

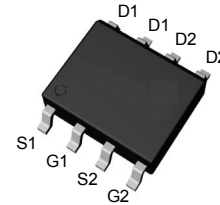
Features

- N-Channel
60V/5.1A,
 $R_{DS(ON)} = 28m\Omega(\text{typ.}) @ V_{GS} = 10V$
 $R_{DS(ON)} = 35m\Omega(\text{typ.}) @ V_{GS} = 4.5V$
- P-Channel
-60V/-3.7A,
 $R_{DS(ON)} = 81m\Omega(\text{typ.}) @ V_{GS} = -10V$
 $R_{DS(ON)} = 95m\Omega(\text{typ.}) @ V_{GS} = -4.5V$
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

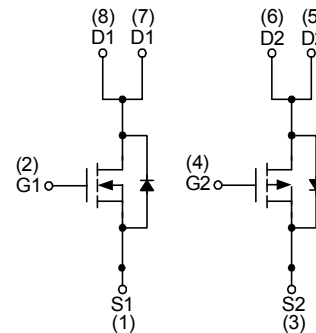
Applications

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

Pin Description



Top View of SOP-8



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 _A =25°C	2.5	-1	A
I _D	Continuous Drain Current	T _A =25°C	5.1	-3.7	
I _{DM} ^a	Pulsed Drain Current	T _A =25°C	20	-14	
P _D	Power Dissipation	T _A =25°C	2	2	W
		T _A =70°C	1.3	1.3	
R _{θJA}	Thermal Resistance-Junction to Ambient	t ≤ 10s	62.5	62.5	°C/W
		Steady State	90	90	
R _{θJL}	Thermal Resistance-Junction to Lead	Steady State	50	50	
I _{AS} ^b	Avalanche Current, Single pulse (L=0.1mH)		16	-18	A
E _{AS} ^b	Avalanche Energy, Single pulse (L=0.1mH)		12	16	mJ

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

Note b : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature $T_J = 25^\circ\text{C}$).

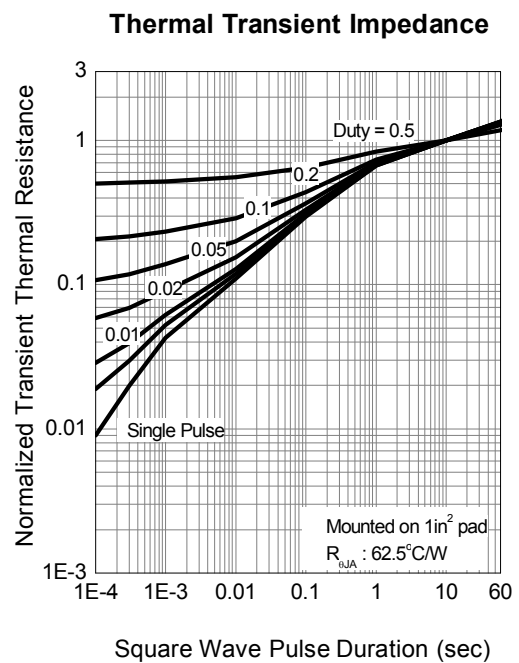
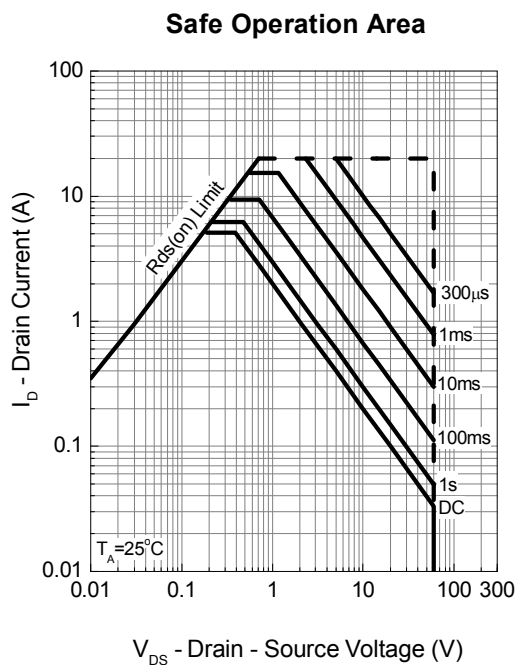
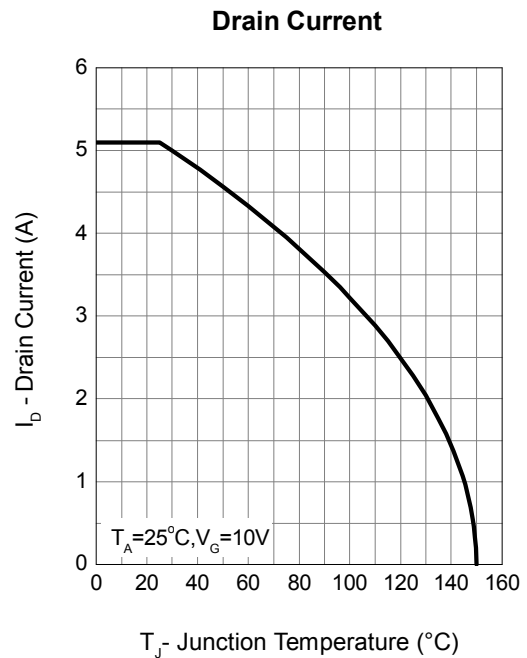
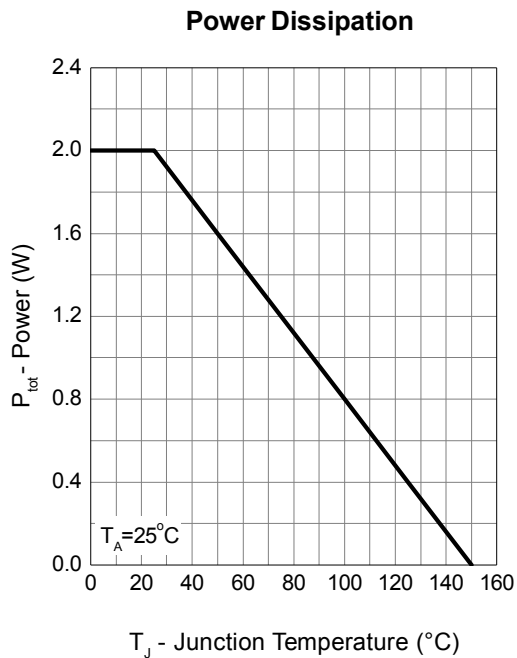
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

