General-purpose ICs

Memory

SDRAM

Standard Legacy DRAM SDRAM
Industrial Legacy DRAM SDRAM
Automotive Legacy DRAM SDRAM

SDRAM for SiP

Video Memory

Standard Video Memory
Automotive Video Memory

Serial EEPROM

Standard EEPROM

I²C BUS EEPROM (2-Wire)
SPI BUS EEPROM
Microwire BUS EEPROM (3-Wire)
WL-CSP EEPROM
Plug & Play EEPROM

Automotive EEPROM

I²C BUS EEPROM (2-Wire)

FeRAM

Parallel BUS FeRAM
I²C BUS FeRAM
SPI BUS FeRAM

Memory Module series

Display series

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Memory
### SDRAM

#### Standard Legacy DRAM SDRAM

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Data Rate (V)</th>
<th>Supply Voltage (V)</th>
<th>Density (bit)</th>
<th>Number of Data Bits</th>
<th>Configuration (bank×word×bit)</th>
<th>Max Operating Frequency (MHz)</th>
<th>Refresh Cycle (cycles/ms)</th>
<th>Cycle Time (ms)</th>
<th>Features</th>
<th>Operating Temperature (Tc) (°C)</th>
<th>Package</th>
<th>Halogen Free Support*1</th>
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<tr>
<td>MSM56V16161N</td>
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<th>Density (bit)</th>
<th>Number of Data Bits</th>
<th>Configuration (bank×word×bit)</th>
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<th>Refresh Cycle (cycles/ms)</th>
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<th>Features</th>
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<th>Refresh Cycle (cycles/ms)</th>
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### Video Memory

#### Video Memory for Standard

**Standard**

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<th>Configuration (word/bit/port)</th>
<th>Number of Data (bit)</th>
<th>Address Access (ns)</th>
<th>Cycle Time (ns)</th>
<th>Power Consumption (mW)</th>
<th>Operating Standby</th>
<th>Notes</th>
<th>Halogen Free Support</th>
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<tr>
<td>MS81V26000</td>
<td>3.3±0.3</td>
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<td>1,114,112×24</td>
<td>1,114,112×24</td>
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<td>64/576/512/568</td>
<td>18</td>
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<td>TOFP100-1414-0.50</td>
<td>Asynchronous serial read/write, Write mask function, Output data control, Cascade, The top address can be specified</td>
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* 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.

#### Video Memory for Automotive

**Automotive**

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<tr>
<th>Part No.</th>
<th>Supply Voltage (V)</th>
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<th>Number of Data (bit)</th>
<th>Address Access (ns)</th>
<th>Cycle Time (ns)</th>
<th>Power Consumption (mW)</th>
<th>Operating Standby</th>
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<th>Halogen Free Support</th>
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<td>12</td>
<td>25</td>
<td>576</td>
<td>18</td>
<td>−45 to +85</td>
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* 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.

* Please inquire to the sales for AEC-Q100.

### Serial EEPROM

#### Standard EEPROM

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

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Package and Suffix</th>
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<th>SOP-JA</th>
<th>SOP-8S</th>
<th>TSSOP-8S</th>
<th>MSOP8</th>
<th>TSSOP-8L</th>
<th>QSN8S2S</th>
<th>QMN8S25</th>
<th>Density (bit)</th>
<th>Bit Format (word/bit)</th>
<th>Supply Voltage (V)</th>
<th>Standby (μA)</th>
<th>Write Cycle Time (ns)</th>
<th>Storage Temperature (TC)(˚C)</th>
<th>Endurance (cycles)</th>
<th>Data Retention (years)</th>
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<tbody>
<tr>
<td>BR24G01</td>
<td>F-3 FJ-3 FV-3 FVT-3 FVM-3 FVJ-3 NUX-3</td>
<td>1K</td>
<td>128×8</td>
<td>1.6 to 5.5</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>400k</td>
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<td>BR24G02</td>
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<td>256×8</td>
<td>1.6 to 5.5</td>
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<td>400k</td>
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<td>400k</td>
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**I²C BUS EEPROM (2-Wire) BR24Gxxx-3A series (SCL Frequency=1MHz)**

