

1. General Description

The amp inc 1.8" Micro SATA III SSD is a flash based disk drive with SATA 3.1 compliant interface. It provides fast read and write speeds, high reliability and its data protection make it an ideal storage solution for the server and mobile environment. It is built with Multi Level Cell (MLC) NAND Flash which is cost effective and provides exceptional reliability and performance. Due to its non-mechanical nature, it has higher shock resistance and lower access time than traditional rotating hard disk drives. Built-in ECC and EDC ensuring error-free transactions for the most demanding applications.

1.1 Density

32GB, 64GB, 128GB, 256GB

1.2 Form Factor

1.8" Type (78.50 x 54.0 x 5.0) mm

1.3 Host interface

SATA 3.1 Compliant, 6.0/3.0/1.5 Gb/s support
Native Command Queuing (up to 32 commands)
SMART Command Transport (basic)

1.4 Performance

Sequential Read transfer: Up to 260MB/s (@128K blocks)
Sequential Write transfer: Up to 260MB/s (@128K blocks)
Random Read IOPS: 30,000(@4K blocks)
Random Write IOPS: 30,000 burst/10,000 sustained (@4K blocks)
PCMark05: 40,000 (HDD test suite score)
PCMark Vantage: 43,000 (HDD test suite score)

1.5 Reliability

1.5.1 MTBF (Mean Time between Failures)

2M hours (MAX), True MTBF calculations must be based on configuration and usage requirements.

1.5.2 ECC Recovery

Up to 40 bytes correctable per 512-byte sector

1.5.3 Unrecoverable Read Errors

Read unrecoverable bit error rate (UBER) 10e-16

1.5.4 Protect Health Monitoring

Self-Monitoring, Analysis and Reporting Technology (SMART) w/ enterprise attributes

1.5.5 Operating System

Windows XP 32-Bit and 64-Bit; Windows Vista 32-Bit & 64Bit; Window 7 32-Bit & 64-Bit; Linux; Solaris 10

1.5.6 Power Requirements

Standard SATA Power Connector 3.3V

1.5.7 Performance Optimization

TRIM (requires OS support)

