

Features

- N-Channel
20V/3A,
 $R_{DS(ON)} = 50m\Omega (typ.) @ V_{GS} = 4.5V$
 $R_{DS(ON)} = 65m\Omega (typ.) @ V_{GS} = 2.5V$
- P-Channel
-20V/-2A,
 $R_{DS(ON)} = 90m\Omega (typ.) @ V_{GS} = -4.5V$
 $R_{DS(ON)} = 130m\Omega (typ.) @ V_{GS} = -2.5V$
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

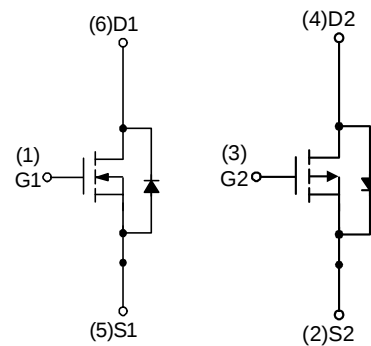
Applications

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

Pin Description



Top View of SOT-23-6



N-Channel MOSFET P-Channel MOSFET

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter		Rating		Unit
			N-Channel	P-Channel	
V _{DSS}	Drain-Source Voltage		20	-20	V
V _{GSS}	Gate-Source Voltage		±12	±12	
I _D *	Continuous Drain Current	V _{GS} =±4.5V	3	-2	A
I _{DM} *	300μs Pulsed Drain Current		12	-8	
I _S *	Diode Continuous Forward Current		1	-1	A
T _J	Maximum Junction Temperature		150		°C
T _{STG}	Storage Temperature Range		-55 to 150		
P _D *	Power Dissipation	T _A =25°C	0.83		W
		T _A =100°C	0.3		
R _{θJA} *	Thermal Resistance-Junction to Ambient		150		°C/W

Note : *Surface Mounted on 1in² pad area, $t \leq 10\text{sec}$.

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

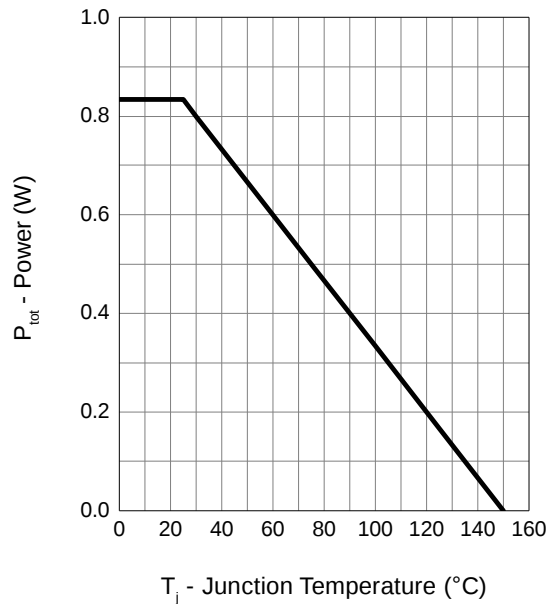
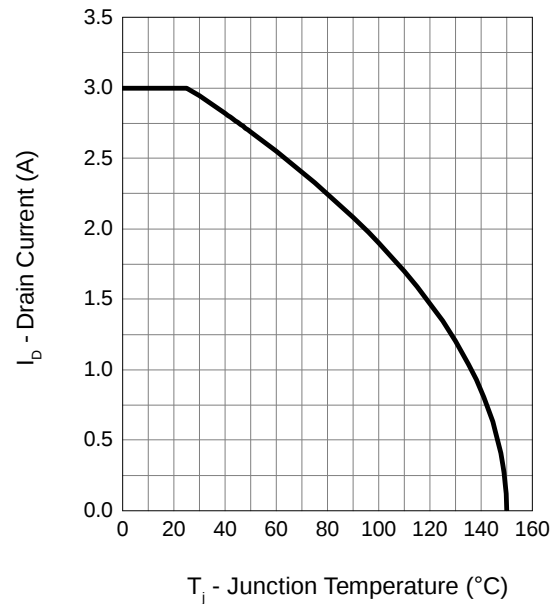
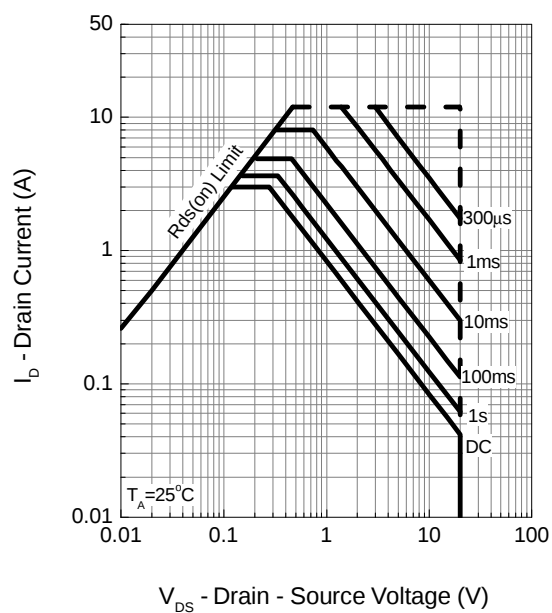
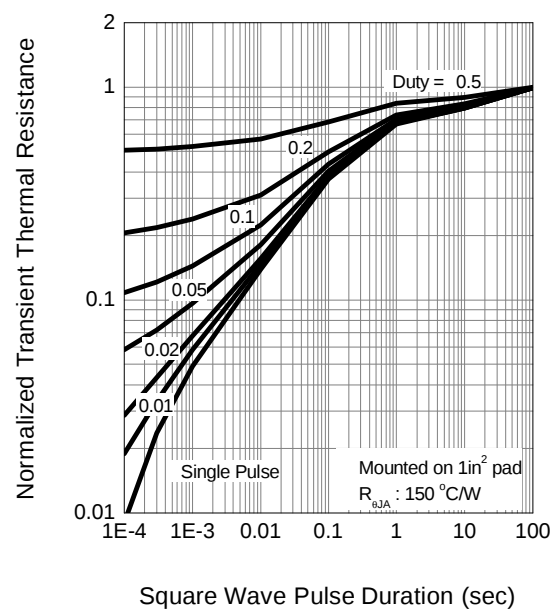
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
Static Characteristics							
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	N-Ch	20	-	-	V
		V _{GS} =0V, I _{DS} =-250μA	P-Ch	-20	-	-	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =16V, V _{GS} =0V T _J =85°C	N-Ch	-	-	1	μA
				-	-	30	
		V _{DS} =-16V, V _{GS} =0V T _J =85°C	P-Ch	-	-	-1	
				-	-	-30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	N-Ch	0.5	0.7	1	V
		V _{DS} =V _{GS} , I _{DS} =-250μA	P-Ch	-0.5	-0.7	-1	
I _{GSS}	Gate Leakage Current	V _{GS} =±10V, V _{DS} =0V	N-Ch	-	-	±10	μA
			P-Ch	-	-	±10	
R _{DS(ON)} ^a	Drain-Source On-State Resistance	V _{GS} =4.5V, I _{DS} =3A	N-Ch	-	50	65	mΩ
		V _{GS} =-4.5V, I _{DS} =-2A	P-Ch	-	90	120	
		V _{GS} =2.5V, I _{DS} =1.7A	N-Ch	-	65	90	
		V _{GS} =-2.5V, I _{DS} =-1A	P-Ch	-	130	180	

