



## DuraFlash™

# BGAE540 | eMMC | 153-ball/100-ball

SMART's DuraFlash BGAE540 eMMC is a soldered-down Flash storage solution that combines NAND Flash memory, an embedded MMC (MultiMediaCard) Controller, and advanced firmware in a small BGA (Ball Grid Array) package that provides stable, yet cost effective high-density embedded storage. The BGAE540 eMMC is designed to meet the rigid requirements of the industrial, medical and networking markets.

SMART's BGAE540 eMMC is compliant to eMMC v5.1 specifications and is available in the standard JEDEC 0.5mm pitch, 153-ball BGA package, as well 1.0mm pitch, 100-ball BGA package. The 100-ball package offers larger ball pitch and ball diameter enabling lower cost PCB designs and simplifies PCB routing with wider metal traces.

### Features & Benefits

- Compliant to JEDEC v5.1 Standard
- BGAE540 SE: Base eMMC, TLC NAND with Capacities from 16GB to 128GB
- BGAE540 UE: Pre-configured to pSLC Enhanced Storage Media Mode with User Capacities from 5GB to 40GB
- Industrial Temp (-40°C to +85°C)

### Product Family Overview

Capacity	Sequential Performance
<b>BGAE540 SE   eMMC   153-ball/100-ball</b> 16GB to 128GB	Up to 320MB/s Read; Up to 45MB/s Write
<b>BGAE540 UE   eMMC   153-ball/100-ball</b> 5GB to 40GB	Up to 320MB/s Read; Up to 215MB/s Write



### Applications

- Factory Automation
- IIoT
- Medical Devices
- Networking Appliances
- POS Terminals
- RFID Scanners
- Single-Board Computers
- Telecom Infrastructure

## Specifications (BGAE540 SE)

	BGAE540 SE   153-ball	BGAE540 SE   100-ball
<b>NAND Type</b>	TLC	
<b>Performance</b>		
Host Interface Rate (maximum)	eMMC v5.1 (HS400)	
Capacities	16GB to 128GB	
Sequential Read (maximum)	320 MB/s	
Sequential Write (maximum)	45 MB/s	
Random Read (maximum)	9.3K IOPS	
Random Write (maximum)	2.1K IOPS	
<b>Reliability</b>		
Endurance	128GB: 40 TBW	
(JEDEC Enterprise Workload)	64GB: 20 TBW	
	32GB: 10 TBW	
	16GB: 25 TBW	
Data Retention	10 years	
Error Correction	LDPC	
<b>Power</b>		
Input Voltage	3.3V ± 10%	
<b>Environmental</b>		
Operating Shock	1500 g half-sine, 0.5 msec, 1 shock along each axis, X, Y, Z in each direction	
Operating Vibration	20G 80-2000Hz, 1.52mm 20-80Hz, 3 axis	
Operating Temperature	Industrial: -40°C to +85°C	
Storage Temperature	-40°C to +85°C	
<b>Physical</b>		
Length	11.5 mm	14 mm
Width	13 mm	18 mm
Height	1.0 mm	2.45 mm

## Ordering Information (BGAE540 SE)

Part Number	Density
<b>BGAE540 SE   eMMC   153-ball</b>	
<b>Industrial Operating Temperature (-40°C to +85°C)</b>	
SP9MDGP3AMI01	128GB
SP9MCGP3AMI01	64GB
SP9MBGP3AMI01	32GB
SP9MAGP3AMI01	16GB
<b>BGAE540 SE   eMMC   153-ball</b>	
<b>Industrial Operating Temperature (-40°C to +85°C)</b>	
SP9QDGP3AMI01	128GB
SP9QCGP3AMI01	64GB
SP9QBG3AMI01	32GB
SP9QAGP3AMI01	16GB

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## Specifications (BGAE540 UE)

	BGAE540 UE   153-ball	BGAE540 UE   100-ball
NAND Type	pSLC	
<b>Performance</b>		
Host Interface Rate (maximum)	eMMC v5.1 (HS400)	
Capacities	5GB to 40GB	
Sequential Read (maximum)	320 MB/s	
Sequential Write (maximum)	215 MB/s	
Random Read (maximum)	9.3K IOPS	
Random Write (maximum)	2.1K IOPS	
<b>Reliability</b>		
Endurance	40GB: 88 TBW	
(JEDEC Enterprise Workload)	20GB: 44 TBW	
	10GB: 22 TBW	
	5GB: 11 TBW	
Data Retention	10 years	
Error Correction	LDPC	
<b>Power</b>		
Input Voltage	3.3V ± 10%	
<b>Environmental</b>		
Operating Shock	1500 g half-sine, 0.5 msec, 1 shock along each axis, X, Y, Z in each direction	
Operating Vibration	20G 80-2000Hz, 1.52mm 20-80Hz, 3 axis	
Operating Temperature	Industrial: -40°C to +85°C	
Storage Temperature	-40°C to +85°C	
<b>Physical</b>		
Length	11.5 mm	14 mm
Width	13 mm	18 mm
Height	1.0 mm	2.45 mm

## Ordering Information (BGAE540 UE)

Part Number	Density
<b>BGAE540 UE   eMMC   153-ball</b>	
<b>Industrial Operating Temperature (-40°C to +85°C)</b>	
SP9MDGP3AMI11	40GB
SP9MCGP3AMI11	20GB
SP9MBGP3AMI11	10GB
SP9MAGP3AMI11	5GB
<b>BGAE540 UE   eMMC   100-ball</b>	
<b>Industrial Operating Temperature (-40°C to +85°C)</b>	
SP9QDGP3AMI11	40GB
SP9QCGP3AMI11	20GB
SP9QBG3AMI11	10GB
SP9QAGP3AMI11	5GB

DuraFlash Product Grading System

**SE** Standard Endurance | TLC

**HE** High Endurance | eTLC

**PE** Premium Endurance | eTLC (OP 28%)

**UE** Ultra Endurance | pSLC



For more information, please visit: [www.smartm.com](http://www.smartm.com)

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