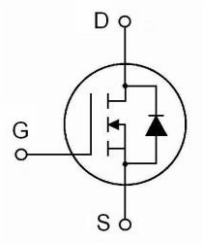
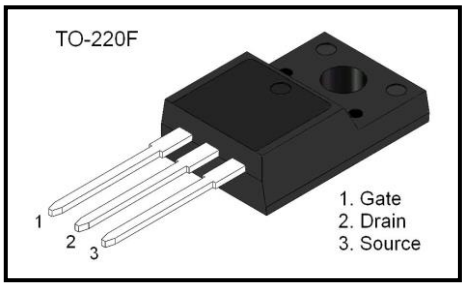
General Description

The 8N50F is a high voltage power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristic. This power MOSFET is usually used in high speed switching applications including power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits

Features

- V_{DS} 500V
- I_D 8A
- $R_{DS(ON)}$ (V_{GS} = 10V) < 0.85Ω
- Fast Switching Capability
- Avalanche Energy Specified
- Improved dv/dt Capability, High Ruggedness





Absolute Maximum Ratings (T_A = 25℃)

Parameter		Symbol	Ratings	Units
Gate-drain voltage		V_{DSS}	500	V
Gate-source voltage		V_{GSS}	±30	V
Drain current	Continuous T_C=25 °C (Note 2)	I_D	8	A
	Pulsed (Note 3)	I_{DM}	32	
Avalanche energy	Single pulsed (Note 4)	E_{AS}	122	mJ
	Repetitive (Note 5)	E_{AR}	13	mJ
Avalanche current (Note 1)		I_{AR}	8	A
Peak diode recovery dv/dt (Note 5)		dv/dt	10	V/ns
Power dissipation		P_D	38.5	W
Junction temperature		T_J	150	°C
Storage temperature		T_{STG}	-55～155	°C

Note: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Drain current limited by maximum junction temperature.
3. Repetitive Rating: Pulse width limited by maximum junction temperature.
4. L = 3.8mH, I_{AS} = 8A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25 °C .
5. I_{SD} ≤ 8A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS} , Starting T_J = 25 °C.

Thermal Characteristic

Parameter	Symbol	Value	Units
Maximum thermal resistance, junction-case	$R_{\theta JC}$	3.3	°C/W
Maximum thermal resistance, junction-ambient	$R_{\theta JA}$	62.5	°C/W

Electrical Characteristics (T_j = 25°C unless otherwise specified)

Parameter		Symbol	Test Conditions	Min.	Typ	Max.	Units
Off Characteristics							
Drain-source breakdown voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	500			V
Breakdown voltage temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA, Referenced to 25°C		0.5		V/°C
Zero gate voltage drain current		I_{DSS}	V_{DS}= 500V, V_{GS}= 0V			25	μA
Gate leakage current	Forward	I_{GSS}	V_{DS}=0V, V_{GS}=+30V			100	nA
	Reverse		V_{DS}=0V, V_{GS} = -30V			-100	
On Characteristics							
Gate threshold voltage		$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2.0		4.0	V
Drain-source on-Resistance		$R_{DS(ON)}$	V_{GS} = 10V,I_D = 4A			0.85	Ω
Dynamic Characteristics							
Input capacitance		Ciss	V_{DS} = 25V,V_{GS} = 0V, f = 1.0MHz		850	1130	pF
Output capacitance		Coss			115	155	
Reverse transfer capacitance		Crss			9	13.5	
Switching Characteristics)							
Turn-on delay time		$t_{d(on)}$	V_{DS} = 250V, I_D = 8A R_G = 25Ω (Note6, 7)		15	40	ns
Turn-on rise time		t_r			38	86	
Turn-off elay time		$t_{d(off)}$			46	102	
Turn-off fall		t_f			33	76	
Total gate charge		Q_g	V_{DS} = 400V, I_D = 8A V_{GS} = 10V (Note6, 7)		18	24	nC
Gate-source charge		Q_{gs}			5		
Gate-drain charge		Q_{gd}			7.5		
Drain-Source Diode Characteristics							
Diode forward voltage		V_{SD}	V_{GS}=0V, I_S = 8A			1.6	V
Diode forward current		I_S				8	A
Pulsed diode forward current		I_{SM}				32	A
Reverse recovery Time		t_{rr}	I_S = 8A, V_{GS} = 0V dI_F/dt =100A/μs (Note 6)		228		ns
Reverse recovery charge		Q_{rr}			1.43		μC

