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Wintec Solid State Drive
2.5” SATA II
WxSSxxxG1TA(I)-D1xx
Endure (D1) Series

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Revision History

Revision	Month	Year	History
0.99c	April	2011	Preliminary Release Revised Colors and formatting, added IOPS to Table 2 pg.4 Added sections 1.3-1.11
1.0	June	2011	Update Configuration with NAND flash capacities
1.01	6/23	2011	Correct table 1 and 16 SLC NAND flash user capacities for 64GB -01 and -A1 versions. Remove 128GB SLC version.
1.1	6/30	2011	Change part number SKUs to reflect the actual user capacities
1.1.1	July	2011	Update tables with overprovisioning %
1.1.2	Jan	2012	Correct Typo

Table of Contents

Wintec Solid State Drive

WxSSxxxG1TA(I)-D1xx Endure Series

Features

GENERAL

- Density up to 512GB
- SandForce SF-1200 controller with internal cache buffer
- SATA-II (3.0 Gbps) interface
- SATA-I (1.5 Gbps) backwards compatible
- High-Performance SLC or MLC NAND Flash memory

PERFORMANCE

- Ultra High Performance 285MB/s Seq. Read
- Ultra High Performance 275MB/s Seq. Write
- Sustained Random Read: 30,000 IOPS at 4KB transfer
- Sustained Random Write: 10,000 IOPS at 4KB transfer
- Power balancing minimizes energy consumption

RELIABILITY

- Intelligent Block Management & Wear Leveling
- Intelligent Data Retention optimization
- Powerful ECC Engine: Up to 24 bytes correctable per 512B sector
- Automatic encryption (AES-128) and optional password security
- MTTF: 2,000,000 operating hours.

COMPATIBILITY

- Serial ATA Revision 2.6 Compliant
- ATA/ATAPI-7 Compliant
- Supports TRIM and Smart command Transport

Wintec Solid State Drive

NOTE:
See Section 5.0 for Configuration & Ordering Guide

Description

The Wintec Industries WxSSxxxG1TA(I)-D1xx Endure series of ROHS Compliant Solid State Drives are constructed with NAND-type flash memory devices paired to SandForce SF-1200 SSD 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 and transfer rate, silent operation and low power consumption, better shock and vibration resistance, and lower total cost of ownership make the Wintec SSDs an attractive choice as the next generation mass storage device.

The Endure series SSD provides high-speed data transfer and reliability utilizing SLC or MLC NAND-flash in storage capacities ranging from 32GB to 512GB, in a small 2.5" hard drive form factor. Its robust design enables the SSD to achieve outstanding reliability and performance. Sequential reads at up to 285MB per second and sequential writes at up to 275MB per second, are the best in its class.

With the proprietary DuraClass™ technology, the SF-1200 controller implements superior wear-leveling techniques and minimizes data write amplification to ensure that the NAND flash memory is not worn out prematurely. The controller also overcomes the flash memory 'Read Disturb' issues by tracking reads and refreshes data in proximity before the data is negatively impacted. The controller utilizes 24 bytes ECC algorithms and embedded RAISE ™ internal redundant array to provide the protection and reliability of RAID on a single disk without any write overhead penalty to the host. Combining intelligent bad block management, wear leveling management, read disturb management, block consolidation and recycling, automatic data compression, AES-128 encryption, and multiple data hardening technologies, the Wintec Endure series SSD guarantees maximum reliability and longevity of the SSD.

