

MS23N02

N-Channel 20-V (D-S) MOSFET

Description

The MS23N02 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the small power switching and load switch applications.

The device meets the RoHS and Green Product requirement with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

Typical Applications

- Notebook
- Load Switch
- Hand-held Instrument

Package type : SOT-23

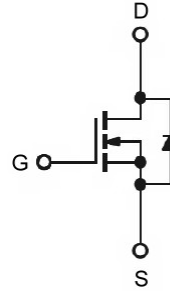
Packing & Order Information

3,000/Reel

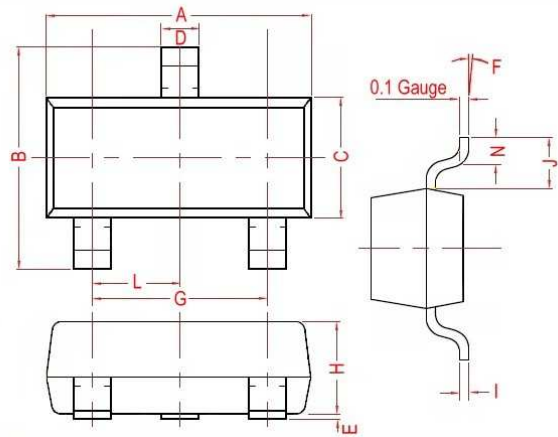


RoHS Compliant

Graphic Symbol

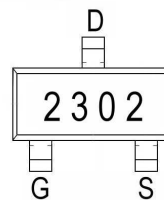


Package Dimension



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.70	3.10	G	1.90 Ref.	
B	2.30	3.00	H	0.90	1.30
C	1.20	1.75	I	0.05	0.21
D	0.30	0.50	J	0.58 Ref.	
E	0.01	0.15	L	0.95 Typ.	
F	0°	10°	N	0.20 Min.	

Marking



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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (unless otherwise specified)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Continuous Drain Current ¹ ($T_A=25^\circ\text{C}$)	3.6	A
	Continuous Drain Current ¹ ($T_A=70^\circ\text{C}$)	2.8	A
I_{DM}	Pulsed Drain Current ² ($T_A=25^\circ\text{C}$)	14.4	A
P_D	Power Dissipation ³ ($T_A=25^\circ\text{C}$)	1.0	W
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$

Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ³	125	$^\circ\text{C/W}$

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	0.4	-	1.2	V
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	20	-	-	V
g_{fs}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=3\text{A}$	-	10	-	S
I_{GSS}	Gate-Source Leakage Current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 12\text{V}$	-	-	± 100	nA
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=16\text{V}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{DS}=16\text{V}$, $V_{GS}=0\text{V}$, $T_J=55^\circ\text{C}$	-	-	5	μA
$R_{DS(on)}$	Static Drain-Source On-Resistance ²	$V_{GS}=4.5\text{V}$, $I_D=3.0\text{A}$	-	-	55	m Ω
		$V_{GS}=2.5\text{V}$, $I_D=2.0\text{A}$	-	-	75	m Ω
V_{SD}	Diode Forward Voltage ²	$I_S=1.0\text{A}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	-	-	1.2	V
I_S	Continuous Source Current ^{1,4} (Diode)	$V_G=V_D=0\text{V}$, Force Current	-	-	3.6	A
I_{SM}	Pulsed Source Current ^{2,4} (Diode)		-	-	7.2	

Notes

1. Surface mounted on a 1 inch² FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
3. The power dissipation is limited by 150 $^\circ\text{C}$ junction temperature.
4. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

