ICs

# Memory

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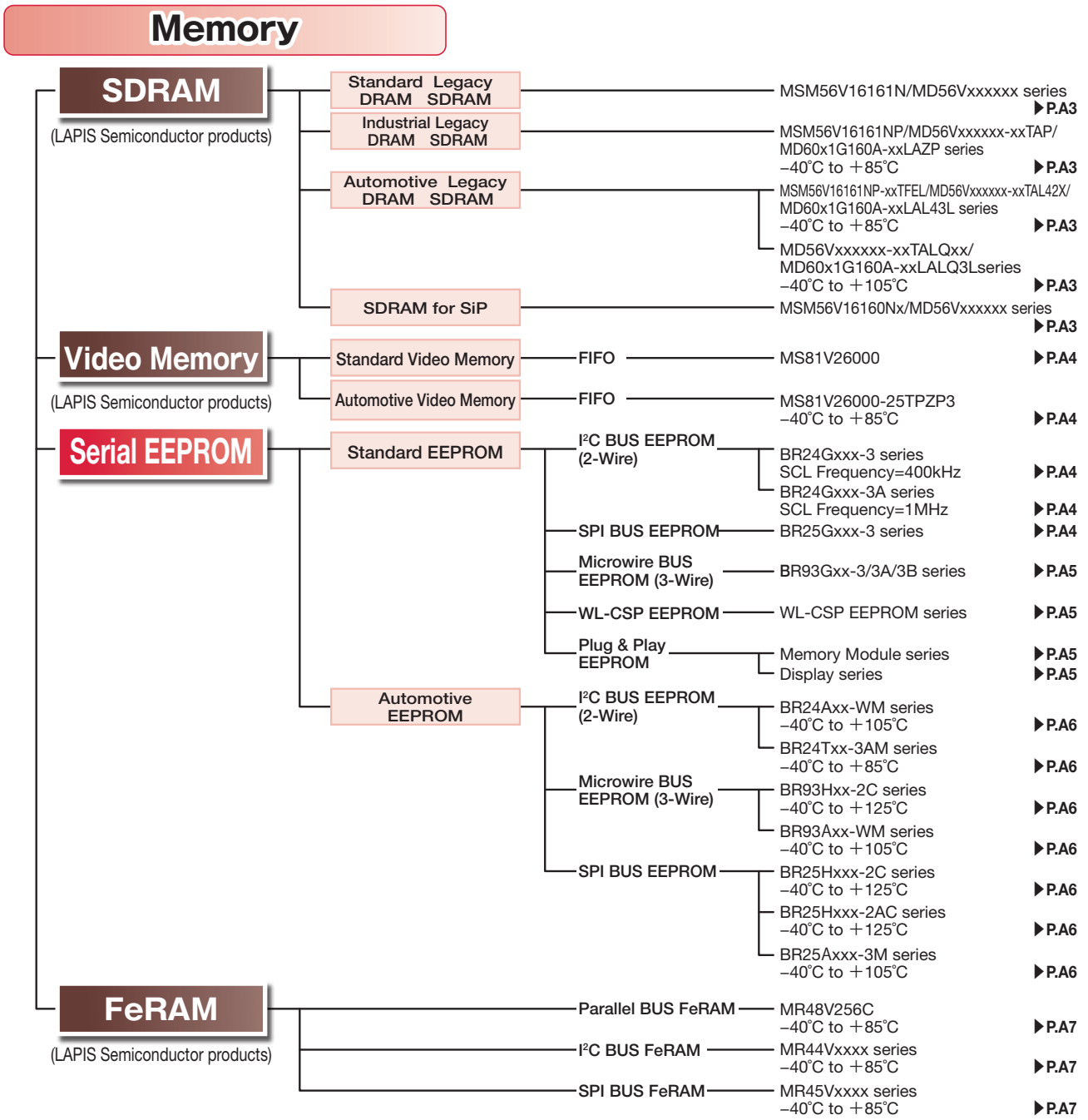
General-purpose ICs

# Memory



# SDRAM

## Standard Legacy DRAM SDRAM

(LAPIS Semiconductor products)

### Standard

| Part No. | Data Rate Type | Supply Voltage (V) | Density (bit) | Number of Data bits | Configuration (bank×word×bit) | Max. Operating Frequency (MHz) | Refresh Cycle (cycles/ms) | Cycle Time (ns) | Features | Operating Temperature Ta(°C) | Package | Halogen Free Support*1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MSM56V16161N | SDR | 3.3±0.3 | 16M | ×16 | 2×512K×16 | 143 | 4096/64 | 7/7.5/10 | Drivability Control | 0 to +70 | TSOP(Ⅱ)50 | ✓ |
| MD56V62161M | | | 64M | | 4×1M×16 | 143 | | 7/7.5/10 | | | TSOP(Ⅱ)54 | ✓ |
| MD56V72161C | | | 128M | | 4×2M×16 | 166 | | 6/7/7.5/10 | | | | ✓ |
| MD56V82161A | | | 256M | | 4×4M×16 | 166 | 8192/64 | 6/7/7.5/10 | | | | ✓ |

## Industrial Legacy DRAM SDRAM

(LAPIS Semiconductor products)

