

Cypress Semiconductor Product Qualification Report

QTP# 060801 VERSION 1.0
May 2006

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|---|--|
| CY505YC56D CY505YC56DT CY505YC56DV | Clock Generator for Intel® Broadwater Chipset |
| R52T-3 Technology, Fab4 | |

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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TECHNOLOGY QUALIFICATION HISTORY

| Qual Report | Description of Qualification Purpose | Date Comp |
|--------------------|---|------------------|
| 024604 | R52T-3 Technology Process Derivative Qual | May 03 |
| 040903 | New Device B30M (CY28437) Base Die in R52T-3 Technology | Feb 05 |
| 060801 | CY505YC56D Rev. D Mask/Bond Option built on existing B30M Base Die in R52T-3 Technology | Apr 06 |

| PRODUCT DESCRIPTION (for qualification) | |
|---|---|
| Qualification Purpose: CY505YC56D Rev. D Mask/Bond Option from qualified B30M Base Die in R52T-3 Technology | |
| Marketing Part #: | CY505YC56D, CY505YC56DT, CY505YC56DV |
| Device Description: | Clock Generator for Intel® Broadwater Chipset available in 56-Lead SSOP/TSSOP/QFN |
| Cypress Division: | Cypress Semiconductor Corporation –Consumer & Computation Division (CCD) |
| Overall Die (or Mask) REV Level (pre-requisite for qualification): | Rev. D |
| What ID markings on Die: | CY7C8B012A |

| TECHNOLOGY/FAB PROCESS DESCRIPTION - R52T-3 | | | |
|--|---|--------------------|--|
| Number of Metal Layers: | 3 | Metal Composition: | Metal 1: 500Å TiW / 6000Å Al / 500Å TiW Metal 2: 500Å TiW / 6000Å Al / 500Å TiW Metal 3: 300Å Ti / 8000Å Al / 300Å TiW |
| Passivation Type and Materials: | 1000Å SiO ₂ / 9000Å Si ₃ N ₄ | | |
| Free Phosphorus contents in top glass layer (%): | 0% | | |
| Number of Transistors in Device | 44,000 | | |
| Number of Gates in Device | 5,500 | | |
| Generic Process Technology/Design Rule (μ-drawn): | CMOS – Triple Metal, 0.25μm | | |
| Gate Oxide Material/Thickness (MOS): | SiO ₂ , 55Å | | |
| Name/Location of Die Fab (prime) Facility: | Cypress Semiconductor – Bloomington, MN | | |
| Die Fab Line ID/Wafer Process ID: | Fab4/R52T-3 | | |

PACKAGE AVAILABILITY

| PACKAGE | ASSEMBLY SITE FACILITY |
|----------------------|-------------------------------|
| 56-Lead SSOP | CML-R, TAIWN-T |
| 56-Lead TSSOP | CML-R |
| 56-QFN | KOREA-L |

| MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION | |
|---|---|
| Package Designation: | SP56 |
| Package Outline, Type, or Name: | 56-Lead Shrunken Small Outline Packages |
| Mold Compound Name/Manufacturer: | Nitto – MP8500 |
| Mold Compound Flammability Rating: | V-O per UL94 |
| Oxygen Rating Index: | N/A |
| Lead Frame Material: | Copper |
| Lead Finish, Composition / Thickness: | NiPdAu |
| Die Backside Preparation Method/Metallization: | Backgrind |
| Die Separation Method: | 100% Saw |
| Die Attach Supplier: | QMI |
| Die Attach Material: | QMI 509 |
| Die Attach Method: | Epoxy Cure |
| Bond Diagram Designation | 001-04545 |
| Wire Bond Method: | Thermosonic |
| Wire Material/Size: | Au. 0.8mil |
| Thermal Resistance Theta JA °C/W: | 71.60°C/W |
| Package Cross Section Yes/No: | N/A |
| Assembly Process Flow: | 11-20048 |
| Name/Location of Assembly (prime) facility: | CML-R |

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

| MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION | |
|---|--|
| Package Designation: | ZZ56 |
| Package Outline, Type, or Name: | 56-Lead Thin Shrunk Small Outline Packages |
| Mold Compound Name/Manufacturer: | CEL9200CYR |
| Mold Compound Flammability Rating: | V-O per UL94 |
| Oxygen Rating Index: | NA |
| Lead Frame Material: | Copper |
| Lead Finish, Composition / Thickness: | NiPdAu |
| Die Backside Preparation Method/Metallization: | Backgrind |
| Die Separation Method: | 100% Saw |
| Die Attach Supplier: | QMI |
| Die Attach Material: | QMI 509 |
| Die Attach Method: | Epoxy Cure |
| Bond Diagram Designation | 001-03061 |
| Wire Bond Method: | Thermosonic |
| Wire Material/Size: | Au. 0.8mil |
| Thermal Resistance Theta JA °C/W: | 75.89°C/W |
| Package Cross Section Yes/No: | N/A |
| Assembly Process Flow: | 11-20047 |
| Name/Location of Assembly (prime) facility: | CML-R |

