RoHS Recast Compliant

USB-Disk Module 3.0 1U

Product Specifications

October 14, 2015

Version 1.2

FEATURES:

- **USB3.0 High-Speed interface and backward compatible with USB2.0 and 1.1**

- **Capacity**
  - SLC: 128, 256, 512 MB
    1, 2, 4, 8, 16 GB
  - MLC: 8, 16, 32 GB

- **Performance**

  SLC
  - Sustained read: up to 40 MB/s
  - Sustained write: up to 35 MB/s
  MLC
  - Sustained read: up to 90 MB/s
  - Sustained write: up to 48 MB/s

- **Flash Managements**
  - Build hardware ECC
  - Dynamic + Static wear-leveling

- **NAND Flash Type**: SLC/MLC

- **Temperature Ranges**
  - Operation:
    Standard: 0°C to 70°C
    Extended: -40°C to 85°C
  - Storage: -40°C to 85°C

- **Power Consumption (typical)**
  - Operating voltage: 5V
  SLC
  - Active mode: 150 mA
  - Idle mode: 70 mA
  MLC
  - Active mode: 190 mA
  - Idle mode: 75 mA

- **Connector**
  - 20-pin (2x10) female header

- **RoHS Compliant**

Notes: the results for performance and power consumption addressed here may vary in real world platforms.

Rev. 1.2

TABLE OF CONTENTS

Rev. 1.2

1. General Description

Apacer's USB-Disk Module (UDM) is a high performance, embedded solid state drive (SSD) designed to replace a conventional IDE hard disk drive. UDM SSD can be plugged into a standard Embedded USB connector commonly found in desktops, portable PC systems and industrial PC systems. This product is well suited for embedded flash storage applications offering new and expanded functionality as well as more cost-effective designs, better performance and increased reliability.

1.1 Performance-optimized Controller

The heart of an UDM is the USB controller, which translates standard USB signals into the data and controls of the flash media. This proprietary USB controller is specifically designed to attain high data throughput from host to flash.

1.1.1 Error Correction Code (ECC)

The UDM uses BCH Error Detection Code (EDC) and Error Correction Code (ECC) algorithms which correct up to 72bit random single-bit errors for each 1024-byte block of data depending on spare area of flash memory. High performance is achieved through hardware-based error detection and correction.

1.1.2 Wear-Leveling

Flash memory can be erased a limited number of times, This number is called the erase cycle limit, or write endurance limit, The erase cycle limit applies to each individual erase block in the flash device.

In a typical application, and especially if a file system is used, specific pages are constantly updated (e.g., the page that contains the FAT, registry, etc.). Without any special handling, these pages would wear out more rapidly than other pages, reducing the lifetime of the entire flash.

To overcome this inherent deficiency, Apacer's USB-Disk Module (UDM) uses wear-leveling algorithm. This wear-leveling algorithm ensures that consecutive writes of a specific sector are not written physically to the same page in the flash. This spreads flash media usage evenly across all pages, thereby maximizing flash lifetime.

The wear-leveling mechanism provides write/erase cycles for reliable data storage over an extended period.

2. Functional Block Diagram

The USB-Disk Module (UDM) contains a controller, embedded firmware, and Flash Media with a female connector. The UDM interfaces with the host system allowing data to be written to and read from the Flash Media.
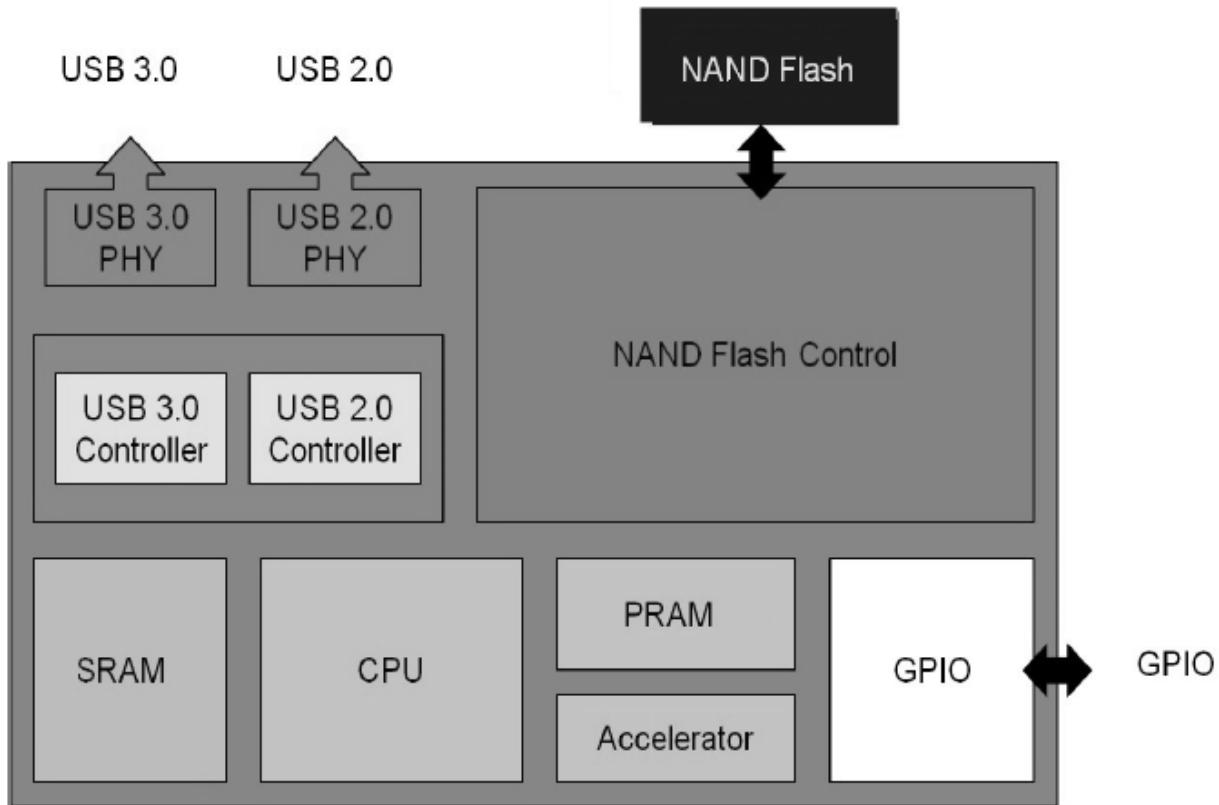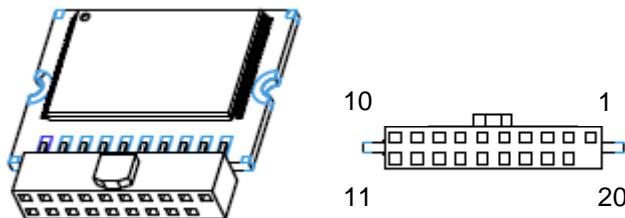
Figure 2-1: Functional block diagram

Rev. 1.2

3. Pin Assignment

This chapter provides the information on the pin assignments and signal descriptions.

Table 3-1: Pin Assignment of the 20-pin configuration

Pin	Signal	Pin	Signal
1	+5V	11	N.C
2	TX-	12	N.C
3	TX+	13	N.C
4	GND	14	N.C
5	RX-	15	N.C
6	RX+	16	N.C
7	GND	17	N.C
8	D-	18	N.C
9	D+	19	N.C
10	N.C	20	-

Note : Pin#11~Pin#19 are not used.

Rev. 1.2

4. Performance & Reliability Specifications

4.1 Capacity Specifications

The USB-Disk Module product family is available as below table matrix.

Table 4-1: Capacity Specification

Density	Total Bytes
128 MB	124,485,632
256 MB	250,314,752
512 MB	500,924,416
1 GB	998,998,016
2 GB	2,001,502,208
4 GB	4,001,382,400
8 GB	8,002,748,416
16 GB	16,022,257,664
32 GB	32,010,944,512

Notes: the number of total bytes may vary depending on the file system in use.