Note 6. Pulse Test: Pulse Width≤300μs,Duty Cycle≤2%

7. Essentially independent of operating temperature.

Typical Characteristics

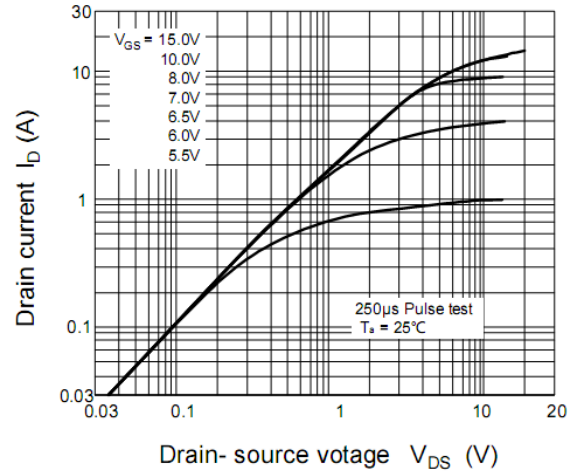


Figure 1 Output Characteristics

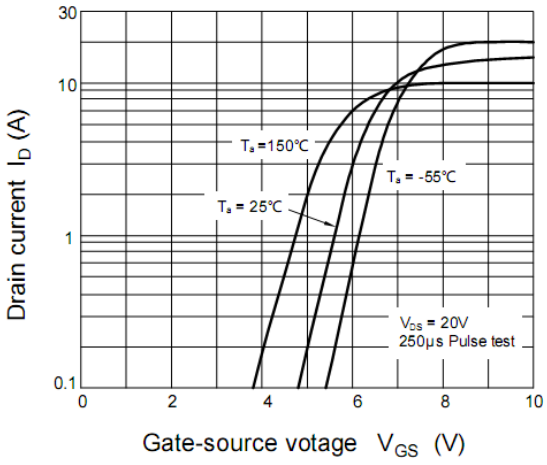


Figure 2. Transfer Characteristics

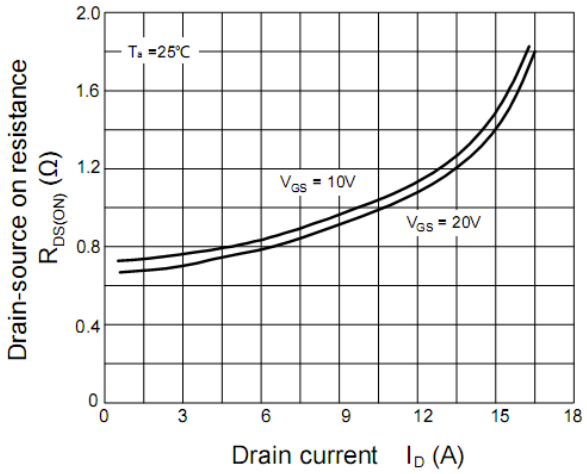


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

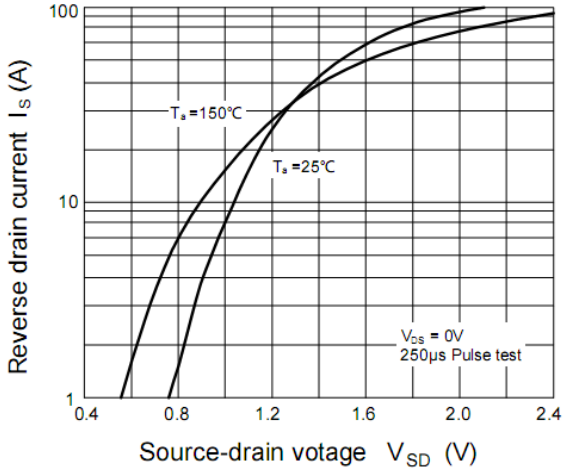


