

# CYPRESS SEMICONDUCTOR

## PRODUCT CHANGE NOTIFICATION

**PCN:** 020002 Revised

**DATE:** March 6, 2002

**Subject:** SRAM, 1Meg 3.3V, Fast Asynchronous Family, Process Technology Changed to RAM7FD.

**To:**

### Reason for Revision:

1). The new ICC limits were changed.

### Description of change:

The part numbers listed below have been qualified to be transferred from RAM52D, a 0.25 $\mu$  process, to RAM7FD-3R, a 0.15 $\mu$  process in Cypress's Bloomington, MN, Fab 4. This will result in a die shrink. The new die revision is F and is marked on the device after the date code.

The part number will be revised to contain the letter "C" (i.e. CY7C1021CV33-10VC) in the part number. New datasheets have been issued to reflect the part number change and to modify the limit on ICC for the industrial temperature range products per the following tables:

Part Number: CY7C1018CV33 Industrial temperature range only.

Speed (tAA)	8 ns	10 ns	12 ns	15ns	
Old ICC Limit (mA)	---	---	190	170	
New ICC Limit (mA)	95	90	85	80	

Part Number: CY7C1019CV33 Industrial temperature range only.

Speed (tAA)	8 ns	10 ns	12ns	15ns	
Old ICC Limit (mA)	---	---	190	170	
New ICC Limit (mA)	95	90	85	180	

Part Number: CY7C1021CV33 Industrial temperature range only.

Speed (tAA)	8 ns	10 ns	12ns	15ns	
Old ICC Limit (mA)	---	---	190	170	
New ICC Limit (mA)	95	90	85	80	

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For data sheets contact

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No other changes have been made that effect form, fit, or function. Qualification report QTP 011908 is attached.

**Cypress part numbers affected:**

CY7C1018BV33\*, CY7C1019BV33\*, CY7C1021BV33\*, all speeds, commercial and industrial temperature range, all packages.

**Customer part numbers affected:**

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**Benefit of change:**

This change will increase the number of good die per wafer resulting in shorter lead-times and improved availability.

**Qualification status:**

Complete. Qualification Report # 011908 is attached.

**Sample status:**

Samples are available by contacting our local sales office.

**Approximate Implementation Date:**

Production release of the new material will be phased in immediately or as agreed per your contract terms and conditions. The old material will be available for last time buys for a minimum of 3 months and formal notice of discontinuance is anticipated to be issued in Q2.

**Response Required:**

*Fax signed approval to Al Laxman at 408-545-7120-4897 or reply by E-mail.  
For any additional information regarding this change, contact your local sales representative.*

Sincerely,

Mike Burke  
Director of QA

Al Laxman  
QA Manager

# Cypress Semiconductor Product Qualification Report

QTP# 011908 VERSION 1.0  
February, 2002

## Fast Asynchronous SRAM

Technology Derivative R7FD-3, Fab4

<b>CY7C1018CV33</b>	<b>128K x 8 Static RAM</b>
<b>CY7C1019CV33</b>	
<b>CY7C1020CV33</b>	<b>32K x 16 Static RAM</b>
<b>CY7C1021CV33</b>	<b>64K x 16 Static RAM</b>

### CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Ed Russell  
Reliability Director  
(408) 432-7069

Al Laxman  
Quality Engineering  
(408) 942-2001

## PRODUCT QUALIFICATION HISTORY

<b>Qual Report</b>	<b>Description of Qualification Purpose</b>	<b>Date Comp</b>
011305	New Technology Derivative R7FD-3R / 4Meg, Fast Asynchronous SRAM CY7C1041CV33 and its metal option family	Dec 01
011908	. 1Meg, Fast Asynchronous SRAM CY7C1021CV33 and its metal/package option family	Jan 02

<b>PRODUCT DESCRIPTION (for qualification)</b>			
Qualification Purpose: Qualify CY7C1021CV33 product and its metal option family in Technology Derivative R7FD-3R, Fab 4			
Marketing Part #:	<b>CY7C1018CV33, CY01019CV33, CY7C1020CV33, CY7C1021CV33</b>		
Device Description:	3.3V, Commercial and Industrial available in 32/34/44-lead SOJ, 44-lead TSSOP II and 48-ball BGA package. respectively		
Cypress Division:	Cypress Semiconductor Corporation –Memory Product Division (MPD)		
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. G	
Die Size (stepping):	115.7mils x 93.0 mils	What ID markings on Die:	7C1320C/7C1321C

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION – R7FD-3</b>			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 150Å Ti / 4,200Å Al / 300Å TiW Metal 2: 300Å Ti / 8,000 Å Al / 300Å TiW
Passivation Type and Materials:	1000Å TEOS / 9000Å PECVD Nitride		
Free Phosphorus contents in top glass layer(%):	0%		
Number of Transistors in Device	7.4 million		
Number of Gates in Device	7.4 million		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double Metal /0.15 μm		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> , 32Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor -- Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/R7FD-3R		

#### PACKAGE AVAILABILITY

<b>PACKAGE</b>	<b>ASSEMBLY SITE FACILITY</b>
<b>32-lead SOJ</b>	<b>Omedata, Indonesia</b>
<b>36/44-lead SOJ</b>	<b>Cypress CSPI-R</b>
<b>44-lead TSSOP II</b>	<b>Cypress CSPI-R</b>
<b>48-ball BGA</b>	<b>Cypress CSPI-R, ASE Taiwan</b>

**Note:** Package Qualification details upon request

**MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION**

<b>Package Designation:</b>	V444
<b>Package Outline, Type, or Name:</b>	44 lead Plastic Small Outline J-Bend (SOJ)
<b>Mold Compound Name/Manufacturer:</b>	Hitachi CEL 9200CY
<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 Plated 90%Sn, 10%Pb
<b>Die Backside Preparation Method/Metallization:</b>	N/A
<b>Die Separation Method:</b>	Wafer Saw
<b>Die Attach Supplier:</b>	Ablestik
<b>Die Attach Material:</b>	8361H
<b>Bond Diagram Designation</b>	10-04248
<b>Wire Bond Method:</b>	Thermosonic
<b>Wire Material/Size:</b>	Gold, 1.0mil
<b>Thermal Resistance Theta JA °C/W:</b>	77.74°C/W
<b>Package Cross Section Yes/No:</b>	N/A
<b>Assembly Process Flow:</b>	11-20004M
<b>Name/Location of Assembly (prime) facility:</b>	Cypress Philippines (CSPI-R)

**ELECTRICAL TEST / FINISH DESCRIPTION**

<b>Test Location:</b>	CSPI-R
<b>Fault Coverage:</b>	100%

**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	1) QTP #011908, QTP #011305 Dynamic Operating Condition, Vcc Max = 2.3V, 150°C	P
High Temperature Operating Life Latent Failure Rate	1) QTP #011908, QTP #011305 Dynamic Operating Condition, Vcc Max=2.3V, 150°C	P
High Temperature Steady State Life	1) QTP #011305 Static Operating Condition, Vcc Max=2.2V, 150°C	P
High Accelerated Saturation Test (HAST)	1) QTP #011305 130°C, 3.63V,85%RH Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Temperature Cycle	1) QTP #011908, QTP #011305 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, 220°C+5, 0°C	P
Pressure Cooker	1) QTP #011908, QTP #011305 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
High Temperature Storage	1) QTP #011305 150°C ± 5°C no bias	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1) QTP #011908, QTP #011305 2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	1) QTP #011908, QTP #011305 500V Cypress Spec. 25-00020	P
Age Bond Strength	1) QTP #011305 200C, 4HRS MIL-STD-883, Method 883-2011	P
SEM X-Section	1) QTP #011305 MIL-STD-883, Method 883-2018-2 / Cypress Spec. 22-00009	P



**RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT (continuation)**

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Acoustic Microscopy, Level 3	1) QTP #011305 Cypress Spec. 25-00104	P
Current Density	1) QTP #011305 Cypress Spec 22-00029	P
Alpha Particle Sensitivity	1) QTP #011908 Cypress Spec. 25-00055, 0 FIT	P
Dynamic Latchup	1) QTP #011305 In accordance with JEDEC 17. Cypress Spec. 01-00081	P
Static Latchup	1) QTP #011908, QTP #011305 125C, 10V, ± 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 AF <sup>4</sup>	Failure Rate <sup>5</sup>
High Temperature Operating Life Early Failure Rate <sup>1</sup>	4,153	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	842,160 DHRs	1	0.7	170	14 FIT

<sup>1</sup> A production burn-in of 6 Hrs at 150°C, 2.75V is required for the product.

