

Cypress Semiconductor Qualification Report

QTP# 99481 VERSION 1.0

February, 2000

1 Meg SRAM, R42HD Technology, Fab 4 Qualification	
CY7C1031/CY7C1032	64K x 18 Synchronous Cache RAM

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Ed Russell
Reliability Manager
(408)432-7069

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify Metal 1 layer on qualified product CY7C1032/31.	
Marketing Part #:	CY7C1032
Package:	52-pin PLCC
Device Description:	64K x 18 Synchronous Cache RAM, R42HD Technology
Cypress Division:	Cypress Semiconductor Corporation
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. F
What ID markings on Die:	7C1031A

TECHNOLOGY/FAB PROCESS DESCRIPTION - R42HD			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500Å TiW/6000Å Al -5%Cu/1200Å TiW Metal 2: 500Å TiW/8000Å Al -5%Cu/300Å TiW
Passivation Type and Materials:	7000Å SiO ₂ + 6000Å Si ₃ N ₄		
Number of Transistors in device	6,489,591		
Die Coating(s), if used:	N/A		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double 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/R42HD		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	52-pin PLCC		
Mold Compound Name/Manufacturer:	Sumitomo EME-6300H		
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 84-1LMISR4
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.3 mil
Thermal Resistance Theta JA	38		
JESD22-A112 Moisture Sensitivity Level:	Level 3		
Name/Location of Assembly (prime) facility:	Omedata, Indonesia (INDNS-O)		

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

RELIABILITY TESTS PERFORMED

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Electrostatic Discharge Human Body Model (ESD-HBM)	MIL-STD-883, Method 3015.7	P 2,200V
Electrostatic Discharge Charge Device Model (ESD-CDM)	Cypress Spec. 25-00020	P 1,000V
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	P +/- 300mA

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	2819	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{2,3} Long Term Failure Rate	791,500 DHRs	0	0.7	170	7 FIT

- ¹ A production burn-in of 48 Hrs at 135°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 = 8.62x10⁻⁵ eV/Kelvin.
- T₁ is the junction temperature of the device under stress and T₂ is the junction temperature of the device at use conditions.

⁵ Failure Rate is based on 1Meg SRAM(CY7C109/1009), R42HD Technology, Fab 4 qualification (QTP #98064)

RELIABILITY TEST DATA

QTP#: 99481

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
=====							
STRESS:	ESD-CHARGE	DEVICE MODEL	(1000V)				
CY7C1032-AJ	INDNS-O	4923065	519913447	COMP	3	0	

STRESS:	ESD-HUMAN BODY CIRCUIT	PER MIL STD 883,	METHOD 3015	(2200V)			
CY7C1032-AJ	INDNS-O	4923065	519913447	COMP	3	0	

RELIABILITY TEST DATA

QTP#: 98437¹

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 5,75V)							
CY7C1031-JC	INDNS-O	4814539	519806477	96	805	0	
CY7C1031-JC	INDNS-O	4811319	519807505	96	436	0	
CY7C1031-JC	INDNS-O	4811319	519807505	96	786	0	
CY7C1031-JC	INDNS-O	4811319	519807506	96	792	0	
STRESS: ESD-CHARGE DEVICE MODEL (1000V)							
CY7C1031-JC	INDNS-O	4830915	519811029	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2200V)							
CY7C1031-JC	INDNS-O	4830915	519811029	COMP	3	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH)							
CY7C1031-JC	INDNS-O	4815593	519809798	168	46	0	
CY7C1031-JC	INDNS-O	4815593	519809799	168	46	0	
CY7C1031-JC	INDNS-O	4814539	519810438	168	46	0	
CY7C1031-JC	INDNS-O	4814539	519810439	168	46	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH (MSL 3)							
CY7C1031-JC	INDNS-O	4815593	519809798	300	46	0	
CY7C1031-JC	INDNS-O	4815593	519809799	300	46	0	
CY7C1031-JC	INDNS-O	4814539	519810438	300	46	0	
CY7C1031-JC	INDNS-O	4814539	519810438	1000	46	0	
CY7C1031-JC	INDNS-O	4814539	519810439	300	46	0	
CY7C1031-JC	INDNS-O	4814539	519810439	1000	46	0	

¹ Product Qualification with R42HD Technology in Fab 4.

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 98064¹

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), 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 1 Meg SRAM, R42HD Technology, Fab 4 qualification