

# swissbit®

## Product Fact Sheet

### Industrial / Automotive e•MMC Memory

#### EM-30 Series

JEDEC e•MMC 5.1 compliant,  
BGA 153 ball

Industrial / Automotive  
Temperature Grade

Date: March 25, 2022  
Revision: 1.04



Made in Germany

## Product Summary

- **Capacities:** 16 GBytes, 32 GBytes, 64 GBytes, 128 GBytes, 256 GBytes
- **Operating Temperature Range<sup>1</sup>:** Industrial Operating Temperature -40 to 85°C / Automotive Operating Temperature -40 to 105°C (not available for 16 GBytes)
- **Endurance in TeraBytes Written (TBW) @ Max Capacity<sup>2</sup>:** up to 160

## Product Features

- Fully compliant with JEDEC e-MMC 5.1 Standard (JESD84-B51)
- 153-ball BGA, 0.5mm pitch
- 11.5 x 13mm, RoHS compliant
- 3D TLC NAND base technology
- Industrial Operating Temperature -40 to 85°C / Automotive Operating Temperature -40 to 105°C (not available for 16 GBytes)
- Multiple 3D TLC or enhanced/reliable mode partitions user configurable according to e-MMC Spec 5.1
- High performance e-MMC 5.1 specification
  - Eleven-wire bus (clock, data strobe, 1 bit command, 8 bit data bus) and a hardware reset
  - Three different data bus width modes: 1-bit (default), 4-bit, and 8-bit
  - Clock frequencies 0-200MHz, High Speed Mode HS400
  - Command Queue Feature according to e-MMC Spec 5.1
  - Up to 300MB/s sequential read and up to 230MB/s sequential write
- Power Supply: (Low-power CMOS technology)
  - VCCQ 1.7V...1.95V or 2.7V...3.6V e-MMC supply
  - VCC 2.7V...3.6V NAND Flash supply
- Optimized FW algorithms
  - Power-fail data loss protection
  - Wear Leveling technology  
Equal wear leveling of static and dynamic data. The wear leveling assures that dynamic data as well as static data is balanced evenly across the memory. With that the maximum write endurance of the device is ensured
  - Read Disturb Management  
The read commands per region are monitored and the content is conditionally refreshed when critical levels have occurred
  - Auto Read Refresh  
The interruptible background process maintains the user data for Read Disturb effects or Retention degradation due to high temperature effects
  - Diagnostic features with Device Health Report according to e-MMC Spec 5.1, and detailed Lifetime Monitor data (Swissbit proprietary, accessible through standard e-MMC commands).
  - Field Firmware update<sup>3</sup>s according to e-MMC Spec 5.1
  - Discard and Sanitize, Trim
  - Boot Operation Mode and Alternative Boot Operation Mode
  - Replay Protected Memory Block (RPMB)



<sup>1</sup> Adequate airflow is required to ensure the temperature does not exceed 85°C (industrial temperature drive)

<sup>2</sup> According to JEDEC (JESD471), the time to write the full TBW is a minimum of 18 months. Higher average daily data volume reduces the specified TBW. The values listed are estimates and are subject to change without notice.

<sup>3</sup> The support of In-Field FW update capabilities on host systems is recommended.

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- High reliability
  - Designed with sophisticated firmware architecture for industrial and embedded markets.
  - Ideal for application like POS/POI, PLC, IoT, gaming, medical and use as general boot medium for embedded applications.
  - The product is optimized for long life cycle that requires superior data retention as well as power fail safety.
  - Intensive write applications should use the enhanced/reliable mode
  - Controlled BOM & PCN process

## 1 Order Information for EM-30

| Density | Part Number                  | Industrial Temp. Range | Firmware     | Flash Technology  |
|---------|------------------------------|------------------------|--------------|-------------------|
| 16GB    | SFEM016GB1ED1T0-I-5E-111-STD | -40°C to 85°C          | FW1: default | 3D TLC NAND Flash |
|         | SFEM016GB2ED1T0-I-5E-111-STD |                        |              |                   |
| 32GB    | SFEM032GB1ED1T0-I-5E-111-STD |                        |              |                   |
|         | SFEM032GB2ED1T0-I-5E-111-STD |                        |              |                   |
| 64GB    | SFEM064GB1ED1T0-I-6F-111-STD |                        |              |                   |
|         | SFEM064GB2ED1T0-I-6F-111-STD |                        |              |                   |
| 128GB   | SFEM128GB1ED1T0-I-7G-111-STD |                        |              |                   |
|         | SFEM128GB2ED1T0-I-7G-111-STD |                        |              |                   |
| 256GB   | SFEM256GB1ED1T0-I-8H-111-STD |                        |              |                   |
|         | SFEM256GB2ED1T0-I-8H-111-STD |                        |              |                   |

| Density | Part Number                  | Automotive Temp. Range | Firmware     | Flash Technology  |
|---------|------------------------------|------------------------|--------------|-------------------|
| 32GB    | SFEM032GB1ED1T0-A-5E-111-STD | -40°C to 105°C         | FW1: default | 3D TLC NAND Flash |
|         | SFEM032GB2ED1T0-A-5E-111-STD |                        |              |                   |
| 64GB    | SFEM064GB1ED1T0-A-6F-111-STD |                        |              |                   |
|         | SFEM064GB2ED1T0-A-6F-111-STD |                        |              |                   |
| 128GB   | SFEM128GB1ED1T0-A-7G-111-STD |                        |              |                   |
|         | SFEM128GB2ED1T0-A-7G-111-STD |                        |              |                   |
| 256GB   | SFEM256GB1ED1T0-A-8H-111-STD |                        |              |                   |
|         | SFEM256GB2ED1T0-A-8H-111-STD |                        |              |                   |

### 1.1 System Performance

| System Performance, HS400                         | Max. 3D TLC | Max. reliable mode | Unit |
|---------------------------------------------------|-------------|--------------------|------|
| Burst Data transfer Rate HS400 (max clock 200MHz) | 400         |                    | MB/s |
| Sequential Read                                   | up to 300   | up to 300          |      |
| Sequential Write                                  | up to 230   | up to 230          |      |

### 1.2 Current consumption

| Current Consumption, HS400, Max. Density | Typ. ICCQ current @ VCCQ 1.8V | Typ. ICC current @ VCC 3.3V | Unit |
|------------------------------------------|-------------------------------|-----------------------------|------|
| Write                                    | 102                           | 101                         | mA   |
| Read                                     | 153                           | 102                         |      |
| Sleep                                    | 0.07                          | 0.07                        |      |

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### 1.3 Physical Dimensions

| Physical Dimensions | Value    | Unit |
|---------------------|----------|------|
| Length              | 13±0.1   | mm   |
| Width               | 11.5±0.1 |      |
| Thickness           | 1.2 max. |      |

### 1.4 Recommended Temperature Conditions

| Parameter                                  | Min. | Typ. | Max. | Unit |
|--------------------------------------------|------|------|------|------|
| Industrial Operating / Storage Temperature | -40  | 25   | 85*  | °C   |
| Automotive Operating / Storage Temperature | -40  | 25   | 105* | °C   |

\* High temperature storage without operation reduces the data retention, in operation the data will be refreshed, if data error issues were detected

For more information on e-MMC interface, please visit JEDEC homepage ([www.jedec.org](http://www.jedec.org))

### Why Swissbit?

Swissbit is focused on the design, development, manufacture, and support of leading edge memory and storage solutions for the worldwide OEM/ODM marketplace. As a global supplier, Swissbit recognizes and addresses the higher level of application requirements of today's industrial, Netcom, and automotive customers by providing best-in-class products and services, with uncompromised attention to driving overall value and quality.