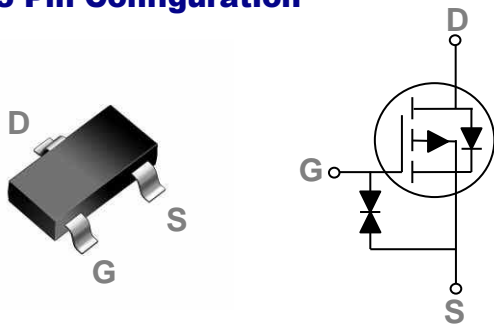


### General Description

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.

### SOT523 Pin Configuration



BVDSS	RDSON	ID
-30V	1Ω	-400mA

### Features

- -30V,-400mA,  $R_{DS(ON)} = 1\Omega @ V_{GS} = -4.5V$
- Improved  $dv/dt$  capability
- Fast switching
- Green Device Available
- Suit for -1.5V 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	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current – Continuous ( $T_A=25^\circ\text{C}$ )	-400	mA
	Drain Current – Continuous ( $T_A=70^\circ\text{C}$ )	-320	mA
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	-1.6	A
$P_D$	Power Dissipation ( $T_A=25^\circ\text{C}$ )	313	mW
	Power Dissipation – Derate above $25^\circ\text{C}$	2.5	mW/ $^\circ\text{C}$
$T_{STG}$	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	---	400	$^\circ\text{C}/\text{W}$

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**
**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-30	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	-10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	---	---	±40	uA

**On Characteristics**

R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.3A	---	0.8	1	Ω
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-0.2A	---	1.1	1.5	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-0.5	-0.7	-1.2	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-4V, I <sub>D</sub> =-0.3A	---	0.8	---	S

**Dynamic and switching Characteristics**

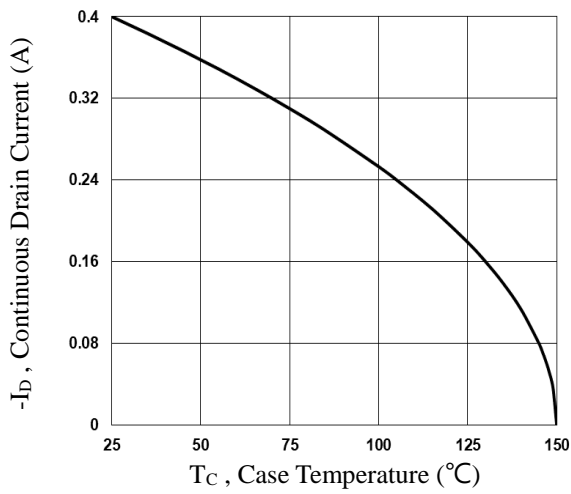
Q <sub>g</sub>	Total Gate Charge <sup>2,3</sup>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.2A	---	3.1	5	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>2,3</sup>		---	1.3	4	
Q <sub>gd</sub>	Gate-Drain Charge <sup>2,3</sup>		---	0.5	3	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>2,3</sup>	V <sub>DD</sub> =-15V, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =6Ω I <sub>D</sub> =-0.2A	---	7.4	15	ns
T <sub>r</sub>	Rise Time <sup>2,3</sup>		---	22	35	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>2,3</sup>		---	47	75	
T <sub>f</sub>	Fall Time <sup>2,3</sup>		---	15	25	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, F=1MHz	---	73	110	pF
C <sub>oss</sub>	Output Capacitance		---	19	30	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	12	20	

