



128MB to 16GB
IDE Flash Drive

SLFLD25xxx(M/G)M1U(I)

Solid-State IDE Flash Drive
(No Moving Parts)

Capacity: 128MB - 16GB

ATA-5 Compatible

ATA Transfer modes:

- PIO 0-6, MWDMA 0-4
- Force PIO Mode available for applications requiring PIO Modes only

Supports TrueIDE and PC Card
Memory and I/O Modes

Form Factors:

- 2.5-inch Ruggedized Enclosure with 44-pin IDE Connector

Endurance Guarantee of 2,000,000
Write/Erase Cycles

Master or Slave Select by Jumper

5V or 3.3V Power Supply

Commercial and Industrial
Operating Temperature Range

5-Byte Detection, 4-Byte Correction
ECC Engine

10 Year Data Retention

RoHS-6 Compliant

General Description and Key Features

STEC's flash storage adheres to the latest industry compliance and regulatory standards including UL, FCC, RoHS, and various compliance associations. Each device incorporates a proprietary state-of-the-art flash memory controller that provides the greatest flexibility to customer-specific applications while supporting key flash management features resulting in the industry's highest reliability and endurance. Key features include:

- Built-in ECC engine detects up to 5-byte and corrects up to 4-byte errors
- Sophisticated block management and wear leveling algorithms guarantees 2,000,000 write/erase cycles
- Power-down data protection ensures data integrity and errors in case of power loss
- Lifecycle management feature allows users to monitor the device's block management

STEC's IDE Flash Drive is the product of choice in applications requiring high reliability and high tolerance to shock, vibration, humidity, altitude, ESD, and temperature. The rugged industrial design combined with industrial temperature (-40°C to 85°C) testing and adherence to rigid JEDEC JESD22 standards ensures flawless execution in the harshest environments.

In addition to custom hardware and firmware designs, STEC also offers value-added services including:

- Custom labeling and packaging
- Custom software imaging and ID strings
- Full BOM control and product change notification
- Total supply-chain management to ensure continuity of supply
- In-field application engineering to help customers through product design-ins

Ordering Information: IDE Flash Drive

| Part Number | Form Factor | Capacity |
|--------------------|-----------------|------------|
| SLFLD25-128MM1U(I) | 2.5-inch/44-pin | 128 Mbytes |
| SLFLD25-256MM1U(I) | 2.5-inch/44-pin | 256 Mbytes |
| SLFLD25-512MM1U(I) | 2.5-inch/44-pin | 512 Mbytes |
| SLFLD25-1GM1U(I) | 2.5-inch/44-pin | 1 GByte |
| SLFLD25-2GM1U(I) | 2.5-inch/44-pin | 2 GBytes |
| SLFLD25-4GM1U(I) | 2.5-inch/44-pin | 4 GBytes |
| SLFLD25-8GM1U(I) | 2.5-inch/44-pin | 8 GBytes |
| SLFLD25-16GM1U(I) | 2.5-inch/44-pin | 16 GBytes |

Legend:

- **SLFLD** = STEC standard IDE Flash Drive part number prefix.
- **25** = 2.5-inch form factor.
- **(M/G)** = proceeding capacity (xxx) is in Megabytes (M) or Gigabytes (G).
- **M1** = STEC Mach 1 controller.
- **U** = RoHS-6 compliant lead-free.
- **Part numbers without (I) = Commercial** temperature range (0°C to 70°C).
- **(I)** = Industrial temperature range (-40°C to +85 °C).
- **P** = forced PIO mode (as shown in Table 11).
Example: SLFLD25-xxx(M/G)M1U(I)-P.

Table of Contents

| | |
|---|-----------|
| General Description and Key Features..... | 1 |
| Ordering Information: IDE Flash Drive | 1 |
| 1.0 Product Specifications | 3 |
| 1.1 Labeling | 3 |
| 1.2 Package Dimensions and Pin Locations | 4 |
| 1.3 Master/Slave Jumper Settings..... | 5 |
| 1.4 Pin Assignment..... | 6 |
| 1.5 Signal Descriptions | 7 |
| 1.6 Performance | 8 |
| 1.7 CHS Parameters | 8 |
| 1.8 Standards Compliance | 9 |
| 1.8.1 CE and FCC Class B & D | 9 |
| 1.8.2 RoHS..... | 9 |
| 2.0 Environmental Specifications..... | 10 |
| 2.1 Recommended Operating Conditions | 10 |
| 2.2 Reliability | 10 |
| 2.3 Shock, Vibration, and Humidity | 10 |
| 3.0 Electrical Specifications | 11 |
| 3.1 Absolute Maximum Ratings..... | 11 |
| 3.2 DC Characteristics..... | 11 |
| 3.3 AC Characteristics..... | 12 |
| 3.3.1 True IDE Mode Register Access..... | 12 |
| 3.3.2 True IDE Mode PIO Access..... | 13 |
| 3.3.3 True IDE Mode Multiword DMA (not used on pn's with Forced PIO)..... | 15 |
| 4.0 Identify Drive Parameter Information | 16 |
| 5.0 Registers | 17 |
| 6.0 Supported ATA Commands | 18 |
| 7.0 Revision History | 20 |

1.0 Product Specifications

1.1 Labeling

STEC IDE Flash Drives can be manufactured with standard labeling, or customer-specific, custom labeling. Standard labeling is shown in Figure 1.

