MGSF2N02EL

Preferred Device

Power MOSFET

2.8 Amps, 20 Volts, N−Channel SOT−23

These miniature surface mount MOSFETs low $R_{DS(on)}$ assure minimal power loss and conserve energy, making these devices ideal for use in space sensitive power management circuitry.

Features

- Pb−Free Packages are Available
- Low $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
- Miniature SOT−23 Surface Mount Package Saves Board Space
- I_{DSS} Specified at Elevated Temperature

Applications

- DC−DC Converters
- Power Management in Portable and Battery Powered Products, ie: Computers, Printers, PCMCIA Cards, Cellular and Cordless Telephones

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	20	Vdc
Gate−to−Source Voltage − Continuous	V_{GS}	± 8.0	Vdc
Drain Current − Continuous @ T_A = 25°C − Single Pulse (t_p = 10 μs)	 I_D I_{DM}	 2.8 5.0	A
Total Power Dissipation @ T_A = 25°C	P_D	1.25	W
Operating and Storage Temperature Range	T_J, T_{stg}	− 55 to 150	°C
Thermal Resistance Junction−to−Ambient (Note 1) Thermal Resistance Junction−to−Ambient (Note 2)	$R_{\theta JA}$	 100 300	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. 1” Pad, t < 10 sec.
2. Min pad, steady state.

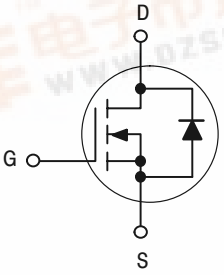
This document contains information on a new product. Specifications and information herein are subject to change without notice.

ON Semiconductor®

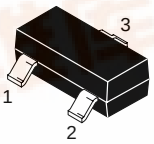
http://onsemi.com

2.8 A, 20 V
$R_{DS(on)}$ = 85 mΩ (max)

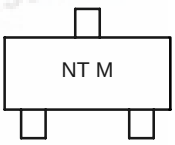
N−Channel



MARKING DIAGRAM

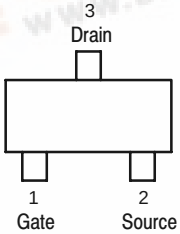


SOT−23
CASE 318
STYLE 21



NT = Device Code
M = Date Code

PIN ASSIGNMENT



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage (Note 3) (V_{GS} = 0 Vdc, I_D = 10 μAdc) Temperature Coefficient (Positive)		$V_{(BR)DSS}$	 20 −	 − 22	 − −	 Vdc mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 20 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 20 Vdc, V_{GS} = 0 Vdc, T_J = 125°C)		I_{DSS}	 − −	 − −	 1.0 10	μAdc
Gate−Source Leakage Current (V_{GS} = ± 8.0 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	−	−	±100	nA
ON CHARACTERISTICS (Note 3)						
Gate−Source Threshold Voltage (V_{DS} = V_{GS}, I_D = 250 μAdc) Threshold Temperature Coefficient (Negative)		$V_{GS(th)}$	 0.5 −	 − −2.3	 1.0 −	 Vdc mV/°C
Static Drain−to−Source On−Resistance (V_{GS} = 4.5 Vdc, I_D = 3.6 A) (V_{GS} = 2.5 Vdc, I_D = 3.1 A)		$R_{DS(on)}$	 − −	 78 105	 85 115	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 5.0 Vdc, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}	−	150	−	pF
Output Capacitance		C_{oss}	−	130	−	
Transfer Capacitance		C_{rss}	−	45	−	
SWITCHING CHARACTERISTICS (Note 4)						
Turn−On Delay Time	(V_{DD} = 16 Vdc, I_D = 2.8 Adc, V_{gs} = 4.5 V, R_G = 2.3 Ω)	$t_{d(on)}$	−	6.0	−	ns
Rise Time		t_r	−	95	−	
Turn−Off Delay Time		$t_{d(off)}$	−	28	−	
Fall Time		t_f	−	125	−	
Gate Charge	(V_{DS} = 16 Vdc, I_D = 1.75 Adc, V_{GS} = 4.0 Vdc) (Note 3)	Q_T	−	3.5	−	nC
		Q_{gs}	−	0.6	−	
		Q_{gd}	−	1.5	−	
SOURCE−DRAIN DIODE CHARACTERISTICS						
Forward Voltage	(I_S = 1.0 Adc, V_{GS} = 0 Vdc) (Note 3)	V_{SD}	 − −	 0.76 −	 1.2 −	V
Reverse Recovery Time	(I_S = 1.0 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs) (Note 3)	t_{rr}	−	104	−	ns
		t_a	−	42	−	
		t_b	−	62	−	
Reverse Recovery Stored Charge		Q_{RR}	−	0.20	−	μC

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperature.

