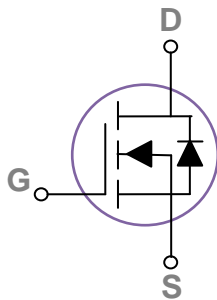


20V N-Channel MOSFETs

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.

SOT-23 Pin Configuration



BV_{DSS}	$R_{DS(ON)Max.}$	I_D
20V	30mΩ	5.5A

Features

- 20V, 4.5A, $R_{DS(ON)Max.}=30m\Omega@V_{GS}=4.5V$
- Improved dv/dt capability
- Fast switching
- Green Device Available
- Suit for 1.8V Gate Drive Applications

Applications

- Notebook
- Load Switch
- 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	V
V_{GS}	Gate-Source Voltage	± 10	V
I_D	Drain Current – Continuous ($T_C=25^\circ\text{C}$)	5.5	A
	Drain Current – Continuous ($T_C=100^\circ\text{C}$)	3.9	A
I_{DM}	Drain Current – Pulsed ¹	22	A
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)	1.56	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Note 1: Exceed these limits to damage to the device.

Note 2: Exposure to absolute maximum rating conditions may affect device reliability.

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

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
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=20V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$			1	μA
		$V_{DS}=16V$, $V_{GS}=0V$, $T_J=85^\circ\text{C}$			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	$V_{GS}=4.5V$, $I_D=4.5A$		23	30	m Ω
		$V_{GS}=2.5V$, $I_D=3.5A$		28	40	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	0.5	0.6	1.2	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient			-2		mV/ $^\circ\text{C}$
gfs	Forward Transconductance	$V_{DS}=5V$, $I_D=4.5A$		30		S

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{2,3}	$V_{DS}=10V$, $V_{GS}=4.5V$, $I_D=4A$		7.7		nC
Q_{gs}	Gate-Source Charge ^{2,3}			0.9		
Q_{gd}	Gate-Drain Charge ^{2,3}			2.4		
$T_{d(on)}$	Turn-On Delay Time ^{2,3}	$V_{DD}=10V$, $V_{GS}=4.5V$, $R_G=25\Omega$ $I_D=1A$		4.1		nS
T_r	Rise Time ^{2,3}			11.6		
$T_{d(off)}$	Turn-Off Delay Time ^{2,3}			23.9		
T_f	Fall Time ^{2,3}			7.6		
C_{iss}	Input Capacitance	$V_{DS}=10V$, $V_{GS}=0V$, $F=1\text{MHz}$		535		pF
C_{oss}	Output Capacitance			60		
C_{rss}	Reverse Transfer Capacitance			34		

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			5.5	A
I_{SM}	Pulsed Source Current				11.4	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.

