PDK2612A

20V N-Channel MOSFETs
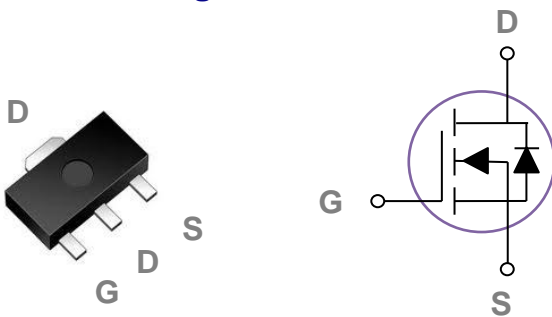
General Description

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
20V	22mΩ	6.5A

Features

- *20V/6.5A, RDS(ON) =22mΩ@VGS = 4.5V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

Applications

- *MB / VGA / Vcore*
- *POL Applications*
- *SMPS 2ⁿᵈ SR*

SOT89 Pin Configuration

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±16	V
I_D	Drain Current – Continuous (T_A=25℃)	6.5	A
	Drain Current – Continuous (T_A=70℃)	5.2	A
I_{DM}	Drain Current – Pulsed[1]	26	A
P_D	Power Dissipation (T_A=25℃)	1.47	W
	Power Dissipation – Derate above 25℃	0.01	W/℃
T_{STG}	Storage Temperature Range	-55 to 175	℃
T_J	Operating Junction Temperature Range	-55 to 175	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	85	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Static State Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	20	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.015	----	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=16V , V_{GS}=0V , T_J=125℃	---	---	10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±16V , V_{DS}=0V	---	---	±100	nA
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=4.5V , I_D=3A	---	17.5	22	mΩ
		V_{GS}=2.5V , I_D=2A	---	22	28	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	0.5	0.8	1.2	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-2.76	---	mV/℃
gfs	Forward Transconductance	V_{DS}=5V , I_D=2A	---	14	---	S

Dynamic Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DS}=10V , V_{GS}=4.5V , I_D=3A	---	5.9	12	nC
Q_{gs}	Gate-Source Charge		---	0.7	2	
Q_{gd}	Gate-Drain Charge		---	1.8	4	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=10V , V_{GS}=4.5V , R_G=3.3Ω I_D=1A	---	4.8	10	ns
T_r	Rise Time		---	7.5	15	
$T_{d(off)}$	Turn-Off Delay Time		---	16.5	32	
T_f	Fall Time		---	4.8	10	
C_{iss}	Input Capacitance	V_{DS}=10V , V_{GS}=0V , F=1MHz	---	775	1440	pF
C_{oss}	Output Capacitance		---	95	190	
C_{rss}	Reverse Transfer Capacitance		---	58	120	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	2.2	---	Ω

