

Aeroflex UTMC Application Note

Frequently Asked Questions Regarding QML T Screening

Introduction:

In order to bring high performance commercial products to the space community, Aeroflex UTMC Quantifies Commercial Off-The Shelf (QCOTS™) microelectronics for use in spaceborne electronics. This qualification testing verifies that the microelectronic components are: immune to charge particle induced latchup, charge particle induced upset, immunity to ionizing dose and proven reliability to space mission applications.

The following questions should further clarify QML T screening by Aeroflex UTMC of QCOTS™ microelectronic components.

Questions and Answers:

Question 1:)

I don't recognize or understand some of the operations listed on the flow, specifically what is: MA SEM, 2/O OPT, and 3rd OPT?

Answer 1:)

MA SEM = Material Analysis Scanning Electron Microscope. 2/O OPT = Second Optical Inspection. 3rd OPT = Third Optical Inspection.

Question 2:)

Why do you do 40 temp.cycles on class T and only 10 on class Q & S?

Answer 2:)

40 temp cycles are being used because we have less history with the die mechanical characteristics for products grouped under our class-T offering. This is a more conservative approach until a product has a greater production mechanical characteristics history.

Question 3:)

Why do you eliminate gross leak testing on class T , but not class Q ?

Answer 3:)

Any leaks would be found with a fine leak test. Gross leak is performed after a fine-leak test. Actually, this approach will be incorporated into Q as well. Aeroflex UTMC historical data has shown that gross leak failures have only been found after fine leak failures have been detected in a lot.

Question 4:)

Since class T is a space level flow, why don't you include PIND ?

Answer 4:)

We do. Our experience is that we never fail PIND. We have a large statistical history with a near non-existence failure rate on PIND for our QML-Q and QML-V products. Although Aeroflex UTMC originally planned to perform PIND on a per request basis in the process flow, we do perform PIND testing on the 4M SRAM.

Question 5:)

What is the Temp., voltage, and time for burn-in

Answer 5:)

Aeroflex UTMC Application Note

The specific Temperature, voltage and time for burn-in is proprietary. It is determined via design of experiment for each product. The methodology that Aeroflex UTMC employs to derive these acceleration factors has been approved by DSCC and is employed for our QML-Q and QML-T products. Aeroflex UTMC elects to maintain this information as proprietary because it would be possible for a competitor to avoid the extensive design of experiment and extended life-test correlation that Aeroflex UTMC performs by simply duplicating our derived results. The key point to keep in mind is that our Methodology and procedures for deriving the acceleration voltage has been approved for our QML-V process where the TRB (Technology Review Board) includes representation from DSCC, DOE, and NASA.

Question 6:)

Why do you use a 10% PDA when all other MIL Specs require 5% Max.?

Answer 6:)

Aeroflex UTMC now uses 0% PDA despite DSCC approval for 10% PDA for QML-Q and QML-V. Once there was enough data to make a judgment this production flow parameter was tightened.

Question 7:)

How can you assure that the class T & Q burn-in has removed all early fails?

Answer 7:)

Aeroflex UTMC has performed extensive analysis to determine that our acceleration methodology is sound and screens out early failure mechanisms. In fact, the acceleration for the primary failure mechanism - random oxide defects, is equivalent to approximately 2-3 years of operation. We also perform extended life-test to correlate our methodology.

Question 8:)

Why do you 100% test at min. temp. on class Q but not on class T?

Answer 8:)

Aeroflex UTMC is currently performing 100% three-temperature testing for Class T. The traditional approach for Mil-Spec parts is 100% testing at -55 degrees C, room temp, and +125 degrees C. We have determined that the primary temperature failures are at high temperature, but have found that the QCOTS 4M SRAM failures occur more frequently at cold. Aeroflex UTMC will continue 100% through temperature testing.

Question 9:)

Why do you backside mark traceability on class Q & S but not class T?

Answer 9:)

Aeroflex UTMC maintains tractability to the individual wafer lot for Class-T.

Question 10:)

Can you supply data (units, hours, temp. volts, & fails) to backup your 10 FIT reliability?

Answer 10:)

This information is available and will be provided if requested (minus the actual proprietary acceleration voltage). The data now shows a rate below 1 FIT.

Aeroflex UTMC Application Note

Question 11:)

Do you do RHA testing on each lot to 60 krad ?

Answer 11:)

Based on evaluation of multiple wafer lots, the best performance has been 35K Rad. Aeroflex UTMC is offering this part with the "D" SMD rad designation (i.e. 10K) to reflect this radiation level. The 2X margin approach is the traditional approach, Aeroflex UTMC has worked with DSCC to employ the "Analysis of Variables" approach which would allow the radiation specification to more closely match the actual verified performance (i.e. "P" or 30K designation). In all cases, Aeroflex UTMC performs 100% wafer lot specific radiation testing, and the actual test results are available for the product.