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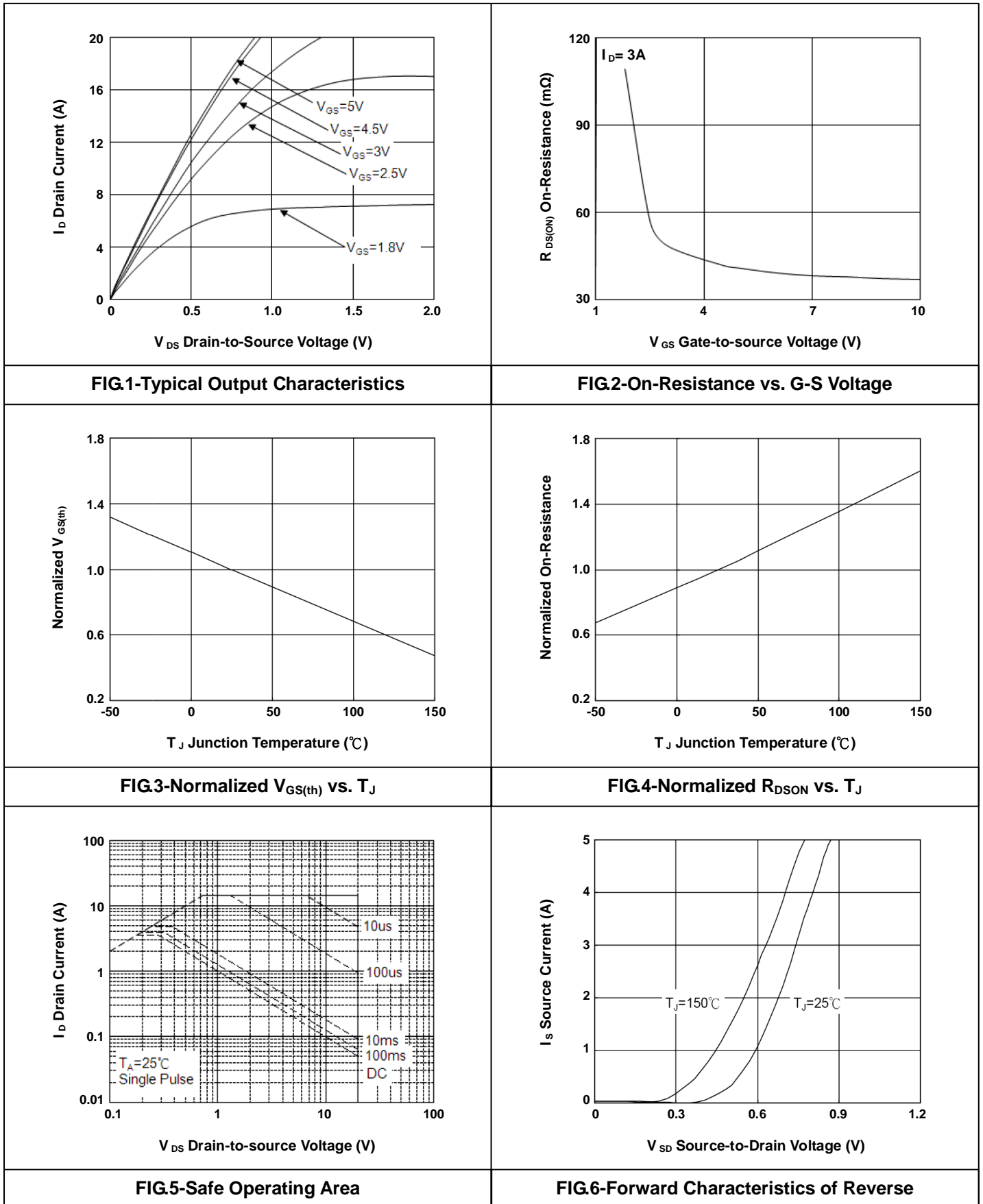
Dynamic and switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge ²	$V_{DS}=15V$	--	4.6	--	nC
Q_{gs}	Gate-Source Charge	$I_D=3A$	--	0.7	--	
Q_{gd}	Gate-Drain Charge	$V_{GS}=4.5V$	--	1.5	--	
$t_{d(on)}$	Turn-On Delay Time ²	$V_{DS}=10V$	--	1.6	--	ns
t_r	Rise Time	$I_D=3A$	--	42	--	
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS}=4.5V$	--	14	--	
t_f	Fall Time	$R_G=3.3\Omega$	--	7	--	
C_{ISS}	Input Capacitance	$V_{DS}=15V$	--	310	--	pF
C_{OSS}	Output Capacitance	$V_{GS}=0V$	--	49	--	
C_{RSS}	Reverse Transfer Capacitance	$f=1.0MHz$	--	35	--	

