

| | | | | | |
|--|--|--|----------------------------|------------------|-----------------------|
| PCN Number: | 20250121001.2 | PCN Date: | January 21, 2025 | | |
| Title: | Qualification of RFAB in addition to DMOS6 for METDCU processing | | | | |
| Customer Contact: | Change Management team | Dept: | Quality Services | | |
| Proposed 1st Ship Date: | July 20, 2025 | Sample requests accepted until: | March 22, 2025* | | |
| *Sample requests received after March 22, 2025 will not be supported. | | | | | |
| Change Type: | | | | | |
| <input type="checkbox"/> | Assembly Site | <input type="checkbox"/> | Design | | |
| <input type="checkbox"/> | Assembly Process | <input type="checkbox"/> | Data Sheet | | |
| <input type="checkbox"/> | Assembly Materials | <input type="checkbox"/> | Part number change | | |
| <input type="checkbox"/> | Mechanical Specification | <input type="checkbox"/> | Test Site | | |
| <input checked="" type="checkbox"/> | Packing/Shipping/Labeling | <input type="checkbox"/> | Test Process | | |
| <input type="checkbox"/> | | <input type="checkbox"/> | Wafer Bump Material | | |
| <input type="checkbox"/> | | <input type="checkbox"/> | Wafer Bump Process | | |
| <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | Wafer Fab Site | | |
| <input type="checkbox"/> | | <input type="checkbox"/> | Wafer Fab Materials | | |
| <input type="checkbox"/> | | <input type="checkbox"/> | Wafer Fab Process | | |
| PCN Details | | | | | |
| Description of Change: | | | | | |
| Texas Instruments is pleased to announce the qualification of RFAB as an additional option for METDCU processing for the devices listed below in the product affected section. | | | | | |
| Current Fab Site | | | Additional Fab Site | | |
| Current Fab Site | Process | Wafer Diameter | Additional Fab Site | Process | Wafer Diameter |
| DMOS6 | LBC7, LBC8, LBC9 | 300 mm | RFAB | LBC7, LBC8, LBC9 | 300 mm |
| Qual details are provided in the Qual Data Section. | | | | | |
| Reason for Change: | | | | | |
| Capacity increase to support demand and continuity of supply. | | | | | |
| Anticipated impact on Form, Fit, Function, Quality or Reliability (positive / negative): | | | | | |
| No anticipated impact. | | | | | |
| Changes to product identification resulting from this PCN: | | | | | |
| None. | | | | | |
| Product Affected: | | | | | |
| DRV3256AEPAPRQ1 | LP8866QRHBRQ1 | SN65LBC176QDRG4 | TCAN1043ADMTRQ1 | | |
| DRV3256BEPAPRQ1 | LP8866SQRHBRQ1 | SN65LBC176QDRG4Q1 | TCAN1043ADRQ1 | | |
| DRV3256EPAPRQ1 | SN104485DR | SN65LBC176QDRQ1 | TCAN1043ADYYRQ1 | | |
| LP8864QRHBRQ1 | SN65LBC176AQDR | SN65LBC176QDRVS | | | |
| LP8864SQRHBRQ1 | SN65LBC176QDR | SN65LBC179QDR | | | |

**Automotive Qualification Summary
(As per AEC-Q100 Rev. J and JEDEC Guidelines)**

**RFAB: Automotive METDCU qual
Approve Date 15-JANUARY -2025**

Product Attributes

| Attributes | Qual Device: BQ79616PAPRQ1 | QBS Process Reference: BQ79616PAPRQ1_2.0 | QBS Process Reference: BQ79616PAPRQ1_2.1 |
|--------------------------|---|---|---|
| Automotive Grade Level | Grade 1 | Grade 1 | Grade 1 |
| Operating Temp Range (C) | -40 to 125 | -40 to 125 | -40 to 125 |
| Product Function | Power Management | Power Management | Power Management |
| Wafer Fab Supplier | RFAB | RFAB | RFAB |
| Assembly Site | PHI | PHI | PHI |
| Package Group | QFP | QFP | QFP |
| Package Designator | PAP | PAP | PAP |
| Pin Count | 64 | 64 | 64 |

- QBS: Qual By Similarity, also known as Generic Data
- Qual Device BQ79616PAPRQ1 is qualified at MSL3 260C

