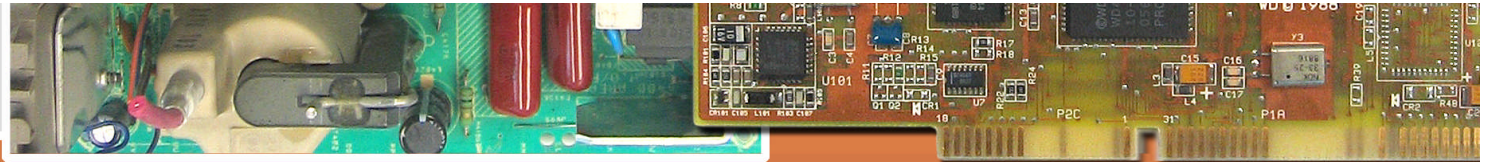


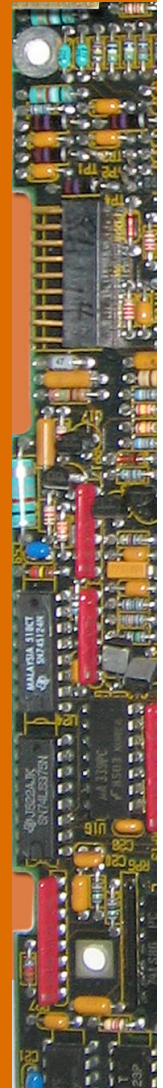


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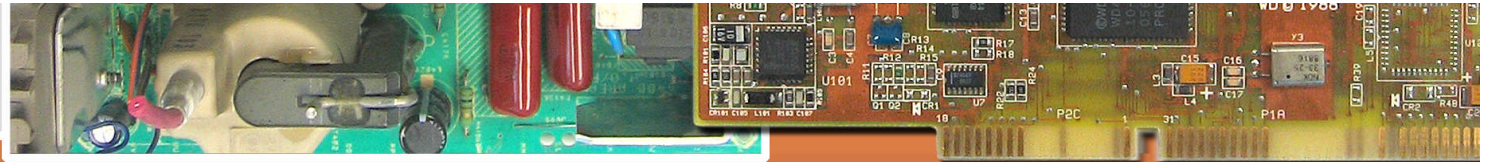
IPC INTERNATIONAL TECHNOLOGY ROADMAP *for* ELECTRONIC INTERCONNECTIONS 2006–2007

Reliability Summit 2007





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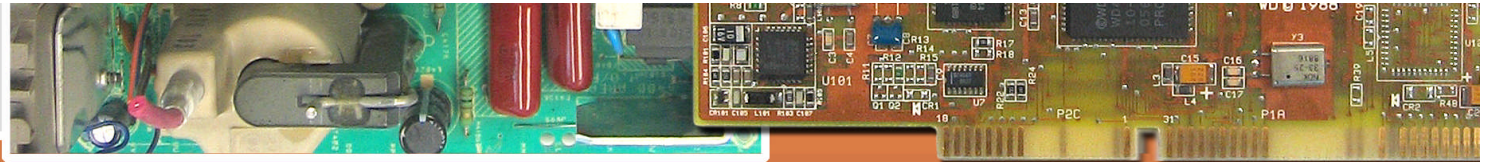


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IPC International Technology Roadmap

**2003 – First inclusion of “Reliability”
as a topic**





Driver in 2003:

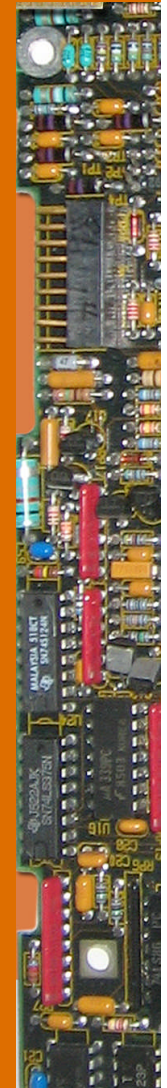
Started to see confusion in testing protocols of
PCB motherboards vs package substrates

Motherboards > Package > MCM > SIP ?