### Industrial

| Part No. | Data Rate Type | Supply Voltage (V) | Density (bit) | Number of Data bits | Configuration (bank×word×bit) | Max. Operating Frequency (MHz) | Refresh Cycle (cycles/ms) | Cycle Time (ns) | Features | Operating Temperature Ta(°C) | Package | Halogen Free Support*1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MSM56V16161NP | SDR | 3.3±0.3 | 16M | ×16 | 2×512K×16 | 143 | 4096/64 | 7/7.5/10 | Drivability Control | −40 to +85 | TSOP(Ⅱ)50 | ✓ |
| MD56V62161M-xxTAP | | | 64M | | 4×1M×16 | 143 | | 7/7.5/10 | | | TSOP(Ⅱ)54 | ✓ |
| MD56V72161C-xxTAP | | | 128M | | 4×2M×16 | 166 | | 6/7/7.5/10 | | | | ✓ |
| MD56V82161A-xxTAP | | | 256M | | 4×4M×16 | 166 | 8192/64 | 6/7/7.5/10 | | | | ✓ |
| ☆MD60Y1G160A-xxLAZP | DDR3 | 1.5±0.075 | 1G | ×16 | 8×8M×16 | 800 (1600Mbps) | Average refresh period : 7.8μs at Tc≦85°C, 3.9μs at Tc>85°C | 1.25/1.5 | — | −40 to +95 | 96-ball FBGA | ✓ |
| ☆MD60S1G160A-xxLAZP | DDR3L | 1.35 +0.1,-0.067 | 1G | ×16 | 8×8M×16 | 800 (1600Mbps) | Average refresh period : 7.8μs at Tc≦85°C, 3.9μs at Tc>85°C | 1.25/1.5 | — | −40 to +95 | 96-ball FBGA | ✓ |

## Automotive Legacy DRAM SDRAM

(LAPIS Semiconductor products)

### Automotive(85°C)

| Part No. | Data Rate Type | Supply Voltage (V) | Density (bit) | Number of Data bits | Configuration (bank×word×bit) | Max. Operating Frequency (MHz) | Refresh Cycle (cycles/ms) | Cycle Time (ns) | Features | Operating Temperature Ta(°C) | Package | Halogen Free Support*1 | Automotive Grade AEC-Q100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MSM56V16161NP-xxTFEL | SDR | 3.3±0.3 | 16M | ×16 | 2×512K×16 | 143 | 4096/64 | 7/7.5/10 | Drivability Control | −40 to +85 | TSOP(Ⅱ)50 | ✓ | YES |
| MD56V62161M-xxTAL42X | | | 64M | | 4×1M×16 | 143 | | 7/7.5/10 | | | TSOP(Ⅱ)54 | ✓ | YES |
| MD56V72161C-xxTAL42X | | | 128M | | 4×2M×16 | 166 | | 6/7/7.5/10 | | | | | |
| MD56V82161A-xxTAL42X | | | 256M | | 4×4M×16 | 166 | 8192/64 | 6/7/7.5/10 | | | | | |
| ☆MD60Y1G160A-xxLAL43L | DDR3 | 1.5±0.075 | 1G | ×16 | 8×8M×16 | 800 (1600Mbps) | Average refresh period : 7.8μs at Tc≦85°C, 3.9μs at Tc>85°C | 1.25/1.5 | — | −40 to +95 | 96-ball FBGA | ✓ | YES |
| ☆MD60S1G160A-xxLAL43L | DDR3L | 1.35 +0.1,-0.067 | 1G | ×16 | 8×8M×16 | 800 (1600Mbps) | Average refresh period : 7.8μs at Tc≦85°C, 3.9μs at Tc>85°C | 1.25/1.5 | — | −40 to +95 | 96-ball FBGA | ✓ | YES |

### Automotive(105°C)

| Part No. | Data Rate Type | Supply Voltage (V) | Density (bit) | Number of Data bits | Configuration (bank×word×bit) | Max. Operating Frequency (MHz) | Refresh Cycle (cycles/ms) | Cycle Time (ns) | Features | Operating Temperature Ta(°C) | Package | Halogen Free Support*1 | Automotive Grade AEC-Q100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MD56V62161M-xxTALQ2X | SDR | 3.3±0.3 | 64M | ×16 | 4×1M×16 | 143 | 4096/16 | 7/7.5/10 | Drivability Control | −40 to +105 | TSOP(Ⅱ)54 | ✓ | YES |
| MD56V72161C-xxTALQ2X | | | 128M | | 4×2M×16 | 166 | | 6/7/7.5/10 | | | | | |
| MD56V82161A-xxTALQ2X | | | 256M | | 4×4M×16 | 166 | 8192/16 | 6/7/7.5/10 | | | | | |
| ☆MD60Y1G160A-xxLALQ3L | DDR3 | 1.5±0.075 | 1G | ×16 | 8×8M×16 | 800 (1600Mbps) | Average refresh period : 7.8μs at Tc≦85°C, 3.9μs at Tc>85°C | 1.25/1.5 | — | −40 to +105 | 96-ball FBGA | ✓ | YES |
| ☆MD60S1G160A-xxLALQ3L | DDR3L | 1.35 +0.1,-0.067 | 1G | ×16 | 8×8M×16 | 800 (1600Mbps) | Average refresh period : 7.8μs at Tc≦85°C, 3.9μs at Tc>85°C | 1.25/1.5 | — | −40 to +105 | 96-ball FBGA | ✓ | YES |

DDR3 : Double Data Rate3 Synchronous DRAM, SDR : Single Data Rate Synchronous DRAM

☆ : Under Development

*1:A check mark of halogen free support means that we will be able to ship out the halogen free products.
For details, please inquire to the sales.

