

Wuxi CMC electronics Co., Ltd



Vision: Become a leader in the domestic IC testing industry

Mission: Scientific and technological innovation, integration and development,
pursuit of excellence

Values: Integrity, Quality, Endeavour and Win win



AEC Q100 CERTIFICATION REPORT

QR-RE-09-02-B

Device Name : FM33HT0X6A

Sample Model : FM33HT056A

Batch Number : C7B18J6G /C7B21J8G/C7B25J5G

Entrusting party : Shanghai Fudan Microelectronics Group Co.,Ltd

Certification Grade : Grade 1: -40℃~125℃

Humidity Sensitivity Level : MSL=3

DECLARATION

The test(s) shown in the report were conducted according to the confirmed procedures. We take full responsibility for the accuracy and completeness of these tests, and provide qualification certification of all testing personnel.

| Post | Name | Signature | Date |
|---------------------|--------------|-----------|------------|
| Testing Engineer | Zhijin Xu | 徐智金 | 2024/10/22 |
| Inspection Engineer | Shengbin Sun | 孙圣斌 | 2024/10/22 |

Wuxi CMC Electronics CO.,Ltd



NOTES

1. The report is invalid without company seal or report seal.
2. The report is invalid without signatures of testing person、 auditors and approver.
3. The report is invalid with any scrawl.
4. Partial copy of the report is unallowed without approving.
5. If test devices come from customers' samples, our company only be responsible of the samples, the results only could explain the quality of samples.
6. If you have any objection to the test results, please appeal to our company within one month from the date of receipt of the report, and attach the original report, otherwise it will not be accepted.

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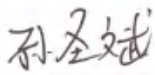
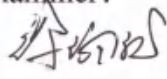
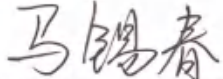
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Catalogue

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1. Test Report

| | | | |
|-------------------------|---|--|--|
| Entrusting party | Shanghai Fudan Microelectronics Group Co.,Ltd | Device Name | FM33HT0X6A |
| Sample Model | FM33HT056A | Sample Batch Number | C7B18J6G/C7B21J8G/C7B25J5G |
| Package Type | LQFP64 | Quantity | 306/286/286 |
| Sample Source | Customer sample delivery | Test Category | AEC Q100 Reliability Test |
| Test Start Date | 2024/07/06 | Test End Date | 2024/10/16 |
| Inspection Standard | AEC Q100-Rev-J-2023 AEC Q006-Rev-A-2016 JEDEC MIL-STD-883 | | |
| Results and Conclusions | The samples have tested and certified according to the requirements of the client and the standard AEC Q100-Rev-J-2023, and the test progress is normal. The certification result is : PASS. | | |
| Comment | / | | |
| Sign | Editor:  | Examiner:  | Approver:  |
| | Date: 2024.10.22 | Date: 2024.10.22 | Date: 2024.10.22 |

2. Reliability test summary

2.1 Sample Information

Table 1: Sample Information

| Lot# | Batch Number | Wafer Fabrication | Wafer Test facility | Assembly facility | Final Test facility |
|------|--------------|-------------------|---------------------|-------------------|---------------------|
| 1 | C7B18J6G | SAMSUNG | FMSH | JCET | CMC |
| 2 | C7B21J8G | | | | |
| 3 | C7B25J5G | | | | |

