

The logo for Goodram, featuring the word "goodram" in a white, lowercase, sans-serif font on a dark blue rectangular background.

**industrial**

# **GOODRAM Industrial**

## **DDR4 DIMM 288pin**

standard temperature

### **DATASHEET**

Document number:

Version: 1.0

Date: June 2021

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## REVISION HISTORY

VERSION	CHANGES	DATE
1.0	Initial release	29.06.2021

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## PRODUCT OVERVIEW

Module Form Factor	288-pin, unbuffered dual in-line memory module (UDIMM)
Interface	DDR4, JEDEC compliant JESD79-4
Capacity	16GB
Fast Data Transfer Rates	PC4-25600 @3200 MT/s
DRAM IC Type	1Gx8
Power Supply	VDD = 1.20V, VPP = 2.5V, VDDSPD = 2.5V
ECC Support	NO
Registered	NO
Thermal sensor	NO
Temperature range <sup>Note1</sup>	Operating: 0°C ~ +85°C; Storage: -40°C ~ +100°C
Fly-by topology	YES
Gold edge contacts	YES
RoHS compliant	YES

Notes:

1. According to IEC-60068-2-1/2/14 standards

## PRODUCT DETAILS

### General Description

High-speed DDR4 SDRAM modules use DDR4 SDRAM devices with two or four internal memory bank groups. DDR4 SDRAM modules utilizing 4- and 8-bit-wide DDR4 SDRAM devices have four internal bank groups consisting of four memory banks each, providing a total of 16 banks. 16-bit-wide DDR4 SDRAM devices have two internal bank groups consisting of four memory banks each, providing a total of eight banks. DDR4 SDRAM modules benefit from DDR4 SDRAM's use of an  $8n$ -prefetch architecture with an interface designed to transfer two data words per clock cycle at the I/O pins. A single READ or WRITE operation for the DDR4 SDRAM effectively consists of a single  $8n$ -bitwide, four-clock data transfer at the internal DRAM core and eight corresponding  $n$ -bitwide, one-half-clock-cycle data transfers at the I/O pins.

DDR4 modules use two sets of differential signals: DQS<sub>t</sub> and DQS<sub>c</sub> to capture data and CK<sub>t</sub> and CK<sub>c</sub> to capture commands, addresses and control signals. Differential clocks and data strobes ensure exceptional noise immunity for these signals and provide precise crossing points to capture input signals.

### Fly-By Topology

DDR4 modules use faster clock speeds than earlier DDR technologies, making signal quality more important than ever. For improved signal quality, the clock, control, command and address buses have been routed in a fly-by topology, where each clock, control, command and address pin on each DRAM is connected to a single trace and terminated (rather than a tree structure, where the termination is off the module near the connector). Inherent to fly-by topology, the timing skew between the clock and DQS signals can be easily accounted for by using the write-leveling feature of DDR4.

### Thermal Sensor Operations

The temperature from the integrated thermal sensor is monitored and converts into a digital word via the I<sup>2</sup>C bus. System designers can use the user-programmable registers to create a custom temperature-sensing solution based on system requirements. Programming and configuration details comply with JEDEC standard 21-C page 4.7-1 "Definition of the TSE2002av. Serial Presence Detect with Temperature Sensor".

## PART NUMBERS AND TIMING PARAMETERS

PART NUMBER	MODULE DENSITY	CONFIGURATION	MODULE BANDWIDTH	MEMORY CLOCK / DATA RATE	CLOCK CYCLES (CL- <sup>T</sup> RCD- <sup>T</sup> RP)
RU4D16G320D8C	16GB	1Gx8 DR	25600MB/s	0.625ns/3200 MT/s	22-22-22

