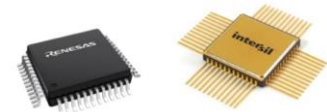
N-channel MosFet	Single, Dual or Quad / 30V to 600V	100-500krad
P-channel MosFet	Single, Dual or Quad -30V to -200V	100-600krad
Diodes	Schottky, ultra fast Rectifiers	
Power ICs	MosFET Driver	100krad / 82MeV
Solid State Relays		100krad
RF Diodes		ESA QPL Parts
RF Transistors	8GHz to 42GHz	ESA QPL Parts



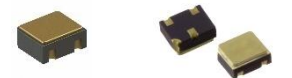
DCDC Converters	1.5W, 6W, 15W, 30W, 100W - Single & Dual	up to 100krad / 85MeV
POL	$I_{out} = 6-15A$ $V_{in} = 3 \text{ to } 7V$ $V_{out} = 0.8 \text{ to } 5V$	up to 100krad / 85MeV
GaN Converter	400W $V_{in} = 100V \text{ or } 120V$	100krad / 85MeV
RF Receiver Power	SLNP17-100CQ, Low-Noise, Quad-Output	100krad



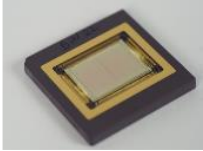
Analog Switches / Buffers	CMOS analog Switches, SPDT, DSPT	HDR 300krad / LDR 50krad / SEE Free / Class V
Current Sense Amplifiers	V_{in} 2.7 to 40V	HDR 100krad / LDR up to 75krad / Class P and V
Current Sources	V_{in} 3 to 40V / I_{out} 1mA or 0.1mA	HDR 100krad / LDR 75krad / 85MeV / Class V
Multiplexers	32:1 or 16:1 or 8:1 / V_{in} 3 to 5.5V different V_{in} versions available	HDR 100krad / LDR 75 krad / 86.4 MeV / Class V
OpAmps	Many options available	HDR 300krad / LDR 75 krad / 86.4 MeV / Class V
Temperature Sensors	V_{in} 3 to 33V / 1.5mW / accuracy -0.05°C	HDR 300krad / LDR 50 krad / 86.4 MeV / Class V
Transistor Arrays	NPN and PNP versions	HDR 100krad / LDR 50 krad / Class V
Voltage References	Many options available 2.048 to 10V / Accuracy $\pm 0.15\%$	HDR 100krad / LDR 50 krad / 86 MeV / Class V
Data Converters (ADC & DAC)	ADC SAR 1-8 Channels / 14 Bit / 900 to 1000 kSPS	LDR 75 krad / 86 MeV / Class Ve
LDOs & POLs	LDOs: I_{out} 1A to 3A versions POLs: I_{out} 1A to 22A versions	HDR 300krad / LDR 75 krad / 87.4 MeV / Class V
Switching Controllers	V_{in} 4.5 to 30V / Switching 2kHz to 3MHz / Single- and Multiphase	HDR 300krad / LDR 75 krad / 89.1 MeV / Class V
MosFET Drivers	Full Bridge, Half Bridge, Low Side, Inverting, Non Inverting, Sync	HDR 300krad / LDR 50 krad / 90.9 MeV / Class V
Supervisors	Many options available	HDR 100krad / LDR 50 krad / 86 MeV / Class V
Power Timing	V_{in} 3 to 18V / 4 Clock outputs / I^2C / 25kHz to 48MHz	LDR 75 krad / 86 MeV / Class Ve
Power Sequencing	V_{in} 3 to 13.2V / controls up to 4 Supplies	HDR 100krad / LDR 75 krad / 86 MeV / Class V
Source Drivers	Many options available	HDR 100krad / LDR 75 krad / 86 MeV / Class V
Protection Switches	NMOS and PMOS Versions / 10A	HDR 100krad / LDR 75 krad / 86 MeV / Class V
GaN Fet Driver	R_{on} 7.5m Ω / V_{in} 4.5 to 13.2V / Regulated Gate Drive 4.5V	LDR 75 krad / 86 MeV / PEMS
Digital Isolators	High Impedance and Passive versions up to 150Mbps	LDR 75 krad / 86 MeV / PEMS
Interfaces	CAN / RS422 / RS 485	HDR 300krad / LDR 75 krad / 89.1 MeV / Class V