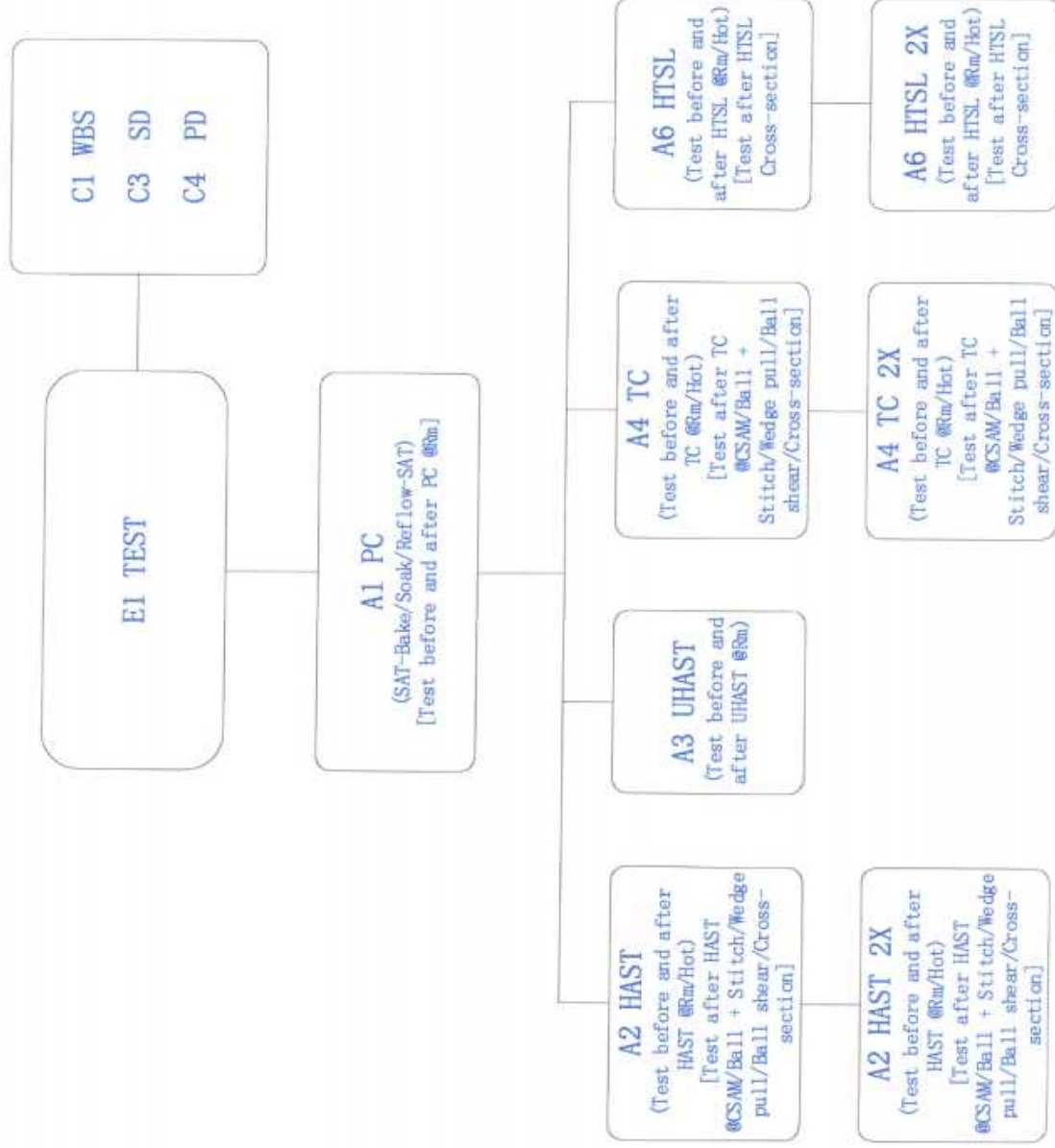
| Item | Vendor | Material type |
|------------------|-------------------|------------------------|
| Lead Frame | Shanghai Changhua | C7025 Rough |
| Molding Compound | Sumitomo | G630 |
| Wire | Nippon | AuPdCu/0.8mil/EX1R20μm |
| Epoxy/DAF | Resonac | EN-4900GC |
| Wafer process | Samsung | Silicon |

2.2 Description of Product

Table 2: Description of Product

| Product Model | Package Type | Operating temperature range | Moisture sensitivity Level | Automotive Temperature Grade |
|---------------|--------------|-----------------------------|----------------------------|------------------------------|
| FM33HT056A | LQFP64 | -40℃~125℃ | MSL=3 | Grade 1 |

