600V N-ch Multi-Epi Super-Junction MOSFET

Lead Free Package and Finish

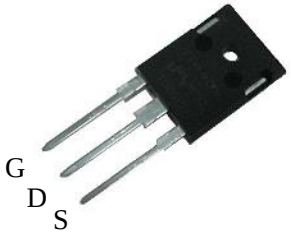
BV_{DSS}	$R_{DS(ON),typ.}$	I_D
600V	0.065Ω	47A

General Features

- Proprietary New Super-Junction Technology
- $R_{DS(ON),typ.}$=65 mΩ@V_{GS}=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

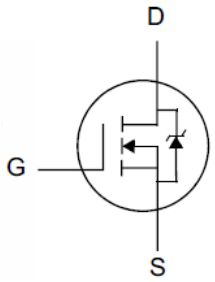
Applications

- Adaptor
- Charger
- SMPS Standby Power
- Switching Voltage Regulators



TO-247

Package Not to Scale



Ordering Information

Part Number	Package	Brand
SPTF60R70FD	TO-247	

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter	Value	Unit
		SPTF60R70FD	
V_{DSS}	Drain-to-Source Voltage	600	V
V_{GSS}	Gate source voltage (static)	±30	
I_D	Continuous Drain Current @ T_C = 25ºC	47	A
	Continuous Drain Current @ T_C = 100ºC	30	
I_{DM}	Pulsed Drain Current at V_{GS}=10V	141	
E_{AS}	Single Pulse Avalanche Energy	1536	mJ
P_D	Power Dissipation	390	W
T_J& T_{STG}	Operating and Storage Temperature Range	-55 to 150	℃

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	Max. Value	Unit
		SPTF60R70FD	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.32	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	50	

Electrical Characteristics

OFF Characteristics

T_J =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	600	--	--	V	V_{GS}=0V, I_D=250uA
I_{DSS}	Drain-to-Source Leakage Current	--	--	10	uA	V_{DS}=600V, V_{GS}=0V
		--	--	100		V_{DS} = 480V, V_{GS} = 0V, T_J=125 ℃
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	V_{GS}=+30V, V_{DS}=0V
		--	--	-100		V_{GS}=-30V, V_{DS}=0V

ON Characteristics

T_J =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	65	85	mΩ	V_{GS}=10V, I_D=20A
$V_{GS(TH)}$	Gate Threshold Voltage	2.5	--	4.5	V	V_{DS}=V_{GS}, I_D=250uA

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	3787	--	pF	V_{GS}=0V, V_{DS}=50V, f=1.0MH_Z
C_{oss}	Output Capacitance	--	364	--		
C_{rss}	Reverse Transfer Capacitance	--	0.8	--		
Q_g	Total Gate Charge	--	78.2	--	nC	V_{DD}=480V, I_D=47A, V_{GS}=0 to 10V
Q_{gs}	Gate-to-Source Charge	--	30	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	28.3	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	53	--	ns	V_{DD}=400V, I_D=26A, V_{GS}=10V Rg=1.7Ω
t_{rise}	Rise Time	--	53	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	129	--		
t_{fall}	Fall Time	--	45	--		

Source-Drain Body Diode Characteristics

T_J=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current[2]	--	--	47	A	Maximum Ratings
I_{SM}	Pulsed Source Current[2]	--	--	141		
V_{SD}	Diode Forward Voltage	--	--	1.2	V	I_S=47A, V_{GS}=0V
T_{rr}	Reverse Recovery Time	--	227	--	nS	I_S=47A , di/dt =100A/us
Q_{rr}	Reverse Recovery Charge	--	1.05	--	uC	

Note:

[1] T_J=+25℃ to +150℃
[2] Pulse width≤380μs; duty cycle≤2%.