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 T _J =85°C	-	-	1 30	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1	2	3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)}	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =5A V _{GS} =4.5V, I _{DS} =4A	- -	28 35	33 42	V mΩ
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _{SD} =2.5A, V _{GS} =0V	-	0.8	1.3	V
t _{rr}	Reverse Recovery Time	I _{DS} =5A, dI _{SD} /dt=100A/μs	-	20	-	ns
Q _{rr}	Reverse Recovery Charge		-	20	-	nC
Dynamic Characteristics						
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	-	670	940	pF
C _{oss}	Output Capacitance		-	70	-	
C _{rss}	Reverse Transfer Capacitance		-	35	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =30V, R _L =30Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	8	15	ns
t _r	Turn-on Rise Time		-	6	11	
t _{d(OFF)}	Turn-off Delay Time		-	23	42	
t _f	Turn-off Fall Time		-	6	11	
Gate Charge Characteristics						
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =4.5V, I _{DS} =5A	-	7	-	nC
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =10V, I _{DS} =5A	-	14	20	
Q _{gs}	Gate-Source Charge		-	2.6	-	
Q _{gd}	Gate-Drain Charge		-	2.6	-	
Q _{gth}	Threshold Gate Charge		-	2.2	-	

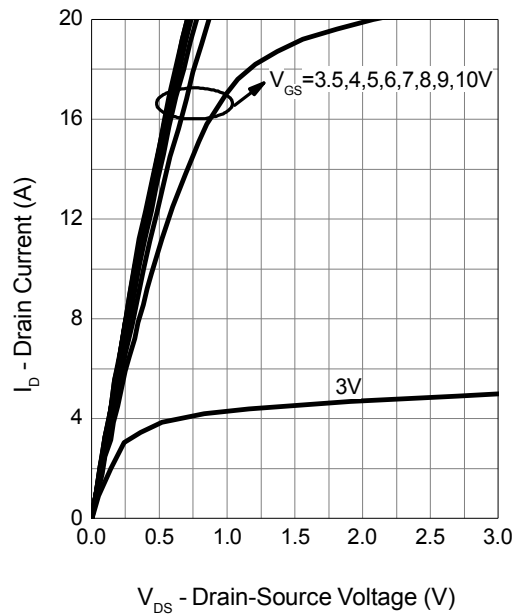
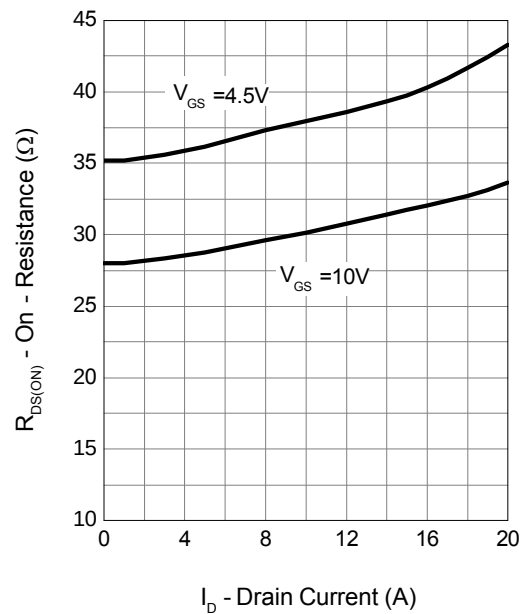
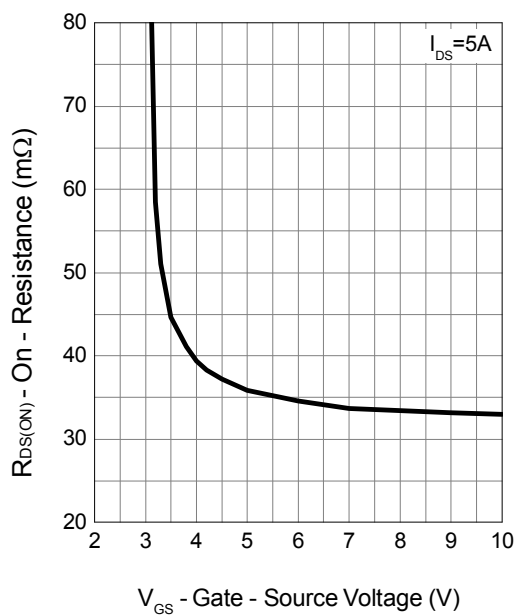
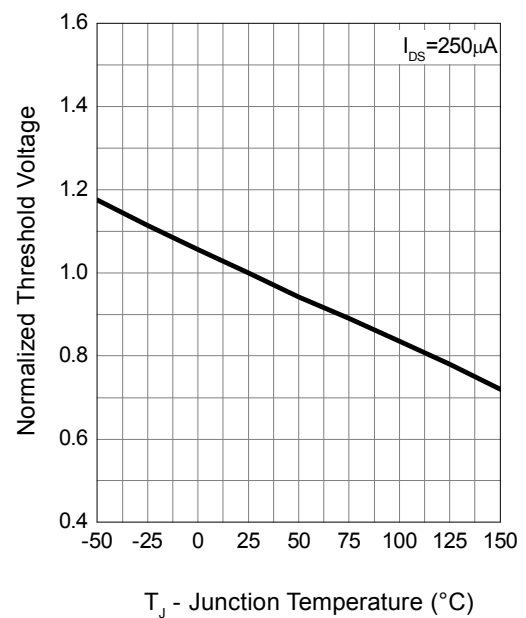
Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

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)}	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} =-3.7A	-	81	88	mΩ
		V _{GS} =-4.5V, I _{DS} =-2A	-	95	107	
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _{SD} =-1A, V _{GS} =0V	-	-0.7	-1	V
t _{rr}	Reverse Recovery Time	I _{sd} =-3.7A, dI _{SD} /dt=100A/μs	-	20	-	ns
Q _{rr}	Reverse Recovery Charge		-	15	-	nC
Dynamic Characteristics						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	10	-	Ω
C _{iSS}	Input Capacitance	V _{GS} =0V, V _{DS} =-30V, Frequency=1.0MHz	-	500	-	pF
C _{oss}	Output Capacitance		-	66	-	
C _{rSS}	Reverse Transfer Capacitance		-	32	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-30V, R _L =30Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	7.5	-	ns
t _r	Turn-on Rise Time		-	4.5	-	
t _{d(OFF)}	Turn-off Delay Time		-	38	-	
t _f	Turn-off Fall Time		-	28	-	
Gate Charge Characteristics						
Q _g	Total Gate Charge	V _{DS} =-30V, V _{GS} =-4.5V, I _{DS} =-3.7A	-	6	-	nC
Q _g	Total Gate Charge	V _{DS} =-30V, V _{GS} =- 10V, I _{DS} =-3.7A	-	12	-	
Q _{gs}	Gate-Source Charge		-	1.3	-	
Q _{gd}	Gate-Drain Charge		-	1.5	-	
Q _{gth}	Threshold Gate Charge		-	3	-	

