

Discrete Semiconductors Part Assessment

This section describes qualification and monitoring requirements for Discrete Semiconductors. Use this section for Discrete Semiconductor qualification or monitoring requirements.

General

Test conditions and methods

For testing, use MIL-STD-750 or equivalent JESD22 Test Methods. Other test methods or circuits may be substituted if such a substitution in no way relaxes the requirements.

Eliminate or reduce test

When a part manufacturer elects to eliminate or reduce a test or 100% screen, by substituting a process monitor or SPC, they are only relieved of the responsibility of performing the test or 100 % screen. They are still responsible for providing a product that meets the performance, quality, and reliability requirements for the application. A part reliability program (study) can replace all or any screening step or conformance inspection, when equivalent to or compliant with application reliability requirement.

End-point electrical measurements

Measure and record applicable (e.g., if deltas are required) end-point electrical measurements. Replace pre-test end point failures with acceptable parts. Perform end-point measurements before 96 hours unless specified.

Rework

Rework of sealed packages shall be limited to re-cleaning, re-branding to correct defective marking and lead straightening, re-plating or re-solder dipping of the leads. After any re-plating, devices shall pass as a 100 percent screen the requirements of Group A, subgroup 2 (DC static-tests at 25°C) and the hermetic seal requirements (fine/gross leak) of MIL-PRF-19500 and MIL-STD-750. In addition, rework shall be limited to the following for wafers: additional etch to correct a nonconformance to a specification limit; photoresist strip and recoat; additional processing to continue or finish incomplete processing; strip and redeposit of non-junction passivation or backside metallization.

Die and Chips

Die and chips used in “normal” or “severe” environments shall meet the minimal requirements for the JANHC level of QML-19500.

Part Monitoring

Parts used in the “normal” and “severe” environment shall have conformance testing or equivalent monitoring performed. Non-military parts shall meet the MIL-PRF-19500 and/or the minimum application requirement. Recommend using process control monitors for test and screen elimination. The manufacturer shall have a process that meets or exceeds the requirements of groups A, B, and C of MIL-PRF-19500.

Part Qualification

When designing-in and/or qualifying Discrete Semiconductors for “normal” or “severe” environments use the MIL-PRF-19500, JANTX level, as a minimum. Qualification requirements for Plastic Discrete Semiconductors are in Table 1. Plastic parts used in the “normal” environment shall pass the requirements in Table 1, as a minimum.

Table 1. Qualification Requirements for Plastic Discrete Semiconductors

Inspection	Test Condition
1. Construction Analysis	Sample 1 each
2. Moisture Sensitivity Classification (very small/thin surface mount packages only)	J-STD-020
3. a. External visual b. Pre electrical test including thermal impedance c. Preconditioning	Monitor for electrical failure and electrical and thermal delta shifts JESD-22-A113A or

<p>d. Post electrical test including thermal impedance</p> <p>4A.</p> <p>a. External visual</p> <p>b. Pre electrical test including thermal impedance</p> <p>c. Temperature Cycling (TC)</p> <p>d. External visual</p> <p>e. Pre electrical test including thermal impedance</p> <p>4B.</p> <p>a. External visual</p> <p>b. Pre electrical test including thermal impedance</p> <p>c. Highly Accelerated Stress Testing (HAST) or equivalent</p> <p>d. External visual</p> <p>e. Pre electrical test including thermal impedance</p> <p>5. Perform failure analysis on all defects and anomalies</p>	<p>equivalent</p> <p>Monitor for electrical failure and electrical and thermal delta shifts</p> <p>Monitor for electrical failure and electrical and thermal delta shifts.</p> <p>500 cycles, -65°C to +150°C</p> <p>Monitor for electrical failure and electrical delta shifts</p> <p>Monitor for electrical failure and electrical and thermal delta shifts.</p> <p>JESD22-A110-A</p> <p>Monitor for electrical failure and electrical and thermal delta shifts</p>
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