

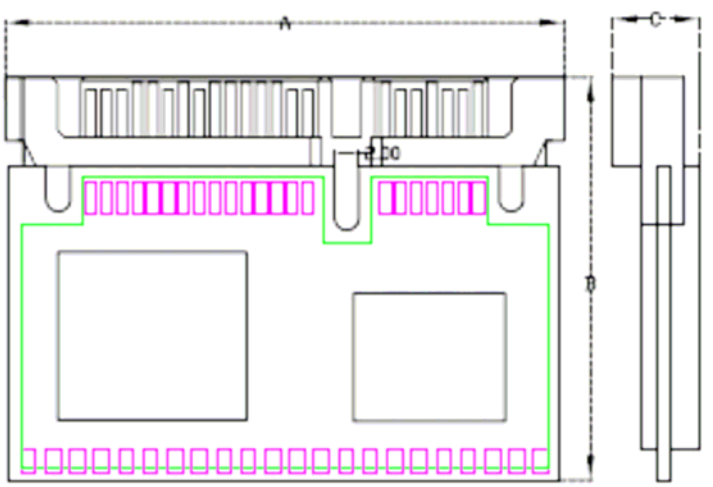
# TS128M-8GSDOM22V

## 22P Vertical Type SATA Flash Modules

### Description

With a 7P Signal + 15P Power SATA interface, high speed and low power consumption, SATA Flash Modules is perfect replacement storage device for PCs, Laptops, gaming systems, and handheld devices.

### Placement



### Features

- RoHS compliant
- Fully compatible with devices and OS that support the SATA 1.0a 1.5Gbps standard
- Non-volatile Flash Memory for outstanding data retention
- Supports up to Ultra DMA Mode 4
- Built-in ECC (Error Correction Code) functionality and wear-leveling algorithm ensures highly reliable of data transfer
- 7P Signal + 15P Power male SATA connector
- Lower Power Consumption
- Shock resistance

### Dimensions

| Side | Millimeters  | Inches        |
|------|--------------|---------------|
| A    | 45.80 ± 0.40 | 1.803 ± 0.016 |
| B    | 33.00 ± 0.50 | 1.299 ± 0.020 |
| C    | 7.08 ± 0.20  | 0.279 ± 0.008 |

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### Specifications

| Physical Specification |        |                                  |
|------------------------|--------|----------------------------------|
| Form Factor            |        | SATA Flash Modules Vertical Type |
| Storage Capacities     |        | 128M~8GB                         |
| Dimensions (mm)        | Length | 45.80 ± 0.40                     |
|                        | Width  | 33.00 ± 0.50                     |
|                        | Height | 7.08 ± 0.20                      |
| Input Voltage          |        | 5V ± 10% / 3.3V ± 5%             |
| Weight                 |        | 8 g                              |
| Connector              |        | SATA 7+15 pins combo connector   |

| Environmental Specifications |                  |
|------------------------------|------------------|
| Operating Temperature        | 0 °C to 70 °C    |
| Storage Temperature          | - 40 °C to 85 °C |

| Power Requirements   |         |          |
|--|---------|----------|
| Input Voltage  |         | 5V ± 10% |
| 2GB SATA Flash Modules<br>Power Consumption<br>(DC 5V @25°C) | Mode    | MAX (mA) |
|  | Write   | 171.1    |
|  | Read    | 178.8    |
|  | Standby | 112.6    |

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| Reliability          |                                       |
|----------------------|---------------------------------------|
| Data Reliability     | Built-in 4 symbol/page correction ECC |
| Data Retention       | 10 years                              |
| Connector Durability | 500 times                             |

| Performance           |             |              |                    |                     |
|-----------------------|-------------|--------------|--------------------|---------------------|
| Model P/N             | Read (KB/s) | Write (KB/s) | Random Read (KB/s) | Random Write (KB/s) |
| 2GB SATA Flash Module | 49636       | 17519        | 47123              | 4598                |

