CONFIDENTIAL

NT1721

2-cell Lithium-ion Battery Protection IC

Reliability Report

þ Product Qualification ☐ On –going monitor

Feb. 3, 2005

Contents

1.Summary

Test Item		Test Condition	Sample Size	Result	Remark
Electrical Stress Test	OLT	Ta=125℃, 1000Hrs	77	Pass	1
Mechanical Stress Test	Physical Dimension	JEDEC MO-153 AA	5	Pass	2
	Lead Integrity	EIA/JESD22-B105-B	5	Pass	
	Solderability	MIL-STD-883E Method 2003.7	5	Pass	
	Marking Permanency	Using 3M tape	5	Pass	
Environmental Stress Test	T/C	-65℃→25℃→+150℃	77	Pass	
	P.C.T	Ta=121℃，2ATM	77	Pass	
	H.T.S.T	Ta=150℃	77	Pass	
	L.T.S.T	Ta= - 50℃	77	Pass	
ESD Test	HBM	±4KV	12	Pass	3
Latch- Up Test	+IT,-IT, Over-Voltage	±200mA	9	Pass	

Remark 1：Tested at Neotec's Lab

Remark 2：Supported by package house

Remark 3：(a)Tested in IST

(b)NT1721 passed ESD 4KV test at IST，but there are small leakage after 4KV ESD test

NT1721 exact ESD level is 3.5KV

2. Electrical Stress Test Results

2.1 Test Description

Equipment：TA0-45LT

Environment Condition of Laboratory： Temperature：25°C±5°C

Humidity：55%±10%RH

Package Type：TSSOP 8L

2.2 Test Condition

Test Items	Conditions	S/S	#of Fail	Duration	Results
H.T.O.L	Ta=125℃	77	0	1000Hrs	Pass

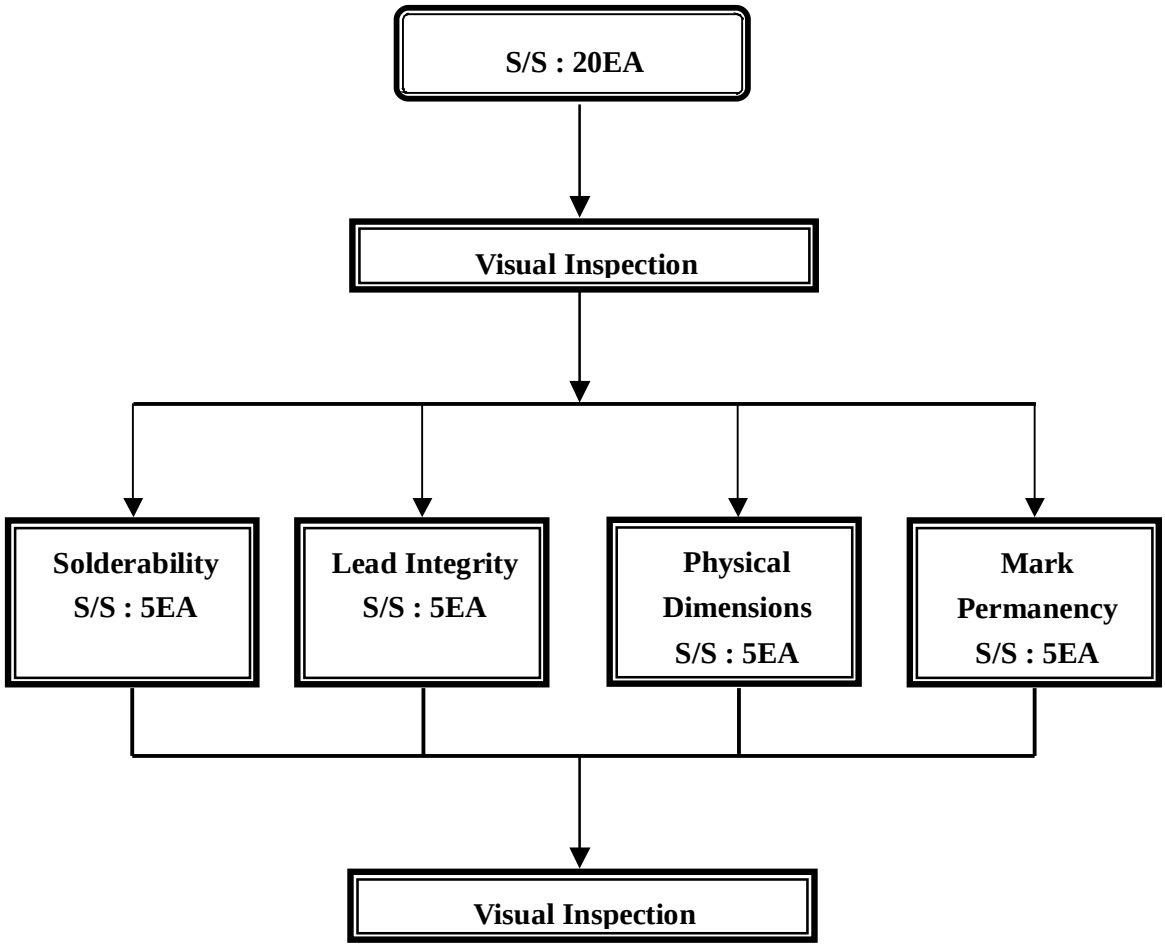
2.3 Test Result

77 parts have been placed in 125°C oven under a bias voltage of 7V.。

After 1000 hours of biased OLT, all parts passed the electrical test.

