DDR4 SDRAM UDIMM Addendum

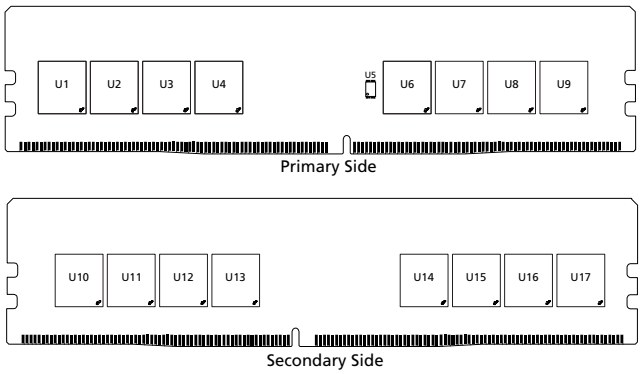
MTA16ATF4G64AZ – 32GB

Features

Information provided here is in addition to or supersedes information provided in the Micron DDR4 UDIMM Core data sheet.

- DDR4 functionality and operations supported as defined in the component data sheet
- Features and specifications supported in the Micron DDR4 UDIMM core data sheet
- 288-pin, unbuffered dual in-line memory module (UDIMM)
- Fast data transfer rates: PC4-3200, PC4-2666
- 32GB (4 Gig x 64)
- Data bus inversion (DBI) for data bus
- On-board serial presence-detect (SPD) EEPROM
- Dual-rank
- 16 internal banks; 4 groups of 4 banks each

Figure 1: 288-Pin UDIMM (R/C-B2)



Options	Marking
• Operating temperature	
– Commercial ($0°C \le T_{OPER} \le 95°C$)	None
• Package	
– 288-pin DIMM (halogen-free)	Z
• Frequency/CAS latency	
– 0.625ns @ CL = 22 (DDR4-3200)	-3G2
– 0.75ns @ CL = 19 (DDR4-2666)	-2G6

Table 1: Addressing

Parameter	32GB
Row address	128K A[16:0]
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	16Gb (2 Gig x 8), 16 banks
Module rank address	2 CS_n[1:0]

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.
Products and specifications discussed herein are subject to change by Micron without notice.

Table 2: Part Numbers and Timing Parameters – 32GB Modules

Base device: MT40A2G8,[1] 16Gb DDR4 SDRAM

Part Number[2]	Module Density	Configuration	Module Bandwidth	Memory Clock/Data Rate	Clock Cycles ($CL\text{-}_nRCD\text{-}_nRP$)
MTA16ATF4G64AZ-3G2__	32GB	4 Gig x 64	25.6 GB/s	0.625ns/3200 MT/s	22-22-22
MTA16ATF4G64AZ-2G6__	32GB	4 Gig x 64	21.3 GB/s	0.75ns/2666 MT/s	19-19-19

Notes: 1. The data sheet for the base device can be found on micron.com.
2. All part numbers end with a two-place code (not shown) that designates component and PCB revisions. Consult factory for current revision codes. Example: MTA16ATF4G64AZ-3G2F1.

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.

Important Notes and Warnings

Micron Technology, Inc. ("Micron") reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions. This document supersedes and replaces all information supplied prior to the publication hereof. You may not rely on any information set forth in this document if you obtain the product described herein from any unauthorized distributor or other source not authorized by Micron.

Automotive Applications. Products are not designed or intended for use in automotive applications unless specifically designated by Micron as automotive-grade by their respective data sheets. Distributor and customer/distributor shall assume the sole risk and liability for and shall indemnify and hold Micron harmless against all claims, costs, damages, and expenses and reasonable attorneys' fees arising out of, directly or indirectly, any claim of product liability, personal injury, death, or property damage resulting directly or indirectly from any use of non-automotive-grade products in automotive applications. Customer/distributor shall ensure that the terms and conditions of sale between customer/distributor and any customer of distributor/customer (1) state that Micron products are not designed or intended for use in automotive applications unless specifically designated by Micron as automotive-grade by their respective data sheets and (2) require such customer of distributor/customer to indemnify and hold Micron harmless against all claims, costs, damages, and expenses and reasonable attorneys' fees arising out of, directly or indirectly, any claim of product liability, personal injury, death, or property damage resulting from any use of non-automotive-grade products in automotive applications.

