DELKIN DEVICES®

CFexpress

Engineering Specification

Document Number: 401-0457-00

Revision: A

Product Overview

- **Capacities**
  - 128, 256, 512 GB
- **Form Factor**
  - CFexpress Type B
- **PCIe Interface**
  - NVMe PCIe Gen 3 x 2
- **Compliance**
  - NVMe 1.3
  - PCI Express Base 3.1
- **Performance[1]**
  - Read: up to 1600 MB/s
  - Write: up to 1000MB/s
- **Reliability**
  - Mean Time Between Failure (MTBF) More than TBD hours
  - Uncorrectable Bit Error Rate (UBER) < 1 sector per 1016 bits read
- **Advanced Flash Management**
  - Static and Dynamic Wear Leveling
  - Bad Block Management
  - TRIM
  - SMART
  - Over-Provisioning
  - Firmware Update Capability
- **Power Management**
  - Support APST
  - Support ASPM
  - Support L1.2
- **Power Consumption[2]**
  - Idle < 50 mW
  - L1.2 < 2 mW
- **Temperature Range**
  - Operation: -40°C to 85°C
  - Storage: -40°C to 85°C
- **RoHS-Compliant**
- **Features Support List:**
  - End to end data path protection
  - Thermal throttling
  - SmartECCTM
  - SmartRefreshTM
  - Drive log
  - Support of TCG OPAL[3]
  - Support of TCG Pyrite[4]

NOTES:

1. Refer to Chapter 2 Section 1.1 for more details
2. Refer to Chapter 4, Section 4.2 Power Consumption for more details.
3. Supported by a separate firmware version. Further information available upon request.
4. Supported by a separate firmware version. Further information available upon request.

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1. INTRODUCTION

1.1. General Description

Delkin's CFexpress delivers all the advantages of flash disk technology with a PCIe Gen3 x2 interface. The CFexpress is available in the capacity range from 128GB to 512GB and can reach up to 1600 MB/s read, as well as 1000 MB/s write high performance. Its lower power consumption makes it an ideal storage choice for high performance embedded platforms.

1.2. Product Block Diagram

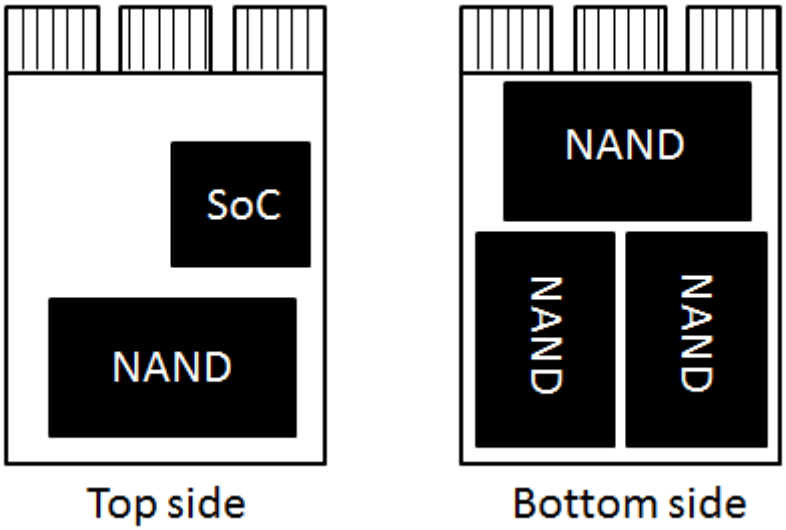

Figure 1-1 CFexpress Product Block Diagram

1.3. Flash Management

1.3.1. Error Correction Code (ECC)

Flash memory cells will deteriorate with use, which might generate random bit errors in the stored data. Thus, Delkin's CFexpress PCIe SSD applies the StrongECC™ (SECC) algorithm, which can detect and correct data errors to ensure data being read correctly and protects data from corruption.

