

ByteNexus | Space Data

Radiation Tolerant Terabytes for Space



1.1 Development Unit

Through SempreHalo, elevate your space missions to unparalleled heights with our space-rated terabyte memory storage solutions—engineered to defy the cosmos's harshest trials. Delivering up to 12TB of ultra-reliable, radiation-hardened NAND flash in a compact, vibration-resistant form factor, our modules ensure seamless data integrity amid extreme temperatures, cosmic rays, and zero-gravity chaos, powering everything from deep-space probes to orbital constellations with zero downtime and flawless performance. Trusted by NASA and leading aerospace innovators, this isn't just storage—it's your unbreakable digital vault for capturing the universe's secrets, mission after mission. Secure yours today and launch into the future without limits.

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- 1GHz quad-core 64-bit Arm Cortex-A53 CPU
 - 512MB SDRAM
 - 2.4GHz 802.11 b/g/n wireless LAN
 - Bluetooth 4.2, Bluetooth Low Energy (BLE), onboard antenna
 - Mini HDMI® port and micro-USB On-The-Go (OTG) port
 - microSD card slot
 - CSI-2 camera connector
 - HAT-compatible 40-pin header footprint (unpopulated)
 - H.264, MPEG-4 decode (1080p30); H.264 encode (1080p30)
 - OpenGL ES 1.1, 2.0 graphics
 - Micro USB power
 - Composite video and reset pins via solder test points
 - 65mm x 30mm
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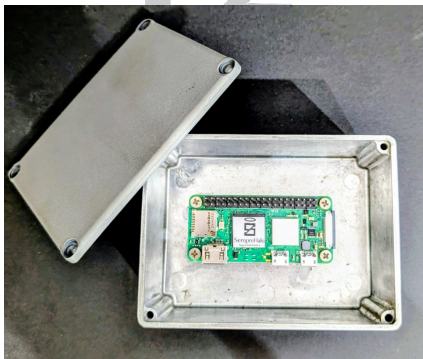


System Architecture

SoC	Broadcom BCM2710A1
Processor	1GHz quad-core 64-bit ARM Cortex-A53 CPU (Quad Core)
System-in-Package (SIP)	Transferrable for an FPGA (Engineering Costing)
Board Resources	- Watchdog (x2 SoC internal and x1 SoC external) - Temperature sensors - Voltage sensors
PMC (Graphics)	VideoCore IV GPU, supporting OpenGL ES 1.1 and 2.0 graphics, H.264 (1080p30 encode, 1080p60 decode), and MPEG-4 decode

Memory Resources

RAM	512MB LPDDR2 SDRAM
SD Card	1TB



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Terabytes (Solutions)

	4TB	8TB	12TB
SSD Series	X10	X10	X10
Interface	USB 3.2 Gen-2 2x2 (20Gb/s)	USB 3.2 Gen-2 2x2 (20Gb/s)	USB 3.2 Gen-2 2x2 (20Gb/s)
Speed and Timing (Sequential Read)	2100	2100	2100

Software

Operating System	- Linux OS - VxWorks RTOS
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Mechanical

Dimensions	- Lab Version: 4.31"D x 3"W x 1.75"H - GEO+ Version: 4.31"D x 3"W x 1.75"H
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Weight Air-Cooled	< 400gr [0.89 lbs.]
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Weight Conduction-Cooled	< 800 g [1.7 lbs.]
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Power

Input Power	Input voltage: 5V power supply, with 2.5A (12.5W)
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Power Consumption	Total power consumption depends on system configuration and expansion options. See I/O variants table for power consumption
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Environmental

Cooling Method	Air-Cooled		Conduction-Cooled ⁽¹⁾	
Board Type	Lab		GEO+	
Operating Temp.	Min.	Max.	-40°C (In vacuum) +65°C ⁽²⁾ (In vacuum)	
Non-Operating Temp.	0°C / +40°C		-62°C / +85°C	
Random vibration (G ² /Hz, (freq)) (3 axes)	N/A		Acceptance	Qualification
			0.005, (20Hz)	0.02, (20Hz)
			0.04, (150 Hz)	0.16, (150 Hz)
			0.04, (1000 Hz)	0.16, (1000 Hz)
			0.006, (2000Hz)	0.026, (2000Hz)
SRS shock G (duration)	N/A		Acceptance	Qualification
			100 Hz, 25G	100 Hz, 100G
			800 Hz, 750G	800 Hz, 3000G
			10K Hz, 1000G	10K Hz, 4000G
Altitude	15,000 feet		10 ⁻⁴ Torr	
Operating Max			10%-100%	
Relative Humidity	10-90%			
Conformal Coating	N/A		Urethane Silicone ⁽³⁾	
Part selection	Commercial		Unscreened, Level 1, 2, or 3 per NASA PEM-INST-001 and NASA EEE-INST-002 available	
Radiation tolerance (TID)	N/A		TID ≥ 100 krad (Si)	
Latch up immunity			SEL/SEE ≥ 67 MeV-cm ² /mg	

Notes:

- (1) Conduction-cooled per ANSI/VITA 30.1 - 2008 3U cPCI or VITA 78 and NESC-RP-21-01628 SpaceVPX mechanical format factor, Conduction-cooled PMCs per ANSI/VITA 20-2001 (R2005) and XM/C/PMC per VITA 78 and NESC-RP-21-01628, Space VPX
- (2) Operating card edge temperatures at module thermal management interface
- (3) Urethane is the default coating material. The customer needs to specify Silicone when ordering.

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