

# 2011

## RENICE X1 Cfast SSD Datasheet



Renice Technology Co.,

Limited

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# 1 Introduction

## 1.1 Product Overview

Renice X1 CFast 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. Renice X1 CFast doesn't have a moving parts and it has a same host interface and same physical dimension with Hard Disk Drive, So it can be drop-in replaced with the hard disk drives without anything. With a high performance and low power consumption, Renice X1 CFast can be a good storage device for NB and Tabletop PC ,Renice X1 CFast purely consists of semiconductor devices and NAND flash memories, which give rugged features against shock and vibration use in extreme environment such as industrial PC an increased MTBF. Further more, Renice X1 CFast has highly advanced flash memory management algorithm to guarantee higher performance and data integrity

## 1.2 Feature

- Performance
  - Maximum Sequential Data Read:140-160MB/s
  - Maximum Sequential Data Write: 30-150MB/s
  - Access Time: 0.1ms
- Form factor: 42.8mmX36.4mmX3.6mm(LxWxH)
- Weight: <10g
- Interface standard: SATA
- Density: 8GB,16GB,32GB,64GB,128GB(MLC:8GB~128GB,SLC:4GB~32GB)
- Input voltage: 3.3V (±5%)
- Operating temperature range from -40 to +85°C
- Flash management algorithm: static and dynamic wear-leveling, bad block management algorithm
- Supports dynamic power management and SMART (Self-Monitoring, Analysis and Reporting Technology)
- Supports BCH ECC 8bits or 15bits in 512 bytes
- Supports NCQ
- Read endurance: unlimited
- Data retention: 10 years
- MTBF:>2,000,000 Hours

