

## N-Channel Enhancement Mode Power MOSFET

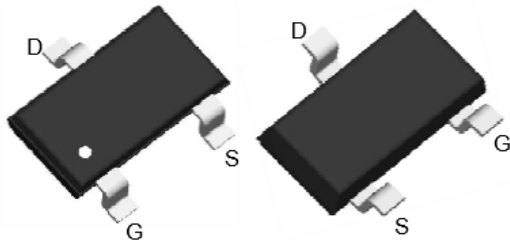
- **Features**

$V_{DS}$	$R_{DS(ON)TYP}$	$I_D$
20V	10.7mΩ@4.5V	7.5A
	12.8mΩ@2.5V	
	18.2mΩ@1.8V	

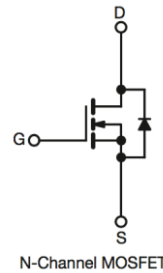
- **General Description**

- Power Management

- **Pin Configurations**



SOT23-3



- **Absolute Maximum Ratings @ $T_A=25^\circ\text{C}$  unless otherwise noted**

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DSS}$	20	V
Gate-Source Voltage	$V_{GSS}$	$\pm 12$	V
Drain Current (Continuous) *AC	$I_D$	$T_A=25^\circ\text{C}$	7.5
		$T_A=70^\circ\text{C}$	4.5
Drain Current (Pulse) *B	$I_{DM}$	24	A
Power Dissipation	$P_D$	1.25	W
Operating Temperature/ Storage Temperature	$T_J/T_{STG}$	-55~150	$^\circ\text{C}$

- **Thermal Resistance Ratings**

Parameter	Symbol	Limit	Unit
Maximum Junction-to-Ambient	$R_{thJA}$	100	$^\circ\text{C/W}$

## Electrical Characteristics

$T_A=25^\circ\text{C}$  unless otherwise noted

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250 \mu A$	20	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20V, V_{GS} = 0V$	--	--	1	$\mu A$
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_{DS} = 250 \mu A$	0.4	0.63	1	V
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 12V, V_{DS} = 0V$	--	--	$\pm 100$	nA
Drain-Source On-state Resistance	$R_{DS(on)}$	$V_{GS} = 4.5V, I_D = 6A$	--	10.7	14	m $\Omega$
	$R_{DS(on)}$	$V_{GS} = 2.5V, I_D = 4A$	--	12.8	17	m $\Omega$
	$R_{DS(on)}$	$V_{GS} = 1.8V, I_D = 2A$	--	18.2	24	m $\Omega$
Diode Forward Voltage	$V_{SD}$	$I_{SD} = 1A, V_{GS} = 0V$	--	--	1	V
Diode Forward Current *AC	$I_S$	$T_A = 25^\circ\text{C}$	--	--	7.5	A
<b>Switching</b>						
Total Gate Charge	$Q_g$	$V_{DS} = 16V, V_{GS} = 4.5V,$ $I_{DS} = 6A$	--	10	--	nC
Gate-Source Charge	$Q_{gs}$		--	1.6	--	nC
Gate-Drain Charge	$Q_{gd}$		--	3.4	--	nC
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 10V, I_{DS} = 6A,$ $V_{GEN} = 4.5V, R_G = 6 \Omega$	--	8	--	ns
Turn-on Rise Time	$t_r$		--	15	--	ns
Turn-off Delay Time	$t_{d(off)}$		--	33	--	ns
Turn-Off Fall Time	$t_f$		--	13	--	ns
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 10V, V_{GS} = 0V, f = 1.0\text{MHz}$	--	590	--	pF
Output Capacitance	$C_{oss}$		--	125	--	pF
Reverse Transfer Capacitance	$C_{rss}$		--	90	--	pF

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The current rating is based on the  $t \leq 10\text{s}$  junction to ambient thermal resistance rating.

