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Cypress Semiconductor
Product Qualification Report

QTP# 083103
May 2013

FullFlex™ 36M Sync SDR Dual Port SRAM C9FD-3R Technology, Fab4	
CYD36S72V18	**512K x 72 (36 Mbit) SDR**
CYD36S36V18	**1M x 36 (36 Mbit) SDR**
CYD36S18V18	**2M x 18 (36 Mbit) SDR**

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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Reliability Director
(408) 943-2675

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Principal Reliability Engineer
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PACKAGE/PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
073907	Qualify C9FQ-3R Technology and 9M/18M Sync DP Devices, Fab4	Oct 07
083103	Qualify 36 Meg Sync DP device (two 18M stack die option), C9FQ-3R Technology	Aug 08
083602	9M, 18M and 36M Devices Defect Reduction Qualification.	Sep 09

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify 36 Meg Sync Dualport device (two 18M stack die option) C9FQ-3R Technology, Fab4	
Marketing Part #:	CYD36S72V18, CYD36S36V18, CYD36S18V18
Device Description:	36 Meg Sync Dualport is a true dual-port static RAMs that are high- speed, low-power 1.8V/1.5V CMOS. Two ports are provided, allowing the array to be accessed simultaneously
Cypress Division:	Cypress Semiconductor Corporation –Memory Product Division (MPD)

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	4	Metal Composition:	Metal 1: 100Å Ti / 3200Å Al /300Å TiW Metal 2: 100Å Ti / 3200Å Al /300Å TiW Metal 3: 1500Å Ti / 4200Å Al /300Å TiW Metal 4: 150Å Ti / 8460Å Al /300Å TiW
Passivation Type and Thickness:			1000Å Oxide TEOS / 9000Å Nitride
Generic Process Technology/Design Rule (µ-drawn):			C9FQ Technology
Gate Oxide Material/Thickness (MOS):			High Voltage Gate Oxide-70
Name/Location of Die Fab (prime) Facility:			Cypress Semiconductor – Bloomington, MN
Die Fab Line ID/Wafer Process ID:			Fab4/ C9FQ-3R

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
484-Ball PBGA	**ASE-Taiwan (G)**

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

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	BY484
Package Outline, Type, or Name:	484-Ball Plastic Ball Grid Array (PBGA)
Mold Compound Name/Manufacturer:	HITACHI 9750ZHF 10AK
Mold Compound Flammability Rating:	UL94 – V0
Oxygen Rating Index:	None
Substrate Material:	BT 1+4+1
Lead Finish, Composition / Thickness:	SnAgCu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	100% Saw
Die Attach Supplier:	Ablestik / Henkel
Die Attach Material:	2100A and QMI-536
Die Attach Method:	Epoxy
Bond Diagram Designation:	001-11340, 001-10145, 001-09683
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au 0.9 mil
Thermal Resistance Theta JA °C/W:	>12 C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-41999
Name/Location of Assembly (prime) facility:	ASE-Taiwan
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	ASE Taiwan (G)

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

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate (EFR)	Dynamic Operating Condition, Vcc Max = 2.07V, 125°C JESD22-A-108	P
High Temperature Operating Life Latent Failure Rate (LFR)	Dynamic Operating Condition, Vcc Max = 2.07V, 125°C JESD22-A-108	P
High Temperature Steady State life	125°C, 2.06V, Vcc Max	P
High Accelerated Saturation Test (HAST)	130°C, 1.8V, 85%RH, JESD22-A-110 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 B, -55°C to 125°C Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, **260°C**+0, -5°C	P
High Temperature Storage	150°C, no bias	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JEDEC EIA/JESD22-A114	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V, JESD22-C101	P
Aged Bond Strength	200C, 4hrs MIL-STD-883, Method 883-2011	P
Acoustic Microscopy	J-STD-020	P
Alpha Particle Emission	0.001 CPH/Cm2	P
Current Density	Meets the Technology Device Level Reliability Specifications	P
Dynamic Latch-up	3.09V & 8.00V	P
Constructional Analysis	Meet external and internal characteristics of Cypress package	P
Dye Penetrant Test	Test to determine the existence and extent of cracks, Criteria: No Package Crack	P
Static Latch up	125C, $\pm$200 mA JESD78	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[3]	Failure Rate
High Temperature Operating Life Early Failure Rate	1,712 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life Long Term Failure Rate	1,248,216 DHRs	1	0.7	170	29 FIT [1]

[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.

[1] Long Term Failure Rate was computed from QTPs 073907 and 083602 LFR Data.

Reliability Test Data

QTP #: 073907

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL3							
CYD18S72V18 (7C08642A)	4546070	610610519	G-TAIWAN	COMP	16	0	
CYD18S72V18 (7C08642A)	4619133	610653400	G-TAIWAN	COMP	15	0	
CYD18S72V18 (7C08642A)	4626844	610660831	G-TAIWAN	COMP	15	0	
STRESS: AGE BOND STRENGTH							
CYD18S72V18 (7C08642A)	4606179	610628791	G-TAIWAN	COMP	3	0	
CYD18S72V18 (7C08642A)	4626844	610660831	G-TAIWAN	COMP	45	0	
CYD18S72V18 (7C08642A)	4619133	610653400	G-TAIWAN	COMP	45	0	
STRESS: ALPHA PARTICLE EMISSION							
CYD09S18V18 (7C08332A)	4620518	610733675	G-TAIWAN	COMP	3	0	
CYD18S72V18 (7C08642A)	4549164	610624646	G-TAIWAN	COMP	3	0	
STRESS: DYNAMIC LATCH-UP, 3.09V & 8.0V							
CYD18S72V18 (7C08642A)	4606179	610628791	G-TAIWAN	COMP	2	0	
STRESS: ESD-CHARGE DEVICE MODEL (500V)							
CYD18S72V18 (7C08642A)	4546070	610610519	G-TAIWAN	COMP	9	0	
CYD09S72V18 (7C08632A)	4607581	610628568	G-TAIWAN	COMP	9	0	
CYD18S72V18 (7C08642A)	4619133	610653400	G-TAIWAN	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-E, 2200V							
CYD18S72V18 (7C08642A)	4546070	610610519	G-TAIWAN	COMP	9	0	
CYD09S72V18 (7C08632A)	4616967	610658346	G-TAIWAN	COMP	9	0	
CYD18S72V18 (7C08642A)	4619133	610653400	G-TAIWAN	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2200V							
CYD18S72V18 (7C08642A)	4546070	610610519	G-TAIWAN	COMP	3	0	
CYD09S72V18 (7C08632A)	4616967	610658346	G-TAIWAN	COMP	3	0	
CYD18S72V18 (7C08642A)	4619133	610653400	G-TAIWAN	COMP	3	0	

Reliability Test Data

QTP #: 073907

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 2.07V, Vcc Max)							
CYD09S18V18 (7C08332A)	4620518	610733675	G-TAIWAN	96	487	0	
CYD09S18V18 (7C08332A)	4620518	610728531	G-TAIWAN	96	513	0	
CYD18S72V18 (7C08642A)	4701013	610727901	G-TAIWAN	96	325	0	
CYD18S36V18 (7C085426A)	4718234	610736293	G-TAIWAN	96	372	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 2.07V, Vcc Max)							
CYD09S18V18 (7C08332A)	4620518	610733675	G-TAIWAN	168	200	0	
CYD18S72V18 (7C08642A)	4701013	610727901	G-TAIWAN	168	324	1	NVD (Suspected Particle Defect)
CYD18S36V18 (7C085426A)	4718234	610736293	G-TAIWAN	168	371	0	
CYD09S36V25 (7C08534A)	4629026	610667807N	G-TAIWAN	1000	198	0	
CYD18S36V18 (7C08542A)	4627153	610701547	G-TAIWAN	1000	171	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (125C, 2.06V)							
CYD18S72V18 (7C08642A)	4546070	610610519	G-TAIWAN	168	76	0	
CYD18S72V18 (7C08642A)	4546070	610610519	G-TAIWAN	336	74	0	
STRESS: HIGH TEMPERATURE STORAGE, 150C, no bias							
CYD18S72V18 (7C08642A)	4549164	610624646	G-TAIWAN	500	45	0	
CYD18S72V18 (7C08642A)	4549164	610624646	G-TAIWAN	1000	45	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 1.80V), PRE COND 192 HR, 30C/60%RH, MSL3							
CYD36S18V18 (7C08352A)	4625265	610662212	G-TAIWAN	128	46	0	
CYD18S72V18 (7C08642A)	4606179	610628791	G-TAIWAN	128	48	0	
CYD18S72V18 (7C08642A)	4619133	610653400	G-TAIWAN	128	44	0	
STRESS: STATIC LATCH-UP TESTING (125C, 5.40V, ±200mA)							
CYD09S72V18 (7C08632A)	4607581	610628568	G-TAIWAN	COMP	3	0	
CYD18S72V18 (7C08642A)	4606179	610628791	G-TAIWAN	COMP	3	0	
CYD18S72V18 (7C08642A)	4619133	610653400	G-TAIWAN	COMP	3	0	

Reliability Test Data

QTP #: 073907

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS, 30C/60%RH, MSL3							
CYD18S36V25 (7C08544A)	4615663	610645172	G-TAIWAN300		45	0	
CYD18S36V25 (7C08544A)	4619133	610659447	G-TAIWAN300		48	0	
CYD09S72V18 (7C08632A)	4607581	610628568	G-TAIWAN300		47	0	
CYD18S72V18 (7C08642A)	4549164	610624646	G-TAIWAN300		47	0	
CYD18S72V18 (7C08642A)	4619133	610653400	G-TAIWAN300		49	0	

Reliability Test Data

QTP #: 083103

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYD36S72V18 (7C08652AC)	4745285	610820071	G-TAIWAN	COMP	15	0	
CYD36S72V18 (7C08652AC)	4749803	610820083	G-TAIWAN	COMP	15	0	
CYD36S72V18 (7C08652AC)	4801412	610820079	G-TAIWAN	COMP	15	0	
STRESS: CONSTRUCTIONAL ANALYSIS							
CYDD36S36V18 (7C08552BC)	4619133	610663110	G-TAIWAN	COMP	5	0	
STRESS: DYE PENETRANT TEST							
CYD36S72V18 (7C08652AC)	4619133	610663113	G-TAIWAN	COMP	15	0	
CYDD36S36V18 (7C08552BC)	4619133	610663110	G-TAIWAN	COMP	15	0	
CYD36S72V18 (7C08652AC)	4628568	610665498	G-TAIWAN	COMP	15	0	
STRESS: TC COND. B –55C TO 125C PRE COND 192 HR 30C/60%RH, MSL3							
CYD36S72V18 (7C08652AC)	4745285	610820071	G-TAIWAN	500	50	0	
CYD36S72V18 (7C08652AC)	4745285	610820071	G-TAIWAN	1000	50	0	
CYD36S72V18 (7C08652AC)	4749803	610820083	G-TAIWAN	500	52	0	
CYD36S72V18 (7C08652AC)	4749803	610820083	G-TAIWAN	1000	52	0	
CYD36S72V18 (7C08652AC)	4801412	610820079	G-TAIWAN	500	54	0	
CYD36S72V18 (7C08652AC)	4801412	610820079	G-TAIWAN	1000	54	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 1.8 V) PRE COND 192 HR 30C/60%RH, MSL3							
CYD36S18V18 (7C08352AC)	4625265	610662212	G-TAIWAN	128	46	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CYD36S36V18 (7C08552AC)	4626844	610660707	G-TAIWAN	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JEDEC EIA/JESD22-A114-E, 2,200V							
CYD36S36V18 (7C08552AC)	4626844	610660707	G-TAIWAN	COMP	2	0	
CYD36S72V18 (7C08652AC)	4619133	610663113	G-TAIWAN	COMP	2	0	
CYD36S18V18 (7C08352AC)	4615663	610654065	G-TAIWAN	COMP	2	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 2.07V, Vcc Max)							
CYD36S72V18 (7C08652AC)	4817568	610829290	G-TAIWAN	96	427	0	
CYD09S72V18 (7C08632AC)	4807941	610823626	G-TAIWAN	96	527	0	
CYD18S72V18 (7C08642AC)	4814725	610825867	G-TAIWAN	96	317	0	
CYD18S36V18 (7C085426AC)	4814961	610826736	G-TAIWAN	96	441	0	

Reliability Test Data

QTP #: 083602

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 2.07V, Vcc Max)							
CYD09S72V18 (7C08632AC)	4807941	610823626	G-TAIWAN	168	178	0	
CYD09S72V18 (7C08632AC)	4807941	610823626	G-TAIWAN	500	178	0	
CYD09S72V18 (7C08632AC)	4807941	610823626	G-TAIWAN	1000	178	0	
CYD18S72V18 (7C08642AC)	4814725	610825867	G-TAIWAN	168	317	0	
CYD18S72V18 (7C08642AC)	4814725	610825867	G-TAIWAN	500	300	0	
CYD18S72V18 (7C08642AC)	4814725	610825867	G-TAIWAN	1000	300	0	
CYD18S36V18 (7C085426AC)	4814961	610826736	G-TAIWAN	168	248	0	
CYD18S36V18 (7C085426AC)	4814961	610826736	G-TAIWAN	500	248	0	
CYD18S36V18 (7C085426AC)	4814961	610826736	G-TAIWAN	1000	248	0	

Document History Page

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