S29GL512S

CS Q99992, Q99990, Q100182a

Qualification of: S29GL512S, 512Mb, 3.0 Volt-only Page Mode Flash Memory featuring 65 nm MirrorBit® Eclipse process technology in LAE064, LAA064, and TSOP056 Packages

Reliability Qualification Summary

CONFIDENTIAL

NOTICE: The material in this report is confidential. It is prepared to assist in the qualification of our product. It is declassified for the internal use of our customers only, and may be modified to meet the needs of specific customers. It also serves as a record of full qualification according to JESD47 and AEC-Q100 Grade 1 requirements.

Additionally, the package details (material set, assembly location, etc.) are specific to the qual vehicle used for the qualification. Alternate material sets and assembly locations may be qualified for the product. Production material can be assembled with any qualified material set and at any qualified assembly location. Tests are performed in accordance with AEC-Q100 and relevant JEDEC specifications.

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I.A. Product Information

Product Description: S29GL512S

512Mb, 3.0 Volt-only Page Mode Flash Memory featuring 65 nm MirrorBit® Eclipse process technology

Package:	LAE064	**Qualification:**	Q99992
Description:	(9 x 9 x 1.4mm) 64 Ball, Fortified Ball Grid Array Package (fFBGA)		
Theta Ja:	39 °C/W	**Psi Jt:**	17 °C/W
Assembly Location:	Spansion Thailand	**Molding Compound:**	RoHS Compliant Epoxy Resin
Substrate/Leadframe:	Laminate Substrate	**Die Attachment:**	Paste
Lead Finish:	96.5Sn3.0Ag0.5Cu Spheres	**Bond Wire:**	Copper
Comments:			

Est. Field Temperature:	55 °C	**Life Test Temperature:**	125 °C
Est. DC Field Current:	25 mA	**Life Test Dynamic Current:**	10 mA
Est. Field Voltage:	3.0 V	**Life Test Voltage:**	3.6 V
Est. Field Power Dissipation:	75 mWatts	**Est. Stress Power Dissipation:**	36 mWatts
Est. Field Tj:	57.9 °C	**Est. Stress Tj:**	126.4 °C

Die:	98290A	**Die Size:**	6.80 x 5.02 mm
Process:	CS239LS (65nm)	**Fab:**	Spansion Fab25
Type:	MirrorBit Eclipse	**Density:**	512M

I.B. Product Information

Product Description: S29GL512S

512Mb, 3.0 Volt-only Page Mode Flash Memory featuring 65 nm MirrorBit® Eclipse process technology

Package:	TS056	**Qualification:**	Q99990
Description:	(18.4 x 14.0 x 1.0mm) 56 Lead, Thin Small Outline Package (TSOP)		
Theta Ja:	40 °C/W	**Psi Jt:**	17 °C/W
Assembly Location:	Spansion Kuala Lumpur	**Molding Compound:**	RoHS Compliant Epoxy Resin
Substrate/Leadframe:	Copper Leadframe	**Die Attachment:**	Paste
Lead Finish:	100% Matte Sn Plating	**Bond Wire:**	Copper
Comments:			

Est. Field Temperature:	55 °C	**Life Test Temperature:**	125 °C
Est. DC Field Current:	25 mA	**Life Test Dynamic Current:**	10 mA
Est. Field Voltage:	3.0 V	**Life Test Voltage:**	3.6 V
Est. Field Power Dissipation:	75 mWatts	**Est. Stress Power Dissipation:**	36 mWatts
Est. Field Tj:	58.0 °C	**Est. Stress Tj:**	126.4 °C

Die:	98290A	**Die Size:**	6.80 x 5.02 mm
Process:	CS239LS (65nm)	**Fab:**	Spansion Fab25
Type:	MirrorBit Eclipse	**Density:**	512M

I.C. Product Information

Product Description: S29GL512S

512M, 3.0 Volt-only Page Mode Flash Memory featuring 65nm MirrorBit Eclipse Process Technology

Package:	LAA064	**Qualification:**	Q100182a
Description:	(13.0 x 11.0 x 1.4mm) 64 Ball, Fortified Ball Grid Array Package (FBGA)		
Theta Ja:	39 °C/W	**Psi Jt:**	11 °C/W
Assembly Location:	Spansion Thailand	**Molding Compound:**	RoHS Compliant Epoxy Resin
Substrate/Leadframe:	Laminate Substrate	**Die Attachment:**	Paste
Lead Finish:	96.5Sn3.0Ag0.5Cu Spheres	**Bond Wire:**	Copper
Comments:			

Est. Field Temperature:	55 °C	**Life Test Temperature:**	125 °C
Est. DC Field Current:	25 mA	**Life Test Dynamic Current:**	10 mA
Est. Field Voltage:	3.0 V	**Life Test Voltage:**	3.6 V
Est. Field Power Dissipation:	75 mWatts	**Est. Stress Power Dissipation:**	36 mWatts
Est. Field Tj:	57.9 °C	**Est. Stress Tj:**	126.4 °C

Die:	98290A	**Die Size:**	6.80 x 5.02 mm
Process:	CS239LS (65nm)	**Fab:**	Spansion Fab25
Type:	MirrorBit Eclipse	**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	168 hrs	1000 hrs	2000 hrs	Ea eV	TAF	VAF	OAF	MTTF (yrs)	Early Life	Inherent Life
PLASTIC											
Sample Size	4950	4615	842	50							
Zero fails, Process ave. Ea	0	0 *	0	0	0.66	53	1	53		48	11
Totals	**0**	**0**	**0**	**0**					**10378**	**48**	**11**

