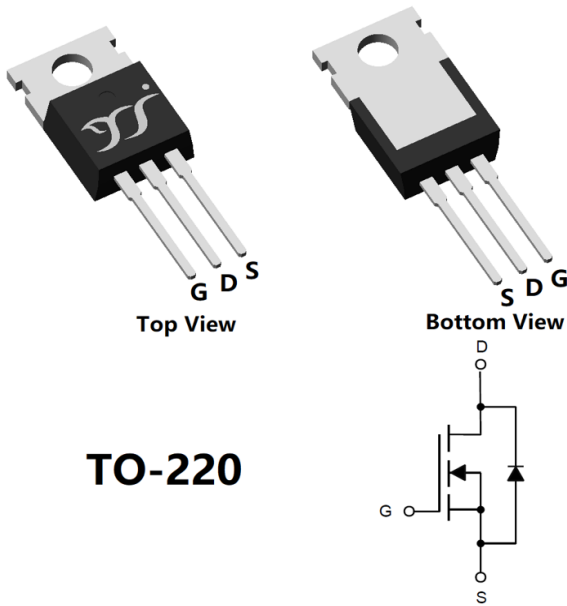


N-Channel Enhancement Mode Field Effect Transistor



TO-220

Product Summary

- V_{DS} 120V
- I_D 90A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $<9m\Omega$
- $R_{DS(ON)}$ (at $V_{GS}=4.5V$) $<11m\Omega$
- 100% EAS Tested
- 100% ∇V_{DS} Tested

General Description

- Split gate trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor

■ Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	120	V
Gate-source Voltage		V_{GS}	± 20	V
Drain Current	$T_A=25^\circ C$	I_D	11	A
	$T_A=100^\circ C$		7	
	$T_C=25^\circ C$		90	
	$T_C=100^\circ C$		56	
Pulsed Drain Current ^A		I_{DM}	300	A
Avalanche energy ^B		EAS	441	mJ
Total Power Dissipation ^C	$T_A=25^\circ C$	P_D	3	W
	$T_A=100^\circ C$		1.2	
	$T_C=25^\circ C$		166	
	$T_C=100^\circ C$		66	
Junction and Storage Temperature Range		T_J, T_{STG}	-55~+150	$^\circ C$

■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient ^D	Steady-State	$R_{\theta JA}$	30	40	$^\circ C/W$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	0.6	0.75	

■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJP90G12A	B1	YJP90G12A	50	/	5000	Tube



YJP90G12A

■ Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	120	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=120V, V_{GS}=0V$	-	-	1	μA
		$V_{DS}=120V, V_{GS}=0V, T_J=150^\circ\text{C}$	-	-	100	
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	2	3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=45A$	-	7	9	m Ω
		$V_{GS}=10V, I_D=20A$	-	7	9	
		$V_{GS}=4.5V, I_D=20A$	-	8.5	11	
Diode Forward Voltage	V_{SD}	$I_S=45A, V_{GS}=0V$	-	0.9	1.2	V
Gate resistance	R_G	$f=1\text{MHz}$, Open drain	-	0.7	-	Ω
Maximum Body-Diode Continuous Current	I_S		-	-	90	A
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{DS}=60V, V_{GS}=0V, f=1\text{MHz}$	-	4600	-	μF
Output Capacitance	C_{oss}		-	430	-	
Reverse Transfer Capacitance	C_{riss}		-	15	-	
Switching Parameters						
Total Gate Charge	Q_g	$V_{GS}=10V, V_{DS}=60V, I_D=45A$	-	72	-	nC
Gate-Source Charge	Q_{gs}		-	20	-	
Gate-Drain Charge	Q_{gd}		-	8	-	
Reverse Recovery Charge	Q_{rr}	$I_F=45A, di/dt=100A/\mu s$	-	195	-	nC
Reverse Recovery Time	t_{rr}		-	86	-	ns
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=10V, V_{DD}=60V, I_D=45A$ $R_{GEN}=2.2\Omega$	-	19	-	ns
Turn-on Rise Time	t_r		-	36	-	
Turn-off Delay Time	$t_{D(off)}$		-	45	-	
Turn-off fall Time	t_f		-	45	-	

A. Repetitive rating; pulse width limited by max. junction temperature.

B. $T_J=25^\circ\text{C}$, $V_{DD}=50V$, $V_{GS}=10V$, $R_G=25\Omega$, $L=2\text{mH}$, $I_{AS}=21A$.

C. P_g is based on max. junction temperature, using junction-case thermal resistance.

D. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in the still air environment with $T_A=25^\circ\text{C}$. The maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design.



