

Cypress Semiconductor Package Qualification Report

QTP# 161901 VERSION
December 2016**

**20-Ball Wafer Level Chip Scale Package
(WLCSP), 1.63 x 2.03 x 0.55 mm**

MSL1, 260C

ASE-Taiwan (G)

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

| QTP Number | DESCRIPTION OF QUALIFICATION PURPOSE | Date |
|-------------------|---|-------------|
| 154802 | New WLCSP Assembly Site Qualification at ASE-Taiwan (G) using 25-Ball WLCSP | Jan. 2016 |
| 161901 | Qualification of 20-Ball WLCSP (1.63x2.03x0.55mm) at ASE-Taiwan (G) using SAC 405 Solder Finish, at MSL1, 260C Reflow Temperature | Nov. 2016 |

| MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION | |
|---|--|
| Package Designation: | FN20B |
| Package Outline, Type, or Name: | 20-Ball Wafer Level Chip Scale Package (WLCSP) (1.63x2.03x0.55mm) |
| Die Backside Preparation Method: | Backgrind |
| Die Separation Method: | Saw |
| Solder Ball/Bump Material: | SAC-405 |
| Bonding Method: | Bump/ RDL |
| Bond Diagram Designation: | 002-03970 |
| Thermal Resistance Theta JA °C/W: | 66°C/W |
| Package Cross Section Yes/No: | N/A |
| Assembly Process Flow: | 49-41999 |
| Name/Location of Assembly (prime) facility: | ASE-Taiwan (G) |
| MSL Level | 1 |
| Reflow Profile | 260C |

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

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

| Stress/Test | Test Condition (Temp/Bias) | Result P/F |
|---|--|-------------------|
| Constructional Analysis | Criteria: 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 |
| Electrostatic Discharge Charge Device Model (ESD-CDM) | 500V//1,000V/1,250V JESD22-C101 | P |
| Electrostatic Discharge Human Body Model (ESD-HBM) | 1,100V/2,200V /3,300V JESD22, Method A114 | P |
| External Visual | MIL-PRF-38535, MIL-STD-883,Method 2009 | P |
| Final Visual | JESD22-B101 | P |
| Functional Board Level Reliability Test | Temperature Cycle,-40°C to 85°C | P |
| High Accelerated Saturation Test (HAST) | JEDEC STD 22-A110: 130°C, 85%RH, 2.27V Precondition: JESD22 Moisture Sensitivity MSL 1 (168 Hrs.,85°C, 85%RH, 260°C Reflow) | P |
| High Accelerated Saturation Test (HAST) – Unbiased | JEDEC STD 22-A110: 130°C, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 1 (168 Hrs.,85°C, 85%RH, 260°C Reflow) | P |
| High Temperature Operating Life Early Failure Rate | Dynamic Operating Condition, Vcc Max=1.8V, 125°C JESD22-A-108 | P |
| High Temperature Operating Life Latent Failure Rate | Dynamic Operating Condition, Vcc Max=1.8V, 125°C JESD22-A-108 | P |
| High Temperature Storage | 150°C, no bias | P |
| Internal Visual | MIL-STD-883-2014 | P |
| Physical Dimension | MIL-STD-1835, JESD22-B100 | P |
| Pressure Cooker Test | JESD22-A102:121°C /100%RH, 15 PSIG Precondition: JESD22 Moisture Sensitivity Level 1 (168 Hrs.,85°C, 85%RH, 260°C Reflow) | P |
| Solder Ball/Bump Shear | JESD22-B117 | P |
| Solderability Test | J-STD-002, JESD22-B102 | P |
| Temperature Cycle | MIL-STD-883, Method 1010, Condition B, -55°C to 125°C Precondition: JESD22 Moisture Sensitivity MSL 1 (168 Hrs.,85°C, 85%RH, 260°C Reflow) | P |

Reliability Test Data

QTP #: 154802

| <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: CONSTRUCTIONAL ANALYSIS | | | | | | | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | COMP | 5 | 0 | |
| STRESS: DYE PENETRANT TEST | | | | | | | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | COMP | 15 | 0 | |
| STRESS: ESD-CHARGE DEVICE MODEL | | | | | | | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 500 | 9 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 1000 | 3 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 1250 | 3 | 0 | |
| STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114 | | | | | | | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 1100 | 3 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 2200 | 8 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 3300 | 3 | 0 | |
| STRESS: EXTERNAL VISUAL | | | | | | | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | COMP | 5811 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | COMP | 5739 | 0 | |
| STRESS: FINAL VISUAL | | | | | | | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | COMP | 25 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | COMP | 16 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533010 | G-TAIWAN | COMP | 18 | 0 | |
| STRESS: FUNCTIONAL BOARD LEVEL RELIABILITY TEST, TC COND.N -40C TO 85C | | | | | | | |
| CY8C4247FNI (8F42478A) | 4427504 | 611431846 | DT-PHILS | 256 | 502 | 0 | |
| TRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 2.27V), PRE COND 168 HR 85C/85%RH (MSL1) | | | | | | | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | 96 | 30 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 96 | 30 | 0 | |
| STRESS: UNBIASED HI-ACCEL SATURATION TEST (130C, 85%RH), PRE COND 168 HR 85C/85%RH (MSL1) | | | | | | | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | 96 | 80 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 96 | 80 | 0 | |
| CY8C4246FNI (8F480000A) | 4528732 | 611533010 | G-TAIWAN | 96 | 80 | 0 | |