2002/2003 IPC roadmap included tables of

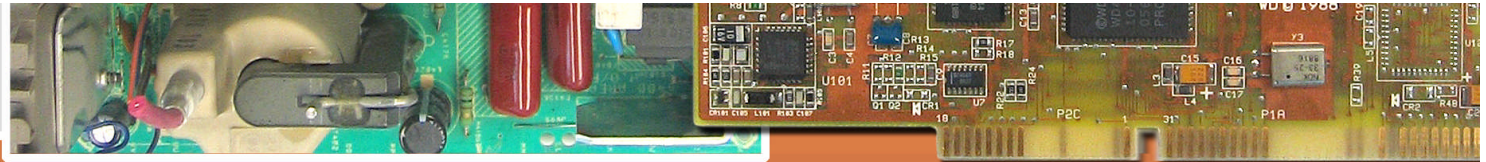
- Test conditions
- Performance requirements

IPC specs, JEDEC, Auto, Military





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2004/2005 Roadmap

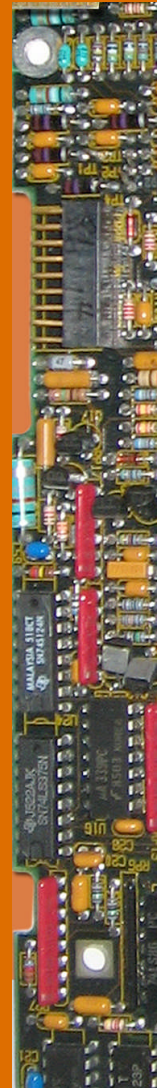
Rapidly changing marketplace

Environment became a factor

Lead free

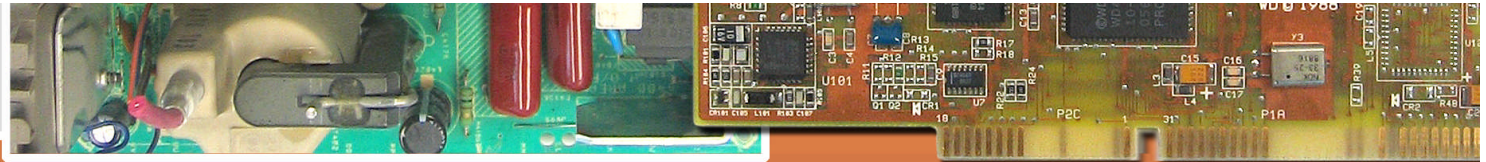
Halogen free

?



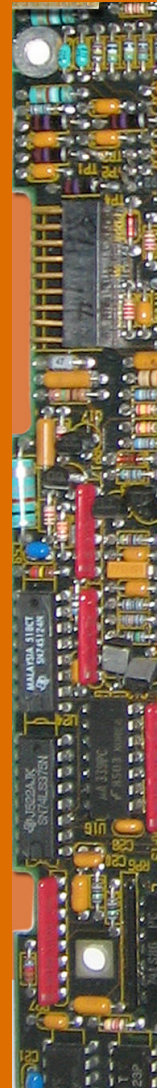


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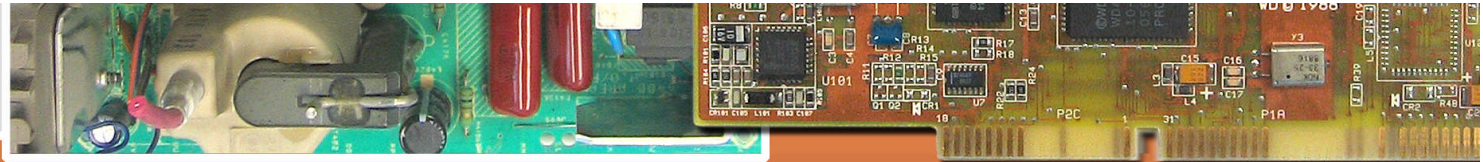
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iNEMI's roadmap also started to discuss
reliability protocols especially in the
SiP TWG > TIG





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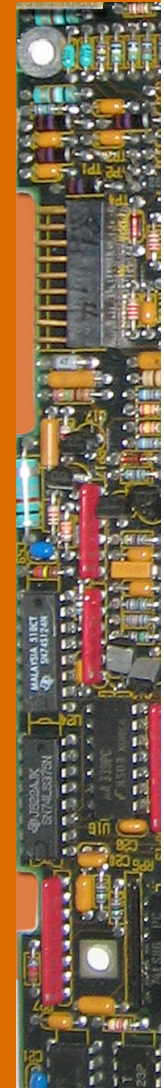
IPC Roadmap 2006/2007

