

MS23N20Z

20V N-Channel MOSFETs

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.

Features

- 20V, 500mA, $R_{DS(ON)} = 350m\Omega @ V_{GS} = 4.5V$
- Worldwide Smallest Package : 1x0.6x0.45 mm
- Fast switching
- Green Device Available
- Suit for 1.2V Gate Drive Applications
- 2KV HBM ESD Capability
- RoHS compliant package

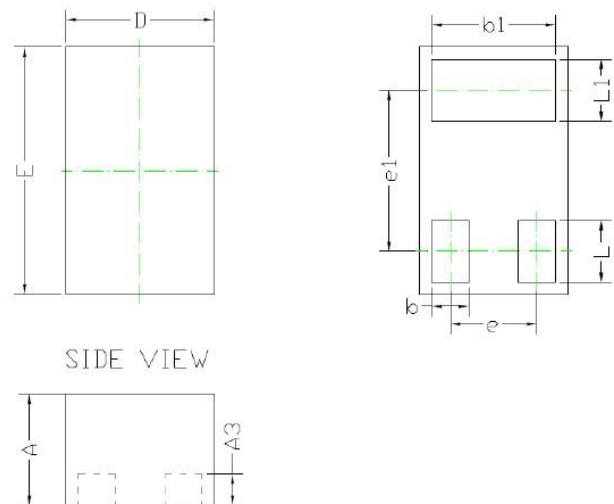
Application

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

Package type : SOT-883

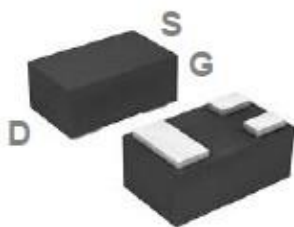
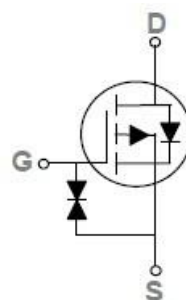
Packing & Order Information

3,000/Reel



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

Graphic symbol



**RoHS
COMPLIANT**

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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage	20	V
V _{GS}	Gate-Source Voltage	±8	V
I _D	Drain Current -Continuous (TC=25°C)	500	mA
	Drain Current -Continuous (TC=100°C)	320	mA
I _{DM}	Drain Current Pulsed ¹	1000	mA
P _D	Power Dissipation (TC=25°C)	155	mW
	Power Dissipation - Derate above 25°C	1.25	mW/°C
T _J	Storage Temperature Range	-55 to 150	°C
T _{STG}	Operating Junction Temperature Range	-55 to 150	°C

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
R _{θJA}	Thermal Resistance Junction to ambient		800	°C/W

Electrical Characteristics (T_J=25°C, unless otherwise noted)

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	0.3	0.5	0.8	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient				3	
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 4.5 V, I _D = 0.5 A		200	350	mΩ
		V _{GS} = 2.5 V, I _D = 0.4 A		235	450	
		V _{GS} = 1.8 V, I _D = 0.2 A		295	600	
		V _{GS} = 1.5 V, I _D = 0.1 A		365	800	
		V _{GS} = 1.2 V, I _D = 0.1 A		600	1500	V

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250μA	20	--	--	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	I _D = 1mA, Referenced to 25°C	--	0.01	--	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} = 20 V, V _{GS} = 0 V, T _J = 125°C V _{DS} = 16 V, V _{GS} = 0 V, T _J = 125°C	--	--	1 10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ±8 V, V _{DS} = 0 V	--	--	±20	uA

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Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
Q_g	Total Gate Charge ^{2,3}	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A},$ $V_{GS} = 4.5\text{ V}$	--	1	2	nC
Q_{gs}	Gate-Source Charge ^{2,3}		--	0.26	0.5	nC
Q_{gd}	Gate-Drain Charge ^{2,3}		--	0.2	0.4	nC
$T_{d(on)}$	Turn-On Time ^{2,3}	$V_{DD} = 10\text{ V}, I_D = 0.5\text{ A},$ $R_G = 10\ \Omega, V_{GS} = 4.5\text{ V}$	--	5	10	ns
T_r	Turn-On Time ^{2,3}		--	3.5	7	ns
$T_{d(off)}$	Turn-Off Delay Time ^{2,3}		--	14	28	ns
T_f	Turn-Off Fall Time ^{2,3}		--	6	12	ns
C_{ISS}	Input Capacitance	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V},$ $F = 1.0\text{ MHz}$	--	38.2	75	pF
C_{OSS}	Output Capacitance		--	14.4	28	pF
C_{RSS}	Reverse Transfer Capacitance		--	6	12	pF

Drain-Source Diode Characteristics and Maximum Ratings						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S	Continuous Source Current	$V_G = V_D = 0\text{ V},$ Force Current	--	--	500	mA
I_{SM}	Pulsed Source Current		--	--	1000	
V_{SD}	Diode Forward Voltage	$I_S = 0.2\text{ A}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$	--	--	1	V