# Typical Electrical and Thermal Characteristics

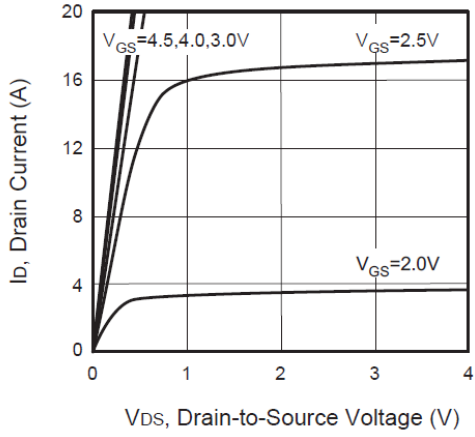


Figure 1. Output Characteristics

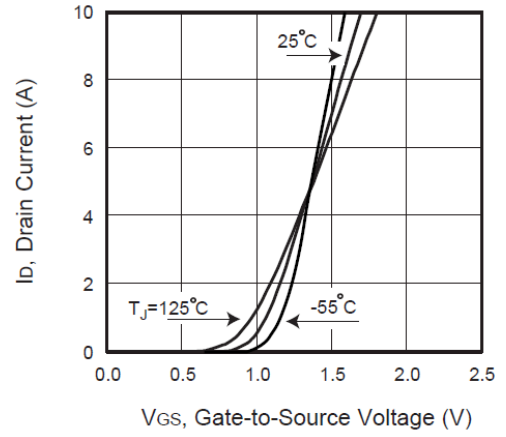


Figure 2. Transfer Characteristics

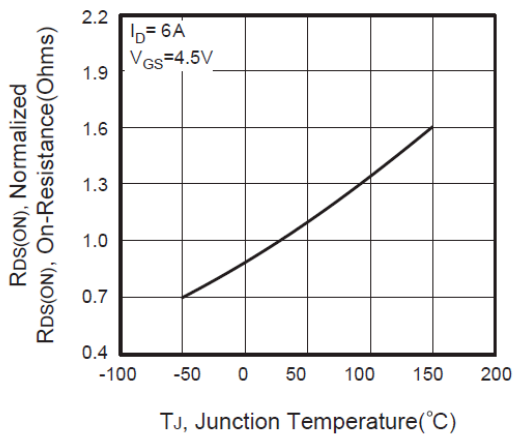


Figure 3. On-Resistance Variation with Temperature

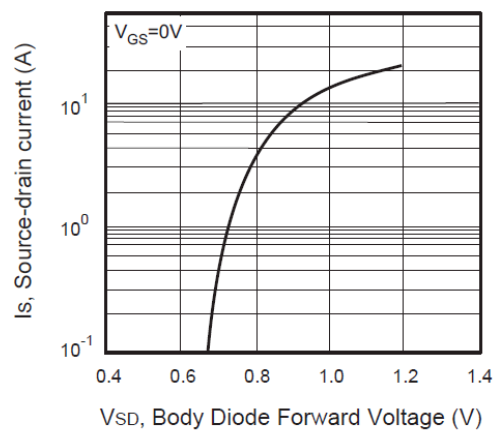


Figure 4. Body Diode Forward Voltage Variation with Source Current

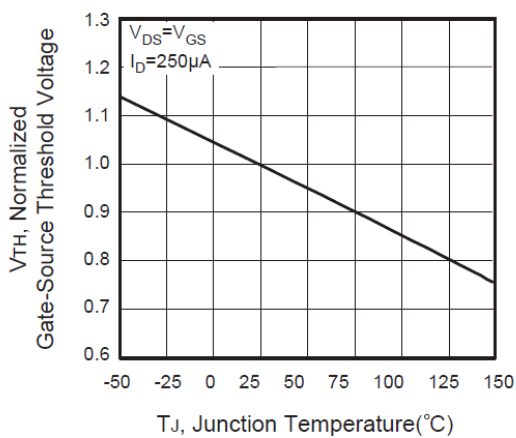


Figure 5. Gate Threshold Variation with Temperature

