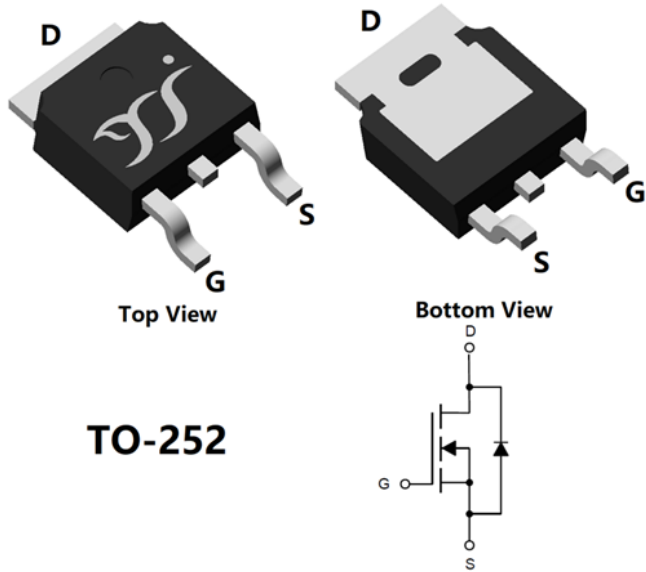


## N-Channel Enhancement Mode Field Effect Transistor



### Product Summary

• $V_{DS}$	60V
• $I_D$	157A
• $R_{DS(ON)}$ ( at $V_{GS}=10V$ )	<3.3m $\Omega$
• $R_{DS(ON)}$ ( at $V_{GS}=4.5V$ )	<4.7m $\Omega$
• 100% EAS Tested	
• 100% $\nabla V_{DS}$ Tested	

### General Description

- Split gate trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- 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	$T_A=25^\circ\text{C}, V_{GS}=10\text{V}$	$I_D$	-	22	A
		$T_A=100^\circ\text{C}, V_{GS}=10\text{V}$		-	14	
Continuous Drain Current (Note 1,3)	Steady-State	$T_C=25^\circ\text{C}, V_{GS}=10\text{V}, \text{Chip limitation}$		-	157	
		$T_C=100^\circ\text{C}, V_{GS}=10\text{V}$		-	99	
Pulsed Drain Current	$T_C=25^\circ\text{C}, t_p \leq 10\mu\text{s}$		$I_{DM}$	-	628	
Maximum Body-Diode Continuous Current	$T_C=25^\circ\text{C}$		$I_S$		110	
Avalanche Energy (non-repetitive)	$T_J=25^\circ\text{C}, V_G=10\text{V}, R_G=25\Omega, L=0.5\text{mH}, I_{AS}=30\text{A}$		EAS	-	225	mJ
Total Power Dissipation (Note 1,2)	Steady-State	$T_A=25^\circ\text{C}$	$P_D$	-	2.7	W
		$T_A=100^\circ\text{C}$		-	1.1	
Total Power Dissipation (Note 1,3)	Steady-State	$T_C=25^\circ\text{C}$		-	138	
		$T_C=100^\circ\text{C}$		-	55	
Junction and Storage Temperature Range			$T_J, T_{STG}$	-55	150	$^\circ\text{C}$

### Thermal Resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient (Note 2)	Steady-State	$R_{\theta JA}$	-	45	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	-	0.9	

### Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD3D3G06A	F1/F2	YJD3D3G06A	2500	/	25000	13" reel



