



NTCKF-F6M.2NGFF-512GB Solid State Drive Datasheet

(Based on NAND Flash)

Version: 1.0

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NOTE: INFORMATION IN THIS PRODUCT SPECIFICATION IS SUBJECT TO CHANGE AT ANYTIME WITHOUT NOTICE.
ALL PRODUCT SPECIFICATIONS ARE PROVIDED FOR REFERENCE ONLY.

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I. Introduction

1 Overview

NTC NGFF SSD (Solid State Drive) is a high performance and high reliability storage device based on NAND Flash technology that designed to solve the bottleneck of computing system by traditional hard disk drives. NGFF SSD can be plugged into a standard NGFF connector commonly found in desktops, IT-STB, industrial PCs and thin client systems, compatible with Windows, MAC, Linux and else OS. With a high performance and low power consumption, Our NGFF SSD can be a good storage device for NB and Tabletop PC.

NTC SSD purely consists of semiconductor devices and NAND flash memories, without any moving parts. It gives rugged features against shock and vibration, used in extreme environment such as industrial PC to increase MTBF. Furthermore, Our SSD has highly advanced flash memory management algorithm to guarantee higher performance and data integrity.

2 Part Type Introduction

This chapter is about the specifications of the NGFF SSD with NGFF interface, it is compatible with SATAIII protocol.

Product Type	Capacity	Flash	interface
NTCKF-F6M.2NGFF-512GB	512GB	3D	NGFF-2280

Table 1 Capacity Specifications

Capacity	Available Capacity	Read/Write (MB/s)	RandomRead/Write IOPS
512GB	476.94GB	530/450	30860 /77600

Note: The performance test by ATTO Benchmark V2.47

II. Outline

Based spec	Interface	NGFF
	Dimension	22*80*3.73 mm
	Weight①	<40g
	Capacity	512GB
	Flash type	TLC NAND Flash
Read/Write Performance ②	Sequential Read	Up to 530MB/s
	Sequential Write	Up to 450MB/s
	4KB Random Read IOPS	30860
	4KB Random Write IOPS	77600
	Response Time	0.2ms
Power Consumption	Power Supply	3.3V±5%
	Standby	0.3W
	4KB Random Write	2W
Reliability	Write endurance: 8 years @ 100G write/day(512G)	
	Read endurance: unlimited	
	MTBF: >2,000,000 hours	
	Data retention: >20years @ 25°C	
	Data destroy do not support	
	Sudden power-off recovery support	
	S.M.A.R.T,NCQ,Trim and dynamic power management support	
	Static and dynamic wear-leveling	
	Bad block management algorithm	
	ECC: LDPC ECC	
Environment	Storage temperature: -40~85 °C	
	Operation temperature: Optional	
	Humidity: 5%~95%	
	Vibration: 20G Peak, 10 ~ 2000Hz, (15mins/ Axis) x3 Axis	
	Shock: 1500G (@0.5ms half sine wave)	
Warranty	2 years	

Table 2 outline of the driver

①, ②: The Read/Write performance and weight vary with different capacity of products.

The testing environment is below:

OS: Windows 7 Ultimate

CPU: Intel (R) Core(TM) i3-2100T CPU @2.50GHz

Memory: 4GB Motherboard: Asrock H67M

Test program: ATTOBenchMark V2.47 (sequential R/W speed)

IOmeter2008 (IOPS)

HD tune V4.6.1 (sustainably R/W speed, access time)

Test Drive: NTCKF-F6M.2NGFF-512GB (TLC)