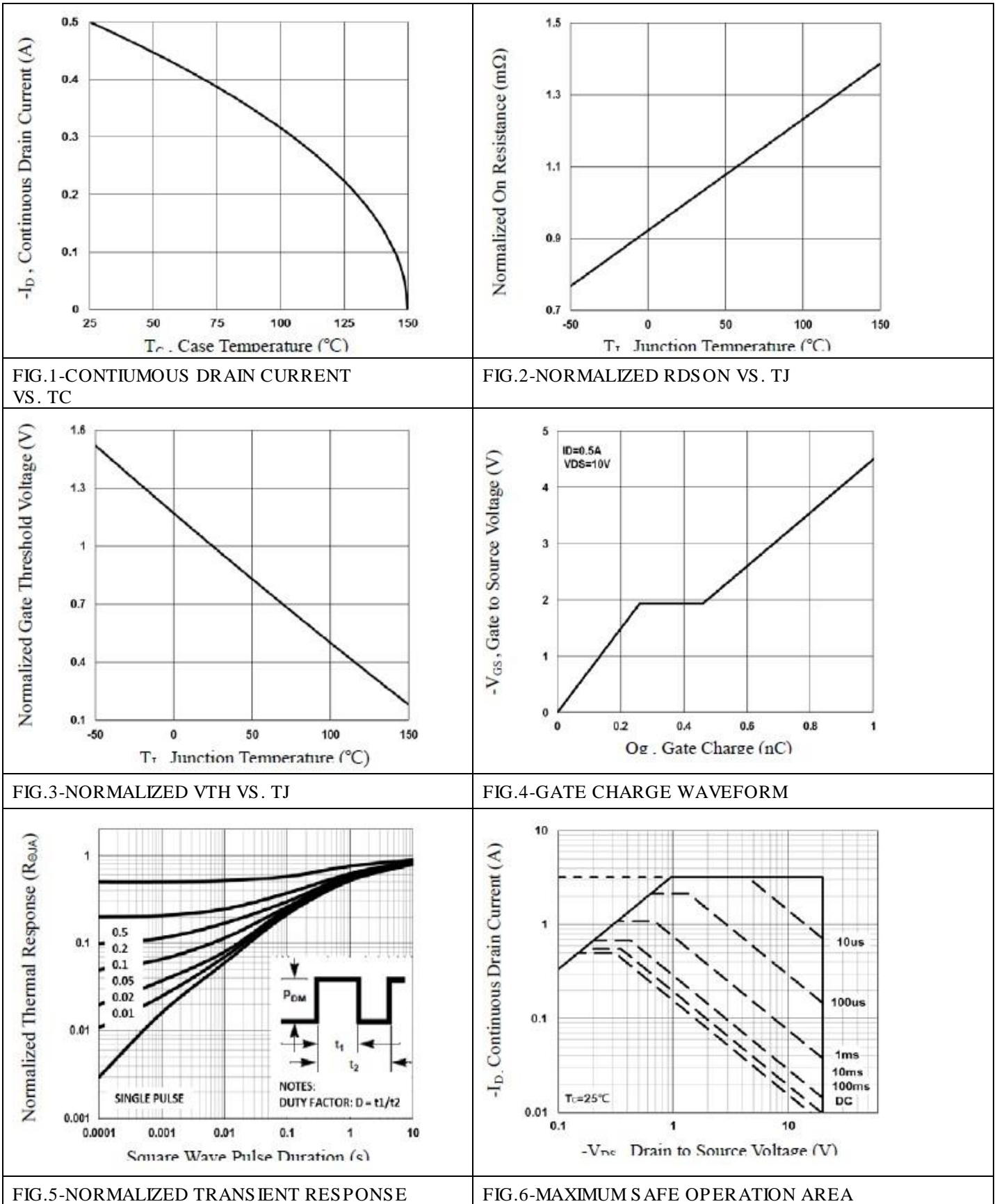
Notes ;

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

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■ Characteristics Curve



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■ Characteristics Curve

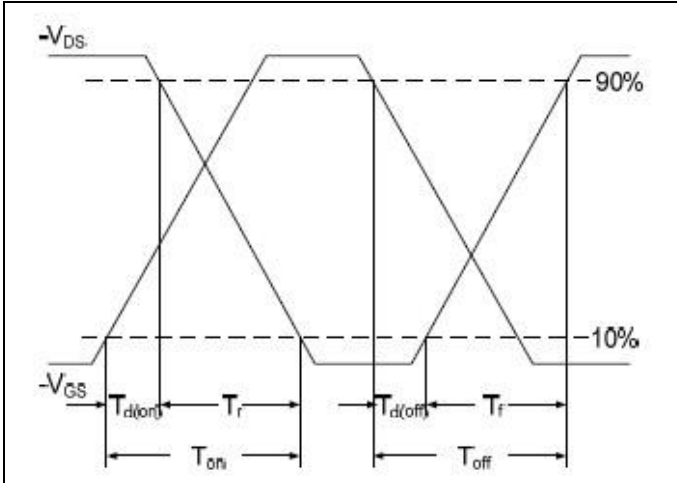


FIG.7-SWITCHING TIME WAVEFORM

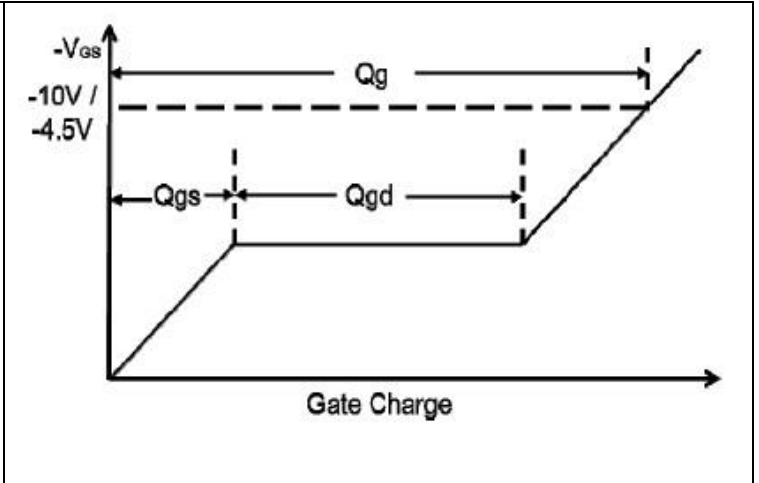


FIG.8-GATE CHARGE WAVEFORM

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