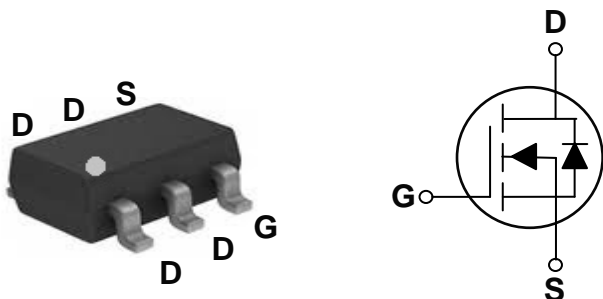## 30V N−Channel MOSFETs

General Description

These N-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
30V	24mΩ	6.5A

Features

- *30V,6.5A, RDS(ON) =24mΩ @VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

Applications

- *MB / VGA / Vcore*
- *Load Switch*
- *Hand-Held Instrument*

SOT-23-6 Pin Configuration

Absolute Maximum Ratings (Tc=25℃ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous (T_C=25℃)	6.5	A
	Drain Current – Continuous (T_C=100℃)	4.1	A
I_{DM}	Drain Current – Pulsed[1]	26	A
EAS	Single Pulse Avalanche Energy[2]	32	mJ
IAS	Single Pulse Avalanched Current[2]	8	A
P_D	Power Dissipation (T_C=25℃)	1.56	W
	Power Dissipation – Derate above 25℃	0.012	W/℃
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Characteristics

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

30V N-Channel MOSFETs

Electrical Characteristics (T$_J$=25 ℃, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV$_{DSS}$	Drain-Source Breakdown Voltage	V$_{GS}$=0V , I$_D$=250uA	30	---	---	V
△BV$_{DSS}$/△T$_J$	BV$_{DSS}$ Temperature Coefficient	Reference to 25℃ , I$_D$=1mA	---	0.04	---	V/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=30V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=24V , V$_{GS}$=0V , T$_J$=125℃	---	---	10	uA
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=± 20V , V$_{DS}$=0V	---	---	± 100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R$_{DS(ON)}$	Static Drain-Source On-Resistance[3]	V$_{GS}$=10V , I$_D$=6A	---	19	24	mΩ
		V$_{GS}$=4.5V , I$_D$=4A	---	25	34	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	1.2	1.6	2.5	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	-4	---	mV/℃
gfs	Forward Transconductance	V$_{DS}$=10V , I$_D$=4A	---	6.5	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q$_g$	Total Gate Charge[3,4]	V$_{DS}$=15V , V$_{GS}$=4.5V , I$_D$=6A	---	4.1	8	nC
Q$_{gs}$	Gate-Source Charge[3,4]		---	1	2	
Q$_{gd}$	Gate-Drain Charge[3,4]		---	2.1	4	
T$_{d(on)}$	Turn-On Delay Time[3,4]	V$_{DD}$=15V , V$_{GS}$=10V , R$_G$=6Ω , I$_D$=1A	---	2.8	5	ns
T$_r$	Rise Time[3,4]		---	7.2	14	
T$_{d(off)}$	Turn-Off Delay Time[3,4]		---	15.8	30	
T$_f$	Fall Time[3,4]		---	4.6	9	
C$_{iss}$	Input Capacitance	V$_{DS}$=25V , V$_{GS}$=0V , F=1MHz	---	345	500	pF
C$_{oss}$	Output Capacitance		---	55	80	
C$_{rss}$	Reverse Transfer Capacitance		---	32	45	
Rg	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, F=1MHz	---	3.2	6.4	Ω