1.3.2. Wear Leveling

NAND flash devices can only undergo a limited number of program/erase cycles, when flash media is not used

evenly, some blocks get updated more frequently than others and the lifetime of device would be reduced significantly. Thus, wear leveling is applied to extend the lifespan of NAND flash by evenly distributing write and erase cycles across the media.

Delkin provides advanced wear leveling algorithms, which can efficiently spread out the flash usage through the whole flash media area. Moreover, by implementing both dynamic and static wear leveling algorithms, the life expectancy of the NAND flash is greatly improved.

1.3.3. Bad Block Management

Bad blocks are blocks that do not function properly or contain more invalid bits causing stored data unstable, and their reliability is not guaranteed. Blocks that are identified and marked as bad by the manufacturer are referred to as “Initial Bad Blocks”. Bad blocks that are developed during the lifespan of the flash are named “Later Bad Blocks”. Delkin implements an efficient bad block management algorithm to detect the factory-produced bad blocks and manages bad blocks that appear with use. This practice prevents data being stored into bad blocks and further improves the data reliability.

1.3.4. TRIM

TRIM is a feature which helps improve the read/write performance and speed of solid state drives (SSD). Unlike hard disk drives (HDD), SSDs are not able to overwrite existing data, so the available space gradually becomes smaller with each use. With the TRIM command, the operating system can inform the SSD so that blocks of data that are no longer in use can be removed permanently. Thus, the SSD will perform the erase action, which prevents unused data from occupying blocks at all time.

1.3.5. SMART

SMART, an acronym for Self-Monitoring, Analysis and Reporting Technology, is an open standard that allows a solid-state drive to automatically detect its health and report potential failures. When a failure is recorded by SMART, users can choose to replace the drive to prevent unexpected outage or data loss. Moreover, SMART can inform users impending failures while there is still time to perform proactive actions, such as save data to another device.

1.3.6. Over-Provisioning

Over Provisioning refers to the inclusion of extra NAND capacity in a SSD, which is not visible to users nor usable by users. Therefore, it allows a SSD controller to utilize additional space for better performance and WAF. With Over Provisioning, the performance and IOPS (Input/Output Operations per Second) are improved by providing the controller additional space to manage P/E cycles, which enhances the reliability and endurance as well. Moreover, the write amplification of the SSD becomes lower when the controller writes data to the flash.

1.3.7. Firmware Upgrade

Firmware can be considered as a set of instructions on how the device communicates with the host. Firmware can be upgraded when new features are added, compatibility issues are fixed, or read/write performance gets improved.

1.3.8. Thermal Throttling

The purpose of thermal throttling is to prevent components in a SSD from over-heating during read and write operations. Delkin's CFexpress is designed with an on-die thermal sensor and with its accuracy, firmware can apply different levels of throttling to achieve the purpose of protection efficiently and proactively via SMART reading.

1.4. GuaranteedFlush™

GuaranteedFlush™ is a mechanism to prevent data loss during unexpected power failure. Delkin's controller applies the GuarenteedFLush technology, which requests the controller to transfer data to the cache. Only when the data is fully committed to the NAND flash will the controller send acknowledgement (ACK) to the host. Such implementation can prevent false-positive performance and the risk of power cycling issues.

1.5. Advanced Device Security Features

1.5.1. Secure Erase

Secure Erase is a standard NVMe format command and will write all "0xFF" to all cells, to fully wipe all the data on hard drives and SSDs. When this command is issued, SSD controller will erase its storage blocks and return to its factory default settings.

1.5.2. Crypto Erase

Crypto Erase is a feature that erases all data of an OPAL-activated SSD or a “SED” (Security-Enabled Disk) drive by resetting the cryptographic key of the disk. Since the key is modified, the previously encrypted data will become useless, achieving the purpose of data security.

1.5.3. Physical Presence SID (PSID)

Physical Presence SID (PSID) is defined by TCG OPAL as a 32-character string and the purpose is to revert SSD back to its manufacturing setting when the drive is still OPAL-activated. PSID code can printed on a SSD label when an OPAL-activated SSD supports PSID revert feature.

