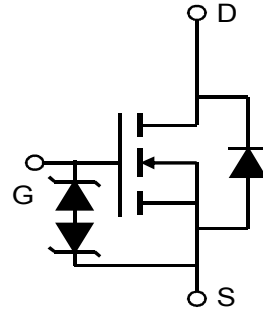


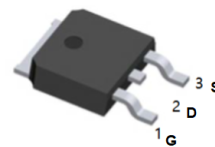
General Description

- Low $R_{DS(ON)}$
- Low Gate Charge
- Low Eoss
- ESD protected
- RoHS and Halogen-Free Compliant



Product Summary

V_{DS}	60V
I_D (at $V_{GS}=10V$)	46A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 9.5m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 13.3m Ω



TO-252(DPAK) top view

Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted				
Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current ^G	$T_C=25^\circ\text{C}$	I_D	46	A
	$T_C=100^\circ\text{C}$		36.5	
Pulsed Drain Current ^C		I_{DM}	110	
Continuous Drain Current	$T_A=25^\circ\text{C}$	I_{DSM}	19	A
	$T_A=70^\circ\text{C}$		15	
Avalanche Current ^C		I_{AS}	17	A
Avalanche energy $L=0.3\text{mH}$ ^C		E_{AS}	43	mJ
V_{DS} Spike ^I		V_{SPIKE}	72	V
Power Dissipation ^B	$T_C=25^\circ\text{C}$	P_D	59.5	W
	$T_C=100^\circ\text{C}$		23.5	
Power Dissipation ^A	$T_A=25^\circ\text{C}$	P_{DSM}	6.2	W
	$T_A=70^\circ\text{C}$		4.0	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$t \leq 10\text{s}$	$R_{\theta JA}$	15	20	$^\circ\text{C/W}$
	Steady-State		40	50	$^\circ\text{C/W}$
Maximum Junction-to-Case		$R_{\theta JC}$	1.7	2.1	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =60V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.4	1.8	2.4	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A		7.7	9.5	mΩ
		V _{GS} =4.5V, I _D =20A		10.3	13.3	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		52		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.72	1	V
I _S	Maximum Body-Diode Continuous Current ^G				46	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, f=1MHz		1100		pF
C _{oss}	Output Capacitance			300		pF
C _{riss}	Reverse Transfer Capacitance			28		pF
R _g	Gate resistance	f=1MHz	0.6	1.2	2.0	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =30V, I _D =20A		14.5	25	nC
Q _{g(4.5V)}	Total Gate Charge			7	13	nC
Q _{gs}	Gate Source Charge			2.5		nC
Q _{gd}	Gate Drain Charge			3.5		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =30V, R _L =1.5Ω, R _{GEN} =3Ω		6.5		ns
t _r	Turn-On Rise Time			3.5		ns
t _{D(off)}	Turn-Off DelayTime			22		ns
t _f	Turn-Off Fall Time			3		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=500A/μs		19		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=500A/μs		65		nC

A. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The Power dissipation P_{DSM} is based on R_{θJA} ≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on T_{J(MAX)}=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Single pulse width limited by junction temperature T_{J(MAX)}=150° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

I. The spike duty cycle 5% max, limited by junction temperature T_{J(MAX)}=125° C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

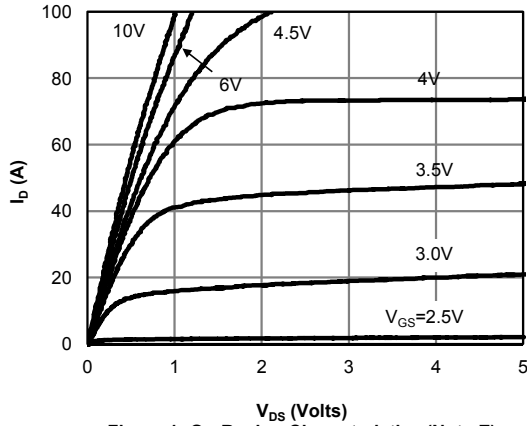


Figure 1: On-Region Characteristics (Note E)

