

# MGSF1N02L, MVGSF1N02L

## Power MOSFET 750 mAmps, 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. Typical applications are dc–dc converters and power management in portable and battery–powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

#### Features

- Low  $R_{DS(on)}$  Provides Higher Efficiency and Extends Battery Life
- Miniature SOT-23 Surface Mount Package Saves Board Space
- MVGSF Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable\*
- These Devices are Pb–Free and are RoHS Compliant

#### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

| Rating   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Drain-to-Source Voltage  | V <sub>DSS</sub>                  | 20          | Vdc  |
| Gate-to-Source Voltage – Continuous  | V <sub>GS</sub>                   | ± 20        | Vdc  |
| Drain Current  |                                   |             |      |
| – Continuous @ T <sub>A</sub> = 25°C   | I <sub>D</sub>                    | 750         | mA   |
| – Pulsed Drain Current (t <sub>p</sub> ≤ 10 μs)                                | I <sub>DM</sub>                   | 2000        |      |
| Total Power Dissipation @ T <sub>A</sub> = 25°C                                | P <sub>D</sub>                    | 400         | mW   |
| Operating and Storage Temperature Range  | T <sub>J</sub> , T <sub>stg</sub> | – 55 to 150 | °C   |
| Thermal Resistance, Junction-to-Ambient  | R <sub>θJA</sub>                  | 300         | °C/W |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds | T <sub>L</sub>                    | 260         | °C   |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



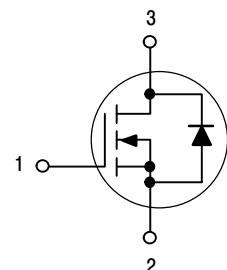
ON Semiconductor®

<http://onsemi.com>

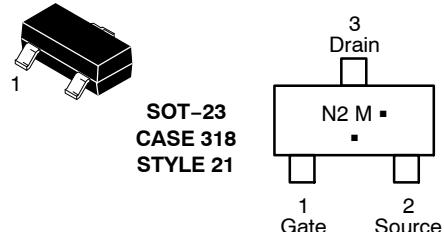
750 mAmps, 20 Volts

$R_{DS(on)} = 90 \text{ m}\Omega$

N-Channel



MARKING DIAGRAM/  
PIN ASSIGNMENT



N2 = Device Code

M = Date Code\*

▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and overbar may vary depending upon manufacturing location.

#### ORDERING INFORMATION

| Device         | Package          | Shipping <sup>†</sup> |
|----------------|------------------|-----------------------|
| MGSF1N02LT1G   | SOT-23 (Pb-Free) | 3000 / Tape & Reel    |
| MVGSF1N02LT1G* | SOT-23 (Pb-Free) | 3000 / Tape & Reel    |

<sup>†</sup>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.

# MGSF1N02L, MVGSF1N02L

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic  | Symbol              | Min    | Typ            | Max            | Unit            |
|---|---------------------|--------|----------------|----------------|-----------------|
| <b>OFF CHARACTERISTICS</b>  |                     |        |                |                |                 |
| Drain-to-Source Breakdown Voltage<br>( $V_{GS} = 0 \text{ Vdc}$ , $I_D = 10 \mu\text{Adc}$ )  | $V_{(BR)DSS}$       | 20     | —              | —              | Vdc             |
| Zero Gate Voltage Drain Current<br>( $V_{DS} = 20 \text{ Vdc}$ , $V_{GS} = 0 \text{ Vdc}$ )<br>( $V_{DS} = 20 \text{ Vdc}$ , $V_{GS} = 0 \text{ Vdc}$ , $T_J = 125^\circ\text{C}$ ) | $I_{DSS}$           | —<br>— | —<br>—         | 1.0<br>10      | $\mu\text{Adc}$ |
| Gate-Body Leakage Current ( $V_{GS} = \pm 20 \text{ Vdc}$ , $V_{DS} = 0 \text{ Vdc}$ )  | $I_{GSS}$           | —      | —              | $\pm 100$      | nAdc            |
| <b>ON CHARACTERISTICS (Note 1)</b>  |                     |        |                |                |                 |
| Gate Threshold Voltage<br>( $V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{Adc}$ )   | $V_{GS(\text{th})}$ | 1.0    | 1.7            | 2.4            | Vdc             |
| Static Drain-to-Source On-Resistance<br>( $V_{GS} = 10 \text{ Vdc}$ , $I_D = 1.2 \text{ Adc}$ )<br>( $V_{GS} = 4.5 \text{ Vdc}$ , $I_D = 1.0 \text{ Adc}$ )                         | $r_{DS(\text{on})}$ | —<br>— | 0.075<br>0.115 | 0.090<br>0.130 | $\Omega$        |
| <b>DYNAMIC CHARACTERISTICS</b>  |                     |        |                |                |                 |
| Input Capacitance   | $C_{iss}$           | —      | 125            | —              | pF              |
| Output Capacitance  | $C_{oss}$           | —      | 120            | —              |                 |
| Transfer Capacitance  | $C_{rss}$           | —      | 45             | —              |                 |
| <b>SWITCHING CHARACTERISTICS (Note 2)</b>   |                     |        |                |                |                 |
| Turn-On Delay Time  | $t_{d(\text{on})}$  | —      | 2.5            | —              | ns              |
| Rise Time   | $t_r$               | —      | 1.0            | —              |                 |
| Turn-Off Delay Time   | $t_{d(\text{off})}$ | —      | 16             | —              |                 |
| Fall Time   | $t_f$               | —      | 8.0            | —              |                 |
| Gate Charge (See Figure 6)  | $Q_T$               | —      | 6000           | —              | pC              |
| <b>SOURCE-DRAIN DIODE CHARACTERISTICS</b>   |                     |        |                |                |                 |
| Continuous Current  | $I_S$               | —      | —              | 0.6            | A               |
| Pulsed Current  | $I_{SM}$            | —      | —              | 0.75           | —               |
| Forward Voltage (Note 2)  | $V_{SD}$            | —      | 0.8            | —              | V               |