**Drain-Source Diode Characteristics and Maximum Ratings**

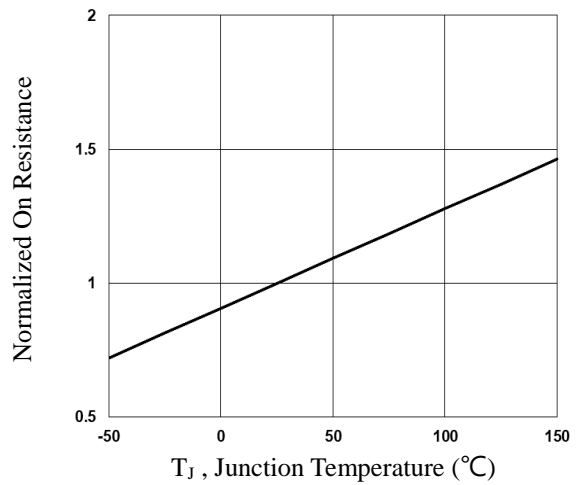
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-400	mA
I <sub>SM</sub>	Pulsed Source Current		---	---	-800	mA
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-0.3A, T <sub>J</sub> =25°C	---	---	-1	V

Note :

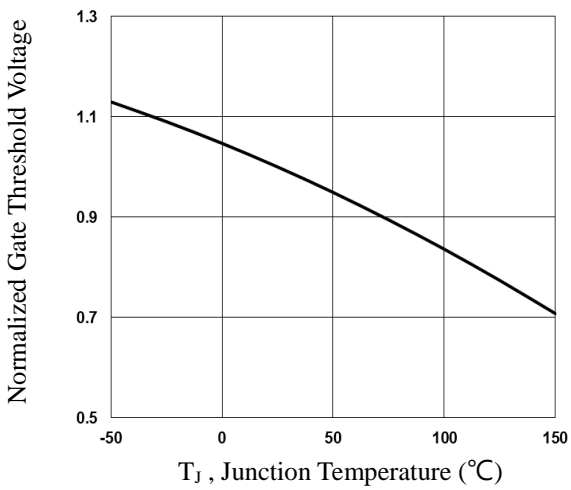
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.



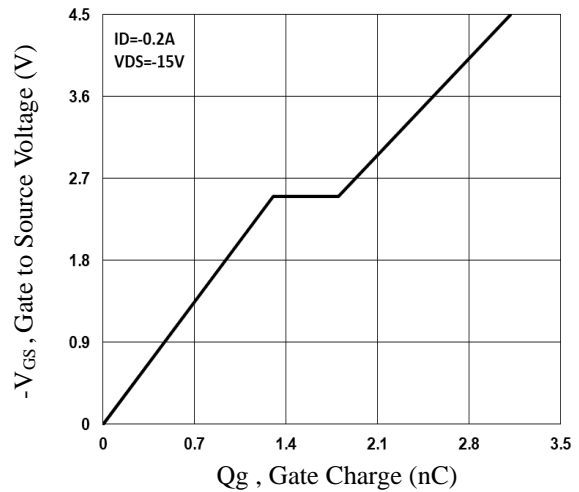
**Fig.1 Continuous Drain Current vs.  $T_c$**



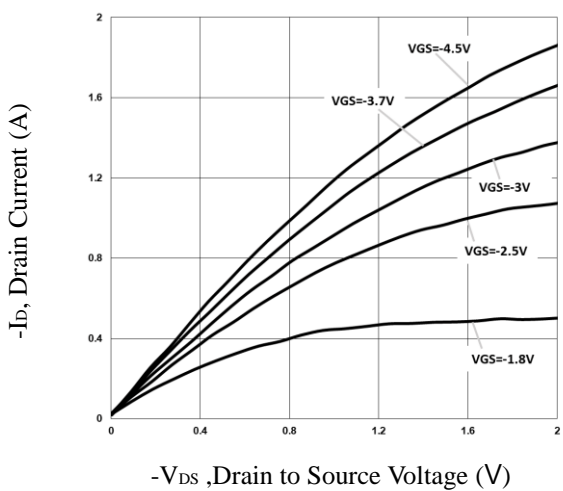
**Fig.2 Normalized  $R_{DSon}$  vs.  $T_j$**



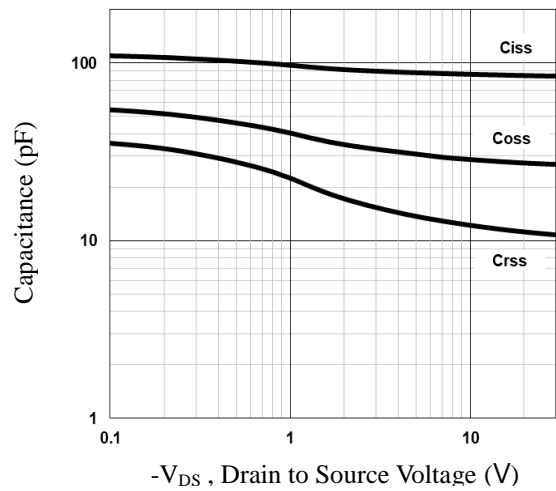
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



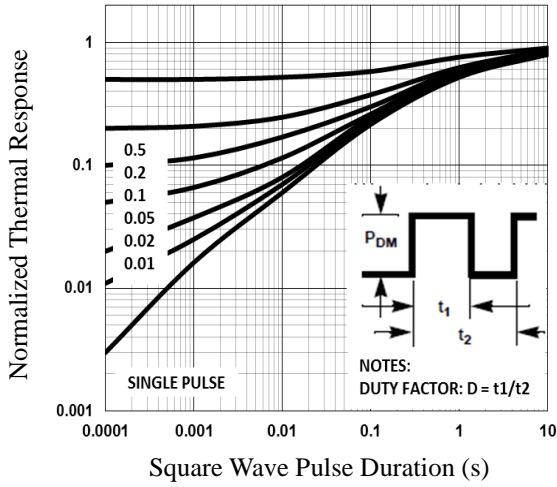
**Fig.4 Gate Charge Waveform**



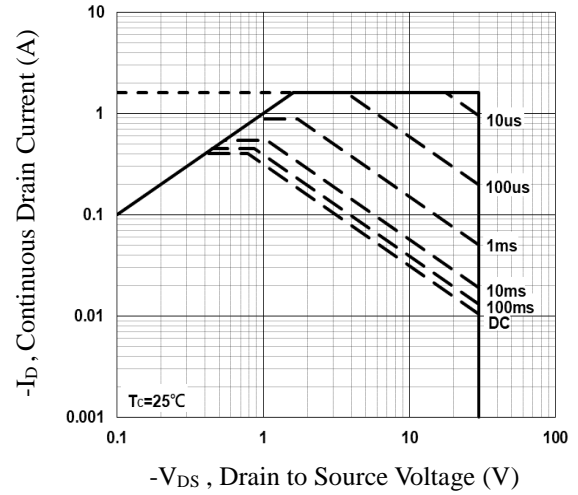
**Fig.5 Typical Output Characteristics**