4.2 Performance Specifications

4.2.1 SLC

Capacity / Performance	128 MB	256 MB	512 MB	1 GB	2 GB	4 GB	8 GB	16 GB
Sustained read (MB/s)	30	30	30	30	30	40	40	40
Sustained write (MB/s)	5	10	20	20	25	30	35	35

Note: 1.Nand Flash: 24nm TSOP
2.Results may vary in real world platforms or flash configurations.

4.2.1 MLC

Capacity / Performance	8 GB	16 GB	32 GB
Sustained read (MB/s)	95	95	90
Sustained write (MB/s)	28	24	48

4.3 Environmental Specifications

Environmental specification of the USB-Disk Module (UDM) product family which follows the MIL-STD-810F standards is available as shown in Table 4-3.

Table 4-3: Environmental Specifications

Temperature	Operation	0°C to 70°C (Std.); -40°C to 85°C (Ext.)
	Storage	-40°C to 85°C
Vibration	Sine wave 10 Hz to 500 Hz, 50 m/s^2 , 3 axes (IEC 68-2-6, non-operating)	
Shock	Half sine wave 50G, 6 axes, 18 times (IEC 68-2-27, non-operating)	
EMC	FCC, CE	

4.4 MTBF

Mean Time Between Failures (MTBF) is predicted based on reliability data for the individual components in this device. The measurement assumes that device failure rate can be generated by the sum of failure rates in each component and a steady state failure rate can be predicated as equal to or greater than 1,000,000 hours.

Notes about the MTBF:

The MTBF is predicated and calculated based on "Bellcore Analysis Method 1".

$$\lambda_{ss} = \pi_E \sum_{i=1}^{m} (Ni\lambda_{SSi})$$

m: number of component types
λ_{SS}: device failure rate at steady state
Ni: quantity of i type component
λ_{SSi}: failure rate for i type component at steady state
π_F: device environment factor

Rev. 1.2

USB-Disk Module 3.0
AP-UMxxxxAUXXX-XXXTX

5. Electrical Specification

Caution: Absolute Maximum Stress Ratings – Applied conditions greater than those listed under "Absolute Maximum Stress Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these conditions or conditions greater than those defined in the operational sections of this data sheet is not implied. Exposure to absolute maximum stress rating conditions may affect device reliability.

Table 5-1: Operating Range

Range	Ambient Temperature	Voltage
Standard	0°C to 70°C	4.5-5.5V
Extended Temperature	-40°C to 85°C	

Table 5-2: Absolute maximum power pin stress ratings

Parameter	Symbol	Min	Max	Unit
Power Supply Input	V_{DD}- V_{SS}	-0.3	5.5	V
Voltage on any pin except VDD with respect to GND	V_{IN}	$-_{SS} - 0.3$	$V_{DD} +0.3$	V

5.1 AC Characteristics

Table 5-3: AC Characteristics Full Speed

Parameter	Symbol	Min	Typ	Max	Unit
Rise Time	T_{FR}	4	—	20	ns
Fall Time	T_{FF}	4	—	20	ns
Differential Rise and Fall Time Matching	T_{FRFM}	90		111.11	%
Driver Output Resistance	Z_{DRV}	28	—	44	Ω

Table 5-4: AC Characteristics High Speed

Parameter	Symbol	Min	Typ	Max	Unit
Rise Time (10%~90%)	T_{HSR}	500	—	—	ps
Fall Time (10%~90%)	T_{HSF}	500	—	—	ps
Driver Output Resistance	Z_{HSDRV}	40.5	—	49.5	Ω

Rev. 1.2

5.2 Power Consumption

Table 5-5 lists UDM power consumption.

5.2.1 SLC
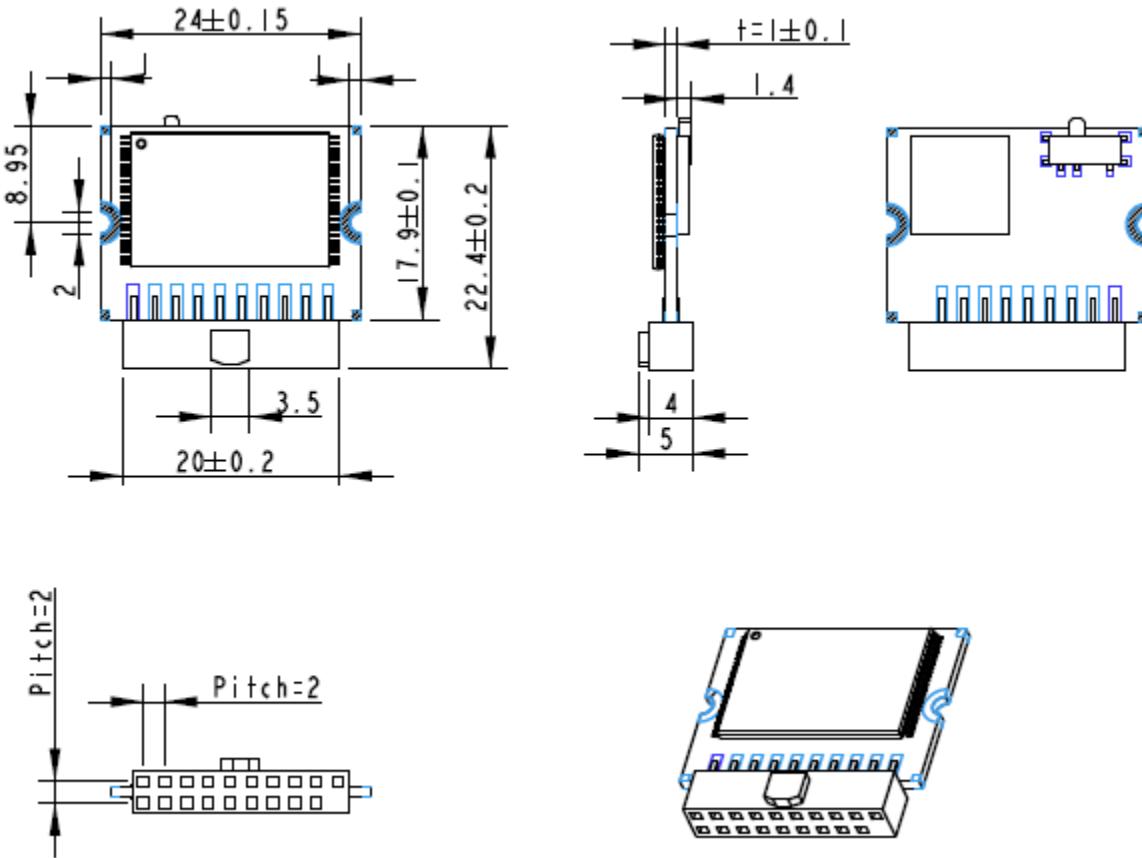
Capacity / Performance	128 MB	256 MB	512 MB	1 GB	2GB	4 GB	8 GB	16 GB
Active Mode (mA)	125	140	140	140	145	145	145	150
Idle Mode (mA)	65	70	70	70	70	70	70	70

Note: power consumption may vary depending on flash configurations or platforms.

