



N-Channel Enhancement Mode Field Effect Transistor

General Description

These are N-Channel enhancement mode silicon gate power field effect transistors. They are advanced power MOSFETs designed, this advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switch mode power supply, power factor correction, electronic lamp ballast based on half bridge.

Features

- 7A, 600V(See Note), $R_{DS(on)} < 1.2\Omega @ V_{GS} = 10V$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS compliant

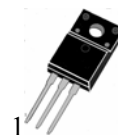
Maximum Ratings (Ta=25°C unless otherwise specified)

T_{stg}	Storage Temperature	-----	-55~150°C
T_j	Operating Junction Temperature	-----	150°C
V_{DSS}	Drain-Source Voltage	-----	600V
V_{GSS}	Gate-Source Voltage	-----	±30V
I_D	Drain Current (Continuous)(T _c =25°C)	-----	7A
I_{DM}	Pulsed Drain Current (Note 1)	-----	28A
P_D	Maximum Power Dissipation (T _c =25°C)	-----	48W
	Derate Above 25°C	-----	0.38W/°C
E_{AS}	Pulsed Avalanche Energy (Note 2)	-----	420mJ
I_{AR}	Avalanche Current (Note 1)	-----	7A
E_{AR}	Repetitive Avalanche Energy (Note 1)	-----	4.8mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	-----	5.5V/ns

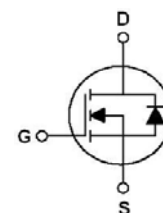
Thermal Characteristics

Symbol	Items	TO-220F	Unit
Rthj-case	Thermal Resistance Junction-case	Max 2.6	°C/W
Rthj-amb	Thermal Resistance Junction-ambient	Max 62.5	°C/W

TO-220F



1- G 2-D 3-S



**Electrical Characteristics** ($T_a=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Items	Min.	Typ.	Max.	Unit	Conditions
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	600			V	I _D =250μA ,V _{GS} =0V
I _{DSS}	Zero Gate Voltage Drain Current			1	μA	V _{DS} =600V, V _{GS} =0V
				10	μA	V _{DS} =480V, V _{GS} =0V,T _j =125°C
I _{GSS}	Gate – Body Leakage			±100	nA	V _{GS} = ±30V , V _{DS} =0V
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	2.0		4.0	V	V _{DS} = V _{GS} , I _D =250μA
R _{DS(on)}	Static Drain-Source On-Resistance		0.91	1.2	Ω	V _{GS} =10V, I _D =3.5A
Dynamic Characteristics and Switching Characteristics						
C _{iss}	Input Capacitance		970	1260	pF	V _{DS} = 25 V, V _{GS} = 0V, f = 1.0 MHz
C _{oss}	Output Capacitance		80	110	pF	
C _{rss}	Reverse Transfer Capacitance		17	22	pF	
t _{d(on)}	Turn - On Delay Time		20	40	nS	V _{DS} = 300V, I _D =7A, R _G = 25 Ω (Note 4,5)
tr	Rise Time		55	110	nS	
t _{d(off)}	Turn - Off Delay Time		90	180	nS	
t _f	Fall Time		60	120	nS	
Q _g	Total Gate Charge		40	52	nC	V _{DS} =480V, I _D =7A, V _{GS} = 10 V (Note 4,5)
Q _{gs}	Gate–Source Charge		6.5		nC	
Q _{gd}	Gate–Drain Charge		16.5		nC	
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Continuous Source–Drain Diode Forward Current			7	A	
I _{SM}	Pulsed Drain-Source Diode Forward Current			28	A	
V _{SD}	Source–Drain Diode Forward On–Voltage			1.4	V	I _S =7A,V _{GS} =0

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=15.7\text{mH}$, $I_{AS}=7.0\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$
3. $I_{SD}\leq 7.0\text{A}$, $di/dt\leq 300\text{A}/\mu\text{S}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$
4. Pulse Test: Pulse width $\leq 300\mu\text{S}$, Duty Cycle $\leq 2\%$
5. Essentially independent of operating temperature typical characteristics



