

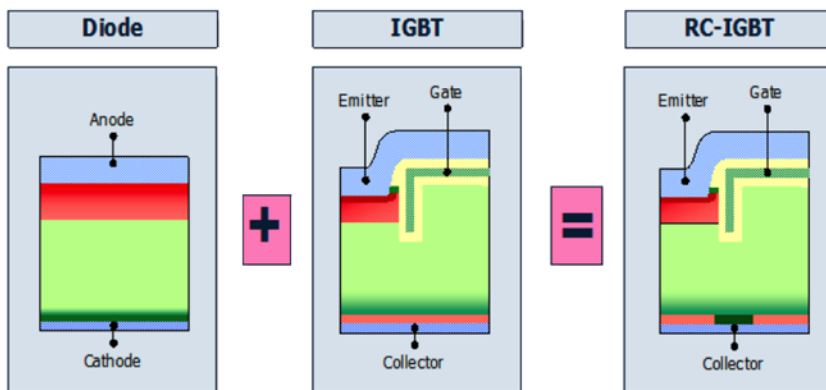


Product Brief

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

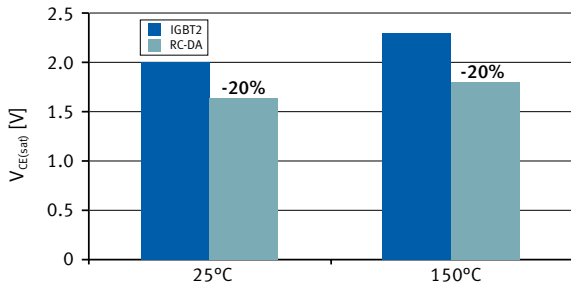
Applications

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

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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.

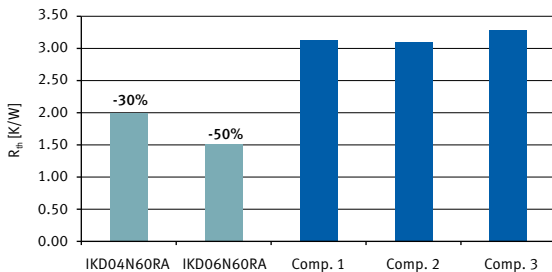
$V_{CE(sat)}$ at nominal current



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

Product	Package	Blocking Voltage	I_C $T_C = 100^\circ\text{C}$	$V_{CE(sat)}$ @ I_C		Body Diode	
				25°C	175°C	V_f @ I_C	Q_{RR} @ 25/175°C
IKD04N60RA	DPAK	600V	4	1.65	1.85	1.7V	0.22/0.52μC
IKD06N60RA			6				0.37/0.80μC
IKD10N60RA			10				0.56/1.22μC
IKD15N60RA			15				0.76/1.70μC

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