

### Quality and Reliability Assurance Programs

Linear Technology Corporation (LTC) has a wide-ranging program integrating vendor participation, design engineering, and manufacturing to produce the most reliable and highest quality linear integrated circuits available on the market. Our modern manufacturing facility in Milpitas, California is DESC Class S and Class B line certified; MIL-I-38535 QML transitional certified, and ISO 9001 certified. We have successfully completed over 90 major OEM quality system surveys to MIL-Q-9858 and MIL-I-45208 including achieving several major customer quality awards. Our Quality and Reliability Assurance Programs are summarized below:

- **Wafer Fabrication** — A modern class 100 area modular clean room construction with full environmental monitors. Emphasis is placed on statistical process control, CV plots, SEM monitors and on our proprietary dual layer passivation system.
- **SPC (Statistical Process Control)** — LTC is committed to SPC as the cornerstone of our continuous quality improvement and Total Quality Management System (TQMS) programs. SPC is fully implemented in all manufacturing areas.
- **Assembly and End of Line** — Incoming inspection of all materials and piece-parts, line surveillance and process control monitors.
- **Testing** — Incoming inspection and acceptance of all offshore lots prior to release to test. LTX and Eagle testers, multipass testing with closed-loop binning to reduce outgoing electrical defective levels. Many “beyond data sheet” tests and full temperature QA lot buy-offs are performed as standard processing.
- **Traceability** — A backside or side mark is placed on all units, where space permits, to give information on each unit to identify the wafer fab lot, assembly, end of line (e.o.l.) and test lots. The information provided exceeds the seal week traceability control required by MIL-STD-883.
- **ESD (Electrostatic Discharge)** — A full program is in place from design through manufacturing. Products are fully characterized to MIL-STD-883 (Method 3015) and strict controls on handling and packaging are observed.
- **Training and Certification** — Operator training has been established for all operations and recertification is performed every 6 months.
- **Major Change Control** — Major change controls are in place to notify our customers in accordance with MIL-I-38535, LTC internal specifications, or specific customer specifications as required.
- **Quality Assurance** — Full monitoring and reporting of quality data with emphasis on Statistical Process Control (SPC) charts and continuous quality improvement. Refer to our section on Quality Assurance Program.
- **Failure Analysis and Reporting** — A full analytical lab and formal program exists to record, analyze and take appropriate corrective action on all returns. A report is generated and sent to the customer stating our findings and action.
- **Reliability Flows** — LTC reliability flows include Class S and Class B JAN-38510, Standard Military Drawings (SMD), DESC Drawings, 883, R-Flow, LTC proprietary Hi-Rel Radiation Hardened (RH) products, and Hi-Rel (Source Controlled Drawings). In addition, specialized processing such as SEM, PIND and other tests can be performed as required.
- **Reliability Monitor** — LTC has a unique reliability structure built into each wafer that is used to obtain rapid feedback on reliability. This data is obtained in less than one week, versus 40 weeks for a typical reliability audit. See the LTC Reliability Assurance Program for more details. LTC has a comprehensive Quick Reaction Reliability (QR<sup>2</sup>) monitor program for plastic packaged devices. A variety of tests are performed on every one-week date code, for every package type and lead count and real time feedback to the assembly facilities.
- **Reliability Reporting** — Data is gathered on a monthly basis for selected process technology/product family/package combinations. This data is summarized each quarter and published in a Reliability Data Pack showing Operating Life, 85/85, HAST, Autoclave, Temperature Cycle, Thermal Shock, 883 Group C, and 883 Group D summary data. Copies of Reliability Data Pack summaries are available by writing or calling Linear Technology Corporation, 1630 McCarthy Blvd., Milpitas, CA 95035. 1-800-4-LINEAR (1-800-454-6327).

# INTRODUCTION

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