## SDRAM for SiP

(LAPIS Semiconductor products)

### Standard

| Part No. | Supply Voltage (V) | Density (bit) | Number of Data bits | Configuration (bank×word×bit) | Max. Operating Frequency (MHz) | Refresh Cycle (cycles/ms) | Cycle Time (ns) | Operating Temperature Tj(°C) | Features |
|---|---|---|---|---|---|---|---|---|---|
| MSM56V16160N | 3.3±0.3 | 16M | ×16 | 2×512K×16 | 166 | 4096/32 | 6/7/7.5/8/10 | −40 to +125 | KGD |
| MD56V62160M | | 64M | | 4×1M×16 | 143 | | 7/7.5/8/10 | | |
| MD56V72160C | | 128M | | 4×2M×16 | 166 | | 6/7/7.5/10 | | |

### Automotive

| Part No. | Supply Voltage (V) | Density (bit) | Number of Data bits | Configuration (bank×word×bit) | Max. Operating Frequency (MHz) | Refresh Cycle (cycles/ms) | Cycle Time (ns) | Operating Temperature Tj(°C) | Features | Automotive Grade*2 |
|---|---|---|---|---|---|---|---|---|---|---|
| MSM56V16160NP | 3.3±0.3 | 16M | ×16 | 2×512K×16 | 166 | 4096/16 | 6/7/7.5/8/10 | −40 to +125 | KGD | YES |
| MD56V62160M | | 64M | | 4×1M×16 | 143 | | 7/7.5/8/10 | | | |
| MD56V72160C | | 128M | | 4×2M×16 | 166 | | 6/7/7.5/10 | | | |

*2:Please inquire to the sales for AEC-Q100.

# Video Memory

## Video Memory for Standard

(LAPIS Semiconductor products)

**Standard**

| Part No. | Supply Voltage (V) | Density (bit) | Configuration (word×bit)×port | Number of Data bits | Max. Operating Frequency (MHz) | Access Time (ns) | Cycle Time (ns) | Power Consumption(mW) | | Operating Temperature Ta(°C) | Package | Notes | Halogen Free Support*1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Operating | Standby | | | | |
| MS81V26000 | 3.3±0.3 | 26M | 1,114,112×24 | ×24 | 100 | 8/9 | 10/12 | 648/576 | 18 | 0 to +70 | TQFP100 | Asynchronous serial read/write, Write mask function, Output data control, Cascade, The top address can be specified | ✓ |

## Video Memory for Automotive

(LAPIS Semiconductor products)

**Automotive**

| Part No. | Supply Voltage (V) | Density (bit) | Configuration (word×bit)×port | Number of Data bits | Max. Operating Frequency (MHz) | Access Time (ns) | Cycle Time (ns) | Power Consumption(mW) | | Operating Temperature Ta(°C) | Package | Notes | Halogen Free Support*1 | Automotive Grade*2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Operating | Standby | | | | | |
| MS81V26000-25TPZP3 | 3.3±0.3 | 26M | 1,114,112×24 | ×24 | 40 | 12 | 25 | 576 | 18 | −40 to +85 | TQFP100 | Asynchronous serial read/write, Write mask function, Output data control, Cascade, The top address can be specified | ✓ | YES |

*1:A check mark of halogen free support means that we will be able to ship out the halogen free products.
For details, please inquire to the sales.
*2:Please inquire to the sales for AEC-Q100.

# Serial EEPROM

## Standard EEPROM

**I²C BUS EEPROM (2-Wire) BR24Gxxx-3 series (SCL Frequency = 400kHz)**

| Part No. | Package and Suffix | | | | | | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | SCL Frequency (Hz) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | SSOP-B8 | TSSOP-B8 | MSOP8 | TSSOP-B8J | VSON008X2030 | VMMP008Z1830 | | | | Operating (mA) | Standby (μA) | | | | | |
| BR24G01 | F-3 | FJ-3 | FV-3 | FVT-3 | FVM-3 | FVJ-3 | NUX-3 | — | 1K | 128×8 | 1.6 to 5.5 | 2 | 2 | 5 | 400K | −40 to +85 | $10^6$ | 40 |
| BR24G02 | F-3 | FJ-3 | FV-3 | FVT-3 | FVM-3 | FVJ-3 | NUX-3 | — | 2K | 256×8 | 1.6 to 5.5 | 2 | 2 | 5 | 400K | | | |
| BR24G04 | F-3 | FJ-3 | FV-3 | FVT-3 | FVM-3 | FVJ-3 | NUX-3 | — | 4K | 512×8 | 1.6 to 5.5 | 2 | 2 | 5 | 400K | | | |
| BR24G08 | F-3 | FJ-3 | FV-3 | FVT-3 | FVM-3 | FVJ-3 | NUX-3 | — | 8K | 1K×8 | 1.6 to 5.5 | 2 | 2 | 5 | 400K | | | |
| BR24G16 | F-3 | FJ-3 | FV-3 | FVT-3 | FVM-3 | FVJ-3 | NUX-3 | QUZ-3 | 16K | 2K×8 | 1.6 to 5.5 | 2 | 2 | 5 | 400K | | | |
| BR24G32 | F-3 | FJ-3 | FV-3 | FVT-3 | FVM-3 | FVJ-3 | NUX-3 | — | 32K | 4K×8 | 1.6 to 5.5 | 2 | 2 | 5 | 400K | | | |
| BR24G64 | F-3 | FJ-3 | FV-3 | FVT-3 | FVM-3 | FVJ-3 | NUX-3 | — | 64K | 8K×8 | 1.6 to 5.5 | 2 | 2 | 5 | 400K | | | |
| BR24G128 | F-3 | FJ-3 | FV-3 | FVT-3 | FVM-3 | FVJ-3 | NUX-3 | — | 128K | 16K×8 | 1.6 to 5.5 | 2.5 | 2 | 5 | 400K | | | |
| BR24G256 | F-3 | FJ-3 | FV-3 | FVT-3 | — | — | — | — | 256K | 32K×8 | 1.6 to 5.5 | 2.5 | 2 | 5 | 400K | | | |