Typical Characteristics

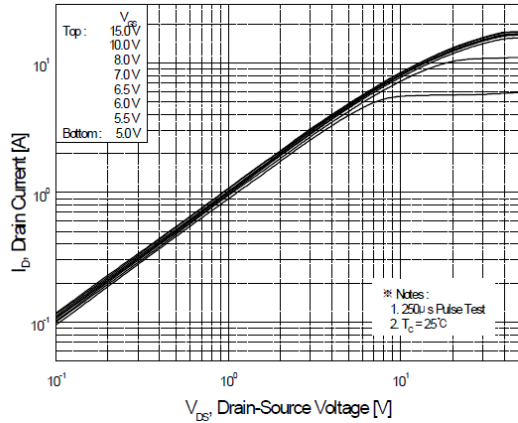


Figure 1. On-Region Characteristics

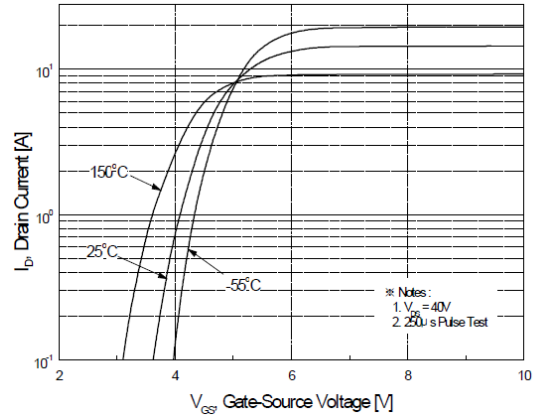


Figure 2. Transfer Characteristics

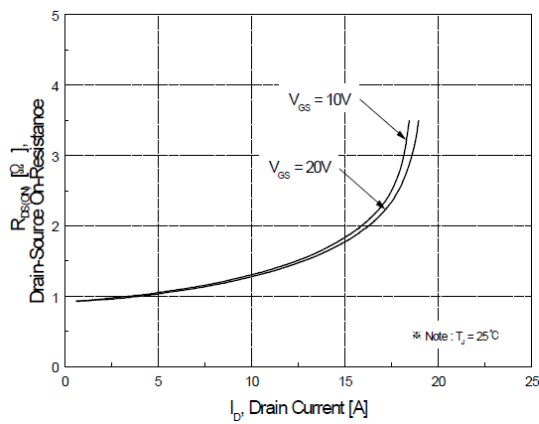


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

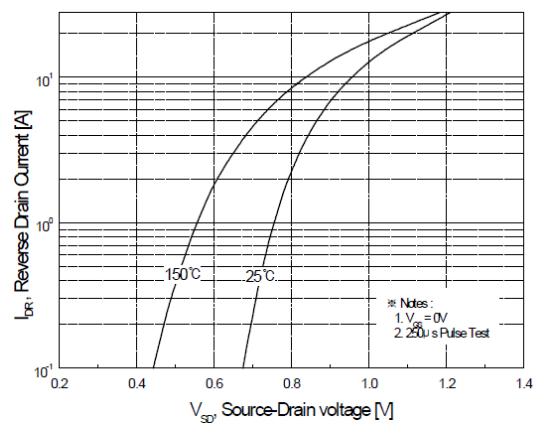