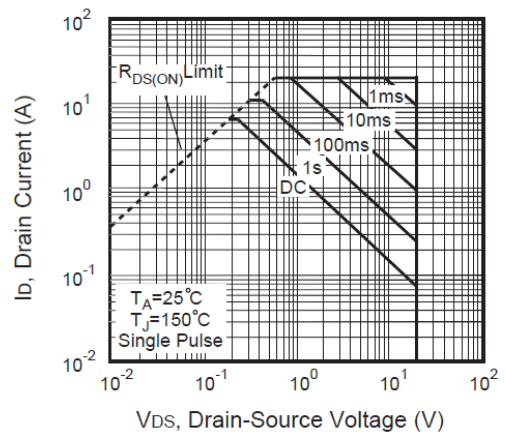


Figure 6. Maximum Safe Operating Area

# Typical Electrical and Thermal Characteristics

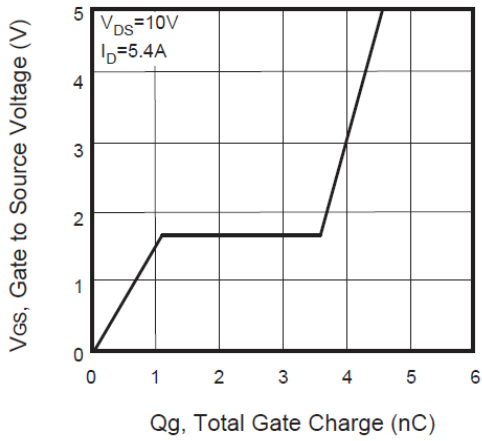


Figure 7. Gate Charge

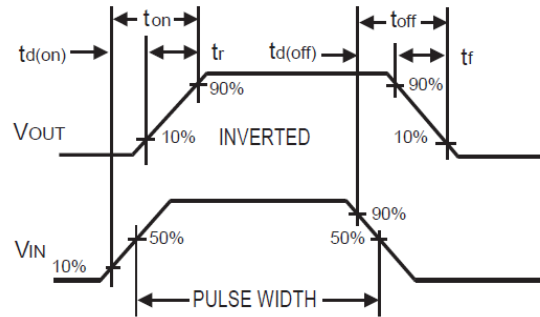


Figure 8. Switching Waveforms

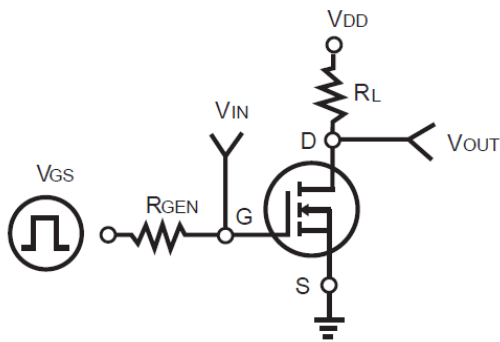


Figure 9. Switching Test Circuit

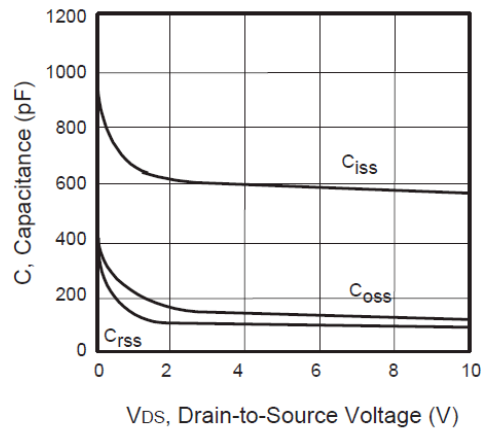


Figure 10. Capacitance

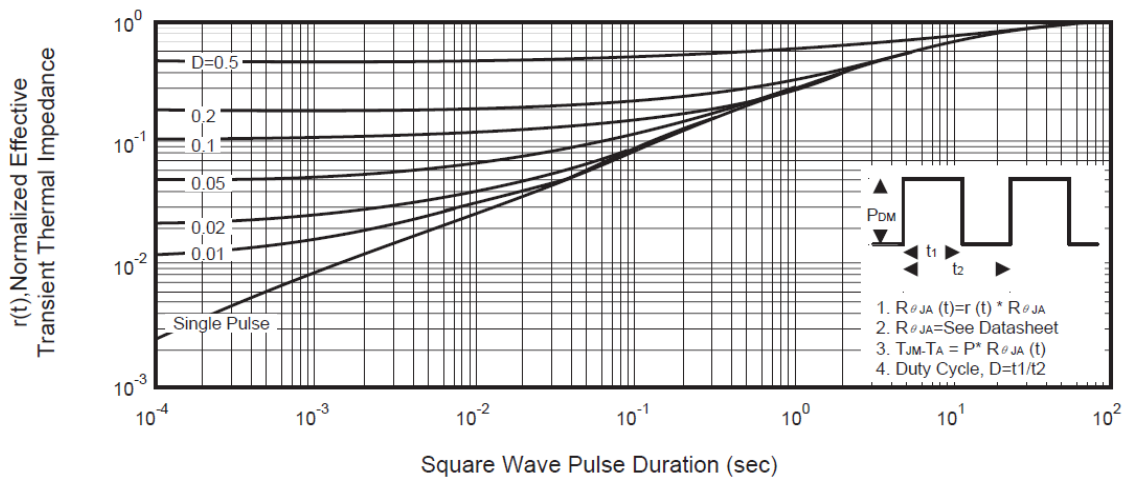
