# CHANGE NOTIFICATION

Linear Technology Corporation
1630 McCarthy Blvd., Milpitas, CA 95035-7417
(408) 432-1900

July 30, 2014

Dear Sir/Madam: PCN# 073014

**Subject: Notification of Additional Assembly Location, ASE Korea for LTM4616**

Please be advised that Linear Technology Corporation has successfully qualified ASE Korea as an assembly site for the subject packages. It was desirable to qualify ASE Korea to serve as an alternate source since it is located in a different geographic area than our existing assembly location in Penang, Malaysia. ASE Korea is ISO9002, QS9000, ISO14001, TS16949, OHSAS 18001 and QC80000 certified. A summary of ASE Korea's product mix and LTC's qualification results are shown on the attached pages. The facility passed a site audit by LTC's supplier quality organization. LTC product assembled in ASE Korea can be identified by the country of origin marked on the device as "KR". The product photo showing the ASE Korea marking is attached. The Approximate datecode of the first units assembled by ASE Korea, and the list of affected part numbers is presented below in the table.

| Part Number | Part Marking | Package Type | Datecode (Approx.) |
|---|---|---|---|
| LTM4616EV#PBF | LTM4616V | LGA | 1414 |
| LTM4616IV#PBF | LTM4616V | LGA | |

In addition, a minor change to the internal package construction was made on this device in order to facilitate the use of one attach material for both die and components. The die attach material is changed from epoxy to solder, which is already used for attaching components in the same µModule device package. In order to use the solder die attach, the die attach paddle (DAP) has been modified by splitting the DAP into multiple pads for dice U1 and U2. Linear has been shipping several µModule devices using solder for die attach and component attach.

Parts incorporating the new substrate design have been fully characterized and tested for package level reliability. The change was qualified by performing extensive characterization over the full operating voltage and temperature ranges and MSL3 preconditioning. Devices from the same µModule device product family have been subjected to 1000 cycles of temperature cycles and thermal shock. Linear Technology performs reliability testing on production lots in accordance with our Quick Reaction Reliability (QR2) Monitor Program. This monitor program is designed to provide fast feedback for possible reliability problems associated with package assembly.
Please provide an expeditious approval to this PCN, so that LTC can build subject packages at ASE.

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Should you have any concerns, please contact me before September 30, 2014, at which time we will consider this change to be approved. If you have any questions or concerns, please feel free to contact me at (408) 432-1900 ext. 2077 or by e-mail at JASON.HU@LINEAR.COM.

Sincerely,

Jason Hu
Quality Assurance Engineer

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**ASE Korea Capacity Summary**

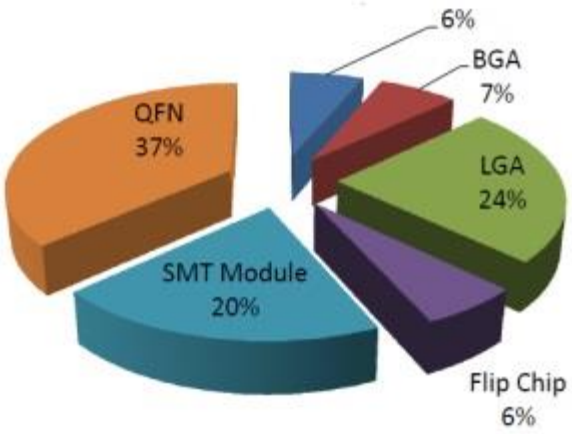
ASE Korea
76, Saneopdanji-gil, Paju-si,
Gyeonggi-do, Korea
Tel: 82-31-9400-114, 82-31-9400-539
Head counts: 2,791

# Package Portfolio - Breakdown

ASE GROUP

- Analog Power for Automotive
- RF for digital/consumer
- MEMS for safety
- Array Packages