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

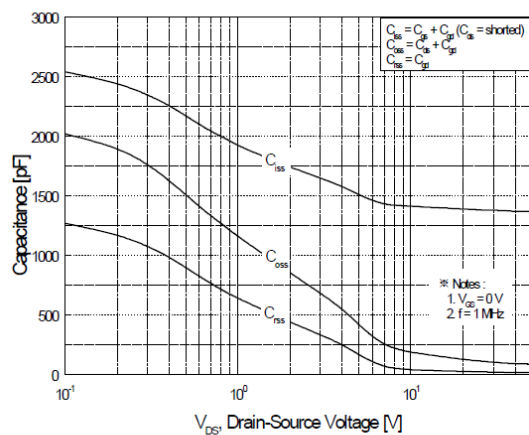


Figure 5. Capacitance Characteristics

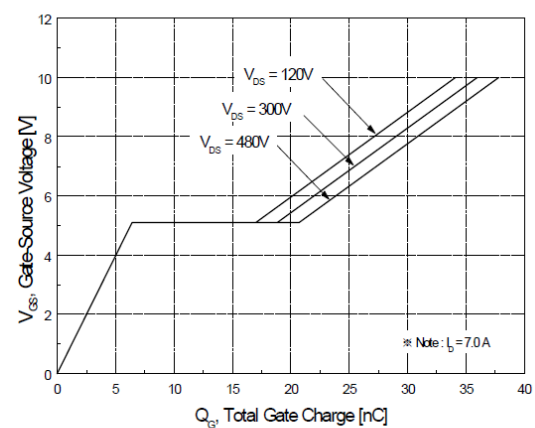


Figure 6. Gate Charge Characteristics



Typical Characteristics

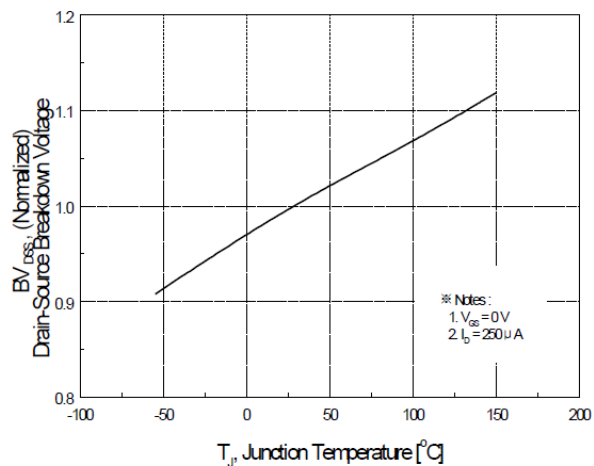


