



## 20V N-Channel MOSFETs

### General Description

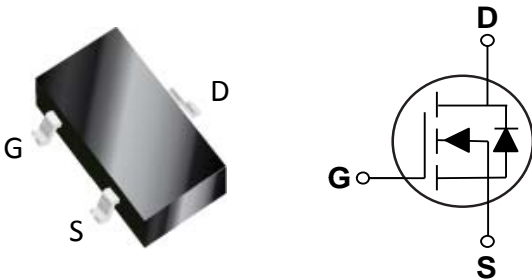
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

<b>BV<sub>DSS</sub></b>	<b>R<sub>DS(ON)</sub></b>	<b>I<sub>D</sub></b>
20 V	25 mΩ	5.8 A

### Features

- 20V, 5.8A, R<sub>DS(ON)</sub>=25mΩ @V<sub>GS</sub>=4.5V
- Improved dv/dt capability
- Fast switching
- Green Device Available
- Suit for 1.8V Gate Drive Applications

SOT-23 Pin Configuration



### Applications

- Notebook
- Load Switch
- Hand-Held Instruments

### Absolute Maximum Ratings T<sub>C</sub>=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	20	V
V <sub>GS</sub>	Gate-Source Voltage	±10	V
I <sub>D</sub>	Drain Current - Continuous (T <sub>C</sub> =25°C)	5.8	A
	Drain Current - Continuous (T <sub>C</sub> =100°C)	3.7	A
I <sub>DM</sub>	Drain Current - Pulsed (NOTE 1)	23.2	A
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> =25°C)	1.56	W
	Power Dissipation - Derate above 25°C	0.012	W/°C
T <sub>J</sub>	Operating Junction Temperature Range	-50 to 150	°C
T <sub>STG</sub>	Storage Temperature Range	-50 to 150	°C
Marking Code		R	

### Thermal Characteristics

Symbol	Parameter	Typ.	Max	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to Ambient	---	80	°C/W



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Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	20	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =16V, V <sub>GS</sub> =0V, T <sub>J</sub> =85°C	---	---	10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A	---	20	25	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =3A	---	27	35	
		V <sub>GS</sub> =1.8V, I <sub>D</sub> =2A	---	39	55	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	0.4	0.6	0.8	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =3A	---	6.5	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge (NOTE 2、3)	V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A	---	7.7	11	nC
Q <sub>gs</sub>	Gate-Source Charge (NOTE 2、3)		---	0.9	1	
Q <sub>gd</sub>	Gate-Drain Charge (NOTE 2、3)		---	2.4	5	
T <sub>d(on)</sub>	Turn-On Delay Time (NOTE 2、3)	V <sub>DD</sub> =10V, V <sub>GS</sub> =4.5V, R <sub>G</sub> =2.5Ω, I <sub>D</sub> =1A	---	4.1	8	ns
T <sub>r</sub>	Rise Time (NOTE 2、3)		---	11.6	22	
T <sub>d(off)</sub>	Turn-Off Delay Time (NOTE 2、3)		---	23.9	45	
T <sub>f</sub>	Fall Time (NOTE 2、3)		---	7.6	14	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, F=1MHz	---	535	775	pF
C <sub>oss</sub>	Output Capacitance		---	60	85	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	34	50	

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	5.8	A
I <sub>SM</sub>	Pulsed Source Current		---	---	23.2	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1	V

NOTES :

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.