1.6. SSD Lifetime Management

1.6.1. Terabytes Written (TBW)

TBW (Terabytes Written) is a measurement of SSDs’ expected lifespan, which represents the amount of data written to the device. To calculate the TBW of a SSD, the following equation is applied:

TBW = [(NAND Endurance) x (SSD Capacity)] / [WAF]

NAND Endurance: NAND endurance refers to the P/E (Program/Erase) cycle rating of a NAND flash, per the manufacturer’s specification.

SSD Capacity: The SSD capacity is the specific capacity in total of a SSD.

WAF: Write Amplification Factor (WAF) is a numerical value representing the ratio between the amount of data that a SSD controller writes to the flash and the amount of data that the host’s flash controller writes. A better WAF, which is near 1, guarantees better endurance and lower frequency of data written to flash memory.

TBW in this document is based on JEDEC 218/219 workload.

1.6.2. Media Wear Indicator

Actual life indicator reported by SMART Attribute byte index [5], Percentage Used, recommends User to replace drive when reaching to 100%.

1.6.3. Read Only Mode (End of Life)

When a drive is aged by accumulated program/erase cycles, media worn-out may cause increasing numbers of later bad blocks. When the number of usable good blocks falls outside a defined usable range, the drive will notify the Host through AER event and Critical Warning to enter Read Only Mode to prevent further data corruption. This acts a notice to the user to replace the drive with another one immediately.

1.7. Adaptive Approach to Performance Tuning

1.7.1. Throughput

Based on the available space of the disk, Delkin's SSD will regulate the read/write speed and manage the throughput performance. When significant free space remains, the firmware will continuously perform read/write action. At this stage, there is still no need to implement garbage collection to allocate and release memory, which will accelerate the read/write process to improve the performance. However, when the free space is used up, the controller will slow down the read/write processing, and implement garbage collection to release memory. Hence, read/write performance will become slower.

1.7.2. Predict & Fetch

Normally, when the Host tries to read data from the PCIe SSD, the PCIe SSD will only perform one read action after receiving one command. However, Delkin's controller applies ***Predict & Fetch*** to improve the read speed. When the host issues sequential read commands to the PCIe SSD, the PCIe SSD will automatically expect that the following will also be read commands. Thus, before receiving the next command, flash has already prepared the data. Accordingly, this accelerates the data processing time, and the host does not need to wait so long to receive data.

1.7.3. SLC Caching

Delkin's controller firmware design currently adopts dynamic caching to deliver better performance for better endurance and consumer user experience.

2. PRODUCT SPECIFICATIONS

- **Capacity**
  - 128GB, 256GB and 512GB
  - Supports 32-bit addressing mode
- **Electrical/Physical Interface**
  - PCIe Interface
  - Compliant with NVMe 1.3
  - PCIe Express Base Ver 3.1
  - PCIe Gen 3 x 2 lane & backward compatible to PCIe Gen 2 and Gen 1
  - Support up to QD 128 with queue depth of up to 64K
  - Support power management
- **ECC Scheme**
  - Delkin CFexpress applies the StrongECC™ (SECC) of ECC algorithm.
- **Sector Size Support**
  - 512B
  - 4KB
- **UART/ GPIO**
- **Supports SMART and TRIM commands**
- **LBA Range**
  - IDEMA standard

1.1. Performance

With HMB (Host Memory Buffer)

Capacity	Sequential (CDM)		Random (8GB Burst)	
	Read (MB/s)	Write (MB/s)	Read (KIOPS)	Write (KIOPS)
128GB	1450	450	90	100
256GB	1550	900	180	170
512GB	1600	1000	230	180

Without HMB (Host Memory Buffer)

Capacity	Sequential (CDM)		Random (8GB Burst)	
	Read (MB/s)	Write (MB/s)	Read (KIOPS)	Write (KIOPS)
128GB	1400	450	45	80
256GB	1550	850	90	120
512GB	1550	950	120	150