Typical Characteristics：

Figure 1. Output Characteristics

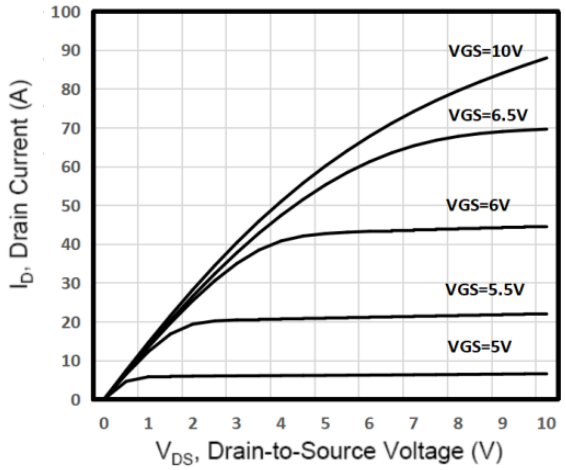


Figure 2. Transfer Characteristics

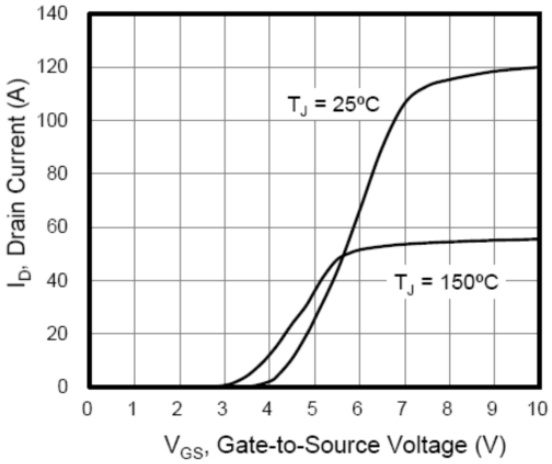


Figure 3. On-Resistance vs. Drain Current