**I²C BUS EEPROM (2-Wire) BR24Gxxx-3A series (SCL Frequency = 1MHz)**

| Part No. | Package and Suffix | | | | | | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | SCL Frequency (Hz) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | SSOP-B8 | TSSOP-B8 | MSOP8 | TSSOP-B8J | VSON008X2030 | VMMP008Z1830 | | | | Operating (mA) | Standby (μA) | | | | | |
| BR24G01 | F-3A | FJ-3A | — | FVT-3A | FVM-3A | FVJ-3A | NUX-3A | — | 1K | 128×8 | 1.7 to 5.5 | 2 | 2 | 5 | 1M | −40 to +85 | $10^6$ | 40 |
| BR24G02 | F-3A | FJ-3A | — | FVT-3A | FVM-3A | FVJ-3A | NUX-3A | — | 2K | 256×8 | 1.7 to 5.5 | 2 | 2 | 5 | 1M | | | |
| BR24G04 | F-3A | FJ-3A | — | FVT-3A | FVM-3A | FVJ-3A | NUX-3A | — | 4K | 512×8 | 1.7 to 5.5 | 2 | 2 | 5 | 1M | | | |
| BR24G08 | F-3A | FJ-3A | — | FVT-3A | FVM-3A | FVJ-3A | NUX-3A | — | 8K | 1K×8 | 1.7 to 5.5 | 2 | 2 | 5 | 1M | | | |
| BR24G16 | F-3A | FJ-3A | — | FVT-3A | FVM-3A | FVJ-3A | NUX-3A | — | 16K | 2K×8 | 1.7 to 5.5 | 2 | 2 | 5 | 1M | | | |
| BR24G32 | F-3A | FJ-3A | FV-3A | FVT-3A | FVM-3A | FVJ-3A | NUX-3A | QUZ-3A | 32K | 4K×8 | 1.7 to 5.5 | 2 | 2 | 5 | 1M | | | |
| BR24G64 | F-3A | FJ-3A | FV-3A | FVT-3A | FVM-3A | FVJ-3A | NUX-3A | QUZ-3A | 64K | 8K×8 | 1.7 to 5.5 | 2 | 2 | 5 | 1M | | | |
| BR24G128 | F-3A | FJ-3A | FV-3A | FVT-3A | FVM-3A | FVJ-3A | NUX-3A | — | 128K | 16K×8 | 1.7 to 5.5 | 2.5 | 2 | 5 | 1M | | | |
| BR24G256 | F-3A | FJ-3A | FV-3A | FVT-3A | — | — | — | — | 256K | 32K×8 | 1.7 to 5.5 | 2.5 | 2 | 5 | 1M | | | |
| BR24G512 | F-3A | FJ-3A | — | FVT-3A | — | — | — | — | 512K | 64K×8 | 1.7 to 5.5 | 4.5 | 3 | 5 | 1M | | | |
| BR24G1M | F-3A | FJ-3A | — | — | — | — | — | — | 1M | 128K×8 | 1.7 to 5.5 | 4.5 | 3 | 5 | 1M | | | |

**SPI BUS EEPROM BR25Gxxx-3 series**

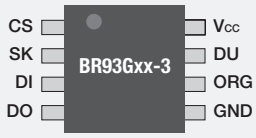
| Part No. | Package and Suffix | | | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | TSSOP-B8 | MSOP8 | VSON008X2030 | | | | Operating (mA) | Standby (μA) | | | | |
| BR25G320 | F-3 | FJ-3 | FVT-3 | FVM-3 | NUX-3 | 32K | 4K×8 | 1.6 to 5.5 | 8 | 2 | 5 | −40 to +85 | $10^6$ | 100 |
| BR25G640 | F-3 | FJ-3 | FVT-3 | FVM-3 | NUX-3 | 64K | 8K×8 | 1.6 to 5.5 | 8 | 2 | 5 | | | |
| BR25G128 | F-3 | FJ-3 | FVT-3 | FVM-3 | NUX-3 | 128K | 16K×8 | 1.6 to 5.5 | 8 | 2 | 5 | | | |
| BR25G256 | F-3 | FJ-3 | FVT-3 | — | — | 256K | 32K×8 | 1.6 to 5.5 | 8 | 2 | 5 | | | |
| BR25G512 | F-3 | FJ-3 | FVT-3 | — | — | 512K | 64K×8 | 1.8 to 5.5 | 4 | 1 | 5 | | | |
| BR25G1M | F-3 | FJ-3 | — | — | — | 1M | 128K×8 | 1.8 to 5.5 | 4 | 1 | 5 | | | |

