

# **Cypress Semiconductor Qualification Report**

**QTP# 97185 VERSION 1.0  
November, 1997**

**CY7C342B  
(128-Macrocell MAX<sup>®</sup> EPLD)**

<b>PRODUCT DESCRIPTION (for qualification)</b>			
Qualification Purpose: All layer mak changed to CY7C342B (7C342B rev. F)			
Marketing Part #:	CY7C342B		
Device Description:	128 Macrocell MAX EPLD		
Cypress Division:	Cypress Semiconductor Corporation PLD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. F		
Die Size (stepping):	250 mils x 192 mils	What ID markings on Die:	7C342B

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION</b>			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 6K Al, 1200A TiW Metal 2: 1,500A TiW, 9K Al, 320A TiW
Passivation Type and Materials:	Oxynitride		
Free Phosphorus contents in top glass layer(%):	None		
Die Coating(s), if used:	N/A		
Number of Transistor in device:			
Number of Gate in device			
Generic Process Technology/Design Rule ( $\mu$ -drawn):	CMOS, Double Metal / 0.65 $\mu$ m		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> / 165A		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX (Fab2)		
Die Fab Line ID/Wafer Process ID:	Fab 2/ P26		

<b>HERMETIC PACKAGE/ASSEMBLY DESCRIPTION</b>			
Package Outline, Type, or Name:	68-Lead Windowed Leaded Chip Carrier		
Lead Frame material:	Alloy 42		
Lead Finish, composition:	Solder Dipped, 63%Sn, 37%Pb		
Seal Material	Glass		
Die Attach Method:	Paste	Die Attach Material:	Silver Glass
Wire Bond Method:	Ultrasonic	Wire Material/Size:	Aluminum / 1.25 mil
Assembly Line ID and Process ID:	Cypress Bangkok, Thailand (ALPHA-X)		

<b>PLASTIC PACKAGE/ASSEMBLY DESCRIPTION</b>			
Package Outline, Type, or Name:	68-Lead PlasticLead Chip Carrier		
Mold Compound/Manufacturer	Sumitomo EME-6300H(R)		
Lead Frame material:	Copper		
Lead Finish, composition:	Solder Plated, 85%Sn, 15%Pb		
Die Attach Area Plating:	Silver Spot		
Die Attach Method:	Epoxy	Die Attach Material:	Ablestik 84-1MISR4
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, Korea (KOREA-A)		

**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 Retention (Plastic)	150C, non-biased	P
Biased 85/85	85C/85%RH/5.0V	P
Pressure Cooker Test	no bias, 121C, 100%Rh, 30 PSIA	P
Life Test	Dynamic Burn-in, 125V/5.5V	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	1,000V
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	7.4V

**RELIABILITY FAILURE RATE SUMMARY**

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Acceleration Factor <sup>5</sup>	Failure Rate
High Temperature Operating Life Early Failure Rate	688 <sup>4</sup>	0	N/A	N/A	0
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	60,000 (@ 150C, QTP 95514)	0	-	-	-
	88,500 (@ 140C, QTP 95514)	0	-	-	-
	115,500 (@125C, QTP 97185)	0	-	-	-
	<b>Total Device Hrs: 264,000</b>	0	-	-	-
	<b>Equivalent Device Hrs @ 150C: 154,985</b>	<b>0</b>	<b>0.7</b>	<b>170</b>	<b>35 FIT</b>

<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> The derating factor, DF, between 125°C/140°C and 150°C is calculated per Arrhenius Equation, assume a 15°C rise due to junction heating, activation energy of 0.7 eV.

$$DF(\text{between } 125C \& 150C) = \exp \left[ \frac{0.7}{k} \left[ \frac{1}{150 + 15 + 273} - \frac{1}{125 + 15 + 273} \right] \right]$$

$$DF(\text{between } 140C \& 150C) = \exp \left[ \frac{0.7}{k} \left[ \frac{1}{150 + 15 + 273} - \frac{1}{140 + 15 + 273} \right] \right]$$

<sup>4</sup> Early Failure Rate is based on 128 Macrocell MAX EPLD, Commercial Burn-in Elimination Qual (QTP97254).

<sup>5</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.

**RELIABILITY TEST DATA**

**QTP#: 97185**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
<b>STRESS:BIASED 85/85/5.5V</b>							
CY7C342B-JC	ALTERA		NCK704402AB	1000		45	0
<b>STRESS: DATA BAKE-PLASTIC (150C, NO BIAS)</b>							
CY7C342B-JC	ALTERA		NCK704402AB	500		45	0
CY7C342B-JC	ALTERA		NCK704402AB	1000		45	0
<b>STRESS: ESD-CHARGE DEVICE MODEL (1,000V)</b>							
CY7C342B-JC	ALPHA-X	2710261	219704673	COMP		3	0
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (4,000V)</b>							
CY7C342B-JC	ALPHA-X	2710261	219704673	COMP		3	0
<b>STRESS: DYNAMIC BURN-IN, 125C, 5.5V (COMMERCIAL)</b>							
CY7C342B-JC	ALTERA		NCK704402AB	168		77	0
CY7C342B-JC	ALTERA		NCK704402AB	500		77	0
CY7C342B-JC	ALTERA		NCK704402AB	1000		77	0
CY7C342B-JC	ALTERA		NCK704402AB	1500		77	0
<b>STRESS: PRESSURE COOKER TEST (121C, 100%RH)</b>							
CY7C342B-JC	ALTERA		NCK704402AB	96		45	0
CY7C342B-JC	ALTERA		NCK704402AB	168		45	0
CY7C342B-JC	ALTERA		NCK704402AB	336		45	0
<b>STRESS: TC JEDEC22 COND. B, -40 TO 125C</b>							
CY7C342B-JC	ALTERA		NCK704402AB	500		45	0
CY7C342B-JC	ALTERA		NCK704402AB	1000		45	0

