

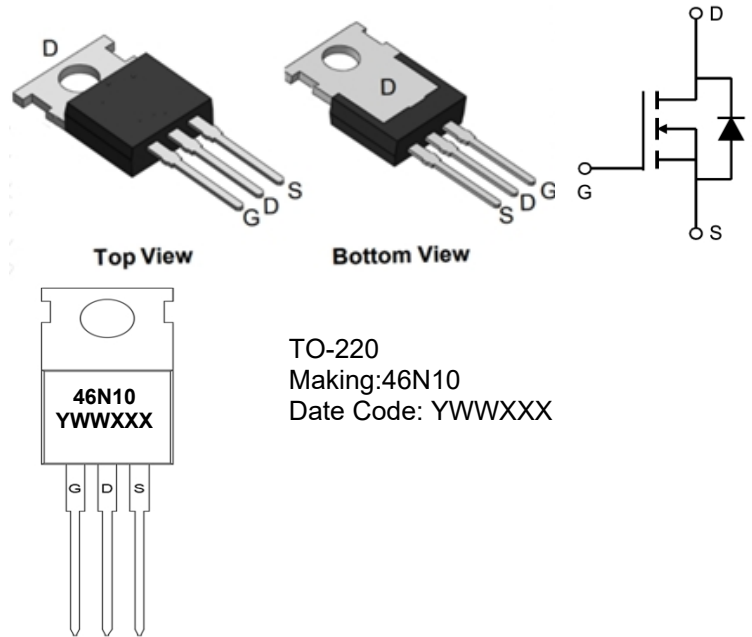
N-Channel Enhancement Mode MOSFET

Features

- Advanced trench cell design
- Low Thermal Resistance

Application

- Motor drives
- Power Tool
- BMS
- DC-DC converters



Halogen-Free & Lead-Free

100% EAS Test

100% Rg Test

Absolute Maximum Ratings (at $T_a = 25^{\circ}\text{C}$ unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_c = 25^{\circ}\text{C}$	I_D	130	A
	$T_c = 100^{\circ}\text{C}$		58	
Peak Drain Current, Pulsed ¹⁾		I_{DM}	360	A
Avalanche Current		I_{AS}	29	A
Single Pulse Avalanche Energy ²⁾		E_{AS}	210	mJ
Power Dissipation $T_c = 25^{\circ}\text{C}$		P_{tot}	147	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.85	$^{\circ}\text{C/W}$
Thermal Resistance from Junction to Ambient ³⁾	$R_{\theta JA}$	55	$^{\circ}\text{C/W}$

Note:

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

²⁾ Limited by $T_J(\text{MAX})$, starting $T_J = 25^{\circ}\text{C}$, $L = 0.5\text{mH}$, $R_g = 25\Omega$, $I_D = 29\text{A}$, $V_{GS} = 10\text{V}$.

Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $I_D = 250\ \mu\text{A}$	BV_{DSS}	100			V
Drain-Source Leakage Current at $V_{DS} = 100\ \text{V}$	I_{DSS}			1	μA
Gate Leakage Current at $V_{GS} = \pm 20\ \text{V}$	I_{GSS}			± 100	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	$V_{GS(th)}$	2		4	V
Drain-Source On-State Resistance at $V_{GS} = 10\ \text{V}$, $I_D = 90\ \text{A}$	$R_{DS(on)}$		4.7	6	m Ω
DYNAMIC PARAMETERS					
Gate resistance at $V_{DS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	R_g			1.7	Ω
Forward Transconductance at $V_{DS} = 5\ \text{V}$, $I_D = 5\ \text{A}$	g_{fs}		22.7		S
Input Capacitance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 40\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}		4580		pF
Output Capacitance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 40\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}		1276		pF
Reverse Transfer Capacitance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 40\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}		103		pF
Gate charge total at $V_{DS} = 50\ \text{V}$, $I_D = 40\ \text{A}$, $V_{GS} = 10\ \text{V}$	Q_g		81		nC
Gate to Source Charge at $V_{DS} = 50\ \text{V}$, $I_D = 40\ \text{A}$, $V_{GS} = 10\ \text{V}$	Q_{gs}		20		nC
Gate to Drain Charge at $V_{DS} = 50\ \text{V}$, $I_D = 40\ \text{A}$, $V_{GS} = 10\ \text{V}$	Q_{gd}		27		nC
Turn-On Delay Time at $V_{GS} = 10\ \text{V}$, $V_{DD} = 50\ \text{V}$, $R_g = 4.7\ \Omega$, $I_D = 40\ \text{A}$	$t_{d(on)}$		36		ns
Turn-On Rise Time at $V_{GS} = 10\ \text{V}$, $V_{DD} = 50\ \text{V}$, $R_g = 4.7\ \Omega$, $I_D = 40\ \text{A}$	t_r		77		ns
Turn-Off Delay Time at $V_{GS} = 10\ \text{V}$, $V_{DD} = 50\ \text{V}$, $R_g = 4.7\ \Omega$, $I_D = 40\ \text{A}$	$t_{d(off)}$		31		ns
Turn-Off Fall Time at $V_{GS} = 10\ \text{V}$, $V_{DD} = 50\ \text{V}$, $R_g = 4.7\ \Omega$, $I_D = 40\ \text{A}$	t_f		34		ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $I_S = 1\ \text{A}$, $V_{GS} = 0\ \text{V}$	V_{SD}			1.2	V
Body Diode Reverse Recovery Time at $I_S = 40\ \text{A}$, $di/dt = 100\ \text{A} / \mu\text{s}$	t_{rr}		52		ns
Body Diode Reverse Recovery Charge at $I_S = 40\ \text{A}$, $di/dt = 100\ \text{A} / \mu\text{s}$	Q_{rr}		73		nC

