MGSF2N02EL, MVSF2N02EL

MOSFET – N-Channel, SOT-23

2.8 A, 20 V

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

- 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
- AEC Q101 Qualified and PPAP Capable − MVSF2N02EL
- These Devices are Pb−Free and are RoHS Compliant

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

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

ON Semiconductor®

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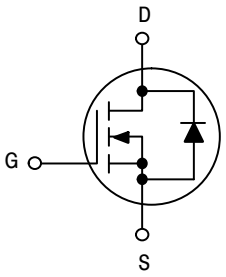
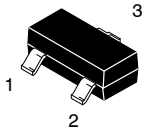
2.8 A, 20 V
$R_{DS(on)}$ = 85 mΩ (max)

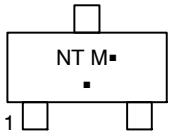
N−Channel



MARKING DIAGRAM

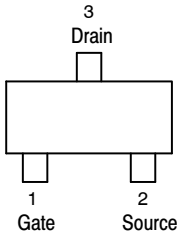


SOT−23
CASE 318
STYLE 21



xxx = Specific Device Code
M = Date Code
▪ = Pb−Free Package

PIN ASSIGNMENT



ORDERING INFORMATION

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

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

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

ORDERING INFORMATION

Device	Package	Shipping†
MGSF2N02ELT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
MVSF2N02ELT1G*		

†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.