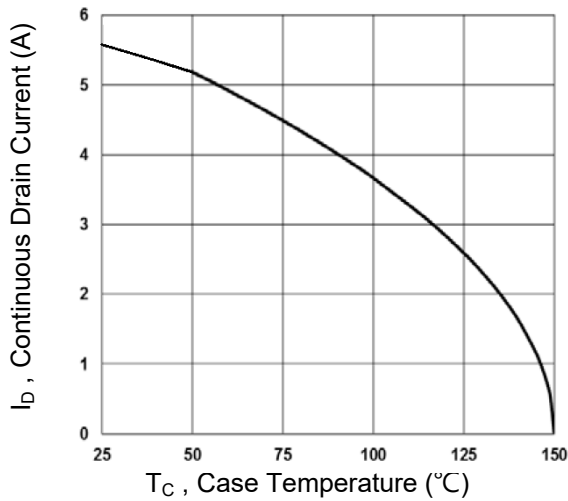


Fig.1 Continuous Drain Current vs. T_c

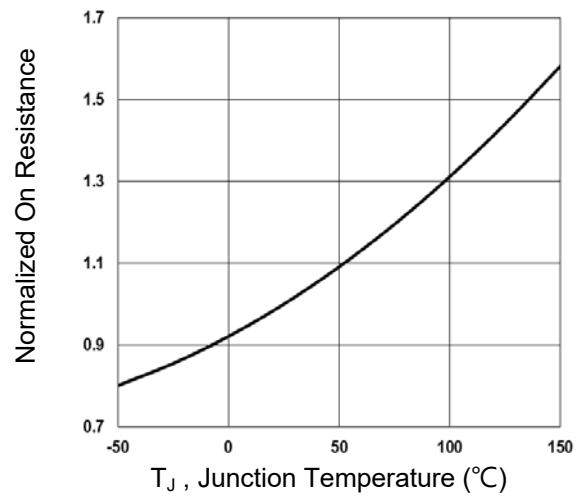


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

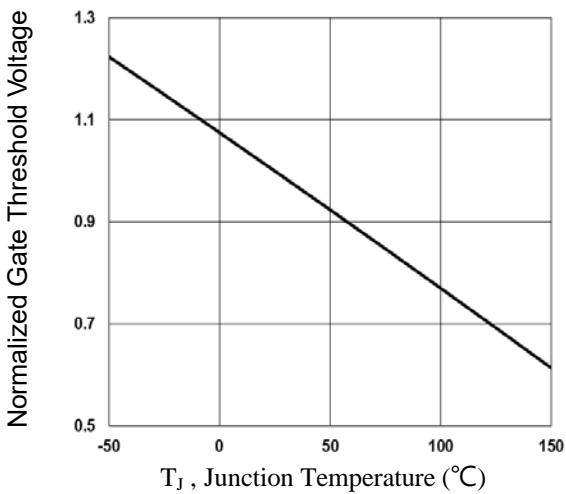


Fig.3 Normalized V_{th} vs. T_j

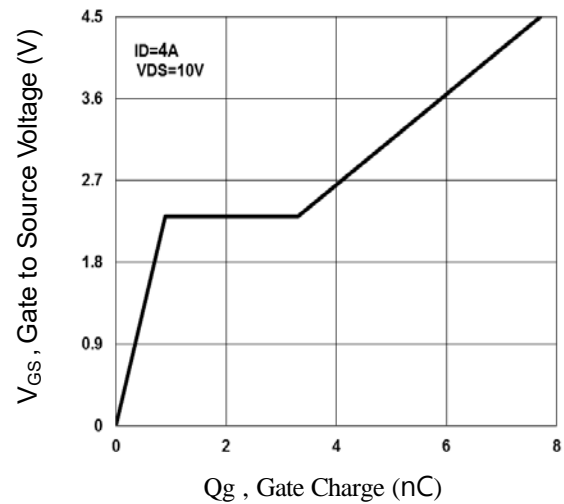


Fig.4 Gate Charge Waveform

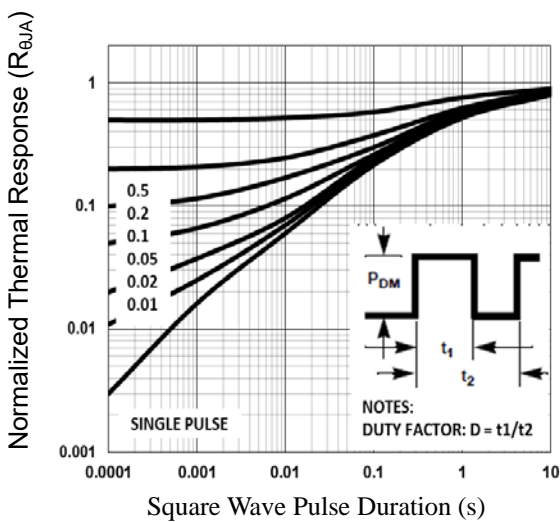


Fig.5 Normalized Transient Impedance

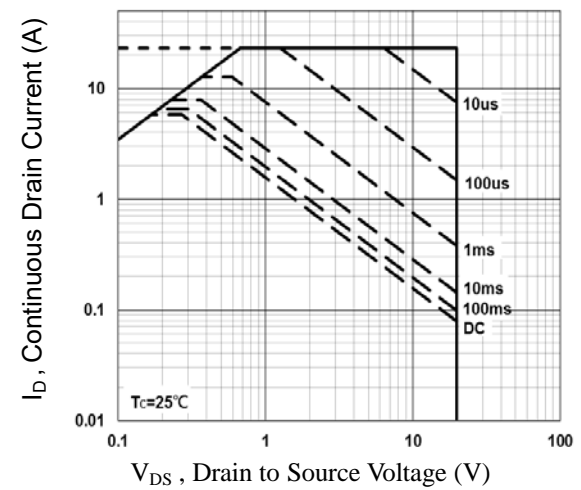