Drain-Source Diode Characteristics

| 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[2]		---	---	13	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	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%.
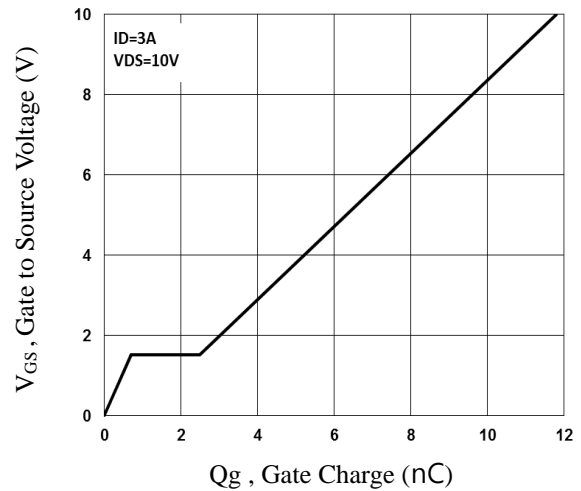3. Essentially independent of operating temperature.
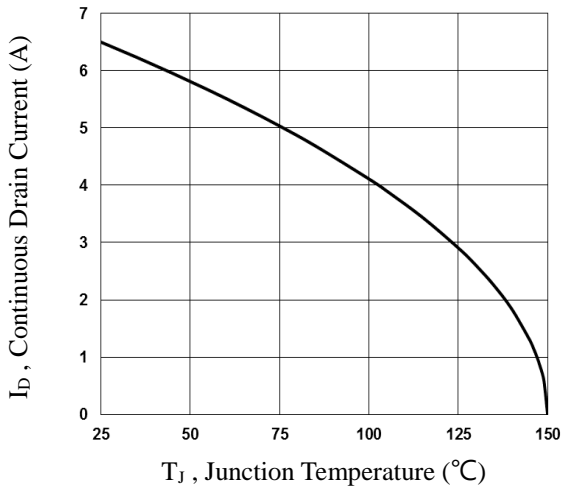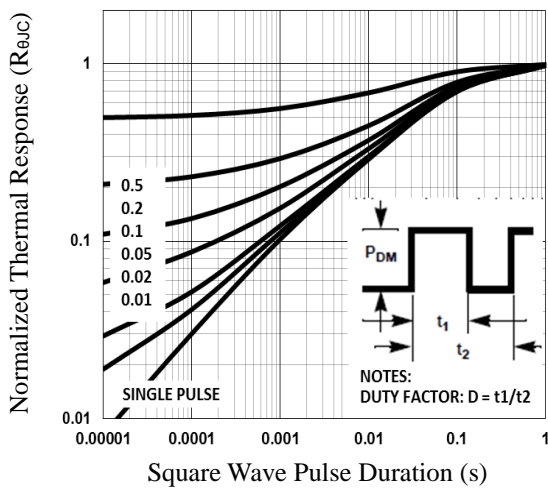
Fig.1   Continuous Drain Current vs. T_C
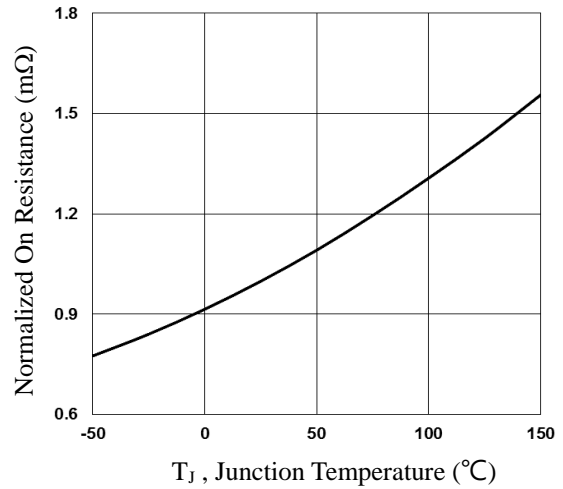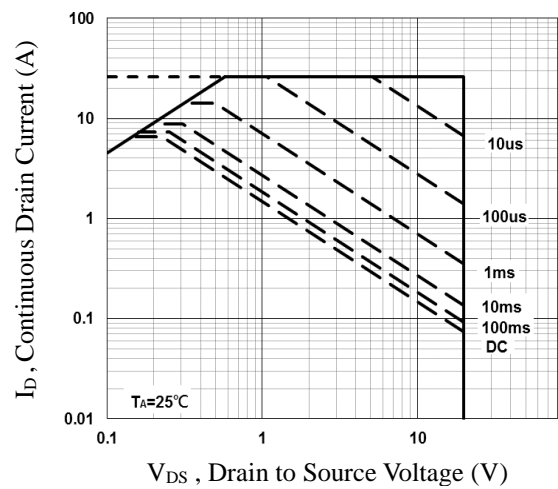

Fig.2   Normalized RDSON vs. T_J
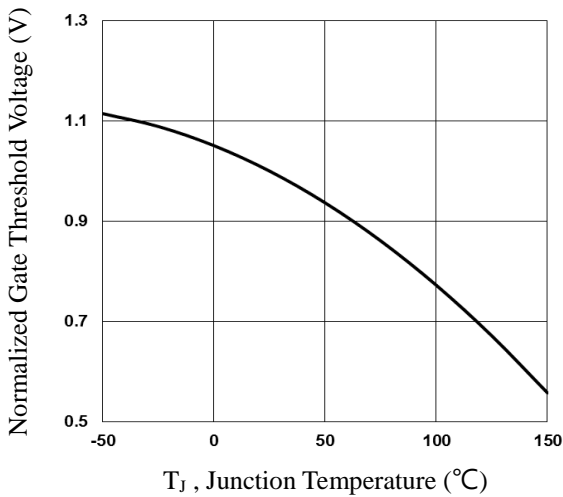
Fig.3   Normalized V_{th} vs. T_J

