

DDR4 SDRAM LRDIMM Addendum

MTA72ASS16G72LZ – 128GB

Introduction

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

Features

- DDR4 functionality and operations supported as defined in the component data sheet
- Features and specifications supported in the Micron DDR4 LRDIMM Core data sheet
- 288-pin, command/address/control-registered, data-buffered, load-reduced dual in-line memory module (LRDIMM)
- Fast data transfer rates: PC4-3200, PC4-2933
- 128GB (16 Gig x 72)
- Quad-rank, using 32Gb TwinDie DDR4
- Each die with 16 internal banks; 4 groups of 4 banks each

Options

- Operating temperature
 - Commercial ($0^{\circ}\text{C} \leq T_{\text{OPER}} \leq 95^{\circ}\text{C}$)
- Package
 - 288-pin DIMM (Green)
- Frequency/CAS latency
 - 0.625ns @ CL = 22 (DDR4-3200)
 - 0.682ns @ CL = 21 (DDR4-2933)

Marking

None
Z
-3G2
-2G9

Figure 1: 288-Pin LRDIMM (R/C-E2)

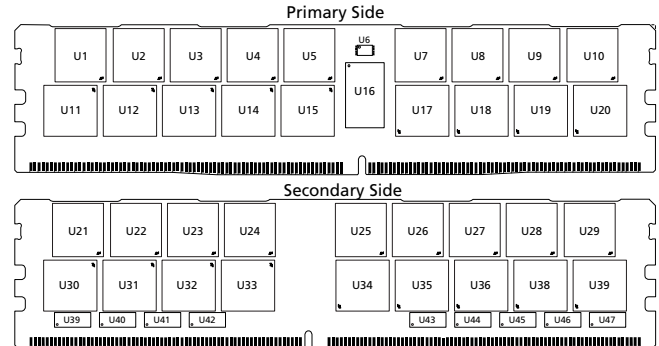


Figure 2: 288-Pin LRDIMM (R/C-D3)

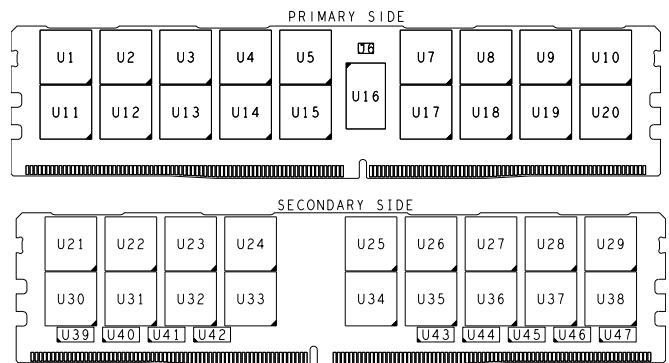




Table 1: Addressing

| Parameter | 128GB |
|-------------------------------|------------------------------------|
| Row address | 256K A[17:0] |
| 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 | 32Gb TwinDie (8 Gig x 4), 16 Banks |
| Package rank address | 4 CS_n[3:0] |

Table 2: Part Numbers and Timing Parameters – 128GB Modules

Base device: MT40A8G4,¹ 32Gb TwinDie DDR4 SDRAM

| Part Number ² | Module Density | Configuration | Module Bandwidth | Memory Clock/ Data Rate | Clock Cycles (CL-nRCD-nRP) |
|--------------------------|----------------|---------------|------------------|----------------------------|-------------------------------|
| MTA72ASS16G72LZ-3G2__ | 128GB | 16 Gig x 72 | 25.6 GB/s | 0.625ns/3200 MT/s | 22-22-22 |
| MTA72ASS16G72LZ-2G9__ | | | 23.47 GB/s | 0.682ns/2933 MT/s | 21-21-21 |

- 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 (ex. MTA72ASS16G72LZ-3G2B1).

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DQ Map

Table 3: Component-to-Module DQ Map, Front (R/C - E2, PCB 2872)

