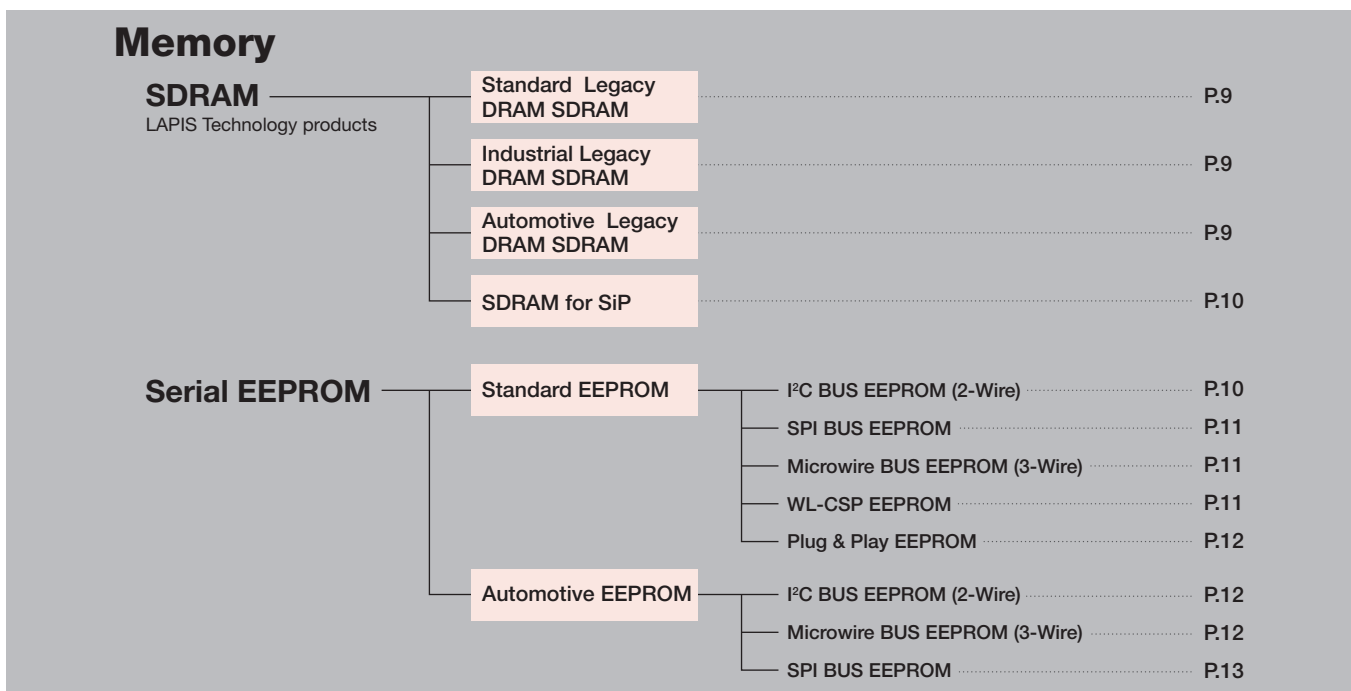


|                                   |     |               |      |
|-----------------------------------|-----|---------------|------|
| <b>Memory</b>                     |     |               |      |
| SDRAM (LAPIS Technology products) | P.9 | Serial EEPROM | P.10 |



# SDRAM

## Standard Legacy DRAM SDRAM

(LAPIS Technology 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 T <sub>a</sub> (°C) | Package                  | Halogen Free Support*1 |
| MD56V62161R      | SDR            | 3.3±0.3            | 64M           | x16                 | 4×1M×16                       | 166                           | 4096/64                   | 6/7/7.5/10               | Drivability Control (EMRS) | 0 to +70                                  | TSOP (2) 54-400-0.80-ZK6 | ✓                      |
| MD56V72161C      |                |                    | 4×2M×16       |                     | TSOP (2) 54-400-0.80-ZK6      |                               |                           |                          |                            |   | ✓                        |                        |
| MD56V82161A      |                |                    | 4×4M×16       |                     | 8192/64                       |                               | 6                         | TSOP (2) 54-400-0.80-ZK6 |                            |   | ✓                        |                        |
| MD56V82160A-xxLA |                |                    |               |                     |                               |                               |                           | P-TFBGA54-0808-0.80-9    |                            |   | ✓                        |                        |

SDR: Single Data Rate Synchronous DRAM

\*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.

