

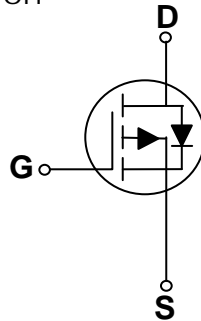
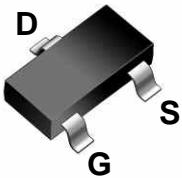
## 20V P-Channel MOSFETs

### General Description

These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BVDSS	RDSON	ID
-20V	33mΩ	-5.8A

### SOT23-3S Pin Configuration



### Features

- -20V,-5.8A,  $R_{DS(ON)} = 33m\Omega @ V_{GS} = -4.5V$
- Improved  $dv/dt$  capability
- Fast switching
- Green Device Available
- Suit for -1.8V Gate Drive Applications

### Applications

- Notebook
- Load Switch
- Battery Protection
- Hand-held Instruments

Absolute Maximum Ratings  $T_c=25^\circ C$  unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 10$	V
$I_D$	Drain Current – Continuous ( $T_c=25^\circ C$ )	-5.8	A
	Drain Current – Continuous ( $T_c=100^\circ C$ )	-3.7	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	-23.2	A
$P_D$	Power Dissipation ( $T_c=25^\circ C$ )	1.56	W
	Power Dissipation – Derate above $25^\circ C$	0.012	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	80	$^\circ C/W$

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

### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	---	-0.02	---	V/ $^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu A$
		$V_{DS}=-16V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 10V, V_{DS}=0V$	---	---	$\pm 100$	nA

### On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-4A$	---	28	33	m $\Omega$
		$V_{GS}=-2.5V, I_D=-3A$	---	37	45	
		$V_{GS}=-1.8V, I_D=-2A$	---	49	65	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.3	-0.6	-1	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	2	---	mV/ $^\circ\text{C}$
gfs	Forward Transconductance	$V_{DS}=-10V, I_S=-3A$	---	8.4	---	S

### Dynamic and switching Characteristics

$Q_g$	Total Gate Charge <sup>2,3</sup>	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-4A$	---	16.1	25	nC
$Q_{gs}$	Gate-Source Charge <sup>2,3</sup>		---	1.8	3	
$Q_{gd}$	Gate-Drain Charge <sup>2,3</sup>		---	3.8	7	
$T_{d(on)}$	Turn-On Delay Time <sup>2,3</sup>	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=25\Omega$ $I_D=-1A$	---	8.2	16	nS
$T_r$	Rise Time <sup>2,3</sup>		---	30	57	
$T_{d(off)}$	Turn-Off Delay Time <sup>2,3</sup>		---	71.1	135	
$T_f$	Fall Time <sup>2,3</sup>		---	19.8	38	
$C_{iss}$	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, F=1\text{MHz}$	---	1440	2100	pF
$C_{oss}$	Output Capacitance		---	155	230	
$C_{rss}$	Reverse Transfer Capacitance		---	115	170	

### Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	---	-5.8	A
$I_{SM}$	Pulsed Source Current		---	---	-23.2	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

