S29GL128S

CS Q100016, Q100016a, Q100079

Qualification of: S29GL128S, 128M, 3.0 Volt-only Page Mode Flash Memory Featuring 65nm MirrorBit Eclipse Process Technology in LAA064, LAE064 and TSOP056 Package

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: S29GL128S

128M, 3.0 Volt-only Page Mode Flash Memory Featuring 65nm MirrorBit Eclipse Process Technology

Package:	LAA064	Qualification:	Q100016
Description:	(13 x 11 x 1.4mm) 64 Ball, Fortified Ball Grid Array Package (fFBGA)		
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:	98741A	Die Size:	4.58 x 4.20 mm
Process:	CS239LS (65nm)	Fab:	Spansion Fab25
Type:	MirrorBit Eclipse	Density:	128M

I.B. Product Information

Product Description: S29GL128S

128M, 3.0 Volt-only Page Mode Flash Memory Featuring 65nm MirrorBit Eclipse Process Technology

Package:	LAE064	Qualification:	Q100016a
Description:	(9 x 9 x 1.4mm) 64 Ball, Fortified Ball Grid Array Package (fFBGA)		
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:	98741A	Die Size:	4.58 x 4.20 mm
Process:	CS239LS (65nm)	Fab:	Spansion Fab25
Type:	MirrorBit Eclipse	Density:	128M

I.C. Product Information

Product Description: S29GL128S

128M, 3.0 Volt-only Page Mode Flash Memory Featuring 65nm MirrorBit Eclipse Process Technology

Package:	TS056	Qualification:	Q100079
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:	98741A	Die Size:	4.58 x 4.20 mm
Process:	CS239LS (65nm)	Fab:	Spansion Fab25
Type:	MirrorBit Eclipse	Density:	128M

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 Q100016, Q100016a, Q100079:							
HTOL (EL)	(3.6V, 125°C)	LAE064 [2]	77	1	0	0.00	48 hours
	(3.6V, 125°C)	LAE064 [2]	77	1	0	0.00	168 hours
ESD CDM	N/A	LAA064 [1]	30	2	Passed 1.0kV		
	N/A	TS056 [3]	15	1	Passed 1.0kV		
ESD HBM	(100pF, 1500 Ohms)	LAA064 [1]	168	2	Passed 2.0kV		
Latch Up	(125°C, +/- 100mA)	LAA064 [1]	12	2	Passed		
Endurance Cycling	(-40°C, 3.6V)	LAA064 [1]	128	2	0	0.00	10K cycles
	(90°C, 3.6V)	LAA064 [1]	128	2	0	0.00	10K cycles
	(90°C, 3.6V)	LAA064 [1]	124	2	0	0.00	100K cycles
Generic Reference Data:							
ESD CDM	N/A	LAE064 [4]	15	1	Passed 1.0kV		
	N/A	LAA064 [5]	15	1	Passed 1.0kV		
Preconditioning	(PC1/260°C, +0°C/-5°C)	LAE064 [6]	216	1	Passed Jedec L3 / Jeita Rank E		
	(PC1/260°C, +0°C/-5°C)	LAA064 [7]	693	3	Passed Jedec L3 / Jeita Rank E		
	(PC9/260°C, +0°C/-5°C)	TS056 [8]	164	1	Passed Jedec L3 / Jeita Rank E		
Precon+Temp Cycle	(PC1/260°C, -40°C/150°C)	LAE064 [6]	72	1	0	0.00	1000 cycles
	(PC1/260°C, -40°C/150°C)	LAA064 [7]	231	3	0	0.00	1000 cycles
	(PC9/260°C, -40°C/150°C)	TS056 [8]	87	1	0	0.00	500 cycles
Precon+HAST	(PC1/260°C, Biased, 110°C/85% RH)	LAE064 [6]	67	1	0	0.00	264 hours
	(PC1/260°C, Biased, 110°C/85% RH)	LAA064 [7]	231	3	0	0.00	96 hours
	(PC9/260°C, Biased, 130°C/85% RH)	TS056 [8]	77	1	0	0.00	96 hours
Precon+uHAST	(PC1/260°C, Unbiased, 130°C/85% RH)	LAE064 [6]	77	1	0	0.00	96 hours
	(PC1/260°C, Unbiased, 130°C/85% RH)	LAA064 [7]	231	3	0	0.00	96 hours

Notes / Justification:
1) Results from Qual Q100016, S29GL128S, 128M CS239LS (65nm) MirrorBit Eclipse in 64 Ball fFBGA (13 x 11 x 1.4mm)
2) Results from Qual Q100016a, S29GL128S, 128M CS239LS (65nm) MirrorBit Eclipse in 64 Ball fFBGA (9 x 9 x 1.4mm)
3) Results from Qual Q100079, S29GL128S, 128M CS239LS (65nm) MirrorBit Eclipse in 56 Lead TSOP (18.4 x 14 x 1mm)
4) Results from Qual Q100073, S29GL128S in 64 Ball fFBGA (9 x 9 x 1.4mm)
5) Results from Qual Q100183a, S29GL128S in 64 Ball fFBGA (13 x 11 x 1.4mm)
6) Results from Qual Q100181, S29GL01GS in 64 Ball fFBGA (9 x 9 x 1.4mm) - Same LAE Package and Flash Technology
7) Results from Qual Q99832, S29GL01GR in 64 Ball fFBGA (13 x 11 x 1.4mm) - Same LAA Package and Flash Technology
8) Results from Qual Q100013, S29GL256S in 56 Lead TSOP (18.4 x 14 x 1mm) - Same TSOP Package and Flash Technology

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 - 6/29/2011	
	Initial Release.