

# Cypress Semiconductor Product Qualification Report

QTP# 023302A VERSION 1.0  
May 2004

|                                |  |
|--------------------------------|--|
| <b>CY7C67200</b>               | <b>EZ-OTG™ Programmable USB On-The-Go<br/>Host/Peripheral Controller</b> |
| <b>R52T-3 Technology, Fab4</b> |  |

## CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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### TECHNOLOGY QUALIFICATION HISTORY

| <b>Qual Report</b> | <b>Description of Qualification Purpose</b>   | <b>Date Comp</b> |
|--------------------|---|------------------|
| 023302A            | New Device EZ-OTGt™ Programmable USB On-The-Go Host/Peripheral Controller (CY7C67200) Base Die in R52T-3 Technology | Feb 04           |

| <b>PRODUCT DESCRIPTION (for qualification)</b>                               |   |
|--|---|
| Qualification Purpose: New Device of CY7C67200 Base Die in R52T-3 Technology |   |
| Marketing Part #:  | CY7C67200   |
| Device Description:  | EZ-OTGt™ Programmable USB On-The-Go Host/Peripheral Controller<br>3.3V available 100-lead TQFP and 48-ball FBGA |
| Cypress Division:  | Cypress Semiconductor Corporation – Personal Communications Division (PCD) WA                                   |
| Overall Die (or Mask) REV Level (pre-requisite for qualification):           | Rev. A  |
| What ID markings on Die:   | 7C67300A  |

| <b>TECHNOLOGY/FAB PROCESS DESCRIPTION – R52T-3</b> |  |                    |   |
|--|--|--------------------|---|
| Number of Metal Layers:                            | 3  | Metal Composition: | Metal 1: 500Å TiW / 6000Å AL / 300Å TiW<br>Metal 2: 500Å TiW / 6000Å AL / 300Å TiW<br>Metal 3: 500Å TiW / 8000Å AL / 300Å TiW |
| Passivation Type and Materials:                    | TEOS 1K Å, Sin 9k Å                      |                    |   |
| Free Phosphorus contents in top glass layer(%):    | 0%                                       |                    |   |
| Number of Transistors in Device                    | 2,805,388                                |                    |   |
| Number of Gates in Device                          | 76K                                      |                    |   |
| Generic Process Technology/Design Rule (μ-drawn):  | 0.25μm                                   |                    |   |
| Gate Oxide Material/Thickness (MOS):               | SiO <sub>2</sub> , 55Å                   |                    |   |
| Name/Location of Die Fab (prime) Facility:         | Cypress Semiconductor -- Bloomington, MN |                    |   |
| Die Fab Line ID/Wafer Process ID:                  | Fab4/R52T-3                              |                    |   |

**PACKAGE AVAILABILITY**

| <b>PACKAGE</b> | <b>ASSEMBLY SITE FACILITY</b> |
|----------------|-------------------------------|
| 48-ball FBGA   | Cypress Philippines (CML-R)   |

| <b>MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION</b> |                             |
|---|-----------------------------|
| <b>Package Designation:</b>                                 | A100                        |
| <b>Package Outline, Type, or Name:</b>                      | 100-LD Thin Quad Flat Packs |
| <b>Mold Compound Name/Manufacturer:</b>                     | Hitachi Cel9200CY           |
| <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>                | Sn 90%- Pb 10% 400u inch    |
| <b>Die Backside Preparation Method/Metallization:</b>       | Backgrinding                |
| <b>Die Separation Method:</b>                               | 100% Wafer Saw              |
| <b>Die Attach Supplier:</b>                                 | Dexter                      |
| <b>Die Attach Material:</b>                                 | QMI 509                     |
| <b>Die Attach Method:</b>                                   | Epoxy                       |
| <b>Bond Diagram Designation:</b>                            | 10-04885                    |
| <b>Wire Bond Method:</b>                                    | Ultrasonic                  |
| <b>Wire Material/Size:</b>                                  | Au, 1.0mil                  |
| <b>Thermal Resistance Theta JA °C/W:</b>                    | 60.28°C/W                   |
| <b>Package Cross Section Yes/No:</b>                        | N/A                         |
| <b>Assembly Process Flow:</b>                               | 11-20005                    |
| <b>Name/Location of Assembly (prime) facility:</b>          | Cypress Philippines (CML-R) |

| <b>ELECTRICAL TEST / FINISH DESCRIPTION</b> |                             |
|---|-----------------------------|
| <b>Test Location:</b>                       | Cypress Philippines (CML-R) |
| <b>Fault Coverage:</b>                      | N/A                         |

**RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT**

| Stress/Test  | Test Condition<br>(Temp/Bias)   | Result<br>P/F |
|--|---|---------------|
| High Temperature Operating Life<br>Early Failure Rate    | Dynamic Operating Condition, Vcc Max = 3.8V, 125°C<br>Dynamic Operating Condition, Vcc Max = 3.8V, 150C   | P             |
| High Temperature Operating Life<br>Latent Failure Rate   | Dynamic Operating Condition, Vcc Max = 3.8V, 125°C<br>Dynamic Operating Condition, Vcc Max = 3.8V, 150C   | P             |
| High Accelerated Saturation Test<br>(HAST)               | 130°C, 3.63V,85%RH<br>Precondition: JESD22 Moisture Sensitivity MSL 3<br>192hrs, 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<br>Precondition: JESD22 Moisture Sensitivity MSL 3<br>192hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C | P             |
| Pressure Cooker  | 121°C, 100%RH<br>Precondition: JESD22 Moisture Sensitivity MSL 3<br>192hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C  | P             |
| High Temperature Storage                                 | 150°C ± 5°C no bias   | P             |
| Electrostatic Discharge<br>Human Body Model (ESD-HBM)    | 2,200V<br>JESD22, Method A114-B   | P             |
| Electrostatic Discharge<br>Human Body Model (ESD-HBM)    | 2,200V<br>MIL-STD-883, Method 3015.7  | P             |
| Electrostatic Discharge<br>Charge Device Model (ESD-CDM) | 500V<br>Cypress Spec. 25-00020  | P             |
| Acoustic Microscopy, MSL 3                               | Cypress Spec. 25-00104  | P             |
| Static Latch-up  | 125C, 10V, ± 300mA<br>In accordance with JEDEC 17. Cypress Spec. 01-00081   | P             |

**RELIABILITY FAILURE RATE SUMMARY**

| Stress/Test  | Device Tested/<br>Device Hours | #<br>Fails | Activation<br>Energy | Thermal<br>AF <sup>4</sup> | Failure Rate |
|--|--------------------------------|------------|----------------------|----------------------------|--------------|
| High Temperature Operating Life<br>Early Failure Rate @125C                    | 2,069                          | 1          | N/A                  | N/A                        | 483 PPM      |
| High Temperature Operating Life<br>Early Failure Rate @150C                    | 4,898                          | 0          | N/A                  | N/A                        | 0 PPM        |
| High Temperature Operating Life <sup>1,2</sup><br>Long Term Failure Rate @150C | 337,828 DHRs                   | 0          | 0.7                  | 170                        | 16 FITs      |

<sup>1</sup> Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

<sup>2</sup> Chi-squared 60% estimations used to calculate the failure rate.

<sup>3</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<sub>A</sub> = The Activation Energy of the defect mechanism.

k = Boltzmann's constant = 8.62x10<sup>-5</sup> eV/Kelvin.

T<sub>1</sub> is the junction temperature of the device under stress and T<sub>2</sub> is the junction temperature of the device at use conditions.