1.0 General Product Specification

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

Table 1: User Capacity Specifications

Model Number[1] (typ)[2,3]	NAND Flash Type	NAND Flash Total Capacity	Over-Provision
W7SS025G1TA(I)-D1xx-yyy.zz	SLC	32 GB	**28%**
W7SS050G1TA(I)-D1xx-yyy.zz	SLC	64 GB	**28%**
W7SS060G1TA(I)-D1xx-yyy.zz	SLC	64 GB	**7%**
W2SS025G1TA(I)-D1xx-yyy.zz	MLC	32 GB	**28%**
W2SS050G1TA(I)-D1xx-yyy.zz	MLC	64 GB	**28%**
W2SS055G1TA(I)-D1xx-yyy.zz	MLC	64 GB	**14%**
W2SS060G1TA(I)-D1xx-yyy.zz	MLC	64 GB	**7%**
W2SS080G1TA(I)-D1xx-yyy.zz	MLC	96 GB	**20%**
W2SS100G1TA(I)-D1xx-yyy.zz	MLC	128 GB	**28%**
W2SS115G1TA(I)-D1xx-yyy.zz	MLC	128 GB	**11%**
W2SS160G1TA(I)-D1xx-yyy.zz	MLC	192 GB	**20%**
W2SS200G1TA(I)-D1xx-yyy.zz	MLC	256 GB	**28%**
W2SS240G1TA(I)-D1xx-yyy.zz	MLC	256 GB	**7%**
W2SS400G1TA-D1xx-yyy.zz	MLC	512 GB	**28%**
W2SS480G1TA-D1xx-yyy.zz	MLC	512 GB	**7%**

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, and may vary with flash configuration.

Table 2: Typical Performance Specifications

Parameter	Typical Performance[4]
Sequential Read	**up to 285 MB/sec**
Sequential Write	**up to 275 MB/sec**
IOPS Random Read	**up to 30,000 IOPS**
IOPS Random Write	**up to 10,000 IOPS**

NOTE:
4. Bandwidth measured on high-performance desktop system. Note that performance may also vary depending on host system, drive capacity, and drive configuration. Measured at QD=32.

Table 3: Flash Endurance

Parameter	Spec
Program/Erase Cycles	up to 100,000 cycles for SLC up to 10,000 cycles for MLC
Data Retention	5 Years (Min.)
MTTF	2,000,000 Hours

Table 4: SSD Data Reliability

Parameter	Spec
Non-Recoverable Errors	< 1 in 10^{16} Bytes Read
Raw ECC Correctability	Up to 24 bits / 512 Bytes data

Table 5: Environmental Specifications

Parameters		Operating	Non-Operating
Temperature	**Commercial Temp.**	0°C to 70°C	-55°C to 95°C
	Industrial Temp.	-40°C to 85°C	-55°C to 95°C
Humidity (Non-Condensing)		5% to 95%	5% to 95%
Vibration		20 G RMS	N/A

