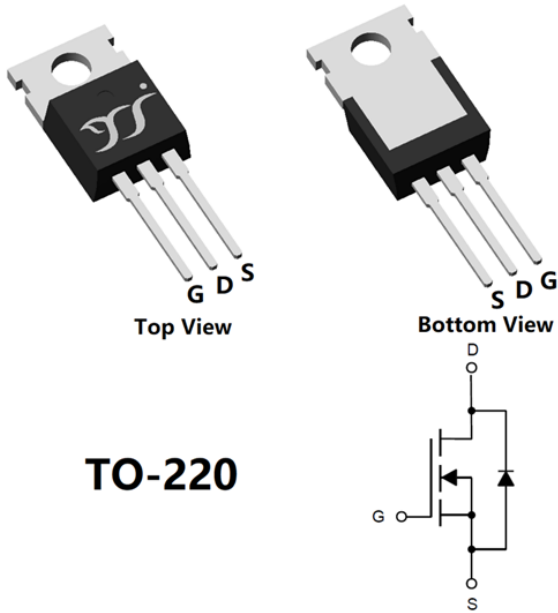


N-Channel Enhancement Mode Field Effect Transistor



TO-220

Product Summary

- V_{DS} 150V
- I_D 90A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $< 12m\Omega$
- 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 converter

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

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	150	V
Gate-source Voltage		V_{GS}	± 20	V
Drain Current	$T_A=25^\circ C$	I_D	12	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}	250	A
Avalanche energy ^B		EAS	400	mJ
Total Power Dissipation ^C	$T_A=25^\circ C$	P_D	3	W
	$T_A=100^\circ C$		1.2	
	$T_C=25^\circ C$		178	
	$T_C=100^\circ C$		71	
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	0.7	

■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJP90G15A	B1	YJP90G15A	50	/	5000	Tube



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■ Electrical Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	150	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =150V, V _{GS} =0V	-	-	1	μA
		V _{DS} =150V, V _{GS} =0V, T _J =150°C	-	-	100	
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3	4	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =45A	-	9.6	12	mΩ
		V _{GS} =10V, I _D =20A	-	9.5	12	
Diode Forward Voltage	V _{SD}	I _S =45A, V _{GS} =0V	-	-	1.2	V
Gate resistance	R _G	f=1MHz	-	1	-	Ω
Maximum Body-Diode Continuous Current	I _S		-	-	90	A
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =75V, V _{GS} =0V, f=1MHz	-	3750	-	pF
Output Capacitance	C _{oss}		-	290	-	
Reverse Transfer Capacitance	C _{rss}		-	6	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =10V, V _{DS} =75V, I _D =45A	-	48	-	nC
Gate-Source Charge	Q _{gs}		-	15	-	
Gate-Drain Charge	Q _{gd}		-	10	-	
Reverse Recovery Charge	Q _{rr}	I _F =37.5A, di/dt=100A/us	-	245	-	nC
Reverse Recovery Time	t _{rr}		-	87	-	ns
Turn-on Delay Time	t _{D(on)}	V _{GS} =10V, V _{DD} =75V, I _D =45A R _{GEN} =2.2Ω	-	16	-	ns
Turn-on Rise Time	t _r		-	82	-	
Turn-off Delay Time	t _{D(off)}		-	30	-	
Turn-off fall Time	t _f		-	6	-	

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

B. T_J=25°C, V_{DD}=75V, V_G=10V, R_G=25Ω, L=2mH, I_{AS}=20A.

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

D. The value of R_{θJA} is measured with the device mounted on the minimum recommend pad size, in the still air environment with T_A=25°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

