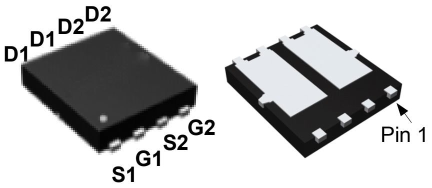
Features

- **N Channel (Integrated Schottky Diode)**
  30V/24A,
  $R_{DS(ON)}$ = 18mΩ (typ.) @ V_{GS} = 10V
  $R_{DS(ON)}$ = 23mΩ (typ.) @ V_{GS} = 4.5V
- **P Channel**
  -30V/-20A,
  $R_{DS(ON)}$ = 24mΩ (typ.) @ V_{GS} =-10V
  $R_{DS(ON)}$ = 34mΩ (typ) @ V_{GS} =-4.5V
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free Available (RoHS Compliant)

Applications

- Synchronous Rectification.
- Motor Control.
- High Current, High Speed Switching.
- Protable equipment application.

Pin Description



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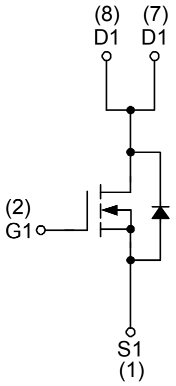
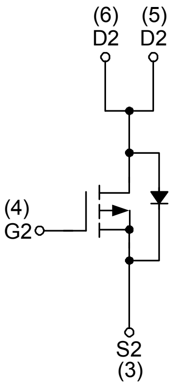


N-Channel MOSFET



P-Channel MOSFET

Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)

Symbol	Parameter		N Channel	P Channel	Unit
V_{DSS}	Drain-Source Voltage		30	-30	V
V_{GSS}	Gate-Source Voltage		±20	±20	
T_J	Maximum Junction Temperature		150		°C
T_{STG}	Storage Temperature Range		-55 to 150		
I_S	Diode Continuous Forward Current	T_C=25°C	24	-20	A
I_D	Continuous Drain Current	T_C=25°C	24	-20	A
		T_C=100°C	10	-8	
P_D	Maximum Power Dissipation	T_C=25°C	18.9		W
		T_C=100°C	7.6		
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	6.6		°C/W
I_D	Continuous Drain Current	T_A=25°C	9	-7.6	A
		T_A=70°C	7.3	-6.0	
I_{DM} [a]	Pulsed Drain Current	T_A=25°C	72	-60	A
P_D	Maximum Power Dissipation	T_A=25°C	2.78		W
		T_A=70°C	1.78		
$R_{\theta JA}$ [b]	Thermal Resistance-Junction to Ambient	$t \le 10s$	45		°C/W
		Steady State	95		°C/W
I_{AS} [c]	Avalanche Current, Single pulse	L=0.1mH	13	19	A
E_{AS} [c]	Avalanche Energy, Single pulse	L=0.1mH	8.5	18	mJ

Note a : Pulse width limited by max. junction temperature.

Note b : Surface mounted on $1in^2$ pad area.

Note c : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_j=25°C)

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	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=24V, V_{GS}=0V	-	-	50	μA
		T_J=85°C	-	-	5	mA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1.0	1.8	2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [d]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=9A	-	18	22	mΩ
		V_{GS}=4.5V, I_{DS}=8A	-	23	28	mΩ
Diode Characteristics						
V_{SD} [d]	Diode Forward Voltage	I_{SD}=1A, V_{GS}=0V	0.3	0.4	0.55	V
t_{rr}	Reverse Recovery Time	I_{SD}=4.0A, dI_{SD}/dt=100A/μs	-	11	-	ns
Q_{rr}	Reverse Recovery Charge		-	3.5	-	nC
Dynamic Characteristics [e]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,f=1MHz	-	3.3	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz	-	255	-	pF
C_{oss}	Output Capacitance		-	55	-	
C_{rss}	Reverse Transfer Capacitance		-	45	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V, R_L=15Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω	-	5.5	-	ns
t_r	Turn-on Rise Time		-	10.5	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	15	-	
t_f	Turn-off Fall Time		-	3.7	-	
Gate Charge Characteristics [e]						
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_{DS}=4.0A	-	4	-	nC
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=10V, I_{DS}=4.0A	-	8.3	12.5	
Q_{gs}	Gate-Source Charge		-	1.1	-	
Q_{gd}	Gate-Drain Charge		-	1.8	-	

Note d：Pulse test ; pulse width≤300μs, duty cycle≤2%.

