


Tandem Insulated SOT-227 Power Module Hyperfast Rectifier, 60 A



SOT-227

FEATURES

- Two fully independent diodes
- Ceramic fully insulated package ($V_{ISOL} = 2500 V_{AC}$)
- Hyperfast reverse recovery
- Optimized for power conversion: welding and industrial SMPS applications
- Industry standard outline
- Plug-in compatible with other SOT-227 packages
- Easy to assemble
- Direct mounting to heatsink
- UL approved file E78996 
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level


RoHS
COMPLIANT

PRODUCT SUMMARY

V_R	600 V
$I_{F(AV)}$ per module at $T_C = 126\text{ }^\circ\text{C}$	60 A
t_{rr}	39 ns

DESCRIPTION

The UFH60GA60P insulated modules integrate two state of the art Vishay hyperfast recovery rectifiers in the compact, industry standard SOT-227 package. The planar structure of the diodes, and the platinum doping life time control, provide an ultrasoft recovery current shape, together with the best overall performance, ruggedness, and reliability characteristics.

These devices are thus intended for high frequency applications in which the switching energy is designed not to be a predominant portion of the total energy, such as in the output rectification stage of welding machines, SMPS, and dc-to-dc converters. Their extremely optimized stored charge and low recovery current reduce both over dissipation in the switching elements (and snubbers) and EMI/RFI.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		600	V
Continuous forward current per diode	I_F	$T_C = 85\text{ }^\circ\text{C}$	56	A
Single pulse forward current per diode	I_{FSM}	$T_C = 25\text{ }^\circ\text{C}$	200	
Maximum power dissipation per module	P_D	$T_C = 85\text{ }^\circ\text{C}$	230	W
RMS isolation voltage	V_{ISOL}	Any terminal to case, $t = 1\text{ min}$	2500	V
Operating junction and storage temperatures	T_J, T_{Stg}		- 55 to 175	$^\circ\text{C}$

ELECTRICAL SPECIFICATIONS (T _J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Cathode to anode breakdown voltage	V _{BR}	I _R = 100 μA	600	-	-	V	
Forward voltage	V _{FM}	I _F = 30 A	-	2.08	3.8		
		I _F = 60 A	-	2.36	4.78		
		I _F = 30 A	T _J = 125 °C	-	1.79		1.92
		I _F = 60 A		-	2.1		2.42
Reverse leakage current	I _{RM}	V _R = V _R rated	-	0.03	75	μA	
		T _J = 175 °C, V _R = V _R rated	-	0.1	1.0	mA	
Junction capacitance	C _T	V _R = 600 V	-	33	-	pF	

DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Reverse recovery time	t _{rr}	T _J = 25 °C	-	39	80	ns	
		T _J = 125 °C	-	66	110		
Peak recovery current	I _{RRM}	T _J = 25 °C	I _F = 30 A di _F /dt = 200 A/μs V _R = 200 V	-	3	7	A
		T _J = 125 °C		-	7	11	
Reverse recovery charge	Q _{rr}	T _J = 25 °C		-	58	280	nC
		T _J = 125 °C		-	235	605	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction to case, single leg conducting	R _{thJC}		-	-	0.78	°C/W
Junction to case, both leg conducting			-	-	0.39	
Case to heatsink per module	R _{thCS}	Flat, greased surface	-	0.05	-	
Weight			-	30	-	g
Mounting torque			-	1.3	-	N · m

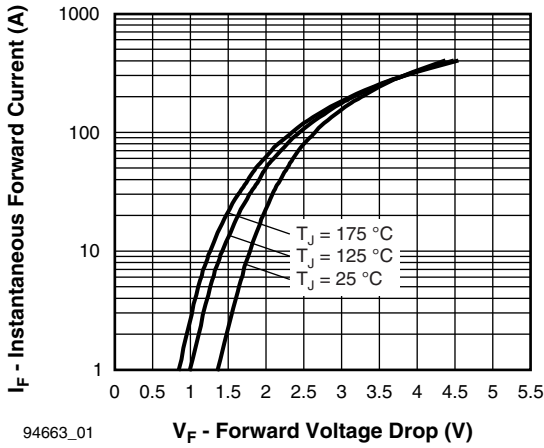


Fig. 1 - Typical Forward Voltage Drop Characteristics (Per Diode)

