

# Data Device Corporation



## SCS3740 Rad Hard SBC and Next Gen SBC using the GR740

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December 15<sup>th</sup>, 2022 GR740 User day



Your Solution Provider for... Connectivity, Power, and Control

## **Component and SBC Roadmaps**

**Volatile and Non-Volatile memory applicable to GR740/GR765**

**Existing SCS3740 using the GR740**

**Fully qualified, shipping flight boards now**

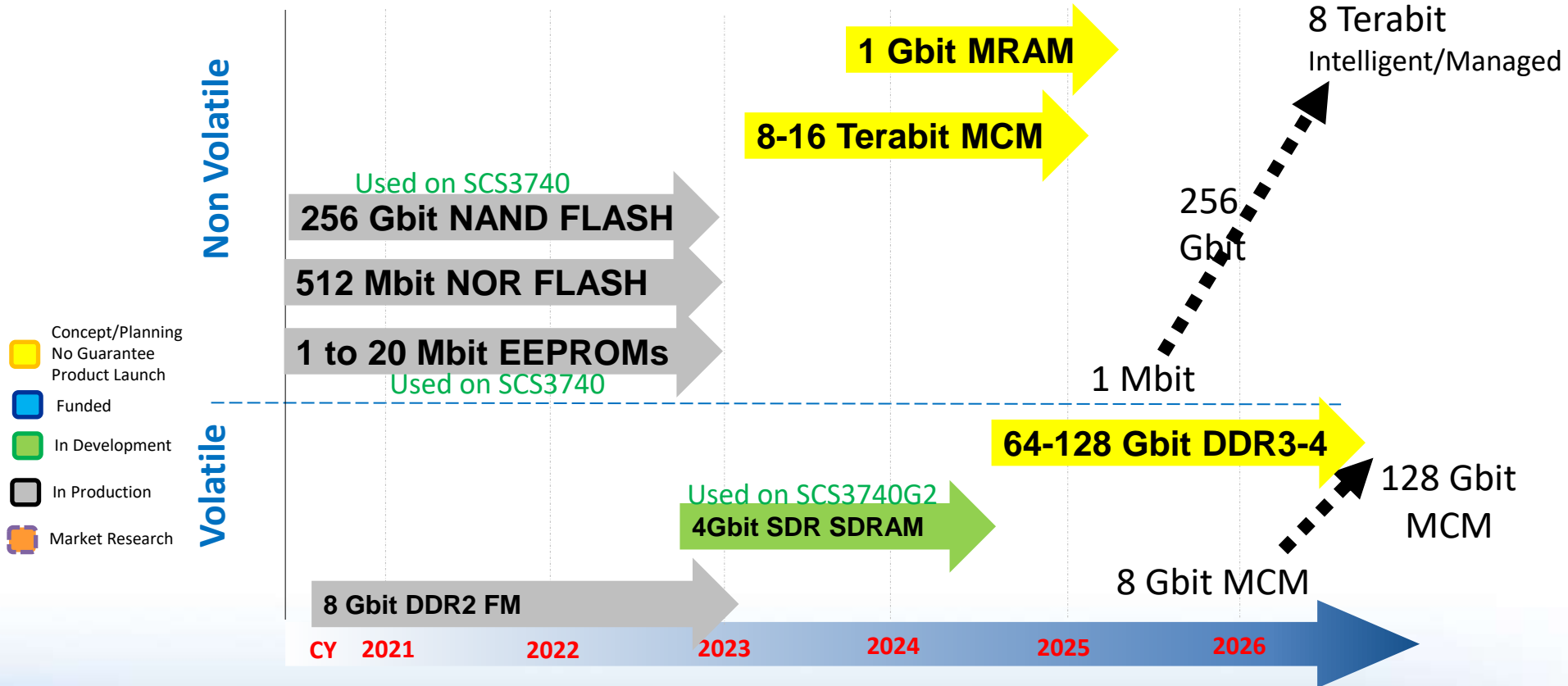
**GR740 Technical challenges**

**SCS3740G2 (RT and RH)**

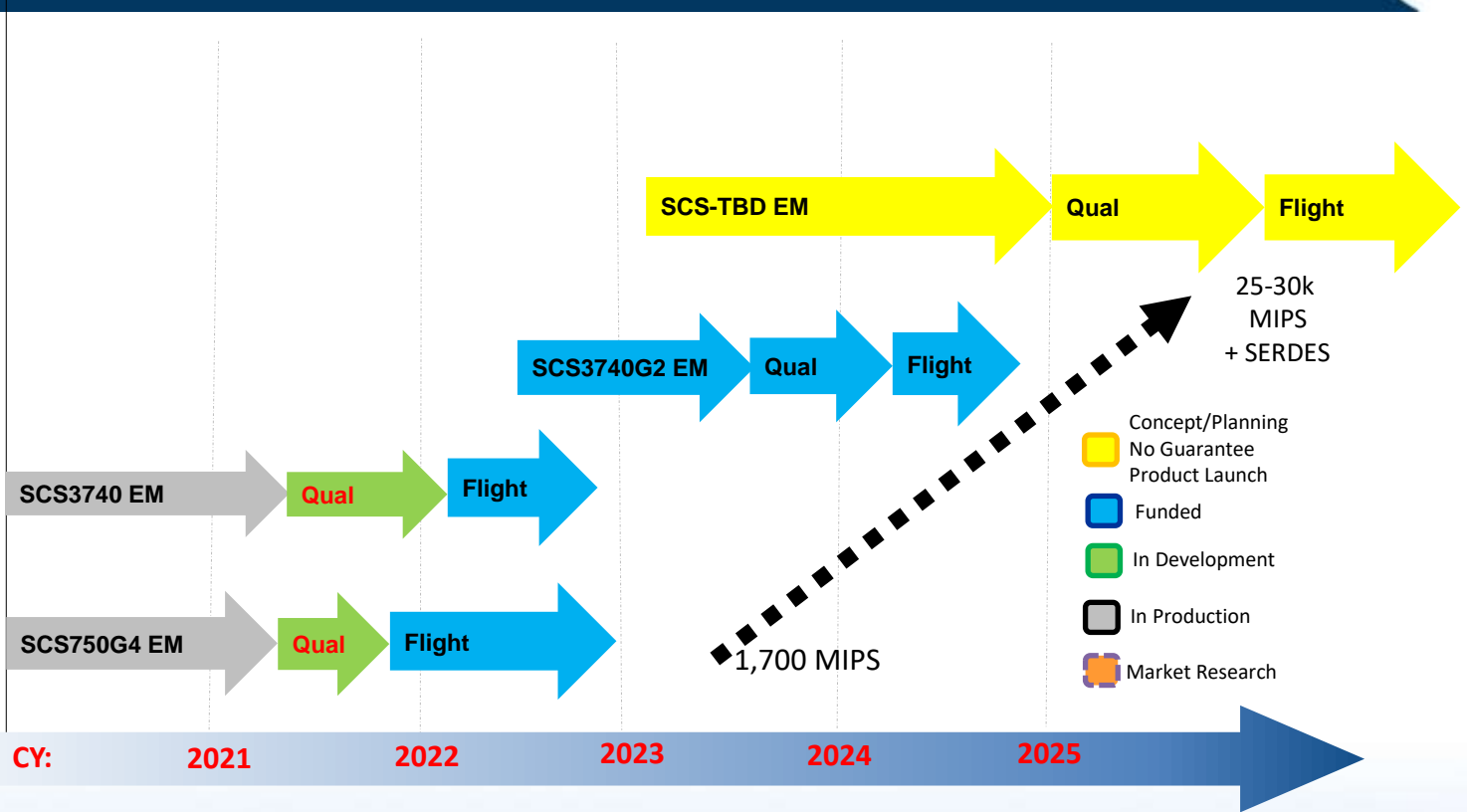
**In Development, with engineering boards Q3/2023**

**FM SBC's available in Q4/2024**

# DDC Space Business Unit Memory Component Roadmap



# Space Business Unit Board Product Roadmap



# New 84SD12832 – 4Gbit SDR SDRAM MCM



## 4Gbit SDR (Single Data Rate) SDRAM

- Up to 100MHz Single Data rate SDRAM
- 16 or 32 bit wide data bus, ceramic/hermetic package
- Excellent package signal integrity/power integrity
  - Makes board level design easier and improve Worst case analysis
- Compatible with many processors/FPGA's
  - DDC is using these SDRAM's on the SCS3740 and next gen SCS3740G2
  - 3.3V I/O for FPGA, GR740 processor compatibility
- Future: Other densities/bus widths – contact DDC



1.2" x 0.9" package  
For existing 72SD3232 (1Gbit)  
And for new 84SD12832 (4Gbit)

## Radiation Tolerance

- >100krad (bare die before package shielding)
- SEL >80.6 MeV·cm<sup>2</sup>/mg @ 85C
- Rare SEFI's were easily cleared with MRS (mode register set)

## Availability:

Engineering	Q4-2023
Flight	Q4-2024

## Up to 8Gbit DDR2 SDRAM

- Ceramic/Hermetic Solution (CCGA Package)
- Up to 800M Data rate SDRAM
- Bus widths of 8, 16, 32, 40, 48, 64 and 80
- Excellent package signal integrity/power integrity
  - Makes board level design easier and improve Worst case analysis
- Compatible with many processors/FPGA's
  - DDC is working on WCA/app note for RTG4 FPGA
- Future: DDR3/DDR4 – contact DDC



0.985" x 0.630" package  
For all densities/bus widths

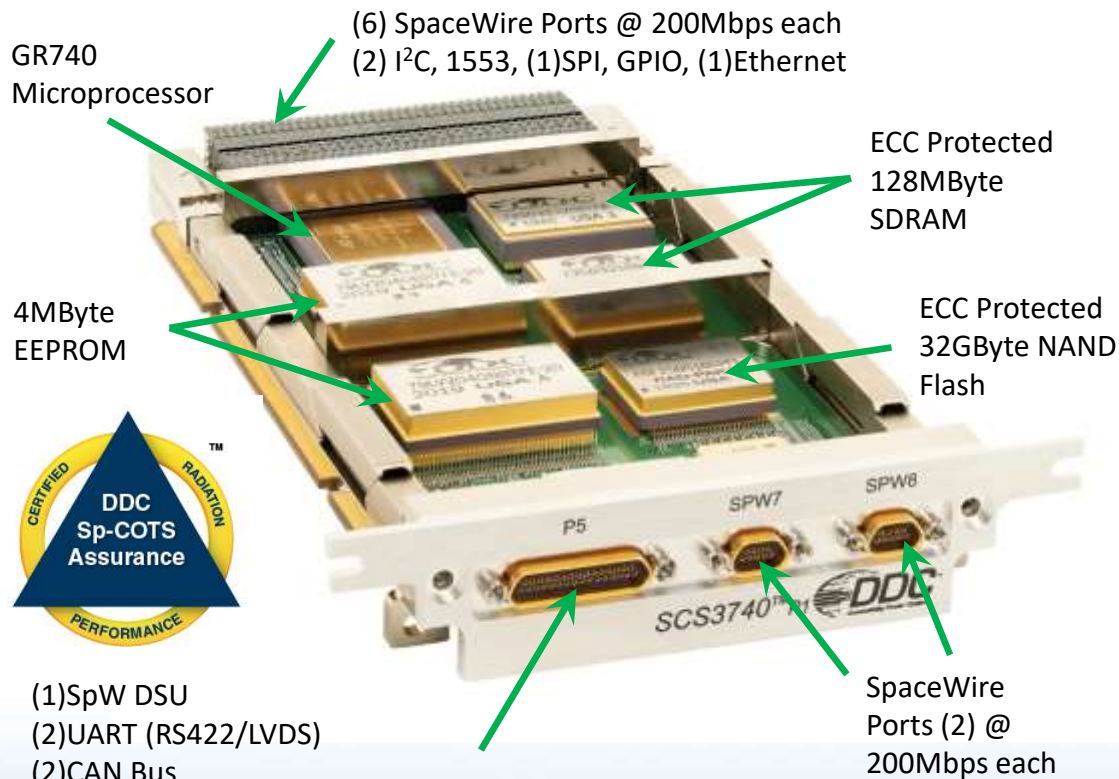
## Radiation Tolerance

- >100krad (bare die before package shielding)
- SEL >85.6 MeV·cm<sup>2</sup>/mg @ 125C
- Much better SEU/SEFI rates than DDR3 and DDR4 products (Rad report available upon request)

### Availability:

Engineering	NOW
Flight	NOW

# 3U Rad Hard Space VPX SCS3740



- GR740: Quad-Core LEON 4FT™
- 1700 Dhrystone MIPS
- 128MB ECC SDRAM
- 32GB ECC Flash
- 4MB EEPROM
- 1553\* (Requires external PHY)
- Debug via Ethernet, JTAG or SpW
- Weight: 550g
  