Shock (Operating)	1,500 G (Max.)	
Noise	0 dB	0 dB

1.1 Block Diagram

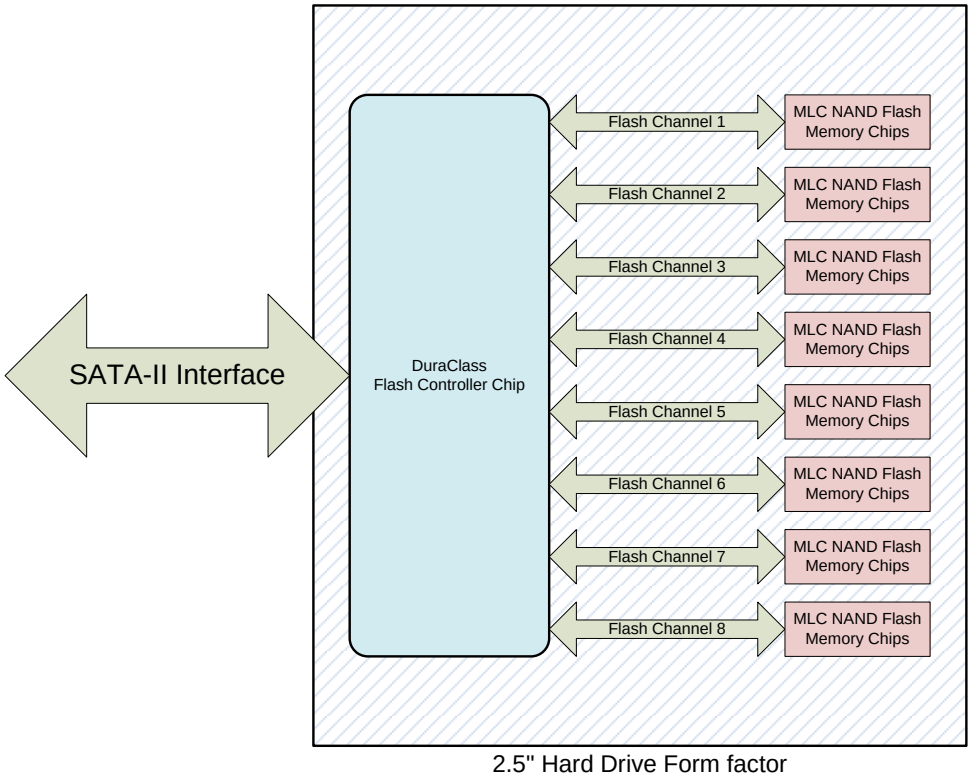

Figure 1. Block Diagram

1.2 Architecture

The Wintec Endure series 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 SLC or MLC flash memory, combined with internal NAND die redundancy, the Wintec SSD can provide both high performance and reliability, while maintaining a minimal unit cost. While other SSDs rely only upon the ECC spare area within the NAND chips to correct inevitable bit errors within the data, the D1-series SSD has additional error correction mechanisms, and can maintain data integrity even after complete loss of an entire NAND flash die.

1.3 Queue Depth

In order to maximize the performance potential of the Wintec D1 series SSD, a queue depth of 32 commands is enabled when used in AHCI mode. This allows multi-threaded disk IO requests from the host to be serviced in parallel within the drive, as well as combining small write requests in the D1 controller's internal buffer to minimize write amplification effects.

1.4 Data compression and Write amplification

The D1 series SSD contains an internal data compression algorithm that is processed inside the controller's internal processing buffer. The internal cache buffer allows for efficient data compression without any involvement from the host or user. This data compression allows for the actual amount of data written to the flash cells to be less than the data written to the drive from the host, greatly extending the reliability and lifetime of the drive beyond our competitors' SSD products.

1.5 AES-128 Data encryption and Secure Erase

Upon initialization of the D1 series SSD, an internal randomly generated AES-128 encryption key is generated in the controller. This encryption key is not externally accessible, which ensures integrity of the encryption key and the data that it protects. This key is then used to encrypt all data being written to the flash. Only encrypted data is written to the physical NAND flash chips, which ensures that any data polled straight from the NAND flash chips is undecipherable to unauthorized parties. When an ATA Secure Erase command is sent to the drive, the controller erases and resets the internal encryption key, rendering the data in the NAND flash undecipherable. The data allocation map data, all LBAs and SMART logs are also erased. The Secure Erase process takes less than 4 seconds to complete, regardless of capacity. After the Secure Erase is completed, the drive is still functional, but the old existing data is unrecoverable.

1.6 Read disturb data loss mitigation

In typical flash read situations, reading of data in nearby cells will cause an accelerated loss of charge from neighboring flash storage cells. The D1 series SSD tracks the number of reads to locations within the flash and will dynamically move data that is at a higher risk of error accumulation and data loss. If other SSD solutions do not actively manage for read disturb effects, this will lead to much shorter data retention times.

1.7 Flash cell wear leveling

The SSD tracks the number of PE (program/erase) cycles that each block in the SSD goes through, and will dynamically remap logical sectors written from the host to different physical pages and blocks within the NAND flash memory. This ensures that the flash cells will wear evenly, and that no premature wear out or data loss will occur in any portions of the drive.

1.8 Error correction and data integrity

The D1 series SSD incorporates multiple levels of error correction and data redundancy to maintain data integrity. The D1 series uses ECC correction from the spare area on the NAND itself, a dedicated redundant NAND flash die for parity information, as well as a data path CRC check to ensure that data errors are detected and correctable. The redundant

NAND flash die can maintain data integrity even after the loss of an entire NAND die. These multiple error detection and correction mechanisms allow the D1 series SSD to maintain lower Uncorrectable Bit Error Rates (UBER) than traditional HDD drives, throughout their entire service lifetime.

