



20V P-Channel MOSFETs

General Description

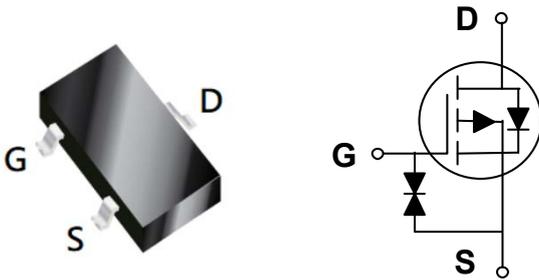
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BV_{DSS}	R_{DS(ON)}	I_D
-20 V	600 mΩ	-400 mA

Features

- $R_{DS(ON)} \leq 600m\Omega @ V_{GS} = -4.5V$
- Improved dv/dt capability
- Fast switching
- Green Device Available
- Suit for -1.5V Gate Drive Applications

SOT-523 Pin Configuration



Applications

- Notebook
- Load Switch
- Battery Protection
- Hand-held Instruments

Absolute Maximum Ratings $T_C=25^\circ C$ 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 ($T_C=25^\circ C$)	-400	mA
	Drain Current - Continuous ($T_C=100^\circ C$)	-250	mA
I_{DM}	Drain Current - Pulsed (NOTE 1)	-1.6	A
P_D	Power Dissipation ($T_C=25^\circ C$)	312	mW
	Power Dissipation – Derate above $25^\circ C$	2.5	mW/ $^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
Marking Code		F	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	400	$^\circ C/W$

**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
		$V_{DS}=-16V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 8V, V_{DS}=0V$	---	---	± 20	μA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-0.3A$	---	---	600	m Ω
		$V_{GS}=-2.5V, I_D=-0.2A$	---	---	850	
		$V_{GS}=-1.8V, I_D=-0.1A$	---	---	1200	
		$V_{GS}=-1.5V, I_D=-0.1A$	---	---	1600	
		$V_{GS}=-1.2V, I_D=-0.1A$	---	---	3000	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.3	-0.6	-1	V

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-0.2A$ (NOTE 2、3)	---	1	---	nC
Q_{gs}	Gate-Source Charge		---	0.28	---	
Q_{gd}	Gate-Drain Charge		---	0.18	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=10\Omega, I_D=-0.2A$ (NOTE 2、3)	---	8	---	nS
T_r	Rise Time		---	5.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	30	---	
T_f	Fall Time		---	18	---	
C_{iss}	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, F=1\text{MHz}$	---	40	---	pF
C_{oss}	Output Capacitance		---	15	---	
C_{rss}	Reverse Transfer Capacitance		---	6.5	---	

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	-0.4	A
I_{SM}	Pulsed Source Current		---	---	-0.8	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=-0.2A, T_J=25^\circ\text{C}$	---	---	-1	V

NOTES :

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.