* Contributes to early life FITS

Data Retention Bake - 150 °C

Reliability Stress	Number of Rejects	Sample Size	Failure Rate %	Failure Mechanism
500 hrs	0	1735	0.00	No Failures
1000 hrs	0	1208	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
Data From Qualification Q99992, Q99990, Q100182a:							
HTOL (EL)	(3.6V, 125°C)	LAE064 [1]	77	1	0	0.00	168 hours
ESD CDM	N/A	LAE064 [1]	15	1	Passed 1.0kV		
	N/A	TS056 [2]	15	1	Passed 1.0kV		
	N/A	LAA064 [3]	15	1	Passed 1.0kV		
ESD HBM	(100pF, 1500 Ohms)	LAE064 [1]	84	1	Passed 2.0kV		
Latch Up	(125°C, +/- 100mA)	LAE064 [1]	6	1	Passed		
Endurance (10k)	(-40°C, 3.6V)	LAE064 [1]	64	1	0	0.00	10K cycles
	(90°C, 3.6V)	LAE064 [1]	128	1	0	0.00	10K cycles
Preconditioning	(PC1/260°C, +0°C/-5°C)	LAE064 [1]	231	2	Passed Jedec L3 / Jeita Rank E		
	(PC9/260°C, +0°C/-5°C)	TS056 [2]	77	1	Passed Jedec L3 (Accel.)		
Precon+Temp Cycle	(PC1/260°C, -40°C/150°C)	LAE064 [1]	77	1	0	0.00	1000 cycles
	(PC9/260°C, -40°C/150°C)	TS056 [2]	77	1	0	0.00	1000 cycles
Precon+HAST	(PC1/260°C, Biased, 110°C/85% RH)	LAE064 [1]	77	1	0	0.00	264 hours
Precon+uHAST	(PC1/260°C, Unbiased, 130°C/85% RH)	LAE064 [1]	77	1	0	0.00	96 hours
Generic Reference Data:							
Preconditioning	(PC1/260°C, +0°C/-5°C)	TS056 [4]	448	2	Passed Jedec L3 / Jeita Rank E		
	(PC1/260°C, +0°C/-5°C)	LAE064 [5]	385	2	Passed Jedec L3 / Jeita Rank E		
	(PC1/260°C, +0°C/-5°C)	LAA064 [6]	693	3	Passed Jedec L3 / Jeita Rank E		
Precon+Temp Cycle	(PC1/260°C, -40°C/150°C)	TS056 [4]	154	2	0	0.00	1000 cycles
	(PC1/260°C, -40°C/150°C)	LAE064 [5]	154	2	0	0.00	1000 cycles
	(PC1/260°C, -40°C/150°C)	LAA064 [6]	231	3	0	0.00	1000 cycles
Precon+HAST	(PC1/260°C, Biased, 130°C/85% RH)	TS056 [4]	140	2	0	0.00	96 hours
	(PC1/260°C, Biased, 110°C/85% RH)	LAE064 [5]	154	2	0	0.00	264 hours
	(PC1/260°C, Biased, 110°C/85% RH)	LAA064 [6]	231	3	0	0.00	96 hours
Precon+uHAST	(PC1/260°C, Unbiased, 130°C/85% RH)	TS056 [4]	154	2	0	0.00	96 hours
	(PC1/260°C, Unbiased, 130°C/85% RH)	LAE064 [5]	77	1	0	0.00	96 hours
	(PC1/260°C, Unbiased, 130°C/85% RH)	LAA064 [6]	231	3	0	0.00	96 hours

Notes / Justification:

1) Results from Qual Q99992, S29GL512S, 512M CS239LS (65nm) MirrorBit Eclipse in 64 Ball fFBGA (9 x 9 x 1.4mm)
2) Results from Qual Q99990, S29GL512S, 512M CS239LS (65nm) MirrorBit Eclipse in 56 Lead TSOP (18.4 x 14 x 1mm)
3) Results from Qual Q100182a, S29GL512S, 512M CS239LS (65nm) MirrorBit Eclipse in 64 Ball fFBGA (13 x 11 x 1.4mm)
4) Results from Qual Q99486a, S29GL512R in 56 Lead TSOP (18.4 x 14 x 1mm) - Same TSOP package, same Density, Similar Process Technology
5) Results from Qual Q99891, S29GL01GS in 64 Ball fFBGA (9 x 9 x 1.4mm) - Same LAE package and Flash Technology
6) Results from Qual Q99832, S29GL01GR in 64 Ball fFBGA (13 x 11 x 1.4mm) - Same LAA package and similar process Technology node

Preconditioning Flows:

PC1 (Exceeds JEDEC L3 and JEITA Rank E): Bake 125°C, 24hr => Soak @ 30°C/70%RH, 216hr => 3x Reflow

PC9 (Accelerated JEDEC L3 / JEITA Rank E): Bake 125°C, 24hr => Soak @ 60°C/70%RH, 72hr => 3x Reflow

IV. Revision History

Section	Description
Revision A - 4/11/2011	
	Initial Release.

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