1.6 Power consumption

2W in operation
0.5W in standby

2. Block Diagram

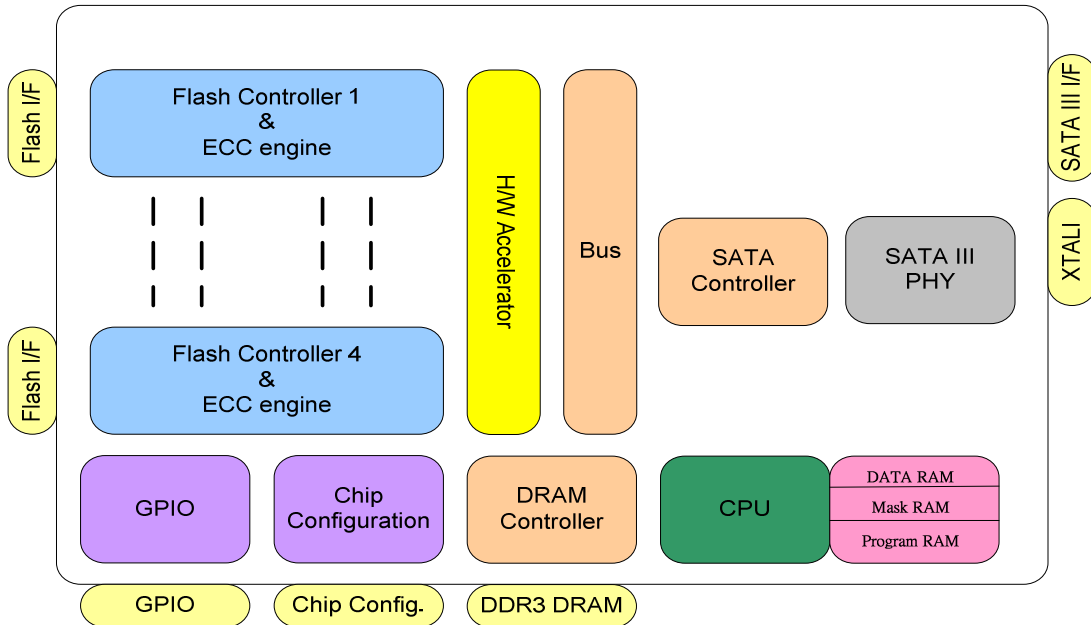


Figure 1 Block diagram

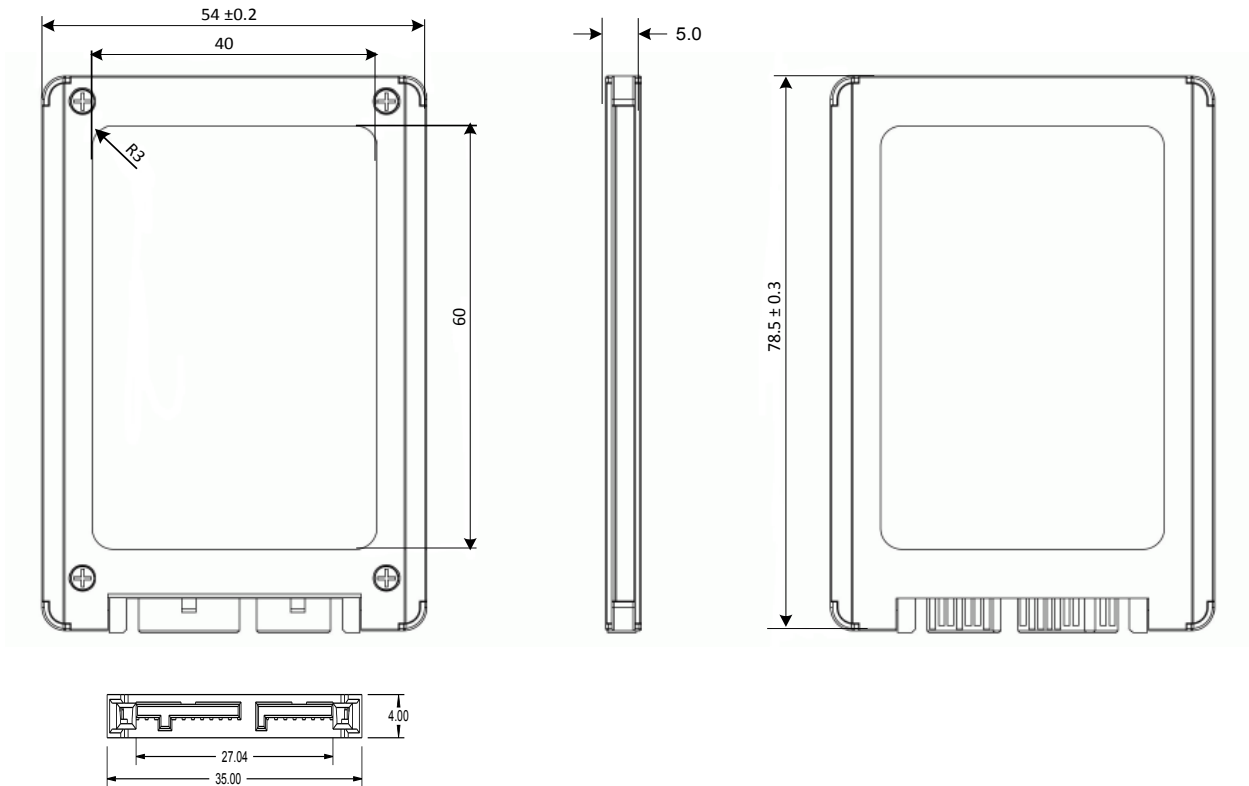
3. Environmental

- 3.1 Temperature
 - Operating: 0°C ~ 70°C (Commercial)
 - 40°C ~ 85°C (Industrial)
- 3.2 Shock
 - Operating: 50G, duration 11ms, Half Sine Wave
 - Non-Operating: 1500G, duration 0.5ms, Half Sine Wave
- 3.3 Vibration
 - Operating: 16.4G Peak, 10~2000Hz, x3 Axis

4. Device Certifications

RoHS Compliant	Restriction of Hazardous Substance Directive
UL Compliant	94V-0-1

5. Physical specifications



6. Part Numbers

Unless otherwise noted, all specifications are measured under ambient conditions, at 25°C, and nominal power. For convenience, the phrases of the drives used throughout this manual are indicated the following drive models:

AMP18T032-NM8AAC(I)	32GB
AMP18T064-NM9AAC(I)	64GB
AMP18T128-NM1AAC(I)	128GB
AMP18T256-NM2AAC(I)	256GB

* C = Commercial Temperature

* I = Industrial Temperature

6.1 Specification Summary table

The specifications listed in the table below are for quick reference. For details on specification measurement or definition, see the appropriate section of this manual.

