

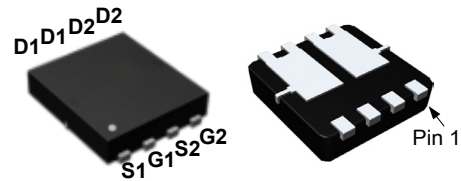
Features

- N Channel : 60V/35A,
 $R_{DS(ON)}=12m\Omega(\text{typ.})@V_{GS}=10V$
 $R_{DS(ON)}=15m\Omega(\text{typ.})@V_{GS}=4.5V$
- P Channel : -60V/-30A,
 $R_{DS(ON)}=28m\Omega(\text{typ.})@V_{GS}=-10V$
 $R_{DS(ON)}=38m\Omega(\text{typ.})@V_{GS}=-4.5V$
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free and Green Devices Available
(RoHS Compliant)
- Moisture Sensitivity Level MSL1
(per JEDEC J-STD-020D)

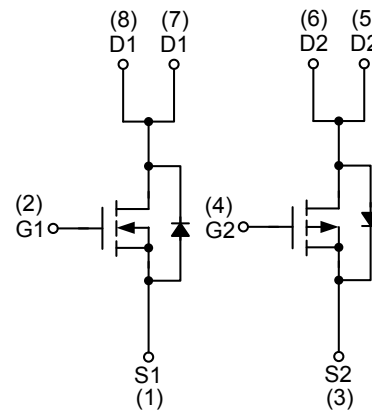
Applications

- For Fan Pre-driver H-Bridge.
- Motor Control.
- Synchronous Rectification.

Pin Description



DFN5x6C-8_EP2



N-Channel MOSFET

P-Channel MOSFET

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		60	-60	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	35	-30	A
I _D	Continuous Drain Current	T _C =25°C	35	-30	A
		T _C =100°C	26.5	-22.5	
I _{DM} ^a	Pulse Drain Current Tested	T _C =25°C	105	-90	A
P _D	Maximum Power Dissipation	T _C =25°C	18.9		W
		T _C =100°C	7.6		
R _{θJC}	Thermal Resistance-Junction to Case	Steady State	6.6		°C/W
R _{θJA} ^b	Thermal Resistance-Junction to Ambient	Steady State	75		°C/W
I _{AS} ^c	Avalanche Current, Single pulse	L=0.5mH	10	-10	A
E _{AS} ^c	Avalanche Energy, Single pulse	L=0.5mH	25	25	mJ

Note * : Current limited by bonding wire.

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 (initial temperature $T_J=25^{\circ}\text{C}$).

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} =250μA	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V, 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)} ^d	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =11.5A	-	12	16	mΩ
		V _{GS} =4.5V, I _{DS} =6.9A	-	15	20	
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =12A, V _{GS} =0V	-	0.8	1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =11.5A,	-	15	-	ns
Q _{rr}	Reverse Recovery Charge	dI _{SD} /dt=100A/μs	-	10	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,f=1MHz	-	2	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, Frequency=1.0MHz	-	1990	2327	pF
C _{oss}	Output Capacitance		-	140	-	
C _{rss}	Reverse Transfer Capacitance		-	120	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =20V, R _L =20Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	11.5	21	ns
t _r	Turn-on Rise Time		-	8	15	
t _{d(OFF)}	Turn-off Delay Time		-	23	42	
t _f	Turn-off Fall Time		-	5.5	10	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =4.5V, I _{DS} =11.5A	-	6.7	-	nC
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V, I _{DS} =11.5A	-	13.6	19	
Q _{gs}	Gate-Source Charge		-	2.5	-	
Q _{gd}	Gate-Drain Charge		-	2.8	-	

