

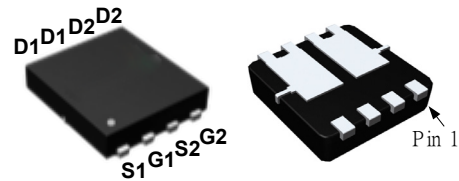
Features

- N Channel : 60V/20A,
 $R_{DS(ON)}=26m\Omega(\text{typ.})@V_{GS}=10V$
 $R_{DS(ON)}=33m\Omega(\text{typ.})@V_{GS}=4.5V$
- P Channel : -60V/-20A,
 $R_{DS(ON)}=65m\Omega(\text{typ.})@V_{GS}=-10V$
 $R_{DS(ON)}=80m\Omega(\text{typ.})@V_{GS}=-4.5V$
- 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)

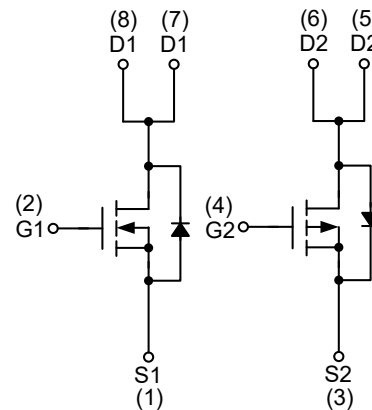
Applications

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

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	20	-20	A
I _D	Continuous Drain Current	T _C =25°C	20	-20	A
		T _C =100°C	15	-15	
I _{DM} ^a	Pulse Drain Current Tested	T _C =25°C	60	-60	A
P _D	Maximum Power Dissipation	T _C =25°C	20.8		W
		T _C =100°C	8.3		
R _{θJC}	Thermal Resistance-Junction to Case	Steady State	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	8	-15	A
E _{AS} ^c	Avalanche Energy, Single pulse	L=0.5mH	16	56	mJ

Note a : Pulse width limited by maximum 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	3	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	-	26	33	mΩ
		V _{GS} =4.5V, I _{DS} =4A	-	33	45	
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =4A, V _{GS} =0V	-	0.8	1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =7A, dI _{SD} /dt=100A/μs	-	21	-	ns
Q _{rr}	Reverse Recovery Charge		-	20	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,f=1MHz	-	2.8	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Frequency=1.0MHz	-	550	715	pF
C _{oss}	Output Capacitance		-	60	-	
C _{rss}	Reverse Transfer Capacitance		-	31	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =30V, R _L =30Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	10	18	ns
t _r	Turn-on Rise Time		-	6	11	
t _{d(OFF)}	Turn-off Delay Time		-	21	38	
t _f	Turn-off Fall Time		-	5.3	10	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =4.5V, I _{DS} =7A	-	4.9	-	nC
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =10V, I _{DS} =7A	-	10	14	
Q _{gs}	Gate-Source Charge		-	1.7	-	
Q _{gd}	Gate-Drain Charge		-	2	-	

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)

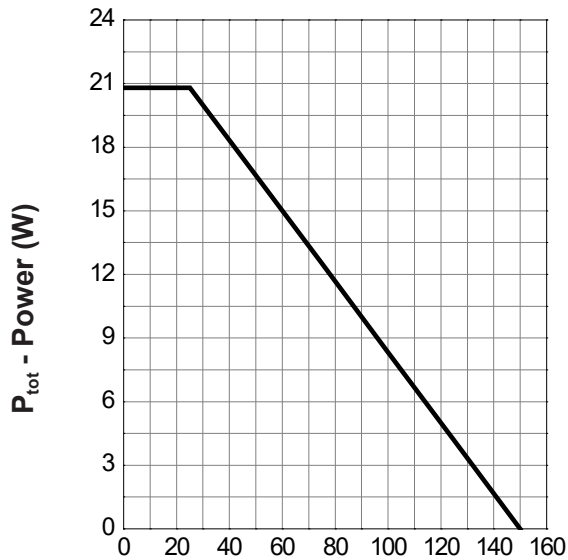
Symbol	Parameter	Test Conditions	P Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-48V, V _{GS} =0V	-	-	-1	μA
		T _J =85°C	-	-	-30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	-1.5	-2	-3	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	-	65	75	mΩ
		V _{GS} =-4.5V, I _{DS} =-4A	-	80	90	
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =-4A, V _{GS} =0V	-	-0.8	-1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =-7A, dI _{SD} /dt=100A/μs	-	27	-	ns
Q _{rr}	Reverse Recovery Charge		-	32	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	3	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-30V, Frequency=1.0MHz	-	1170	1520	pF
C _{oss}	Output Capacitance		-	113	-	
C _{rss}	Reverse Transfer Capacitance		-	66	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-30V, R _L =-30Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	12	22	ns
t _r	Turn-on Rise Time		-	8	14	
t _{d(OFF)}	Turn-off Delay Time		-	40	72	
t _f	Turn-off Fall Time		-	12	22	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =-30V, V _{GS} =-4.5V, I _{DS} =-7A	-	11.4	-	nC
Q _g	Total Gate Charge	V _{DS} =-30V, V _{GS} =-10V, I _{DS} =-7A	-	23.7	33.2	
Q _{gs}	Gate-Source Charge		-	3.6	-	
Q _{gd}	Gate-Drain Charge		-	4.9	-	

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

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

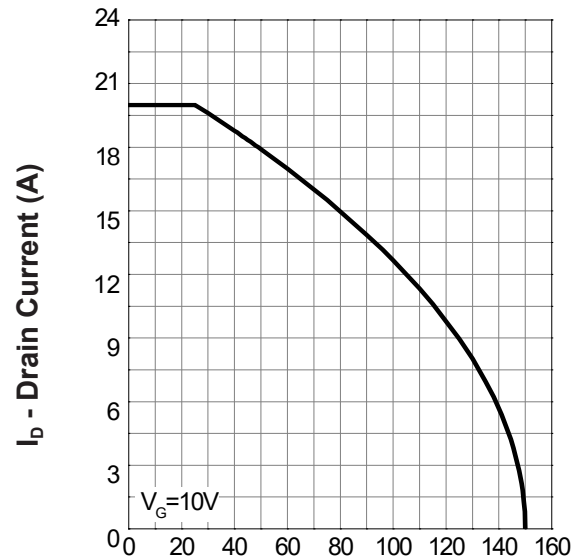
N Channel Typical Operating Characteristics

