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Cypress Semiconductor Automotive Product Qualification Report

QTP# 032403 VERSION *A
July 2014

Automotive Qual R52LD-5R Technology, Fab4	
CY62128B MoBL® **CY621282B MoBL®**	1M (128K x 8) Static RAM

FOR ANY QUESTIONS ON THIS REPORT, PLEAE CONTACT
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PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date Comp
032403	7C62128H, 1 Meg, R5-AEC-Q100 Automotive Qual on R52LD-5R Technology	Dec 03

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose: Qualify 7C62128H (1Meg, 5V) device on R52LD-5R Technology for Automotive Application		
Marketing Part #:	CY62128B, CY621282B	
Device Description:	5V, Automotive	
Cypress Division:	Cypress Semiconductor Corporation –Memory Product Division (MPD)	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. H
What ID markings on Die:	7C62128/7C1128	

TECHNOLOGY/FAB PROCESS DESCRIPTION – R95LD-3R			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500Å TiW/6000Å A1-5%, Cu/300Å TiW Metal 2: 300Å CoTi/8000Å A1-5%, Cu/300Å TiW
Passivation Type and Materials:		1000 Å PECVD Oxide, 9000Å PECVD Si3N4	
Generic Process Technology/Design Rule (-drawn):		CMOS, Double Metal / 0.25µm/0.3 FETS	
Gate Oxide Material/Thickness (MOS):		70Å (Core) 110Å Regulator	
Name/Location of Die Fab (prime) Facility:		Cypress Semiconductor -- Bloomington, MN	
Die Fab Line ID/Wafer Process ID:		Fab4/R52LD-5R	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
32-Lead STSOP I/TSOP I	OSE-Taiwan (T)
32-lead SOIC	JCET-China (JT)
32-lead Reverse TSOP I	OSE-Taiwan (T)

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	Z32
Package Outline, Type, or Name:	32-lead Thin Small Outline Package (TSOP I)
Mold Compound Name/Manufacturer:	Sumitomo7351LS
Mold Compound Flammability Rating:	UL-94 V-0
Oxygen Rating Index:	N/A
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	85Sn/15Pb
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	100% Saw Through
Die Attach Supplier:	Ablestik
Die Attach Material:	8361J
Die Attach Method:	Silver Epoxy
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.0 mil
Thermal Resistance Theta JA °C/W:	97.4°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-35999
Name/Location of Assembly (prime) facility:	Amkor-Korea (GQ), OSE-Taiwan (T)
MSL Level	3
Reflow Profile	235C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	**CML-R**

Note: Please contact a Cypress Representative for other package availability.

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	AEC-Q100-008 and JESD22-A108 Dynamic Operating Condition, Vcc Max = 5.75V, 125°C	P
High Temperature Operating Life Latent Failure Rate	JESD22-A-108 Dynamic Operating Condition, Vcc Max = 5.75V, 150°C	P
High Accelerated Saturation Test (HAST)	JESD22-A110 130°C, 5.5V,85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+ Reflow, 220°C+5, 0°C	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs, 30C/60%RH+ Reflow, 220°C+5, 0°C	P
Pressure Cooker	JESD22-A102 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+ Reflow, 220°C+5, 0°C	P
High Temperature Storage	JESD22-A103 150°C ± 5°C no bias	P
Electrostatic Discharge Human Body Model (ESD-HBM)	500V/1000V/1500V/2000V AEC-Q100-002	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	250V/500V AEC-Q100-011	P
Bond Pull	MIL-STD-883 – Method 2011, Cpk : 1.33, Ppk : 1.66	P
External Visual	MIL-PRF-38535, MILSTD-883, METHOD 2009	P
Ball Shear	AEC Q100-001	P
Solderability	JESD22-B102 ,95% solder coverage minimum	P
Electrical Distributions	AEC-Q100-009	P
Physical Dimensions	MIL-STD-1835, JESD22-B100	P
Static Latch-up	125C, 12V, ± 300mA In accordance with JEDEC 17	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[4]	Failure Rate
High Temperature Operating Life Early Failure Rate	2536 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2,] Long Term Failure Rate	94,248 DHRs	0	0.7	170	57 FIT**

[1] Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.
[2] Chi-squared 60% estimations used to calculate the failure rate.
[3] Thermal Acceleration Factor is calculated from the Arrhenius equation

$$AF = \exp\left[\frac{E_A}{k}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]\right]$$

where:

E_A =The Activation Energy of the defect mechanism.
K = Boltzmann's constant = 8.62×10^{-5} eV/Kelvin.
T_1 is the junction temperature of the device under stress and T_2 is the junction temperature of the device at use conditions.