## Microwire BUS EEPROM (3-Wire) BR93Gxx-3/3A/3B series

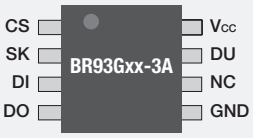
| Part No. | Package and Suffix | | | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | TSSOP-B8 | MSOP8 | VSON008X3020 | | | | Operating (mA) | Standby (μA) | | | | |
| BR93G46 | F-3*1/ F-3A*2/ F-3B*3 | FJ-3*1/ FJ-3A*2/ FJ-3B*3 | FVT-3*1/ FVT-3A*2/ FVT-3B*3 | FVM-3*1/ FVM-3A*2/ FVM-3B*3 | NUX-3*1/ NUX-3A*2/ NUX-3B*3 | 1K | 64×16 (128×8) | 1.7 to 5.5 | 3 | 2 | 5 | −40 to +85 | $10^6$ | 40 |
| BR93G56 | F-3*1/ F-3A*2/ F-3B*3 | FJ-3*1/ FJ-3A*2/ FJ-3B*3 | FVT-3*1/ FVT-3A*2/ FVT-3B*3 | FVM-3*1/ FVM-3A*2/ FVM-3B*3 | NUX-3*1/ NUX-3A*2/ NUX-3B*3 | 2K | 128×16 (256×8) | 1.7 to 5.5 | 3 | 2 | 5 | | | |
| BR93G66 | F-3*1/ F-3A*2/ F-3B*3 | FJ-3*1/ FJ-3A*2/ FJ-3B*3 | FVT-3*1/ FVT-3A*2/ FVT-3B*3 | FVM-3*1/ FVM-3A*2/ FVM-3B*3 | NUX-3*1/ NUX-3A*2/ NUX-3B*3 | 4K | 256×16 (512×8) | 1.7 to 5.5 | 3 | 2 | 5 | | | |
| BR93G76 | F-3*1/ F-3A*2/ F-3B*3 | FJ-3*1/ FJ-3A*2/ FJ-3B*3 | FVT-3*1/ FVT-3A*2/ FVT-3B*3 | FVM-3*1/ FVM-3A*2/ FVM-3B*3 | NUX-3*1/ NUX-3A*2/ NUX-3B*3 | 8K | 512×16 (1K×8) | 1.7 to 5.5 | 3 | 2 | 5 | | | |
| BR93G86 | F-3*1/ F-3A*2/ F-3B*3 | FJ-3*1/ FJ-3A*2/ FJ-3B*3 | FVT-3*1/ FVT-3A*2/ FVT-3B*3 | FVM-3*1/ FVM-3A*2/ FVM-3B*3 | NUX-3*1/ NUX-3A*2/ NUX-3B*3 | 16K | 1K×16 (2K×8) | 1.7 to 5.5 | 3 | 2 | 5 | | | |

Microwire BUS EEPROM (3-Wire) BR93Gxx-3/3A/3B series : *1 : They are dual organization (by 16bit or 8bit) and it is selected the input of ORG PIN. *2 : 1PIN : CS PIN *3 : 3PIN : CS PIN

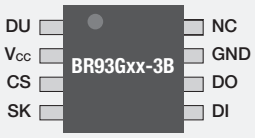
## Micro Wire BUS Pin Assignment




Selectable Bit Format (8bit or 16bit)