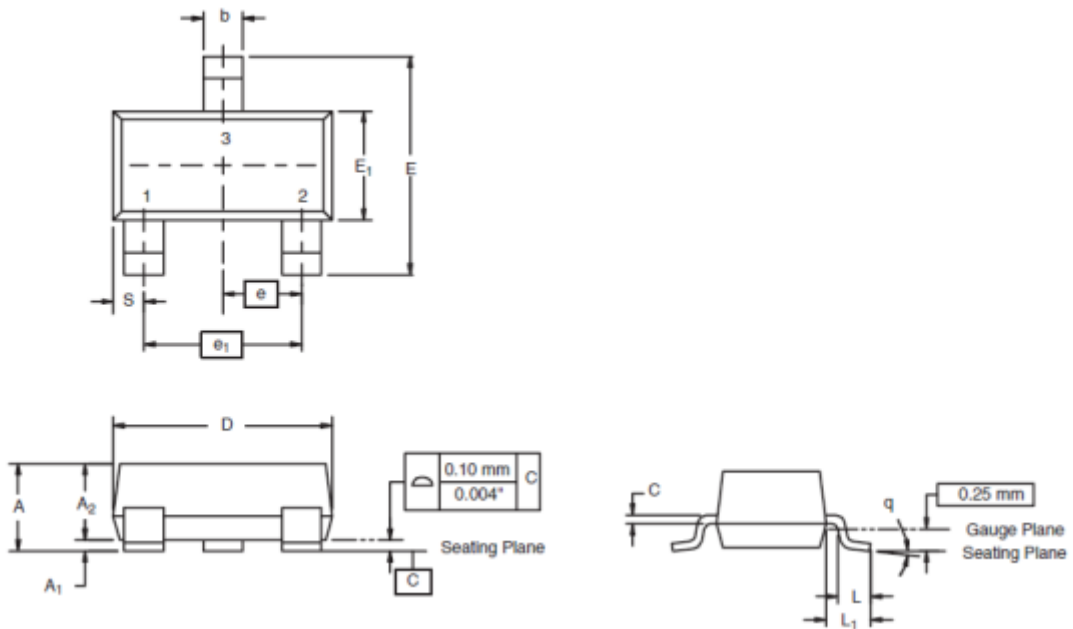


Figure 11. Normalized Thermal Transient Impedance Curve

# Package Information



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A <sub>1</sub>	0.01	0.10	0.0004	0.004
A <sub>2</sub>	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.60	3.00	0.102	0.118
E <sub>1</sub>	1.40	1.80	0.055	0.071
e	0.95 BSC		0.0374 Ref	
e <sub>1</sub>	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L <sub>1</sub>	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°