DR – Double Rank

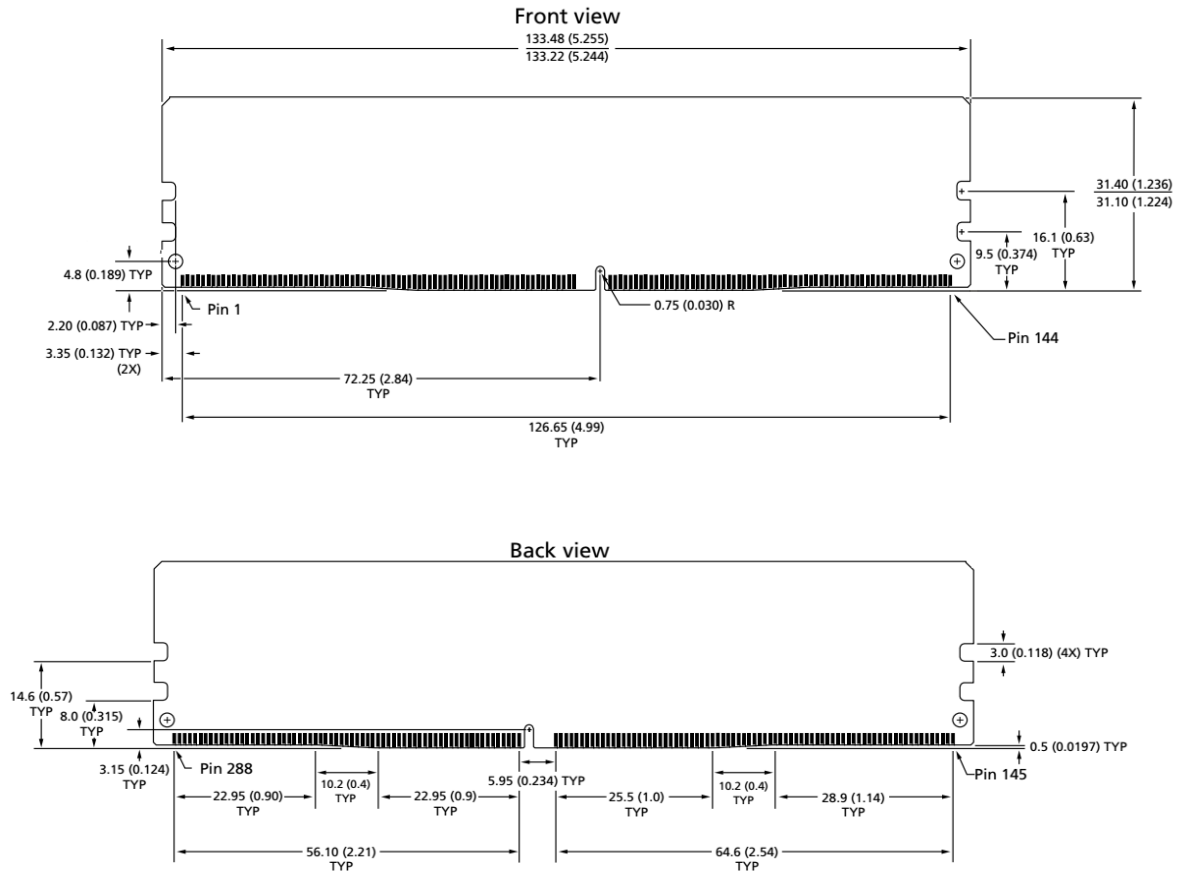
C – standard temperature

## ADDRESSING

PARAMETER	16GB DR
Row address	64K A[15:0]
Column address	1K A[9:0]
Device bank group address	4 BG[1:0]
Device bank address per group	4 BA[1:0]
Device configuration	8Gb (1Gx8)
Module rank address	2 CS <sub>n</sub> [1:0]

## PHYSICAL DIMENSION

Dimensions: 133.35mm (L) \* 31.25mm (W)



**Note:**

1. All dimensions are in millimeters (inches). MAX/MIN or typical (TYP) where noted.
2. The dimensional diagram is for reference only. Refer to JEDEC document for additional design dimensions.



## 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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