

-55V P-Channel MOSFET

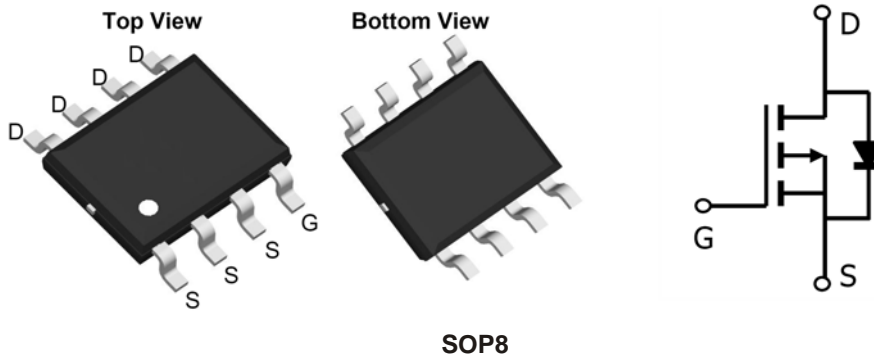
- Features**

-55V/5.8A ,
 $R_{DS(ON)} < 35m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 50m\Omega @ V_{GS} = -4.5V$
 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**



- Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted**

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-55	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	$T_A=25^\circ\text{C}$	I_D	5.8	A
	$T_A=70^\circ\text{C}$		4.7	
Pulsed Drain Current ^C		I_{DM}	25	
Avalanche Current ^C		I_{AS}, I_{AR}	8	
Avalanche energy $L=0.1\text{mH}$ ^C		E_{AS}, E_{AR}	18	mJ
Power Dissipation ^B	$T_A=25^\circ\text{C}$	P_D	3.1	W
	$T_A=70^\circ\text{C}$		2	
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	Steady-State	$R_{\theta JA}$	31	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A D}			59	75	
Maximum Junction-to-Lead			$R_{\theta JL}$	16	

● 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	μA
			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			8		
t _r	Turn-On Rise Time	V _{GS} =-10V, V _{DS} =-30V, R _L =2.5Ω, R _{GEN} =3Ω		9.5		ns
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_{θJA} is measured 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 Power dissipation P_{DSM} is based on R_{θJA} 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_{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 <300 μs 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)}=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

