

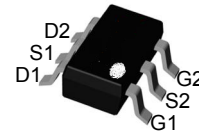
Features

- **N-Channel**
20V/5A,
 $R_{DS(ON)} = 21m\Omega(\text{typ.}) @ V_{GS} = 4.5V$
 $R_{DS(ON)} = 28m\Omega(\text{typ.}) @ V_{GS} = 2.5V$
- **P-Channel**
-20V/-3.6A,
 $R_{DS(ON)} = 54m\Omega(\text{typ.}) @ V_{GS} = -4.5V$
 $R_{DS(ON)} = 69m\Omega(\text{typ.}) @ V_{GS} = -2.5V$
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

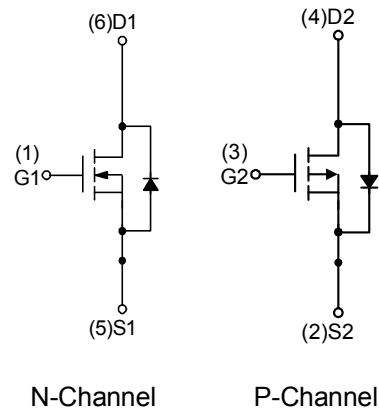
Applications

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

Pin Description



Top View of SOT-23-6



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		20	-20	V
V _{GSS}	Gate-Source Voltage		±12	±12	V
I _D	Continuous Drain Current	T _A =25°C	5	-3.6	A
		T _A =70°C	3.8	-2.7	
I _{DM}	Pulsed Drain Current	V _{GS} =10V	15	-10.8	
I _S	Diode Continuous Forward Current		5	-3.6	
T _J	Maximum Junction Temperature		150		°C
T _{STG}	Storage Temperature Range		-55 to 150		
P _D	Maximum Power Dissipation	T _A =25°C	1.4		W
		T _A =70°C	0.9		
R _{θJA} *	Thermal Resistance-Junction to Ambient	t ≤ 10s	90		°C/W
		Steady State	125		

Note: * Surface Mounted on 1in^2 pad area.

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	20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =16V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	0.5	0.7	1	V
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^a	Drain-Source On-State Resistance	V _{GS} =4.5V, I _{DS} =5A	-	21	26	mΩ
		V _{GS} =2.5V, I _{DS} =4A	-	28	40	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.75	1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =5A, dI _{SD} /dt=100A/μs	-	10.5	-	ns
Q _{rr}	Reverse Recovery Charge		-	3.2	-	nC
Dynamic Characteristics ^b						
R _g	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	2.2	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =10V, Frequency=1.0MHz	-	365	-	pF
C _{oss}	Output Capacitance		-	70	-	
C _{rss}	Reverse Transfer Capacitance		-	60	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =10V, R _L =10Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	2.4	-	ns
T _r	Turn-on Rise Time		-	13	-	
t _{d(OFF)}	Turn-off Delay Time		-	15.5	-	
T _f	Turn-off Fall Time		-	3	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} =10V, I _{DS} =5A	V _{GS} =4.5V,	-	4.5	nC
			V _{GS} =10V	-	9	
Q _{gs}	Gate-Source Charge	V _{DS} =10V, V _{GS} =10V, I _{DS} =5A	-	0.3	-	
Q _{gd}	Gate-Drain Charge		-	2	-	
Q _{gth}	Threshold Gate Charge		-	0.1	-	

