mercury systems®

TRRUST-Stor® VPX SRIO SpaceDrive (TRL-9)
Radiation-Tolerant Large Geometry 9 Gb/s, 440 GB SLC Solid State Drive

Models RH3440NM2S-000IP2-01 (EDU)
RH3440NM2S-000IP2-02 (FLT)

- **Innovative Mercury SpaceDrive NAND controller**

- **3U VPX form-factor**

- **Radiation-tolerant solid state storage**

- **440 GB large geometry SLC NAND**

- **ECC and spare mitigation for bit errors and failing devices**

Mercury's TRRUST-Stor series of radiation-tolerant solid state drives represent the world's first commercially available, customizable SSDs precision-engineered for the harshest operating environments on earth and beyond. Although designed for Space applications, these blazingly fast, high reliability drives are a perfect fit for applications with potential for radiation exposure, including high-altitude aircraft, airborne weapons and mission-critical ground computing systems.

The TRRUST-Stor RH3440 includes Mercury's advanced horizontal error correction algorithms paired with large geometry industrial-grade Single-Level Cell (SLC) NAND flash memory. Designed for fault-tolerance with multiple failed NAND flash devices, the RH3440 offers long-term data integrity for applications where device repair or replacement may be impossible. Recognizing that no two mission requirements are identical, power consumption, ECC, capacity and spare devices are tunable against performance to create the perfect set of features as required by each unique mission.

Standard Features

- Standard 3U VPX form factor: 160mm tall x 100mm x 25.4mm
- Performance:
  - Writes 1160 MB/s (9280 Mbps), Reads 1040 MB/s (8320 Mbps)
  - Options for lower power, lower speed operation
  - Time to fill entire SpaceDrive: 6.32 minutes
- VPX connectors:
  - Guide blocks have no keying
  - Smiths KVPX Series
    - 500 mate/unmated cycles
  - TE connectivity MultiGig RT 2-R Series
    - 500 mate/unmated cycles

- Operating mode: Linear and Host Addressable
  - Linear Mode: Sequential data recording (Data recorder mode)
  - Host Addressable: Random RW
- Capacity to host:
  - 440 GB. Host capacity remains constant over entire life
- Error correction:
  - Ultra strong horizontal Reed Solomon ECC algorithm
  - Corrects bit errors, defects and several failing devices
  - Extends NAND endurance
  - Automatically replaces worn out blocks with spare blocks
  - Correction for 6 bytes
- Bad block table:
  - Supports field upgrades
- Radiation-tolerant design:
  - RTG4-based NAND processor/controller
  - NAND flash: TID > 30K rad
  - All other devices: Radiation tolerant by design
- NAND endurance:
  - Minimum 60,000 drive over writes
  - Up to 15 drive over-writes/day for 7 years
  - 26 PB minimum
  - Minimum 3 month retention at EOL
- Reliability:
  - Microprocessor-free design, no software
  - Automatic block retirement
  - Abrupt power interruption protection
  - Corruption free design
  - UBER: Better than $1E^{-19}$
- Erase operation: < 30 seconds

Mercury Systems is a leading commercial provider of secure sensor and safety-critical processing subsystems. Optimized for customer and mission success, Mercury's solutions power a wide variety of critical defense and intelligence programs.