*MVSF Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

TYPICAL CHARACTERISTICS

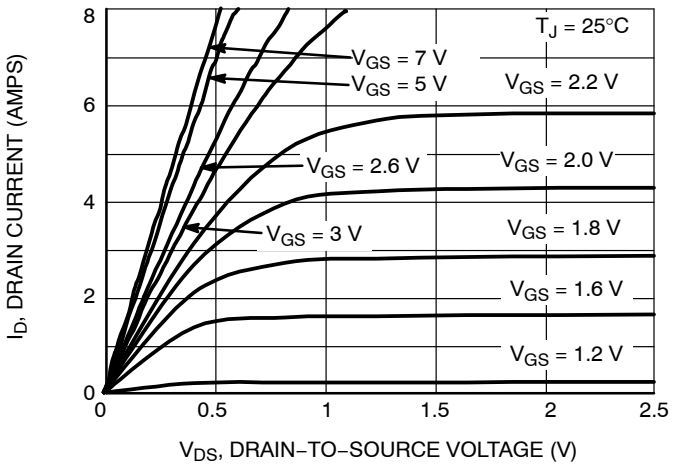


Figure 1. On−Region Characteristics

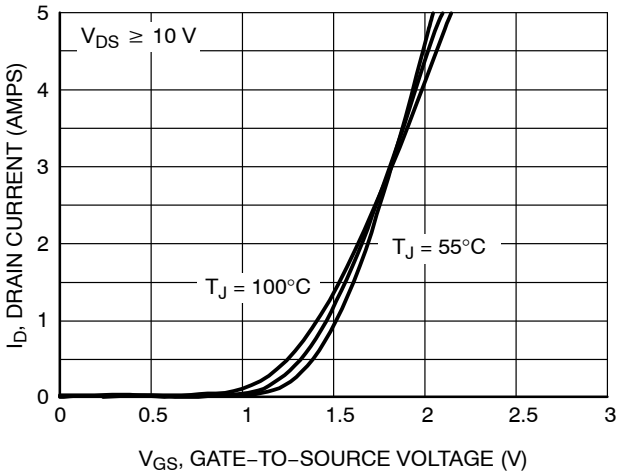


Figure 2. Transfer Characteristics

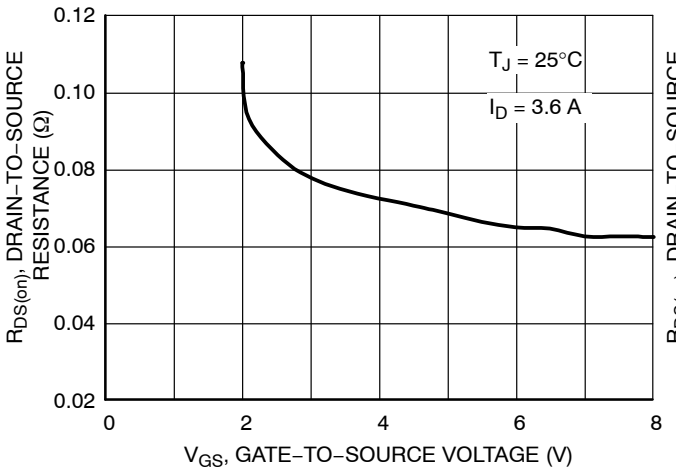


Figure 3. On−Resistance vs. Gate−to−Source Voltage

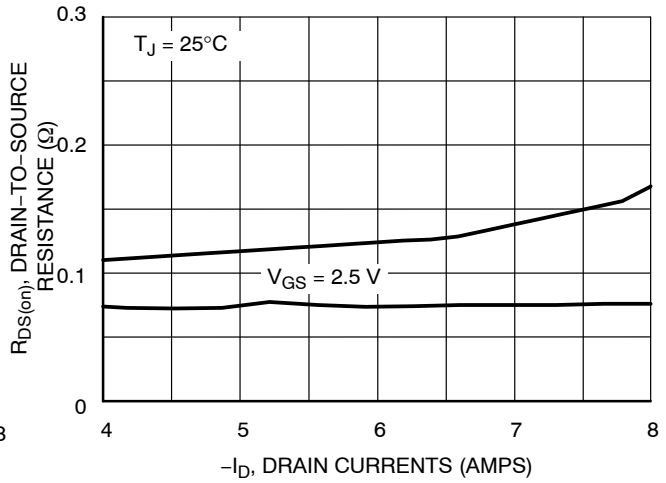


Figure 4. On−Resistance vs. Gate Voltage

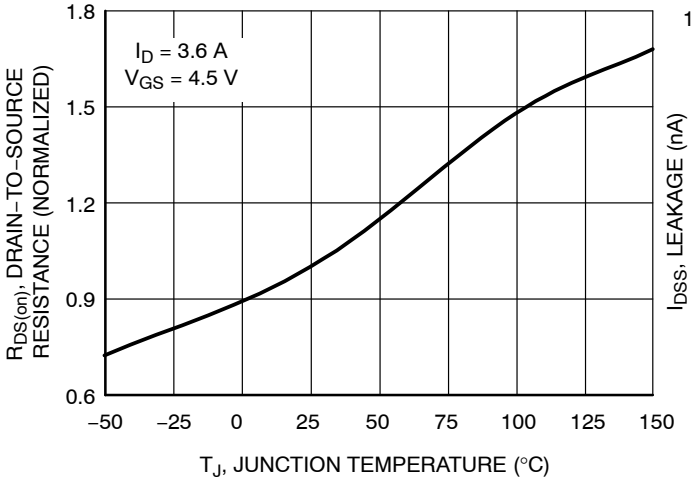


Figure 5. On−Resistance Variation with Temperature

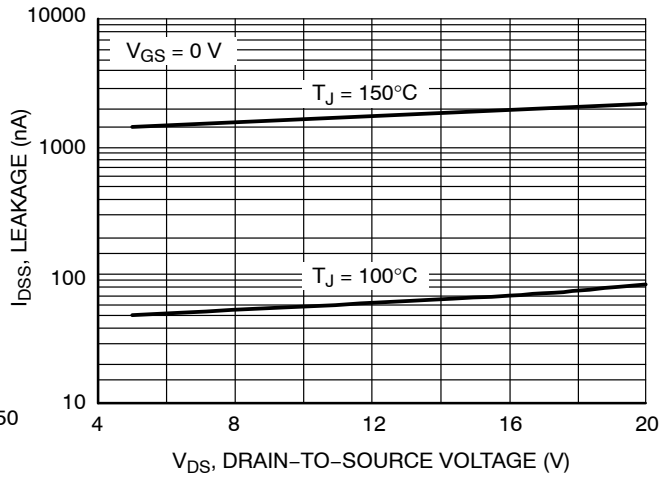


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

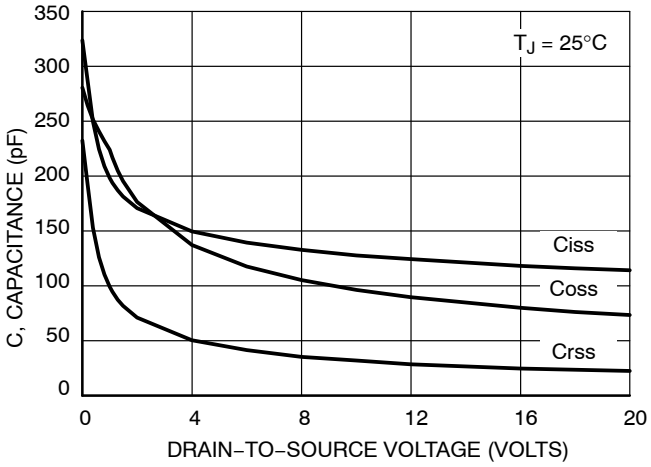


Figure 7. Capacitance Variation

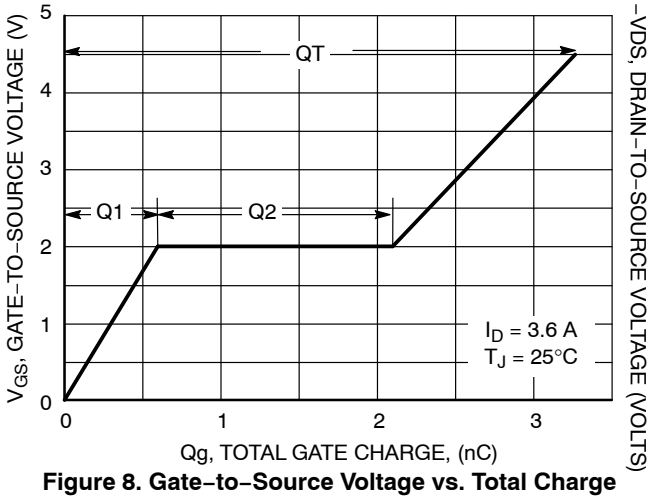


Figure 8. Gate−to−Source Voltage vs. Total Charge

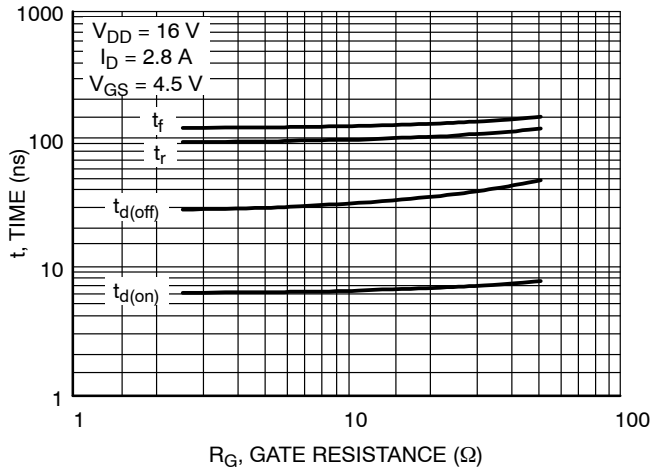


