

# Intel® Solid-State Drive 320 Series

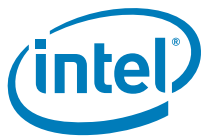
## Product Specification

- Form Factors: 1.8-inch and 2.5-inch
- Capacity:
  - 80/160/300 GB (1.8-inch)
  - 40/80/120/160/300/600 GB (2.5-inch)
- Components:
  - Intel® 25nm NAND Flash Memory
  - Multi-Level Cell (MLC)
- Bandwidth Performance<sup>1</sup> (Iometer\* Queue Depth 32)
  - Sustained Sequential Read: Up to 270 MB/s
  - Sustained Sequential Write: Up to 220 MB/s
- Read and Write IOPS<sup>1</sup> (Iometer Queue Depth 32)
  - Random 4 KB<sup>2</sup> Reads: Up to 39,500 IOPS
  - Random 4 KB Writes: Up to 23,000 IOPS
- Latency (average sequential)
  - Read: 75 µs (TYP)
  - Write: 90 µs (TYP)
- AES 128-bit Encryption
- Compatibility
  - Intel® SSD Toolbox with Intel® SSD Optimizer
  - Intel® Data Migration Software
  - Intel® Rapid Storage Technology
  - Intel® 6 Series Express Chipsets (with SATA 6Gb/s)
  - SATA Revision 2.6
  - ATA8-ACS
  - SSD-enhanced SMART ATA feature set
  - Native Command Queuing (NCQ) command set
  - Data Set Management Command Trim attribute
- Power Management
  - 3.3 V (1.8-inch form factor) or 5 V (2.5-inch form factor) SATA Supply Rail
  - SATA Interface Power Management
  - OS-aware hot plug/removal
  - Enhanced power-loss data protection
- Power
  - Active (MobileMark\* 2007 Workload): 150 mW (TYP)
  - Idle<sup>3</sup>: 100 mW (TYP)
- Temperature
  - Operating: 0° C to 70° C
  - Non-Operating: -55° C to 95° C
- Reliability
  - Uncorrectable Bit Error Rate (UBER): 1 sector per 10<sup>16</sup> bits read
  - Mean Time Between Failures (MTBF): 1,200,000 hours
- Shock (operating and non-operating): 1,500 G/0.5 msec
- Vibration
  - Operating: 2.17 G<sub>RMS</sub> (5-700 Hz)
  - Non-operating: 3.13 G<sub>RMS</sub> (5-800 Hz)
- Weight
  - 1.8-inch form factor: Up to 49 grams
  - 2.5-inch 7mm form factor: Up to 82 grams
  - 2.5-inch 9.5mm form factor: Up to 88 grams
- Certifications and Declarations:
  - UL\*
  - CE\*
  - C-Tick\*
  - BSMI\*
  - KCC\*
  - Microsoft\* WHQL
  - VCCI\*
  - SATA-IO\*
- Product Ecological Compliance
  - RoHS\*

1. Performance values vary by capacity.

2. 4 KB = 4,096 bytes.

3. Idle power measured with Device Initiated Power Management (DIPM) enabled.



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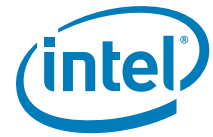


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## 1.0 Overview

This document describes the specifications and capabilities of the Intel® Solid-State Drive 320 Series (Intel® SSD 320 Series).

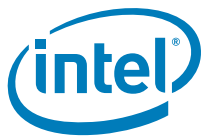
The Intel SSD 320 Series delivers leading performance for Serial Advanced Technology Attachment (SATA)-based computers in capacities up to 600 GB.

By combining Intel's leading 25nm NAND Flash Memory technology with SATA 3Gb/s interface support, the Intel SSD 320 Series delivers sequential read speeds of up to 270 MB/s and sequential write speeds of up to 220 MB/s.

The industry-standard 1.8-inch and 2.5-inch form factors enable interchangeability with existing hard disk drives (HDDs) and native SATA HDD drop-in replacement with the enhanced performance, reliability, ruggedness, and power savings offered by an SSD.

As compared to standard SATA HDDs, the Intel SSD 320 Series offers these key features:

- High I/O and throughput performance
- Low power
- Increased system responsiveness
- High reliability
- Enhanced ruggedness



## 2.0 Product Specifications

### 2.1 Capacity

**Table 1. User Addressable Sectors**

| Intel SSD 320 Series | Unformatted Capacity<br>(Total User Addressable Sectors in LBA Mode) |
|----------------------|----------------------------------------------------------------------|
| 40 GB                | 78,165,360                                                           |
| 80 GB                | 156,301,488                                                          |
| 120 GB               | 234,441,648                                                          |
| 160 GB               | 312,581,808                                                          |
| 300 GB               | 586,072,368                                                          |
| 600 GB               | 1,172,123,568                                                        |

**Notes:** 1 GB = 1,000,000,000 bytes; 1 sector = 512 bytes.

LBA count shown represents total user storage capacity and will remain the same throughout the life of the drive.

The total usable capacity of the SSD may be less than the total physical capacity because a small portion of the capacity is used for NAND flash management and maintenance purposes.

### 2.2 Performance

**Table 2. Random Read and Write Input/Output Operations Per Second (IOPS)**

| Specification <sup>1</sup> | Unit | Intel SSD 320 Series |        |        |        |        |        |
|----------------------------|------|----------------------|--------|--------|--------|--------|--------|
|                            |      | 40 GB                | 80 GB  | 120 GB | 160 GB | 300 GB | 600 GB |
| Random 4 KB Read (up to)   | IOPS | 30,000               | 38,000 | 38,000 | 39,000 | 39,500 | 39,500 |
| Random 4 KB Write (up to)  | IOPS | 3,700                | 10,000 | 14,000 | 21,000 | 23,000 | 23,000 |

**Notes:** 1. Performance measured using Iometer\* with Queue Depth equal to 32. Measurements are performed on 8 GB of Logical Block Address (LBA) range. Write Cache enabled. 4 KB = 4,096 bytes.

**Table 3. Maximum Sustained Sequential Read and Write Bandwidth**

| Specification <sup>1</sup> | Unit | Intel SSD 320 Series |       |        |        |        |        |
|----------------------------|------|----------------------|-------|--------|--------|--------|--------|
|                            |      | 40 GB                | 80 GB | 120 GB | 160 GB | 300 GB | 600 GB |
| Sequential Read (up to)    | MB/s | 200                  | 270   | 270    | 270    | 270    | 270    |
| Sequential Write (up to)   | MB/s | 45                   | 90    | 130    | 165    | 205    | 220    |

**Note:** 1. Performance measured using Iometer with Queue Depth equal to 32.

**Table 4. Latency**

| Specification                  | Intel SSD 320 Series                      |       |        |        |        |        |
|--------------------------------|-------------------------------------------|-------|--------|--------|--------|--------|
|                                | 40 GB                                     | 80 GB | 120 GB | 160 GB | 300 GB | 600 GB |
| Latency <sup>1</sup>           | 75 µs (TYP)<br>90 µs (TYP)<br>2.0 s (TYP) |       |        |        |        |        |
| Read                           |                                           |       |        |        |        |        |
| Write                          |                                           |       |        |        |        |        |
| Power On To Ready <sup>2</sup> |                                           |       |        |        |        |        |

**Notes:** 1. Based on sequential 4 KB (4,096 bytes) at Queue Depth 1 Iometer workload. Write Cache Enabled.

2. Power On To Ready time assumes proper shutdown.



## 2.3 Electrical Characteristics

**Table 5. Operating Voltage and Power Consumption**

| Electrical Characteristics         | Value  |
|------------------------------------|--------|
| Operating Voltage for 5 V (+/- 5%) |        |
| Min                                | 4.75 V |
| Max                                | 5.25 V |
| Power Consumption (Typical)        |        |
| Active <sup>1</sup>                | 150 mW |
| Idle <sup>2</sup>                  | 100 mW |

**Notes:**

1. Active power measured during execution of MobileMark\* 2007 with Device Initiated Power Management (DIPM) enabled.
2. Idle power defined as SSD at idle with DIPM enabled.

