Cypress Semiconductor
Product Qualification Report

QTP# 042105 VERSION 2.0
July 2005

DDR2 Register Device Family C8Q-3R Technology, Fab 4	
CY2SSTU32864	**1.8V, 25-bit (1:1) OR 14-bit (1:2) JEDEC-Compliant Data Register**
CY2SSTU32866	**1.8V, 25-bit (1:1) OR 14-bit (1:2) JEDEC-Compliant Data Register with Parity**

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Sabbas Daniel
Quality Engineering Director
(408) 943-2685

Fredrick Whitwer
Principal Reliability Engineer
(408) 943-2722

PRODUCT QUALIFICATION HISTORY

Qual Report		Description of Qualification Purpose		Date Comp
042106		7C82877A DDR2 PLL New Device family on New C8Q-3R Technology, Fab4		Jan 05
042105		7C83864/6A New Device Family on C8Q-3R Technology, Fab4		Mar 05
052209		6 Mask Layer (M1 to V1A3) change to improve VOH, VOL and fix parity bug		Jun 05

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: 7C8386xxA, DDR2 Register Device Family in C8Q-3R Technology from Fab4	
Marketing Part #:	CY2SSTU32864, CY2SSTU32866
Device Description:	1.8V, Commercial, available in 96-Ball FBGA
Cypress Division:	Cypress Semiconductor Corporation – Consumer & Computation Division (CCD)
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A
What ID markings on Die:	7C83864A

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	4	Metal Composition:	Metal 1: 300A Ti/3,200A Al 0.5% Cu /300A TiW Metal 2: 150A Ti/4,000A Al 0.5% Cu/300A TiW Metal 3: 150A Ti/4,000A Al 0.5% Cu/300A TiW Metal 4: 150A Ti/4,000A Al 0.5% Cu/300A TiW
Passivation Type and Materials:	1,000A TeOs / 9,000A Si_3N_4		
Free Phosphorus contents in top glass layer (%):	0%		
Number of Transistors in Device:	9,147		
Number of Gates in Device	2,199		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, 0.13 μm		
Gate Oxide Material/Thickness (MOS):	SiO_2 DGOX 32/55A		
Name/Location of Die Fab (prime) Facility:	CMI/Fab4		
Die Fab Line ID/Wafer Process ID:	Fab4, C8Q-3R		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
96-Ball FBGA	**ASE-Taiwan (G)**

Note: Package Qualification details upon request.

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	BP96
Package Outline, Type, or Name:	96-Pin Fine Ball Grid Array (FBGA)
Mold Compound Name/Manufacturer:	Plaskon SMT-B-1
Mold Compound Flammability Rating:	UL94 V-O
Oxygen Rating Index:	34
Lead Frame Designation:	NA
Substrate Material:	BT Resin
Lead Finish, Composition / Thickness:	**N/A**
Die Backside Preparation Method/Metallization:	None (Back Lap)
Die Separation Method:	Saw
Die Attach Supplier:	Ablebond
Die Attach Material:	8355F
Die Attach Method:	Epoxy
Bond Diagram Designation:	10-06191
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.0mil
Thermal Resistance Theta JA °C/W:	80°C/W
Package Cross Section Yes/No:	No
Assembly Process Flow:	49-41018
Name/Location of Assembly (prime) facility:	ASE-TAIWAN (TAIWN-G)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R, CY WA
Fault Coverage:	99.5%

Note: Please contact a Cypress Representative for other packages availability.

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max=3.8V, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=3.8V, 125°C	P
Long Life Verification	Dynamic Operating Condition, Vcc Max=3.8V, 125°C	P
Low Temperature Operating Life	-30C, 4.3V	P
High Temperature Steady State life	125°C, 3.63V, Vcc Max	P
High Accelerated Saturation Test (HAST)	130°C, 3.63V, 85%RH Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
Pressure Cooker	121°C, 100%RH Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JESD22, Method A114-B	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V Cypress Spec. 25-00020	P
Age Bond Strength	200C, 4hrs MIL-STD-883, Method 883-2011	P
Ball Shear	Cypress Spec 24-00018	P
Acoustic Microscopy	Spec. 25-00104	P
Latch up Sensitivity	125C, 5.5V/6.5V/7.5V, ± 300mA In accordance with JEDEC 17. Cypress Spec. 01-00081	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal[3] A.F	Failure Rate
High Temperature Operating Life Early Failure Rate[1]	1,078 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	806,008 DHRs	0	0 .7	55	21 FIT