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

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

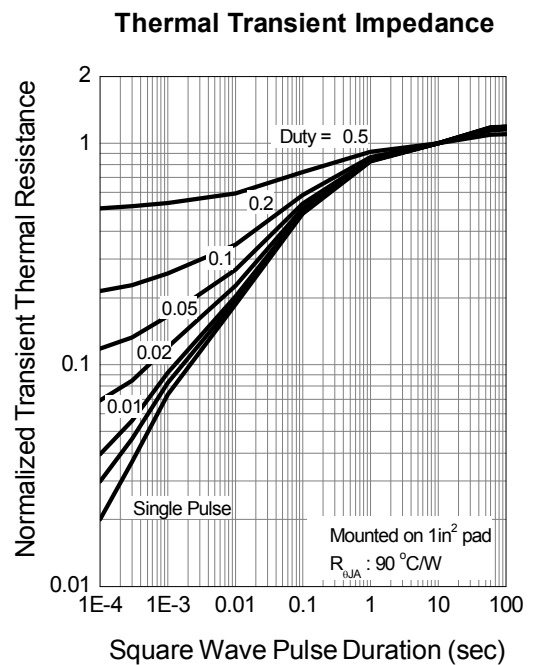
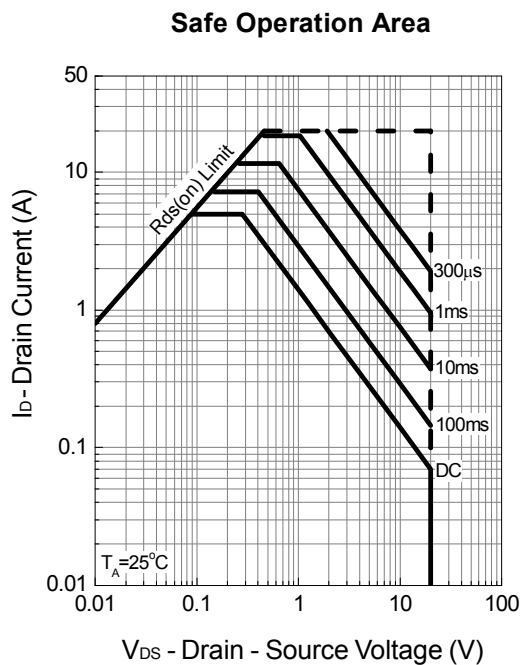
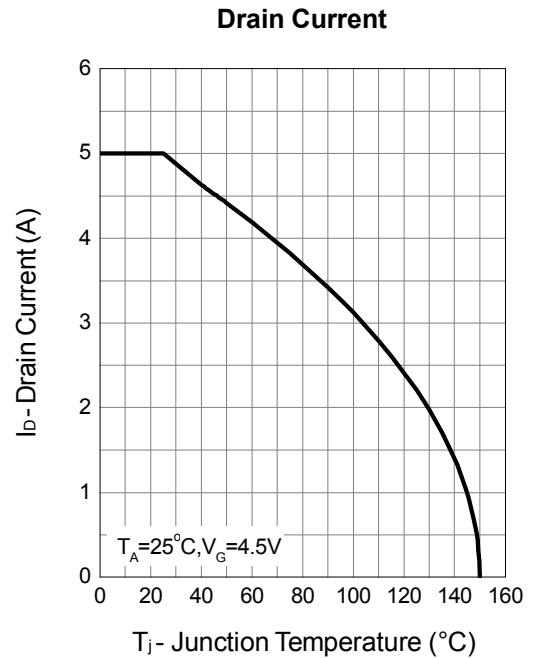
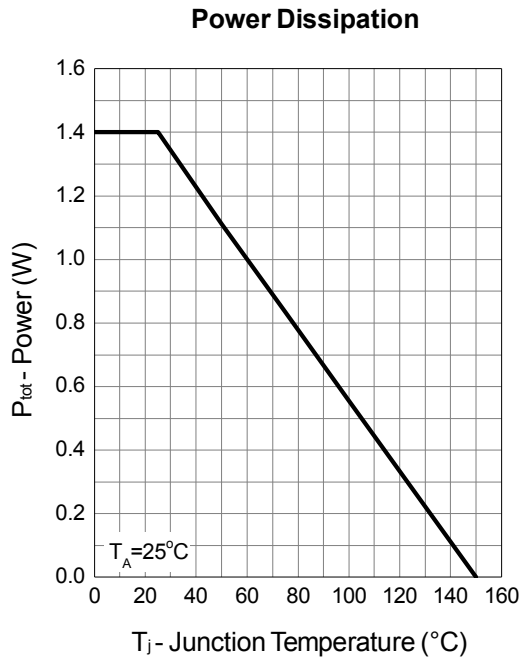
P Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	P Channel			Unit	
			Min.	Typ.	Max.		
Static Characteristics							
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-20	-	-	V	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-16V, V _{GS} =0V	-	-	-1	μA	
		T _J =85°C	-	-	-30		
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	-0.5	-0.7	-1	V	
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA	
R _{DS(ON)} ^a	Drain-Source On-State Resistance	V _{GS} =-4.5V, I _{DS} =-3.3A	-	54	65	mΩ	
		V _{GS} =-2.5V, I _{DS} =-2.1A	-	69	90		
Diode Characteristics							
V _{SD} ^a	Diode Forward Voltage	I _{SD} =-1A, V _{GS} =0V	-	-0.75	-1.1	V	
t _{rr}	Reverse Recovery Time	I _{SD} =-3.3A, dI _{SD} /dt=100A/μs	-	16	-	ns	
Q _{rr}	Reverse Recovery Charge		-	6	-	nC	
Dynamic Characteristics ^b							
R _g	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	10	-	Ω	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-10V, Frequency=1.0MHz	-	480	-	pF	
C _{oss}	Output Capacitance		-	64	-		
C _{rss}	Reverse Transfer Capacitance		-	57	-		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-10V, R _L =10Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	5.3	-	ns	
T _r	Turn-on Rise Time		-	14.2	-		
t _{d(OFF)}	Turn-off Delay Time		-	30	-		
T _f	Turn-off Fall Time		-	23	-		
Gate Charge Characteristics ^b							
Q _g	Total Gate Charge	V _{DS} =-10V, I _{DS} =-3.3A	V _{GS} =-4.5V,	-	4.5	-	nC
			V _{GS} =-10V	-	9.2	-	
Q _{gs}	Gate-Source Charge	V _{DS} =-10V, V _{GS} =-10V, I _{DS} =-3.3A	-	0.7	-		
Q _{gd}	Gate-Drain Charge		-	1.8	-		
Q _{gth}	Threshold Gate Charge		-	0.3	-		