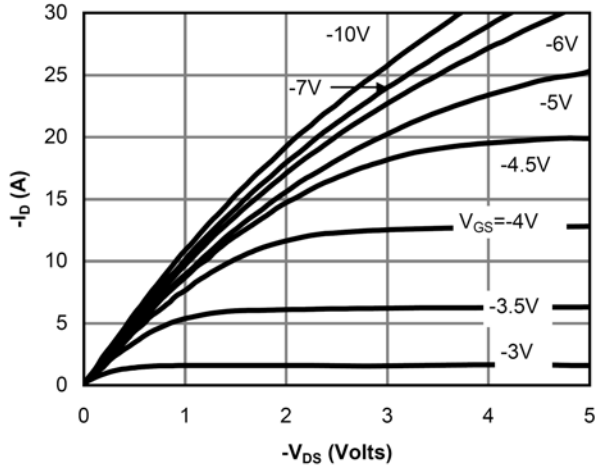


Fig 1: On-Region Characteristics

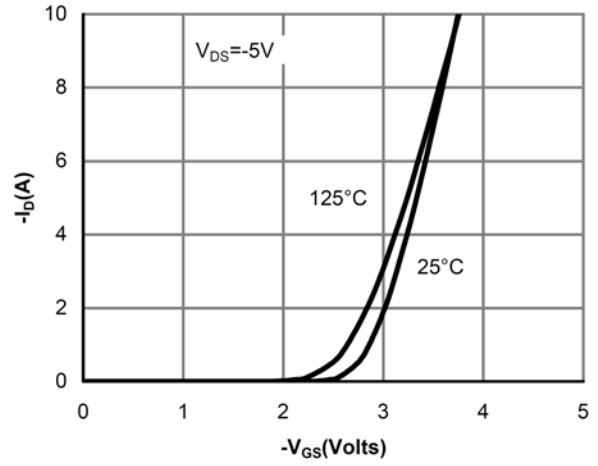


Figure 2: Transfer Characteristics

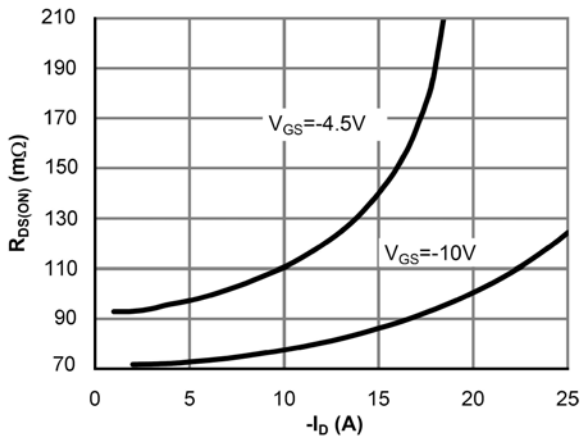


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

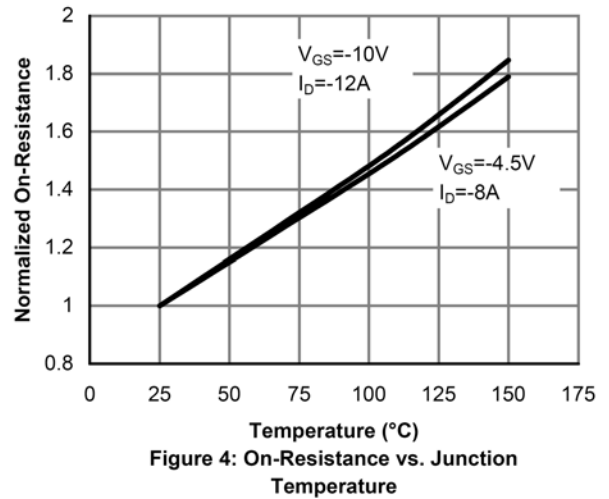