3. Mechanical Stress Test Results

3.1 Test Flow Chart



3.2 Test Condition

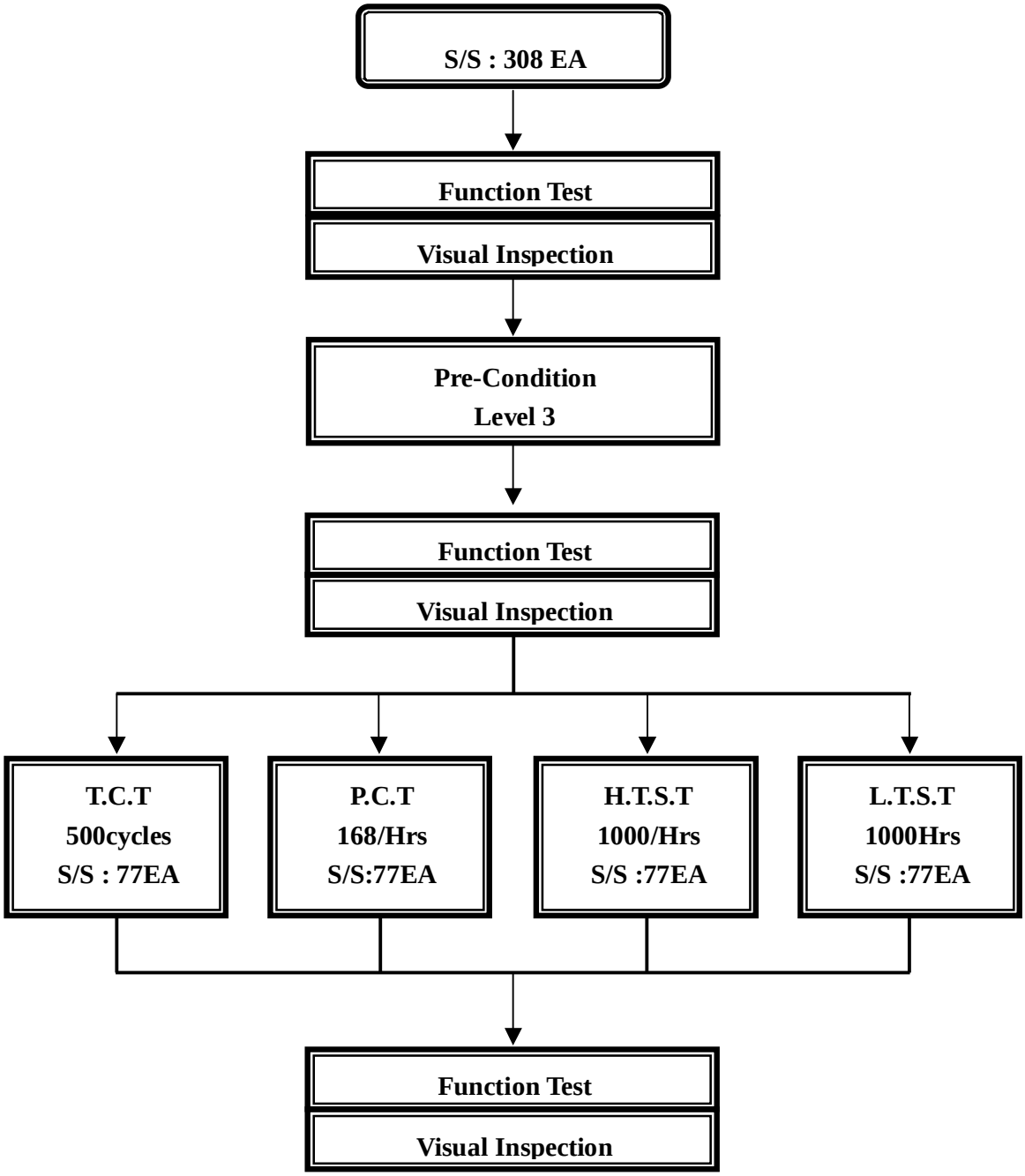
Test Items	Conditions	S/S	#of Fail	Results
Physical Dimension	JEDEC MO-153 AA	5	0	Pass
Lead Integrity	EIA/JESD22-B105-B	5	0	Pass
Solderability	MIL-STD-883E Method 2003.7	5	0	Pass
Marking Permanency	Using 3M tape	5	0	Pass

3.3 Test Result

No Failures counted for this qualification test.

