Diode Division
R & D Module Discrete Bridge

INTRODUCTION

This document shows a description of the PSpice model developed for Schottky diodes inside module QA250FA20 in SOT-227 package. This module has two separate parallel diodes as shown below and the model refers to a single diode of the module.
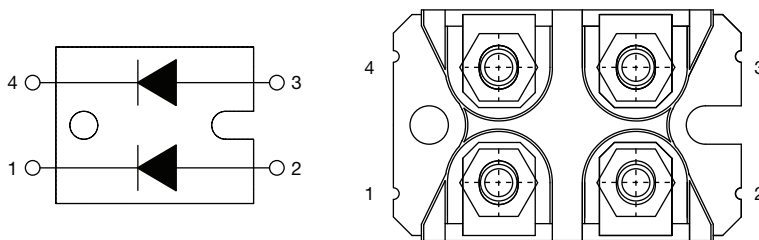

Fig. 1 - Module Package and Internal Configuration

The .txt file describing the model can be downloaded from Vishay website, in the power modules section.

SIMULATION RESULTS

The extracted model has been compared to experimental data obtained during device characterization. In particular, forward voltage drop, junction capacitance and the recovery waveforms have been simulated and compared at T_J = 25 °C.

FORWARD VOLTAGE DROP
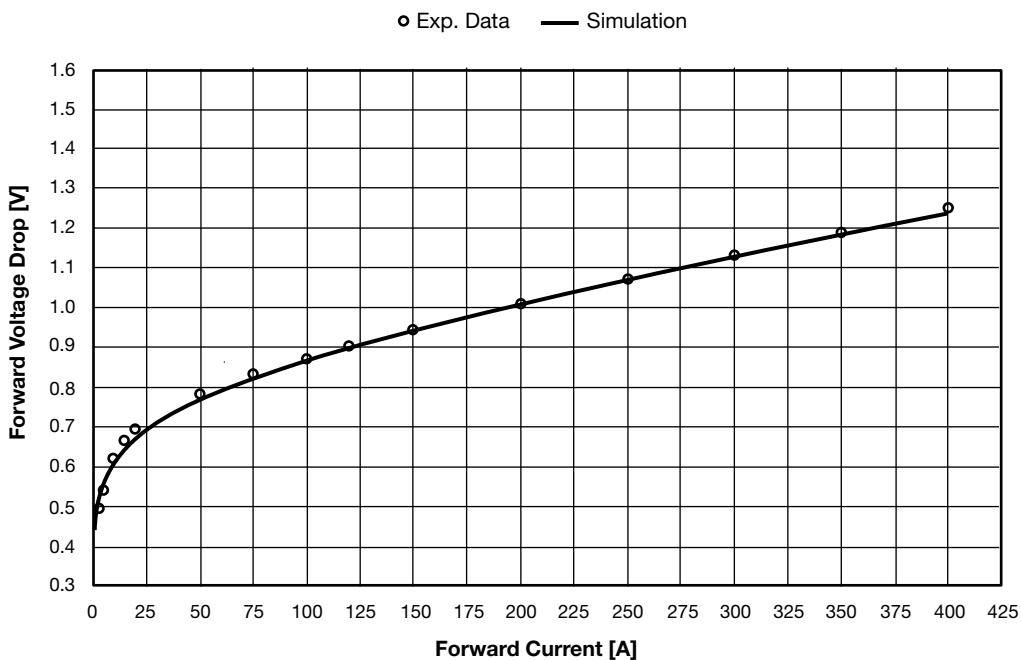
NETLIST OF MODEL

Following list shows the netlist of the model:

```
**************************************
* Copyright                       *
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**************************************
*DEVICE=QA250FA20,D
* QA250FA20 D model
* updated using Model Editor release 17.2.0 on 04/11/17 at 11:29
* The Model Editor is a PSpice product.
.MODEL QA250FA20 D
+ IS=13.800E-6
+ N=1.4919
+ RS=876.13E-6
+ IKF=1.1197
+ CJO=24.309E-9
+ M=1.1776
+ VJ=1.9440
+ ISR=10.010E-21
+ NR=4.9950
+ BV=200.24
+ IBV=10
+ TT=23.281E-9
```

