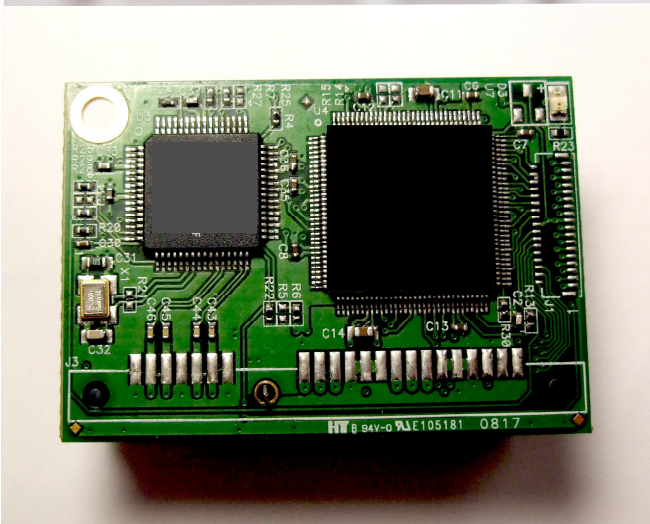
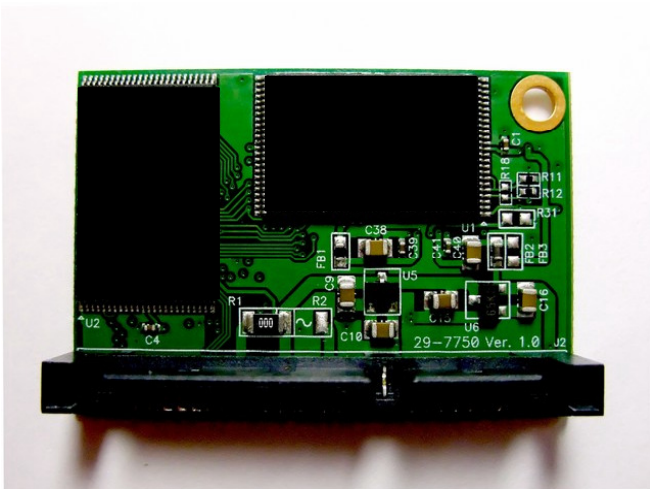


Description

Serial-ATA is designed as a successor to the legacy SATA standard. The new standard is dedicated to achieve higher transfer rate with thinner cables and more reliable operation than Parallel ATA interface. SATA Flash Modules is perfect replacement storage device for PCs, Laptops, gaming systems, and handheld devices.

Placement



Features

- RoHS compliant
- Fully compatible with devices and OS that support the SATA 1.0a 1.5Gbps standard
- Non-volatile Flash Memory for outstanding data retention
- Supports up to Ultra DMA Mode 4
- Built-in ECC (Error Correction Code) functionality and wear-leveling algorithm ensures highly reliable of data transfer
- 7P Signal + 15P Power male SATA connector
- Low Power Consumption
- Shock resistance

Dimensions

Side	Millimeters	Inches
A	44.00 ± 0.15	1.732 ± 0.006
B	33.57 ± 0.15	1.322 ± 0.006
C	10.98 ± 0.20	0.432 ± 0.008

* Please refer to Mechanical Drawing

Specifications

Physical Specification		
Form Factor	SATA Flash Modules Vertical Type	
Storage Capacities	4GB(T.B.D)	
Dimensions (mm)	Length	44.00 ± 0.15
	Width	33.57 ± 0.15
	Height	10.98 ± 0.20
Input Voltage	5V ± 10%(default) / 3.3V ± 5%(option)	
Weight	8 g	
Connector	SATA 7+15 pins combo connector	

Environmental Specifications	
Operating Temperature	0 °C to 70 °C
Storage Temperature	- 40 °C to 85 °C

Power Requirements		
Input Voltage	5V ± 10%	
4GB SATA Flash Modules Power Consumption (DC 5V @25°C)	Mode	MAX (mA)
	Write	207.3
	Read	212.2
	Standby	111.8

