

## PRODUCT PORTFOLIO

### microSD/SDHC/SDXC Cards

microSD cards have been mainstream for years as storage for mobile phones, action cameras and other consumer devices. More recently, the small, lightweight and rugged form factor has become one of the most popular storage media for industrial and OEM applications as well. For handheld devices and other real estate-constrained designs, across a wide range of applications including inventory management, telecommunications, medical devices, power and energy, infotainment and transportation, Delkin Devices offers a full menu of microSD cards, allowing the best product selection to match any use model. Delkin microSD products have many additional benefits over standard retail consumer-grade cards, including BOM control, life cycle management and outstanding applications support.

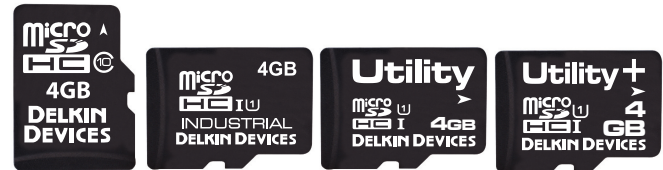
Whether the application calls for a few Megabytes of storage to launch an application, or several Gigabytes to store video data, Delkin has the solution.

For the most demanding applications, in terms of environmental conditions, write-intensive workload or the mission-critical nature of the stored data, Delkin offers true industrial SD controllers, high endurance SLC NAND flash, full industrial temperature range and long life cycles.

For more cost sensitive designs, Delkin offers lines of MLC-based cards – the Utility family in standard (-25°C to +85°C) and Utility+ family offering full industrial (-40°C to +85°C) temperature ranges.

Regardless of the microSD product family, Delkin ensures consistent performance and host compatibility through managed configurations. Delkin locks the card configuration down to the specific controller, firmware and flash chips, with a change to any of these components dictating a new part number. When an unavoidable EOL occurs to any of these items, Delkin communicates the discontinuation in advance, providing the opportunity to place a last time buy as well as to qualify the replacement solution.

Additionally, since the Delkin Devices facility in Poway, California is the headquarters for our design, manufacturing and support teams, we can also provide customized microSD solutions. Options include pad printing, content or image loading, conformal coating or other mechanical modifications to meet a specific need. Contact us to ask how a card can be customized for your application.



## HIGHLIGHTS

### Five microSD Product Families

- SLC and MLC Flash
- Commercial & Industrial Temp
- SD 3.0 & SD 2.0

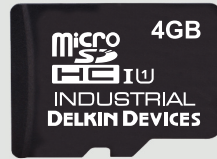
Wide Range of Capacities from  
128MB to 64GB

Support for SD and SPI Modes

Controlled BOM

Life Cycle Management

# microSD/SDHC/SDXC CARD PRODUCT MATRIX



| SD Product Family           | U331A Series                                                                                                                                             | U300 Series                                                                                                                                           | Utility microSD                                                                                                                                                                      | Utility+ microSD                                                                                                                                        |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface                   | SD 3.0, Class 10, UHS-I                                                                                                                                  |                                                                                                                                                       |                                                                                                                                                                                      |                                                                                                                                                         |
| Connector                   | Standard microSD 8 pin                                                                                                                                   |                                                                                                                                                       |                                                                                                                                                                                      |                                                                                                                                                         |
| Outline Dimensions          | 11 x 15 x 1 mm                                                                                                                                           |                                                                                                                                                       |                                                                                                                                                                                      |                                                                                                                                                         |
| Flash Type                  | SLC                                                                                                                                                      |                                                                                                                                                       | MLC                                                                                                                                                                                  |                                                                                                                                                         |
| Density Range               | 128 MB – 2 GB (SD)<br>4 GB (SDHC)                                                                                                                        | 512 MB - 2GB (SD)<br>4GB - 16GB (SDHC)                                                                                                                | 4 GB – 32 GB (SDHC)<br>64 -128GB(SDXC)                                                                                                                                               | 4 GB – 32 GB (SDHC)<br>64 – 128GB (SDXC)                                                                                                                |
| Data Retention              | 10 years - up to 10% of P/E cycles                                                                                                                       |                                                                                                                                                       | 5 years - up to 10% of P/E cycles                                                                                                                                                    |                                                                                                                                                         |
|                             | 1 year - at end of life / 100% of cycles                                                                                                                 |                                                                                                                                                       | 1 year - at end of life / 100% of cycles                                                                                                                                             |                                                                                                                                                         |
| Endurance (Raw Flash Level) | 60,000 P/E cycles                                                                                                                                        |                                                                                                                                                       | 3,000 P/E Cycles                                                                                                                                                                     |                                                                                                                                                         |
| Operating Temperature       | -40°C to +85°C                                                                                                                                           | -40°C to +85°C                                                                                                                                        | -25°C to +85°C                                                                                                                                                                       | -40°C to +85°C                                                                                                                                          |
| Storage Temperature         | -40°C to +85°C                                                                                                                                           | -50°C to +100°C                                                                                                                                       | -40°C to +85°C                                                                                                                                                                       |                                                                                                                                                         |
| Performance                 |                                                                                                                                                          |                                                                                                                                                       |                                                                                                                                                                                      |                                                                                                                                                         |
| Sequential Read (MB/s)      | up to 22                                                                                                                                                 | up to 29                                                                                                                                              | up to 95                                                                                                                                                                             |                                                                                                                                                         |
| Sequential Write (MB/s)     | up to 22                                                                                                                                                 | up to 20                                                                                                                                              | up to 90                                                                                                                                                                             |                                                                                                                                                         |
| MTBF                        | ≥ 2,000,000 hours (0 - 25°C)                                                                                                                             |                                                                                                                                                       | ≥ 3,000,000 hours (0 - 30°C)                                                                                                                                                         |                                                                                                                                                         |
| Shock*                      | 1,500 G for 0.5msec                                                                                                                                      |                                                                                                                                                       |                                                                                                                                                                                      |                                                                                                                                                         |
| Vibration*                  | 20Hz ~80Hz/1.52mm displacement, 80Hz~2000Hz / 20G Acceleration                                                                                           |                                                                                                                                                       |                                                                                                                                                                                      |                                                                                                                                                         |
| Humidity                    | 5 - 95% RH, non-condensing                                                                                                                               |                                                                                                                                                       | 95% RH under 40°C                                                                                                                                                                    |                                                                                                                                                         |
| Voltage                     | 2.7 – 3.6 V Normal                                                                                                                                       |                                                                                                                                                       |                                                                                                                                                                                      |                                                                                                                                                         |
| Power Consumption           | Read typically <50 mA<br>Write typically < 100 mA<br>Idle typically < 500 uA                                                                             |                                                                                                                                                       | Read typically <160 mA<br>Write typically < 130 mA<br>Idle typically < 300 uA                                                                                                        |                                                                                                                                                         |
| Features & Tools            | Proven Power Fail Safety<br>Sophisticated Wear Leveling & Bad Block management<br>Highest Endurance<br>Longest Life Cycle                                |                                                                                                                                                       | Robust Power Fail & Firmware Protection<br>Sophisticated Wear Leveling & Bad Block management<br>SMART Data Reporting & Dashboard<br>Limited Life Cycle Management<br>Cost Effective |                                                                                                                                                         |
| SMART Capability            | CMD56, Libraries Available<br>Delkin Dashboard (Windows)                                                                                                 | CMD56, Emulation<br>Dashboard                                                                                                                         | CMD56, Libraries Available<br>Delkin Dashboard (Windows)                                                                                                                             |                                                                                                                                                         |
| Part Numbers                | 128MB S312TLKCN-C1000-3<br>256MB S325TLMCN-C1000-3<br>512MB S351TLNCN-C1000-3<br>1GB S30GTLNCN-C1000-3<br>2GB S302TLNCN-C1000-3<br>4GB S304TLNCN-U1000-3 | 512MB S351MMVAL-C1000-4<br>1GB S30GMMUAL-C1000-4<br>2GB S302MMZAL-C1000-4<br>4GB S304MMZAL-U1000-4<br>8GB S308MMZAL-U1000-4<br>16GB S316MMZAL-U1000-4 | 4GB S404APY5Q-U1000-3<br>8GB S408APG49-U1000-3<br>16GB S416APG49-U3000-3<br>32GB S432APG49-U3000-3<br>64GB S464APG5S-U3000-3<br>128GB S41HAPGAC-U3000-3                              | 4GB S304APY5Q-U1000-3<br>8GB S308APG49-U1000-3<br>16GB S316APG49-U3000-3<br>32GB S332APG49-U3000-3<br>64GB S364APG5S-U3000-3<br>128GB S31HAPGAC-U3000-3 |
|                             | All capacities include Embedded Mode to ensure efficient wear leveling regardless of operating system or file system used.                               | All capacities include AES Encryption Engine.                                                                                                         | Contact Delkin for other options, including pSLC configurations                                                                                                                      | Contact Delkin for other options, including pSLC configurations                                                                                         |
|                             | Contact Delkin for other options                                                                                                                         | Contact Delkin for other options                                                                                                                      |                                                                                                                                                                                      |                                                                                                                                                         |