

N-Channel Enhancement Mode

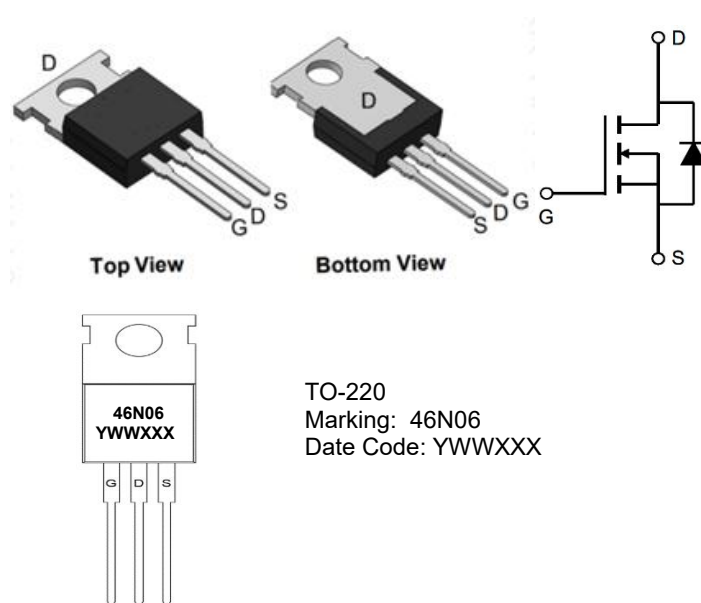
Features

- Advanced Trench Process Technology
- Low Threshold Voltage
- Fast Switching Speed
- Halogen-Free & Lead-Free

Application

- Motor/Body Load Control
- Load Switch
- DC-DC converters

100% EAS Test



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	80	A
Peak Drain Current, Pulsed ¹⁾	I_{DM}	150	A
Power Dissipation	P_{tot}	215	W
Avalanche Current	I_{AS}	39	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	152	mJ
Operating Junction	T_J	-55~175	°C
Storage Temperature Range	T_{stg}	-55~175	°C

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case ³⁾	$R_{\theta JC}$	0.7	°C/W
Thermal Resistance from Junction to Ambient ³⁾	$R_{\theta JA}$	62	°C/W

Note:

1) Pulse Test: Pulse Width $\leq 100\mu s$, Duty Cycle $\leq 2\%$, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ C$.

2) Limited by $T_{J(MAX)}$, starting $T_J = 25^\circ C$, $L = 0.2mH$, $R_g = 25\Omega$, $I_D = 39A$, $V_{GS} = 10V$.

3) Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square

Characteristics at Ta = 25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $V_{GS}=0V$, $I_D=250\mu A$	BV_{DSS}	60			V
Drain-Source Leakage Current at $V_{DS}=60V$, $V_{GS}=0V$	I_{DSS}			1	μA
Gate Leakage Current at $V_{DS}=0V$, $V_{GS}=\pm 20V$	I_{GSS}			± 100	nA
Gate-Source Threshold Voltage at $V_{DS}=V_{GS}$, $I_D=250\mu A$	$V_{GS(th)}$	2	3	4	V
Drain-Source On-State Resistance at $V_{GS}=10V$, $I_D=30A$	$R_{DS(on)}$		4.5	6	m Ω
DYNAMIC PARAMETERS					
Gate resistance at $V_{DS}=0V$, $f=1MHz$	R_g			2	Ω
Input Capacitance at $V_{DS}=25V$, $V_{GS}=0V$, $f=1MHz$	C_{iss}		3900		pF
Output Capacitance at $V_{DS}=25V$, $V_{GS}=0V$, $f=1MHz$	C_{oss}		750		pF
Reverse Transfer Capacitance at $V_{DS}=25V$, $V_{GS}=0V$, $f=1MHz$	C_{rss}		270		pF
Gate charge total at $V_{DD}=30V$, $I_D=80A$, $V_{GS}=10V$, $I_g=1mA$	Q_g		61		nC
Gate to Source Charge at $V_{DD}=30V$, $I_D=80A$, $V_{GS}=10V$, $I_g=1mA$	Q_{gs}		24		nC
Gate to Drain Charge at $V_{DD}=30V$, $I_D=80A$, $V_{GS}=10V$, $I_g=1mA$	Q_{gd}		15		nC
Turn-On Delay Time at $V_{DD}=30V$, $I_D=80A$, $R_{GS}=4.3\Omega$, $V_{GS}=10V$	$t_{d(on)}$		16		nS
Turn-On Rise Time at $V_{DD}=30V$, $I_D=80A$, $R_{GS}=4.3\Omega$, $V_{GS}=10V$	t_r		160		ns
Turn-Off Delay Time at $V_{DD}=30V$, $I_D=80A$, $R_{GS}=4.3\Omega$, $V_{GS}=10V$	$t_{d(off)}$		28		nS
Turn-Off Fall Time at $V_{DD}=30V$, $I_D=80A$, $R_{GS}=4.3\Omega$, $V_{GS}=10V$	t_f		29		ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $I_{SD}=80A$, $V_{GS}=0V$	V_{SD}			1.25	V
Body Diode Reverse Recovery Time at $I_{SD}=75A$, $di/dt=100A/\mu s$	t_{rr}		34		nS
Body Diode Reverse Recovery Charge at $I_{SD}=75A$, $di/dt=100A/\mu s$	Q_{rr}		25		μC

Electrical Characteristics Curves

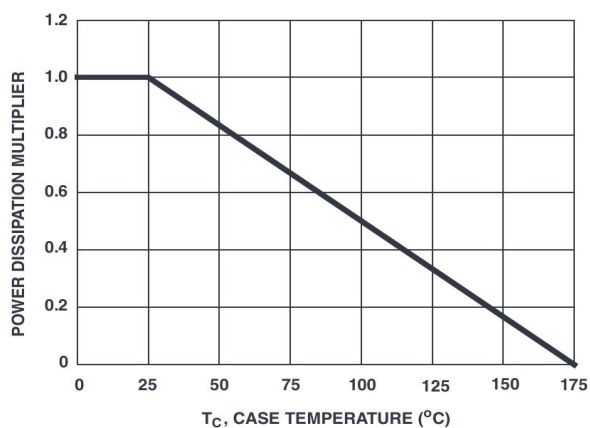


Figure 1. Normalized Power Dissipation vs Ambient Temperature

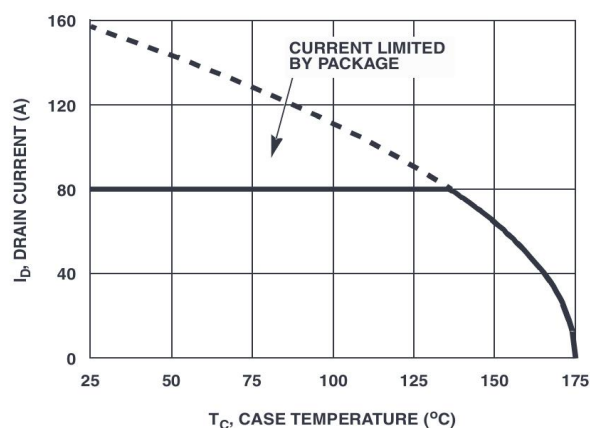


Figure 2. Maximum Continuous Drain Current vs Case Temperature

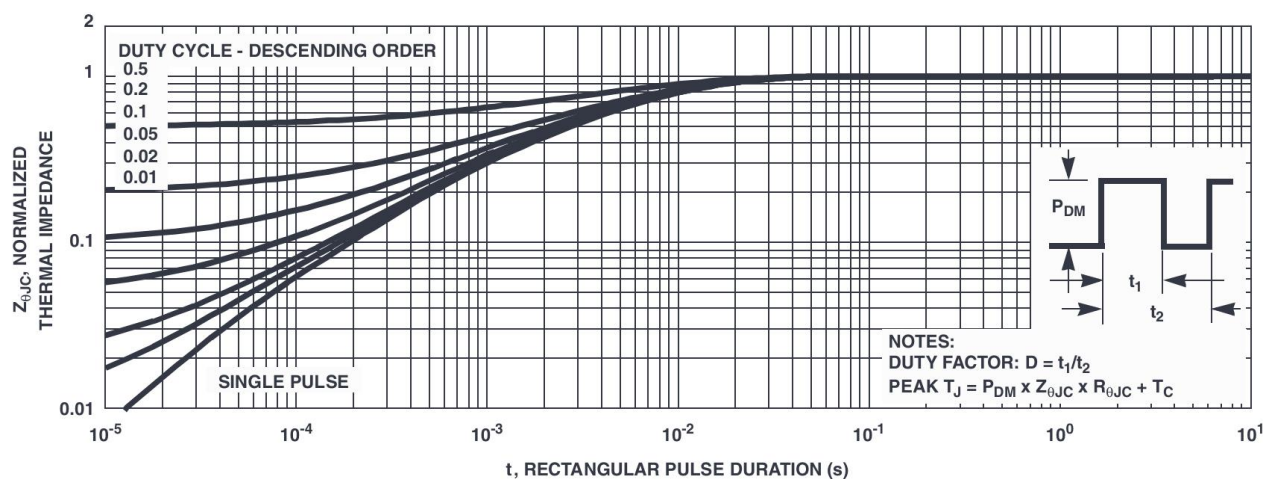


Figure 3. Normalized Maximum Transient Thermal Impedance

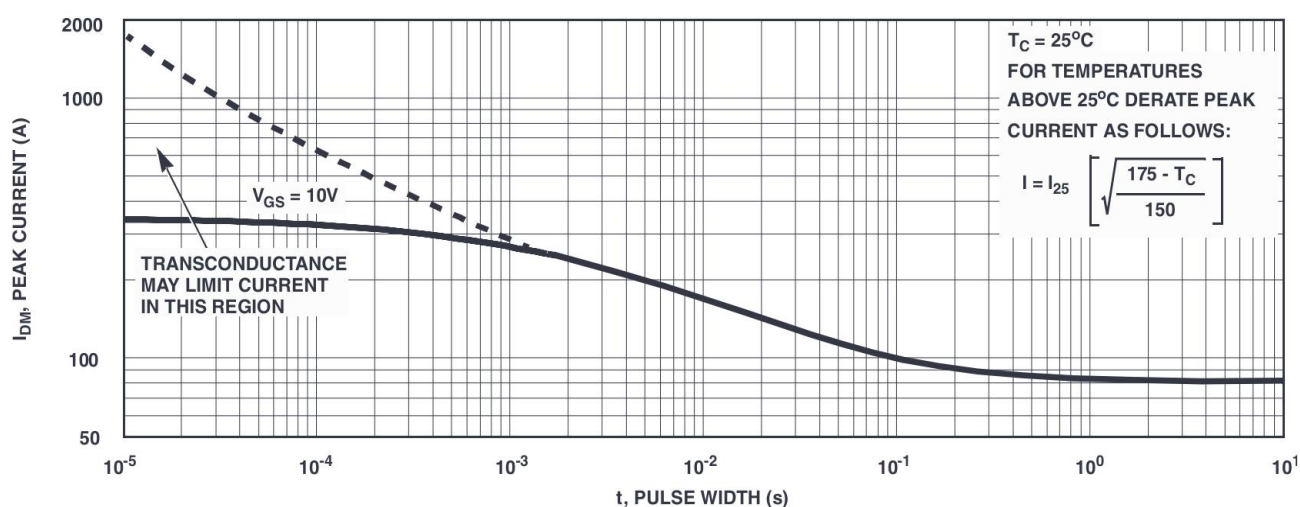


Figure 4. Peak Current Capability

Electrical Characteristics Curves

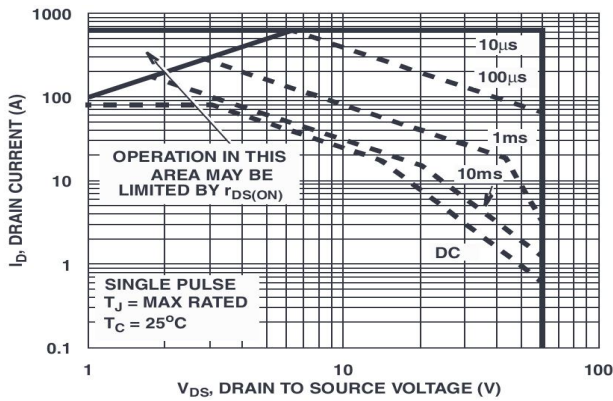
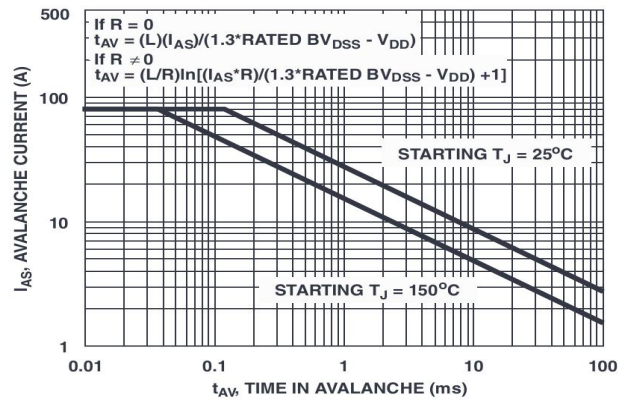


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

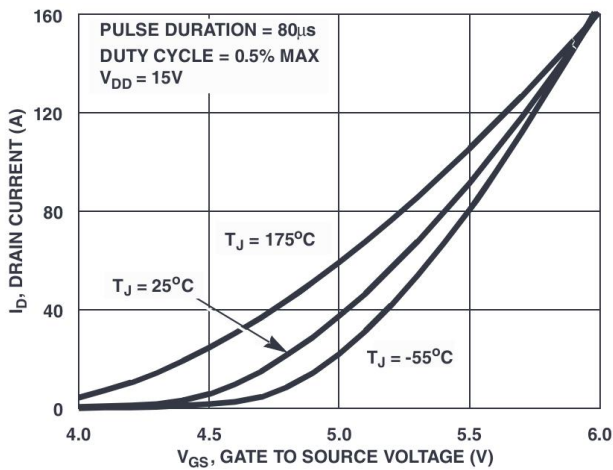


Figure 7. Transfer Characteristics

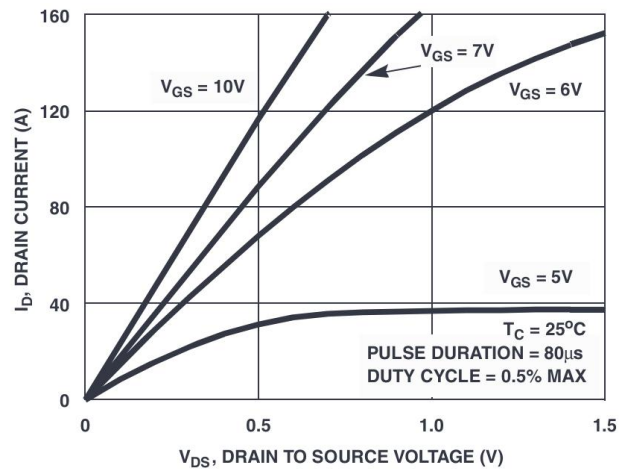


Figure 8. Saturation Characteristics

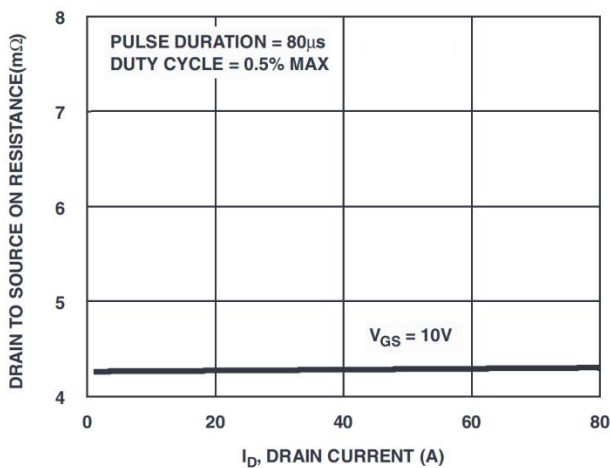


Figure 9. Drain to Source On Resistance vs Drain Current

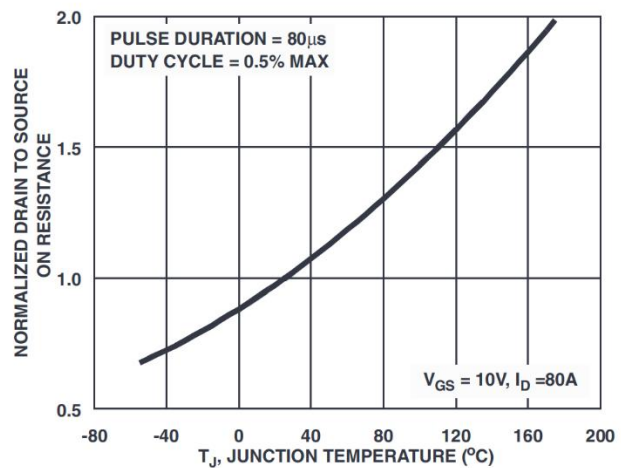


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Electrical Characteristics Curves

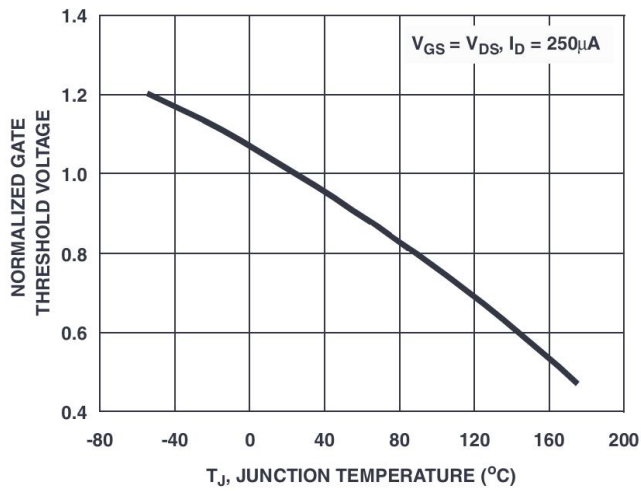


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

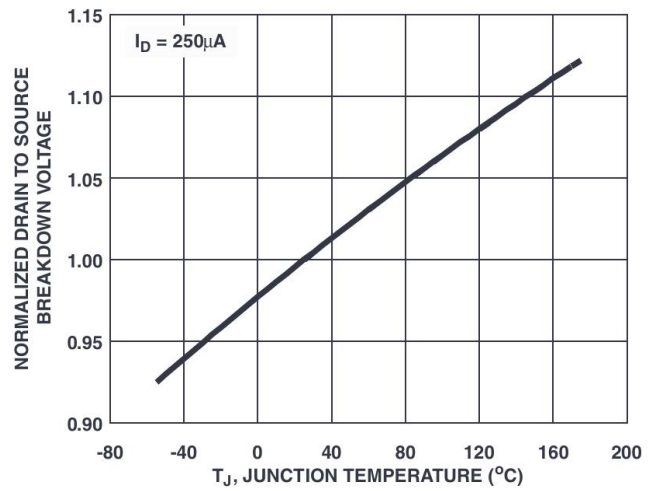


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

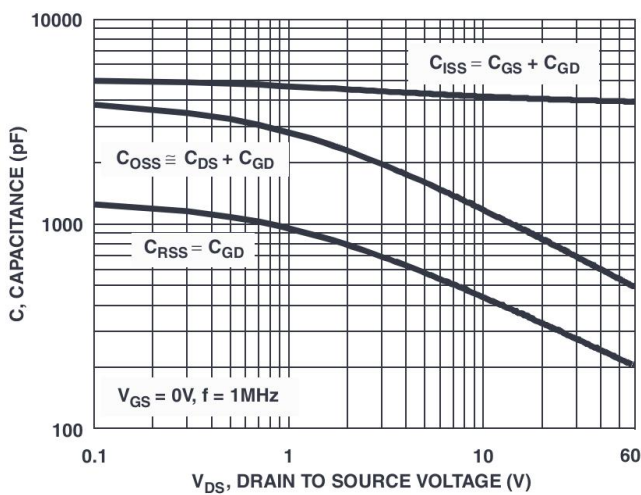


Figure 13. Capacitance vs Drain to Source Voltage

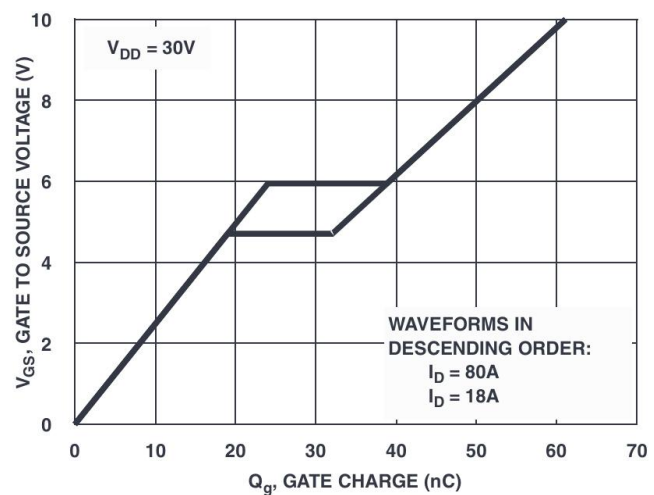


Figure 14. Gate Charge Waveforms for Constant Gate Current

Test Circuits

