

Digitization comes to life

A woman with dark hair tied back, wearing a green jacket, is focused on her work at a computer. She is looking at a large monitor displaying a technical diagram. In the background, another person is blurred, working at a desk. The scene is set in a modern office environment with warm lighting.

TEAM SSD SERIES

Team's Solid State Disk (SSD) is break-through product promising faster booting time, low power consumption , zero noise , shock resistance and light weight. The SSD uses a random access mechanism, which is superior to semi-progressive, and semi-random access of conventional hard drives. This can help to enhance program execution and data read/write speeds; the SSD is a favorable option for system using Windows Vista.

TEAMGROUP *Team*

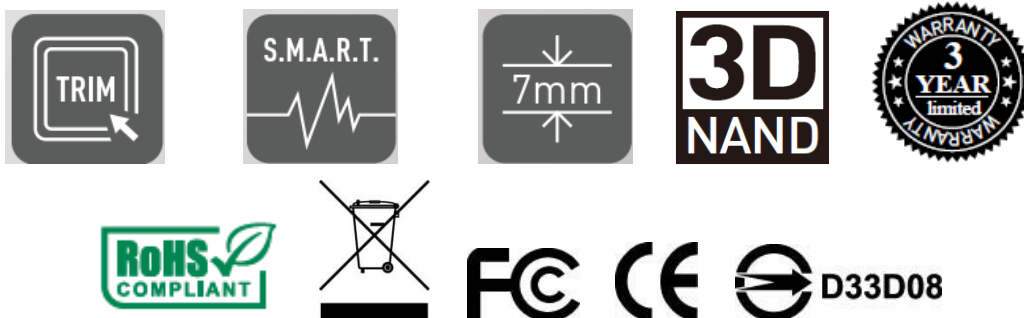
Team Group Solid State drive

L5 LITE 3D SSD SATA III (2.5" Inch)



TEAMGROUP 

<http://www.teamgroupinc.com>



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● Revision Histories

Documentation Revise History:

Version	Revision Description	Date	Remark
A.0	Initial Release	15-SEP-2017	Steve Lin
A.1	Add 1TB capacity	13-DEC-2017	Steve Lin

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1. General Description

The latest generation of 3D NAND flash memory has overcome the technical barrier of 2D NAND, and has enhanced the overall capacity, performance and reliability. Unlike the 2D planar flash memory, 3D NAND increases storage capacity by stacking up cells in vertical direction. It not only provides a better performance and endurance, but also breaks through the technical limitation of planar chips.

The L5 LITE 3D solid state drive is 4 times faster than the traditional hard drive. Its excellent performance and read/write speed not only allow fast boot/shutdown time, but also speed up the response time of all applications, so consumers can enjoy the high speed performance immediately after the upgrade. The lightweight and zero hassle advantage make it the best product to replace traditional hard drive.

The L5 LITE 3D solid state drive has an industry-standard 2.5-inch. With only 7mm in height, it is best suited for Ultrabooks on the market. Whether it is for laptop or desktop, the upgrade can be done quickly. It is using SATA III 6Gbps specification and capacities available in 120GB, 240GB, 480GB, etc. With read speed up to 470 MB/s, it not only improves the computer performance, but it is also the best bargain available.

The L5 LITE 3D solid state drive is using 3D NAND flash memory chip, which is durable, shockproof, drop resistant and offers a total protection for the data. Even if you accidentally drop your computer or it landed on a hard surface, it can still prevent damages and data corruption from accidents.

The L5 LITE 3D solid state drive supports Windows TRIM optimization command which is able to release free blocks, allowing operating system to use them later immediately when writing data. The optimized access control technology of NCQ can speed up the transfer and write performance of the SSD, and effectively reduces performance degradation and wear and tear of the drive. This can prolong the service life of the SSD perfectly.

L5 LITE 3D solid state drive's built-in smart algorithm management mechanism has functions such as garbage collection which is able to ensure operation efficiency. The powerful Wear-Leveling technology and ECC (Error Correction Code) function enhance the reliability of data transfer.