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



NanoXplore

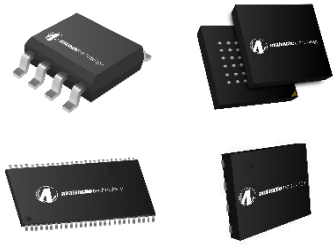


NG-Medium	SpW & DDR 2 PHY	34KLUT
NG-Ultra	Quadcore ARM R52 @ 600MHz / 32 HSSL @ 12.5 Gbps / SpW & DDR 3&4 PHY	500KLUT
NG-Ultra300	16 HSSL @ 12.5 Gbps / SpW & DDR 3&4 PHY / Embedded ADCs & DACs	290KLUT



avalanche technology

Parallel x32 (Gen 3)	1Gb / 4Gb	75/300krad
Serial D-QSPI (Gen 3)	1Gb / 2Gb / 4Gb / 8Gb	75/300krad
Serial QSPI (Gen 1)	4Mb / 8Mb	75/300krad
Serial (Gen 2)	16Mb	75/300krad
Parallel x16 (Gen 2)	16MB / 32Mb / 64Mb	75/300krad



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



Chokes	ESA Technology Flow Qualified	Custom & Standard
Transformers	ESA Technology Flow Qualified	Custom & Standard
Inductors	ESA Technology Flow Qualified	Custom & Standard



Nano D and More	Rugged Nano-D and many more Connectors for HighRel Applications
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®)



Transistors	NPN and PNP Small Single and Power BJTs
Diodes	Zener, TC Zener, Schottky, Ultra Fast, Rectifier



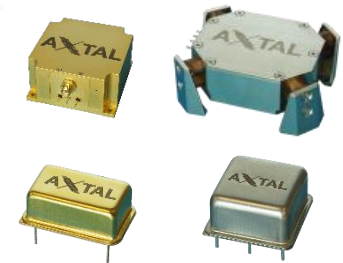
up to JANSR/F
up to JANS



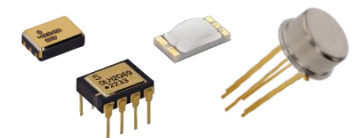
OCXO	±0,005ppm / Ultra Low Noise
TCXO	±0,5ppm
VCXO	±5ppm / Low Noise
SAW Oscillator	±350ppm
Quartz Filter	±1ppm
PRECISION CRYSTALS	SC, IT & AT-cut crystals for instrumentation , defense, space & other markets



10MHz to 150MHz
1MHz to 2,5GHz
1MHz to 1,5GHz
500MHz to 1,6GHz
10MHz to 100MHz
Compliant to ESCC3501



Optocouplers	Many different types available like (OLS049 or OLS249) acc. to MILPRF19500 or MILPRF38534
RF Diodes	PIN, Schottky, Varactor, Limiter
SPDT	SPDT and ST4T
RF Amplifiers LNA	Small QFM Packages 2x2mm
Other RF parts	Combined LNA with switch in one package, Gain Blocks



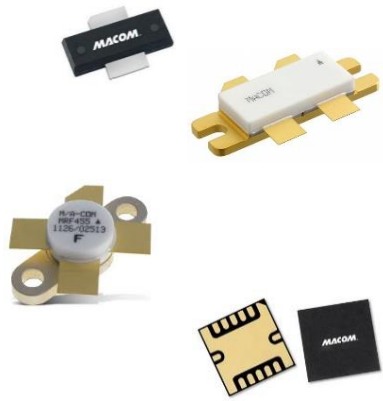
ZES

ZERO-ERROR SYSTEMS

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



Partners from RF to Light

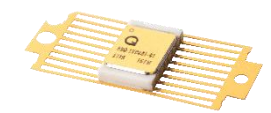


RF - Amplifiers	Gain Blocks, Low Noise, RF Power, Linear, Transimpedance	
RF - Attenuators	Digital, Fixed, Voltage Variable	
RF - Capacitors	Beam Lead, Binary Chip, Bypass, HighQ, MNS, MNOS	
RF - Couplers	Hybrid, Stripline, Broadband	
RF - Diodes	PIN, Step Recovery, Schottky, Varactor Tuning	
RF - Filters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

ARQUIMEA

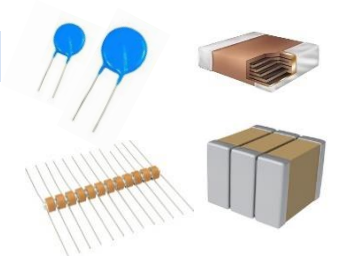


LVDS	EPPL → Quad Driver / Receiver and Dual Transceiver	
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CALRAMIC TECHNOLOGIES LLC

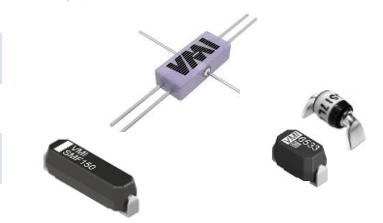
High Voltage Disc	3kV to 20kV / MIL-PRF-49467 Option	X7R / X5R / X5U / Z5U / NPO
High Voltage Multilayer	500V to 10kV / MIL-PRF-49467 Option	X7R / NPO



VMI VOLTAGE MULTIPLIERS INC.



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



dpc Digital Programmable Controller



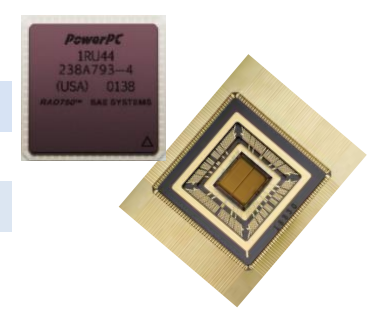
DPC G1	16bit openMSP430 – Digital Programmable Controller >60krad / SEL >72.2MeV / SEU >40MeV / 16 ADCs / 3DAC / 108 IO / PLL / PWM / Low Power 3x 30MIPS / MIL-1553 / CAN / UART / -55 to 125°C	μController
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BAE SYSTEMS INSPIRED WORK



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



smiths interconnect



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




Photodetector Read-Out	Series of 5 Chips, for LIDAR, Scientific Instrumentation and Mixed Signal Readout with ADC and TDC	
Dual E-Circuit Breaker & Current Limiter Controller	Programmable and fail-safe power control on rail from 20V to 130V with a current limitation up to 12A	

EPSON



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

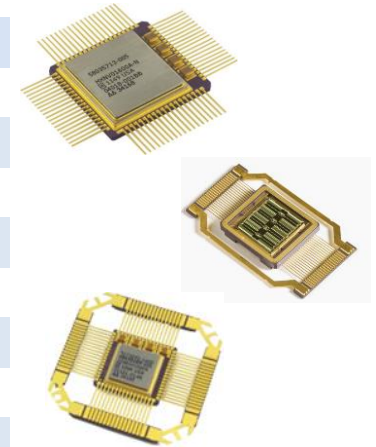



SRAM also RadTolerant	SigmaQuad-II+ (x18 / x32 configuration) 350 MHz	288M / 144M / 72M
SRAM also RadTolerant	SyncBurst & NBT (x18 / x32 configuration) 333 MHz	144M / 72M / 36M
APU	High Speed Paralell Computing for SAR, Imaging and AI Applications	

Honeywell



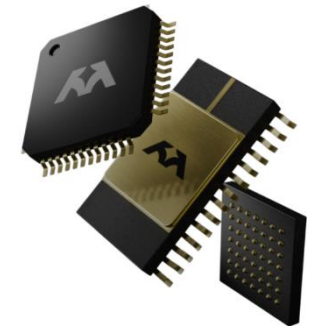
SRAM	QML-Q and V (x8 or x32 configurations)	256k to 64M
MRAM	QML-Q and V (x8 or x16 configuration)	16M / 1M
SER/DES	1-4 Lines or 1-8 Lines	up to 3,125GB/s
RS422	Quad Driver and Receiver	20Mb/s
LVDS	Quad Driver and Receiver	100MHz
Processors	HX1750 & HXRHPPC Microprocessor	
Logic	Quad 2-input NAND	
ADC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