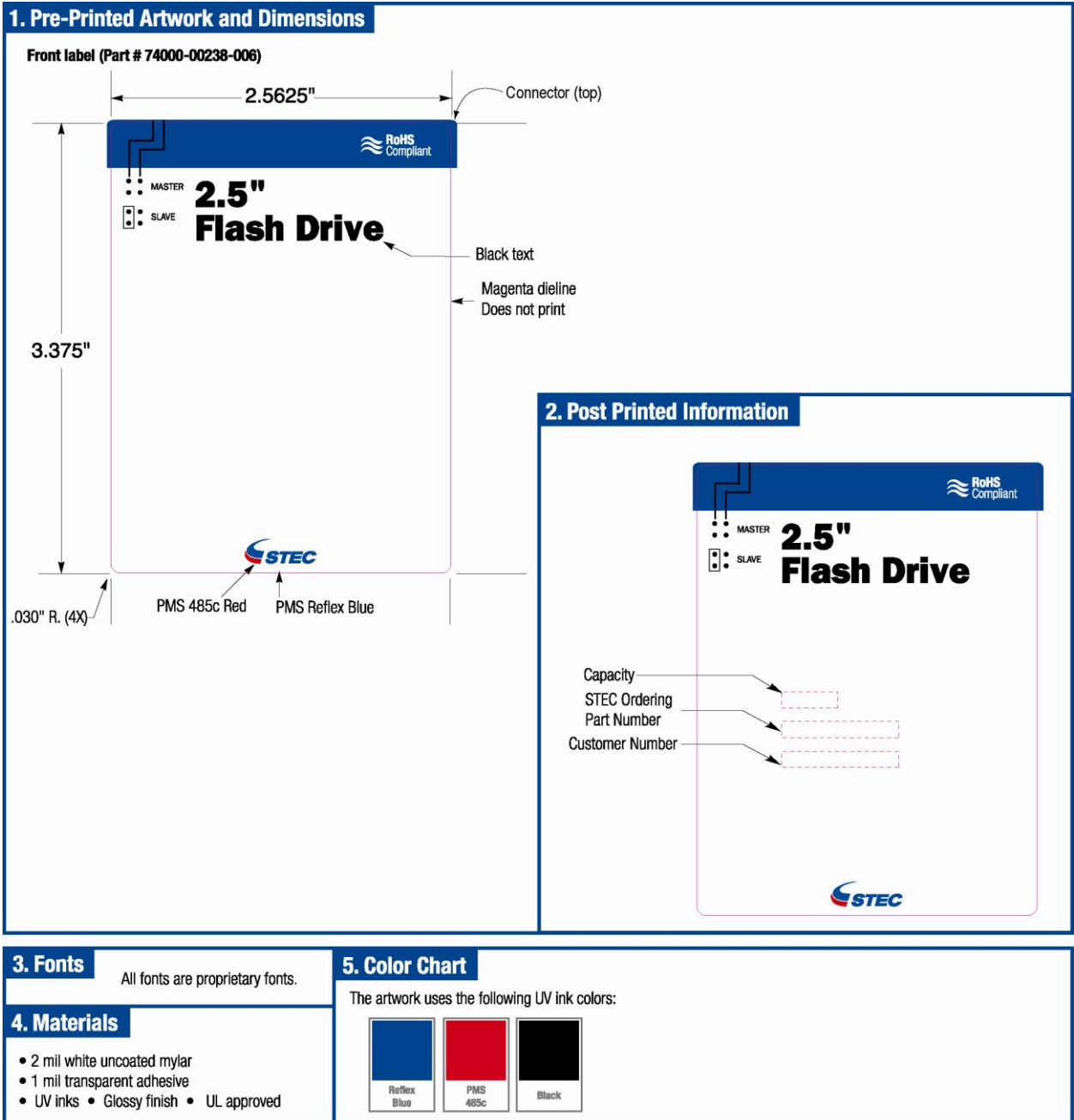


Figure 1: Standard Labeling

1.2 Package Dimensions and Pin Locations

Table 1 and Figure 2 show the mechanical dimensions of the 2.5-inch IDE Flash Drive.

Table 1: Mechanical dimensions 2.5-Inch IDE Flash Drive

| Parameter | Value |
|-------------------------------|--------------------------------------|
| Length | 100.20 ± 0.127 mm (3.945 ± 0.005 in) |
| Width | 69.85 ± 0.127 mm (2.750 ± 0.005 in) |
| Height (including label area) | 9.5 mm (0.375 in) max |