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Typical Electrical and Thermal Characteristics Diagrams

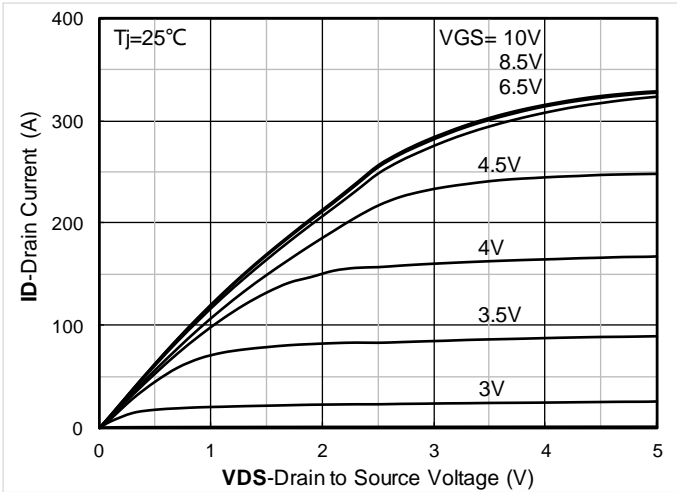


Figure 1. Output Characteristics

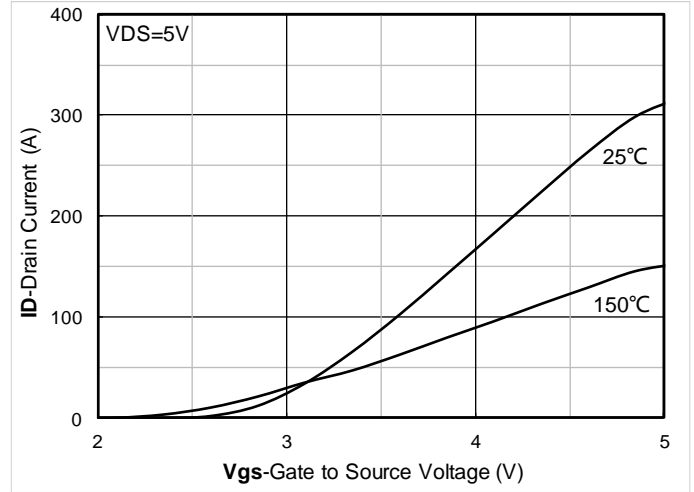


Figure 2. Transfer Characteristics

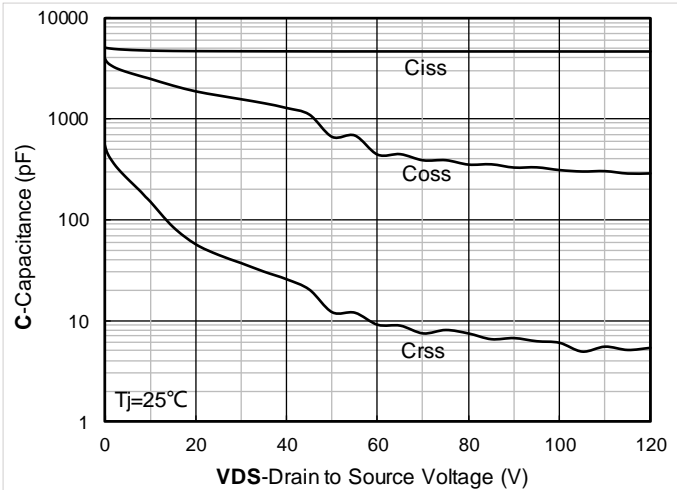


Figure 3. Capacitance Characteristics