Figure 7. Breakdown Voltage Variation vs Temperature

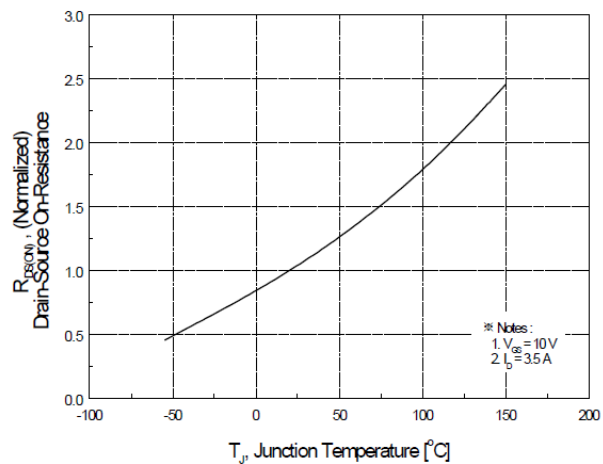


Figure 8. On-Resistance Variation

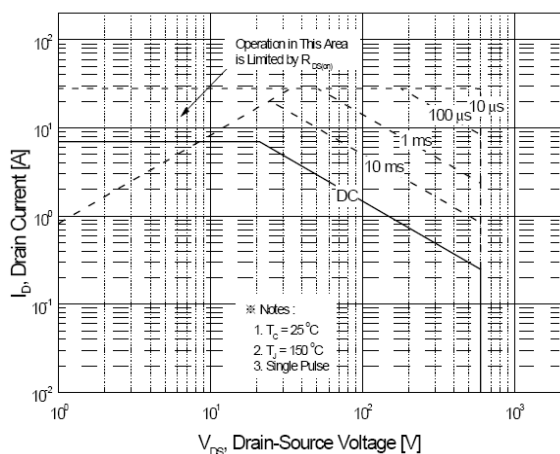


Figure 9. Maximum Safe Operating Area

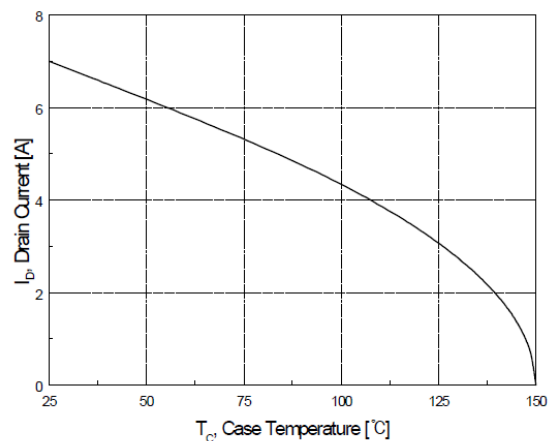


Figure 10. Maximum Drain Current vs Case Temperature

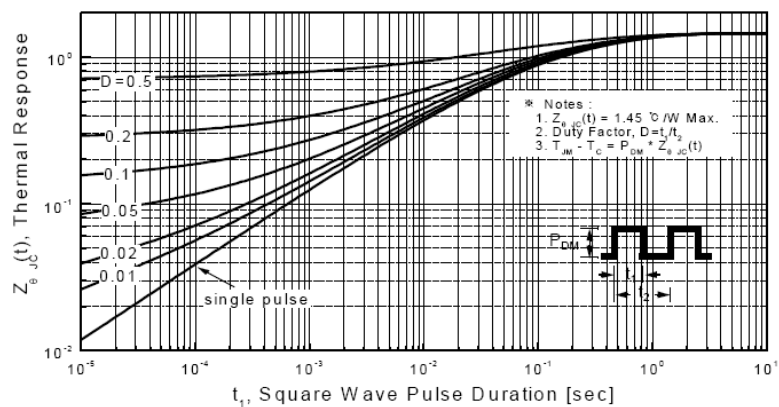