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

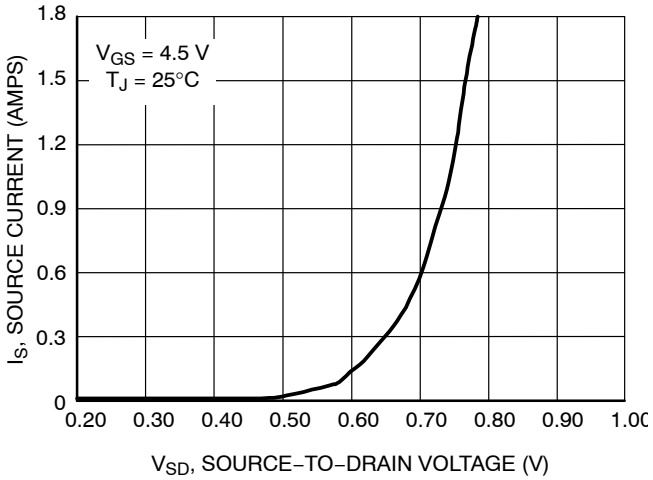
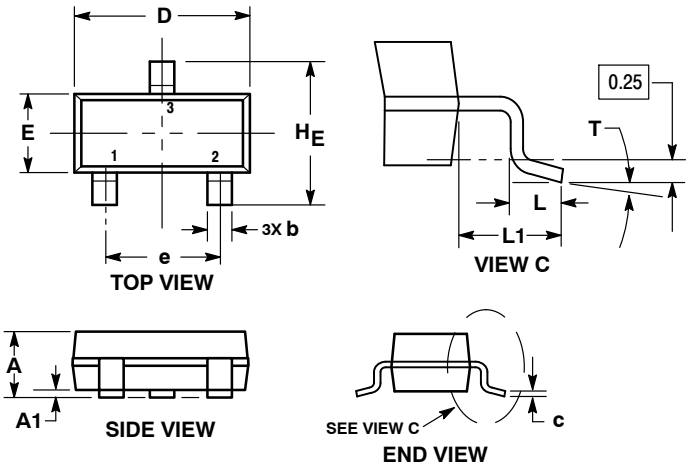


Figure 10. Diode Forward Voltage vs. Current

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AR

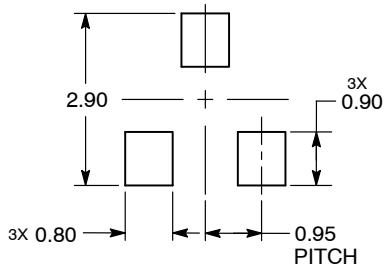


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H_E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	−−−	10°	0°	−−−	10°

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

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*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
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
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Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
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