\* Note : 25 °C, according to 7+15 pins combo connector test on GA-8IG1000MK, 256 MB RAM, IDE interface support UDMA4, Windows® XP Version 2002 SP2, benchmark utility HDBENCH (version 3.4006), copied file 100MB

| Actual Capacity |          |                 |          |                       |
|-----------------|----------|-----------------|----------|-----------------------|
| Model P/N       | Capacity | C/H/S           | Capacity | User capacity (Bytes) |
| TS128MSDOM22V   | 128M     | 248 / 16 / 63   | 121MB    | 127,176,704           |
| TS256MSDOM22V   | 256M     | 496 / 16 / 63   | 243MB    | 255,168,512           |
| TS512MSDOM22V   | 512M     | 993 / 16 / 63   | 488MB    | 511,787,008           |
| TS1GSDOM22V     | 1GB      | 1942 / 16 / 63  | 955MB    | 1,001,439,232         |
| TS2GSDOM22V     | 2GB      | 3884 / 16 / 63  | 1.86GB   | 2,003,697,664         |
| TS4GSDOM22V     | 4GB      | 7769 / 16 / 63  | 3.73GB   | 4,007,985,152         |
| TS8GSDOM22V     | 8GB      | 15538 / 16 / 63 | 7.46GB   | 8,016,560,128         |

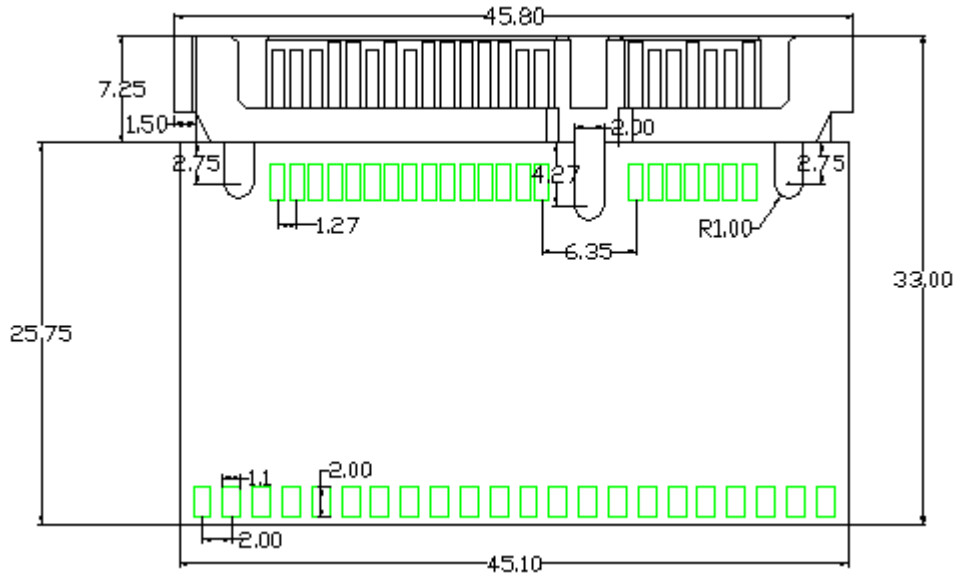
\* Note: FAT format for <4GB, FAT32 format for 4~8GB

| Regulations |                  |
|-------------|------------------|
| Compliance  | CE, FCC and BSMI |

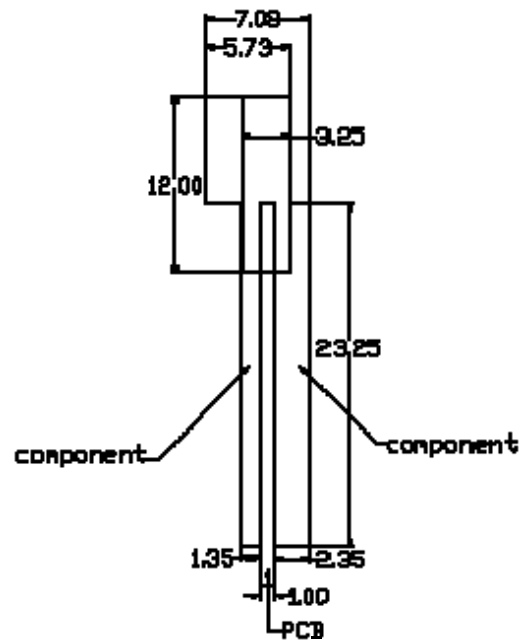
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## 22P Vertical Type SATA Flash Modules

