

## Storage Media Solutions

Panasonic provides Storage Media Solutions with extended endurance, exceptional performance and reasonable cost for an all-encompassing range of Industrial devices. The modern and changing demands of physical Media Storage requires Panasonic Memory Devices to provide a variety of form factors (Standard SD, microSD, and eMMC) as well as a selection of operating temperatures ranges (-40°C to +85°C or -25°C to +85°C). With available capacities spanning from a mere 512MB up to 256GB, nearly all Industrial-type applications can be met with a suitable solution. By adopting a proprietary controller design plus high endurance 2D and 3D-type NAND Flash, Panasonic ensures a reliable product and very low risk of BOM changes. Not all SD Cards or eMMC products are created equally and the proven longevity of Panasonic's Memory Cards speaks for itself.



## Consumer Plus SD Cards

Panasonic has adopted the new 3D-Based NAND flash technology into four new Consumer Plus SD Card Series. By utilizing both TLC (Triple Level Cell) and pSLC (pseudo-Single Level Cell) technologies, card endurances from 3,000 to 20,000 total program/erase cycles are available. A standard operating temperature of -25°C to +85°C is available with all Panasonic Consumer Plus SD Cards which is an improvement over some consumer-type products on the market. Along with Panasonic's current 2D-NAND-based product line, the New Consumer Plus Grade 3D-Based SD Cards can also offer up to UH1-1 U3 speed grades and read performance of up to 95 MB/s. Panasonic's proprietary controller firmware design supports additional firmware features such as Power Fail Robustness (available on some Series) and Static Wear Leveling to ensure long life in nearly any customer application. While many memory suppliers are moving away from low capacities like 4GB and 8GB, Panasonic strives to support both the older, "legacy" products and the more modern, high capacity applications being developed. Currently, Panasonic provides capacities from 4GB up to 256GB.

|                       | NEW! Consumer Plus 3D NAND                                                        |                                                                                   |                                                                                   |                                                                                   | Consumer Plus 2D NAND                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
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|                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                       | UC Series                                                                         | TC Series                                                                         | UA Series                                                                         | TA Series                                                                         | QE Series                                                                         | ME Series                                                                         | UE Series                                                                          | XE Series                                                                           | PE Series                                                                           | LE Series                                                                           | TE Series                                                                           | HT Series                                                                           | TT Series                                                                           | PT Series                                                                           |
| Type                  | SD                                                                                | microSD                                                                           | SD                                                                                | microSD                                                                           | SD                                                                                | SD                                                                                | SD                                                                                 | SD                                                                                  | microSD                                                                             | microSD                                                                             | microSD                                                                             | SD                                                                                  | microSD                                                                             | microSD                                                                             |
| Cell Structure        | 3D TLC                                                                            | 3D TLC                                                                            | 3D pSLC                                                                           | 3D pSLC                                                                           | 2D pSLC                                                                           | 2D MLC                                                                            | 2D MLC                                                                             | 2D MLC                                                                              | 2D pSLC                                                                             | 2D MLC                                                                              | 2D MLC                                                                              | 2D MLC                                                                              | 2D MLC                                                                              | 2D pSLC                                                                             |
| Operating Temperature | -25C~+85C                                                                         |                                                                                   |                                                                                   |                                                                                   | -25C~+85C                                                                         |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | -40C~+85C                                                                           |                                                                                     |                                                                                     |
| P/E Cycles*           | 3,000                                                                             |                                                                                   | 20,000                                                                            |                                                                                   | 20,000                                                                            | 2,000                                                                             | 2,000                                                                              | 2,000                                                                               | 20,000                                                                              | 2,000                                                                               | 2,000                                                                               | 2,000                                                                               | 2,000                                                                               | 20,000                                                                              |
| Capacity              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 512MB                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 1GB                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 2GB                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 4GB                   |                                                                                   |                                                                                   | RP-TDUA04DA1                                                                      | RP-TMTA04DA1                                                                      | RP-SDQE04DA1                                                                      | RP-SDME04DA1                                                                      |                                                                                    |                                                                                     | RP-SMPE04DA1                                                                        | RP-SMLE04DA1                                                                        |                                                                                     |                                                                                     |                                                                                     | RP-SMPT04DA1                                                                        |
| 8GB                   |                                                                                   |                                                                                   | RP-TDUA08DA1                                                                      | RP-TMTA08DA1                                                                      | RP-SDQE08DA1                                                                      | RP-SDME08DA1                                                                      |                                                                                    |                                                                                     | RP-SMPE08DA1                                                                        | RP-SMLE08DA1                                                                        |                                                                                     |                                                                                     |                                                                                     | RP-SMPT08DA1                                                                        |
| 16GB                  | RP-TDUC16DA1                                                                      | RP-TMTC16DA1                                                                      |                                                                                   |                                                                                   | RP-SDQE16DA1                                                                      | RP-SDME16DA1                                                                      |                                                                                    |                                                                                     | RP-SMPE16DA1                                                                        | RP-SMLE16DA1                                                                        |                                                                                     |                                                                                     |                                                                                     | RP-SMPT16DA1                                                                        |
| 32GB                  | RP-TDUC32DA1                                                                      | RP-TMTC32DA1                                                                      |                                                                                   |                                                                                   |                                                                                   | RP-SDME32DA1                                                                      |                                                                                    |                                                                                     | RP-SMPE32DA1                                                                        | RP-SMLE32DA1                                                                        |                                                                                     |                                                                                     | RP-SMTT32DA1                                                                        | RP-SMPT32DA1                                                                        |
| 64GB                  | RP-TDUC64DA1                                                                      | RP-TMTC64DA1                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   | RP-SDUE64DA1                                                                       |                                                                                     |                                                                                     |                                                                                     | RP-SMTE64DA1                                                                        | RP-SDHT64DA1                                                                        | RP-SMTT64DA1                                                                        |                                                                                     |
| 128GB                 | RP-TDUC128DA1                                                                     | RP-TMTC128DA1                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                   | RP-SDUE128DA1                                                                      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 256GB                 | RP-TDUC256DA1                                                                     | RP-TMTC256DA1                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                   | CUSTOM                                                                             | RP-SDXE256DA1                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