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

| MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION | |
|---|--------------------------|
| Package Designation: | LY56 |
| Package Outline, Type, or Name: | 56-Pin Quad Flat no Lead |
| Mold Compound Name/Manufacturer: | Sumitomo – G700 |
| Mold Compound Flammability Rating: | V-O per UL94 |
| Oxygen Rating Index: | NA |
| Lead Frame Material: | Copper |
| Lead Finish, Composition / Thickness: | 100% Matte Sn |
| Die Backside Preparation Method/Metallization: | Backgrind |
| Die Separation Method: | 100% Saw |
| Die Attach Supplier: | Ablestik |
| Die Attach Material: | Ablebond 8290 |
| Die Attach Method: | Epoxy Cure |
| Bond Diagram Designation | 001-04969 |
| Wire Bond Method: | Thermosonic |
| Wire Material/Size: | Au. 1.0 mil |
| Thermal Resistance Theta JA °C/W: | 21.98°C/W |
| Package Cross Section Yes/No: | N/A |
| Assembly Process Flow: | 49-10994 |
| Name/Location of Assembly (prime) facility: | SEOUL-KOREA (L) |

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

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 = 3.8V, 125°C | P |
| High Temperature Operating Life Latent Failure Rate | Dynamic Operating Condition, Vcc Max = 3.8V, 125°C | P |
| High Accelerated Saturation Test (HAST) | 130°C, 3.63V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 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 MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+0, -5°C Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C | P |
| Pressure Cooker | 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+0, -5°C Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C | P |
| Electrostatic Discharge Human Body Model (ESD-HBM) | 2,200V JESD22, Method A114-B | 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 Cypress Spec. 25-00020 | P |
| Acoustic Microscopy | Cypress Spec. 25-00104 | P |
| Static Latch-up | 125C, ± 200mA/± 300mA Cypress Spec. 01-00081 | 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 | 4,377 Devices | 0 | N/A | N/A | 0 PPM |
| High Temperature Operating Life ^{1,2} Long Term Failure Rate | 547,000 DHRs | 0 | 0.7 | 55 | 30 FITs |

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 #: 024604

| Device | Fab Lot # | Assy Lot # | Assy Loc | Duration | Samp | Rej | Failure Mechanism |
|---|-----------|-------------------|----------|----------|------|-----|-------------------|
| STRESS: ACOUSTIC-, MSL3 | | | | | | | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | COMP | 18 | 0 | |
| STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.8V, Vcc Max) | | | | | | | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2/27521 | TAIWN-G | 96 | 1342 | 0 | |
| CY6981-BA (7C6981A) | 4238026 | 610250542 | TAIWN-G | 96 | 1020 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004/7 | TAIWN-G | 96 | 1015 | 0 | |
| STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.8V, Vcc Max) | | | | | | | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2 | TAIWN-G | 168 | 182 | 0 | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2 | TAIWN-G | 500 | 182 | 0 | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2 | TAIWN-G | 1000 | 182 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | 168 | 182 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | 500 | 182 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | 1000 | 180 | 0 | |
| CY6981-BA (7C6981A) | 4238026 | 610250542 | TAIWN-G | 168 | 368 | 0 | |
| CY6981-BA (7C6981A) | 4238026 | 610250542 | TAIWN-G | 500 | 368 | 0 | |
| STRESS: ESD-CHARGE DEVICE MODEL (500V) | | | | | | | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2/2752 | TAIWN-G | COMP | 9 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | COMP | 9 | 0 | |
| ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V) | | | | | | | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2/2752 | TAIWN-G | COMP | 9 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | COMP | 9 | 0 | |
| STRESS: STATIC LATCH-UP TESTING (125C, 10V, +/-300mA) | | | | | | | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2/2752 | TAIWN-G | COMP | 3 | 0 | |
| CY6981-BA (7C6981A) | 4238026 | 610250542 | TAIWN-G | COMP | 3 | 0 | |
| STRESS: PRESSURE COOKER TEST, (121C, 100%RH), PRE COND 192 HR 30C/60%RH, MSL3 | | | | | | | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2/2752 | TAIWN-G | 168 | 50 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | 168 | 48 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | 288 | 48 | 0 | |
| CY6981-BA (7C6981A) | 4238026 | 610250542 | TAIWN-G | 168 | 48 | 0 | |
| CY6981-BA (7C6981A) | 4238026 | 610250542 | TAIWN-G | 288 | 48 | 0 | |