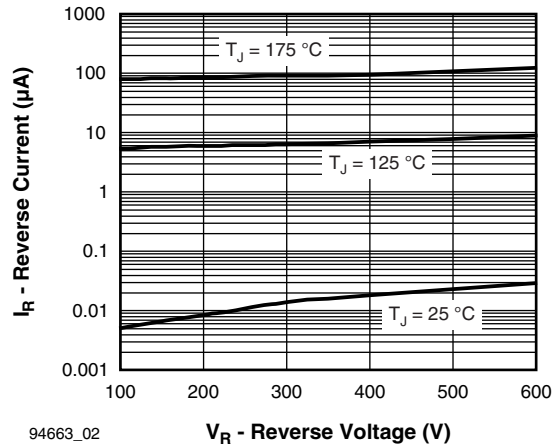


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

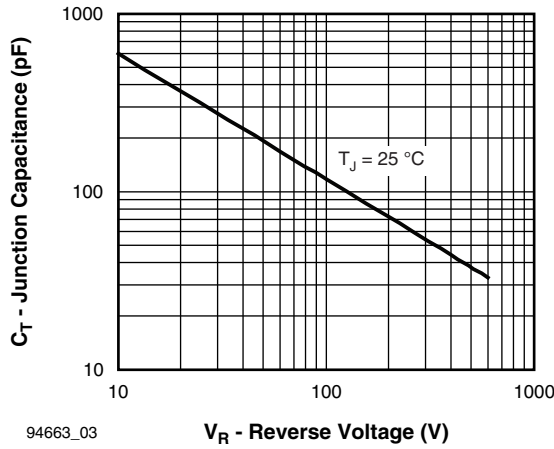
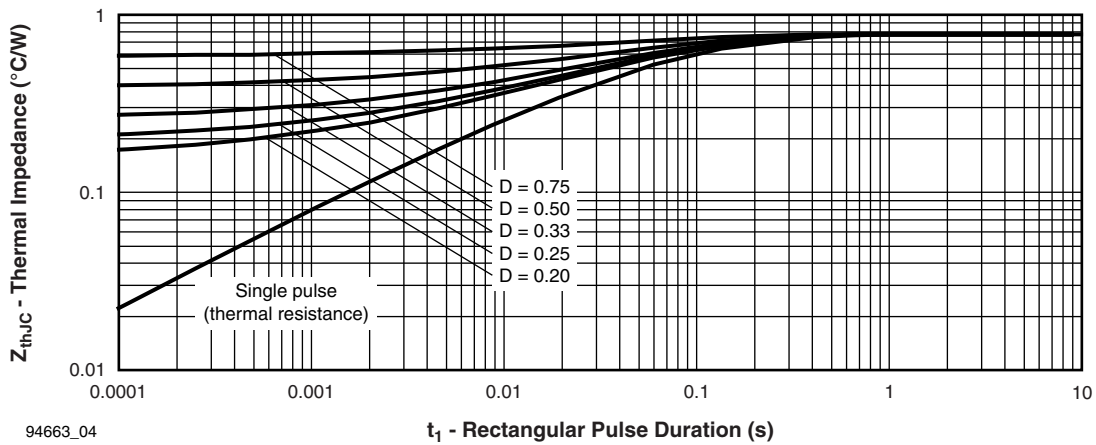


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


 Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Diode)

