

Cypress Semiconductor Reliability Qualification Report

QTP# Q100776 Version **

S26KS512S

**Qualification of: S26KS512S, 512 Mbit (64 Mbyte) HyperFlash™ Family
Non-Volatile Memory CMOS 1.8 Volt Core and I/O in VAA024 Package**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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I. Product and Package Information

Product Description: S26KS512S **Cypress Division:** Memory Product Division
512 Mbit (64 Mbyte) HyperFlash™ Family Non-Volatile Memory CMOS 1.8 Volt Core and I/O

Package: VAA024	QTP: Q100776	
Description: (8 x 6 x 1mm) 24 Ball, Fine Pitch Ball Grid Array Package (FBGA)		Flammability: O2 Index:
Assembly: Cypress Thailand	Molding Compound: ShinEtsu KMC 3580LVA	UL-V0 >28
Electrical Test: Cypress Thailand	Theta Ja / Psi Jt: 39 °C/W / 5 °C/W	
Substrate/Leadframe: Laminate Substrate	Die Attachment: HR9050	
Lead Finish: 96.5Sn3.0Ag0.5Cu Spheres	Bond Wire: Copper	
Comments:		

Est. Field Temperature: 55 °C	Life Test Temperature: 150 °C
Est. DC Field Current: 80 mA	Life Test Dynamic Current: 100 mA
Est. Field Voltage: 1.8 V	Life Test Voltage: 1.95 V
Est. Field Power Dissipation: 144 mWatts	Est. Stress Power Dissipation: 195 mWatts
Est. Field Tj: 60.6 °C	Est. Stress Tj: 157.6 °C

Die: 98UZ0A	Die Size: 5.43 x 5.19 mm
Process: CS239LS (65nm)	Fab: FAB25
Type: MirrorBit	Density: 512M

II. CS239LS Life Test Failure Rate Calculation

HTOL Stress Temperature - 125 °C

Failure Mechanism	Read Points / Test Results					Modeling Parameters @ 55°C					Avg. Failure Rate FITS @ 55°C, 60% Conf.	
	24 hrs	48 hrs	168 hrs	1000 hrs	2000 hrs	Ea eV	TAF	VAF	OAF	MTTF (yrs)	PPM	FIT
PLASTIC												
Sample Size	2770	2970	5744	1504	135							
Zero fails, Process ave. Ea	0	0	0	0	0	0.7	69	1	69			
Totals	0	0	0	0	0					19026	0	6

* Contributes to early life FITS

Data Retention Bake - 150 °C

Reliability Stress	Number of Rejects	Sample Size	Failure Rate %	Failure Mechanism
500 hrs	0	3765	0.00	No Failures
1000 hrs	0	3473	0.00	No Failures

III. Summary of Stress Test Results

Stress Test	Stress Condition	Package Type	Sample Size	Num. of Lots	Num. of Fails	Failure Rate %	Comments
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Data From Qualification Q100776:

ESD CDM	N/A	VAA024 ¹	15	1		Passed 1.0kV	
Preconditioning	(PC2/260°C, +0°C/-5°C)	VAA024 ¹	154	1		Passed Jedec L3	
Precon+Temp Cycle	(PC2/260°C, -40°C/150°C)	VAA024 ¹	77	1	0	0.00	500 cycles

Generic Reference Data:

HTOL (EL)	(1.95V, 150°C)	FAB024 ⁴	384	4	0	0.00	168 hours
HTOL (IL)	(1.95V, 150°C)	FAB024 ⁴	154	4	0	0.00	504 hours
HTOL (XL)	(1.95V, 150°C)	FAB024 ⁴	154	4	0	0.00	1000 hours
High Temp Bake (200°C)	(200°C)	FAB024 ³	77	1	0	0.00	300 hours
ESD HBM	(100pF, 1500 Ohms)	FAB024 ⁴	84	1		Passed 2.0kV	
Latch Up	(+/- 100mA)	FAB024 ⁴	6	1		Passed	
Preconditioning	(PC2/260°C, +0°C/-5°C)	VAA024 ²	718	7		Passed Jedec L3	
Precon+Temp Cycle	(PC2/260°C, -65°C/150°C)	VAA024 ²	154	1	0	0.00	500 cycles
	(PC2/260°C, -40°C/150°C)	VAA024 ²	77	1	0	0.00	1000 cycles
	(PC2/260°C, -40°C/150°C)	FAB024 ⁵	76	1	0	0.00	1000 cycles
Precon+HAST	(PC2/260°C, Biased, 110°C/85% RH)	VAA024 ²	297	5	0	0.00	264 hours
Precon+uHAST	(PC2/260°C, Unbiased, 130°C/85% RH)	FAB024 ⁵	77	1	0	0.00	96 hours
	(PC1/260°C, Unbiased, 130°C/85% RH)	FAB024 ⁶	77	1	0	0.00	96 hours

- Notes / Justification:**
- 1) Results from Qual Q100776, S26KS512S, CS239LS (65nm) MirrorBit in 24 Ball FBGA (8 x 6 x 1mm)
 - 2) Results from Qual Q100817, S26KL512S in 24 Ball FBGA (8 x 6 x 1mm) - Same Product and Same Package
 - 3) Results from Qual Q100052c, S25FL064P in 24 Ball FBGA (8 x 6 x 1.2mm) - Same FAB024 (Similar to VAA024) Package with 3.0V Product
 - 4) Results from Qual Q100502, S26KS512S in 24 Ball FBGA (8 x 6 x 1.2mm) - Same 1.8V Product with Mask Set 3 and same FAB024 (Similar to VAA024) Package
 - 5) Results from Qual Q100629, S26KL512S in 24 Ball FBGA (8 x 6 x 1.2mm) - Same 1.8V Product in FAB024 Package (Similar to VAA024)
 - 6) Results from Qual Q100087, S25FL256S in 24 Ball FBGA (8 x 6 x 1.2mm) - Same FAB024 (Similar to VAA024) Package and Assembly Location

Preconditioning Flows: PC2 (JEDEC L3): Bake 125°C, 24hr => Soak @ 30°C/60%RH, 192hr => 3x Reflow

Reliability Tests Performed per Specification Requirements

Stress	Condition	Specification Reference
ESD CDM	N/A	JS002 / AEC-Q100-011
ESD HBM	(100pF, 1500 Ohms)	JS001 / AEC-Q100-002
High Temp Bake (200°C)	(200°C)	JESD22-A103
HTOL (EL)	(1.95V, 150°C)	JESD22-A108
HTOL (IL)	(1.95V, 150°C)	JESD22-A108
HTOL (XL)	(1.95V, 150°C)	JESD22-A108
Latch Up	(+/- 100mA)	JESD78 / AEC Q100-004
Precon+HAST	(PC2/260°C, Biased, 110°C/85% RH)	JESD22-A110
Precon+Temp Cycle	(PC2/260°C, -40°C/150°C)	JESD22-A104
Precon+Temp Cycle	(PC2/260°C, -65°C/150°C)	JESD22-A104
Precon+uHAST	(PC1/260°C, Unbiased, 130°C/85% RH)	JESD22-A118
Precon+uHAST	(PC2/260°C, Unbiased, 130°C/85% RH)	JESD22-A118
Preconditioning	(PC2/260°C, +0°C/-5°C)	J-STD-020

IV. Revision History

Document Number: 002-23045**Document Title:** Q100776 : Qualification of S26KS512S in VAA024 Package

Rev.	Issue Date	ECN#	Originator	Description
**	2/9/2018	6064783	EKNG	Initial Release.

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