III. Block Diagram

Figure 1: SM2258XT Block Diagram

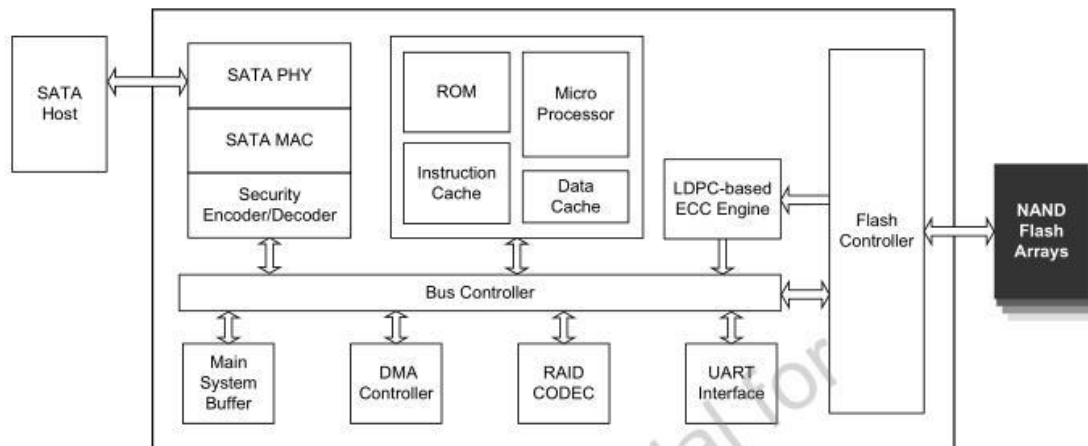


Figure 1 Block Diagram

IV. Product Specifications

4.1 Physical Dimensions

Parameter	Value
Length	80±0.2 mm
width	22±0.1 mm
height	3.20±0.2 mm

Table 3 Physical dimensions of the driver

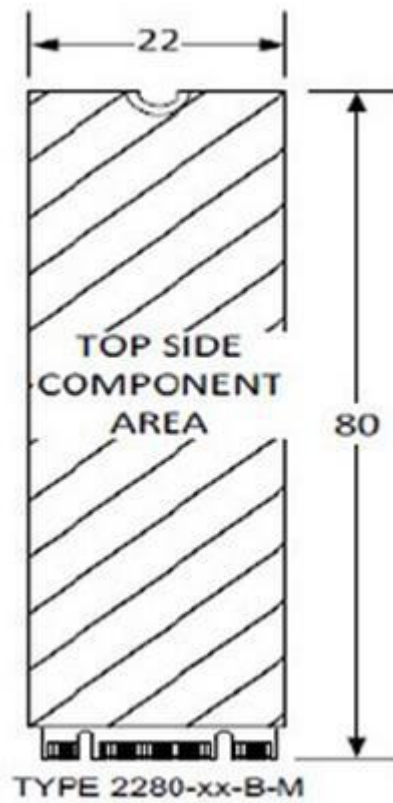


Figure 2 Physical dimensions

4.2 Interface Specification

4.2.1 Pin Assignment



Pin#	Assignment	Description	Pin#	Assignment	Description
1	CONFIG_3	Defines module type	39	GND	Return Current Path
2	+3.3V	3.3V source	40	N/A	N/A
3	GND	Return Current Path	41	SATA-B+/PERn0	Host receiver differential signal pair
4	+3.3V	3.3V source	42	N/A	N/A
5	N/A	N/A	43	SATA-B+/PERn0	Host receiver differential signal pair
6	N/A	N/A	44	N/A	N/A
7	N/A	N/A	45	GND	Return Current Path
8	N/A	N/A	46	N/A	N/A
9	N/A	N/A	47	SATA-A+/PETn0	Host transmitter differential signal pair
10	N/A	N/A	48	N/A	N/A
11	N/A	N/A	49	SATA-A+/PETn0	Host transmitter differential signal pair
12	(removed for key)	Mechanical Notch B	50	N/A	N/A
13	(removed for key)	Mechanical Notch B	51	GND	Return Current Path
14	(removed for key)	Mechanical Notch B	52	N/A	N/A
15	(removed for key)	Mechanical Notch B	53	N/A	N/A
16	(removed for key)	Mechanical Notch B	54	N/A	N/A
17	(removed for key)	Mechanical Notch B	55	N/A	N/A
18	(removed for key)	Mechanical Notch B	56	N/A	N/A
19	(removed for key)	Mechanical Notch B	57	GND	Return Current Path
20	N/A	N/A	58	N/A	N/A
21	CONFIG_0	Defines module type	59	NOTCH	Mechanical Notch M
22	N/A	N/A	60	NOTCH	Mechanical Notch M
23	N/A	N/A	61	NOTCH	Mechanical Notch M
24	N/A	N/A	62	NOTCH	Mechanical Notch M
25	N/A	N/A	63	NOTCH	Mechanical Notch M
26	N/A	N/A	64	NOTCH	Mechanical Notch M
27	GND	Return Current Path	65	NOTCH	Mechanical Notch M
28	N/A	N/A	66	NOTCH	Mechanical Notch M
29	N/A	N/A	67	N/A	N/A
30	N/A	N/A	68	N/A	N/A
31	N/A	N/A	69	CONFIG_1	Defines module type
32	N/A	N/A	70	+3.3V	3.3V source
33	GND	Return Current Path	71	GND	Return Current Path
34	N/A	N/A	72	+3.3V	3.3V source
35	N/A	N/A	73	GND	Return Current Path
36	N/A	N/A	74	+3.3V	3.3V source
37	N/A	N/A	75	CONFIG_2	Defines module type
38	DEVSLP	Device Sleep,Input			