NOTES:

1. Performance may differ according to flash configuration and platform.
2. Performance is measured with the following conditions
   (a) CrystalDiskMark 5.1.2, 1GB range, QD=32, Thread=1
   (b) IOMeter, 8GB range, 4K data size, QD=32 (3) ATTO, transfer Size 8192 KB

- Part Numbers

Capacity	Operating Temperature
	Industrial (-40 to 85˚C)
128GB	CX1HFRCFD-XN000-2
256GB	CX2HFRCFD-XN000-2
512GB	CX5HFQXFD-XN00-2

3. ENVIRONMENTAL SPECIFICATIONS

3.1. Environmental Conditions

3.1.1. Temperature and Humidity

Table 3-1 High Temperature

	Temperature	Humidity
Operation	85°C	0% RH
Storage	85°C	0% RH

Table 3-2 Low Temperature

	Temperature	Humidity
Operation	-40°C	0% RH
Storage	-40°C	0% RH

Table 3-3 High Humidity

	Temperature	Humidity
Operation	40°C	90% RH
Storage	40°C	93% RH

Table 3-4 Temperature Cycling

	Temperature
Operation	-40°C
	85°C[1]
Storage	-40°C
	85°C

NOTES:

1. Operation temperature is measured by device temperature sensor. Airflow is suggested and it will allow device to be operated in at appropriate temperature for each component during heavy workload environments.

3.1.2. Shock

Table 3-5 Shock

	Acceleration Force
Non-operational	1500G

3.1.3. Vibration

Table 3-6 Vibration

	Condition	
	Frequency/Displacement	**Frequency/Acceleration**
Non-operational	20Hz~80Hz/1.52mm	80Hz~2000Hz/20G

3.1.4. Drop

Table 3-7 Drop

	Height of Drop	Number of Drops
Non-operational	80cm free fall	6 face of each unit

3.1.5. Bending

Table 3-8 Bending

	Force	Action
Non-operational	≥ 20N	Hold 1min/5 times

3.1.6. Torque

Table 3-9 Torque

	Force	Action
Non-operational	0.5N-m or ±2.5 deg	Hold 1min/5 times

3.1.7. Electrostatic Discharge (ESD)

Table 3-10 ESD

Specification	+/- 4KV
EN 55024, CISPR 24 EN 61000-4-2 and IEC 61000-4-2	Device functions are affected, but EUT will be back to its normal or operational state automatically.

3.1.8. EMI Compliance

Table 3-11 EMI

Specification
EN 55032, CISPR 32(CE)
AS/NZS CISPR 32(CE)
ANSI C63.4 (FCC)
VCCI-CISPR 32 (VCCI)
CNS 13438 (BSMI)

3.2. MTBF

MTBF, Mean Time Between Failures, is a measure of a device's reliability. Its value represents the average time between a repair and the next failure. The unit of MTBF is in hours. The higher the MTBF value, the higher the reliability of the device.

Our MTBF result is based on Telcordia methodology. Please note that a lower MTBF should be expected for higher capacity drives, and we apply the lowest MTBF for all capacities.

3.3. Certification & Compliance

- RoHS
- WHQL
- PCI Express Base 3.1
- UNH-IOL NVM Express Logo

4. ELECTRICAL SPECIFICATIONS

4.1. Supply Voltage

Table 4-1 Supply Voltage

Parameter	Rating
Operating Voltage	Min = 3.14V Max = 3.47 V
Rise Time (Max/Min)	100 ms / 0.1 ms
Fall Time (Max/Min)	5s / 1 ms
Min. Off Time[1]	1s

NOTE:

1. Minimum time between power removed from SSD (Vcc < 100 mW) and power re-applied to the drive.

4.2. Power Consumption

Table 4-2 Power Consumption in mW

Capacity	Read (Max)	Write (Max)	Read (Avg.)	Write (Avg.)
128GB	2600	1800	2550	1800
256GB	2900	2400	2850	2300
512GB	3100	2600	3000	2500

NOTES:

1. Based on ambient temperature.
2. Use CrystalDiskMark 5.1.2 with the setting of 1000MB. Sequentially read and write the disk for 5 times, and measure power consumption during sequential Read [1/5]~[5/5] or sequential Write [1/5]~[5/5]
3. Power Consumption may differ according to flash configuration and platform.
4. The measured power voltage is 3.3V.

