

RoHS Compliant

CFast Card Series

Datasheet for Industrial CFast Card – ST25-E Series

September 1, 2026

Revision 1.0

***This Specification Describes the Features and
Capabilities of the Standard and Industrial
Temperature CFast Cards***

***Please Contact Fortasa Memory Systems Sales for
any Custom Features Required For Your Specific
Application***



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Features:

- **Standard Serial SATA 3.2 (Gen 3)**
 - SATA 3.2 command set compatible
 - Serial SATA 6.0 Gbps
 - ATA-8 compatible command set
- **Capacity**
 - 64, 128, 256, 512GB
- **NAND flash type: 3D TLC**
- **MTBF (hours):** >3,000,000
- **Low power consumption (typical)**
 - Supply voltage: 3.3V±5%
 - Active mode: 400 mA
 - Sleep mode: 65 mA
- **Performance**
 - Sustained read: Up to 555 MB/sec
 - Sustained write: Up to 505 MB/sec
 - Random read (4K): up to 55,000 IOPS
 - Random write (4K): up to 66,000 IOPS
- **Intelligent endurance design**
 - Low Density Parity Check (LDPC) Error Correction
 - Global wear-leveling scheme together with dynamical block allocation to significantly increase the lifetime of a flash device and optimize the disk performance
 - Flash bad-block management
 - *Power Failure Management*
 - *ATA Secure Erase*
 - *SMART Command*
 - *Trim Command*
- **Physical Characteristics**
 - Form factor: Type I CFast
 - Dimensions: 42.80 x 36.45 x 3.60(max.), unit: mm
 - Net weight: 9.33g ± 5%
- **Connector Type**
 - 7-pin signal connector
 - 17-pin power connector
- **Shock and Vibration**
 - Shock: 1500g (approx.)
 - Vibration: 15g (approx.)
- **RoHS compliant**
- **Hardware Write Protect Switch Support (optional)**
- **Temperature ranges**
 - Operation:
 - Standard: 0°C to 70°C (32° ~ 158°F)
 - Industrial: -40°C to 85°C (-40° ~ 185°F)
 - Storage: -40°C to 100°C (-40° ~ 212°F)
- **Endurance in Drive Writes Per Day (DWPD)**
 - 64 GB: 2.5 TBW
 - 128 GB: 2.27 TBW
 - 256 GB: 2.15 TBW
 - 512 GB: 2.18 TBW
- **Security (Optional)**
 - AES 256 Hardware Encryption

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1 Product Description

1.1 General Description

CFast emerged as an evolution of the CompactFlash card standard, by adopting a SATA bus interface to deliver a much higher data transfer rate required in the current generation of industrial and enterprise applications. Offering a substantially higher data throughput rate, CFast proved to be a more advanced embedded solution for cache, storage acceleration, communication and networking applications is a small, compact package.

Fortasa's CFast solution is designed with a powerful Flash controller that easily breaks the performance limit for CompactFlash by delivering the transfer rate up to 500 MB/s. Leveraging from CompactFlash form factor and SATA interface, CFast card can be integrated into host computing system without excessive BIOS configurations and driver installations.

In addition to its peak performance, Fortasa CFast is designed with high reliability and data integrity. The CFast card adopts static wear-leveling to average the use of all flash blocks to prolong the lifetime and improve block efficiency of flash media. A built-in powerful ECC engine operates at hardware level for error correction and detection. CFast is an ideal storage device for industrial, enterprise and communication applications. **Manufactured using Industrial Temperature rated 3D TLC NAND-flash components, this SSD can work in highly demanding environment and withstand wide range of operating temperature from -40°C to +85°C.**

1.2 Functional Block

Fortasa CFast includes a single-chip SATA Controller and the flash media. The controller integrates the flash management unit to support multi-channel, multi-bank flash arrays. Figure 1-1 shows the functional block diagram.

