Cypress Semiconductor
Technology Qualification Report

QTP# 084612 VERSION 1.0
May 2009

16 Meg MoBL SRAM Automotive Devices R95LD-3R, FAB 4	
CY62167EV30LL*	16-MBIT (1M X 16 / 2M X 8) STATIC RAM
CY62168EV30LL*	16-MBIT (2M X 8) STATIC RAM

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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TECHNOLOGY QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
071103	8 Meg MoBL SRAM Automotive Device & Technology (R95LD-3R) at Fab4	Mar 07
084612	MoBL SRAM Hirel Technology Qual using 7C62167FC, R95LD-3R, 16Meg at Fab4	May 09

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify 16Meg MoBL SRAM Automotive Device and Technology (R95LD-3R) at Fab4	
Marketing Part #:	CY62167EV30LL, CY62168EV30LL
Device Description:	3V, 16Meg (x16) MoBL SRAM
Cypress Division:	Cypress Semiconductor Corporation –Memory Image Division (MID)

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 (-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
48-Ball FBGA	**TAIWAN-G**
48-Pin TSOP I	**TAIWAN-T**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	ZT48
Package Outline, Type, or Name:	48-Pin TSOP I
Mold Compound Name/Manufacturer:	Hitachi CEL9200HFU
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	N/A
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Hitachi
Die Attach Material:	EN-4900G
Die Attach Method:	Die Attach Epoxy
Bond Diagram Designation:	001-14702
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil
Thermal Resistance Theta JA °C/W:	28.71 °C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	001-16674/M
Name/Location of Assembly (prime) facility:	Taiwan-T
MSL Level	3
Reflow Profile	260C

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

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

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 Dynamic Operating Condition, Vcc Max = 1.85V, 150°C	P
High Temperature Operating Life Latent Failure Rate	AEC-Q100-008 and JESD22-A108 Dynamic Operating Condition, Vcc Max = 1.85V, 150°C	P
High Accelerated Saturation Test (HAST)	JESD22-A110, 130°C, 5.5V, 85%RH JESD22-A110, 130°C, 3.6V, 85%RH Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-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+3IR-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+3IR-Reflow, 260°C+0, -5°C	P
Acoustics	Cypress Spec. 25-00104	P
Ball Shear	AEC-Q100-010	P
Bond Pull	Mil-Std 883, Method 2011	P
Constructional Analysis	Cypress Spec. 25-20035	P
Dye Penetration Test	Cypress Spec. 25-00046	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, 150C	P
Physical Dimensions	AEC Q100-009	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	11,274 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2,] Long Term Failure Rate	149,568 DHRs	0	0.7	170	36 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 #: 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)	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)	4622329	*610650792*	*CML-R*	COMP	340	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
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	
STRESS: HIGH TEMPERATURE STORAGE, 150C, no bias							
CY62157EV30 (7C62157F)	4622329	*610650792*	*CML-R*	1000	50	0	
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
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	
CY62157EV30 (7C62157F)	4622329	*610650792*	*CML-R*	168	48	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3							
CY62157EV30 (7C62157F)	4622329	*610650792*	*CML-R*	500	55	0	
CY62157EV30 (7C62157F)	4622329	*610650792*	*CML-R*	1000	50	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 8.27V, ±100mA							
CY62157EV30 (7C62157F)	4622329	*610650792*	*CML-R*	COMP	6	0	
STRESS: SOLDERABILITY							
CY62157EV30 (7C62157F)	4622329	*610650792*	*CML-R*	COMP	15	0	
CY62157EV30 (7C62157F)	4629071	*610660070*	*CML-R*	COMP	15	0	
CY62157EV30 (7C62157F)	4627156	*610661706*	*CML-R*	COMP	15	0	

Reliability Test Data

QTP #: 084612

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTICS							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	22	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	COMP	22	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	COMP	22	0	
STRESS: BALL SHEAR							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	30	0	
STRESS: BOND PULL							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	30	0	
STRESS: CONSTRUCTIONAL ANALYSIS							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	5	0	
STRESS: DYE PENETRATION TEST							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	15	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	COMP	15	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	COMP	15	0	
STRESS: POST TEMP CYCLE BOND PULL							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	5	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500 V							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 1000V							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 1250V							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 750V, Corner Pins Only							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT , 500V							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT, 1,000V							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT, 1,500V							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT, 2,000V							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	3	0	

Reliability Test Data

QTP #: 084612

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ELECTRICAL DISTRIBUTIONS							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	30	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	COMP	30	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	COMP	30	0	
STRESS: PHYSICAL DIMENSIONS							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	10	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	COMP	10	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	COMP	10	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 1.85V, Vcc Max							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	24	4249	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	24	3730	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	24	3295	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 1.85V, Vcc Max							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	432	100	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	432	99	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	432	100	0	
STRESS: HIGH TEMPERATURE STORAGE, 150C, no bias							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	1000	80	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.6V, PRE COND 192 HR 30C/60%RH, MSL3							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	96	79	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	96	79	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	96	80	0	

Reliability Test Data

QTP #: 084612

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	96	80	0	
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	168	80	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	96	80	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	168	80	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	96	80	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	168	80	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	500	85	0	
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	1000	79	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	500	85	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	1000	85	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	500	85	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	1000	85	0	
STRESS: STATIC LATCH-UP TESTING, 125C, ±200mA							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	6	0	
STRESS: SOLDERABILITY							
CY62177EV30LL (7A62167F)	4838611	*610854900*	*TAIWAN-T*	COMP	15	0	
CY62177EV30LL (7A62167F)	4836421	*610854901*	*TAIWAN-T*	COMP	15	0	
CY62177EV30LL (7A62167F)	4836814	*610854902*	*TAIWAN-T*	COMP	15	0	