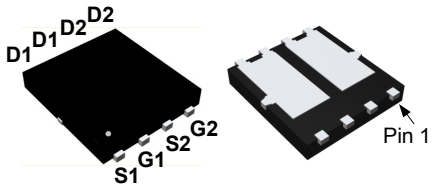
Features

- **N Channel**
  30V/38A,
  $R_{DS(ON)}$ = 8 mΩ (typ.) @ V_{GS} = 10V
  $R_{DS(ON)}$ = 11mΩ (typ.) @ V_{GS} = 4.5V
- **P Channel**
  -30V/-35A,
  $R_{DS(ON)}$ = 12mΩ (typ.) @ V_{GS} =-10V
  $R_{DS(ON)}$ = 18mΩ (typ.) @ V_{GS} =-4.5V
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free Available (RoHS Compliant)
- Moisture Sensitivity Level MSL1
  (per JEDEC J-STD-020D)

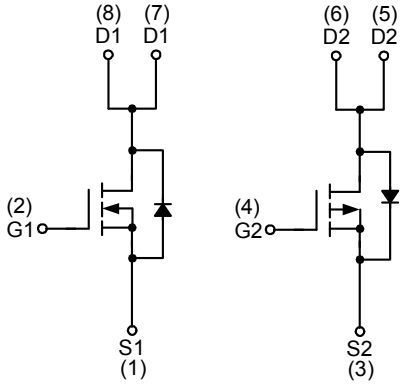
Applications

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

Pin Description



DFN5x6C-8_EP2



N-Channel MOSFET P-Channel MOSFET

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

Symbol	Parameter		N Channel	P Channel	Unit
Common Ratings					
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	38	-35	A
I_D	Continuous Drain Current	T_C=25°C	38	-35	A
		T_C=100°C	29	-27	
P_D	Maximum Power Dissipation	T_C=25°C	19	19	W
		T_C=100°C	7.7	7.7	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	6.5	6.5	°C/W
$R_{\theta JA}$ [b]	Thermal Resistance-Junction to Ambient	t ≤ 10s	45	45	°C/W
		Steady State	88	88	°C/W
I_{AS} [c]	Avalanche Current, Single pulse	L=0.1mH	23	-24	A
E_{AS} [c]	Avalanche Energy, Single pulse	L=0.1mH	26.45	-28.8	mJ

Note a : Max. continuous current is limited by bonding wire.
Note b : Pulse width limited by max. junction temperature.
Note c : Surface Mounted on 1in^2 pad area, steady state t = 999s.
Note d : 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	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1.5	1.8	2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [e]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=8A	-	8	11	mΩ
		T_J=125°C	-	12.9	-	
		V_{GS}=4.5V, I_{DS}=5A	-	11	15	
Gfs	Forward Transconductance	V_{DS}=5V, I_{DS}=5A	-	15	-	S
Diode Characteristics						
V_{SD} [e]	Diode Forward Voltage	I_{SD}=3A, V_{GS}=0V	-	0.75	1.1	V
t_{rr}	Reverse Recovery Time	I_{SD}=8A, dI_{SD}/dt=100A/μs	-	11.7	-	ns
t_a	Charge Time		-	4.8	-	
t_b	Discharge Time		-	6.9	-	
Q_{rr}	Reverse Recovery Charge		-	1.7	-	nC
Dynamic Characteristics [f]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,f=1MHz	-	0.9	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz	-	940	-	pF
C_{oss}	Output Capacitance		-	150	-	
C_{rss}	Reverse Transfer Capacitance		-	100	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V, R_L=15Ω, I_{DS}=1A, V_{GEN}=10V, R_G=1Ω	-	11.9	-	ns
t_r	Turn-on Rise Time		-	10.1	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	22	-	
t_f	Turn-off Fall Time		-	5	-	
Gate Charge Characteristics [f]						
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_{DS}=8A	-	8.7	-	nC
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=10V, I_{DS}=8A	-	18	-	
Q_{gth}	Threshold Gate Charge		-	1.24	-	
Q_{gs}	Gate-Source Charge		-	2	-	
Q_{gd}	Gate-Drain Charge		-	4	-	

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

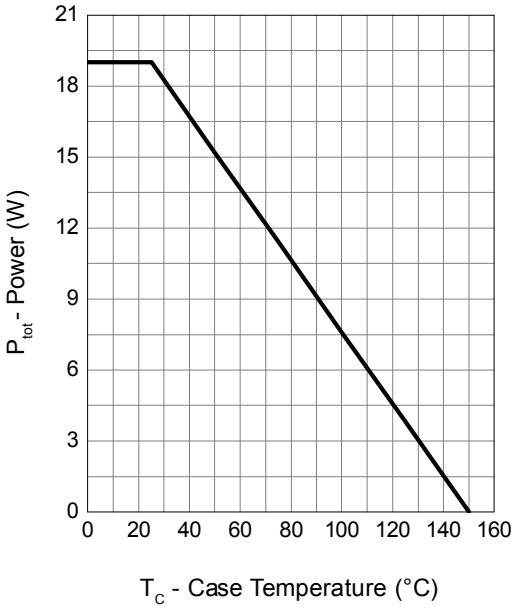
P Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)

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	-1.5	-2	-2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [e]	Drain-Source On-state Resistance	V_{GS}=-10V, I_{DS}=-10A	-	12	16	mΩ
		T_J=125°C	-	17.9	-	
		V_{GS}=-4.5V, I_{DS}=-5A	-	18	25	
Gfs	Forward Transconductance	V_{DS}=5V, I_{DS}=5A	-	13	-	S
Diode Characteristics						
V_{SD} [e]	Diode Forward Voltage	I_{SD}=-1A, V_{GS}=0V	-	-0.75	-1	V
t_{rr}	Reverse Recovery Time	I_{SD}=-10A, dI_{SD}/dt=100A/μs	-	26	-	ns
t_a	Charge Time		-	8	-	
t_b	Discharge Time		-	18	-	
Q_{rr}	Reverse Recovery Charge		-	7	-	nC
Dynamic Characteristics [f]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,f=1MHz	-	3.4	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, Frequency=1.0MHz	-	1000	-	pF
C_{oss}	Output Capacitance		-	210	-	
C_{rss}	Reverse Transfer Capacitance		-	150	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-15V, R_L=15Ω, I_{DS}=-1A, V_{GEN}=-10V, R_G=6Ω	-	11	-	ns
t_r	Turn-on Rise Time		-	12	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	26	-	
t_f	Turn-off Fall Time		-	12	-	
Gate Charge Characteristics [f]						
Q_g	Total Gate Charge	V_{DS}=-15V, V_{GS}=-4.5V, I_{DS}=-10A	-	9.6	-	nC
Q_g	Total Gate Charge	V_{DS}=-15V, V_{GS}=-10V, I_{DS}=-10A	-	21	-	
Q_{gth}	Threshold Gate Charge		-	1.5	-	
Q_{gs}	Gate-Source Charge		-	3.5	-	
Q_{gd}	Gate-Drain Charge		-	5.9	-	

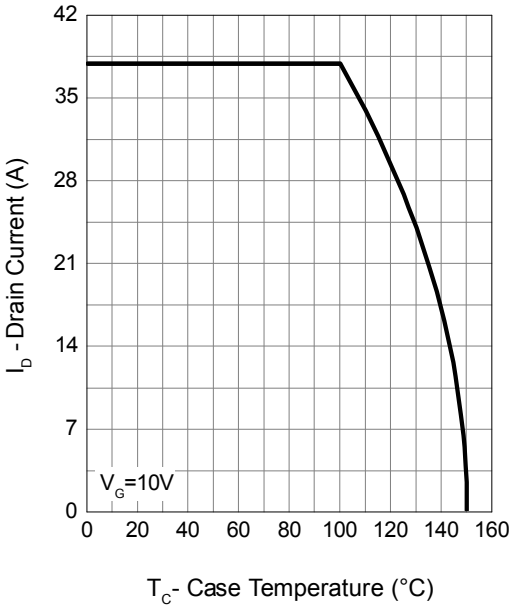
Note e：Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note f：Guaranteed by design, not subject to production testing.

N Channel Typical Operating Characteristics

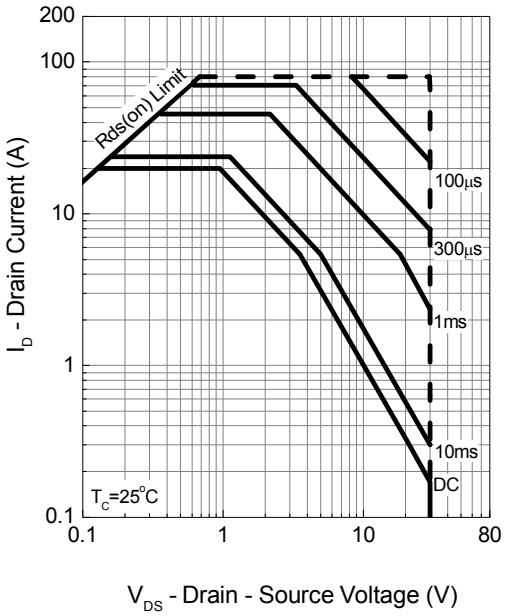
Power Dissipation



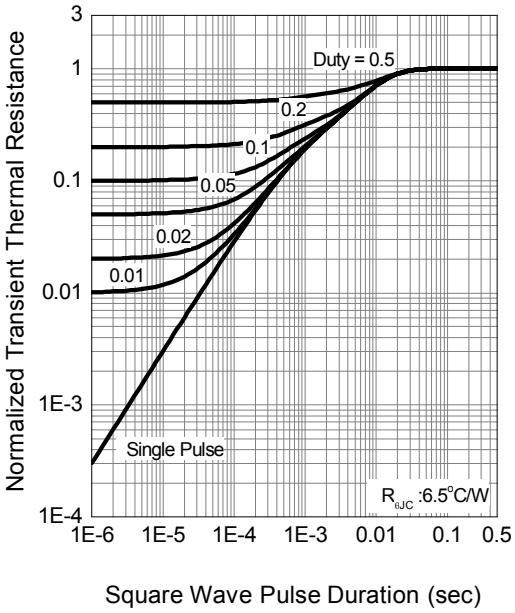
Drain Current



Safe Operation Area

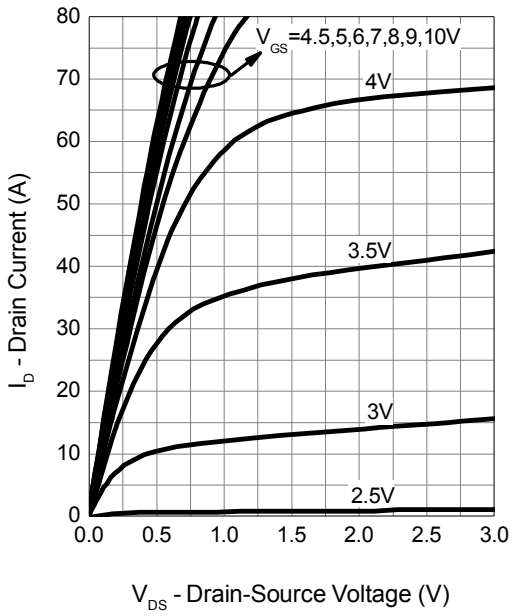


Thermal Transient Impedance

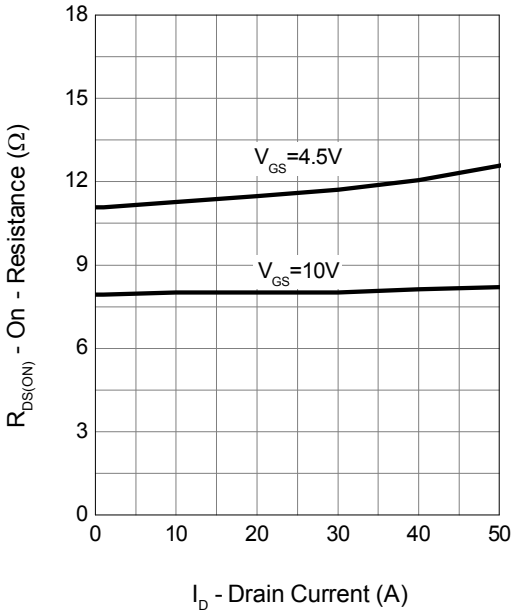


N Channel Typical Operating Characteristics (Cont.)