Table 4 pin assignment

4.2.2 Interface Mode

The interface of the NGFF complies with the SATAIII protocol:

- ① NGFF
- ② PIO mode 0,1,2,3,4
- ③ DMA mode 0,1,2
- ④ UDMA mode 0,1,2,3,4,5,6

V Reliability Specification

5.3.1 ECC Descriptions

LDPC ECC

The LDPC ECC engine executes parity generation and error detection/correction features, and enhances decoding throughput and data reliability. With LDPC of correction capability $1e-2$ RBER, the hard and soft decoding mechanism provides powerful error correction. Hence the SM2256 can enhance the endurance and retention of TLC NAND and extends the SSD lifespan.

5.3.2 Advance Wear-Leveling Algorithm

The NAND flash devices are limited by a certain number of write cycles. When using a file system, frequent file table updates is mandatory. If some area on the flash wears out faster than others, it would significantly reduce the lifetime of the whole device, even if the erase counts of others are far from the write cycle limit. Thus, if the write cycles can be distributed evenly across the media, the lifetime of the media can be prolonged significantly. The scheme is achieved both via buffer management and specific advanced wear leveling to ensure that the lifetime of the flash media can be increased, and the disk access performance is optimized as well.

5.3.3 S.M.A.R.T Function

S.M.A.R.T. is an acronym for Self-Monitoring, Analysis and Reporting Technology, an open standard allowing disk drives to automatically monitor their own health and report potential problems. It protects the user from unscheduled downtime by monitoring and storing critical drive performance and calibration parameters. Ideally, this should allow taking proactive actions to prevent impending drive failure. SMART feature adopts the standard SMART command B0h to read data from the drive. When the SMART Utility running on the host, it analyzes and reports the disk status to the host before the device is in critical condition.

VI. Command Descriptions

6.1 ATA Command Register

This table with the following paragraphs summarizes the ATA command set.