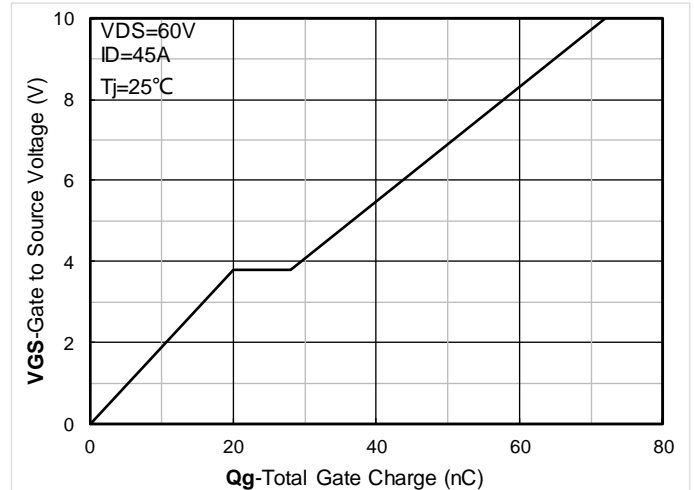


Figure 4. Gate Charge

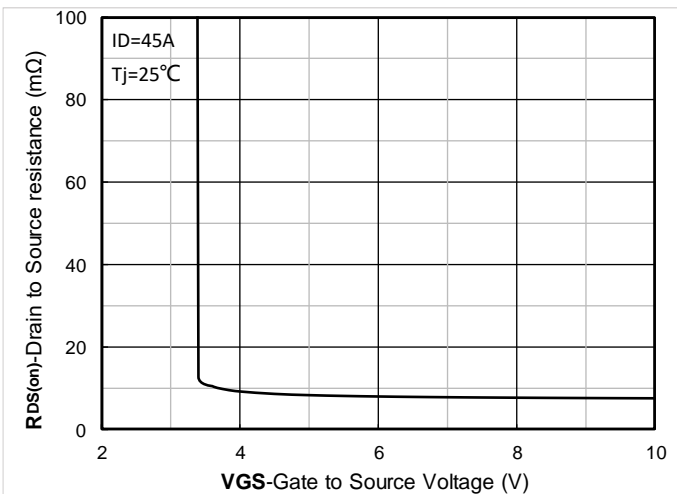


Figure 5. On-Resistance vs Gate to Source Voltage

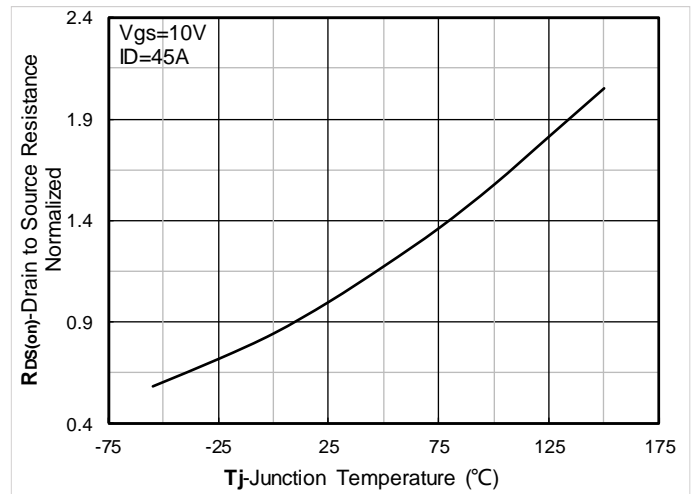


Figure 6. Normalized On-Resistance



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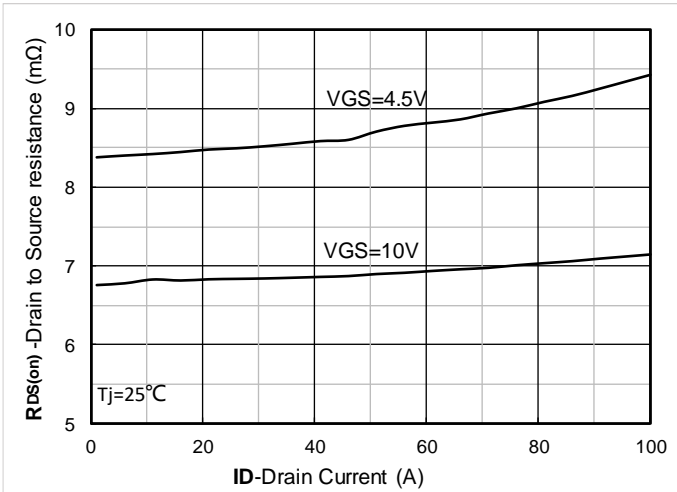