Power Dissipation



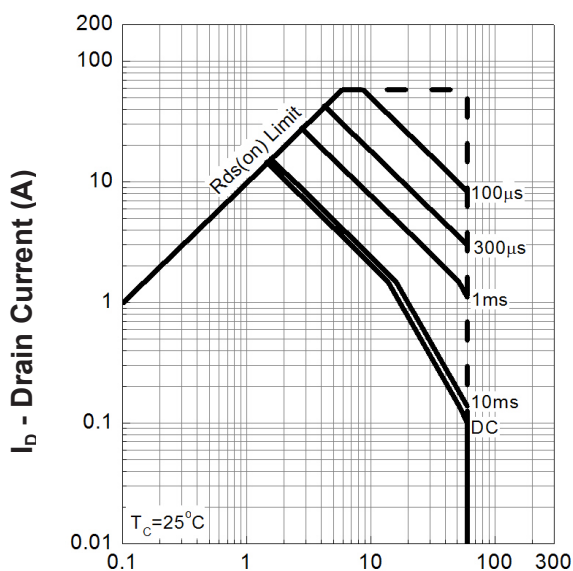
T_c - Case Temperature (°C)

Drain Current



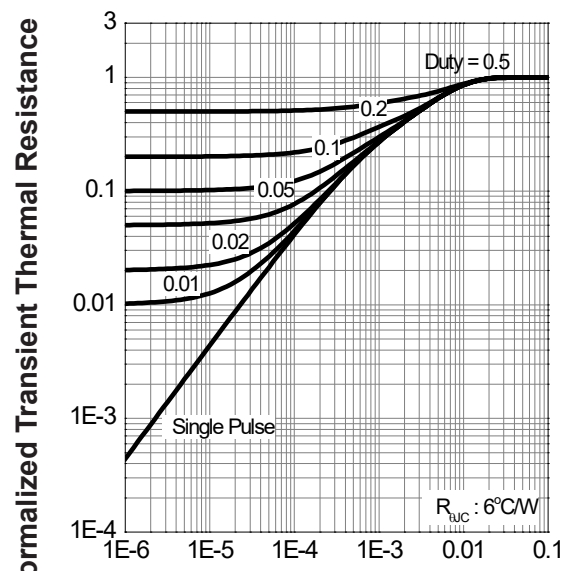
T_c - Case Temperature (°C)

Safe Operation Area



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

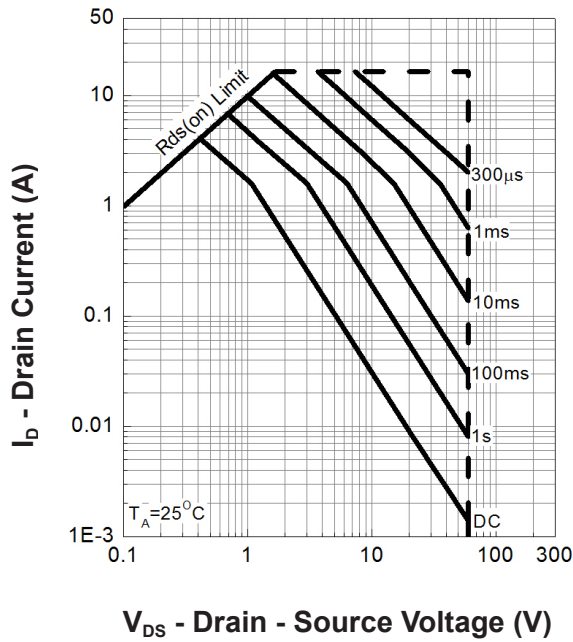
Thermal Transient Impedance



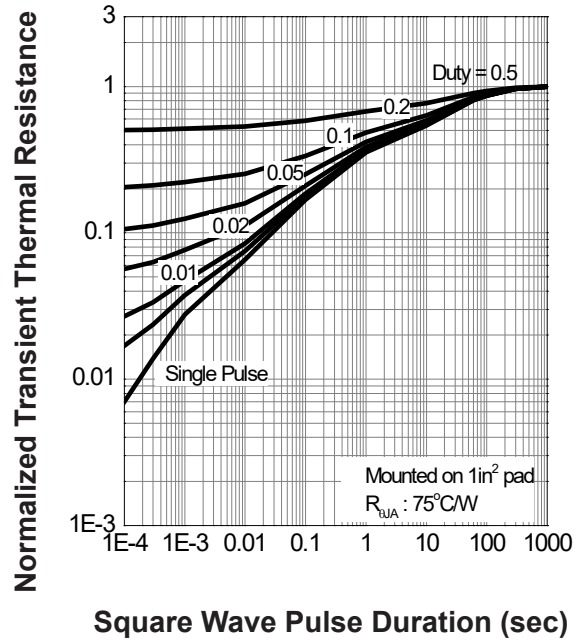
Square Wave Pulse Duration (sec)

N Channel Typical Operating Characteristics(Cont.)

