Semiconductor devices - Part 1: Time-dependent dielectric breakdown (TDDB) test for inter-metal layers

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Dispositifs à semiconducteurs - Partie 1: Essai de rupture diélectrique en fonction du temps (TDDB) pour les couches intermétalliques (CEI 62374-1:2010)

Halbleiterbauelemente - Teil 1: Prüfung auf zeitabhängigen dielektrischen Durchbruch (TDDB) bei Isolationsschichten zwischen metallischen Leiterbahnen (IEC 62374-1:2010)

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Foreword

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– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-08-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-11-01

Endorsement notice

The text of the International Standard IEC 62374-1:2010 was approved by CENELEC as a European Standard without any modification.

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SEMICONDUCTOR DEVICES –

Part 1: Time-dependent dielectric breakdown (TDDB) test for inter-metal layers

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1 Scope

This part of IEC 62374 describes a test method, test structure and lifetime estimation method of the time-dependent dielectric breakdown (TDDB) test for inter-metal layers applied in semiconductor devices.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
leakage current of inter-metal layer
I_{leak}
current through the dielectric layer when a use voltage is applied

2.2
initial leakage current of inter-metal layer
$I_{leak\text{-}0}$
leakage current of inter-metal layer before a stress voltage is applied

2.3
compliance current
I_{comp}
maximum current of the voltage-forcing equipment

NOTE A compliance limit can be specified for a particular test.

2.4
measured leakage current of inter-metal layer
I_{meas}
measured current in constant voltage stress (CVS) test

2.5
breakdown time
t_{bd}
summation of time during which stress voltage is applied to inter-metal layer until failure

NOTE In CVS test, applied stress voltage is interrupted by measuring and assessing repeatedly (see Figure 5).

2.6
dielectric layer thickness
t_d
physical thickness of dielectric layer which is pitched between metal lines

2.7
stress voltage
V_{stress}
voltage applied during CVS test

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