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
Diode Characteristics							
V _{SD} ^a	Diode Forward Voltage	I _{SD} =0.5A, V _{GS} =0V	N-Ch	-	0.7	1.3	V
		I _{SD} =-0.5A, V _{GS} =0V	P-Ch	-	-0.7	-1.3	
t _{rr}	Reverse Recovery Time	N-Channel I _{SD} =3A, dI _{SD} /dt=100A/μs	N-Ch	-	11	-	ns
			P-Ch	-	12	-	
Q _{rr}	Reverse Recovery Charge	P-Channel I _{SD} =-2A, dI _{SD} /dt=100A/μs	N-Ch	-	4	-	nC
			P-Ch	-	4	-	
Dynamic Characteristics ^b							
C _{iss}	Input Capacitance	N-Channel V _{GS} =0V, V _{DS} =10V, Frequency=1.0MHz	N-Ch	-	200	-	pF
			P-Ch	-	250	-	
C _{oss}	Output Capacitance	P-Channel V _{GS} =0V, V _{DS} =-10V, Frequency=1.0MHz	N-Ch	-	70	-	
			P-Ch	-	70	-	
C _{rss}	Reverse Transfer Capacitance	N-Channel V _{GS} =0V, V _{DS} =-10V, Frequency=1.0MHz	N-Ch	-	50	-	
			P-Ch	-	50	-	
t _{d(ON)}	Turn-on Delay Time	N-Channel V _{DD} =10V, R _L =10Ω, I _{DS} =1A, V _{GEN} =4.5V, R _G =6Ω	N-Ch	-	4	8	ns
			P-Ch	-	6	12	
T _r	Turn-on Rise Time	P-Channel V _{DD} =-10V, R _L =10Ω, I _{DS} =-1A, V _{GEN} =-4.5V, R _G =6Ω	N-Ch	-	14	26	
			P-Ch	-	14	26	
t _{d(OFF)}	Turn-off Delay Time	N-Channel V _{DD} =10V, R _L =10Ω, I _{DS} =1A, V _{GEN} =4.5V, R _G =6Ω	N-Ch	-	21	39	
			P-Ch	-	27	50	
T _f	Turn-off Fall Time	P-Channel V _{DD} =-10V, R _L =10Ω, I _{DS} =-1A, V _{GEN} =-4.5V, R _G =6Ω	N-Ch	-	5	10	
			P-Ch	-	5	10	
Gate Charge Characteristics ^b							
Q _g	Total Gate Charge	N-Channel V _{DS} =10V, V _{GS} =4.5V, I _{DS} =3A	N-Ch	-	4.1	6	nC
			P-Ch	-	4.2	6	
Q _{gs}	Gate-Source Charge	P-Channel V _{DS} =-10V, V _{GS} =-4.5V, I _{DS} =-2A	N-Ch	-	0.4	-	
			P-Ch	-	0.6	-	
Q _{gd}	Gate-Drain Charge	N-Channel V _{DS} =10V, V _{GS} =4.5V, I _{DS} =3A	N-Ch	-	1.7	-	
			P-Ch	-	1.3	-	