## Industrial Legacy DRAM SDRAM

(LAPIS Technology 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 T <sub>a</sub> (°C) | Package                  | Halogen Free Support*1 | for Industrial Equipment |
| MD56V62161R-xxTAP | SDR            | 3.3±0.3            | 64M           | x16                 | 4×1M×16                       | 166                           | 4096/64                   | 6/7/7.5/10               | Drivability Control (EMRS) | -40 to +85                                | TSOP (2) 54-400-0.80-ZK6 | ✓                      | ✓                        |
| MD56V72161C-xxTAP |                |                    | 4×2M×16       |                     | TSOP (2) 54-400-0.80-ZK6      |                               |                           |                          |                            |   | ✓                        | ✓                      |                          |
| MD56V82161A-xxTAP |                |                    | 4×4M×16       |                     | 8192/64                       |                               | 6                         | TSOP (2) 54-400-0.80-ZK6 |                            |   | ✓                        | ✓                      |                          |
| MD56V82160A-xxLAP |                |                    |               |                     |                               |                               |                           | P-TFBGA54-0808-0.80-9    |                            |   | ✓                        | ✓                      |                          |

\*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.

## Automotive Legacy DRAM SDRAM

(LAPIS Technology products)

| Automotive (85°C/95°C/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 T <sub>a</sub> (°C) | Package                  | Halogen Free Support*1 | Automotive Grade*2 |
| MD56V62161R-xxTAL            | SDR            | 3.3±0.3            | 64M           | 16                  | 4×1M×16                       | 166                           | 4096/64                   | 6/7/7.5/10      | Drivability Control (EMRS) | -40 to +85<br>-40 to +105                 | TSOP (2) 54-400-0.80-ZK6 | ✓                      | YES                |
| MD56V72161C-xxTAL            |                |                    | 4×2M×16       |                     | 4096/16                       |                               | TSOP (2) 54-400-0.80-ZK6  |                 |                            |   | ✓                        | YES                    |                    |
| MD56V82161A-xxTAL            |                |                    | 4×4M×16       |                     | 8192/64<br>8192/16            |                               | TSOP (2) 54-400-0.80-ZK6  |                 |                            |   | ✓                        | 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.

## SDRAM for SiP

(LAPIS Technology products)

Memory

| 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 T <sub>J</sub> (°C) | Features |
| MD56V62160R-xxWBP | 3.3±0.3            | 64M           | ×16                 | 4×1M×16                       | 166                           | 4096/32                   | 6/7             | -40 to +125                               | KGD      |
| MD56V72160C-xxWBP |                    | 128M          |                     | 4×2M×16                       |                               |                           | 6/7/7.5/10      |   |          |