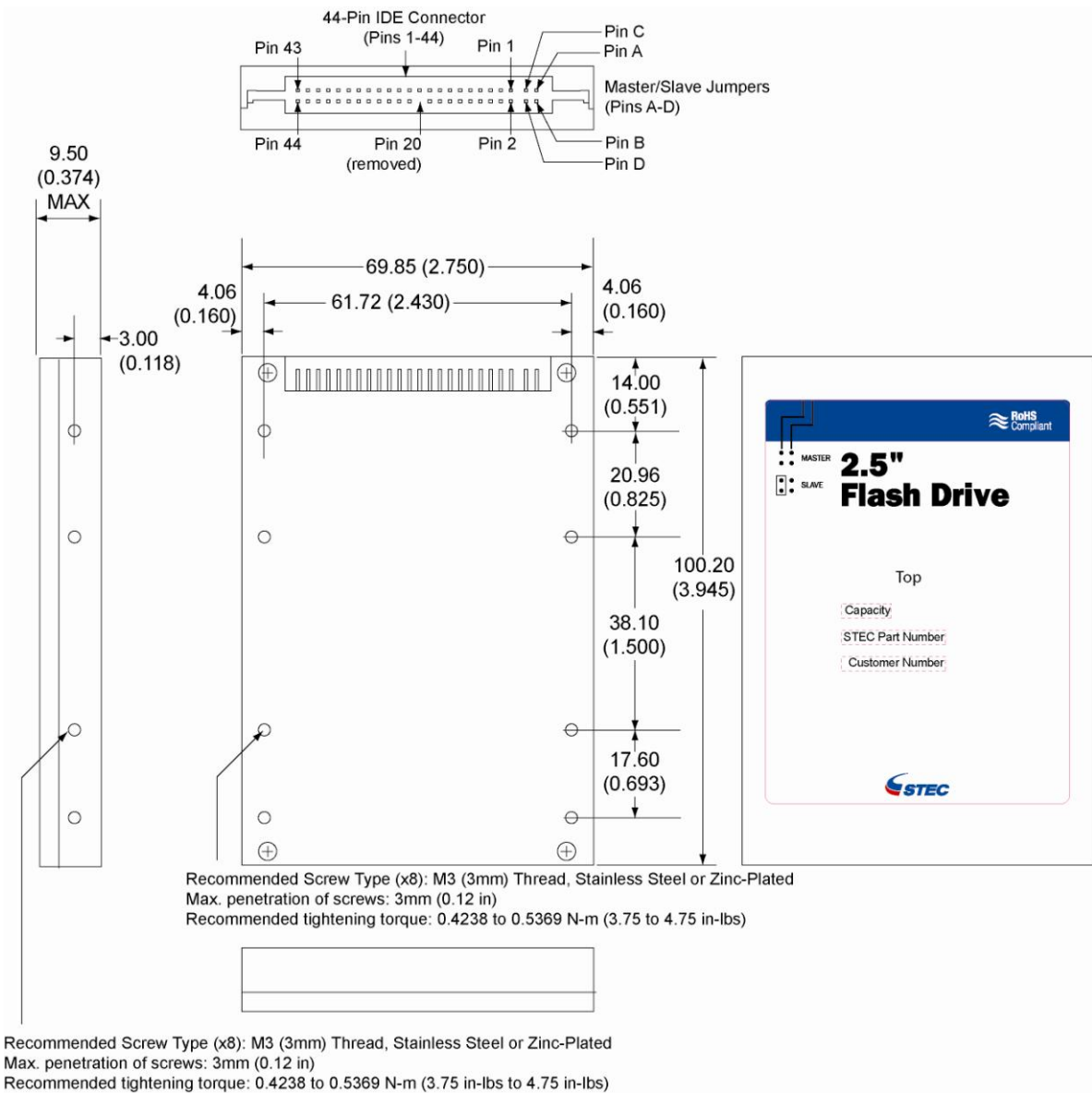
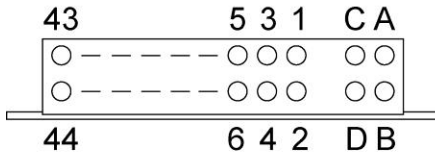
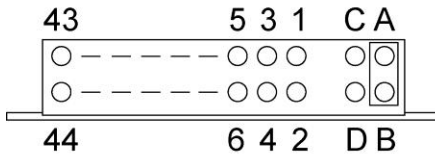


Figure 2: Mechanical dimensions 2.5-Inch IDE Flash Drive

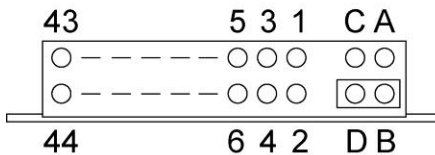
1.3 Master/Slave Jumper Settings



If all pins A, B, C, and D are open, the drive is in master mode.



If pin A is jumpered to pin B, the drive is in slave mode.



If pin B is jumpered to pin D, the drive mode is determined by the -CSEL signal (Pin 28).

NOTE: In multiple drive configuration, it may become necessary to establish master drive and slave drive. This can be done by booting the PC and using IDE HDD Auto Detection available in CMOS setup.

Figure 3: Master/Slave Jumper Settings

1.4 Pin Assignment

Table 2: IDE Flash Drive Pin Assignment

| Pin Number | Signal Name | Pin Type | Pin Number | Signal Name | Pin Type |
|------------|--|----------|------------|---|------------|
| 1 | -RESET | I | 23 | -IOWR | I |
| 2 | GND | Ground | 24 | GND | Ground |
| 3 | D07 | I/O | 25 | -IORD | I |
| 4 | D08 | I/O | 26 | GND | Ground |
| 5 | D06 | I/O | 27 | -IORDY | O |
| 6 | D09 | I/O | 28 | -CSEL | I |
| 7 | D05 | I/O | 29 | -DMACK (not used on pn's with Forced PIO) | I |
| 8 | D10 | I/O | 30 | GND | Ground |
| 9 | D04 | I/O | 31 | INTRQ | O |
| 10 | D11 | I/O | 32 | -IOCS16 | O |
| 11 | D03 | I/O | 33 | A1 | I |
| 12 | D12 | I/O | 34 | -PDIAG | I/O |
| 13 | D02 | I/O | 35 | A0 | I |
| 14 | D13 | I/O | 36 | A2 | I |
| 15 | D01 | I/O | 37 | -CS0 | I |
| 16 | D14 | I/O | 38 | -CS1 | I |
| 17 | D00 | I/O | 39 | -DASP | I/O |
| 18 | D15 | I/O | 40 | GND | Ground |
| 19 | GND | Ground | 41 | VCC | Power |
| 20 | Key | Key | 42 | VCC | Power |
| 21 | DMARQ (not used on pn's with Forced PIO) | O | 43 | GND | Ground |
| 22 | GND | Ground | 44 | NC | No Connect |