Electrical Characteristics Curves

Fig. 1 Typical Output Characteristic

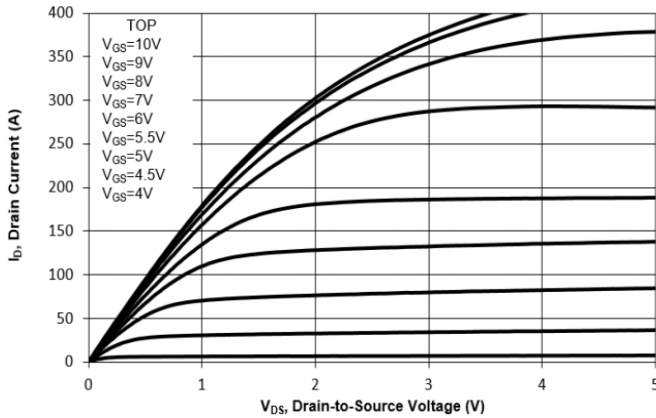


Fig. 2 Typical Transfer Characteristic

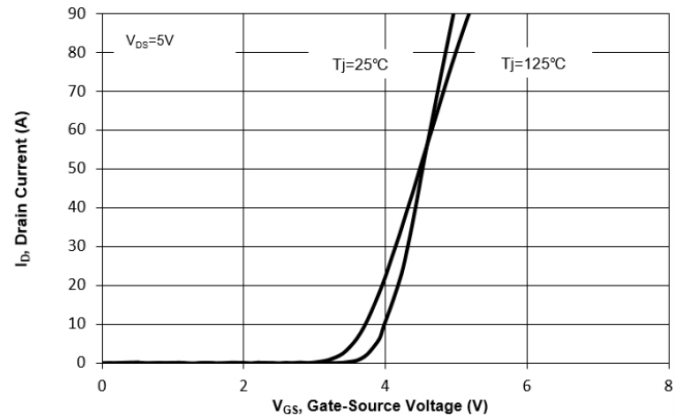


Fig. 3 on-Resistance vs Drain Current