MAGICS



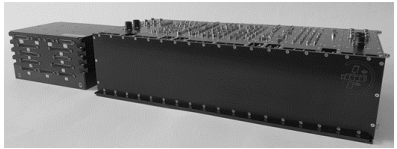
PLL	1 MHz – 5 GHz - Phase noise of -120 dBc/H - 300mW	TID 100krad / SEE 62.5MeV
Time-to-Digital	Resolution < 8ps - Zero dead-zone - 1.2V core / 1.8-3.3V IO / 20mW	TID 100krad / SEE 62.5MeV
TIA (Trans-Impedance Amplifier)	10-100 kΩ AC gain control - 3-30 MHz AC pass band	TID 100krad / SEE 62.5MeV



VA7 Family	Dual 1.5 GHz Arm® Cortex®-A72 Core, 1st edge computing MPU with integrated 3D GPU, PCIe, USB 3.0, and SATA, 6 total Ethernet Interfaces up to 2.5Gbps, 4-port TSN switch, Arm® TrustZone® and Secure Boot	Target ≥ 100 krad(Si) LDR Target: >60 (MeVcm ²)/mg @
VA5 Family	Dual-core Arm® Cortex®-M55 Microcontroller, 256kB NVM, 512kB on-chip double word SRAM, 128kB on-chip byte SRAM, EDAC & scrub engine for error resilience	Rad-Hard and Rad-Tolerant options
VA5 Family	8 Rad-Hard and Rad-Tolerant options, 256kB program, 64kB data memory, 256kB NVM, 8-Ch. ADC, 2-Ch. DAC, Ethernet, SpaceWire	Radiation Hardness Assurance (RHA) level of 100 kRad(Si)



New Space Systems & Board Level Products:



Crypto for Constellations	Full Red/Black Separation - For Platform and Payload (up to 10Gbps)	AES 256 GCM Encryption – Over the Air Rekeying
Satellite Core Avionic	CCSDS / IO + Platform Memory / OBC	
Onboard AI Image Classification Algorithm	Multi-Object detection algorithms available - Average image scan duration 0.4 sec - Training database with currently 25,000 images available	16U CubeSats up to small satellites and constellations 9W average power consumption



F-Series Gen3
CCSDS Crypto
Modules



F-Series OBCs are strictly
modular with internal
SpaceWire module
interconnects



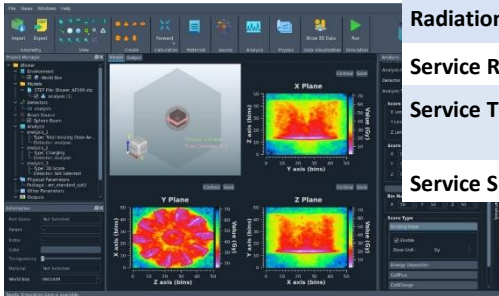
I/O-Router Modules
Spw, RS422,
RS485, GPIO



CPU Modules
LEON 3 / 4
SpW, CAN, RS422



Software & Services:



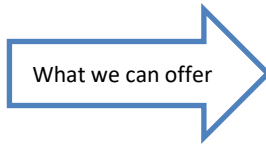
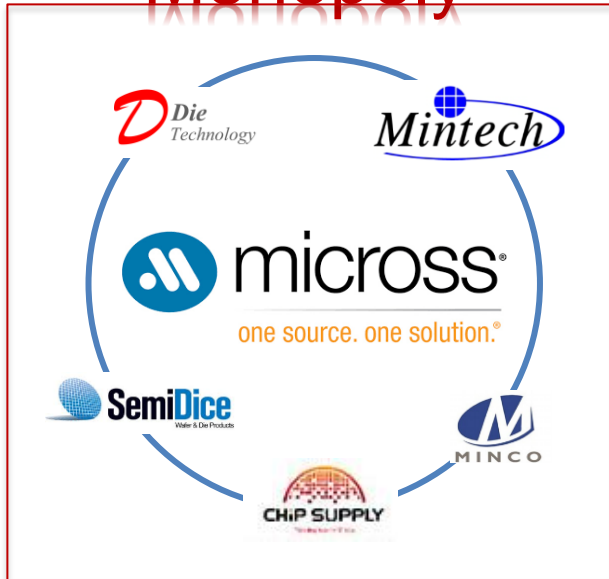
Radiation Simulation Software	MRADSIM SPACE, DOSE, CONVERTER PRO
Service RHA Testing	Heavy Ion / Proton / Co60 / Neutrons / ATOX
Service TVAC	-70/+180°C and down to a vacuum pressure of 10 ⁻⁷ mbar, humidity testing from +10 to +95°C & humidity between 10% and 98%, along with other thermal tests with temperature ranges up to -200/+200°C
Service Simulation	Radiation Simulation based on your Model



Service Provider	Final Source Inspection or Pre-Cap Inspection	To combine with PO
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Chip & Die Supplier for Hybrids

Monopoly



And many more, just ask us about your needs for Chips / Die and we will get you a competitive Quote

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Francesco Antonacchio

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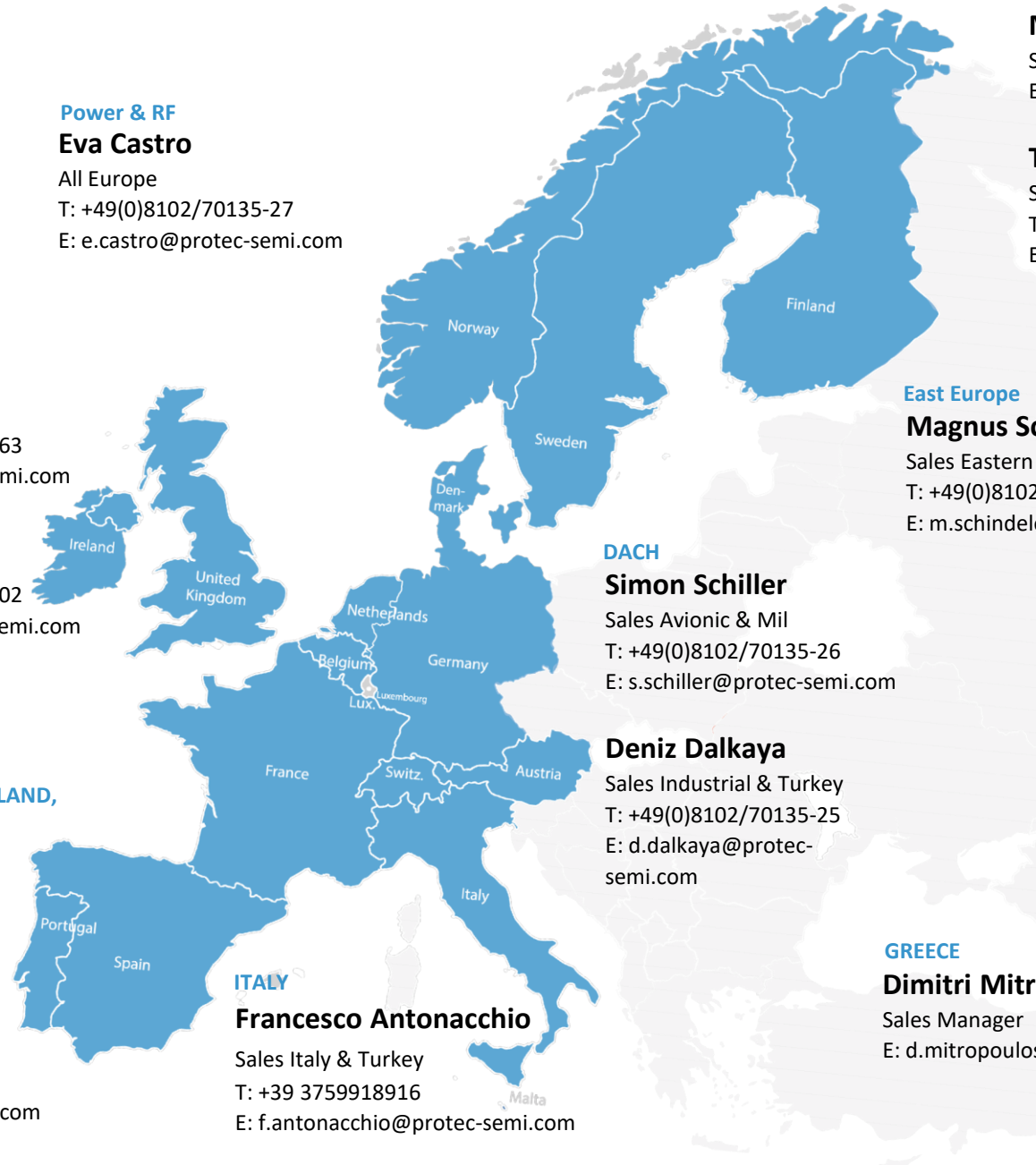
E: f.antonacchio@protec-semi.com