2.3 Test Flow



2.4 Test Result Summary

Table 3: Test Result Summary

| TEST GROUP A ACCELERATED ENVIRONMENT STRESS TESTS | | | | | | | | | |
|---|--------------------------|------|--------------------------------|-----------------------------------|-------|---------------|--------|------------|--------|
| Group | Test Description | ABV | Test Method | Test Condition | #Lots | Total # Units | Result | Conclusion | Remark |
| A1 | Pre-conditioning | PC | JESD22-A113 JEDEC J-STD-020 | SAT-Bake/Soak/Reflow-SAT | 3 | 3*231 | 0/693 | Pass | / |
| | Biased HAST | HAST | JESD22-A110 | Ta=130°C,85%RH, Vd= 5.5V,96hrs | 3 | 3*77 | 0/231 | Pass | / |
| A2 | CSAM | / | AEC-Q006 | Test to spec | 3 | 3*22 | 0/66 | Pass | / |
| | Ball + Stitch/Wedge pull | / | AEC-Q006 | Wire AuPdCu 20µm | 3 | 3*3 | 0/9 | Pass | / |
| | Ball shear | / | AEC-Q006 | Bond 2.0mil | 3 | 3*3 | 0/9 | Pass | / |
| | Cross-section | / | AEC-Q006 | Test to spec | 3 | 3*1 | 0/3 | Pass | / |
| | Biased HAST Stress 2X | HAST | JESD22-A110 | Ta=130°C,85%RH, Vd= 5.5V,96hrs | 3 | 3*70 | 0/210 | Pass | / |
| | CSAM | / | AEC-Q006 | Test to spec | 3 | 3*22 | 0/66 | Pass | / |
| | Ball + Stitch/Wedge pull | / | AEC-Q006 | Wire AuPdCu 20µm | 3 | 3*3 | 0/9 | Pass | / |
| | Ball shear | / | AEC-Q006 | Bond 2.0mil | 3 | 3*3 | 0/9 | Pass | / |
| | Cross-section | / | AEC-Q006 | Test to spec | 3 | 3*1 | 0/3 | Pass | / |
| | | | | | | | | | |

| TEST GROUP A ACCELERATED ENVIRONMENT STRESS TESTS | | | | | | | | | |
|---|-------------------------------|-------|-------------|--------------------------------|-------|---------------|--------|------------|--------|
| Group | Test Description | ABV | Test Method | Test Condition | #Lots | Total # Units | Result | Conclusion | Remark |
| A3 | Unbiased HAST | UHAST | JESD22-A118 | Ta=130°C, 85%RH, 96hrs | 3 | 3*77 | 0/231 | Pass | / |
| | Temperature Cycling | TC | JESD22-A104 | Ta=-65°C to +150°C, 500 cycles | 3 | 3*77 | 0/231 | Pass | / |
| A4 | CSAM | / | AEC-Q006 | Test to spec | 3 | 3*22 | 0/66 | Pass | / |
| | Ball + Stitch/Wedge pull | / | AEC-Q006 | Wire AuPdCu 20µm | 3 | 3*3 | 0/9 | Pass | / |
| | Ball shear | / | AEC-Q006 | Bond 2.0mil | 3 | 3*3 | 0/9 | Pass | / |
| | Cross-section | / | AEC-Q006 | Test to spec | 3 | 3*1 | 0/3 | Pass | / |
| | Temperature Cycling Stress 2X | TC | JESD22-A104 | Ta=-65°C to +150°C, 500 cycles | 3 | 3*70 | 0/210 | Pass | / |
| | CSAM | / | AEC-Q006 | Test to spec | 3 | 3*22 | 0/66 | Pass | / |
| | Ball + Stitch/Wedge pull | / | AEC-Q006 | Wire AuPdCu 20µm | 3 | 3*3 | 0/9 | Pass | / |
| | Ball shear | / | AEC-Q006 | Bond 2.0mil | 3 | 3*3 | 0/9 | Pass | / |
| | Cross-section | / | AEC-Q006 | Test to spec | 3 | 3*1 | 0/3 | Pass | / |