TS4GSDOM22H

22P Horizontal Type SATA Flash Modules

Reliability	
Data Reliability	13bit BCH ECC(2k+64 / 4k+128 byte per page flash) 24bit BCH ECC(4k+208 byte per page flash)
Data Retention	10 years
Connector Durability	500 mating cycles

Performance				
Model P/N	Read (KB/s)	Write (KB/s)	Random Read (KB/s)	Random Write (KB/s)
4GB SATA Flash Module	50393	24357	43371	8466

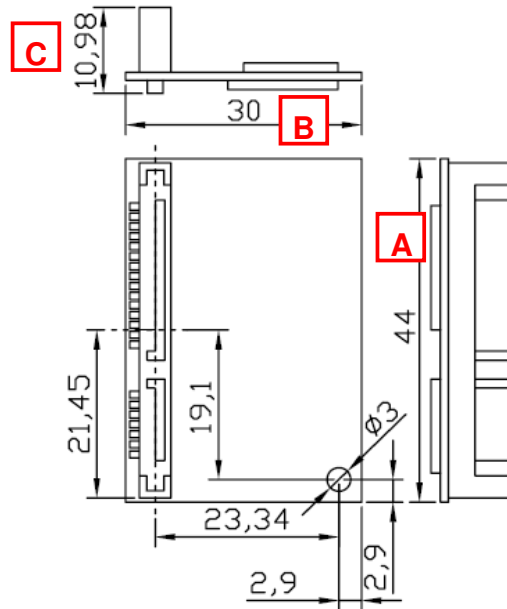
* Note : The performance is based on Samsung K9KAG08U0M, dual channel. Environment: at 25 °C, tested with GA-8IG1000MK, 256 MB RAM, SATA interface support UDMA4, Windows® XP Version 2002 SP2, benchmark utility : HDBENCH (version 3.4006), copied file 100MB

Actual Capacity				
Model P/N	Capacity	C/H/S	Capacity	User capacity (Bytes)
TS4GSDOM22H	4GB	7785 / 16 / 63	3.73GB	4,009,922,560

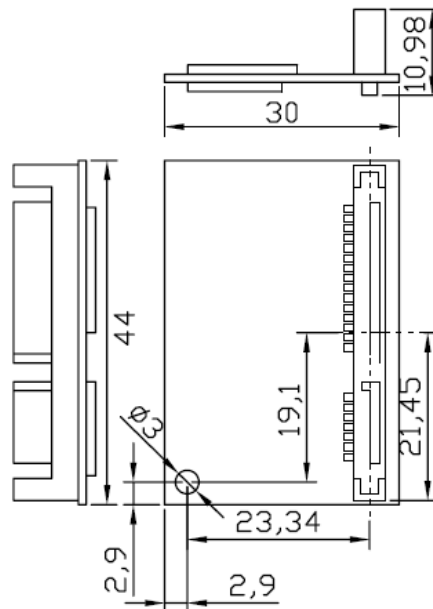
* Note: FAT32 format

Regulations	
Compliance	CE, FCC and BSMI (T.B.D.)

Mechanical Drawing



(Normal Type)

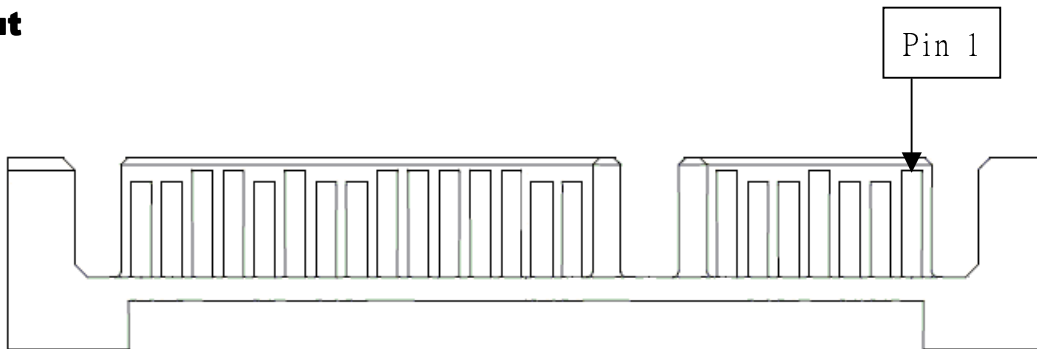


(Reversed Type)