1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
2. Switching characteristics are independent of operating junction temperature.

## TYPICAL ELECTRICAL CHARACTERISTICS

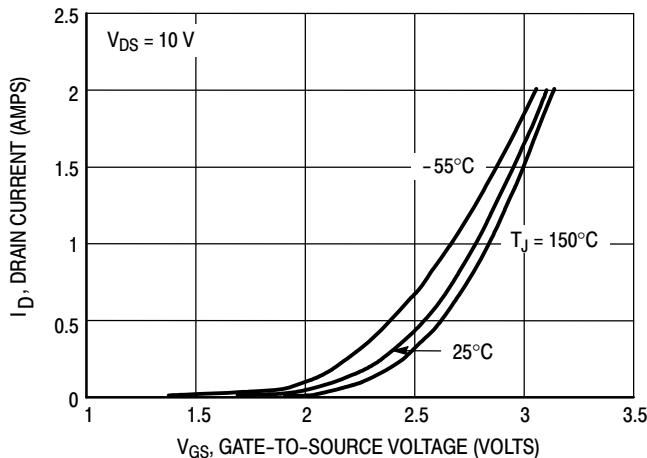


Figure 1. Transfer Characteristics

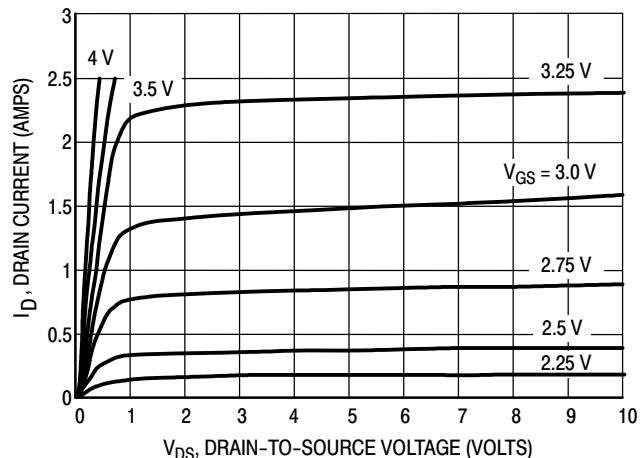


Figure 2. On-Region Characteristics

# MGSF1N02L, MVGSF1N02L

## TYPICAL ELECTRICAL CHARACTERISTICS

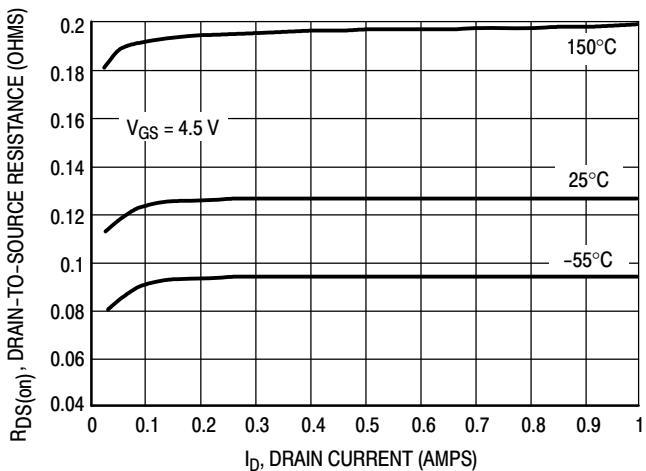