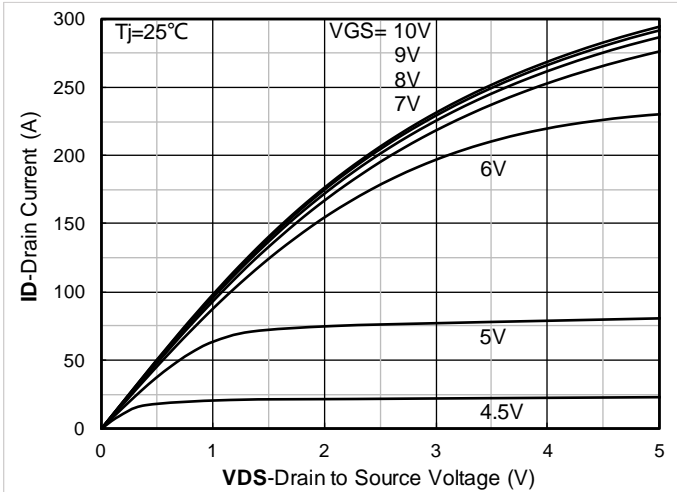


Figure 1. Output Characteristics

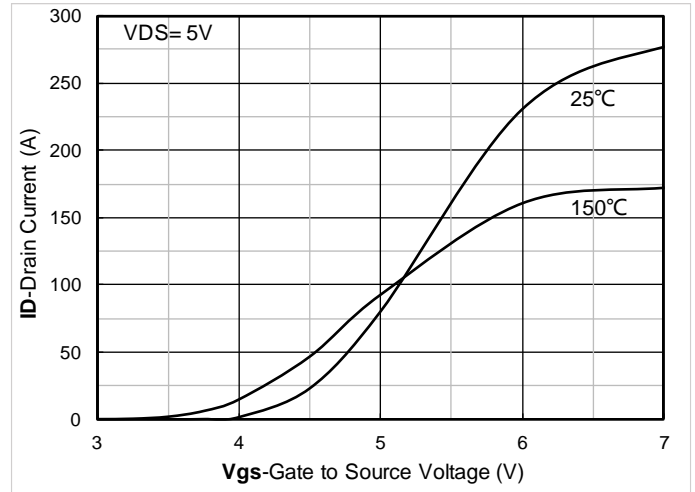


Figure 2. Transfer Characteristics

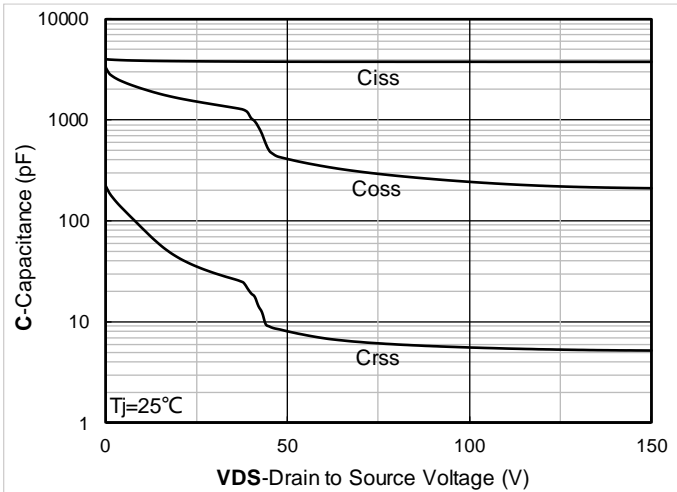


Figure 3. Capacitance Characteristics

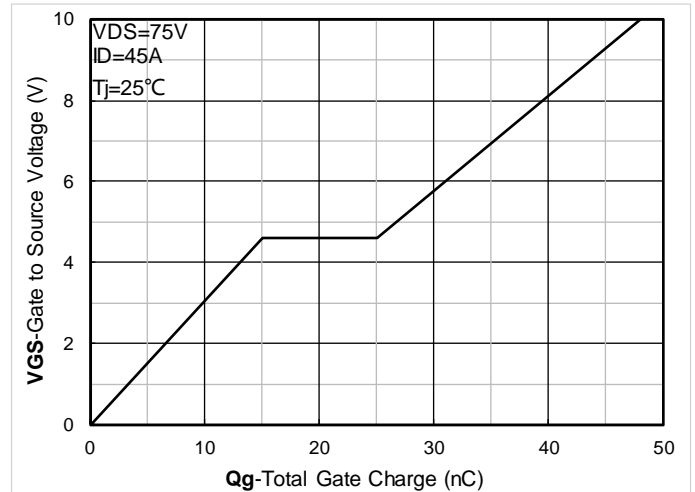


Figure 4. Gate Charge

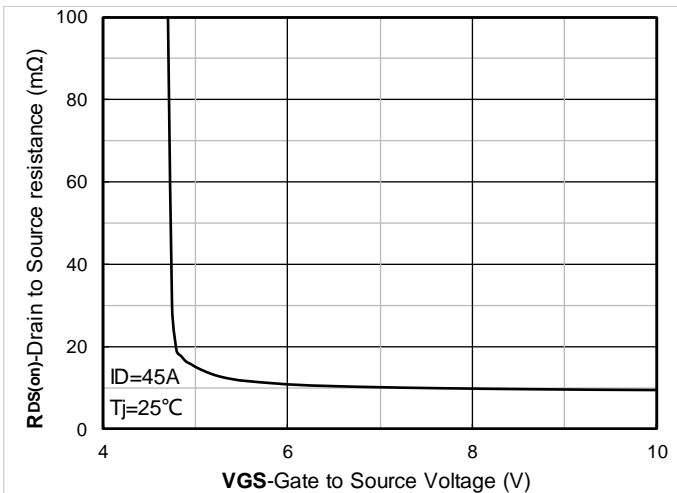


Figure 5. On-Resistance vs Gate to Source Voltage

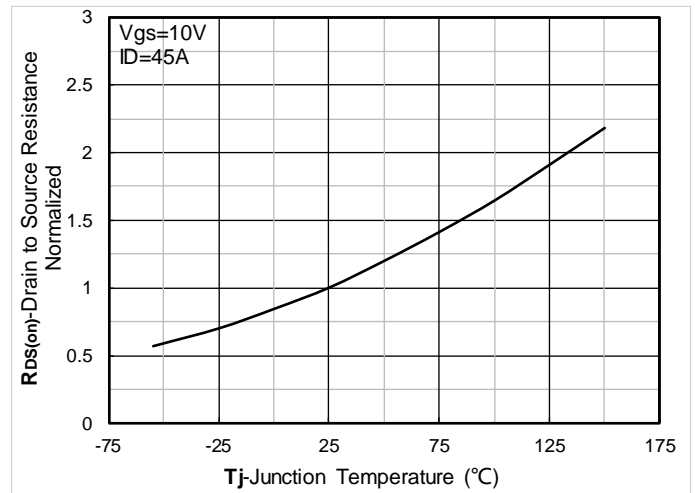


Figure 6. Normalized On-Resistance



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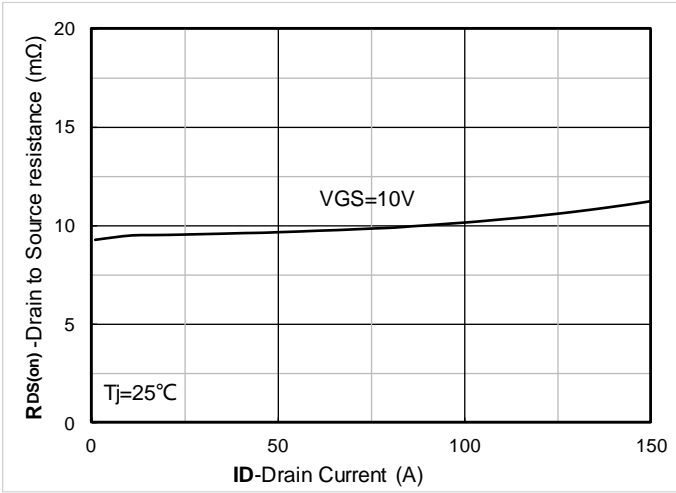


Figure 7. RDS(on) VS Drain Current

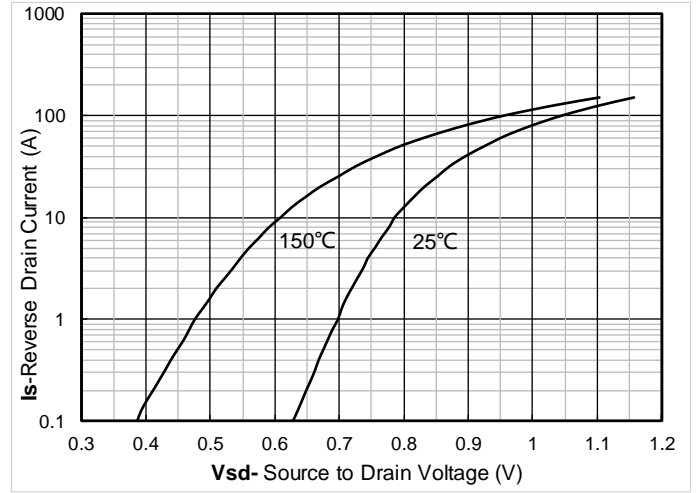


Figure 8. Forward characteristics of reverse diode

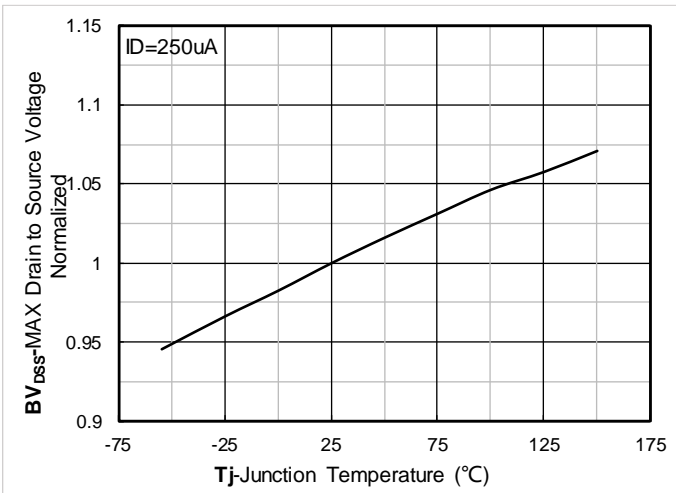


Figure 9. Normalized breakdown voltage

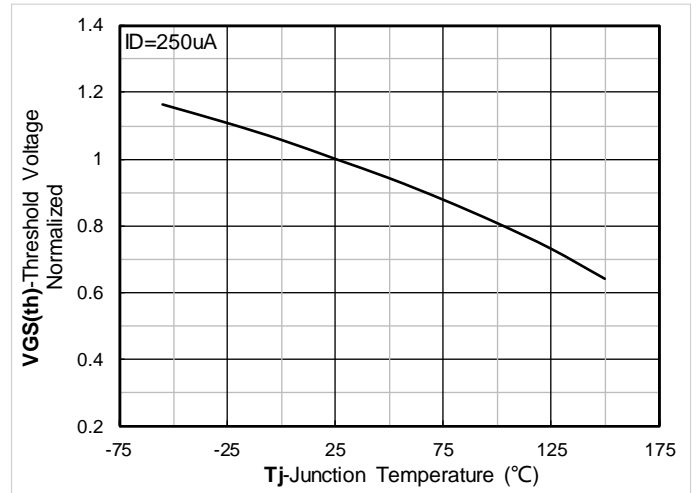


Figure 10. Normalized Threshold voltage

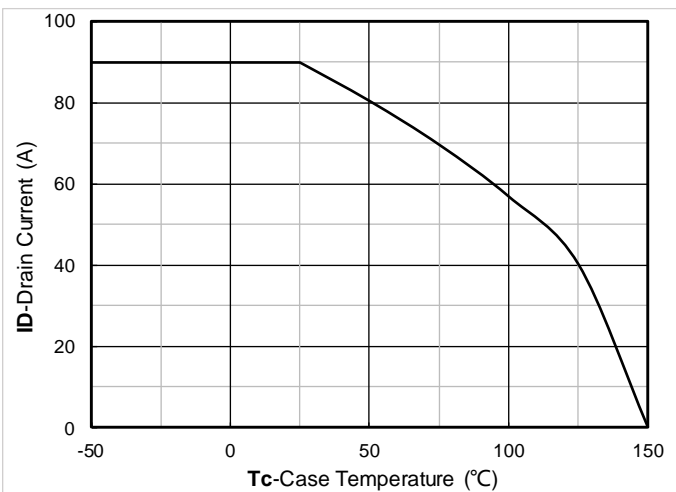


Figure 11. Current dissipation

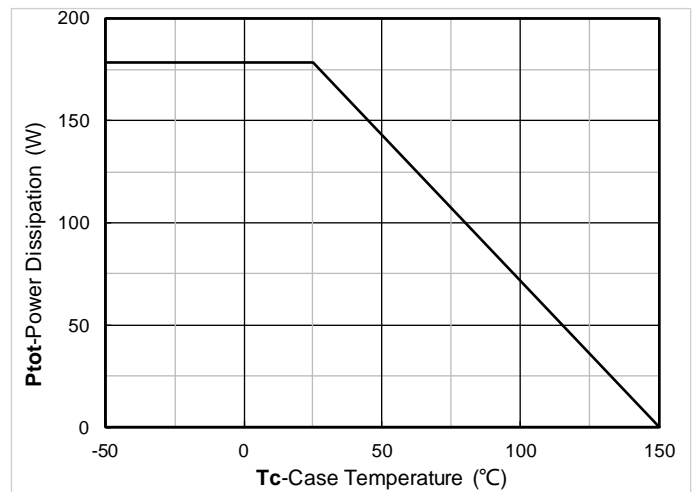


Figure 12. Power dissipation

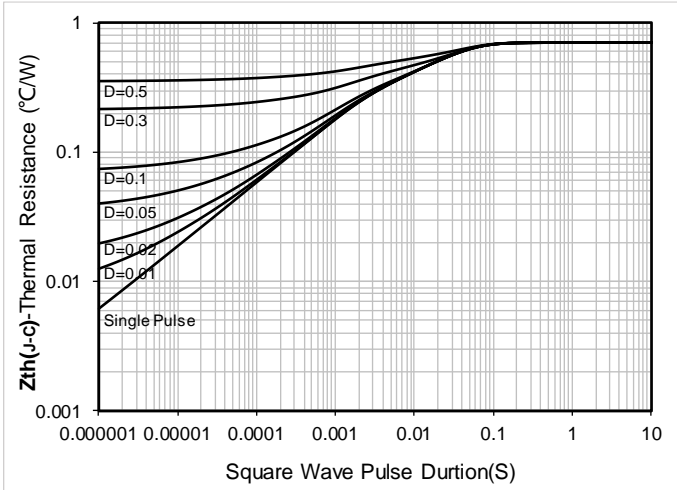


Figure 13. Maximum Transient Thermal Impedance

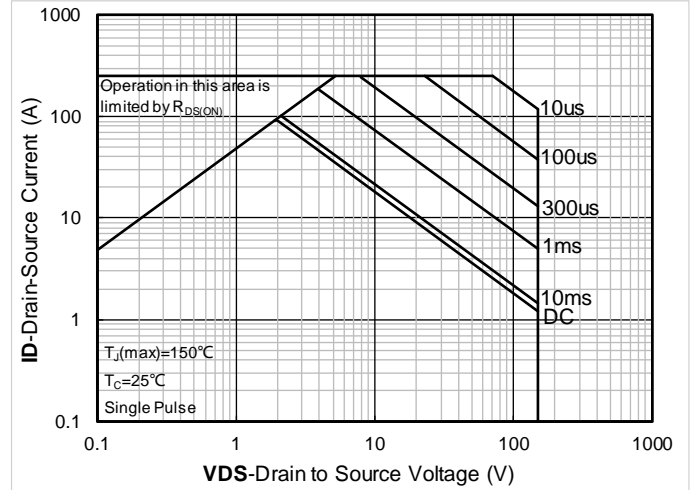


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

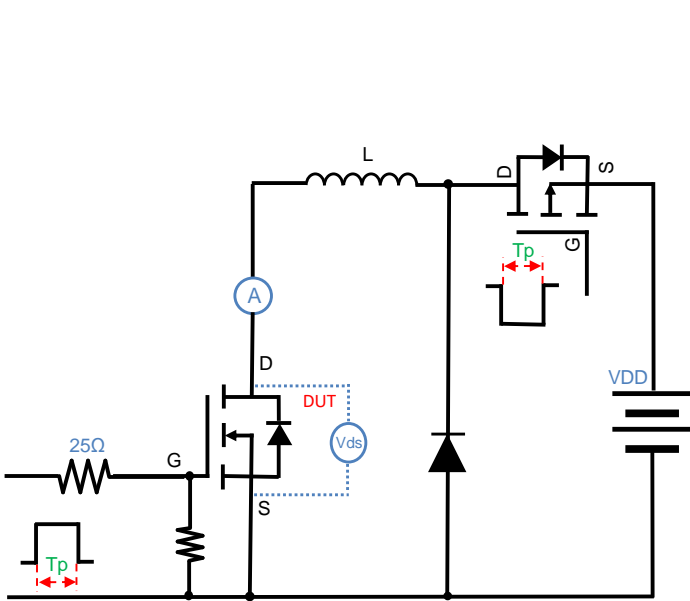
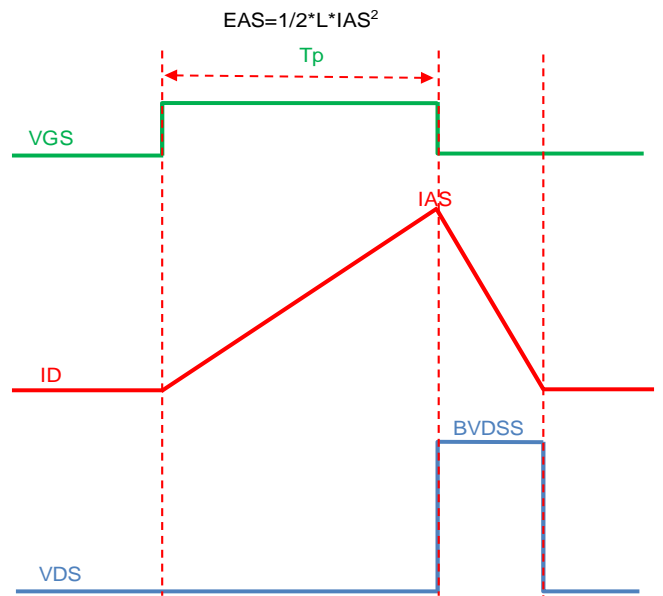


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform



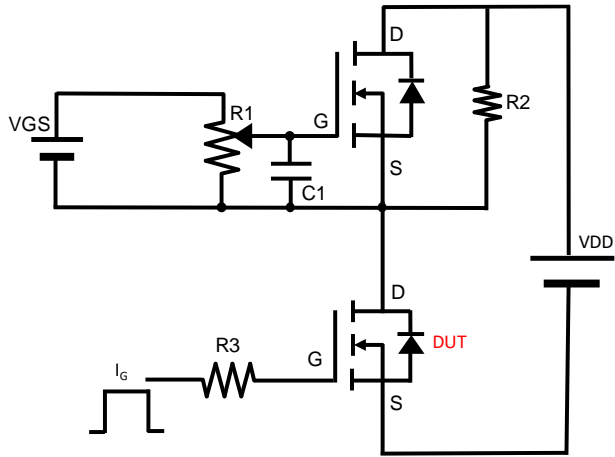


Figure B. Gate Charge Test Circuit & Waveform

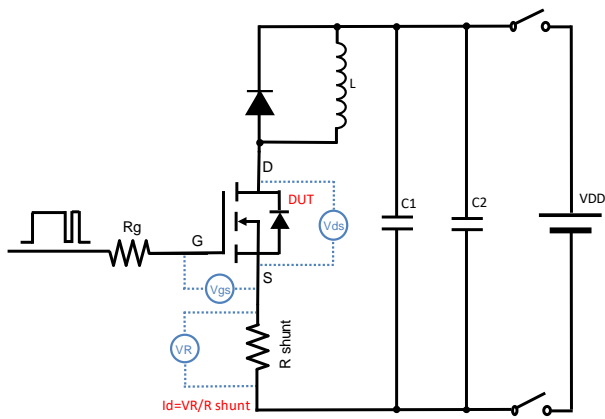


Figure C. Resistive Switching Test Circuit & Waveform

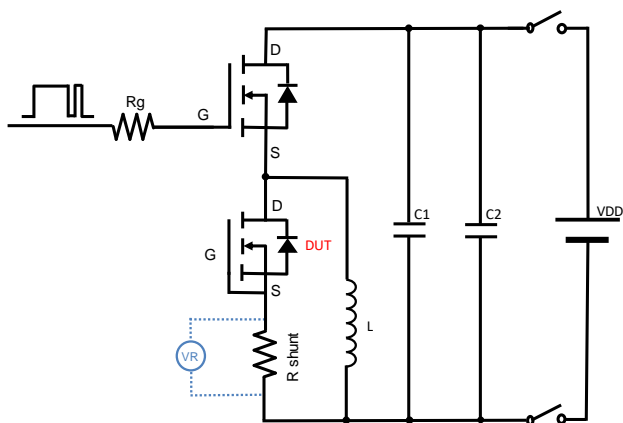
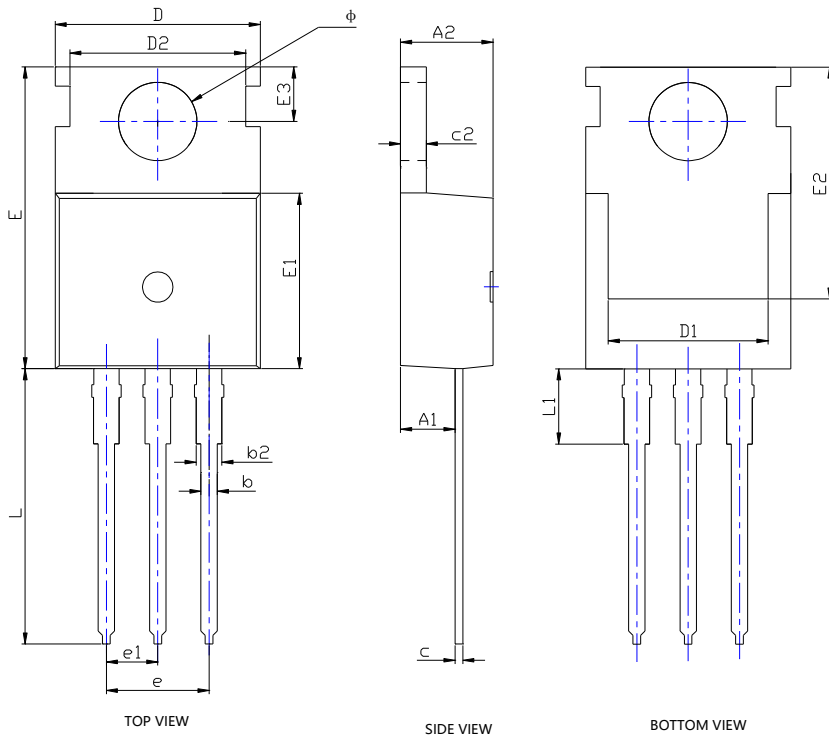


Figure D. Diode Recovery Test Circuit & Waveform



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■ TO-220AB-C Package information



SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A1	0.091	0.098	2.300	2.500
A2	0.173	0.181	4.400	4.600
b	0.028	0.035	0.700	0.900
b2	0.049	0.056	1.250	1.420
c	0.018	0.022	0.450	0.550
c2	0.049	0.053	1.250	1.350
D	0.382	0.402	9.700	10.200
D1	0.295	0.331	7.500	8.400
D2	0.335	0.350	8.500	8.900
E	0.602	0.634	15.300	16.100
E1	0.358	0.366	9.100	9.300
E2	0.497	0.525	12.630	13.330
E3	0.108BSC		2.750BSC	
e	0.200BSC		5.080BSC	
e1	0.100BSC		2.540BSC	
L	0.512	0.531	13.000	13.500
L1	---	0.138	---	3.500
∅	0.140	0.148	3.550	3.750

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



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