Wintec Solid State Drive
2.5” SATA II
3312132x Series

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Revision History

Revision	Month	Year	History
1.0	March	2010	Initial Release

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Wintec Solid State Drive

3312132x Series

Features

GENERAL
- Density up to 256GB
- Solid State Data Storage
- Multi-core embedded Flash Processor controller
- SATA-II (3.0 Gbps) interface
  - SATA-I (1.5 Gbps) backwards compatible
- High-Performance MLC NAND-Flash
- TRIM support for Windows 7

PERFORMANCE
- High Performance 210 MB/s Sequential Read Max.
- High Performance 165 MB/s Sequential Write Max.
- Low Power Consumption

RELIABILITY
- MLC NAND-Flash memory
  - 10,000 Write/Erase Cycles
- Internal Wear Leveling
  - Includes Static Block Management
- Spares & Bad Block Management
- On-Board ECC
  - Detects and corrects up to 14 bits/ 512 Byte sector
- High Environmental Tolerance
- 10-Year Data Retention

COMPATIBILITY
- Serial ATA Revision 2.6 Compliant
- ATA/ATAPI-7 Compliant

Wintec Solid State Drive

NOTE:
1. See Section 4.0 for Configuration & Ordering Guide

DESCRIPTION

The Wintec Industries 3312132x series of ROHS Compliant Solid State Drives are constructed with NAND-type multiple-level-cell (MLC) flash memory devices paired to 4 embedded powerful flash processing units controller for virtual-to-physical address mapping and other sophisticated flash management functions.

The Wintec Flash Solid State Disk (SSD) provides major advantages over the traditional magnetic hard disk drive (HDD). Faster access time, faster transfer rate, quieter operation, lower power consumption, more endurance to shock and vibration, and lower total cost of ownership make the Wintec SSD an attractive choice as the next generation mass storage device.

The Wintec SSD has substantial power savings over traditional magnetic hard disk drive. The SSD itself consumes very little idle power and active power compared to a hard drive. In servers and workstations where multiple hard drives are utilized in a RAID array for maximum performance and reliability, this power savings benefit is thereby multiplied.

The Wintec SSD provides high-speed data transfer and reliability utilizing MLC NAND-flash in 256GB, 128GB, and 64GB storage capacities, in a small 2.5" hard drive form factor. Its robust design enables the SSD to achieve outstanding performance of sustained read at up to 210 MB/sec and sustained write at up to 165 MB/sec, one of the best in the industry.

The Wintec SSD utilizes a Serial ATA Generation 2 (3.0 Gbps) interface. The ECC engines have the 14 bit or 28 bit ECC ability to protect data stored. The four independent CPUs provides the embedded dynamic/static wear leveling and bad block management to guarantee the high reliability and maximum life-time for flash memories

1.0 General Product Specification

For all the following specifications, values are defined at ambient temperature and nominal supply voltage unless otherwise stated.

Table 1: Capacity Specifications

Model Number[1]	NAND Flash Type	Total Capacity[2,3]
33121321	MLC	32 GB
33121322	MLC	64 GB
33121323	MLC	128 GB
33121324	MLC	256 GB

NOTE:
1. See Section 4.0 for Configuration & Ordering Guide
2. 1GB = 1,000,000,000 Bytes
3. Capacity available to end-user is less than "Total Capacity" due to flash controller overhead (ECC data and wear leveling)

Table 2: Typical Performance Specifications

Parameter	Bandwidth[4]	
	Sequential Read	Sequential Write
33121321	200 MB/sec	60 MB/sec
33121322	200 MB/sec	100 MB/sec
33121323	210 MB/sec	165 MB/sec
33121324	210 MB/sec	165 MB/sec

NOTE:
4. Bandwidth measured on high-performance desktop system. Note that performance may also vary depending on host system, drive capacity, and drive configuration.