## 2.4 Environmental Conditions

**Table 6. Temperature, Shock, Vibration**

| Temperature                       | Range                                |
|-----------------------------------|--------------------------------------|
| Case Temperature                  |                                      |
| Operating                         | 0 – 70 °C                            |
| Non-operating                     | -55 – 95 °C                          |
| Temperature Gradient <sup>1</sup> |                                      |
| Operating                         | 30 (Typical) °C/hr                   |
| Non-operating                     | 30 (Typical) °C/hr                   |
| Humidity                          |                                      |
| Operating                         | 5 – 95 %                             |
| Non-operating                     | 5 – 95 %                             |
| Shock and Vibration               | Range                                |
| Shock <sup>2</sup>                |                                      |
| Operating                         | 1,500 G (Max) at 0.5 msec            |
| Non-operating                     | 1,500 G (Max) at 0.5 msec            |
| Vibration <sup>3</sup>            |                                      |
| Operating                         | 2.17 G <sub>RMS</sub> (5-700 Hz) Max |
| Non-operating                     | 3.13 G <sub>RMS</sub> (5-800 Hz) Max |

**Notes:**

1. Temperature gradient measured without condensation.
2. Shock specifications assume the SSD is mounted securely with the input vibration applied to the drive-mounting screws. Stimulus may be applied in the X, Y or Z axis. Shock specification is measured using Root Mean Squared (RMS) value.
3. Vibration specifications assume the SSD is mounted securely with the input vibration applied to the drive-mounting screws. Stimulus may be applied in the X, Y or Z axis. Vibration specification measured using Root Mean Squared (RMS) value.



## 2.5 Product Regulatory Compliance

The Intel SSD 320 Series meets or exceeds the regulatory or certification requirements in [Table 7](#).

**Table 7. Product Regulatory Compliance Specifications**

| Title                                                                            | Description                                                                                                                     | Region for which conformity declared |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| European Union Low Voltage Directive (LVD) 2006/95/EC                            | EN 60950-1 2nd edition for Information Technology Equipment - Safety - Part 1: General Requirements                             | European Union                       |
| UL/CSA 60950-1, Second Edition<br>CAN/CSA-C22.2 No. 60950-1-07<br>Second Edition | Information Technology Equipment - Safety - Part 1: General Requirements                                                        | USA/Canada                           |
| CFR Title 47 Part 15                                                             | Radio Frequency Devices - Subpart B (Unintentional Radiators)                                                                   | USA                                  |
| ICES-003 Issue 4                                                                 | Interference Causing Equipment Standard                                                                                         | Canada                               |
| EN 55022:2006                                                                    | Information technology equipment -<br>Radio disturbance characteristics -<br>Limits and methods of measurement                  | European Union                       |
| CNS 14348:2006                                                                   | Information technology equipment -<br>Radio disturbance characteristics -<br>Limits and methods of measurement                  | Taiwan                               |
| VCCI V3/2010.04                                                                  | Information technology equipment -<br>Radio disturbance characteristics -<br>Limits and methods of measurement                  | Japan                                |
| KN22 (2008-5)                                                                    | Information technology equipment -<br>Radio disturbance characteristics -<br>Limits and methods of measurement                  | Korea                                |
| CISPR 22:2006                                                                    | Information technology equipment -<br>Radio disturbance characteristics -<br>Limits and methods of measurement                  | International                        |
| EN 55024:1998                                                                    | Information technology equipment -<br>Immunity characteristics -<br>Limits and methods of measurement (CISPR 24:1997, modified) | European Union                       |
| KN24 (2008-5)                                                                    | Information technology equipment -<br>Immunity characteristics -<br>Limits and methods of measurement (CISPR 24:1997, modified) | Korea                                |





## 2.6 Reliability

The Intel SSD 320 Series meets or exceeds SSD endurance and data retention requirements as specified in the JESD218 specification.

Reliability specifications are listed in [Table 8](#).

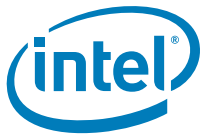
**Table 8. Reliability Specifications**

| Parameter                                                                                                                                                                                                                                                                                                                              | Value                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>Uncorrectable Bit Error Rate (UBER)</b><br><br>Uncorrectable bit error rate will not exceed one sector in the specified number of bits read. In the unlikely event of a nonrecoverable read error, the SSD will report it as a read failure to the host; the sector in error is considered corrupt and is not returned to the host. | 1 sector in $10^{16}$ bits read, max |
| <b>Mean Time Between Failure (MTBF)</b><br><br>Mean Time Between Failure is estimated based on Telcordia* methodology and demonstrated through Reliability Demonstration Test (RDT).                                                                                                                                                   | 1,200,000 hours                      |
| <b>Power On/Off Cycles</b><br><br>Power On/Off Cycles is defined as power being removed from the SSD and then restored. Most host systems remove power from the SSD when entering suspend and hibernate as well as on a system shutdown.                                                                                               | 50,000 cycles                        |
| <b>Minimum Useful Life/Endurance Rating</b><br><br>The SSD will have a minimum of five years of useful life under typical client workloads with up to 20 GB of host writes per day.                                                                                                                                                    | 5 years                              |
| <b>Insertion Cycles</b><br><br>The SSD supports up to 250 insertion/removal cycles on SATA/ power cable.                                                                                                                                                                                                                               | 250 insertion/removal cycles         |

## 2.7 Hot Plug Support

Hot Plug insertion and removal is supported in the presence of a proper connector and appropriate operating system (OS), as described in the SATA 2.6 specification.

This product supports asynchronous signal recovery and issues an unsolicited COMINIT when first mated with a powered connector to guarantee reliable detection by a host system without hardware device detection.

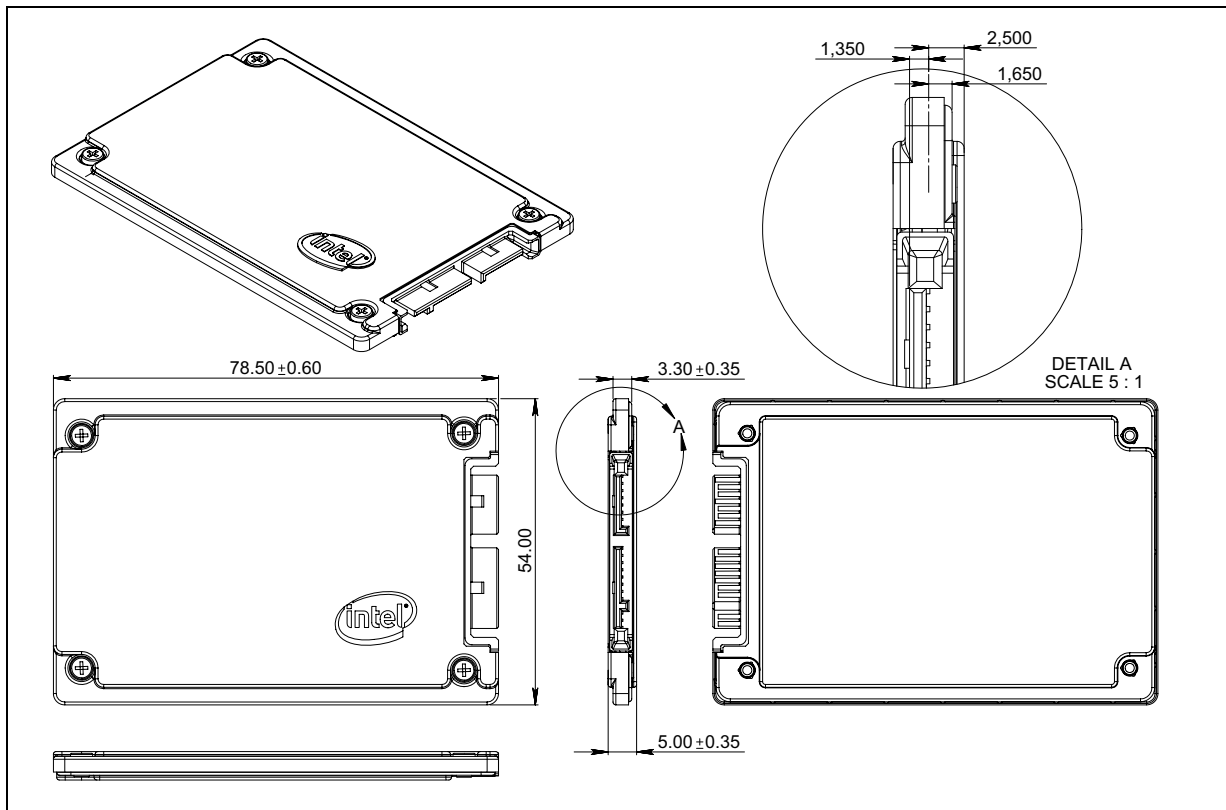


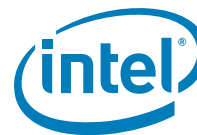
## 3.0 Mechanical Information

### 3.1 1.8-inch Form Factor

Figure 1 shows the physical package information for the 1.8-inch Intel SSD 320 Series. All dimensions are in millimeters.