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

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

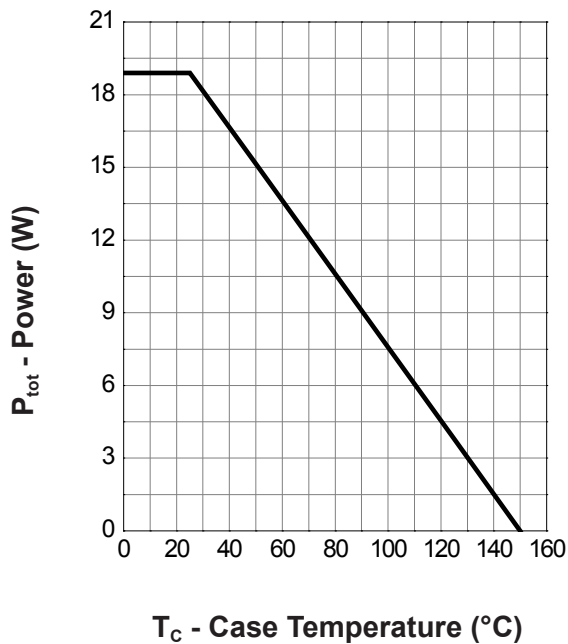
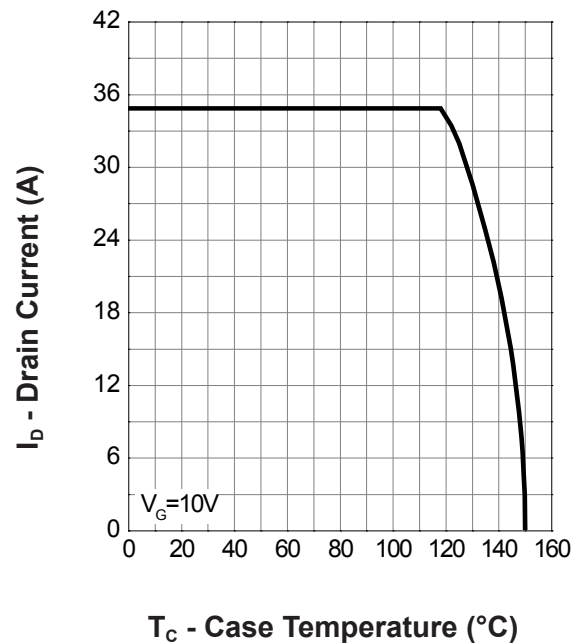
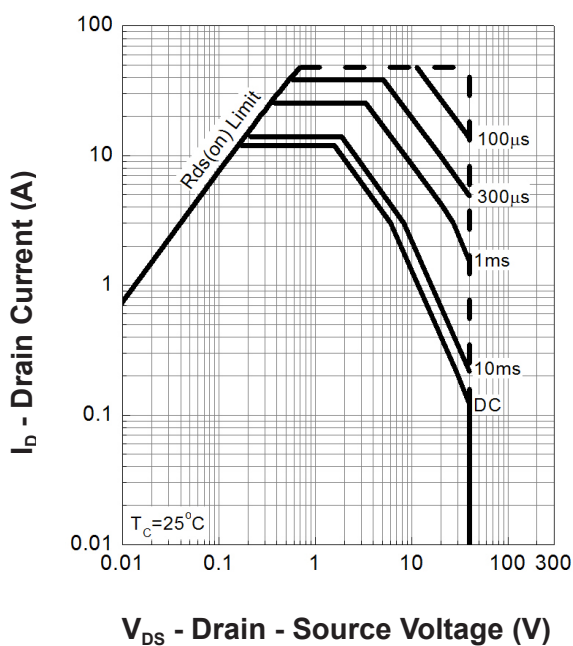
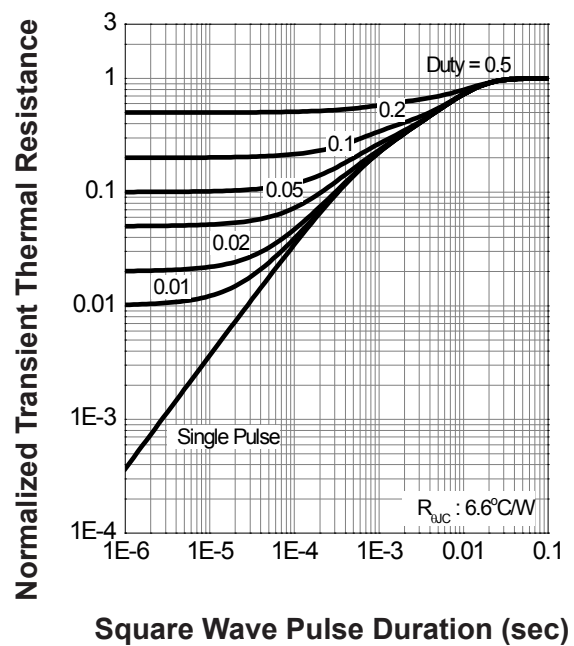
P Channel Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	P Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-48V, 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)} ^d	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} =-8.8A	-	28	36	mΩ
		V _{GS} =-4.5V, I _{DS} =-5.3A	-	38	48	
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =-8.8A, V _{GS} =0V	-	-0.8	-1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =-8.8A, di _{SD} /dt=100A/μs	-	16	-	ns
Q _{rr}	Reverse Recovery Charge		-	10	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,f=1MHz	-	8	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-20V, Frequency=1.0MHz	-	4068	4868	pF
C _{oss}	Output Capacitance		-	135	-	
C _{rss}	Reverse Transfer Capacitance		-	100	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-20V, R _L =-20Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	10	18	ns
t _r	Turn-on Rise Time		-	10	18	
t _{d(OFF)}	Turn-off Delay Time		-	33	59	
t _f	Turn-off Fall Time		-	18	32	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =-20V, V _{GS} =-4.5V, I _{DS} =-8.8A	-	6.9	-	nC
Q _g	Total Gate Charge	V _{DS} =-20V, V _{GS} =-10V, I _{DS} =-8.8A	-	13.5	18.9	
Q _{gs}	Gate-Source Charge		-	2.3	-	
Q _{gd}	Gate-Drain Charge		-	3.6	-	

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

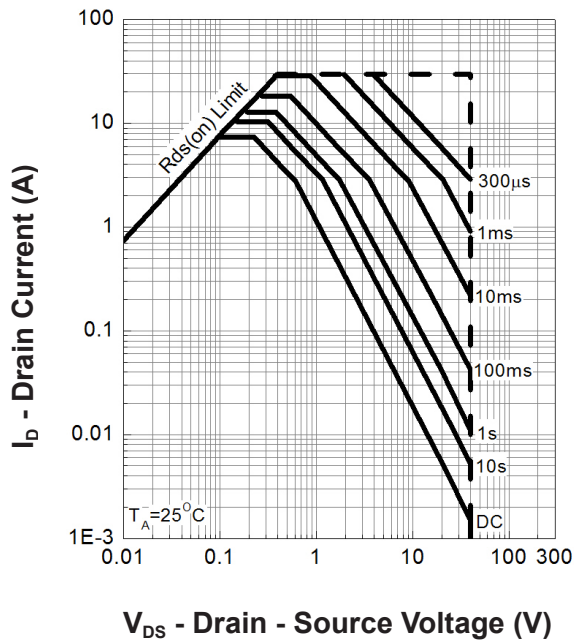
Note e : Guaranteed by design, not subject to production testing.