| Component Reference Number | Component DQ | Module DQ | Module Pin Number | Component Reference Number | Component DQ | Module DQ | Module Pin Number |
|----------------------------|--------------|-----------|-------------------|----------------------------|--------------|-----------|-------------------|
| U1 | 0 | 7 | 155 | U2 | 0 | 15 | 166 |
| | 1 | 5 | 148 | | 1 | 13 | 159 |
| | 2 | 6 | 10 | | 2 | 14 | 21 |
| | 3 | 4 | 3 | | 3 | 12 | 14 |
| U3 | 0 | 23 | 177 | U4 | 0 | 31 | 188 |
| | 1 | 21 | 170 | | 1 | 29 | 181 |
| | 2 | 22 | 32 | | 2 | 30 | 43 |
| | 3 | 20 | 25 | | 3 | 28 | 36 |
| U5 | 0 | CB7 | 199 | U7 | 0 | 39 | 247 |
| | 1 | CB5 | 192 | | 1 | 37 | 240 |
| | 2 | CB6 | 54 | | 2 | 38 | 102 |
| | 3 | CB4 | 47 | | 3 | 36 | 95 |
| U8 | 0 | 47 | 258 | U9 | 0 | 55 | 269 |
| | 1 | 45 | 251 | | 1 | 53 | 262 |
| | 2 | 46 | 113 | | 2 | 54 | 124 |
| | 3 | 44 | 106 | | 3 | 52 | 117 |
| U10 | 0 | 63 | 280 | U12 | 0 | 2 | 12 |
| | 1 | 61 | 273 | | 1 | 1 | 150 |
| | 2 | 62 | 135 | | 2 | 3 | 157 |
| | 3 | 60 | 128 | | 3 | 0 | 5 |
| U13 | 0 | 8 | 16 | U14 | 0 | 16 | 27 |
| | 1 | 10 | 23 | | 1 | 18 | 34 |
| | 2 | 9 | 161 | | 2 | 17 | 172 |
| | 3 | 11 | 168 | | 3 | 19 | 179 |
| U15 | 0 | 26 | 45 | U16 | 0 | CB2 | 56 |
| | 1 | 25 | 183 | | 1 | CB1 | 194 |
| | 2 | 27 | 190 | | 2 | CB3 | 201 |
| | 3 | 24 | 38 | | 3 | CB0 | 49 |
| U17 | 0 | 34 | 104 | U18 | 0 | 42 | 115 |
| | 1 | 32 | 97 | | 1 | 40 | 108 |
| | 2 | 35 | 249 | | 2 | 43 | 260 |
| | 3 | 33 | 242 | | 3 | 41 | 253 |
| U19 | 0 | 50 | 126 | U20 | 0 | 56 | 130 |
| | 1 | 48 | 119 | | 1 | 58 | 137 |
| | 2 | 51 | 271 | | 2 | 57 | 275 |
| | 3 | 49 | 264 | | 3 | 59 | 282 |



Table 4: Component-to-Module DQ Map, Back (R/C - E2, PCB 2872)

| Component Reference Number | Component DQ | Module DQ | Module Pin Number | Component Reference Number | Component DQ | Module DQ | Module Pin Number |
|----------------------------|--------------|-----------|-------------------|----------------------------|--------------|-----------|-------------------|
| U21 | 0 | 61 | 273 | U22 | 0 | 53 | 262 |
| | 1 | 63 | 280 | | 1 | 55 | 269 |
| | 2 | 60 | 128 | | 2 | 52 | 117 |
| | 3 | 62 | 135 | | 3 | 54 | 124 |
| U23 | 0 | 45 | 251 | U24 | 0 | 37 | 240 |
| | 1 | 47 | 258 | | 1 | 39 | 247 |
| | 2 | 44 | 106 | | 2 | 36 | 95 |
| | 3 | 46 | 113 | | 3 | 38 | 102 |
| U25 | 0 | CB5 | 192 | U26 | 0 | 29 | 181 |
| | 1 | CB7 | 199 | | 1 | 31 | 188 |
| | 2 | CB4 | 47 | | 2 | 28 | 36 |
| | 3 | CB6 | 54 | | 3 | 30 | 43 |
| U27 | 0 | 21 | 170 | U28 | 0 | 13 | 159 |
| | 1 | 23 | 177 | | 1 | 15 | 166 |
| | 2 | 20 | 25 | | 2 | 12 | 14 |
| | 3 | 22 | 32 | | 3 | 14 | 21 |
| U29 | 0 | 5 | 148 | U30 | 0 | 58 | 137 |
| | 1 | 7 | 155 | | 1 | 56 | 130 |
| | 2 | 4 | 3 | | 2 | 59 | 282 |
| | 3 | 6 | 10 | | 3 | 57 | 275 |
| U31 | 0 | 48 | 119 | U32 | 0 | 40 | 108 |
| | 1 | 50 | 126 | | 1 | 42 | 115 |
| | 2 | 49 | 264 | | 2 | 41 | 253 |
| | 3 | 51 | 271 | | 3 | 43 | 260 |
| U33 | 0 | 32 | 97 | U34 | 0 | CB1 | 194 |
| | 1 | 34 | 104 | | 1 | CB2 | 56 |
| | 2 | 33 | 242 | | 2 | CB0 | 49 |
| | 3 | 35 | 249 | | 3 | CB3 | 201 |
| U35 | 0 | 25 | 183 | U36 | 0 | 18 | 34 |
| | 1 | 26 | 45 | | 1 | 16 | 27 |
| | 2 | 24 | 38 | | 2 | 19 | 179 |
| | 3 | 27 | 190 | | 3 | 17 | 172 |
| U37 | 0 | 10 | 23 | U38 | 0 | 1 | 150 |
| | 1 | 8 | 16 | | 1 | 2 | 12 |
| | 2 | 11 | 168 | | 2 | 0 | 5 |
| | 3 | 9 | 161 | | 3 | 3 | 157 |