### Mechanical Drawing



**Top View**



**Lateral View**

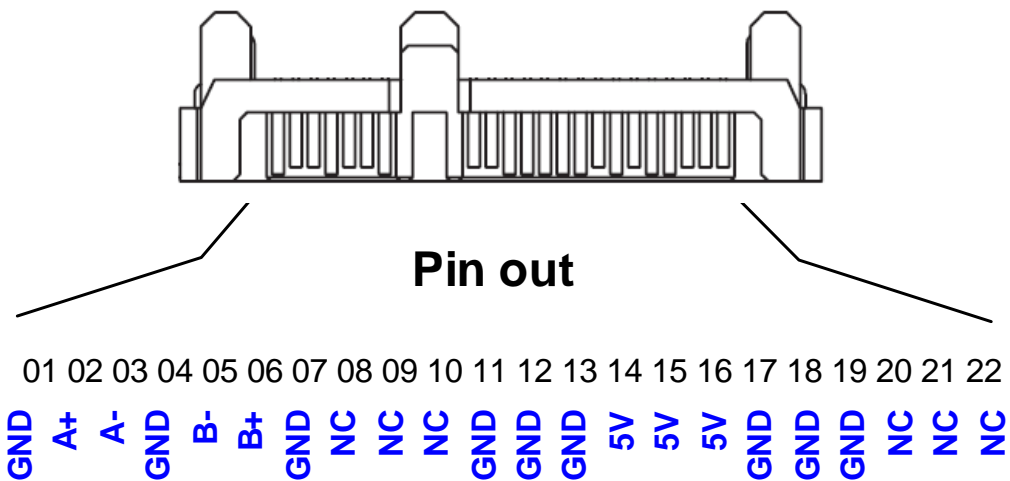
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## 22P Vertical Type SATA Flash Modules

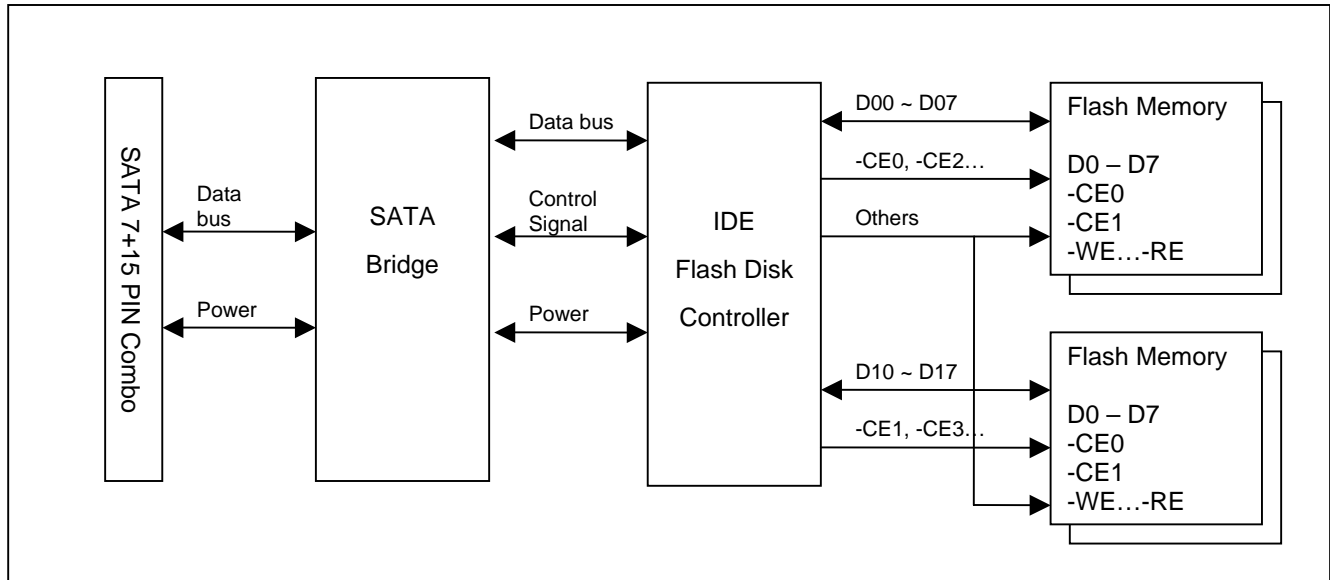
Pin Assignments

| Pin No. | Pin Name | Pin No. | Pin Name |
|---------|----------|---------|----------|
| 01      | GND      | 02      | A+       |
| 03      | A-       | 04      | GND      |
| 05      | B-       | 06      | B+       |
| 07      | GND      | 08      | NC       |
| 09      | NC       | 10      | NC       |
| 11      | GND      | 12      | GND      |
| 13      | GND      | 14      | 5V       |
| 15      | 5V       | 16      | 5V       |
| 17      | GND      | 18      | GND      |
| 19      | GND      | 20      | NC       |
| 21      | NC       | 22      | NC       |