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: BQ79616PAPRQ1 | QBS Process Reference: BQ79616PAPRQ1 | QBS Process Reference: BQ79616PAPRQ1 |
|---|----|-------------------------------------|-------------|----------|-------------------------------|-------------|-------------|---|---|---|
| Test Group A - Accelerated Environment Stress Tests | | | | | | | | | | |
| PC | A1 | JEDEC J-STD-020 JESD22-A113 | 3 | 77 | Preconditioning | MSL3 260C | - | 3/0/0 | 3/0/0 | 1/0/0 |
| HAST | A2 | JEDEC JESD22-A110 | 3 | 77 | Biased HAST | 130C/85%RH | 96 Hours | 3/231/0 | 3/231/1 | 1/77/0 |
| AC/UHAST | A3 | JEDEC JESD22-A102/JEDEC JESD22-A118 | 3 | 77 | Autoclave | 121C/15psig | 96 Hours | - | 3/231/0 | - |
| AC/UHAST | A3 | JEDEC JESD22-A102/JEDEC JESD22-A118 | 3 | 77 | Unbiased HAST | 130C/85%RH | 96 Hours | 3/231/0 | - | - |
| TC | A4 | JEDEC JESD22-A104 and Appendix 3 | 3 | 77 | Temperature Cycle | -65C/150C | 500 Cycles | 3/231/0 | 3/231/0 | 1/77/0 |
| TC-BP | A4 | MIL-STD883 Method 2011 | 1 | 5 | Post Temp Cycle Bond Pull | - | - | 1/5/0 | - | - |
| PTC | A5 | JEDEC JESD22-A105 | 1 | 45 | PTC | -40/125C | 1000 Cycles | - | 1/45/0 | - |
| PTC | A5 | JEDEC JESD22-A105 | 1 | 45 | PTC | -40/125C | 2000 Cycles | - | 1/45/0 | - |
| HTSL | A6 | JEDEC JESD22-A103 | 1 | 45 | High Temperature Storage Life | 150C | 1000 Hours | 3/135/0 | 3/135/0 | - |
| Test Group B - Accelerated Lifetime Simulation Tests | | | | | | | | | | |
| HTOL | B1 | JEDEC JESD22-A108 | 3 | 77 | Life Test | 125C | 1000 Hours | - | 3/231/0 | - |
| ELFR | B2 | AEC Q100-008 | 3 | 800 | Early Life Failure Rate | 125C | 48 Hours | - | 3/2400/0 | - |

| Type | # | Test Spec | Min Lot Qty | SS / Lot | Test Name | Condition | Duration | Qual Device: BQ79616PAPRQ1 | QBS Process Reference: BQ79616PAPRQ1 | QBS Process Reference: BQ79616PAPRQ1 |
|------|---|-----------|-------------|----------|-----------|-----------|----------|-------------------------------|---|---|
|------|---|-----------|-------------|----------|-----------|-----------|----------|-------------------------------|---|---|

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 | 3/90/0 | 3/90/0 | 1/30/0 |
| WBP | C2 | MIL-STD883 Method 2011 | 1 | 30 | Wire Bond Pull | Minimum of 5 devices, 30 wires Cpk>1.67 | Wires | 3/90/0 | 3/90/0 | 1/30/0 |
| SD | C3 | JEDEC J-STD-002 | 1 | 15 | PB Solderability | >95% Lead Coverage | - | - | 1/15/0 | - |
| SD | C3 | JEDEC J-STD-002 | 1 | 15 | PB-Free Solderability | >95% Lead Coverage | - | 1/15/0 | 1/15/0 | - |
| PD | C4 | JEDEC JESD22-B100 and B108 | 3 | 10 | Physical Dimensions | Cpk>1.67 | - | 3/30/0 | 3/30/0 | 1/10/0 |

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 |
| BTI | D4 | - | - | - | 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 |

| Type | # | Test Spec | Min Lot Qty | SS / Lot | Test Name | Condition | Duration | Qual Device: BQ79616PAPRQ1 | QBS Process Reference: BQ79616PAPRQ1 | QBS Process Reference: BQ79616PAPRQ1 |
|------|---|-----------|-------------|----------|-----------|-----------|----------|-------------------------------|---|---|
|------|---|-----------|-------------|----------|-----------|-----------|----------|-------------------------------|---|---|

Test Group E - Electrical Verification Tests

| | | | | | | | | | | |
|-----|----|--------------|---|----|--------------------------|------------------------------|------------|--------|--------|--------|
| ESD | E2 | AEC Q100-002 | 1 | 3 | ESD HBM | - | 2500 Volts | - | - | 1/3/0 |
| ESD | E3 | AEC Q100-011 | 1 | 3 | ESD CDM | - | 1000 Volts | - | - | 1/3/0 |
| LU | E4 | AEC Q100-004 | 1 | 3 | Latch-Up | Per AEC Q100-004 | - | - | - | 1/6/0 |
| ED | E5 | AEC Q100-009 | 3 | 30 | Electrical Distributions | Cpk>1.67 Room, hot, and cold | - | 3/90/0 | 3/90/0 | 1/30/0 |

Additional Tests

- 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/>

TI Qualification ID: R-CHG-2409-073

**Automotive Qualification Summary
(As per AEC and JEDEC Guidelines)**

**Q006 QFP at PHI
Approve Date 15-JANUARY -2025**

| Attributes | Qual Device: BQ79616PAPRQ1 | QBS Process Reference: BQ79616PAPRQ1 | QBS Process Reference: BQ79616PAPRQ1 |
|--------------------------|---|---|---|
| Automotive Grade Level | Grade 1 | Grade 1 | Grade 1 |
| Operating Temp Range (C) | -40 to 125 | -40 to 125 | -40 to 125 |
| Product Function | Power Management | Power Management | Power Management |
| Wafer Fab Supplier | RFAB | RFAB | RFAB |
| Assembly Site | PHI | PHI | PHI |
| Package Group | QFP | QFP | QFP |
| Package Designator | PAP | PAP | PAP |
| Pin Count | 64 | 64 | 64 |

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: BQ79616PAPRQ1 | QBS Reference: BQ79616PAPRQ1 | QBS Reference: BQ79616PAPRQ1 |
|--|--------|-----------------------------|-------------|----------|---------------------------------------|---------------------------|-----------|---|---|---|
| Test Group A - Accelerated Environment Stress Tests | | | | | | | | | | |
| PC | A1 | JEDEC J-STD-020 JESD22-A113 | 3 | 77 | Preconditioning | MSL3 260C | - | 3/0/0 | 3/0/0 | - |
| PC | A1.1 | - | 3 | 22 | SAM Precon Pre | Review for delamination | - | 3/66/0 | 3/66/0 | - |
| PC | A1.2 | - | 3 | 22 | SAM Precon Post | Review for delamination | - | 3/66/0 | 3/66/0 | - |
| HAST | A2.1 | JEDEC JESD22-A110 | 3 | 77 | Biased HAST | 130C/85%RH | 96 Hours | 3/231/0 | 3/231/1 | - |
| HAST | A2.1.2 | - | 3 | 1 | Cross Section, post bHAST, 1X | Post stress cross section | Completed | 3/3/0 | 3/3/0 | - |
| HAST | A2.1.3 | - | 3 | 3 | Wire Bond Shear, post bHAST, 1X | Post stress | - | 3/9/0 | 3/9/0 | - |
| HAST | A2.1.4 | - | 3 | 3 | Bond Pull over Stitch, post bHAST, 1X | Post stress | - | 3/9/0 | 3/9/0 | - |
| HAST | A2.1.5 | - | 3 | 3 | Bond Pull over Ball, post bHAST, 1X | Post stress | - | 3/9/0 | 3/9/0 | - |
| HAST | A2.2 | JEDEC JESD22-A110 | 3 | 70 | Biased HAST | 130C/85%RH | 192 Hours | 3/231/0 | 3/231/12 ¹ | - |
| HAST | A2.2.1 | - | 3 | 22 | SAM Analysis, post bHAST 2X | Review for delamination | Completed | 3/66/0 | 3/66/0 | - |
| HAST | A2.2.2 | - | 3 | 1 | Cross Section, post bHAST, 2X | Post stress cross section | Completed | 3/3/0 | 3/3/0 | - |
| HAST | A2.2.3 | - | 3 | 3 | Wire Bond Shear, post bHAST, 2X | Post stress | - | 3/9/0 | 3/9/0 | - |
| HAST | A2.2.4 | - | 3 | 3 | Bond Pull over Stitch, post bHAST, 2X | Post stress | - | 3/9/0 | 3/9/0 | - |

