

Soldering Resistance of Axial Lead Packages

The solder strength of axial lead type diodes finished with Sn-Cu solder is described. The Pb free external terminal mounted on a printed board have a good resistance for pull strength.

I. Device Type

Axial lead type of diodes

II. Test Items and Conditions

Pull strength of external lead terminal mounted on a FR-4 printed board by flow soldering

Solder material: Sn-2.5Ag-1Bi-0.5Cu

Flow temperature: 255±3°C

Printed board: FR-4 (t=1.6mm)

Flux: Non-active flux of 25wt% rosin in IPA solvent (SENJU KINZOKU) is used.

Heat cycle stress before pull test: -55°C (30min) to 125°C (30min), 1000 cycles

Pull speed: 5mm/min

Criteria: The pull strength after heat cycle test is higher than 50% of initial pull strength.

III. Conclusion

The pull strength after heat cycle test fulfills the criteria.

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IV. Test Results

Table 1 shows the pull strength before and after the heat cycle test. The strength changes obtained for typical devices with various lead diameters are less than 50%.

Table 1 Pull test results

Test No.		1				2			
Mold size (mm)		φ2.5 × 3.0L				φ6.4 × 7.5L			
Lead dia. (mm)		φ0.56				φ1.2			
Device type		ERA15- ^{**}				ERD07- ^{**}			
Finishing solder		Sn-Cu		Pb-Sn		Sn-Cu		Pb-Sn	
Measured point		Initial	Final	Initial	Final	Initial	Final	Initial	Final
Pull strength (kgf)	1	3.2	2.9	3.0	2.4	12.4	8.1	12.8	10.4
	2	2.9	2.3	3.9	2.8	11.2	11.5	11.2	10.3
	3	3.1	2.7	3.7	2.4	12.3	9.1	11.3	10.3
	4	3.0	2.8	3.2	2.5	11.5	8.3	12.6	10.3
	5	3.2	2.8	3.1	2.4	12.2	9.1	12.7	10.4
Average (kgf)		3.1	2.7	3.4	2.5	11.9	9.2	12.1	10.3
Strength change(%)		-12.3		-26.0		-22.7		-14.7	
Test No.		3							
Mold size (mm)		φ7.5 × 10L							
Lead dia. (mm)		φ1.8							
Device type		ERD29- ^{**}							
Finishing solder		Sn-Cu		Pb-Sn					
Measured point		Initial	Final	Initial	Final				
Pull strength (kgf)	1	28.8	21.8	22.3	21.9				
	2	24.9	20.8	19.2	20.8				
	3	22.0	20.8	19.8	20.9				
	4	26.9	21.0	22.0	20.8				
	5	28.0	20.9	20.8	21.7				
Average (kgf)		26.1	21.1	20.8	21.2				
Strength change(%)		-19.4		1.9					

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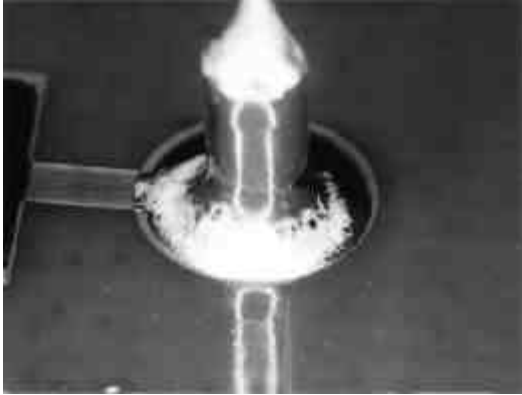

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V. Observation of Soldering Area

Table 2 shows the observation results of soldering area. The good fillets are formed.

Table 2 Observation results of soldering area by an optical microscope

Package	Finishing solder: Sn-Cu	Finishing solder: Pb-Sn
ERA15		
ERD07		
ERD29		

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