Table 1: Specifications Summary

Drive specification	
Capacity	32GB to 256GB
Bytes per sector	512
Sustained data transfer rate(read)	260 MB/sec
Sustained data transfer rate(write)	260 MB/sec
Channels	4
Media type	Multi Layer Cell (MLC) NAND Flash
Random 4K IOPS(read)	30K
Random 4K IOPS(write)	30K
Interface	Serial ATA 3.1
I/O data-transfer rate	300 Mbytes/sec
ATA data-transfer modes supported	PIO modes 0-4, Ultra DMA modes 0-6
Total Number of User Address Sectors in LBA mode	125,045,424
Access Time	1ms
Buffer size	64MB
Height	5.00 ± 0.1mm
Width	54.0 ± 0.1mm
Length	78.50 ± 0.1mm
Weight (grams)	78
Continue read power (Typical)**	2.0 watts
Continue write power (Typical)**	2.0 watts
Idle mode power (Typical)**	0.5 watts
Standby mode power (Typical)**	0.5 watts
Sleep mode power (Typical)**	.025 watts
Voltage tolerance (including noise)	3.3V ± 5%
Ambient temperature	0°C to 70°C (Commercial)
Temperature gradient	20°C (operating)
Relative humidity (non-condensing)	50% to 95% (non-operating)
Relative humidity gradient	30% per hour max
Drive acoustics, sound power (dB)	0
Non-recoverable read errors	< 1 per 10 ¹⁶ bits read
Mean Time Before Failure (MTBF)	2 M hours (max)
Altitude	0-80000(ft)/0-24(km.)
Service life	5 years
Warranty	2 years

** Typical value under room temperature

Benchmark	Test	64 GB	Unit
		Clean	
PCMark 05	Overall Score	47,000	Point
	XP Startup	156	MB/s
	Application Loading	115	MB/s
	General HDD Usage	180	MB/s
	Virus Scan	220	MB/s
	File Write	152.030	MB/s
Iometer 2006.07.27	Sequential Write 128KB	250	MB/s
	Sequential Read 128KB	250	MB/s
	Random Write 4KB	30,000	IOPS
	Random Read 4KB	30,000	IOPS

Table: 2

6.2 Power specifications

The drive receives DC power (+3.3V) through the interface connector.

6.2.1 Conducted Noise

Input noise ripple is measured at the host system power supply across an equivalent 25-ohm resistive loading on the voltage source.

Using 3.3V power, the drive is expected to operate with a maximum of 100 mV peak-to-peak square-wave injected noise at up to 10 MHz.

Note: Equivalent resistance is calculated by dividing the nominal voltage by the typical RMS read/write current.

7. SATA interface signals and connector pins

The connector on amp inc's SSD is divided into a signal segment and a power Segment. The following tables summarize the signals on the SATA interface connector. For a detailed description of this description of these signals, refer to the Draft ATA-8 Standard.

