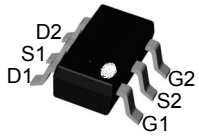
Features

- **N-Channel**
  20V/5A,
  $R_{DS(ON)}$=40mΩ(TYP.) @ V_{GS} =4.5V
  $R_{DS(ON)}$=50mΩ(TYP.) @ V_{GS} =2.5V
  $R_{DS(ON)}$=80mΩ(TYP.) @ V_{GS} =1.8V
- **P-Channel**
  -20V/-3.3A,
  $R_{DS(ON)}$=65mΩ(TYP.) @ V_{GS}=-4.5V
  $R_{DS(ON)}$=90mΩ(TYP.) @ V_{GS}=-2.5V
  $R_{DS(ON)}$=130mΩ(TYP.) @ V_{GS}=-1.8V
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

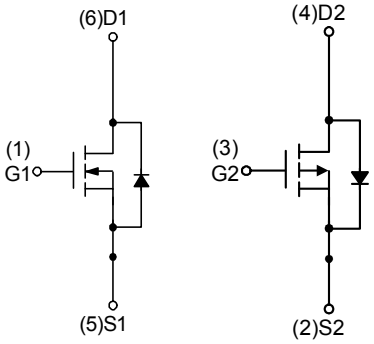
Applications

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

Pin Description



Top View of SOT-23-6



N-Channel P-Channel

Absolute Maximum Ratings (T_A = 25°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°C	5	-3.3	A
		T_A=70°C	4	-2.6	
I_{DM}	Pulsed Drain Current	V_{GS}=10V	20	-13	
I_S	Diode Continuous Forward Current		1		
T_J	Maximum Junction Temperature		150		°C
T_{STG}	Storage Temperature Range		-55 to 150		
P_D	Maximum Power Dissipation	T_A=25°C	1.4		W
		T_A=70°C	0.9		
$R_{\theta JA}$*	Thermal Resistance-Junction to Ambient	t ≤ 10s	90		°C/W
		Steady State	125		

N Channel Electrical Characteristics (T_A = 25°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}=250μA	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=16V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	0.5	0.7	1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±12V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [a]	Drain-Source On-State Resistance	V_{GS}=4.5V, I_{DS}=5A	-	40	58	mΩ
		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/μs	-	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, Frequency=1.0MHz	-	275	-	pF
C_{oss}	Output Capacitance		-	70	-	
C_{rss}	Reverse Transfer Capacitance		-	60	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=10V, R_L=10Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω	-	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_{DS}=10V, I_{DS}=5A, 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≤300μs, duty cycle≤2%.
Note b：Guaranteed by design, not subject to production testing.

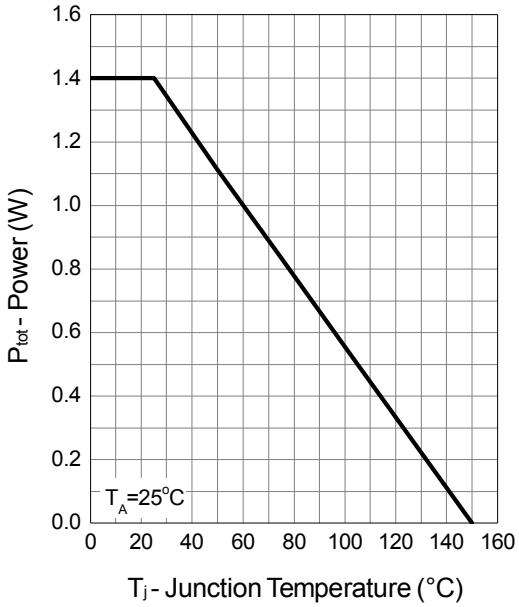
P Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	P Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=-250μA	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-16V, V_{GS}=0V	-	-	-1	μA
		T_J=85°C	-	-	-30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250μA	-0.5	-0.7	-1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±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	mΩ
		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/μs	-	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, Frequency=1.0MHz	-	365	-	pF
C_{oss}	Output Capacitance		-	75	-	
C_{rss}	Reverse Transfer Capacitance		-	60	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-10V, R_L=10Ω, I_{DS}=-1A, V_{GEN}=-10V, R_G=6Ω	-	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	-	

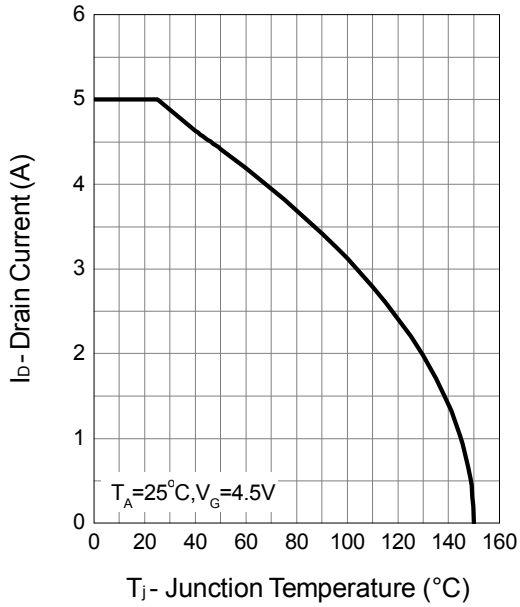
Note a：Pulse test; pulse width≤300μs, duty cycle≤2%.
Note b：Guaranteed by design, not subject to production testing.

N Channel Typical Operating Characteristics

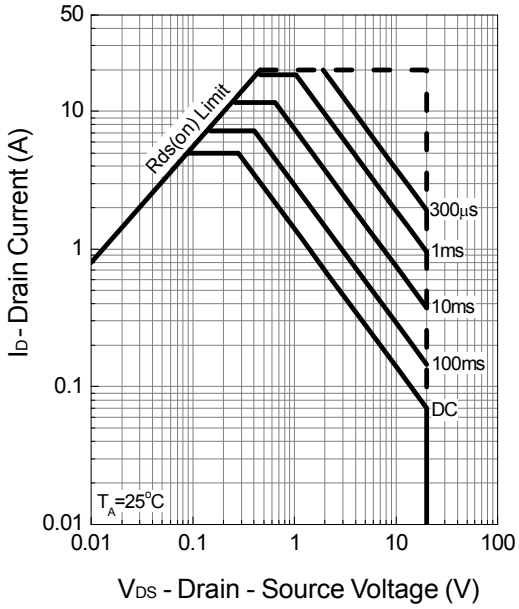
Power Dissipation



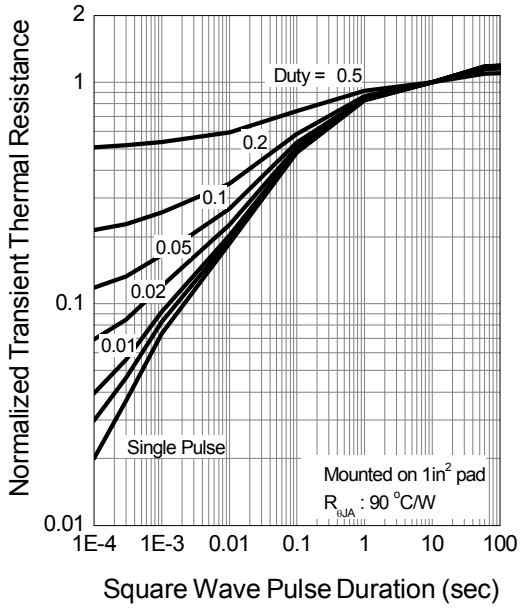
Drain Current



Safe Operation Area

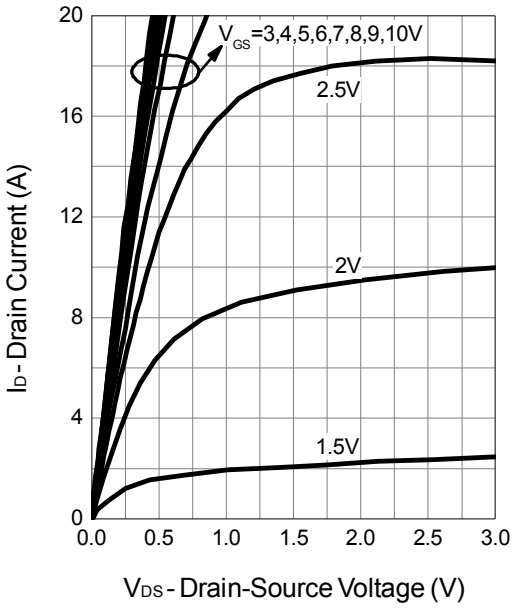


Thermal Transient Impedance

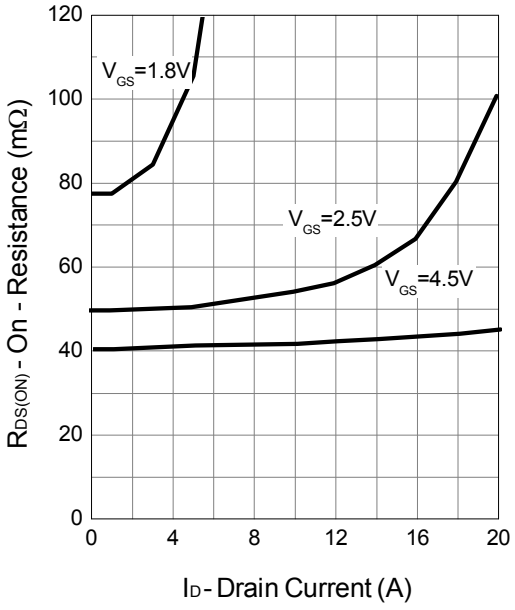


N Channel Typical Operating Characteristics (Cont.)

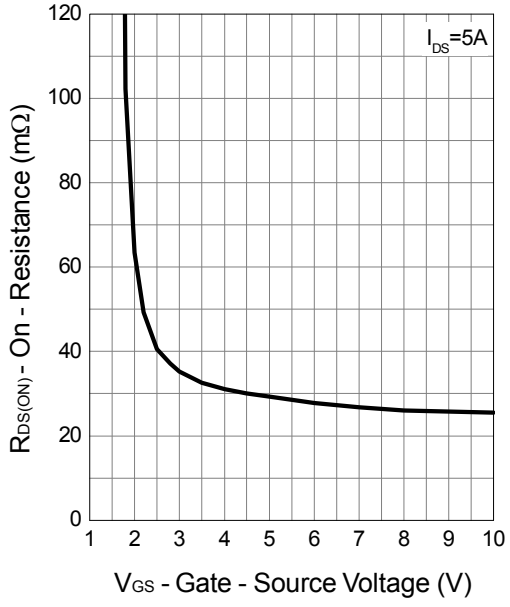
Output Characteristics



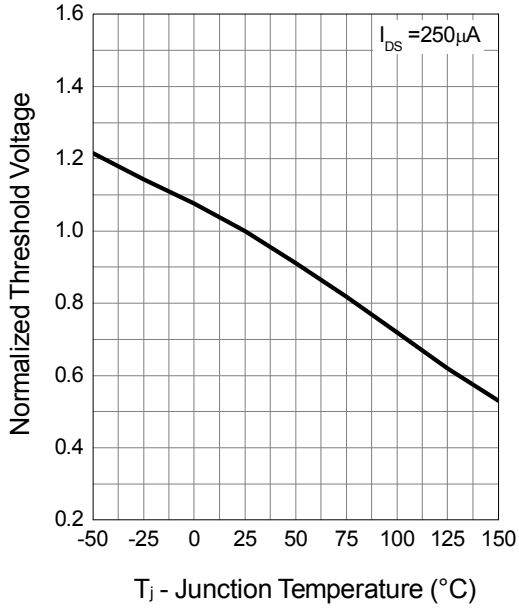
Drain-Source On Resistance



Gate-Source On Resistance

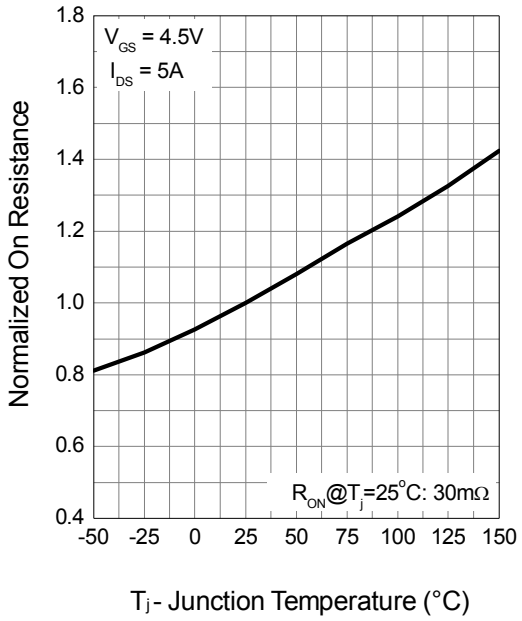


Gate Threshold Voltage

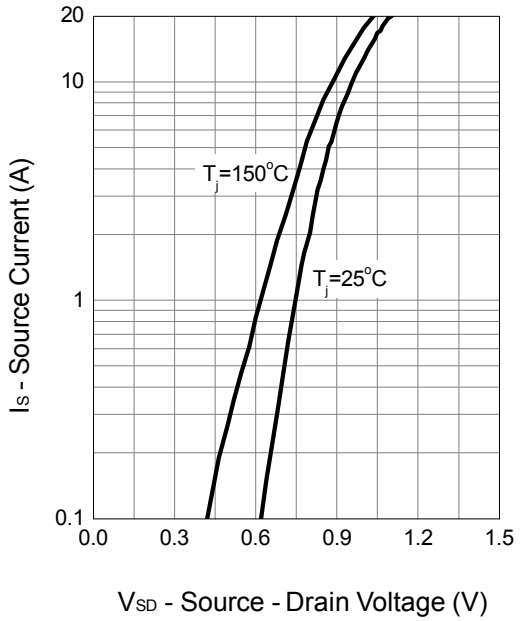


N Channel Typical Operating Characteristics (Cont.)

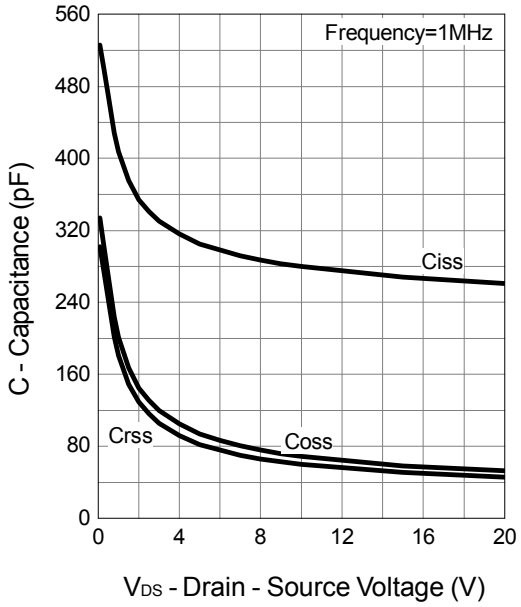
Drain-Source On Resistance



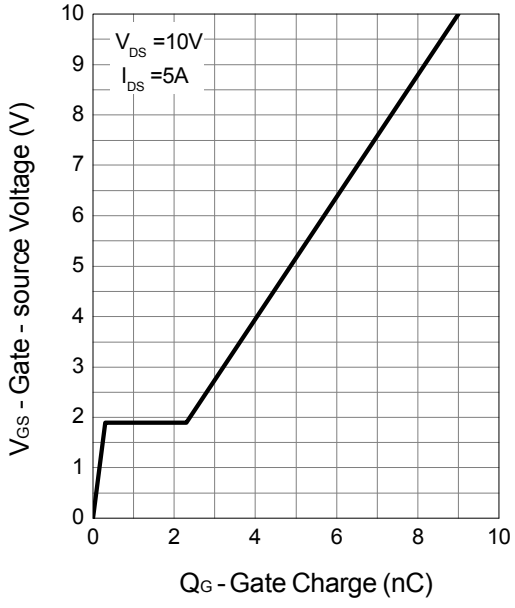
Source-Drain Diode Forward



Capacitance

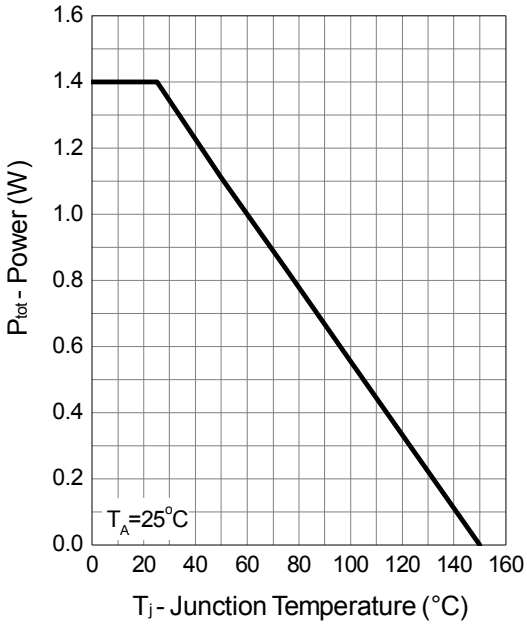


Gate Charge

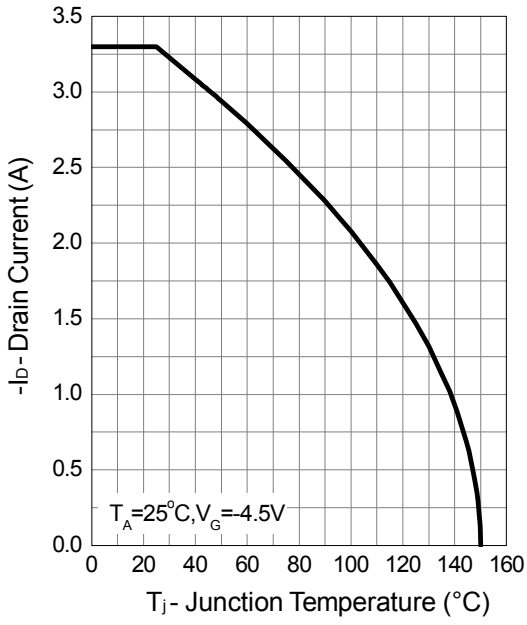


P Channel Typical Operating Characteristics

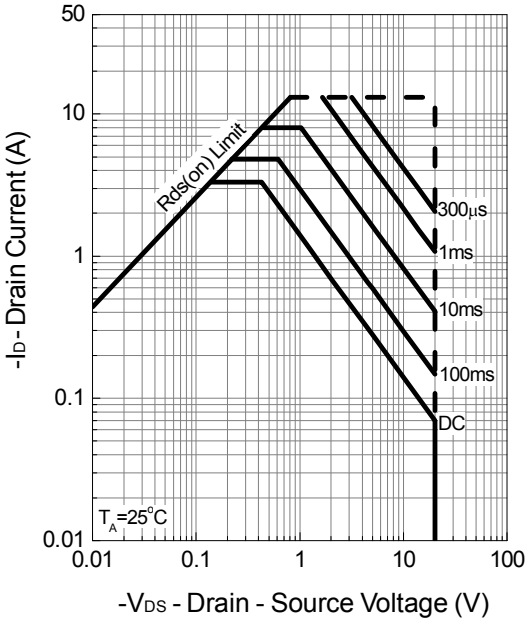
Power Dissipation



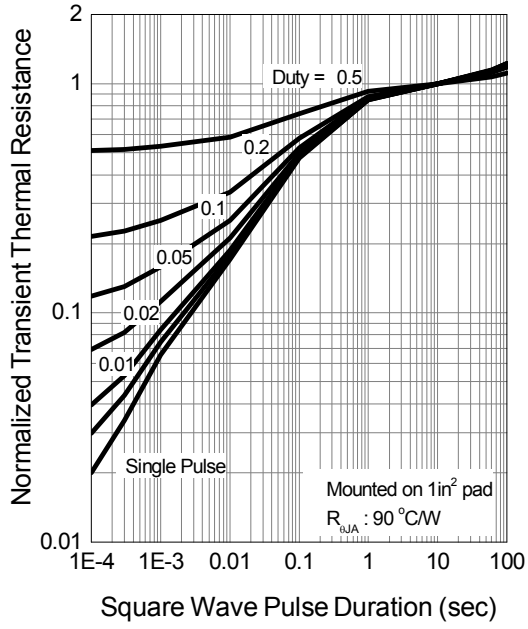
Drain Current



Safe Operation Area

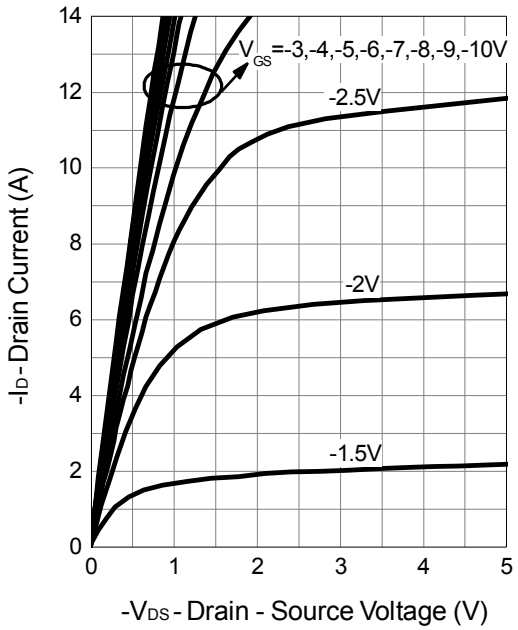


Thermal Transient Impedance

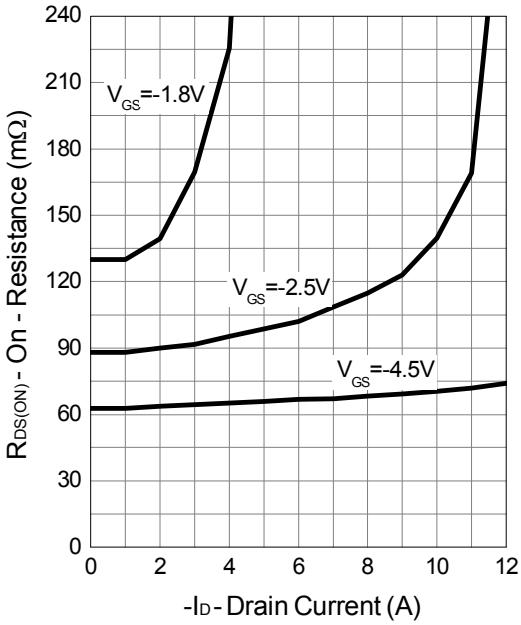


P Channel Typical Operating Characteristics (Cont.)

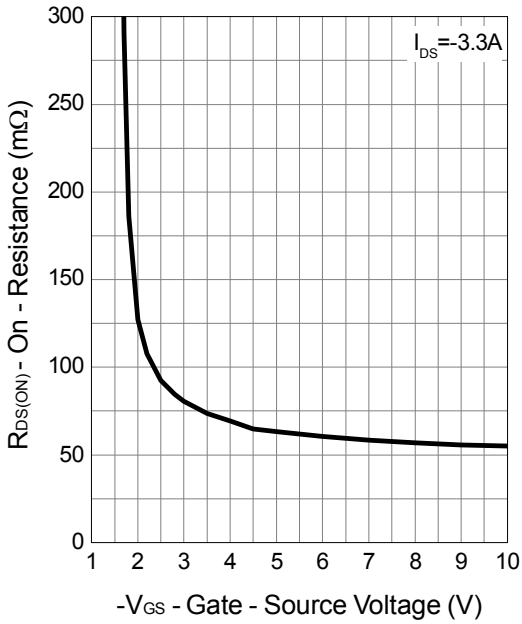
Output Characteristics



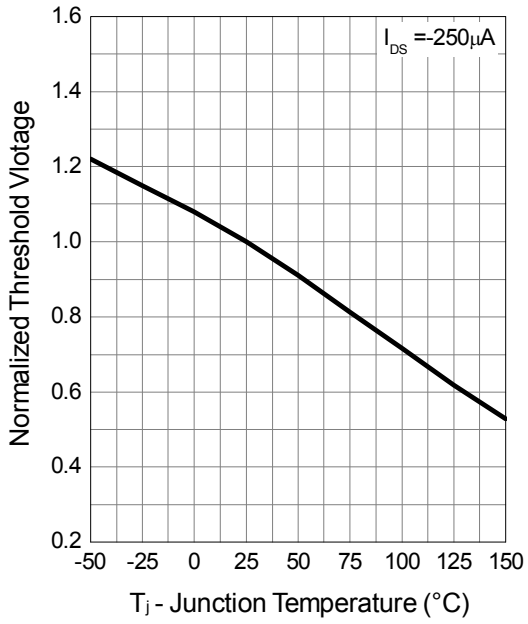
Drain-Source On Resistance



Gate-Source On Resistance

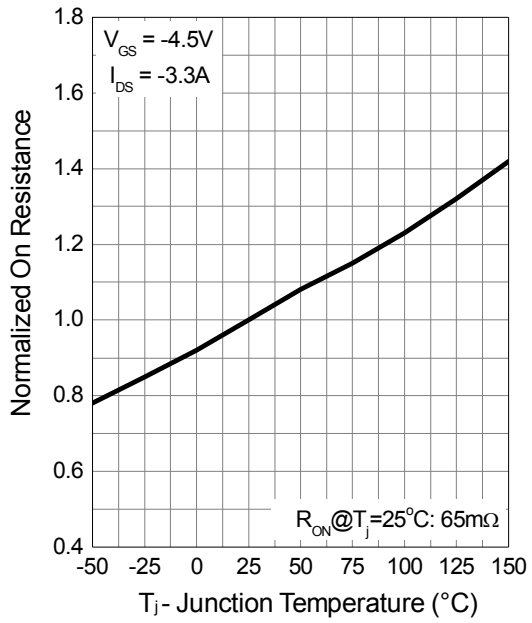


Gate Threshold Voltage

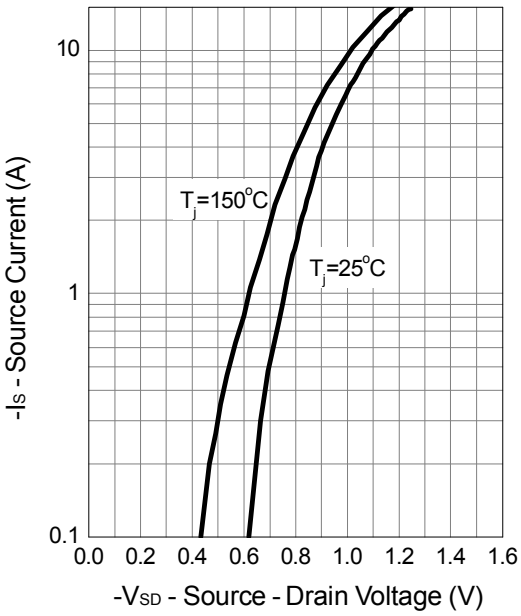


P Channel Typical Operating Characteristics (Cont.)

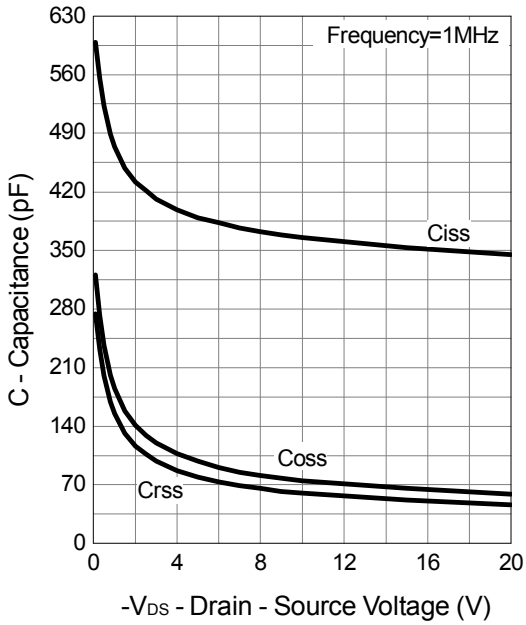
Drain-Source On Resistance



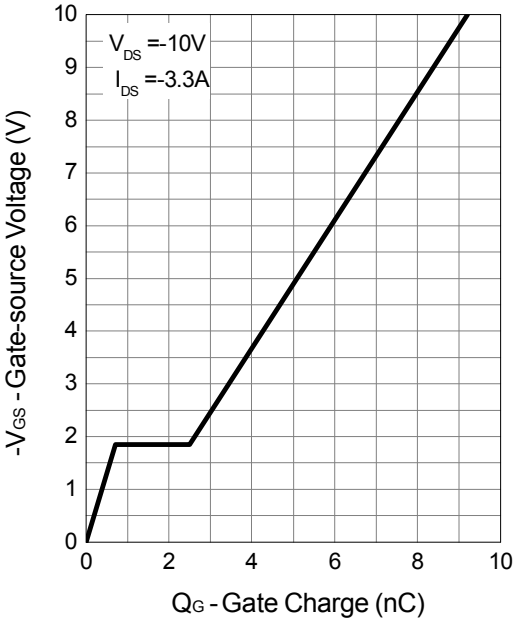
Source-Drain Diode Forward



Capacitance

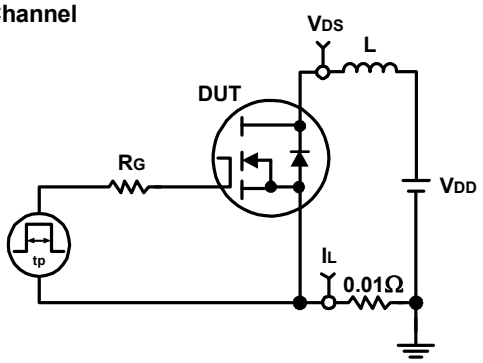


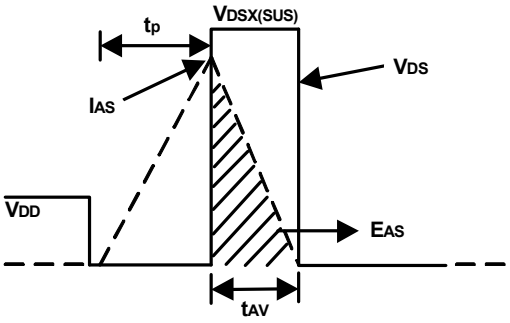
Gate Charge



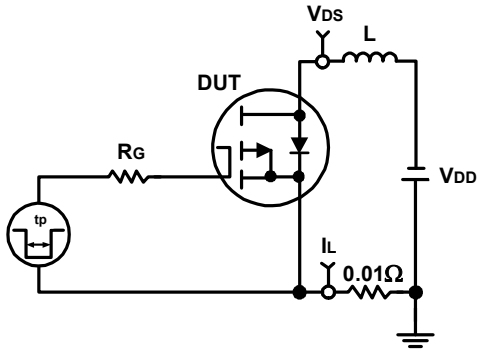
Avalanche Test Circuit and Waveforms

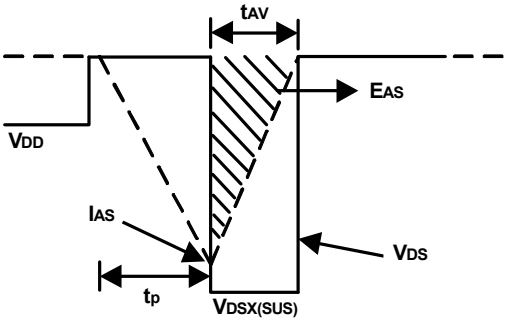
N Channel





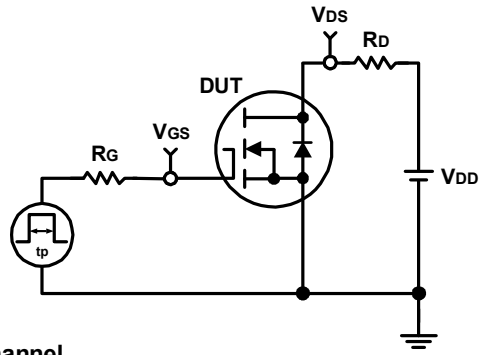
P Channel

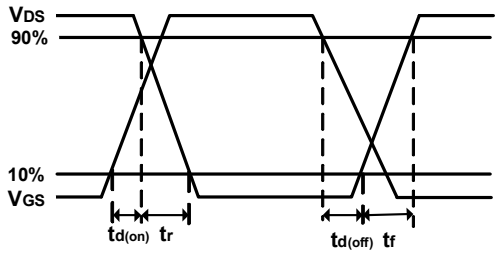




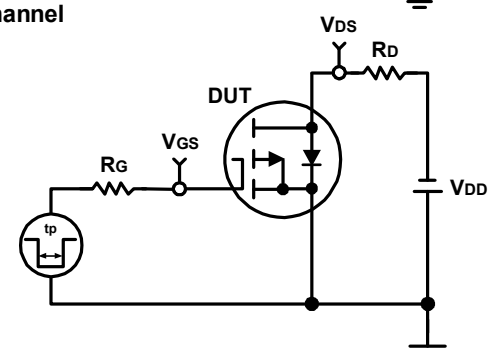
Switching Time Test Circuit and Waveforms

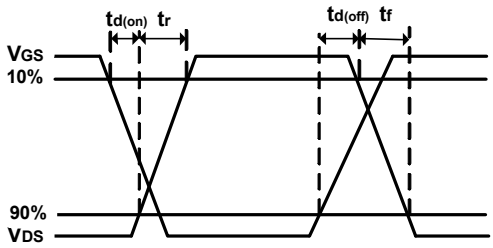
N Channel





P Channel





Flow (wave) soldering (solder dipping)

Product	Peak Temperature	Dipping Time
Pb device	245℃±5℃	5sec±1sec
Pb-Free device	260℃+0/-5℃	5sec±1sec

This integrated circuit can be damaged by ESD UniverChip Corporation recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedure can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

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