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Cypress Semiconductor Package Qualification Report

QTP# 103308 VERSION*B
January, 2015

**165 - Ball FBGA
(15X17X1.4mm)
SnAgCu, MSL3, 260C Reflow
CML-RA**

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

| QTP Number | Description of Qualification Purpose | Date Comp |
|-----------------------|--|----------------------|
| 103308 | 165-Ball FBGA (15X17X1.4mm) for LL65nm 144M QDR Device using GR9810 Mold Compound, QMI 506 Epoxy SnAgCu, MSL3, 260C Reflow assembled at CML-RA | Dec 10 |

| MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION | |
|--|--------------------------|
| Package Designation: | BW 165 (15X17X1.4mm) |
| Package Outline, Type, or Name: | 165-Ball FBGA |
| Mold Compound Name/Manufacturer: | GR9810/Hysol |
| Mold Compound Flammability Rating: | UL-94V (0) |
| Substrate Material: | SUBBBW165RF/ SUBBBW165RG |
| Lead Finish, Composition / Thickness: | SAC405 |
| Die Backside Preparation Method/Metallization: | Backgrinding |
| Die Separation Method: | Saw |
| Die Attach Supplier: | Henkel |
| Die Attach Material: | QMI-506 |
| Die Attach Method: | Epoxy |
| Bond Diagram Designation: | 001-57409, 001-57411 |
| Wire Bond Method: | Thermosonic |
| Wire Material/Size: | Au / 1.0 mil |
| Thermal Resistance Theta JA °C/W: | 12.55 °C/W |
| Package Cross Section Yes/No: | Yes |
| Assembly Process Flow: | 11-21099 |
| Name/Location of Assembly (prime) facility: | CML-RA |
| MSL Level | 3 |
| Reflow Profile | 260C |

| ELECTRICAL TEST / FINISH DESCRIPTION | |
|--------------------------------------|-------|
| Test Location: | CML-R |

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

| Stress/Test | Test Condition (Temp/Bias) | Result P/F |
|--|--|---------------|
| Acoustic Microscopy | J-STD-020 Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C +0, -5°C | P |
| Ball Shear | JESD22-B116 | P |
| Bond Pull | MIL-STD-883 – Method 2011 | P |
| Constructional Analysis | Criteria: Meet external and internal characteristics of Cypress package | P |
| Die Shear | MIL-STD-883, Method 2019 Per die size: <ul style="list-style-type: none"> <3000 sq. mils = 1.2 kgf 30001-5000 sq. mils = 1.2 >5001 sq. mils = 1.2 kgf | P |
| Dye Penetrant Test | Test to determine the existence and extent of cracks, Criteria: No Package Crack | P |
| Final Visual | JESD22-B101 | P |
| High Temp Storage | JESD22-A103: 150°C, no bias | P |
| Internal Visual | MIL-STD-883-2014 | P |
| High Accelerated Saturation Test (HAST) | JEDEC STD 22-A110: 110°C, 85%RH, 2.05V Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C +0, -5°C | P |
| Pressure Cooker | JESD22-A102: 121°C, 100%RH, 15 Psig Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C +0, -5°C | P |
| Solder Ball Shear | JESD22-B117 | P |
| Temperature Cycle | MIL-STD-883, Method 1010, Condition B, -55°C to 125°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C +0, -5°C | P |
| Thermal Shock | MIL-STD-883, Method 1011, Condition B, -55°C to 125°C and JESD22-A106, Condition C, -55°C to 125°C | P |
| X-ray | MIL-STD-883 2012 | P |



Reliability Test Data

QTP #: 103308

| Device | Fab Lot # | Assy Lot # | Assy Loc | Duration | Samp | Rej | Failure Mechanism |
|--|-----------|------------|----------|----------|------|-----|-------------------|
| STRESS: ACOUSTIC, MSL3 | | | | | | | |
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032555 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032554 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | COMP | 230 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611024890 | CML-RA | COMP | 15 | 0 | |
| STRESS: BALL SHEAR | | | | | | | |
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032555 | CML-RA | COMP | 5 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032554 | CML-RA | COMP | 5 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | COMP | 15 | 0 | |
| STRESS: BOND PULL | | | | | | | |
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032555 | CML-RA | COMP | 5 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032554 | CML-RA | COMP | 5 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | COMP | 15 | 0 | |
| STRESS: CONSTRUCTIONAL ANALYSIS | | | | | | | |
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | COMP | 15 | 0 | |
| STRESS: DYE PENETRATION TEST | | | | | | | |
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032555 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032554 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | COMP | 15 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611024890 | CML-RA | COMP | 15 | 0 | |
| STRESS: DIE SHEAR | | | | | | | |
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | COMP | 5 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | COMP | 30 | 0 | |

Reliability Test Data

QTP #: 103308

| Device | Fab Lot # | Assy Lot # | Assy Loc | Duration | Samp | Rej | Failure Mechanism |
|--------|-----------|------------|----------|----------|------|-----|-------------------|
|--------|-----------|------------|----------|----------|------|-----|-------------------|