Table 4-3 Power Consumption in mW

Capacity	Seq. Write			PS3	PS4
	PS0	PS1	PS2		
128GB	1800	1600	1400	30	2
256GB	2400	2100	1700	30	2
512GB	2600	2200	1700	30	2

NOTES:

1. Based on ambient temperature.
2. The average value of power consumption is achieved based on 100% conversion efficiency.
3. The measured power voltage is 3.3V.
4. The temperature of a storage device in PS1 should remain constant or should slightly decrease for all workloads so the actual power in PS1 should be lower than PS0.
5. The temperature of a storage device in PS2 should decrease sharply for all workloads so the actual power in PS2 should be lower than PS1.

Power Save Modes - PS0 Default Operational, PS1 Light Throttle, PS2 Heavy Throttle, PS3 Non-operational with fast recover, PS4 Lowest non-zero power state.

5. INTERFACE

5.1. Pin Assignment and Descriptions

Table 5-1 lists the pin assignment of the media.

The I/O column indicates the signal direction viewed from the media: “I” indicates the signal input to the media and “O” indicates the signal output from the media. In the Connection column, “R” indicates the signal is required, “Opt” indicates the signal is optional, and “NC” indicates the signal shall not be connected.

Table 5-1 Pin Assignment and Description of CFexpress

Pin No.	Signal	I/O	Media	Host	Notes
21	GND		R	R	
20	PETp0	I	R	R	
19	PETn0	I	R	R	
18	GND		R	R	
17	PERp0	O	R	R	
16	PERn0	O	R	R	
15	GND		R	R	
14	REFCLK+	I	R	R	
13	REFCLK-	I	R	R	
12	INS#	O	R	R	1
11	CLKREQ#	O	R	Opt	2
10	+3.3V		R	R	
9	PERST#	I	R	R	
8	Reserved		NC	NC	
7	Reserved		NC	NC	4
6	PETp1	I	Opt	Opt	
5	PETn1	I	Opt	Opt	
4	GND		R	Opt	3
3	PERp1	O	Opt	Opt	
2	PERn1	O	Opt	Opt	
1	GND		R	R	

1. A host pull-up resistor in the range of 100kΩ-200kΩ is required on this pin.
2. A host pull-up resistor (≥5kΩ) is required on this pin.
3. If the PCI Express Transmitter differential pair Lane 1 and Receiver differential pair Lane 1 are implemented, this pin shall be connected to ground.
4. Note that this pin is assigned to USBEN in the XQD specification.

Table 5-2 Signal / Pin Descriptions of CFexpress

Category	Signal Name	Description
PCI Express	PETp0 PETn0 PERp0 PERn0 PETp1 PETn1 PERp1 PERn1	PCI Express 8 GT/s two Lane. 2 transmitter differential pairs and 2 receiver differential pairs.
Auxiliary	REFCLK+ REFCLK-	PCI Express differential (and spread-spectrum) reference clock.
	PERST#	PCI Express functional reset.
	INS#	This signal is used for media detection and power control.
	CLKREQ#	This signal is used to indicate when REFCLK is needed for the PCI Express interface.
Power Source	+3.3V	3.3V power
Ground	GND	Ground

6. SUPPORTED COMMANDS

6.1. NVMe Command List

Table 6-1 Admin Commands

Opcode	Command Description
00h	Delete I/O Submission Queue
01h	Create I/O Submission Queue
02h	Get Log Page
04h	Delete I/O Completion Queue
05h	Create I/O Completion Queue
06h	Identify
08h	Abort
09h	Set Features
0Ah	Get Features
0Ch	Asynchronous Event Request
10h	Firmware Activate
11h	Firmware Image Download