<table>
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<tr>
<th>Part No.</th>
<th>Package and Suffix</th>
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<th>SOP-JA</th>
<th>SOP-8S</th>
<th>TSSOP-8S</th>
<th>MSOP8</th>
<th>TSSOP-8L</th>
<th>QSN8S2S</th>
<th>QMN8S25</th>
<th>Density (bit)</th>
<th>Bit Format (word/bit)</th>
<th>Supply Voltage (V)</th>
<th>Standby (μA)</th>
<th>Write Cycle Time (ns)</th>
<th>Storage Temperature (TC)(˚C)</th>
<th>Endurance (cycles)</th>
<th>Data Retention (years)</th>
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<td>BR24G01</td>
<td>F-3A FJ-3A FV-3A FVT-3A FVM-3A FVJ-3A NUX-3A</td>
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<td>1.7 to 5.5</td>
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<td>F-3A FJ-3A FV-3A FVT-3A</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>256K</td>
<td>32K×8</td>
<td>1.7 to 5.5</td>
<td>2</td>
<td>2.5</td>
<td>5</td>
<td>1M</td>
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**I²C BUS EEPROM (2-Wire) BR24Gxxx-5 series (SCL Frequency=1MHz)**

<table>
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<th>SOP8</th>
<th>SOP-JA</th>
<th>SOP-8S</th>
<th>TSSOP-8S</th>
<th>MSOP8</th>
<th>TSSOP-8L</th>
<th>QSN8S2S</th>
<th>QMN8S25</th>
<th>Density (bit)</th>
<th>Bit Format (word/bit)</th>
<th>Supply Voltage (V)</th>
<th>Standby (μA)</th>
<th>Write Cycle Time (ns)</th>
<th>Storage Temperature (TC)(˚C)</th>
<th>Endurance (cycles)</th>
<th>Data Retention (years)</th>
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<tbody>
<tr>
<td>BR24G32</td>
<td>F-5 FJ-5 FV-5 FVT-5 FVM-5</td>
<td>32K</td>
<td>4K×8</td>
<td>1.6 to 5.5</td>
<td>2</td>
<td>2.5</td>
<td>5</td>
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<td>BR24G64</td>
<td>F-5 FJ-5 FV-5 FVT-5 FVM-5</td>
<td>64K</td>
<td>8K×8</td>
<td>1.6 to 5.5</td>
<td>2</td>
<td>2.5</td>
<td>5</td>
<td>1M</td>
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<td>BR24G128</td>
<td>F-5 FJ-5 FV-5 FVT-5 FVM-5</td>
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<td>16K×8</td>
<td>1.6 to 5.5</td>
<td>2</td>
<td>2.5</td>
<td>5</td>
<td>1M</td>
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<tr>
<td>BR24G256</td>
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<td>256K</td>
<td>32K×8</td>
<td>1.6 to 5.5</td>
<td>2</td>
<td>2.5</td>
<td>5</td>
<td>1M</td>
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### Memory

#### SPI BUS EEPROM BR25Gxxx-3 series

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<th>D/C</th>
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<th>Supply Voltage (V)</th>
<th>Current Consumption (mA)</th>
<th>Write Cycle (ms)</th>
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<td>8</td>
<td>2 5</td>
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<td>BR25G640</td>
<td>F-3 FJ-3 FVT-3 FVM-3</td>
<td>1.7</td>
<td>5.5</td>
<td>2 2 5</td>
<td>1.6 to 5.5</td>
<td>8</td>
<td>2 5</td>
</tr>
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<td>BR25G128</td>
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<td>1.7</td>
<td>5.5</td>
<td>2 2 5</td>
<td>1.6 to 5.5</td>
<td>8</td>
<td>2 5</td>
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<td>BR25G256</td>
<td>F-3 FJ-3 FVT-3 FVM-3</td>
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<td>8</td>
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<td>BR25G512</td>
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<td>BR25G1M</td>
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#### Microwire BUS EEPROM (3-Wire) BR93Gxx-3/3A/3B series

- **Part No.**
- **I/F**
- **Density**
- **Bit Format**
- **Supply Voltage (V)**
- **Current Consumption (mA)**
- **Write Cycle (ms)**

| BR93G46   | F-3 FJ-3 A*2/ F-3B*3 | 1.7 | 5.5 | 2 2 5 | 1.6 to 5.5 | 8 | 2 5 |
| BR93G56   | F-3 FJ-3 A*2/ F-3B*3 | 1.7 | 5.5 | 2 2 5 | 1.6 to 5.5 | 8 | 2 5 |
| BR93G66   | F-3 FJ-3 A*2/ F-3B*3 | 1.7 | 5.5 | 2 2 5 | 1.6 to 5.5 | 8 | 2 5 |
| BR93G76   | F-3 FJ-3 A*2/ F-3B*3 | 1.7 | 5.5 | 2 2 5 | 1.6 to 5.5 | 8 | 2 5 |
| BR93G86   | F-3 FJ-3 A*2/ F-3B*3 | 1.7 | 5.5 | 2 2 5 | 1.6 to 5.5 | 8 | 2 5 |

### Micro Wire BUS Pin Assignment

#### WL-CSP EEPROM

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<th>D/C</th>
<th>Bit Format</th>
<th>Supply Voltage (V)</th>
<th>Current Consumption (mA)</th>
<th>Write Cycle (ms)</th>
</tr>
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<tbody>
<tr>
<td>BU9833GUL-W</td>
<td>2K</td>
<td>VCSP50L1</td>
<td>x: 1.27 y: 1.50</td>
<td>0.55 0.5</td>
<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BU9824GUL-W</td>
<td>4K</td>
<td>VCSP50L1</td>
<td>x: 1.95 y: 1.06</td>
<td>0.55 0.5</td>
<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BU9899GUL-W</td>
<td>8K</td>
<td>VCSP50L1</td>
<td>x: 1.60 y: 1.00</td>
<td>0.55 0.5</td>
<td>1.7 to 5.5</td>
<td>8</td>
</tr>
<tr>
<td>BRCBO08GWZ-3</td>
<td>8K</td>
<td>UCP50L1</td>
<td>x: 0.94 y: 0.94</td>
<td>0.33 0.4</td>
<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BRCBO16GWL-3</td>
<td>16K</td>
<td>UCP50L1</td>
<td>x: 1.10 y: 1.15</td>
<td>0.55 0.4</td>
<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BRCBO16GWZ-3</td>
<td>16K</td>
<td>UCP50L1</td>
<td>x: 1.30 y: 0.77</td>
<td>0.40 0.4</td>
<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BRCBO16GWZ-3</td>
<td>16K</td>
<td>UCP50L1</td>
<td>x: 1.30 y: 0.77</td>
<td>0.40 0.4</td>
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<tr>
<td>BRCBO32GWZ-3</td>
<td>32K</td>
<td>UCP50L1</td>
<td>x: 1.45 y: 0.77</td>
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<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BRCEO16GWZ-3</td>
<td>32K</td>
<td>UCP50L1</td>
<td>x: 1.50 y: 0.77</td>
<td>0.33 0.4</td>
<td>1.7 to 5.5</td>
<td>8</td>
</tr>
<tr>
<td>BRCEO16GWZ-3</td>
<td>32K</td>
<td>UCP50L1</td>
<td>x: 1.50 y: 0.77</td>
<td>0.33 0.4</td>
<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BU9897GUL-W</td>
<td>128K</td>
<td>VCSP50L2</td>
<td>x: 2.44 y: 1.99</td>
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<td>1.7 to 5.5</td>
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<td>BU9832GUL-W</td>
<td>8K</td>
<td>VCSP50L2</td>
<td>x: 2.09 y: 1.85</td>
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<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BU9828GUL-W</td>
<td>16K</td>
<td>VCSP50L2</td>
<td>x: 1.74 y: 1.65</td>
<td>0.55 0.5</td>
<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BR25S128GUL-W</td>
<td>128K</td>
<td>VCSP50L2</td>
<td>x: 2.00 y: 2.63</td>
<td>0.40 0.5</td>
<td>1.7 to 5.5</td>
<td>8</td>
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<tr>
<td>BU9897GUL-W</td>
<td>4K</td>
<td>VCSP50L1</td>
<td>x: 1.60 y: 1.00</td>
<td>0.55 0.5</td>
<td>1.7 to 5.5</td>
<td>8</td>
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## Plug & Play EEPROM For Memory Modules

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<tr>
<th>Part No.</th>
<th>Package and Suffix</th>
<th>Bit Format (word×bit)</th>
<th>Supply Voltage (V)</th>
<th>Clock Frequency (kHz)</th>
<th>Write Cycle Time (ms)</th>
<th>Endurance (times)</th>
<th>Data Retention (years)</th>
<th>Write Protect</th>
</tr>
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<tbody>
<tr>
<td>BR34L02</td>
<td>FVT-W</td>
<td>256×8 1.7 to 5.5</td>
<td>100/400</td>
<td>5</td>
<td>106</td>
<td>40</td>
<td>Onetime ROM write protect</td>
<td></td>
</tr>
<tr>
<td>BR34E02</td>
<td>FVT-3/FVT-W NUX-3/NUX-W</td>
<td>256×8 1.7 to 3.6</td>
<td>400</td>
<td>5</td>
<td>106</td>
<td>40</td>
<td>Settable write protect Onetime ROM write protect</td>
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## Plug & Play EEPROM For Display

