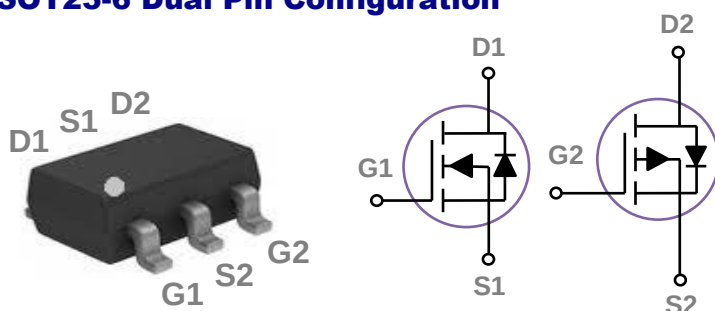


General Description

These N+P dual 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.

SOT23-6 Dual Pin Configuration



BVDSS	RDS(on)	ID
20V	40mΩ	3.8A
-20V	100mΩ	-2.5A

Features

- Fast switching
- Green Device Available
- Suit for 1.8V Gate Drive Applications

Applications

- Notebook
- Load Switch
- Networking
- 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	-20	V
V_{GS}	Gate-Source Voltage	± 10	± 10	V
I_D	Drain Current – Continuous ($T_c=25^{\circ}\text{C}$)	3.8	-2.5	A
	Drain Current – Continuous ($T_c=100^{\circ}\text{C}$)	2.3	-1.5	A
I_{DM}	Drain Current – Pulsed ¹	15.2	-10	A
P_D	Power Dissipation ($T_c=25^{\circ}\text{C}$)	1.25	1.25	W
	Power Dissipation – Derate above 25°C	0.01	0.01	W/ $^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^{\circ}\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	100	$^{\circ}\text{C/W}$

N-CH Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise)
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°C , $I_D=1mA$	---	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	μA
		$V_{DS}=16V$, $V_{GS}=0V$, $T_J=125^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 10V$, $V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5V$, $I_D=3A$	---	30	40	$m\Omega$
		$V_{GS}=2.5V$, $I_D=2A$	---	42	55	$m\Omega$
		$V_{GS}=1.8V$, $I_D=1.5A$		55	70	$m\Omega$
$V_{GS(th)}$	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	$V_{DS}=10V$, $I_D=2A$	---	4.4	---	S