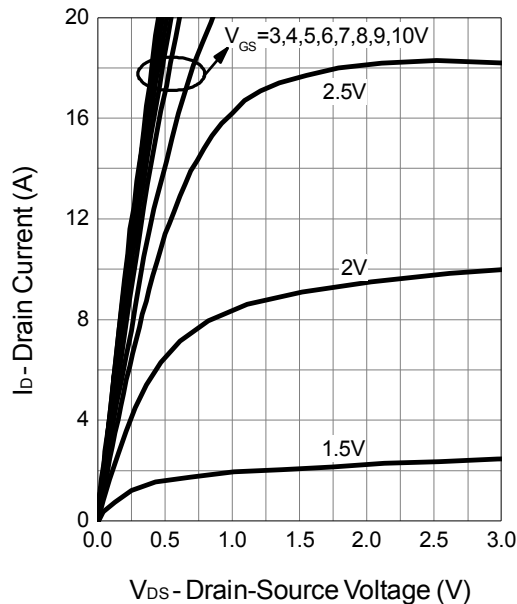
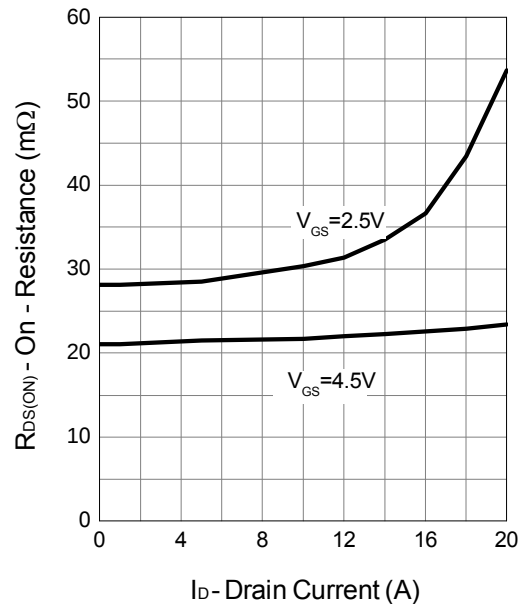
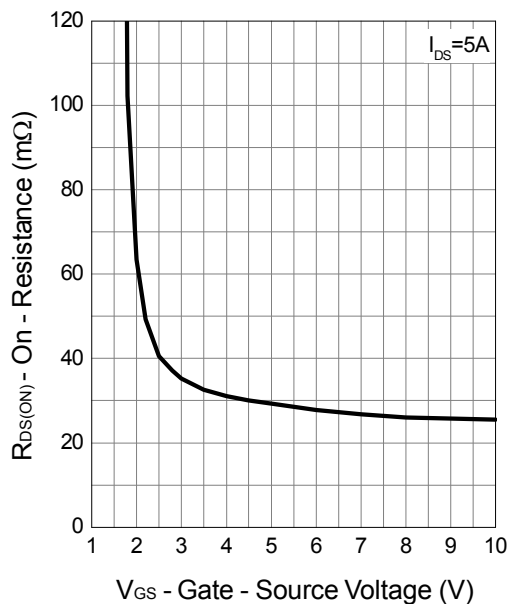
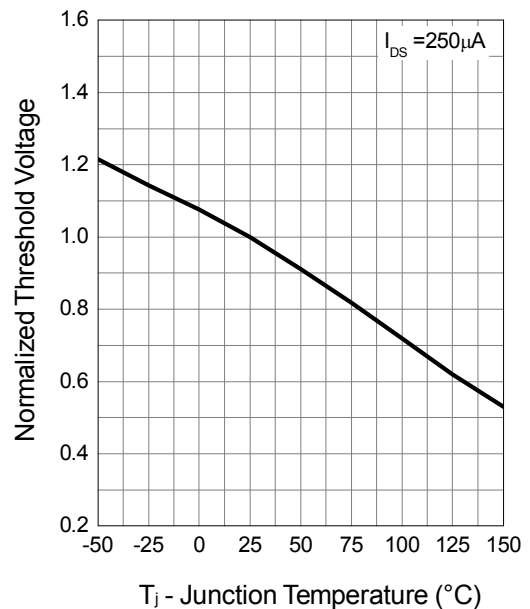
Note a : Pulse test; pulse width≤300μs, duty cycle≤2%.

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

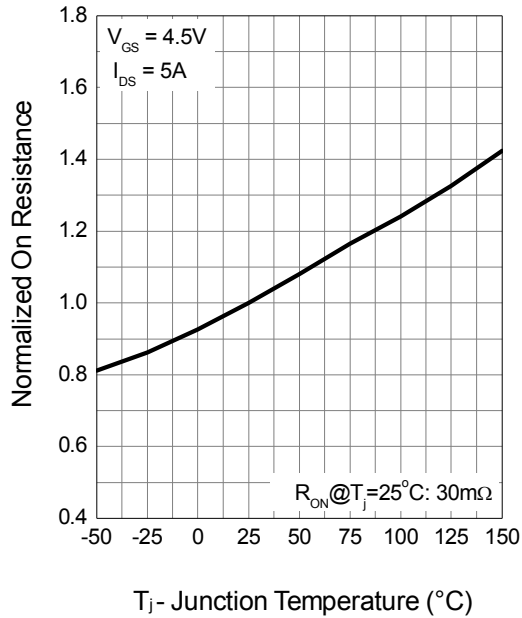
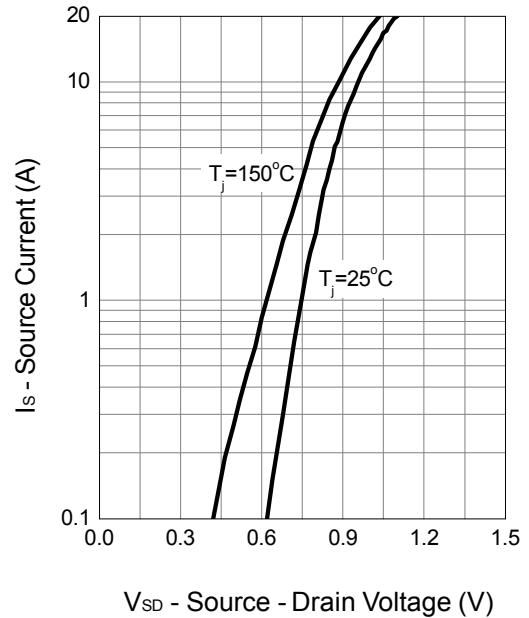
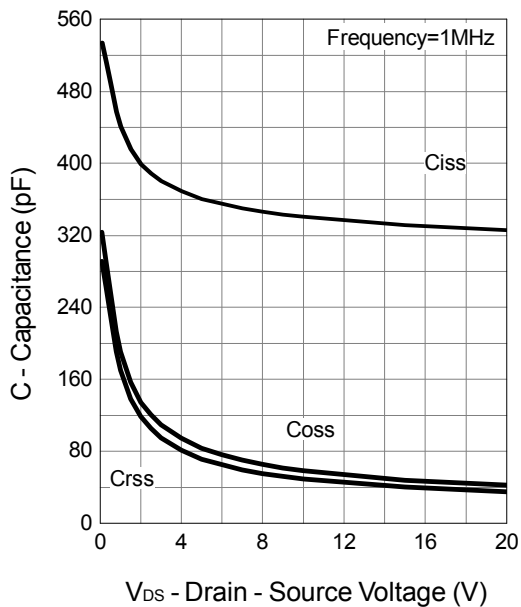
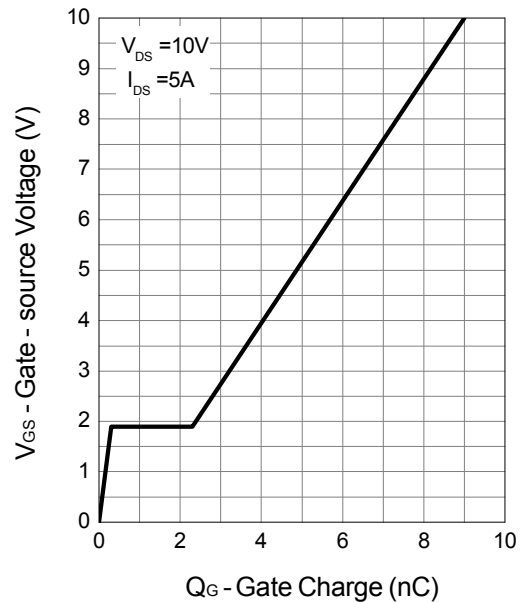
N Channel Typical Operating Characteristics