Legend: "-" = Low active

1.5 Signal Descriptions

| Signal Name | Dir | Pin | Description |
|---|-----|---|--|
| -DASP | I/O | 39 | This input/output is the Disk Active/Slave Present signal in the Master/ Slave handshake protocol. |
| D15-D00 | I/O | 18, 16, 14, 12, 10, 8, 6, 4, 3, 5, 7, 9, 11, 13, 15, 17 | All Task File operations occur in byte mode on the low order bus D00-D07 while all data transfers are 16 bit using D00-D15. |
| -IOWR | I | 23 | The I/O Write strobe pulse is used to clock I/O data on the module Data bus into the Module controller registers when the Module is configured to use the I/O interface. The clocking will occur on the negative to positive edge of the signal (trailing edge). |
| -IORD | I | 25 | This is an I/O Read strobe generated by the host. This signal gates I/O data onto the bus from the Module. |
| INTRQ | O | 31 | Signal is the active high Interrupt Request to the host. |
| A2-A0 | I | 35, 33, 36 | A[2:0] are used to select the one of eight registers in the Task File. |
| -CS0, -CS1 | I | 37, 38 | -CS0 is the chip select for the task file registers while -CS1 is used to select the Alternate Status Register and the Device Control Register. |
| -CSEL | I | 28 | This internally pulled up signal is used to configure the card as a Master or Slave. When the pin is grounded, the card is configured as a Master. When the pin is open, the card is configured as a Slave. |
| -IOCS16 | O | 32 | Not used. |
| -PDIAG | I/O | 34 | This input/output is the Pass Diagnostic signal in the Master/Slave handshake protocol. |
| DMARQ (not used on pn's with Forced PIO) | O | 21 | This signal is asserted by the device when it is ready to transfer data to/ from the host. Data direction is controlled by -IORD and -IOWR. This signal is used in a handshake manner with -DMACK. |
| -DMACK (not used on pn's with Forced PIO) | I | 29 | This input signal is used by host in response to DMARQ to initiate DMA transfers. |
| -IORDY | O | 27 | Not used, and pulled up to VCC through a 4.7K ohm resistor. |
| -RESET | I | 1 | This input pin is the active low hardware reset from the host. |
| VCC | — | 41, 42 | Power. |
| GND | — | 2, 19, 22, 24, 26, 30, 40, 43 | Ground. |
| Key | — | 20 | This pin is keyed to ensure cable is connected with the proper orientation. |
| NC | — | 44 | No connect. |

1.6 Performance

Table 3: IDE Flash Drive Read/Write Performance

| Parameter | Value |
|---------------------------------|-----------------------|
| Data transfer rate to/from host | 16.7 MBytes/s (burst) |
| Sustained read | up to 10 MBytes/s |
| Sustained write | up to 7 MBytes/s |

1.7 CHS Parameters

Table 4: CHS Parameters per capacity

| Capacity | Cylinder (C) | Head (H) | Sectors/Track (S) |
|----------|--------------|----------|-------------------|
| 128MB | 980 | 8 | 32 |
| 256MB | 980 | 16 | 32 |
| 512MB | 993 | 16 | 63 |
| 1GB | 1,986 | 16 | 63 |
| 2GB | 3,970 | 16 | 63 |
| 4GB | 7,964 | 16 | 63 |
| 8GB | 16,062 | 16 | 63 |
| 16GB | 31,760 | 16 | 63 |

1.8 Standards Compliance

STEC products specified in this document are compliant with Technical Committee T13, AT Attachment-5 (ATA-5) standards and are certified for compliance with these other industry standards:

- UL 950
- CE, and FCC Class B & D
- RoHS

1.8.1 CE and FCC Class B & D

The STEC products specified in this document meet the following requirements and limits of the European Standards:

- **Class B** requirements of the following European Standard:
EN 55022: 1998 – “Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement”
- **Class D** limits of the following European Standards:
EN 61000-3-2 “Electromagnetic compatibility (EMC) Part 3-2: Limits – Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)”
EN 61000-3-3: 1995 – “Part 3: Limits – Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current $\leq 16A$ ”
EN 55024 – “Information technology equipment – Immunity characteristics – Limits and methods of measurement”

1.8.2 RoHS

STEC certifies that its products do not contain any of the restricted substances as stated below and are in compliance with RoHS EU directive 2002/95/EC, specifically:

- Mercury (Hg)
- Cadmium Cd)
- Chromium VI (Cr +6)
- Polybrominated biphenyl (PBB)
- Polybrominated biphenyl ether (PBDE)
- Lead (Pb)

Materials used in the STEC's products are limited to the following:

- Steel, Nylon 6/6, PCB laminate
- Copper, Gold, Nickel
- Silicon on ICs and Components
- Polyester on Labels

2.0 Environmental Specifications

2.1 Recommended Operating Conditions

Table 5: IDE Flash Drive Recommended Operating Conditions

| Parameter | Symbol | Min | Typ | Max | Unit |
|----------------------------------|--------|------|-----|-------|------|
| Commercial Operating Temperature | Ta | 0 | 25 | 70 | °C |
| Industrial Operating Temperature | Ta | -40 | - | 85 | °C |
| VCC voltage 5.0 | VCC5 | 4.75 | 5.0 | 5.25 | V |
| VCC voltage 3.3 | VCC3.3 | 3.18 | 3.3 | 3.465 | V |

2.2 Reliability

Table 6: IDE Flash Drive Endurance & Data Reliability

| Parameter | Value |
|------------------|----------------------------------|
| Endurance | 2,000,000 Write/Erase Cycles |
| Data reliability | 1 in 10 ¹⁴ bits, read |
| Data retention | 10 years |

2.3 Shock, Vibration, and Humidity

Table 7: IDE Flash Drive Shock, Vibration & Humidity

| Parameter | Value |
|-----------|--|
| Shock | 1.5K G peak, 0.5ms pulse duration, five (5) pulses per each of six (6) directions (per JEDEC JESD22 standard, method B110) |
| Vibration | 20 G peak, 20Hz-2000Hz, 4 cycles per direction (per JEDEC JESD22 standard, method B103) |
| Humidity | 85°C 85% RH, 500 hrs |

3.0 Electrical Specifications

3.1 Absolute Maximum Ratings

Table 8: IDE Flash Drive Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---------------------------|-----------|------------------|------|
| Voltage | Vin, Vout | -0.5 to VCC +0.5 | V |
| Storage temperature range | Tstg | -65 to +150 | °C |

3.2 DC Characteristics

Measurements at Recommended Operating Conditions unless otherwise specified.

Table 9: IDE Flash Drive DC Characteristics

| Symbol | Parameter | Min | Max | Unit | Notes |
|--------|----------------------------|------|----------|------|---|
| VIL | Input LOW Voltage | -0.3 | +0.8 | V | VCC=3.3V or 5.0V |
| VIH | Input HIGH Voltage | 2.0 | VCC +0.3 | V | VCC=3.3V or 5.0V |
| VOL3.3 | Output LOW Voltage 3.3 | | 0.45 | V | VCC=3.3V |
| VOL5 | Output LOW Voltage 5 | | 0.8 | | VCC=5.0V |
| VOH | Output HIGH Voltage | 2.4 | | V | VCC=3.3V or 5.0V |
| ICCSB | Standby Mode | | 2 | mA | ICC at VCC=3.3V or 5.0V |
| ICC | Operating Current | | 75 | mA | ICC at VCC=3.3V or 5.0V Operating current measured with 2-way interleaving. |
| ILI | Input Leakage Current | | 10 | μA | VCC=3.3V or 5.0V |
| ILO3.3 | Output Leakage Current 3.3 | | 1 | μA | VCC=3.3V |
| ILO5 | Output Leakage Current 5 | | 2 | μA | VCC= 5.0V |
| CI/O | Input/output Capacitance | | 25 | pF | VCC=3.3V or 5.0V |

3.3 AC Characteristics

Measurements at Recommended Operating Conditions, unless otherwise specified.

3.3.1 True IDE Mode Register Access

Table 10: True IDE Mode Register Access AC Characteristics

| Parameter | Symbol | Mode0 | Mode1 | Mode2 | Mode3 | Mode4 | Mode5 | Mode6 | Unit |
|--|--------|-------|-------|-------|-------|-------|-------|-------|------|
| Cycle time (min) | t0 | 600 | 383 | 330 | 180 | 120 | 100 | 80 | ns |
| Address valid to -IORD/-IOWR (min) setup | t1 | 70 | 50 | 30 | 30 | 25 | 15 | 10 | ns |
| -IORD/-IOWR pulse width 8bit (min) | t2 | 290 | 290 | 290 | 80 | 70 | 65 | 55 | ns |
| -IORD/-IOWR recovery time (min) | t2i | — | — | — | 70 | 25 | 25 | 20 | ns |
| -IOWR data setup (min) | t3 | 60 | 45 | 30 | 30 | 20 | 20 | 15 | ns |
| -IOWR data hold (min) | t4 | 30 | 20 | 15 | 10 | 10 | 5 | 5 | ns |
| -IORD data setup (min) | t5 | 50 | 35 | 20 | 20 | 20 | 15 | 10 | ns |
| -IORD data hold (min) | t6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | ns |
| -IORD data tristate (max) | t6z | 30 | 30 | 30 | 30 | 30 | 20 | 20 | ns |
| Addresses valid to -IOCS16 assert. (max) | t7 | 90 | 50 | 40 | N/A | N/A | N/A | N/A | ns |
| Address valid to -IOCS16 release (max) | t8 | 60 | 45 | 30 | N/A | N/A | N/A | N/A | ns |
| -IORD/-IOWR to address valid hold | t9 | 20 | 15 | 10 | 10 | 10 | 10 | 10 | ns |

3.3.2 True IDE Mode PIO Access

Table 11: True IDE Mode PIO Access AC Characteristics

| Parameter | Symbol | Mode0 | Mode1 | Mode2 | Mode3 | Mode4 | Mode5 | Mode6 | Unit |
|--|--------|-------|-------|-------|-------|-------|-------|-------|------|
| Cycle time (min) | t0 | 600 | 383 | 330 | 180 | 120 | 100 | 80 | ns |
| Address valid to -IORD/-IOWR (min) setup | t1 | 70 | 50 | 30 | 30 | 25 | 15 | 10 | ns |
| -IORD/-IOWR pulse width 8bit (min) | t2 | 290 | 290 | 290 | 80 | 70 | 65 | 55 | ns |
| -IORD/-IOWR recovery time (min) | t2i | — | — | — | 70 | 25 | 25 | 20 | ns |
| -IOWR data setup (min) | t3 | 60 | 45 | 30 | 30 | 20 | 20 | 15 | ns |
| -IOWR data hold (min) | t4 | 30 | 20 | 15 | 10 | 10 | 5 | 5 | ns |
| -IORD data setup (min) | t5 | 50 | 35 | 20 | 20 | 20 | 15 | 10 | ns |
| -IORD data hold (min) | t6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | ns |
| -IORD data tristate (max) | t6z | 30 | 30 | 30 | 30 | 30 | 20 | 20 | ns |
| Addresses valid to -IOCS16 assert. (max) | t7 | 90 | 50 | 40 | N/A | N/A | N/A | N/A | ns |
| Address valid to -IOCS16 release | t8 | 60 | 45 | 30 | N/A | N/A | N/A | N/A | ns |
| -IORD/-IOWR to address valid hold | t9 | 20 | 15 | 10 | 10 | 10 | 10 | 10 | ns |