Reliability Test Data

QTP #: 154802

| <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: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 1.8V, Vcc Max)

| | | | | | | | |
|-----------|------------|---------|----------|------|----|---|--|
| MB9AF01AM | MIFS # 101 | 4K55169 | G-TAIWAN | COMP | 78 | 0 | |
|-----------|------------|---------|----------|------|----|---|--|

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 1.8V, Vcc Max)

| | | | | | | | |
|-----------|------------|---------|----------|------|----|---|--|
| MB9AF01AM | MIFS # 101 | 4K55169 | G-TAIWAN | COMP | 75 | 0 | |
|-----------|------------|---------|----------|------|----|---|--|

STRESS: HIGH TEMPERATURE STORAGE, 150C

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|-------------------------|---------|-----------|----------|-----|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | 500 | 80 | 0 | |
|-------------------------|---------|-----------|----------|-----|----|---|--|

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|-------------------------|---------|-----------|----------|------|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | 1000 | 80 | 0 | |
|-------------------------|---------|-----------|----------|------|----|---|--|

STRESS: PHYSICAL DIMENSION

| | | | | | | | |
|-------------------------|---------|-----------|----------|------|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | COMP | 30 | 0 | |
|-------------------------|---------|-----------|----------|------|----|---|--|

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|-------------------------|---------|-----------|----------|------|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | COMP | 30 | 0 | |
|-------------------------|---------|-----------|----------|------|----|---|--|

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|-------------------------|---------|-----------|----------|------|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533010 | G-TAIWAN | COMP | 30 | 0 | |
|-------------------------|---------|-----------|----------|------|----|---|--|

STRESS: SOLDER BALL/BUMP SHEAR

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|-------------------------|---------|-----------|----------|------|---|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | COMP | 5 | 0 | |
|-------------------------|---------|-----------|----------|------|---|---|--|

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|-------------------------|---------|-----------|----------|------|---|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | COMP | 5 | 0 | |
|-------------------------|---------|-----------|----------|------|---|---|--|

| | | | | | | | |
|-------------------------|---------|-----------|----------|------|---|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533010 | G-TAIWAN | COMP | 5 | 0 | |
|-------------------------|---------|-----------|----------|------|---|---|--|

STRESS: TC COND. B -55C TO 125C, PRE COND 168 HRS 85C/85%RH, MSL1

| | | | | | | | |
|-------------------------|---------|-----------|----------|-----|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | 500 | 80 | 0 | |
|-------------------------|---------|-----------|----------|-----|----|---|--|

| | | | | | | | |
|-------------------------|---------|-----------|----------|------|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533008 | G-TAIWAN | 1000 | 80 | 0 | |
|-------------------------|---------|-----------|----------|------|----|---|--|

| | | | | | | | |
|-------------------------|---------|-----------|----------|-----|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 500 | 80 | 0 | |
|-------------------------|---------|-----------|----------|-----|----|---|--|

| | | | | | | | |
|-------------------------|---------|-----------|----------|------|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533009 | G-TAIWAN | 1000 | 80 | 0 | |
|-------------------------|---------|-----------|----------|------|----|---|--|

| | | | | | | | |
|-------------------------|---------|-----------|----------|-----|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533010 | G-TAIWAN | 500 | 80 | 0 | |
|-------------------------|---------|-----------|----------|-----|----|---|--|

| | | | | | | | |
|-------------------------|---------|-----------|----------|------|----|---|--|
| CY8C4246FNI (8F480000A) | 4528732 | 611533010 | G-TAIWAN | 1000 | 80 | 0 | |
|-------------------------|---------|-----------|----------|------|----|---|--|