Interchangeable with the BR93LxxRxx-W series




Rotated Pins

## WL-CSP EEPROM

| Part No. | I/F | Density (bit) | Package | | | | Pull-up Resister | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time(ms) | Operating Temperature (°C) | Data Retention (years) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Package Name | Size (mm) | Thickness (mm)Max. | Ball Pitch (mm) | RESIN COATING | | | | | | | |
| BU9833GUL-W | I²C | 2K | VCSP50L1 | x : 1.27 y : 1.50 | 0.55 | 0.5 | ✓ | — | 256×8 | 1.7 to 5.5 | 2 | 2 | 5 | −40 to +85 | 40 |
| BU9847GUL-W | I²C | 4K | VCSP50L1 | x : 1.95 y : 1.06 | 0.55 | 0.5 | ✓ | — | 512×8 | 1.7 to 5.5 | 2 | 2 | 5 | −40 to +85 | 40 |
| BU9889GUL-W | I²C | 8K | VCSP50L2 | x : 1.60 y : 1.00 | 0.55 | 0.5 | ✓ | — | 1K×8 | 1.7 to 5.5 | 2 | 2 | 5 | −40 to +85 | 40 |
| BRCB008GWZ-3 | I²C | 8K | UCSP30L1 | x : 0.94 y : 0.94 | 0.33 | 0.4 | — | — | 1K×8 | 1.7 to 3.6 | 2 | 2 | 5 | −40 to +85 | 40 |
| BRCB016GWL-3 | I²C | 16K | UCSP50L1 | x : 1.10 y : 1.15 | 0.55 | 0.4 | ✓ | — | 2K×8 | 1.7 to 3.6 | 2 | 2 | 5 | −40 to +85 | 40 |
| BRCD016GWZ-3 | I²C | 16K | UCSP35L1 | x : 1.30 y : 0.77 | 0.40 | 0.4 | ✓ | — | 2K×8 | 1.7 to 3.6 | 2 | 2 | 5 | −40 to +85 | 40 |
| New BRCG016GWZ-3 | I²C | 16K | UCSP30L1A | x : 0.82 y : 0.82 | 0.33 | 0.4 | ✓ | — | 2K×8 | 1.7 to 5.5 | 2 | 2 | 5 | −40 to +85 | 40 |
| BRCF016GWZ-3 | I²C | 16K | UCSP30L1 | x : 0.86 y : 0.84 | 0.35 | 0.4 | — | — | 2K×8 | 1.7 to 5.5 | 2 | 2 | 5 | −40 to +85 | 40 |
| BRCA016GWZ-W | I²C | 16K | UCSP30L1 | x : 1.30 y : 0.77 | 0.35 | 0.4 | — | — | 2K×8 | 1.7 to 3.6 | 2 | 2 | 5 | −40 to +85 | 40 |
| BRCB032GWZ-3 | I²C | 32K | UCSP30L1 | x : 1.45 y : 0.77 | 0.33 | 0.4 | — | — | 4K×8 | 1.7 to 5.5 | 2 | 2 | 5 | −40 to +85 | 40 |
| BRCH064GWZ-3 | I²C | 64K | UCSP35L1A | x : 1.50 y : 1.00 | 0.33 | 0.4 | ✓ | — | 8K×8 | 1.6 to 5.5 | 2 | 2 | 5 | −40 to +85 | 40 |
| BRCB064GWZ-3 | I²C | 64K | UCSP30L1 | x : 1.50 y : 1.00 | 0.35 | 0.4 | — | WP | 8K×8 | 1.6 to 5.5 | 3.9 | 2 | 5 | −40 to +85 | 40 |
| BRCE064GWZ-3 | I²C | 64K | UCSP25L1 | x : 1.50 y : 1.00 | 0.30 | 0.4 | — | — | 8K×8 | 1.6 to 5.5 | 2 | 2 | 5 | −40 to +85 | 40 |
| BU9897GUL-W | I²C | 128K | VCSP50L2 | x : 2.44 y : 1.99 | 0.55 | 0.5 | ✓ | — | 16K×8 | 1.7 to 5.5 | 2.5 | 2 | 5 | −40 to +85 | 40 |
| BU9832GUL-W | SPI | 8K | VCSP50L2 | x : 2.09 y : 1.85 | 0.55 | 0.5 | ✓ | — | 1K×8 | 1.8 to 5.5 | 3 | 2 | 5 | −40 to +85 | 40 |
| BU9829GUL-W | SPI | 16K | VCSP50L1 | x : 1.74 y : 1.65 | 0.55 | 0.5 | ✓ | — | 2K×8 | 1.6 to 3.6 | 2 | 1 | 5 | −30 to +85 | 10 |
| BR25S128GUZ-W | SPI | 128K | VCSP35L2 | x : 2.00 y : 2.63 | 0.40 | 0.5 | ✓ | — | 16K×8 | 1.7 to 5.5 | 2* | 2 | 5 | −40 to +85 | 40 |
| BU9891GUL-W | MW | 4K | VCSP50L1 | x : 1.60 y : 1.00 | 0.55 | 0.5 | ✓ | — | 256×16 | 1.7 to 5.5 | 3 | 2 | 5 | −40 to +85 | 40 |

WL-CSP EEPROM : * VCC=2.5V

## Plug & Play EEPROM For Memory Modules

| Part No. | Package and Suffix | | Bit Format (word×bit) | Supply Voltage (V) | Clock Frequency (kHz) | Write Cycle Time (ms) | Endurance (times) | Data Retention (years) | Write Protect |
|---|---|---|---|---|---|---|---|---|---|
| | TSSOP-B8 | VSON008X2030 | | | | | | | |
| BR34L02 | FVT-W | — | 256×8 | 1.7 to 5.5 | 100*1/400*2 | 5 | $10^6$ | 40 | Onetime ROM write protect |
| BR34E02 | FVT-3 | NUX-3 | 256×8 | 1.7 to 5.5 | 400 | 5 | $10^6$ | 40 | Settable write protect Onetime ROM write protect |

Plug & Play EEPROM For Memory Modules : *1 : VCC=1.7 to 5.5V *2 : VCC=2.5 to 5.5V

## Plug & Play EEPROM For Display

| Part No. | Package and Suffix | | | | | | | Function Descriptions | Bit Format (word×bit) | Supply Voltage (V) | Clock Frequency (MHz) | Write Cycle Time (ms) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | SSOP-B8 | SOP14 | SSOP-B14 | SSOP-B16 | VSON008X2030 | | | | | |
| BR24C21 | F | FJ | FV | — | — | — | — | Supports DDC1™/ DDC2™ for displays | 128×8 | 2.5 to 5.5 | 100/400 | 10 |
| BU9882 | — | — | — | F-W | FV-W | — | — | Dual-port type compatible with DDC2™ for displays | 128×8×2ch | 2.5 to 5.5 | 100/400 | 10 |
| BU9883 | — | — | — | — | — | FV-W | — | 2kbit×3ch EEPROM for HDMI ports | 256×8×3ch | 3.0 to 5.5 | 400 | 5 |
| BU99022 | — | — | — | — | — | — | NUX-3 | 2Kbit×2ch type | 256×8×2ch | 1.7 to 5.5 | 400 | 5 |

DDC is a trademark of Video Electronics Standards Association.