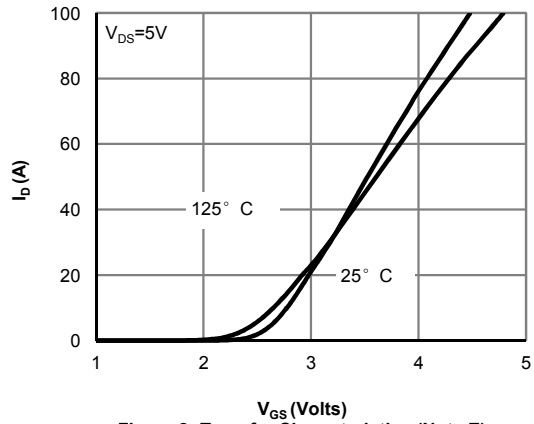


Figure 2: Transfer Characteristics (Note E)

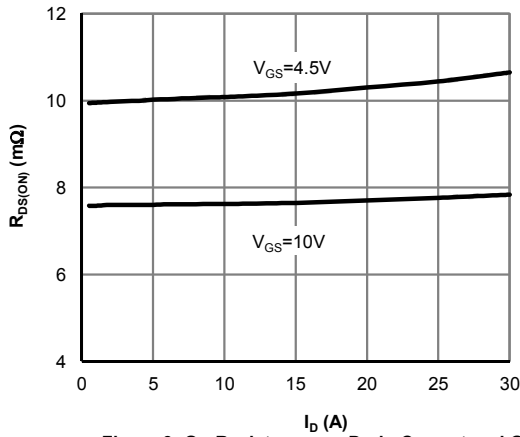


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

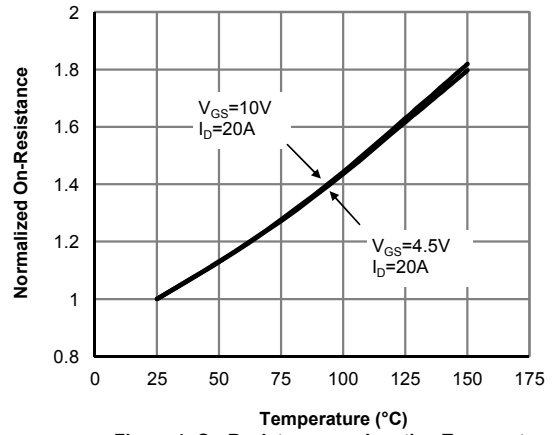


Figure 4: On-Resistance vs. Junction Temperature (Note E)