- Fully Qualified and shipping flight



- (1)SpW DSU
- (2)UART (RS422/LVDS)
- (2)CAN Bus
- Miscellaneous Status/Control

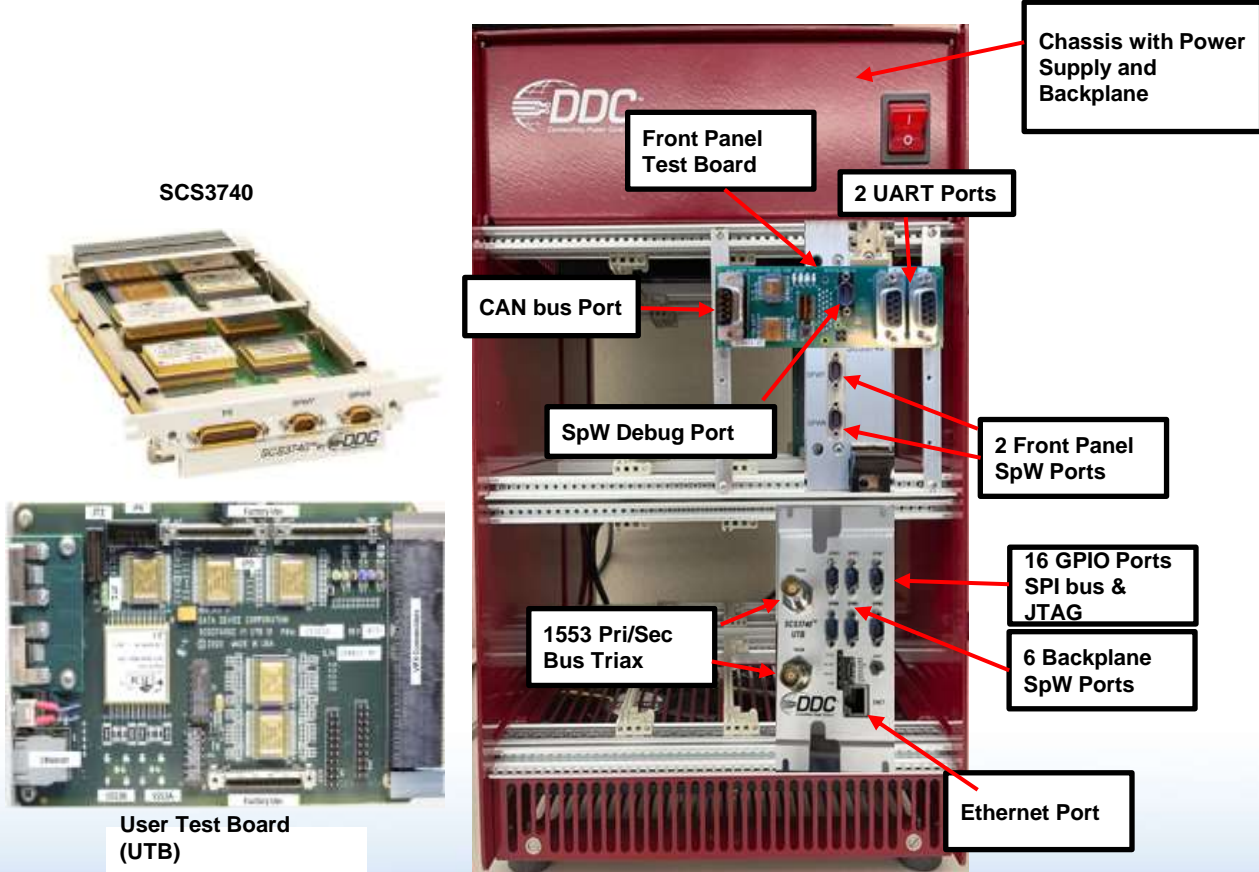
**Low Power - 5W typical, 3.3V only**

- 100 krad(Si) TID for entire SBC (orbit dependent)
- Uncorrectable upset rate better than 1 in 120 years (GEO)
  - Existing and next gen SCS3740G2 will both have industry leading upset rates
- GR740 LEON 4FT™ Processor
  - STMicro C65SPACE RHBD Library – 300Krad(Si), SEL immune
  - Architecture implements combination of RHBD FFs, TMR, Parity and ECC
- Memory ECC:
  - Reed Solomon SDRAM error correction (multi-nibble correction)
  - NAND Flash advanced BCH correction (16 bit correction)
- Rad Hard Microchip RTAX FPGA
- Rad Hard POL, Clocks, etc.





# SCS3740 & SCS3740DK6-CBUF Software Development Kit



- **GR740 – Ethernet timing (125Mhz) – unable to support GbE**

Name	Parameter	Reference edge	Min	Max	Unit
$t_{ETH0GMII}$	transmitter clock to output delay	rising (GMII) clock edge	1.5	10.5	ns

- **GR740 to SDRAM timing – unable to support 100MHz even with 2T Signaling**

Name	Parameter	Reference edge	Min	Max	Unit
$t_{SDRAM0}$	clock to output delay	rising mem_clk_in edge	2.5	12.0	ns
$t_{SDRAM1}$	clock to data output delay	rising mem_clk_in edge	2.5	12.0	ns

SCS3740G2 pinout and functionally compatible with Existing SCS3740

Increased SDRAM from 128MByte to 1GByte

Increased boot memory (non FLASH)

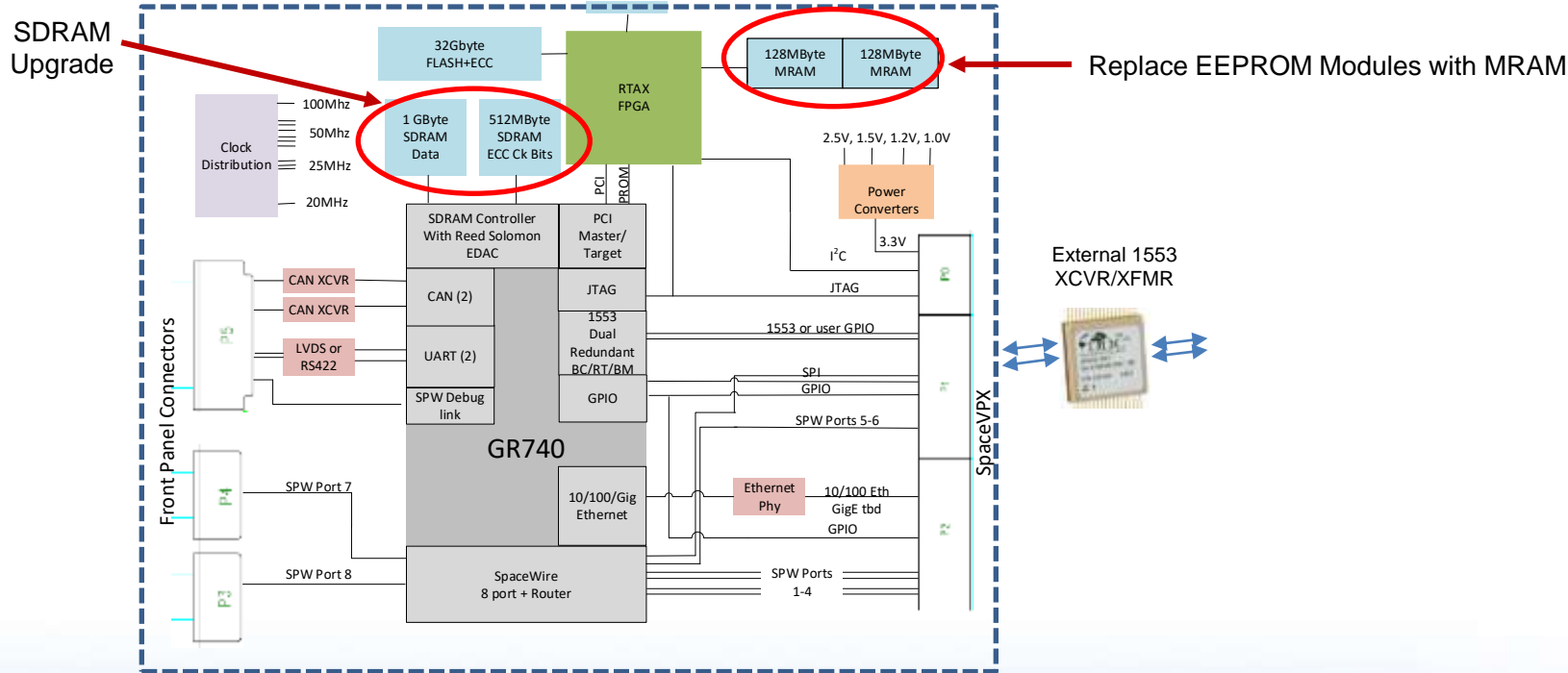
- SCS3740 currently is 4MByte EEPROM
- SCS3740G2 increased to 128MByte MRAM
- Includes redundant SuROM and OS images
- VxWorks 7 and Linux support (planned Q4 2023)