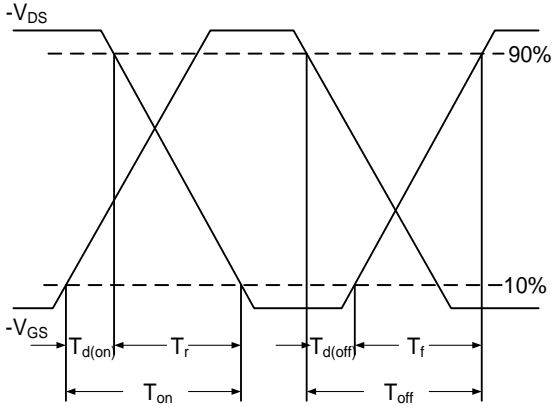
**Fig.6 Capacitance Characteristics**



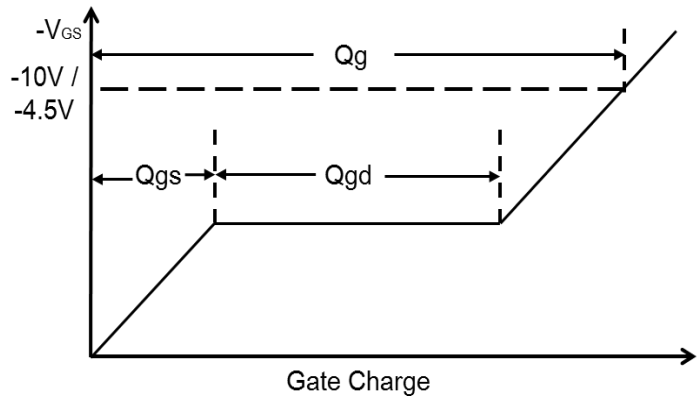
**Fig.7 Normalized Transient Impedance**



**Fig.8 Maximum Safe Operation Area**

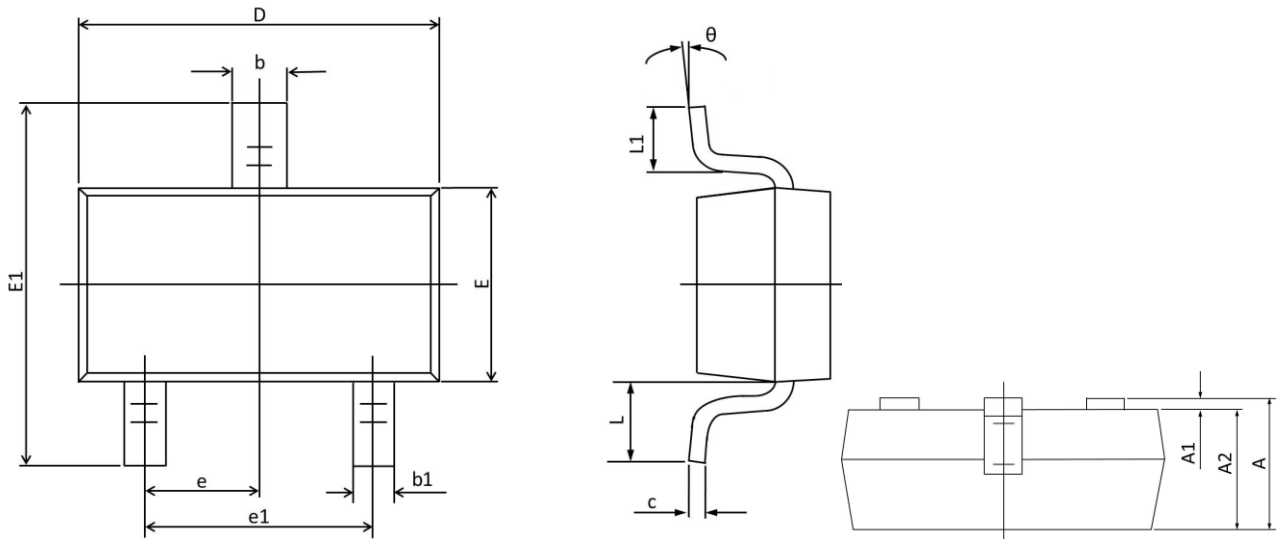


**Fig.9 Switching Time Waveform**



**Fig.10 Gate Charge Waveform**

## SOT523 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.900	0.700	0.035	0.028
A1	0.100	0.000	0.004	0.000
A2	0.800	0.700	0.031	0.028
b	0.350	0.250	0.014	0.010
b1	0.250	0.150	0.010	0.006
c	0.200	0.100	0.008	0.004
D	1.750	1.500	0.069	0.059
E	0.900	0.700	0.035	0.028
E1	1.750	1.400	0.069	0.055
e	0.5TYP.		0.02TYP.	
e1	1.100	0.900	0.043	0.035
L	0.460	0.300	0.018	0.012
L1	0.460	0.260	0.018	0.010
$\theta$	8°	0°	8°	0°