

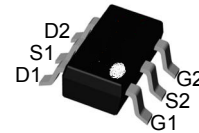
Features

- N-Channel**
 20V/5A,
 $R_{DS(ON)} = 58m\Omega(\text{max.}) @ V_{GS} = 4.5V$
 $R_{DS(ON)} = 74m\Omega(\text{max.}) @ V_{GS} = 2.5V$
 $R_{DS(ON)} = 95m\Omega(\text{max.}) @ V_{GS} = 1.8V$
- P-Channel**
 -20V/-3.3A,
 $R_{DS(ON)} = 85m\Omega(\text{max.}) @ V_{GS} = -4.5V$
 $R_{DS(ON)} = 120m\Omega(\text{max.}) @ V_{GS} = -2.5V$
 $R_{DS(ON)} = 210m\Omega(\text{max.}) @ V_{GS} = -1.8V$
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

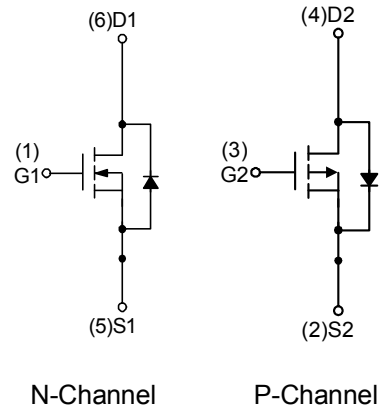
Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.
- Load Switch

Pin Description



Top View of SOT-23-6



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

Symbol	Parameter	N Channel	P Channel	Unit	
Common Ratings					
V_{DSS}	Drain-Source Voltage	20	-20	V	
V_{GSS}	Gate-Source Voltage	± 12	± 12	V	
I_D	Continuous Drain Current	$T_A=25^\circ\text{C}$	5	-3.3	A
		$T_A=70^\circ\text{C}$	4	-2.6	
I_{DM}	Pulsed Drain Current	$V_{GS}=10\text{V}$	20	-13	
I_S	Diode Continuous Forward Current	1			
T_J	Maximum Junction Temperature	150		$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150			
P_D	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	1.4	W	
		$T_A=70^\circ\text{C}$	0.9		
$R_{\theta JA}^*$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	90	$^\circ\text{C/W}$	
		Steady State	125		

Note: * Surface Mounted on 1in^2 pad area.

N Channel Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	N Channel			Unit	
			Min.	Typ.	Max.		
Static Characteristics							
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	20	-	-	V	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=16V, V_{GS}=0V$	-	-	1	μA	
		$T_J=85^\circ C$	-	-	30		
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	0.5	0.7	1	V	
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	± 100	nA	
$R_{DS(ON)}^a$	Drain-Source On-State Resistance	$V_{GS}=4.5V, I_{DS}=5A$	-	40	58	m Ω	
		$V_{GS}=2.5V, I_{DS}=4A$	-	50	74		
		$V_{GS}=1.8V, I_{DS}=1A$	-	80	95		
Diode Characteristics							
V_{SD}^a	Diode Forward Voltage	$I_{SD}=1A, V_{GS}=0V$	-	0.75	1.1	V	
t_{rr}	Reverse Recovery Time	$I_{SD}=5A, dI_{SD}/dt=100A/\mu s$	-	10.5	-	ns	
Q_{rr}	Reverse Recovery Charge		-	3.2	-	nC	
Dynamic Characteristics^b							
R_g	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	-	2.2	-	Ω	
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=10V, \text{Frequency}=1.0MHz$	-	275	-	pF	
C_{oss}	Output Capacitance		-	70	-		
C_{riss}	Reverse Transfer Capacitance		-	60	-		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=10V, R_L=10\Omega, I_{DS}=1A, V_{GEN}=10V, R_G=6\Omega$	-	2.4	-	ns	
T_r	Turn-on Rise Time		-	13	-		
$t_{d(OFF)}$	Turn-off Delay Time		-	15.5	-		
T_f	Turn-off Fall Time		-	3	-		
Gate Charge Characteristics^b							
Q_g	Total Gate Charge	$V_{DS}=10V, I_{DS}=5A$	$V_{GS}=4.5V,$	-	4.5	-	nC
			$V_{GS}=10V$	-	9	-	
Q_{gs}	Gate-Source Charge	$V_{DS}=10V, V_{GS}=10V, I_{DS}=5A$	-	0.3	-		
Q_{gd}	Gate-Drain Charge		-	2	-		
Q_{gth}	Threshold Gate Charge		-	0.1	-		

Note a : Pulse test; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

Note b : Guaranteed by design, not subject to production testing.