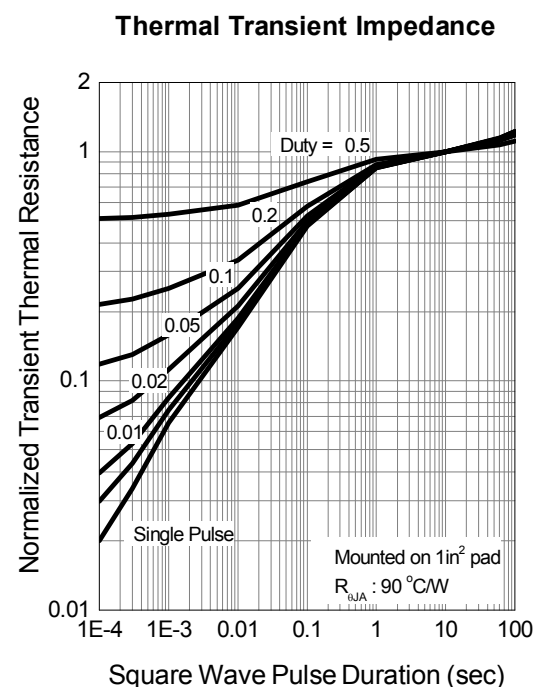
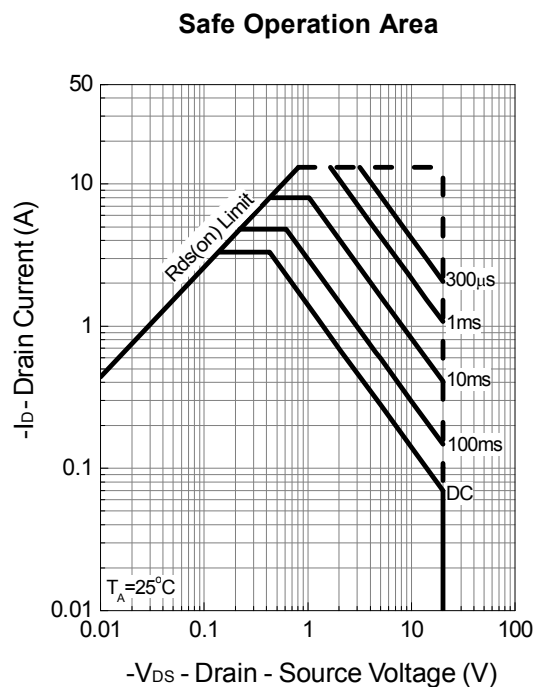
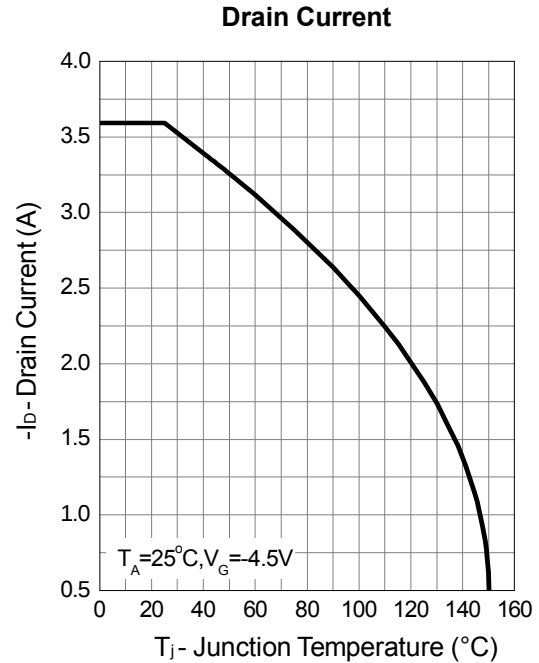
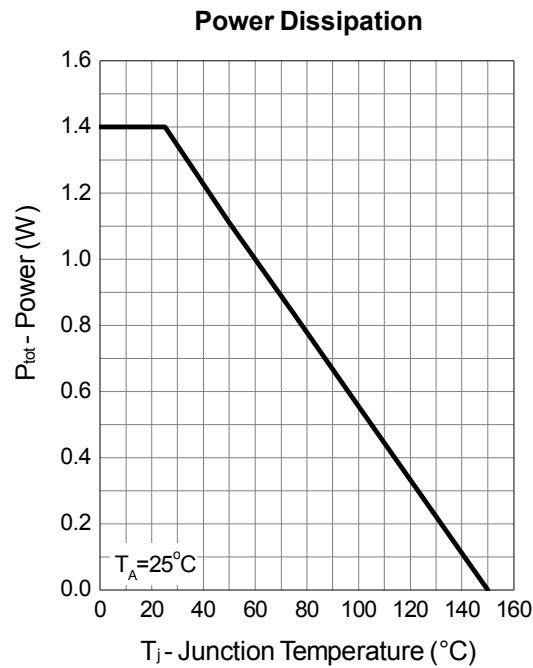
N Channel Typical Operating Characteristics (Cont.)

Output Characteristics

Drain-Source On Resistance

Gate-Source On Resistance

Gate Threshold Voltage


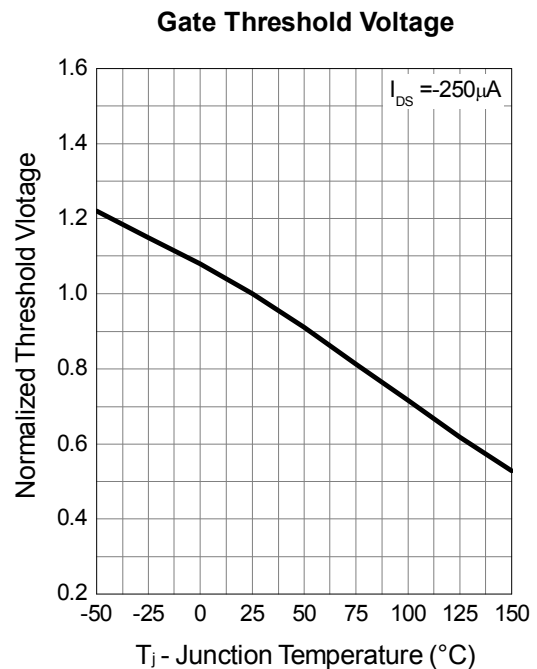
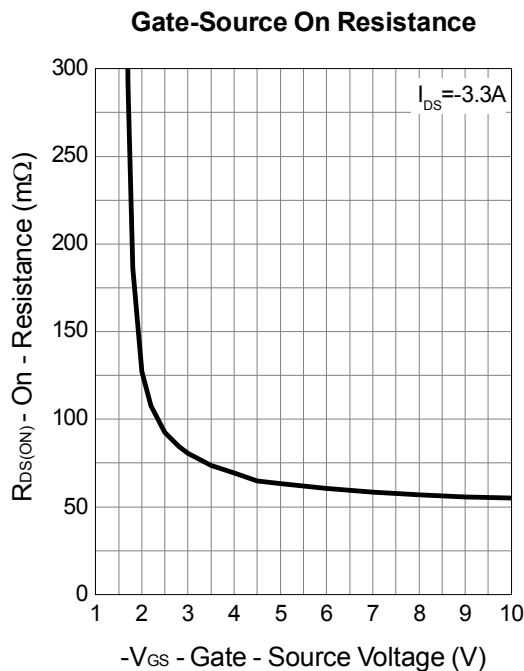
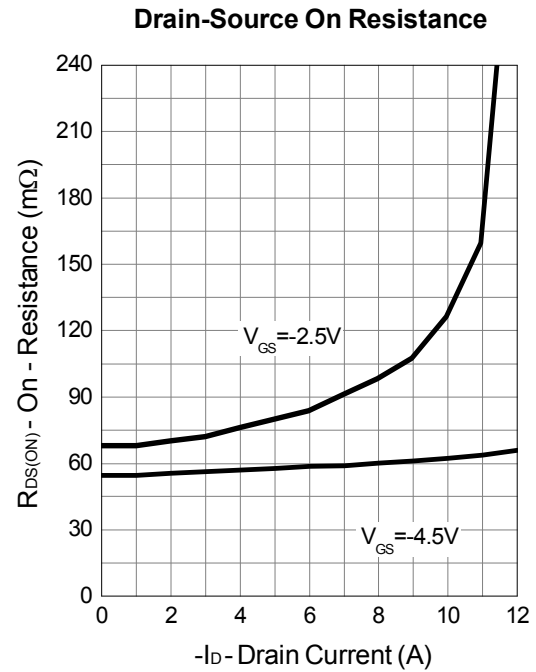
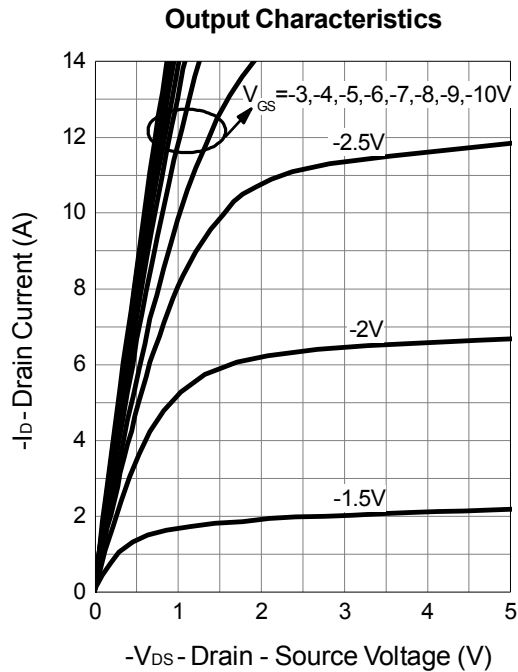
N Channel Typical Operating Characteristics (Cont.)