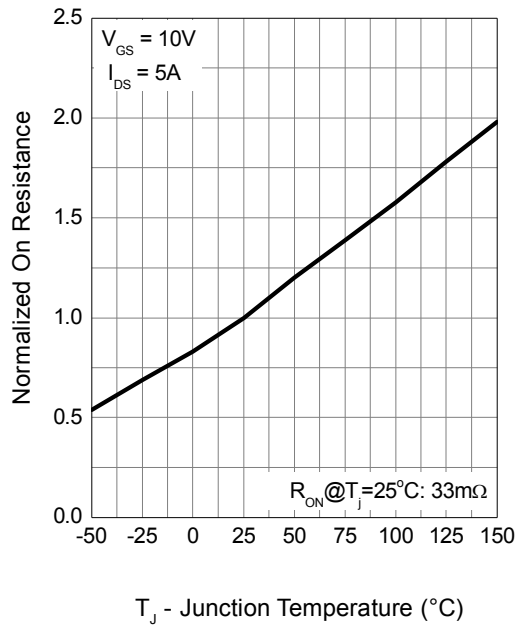
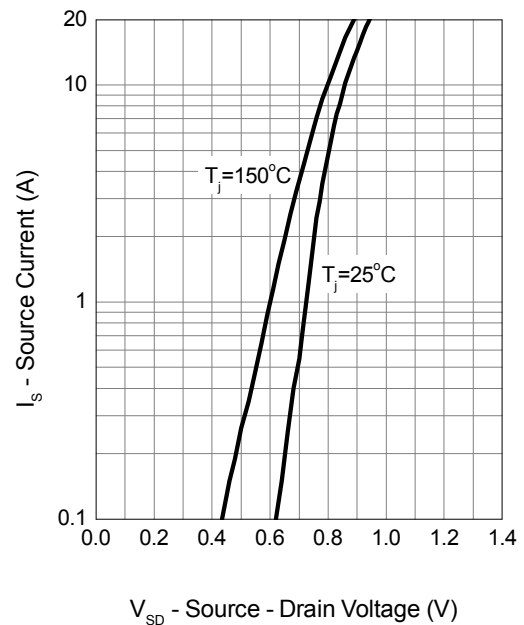
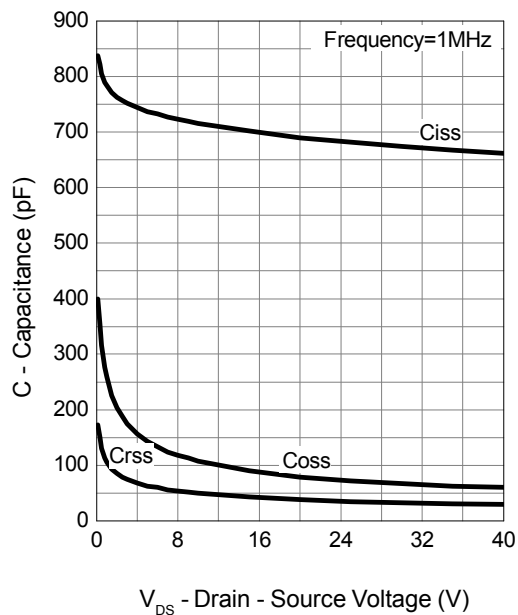
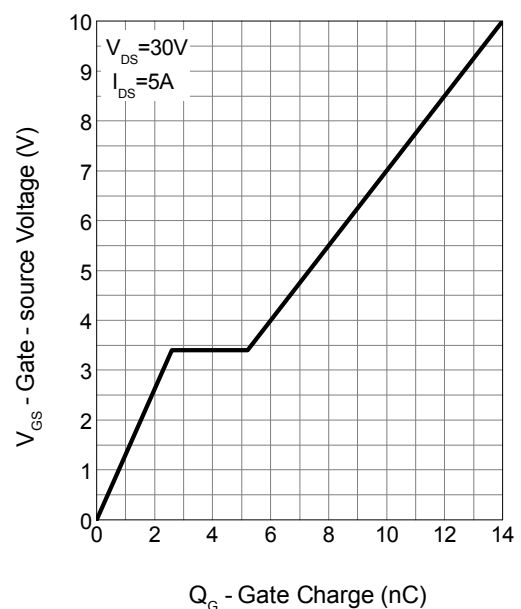
N Channel Typical Operating Characteristics



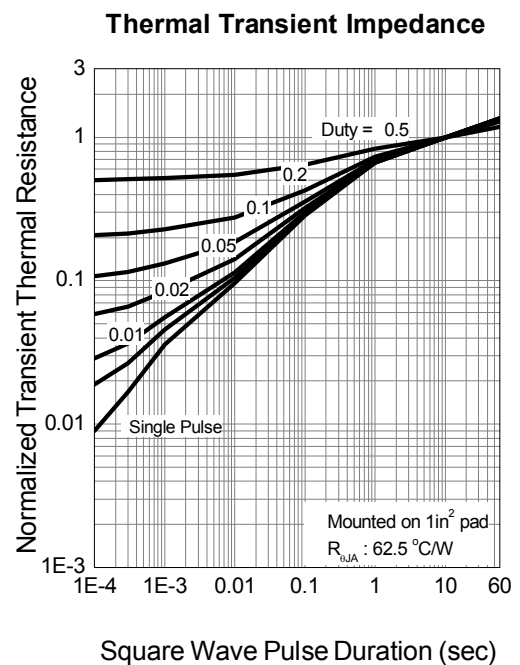
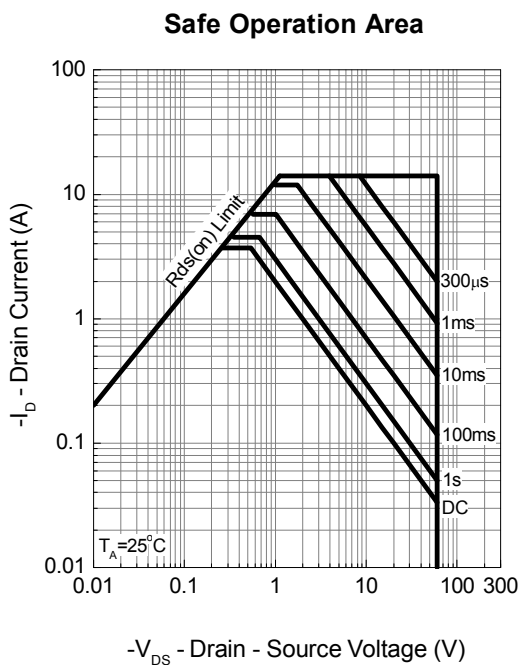
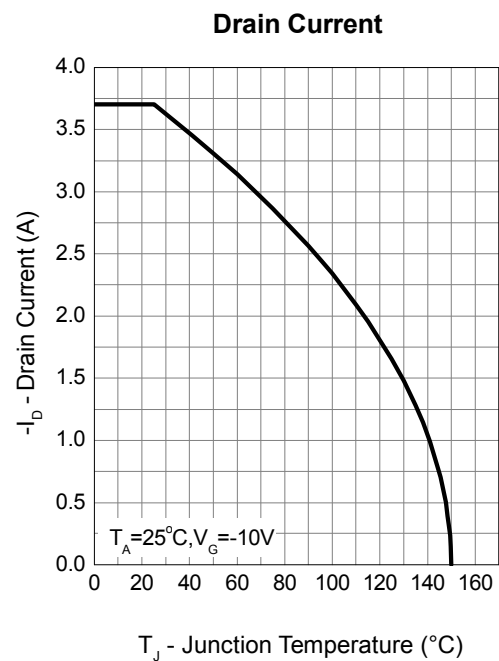
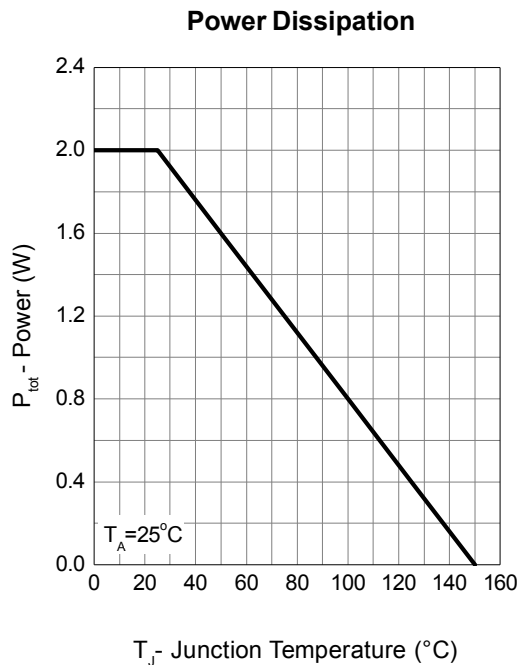
N Channel Typical Operating Characteristics (Cont.)