Table 5: Component-to-Module DQ Map, Front (R/C - D3, PCB 3055)

| Component Reference Number | Component DQ | Module DQ | Module Pin Number | Component Reference Number | Component DQ | Module DQ | Module Pin Number |
|----------------------------|--------------|-----------|-------------------|----------------------------|--------------|-----------|-------------------|
| U1 | 0 | 6 | 10 | U2 | 0 | 14 | 21 |
| | 1 | 4 | 3 | | 1 | 12 | 14 |
| | 2 | 7 | 155 | | 2 | 15 | 166 |
| | 3 | 5 | 148 | | 3 | 13 | 159 |
| U3 | 0 | 22 | 32 | U4 | 0 | 30 | 43 |
| | 1 | 20 | 25 | | 1 | 28 | 36 |
| | 2 | 23 | 177 | | 2 | 31 | 188 |
| | 3 | 21 | 170 | | 3 | 29 | 181 |
| U5 | 0 | CB6 | 54 | U7 | 0 | 38 | 102 |
| | 1 | CB4 | 47 | | 1 | 36 | 95 |
| | 2 | CB7 | 199 | | 2 | 39 | 247 |
| | 3 | CB5 | 192 | | 3 | 37 | 240 |
| U8 | 0 | 46 | 113 | U9 | 0 | 54 | 124 |
| | 1 | 44 | 106 | | 1 | 52 | 117 |
| | 2 | 47 | 258 | | 2 | 55 | 269 |
| | 3 | 45 | 251 | | 3 | 53 | 262 |
| U10 | 0 | 62 | 135 | U12 | 0 | 2 | 12 |
| | 1 | 60 | 128 | | 1 | 0 | 5 |
| | 2 | 63 | 280 | | 2 | 3 | 157 |
| | 3 | 61 | 273 | | 3 | 1 | 150 |
| U13 | 0 | 10 | 23 | U14 | 0 | 18 | 34 |
| | 1 | 8 | 16 | | 1 | 16 | 27 |
| | 2 | 11 | 168 | | 2 | 19 | 179 |
| | 3 | 9 | 161 | | 3 | 17 | 172 |
| U15 | 0 | 26 | 45 | U16 | 0 | CB2 | 56 |
| | 1 | 24 | 38 | | 1 | CB0 | 49 |
| | 2 | 27 | 190 | | 2 | CB3 | 201 |
| | 3 | 25 | 183 | | 3 | CB1 | 194 |
| U17 | 0 | 34 | 104 | U18 | 0 | 42 | 115 |
| | 1 | 32 | 97 | | 1 | 40 | 108 |
| | 2 | 35 | 249 | | 2 | 43 | 260 |
| | 3 | 33 | 242 | | 3 | 41 | 253 |
| U19 | 0 | 50 | 126 | U20 | 0 | 58 | 137 |
| | 1 | 48 | 119 | | 1 | 56 | 130 |
| | 2 | 51 | 271 | | 2 | 59 | 282 |
| | 3 | 49 | 264 | | 3 | 57 | 275 |



Table 6: Component-to-Module DQ Map, Back (R/C - D3, PCB 3055,3264)

