| PCN Number: | 20221003000.2 | PCN Date: | October 03, 2022 |
|---|---|---|---|
| Title: | Qualification of new Fab site (RFAB) and additional Assembly BOM options for select ABCD6 devices | | |
| Customer Contact: | PCN Manager | Dept: | Quality Services |
| Proposed 1st Ship Date: | Apr 3, 2023 | Sample requests accepted until: | November 3, 2022* |

***Sample requests received after November 3, 2022 will not be supported.**

| Change Type: | | | | | |
|---|---|---|---|---|---|
| ☐ | Assembly Site | ☐ | Assembly Process | ☒ | Assembly Materials |
| ☐ | Design | ☐ | Electrical Specification | ☐ | Mechanical Specification |
| ☐ | Test Site | ☐ | Packing/Shipping/Labeling | ☐ | Test Process |
| ☐ | Wafer Bump Site | ☐ | Wafer Bump Material | ☐ | Wafer Bump Process |
| ☒ | Wafer Fab Site | ☒ | Wafer Fab Materials | ☒ | Wafer Fab Process |
| | | ☐ | Part number change | | |

## PCN Details

**Description of Change:**

Texas Instruments is pleased to announce the qualification of its RFAB fabrication facility as an additional Wafer Fab source and Assembly BOM options for selected devices as listed below in the product affected section. Construction differences are noted below:

| Current Fab Site | | | | Additional Fab Site | | | |
|---|---|---|---|---|---|---|---|
| Current Fab Site | Process | Passivation | Wafer Diameter | Additional Fab Site | Process | Passivation | Wafer Diameter |
| MAINEFAB | ABCD6 | oxide/nitride | 200 mm | RFAB | ABCD6 | oxide/oxy-nitride | 300 mm |

Additionally, there will be Assembly BOM options introduced for these devices:

**Material Differences:**

| | Current | Proposed |
|---|---|---|
| Wire type | 1.3mil Au | 1.0mil Cu |
| Mold compound | SID#EN2000784 | SID#EN20000519 |

Qual details are provided in the Qual Data Section.

**Reason for Change:**

Continuity of Supply

**Anticipated impact on Form, Fit, Function, Quality or Reliability (positive / negative):**

None

**Impact on Environmental Ratings:**

Checked boxes indicate the status of environmental ratings following implementation of this change. If below boxes are checked, there are no changes to the associated environmental ratings.

| RoHS | REACH | Green Status | IEC 62474 |
|---|---|---|---|
| ☒ No Change | ☒ No Change | ☒ No Change | ☒ No Change |

**Changes to product identification resulting from this PCN:**

**Current:**

| Current Chip Site | Chip Site Origin Code (20L) | Chip Site Country Code (21L) | Chip Site City |
|---|---|---|---|
| MAINEFAB | CUA | USA | South Portland |

**New Fab Site:**

| New Chip Site | Chip Site Origin Code (20L) | Chip Site Country Code (21L) | Chip Site City |
|---|---|---|---|
| **RFAB** | **RFB** | **USA** | **Richardson** |

Sample product shipping label (not actual product label)