1.9 Block recycling and Garbage collection

As data is written to the SSD from the host, the Logical LBAs do not match with the page or erase block sizes within the NAND flash chips, which means that as the user data fills the drive there is always some amount of data fragmentation or non-contiguous logical LBA mapping to adjacent flash cells. This also means that invalid data is mixed into a block with valid data. By moving and combining valid data from multiple blocks within the device, and then writing that data to an empty block, free space can be made into whole free blocks. This maximizes performance within the D1 series SSD, and is done internally within the drive.

1.10 TRIM support

The D1 series SSD supports the TRIM command. Data that has been deleted from the host can be marked as free space by the host issuing the TRIM command to the drive. This allows the drive to more efficiently reclaim free space and maintain performance.

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
	Operating Temperature **(Industrial Temp)**	-40	85	°C
H	Humidity	5	95	%

Table 8: Power consumption

Symbol	Parameter	Value	Units
P_i	Idle Power consumption	0.65	Watts
P_T[5]	Typical operating power consumption	1.10	Watts
P_{max}[5]	Maximum operating power consumption	2.00	Watts

[5] Power measurements taken under IOMeter06 stress load with 4kB aligned reads and writes

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 9: 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)

3.0 Software Interface

3.1 ATA Command Set

The Wintec Industries SSD drive complies with ATA-8. All mandatory, and some optional commands and features are supported. The following tables summarize the ATA feature set and commands.

Table 10: ATA Feature Set

Feature Set	ATA-8 Reference	Manadatory / Optional
General feature set	**4.2**	M
48-Bit Address feature set	**4.4**	O
General Purpose Logging (GPL) feature set	**4.10**	O
Host Protected Area (HPA) feature set	**4.11**	O
Native Command Queuing (NCQ) feature set	**4.15**	O
Power Management feature set	**4.18**	M
Security feature set	**4.20**	O
S.M.A.R.T feature set	**4.21**	O
Software Settings Preservation (SSP) feature set	**4.22**	O

Table 11: ATA Command

	Command	OpCode
General Feature Set		
	NOP	00h
	Data Set Management EXT (I.E. TRIM)	06h
	Recalibrate	10h
	Read Sector(s)	20h
	Read Sector(s) w/o retry	21h
	Read Long	22h
	Read Long w/o retry	23h
	Read Sector(s) EXT	24h
	Read DMA EXT	25h
	Read Multiple EXT	29h
	Read Log EXT	2Fh
	Write Sector(s)	30h
	Write Sector(s) (w/o retry)	31h
	Write Long	32h
	Write Long w/o retry	33h
	Write Sector(s) EXT	34h
	Write DMA EXT	35h
	Write Multiple EXT	39h
	Write DMA FUA EXT	3Dh
	Write Log EXT	3Fh
	Read Verify Sector(s)	40h
	Read Verify Sector(s) (w/o retry)	41h

	Read Verify Sector(s) EXT	42h
	Write Uncorrectable EXT	45h
	Read Log DMA EXT	47h
	Write Log DMA EXT	57h
	Read FPDMA Queued	60h
	Write FPDMA Queued	61h
	SEEK	70h
	Execute Device Diagnostic	90h
	Initialize Device Parameters	91h
	Download Microcode	92h
	Read Multiple	C4h
	Write Multiple	C5h
	Set Multiple Mode	C6h
	Read DMA	C8h
	Read DMA (w/o retry)	C9h
	Write DMA	CAh
	Write DMA (w/o retry)	CBh
	Write Multiple FUA EXT	CEh
	Read Buffer	E4h
	Flush Cache	E7h
	Write Buffer	E8h
	Flush Cache EXT	EAh
	Identify Device	ECh
	Set Feature [Enable/Disable - Write Cache, Look-ahead, Automatic Acoustic mgnt., Reverting to power-on defaults, DMA setup FIS auto-activate optimization, Device-initiated interface power state transitions, software settings preservations] Set transfer mode (based on value in sector count register)	EFh
Power Management Feature Set		
	Standby Immediate	E0h
	Idle Immediate	E1h
	Standby	E2h
	Idle	E3h
	Check Power Mode	E5h
	Sleep	E6h
Security Mode Feature Set		
	Security Set Password	F1h
	Security Unlock	F2h
	Security Erase Prepare	F3h
	Security Erase Unit	F4h
	Security Freeze Lock	F5h
	Security Disable Password	F6h
SMART Feature Set		
	SMART Execute Off-Line Routine	B0h
	SMART Execute Short Self-test Routine	B0h
	SMART Execute Extended Self-test Routine	B0h
	SMART Execute Selective Self-test Routine	B0h
	SMART Abort Off-Line Routine	B0h
	SMART Execute Short Self-test Routine (captive)	B0h
	SMART Execute Extended Self-test Routine (captive)	B0h
	SMART Execute Selective Self-test Routine (captive)	B0h