| Component Reference Number | Component DQ | Module DQ | Module Pin Number | Component Reference Number | Component DQ | Module DQ | Module Pin Number |
|----------------------------|--------------|-----------|-------------------|----------------------------|--------------|-----------|-------------------|
| U21 | 0 | 60 | 128 | U22 | 0 | 52 | 117 |
| | 1 | 62 | 135 | | 1 | 54 | 124 |
| | 2 | 61 | 273 | | 2 | 53 | 262 |
| | 3 | 63 | 280 | | 3 | 55 | 269 |
| U23 | 0 | 44 | 106 | U24 | 0 | 36 | 95 |
| | 1 | 46 | 113 | | 1 | 38 | 102 |
| | 2 | 45 | 251 | | 2 | 37 | 240 |
| | 3 | 47 | 258 | | 3 | 39 | 247 |
| U25 | 0 | CB4 | 47 | U26 | 0 | 28 | 36 |
| | 1 | CB6 | 54 | | 1 | 30 | 43 |
| | 2 | CB5 | 192 | | 2 | 29 | 181 |
| | 3 | CB7 | 199 | | 3 | 31 | 188 |
| U27 | 0 | 20 | 25 | U28 | 0 | 12 | 14 |
| | 1 | 22 | 32 | | 1 | 14 | 21 |
| | 2 | 21 | 170 | | 2 | 13 | 159 |
| | 3 | 23 | 177 | | 3 | 15 | 166 |
| U29 | 0 | 4 | 3 | U30 | 0 | 56 | 130 |
| | 1 | 6 | 10 | | 1 | 58 | 137 |
| | 2 | 5 | 148 | | 2 | 57 | 275 |
| | 3 | 7 | 155 | | 3 | 59 | 282 |
| U31 | 0 | 48 | 119 | U32 | 0 | 40 | 108 |
| | 1 | 50 | 126 | | 1 | 42 | 115 |
| | 2 | 49 | 264 | | 2 | 41 | 253 |
| | 3 | 51 | 271 | | 3 | 43 | 260 |
| U33 | 0 | 32 | 97 | U34 | 0 | CB0 | 49 |
| | 1 | 34 | 104 | | 1 | CB2 | 56 |
| | 2 | 33 | 242 | | 2 | CB1 | 194 |
| | 3 | 35 | 249 | | 3 | CB3 | 201 |
| U35 | 0 | 24 | 38 | U36 | 0 | 16 | 27 |
| | 1 | 26 | 45 | | 1 | 18 | 34 |
| | 2 | 25 | 183 | | 2 | 17 | 172 |
| | 3 | 27 | 190 | | 3 | 19 | 179 |
| U37 | 0 | 8 | 16 | U38 | 0 | 0 | 5 |
| | 1 | 10 | 23 | | 1 | 2 | 12 |
| | 2 | 9 | 161 | | 2 | 1 | 150 |
| | 3 | 11 | 168 | | 3 | 3 | 157 |



I_{DD} Specifications

Table 7: DDR4 I_{DD} Specifications and Conditions (0°C ≤ T_C ≤ 85°C) – 128GB (Die Revision B)

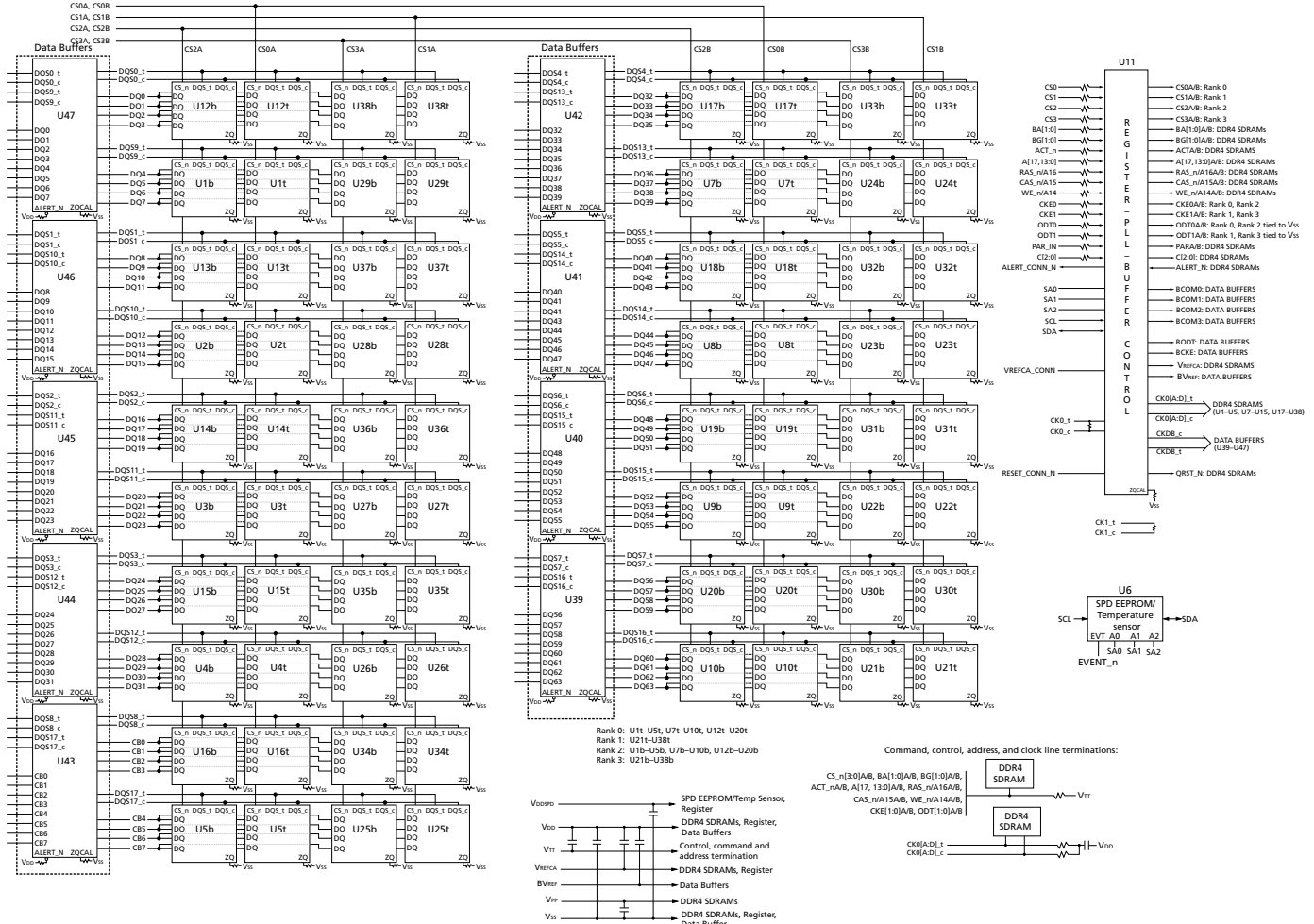
Values are for the MT40A8G4 DDR4 TwinDie SDRAM only and are computed from values specified in the 32Gb (8 Gig x 4) component data sheet