[1] Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.
[2] Chi-squared 60% estimations used to calculate the failure rate.
[3] 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 = $8.62x10^{-5}$ 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

QTP #: 042106

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL3							
CY7C68013A (7C681000A)	4416666	*610434406*	TAIWN-G	COMP	17	0	
CY2SSTU877 (7C87741A)	4416666B	*H20592*	TAIWN-G	COMP	16	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	COMP	17	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	COMP	16	0	
STRESS: AGE BOND STRENGTH							
CY7C68013A (7C681000A)	4416666	*610434406*	TAIWN-G	COMP	5	0	
CY7C68013A (7C682001A)	4416701	*610437657*	TAIWN-G	COMP	5	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	COMP	3	0	
STRESS: BALL SHEAR							
CY7C68013A (7C682001A)	4416701	*610437657*	TAIWN-G	COMP	5	0	
STRESS: DYNAMIC LATCH-UP TESTING, 6.9V							
CY7C68013A (7C682001A)	4416701	*610437657*	TAIWN-G	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY7C68013A (7C682001A)	4416666	*610437607*	TAIWN-G	COMP	9	0	
CY7C68013A (7C682000A)	4416666	*610437102*	TAIWN-G	COMP	9	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	COMP	9	0	
CY7C68013A (7C682000A)	4416701	*610437702*	TAIWN-G	COMP	9	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V							
CY7C68013A (7C682001A)	4416666	*610437607*	TAIWN-G	COMP	9	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	COMP	9	0	
CY2SSTU877 (7C82877A)	4413035	*H19747*	TAIWN-G	COMP	9	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2200V							
CY7C68013A (7C682001A)	4416666	*610437607*	TAIWN-G	COMP	3	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	COMP	3	0	
CY2SSTU877 (7C82877A)	4413035	*H19747*	TAIWN-G	COMP	3	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	COMP	3	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 3.63V)							
CY7C68013A (7C682005A)	4416701	*610438121*	TAIWN-G	80	80	0	
CY7C68013A (7C682005A)	4416701	*610438121*	TAIWN-G	168	80	0	

Reliability Test Data

QTP #: 042106

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 3.8V, Vcc Max							
CY7C68013A (7C682001A)	4416666	*610437607*	TAIWN-G	96	499	0	
CY7C68013A (7C682005A)	4417143	*610443845*	TAIWN-G	96	514	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 3.8V, Vcc Max							
CY7C68013A (7C682001A)	4416666	*610437607*	TAIWN-G	168	200	0	
CY7C68013A (7C682001A)	4416666	*610437607*	TAIWN-G	1000	194	0	
CY7C68013A (7C682005A)	4417143	*610443845*	TAIWN-G	168	208	0	
CY7C68013A (7C682005A)	4417143	*610443845*	TAIWN-G	1000	208	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 2.35V, Vcc Max							
CY2SSTU877 (7C87741A)	4416666B	*H20592*	TAIWN-G	96	276	0	
CY2SSTU877 (7C82877A)	4416701	*H20501*	TAIWN-G	96	126	0	
CY2SSTU877 (7C87741A)	4416701	*H20500*	TAIWN-G	96	89	0	
CY2SSTU877 (7C87740A)	4416791B	*H20536*	TAIWN-G	96	169	0	
CY2SSTU877 (7C87741A)	4417975	*H20583*	TAIWN-G	96	304	0	
CY2SSTU877 (7C87741A)	4419587	*H20650*	TAIWN-G	96	500	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 3.8V, Vcc Max							
CY2SSTU877 (7C87741A)	4416666B	*H20592*	TAIWN-G	1000	253	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	168	150	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	1000	150	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.63V), PRE COND 192 HR, 30C/60%RH, MSL3							
CY7C68013A (7C682001A)	4416666	*610437607*	TAIWN-G	128	47	0	
CY7C68013A (7C682001A)	4416666	*610437607*	TAIWN-G	256	47	0	
CY7C68013A (7C682000A)	4416701	*610437702*	TAIWN-G	128	47	0	
CY7C68013A (7C682000A)	4416701	*610437702*	TAIWN-G	256	45	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 1.8V), PRE COND 192 HR, 30C/60%RH, MSL3							
CY2SSTU877 (7C87741A)	4417975	*H20583*	TAIWN-G	128	43	0	
STRESS: LOW TEMPERATURE OPERATING LIFE (-30C, 4.3V)							
CY7C68013A (7C682005A)	4416701	*610438121*	TAIWN-G	500	80	0	
STRESS: STATIC LATCH-UP TESTING (125C, 5.5V, ±300mA)							
CY2SSTU877 (7C82877A)	4413035	*H19747*	TAIWN-G	COMP	3	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	COMP	3	0	