ORDERING INFORMATION

Device	Package	Shipping†
MGSF2N02ELT1	SOT−23	3,000 Tape & Reel
MGSF2N02ELT1G	SOT−23 (Pb−Free)	3,000 Tape & Reel
MGSF2N02ELT3	SOT−23	10,000 Tape & Reel
MGSF2N02ELT3G	SOT−23 (Pb−Free)	10,000 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

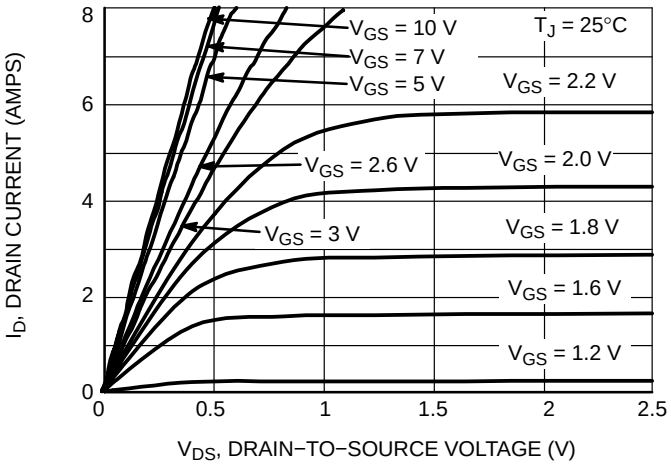


Figure 1. On−Region Characteristics

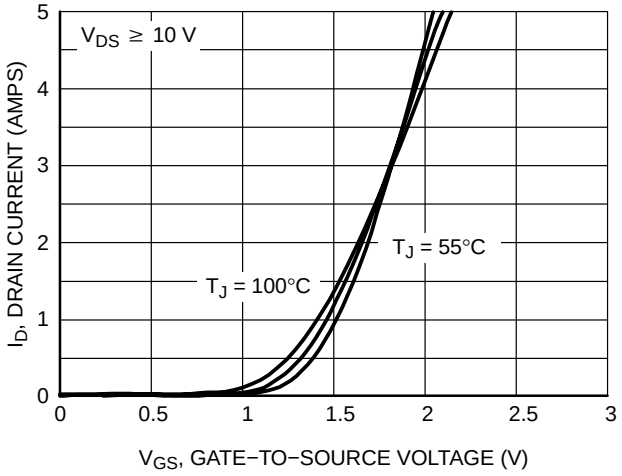


Figure 2. Transfer Characteristics

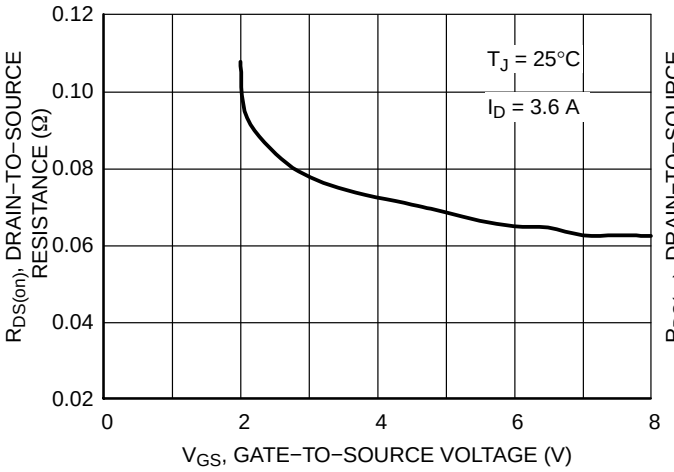


Figure 3. On−Resistance vs. Gate−to−Source Voltage

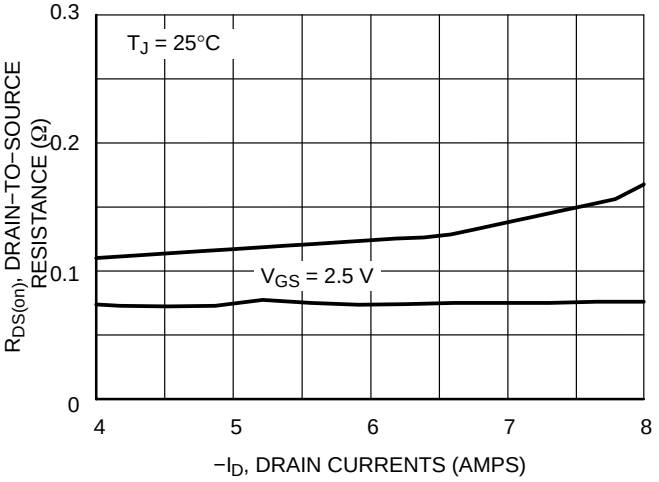


Figure 4. On−Resistance vs. Gate Voltage

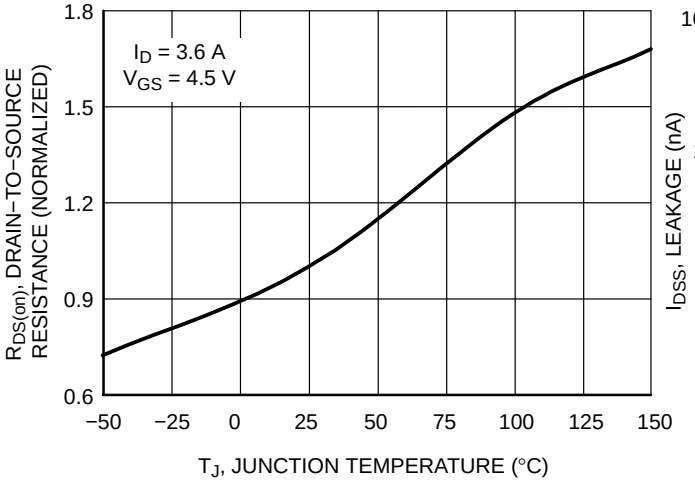