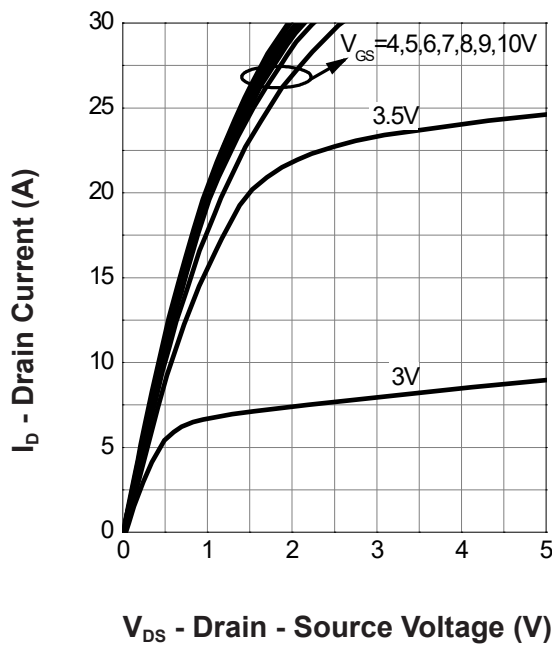
Safe Operation Area



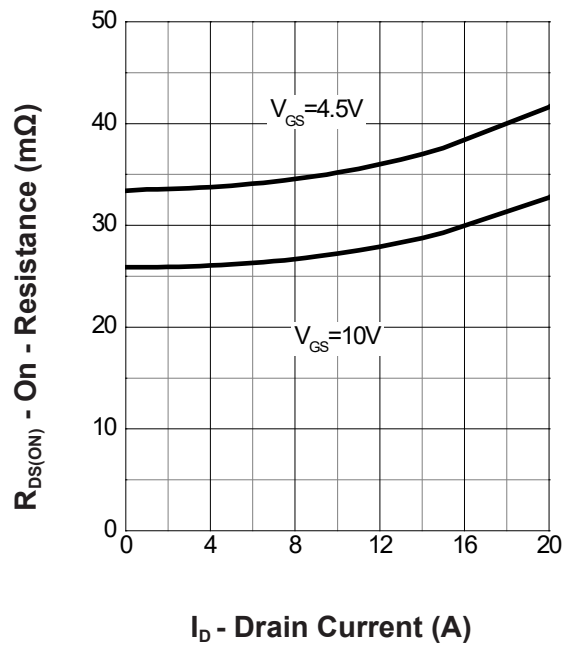
Thermal Transient Impedance



Output Characteristics

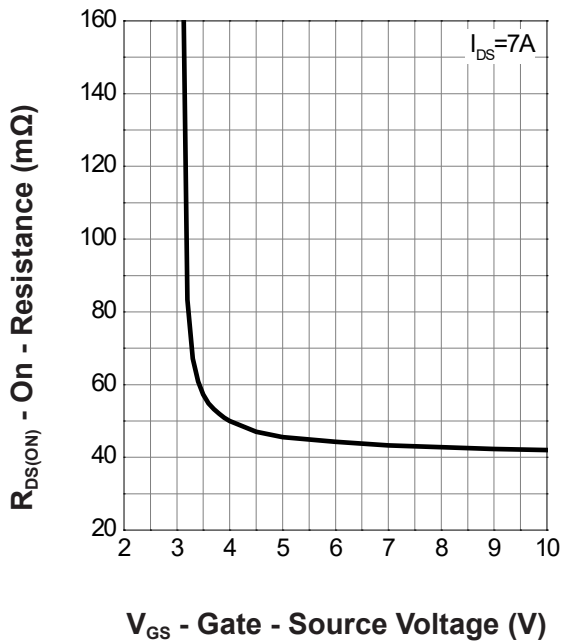


Drain-Source On Resistance

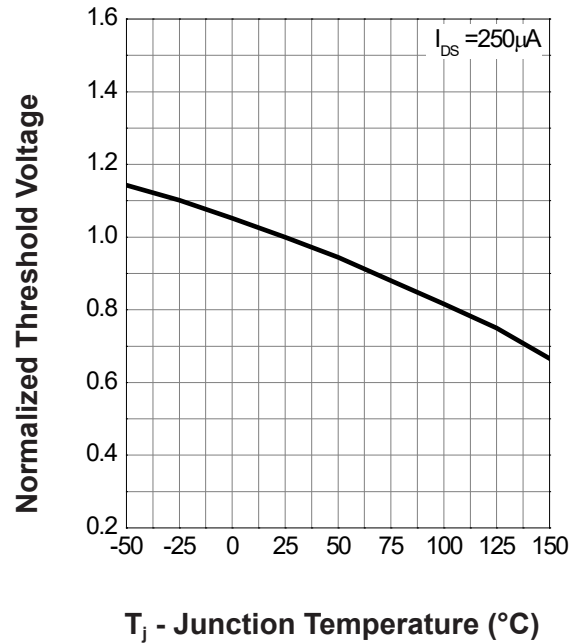


N Channel Typical Operating Characteristics(Cont.)

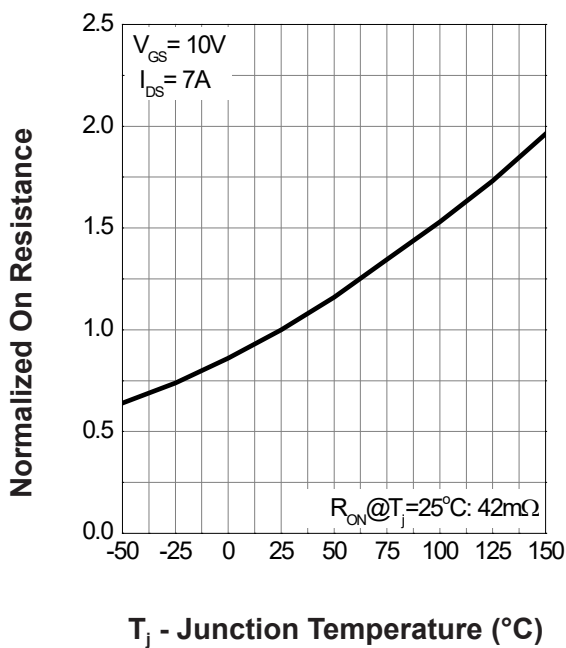
Gate-Source On Resistance



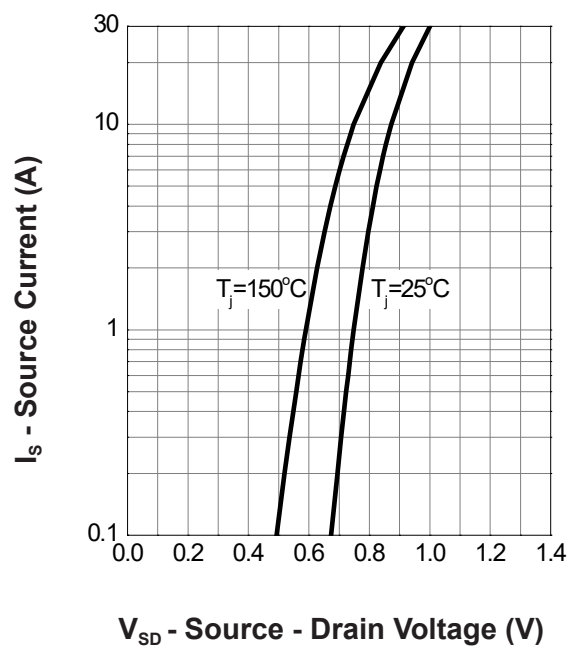
Gate Threshold Voltage



Drain-Source On Resistance

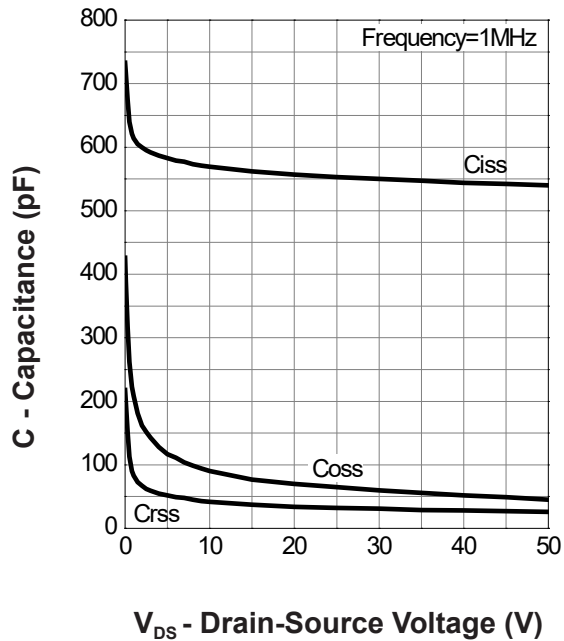


Source-Drain Diode Forward

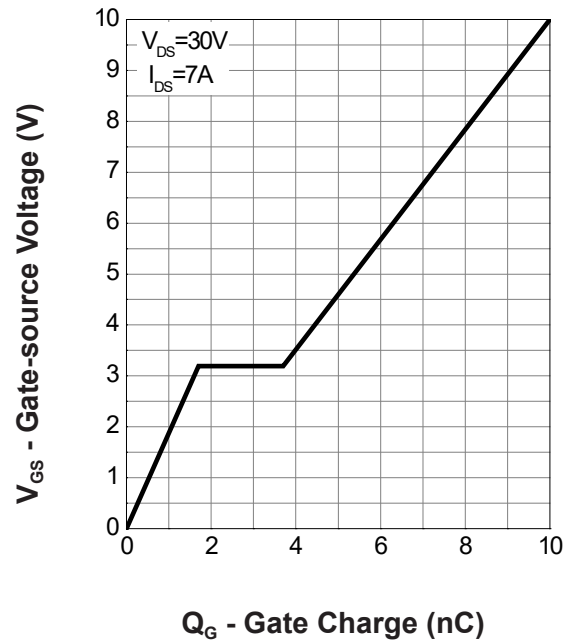


N Channel Typical Operating Characteristics(Cont.)

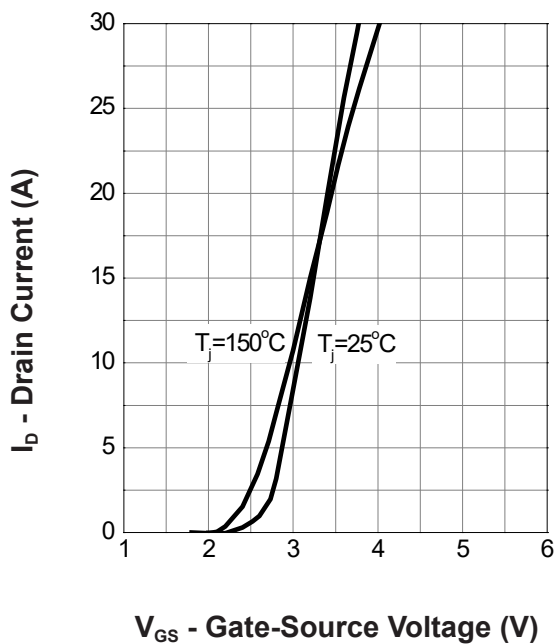
Capacitance



Gate Charge

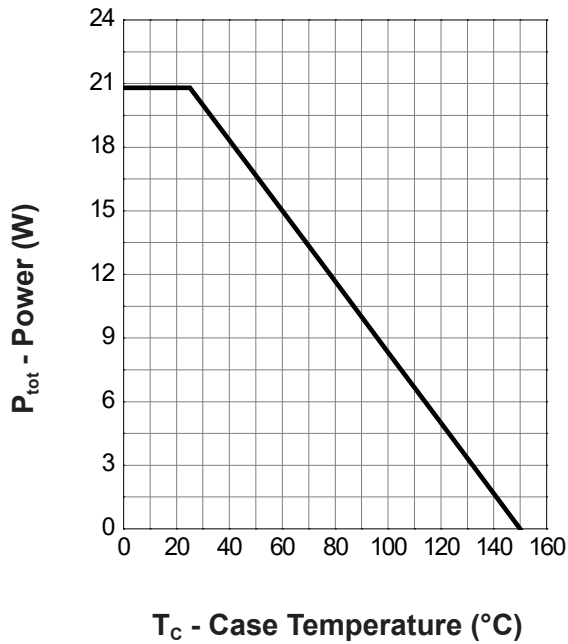


Transfer Characteristics

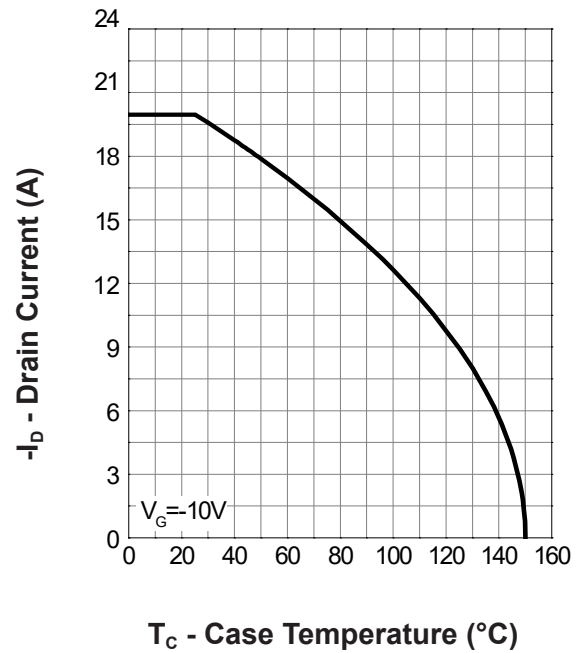


P Channel Typical Operating Characteristics

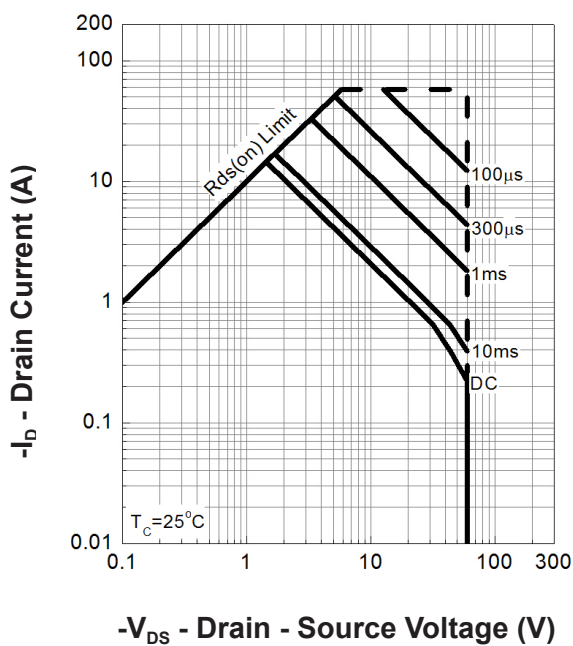
Power Dissipation



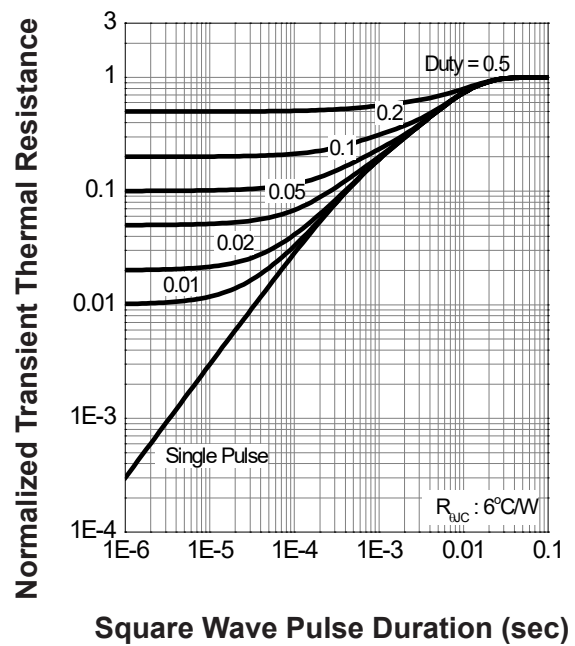
Drain Current



Safe Operation Area

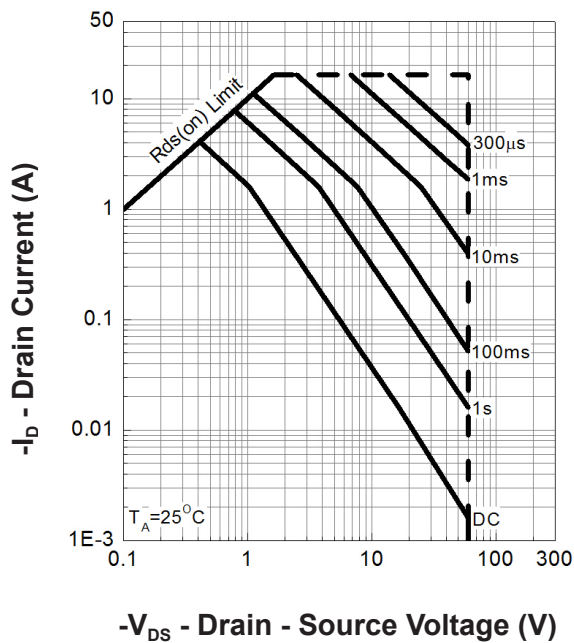


Thermal Transient Impedance

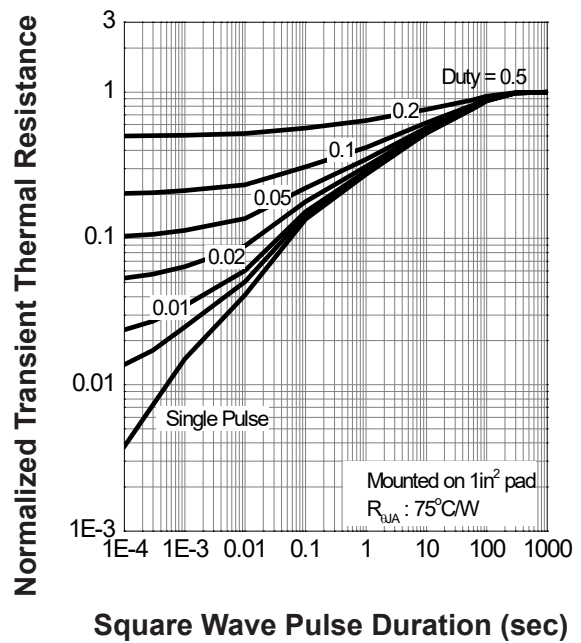


P Channel Typical Operating Characteristics(Cont.)