Drain-Source On Resistance

Source-Drain Diode Forward

Capacitance

Gate Charge


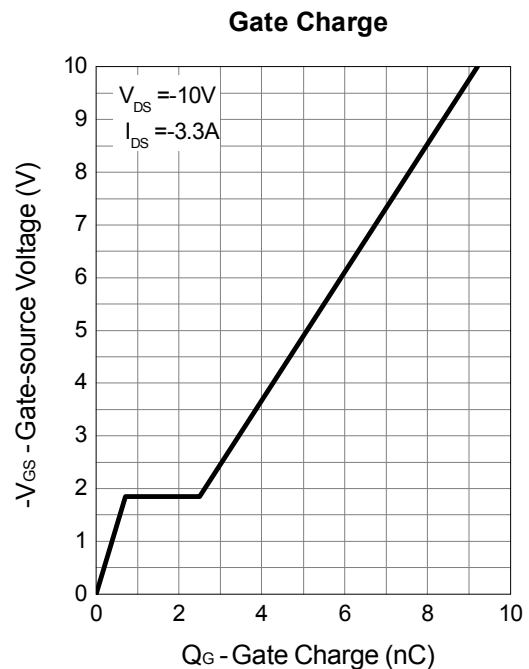
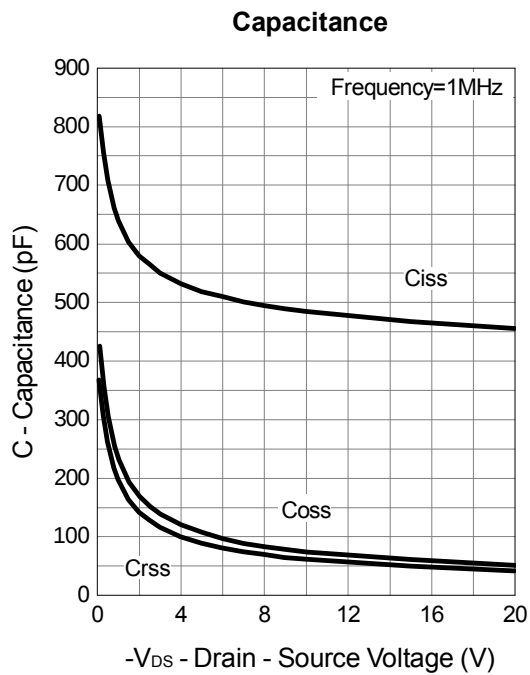
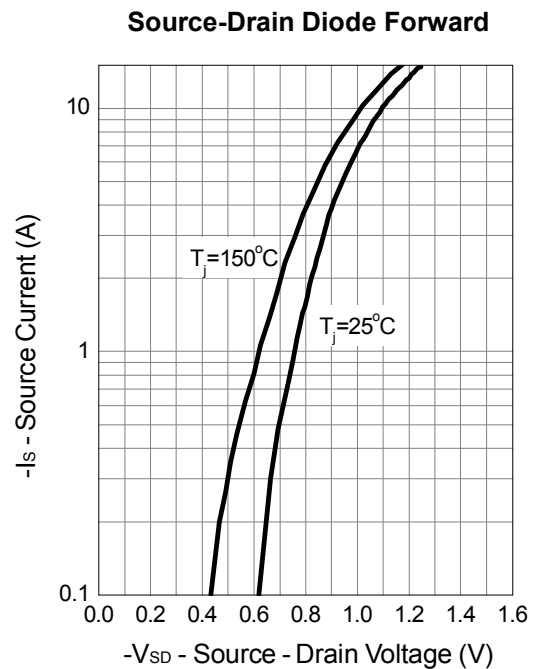
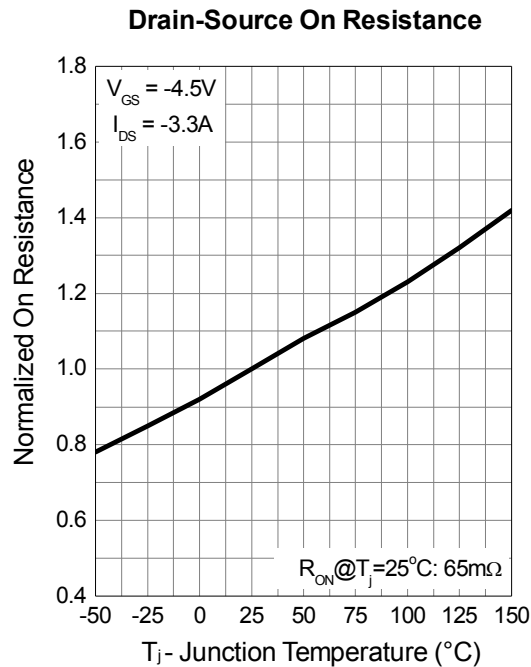
P Channel Typical Operating Characteristics