STRESS: HIGH TEMP STORAGE

| | | | | | | | |
|---------------------|---------|-----------|--------|------|----|---|--|
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | 500 | 76 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | 1000 | 74 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | 1500 | 66 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | 500 | 77 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | 1000 | 76 | 0 | |

STRESS: HI-ACCEL SATURATION TEST (110C, 85%RH, 2.05V), PRE COND 192 HR 30C/60%RH, MSL3

| | | | | | | | |
|---------------------|---------|-----------|--------|-----|----|---|--|
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | 264 | 76 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | 264 | 72 | 0 | |

STRESS: INTERNAL VISUAL

| | | | | | | | |
|---------------------|---------|-----------|--------|------|---|---|--|
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | COMP | 5 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032555 | CML-RA | COMP | 5 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032554 | CML-RA | COMP | 5 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | COMP | 5 | 0 | |

STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192 HR 30C/60%RH, MSL3

| | | | | | | | |
|---------------------|---------|-----------|--------|-----|----|---|--|
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | 168 | 75 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | 288 | 72 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032555 | CML-RA | 168 | 73 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032555 | CML-RA | 288 | 73 | 0 | |

STRESS: SOLDER BALL SHEAR

| | | | | | | | |
|---------------------|---------|-----------|--------|------|----|---|--|
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | COMP | 20 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032555 | CML-RA | COMP | 20 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032554 | CML-RA | COMP | 20 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | COMP | 15 | 0 | |



Reliability Test Data

QTP #: 103308

| Device | Fab Lot # | Assy Lot # | Assy Loc | Duration | Samp | Rej | Failure Mechanism |
|--------|-----------|------------|----------|----------|------|-----|-------------------|
|--------|-----------|------------|----------|----------|------|-----|-------------------|

STRESS: TC COND. B -55C TO 125C, PRE COND192 HRS 30C/60%RH, MSL3

| | | | | | | | |
|----------------------|---------|-----------|--------|------|----|---|--|
| CY7C1614KV (7C1614K) | 8945028 | 611036123 | CML-RA | 500 | 74 | 0 | |
| CY7C1614KV (7C1614K) | 8945028 | 611036123 | CML-RA | 1000 | 74 | 0 | |
| CY7C1614KV (7C1614K) | 8945028 | 611036123 | CML-RA | 1300 | 74 | 0 | |
| CY7C1618KV (7C1618K) | 8945028 | 611036125 | CML-RA | 500 | 76 | 0 | |
| CY7C1618KV (7C1618K) | 8945028 | 611036125 | CML-RA | 1000 | 75 | 0 | |
| CY7C1618KV (7C1618K) | 8945028 | 611036125 | CML-RA | 1300 | 75 | 0 | |
| CY7C1613KV (7C1613K) | 8015005 | 611041460 | CML-RA | 500 | 77 | 0 | |
| CY7C1613KV (7C1613K) | 8015005 | 611041460 | CML-RA | 1000 | 77 | 0 | |
| CY7C1613KV (7C1613K) | 8015005 | 611041460 | CML-RA | 1300 | 77 | 0 | |

STRESS: THERMAL SHOCK

| | | | | | | | |
|---------------------|---------|-----------|--------|------|----|---|--|
| CY7C1612K (7C1612K) | 8845001 | 611032554 | CML-RA | 200 | 77 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032554 | CML-RA | 1000 | 77 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | 200 | 77 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | 1000 | 76 | 0 | |

STRESS: X-RAY

| | | | | | | | |
|---------------------|---------|-----------|--------|------|-----|---|--|
| CY7C1612K (7C1612K) | 8845001 | 611032553 | CML-RA | COMP | 324 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032555 | CML-RA | COMP | 36 | 0 | |
| CY7C1612K (7C1612K) | 8845001 | 611032554 | CML-RA | COMP | 36 | 0 | |
| CY7C1612K (7C1612K) | 8908003 | 611024882 | CML-RA | COMP | 36 | 0 | |

Document History Page

Document Title: QTP 103308:165 - Ball FBGA (15X17X1.4mm) for 144M 65nm, SnAgCu, MSL3, 260C at CML-RA
Qualification Report
Document Number: 001-66057

| Rev. | ECN No. | Orig. of Change | Description of Change |
|------|---------|-----------------|--|
| ** | 3112570 | NSR | Initial spec release |
| *A | 4231150 | JYF | Sunset Review: QTP title page update: <ul style="list-style-type: none">- Deleted Version 1.0- Updated title of QA Engineering Director to Reliability Director and Principal Reliability Engineer to Reliability Engineer, MTS; Deleted obsolete spec 001-57677 and 001-57674 in Major Package Information table; Complete re-write of Reliability Test Performed table for template alignment. |
| *B | 4614479 | JYF | Sunset Review: Updated QTP title page for template alignment. |

Distribution: WEB

Posting: None