VIGOR S

Supreme Series
2.5" SATA SLC Flash SSD

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Supreme Series

Industrial SSD

www.macrotronusa.com

240GB

VIGOR S

SATA 2.5" SLC Flash Solid State Drive

I-Temp (-40℃ to +85℃)

VCI FC CE N12610

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Supreme Series
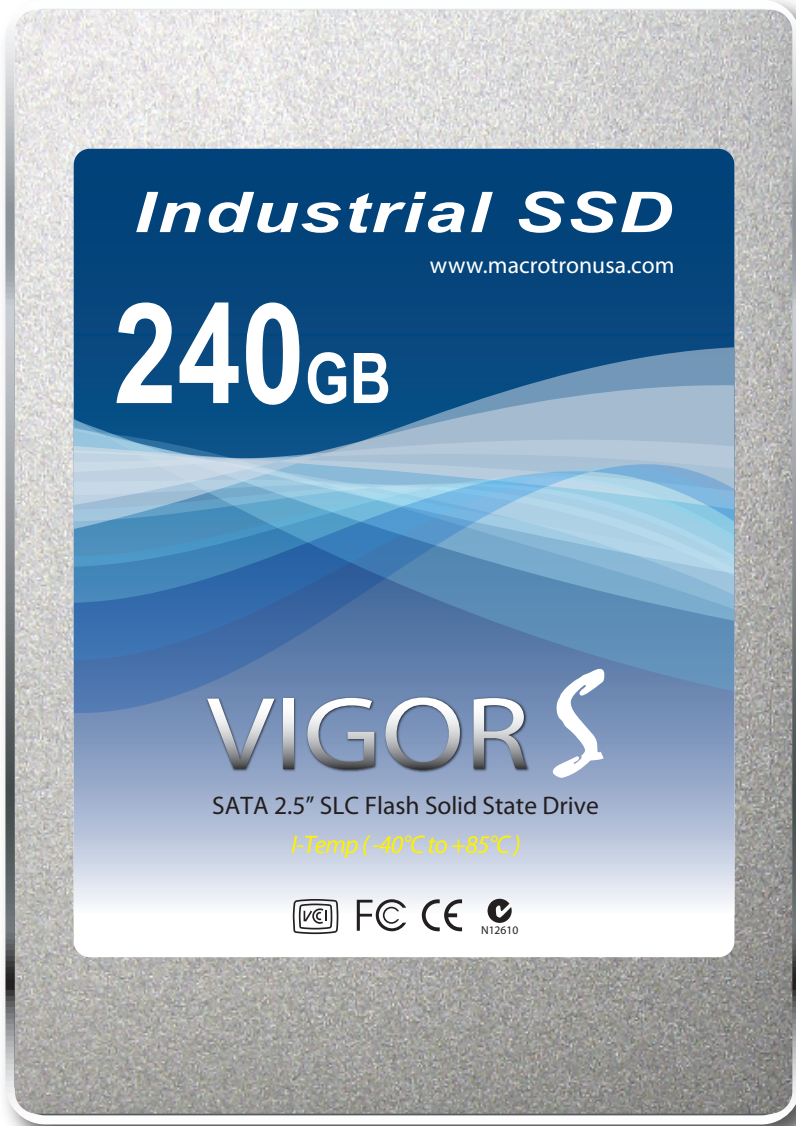
PHYSICAL SPECIFICATIONS

Basic Physical Parameters

Parameter	Value	Unit
Form Factor	2.5	Inch
Dimension	69.8 x 100.2 x 9.5	mm
Interface Standard	SATA-II, backward support to SATA-I	
Package	Metal housing	
Weight	85, typical	gram

Interface
a. The interface is compliant with SATA 2.6 revision. It is compatible with SATA-II, 3.0 Gb/s, and SATA-I, 1.5 Gb/s of interface rate.
b. Fully compliant with ATA8-ACS standard

Transfer Modes
a. PIO mode 0, 1, 2, 3, 4
b. DMA mode 0, 1, 2
c. UDMA mode 0, 1, 2, 3, 4, 5, 6

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PERFORMANCE SPECIFICATIONS

Speed and IOPS

Parameter	Value	Unit
Maximum Read Speed up to	260	MB/s
Maximum Write Speed	260	MB/s
Random Read IOPS at 4KB	20,000	
Random Write IOPS at 4KB	15,000	
Access Time	0.1	ms
Power on to Ready	0.5	s
Read Latency	50	μs
Write Latency	100	μs

The above performance was measured under manufacturer's testing environment. The performance parameters are not guaranteed under user's specific application environments. Actual performance in above is subject to change at different host computers, by different testing tools, and under different testing environment.

Testing System Setup
Processor: Intel® Intel Core i7 CPU 920@2.67GHz
Memory: 4GB ECC DDR3 PC3-8500 SDRAM at 667MHz
Motherboard: ASUS P6T7 WS
Graphic Card: NVIDIA Quadro FX 380 16-core (256MB)
SATA BIOS setup as AHCI enabled
Operating System Related Software: Windows 7 Professional 64-bit

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PERFORMANCE SPECIFICATIONS

Data Transfer Rate Measurement Method

Data transfer speeds are maximums and are measured using ATTO, HDTach or HDBench. ATTO Disk Benchmark is a Hard Disk Benchmarking tool which is also useful in measuring SSD performance. The test provides measured write and read transfer rates under various transfer sizes from 64KB, 128KB, 256KB, 512KB, and 1,024KB.

IOPS Measured Measurement Method

IOMETER is an I/O subsystem characterization tool. It is highly useful for characterizing disk performance in server and workstation environments where often IOPS are more critical than Bandwidth. It was originally developed by Intel in 1998 and since then has been supported by the Open Source Development Lab. For our testing we focused on the most commonly used measurement of 4KB and 512KB transaction size IOPS in both Random and Sequential Read and Write. We cycled Queue Depth from 1 to 32 with an Exponential step type.

Access Time Measurement Method

HDTach is an easy to use low level hardware benchmark available from Simpli Software. It will measure Burst Read Speeds, Average Read and Write Speeds, Random Access Time and CPU Utilization. HDTach is used to measure random Access Time in above table.

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RELIABILITY SPECIFICATIONS

Reliability Parameters

Parameter	Value	Unit
MTBF	3,000,000	Hours
Data Reliability	Built-in BBM and 24-bit EDC/ECC function	
Data Integrity	10	Years
Uncorrectable Bit Error Rate	$<1e_{-16}$	
Wear Leveling Factor	1.03	
Write Amplification Factor	1.05	

MTBF prediction method is based on Telcordia TR-332. Macrotron USA supports both static and dynamic wear-leveling. These two algorithms guarantee the use of all flash memory at the same level of write-erase cycles to improve lifetime limitation of NAND flash memory based storage. Wear-leveling algorithms are patent pending.

Macrotron SSD comes with built-in BBM (Bad Block Management) mechanism. With BBM, SSD drive will self identify bad blocks and remap physical to logical addresses to avoid bad blocks. In addition, Macrotron's ECC/EDC (Error Correction Code/Error Detection Code), the buil in error detection and correction, will correct physical bit errors in NAND flash memory, which further increase the data retention period of the SSD.

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ENDURANCE SPECIFICATIONS

Useful Life Time

Parameter	Value	Unit
Read	150 years	
Write	125 years at 200% capacity write-erase per day	

The above prediction is under typical user work environment and based on eighty-five percent of discount rate of the guaranteed one hunderd thousand write-erase cycles of flash memory from vendors and the assumption that the write is performed in sequential manner.

ENVIRONMENTAL SPECIFICATIONS

Ruggedness Parameters

Parameter	Value	Unit
Operating Shock	2,000G	
Operating Vibration	20G	
Operating Drop	2.0 m, 60 kg, all axes	
Operating Temperature	-40~+85	°C
Storage Temperature	-55~+95	°C
Operating Humidity	5~98%	RH
Operating Altitude	120,000	Ft

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Operating Temperature and Humidity Testing Method

The Macrotron SSD was able to perform in the commercial standard, operational temperature range of -40°C to 85°C, when tested under the following test specifications. The transfer time is 1°C/min with a total test time of 52 hours.

Apparatus Name:	Tempe/Low Humidity Chamber
Manufacturer:	KSON THS-D
Temperature Range:	-40°C ~ 85°C
Humidity Range:	5% ~ 98% RH
Ramp Rate:	0.8 - 3°C/min

Mechanical Shock Test Procedure

The Macrotron SSD met its rated shock value of 1,500G under the following test specifications with shock applied on the X, Y, and Z-axis.

Apparatus Name:	Vibration Source Shock Tester
Model:	SHOCK-2
Rated Force:	10kg
Acceleration:	30 ~ 1,500G
Pulse Duration:	0.2 - 11ms

Vibration Test Procedure

The Macrotron SSD was able to perform at our given rated value of 20G with force equal to 600Kgf applied in the X, Y, and Z-axis for a test time of one hour.

|	
Apparatus Name:	KING DESIGN Vibration Test System
Model:	EM-600F2K-40N120
Rated Force:	600Kgf
Frequency Range:	2 ~ 2,000Hz (DC)
Acceleration Max:	60G
Displacement Max:	40mm
Velocity max:	220cm/sec
Test Name:	DACTRON Vibration Control System

Mechanical Drop Test Procedure

The tough mechanical casing enhances the rugged feature of the SSD; an unexpected fall can spell the end of a conventional hard disk drive (HDD). The drop test shows that the Macrotron SSD won't lose your data when it hits the floor. The drop test was performed under the following test specifications.

Apparatus Name:	KING DESIGN DROP Tester
Model:	KD128A
Payload Capacity:	60kg
Payload Dimension:	80 x 80 x 80cm
Drop Height Range:	30 - 200cm

ELECTRICAL SPECIFICATIONS

PIN Descriptions
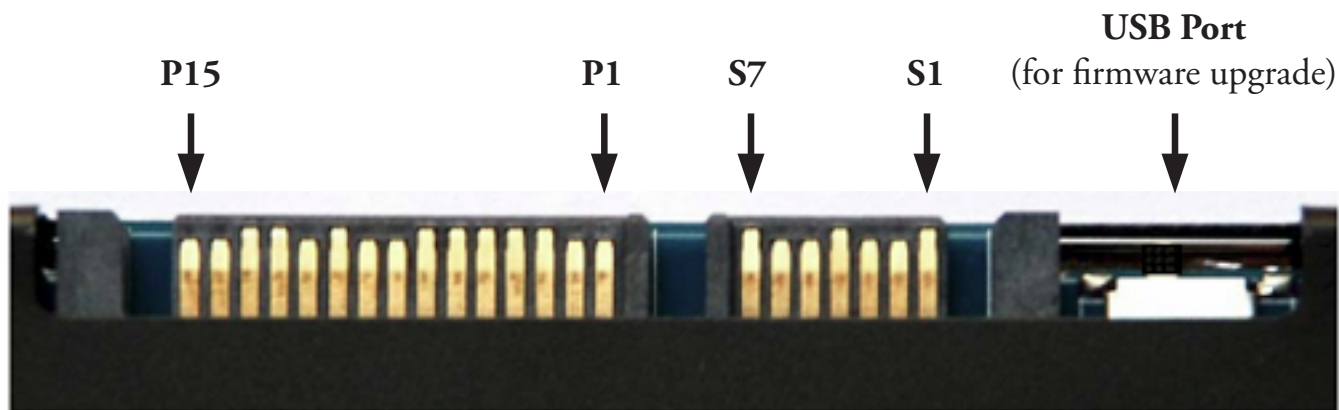
Power Parameters

Parameter	Value	Unit
Power Supply	5.0Vcc +/- 5%	V
Power Consumption, Active	0.53	W
Power Consumption, Idle	0.13	W

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Pin Assignment for the Power Segment

PIN	Signal Name	Description
P1	Not Used (3.3V)	N/A
P2	Not Used (3.3V)	N/A
P3	Not Used (3.3V Precharge)	
P4	GND	1st mate
P5	GND	2nd mate
P6	GND	
P7	5V Precharge	5V Power
P8	5V Precharge	5V Power
P9	5V Precharge	
P10	GND	
P11	Reserved	
P12	GND	1st mate
P13	Not Used (12V Precharge)	N/A
P14	Not Used (12V)	
P15	Not Used (12V)	

Pin Assignment for the Signal Segment

PIN	Signal Name	Description
S1	GND	
S2	RxP	Differential Signal pair for Receive
S3	RxN	Differential Signal pair for Receive
S4	GND	
S5	TxN	Differential Signal pair for Transmit
S6	TxP	Differential Signal pair for Transmit
S7	GND	

USB Port

The USB port is reserved for mass production programming. It is used by authorized manufacturer engineer only. User should not connect any cable to the USB port at anytime.