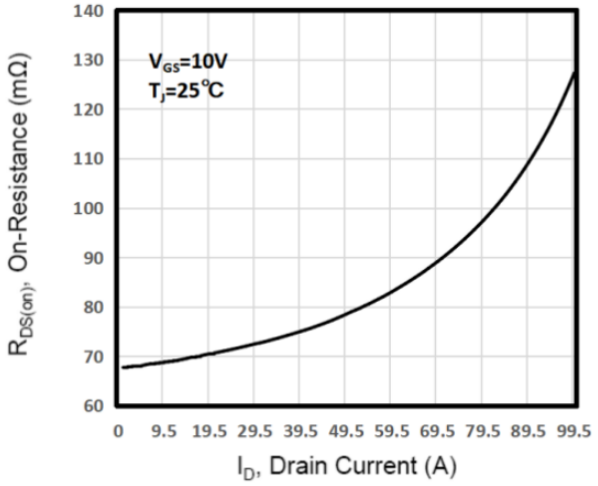


Figure 4. Capacitance

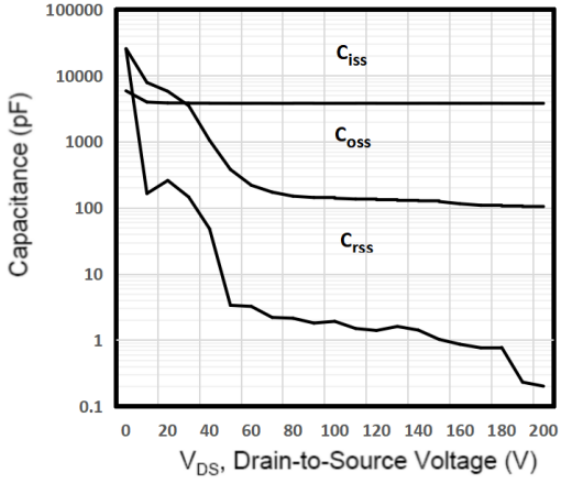


Figure 5. Gate Charge

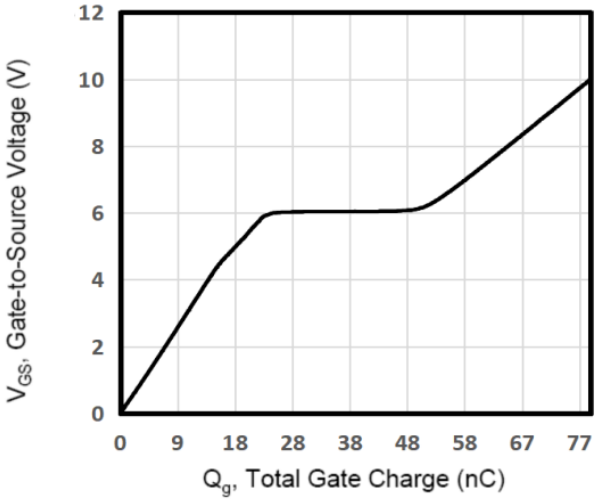
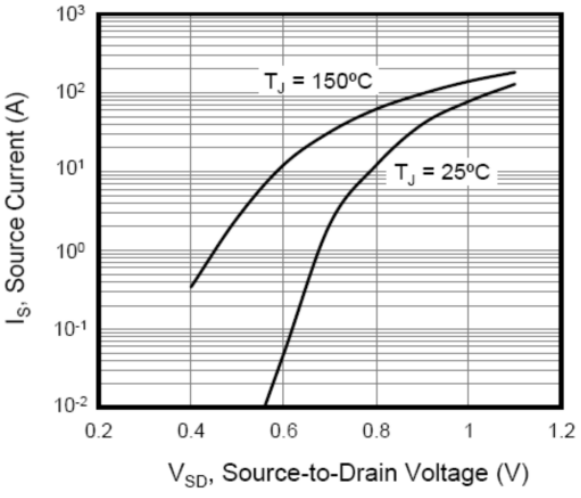