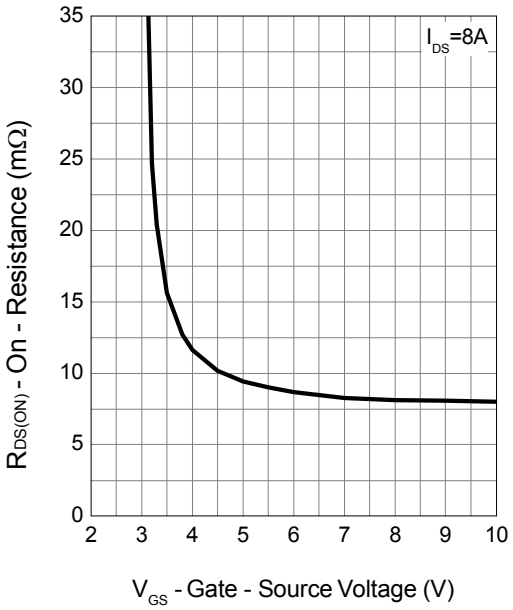
Output Characteristics



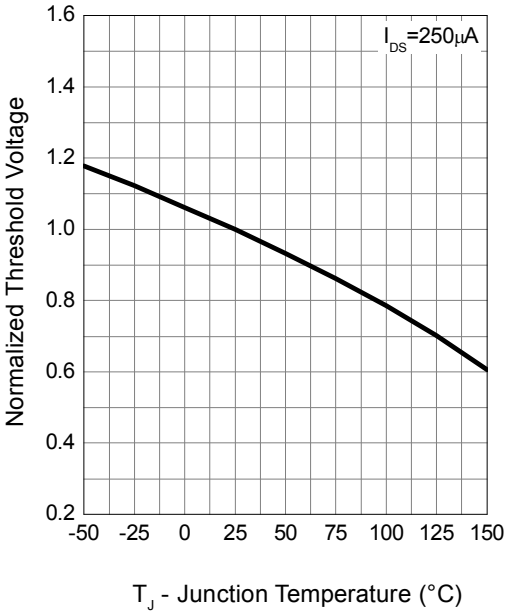
Drain-Source On Resistance



Transfer Characteristics

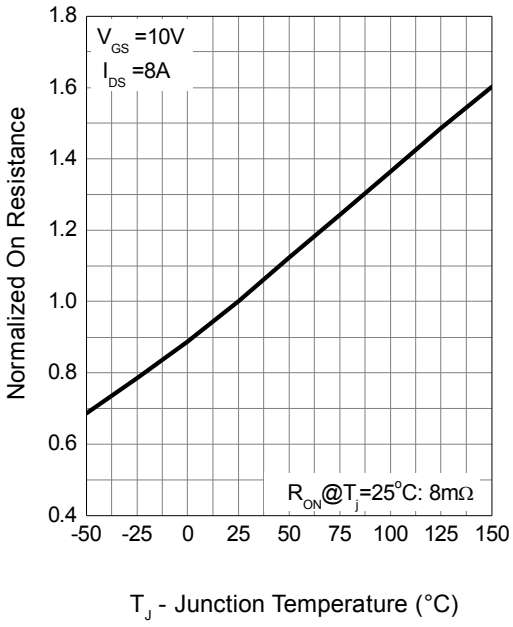


Gate Threshold Voltage

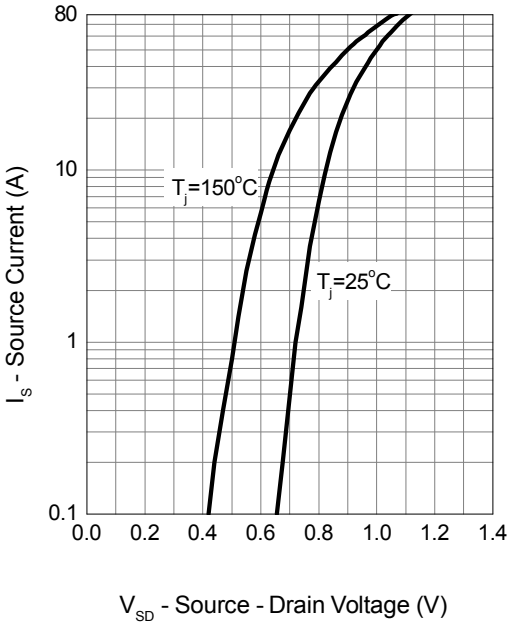


N Channel Typical Operating Characteristics (Cont.)

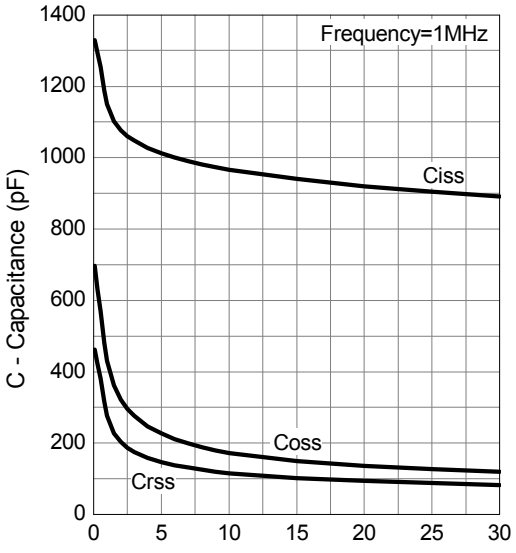
Drain-Source On Resistance



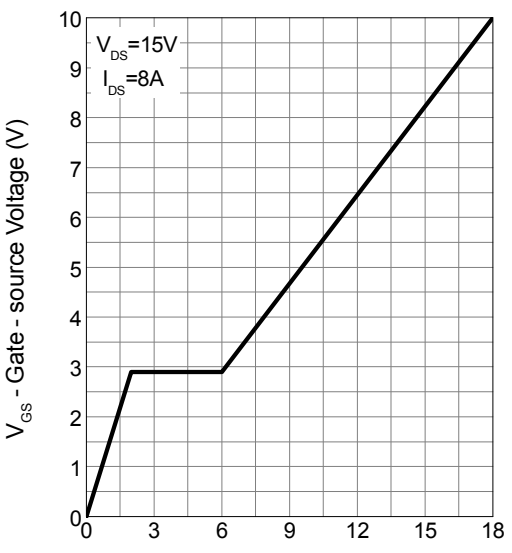
Source-Drain Diode Forward



Capacitance

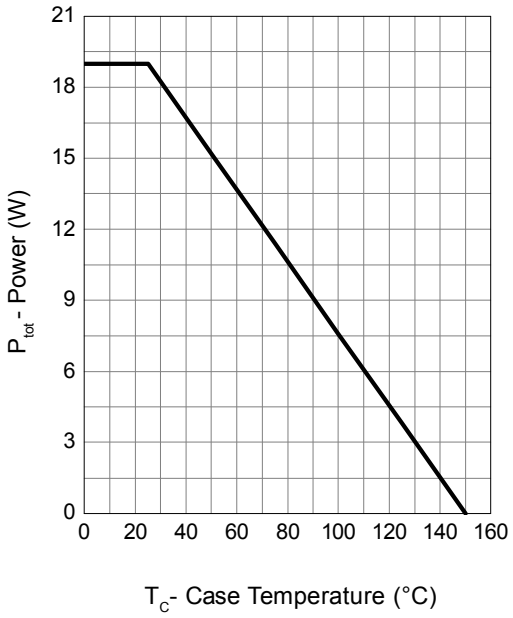


Gate Charge

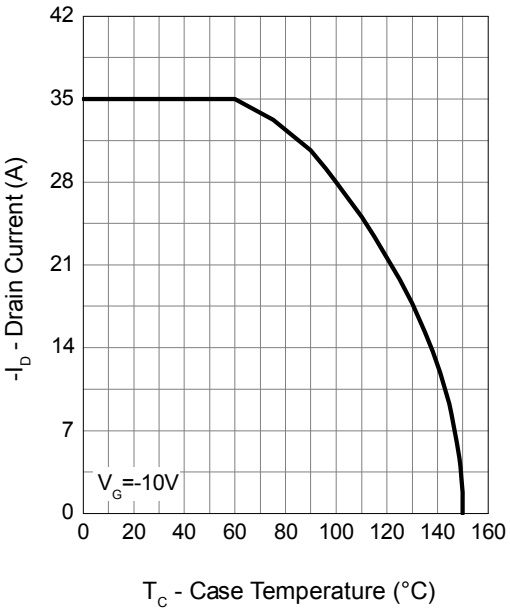


P Channel Typical Operating Characteristics

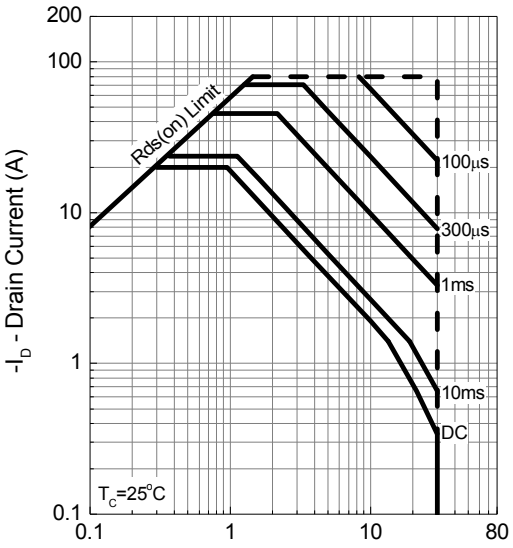
Power Dissipation



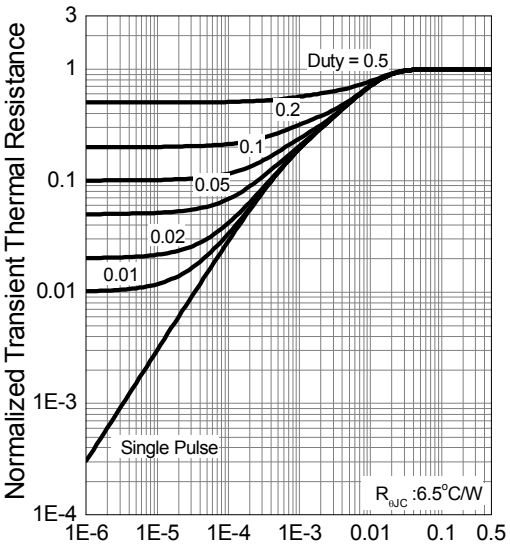
Drain Current



Safe Operation Area

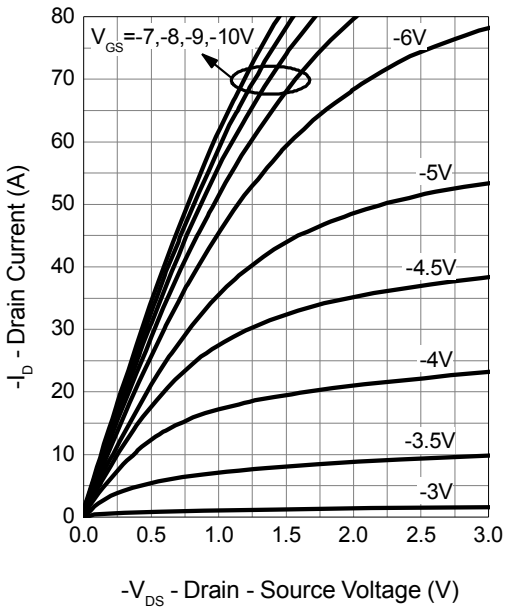


Thermal Transient Impedance

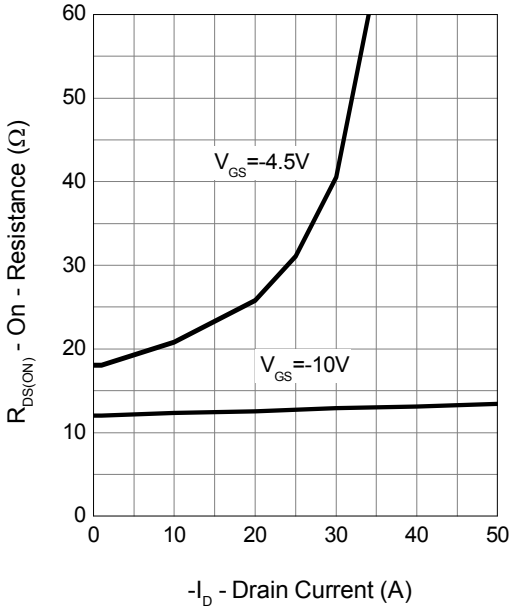


P Channel Typical Operating Characteristics (Cont.)

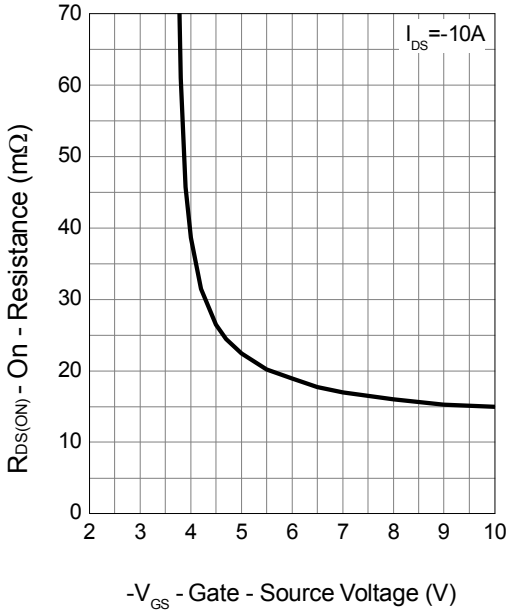
Output Characteristics



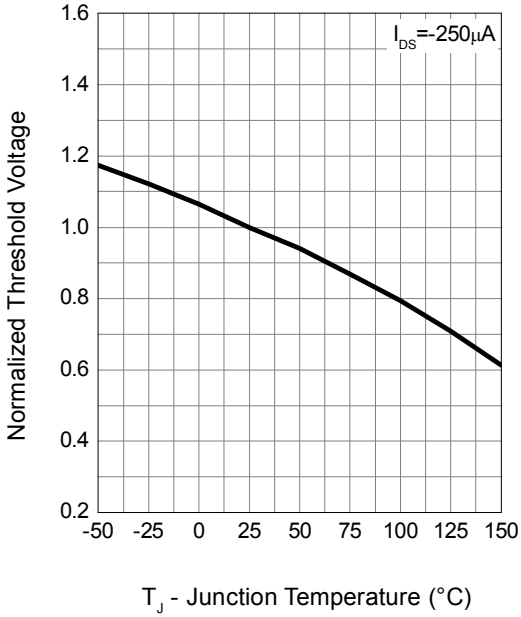
Drain-Source On Resistance



Transfer Characteristics

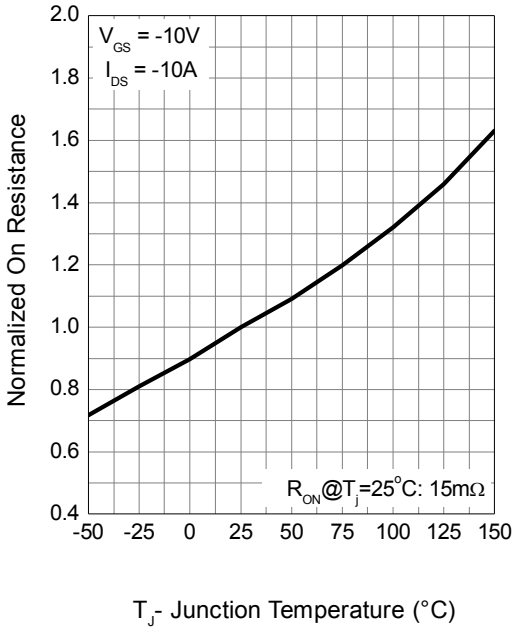


Gate Threshold Voltage



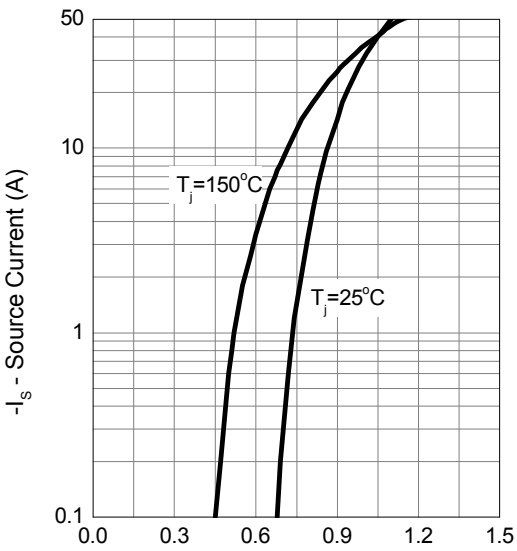
P Channel Typical Operating Characteristics (Cont.)

Drain-Source On Resistance



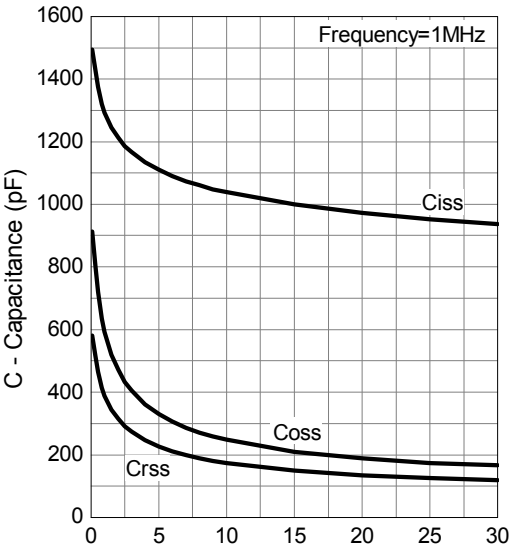
T_J- Junction Temperature (°C)

Source-Drain Diode Forward



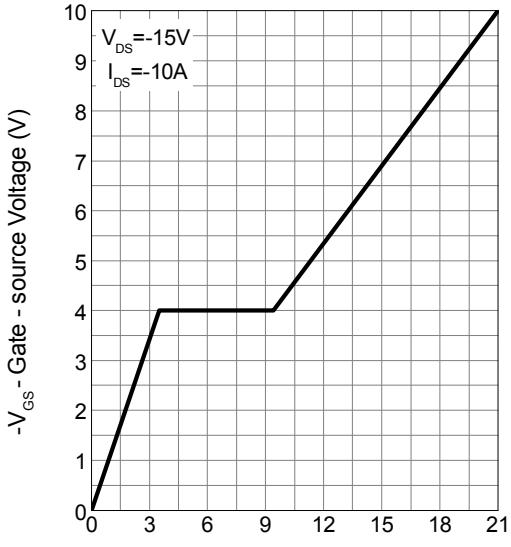
$-V_{SD}$ - Source - Drain Voltage (V)

Capacitance



$-V_{DS}$ - Drain - Source Voltage (V)

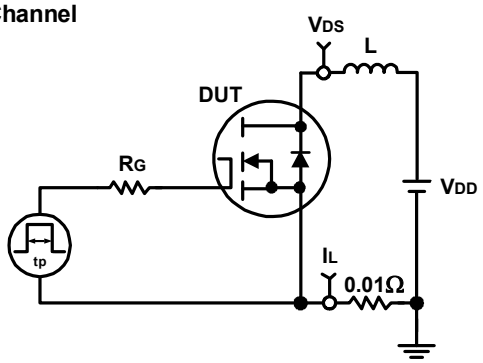
Gate Charge

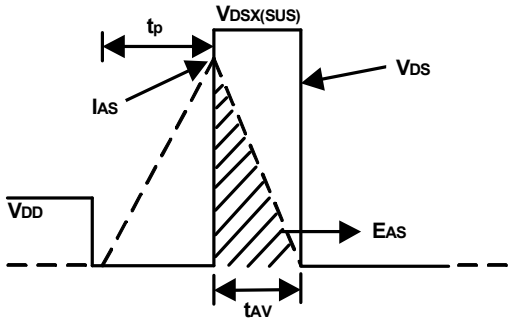


Q_G - Gate Charge (nC)

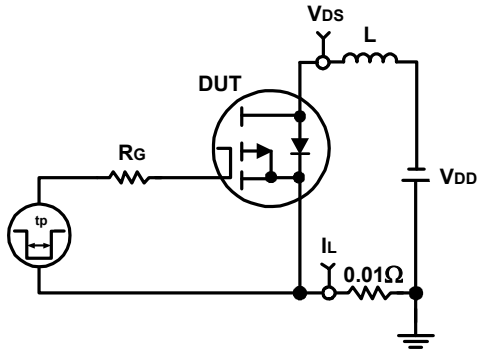
Avalanche Test Circuit and Waveforms

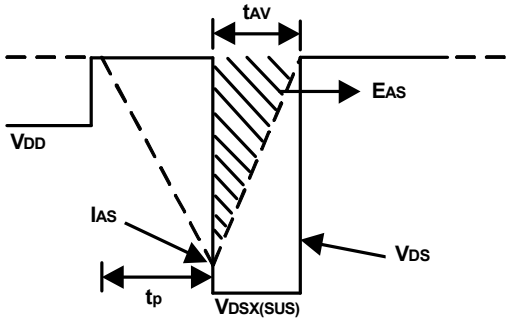
N Channel





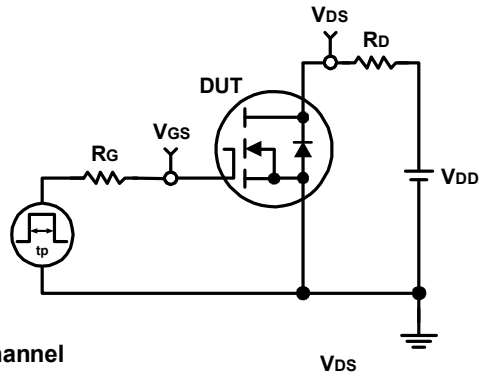
P Channel

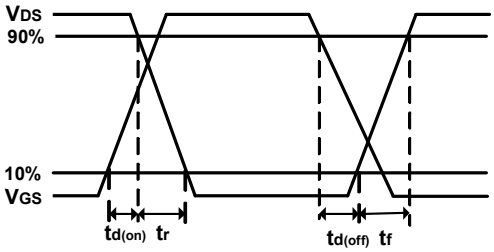




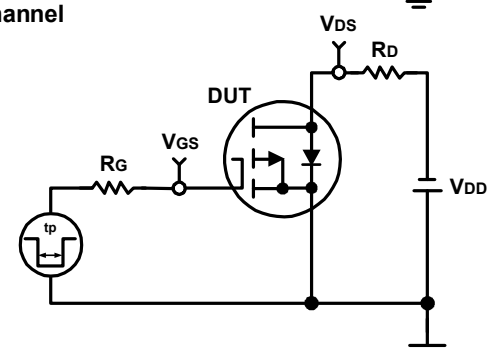
Switching Time Test Circuit and Waveforms

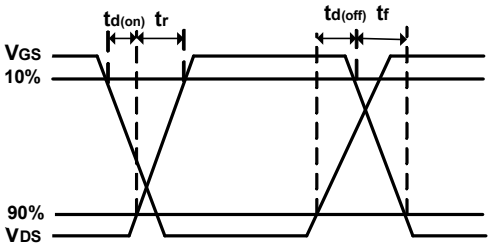
N Channel





P Channel





DFN5×6 OUTLINE