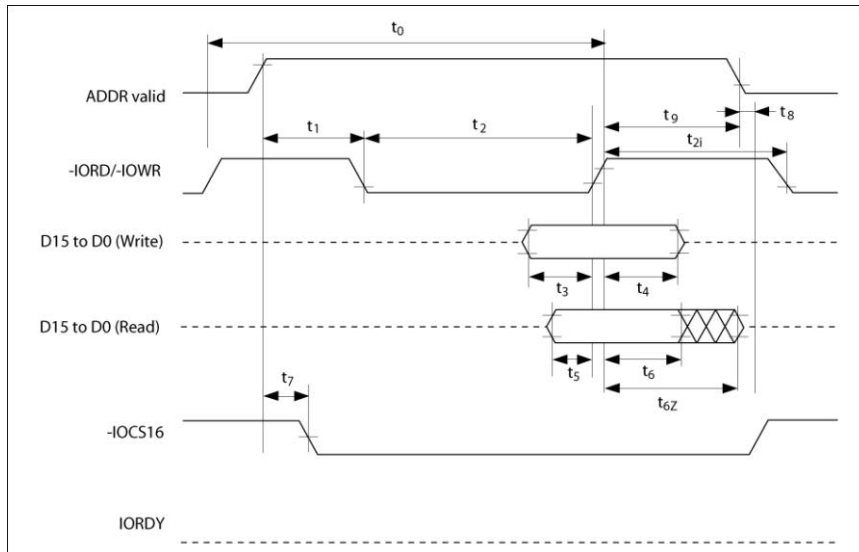


Figure 4: True IDE Mode PIO Access Timing Diagram

3.3.3 True IDE Mode Multiword DMA (not used on pn's with Forced PIO)

Table 12: True IDE Mode Multiword DMA AC Characteristics

| Parameter | Symbol | Mode 0 | Mode 1 | Mode 2 | Mode 3 | Mode 4 | Unit |
|----------------------------------|----------|--------|--------|--------|--------|--------|------|
| Cycle time (min) | t_0 | 480 | 150 | 120 | 100 | 80 | ns |
| -IORD/-IOWR Asserted Pulse (min) | t_D | 215 | 80 | 70 | 65 | 55 | ns |
| -IORD data access (max) | t_E | 150 | 60 | 50 | 50 | 45 | ns |
| -IORD data hold (min) | t_F | 5 | 5 | 5 | 5 | 5 | ns |
| -IORD/-IOWR data setup (min) | t_G | 100 | 30 | 20 | 15 | 10 | ns |
| -IOWR data hold (min) | t_H | 20 | 15 | 10 | 5 | 5 | ns |
| DMACK to -IORD/-IOWR setup (min) | t_I | 0 | 0 | 0 | 0 | 0 | ns |
| -IORD/-IOWR to DMACK hold (min) | t_J | 20 | 5 | 5 | 5 | 5 | ns |
| -IORD negated pulse width (max) | t_{KR} | 50 | 50 | 25 | 25 | 20 | ns |
| -IOWR negated pulse width (min) | t_{KW} | 215 | 50 | 25 | 25 | 20 | ns |
| -IORD to DMARQ delay (max) | t_{LR} | 120 | 40 | 35 | 35 | 35 | ns |
| -IOWR to DMARQ delay (max) | t_{LW} | 40 | 40 | 35 | 35 | 35 | ns |

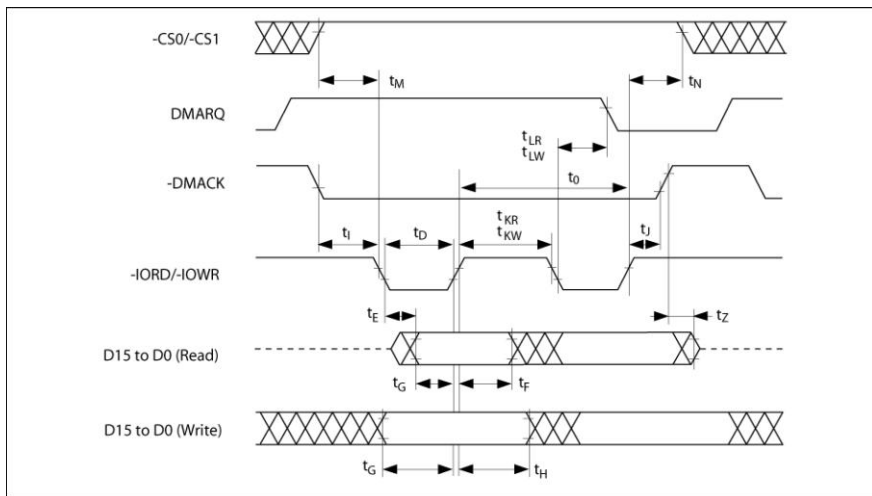


Figure 5: True IDE Mode Multiword DMA Timing Diagram

4.0 Identify Drive Parameter Information

An example of the parameter information received from the IDE Flash Drive when invoking the Identify Drive command (ECh) is listed in Table 13.

Table 13: Identify Drive Parameter Information

| Word Address | Data | Total Bytes | Description |
|--|-----------------|-------------|--|
| 0 | 044AH | 2 | Value fixed by CFA |
| 1 | XXXXH | 2 | Default number of cylinders |
| 2 | 0000H | 2 | Reserved |
| 3 | 00XXH | 2 | Default number of heads |
| 4 | XXXXH | 2 | Do not use this word. Before retirement, was number of unformatted bytes per track |
| 5 | XXXXH | 2 | Do not use this word. Before retirement, was number of unformatted bytes per sector |
| 6 | XXXXH | 2 | Default number of sectors per track |
| 7 - 8 | XXXXH | 4 | Number of sectors per IDE Flash Drive (word 7 = MSW, word 8 = LSW) |
| 9 | 0000H | 2 | Reserved |
| 10 - 19 | Unique per card | 20 | Serial Number in ASCII (20 characters): STEC proprietary |
| 20 | XXXXH | 2 | Do not use this word. Before retirement, was buffer type |
| 21 | XXXXH | 2 | Do not use this word. Before retirement, was buffer size in 512 byte increments |
| 22 | 0004H | 2 | # of ECC bytes passed on Read/Write Long commands |
| 23 - 26 | See description | 8 | Firmware revision in ASCII (8 characters): Rev8.0.0 52 65 76 38 2E 30 2E 30 hex |
| 27 - 46 | See description | 40 | Model Number in ASCII (40 characters): STI Flash 8.0.0 <left justified> 53 54 49 20 46 6C 61 73 68 20 38 2E 30 2E 30 20 hex |
| 47 | 0001H | 2 | Maximum of 1 sector on Read/Write Multiple command |
| 48 | 0000H | 2 | Double Word not supported |
| 49 | 0300H | 2 | DMA supported, LBA supported (0200H DMA not supported, LBA supported for pn's with Forced PIO) |
| 50 | 0000H | 2 | Reserved |
| 51 | 0200H | 2 | PIO data transfer cycle timing mode |
| 52 | 0000H | 2 | Single word DMA data transfer cycle timing mode (not supported) |
| 53 | 0003h | 2 | Words 54 - 58 and 64 - 70 are valid |
| 54 | XXXXH | 2 | Number of Current Cylinders |
| 55 | XXXXH | 2 | Number of Current Heads |
| 56 | XXXXH | 2 | Number of Current Sectors Per Track |
| 57 | XXXXH | 2 | LSW of the Current Capacity in Sectors |
| 58 | XXXXH | 2 | MSW of the Current Capacity in Sectors |
| 59 | 010XH | 2 | Current Setting for Block Count=1 for R/W Multiple commands |
| 60 - 61 | XXXXH | 4 | Total number of sectors addressable in LBA Mode |
| 62 | 0000H | 2 | Single word DMA transfer not supported |
| 63 | 0407H | 2 | Multiword DMA modes supported (0000H MWDMA modes not supported for pn's with Forced PIO) |
| 64 | 0003H | 2 | Advanced PIO modes supported (modes 3 and 4) |
| 65 | 0078H | 2 | Minimum multiword DMA transfer cycle time per word (ns) (0000H for pn's with Forced PIO) |
| 66 | 0078H | 2 | Recommended multiword DMA transfer cycle time per word (ns) (0000H MWDMA pn's with Forced PIO) |
| 67 | 0078H | 2 | Minimum PIO transfer without flow control |
| 68 | 0078H | 2 | Minimum PIO transfer with IORDY flow control |
| 69 - 255 | 0000H | 374 | Reserved |
| XXXXH = These values depend on the specific IDE Flash Drive. | | | |