7.1 Signal Segment Pin-out Configuration

Pin Configuration

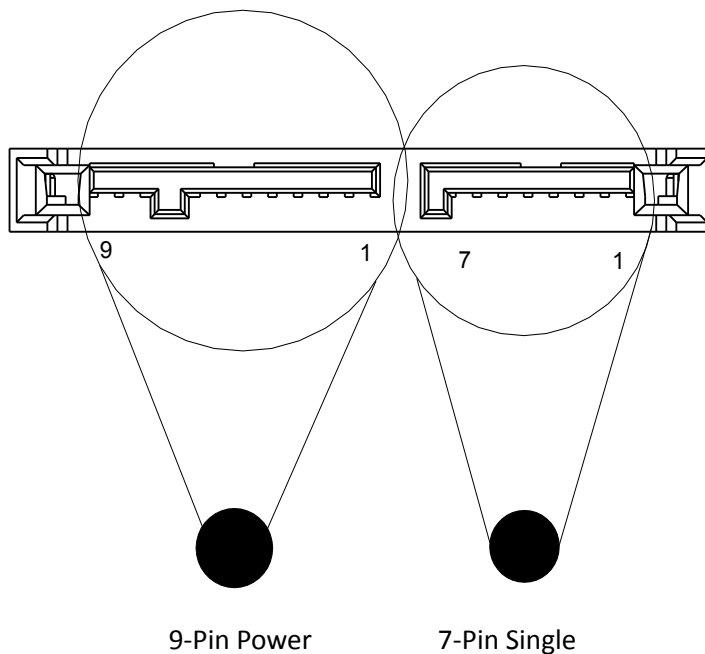


Figure 2. SATA Connector View

The SATA signal cable uses a protocol transmitted over a 7-pin cable. The following table lists the signal definitions of the 7-pin segment.

Table 3: SATA Connector Signal Definitions

Pin	Signal Name	Signal Definitions
S1	Ground	Second Mate
S2	R+	+Differential Receive Signal
S3	R-	- Differential Receive Signal
S4	Ground	Second Mate
S5	T-	-Differential Transmit Signal
S6	T+	+Differential Transmit Signal
S7	Ground	Second Mate

7.2 Power Segment Pin-out Configuration

The SATA power connector consists of 9 pins. The following table lists the single definitions of the 9-pin segment.

Table 4: SATA Connector Power segment Definitions

Pin	Signal name
P1	3.3V*
P2	3.3V*
P3	Ground
P4	Ground
P5	5V*
P6	5V*
P7	NC
P8	NC
P9	NC

* Voltage settings depend on drive's configuration.

7.3 ATA Command register

The table with the following paragraphs summarizes the ATA command set.

Table 5: Command table

Commands	Code	Comments					
		SC	SN	CY	DR	HD	FT
CHECK POWER MODE	E5h	X	X	X	O	X	X
EXECUTE DIAGNOSTICS	90h	X	X	X	O	X	X
FLUSH CACHE	E7h	X	X	X	O	O	X
IDENTIFY DEVICE	ECh	X	X	X	O	X	X
IDLE	E3h	O	X	X	O	X	X
IDLE IMMEDIATE	E1h	X	X	X	O	X	X
INITIALIZE DEVICE PARAMETERS	91h	O	X	X	O	O	X
READ DMA	C8h	O	O	O	O	O	X
READ DMA EXT	25h	O	O	O	O	O	X
READ FPDMA QUEUED	60h	O	O	O	O	O	X
READ LOG DMA EXT	47h	O	O	O	O	O	X
READ LOG EXT	2Fh	O	O	O	O	O	X
READ MULTIPLE	C4h	O	O	O	O	O	X
READ SECTOR(S)	20h or 21h	O	O	O	O	O	X
READ VERIFY SECTOR(S)	40h or 41h	O	O	O	O	O	X
RECALIBRATE	10h	X	X	X	O	X	X
SECURITY DISABLE PASSWORD	F6h	X	X	X	O	X	X
SECURITY ERASE PREPARE	F3h	X	X	X	O	X	X
SECURITY ERASE UNIT	F4h	X	X	X	O	X	X
SECURITY FREEZE LOCK	F5h	X	X	X	O	X	X
SECURITY SET PASSWORD	F1h	X	X	X	O	X	X
SECURITY UNLOCK	F2h	X	X	X	O	X	X
SEEK	7xh	X	X	O	O	O	X

SET FEATURES	EFh	O	X	X	O	X	O
SET MULTIPLE MODE	C6h	O	X	X	O	X	X
SLEEP	E6h	X	X	X	O	X	X
SMART	B0h	X	X	O	O	X	O
STANDBY	E2h	X	X	X	O	X	X
STANDBY IMMEDIATE	E0h	X	X	X	O	X	X
WRITE DMA	CAh	O	O	O	O	O	X
WRITE DMA EXT	35h	O	O	O	O	O	X
WRITE FPDMA QUEUED	61h	O	O	O	O	O	X
WRITE LOG DMA EXT	57h	O	O	O	O	O	X
WRITE LOG EXT	3Fh	O	O	O	O	O	X
WRITE MULTIPLE	C5h	O	O	O	O	O	X
WRITE SECTOR(S)	30h or 31h	O	O	O	O	O	X

Note:

- O = Vakud, X = Don't care
- SC= Sector Count Register
- SN= Sector Number Register
- CY= Cylinder Low/High Register
- DR= DEVICE SELECT Bit (DEVICE/HEAD Register Bit4)
- HD= HEAD SELECT Bit (DEVICE/HEAD Register Bit 3-0)

8. ATA Command Specifications

Identify Device (ECh)

This commands read out 512bytes of drive parameter information. Paraneter Information consists of the arrangement and value as shown in the following table. This command enables the host to receive the Identify Drive Infromation from the device.