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<th>Function Descriptions</th>
<th>Bit Format (word×bit)</th>
<th>Supply Voltage (V)</th>
<th>Clock Frequency (MHz)</th>
<th>Write Cycle Time (ms)</th>
<th>Endurance (times)</th>
<th>Data Retention (years)</th>
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</thead>
<tbody>
<tr>
<td>BR34L02</td>
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<td></td>
<td></td>
<td>1.7 to 5.5</td>
<td>100/400</td>
<td>5</td>
<td>106</td>
<td>40</td>
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<td></td>
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<td>1.7 to 3.6</td>
<td>400</td>
<td>5</td>
<td>106</td>
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</tbody>
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## Automotive EEPROM

### 105˚C Operation I²C BUS EEPROM (2-Wire) BR24Ax-xx-WM series

<table>
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<th>Part No.</th>
<th>Package and Suffix</th>
<th>Density (bit)</th>
<th>Bit Format (word×bit)</th>
<th>Supply Voltage (V)</th>
<th>Current Consumption (Max) (mA)</th>
<th>Write Cycle Time (Max) (ms)</th>
<th>Operating Temperature (˚C)</th>
<th>Endurance (times)</th>
<th>Data Retention (years)</th>
<th>Automotive Grade AEC-Q100</th>
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<tbody>
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<td>128×8</td>
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<td>2</td>
<td>5</td>
<td>10°C</td>
<td>40</td>
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<tr>
<td>BR24A02</td>
<td>F-WM</td>
<td>2K</td>
<td>256×8</td>
<td>2.5 to 5.5</td>
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### 85˚C Operation I²C BUS EEPROM (2-Wire) BR24Tx-xx-3AM series

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<th>Supply Voltage (V)</th>
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<th>Write Cycle Time (Max) (ms)</th>
<th>Operating Temperature (˚C)</th>
<th>Endurance (times)</th>
<th>Data Retention (years)</th>
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<tbody>
<tr>
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<td>F-3AM</td>
<td>1K</td>
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<td>10</td>
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<tr>
<td>BR24T1M</td>
<td>F-3AM</td>
<td>1M</td>
<td>128×8</td>
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### 125˚C Operation Microwire BUS EEPROM (3-Wire) BR93Hxx-xx-C series

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<th>Bit Format (word×bit)</th>
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<th>Current Consumption (Max) (mA)</th>
<th>Write Cycle Time (Max) (ms)</th>
<th>Operating Temperature (˚C)</th>
<th>Endurance (times)</th>
<th>Data Retention (years)</th>
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### 105˚C Operation Microwire BUS EEPROM (3-Wire) BR93Axx-xx-C series

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<th>Density (bit)</th>
<th>Bit Format (word×bit)</th>
<th>Supply Voltage (V)</th>
<th>Current Consumption (Max) (mA)</th>
<th>Write Cycle Time (Max) (ms)</th>
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<th>Endurance (times)</th>
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<td>64×16</td>
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<td>10</td>
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<td>10°C</td>
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<td>BR93A56</td>
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### 125˚C Operation SPI BUS EEPROM BR25Hxxx-xx-C series

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<th>Density (bit)</th>
<th>Bit Format (word×bit)</th>
<th>Supply Voltage (V)</th>
<th>Current Consumption (Max) (mA)</th>
<th>Write Cycle Time (Max) (ms)</th>
<th>Operating Temperature (˚C)</th>
<th>Endurance (times)</th>
<th>Data Retention (years)</th>
<th>Automotive Grade AEC-Q100</th>
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<tbody>
<tr>
<td>BR25H010</td>
<td>F-2C</td>
<td>1K</td>
<td>128×8</td>
<td>2.5 to 5.5</td>
<td>4</td>
<td>10</td>
<td>4</td>
<td>10°C</td>
<td>100</td>
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<td>BR25H020</td>
<td>F-2C</td>
<td>2K</td>
<td>256×8</td>
<td>2.5 to 5.5</td>
<td>4</td>
<td>10</td>
<td>4</td>
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<td>BR25H040</td>
<td>F-2C</td>
<td>4K</td>
<td>512×8</td>
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<td>10</td>
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<td>BR25H080</td>
<td>F-2C</td>
<td>8K</td>
<td>1K×8</td>
<td>2.5 to 5.5</td>
<td>4</td>
<td>10</td>
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<tr>
<td>BR25H160</td>
<td>F-2C</td>
<td>16K</td>
<td>2K×8</td>
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<td>4</td>
<td>10</td>
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<td>BR25H320</td>
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<td>2.5 to 5.5</td>
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<td>BR25H640</td>
<td>F-2C</td>
<td>64K</td>
<td>8K×8</td>
<td>2.5 to 5.5</td>
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<td>16K×8</td>
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### 125°C Operation SPI BUS EEPROM with ECC Function BR25Hxxx-2AC series

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<thead>
<tr>
<th>Part No.</th>
<th>Package and Suffix</th>
<th>Density (bit)</th>
<th>Bit Format (word×bit)</th>
<th>Supply Voltage (V)</th>
<th>Current Consumption (Max)</th>
<th>Write Cycle Time (ms)</th>
<th>Operating Temperature (˚C)</th>
<th>Endurance (times)</th>
<th>Data Retention (years)</th>
<th>Automotive Grade</th>
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<tbody>
<tr>
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<td>F-2AC FJ-2AC FVT-2AC FVM-2AC</td>
<td>64K</td>
<td>8K×8</td>
<td>2.5 to 5.5</td>
<td>5.5</td>
<td>10</td>
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<td>-40 to +125</td>
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<td>16K×8</td>
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<td>10</td>
<td>4</td>
<td>-40 to +125</td>
<td>10^5</td>
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<tr>
<td>BR25H256</td>
<td>F-2AC FJ-2AC</td>
<td>256K</td>
<td>32K×8</td>
<td>2.5 to 5.5</td>
<td>5.5</td>
<td>10</td>
<td>4</td>
<td>-40 to +125</td>
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### 105°C Operation SPI BUS EEPROM BR25Axxx-3M series

<table>
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<tr>
<th>Part No.</th>
<th>Package and Suffix</th>
<th>Density (bit)</th>
<th>Bit Format (word×bit)</th>
<th>Supply Voltage (V)</th>
<th>Operating Temperature (˚C)</th>
<th>Endurance (times)</th>
<th>Data Retention (years)</th>
<th>Automotive Grade</th>
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<tbody>
<tr>
<td>BR25A256</td>
<td>F-3M FJ-3M FVT-3M</td>
<td>256K</td>
<td>32K×8</td>
<td>2.5 to 5.5</td>
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<td>10</td>
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<td>BR25A512</td>
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<td>512K</td>
<td>64K×8</td>
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<td>10</td>
<td>5</td>
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<tr>
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<td>1M</td>
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### FeRAM

#### FeRAM (LAPIS Semiconductor products)

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<th>Parallel BUS FeRAM</th>
<th>Memory Density (bit)</th>
<th>Configuration (word×bit)</th>
<th>Supply Voltage (V)</th>
<th>Operating Speed</th>
<th>Read/Write Endurance (times)</th>
<th>Data Retention (years)</th>
<th>Operating Temperature Ta (˚C)</th>
<th>Package</th>
<th>Halogen Free Support*1</th>
<th>Automotive Grade*2</th>
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<tbody>
<tr>
<td>MR48V256CTAZAAX</td>
<td>256K</td>
<td>32K×8</td>
<td>2.7 to 3.6</td>
<td>t_{cc}=150ns</td>
<td>10</td>
<td>10</td>
<td>−40 to +85</td>
<td>TSOP (I)</td>
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<tr>
<td>MR48V102AMAZAATL</td>
<td>64K</td>
<td>8K×8</td>
<td>1.8 to 3.6</td>
<td>t_{ac}=3.4MHz</td>
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<td>10</td>
<td>−40 to +85</td>
<td>SOP8-200-1.27</td>
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<td>MR48V102AMAZAATL</td>
<td>1M</td>
<td>128K×8</td>
<td>2.7 to 3.6</td>
<td>f_{rc}=15MHz</td>
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<td>10</td>
<td>−40 to +85</td>
<td>SOP8-200-1.27</td>
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<tr>
<td>MR49V064BMAZATL</td>
<td>64K</td>
<td>8K×8</td>
<td>2.7 to 3.6</td>
<td>f_{ac}=3.4MHz</td>
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<td>10</td>
<td>−40 to +85</td>
<td>SOP8-200-1.27</td>
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<td>MR49V256AMAZAT-L</td>
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<td>32K×8</td>
<td>3.0 to 3.6</td>
<td>f_{ac}=15MHz</td>
<td>10</td>
<td>10</td>
<td>−40 to +85</td>
<td>SOP8-200-1.27</td>
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<td>128K×8</td>
<td>3.0 to 3.6</td>
<td>f_{ac}=15MHz</td>
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<td>10</td>
<td>−40 to +85</td>
<td>SOP8-200-1.27</td>
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</tbody>
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*1 A check mark of halogen free support means that we will be able to ship out the halogen free products.
*2 For details, please inquire to the sales.
*3 Please inquire to the sales for AEC-Q100.