Figure 6. Body Diode Forward Voltage



Typical Characteristics：

Figure 7. On-Resistance vs. Temperature

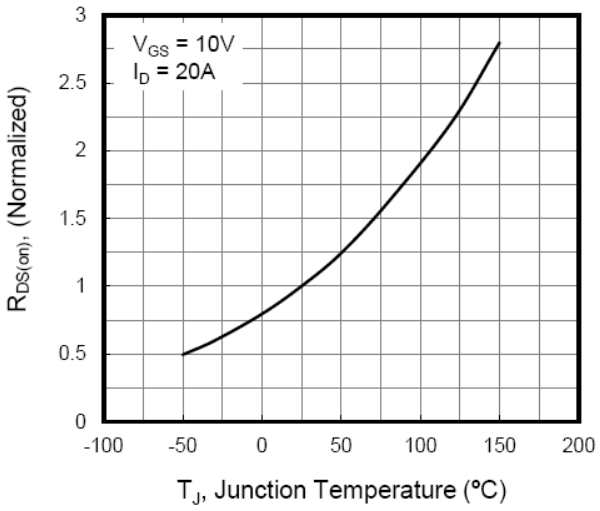


Figure 8. Threshold Voltage vs. Temperature

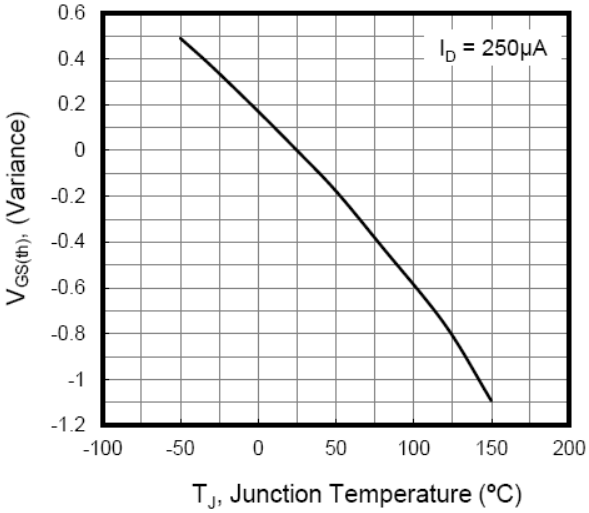
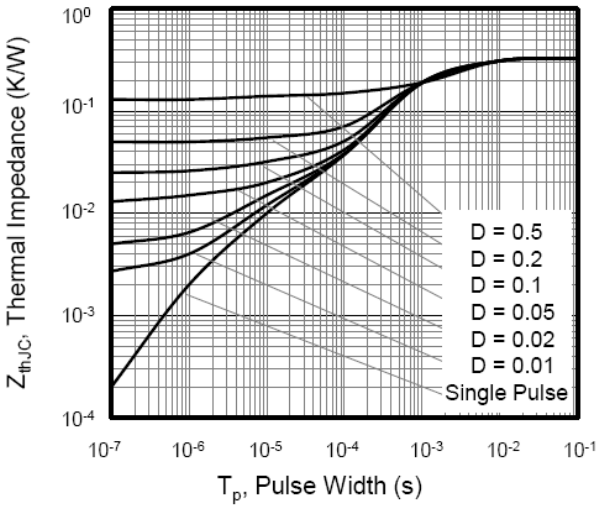


