GOODRAM Industrial
uSD 3D TLC type
DATASHEET

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REVISION HISTORY

VERSION	CHANGES	DATE
1.0	Initial release	07.03.2022
1.1	Logo amendment	20.12.2023

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PRODUCT OVERVIEW

Capacity	32GB
Form Factor	microSD
Bus Speed Mode	UHS-I
Speed Class	Class 10, U1
Performance[Note1]	- Read: up to 75MB/s - Write: up to 20MB/s
Power Consumption	- Read: up to 400mA - Write: up to 400mA
MTBF	More than 2000000 hours
Endurance	- Up to 3000 erase/program cycles in whole capacity - Data retention over 10 years in room temperature (+25°C)[Note2]
Advanced Flash Management:	- Static and Dynamic Wear Leveling - Error Correction Code - Wear Leveling - Bad Block Management
Temperature Range [Note3]:	- Operation: 0°C — +70°C - Storage: -40°C — +85°C
RoHS compliant	

Notes:

1. Measured by TestMetrix
2. In new product.
3. According to IEC-60068-2-1/2/14/38 standard.

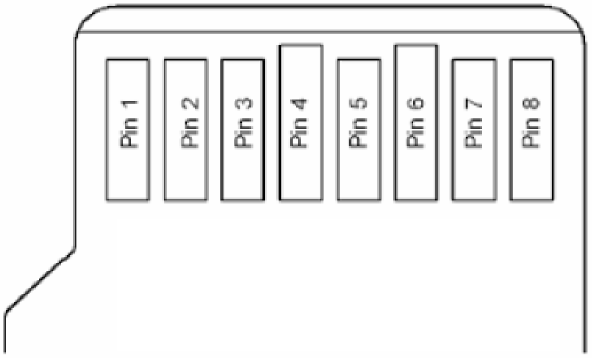
PRODUCT DETAILS

GENERAL DESCRIPTION

The micro Secure Digital (microSD) card version is fully compliant to the specification released by SD Card Association. The Command List supports [Part 1 Physical Layer Specification Ver6.10 Final] definitions. Card Capacity of Non-secure Area, Secure Area Supports [Part 3 Security Specification Ver7.0 Final] Specifications.

The uSD 6.x is based on 8-pin interface, designed to operate at a maximum operating frequency of 208MHz. It can alternate communication protocol between the SD mode and SPI mode. It performs data error detection and correction with very low power consumption.

PIN ASSIGNMENT



PIN	SD MODE			SPI MODE		
	NAME	**TYPE**	**DESCRIPTION**	**NAME**	**TYPE**	**DESCRIPTION**
1	DAT2	I/O/PP	Data Line [bit2]	RSV		
2	CD/DAT3	I/O/PP	Card Detect/ Data Line [bit3]	CS	I	Chip Select (neg true)
3	CMD	PP	Command/Response	DI	I	Data In
4	VDD	S	Supply Voltage	VDD	S	Supply voltage
5	CLK	I	Clock	SCLK	I	Clock
6	VSS	S	Supply voltage ground	VSS	S	Supply voltage ground
7	DAT0	I/O/PP	Data Line [bit0]	DO	O/PP	Data Out
8	DAT1	I/O/PP	Data Line [bit1]	RSV		

FLASH MANAGEMENT

GOODRAM microSD card utilizes all the state of art technologies to ensure full reliability until the specified NAND Flash program/erase cycles parameter is reached. These technologies include but are not limited to:

Error Correction Code (ECC)

Flash memory cells will deteriorate with use, which may generate random bit errors in the stored data. To ensure the highest reliability, GOODRAM uSD card applies the ECC Algorithm, which can detect and correct errors that occur during read process, to ensure data is read correctly, as well as protected from corruption.

Wear Levelling

Storage devices based on NAND flash memory, can only undergo a limited number of program/erase cycles, and due to various usage scenarios, data may not be distributed evenly between NAND flash chips. If a certain area gets updated more frequently than others, the lifetime of the device will be reduced significantly. Wear Leveling algorithm used in GOODRAM microSD cards is used to extend the lifespan of NAND Flash by evenly distributing write and erase cycles across the whole storage area. Moreover, by utilizing both dynamic and static Wear Leveling algorithms, the life expectancy of GOODRAM uSD cards can meet the listed specification.

Bad Block Management

Bad blocks are blocks that include one or more invalid bits, and their reliability is not guaranteed. Blocks that are identified and marked as bad by the manufacturer are referred to as “Initial Bad Blocks”. Bad blocks that are developed during the lifespan of the flash are named “Later Bad Blocks”. GOODRAM microSD card uses an efficient bad block management algorithm to detect all types of bad blocks, which further prevents data being stored into them and improves the data reliability.

COMPARING microSDSC, microSDHC AND microSDXC

	microSDSC	**microSDHC/microSDXC**
Addressing Mode	Byte (1 byte unit)	Block (512 byte unit)
HCS/CCS bits of ACMD41	Support	Support
CMD8 (SEND_IF_COND)	Support	Support
CMD16 (SET_BLOCKLEN)	Support	Support (Only CMD42)
Partial Read	Support	Not Support
Lock/Unlock Function	Mandatory	Mandatory
Write Protect Groups	Optional	Not Support
Supply Voltage 2.0v – 2.7v (for initialization)	Support	Support
Total Bus Capacitance for each signal line	40pF	40pF
CSD Version (CSD_STRUCTURE Value)	1.0 (0x0)	2.0 (0x1)
Speed Class	Optional	Mandatory (Class 2/4/6/10)

PERFORMANCE AND POWER CONSUMPTION

Capacity	**Flash Structure**	**Performance**		**Power Consumption**	
		TestMetrix		**Read (mA)**	**Write (mA)**
		Read (MB/s)	**Write (MB/s)**		
32GB	32GB x 1	75	20	400	400

NOTES:
1. The performance was measured using TestMetrix.
2. Performance may differ according to flash configuration and platform.
3. The table above is for reference only. The criteria for MP (mass production) and for accepting goods shall be discussed based on different flash configuration.