**Product Affected:**

LM5163QDDARQ1

# Automotive New Product Qualification Summary
# (As per AEC-Q100, AEC-Q006, and JEDEC Guidelines)

## Approve Date 13-SEPTEMBER-2022

**Qualification Results**

**Data Displayed as: Number of lots / Total sample size / Total failed**

| Type | # | Test Spec | Min Lot Qty | SS / Lot | Test Name | Condition | Duration | Qual Device: LM5164QDDARQ1 |
|---|---|---|---|---|---|---|---|---|
| Test Group A - Accelerated Environment Stress Tests | | | | | | | | |
| PC | A1 | JEDEC J-STD-020 JESD22-A113 | 3 | 77 | Preconditioning | MSL2 260C | 1 Step | 3/0/0 |
| PC | A1.1 | - | 3 | 11 | SAM Precon Pre | Review for delamination | 1 Step | 3/33/0 |
| PC | A1.2 | - | 3 | 11 | SAM Precon Post | Review for delamination | 1 Step | 3/33/0 |
| HAST | A2.1 | JEDEC JESD22-A110 | 3 | 77 | Biased HAST | 130C/85%RH | 96 Hours | 3/231/0 |
| HAST | A2.1.2 | - | 3 | 1 | Cross Section, post bHAST, 1X | Post stress cross section | Completed | 3/3/0 |
| HAST | A2.1.3 | - | 3 | 30 | Wire Bond Shear, post bHAST, 1X | Post stress | Wires | 3/90/0 |
| HAST | A2.1.4 | - | 3 | 30 | Bond Pull over Stitch, post bHAST, 1X | Post stress | Wires | 3/90/0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| HAST | A2.1.5 | - | 3 | 30 | Bond Pull over Ball, post bHAST, 1X | Post stress | Wires | 3/90/0 |
| HAST | A2.2 | JEDEC JESD22-A110 | 3 | 70 | Biased HAST | 130C/85%RH | 192 Hours | 3/240/0 |
| HAST | A2.2.1 | - | 3 | 11 | SAM Analysis, post bHAST 2X | Review for delamination | Completed | 3/33/0 |
| HAST | A2.2.2 | - | 3 | 1 | Cross Section, post bHAST, 2X | Post stress cross section | Completed | 3/3/0 |
| HAST | A2.2.3 | - | 3 | 20 | Wire Bond Shear, post bHAST, 2X | Post stress | Wires | 3/60/0 |
| HAST | A2.2.4 | - | 3 | 20 | Bond Pull over Stitch, post bHAST, 2X | Post stress | Wires | 3/60/0 |
| HAST | A2.2.5 | - | 3 | 20 | Bond Pull over Ball, post bHAST, 2X | Post stress | Wires | 3/60/0 |
| TC | A4.1 | JEDEC JESD22-A104 and Appendix 3 | 3 | 77 | Temperature Cycle | -65C/150C | 500 Cycles | 3/210/0 |
| TC | A4.1.1 | - | 3 | 11 | SAM Analysis, post TC 1X | Review for delamination | Completed | 3/33/0 |
| TC | A4.1.2 | - | 3 | 1 | Cross Section, post TC, 1X | Post stress cross section | Completed | 3/3/0 |
| TC | A4.1.3 | - | 3 | 30 | Wire Bond Shear, post TC, 1X | Post stress | Wires | 3/90/0 |
| TC | A4.1.4 | - | 3 | 30 | Bond Pull over Stitch, post TC, 1X | Post stress | Wires | 3/90/0 |
| TC | A4.1.5 | - | 3 | 30 | Bond Pull over Ball, post TC, 1X | Post stress | Wires | 3/9/0 |
| TC | A4.2 | JEDEC JESD22-A104 and Appendix 3 | 3 | 77 | Temperature Cycle | -65C/150C | 1000 Cycles | 3/210/0 |
| TC | A4.2.1 | - | 3 | 11 | SAM Analysis, post TC, 2X | Review for delamination | Completed | 3/33/0 |
| TC | A4.2.2 | - | 3 | 1 | Cross Section, post TC, 2X | Post stress cross section | Completed | 3/3/0 |
| TC | A4.2.3 | - | 3 | 20 | Wire Bond Shear, post TC, 2X | Post stress | Wires | 3/60/0 |
| TC | A4.2.4 | - | 3 | 20 | Bond Pull over Stitch, post TC, 2X | Post stress | Wires | 3/60/0 |
| TC | A4.2.5 | - | 3 | 20 | Bond Pull over Ball, post TC, 2X | Post stress | Wires | 3/60/0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| HTSL | A6.1 | JEDEC JESD22-A103 | 3 | 45 | High Temperature Storage Life | 175C | 500 Hours | 3/133/0 |
| HTSL | A6.1.1 | - | 3 | 1 | Cross Section, post HTSL, 1X | Post stress cross section | Completed | 3/3/0 |
| HTSL | A6.2 | JEDEC JESD22-A103 | 3 | 44 | High Temperature Storage Life | 175C | 1000 Hours | 3/132/0 |
| HTSL | A6.2.1 | - | 3 | 1 | Cross Section, post HTSL, 2X | Post stress cross section | Completed | 3/3/0 |

- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
- The following are equivalent HTOL options based on an activation energy of 0.7eV : 125C/1k Hours, 140C/480 Hours, 150C/300 Hours, and 155C/240 Hours
- The following are equivalent HTSL options based on an activation energy of 0.7eV : 150C/1k Hours, and 170C/420 Hours
- The following are equivalent Temp Cycle options per JESD47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

**Ambient Operating Temperature by Automotive Grade Level:**

- Grade 0 (or E): -40C to +150C
- Grade 1 (or Q): -40C to +125C
- Grade 2 (or T): -40C to +105C
- Grade 3 (or I) : -40C to +85C

**E1 (TEST): Electrical test temperatures of Qual samples (High temperature according to Grade level):**

- Room/Hot/Cold : HTOL, ED
- Room/Hot : THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU
- Room : AC/uHAST

Quality and Environmental data is available at TI's external Web site: http://www.ti.com/