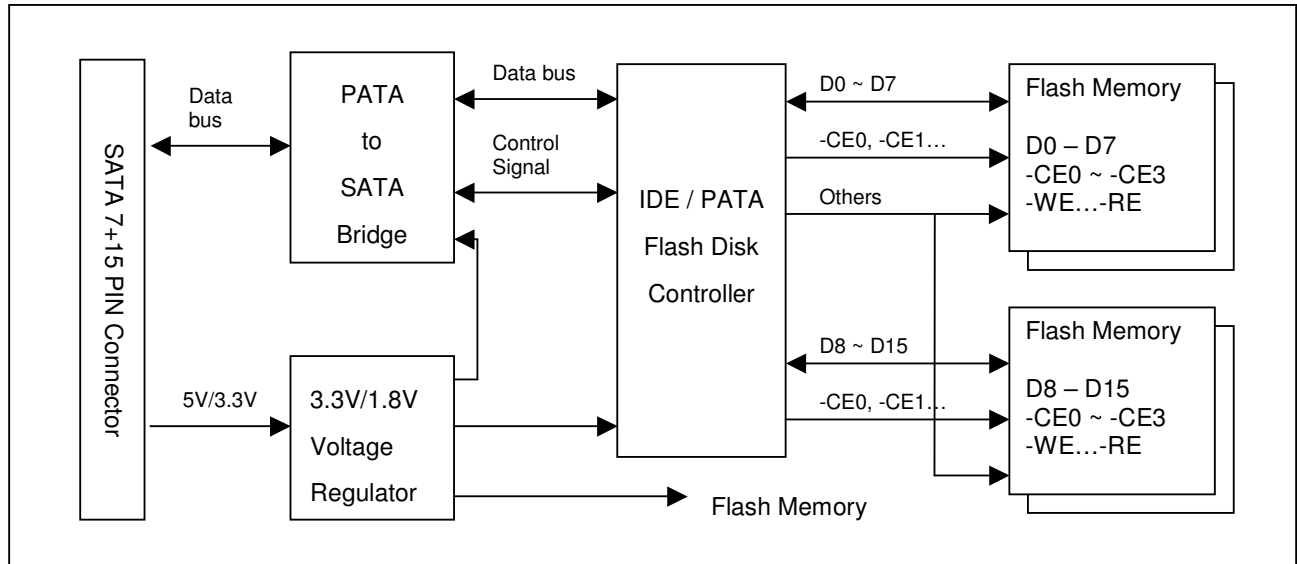
Pin Assignments

Pin No.	Pin Name	Pin No.	Pin Name
01	GND	02	A+
03	A-	04	GND
05	B-	06	B+
07	GND	08	NC
09	NC	10	NC
11	GND	12	GND
13	GND	14	5V
15	5V	16	5V
17	GND	18	GND
19	GND	20	NC
21	NC	22	NC

Pin Layout



Block Diagram



DC Characteristics

Parameter	Symbol	Min.	Max.	Unit	Remark
Supply Voltage	V_{CC}	2.97	5.5	V	
High level output voltage	V_{OH}	$V_{CC} - 0.8$		V	
Low level output voltage	V_{OL}		0.8	V	
High level input voltage	V_{IH}	2.4		V	Non-schmitt trigger
		2.05		V	Schmitt trigger ¹
Low level input voltage	V_{IL}		0.6	V	Non-schmitt trigger
			1.25	V	Schmitt trigger ¹
Pull up resistance ²	R_{PU}	52.7	141	KOhm	
Pull down resistance	R_{PD}	47.5	172	kOhm	

1. Include CE1, CE2, HREG, HOE, HIOE, HWE, HIOW pins.

2. Include CE1, CE2, HREG, HOE, HIOE, HWE, HIOW, CSEL(P35), PDIAG, DASP pins.

Command Set

	Command	Code	FR	SC	SN	CY	DH	LBA	Status	Note
1	Check Power Mode	E5 or 98h	-	-	-	-	Y	-	Support	
2	Execute Drive Diagnostic	90h	-	-	-	-	Y	-	Support	
3	Erase Sector	C0h	-	Y	Y	Y	Y	Y	Support	
4	Flush Cache	E7h	-	-	-	-	Y	-	Support	
5	Format Track	50h	-	Y	-	Y	Y	Y	Support	
6	Identify Device	ECh	-	-	-	-	Y	-	Support	
7	Idle	E3h or 97h	-	Y	-	-	Y	-	Support	
8	Idle Immediate	E1h or 95h	-	-	-	-	Y	-	Support	
9	Initialize Drive Parameters	91h	-	Y	-	-	Y	-	Support	
10	NOP	00h	-	-	-	-	Y	-	Support	
11	Read Buffer	E4h	-	-	-	-	Y	-	Support	
12	Read DMA	C8h	-	Y	Y	Y	Y	Y	Support	
13	Read Multiple	C4h	-	Y	Y	Y	Y	Y	Support	
14	Read Sector(s)	20h or 21h	-	Y	Y	Y	Y	Y	Support	
15	Read Verify Sector(s)	40h or 41h	-	Y	Y	Y	Y	Y	Support	
16	Recalibrate	1Xh	-	-	-	-	Y	-	Support	
17	Request Sense	03h	-	-	-	-	Y	-	Support	
18	Security Disable Password	F6h	-	-	-	-	Y	-	Support	
19	Security Erase Prepare	F3h	-	-	-	-	Y	-	Support	
20	Security Erase Unit	F4h	-	-	-	-	Y	-	Support	
21	Security Freeze Lock	F5h	-	-	-	-	Y	-	Support	
22	Security Set Password	F1h	-	-	-	-	Y	-	Support	
23	Security Unlock	F2h	-	-	-	-	Y	-	Support	
24	Seek	7Xh	-	-	Y	Y	Y	Y	Support	
25	Set Feature	EFh	Y	-	-	-	Y	-	Support	
26	Set Multiple Mode	C6h	-	Y	-	-	Y	-	Support	
27	Set Sleep Mode	E6h or 99h	-	-	-	-	Y	-	Support	
28	Standby	E2 or 96h	-	-	-	-	Y	-	Support	
29	Standby Immediate	E0 or 94h	-	-	-	-	Y	-	Support	

30	Translate Sector	87h	-	Y	Y	Y	Y	Y	Support	
31	Wear Level	F5h	-	-	-	-	Y	-	Support	
32	Write Buffer	E8h	-	-	-	-	Y	-	Support	
33	Write DMA	CAh	-	Y	Y	Y	Y	Y	Support	
34	Write Multiple	C5h	-	Y	Y	Y	Y	Y	Support	
35	Write Multiple w/o Erase	CDh	-	Y	Y	Y	Y	Y	Support	
36	Write Sector(s)	30h or 31h	-	Y	Y	Y	Y	Y	Support	
37	Write Sector(s) w/o Erase	38h	-	Y	Y	Y	Y	Y	Support	
38	Write Verify	3Ch	-	Y	Y	Y	Y	Y	Support	

Definitions

FR = Features Register

SC =Sector Count register (00H to FFH, 00H means 256 sectors)

SN = Sector Number register

CY = Cylinder Low/High register

DH = Head No. (0 to 15) of Drive/Head register

LBA = Logic Block Address Mode Support

- = Not used for the command

Y = Used for the command

SMART Command Set

- SMART Command Set

SMART Feature Register Values			
D0h	Read Data	D4h	Execute OFF-LINE Immediate
D1h	Read Attribute Threshold	D8h	Enable SMART Operations
D2h	Enable/Disable Autosave	D9h	Disable SMART Operations
D3h	Save Attribute Values	DAh	Return Status

- If reserved size is below the Threshold, the status can be read from Cylinder register by Return Status command (DAh).