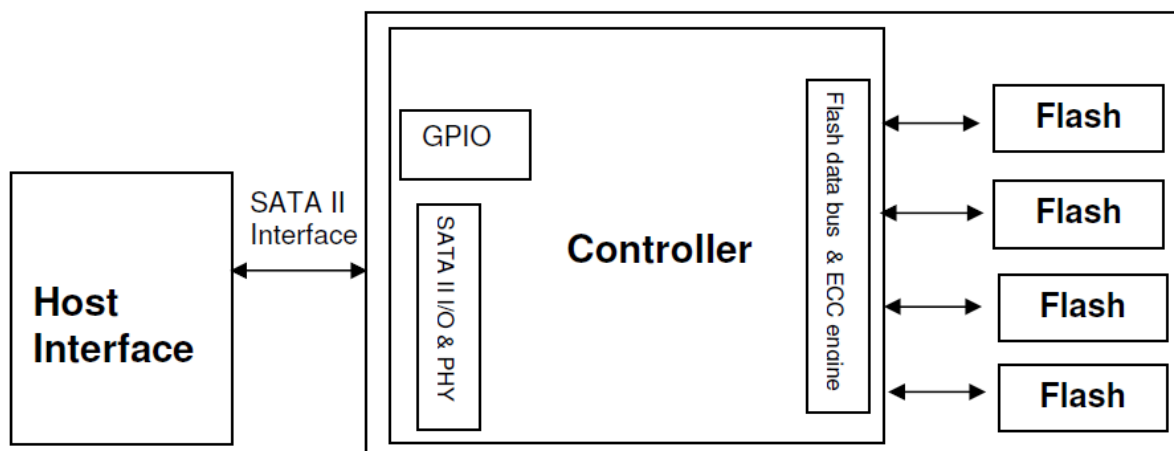


Figure 1-1: CFast functional block diagram

1.3 Capacity Specification

Standard capacity specification of the CFast product are shown in Table 1-1. The table lists the specific capacity and the default numbers of heads, sectors and cylinders (CHS) for each product line.

Table 1-1: Capacity specifications

Capacity	Total Bytes	Cylinders	Heads	Sectors	Max LBA
64GB	60,022,480,896	16383 ¹	16	63	117,231,408
128GB	120,034,123,776	16383 ¹	16	63	234,441,648
256GB	240,057,409,536	16383 ¹	16	63	468,862,128
512GB	480,103,981,056	16383 ¹	16	63	937,703,088

1. Cylinders, heads or sectors are not applicable for these capacities. Only LBA addressing applies. LBA count addressed in the table above indicates total user storage capacity and will remain the same throughout the lifespan of the device. However, the total usable capacity of the CFast is most likely to be less than the total physical capacity because a small portion of the capacity is reserved for device maintenance usages.
2. Display of total bytes varies between file systems.

Please contact factory for any non-listed CFast capacity or custom CHS requirement.

1.4 Performance Specification

Performances of the CFast device are listed in Table 1-2.

Table 1-2: Standard Performance specifications

Capacity Performance	64GB	128GB	256GB	512GB
Sustained read (MB/s)	280	535	555	555
Sustained write (MB/s)	275	485	505	505
Random Read IOPS (4K)	11,000	14,000	32,000	50,000
Random Write IOPS (4K)	55,000	65,000	66,000	60,000

Notes:

- Results may differ from various flash configurations or host system setting.
- Sequential read/write is based on CrystalDiskMark 8.0.4 with file size 1,000MB.
- Random read/write is measured using IOMeter with Queue Depth 32.

1.5 Pin Assignments

Figure 1-2: Pin Assignment

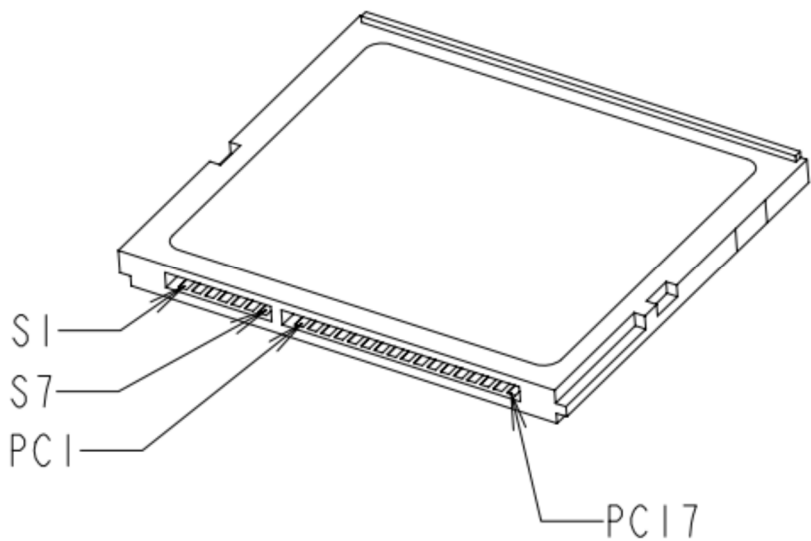
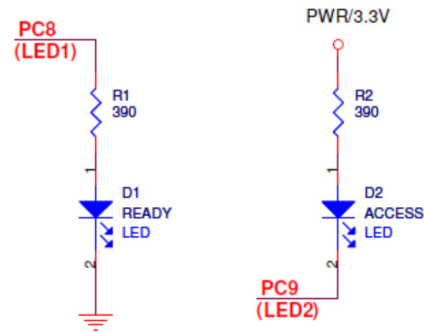