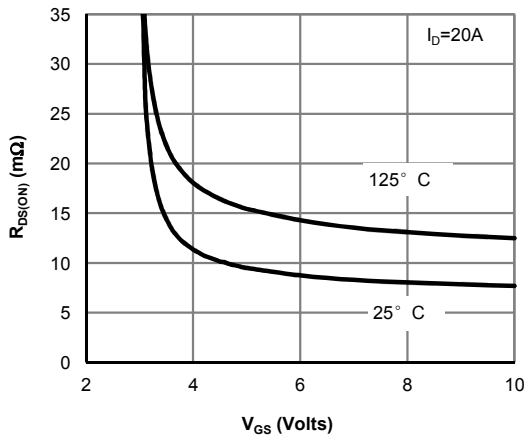


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

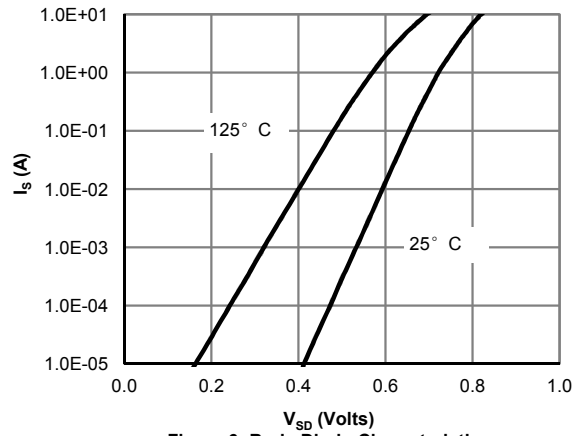


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

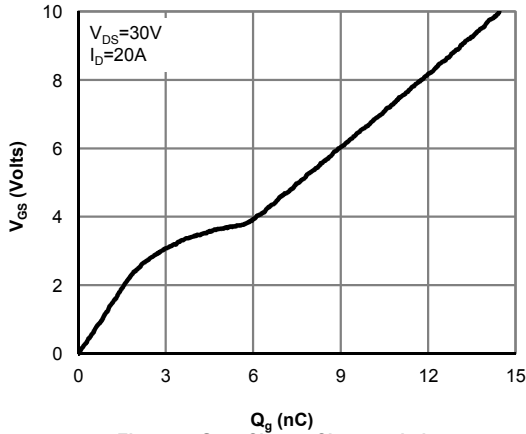


Figure 7: Gate-Charge Characteristics

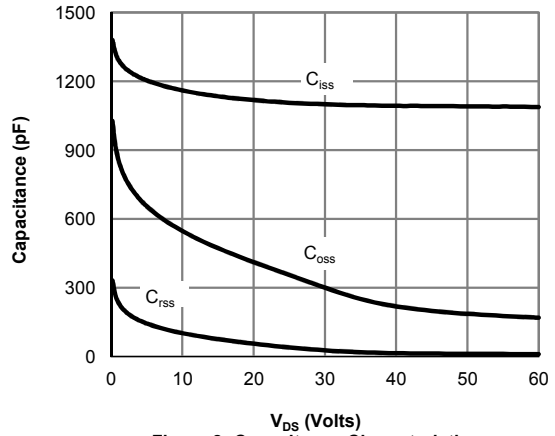


Figure 8: Capacitance Characteristics

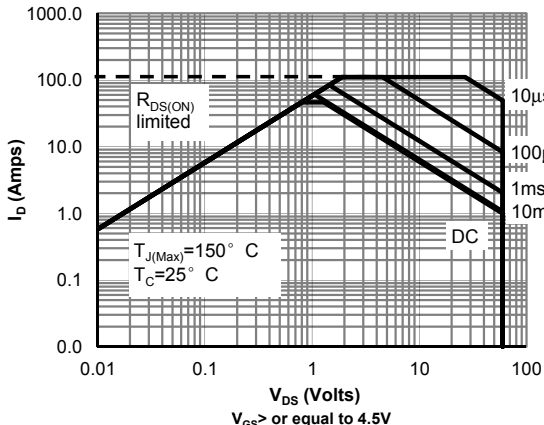


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

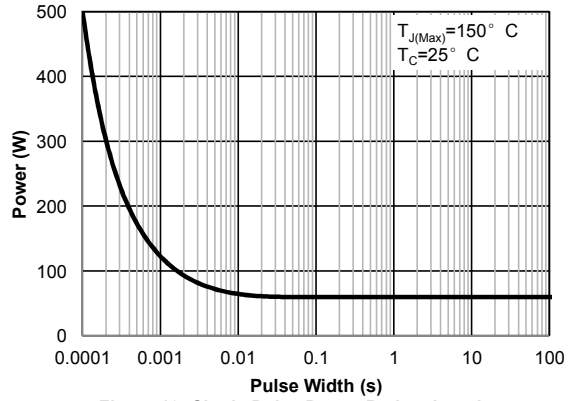


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

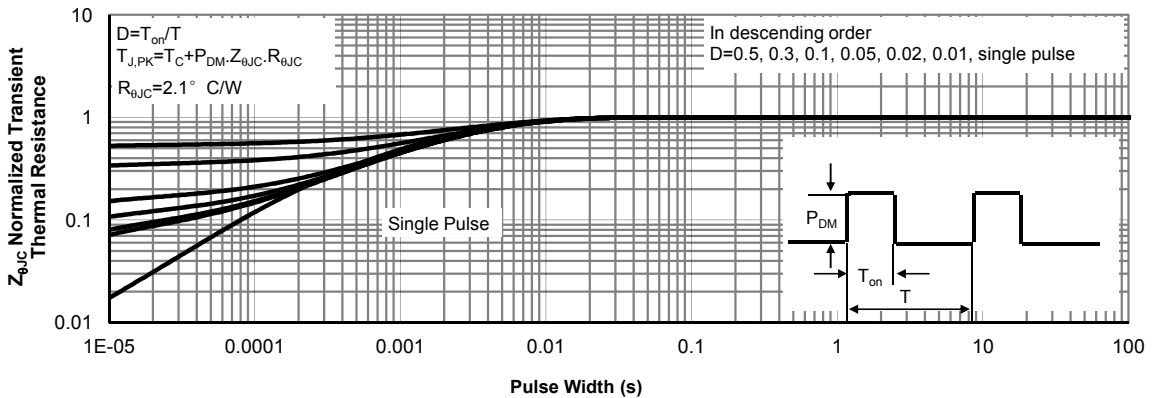


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

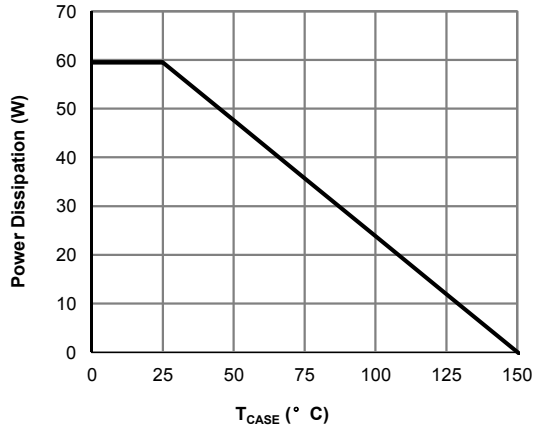


Figure 12: Power De-rating (Note F)

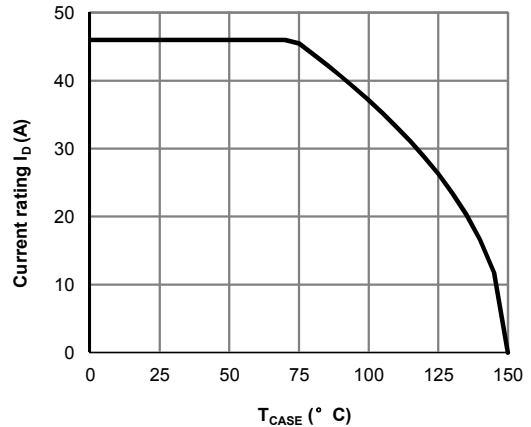


Figure 13: Current De-rating (Note F)

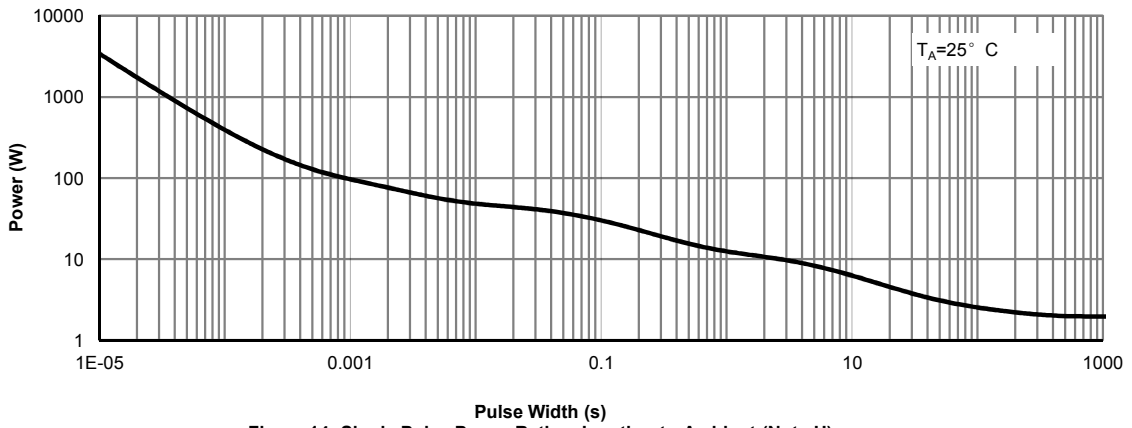


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

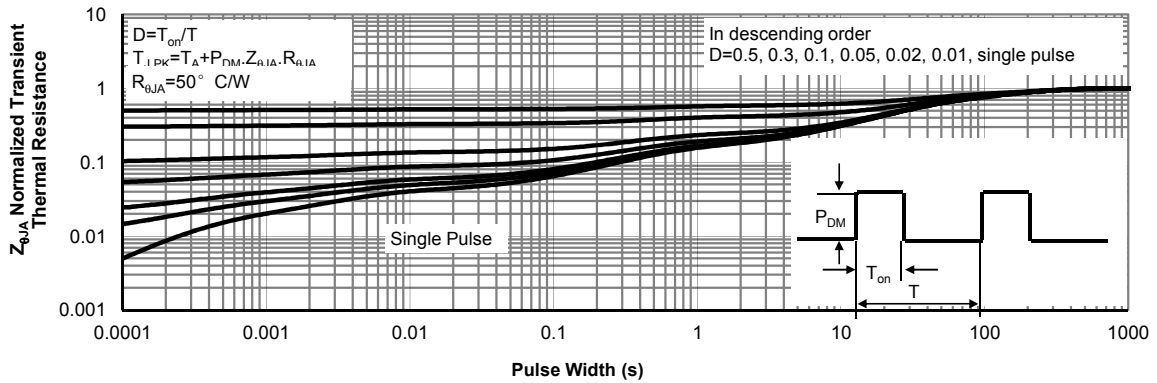


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

Figure A: Gate Charge Test Circuit & Waveforms

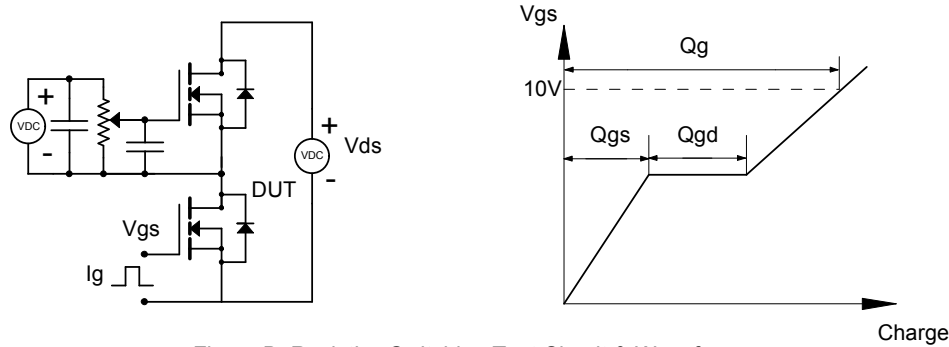


Figure B: Resistive Switching Test Circuit & Waveforms

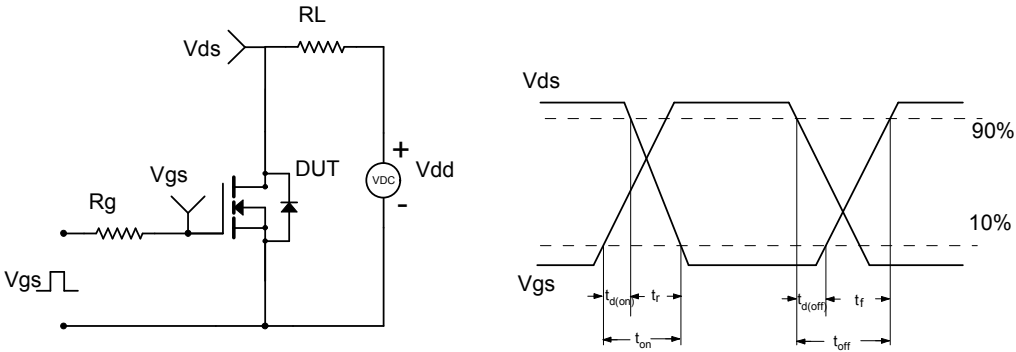


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

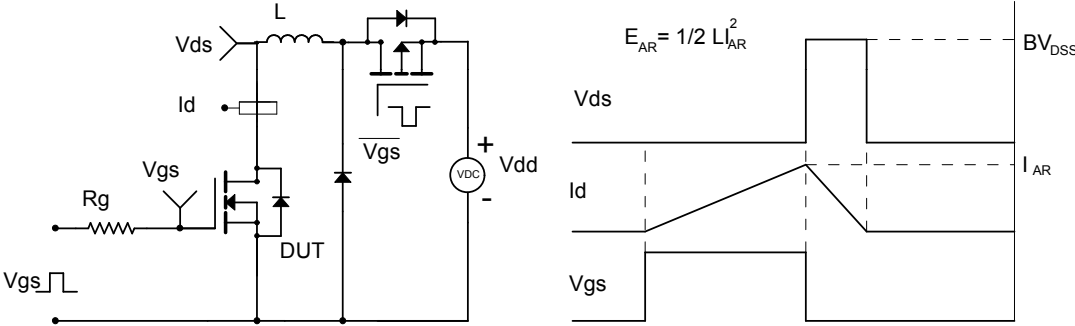
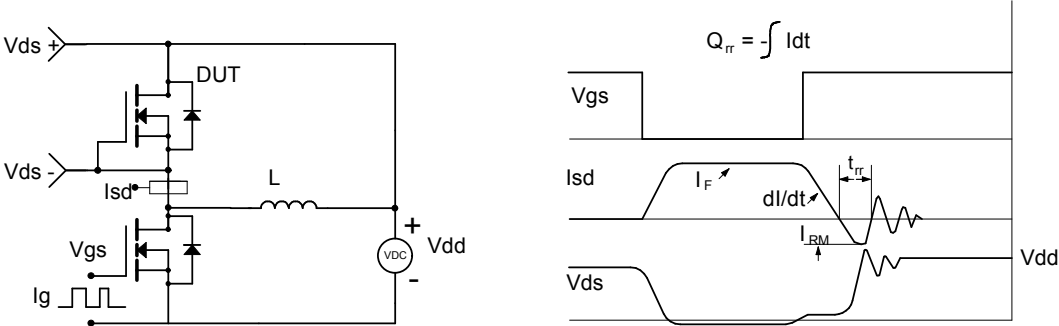
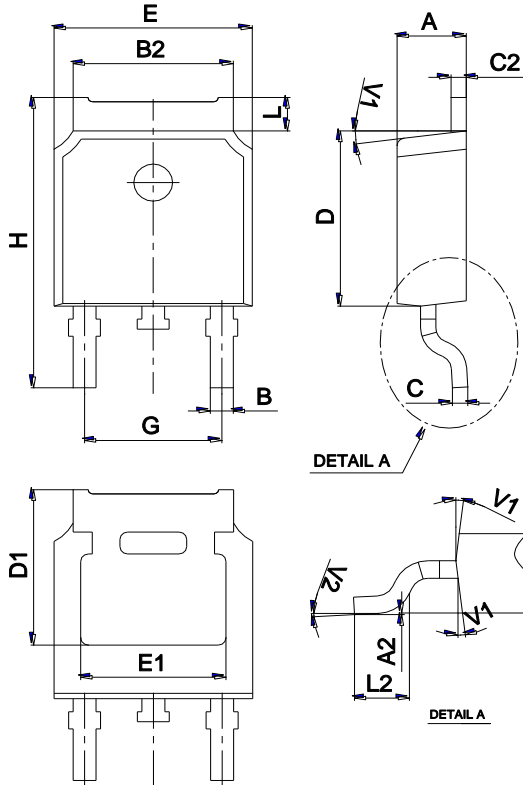


Figure D: Diode Recovery Test Circuit & Waveforms



Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Ordering information

Order code	Package	Baseqty	Delivery mode
AOD2610E	TO-252	2500	Tape and reel