Characteristics Curves

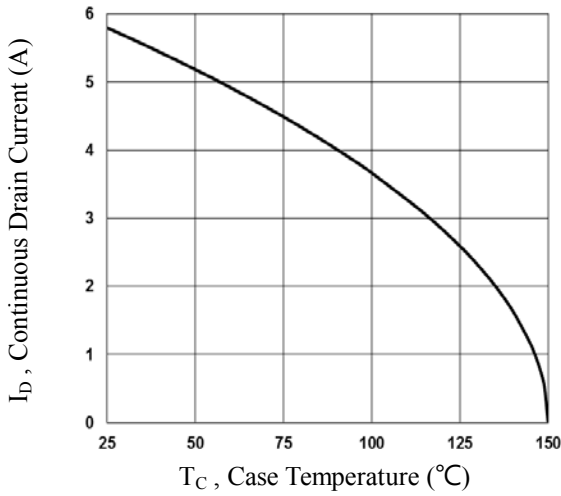


Fig.1 Continuous Drain Current vs.  $T_C$

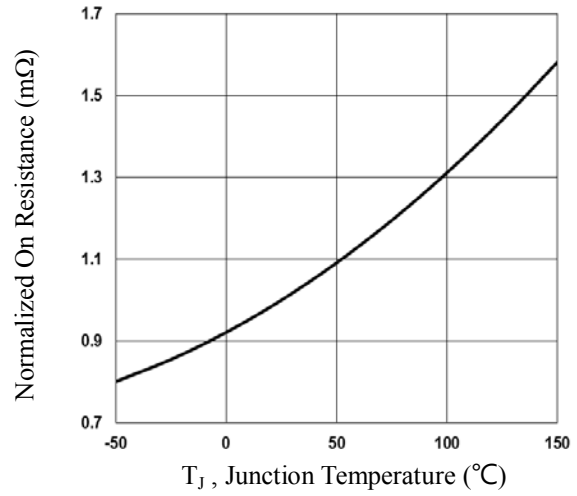


Fig.2 Normalized RDSON vs.  $T_J$

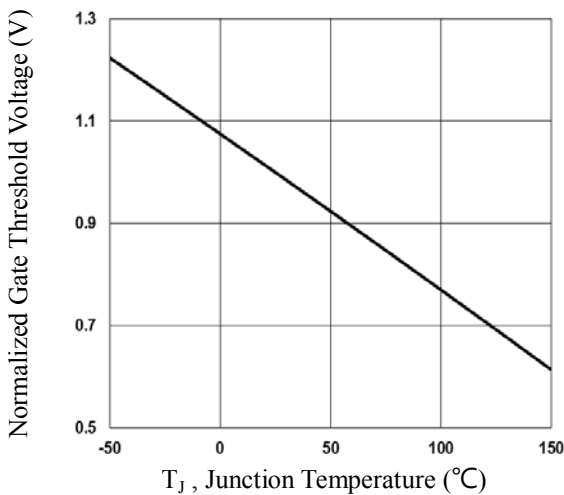


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

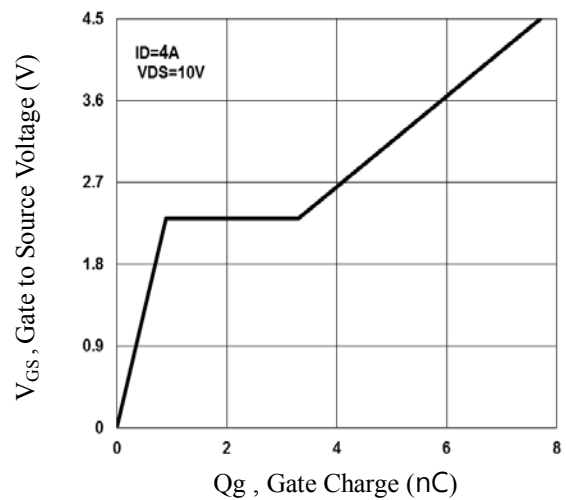


Fig.4 Gate Charge Waveform

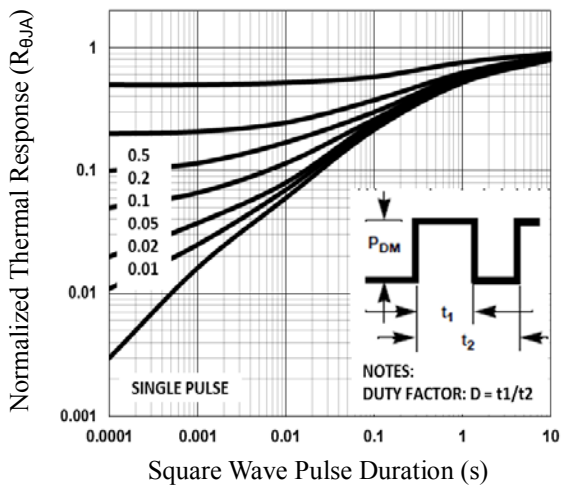


Fig.5 Normalized Transient Impedance

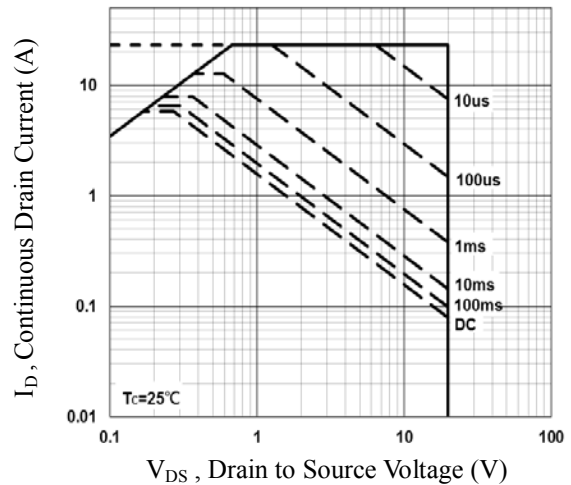


Fig.6 Maximum Safe Operation Area



Characteristics Curves

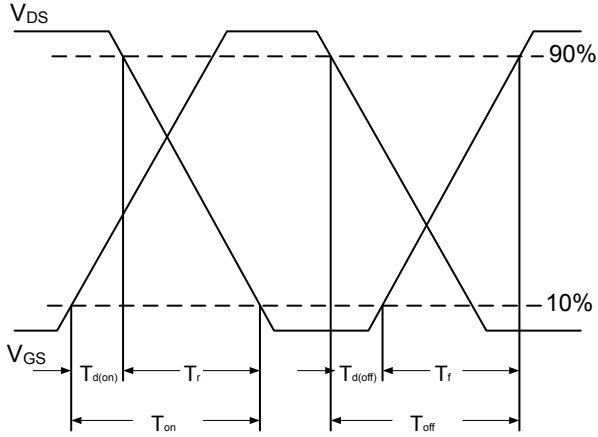


Fig.7 Switching Time Waveform

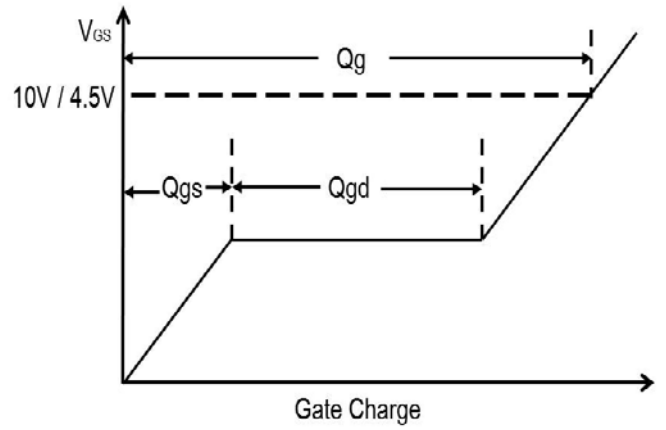
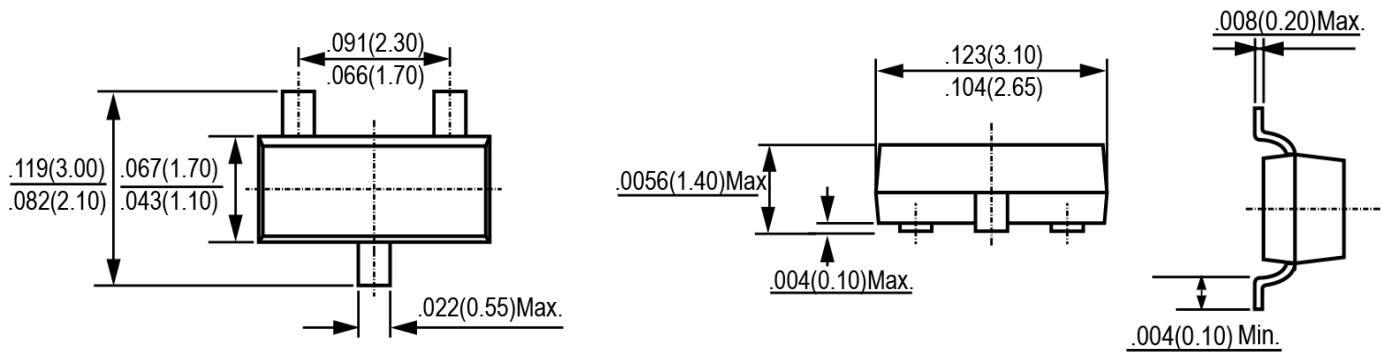


Fig.8 Gate Charge Waveform

Package Outline Dimensions



SOT-23

Dimensions in inches and (millimeters)



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