| TEST GROUP A ACCELERATED ENVIRONMENT STRESS TESTS | | | | | | | | | |
|---|---|------|-------------|------------------|-------|---------------|--------|------------|--------|
| Group | Test Description | ABV | Test Method | Test Condition | #Lots | Total # Units | Result | Conclusion | Remark |
| A6 | High Temperature Storage Life | HTSL | JESD22-A103 | Ta=150℃, 1000hrs | 3 | 3*45 | 0/135 | Pass | / |
| | Cross-section | / | AEC-Q006 | Test to spec | 3 | 3*1 | 0/3 | Pass | / |
| | High Temperature Storage Life Stress 2X | HTSL | JESD22-A103 | Ta=150℃, 1000hrs | 3 | 3*44 | 0/132 | Pass | / |
| | Cross-section | / | AEC-Q006 | Test to spec | 3 | 3*1 | 0/3 | Pass | / |

| TEST GROUP C-PACKAGE ASSEMBLY INTEGRITY TESTS | | | | | | | | | |
|---|---------------------|-----|----------------------------|--|-------|---------------|--------|------------|-----------------------------|
| Group | Test Description | ABV | Test Method | Test Condition | #Lots | Total # Units | Result | Conclusion | Remark |
| C1 | Wire Bond Shear | WBS | AEC-Q100-001 | Bond 2.0mil | 1 | 5 | 0/5 | Pass | CPK: 12.19 |
| C2 | Wire Bond Pull | WBP | MIL-STD-883 Method 2011 | Wire AuPdCu 20μm | 1 | 5 | 0/5 | Pass | CPK: 1.96 |
| C3 | Solderability | SD | JESD22-B102 | 8 hour water vapor aging prior to test Ta=245±5°C, Infiltration time 5±0.5s | 1 | 15 | 0/15 | Pass | >95% Lead coverage |
| C4 | Physical Dimensions | PD | JESD22-B100 JESD22-B108 | Test to spec | 3 | 3*10 | 0/30 | Pass | CPK _(min) : 1.92 |

| TEST GROUPE ELECTRICAL CHARACTERISTIC VERIFICATION TESTS | | | | | | | | | |
|--|-------------------------------------|------|---|----------------|-------|---------------|--------|------------|--------|
| Group | Test Description | ABV | Test Method | Test Condition | #Lots | Total # Units | Result | Conclusion | Remark |
| E1 | Pre and post stress electrical test | Test | Test program to supplier data sheet or user specification | Test to spec | 3 | All | 0/all | Pass | / |

3. Test Equipment


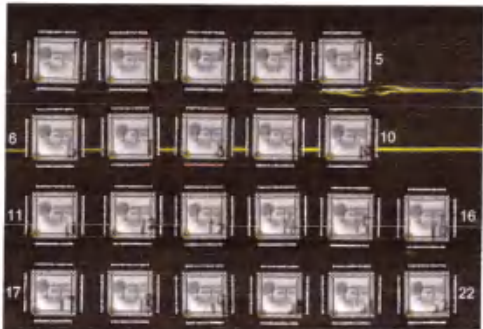

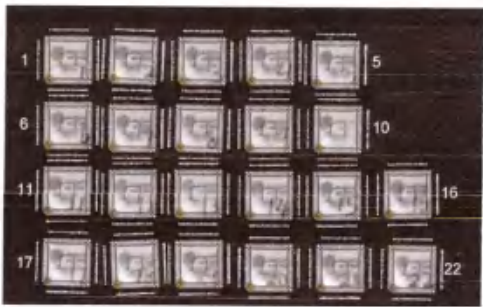
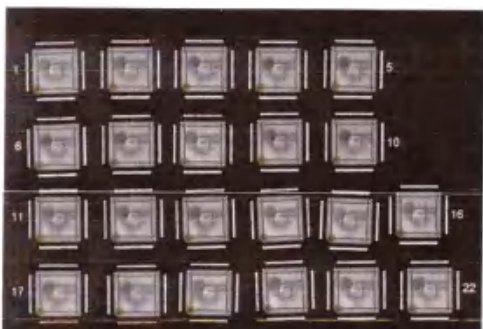