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

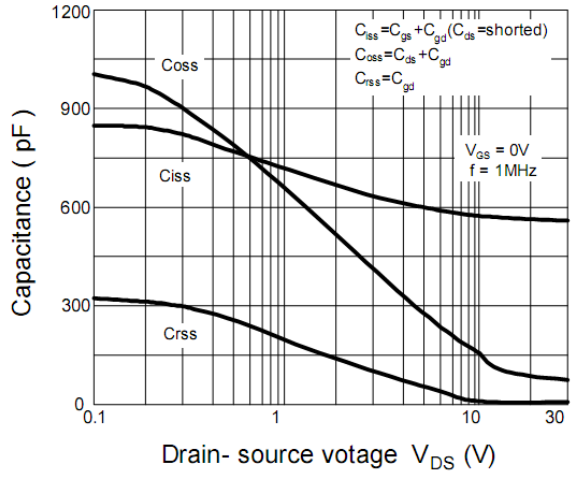


Figure 5. Capacitance Characteristics

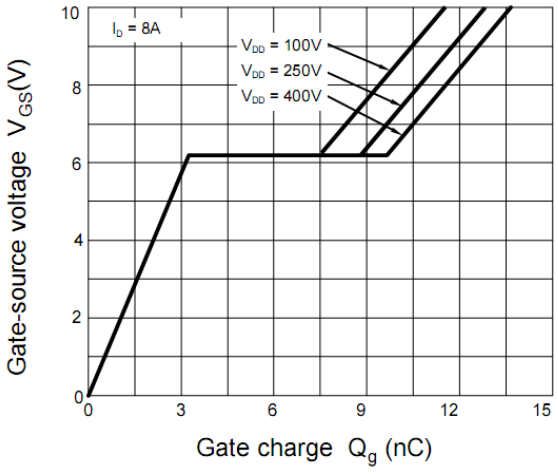


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

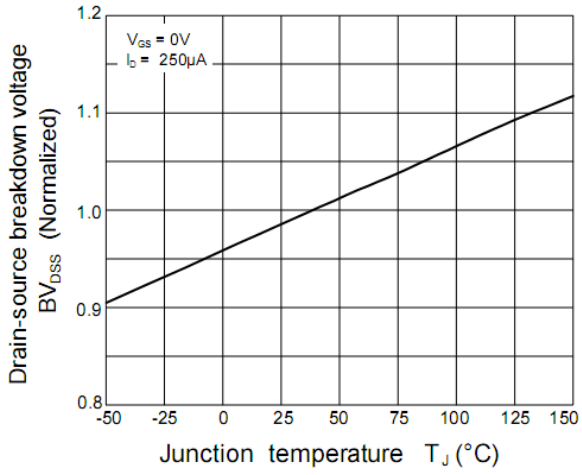


Figure 7. Breakdown Voltage Variation vs Temperature

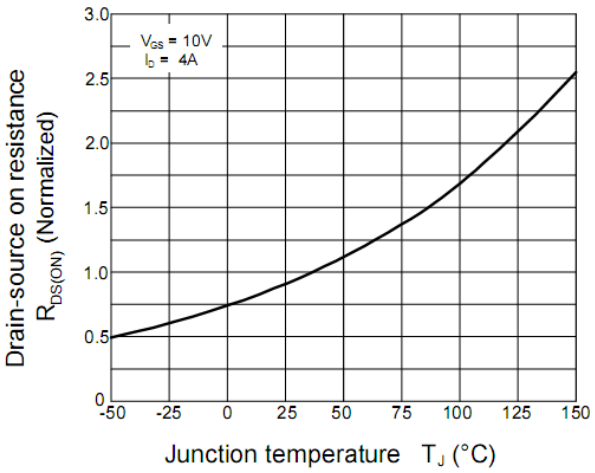


Figure 8. On-Resistance Variation vs Temperature

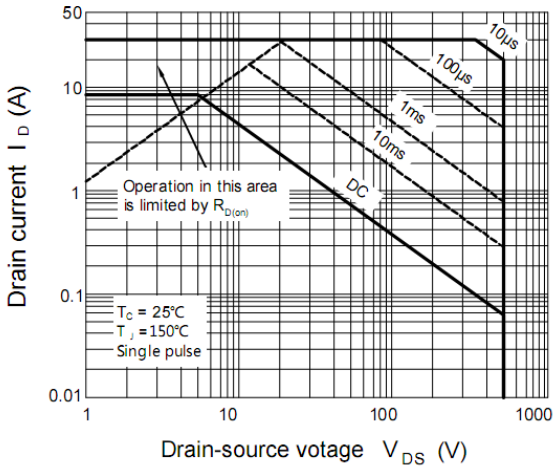