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

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

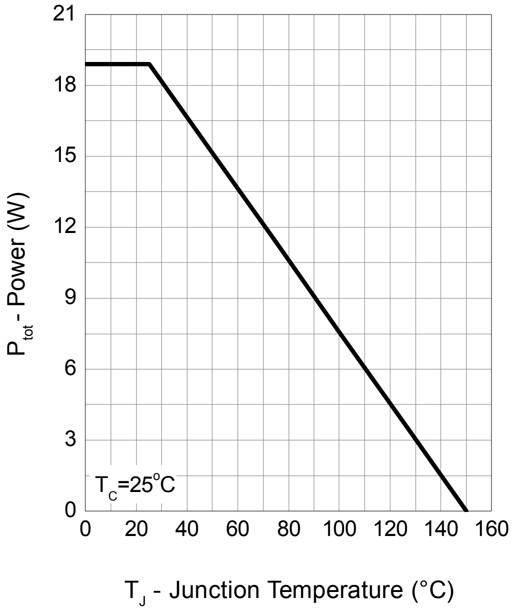
Symbol	Parameter	Test Conditions	P Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=-250μA	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-24V, V_{GS}=0V	-	-	-1	μA
		T_J=85°C	-	-	-30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250μA	-1.1	-1.6	-2.2	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ d	Drain-Source On-state Resistance	V_{GS}=-10V, I_{DS}=-7A	-	24	28	mΩ
		V_{GS}=-4.5V, I_{DS}=-4A	-	34	40	mΩ
Diode Characteristics						
V_{SD} d	Diode Forward Voltage	I_{SD}=-1A, V_{GS}=0V	-	-0.75	-1	V
t_{rr}	Reverse Recovery Time	I_{SD}=-7.0A, dI_{SD}/dt=100A/μs	-	17	-	ns
Q_{rr}	Reverse Recovery Charge		-	9	-	nC
Dynamic Characteristics e						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,f=1MHz	-	12	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, Frequency=1.0MHz	-	750	975	pF
C_{oss}	Output Capacitance		-	142	-	
C_{rss}	Reverse Transfer Capacitance		-	102	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-15V, R_L=15Ω, I_{DS}=-1A, V_{GEN}=-10V, R_G=6Ω	-	9	17	ns
t_r	Turn-on Rise Time		-	11	20	
$t_{d(OFF)}$	Turn-off Delay Time		-	55	99	
t_f	Turn-off Fall Time		-	34	62	
Gate Charge Characteristics e						
Q_g	Total Gate Charge	V_{DS}=-15V, V_{GS}=-4.5V, I_{DS}=-7.0A	-	8	-	nC
Q_g	Total Gate Charge	V_{DS}=-15V, V_{GS}=-10V, I_{DS}=-7.0A	-	17	24	
Q_{gth}	Threshold Gate Charge		-	1	-	
Q_{gs}	Gate-Source Charge		-	2	-	
Q_{gd}	Gate-Drain Charge		-	4	-	

Note d：Pulse test ; pulse width≤300μs, duty cycle≤2%.

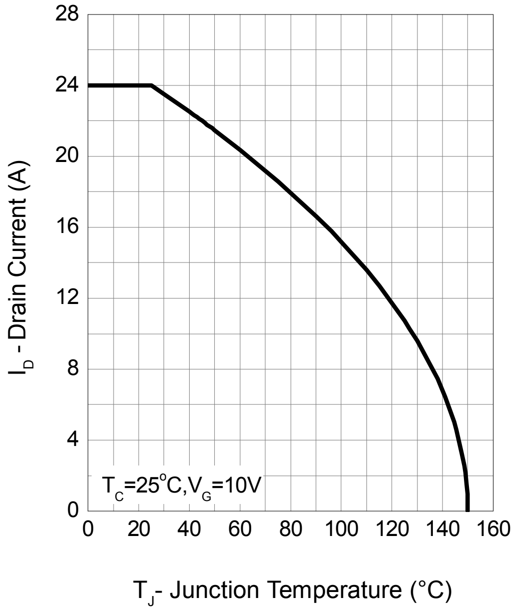
Note e：Guaranteed by design, not subject to production testing.