Table 4: Test Equipment Information

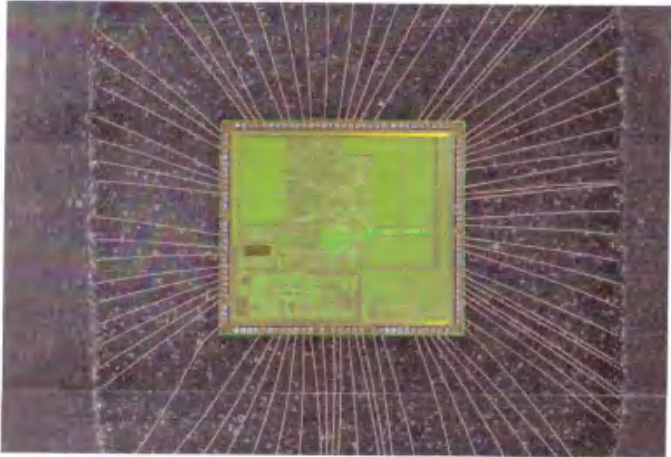
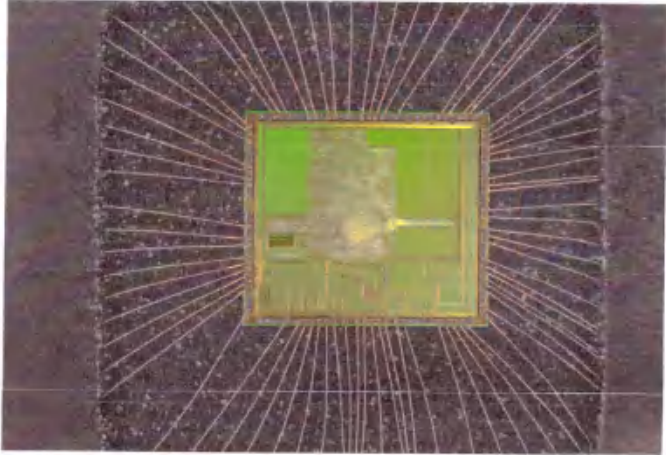
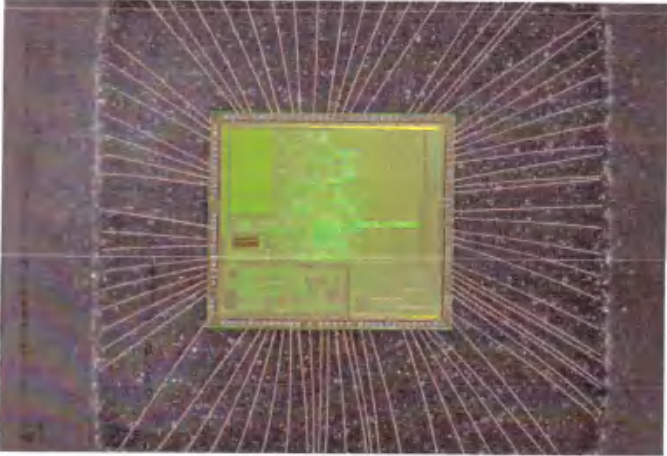
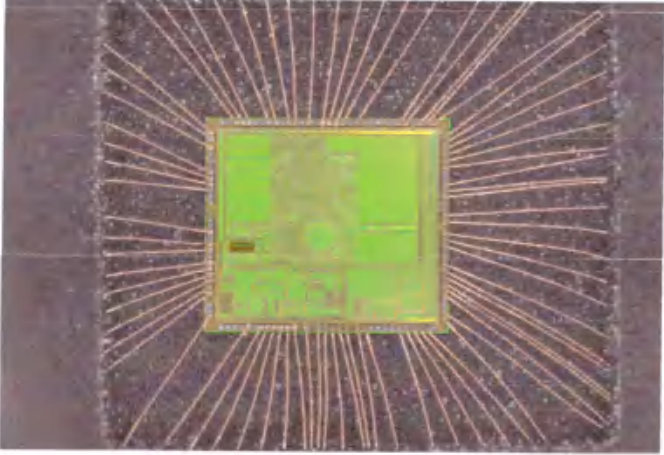
| No. | Equipment Nr. | Equipment Name | Model Nr. | Effective period of measurement |
|-----|--------------------|--|---------------|--|
| 1 | JS24CM023 | Ultrasonic microscope | UTSCAN 400 | / |
| 2 | 58566244680010 | Temperature shock chamber | VT7012S2 | 2024.06.14 - 2025.06.13 |
| 3 | 58566244680030 | Temperature shock chamber | VT7012S2 | 2024.06.14 - 2025.06.13 |
| 4 | 2006770978 | Strong acceleration humidity box | PC-422R8D | 2023.08.07 - 2024.08.06 2024.07.29 - 2025.07.28 |
| 5 | 1807768445 | Strong acceleration humidity box | PC-422R8D | 2023.08.07 - 2024.08.06 2024.07.29 - 2025.07.28 |
| 6 | 8112180014 | High and low temperature humid heat test chamber | SETH-A-100L | 2024.04.16 - 2025.04.15 |
| 7 | 7824 | Reflow soldering machine | TNV25-308EN-P | 2024.04.16 - 2025.04.15 |
| 8 | 17102224 | High temperature test chamber | PH101 | 2023.11.02 - 2024.11.01 |
| 9 | 0030-003158 | High temperature test chamber | GPH-20 | 2023.10.20 - 2024.10.19 2024.08.26 - 2025.08.25 |
| 10 | 0020-003067 | High temperature test chamber | GPH-20 | 2024.05.09 - 2025.05.08 |
| 11 | 1040210024 | Small high temperature test chamber | STH-120 | 2024.04.09 - 2025.04.08 |
| 12 | 1040210028 | Small high temperature test chamber | STH-120 | 2024.04.25 - 2025.04.24 |
| 13 | 1040210030 | Small high temperature test chamber | STH-120 | 2024.04.25 - 2025.04.24 |
| 14 | 802123072737520020 | DC power supply | IT6333A | 2024.04.15 - 2025.04.14 |
| 15 | 800543013757310076 | DC power supply | IT6952A | 2023.09.08 - 2024.09.07 2024.09.04 - 2025.09.03 |
| 16 | SH1702A4001 | Digital caliper | 0-150mm | 2024.03.09 - 2025.03.08 |