### 1.3 Functional Block Diagram

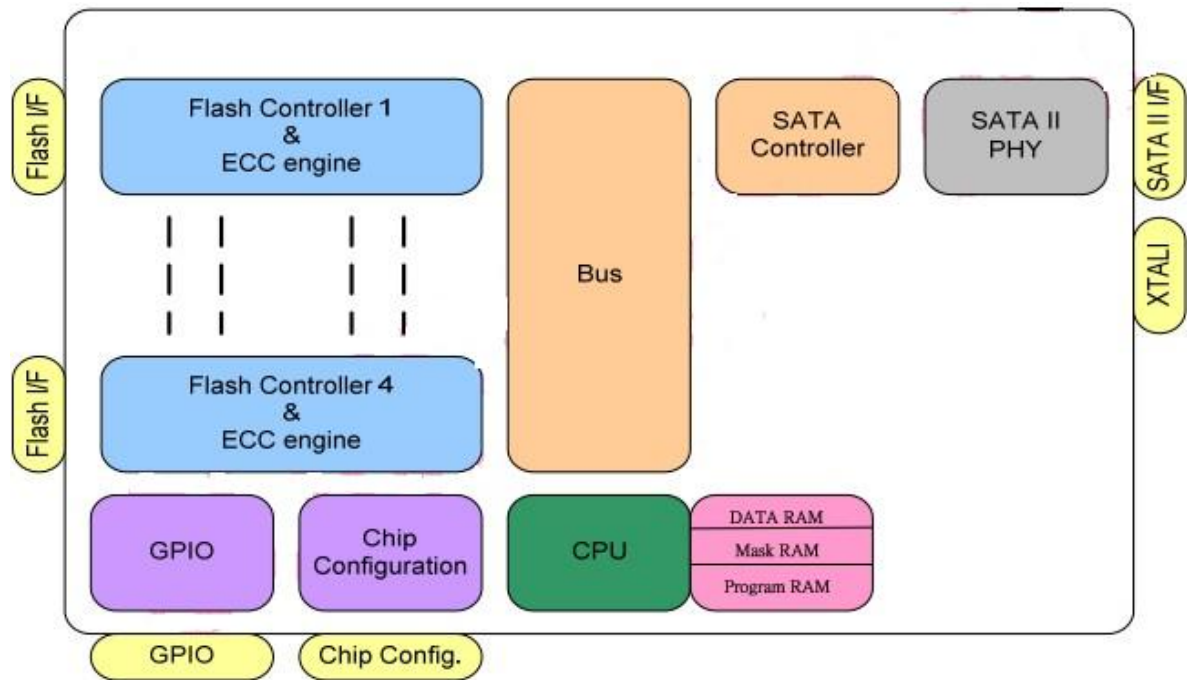


Figure 1.1: Functional Block Diagram

### 1.4 Form Size: 42.8mmX36.4mmX3.6mm(LxWxH)

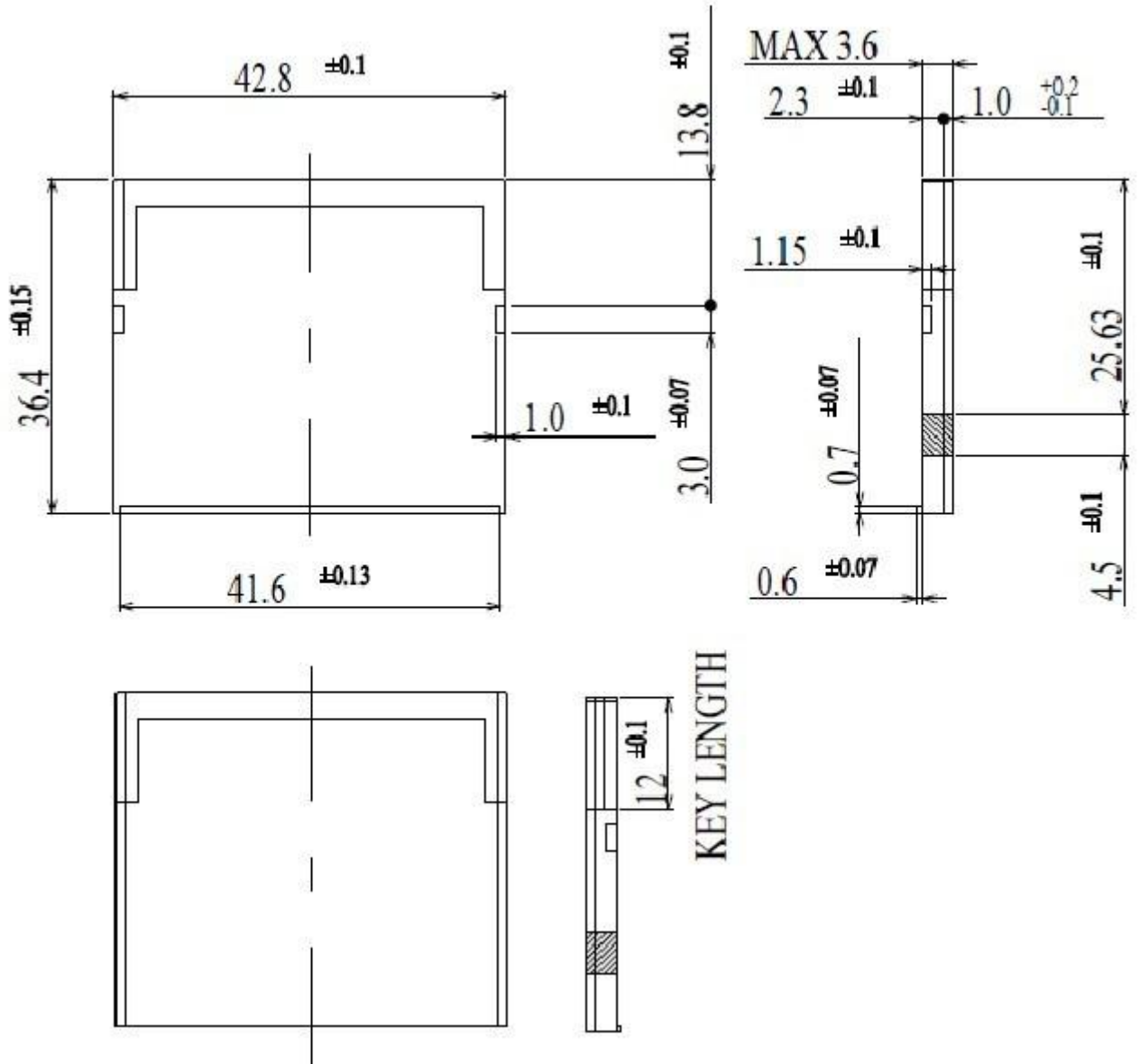


Figure1.2:form size

## 2 Pin out information

## 1) Pin Assignment

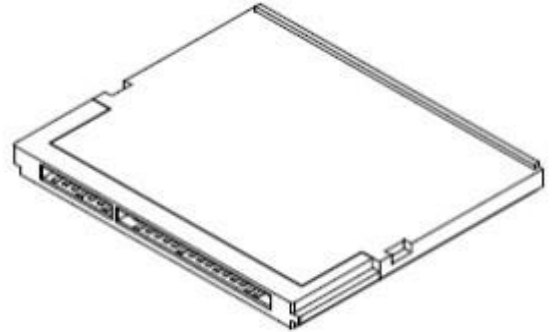
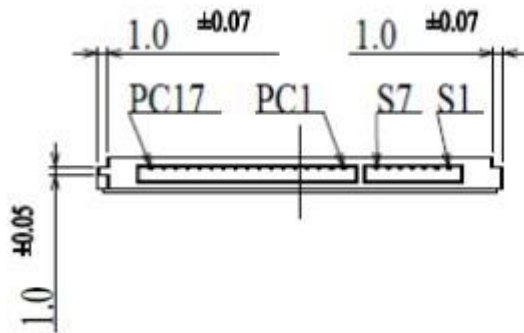