Figure 9. Safe Operating Area

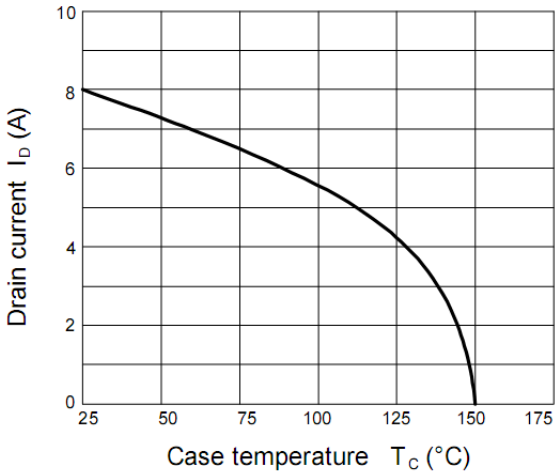


Figure 10. Maximum Drain Current vs Case Temperature

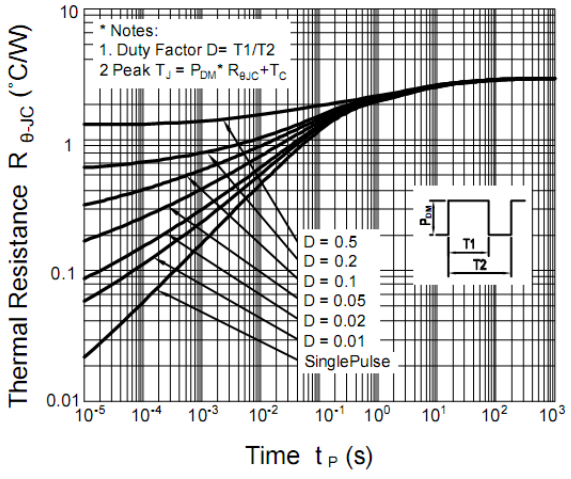


Figure 11. Transient Thermal Response Curve

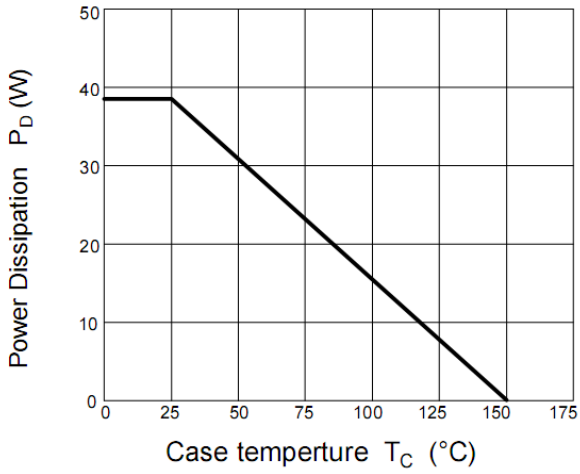


Figure 12. Power Derating

Test Circuits and Waveforms

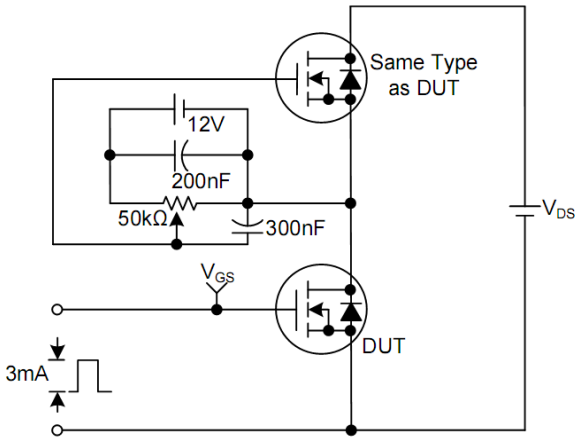


Figure 13. Gate Charge Test Circuit

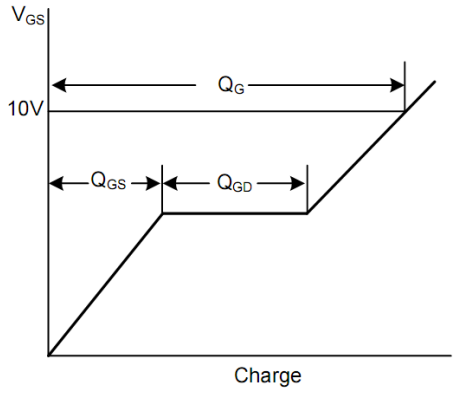