| No. | Equipment Nr. | Equipment Name | Model Nr. | Effective period of measurement |
|-----|----------------|--|---------------|--|
| 17 | 743602102 | Scanning electron microscope | SUPRA55 | 2023.12.20 - 2024.12.19 |
| 18 | EC30SM-221117 | Grinder | EcoMet 30 | / |
| 19 | 041-5786-02 | Ion polisher | 1061 SEM Mill | / |
| 20 | 8602-04 | Electron microscope | SU8600 | 2023.10.13 - 2024.10.12 2024.10.12 - 2025.10.11 |
| 21 | MT500000000008 | High precision three-dimensional measurement and analysis system | MT-500 | 2024.05.13 - 2025.05.12 |
| 22 | 745499001 | Tensile shear force tester | DAGE-4000 | 2023.08.07 - 2024.08.06 2024.07.29 - 2025.07.28 |
| 23 | 140218/2079 | Weldability testing machine | ST88 | 2024.03.04 - 2025.03.03 |

4. Test process photos

Table 5: Test process photos

| SAT | |
|---|--|
| C7B18J6G_SAT before PC | C7B18J6G_SAT after PC |
|  |  |
| C7B21J8G_SAT before PC | C7B21J8G_SAT after PC |
|  |  |
| C7B25J5G_SAT before PC | C7B25J5G_SAT after PC |
|  |  |

| Decap | |
|--|--|
| Graph 1 | Graph 2 |
|  |  |
| Graph 3 | Graph 4 |
|  |  |

Solderability

Graph 1



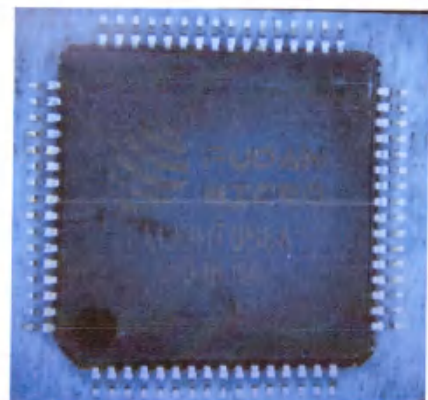
Graph 2



Graph 3



Graph 4



Graph 5



Graph 6



5. Test raw data

See the CD for the electrical performance test data.