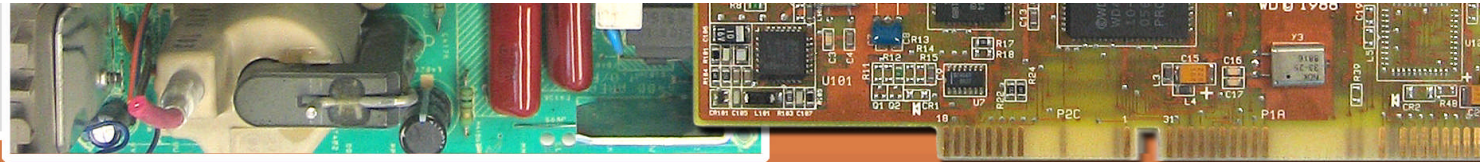
For 2006 / 2007 IPC roadmap had a series of “Focus Meetings” on several topics

Including:

- Equipment roadmapping
- Operating environment
- Design
- Flex technology
- Packaging
- Optoelectronic assembly
- “Reliability”

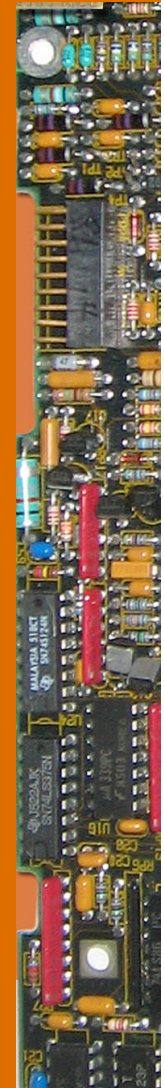
Reconfigured the reliability tables to a functional format





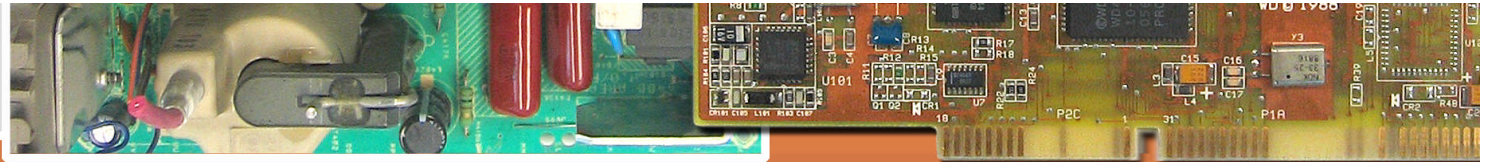
Results of the Reliability Focus Meeting:

- Comparisons of JEDEC to IPC is difficult
- LF is perplexing testing protocols
- New markets are appearing and they don't have protocols (Medical implants)
- New markets sometimes last 6 mos, to develop a new protocol can take two years
- The OEM's often deviate from the IPC/JEDEC standards
- Should the industry consider "Application Specific" protocols





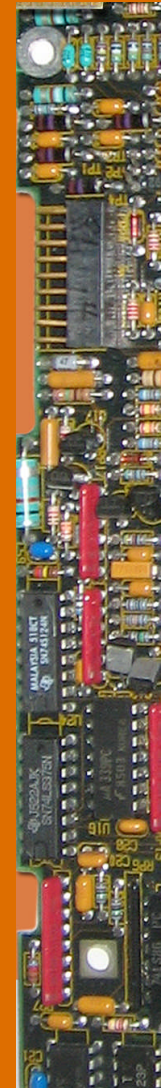
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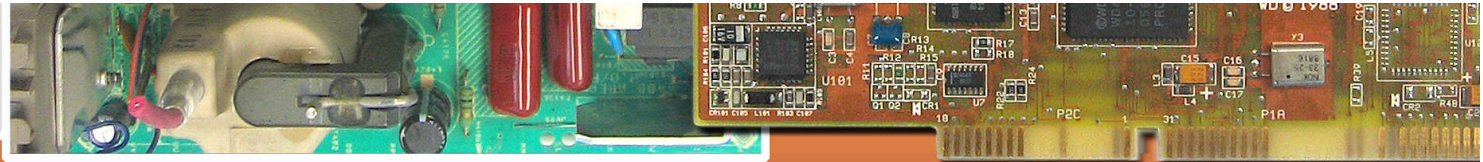
The purpose of today's meeting is to bring together all of the consortia and trade organizations along with academia and the OEM's to determine if the current, somewhat segmented, structure of developing reliability test protocols is satisfactory or do we need to modify the focus.