## 2013 Production Mix by Package

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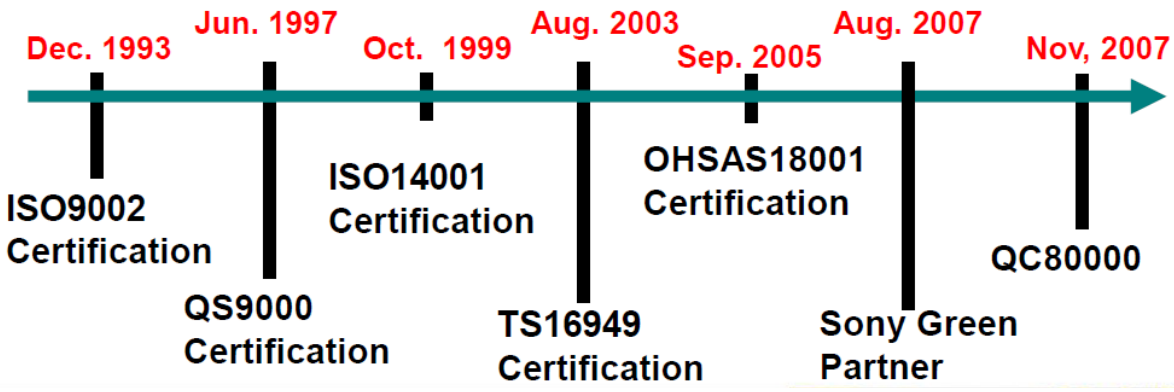
# Quality System Certification

ASE GROUP

- ISO9002 certified by SGS-Yarsely in December 1993.
- QS9000 certified by LRQA in June 1997
- ISO14001 certified by LRQA in October 1999
- TS16949 certified by LRQA in August 2003
- OHSAS18001 certified by KFQ in September 2005
- Sony Green Partner certified by Sony in August 2007
- QC80000 certified by SGS in November 2007

*Surveillance Audit : Every 6 Months

--- Assessment History----------

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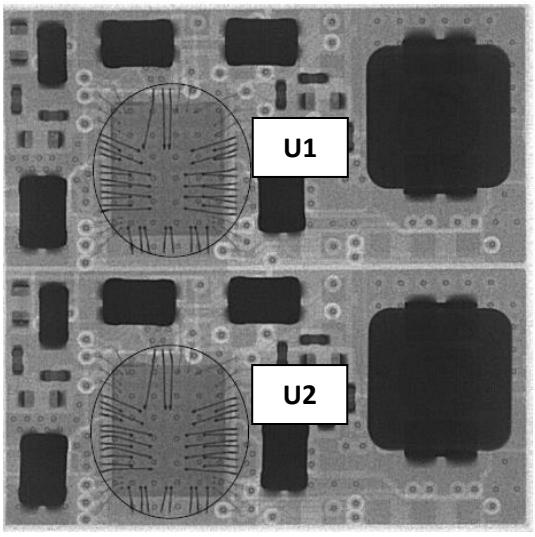
**Country of Origin on Top Mark**

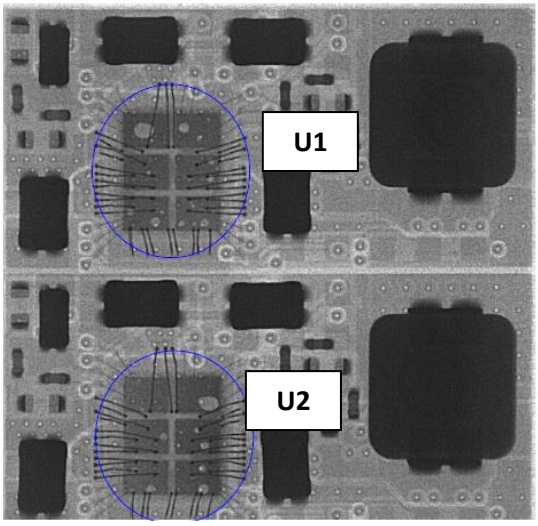

**Before**

LTM4616-EPOXY DIE ATTACH




**After**

LTM4616-SOLDER DIE ATTACH

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# PACKAGE RELIABILITY DATA
## LTM4616 / LTM4619 / LTM8023 / LTM8032
## ASE ASSEMBLY SITE QUALIFICATION

**7/8/2014**

**• J-STD-020 MSL 3 PRECONDITIONING: 192h +30°C/60%R.H. SOAK, 3x REFLOW AT +245°C PEAK**

| DEVICE TYPE | SAMPLE SIZE | OLDEST DATE CODE | NEWEST DATE CODE | | NUMBER OF FAILURES |
|---|---|---|---|---|---|
| LTM4616 | 231 | 1414 | 1414 | | 0 |
| LTM4619 | 231 | 1411 | 1411 | | 0 |
| LTM8023 | 385 | 1411 | 1411 | | 0 |
| LTM8032 | 385 | 1411 | 1411 | | 0 |
| | 1,232 | | | | 0 |

