

***RoHS Compliant***

# **USB Flash Drive**

***AH322 Product Specifications***

**December 13, 2016**

*Version 2.2*



**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, 64 GB
- **NAND Flash Type: MLC & SLC**
- **Performance\***
  - Sustained read: up to 34 MB/s
  - Sustained write: up to 22 MB/s
- **Power Consumption**
  - Active mode: 185 mA
  - Idle mode: 65 mA
  - Operating voltage: 5V
- **Flash Management**
  - Implements advanced wear-leveling algorithms to substantially increase longevity of flash media
  - ECC
- **Temperature Range**
  - Operating:  
Standard: 0°C to 70°C  
Extended: -40°C to 85°C
  - Storage: -40°C to 100°C
- **Support Non-Removable Setting**
- **OS Support**
  - Windows: WinXP/7 or later
  - Mac: 10.2.8 or later
  - Linux: 2.4.10 or later
- **Dimensions: 55.29 x 18.00 x 8.50, unit: mm**
- **LED Indicator**
- **EMC: CE, FCC**
- **RoHS Compliant**

\*Varies from capacities. The results for performance and power consumption addressed here are typical and 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 Functional Block

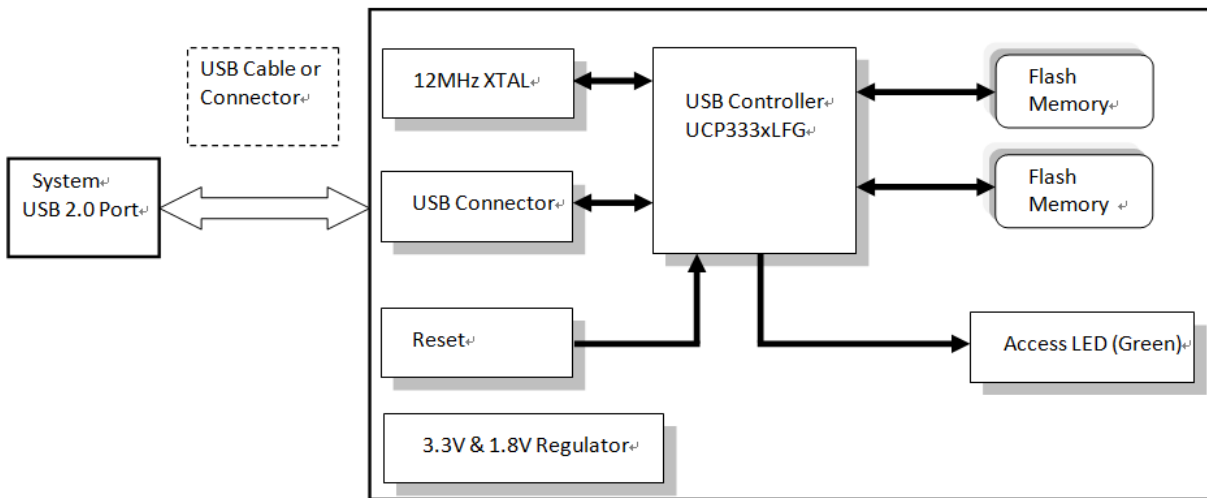


Figure 1-1 Functional Block Diagram

### 1.2 Error Correction Code (ECC)

Apacer's USB FLASH Drive (UFD) 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.

### 1.3 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 FLASH Drive (UFD) 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

### 2.1 General Specifications

**Table 2-1** General Specifications

Item	Description
<b>Interface</b>	High-speed USB2.0 compliant; backward compatible with USB 1.1
<b>Performance*</b>	SLC: up to 34 MB/s (read); 22 MB/s (write) MLC: up to 33 MB/s (read); 16 MB/s (write)
<b>Temperature</b>	0°C to 70°C (Standard); -40°C to 85°C (Extended)
<b>EMC</b>	FCC, CE
<b>MTBF</b>	2,000,000 hours (SLC); 1,000,000 (MLC)
<b>Shock</b>	Operation: 1,500G, 0.5ms Non-operation: 50G, 11ms
<b>Vibration</b>	Operation: 7.69 Grms, 20~2000 Hz/random (complies with MIL-STD-810G) Non-operation: 15 G, 10~2000 Hz/sine

Note: Results may vary from flash configurations or host system settings.