RECOVERY WAVEFORMS
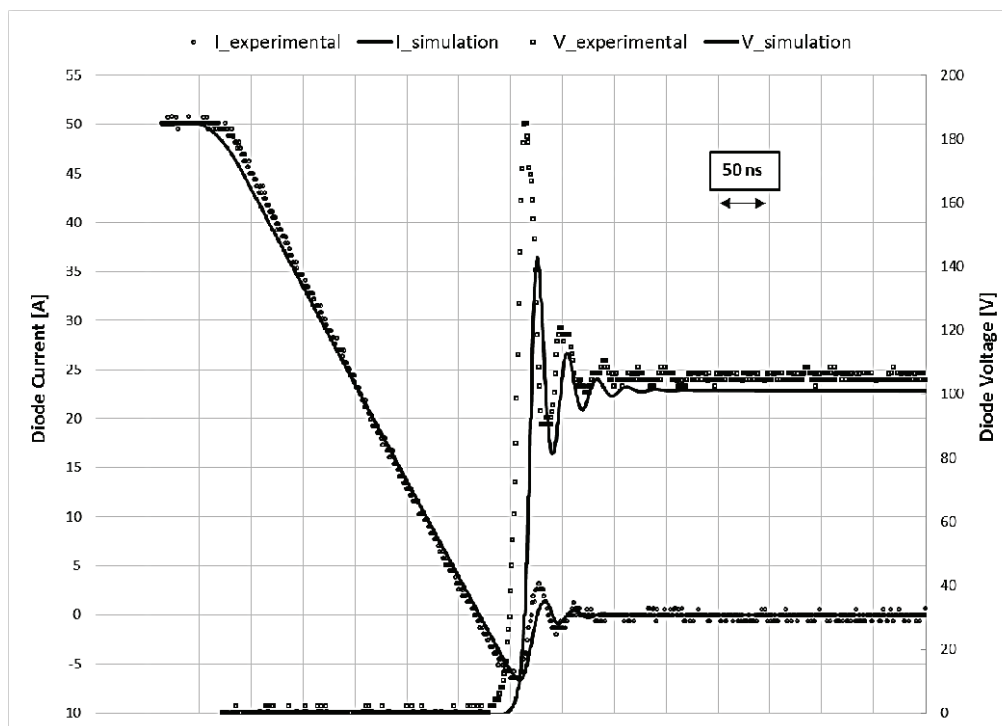
Voltage recovery waveform, in particular the peak value, is very sensitive to stray inductance, both of the module and of the measurement system. The simulation takes into account some of this inductance but not the overall effect.

SIMULATED PARAMETERS (T_{amb} = 25 °C, unless otherwise specified)					
PARAMETER	SYMBOL	TEST CONDITION	EXPERIMENTAL MEASUREMENTS	SIMULATION DATA	UNIT
Reverse recovery time	t_{rr}	I_F = 50 A, di/dt = 200 A/µs, V_R = 100 V	54	55	ns
Reverse recovery current	I_{rr}		6	6.6	A

JUNCTION CAPACITANCE
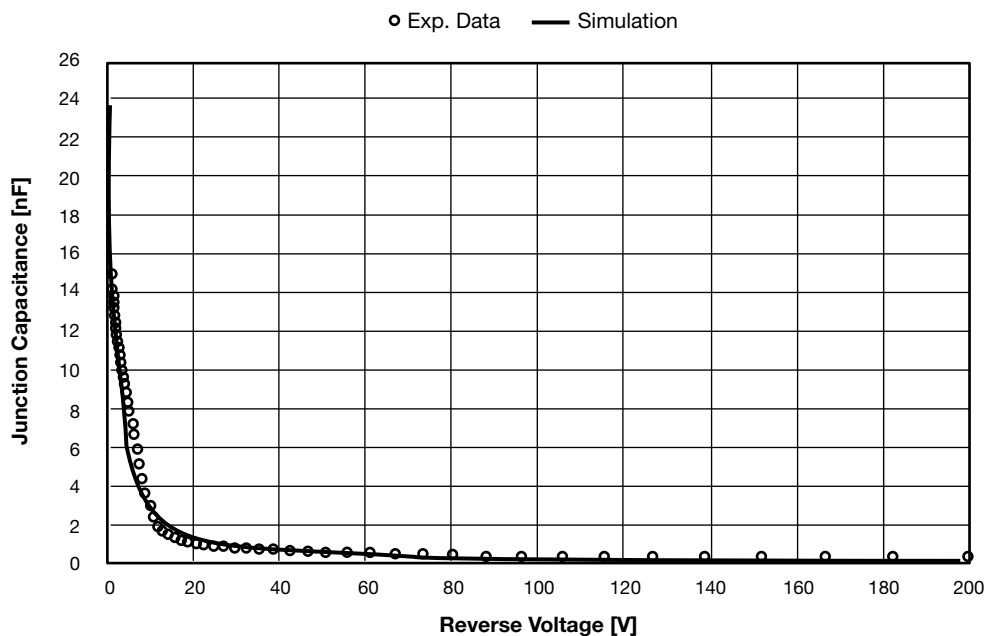
NOTE ON DIODE LEAKAGE CURRENT

It is noted that because of software internal settings it is not possible to accurately model the leakage current in the voltage range that would be of interest for this power diode. In particular, with this model only a constant leakage current value can be obtained, basically over the entire blocking range of the device. This value is in line with the typical leakage at the maximum rated voltage of 200 V, thus giving an overestimate for lower blocking voltages

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