Reliability Test Data

QTP #: 042106

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: STATIC LATCH-UP TESTING (125C, 6.5V, ±300mA)							
CY7C68013A (7C682001A)	4416666	*610437607*	TAIWN-G	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, 7.5V, ±300mA)							
CY7C68013A (7C682001A)	4416701	*610437657*	TAIWN-G	COMP	3	0	
STRESS: HIGH TEMPERATURE STORAGE, 150C, no bias							
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	500	50	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	1000	50	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	500	45	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	1000	45	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192 HR, 30C/60%RH, MSL3							
CY7C68013A (7C681000A)	4416666	*610434406*	TAIWN-G	168	50	0	
CY7C68013A (7C681000A)	4416666	*610434406*	TAIWN-G	288	50	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	168	50	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	288	50	0	
CY2SSTU877 (7C82877A)	4413035	*H19747*	TAIWN-G	168	47	0	
CY2SSTU877 (7C82877A)	4413035	*H19747*	TAIWN-G	288	47	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	168	45	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	288	45	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS, 30C/60%RH, MSL3							
CY7C68013A (7C681000A)	4416666	*610434406*	TAIWN-G	300	50	0	
CY7C68013A (7C681000A)	4416666	*610434406*	TAIWN-G	500	50	0	
CY7C68013A (7C681000A)	4416666	*610434406*	TAIWN-G	1000	50	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	168	50	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	500	50	0	
CY7C68013A (7C681000A)	4416701	*610434407/8*	TAIWN-G	1000	50	0	
CY2SSTU877 (7C82877A)	4413035	*H19747*	TAIWN-G	300	46	0	
CY2SSTU877 (7C82877A)	4413035	*H19747*	TAIWN-G	500	45	0	
CY2SSTU877 (7C82877A)	4413035	*H19747*	TAIWN-G	1000	45	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	300	45	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	500	45	0	
CY2SSTU877 (7C87740A)	4417143	*H20549*	TAIWN-G	1000	45	0	

Reliability Test Data

QTP #: 042105

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY2SSTU32864 (7C83864A)	4443023	*610463608*	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V							
CY2SSTU32864 (7C83864A)	4443023	*610463608*	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY2SSTU32864 (7C83864A)	4443023	*610463608*	TAIWN-G	COMP	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 2.35V, Vcc Max							
CY2SSTU32864 (7C83864A)	4443023	*610463608*	TAIWN-G	48	1078	0	
STRESS: STATIC LATCH-UP TESTING (125C, 5.5V, ±300mA)							
CY2SSTU32864 (7C83864A)	4443023	*610463608*	TAIWN-G	COMP	3	0	

Reliability Test Data

QTP #: 052209

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY2SSTU32864BFXC (7C83864A)	4505608	*610520253*	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V							
CY2SSTU32864BFXC (7C83864A)	4505608	*610520253*	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY2SSTU32864BFXC (7C83864A)	4505608	*610520253*	TAIWN-G	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, 5.5V, ±300mA)							
CY2SSTU32864BFXC (7C83864A)	4505608	*610520253*	TAIWN-G	COMP	3	0	