Figure 3. On-Resistance versus Drain Current

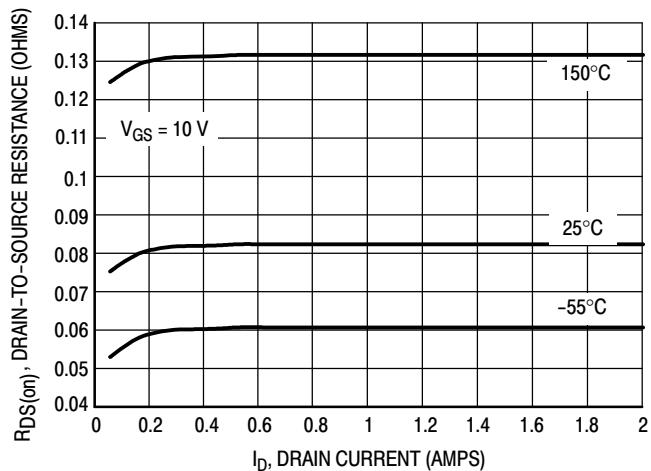


Figure 4. On-Resistance versus Drain Current

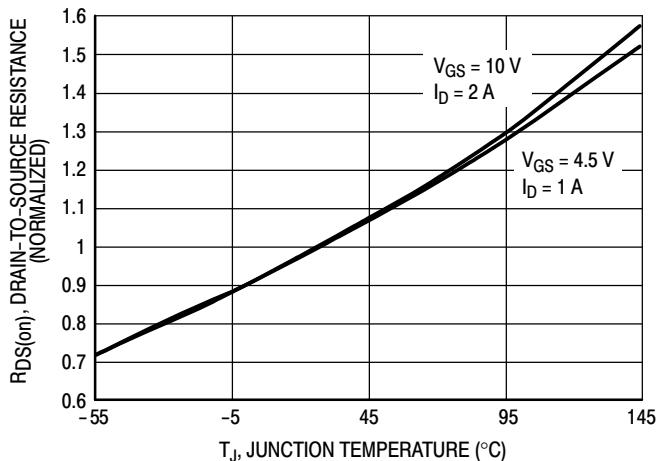


Figure 5. On-Resistance Variation with Temperature

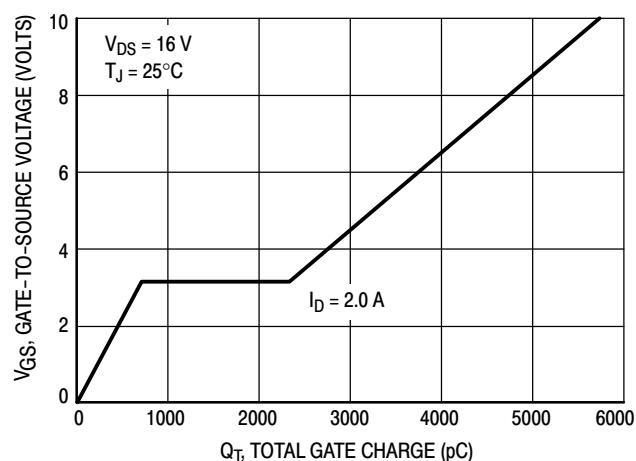


Figure 6. Gate Charge

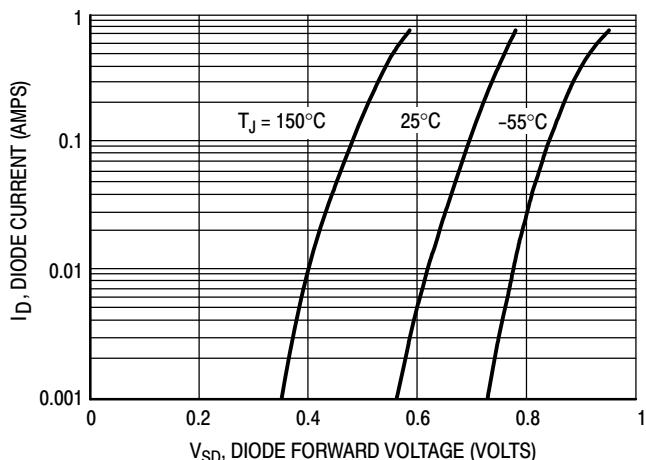


Figure 7. Body Diode Forward Voltage

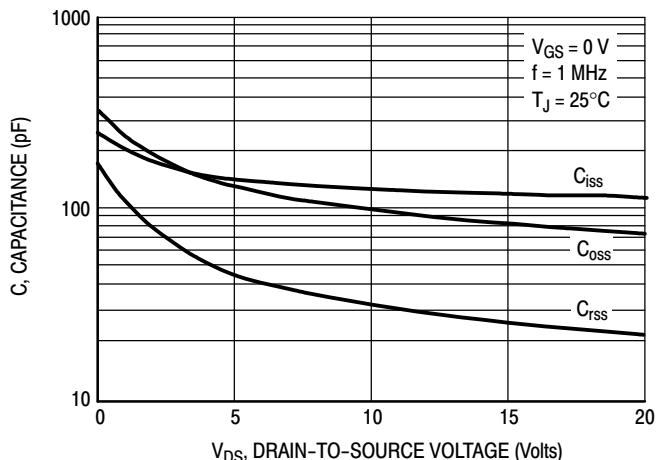