Fig.4   Gate Charge Waveform

Fig.5   Normalized Transient Impedance

Fig.6   Maximum Safe Operation Area
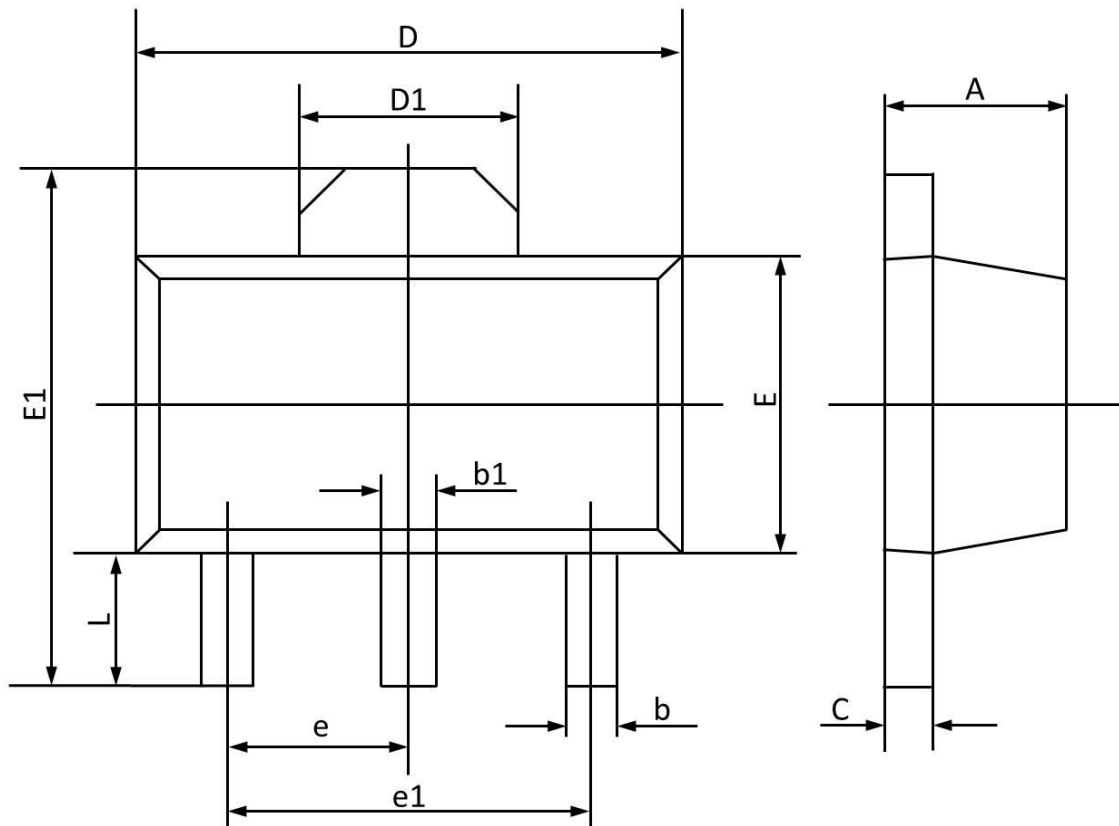
$$EAS = \frac{1}{2}L \times I_{AS}{}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$
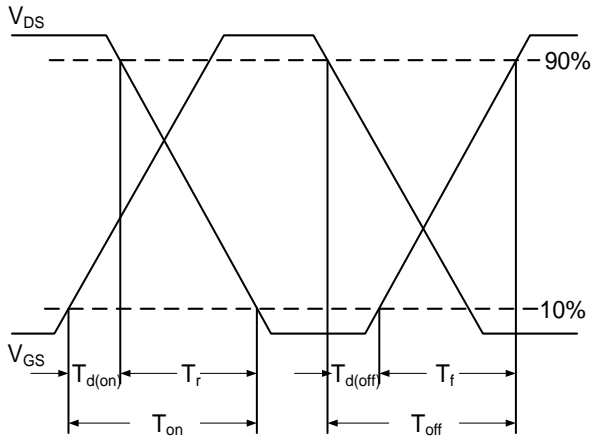
Fig.7   Switching Time Waveform

Fig.8   EAS Waveform

SOT89 PACKAGE INFORMATION

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047