<sup>2</sup> Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

<sup>3</sup> Chi-squared 60% estimations used to calculate the failure rate..

<sup>4</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.

device

<sup>5</sup> EFR and LFR Failure Rate based on QTP #011908 and QTP #011305.

# Reliability Test Data

QTP #: 011908

<b>Device Mechanism</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Ass Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>	<b>Failure</b>
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.3V, Vcc Max)</b>							
CY7C1021CV33-VC (7C1321G)	4126989	610130646	CSPI-R	48	1005	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.3V, Vcc Max)</b>							
CY7C1021CV33-VC (7C1321G)	4126989	610130646	CSPI-R	80	395	0	
CY7C1021CV33-VC (7C1321G)	4126989	610130646	CSPI-R	500	395	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)</b>							
CY7C1021CV33-VC (7C1321G)	4126989	610130646	CSPI-R	COMP	9	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL (500V)</b>							
CY7C1021CV33-VC (7C1321G)	4126989	610130646	CSPI-R	COMP	9	0	
<b>STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/-300mA</b>							
CY7C1021CV33-VC (7C1321G)	4126989	610130646	CSPI-R	COMP	3	0	
<b>STRESS: PRESSURE COOKER TEST, 121C, 100%RH,, PRE COND 192 HR 30C/60%RH</b>							
CY7C1021CV33-VC (7C1321G)	4126989	610130646	CSPI-R	168	50	0	
<b>STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH, MSL3</b>							
CY7C1021CV33-VC (7C1321G)	4126989	610130646	CSPI-R	300	50	0	

# Reliability Test Data

QTP #: 011305

<b>Device Mechanism</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Ass Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>	<b>Failure</b>
<b>STRESS: ACOUSTIC-MSL3</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	COMP	15	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	COMP	15	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	COMP	20	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.3V, Vcc Max)</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	48	1050	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	48	1048	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	48	1050	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.3V, Vcc Max)</b>							
CY7C1041CV33-BC (7C1341F)	4132141	610132436	CSPI-R	80	297	0	
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	500	295	1	OPEN FA
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	80	394	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	500	394	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	80	600	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	500	600	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	COMP	9	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	COMP	9	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	COMP	9	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL (500V)</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	COMP	9	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	COMP	9	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	COMP	9	0	
<b>STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/300mA</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	COMP	3	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	COMP	3	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	COMP	3	0	
<b>STRESS: DYNAMIC LATCH-UP TESTING</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	COMP	3	0	
<b>STRESS: AGE BOND STRENGTH</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	COMP	3	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	COMP	3	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	COMP	3	0	
<b>STRESS: LOW TEMPERATURE OPERATING LIFE (-30C, 2.6V)</b>							
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	500	48	0	

# Reliability Test Data

QTP #: 011305

<b>Device Mechanism</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Ass Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>	<b>Failure</b>
<b>STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	500	50	0	
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	1000	50	0	
<b>STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 2.2V, Vcc MAX)</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	80	80	0	
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	168	80	0	
<b>STRESS: PRESSURE COOKER TEST, 121C, 100%RH,, PRE COND 192 HR 30C/60%RH</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	168	49	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	168	50	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	168	50	0	
<b>STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 192 HR 30C/60%RH, MSL3</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	128	50	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	128	50	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	128	50	0	
<b>STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH, MSL3</b>							
CY7C1041CV33-VC (7C1341F)	4132141	610132436	CSPI-R	300	50	0	
CY7C1041CV33-VC (7C1341F)	4133290	610134313	CSPI-R	300	50	0	
CY7C1041CV33-ZC (7C1341F)	4135715	610140940	CSPI-R	300	50	0	