Figure 1. Dimensions for 1.8-inch Form Factor





## 3.2 2.5-inch Form Factors

Figure 2 shows the physical package information for the 7mm height 2.5-inch Intel SSD 320 Series. All dimensions are in millimeters.

**Figure 2. Dimensions for 7mm 2.5-inch Form Factor**

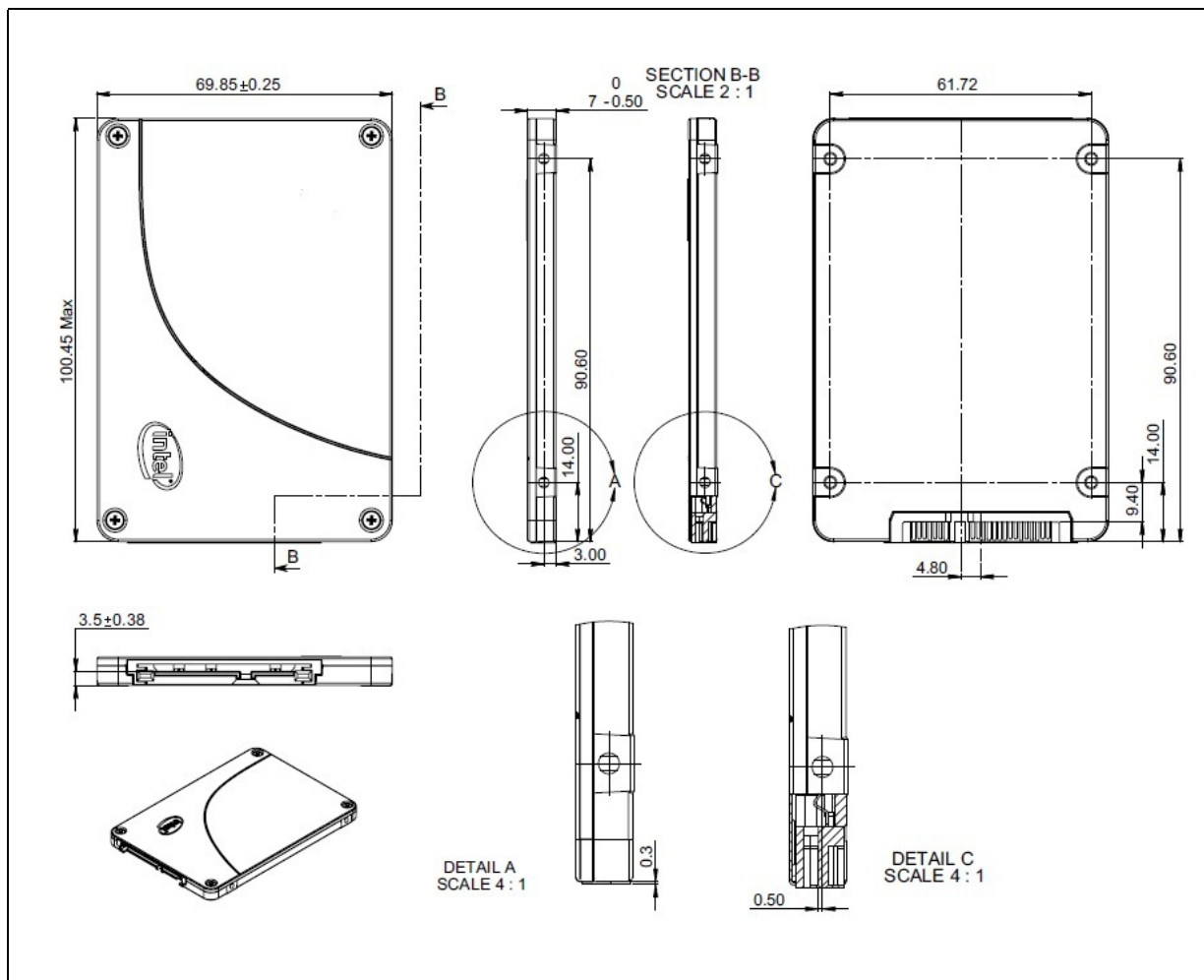
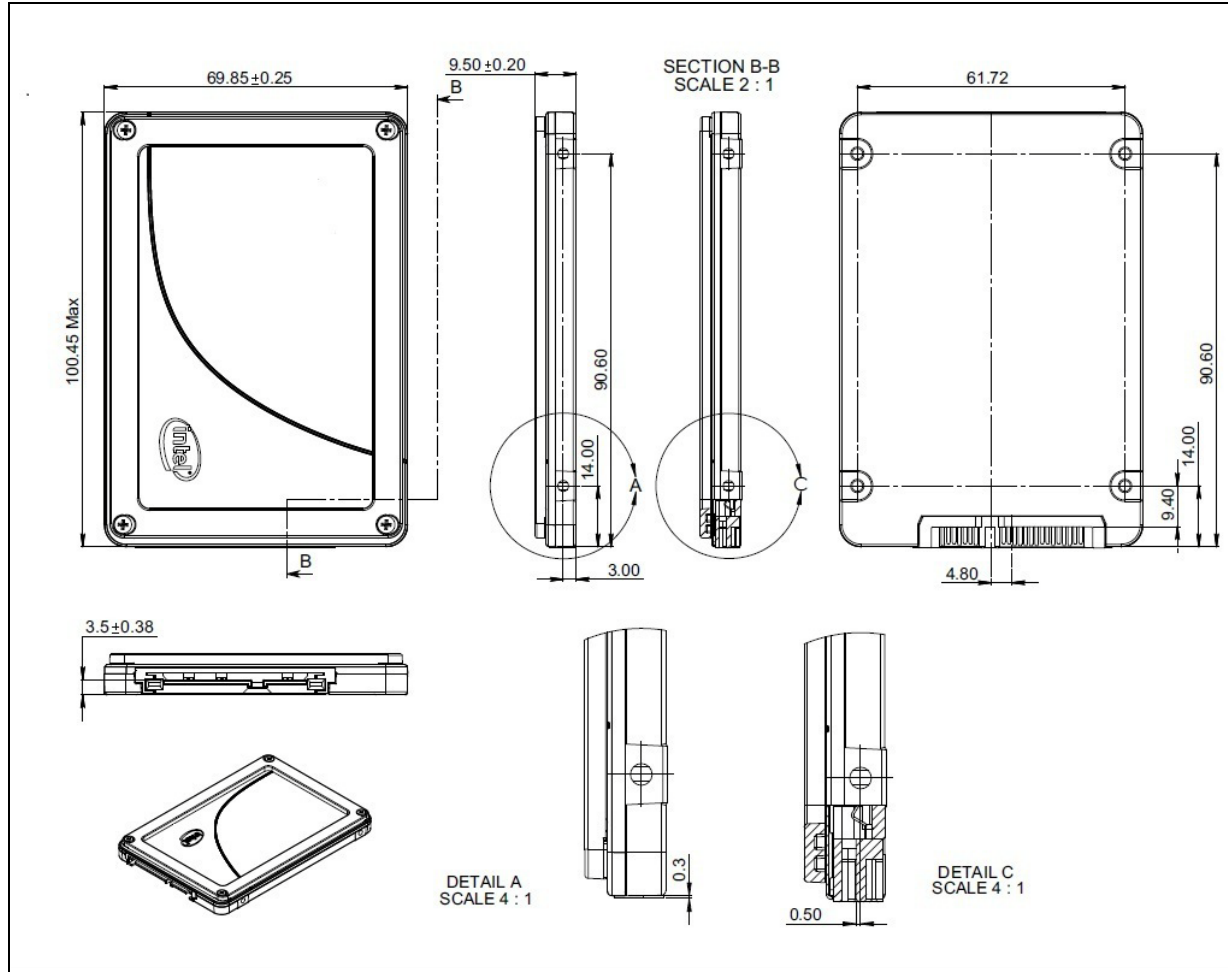


Figure 3 shows the physical package information for the 9.5mm height 2.5-inch Intel SSD 320 Series. All dimensions are in millimeters.