Figure 11. Transient Thermal Response Curve



Typical Characteristics

Fig 12. Gate Charge Test Circuit & Waveform

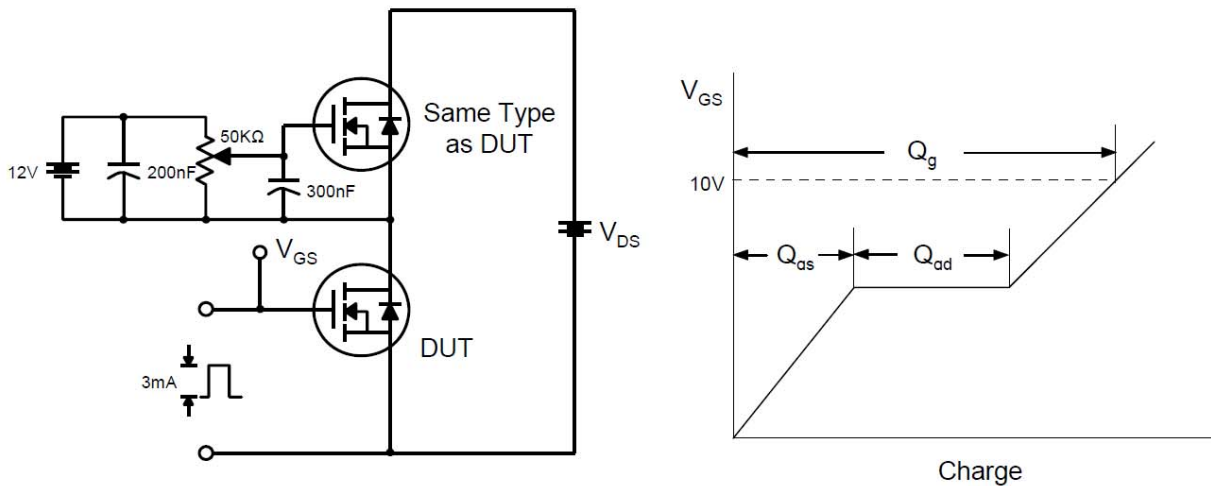


Fig 13. Resistive Switching Test Circuit & Waveforms

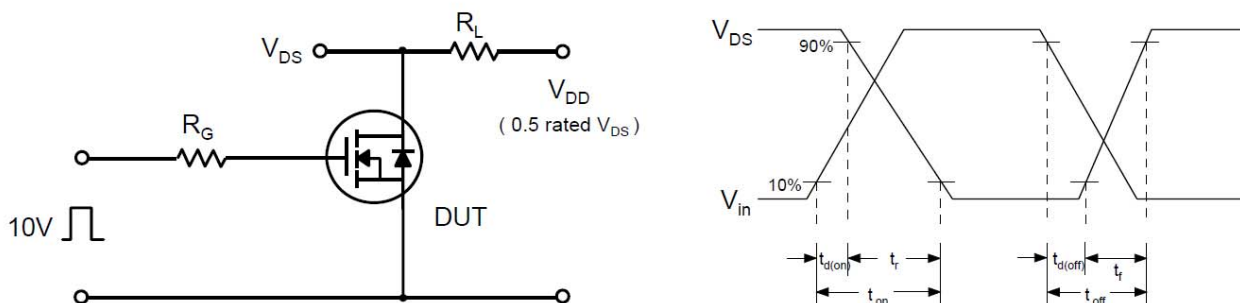
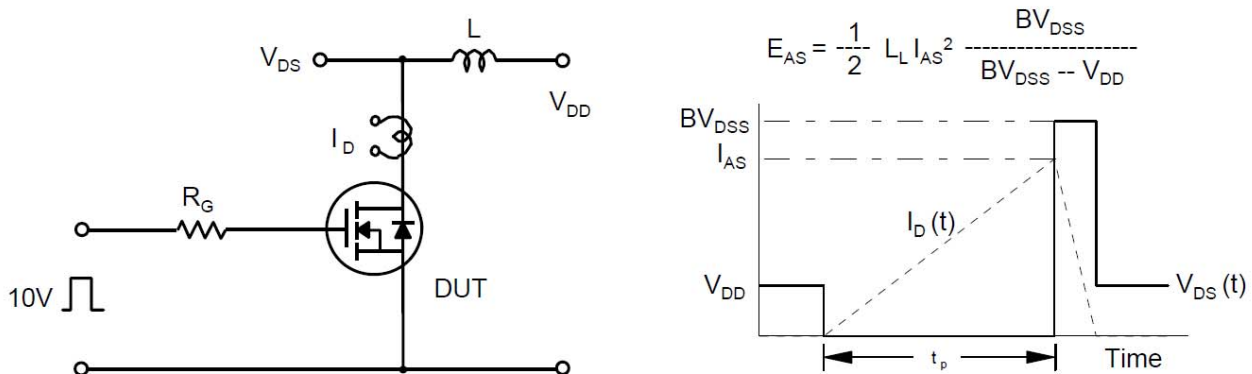