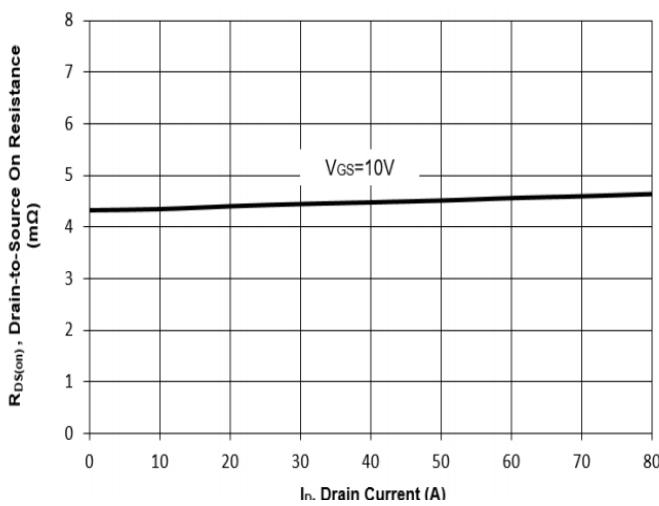


Fig. 4 on-Resistance vs. Gate Voltage

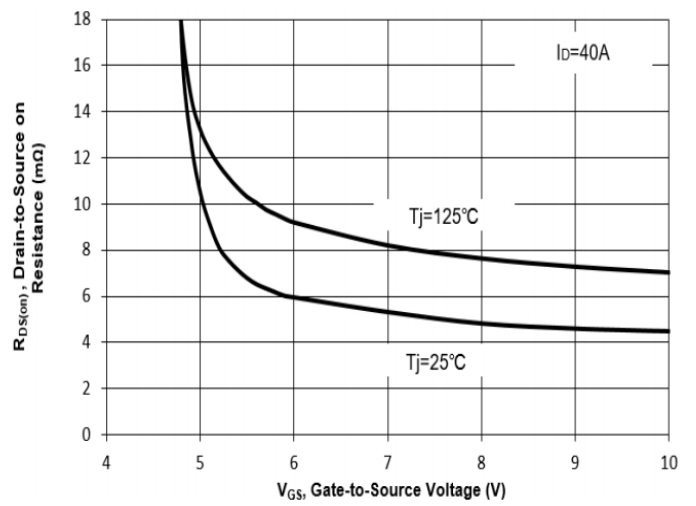
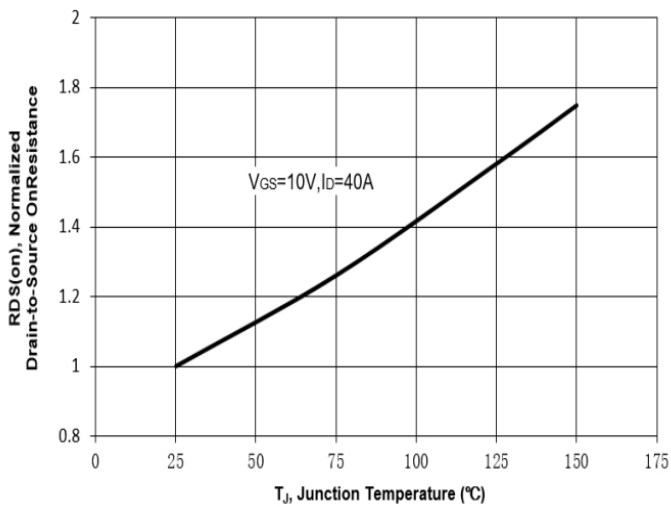
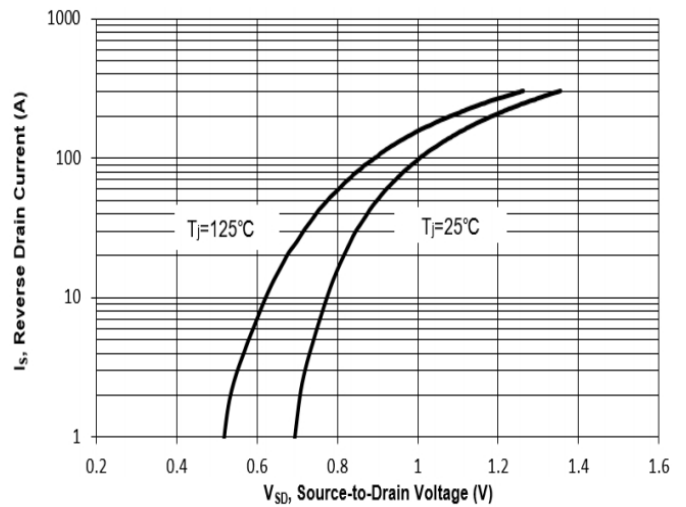