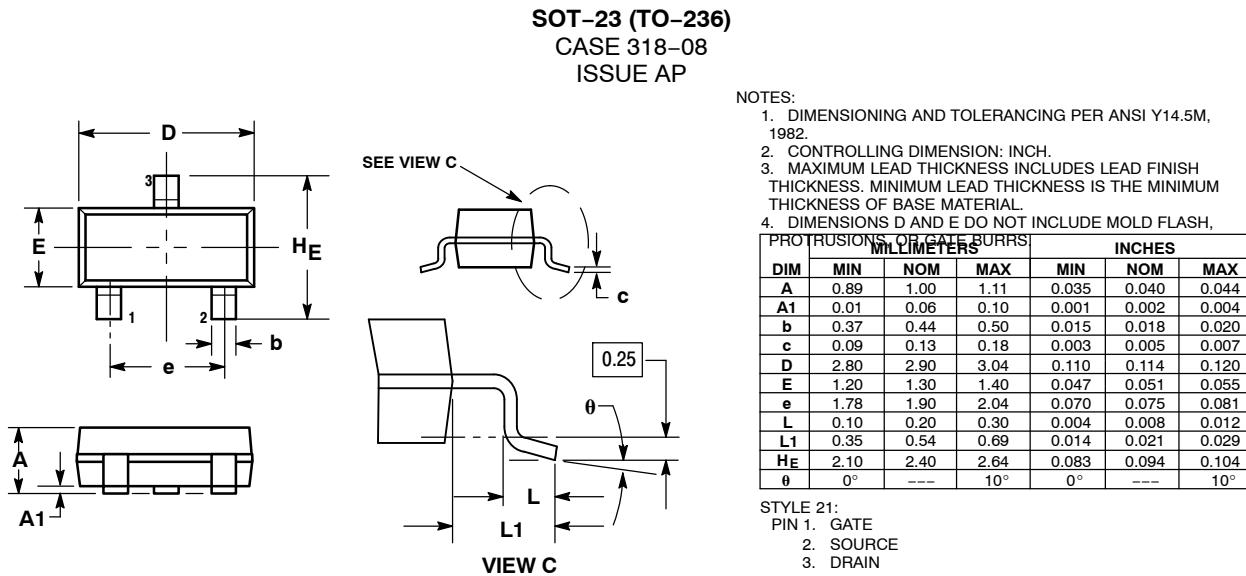


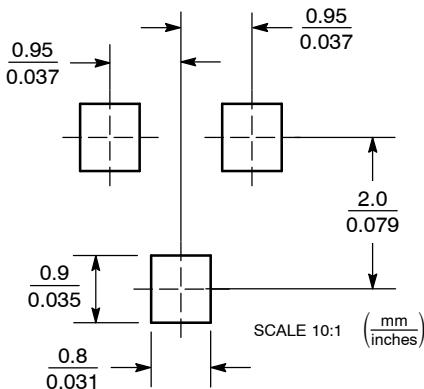
Figure 8. Capacitance

# MGSF1N02L, MVGSF1N02L

## PACKAGE DIMENSIONS



## 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.

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

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

**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center:**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative