Discrete Semiconductors Reliability

This section describes reliability related to the factors established in the Scope section of this document/database. Use this section for reliability requirements of Discrete Semiconductors.

Discrete Semiconductor Probability

The Reliability Prediction of Electronic Handbook, MIL-HDBK-217F Notice 2, is used as the guideline for establishing the probability for Discrete Semiconductors. This handbook is still the best tool to use when establishing probability for these type parts.

Discrete Semiconductor Performance

Since the military allows the use of non-military parts in its systems, the risk to satisfactory operation has increased dramatically. Discrete semiconductors are usually employed in key application functions. Observing temperature ratings and the ability to dissipate heat from such parts are critical to maintaining function. Using non-military parts involves a trade-off between their material and construction, and their durability. Lower quality material typically raises the parts' temperature and poorer construction inhibits efficient heat dissipation. The combination of these two characteristics has the net effect of reducing part reliability and expected life. To operate at a performance level satisfactorily, use QML-19500 manufacturers and JANTX level parts, as a minimum.

Discrete Semiconductor Life (Time)

The environmental categories described in detail in the Scope section of this document/database categorize part life as being either 5, 10, or 20 years. The derating recommendations in Discrete Semiconductor Derating section take part quality levels and application environments into account. This will assist the designer in selecting the correct part for the application. The only parts designed to last over 5 years and up to 20 years are QML-19500 parts.

Discrete Semiconductor Operating Conditions

Military (QML) parts are designed to withstand the extreme environmental conditions of military applications whereas non-military parts are designed for much lower environmental levels. Temperature, shock, and vibration are the most important environmental conditions; moisture is less so due to the typically smaller package size. Even in a low vibration or shock application, a poorly

bonded non-military part can fail causing a catastrophic failure. Assessment of non-military parts and/or an evaluation of the manufacturer is recommended for risk reduction.