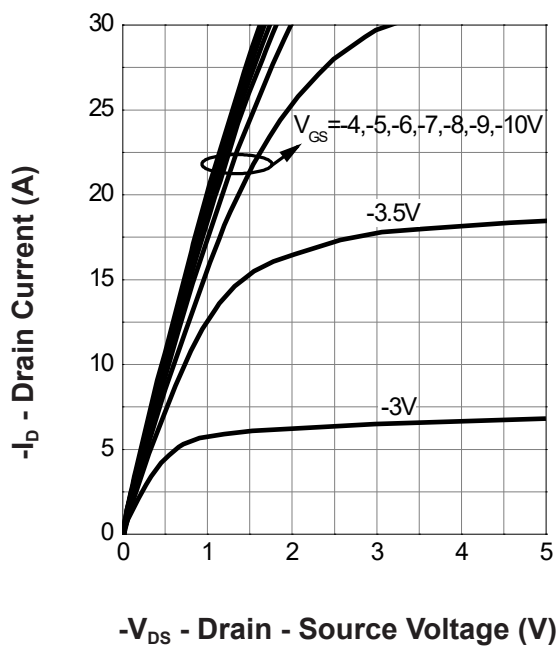
Safe Operation Area



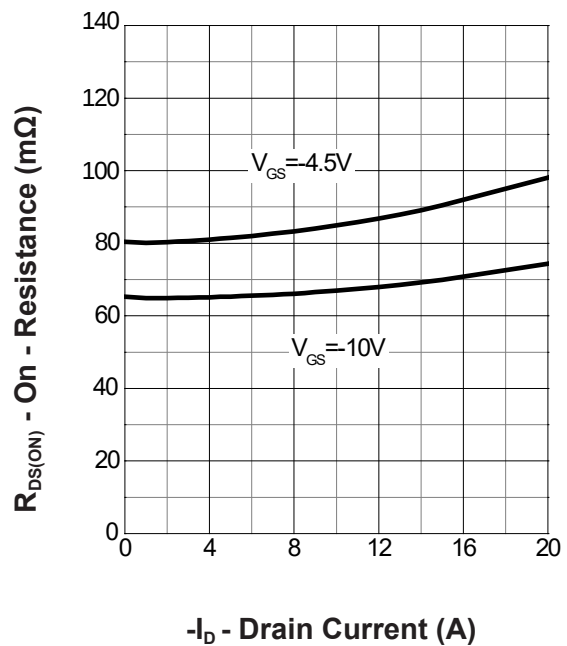
Thermal Transient Impedance



Output Characteristics

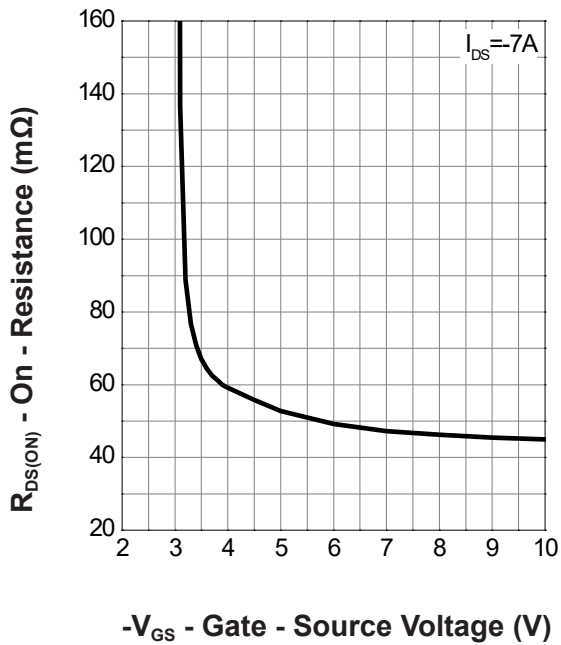


Drain-Source On Resistance

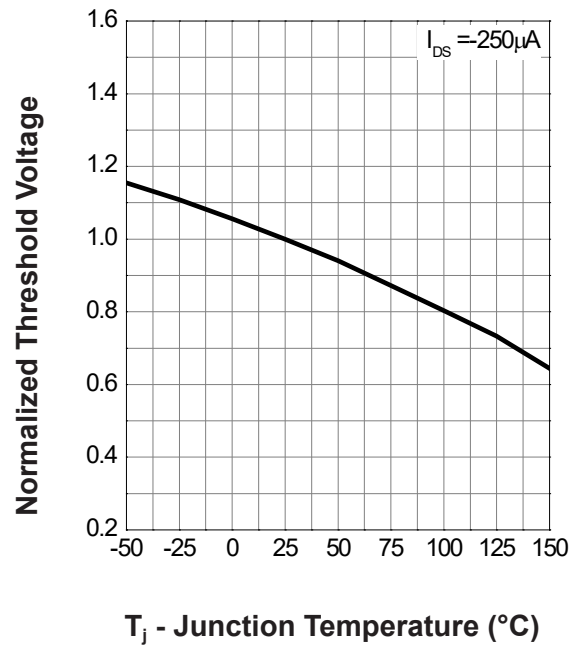


P Channel Typical Operating Characteristics(Cont.)