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	---	---	6.5	A
I$_{SM}$	Pulsed Source Current[3]		---	---	26	A
V$_{SD}$	Diode Forward Voltage[3]	V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃	---	---	1	V
t$_{rr}$	Reverse Recovery Time	V$_{GS}$=0V,I$_S$=1A , di/dt=100A/μs	---	---	---	ns
Q$_{rr}$	Reverse Recovery Charge	T$_J$=25℃	---	---	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V$_{DD}$=25V,V$_{GS}$=10V,L=1mH,I$_{AS}$=8A.,R$_G$=25Ω , Starting T$_J$=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.
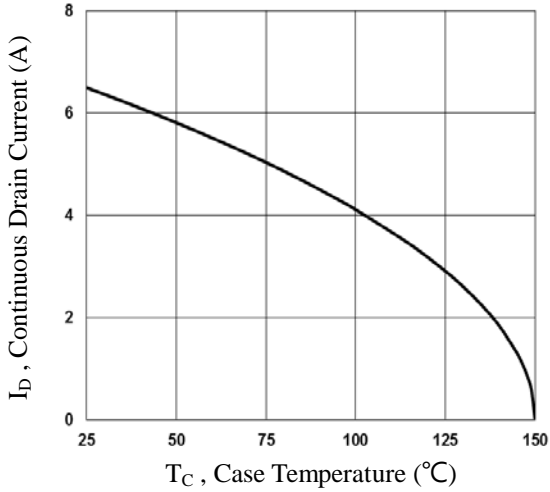
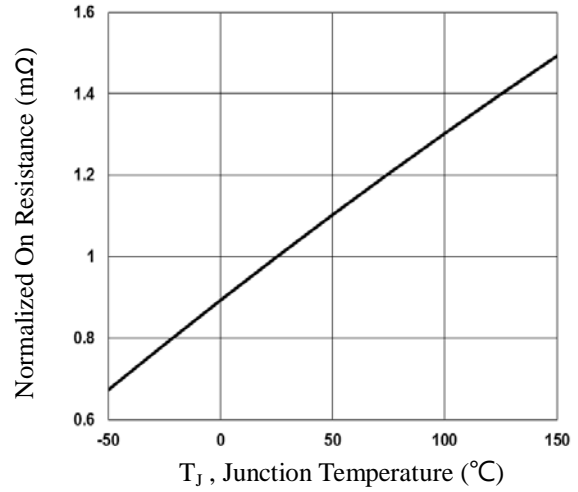## 30V N-Channel MOSFETs