Higher Performance FLASH Memory

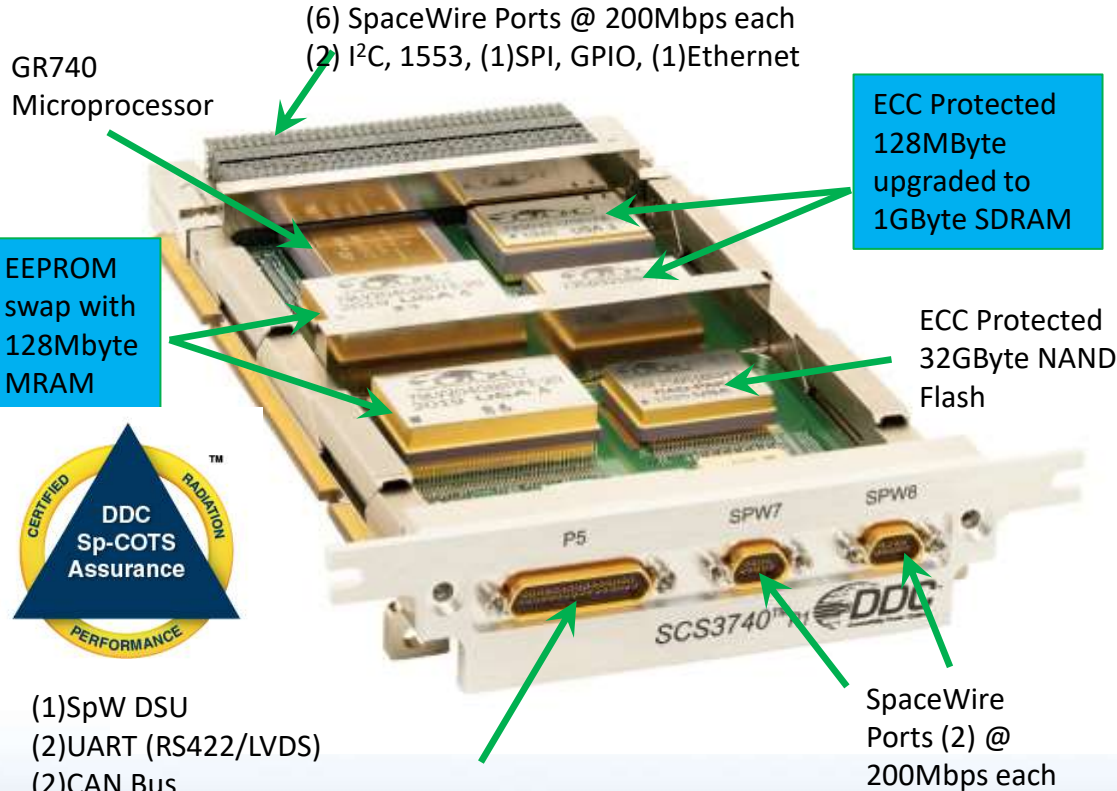
- Adding BCH Error Correction in hardware

SBC available in low cost RT (30krad) as well as RH (100krad)

# SCS3740G2 (In Development)



# 3U Space VPX SCS3740G2



EEPROM swap with 128Mbyte MRAM



- (1)SpW DSU
- (2)UART (RS422/LVDS)
- (2)CAN Bus
- Miscellaneous Status/Control

- Main changes:
  - Upgraded boot memory to 128Mbyte
  - Upgraded SDRAM to 1GByte
  - Increased flash file system speed
- New ordering options
  - RT lower cost option: 30krad
  - RH for 100krad
- Operating System Options:
  - VxWorks 7.0 (baseline)
  - Linux (planned)
- Easy upgrade from existing 3740R1
  - Same pinout/interfaces/arch.
  - 3740R1 available now
  - 3740G2 dev boards avail Q3-2023

Blue boxes designate SCS3740G2 changes from existing SCS3740R1 SBC