## Serial EEPROM

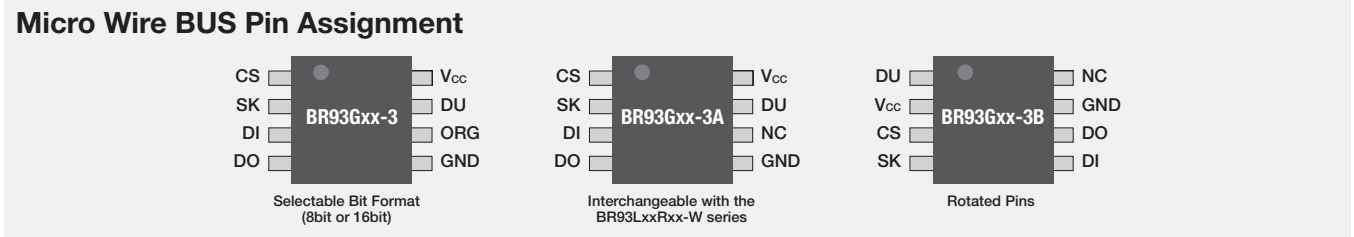
### Standard EEPROM

| I <sup>2</sup> C 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 |               |                       |                    | 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 <sup>6</sup>   | 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        | 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               |                            |                   |                        |
| I <sup>2</sup> C BUS EEPROM (2-Wire) BR24Gxxx-3A series (SCL Frequency=1MHz)                          |                    |        |         |          |        |           |              |               |                       |                    |                           |              |                             |                    |                            |                   |                        |
| 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 <sup>6</sup>   | 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                 |                            |                   |                        |
| BR24G512  | F-3A               | FJ-3A  | -       | FVT-3A   | -      | -         | -            | 512K          | 64K×8                 | 1.7 to 5.5         | 4.5                       | 3            | 5                           | 1M                 |                            |                   |                        |
| I <sup>2</sup> C BUS EEPROM (2-Wire) BR24Gxxx-5 series (SCL Frequency=1MHz/Endurance=4million times)  |                    |        |         |          |        |           |              |               |                       |                    |                           |              |                             |                    |                            |                   |                        |
| BR24G32   | F-5                | FJ-5   | -       | FVT-5    | FVM-5  | -         | NUX-5        | 32K           | 4K×8                  | 1.6 to 5.5         | 2                         | 2.5          | 5                           | 1M                 | -40 to +85                 | 4×10 <sup>6</sup> | 200                    |
| BR24G64   | F-5                | FJ-5   | -       | FVT-5    | FVM-5  | -         | NUX-5        | 64K           | 8K×8                  | 1.6 to 5.5         | 2                         | 2.5          | 5                           | 1M                 |                            |                   |                        |
| BR24G128  | F-5                | FJ-5   | -       | FVT-5    | FVM-5  | -         | NUX-5        | 128K          | 16K×8                 | 1.6 to 5.5         | 2                         | 2.5          | 5                           | 1M                 |                            |                   |                        |
| BR24G256  | F-5                | FJ-5   | -       | FVT-5    | FVM-5  | -         | NUX-5        | 256K          | 32K×8                 | 1.6 to 5.5         | 2                         | 2.5          | 5                           | 1M                 |                            |                   |                        |
| I <sup>2</sup> C BUS EEPROM (2-Wire) BR24Gxxx-5A series (SCL Frequency=1MHz/Endurance=4million times) |                    |        |         |          |        |           |              |               |                       |                    |                           |              |                             |                    |                            |                   |                        |
| <b>New</b> BR24G512   | F-5A               | FJ-5A  | -       | FVT-5A   | FVM-5A | -         | -            | 512K          | 64K×8                 | 1.6 to 5.5         | 3                         | 5            | 3.5                         | 1M                 | -40 to +85                 | 4×10 <sup>6</sup> | 200                    |
| <b>New</b> BR24G1M  | F-5A               | FJ-5A  | -       | FVT-5A   | -      | -         | -            | 1M            | 128K×8                | 1.7 to 5.5         | 3                         | 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 <sup>6</sup>   | 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 |                             |                                |                                   |                                   |                                   |     |                   |            |   |   |   |            |                 |    |
|--|-----------------------------|--------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----|-------------------|------------|---|---|---|------------|-----------------|----|
| BR93G46  | F-3*1/<br>F-3A*2/<br>F-3B*3 | FJ-3*1/<br>FJ-3A*2/<br>FJ-3B*3 | FVT-3*1/<br>FVT-3A*2/<br>FVT-3B*3 | FVM-3*1/<br>FVM-3A*2/<br>FVM-3B*3 | NUX-3*1/<br>NUX-3A*2/<br>NUX-3B*3 | 1K  | 64×16<br>(128×8)  | 1.7 to 5.5 | 3 | 2 | 5 | -40 to +85 | 10 <sup>6</sup> | 40 |
| BR93G56  | F-3*1/<br>F-3A*2/<br>F-3B*3 | FJ-3*1/<br>FJ-3A*2/<br>FJ-3B*3 | FVT-3*1/<br>FVT-3A*2/<br>FVT-3B*3 | FVM-3*1/<br>FVM-3A*2/<br>FVM-3B*3 | NUX-3*1/<br>NUX-3A*2/<br>NUX-3B*3 | 2K  | 128×16<br>(256×8) | 1.7 to 5.5 | 3 | 2 | 5 |            |                 |    |
| BR93G66  | F-3*1/<br>F-3A*2/<br>F-3B*3 | FJ-3*1/<br>FJ-3A*2/<br>FJ-3B*3 | FVT-3*1/<br>FVT-3A*2/<br>FVT-3B*3 | FVM-3*1/<br>FVM-3A*2/<br>FVM-3B*3 | NUX-3*1/<br>NUX-3A*2/<br>NUX-3B*3 | 4K  | 256×16<br>(512×8) | 1.7 to 5.5 | 3 | 2 | 5 |            |                 |    |
| BR93G76  | F-3*1/<br>F-3A*2/<br>F-3B*3 | FJ-3*1/<br>FJ-3A*2/<br>FJ-3B*3 | FVT-3*1/<br>FVT-3A*2/<br>FVT-3B*3 | FVM-3*1/<br>FVM-3A*2/<br>FVM-3B*3 | NUX-3*1/<br>NUX-3A*2/<br>NUX-3B*3 | 8K  | 512×16<br>(1K×8)  | 1.7 to 5.5 | 3 | 2 | 5 |            |                 |    |
| BR93G86  | F-3*1/<br>F-3A*2/<br>F-3B*3 | FJ-3*1/<br>FJ-3A*2/<br>FJ-3B*3 | FVT-3*1/<br>FVT-3A*2/<br>FVT-3B*3 | FVM-3*1/<br>FVM-3A*2/<br>FVM-3B*3 | NUX-3*1/<br>NUX-3A*2/<br>NUX-3B*3 | 16K | 1K×16<br>(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