**Figure 3. Dimensions for 9.5mm 2.5-inch Form Factor**

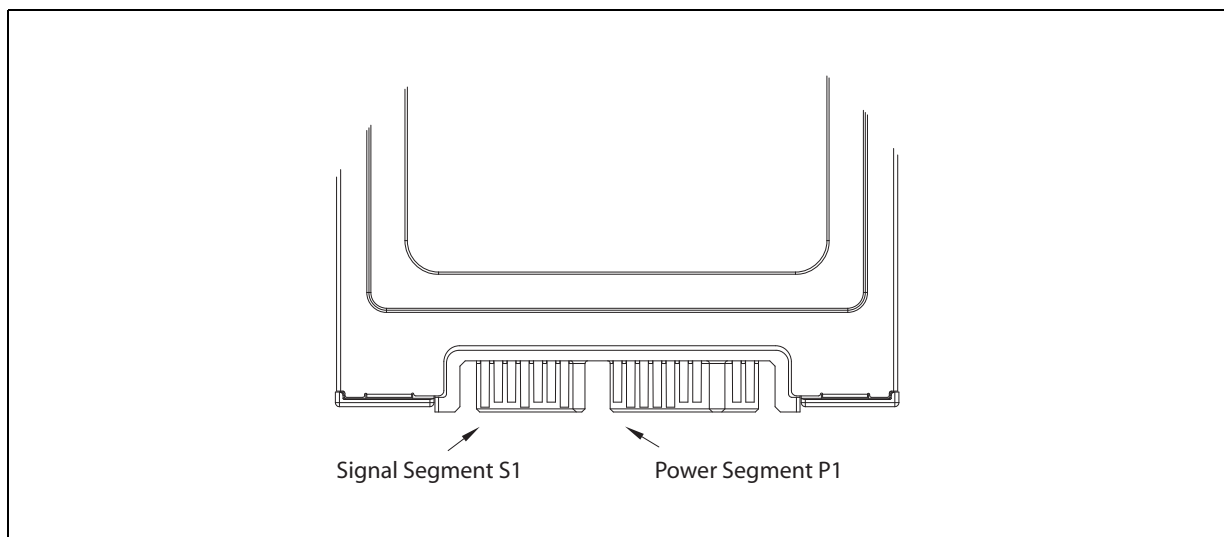


## 4.0 Pin and Signal Descriptions

### 4.1 Pin Locations

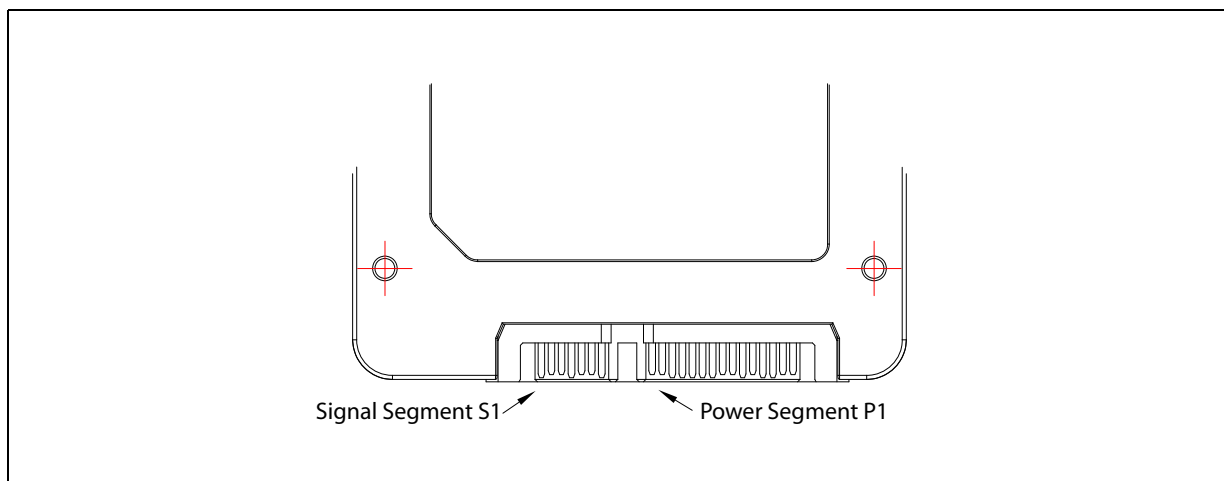
#### 4.1.1 1.8-inch Form Factor Pin Locations

**Figure 4.** Layout of Signal and Power Segment Pins



#### 4.1.2 2.5-inch Form Factor Pin Locations

**Figure 5.** Layout of Signal and Power Segment Pins



**Note:** 2.5-inch connector supports in-built latching capability.



## 4.2 Signal Descriptions

### 4.2.1 Connector Pin Signal Definitions

**Table 9. Serial ATA Connector Pin Signal Definitions — 1.8-inch and 2.5-inch Form Factors**

| Pin | Function | Definition                 |
|-----|----------|----------------------------|
| S1  | Ground   | 1st mate                   |
| S2  | A+       | Differential signal pair A |
| S3  | A-       |                            |
| S4  | Ground   | 1st mate                   |
| S5  | B-       | Differential signal pair B |
| S6  | B+       |                            |
| S7  | Ground   | 1st mate                   |

**Note:** Key and spacing separate signal and power segments.

### 4.2.2 Power Pin Signal Definitions

**Table 10. Serial ATA Power Pin Definitions — 1.8-inch Form Factor**

| Pin             | Function        | Definition               | Mating Order <sup>1</sup> |
|-----------------|-----------------|--------------------------|---------------------------|
| P1 <sup>2</sup> | V <sub>33</sub> | 3.3 V Power              | 2nd Mate                  |
| P2 <sup>2</sup> | V <sub>33</sub> | 3.3 V Power, pre-charge  | 2nd Mate                  |
| P3 <sup>3</sup> | Ground          |                          | 1st Mate                  |
| P4 <sup>3</sup> | Ground          |                          | 1st Mate                  |
| P5 <sup>4</sup> | V <sub>5</sub>  | 5 V Power. Not connected | 1st Mate                  |
| P6 <sup>4</sup> | V <sub>5</sub>  | 5 V Power. Not connected | 2nd Mate                  |
| P7 <sup>5</sup> | DAS             | Device Activity Signal   | 2nd Mate                  |
| Key             | Key             | NC                       | NC                        |
| P8 <sup>6</sup> | Optional        | Manufacturing Test Pin   | 2nd Mate                  |
| P9 <sup>6</sup> | Optional        | Manufacturing Test Pin   | 2nd Mate                  |

**Notes:**

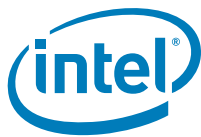
1. All mate sequences assume zero angular offset between connectors.
2. P1 and P2 are internally connected to one another within the device.
3. Ground connectors P3 and P4 may contact before the other 1st mate pins in both the power and signal connectors to discharge ESD in a suitably configure backplane connector.
4. P5 and P6 are not connected internally to the device. The host may put 5V on these pins.
5. The host may ground P7 if it is not used for Device Activity Signal (DAS).
6. P8 and P9 should not be connected by the host.