A Memory

## Automotive EEPROM

### 105°C Operation I²C BUS EEPROM (2-Wire) BR24Axx-WM series

| Part No. | Package and Suffix | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) | Automotive Grade AEC-Q100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | MSOP8 | | | | Operating (mA) | Standby (μA) | | | | | |
| BR24A01A | F-WM | FJ-WM | — | 1K | 128×8 | 2.5 to 5.5 | 2 | 2 | 5 | −40 to +105 | $10^6$ | 40 | YES |
| BR24A02 | F-WM | FJ-WM | FVM-WM | 2K | 256×8 | 2.5 to 5.5 | 2 | 2 | 5 | | | | |
| BR24A04 | F-WM | FJ-WM | — | 4K | 512×8 | 2.5 to 5.5 | 2 | 2 | 5 | | | | |
| BR24A08 | F-WM | FJ-WM | — | 8K | 1K×8 | 2.5 to 5.5 | 2 | 2 | 5 | | | | |
| BR24A16 | F-WM | FJ-WM | — | 16K | 2K×8 | 2.5 to 5.5 | 2 | 2 | 5 | | | | |
| BR24A32 | F-WM | — | — | 32K | 4K×8 | 2.5 to 5.5 | 3 | 2 | 5 | | | | |
| BR24A64 | F-WM | — | — | 64K | 8K×8 | 2.5 to 5.5 | 3 | 2 | 5 | | | | |

### 85°C Operation Microwire I²C BUS EEPROM (2-Wire) BR24Txx-3AM series

| Part No. | Package and Suffix | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) | Automotive Grade AEC-Q100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | TSSOP-B8 | | | | Operating (mA) | Standby (μA) | | | | | |
| New BR24T512 | F-3AM | FJ-3AM | FVT-3AM | 512K | 64K×8 | 1.7 to 5.5 | 4.5 | 3 | 5 | −40 to +85 | $10^6$ | 40 | YES |
| New BR24T1M | F-3AM | FJ-3AM | — | 1M | 128K×8 | 1.7 to 5.5 | 4.5 | 3 | 5 | | | | |

### 125°C Operation Microwire BUS EEPROM (3-Wire) BR93Hxx-2C series

| Part No. | Package and Suffix | | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) | Automotive Grade AEC-Q100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | TSSOP-B8 | MSOP8 | | | | Operating (mA) | Standby (μA) | | | | | |
| BR93H46 | RF-2C | RFJ-2C | RFVT-2C | RFVM-2C | 1K | 64×16 | 2.5 to 5.5 | 3 | 10 | 4 | −40 to +125 | $10^6$ | 100 | YES |
| BR93H56 | RF-2C | RFJ-2C | RFVT-2C | RFVM-2C | 2K | 128×16 | 2.5 to 5.5 | 3 | 10 | 4 | | | | |
| BR93H66 | RF-2C | RFJ-2C | RFVT-2C | RFVM-2C | 4K | 256×16 | 2.5 to 5.5 | 3 | 10 | 4 | | | | |
| BR93H76 | RF-2C | RFJ-2C | RFVT-2C | RFVM-2C | 8K | 512×16 | 2.5 to 5.5 | 3 | 10 | 4 | | | | |
| BR93H86 | RF-2C | RFJ-2C | RFVT-2C | RFVM-2C | 16K | 1K×16 | 2.5 to 5.5 | 3 | 10 | 4 | | | | |

### 105°C Operation Microwire BUS EEPROM (3-Wire) BR93Axx-WM series

| Part No. | Package and Suffix | | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) | Automotive Grade AEC-Q100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | TSSOP-B8 | MSOP8 | | | | Operating (mA) | Standby (μA) | | | | | |
| BR93A46 | RF-WM | RFJ-WM | RFVT-WM | RFVM-WM | 1K | 64×16 | 2.5 to 5.5 | 3 | 2 | 5 | −40 to +105 | $10^6$ | 40 | YES |
| BR93A56 | RF-WM | RFJ-WM | RFVT-WM | RFVM-WM | 2K | 128×16 | 2.5 to 5.5 | 3 | 2 | 5 | | | | |
| BR93A66 | RF-WM | RFJ-WM | RFVT-WM | RFVM-WM | 4K | 256×16 | 2.5 to 5.5 | 3 | 2 | 5 | | | | |
| BR93A76 | RF-WM | RFJ-WM | RFVT-WM | RFVM-WM | 8K | 512×16 | 2.5 to 5.5 | 3 | 2 | 5 | | | | |
| BR93A86 | RF-WM | RFJ-WM | RFVT-WM | RFVM-WM | 16K | 1K×16 | 2.5 to 5.5 | 3 | 2 | 5 | | | | |

