Cypress Semiconductor
Technology Qualification Report

QTP# 91216/93321/97239/98153 VERSION 1.0
March, 2000

MAX® EPLD, P20 Technology, Fab 2	
CY7C344	**32-Macrocell MAX EPLD**

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CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT DESCRIPTION (for qualification)			
Qualification Purpose: Qualifies CY7C344 in P20 Technology, Fab2.			
Marketing Part #:	CY7C344		
Package:	28L Ceramic Windowed J-Leaded Chip Carriers (WLCC) 28L Ceramic Windowed Dual-In-Line Packages (W-CerDip) 28L Plastic Leaded Chip Carrier (PLCC)		
Device Description:	32-Macrocell MAX EPLD		
Cypress Division:	Cypress Semiconductor Corporation – MPD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. A	
Die Size (stepping):	134 mils x 236 mils	What ID markings on Die:	None

TECHNOLOGY/FAB PROCESS DESCRIPTION – P20DHZ			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500Å Ti/ 1200Å TiW/6000Å Al/500Å Ti Metal 2: 1minRF/1500Å Ti/9000Å Al
Passivation Type and Materials:	Oxide/Oxynitride		
Free Phosphorus contents in top glass layer(%):	0%		
Generic Process Technology/Design Rule (µ-drawn):	CMOS, Double Metal /0.8 µm		
Gate Oxide Material/Thickness (MOS):	SiO_2 / 195 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX (Fab2)		
Die Fab Line ID/Wafer Process ID:	Fab2/P20		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	28L Plastic Leaded Chip Carrier (PLCC)		
Mold Compound Name/Manufacturer:	Sumitomo EME-6300		
Lead Frame material:	Copper		
Lead Finish, composition:	Solder Plated, 85%Sn, 15%Pb		
Die Attach Method:	Paste	Die Attach Material:	Silver Epoxy
Wire Bond Method:	Thermosonic	Wire Material/Size:	Au / 1.3 mil
Thermal Resistance Theta JA	57		
JESD22-A112 Moisture Sensitivity Level:	Level 1		
Name/Location of Assembly (prime) facility:	Anam, Korea		

HERMETIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	28L Ceramic Windowed Dual-In-Line Package (W CerDIP) 28L Ceramic Windowed J-Leaded Chip Carrier (W LCC)		
Lead Frame material:	Alloy 42		
Lead Finish, composition:	Solder Plated, 63%Sn, 37%Pb		
Die Attach Method:	Paste	Die Attach Material:	Silver Glass
Wire Bond Method:	Ultrasonic	Wire Material/Size:	Au / 1.25 mil
JESD22-A112 Moisture Sensitivity Level:	N/A		
Name/Location of Assembly (prime) facility:	Cypress Bangkok, Thailand (Alpha-X)		

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 = 150°C/ 5.75 V	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 125°C/ 5.75V	P
High Accelerated Saturation Test (HAST)	140°C, 5.75V Precondition: JESD22 Moisture Sensitivity Level 1 (192 Hrs, 30/85%RH	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C	P
Temperature Cycle	MIL-STD-883B Method 1010, Condition B, -40°C to 125°C Precondition: JESD22 Moisture Sensitivity Level 1 (plcc) (192 Hrs, 30°C/85H)	P
Military Life Group C	MIL-STD-883, Method 1005.4, 125°C,5.75V	P
High Temperature Steady State Life Test	Cypress Spec. 29-00020, 125°C,575V	P
Data Bake Hermetic Data Bake Plastic	Cypress Spec. 25-00060 (250°C, No Bias) (185°C, No Bias)	P
Lead Torque	Cypress Spec. 25-00035	P
Internal Water Vapor	MIL-STD-883, Method 1018	P
Moisture Resistance	MIL-STD-883, Method 1004	P
Salt Atmosphere	Cypress Spec. 25-00013	P
Adhesion of Lead Finish	Cypress Spec. 25-00029	P
Physical Dimensions	Cypress Spec. 25-00031	P
Pressure Cooker Test	No bias, 121°C, 100%RH	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[4]	Failure Rate
High Temperature Operating Life Early Failure Rate[1]	1132	0	N/A	N/A	0 PPM
High Temperature Operating Life[2,3] Long Term Failure Rate	627,672 DHRs	1	0.7	170	58 FIT

[1] Production burn-in of 24 Hrs at 150°C, 5.0V is required for the Military 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.

RELIABILITY TEST DATA

QTP91216/93321/97239/98153[5]

EVAL #	DEVICE	ASSY-LOC	ASSYLOT#	FABLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: DATA BAKE-HERMETIC (250C, NO BIAS)								
91216	CY7C344-HC	USA-C	67964	2117252	81	55	0	
91216	CY7C344-HC	USA-C	67964	2117252	162	55	0	
91216	CY7C344-HC	USA-C	67964	2117252	162	66	0	
STRESS: DATA BAKE-PLASTIC (165C, NO BIAS)								
91216	CY7C344-JI	KOREA-A	73119	2133901	552	127	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	168	129	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)								
97239	CY7C344-WMB	ALPHA-X	219704725	2706905	81	158	0	
97239	CY7C344-WMB	ALPHA-X	219704467	2707932	81	168	0	
97239	CY7C344-WMB	ALPHA-X	219705133	2707946	81	172	0	
98153	CY7C344-HMB	ALPHA-X	219803380P	2809625	72	210	0	
98153	CY7C344-HMB	ALPHA-X	219802901P	2804065	72	211	0	
98153	CY7C344-HMB	ALPHA-X	219802900P	2740072	72	213	0	
STRESS: MILITARY LIFE GROUP C (125C,5.75C)								
93321	CY7C344-WMB	ALPHA-X	219303498	2317467	184	83	0	
91216	CY7C344-HMB	USA-C	72580	2127651	500	156	0	
STRESS: HI-ACCEL SATURATION TEST (140C,5.75V)								
91216	CY7C344-JI	KOREA-A	73119	2133901	100	78	1	IONIC CONTAMINATION
STRESS: HIGH TEMP STEADY STATE LIFE TEST (125C, 5.75V)								
91216	CY7C344-HC	USA-C	67964	2117252	168	76	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	336	131	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	168	131	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 5.75V)								
91216	CY7C344-HC	USA-C	67964	2117252	1000	268	1	IONIC CONTAMINATION
91216	CY7C344-HC	USA-C	67964	2117252	168	271	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	1000	357	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	500	361	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	168	362	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH)								
91216	CY7C344-JI	KOREA-A	73119	2133901	288	5	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	168	5	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	288	73	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	168	78	0	
STRESS: TC COND. C, -65 TO 150C, HERMETIC DEVICES								
91216	CY7C344-HC	USA-C	67964	2117252	1000	72	0	
91216	CY7C344-HC	USA-C	67964	2117252	100	75	0	
STRESS: TC JEDEC22 COND. B, -40 TO 125C								
91216	CY7C344-JI	KOREA-A	73119	2133901	300	78	0	
91216	CY7C344-JI	KOREA-A	73119	2133901	1000	78	0	

[5]QTP #91216 To qualified CY7C344 in a qualified P20 Technology

[5]QTP #93321 Mil Qual. (Group C) with ONO

[5]QTP #97239 Military Burn-In Reduction

[5]QTP #98153 Military Voltage Reduction