

EAG Laboratories

PRODUCT RELIABILITY MATERIAL RELIABILITY **COMPONENT RELIABILITY**

Reliability test approach:

Test plan definition (define CtQ & pass-fail criteria) => experimental phase => data analysis

Product reliability test example:

Reliability of a Bluetooth speaker

Test plan definition — accelerated testing:

Exploratory experiments from field data showed that this speaker is sensitive to mechanical forces (dropping) and to the combination of humidity and high temperature when switched on

Experimental phase & data analysis:

Drop test 30 – 60 – 100 cm





2A: Choose a reliability failure mechanism accceleration model (Arrhenius, Eyring, Temp-humidity...) 2B: Choose life distribution that fits the fail data (Weibull, lognormal, exponential)

Damp-heat test 40°C/90%RH - 50°C/50%RH - 60°C/90%RH













Results: Product reliability **Failure mode** Failure mechanism Reliable life (90% survival) No Bluetooth connection, no sound Electrical short cut due to dendrite growth 3000 hours @ 20°C/50%RH Glue bond delamination Hydrolysis of epoxy glue Drop resistance (90% survival) Cracks in housing Mechanical overload 2000 drops @10cm Loose connector Solder fatigue Mean Time to Failure (MTTF) 3445 hours

Material & component reliability testing:

Same approach as for product testing. Often no clear pass/fail criteria available because of progressive degradation

- Failure mode(s) and degradation data needed (chemical, optical, physical, mechanical) for correct data analysis
- Our Material Analysis Lab is well equipped to support failure mode and degradation studies

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lapping B'

data

3:Check validity of experimental

Test plan: Non-operational drop tests at 3 heights and operational damp-heat storage tests at 3 heights