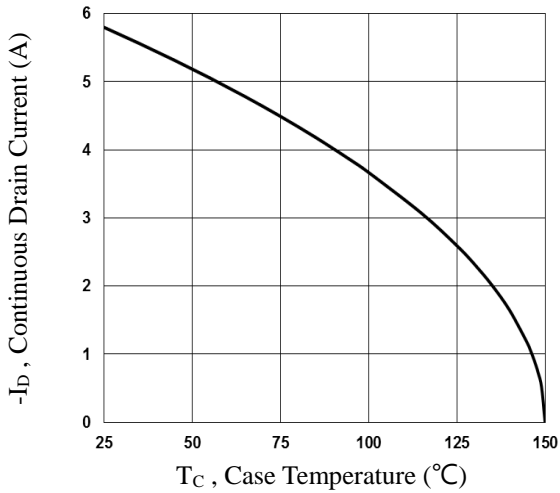


Fig.1 Continuous Drain Current vs.  $T_c$

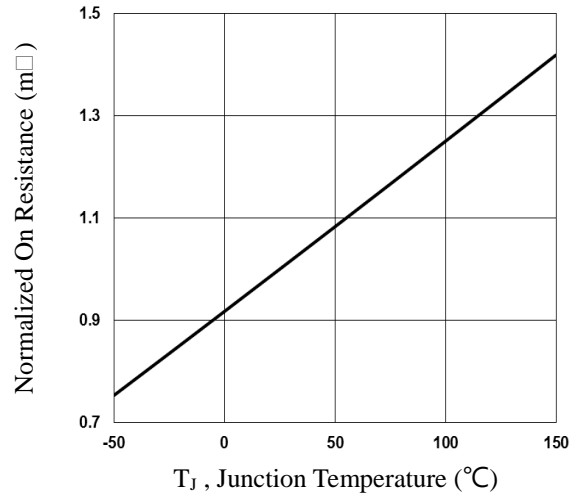


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$

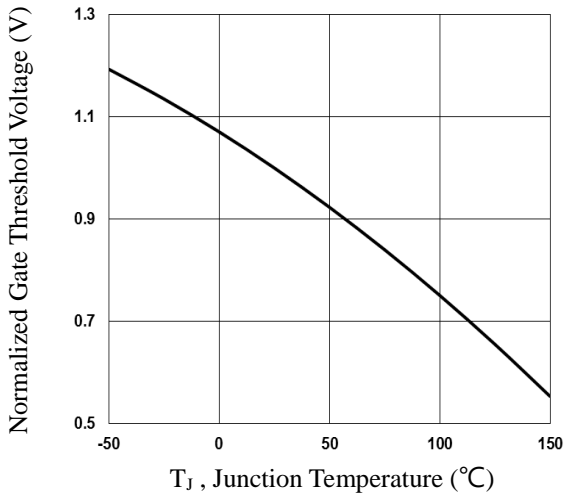


Fig.3 Normalized  $V_{th}$  vs.  $T_j$

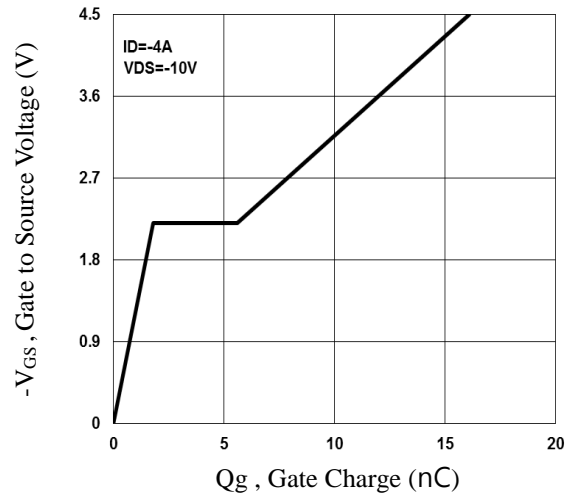


Fig.4 Gate Charge Waveform

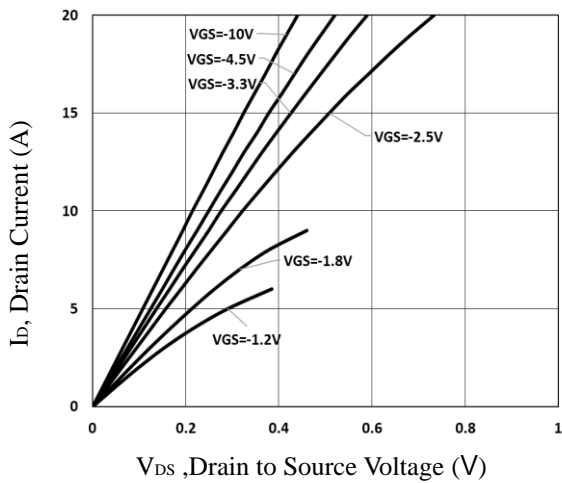


Fig.5 Typical Output Characteristics

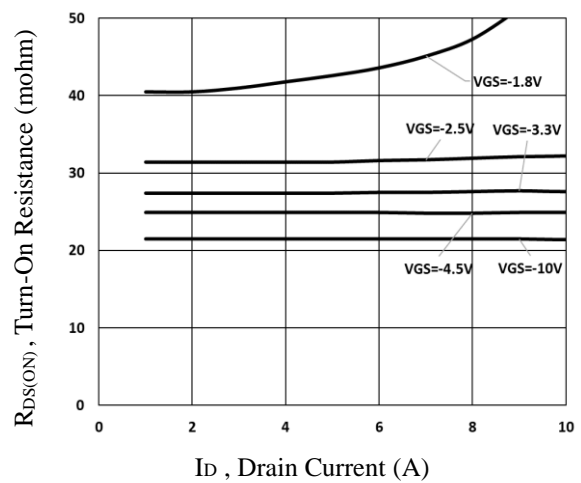


Fig.6 Turn-On Resistance vs.  $I_d$

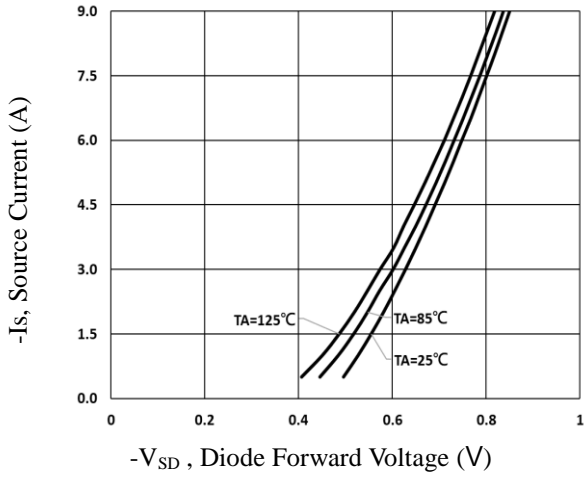


Fig.7 Diode Forward Voltage Characteristics

