Product Brief

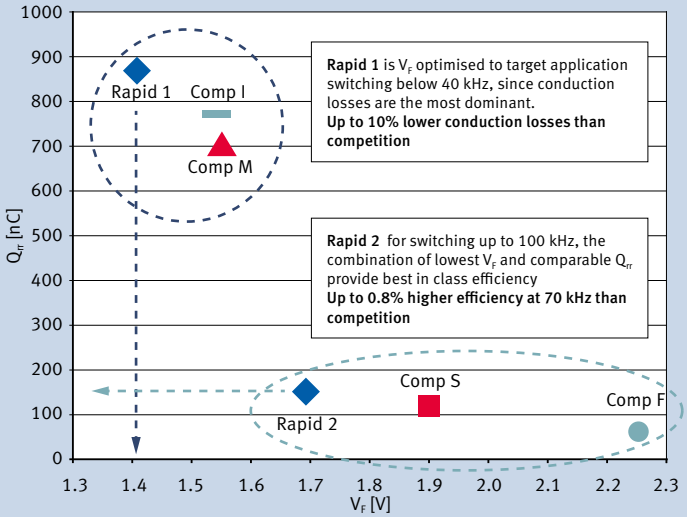
Ultrafast Reverse Recovery Power Silicon Diodes

Rapid Diodes - The Perfect Partner to CoolMOS™ and TRENCHSTOP™ 5

With the new 650V Rapid 1 and Rapid 2 Diode families, Infineon enters the high voltage hyperfast silicon diode market. The new Rapid diode family complements Infineon's existing high power 600V/650V diodes by filling the gap between the SiC diodes and the previously available emitter-controlled diodes. They represent a perfect balance between cost and performance and target high efficiency applications switching between 18 kHz and 100 kHz and are optimized to work in harmony with CoolMOS™ and TRENCHSTOP™ 5 in PFC Topologies.

The Rapid Diode will be released as two versions with 650V break-through voltage, where until now 600V was offered. Thus providing an additional 50V for higher reliability without efficiency being penalized. The V_F is temperature stable. This means from -40°C to 175°C the forward voltage of the diode remains constant. This allows customers to harvest the maximum efficiency out of the diodes regardless of the junction temperature. The Rapid 1 family is optimized with low V_F and soft recovery and is perfect for applications switching between 18 kHz and 40 kHz, where conduction losses and EMI emissions are critical design parameters. The Rapid 2 family meanwhile is designed for applications switching between 40 kHz and 100 kHz. In this switching range, the main loss component comes from the switching losses; therefore the Rapid 2 has been optimized to provide low Q_{rr} and t_{rr}. The Rapid 2 also provides super soft recovery behavior with an S-factor ››1.

Trade-off V_F-Q_{rr}



www.infineon.com/rapiddiodes

Features

- Temperature stable conduction losses (V_F)
- Rapid 1 offers 250mV lower conduction losses (V_F) than best competitor
- Rapid 2 offers lowest Q_{rr}:V_F ratio
- 10% lower I_{rrm} than best competitor
- High level of softness

Benefits

- Rapid 2 offers Best-in-Class efficiency for hyperfast Si diodes at 70 kHz
- Lowest I_{rrm} improves the E_{on} of the switch in the PFC by 10%
- High level of softness provides BiC EMI behaviour

Applications

The boost diode in all PFCs where high efficiency is required and boost topologies in photovoltaic inverters.

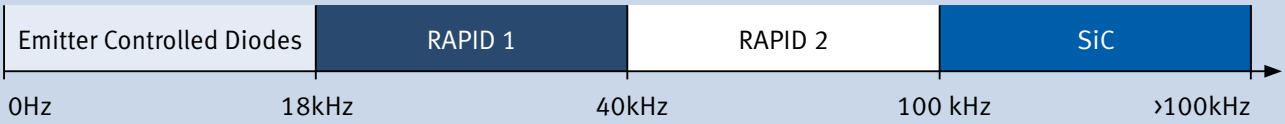
PFCs can be found in

- Room air conditioners
- Commercial air conditioners
- Welding machines
- Servers
- Telecom rectifiers
- PC Power (›90W)
- TV PFC (›90W)
- Free-wheeling diodes in Solar inverters
- Two transistor forward topologies (TTF)

Ultrafast Reverse Recovery Power Silicon Diodes

Rapid Diodes - The Perfect Partner to CoolMOS™ and TRENCHSTOP™ 5

More background information



Rapid 1 with optimized V_F

- 1.35V temperature-stable forward voltage (V_F)
- Highest S-factor for ultimate softness and low EMI filtering needed
- Lowest I_{rrm} to provide lowest turn-on losses on the boost switch
- For applications switching between 18 kHz and 40 kHz.
- t_{rr} ‹ 100ns

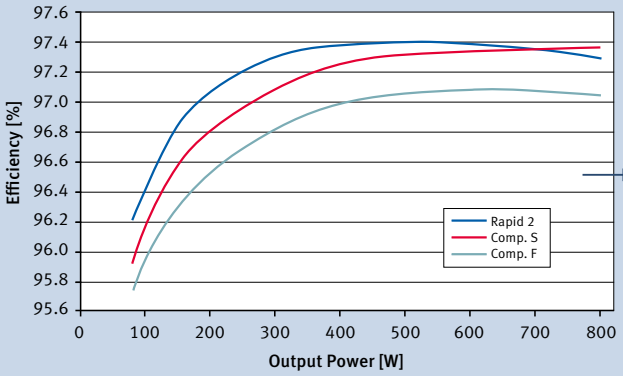
The Rapid 2 diode family

- Lowest reverse recovery charge (Q_{rr}): V_F ratio for BiC performance
- Low reverse recovery time (t_{rr})
- Lowest I_{rrm} to provide lowest turn-on losses on the boost switch
- Designed for applications switching between 40 kHz and 100 kHz
- t_{rr} ‹ 50ns

Here the boost diode shows excellent compatibility with Infineon's CoolMOS™ or the high speed IGBTs (Insulated Gate Bipolar Transistor) such as the TRENCHSTOP™ 5 + HighSpeed 3.

Rapid 2 Best-in-Class Performance

PFC Efficiency @ 70 kHz - High Line V_{in} = 230V



	Rapid 2	Comp. S	Comp. F
E_{on} [mj]	52	59	59
S	2.5	0.8	0.9
$V_{F(typ)}$ [V]	1.7	2.4	3.0

Highest S-factor and lowest E_{ON} seen in the switch for Best-in-Class system efficiency.

The New Rapid Diode Families

Continous Current I_c T_c=100°C		TO-220 real 2-leg	TO-220 FullPAK real 2-leg	TO-247
Rapid 1	8	IDP08E65D1		
	15	IDP15E65D1		
	30			IDW30E65D1
	40			IDW40E65D1
Rapid 2	8	IDP08E65D2	IDV08E65D2	
	15	IDP15E65D2	IDV15E65D2	IDW15E65D2
	40	IDP40E65D2		IDW40E65D2

Published by
Infineon Technologies Austria AG
9500 Villach, Austria

Visit us:
www.infineon.com

Order Number: B114-H9794-X-X-7600-DB2013-0004
Date: 03 / 2013