MGSF2N02EL, MVSF2N02EL

MOSFET – N-Channel, SOT-23

2.8 A, 20 V

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

Features
• Low RDS(on) Provides Higher Efficiency and Extends Battery Life
• Miniature SOT-23 Surface Mount Package Saves Board Space
• IDSS 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 (TJ = 25°C unless otherwise noted)

<table>
<thead>
<tr>
<th>Rating</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain–to–Source Voltage</td>
<td>VDSS</td>
<td>20</td>
<td>Vdc</td>
</tr>
<tr>
<td>Gate–to–Source Voltage – Continuous</td>
<td>VG</td>
<td>± 8.0</td>
<td>Vdc</td>
</tr>
<tr>
<td>Drain Current – Continuous @ T_A = 25°C</td>
<td>ID</td>
<td>2.8</td>
<td>A</td>
</tr>
<tr>
<td>– Single Pulse (tP = 10 μs)</td>
<td>IDM</td>
<td>5.0</td>
<td>A</td>
</tr>
<tr>
<td>Total Power Dissipation @ T_A = 25°C</td>
<td>PD</td>
<td>1.25</td>
<td>W</td>
</tr>
<tr>
<td>Operating and Storage Temperature</td>
<td>TJ, Tstg</td>
<td>– 55 to 150</td>
<td>°C</td>
</tr>
<tr>
<td>Range</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Resistance Junction–to–Ambient (Note 1)</td>
<td>RUA</td>
<td>100</td>
<td>°C/W</td>
</tr>
<tr>
<td>Thermal Resistance Junction–to–Ambient (Note 2)</td>
<td></td>
<td>300</td>
<td>°C/W</td>
</tr>
<tr>
<td>Maximum Lead Temperature for Soldering Purposes, 1/8&quot; from case for 10 seconds</td>
<td>TL</td>
<td>260</td>
<td>°C</td>
</tr>
</tbody>
</table>

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.

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

ORDERING INFORMATION

NT M•

xxx = Specific Device Code
M = Date Code
• = Pb-Free Package

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### ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OFF CHARACTERISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain–to–Source Breakdown Voltage (Note 3)</td>
<td>V(BR)DSS</td>
<td>20</td>
<td>–</td>
<td>22</td>
<td>Vdc mV/°C</td>
</tr>
<tr>
<td>Temperature Coefficient (Positive)</td>
<td>T(J)</td>
<td>–</td>
<td>–</td>
<td>1.0</td>
<td>μAdc</td>
</tr>
<tr>
<td>Gate–Source Leakage Current (VGS = ± 8.0 Vdc, VDS = 0 Vdc)</td>
<td>IGSS</td>
<td>–</td>
<td>–</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td><strong>ON CHARACTERISTICS (Note 3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate–Source Threshold Voltage</td>
<td>VGS(th)</td>
<td>0.5</td>
<td>–</td>
<td>1.0</td>
<td>Vdc</td>
</tr>
<tr>
<td>Temperature Coefficient (Negative)</td>
<td>T(J)</td>
<td>–</td>
<td>–</td>
<td>2.3</td>
<td>mΩ</td>
</tr>
<tr>
<td>Static Drain–to–Source On–Resistance</td>
<td>RDS(on)</td>
<td>–</td>
<td>78</td>
<td>85</td>
<td>mΩ</td>
</tr>
<tr>
<td><strong>DYNAMIC CHARACTERISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>Ciss</td>
<td>–</td>
<td>150</td>
<td>–</td>
<td>pF</td>
</tr>
<tr>
<td>Output Capacitance</td>
<td>COSS</td>
<td>–</td>
<td>130</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Transfer Capacitance</td>
<td>Crss</td>
<td>–</td>
<td>45</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td><strong>SWITCHING CHARACTERISTICS (Note 4)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn–On Delay Time</td>
<td>tD(on)</td>
<td>–</td>
<td>6.0</td>
<td>–</td>
<td>ns</td>
</tr>
<tr>
<td>Rise Time</td>
<td>tR</td>
<td>–</td>
<td>95</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Turn–Off Delay Time</td>
<td>tD(off)</td>
<td>–</td>
<td>28</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Fall Time</td>
<td>tF</td>
<td>–</td>
<td>125</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Gate Charge</td>
<td>QT</td>
<td>–</td>
<td>3.5</td>
<td>–</td>
<td>nC</td>
</tr>
<tr>
<td>Reverse Recovery Time</td>
<td>tRR</td>
<td>–</td>
<td>104</td>
<td>–</td>
<td>ns</td>
</tr>
<tr>
<td>Reverse Recovery Stored Charge</td>
<td>QRR</td>
<td>–</td>
<td>0.20</td>
<td>–</td>
<td>μC</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Device</th>
<th>Package</th>
<th>Shipping†</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGSF2N02ELT1G</td>
<td>SOT–23 (Pb–Free)</td>
<td>3,000 / Tape &amp; Reel</td>
</tr>
<tr>
<td>MVSF2N02ELT1G*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