5.2.2 MLC

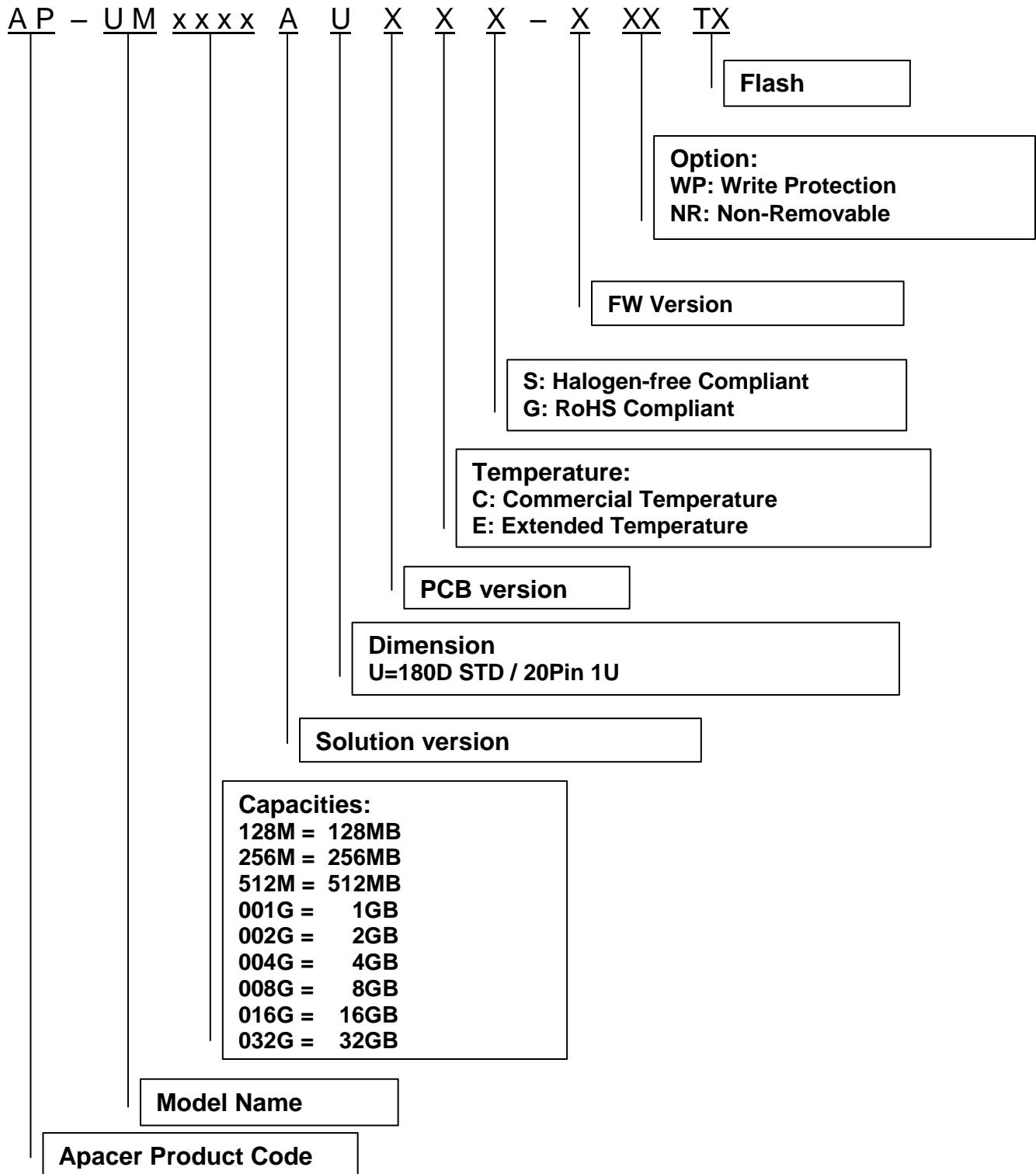| Capacity / Performance	8 GB	16 GB	32 GB
Active Mode (mA)	165	170	190
Idle Mode (mA)	75	75	75

Rev. 1.2

6. Physical Dimension

Unit: mm
Tolerance: ±0.2

Rev. 1.2

7. Product Ordering Information

7.1 Product Code Designations

A P – U M x x x x A U X X X – X XX TX

Flash

Option:
WP: Write Protection
NR: Non-Removable

FW Version

S: Halogen-free Compliant
G: RoHS Compliant

Temperature:
C: Commercial Temperature
E: Extended Temperature

PCB version

Dimension
U=180D STD / 20Pin 1U

Solution version

Capacities:
128M = 128MB
256M = 256MB
512M = 512MB
001G =   1GB
002G =   2GB
004G =   4GB
008G =   8GB
016G = 16GB
032G = 32GB