| WL-CSP EEPROM            |                  |               |              |                 |                      |                 |               |                  |                       |                    |                           |              |                             |                            |                        |
|--------------------------|------------------|---------------|--------------|-----------------|----------------------|-----------------|---------------|------------------|-----------------------|--------------------|---------------------------|--------------|-----------------------------|----------------------------|------------------------|
| Part No.                 | I/F              | Density (bit) | Package      |                 |                      |                 |               | Pull-up Resistor | Bit Format (word×bit) | Supply Voltage (V) | Current Consumption (Max) |              | Write Cycle Time (Max) (ms) | Operating Temperature (°C) | Data Retention (years) |
|                          |                  |               | Package Name | Size (mm)       | Thickness (mm) (Max) | Ball Pitch (mm) | RESIN COATING |                  |                       |                    | Operating (mA)            | Standby (µA) |                             |                            |                        |
| BU9833GUL-W              | I <sup>2</sup> C | 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              | I <sup>2</sup> C | 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              | I <sup>2</sup> C | 8K            | VCSP50L1     | 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             | I <sup>2</sup> C | 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                     |
| <b>New</b> BRCB016GWL-3U | I <sup>2</sup> C | 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             | I <sup>2</sup> C | 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                     |
| BRCG016GWZ-3             | I <sup>2</sup> C | 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             | I <sup>2</sup> C | 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             | I <sup>2</sup> C | 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             | I <sup>2</sup> C | 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             | I <sup>2</sup> C | 64K           | UCSP30L1A    | 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             | I <sup>2</sup> C | 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             | I <sup>2</sup> C | 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              | I <sup>2</sup> C | 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: \*V<sub>CC</sub>=2.5V



## Standard EEPROM

### 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 <sup>1</sup> /400 <sup>2</sup> | 5                     | 10 <sup>6</sup>   | 40                     | Overtime ROM write protect                           |
| BR34E02  | FVT-3/FVT-W        | NUX-3/NUX-W  | 256×8                 | 1.7 to 5.5/<br>1.7 to 3.6 | 400                                | 5                     | 10 <sup>6</sup>   | 40                     | Settable write protect<br>Overtime ROM write protect |

Plug & Play EEPROM For Memory Modules: \*1 V<sub>CC</sub>=1.7 to 5.5V \*2 V<sub>CC</sub>=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                     |