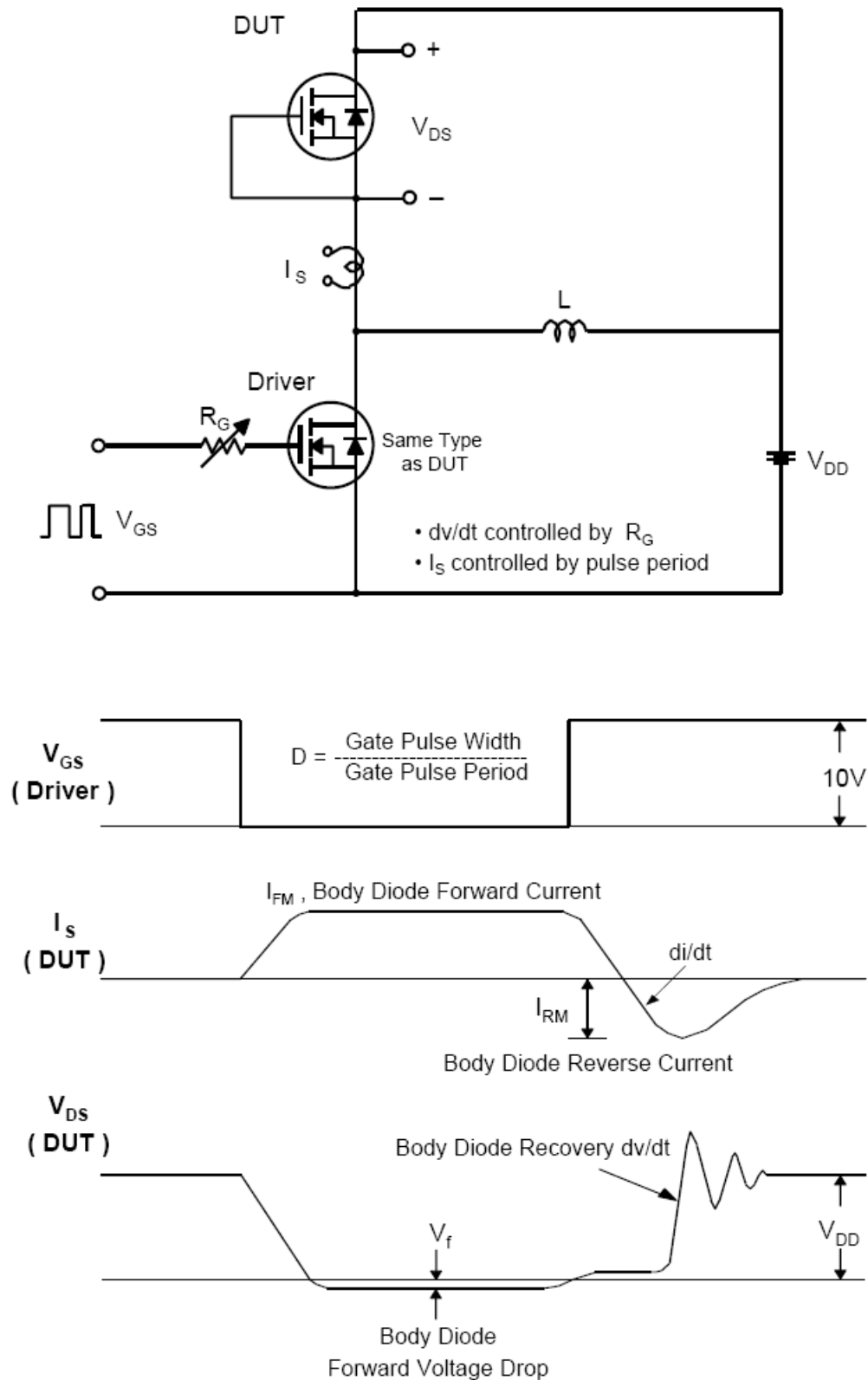
Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms





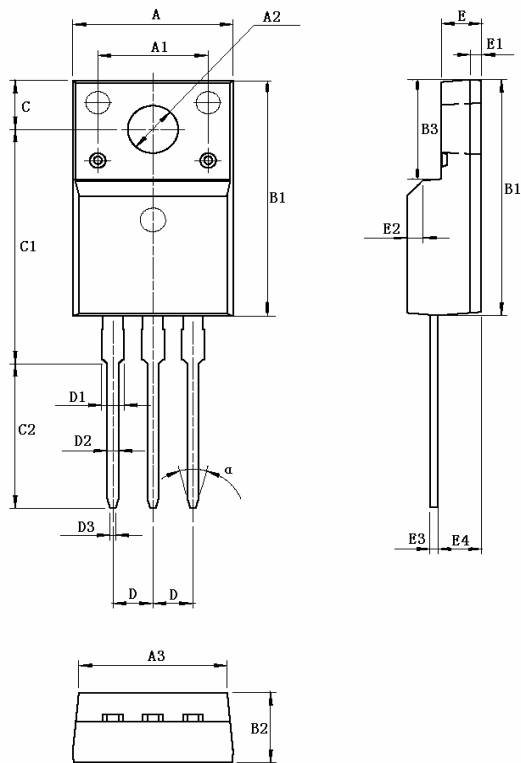
■ Typical Characteristics

Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





■ Package Dimensions



Symbol	Millimeters			Symbol	Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	9.96		10.36	D		2.54	
A1		7.0		D1			1.47
A2 (Φ)	3.08		3.28	D2	0.70		0.90
A3	9.26		9.66	D3	0.25		0.45
B1	15.67		16.07	E	2.34		2.74
B2	4.50		4.90	E1		0.70	
B3	6.48		6.88	E2		1.0×45°	
C	3.20		3.40	E3	0.45		0.60
C1	15.60		16.00	E4	2.56	2.76	2.96
C2	9.55		9.95	α(°)		30°	