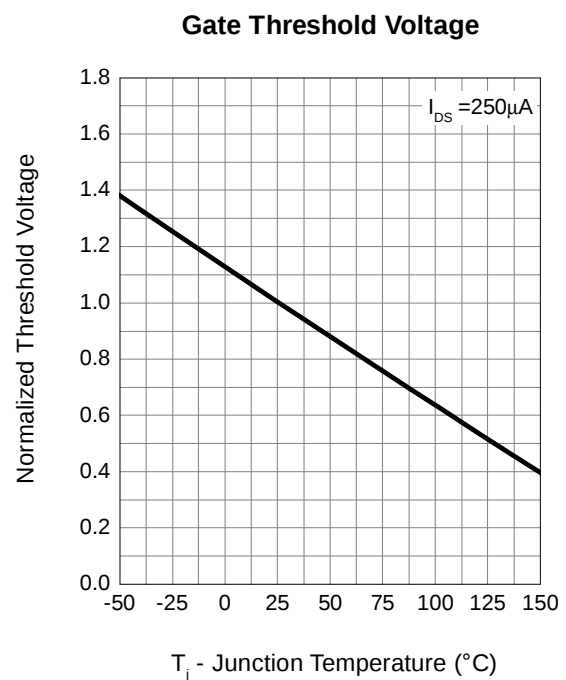
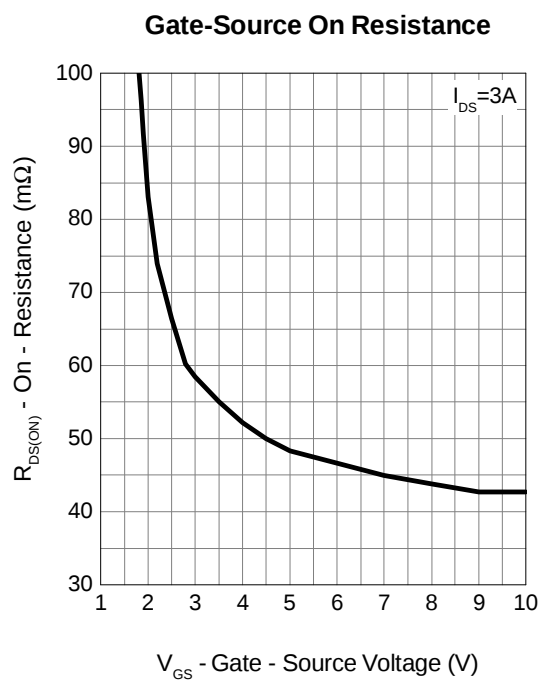
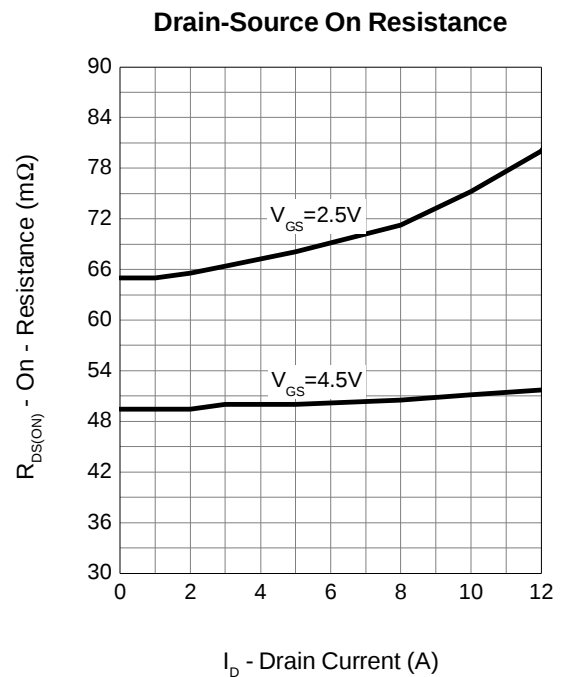
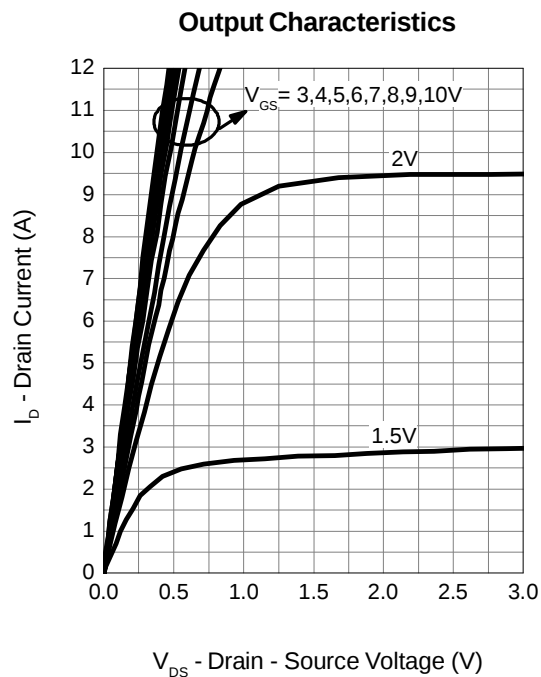
Typical Operating Characteristics

N-Channel

Power Dissipation

Drain Current

Safe Operation Area

Thermal Transient Impedance


Typical Operating Characteristics (Cont.)