6. Appendix

Appendix1: Wire Bond Pull Data

Appendix2: Wire Bond Shear Data

Appendix3: Physical Dimensions Data

Appendix1: Wire Bond Pull Strength Data

| Sample Model | Sample Batch Number | | Wire type | | Wire diameter | |
|-----------------------------------|---------------------|-------|-----------|-------|---------------|-------|
| FM33HT056A | C7B18J6G | | AuPdCu | | 20μm | |
| Wire Bond Pull Data (SPEC: ≥1.5g) | | | | | | |
| Sample# | 1# | | | | | |
| Wire# | Wire1 | Wire2 | Wire3 | Wire4 | Wire5 | Wire6 |
| Data | 3.53 | 3.74 | 3.66 | 3.43 | 3.75 | 4.22 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |
| Sample# | 2# | | | | | |
| Wire# | Wire1 | Wire2 | Wire3 | Wire4 | Wire5 | Wire6 |
| Data | 3.62 | 3.55 | 3.58 | 3.79 | 4.32 | 3.87 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |
| Sample# | 3# | | | | | |
| Wire# | Wire1 | Wire2 | Wire3 | Wire4 | Wire5 | Wire6 |
| Data | 3.01 | 3.83 | 4.29 | 3.97 | 3.09 | 4.04 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |
| Sample# | 4# | | | | | |
| Wire# | Wire1 | Wire2 | Wire3 | Wire4 | Wire5 | Wire6 |
| Data | 3.08 | 3.79 | 3.87 | 3.35 | 3.28 | 3.13 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |
| Sample# | 5# | | | | | |
| Wire# | Wire1 | Wire2 | Wire3 | Wire4 | Wire5 | Wire6 |
| Data | 3.46 | 3.29 | 3.79 | 3.11 | 3.51 | 3.42 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |

Appendix2: Wire Bond Shear Data

| Sample Model | Sample Batch Number | | | Bond diameter | | |
|--|---------------------|--------|--------|---------------|--------|--------|
| FM33HT056A | C7B18J6G | | | 2.0mil | | |
| Wire Bond Shear Data (SPEC: ≥ 5.7 g) | | | | | | |
| Sample# | 1# | | | | | |
| Bond # | Bond 1 | Bond 2 | Bond 3 | Bond 4 | Bond 5 | Bond 6 |
| Data | 20.55 | 20.31 | 21.09 | 20.43 | 20.74 | 20.49 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |
| Sample# | 2# | | | | | |
| Bond # | Bond 1 | Bond 2 | Bond 3 | Bond 4 | Bond 5 | Bond 6 |
| Data | 20.73 | 20.74 | 21.08 | 21.34 | 20.91 | 21.79 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |
| Sample# | 3# | | | | | |
| Bond # | Bond 1 | Bond 2 | Bond 3 | Bond 4 | Bond 5 | Bond 6 |
| Data | 21.30 | 20.22 | 20.43 | 21.61 | 21.19 | 20.97 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |
| Sample# | 4# | | | | | |
| Bond # | Bond 1 | Bond 2 | Bond 3 | Bond 4 | Bond 5 | Bond 6 |
| Data | 20.36 | 20.74 | 21.10 | 21.19 | 20.12 | 21.13 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |
| Sample# | 5# | | | | | |
| Bond # | Bond 1 | Bond 2 | Bond 3 | Bond 4 | Bond 5 | Bond 6 |
| Data | 21.12 | 20.88 | 21.20 | 21.30 | 20.48 | 20.92 |
| Result: | Pass | Pass | Pass | Pass | Pass | Pass |