Figure 7. $R_{DS(on)}$ VS Drain Current

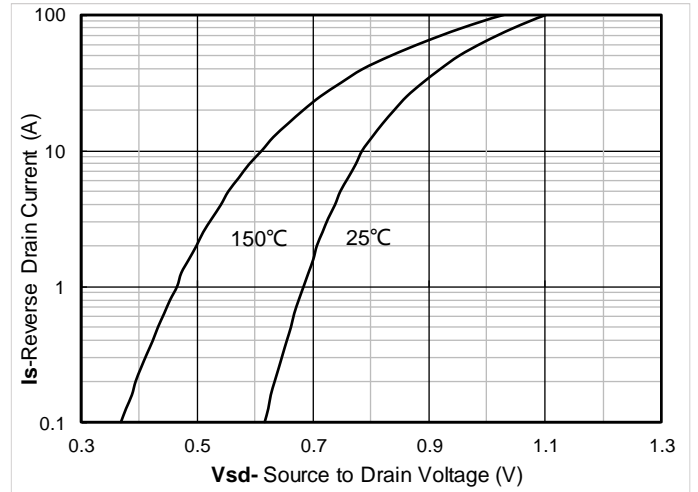


Figure 8. Forward characteristics of reverse diode

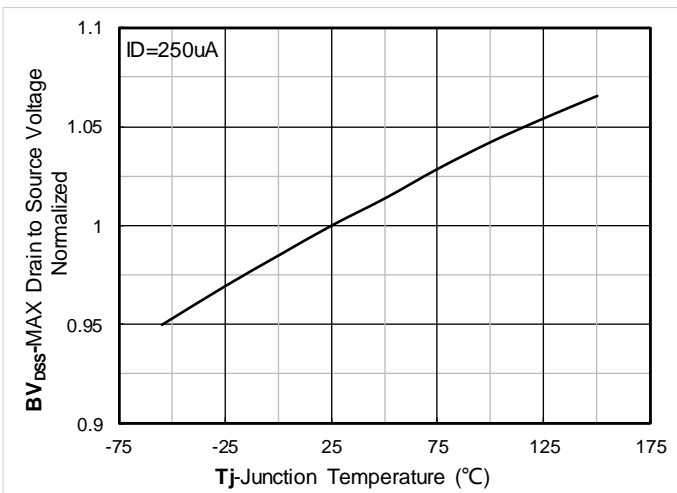


Figure 9. Normalized breakdown voltage

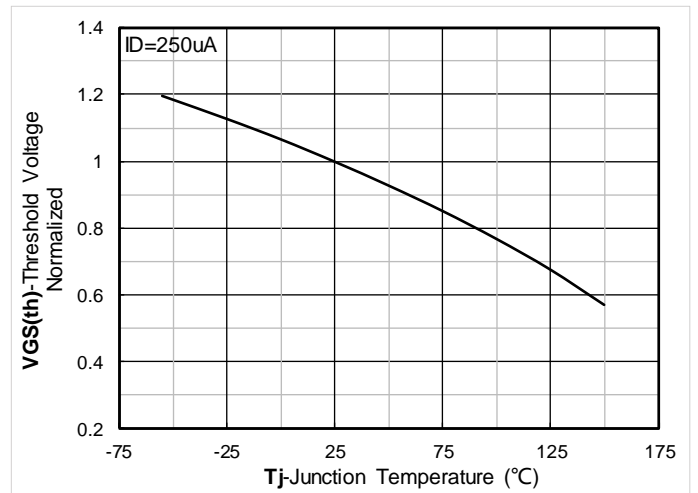


Figure 10. Normalized Threshold voltage

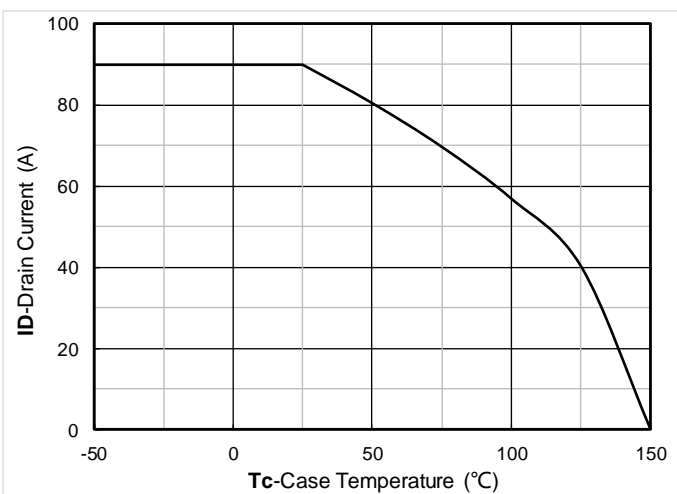


Figure 11. Current dissipation

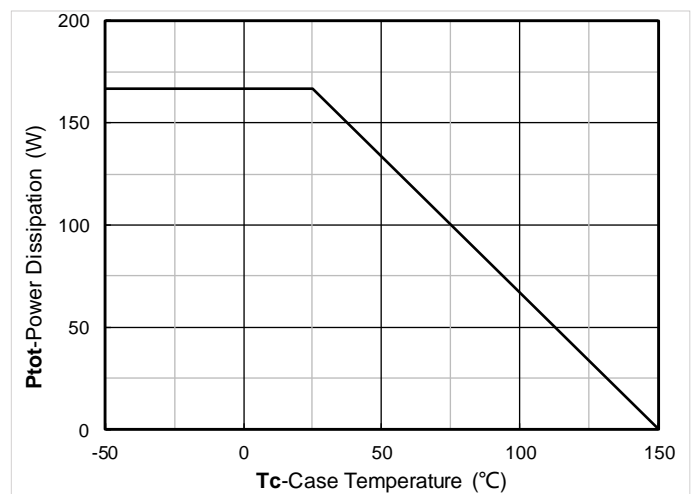


Figure 12. Power dissipation