5.0 Registers

This chapter lists the registers of the IDE Flash Drive. Refer to ATA/IDE standards for further details, including Task File Register mapping and bit definitions of each Task File Register.

The Data Register is accessed in word (16-bit) mode at power up. The IDE Flash Drive permits 8-bit accesses if the host issues a Set Feature Command to put the IDE Flash Drive in 8-bit mode.

Table 14: IDE Flash Drive Task File Registers

| Task File Register | Description |
|---------------------------|---|
| Data Register | The Data Register is a 16-bit read/write register used for transferring data between the IDE Flash Drive and the host. This register can be accessed in word mode and byte mode. |
| Error Register | The Error Register is a read-only register that is used for analyzing an error. This register is valid when the BSY bit in the Status register and Alternate Status register are set to "0" (Ready). Diagnostic Codes are returned in the Error Register after a Execute Drive Diagnostic command (code 90h). Extended Error Codes returned in the Error Register after a Request Sense command (code 03h). |
| Sector Count Register | This register contains the numbers of sectors of data requested to be transferred on a read or write operation between the host and the IDE Flash Drive. If the value in the register is 0, a count of 256 sectors is indicated. |
| Sector Number Register | When the LBA bit in the Drive/Head register is 0, this register contains the starting sector number for any media access. When the LBA bit is set to 1, this register contains bits 7:0 of the LBA for any media access. |
| Cylinder Low Register | In CHS mode (LBA=0), this register contains the low-order bits of the starting cylinder address. In LBA mode, it contains bits 15:8 of the LBA. |
| Cylinder High Register | In CHS mode (LBA=0), this register contains the high-order bits of the starting cylinder address. In LBA mode, it contains bits 23:16 of the LBA. |
| Drive/Head Register | This register selects the IDE Flash Drive address translation (CHS or LBA) and provides head address (CHS) or high-order address bits 27:24 for LBA. |
| Status Register | This read-only register indicates status of a command execution. When the BSY bit is "0", the other bits are valid; when the BSY bit is "1", the other bits are not valid. When the register is read, the interrupt pin, is cleared. |
| Alternate Status Register | This register is the same as the Status register, except that is not negated when the register is read. |
| Device Control Register | This write-only register is used for controlling the interrupt request and issuing an ATA soft reset to the IDE Flash Drive. |
| Drive Address Register | This read-only register is used for confirming the IDE Flash Drive's status. This register is provided for compatibility with the AT disk drive interface and it is not recommended that this register be mapped into the host's I/O space because of potential conflicts on bit 7. |
| Command Register | This write-only register is used for writing the command that executes the IDE Flash Drive's operation. The command code is written in the command register after its parameters are written in the Task File during the IDE Flash Drive ready state. |

6.0 Supported ATA Commands

The ATA commands used by the IDE Flash Drive are listed in Table 15. Refer to ATA/IDE standards for details.

