

# **Cypress Semiconductor Qualification Report**

**QTP# 96471/96472 V 2.0  
May, 1997**

**UltraLogic™ 64-Macrocell Flash CPLD  
CY7C372I/373I**

<b>PRODUCT DESCRIPTION (for qualification)</b>			
Information provided in this document is intended for generic qualification and technically describes the Cypress part supplied:			
Marketing Part #:	CY7C372I/373I		
Package:	84 pins PLCC/44 pins CLCC		
Device Description:	UltraLogic™ 64-Macrocell Flash CPLD		
Cypress Division:	Cypress Semiconductor Corporation - PLD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):	7C372D/373D		
Die Size (stepping):	327 mils x 193 mils	What ID markings on Die:	7C372I/373I

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION - FLASH24/28</b>			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 6,800Å AL-1%Si/1,200Å TiW Metal 2: 1500Å TiW/10,000Å Al-1%Si/300Å Tiw
Passivation Type and Materials:	3,000A SiO <sub>2</sub> + 15,000A Oxynitride		
Number of transistors in device	240K		
Number of gates in device	240K		
Free Phosphorus contents in top glass layer(%):	None		
Die Coating(s), if used:	None		
Generic Process Technology/Design Rule (μ-drawn):	CMOS FLASH 0.65μm		
Gate Oxide Material/Thickness (MOS):	Gox1 = 225Å, Gox2 = 165Å, Tunel ox = 100Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX		
Die Fab Line ID/Wafer Process ID:	Fab 2 / FLASH24/28		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	84-pin PLCC		
Mold Compound Name/Manufacturer:	Nitto-MP8000		
Lead Frame material:	Copper		
Lead Finish, composition:	Solder Plated, 90%Sn, 10%Pb		
Die Attach Area Plating:	Silver Spot		
Die Attach Method:	Paste	Die Attach Material:	Silver Epoxy
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.3 mil
JESD22-A112 Moisture Sensitivity Level	Level 3		
Assembly Line ID and Process ID:	Anam-Seoul, Korea		

HERMETIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	44-pin CLCC		
Lead Seal Method/Material	Glass Seal, KC700/187		
Lead Frame material:	Alloy 42		
Lead Finish, composition:	Sn Pb Solder Dip (63/37)		
Die Attach Method:	Ag Glass	Die Attach Material:	QMI 2419MG
Wire Bond Method:	Ultrasonic	Wire Material/Size:	Al / 1.25 mil
Assembly Line ID and Process ID:	Cypress Bangkok, Thailand		

**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>
Data Bake (Plastic)	165°C, no bias	P
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc = 6.5V, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 6.5V, 125°C	P
Read and Record Life Test	Dynamic Operating Condition, Vcc = 6.5V, 125°C	P
Military Test Group C	Group C, Sub group 1, Life Test (Vcc = 5.75V, 150°C)	
High Temperature Steady State Life	Static Operating Condition, Vcc = 5.75V, 125°C	P
High Accelerated Saturation Test (HAST)	140°C, 85%RH, 5.5V Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30°C/60%RH + 3cys Solder Reflow	P
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 + 3cys Solder Reflow	P
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 500V
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	12V
Input Capacitance	Cypress Spec 01-00123	P

**RELIABILITY FAILURE RATE SUMMARY**

<b>Stress/Test</b>	<b>Device Tested/ Devive Hours</b>	<b># Fails</b>	<b>Activation Energy</b>	<b>Thermal AF</b>	<b>Failure Rate<sup>3</sup></b>
High Temperature Operating Life Early Failure Rate	1,004 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	201,000 DHRs	0	0.6	82 (150C) 31 (125C)	112 FIT

<sup>1</sup> Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

<sup>2</sup> Chi-squared 60% estimations used to calculate the failure rate.

<sup>3</sup> Faigure rate based on Flash24/28 Technology qualification, QTP96176 and 96471.

**RELIABILITY TEST DATA**

**QTP#: 96471<sup>1</sup>/96472<sup>2</sup>**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
<b>STRESS: DATA BAKE-PLASTIC (165C, NO BIAS)</b>							
CY7C373I-JC	KOREA-L	2637580	349613900	168	79	0	
CY7C373I-JC	KOREA-L	2637580	349613900	552	79	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 6.50V)</b>							
CY7C373I-JC	ALPHA-X	2643368	219701008	48	503	0	
CY7C373I-JC	KOREA-L	2637580	349613900	48	501	0	
<b>STRESS: GROUP C, SUBGROUP 1, LIFE TEST (150C, 5.75V)</b>							
CY7C372I-YMB	ALPHA-X	2643368	219700639	184	50	0	
<b>STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 192 HRS 30C/60%RH</b>							
CY7C373I-JC	KOREA-L	2637580	349613900	128	48	0	
<b>STRESS: HIGH TEMP STEADY STATE LIFE TEST (125C, 5.75V)</b>							
CY7C373I-JC	KOREA-L	2637580	349613900	168	79	0	
CY7C373I-JC	KOREA-L	2637580	349613900	336	79	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 6.50V)</b>							
CY7C373I-JC	KOREA-L	2637580	349613900	80	79	0	
CY7C373I-JC	KOREA-L	2637580	349613900	500	79	0	
<b>STRESS: READ &amp; RECORD LIFE TEST (125C, 6.50V)</b>							
CY7C373I-JC	KOREA-L	2637580	349613900	48	10	0	
CY7C373I-JC	KOREA-L	2637580	349613900	500	10	0	
<b>STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH</b>							
CY7C373I-JC	KOREA-L	2637580	349613900	300	48	0	
CY7C373I-JC	KOREA-L	2637580	349613900	1000	48	0	

<sup>1</sup> QTP 96471, 64 Mcell Flash CPLD (CY7C372I/373I) Commercial Qualification.

<sup>2</sup> QTP 96472, 64 Mcell Flash CPLC (CY7C372I/373I) Military Qualification.

**DEVICE RELATED RELIABILITY TEST DATA**

**QTP#: 96176<sup>3</sup>**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
<b>STRESS: DATA BAKE-HERMETIC (250C, NO BIAS)</b>							
CY7C374I-YC	ALPHA-X	2620451	219612105	96	76	0	
<b>STRESS: DATA BAKE-PLASTIC (165C, NO BIAS)</b>							
CY7C374I-JC	KOREA-A	2611212	349605154	168	79	0	
CY7C374I-JC	KOREA-A	2611212	349605154	552	79	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)</b>							
CY7C374I-YM	ALPHA-X	2613470	219607661	12	93	0	1 EOS
CY7C374I-YM	ALPHA-X	2613470	219607661	60	90	0	3 EOS
CY7C374I-YM	ALPHA-X	2613470	219607661	96	87	0	1 EOS
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 6.5V)</b>							
CY7C374I-JC	KOREA-A	2611212	349604951	12	79	0	
CY7C374I-JC	KOREA-A	2611212	349604951	48	79	0	
CY7C374I-JC	KOREA-A	2611212	349605154	24	91	0	
CY7C374I-JC	KOREA-A	2611212	349605154	96	91	0	
CY7C375I-AC	KOREA-Q	2612340	349605999/34960	48	77	0	
CY7C374I-JC	KOREA-A	2612340	349606397	12	94	0	
CY7C374I-JC	KOREA-A	2612340	349606397	48	93	0	
CY7C374I-JC	KOREA-A	2620499	349608901	12	79	0	
CY7C374I-JC	KOREA-A	2620499	349608901	48	79	0	
CY7C374I-JC	KOREA-A	2625097	349610752	48	84	0	
CY7C374I-JC	KOREA-A	2625097	349610752	96	84	0	
<b>STRESS: GROUP C, SUBGROUP 1, LIFE TEST (150C, 5.75V)</b>							
CY7C374I-YMB	ALPHA-X	2613470	219607661	184	47	0	1 EOS
<b>STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 24 HRS 85C/60%RH</b>							
CY7C374I-JC	KOREA-A	2612340	349606397	36	10	0	
CY7C374I-JC	KOREA-A	2612340	349606397	128	10	0	
CY7C374I-JC	KOREA-A	2612340	349606397	128	14	0	
CY7C374I-JC	KOREA-A	2612340	349606397	128	14	0	
<b>STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. DB + 72 HRS 30C/60%RH</b>							
CY7C374I-JC	KOREA-A	2611212	349605154	128	47	0	
CY7C375I-AC	KOREA-Q	2613561	349607199	128	27	0	

<sup>3</sup> 128 Macrocell Flash CPLD qualified in Fab2, Flash24/28 Technology.

**DEVICE RELATED RELIABILITY TEST DATA**

**QTP#: 96176**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
<b>STRESS: HI-ACCEL SATURATION TEST (130C, 5.5V), PRECOND. DB + 72 HRS 30C/60%RH</b>							
CY7C375I-AC	KOREA-Q	2612340	349605999/34960	128	36	0	
<b>STRESS: HIGH TEMP STEADY STATE LIFE TEST (125C, 5.75V)</b>							
CY7C374I-JC	KOREA-A	2611212	349605154	168	79	0	
CY7C374I-JC	KOREA-A	2611212	349605154	336	79	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)</b>							
CY7C374I-YM	ALPHA-X	2613470	219607661	12	79	0	
CY7C374I-YM	ALPHA-X	2613470	219607661	60	75	0	
CY7C374I-YM	ALPHA-X	2613470	219607661	500	75	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 6.5V)</b>							
CY7C374I-JC	KOREA-A	2611212	349604951	500	79	0	
CY7C375I-AC	KOREA-Q	2612340	349605999/34960	500	76	0	
CY7C374I-JC	KOREA-A	2612340	349606397	500	93	0	
CY7C374I-JC	KOREA-A	2620499	349608901	80	79	0	
<b>STRESS: TC COND. C, -65 TO 150C, HERMETIC DEVICES</b>							
CY7C374I-YM	ALPHA-X	2613470	219607661	100	48	0	
CY7C374I-YM	ALPHA-X	2613470	219607661	1000	48	0	
<b>STRESS: TC COND. C, -65 TO 150C, PRECONDITION DRY-BAKE</b>							
CY7C374I-JC	KOREA-A	2611212	349604951	300	48	0	
CY7C374I-JC	KOREA-A	2611212	349604951	1000	47	0	
<b>STRESS: TC COND. C, -65 TO 150C, PRECOND. DBAKE + 72 HRS 30/60%RH</b>							
CY7C375I-AC	KOREA-Q	2612340	349605999/34960	300	48	0	
CY7C375I-AC	KOREA-Q	2612340	349605999/34960	1000	48	0	