Output Characteristics

Drain-Source On Resistance

Transfer Characteristics

Gate Threshold Voltage


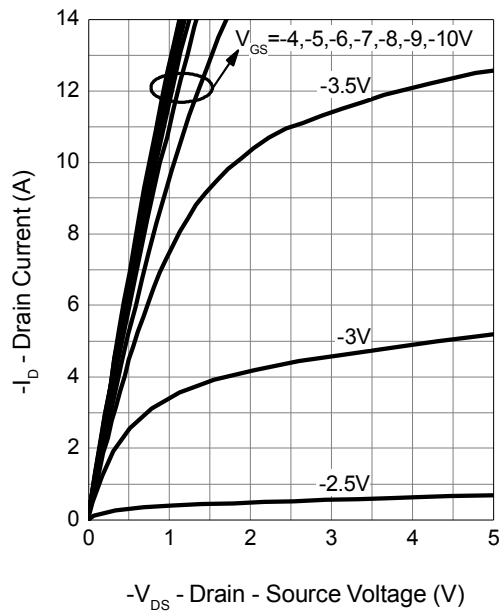
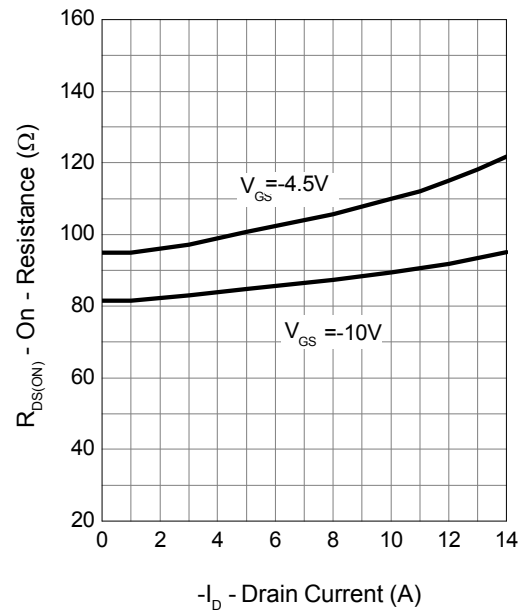
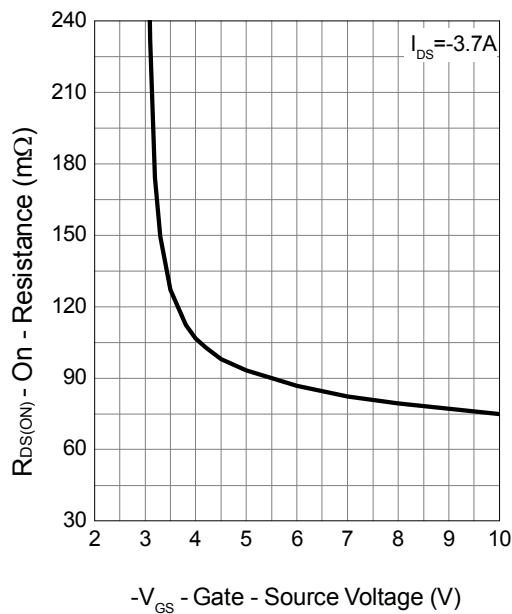
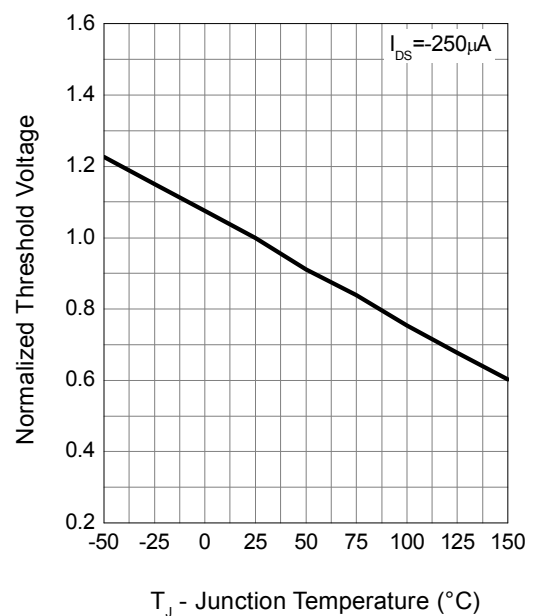
N Channel Typical Operating Characteristics (Cont.)

Drain-Source On Resistance

Source-Drain Diode Forward

Capacitance

Gate Charge


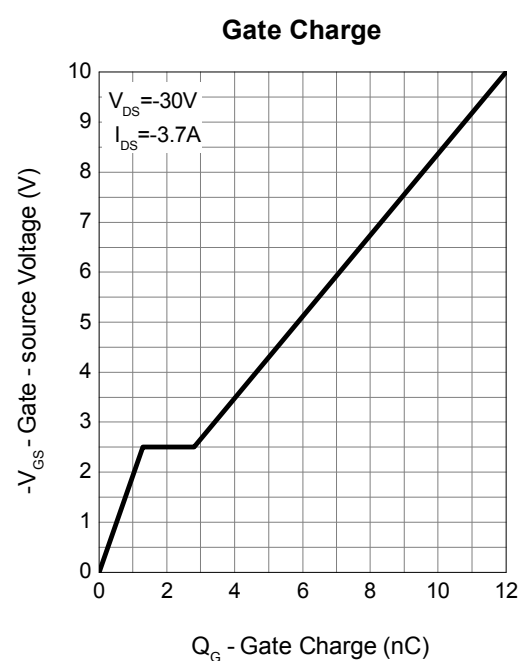
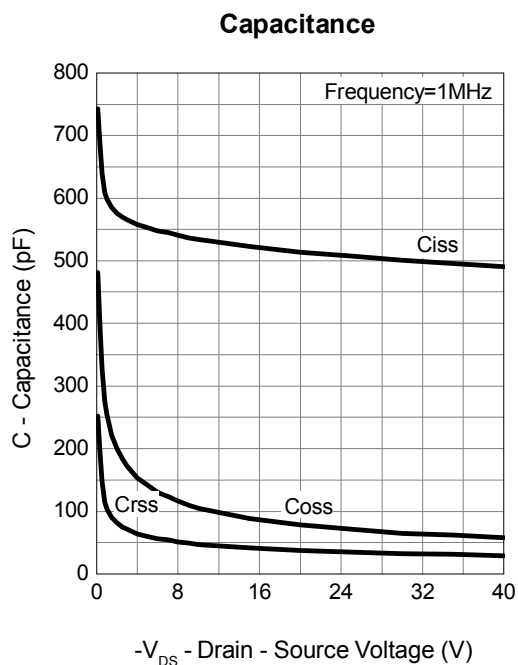
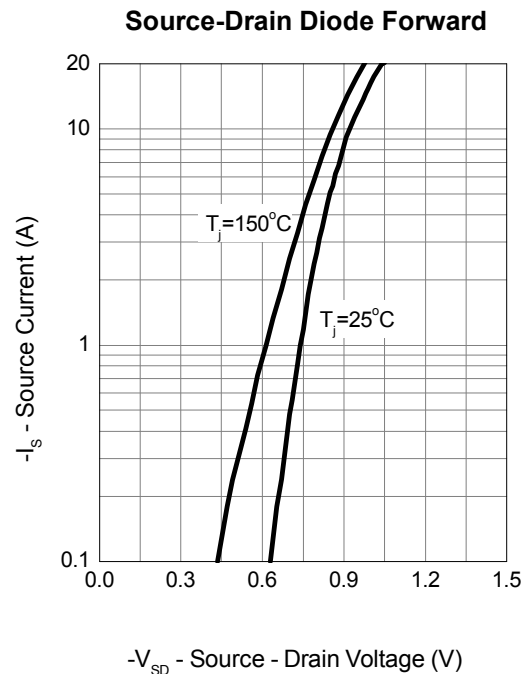
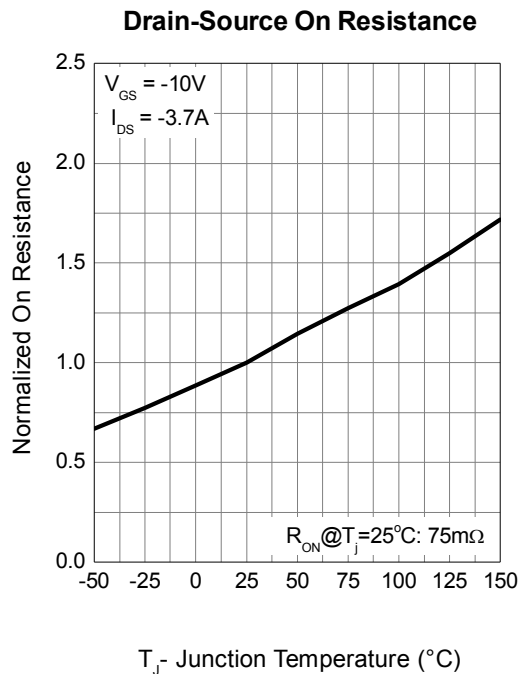
P Channel Typical Operating Characteristics



