Summary: MTBF Prediction for Technologic Systems TS-7250-V2 (TELC3)

Report Date: 11/9/2018

Note: Technologic Systems, Inc. assumes no liability for the use of the information provided in this report.

MTBF Calculation Methodology:

The MTBF prediction calculation was performed using the RelCalc V5.1-TELC3 software, which implements the Telcordia SR-332 (Issue 3) failure rate models. The BOM was imported from file "UT-7250-V2-512-8S-I_B04". It is assumed that any component failure results in a system failure (i.e., no redundancy).

The calculation was done with the following assumptions:

1. Operating internal chassis temperature=30C (assume temp across PCB is relatively constant).
2. Telcordia environment = GB. The Telcordia definition for GB is Ground, Fixed, Controlled: Vibration/Shock stresses: Low; Atmospheric variations: Low; Temperature cycling stresses: Low; Application examples: Central office, data center, environmentally controlled vaults, environmentally controlled remote shelters, and environmentally controlled customer premise areas.
3. Each part's operating current/voltage/power stress = 50%.
4. Each IC or semiconductor part's operating power = typical data sheet value.
5. Calculate using the 90% UCL (Upper confidence Level) Telcordia Issue 3 model.
6. Each part's Telcordia Quality Level = II.

Note: The Telcordia SR-332 (Issue 3) definition for Quality Level = II: (a) steps must have been taken to ensure that the components are compatible with the design application and manufacturing process; (b) an effective feedback and corrective action program must be in place to identify and resolve problems quickly in manufacturing and in the field; (c) purchase specifications must explicitly identify important characteristics (electrical, mechanical, thermal and environmental) and acceptable quality levels (i.e., AQLs, Defects Per Million [DPMs], etc.) for lot control; (d) devices and device manufacturers must be qualified and identified on approved parts/manufacturers lists (device qualification must include appropriate life and endurance tests); (e) lot-to-lot controls, either by the equipment manufacturer or the device manufacturer, must be in place at adequate AQLs/DPMs to ensure consistent quality.

Where possible, manufacturer failure rate data was used. Where this data was not specifically available, data for similar parts was substituted and a correction factor (CF)

was adjusted to provide a more conservative estimate and a more realistic value. Detailed information to be provided in the Notes Report (notes-report.pdf).

Calculation Results at GB/30C/QuLev-II:

- Parts = 386
- Failure Rate = 314.36 FITs (FITs = failures per billion hours)
- MTBF = 3181098.75 hours

Reports and Graphs:

The following documents were generated for this report:

- Short-Report.pdf: short format report of calculation results.
- Graph-MTBF-vs-Temp.pdf: graphs MTBF vs Temperature, 0C to +90C, step 5C (at Env = GB)
- Graph-Reliability-vs-Time.pdf: graphs Reliability vs Time 0-100K Hours, step 10K Hours (at GB/30C).
- Note: Reliability is the probability that the system will operate without failure for the given time. Note that the time is actual device operating time, not calendar time. Note: the Reliability calculation assumes replacement upon failure.

Important Note:

The failure rate models used for this prediction are idealized models that predict device hardware failures, and do not include system failures that may be caused by: design errors; manufacturing process errors (eg, solder joints, wiring, assembly, etc); software failures; transient failures caused by power supply fluctionstions, external magnetic or electric fields, etc; transient failures from soft errors due to alpha particles, cosmic radiation, or charge loss; failure due to operator usage errors or abuse in the field; etc. Technologic Systems makes no claims regarding the accuracy of this prediction and specifically disclaims all liability for loss or damages of any kind resulting from any use of this prediction by any party.