## Automotive EEPROM

### 125°C Operation I<sup>2</sup>C BUS EEPROM (2-Wire) BR24Hxxx-5AC 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) | ComfySIL™ Functional Safety*1 | Automotive Grade AEC-Q100 |
|--------------------|--------------------|--------|----------|---------|--------------|--------------|---------------|-----------------------|--------------------|---------------------------|--------------|-----------------------------|----------------------------|-------------------|------------------------|-------------------------------|---------------------------|
|                    | SOP8               | SOP-J8 | TSSOP-B8 | MSOP8   | VSON008X2030 | VSON08AX2030 |               |                       |                    | Operating (mA)            | Standby (μA) |                             |                            |                   |                        |                               |                           |
| <b>New</b> BR24H01 | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | —            | ANUX-5AC     | 1K            | 128×8                 | 1.7 to 5.5         | 1.7                       | 10           | 3.5                         | -40 to +125                | 4×10 <sup>6</sup> | 100                    | FSs                           | YES                       |
| <b>New</b> BR24H02 | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | —            | ANUX-5AC     | 2K            | 256×8                 | 1.7 to 5.5         | 1.7                       | 10           | 3.5                         |                            |                   |                        |                               |                           |
| <b>New</b> BR24H04 | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | —            | ANUX-5AC     | 4K            | 512×8                 | 1.7 to 5.5         | 1.7                       | 10           | 3.5                         |                            |                   |                        |                               |                           |
| <b>New</b> BR24H08 | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | —            | ANUX-5AC     | 8K            | 1K×8                  | 1.7 to 5.5         | 1.7                       | 10           | 3.5                         |                            |                   |                        |                               |                           |
| <b>New</b> BR24H16 | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | —            | ANUX-5AC     | 16K           | 2K×8                  | 1.7 to 5.5         | 1.7                       | 10           | 3.5                         |                            |                   |                        |                               |                           |
| BR24H32            | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | NUX-5AC      | —            | 32K           | 4K×8                  | 1.7 to 5.5         | 1.7                       | 10           | 3.5                         |                            |                   |                        |                               |                           |
| <b>New</b> BR24H64 | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | NUX-5AC      | —            | 64K           | 8K×8                  | 1.7 to 5.5         | 1.7                       | 10           | 3.5                         |                            |                   |                        |                               |                           |
| BR24H128           | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | NUX-5AC      | —            | 128K          | 16K×8                 | 1.7 to 5.5         | 1.7                       | 10           | 3.5                         |                            |                   |                        |                               |                           |
| BR24H256           | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | NUX-5AC      | —            | 256K          | 32K×8                 | 1.7 to 5.5         | 1.7                       | 10           | 3.5                         |                            |                   |                        |                               |                           |
| <b>New</b> BR24H1M | F-5AC              | FJ-5AC | FVT-5AC  | —       | —            | —            | 1M            | 128K×8                | 2.5 to 5.5         | 3                         | 20           | 3.5                         |                            |                   |                        |                               |                           |

### 105°C Operation I<sup>2</sup>C 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) | ComfySIL™ Functional Safety*1 | 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 <sup>6</sup>   | 40                     | FSs                           | 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 I<sup>2</sup>C 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) | ComfySIL™ Functional Safety*1 | Automotive Grade AEC-Q100 |
|----------|--------------------|--------|----------|---------------|-----------------------|--------------------|---------------------------|--------------|-----------------------------|----------------------------|-------------------|------------------------|-------------------------------|---------------------------|
|          | SOP8               | SOP-J8 | TSSOP-B8 |               |                       |                    | Operating (mA)            | Standby (μA) |                             |                            |                   |                        |                               |                           |
| BR24T512 | F-3AM              | FJ-3AM | FVT-3AM  | 512K          | 64K×8                 | 1.7 to 5.5         | 4.5                       | 3            | 5                           | -40 to +85                 | 10 <sup>6</sup>   | 40                     | FSs                           | YES                       |
| 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) | ComfySIL™ Functional Safety*1 | 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 <sup>6</sup>   | 100                    | FSs                           | 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) | ComfySIL™ Functional Safety*1 | 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 <sup>6</sup>   | 40                     | FSs                           | 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                           |                            |                   |                        |                               |                           |

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\*1 For more information about "ComfySIL™ Functional Safety", please refer to the of the cover.