 Fig. 5 on-Resistance vs. T_J


Fig. 6 Typical Body Diode Forward Characteristic



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

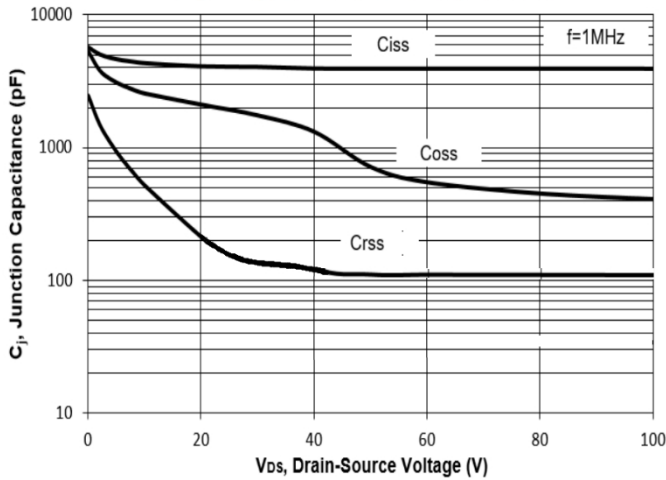


Fig. 8 Drain-Source Leakage Current vs. T_j

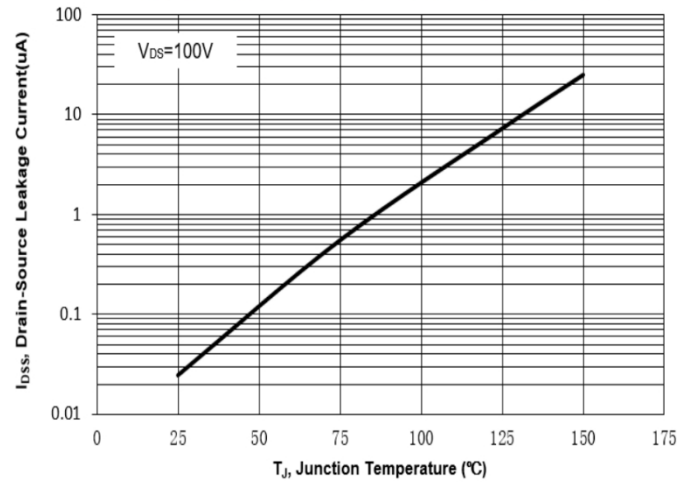


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

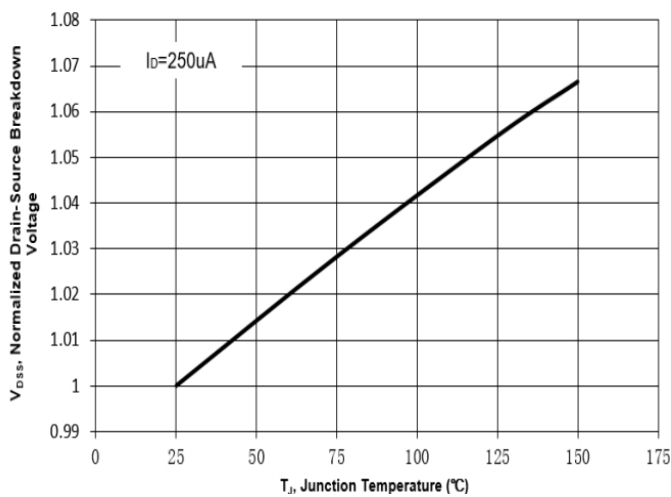


Fig. 10 Gate Threshold Variation vs. T_j

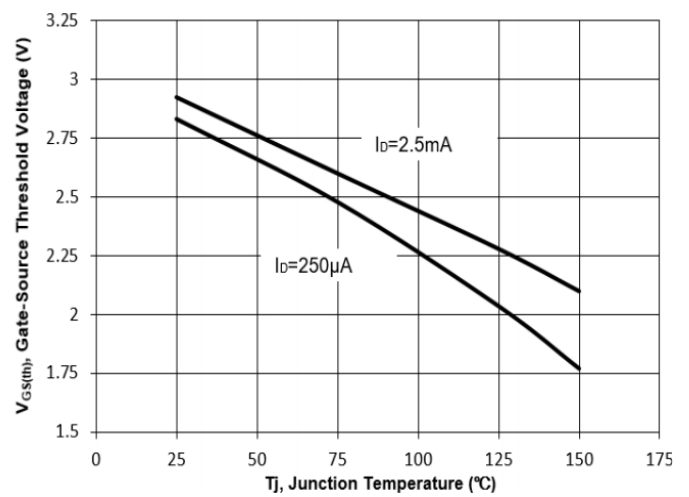


Fig. 11 Gate Charge

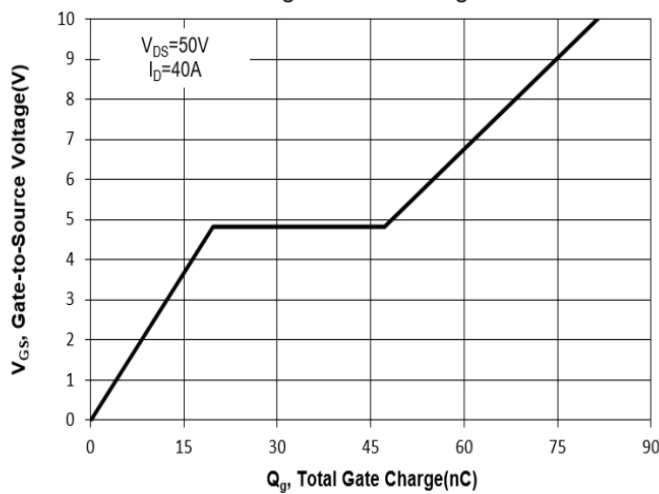
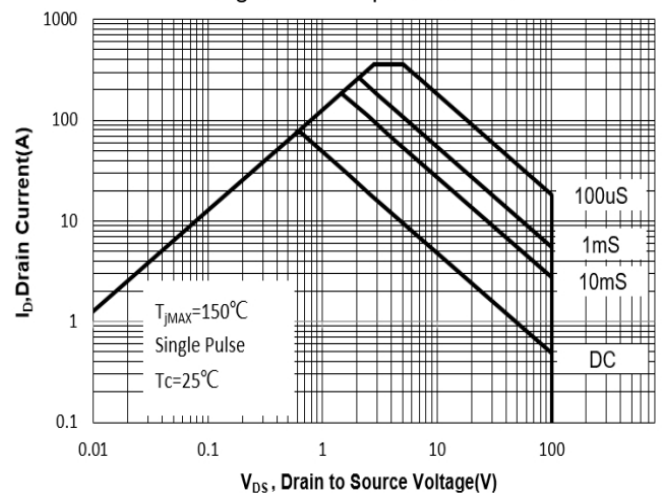
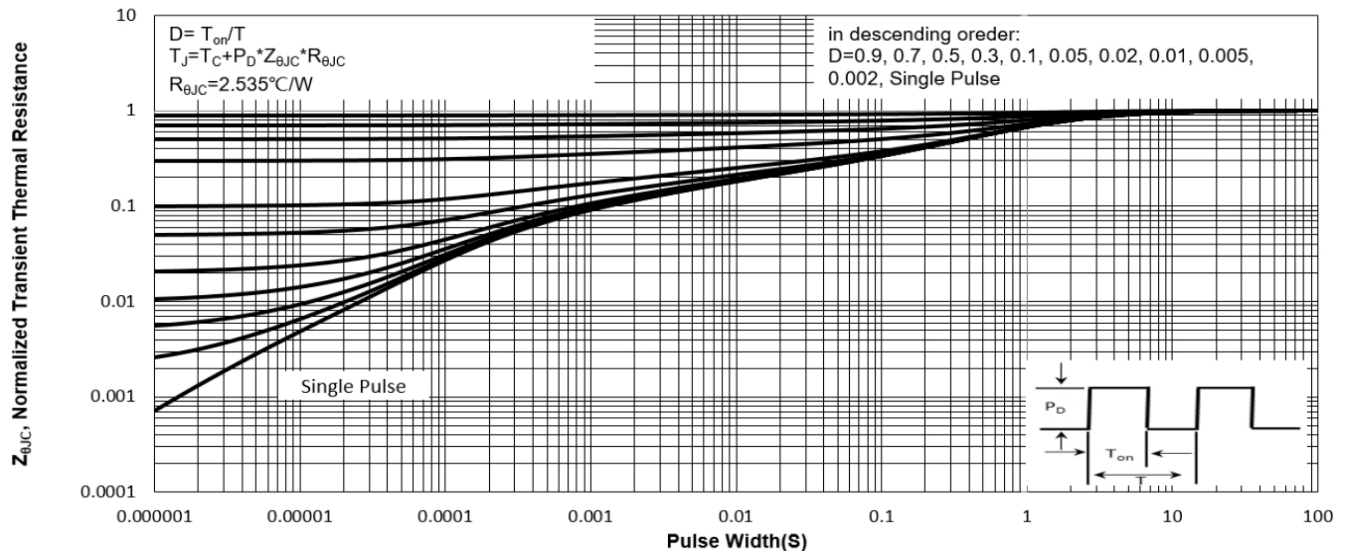