Table 3: Flash Endurance

Parameter	Spec
Write/Erase Cycles	10,000 cycles
Data Retention	10 Years (Min.)
MTBF	1,350,000 Hours

Table 4: SSD Data Reliability

Parameter	Spec
Non-Recoverable Errors	< 1 in 10^{15} Bytes Read
ECC Correctability	8 bits / 512 Byte Sector
ECC Detectability	15 bits / 512 Byte Sector

Table 5: Environmental Specifications

Parameters		Operating	Non-Operating
Temperature	**Commercial Temp.**	0°C to 70°C	-55°C to 95°C
Humidity		5% to 95% (Non-Condensing)	5% to 95% (Non-Condensing)
Vibration		20 G RMS	N/A
Shock (Operating)		1,500 G (Max.)	
Noise		0 dB	0 dB

1.1 Block Diagram

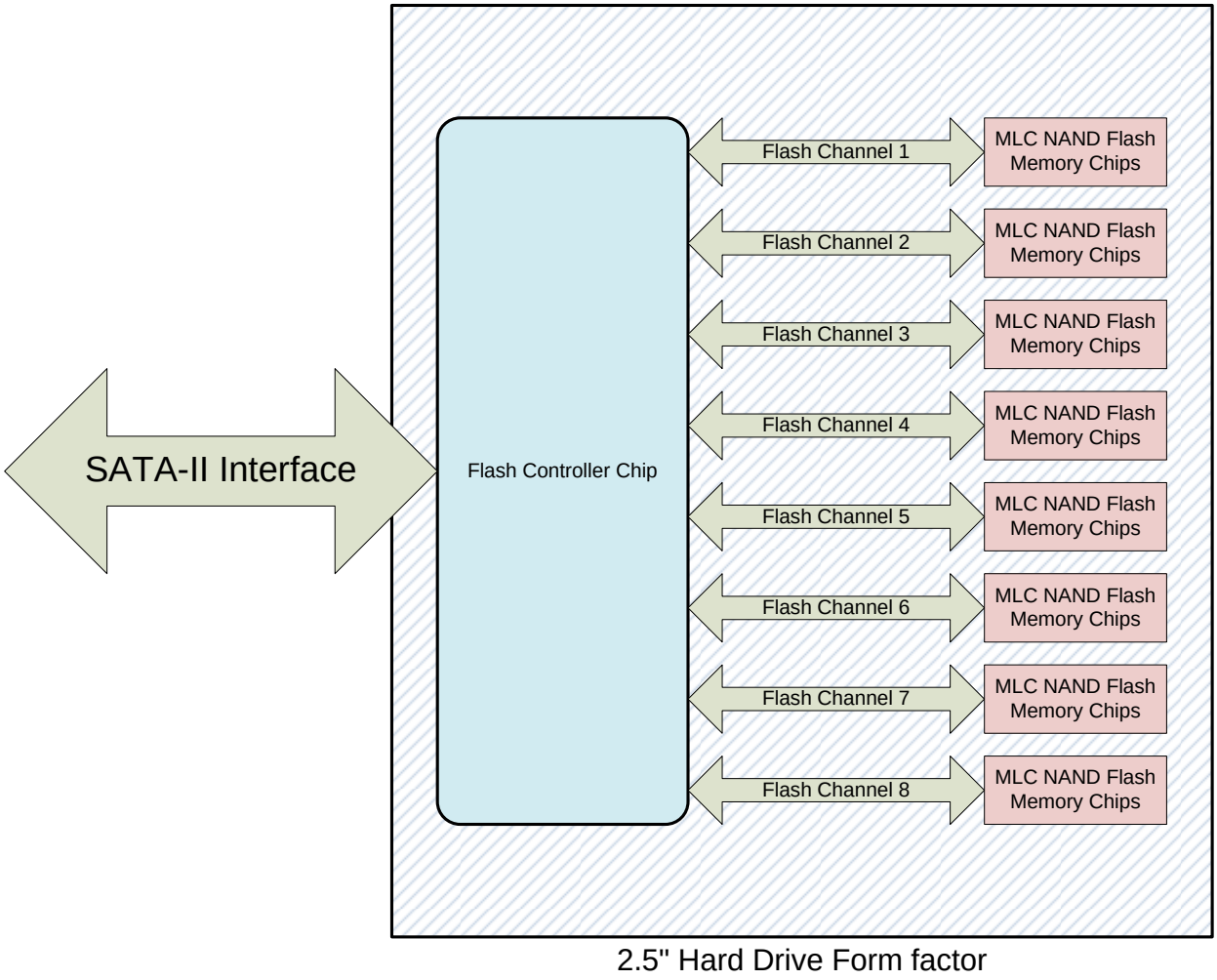

Figure 1. Block Diagram

1.2 Architecture

The Wintec SSD utilizes a single flash controller chip with 8 parallel channels of flash memory interface. The flash controller also simultaneously manages the file read and write interface with the host system via a single SATA-II interface. By utilizing 8 parallel channels of MLC flash memory on a single controller, the Wintec SSD can provide both high performance and reliability, while maintaining a minimal unit cost.

2.0 Electrical Specification

2.1 General

Table 6: Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Units
V_{CC}	V_{CC} With Respect to GND	-0.5	6.0	V

Table 7: Typical Operating Conditions (V_{CC}=5V ± 10%)

Symbol	Parameter	Min	Max	Units
V_{CC}	V_{CC} With Respect to GND	4.5	5.5	V
T_A	Operating Temperature **(Commercial Temp)**	0	70	°C
H	Humidity	5	95	%

2.2 SATA Pin Assignment and Description

The SATA connectors are compliant with standard SATA power specifications. As is standard, power may be supplied to all of the power pins. However, only the 5V power pins are utilized to provide power to the SSD. Therefore, where non-standard power supplies and connections are utilized, the power supply does not need to supply the SSD with power to the 3.3V or 12V power pins.

Table 8: SATA connector specification compliant

	No.	Plug Connector pin definition	
Signal	S1	GND	Ground
	S2	A+	Differential signal A
	S3	A-	
	S4	GND	Ground
	S5	B-	Differential signal B
	S6	B+	
	S7	GND	Ground
Key and spacing separate signal and power segments			
Power	P1	V33	3.3V power (Not Used)
	P2	V33	3.3V power (Not Used)
	P3	V33	3.3V power, pre-charge (Not Used)
	P4	GND	Ground
	P5	GND	Ground
	P6	GND	Ground
	P7	V5	5V power, pre-charge
	P8	V5	5V power
	P9	V5	5V power
	P10	GND	Ground
	P11	DAS/DSS	Device Activity Signal
	P12	GND	Ground
	P13	V12	12V power, pre-charge (Not Used)
	P14	V12	12V power (Not Used)
	P15	V12	12V power (Not Used)

2.3 ATA Command Register

Table 9: ATA Command Register

Command Name	Code	Parameters Used					
		SC	SN	CY	DR	HD	FT
Check Power Mode	**E5h**	X	X	X	O	X	X
Execute Diagnostics	**90h**	X	X	X	O	X	X
Flush Cache	**E7h**	X	X	X	O	O	X
Identify Device	**ECh**	X	X	X	O	X	X
Idle	**E3h**	O	X	X	O	X	X
Idle Immediate	**E1h**	X	X	X	O	X	X
Initialize Device Parameters	**91h**	O	X	X	O	O	X
Read DMA	**C8h or C9h**	O	O	O	O	O	X
Read Multiple	**C4h**	O	O	O	O	O	X
Read Sector(s)	**20h or 21h**	O	O	O	O	O	X
Read Verify Sector(s)	**40h or 41h**	O	O	O	O	O	X
Recalibrate	**10h**	X	X	X	O	X	X
Security Disable Password	**F6h**	X	X	X	O	X	X
Security Erase Prepare	**F3h**	X	X	X	O	X	X
Security Erase Unit	**F4h**	X	X	X	O	X	X
Security Freeze Lock	**F5h**	X	X	X	O	X	X
Security Set Password	**F1h**	X	X	X	O	X	X
Security Unlock	**F2h**	X	X	X	O	X	X
Seek	**7xh**	X	X	O	O	O	X
Set Features	**EFh**	O	X	X	O	X	O
Set Multiple Mode	**C6h**	O	X	X	O	X	X
Sleep	**E6h**	X	X	X	O	X	X
Smart	**B0h**	X	X	O	O	X	O
Standby	**E2h**	X	X	X	O	X	X
Standby Immediate	**E0h**	X	X	X	O	X	X
Write DMA	**CAh or CBh**	O	O	O	O	O	O
Write Multiple	**C5h**	O	O	O	O	O	O
Write Sector(s)	**30h or 31h**	O	O	O	O	O	O

O = Valid
X = Don't Care
SC = Sector Count Register
SN = Sector Number Register
CY = Cylinder Low/High Register
DR = Device Select Bit (Device/Head Register Bit 4)
HD = Head Select Bit (Device/Head Register Bit 3-0)
FT = Features Register

CHECK POWER MODE (E5h)
The host can use this command to determine the current power management mode.

EXECUTE DIAGNOSITICS (90h)
This command performs the internal diagnostic tests implemented by the drive. See ERROR register for diagnostic codes.

FLUSH CACHE (E7h)
This command is used by the host to request the device to flush the write cache. If there is data in the write cache, that data shall be written to the media. The BSY bit shall remain set to one until all data has been successfully written or an error occurs.

IDLE (E3h)
This command causes the device to set BSY, enter the idle mode, clear BSY and generate an interrupt. If sector count is non-zero, the automatic power down mode is enabled. If the sector count is zero, the automatic power mode is disabled.

IDLE IMMEDIATE (E1h)
This command causes the device to set BSY, enter the Idle (Read) mode, clear BSY and generate an interrupt.

INITIALIZE DEVICE PARAMETERS (91h)
This command enables the host to set the number of sectors per track and the number of tracks per heads.

READ DMA (C8h)
Reads data from sectors during Ultra DMA and Multiword DMA transfer. Use the SET FEATURES command to specify the mode value. A sector count of zero requests 256 sectors.

READ MULTIPLE (C4h)
This command performs similarly to the Read Sectors command. Interrupts are not generated on each sector, but on the transfer of a block which contains the number of sectors defined by a Set Multiple command.

READ SECTOR(S) (20h/21h)
This command reads 1 to 256 sectors as specified in the Sector Count register from sectors which is set by Sector number register. A sector count of 0 requests 256 sectors. The transfer beings specified in the Sector Number register.

READ VERIFY SECTOR(S) (40h/41h)
This command verifies one or more sectors on the drive by transferring data from the flash media to the data buffer in the 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 (10h)
The current drive performs no processing if it receives this command. It is supported for backward compatibility with previous devices.

SECURITY DISABLE PASSWORD (F6h)
Disables any previously set user password and cancels the lock. The host transfers 512 bytes of data, as shown in the following table, to the drive. The transferred data contains a user or master password, which the drive compares with the saved password. If they match, the drive cancels the lock. The master password is still saved. It is re-enabled by issuing the SECURITY SET PASSWORD command to re-set a user password.

SECURITY ERASE PREPARE (F3h)
This command shall be issued immediately before the Security Erase Unit command to enable erasing and unlocking. This command prevents accidental loss of data on the drive.

SECURITY ERASE UNIT (F4h)
The host uses this command to transfer 512 bytes of data, as shown in the following table, to the drive. The transferred data contains a user or master password, which the drive compares with the saved password. If they match, the drive deletes user data, disables the user password, and cancels the lock. The master password is still saved. It is re-enabled by issuing the SECURITY SET PASSWORD command to re-set a user password.