Appendix3: Physical Dimensions Data

| Sample Model | | FM33HT056A | | Samples Count | | 30 (10/lot) | | Package Type | | | LQFP64 | |
|--------------|-----------|------------|-------|---------------|-------|-------------|-------|--------------|-------|-------|--------|------|
| Symbol | Sample ID | 1" | 2" | 3" | 4" | 5" | 6" | 7" | 8" | 9" | 10" | CPK |
| A | C7B18J6G | 1.462 | 1.500 | 1.500 | 1.485 | 1.465 | 1.500 | 1.485 | 1.488 | 1.465 | 1.482 | 2.22 |
| | C7B21J8G | 1.483 | 1.462 | 1.419 | 1.464 | 1.483 | 1.462 | 1.485 | 1.486 | 1.465 | 1.468 | |
| | C7B25J5G | 1.484 | 1.462 | 1.506 | 1.484 | 1.484 | 1.464 | 1.441 | 1.484 | 1.448 | 1.465 | |
| A1 | C7B18J6G | 0.087 | 0.090 | 0.091 | 0.088 | 0.090 | 0.087 | 0.092 | 0.077 | 0.085 | 0.091 | 3.22 |
| | C7B21J8G | 0.089 | 0.082 | 0.090 | 0.093 | 0.086 | 0.079 | 0.095 | 0.085 | 0.087 | 0.090 | |
| | C7B25J5G | 0.087 | 0.093 | 0.088 | 0.089 | 0.092 | 0.087 | 0.088 | 0.085 | 0.088 | 0.091 | |
| A2 | C7B18J6G | 1.395 | 1.400 | 1.397 | 1.399 | 1.402 | 1.394 | 1.393 | 1.399 | 1.400 | 1.401 | 3.46 |
| | C7B21J8G | 1.379 | 1.393 | 1.3995 | 1.398 | 1.400 | 1.403 | 1.394 | 1.392 | 1.394 | 1.398 | |
| | C7B25J5G | 1.397 | 1.397 | 1.400 | 1.397 | 1.395 | 1.394 | 1.395 | 1.401 | 1.393 | 1.397 | |
| A3 | C7B18J6G | 0.633 | 0.633 | 0.633 | 0.632 | 0.633 | 0.633 | 0.635 | 0.633 | 0.633 | 0.645 | 2.43 |
| | C7B21J8G | 0.636 | 0.631 | 0.633 | 0.633 | 0.633 | 0.635 | 0.642 | 0.635 | 0.633 | 0.633 | |
| | C7B25J5G | 0.635 | 0.633 | 0.630 | 0.633 | 0.633 | 0.633 | 0.634 | 0.631 | 0.631 | 0.632 | |
| b | C7B18J6G | 0.228 | 0.235 | 0.245 | 0.242 | 0.236 | 0.241 | 0.243 | 0.232 | 0.229 | 0.241 | 1.92 |
| | C7B21J8G | 0.235 | 0.241 | 0.245 | 0.245 | 0.238 | 0.228 | 0.234 | 0.242 | 0.245 | 0.245 | |
| | C7B25J5G | 0.240 | 0.245 | 0.237 | 0.242 | 0.245 | 0.243 | 0.239 | 0.234 | 0.239 | 0.243 | |
| T | C7B18J6G | 0.152 | 0.139 | 0.135 | 0.155 | 0.138 | 0.155 | 0.135 | 0.135 | 0.151 | 0.139 | 2.08 |
| | C7B21J8G | 0.135 | 0.135 | 0.139 | 0.150 | 0.138 | 0.152 | 0.155 | 0.139 | 0.155 | 0.135 | |
| | C7B25J5G | 0.152 | 0.155 | 0.155 | 0.135 | 0.139 | 0.135 | 0.135 | 0.155 | 0.153 | 0.138 | |
| L | C7B18J6G | 0.555 | 0.552 | 0.558 | 0.545 | 0.545 | 0.553 | 0.549 | 0.552 | 0.555 | 0.548 | 2.05 |
| | C7B21J8G | 0.562 | 0.556 | 0.561 | 0.555 | 0.548 | 0.565 | 0.567 | 0.555 | 0.562 | 0.558 | |
| | C7B25J5G | 0.545 | 0.562 | 0.558 | 0.561 | 0.557 | 0.578 | 0.552 | 0.561 | 0.557 | 0.589 | |

END