Table 1-3: Signal Segment

Pin	Signal	Description
S1		Ground
S2	A+	SATA Differential Signal Pair A
S3	A-	
S4		Ground
S5	B-	SATA Differential Signal Pair B
S6	B+	
S7		Ground

Table 1-4: Power Segment

Pin	Name	Type	Description
PC1	CDI	CMOS Input	Card Detect In
PC2	GND	Device GND	
PC3	DEVSLP	DEVSLP card Input	DEVSLP Enable
PC4	TBD	TBD	
PC5	TBD	TBD	
PC6	TBD	TBD	
PC7	GND	Device GND	
PC8*	LED1	LED Output	Ready
PC9*	LED2	LED Output	Access
PC10			Reserved I/O ¹
PC11			Reserved I/O ¹
PC12	IFDet		Reserved I/O ¹
PC13	PWR	3.3V	Device Power 3.3V
PC14	PWR	3.3V	Device Power 3.3V
PC15	PGND	Device GND	Device GND
PC16	PGND	Device GND	Device GND
PC17	PGND	CMOS Output	Card Detect Out



*Refer above for LED output design guide

Note:

- Reserved by Fortasa, please do not connect to a host

2. Software Interface

2.1 Command Set

Table 2-1 summarizes the command set with the paragraphs that follow describing the individual commands and the task file for each.

Table 2-1: Command set

Command	Code	Command	Code
Check-Power-Mode	E5H	Security-Erase-Prepare	F3H
Data Set Management	06H	Security-Erase-Unit	F4H
Download Microcode	92H	Security-Freeze-Lock	F5H
Execute-Drive-Diagnostic	90H	Security-Set-Password	F1H
Flush-Cache	E7H	Security-Unlock	F2H
Flush-Cache EXT	EAH	Seek	70H
Identify-Drive	ECH	Set-Features	EFH
Idle	E3H	SMART	B0H
Idle-Immediate	E1H	Set-Multiple-Mode	C6H
Initialize-Drive-Parameters	91H	Set-Sleep-Mode	E6H
Read DMA	C8H	Stand-By	E2H
Read DMA EXT	25H	Stand-By-Immediate	E0H
Read-Multiple	C4H	Write DMA	CAH
Read-Multiple EXT	29H	Write DMA EXT	35H
Read-Sector	20H	Write-Multiple	C5H
Read-Sector EXT	24H	Write-Multiple EXT	39H
Read-Verify-Sectors	40H	Write-Sector	30H
Read-Verify-Sectors EXT	42H	Write-Sector EXT	34H
Recalibrate	1XH	Write-Uncorrectable EXT	45H
Security-Disable-Password	F6H	Sanitize	B4H

3. Flash Management

3.1 Error Correction/Detection

Fortasa's ST25-E Industrial CFast card implements a hardware ECC scheme, based on the Low Density Parity Check (LDPC). LDPC is a class of linear block error correcting code which has apparent coding gain over BCH code because LDPC code includes both hard decoding and soft decoding algorithms. With the error rate decreasing, LDPC can extend SSD endurance and increase data reliability while reading raw data inside a flash chip.

3.2 Wear Leveling

All NAND flash devices are limited by a finite number of write cycles. Under a standard file system, frequent file table updates are mandatory. As a painful side effect of OS file overhead, some areas of flash address space wear out faster than others. As these certain sections get a substantially higher write occurrence the whole CFast can wear out very quickly. This uneven wear would significantly reduce the lifetime of the whole device, even if majority of the Flash sectors are far from the write cycle limit. Fortasa's CFast products offer advanced data wear leveling which distributes Flash writes evenly across the full memory space. By utilizing this advanced wear leveling feature, the lifetime of the media can be significantly extended.

