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Continuity of document content
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Cypress Semiconductor
Technology Derivative Qualification Report

QTP# 011305
May, 2013

Fast Asynchronous SRAM Technology Derivative R7FD-3, Fab4	
CY7C1011CV33	**128K x 16 Static RAM**
CY7C1041CV33	**256K x 16 Static RAM**
CY7C1046CV33	**1M x 4 Static RAM**
CY7C1049CV33	**512K x 8 Static RAM**

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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Reliability Director
(408) 943-2675

Zhaomin Ji
Principal Reliability Engineer
(408) 432-7021

PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
011305	New Technology Derivative R7FD-3R / 4Meg, Fast Asynchronous SRAM CY7C1041CV33 and its metal option family.	Dec 01
033901	R7FD-3R New Poly CD with HV P-Tip Implant Removal	Oct 03

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose: Qualify new Technology Derivative R7FD-3R, Fab 4, CY7C1041CV33 product and its metal option family.		
Marketing Part #:	CY7C1041CV33, CY7C1046CV33, CY7C1049CV33, CY7C1011CV33	
Device Description:	3.3V, Commercial and Industrial available in 32/36/44-lead SOJ, 44-lead TSOP II and 48-ball BGA package.	
Cypress Division:	Cypress Semiconductor Corporation –Memory Product Division (MPD)	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. F
What ID markings on Die:	7C1341F	

TECHNOLOGY/FAB PROCESS DESCRIPTION – R7FD-3			
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		4 million x 6T	
Number of Gates in Device		26 million	
Generic Process Technology/Design Rule (μ-drawn):		CMOS, Double Metal /0.15 μm	
Gate Oxide Material/Thickness (MOS):		SiO_2, 32Å	
Name/Location of Die Fab (prime) Facility:		Cypress Semiconductor -- Bloomington, MN	
Die Fab Line ID/Wafer Process ID:		Fab4/R7FD-3R	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
32-lead SOJ	JCET-CHINA (JT)
36/44-lead SOJ	JCET-CHINA (JT)
48-ball BGA	CML-RA, ASE Taiwan
44-lead TSSOP	CML-RA, CHINA (JT)
44-lead TQFP	JCET-CHINA (JT)

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	ZS444
Package Outline, Type, or Name:	44 lead This Small Outline Package, Type II (TSOP II)
Mold Compound Name/Manufacturer:	Hitachi CEL9200CY
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	>28%
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Solder Plated 90%Sn, 10%Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	8361H
Wire Bond Method:	Thermosonic
Wire Material/Size:	Gold, 1.0mil
Thermal Resistance Theta JA °C/W:	102°C/W
Package Cross Section Yes/No:	N/A
Name/Location of Assembly (prime) facility:	Cypress Philippines (CSPI-R) – Moved to JCET-China

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	Cypress Philippines (CML-R)

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

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	V444
Package Outline, Type, or Name:	44 lead Plastic Small Outline J-Bend (SOJ)
Mold Compound Name/Manufacturer:	Hitachi CEL 9200CY
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	>28%
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Solder Plated 90%Sn, 10%Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	8361H
Wire Bond Method:	Thermosonic
Wire Material/Size:	Gold, 1.0mil
Thermal Resistance Theta JA °C/W:	77.74°C/W
Package Cross Section Yes/No:	N/A
Name/Location of Assembly (prime) facility:	Cypress Philippines (CSPI-R) – Moved to JCET-China

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CSPI-R
Fault Coverage:	100%

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	JESD22-A108: Dynamic Operating Condition, Vcc Max = 2.3V, 150°C	P
High Temperature Operating Life Latent Failure Rate	JESD22-A108: Dynamic Operating Condition, Vcc Max=2.3V, 150°C	P
High Temperature Steady State Life	JESD22-A108: Static Operating Condition, Vcc Max=2.2V, 150°C	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 130°C, 3.63V,85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Pressure Cooker	JESD22-A102: 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
High Temperature Storage	JESD22-A103: 150°C ± 5°C no bias	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V JESD22-C101	P
Age Bond Strength	200C, 4HRS MIL-STD-883, Method 883-2011	P
SEM X-Section	MIL-STD-883, Method 883-2018-2	P
Acoustic Microscopy, MSL 3	J-STD-020	P
Current Density	Meets the Technology Device Level Reliability Specifications	P
Dynamic Latchup	In accordance with JEDEC 17	P
Static Latchup	125C, 10V, ± 300mA In accordance with JEDEC 17	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[4]	Failure Rate
High Temperature Operating Life Early Failure Rate[1]	3,148	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	644,660 DHRs	0	0.7	170	8 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 = 8.62×10^{-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 #: 011305

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

Reliability Test Data
QTP #: 011305

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

Document History Page

Document Title: QTP 011305: FAST ASYNCHRONOUS SRAM, TECHNOLOGY DERIVATIVE R7FD-3, FAB4
Document Number: 001-87701

Rev.	ECN No.	Orig. of Change	Description of Change
**	4009754	NSR	Initial Spec Release. Converted old qual report to spec format.

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