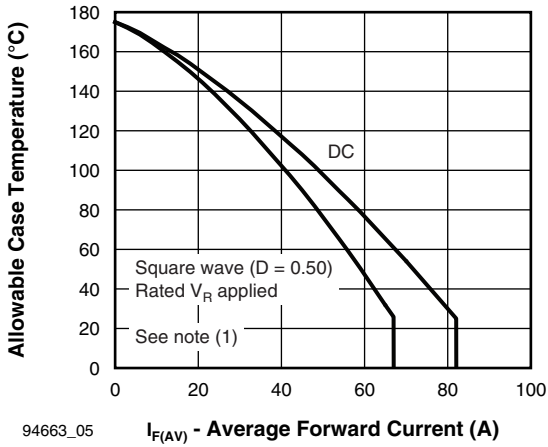


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

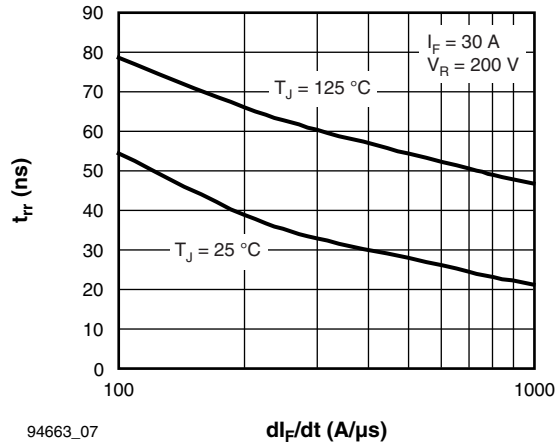


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

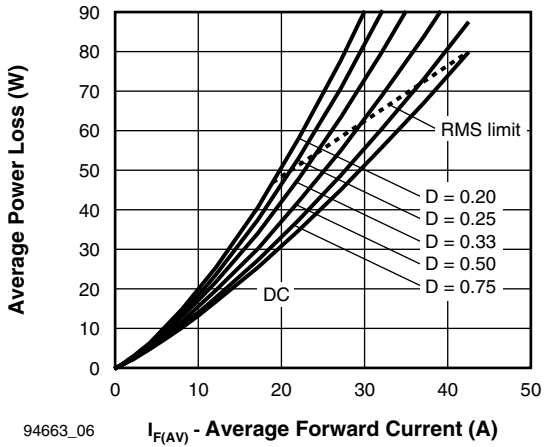


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

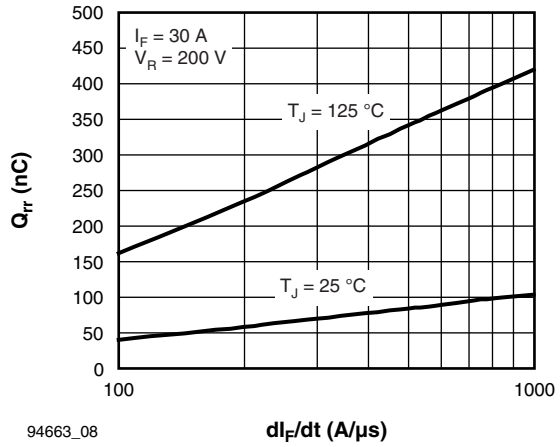


Fig. 8 - Typical Stored Charge vs. di_F/dt

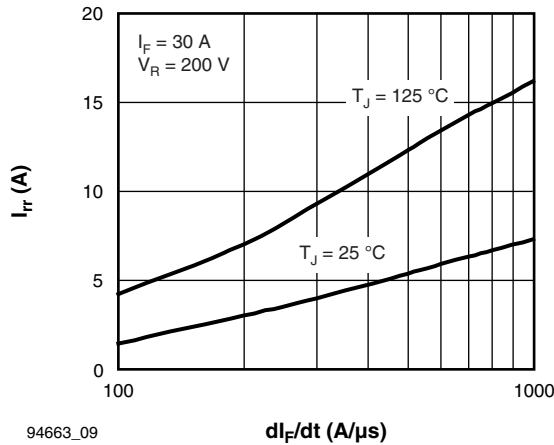


Fig. 9 - Typical Stored Current vs. di_F/dt

Note

- (1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
 Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 Pd_{REV} = Inverse power loss = $V_{R1} \times I_{R1} (1 - D)$; I_{R1} at $V_{R1} = 80\%$ rated V_R

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Power Module Hyperfast Rectifier, 60 A

Vishay Semiconductors

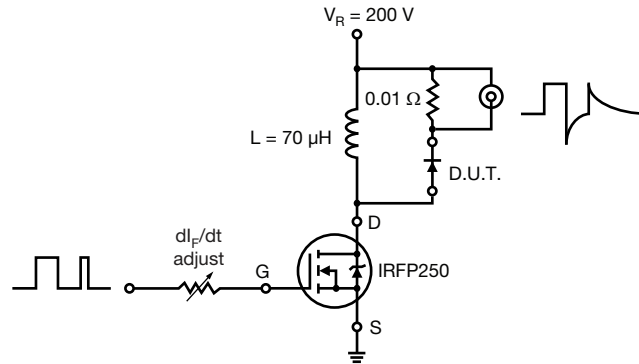
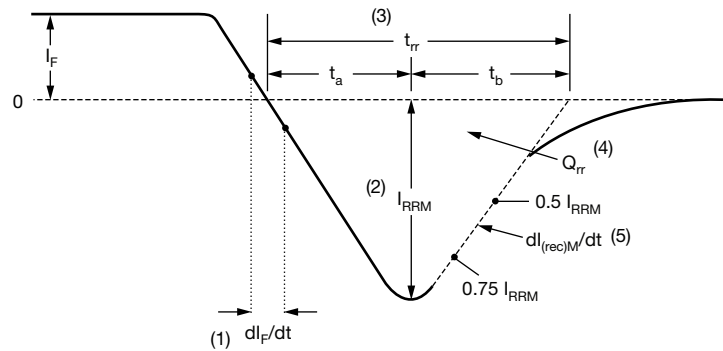


Fig. 10 - Reverse Recovery Parameter Test Circuit



(1) dl_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $dl_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

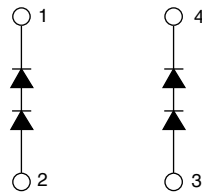
Fig. 11 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	UF	H	60	G	A	60	P
	①	②	③	④	⑤	⑥	⑦

- 1** - Ultrafast rectifier
- 2** - Hyperfast rectifier
- 3** - Current rating (60 = 60 A)
- 4** - Circuit configuration (2 separate diodes, tandem configuration)
- 5** - Package indicator (SOT-227 standard isolated base)
- 6** - Voltage rating (60 = 600 V)
- 7** - P = Lead (Pb)-free

CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95036
Packaging information	www.vishay.com/doc?95037



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