**Table 11. Serial ATA Power Pin Definitions — 2.5-inch Form Factor**

| Pin <sup>1</sup>    | Function        | Definition                | Mating Order |
|---------------------|-----------------|---------------------------|--------------|
| P1 <sup>2</sup>     | Not connected   | (3.3 V Power)             |              |
| P2 <sup>2</sup>     | Not connected   | (3.3 V Power)             |              |
| P3 <sup>2</sup>     | Not connected   | (3.3 V Power; pre-charge) | 2nd Mate     |
| P4 <sup>3,4</sup>   | Ground          |                           | 1st Mate     |
| P5 <sup>3</sup>     | Ground          |                           | 1st Mate     |
| P6 <sup>3</sup>     | Ground          |                           | 1st Mate     |
| P7 <sup>3,5</sup>   | V <sub>5</sub>  | 5 V Power                 | 1st Mate     |
| P8 <sup>3,5</sup>   | V <sub>5</sub>  | 5 V Power                 | 2nd Mate     |
| P9 <sup>3,5</sup>   | V <sub>5</sub>  | 5 V Power                 | 2nd Mate     |
| P10 <sup>3</sup>    | Ground          |                           | 1st Mate     |
| P11 <sup>6</sup>    | DAS             | Device Activity Signal    | 2nd Mate     |
| P12 <sup>3, 4</sup> | Ground          |                           | 1st Mate     |
| P13 <sup>7</sup>    | V <sub>12</sub> | 12 V Power; not used      | 1st Mate     |
| P14 <sup>7</sup>    | V <sub>12</sub> | 12 V Power; not used      | 2nd Mate     |
| P15 <sup>7</sup>    | V <sub>12</sub> | 12 V Power; not used      | 2nd Mate     |

**Notes:**

- All pins are in a single row, with a 1.27 mm (0.050-inch) pitch.
- Pins P1, P2 and P3 are connected together, although they are not connected internally to the device. The host may put 3.3 V on these pins.
- The mating sequence is:
  - the ground pins P4-P6, P10, P12 and the 5V power pin P7.
  - the signal pins and the rest of the 5V power pins P8-P9.
- Ground connectors P4 and P12 may contact before the other 1st mate pins in both the power and signal connectors to discharge ESD in a suitably configured backplane connector.
- Power pins P7, P8, and P9 are internally connected to one another within the device.
- The host may ground P11 if it is not used for Device Activity Signal (DAS).
- Pins P13, P14 and P15 are connected together, although they are not connected internally to the device. The host may put 12 V on these pins.



## 5.0 Supported Command Sets

The Intel SSD 320 Series supports all the mandatory ATA (Advanced Technology Attachment) commands defined in the ATA8-ACS specification described in this section.

### 5.1 ATA General Feature Command Set

The Intel SSD 320 Series supports the ATA General Feature command set (non-PACKET), which consists of:

- EXECUTE DEVICE DIAGNOSTIC
- FLUSH CACHE
- IDENTIFY DEVICE

**Note:** See [Appendix A, "IDENTIFY DEVICE Command Data"](#) on [page 26](#) for details on the sector data returned after issuing an IDENTIFY DEVICE command.

- READ DMA
- READ SECTOR(S)
- READ VERIFY SECTOR(S)
- SEEK
- SET FEATURES
- WRITE DMA
- WRITE SECTOR(S)
- READ MULTIPLE
- SET MULTIPLE MODE
- WRITE MULTIPLE

The Intel SSD 320 Series also supports the following optional commands:

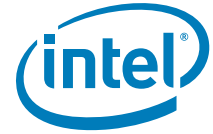
- READ BUFFER
- WRITE BUFFER
- NOP
- DOWNLOAD MICROCODE

### 5.2 Power Management Command Set

The Intel SSD 320 Series supports the Power Management command set, which consists of:

- CHECK POWER MODE
- IDLE
- IDLE IMMEDIATE
- SLEEP
- STANDBY
- STANDBY IMMEDIATE





### 5.3 Security Mode Feature Set

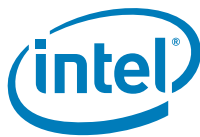
The Intel SSD 320 Series supports the Security Mode command set, which consists of:

- SECURITY SET PASSWORD
- SECURITY UNLOCK
- SECURITY ERASE PREPARE
- SECURITY ERASE UNIT
- SECURITY FREEZE LOCK
- SECURITY DISABLE PASSWORD

### 5.4 SMART Command Set

The Intel SSD 320 Series supports the SMART command set, which consists of:

- SMART READ DATA
- SMART READ ATTRIBUTE THRESHOLDS
- SMART ENABLE/DISABLE ATTRIBUTE AUTOSAVE
- SMART SAVE ATTRIBUTE VALUES
- SMART EXECUTE OFF-LINE IMMEDIATE
- SMART READ LOG SECTOR
- SMART WRITE LOG SECTOR
- SMART ENABLE OPERATIONS
- SMART DISABLE OPERATIONS
- SMART RETURN STATUS
- SMART ENABLE/DISABLE AUTOMATIC OFFLINE

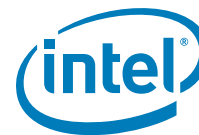


### 5.4.1 SMART Attributes

Table 12 lists the SMART attributes supported by the Intel SSD 320 Series and the corresponding status flags and threshold settings.

**Table 12. SMART Attributes**

| ID               | Attribute                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Status Flags |    |    |    |    |    | Threshold |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----|----|----|----|----|-----------|
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SP           | EC | ER | PE | OC | PW |           |
| 03h              | Spin Up Time<br>Reports a fixed value of zero (0).                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1            | 0  | 0  | 0  | 0  | 0  | 0 (none)  |
| 04h              | Start/Stop Count<br>Reports a fixed value of zero (0).                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1            | 1  | 0  | 0  | 0  | 0  | 0 (none)  |
| 05h              | Re-allocated Sector Count<br>The raw value of this attribute shows the number of retired blocks since leaving the factory (grown defect count).                                                                                                                                                                                                                                                                                                                                                                              | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| 09h              | Power-On Hours Count<br>Reports the cumulative number of power-on hours over the life of the device. However, the On/Off status of the Device Initiated Power Management (DIPM) feature will affect the number of hours reported. If DIPM is turned On, the recorded value for power-on hours does not include the time that the device is in a "slumber" state. If DIPM is turned Off, the recorded value for power-on hours should match the clock time, as all three device states are counted: active, idle and slumber. | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| 0Ch              | Power Cycle Count<br>The raw value of this attribute reports the cumulative number of power cycle events over the life of the device.                                                                                                                                                                                                                                                                                                                                                                                        | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| AAh              | Available Reserved Space                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1            | 1  | 0  | 0  | 1  | 1  | 10        |
| ABh              | Program Fail Count<br>The raw value of this attribute shows total count of program fails and the normalized value, beginning at 100, shows the percent remaining of allowable program fails.                                                                                                                                                                                                                                                                                                                                 | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| ACh              | Erase Fail Count<br>The raw value of this attribute shows total count of erase fails and the normalized value, beginning at 100, shows the percent remaining of allowable erase fails.                                                                                                                                                                                                                                                                                                                                       | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| B7h <sup>1</sup> | SATA Downshift Count<br>The count of the number of times SATA interface selected lower signaling rate due to error.                                                                                                                                                                                                                                                                                                                                                                                                          | 1            | 1  | 0  | 0  | 1  | 0  | 100       |
| B8h              | End-to-End Error Detection Count<br>Reports number of errors encountered during logical block address (LBA) tag checks, within the SSD data path.                                                                                                                                                                                                                                                                                                                                                                            | 1            | 1  | 0  | 0  | 1  | 1  | 90        |
| BBh              | Uncorrectable Error Count<br>The raw value shows the count of errors that could not be recovered using Error Correction Code (ECC).                                                                                                                                                                                                                                                                                                                                                                                          | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| C0h              | Power-Off Retract Count (Unsafe Shutdown Count)<br>The raw value of this attribute reports the cumulative number of unsafe (unclean) shutdown events over the life of the device. An unsafe shutdown occurs whenever the device is powered off without STANDBY IMMEDIATE being the last command.                                                                                                                                                                                                                             | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |

**Table 12. SMART Attributes (Continued)**

| ID               | Attribute                                                                                                                                                                                                                                                                                                                                                                                       | Status Flags |    |    |    |    |    | Threshold |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----|----|----|----|----|-----------|
|                  |                                                                                                                                                                                                                                                                                                                                                                                                 | SP           | EC | ER | PE | OC | PW |           |
| C7h <sup>1</sup> | CRC Error Count<br>The total number of encountered SATA interface cyclic redundancy check (CRC) errors.                                                                                                                                                                                                                                                                                         | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| E1h              | Host Writes<br>The raw value of this attribute reports the total number of sectors written by the host system. The raw value is increased by 1 for every 65,536 sectors (32MB) written by the host.                                                                                                                                                                                             | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| E2h              | Timed Workload Media Wear<br>Measures the wear seen by the SSD (since reset of the workload timer, attribute E4h), as a percentage of the maximum rated cycles.                                                                                                                                                                                                                                 | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| E3h              | Timed Workload Host Read/Write Ratio<br>Shows the percentage of I/O operations that are read operations (since reset of the workload timer, attribute E4h).                                                                                                                                                                                                                                     | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| E4h              | Timed Workload Timer<br>Measures the elapsed time (number of minutes since starting this workload timer).                                                                                                                                                                                                                                                                                       | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| E8h              | Available Reserved Space<br>This attribute reports the number of reserve blocks remaining. The normalized value begins at 100 (64h), which corresponds to 100 percent availability of the reserved space. The threshold value for this attribute is 10 percent availability.                                                                                                                    | 1            | 1  | 0  | 0  | 1  | 1  | 10        |
| E9h              | Media Wearout Indicator<br>This attribute reports the number of cycles the NAND media has undergone. The normalized value declines linearly from 100 to 1 as the average erase cycle count increases from 0 to the maximum rated cycles.<br>Once the normalized value reaches 1, the number will not decrease, although it is likely that significant additional wear can be put on the device. | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| F1h              | Total LBAs Written<br>Counts sectors written by the host.                                                                                                                                                                                                                                                                                                                                       | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |
| F2h              | Total LBAs Read<br>Counts sectors read by the host.                                                                                                                                                                                                                                                                                                                                             | 1            | 1  | 0  | 0  | 1  | 0  | 0 (none)  |

**Note:** 1. B7h and C7h attributes are available with firmware version 4Px10362 and later.

Table 13 defines the SMART Attribute status flags.