N Channel Typical Operating Characteristics

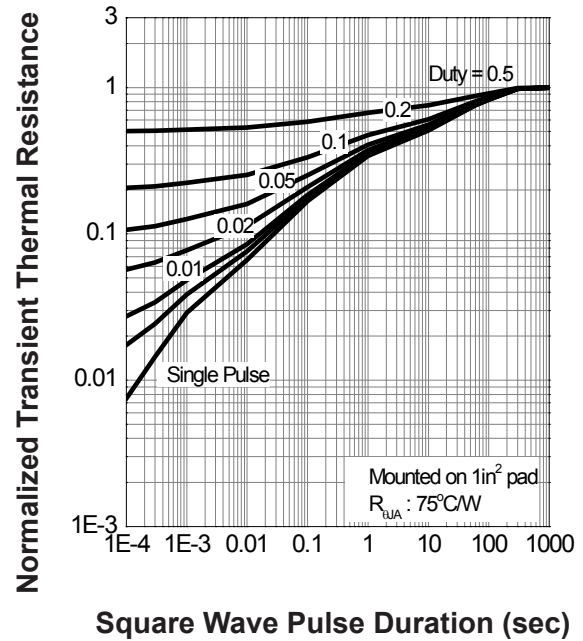
Power Dissipation

Drain Current

Safe Operation Area

Thermal Transient Impedance


N Channel Typical Operating Characteristics(Cont.)

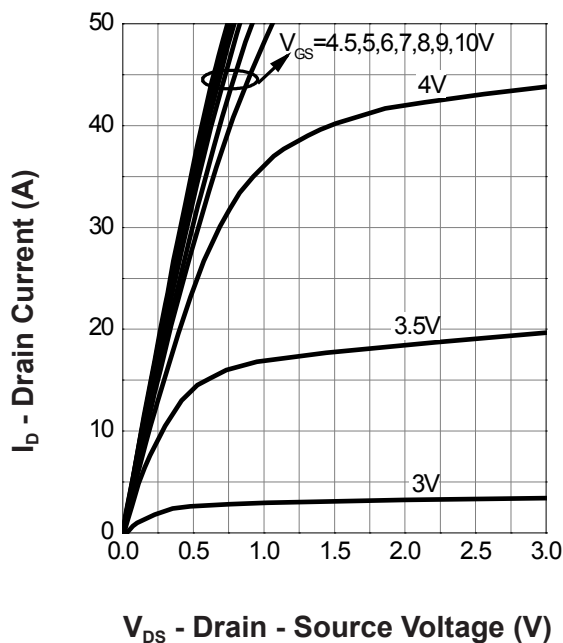
Safe Operation Area



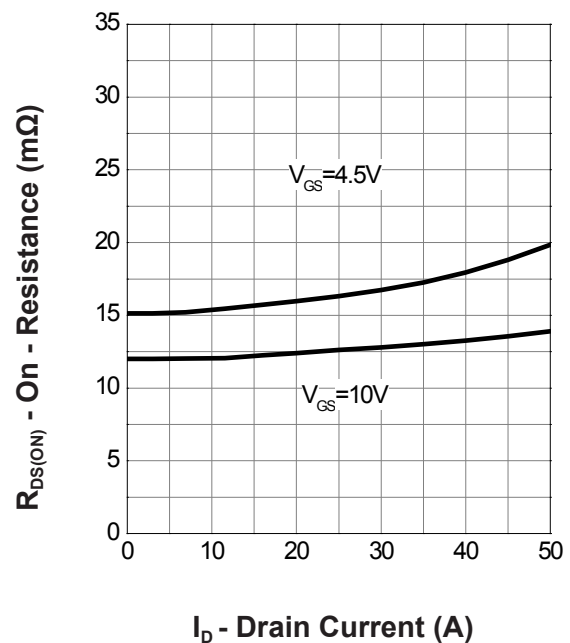
Thermal Transient Impedance



Output Characteristics

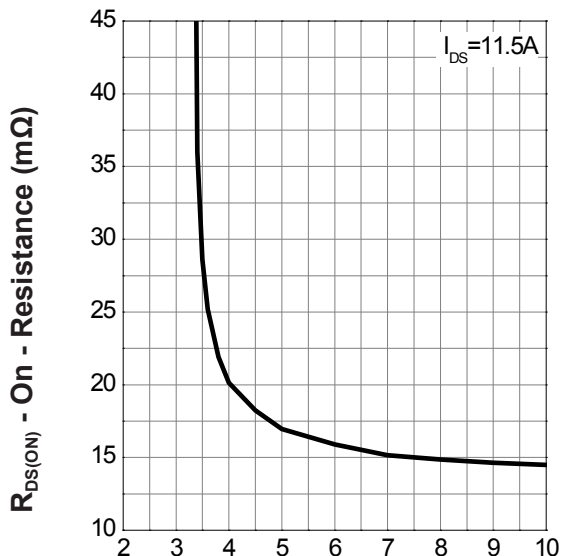


Drain-Source On Resistance



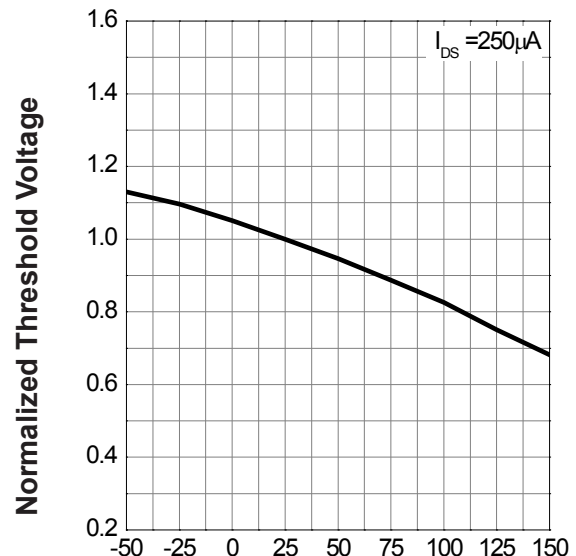
N Channel Typical Operating Characteristics(Cont.)

Gate-Source On Resistance



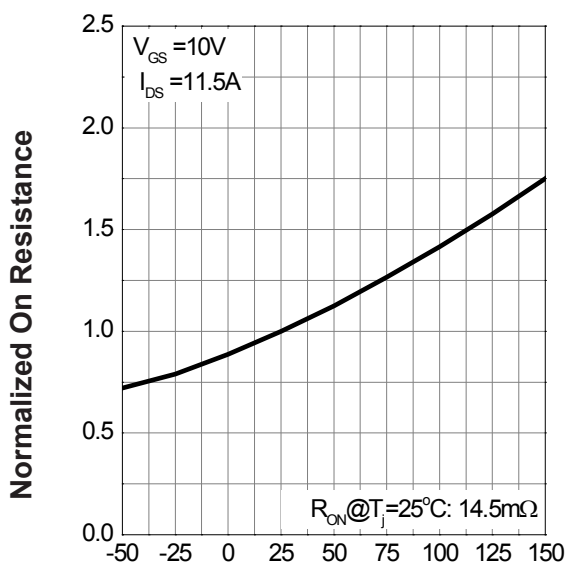
V_{GS} - Gate - Source Voltage (V)

Gate Threshold Voltage



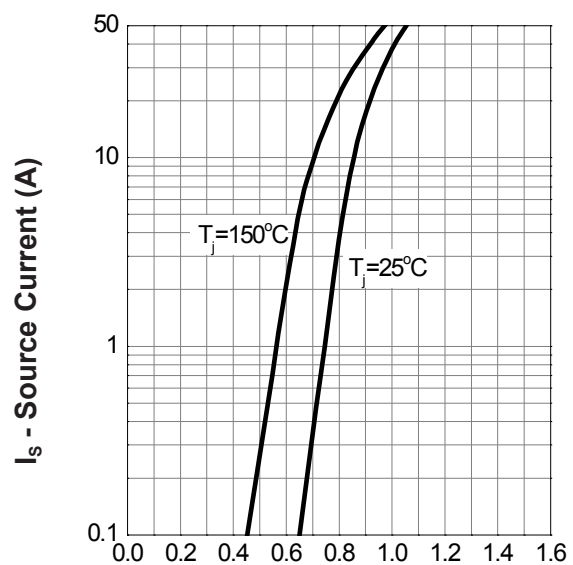
T_J - Junction Temperature ($^{\circ}C$)

Drain-Source On Resistance



T_J - Junction Temperature ($^{\circ}C$)

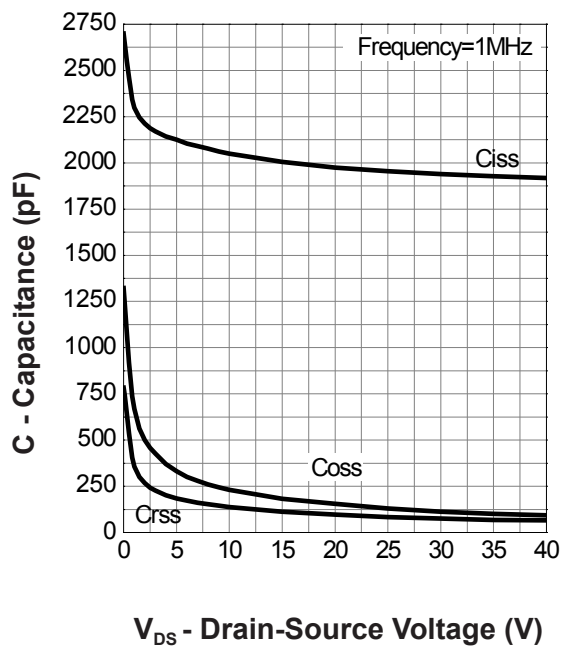
Source-Drain Diode Forward



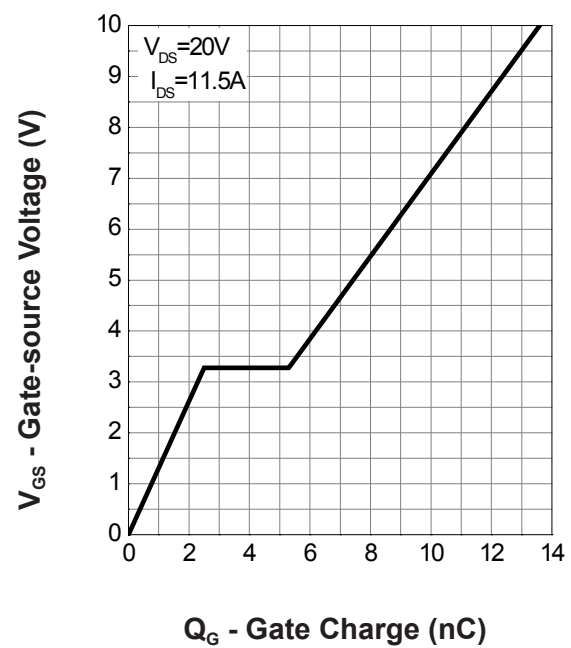
V_{SD} - Source - Drain Voltage (V)

N Channel Typical Operating Characteristics(Cont.)