†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.
MGSF2N02EL, MVSF2N02EL

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

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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
**RECOMMENDED SOLDERING FOOTPRINT**

```
 2.90
```

**DIMENSIONS: MILLIMETERS**

- **3X 0.90**
- **0.95 PITCH**

**NOTES:**
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.

**MECHANICAL CASE OUTLINE**
**PACKAGE DIMENSIONS**

**SOT–23 (TO–236)**
**CASE 318–08**
**ISSUE AS**

**DATE 30 JAN 2018**

**NOTES:**
- **STYLE 1 THRU 5:** CANCELLED
- **STYLE 6:**
  - PIN 1: BASE
  - PIN 2: Emitter
  - PIN 3: Collector
- **STYLE 7:**
  - PIN 1: EMITTER
  - PIN 2: BASE
  - PIN 3: COLLECTOR
- **STYLE 8:**
  - PIN 1: ANODE
  - PIN 2: NO CONNECTION
  - PIN 3: CATHODE
- **STYLE 9:**
  - PIN 1: ANODE
  - PIN 2: EMITTER
  - PIN 3: COLLECTOR
- **STYLE 10:**
  - PIN 1: ANODE
  - PIN 2: SOURCE
  - PIN 3: GATE
- **STYLE 11:**
  - PIN 1: ANODE
  - PIN 2: CATHODE
  - PIN 3: ANODE
- **STYLE 12:**
  - PIN 1: CATHODE
  - PIN 2: CATHODE
  - PIN 3: ANODE
- **STYLE 13:**
  - PIN 1: CATHODE
  - PIN 2: DRAIN
  - PIN 3: GATE
- **STYLE 14:**
  - PIN 1: CATHODE
  - PIN 2: ANODE
  - PIN 3: NO CONNECTION
- **STYLE 15:**
  - PIN 1: GATE
  - PIN 2: SOURCE
  - PIN 3: DRAIN
- **STYLE 16:**
  - PIN 1: GATE
  - PIN 2: ANODE
  - PIN 3: CATHODE
- **STYLE 17:**
  - PIN 1: NO CONNECTION
  - PIN 2: CATHODE
  - PIN 3: ANODE
- **STYLE 18:**
  - PIN 1: NO CONNECTION
  - PIN 2: ANODE
  - PIN 3: CATHODE
- **STYLE 19:**
  - PIN 1: ANODE
  - PIN 2: CATHODE
  - PIN 3: ANODE
- **STYLE 20:**
  - PIN 1: CATHODE
  - PIN 2: NO CONNECTION
  - PIN 3: ANODE
- **STYLE 21:**
  - PIN 1: GATE
  - PIN 2: RETURN
  - PIN 3: INPUT
- **STYLE 22:**
  - PIN 1: GATE
  - PIN 2: SOURCE
  - PIN 3: DRAIN
- **STYLE 23:**
  - PIN 1: ANODE
  - PIN 2: DRAIN
  - PIN 3: SOURCE
- **STYLE 24:**
  - PIN 1: ANODE
  - PIN 2: GATE
  - PIN 3: CATHODE
- **STYLE 25:**
  - PIN 1: CATHODE
  - PIN 2: NO CONNECTION
  - PIN 3: CATHODE
- **STYLE 26:**
  - PIN 1: CATHODE
  - PIN 2: ANODE
  - PIN 3: NO CONNECTION

**SCALE 4:1**

**DOCUMENT NUMBER:** 98ASB42226B

**DESCRIPTION:** SOT–23 (TO–236)

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