Critical Applications. Products are not authorized for use in applications in which failure of the Micron component could result, directly or indirectly in death, personal injury, or severe property or environmental damage ("Critical Applications"). Customer must protect against death, personal injury, and severe property and environmental damage by incorporating safety design measures into customer's applications to ensure that failure of the Micron component will not result in such harms. Should customer or distributor purchase, use, or sell any Micron component for any critical application, customer and distributor shall indemnify and hold harmless Micron and its subsidiaries, subcontractors, and affiliates and the directors, officers, and employees of each against all claims, costs, damages, and expenses and reasonable attorneys' fees arising out of, directly or indirectly, any claim of product liability, personal injury, or death arising in any way out of such critical application, whether or not Micron or its subsidiaries, subcontractors, or affiliates were negligent in the design, manufacture, or warning of the Micron product.

Customer Responsibility. Customers are responsible for the design, manufacture, and operation of their systems, applications, and products using Micron products. ALL SEMICONDUCTOR PRODUCTS HAVE INHERENT FAILURE RATES AND LIMITED USEFUL LIVES. IT IS THE CUSTOMER'S SOLE RESPONSIBILITY TO DETERMINE WHETHER THE MICRON PRODUCT IS SUITABLE AND FIT FOR THE CUSTOMER'S SYSTEM, APPLICATION, OR PRODUCT. Customers must ensure that adequate design, manufacturing, and operating safeguards are included in customer's applications and products to eliminate the risk that personal injury, death, or severe property or environmental damages will result from failure of any semiconductor component.

Limited Warranty. In no event shall Micron be liable for any indirect, incidental, punitive, special or consequential damages (including without limitation lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort, warranty, breach of contract or other legal theory, unless explicitly stated in a written agreement executed by Micron's duly authorized representative.

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.

DQ Map

Table 3: Component-to-Module DQ Map

Component Reference Number	Component DQ	Module DQ	Module Pin Number	Component Reference Number	Component DQ	Module DQ	Module Pin Number
U1	0	2	12	U2	0	11	168
	1	1	150		1	9	161
	2	3	157		2	10	23
	3	0	5		3	8	16
	4	6	10		4	15	166
	5	4	3		5	13	159
	6	7	155		6	14	21
	7	5	148		7	12	14
U3	0	18	34	U4	0	27	190
	1	16	27		1	24	38
	2	19	179		2	26	45
	3	17	172		3	25	183
	4	22	32		4	31	188
	5	20	25		5	29	181
	6	23	177		6	30	43
	7	21	170		7	28	36
U6	0	38	102	U7	0	47	258
	1	37	240		1	44	106
	2	39	247		2	46	113
	3	36	95		3	45	251
	4	35	249		4	42	115
	5	33	242		5	40	108
	6	34	104		6	43	260
	7	32	97		7	41	253
U8	0	55	269	U9	0	63	280
	1	53	262		1	60	128
	2	54	124		2	62	135
	3	52	117		3	61	273
	4	51	271		4	58	137
	5	48	119		5	56	130
	6	50	126		6	59	260
	7	47	264		7	57	275

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.

Table 3: Component-to-Module DQ Map (Continued)

Component Reference Number	Component DQ	Module DQ	Module Pin Number	Component Reference Number	Component DQ	Module DQ	Module Pin Number
U10	0	60	128	U11	0	53	262
	1	63	280		1	55	269
	2	61	273		2	52	117
	3	62	135		3	54	124
	4	56	130		4	48	119
	5	58	137		5	51	271
	6	57	275		6	49	264
	7	59	282		7	50	126
U12	0	44	106	U13	0	37	240
	1	47	258		1	38	102
	2	45	251		2	36	95
	3	46	113		3	39	247
	4	40	108		4	33	242
	5	42	115		5	35	249
	6	41	253		6	32	97
	7	43	260		7	34	104
U14	0	24	38	U15	0	16	27
	1	27	190		1	18	34
	2	25	183		2	17	172
	3	26	45		3	19	179
	4	29	181		4	20	25
	5	31	188		5	22	32
	6	28	36		6	21	170
	7	30	43		7	23	177
U16	0	9	161	U17	0	1	150
	1	11	168		1	2	12
	2	8	16		2	0	5
	3	10	23		3	3	157
	4	13	159		4	4	3
	5	15	166		5	6	10
	6	12	14		6	5	148
	7	14	21		7	7	155

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.