### 2.2 Performance Specifications – SLC

**Table 2-2** Performance Specifications (SLC)

Capacity \ Performance	256 MB	512 MB	1 GB	2 GB	4 GB	8 GB	16 GB	32 GB
<b>Sustained Read (MB/s)</b>	31	31	32	34	28	32	34	31
<b>Sustained Write (MB/s)</b>	10	15	19	19	21	15	22	21

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

### 2.3 Performance Specifications – MLC

**Table 2-3** Performance Specifications (MLC)

Capacity \ Performance	4 GB	8 GB	16 GB	32 GB	64 GB
<b>Sustained Read (MB/s)</b>	32	32	33	33	29
<b>Sustained Write (MB/s)</b>	10	10	14	16	10

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

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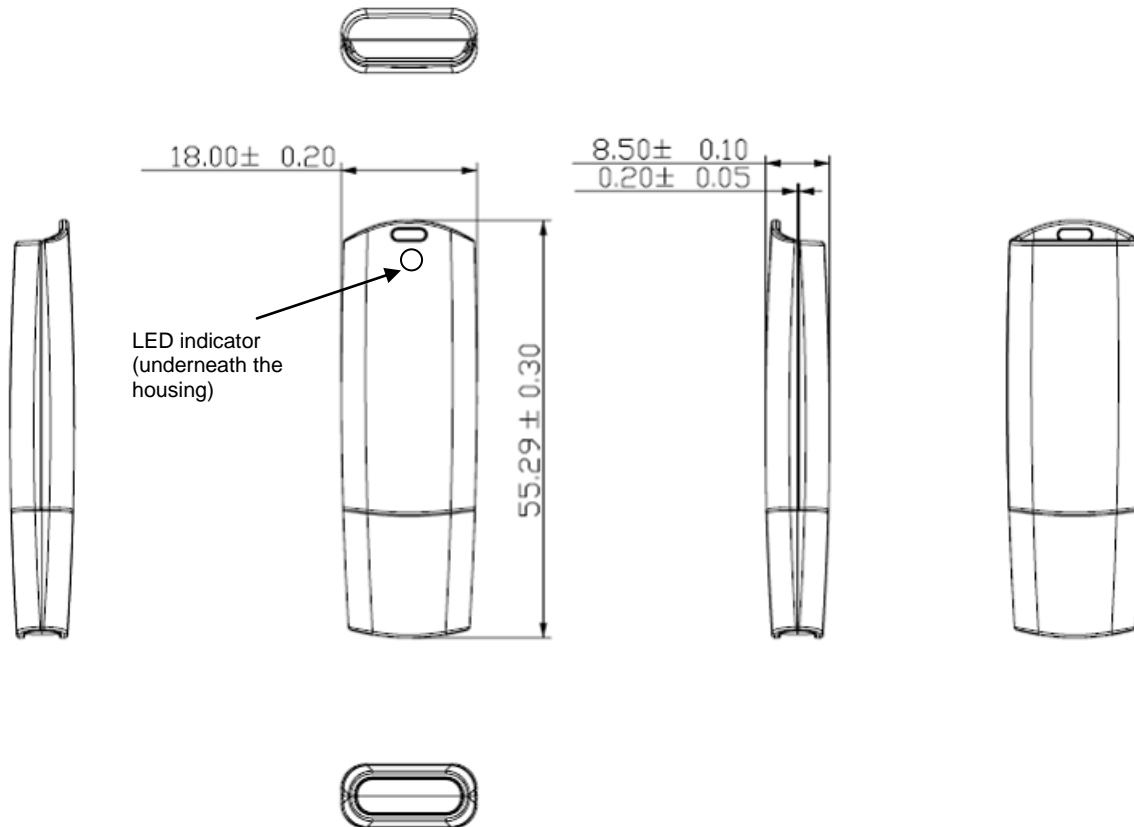
### 3. Electrical Specifications

