TK Lab *provides*

Highly Accelerated Thermal Shock (HATS™)

Tests for Europe and the Middle East

TK Lab

INTEGRATED RELIABILITY TEST SYSTEMS, INC.

Integrated Reliability Test Systems, Inc.

- Partnership between Conductor Analysis Technologies (Albuquerque, NM) and Microtek Labs (Anaheim, CA)
- Global provider of thermal shock test systems and services to the printed circuit board and electronic interconnect industries
- Products and services provide quantitative data on electrical interconnect reliability

History of Thermal Shock

- MIL-STD-202G, Method 107G
  - Originated in the late 1950's
  - Last updated in 1984
- Cycle time is conservatively estimated based upon mass of samples
- IPC, JEDEC, Delphi and many others have customized this method for their needs

Air-to-Air Systems

- Use "air" as heat transfer mechanism
- Low heat transfer rate to samples
- Lots of thermal mass in transfer cage
- Difficult sample fixturing and wiring
  - Generally infrequent data sampling
- Significant disadvantages in cost and time
  - Electricity and/or liquid nitrogen
  - Long cycle times due to thermal mass

IPC-TM-650, Method 2.6.7.2B (May 2004)

- Thermal shock, continuity and microsection of printed boards

Step	Test Condition A		Test Condition B		Test Condition C	
	Temperature °C [°F]	Time (min)[1]	Temperature °C [°F]	Time (min)[1]	Temperature °C [°F]	Time (min)[1]
1	0, +0/5 [32, +0/9]	15	-40, +0/-5 [-40, +0/-9]	15	-55, +0/-5 [-67, +0/-9]	15
2	25, +10/-5 [77, +18/-9]	0	25, +10/-5 [77, +18/-9]	0	25, +10/-5 [77, +18/-9]	0
3	+70, +5/-0 [158, +9/-0]	15	+85, +5/-0 [185, +9/-0]	15	+105, +5/-0 [221, +9/-0]	15
4	25, +10/-5 [77, +18/-9]	0	25, +10/-5 [77, +18/-9]	0	25, +10/-5 [77, +18/-9]	0
Step	Test Condition D		Test Condition E		Test Condition F	
	Temperature °C [°F]	Time (min)[1]	Temperature °C [°F]	Time (min)[1]	Temperature °C [°F]	Time (min)[1]
1	-55, +0/-5 [-67, +0/-9]	15	-65, +0/-5 [-85, +0/-9]	15	-65, +0/-5 [-85, +0/-9]	15
2	25, +10/-5 [77, +18/-9]	0	25, +10/-5 [77, +18/-9]	0	25, +10/-5 [77, +18/-9]	0
3	+125, +5/-0 [257, +9/-0]	15	+150, +5/-0 [302, +9/-0]	15	+170, +5/-0 [338, +9/-0]	15
4	25, +10/-5 [77, +18/-9]	0	25, +10/-5 [77, +18/-9]	0	25, +10/-5 [77, +18/-9]	0

[1] Or until samples reach test temperature.

- Via net resistance change after 100 cycles
- Or, As Agreed Between User and Supplier (AABUS)

Liquid-to-Liquid Systems

- Use "liquids" as heat transfer mechanism
- High heat transfer rate to samples
- Difficult to move samples between liquids
- Difficult sample fixturing and wiring
  - Generally infrequent data sampling
- Significant disadvantages in cost
  - Liquids are volatile and very expensive

Current Induced Methods

- Apply DC current to internal interconnect to generate heat in the coupons
- Monitor and control resistance/temperature through PTH interconnect
- Typical cycle from room temperature to 150C (delta T of only 125C)
- Limited number of samples per load

HATS™ System

- Air-to-air methodology
  - Single chamber with stationary coupons
  - High volume airflow with large heat transfer capacity
- 36 coupons (144 nets) per chamber load
- Temperature cycles from -55 to +160C
  - Performs traditional air-to-air tests
  - Can emulate current induced cycles
- Software optimized cycle times
- Easy coupon design

Specifications

- Air transfer subsystem
  - Temperature range: -55 to +160C
  - Air transition time: 30 seconds (-55 to +160C)
  - Air Stability: ±2C
- Data acquisition subsystem
  - Mode: 4-wire resistance
  - Accuracy: 2% of resistance value
  - Precision: 2% resistance CoV
  - Speed: 12 readings per second

HATS™ System


HATS
HIGHLY ACCELERATED THERMAL SHOCK
IRTS
INTEGRATED RELIABILITY
TEST SYSTEMS, INC.

Contact Information

TK Lab

159 Yigal Alon Street, Tel Aviv 67443, Israel
Tel. 972-369-58117, Fax 972-369-17117
lab@tech-knowledge.co.il