### 125°C Operation SPI BUS EEPROM BR25Hxxx-2C series

| Part No. | Package and Suffix | | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) | Automotive Grade AEC-Q100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | TSSOP-B8 | MSOP8 | | | | Operating (mA) | Standby (μA) | | | | | |
| BR25H010 | F-2C | FJ-2C | FVT-2C | FVM-2C | 1K | 128×8 | 2.5 to 5.5 | 4 | 10 | 4 | −40 to +125 | $10^6$ | 100 | YES |
| BR25H020 | F-2C | FJ-2C | FVT-2C | FVM-2C | 2K | 256×8 | 2.5 to 5.5 | 4 | 10 | 4 | | | | |
| BR25H040 | F-2C | FJ-2C | FVT-2C | FVM-2C | 4K | 512×8 | 2.5 to 5.5 | 4 | 10 | 4 | | | | |
| BR25H080 | F-2C | FJ-2C | FVT-2C | FVM-2C | 8K | 1K×8 | 2.5 to 5.5 | 4 | 10 | 4 | | | | |
| BR25H160 | F-2C | FJ-2C | FVT-2C | FVM-2C | 16K | 2K×8 | 2.5 to 5.5 | 4 | 10 | 4 | | | | |
| BR25H320 | F-2C | FJ-2C | FVT-2C | FVM-2C | 32K | 4K×8 | 2.5 to 5.5 | 4 | 10 | 4 | | | | |
| BR25H640 | F-2C | FJ-2C | FVT-2C | — | 64K | 8K×8 | 2.5 to 5.5 | 5.5 | 10 | 4 | | | | |
| BR25H128 | F-2C | FJ-2C | — | — | 128K | 16K×8 | 2.5 to 5.5 | 5.5 | 10 | 4 | | | | |

### 125°C Operation SPI BUS EEPROM with ECC Function BR25Hxxx-2AC series

| Part No. | Package and Suffix | | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) | Automotive Grade AEC-Q100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | TSSOP-B8 | MSOP8 | | | | Operating (mA) | Standby (μA) | | | | | |
| BR25H640 | F-2AC | FJ-2AC | FVT-2AC | FVM-2AC | 64K | 8K×8 | 2.5 to 5.5 | 5.5 | 10 | 4 | −40 to +125 | $10^6$ | 100 | YES |
| BR25H128 | F-2AC | FJ-2AC | FVT-2AC | — | 128K | 16K×8 | 2.5 to 5.5 | 5.5 | 10 | 4 | | | | |
| BR25H256 | F-2AC | FJ-2AC | — | — | 256K | 32K×8 | 2.5 to 5.5 | 5.5 | 10 | 4 | | | | |

### 105°C Operation SPI BUS EEPROM BR25Axxx-3M series

| Part No. | Package and Suffix | | | | Density (bit) | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption(Max.) | | Write Cycle Time (Max.)(ms) | Operating Temperature (°C) | Endurance (times) | Data Retention (years) | Automotive Grade AEC-Q100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOP8 | SOP-J8 | TSSOP-B8 | MSOP8 | | | | Operating (mA) | Standby (μA) | | | | | |
| BR25A256 | F-3M | FJ-3M | FVT-3M | — | 256K | 32K×8 | 2.5 to 5.5 | 4 | 10 | 5 | −40 to +105 | $10^6$ | 100 | YES |
| BR25A512 | F-3M | FJ-3M | FVT-3M | — | 512K | 64K×8 | 2.5 to 5.5 | 4 | 10 | 5 | | | | |
| BR25A1M | F-3M | FJ-3M | — | — | 1M | 128K×8 | 2.5 to 5.5 | 4 | 10 | 5 | | | | |

# FeRAM

## Ferroelectric Memory

(LAPIS Semiconductor products)

| Part No. | Memory Density (bit) | Configuration (word×bit) | Supply Voltage (V) | Operating Speed | Read/Write Endurance (times) | Data Retention (years) | Operating Temperature Ta(°C) | Package | Halogen Free Support*1 | Automotive Grade*2 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parallel BUS FeRAM** | | | | | | | | | | |
| MR48V256C | 256K | 32K×8 | 2.7 to 3.6 | $t_{RC}$=150ns | $10^{12}$ | 10 | −40 to +85 | TSOP(I)28 | — | YES |
| **I²C BUS FeRAM MR44Vxxxx series** | | | | | | | | | | |
| MR44V064A | 64K | 8K×8 | 2.5 to 3.6 | $f_{clk}$=3.4MHz | $10^{12}$ | 10 | −40 to +85 | SOP8 | ✓ | YES |
| MR44V064B | 64K | 8K×8 | 1.8 to 3.6 | $f_{clk}$=3.4MHz | | | | | ✓ | |
| New MR44V100A | 1M | 128K×8 | 1.8 to 3.6 | $f_{clk}$=3.4MHz | | | | | ✓ | |
| **SPI BUS FeRAM MR45Vxxxx series** | | | | | | | | | | |
| MR45V032A | 32K | 4K×8 | 2.7 to 3.6 | $f_{clk}$=15MHz | $10^{12}$ | 10 | −40 to +85 | SOP8 | ✓ | YES |
| MR45V064B | 64K | 8K×8 | 1.8 to 3.6 | $f_{clk}$=40MHz | | | | | | |
| MR45V256A | 256K | 32K×8 | 3.0 to 3.6 | $f_{clk}$=15MHz | | | | | | |
| New MR45V100A | 1M | 128K×8 | 1.8 to 3.6 | $f_{clk}$=40MHz | | | | SOP8 | ✓ | YES |
| | | | | | | | | DIP8 | ✓ | — |
| MR45V200A | 2M | 256K×8 | 2.7 to 3.6 | $f_{clk}$=34MHz | | | | DIP8 | ✓ | — |

*1:A check mark of halogen free support means that we will be able to ship out the halogen free products.
For details, please inquire to the sales.
*2:Please inquire to the sales for AEC-Q100.