-55V P-Channel MOSFET

Features

-55V/5.8A ,

$R_{DS(ON)}$ < 35mΩ @ V_{GS}= - 10V

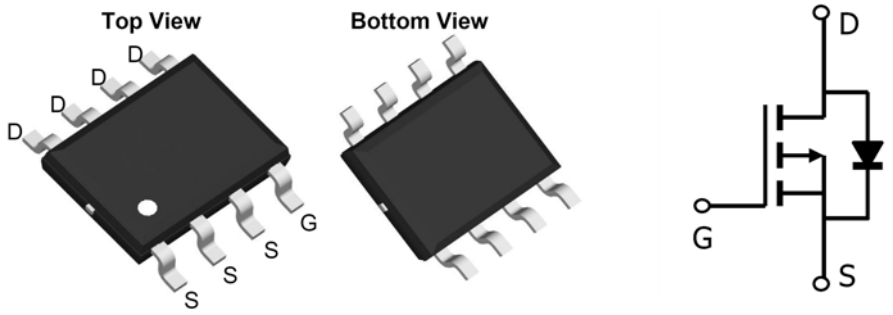
$R_{DS(ON)}$ < 50mΩ @ V_{GS}= - 4.5V

Lead Free Available (RoHS Compliant)

General Description

The FS2241 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. this device is well suited for high current load applications.

Pin Configuration



SOP8

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-55	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current	T_A=25°C	I_D	5.8	A
	T_A=70°C		4.7	
Pulsed Drain Current [C]		I_{DM}	25	
Avalanche Current [C]		I_{AS}, I_{AR}	8	
Avalanche energy L=0.1mH [C]		E_{AS}, E_{AR}	18	mJ
Power Dissipation [B]	T_A=25°C	P_D	3.1	W
	T_A=70°C		2	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	31	40	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		59	75	
Maximum Junction-to-Lead		$R_{\theta JL}$	16	24	

Electrical Characteristics (T_A=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		-55			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-55V, V_{GS}=0	T_A=25°C		-0.002	-1	uA
			T_A=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±20V				±0.1	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250μA		-0.8		-2.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=-10V, V_{DS}=-5V		5.8			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-10A	T_A=25°C		30	40	mΩ
			T_A=125°C		50		
		V_{GS}=-4.5V, I_D=-8A			45	50	
g_{FS}	Forward Trans conductance	V_{DS}=-5V, I_D=-12A			13.4		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V			-0.75	-1.2	V
I_S	Maximum Body-Diode Continuous Current					-2.5	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-30V, f=1MHz			980	1170	pF
C_{oss}	Output Capacitance				110	127	
C_{rss}	Reverse Transfer Capacitance				45	63	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz			6	10	Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS}=-10V, V_{DS}=-30V, I_D=-12A			15		nC
Q_g(4.5V)					7.5		
Q_{gs}	Gate Source Charge				2.5		
Q_{gd}	Gate Drain Charge				3		
$t_{D(on)}$	Turn-On Delay Time	V_{GS}=-10V, V_{DS}=-30V, R_L=2.5Ω, R_{GEN}=3Ω			8		ns
t_r	Turn-On Rise Time				9.5		
$t_{D(off)}$	Turn-Off Delay Time				19		
t_f	Turn-Off Fall Time				10		
t_{rr}	Body Diode Reverse Recovery Time	I_F=-12A, dI/dt=100A/μs			25	35	
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-12A, dI/dt=100A/μs			27		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B. The power dissipation P_D is based on $T_{J(MAX)}$=175°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: Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=175°C.

D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to case $R_{\theta JC}$ and case to ambient.

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

F. These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°C.

G. The maximum current rating is limited by bond-wires.

H. These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

*This device is guaranteed green after data code 8X11 (Sep 1ST 2008).

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

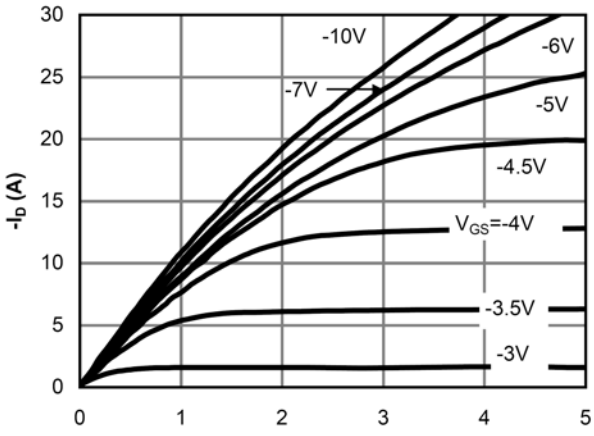


Fig 1: On-Region Characteristics

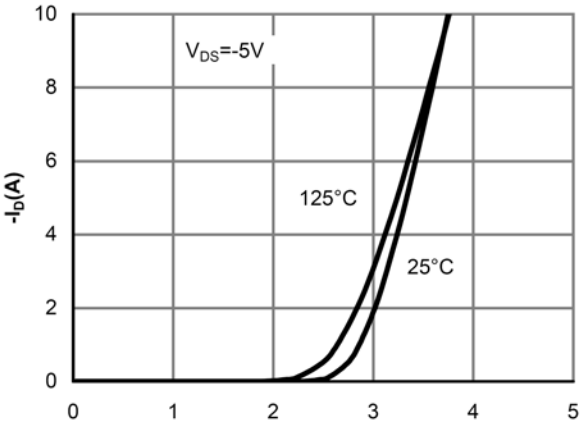


Figure 2: Transfer Characteristics

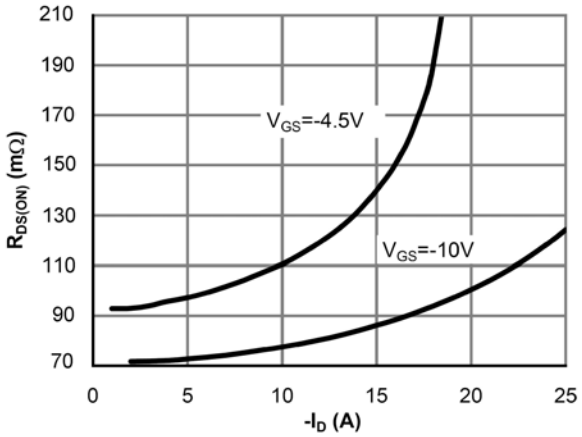


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

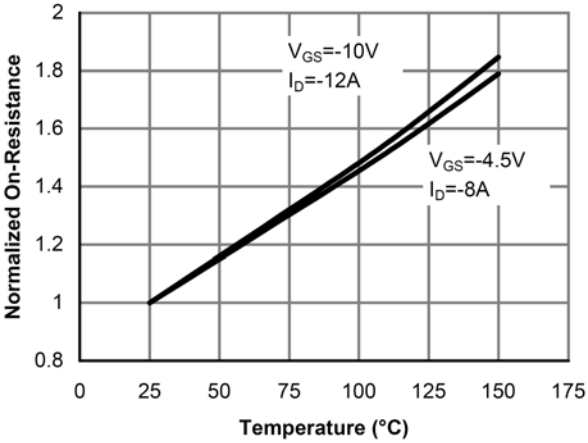


Figure 4: On-Resistance vs. Junction Temperature

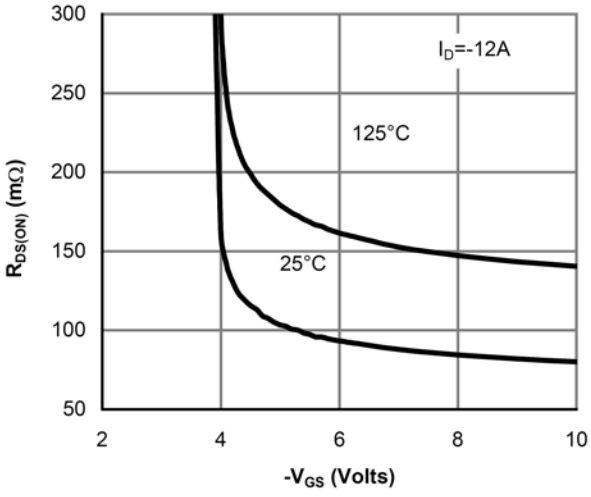


Figure 5: On-Resistance vs. Gate-Source Voltage

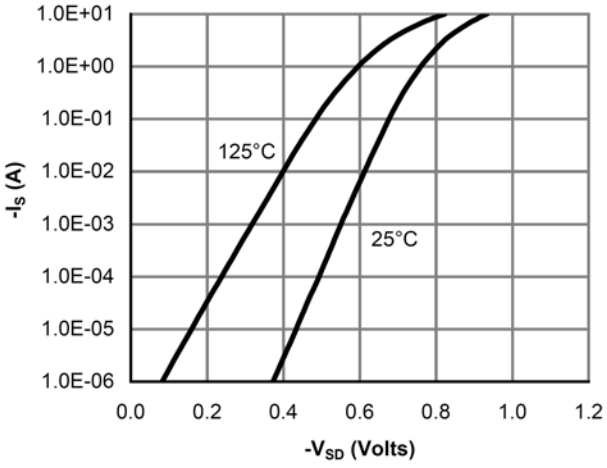


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

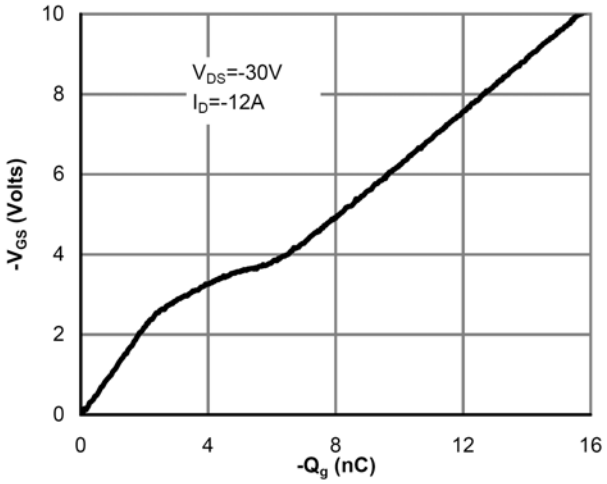


Figure 7: Gate-Charge Characteristics

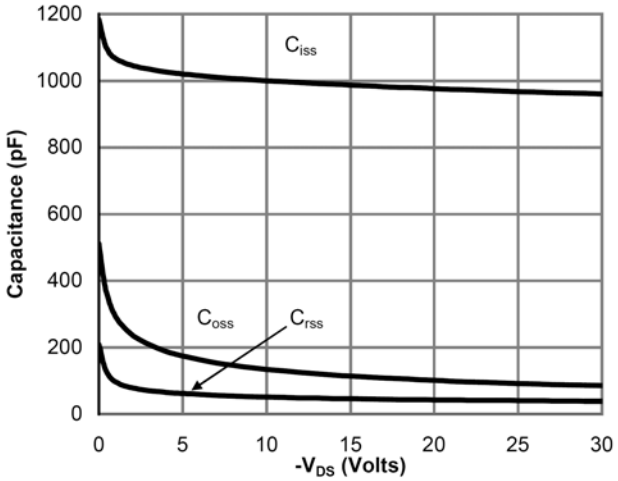


Figure 8: Capacitance Characteristics

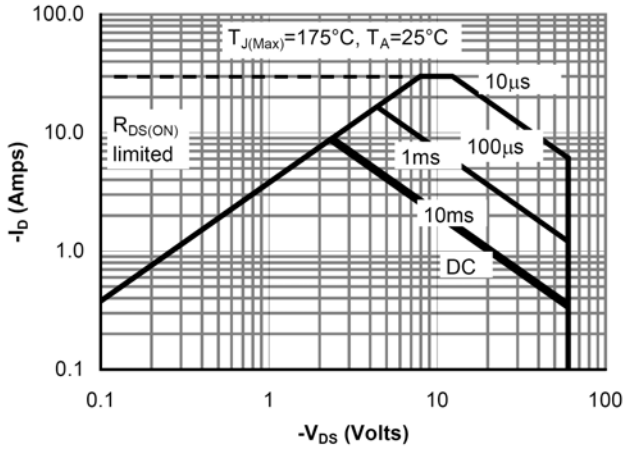


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

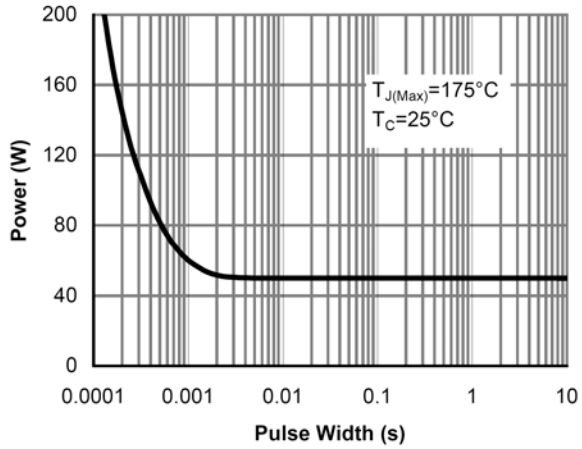


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

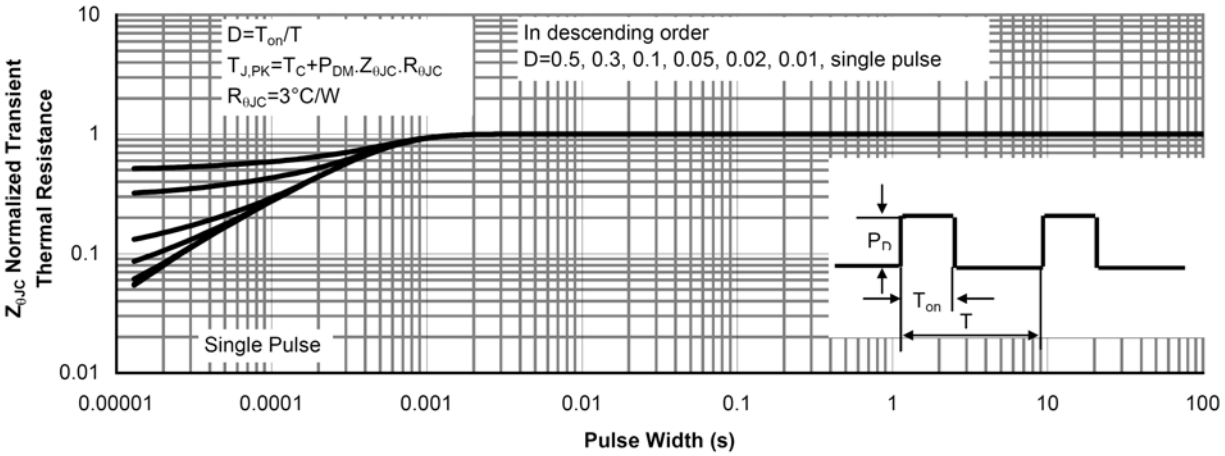


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

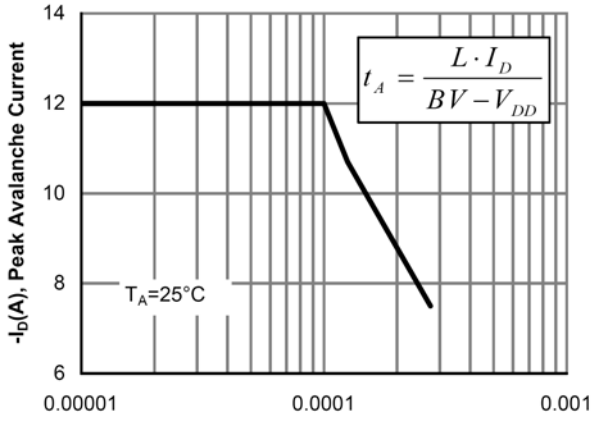


Figure 12: Single Pulse Avalanche capability

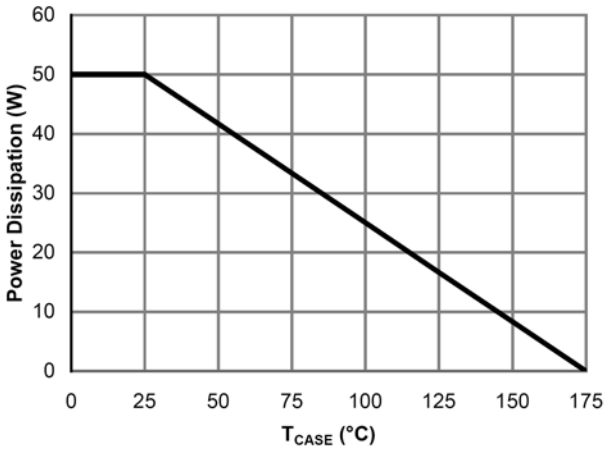


Figure 13: Power De-rating (Note B)

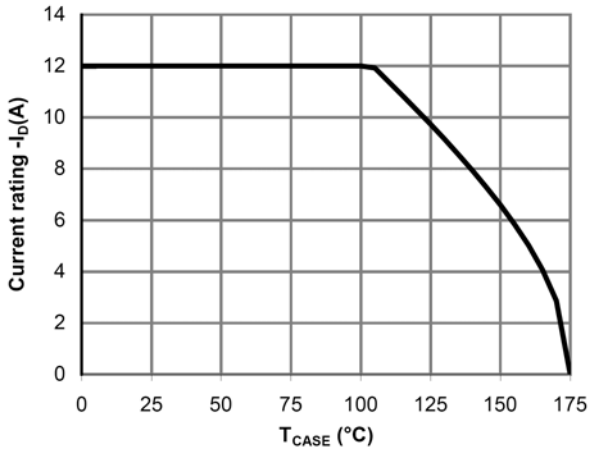


Figure 14: Current De-rating (Note B)

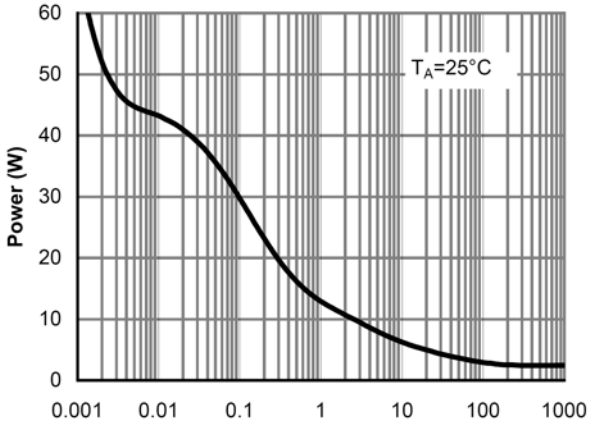


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

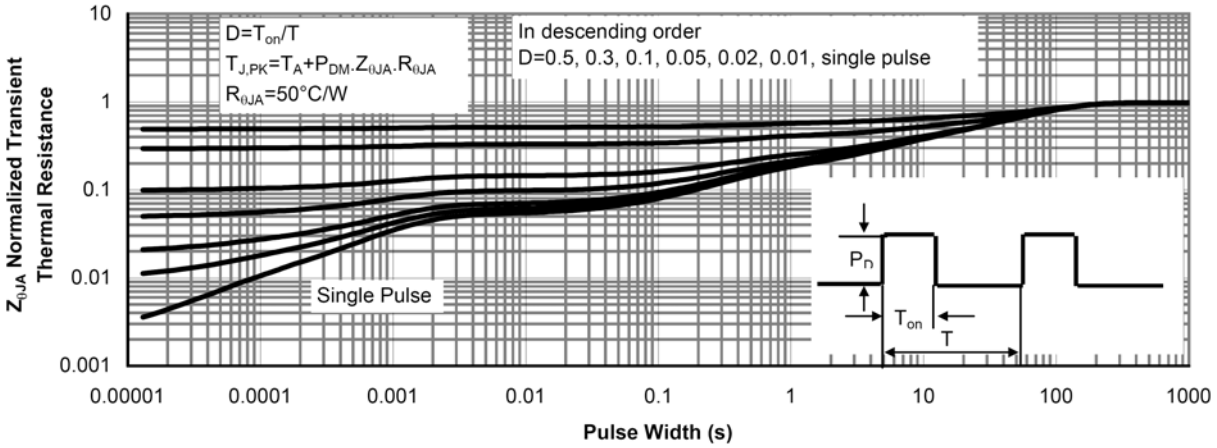
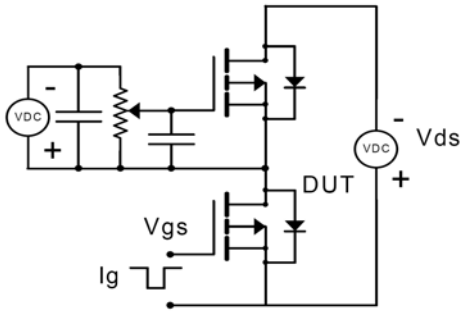
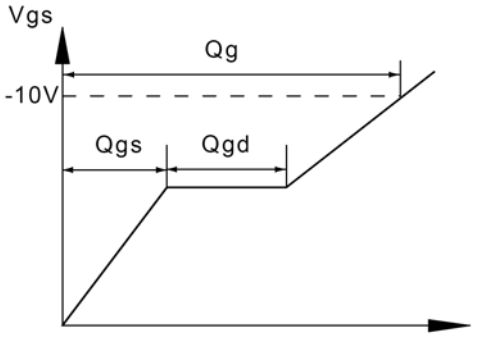


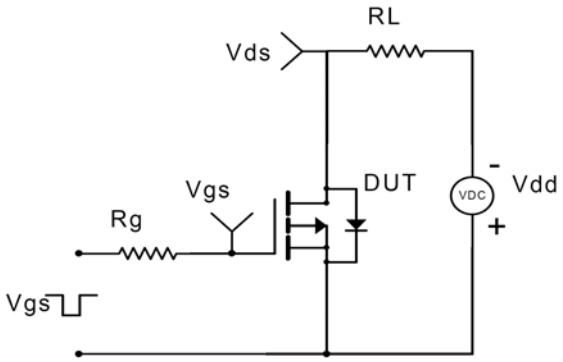
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

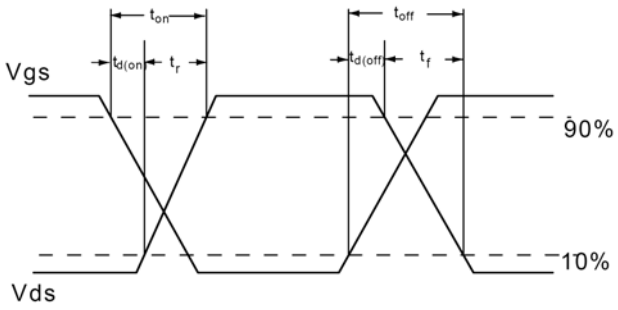
Gate Charge Test Circuit & Waveform



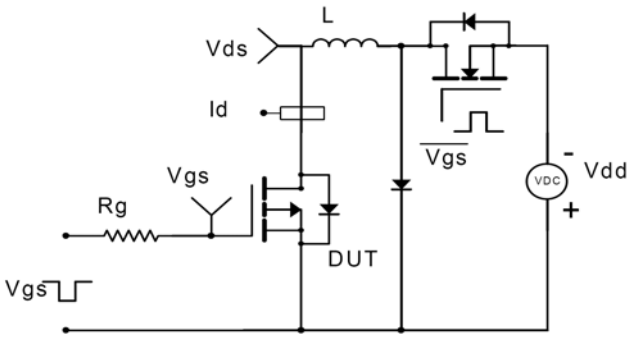


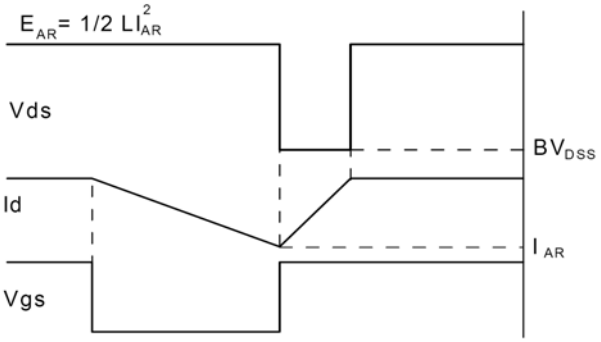
Resistive Switching Test Circuit & Waveforms



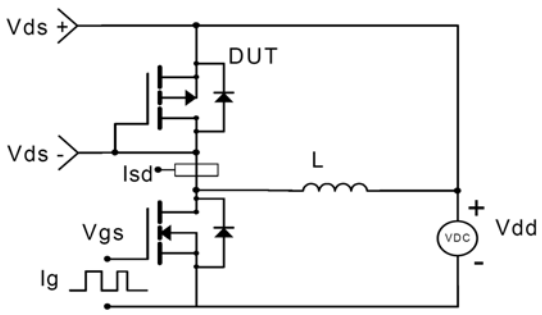


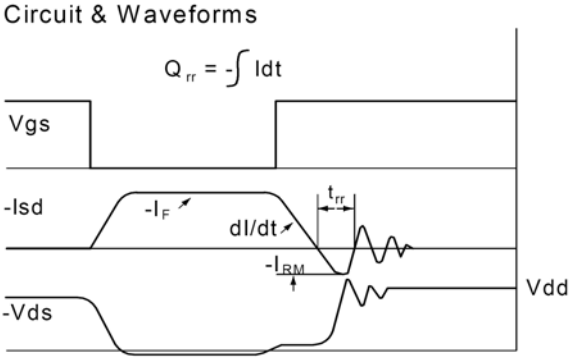
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





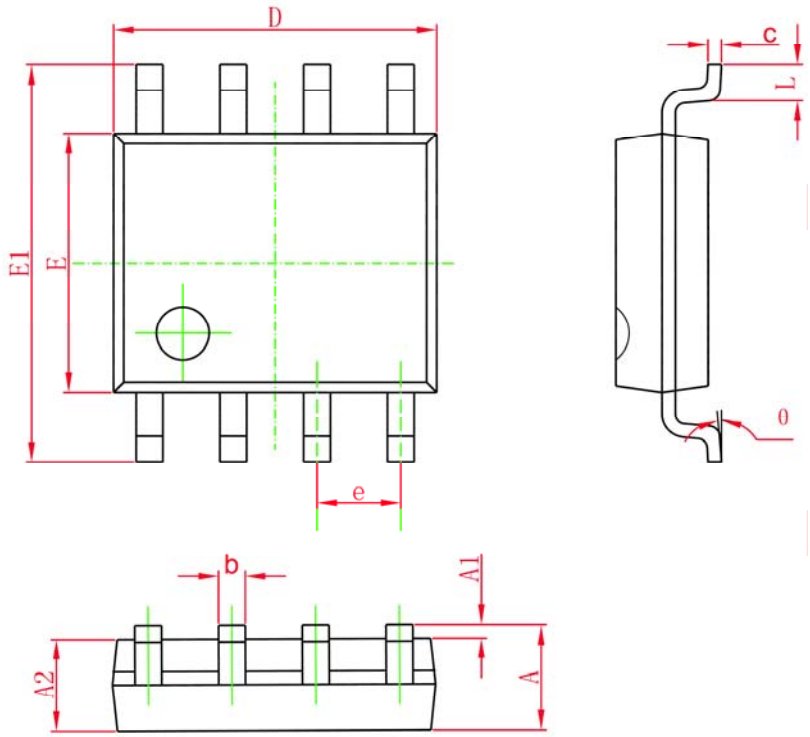
Diode Recovery Test Circuit & Waveforms





- **Package Information**

SOP8 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°