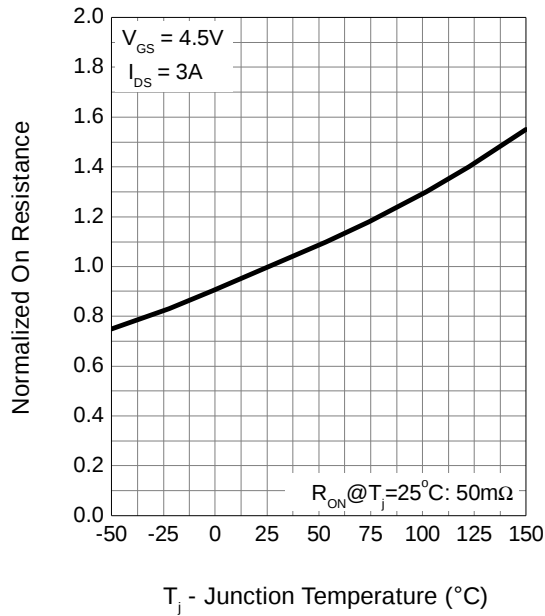
N-Channel



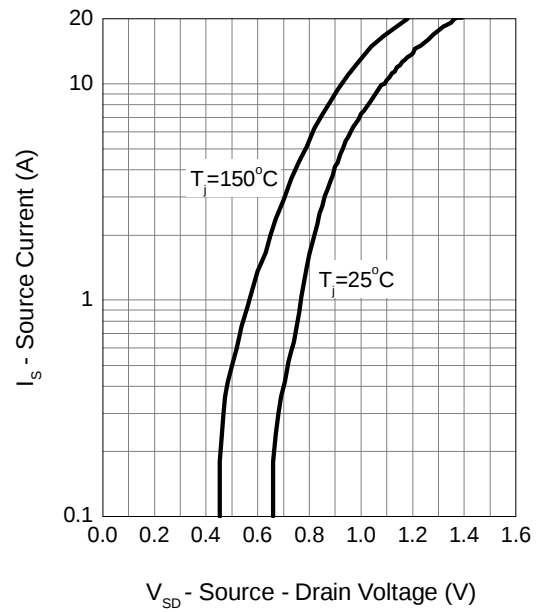
Typical Operating Characteristics (Cont.)