- SMART Data Structure

BYTE	F / V	Decription
0-1	X	Revision code
2-361	X	Vendor specific
362	V	Off line data collection status
363	X	Self-test execution status byte
364-365	V	Total time in seconds to complete off-line data collection activity
366	X	Vendor specific
367	F	Off-line data collection capability
368-369	F	SMART capability
370	F	Error logging capability 7-1 Reserved 0 1=Device error logging supported
371	X	Vendor specific
372	F	Short self-test routine recommended polling time (in minutes)
373	F	Extended self-test routine recommended polling time (in minutes)
374	F	Conveyance self-test routine recommended polling time (in minutes)
375-385	R	Reserved
386-395	F	Date Code
396-397	F	Number of initial invalid block (396 = MSB, 397 = LSB)
398-399	V	Number of run time bad block (398 = MSB, 399 = LSB)
400	V	Number of spare block
511	V	Data structure checksum

F=the content of the byte is fixed and does not change.

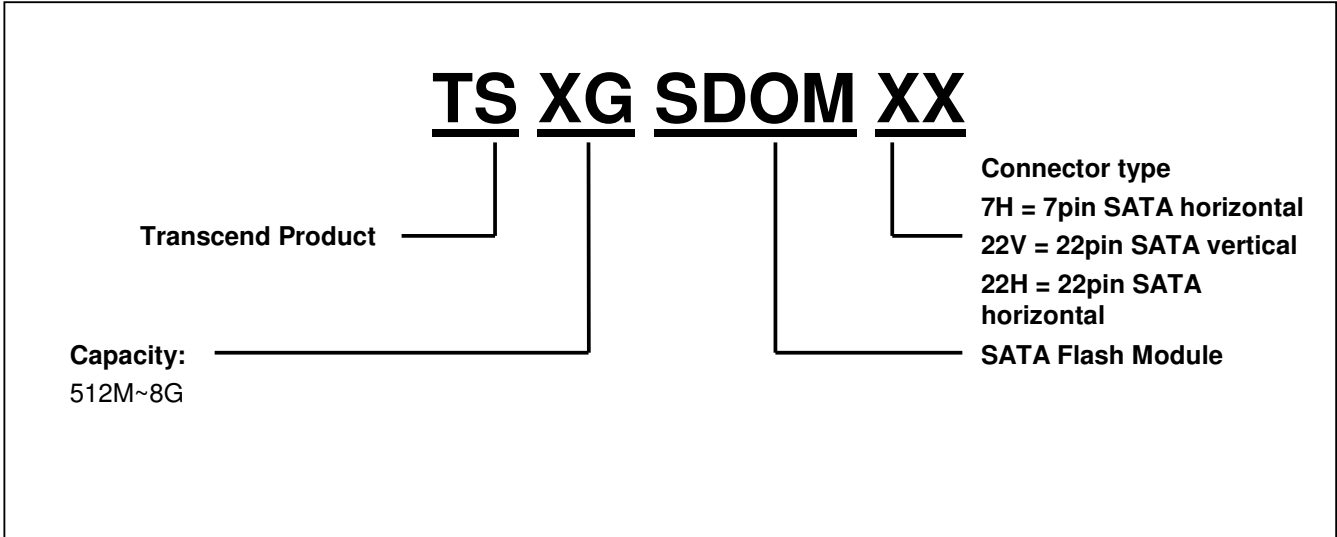
V=the content of the byte is variable and may change depending on the state of the device or the commands executed by the device.

X=the content of the byte is vendor specific and may be fixed or variable.


R=the content of the byte is reserved and shall be zero.

* 4 Byte value : [MSB] [2] [1] [LSB]

Ordering Information



- The above technical information is based on industry standard data and has been tested to be reliable. However, Transcend makes no warranty, either expressed or implied, as to its accuracy and assumes no liability in connection with the use of this product. Transcend reserves the right to make changes to the specifications at any time without prior notice.
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