Fig.1   Continuous Drain Current vs. T$_C$

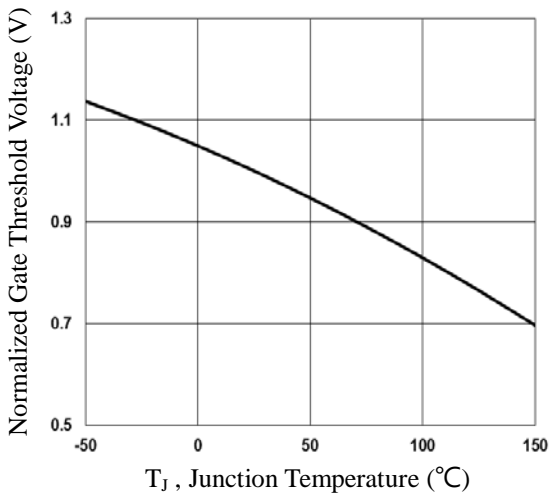Fig.2   Normalized RDSON vs. T$_J$

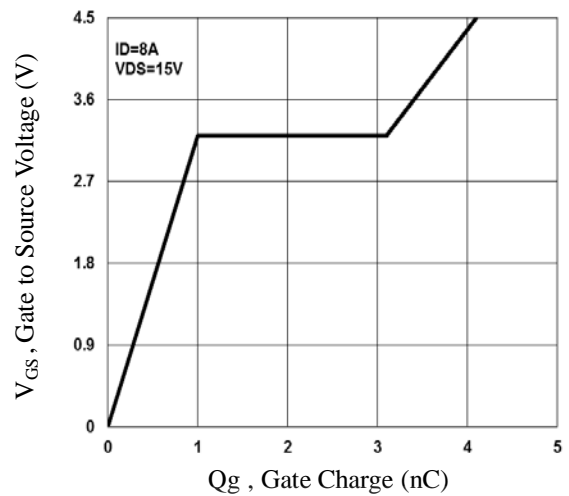Fig.3   Normalized V$_{th}$ vs. T$_J$
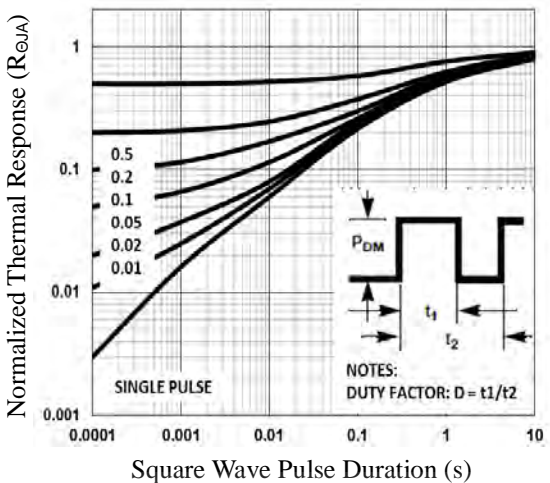