| Parameter | Symbol | 3200 | 2933 | Units |
|--|---------------------------|------|------|-------|
| One bank ACTIVATE-PRECHARGE current | I _{CDD0} | 3402 | 3384 | mA |
| One bank ACTIVATE-PRECHARGE, wordline boost, I _{pp} current | I _{CPP0} | 234 | 234 | mA |
| One bank ACTIVATE-READ-PRECHARGE current | I _{CDD1} | 3582 | 3564 | mA |
| Precharge standby current | I _{CDD2N} | 3258 | 3240 | mA |
| Precharge standby ODT current | I _{CDD2NT} | 3330 | 3312 | mA |
| Precharge power-down current | I _{CDD2P} | 3096 | 3096 | mA |
| Precharge quiet standby current | I _{CDD2Q} | 3168 | 3168 | mA |
| Active standby current | I _{CDD3N} | 3726 | 3708 | mA |
| Active standby I _{pp} current | I _{CPP3N} | 216 | 216 | mA |
| Active power-down current | I _{CDD3P} | 3564 | 3546 | mA |
| Burst read current | I _{CDD4R} | 5418 | 5274 | mA |
| Burst write current | I _{CDD4W} | 5274 | 5148 | mA |
| Distributed refresh current (1x REF) | I _{CDD5R} | 3744 | 3726 | mA |
| Distributed refresh I _{pp} current (1x REF) | I _{CPP5R} | 252 | 252 | mA |
| Self refresh current: Normal temperature range (0°C to 85°C) | I _{CDD6N} | 3528 | 3528 | mA |
| Self refresh current: Extended temperature range (0°C to 95°C) | I _{CDD6E} | 4500 | 4500 | mA |
| Self refresh current: Reduced temperature range (0°C to 45°C) | I _{CDD6R} | 2844 | 2844 | mA |
| Auto self refresh current (25°C) | I _{CDD6A (25°C)} | 2502 | 2502 | mA |
| Auto self refresh current (45°C) | I _{CDD6A (45°C)} | 2844 | 2844 | mA |
| Auto self refresh current (75°C) | I _{CDD6A (75°C)} | 3420 | 3420 | mA |
| Auto self refresh current (95°C) | I _{CDD6A (95°C)} | 4500 | 4500 | mA |
| Auto self refresh I _{pp} current | I _{CPP6X} | 504 | 504 | mA |
| Bank interleave read current | I _{CDD7} | 6606 | 6480 | mA |
| Bank interleave read I _{pp} current | I _{CPP7} | 360 | 360 | mA |
| Maximum power-down current | I _{CDD8} | 2880 | 2880 | mA |

Note: 1. 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.

Functional Block Diagram

Figure 3: Functional Block Diagram



Note: 1. The ZQ ball on each DDR4 component is connected to an external $240\Omega \pm 1\%$ 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, Tel: 208-368-4000

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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.