N-Channel

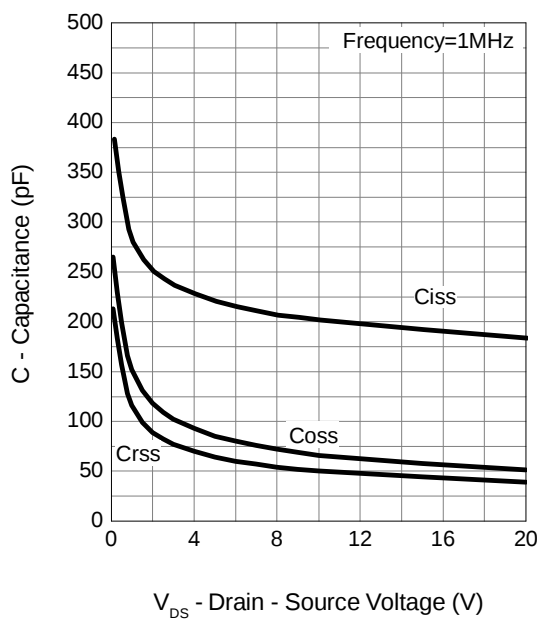
Drain-Source On Resistance



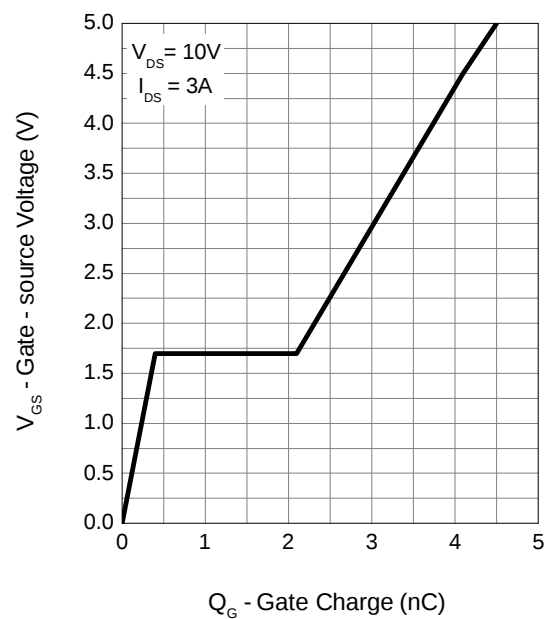
Source-Drain Diode Forward



Capacitance



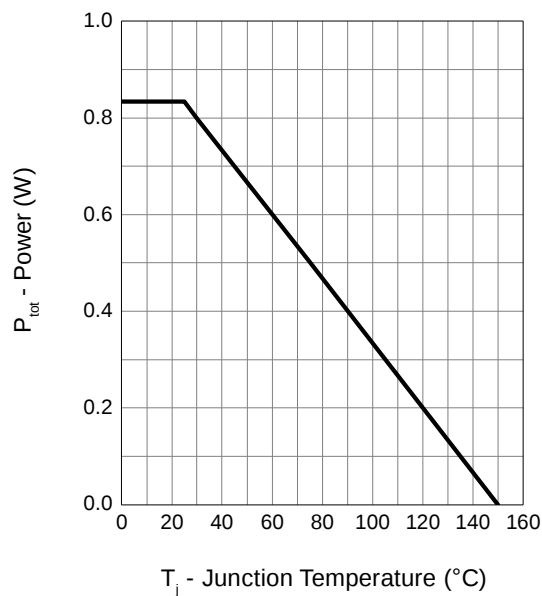
Gate Charge



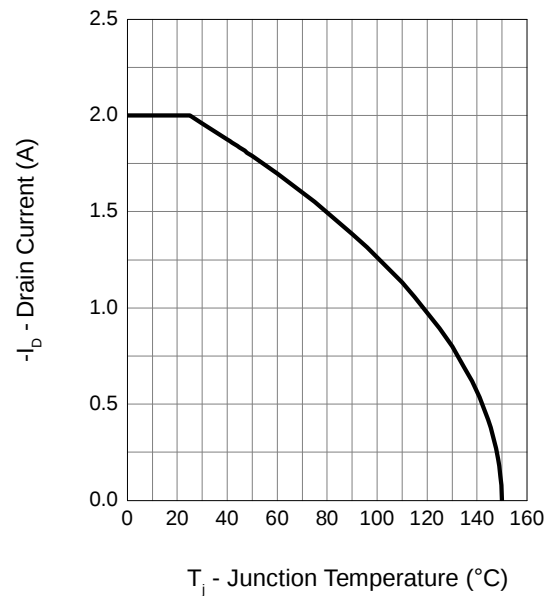
Typical Operating Characteristics (Cont.)

P-Channel

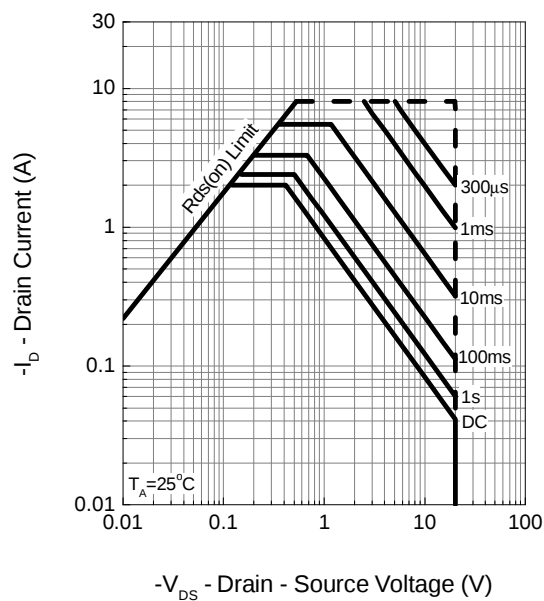
Power Dissipation



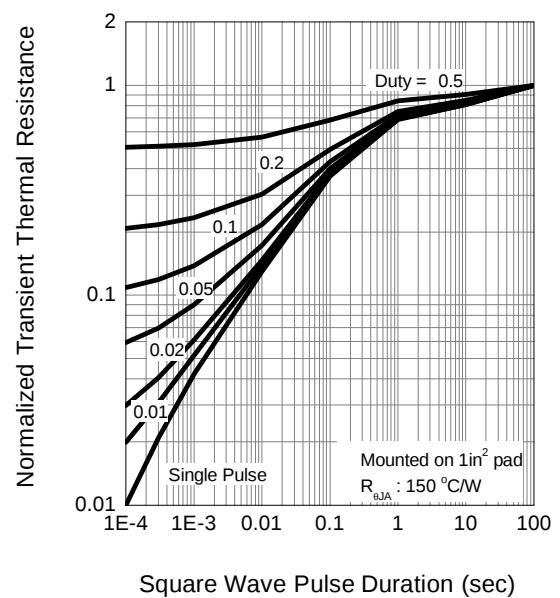
Drain Current



Safe Operation Area



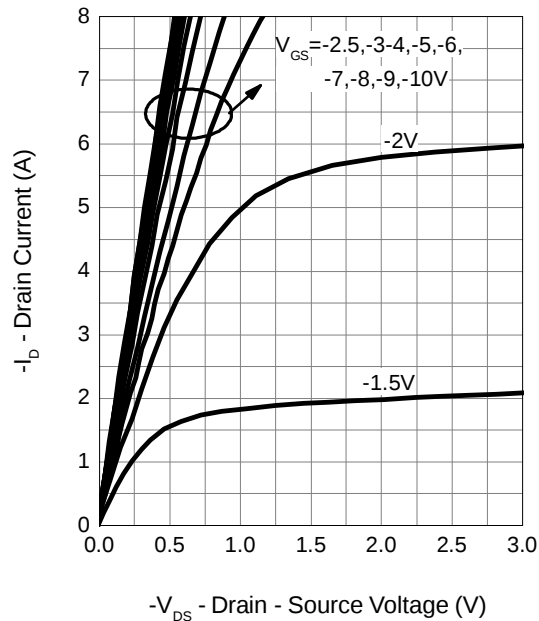
Thermal Transient Impedance



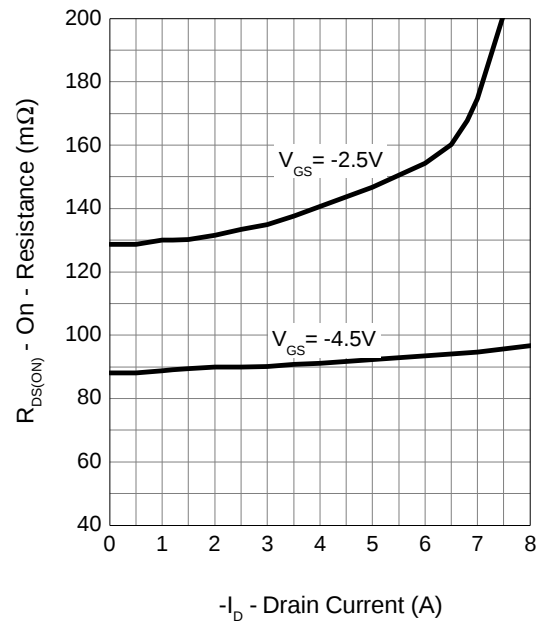
Typical Operating Characteristics (Cont.)