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MECHANICAL SPECIFICATIONS

Unit: mm
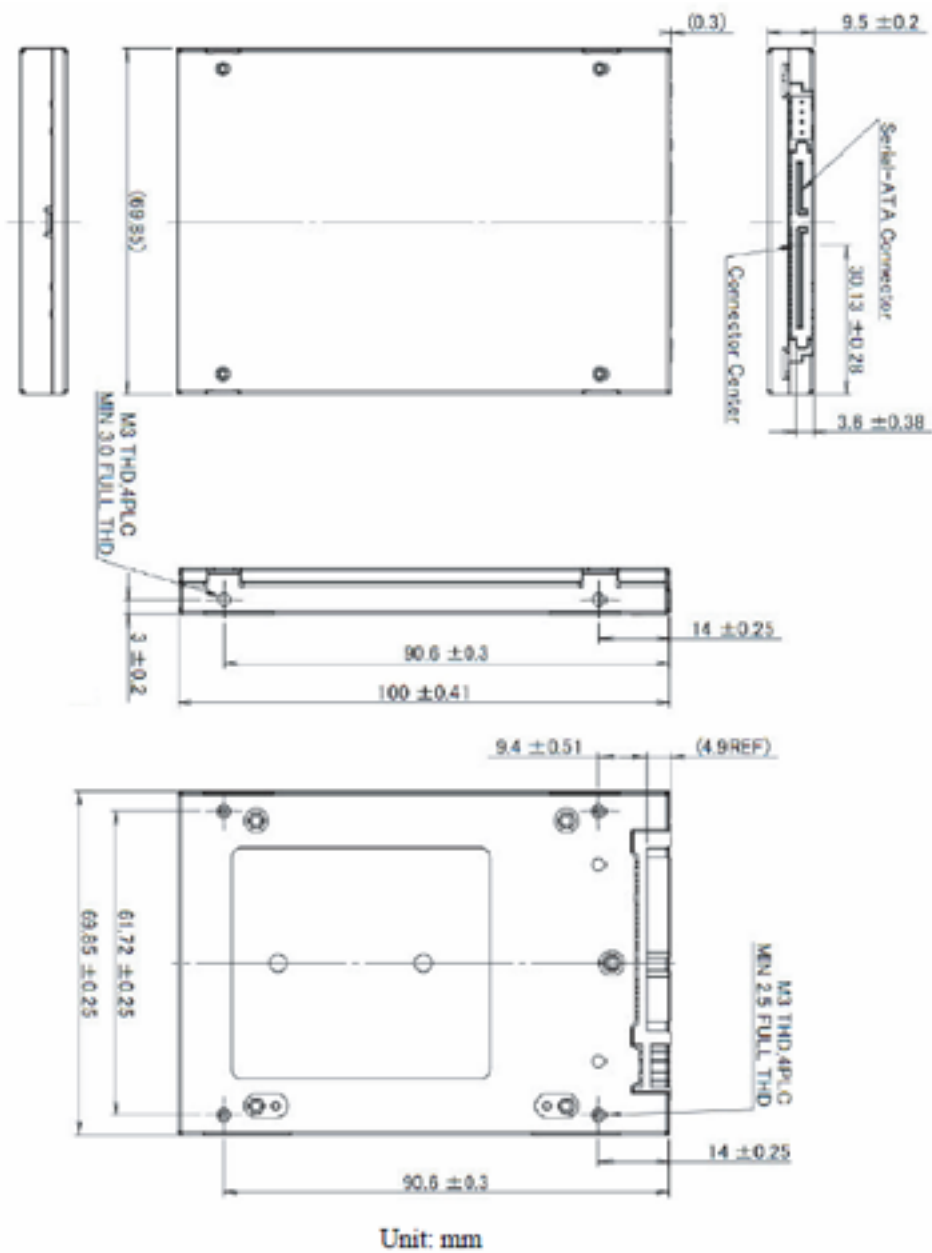
Actual product may look difference in appearance.