4. Environmental Stress Test Results

4.1 Test Flow Chart



4.2 Test Conditition

Test Items	Conditions	S/S	# of Fail	Duration	Results
T/C (Thermal Cycle)	-65℃→25℃→+150℃	77	0	500 Cycle	Pass
P.C.T (Pressure Cooker test)	Ta=121℃，2ATM	77	0	168 Hrs	Pass
H.T.S.T (High Temperature Storage Test)	Ta=150℃	77	0	1000 Hrs	Pass
L.T.S.T (Low Temperature Storage Test)	Ta= - 50℃	77	0	1000 Hrs	Pass

4.3 Test Result

(a). No Failures counted for this qualification test.

(b). Precondition：**JESD22-A113 Level III**

This test method establishes an industry standard preconditioning flow for plastic SMDs (surface mount device) that is representative of a typical industry multiple solder re-flow operation.

Test procedure is as following:

Step 1: TCT 5cycles

Step 2: Bake 125℃，24hrs

Step 3: Moisture Soak (30℃/60%/192Hrs) Level 3

Step 4: IR Re-flow 235℃ 3cycles

5. ESD Test Results

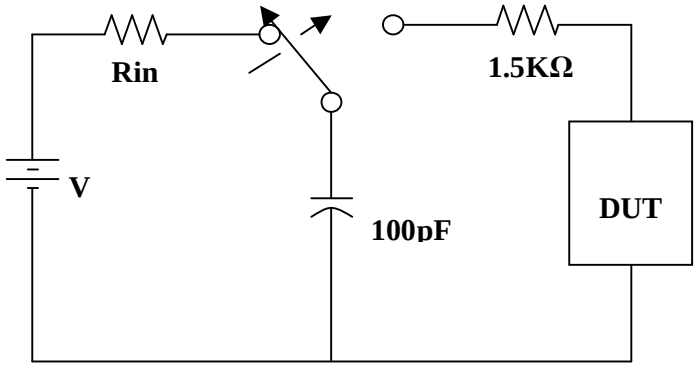
5.1 Test Description

Human-Body-Model stresses devices by sudden application of a high voltage supplied by a 100pF capacitor through 1.5KΩ resistance.

Test Standard ：MIL-STD-883C Method 3015.7

5.2 Test Circuit & Condition

5.2.1 Circuit



5.2.2 Condition

Zap Interval：1second

# of Zaps : 3 times of positive voltage or 3 times of negative voltage

Criteria : Pass Leakage and Function test

5.3 ESD Data

MODEL: HBM	ESD SENSITIVITY PASS : ±4000V		V CLASS: 3
PIN COMBINATION	SAMPLE SIZE	PASSED VOLTS	NOTE:
VSS(+)	3	+4000V	FOR MIL-STD CLASS1: 0V-1999V CLASS2: 2000V-3999V CLASS3: 4000V-TO ABOVE
VCC(-)	3	-4000V	

5.4 Test Result

(a)NT1721 passed ESD 4KV test at IST，but there are small leakage at 4KV

NT1721 exact ESD level is 3.5KV

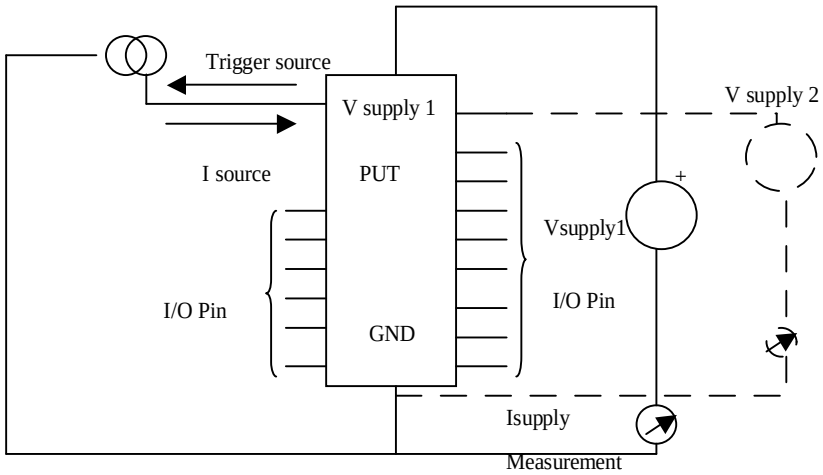
6. Latch- Up Test Results

6.1 Test Description

Latch-Up testing was performed at room ambient using Zapmaster system which applies a stepped voltage to one pin per device with all other pins open except VDD and VSS which were biased to operating voltage and ground respectively.

This procedure was recommended by the JEDEC JC-40.2 CMOS Logic standardization committee.

6.2 Test Circuit & Condition



(Positive or Negative Input / Output Over-voltage / Over-current)

6.3 Latch-up Data

TRIGGER MODEL	TEST PIN	SAMPLE SIZE	TRIGGER SOURCE INDUCE LATCH-UP	**IT CLASS: 3**
+IT	I/P	3	PASS	**NOTE:**
	O/P		PASS	CLASS1: +IT:0mA~39mA -IT:0mA~ -39mA
-IT	I/P	3	PASS	CLASS2: +IT: 40mA~+99mA -IT: -40mA~-99mA
	O/P		PASS	
V_{supply} OVER VOLTAGE TEST	VCC	3	PASS	CLASS3: +IT:>100mA -IT:<-100mA

NT1721 Pass 200mA(±) Latch-up Test