3.3 Power Failure Management

The Low Power Detection on the Flash controller initiates cached data saving before the power supply to the device drops too low for operation. This feature prevents the device from system crash and ensures data integrity during an unexpected brownout. This feature makes sure that there are no catastrophic failures of the CFast due to system power glitches.

3.4 ATA Secure Erase

Accomplished by the Secure Erase (SE) command, which added to the open ANSI standards that control disk drives, "ATA Secure Erase" is built into the disk drive itself and thus far less susceptible to malicious software attacks than external software utilities. It is a positive easy-to-use data destroy command, amounting to electronic data shredding. Executing the command causes a drive to internally completely erase all possible user data. This command is carried out within disk drives, so no additional software is required. The erase process will not stop until it is completed. In case of power failure, the erase process will continue when the power is reapplied to the device.

3.5 S.M.A.R.T. Technology

S.M.A.R.T. is an acronym for Self-Monitoring, Analysis and Reporting Technology, an open standard allowing disk drives to automatically monitor their own health and report potential problems. It protects the user from unscheduled downtime by monitoring and storing critical drive performance and calibration parameters. Ideally, this should allow taking proactive actions to prevent impending drive failure.

Code	SMART Subcommand
D0h	READ DATA
D1h	READ ATTRIBUTE THRESHOLDS
D2h	Enable/Disable Attribute Autosave
D4h	Execute Off-line Immediate
D5h	Read Log (optional)
D6h	Write Log (optional)
D8h	Enable Operations
D9h	Disable operations
DAh	Return Status

General SMART attribute structure

Byte	Description
0	ID (Hex)
1 – 2	Status flag
3	Value
4	Worst
5*-11	Raw Data

*Byte 5: LSB

SMART attribute ID list

ID (Hex)	Attribute Name
9 (0x09)	Power-on hours
12 (0x0C)	Power cycle count
163 (0xA3)	Max. erase count
164 (0xA4)	Avg. erase count
166 (0xA6)	Total later bad block count
167 (0xA7)	SSD Protect Mode (vendor specific)
168 (0xA8)	SATA PHY Error Count
171 (0xAB)	Program Fail Count
172 (0xAC)	Erase Fail Count
175 (0xAF)	Bad Cluster Table Count
192 (0xC0)	Unexpected Power Loss Count
194 (0xC2)	Temperature
231 (0xE7)	Lifetime Left
241 (0xF1)	Total sectors of write

3.6 TRIM Command Support

Over time the performance of SSD degrades as user continually writes and erases data. The ATA-TRIM command “formats” the SSD to optimize the drive performance. A TRIM enabled SSD running an OS with TRIM support will stay closer to its peak performance without much performance variance.

3.7 SATA Power Management

The CFast card supports the following SATA power saving modes:

- ACTIVE: PHY ready, full power, Tx & Rx operational
- PARTIAL: Reduces power, resumes in under 10 μ s (microseconds)
- SLUMBER: Reduces power, resumes in under 10 ms (milliseconds)
- HIPM: Host-Initiated Power Management
- DIPM: Device-Initiated Power Management
- AUTO-SLUMBER: Automatic transition from partial to slumber.

Note:

1. The behaviors of power management features depend on host/device settings.

3.8 Write Protect Switch (Optional)

Fortasa CFast card includes a Data Write Protect Switch. See Physical Characteristics section for Write Protect Switch location.

Once the Write Protect mode is enabled, the card will exhibit a Virtual Write scheme that will allow all destructive (write or erase) commands to be accepted by the flash controller and new data temporarily stored, but no data will actually be written into the flash. Once the system is reset and rebooted, the temporarily stored data will be destroyed and nowhere to be found in the system. Since the Virtual Write scheme runs at device level, it requires no software or driver installation and is independent from the host OS. Additionally, all destructive commands will not generate a write error and will be transparent to device operation.

3.9 AES 256-bit Encryption

Fortasa's ST25-E CFast card incorporates Advanced Encryption Standard (AES) 256-bit which is an industry standard in data security and has been adopted by U.S. government and now widely used for symmetric-key data encrypting in order to meet higher level of data security requirements.

4. Environmental Specifications

4.1 Environments

Environmental specification of the CFast series follows the MIL-STD-810F standard as shown in Table 4-1.

