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**Test method of long-term reliability of
gate insulator for SiC devices at high
temperature**

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

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Test method of long-term reliability of gate insulator for SiC devices at high temperature

1 Scope

This Japanese Industrial Standard specifies the matters related to the “long-term reliability test of gate insulator for silicon carbide (SiC) devices at high temperature” (hereafter referred to as the “long-term reliability test”), namely, the test apparatus used, the structure of a sample, the method for eliminating the effect of defects in an SiC substrate and the test procedure.

2 Terms and definitions

For the purpose of this Standard, the following terms and definitions apply.

2.1 SiC device

device formed on an SiC substrate with the compound semiconductor consisting of silicon (Si) and carbon (C)

2.2 high temperature

temperature higher than the service temperature of an Si device, usually not less than 200 °C

2.3 gate insulator

insulating film used for the gate of a metal-insulator-semiconductor field-effect transistor (MISFET)

2.4 shape parameter

gradient of a straight line showing the relation between $\ln\{-\ln[1-F(t)]\}$ and the time to dielectric breakdown or the amount of charge injected to the point of dielectric breakdown, where $F(t)$ indicates cumulative failure probability

It is the basic parameter that determines the shape of distributions in the Weibull distribution used for assumption of the lifetime distribution of a semiconductor device.

It is also called Weibull modulus.

2.5 TDDB life

stress time to the point where the cumulative failure probability reaches a certain value, which is obtained by applying electrical stress to many gate insulators, by measuring the time until the gate insulators break down and by showing the relation between $\ln\{-\ln[1-F(t)]\}$ and the stress time

TDDB stands for Time Dependent Dielectric Breakdown.

2.6 amount of charge injected to the point of dielectric breakdown

total amount of charge injected into a gate insulator until the gate insulator reaches dielectric breakdown when constant voltage or constant current stress is applied to the gate insulator