## Automotive Change Qualification Summary
## (As per AEC-Q100 and JEDEC Guidelines)

# Approve Date 9-May-2022

| Type | # | Test Spec | Min Lot Qty | SS / Lot | Test Name | Condition | Duration | Qual Device: LM5163QDDARQ1 | QBS Reference: LM5141QRGERQ1 | QBS Reference: LM5169FQDDARQ1 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Test Group A - Accelerated Environment Stress Tests** | | | | | | | | | | |
| PC | A1 | JEDEC J-STD-020 JESD22A113 | 3 | 77 | Preconditioning | MSL2 260C | 3 reflows | QBS | - | 3/693/0 |
| HAST | A2 | JEDEC JESD22A110 | 3 | 77 | Biased HAST | 130C/85%RH | 96 Hours | QBS | - | 3/231/0 |
| AC/UHAST | A3 | JEDEC JESD22-A102/JEDEC JESD22-A118 | 3 | 77 | Unbiased HAST | 130C/85%RH | 96 Hours | QBS | - | 3/231/0 |
| TC | A4 | JEDEC JESD22A104 and Appendix 3 | 3 | 77 | Temperature Cycle | -65C/150C | 500 Cycles | QBS | - | 3/231/0 |

**Qualification Results**

**Data Displayed as: Number of lots / Total sample size / Total failed**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TC-BP | A4 | MIL-STD883 Method 2011 | 1 | 5 | Post Temp Cycle Bond Pull | - | - | - | - | 1/5/0 |
| HTSL | A6 | JEDEC JESD22A103 | 1 | 45 | High Temperature Storage Life | 150C | 1000 Hours | - | - | 1/45/0 |
| **Test Group B - Accelerated Lifetime Simulation Tests** | | | | | | | | | | |
| HTOL | B1 | JEDEC JESD22A108 | 1 | 77 | Life Test | 125C | 1000 Hours | QBS | 3/231/0 | - |
| HTOL | B1 | JEDEC JESD22A108 | 1 | 77 | Life Test | 150C | 300 Hours | QBS | - | 2/154/0 |
| ELFR | B2 | AEC Q100-008 | 1 | 77 | Early Life Failure Rate | 125C | 48 Hours | QBS | 3/2400/0 | - |
| **Test Group C - Package Assembly Integrity Tests** | | | | | | | | | | |
| WBS | C1 | AEC Q100-001 | 1 | 30 | Wire Bond Shear | Minimum of 5 devices, 30 wires Cpk>1.67 | Wires | QBS | - | 3/90/0 |
| WBP | C2 | MIL-STD883 Method 2011 | 1 | 30 | Wire Bond Pull | Minimum of 5 devices, 30 wires Cpk>1.67 | Wires | QBS | - | 3/90/0 |
| SD | C3 | JEDEC JESD22B102 | 1 | 15 | PB-Free Solderability | >95% Lead Coverage | - | QBS | - | 1/15/0 |
| PD | C4 | JEDEC JESD22B100 and B108 | 1 | 10 | Physical Dimensions | Cpk>1.67 | - | QBS | - | 3/30/0 |
| **Test Group D - Die Fabrication Reliability Tests** | | | | | | | | | | |
| EM | D1 | JESD61 | - | - | Electromigration | - | - | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements |
| TDDB | D2 | JESD35 | - | - | Time Dependent Dielectric Breakdown | - | - | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements |
| HCI | D3 | JESD60 & 28 | - | - | Hot Carrier Injection | - | - | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NBTI | D4 | - | - | - | Negative Bias Temperature Instability | - | - | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements |
| SM | D5 | - | - | - | Stress Migration | - | - | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements | Completed Per Process Technology Requirements |
| **Test Group E - Electrical Verification Tests** | | | | | | | | | | |
| ESD | E2 | AEC Q100-002 | 1 | 3 | ESD HBM | - | 2000 Volts | 1/3/0 | - | - |
| ESD | E3 | AEC Q100-011 | 1 | 3 | ESD CDM | - | 500 Volts | 1/3/0 | - | - |
| LU | E4 | AEC Q100-004 | 1 | 6 | Latch-Up | Per AEC Q100004 | - | 1/6/0 | - | - |
| ED | E5 | AEC Q100-009 | 3 | 30 | Electrical Distributions | Cpk>1.67 Room, hot, and cold | - | 3/90/0 | - | - |

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**E1 (TEST): Electrical test temperatures of Qual samples (High temperature according to Grade level):**

- Room/Hot/Cold : HTOL, ED
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- Room : AC/uHAST

Quality and Environmental data is available at TI's external Web site: http://www.ti.com/

For questions regarding this notice, e-mails can be sent to the contact below or your local Field Sales Representative.

| Location | E-Mail |
|---|---|
| WW Change Management Team | PCN_ww_admin_team@list.ti.com |