swissbit®

Product Data Sheet
Addendum for 100-ball BGA

Industrial
e•MMC Memory

EM-36 Series
**JEDEC e•MMC 5.1 compliant,
BGA 100-ball**

Industrial and Automotive
Temperature Grade

Date: March 11, 2025
Revision: 1.04

EM-36 Series – Industrial embedded MMC 5.1
5 - 80 GBytes, 100-ball BGA

1. Ordering Information

The following Table 1 lists the part number associated with the changes identified in this document.

Table 1: Available Part Numbers

Capacity	Part Number	Temperatur
5 GBytes (pSLC)	SFEM005GB1ED1T0–I–5E–31P–STD	Industrial
10 GBytes (pSLC)	SFEM010GB1ED1T0–I–5E–31P–STD	Industrial
20 GBytes (pSLC)	SFEM020GB1ED1T0–I–6F–31P–STD	Industrial
20 GBytes (pSLC)	SFEM020GB1ED1TB–I–CE–31P–STD	Industrial
20 GBytes (pSLC)	SFEM020GB1ED1TB–A–CE–31P–STD	Automotive
40 GBytes (pSLC)	SFEM040GB1ED1TB–I–EF–31P–STD	Industrial
40 GBytes (pSLC)	SFEM040GB1ED1TB–A–EF–31P–STD	Automotive
80 GBytes (pSLC)	SFEM080GB1ED1TB–I–VG–31P–STD	Industrial
80 GBytes (pSLC)	SFEM080GB1ED1TB–A–VG–31P–STD	Automotive

2. Product Changes

The 100–ball Industrial e·MMC 5.1 is identical to the Swissbit standard EM–36 device with the exceptions defined in the following section.
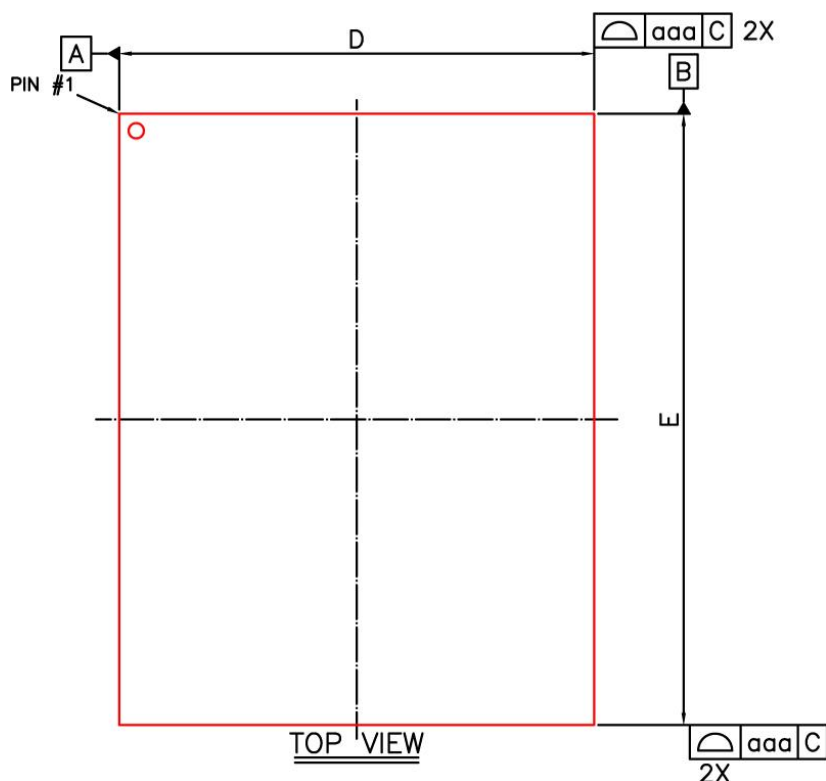
2.1 Mechanical Specifications

Table 2: Physical Dimensions

Physical Dimensions		Unit
Length	14±0.1	mm
Width	18±0.1	
Thickness (Max)	1.4 max.	
Weight (Max Capacity)	< 1	g

