TRIDENT SYSTEMS’ 
MULTIFUNCTION RF ELECTRONICS UNIT (MFREU)

Built around Trident’s Space Qualifiable Digital Radar Transceiver and our mature RAPTOR digital RF architecture, the MFREU provides a complete solution for flexible high-bandwidth programmable RF system needs in space, enabling rapid implementation of radar and other advanced programmable multifunction RF capabilities in a compact form factor.

Highly Integrated.
The MFREU combines Trident’s SQDRT and a high-performance general purpose processor with supporting telemetry and is based on our powerful, flexible RAPTOR architecture. The MFREU provides programmability over all key RF features in a very small size, weight, and power footprint. SpaceVPX compatibility provides modularity and simplifies integration of peripherals and additional capability.

Highly Reliable.
A Single Event Effects aware FPGA architecture, coupled with radiation-tolerant components and a robust mechanical design, provide a high-reliability platform for operation in harsh orbital and interplanetary environments.
Programmable radar features:
- On-orbit re-programmability
- Waveform (pulse-to-pulse)
- Pulse length & chirp rate
- Pulse repetition interval
- Range gates position and size
- Block adaptive quantization

Multifunction Reconfigurability:
- Multiple FPGA boot load options
- Dynamically reconfigurable
- On-orbit re-programmability

Specifications:
Number of Channels 1 Transmit, 2 Simultaneous Receive
Digital Converters 12 bits transmit, 12 bits receive; synchronization across multiple transceivers
Sample Clock Range programmable up to 3.2 Gsamples/sec
Instantaneous BW programmable up to 800MHz
FPGA Xilinx Virtex-5QV
Power < 85W (FPGA mode & duty cycle dependent; flexible low-power/standby modes)
Weight < 13kg
Shock/Vibration packaging, materials, construction per NASA and DoD test methods
Temperature -20° C to +40 °C Operation (at thermal interface)
Memory 1Gbyte SDRAM, 16MB QDR II+ SRAM (with EDAC)
Form Factor 10.7” x 10.7” (baseplate dimensions), 5.5” height
Radiation tolerance All components selected for high latchup immunity and total dose
Fault Tolerance TMR program flow
Parts/Materials/Processes Exceeds requirements for targeted missions; contact Trident for details
Base Transceiver Card Trident Space Qualifiable Digital RF Transceiver (SQDRT)
Expansion Slot OpenVPX Specification, SRI0 and SpaceWire connectivity, accepts SQDRT card
Telemetry Dedicated card collects and manages both in-chassis and external telemetry data
System Controller PowerQUICC III based system controller with 512MB onboard DDR1 memory

Interfaces:
High-speed data Serial RapidIO
Control & low-speed data Dual-Redundant SpaceWire Interfaces
General Purpose I/O LVTTL and LVDS
RF 50 ohm single ended
Reference & Sample Clocks Internal or External
Backplane Interface SpaceVPX/OpenVPX per VITA 78/65
Power 28VDC

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