



DuraFlash™

BGAE440 | eMMC

SMART's DuraFlash BGAE440 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 BGAE440 eMMC is designed to meet the rigid requirements of the industrial, medical and networking markets.

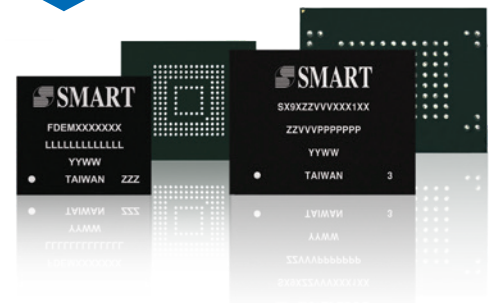
SMART's BGAE440 eMMC is compliant to eMMC v5.1 specifications and is available in the standard JEDEC 0.5mm pitch, 153-ball BGA package, as well 1.0mm pitch, 100-ball BGA package. The 100-ball package offers larger ball pitch and ball diameter enabling lower cost PCB designs and simplifies PCB routing with wider metal traces.

Features & Benefits

- Compliant to JEDEC v5.1 Standard
- Capacities from 16GB to 256GB for TLC Version, and from 5GB to 80GB for pSLC Version
- Pre-Configurable to pSLC Enhanced Storage Media Mode
- Extended Temp (-25°C to +85°C)
- Industrial Temp (-40°C to +85°C)
- VCC = 3.3V and VCCQ = 3.3V or 1.8V

Product Family Overview

Capacity	Sequential Performance
BGAE440 eMMC TLC (153/100 ball)	
16GB to 256GB	Up to 315MB/s Read; Up to 235MB/s Write
BGAE440 eMMC pSLC (153/100 ball)	
5GB to 80GB	Up to 315MB/s Read; Up to 235MB/s Write



Applications

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

Specifications (TLC)

	BGAE440 153-ball	BGAE440 100-ball
NAND Type	TLC	
Performance		
Host Interface Rate (maximum)	eMMC v5.1	
Capacities	16GB to 256GB	
Sequential Read (maximum)	315 MB/s	
Sequential Write (maximum)	235 MB/s	
Random Read (maximum)	10K IOPS	
Random Write (maximum)	2.4K IOPS	
Reliability		
Endurance (JEDEC Enterprise Workload)	256GB:	48 TBW
	128GB:	24 TBW
	64GB:	12 TBW
	32GB:	6 TBW
	16GB:	3 TBW
Data Retention	10 years	
Error Correction	LDPC	
Power		
Input Voltage	3.3V ± 5%	
Environmental		
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	Extended: -25°C to +85°C Industrial: -40°C to +85°C	
Storage Temperature	-40°C to +85°C	
Physical		
Length	11.5 mm	14 mm
Width	13 mm	18 mm
Height	1.2 mm	1.4 mm

Ordering Information (TLC)

Part Number	Density
BGAE440 153-ball TLC Extended Operating Temperature (-25°C to +85°C)	
SP9MEGR1AWE01	256GB
SP9MDGR1AWE01	128GB
SP9MCGR1AWE01	64GB
SP9MBGR1AWE01	32GB
SP9MAGR1AWE01	16GB
BGAE440 153-ball TLC Industrial Operating Temperature (-40°C to +85°C)	
SP9MEGR1AWI01	256GB
SP9MDGR1AWI01	128GB
SP9MCGR1AWI01	64GB
SP9MBGR1AWI01	32GB
SP9MAGR1AWI01	16GB
BGAE440 100-ball TLC Extended Operating Temperature (-25°C to +85°C)	
SP9LEGR1AWE01	256GB
SP9LDGR1AWE01	128GB
SP9LCGR1AWE01	64GB
SP9LBGR1AWE01	32GB
SP9LAGR1AWE01	16GB
BGAE440 100-ball TLC Industrial Operating Temperature (-40°C to +85°C)	
SP9LEGR1AWI01	256GB
SP9LDGR1AWI01	128GB
SP9LCGR1AWI01	64GB
SP9LBGR1AWI01	32GB
SP9LAGR1AWI01	16GB

Specifications (pSLC)

	BGAE440 153-ball	BGAE440 100-ball
NAND Type	pSLC	
Performance		
Host Interface Rate (maximum)	eMMC v5.1	
Capacities	5GB to 80GB	
Sequential Read (maximum)	315 MB/s	
Sequential Write (maximum)	235 MB/s	
Random Read (maximum)	10K IOPS	
Random Write (maximum)	2.6K IOPS	
Reliability		
Endurance (JEDEC Enterprise Workload)	80GB: 176 TBW	
	40GB: 88 TBW	
	20GB: 44 TBW	
	10GB: 22 TBW	
	5GB: 11 TBW	
Data Retention	10 years	
Error Correction	LDPC	
Power		
Input Voltage	3.3V ± 5%	
Environmental		
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	Extended: -25°C to +85°C Industrial: -40°C to +85°C	
Storage Temperature	-40°C to +85°C	
Physical		
Length	11.5 mm	14 mm
Width	13 mm	18 mm
Height	1.2 mm	1.4 mm

Ordering Information (pSLC)

Part Number	Density
BGAE440 153-ball pSLC Extended Operating Temperature (-25°C to +85°C)	
SP9MEGR1AWE11	80GB
SP9MDGR1AWE11	40GB
SP9MCGR1AWE11	20GB
SP9MBGR1AWE11	10GB
SP9MAGR1AWE11	5GB
BGAE440 153-ball pSLC Industrial Operating Temperature (-40°C to +85°C)	
SP9MEGR1AWI11	80GB
SP9MCGR1AWI11	40GB
SP9MCGR1AWI11	20GB
SP9MBGR1AWI11	10GB
SP9MAGR1AWI11	5GB
BGAE440 100-ball pSLC Extended Operating Temperature (-25°C to +85°C)	
SP9LEGR1AWE11	80GB
SP9MCGR1AWI11	40GB
SP9LCGR1AWE11	20GB
SP9LBGR1AWE11	10GB
SP9LAGR1AWE11	5GB
BGAE440 100-ball pSLC Industrial Operating Temperature (-40°C to +85°C)	
SP9LEGR1AWI11	80GB
SP9LDGR1AWI11	40GB
SP9LCGR1AWI11	20GB
SP9LBGR1AWI11	10GB
SP9LAGR1AWI11	5GB



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