	SMART Execute Conveyance Self-test Routine (offline)	B0h
	SMART Execute Conveyance Self-test Routine (captive)	B0h
	SMART SCT (SMART Command transport) Command/Status	B0h
	SMART Data Transfer	B0h
	SMART SCT Control: Forced Write Cache Enable/Disable	B0h
	SMART SCT Data Tables: Read Table:(HAD)Temperature History	B0h
	SMART Read Data	B0h/D0h
	SMART Enable/Disable Autosave	B0h/D2h
	SMART Execute Off-line Immediate	B0h/D4h
	SMART Read Log	B0h/D5h
	SMART Write Log	B0h/D6h
	SMART Enable Operations	B0h/D8h
	SMART Disable Operations	B0h/D9h
	SMART Return Status	B0h/DAh
	SMART Read Threshold	B0h/D1h
	SMART Save ATB Threshold	B0h/D3h
Host Protected Area Feature Set		
	Read Native Max Address	F8h
	Read Native Max Address EXT	27h
	Set Max Address	F9h
	Set Max Address EXT	37h
	Set Max Set Password	F9h/01h
	Set Max Lock	F9h/02h
	Set Max unLock	F9h/03h
	Set Max Freeze Lock	F9h/04h

3.2 SMART Command Support

The Wintec Industries SSD drive supports SMART command Set is used to define some vendor-specific data to report spare/bad block numbers in each memory management unit.

Table 12: SMART Command Set

Value	Command	Value	Command
00-CF	Reserved	**D6h**	Write Log sector
D0h	Read Data attributes	**D7h**	Write attribute threshold
D1h	Read attribute Threshold	**D8h**	Enable SMART operation
D2h	Enable/Disable attribute autosave	**D9h**	Disable SMART operation
D3h	Save attribute Values	**DAh**	Smart Return Status
D4h	Execute OFF-LINE Immediate	**DBh**	Enable / disable automatic off-line
D5h	Read Log sector	**DC-FFh**	Reserved

3.2.1 SMART Attribute Sector

The following 512 bytes defines the SMART format. Users can obtain the data using the "Read Data" command.

Table 13: SMART Attribute Data Structure

Byte	Description
0-1	SMART structure version code
2	1st Stored Attribute Number
3-4	Status
5	Nominal value
6	Worst value since SSD was deployed
7-12	Raw Data
13	Reserved
14-25	Next Stored Attribute Number
26-361	Next Stored Attribute Numbers
362	Off-line data collection status
363	Self-test execution status byte
364-365	Total time in seconds to complete off-line data collection activity
366	Reserved
367	Off-line data collection capability
368-369	SMART capability
370	Error Logging capability • bit 0 1 = Device error logging supported
371	Next Self Test Step
372	Short self-test routine recommended polling time (in minutes)
373	Extended self-test routine recommended polling time (in minutes)
374	Conveyance self-test routine recommended polling time (in minutes)
375-376	Time for Extended Self Test if > 255 (ie, 373 to FFh)
377-385	Reserved
386-510	Vendor specific
511	Checksum of Data structure (generated on retrieval of stored data)

3.2.2 Supported SMART Attributes

The following table summarizes the SMART attribute Menu.

Table 14: SMART Attribute Menu Summary

ID	Hex	Attribute Name	Description
1	01h	Raw Read Error Rate	Raw error rate related to ECC errors. Correctable and uncorrectable errors are included in error event count
5	05h	Retired Block Count	Tracks the total number of retired blocks.
9	09h	Power-On Hours (POH)	Total count of hours in power-on state.
12	0Ch	Device Power Cycle Count	The count of full disk power on/off cycles.
13	0Dh	Soft Read Error Rate	The number of corrected ECC read errors reports
100	64h	Gigabytes Erased	The number of Flash bytes erased across the entire drive over the life of the drive
170	AAh	Reserve Block Count	Returns current number of reserve (over-provisioned) blocks
171	ABh	Program Fail Count	Counts the number of flash program failure
172	ACh	Erase Fail Count	Counts the number of flash erase failure
174	AEh	Unexpected Power loss count	Counts the number of unexpected power loss events since the drive was deployed
177	B1h	Wear Range Delta	Return the percent difference in wear between the most-worn block and least-worn block
181	B5h	Program Fail Count	(Identical to attribute 171)
182	B6h	Erase Fail count	(Identical to attribute 172)
184	B8h	Reported I/O Error Detection Code Errors	I/O Error Detection Code error count. The attribute tracks the number of end-to end CRC errors encountered during host initiated reads and writes.
187	BBh	Reported Uncorrectable Errors	This attribute tracks the number of uncorrectable errors reported back to the host for all data access commands
194	C2h	Reserved	Not used
195	C3h	On-the-fly ECC Uncorrectable Error Count	This attribute tracks the number of uncorrectable errors. (UECC)
196	C4h	Reallocation Even Count	This attribute tracks the number of blocks that fail programming which are reallocated as a result
198	C6h	Uncorrectable Sector Count	Number of uncorrectable errors when reading/writing a sector since the drive was deployed
199	C7h	SATA R-Errors Error Count	SATA R-Errors (CRC) Count
201	C9h	Uncorrectable Soft Read Error Rate	Number of soft read errors that cannot be fixed on-the-fly and requires deep recovery via RAISE ™ (ieUECC)
204	CCh	Soft ECC correction Rate	Number of errors corrected by RAISE ™
230	E6h	Life Curve Status	A life curve used to help predict life in terms of the endurance based on the number of writes to flash
231	E7h	SSD Life left	Indicates the approximate percentage of SDD life left
232	E8h	Available Reserved Space	The number of reserved blocks remained.
241	F1h	Lifetime Writes from Host	Indicates the total amount of data written from hosts since the drive was deployed
242	F2h	Lifetime Reads from Host	Indicates the total amount of data read to hosts since the drive was deployed