\*Dependent on use case

## Industrial SD Cards and Industrial/Automotive eMMC

Industrial SD Cards from Panasonic provide robust Storage Media Solutions for applications where data is mission critical. Utilizing both Industrial-type SLC (Single Level Cell) and MLC (Multi Level Cell) 2D NAND flash, Panasonic Industrial SD Cards can be used in a multitude of devices that are both write-intensive and read-intensive. By utilizing a proprietary controller and firmware, Panasonic offers such features as Power Fail Robustness, Global Wear Leveling, and compatibility with all types of File Systems. Panasonic Industrial SD Cards are unique in that every single Industrial SD Card and eMMC is rated for temperatures of -40°C to +85°C to handle extreme weather conditions. The Embedded-Type eMMCs are rated for both Industrial and Automotive applications due to their inherent AEC-Q100 compliance and performance in high-vibration environments. Capacities for Panasonic Industrial SD Cards range from 512MB up to 32GB.

|                       | Industrial Grade                                                                  |                                                                                   |                                                                                   |                                                                                    |                                                                                     | Industrial/Automotive eMMC                                                          |
|-----------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |  |  |  |  |  |  |
|                       | FX Series                                                                         | P Series                                                                          | G Series                                                                          | SC Series                                                                          | KC Series                                                                           | MC Series                                                                           |
| Type                  | SD                                                                                | SD                                                                                | SD                                                                                | microSD                                                                            | microSD                                                                             | eMMC                                                                                |
| Cell Structure        | 2D SLC                                                                            | 2D MLC                                                                            | 2D MLC                                                                            | 2D SLC                                                                             | 2D MLC                                                                              | 2D MLC                                                                              |
| Operating Temperature | -40C~+85C                                                                         |                                                                                   |                                                                                   |                                                                                    |                                                                                     | -40C~+85C                                                                           |
| P/E Cycles*           | 60,000                                                                            | 2,000                                                                             | 2,000                                                                             | 60,000                                                                             | 2,000                                                                               | 2,000                                                                               |
| Capacity              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| 512MB                 | RP-SDFC51DA1                                                                      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| 1GB                   |                                                                                   |                                                                                   |                                                                                   | RP-SMSC01DA1                                                                       |                                                                                     |                                                                                     |
| 2GB                   | RP-SDF02GDA1                                                                      |                                                                                   |                                                                                   | RP-SMSC02DA1                                                                       |                                                                                     |                                                                                     |
| 4GB                   | RP-SDFC04DA1                                                                      | RP-SDPC04DA1                                                                      |                                                                                   | RP-SMSC04DA1                                                                       | RP-SMKC04DA1                                                                        |                                                                                     |
| 8GB                   | RP-SDFC08DA1                                                                      | RP-SDPC08DA1                                                                      |                                                                                   | RP-SMSC08DA1                                                                       | RP-SMKC08DA1                                                                        | RP-SEMC08DA1                                                                        |
| 16GB                  | RP-SDFC16DA1                                                                      | RP-SDPC16DA1                                                                      | RP-SDGD16DA2                                                                      |                                                                                    | RP-SMKC16DA1                                                                        | RP-SEMC16DA1                                                                        |
| 32GB                  |                                                                                   |                                                                                   | RP-SDGD32DA2                                                                      |                                                                                    |                                                                                     | RP-SEMC32DA1                                                                        |
| 64GB                  |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| 128GB                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| 256GB                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |



# Use Case Analysis Service From Panasonic

Panasonic can recommend a specific, tailor-made Storage Media Solution to users interested in qualifying a Panasonic SD Card or eMMC into their board design! As a complimentary service, Panasonic will provide a sample for testing and log the SD Card/eMMC access pattern (about two weeks of testing is recommended). Simply ship the card back to Panasonic for a full analysis of the access pattern. A final report outlining the results will be provided, including the estimated life endurance of the Memory Device tested and a recommendation of the card most suitable for the application in question.

To take advantage of Panasonic's Use Case Analysis Service, learn more:

<http://pages.na.industrial.panasonic.com/SD-Card-App-Testing.html>

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