Table 6: Identify device information default value

Word	Value	F/V	Description
0	0040h	F X F X X F X F	General configuratin bit-significant information. 15 0 = ATA device 14-8 Retired 7 1 = removable media device 6 Obsolete 5-3 Retired 2 Reserved 1 Retired 0 Reserved
1	XXXXh	X	Number of logical cylinders
2	C837h	V	Specific configuration
3	00XXh	X	Number of logical heads
4-5	XXXXh	X	Retired
6	XXXXh	X	Number of logical sector per logical track
7-8	XXXXh	V	Reserved for assignment by the CompactFlash_ Association
9	000Eh	X	Retired
10-19	XXXXh	F	Serial number (20 ASCII characters)

Word	Value	F/V	Description
20-21	XXXXh	X	Retired
22	003Fh	X	Obsolete
23-26	XXXXh	F	Firmware revision (8 ASCII characters)
27-46	XXXXh	F	Model number (40 ASCII characters)
47	8000h	F F F	15-8 80h 7-0 00h = Reserved 01h = Maximum number of 1 sectors on READ/WRITE MULTIPLE commands
48	4000h	F	Reserved
49	2F00h	F F F F F F F X	Capabilities 15-14 Reserved for the IDENTIFY PACKET DEVICE command. 13 1 = Standby timer values as specified in this standard are supported 0 = Standby timer values shall be managed by the device 12 Reserved for the IDENTIFY PACKET DEVICE command. 11 1 = IORDY supported 0 = IORDY may be supported 10 1 = IORDY may be disabled 9 1 = LBA supported 8 1 = DMA supported. 7-0 Retired
50	4000h	F F F X F	Capabilities 15 Shall be cleared to zero. 14 Shall be set to one. 13-2 Reserved. 1 Obsolete 0 Shall be set to one to indicate a device specific Standby timer value minimum
51-52	0000h	X	Obsolete
53	0007h	F F F X	15-3 Reserved 2 1 = the fields reported in word 88 are valid 0 = the fields reported in word 88 are not valid 1 1 = the fields reported in words 70:64 are valid 0 = the fields reported in words 70:64 are not valid 0 1 = the fields reported in words 58:54 are valid 0 = the fields reported in words 58:54 are not valid
54-58	XXXXh	X	Obsolete
59	0000h	F V V	15-9 Reserved 8 1 = Multiple sector setting is valid 7-0 xxh = Setting for number of sectors that shall be transferred per interrupt on R/W Multiple command
60-61	XXXXh	F	Total number of user addressable sectors
62	0000h	X	Obsolete
63	0007h	F V V V F F F F	15-11 Reserved 10 1 = Multiword DMA mode 2 is selected 0 = Multiword DMA mode 2 is not selected 9 1 = Multiword DMA mode 1 is selected 0 = Multiword DMA mode 1 is not selected 8 1 = Multiword DMA mode 0 is selected 0 = Multiword DMA mode 0 is not selected 7-3 Reserved 2 1 = Multiword DMA mode 2 and below are supported 1 1 = Multiword DMA mode 1 and below are supported 0 1 = Multiword DMA mode 0 is supported
64	0003h	F F	15-8 Reserved 7-0 Advanced PIO modes supported
65	007Bh	F	Minimum Multiword DMA transfer cycle time per word
66	0078h	F	Manufacturer's recommended Multiword DMA transfer cycle time