Reliability Test Data

QTP #: 161901

| <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: CONSTRUCTIONAL ANALYSIS | | | | | | | |
| CYPD2103 (7F64100A) | 4524074 | 611607212 | G-TAIWAN | COMP | 5 | 0 | |
| CYPD2104 (7F64100A) | 4524074 | 611607213 | G-TAIWAN | COMP | 5 | 0 | |
| CYPD2103 (7F64100A) | 4524074 | 611607214 | G-TAIWAN | COMP | 5 | 0 | |
| STRESS: DYE PENETRANT TEST | | | | | | | |
| CYPD2103 (7F64100A) | 4524074 | 611607212 | G-TAIWAN | COMP | 15 | 0 | |
| CYPD2104 (7F64100A) | 4524074 | 611607213 | G-TAIWAN | COMP | 15 | 0 | |
| CYPD2103 (7F64100A) | 4524074 | 611607214 | G-TAIWAN | COMP | 15 | 0 | |
| STRESS: UNBIASED HI-ACCEL SATURATION TEST (130C, 85%RH), PRE COND 168 HR 85C/85%RH (MSL1) | | | | | | | |
| CYPD2103 (7F64100A) | 4524074 | 611607212 | G-TAIWAN | 96 | 83 | 0 | |
| CYPD2104 (7F64100A) | 4524074 | 611607213 | G-TAIWAN | 96 | 89 | 0 | |
| CYPD2103 (7F64100A) | 4524074 | 611607214 | G-TAIWAN | 96 | 89 | 0 | |
| STRESS: INTERNAL VISUAL | | | | | | | |
| CYPD2103 (7F64100A) | 4524074 | 611607212 | G-TAIWAN | COMP | 5 | 0 | |
| CYPD2104 (7F64100A) | 4524074 | 611607213 | G-TAIWAN | COMP | 5 | 0 | |
| CYPD2103 (7F64100A) | 4524074 | 611607214 | G-TAIWAN | COMP | 5 | 0 | |
| STRESS: PHYSICAL DIMENSION | | | | | | | |
| CYPD2103 (7F64100A) | 4524074 | 611607212 | G-TAIWAN | COMP | 30 | 0 | |
| CYPD2104 (7F64100A) | 4524074 | 611607213 | G-TAIWAN | COMP | 30 | 0 | |
| CYPD2103 (7F64100A) | 4524074 | 611607214 | G-TAIWAN | COMP | 30 | 0 | |
| STRESS: PRESSURE COOKER TEST (121C, 100%RH, 15 Psig), PRE COND 168 HR 85C/85%RH (MSL1) | | | | | | | |
| CYPD2103 (7F64100A) | 4524074 | 611607212 | G-TAIWAN | 96 | 76 | 0 | |
| CYPD2104 (7F64100A) | 4524074 | 611607213 | G-TAIWAN | 96 | 79 | 0 | |
| CYPD2103 (7F64100A) | 4524074 | 611607214 | G-TAIWAN | 96 | 79 | 0 | |
| STRESS: SOLDER BALL/BUMP SHEAR | | | | | | | |
| CYPD2103 (7F64100A) | 4524074 | 611607212 | G-TAIWAN | COMP | 5 | 0 | |
| CYPD2104 (7F64100A) | 4524074 | 611607213 | G-TAIWAN | COMP | 5 | 0 | |
| CYPD2103 (7F64100A) | 4524074 | 611607214 | G-TAIWAN | COMP | 5 | 0 | |

Reliability Test Data

QTP #: 161901

| <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: SOLDERABILITY TEST

| | | | | | | | |
|---------------------|---------|-----------|----------|------|---|---|--|
| CYPD2103 (7F64100A) | 4524074 | 611607212 | G-TAIWAN | COMP | 5 | 0 | |
| CYPD2104 (7F64100A) | 4524074 | 611607213 | G-TAIWAN | COMP | 5 | 0 | |
| CYPD2103 (7F64100A) | 4524074 | 611607214 | G-TAIWAN | COMP | 5 | 0 | |

STRESS: TC COND. B -55C TO 125C, PRE COND 168 HRS 85C/85%RH, MSL1

| | | | | | | | |
|---------------------|---------|-----------|----------|-----|----|---|--|
| CYPD2103 (7F64100A) | 4524074 | 611607212 | G-TAIWAN | 700 | 89 | 0 | |
| CYPD2104 (7F64100A) | 4524074 | 611607213 | G-TAIWAN | 700 | 87 | 0 | |
| CYPD2103 (7F64100A) | 4524074 | 611607214 | G-TAIWAN | 700 | 87 | 0 | |



Document History Page

Document Title: QTP#161901:20-BALL WAFER LEVEL CHIP SCALE PACKAGE (WLCSP),1.63X2.03X0.55MM,
MSL1, 260C ASE-TAIWAN (G)

Document Number: 002-18185

| Rev. | ECN No. | Orig. of Change | Description of Change |
|------|---------|-----------------|-----------------------|
| ** | 5552238 | JYF | Initial spec release. |