Figure .2-1: Pin Assignment

## 2) Connector Pin Signal Definitions

Table .2-2: Connector Pin Signal Definitions

Pin	Segment	Name	Type	Description	Mate Sequence
S1	SATA	SGND	Signal GND	Vss, Ground for signal integrity	1st
S2	SATA	A+	SATA Differential	HOST, Signal Pair A	2nd
S3	SATA	A-	SATA Differential		2nd
S4	SATA	SGND	Signal GND	Vss, Ground for signal integrity	1st
S5	SATA	B-	SATA Differential	HOST, Signal Pair B	2nd
S6	SATA	B+	SATA Differential		2nd
S7	SATA	SGND	Signal GND	Vss, Ground for signal integrity	1st
	Key				
	Key				
PC1	PWR/CTL	CDI	CMOS Input <sup>1</sup>	Card Detect In (CDI)	3rd
PC2	PWR/CTL	GND	Device GND	Vss	1st
PC3	PWR/CTL	TBD	No Connect	(reserved)	
PC4	PWR/CTL	TBD	No Connect	(reserved)	
PC5	PWR/CTL	TBD	No Connect	(reserved)	
PC6	PWR/CTL	TBD	No Connect	(reserved)	
PC7	PWR/CTL	GND	Device GND	Vss	1st
PC8	PWR/CTL	IO11	No Connect	Reserved Input/Output	2nd
PC9	PWR/CTL	IO1 2	No Connect	Reserved Input/Output	2nd
PC10	PWR/CTL	IO1	No Connect	Reserved Input/Output	
PC11	PWR/CTL	IO2	No Connect	Reserved Input/Output	
PC12	PWR/CTL	IO3	No Connect	Reserved Input/Output	
PC13	PWR/CTL	PWR	3.3V	Device Power (3.3V)	3rd
PC14	PWR/CTL	PWR	3.3V	Device Power (3.3V)	3rd
PC15	PWR/CTL	PGND	Device GND	Vss	1st
PC16	PWR/CTL	PGND	Device GND	Vss	1st
PC17	PWR/CTL	CDO	CMOS Output <sup>1</sup>	Card Detect Out (CDO)	3rd

### 3 Power Specification

**1) Operating Voltage :3.3V(±5%)**

**2) Power Supply Voltage**

1.0v for Core, 3.3V for NAND and Core.

### 3) Power Consumption(typical)

Operation (Read/Write) – 1.2W

Idle - 0.6W

Standby - 0.6W

Sleep(Partial/Slumber) - 0.6W/0.26W

## 4 Reliability Specification

Item	Features	
Temperature	Operating	Industrial: -40°C ~ 85°C
		Storage: -50°C ~ 95°C
Humidity	5-95%	
Vibration	20G(7-2000Hz)	
Shock	2,000G(@0.3ms half sine wave)	
MTBF	>4,000,000 hours	

## 5 SATA Interface Features

- . Seamless SATA interoperability
- . Plug-and-play field-proven SATA-v2.6-compliant interface
- . 3 Gbps / 1.5 Gbps signaling (auto-negotiated)
- . Native Command Queuing (NCQ) support