N Channel Typical Operating Characteristics

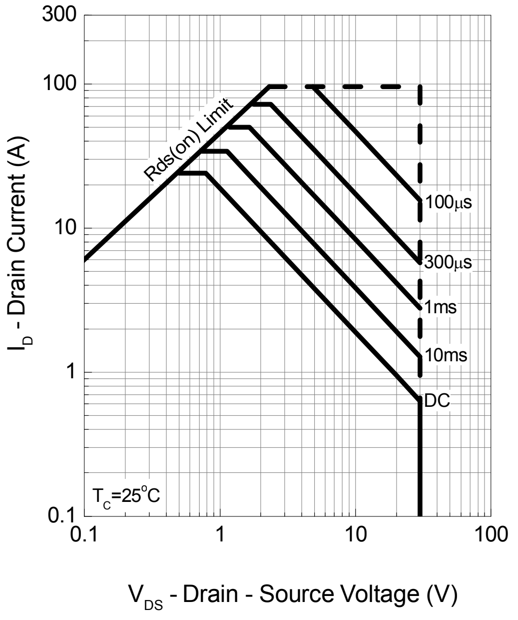
Power Dissipation



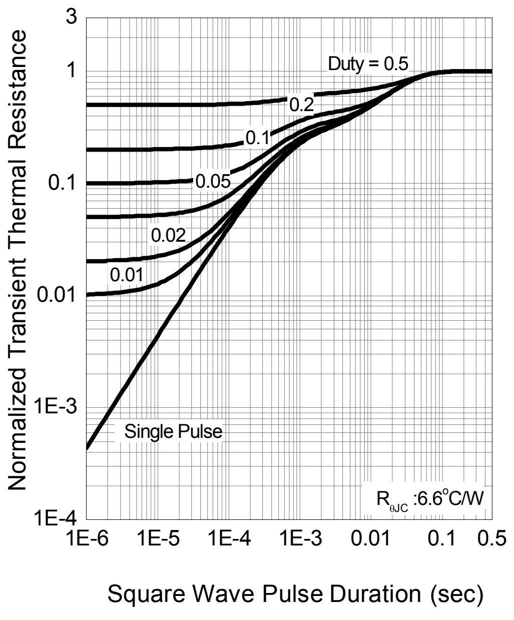
Drain Current



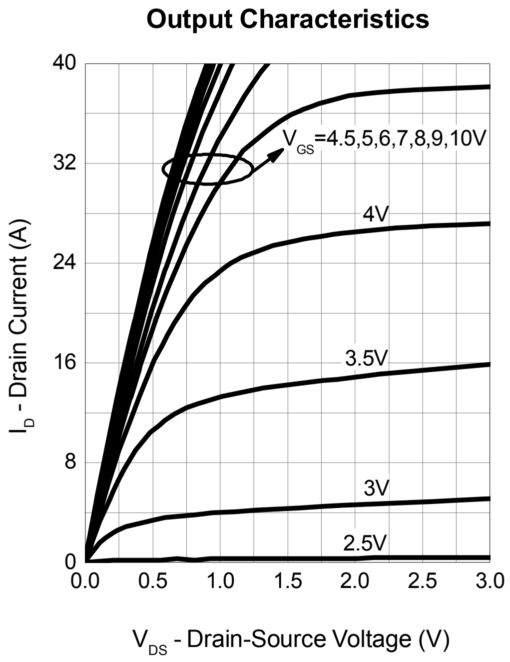
Safe Operation Area

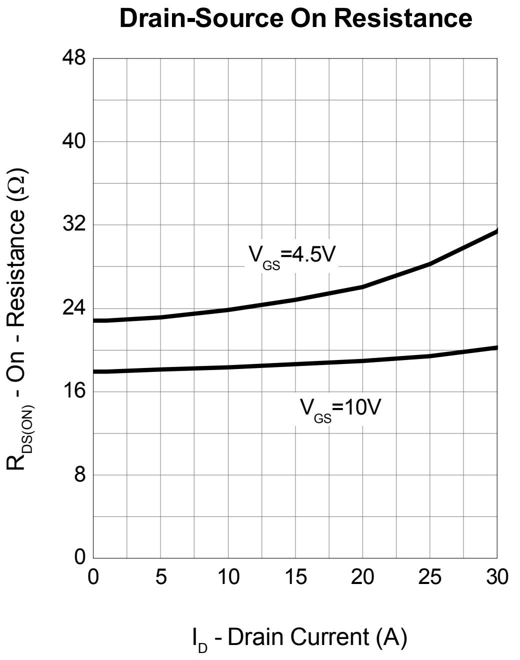


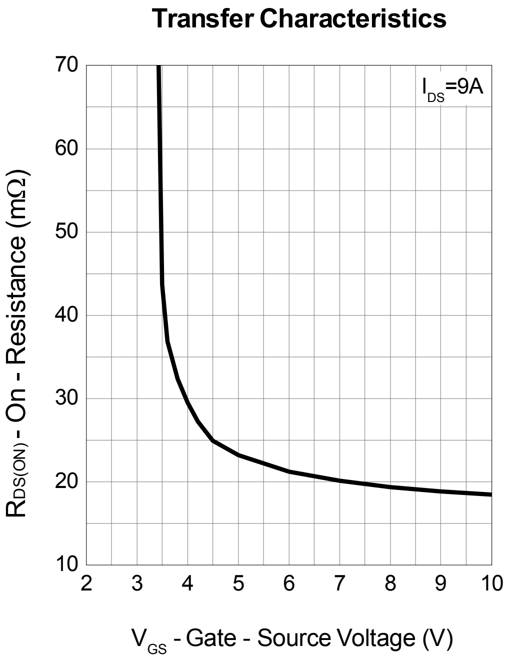
Thermal Transient Impedance

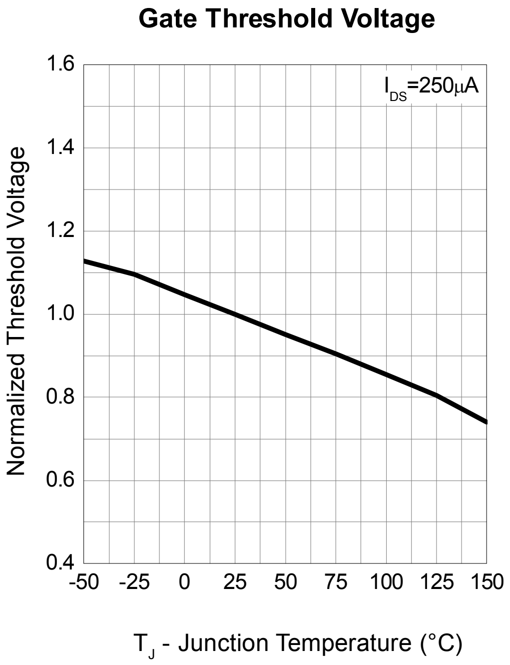


N Channel Typical Operating Characteristics (Cont.)

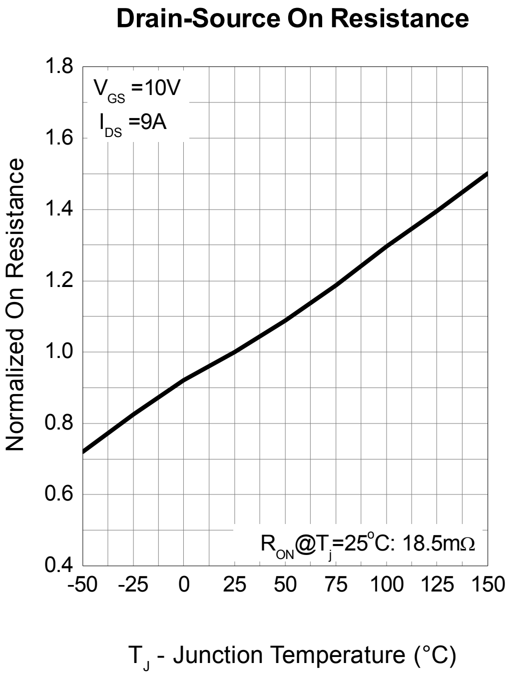


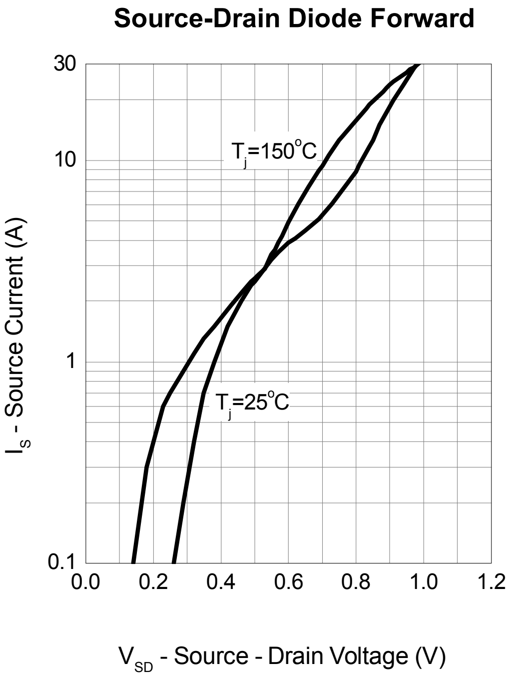


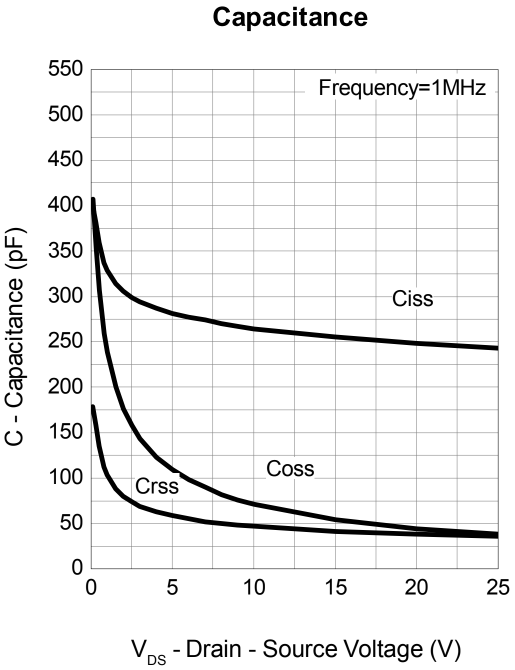


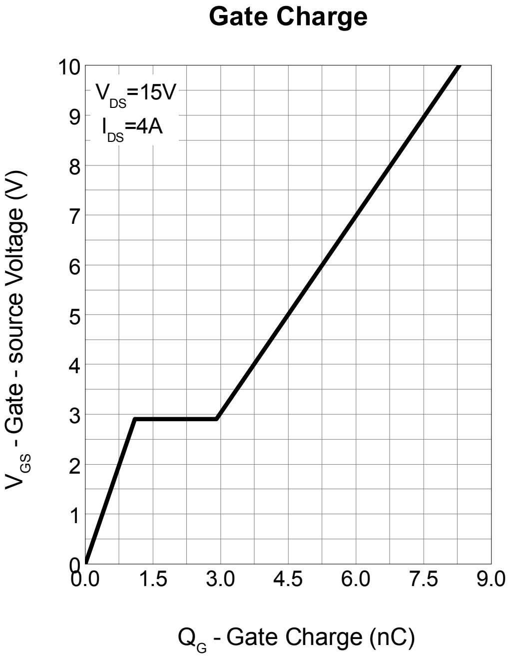


N Channel Typical Operating Characteristics (Cont.)



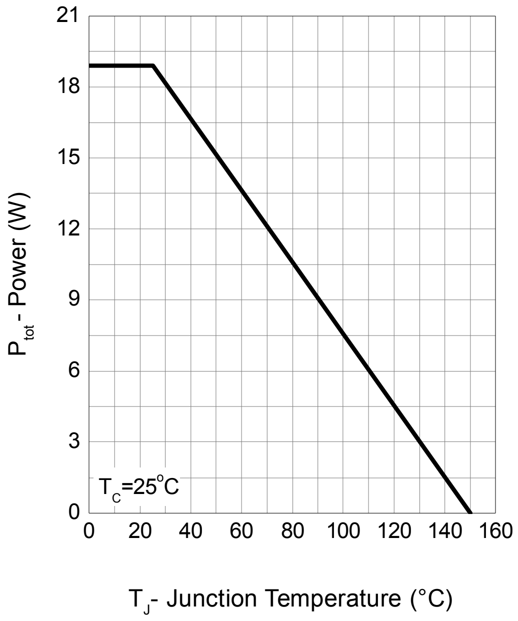




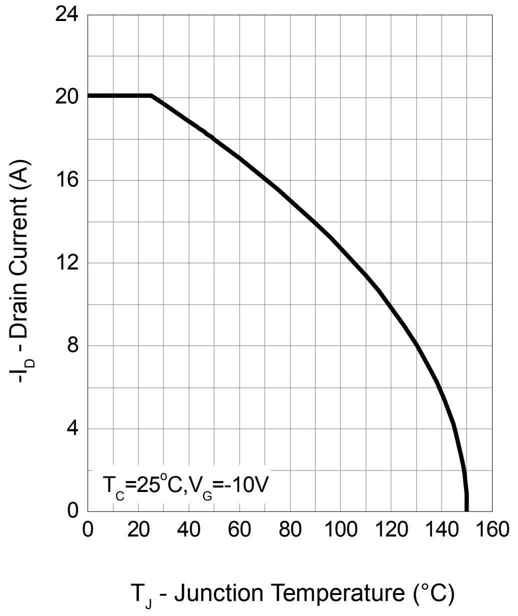


P Channel Typical Operating Characteristics

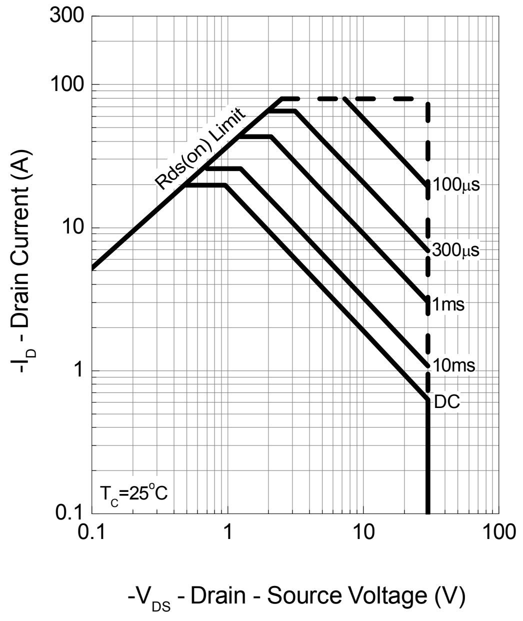
Power Dissipation



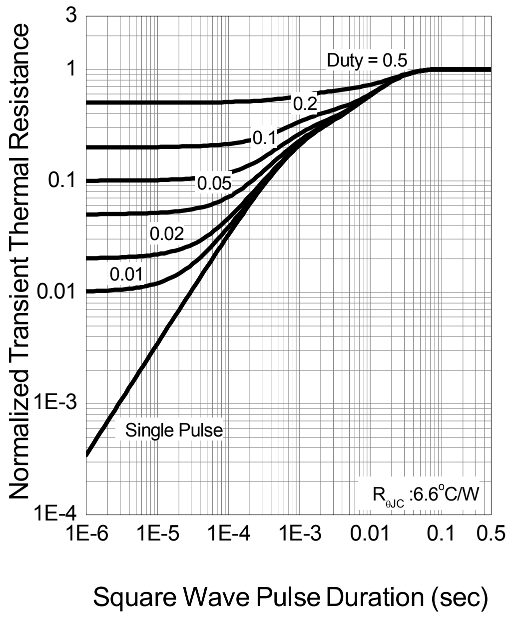
Drain Current



Safe Operation Area

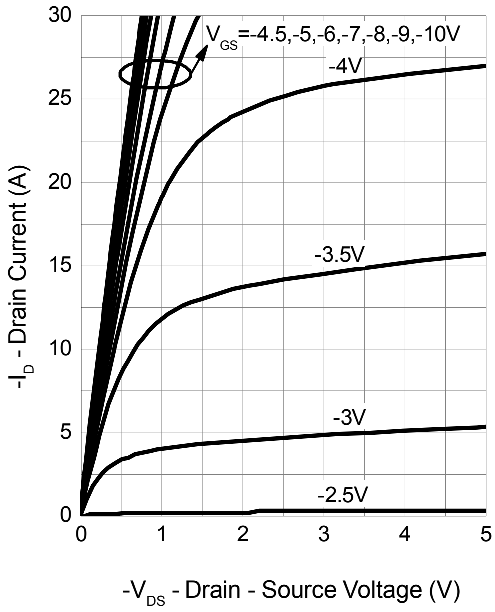


Thermal Transient Impedance

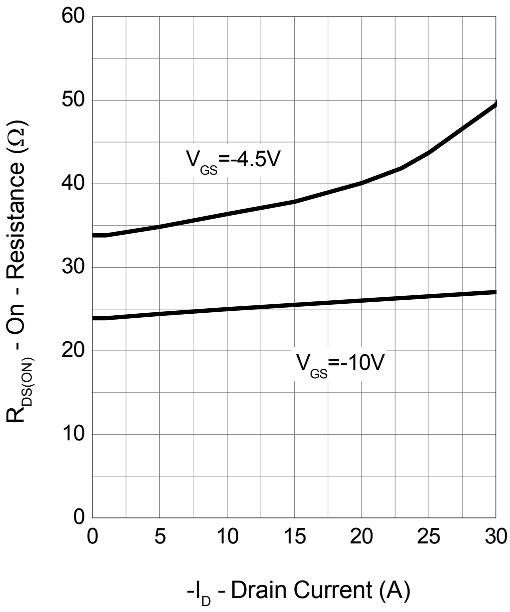


P Channel Typical Operating Characteristics (Cont.)

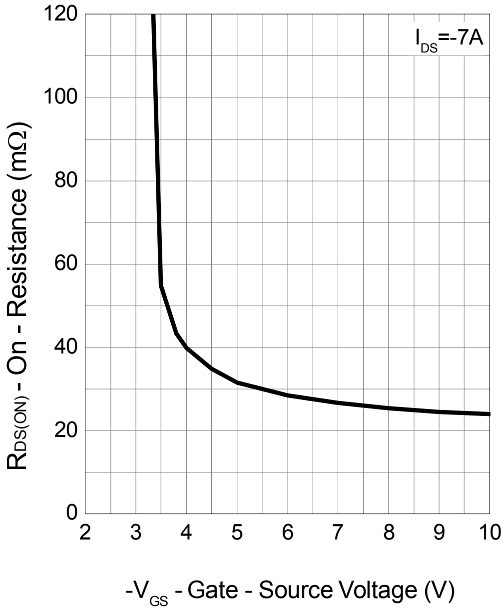
Output Characteristics



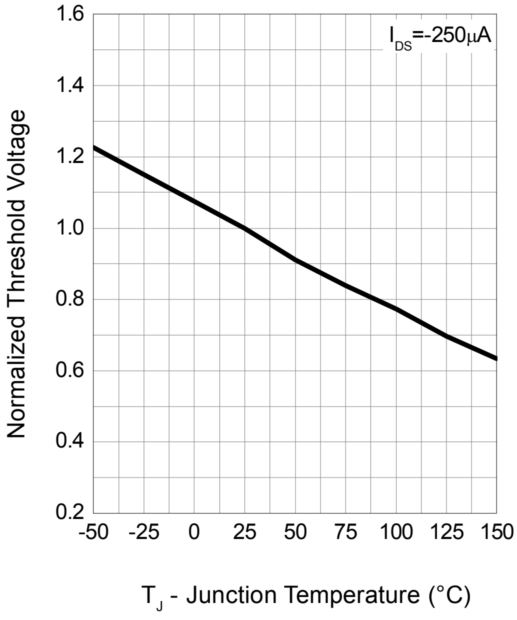
Drain-Source On Resistance



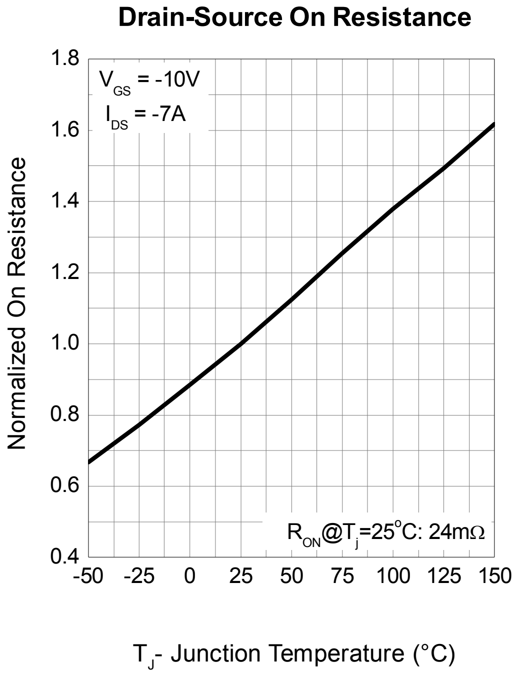
Transfer Characteristics

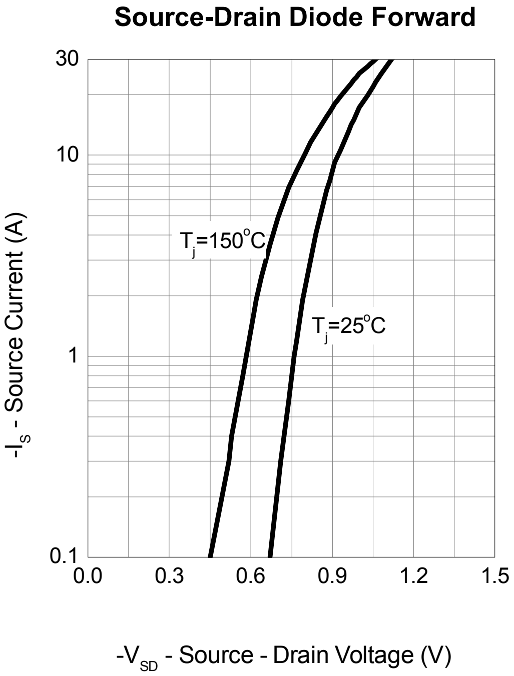


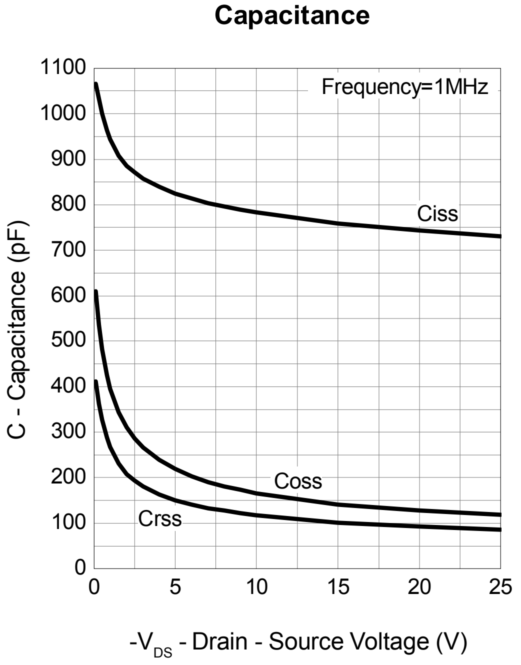
Gate Threshold Voltage

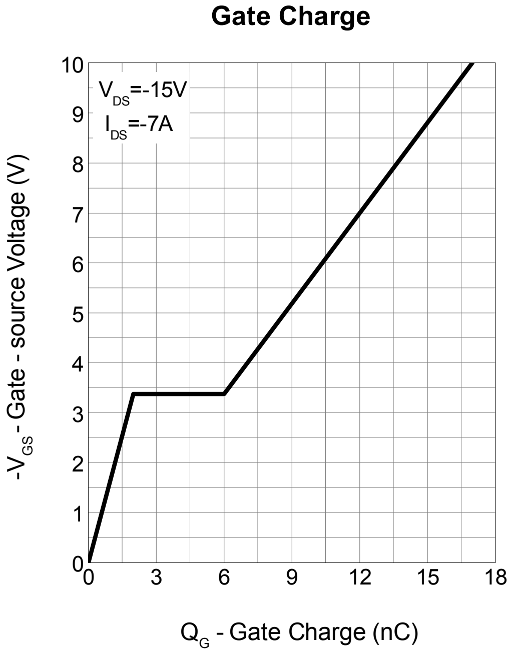


P Channel Typical Operating Characteristics (Cont.)



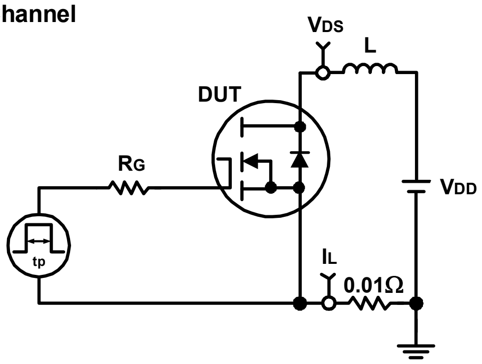


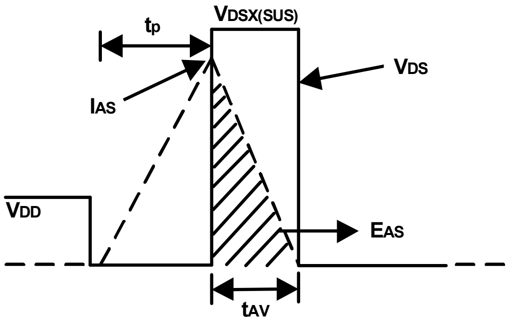




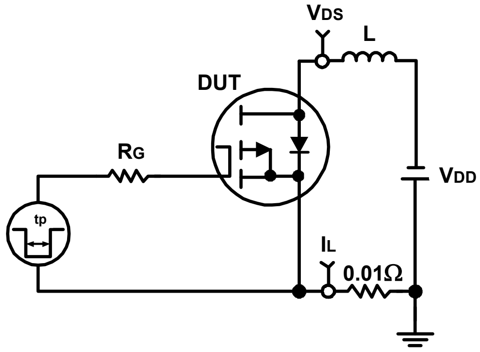
Avalanche Test Circuit and Waveforms

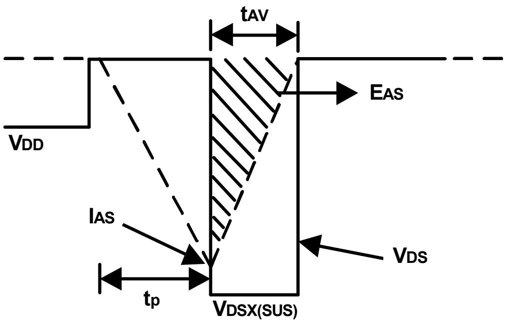
N Channel





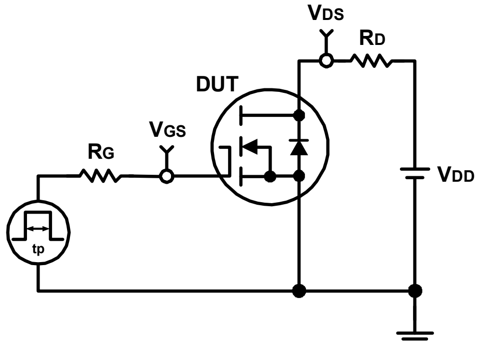
P Channel

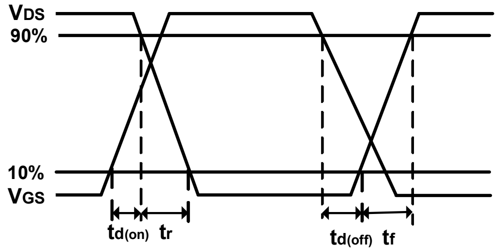




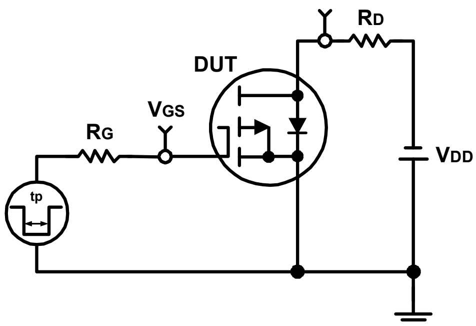
Switching Time Test Circuit and Waveforms

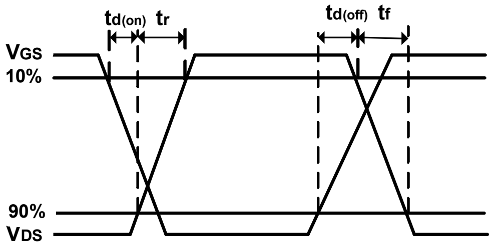
N Channel





P Channel





DFN5×6 OUTLINE