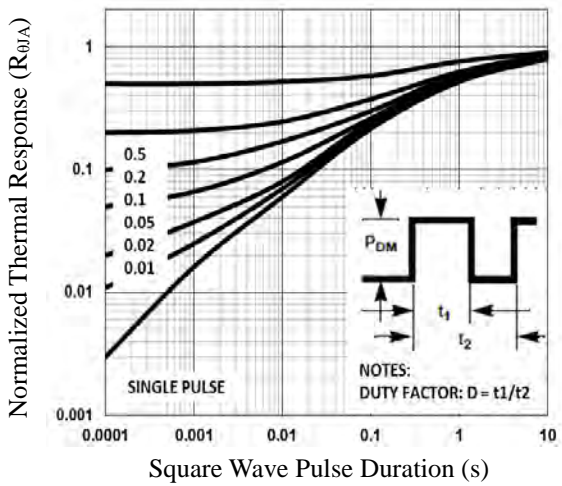


Fig.8 Normalized Transient Impedance

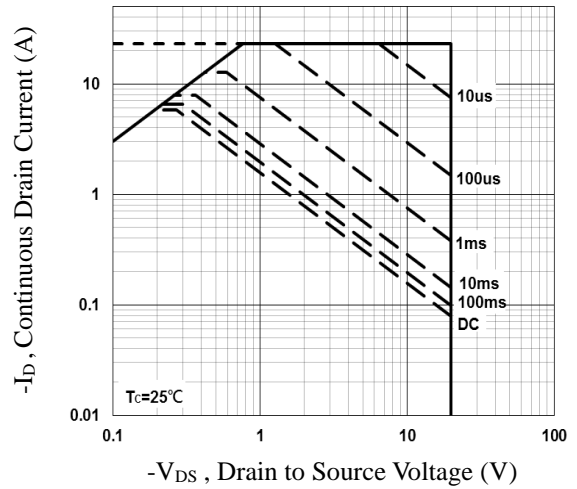


Fig.9 Maximum Safe Operation Area

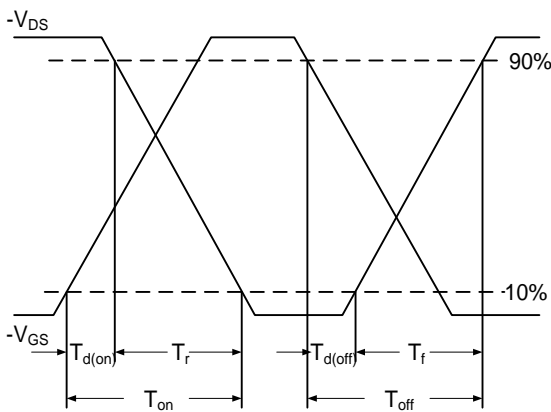


Fig.10 Switching Time Waveform

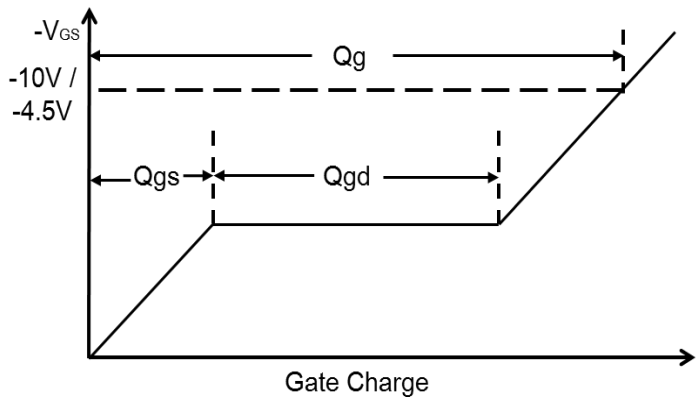
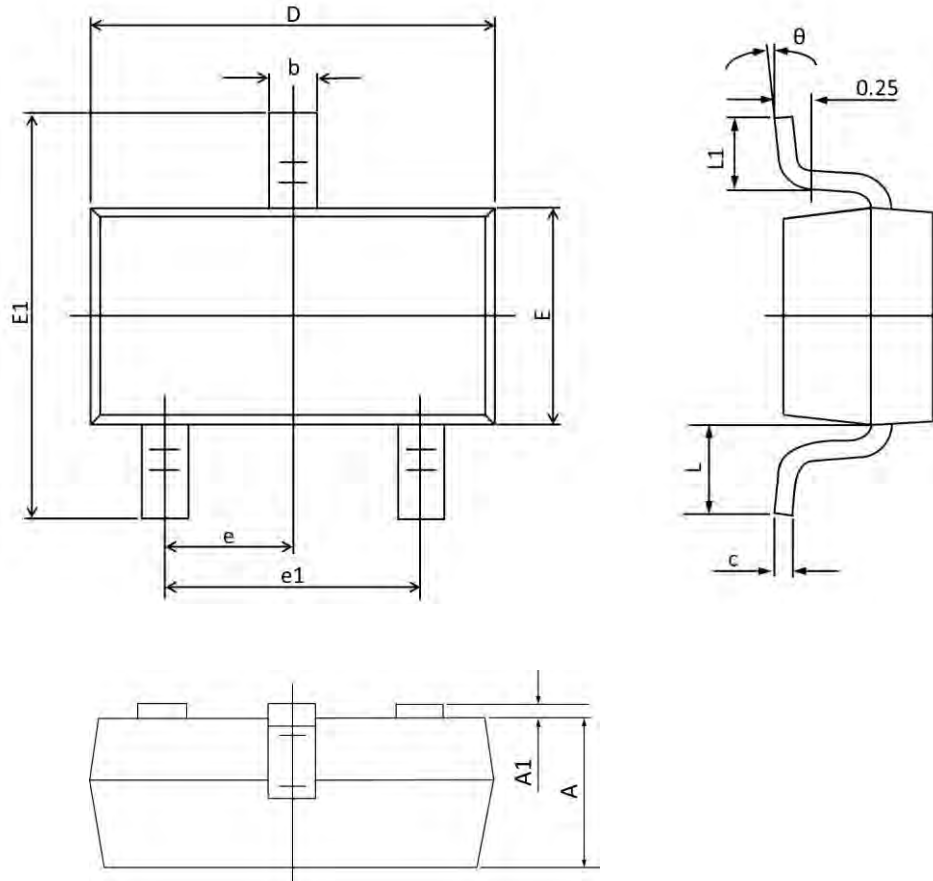


Fig.11 Gate Charge Waveform

**SOT23-3S PACKAGE INFORMATION**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
<b>A</b>	<b>0.900</b>	<b>1.000</b>	<b>0.035</b>	<b>0.039</b>
<b>A1</b>	<b>0.000</b>	<b>0.100</b>	<b>0.000</b>	<b>0.004</b>
<b>b</b>	<b>0.300</b>	<b>0.500</b>	<b>0.012</b>	<b>0.020</b>
<b>c</b>	<b>0.090</b>	<b>0.110</b>	<b>0.003</b>	<b>0.004</b>
<b>D</b>	<b>2.800</b>	<b>3.000</b>	<b>0.110</b>	<b>0.118</b>
<b>E</b>	<b>1.200</b>	<b>1.400</b>	<b>0.047</b>	<b>0.055</b>
<b>E1</b>	<b>2.250</b>	<b>2.550</b>	<b>0.089</b>	<b>0.100</b>
<b>e</b>	<b>0.950 TYP.</b>		<b>0.037 TYP.</b>	
<b>e1</b>	<b>1.800</b>	<b>2.000</b>	<b>0.071</b>	<b>0.079</b>
<b>L</b>	<b>0.550 REF.</b>		<b>0.022 REF.</b>	
<b>L1</b>	<b>0.300</b>	<b>0.500</b>	<b>0.012</b>	<b>0.020</b>
<b><math>\theta</math></b>	<b>1°</b>	<b>7°</b>	<b>1°</b>	<b>7°</b>