

THERMAL CYCLE TEST

Process: SMT (Solder Paste)

Viromet 347, 349 and SnPb Alloy

This Thermal Cycle test is performed to the stringent criteria of JESD 22-A104-B. Failure is observed on both Viromet 347 and SnPb (control) samples. Components tested are *chip resistors (0805)*, *PLCC (J-Leads)*, *QFP (p0.5)* and *SOIC (p0.5)*. All the components tested have SnPb terminations as these components are currently the most commonly used in the industry.

Condition (JESD22-A104-B, Test condition G)

Temperature:	-40°C to +125°C
Dwell time:	15 minutes
Number of cycles:	0, 500, 800, 1000
Frequency:	1 cycle / hr.

Component Type

Chip Resistors (0805)
PLCC (J-Leads)
QFP (p0.5)
SOIC (p0.5)

Terminations Plating

SnPb
SnPb
SnPb
SnPb

PCB Plating

OSP/Cu (Organic Solderability Preservatives/ Copper)
Silver (Ag)

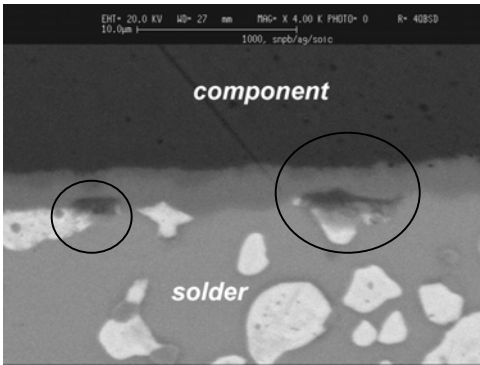
Thermal Cycling Test Result Summary:

Solder Type	Plating types	Component type	0 Cycles			500 Cycles			800 Cycles			1000 cycles			Total defects
			Defects (Cracks)												
			Solder	Cu pad	Lead	Solder	Cu pad	Lead	Solder	Cu pad	Lead	Solder	Cu pad	Lead	
Sn/Pb	Ag	Chip Resistors				MC									1X MC
		PLCC				MC									1XMC
		QFP										SC		MC	1XMC, 1XSC
		SOIC					MC		MC	MC				MC	4XMC
	Cu	Chip Resistors							MC						1XMC
		PLCC								MC	MC		MC		3XMC
		QFP				MC							MC	MC	3XMC
		SOIC					MC								1XMC
V347	Ag	Chip Resistors													
		PLCC										MC			1XMC
		QFP								MC		SC		MC	2XMC, 1XSC
		SOIC											MC		1XMC
	Cu	Chip Resistors													
		PLCC													
		QFP					MC						MC	MC	3XMC
		SOIC							MC						1XMC
V349	Ag	Chip Resistors													
		PLCC											MC	MC	2XMC
		QFP					MC						MC		2XMC
		SOIC													
	Cu	Chip Resistors													
		PLCC											MC	MC	2XMC
		QFP										SC	MC	MC	2XMC, 1XSC
		SOIC						MC							1XMC

SC – Solder crack, MC – Micro-crack

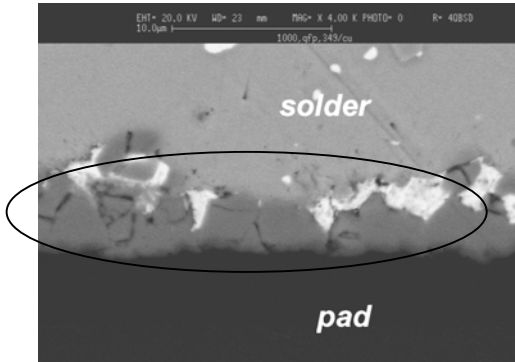
Examples of Crack Seen

Microcrack on lead



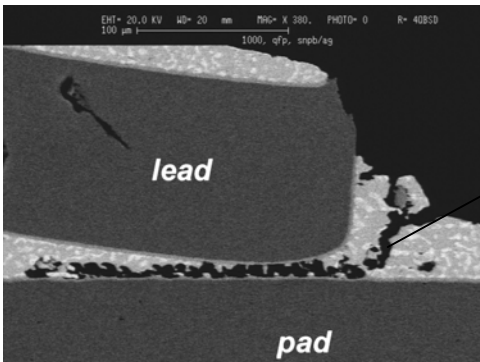
Microcrack observed at the intermetallic between the component plating and the solder

Microcrack on Pad



Microcrack observed along the plating of the pad area

Solder Crack



Solder Crack seen on the SnPb solder after 1000 cycles