Cypress Semiconductor
Qualification Report

QTP# 98111 VERSION 2.0
June, 1999

4 Meg SRAM, R42H Technology, Hot Aluminum	
CY62148	512K x 8 Static RAM

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Ed Russell
Reliability Manager
(408)432-7069

PRODUCT DESCRIPTION (for qualification)	
Qualification Purposes:	To qualify 4 Meg SRAM, CY62148 in R42H Technology w/ Hot Al.
Marketing Part #:	CY62148
Package:	32-pin SOIC
Device Description:	512K x 8 Static RAM
Cypress Division:	Cypress Semiconductor Corporation
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A
What ID markings on Die:	62148 7C11481

TECHNOLOGY/FAB PROCESS DESCRIPTION - R42HHA			
Number of Metal Layers:	1	Metal Composition:	Metal 1: 500Å Cu-Ti/8000Å Al
Passivation Type and Materials:	3K Å Oxide + 6,000 Å Nitride (both with PECVD)		
Free Phosphorus contents in top glass layer(%):	0%		
Die Coating(s), if used:	None		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Single Metal /0.42 μm		
Gate Oxide Material/Thickness (MOS):	SiO_2 / 110Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/R42HHA		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	32-pin SOIC		
Mold Compound Name/Manufacturer:	Hitachi CEL 9200		
Lead Frame material:	Copper Alloy 194		
Lead Finish, composition:	Solder Plated, 90%Sn, 10%Pb		
Die Attach Area Plating:	Silver Spot		
Die Attach Method:	Epoxy	Die Attach Material:	Ablestik 8361
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.3 mil
JESD22-A112 Moisture Sensitivity Level:	Level 3		
Name/Location of Assembly (prime) facility:	ASE Taiwan (SOIC)		

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

RELIABILITY TESTS PERFORMED

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc = 5.75V, 125°C	P
High Temperature Operating Life Long Term Failure Rate	Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	MIL-STD-883, Method 3015.7	2,200V
Electrostatic Discharge Charge Device Model (ESD-CDM)	Cypress Spec. 25-00020	1,000V
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	11.5V
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 3 (192 Hrs, 30C/60%RH)	P
Pressure Cooker Test	No bias, 121°C, 100%RH	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]	1595	0	N/A	N/A	0 PPM
High Temperature Operating Life[2,3] Long Term Failure Rate	791,500 DHRs (R42HD Qualification, 1Meg SRAM)	0	0.7	170	7 FIT
	392,500 DHR (4 Meg SRAM qualified in R42HD)	0	0.7	170	14 FIT

[1] A production burn-in of 48 Hrs at 125°C, 6.5V 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 R42HD technology, 1Meg /4 Meg SRAM qualifications.

RELIABILITY TEST DATA

QTP#: 98111

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 5.75V)							
CY62148-SC	TAIWN-G	4816753	619807424	96	1595	0	
STRESS: ESD-CHARGE DEVICE MODEL (750V)							
CY62148-SC	TAIWN-G	4816753	619807424	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (4,400V)							
CY62148-SC	TAIWN-G	4816753	619807424	COMP	3	0	
STRESS: STATIC LATCH-UP 125C, 11V							
CY62148-SC	TAIWN-G	4816753	619807424	COMP	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY62148-SC	TAIWN-G	4816753	619807424	500	120	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH)							
CY62148-SC	TAIWN-G	4816753	619807424	168	48	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH (MSL 3)							
CY62148-SC	TAIWN-G	4816753	619807424	300	48	0	
CY62148-SC	TAIWN-G	4816753	619807424	1000	48	0	

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 98064[1]