Characteristics Curves

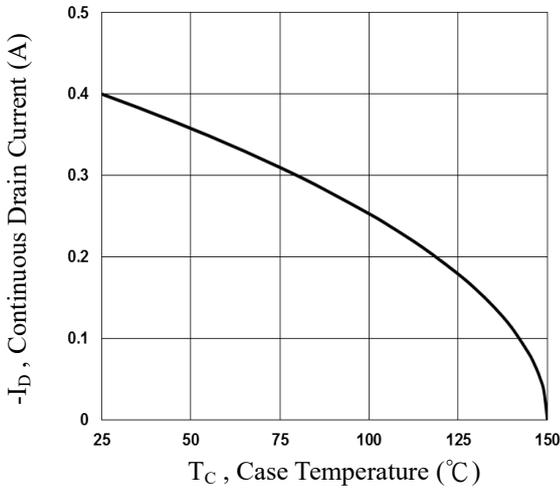


Fig.1 Continuous Drain Current vs. T_C

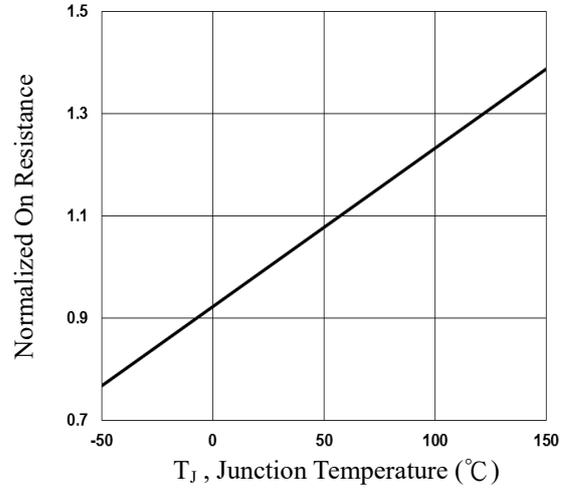


Fig.2 Normalized R_{DSon} vs. T_J

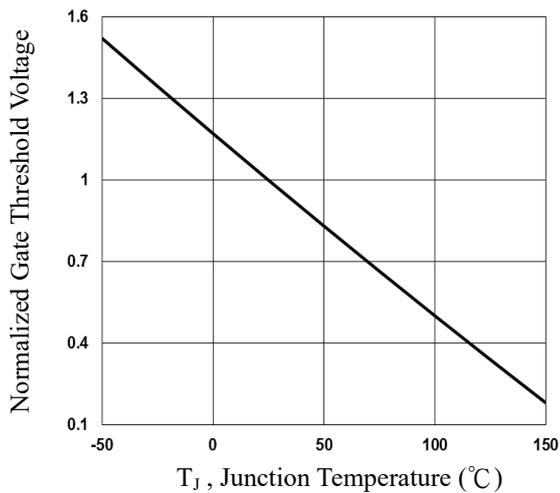


Fig.3 Normalized V_{th} vs. T_J

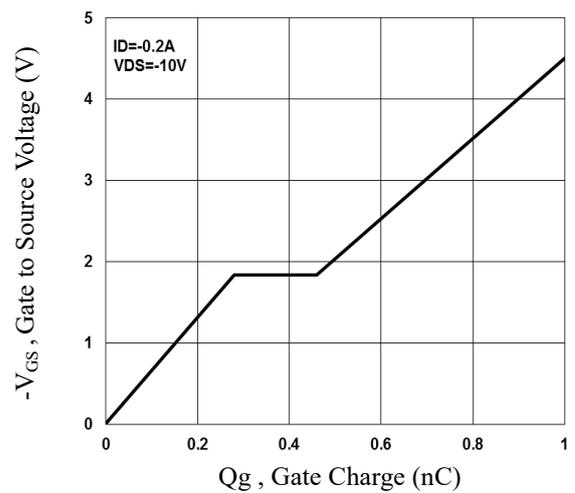


Fig.4 Gate Charge Waveform

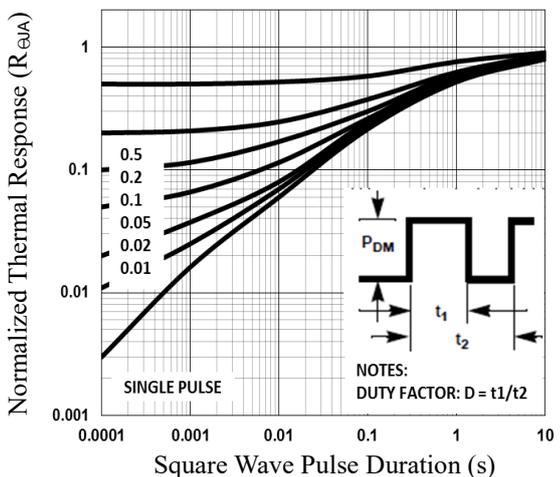


Fig.5 Normalized Transient Response