4.0 Physical Specifications

Table 15: Physical Specifications

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

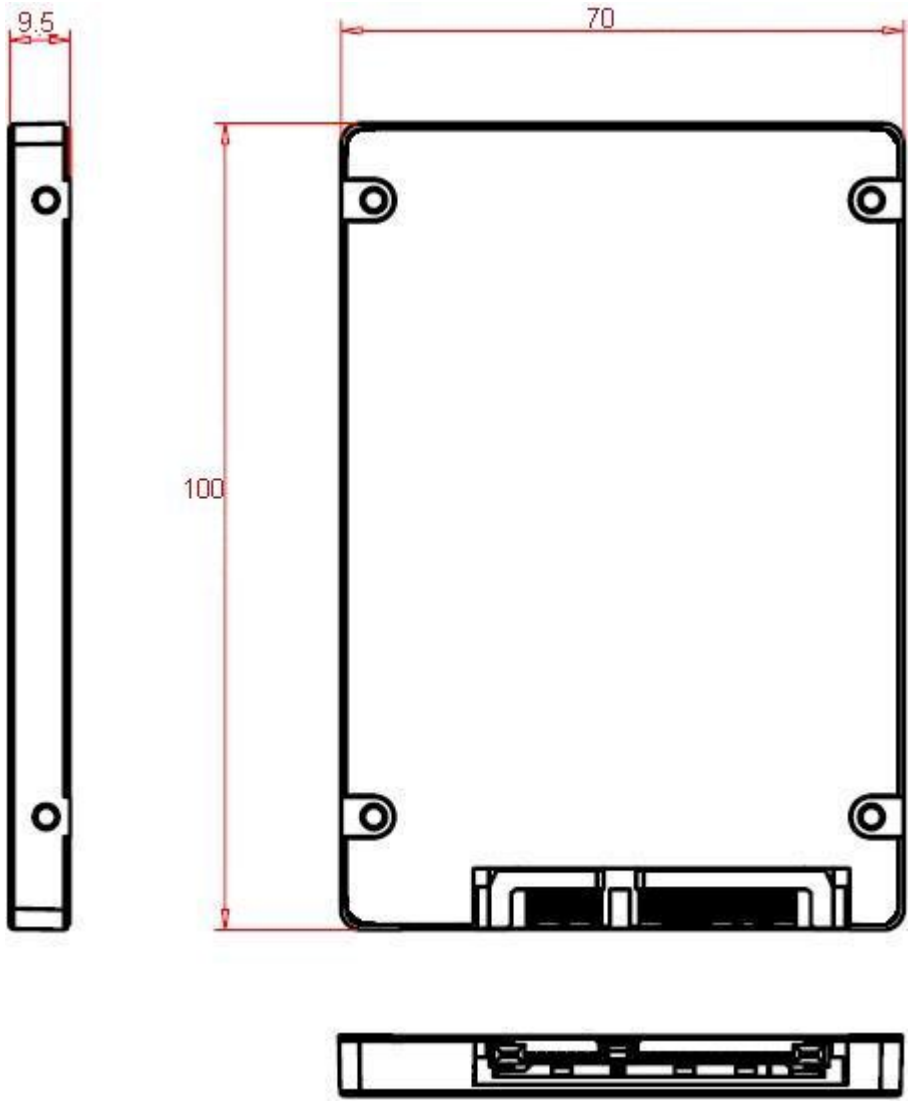

Figure 2: Physical Dimensions

5.0 Ordering Information

Table 16: Product Availability List & Naming

A. Drives with over 20% provisioning (Improve Reliability & Write Amplification, more Bad Block tolerance with less flash screening)

Model Number[1]	NAND Flash Type	Overprovision	User Capacity (typ)[2,3]
W7SS025G1TA(v)-D1xx-yyy.zz	SLC	28%	**25 GB**
W7SS050G1TA(v)-D1xx-yyy.zz	SLC	28%	**50 GB**
W2SS025G1TA(v)-D1xx-yyy.zz	MLC	28%	**25 GB**
W2SS050G1TA(v)-D1xx-yyy.zz	MLC	28%	**50 GB**
W2SS080G1TA(v)-D1xx-yyy.zz	MLC	20%	**80 GB**
W2SS100G1TA(v)-D1xx-yyy.zz	MLC	28%	**100 GB**
W2SS160G1TA(v)-D1xx-yyy.zz	MLC	20%	**160 GB**
W2SS200G1TA(v)-D1xx-yyy.zz	MLC	28%	**200 GB**
W2SS400G1TA-D1xx-yyy.zz	MLC	28%	**400 GB**

B. Drives with more capacities

Model Number[1]	NAND Flash Type	Overprovision	User Capacity (typ)[2,3]
W7SS060G1TA(v)-D1xx-yyy.zz	SLC	7%	**60 GB**
W2SS055G1TA(v)-D1xx-yyy.zz	MLC	16%	**55 GB**
W2SS060G1TA(v)-D1xx-yyy.zz	MLC	7%	**60 GB**
W2SS115G1TA(v)-D1xx-yyy.zz	MLC	11%	**115 GB**
W2SS240G1TA(v)-D1xx-yyy.zz	MLC	7%	**240 GB**
W2SS480G1TA-D1xx-yyy.zz	MLC	7%	**480 GB**

(*v*) Temperature grade
(blank): Commercial (0° to 70° C)
I: Industrial (-40° to 85° C)

(xx) Memory Manufacturer and Die Revision
(select and locked by Wintec**)**

(yyy) Flash configuration

(*zz*) Firmware Revision/Options
Please contact the factory for the latest firmware revisions and/or custom labeling and programming identification.

Contact Us (US & Int'l):

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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 (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.

Important Notice: