



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. They represent a perfect balance between cost and performance and target high efficiency applications switching between 18kHz and 100kHz. The new diodes are optimized to work in harmony with CoolMOS™ and TRENCHSTOP™ 5 in PFC topologies.

The Rapid 1 family is optimized with low V_F and soft recovery and is perfect for applications switching between 18kHz and 40kHz, where conduction losses and EMI emissions are critical design parameters.

The Rapid 2 family meanwhile is designed for applications switching between 40kHz and 100kHz. 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 $\gg 1$.

Features

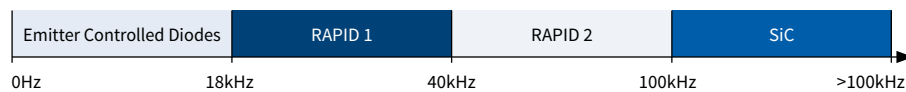
- Temperature stable conduction losses (V_F)
- Rapid 1 offers 250mV lower conduction losses (V_F) than best competitor
- Rapid 2 offers lowest $Q_{rr} : V_F$ ratio
- 10% lower I_{rrm} than best competitor
- High level of softness

Benefits

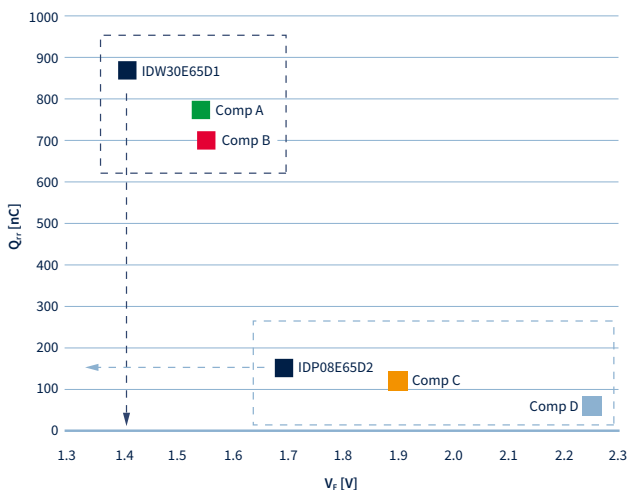
- Rapid 2 offers Best-in-Class (BiC) efficiency for hyperfast Si diodes at 70kHz
- Lowest I_{rrm} improves the E_{on} of the switch in the PFC by 10%
- High level of softness provides BiC EMI behavior

Applications

- Room and Commercial Airconditioners
- PFC Server
- PFC Telecom Rectifier
- PC Power (>90W)
- UPS
- TV PFC (>90W)
- Welding Machines



Trade-off $V_F - Q_{rr}$



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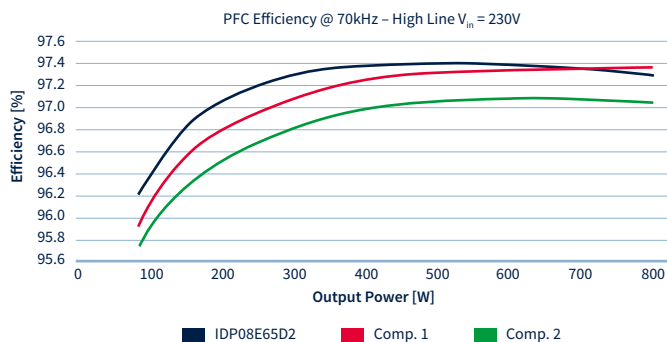
Rapid 1 with optimized V_F

- 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
- Designed for applications switching between 18kHz and 40kHz
- $t_{rr} < 100ns$

Common Cathode and Dual Anode Rapid Diode in TO-247-3 and TO-220-3

- Optimization of the layout for more compact design and easier assembly
- Nominal current I_{nom} up to 75A Rapid 1 in Dual Anode
- 2 times 40A Rapid 1 and Rapid 2 in Common Cathode

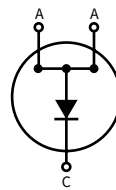
Rapid 2 Best-in-Class Performance



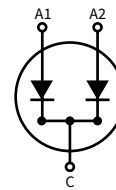
The Rapid 2 diode family

- 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 40kHz and 100kHz
- $t_{rr} < 50ns$

IDW75D65D1 (Dual Anode)



IDW80C65D1 (Common Cathode)



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

	TO-220	Comp. 1	Comp. 2
E_{on} [mJ]	52	59	59
S	2.5	0.8	0.9
$V_{F(typ)}$ [V]	1.7	2.4	3.0

The New Rapid Diode Families

	Continuous current I_C $T_C = 100^\circ C$	TO-220 real 2pin	TO-220 FullPAK real 2pin	TO-220 3pin Common Cathode	TO-247 3pin	TO-247 3pin Common Cathode
Rapid 1	8	IDP08E65D1				
	15	IDP15E65D1				
	20		IDV20E65D1 new			
	30	IDP30E65D1 new			IDW30E65D1	IDW30C65D1 new
	40				IDW40E65D1	
	60					IDW60C65D1 new
	75					IDW75D65D1 new
Rapid 2	8	IDP08E65D2	IDV08E65D2			
	15	IDP15E65D2	IDV15E65D2		IDW15E65D2	
	20	IDP20E65D2 new		IDP20C65D2 new		IDW20C65D2 new
	30	IDP30E65D2 new	IDV30E65D2 new	IDP30C65D2 new		IDW30C65D2 new
	40	IDP40E65D2			IDW40E65D2	
	80					IDW80C65D2 new

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