MTBF-vs-Temp Graph:
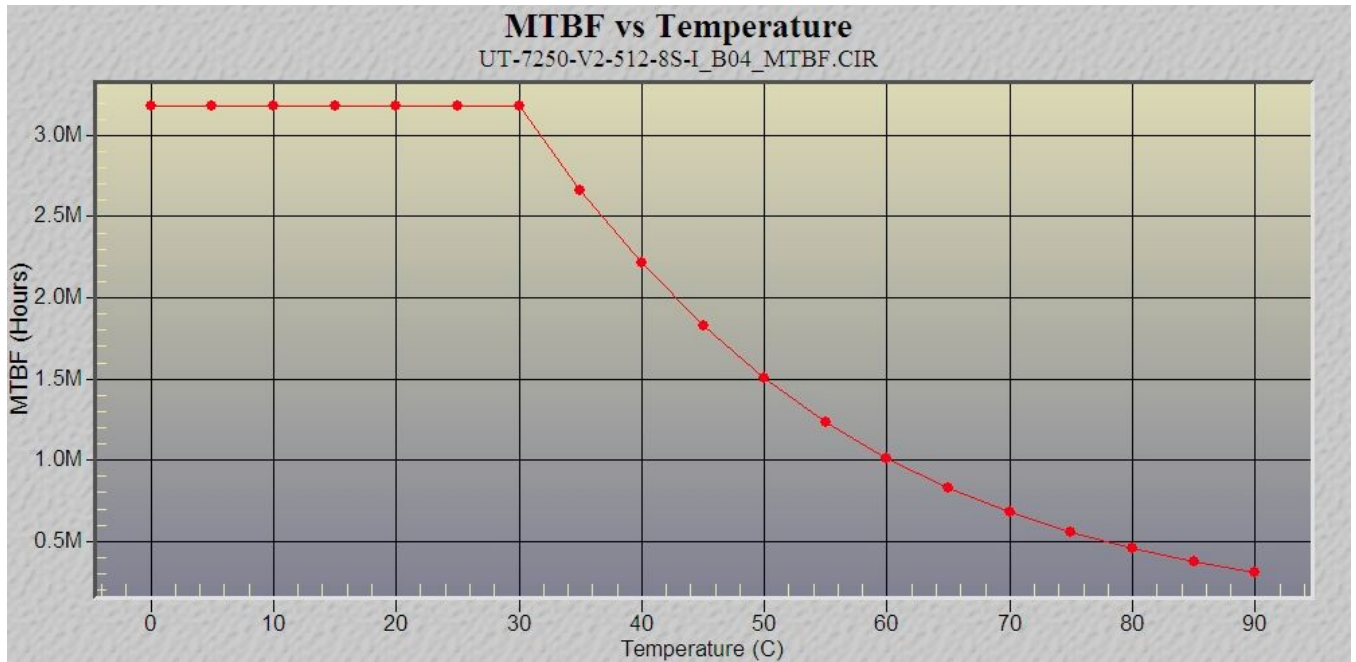
Reliability-vs-Time Graph:
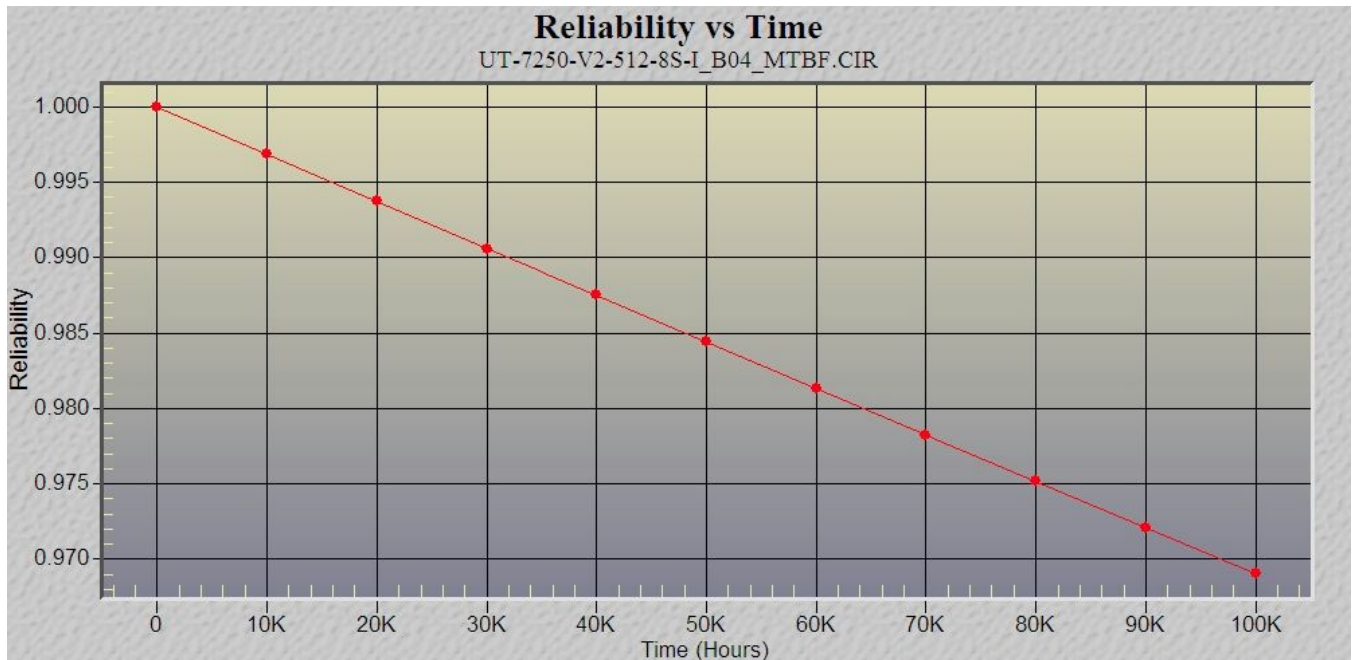
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