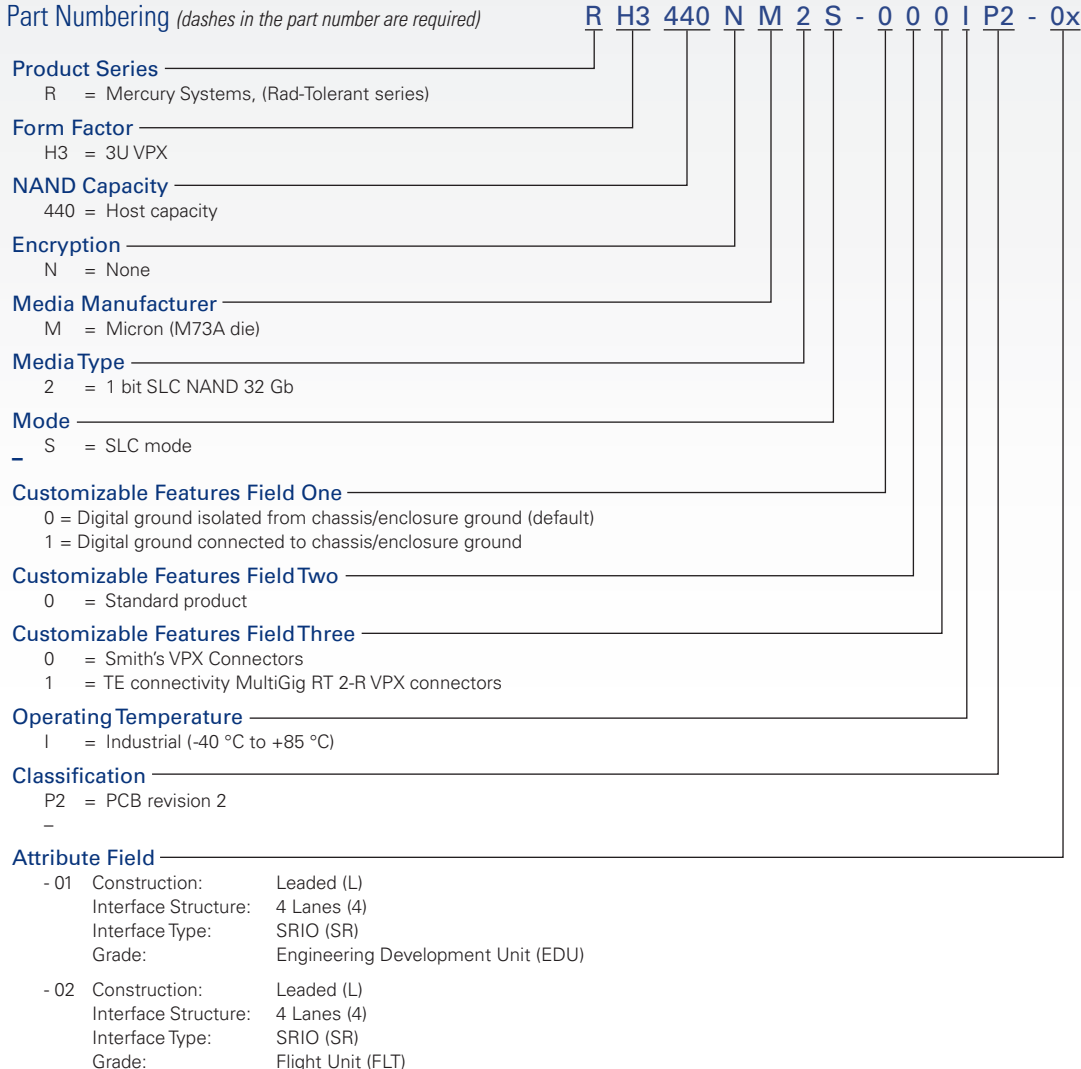ACQUIRE | DIGITIZE | PROCESS | STORAGE | EXPLOIT | DISSEMINATE

- Status data:
  - All voltages, 1 temperature sensor
  - Spares remaining, Erase cycle count
- 100% dynamic burn-in
- Ruggedized construction and assembly
- Rail temperature: -40 °C to +72 °C
- Storage temperature: -55 °C to +105 °C

- Weight: < 620 grams
- Power: 10.8V to 12.3V (12V target)
  3.25V to 4.00V (3.3V target)
- BOM, schematics and design document available on request

Applications include:
- Low Earth Orbit Satellites (LEO); Contact Mercury for other orbit solutions
  - Missiles
  - Launch vehicles
  - Scientific payloads
  - Terrestrial applications with radiation exposure

Part Numbering (dashes in the part number are required)

R H3 440 N M 2 S - 0 0 0 I P2 - 0x

Product Series
R = Mercury Systems, (Rad-Tolerant series)

Form Factor
H3 = 3U VPX

NAND Capacity
440 = Host capacity

Encryption
N = None

Media Manufacturer
M = Micron (M73A die)

Media Type
2 = 1 bit SLC NAND 32 Gb

Mode
S = SLC mode

Customizable Features Field One
0 = Digital ground isolated from chassis/enclosure ground (default)
1 = Digital ground connected to chassis/enclosure ground

Customizable Features Field Two
0 = Standard product

Customizable Features Field Three
0 = Smith's VPX Connectors
1 = TE connectivity MultiGig RT 2-R VPX connectors

Operating Temperature
I = Industrial (-40 °C to +85 °C)

Classification
P2 = PCB revision 2
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Attribute Field
- 01   Construction: Leaded (L)
       Interface Structure: 4 Lanes (4)
       Interface Type: SRIO (SR)
       Grade: Engineering Development Unit (EDU)

- 02   Construction: Leaded (L)
       Interface Structure: 4 Lanes (4)
       Interface Type: SRIO (SR)
       Grade: Flight Unit (FLT)

Note: EDU units are not ruggedized and should not be subjected to shock, vibration, or temperature cycle testing.

Example part Number: RH3440NM2S-000IP2-01 (EDU)

Download our
Secure SSD Tech Brief

Download our
Demystifying Hardware Full Disk Encryption Technology for Military Data Storage

Download our
Safeguarding Mission Critical Data Whitepaper

Download our
Microelectronics Quick Reference Guide

Need More Help? Need a Variant of This Product?
Contact Mercury's Secure SSD application engineering team at secure.ssd@mrcy.com

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