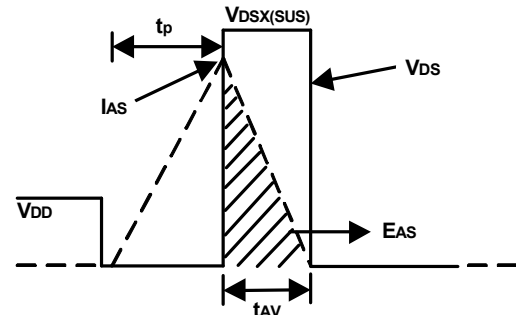
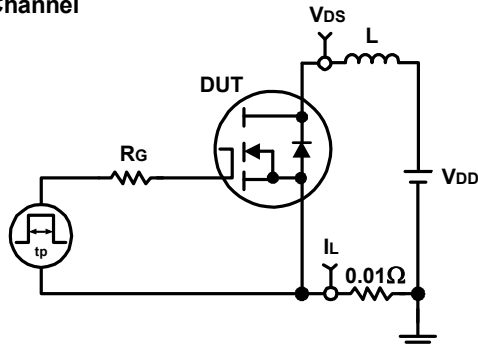
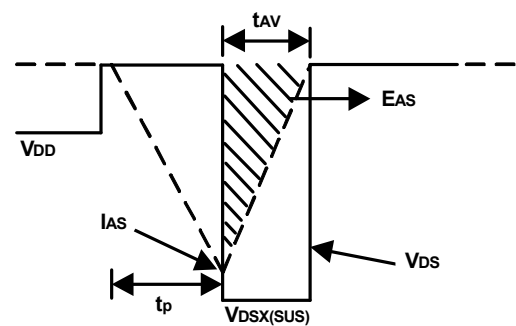
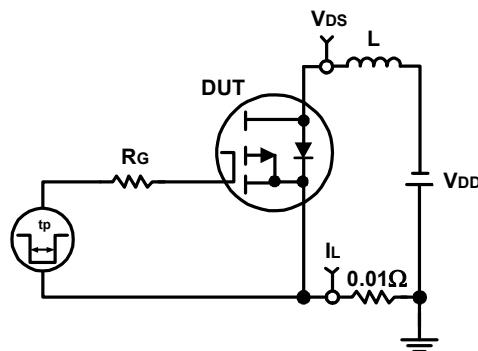
P Channel Typical Operating Characteristics (Cont.)