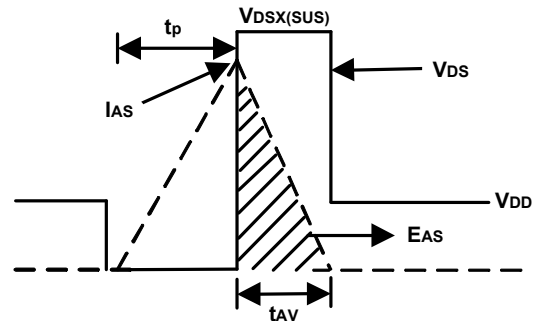
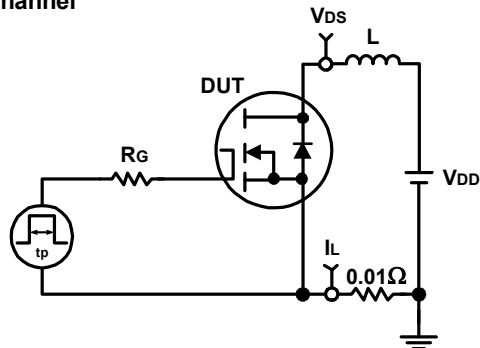
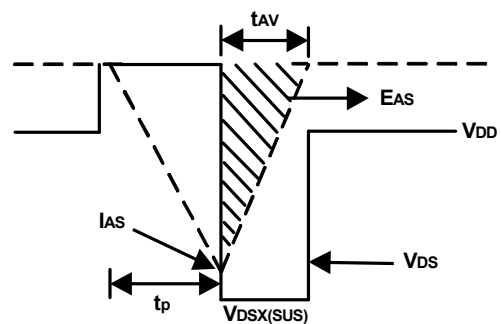
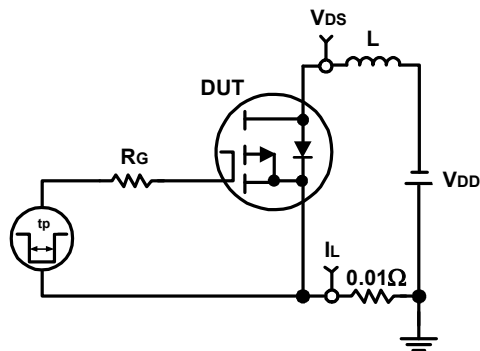
P Channel Typical Operating Characteristics (Cont.)

