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Cypress Semiconductor Automotive Product Qualification Report

QTP# 061805 VERSION*C
November, 2014

1 Meg MoBL SRAM Automotive Devices	
R95LD-3R, FAB 4	
CY62126ESL MoBL®	1-Mbit (64K x 16) Static RAM
CY62126EV30 MoBL®	1-Mbit (64K x 16) Static RAM
CY62127EV30 MoBL®	1-Mbit (64K x 16) Static RAM
CY62128E MoBL®	1-Mbit (128K x 8) Static RAM
CY62128EV30 MoBL®	1-Mbit (128K x 8) Static RAM
CY62256E MoBL®	256-Kb (32K x 8) Static RAM
CY6264E MoBL®	640Kb (8K x 8) Static RAM

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
reliability@cypress.com or via a CYLINK CRM CASE

Prepared By:
Josephine Pineda (JYF)
Reliability Engineer

Reviewed By:
Rene Rodgers (RT)
Reliability Manager

Approved By:
Richard Oshiro (RGO)
Reliability Director

PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
071103	8 Meg MoBL SRAM Automotive Device Family & Technology (R95LD-3R) Qualification at Fab 4	Mar 07
061805	Qualify 1Meg MoBL Static RAM Automotive device and family on R95LD-3R Technology at Fab 4	Mar 07
134510	Qualify polyimide mask to qualified Automotive 1 Meg MoBL SRAM, R95LD-3R Technology at Fab 4	Nov 13

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify 1Meg MoBL SRAM Automotive device and family, R95LD-3R Technology at Fab4	
Marketing Part #:	CY62128E, CY62126EV30, CY62127EV30, CY62128EV30, CY62256E, CY6264E, and CY62126ESL
Device Description:	1.8V, 3V, 5V Automotive
Cypress Division:	Cypress Semiconductor Corporation –Programmable Systems Division (PSD)

TECHNOLOGY/FAB PROCESS DESCRIPTION – R95LD-3R			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 100Å Ti / 3200Å Al / 300Å TiW Metal 2: 150Å Ti / 8000Å Al / 300Å TiW
Passivation Type and Materials:	1000Å Oxide TEOS / 9000Å Nitride		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double Metal, 0.09μm		
Gate Oxide Material/Thickness (MOS):	28Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor -- Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/R95LD-3R		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
28-Lead SNC	CML-R
32-Lead SOIC	CML-R
32-Lead TSOP	CML-R
32-TSOP/STSOP	CML-R, TAIWAN-T
44-Pin TSOP II	CML-R
48-Ball VFBGA/FBGA	TAIWAN-G, CML-RA

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	ZW44
Package Outline, Type, or Name:	44-Pin TSOPII
Mold Compound Name/Manufacturer:	Hitachi CEL9200CYRU
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	28%
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Dexter
Die Attach Material:	QMI509
Die Attach Method:	Die Attach Epoxy
Bond Diagram Designation:	10-06722
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil
Thermal Resistance Theta JA °C/W:	27.83 °C/W
Package Cross Section Yes/No:	N/A
Name/Location of Assembly (prime) facility:	CML-R
MSL Level	3
Reflow Profile	260C

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 = 1.85V, 125°C	P
High Temperature Operating Life Latent Failure Rate	JESD22-A108 Dynamic Operating Condition, Vcc Max = 1.85V, 150°C, 125°C	P
High Accelerated Saturation Test (HAST)	JESD22-A110, 130°C, 5.5V, 85%RH Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+ Reflow, 260°C+0, -5°C	P
Temperature Cycle	JESD22-A104, Condition C, -65°C to 150°C Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+ Reflow, 260°C+0, -5°C	P
Pressure Cooker	JESD22-A102, 121°C, 100%RH, 15 Psig Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+ Reflow, 260°C+0, -5°C	P
Ball Shear	AEC-Q100-010	P
Bond Pull	Mil-Std 883, Method 2011	P
Electrostatic Discharge Human Body Model (ESD-HBM)	AEC-Q100-002	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	AEC-Q100-011	P
Electrical Distributions	AEC Q100-009	P
External Visual	JESD22-B100	P
High Temperature Storage	JESD22-A103, 150°C	P
Physical Dimensions	JESD22B100 and B108	P
Post Temp Cycle Bond Pull	Mil-Std 883, Method 2011	P
Solderability	JESD22-B102	P
Static Latch-up	AEC-Q100-004	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	11,642 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	96,400 DHRs	0	0.7	170	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 = 8.62x10⁻⁵ eV/Kelvin.

T₁ is the junction temperature of the device under stress and T₂ 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 #: 071103

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: BALL SHEAR							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	5	0	
STRESS: BOND PULL							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	5	0	
STRESS: POST TEMP CYCLE BOND PULL							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	5	0	
STRESS: ESD-CHARGE DEVICE MODEL, 250V							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 750V, Corner Pins Only							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT , 500V							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT , 1,000V							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT , 1,500V							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT , 2,000V							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	3	0	
STRESS: EXTERNAL VISUAL							
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	340	0	
CY62157EV30 (7C62157F)	4641534	610700620/2/3	CML-R	COMP	4452	0	
CY62157EV30 (7C62157F)	4644874	610701731/2/3	CML-R	COMP	4292	0	
CY62157EV30 (7C62157F)	4638533	610702506/8/981	CML-R	COMP	4344	0	
CY62157EV30 (7C62157F)	4629071	610660071	CML-R	COMP	30	0	
CY62157EV30 (7C62157F)	4627156	610661704	CML-R	COMP	30	0	



Reliability Test Data

QTP #: 071103

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: ELECTRICAL DISTRIBUTIONS

CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	30	0	
CY62157EV30 (7C62157F)	4629071	610660071	CML-R	COMP	30	0	
CY62157EV30 (7C62157F)	4627156	610661704	CML-R	COMP	30	0	