Figure 9. Transient Thermal Impedance



Test Circuits and Waveforms

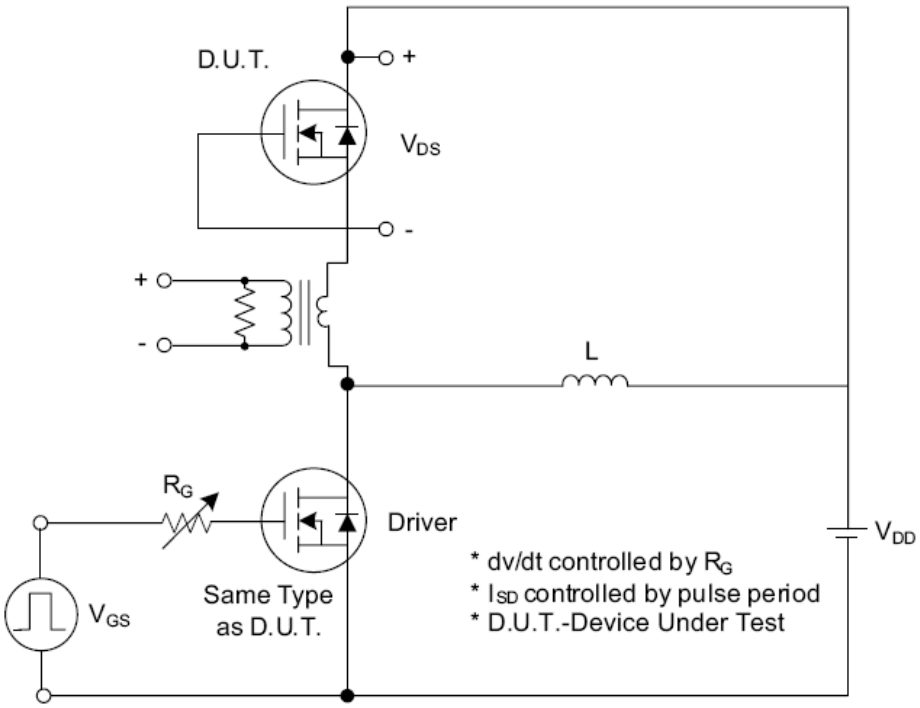


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

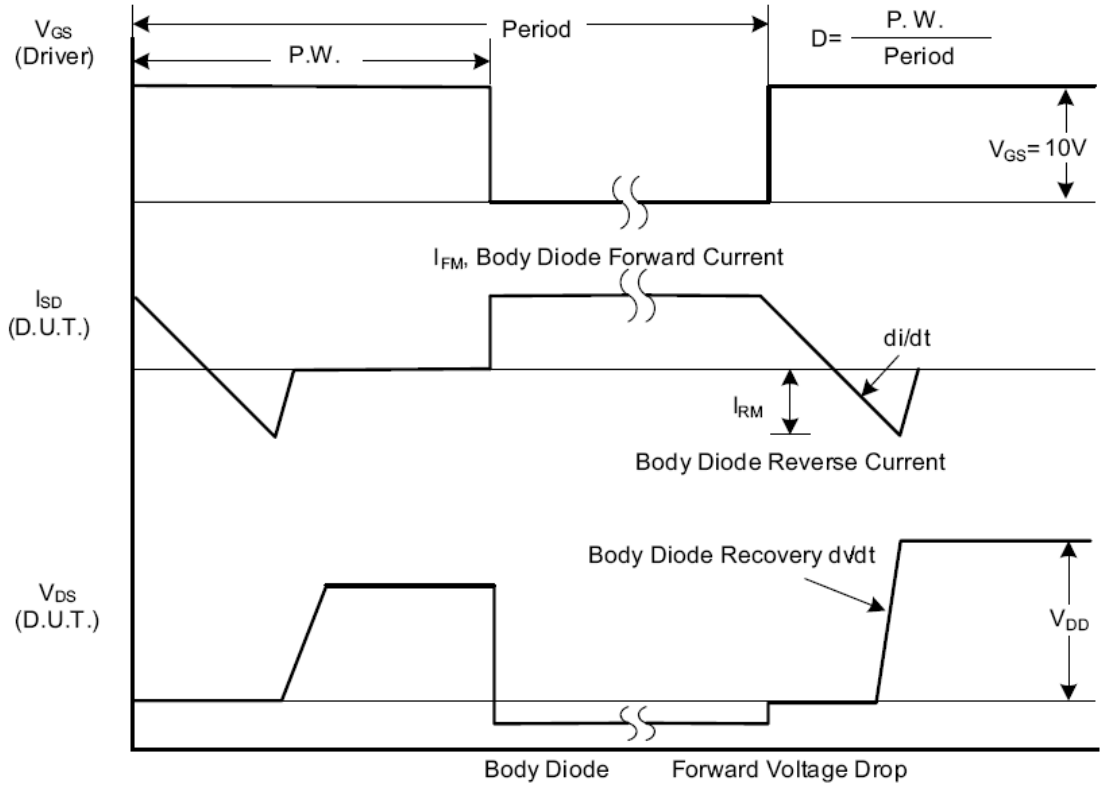


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)