**125°C Operation Built-in ECC Function SPI BUS EEPROM BR25Hxxx-5AC 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) | ComfySIL™ Functional Safety*1 | Automotive Grade AEC-Q100 |
|---------------------|--------------------|--------|----------|---------|--------------|---------------|-----------------------|--------------------|---------------------------|--------------|-----------------------------|----------------------------|-------------------|------------------------|-------------------------------|---------------------------|
|                     | SOP8               | SOP-J8 | TSSOP-B8 | MSOP8   | VSON008X2100 |               |                       |                    | Operating (mA)            | Standby (µA) |                             |                            |                   |                        |                               |                           |
| <b>New</b> BR25H640 | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | NUX-5AC      | 64K           | 8K×8                  | 1.7 to 5.5         | 8                         | 10           | 3.5                         | -40 to +125                | 4×10 <sup>6</sup> | 100                    | FSs                           | YES                       |
| BR25H128            | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | NUX-5AC      | 128K          | 16K×8                 | 1.7 to 5.5         | 8                         | 10           | 3.5                         |                            |                   |                        | FSs                           |                           |
| <b>New</b> BR25H256 | F-5AC              | FJ-5AC | FVT-5AC  | FVM-5AC | NUX-5AC      | 256K          | 32K×8                 | 1.7 to 5.5         | 8                         | 10           | 3.5                         |                            |                   |                        | FSs                           |                           |
| <b>New</b> BR25H1M  | F-5AC              | FJ-5AC | FVT-5AC  | —       | —            | 1024K         | 128K×8                | 1.7 to 5.5         | 8                         | 20           | 3.5                         |                            |                   |                        | FSs                           |                           |

**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) | ComfySIL™ Functional Safety*1 | 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 <sup>6</sup>   | 100                    | FSs                           | YES                       |
| BR25H128 | F-2AC              | FJ-2AC | FVT-2AC  | —       | 128K          | 16K×8                 | 2.5 to 5.5         | 5.5                       | 10           | 4                           |                            |                   |                        | FSs                           |                           |
| BR25H256 | F-2AC              | FJ-2AC | —        | —       | 256K          | 32K×8                 | 2.5 to 5.5         | 5.5                       | 10           | 4                           |                            |                   |                        | FSs                           |                           |

**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) | ComfySIL™ Functional Safety*1 | 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 <sup>6</sup>   | 100                    | FSs                           | YES                       |
| BR25H020 | F-2C               | FJ-2C  | FVT-2C   | FVM-2C | 2K            | 256×8                 | 2.5 to 5.5         | 4                         | 10           | 4                           |                            |                   |                        | FSs                           |                           |
| BR25H040 | F-2C               | FJ-2C  | FVT-2C   | FVM-2C | 4K            | 512×8                 | 2.5 to 5.5         | 4                         | 10           | 4                           |                            |                   |                        | FSs                           |                           |
| BR25H080 | F-2C               | FJ-2C  | FVT-2C   | FVM-2C | 8K            | 1K×8                  | 2.5 to 5.5         | 4                         | 10           | 4                           |                            |                   |                        | FSs                           |                           |
| BR25H160 | F-2C               | FJ-2C  | FVT-2C   | FVM-2C | 16K           | 2K×8                  | 2.5 to 5.5         | 4                         | 10           | 4                           |                            |                   |                        | FSs                           |                           |
| BR25H320 | F-2C               | FJ-2C  | FVT-2C   | FVM-2C | 32K           | 4K×8                  | 2.5 to 5.5         | 4                         | 10           | 4                           |                            |                   |                        | FSs                           |                           |
| BR25H640 | F-2C               | FJ-2C  | FVT-2C   | —      | 64K           | 8K×8                  | 2.5 to 5.5         | 5.5                       | 10           | 4                           |                            |                   |                        | FSs                           |                           |
| BR25H128 | F-2C               | FJ-2C  | —        | —      | 128K          | 16K×8                 | 2.5 to 5.5         | 5.5                       | 10           | 4                           |                            |                   |                        | FSs                           |                           |

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

|          |      |       |        |   |      |        |            |   |    |   |             |                 |     |     |     |
|----------|------|-------|--------|---|------|--------|------------|---|----|---|-------------|-----------------|-----|-----|-----|
| BR25A256 | F-3M | FJ-3M | FVT-3M | — | 256K | 32K×8  | 2.5 to 5.5 | 4 | 10 | 5 | -40 to +105 | 10 <sup>6</sup> | 100 | FSs | YES |
| BR25A512 | F-3M | FJ-3M | FVT-3M | — | 512K | 64K×8  | 2.5 to 5.5 | 4 | 10 | 5 |             |                 |     | FSs |     |
| BR25A1M  | F-3M | FJ-3M | —      | — | 1M   | 128K×8 | 2.5 to 5.5 | 4 | 10 | 5 |             |                 |     | FSs |     |

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 \*1 For more information about "ComfySIL™ Functional Safety", please refer to the of the cover.