Cypress Semiconductor
Package Qualification Report

QTP# 99387 VERSION 1.0
May, 2002

R52D-3 Technology , Fab 4	
CY62126BVLL CY62127BVLL	64K x 16 Static RAM

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
99075	New Technology R52LD-3 / 2Meg, Slow Low Power MoBL SRAM, CY62137V	Apr 99
99387	New 1 Meg CY62126BVLL / CY62127BVLL	Apr 00

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose: Qualifies CY62126BVLL / CY62127BVLL, R52LD-3 Technology , Fab4		
Marketing Part #:	CY62126 BVLL/ CY62127BVLL	
Device Description:	64 x 16 Slow Low Power Mobl SRAM	
Cypress Division:	Cypress Semiconductor Corporation – MPD Division	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. B
What ID markings on Die:	7C62126/7V	

TECHNOLOGY/FAB PROCESS DESCRIPTION - R52LD-3			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 300 Å CoTi/6000 Å Al-Cu/300 Å TiW Metal 2: 300Å CoTi/8000Å Al-.Cu/300Å TiW
Passivation Type and Materials:		1000Å PECVD Oxide + 9000Å PECVD Si_2N_4	
Free Phosphorus contents in top glass layer(%):		0%	
Generic Process Technology/Design Rule (µ-drawn):		CMOS, Double Metal /0.25 µm/0.3 FETS	
Gate Oxide Material/Thickness (MOS):		SiO_2 / 70 Å	
Name/Location of Die Fab (prime) Facility:		Cypress Semiconductor -- Bloomington, MN	
Die Fab Line ID/Wafer Process ID:		Fab4/R52LD-3	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
48-Ball FBGA	**Cypress Philippines (CML), ASE Taiwan (TAIWN-G), OSE Taiwan (TAIWN-T)**
44-pin TSOP II	**CSPI-R**

Major Package Information Used in This Qualification	
Package Designation:	ZS444
Package Outline, Type, or Name:	44-pin Thin Small outline Package (TSOP II)
Mold Compound Name/Manufacturer:	Hitachi CEL 9200
Mold Compound Flammability Rating:	V-O per UL 94
Oxygen Rating Index:	＞28%
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Solder Plated, 90%Sn, 10%Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Dexter
Die Attach Material:	QMI 509
Bond Diagram Designation	10-03685
Wire Bond Method:	Thermosonic
Wire Material/Size:	Gold, 1.0mil
Thermal Resistance Theta JA °C/W:	63°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	11-20007
Name/Location of Assembly (prime) facility:	Cypress Philippines (CSPI-R)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	Cypress Philippines (CSPI-R)
Fault Coverage:	100%

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	1) QTP #99387 Dynamic Operating Condition, Vcc=3.8/4.5V, 150°C Dynamic Operating Condition, Vcc =3.8V, 125°C	P
High Temperature Operating Life Latent Failure Rate	1) QTP #99075 Dynamic Operating Condition, Vcc=3.8V, 150°C	P
Long Life Verification	1) QTP #99075 Extended Dynamic burn-in 150°C, 3.8V	P
High Temperature Steady State Life	1) QTP #99075 Static Operating Condition, Vcc=3.8V, 150°C	P
Temperature Cycle	1) 99387, QTP #99075 MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR Reflow, 235°C+5,-0°C	P
High Accelerated Saturation Test HAST	1) QTP #99075 130/140°C, 3.63/5.5V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR Reflow, 235°C+5,-0°C	P
Pressure Cooker Test	1) QTP #99387, QTP #99075 No bias, 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR Reflow, 235°C+5,-0°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1) QTP #99387, QTP #99075 2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	1) QTP #99387, QTP #99075 500V Cypress Spec. 25-00020	P
High Temperature Storage	1) QTP #99075 165°C, no bias	P
Internal Visual	1) QTP #99075 Cypress Spec. 25-00017	P

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS (continuation)

Stress/Test	Test Condition (Temp/Bias)	Result P/F
External Visual	1) QTP #99075 Cypress Spec. 12-00292	P
Physical Dimensions	1) QTP #99075 Cypress Spec. 25-00031	P
Die Shear	1) QTP #9075 Cypress Spec. 12-00292	P
Ball Shear	1) QTP #99075 Cypress Spec. 12-00292	P
Bond Pull	1) QTP #99075 Cypress Spec. 12-00292	P
Thermal Shock	1) QTP #99075 Cypress Spec. 25-00014	P
Solderability, Steam Aged	1) QTP #99075 Cypress Spec. 25-00018	P
Low Temperature Operating Life	1) QTP #99075 -30°C, 3.8V, 8MHz	P
Current Density	1) QTP #99075 Cypress Spec. 25-00104	P
X-Ray	1) QTP #99075 Cypress Spec. 12-00292	P
SEM X-Section	1) QTP #99075 MIL-STD-883, Method 883-2018-2	P
Acoustic Microscopy MSL 3	2) QTP #99075 Cypress Spec. 25-00104	P
Latchup Sensitivity	1) QTP #99387, QTP #99075 125C, 9V In accordance with JEDEC 17. Cypress Spec. 01-00081, ± 200mA	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[4]	Failure Rate[5]
High Temperature Operating Life Early Failure Rate[1]	7138	0	N/A	N/A	0 PPM
High Temperature Operating Life[2,3] Long Term Failure Rate	804,500 DHRs	1	0.7	170	7 FIT

[1] A production burn-in of 12 Hrs at 150°C, 4.5V is required for the product.
[2] Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.
[3] Chi-squared 60% estimations used to calculate the failure rate.
[4] 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.

[5] **Long Term Failure Rate is based on 2 Meg SRAM, R53LD-3 Technology, Fab4, QTP #99075**

RELIABILITY TEST DATA

QTP#: 99387

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 3.8V/4.5V							
CY7C62126BVLL-ZSI (621273B)	4948248	*610002662*	CSPI-R	48	3544	0	
CY7C62126BVLL-ZSI (621273B)	4948248	*610008119*	CSPI-R	48	3594	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY7C62126BVLL-ZSI (621273B)	4948248	*610002662*	CSPI-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 3,300V							
CY7C62126 BVLL-ZSI (621273B)	4948248	*610002662*	CSPI-R	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, 9V,							
CY7C62126 BVLL-ZSI (621273B)	4948248	*610002662*	CSPI-R	COMP	3	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH), PRE COND 192 HR 30C/60%RH, MSL3							
CY7C62126 BVLL-ZSI (621273B)	4948248	*610002662*	CSPI-R	168	48	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH, MSL3							
CY7C62126 BVLL-ZSI (621273B)	4948248	*610002662*	CSPI-R	300	48	0	

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 99075

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 3.8V							
CY62137V-ZSIB	CSPI-R	4852210	619903364	48	1505	0	
CY62137V-ZSIB	CSPI-R	4902501	619905577	48	1504	1	1 Marginal to TOH (See note 1)
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY62137V-ZSIB	CSPI-R	4852210	619903364	COMP	3	0	
CY62138V-ZSC	CSPI-R	4851023	619907600	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2200V							
CY62137V-ZSIB	CSPI-R	4852210	619903364	COMP	3	0	
CY62138V-ZSC	CSPI-R	4851023	619907600	COMP	3	0	
STRESS: DYNAMIC LATCH-UP TESTING, 4.4V							
CY62137V-ZSIB	CSPI-R	4852210	619903364	COMP	3	0	
STRESS:STATIC LATCH-UP TESTING, 125C, 9V, +/200m							
CY62137V-ZSIB	CSPI-R	4852210	619903364	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST, 140C, 3.63V, PRECOND. 192 HRS 30C/60%RH, MSL3							
CY62137V-ZSIB	CSPI-R	4852210	619903364	128	48	0	
CY62137V-ZSIB	CSPI-R	4852210	619903364	256	48	0	
CY62137V-ZSIB	CSPI-R	4902501	619905577	128	48	0	
CY62137V-ZSIB	CSPI-R	4902501	619905577	256	48	0	
CY62137V-RZIB	CSPI-R	4903568	619907944	128	48	0	
STRESS: HIGH TEMPERATURE STORAGE, 165C, NO BIAS							
CY62137V-ZSIB	CSPI-R	4852210	619903364	336	47	0	
CY62137V-ZSIB	CSPI-R	4852210	619903364	1000	47	0	
CY62137V-ZSIB	CSPI-R	4902501	619905577	336	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST, 150C, 3.63V							
CY62137V-ZSIB	CSPI-R	4852210	619903364	80	71	0	
CY62137V-ZSIB	CSPI-R	4852210	619903364	80	9	0	
CY62137V-ZSIB	CSPI-R	4852210	619903364	168	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 3.8V							
CY62137V-ZSIB	CSPI-R	4852210	619903364	80	405	0	
CY62137V-ZSIB	CSPI-R	4852210	619903364	500	405	1	UNKNOWN
CY62137V-ZSIB	CSPI-R	4902501	619905577	80	396	0	
CY62137V-ZSIB	CSPI-R	4902501	619905577	500	396	0	

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 99075

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: EXTENDED DYNAMIC BURN-IN, 150C, 3.8V							
CY62137V-ZSIB	CSPI-R	4852210	619903364	1000	404	0	
STRESS: LOW TEMPERATURE OPERATING LIFE, -30C, 3.8V, 8 MHZ							
CY62137V-ZSIB	CSPI-R	4852210	619903364	500	45	0	

NOTE 1: The failure unit was marginal to TOH (1 Ns). Corrective action was assigned, CAR C991604Q. Permanent corrective action was implemented in WW9912 to tight TOHA limit at Class test to 12 ns + Guard band to screen out marginal TOHA rejects.

RELIABILITY TEST DATA

QTP#: 99075

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRECOND. 192 HRS 30C/60%R, (MSL 3							
CY62137V-ZSIB	CSPI-R	4852210	619903364	168	48	0	
CY62137V-ZSIB	CSPI-R	4902501	619905577	168	48	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%R, (MSL 3							
CY62137V-ZSIB	CSPI-R	4852210	619903364	300	48	0	
CY62137V-ZSIB	CSPI-R	4852210	619903364	1000	48	0	
CY62137V-ZSIB	CSPI-R	4902501	619905577	300	48	0	
CY62137V-ZSIB	CSPI-R	4902501	619905577	1000	48	0	