Virtium TuffDrive® PATA SSDs

Ongoing legacy support for an industry standard

Overview

Virtium TuffDrive Parallel ATA (PATA) solid state drives (SSDs) are direct replacements for legacy PATA hard disk drives (HDDs) found in industrial embedded designs, as well as, laptops and desktop computers. PATA SSDs are compatible with all operating systems and provide a significant performance upgrade by offering much quicker access times while requiring less power than conventional HDDs.

TuffDrive PATA drives offer high reliability and durability, extreme temperature operation and the superior shock-proof benefits of solid-state technology. PATA SSDs are lighter than PATA HDDs and PATA SSD durability and MTBF are much better with far fewer field failures.

PATA based HDDs are now virtually obsolete as HDD manufactures' focus are SATA and PCIe drives. This means that for the millions of PATA HDDs in the field which need to be replaced as a result of aging equipment and wear, PATA-based SSDs are the only option. Virtium's commitment to long product life cycles ensures supply of this drive for years to come.

Virtium TuffDrive SSDs are based on high endurance SLC technology with industrial operating temperatures and high program/erase cycles – up to 8.7 drive writes per day (DWPD) for five years with JEDEC standard small random workload and up to 88.6 DWPD for five years with 100% sequential workload. The drives feature high mean-time-between-failure (MTBF) of greater than 3,000,000 hours and vtGuard™ for excellent data protection during unexpected power-loss.

Virtium's TuffDrive PATA advanced controller supports:

- Low power consumption with typical active read power consumption of 250mA, active write power consumption of 220mA, and idle power consumption of 75mA.
- Wear leveling algorithms which guarantee each block of flash memory is at same level of erase cycles to improve life of NAND.
- Bad block management over time and advanced error detection/correction.
- Reporting advanced SMART attributes and Virtium's vtView SSD Software - for precision analysis, qualification and monitoring.

Virtium TuffDrive SSD's operate with 5V supply and the interface on Virtium PATA SSD's is standard 44 Pin IDE/PATA as shown in Figure 1:

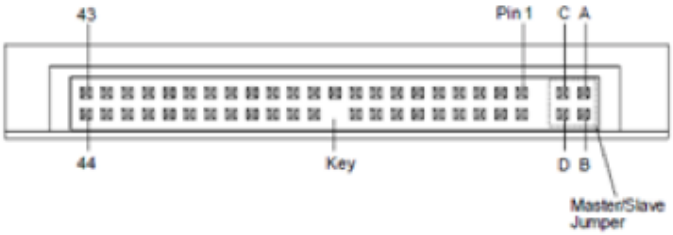

Figure 1. PATA Connector

Signal definitions are defined in Table 1:

Table 1: TuffDrive P25 PATA SSD Pin Assignments

Pin No.	Name	Function	Pin No.	Name	Function
1	HRESET	Host Reset	2	GND	Ground
3	HDB[7]	Host Data Bit 7	4	HDB[8]	Host Data Bit 8
5	HDB[6]	Host Data Bit 6	6	HDB[9]	Host Data Bit 9
7	HDB[5]	Host Data Bit 5	8	HDB[10]	Host Data Bit 10
9	HDB[4]	Host Data Bit 4	10	HDB[11]	Host Data Bit 11
11	HDB[3]	Host Data Bit 3	12	HDB[12]	Host Data Bit 12
13	HDB[2]	Host Data Bit 2	14	HDB[13]	Host Data Bit 13
15	HDB[1]	Host Data Bit 1	16	HDB[14]	Host Data Bit 14
17	HDB[0]	Host Data Bit 0	18	HDB[15]	Host Data Bit 15
19	GND	Ground	20	KEY	Key-pin
21	DMARQ	DMA Request	22	GND	Ground
23	HIOW(1)	Host I/O Write	24	GND	Ground
	STOP(2)	Stop Ultra DMA burst			
25	HIOR(1)	Host I/O Read	26	GND	Ground
	HDMARDY(2)	Ultra DMA ready			
	HSTROBE(2)	Ultra DMA data strobe			
27	IORDY(1)	I/O Ready	28	CSEL	Master/Slave Select
	DDMARDY(2)	Ultra DMA ready			
	DSTROBE(2)	Ultra DMA data strobe			
29	DMACK	DMA Acknowledge	30	GND	Ground
31	INTRQ	Interrupt Request	32	IOCS16	CS I/O 16-Bit
33	HAB[1]	Host Address Bit 1	34	PDIAG	Passed Diagnostic
35	HAB[0]	Host Address Bit 0	36	HAB[2]	Host Address Bit 2
37	CS0#	Chip Select 0	38	CS1#	Chip Select 1
39	DASP	Drive Active	40	GND	Ground
41	VCC	Supply Voltage	42	VCC	Supply Voltage
43	GND	Ground	44	NC	Not Connected
A	N/A	Master/Slave	B	N/A	Master/Slave
C	N/A	NC	D	N/A	NC

Note: 1. Signal usage in PIO & Multiword DMA mode.
2. Signal usage in Ultra DMA mode

Compatibility Considerations

While Virtium TuffDrive PATA SSDs are true drop-in replacements for applications with PATA HDDs, note that in a small percentage of older systems/platforms may require hardware and/or firmware modifications to be compatible with the host system. These cases are due to the limitation of the host system as defined below.

Virtium drives offer ATA/ATAPI-8 transfer modes which includes up to UDMA-6, MDMA-4 and PIO-6. In the vast majority of systems the host and the drive will negotiate transfer mode during device identification and lock on the highest transfer mode they can both support. Some older systems/platforms have a limitation where if a device with higher transfer mode is detected, the system may be confused and incorrectly set transfer rate at a higher rate than it can support.

For instance, if the system can work only up to UDMA-2, it may incorrectly attempt to lock on a higher transfer mode such as UDMA-4 or UDMA-6 supported by the device - resulting in compatibility and inoperability. This is a limitation of the system. In such cases Virtium can change device parameters to limit its transfer rate up to the rate supported by the system, thereby resolving the issue.

In other cases the system may have undesirable cabling and connectivity which degrade signal integrity issues and cause lower transfer rates. Virtium can overcome this issue by changing termination resistor values on the drive to match the system and improve signal integrity.

As noted, the above cases are rare in nature and in the vast majority of systems/platforms the Virtium TuffDrive SSD will operate seamlessly as a drop-in replacement for the existing HDD.

Virtium manufactures memory and storage solutions for the world's top industrial embedded OEMs. For two decades we have designed, built and supported our products in the USA - fortified by a network of global locations. Our world-class technology and unsurpassed support provide a superior customer experience that continuously results in better industrial embedded products for our increasingly interconnected world.

Virtium
Solid State Storage and Memory

30052 Tomas | Rancho Santa Margarita, CA 92688
Phone: 949-888-2444 | Fax: 949-888-2445
www.virtium.com