### Pin Layout



### Block Diagram



### DC Characteristics

| Parameter                       | Symbol   | Min.           | Max. | Unit | Remark                       |
|---------------------------------|----------|----------------|------|------|------------------------------|
| Supply Voltage                  | $V_{CC}$ | 2.97           | 5.5  | V    |                              |
| High level output voltage       | $V_{OH}$ | $V_{CC} - 0.8$ |      | V    |                              |
| Low level output voltage        | $V_{OL}$ |                | 0.8  | V    |                              |
| High level input voltage        | $V_{IH}$ | 2.4            |      | V    | Non-schmitt trigger          |
|                                 |          | 2.05           |      | V    | Schmitt trigger <sup>1</sup> |
| Low level input voltage         | $V_{IL}$ |                | 0.6  | V    | Non-schmitt trigger          |
|                                 |          |                | 1.25 | V    | Schmitt trigger <sup>1</sup> |
| Pull up resistance <sup>2</sup> | $R_{PU}$ | 52.7           | 141  | KOhm |                              |
| Pull down resistance            | $R_{PD}$ | 47.5           | 172  | kOhm |                              |

1. Include CE1, CE2, HREG, HOE, HIOE, HWE, HIOW pins.

2. Include CE1, CE2, HREG, HOE, HIOE, HWE, HIOW, CSEL(P35), PDIAG, DASP pins.

### Command Set

|    | Command                                    | Code               | FR | SC | SN | CY | DH | LBA | Status      | Note |
|----|--|--------------------|----|----|----|----|----|-----|-------------|------|
| 1  | Check Power Mode                           | E5 or 98h          | -  | -  | -  | -  | Y  | -   | Support     |      |
| 2  | Execute Drive Diagnostic                   | 90h                | -  | -  | -  | -  | Y  | -   | Support     |      |
| 3  | Erase Sector                               | C0h                | -  | Y  | Y  | Y  | Y  | Y   | Not Support | #3   |
| 4  | Flush Cache                                | E7h                | -  | -  | -  | -  | Y  | -   | Support     |      |
| 5  | Format Track                               | 50h                | -  | Y  | -  | Y  | Y  | Y   | Support     |      |
| 6  | Identify Device                            | ECh                | -  | -  | -  | -  | Y  | -   | Support     |      |
| 7  | Idle                                       | E3h or 97h         | -  | Y  | -  | -  | Y  | -   | Support     |      |
| 8  | Idle Immediate                             | E1h or 95h         | -  | -  | -  | -  | Y  | -   | Support     |      |
| 9  | Initialize Drive Parameters                | 91h                | -  | Y  | -  | -  | Y  | -   | Support     |      |
| 10 | Key Management Structure Read              | B9 (Feature 0-127) | Y  | Y  | Y  | Y  | Y  | -   | NOT Support | #1   |
| 11 | Key Management Read Keying Material        | B9 (Feature 80)    | Y  | Y  | Y  | Y  | Y  | -   | NOT Support | #1   |
| 12 | Key Management Change Key Management Value | B9 (Feature 81)    | Y  | Y  | Y  | Y  | Y  | -   | NOT Support | #1   |
| 13 | NOP  | 00h                | -  | -  | -  | -  | Y  | -   | NOT Support |      |
| 14 | Read Buffer                                | E4h                | -  | -  | -  | -  | Y  | -   | Support     |      |
| 15 | Read DMA                                   | C8h                | -  | Y  | Y  | Y  | Y  | Y   | Support     |      |
| 16 | Read Long Sector                           | 22h or 23h         | -  | -  | Y  | Y  | Y  | Y   | NOT Support | #2   |
| 17 | Read Multiple                              | C4h                | -  | Y  | Y  | Y  | Y  | Y   | Support     |      |
| 18 | Read Sector(s)                             | 20h or 21h         | -  | Y  | Y  | Y  | Y  | Y   | Support     |      |
| 19 | Read Verify Sector(s)                      | 40h or 41h         | -  | Y  | Y  | Y  | Y  | Y   | Support     |      |
| 20 | Recalibrate                                | 1Xh                | -  | -  | -  | -  | Y  | -   | Support     |      |
| 21 | Request Sense                              | 03h                | -  | -  | -  | -  | Y  | -   | Not Support | #3   |
| 22 | Security Disable Password                  | F6h                | -  | -  | -  | -  | Y  | -   | Support     |      |
| 23 | Security Erase Prepare                     | F3h                | -  | -  | -  | -  | Y  | -   | Support     |      |
| 24 | Security Erase Unit                        | F4h                | -  | -  | -  | -  | Y  | -   | Support     |      |
| 25 | Security Freeze Lock                       | F5h                | -  | -  | -  | -  | Y  | -   | Support     |      |
| 26 | Security Set Password                      | F1h                | -  | -  | -  | -  | Y  | -   | Support     |      |