Table 6-2 Admin Commands – NVM Command Set Specific

Opcode	Command Description
80h	Format NVM
81h	Security Send
82h	Security Receive

Table 6-3 NVM Commands

Opcode	Command Description
00h	Flush
01h	Write
02h	Read
04h	Write Uncorrectable
08h	Write Zeroes
09h	Dataset Management

6.2. Identify Device Data

The following table details the sector data returned by the IDENTIFY DEVICE command.

Table 6-4 Identify Controller Data Structure

Bytes	O/M	Description	Default Value
01:00	M	PCI Vendor ID (VID)	0x1E33
03:02	M	PCI Subsystem Vendor ID (SSVID)	0x1E33
23:04	M	Serial Number (SN)	SN
63:24	M	Model Number (MN)	Model Number
71:64	M	Firmware Revision (FR)	FW Name
72	M	Recommended Arbitration Burst (RAB)	0x01
75:73	M	IEEE OUI Identifier (IEEE)	0x000000
76	O	Controller Multi-Path I/O and Namespace Sharing Capabilities (CMIC)	0x00
77	M	Maximum Data Transfer Size (MDTS)	0x09
79:78	M	Controller ID (CNTLID)	0x0000
83:80	M	Version (VER)	0x00010200
87:84	M	RTD3 Resume Latency (RTD3R)	0x00124F80
91:88	M	RTD3 Entry Latency (RTD3E)	0x0016E360
95:92	M	Optional Asynchronous Events Supported (OAES)	0x00000000
239:96	-	Reserved	0x0
255:240	-	Refer to the NVMe Management Interface Specification for definition	0x0
257:256	M	Optional Admin Command Support (OACS)	0x0007
258	M	Abort Command Limit (ACL)	0x00
259	M	Asynchronous Event Request Limit (AERL)	0x03
260	M	Firmware Updates (FRMW)	0x02
261	M	Log Page Attributes (LPA)	0x04
262	M	Error Log Page Entries (ELPE)	0x0F
263	M	Number of Power States Support (NPSS)	0x04
264	M	Admin Vendor Specific Command Configuration (AVSCC)	0x01
265	O	Autonomous Power State Transition Attributes (APSTA)	0x01
267:266	M	Warning Composite Temperature Threshold (WCTEMP)	0x016B
269:268	M	Critical Composite Temperature Threshold (CCTEMP)	0x016F
271:270	O	Maximum Time for Firmware Activation (MTFA)	0x0000
275:272	O	Host Memory Buffer Preferred Size (HMPRE)	0x00000000
279:276	O	Host Memory Buffer Minimum Size (HMMIN)	0x00000000
295:280	O	Total NVM Capacity (TNVMCAP)	0x0
311:296	O	Unallocated NVM Capacity (UNVMCAP)	0x0

Bytes	O/M	Description	Default Value
315:312	O	Replay Protected Memory Block Support (RPMBS)	0x00000000
511:316	-	Reserved	0x0
NVM Command Set Attributes			
512	M	Submission Queue Entry Size (SQES)	0x66
513	M	Completion Queue Entry Size (CQES)	0x44
515:514	-	Reserved	0x0000
519:516	M	Number of Namespaces (NN)	0x00000001
521:520	M	Optional NVM Command Support (ONCS)	0x001E
523:522	M	Fused Operation Support (FUSES)	0x0000
524	M	Format NVM Attributes (FNA)	0x01
525	M	Volatile Write Cache (VWC)	0x01
527:526	M	Atomic Write Unit Normal (AWUN)	0x00FF
529:528	M	Atomic Write Unit Power Fail (AWUPF)	0x0000
530	M	NVM Vendor Specific Command Configuration (NVSCC)	0x00
531	M	Reserved	0x00
533:532	O	Atomic Compare & Write Unit (ACWU)	0x0000
535:534	M	Reserved	0x0000
539:536	O	SGL Support (SGLS)	0x00000000
703:540	M	Reserved	0x0
IO Command Set Attributes			
2047:704	M	Reserved	0x0
2048:2079	M	Power State 0 Descriptor	PSD0
2111:2080	O	Power State 1 Descriptor	PSD1
2143:2112	O	Power State 2 Descriptor	PSD2
2175:2144	O	Power State 3 Descriptor	PSD3
2207:2176	O	Power State 4 Descriptor	PSD4
…	-	(N/A)	0x0
3071:3040	O	Power State 31 Descriptor	PSD31
Vendor Specific			
4095:3072	O	Vendor Specific (VS)	Reserved

Table 6-5 Identify Namespace Data Structure & NVM Command Set Specific

Bytes	Description
7:0	Namespace Size (NSZE)
15:8	Namespace Capacity (NCAP)
23:16	Namespace Utilization (NUSE)
24	Namespace Features (NSFEAT)
25	Number of LBA Formats (NLBAF)
26	Formatted LBA Size (FLBAS)
27	Metadata Capabilities (MC)
28	End-to-end Data Protection Capabilities (DPC)
29	End-to-end Data Protection Type Settings (DPS)
30	Namespace Multi-path I/O and Namespace Sharing Capabilities (NMIC)
31	Reservation Capabilities (RESCAP)
119:32	Reserved
127:120	IEEE Extended Unique Identifier (EUI64)
131:128	LBA Format 0 Support (LBAF0)
135:132	LBA Format 1 Support (LBAF1)
139:136	LBA Format 2 Support (LBAF2)
143:140	LBA Format 3 Support (LBAF3)
147:144	LBA Format 4 Support (LBAF4)
151:148	LBA Format 5 Support (LBAF5)
155:152	LBA Format 6 Support (LBAF6)
159:156	LBA Format 7 Support (LBAF7)
163:160	LBA Format 8 Support (LBAF8)
167:164	LBA Format 9 Support (LBAF9)
171:168	LBA Format 10 Support (LBAF10)
175:172	LBA Format 11 Support (LBAF11)
179:176	LBA Format 12 Support (LBAF12)
183:180	LBA Format 13 Support (LBAF13)
187:184	LBA Format 14 Support (LBAF14)
191:188	LBA Format 15 Support (LBAF15)
383:192	Reserved
4095:384	Vendor Specific (VS)

Table 6-6 List of Identify Namespace Data Structure for Each Capacity

Capacity (GB)	Byte[7:0]: Namespace Size (NSZE)
128	EE7C2B0
256	1DCF32B0
512	3B9E12B0

6.3. SMART Attributes

Table 6-7 SMART Attributes (Log Identifier 02h)

Bytes Index	Bytes	Description
[0]	1	Critical Warning
[2:1]	2	Composite Temperature
[3]	1	Available Spare
[4]	1	Available Spare Threshold
[5]	1	Percentage Used
[31:6]	26	Reserved
[47:32]	16	Data Units Read
[63:48]	16	Data Units Written
[79:64]	16	Host Read Commands
[95:80]	16	Host Write Commands
[111:96]	16	Controller Busy Time
[127:112]	16	Power Cycles
[143:128]	16	Power On Hours
[159:144]	16	Unsafe Shutdowns
[175:160]	16	Media and Data Integrity Errors
[191:176]	16	Number of Error Information Log Entries
[195:192]	4	Warning Composite Temperature Time
[199:196]	4	Critical Composite Temperature Time
[201:200]	2	Temperature Sensor 1
[203:202]	2	Temperature Sensor 2
[205:204]	2	Temperature Sensor 3
[207:206]	2	Temperature Sensor 4

7. PHYSICAL DIMENSION

CFexpress : 38.50mm (L) x 29.60mm (W) x 3.8mm (H)