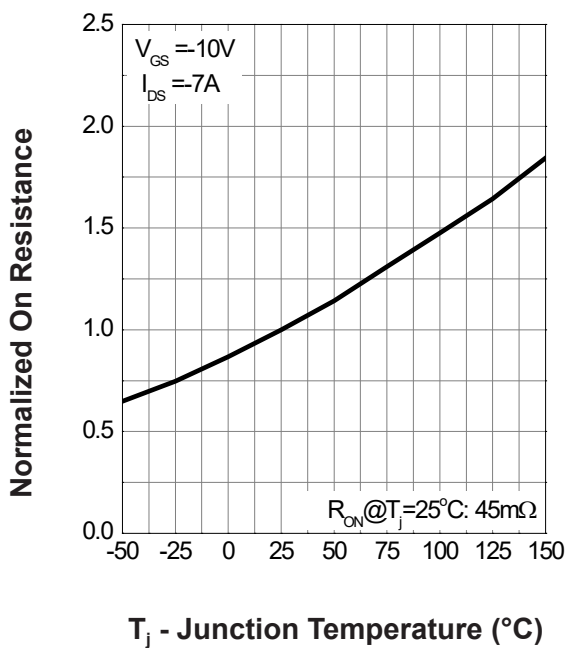
Gate-Source On Resistance



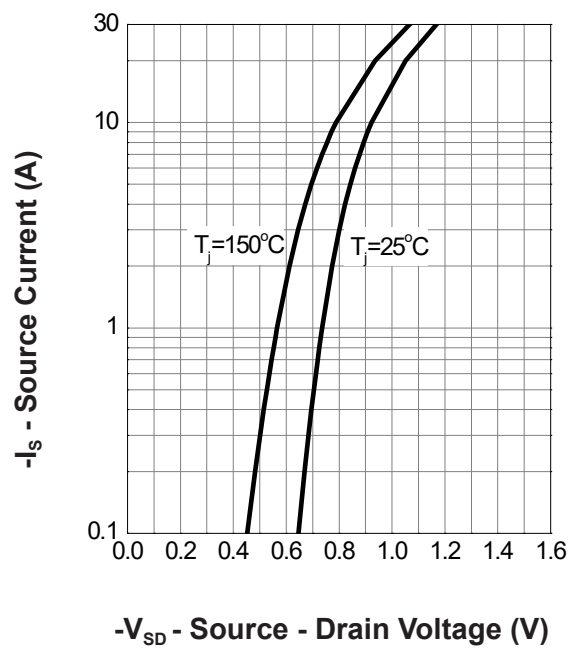
Gate Threshold Voltage



Drain-Source On Resistance

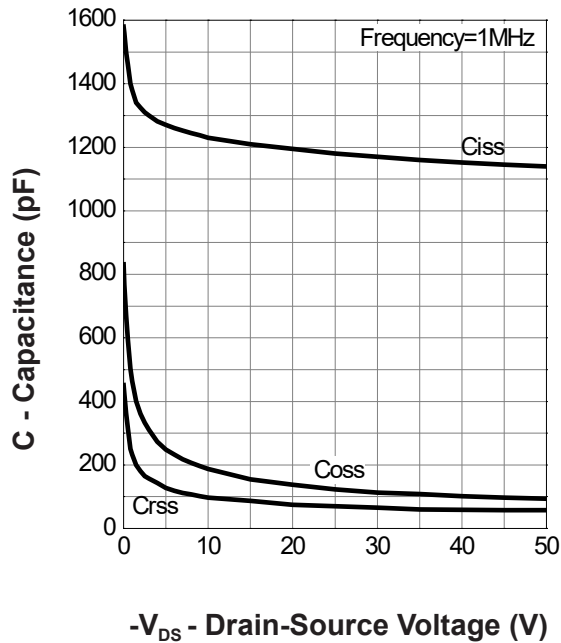


Source-Drain Diode Forward

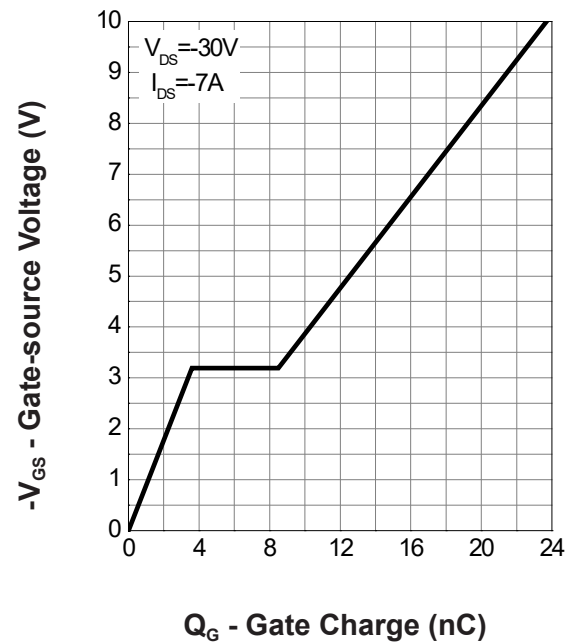


P Channel Typical Operating Characteristics(Cont.)

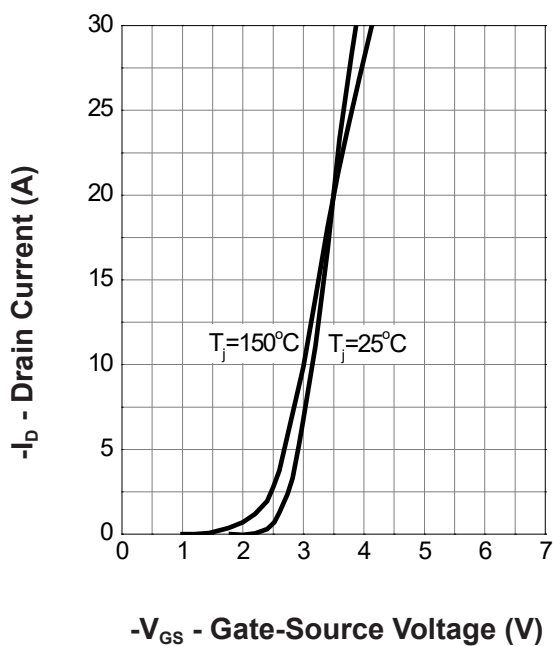
Capacitance



Gate Charge

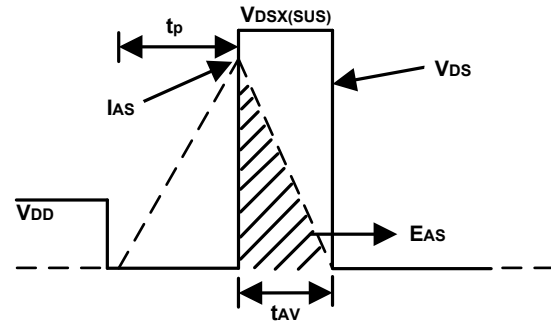
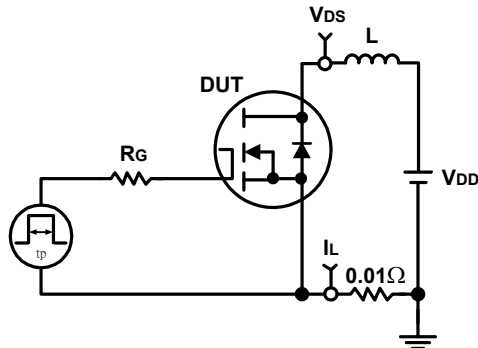


Transfer Characteristics

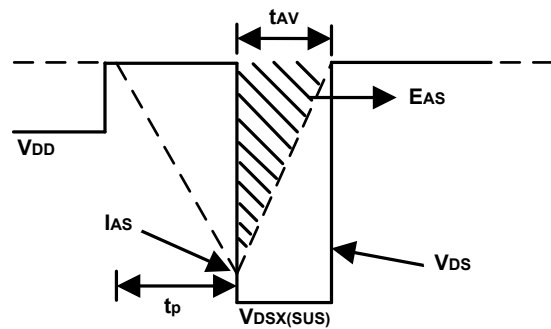
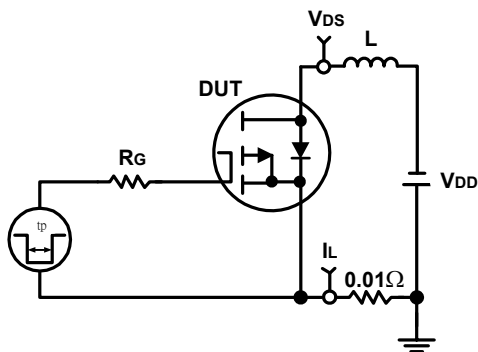