Fig.4   Gate Charge Waveform
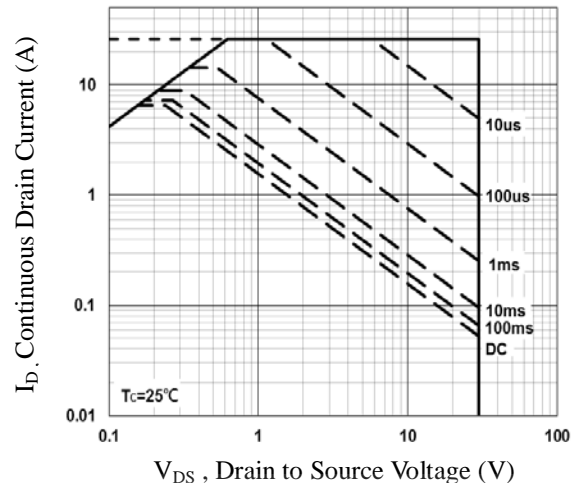

Fig.5   Normalized Transient Response

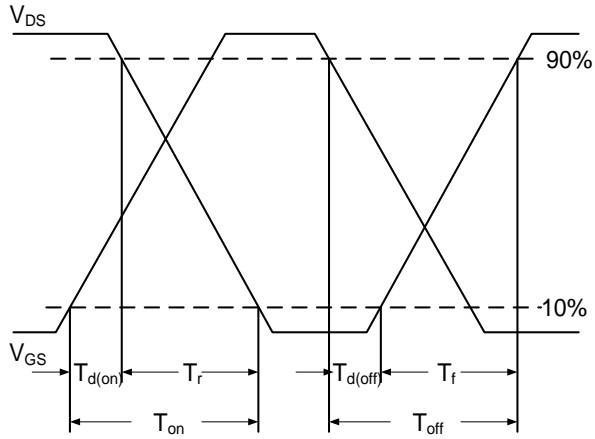Fig.6   Maximum Safe Operation Area

30V N-Channel MOSFETs

Fig.7 Switching Time Waveform

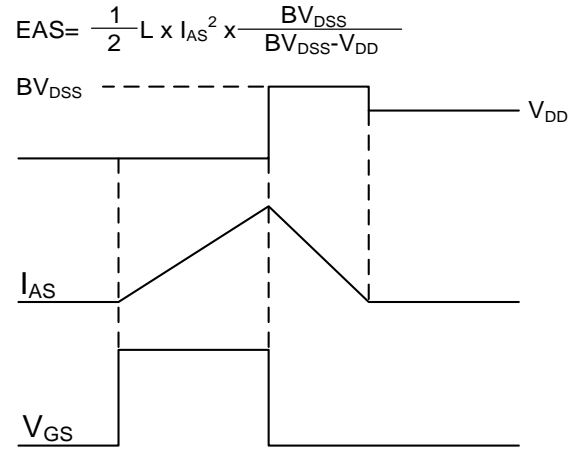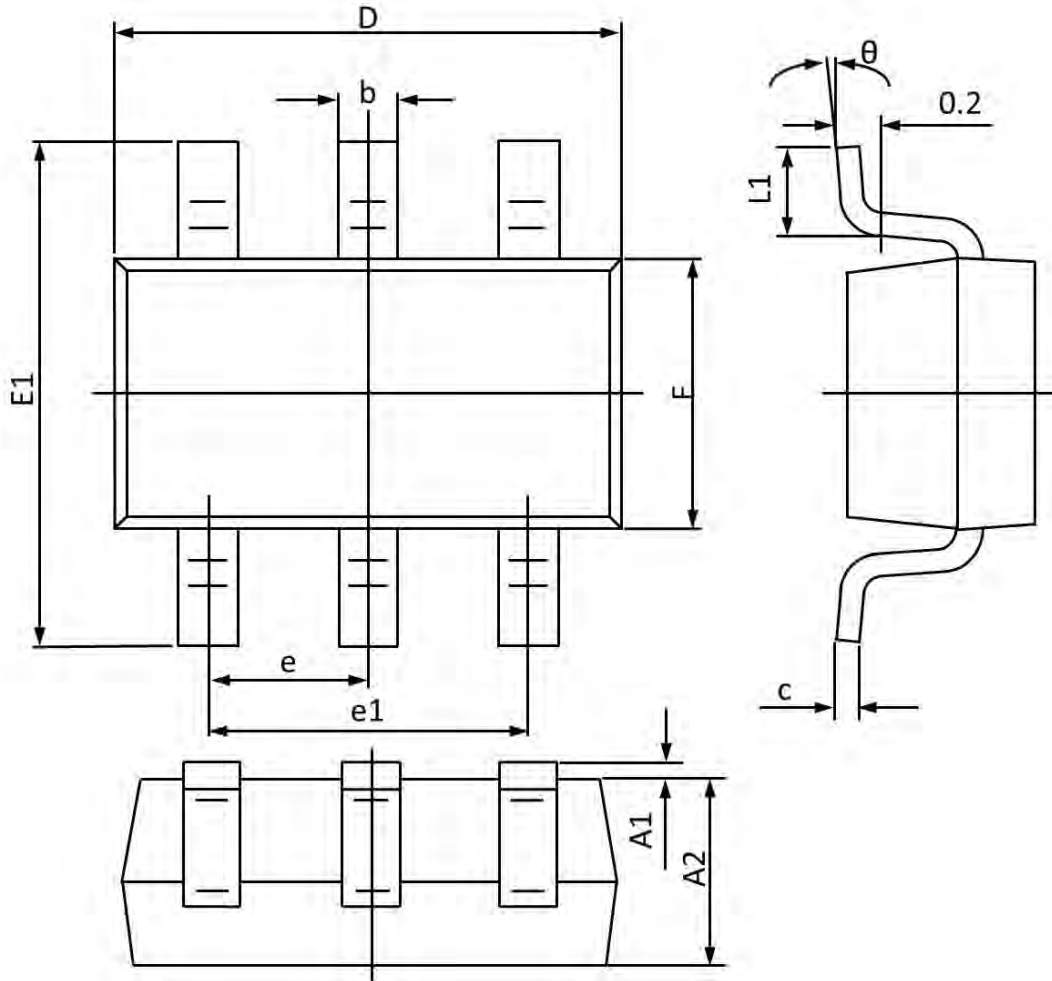$$EAS= \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

Fig.8 EAS Waveform

30V N-Channel MOSFETs

SOT-23-6 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
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°