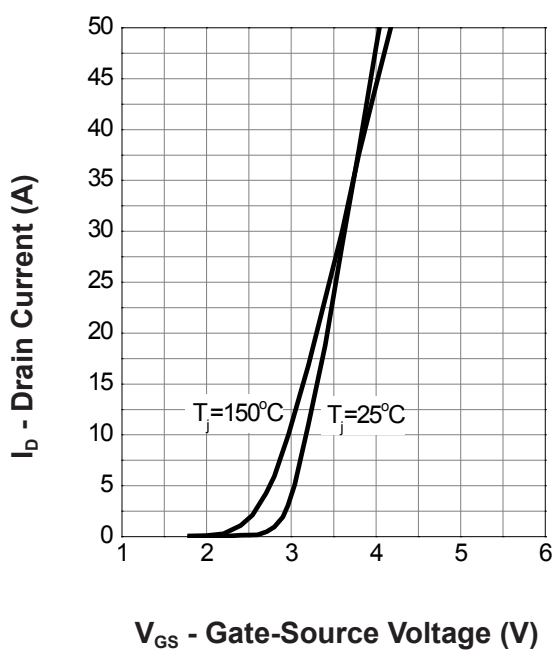
Capacitance



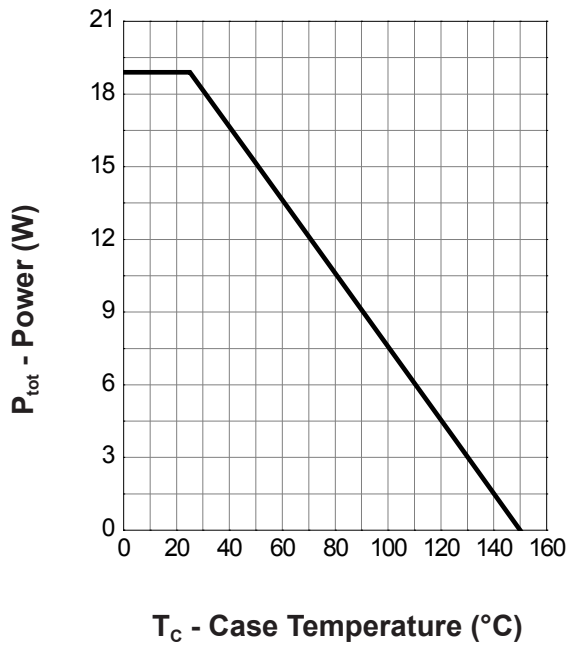
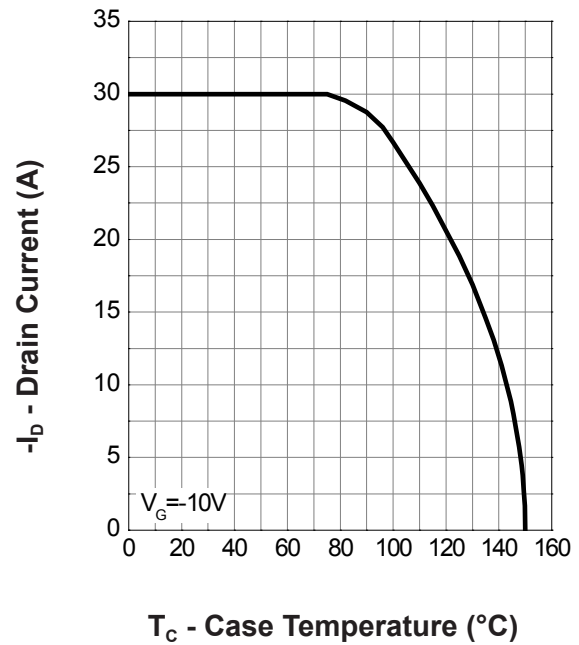
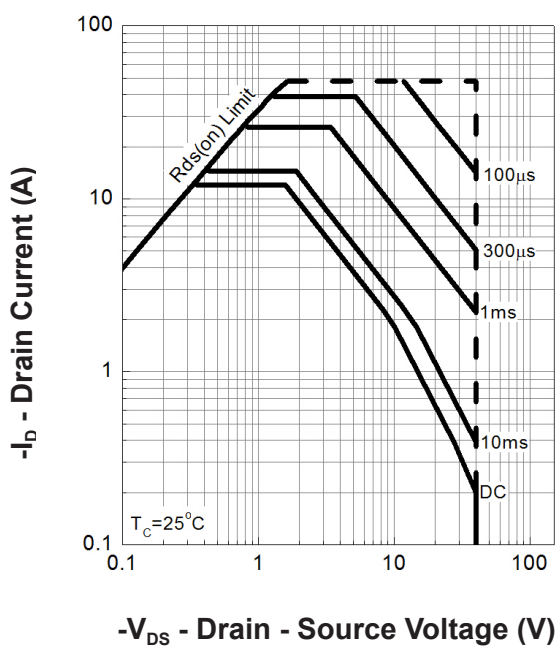
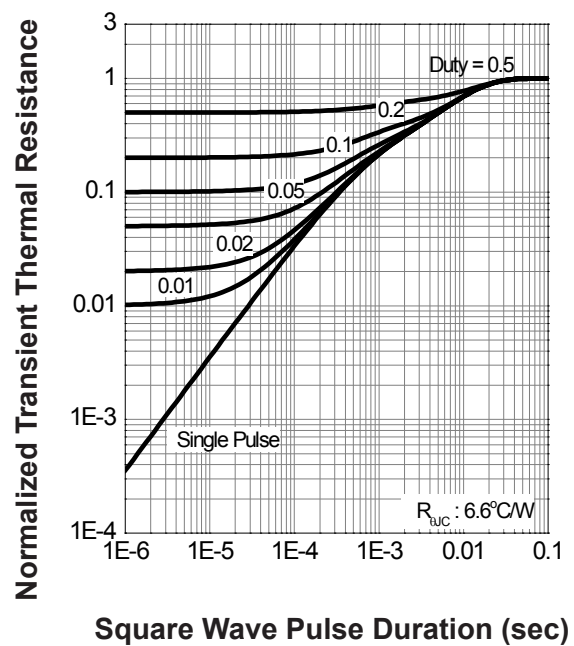
Gate Charge



Transfer Characteristics

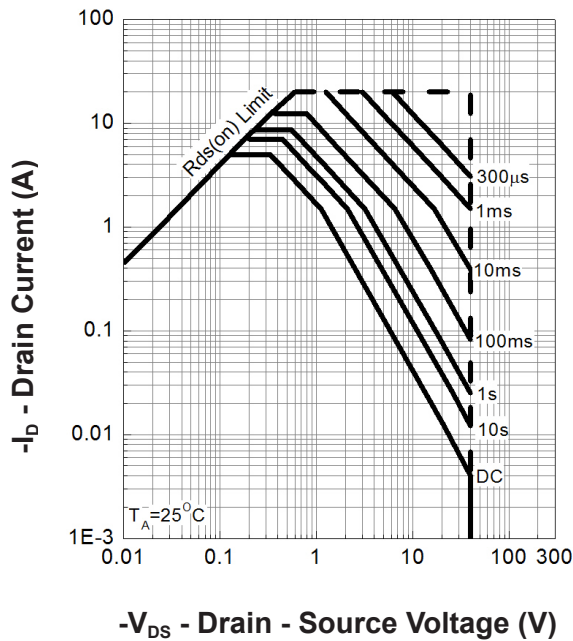


P Channel Typical Operating Characteristics

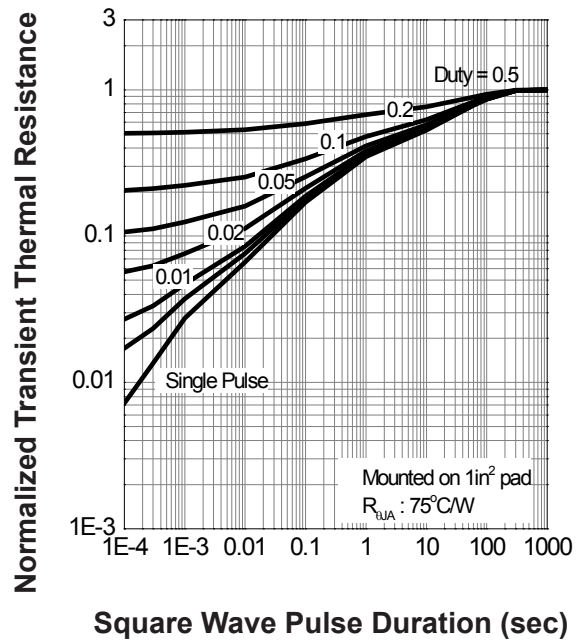
Power Dissipation

Drain Current

Safe Operation Area

Thermal Transient Impedance


P Channel Typical Operating Characteristics(Cont.)