Avalanche Test Circuit and Waveforms

N Channel

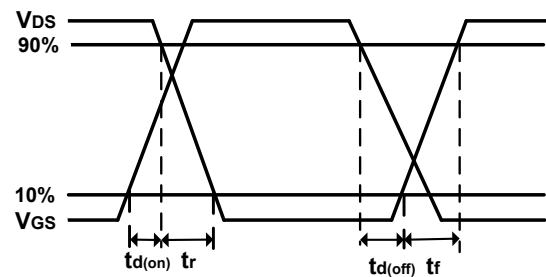
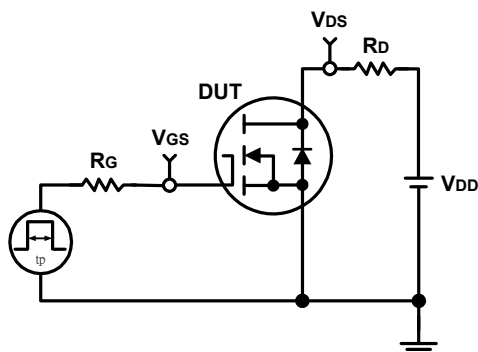


P Channel

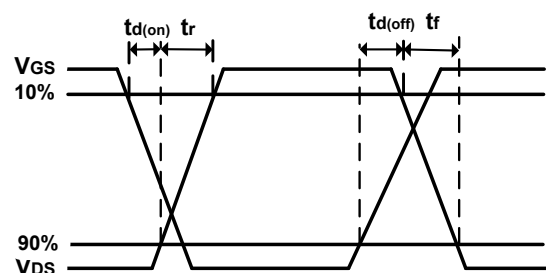
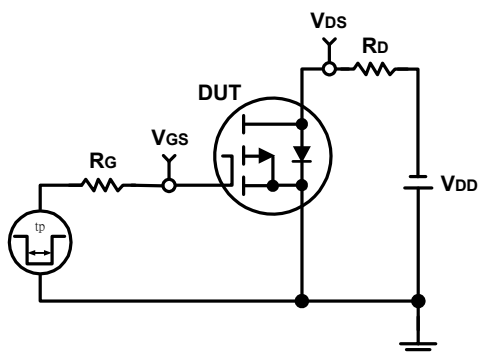


Switching Time Test Circuit and Waveforms

N Channel

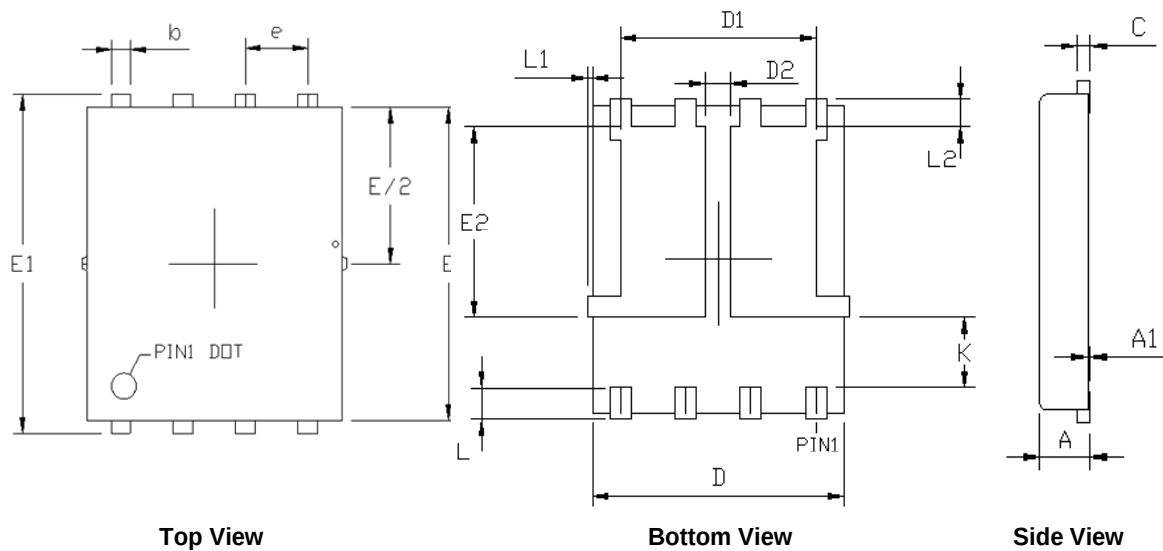


P Channel



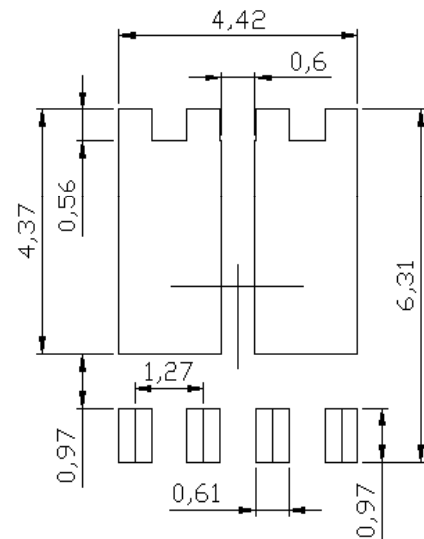
Package Information

DFN5x6C-8



SYMBOLS	DFN5x6C-8_EP2_P			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.900	1.200	0.035	0.047
A1	0.000	0.050	0.000	0.002
b	0.300	0.500	0.012	0.020
c	0.150	0.300	0.006	0.012
D	4.800	5.000	0.189	0.197
D1	3.550	4.550	0.140	0.179
D2	0.500	0.910	0.020	0.036
E	5.650	5.850	0.222	0.230
E1	5.900	6.200	0.232	0.244
E2	3.200	3.780	0.126	0.149
e	1.27 BSC		0.050 BSC	
K	1.100	-	0.043	-
L	0.500	0.800	0.020	0.031
L1	0.000	0.150	0.000	0.006
L2	0.325	0.610	0.013	0.024

RECOMMENDED LAND PATTERN



UNIT: mm