Three distinct levels
Component
Assembly
Board





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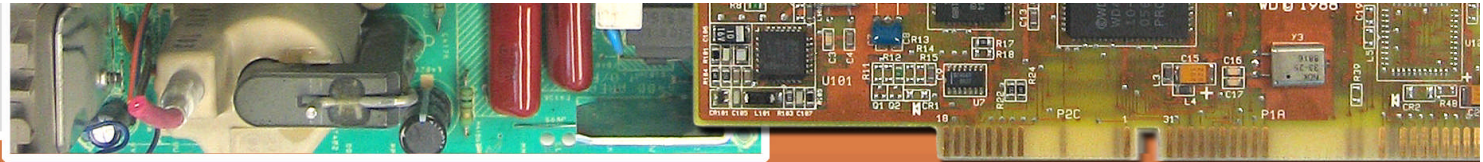
George Smith D.O.D. 1973

Requirement	TV Radio	IPC Class 1	IPC Class 2	IPC Class 3	MIL SPEC	NSA stndrd	NSA HI-REL
Visual and Dimensional	X	X	X	X	X	X	X
Etch Back						X	X
Plating Adhesion		X	X	X	X	X	X
Microsectioning					X	X	X
Terminal Pull		X	X	X	X	X	X
Copper Strike						X	X
Warp and Twist			X	X	X	X	X
Traceability						X	X
Water Absorption						X	X
Copper Pyrophosphate							X
Solderability	X			X		X	X
PTH structure					X	X	X
Fungus Resistance							X
Mechanical Shock							X
Vibration							X
Thermal Shock					X	X	X
Thermal Stress					X	X	X
Outgassing							X
Interconnection Resistance				X	X	X	X
Insulation Resistance		X	X	X	X	X	X
Dielectric Strength		X	X	X	X	X	X
Hot Oil Resistance		X	X	X	X		
Moisture Resistance				X	X	X	X
Current Carrying Capacity	X		X	X		X	X
Internal Shorts	X	X	X	X		X	X
Circuitry Electrical Test 100%					X	X	X
Flammability			X	X	X	X	X





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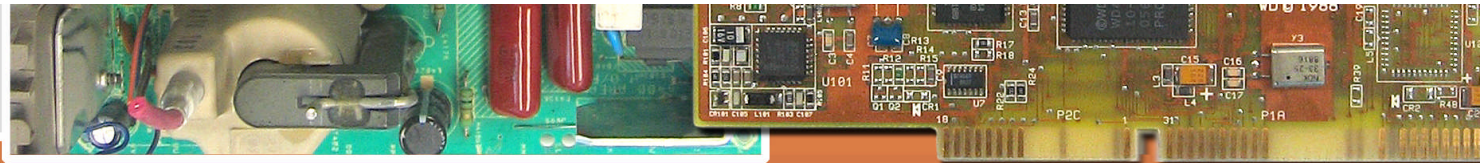
IPC INTERNATIONAL TECHNOLOGY ROADMAP *for* ELECTRONIC INTERCONNECTIONS 2006–2007

Test Type	Index	Title	Conditions	Uses	Comments
A) T&H (Moisture and delamination sensitivity)	A-1 (IPC)	IPC-TM-650 2.6.16 Pressure vessel method for glass epoxy laminates integrity	15psi /30 min + Solder dip	PWB slugs	Still widely used laminates test except: PCT times > 15 minutes and sample thicknesses > 1/16" are common today.
	A-2 (IPC)	IPC-TM-650 2.6.2.1A Water absorption, metal clad plastic laminates	24 hrs in H2O at 23C (prebake: 1 hr at 105-110C)	PWB slugs	Standard for Laminates weight gain (relative moisture absorption measurement).
	A-3 (Jedec/ IPC)	JSTD-020C Moisture/Reflow Sensitivity Classification for Non- hermetic Solid State Surface Mount Devices	Varies per Levels 1 – 6: Soak 30C/60% to 85C/85% 3x reflow, 225, 245, 250, or 260C (standard reflow to Pb free).	Component s	Widely used for components to determine moisture level for assembly ("popcorn" mechanism), and as precon before other tests.
	A-4	JESD220-A102C Accelerated Moisture Resistance-- Unbiased Autclave	1210C / 100%RH (A)24 – (F)336 hrs, +Electrical test	Component s	Pure moisture resistance (no solder dip or reflow).
	A-5	JESD220-A118 Accelerated Moisture Resistance-- Unbiased HAST	130C / 85%RH, 1100C / 85%RH 96 – 264 hrs	Component s	Pure moisture resistance (no solder dip or reflow).



