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Cypress Semiconductor Product Qualification Report

QTP# 044102
June 2013

| SYNCHRONOUS DUAL PORT RAM FAMILY CY7C085XV / CY7C083XV / CYDXXS18V / CYDXXS36V / CYDXXS72V R7FT-3R TECHNOLOGY, FAB 4 | |
|---|--|
| CY7C0830AV/CY7C0831AV CY7C0832AV/CY7C0833AV CY7C0837AV | FLEx18™ 3.3V 64K/128K x 36 and 128K/256K x 18 Synchronous Dual-Port RAM |
| CYD01S18V/CYD02S18V CYD04S18V/CYD09S18V | FLEx18™ 3.3V 64K/128K/256K/512K x 18 Synchronous Dual-Port RAM |
| CY7C0850AV/CY7C0851AV CY7C0852AV/CY7C0853AV | FLEx36™ 3.3V 32K/64K/128K/256K x 36 Synchronous Dual-Port RAM |
| CYD01S36V/CYD02S36V CYD04S36V/CYD09S36V CYD18S36V | FLEx36™ 3.3V 32K/64K/128K/256K/512 x 36 Synchronous Dual-Port RAM |
| CYD047S72V/CYD09S72V CYD18S72AV | FLEx72™ 3.3V 64K/128K/256K x 72 Synchronous Dual-Port RAM |

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Zhaomin Ji
Principal Reliability Engineer
(408) 432-7021

Mira Ben-Tzur
Quality Engineering Director
(408) 943-2675

PRODUCT QUALIFICATION HISTORY

| Qual Report | Description of Qualification Purpose | Date Comp |
|-------------|--|-----------|
| 014807 | New Technology Derivative R7FT-3R (Hot AI) / 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 FBGA (15mm x 15mm x 1.25mm), ASE Taiwan Assembly, MSL3 | Dec 02 |
| 032406 | 18 Meg Dual Port 2 Stacked Die (4- 4 Meg die), R7FT-3R, 484-ball FBGA, MSL3 Assembled @ASE-Taiwan | Dec 03 |
| 033202 | Increased Polyimide thickness of 10um max from 5-6um | Mar 04 |
| 044104 | 6 micron Polyimide thickness for 18 Meg (4-4) die fabricated @ Fab4, 484-ball FBGA | Nov 04 |
| 041505 | 8 micron Polyimide thickness for 18 Meg (4-4) die fabricated @ Fab4, 484-ball FBGA | Nov 04 |
| 044102 | 18Meg to 1/2Meg Functionality Mask Change, R7FT-3R Technology from Fab4 | Jun 05 |

| PRODUCT DESCRIPTION (for qualification) | |
|--|---|
| Qualification Purpose: | Device Functionality Mask Change on 18Meg to ½ Meg Synchronous Dual-Port RAM Family & options, R7FT-3R |
| Marketing Part #: | CY7C0830/1/2/3/7AV, CY7C0850/1/2/3AV, CYD01/2/4/9S18V, CYD01/2/4/9S36V, CYD18S36V, CYD04/9S72V, CYD18S72AV |
| Device Description: | Synchronous Dual Port RAM, 3.3V, Commercial and Industrial available in 120/176-Lead TQFP, 144/172/256/484-Ball FBGA package. |
| Cypress Division: | Cypress Semiconductor Corporation –Data Com Division (DCD) |
| Overall Die (or Mask) REV Level (pre-requisite for qualification): | Rev. B |
| What ID markings on Die: | 7C08524B |

| 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: | 1000Å TEOS / 9000Å PECVD Nitride | | |
| Free Phosphorus contents in top glass layer (%): | 0% | | |
| 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 ₂ , 32Å | | |
| Name/Location of Die Fab (prime) Facility: | Cypress Semiconductor -- Bloomington, MN | | |
| Die Fab Line ID/Wafer Process ID: | RAM7FT-3R | | |

PACKAGE AVAILABILITY

| PACKAGE | ASSEMBLY SITE FACILITY |
|--------------------------|------------------------|
| 144/172/256/484-Ball BGA | ASE Taiwan |
| 120/176-Lead TQFP | ASE Taiwan |

Note: Package Qualification details upon request

| MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION | |
|--|---------------------------------------|
| Package Designation: | BB172 |
| Package Outline, Type, or Name: | 172-ball, Thin Ball Grid Array (FBGA) |
| Mold Compound Name/Manufacturer: | PLASKON SMT-B-1 |
| Mold Compound Flammability Rating: | V-O per UL94 |
| Oxygen Rating Index: | >28% |
| Substrate Material: | BT Resin |
| Lead Finish, Composition / Thickness: | Solder Ball, 63%Sn, 37%Pb |
| Die Backside Preparation Method/Metallization: | N/A |
| Die Separation Method: | Wafer Saw |
| Die Attach Supplier: | Ablestik |
| Die Attach Material: | Ablestik 8355F |
| Die Attach Method: | Silver Epoxy |
| Bond Diagram Designation: | 10-04267 |
| Wire Bond Method: | Thermosonic |
| Wire Material/Size: | Au, 1.0um |
| Thermal Resistance Theta JA °C/W: | 17C/W |
| Package Cross Section Yes/No: | N/A |
| Assembly Process Flow: | 49-41020 |
| Name/Location of Assembly (prime) facility: | ASE Taiwan |

| ELECTRICAL TEST / FINISH DESCRIPTION | |
|--------------------------------------|-------------------------------------|
| Test Location: | ASE Taiwan (TAIWN-G), KYEC, CHIPMOS |
| Fault Coverage: | 100% |

Note: Please contact a Cypress Representative for other packages availability

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

| Stress/Test | Test Condition (Temp/Bias) | Result P/F |
|--|--|---------------|
| High Temperature Operating Life Early Failure Rate | Dynamic Operating Condition, Vcc Max = 2.3V, 150°C | P |
| High Temperature Operating Life Latent Failure Rate | Dynamic Operating Condition, Vcc Max = 2.3V, 150°C | P |
| High Temperature Steady State Life | Static Operating Condition, Vcc Max = 3.63V, 150°C | P |
| High Accelerated Saturation Test (HAST) | 130°C, 3.63V, 85%RH Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C +0, -5°C | P |
| Temperature Cycle | 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 +0, -5°C | P |
| Pressure Cooker | 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C +0, -5°C | P |
| High Temperature Storage | 150°C, No bias | P |
| Electrostatic Discharge Human Body Model (ESD-HBM) | 2,200V JESD22, Method A114-B | P |
| Electrostatic Discharge Human Body Model (ESD-HBM) | 1,100V, 2,200V MIL-STD-883, Method 3015.7 | P |
| Electrostatic Discharge Charge Device Model (ESD-CDM) | 500V, JESD22-C101C | P |
| Age Bond Strength | 200C, 4HRS MIL-STD-883, Method 883-2011 | P |
| Acoustic Microscopy | J-STD-020 | P |
| Current Density | Meets the Technology Device Level Reliability Specifications | P |
| Dynamic Latch up | In accordance with JEDEC 17 | P |
| Static Latch up | 125C, 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 | 996 Devices | 0 | N/A | N/A | 0 PPM |
| High Temperature Operating Life ^{1, 2} Long Term Failure Rate | 445,840 DHRs | 0 | 0.7 | 170 | 12 FIT |

¹ A production burn-in of 30 Hrs at 125C, 2.7V is required for the product.

² Assuming an ambient temperature of 55C and a junction temperature rise of 15C.

³ Chi-squared 60% estimations used to calculate the failure rate.

⁴ 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 #:014807

| Device | Fab Lot # | Assy Lot # | Ass Loc | Duration | Samp | Rej | Failure Mechanism |
|--|-----------|-------------|----------|----------|------|-----|-------------------|
| STRESS: ACOUSTIC-MSL3 | | | | | | | |
| CY7C0852V (7C08523A) | 4130707 | 610133760L1 | TAIWAN-G | COMP | 15 | 0 | |
| CY7C0852V (7C08523A) | 4131840 | 610135256 | TAIWAN-G | COMP | 15 | 0 | |
| CY7C0852V (7C08523A) | 4131841 | 610137123L1 | TAIWAN-G | COMP | 15 | 0 | |
| STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 2.3V, Vcc Max | | | | | | | |
| CY7C0852V (7C08523A) | 4131841 | 610137123L1 | TAIWAN-G | 48 | 772 | 0 | |
| CY7C0852V (7C08523A) | 4141878 | 610145152 | TAIWAN-G | 96 | 455 | 0 | |
| STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.3V, Vcc Max | | | | | | | |
| CY7C0852V (7C08523A) | 4131840 | 610135256 | TAIWAN-G | 80 | 300 | 0 | |
| CY7C0852V (7C08523A) | 4131840 | 610135256 | TAIWAN-G | 500 | 274 | 0 | |
| CY7C0852V (7C08523A) | 4131841 | 610137123L1 | TAIWAN-G | 80 | 400 | 0 | |
| CY7C0852V (7C08523A) | 4131841 | 610137123L1 | TAIWAN-G | 500 | 193 | 0 | |
| CY7C0852V (7C08523A) | 4133371 | 610137695 | TAIWAN-G | 80 | 400 | 0 | |
| CY7C0852V (7C08523A) | 4133371 | 610137695 | TAIWAN-G | 500 | 385 | 0 | |
| STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 1,100V | | | | | | | |
| CY7C0852V (7C08523A) | 4133371 | 610137695 | TAIWAN-G | COMP | 9 | 0 | |
| STRESS: ESD-CHARGE DEVICE MODEL, 500V | | | | | | | |
| CY7C0852V (7C08523A) | 4133371 | 610137695 | TAIWAN-G | COMP | 9 | 0 | |
| STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/-300mA | | | | | | | |
| CY7C0852V (7C08523A) | 4130707 | 610133760L1 | TAIWAN-G | COMP | 3 | 0 | |
| CY7C0852V (7C08523A) | 4131840 | 610135256 | TAIWAN-G | COMP | 3 | 0 | |
| STRESS: AGE BOND STRENGTH | | | | | | | |
| CY7C0852V (7C08523A) | 4130707 | 610133760L1 | TAIWAN-G | COMP | 5 | 0 | |
| CY7C0852V (7C08523A) | 4131840 | 610135256 | TAIWAN-G | COMP | 6 | 0 | |
| STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C | | | | | | | |
| CY7C0852V (7C08523A) | 4128335 | 610130788 | TAIWAN-G | 500 | 48 | 0 | |
| CY7C0852V (7C08523A) | 4128335 | 610130788 | TAIWAN-G | 1000 | 48 | 0 | |
| STRESS: HIGH TEMP STEADY STATE LIFE TEST, 150C, 3.63V, Vcc MAX | | | | | | | |
| CY7C0852V (7C08523A) | 4130707 | 610133760L1 | TAIWAN-G | 80 | 78 | 0 | |
| CY7C0852V (7C08523A) | 4130707 | 610133760L1 | TAIWAN-G | 168 | 76 | 0 | |

Reliability Test Data

QTP #:014807

| 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

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|----------------------|---------|-----------|----------|-----|----|---|--|
| CY7C0852V (7C08523A) | 4131840 | 610135256 | TAIWAN-G | 168 | 47 | 0 | |
|----------------------|---------|-----------|----------|-----|----|---|--|

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|----------------------|---------|-------------|----------|-----|----|---|--|
| CY7C0852V (7C08523A) | 4131841 | 610137123L1 | TAIWAN-G | 168 | 48 | 0 | |
|----------------------|---------|-------------|----------|-----|----|---|--|

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

| | | | | | | | |
|----------------------|---------|-----------|----------|-----|----|---|--|
| CY7C0852V (7C08523A) | 4131840 | 610135256 | TAIWAN-G | 128 | 48 | 0 | |
|----------------------|---------|-----------|----------|-----|----|---|--|

