

Cypress Semiconductor Qualification Report

QTP# 99325 VERSION 1.0
January, 2000

5V Synchronous FIFOs – R42HDHA Technology, Fab 4	
CY7C43683	16K x 36 Undirectional Synchronous FIFO w/ Bus Matching – 128 Pins TQFP
CY7C43684	16K x 36 x 2 Bidirectional Synchronous FIFO w/ Bus Matching – 128 Pins TQFP
CY7C43686	16K x 36 / x 18 x 2 Tri Bus FIFO – 128 Pins TQFP

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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Reliability Director
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PRODUCT DESCRIPTION (for qualification)			
Qualification Purpose: To qualify 7C43684, 1 Meg Sync. FIFO, R42HDHA Technology, Fab 4.			
Marketing Part #:	CY7C43684		
Device Description:	16K x 36 x 2, Sync FIFO, RAM42HDHA Technology		
Cypress Division:	Data Communications Division (DCD)		
Overall Die (or Mask) REV Level (pre-requisite for qualification):			Rev. A
Die Size (stepping):	249 mils x 279 mils	What ID markings on Die:	7C43684A

TECHNOLOGY/FAB PROCESS DESCRIPTION - R42D w/ Hot Al			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500Å TiW / 6000Å Al -5%Cu -/ 1200Å TiW Metal 2: 500Å TiW / 6000Å Al -5%Cu / 1200Å TiW
Passivation Type and Materials:	7000Å SiO ₂ + 6000Å Si ₃ N ₄		
Number of transistors in device	6417696		
Number of Gates in device	163,119		
Free Phosphorus contents in top glass layer(%):	0%		
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 (fab 4)		
Die Fab Line ID/Wafer Process ID:	Cypress Semiconductor-Bloomington, MN / R42HDHA		

PLASTIC PACKAGE/ASSEMBLY /MARK DESCRIPTION			
Mold Compound Name/Manufacturer:	Sumitomo 7320		
Package Outline, Type or Name:	128 Lead TQFP (Die Size 249 x 279)		
Mold Compound Tg, °C:	135°C		
Lead Frame material:	Copper		
Lead Finish, composition:	Solder Plated, Sn / Pb		
Die Attach Area Plating:	Silver	Die Attach Pad Size:	335 x 335
Die Attach Method:	Silver Epoxy	Die Attach Material:	84-1 LMIS R4
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.3 mil
Thermal Resistance Theta JA	56°C/W		
Assembly Line Process Flow:	49-1001		
Name/Location of Assembly (prime) facility:	Anam, Korea		

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 = 6.5V, 135°C	P
High Accelerated Saturation Test (HAST)	140°C, 85%RH, 5.5V Precondition: JESD22 Moisture Sensitivity Level 3 (192 Hrs, 30C/60%RH)	P
Electrostatic Discharge Human Body Model (ESD-HBM)	MIL-STD-883, Method 3015.7	4,400V
Electrostatic Discharge Charge Device Model (ESD-CDM)	Cypress Spec. 25-00020	1000V
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs., 30°C, 60%RH	P
Latch-up Sensitivity	In Accordance with JEDC 17. Cypress Spec. 01-00081	12V ± 200mA
Pressure Cooker Test	No bias, 121C, 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	1004	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{2,3} Long Term Failure Rate	392,500 DHRs	0	0.7	170	14 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 = 8.62×10^{-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 R42HDHA Technology qualified in fab 4. QTP 98248.

RELIABILITY TEST DATA

QTP#: 99325

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (135C, 6.5V)							
7C43643AC-QAC	KOREA-Q	4924189	619927955	48	501	0	
7C43664AC-QAC	KOREA-Q	4924189	619928058	48	503	0	
STRESS: ESD-CHARGE DEVICE MODEL 1000v							
7C43684AC-QAC	KOREA-Q	4924189	619924084	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (4400)							
7C43684AC-QAC	KOREA-Q	4924189	619924084	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C/85%RH/5.5V), PRECOND. 192 HRS 30C/60%RH							
7C43684AC-QAC	KOREA-Q	4924189	619925738	128	48	0	
7C43684AC-QAC	KOREA-Q	4924189	619925738	S/RE-FLOW	48	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH)							
7C43684AC-QAC	KOREA-Q	4910451	619909326	168	48	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH (MSL 3)							
7C43684AC-QAC	KOREA-Q	4910451	619909326	300	48	0	
7C43684AC-QAC	KOREA-Q	4910451	619909326	1000	48	0	

RELIABILITY TEST DATA
QTP#: 98248¹

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
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), 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	
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	

¹ QTP 99248, 4 Mag SRAM Product, R42HDHA Technology, Fab. 4.