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- Typical Electrical Characteristics



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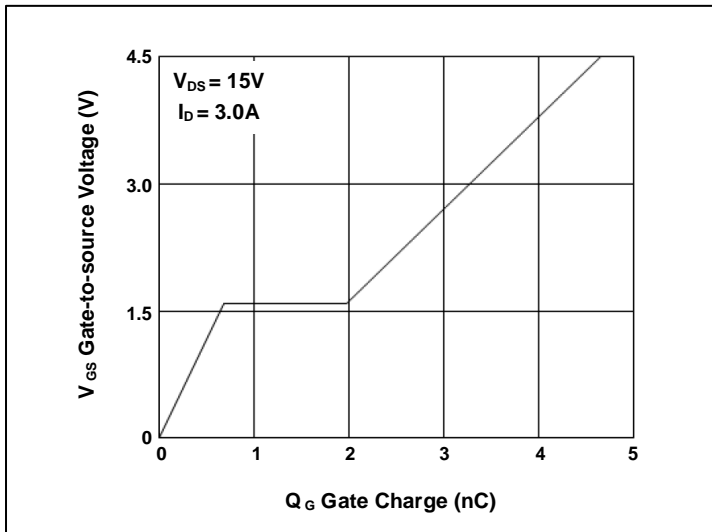


