

# **Cypress Semiconductor Product Qualification Report**

**QTP# 014807, 020709, 023101 VERSION 2.0  
June 2005**

<b>Synchronous Dual Port RAM Family</b> <b>CY7C083xV / CY7C085xV</b> <b>R7FTW-3R Technology Fab4</b>	
<b>CY7C0831V</b> <b>CY7C0832V</b>	<b>128K/256 x 18 Synchronous Dual Port RAM</b>
<b>CY7C0851V</b> <b>CY7C0852V</b> <b>CY7C0853V</b>	<b>64K/128/256K x 36 Synchronous Dual-Port RAM</b>

## **CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:**

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### PRODUCT QUALIFICATION HISTORY

QUAL REPORT		DESCRIPTION OF QUALIFICATION PURPOSE	DATE COMP.
014807		New Technology Derivative R7FT-3R (Hot Al) / Synchronous Dual-Port RAM CY7C0852V, product family and package option.	Feb 02
020709		Process R7FT-3R with Via 2 W Plug (4 Meg Dual Port )	Apr 02
023101		9 Meg Sync Dual Port Stacked Die, R7FT-3R, 172-ball PBGA (15mm x 15mm x 1.25mm), ASE Taiwan Assembly, MSL3	Dec 02

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: 9 Meg Sync Dual Port Stacked Die, R7FT-3R, 172-ball PBGA (15mm x 15mm x 1.25mm), ASE Taiwan Assembly, MSL3	
Marketing Part #:	CY7C0851V/ CY7C0852V/ CY7C0853V/CY7C0831V/CY7C0832V
Device Description:	Synchronous Dual Port RAM, 3.3V, Commercial and Industrial, available in 172-ball Grid Array (BGA) & 176-pin Flat Pack (TQFP)
Cypress Division:	Cypress Semiconductor Corporation – Data Com Division (DCD)
Overall Die (or Mask) REV:	Rev. A
What ID markings on Die:	7C08523VA

TECHNOLOGY/FAB PROCESS DESCRIPTION – R7FT-3R			
Number of Metal Layers:	3	Metal Composition:	Metal 1: 150Å Ti / 4,200Å Al / 300Å TiW Metal 2: 150Å Ti / 4,200 Å Al / 300Å TiW Metal 3: 150Å Ti / 8,000Å Al / 300Å TiW
Passivation Type and Materials:	1,000A TEOS + 9,000A SiN		
Free Phosphorus contents in top glass layer(%):	0%		
Die Coating(s), if used:	N/A		
Number of Transistors in Device:	62 million		
Number of Gates in Device:	112K		
Generic Process Technology/Design Rule (□ - drawn):	CMOS, Triple Metal /0.18 um		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> 32Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor – Bloomington Minnesota		
Die Fab Line ID/Wafer Process ID:	RAM7FT-3R		

#### PACKAGE AVAILABILITY

PACKAGE	<u>ASSEMBLY FACILITY SITE</u>
172-lead BGA, 176-lead TQFP	ASE Taiwan (TAIWN-G)

Note: Package Qualification details upon request.

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
<b>Package Designation:</b>	BB172
<b>Package Outline, Type, or Name:</b>	172-ball, Thin Ball Grid Array (FBGA)
<b>Mold Compound Name/Manufacturer:</b>	KE-G2270
<b>Mold Compound Flammability Rating:</b>	V-O per UL94
<b>Oxygen Rating Index:</b>	>28%
<b>Substrate Material:</b>	BT Resin
<b>Lead Finish, Composition / Thickness:</b>	Solder Ball, 63%Sn, 37%Pb
<b>Die Backside Preparation Method/Metallization:</b>	Backgrind
<b>Die Separation Method:</b>	Wafer Saw
<b>Die Attach Supplier:</b>	Dexter
<b>Die Attach Material:</b>	QMI 536 / 2025D
<b>Die Attach Method:</b>	Silver Epoxy
<b>Bond Diagram Designation:</b>	10-04438
<b>Wire Bond Method:</b>	Thermosonic
<b>Wire Material/Size:</b>	Au, 1.0um
<b>Thermal Resistance Theta JA °C/W:</b>	16° C/W
<b>Package Cross Section Yes/No:</b>	N/A
<b>Assembly Process Flow:</b>	49-41024
<b>Name/Location of Assembly (prime) facility:</b>	ASE Taiwan (TAIWN-G)