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

Fig. 13 Normalized Maximum Transient Thermal Impedance($z_{\theta JC}$)



Test Circuits

Fig.1-1 Switching times test circuit

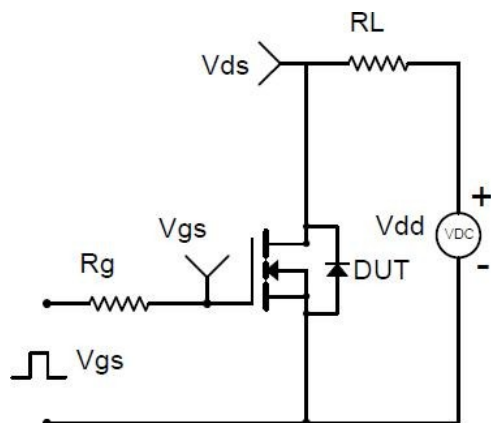


Fig.1-2 Switching Waveform

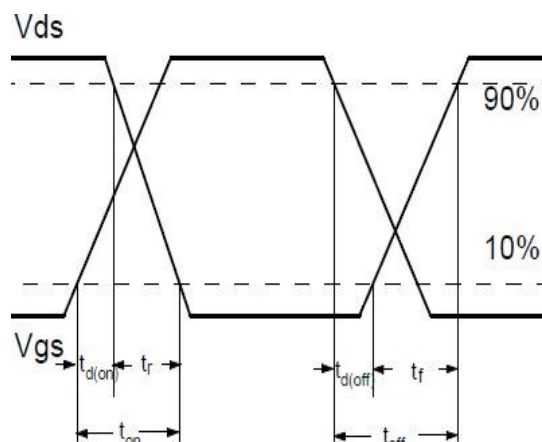


Fig.2-1 Gate charge test circuit

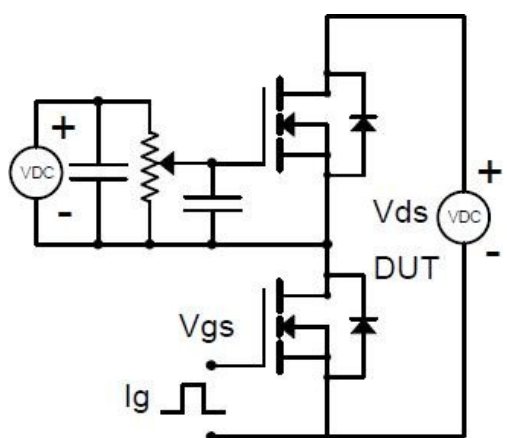


Fig.2-2 Gate charge waveform

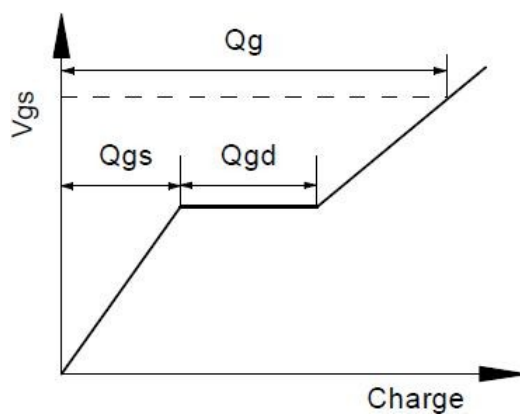


Fig.3-1 Avalanche test circuit

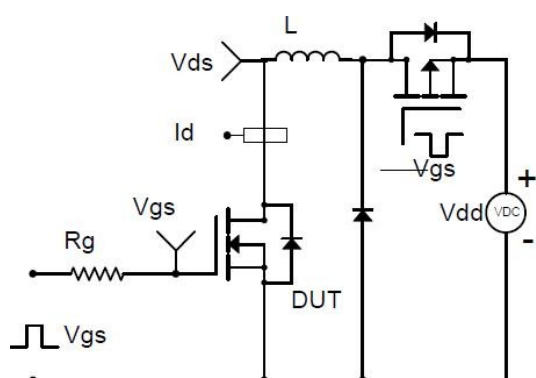
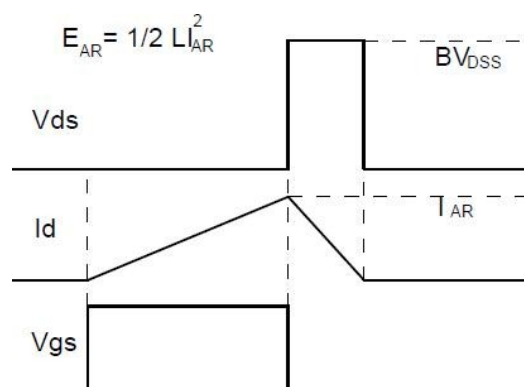
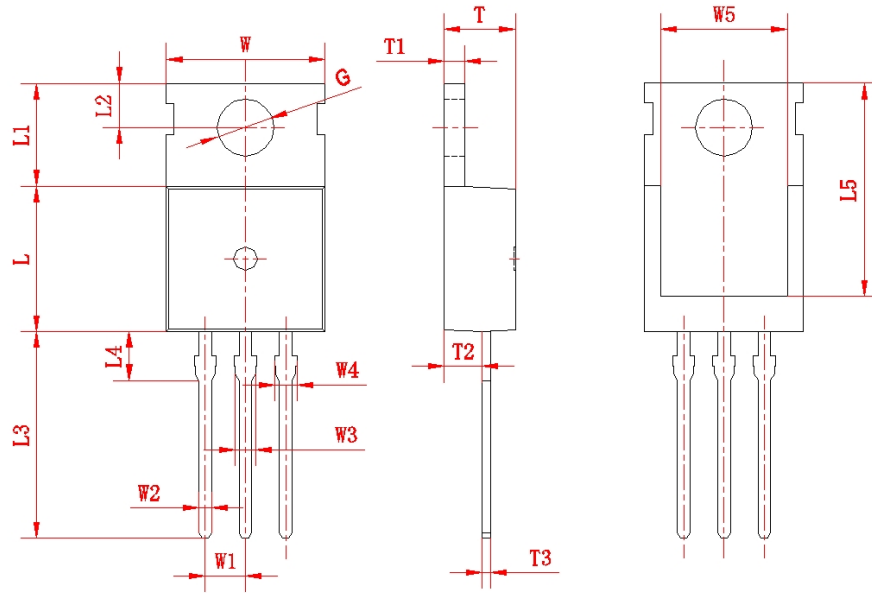


Fig.3-2 Avalanche waveform



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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