|    |                           |            |   |   |   |   |   |   |             |    |
|----|---------------------------|------------|---|---|---|---|---|---|-------------|----|
| 27 | Security Unlock           | F2h        | - | - | - | - | Y | - | Support     |    |
| 28 | Seek                      | 7Xh        | - | - | Y | Y | Y | Y | Support     |    |
| 29 | Set Feature               | EFh        | Y | - | - | - | Y | - | Support     |    |
| 30 | Set Multiple Mode         | C6h        | - | Y | - | - | Y | - | Support     |    |
| 31 | Set Sleep Mode            | E6h or 99h | - | - | - | - | Y | - | Support     |    |
| 32 | Standby                   | E2 or 96h  | - | - | - | - | Y | - | Support     |    |
| 33 | Standby Immediate         | E0 or 94h  | - | - | - | - | Y | - | Support     |    |
| 34 | Translate Sector          | 87h        | - | Y | Y | Y | Y | Y | Not Support | #3 |
| 35 | Wear Level                | F5h        | - | - | - | - | Y | - | Support     | #4 |
| 36 | Write Buffer              | E8h        | - | - | - | - | Y | - | Support     |    |
| 37 | Write DMA                 | CAh        | - | Y | Y | Y | Y | Y | Support     |    |
| 38 | Write Long Sector         | 32h or 33h | - | - | Y | Y | Y | Y | Not Support | #2 |
| 39 | Write Multiple            | C5h        | - | Y | Y | Y | Y | Y | Support     |    |
| 40 | Write Multiple w/o Erase  | CDh        | - | Y | Y | Y | Y | Y | Not Support | #3 |
| 41 | Write Sector(s)           | 30h or 31h | - | Y | Y | Y | Y | Y | Support     |    |
| 42 | Write Sector(s) w/o Erase | 38h        | - | Y | Y | Y | Y | Y | Not Support | #3 |
| 43 | Write Verify              | 3Ch        | - | Y | Y | Y | Y | Y | Support     |    |

#1: This command is optional, depending on the key Management scheme in use.

#2: Use of this command is not recommended.

#3: CFA feature set command is not supported by P-ATA to S-ATA bridge controller.

#4: If Security command 22~27 are supported, this command is not supported.

### Definitions

FR = Features Register

SC =Sector Count register (00H to FFH, 00H means 256 sectors)

SN = Sector Number register

CY = Cylinder Low/High register

DH = Head No. (0 to 15) of Drive/Head register

LBA = Logic Block Address Mode Support

- = Not used for the command

Y = Used for the command



### SMART Command Set

- SMART Command Set

| SMART Feature Register Values |                          |     |                            |
|-------------------------------|--------------------------|-----|----------------------------|
| D0h                           | Read Data                | D4h | Execute OFF-LINE Immediate |
| D1h                           | Read Attribute Threshold | D8h | Enable SMART Operations    |
| D2h                           | Enable/Disable Autosave  | D9h | Disable SMART Operations   |
| D3h                           | Save Attribute Values    | DAh | Return Status              |

- If reserved size is below the Threshold, the status can be read from Cylinder register by Return Status command (DAh).

