Cypress Semiconductor
Qualification Report

QTP# 99083 VERSION 1.0
March, 1999

Low Voltage Synchronous FIFO – R28 Technology – Fab2	
CY7C4245V/4235V/4225V/4215V/4205V/4425V	4K/2K/1K/512/256/64 x 18 Low Voltage Synchronous FIFOs 64 pins STQFP/68 pins PLCC Packages
CY7C4251V/4241V/4231V/4221V/4211V/4201V/4421V	8K/4K/2K/1K/512/256/64 x 9 Low Voltage Synchronous FIFO 32 pins TQFP/PLCC Packages

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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Reliability Manager
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PRODUCT DESCRIPTION (for qualification)			
Qualification Purpose: To transfer qualified Low Voltage Synchronous FIFO products, CY7C4245V (Rev. A) and its options, R28 technology from Fab 3 to Fab2.			
Marketing Part #:	CY7C4245V		
Package:	68 pins PLCC 64 pins TQFP		
Device Description:	4K x 18 Synchronous FIFO		
Cypress Division:	Cypress Semiconductor Corporation – DCD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. A	
Die Size (stepping):	160 mils x 170 mils	What ID markings on Die:	7C4345A

TECHNOLOGY/FAB PROCESS DESCRIPTION - R28			
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_2N_4	
Free Phosphorus contents in top glass layer(%):		N/A	
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_2 / 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:	68-pin PLCC 64-pin TQFP		
Mold Compound Name/Manufacturer:	Nitto 8000		
Lead Frame material:	Copper Alloy		
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 3 (previously qualified)		
Assembly Line ID and Process ID:	Alphatec, Thailand (PLCC package) Anam, Korea (STQFP package)		

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 = 3.8V, 150°C Cypress Spec 29-00020	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	P 10V ± 200 mA

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]	2059 Devices	1	N/A	N/A	486 PPM
High Temperature Operating Life[2,3] Long Term Failure Rate	633,360 DHRs (97476)	0	0.7	170	9 FIT
	122,500 DHRs (98302)	0	0.7	170	44 FIT

[1] Production Burn-in of 96 Hrs., at 150C, 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 are based on R28 Technology qualified in Fab2, QTP 97476 and 98302

RELIABILITY TEST DATA

QTP#: 99083

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V)							
CY7C4245V-ASC	KOREA-Q	2823135	619818118	48	731	1	1 Blocked Contact
CY7C4245V-ASC	KOREA-Q	2823135	619818118	48	741	0	1 EOS
CY7C4245V-ASC	KOREA-Q	2823135	619818118	48	287	0	
CY7C4245V-ASC	KOREA-Q	2823135	619818118	48	300	0	
STRESS: ESD-CHARGE DEVICE MODEL (1000V)							
CY7C4245V-JC	ALPHA-X	2823135	219806478L1	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2200V)							
CY7C4245V-JC	ALPHA-X	2823135	219806478L1	COMP	3	0	

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 97476[1]

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C199-VC	INDNS-O	2734322	519711442D	48	540	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	48	535	0	
CY7C199-VC	CSPI-R	2733162	619707989	48	535	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY7C199-VC	INDNS-O	2734322	519711442D	COMP	3	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015							
CY7C199-VC	INDNS-O	2734322	519711442D	COMP	3	0	
CY7C199-VC	CSPI-R	2736541	619708989	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 168 HRS 85C/85%RH							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	128	48	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	256	48	0	
CY7C199-VC	CSPI-R	2733162	619707989	128	45	0	
CY7C199-VC	CSPI-R	2733162	619707989	128	50	0	
CY7C199-VC	CSPI-R	2735410	619708288	128	45	0	
CY7C199-VC	CSPI-R	2735410	619708288	128	48	0	
CY7C199-VC	CSPI-R	2736541	619708989	128	47	0	
STRESS: HIGH TEMPERATURE STORAGE (165C, NO BIAS)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	336	48	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	500	48	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	1000	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.50V)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	80	81	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	168	81	0	
CY7C199-VC	CSPI-R	2733162	619707989	80	80	0	
CY7C199-VC	CSPI-R	2733162	619707989	168	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C199-VC	INDNS-O	2734322	519711442D	80	540	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	80	535	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	500	533	0	2 EOS
CY7C199-VC	CSPI-R	2733162	619707989	80	527	0	
CY7C199-VC	CSPI-R	2733162	619707989	500	527	0	
STRESS: LONG LIFE VERIFICATION (150C, 5.75V)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	1000	120	0	

[1] QTP 97476, 32K x 8 SRAM, R28 Technology, Fab2 qualification.

DEVICE RELAED RELIABILITY TEST DATA

QTP#: 97476

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: COLD LIFE TEST (-30C, 6.5V)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	500	45	0	
STRESS: READ & RECORD LIFE TEST (150C, 5.75V)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	48	10	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	80	10	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	500	10	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	300	48	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	1000	48	0	
CY7C199-VC	CSPI-R	2733162	619707989	300	50	0	
CY7C199-VC	CSPI-R	2733162	619707989	1000	50	0	

DEVICE RELAED RELIABILITY TEST DATA

QTP#: 98302[2]

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

[2] DP SRAM, R28 Technology, qualified in Fab 2.