● **Main Feature**

- 3D NAND – excellent choice for upgrade
- Read/write speed is 4 times faster than traditional hard drive – breathe new life into old system
- Smooth read/write speed – up to 470 MB/s of read speed is able to enhance the speed and performance of the overall system
- Ultra lightweight and slim - 2.5-inch hard drive with just 7.0 mm thickness, it can be installed on laptop or any other system
- Support S.M.A.R.T. technology - monitoring hard drive status efficiently
- Support TRIM - bring out its best performance on the compatible operating system
- Three years product warranty with free technical support service

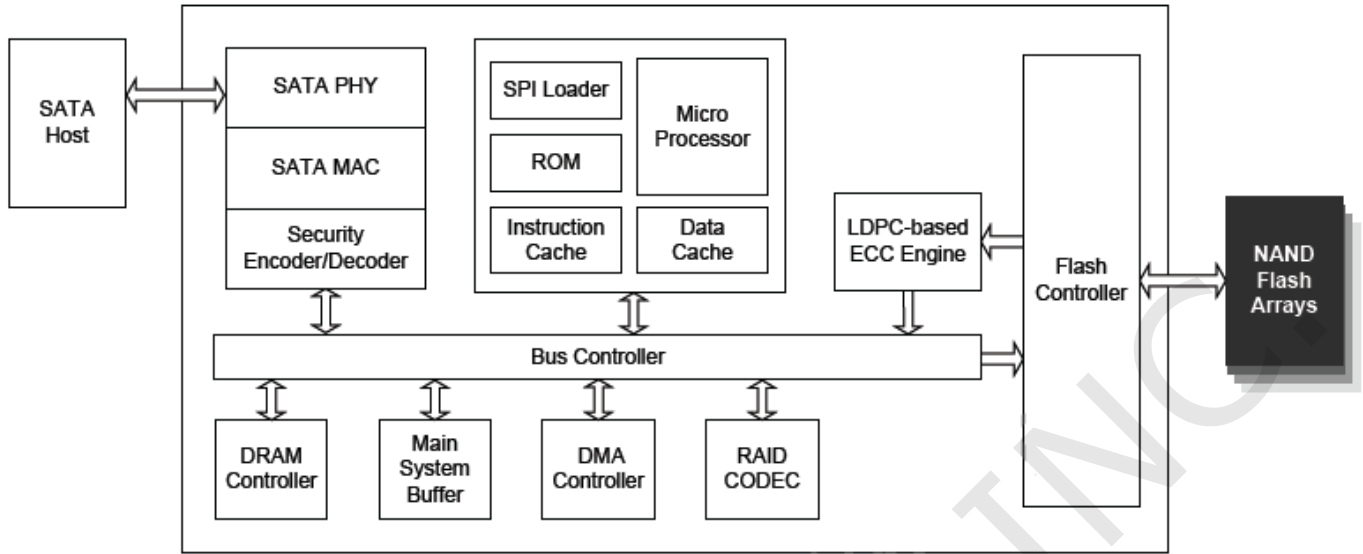
Item	Specification
Model	L5 LITE 3D
Interface	SATA Rev. 3.0 (6Gb/s) – with backwards compatibility to SATA Rev. 2.0
Capacity	120 / 240 / 480GB / 1TB*
Color	Gold
Voltage	DC 5V
Operation Temperature	0°C ~ 70°C
Performance	ATTO / Crystal Disk Mark: 120GB Read: 470MB/s ; Write: 300MB/s 240GB Read: 470MB/s ; Write: 400MB/s 480GB Read: 470MB/s ; Write: 420MB/s 1TB Read: 500MB/s ; Write: 480MB/s** IOPS: 120GB 4K Random Read/Write: 30K/40K IOPS max 240GB 4K Random Read/Write: 65K/70K IOPS max 480GB 4K Random Read/Write: 70K/70K IOPS max 1TB 4K Random Read/Write: 80K/70K IOPS max**
Weight	65g
Dimensions	100(L) x 69.85(W) x 7(H) mm
Humidity	0°C to 55°C / 5% ~ 95% RH, non-condensing
Vibration	20G (non-operating)
Shock	1500G
MTBF	1,000,000 hours
System Requirements	Windows 10 / 8 / 7 / Vista, MAC OS 10.4 or later, Linux 2.6.33 or later
Warranty	3-year limited warranty

Notes: *1GB=1,000,000,000 Bytes. In OS system, it would be displayed as 1,000,000,000 Bytes / 1024 / 1024 / 1024 = 0.93GB

**Transmission speed will vary according to different hardware / software conditions, therefore the data can only used for basic reference.