ELECTRICAL TEST / FINISH DESCRIPTION	
<b>Test Location:</b>	ASE Taiwan (TAIWN-G), CML-R
<b>Fault Coverage:</b>	100%

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

<b>MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION</b>	
<b>Package Designation:</b>	A176
<b>Package Outline, Type, or Name:</b>	176-pin Thin Quad Flat Pack (TQFP)
<b>Mold Compound Name/Manufacturer:</b>	Sumitomo EME 7320A
<b>Mold Compound Flammability Rating:</b>	V-O per UL94
<b>Oxygen Rating Index:</b>	>28%
<b>Lead Frame Material:</b>	Copper
<b>Lead Finish, Composition / Thickness:</b>	Solder Plate, 85%Sn, 15%Pb
<b>Die Backside Preparation Method/Metallization:</b>	Backgrind
<b>Die Separation Method:</b>	Wafer Saw
<b>Die Attach Supplier:</b>	Ablestik
<b>Die Attach Material:</b>	Ablestik 8361
<b>Bond Diagram Designation</b>	10-04266
<b>Wire Bond Method:</b>	Thermosonic
<b>Wire Material/Size:</b>	Gold/ 1.2mil
<b>Thermal Resistance Theta JA °C/W:</b>	38°C/W
<b>Package Cross Section Yes/No:</b>	N/A
<b>Assembly Process Flow:</b>	49-41021
<b>Name/Location of Assembly (prime) facility:</b>	ASE Taiwan (TAIWN-G)

<b><u>ELECTRICAL TEST / FINISH DESCRIPTION</u></b>	
<b>Test Location:</b>	ASE Taiwan (TAIWN-G), CML-R
<b>Fault Coverage:</b>	100%

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

# RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max = 2.3V, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=2.3V, 125°C	P
High Temperature Steady State Life	Static Operating Condition, Vcc = 3.63 V, 150°C, Vcc Max	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+0, -5°C	P
Pressure Cooker	121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR-Reflow, 220°C+0, -5°C	P
High Accelerated Saturation Test (HAST)	130°C, 3.63V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR-Reflow, 220°C+0, -5°C	P
High Temperature Storage	150°C ± 5°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V MIL-STD-883, Method 3015	P
Age Bond Strength	MIL-STD-883, Method 883-2011, 200C	P
Ball Shear	Cypress Spec. 12-00292	P
Bond Pull	Cypress Spec. 12-00292	P
Die Shear	Cypress Spec. 12-00292	P
Internal Visual	Cypress Spec. 25-00017	P
X-Ray	MIL-STD-883C, Method 2012/Cypress Spec. 12-00292	P
Thermal Shock	-55C to +125°C Cypress Spec. 25-00014	P
Current Density	Cypress Spec 22-00029	P
Acoustic Microscopy, MSL 3	Cypress Spec. 25-00104	P

### RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Acceleration Factor <sup>3</sup>	Failure Rate <sup>54</sup>
High Temperature Operating Life Early Failure Rate (4 Meg)	2832	0	N/A	N/A	0 PPM
High Temperature Operating Life Early Failure Rate (9 Meg)	499	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	724,190 HRs	0	0.7	170	8 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 #: 014807**