P-Channel

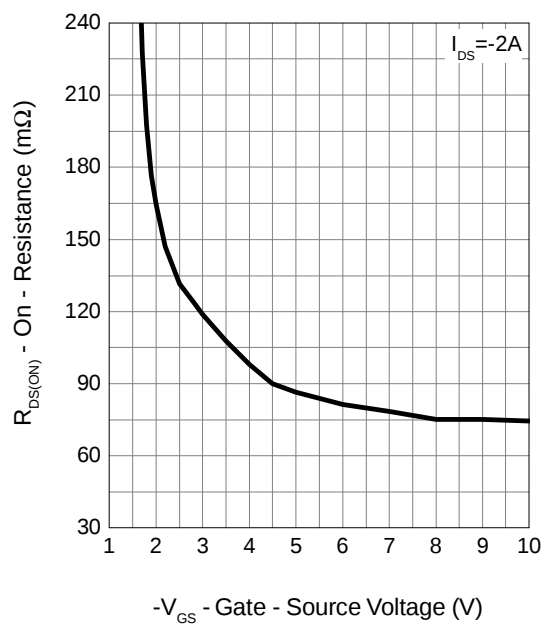
Output Characteristics



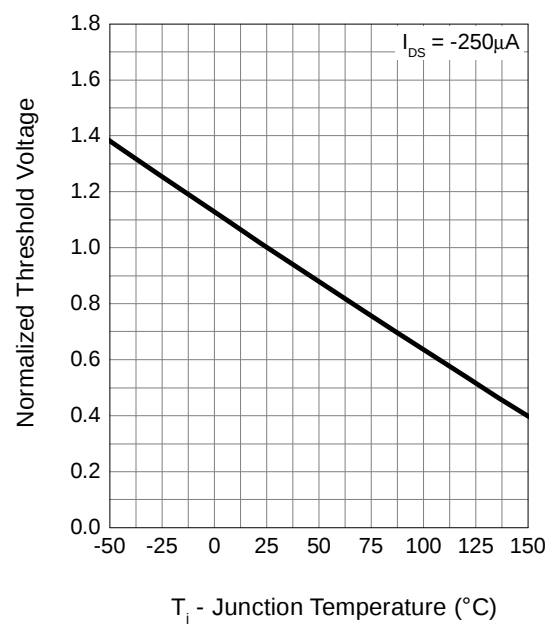
Drain-Source On Resistance



Gate-Source On Resistance



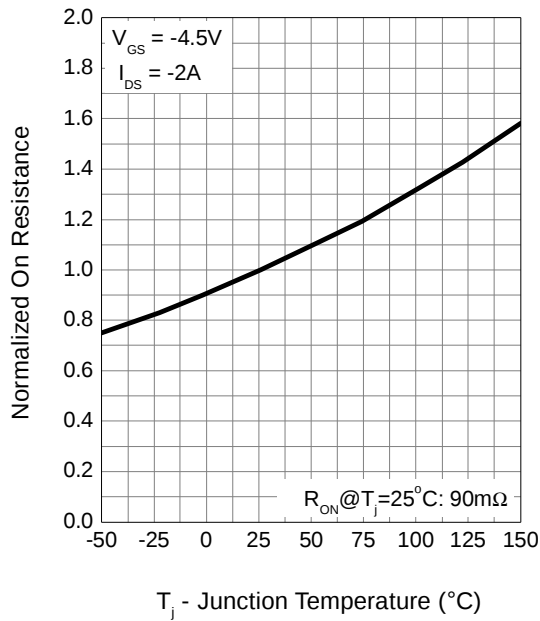
Gate Threshold Voltage



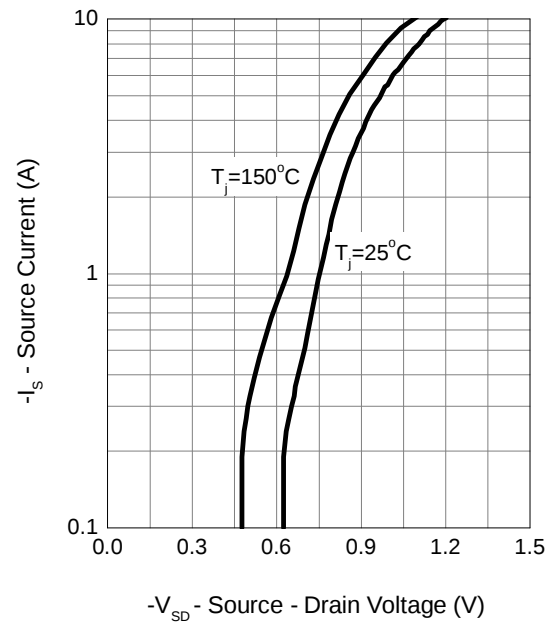
Typical Operating Characteristics (Cont.)

P-Channel

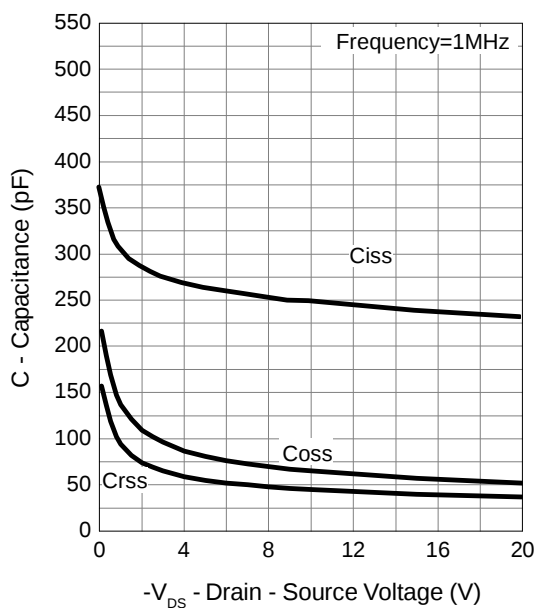
Drain-Source On Resistance



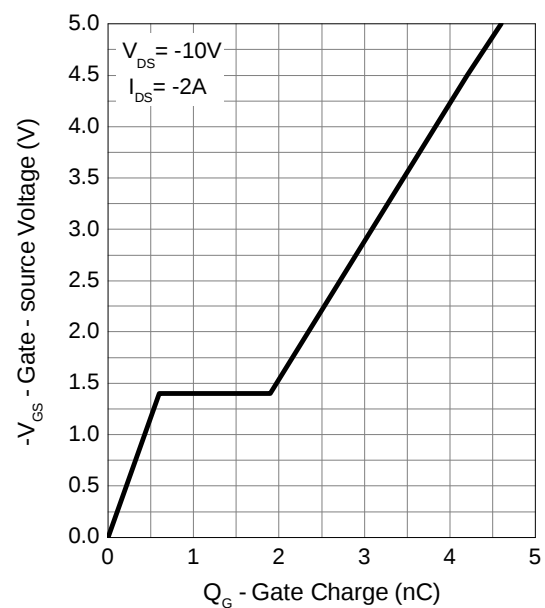
Source-Drain Diode Forward



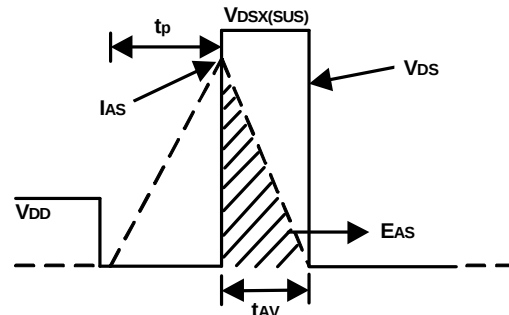
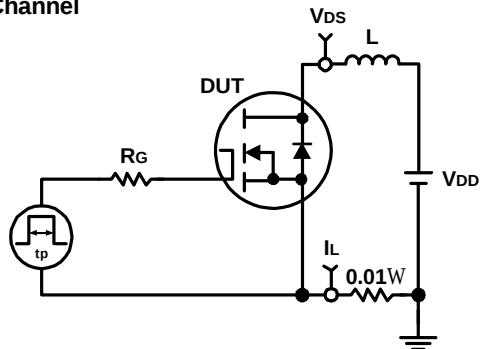
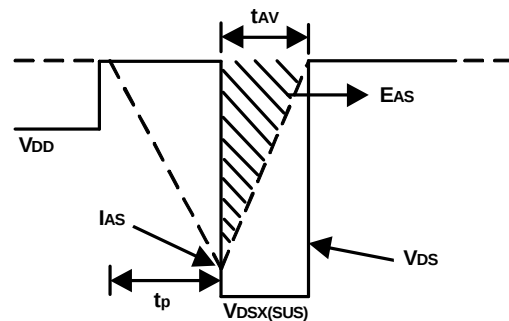
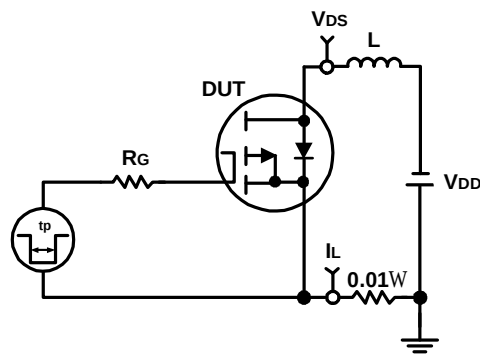
Capacitance