67	0078h	F	Minimum PIO transfer cycle time without flow control
68	0078h	F	Minimum PIO transfer cycle time with IORDY flow control
67-74	0000h	F	Reserved (for future command overlap and queuing)
75	0000h	F	Queue depth 15:5 Reserved 4:0 Maximum queue depth - 1
76	xh	F	Serial ATA Capabilities 15:13 Reserved for Serial ATA 12 1 = Supports NCQ priority information 11 1 = Supports Unload while NCQ commands are outstanding 10 1 = Supports the SATA Phy Event Counters log 9 1 = Supports receipt of host initiated power management requests 8 1 = Supports the NCQ feature set 7:4 Reserved for Serial ATA 3 1 = Supports SATA Gen3 Signaling Speed (6.0Gb/s) 2 1 = Supports SATA Gen2 Signaling Speed (3.0Gb/s) 1 1 = Supports SATA Gen1 Signaling Speed (1.5Gb/s) 0 Shall be cleared to zero
77			Reserved
78	xh		Serial ATA features supported 15:7 Reserved for Serial ATA 6 1 = Device supports Software Settings Preservation 5 Reserved for Serial ATA 4 1 = Device supports in-order data delivery 3 1 = Device supports initiating power management 2 1 = Device supports DMA Setup auto-activation 1 1 = Device supports non-zero buffer offsets 0 Shall be cleared to zero
79	xh		Serial ATA features enabled 15:7 Reserved for Serial ATA 6 1 = Software Settings Preservation enabled 5 Reserved for Serial ATA 4 1 = In-order data delivery enabled 3 1 = Device initiated power management enabled 2 1 = DMA Setup auto-activation enabled 1 1 = Non-zero buffer offsets enabled F 0 Shall be cleared to zero
80	01FEh	F F F F F F F F F F F F X X F	Major version number 0000h or FFFFh = device does not report version 15 Reserved 14 Reserved for ATA/ATAPI-14 13 Reserved for ATA/ATAPI-13 12 Reserved for ATA/ATAPI-12 11 Reserved for ATA/ATAPI-11 10 Reserved for ATA/ATAPI-10 9 Reserved for ATA/ATAPI-9 8 Reserved for ATA/ATAPI-8 7 1 = supports ATA/ATAPI-7 6 1 = supports ATA/ATAPI-6 5 1 = supports ATA/ATAPI-5 4 1 = supports ATA/ATAPI-4 3 Obsolete 2 Obsolete 1 Obsolete 0 Reserved
81	0021h	F	Minor version number
82	0086h	X F F F X F	Command set supported. 15 Obsolete 14 1 = NOP command supported 13 1 = READ BUFFER command supported 12 1 = WRITE BUFFER command supported 11 Obsolete 10 1 = Host Protected Area feature set supported