FIG.7-Gate Charge Characteristics

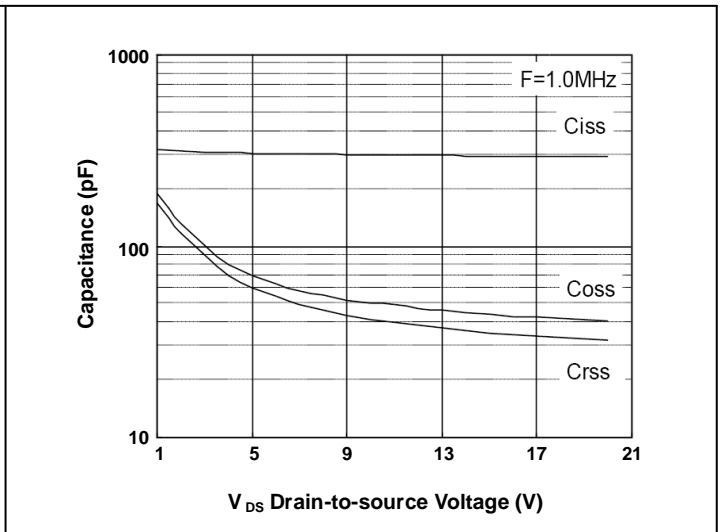


FIG.8-Capacitance Characteristics

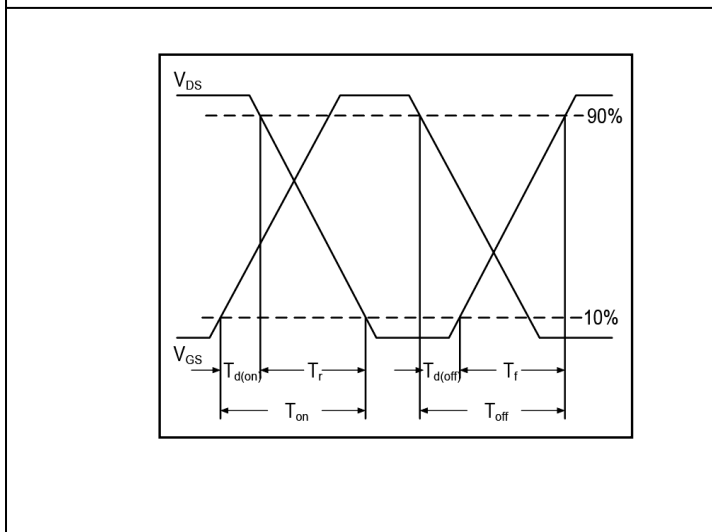


FIG.9-Switching Time Waveform

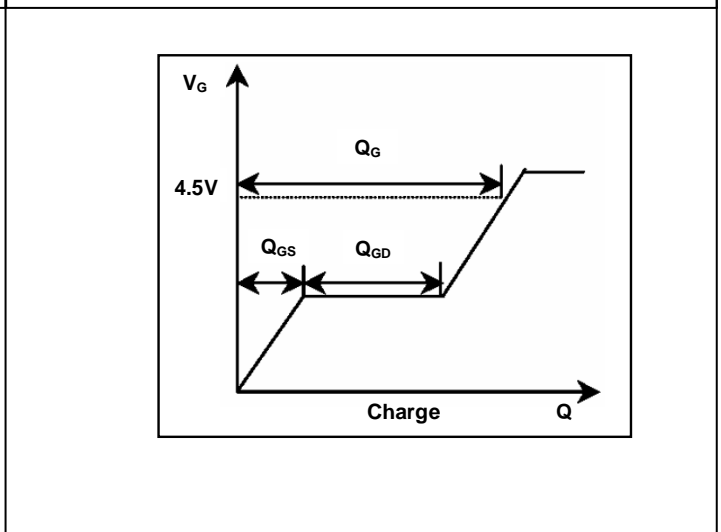


FIG.10-Gate Charge Waveform

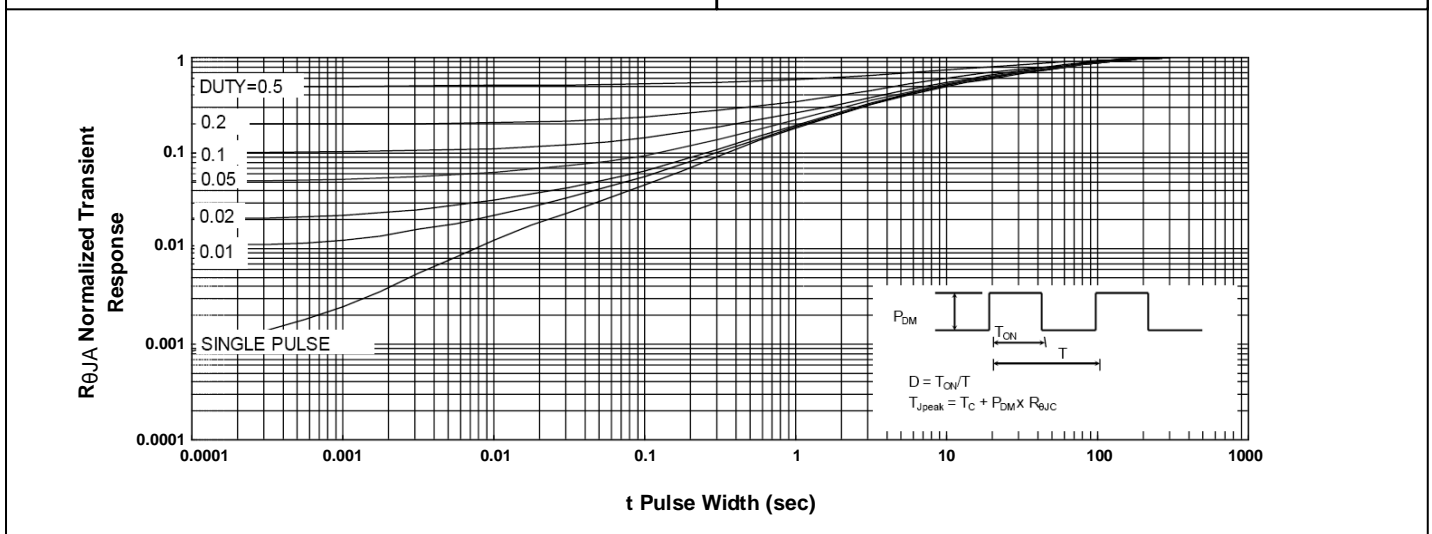


FIG.11-Normalized Maximum Transient Thermal Impedance

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