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: ESD-CHARGE DEVICE MODEL, 1000V							
CY7C109-VC	INDNS-O	4738602	519712560	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2200V							
CY7C109-VC	INDNS-O	4738602	519712560	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V, 85%RH), PRECOND. 192 HRS 30C/60%RH							
CY7C109-VC	INDNS-O	4738602	519712560	128	46	0	
CY7C109-VC	INDNS-O	4738564	519712898	128	46	0	
CY7C109-VC	INDNS-O	4738564	519712898	256	46	0	
CY7C109-VC	INDNS-O	4739644	519714390	128	46	0	
STRESS: HIGH TEMPERATURE STORAGE (165C, NO BIAS)							
CY7C109-VC	INDNS-O	4738602	519712560	336	46	0	
CY7C109-VC	INDNS-O	4738602	519712560	500	46	0	
CY7C109-VC	INDNS-O	4738602	519712560	1000	46	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)							
CY7C109-VC	INDNS-O	4738602	519712560	80	78	0	
CY7C109-VC	INDNS-O	4738602	519712560	168	78	0	
CY7C109-VC	INDNS-O	4739644	519714390	80	78	0	
CY7C109-VC	INDNS-O	4739644	519714390	168	78	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C109-VC	INDNS-O	4739644	519714390	80	528	0	
CY7C109-VC	INDNS-O	4739644	519714390	500	527	0	
CY7C109-VC	INDNS-O	4745042	519800651L1	80	529	0	
CY7C109-VC	INDNS-O	4745042	519800651L1	500	529	0	
STRESS: EXTENDED DYNAMIC BURN-IN (150C, 5.75V)							
CY7C109-VC	INDNS-O	4739644	519714390	1000	527	0	
STRESS: COLD LIFE TEST (-30C, 6.5V)							
CY7C109-VC	INDNS-O	4738602	519712560	500	45	0	
CY7C109-VC	INDNS-O	4738602	519712560	1000	45	0	
STRESS: READ & RECORD LIFE TEST (150C, 5.75V)							
CY7C109-VC	INDNS-O	4738602	519712560	48	10	0	
CY7C109-VC	INDNS-O	4738602	519712560	500	10	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH							
CY7C109-VC	INDNS-O	4738602	519712560	300	46	0	
CY7C109-VC	INDNS-O	4738602	519712560	1000	46	0	
CY7C109-VC	INDNS-O	4738564	519712898	300	46	0	
CY7C109-VC	INDNS-O	4739644	519714390	300	46	0	

[1] R42HD Technology qualified in Fab 4(1Meg SRAM)

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 98248[2]

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: ALPHA SENSITIVITY							
CY7C1049-VC	SEOL-L	4750331	619800740	DATA	5	0	
STRESS: STATIC LATCH-UP TESTING (125C / 7.5V)							
CY7C1049-VC	SEOL-L	4750331	619800740	DATA	3	0	
STRESS: DYNAMIC LATCH-UP TESTING (11.2V)							
CY7C1049-VC	SEOL-L	4750331	619800740	DATA	3	0	
STRESS: ESD-CHARGE DEVICE MODEL (1000V)							
CY7C1049-VC	SEOL-L	4750331	619800740	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2200V)							
CY7C1049-VC	SEOL-L	4750331	619800740	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V, 85%RH), PRECOND. 168 HRS 85C/85%RH							
CY7C1049-VC	SEOL-L	4750331	619800740	128	47	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.5V)							
CY7C1049-VC	SEOL-L	4750331	619800740	80	79	0	1 EOS
CY7C1049-VC	SEOL-L	4750331	619800740	168	79	0	
CY7C1049-VCB	SEOL-L	4750364	619801747	168	80	0	
CY7C1049-VCB	SEOL-L	4750364	619801747	80	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C1049-VC	SEOL-L	4750331	619800740	80	385	0	
CY7C1049-VC	SEOL-L	4750331	619800740	500	385	0	
CY7C1049-VCB	SEOL-L	4750364	619801747	80	400	0	
CY7C1049-VCB	SEOL-L	4750364	619801747	500	400	0	
STRESS: READ & RECORD (150C, 5.75V)							
CY7C1049-VC	SEOL-L	4750331	619800740	500	12	0	
CY7C1049-VCB	SEOL-L	4750364	619801747	500	12	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH (MSL 3)							
CY7C1049-VC	SEOL-L	4750331	619800740	300	47	0	
CY7C1049-VCB	SEOL-L	4750364	619801747	300	48	0	
CY7C1049-VCB	SEOL-L	4752513	619802812L1	300	47	0	

[2] 4 Meg SRAM qualified in Fab 4, R42HD Technology