- SMART Data Structure

| BYTE             | F / V    | Decription   |
|------------------|----------|--|
| 0-1              | X        | Revision code  |
| 2-361            | X        | Vendor specific  |
| 362              | V        | Off line data collection status  |
| 363              | X        | Self-test execution status byte  |
| 364-365          | V        | Total time in seconds to complete off-line data collection activity            |
| 366              | X        | Vendor specific  |
| 367              | F        | Off-line data collection capability  |
| 368-369          | F        | SMART capability   |
| 370              | F        | Error logging capability<br>7-1 Reserved<br>0 1=Device error logging supported |
| 371              | X        | Vendor specific  |
| 372              | F        | Short self-test routine recommended polling time (in minutes)                  |
| 373              | F        | Extended self-test routine recommended polling time (in minutes)               |
| 374              | F        | Conveyance self-test routine recommended polling time (in minutes)             |
| 375-385          | R        | Reserved   |
| <b>386-395</b>   | <b>F</b> | <b>Date Code</b>   |
| <b>396</b>       | <b>V</b> | <b>Number of MU in device (0~n)</b>  |
| <b>397+(n*6)</b> | <b>V</b> | <b>MU number</b>   |
| <b>398+(n*6)</b> | <b>V</b> | <b>MU data block</b>   |

|           |   |                                       |
|-----------|---|---------------------------------------|
| 400+(n*6) | V | MU spare block                        |
| 401+(n*6) | V | Init. Bad block                       |
| 402+(n*6) | V | Last Defect Bad block ( Newest state) |
| 511       | V | Data structure checksum               |

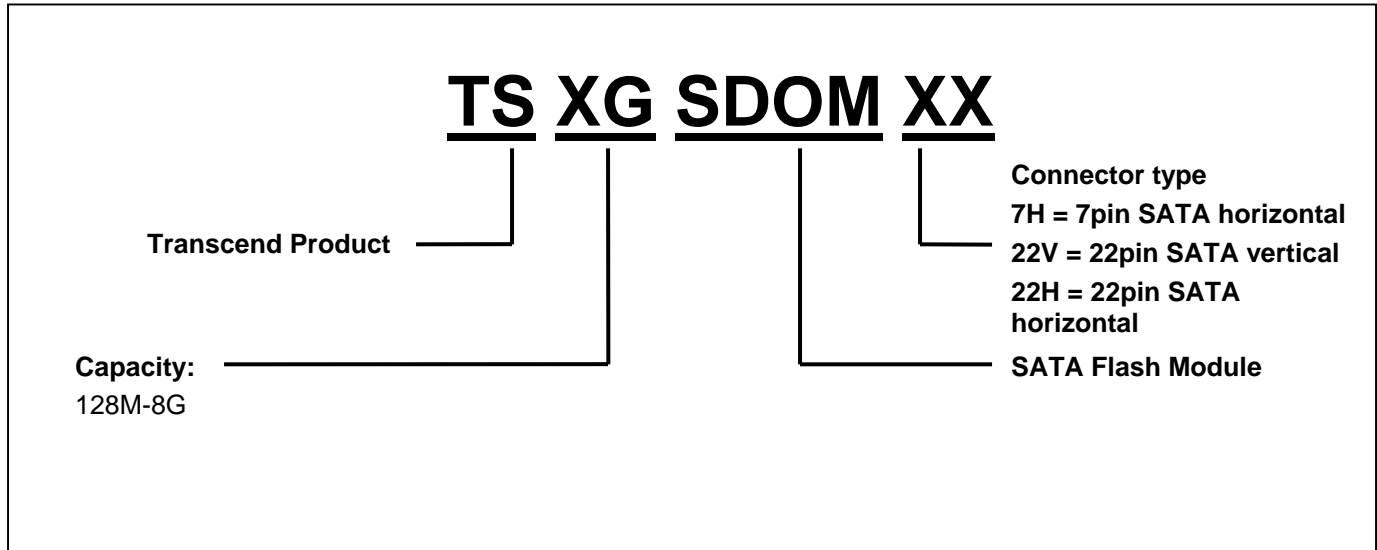
F=the content of the byte is fixed and does not change.  
V=the content of the byte is variable and may change depending on the state of the device or the commands executed by the device.  
X=the content of the byte is vendor specific and may be fixed or variable.  
R=the content of the byte is reserved and shall be zero.

\* 4 Byte value : [MSB] [2] [1] [LSB]

# TS128M-8GSDOM22V

## 22P Vertical Type SATA Flash Modules

### Ordering Information



1. The above technical information is based on industry standard data and has been tested to be reliable. However, Transcend makes no warranty, either expressed or implied, as to its accuracy and assumes no liability in connection with the use of this product. Transcend reserves the right to make changes to the specifications at any time without prior notice.
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