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colour inside

Semiconductor devices – Mechanical and climatic test methods – Part 19: Die shear strength

Dispositifs à semiconducteurs – Méthodes d'essais mécaniques et climatiques – Partie 19: Résistance de la pastille au cisaillement

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SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 19: Die shear strength

FOREWORD

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IEC 60749-19 edition 1.1 contains the first edition (2003) [documents 47/1664/FDIS and 47/1684/RVD] and its amendment 1 (2010) [documents 47/2016/CDV and 47/2060/RVC].

A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

International Standard IEC 60749-19 has been prepared by IEC technical committee 47: Semiconductor devices.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This mechanical and climatic test method, as it relates to die shear strength, is a rewrite of the test method contained in Clause 7, Chapter 2 of IEC 60749.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 19: Die shear strength

1 Scope

This part of IEC 60749 determines (see note) the integrity of materials and procedures used to attach semiconductor die to package headers or other substrates (for the purpose of this test method, the term “semiconductor die” should be taken to include passive elements).

This test method is generally only applicable to cavity packages or as a process monitor. It is not applicable for die areas greater than 10 mm^2. It is also not applicable to flip chip technology or to flexible substrates.

NOTE 1 This determination is based on a measure of the force applied to the die or to the element, and, if a failure occurs, the type of failure resulting from the application of force and the visual appearance of the residual die attach medium and the header/substrate metallization.

NOTE 2 In cavity packages, die shear strength is measured in order to assure the strength of the die attachment within the cavity.

In non-cavity packages, such as plastic encapsulated packages, die bonding is used to prevent die movement until the resin mould is completely cured. Normally, specification of the die shear strength and the minimum adhesion area of die bond after moulding are unnecessary, except in the following circumstances:

– when the die needs to be electrically connected to die pad;

– when heat from the die needs to be diffused through the die bond.

2 Description of the test apparatus

The apparatus for this test shall consist of a load applying instrument in the form of a linear motion force-applying instrument or a circular dynamometer with a lever arm. In addition it shall have the following:

a) a contact tool which applies a uniform load to the edge of the die, perpendicular to the die mounting plane of the package or substrate (see Figure 3). A compliant material on the contact tool may be used to ensure that the load is applied uniformly (see Figure 1);

b) an accuracy of 5 % of full scale or ±0,5 N, whichever is the greater tolerance;

c) a means of indicating the load applied;

d) a facility, fitted with suitable light source, to allow visual observation (e.g. at 10× magnification) of the die and contact tool during testing;

e) a fixture with rotational capability relative to the die contact tool and package/substrate holding fixture to allow line contact of the tool along the whole edge of the die from end to end (see Figure 2).

NOTE Many measuring equipments are graduated in kilogram-force (kgf) (1 kgf = 9,8 N).