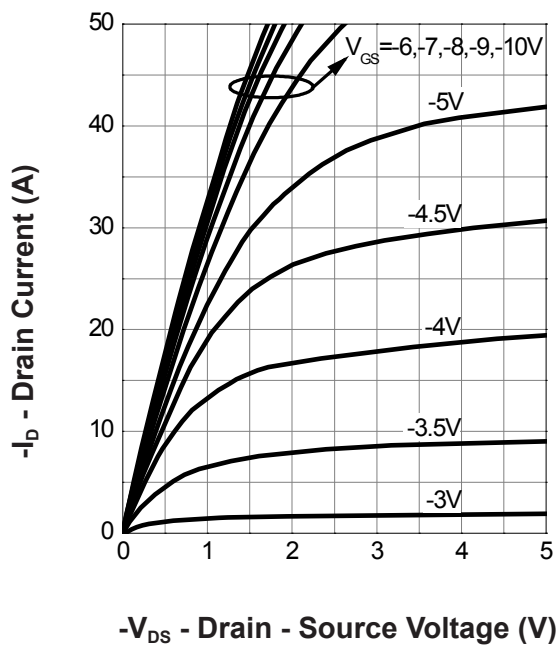
Safe Operation Area



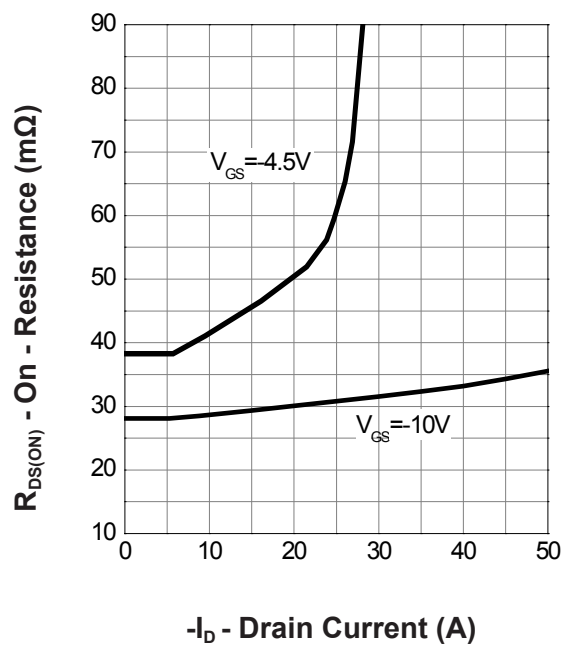
Thermal Transient Impedance



Output Characteristics

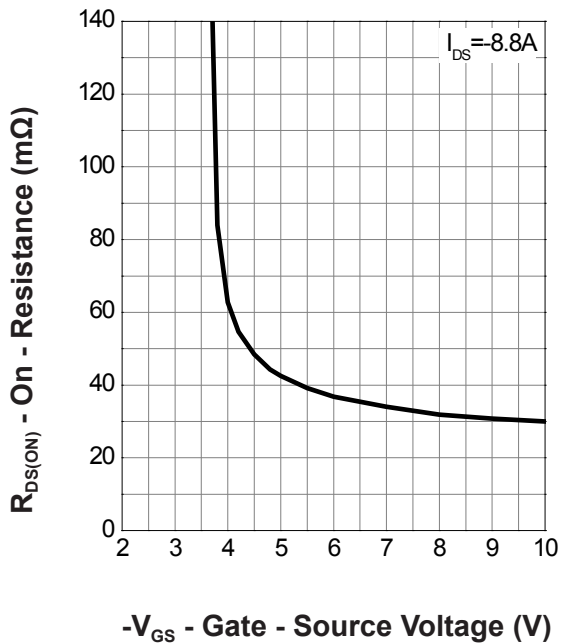


Drain-Source On Resistance

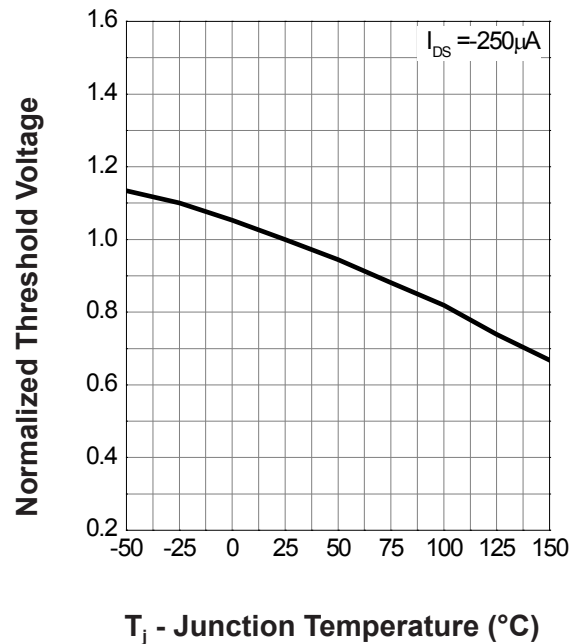


P Channel Typical Operating Characteristics(Cont.)

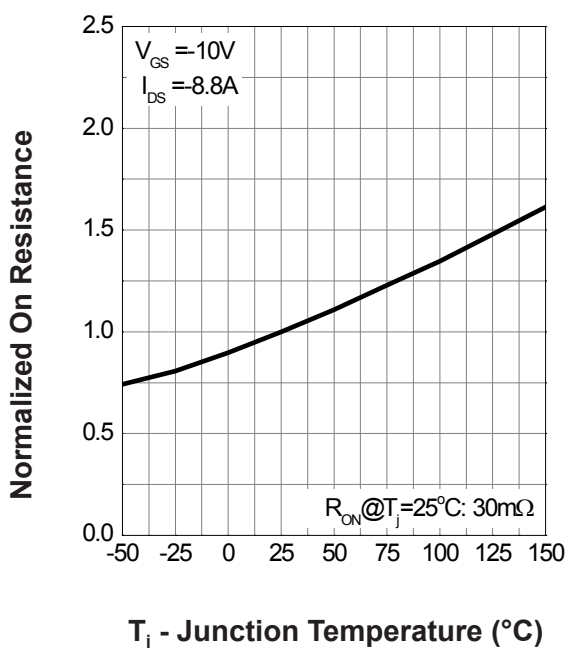
Gate-Source On Resistance



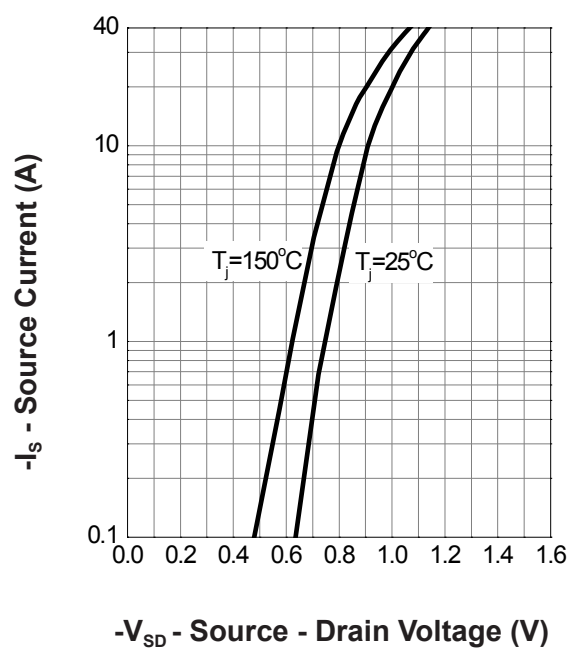
Gate Threshold Voltage



Drain-Source On Resistance

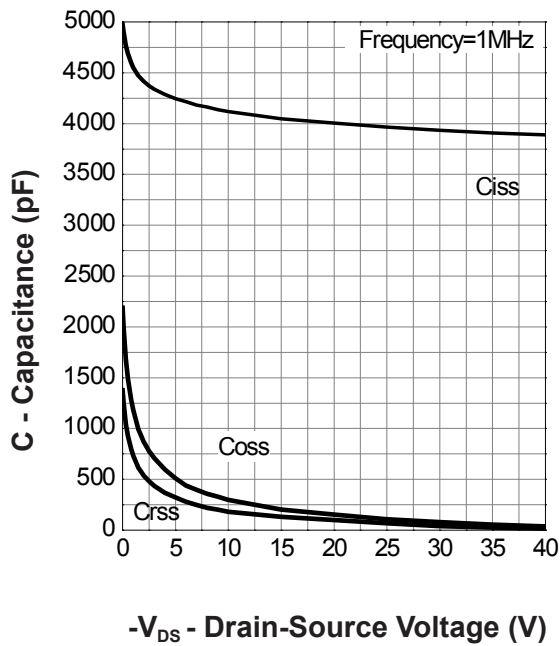


Source-Drain Diode Forward

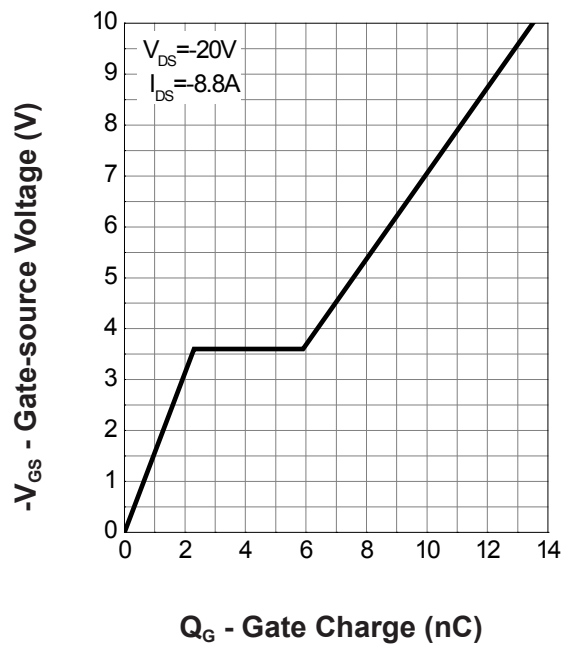


P Channel Typical Operating Characteristics(Cont.)

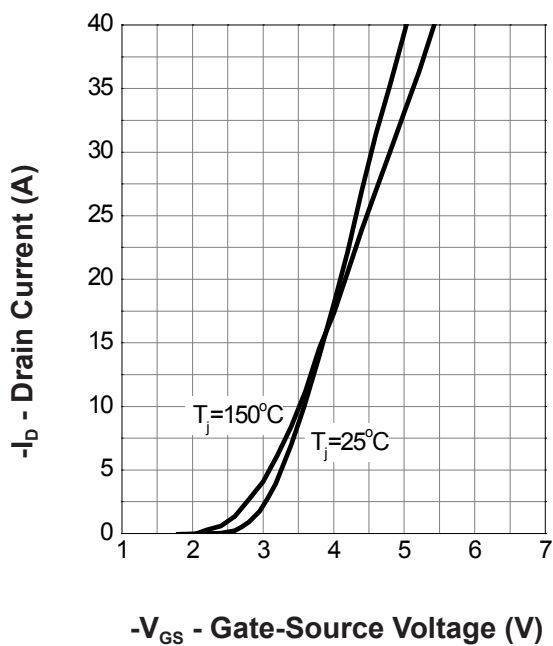
Capacitance



Gate Charge

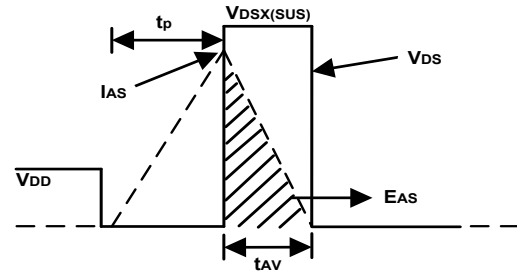
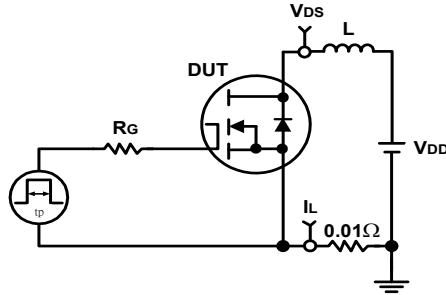


Transfer Characteristics

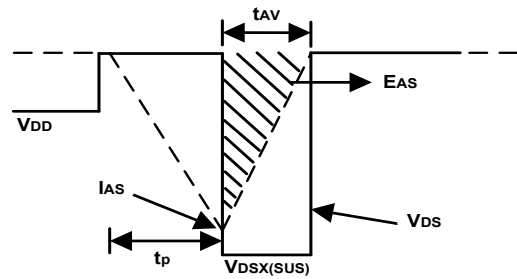
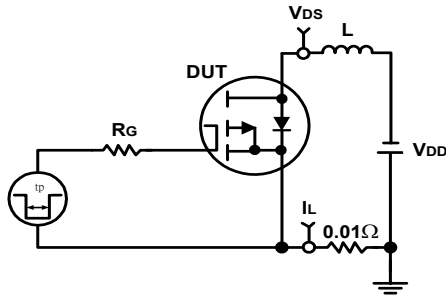


Avalanche Test Circuit and Waveforms

N Channel

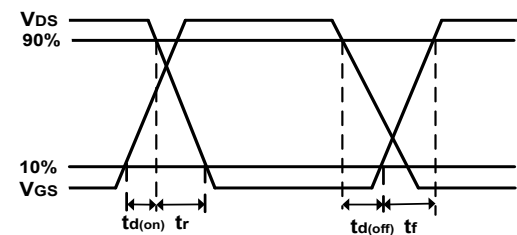
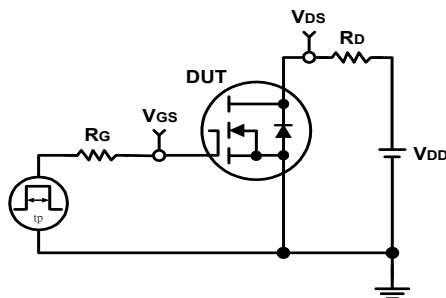


P Channel

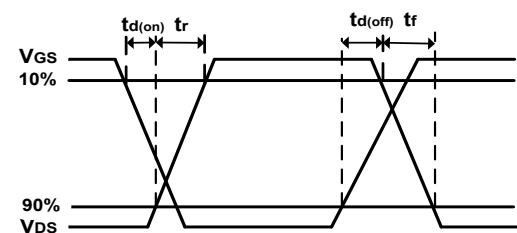
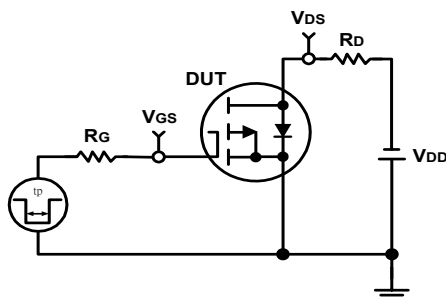


Switching Time Test Circuit and Waveforms

N Channel



P Channel



DFN5×6 OUTLINE