- . S.M.A.R.T. command transport (SCT) technology

## 6 ATA Command Set

Commands	Feature Set	ATA-8	Comments	OpCode
CHECK POWER MODE	Power Mgmt	M		E5h
DATA SET MANAGEMENT EXT (I.E. TRIM)	Data Set Mgmt	O		06h
DISABLE AUTOMATIC ACOUSTIC MGMT	Set Features			EFh
DISABLE DEVICE-INITIATED INTERFACE POWER-STATE TRANSITIONS	Set Features			EFh
DISABLE DMA SETUP FIS AUTO-ACTIVATE OPTIMIZATION	Set Features			EFh
DISABLE LOOK-AHEAD	Set Features			EFh
DISABLE REVERTING TO POWER-ON DEFAULTS	Set Features			EFh
DISABLE SOFTWARE SETTINGS PRESERVATION	Set Features			EFh
DISABLE WRITE CACHE	Set Features			EFh
DOWNLOAD MICROCODE	General	O		92h
ENABLE AUTOMATIC ACOUSTIC MGMT	Set Features			EFh
ENABLE DEVICE-INITIATED INTERFACE POWER-STATE TRANSITIONS	Set Features			EFh
ENABLE DMA SETUP FIS AUTO-ACTIVATE OPTIMIZATION	Set Features			EFh
ENABLE LOOK-AHEAD	Set Features			EFh
ENABLE REVERTING TO POWER-ON DEFAULTS	Set Features			EFh
ENABLE SOFTWARE SETTINGS PRESERVATION	Set Features			EFh
ENABLE WRITE CACHE	Set Features			EFh
EXECUTE DEVICE DIAGNOSTIC	General	M		90h
FLUSH CACHE	General	M		E7h
FLUSH CACHE EXT	48-bit Address	M		EAh
IDENTIFY DEVICE	General	M		ECh
IDLE	Power Mgmt	M		E3h
IDLE IMMEDIATE	Power Mgmt	M	No support for unload	E1h
INITIALIZE DEVICE PARAMETERS	General	M		91h
NOP	General	O		00h
READ BUFFER	General	O		E4H
READ DMA	Data Transfer	M		C8h
READ DMA (w/o retry)	Data Transfer	Obs		C9h
READ DMA EXT	48-bit Address	M		25h
READ FPDMA QUEUED	Data Transfer NCQ	M		60h
READ LOG DMA EXT	Gen.Purpose Logging 48-bit	O		47h
READ LOG EXT	Gen.Purpose Logging	M		2Fh
READ LONG	Data Transfer			22h
READ LONG without Retry	Data Transfer			23h

Commands	Feature Set	ATA-8	Comments	OpCode
READ MULTIPLE	Data Transfer	M		C4h
READ MULTIPLE EXT	48-bit Address	M		29h
READ NATIVE MAX ADDRESS	HPA	M		F8h
READ NATIVE MAX ADDRESS EXT	HPA	M		27h
READ SECTOR(S)	Data Transfer	M		20h
READ SECTOR(S) EXT	48-bit Address	M		24h
READ SECTOR(S) without Retry	Data Transfer			21h
READ VERIFY SECTOR(S)	General	M		40h
READ VERIFY SECTOR(S) EXT	48-bit Address	M		42h
READ VERIFY SECTORS(S) (w/o retry)	General	Obs		41h
RECALIBRATE	General	Obs		10h
SCT COMMAND / STATUS	SMART			B0h
SCT DATA TABLES: READ TABLE: (HDA) TEMPERATURE HISTORY TABLE	SMART			B0h
SCT DATA TRANSFER	SMART			B0h
SCT FEATURE CONTROL: FORCED WRITE CACHE ENABLE & DISABLE	SMART			B0h
SCT WRITE SAME	SMART		Not recommended for SSDs; can negatively affect initial performance of drive.	B0h
SECURITY DISABLE PASSWORD	Security	M		F6h
SECURITY ERASE PREPARE	Security	M		F3h
SECURITY ERASE UNIT	Security	M		F4h
SECURITY FREEZE LOCK	Security	O		F5h
SECURITY SET PASSWORD	Security	M		F1h
SECURITY UNLOCK	Security	M		F2h
SEEK	General	M		70h
SET MAX ADDRESS	HPA	M		F9h
SET MAX ADDRESS EXT	HPA	M		37h
SET MAX FREEZE LOCK	HPA	O		F9h/04h
SET MAX LOCK	HPA	O		F9h/02h
SET MAX SET PASSWORD	HPA	O		F9h/01h
SET MAX UNLOCK	HPA	O		F9h/03h
SET MULTIPLE MODE	General	M		C6h
SET TRANSFER MODE (based on value in SECTOR COUNT REGISTER)	Set Features			EFh
SLEEP	Power Mgmt	M		E6h
SMART ABORT OFFLINE ROUTINE	SMART			B0h
SMART DISABLE OPERATIONS	SMART	M		B0h/D9h
SMART ENABLE OPERATIONS	SMART	M		B0h/D8h
SMART ENABLE/DISABLE AUTOSAVE	SMART	M		B0h/D2h
SMART EXECUTE CONVEYANCE SELF-TEST ROUTINE (captive)	SMART			B0h

