Cypress Semiconductor Automotive Product Qualification Report

QTP# 084601 VERSION *D
March 2025

Automotive Fast Async Device R7FD-3R Technology, Fab 4	
CY7C1011CV33	**2-Mbit (128K x 16) Static RAM**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
034402	CY7C1020CV33, 512Kb and family on R7FD-3R Technology from Fab4, AEC-Q100 Automotive Application	Jul 04
075101	Automotive Device Qualification for the 7A13412FC, 2Meg R7FD-3R Fast Async w/ NSM Fix	Jan 08
084601	Automotive Device Qualification for 7A13412FC, 2Meg R7FD-3R Fast Async for E-Grade	Feb 09

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose:	To qualify the 7A13412FC, 2Meg R7FD-3R Fast Asynch for E-grade
Marketing Part #:	CY7C1011CV33
Device Description:	3.3V, R7FD-3R, 128K X 16
Cypress Division:	Cypress Semiconductor Corporation – Memory Product Division (MPD)

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 150A TiW, 4200A Al /300A TiW Metal 2: 300A Ti, 8000A Al /300A TiW
Passivation Type and Materials:			1000A TEOS / 9,000A PECVD Nitrite
Generic Process Technology/Design Rule (µ-drawn):			0.15µm
Gate Oxide Material/Thickness (MOS):			SiO_2, 32A
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 FACILITY SITE
44-Lead TSOP II	**JT-China**

Note: Package Qualification details available upon request.

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	ZW44
Package Outline, Type, or Name:	44-Lead Thin Small Outline Package (TSOP II)
Mold Compound Name/Manufacturer:	Hitachi CEL9200CYR
Mold Compound Flammability Rating:	UL 94 V0
Mold Compound Alpha Emission Rate :	0.001counts/cm2-h Max
Oxygen Rating Index:	N/A
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Dexter
Die Attach Material:	QMI509
Die Attach Method:	Epoxy Dispense
Bond Diagram Designation	001-23879
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil
Thermal Resistance Theta JA °C/W:	42.96
Package Cross Section Yes/No:	N/A
Name/Location of Assembly facility:	JT-China
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	JT-China

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
Wire Bond Shear	AEC-Q100-001	P
Wire Bond Pull	Mil-Std 883, Method 2011	P
External Visual	MIL-STD-883-2014	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	250V/500V/750V (Corner Pins) AEC-Q100-011	P
Electrical Distributions	AEC-Q100-009	P
Electrostatic Discharge Human Body Model (ESD-HBM)	500V/1000V/1500V/2,000V AEC-Q100-002	P
High Accelerated Saturation Test (HAST)	JESD22-A110, 130°C, 3.65V,85%RH Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 235°C+0, -5°C	P
High Temperature Operating Life Early Failure Rate	AEC-Q100-008 and JESD22-A108, 150°C Dynamic Operating Condition, Vcc = 2.3V, 150°C	P
High Temperature Operating Life Latent Failure Rate	JESD22-A108, 150°C Dynamic Operating Condition, Vcc Max = 2.3V, 150°C	P
High Temperature Storage	JESD22-A103, 150°C	P
Static Latch-up	AEC-Q100-004, 125C, 5.4V, ± 100mA JESD78B	P
Physical Dimensions	JESD22B100 and B108	P
Pressure Cooker	JESD22-A102, 121°C, 100%RH, 15PSIG Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR-Reflow, 235°C+0, -5°C	P
Accelerated Soft Error Test	JESD89 -1, JESD89-3	P
Solderability	JESD22-B102	P
Temperature Cycle	JESD22-A104, -65°C to 150°C Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR-Reflow, 235°C+0, -5°C	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fail	Activation	Thermal	Failure Rate
High Temperature Operating Life Early Failure Rate	10,494 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	97,920 DHRs	0	0.7	170	55 FIT [2]

[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.

Based on Automotive qual samples size not Commercial qual sample size.

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 2.3V, Vcc Max							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	24	839	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	24	839	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	24	832	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.3V, Vcc Max							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	48	80	0	
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	80	80	0	
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	408	80	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	48	80	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	80	80	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	408	80	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	48	80	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	80	80	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	408	80	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 500V							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 1,000V							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 1,500V							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,000V							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 250V							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 750V (Corner Pins)							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	6	0	

Reliability Test Data

QTP #: 034402

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: BOND PULL							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	5	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 5.45 V, ±100mA							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	6	0	
STRESS: ELECTRICAL DISTRIBUTIONS							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	30	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	COM	30	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	COMP	30	0	
STRESS: HIGH TEMPERATURE STORAGE, 150ºC							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	500	80	0	
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	1000	80	0	
STRESS: PHYSICAL DIMENSIONS							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	30	0	
STRESS: SOLDERABILITY							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	15	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	COMP	15	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	COMP	15	0	
STRESS: BALL SHEAR							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	5	0	
STRESS: EXTERNAL VISUAL							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	COMP	1351	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	COMP	1199	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	COMP	1197	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.65V, PRE COND 192 HR 30C/60%RH, MSL3							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	96	77	0	
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	128	77	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	96	75	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	128	75	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	96	80	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	128	80	0	

Reliability Test Data

QTP #: 034402

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192 HR 30C/60%RH, MSL3							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	96	80	0	
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	168	77	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	96	80	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	168	80	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	96	80	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	168	80	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH, MSL3							
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	300	80	0	
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	500	80	0	
CY7C1020CV33 (7C1320G)	4320164	610345596	CML-R	1000	80	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	300	80	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	500	80	0	
CY7C1020CV33 (7C1320G)	4210573	610347340	CML-R	1000	80	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	300	78	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	500	78	0	
CY7C1020CV33 (7C1320G)	4329858	610344870	CML-R	1000	78	0	

Reliability Test Data

QTP #: 075101

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 2.30V, Vcc Max							
CY7C1011CV33 (7A13412F)	4711544	610762256	CML-R	48	3500	0	
CY7C1011CV33 (7A13412F)	4709996	610752257	CML-R	48	3497	0	
CY7C1011CV33 (7A13412F)	4710395	610762258	CML-R	48	3497	0	
STRESS: ESD-CHARGE DEVICE MODEL, 250V							
CY7C1011CV33 (7A13412F)	4711544	610762256	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY7C1011CV33 (7A13412F)	4711544	610762256	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114, 500V							
CY7C1011CV33 (7A13412F)	4711544	610762256	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114, 1000V							
CY7C1011CV33 (7A13412F)	4711544	610762256	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114, 1500V							
CY7C1011CV33 (7A13412F)	4711544	610762256	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114, 2000V							
CY7C1011CV33 (7A13412F)	4711544	610762256	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 5.4V, +/100mA							
CY7C1011CV33 (7A13412F)	4711544	610762256	CML-R	COMP	6	0	
STRESS: ELECTRICAL DISTRIBUTION							
CY7C1011CV33 (7A13412F)	4706875	610722768	CML-R	COMP	30	0	
CY7C1011CV33 (7A13412F)	4647740	610702615	CML-R	COMP	30	0	
CY7C1011CV33 (7A13412F)	4648473	610702464	CML-R	COMP	30	0	

Reliability Test Data

QTP #: 084601

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: BALL SHEAR							
CY7C1041CV33 (7C1341F)	4338799	610401498	CML-R	COMP	30	0	
STRESS: BOND PULL							
CY7C1041CV33 (7C1341F)	4338799	610401498	CML-R	COMP	30	0	
STRESS: ELECTRICAL DISTRIBUTION							
CY7C1041CV33 (7C1341F)	4347658	610407671	CML-R	COMP	30	0	
CY7C1011CV33 (7A13412F)	4706875	610722768	CML-R	COMP	30	0	
CY7C1011CV33 (7A13412F)	4647740	610702615	CML-R	COMP	30	0	
CY7C1011CV33 (7A13412F)	4648473	610702464	CML-R	COMP	30	0	
STRESS: EXTERNAL VISUAL							
CY7C1041CV33 (7C1341F)	4347658	610407671	CML-R	COMP	179	0	
CY7C1041CV33 (7C1341F)	4346466	610401794	CML-R	COMP	105	0	
CY7C1041CV33 (7C1341F)	4338799	610401498	CML-R	COMP	165	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192 HR 30C/60%RH, MSL3							
CY7C1041CV33 (7C1341F)	4347658	610407671	CML-R	96	50	0	
STRESS: PHYSICAL DIMENSIONS							
CY7C1041CV33 (7C1341F)	4347658	610407671	CML-R	COMP	10	0	
CY7C1041CV33 (7C1341F)	4346466	610401794	CML-R	COMP	10	0	
CY7C1041CV33 (7C1341F)	4338799	610401498	CML-R	COMP	10	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 5.4V, **±100mA**							
CY7C1041CV33 (7C1341F)	4347658	610407671	CML-R	COMP	3	0	
STRESS: SOLDERABILITY							
CY7C1041CV33 (7C1341F)	4347658	610407671	CML-R	COMP	15	0	
CY7C1041CV33 (7C1341F)	4346466	610401794	CML-R	COMP	15	0	
CY7C1041CV33 (7C1341F)	4338799	610401498	CML-R	COMP	15	0	
STRESS: TC CONDITION C, 150C TO -65C, PRE COND 192 HR 30C/60%RH, MSL3							
CY7C1041CV33 (7C1341F)	4347658	610407671	CML-R	500	50	0	
CY7C1041CV33 (7C1341F)	4346466	610401794	CML-R	500	50	0	
CY7C1041CV33 (7C1341F)	4338799	610401498	CML-R	500	50	0	

Document History Page

Document Title: 084601: AUTOMOTIVE FAST ASYNC DEVICE (CY7C1011CV33) R7FD-3R TECHNOLOGY, FAB4
Document Number: 001-69309

Rev.	ECN No.	Orig. of Change	Description of Change
**	3242172	HGA	Initial Spec Release
*A	4001808	HSTO	-Replaced Memory Image Division (MID) with Memory Product Division (MPD) in Product Description. -Replaced CML-R with JT-China in Assembly Facility Site, Major Package Information Table and Test Location. -Deleted Cypress obsolete referenced spec 11-20047 in Major Package and replaced it with 001-64160 -Deleted Cypress referenced specs 12-00292/12-00103, 01-00081 , 25-00055 and retained/replaced with industry standards in Reliability Test Performed per Specification Requirements Table.
*B	4379048	HSTO	Align qualification report based on the new template in the front page
*C	4775580	HSTO	Update reference for Reliability Director
*D	8114730	HSTO	Removed obsolete specs#001-64160