			<p>9 1 = DEVICE RESET command supported</p> <p>8 1 = SERVICE interrupt supported</p> <p>7 1 = release interrupt supported</p> <p>6 1 = look-ahead supported</p> <p>5 1 = write cache supported</p> <p>4 Shall be cleared to zero to indicate that the PACKET Command feature set is not supported.</p> <p>3 1 = mandatory Power Management feature set supported</p> <p>2 1 = Removable Media feature set supported</p> <p>1 1 = Security Mode feature set supported</p> <p>0 1 = SMART feature set supported</p>
83	5000h	<p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p>	<p>Command sets supported.</p> <p>15 Shall be cleared to zero</p> <p>14 Shall be set to one</p> <p>13-9 Reserved</p> <p>8 1 = SET MAX security extension supported</p> <p>7 Reserved</p> <p>6 1 = SET FEATURES subcommand required to spinup after power-up</p> <p>5 1 = Power-Up In Standby feature set supported</p> <p>4 1 = Removable Media Status Notification feature set supported</p> <p>3 1 = Advanced Power Management feature set supported</p> <p>2 1 = CFA feature set supported</p> <p>1 1 = READ/WRITE DMA QUEUED supported</p> <p>0 1 = DOWNLOAD MICROCODE command supported</p>
84	4000h	<p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p>	<p>Command set/feature supported extension.</p> <p>15 Shall be cleared to zero</p> <p>14 Shall be set to one</p> <p>13-2 Reserved</p> <p>1 1 = SMART self-test supported</p> <p>0 1 = SMART error logging supported</p>
85	0008h	<p>X</p> <p>F</p> <p>F</p> <p>F</p> <p>X</p> <p>V</p> <p>F</p> <p>V</p> <p>V</p> <p>V</p> <p>V</p> <p>V</p> <p>F</p> <p>F</p> <p>V</p> <p>V</p> <p>V</p>	<p>Command set/feature enabled.</p> <p>15 Obsolete</p> <p>14 1 = NOP command enabled</p> <p>13 1 = READ BUFFER command enabled</p> <p>12 1 = WRITE BUFFER command enabled</p> <p>11 Obsolete</p> <p>10 1 = Host Protected Area feature set enabled</p> <p>9 1 = DEVICE RESET command enabled</p> <p>8 1 = SERVICE interrupt enabled</p> <p>7 1 = release interrupt enabled</p> <p>6 1 = look-ahead enabled</p> <p>5 1 = write cache enabled</p> <p>4 Shall be cleared to zero to indicate that the PACKET Command feature set is not supported.</p> <p>3 1 = Power Management feature set enabled</p> <p>2 1 = Removable Media feature set enabled</p> <p>1 1 = Security Mode feature set enabled</p> <p>0 1 = SMART feature set enabled</p>
86	5000h	<p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>V</p> <p>V</p> <p>V</p> <p>F</p>	<p>Command set/feature enabled.</p> <p>15-9 Reserved</p> <p>8 1 = SET MAX security extension enabled by SET MAX SET PASSWORD</p> <p>7 See Address Offset Reserved Area Boot, INCITS TR27:2001</p> <p>6 1 = SET FEATURES subcommand required to spin-up after power-up</p> <p>5 1 = Power-Up In Standby feature set enabled</p> <p>4 1 = Removable Media Status Notification feature set enabled</p> <p>3-1 1 = Advanced Power Management feature set enabled</p> <p>0 1 = DOWNLOAD MICROCODE command supported</p>
87	4000h	<p>F</p> <p>F</p> <p>F</p> <p>F</p> <p>F</p>	<p>Command set/feature default.</p> <p>15 Shall be cleared to zero</p> <p>14 Shall be set to one</p> <p>13-2 Reserved</p> <p>1 1 = SMART self-test supported</p> <p>0 1 = SMART error logging supported</p>

88	xh	V	15-14	Reserved
			13	1 = Ultra DMA mode 5 is selected 0 = Ultra DMA mode 5 is not selected
		V	12	1 = Ultra DMA mode 4 is selected 0 = Ultra DMA mode 4 is not selected
		V	11	1 = Ultra DMA mode 3 is selected 0 = Ultra DMA mode 3 is not selected
		V	10	1 = Ultra DMA mode 2 is selected 0 = Ultra DMA mode 2 is not selected
		V	9	1 = Ultra DMA mode 1 is selected 0 = Ultra DMA mode 1 is not selected
		F	8	1 = Ultra DMA mode 0 is selected 0 = Ultra DMA mode 0 is not selected
		F	7-6	Reserved
		F	5	1 = Ultra DMA mode 5 and below are supported
		F	4	1 = Ultra DMA mode 4 and below are supported
		F	3	1 = Ultra DMA mode 3 and below are supported
			2	1 = Ultra DMA mode 2 and below are supported
			1	1 = Ultra DMA mode 1 and below are supported
			0	1 = Ultra DMA mode 0 is supported
		89	0000h	F
90	0000h	F	Time required for Enhanced security erase completion	
91	0000h	V	Current advanced power management value	
92	0000h	V	Master Password Revision Code	
93	0000h	X	Hardware reset result	
94-126	0000h	V	Reserved	
127	0000h		Removable Media Status Notification feature set support	
		F	15-2	Reserved
		F	1-0	00 = Removable Media Status Notification feature set not supported 01 = Removable Media Status Notification feature supported 10 = Reserved 11 = Reserved
128	0001h	F	Security status	
		V	15-9	Reserved
			8	Security level 0 = High, 1 = Maximum
		F	7-6	Reserved
		F	5	1 = Enhanced security erase supported
		V	4	1 = Security count expired
		V	3	1 = Security frozen
		V	2	1 = Security locked
		V	1	1 = Security enabled
F	0	1 = Security supported		
129-159	0000h	X	Vendor specific	
160-254	0000h	X	Reserved	
255	0000h	X	Integrity word	
			15-8	Checksum
			7-0	Signature
Key: F/V = Fixed/variable content F = the content of the word is fixed and does not change. For removable media devices, these values may change when media is removed or changed. V = the contents of the word is variable and may change depending on the state of the device or the commands executed by the device. X = the content of the word may be fixed or variable.				