Table 4-1: Environmental specifications

Environment		Specification
Temperature	Operation	0°C to 70°C (Standard); -40°C to 85°C (Industrial)
	Storage	-40°C to 100°C
Vibration		Non-operating : 4.02 GRMS, 15~2000 Hz/random (compliant with MIL-STD-810G) Operating : 7.69 GRMS, 20~2000 Hz/random (compliant with MIL-STD-810G)
Shock-		Non-operating : Acceleration, 1500(G)/0.5(ms)/half sine (compliant with MIL-STD-883K) Operating : Acceleration, 50(G)/11(ms)/half sine (compliant with MIL-STD-202G)

Notes:

- This Environmental Specification table indicates the conditions for testing the device. Real world usages may affect the results.
- Tc: case temperature; Ta: ambient temperature. The operating temperature is determined by the case temperature. Adequate airflow is advisable as it enables the device to maintain optimal temperatures, especially in environments with heavy workloads.

4.2 Mean Time Between Failures (MTBF)

Mean Time Between Failures (MTBF) is predicted based on reliability data for the individual components in the CFast drive. Based on provided component data, CFast is rated at more than 3,000,000 hours. The MTBF estimate is based on Telcordia Technologies Special Report, SR-332, Issue 3 method.

4.3 Certification and Compliance

The CFast card complies with the following standards:

- CE
- FCC
- RoHS
- MIL-STD-810F

4.4 Endurance

The endurance of a storage device is predicted by Drive Writes Per Day (DWPD) estimate based on several factors related to usage, such as the amount of data written into the drive, block management conditions, and daily workload for the drive. Thus, key factors, such as Write Amplifications and the number of P/E cycles, can influence the lifespan of the drive.

Capacity	Drive Writes Per Day (DWPD)
64 GB	2.50
128 GB	2.27
256 GB	2.15
512 GB	2.18

Notes:

- This estimation complies with JEDEC JESD-219, Enterprise endurance workload of random data with payload size distribution.
- Flash vendor guaranteed 3D NAND TLC P/E cycles: 3K
- WAF may vary from capacity, flash configurations and writing behavior on each platform.
- 1 Terabyte = 1,024 GB
- DWPD (Drive Write Per Day) is calculated based on the number of times that user overwrites the entire capacity of an SSD per day of its lifetime during the warranty period. (3D NAND TLC warranty: 3 years)

5. Electrical Specification

5.1 Operating Voltage

Caution: Absolute Maximum Stress Ratings – Applied conditions greater than those listed under “Absolute Maximum Stress Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these conditions or conditions greater than those defined in the operational sections of this data sheet is not implied. Exposure to absolute maximum stress rating conditions may affect device reliability.

Table 5-1: Operating range

Range	Ambient Temperature	Conditions
Standard	0°C to +70°C	3.135 V – 3.465 V
Industrial	-40°C to 85°C	

5.2 Power Consumption

Table 5-2 lists the CFast power consumption.

Table 5-2 CFast power consumption (typical)

Performance \ Capacity	64GB	128GB	256GB	512GB
	64GB	128GB	256GB	512GB
Active Mode Max (mA)	290	365	380	400
Stand-by Mode Typ (mA)	65	65	60	65

