20V N-Channel MOSFETs

PDEU2320W

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	350mΩ	500mA

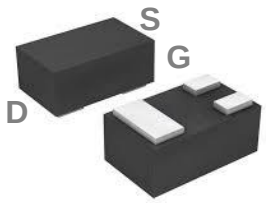
Features

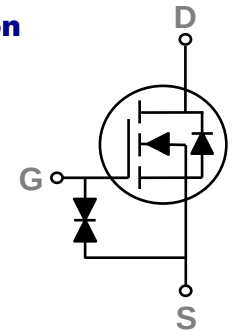
- *20V,500mA, RDS(ON) =350mΩ@VGS = 4.5V*
- *Worldwide Smallest Package : 1x0.6x0.45 mm*
- *Fast switching*
- *Green Device Available*
- *Suit for 1.2V Gate Drive Applications*
- *2KV HBM ESD Capability*

Applications

- *Notebook*
- *Smartphone*
- *Battery Protection*
- *Hand-held Instruments*

SOT883 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	±8	V
I_D	Drain Current – Continuous (T_A=25℃)	500	mA
	Drain Current – Continuous (T_A=70℃)	400	mA
I_{DM}	Drain Current – Pulsed[1]	2000	mA
P_D	Power Dissipation (T_A=25℃)	155	mW
	Power Dissipation – Derate above 25℃	1.25	mW/℃
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	---	800	℃/W

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	20	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=250uA	---	0.04	---	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}=±8V , V_{DS}=0V	---	---	±10	uA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V , I_D=0.5A	---	200	350	mΩ
		V_{GS}=2.5V , I_D=0.4A	---	235	450	
		V_{GS}=1.8V , I_D=0.2A	---	295	600	
		V_{GS}=1.5V , I_D=0.1A	---	365	800	
		V_{GS}=1.2V , I_D=0.1A	---	600	1500	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	0.3	0.5	0.8	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-1.74	---	mV/℃

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=10V , V_{GS}=4.5V , I_D=0.5A	---	1	2	nC
Q_{gs}	Gate-Source Charge[2,3]		---	0.26	0.5	
Q_{gd}	Gate-Drain Charge[2,3]		---	0.2	0.4	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=10V , V_{GS}=4.5V , R_G=10Ω , I_D=0.5A	---	5	10	ns
T_r	Rise Time[2,3]		---	3.5	7	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	14	28	
T_f	Fall Time[2,3]		---	6	12	
C_{iss}	Input Capacitance	V_{DS}=10V , V_{GS}=0V , F=1MHz	---	38.2	75	pF
C_{oss}	Output Capacitance		---	14.4	28	
C_{rss}	Reverse Transfer Capacitance		---	6	12	

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	---	---	500	mA
I_{SM}	Pulsed Source Current		---	---	1000	mA
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=0.5A , 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.

