

# DDR3L SDRAM Data Sheet Addendum

**MT41K1G4 – 128 Meg x 4 x 8 banks**

**MT41K512M8 – 64 Meg x 8 x 8 banks**

**MT41K256M16 – 32 Meg x 16 x 8 banks**

## Description

DDR3L SDRAM (1.35V) is a low voltage version of the DDR3 (1.5V) SDRAM. Refer to DDR3 (1.5V) SDRAM (Die Rev.: E) data sheet specifications when running in 1.5V compatible mode.

## Features

- $V_{DD} = V_{DDQ} = 1.35V$  (1.283–1.45V)
- Backward compatible to  $V_{DD} = V_{DDQ} = 1.5V \pm 0.075V$ 
  - Supports DDR3L devices to be backward compatible in 1.5V applications
- Differential bidirectional data strobe
- 8n-bit prefetch architecture
- Differential clock inputs (CK, CK#)
- 8 internal banks
- Nominal and dynamic on-die termination (ODT) for data, strobe, and mask signals
- Programmable CAS (READ) latency (CL)
- Programmable posted CAS additive latency (AL)
- Programmable CAS (WRITE) latency (CWL)
- Fixed burst length (BL) of 8 and burst chop (BC) of 4 (via the mode register set [MRS])
- Selectable BC4 or BL8 on-the-fly (OTF)
- Self refresh mode
- $T_C$  of 0°C to +95°C
  - 64ms, 8192-cycle refresh at 0°C to +85°C
  - 32ms at +85°C to +95°C

- Self refresh temperature (SRT)
- Automatic self refresh (ASR)
- Write leveling
- Multipurpose register
- Output driver calibration

## Options

- Configuration
  - 1 Gig x 4
  - 512 Meg x 8
  - 256 Meg x 16
- FBGA package (Pb-free) – x4, x8
  - 78-ball (8mm x 10.5mm) Rev. P
- FBGA package (Pb-free) – x16
  - 96-ball (8mm x 14mm) Rev. P
- Timing – cycle time
  - 938ps @ CL = 14 (DDR3-2133)
  - 1.07ns @ CL = 13 (DDR3-1866)
  - 1.25ns @ CL = 11 (DDR3-1600)
- Special Options
  - Premium Lifecycle Product (PLP)
- Operating temperature
  - Commercial (0°C ≤  $T_C$  ≤ +95°C)
  - Industrial (–40°C ≤  $T_C$  ≤ +95°C)
- Revision

## Marking

1G4  
512M8  
256M16

DA

TW

-093

-107

-125

X

None

IT

P

**Table 1: Key Timing Parameters**

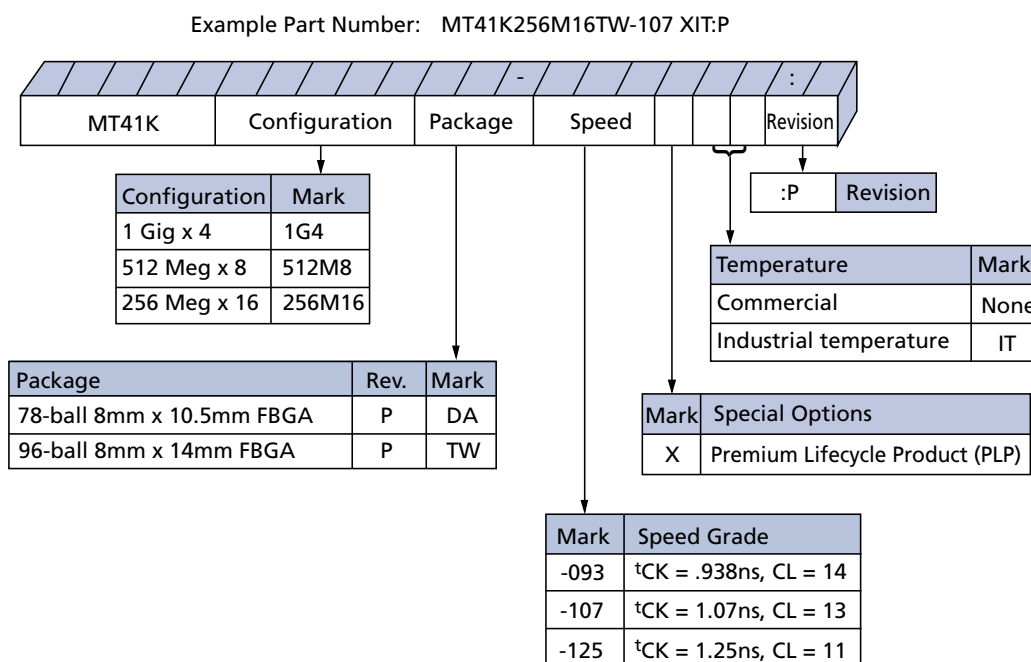
| Speed Grade          | Data Rate (MT/s) | Target $t_{RCD}$ - $t_{RP}$ -CL | $t_{RCD}$ (ns) | $t_{RP}$ (ns) | CL (ns) |
|----------------------|------------------|---------------------------------|----------------|---------------|---------|
| -093 <sup>1, 2</sup> | 2133             | 14-14-14                        | 13.09          | 13.09         | 13.09   |
| -107 <sup>1</sup>    | 1866             | 13-13-13                        | 13.91          | 13.91         | 13.91   |
| -125                 | 1600             | 11-11-11                        | 13.75          | 13.75         | 13.75   |

Notes: 1. Backward compatible to 1600, CL = 11 (-125).  
2. Backward compatible to 1866, CL = 13 (-107).

**Table 2: Addressing**

| Parameter      | 1 Gig x 4             | 512 Meg x 8          | 256 Meg x 16          |
|----------------|-----------------------|----------------------|-----------------------|
| Configuration  | 128 Meg x 4 x 8 banks | 64 Meg x 8 x 8 banks | 32 Meg x 16 x 8 banks |
| Refresh count  | 8K                    | 8K                   | 8K                    |
| Row address    | 64K (A[15:0])         | 64K (A[15:0])        | 32K (A[14:0])         |
| Bank address   | 8 (BA[2:0])           | 8 (BA[2:0])          | 8 (BA[2:0])           |
| Column address | 2K (A[11, 9:0])       | 1K (A[9:0])          | 1K (A[9:0])           |
| Page size      | 1KB                   | 1KB                  | 2KB                   |

**Figure 1: DDR3L Part Numbers**



Note: 1. Not all options listed can be combined to define an offered product. Use the part catalog search on <http://www.micron.com> for available offerings.

## FBGA Part Marking Decoder

Due to space limitations, FBGA-packaged components have an abbreviated part marking that is different from the part number. For a quick conversion of an FBGA code, see the FBGA Part Marking Decoder on Micron's Web site: <http://www.micron.com>.

## **Revision History**

### **Rev. A – 02/16**

- Initial release based on the 4Gb x4, x8, x16 DDR3L SDRAM, Rev. N 12/15 data sheet

8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006, Tel: 208-368-4000

[www.micron.com/products/support](http://www.micron.com/products/support) Sales inquiries: 800-932-4992

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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.