Figure 14. Gate Charge Waveforms

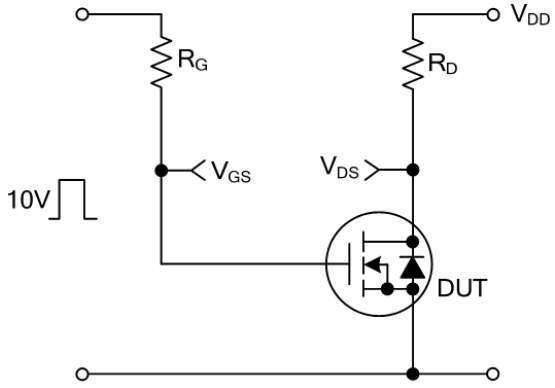


Figure 15. Resistive Switching Circuit

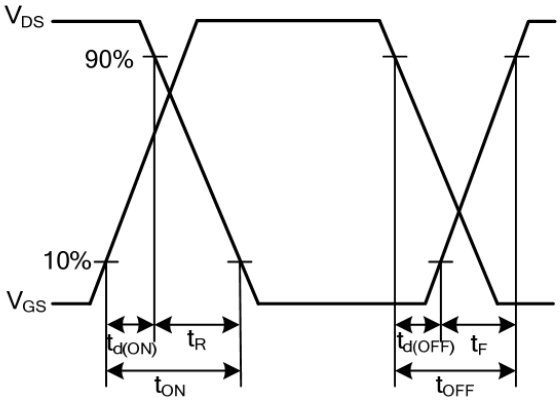


Figure 16. Resistive Switching Waveforms

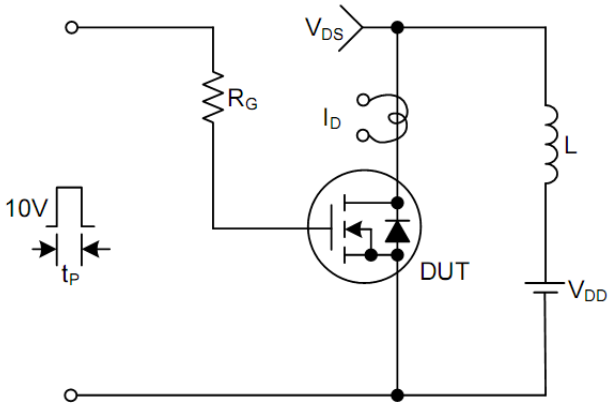


Figure 17. Unclamped Inductive Switching Test Circuit

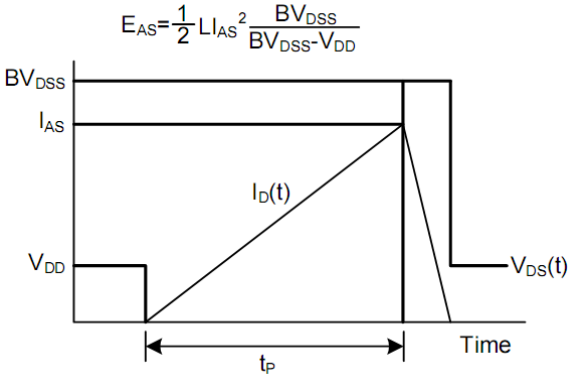


Figure 18. Unclamped Inductive Switching Waveforms

Test Circuits and Waveforms (Continued)