POWER SUPPLY

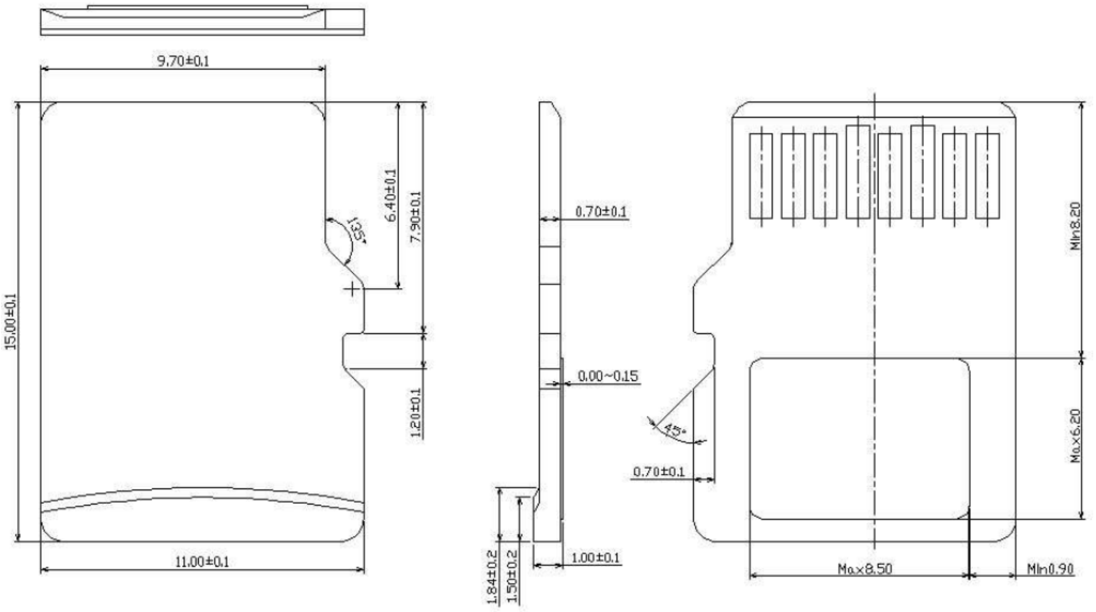
PARAMETER	**RATING**
Operating voltage	2.7 – 3.6V±5%

TEMPERATURE SPECIFICATION

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
T_a	Operating Temperature	0	+70	°C
T_{st}	Storage Temperature	-40	+85	°C

PHYSICAL DIMENSION

Dimensions: 15mm (L) * 11mm (W) * 1mm (H)



PRODUCT ORDERING INFORMATION

PN	Type	Capacity	Technology	Temp range
SDUU1-0323SG	uSD	32GB	3D TLC	0°C — +70°C

STANDARDS & REFERENCES

The following table is to list out the standards that have been adopted for designing the product.

STANDARD USED	ACRONYM/SOURCE
RoHS	Restriction of Hazardous Substances Directive
CE	Consumer electronics certification; please contact us for further information.

SAFETY PRECAUTIONS

Do not bend, crush, drop, or place heavy objects on top of the Product. Do not use tweezers, pliers or similar items that could damage the Product. Take particular care when inserting or removing the Product. Stop using the Product when the Product does not work properly. Failure to follow these instructions could result in fire, damage to the Product and/or other property, and/or personal injury including burns and electric shock.

Keep out of reach of small children. Accidental swallowing may cause suffocation or injury. Contact a doctor immediately if you suspect a child has swallowed the Product.

Do not directly touch the interface pins, put them in contact with metal, strike them with hard objects or cause them to short. Do not expose to static electricity.

Do not disassemble or modify the Product. This may cause electric shock, damage to the Product or fire.

NOTES ON USAGE

The Product contains nonvolatile semiconductor memory. Do not use the Product in accordance with a method of usage other than that written in the manual. This may cause the destruction or loss of data.

To protect against accidental data loss, you should back up your data frequently on more than one type of storage media. Wilk Elektronik S.A. assumes no liability for destruction or loss of data recorded on the Card for any reason.

When used over a long period of time or repeatedly, the reading, writing and deleting capabilities of the Product will eventually fail, and the performance speed of the Product may decrease below the original speed specific to the Product's applicable class.

If the Product is to be transferred or destroyed, note that the data it contained may still be recoverable unless it is permanently deleted by third-party deletion software or similar means beforehand.

Product is intended for use in general electronics applications and selected industrial applications and any other specific applications as expressly stated in this document. Product is neither intended nor warranted for use in equipment or systems where failure may cause loss of human life, bodily injury, serious property damage or serious public impact (“Unintended Use”). Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment or equipment used to control combustions or explosions. Do not use Product for Unintended Use unless specifically permitted in this document.

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