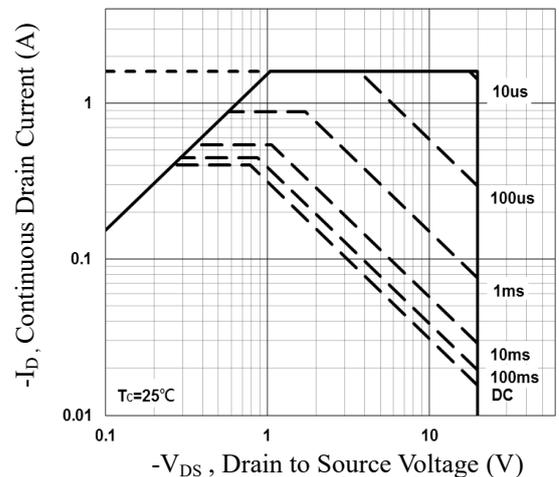


Fig.6 Maximum Safe Operation Area



Characteristics Curves

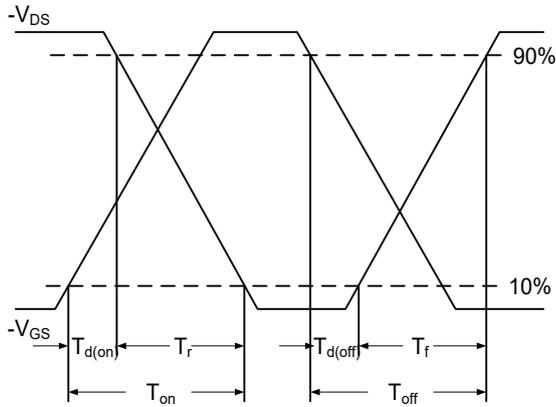


Fig.7 Switching Time Waveform

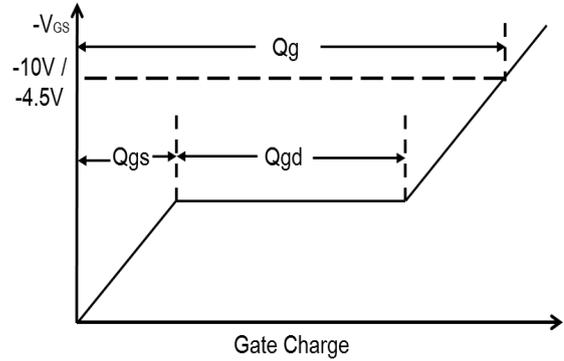
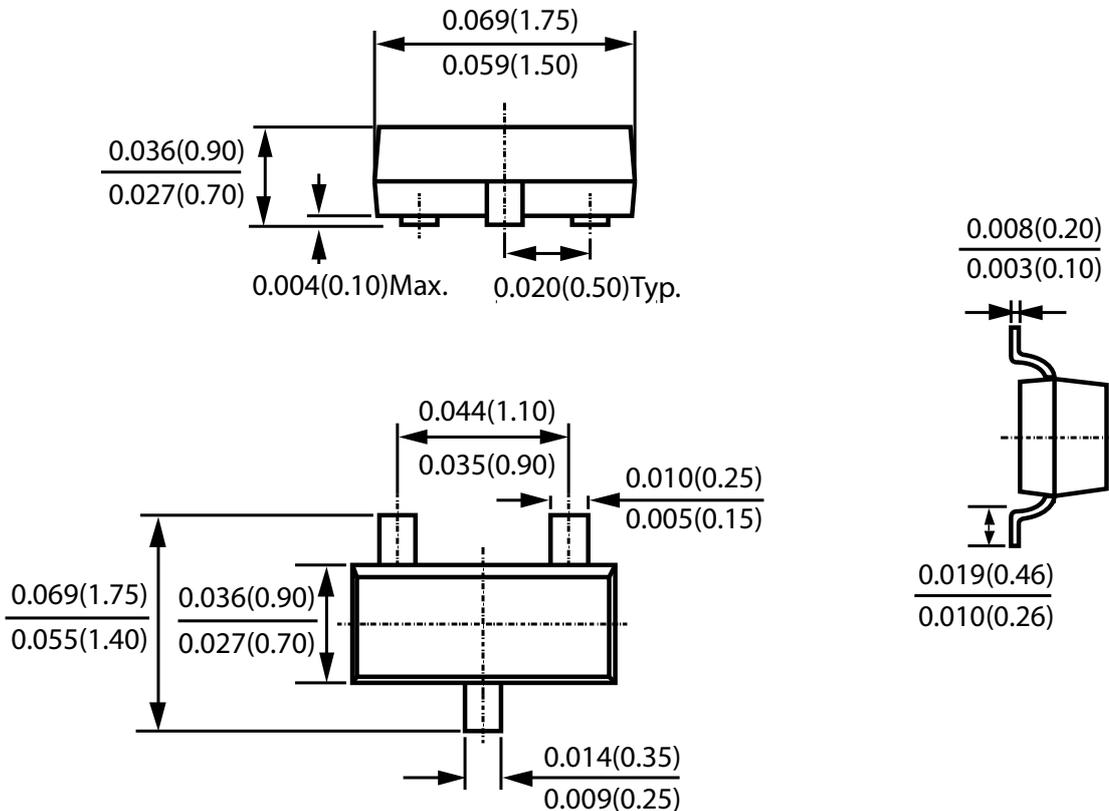


Fig.8 Gate Charge Waveform

Package Outline Dimensions



SOT-523

Dimensions in inches and (millimeters)



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