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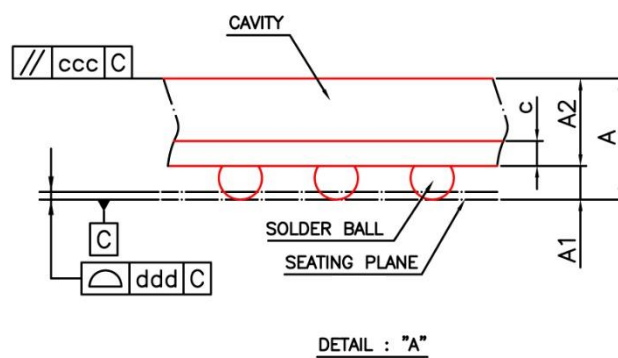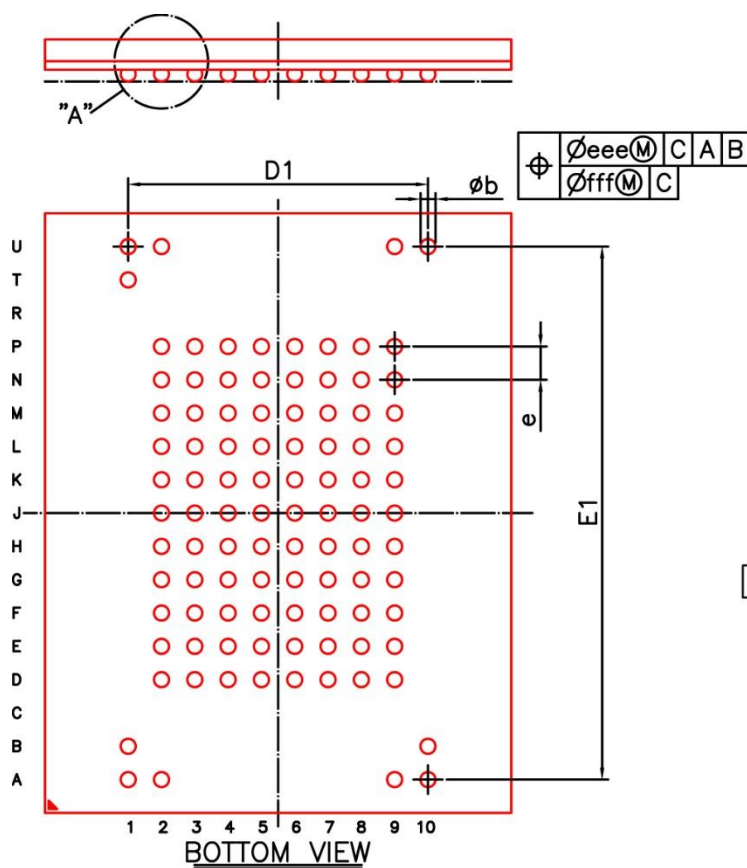Template: Doc–4991
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2.2 Physical description

Figure 1: Mechanical dimensions eMMC

Package Mechanical (14 x 18 x 1.4mm)

Symbol	Dimension in mm		
	MIN	NOM	MAX
A	---	---	1.40
A1	0.30	0.35	0.40
A2	0.86	0.91	0.96
c	0.22	0.26	0.30
D	13.90	14.00	14.10
E	17.90	18.00	18.10
D1	---	9.00	---
E1	---	16.00	---
e	---	1.00	---
b	0.40	0.45	0.50
aaa	0.15		
ccc	0.15		
ddd	0.12		
eee	0.15		
fff	0.08		

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2.3 Pinout

Figure 2: Ball assignment (top view, ball down)

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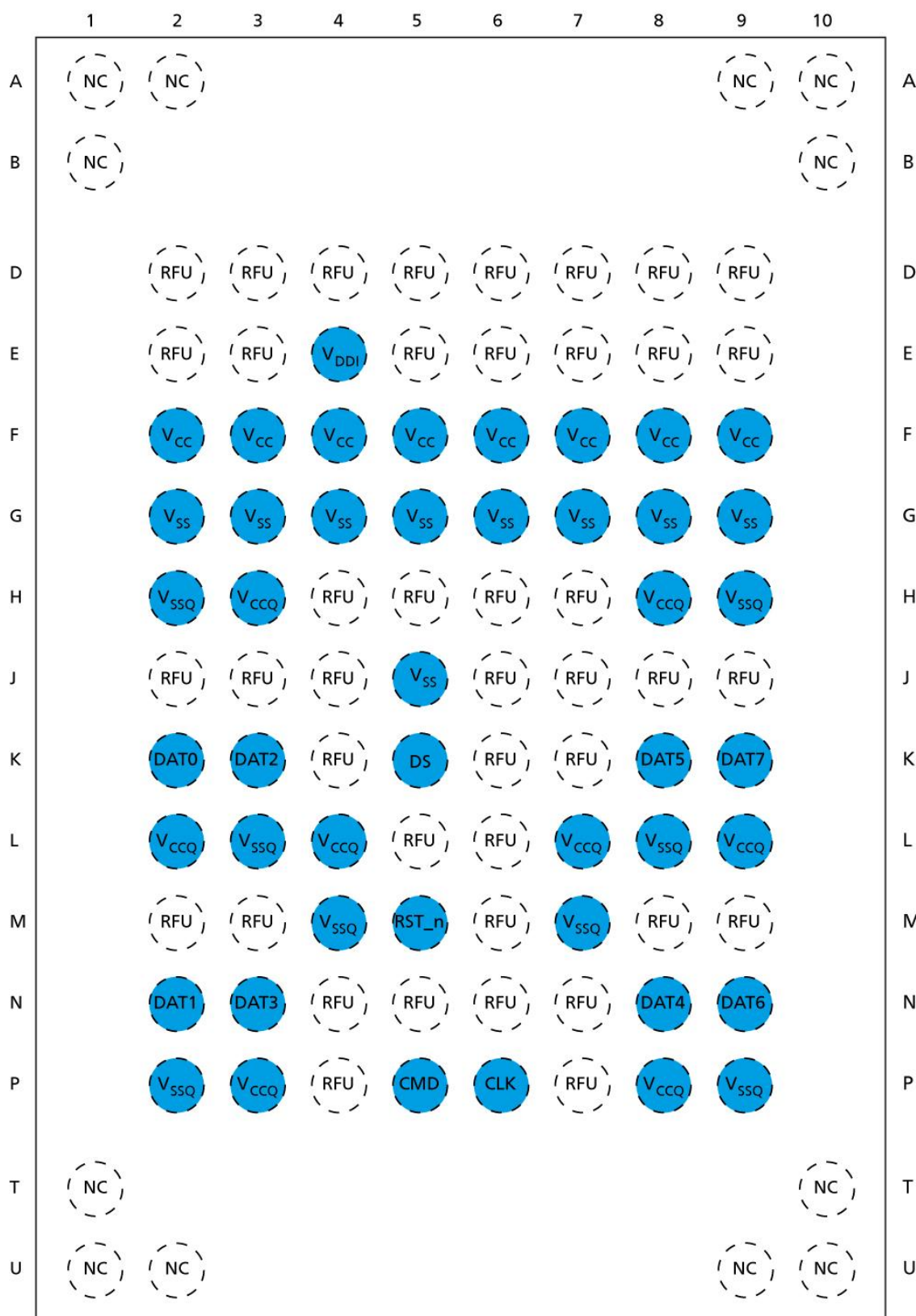
Table 3: Pinout