**• TEMP CYCLE FROM -55°C to +125°C [1]**

| DEVICE TYPE | SAMPLE SIZE | OLDEST DATE CODE | NEWEST DATE CODE | K DEVICE CYCLES | NUMBER OF FAILURES |
|---|---|---|---|---|---|
| LTM4616 | 77 | 1414 | 1414 | 38.50 | 0 |
| LTM4619 | 77 | 1411 | 1411 | 38.50 | 0 |
| LTM8023 | 77 | 1411 | 1411 | 38.50 | 0 |
| LTM8032 | 77 | 1411 | 1411 | 38.50 | 0 |
| | 308 | | | 154.00 | 0 |

**• TEMP CYCLE FROM -65°C to +150°C [1]**

| DEVICE TYPE | SAMPLE SIZE | OLDEST DATE CODE | NEWEST DATE CODE | K DEVICE CYCLES | NUMBER OF FAILURES |
|---|---|---|---|---|---|
| LTM8023 | 77 | 1411 | 1411 | 38.50 | 0 |
| LTM8032 | 77 | 1411 | 1411 | 77.00 | 0 |
| | 154 | | | 115.50 | 0 |

**• THERMAL SHOCK FROM -55°C to +125°C [1]**

| DEVICE TYPE | SAMPLE SIZE | OLDEST DATE CODE | NEWEST DATE CODE | K DEVICE CYCLES | NUMBER OF FAILURES |
|---|---|---|---|---|---|
| LTM4616 | 74 | 1414 | 1414 | 37.00 | 0 |
| LTM4619 | 77 | 1411 | 1411 | 77.00 | 0 |
| LTM8023 | 77 | 1411 | 1411 | 77.00 | 0 |
| LTM8032 | 77 | 1411 | 1411 | 38.50 | 0 |
| | 305 | | | 229.50 | 0 |

**• THERMAL SHOCK FROM -65°C to +150°C [1]**

| DEVICE TYPE | SAMPLE SIZE | OLDEST DATE CODE | NEWEST DATE CODE | K DEVICE CYCLES | NUMBER OF FAILURES |
|---|---|---|---|---|---|
| LTM8023 | 77 | 1411 | 1411 | 77.00 | 0 |
| LTM8032 | 77 | 1411 | 1411 | 77.00 | 0 |
| | 154 | | | 154.00 | 0 |

**• HIGH TEMPERATURE STORAGE +150°C**

| DEVICE TYPE | SAMPLE SIZE | OLDEST DATE CODE | NEWEST DATE CODE | K DEVICE HOURS AT +150°C | NUMBER OF FAILURES |
|---|---|---|---|---|---|
| LTM4616 | 77 | 1414 | 1414 | 38.50 | 0 |
| LTM4619 | 77 | 1411 | 1411 | 77.00 | 0 |
| LTM8023 | 77 | 1411 | 1411 | 77.00 | 0 |
| LTM8032 | 77 | 1411 | 1411 | 77.00 | 0 |
| | 308 | | | 269.50 | 0 |

**• UNBIASED HIGHLY ACCELERATED STRESS TEST +130°C/85% R.H. [1]**

| DEVICE TYPE | SAMPLE SIZE | OLDEST DATE CODE | NEWEST DATE CODE | K DEVICE HOURS AT +130°C | NUMBER OF FAILURES |
|---|---|---|---|---|---|
| LTM4616 | 77 | 1411 | 1411 | 3.70 | 0 |
| | 77 | | | 3.70 | 0 |

**• UNBIASED TEMPERATURE/HUMIDITY STORAGE TEST +85°C/85% R.H. [1]**

| DEVICE TYPE | SAMPLE SIZE | OLDEST DATE CODE | NEWEST DATE CODE | K DEVICE HOURS AT +85°C | NUMBER OF FAILURES |
|---|---|---|---|---|---|
| LTM8023 | 77 | 1411 | 1411 | 38.50 | 0 |
| LTM8032 | 77 | 1411 | 1411 | 38.50 | 0 |
| | 154 | | | 77.00 | 0 |

(1) Environmental stress are preceded by J-STD-020 Level 3 Preconditioning: 192h 30°C/60% R.H. soak, followed by 3x Reflow at 245°C.

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