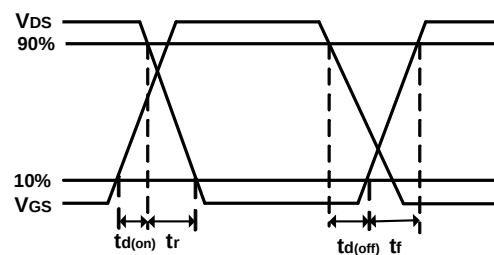
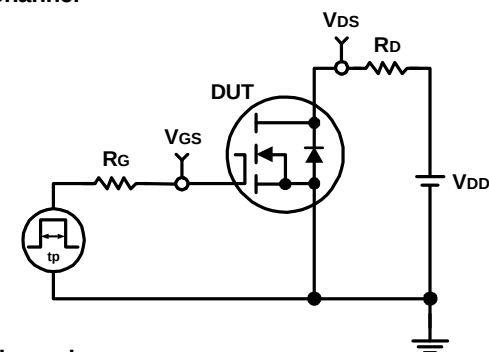
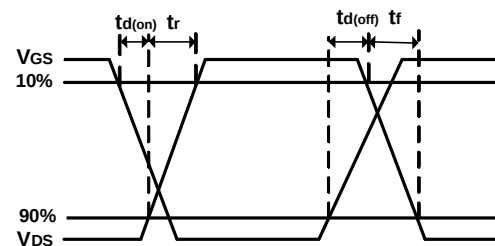
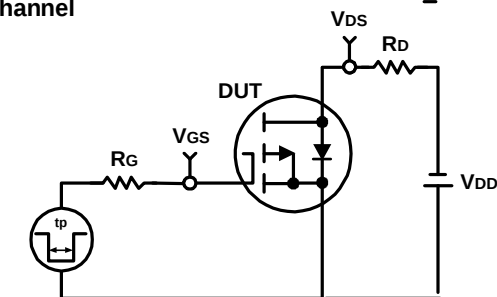
Gate Charge



Avalanche Test Circuit and Waveforms

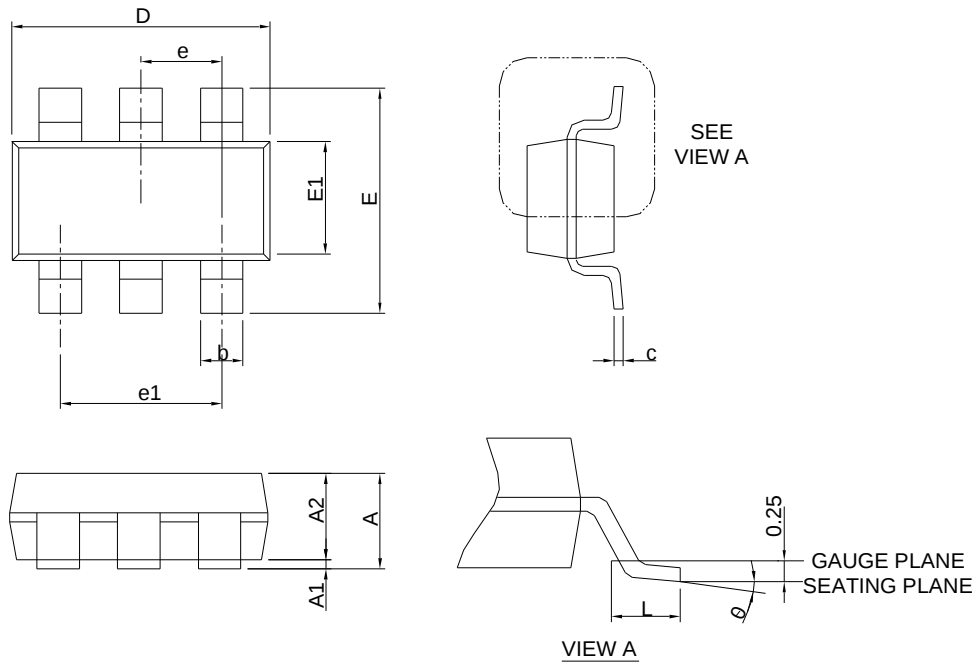
N Channel

P Channel


Switching Time Test Circuit and Waveforms

N Channel

P Channel


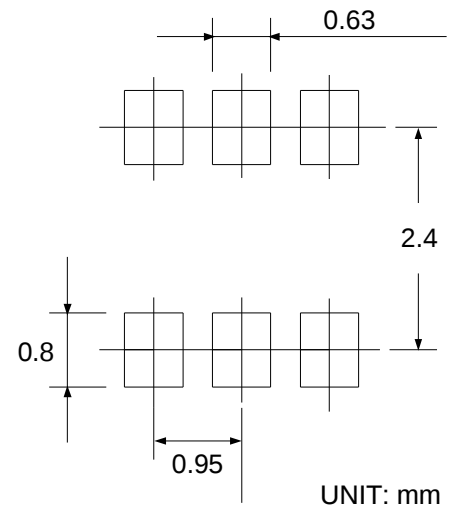
Package Information

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.