<b>Device</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Ass Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>	<b>Failure Mechanism</b>
<b>STRESS: ACOUSTIC, MSL3</b>							
CY7C0852V-AC (7C08523A)	4130707	610133760L1	TAIWN-G	COMP	15	0	
CY7C0852V-AC (7C08523A)	4131840	610135256L1	TAIWN-G	COMP	15	0	
CY7C0852V-AC (7C08523A)	4131841	610137123L1	TAIWN-G	COMP	15	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 2.3V, Vcc Max</b>							
CY7C0852V-AC (7C08523A)	4131841	610137123L1	TAIWN-G	48	772	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 2.3V, Vcc Max</b>							
CY7C0853V-BBC (7C08533A)	4147878	610145152	TAIWN-G	96	455	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.3V, Vcc Max</b>							
CY7C0852V-AC (7C08523A)	4131840	610135256	TAIWN-G	80	400	0	
CY7C0852V-AC (7C08523A)	4131840	610135256	TAIWN-G	336	256	0	
CY7C0852V-AC (7C08523A)	4131840	610135256	TAIWN-G	500	193	0	
CY7C0852V-AC (7C08523A)	4131840	610135256L1	TAIWN-G	80	300	0	
CY7C0852V-AC (7C08523A)	4131840	610135256L1	TAIWN-G	336	295	0	
CY7C0852V-AC (7C08523A)	4131840	610135256L1	TAIWN-G	500	274	0	
CY7C0852V-AC (7C08523A)	4131841	610137123L1	TAIWN-G	80	400	0	
CY7C0852V-AC (7C08523A)	4131841	610137123L1	TAIWN-G	336	255	0	
CY7C0852V-AC (7C08523A)	4131841	610137123L1	TAIWN-G	500	193	0	
CY7C0852V-AC (7C08523A)	4133371	610137695	TAIWN-G	80	400	0	
CY7C0852V-AC (7C08523A)	4133371	610137695	TAIWN-G	336	398	0	
CY7C0852V-AC (7C08523A)	4133371	610137695	TAIWN-G	500	385	0	
CY7C0852V-AC (7C08523A)	4133371	610138257L1	TAIWN-G	80	400	0	
<b>STRESS: HIGH TEMP STEADY STATE LIFE, 150C, 3.63V, Vcc Max</b>							
CY7C0852V-AC (7C08523A)	4130707	610133760L1	TAIWN-G	80	78	0	
CY7C0852V-AC (7C08523A)	4130707	610133760L1	TAIWN-G	168	76	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V</b>							
CY7C0852V-AC (7C08523A)	4133371	610137695	TAIWN-G	COMP	9	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL, 500V</b>							
CY7C0852V-AC (7C08523A)	4131840	610135256L1	TAIWN-G	COMP	9	0	
CY7C0852V-AC (7C08523A)	4133371	610137695	TAIWN-G	COMP	9	0	



## Reliability Test Data

**QTP #: 014807**

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
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**STRESS: STATIC LATCH-UP TESTING (125C, 10.0V, +/-300mA)**

CY7C0852V-AC (7C08523A)	4130707	610133760L1	TAIWN-G	COMP	3	0	
CY7C0852V-AC (7C08523A)	4131840	610135256L1	TAIWN-G	COMP	3	0	

**STRESS: AGE BOND STRENGTH**

CY7C0852V-AC (7C08523A)	4130707	610133760L1	TAIWN-G	COMP	5	0	
CY7C0852V-AC (7C08523A)	4131840	610135256L1	TAIWN-G	COMP	6	0	

**STRESS: HIGH TEMPERATURE STORAGE, +150C**

CY7C0852V-BBC (7C08523A)	4128335	610130788	TAIWN-G	500	48	0	
CY7C0852V-BBC (7C08523A)	4128335	610130788	TAIWN-G	1000	48	0	

**STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 192 HR 30C/60%RH, MSL3**

CY7C0852V-AC (7C08523A)	4131840	610135256	TAIWN-G	128	47	0	
CY7C0852V-AC (7C08523A)	4131840	610135256L1	TAIWN-G	128	48	0	
CY7C0852V-AC (7C08523A)	4131841	610137123L1	TAIWN-G	128	46	0	

**STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192 HR 30C/60%RH, MSL3**

CY7C0852V-AC (7C08523A)	4131840	610135256L1	TAIWN-G	168	47	0	
CY7C0852V-AC (7C08523A)	4131841	610137123L1	TAIWN-G	168	48	0	

**STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3**

CY7C0852V-AC (7C08523A)	4130707	610133760L1	TAIWN-G	300	47	0	
CY7C0852V-AC (7C08523A)	4130707	610133760L1	TAIWN-G	500	46	0	
CY7C0852V-AC (7C08523A)	4130707	610133760L1	TAIWN-G	1000	45	0	
CY7C0852V-AC (7C08523A)	4131841	610137123L1	TAIWN-G	300	46	0	
CY7C0852V-AC (7C08523A)	4131841	610137123L1	TAIWN-G	500	45	0	

## Reliability Test Data

**QTP #: 020709**

<b>Device</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Ass Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>	<b>Failure Mechanism</b>
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**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 2.3V, Vcc Max**

CY7C0852V-AC (7C08523A)	4147843	610203531	TAIWN-G	96	601	0	
CY7C0852V-AC (7C08523A)	4147843	610203532	TAIWN-G	96	505	0	
CY7C0852V-AC (7C08523A)	4150386	610206445	TAIWN-G	96	499	0	