SECURITY FREEZE LOCK (F5h)
Causes the drive to enter Frozen mode. Once this command has been executed, the following commands to update a lock result in the Aborted Command error:
• SECURITY SET PASSWORD
• SECURITY UNLOCK
• SECURITY DISABLE PASSWORD
• SECURITY ERASE PREPARE
• SECURITY ERASE UNIT
The drive exits from Frozen mode upon a power-off or hard reset. If the SECURITY FREEZE LOCK command is issued when the drive is placed in Frozen mode, the drive executes the command, staying in Frozen mode.

SECURITY SET PASSWORD (F1h)
This command set user password or master password. The host outputs sector data with PIO data-out protocol to indicate the information defined in the following table.

SECURITY UNLOCK (F2h)
This command disables LOCKED MODE of the device. This command transfers 512 bytes of data from the host with PIO data-out protocol. The following table defines the content of this information.

SEEK (7xh)
This command is effectively a NOP command to the device although it does perform a range check.

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

Table 10: SET ATA Command detail

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

SET MULTIPLE MODE (C6h)
This command enables the device to perform READ MULTIPLE and WRITE MULTIPLE operations and establishes the block count for these commands.

SLEEP (E6h)
This command causes the device to set BSY, enter the Sleep mode, clear BSY and generate an interrupt.

SMART Function Set (B0h)
Performs different processing required for predicting device failures, according to the subcommand specified in the Features register. If the Features register contains an unsupported value, the Aborted Command error is returned. If the SMART function is disabled, any subcommand other than SMART ENABLE OPERATIONS results in the Aborted Command error.

STANDBY (E2h)
This command causes the device to set BSY, enter the Sleep mode (which corresponds to the ATA "Standby" Mode), clear BSY and return the interrupt immediately.

STANDBY IMMEDIATE (E0h)
This command causes the drive to set BSY, enter the Sleep mode (which corresponds to the ATA "Standby" Mode), clear BSY and return the interrupt immediately.

WRITE DMA (CAh)
Write data to sectors during Ultra DMA and Multiword DMA transfer. Use the SET FEATURES command to specify the mode value.

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 SECTOR(S) (30h/31h)
Write data to a specified number of sectors (1 to 256, as specified with the Sector Count register) from the specified address. Specify "00h" to write 256 sectors.

ATA Identify Device (ECh) Command Specification

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

Table 11: ATA Identify Device Command detail

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

10-19	XXXXh	F	Serial number (20 ASCII characters)
20-21	XXXXh	X	Retired
22	003Fh	X	Obsolete
23-26	XXXXh	F	Firmware revision (8 ASCII characters)
27-46	XXXXh	F	Model number (40 ASCII characters)
47	8000h	F F F	15-8 80h 7-0 00h = Reserved 01h = Maximum number of 1 sectors on Read/Write Multiple commands
48	4000h	F	Reserved
49	2F00h	 F F F F F F X	Capabilities 15-14 Reserved for the IDENTIFY PACKET DEVICE command. 13 1 = Standby timer values as specified in this standard are supported 0 = Standby timer values shall be managed by the device 12 Reserved for the IDENTIFY PACKET DEVICE command. 11 1 = IORDY supported 0 = IORDY may be supported 10 1 = IORDY may be disabled 9 1 = LBA supported 8 1 = DMA supported. 7-0 Retired
50	4000h	 F F F X F	Capabilities 15 Shall be cleared to zero. 14 Shall be set to one. 13-2 Reserved. 1 Obsolete 0 Shall be set to one to indicate a device specific Standby timer value minimum.
51	0280h	X	15-8 PIO data transfer cycle timing mode 7-0 Reserved
52	0000h	X	Obsolete
53	0007h	F F F X	15-3 Reserved 2 1 = the fields reported in word 88 are valid 0 = the fields reported in word 88 are not valid 1 1 = the fields reported in words 70:64 are valid 0 = the fields reported in words 70:64 are not valid 0 1 = the fields reported in words 58:54 are valid 0 = the fields reported in words 58:54 are not valid
54	XXXXh	X	Number of current cylinders
55	00XXh	X	Number of current heads
56	XXXXh	X	Number of current sector per track
57-58	XXXXh	X	Current capacity in sectors
59	0000h	F V V	15-9 Reserved 8 1 = Multiple sector setting is valid 7-0 xxh = Setting for number of sectors that shall be transferred per interrupt on R/W Multiple command
60-61	XXXXh	F	Total number of user addressable sectors
62	0000h	X	Obsolete
63	0007h	F V V V F F F F	15-11 Reserved 10 1 = Multiword DMA mode 2 is selected 0 = Multiword DMA mode 2 is not selected 9 1 = Multiword DMA mode 1 is selected 0 = Multiword DMA mode 1 is not selected 8 1 = Multiword DMA mode 0 is selected 0 = Multiword DMA mode 0 is not selected 7-3 Reserved 2 1 = Multiword DMA mode 2 and below are supported 1 1 = Multiword DMA mode 1 and below are supported 0 1 = Multiword DMA mode 0 is supported