Reliability Test Data

QTP #: 024604

| <i>Device</i> | <i>Fab Lot #</i> | <i>Assy Lot #</i> | <i>Assy Loc</i> | <i>Duration</i> | <i>Samp</i> | <i>Rej</i> | <i>Failure Mechanism</i> |
|---|------------------|-------------------|-----------------|-----------------|-------------|------------|--------------------------|
| STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.63V), PRE COND 192 HR 30C/60%RH, MSL3 | | | | | | | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2/2752 | TAIWN-G | 128 | 50 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | 128 | 47 | 0 | |
| STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3 | | | | | | | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2/2752 | TAIWN-G | 300 | 50 | 0 | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2/2752 | TAIWN-G | 500 | 50 | 0 | |
| CY6981-BA (7C6981A) | 4147861 | 610221501/2/2752 | TAIWN-G | 1000 | 50 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | 300 | 48 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | 500 | 48 | 0 | |
| CY6981-BA (7C6981A) | 4223346 | 610243127/3004 | TAIWN-G | 1000 | 48 | 0 | |
| CY6981-BA (7C6981A) | 4238026 | 610250542 | TAIWN-G | 300 | 48 | 0 | |
| CY6981-BA (7C6981A) | 4238026 | 610250542 | TAIWN-G | 500 | 48 | 0 | |
| CY6981-BA (7C6981A) | 4238026 | 610250542 | TAIWN-G | 1000 | 48 | 0 | |

Reliability Test Data

QTP #: 040903

| <i>Device</i> | <i>Fab Lot #</i> | <i>Assy Lot #</i> | <i>Assy Loc</i> | <i>Duration</i> | <i>Samp</i> | <i>Rej</i> | <i>Failure Mechanism</i> |
|---|------------------|-------------------|-----------------|-----------------|-------------|------------|--------------------------|
| STRESS: ESD-CHARGE DEVICE MODEL, 500V | | | | | | | |
| CY28437OXCT (7C828437A) | 4444247 | 610463705 | CML-R | COMP | 9 | 0 | |
| STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V | | | | | | | |
| CY28437OXCT (7C828437A) | 4444247 | 610463705 | CML-R | COMP | 9 | 0 | |
| STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V | | | | | | | |
| CY28437OXCT (7C828437A) | 4444247 | 610463705 | CML-R | COMP | 3 | 0 | |
| STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 3.8V, Vcc Max | | | | | | | |
| CY28437OXCT (7C828437A) | 4444247 | 610463705 | CML-R | 96 | 442 | 0 | |
| CY28437OXCT (7C828437A) | 4444247 | 610463737 | CML-R | 96 | 260 | 0 | |
| CY28437OXCT (7C828437A) | 4444247 | 610463736 | CML-R | 96 | 298 | 0 | |
| STRESS: PRESSURE COOKER TEST, (121C, 100%RH), PRE COND 168 HR 85C/85%RH, MSL1 | | | | | | | |
| CY28437OXCT (7C828437A) | 4444247 | 610463705 | CML-R | 168 | 45 | 0 | |
| STRESS: STATIC LATCH-UP TESTING (125C, 8.48V, +/-300mA) | | | | | | | |
| CY28437OXCT (7C828437A) | 4444247 | 610463705 | CML-R | COMP | 3 | 0 | |
| STRESS: TC COND. C -65C TO 150C, PRE COND 168 HR 85C/85%RH, MSL1 | | | | | | | |
| CY28437OXCT (7C828437A) | 4444247 | 610463705 | CML-R | 300 | 45 | 0 | |

Reliability Test Data

QTP #: 060801

| <i>Device</i> | <i>Fab Lot #</i> | <i>Assy Lot #</i> | <i>Assy Loc</i> | <i>Duration</i> | <i>Samp</i> | <i>Rej</i> | <i>Failure Mechanism</i> |
|--|------------------|-------------------|-----------------|-----------------|-------------|------------|--------------------------|
| STRESS: ESD-CHARGE DEVICE MODEL, 500V | | | | | | | |
| CY505YC56D (7C828505D) | 4602891 | 610610202 | CML-R | COMP | 9 | 0 | |
| CY505YC56DS (7C828505D) | 4602891 | 610610201 | CML-R | COMP | 9 | 0 | |
| CY505YC56DV (7C828505D) | 4602891 | 610610208 | SEOL-L | COMP | 9 | 0 | |
| STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V | | | | | | | |
| CY505YC56D (7C828505D) | 4602891 | 610610202 | CML-R | COMP | 9 | 0 | |
| STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V | | | | | | | |
| CY505YC56D (7C828505D) | 4602891 | 610610202 | CML-R | COMP | 3 | 0 | |
| STRESS: STATIC LATCH-UP TESTING (125C, 5.42V, +/-200mA) | | | | | | | |
| CY505YC56D (7C828505D) | 4602891 | 610610202 | CML-R | COMP | 3 | 0 | |