Command name	Code(Hex)	Command name	Code(Hex)
CHECK POWER MODE	E5h	SECURITY ERASE UNIT	F4h
DEVICE CONFIGURATION OVERLAY	B1h	SECURITY FREEZE LOCK	F5h
EXECUTE DIAGNOSTICS	90h	SECURITY SET PASSWORD	F1h
FLUSH CACHE	E7h	SECURITY UNLOCK	F2h
FLUSH CACHE EXT	EAh	SEEK	7xh
IDENTIFY DEVICE	ECh	SET FEATURES	EFh
IDLE	E3h	SET MAX	F9h
IDLE IMMEDIATE	E1h	SET MAX ADDRESS EXT	37h
NOP	00h	SET MULTIPLE MODE	C6h
INITIALIZE DEVICE PARAMETER	91h	SLEEP	E6h
READ BUFFER	E4h	SMART	B0h
READ DMA	C8h or C9h	STANDBY	E2h
READ DMA EXT	25h	STANDBY IMMEDIATE	E0h
READ FPDMA QUEUED	60h	WRITE BUFFER	E8h
READ LOG EXT	2Fh	WRITE DAM	CAh or CBh
READ MULTIPLE	C4h	WRITE DMA EXT	35h
READ MULTIPLE EXT	29h	WRITE DMA FUA EXT	3Dh
READ NATIVE MAX ADDRESS	F8h	WRITE FPDMA QUEUED	61h
READ NATIVE MAX ADDRESS EXT	27h	WRITE LOG EXT	3Fh
READ SECTOR(S)	20h or 21h	WRITE MULTIPLE	C5h
READ VERIFY SECTOR(S)	40h or 41h	WRITE MULTIPLE EXT	39h
RECALIBRATE	10h	WRITE MULTIPLE FUA EXT	CEh
SECURITY DISABLE PASSWORD	F6h	WRITE SECTOR(S)	30h or 31h
SECURITY ERASE PREPARE	F3h	WRITE SECTOR(S) EXT	34h
		WRITE VERIFY	3Ch

Table 12 ATA commands I

6.2 ATA Commands Specifications

Please refer to the attachment.

VII. order number

Model	Capacity	PN
F6M.2	512GB	NTCKF-F6M.2NGFF-512GB

VIII. Related documentation

For more information, visit www.ntccomputadores.com.br

Attachment

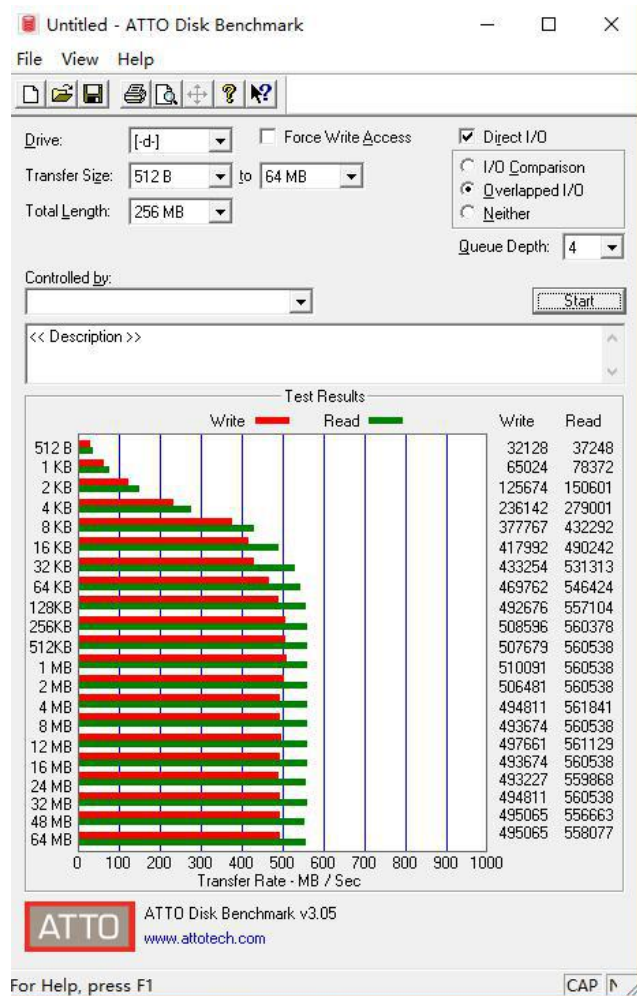
PERFORMANCE TEST

Testing Platform Information

OS: Windows 7 Ultimate
CPU: Intel (R) Core(TM) i3-2100T CPU @2.50GHz
Memory: 4GB
Motherboard: Asrock H67M
SSD:NTCKF-F6M.2NGFF-512GB

Performance:

ATTO:



AS SSD benchmark:

