

# Cypress Semiconductor Product Qualification Report

QTP# 042106 VERSION 3.0  
March 2007

<b>DDR2 PLL Device Family</b>	
<b>C8Q-3R Technology, Fab 4</b>	
<b>CY2SSTU877</b>	<b>1.8V, 500-MHz, 10-Output JEDEC-Compliant Zero Delay Buffer</b>

## CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Mira Ben-Tzur  
Quality Engineering Director  
(408) 943-2675

Fredrick Whitwer  
Principal Reliability Engineer  
(408) 943-2722

### PRODUCT QUALIFICATION HISTORY

<b>Qual Report</b>	<b>Description of Qualification Purpose</b>	<b>Date Comp</b>
042106	7C82877A DDR2 PLL New Device family on New C8Q-3R Technology, Fab4	Jan 05
050305	7C82877B DDR2 PLL All Layer Independent mask set on C8Q-3RQ Technology, Fab4	Mar 05

<b>PRODUCT DESCRIPTION (for qualification)</b>	
Qualification Purpose: New Device CY2SSTU877, DDR2 PLL in C8Q-3R Technology from Fab4	
Marketing Part #:	CY2SSTU877
Device Description:	1.8V, Commercial/Industrial, available in 52-pin VFBGA, 40-pin QFN
Cypress Division:	Cypress Semiconductor Corporation – Consumer & Computation Division (CCD)

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION</b>			
Number of Metal Layers:	4	Metal Composition:	Metal 1: 100A Ti/3,200A Al 0.5% Cu /300A TiW Metal 2: 150A Ti/4,230A Al 0.5% Cu/300A TiW Metal 3: 150A Ti/4,230A Al 0.5% Cu/300A TiW Metal 4: 150A Ti/8,000A Al 0.5% Cu/300A TiW
Passivation Type and Materials:		1,000A TeOs / 9,000A Si <sub>3</sub> N <sub>4</sub>	
Generic Process Technology/Design Rule (μ-drawn):		CMOS, 0.13 μm	
Gate Oxide Material/Thickness (MOS):		SiO <sub>2</sub> DGOX 32/55A	
Name/Location of Die Fab (prime) Facility:		CMI/Bloomington MN	
Die Fab Line ID/Wafer Process ID:		Fab4, C8Q-3R	

**PACKAGE AVAILABILITY**

<b>PACKAGE</b>	<b>ASSEMBLY SITE FACILITY</b>
<b>52-Pin FBGA</b>	<b>ASE-Taiwan (G)</b>
<b>40-Pin QFN</b>	Amkor-Seoul Korea (L)

**Note:** Package Qualification details upon request.

<b>MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION</b>	
<b>Package Designation:</b>	BV52
<b>Package Outline, Type, or Name:</b>	52-Pin Fine Ball Grid Array (FBGA)
<b>Mold Compound Name/Manufacturer:</b>	Plaskon SMT-B-1
<b>Mold Compound Flammability Rating:</b>	UL94 V-O
<b>Oxygen Rating Index:</b>	34
<b>Lead Frame Designation:</b>	NA
<b>Substrate Material:</b>	BT Resin
<b>Lead Finish, Composition / Thickness:</b>	NA
<b>Die Backside Preparation Method/Metallization:</b>	None (Back Lap)
<b>Die Separation Method:</b>	Saw
<b>Die Attach Supplier:</b>	Ablebond
<b>Die Attach Material:</b>	8355F
<b>Die Attach Method:</b>	Epoxy
<b>Bond Diagram Designation:</b>	10-05820
<b>Wire Bond Method:</b>	Thermosonic
<b>Wire Material/Size:</b>	Au, 1.0mil
<b>Thermal Resistance Theta JA °C/W:</b>	80°C/W
<b>Package Cross Section Yes/No:</b>	No
<b>Assembly Process Flow:</b>	49-41010
<b>Name/Location of Assembly (prime) facility:</b>	TAIWN-G
<b>MSL Level</b>	3
<b>Reflow Profile</b>	260C

<b>ELECTRICAL TEST / FINISH DESCRIPTION</b>	
<b>Test Location:</b>	CML-R, CY WA

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

**RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT**

<b>Stress/Test</b>	<b>Test Condition (Temp/Bias)</b>	<b>Result P/F</b>
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, 15 Psig 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)	2200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2200V 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, Level 3	Spec. 25-00104	P
Latchup Sensitivity	125C, ± 300mA Cypress Spec. 01-00081	P

### RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal <sup>3</sup> A.F	Failure Rate
High Temperature Operating Life Early Failure Rate <sup>1</sup>	1,018 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	806,008 DHRs	0	0.7	55	21 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> 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 =  $8.62 \times 10^{-5}$  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

QTP #: 042106

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
<b>STRESS: ACOUSTIC-MSL3</b>							
CY68013A (7C681000A)	4416666	610434406	TAIWN-G	COMP	17	0	
CY2SSTU877 (7C87741A)	4416666B	H20592	TAIWN-G	COMP	16	0	
CY68013A (7C681000A)	4416701	610434407/8	TAIWN-G	COMP	17	0	
CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	COMP	16	0	
<b>STRESS: AGE BOND STRENGTH</b>							
CY68013A (7C681000A)	4416666	610434406	TAIWN-G	COMP	5	0	
CY68013A (7C682001A)	4416701	610437657	TAIWN-G	COMP	5	0	
CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	COMP	3	0	
<b>STRESS: BALL SHEAR</b>							
CY68013A (7C682001A)	4416701	610437657	TAIWN-G	COMP	5	0	
<b>STRESS: DYNAMIC LATCH-UP TESTING (6.9V)</b>							
CY68013A (7C682001A)	4416701	610437657	TAIWN-G	COMP	3	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL (500V)</b>							
CY68013A (7C682001A)	4416666	610437607	TAIWN-G	COMP	9	0	
CY68013A (7C682000A)	4416666	610437102	TAIWN-G	COMP	9	0	
CY68013A (7C681000A)	4416701	610434407/8	TAIWN-G	COMP	9	0	
CY68013A (7C682000A)	4416701	610437702	TAIWN-G	COMP	9	0	
CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	COMP	9	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2200V</b>							
CY68013A (7C682001A)	4416666	610437607	TAIWN-G	COMP	9	0	
CY68013A (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	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2200V</b>							
CY68013A (7C682001A)	4416666	610437607	TAIWN-G	COMP	3	0	
CY68013A (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	
<b>STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 3.63V)</b>							
CY68013A (7C682005A)	4416701	610438121	TAIWN-G	80	80	0	
CY68013A (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
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**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.8V, Vcc Max)**

CY68013A (7C682001A)	4416666	610437607	TAIWN-G	96	499	0	
CY68013A (7C682005A)	4417143	610443845	TAIWN-G	96	514	0	

**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.8V, Vcc Max)**

CY68013A (7C682001A)	4416666	610437607	TAIWN-G	168	200	0	
CY68013A (7C682001A)	4416666	610437607	TAIWN-G	1000	194	0	
CY68013A (7C682005A)	4417143	610443845	TAIWN-G	168	208	0	
CY68013A (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**

CY68013A (7C682001A)	4416666	610437607	TAIWN-G	128	47	0	
CY68013A (7C682001A)	4416666	610437607	TAIWN-G	256	47	0	
CY68013A (7C682000A)	4416701	610437702	TAIWN-G	128	47	0	
CY68013A (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	
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**STRESS: LOW TEMPERATURE OPERATING LIFE (-30C, 4.3V)**

CY68013A (7C682005A)	4416701	610438121	TAIWN-G	500	80	0	
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**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
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**STRESS: STATIC LATCH-UP TESTING (125C, 6.5V, ±300mA)**

CY68013A (7C682001A)	4416666	610437607	TAIWN-G	COMP	3	0	
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**STRESS: STATIC LATCH-UP TESTING (125C, 7.5V, ±300mA)**

CY68013A (7C682001A)	4416701	610437657	TAIWN-G	COMP	3	0	
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**STRESS: HIGH TEMPERATURE STORAGE, 150C, no bias**

CY68013A (7C681000A)	4416701	610434407/8	TAIWN-G	500	50	0	
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CY68013A (7C681000A)	4416701	610434407/8	TAIWN-G	1000	50	0	
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CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	500	45	0	
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CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	1000	45	0	
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**STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR, 30C/60%RH, MSL3**

CY68013A (7C681000A)	4416666	610434406	TAIWN-G	168	50	0	
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CY68013A (7C681000A)	4416666	610434406	TAIWN-G	288	50	0	
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CY68013A (7C681000A)	4416701	610434407/8	TAIWN-G	168	50	0	
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CY68013A (7C681000A)	4416701	610434407/8	TAIWN-G	288	50	0	
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CY2SSTU877 (7C82877A)	4413035	H19747	TAIWN-G	168	47	0	
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CY2SSTU877 (7C82877A)	4413035	H19747	TAIWN-G	288	47	0	
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CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	168	45	0	
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CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	288	45	0	
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**STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS, 30C/60%RH, MSL3**

CY68013A (7C681000A)	4416666	610434406	TAIWN-G	300	50	0	
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CY68013A (7C681000A)	4416666	610434406	TAIWN-G	500	50	0	
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CY68013A (7C681000A)	4416666	610434406	TAIWN-G	1000	50	0	
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CY68013A (7C681000A)	4416701	610434407/8	TAIWN-G	168	50	0	
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CY68013A (7C681000A)	4416701	610434407/8	TAIWN-G	500	50	0	
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CY68013A (7C681000A)	4416701	610434407/8	TAIWN-G	1000	50	0	
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CY2SSTU877 (7C82877A)	4413035	H19747	TAIWN-G	300	46	0	
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CY2SSTU877 (7C82877A)	4413035	H19747	TAIWN-G	500	45	0	
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CY2SSTU877 (7C82877A)	4413035	H19747	TAIWN-G	1000	45	0	
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CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	300	45	0	
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CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	500	45	0	
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CY2SSTU877 (7C87740A)	4417143	H20549	TAIWN-G	1000	45	0	
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## Reliability Test Data

QTP #: 050305

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
<b>STRESS: ESD-CHARGE DEVICE MODEL (500V)</b>							
CY2SSTU877BVXC (7C828771B)	4448054	610501198	TAIWN-G	COMP	9	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2200V</b>							
CY2SSTU877BVXC (7C828771B)	4448054	610501198	TAIWN-G	COMP	9	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2200V</b>							
CY2SSTU877BVXC (7C828771B)	4448054	610501198	TAIWN-G	COMP	3	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 2.35V, Vcc Max)</b>							
CY2SSTU877BVXC (7C828771B)	4448054	610501198	TAIWN-G	96	1018	0	
<b>STRESS: STATIC LATCH-UP TESTING (125C, 6.5V, ±300mA)</b>							
CY2SSTU877BVXC (7C828771B)	4448054	610501198	TAIWN-G	COMP	3	0	