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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



RoHS Compliant

USB Flash Drive

AH321 Specifications

November 26, 2015

Version 1.9



Apacer
Access the best

Apacer Technology Inc.

1F, No.32, Zhongcheng Rd., Tucheng Dist., New Taipei City, Taiwan, R.O.C

Tel: +886-2-2267-8000 Fax: +886-2-2267-2261

www.apacer.com

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, 64 GB
- **Performance***
 - Sustained read: up to 34 MB/s
 - Sustained write: up to 22 MB/s
- **Flash Management**
 - Implements advanced wear-leveling algorithms to substantially increase longevity of flash media
 - ECC
- **Temperature Ranges**
 - Operating:
 - Standard: 0°C to 70°C
 - Extended: -40°C to 85°C
 - Storage: -40°C to 85°C
- **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

* 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

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) 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

| Capacity | 256 MB | 512 MB | 1 GB | 2 GB | 4 GB | 8 GB | 16 GB | 32 GB |
|-------------------------------|--------|--------|------|------|------|------|-------|-------|
| Performance | | | | | | | | |
| 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

| Capacity | 4 GB | 8 GB | 16 GB | 32 GB | 64 GB |
|-------------------------------|------|------|-------|-------|-------|
| Performance | | | | | |
| Sustained read (MB/s) | 32 | 32 | 33 | 33 | 29 |
| Sustained write (MB/s) | 10 | 10 | 14 | 16 | 10 |

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

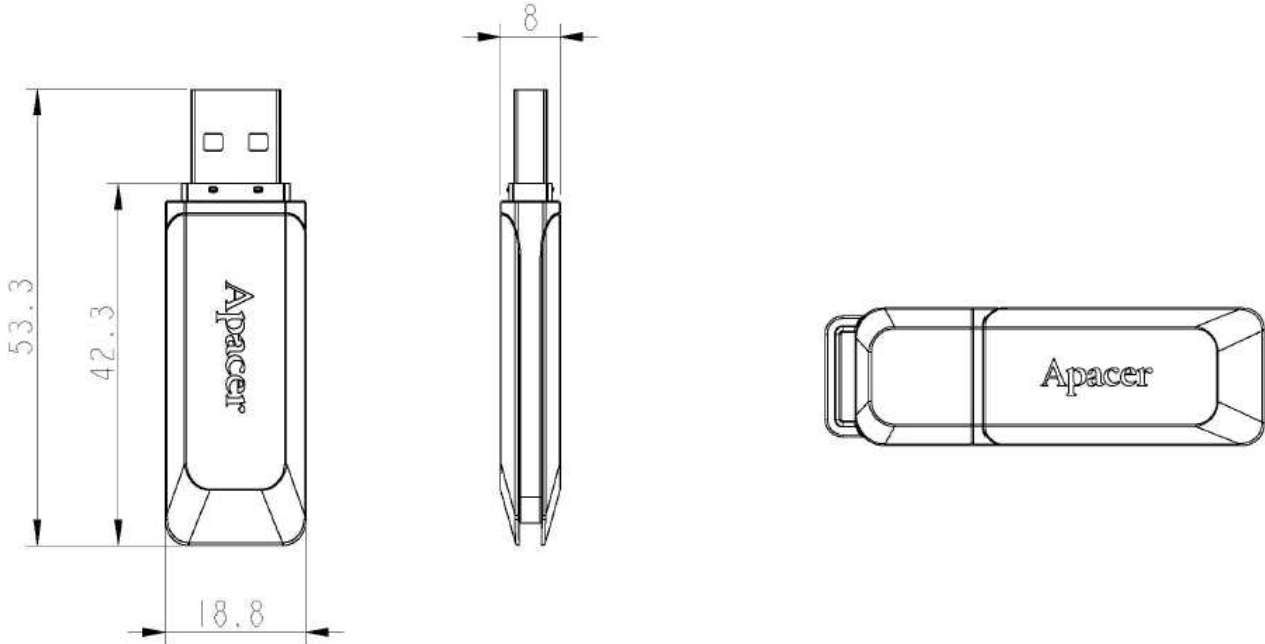
3. Electrical Specifications

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 |
| Storage temperature | -40 to 85°C |
| Required power supply | 4.5-5.5V |
| Input power (VDD) | -0.3V (min.) to 5.5V (max.) |
| Voltage on any pin except VDD with respect to GND | -0.3V (min.) to VDD + 0.3V (max.) |