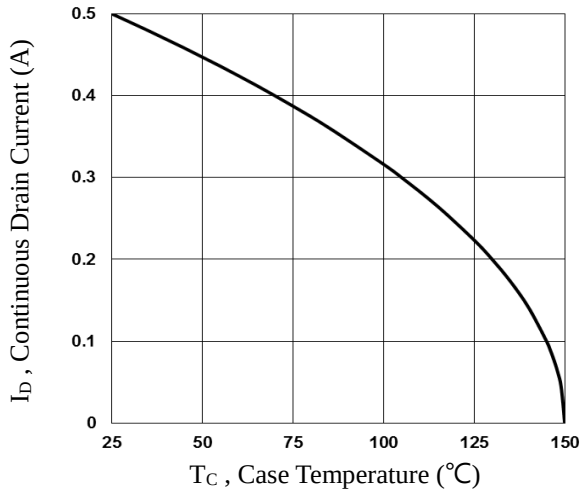


Fig.1 Continuous Drain Current vs. T_C

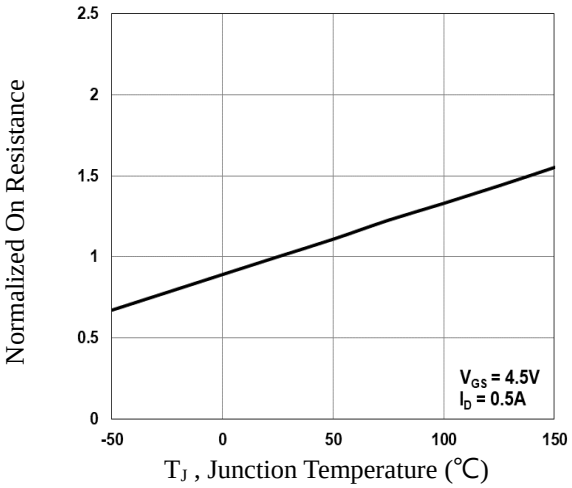


Fig.2 Normalized RDSON vs. T_J

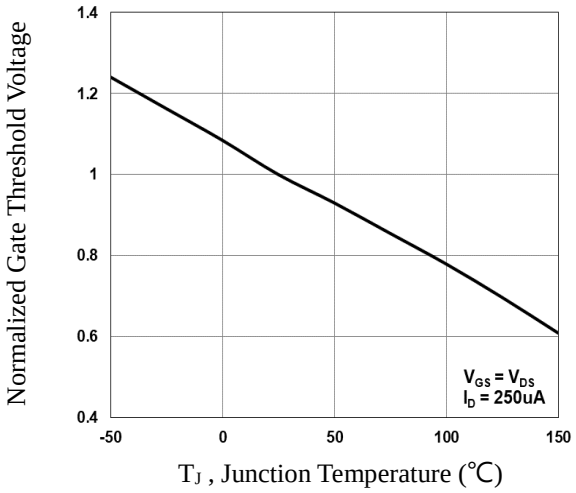


Fig.3 Normalized V_{th} vs. T_J

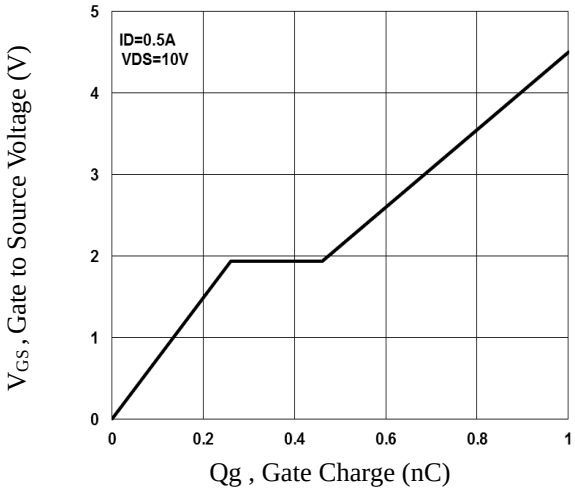


Fig.4 Gate Charge Waveform

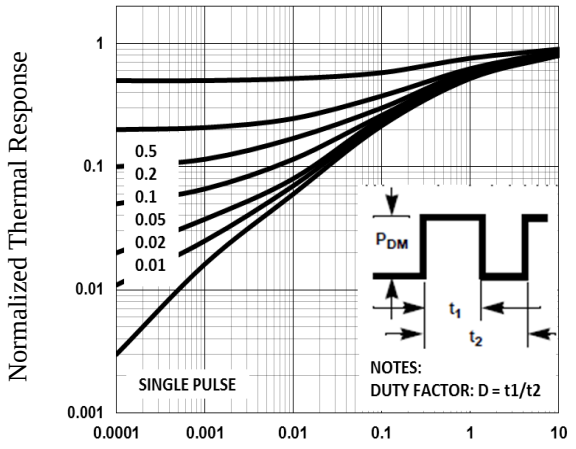


Fig.5 Normalized Transient Response

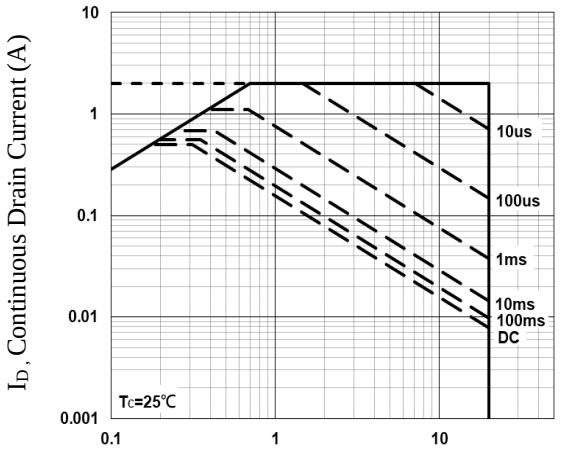


Fig.6 Maximum Safe Operation Area