STRESS: PHYSICAL DIMENSIONS

CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	10	0	
CY62157EV30 (7C62157F)	4641534	610700620	CML-R	COMP	10	0	
CY62157EV30 (7C62157F)	4644874	610701731	CML-R	COMP	10	0	
CY62157EV30 (7C62157F)	4638533	610702506	CML-R	COMP	10	0	

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 1.85V, Vcc Max

CY62157EV30 (7C62157F)	4641534	610700620	CML-R	48	1410	0	
CY62157EV30 (7C62157F)	4641534	610700622	CML-R	48	1497	0	
CY62157EV30 (7C62157F)	4641534	610700623	CML-R	48	1535	0	
CY62157EV30 (7C62157F)	4644874	610701731	CML-R	48	1427	0	
CY62157EV30 (7C62157F)	4644874	610701732	CML-R	48	1469	0	
CY62157EV30 (7C62157F)	4644874	610701733	CML-R	48	1386	0	
CY62157EV30 (7C62157F)	4638533	610702506	CML-R	48	1490	0	
CY62157EV30 (7C62157F)	4638533	610702508	CML-R	48	1444	0	
CY62157EV30 (7C62157F)	4638533	610702981	CML-R	48	1400	0	

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 1.85V, Vcc Max

CY62157EV30 (7C62157F)	4622329	610650792	CML-R	408	50	0	
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STRESS: HIGH TEMPERATURE STORAGE, 150C, no bias

CY62157EV30 (7C62157F)	4622329	610650792	CML-R	1000	50	0	
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STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V, PRE COND 192 HR 30C/60%RH, MSL3

CY62157EV30 (7C62157F)	4622329	610650792	CML-R	96	45	0	
CY62157EV30 (7C62157F)	4622329	610650792	CML-R	128	45	0	



Reliability Test Data

QTP #: 071103

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3

CY62157EV30 (7C62157F)	4622329	610650792	CML-R	96	50	0	
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CY62157EV30 (7C62157F)	4622329	610650792	CML-R	168	48	0	
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STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3

CY62157EV30 (7C62157F)	4622329	610650792	CML-R	500	55	0	
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CY62157EV30 (7C62157F)	4622329	610650792	CML-R	1000	50	0	
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STRESS: STATIC LATCH-UP TESTING, 125C, 8.27V, ±100mA

CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	6	0	
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STRESS: SOLDERABILITY

CY62157EV30 (7C62157F)	4622329	610650792	CML-R	COMP	15	0	
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CY62157EV30 (7C62157F)	4629071	610660070	CML-R	COMP	15	0	
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CY62157EV30 (7C62157F)	4627156	610661706	CML-R	COMP	15	0	
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Reliability Test Data

QTP #: 061805

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ESD-CHARGE DEVICE MODEL, 200V							
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 250V							
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 750V, Corner Pins Only							
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT , 500V							
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT , 1,000V							
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT , 1,500V							
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT , 2,000V							
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	3	0	
STRESS: ESD-MACHINE MODEL, 100V							
CY62128ELL (7A62128K)	4648460	610726022	CML-R	COMP	3	0	
STRESS: ESD-MACHINE MODEL, 200V							
CY62128ELL (7A62128K)	4648460	610726022	CML-R	COMP	3	0	
STRESS: ESD-MACHINE MODEL, 400V							
CY62128ELL (7A62128K)	4648460	610726022	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 8.27V, ±100mA							
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	3	0	
STRESS: ELECTRICAL DISTRIBUTIONS							
CY62126EV30LL (7C62126F)	4618754	610655703	CML-R	COMP	30	0	
CY62126EV30LL (7C62126F)	4620625	610653683	CML-R	COMP	30	0	
CY62126EV30LL (7C62126F)	4622986	610655531	CML-R	COMP	30	0	



Reliability Test Data

QTP #: 061805

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
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STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 1.85V, Vcc Max

CY62126EV30LL (7C62126F)	4647074	610707488	CML-R	48	3928	0	
CY62126EV30LL (7C62126F)	4647074	610707489	CML-R	48	3811	0	
CY62126EV30LL (7C62126F)	4647074	610707490	CML-R	48	2901	0	
CY62126EV30LL (7C62126F)	4647074	610707490N	CML-R	48	1002	0	

Reliability Test Data

QTP #: 134510

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 1.85V, Vcc Max (Core)

CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	168	76	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	1000	76	0	

STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3

CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	500	77	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	1000	76	0	

STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3

CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	96	76	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	168	65	0	

STRESS: HI-ACCEL SATURATION TEST, 110C, 85%RH, 1.85V, PRE COND 192 HR 30C/60%RH, MSL3

CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	128	77	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	264	77	0	

STRESS: HIGH TEMPERATURE STORAGE

CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	1000	77	0	
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STRESS: INTERNAL VISUAL

CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	COMP	5	0	
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STRESS: SORT YIELD

7C62155FC	VARIOUS	NA	NA	COMP	EQUIVALENT		
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STRESS: E-TEST YIELD

7C62155FC	VARIOUS	NA	NA	COMP	EQUIVALENT		
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Document History Page

Document Title: QTP 061805: 1 MEG MOBL SRAM AUTOMOTIVE DEVICES, R95LD-3R, FAB 4
Document Number: 001-84627

Rev.	ECN No.	Orig. of Change	Description of Change
**	3810708	NSR	Initial Spec Release
*A	4039096	JYF	Added CY62126ESL part no. in the device coverage of the qual report.
*B	4185332	JYF	Template alignment and addition of polyimide qualification data.
*C	4577806	JYF	Sunset review: Updated QTP title page for template alignment.

Distribution: WEB

Posting: None