**RELIABILITY RELATED TEST DATA**

**QTP#: 95514<sup>1</sup>**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
<b>STRESS: DATA BAKE-HERMETIC (250C, NO BIAS)</b>							
CY7C342B-HC		2338197	10323	168	76	0	
<b>STRESS: DATA BAKE-PLASTIC (165C, NO BIAS)</b>							
CY7C342B-JC	KOREA-A	2336046	70059	168	77	0	
CY7C342B-JC	KOREA-A	2336046	70059	500	77	0	
CY7C342B-JC	KOREA-A	2336046	70059	1000	77	0	
CY7C342B-JC	KOREA-A	2337126	70060	168	45	0	
CY7C342B-JC	KOREA-A	2337126	70060	500	45	0	
CY7C342B-JC	KOREA-A	2337126	70060	1000	45	0	
<b>STRESS: HI-ACCEL SATURATION TEST (140C, 85%RH, 5.5V), PRECONDITION 48 HRS PCT</b>							
CY7C342B-JC	KOREA-A	2545793	349525756	128	44	0	1 EOS
CY7C342B-JC	KOREA-A	2544651	349600026	128	48	0	
CY7C342B-JC	KOREA-A	2544651	349600026	256	48	0	
<b>STRESS: HIGH TEMP STEADY STATE LIFE TEST (140C, 5.75V)</b>							
CY7C342B-JC	KOREA-A	2515875A	13088(SWR)	80	80	0	
CY7C342B-JC	KOREA-A	2517113	349511336	80	80	0	
CY7C342B-JC	KOREA-A	2517113	349511336	168	80	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)</b>							
CY7C342B-JC	KOREA-A	2517113	349511336	80	120	0	
CY7C342B-JC	KOREA-A	2517113	349511336	500	120	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (140C, 5.75V)</b>							
CY7C342B-JC	KOREA-A	2515875A	13088(SWR)	140	120	0	
CY7C342B-JC	KOREA-A	2515875A	13088(SWR)	750	118	0	1 EOS
<b>STRESS: PRESSURE COOKER TEST (121C, 100%RH)</b>							
CY7C342B-JC	KOREA-A	2545793	349525756	168	48	0	
CY7C342B-JC	KOREA-A	2545793	349525756	288	48	0	
CY7C342B-JC	KOREA-A	2544651	349600026	168	51	0	
CY7C342B-JC	KOREA-A	2544651	349600026	288	51	0	
<b>STRESS: READ &amp; RECORD LIFE TEST (125C, 5.75V)</b>							
CY7C342B-HC	KOREA-A	2338197	10323	96	10	0	
CY7C342B-HC	KOREA-A	2338197	10323	168	10	0	
CY7C342B-HC	KOREA-A	2338197	10323	1000	10	0	
<b>STRESS: TEMP CYCLE, COND. C, -65 TO 150C, PRECONDITION 48 HRS PCT</b>							
CY7C342B-JC	KOREA-A	2545793	349525756	300	47	0	
CY7C342B-JC	KOREA-A	2545793	349525756	500	47	0	
CY7C342B-JC	KOREA-A	2544651	349600026	300	51	0	
CY7C342B-JC	KOREA-A	2544651	349600026	500	51	0	
CY7C342B-JC	KOREA-A	2544651	349600026	1000	51	0	

<sup>1</sup> 128 Macrocell MAX EPLD, P26 Technology, Fab 2 Qualification

**RELIABILITY RELATED TEST DATA**

**QTP#: 97254<sup>2</sup>**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (140C, 5.75V)							
ACTUAL CONDITION 140C /5.75V							
CY7C342B-JC	ALPHA-X	2710261	219704671	24	166	0	
CY7C342B-JC	ALPHA-X	2710261	219704671	48	166	0	
CY7C342B-JC	ALPHA-X	2710261	219704672	24	167	0	
CY7C342B-JC	ALPHA-X	2710261	219704672	48	167	0	
CY7C342B-JC	ALPHA-X	2711431	219704945	24	167	0	
CY7C342B-JC	ALPHA-X	2711431	219704945	48	163	0	
CY7C342B-JC	ALPHA-X	2720482	21970600V1	72	192	0	

<sup>2</sup> 128 Macrocell MAX EPLD, P26 Technology, Commercial Burn-in Elimination Qual