Fig.6 Maximum Safe Operation Area

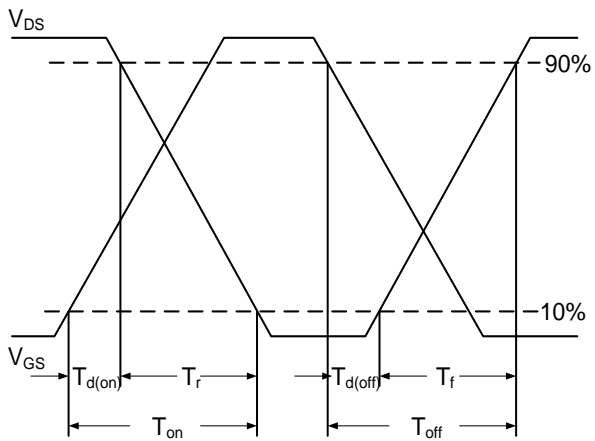


Fig.7 Switching Time Waveform

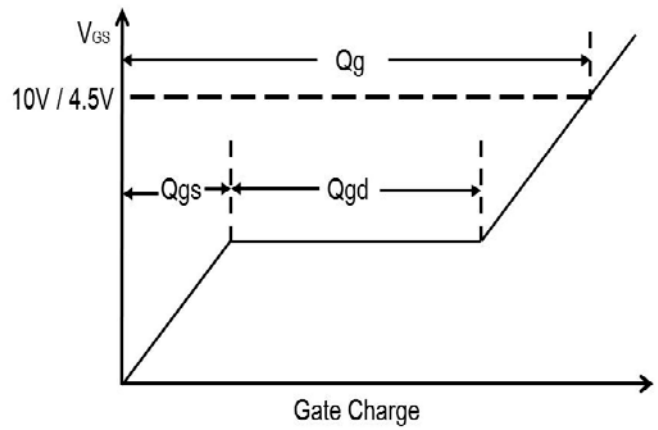
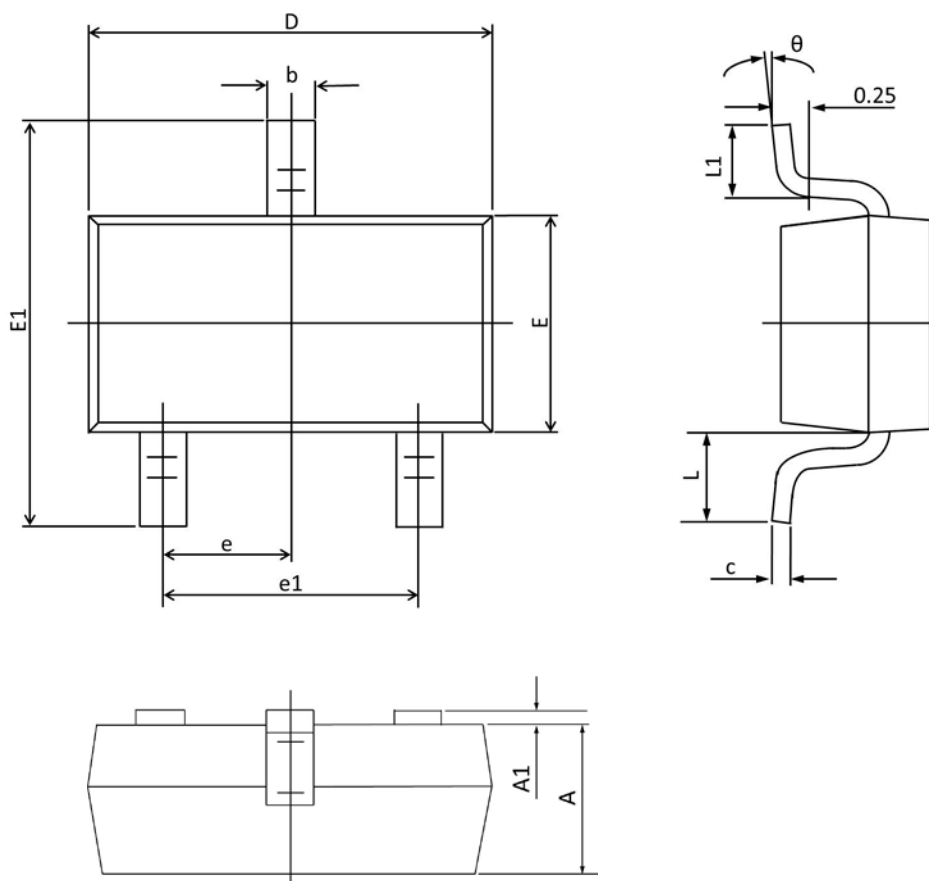


Fig.8 Gate Charge Waveform

SOT-23 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.000	0.035	0.039
A1	0.000	0.100	0.000	0.004
b	0.300	0.500	0.012	0.020
c	0.090	0.110	0.003	0.004
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	1°	7°	1°	7°