SET FEATURES (EFh)

This command set parameter to Features register and set drive's operation. For transfer mode, parameter is set to Sector Count register. This command is used by the host to establish or select certain features.

Table 7 Features register value and settable operating mode

Value	Function
02h	Enable write cache
03h	Set transfer mode based on value in Sector Count register.
55h	Disable read look-ahead feature
82h	Disable write cache
90h	Disable use of SATA feature
AAh	Enable read look-ahead feature

9. Electrical Characteristics

9.1 Absolute Maximum Rating

Parameter	Symbol	Condition	Min	Max	Unit
Analog power supply	AVDDH		-0.5	6	V
Digital I/O power supply	DVDD		-0.5	6	V
Digital I/O input voltage	$V_{(DI)}$		-0.4	DVDD+0.4	V
Storage temperature	$T_{STORAGE}$		-40	130	°C

9.2 Recommended Power Supply Operation Conditions and Temperature

Parameter	Symbol	Condition	Min	Typical	Max	Unit
Operation digital power supply	G3V3		-5%	3.3	+5%	V
	C1V2		-5%	1.2	+5%	V
Operation analog power supply	AS1V2		-5%	1.2	+5%	V
	AS3V3		-5%	3.3	+5%	V
Operation DR1V5 power supply	DR1V5		-5%	1.5	+5%	V
Operation DRVREFF power supply	DRVREFFDQ	$V_{ref}=0.5 \times DDR_PP$	$0.49 \times DDR_PP$	V_{ref}	$0.51 \times DDR_PP$	V
Ambient operation temperature	T_A	For commercial spec.	0		70	°C
Ambient operation temperature	T_A	For industry spec.	-40		85	°C
Junction temperature	T_J				125	°C
Case operation temperature	T_C	For commercial spec and base on T_A			85	°C
Case operation temperature	T_C	For industry spec and base on T_A			100	°C
TFBGA 288 ball (@mSATA)	θ_{JC}			14.7		°C/W

9.3 Recommended External Clock Source Conditions

Parameter	Symbol	Condition	Min	Typical	Max	Unit
External reference clock					25	MHz
Clock Duty Cycle			45	50	55	%

9.4 Power Supply DC Characteristics (SATA Idle mode)

Parameter	Symbol	Condition	Min	Typical	Max	Unit
Digital Power Supply	I _{G3V3}	3.3V		2.8		mA
	I _{C1V2}	1.2V		5.0		mA
SATA Analog Power Supply	I _{AS3V3}	3.3V		1.2		mA
SATA Analog Power Supply	I _{AS1V2}	1.2V		3.1		mA
DDR PAD Power Supply	I _{DDR_PP}	1.5V		1.6		mA

9.5 Power Supply DC Characteristics (SATA Active mode, 4CH1CE SW operation)

Parameter	Symbol	Condition	Min	Typical	Max	Unit
Digital Power Supply	I _{G3V3}	3.3V		6		mA
	I _{C1V2}	1.2V		138		mA
SATA Analog Power Supply	I _{AS3V3}	3.3V		12.8		mA
SATA Analog Power Supply	I _{AS1V2}	1.2V		73		mA
DDR PAD Power Supply	I _{DDR_PP}	1.5V		74		mA

9.6 I/O DC Characteristics

Parameter	Symbol	Condition	Min	Typical	Max	Unit
Input low voltage	V _{IL}				0.2*VCCQ	V
Input high voltage	V _{IH}		0.8*VCCQ			V
Output low voltage	V _{OL}				0.4	V
Output high voltage	V _{OH}		2.4			V

9.7 Power Sequence (No DEVSLP)

Parameter	Symbol	Condition	Min	Typical	Max	Unit
Time interval between 3.3V and 1.2V/1.8V	T01		-2	0	2	ms
Time interval between last power and RSTn	T02		150	200	250	ms

9.8 Power Sequence (DEVSLP)

Parameter	Symbol	Condition	Min	Typical	Max	Unit
Time interval between 3.3V and 1.2V/1.8V	T01		-2	0	2	ms
Time interval between last power and RSTn	T02		12	-	-	ms