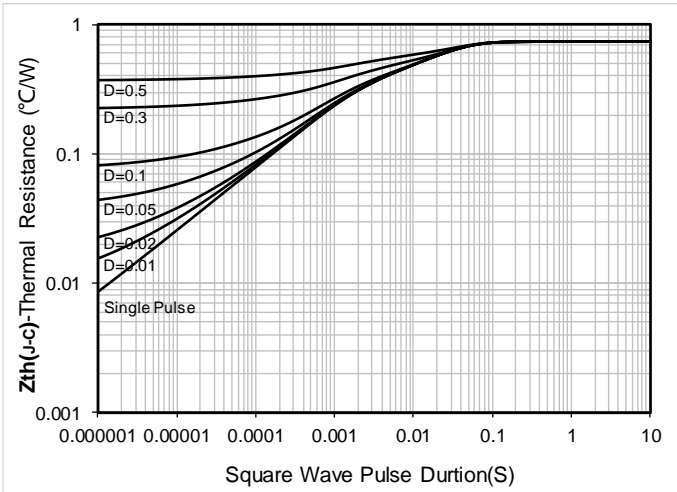


Figure 13. Maximum Transient Thermal Impedance

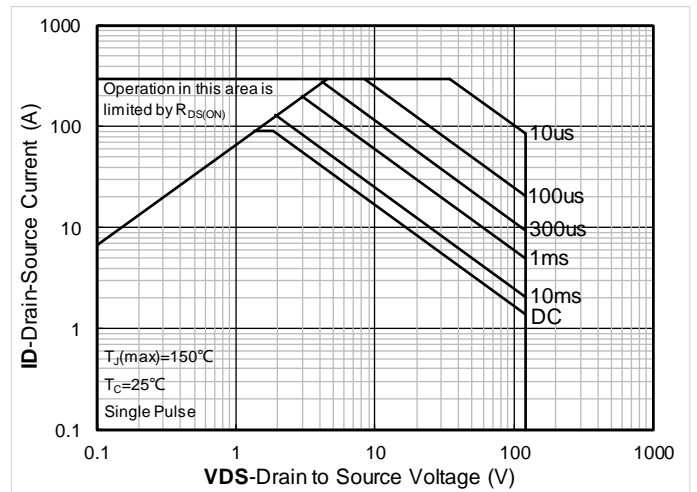


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

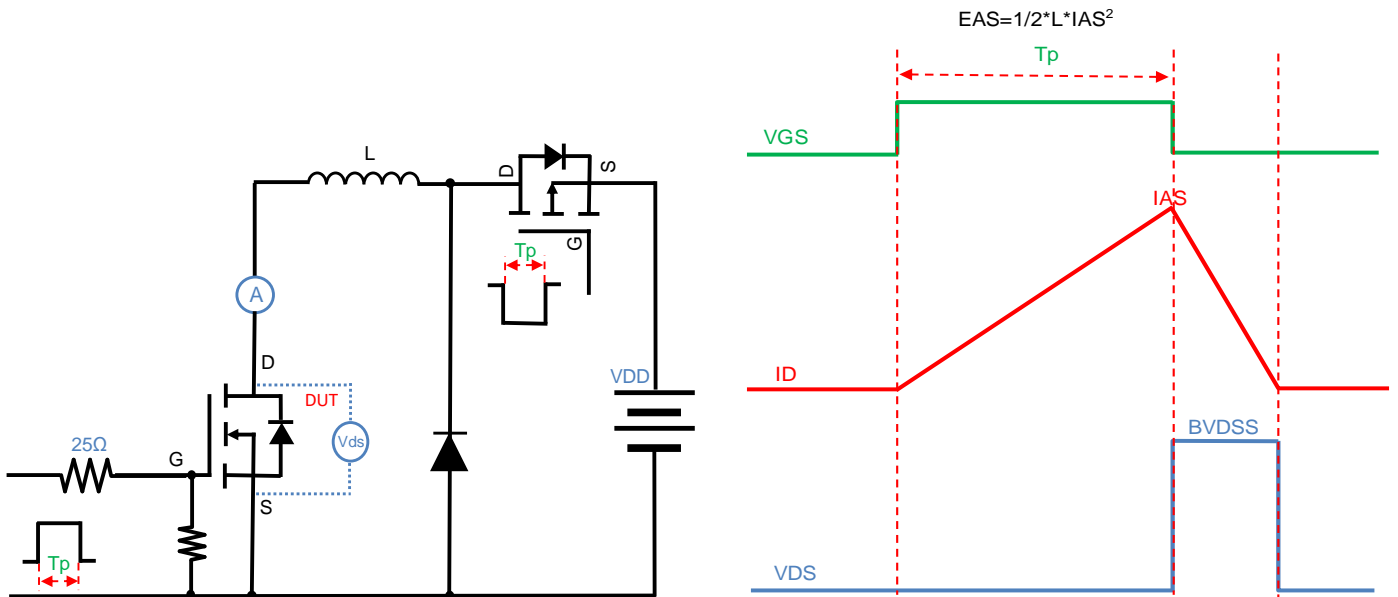


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

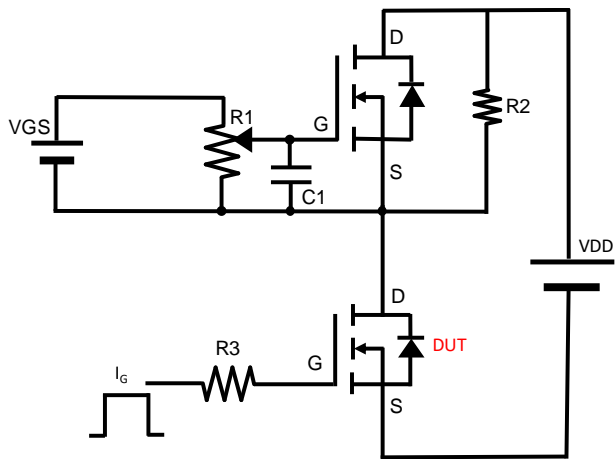


Figure B. Gate Charge Test Circuit & Waveform

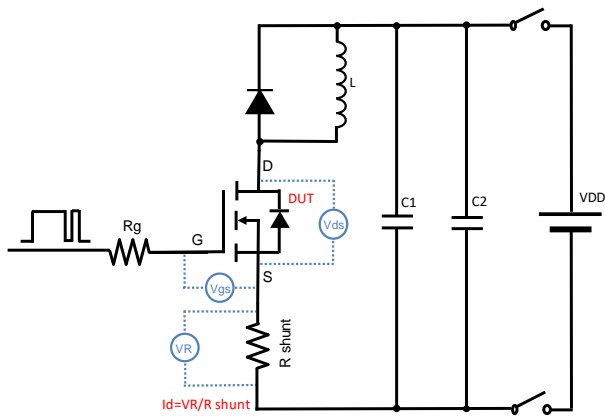


Figure C. Resistive Switching Test Circuit & Waveform

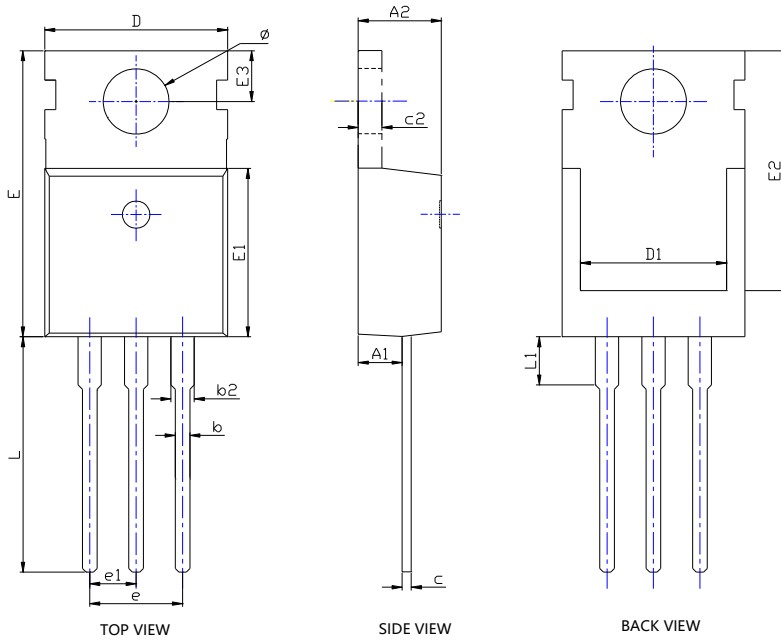


Figure D. Diode Recovery Test Circuit & Waveform



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■ TO-220AB-D Package information



SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A1	0.091	0.098	2.300	2.500
A2	0.175	0.183	4.450	4.650
b	0.030	0.033	0.750	0.850
b2	0.048	0.052	1.220	1.320
c	0.018	0.022	0.450	0.550
c2	0.050	0.052	1.270	1.330
D	0.386	0.402	9.800	10.200
D1	0.303	0.327	7.700	8.300
E	0.614	0.630	15.600	16.000
E1	0.360	0.372	9.150	9.450
E2	0.510	0.533	12.950	13.550
E3	0.110BSC		2.800BSC	
e	0.200BSC		5.080BSC	
e1	0.100BSC		2.540BSC	
L	0.506	0.518	12.850	13.150
L1	0.093	0.117	2.360	2.960
ϕ	0.138	0.146	3.500	3.700

NOTE:
 1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
 2. TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.



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