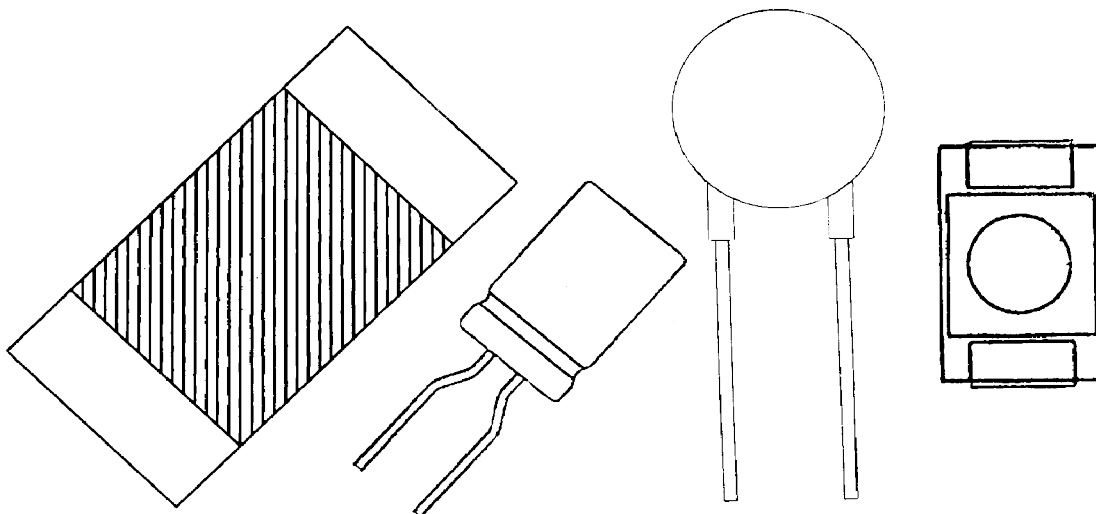


# **STRESS TEST QUALIFICATION FOR PASSIVE COMPONENTS**



**Automotive Electronics Council**  
Component Technical Committee

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## STRESS TEST QUALIFICATION FOR PASSIVE ELECTRICAL DEVICES

### 1.0 SCOPE

#### 1.1 Description

This specification defines the minimum stress test driven qualification requirements and references test conditions for qualification of passive electrical devices. This document does not relieve the supplier of their responsibility to meet their own company's internal qualification program or meeting any additional requirements needed by their customers. In this document, "user" is defined as all companies that adhere to this document. The user is responsible to confirm and validate all qualification and assessment data that substantiates conformance to this document.

##### 1.1.1 Definition of Stress-Test Qualification

Stress-Test "Qualification" is defined as successful completion of test requirements outlined in this document. The minimum temperature range required for each passive electrical component type is listed below (maximum capability) as well as example applications typical of each grade (application specific):

GRADE	TEMPERATURE RANGE		PASSIVE COMPONENT TYPE Maximum capability unless otherwise specified and qualified	TYPICAL/EXAMPLE APPLICATION
	MINIMUM	MAXIMUM		
0	-50°C	+150°C	Flat chip ceramic resistors, X8R ceramic capacitors	All automotive
1	-40°C	+125°C	Capacitor Networks, Resistors, Inductors, Transformers, Thermistors, Resonators, Crystals and Varistors, all other ceramic and tantalum capacitors	Most underhood
2	-40°C	+105°C	Aluminum Electrolytic capacitors	Passenger compartment hot spots
3	-40°C	+85°C	Film capacitors, Ferrites, R/R-C Networks and Trimmer capacitors	Most passenger compartment
4	0°C	+70°C		Non-automotive

Qualification of the noted device type to its minimum temperature grade allows the supplier to claim the part as "AEC qualified" to that grade and all lesser grades. Qualification to temperatures less than the minimum specified above would allow the supplier to claim the part as "AEC qualified" at the lower grade only.

Determining the temperature grade of a passive component type or an application not mentioned above should be agreed to between the supplier and user.

##### 1.1.2 Approval for Use in an Application

"Approval" is defined as user approval for use of the part being qualified in the intended application along with any applicable supplements and compliance to any applicable user packaging specification. The user's method of approval is beyond the scope of this document.

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**1.2 Reference Documents**

Current revision of the referenced documents will be in effect at the date of agreement to the qualification plan. Subsequent qualification plans will automatically use updated revisions of these referenced documents.

**1.2.1 Military/EIA**

- |                |   |
|----------------|---|
| 1. EIA-469     | Destructive Physical Analysis (DPA)   |
| 2. MIL-STD-202 | Test Methods for Electronic and Electrical Parts  |
| 3. EIA-198     | Ceramic Dielectric Capacitors Classes I,II,III,IV   |
| 4. EIA-535     | Tantalum Capacitors   |
| 5. J-STD-002   | Solderability Spec  |
| 6. JESD22      | JEDEC Standard  |
| 7. MIL-PRF-27  | Test Methods for Inductors/Transformers   |
| 8. JESD201     | Environmental Requirements for Tin Whisker Susceptibility of Tin and Tin Alloy Surface Finishes |
| 9. JESD22-A121 | Test Method for Measuring Whisker Growth on Tin and Tin Alloy Surface Finishes                  |

**1.2.2 Industrial**

- |                     |   |
|---------------------|---|
| 1. UL-STD-94        | Test for Flammability of Plastic Materials      |
| 2. ISO-7637-1       | Road Vehicle Electrical Disturbance             |
| 3. IEC ISO/DIS10605 | ESD Human Body Model (modify Q200-002)          |
| 4. iNEMI            | Recommendations for Pb-free Termination Plating |

**1.2.3 AEC**

- |                 |  |
|-----------------|--|
| 1. AEC-Q200-001 | Flame Retardance Test                    |
| 2. AEC-Q200-002 | ESD (Human Body Model) Test              |
| 3. AEC-Q200-003 | Beam Load (Break Strength) Test          |
| 4. AEC-Q200-004 | Polymeric Resettable Fuse Test           |
| 5. AEC-Q200-005 | Flame Retardance Test                    |
| 6. AEC-Q200-006 | Measurement Methods for Resettable Fuses |
| 7. AEC-Q200-007 | Voltage Surge Test                       |
| 8. AEC-Q005     | Pb-Free Test Requirements                |

**1.3 Glossary of Terms/Abbreviations**

- |        |  |
|--------|--|
| 1. AEC | AUTOMOTIVE ELECTRONIC COUNCIL                    |
| 2. ESD | ELECTROSTATIC DISCHARGE                          |
| 3. FIT | FAILURE IN TIME                                  |
| 4. DWV | DIELECTRIC WITHSTANDING VOLTAGE                  |
| 5. 8D  | DISCIPLINED APPROACH FOR PROBLEM SOLVING PROCESS |