Dynamic and switching Characteristics

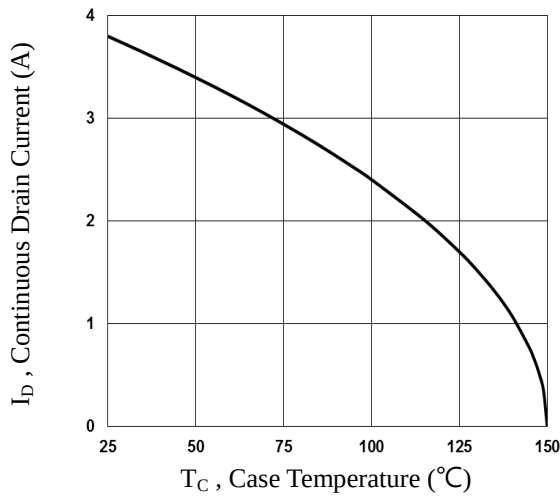
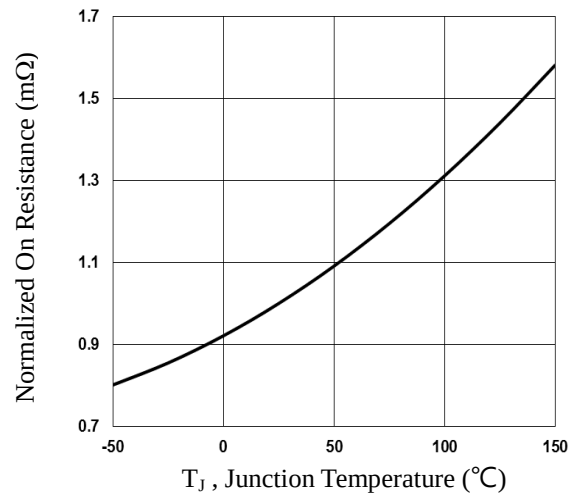
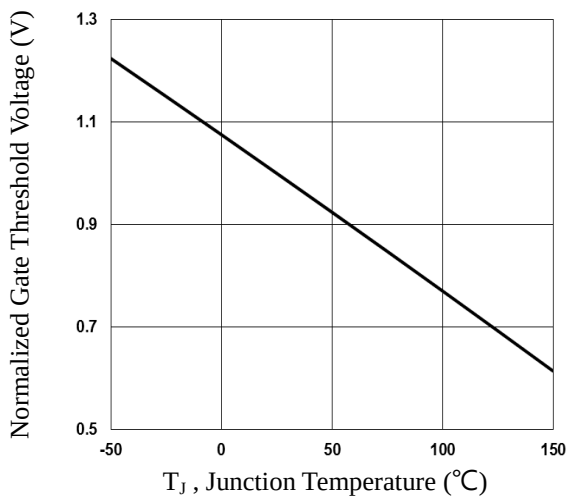
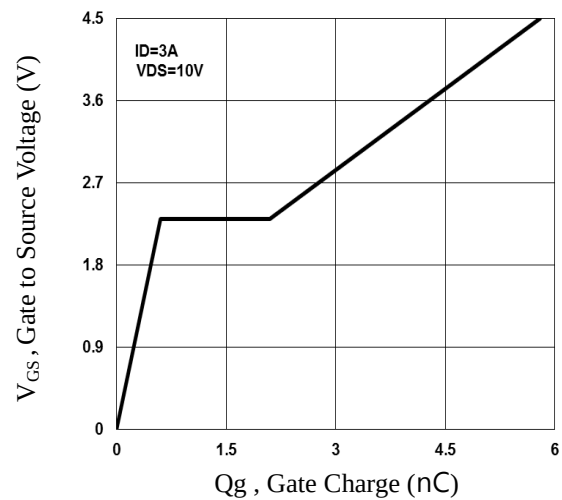
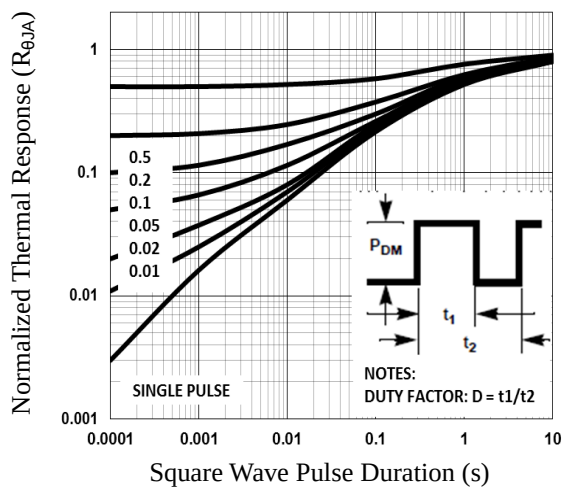
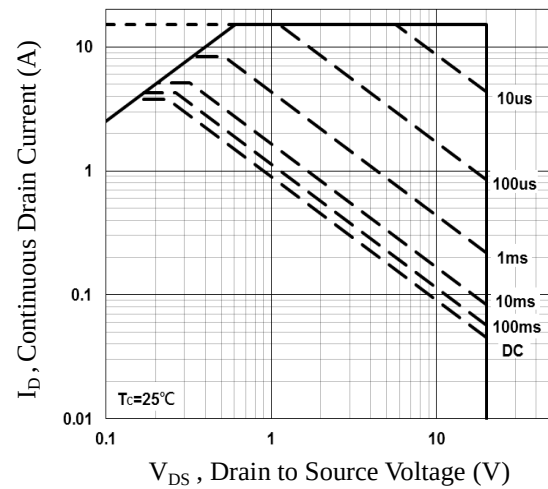
Q_g	Total Gate Charge ^{2,3}	$V_{DS}=10V$, $V_{GS}=4.5V$, $I_D=3A$	---	5.8	10	nC
Q_{gs}	Gate-Source Charge ^{2,3}		---	0.6	1.5	
Q_{gd}	Gate-Drain Charge ^{2,3}		---	1.5	3	
$T_{d(on)}$	Turn-On Delay Time ^{2,3}	$V_{DD}=10V$, $V_{GS}=4.5V$, $R_G=25\Omega$ $I_D=1A$	---	2.9	6	ns
T_r	Rise Time ^{2,3}		---	8.4	16	
$T_{d(off)}$	Turn-Off Delay Time ^{2,3}		---	19.2	38	
T_f	Fall Time ^{2,3}		---	5.6	12	
C_{iss}	Input Capacitance	$V_{DS}=15V$, $V_{GS}=0V$, $F=1MHz$	---	315	600	pF
C_{oss}	Output Capacitance		---	50	80	
C_{rss}	Reverse Transfer Capacitance		---	40	60	

