

# Cypress Semiconductor Qualification Report

**QTP# 98393 VERSION 1.3**  
**March, 1999**

<b>Dual Port SRAM - R28 Technology - Fab 2</b>	
CY7C0241	4K x 18 Dual Port SRAM
CY7C024	4K x 16 Dual Port SRAM
CY7C145	8K x 9 Dual Port SRAM
CY7C144	8K x 8 Dual Port SRAM
CY7C139	4K x 9 Dual Port SRAM
CY7C1342/135/138	4K x 8 Dual Port SRAM
CY7C133/143	2K x 16 Dual Port SRAM

**CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:**

Cypress Semiconductor  
Quality and Reliability Department

<b>PRODUCT DESCRIPTION (for qualification)</b>			
Qualification Purpose: Transfer CY7C0241 (Rev. C, 7C025D chop) and its options from Fab3 to Fab2			
Marketing Part #:	CY7C0241		
Package:	100 pins TQFP		
Device Description:	4K x 18 Synchronous Dual Port Static RAM, R28 Technology		
Cypress Division:	Cypress Semiconductor Corporation – DCD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. C		
Die Size (stepping):	190.5 mils x 190 mils	What ID markings on Die:	7C0241A

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION – R28</b>			
Number of Metal Layers:	2	Metal Composition:	Metal 1: Ti/TiW/Al-Si/TiW, 500Å/1.2KÅ/6KÅ/1.2K Å Metal 2: TiW/Al-Si/TiW, 1.2KÅ/10KÅ/150Å
Passivation Type and Materials:	7000A TEOS + 6000A Si <sub>3</sub> N <sub>4</sub>		
Free Phosphorus contents in top glass layer(%):	0%		
Die Coating(s), if used:	None		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double Poly, Double Metal /0.65 μm		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> / 165 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX		
Die Fab Line ID/Wafer Process ID:	Fab2/R28		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	100-pin TQFP		
Mold Compound Name/Manufacturer:	Nitto 8000		
Lead Frame material:	Copper		
Lead Finish, composition:	Solder Plated, 90%Sn, 10%Pb		
Die Attach Area Plating:	Silver Spot		
Die Attach Method:	Epoxy	Die Attach Material:	Ablestik 8361H
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.0 mil
JESD22-A112 Moisture Sensitivity Level:	Level 5 (previously qualified)		
Name/Location of Assembly (prime) facility:	Anam, Korea (KOREA-Q)		

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

**RELIABILITY TESTS PERFORMED**

<b>Stress/Test</b>	<b>Test Condition (Temp/Bias)</b>	<b>Result P/F</b>
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc = 5.75V, 150°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	500V
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	12V

**RELIABILITY FAILURE RATE SUMMARY**

<b>Stress/Test</b>	<b>Device Tested/ Device Hours</b>	<b># Fails</b>	<b>Activation Energy</b>	<b>Thermal AF<sup>4</sup></b>	<b>Failure Rate</b>
High Temperature Operating Life Early Failure Rate <sup>1</sup>	999	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>2,3</sup> Long Term Failure Rate	122,500 DHRs	0	0.7	170	44 FIT <sup>5</sup>

<sup>1</sup> A production burn-in of 104 Hrs at 150°C, 6.5V is required for the product.

<sup>2</sup> Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

<sup>3</sup> Chi-squared 60% estimations used to calculate the failure rate.

<sup>4</sup> 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<sub>A</sub> = The Activation Energy of the defect mechanism.

k = Boltzmann's constant = 8.62x10<sup>-5</sup> eV/Kelvin.

T<sub>1</sub> is the junction temperature of the device under stress and T<sub>2</sub> is the junction temperature of the device at use conditions.

<sup>5</sup> Long Term Failure Rate is based DP SRAM (7C0251D), R28 Technology qualified in Fab2, Qtp 98302.

**RELIABILITY TEST DATA**

**QTP#: 98393**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C0241-AC	KOREA-Q	2829511	619810551	48	999	0	
STRESS: ESD-CHARGE DEVICE MODEL (500V)							
CY7C0241-AC	KOREA-Q	2829511	619810551	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY7C0241-AC	KOREA-Q	2829511	619810551	COMP	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C0241-AC	KOREA-Q	2829511	619810551	80	125	0	
CY7C0241-AC	KOREA-Q	2829511	619810551	500	125	0	

**DEVICE RELATED RELIABILITY TEST DATA**

**QTP#: 98302<sup>1</sup>**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)</b>							
CY7C0251-AC	KOREA-Q	2824171	619809165	48	536	0	
CY7C0251-AC	KOREA-Q	2824171	619809165	48	125	0	
CY7C0251-AC	KOREA-Q	2824171	619809165	48	467	0	
CY7C0251-AC	KOREA-Q	2824171	619809165	48	505	0	
CY7C0251-AC	KOREA-Q	2828426	619810549	48	509	1 1	UNKNOWN CAUSE
<b>STRESS: ESD-CHARGE DEVICE MODEL (1000V)</b>							
CY7C0251-AC	KOREA-Q	2824171	619809165	COMP	3	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)</b>							
CY7C0251-AC	KOREA-Q	2824171	619809165	COMP	3	0	
<b>STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 192 HRS 30C/60%RH</b>							
CY7C0251-AC	KOREA-Q	2824171	619809165	128	45	0 1	EOS
<b>STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. DB + 72 HRS 30C/60%RH</b>							
CY7C0251-AC	KOREA-Q	2824171	619809165	128	47	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)</b>							
CY7C0251-AC	KOREA-Q	2824171	619809165	80	125	0	
CY7C0251-AC	KOREA-Q	2824171	619809165	500	125	0	
CY7C0251-AC	KOREA-Q	2828426	619810549	80	120	0	
CY7C0251-AC	KOREA-Q	2828426	619810549	500	120	0	
<b>STRESS: PRESSURE COOKER TEST (121C, 100%RH)</b>							
CY7C0251-AC	KOREA-Q	2824171	619809165	168	47	0	
<b>STRESS: TC COND. C, -65 TO 150C, PRECOND. 72 HRS 30/60%RH (MSL 5)</b>							
CY7C0251-AC	KOREA-Q	2824171	619809165	300	47	0	
CY7C0251-AC	KOREA-Q	2828426	619810548	300	50	0	
CY7C0251-AC	KOREA-Q	2828426	619810549	300	50	0	
CY7C0251-AC	KOREA-Q	2828426	619810549	1000	50	0	

<sup>1</sup> DP SRAM, R28 Technology, qualified in Fab 2.