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|----------------------|---------|-------------|----------|-----|----|---|--|
| CY7C0852V (7C08523A) | 4131841 | 610137123L1 | TAIWAN-G | 128 | 46 | 0 | |
|----------------------|---------|-------------|----------|-----|----|---|--|

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

| | | | | | | | |
|----------------------|---------|-------------|----------|-----|----|---|--|
| CY7C0852V (7C08523A) | 4130707 | 610133760L1 | TAIWAN-G | 300 | 47 | 0 | |
|----------------------|---------|-------------|----------|-----|----|---|--|

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|----------------------|---------|-------------|----------|-----|----|---|--|
| CY7C0852V (7C08523A) | 4130707 | 610133760L1 | TAIWAN-G | 500 | 46 | 0 | |
|----------------------|---------|-------------|----------|-----|----|---|--|

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|----------------------|---------|-------------|----------|------|----|---|--|
| CY7C0852V (7C08523A) | 4130707 | 610133760L1 | TAIWAN-G | 1000 | 45 | 0 | |
|----------------------|---------|-------------|----------|------|----|---|--|

| | | | | | | | |
|----------------------|---------|-------------|----------|-----|----|---|--|
| CY7C0852V (7C08523A) | 4131841 | 610137123L1 | TAIWAN-G | 300 | 46 | 0 | |
|----------------------|---------|-------------|----------|-----|----|---|--|

| | | | | | | | |
|----------------------|---------|-------------|----------|-----|----|---|--|
| CY7C0852V (7C08523A) | 4131841 | 610137123L1 | TAIWAN-G | 500 | 45 | 0 | |
|----------------------|---------|-------------|----------|-----|----|---|--|

Reliability Test Data

QTP #:044102

| Device | Fab Lot # | Assy Lot # | Ass Loc | Duration | Samp | Rej | Failure Mechanism |
|---|-----------|------------|----------|----------|------|-----|-------------------|
| STRESS: ACOUSTIC-MSL3 | | | | | | | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | COMP | 15 | 0 | |
| STRESS: ESD-CHARGE DEVICE MODEL, 500V | | | | | | | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | COMP | 9 | 0 | |
| STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V | | | | | | | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | COMP | 9 | 0 | |
| STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V | | | | | | | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | COMP | 3 | 0 | |
| STRESS: STATIC LATCH-UP TESTING (125C, 7.5V, +/-300mA) | | | | | | | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | COMP | 3 | 0 | |
| STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 2.3V, Vcc Max | | | | | | | |
| CY7C0832AV (7C08323C) | 4508357 | 610519474 | TAIWAN-G | 96 | 101 | 0 | |
| CY7C0832AV (7C08323C) | 4508357 | 610518574 | TAIWAN-G | 96 | 895 | 0 | |
| STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192 HR 30C/60%RH, MSL3 | | | | | | | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | 168 | 48 | 0 | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | 288 | 48 | 0 | |
| STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3 | | | | | | | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | 300 | 48 | 0 | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | 500 | 48 | 0 | |
| CY7C0852AV (7C08523D) | 4452211 | 610507578 | TAIWAN-G | 1000 | 48 | 0 | |

Document History Page

Document Title: QTP # 044102 : SYNCHRONOUS DUAL PORT RAM FAMILY (CY7C085XV / CY7C083XV / CYDXXS18V / CYDXXS36V / CYDXXS72V), R7FT-3R TECHNOLOGY, FAB 4
Document Number: 001-87913

| Rev. | ECN No. | Orig. of Change | Description of Change |
|------|---------|-----------------|--|
| ** | 4026890 | ILZ | Initial Spec Release Qualification report published on Cypress.com is documented on memo LGQ-279 in spec format. Initiated spec for QTP 044102 data from LGQ-279 was transferred to qualification report spec template. Deleted package qualification details on package qualification history table Deleted Cypress reference Spec and replaced with Industry Standards Updated package availability based on current qualified test & assembly site |

Distribution: WEB

Posting: None