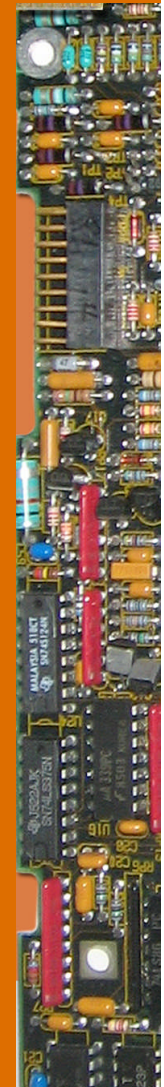


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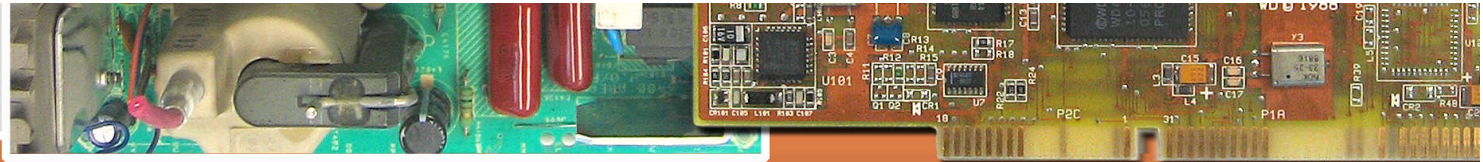
IPC INTERNATIONAL TECHNOLOGY ROADMAP *for* ELECTRONIC INTERCONNECTIONS 2006–2007

Test Type	Index	Title	Conditions	Uses	Comments
B) TH&B (Moisture and Insulation Resistance)	B-1 (IPC)	IPC-TM-650 2.6.3F Moisture and Insulation Resistance, PCBs	Cls 2: 50C/ 90%/ 100v /168 hrs Cls 3: 25-65C/ 90%/ 100v/160 hrs	PWB Coupon	Less used in favor of 2.5.25.
	B-2 (IPC)	IPC-TM-650 2.6.25 Conductive Anodic Filament test, X-Y axis	65C/85% or 85C/85%, 100v / 500 hrs	PWB coupon	Becoming widely used as PWB IR test (more than CAF only)
	B-3 (Jedec)	JESD22-A101B Steady State Temperature Humidity Bias Life test	85C/ 85% / 1000 hrs	Componen ts	Widely used as component TH&B test.
	B-4 (Jedec)	JESD22-A110-B Highly-Accelerated Temperature and Humidity Stress test	130C / 85% / 33.3 psia / 96 hrs, or 110C / 85% / 17.7 psia / 264 hrs.	Componen ts	"HAST", Accelerated version of B-3, when failure mechanisms shown to be same.