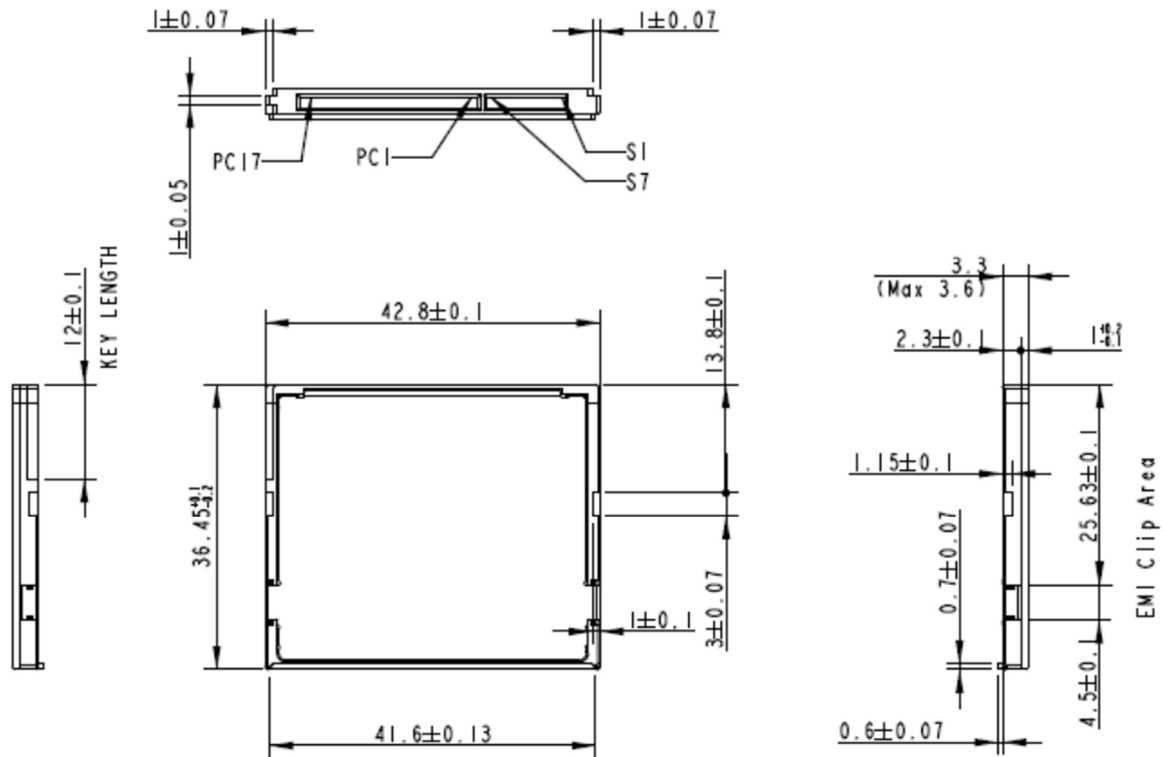
Notes:

- All values are typical and may vary depending on flash configurations or host system settings.
- Power consumption is measured using CrystalDiskMark 8.0.4 with file size 1,000MB.

6. Physical Characteristics

6.1 Dimensions

Figure 6-1 illustrates the overall dimensions of the CFast card.