**Table 13. SMART Attribute Status Flags**

| Status Flag | Description                 | Value = 0                              | Value = 1                                         |
|-------------|-----------------------------|----------------------------------------|---------------------------------------------------|
| SP          | Self-preserving attribute   | Not a self-preserving attribute        | Self-preserving attribute                         |
| EC          | Event count attribute       | Not an event count attribute           | Event count attribute                             |
| ER          | Error rate attribute        | Not an error rate attribute            | Error rate attribute                              |
| PE          | Performance attribute       | Not a performance attribute            | Performance attribute                             |
| OC          | Online collection attribute | Collected only during offline activity | Collected during both offline and online activity |
| PW          | Pre-fail warranty attribute | Advisory                               | Pre-fail                                          |



### 5.4.2 SMART Logs

The Intel SSD 320 Series implements the following Log Addresses: 00h, 02h, 03h, 06h, and 07h.

The Intel SSD 320 Series implements host vendor specific logs (addresses 80h-9Fh) as read and write scratchpads, where the default value is zero (0). Intel SSD 320 Series does not write any specific values to these logs unless directed by the host through the appropriate commands.

The Intel SSD 320 Series also implements a device vendor specific log at address A9h as a read-only log area with a default value of zero (0).

## 5.5 Device Statistics

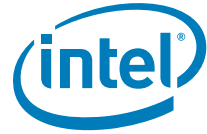
In addition to the SMART attribute structure, statistics pertaining to the operation and health of the Intel SSD 320 Series can be reported to the host on request through the Device Statistics log as defined in the ATA specification.

The Device Statistics log is a read-only GPL/SMART log located at read log address 0x04 and is accessible using READ LOG EXT, READ LOG DMA EXT or SMART READ LOG commands.

Table 14 lists the Device Statistics supported by the Intel SSD 320 Series.

**Table 14. Device Statistics Log**

| Page                                 | Offset | Description                                                          | Equivalent SMART attribute if applicable                                                                                                             |
|--------------------------------------|--------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x00                                 | -      | List of Supported Pages                                              | -                                                                                                                                                    |
| 0x01 - General Statistics            | 0x08   | Power Cycle Count                                                    | 0Ch                                                                                                                                                  |
|                                      | 0x10   | Power-On Hours                                                       | 09h                                                                                                                                                  |
|                                      | 0x18   | Logical Sectors Written                                              | E1h                                                                                                                                                  |
|                                      | 0x20   | Num Write Commands - incremented by one for every host write command | -                                                                                                                                                    |
|                                      | 0x28   | Logical Sectors Read                                                 | F2h                                                                                                                                                  |
|                                      | 0x30   | Num Read Commands - incremented by one for every host write command  | -                                                                                                                                                    |
| 0x04 - General Errors Statistics     | 0x08   | Num Reported Uncorrectable Errors                                    | BBh                                                                                                                                                  |
|                                      | 0x10   | Num Resets Between Command Acceptance and Completion                 | -                                                                                                                                                    |
| 0x06 - Transport Statistics          | 0x08   | Num Hardware Resets                                                  | -                                                                                                                                                    |
|                                      | 0x10   | Num ASR Events                                                       | -                                                                                                                                                    |
|                                      | 0x18   | CRC Error Count                                                      | -                                                                                                                                                    |
| 0x07 - Solid State Device Statistics | 0x08   | Percentage Used Endurance Indicator                                  | E9h<br>Note: This device statistic counts up from 0 rather than down from 100, and may go beyond 100 for drives that exceed their expected lifetime. |



## 5.6 SMART Command Transport (SCT)

With SMART Command Transport (SCT), a host can send commands and data to an SSD and receive status and data from an SSD using standard write/read commands to manipulate two SMART Logs:

- Log Address E0h ("SCT Command/Status") — used to send commands and retrieve status
- Log Address E1h ("SCT Data Transfer") — used to transport data

The Intel SSD 320 Series supports the following standard SCT actions:

- Write Same — Intel SSD 320 Series implements this action code as described in the ATA specification.
- Error Recovery Control — Intel SSD 320 Series accepts this action code, and will store and return error-recovery time limit values.
- Feature Control - Intel SSD 320 Series supports feature code 0001h (write cache) and feature code 0002h (write cache reordering).

## 5.7 Data Set Management Command Set

The Intel SSD 320 Series supports the Data Set Management command set Trim attribute, which consists of:

- DATA SET MANAGEMENT

## 5.8 Host Protected Area Command Set

The Intel SSD 320 Series supports the Host Protected Area command set, which consists of:

- READ NATIVE MAX ADDRESS
- SET MAX ADDRESS
- READ NATIVE MAX ADDRESS EXT
- SET MAX ADDRESS EXT

The Intel SSD 320 Series also supports the following optional commands:

- SET MAX SET PASSWORD
- SET MAX LOCK
- SET MAX FREEZE LOCK
- SET MAX UNLOCK



## 5.9 48-Bit Address Command Set

The Intel SSD 320 Series supports the 48-bit Address command set, which consists of:

- FLUSH CACHE EXT
- READ DMA EXT
- READ NATIVE MAX ADDRESS
- READ NATIVE MAX ADDRESS EXT
- READ SECTOR(S) EXT
- READ VERIFY SECTOR(S) EXT
- SET MAX ADDRESS EXT
- WRITE DMA EXT
- WRITE MULTIPLE EXT
- WRITE SECTOR(S) EXT

## 5.10 Device Configuration Overlay Command Set

The Intel SSD 320 Series supports the Device Configuration Overlay command set, which consists of:

- DEVICE CONFIGURATION FREEZE LOCK
- DEVICE CONFIGURATION IDENTITY
- DEVICE CONFIGURATION RESTORE
- DEVICE CONFIGURATION SET

## 5.11 General Purpose Log Command Set

The Intel SSD 320 Series supports the General Purpose Log command set, which consists of:

- READ LOG EXT
- WRITE LOG EXT

## 5.12 Native Command Queuing

The Intel SSD 320 Series supports the Native Command Queuing (NCQ) command set, which includes:

- READ FPDMA QUEUED
- WRITE FPDMA QUEUED

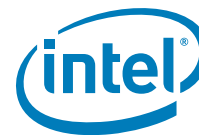
**Note:** With a maximum Queue Depth equal to 32.

## 5.13 Software Settings Preservation

The Intel SSD 320 Series supports the SET FEATURES parameter to enable/disable the preservation of software settings.

## 5.14 Device Initiated Power Management (DIPM)

The Intel SSD 320 Series supports the SET FEATURES parameter to enable Device Initiated Power Management.



## 6.0 Certifications and Declarations

Table 15 describes the Device Certifications supported by the Intel SSD 320 Series.