64	0003h	F F	15-8 Reserved 7-0 Advanced PIO modes supported
65	0078h	F	Minimum Multiword DMA transfer cycle time per word
66	0078h	F	Manufacturer's recommended Multiword DMA transfer cycle time
67	0078h	F	Minimum PIO transfer cycle time without flow control
68	0078h	F	Minimum PIO transfer cycle time with IORDY flow control
69-79	0000h	F	Reserved (for future command overlap and queuing)
80	01FEh	 F F F F F F F F F F F X X F	Major version number 0000h or FFFFh = device does not report version 15 Reserved 14 Reserved for ATA/ATAPI-14 13 Reserved for ATA/ATAPI-13 12 Reserved for ATA/ATAPI-12 11 Reserved for ATA/ATAPI-11 10 Reserved for ATA/ATAPI-10 9 Reserved for ATA/ATAPI-9 8 Reserved for ATA/ATAPI-8 7 1 = supports ATA/ATAPI-7 6 1 = supports ATA/ATAPI-6 5 1 = supports ATA/ATAPI-5 4 1 = supports ATA/ATAPI-4 3 Obsolete 2 Obsolete 1 Obsolete 0 Reserved
81	0021h	F	Minor version number
82	0068h	X F F F X F F F F F F F F F F	Command set supported. 15 Obsolete 14 1 = NOP command supported 13 1 = READ BUFFER command supported 12 1 = WRITE BUFFER command supported 11 Obsolete 10 1 = Host Protected Area feature set supported 9 1 = DEVICE RESET command supported 8 1 = SERVICE interrupt supported 7 1 = release interrupt supported 6 1 = look-ahead supported 5 1 = write cache supported 4 Shall be cleared to zero to indicate that the PACKET Command feature set is not supported. 3 1 = mandatory Power Management feature set supported 2 1 = Removable Media feature set supported 1 1 = Security Mode feature set supported 0 1 = SMART feature set supported
83	5000h	 F F F F F F F F F F F F F	Command sets supported. 15 Shall be cleared to zero 14 Shall be set to one 13-9 Reserved 8 1 = SET MAX security extension supported 7 Reserved 6 1 = SET FEATURES subcommand required to spin up after power-up 5 1 = Power-Up In Standby feature set supported 4 1 = Removable Media Status Notification feature set supported 3 1 = Advanced Power Management feature set supported 2 1 = CFA feature set supported 1 1 = READ/WRITE DMA QUEUED supported 0 1 = DOWNLOAD MICROCODE command supported
84	4000h	 F F F	Command set/feature supported extension. 15 Shall be cleared to zero 14 Shall be set to one 13-2 Reserved

