

***RoHS Compliant***

# **USB Flash Drive**

***AH321 Specifications***

**June 4<sup>th</sup>, 2014**

***Version 1.4***



**Apacer**  
*Access the best*

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## FEATURES:

- **USB2.0 High-Speed and USB1.1 Full-Speed compatible interface**
- **Capacity**
  - For SLC: 128, 256, 512 MB  
1, 2, 4, 8, 16, 32 GB
  - For MLC: 4, 8, 16, 32 GB
- **Performance**
  - Sustained read: up to 34 MB/s
  - Sustained write: up to 22 MB/s
- **Intelligent USB Module**
  - Implements advanced wear-leveling algorithms to substantially increase longevity of flash media
  - ECC
- **Temperature ranges**
  - 0°C to 70°C (standard)
- **Power consumption (typical)**
  - Active mode: 185 mA
  - Idle mode: 65 mA
  - Operating voltage: 5V
- **RoHS Compliant**
- **Dimensions:** 53.30 x 18.80 x 8.00, unit: mm
- **EMC:** FCC, CE

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

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## **1. General Description**

Apacer's USB FLASH Drive (UFD) is a high performance, flash disk drive designed offering portable storage solutions. UFDs can be plugged into a standard USB 2.0 connector commonly found in desktops, portable computers and even enterprise PC systems. Apacer's UFDs have an efficient built-in microcontroller and file management firmware that ensures ideal performance, functionality and reliability. This product is well suited for portable flash storage applications while operating at minimal power consumption.

### **1.1 Performance-optimized USB Controller**

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The heart of an UDM is the USB controller, which translates standard USB signals to the flash media and controls the data in/out between the controller itself and 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 24 random single-bit errors for each 1024-byte block of data.

#### **1.1.2 Wear-Leveling**

Flash memory can be erased a limited number of times. 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 distributes 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. General Specifications

|              |  |
|--------------|--|
| Interface    | High-speed USB2.0 compliant; backward compatible with USB 1.1                            |
| Performance* | SLC: up to 34 MB/s (read); 22 MB/s (write)<br>MLC: up to 33 MB/s (read); 16 MB/s (write) |
| Temperature  | 0 to 70°C  |
| Shock        | Half sine wave 40 G, 11ms / Square wave 100 G, 6ms                                       |
| EMC          | FCC, CE  |
| MTBF         | 2,000,000 hours (SLC) / 1,000,000 (MLC)  |

\*Results may vary from flash configurations or host system settings.

### 2.1 Performance Specifications – SLC

Table 2-1: SLC Performance Specifications

| Capacity \ Performance | 256 MB | 512 MB | 1 GB | 2 GB | 4 GB | 8 GB | 16 GB | 32 GB |
|------------------------|--------|--------|------|------|------|------|-------|-------|
| Sustained read (MB/s)  | 31     | 31     | 32   | 34   | 28   | 32   | 34    | 31    |
| Sustained write (MB/s) | 10     | 15     | 19   | 19   | 21   | 15   | 22    | 21    |

Note: results may vary depending on flash configurations or host system settings

### 2.2 Performance Specifications – MLC

Table 2-2: MLC Performance Specifications

| Capacity \ Performance | 4 GB | 8 GB | 16 GB | 32 GB |
|------------------------|------|------|-------|-------|
| Sustained read (MB/s)  | 32   | 32   | 33    | 33    |
| Sustained write (MB/s) | 10   | 10   | 14    | 16    |

Note: results may vary depending on flash configurations or host system settings

### 3. Electrical Specifications

**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: Absolute Stress Rating

| Parameters   | Conditions                             |
|--|--|
| Ambient temperature                                    | 0 to 70 °C                             |
| Required power supply                                  | 4.5-5.5V                               |
| Input power ( $V_{DD}$ )                               | -0.3V (min.) to 5.5V (max.)            |
| Voltage on any pin except $V_{DD}$ with respect to GND | -0.3V (min.) to $V_{DD} + 0.3V$ (max.) |

### 4. Physical Dimensions



Unit: mm  
Tolerance:  $\pm 0.2$ mm

## 5. Product Ordering Information

### 5.1 Product Code Designation



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## 5.2 Valid Combinations

### 5.2.1 AH321 (SLC)

| Capacity | Standard         |
|----------|------------------|
| 128MB    | APHA128MR13CG-2T |
| 256MB    | APHA256MR13CG-2T |
| 512MB    | APHA512MR13CG-2T |
| 1GB      | APHA001GR13CG-2T |
| 2GB      | APHA002GR13CG-2T |
| 4GB      | APHA004GR13CG-2T |
| 8GB      | APHA008GR13CG-2T |
| 16GB     | APHA016GR13CG-2T |
| 32GB     | APHA032GR13CG-2T |

### 5.2.2 AH321 (MLC)

| Capacity | Standard         |
|----------|------------------|
| 4GB      | APHA004GR13CG-CM |
| 8GB      | APHA008GR13CG-CM |
| 16GB     | APHA016GR13CG-CM |
| 32GB     | APHA032GR13CG-CM |

**Note:** For availability or customized requests, please consult with Apacer sales representatives.



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## Revision History

| Revision | Description   | Date                           |
|----------|---|--------------------------------|
| 1.0      | Official Release  | August 11 <sup>th</sup> , 2011 |
| 1.1      | Updated Product Ordering Information  | June 20 <sup>th</sup> , 2012   |
| 1.2      | Updated Product Ordering Information<br>- contents relating to extended temperature are removed                                   | July 2 <sup>nd</sup> , 2012    |
| 1.3      | Updated read/write performance due to change in NAND flash use<br>Updated addresses of Taiwan headquarter and the office in India | July 30 <sup>th</sup> , 2013   |
| 1.4      | Added performance tables  | June 4 <sup>th</sup> , 2014    |

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## Global Presence

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