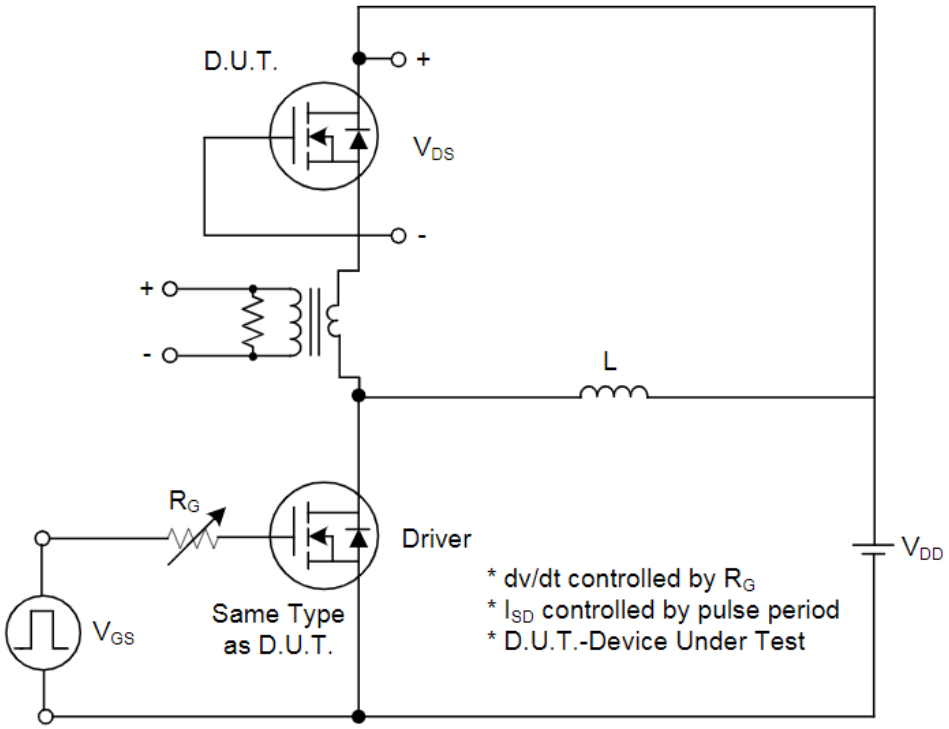


Figure 19. Peak Diode Recovery dv/dt Test Circuit

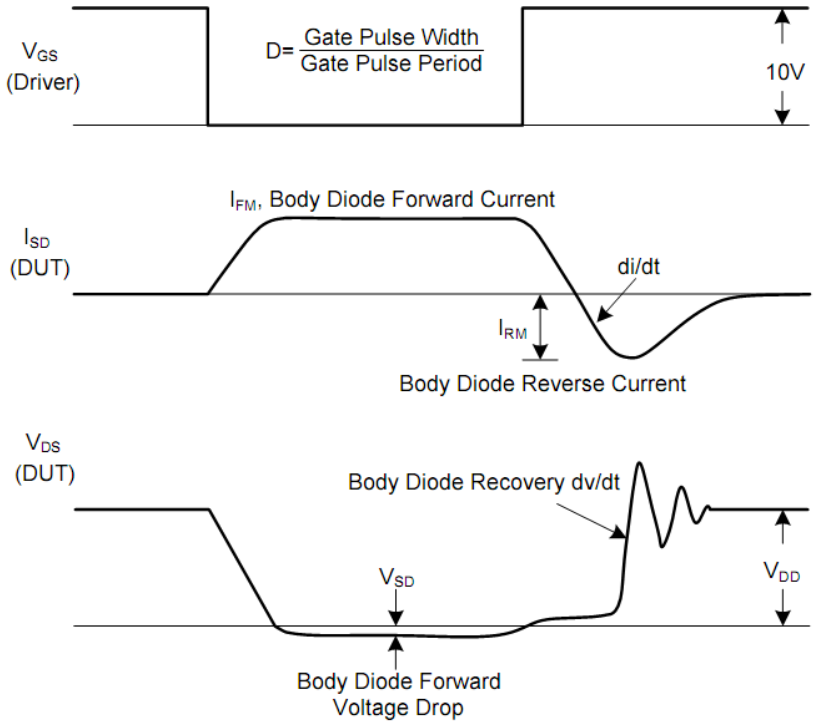
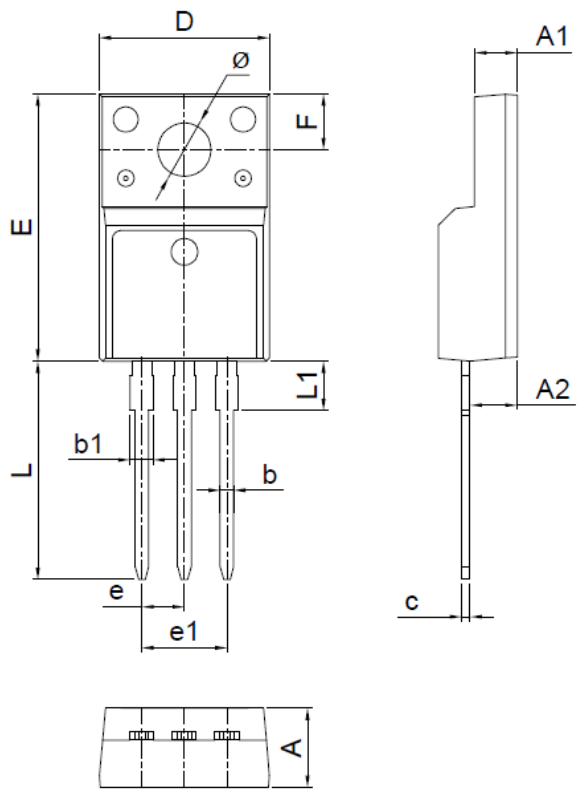


Figure 20. Peak Diode Recovery dv/dt Waveforms

Package Dimensions



Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.50	4.90	0.177	0.193
A1	2.34	2.74	0.092	0.108
A2	2.66	2.86	0.105	0.113
b	0.75	0.85	0.030	0.033
b1	1.24	1.44	0.049	0.057
c	0.40	0.60	0.016	0.024
D	10.00	10.32	0.394	0.406
E	15.75	16.05	0.620	0.632
e	2.44	2.64	0.096	0.104
e1	4.88	5.28	0.192	0.208
F	3.10	3.5	0.122	0.138
L	12.90	13.50	0.508	0.531
L1	2.90	3.30	0.114	0.130
Φ	3.10	3.30	0.122	0.130