ATC Commercial Off-the-Shelf (COTS) High Reliability Certification Program

A Cost Effective approach to qualifying standard products for enhanced reliability applications.

A Flexible program offering standard screening packages with options to support specifics of customer-driven program requirements.

Applications:
- Ruggedized Commercial (Medical, Industrial, Telecommunications)
- Military (Ground, Naval, Airborne)
- Space/Satellite
COTS initiatives have ignited a fast-growing industry of test labs specializing in up-screening of commercial products for Hi-Rel applications. Recognizing the need for this service, ATC offers its extensive test laboratory facilities for COTS upscreening in a well-defined, modular package. ATC COTS upscreening is faster and more cost-effective than that of general purpose commercial test laboratories.

An increasing number of users are seeking to further reduce costs by eliminating their own source control drawings where possible. In such instances a standard Hi-Rel screening offering from a supplier simply requires the user to identify the supplier’s Hi-Rel part number. Such standard offerings can be provided at substantially lower costs than those programs imposed by customized source control drawings.

ATC’s mature and knowledgeable test laboratory staff offer years of experience in high reliability testing, medical, military and aerospace quality conformance inspection and reliability programs.

As a supplier of high reliability products to the military, aerospace and telecommunications industry for over thirty years, ATC has participated in government programs for evaluation of HALT (Highly Accelerated Life Testing) as well as the development of reliability test requirements for MIL-PRF-55681 and MIL-PRF-123. During this time ATC has focused extensive work in the characterization of failure mechanisms in ceramic capacitors. Our experience in this field led us to develop a standard Hi-Rel Certification Package that is guaranteed to ensure a capacitor manufacturing lot or inspection lot is free of residual mechanisms for early failure.

The COTS Certification Package is designed to ensure that any infant mortality subpopulation is identified and weeded out. This screen is designed to be more effective than that of the military established reliability specification MIL-PRF-55681 and the space level specification MIL-PRF-123.

In performance-critical applications requiring ruggedized or certified components, ATC COTS up-screening is the answer.
ATC High Reliability Experience

ATC – The leader in High Performance RF Capacitors

ATC was the first company to obtain qualification listing to the high frequency specification sheets of MIL-PRF-55681. ATC products are known for their high power handling capability and reliability in mission critical applications.

The ATC 100 (BG) and 700 (BP) series capacitor chips are qualified to the “S” failure rate level. These products have been routinely and successfully used in space, satellite, military and telecommunication applications, where component failure cannot be tolerated.

The ATC standard catalog product is produced on the same manufacturing line as the ATC QPL product, with the identical procedures and controls. These are offered to you as high quality and high reliability COTS.

ATC’s Recommended Hi-Rel Certification Package “HA”

<table>
<thead>
<tr>
<th>P/N Prefix</th>
<th>Evaluation Operation</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA HB HC HD</td>
<td>Ultrasonic Screening †</td>
<td>100%</td>
</tr>
<tr>
<td>X X</td>
<td>Thermal Shock (5 Cycles for HC and 20 Cycles for HD)</td>
<td>100%</td>
</tr>
<tr>
<td>X X</td>
<td>Standard Hi-Rel Certification Package (HA)</td>
<td>100%</td>
</tr>
<tr>
<td>X X</td>
<td>Destructive Physical Analysis</td>
<td>see table*</td>
</tr>
<tr>
<td>X X</td>
<td>85/85 (Low Voltage Moisture Humidity)</td>
<td>13 units*</td>
</tr>
<tr>
<td>X X</td>
<td>Solderability (Solderable or Solder Coated Only)</td>
<td>5 units*</td>
</tr>
<tr>
<td>X X</td>
<td>Wire Bond Test (Gold Terminated Chips Only)</td>
<td>13 units*</td>
</tr>
<tr>
<td>X</td>
<td>Life Test (2000)</td>
<td>25 units*</td>
</tr>
</tbody>
</table>

* Additional sample units required that have passed the 100% testing along with the deliverable (flight) quantity.
† Not applicable to SLC’s or MLC’s of sizes 0603 and smaller.

DPA Sample Table

<table>
<thead>
<tr>
<th>Lot Size</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 500</td>
<td>14</td>
</tr>
<tr>
<td>501 - 10,000</td>
<td>32</td>
</tr>
<tr>
<td>10,001 - 35,000</td>
<td>50</td>
</tr>
<tr>
<td>35,001 -</td>
<td>80</td>
</tr>
</tbody>
</table>

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Standard Hi-Rel Certification Package (HA)

Voltage Conditioning (Burn-In) exposure per MIL-PRF-55681
with the following conditions:

1. Applied DC voltage: 200 % WVDC for WVDC’s of 500 or less
   120 % WVDC for WVDC’s of 1250 or less
   100 % WVDC for WVDC’s > 1250

   Burn-in duration shall be 100 hours, except where there are failures it may be extended up to
   300 hours.
   Burn-in shall be discontinued when 100 failure-free hours have been accumulated or when the
   PDA (Parts Defective Allowance) has been exceeded.

2. DWV: Applied DC voltage: 250 % WVDC for WVDC’s of 500 or less
   150 % WVDC for WVDC’s of 1250 or less
   120 % WVDC for WVDC’s > 1250

3. IR: Applied DC voltage: At WVDC, except above WVDC’s of 500 volts, the applied voltage shall be 500
   volts.

4. Capacitance and Dissipation Factor

5. Visual @ 20 X

6. The PDA for steps 1 through 5, shall be 3 percent and the time between failures must be increasing at the
   end of voltage conditioning.

7. The final fault-free 100-hour interval shall also verify that any prior observed TBF (Time Before Failure) is in-
   creasing.

MIL-PRF-123
Voltage conditioning per MIL-PRF-123 is established
at 168 hours minimum. It may be extended to 264
hours. The PDA is 3 percent and the last 48 hours of
burn-in must exhibit less than 1 unit or 0.1 percent
(whichever is greater) failed units.

NOTE: A decreasing failure rate is not certified.

MIL-PRF-55681
Voltage conditioning per MIL-PRF-55681 is estab-
lished at 100 hours. It cannot be extended. The PDA
is 8 percent.

NOTE: A decreasing failure rate is not certified.

Comparisons

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Manufacturing Process Flow

- BATCHING/CASTING
- LAMINATION
- DICING
- FIRING
- TERMINATION METALIZATION
- PLATING
- FINISHING
- TEST INSPECTION

Sample Analyses
- Capacitance Distribution
- Dissipation Factor
- Insulation Resistance
- Voltage Strength

Lot Qualification

COTS

COTS Up-Screening
CDR Quality
Conformance Inspection

SCD Customized
Hi-Rel Testing

Established Reliability
Program

CUSTOMER

CUSTOMER