※We reserve the right to modify product specifications without prior notice.

● SSD Functional Block Diagram

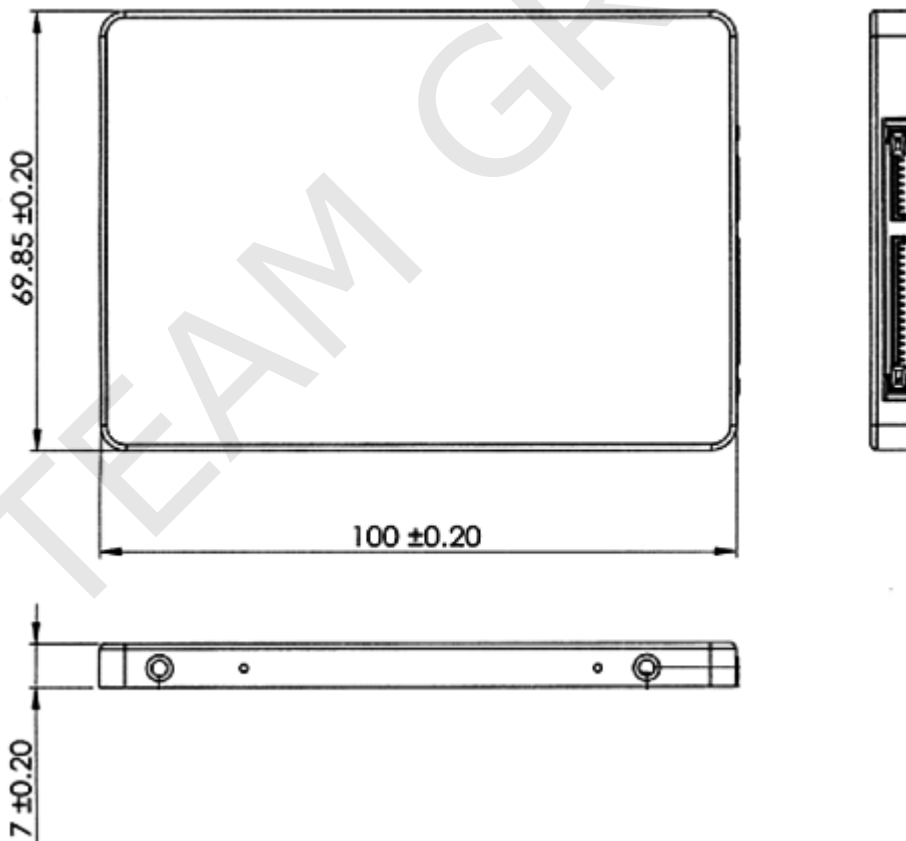


2. Mechanical Specification

2.1 2.5 inch SSD physical dimensions and Weight

Height (mm)	Width (mm)	Length (mm)	Weight (gram)
7.00 (+/- 0.15)	69.85 (+/- 0.15)	100.00 (+/- 0.15)	65g (Max)

■ 2.5 inch plastic shell Physical dimension (top)



3. Product Specification

3.1 System Interface and Configuration

- Burst read/write rate is 600 MB/sec (6.0 Gb/sec).

3.2 System Performance

SATA 6Gb/s host interface					
Parameter	Unit	120GB	240GB	480GB	1TB
Sequential Read	MB/S	470(Max)*	470(Max)*	470(Max)*	500(Max)*
Sequential Write	MB/S	300(Max)*	400(Max)*	420(Max)*	480(Max)*
Random Read(4K) QD=32	IOPS	30K(Max)*	65K(Max)*	70K(Max)*	80K(Max)*
Random Write(4K) QD=32	IOPS	40K(Max)*	70K(Max)*	70K(Max)*	70K(Max)*

Note: Actual performance may vary depending on use conditions and environment.

3.3 Drive Capacity

Unformatted Capacity	120GB	240GB	480GB	1TB
Total Number of User-Addressable Sectors in LBA Mode	234,375,000	468,750,000	937,500,000	1,953,125,000
Bytes per Sector	512 Bytes			

Note:

* 1 Megabyte (MB) = 1 Million byte ; 1 Gigabyte (GB) = 1 Billion bytes.

**Actual usable capacity may be less (due to formatting, partitioning, operating system, and applications or otherwise)

3.4 Supply Voltage

Item	Requirements
Allowable voltage	5.0V +/- 5%
Allowable noise / ripple	100mV p-p or less

3.5 System Power Consumption

Input Voltage 5.0 +/- 5% (mA)				
Parameter	120GB	240GB	480GB	1TB
Idle	149.4	148.8	140.6	140.6
Sequential Read	431.4	430.9	326.9	329.3
Sequential Write	382.5	405.5	410.5	434.4

NOTES:

*The average value of power consumption is achieved based on 100% conversion efficiency.

** The measured power voltage is 5V.

***Samples were built of 3D NAND flash and measured under ambient temperature.

****Sequential R/W is measured while testing 1MB sequential R/W 3 times by IOMeter.

*****Power Consumption may differ according to flash configuration and platform.

3.6 System Reliability

➤ MTBF: 1,000,000 Hours

*MTBF is Mean Time between Failures. As same word, annual failure ratio is 0.4%.

3.7 Environmental Specifications

Features	Operating	Non-Operating
Temperature	0°C to 70°C	-40°C to 85°C
Humidity	5% to 95%, non-condensing	
Vibration	7~800Hz, 3.08Grms, 30min / axis (X,Y,Z)	
Shock	1500G, duration 0.5ms, Half Sine Wave	

Note:

*Temperature specification is following JEDEC standard; Expressed temperature must be measured right on the case.

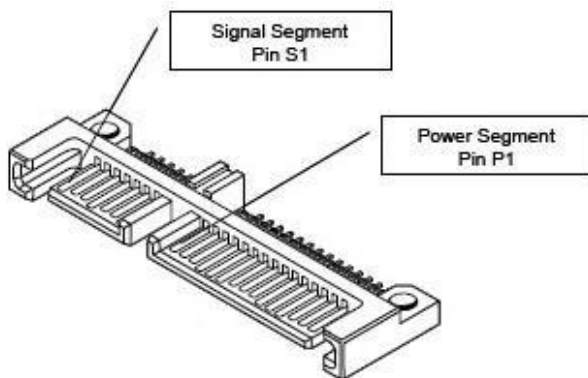
**Humidity is measured in non-condensing.

***Test condition for shock: 0.5ms duration with half sine wave.

****Test condition for vibration: 10Hz to 2,000Hz, 15mins/axis on 3axis

4. Electrical Interface Specification

4.1 2.5 inch Connector Pin Assignments



Plug connector pin definition			
Signal	S1	GND	2 nd mate
	S2	A+	Differential signal A from phy
	S3	A-	
	S4	GND	2 nd mate
	S5	B-	Differential signal B from phy
	S6	B+	
	S7	GND	2 nd mate
Key and spacing separate signal and power segments			
Power	P1	V33	3.3V power (Unused)
	P2	V33	3.3V power (Unused)
	P3	V33	3.3V power, pre-charge, 2 nd mate (Unused)
	P4	GND	1 st mate
	P5	GND	2 nd mate
	P6	GND	2 nd mate
	P7	V5	5V power, pre-charge, 2 nd mate
	P8	V5	5V power
	P9	V5	5V power
	P10	GND	2 nd mate
	P11	DAS / DSS	Device Activity Signal / Disable Staggered Spinup
	P12	GND	1 st mate
	P13	V12	12V power, pre-charge, mate (Unused)
	P14	V12	12V power (Unused)
	P15	V12	12V power (Unused)

5. Command Descriptions

5.1 Supported ATA Commands

Command	Code	Protocol
General Feature Set		
Execute Device Diagnostic	90h	Execute device diagnostic
Flush Cache	E7h	Non-data
Identify Device	ECh	PIO
Initialize Drive Parameters	91h	Non- data
Read DMA	C8h	DMA
Read Log Ext	2Fh	PIO
Read Multiple	C4h	PIO
Read Sector(s)	20h	PIO
Read Verify Sector(s)	40h or 41h	Non- data
Set Feature	EFh	Non- data
Set Multiple Mode	C6h	Non- data
Write DMA	CAh	DMA
Write Multiple	C5h	PIO data-out
Write Sector(s)	30h	PIO data-out
NOP	00h	Non- data
Read Buffer	E4h	PIO
Write Buffer	E8h	PIO data-out
Power Management Feature Set		
Check Power Mode	E5h or 98h	Non- data
Idle	E3h or 97h	Non- data
Idle Immediate	E1h or 95h	Non- data
Sleep	E6h or 99h	Non- data t
Standby	E2h or 96h	Non- data
Standby Immediate	E0h or 94h	Non- data
SMART Feature Set		
SMART Read Data	B0h	PIO data-in
SMART Read Threshold	B0h	PIO data-in
Host Protected Area Feature Set		
Read Native Max Address	F8h	Non-data
48-bit Address Feature Set		
Flush Cache Ext	EAh	Non-data
Read Sector(s) Ext	24h	PIO data-in
Read DMA Ext	25h	DMA
Read Multiple Ext	29h	PIO data-in
Read Native Max Address Ext	27h	Non-data
Read Verify Sector(s) Ext	42h	Non-data
Write DMA Ext	35h	DMA

Write Multiple Ext	39h	PIO data-out
Write Sector(s) Ext	34h	PIO data-out
NCQ Feature Set		
Read FPDMA Queued	60h	DMA Queued
Write FPDMA Queued	61h	DMA Queued
Others		
Data Set Management	06h	DMA
Seek	70h	Non-data

5.2 SMART Attributes

Attribute ID (hex)	Attribute Name
01	Read Error Rate
*02	Throughput Performance
*03	Spin Up Time
*05	Reallocated Sectors Count
*07	Seek Error Rate
*08	Seek Time Performance
09	Power-On Hours
*0A	Spin Retry Count
0C	Power Cycle Count
A8	SATA PHY Error Count
AA	“Bad Block Count (Early / Later)”
AD	Erase count (Average, Max Erase Count)
*AF	Bad Cluster Table Count
BB	Uncorrectable Errors
C0	Unsafe Shutdown Count
C2	Temperature
*C4	Later Bad Block Count
*C5	Current Pending Sector Count
C7	CRC Error Count
DA	CRC Error Count
E7	SSD Life Left
E9	Lifetime Writes to Flash
*F0	Write Head
F1	Host Writes (Sector Unit)
F2	Host Reads (Sector Unit)
F4	Average Erase Count
F5	Max Erase Count
F6	Total Erase Count

* These fields are included for compatibility with legacy systems and return fixed values.

6. Identify Device Data

The Identify Device command enables the host to receive parameter information from the controller. This command has the same protocol as the Read Sector(s) command. The parameter words in the buffer have the arrangement and meanings defined in the following table.

● ID Table Information

Word	F / V	Default Value	Description
0	F	0040h	General configuration
1	X	XXXXh	Default number of cylinders
2	V	0000h	Reserved
3	X	00XXh	Default number of heads
4	X	0000h	Obsolete
5	X	0240h	Obsolete
6	F	XXXXh	Default number of sectors per track
7 - 8	V	XXXXh	Number of sectors per card (Word 7 = MSW, Word 8 = LSW)
9	X	0000h	Obsolete
10 - 19	F	XXXXh	Serial number in ASCII (Right justified)
20	X	0002h	Obsolete
21	X	0002h	Obsolete
22	X	0000h	Obsolete
23 - 26	F	XXXXh	Firmware revision in ASCII Big Endian Byte Order in Word
27 - 46	F	XXXXh	Model number in ASCII (Left justified) Big Endian Byte Order in Word
47	F	8001h	Maximum number of sectors on Read/Write Multiple command
48	F	0000h	Reserved
49	F	0F00h	Capabilities
50	F	4000h	Capabilities
51	F	0200h	PIO data transfer cycle timing mode
52	X	0000h	Obsolete
53	F	0007h	Field validity
54	X	XXXXh	Current numbers of cylinders
55	X	XXXXh	Current numbers of heads
56	X	XXXXh	Current sectors per track
57 - 58	X	XXXXh	Current capacity in sectors (LBAs) (Word 57 = LSW , Word 58 = MSW)
59	F	0101h	Multiple sector setting
60 - 61	F	XXXXh	Total number of user addressable logical sectors for 28-bit

			commands (DWord)
62	X	0000h	Reserved
63	F	0007h	Multiword DMA transfer Supports MDMA mode 0, 1 and 2
64	F	0003h	Advanced PIO modes supported
65	F	0078h	Minimum Multiword DMA transfer cycle time per word
66	F	0078h	Recommended Multiword DMA transfer cycle time
67	F	0078h	Minimum PIO transfer cycle time without flow control
68	F	0078h	Minimum PIO transfer cycle time with IORDY flow control
69	F	4000h	Additional supported
70 – 74	F	0000h	Reserved
75	F	001Fh	Queue depth
76	F	E70Eh	Serial ATA capabilities • Supports Serial ATA Gen3 • Supports Serial ATA Gen2 • Supports Serial ATA Gen1 • Supports Phy event counters log • Supports receipt of host initiated power management requests • Supports Native Command Queuing
77	F	0080h	Serial ATA additional capability • DevSleep_to_ReducedPwrState
78	F	0148h	Serial ATA features supported • Supports Device Sleep • Supports software settings preservation • Device supports initiating power management
79	V	0040h	Reserved
80	F	03F0h	Major version number (ACS-2)
81	F	0000h	Minor version number
82	F	742Bh	Command sets supported 0
83	F	7500h	Command sets supported 1
84	F	4023h	Command sets supported 2
85 - 87	V	XXXXh	Command set/feature enabled
88	V	007Fh	Ultra DMA mode supported and selected
89	F	0003h	Time required for a Normal Erase mode Security Erase Unit command
90	F	0001h	Time required for an Enhanced Erase mode Security Erase Unit command
91	V	0000h	Current advanced power management value
92	V	FFFEh	Master password identifier
93 - 99	V	0000h	Reserved
100 –103	V	XXXXh	Maximum user LBA for 48-bit address feature set