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	---	---	3.8	A
I_{SM}	Pulsed Source Current		---	---	7.6	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

P-CH Electrical Characteristics (T_J=25 °C, unless otherwise
Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-20	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =-1mA	---	-0.01	---	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-20V, V _{GS} =0V, T _J =25°C	---	---	-1	uA
		V _{DS} =-16V, V _{GS} =0V, T _J =125°C	---	---	-10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±10V, V _{DS} =0V	---	---	±100	nA

On Characteristics

R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-4.5V, I _D =-3A	---	82	100	mΩ
		V _{GS} =-2.5V, I _D =-2A	---	125	140	mΩ
		V _{GS} =-1.8V, I _D =-1A	---	197	230	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-0.3	-0.6	-1.0	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	3	---	mV/°C
g _{fs}	Forward Transconductance	V _{DS} =-10V, I _D =-1A	---	2.2	---	S

Dynamic and switching Characteristics

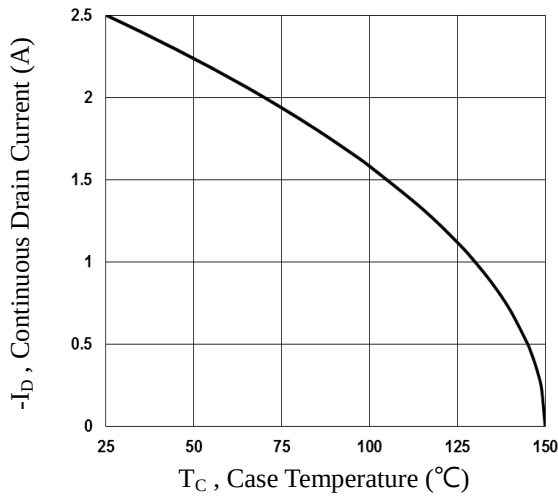
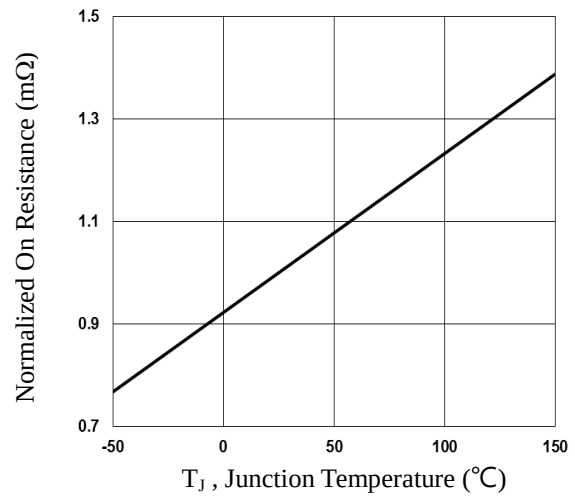
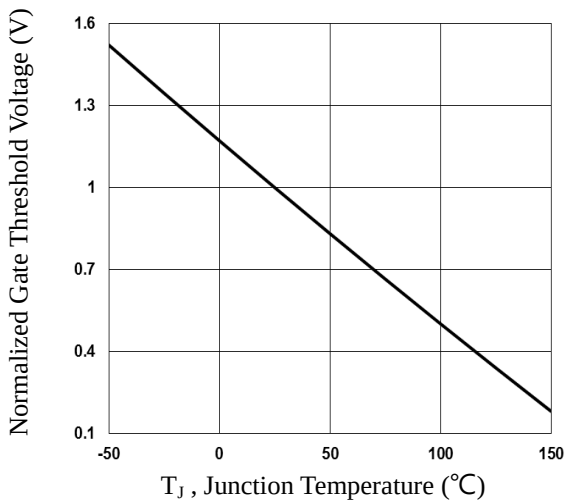
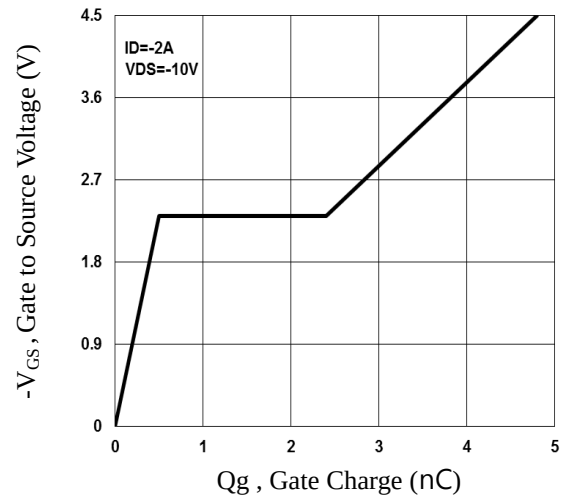
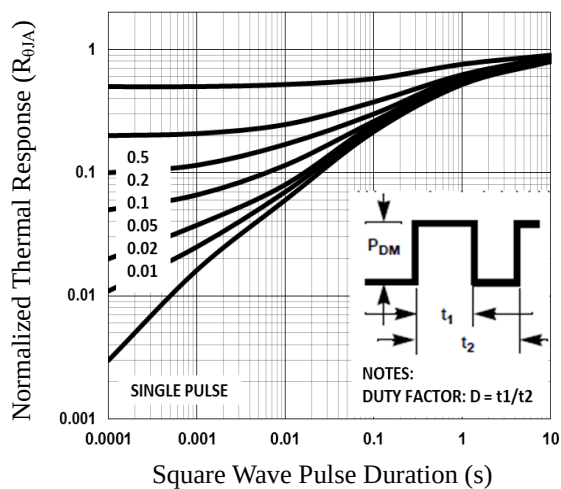
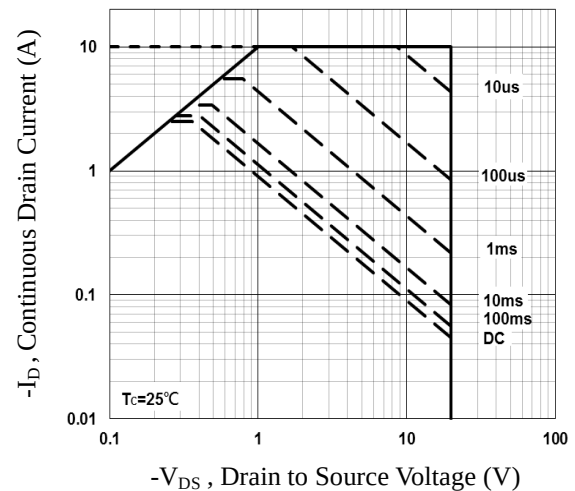
Q _g	Total Gate Charge ^{2, 3}	V _{DS} =-10V, V _{GS} =-4.5V, I _D =-2A	---	4.8	10	nC
Q _{gs}	Gate-Source Charge ^{2, 3}		---	0.5	1	
Q _{gd}	Gate-Drain Charge ^{2, 3}		---	1.9	4	
T _{d(on)}	Turn-On Delay Time ^{2, 3}	V _{DD} =-10V, V _{GS} =-4.5V, R _G =25Ω I _D =-1A	---	3.5	7	ns
T _r	Rise Time ^{2, 3}		---	12.6	24	
T _{d(off)}	Turn-Off Delay Time ^{2, 3}		---	32.6	62	
T _f	Fall Time ^{2, 3}		---	8.4	16	
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, F=1MHz	---	350	510	pF
C _{oss}	Output Capacitance		---	65	95	
C _{rss}	Reverse Transfer Capacitance		---	50	75	

Drain-Source Diode Characteristics and Maximum Ratings

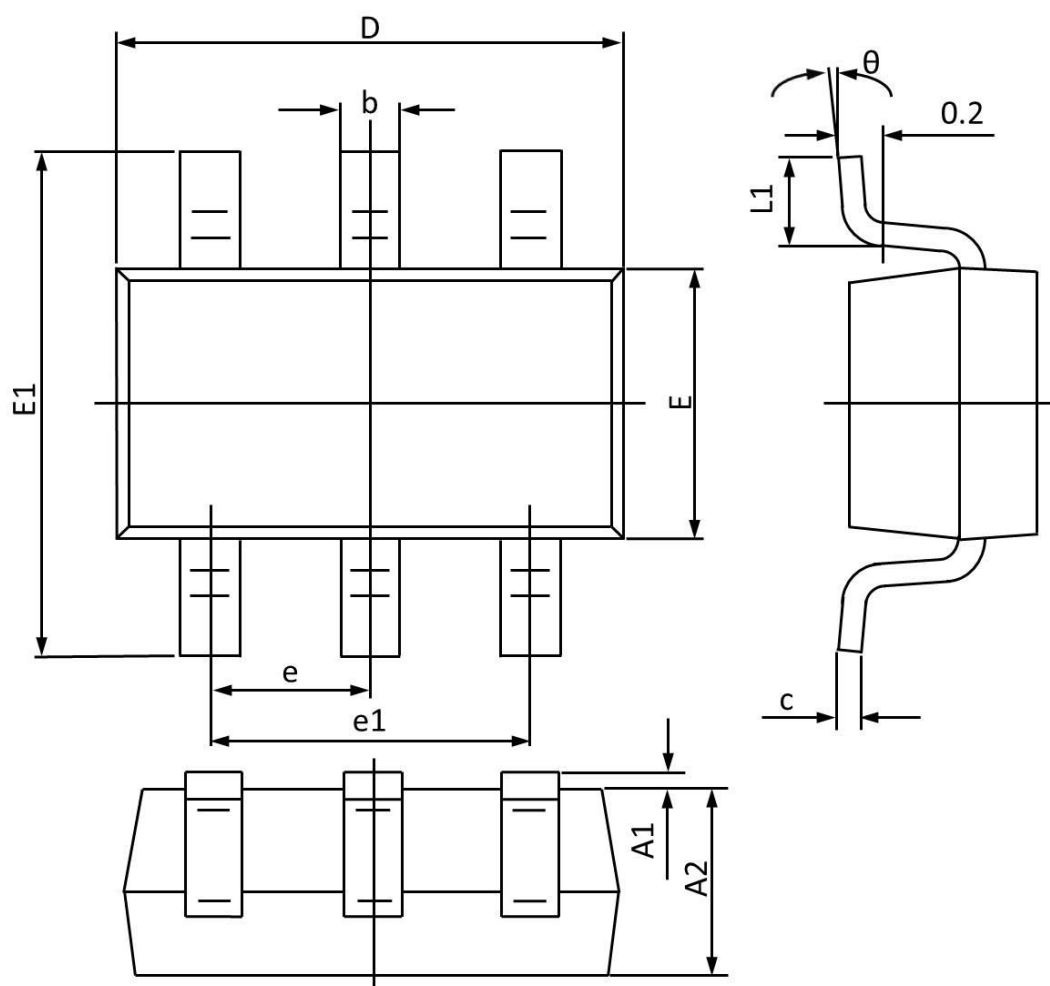
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	-2.5	A
I _{SM}	Pulsed Source Current		---	---	-5	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =-1A, T _J =25°C	---	---	-1	V

Note :

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


Fig.7 Continuous Drain Current vs. T_C

Fig.8 Normalized $R_{DS(on)}$ vs. T_J

Fig.9 Normalized V_{th} vs. T_J

Fig.10 Gate Charge Waveform

Fig.11 Normalized Transient Impedance

Fig.12 Maximum Safe Operation Area

SOT23-6 Dual PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A1	0.000	0.100	0.000	0.004
A2	1.000	1.200	0.040	0.047
b	0.300	0.500	0.012	0.019
c	0.047	0.207	0.002	0.008
D	2.800	3.000	0.110	0.118
E	1.500	1.800	0.059	0.070
E1	2.600	3.000	0.103	0.118
e	0.950 TYP		0.037 TYP	
e1	1.900 TYP		0.075 TYP	
L1	0.250	0.550	0.010	0.021
θ	0°	8°	0°	8°