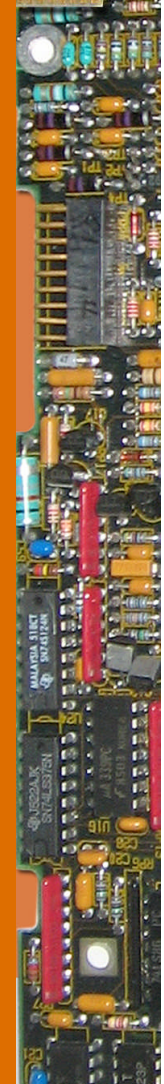


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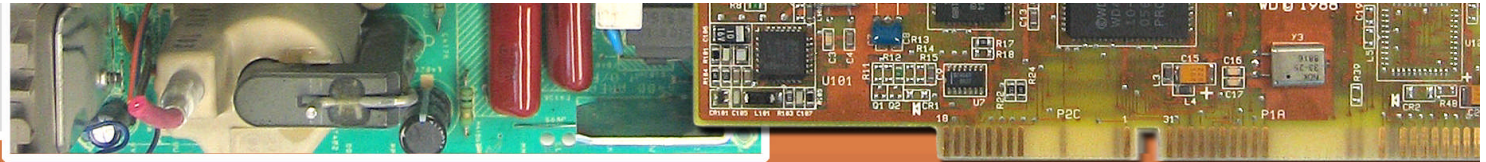
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Test Type	Index	Title	Conditions	Uses	Comments
C) Temperature Cycle or Shock	C-1 (IPC)	IPC-TM-650 2.6.7A Thermal Shock and continuity, PWB	-65 to 125C, 150C, 170C. 100 cycles	PWB coupons	Used less in favor of other tests below including HATS, CITC
	C-2 (IPC)	IPC-TM-650 2.4.13.1 Thermal stress of Laminates	1x solder shock @ 550F Inspect and x-section (prebake:4-6 hrs @ 125C)	PWB slugs or coupons	Still widely used for hybrid product. May phase out as PIH goes away...
	C-3 (IPC)	IPC 9701 Performance Test Methods and qualification requirements for Surface Mount Solder Attachments	Varies, including: 0-100C (preferred), -55 to 125C, -40 to 125C, ...	Card assemblies	Becoming widely used ATC test of assembled cards, including associated PWB and components.
	C-4 (Jedec)	JESD22-A104C Temperature Cycling	Varies, including: -65 to 150C, -55 to 125C, -40 to 115C, 0 to 100C, ...	Components (assemblies)	Very widely used ATC test for fixtured and soldered components.
	C-5 (Jedec)	JESD22-A106C Wet thermal shock		Components	No PWB spec for wet thermal shock, though some use reported.
	C-6 (IPC)	IPC-TM-650 2.6.26 DC current induced thermal cycle	25C to 50-250C.	PWB Coupons	
	C-7 (Jedec)	JESD22-A105C Power and Temperature Cycling	-40 to 85C, -40 to 125C	Devices	Chamber + device on/off cycling. Not widely used.



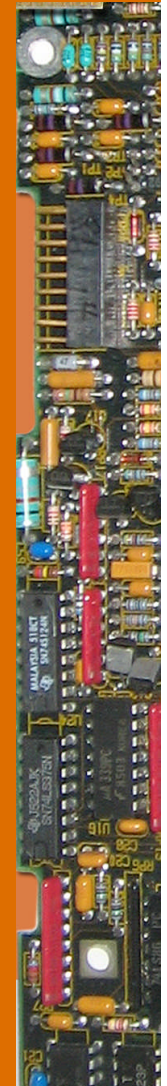


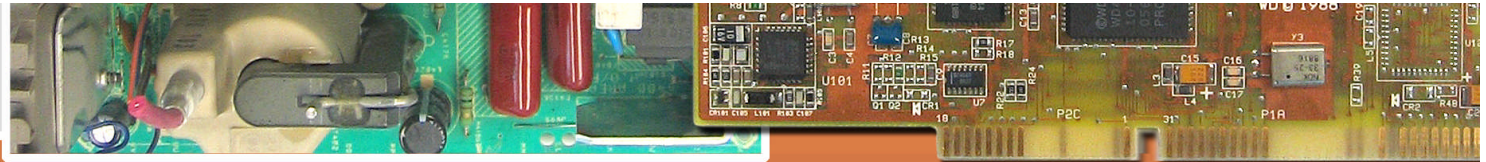
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Test Type	Index	Title	Conditions	Uses	Comments
D) <u>Temperature Aging</u>	D-1 (Jedec)	JESD22-A103C High temperature Storage Life	Bake 85 – 300C. Typical: 1000hrs @ 150C	Components	Test for thermal activated failure mechanisms
E) <u>Physical Shock and vibration</u>	E-1	IPC-TM-650 2.6.5D Physical Shock, PWB		PWB cards	
	E-2	JESD22-B104C Mechanical Shock		Components	





- In light of the rapidly changing technology environment and new developing markets appearing, in your opinion is the industry properly focused on reliability and reliability protocols??
- Taken as a group, is there something different the trade organizations and consortia could do to improve the situation??