Fig.1-1 Switching times test circuit

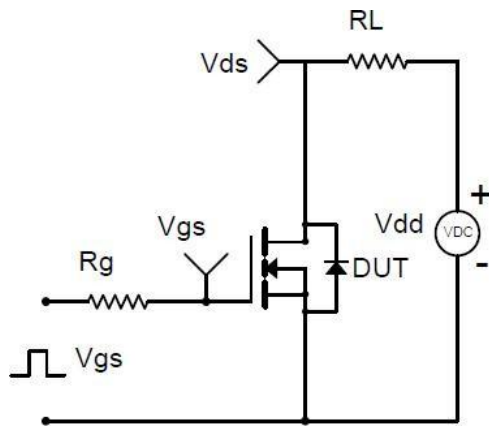


Fig.1-2 Switching Waveform

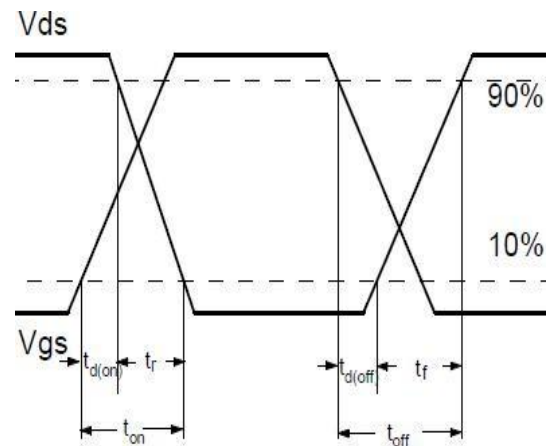


Fig.2-1 Gate charge test circuit

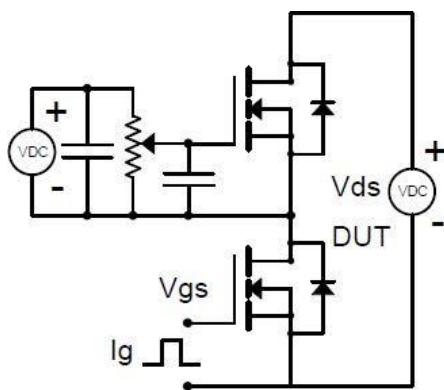


Fig.2-2 Gate charge waveform

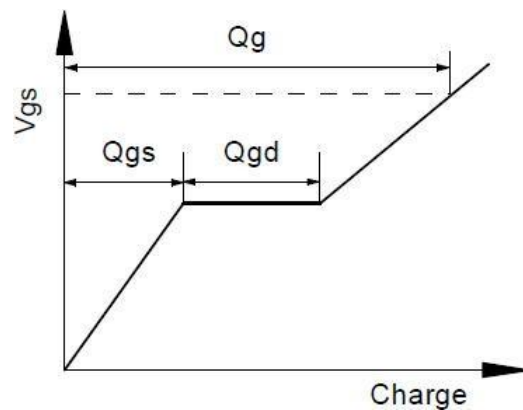


Fig.3-1 Avalanche test circuit

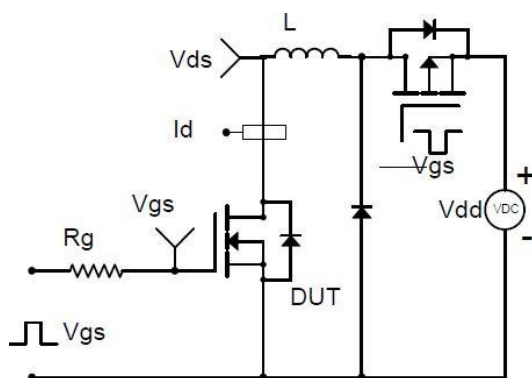
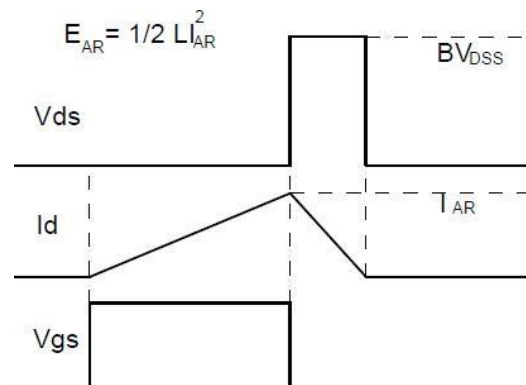
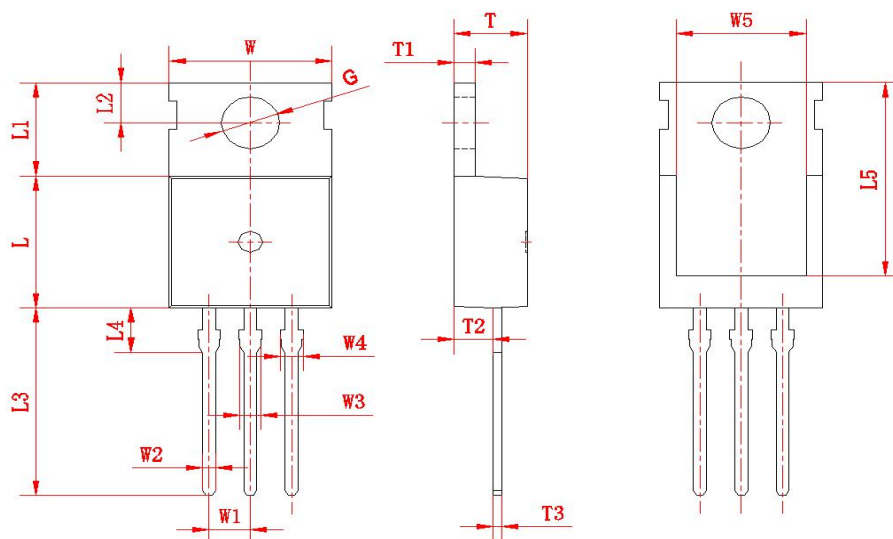


Fig.3-2 Avalanche waveform



Package Outline Dimensions (Units: mm)
TO-220


符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max
W	9.80	10.20	L	9.00	9.40	T	4.30	4.70
W1	(2.54)		L1	6.30	6.70	T1	1.20	1.40
W2	0.70	0.90	L2	2.70	2.90	T2	2.20	2.60
W3	1.17	1.37	L3	12.88	13.28	T3	0.45	0.60
W4	1.17	1.62	L4	(3.10)		G	3.50	3.70
W5	(8.00)		L5	(13.5)				

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