Model Name

Apacer Product Code

Rev. 1.2

7.2 Valid Combinations

7.2.1 180D STD / 20Pin 1U SLC

Capacity	Standard	Extended Temperature
128MB	AP-UM128MAU0CS-2T	AP-UM128MAU0ES-2T
256MB	AP-UM256MAU0CS-2T	AP-UM256MAU0ES-2T
512MB	AP-UM512MAU0CS-2T	AP-UM512MAU0ES-2T
1GB	AP-UM001GAU0CS-2T	AP-UM001GAU0ES-2T
2GB	AP-UM002GAU0CS-2T	AP-UM002GAU0ES-2T
4GB	AP-UM004GAU0CS-2T	AP-UM004GAU0ES-2T
8GB	AP-UM008GAU0CS-2T	AP-UM008GAU0ES-2T
16GB	AP-UM016GAU0CS-2T	AP-UM016GAU0ES-2T

7.2.2 180D STD / 20Pin 1U MLC

Capacity	Standard	Extended Temperature
8GB	AP-UM008GAU0CS-3TM	AP-UM008GAU0ES-3TM
16GB	AP-UM016GAU0CS-3TM	AP-UM016GAU0ES-3TM
32GB	AP-UM032GAU0CS-3TM	AP-UM032GAU0ES-3TM

Rev. 1.2

Revision History

Revision	Description	Date
1.0	First release	07/14/2015
1.1	Added MLC models.	09/21/2015
1.2	Revised product ordering information.	10/14/2015

Global Presence

Taiwan (Headquarters)

Apacer Technology Inc.
1F., No.32, Zhongcheng Rd., Tucheng Dist.,
New Taipei City 236, Taiwan R.O.C.
Tel: 886-2-2267-8000
Fax: 886-2-2267-2261
amtsales@apacer.com

U.S.A.

Apacer Memory America, Inc.
46732 Lakeview Blvd., Fremont, CA 94538
Tel: 1-408-518-8699
Fax: 1-510-249-9568
sa@apacerus.com

Japan

Apacer Technology Corp.
5F, Matsura Bldg., Shiba, Minato-Ku
Tokyo, 105-0014, Japan
Tel: 81-3-5419-2668
Fax: 81-3-5419-0018
jpservices@apacer.com

Europe

Apacer Technology B.V.
Science Park Eindhoven 5051 5692 EB Son,
The Netherlands
Tel: 31-40-267-0000
Fax: 31-40-267-0000#6199
sales@apacer.nl

China

Apacer Electronic (Shanghai) Co., Ltd
Room D, 22/FL, No.2, Lane 600, JieyunPlaza,
Tianshan RD, Shanghai, 200051, China
Tel: 86-21-6228-9939
Fax: 86-21-6228-9936
sales@apacer.com.cn

India

Apacer Technologies Pvt Ltd,
Unit No.201, "Brigade Corner", 7th Block Jayanagar,
Yediyur Circle, Bangalore – 560082, India
Tel: 91-80-4152-9061
Fax: 91-80-4170-0215
sales_india@apacer.com

Rev. 1.2

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Managed NAND *category:*

Click to view products by Apacer *manufacturer:*

Other Similar products are found below :

MTEDFBR008SCA-1P2IT GLS85LS1128C-M-I-FZJE-ND130 GLS85LS1032C-M-I-LBJE-ND123 SFUI016GJ1AB1TO-I-QT-211-STD AP-UM008GR40CG-2T AP-UM002GR31CG-2MST AP-UM001GR31CG-2MST AP-UM004GR13CS-2MSNRT AP-UM512MR13CS-2MST MTEDCAR002SAJ-1M2 MTEDCBR002SAJ-1M2 VTDU41PI016G GLS85LS1032P-S-I-FZJE-TT095 SFUI2048J1AB1TO-I-GS-2AP-STD AP-UM008GR31CG-2MST AP-UM004GR40CG-2T AP-UM001GR13CS-2MST