I_{DD} Specifications

Table 4: DDR4 I_{DD} Specifications and Conditions (0° ≤ T_C ≤ 85°) – 32GB (Die Revision E)

Values are for the MT40A2GM8 DDR4 SDRAM only and are computed from values specified in the 16Gb (2 Gig x 8) component data sheet

Parameter	Symbol	3200	2666	Units
One bank ACTIVATE-PRECHARGE current	I_{DD0}[1]	784	768	mA
One bank ACTIVATE-PRECHARGE, wordline boost, I_{PP} current	I_{PP0}[1]	40	40	mA
One bank ACTIVATE-READ-PRECHARGE current	I_{DD1}[1]	872	856	mA
Precharge standby current	I_{DD2N}[2]	720	688	mA
Precharge standby ODT current	I_{DD2NT}[1]	712	696	mA
Precharge power-down current	I_{DD2P}[2]	608	608	mA
Precharge quite standby current	I_{DD2Q}[2]	672	672	mA
Active standby current	I_{DD3N}[2]	976	944	mA
Active standby I_{PP} current	I_{PP3N}[2]	32	32	mA
Active power-down current	I_{DD3P}[2]	800	768	mA
Burst read current	I_{DD4R}[1]	1600	1472	mA
Burst write current	I_{DD4W}[1]	1328	1240	mA
Different logic rank burst refresh current (1x REF)	I_{DD5R}[1]	848	848	mA
Different logic rank burst refresh I_{PP} current (1x REF)	I_{PP5R}[1]	48	48	mA
Self refresh current: Normal temperature range (0°C to 85°C)	$I_{DD6N\ (0–85°C)}$[2]	848	848	mA
Self refresh current: Extended temperature range (0°C to 95°C)	$I_{DD6E\ (0–95°C)}$[2]	1808	1808	mA
Self refresh current: Reduced temperature range (0°C to 45°C)	$I_{DD6R\ (0–45°C)}$[2]	320	320	mA
Auto self refresh current (25°C)	$I_{DD6A\ (25°C)}$[2]	176	176	mA
Auto self refresh current (45°C)	$I_{DD6A\ (45°C)}$[2]	320	320	mA
Auto self refresh current (75°C)	$I_{DD6A\ (75°C)}$[2]	816	816	mA
Auto self refresh current (95°C)	$I_{DD6A\ (95°C)}$[2]	1808	1808	mA
Auto self refresh I_{PP} current (0°C to 95°C)	I_{PP6X}[2]	96	96	mA
Bank interleave read current	I_{DD7}[1]	1784	1752	mA
Bank interleave read I_{PP} current	I_{PP7}[1]	128	128	mA
Maximum power-down current	I_{DD8}[2]	576	576	mA

Notes: 1. One module rank in the active $I_{DD/PP}$, the other rank in $I_{DD2P/PP3N}$.
2. All ranks in this $I_{DD/PP}$ condition.

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.

3. When $T_C > 85°C$, the I_{DD} and I_{PP} values must be derated. Refer to the base device data sheet I_{DD} and I_{PP} specification tables for derating values for the applicable die-revision.

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.

Table 5: DDR4 I_{DD} Specifications and Conditions (0° ≤ T_C ≤ 85°) – 32GB (Die Revision B)

Values are for the MT40A2GM8 DDR4 SDRAM only and are computed from values specified in the 16Gb (2 Gig x 8) component data sheet

Parameter	Symbol	3200	2666	Units
One bank ACTIVATE-PRECHARGE current	I_{DD0}[1]	848	832	mA
One bank ACTIVATE-PRECHARGE, wordline boost, I_{PP} current	I_{PP0}[1]	56	56	mA
One bank ACTIVATE-READ-PRECHARGE current	I_{DD1}[1]	936	920	mA
Precharge standby current	I_{DD2N}[2]	832	800	mA
Precharge standby ODT current	I_{DD2NT}[1]	792	776	mA
Precharge power-down current	I_{DD2P}[2]	688	688	mA
Precharge quite standby current	I_{DD2Q}[2]	752	752	mA
Active standby current	I_{DD3N}[2]	1280	1248	mA
Active standby I_{PP} current	I_{PP3N}[2]	48	48	mA
Active power-down current	I_{DD3P}[2]	1104	1088	mA
Burst read current	I_{DD4R}[1]	1960	1800	mA
Burst write current	I_{DD4W}[1]	1808	1672	mA
Different logic rank burst refresh current (1x REF)	I_{DD5R}[1]	976	960	mA
Different logic rank burst refresh I_{PP} current (1x REF)	I_{PP5R}[1]	64	64	mA
Self refresh current: Normal temperature range (0°C to 85°C)	$I_{DD6N\ (0–85°C)}$[2]	1072	1072	mA
Self refresh current: Extended temperature range (0°C to 95°C)	$I_{DD6E\ (0–95°C)}$[2]	1936	1936	mA
Self refresh current: Reduced temperature range (0°C to 45°C)	$I_{DD6R\ (0–45°C)}$[2]	464	464	mA
Auto self refresh current (25°C)	$I_{DD6A\ (25°C)}$[2]	160	160	mA
Auto self refresh current (45°C)	$I_{DD6A\ (45°C)}$[2]	464	464	mA
Auto self refresh current (75°C)	$I_{DD6A\ (75°C)}$[2]	976	976	mA
Auto self refresh current (95°C)	$I_{DD6A\ (95°C)}$[2]	1936	1936	mA
Auto self refresh I_{PP} current (0°C to 95°C)	I_{PP6X}[2]	176	176	mA
Bank interleave read current	I_{DD7}[1]	1912	1864	mA
Bank interleave read I_{PP} current	I_{PP7}[1]	104	104	mA
Maximum power-down current	I_{DD8}[2]	640	640	mA

Notes: 1. One module rank in the active $I_{DD/PP}$, the other rank in $I_{DD2P/PP3N}$.
2. All ranks in this $I_{DD/PP}$ condition.
3. When T_C > 85°C, the I_{DD} and I_{PP} values must be derated. Refer to the base device data sheet I_{DD} and I_{PP} specification tables for derating values for the applicable die-revision.

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.

Table 6: DDR4 I_{DD} Specifications and Conditions (0° ≤ T_C ≤ 85°) – 32GB (Die Revision F)

Values are for the MT40A2GM8 DDR4 SDRAM only and are computed from values specified in the 16Gb (2 Gig x 8) component data sheet

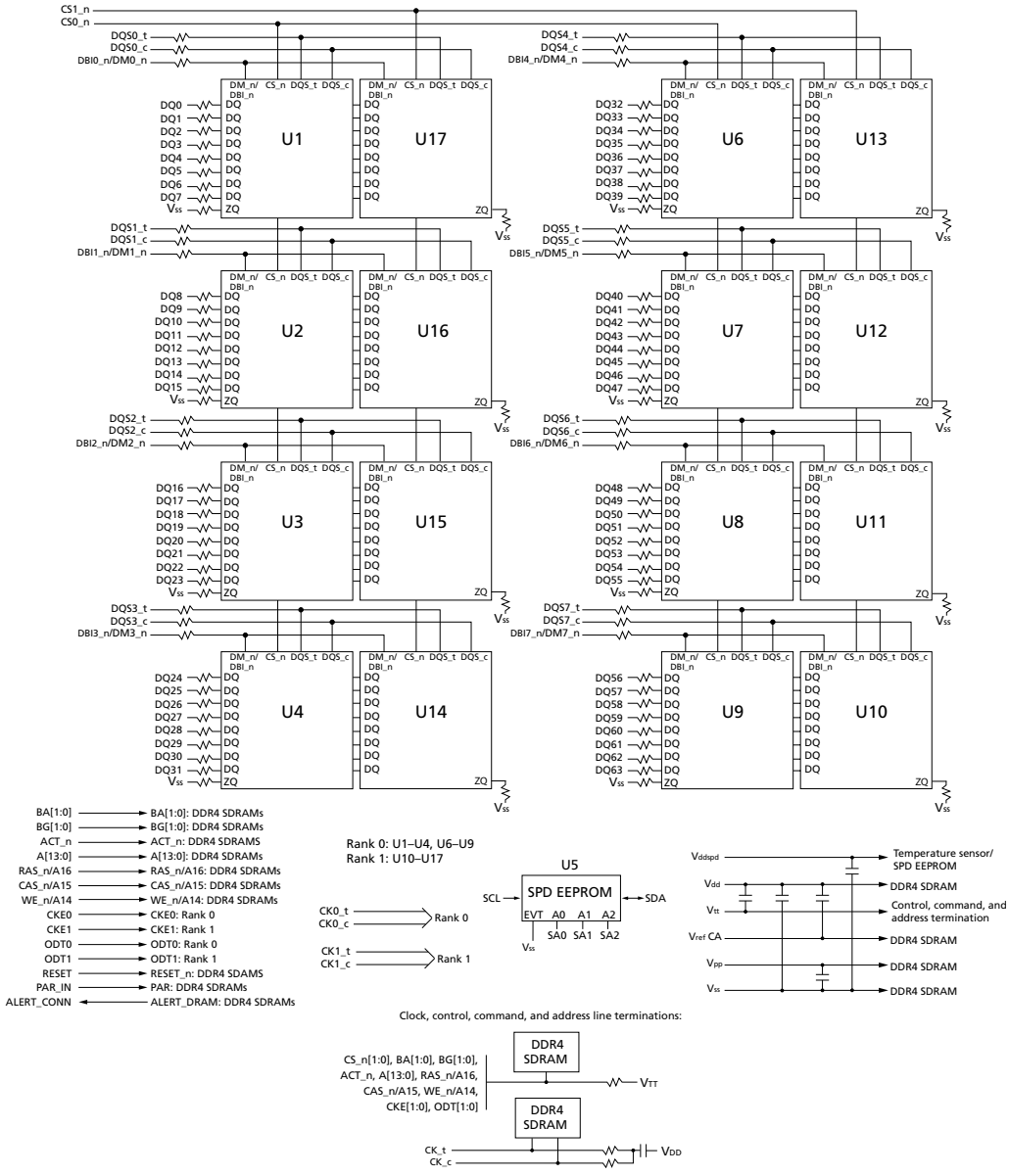
Parameter	Symbol	3200	2666	Units
One bank ACTIVATE-PRECHARGE current	I_{DD0}[1]	784	768	mA
One bank ACTIVATE-PRECHARGE, wordline boost, I_{PP} current	I_{PP0}[1]	40	40	mA
One bank ACTIVATE-READ-PRECHARGE current	I_{DD1}[1]	872	856	mA
Precharge standby current	I_{DD2N}[2]	720	688	mA
Precharge standby ODT current	I_{DD2NT}[1]	712	696	mA
Precharge power-down current	I_{DD2P}[2]	608	608	mA
Precharge quite standby current	I_{DD2Q}[2]	672	672	mA
Active standby current	I_{DD3N}[2]	976	944	mA
Active standby I_{PP} current	I_{PP3N}[2]	32	32	mA
Active power-down current	I_{DD3P}[2]	800	768	mA
Burst read current	I_{DD4R}[1]	1424	1304	mA
Burst write current	I_{DD4W}[1]	1200	1120	mA
Different logic rank burst refresh current (1x REF)	I_{DD5R}[1]	848	848	mA
Different logic rank burst refresh I_{PP} current (1x REF)	I_{PP5R}[1]	48	48	mA
Self refresh current: Normal temperature range (0°C to 85°C)	$I_{DD6N\ (0–85°C)}$[2]	848	848	mA
Self refresh current: Extended temperature range (0°C to 95°C)	$I_{DD6E\ (0–95°C)}$[2]	1440	1440	mA
Self refresh current: Reduced temperature range (0°C to 45°C)	$I_{DD6R\ (0–45°C)}$[2]	320	320	mA
Auto self refresh current (25°C)	$I_{DD6A\ (25°C)}$[2]	176	176	mA
Auto self refresh current (45°C)	$I_{DD6A\ (45°C)}$[2]	320	320	mA
Auto self refresh current (75°C)	$I_{DD6A\ (75°C)}$[2]	816	816	mA
Auto self refresh current (95°C)	$I_{DD6A\ (95°C)}$[2]	1440	1440	mA
Auto self refresh I_{PP} current (0°C to 95°C)	I_{PP6X}[2]	96	96	mA
Bank interleave read current	I_{DD7}[1]	1640	1608	mA
Bank interleave read I_{PP} current	I_{PP7}[1]	128	128	mA
Maximum power-down current	I_{DD8}[2]	576	576	mA

Notes: 1. One module rank in the active $I_{DD/PP}$, the other rank in $I_{DD2P/PP3N}$.
2. All ranks in this $I_{DD/PP}$ condition.
3. When T_C > 85°C, the I_{DD} and I_{PP} values must be derated. Refer to the base device data sheet I_{DD} and I_{PP} specification tables for derating values for the applicable die-revision.

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.

Functional Block Diagram

Figure 2: Functional Block Diagram



Note: 1. The ZQ ball on each DDR4 component is connected to an external 240Ω ±1% resistor that is tied to ground. It is used for the calibration of the component's ODT and output driver.

8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006
208-368-4000, micron.com/support
Micron and the Micron logo are trademarks of Micron Technology, Inc.
All other trademarks are the property of their respective owners.
This data sheet contains minimum and maximum limits specified over the power supply and temperature range set forth herein. Although considered final, these specifications are subject to change, as further product development and data characterization sometimes occur.

Micron Technology, Inc. reserves the right to change products or specifications without notice.
© 2019 Micron Technology, Inc. All rights reserved.