**Table 15. Device Certifications and Declarations**

| Certification    | Description                                                                                                                                                                                                                                                                    |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CE Compliant     | Indicates conformity with the essential health and safety requirements described in European Directives Low Voltage Directive and EMC Directive.                                                                                                                               |
| UL Certified     | Underwriters Laboratories, Inc. Component Recognition UL60950-1.                                                                                                                                                                                                               |
| C-Tick Compliant | Compliance with the Australia/New Zealand Standard AS/NZS3548 and Electromagnetic Compatibility (EMC) Framework requirements of the Australian Communication Authority (ACA).                                                                                                  |
| BSMI Compliant   | Compliance to the Taiwan EMC standard "Limits and methods of measurement of radio disturbance characteristics of information technology equipment, CNS 13438 Class B."                                                                                                         |
| KCC              | Compliance with paragraph 1 of Article 11 of the Electromagnetic Compatibility Control Regulation and meets the Electromagnetic Compatibility (EMC) Framework requirements of the Radio Research Laboratory (RRL) Ministry of Information and Communication Republic of Korea. |
| Microsoft WHQL   | Microsoft Windows Hardware Quality Labs                                                                                                                                                                                                                                        |
| RoHS Compliant   | Restriction of Hazardous Substance Directive                                                                                                                                                                                                                                   |
| VCCI             | Voluntary Control Council for Interface to cope with disturbance problems caused by personal computers or facsimile.                                                                                                                                                           |
| SATA-IO          | Indicates certified logo program from Serial ATA International Organization.                                                                                                                                                                                                   |

## 7.0 References

Table 16 identifies the standards information referenced in this document.

**Table 16. Standards References**

| Date or Rev. #                               | Title                                                                                                                                                                                                                                                                                                                                                                                                                                              | Location                                                                                                                                       |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Sept 2010                                    | Solid-State Drive (SSD) Requirements and Endurance Test Method (JESD218)                                                                                                                                                                                                                                                                                                                                                                           | <a href="http://www.jedec.org/standards-documents/docs/jesd218/">http://www.jedec.org/standards-documents/docs/jesd218/</a>                    |
| Dec 2008                                     | VCCI                                                                                                                                                                                                                                                                                                                                                                                                                                               | <a href="http://www.vcci.jp/vcci_e/">http://www.vcci.jp/vcci_e/</a>                                                                            |
| June 2009                                    | RoHS                                                                                                                                                                                                                                                                                                                                                                                                                                               | <a href="http://qdms.intel.com/">http://qdms.intel.com/</a><br>Click <i>Search MDDS Database</i> and search for material description datasheet |
| August 2009                                  | ATA8-ACS Specification                                                                                                                                                                                                                                                                                                                                                                                                                             | <a href="http://www.t13.org/">http://www.t13.org/</a>                                                                                          |
| June 2009                                    | Serial ATA Revision 2.6                                                                                                                                                                                                                                                                                                                                                                                                                            | <a href="http://www.sata-io.org/">http://www.sata-io.org/</a>                                                                                  |
| May 2006                                     | SFF-8223, 2.5-inch Drive w/Serial Attachment Connector                                                                                                                                                                                                                                                                                                                                                                                             | <a href="http://www.sffcommittee.org/">http://www.sffcommittee.org/</a>                                                                        |
| May 2005                                     | SFF-8201, 2.5-inch drive form factor                                                                                                                                                                                                                                                                                                                                                                                                               | <a href="http://www.sffcommittee.org/">http://www.sffcommittee.org/</a>                                                                        |
| 1995<br>1996<br>1995<br>1995<br>1997<br>1994 | International Electrotechnical Commission EN 61000<br>4-2 (Electrostatic discharge immunity test)<br>4-3 (Radiated, radio-frequency, electromagnetic field immunity test)<br>4-4 (Electrical fast transient/burst immunity test)<br>4-5 (Surge immunity test)<br>4-6 (Immunity to conducted disturbances, induced by radio-frequency fields)<br>4-11 (Voltage Variations, voltage dips, short interruptions and voltage variations immunity tests) | <a href="http://www.iec.ch/">http://www.iec.ch/</a>                                                                                            |
| 1995                                         | ENV 50204<br>(Radiated electromagnetic field from digital radio telephones)                                                                                                                                                                                                                                                                                                                                                                        | <a href="http://www.dbicorporation.com/radimmun.htm/">http://www.dbicorporation.com/radimmun.htm/</a>                                          |



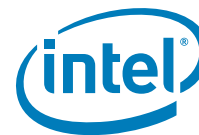
## 8.0 Terms and Acronyms

Table 17 defines the terms and acronyms used in this document.

**Table 17. Glossary of Terms and Acronyms**

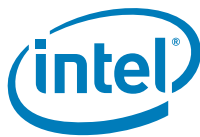
| Term  | Definition                                                                                                                                                                                               |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ATA   | Advanced Technology Attachment                                                                                                                                                                           |
| DAS   | Device Activity Signal                                                                                                                                                                                   |
| DIPM  | Device Initiated Power Management                                                                                                                                                                        |
| DMA   | Direct Memory Access                                                                                                                                                                                     |
| ECC   | Error Correction Code                                                                                                                                                                                    |
| EXT   | Extended                                                                                                                                                                                                 |
| FPDMA | First Party Direct Memory Access                                                                                                                                                                         |
| GB    | Gigabyte<br>Note: The total usable capacity of the SSD may be less than the total physical capacity because a small portion of the capacity is used for NAND flash management and maintenance purposes.  |
| HDD   | Hard Disk Drive                                                                                                                                                                                          |
| I/O   | Input/Output                                                                                                                                                                                             |
| IOPS  | Input/Output Operations Per Second                                                                                                                                                                       |
| ISO   | International Standards Organization                                                                                                                                                                     |
| KB    | Kilobyte                                                                                                                                                                                                 |
| LBA   | Logical Block Address                                                                                                                                                                                    |
| MB    | Megabyte                                                                                                                                                                                                 |
| MLC   | Multi-level Cell                                                                                                                                                                                         |
| MTBF  | Mean Time Between Failures                                                                                                                                                                               |
| NCQ   | Native Command Queuing                                                                                                                                                                                   |
| NOP   | No Operation                                                                                                                                                                                             |
| PIO   | Programmed Input/Output                                                                                                                                                                                  |
| RDT   | Reliability Demonstration Test                                                                                                                                                                           |
| RMS   | Root Mean Squared                                                                                                                                                                                        |
| RoHS  | Restriction of Hazardous Substances                                                                                                                                                                      |
| SATA  | Serial Advanced Technology Attachment                                                                                                                                                                    |
| SCT   | SMART Command Transport                                                                                                                                                                                  |
| SMART | Self-Monitoring, Analysis and Reporting Technology<br>An open standard for developing hard drives and software systems that automatically monitors the health of a drive and reports potential problems. |
| SSD   | Solid-State Drive                                                                                                                                                                                        |
| TYP   | Typical                                                                                                                                                                                                  |
| UBER  | Uncorrectable Bit Error Rate                                                                                                                                                                             |





## 9.0 Revision History

| Date           | Revision | Description                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| September 2011 | 002      | Updated <a href="#">Figure 2, "Dimensions for 7mm 2.5-inch Form Factor"</a> .<br>Updated <a href="#">Figure 3, "Dimensions for 9.5mm 2.5-inch Form Factor"</a> .<br>Updated SMART attributes ABh and ACh.<br>Added SMART attributes B7h, C7h, BBh, E2h, E3h, and E4h.<br>Changed offset 0x18 in 0x06 - Transport Statistics in <a href="#">Table 14 on page 20</a> from "Num Interface CRC Errors" to "CRC Error Count".<br>Misc. documentation changes. |
| March 2011     | 001      | Initial release.                                                                                                                                                                                                                                                                                                                                                                                                                                         |



## Appendix A IDENTIFY DEVICE Command Data

Table 18 details the sector data returned after issuing an IDENTIFY DEVICE command.