Name	Type[1]	Ball No.	Description
CLK	I	P6	Clock: Each cycle directs a 1-bit transfer on the command and DAT lines.
CMD	I/O/PP/OD	P5	Command: A bidirectional channel used for device initialization and command transfer. Command has two operating modes: 1) Open-drain for initialization. 2) Push-pull for fast command transfer.
DAT0	I/O/PP	K2	Data I/O0: Bidirectional channel used for data transfer.
DAT1	I/O/PP	N2	Data I/O1: Bidirectional channel used for data transfer.
DAT2	I/O/PP	K3	Data I/O2: Bidirectional channel used for data transfer.
DAT3	I/O/PP	N3	Data I/O3: Bidirectional channel used for data transfer.
DAT4	I/O/PP	N8	Data I/O4: Bidirectional channel used for data transfer.
DAT5	I/O/PP	K8	Data I/O5: Bidirectional channel used for data transfer.
DAT6	I/O/PP	N9	Data I/O6: Bidirectional channel used for data transfer.
DAT7	I/O/PP	K9	Data I/O7: Bidirectional channel used for data transfer.
RST_n	I	M5	Reset signal pin
VCC	S	F2, F3, F4, F5, F6, F7, F8, F9	VCC: Flash memory I/F and Flash memory power supply.
VCCQ	S	H3, H8, L2, L4, L7, L9, P3, P8	VCCQ : Memory controller core and MMC interface I/O power supply.
VSS	S	G2, G3, G4, G5, G6, G7, G8, G9, J5	VSS: Flash memory I/F and Flash memory ground connection.
VSSQ	S	H2, H9, L3, L8, M4, M7, P2, P9	VSSQ: Memory controller core and MMC I/F ground connection.
VDDi		E4	VDDi : Connect capacitor Creg from VDDi to GND.
DS	O/PP	K5	Data Strobe: Newly assigned pin for HS400 mode.
NC			Not connected
RFU			Reserved for future use, leave floating

1. I: input; O: output; PP: push-pull; OD: open-drain; NC: Not connected; S: power supply.

2.4 Part Number change

To differentiate, the BGA form factor is encoded in the part number:

SFEM005GB1ED1TO-I-5E-x1P-STD
SFEM010GB1ED1TO-I-5E-x1P-STD
SFEM020GB1ED1TO-I-6F-x1P-STD
SFEM020GB1ED1TB-I-CE-x1P-STD
SFEM020GB1ED1TB-A-CE-x1P-STD
SFEM040GB1ED1TB-I-EF-x1P-STD
SFEM040GB1ED1TB-A-EF-x1P-STD
SFEM080GB1ED1TB-I-VG-x1P-STD
SFEM080GB1ED1TB-A-VG-x1P-STD

x = BGA form type

BGA form type	x
11.5 x 13mm, 153ball	1
14 x 18mm, 100ball	3

For further details about our Industrial e·MMC 5.1, see our standard product data sheet or fact sheet of the EM-36 Series (http://www.swissbit.com).

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3. Revision History

Table 4: Document Revision History

Date	Revision	Description	Revision Details
18-Jun-2020	0.90	Preliminary initial release	Doc. req. no. 3786
25-Feb-2021	1.00	Initial release	Doc. req. no. 4420
18-Jan-2022	1.01	Added product variants, updated footer (doc. classification), preliminary release	Doc. req. no. 5160
07-Jul-2022	1.02	Final release	Doc. req. no. 5551
19-Sep-2023	1.03	Added solder ball / SMD ball pad information.	Doc. req. no. 6568
11-Mar-2025	1.04	Added new variants and adjusted physical description	–

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