GREECE

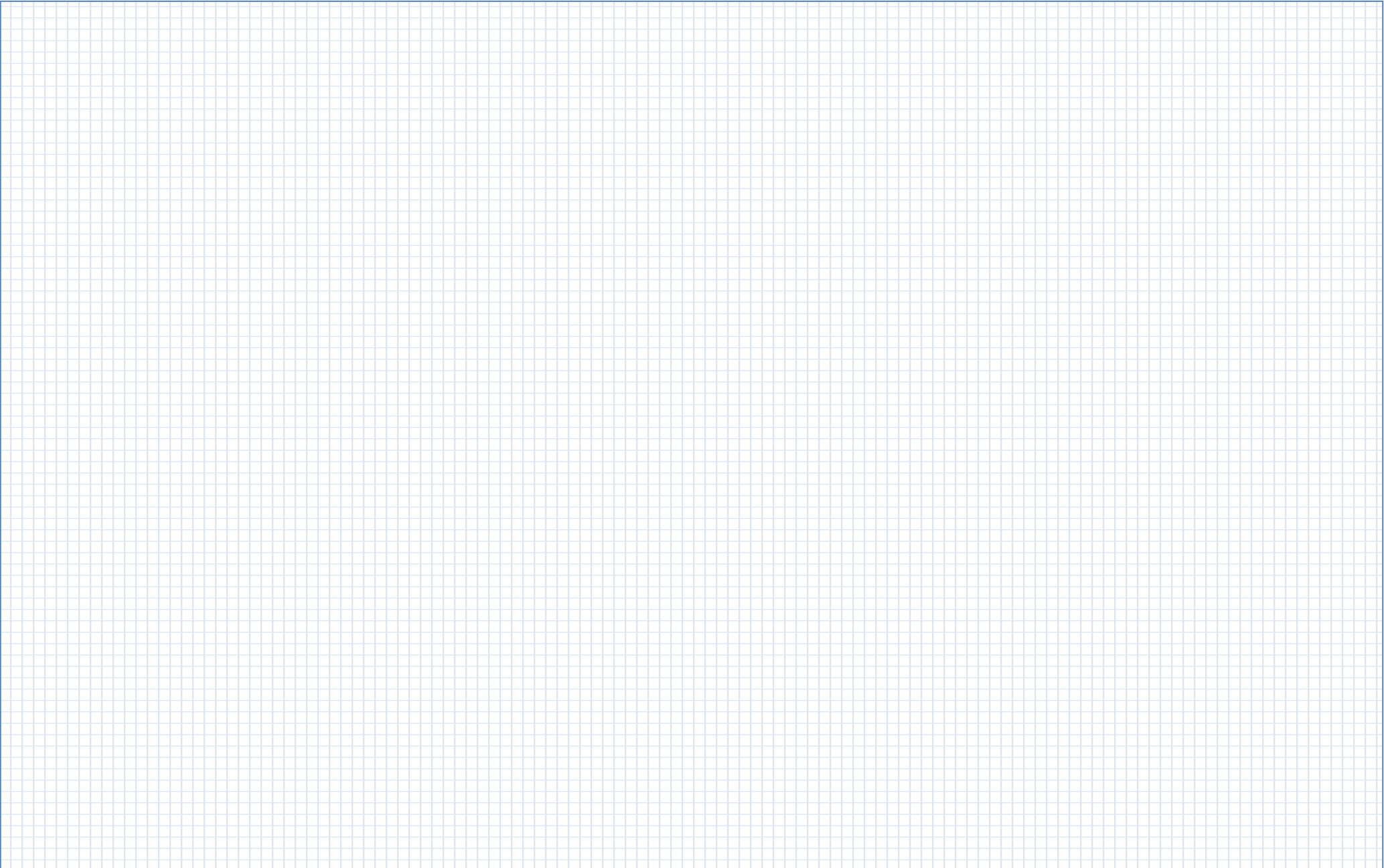
Dimitri Mitropoulos

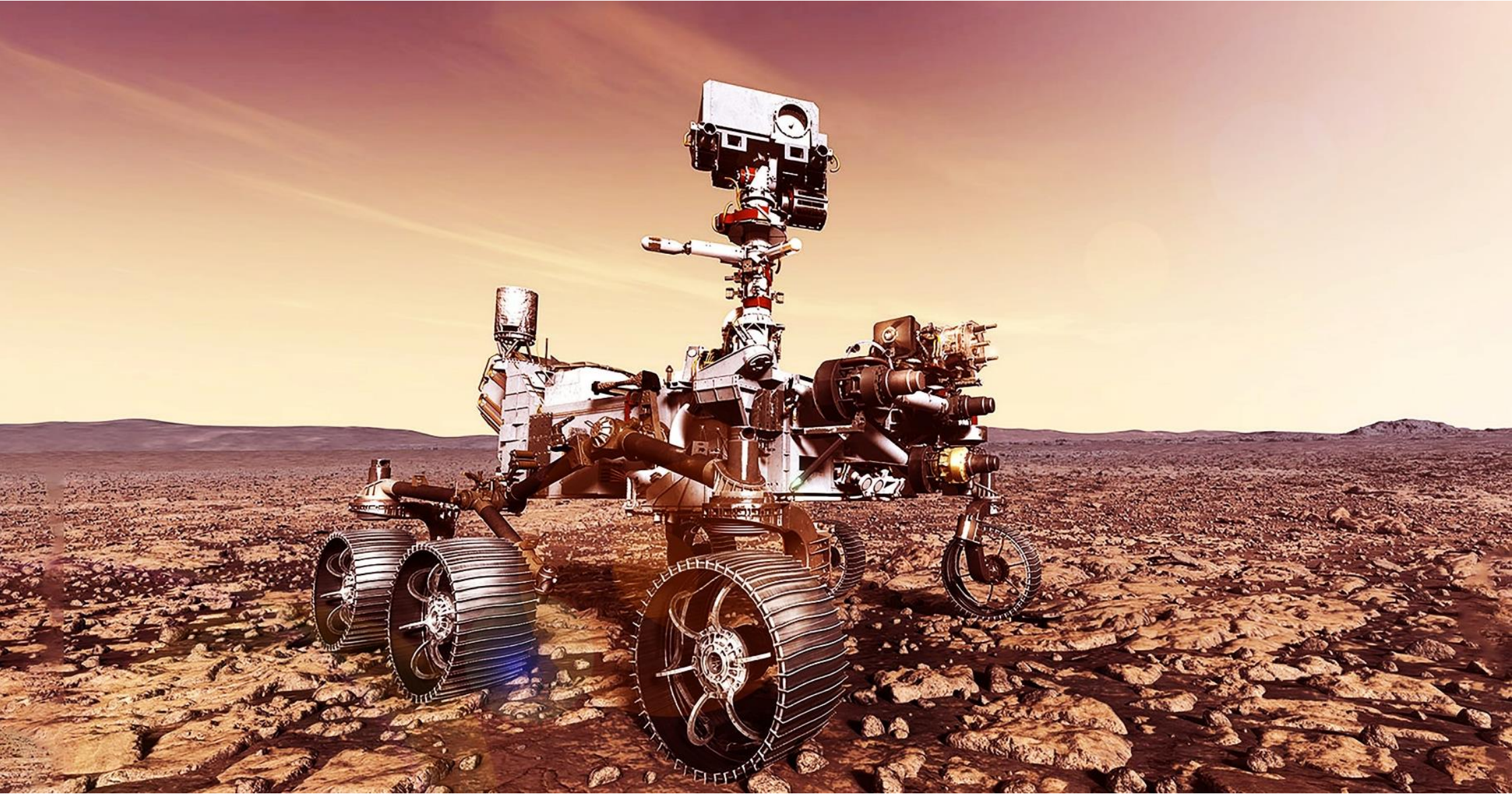
Sales Manager

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Space for your Notes:

A large rectangular area filled with a light blue grid pattern, intended for taking notes.



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