**Table 18. Returned Sector Data**

| Word  | F = Fixed<br>V = Variable<br>X = Both | Default Value | Description                                                                  |
|-------|---------------------------------------|---------------|------------------------------------------------------------------------------|
| 0     | F                                     | 0040h         | General configuration bit-significant information                            |
| 1     | X                                     | 3FFFh         | Obsolete - Number of logical cylinders (16,383)                              |
| 2     | V                                     | C837h         | Specific configuration                                                       |
| 3     | X                                     | 0010h         | Obsolete - Number of logical heads (16)                                      |
| 4-5   | X                                     | 0h            | Retired                                                                      |
| 6     | X                                     | 003Fh         | Obsolete - Number of logical sectors per logical track (63)                  |
| 7-8   | V                                     | 0h            | Reserved for assignment by the CompactFlash* Association (CFA)               |
| 9     | X                                     | 0h            | Retired                                                                      |
| 10-19 | F                                     | varies        | Serial number (20 ASCII characters)                                          |
| 20-21 | X                                     | 0h            | Retired                                                                      |
| 22    | X                                     | 0h            | Obsolete                                                                     |
| 23-26 | F                                     | varies        | Firmware revision (8 ASCII characters)                                       |
| 27-46 | F                                     | varies        | Model number (Intel® Solid-State Drive)                                      |
| 47    | F                                     | 8010h         | 7:0—Maximum number of sectors transferred per interrupt on multiple commands |
| 48    | F                                     | 0000h         | Reserved                                                                     |
| 49    | F                                     | 2F00h         | Capabilities                                                                 |
| 50    | F                                     | 4000h         | Capabilities                                                                 |
| 51-52 | X                                     | 0h            | Obsolete                                                                     |
| 53    | F                                     | 0007h         | Words 88 and 70:64 valid                                                     |
| 54    | X                                     | 3FFFh         | Obsolete - Number of logical cylinders (16,383)                              |
| 55    | X                                     | 0010h         | Obsolete - Number of logical heads (16)                                      |
| 56    | X                                     | 003Fh         | Obsolete - Number of logical sectors per logical track (63)                  |
| 57-58 | X                                     | 00FBFC10h     | Obsolete                                                                     |
| 59    | V                                     | 0110h         | Number of sectors transferred per interrupt on multiple commands             |
| 60-61 | F                                     | varies        | Total number of user-addressable sectors                                     |
| 62    | X                                     | 0h            | Obsolete                                                                     |
| 63    | F                                     | 0007h         | Multi-word DMA modes supported/selected                                      |
| 64    | F                                     | 0003h         | PIO modes supported                                                          |
| 65    | F                                     | 0078h         | Minimum multiword DMA transfer cycle time per word                           |
| 66    | F                                     | 0078h         | Manufacturer's recommended multiword DMA transfer cycle time                 |
| 67    | F                                     | 0078h         | Minimum PIO transfer cycle time without flow control                         |
| 68    | F                                     | 0078h         | Minimum PIO transfer cycle time with IORDY flow control                      |
| 69    | F                                     | 4020h         | Additional Supported                                                         |
| 70    | F                                     | 0000h         | Reserved                                                                     |
| 71-74 | F                                     | 0h            | Reserved for IDENTIFY PACKET DEVICE command                                  |

**Table 18. Returned Sector Data (Continued)**

| Word    | F = Fixed<br>V = Variable<br>X = Both | Default Value | Description                                                                                                                |
|---------|---------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------|
| 75      | F                                     | 001Fh         | Queue depth                                                                                                                |
| 76      | F                                     | 0506h         | Serial ATA capabilities                                                                                                    |
| 77      | F                                     | 0h            | Reserved for future Serial ATA definition                                                                                  |
| 78      | F                                     | 0048h         | Serial ATA features supported                                                                                              |
| 79      | V                                     | 0040h         | Serial ATA features enabled                                                                                                |
| 80      | F                                     | 01FCh         | Major version number                                                                                                       |
| 81      | F                                     | 0029h         | Minor version number                                                                                                       |
| 82      | F                                     | 746Bh         | Command set supported                                                                                                      |
| 83      | F                                     | 7D01h         | Command sets supported                                                                                                     |
| 84      | F                                     | 6163h         | Command set/feature supported extension                                                                                    |
| 85      | V                                     | 7469h         | Command set/feature enabled                                                                                                |
| 86      | V                                     | BC01h         | Command set/feature enabled                                                                                                |
| 87      | V                                     | 6163h         | Command set/feature default                                                                                                |
| 88      | V                                     | 407Fh         | Ultra DMA Modes                                                                                                            |
| 89      | F                                     | 0001h         | Time required for security erase unit completion                                                                           |
| 90      | F                                     | 0001h         | Time required for enhanced security erase completion                                                                       |
| 91      | V                                     | 0h            | Current advanced power management value                                                                                    |
| 92      | V                                     | FFFEh         | Master Password Revision Code                                                                                              |
| 93      | F                                     | 0h            | Hardware reset result: the contents of bits (12:0) of this word shall change only during the execution of a hardware reset |
| 94      | V                                     | 0h            | Vendor's recommended and actual acoustic management value                                                                  |
| 95      | F                                     | 0h            | Stream minimum request size                                                                                                |
| 96      | V                                     | 0h            | Streaming transfer time - DMA                                                                                              |
| 97      | V                                     | 0h            | Streaming access latency - DMA and PIO                                                                                     |
| 98-99   | F                                     | 0h            | Streaming performance granularity                                                                                          |
| 100-103 | V                                     | varies        | Maximum user LBA for 48-bit address feature set                                                                            |
| 104     | V                                     | 0h            | Streaming transfer time - PIO                                                                                              |
| 105     | F                                     | 0008h         | Reserved                                                                                                                   |
| 106     | F                                     | 4000h         | Physical sector size / logical sector size                                                                                 |
| 107     | F                                     | 0h            | Inter-seek delay for ISO-7779 acoustic testing in microseconds                                                             |
| 108-111 | F                                     | varies        | Unique ID                                                                                                                  |
| 112-115 | F                                     | 0h            | Reserved for world wide name extension to 128 bits                                                                         |
| 116     | V                                     | 0h            | Reserved for technical report                                                                                              |
| 117-118 | F                                     | 0h            | Words per logical sector                                                                                                   |
| 119     | F                                     | 401Ch         | Supported settings                                                                                                         |
| 120     | F                                     | 401Ch         | Command set/feature enabled/supported                                                                                      |
| 121-126 | F                                     | 0h            | Reserved                                                                                                                   |
| 127     | F                                     | 0h            | Removable Media Status Notification feature set support                                                                    |
| 128     | V                                     | 0021h         | Security status                                                                                                            |
| 129-159 | X                                     | varies        | Vendor-specific                                                                                                            |



Table 18. Returned Sector Data (Continued)

| Word    | F = Fixed<br>V = Variable<br>X = Both | Default Value | Description                                                                        |
|---------|---------------------------------------|---------------|------------------------------------------------------------------------------------|
| 160     | F                                     | 0h            | CompactFlash Association (CFA) power mode 1                                        |
| 161-168 | X                                     | 0h            | Reserved for assignment by the CFA                                                 |
| 169     | X                                     | 0001h         | Data set management Trim attribute support                                         |
| 170-173 | F                                     | 0h            | Additional Product Identifier                                                      |
| 174-175 | F                                     | 0h            | Reserved                                                                           |
| 176-205 | V                                     | 0h            | Current media serial number                                                        |
| 206     | X                                     | 003Dh         | SCT Command Transport                                                              |
| 207-208 | X                                     | 0000h         | Reserved                                                                           |
| 209     | X                                     | 0000h         | Alignment of logical blocks within a physical block                                |
| 210-211 | X                                     | 0000h         | Write-Read-Verify Sector Count Mode 3 (DWord)                                      |
| 212-213 | X                                     | 0000h         | Write-Read-Verify Sector Count Mode 2 (DWord)                                      |
| 214     | X                                     | 0000h         | NV Cache Capabilities                                                              |
| 215-216 | X                                     | 0000h         | NV Cache Size in Logical Blocks (DWord)                                            |
| 217     | X                                     | 0001h         | Nominal media rotation rate                                                        |
| 218     | X                                     | 0000h         | Reserved                                                                           |
| 219     | X                                     | 0000h         | NV Cache Options                                                                   |
| 220     | X                                     | 0000h         | Write-Read-Verify feature set                                                      |
| 221     | X                                     | 0000h         | Reserved                                                                           |
| 222     | X                                     | 101Fh         | Transport major version number                                                     |
| 223     | X                                     | 0000h         | Transport minor version number                                                     |
| 224-229 | X                                     | 0000h         | Reserved                                                                           |
| 230-233 | X                                     | 0000h         | Extended Number of User Addressable Sectors (QWord)                                |
| 234     | X                                     | 0001h         | Minimum number of 512-byte data blocks per DOWNLOAD MICROCODE command for mode 03h |
| 235     | X                                     | 0400h         | Maximum number of 512-byte data blocks per DOWNLOAD MICROCODE command for mode 03h |
| 236-254 | X                                     | 0000h         | Reserved                                                                           |
| 255     | X                                     | varies        | Integrity word                                                                     |

**Notes:** **F = Fixed.** 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 = Variable.** The state of at least one bit in a word is variable and may change depending on the state of the device or the commands executed by the device.

**X = F or V.** The content of the word may be fixed or variable.