Industrial ROBUST USB DRIVE Specification

(FxAce Series, 3D TLC)

Version 1.8

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1. GENERAL DESCRIPTION

1.1. Introduction

FLEXXON's Industrial Robust Drive (FxAce series) is a super speed USB 3.2(Gen1) removable flash disk drive and supports various storage capacities, which is fully compatible with all USB specification (USB1.1 / USB 2.0). It has passed various rugged environmental tests and it uses external crystal to increase product reliability and compatibility in high temperature working environment. Moreover, it offers good performance, wide compatibility and high reliability, suitable for different type of applications and tough environments.

1.2. Product Overview

- **Flash**
  - 3D TLC
- **Capacity**
  - 32GB up to 512GB
- **High IOPS**
- **Compatible with USB specification revision 1.1 and 2.0**
- **Low Power Consumption**
- **ECC Scheme**
  - Applies LDPC (Low Density Parity Check) of ECC algorithm
- **Transfer rate for USB interface:**
  - Super speed up to 5Gbit/sec for USB 3.1 GEN 1
  - High speed up to 480Mbits/sec for USB 2.0
  - Full speed up to 12Mbits/sec for USB 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 3.1 GEN 1 speed).**
- **Support Linux Kernel ver2.4.0 or above without device driver (USB 1.1 speed).**
- **Support Linux Kernel ver2.4.10 or above without device driver (USB 2.0 speed).**
- **Support Linux Kernel ver2.6.31 or above without device driver (USB 3.0 speed).**
- **Temperature Range**
  - Operation (Diamond): -40°C ~ 85°C
  - Storage: -40°C ~ 85°C
- **RoHS Compliant**

2. PRODUCT SPECIFICATIONS

2.1. Performance

Table 2-1 Performance of FxAce ROBUST USB

Capacity	Sequential		Random	
	Read (MB/s)	Write (MB/s)	Read (IOPS)	Write (IOPS)
32GB	210	30	1790	760
64GB	210	60	1790	760
128GB	210	60	1790	760
256GB	210	120	2560	1024
512GB	210	120	2560	1024

NOTES:

1. The performance was measured using CrystalDiskMark.
2. Performance may differ according to flash configuration and platform.

2.2. Power

Table 2-2 Power Consumption of FxAce ROBUST USB

Capacity	Item	Power Consumption (mA)
32GB ~ 512GB	Read	<230
	Write	<216
	Normal	<71
	Hibernate	<0.92

Unit: mA

NOTES:

1. Power Consumption may differ according to flash configuration and platform.

2.3. MTBF

MTBF, an acronym for Mean Time Between Failures, is a measure of a device's reliability. Its value represents the average time between a repair and the next failure. The predicted result of FLEXXON's Industrial Robust Drive (FxAce solution) is more than 4 million hours.

2.4. Data Retention

- 10 years if > 90% life remaining (@25C)
- 1 year if < 10% life remaining (@25C)

3. ENVIRONMENTAL SPECIFICATIONS

Test Items	Test Conditions
Storage Temperature	-40°C ~ 85°C
Operating Temperature	Diamond Grade: -40°C~ 85°C
Storage Humidity	Diamond Grade: 55°C, 95% RH
Operating Humidity	Diamond Grade: 55°C, 95% RH
Shock	1500G, Half Sin Pulse Duration 0.5ms
Vibration	80Hz ~ 2000Hz/20G, 20Hz ~ 80Hz/1.52mm, 3 axis/60min
Drop	110cm free fall, 6 face of each unit
Bending	≥ 50N, Hold 1 min/5 times
Torque	0.5N-m or +/- 5 deg, Hold 30s/5times
Durability	5,000 times with force between extraction 10N (min) and insertion 35N (max)
ESD	24.0°C, 49% RH, +/-4KV