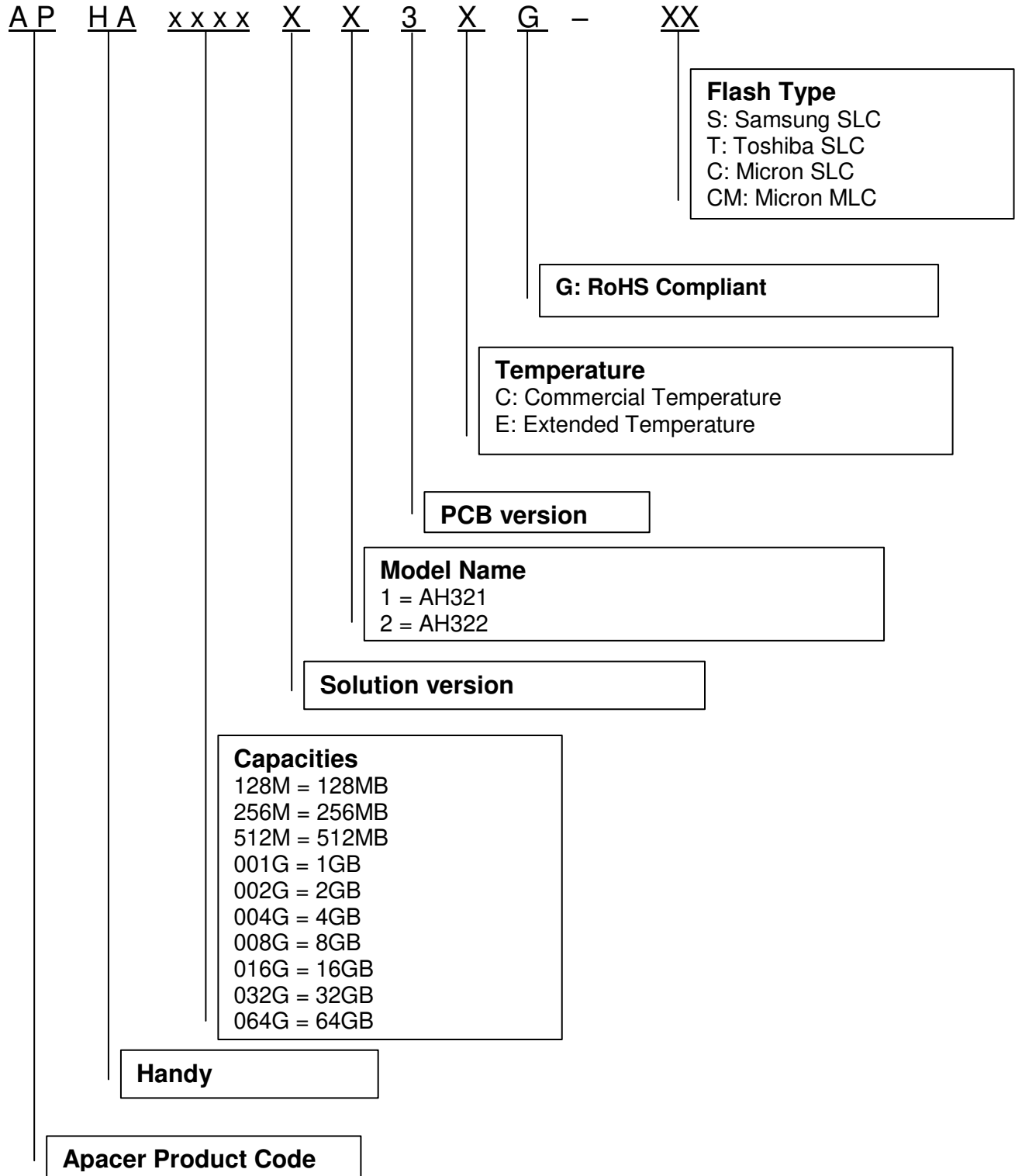
4. Physical Dimensions



Unit: mm
Tolerance: ± 0.2 mm

5. Product Ordering Information

5.1 Product Code Designations



5.2 Valid Combinations

5.2.1 AH322 (SLC)

| Capacity | Standard | Extended |
|----------|------------------|------------------|
| 128 MB | APHA128MR13CG-2T | APHA128MT13EG-2T |
| 256 MB | APHA256MR13CG-2T | APHA256MT13EG-2T |
| 512 MB | APHA512MR13CG-2T | APHA512MT13EG-2T |
| 1 GB | APHA001GR13CG-2T | APHA001GT13EG-2T |
| 2 GB | APHA002GR13CG-2T | APHA002GT13EG-2T |
| 4 GB | APHA004GR13CG-2T | APHA004GT13EG-2T |
| 8 GB | APHA008GR13CG-2T | APHA008GT13EG-2T |
| 16 GB | APHA016GR13CG-2T | APHA016GT13EG-2T |
| 32 GB | APHA032GR13CG-2T | APHA032GT13EG-2T |

5.2.2 AH322 (MLC)

| Capacity | Standard | Extended |
|----------|------------------|------------------|
| 4 GB | APHA004GR13CG-CM | APHA004GT13EG-CM |
| 8 GB | APHA008GR13CG-CM | APHA008GT13EG-CM |
| 16 GB | APHA016GR13CG-CM | APHA016GT13EG-CM |
| 32 GB | APHA032GR13CG-CM | APHA032GT13EG-CM |
| 64 GB | APHA064GR13CG-CM | APHA064GT13EG-CM |

Revision History

| Revision | Description | Date |
|----------|---|----------------------------------|
| 1.0 | Official Release | August 11 th , 2011 |
| 1.1 | Updated Product Ordering Information | June 20 th , 2012 |
| 1.2 | Updated Product Ordering Information - contents relating to extended temperature are removed | July 2 nd , 2012 |
| 1.3 | Updated read/write performance due to change in NAND flash use Updated addresses of Taiwan headquarter and the office in India | July 30 th , 2013 |
| 1.4 | Added performance tables | June 4 th , 2014 |
| 1.5 | Added SLC extended temperature models | October 17 th , 2014 |
| 1.6 | Updated Product Ordering Information | November 17 th , 2014 |
| 1.7 | Updated Product Ordering Information | February 17 th , 2015 |
| 1.8 | Added storage temperature | November 11 th , 2015 |
| 1.9 | Added 64GB support | November 26 th , 2015 |

Global Presence

| | |
|------------------------------|---|
| Taiwan (Headquarters) | Apacer Technology Inc. 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 ipservices@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", 7 th Block Jayanagar, Yediyur Circle, Bangalore – 560082, India Tel: 91-80-4152-9061 Fax: 91-80-4170-0215 sales_india@apacer.com |