## Reliability Test Data

QTP #: 023302

| Device   | Fab Lot # | Assy Lot #     | Ass Loc | Duration | Samp | Rej | Failure Mechanism |
|--|-----------|----------------|---------|----------|------|-----|-------------------|
| <b>STRESS: ACOUSTIC-MSL3</b>   |           |                |         |          |      |     |                   |
| CY7C67300 (7C67300A)   | 4243325   | 610307229/30/1 | CML-R   | COMP     | 15   | 0   |                   |
| <b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 3.8V, Vcc Max</b>  |           |                |         |          |      |     |                   |
| CY7C67300 (7C67300A)   | 4243325   | 610307229/30/1 | CML-R   | 96       | 1022 | 0   |                   |
| CY7C67300 (7C67300A)   | 4308967   | 610324821      | CML-R   | 96       | 1047 | 1   | METAL SHORT       |
| <b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 3.8V, Vcc Max</b> |           |                |         |          |      |     |                   |
| CY7C67300 (7C67300A)   | 4315341   | 610324827      | CML-R   | 168      | 237  | 0   |                   |
| CY7C67300 (7C67300A)   | 4315341   | 610324827      | CML-R   | 500      | 235  | 0   |                   |
| CY7C67300 (7C67300A)   | 4315341   | 610324827      | CML-R   | 1000     | 111  | 0   |                   |
| CY7C67300 (7C67300A)   | 4308967   | 610324821      | CML-R   | 168      | 120  | 0   |                   |
| CY7C67300 (7C67300A)   | 4308967   | 610324821      | CML-R   | 500      | 120  | 0   |                   |
| CY7C67300 (7C67300A)   | 4308967   | 610324821      | CML-R   | 803      | 120  | 0   |                   |
| CY7C67300 (7C67300A)   | 4325123   | 610341061      | CML-R   | 168      | 120  | 0   |                   |
| CY7C67300 (7C67300A)   | 4325123   | 610341061      | CML-R   | 500      | 120  | 0   |                   |
| CY7C67300 (7C67300A)   | 4325123   | 610341061      | CML-R   | 803      | 120  | 0   |                   |
| <b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 3.8V, Vcc Max</b>  |           |                |         |          |      |     |                   |
| CY7C67300 (7C67300A)   | 4243325   | 610307229/30/1 | CML-R   | 48       | 399  | 0   |                   |
| CY7C67300 (7C67300A)   | 4308967   | 610324821      | CML-R   | 48       | 350  | 0   |                   |
| CY7C67300 (7C67300A)   | 4325123   | 610341061      | CML-R   | 48       | 1044 | 0   |                   |
| CY7C67300 (7C67300A)   | 4315341   | 610324827      | CML-R   | 48       | 1036 | 0   |                   |
| CY7C67300 (7C67300A)   | 4346531   | 610359501      | CML-R   | 48       | 2069 | 0   |                   |
| <b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 3.8V, Vcc Max</b> |           |                |         |          |      |     |                   |
| CY7C67300 (7C67300A)   | 4243325   | 610307229/30/1 | CML-R   | 80       | 120  | 0   |                   |
| CY7C67300 (7C67300A)   | 4346531   | 610359501      | CML-R   | 80       | 430  | 0   |                   |
| CY7C67300 (7C67300A)   | 4346531   | 610359501      | CML-R   | 226      | 423  | 0   |                   |
| CY7C67300 (7C67300A)   | 4346531   | 610359501      | CML-R   | 500      | 416  | 0   |                   |
| <b>STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V</b>                  |           |                |         |          |      |     |                   |
| CY7C67300 (7C67300A)   | 4243325   | 610307229/30/1 | CML-R   | COMP     | 9    | 0   |                   |
| CY7C67300 (7C67300A)   | 4315341   | 610324827      | CML-R   | COMP     | 9    | 0   |                   |

## Reliability Test Data

**QTP #: 023302**

| <b>Device</b>  | <b>Fab Lot #</b> | <b>Assy Lot #</b> | <b>Ass Loc</b> | <b>Duration</b> | <b>Samp</b> | <b>Rej</b> | <b>Failure Mechanism</b> |
|--|------------------|-------------------|----------------|-----------------|-------------|------------|--------------------------|
| <b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V</b>             |                  |                   |                |                 |             |            |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | COMP            | 3           | 0          |                          |
| CY7C67300 (7C67300A)   | 4315341          | 610324827         | CML-R          | COMP            | 3           | 0          |                          |
| <b>STRESS: ESD-CHARGE DEVICE MODEL, 500V</b>   |                  |                   |                |                 |             |            |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | COMP            | 9           | 0          |                          |
| CY7C67300 (7C67300A)   | 4315341          | 610324827         | CML-R          | COMP            | 9           | 0          |                          |
| <b>STRESS: STATIC LATCH-UP TESTING (125C, 10V, +/-300mA)</b>                           |                  |                   |                |                 |             |            |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | COMP            | 3           | 0          |                          |
| CY7C67300 (7C67300A)   | 4315341          | 610324827         | CML-R          | COMP            | 3           | 0          |                          |
| <b>STRESS: HIGH TEMPERATURE STORAGE, 150C, No Bias</b>                                 |                  |                   |                |                 |             |            |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | 500             | 48          | 0          |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | 1000            | 48          | 0          |                          |
| <b>STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.6V), PRE COND 168 HR 85C/85%RH</b> |                  |                   |                |                 |             |            |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | 128             | 48          | 0          |                          |
| <b>STRESS: PRESSURE COOKER TEST, 121C, 100%RH), PRE COND 168 HR 85C/85%RH</b>          |                  |                   |                |                 |             |            |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | 168             | 48          | 0          |                          |
| <b>STRESS: TC COND. C -65C TO 150C, PRECOND 168 HR 85C/85%RH</b>                       |                  |                   |                |                 |             |            |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | 300             | 47          | 0          |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | 500             | 47          | 0          |                          |
| CY7C67300 (7C67300A)   | 4243325          | 610307229/30/1    | CML-R          | 1000            | 47          | 0          |                          |