**TEST**

**PRODUCT**

**QUALIFICATION**

**REPORT**

**TITLE:**

LT8611 Test Site Transfer from Analog Devices Singapore to UTAC Thailand

**PCN Number:**

PCN

**REVISION:**

A

**DATE:**

04 Sep, 2020

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**PROJECT BACKGROUND:**

The LT8611 is currently undergoing production testing at the Analog Devices Singapore (ADSG). As ADSG is closing in Apr2021, it is a business strategic decision to qualify UTAC Thailand (UTL) to be test site to ensure continuity in supply.

 **SUMMARY:**

The LT8611 is a compact, high efficiency, high speed synchronous monolithic step-down switching regulator that consumes only 2.5μA of quiescent current. Top and bottom power switches are included with all necessary circuitry to minimize the need for external components. The built-in current sense amplifier with monitor and control pins allows accurate input or output current regulation and limiting. Low ripple Burst Mode operation enables high efficiency down to very low output currents while keeping the output ripple below 10mVP-P. A SYNC pin allows synchronization to an external clock. Internal compensation with peak current mode topology allows the use of small inductors and results in fast transient response and good loop stability. The EN/UV pin has an accurate 1V threshold and can be used to program VIN undervoltage lockout or to shut down the LT8611 reducing the input supply current to 1μA. A capacitor on the TR/SS pin programs the output voltage ramp rate during start-up. The PG flag signals when VOUT is within ±9% of the programmed output voltage as well as fault conditions.

This report documents the successful completion of the product test transfer requirements for the release of LT8611 in UTAC Thailand.

**TEST AND PRODUCT INFORMATION:**

Device: LT8611

 Package: QFN (3mm x 5mm)

 Leads: 24 leads

|  |  |
| --- | --- |
| Generics | FGs |
| LT8611 | LT8611EUDD#TRPBF |
| LT8611EUDD#PBF |
| LT8611IUDD#TRPBF |
| LT8611IUDD#PBF |

 Affected products:

Tester Platform: ETS364B

 Handler: RASCO1000

The LT8611 is planned to be tested in UTAC Thailand using exactly same test design as ADSG, details shown in the Table 1 below:

***Table 1****: LT8611 Test Details*

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameters** | **ADSG** | **UTL** | **Remarks** |
| Tester Platform | ETS364B | ETS364B | No change |
| Handler | RASCO1000 | RASCO1000 | No Change |
| Test Flow | FT – QAR – QAH - QAC | FT – QAR – QAH - QAC | No Change |
| Contactor | 24L JTI socket D#5701 | 18L JTI socket D#5701 | No Change |
| Performance Board | LT8611 DIB | LT8611 DIB | No change |
| Test Program | LT8611\_03 | LT8611\_03 | No change |

There is no change to the form, fit and function of the product.

**DESCRIPTION AND TEST RESULTS:**

Below tables provide description of the qualification tests conducted and corresponding test results for LT8611. All the units have undergone electrical tests on both the sending and receiving sites on the same test platform. Any device that will not meet the electrical qualification requirements will mean failure of the qualification and require solid corrective actions and a repeat of the qualification process. Qualification activities performed, and acceptance criteria is shown on Table 2 below:

**Table 2:** *Qualification Activities and Acceptance Criteria*

|  |  |  |
| --- | --- | --- |
| **Qualification Activity** | **Sample Quantity** | **Accept Criteria** |
| Correlation device run | 5 correlation device units | \*100% Passing correlation devices  |
| Parametric Correlation | Minimum of 300 known Bin1 units tested in full product test flow (ALL temperature passes) in Sending site (ADSG) and Receiving site (UTL). | \*CpK≥1.67\* For tightened limits, Mean Shift Criteria and sigma-spread criteria to apply- Mean Shift Criteria  (ABS (SS\_mean - RS\_Mean) / Limit Range ) x 100 ≤ 5%- Sigma-spread criteria (RS\_Sigma / SS\_Sigma ) ≤ 1.3 |
|
| Validation Lot Run | Minimum of 2,500 fresh units in full product test flow (ALL temperature passes)  | yield between receiving site vs. historical yield of sending site should be comparable |
| Untrimmed/Fresh unit verification using QA program | 5 Fresh (Untrimmed) unit tested in QA Program. | QC program must detect untrimmed or fresh parts |
| GR&R | 10 Bin 1 units tested on 1 board and 3 testers |  |
| R&R % =<10% |
|  |

*\*SS = Sending Site \* RS = Receiving Site*

To validate full set-up functionality such as hardware, software, test paraphernalia and tester platform, 5 correlation devices of LT8611 were tested both in ADSG and UTL. Data between sites were analyzed and summarized in Table 3.

**Table 3:** *Correlation Device Run result*

|  |  |  |  |
| --- | --- | --- | --- |
| Generic | Package | No. of correlation device | ALL correlation devices passed? |
| LT8611 | 24L QFN | 5 units | YES |

The LT8611 was further analyzed by testing a sample of minimum 300 known-good-units in both ADSG and UTL. This is to capture variation in tester and set-up condition thru mean shift and sigma spread analysis, to ensure the parameter measurement are still within the accepted range of variations. Data between sites were analyzed and summarized in Table 4.

**Table 4:** *Product Site Transfer Correlation*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Temperature | Generic | Package | Lot Number | Lot Size | Sending Site | Receiving Site | Total No. of Correlation Parameters | Result |
| Ambient | LT8611 | 24L QFN | 1000536.1 | 310 | ADSG | UTL | 206 | ALL PASSED |
| Hot | LT8611 | 24L QFN | 1000536.1 | 310 | ADSG | UTL | 206 | ALL PASSED |
| Cold | LT8611 | 24L QFN | 1000536.1 | 310 | ADSG | UTL | 206 | ALL PASSED |

The LT8611 was qualified by running a validation lot with minimum 2,500 units in UTL and was compared to ADSG historical yield. Comparison result is summarized in Table 5.

**Table 5:** *Manufacturing Validation Lot Run*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Generic | Package | FT lot number | Lot Size | Test Site | lot yield comparison between ADSG and UTL |
| LT8611 | 24L QFN | 5004130.1 | 12574 | UTL | Matched |

To ensure QA Program does not trim untrimmed/fresh parts, samples of untrimmed or fresh parts were tested using QA Program. Results were analyzed and summarized in Table 6.

**Table 6:** *Untrimmed/Fresh unit verification using QA program*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Generic | Package | Lot Number | No. of Untrimmed/Fresh units tested on QC program | QA Program detected untrimmed or fresh parts? |
| LT8611 | 24L QFN | 1000536.1 | 5 | YES |

GR&R was performed on UTL ETS364 ATEs using a switcher product representative LT8614 to confirm tester repeatability and reproducibility performance, 10 serialized units were repeatedly tested on 1 test board and 3 test systems. GR&R result was analyzed and summarized in Table 7.

**Table 7:** *GR&R Result*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Generic | Package | Lot Number | No. of Units | No. of Test Boards | No. of Testers | All parameters passed R&R % =<10%? |
| LT8614 | 18L QFN | 1012692.1 | 10 | 1 | 3 | Yes – ALL PASSED |

**APPROVALS:**

Technical Review Board No. TRB-61507- ADSG to UTL Test Transfer

**ADDITIONAL INFORMATION:**

Homepage: <https://www.analog.com/en/index.html>

Customer Service: <https://www.analog.com/en/support/technical-support.html>