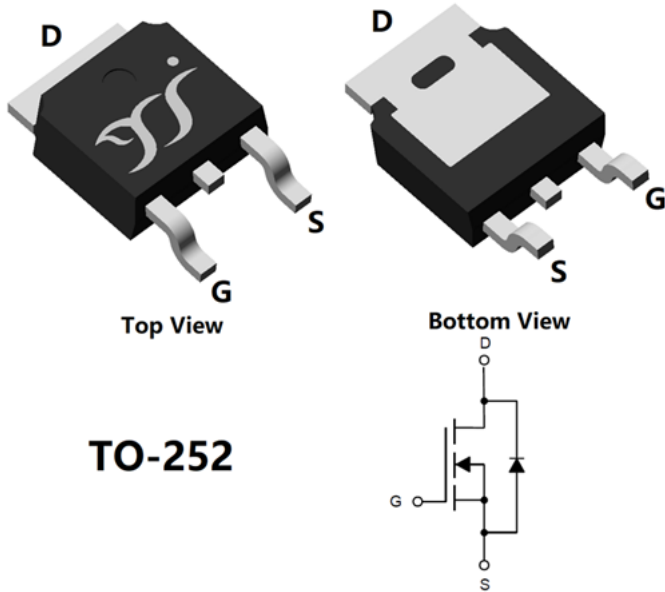


N-Channel Enhancement Mode Field Effect Transistor



TO-252

Product Summary

- V_{DS} 60V
- I_D 80A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $<6.5m\Omega$
- $R_{DS(ON)}$ (at $V_{GS}=4.5V$) $<9m\Omega$
- 100% EAS Tested
- 100% ∇V_{DS} Tested

General Description

- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free
- Part no. with suffix "Q" means AEC-Q101 qualified

Applications

- Engine management systems
- DC-DC convertor
- Body control electronics

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

Parameter		Symbol	Limit	Unit	
Drain-source Voltage		V_{DS}	60	V	
Gate-source Voltage		V_{GS}	± 20	V	
Continuous Drain Current (Note 1,2)	Steady-State	$T_A=25^\circ C$	14.9	A	
		$T_A=100^\circ C$	10.5		
Continuous Drain Current (Note 1,3)	Steady-State	$T_C=25^\circ C$	80		
		$T_C=100^\circ C$	56		
Pulsed Drain Current	$T_C=25^\circ C, t_p=100\mu s$	I_{DM}	280	A	
Avalanche energy		$V_G=10V, R_G=25\Omega, L=0.5mH, I_{AS}=23A$	EAS	132.25	mJ
Total Power Dissipation (Note 1,2)	Steady-State	$T_A=25^\circ C$	3	W	
		$T_A=100^\circ C$	1.5		
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	$R_{\theta JA}$	40	50	$^\circ C/W$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	1.4	1.7	

■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD6D5G06AHQ	F1/F2	YJD6D5G06A	2500	/	25000	13" reel



YJD6D5G06AHQ

■ 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	60	-	-	V
		V _{GS} = 0V, I _D =1mA	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
		V _{DS} =60V, V _{GS} =0V, T _J =125°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	1.3	1.8	2.3	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	5	6.5	mΩ
		V _{GS} =4.5V, I _D =10A	-	6.7	9	mΩ
Diode Forward Voltage	V _{SD}	I _S =20A, V _{GS} =0V	-	-	1.2	V
Gate resistance	R _G	f=1MHz	-	1.5	-	Ω
Maximum Body-Diode Continuous Current	I _S		-	-	80	A
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =30V, V _{GS} =0V, f=1MHz	-	2060	-	pF
Output Capacitance	C _{oss}		-	340	-	
Reverse Transfer Capacitance	C _{rss}		-	16.8	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =10V, V _{DS} =30V, I _D =20A	-	27.2	-	nC
Gate-Source Charge	Q _{gs}		-	5.6	-	
Gate-Drain Charge	Q _{gd}		-	3.9	-	
Reverse Recovery Charge	Q _{rr}	I _F =20A, di/dt=100A/us	-	17.3	-	nC
Reverse Recovery Time	t _{rr}		-	23.3	-	ns
Turn-on Delay Time	t _{D(on)}	V _{GS} =10V, V _{DD} =30V, I _D =20A R _{GEN} =2.7Ω	-	11.6	-	ns
Turn-on Rise Time	t _r		-	58	-	
Turn-off Delay Time	t _{D(off)}		-	27.4	-	
Turn-off fall Time	t _f		-	5.8	-	

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_{θJA} 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°C. The maximum allowed junction temperature of 175°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

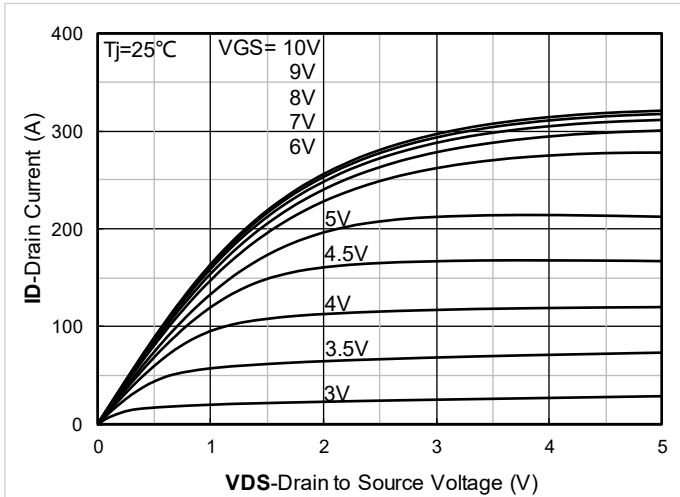


Figure 1. Output Characteristics

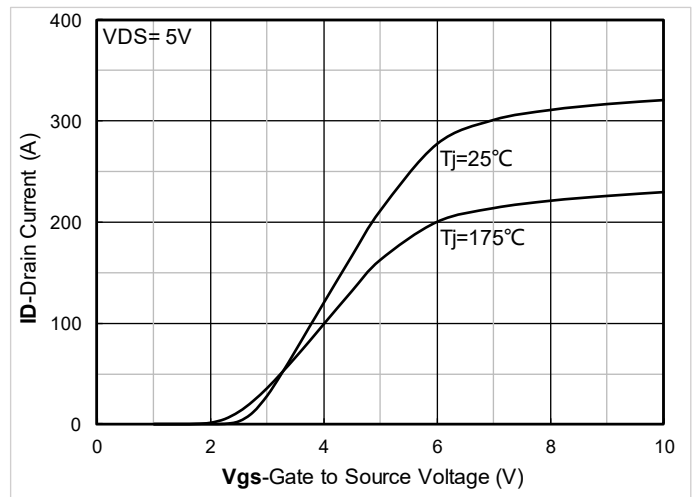


Figure 2. Transfer Characteristics

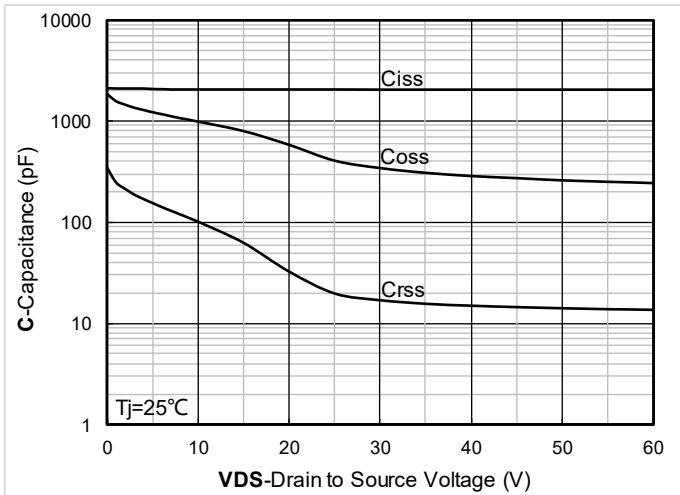


Figure 3. Capacitance Characteristics

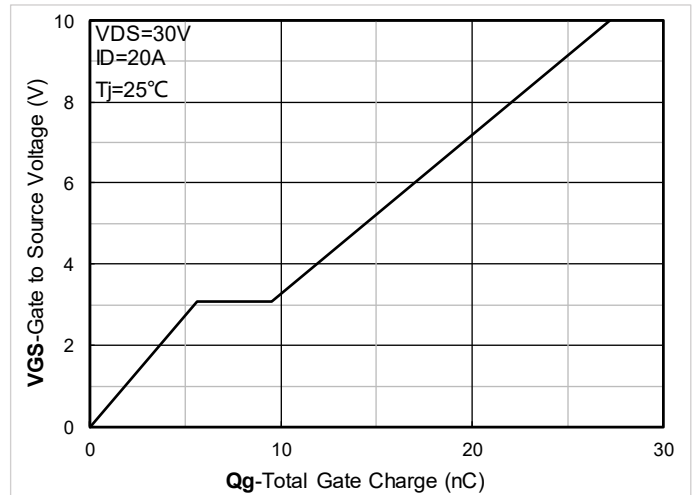


Figure 4. Gate Charge

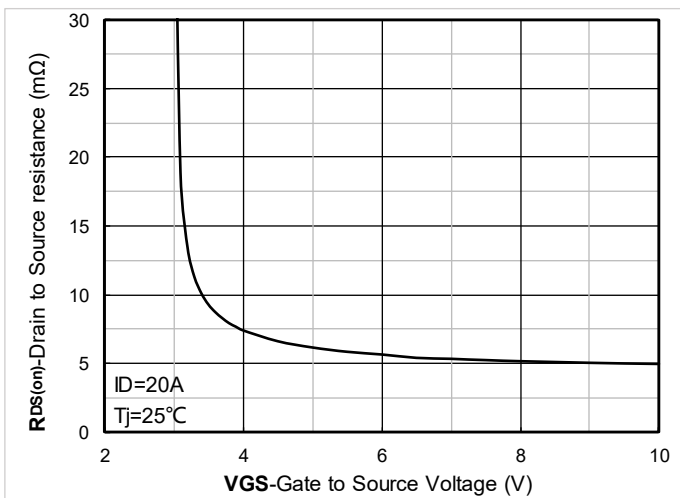


Figure 5. On-Resistance vs Gate to Source Voltage

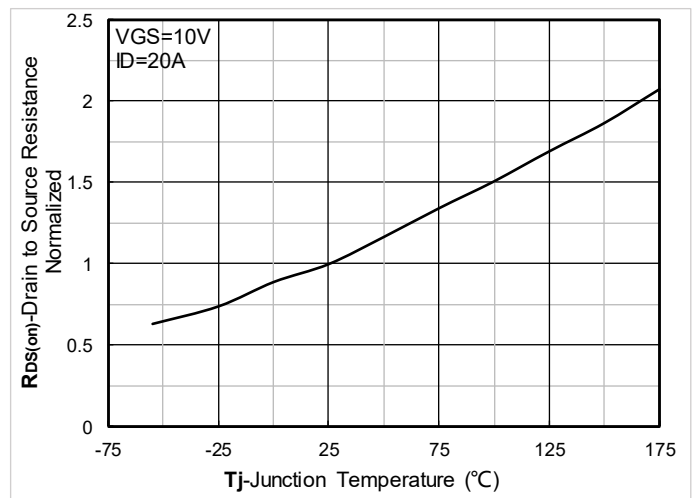


Figure 6. Normalized On-Resistance



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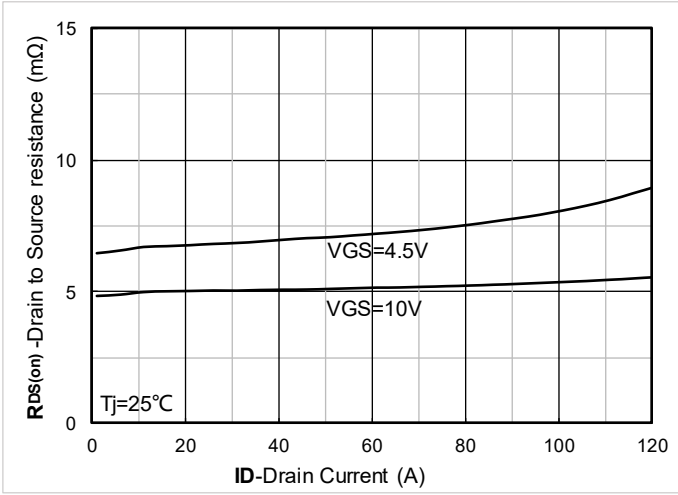


Figure 7. $R_{DS(on)}$ VS Drain Current

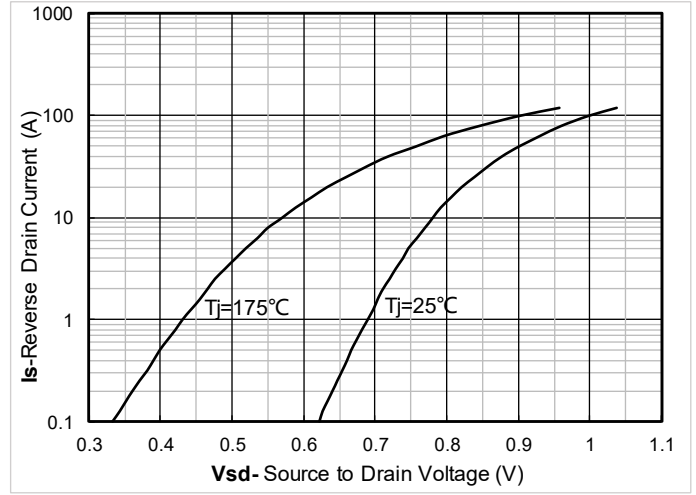


Figure 8. Forward characteristics of reverse diode

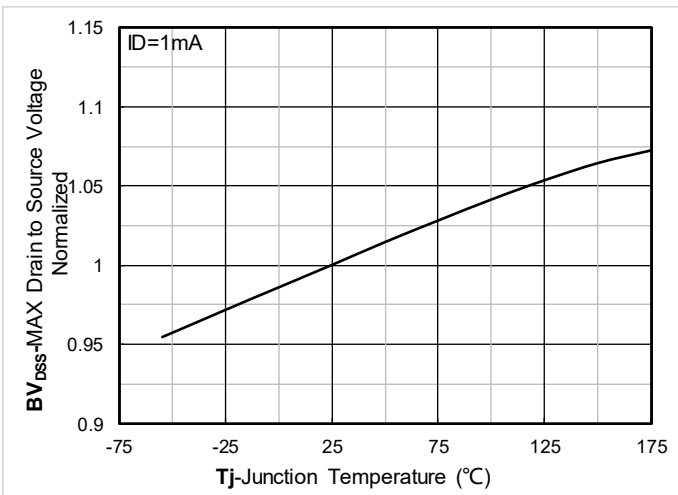


Figure 9. Normalized breakdown voltage

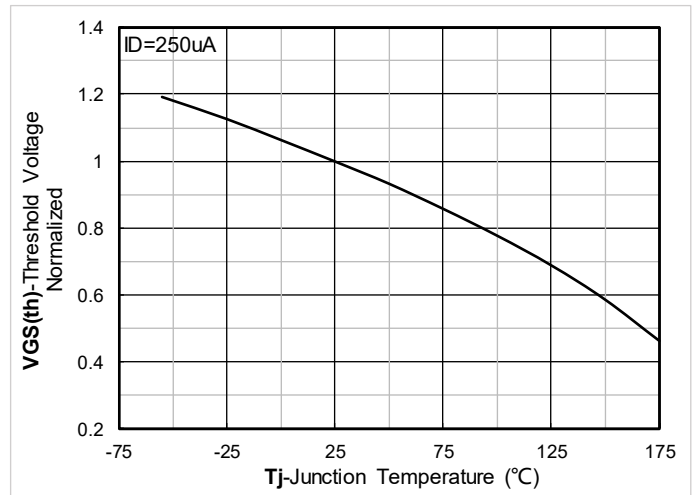


Figure 10. Normalized Threshold voltage

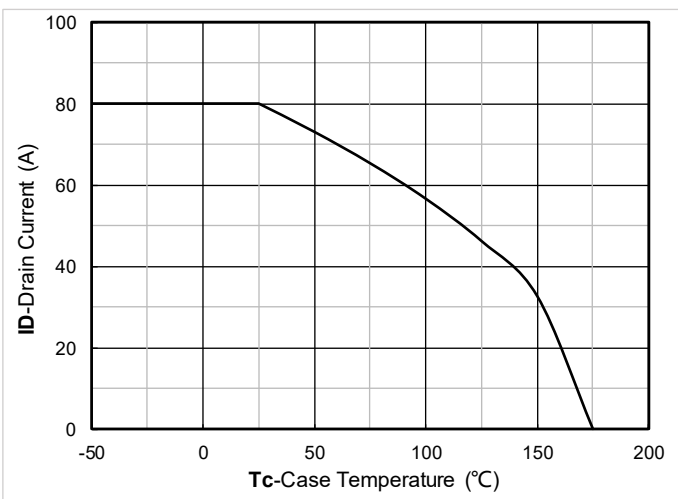


Figure 11. Current dissipation

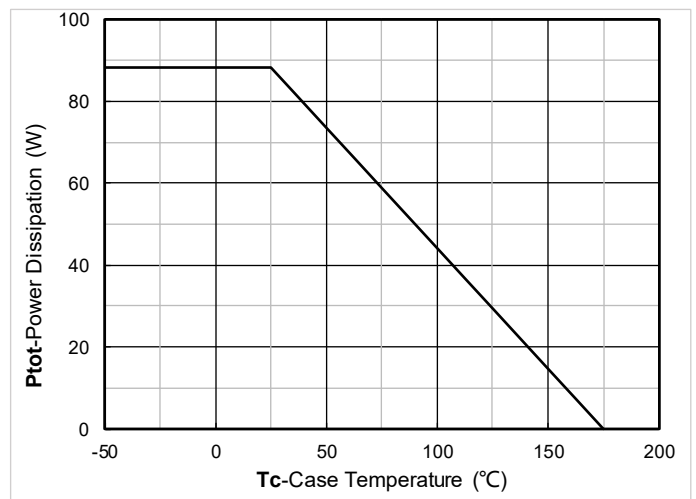


Figure 12. Power dissipation

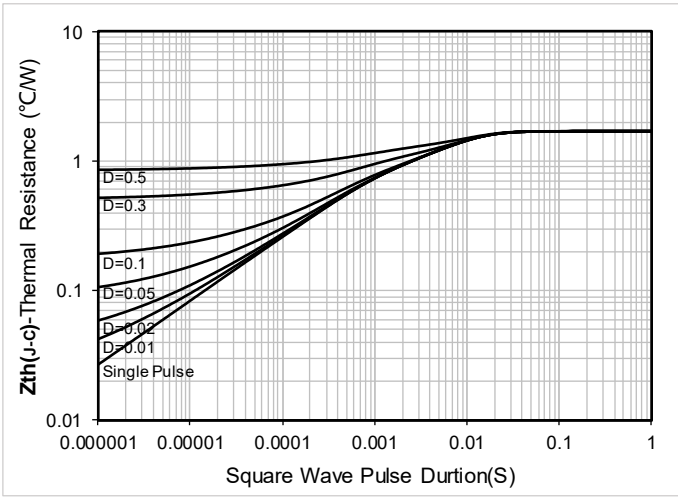


Figure 13. Maximum Transient Thermal Impedance

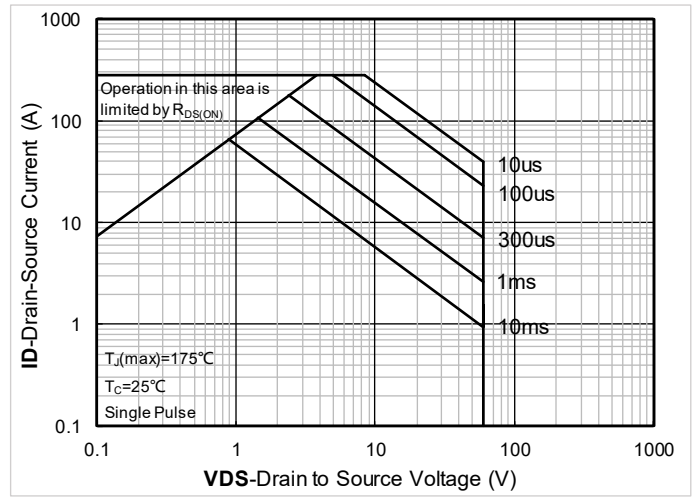


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

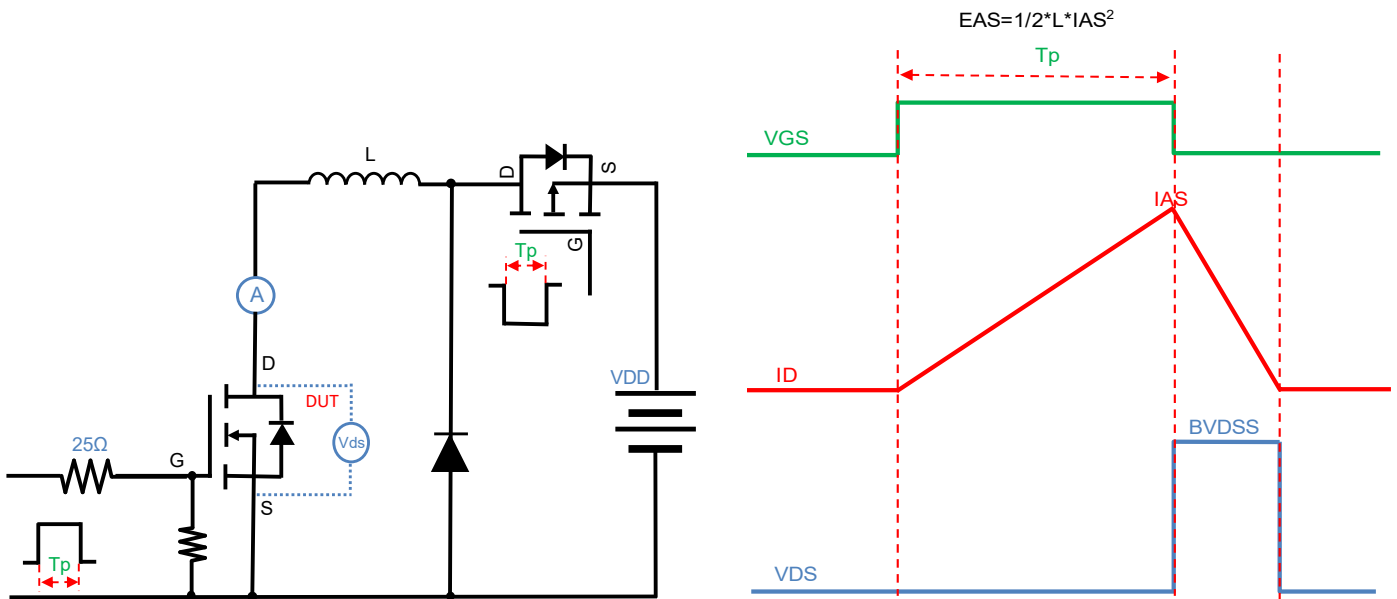


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

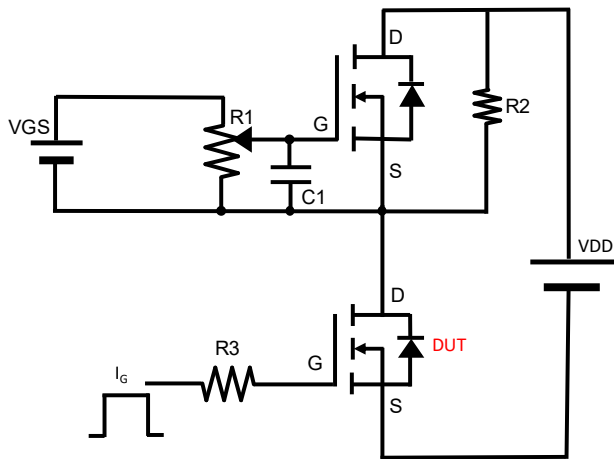


Figure B. Gate Charge Test Circuit & Waveform

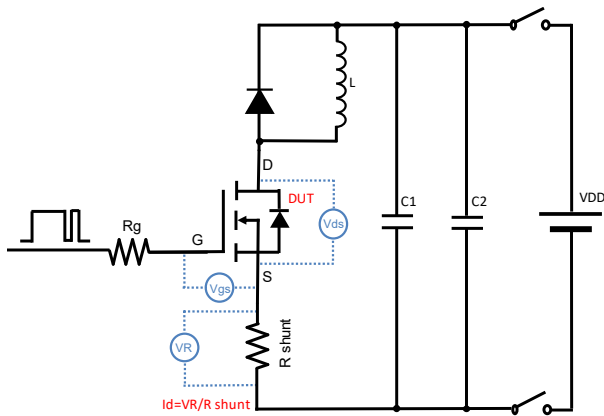


Figure C. Resistive Switching Test Circuit & Waveform

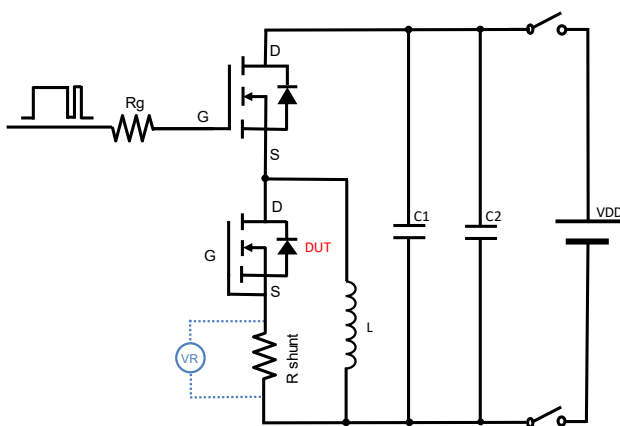
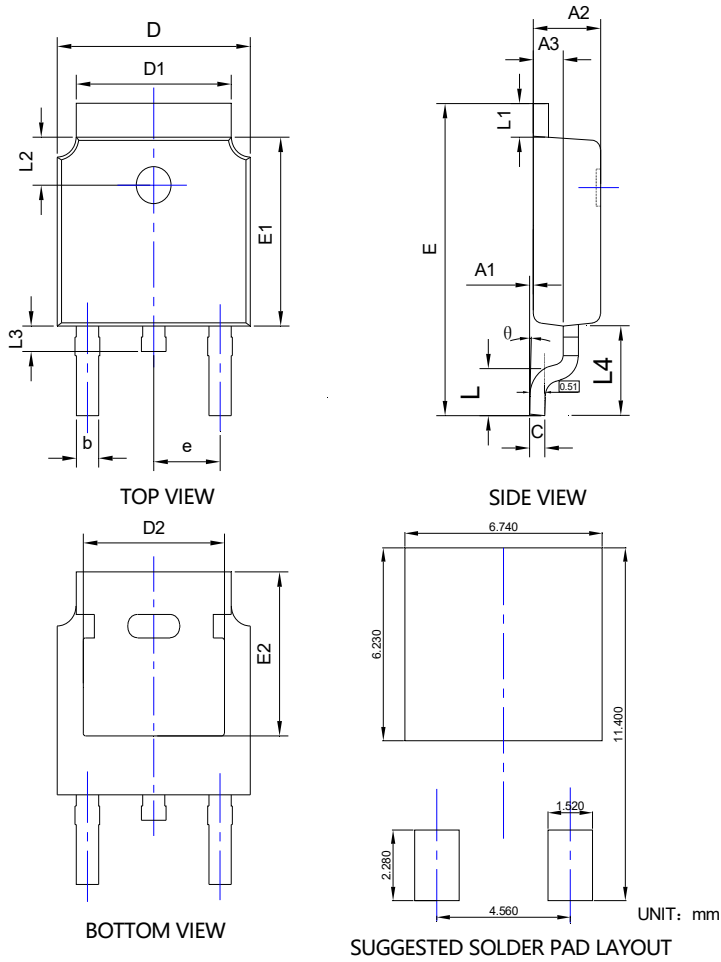


Figure D. Diode Recovery Test Circuit & Waveform



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TO-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		
θ	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.



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