		F F	1 1 = SMART self-test supported 0 1 = SMART error logging supported
85	0008h	X F F F X V F V V V V F F F V V	Command set/feature enabled. 15 Obsolete 14 1 = NOP command enabled 13 1 = READ BUFFER command enabled 12 1 = WRITE BUFFER command enabled 11 Obsolete 10 1 = Host Protected Area feature set enabled 9 1 = DEVICE RESET command enabled 8 1 = SERVICE interrupt enabled 7 1 = release interrupt enabled 6 1 = look-ahead enabled 5 1 = write cache enabled 4 Shall be cleared to zero to indicate that the PACKET Command feature set is not supported. 3 1 = Power Management feature set enabled 2 1 = Removable Media feature set enabled 1 1 = Security Mode feature set enabled 0 1 = SMART feature set enabled
86	5000h	F F F F V V V F	Command set/feature enabled. 15-9 Reserved 8 1 = SET MAX security extension enabled by SET MAX SET PASSWORD 7 See Address Offset Reserved Area Boot, INCITS TR27:2001 6 1 = SET FEATURES subcommand required to spin-up after power-up 5 1 = Power-Up In Standby feature set enabled 4 1 = Removable Media Status Notification feature set enabled 3-1 1 = Advanced Power Management feature set enabled 0 1 = DOWNLOAD MICROCODE command supported
87	4000h	F F F F F	Command set/feature default. 15 Shall be cleared to zero 14 Shall be set to one 13-2 Reserved 1 1 = SMART self-test supported 0 1 = SMART error logging supported
88	203Fh	V V V V F F F F F	15-13 Reserved 12 1 = Ultra DMA mode 4 is selected 0 = Ultra DMA mode 4 is not selected 11 1 = Ultra DMA mode 3 is selected 0 = Ultra DMA mode 3 is not selected 10 1 = Ultra DMA mode 2 is selected 0 = Ultra DMA mode 2 is not selected 9 1 = Ultra DMA mode 1 is selected 0 = Ultra DMA mode 1 is not selected 8 1 = Ultra DMA mode 0 is selected 0 = Ultra DMA mode 0 is not selected 7-5 Reserved 4 1 = Ultra DMA mode 4 and below are supported 3 1 = Ultra DMA mode 3 and below are supported 2 1 = Ultra DMA mode 2 and below are supported 1 1 = Ultra DMA mode 1 and below are supported 0 1 = Ultra DMA mode 0 is supported
89	0000h	F	Time required for security erase unit completion
90	0000h	F	Time required for Enhanced security erase completion
91	0000h	V	Current advanced power management value
92	0000h	V	Master Password Revision Code
93	0000h	X	Hardware reset result
94-126	0000h	V	Reserved
127	0000h	F F	Removable Media Status Notification feature set support 15-2 Reserved 1-0 00 = Removable Media Status Notification feature set not supported

			01 = Removable Media Status Notification feature supported 10 = Reserved 11 = Reserved
128	0001h	F V F F V V V V F	Security status 15-9 Reserved 8 Security level 0 = High, 1 = Maximum 7-6 Reserved 5 1 = Enhanced security erase supported 4 1 = Security count expired 3 1 = Security frozen 2 1 = Security locked 1 1 = Security enabled 0 1 = Security supported
129-159	0000h	X	Vendor specific
160-254	0000h	X	Reserved
255	0000h	X	Integrity word 15-8 Checksum 7-0 Signature

F/V = Fixed / Variable Content

F = the content of the word is fixed and does not change. For removable media devices, these values may change when media is removed or changed.

V = the contents of the word is variable and may change depending on the state of the device or the commands executed by the device.

X = the content of the word may be fixed or variable.

