

3D NAND TLC Flash

(KIOXIA BiCS5 3D aSLC Mode)

PHANES-UA Series

SMALL USB 3.2 Flash Disk

Document No. : 100-SPUFD-PUAT5AS-SA

Version No. : 01V0

Date : June, 2024



ISO 9001 : 2015 CERTIFIED



Product Features

■ Flash IC

- Kioxia **BiCS FLASH™** *3
- Kioxia **BiCS-5** 3D-TLC w/aSLC Technology.

■ Compatibility

- Fully compatible with USB Specification Version 3.2 gen 1, and backward compatible with USB 3.1, 2.0 & 1.1
- Support Windows Vista, Windows XP, Windows 7, Windows 8 and Windows 10 without device driver.
- Support MAC OS X and later without device driver. (USB 1.1 speed)
- Support MAC OS 10.2.8 and later without device driver. (USB 2.0 speed)
- Support MAC OS 10.8 and later without device driver. (USB 3.2 GEN 1 speed)
- Support Linux Kernel ver. 2.4.0 or above without device driver. (USB 1.1 speed)
- Support Linux Kernel ver. 2.4.10 or above without device driver. (USB 2.0 speed)

■ Additional Capabilities *1

- S.M.A.R.T.*1 (Self-Monitoring, Analysis and Reporting Technology) feature set support.
- Low power consumption.
- Support Static/Dynamic Wear-Leveling algorithm.

■ Mechanical

- USB 3.2 standard A interface
- Dimension: 34.6 mm x 12.4 mm x 4.7 mm.
- Weight: 1.60 g / 0.056 oz.

■ Power

- Operating Voltage 5V (+/-) 10%
- Read Mode: 121 mA (max.)
- Write Mode: 97 mA (max.)
- Idle Mode: 58 mA (max.)

■ Performance (Maximum value) *2

- **16GB 3D aSLC**
- Sequential Read: 248 MB/sec. (max.)
- Sequential Write: 114 MB/sec. (max.)

■ Capacity

- **3D aSLC** : 1GB, 2GB, 4GB, 8GB, 16GB

■ Reliability

- **ECC:** LDPC ECC engine embedded
- **Temperature:** (Operating)
Standard Grade: 0°C ~ +70°C

■ Certifications and Declarations

- **Certifications:** CE & FCC
- **Declarations:** RoHS2 & REACH

Remarks:

1. Support official S.M.A.R.T. Utility.
2. Sequential performance is based on CrystalDiskMark 5.1.2 with file size 1000MB
3. **BiCS** means Bit Cost Scalable Technology.
BiCS FLASH is a trademark of KIOXIA Corporation.

Order Information

I. Part Number List

◆ APRO Kioxia BiCS-5 3D-aSLC USB3.2 Flash Disk PHANES-UA Series

Product Picture	Capacity	Standard grade (0°C ~ 70°C)
	1GB	SPUFD001G-PUAT5AS-SA
	2GB	SPUFD002G-PUAT5AS-SA
	4GB	SPUFD004G-PUAT5AS-SA
	8GB	SPUFD008G-PUAT5AS-SA
	16GB	SPUFD016G-PUAT5AS-SA

II. Part Number Decoder:

X1 X2 X3 X4 X5 X6 X7 X8 X9 — **X11 X12 X13 X14 X15 X16 X17** — **X19 X20**

X1 : Grade

S : Standard Grade – operating temp. 0° C ~ 70 ° C

X12 X13 : Controller version

UA : USB CTL_PS 2251-11

X2 : The material of case

P : Plastic housing

X14 X15 : Flash IC

T5 : KIOXIA (Toshiba) 3D TLC BiCS5

X3 X4 X5 : Product category

UFD : USB Flash Disk

X16 X17 : Flash IC grade / Type

AS : aSLC Mode

X6 X7 X8 X9 : Capacity

001G:	1GB	008G:	8GB
002G:	2GB	016G:	16GB
004G:	4GB		

X19 X20 : Casing Generation

SA : APRO Small USB Generation A.

X11 : Controller

P : PHISON CTL.

Revision History

Revision	Description	Date
1.0	Initial release.	2024/06/27
1.1	Typo correction	2024/09/02

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1. Introduction

APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk PHANES-UA Series is a super speed USB 3.2 GEN 1 removable flash disk drive with USB 3.2 GEN 1 connection (backward compatible with USB 2.0/1.1) and supports various storage capacities.

APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk PHANES-UA Series is compatible with all USB specification (USB 1.1 / USB 2.0 / USB 3.2 GEN 1). It is a plug and play device, simply plug it into any USB port and it will automatically get detected by the computer. Now you can read, write, copy, delete and move data from your hard disk drive to the UFD or from UFD to your hard disk drive with the super speed of USB 3.2 GEN 1.

APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk is so compact that you can take it with you anywhere in your pocket. With the high capacity of APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk, you can use it as an external removable hard drive. Now, you don't have to carry a laptop computer with you to work if you have access to a computer. "Bring your data only." Moreover, APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk does not require any battery, cables or software drivers. It is compatible with any desktop or notebook computers with USB port. Experience the light weighted, compact design, super performance and fast data transfer with APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk.

APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk also offers unique customization for OEM customers by laser carvings.

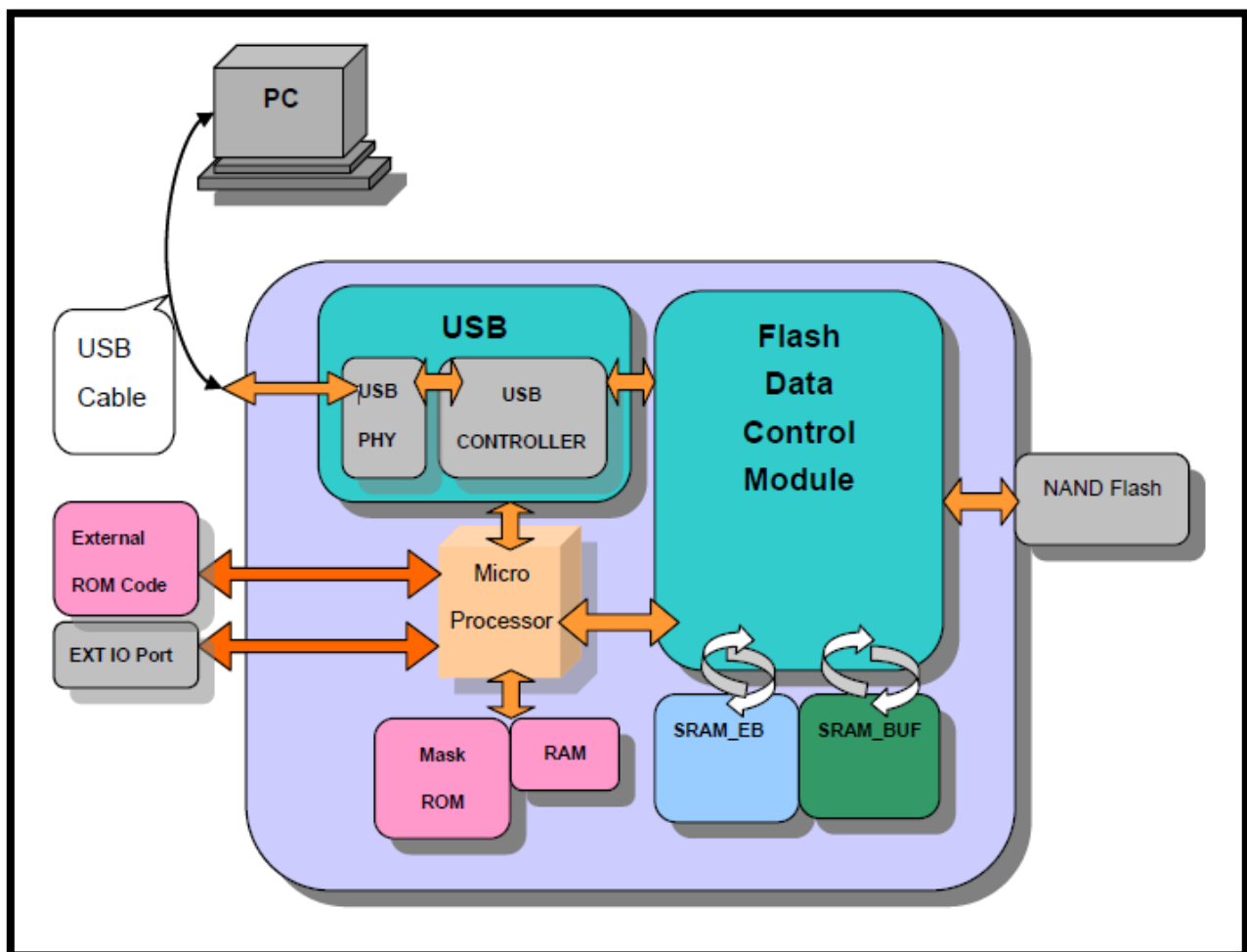


Figure 1: APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk PHANES-UA Series controller block diagram

1.1. Scope

This document describes features, specifications and installation guide of A APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk PHANES-UA Series. In the appendix, there provides order information, warranty policy, RMA/DOA procedure for the most convenient reference.

1.2. Flash Management Technology – Static & Dynamic Wear Leveling

NAND flash devices can only undergo a limited number of program/erase cycles, and in most cases, the flash media are not used evenly. If some areas get updated more frequently than others, the lifetime of the device would be reduced significantly. Thus, Wear Leveling is applied to extend the lifespan of NAND Flash by evenly distributing write and erase cycles across the media.

An APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk provides advanced Wear Leveling algorithm, which can efficiently spread out the flash usage through the whole flash media area. Moreover, by implementing both dynamic and static Wear Leveling algorithms, the life expectancy of the NAND flash is greatly improved.

1.3. Host Operating System support ability

- Support Windows Vista, Windows XP, Windows 7, Windows 8 and Windows 10 without device driver.
- Support MAC OS 10.2.8 and later without device driver. (USB 2.0 speed)
- Support MAC OS 10.8 and later without device driver. (USB 3.2 GEN 1 speed)
- Support Linux Kernel ver 2.4.0 or above without device driver. (USB 1.1 speed)
- Support Linux Kernel ver 2.4.10 or above without device driver. (USB 2.0 speed)

2. Product Specifications

For all the following specifications, values are defined at ambient temperature and nominal supply voltage unless otherwise stated.

2.1. System Environmental Specifications

Table 1: Environmental Specification

APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk PHANES-UA Series		Standard Grade
Temperature	Operating:	0°C ~ +70°C
	Non-operating:	-20°C ~ +80°C
Humidity	Operating & Non-operating:	20% to 90% RH

2.2. System Power Requirements

Table 2: Power Requirement

APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk PHANES-UA Series						
DC Input Voltage (VCC)		5V±10%				
3D-TLC w/aSLC mode		1GB	2GB	4GB	8GB	16GB
Maximum average value	Reading Mode : mA (max.)	115	114	118	118	121
	Writing Mode : mA (max.)	92	91	94	95	97
	Idle Mode : mA (max.)	56	55	56	56	58

2.3. System Performance

Table 3: System Performances

Data Transfer Mode supporting	USB 3.2 GEN 1 speed				
3D-TLC w/aSLC mode	1GB	2GB	4GB	8GB	16GB
Sequential Read (MB/s) (max.)	248.5	248.2	248.3	268	268
Sequential Write (MB/s) (max.)	113.3	114.2	114.0	76	76

