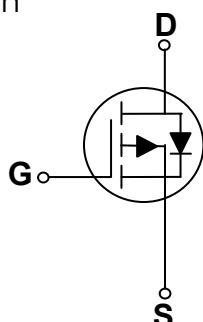
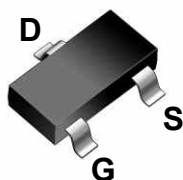


## General Description

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.

## SOT23-3 Pin Configuration



BVDSS	RDSON	ID
-20V	33mΩ	-5.8A

## 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  $T_c=25^\circ\text{C}$  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 ( $T_c=25^\circ\text{C}$ )	-5.8	A
	Drain Current – Continuous ( $T_c=100^\circ\text{C}$ )	-3.7	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	-23.2	A
$P_D$	Power Dissipation ( $T_c=25^\circ\text{C}$ )	1.56	W
	Power Dissipation – Derate above $25^\circ\text{C}$	0.012	W/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

## Thermal Characteristics

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

**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	---	$\text{mV}/^\circ\text{C}$
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.

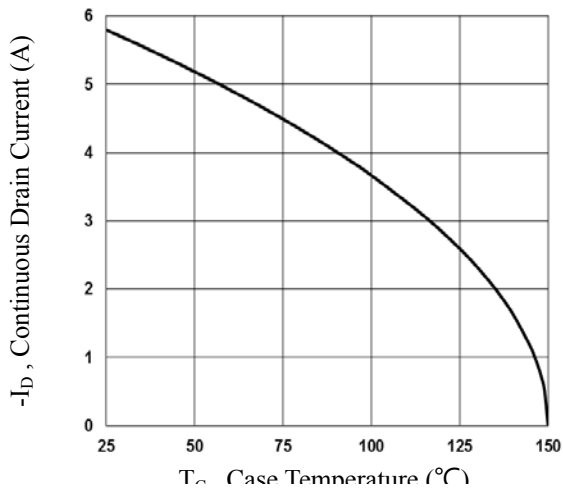


Fig.1 Continuous Drain Current vs.  $T_c$

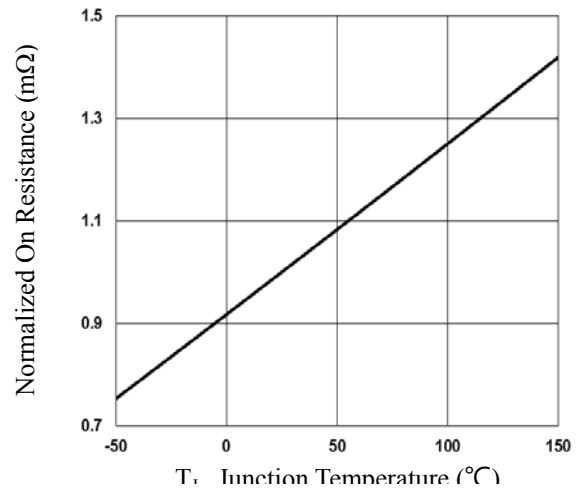


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$

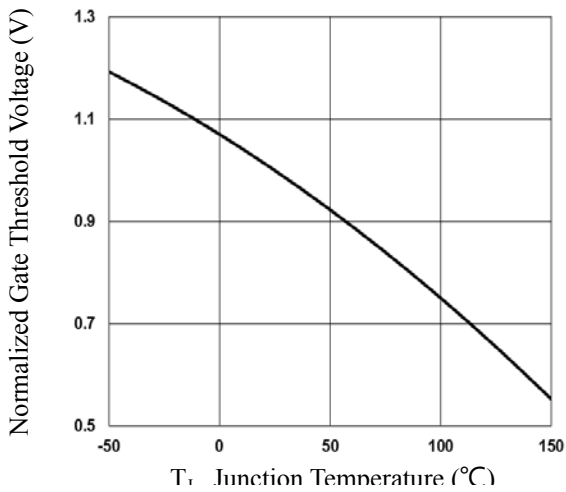


Fig.3 Normalized  $V_{th}$  vs.  $T_j$

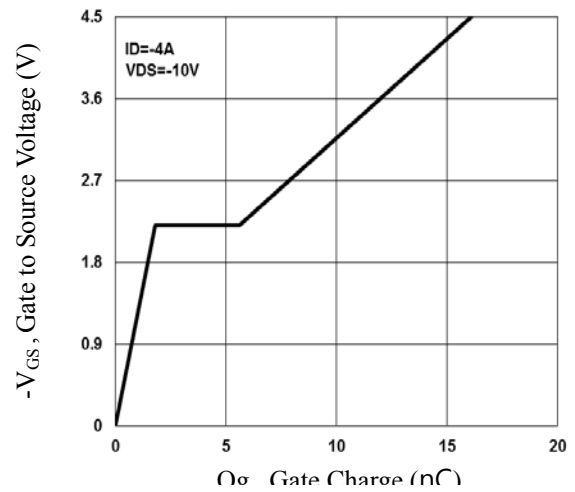


Fig.4 Gate Charge Waveform

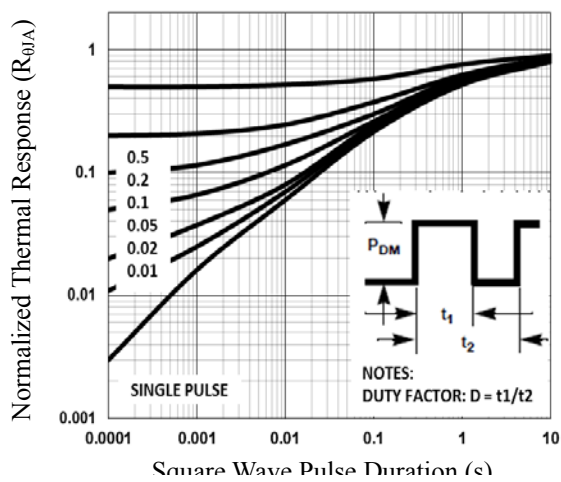


Fig.5 Normalized Transient Impedance

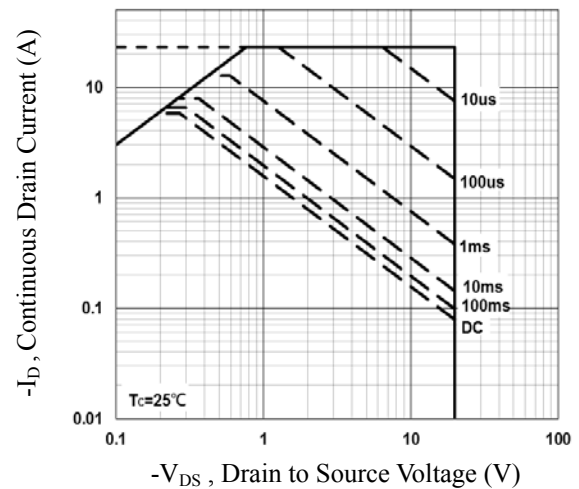


Fig.6 Maximum Safe Operation Area

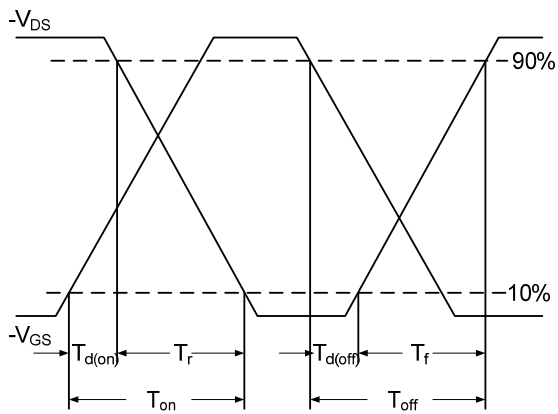


Fig.7 Switching Time Waveform

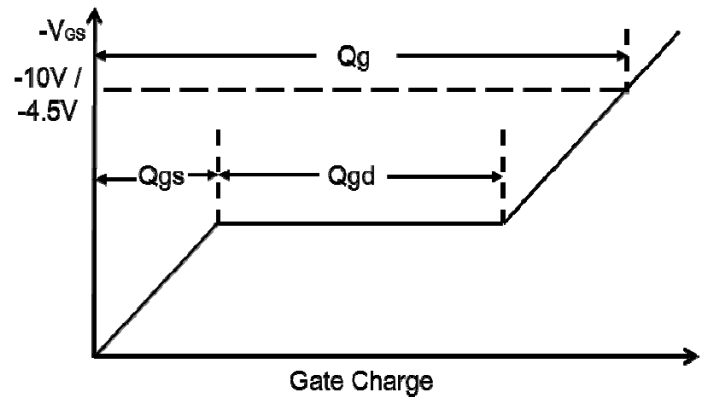
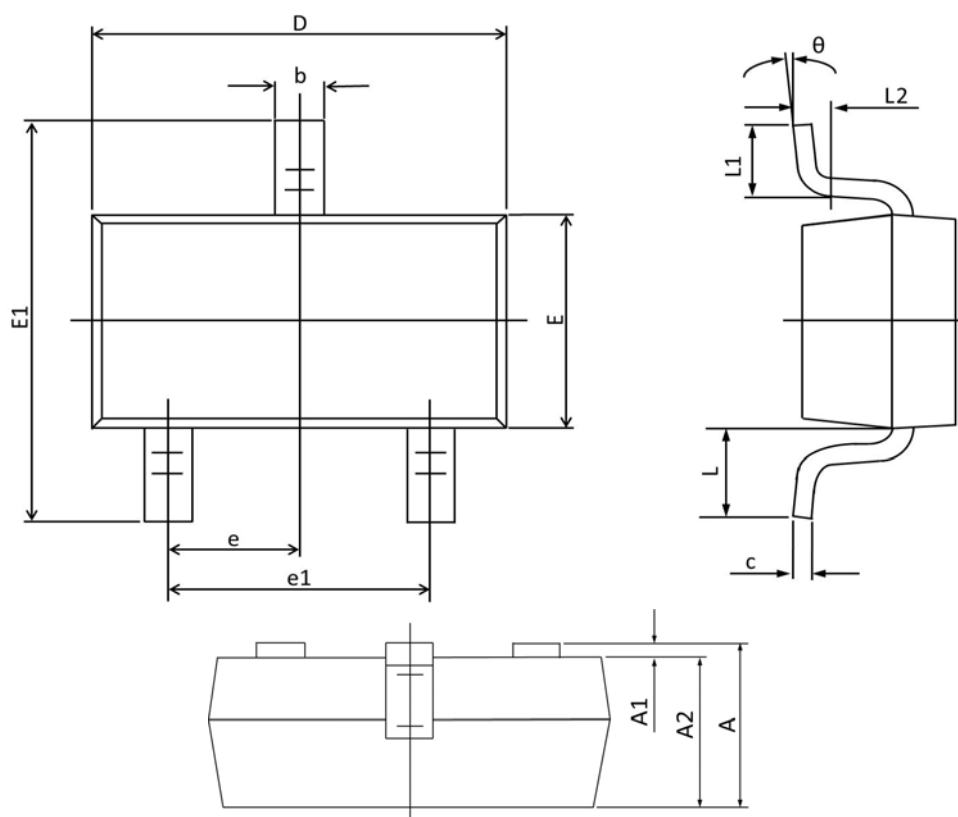


Fig.8 Gate Charge Waveform

## SOT23-3 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.450	---	0.057	---
A1	0.100	0.000	0.004	0.000
A2	1.3	0.900	0.051	0.035
b	0.500	0.300	0.020	0.012
c	0.150	0.080	0.006	0.003
D	3.050	2.850	0.120	0.112
E	1.750	1.550	0.069	0.061
E1	3.000	2.600	0.118	0.102
e	0.95 TYP.		0.037 TYP.	
e1	2.000	1.800	0.079	0.071
L	0.59 REF.		0.022 REF.	
L1	0.600	0.350	0.024	0.014
L2	0.25 TYP.		0.01 TYP.	
θ	12°	0°	12°	0°