3.0 Physical Specifications

Table 12: Physical Specifications

Weight:	4.0 oz typical
Length:	100.0 mm
Width:	70.0 mm
Thickness:	9.5 mm

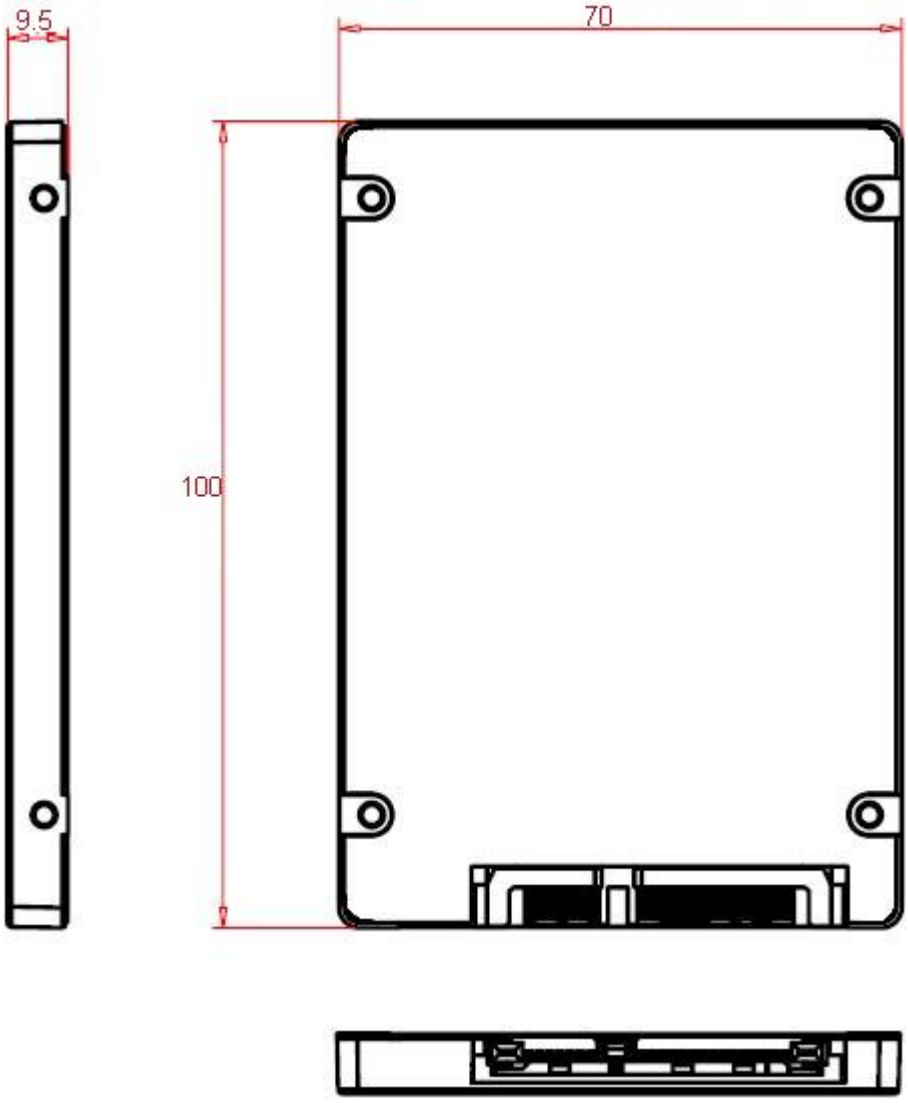

Figure 2: Physical Dimensions

4.0 Ordering Information

Table 13: Product Availability List & Naming

SSD Capacity	Part Number
32 GB	33121321
64 GB	33121322
128 GB	33121323
256 GB	33121324

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About Wintec Industries, Inc.:

Wintec Industries, founded in 1988, is headquartered in Milpitas, California. Wintec, an ODM/OEM solution provider, specializes in product designs and manufacturing, including Flash modules (CF, SD, USB, embedded Flash, SSD, etc), DRAM modules (FBDIMM, RDIMM, SODIMM, UDIMM), wireless products, modem products (embedded and USB), Advanced Digital Display products (ADD2 DVI, HDMI, digital signage), and so on. With experienced engineering team in Silicon Valley, Wintec provides a wide range of services and solutions for customers. Wintec is ISO9001-2000 certified.

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