Commands	Feature Set	ATA-8	Comments	OpCode
SMART EXECUTE CONVEYANCE SELF-TEST ROUTINE (offline)	SMART			80h
SMART EXECUTE EXTENDED SELF-TEST ROUTINE	SMART			80h
SMART EXECUTE EXTENDED SELF-TEST ROUTINE (captive)	SMART			80h
SMART EXECUTE OFFLINE IMMEDIATE	SMART	O		80h/D4h
SMART EXECUTE OFFLINE ROUTINE	SMART			80h
SMART EXECUTE SELECTIVE SELF-TEST ROUTINE	SMART			80h
SMART EXECUTE SELECTIVE SELF-TEST ROUTINE (captive)	SMART			80h
SMART EXECUTE SHORT SELF-TEST ROUTINE	SMART			80h
SMART EXECUTE SHORT SELF-TEST ROUTINE (captive)	SMART			80h
SMART READ DATA	SMART	O		80h/D0h
SMART READ LOG	SMART	O		80h/D5h
SMART READ THRESHOLD	SMART	Obs		80h-D1h
SMART RETURN STATUS	SMART	O		80h/DAh
SMART SAVE ATB THRESHOLDS	SMART	Obs		80h-D3h
SMART WRITE LOG	SMART	O		80h/D6h
STANDBY	Power Mgmt	M		E2h
STANDBY IMMEDIATE	Power Mgmt	M		E0h
WRITE BUFFER	General	O		E8h
WRITE DMA	Data Transfer	M		CAh
WRITE DMA (w/o retry)	Data Transfer	Obs		CBh
WRITE DMA EXT	48-bit Address	M		35h
WRITE DMA FUA EXT	48-bit Address	M		3Dh
WRITE FPDMA QUEUED	Data Transfer NCQ	M		61h
WRITE LOG DMA EXT	Gen.Purpose Logging	O		57h
WRITE LOG EXT	Gen.Purpose Logging	M		3Fh
WRITE LONG	Data Transfer			32h
WRITE LONG without Retry	Data Transfer			33h
WRITE MULTIPLE	Data Transfer	M		C5h
WRITE MULTIPLE EXT	48-bit Address	M		39h
WRITE MULTIPLE FUA EXT	48-bit Address	M		CEh
WRITE SECTOR(S)	Data Transfer	M		30h
WRITE SECTOR(S) (w/o retry)	Data Transfer	Obs		31h
WRITE SECTOR(S) EXT	48-bit Address	M		34h
WRITE UNCORRECTABLE EXT	General	O		45h
<b>Key: M-Mandatory O-Optional P-Prohibited N-Not defined</b>				

## 7 SMART

**Table 10-1:SMART Command Set**

Value(hex)	Command
00-CF	Reserved
D0	SMART read attributes
D1*	SMART read threshold
D2	SMART enable/disable attribute autosave
D3*	SMART save attribute values
D4	SMART execute off-line immediate
D5	SMART read log sector
D6	SMART write log sector
D7*	SMART write attribute threshold
D8	SMART enable operations
D9	SMART disable operations
DA	SMART return status
DC-FF	Reserved (Vendor Specific)

**Table 10-2: SMART Attribute Data Structure**

Byte	Description
0:1	SMART structure version number
2	First Stored Attribute Number (i.e. "1" for "Raw Read Error Rate")
3:4	Status
5	Nominal value
6	Worst value since SSD was deployed
7:12	Raw Data
13	(Reserved; for some Attributes, the 7 <sup>th</sup> "raw data" byte)
14:25	Next Stored Attribute Number (i.e. "3" for "Retired Block Count")
26:361	Next Stored Attribute Nos (max 30 collected Attributes, including above)
362	Off-line data collection status
363	Self-Test execution status byte
364:365	Total time to complete off-line data collection (in seconds)
366	(Reserved)
367	Off-line Data Collection capability
368:369	SMART capability
370	Error Logging Capability (bit 0 set = 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	Recommended polling time for Conveyance Self Test
375:376	Time for Extended Self Test if > 255 (ie, 373 to FFh)
377:385	(Reserved)
386:510	Vendor information
511	Checksum of data structure (generated on retrieval of stored data)

## 8 Buy Information

Capacity	MLC Part Numbers	SLC Part Numbers
8GB	RIM008-SX1C	RIS008-SX1C
16GB	RIM016-SX1C	RIS016-SX1C
32GB	RIM032-SX1C	RIS032-SX1C
64GB	RIM064-SX1C	RIS064-SX1C
128GB	RIM128-SX1C	N

## 9 Product model of naming rule