**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 3-1** Absolute Stress Rating

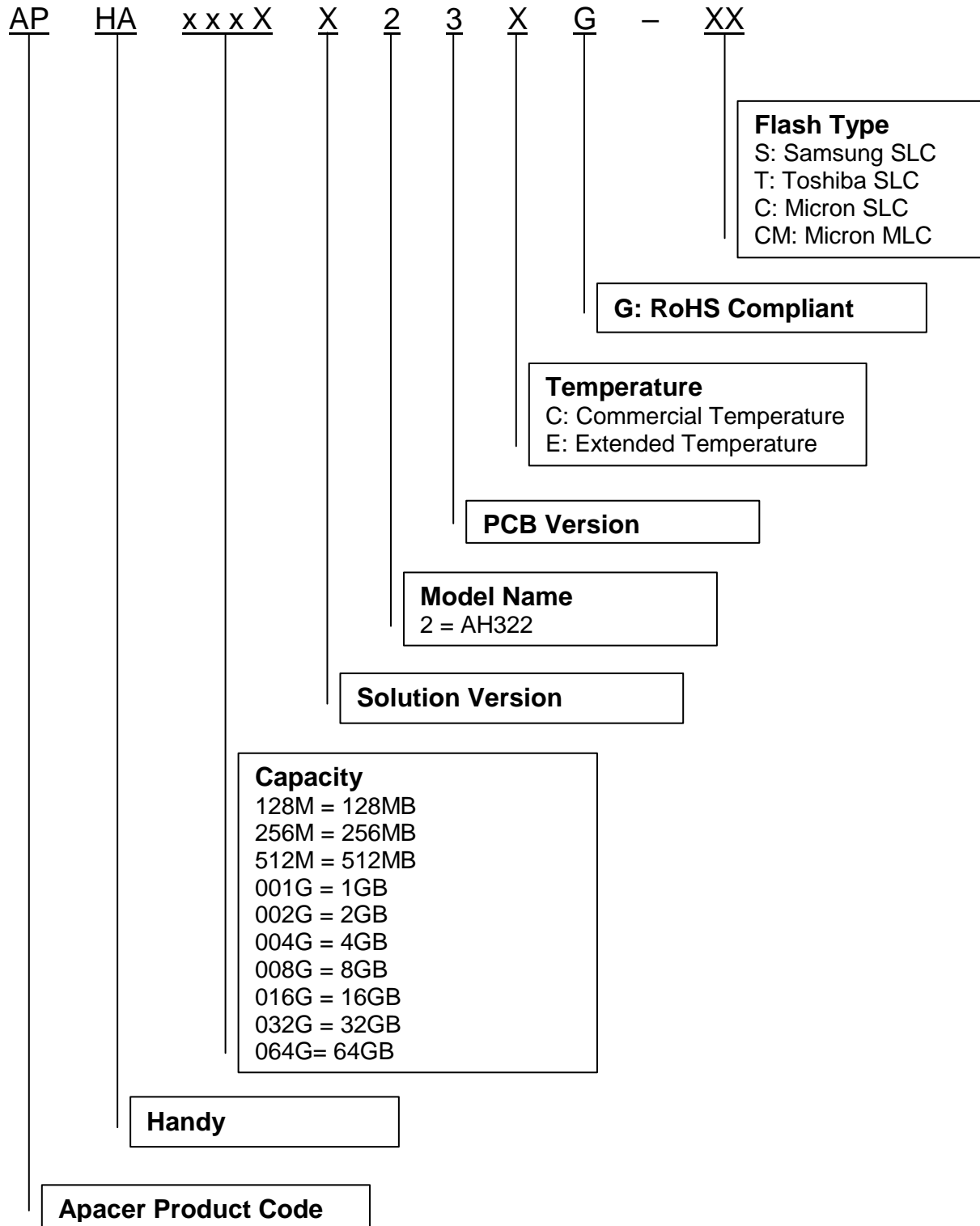
Parameters	Conditions
Ambient temperature	0°C to 70°C (Standard); -40°C to 85°C (Extended)
Storage temperature	-40 to 100°C
Required power supply	4.5-5.5V
Input power (VDD )	-0.3V (min.) to 5.5V (max.)
Voltage on any pin except VDD with respect to GND	-0.3V (min.) to VDD + 0.3V (max.)

## 4. Physical Dimensions



## 5. Product Ordering Information

### 5.1 Product Code Designations





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## 5.2 Valid Combinations

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### 5.2.1 AH322 (SLC)

Capacity	Standard	Extended
128 MB	APHA128MR23CG-2T	APHA128MT23EG-2T
256 MB	APHA256MR23CG-2T	APHA256MT23EG-2T
512 MB	APHA512MR23CG-2T	APHA512MT23EG-2T
1 GB	APHA001GR23CG-2T	APHA001GT23EG-2T
2 GB	APHA002GR23CG-2T	APHA002GT23EG-2T
4 GB	APHA004GR23CG-2T	APHA004GT23EG-2T
8 GB	APHA008GR23CG-2T	APHA008GT23EG-2T
16 GB	APHA016GR23CG-2T	APHA016GT23EG-2T
32 GB	APHA032GR23CG-2T	APHA032GT23EG-2T

### 5.2.2 AH322 (MLC)

Capacity	Standard	Extended
4 GB	APHA004GR23CG-CM	APHA004GT23EG-CM
8 GB	APHA008GR23CG-CM	APHA008GT23EG-CM
16 GB	APHA016GR23CG-CM	APHA016GT23EG-CM
32 GB	APHA032GR23CG-CM	APHA032GT23EG-CM
64 GB	APHA064GR23CG-CM	APHA064GT23EG-CM

## Revision History

<b>Revision</b>	<b>Description</b>	<b>Date</b>
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 - 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 Updated addresses of Taiwan headquarter and the office in India	August 6 <sup>th</sup> , 2013
1.4	Added performance tables	June 4 <sup>th</sup> , 2014
1.5	Added SLC extended temperature to the product line up	October 17 <sup>th</sup> , 2014
1.6	Updated Product Ordering Information	November 17 <sup>th</sup> , 2014
1.7	Updated Product Ordering Information	February 17 <sup>th</sup> , 2015
1.8	Added storage temperature	November 11 <sup>th</sup> , 2015
1.9	Added 64GB support	November 26 <sup>th</sup> , 2015
2.0	- Revised mechanical specifications - Added non-removable setting and OS support on Features page - Added block diagram - Added shock and vibration specifications - Revised product ordering information	June 7 <sup>th</sup> , 2016
2.1	Added SLC&MLC to file name	October 3 <sup>rd</sup> , 2016
2.2	Revised storage temperature	December 13 <sup>th</sup> , 2016

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## Global Presence

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