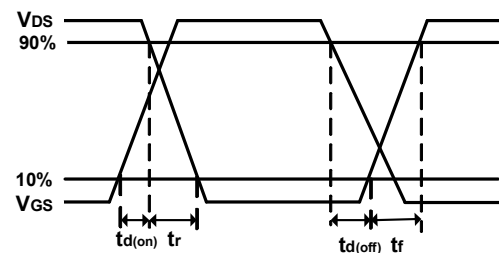
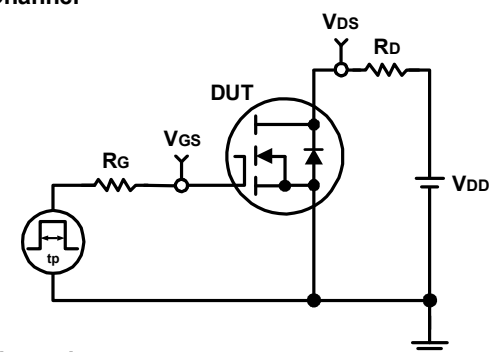
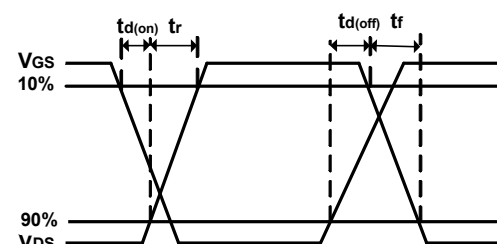
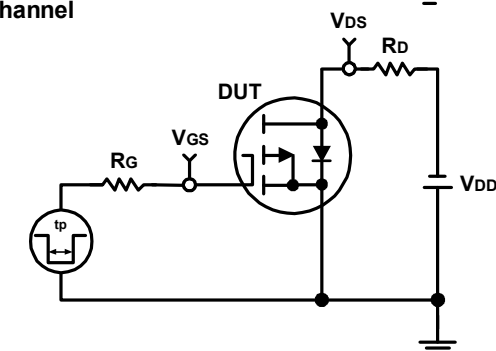
P Channel Typical Operating Characteristics (Cont.)



Avalanche Test Circuit and Waveforms

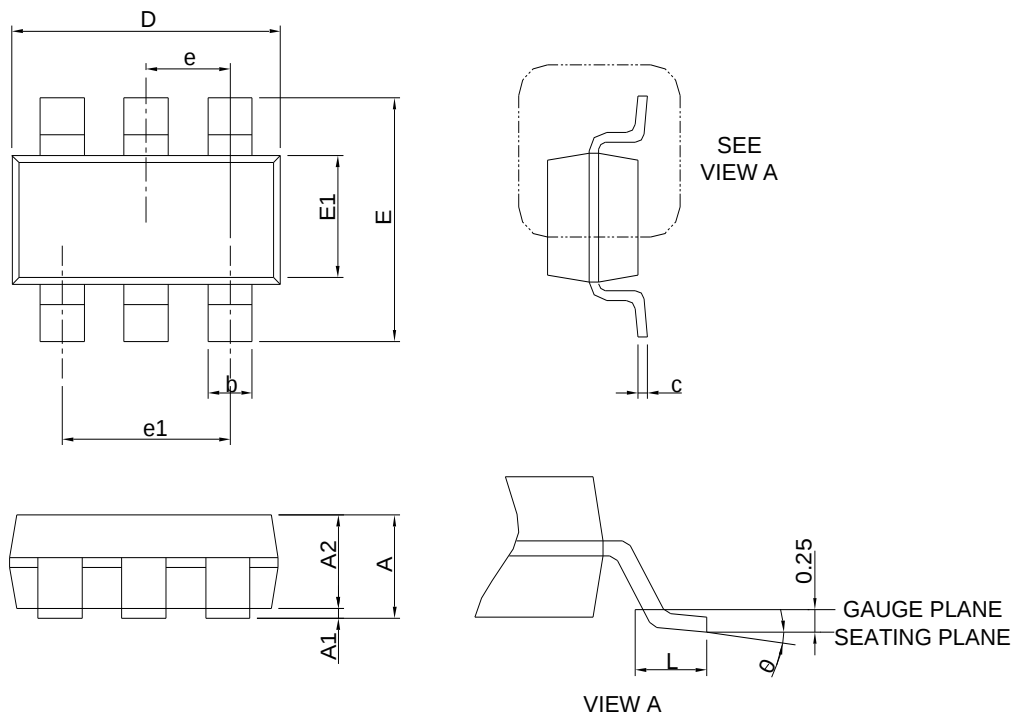
N Channel

P Channel


Switching Time Test Circuit and Waveforms

N Channel

P Channel


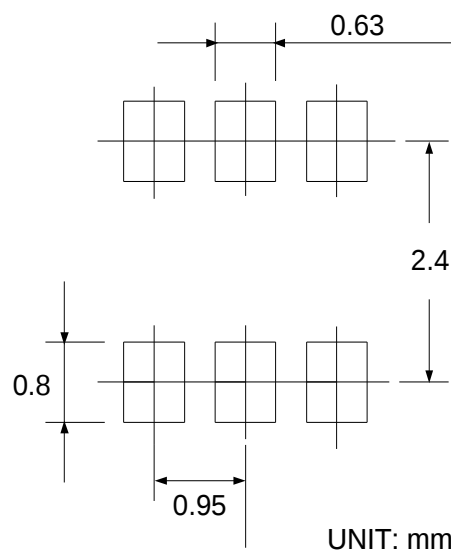
Package Information

SOT-23-6



SYMBOL	SOT-23-6			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	-	1.25	-	0.049
A1	0.00	0.05	0.000	0.002
A2	0.90	1.20	0.035	0.047
b	0.30	0.50	0.012	0.020
c	0.08	0.22	0.003	0.009
D	2.70	3.10	0.106	0.122
E	2.60	3.00	0.102	0.118
E1	1.40	1.80	0.055	0.071
e	0.95 BSC		0.037 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.30	0.60	0.012	0.024
θ	0°	8°	0°	8°

RECOMMENDED LAND PATTERN



Note : 1. Follow JEDEC TO-178 AB.

2. Dimension D and E1 do not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.