Unit: mm

Figure 6-1 CFast mechanical dimensions

6.2 Write Protect Switch (Optional)

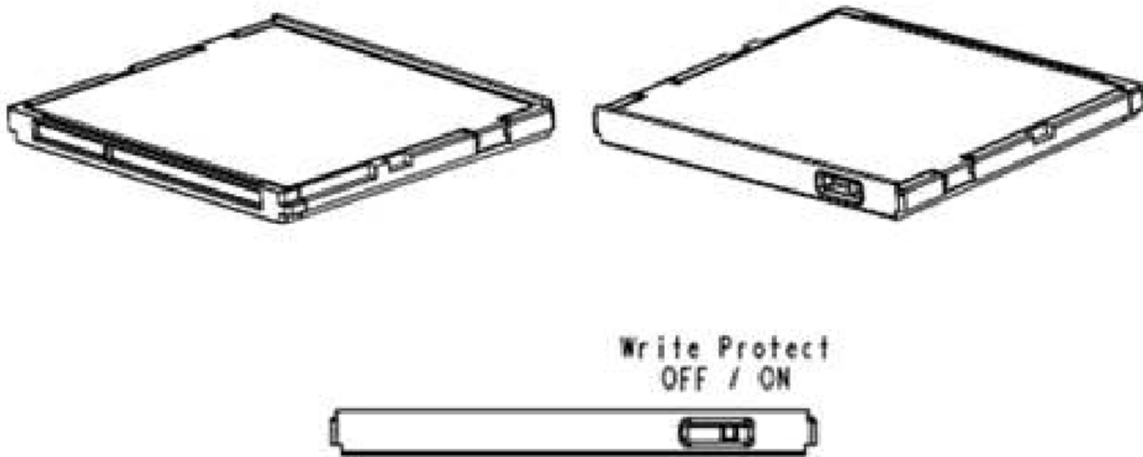
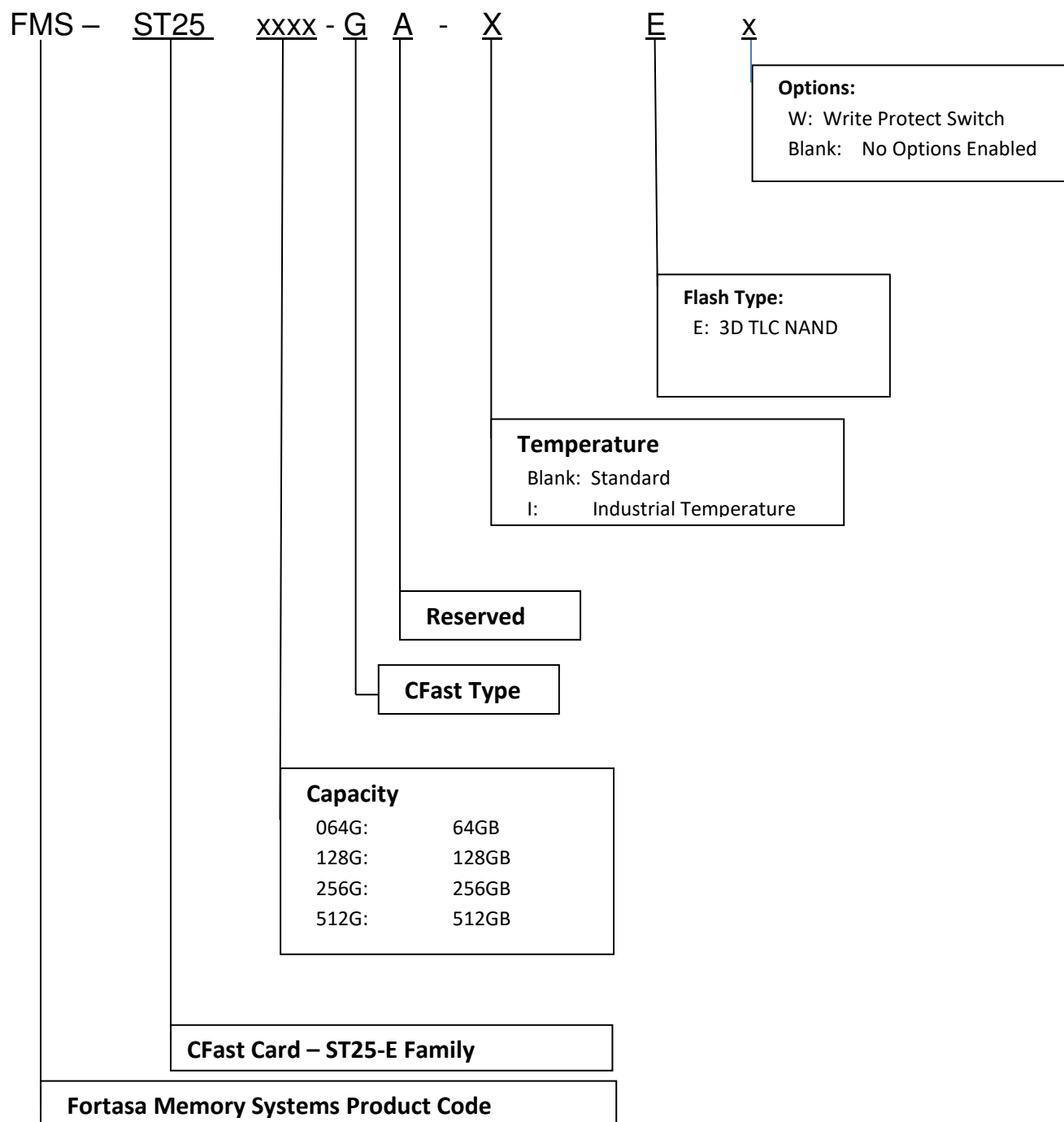


Figure 6-2 Write Protect Switch

7. Product Ordering Information

7.1 Product Code Designations



7.2 Valid Combinations

Standard Options

Capacity	Standard Temperature Model Numbers	Industrial Temperature Model Numbers
64GB	FMS-ST25064GA-E	FMS-ST25064GA-IE
128GB	FMS-ST25128GA-E	FMS-ST25128GA-IE
256GB	FMS-ST25256GA-E	FMS-ST25256GA-IE
512GB	FMS-ST25512GA-E	FMS-ST25512GA-IE

Write Protect

Capacity	Standard Temperature Model Numbers	Industrial Temperature Model Numbers
64GB	FMS-ST25064GA-EW	FMS-ST25064GA-IEW
128GB	FMS-ST25128GA-EW	FMS-ST25128GA-IEW
256GB	FMS-ST25256GA-EW	FMS-ST25256GA-IEW
512GB	FMS-ST25512GA-EW	FMS-ST25512GA-IEW

Note: Valid combinations are those products in mass production or will be in mass production. Consult your Fortasa sales representative to confirm availability of valid combinations and to determine availability of new product combinations

8. Revision History

Revision	Date	Description	Comments
1.0	9/1/2026	Initial Release	

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