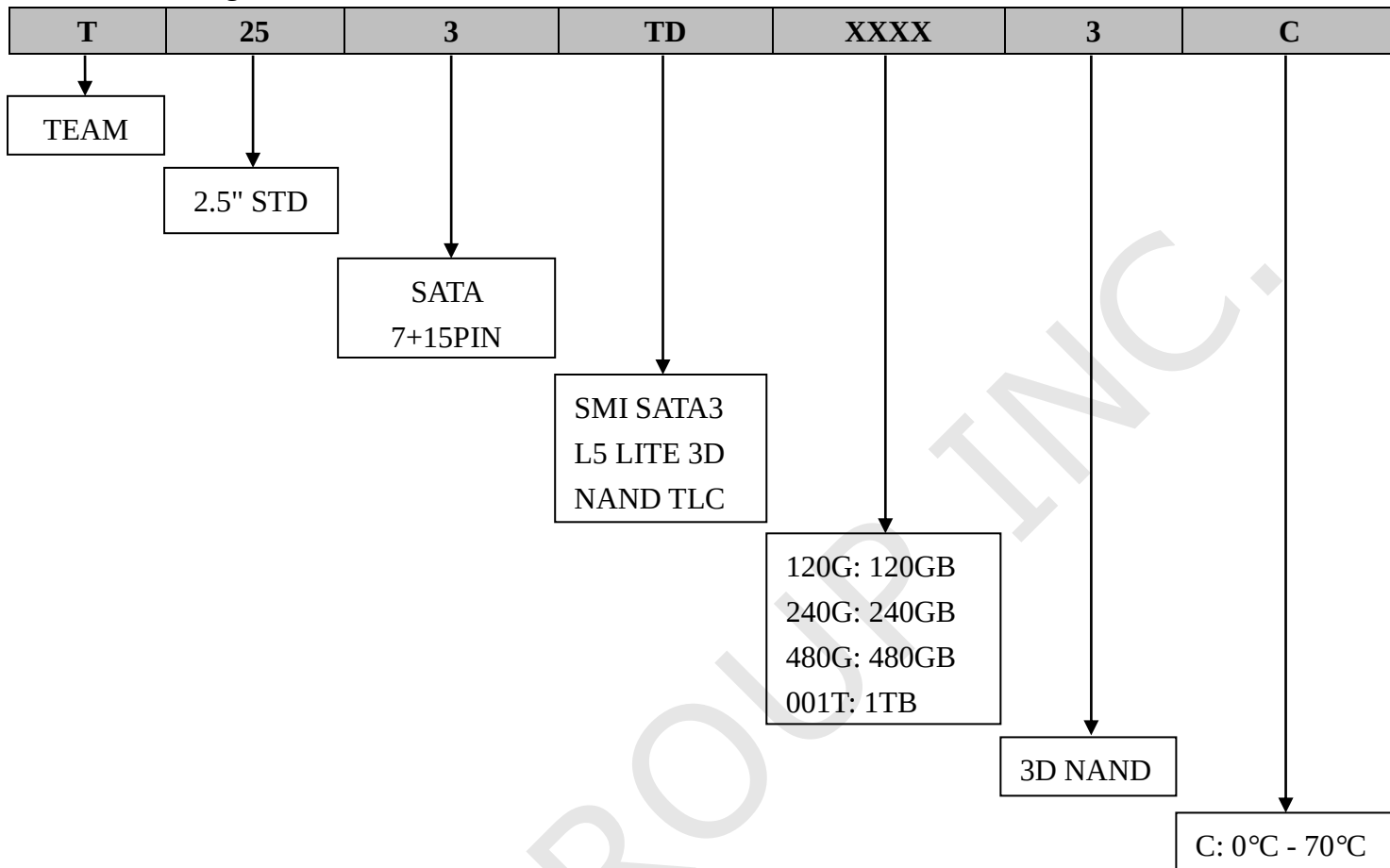
104	V	0000h	Reserved
105	F	0100h	Maximum number of 512-byte blocks per Data Set Management command
106 -127	V	0000h	Reserved
128	V	0001h	Security status
129 –159	X	XXXXh	Vendor specific
160	F	0000h	Power requirement description
161	X	0000h	Reserved
162	F	0000h	Key management schemes supported
163	F	0000h	CF Advanced True IDE Timing mode capability and setting
164 -168	V	0000h	Reserved
169	F	0001h	Data Set Management supported
170 –216	V	XXXXh	Reserved
217	F	0001h	Non-rotating media (SSD)
218 -221	X	0000h	Reserved
222	F	107Fh	Transport major revision (SATA Rev 3.1)
223 –254	X	0000h	Reserved
255	X	XXXXh	Integrity word

Note:

1. F = content (byte) is fixed and does not change.
2. V = content (byte) is variable and may change depending on the state of the device or the commands executed by the device.
3. X = content (byte) is vendor specific and may be fixed or variable.

7. Ordering Information

➤ The ordering number rule is as below:



Team P/N	Capacity	Description
T253TD120G3C101	120GB	TEAM 2.5" STD SATA3 L5 LITE 3D 7mm 120GB RETAIL
T253TD240G3C101	240GB	TEAM 2.5" STD SATA3 L5 LITE 3D 7mm 240GB RETAIL
T253TD480G3C101	480GB	TEAM 2.5" STD SATA3 L5 LITE 3D 7mm 480GB RETAIL
T253TD001T3C101	1TB	TEAM 2.5" STD SATA3 L5 LITE 3D 7mm 1TB RETAIL