Output Characteristics

Drain-Source On Resistance

Transfer Characteristics

Gate Threshold Voltage


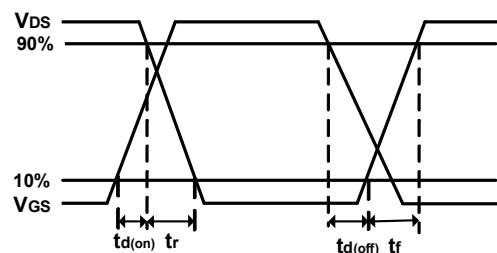
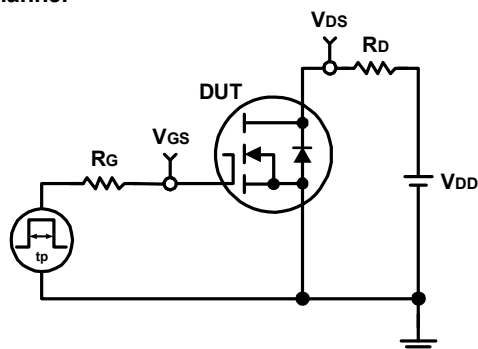
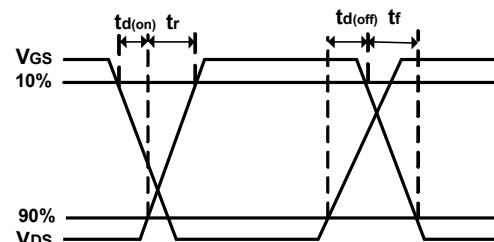
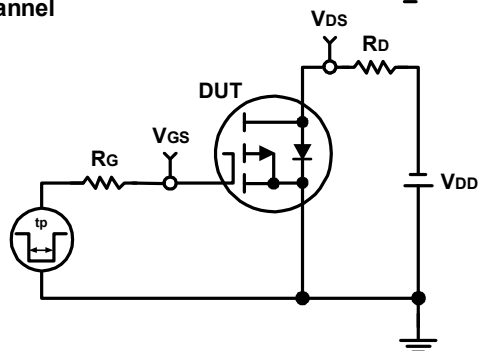
P Channel Typical Operating Characteristics (Cont.)



Avalanche Test Circuit and Waveforms

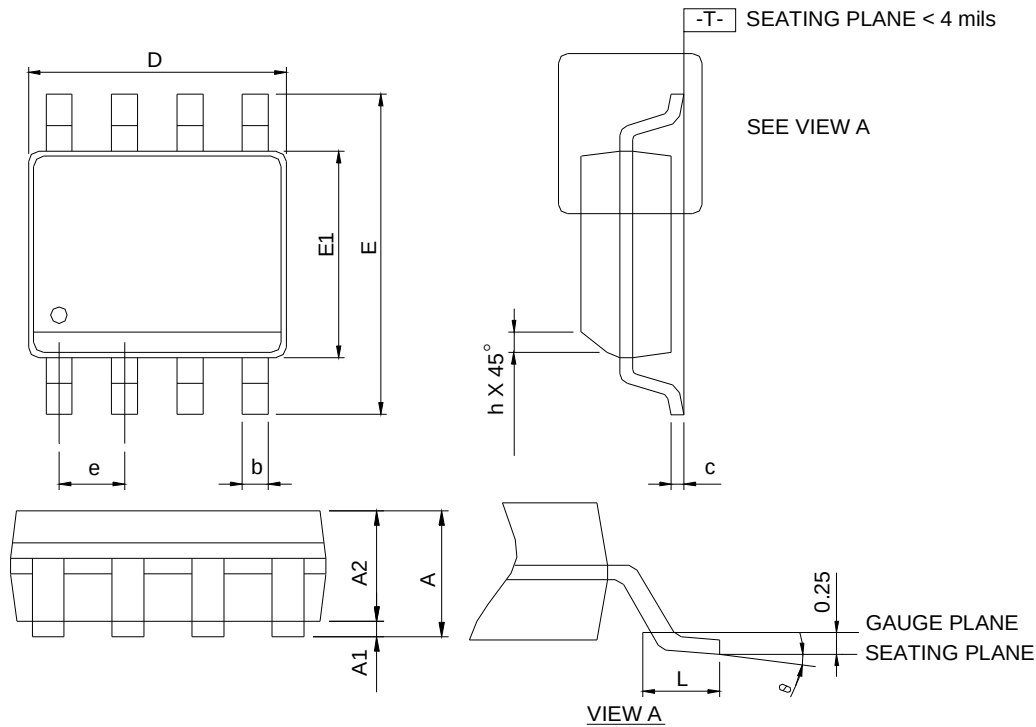
N Channel

P Channel


Switching Time Test Circuit and Waveforms

N Channel

P Channel


Package Information

SOP-8



SYMBOL	SOP-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	-	1.75	-	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	-	0.049	-
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

Note: 1. Follow JEDEC MS-012 AA.

2. Dimension "D" does not include mold flash, protrusions or gate burrs.
Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.

3. Dimension "E" does not include inter-lead flash or protrusions.
Inter-lead flash and protrusions shall not exceed 10 mil per side.

RECOMMENDED LAND PATTERN