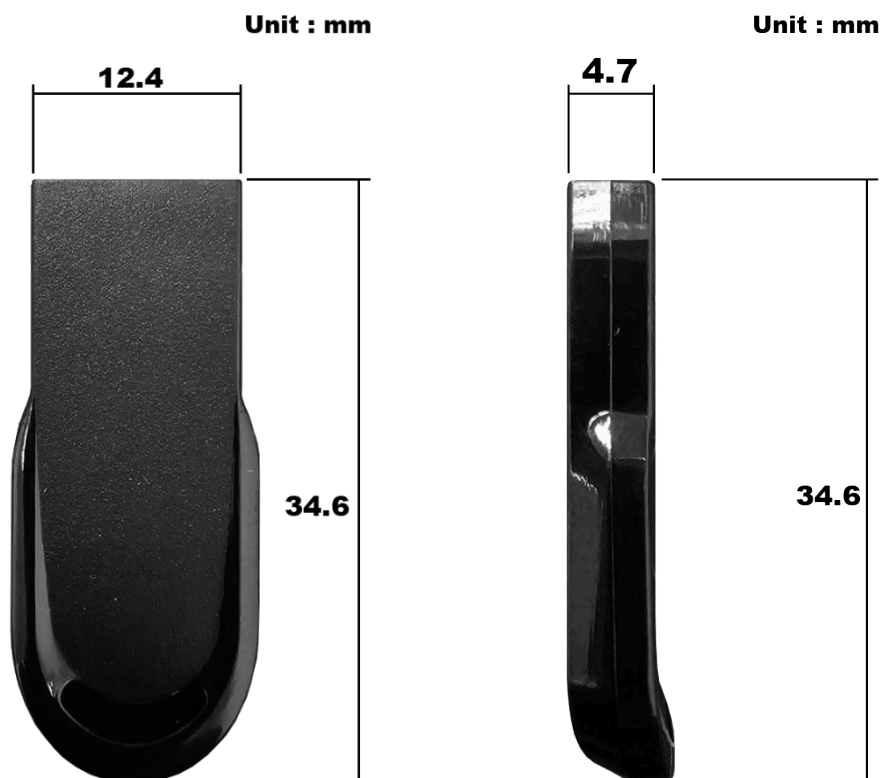
Note: Performance based on flash mode Toggle 2.0.

2.4. Physical Specifications

Refer to Table 5 and see Figure 2 for APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk PHANES-UA Series physical specifications and dimensions.

Table 5: Physical Specifications

Length:	34.6 mm (+/- 0.5)
Width:	12.4 mm (+/- 0.3)
Thickness:	4.7 mm (+/- 0.3)
Weight:	1.6 g / 0.056 oz.



3. Interface Description

3.1. APRO USB 3.2 Flash Disk Type A male interface

APRO Kioxia BiCS-5 3D aSLC USB3.2 Flash Disk is equipped with standard 9 pins USB 3.2 Type A male connector.

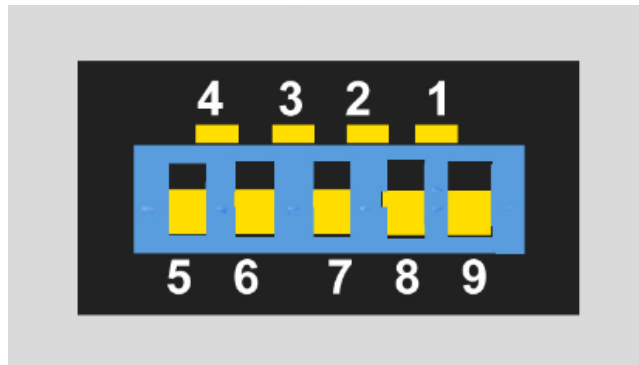


Figure 3: The Type A male connector of APRO USB 3.2 Flash Disk

3.2. Pin Assignments

There are total of 9 pins in the signal segment. The pin assignments are listed in below table 6.

Table 6 - Pin Assignments

Name	Type	Description
1	VBUS	Power
2	D-	USB2.0 Differential Pair
3	D+	
4	GND	Ground for power return
5	StdA_SSRX-	Super-speed receiver differential pair
6	StdA_SSRX+	
7	GND_DRAIN	Ground for signal return
8	StdA_SSTX-	Super-speed transmitter differential pair
9	StdA_SSTX+	

Appendix A: Limited Warranty

APRO warrants your 3D-NAND USB3.2 Flash Disk PHANES-UA Series against defects in material and workmanship for the life of the drive. The warranty is void in the case of misuse, accident, alteration, improper installation, misapplication or the result of unauthorized service or repair. The implied warranties of merchantability and fitness for a particular purpose, and all other warranties, expressed or implied, except as set forth in this warranty, shall not apply to the products delivered. In no event shall APRO be liable for any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, this product.

BEFORE RETURNING PRODUCT, A RETURN MATERIAL AUTHORIZATION (RMA) MUST BE OBTAINED FROM APRO.

Product shall be returned to APRO with shipping prepaid. If the product fails to conform based on customers' purchasing orders, APRO will reimburse customers for the transportation charges incurred.

WARRANTY PERIOD:

- **3D-aSLC (Standard Grade 0°C ~ +70°C) 2 years / Within 30K Erasing Counts**

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