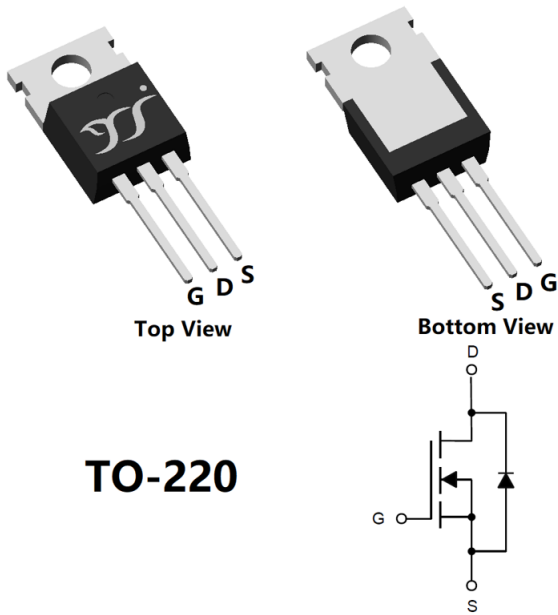


N-Channel Enhancement Mode Field Effect Transistor



TO-220

Product Summary

- V_{DS} 60V
- I_D 90A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $<5.4m\Omega$
- 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

Limiting Values

Parameter	Conditions		Symbol	Min	Max	Unit
Drain-source Voltage			V_{DS}	-	60	V
Gate-source Voltage			V_{GS}	-20	20	
Continuous Drain Current (Note 1,2)	Steady-State	$T_A=25^\circ C, V_{GS}=10V$	I_D	-	20	A
		$T_A=100^\circ C, V_{GS}=10V$		-	14	
Continuous Drain Current (Note 1,3)	Steady-State	$T_C=25^\circ C, V_{GS}=10V, \text{Chip limitation}$		-	90	
		$T_C=100^\circ C, V_{GS}=10V$		-	63	
Pulsed Drain Current	$T_C=25^\circ C, t_p \leq 10\mu s$		I_{DM}	-	350	
Maximum Body-Diode Continuous Current	$T_C=25^\circ C$		I_S		75	
Avalanche Energy (non-repetitive)	$T_J=25^\circ C, V_G=10V, R_G=25\Omega, L=0.5mH, I_{AS}=23.5A$		EAS	-	138	mJ
Total Power Dissipation (Note 1,2)	Steady-State	$T_A=25^\circ C$	P_D	-	4.2	W
		$T_A=100^\circ C$		-	2.1	
Total Power Dissipation (Note 1,3)	Steady-State	$T_C=25^\circ C$		-	88	
		$T_C=100^\circ C$		-	44	
Junction and Storage Temperature Range			T_J, T_{STG}	-55	175	$^\circ C$

Thermal Resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient (Note 2)	Steady-State	$R_{\theta JA}$	-	35	$^\circ C/W$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	-	1.7	

Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJP5D4G06H	B1	YJP5D4G06H	50	/	5000	Tube



YJP5D4G06H

■ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A, T_j=25^\circ C$	60	-	-	V
		$V_{GS}=0V, I_D=1mA, T_j=25^\circ C$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V, T_j=25^\circ C$	-	-	1	μA
		$V_{DS}=60V, V_{GS}=0V, T_j=125^\circ C$	-	-	100	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V, T_j=25^\circ C$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A, T_j=25^\circ C$	2	3	4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=45A, T_j=25^\circ C$	-	4.3	5.4	m Ω
Diode Forward Voltage	V_{SD}	$I_S=45A, V_{GS}=0V, T_j=25^\circ C$	-	0.89	1.2	V
Gate Resistance	R_G	$f=1MHz, T_j=25^\circ C$	-	1.5	-	Ω
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V, f=1MHz, T_j=25^\circ C$	-	1530	-	pF
Output Capacitance	C_{oss}		-	460	-	
Reverse Transfer Capacitance	C_{rss}		-	16	-	
Switching Parameters						
Total Gate Charge	Q_g	$V_{GS}=10V, V_{DS}=30V, I_D=45A, T_j=25^\circ C$	-	28	-	nC
Gate-Source Charge	Q_{gs}		-	7.5	-	
Gate-Drain Charge	Q_{gd}		-	9	-	
Reverse Recovery Charge	Q_{rr}	$I_F=45A, di/dt=100A/\mu s, V_{GS}=0V, V_R=30V, T_j=25^\circ C$	-	16	-	nC
Reverse Recovery Time	t_{rr}		-	25	-	ns
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=30V, I_D=45A, R_L=0.67\Omega, R_{GEN}=3\Omega, T_j=25^\circ C$	-	12	-	ns
Turn-on Rise Time	t_r		-	68	-	
Turn-off Delay Time	$t_{D(off)}$		-	21	-	
Turn-off Fall Time	t_f		-	10	-	

Note:

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of $R_{\theta JA}$ is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 2oz. Copper, in the still air environment with $T_A=25^\circ C$. The maximum allowed junction temperature of 175 $^\circ C$. The value in any given application depends on the user's specific board design.
- Thermal resistance from junction to soldering point (on the exposed drain pad).



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Typical Electrical and Thermal Characteristics Diagrams

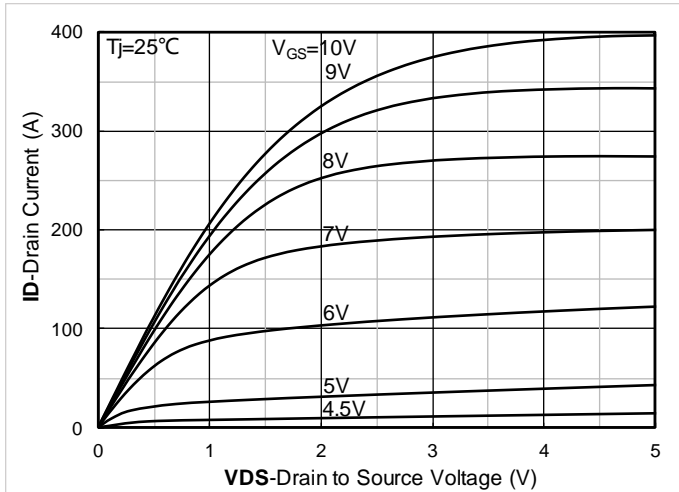


Figure 1. Output Characteristics; typical values

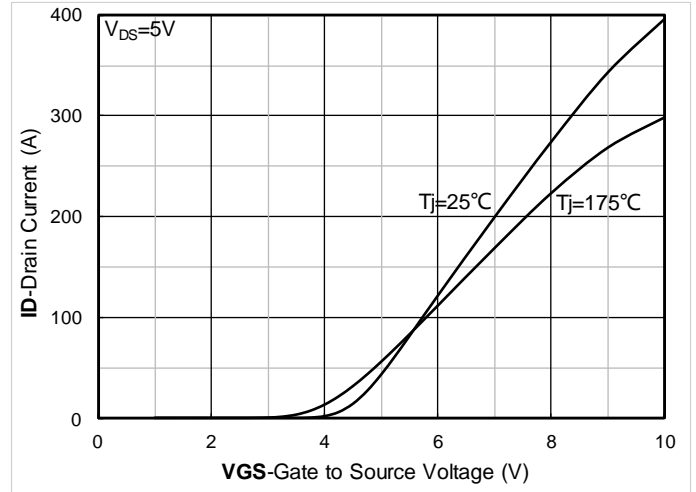


Figure 2. Transfer Characteristics; typical values

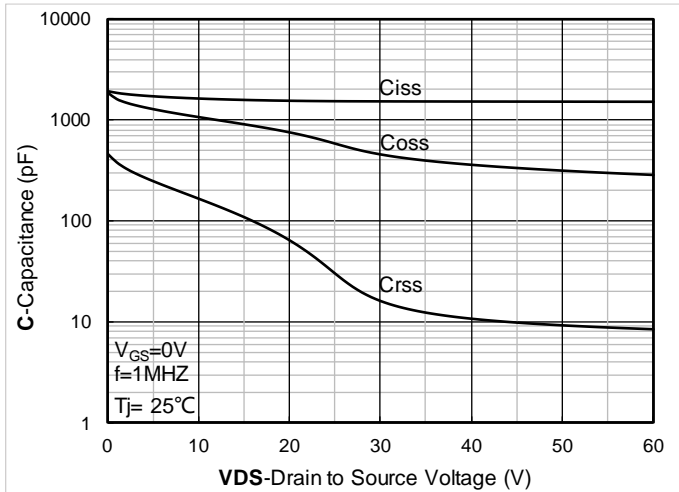


Figure 3. Capacitance Characteristics; typical values

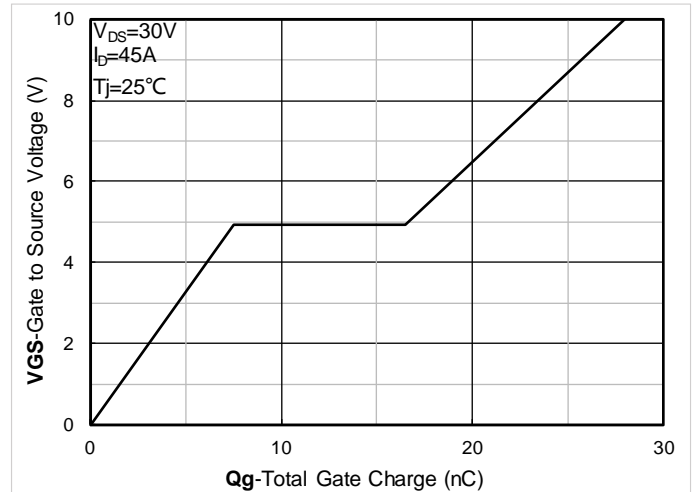


Figure 4. Gate Charge; typical values

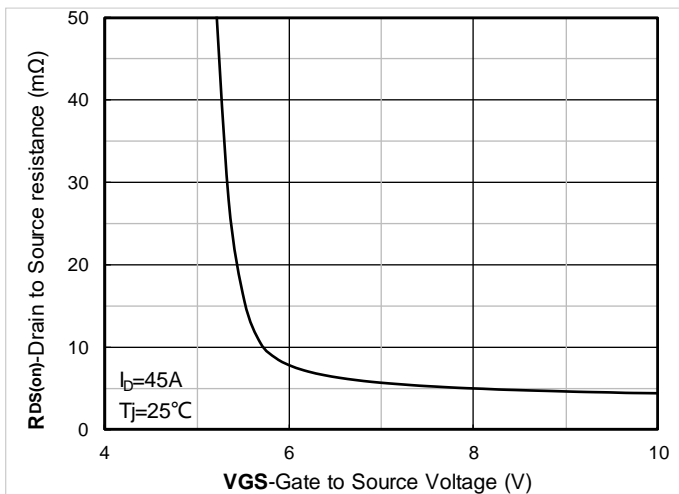


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

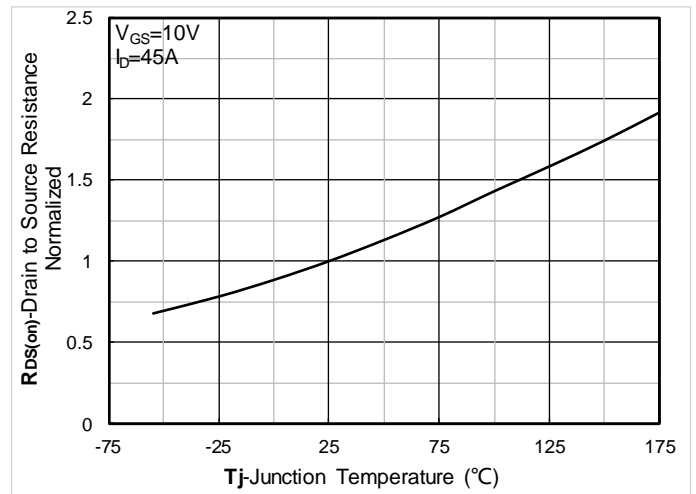


Figure 6. Normalized On-Resistance



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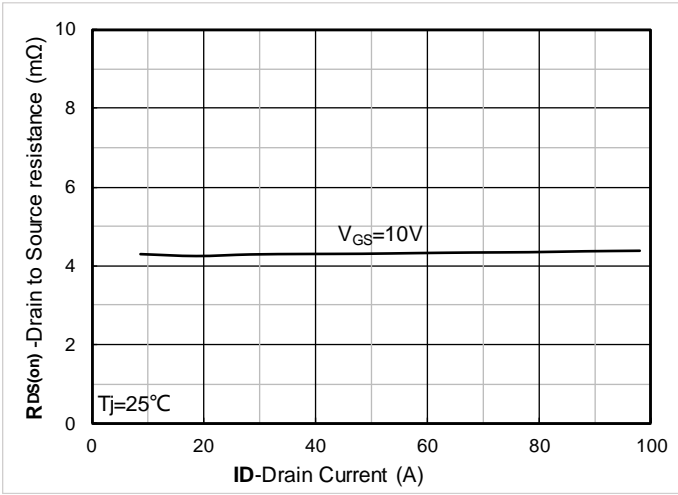


Figure 7. RDS(on) vs. Drain Current; typical values

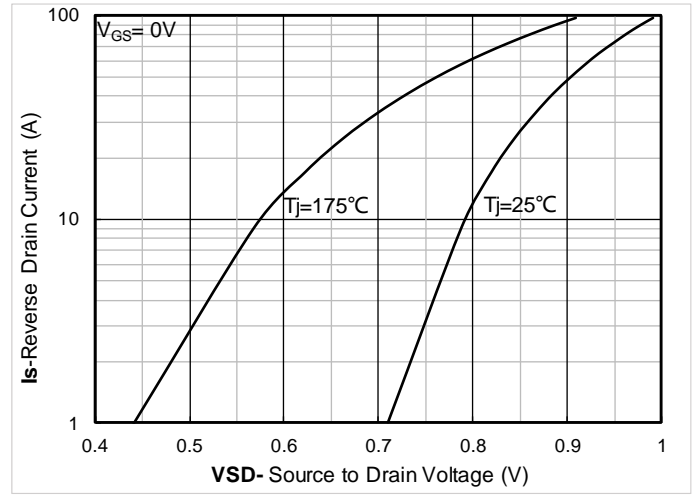


Figure 8. Forward characteristics of reverse diode; typical values

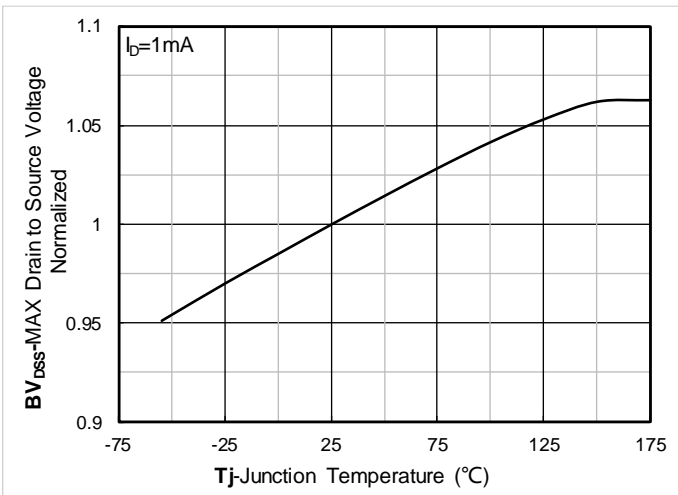


Figure 9. Normalized breakdown voltage

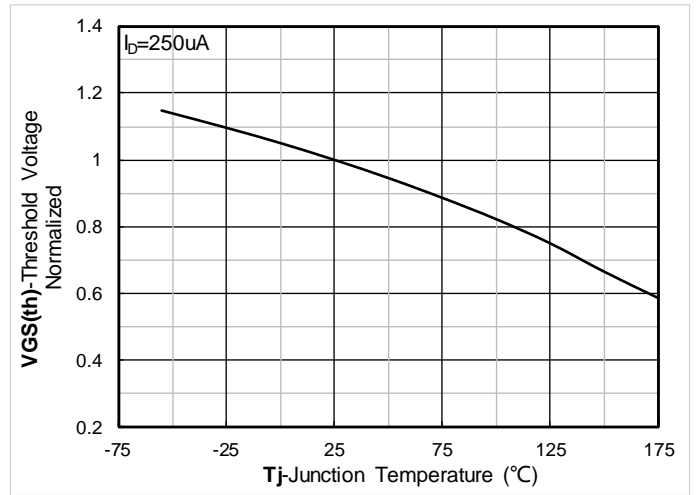


Figure 10. Normalized Threshold voltage

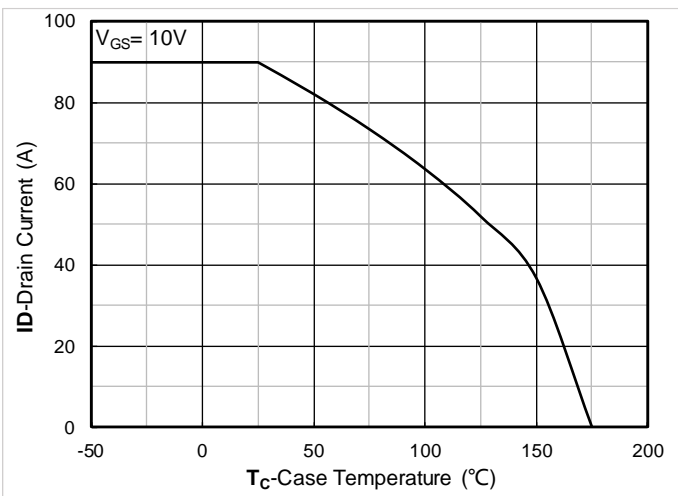


Figure 11. Current dissipation

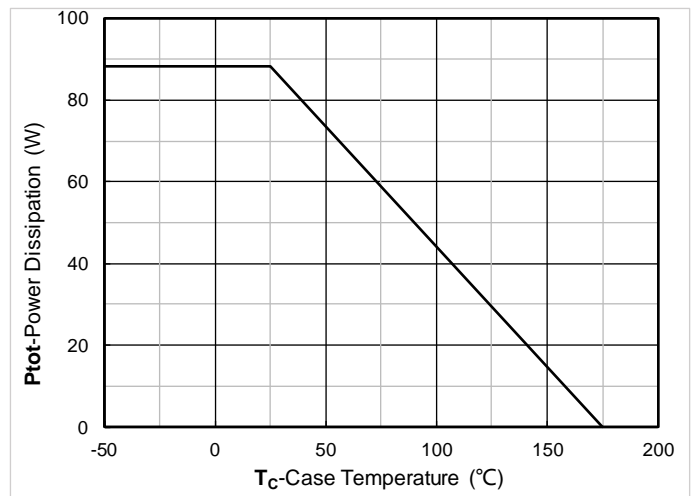


Figure 12. Power dissipation



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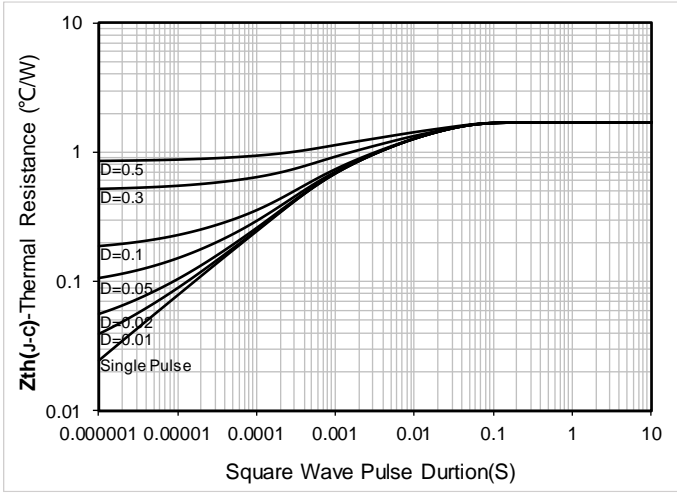


Figure 13. Maximum Transient Thermal Impedance

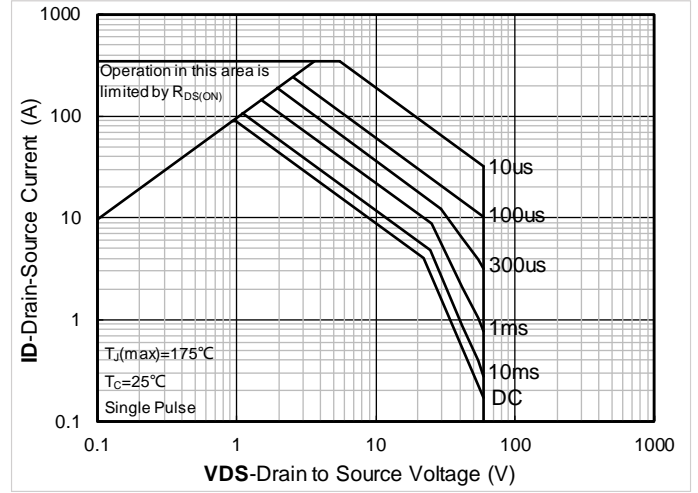


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

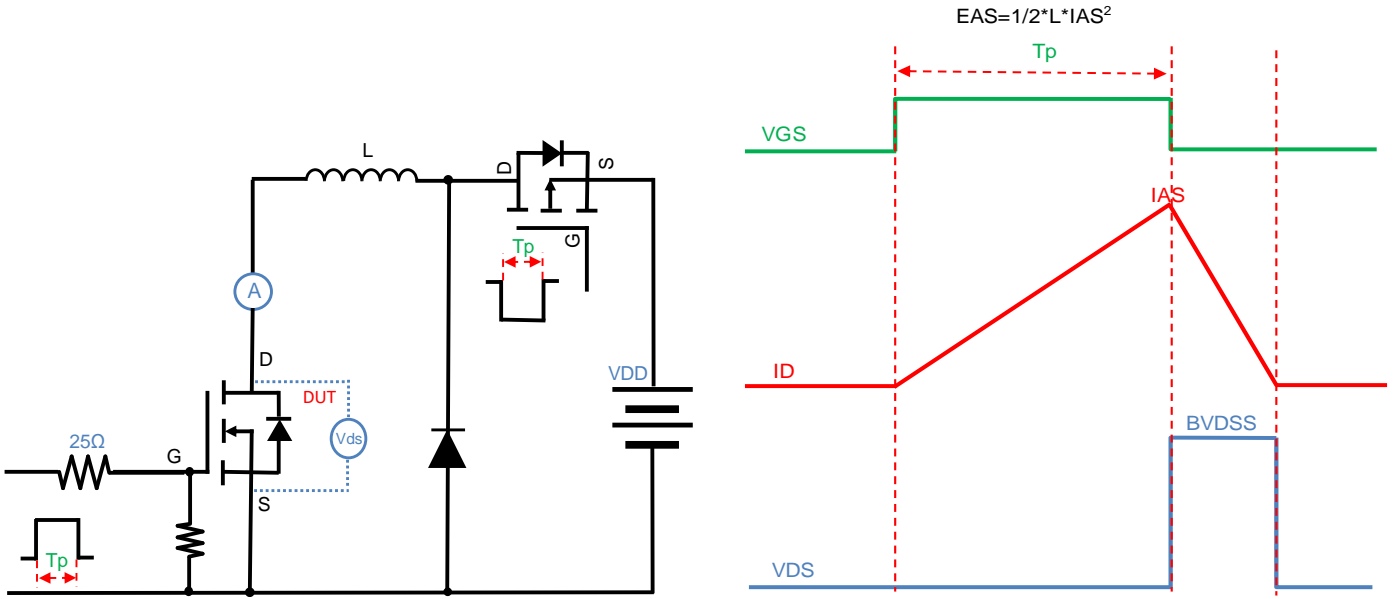


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

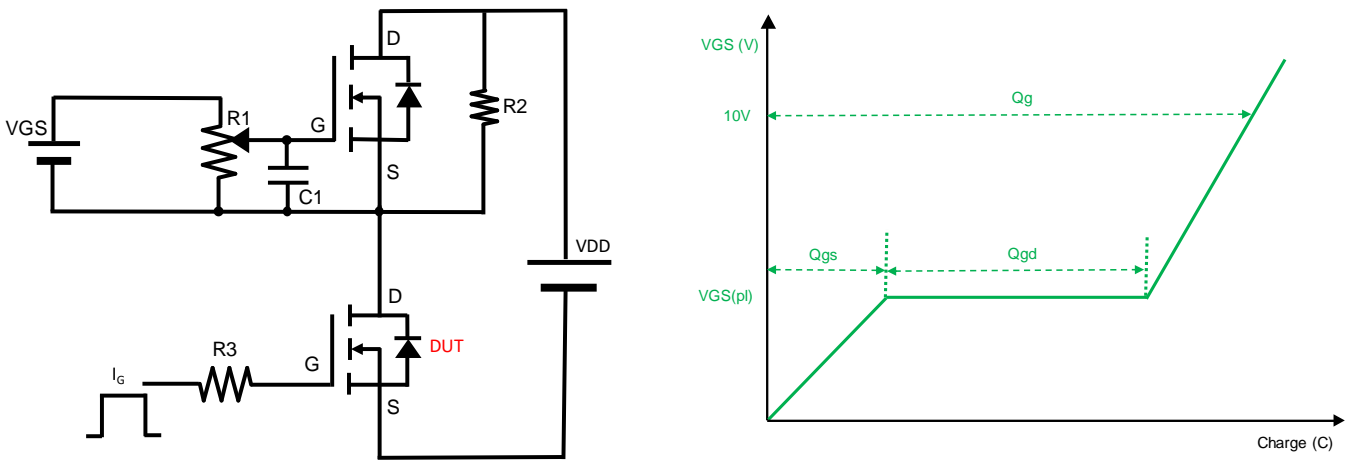


Figure B. Gate Charge Test Circuit & Waveform

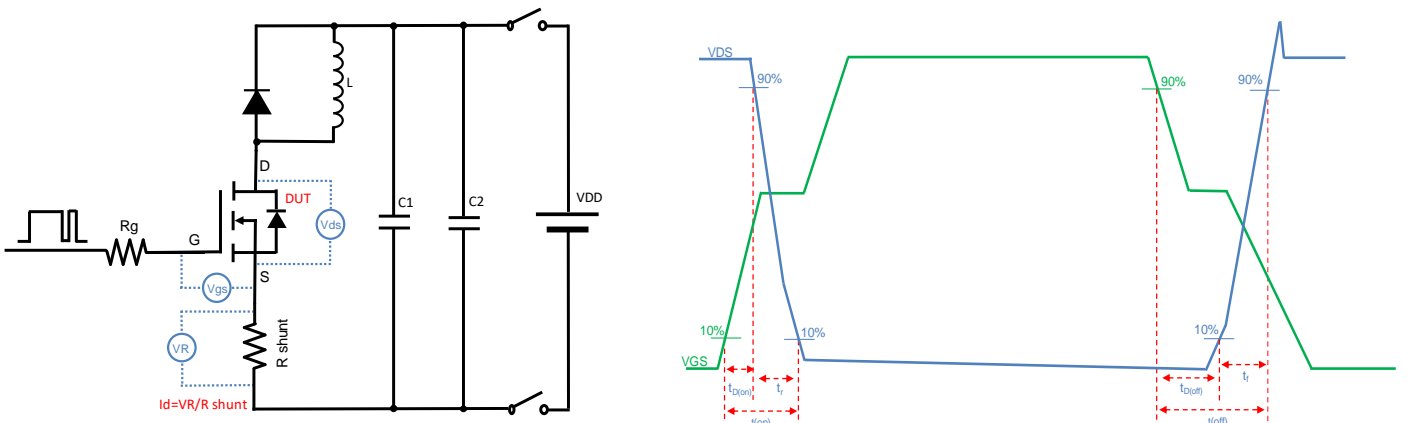


Figure C. Resistive Switching Test Circuit & Waveform

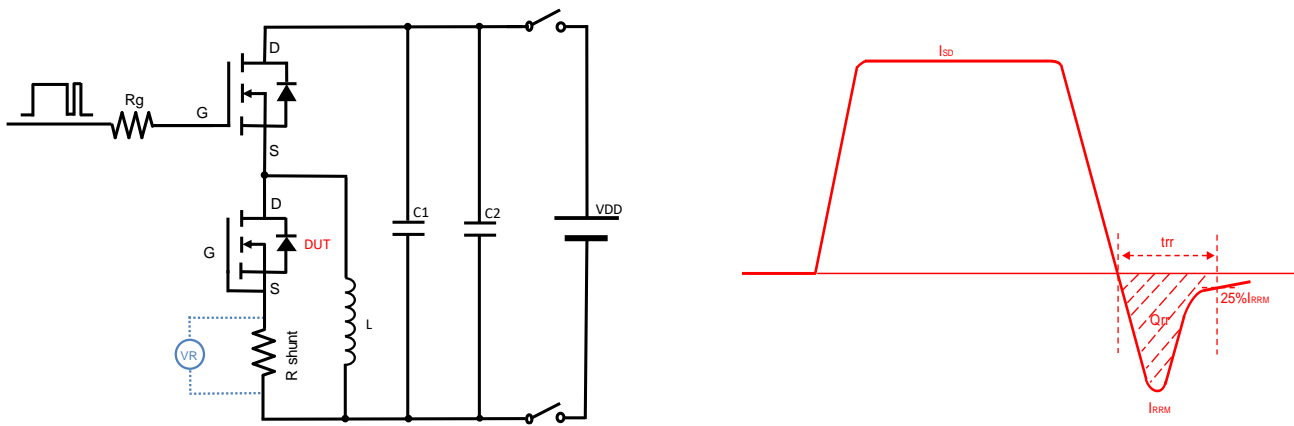
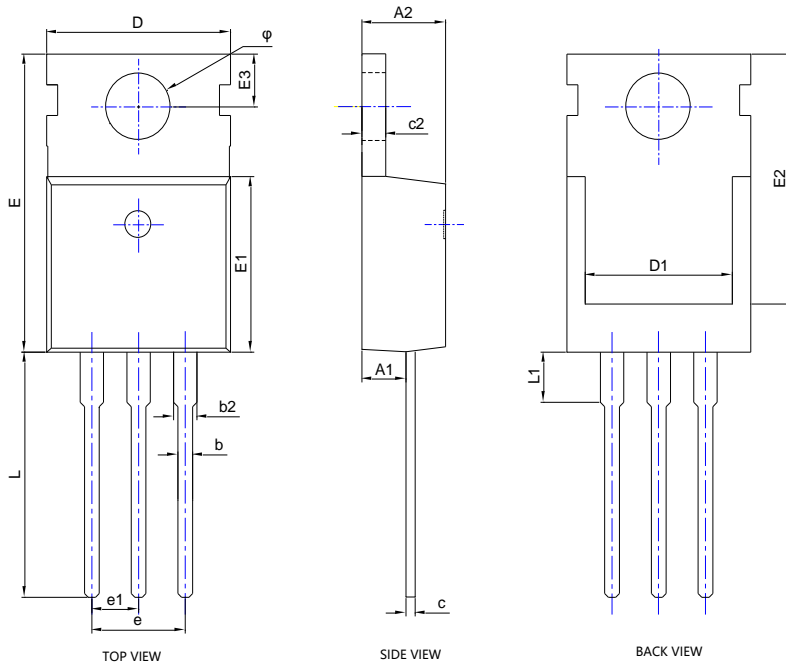


Figure D. Diode Recovery Test Circuit & Waveform



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■ TO-220AB-E Package information



SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A1	0.093	0.114	2.350	2.900
A2	0.176	0.184	4.470	4.670
b	0.028	0.036	0.710	0.910
b2	0.048	0.054	1.220	1.360
c	0.019	0.024	0.470	0.600
c2	0.047	0.055	1.200	1.400
D	0.382	0.408	9.700	10.370
D1	0.276	0.350	7.000	8.890
E	0.579	0.622	14.700	15.800
E1	0.350	0.373	8.900	9.470
E2	0.463	0.535	11.750	13.600
E3	0.108BSC		2.740BSC	
e	0.200BSC		5.080BSC	
e1	0.100BSC		2.540BSC	
L	0.508	0.583	12.900	14.800
L1	0.100	0.151	2.540	3.840
φ	0.142	0.154	3.600	3.900

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



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