| Type | # | Test Spec | Min Lot Qty | SS / Lot | Test Name | Condition | Duration | Qual Device: BQ79616PAPRQ1 | QBS Reference: BQ79616PAPRQ1 | QBS Reference: BQ79616PAPRQ1 |
|------|--------|----------------------------------|-------------|----------|-------------------------------------|---------------------------|-------------|----------------------------|------------------------------|------------------------------|
| HAST | A2.2.5 | - | 3 | 3 | Bond Pull over Ball, post bHAST, 2X | Post stress | - | 3/9/0 | 3/9/0 | - |
| TC | A4.1 | JEDEC JESD22-A104 and Appendix 3 | 3 | 77 | Temperature Cycle | -65C/150C | 500 Cycles | 3/231/0 | 3/231/0 | - |
| TC | A4.1.1 | - | 3 | 22 | SAM Analysis, post TC 1X | Review for delamination | Completed | 3/66/0 | 3/66/0 | - |
| TC | A4.1.2 | - | 3 | 1 | Cross Section, post TC, 1X | Post stress cross section | Completed | 3/3/0 | 3/3/0 | - |
| TC | A4.1.3 | - | 3 | 3 | Wire Bond Shear, post TC, 1X | Post stress | - | 3/9/0 | 3/9/0 | - |
| TC | A4.1.4 | - | 3 | 3 | Bond Pull over Stitch, post TC, 1X | Post stress | - | 3/9/0 | 3/9/0 | - |
| TC | A4.1.5 | - | 3 | 3 | Bond Pull over Ball, post TC, 1X | Post stress | - | 3/9/0 | 3/9/0 | - |
| TC | A4.2 | JEDEC JESD22-A104 and Appendix 3 | 3 | 70 | Temperature Cycle | -65C/150C | 1000 Cycles | 3/231/0 | 3/231/0 | - |
| TC | A4.2.1 | - | 3 | 22 | SAM Analysis, post TC, 2X | Review for delamination | Completed | 3/66/0 | 3/66/0 | - |
| TC | A4.2.2 | - | 3 | 1 | Cross Section, post TC, 2X | Post stress cross section | Completed | 3/3/0 | 3/3/0 | - |
| TC | A4.2.3 | - | 3 | 3 | Wire Bond Shear, post TC, 2X | Post stress | - | 3/9/0 | 3/9/0 | - |
| TC | A4.2.4 | - | 3 | 3 | Bond Pull over Stitch, post TC, 2X | Post stress | - | 3/9/0 | 3/9/0 | - |
| TC | A4.2.5 | - | 3 | 3 | Bond Pull over Ball, post TC, 2X | Post stress | - | 3/9/0 | 3/9/0 | - |
| PTC | A5.1 | JEDEC JESD22-A105 | 1 | 45 | PTC | -40/125C | 1000 Cycles | - | 1/45/0 | - |
| PTC | A5.2 | JEDEC JESD22-A105 | 1 | 45 | PTC | -40/125C | 2000 Cycles | - | 1/45/0 | - |

| Type | # | Test Spec | Min Lot Qty | SS / Lot | Test Name | Condition | Duration | Qual Device: BQ79616PAPRQ1 | QBS Reference: BQ79616PAPRQ1 | QBS Reference: BQ79616PAPRQ1 |
|------|--------|-------------------|-------------|----------|-------------------------------|---------------------------|------------|----------------------------|------------------------------|------------------------------|
| HTSL | A6.1 | JEDEC JESD22-A103 | 3 | 45 | High Temperature Storage Life | 150C | 1000 Hours | 3/135/0 | 3/135/0 | - |
| HTSL | A6.1.1 | - | 3 | 1 | Cross Section, post HTSL, 1X | Post stress cross section | Completed | 3/3/0 | 3/3/0 | - |
| HTSL | A6.2 | JEDEC JESD22-A103 | 3 | 44 | High Temperature Storage Life | 150C | 2000 Hours | 3/135/0 | 3/135/0 | - |
| HTSL | A6.2.1 | - | 3 | 1 | Cross Section, post HTSL, 2X | Post stress cross section | Completed | 3/3/0 | 3/3/0 | - |

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 | 3/90/0 | 3/90/0 | 1/30/0 |
| WBP | C2 | MIL-STD883 Method 2011 | 1 | 30 | Wire Bond Pull | Minimum of 5 devices, 30 wires Cpk>1.67 | Wires | 3/90/0 | 3/90/0 | 1/30/0 |

- QBS: Qual By Similarity, also known as Generic Data
- Qual Device BQ79616PAPRQ1 is qualified at MSL3 260C

- 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

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- Grade 1 (or Q): -40C to +125C
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- 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/>

TI Qualification ID: R-CHG-2409-073

[1]-QEM-EVAL-2009-00336: Discounted. Assembly die attach process issue process optimized to avoid re-occurrence.

ZVEI ID's: SEM-PW-12

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

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