Reverse Conducting RC-DA IGBT according to AEC-Q Standard
High Intensity Discharge Lighting Applications (HID)

The RC-DA technology is based on the established Trench Field Stop IGBT technology. The reverse conducting IGBT chip has a monolithically integrated freewheeling diode which leads to a substantial Si area saving.

Reverse conducting IGBT construction

An automotive application field of RC-DA devices is High Intensity Discharge (HID) lamp where only small space is available resulting in the usage of small packages like DPAKs.

These HID lamps have two important issues, namely a greater starting voltage and the presence of acoustic resonance. The first issue is resolved by using a sort of starting aid, called igniters, which ignite the lamp. In the starting phase the devices are stressed by several hundred volt which makes it necessary to use devices with a high blocking voltage. In order to avoid acoustic resonance and flickering, the designer must avoid the combination of power fluctuation and operating frequency. A typical switching frequency used in this application is 400Hz. Power fluctuation can be avoided by using square wave alternate current techniques. This current control can be achieved by using a full bridge that converts the DC current coming from a DC/DC converter into a AC current for the lamp.

Key Features
- Operating range of DC to 5kHz
- Maximum junction temperature 175°C
- Short circuit capability of 5µs
- Very tight parameter distribution
- Best in class current versus package size performance
- Smooth switching performance leading to low EMI levels

Key Benefits
- Excellent cost/performance for hard switching applications
- Outstanding temperature stability
- Very good EMI behavior
- Up to 60% space saving on the PCB
- Higher reliability due to monolithically integrated IGBT and diode due to less thermal cycling during switching

Applications
- HID
- Further Applications
  - Piezo Injection
  - Pumps
  - Small Drives

www.infineon.com/discrete-automotive-igbt
Reverse Conducting RC-DA IGBT according to AEC-Q Standard
High Intensity Discharge Lighting Applications (HID)

Due to the low switching frequency for HID the conduction losses dominate the total power losses. With the RC-DA technology a $V_{CE(sat)}$ reduction of 20% compared to former technologies was achieved.

$V_{CE(sat)}$ at nominal current

In comparison to the competition the product family shows a significant improvement in thermal performance. Due to the better thermal resistance the operating junction temperature gets reduced and this results in:

- Higher reliability over lifetime
- Lower cooling efforts
- System cost reduction

Thermal resistance

Product Portfolio RC-DA IGBT

<table>
<thead>
<tr>
<th>Product</th>
<th>Package</th>
<th>Blocking Voltage</th>
<th>$I_C$ at $T_C = 100°C$</th>
<th>$V_{CE(sat)} @ I_C$</th>
<th>Body Diode</th>
<th>$Q_{ss} @ 25/175°C$</th>
</tr>
</thead>
<tbody>
<tr>
<td>IKD04N60RA</td>
<td>DPAK</td>
<td>600V</td>
<td>4</td>
<td>1.65</td>
<td>1.7V</td>
<td>0.22/0.52µC</td>
</tr>
<tr>
<td>IKD06N60RA</td>
<td></td>
<td></td>
<td>6</td>
<td>1.85</td>
<td>0.37/0.80µC</td>
<td></td>
</tr>
<tr>
<td>IKD10N60RA</td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td>0.56/1.22µC</td>
<td></td>
</tr>
<tr>
<td>IKD15N60RA</td>
<td></td>
<td></td>
<td>15</td>
<td></td>
<td>0.76/1.70µC</td>
<td></td>
</tr>
</tbody>
</table>

Published by
Infineon Technologies Austria AG
9500 Villach, Austria
© 2014 Infineon Technologies AG.
All Rights Reserved.
Visit us:
www.infineon.com

Order Number: B114-H9898-X-X-7600-0B2014-0011
Date: 04/2014

Attention please!
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie"). With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

Information
For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office (www.infineon.com).

Warnings
Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office. Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies. If a failure of such components can reasonably be expected to cause the failure of that life-support device or system, to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.