P Channel Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

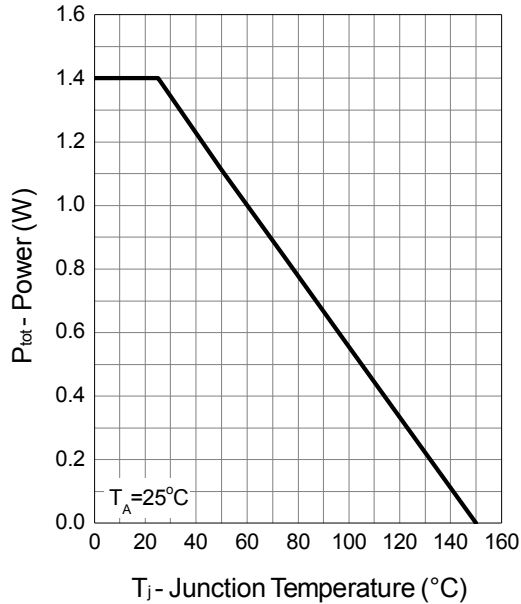
Symbol	Parameter	Test Conditions	P Channel			Unit	
			Min.	Typ.	Max.		
Static Characteristics							
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=-250\mu A$	-20	-	-	V	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-16V, V_{GS}=0V$	-	-	-1	μA	
		$T_J=85^\circ C$	-	-	-30		
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-0.5	-0.7	-1	V	
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	± 100	nA	
$R_{DS(ON)}^a$	Drain-Source On-State Resistance	$V_{GS}=-4.5V, I_{DS}=-3.3A$	-	65	85	m Ω	
		$V_{GS}=-2.5V, I_{DS}=-2.1A$	-	90	120		
		$V_{GS}=-1.8V, I_{DS}=-1A$	-	130	210		
Diode Characteristics							
V_{SD}^a	Diode Forward Voltage	$I_{SD}=-1A, V_{GS}=0V$	-	-0.75	-1.1	V	
t_{rr}	Reverse Recovery Time	$I_{SD}=-3.3A, di_{SD}/dt=100A/\mu s$	-	16	-	ns	
Q_{rr}	Reverse Recovery Charge		-	6	-	nC	
Dynamic Characteristics^b							
R_g	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	-	10	-	Ω	
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=-10V, \text{Frequency}=1.0MHz$	-	365	-	pF	
C_{oss}	Output Capacitance		-	75	-		
C_{riss}	Reverse Transfer Capacitance		-	60	-		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-10V, R_L=10\Omega, I_{DS}=-1A, V_{GEN}=-10V, R_G=6\Omega$	-	5.3	-	ns	
T_r	Turn-on Rise Time		-	14.2	-		
$t_{d(OFF)}$	Turn-off Delay Time		-	30	-		
T_f	Turn-off Fall Time		-	23	-		
Gate Charge Characteristics^b							
Q_g	Total Gate Charge	$V_{DS}=-10V, I_{DS}=-3.3A$	$V_{GS}=-4.5V,$	-	4.5	-	nC
			$V_{GS}=-10V$	-	9.2	-	
Q_{gs}	Gate-Source Charge	$V_{DS}=-10V, V_{GS}=-10V, I_{DS}=-3.3A$	-	0.7	-		
Q_{gd}	Gate-Drain Charge		-	1.8	-		
Q_{gth}	Threshold Gate Charge		-	0.3	-		

Note a : Pulse test; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

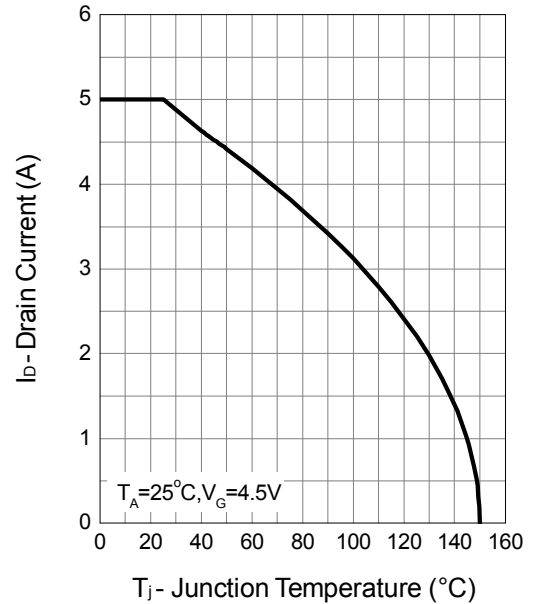
Note b : Guaranteed by design, not subject to production testing.

N Channel Typical Operating Characteristics

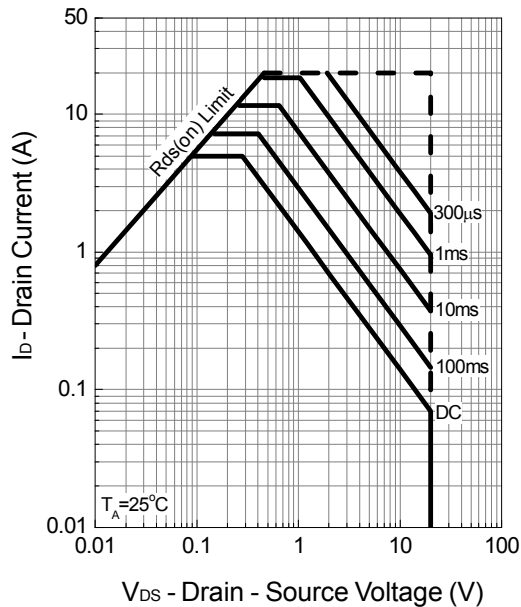
Power Dissipation



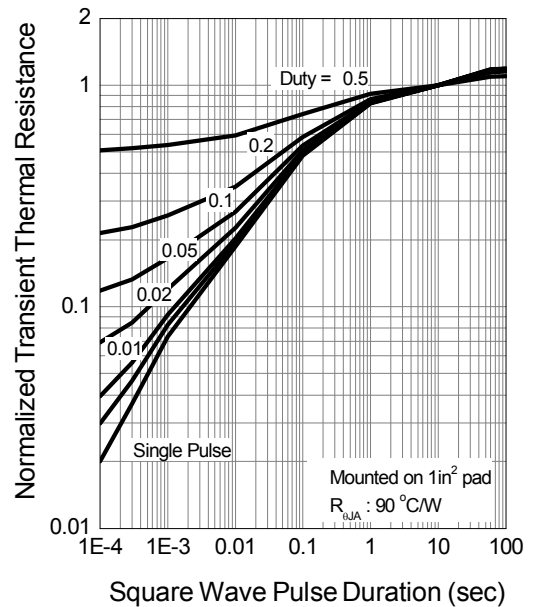
Drain Current



Safe Operation Area

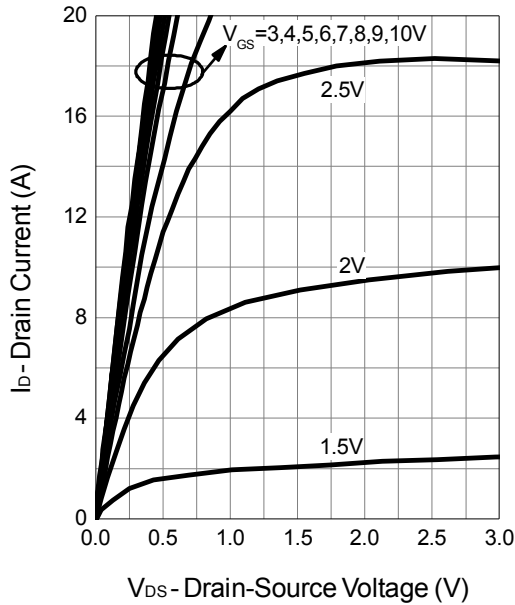


Thermal Transient Impedance

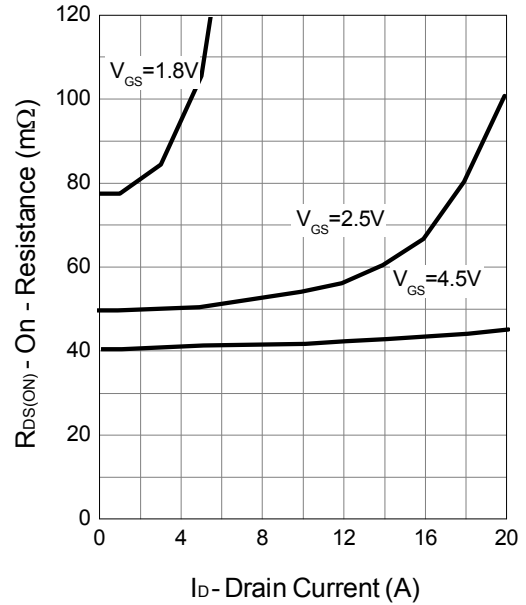


N Channel Typical Operating Characteristics (Cont.)

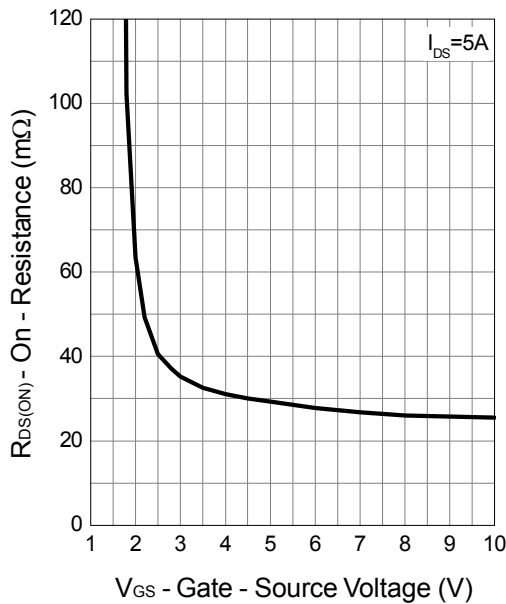
Output Characteristics



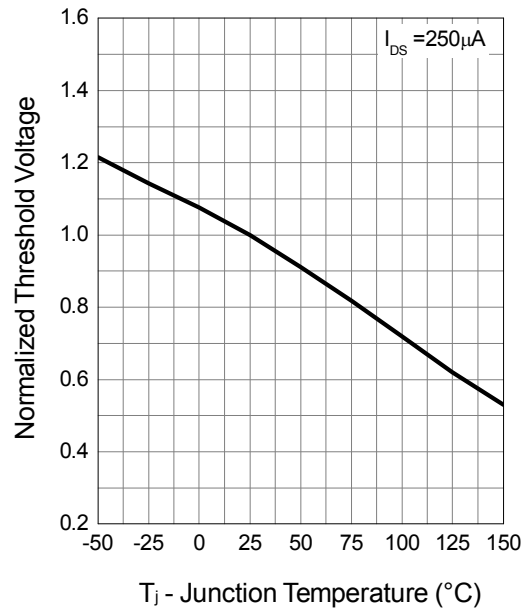
Drain-Source On Resistance



Gate-Source On Resistance

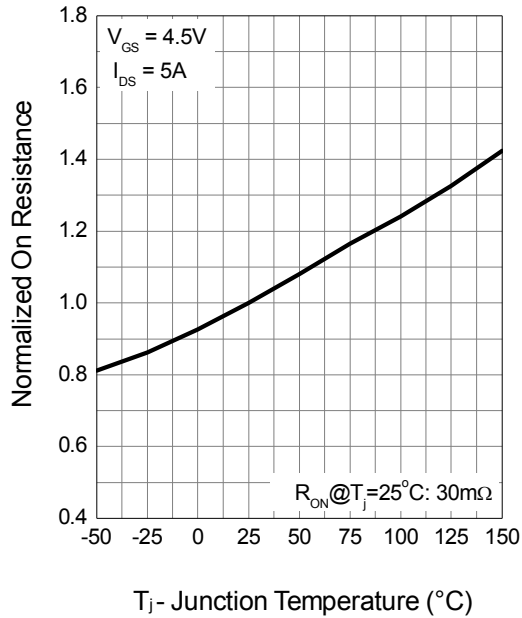


Gate Threshold Voltage

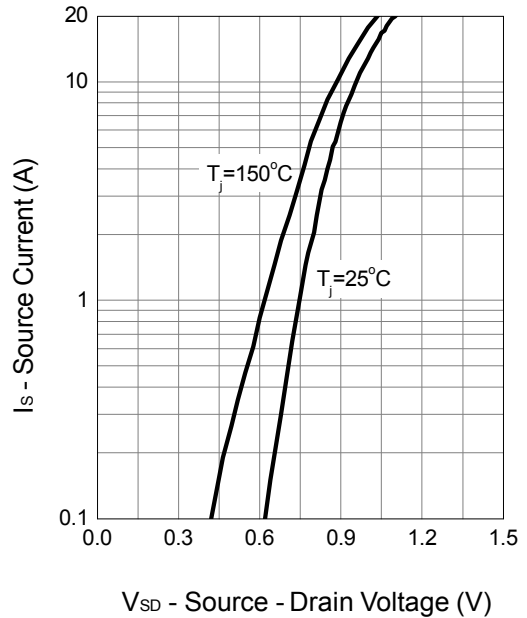


N Channel Typical Operating Characteristics (Cont.)

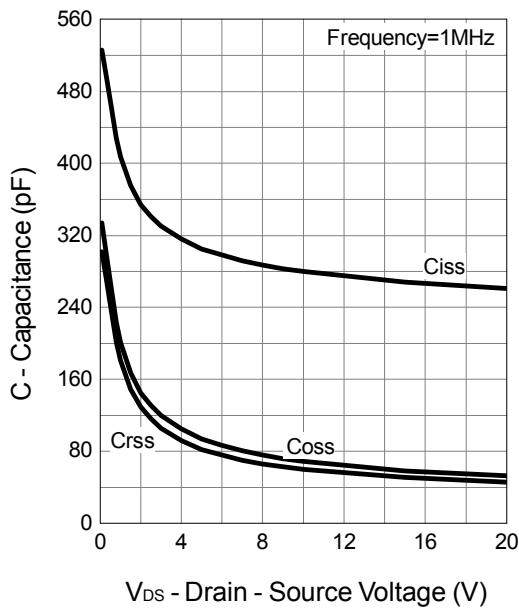
Drain-Source On Resistance



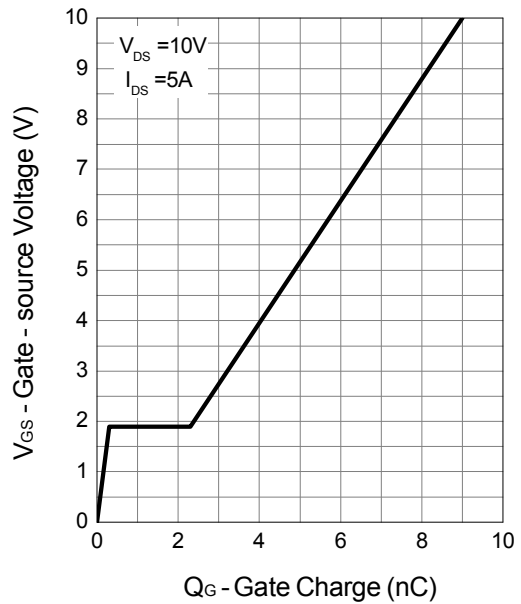
Source-Drain Diode Forward



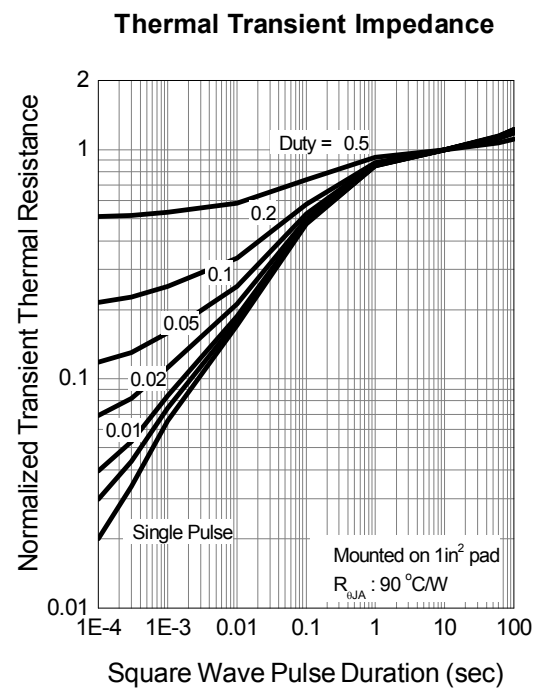
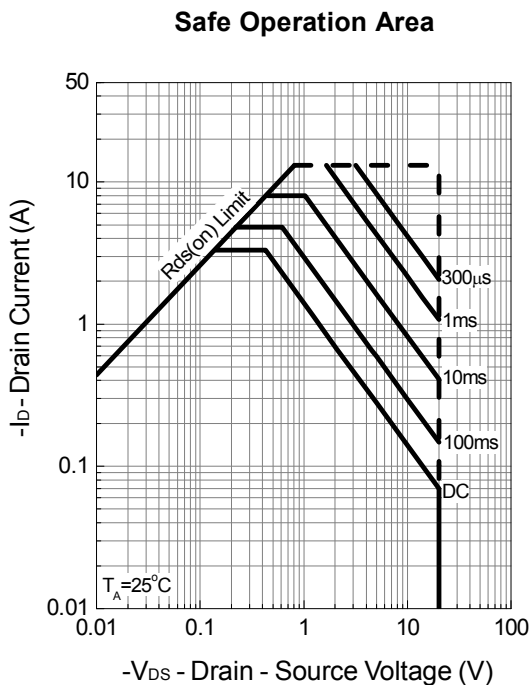
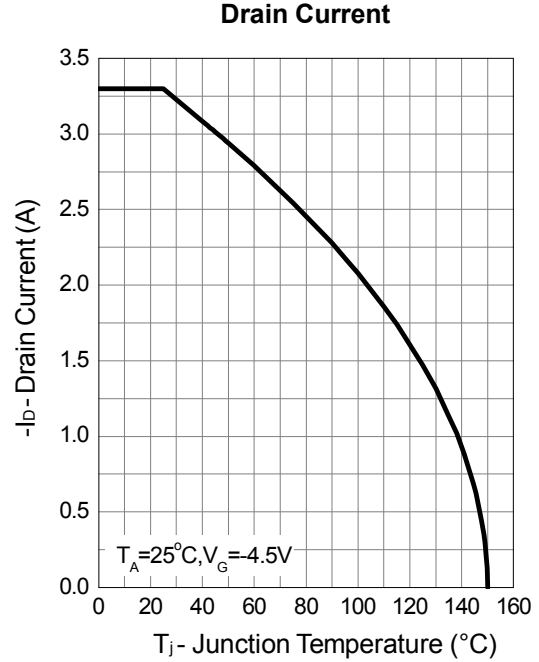
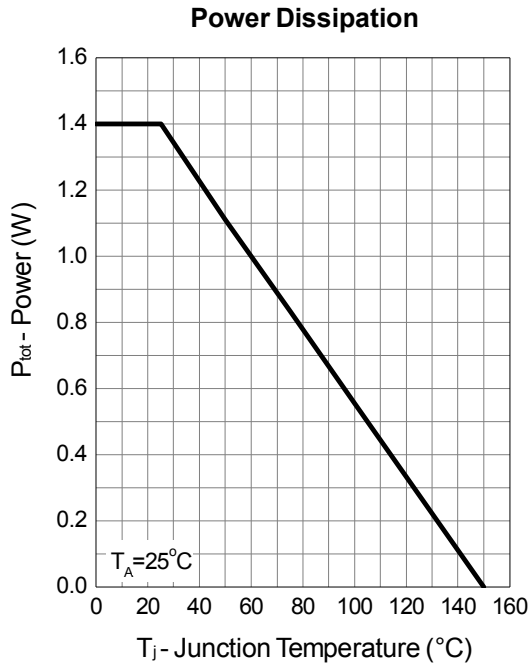
Capacitance



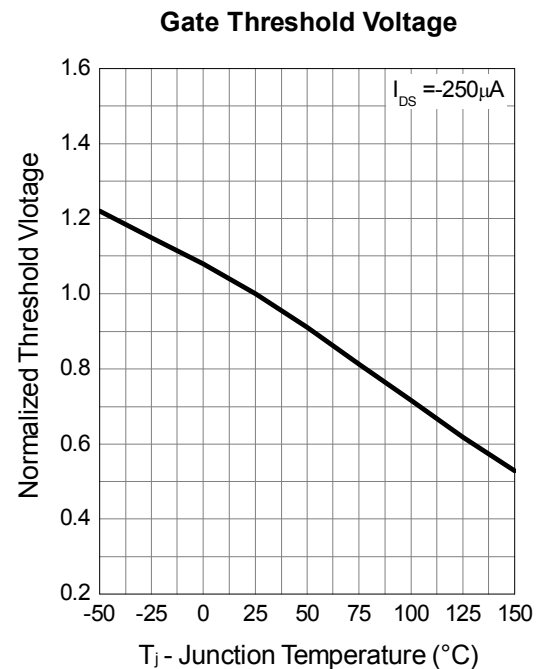
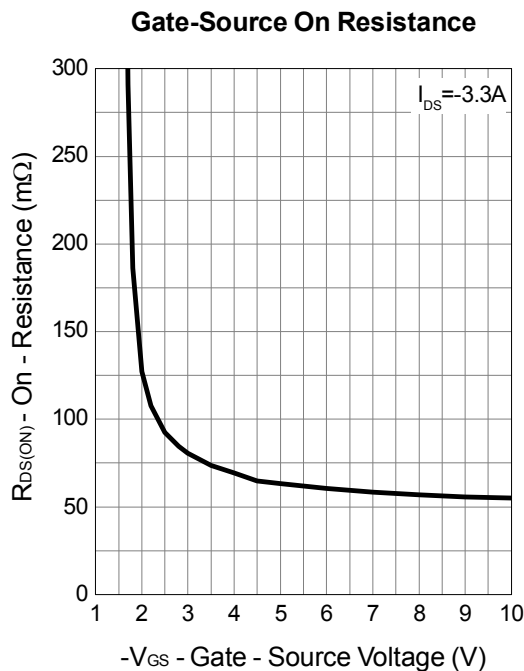
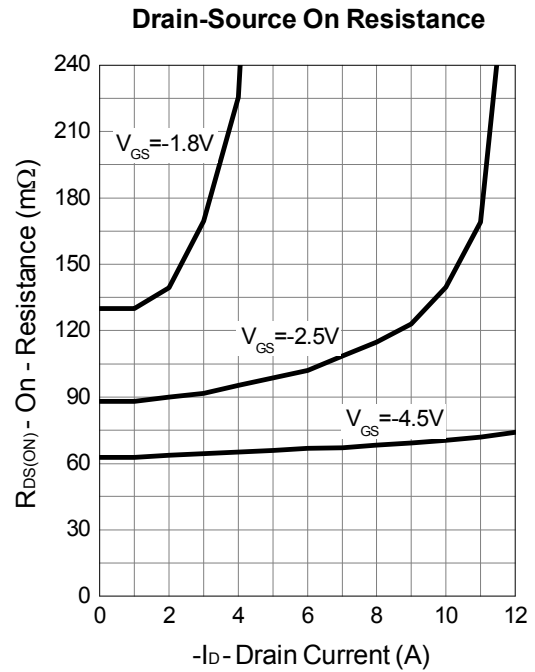
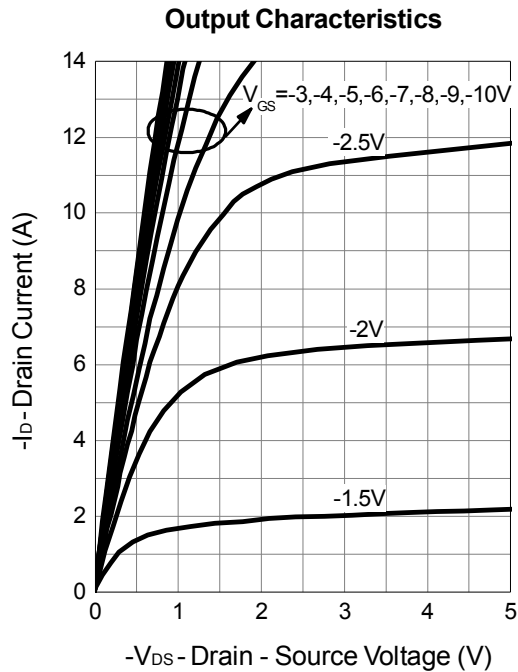
Gate Charge



P Channel Typical Operating Characteristics

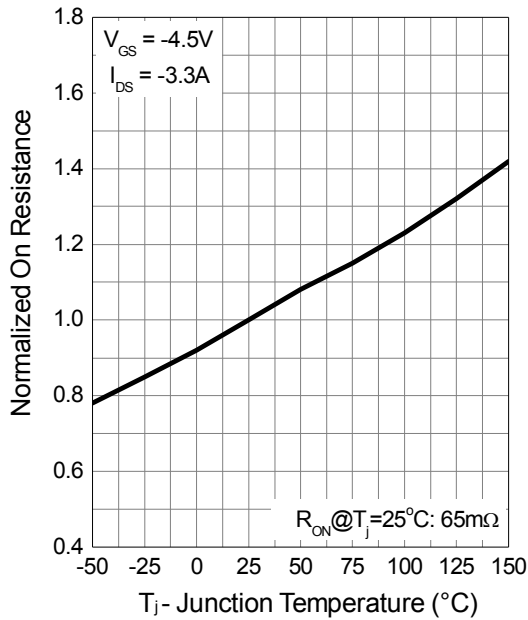


P Channel Typical Operating Characteristics (Cont.)

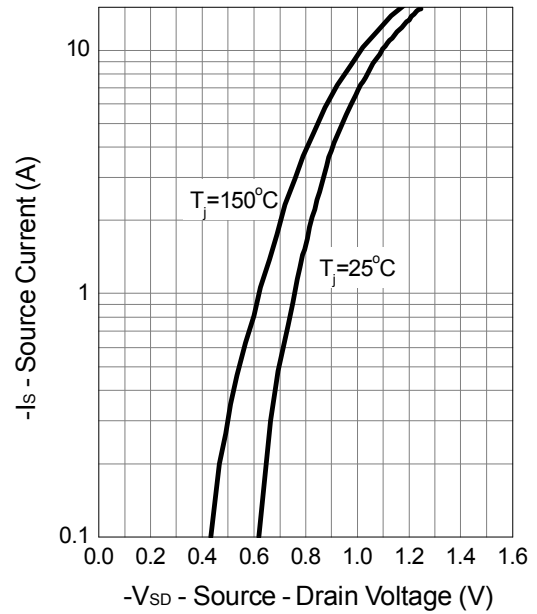


P Channel Typical Operating Characteristics (Cont.)

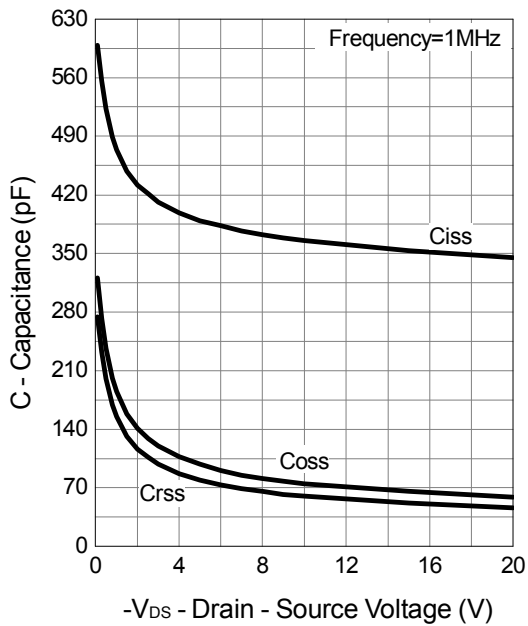
Drain-Source On Resistance



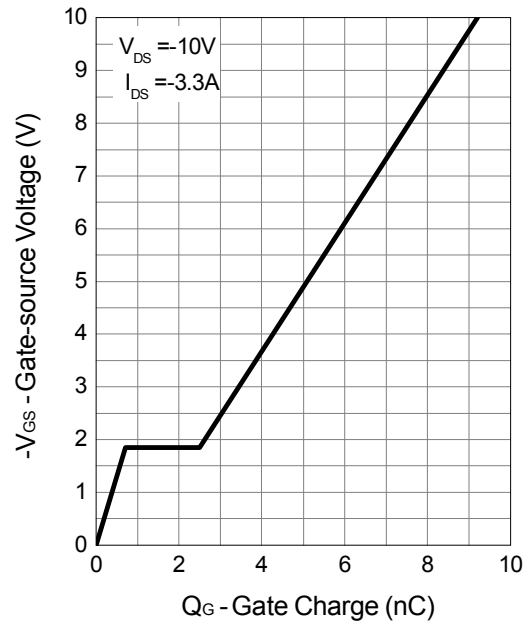
Source-Drain Diode Forward



Capacitance

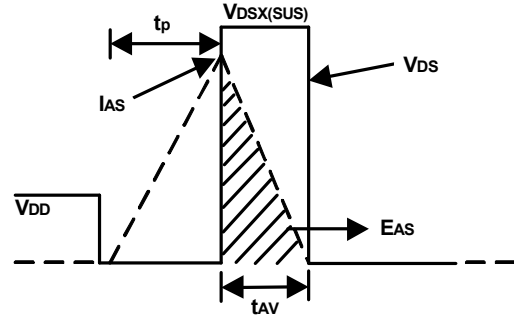
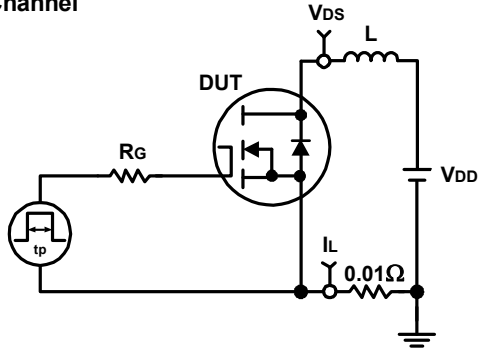


Gate Charge

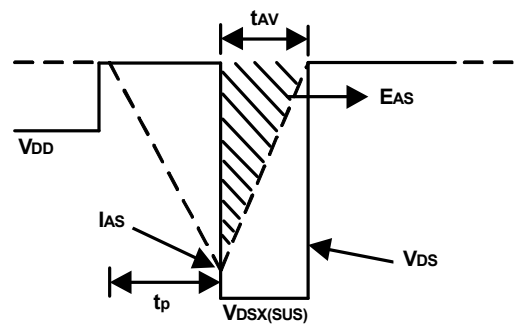
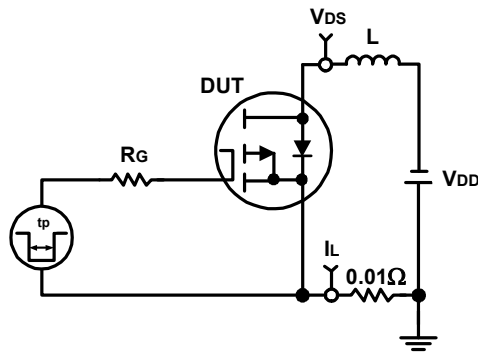


Avalanche Test Circuit and Waveforms

N Channel

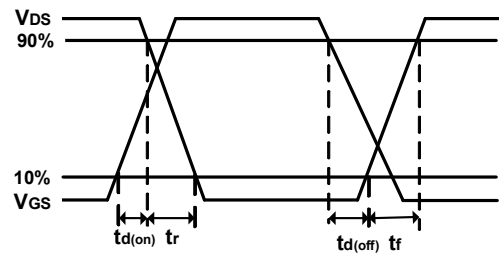
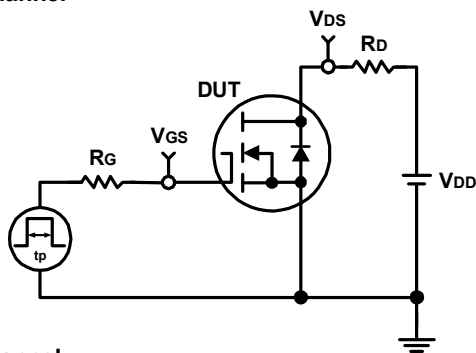


P Channel



Switching Time Test Circuit and Waveforms

N Channel



P Channel