# YJD3D3G06A

## ■ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
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	$\mu A$
		$V_{DS}=60V, V_{GS}=0V, T_j=125^\circ C$	-	-	100	
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V, T_j=25^\circ C$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A, T_j=25^\circ C$	1.2	1.8	2.5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=50A, T_j=25^\circ C$	-	2.7	3.3	$m\Omega$
		$V_{GS}=4.5V, I_D=30A, T_j=25^\circ C$	-	3.5	4.7	$m\Omega$
Diode Forward Voltage	$V_{SD}$	$I_S=50A, V_{GS}=0V, T_j=25^\circ C$	-	0.87	1.2	V
Gate Resistance	$R_G$	$f=1MHz, T_j=25^\circ C$	-	2	-	$\Omega$
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=30V, V_{GS}=0V, f=1MHz, T_j=25^\circ C$	-	3500	-	$pF$
Output Capacitance	$C_{oss}$		-	1345	-	
Reverse Transfer Capacitance	$C_{rss}$		-	54	-	
<b>Switching Parameters</b>						
Total Gate Charge	$Q_g$	$V_{GS}=10V, V_{DS}=30V, I_D=50A, T_j=25^\circ C$	-	56	-	$nC$
Gate-Source Charge	$Q_{gs}$		-	11.3	-	
Gate-Drain Charge	$Q_{gd}$		-	8.6	-	
Reverse Recovery Charge	$Q_{rr}$	$I_F=50A, di/dt=100A/\mu s, V_{GS}=0V, V_R=30V, T_j=25^\circ C$	-	22	-	$nC$
Reverse Recovery Time	$t_{rr}$		-	31	-	ns
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=30V, I_D=50A, R_{GEN}=3\Omega, T_j=25^\circ C$	-	13	-	$ns$
Turn-on Rise Time	$t_r$		-	11	-	
Turn-off Delay Time	$t_{D(off)}$		-	46	-	
Turn-off Fall Time	$t_f$		-	21	-	

### 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 in<sup>2</sup> pad of 2oz. Copper, in the still air environment with  $T_A=25^\circ C$ . The maximum allowed junction temperature of  $150^\circ C$ . 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).



# YJD3D3G06A

## Typical Electrical and Thermal Characteristics Diagrams

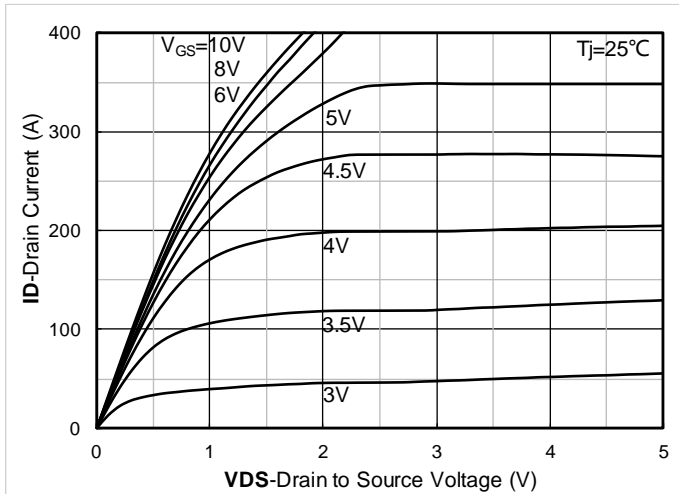


Figure 1. Output Characteristics; typical values

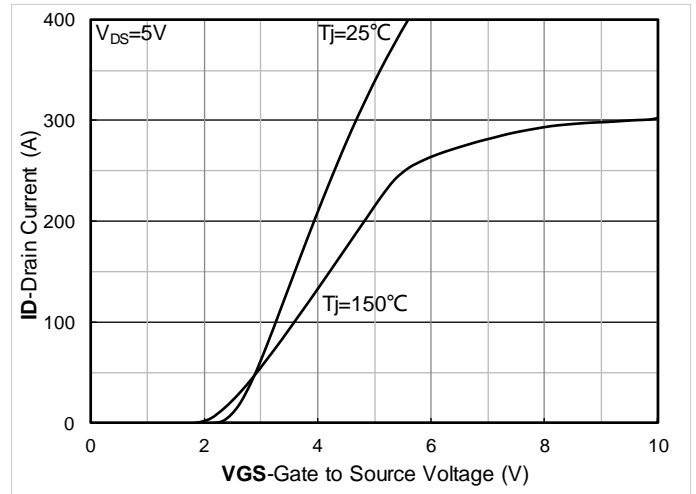


Figure 2. Transfer Characteristics; typical values

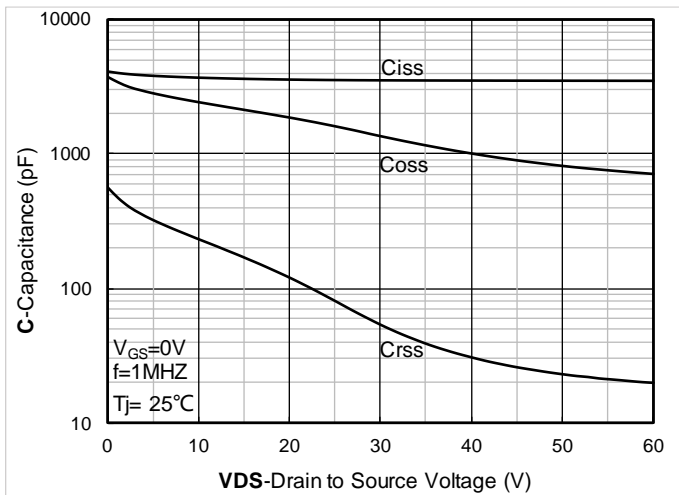


Figure 3. Capacitance Characteristics; typical values

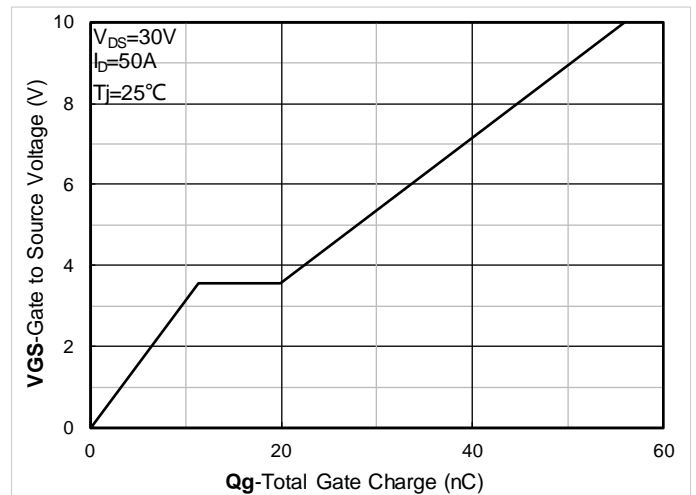


Figure 4. Gate Charge; typical values

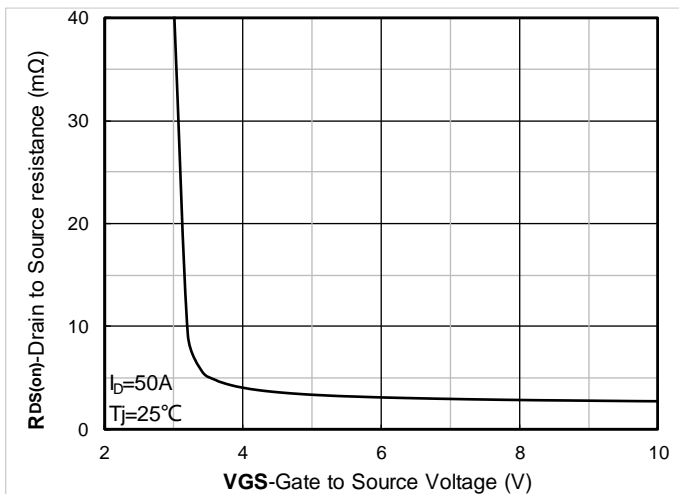


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

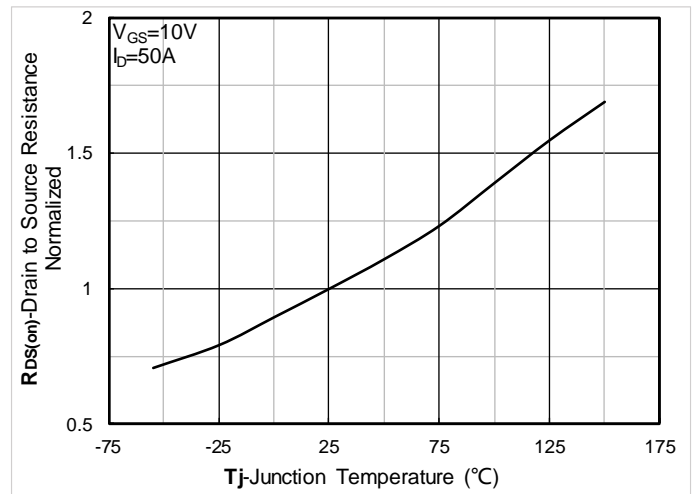


Figure 6. Normalized On-Resistance



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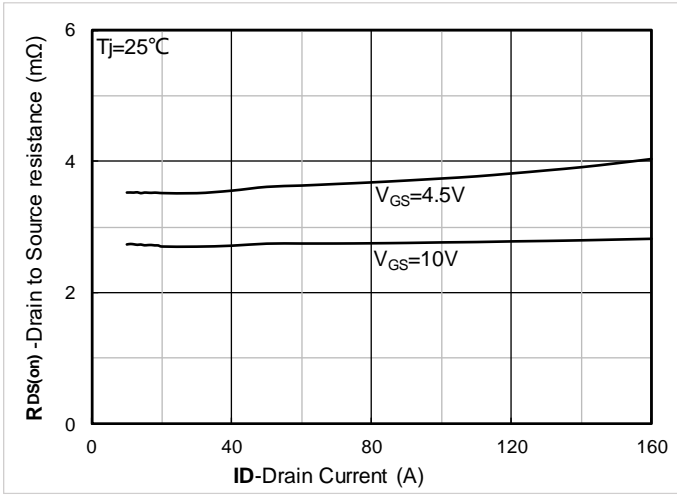


Figure 7. RDS(on) vs. Drain Current; typical values

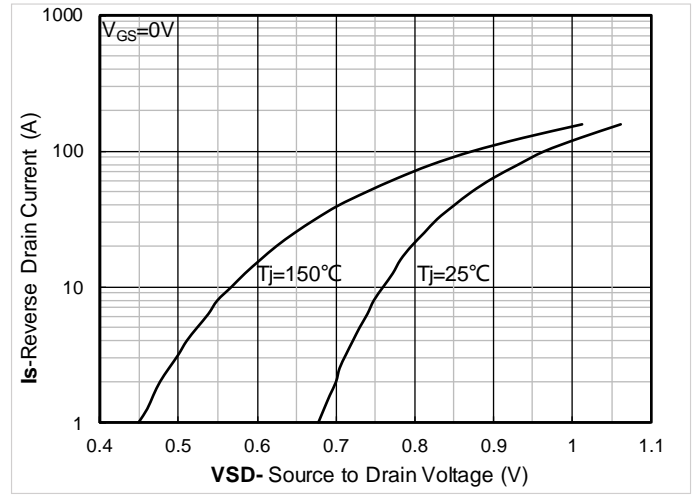


Figure 8. Forward characteristics of reverse diode; typical values

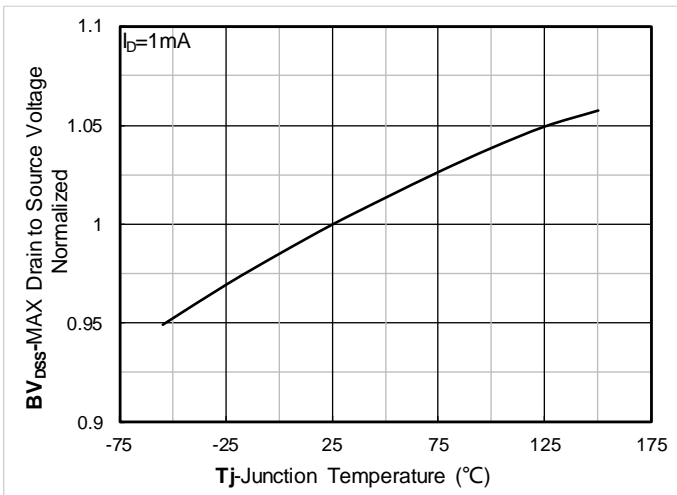


Figure 9. Normalized breakdown voltage

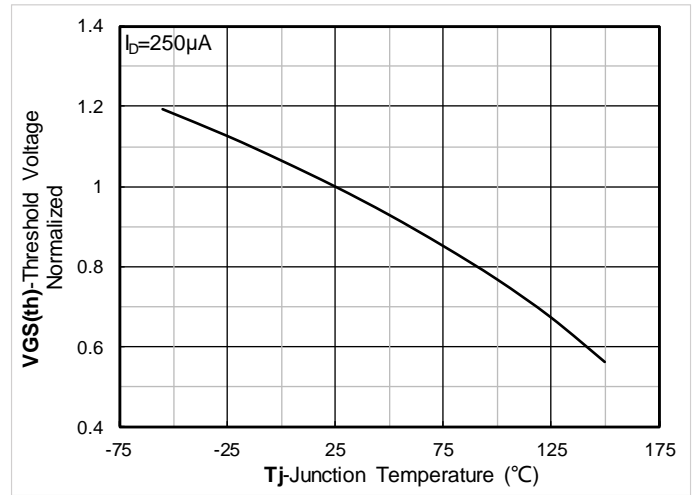


Figure 10. Normalized Threshold voltage

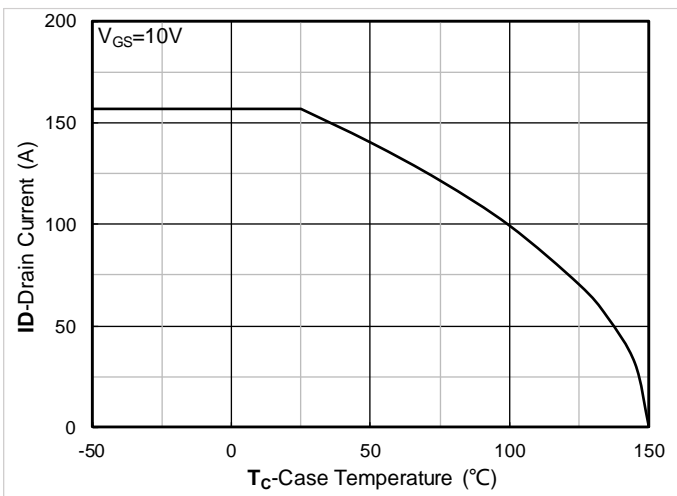


Figure 11. Current dissipation

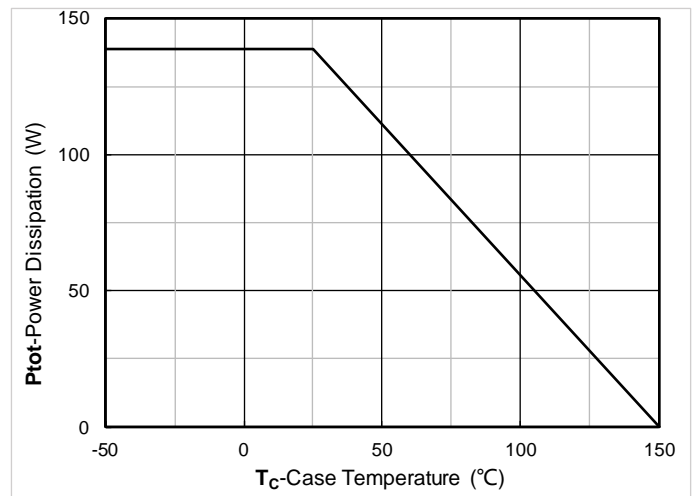


Figure 12. Power dissipation



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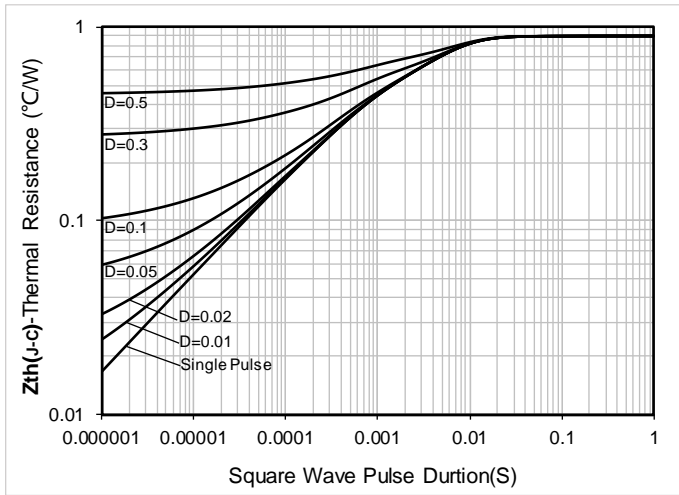


Figure 13. Maximum Transient Thermal Impedance

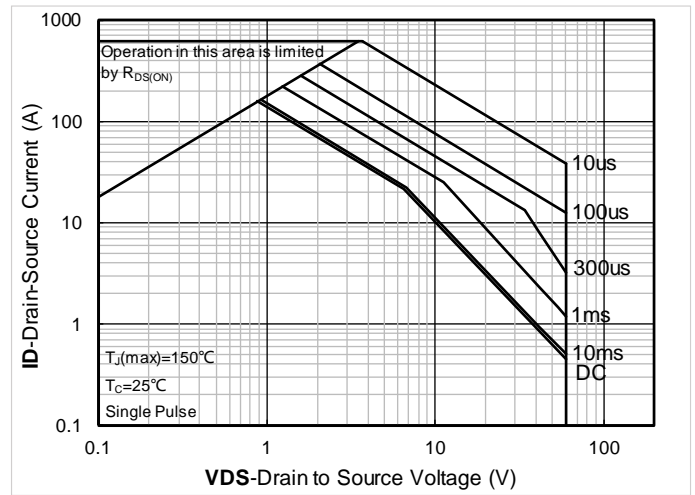


Figure 14. Safe Operation Area

## ■ Test Circuits & Waveforms

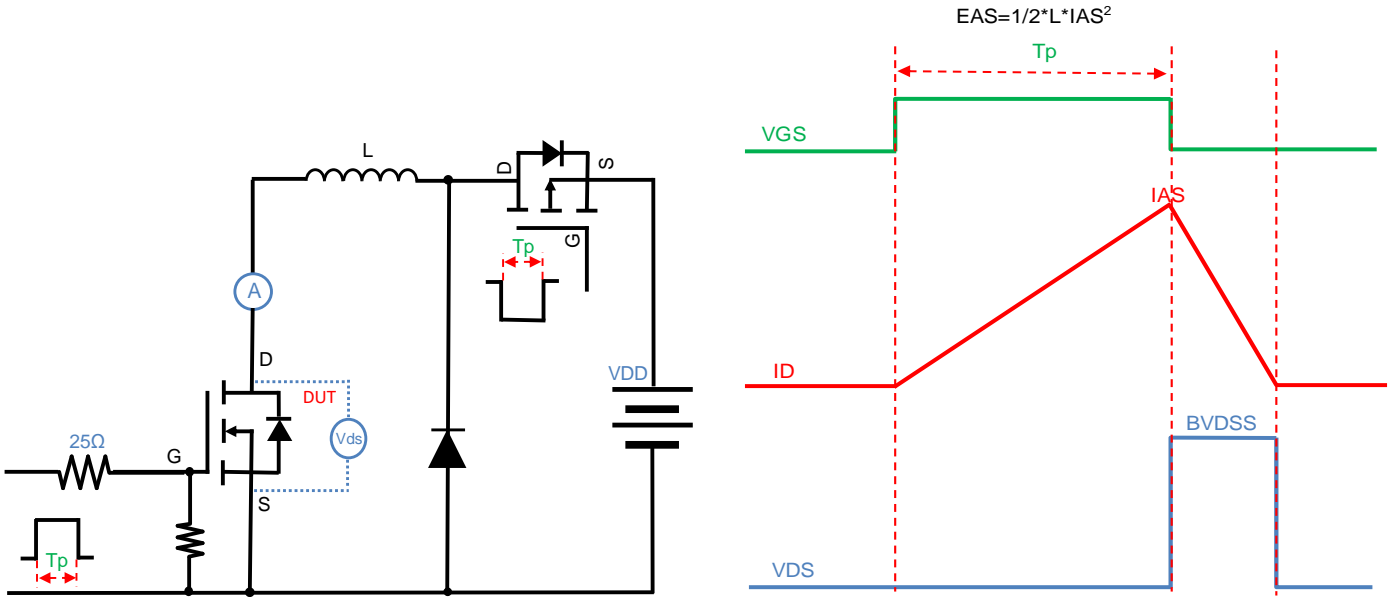


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

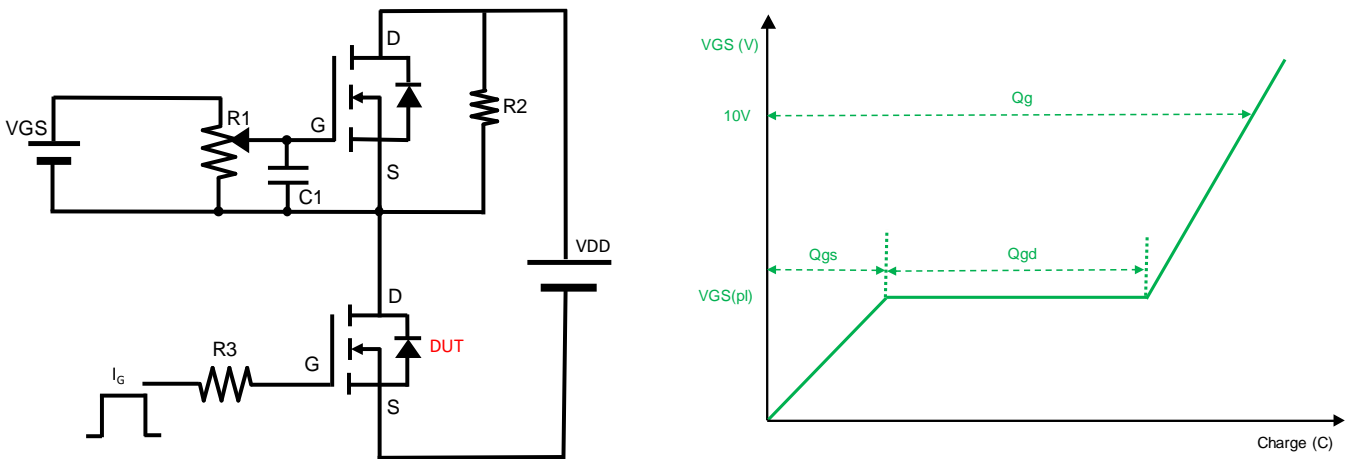


Figure B. Gate Charge Test Circuit & Waveform

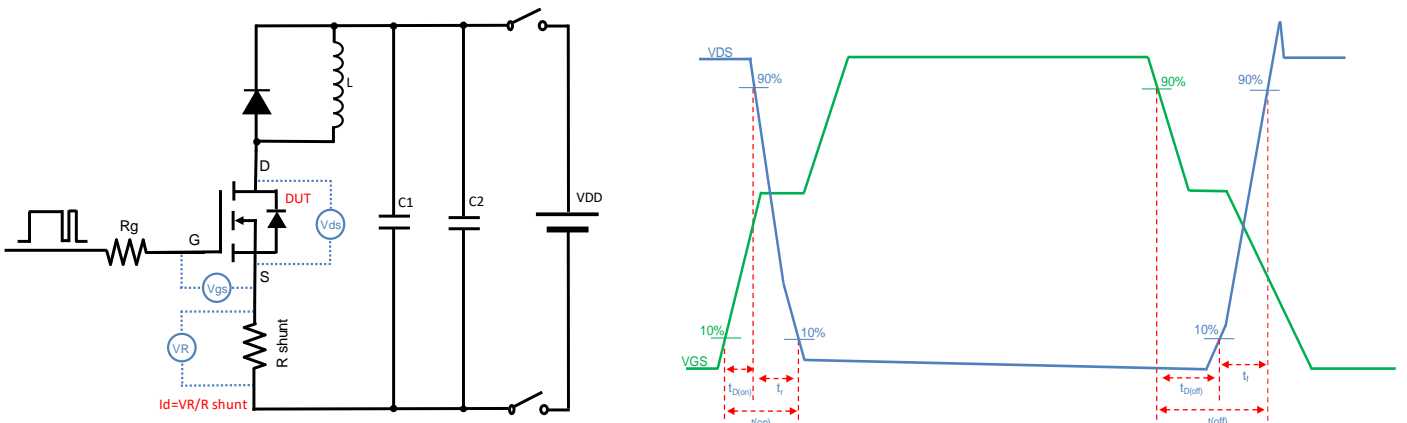


Figure C. Resistive Switching Test Circuit & Waveform

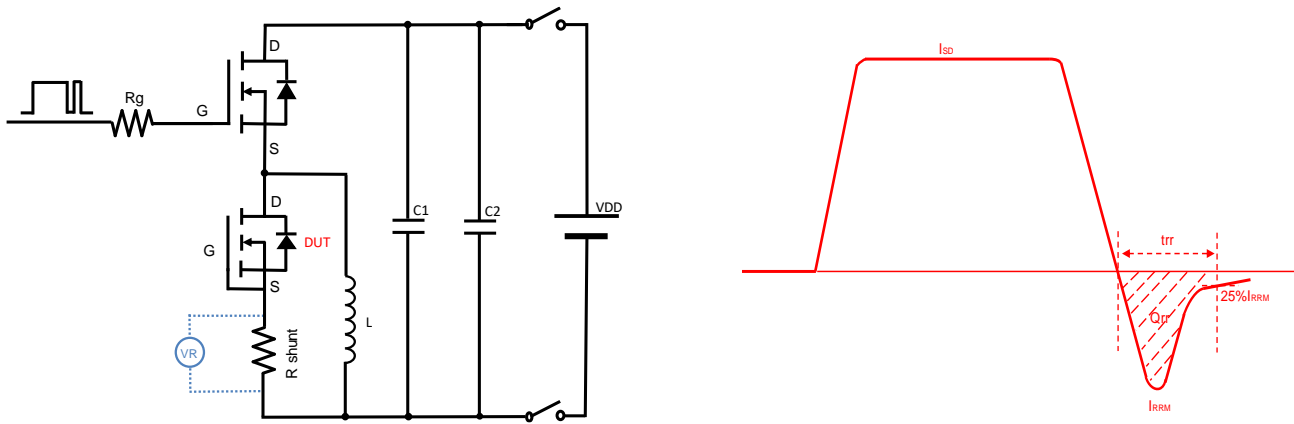
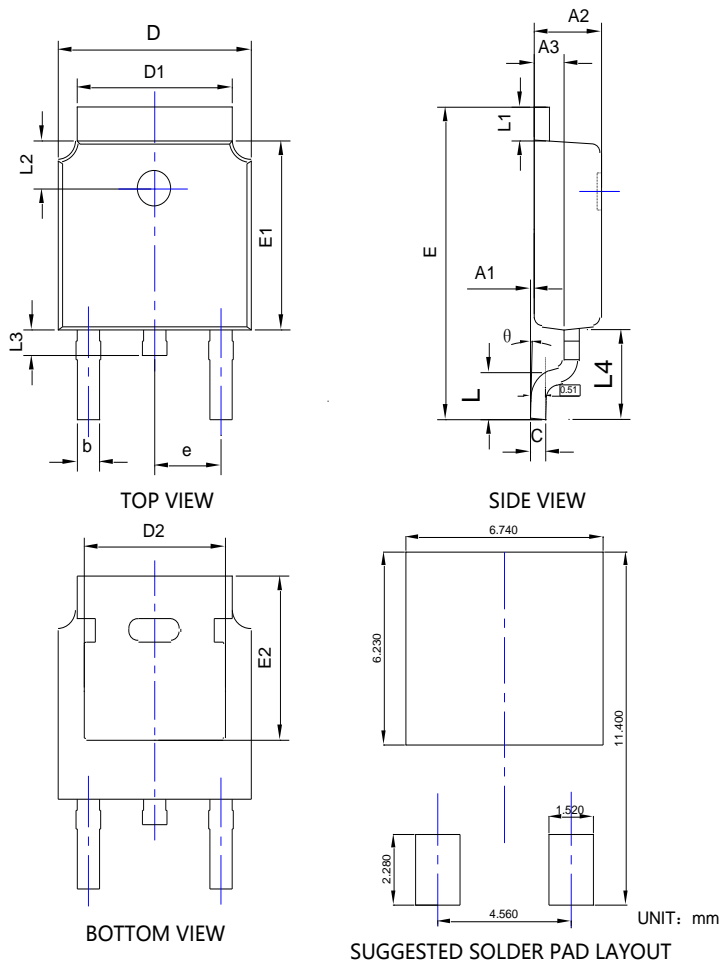


Figure D. Diode Recovery Test Circuit & Waveform



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## ■ TO-252-B Package Information



SYMBOL	DIMENSIONS					
	INCHES			Millimeter		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A1	0.000	---	0.008	0.000	---	0.200
A2	0.087	0.091	0.094	2.200	2.300	2.400
A3	0.035	0.039	0.043	0.900	1.000	1.100
b	0.026	0.030	0.034	0.660	0.760	0.860
c	0.018	0.020	0.023	0.460	0.520	0.580
D	0.256	0.260	0.264	6.500	6.600	6.700
D1	0.203	0.209	0.215	5.150	5.300	5.450
D2	0.181	0.189	0.195	4.600	4.800	4.950
E	0.390	0.398	0.406	9.900	10.100	10.300
E1	0.236	0.240	0.244	6.000	6.100	6.200
E2	0.203	0.209	0.215	5.150	5.300	5.450
e	0.090BSC			2.286BSC		
L	0.049	0.059	0.069	1.250	1.500	1.750
L1	0.035	---	0.050	0.900	---	1.270
L2	0.055	---	0.075	1.400	---	1.900
L3	0.024	0.031	0.039	0.600	0.800	1.000
L4	0.114REF			2.900REF		
$\theta$	0°	---	10°	0°	---	10°

NOTE:  
 1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.  
 2. TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.  
 3. THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.





## YJD3D3G06A

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