4. ELECTRICAL SPECIFICATIONS

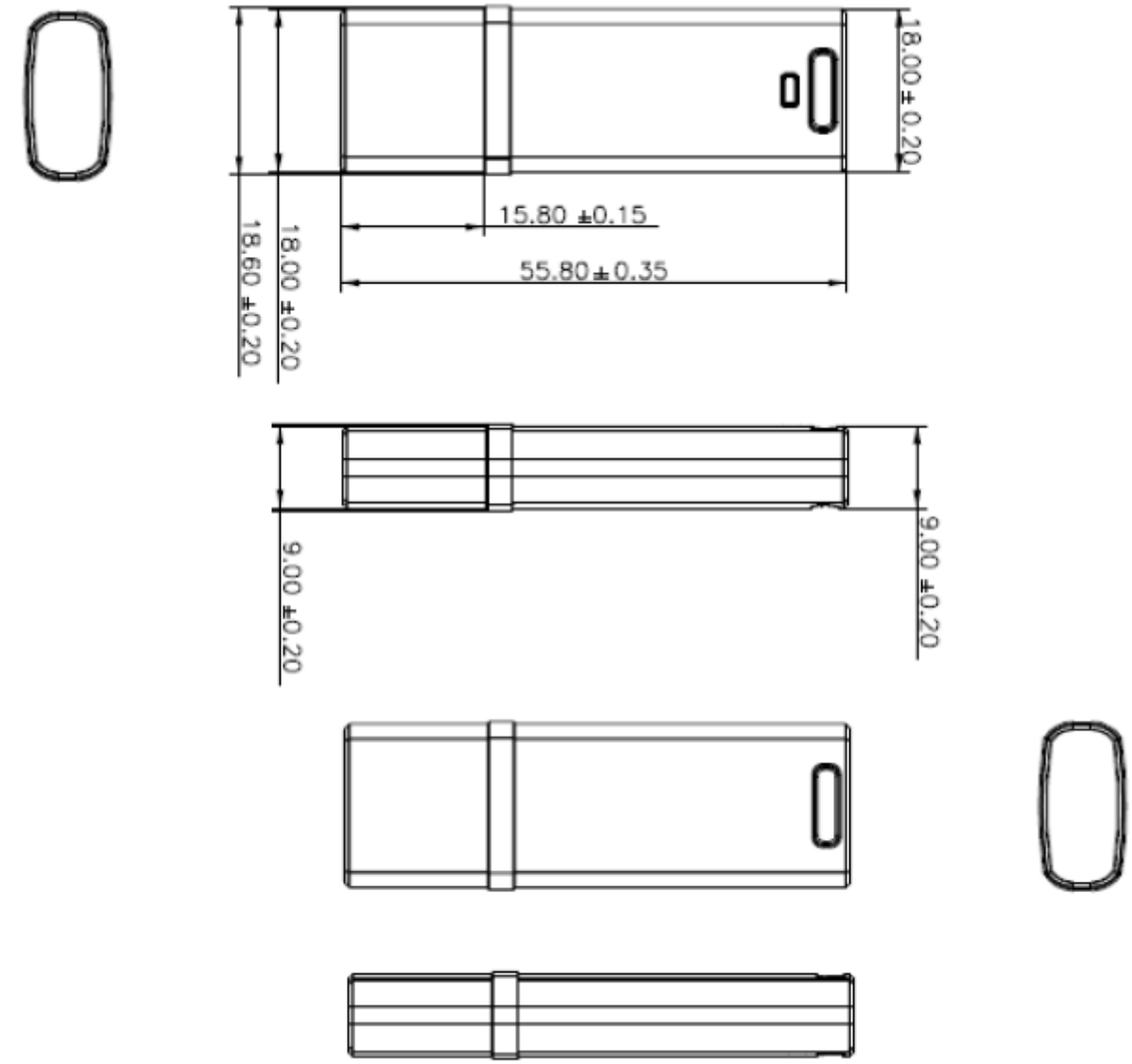
4.1. DC Characteristic

Table 4-1 FxAce ROBUST USB DC characteristic of I/O cells

Parameter		Min.	Typ.	Max.
Supply Voltage VDDIO (3.3V)		2.7V	3.3V	3.6V
Supply Voltage VDDIO (1.8V)		1.7V	1.8V	1.95V
VREF		0.49*VDDIO	0.5*VDDIO	0.51*VDDIO
VILH (3.3V)	AC Input High Voltage-VIH	0.8 * VDDIO		
	AC Input Low Voltage-VIL	0.2 * VDDIO		
	DC Input High Voltage-VIH	0.7 xVDDIO		VDDIO +0.3
	DC Input Low Voltage-VIL	VSSIO-0.3		0.3 * VDDIO
VILH (1.8V)	AC Input High Voltage-VIH	0.8 * VDDIO		
	AC Input Low Voltage-VIL	0.2 * VDDIO		
	DC Input High Voltage-VIH	0.7 xVDDIO		VDDIO +0.3
	DC Input Low Voltage-VIL	VSSIO-0.3		0.3 xVDDIO
	AC Input High Voltage-VIH	VREF + 0.250		
	AC Input Low Voltage-VIL	VREF - 0.250		
	DC Input High Voltage-VIH	VREF + 0.125		VDDIO +0.3
	DC Input Low Voltage-VIL	VSSIO-0.3		VREF - 0.125
Pu / Pd Resistance (Ω) (1.2V)	Pull-up 5K	3K	5K	7K
	Pull-up 5.5K	3.3K	5.5K	7.7K
	Pull-up 37.5K	22.5K	37.5K	52.5K
	Pull-down 37.5K	22.5K	37.5K	52.5K
Pu / Pd Resistance (Ω) (1.8V)	Pull-up 5K	3K	5K	7K
	Pull-up 5.5K	3.3K	5.5K	7.7K
	Pull-up 37.5K	22.5K	37.5K	52.5K
	Pull-down 37.5K	22.5K	37.5K	52.5K

5. PHYSICAL DIMENSION

Dimension: 55.8 (L) x 18.0 (W) x 9.0 (H) mm



6. ORDERING INFORMATION

Capacity	MPN (Diamond Grade)
16GB	-
32GB	FUUP032GBE-1100
64GB	FUUP064GBE-1100
128GB	FUUP128GBE-1100
256GB	FUUP256GBE-1100
512GB	FUUP512GBE-1100

Revision History

Revision	Release Date	History
1.0	2019/05	First release
1.1	2019/06	Update Ordering Information
1.2	2019/11	Update Logo
1.3	2019/11	Update Power Consumption
1.4	2020/02	Update Drop Test Condition
1.5	2020/04	Change series name FxUA to FxAce
1.6	2021/03	Update performance
1.7	2021/10	Update product information
1.8	2022/07	Update ordering information and performance