Figure 5. On−Resistance Variation with Temperature

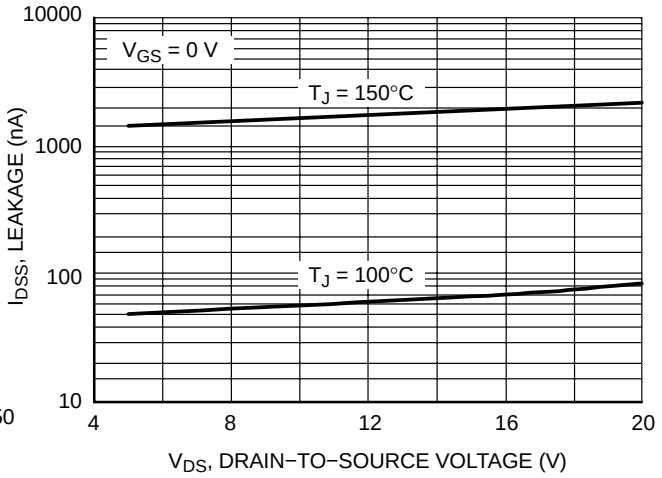


Figure 6. Drain−to−Source Leakage Current vs. Voltage

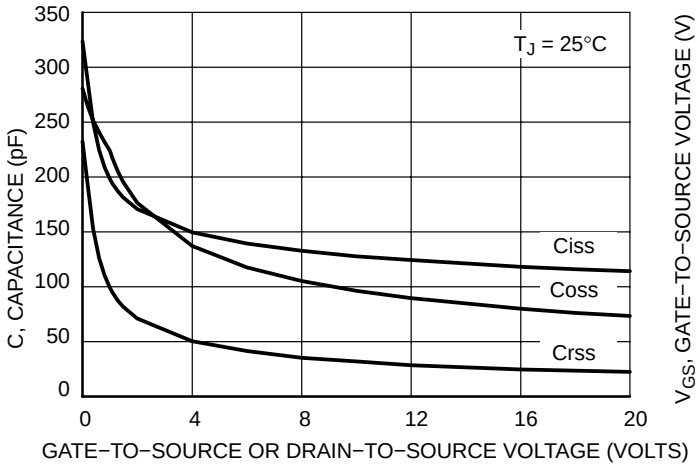


Figure 7. Capacitance Variation

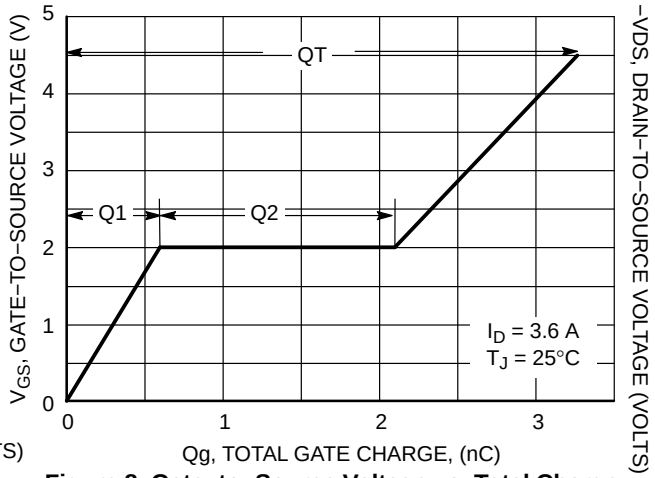


Figure 8. Gate−to−Source Voltage vs. Total Charge

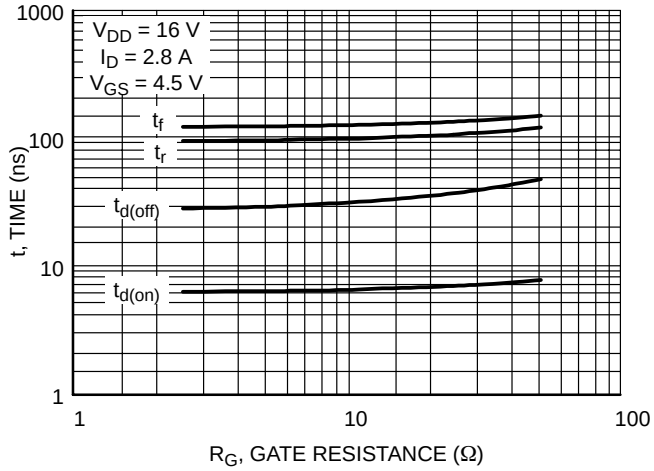


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

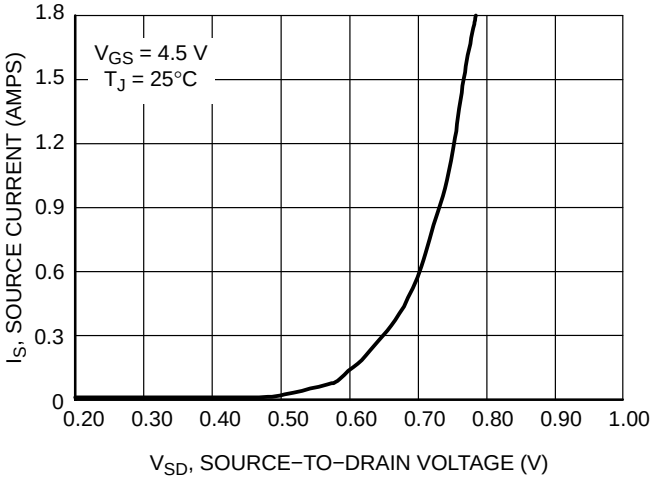
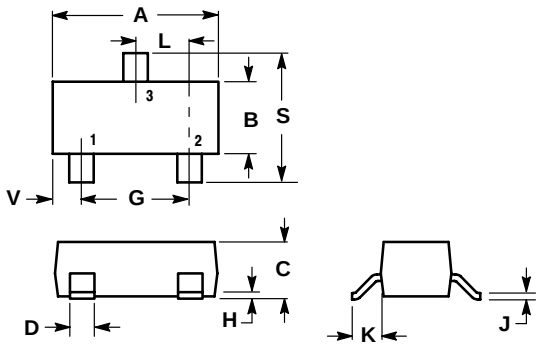


Figure 10. Diode Forward Voltage vs. Current

MGSF2N02EL

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AJ

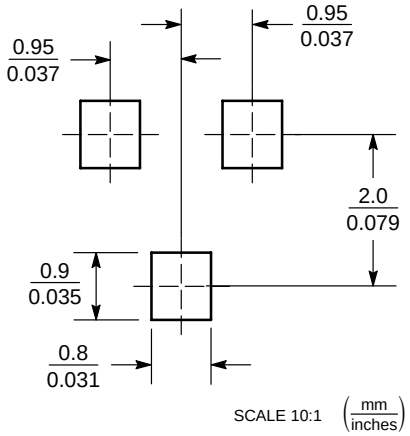


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318−03 AND −07 OBSOLETE, NEW STANDARD 318−08.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

SOLDERING FOOTPRINT*



*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082−1312 USA
Phone: 480−829−7710 or 800−344−3860 Toll Free USA/Canada
Fax: 480−829−7709 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2−9−1 Kamimeguro, Meguro−ku, Tokyo, Japan 153−0051
Phone: 81−3−5773−3850

ON Semiconductor Website: http://onsemi.com

Order Literature: http://www.onsemi.com/litorder

For additional information, please contact your local Sales Representative.