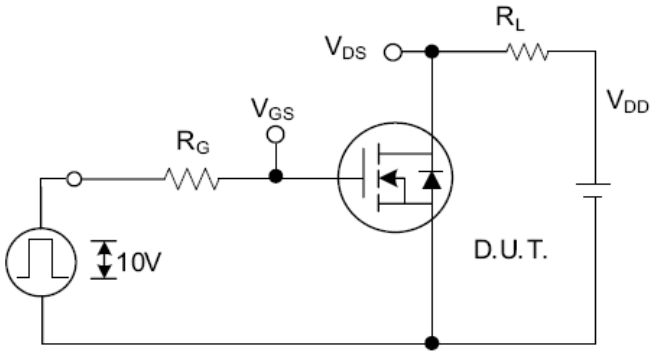


Fig. 2.1 Switching Test Circuit

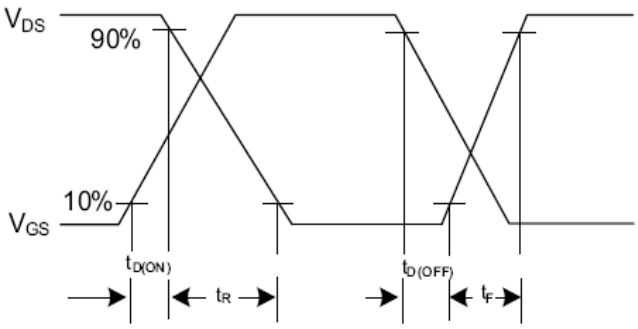


Fig. 2.2 Switching Waveforms

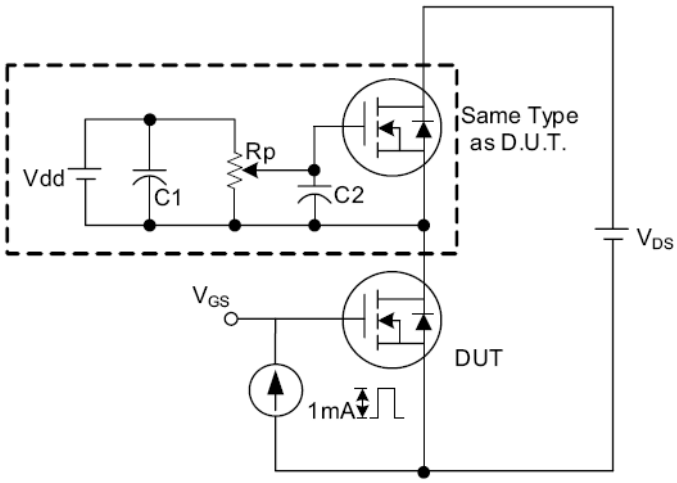


Fig. 3 . 1 Gate Charge Test Circuit

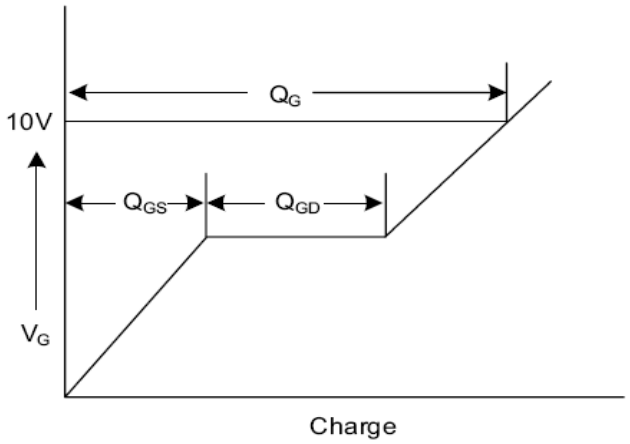


Fig. 3 . 2 Gate Charge Waveform

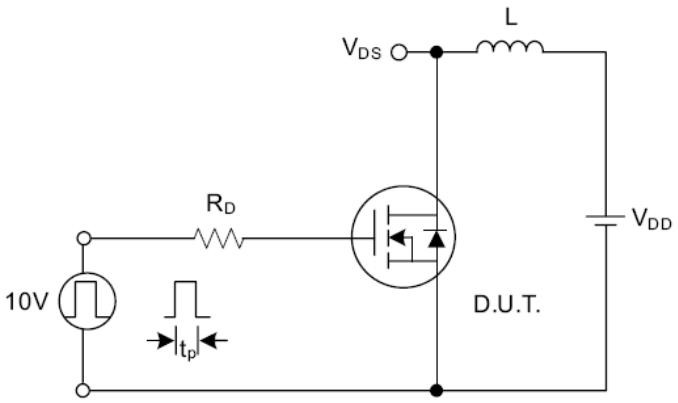


Fig. 4.1 Unclamped Inductive Switching Test Circuit

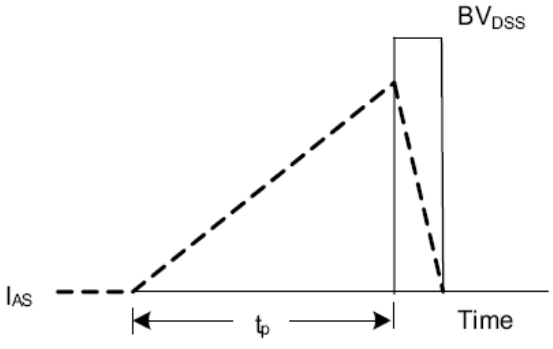


Fig. 4.2 Unclamped Inductive Switching Waveforms

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