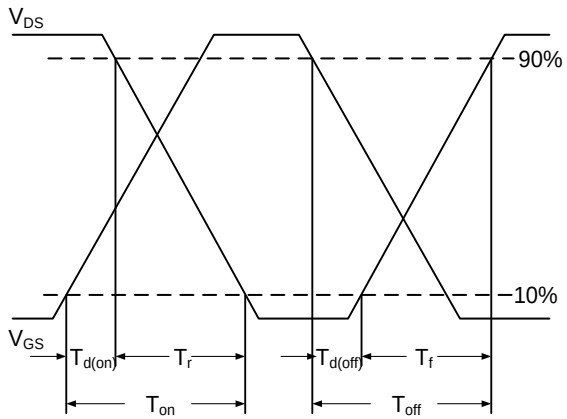


Fig.7 Switching Time Waveform

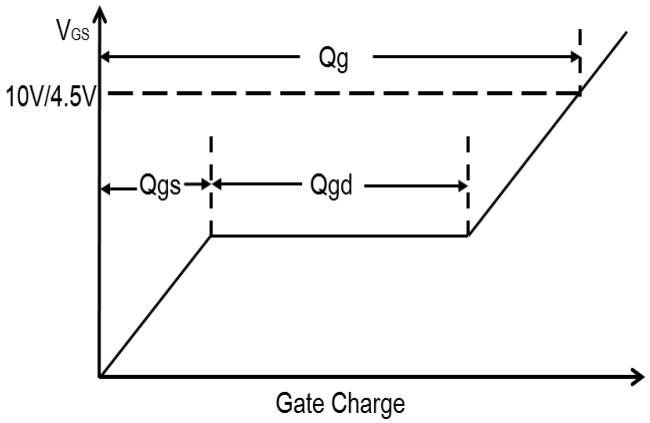
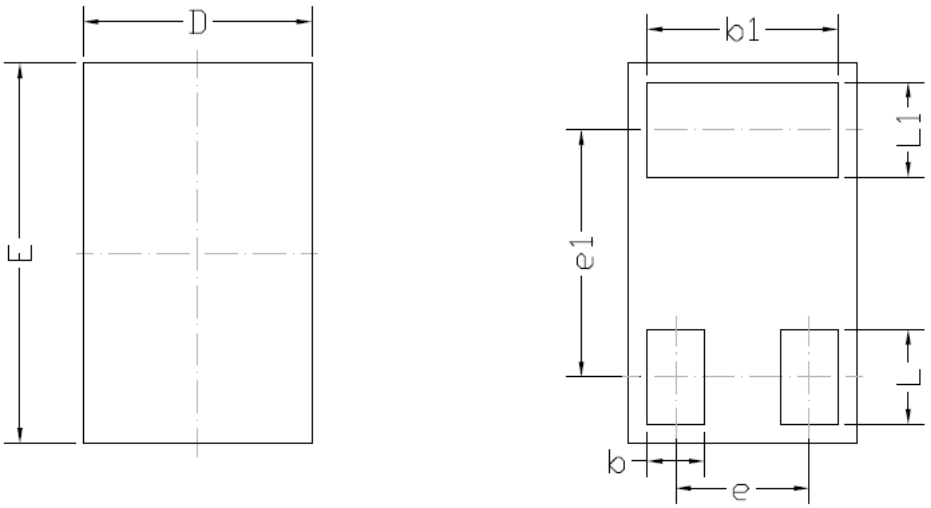
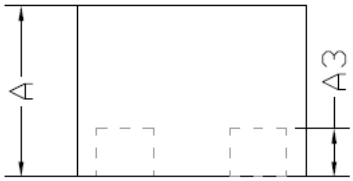


Fig.8 Gate Charge Waveform

SOT883 PACKAGE INFORMATION



SIDE VIEW



SYMBOL	COMMON DIMENSIONS MILLIMETER		
	MIN	NOM.	MAX
A	0.40	0.45	0.50
A3	0.127 BSC		
D	0.55	0.60	0.65
E	0.95	1.00	1.05
e	0.35 BSC		
e1	0.65 BSC		
b	0.13	0.15	0.18
b1	0.45	0.50	0.55
L	0.20	0.25	0.30
L1	0.20	0.25	0.30