**Insufficient samples to calculate FIT Rate.
**Based on Automotive qual samples size not Commercial qual sample size.

Reliability Test Data

QTP #: 032403

Device	Fab Lot #	Assy Lot #	Assy Loc		Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 5.75V, Vcc Max								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	48	844	0		
CY62128BLL (7C62128H)	4038533	610049068	KOREA-GQ	48	846	0		
CY62128BLL (7C62128H)	4329943	610337799	KOREA-GQ	48	846	0		
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 5.75V, Vcc Max								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	408	77	0		
CY62128BLL (7C62128H)	4038533	610049068	KOREA-GQ	408	77	0		
CY62128BLL (7C62128H)	4329943	610337799	KOREA-GQ	408	77	0		
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 500V								
CY62128BLL (7C62128H)	4149243	610234118	TAIWN-T	COMP	3	0		
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 1,000V								
CY62128BLL (7C62128H)	4149243	610234118	TAIWN-T	COMP	3	0		
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 1,500V								
CY62128BLL (7C62128H)	4149243	610234118	TAIWN-T	COMP	3	0		
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,000V								
CY62128BLL (7C62128H)	4149243	610234118	TAIWN-T	COMP	3	0		
STRESS: ESD-CHARGE DEVICE MODEL, 250V								
CY62128BLL (7C62128H)	4149243	610234118	TAIWN-T	COMP	3	0		
STRESS: ESD-CHARGE DEVICE MODEL, 500V								
CY62128BLL (7C62128H)	4149243	610234118	TAIWN-T	COMP	3	0		
STRESS: STATIC LATCH-UP TESTING, 125C, 12V, ±300mA								
CY62128BLL (7C62128H)	4149243	610234118	TAIWN-T	COMP	6	0		
STRESS: BOND PULL								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	COMP	5	0		
STRESS: ELECTRICAL DISTRIBUTIONS								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	COMP	77	0		
CY62128BLL (7C62128H)	4038533	610049068	KOREA-GQ	COMP	77	0		
CY62128BLL (7C62128H)	4329943	610337799	KOREA-GQ	COMP	77	0		

Reliability Test Data

QTP #: 032403

Device	Fab Lot #	Assy Lot #	Assy Loc		Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMPERATURE STORAGE, 150ºC								
CY62128BLL (7C62128H)	4038533	610049068	KOREA-GQ	1000	77	0		
STRESS: PHYSICAL DIMENSIONS								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	COMP	30	0		
STRESS: SOLDERABILITY								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	COMP	15	0		
CY62128BLL (7C62128H)	4038533	610049068	KOREA-GQ	COMP	15	0		
CY62128BLL (7C62128H)	4329943	610337799	KOREA-GQ	COMP	15	0		
STRESS: BALL SHEAR								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	COMP	5	0		
STRESS: EXTERNAL VISUAL								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	COMP	844	0		
CY62128BLL (7C62128H)	4038533	610049068	KOREA-GQ	COMP	846	0		
CY62128BLL (7C62128H)	4329943	610337799	KOREA-GQ	COMP	846	0		
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V, PRE COND 192 HR 30C/60%RH, MSL3								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	96	80	0		
CY62128BLL (7C62128H)	4038533	610049068	KOREA-GQ	96	78	0		
CY62128BLL (7C62128H)	4329943	610337799	KOREA-GQ	96	77	0		
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192 HR 30C/60%RH, MSL3								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	96	80	0		
CY62128BLL (7C62128H)	4038533	610049068	KOREA-GQ	96	80	0		
CY62128BLL (7C62128H)	4329943	610337799	KOREA-GQ	96	80	0		
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH, MSL3								
CY62128BLL (7C62128H)	4329911	610337944	KOREA-GQ	500	80	0		
CY62128BLL (7C62128H)	4038533	610049068	KOREA-GQ	500	80	0		
CY62128BLL (7C62128H)	4329943	610337799	KOREA-GQ	500	80	0		

Document History Page

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Rev.	ECN No.	Orig. of Change	Description of Change
**	4040426	JYF	Initial spec release.
*A	4431902	HSTO	Align qualification report based on the new template in the front page

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