Figure 4: On-Resistance vs. Junction Temperature

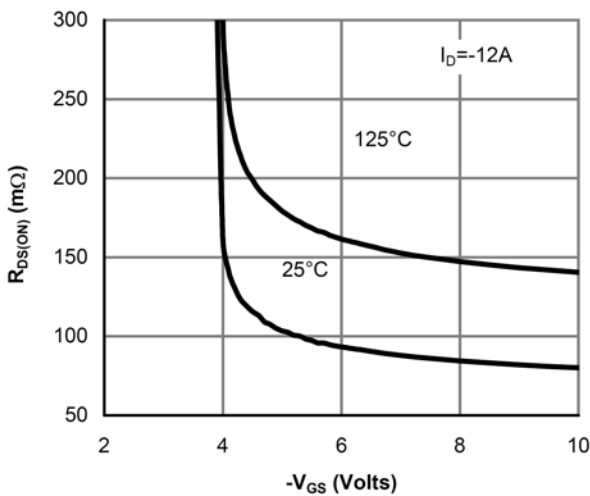


Figure 5: On-Resistance vs. Gate-Source Voltage

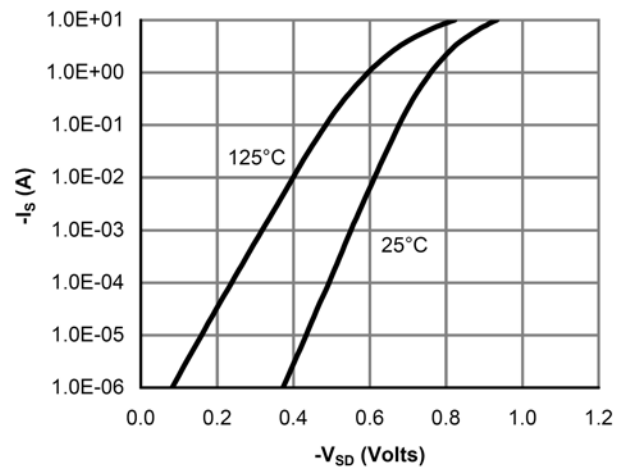


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

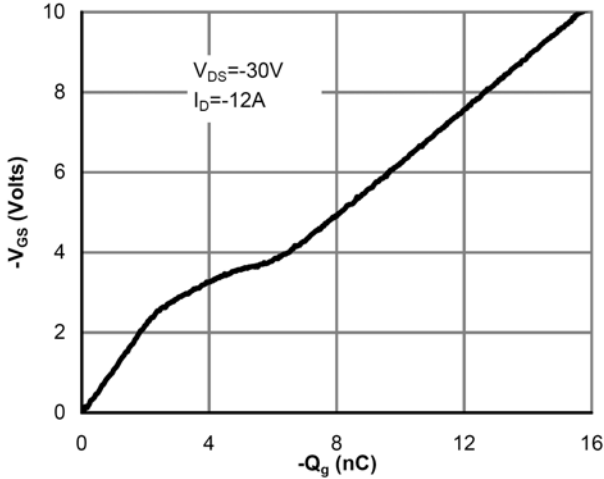


Figure 7: Gate-Charge Characteristics

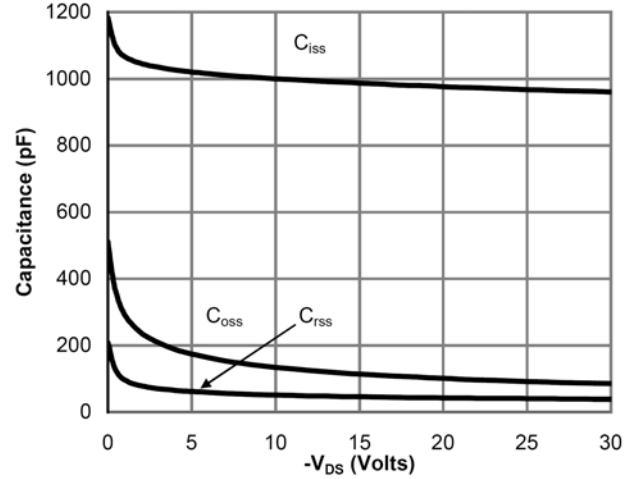


Figure 8: Capacitance Characteristics

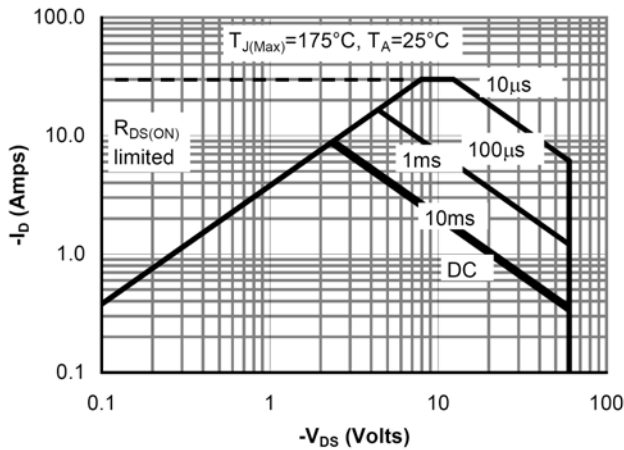


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

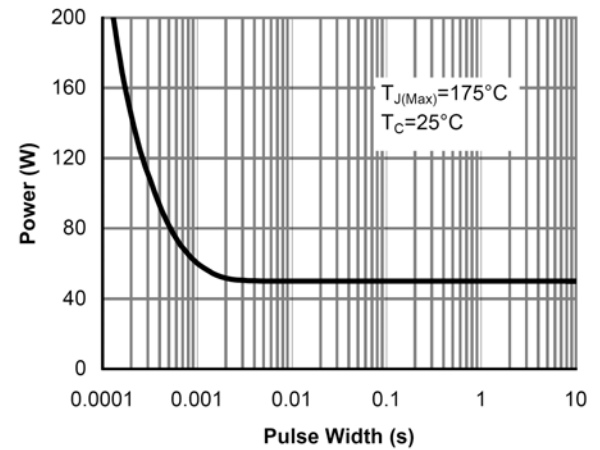


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

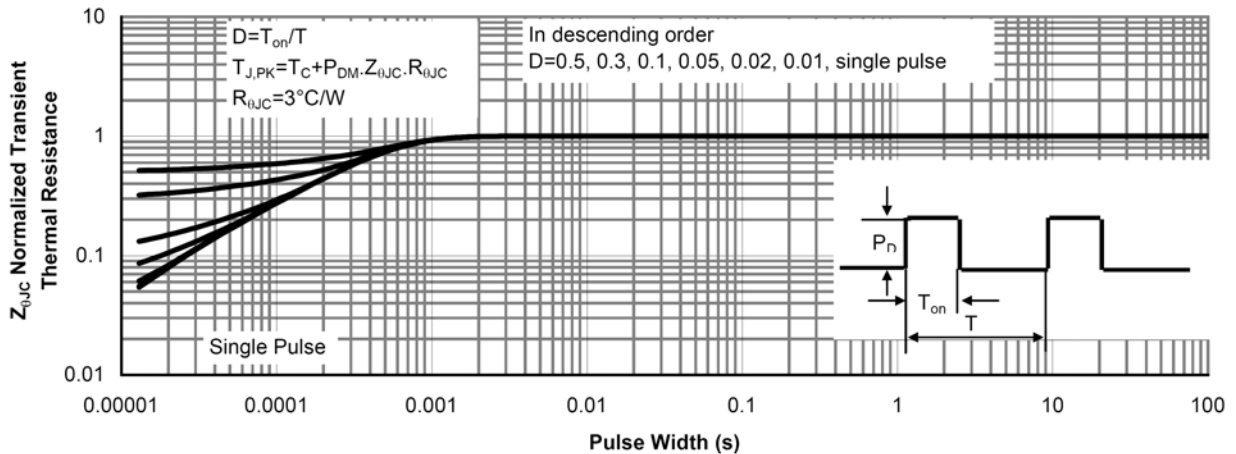


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

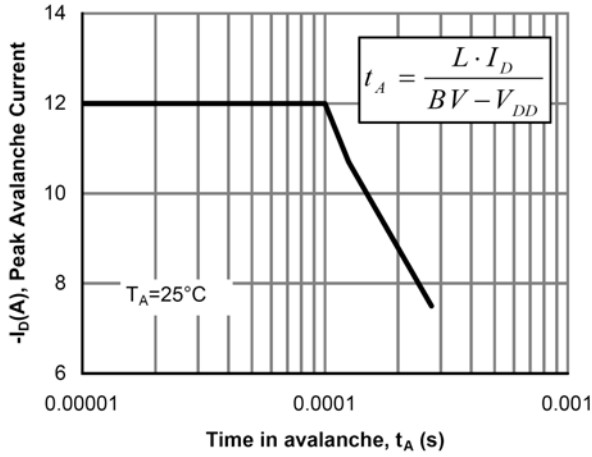


Figure 12: Single Pulse Avalanche capability

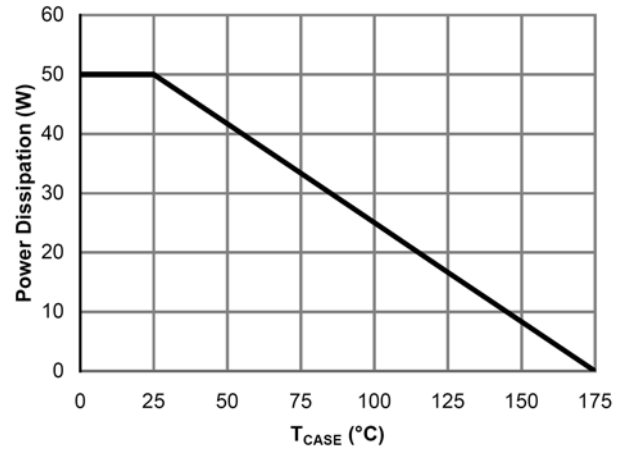


Figure 13: Power De-rating (Note B)

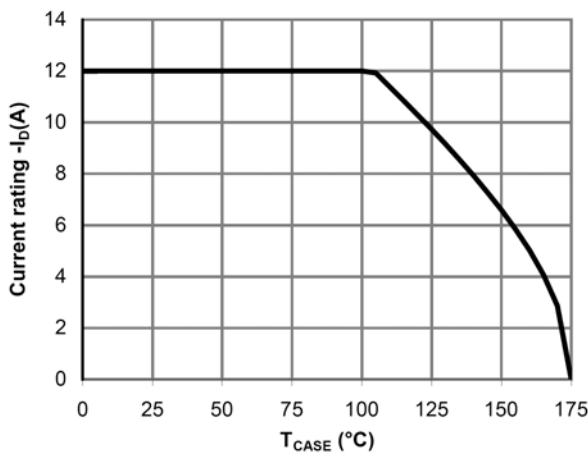


Figure 14: Current De-rating (Note B)

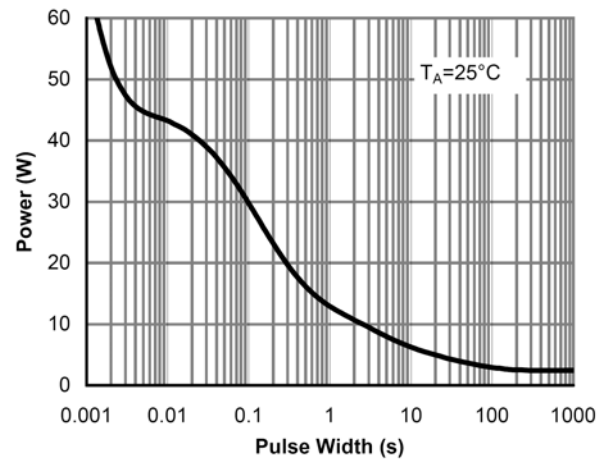


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

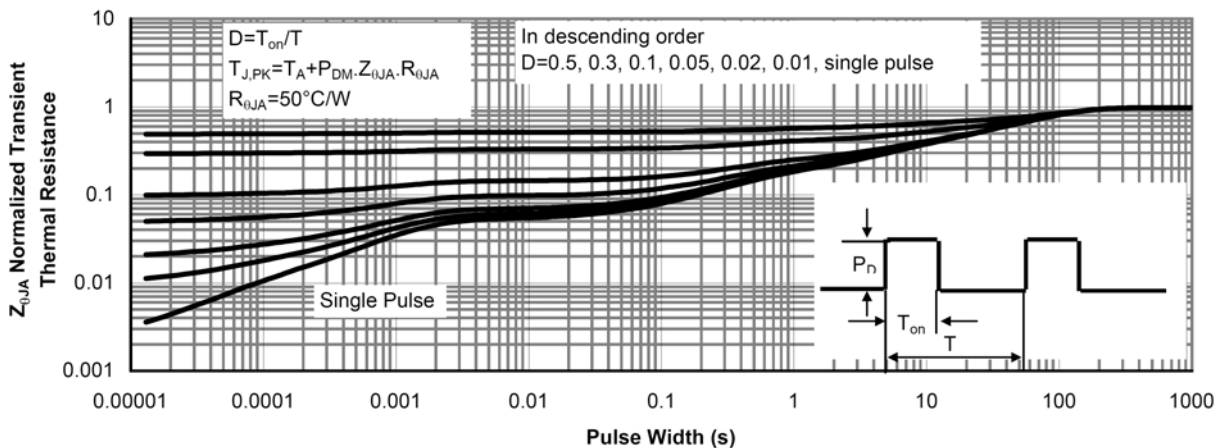
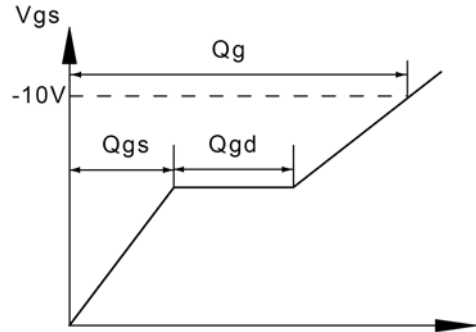
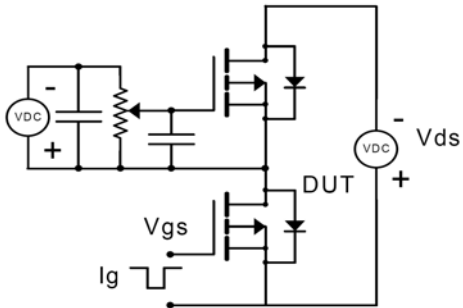
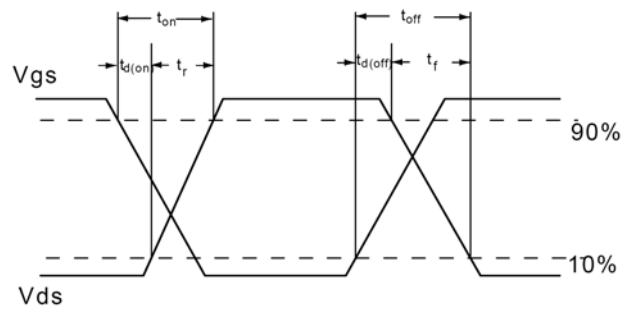
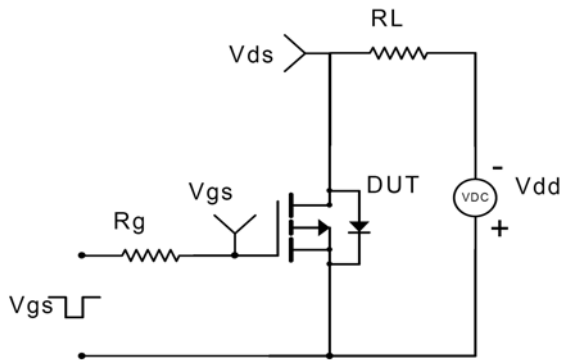


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

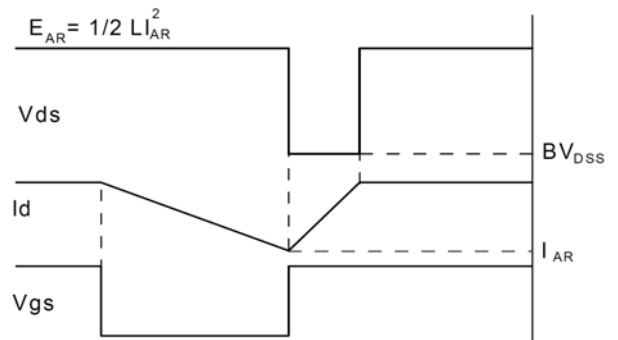
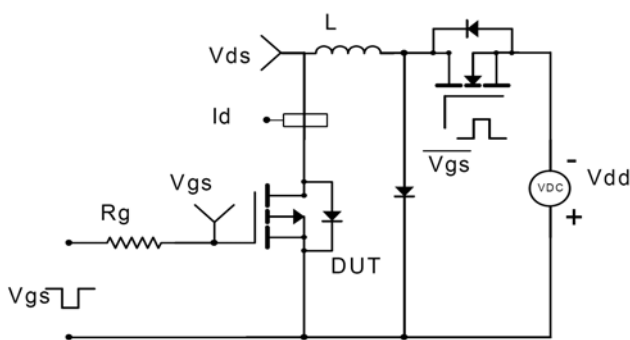
Gate Charge Test Circuit & Waveform



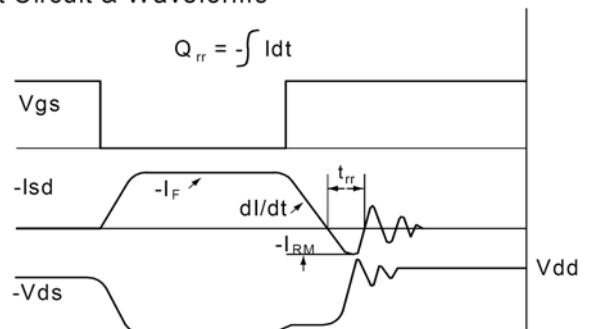
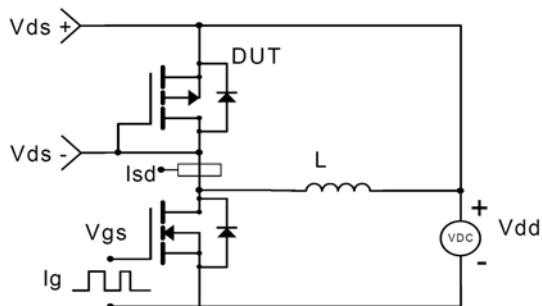
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

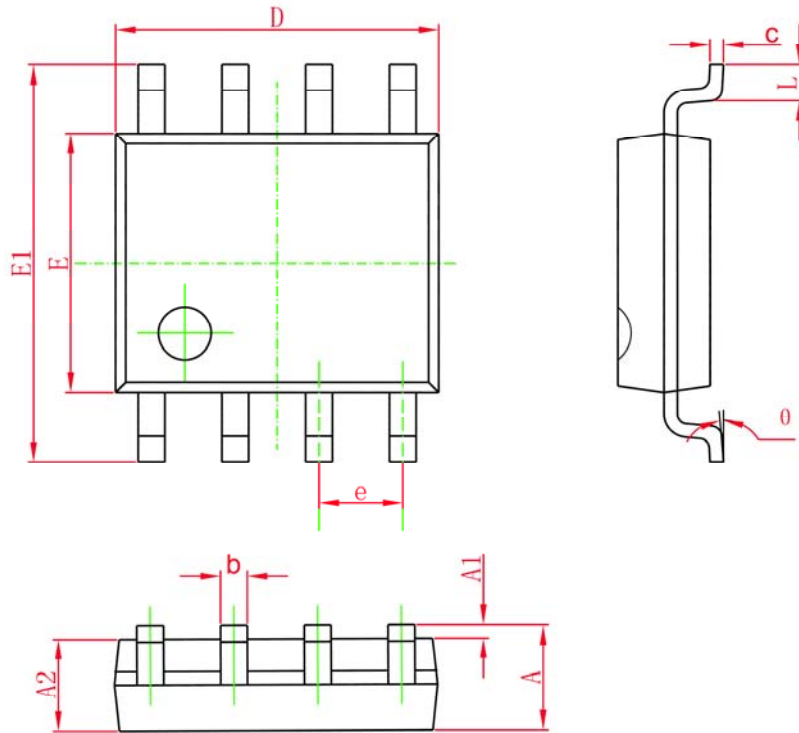


Diode Recovery Test Circuit & Waveforms



- 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°