Table 15: IDE Flash Drive Supported ATA Commands

| Command Set | Code | Description |
|---|-----------------------------------|--|
| Check Power Mode | E5h or 98h | This command checks the power mode. |
| Execute Drive Diagnostic | 90h | This command performs the internal diagnostic tests implemented by the IDE Flash Drive. The Diagnostic Code is returned in the Error Register. |
| Erase Sector(s) | C0h | Command is used to pre-erase/condition data sectors in advance. |
| Format Track | 50h | Command writes the desired head/cylinder of the selected drive with a vendor unique data pattern (typically 00h or FFh). This IDE Flash Drive accepts a sector buffer of data from the host to follow the command with the same protocol as the Write Sector Command although the information in the buffer is not used. |
| Identify Drive | ECh | Command lets host receive parameter information from the IDE Flash Drive in the same protocol as Read Sector(s) command. |
| Idle | E3h or 97h | Command causes the IDE Flash Drive to set BSY, enter the Idle mode, clear BSY, and generate an interrupt. If sector count is non-zero, automatic power down mode is enabled. If sector count is zero, the automatic power down mode is disabled. |
| Idle Immediate | E1h or 95h | This command causes the IDE Flash Drive to set BSY, enter the Idle mode, clear BSY, and generate an interrupt. |
| Initialize Drive Parameters | 91h | This command enables the host to set the number of sectors per track and the number of heads per cylinder. |
| NOP | 00h | No Operation. |
| Read Buffer | E4h | This command enables the host to read the current contents of the IDE Flash Drive's sector buffer. |
| Read DMA (not used on pn's with Forced PIO) | C8h | Command is sector read command used for MWDMA transfer. |
| Read Multiple | C4h | Command performs similarly to the Read Sectors command. Interrupts are not generated on each sector, but on transfer of a block which contains the number of sectors defined by a Set Multiple command. |
| Read Long Sector | 22h or 23h | Command performs similarly to the Read Sector(s) command except that it returns 516 bytes of data instead of 512 bytes. |
| Read Sector(s) | 20h (w/ retry) 21h (w/o retry) | Command reads from 1 to 256 sectors as specified in the Sector Count register. Sector count of 0 requests 256 sectors. Transfer begins at the sector specified in the Sector Number register. |
| Read Verify Sector(s) | 40h (w/ retry) 41h (w/o retry) | This command verifies one or more sectors on the IDE Flash Drive by transferring data from the flash media to the data buffer in the IDE Flash Drive and verifying that the ECC is correct. This command is identical to the Read Sectors command, except that DRQ is never set and no data is transferred to the host. |
| Recalibrate | 1Xh | The IDE Flash Drive performs only the interface timing and register operations. When this command is issued, the IDE Flash Drive sets BSY and waits for an appropriate length of time, after which it clears BSY and issues an interrupt. When this command ends normally, the IDE Flash Drive is initialized. |
| Request Sense (Extended Error) | 03h | Command requests extended error code after command ends with error. Extended error code is returned in the Error Register |

| Command Set | Code | Description |
|--|-----------------------------------|--|
| Seek | 7Xh | This command is effectively a NOP command to the IDE Flash Drive although it does perform a range check. |
| Set Features | EFh | Command is used by host to establish or select certain features. |
| Set Multiple Mode | C6h | Command enables IDE Flash Drive to perform multiple r/w operations and establishes block count for r/w commands. |
| Set Sleep Mode | E6h or 99h | This is the only command that allows the host to set the IDE Flash Drive into Sleep mode. When the IDE Flash Drive is set to sleep mode, the IDE Flash Drive clears the BSY line and issues an interrupt. The IDE Flash Drive enters sleep mode and the only method to make the IDE Flash Drive active again (back to normal operation) is by performing a hardware reset or a software reset. |
| Stand By | E2h or 96h | Command sets IDE Flash Drive in Standby mode. If Sector Count Register is value other than 0H, Auto Power Down is enabled and when IDE Flash Drive returns to the idle mode, timer starts a countdown. Time is set in Sector Count Register. |
| Stand By Immediate | E0h or 94h | This command causes the IDE Flash Drive to set BSY, enter the Standby mode, clear BSY and return the interrupt immediately. |
| Translate Sector | 87h | This command allows the host a method of determining the exact number of times a user sector has been erased and programmed. This command is not supported. |
| Wear Level | F5h | This command is effectively a NOP command and only implemented for backward compatibility. The Sector Count Register will always be returned with an 00h indicating Wear Level is not needed. |
| Write Buffer | E8h | This command enables the host to overwrite the contents of the IDE Flash Drive's sector buffer with any data pattern desired. |
| Write DMA (not used on pn's with Forced PIO) | CAh | This command is the sector write command used for Multiword DMA transfer. |
| Write Long Sector | 32h or 33h | This command is provided for compatibility purposes and is similar to the Write Sector(s) command except that it writes 516 bytes instead of 512 bytes. |
| Write Multiple | C5h | This command is similar to the Write Sectors command. Interrupts are not presented on each sector, but on the transfer of a block which contains the number of sectors defined by Set Multiple command. |
| Write Multiple w/o Erase | CDh | This command is similar to the Write Multiple command, except that an implied erase before the write operation is not performed. Note: Before using this command, it is required to erase the respective sectors using the Erase Sectors command |
| Write Sector(s) | 30h (w/ retry) 31h (w/o retry) | This command writes from 1 to 256 sectors as specified in the Sector Count register. A sector count of zero requests 256 sectors. The transfer begins at the sector specified in the Sector Number register. |
| Write Sector(s) w/o Erase | 38h | This command is similar to the Write Sector(s) command, except that an implied erase before the write operation is not performed. Note: Before using this command, it is required to erase the respective sectors using the Erase Sectors command. |
| Write Verify | 3Ch | This command is similar to the Write Sector(s) command except each sector is verified immediately after being written. |

7.0 Revision History

| Revision | Date | Description |
|-----------------|-------------|---|
| -101 | 11/20/06 | Product release. |
| -102 | 12/14/06 | ID file Serial Number, Firmware Revision, and Model Number corrected in table. |
| -103 | 1/16/07 | Logo updated. Disclaimer updated. Contact Information added. |
| -104 | 2/23/07 | In between capacities removed from Ordering Information and CHS parameters. Serial number revision (paper correction only). |
| -105 | 2/28/07 | CSEL signal description corrected. 16GB CHS parameters added. DC Characteristics corrected |
| -106 | 4/10/07 | Shock updated from 1K to 1.5K. Vibration updated from 15 to 20. |
| -107 | 5/21/07. | Label section added. |
| -108 | 6/11/07 | Connector location added to label section. Label added to dimension illustration. |
| -109 | 8/06/07 | Warranty bullet removed from features column on page 1 |
| -110 | 9/19/07 | General Description text updated. |
| -111 | 11/12/07 | Layout updated for consistency and easier editing. Disclaimer notice reformatted with headings. |
| -112 | 3/7/08 | Contact information on last page updated. |
| -113 | 4/2/08 | STEC China address on last page updated. |
| -114 | 5/29/08 | P designator added to Ordering Information. |
| -115 | 7/17/08 | Recommended torque for screw on dimension illustration corrected from 6.0 in-lbs to 3.75-4.75 in-lbs. |

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