**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 2.3V, Vcc Max**

CY7C0852V-AC (7C08523A)	4147843	610203532	TAIWN-G	336	503	0	
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**STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3**

CY7C0852V-AC (7C08523A)	4147843	610203532	TAIWN-G	300	44	0	
CY7C0852V-AC (7C08523A)	4147843	610203532	TAIWN-G	500	44	0	
CY7C0852V-AC (7C08523A)	4147843	610203532	TAIWN-G	1000	44	0	

## Reliability Test Data

**QTP #: 023101**

<b>Device</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Ass Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>	<b>Failure Mechanism</b>
<b>STRESS: ACOUSTIC, MSL3</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	COMP	15	0	
CY7C0853V-BBC (7C08533A)	4147878	610145152L1	TAIWN-G	COMP	15	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 2.3V, Vcc Max</b>							
CY7C0853V-BBC (7C08533A)	4147878	610145152	TAIWN-G	96	499	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 2.3V, Vcc Max</b>							
CY7C0853V-BBC (7C08533A)	4147878	610145152	TAIWN-G	168	118	0	
CY7C0853V-BBC (7C08533A)	4147878	610145152	TAIWN-G	500	118	0	
CY7C0853V-BBC (7C08533A)	4147878	610145152	TAIWN-G	1000	118	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,000V</b>							
CY7C0853V-BBC (7C08533A)	4147878	610145152L1	TAIWN-G	COMP	9	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL, 500V</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	COMP	9	0	
<b>STRESS: STATIC LATCH-UP TESTING (125C, 10.0V, +/-300mA)</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	COMP	3	0	
<b>STRESS: THERMAL SHOCK, +125C/-55C</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	100	48	0	
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	200	48	0	
<b>STRESS: HIGH TEMPERATURE STORAGE, +150C</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	500	48	0	
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	1000	48	0	
<b>STRESS: PHYSICAL DIMENSIONS</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	COMP	5	0	
<b>STRESS: EXTERNAL VISUAL</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	COMP	15	0	
<b>STRESS: BALL SHEAR</b>							
CY7C0853V-BBC (7C08533A)	4223477	610234276LM	TAIWN-G	COMP	10	0	
CY7C0853V-BBC (7C08533A)	4223477	610237235M	TAIWN-G	COMP	10	0	
<b>STRESS: BOND PULL</b>							
CY7C0853V-BBC (7C08533A)	4223477	610234276LM	TAIWN-G	COMP	10	0	
CY7C0853V-BBC (7C08533A)	4223477	610237235M	TAIWN-G	COMP	10	0	

## Reliability Test Data

**QTP #: 023101**

<b>Device</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Ass Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>	<b>Failure Mechanism</b>
<b>STRESS: DIE SHEAR</b>							
CY7C0853V-BBC (7C08533A)	4223477	610234276LM	TAIWN-G	COMP	15	0	
CY7C0853V-BBC (7C08533A)	4223477	610237235M	TAIWN-G	COMP	15	0	
<b>STRESS: INTERNAL VISUAL</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	COMP	5	0	
<b>STRESS: X-RAY</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	COMP	15	0	
<b>STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 192 HR 30C/60%RH, MSL3</b>							
CY7C0853V-BBC (7C08533A)	4133371	610136480L	TAIWN-G	128	47	0	
<b>STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192 HR 30C/60%RH, MSL3</b>							
CY7C0853V-BBC (7C08533A)	4223476	610232577LM1	TAIWN-G	168	50	0	
CY7C0853V-BBC (7C08533A)	4223477	610234276LM	TAIWN-G	168	50	0	
CY7C0853V-BBC (7C08533A)	4223477	610237235M	TAIWN-G	168	49	0	
<b>STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3</b>							
CY7C0853V-BBC (7C08533A)	4223477	610234276LM	TAIWN-G	300	47	0	
CY7C0853V-BBC (7C08533A)	4223476	610232577LM1	TAIWN-G	300	50	0	
CY7C0853V-BBC (7C08533A)	4223476	610232577LM1	TAIWN-G	500	50	0	
CY7C0853V-BBC (7C08533A)	4223476	610232577LM1	TAIWN-G	1000	50	0	
CY7C0853V-BBC (7C08533A)	4223477	610237235M	TAIWN-G	300	49	0	