Ultra Low On-Resistance
P-Channel MOSFET
Surface Mount
Available in Tape & Reel
Low Gate Charge
RoHS Compliant, Halogen-Free

**Description**
These P-channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve the extremely low on-resistance per silicon area. This benefit provides the designer with an extremely efficient device for use in battery and load management applications.

A thermally enhanced large pad leadframe has been incorporated into the standard SOT-23 package to produce a HEXFET Power MOSFET with the industry's smallest footprint. This package, dubbed the Micro3™, is ideal for applications where printed circuit board space is at a premium. The low profile (<1.1mm) of the Micro3 allows it to fit easily into extremely thin application environments such as portable electronics and PCMCIA cards. The thermal resistance and power dissipation are the best available.

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{DS}</td>
<td>-30V</td>
<td></td>
</tr>
<tr>
<td>I_{D} @ T_A = 25°C</td>
<td>-3.0A</td>
<td>A</td>
</tr>
<tr>
<td>I_{D} @ T_A = 70°C</td>
<td>-2.4A</td>
<td>A</td>
</tr>
<tr>
<td>P_{D} @ T_A = 25°C</td>
<td>1.25W</td>
<td></td>
</tr>
<tr>
<td>P_{D} @ T_A = 70°C</td>
<td>0.80W</td>
<td></td>
</tr>
<tr>
<td>V_{GS}</td>
<td>± 20V</td>
<td></td>
</tr>
<tr>
<td>T_J, T_{STG}</td>
<td>-55 to +150°C</td>
<td></td>
</tr>
</tbody>
</table>

**Thermal Resistance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>R_{JUA}</td>
<td>100</td>
<td>°C/W</td>
</tr>
</tbody>
</table>
Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>V(BR)DSS</td>
<td>-30</td>
<td></td>
<td></td>
<td>V</td>
<td>V_DS = 0V, I_D = -250μA</td>
</tr>
<tr>
<td>ΔV(BR)DSS/ΔT_J</td>
<td>0.019</td>
<td></td>
<td></td>
<td>V/°C</td>
<td>Reference to 25°C, I_D = -1mA</td>
</tr>
<tr>
<td>R_DS(ON)</td>
<td>98</td>
<td></td>
<td></td>
<td>mΩ</td>
<td>V_DS = -10V, I_D = -3.0A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>V_DS = -4.5V, I_D = -2.6A</td>
</tr>
<tr>
<td>V_GS(th)</td>
<td>-1.0</td>
<td></td>
<td>-2.5</td>
<td>V</td>
<td>V_DS = V_GS, I_D = -250μA</td>
</tr>
<tr>
<td>g_FS</td>
<td>3.1</td>
<td></td>
<td>-1.0</td>
<td>μA</td>
<td>V_DS = -24V, V_GS = 0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-5.0</td>
<td></td>
<td>V_DS = -24V, V_GS = 0V, T_J = 70°C</td>
</tr>
<tr>
<td>I_GSS</td>
<td>-100</td>
<td></td>
<td></td>
<td>nA</td>
<td>V_DS = -20V</td>
</tr>
<tr>
<td>Q_g</td>
<td>9.5</td>
<td>14</td>
<td></td>
<td>nC</td>
<td>I_D = -3.0A</td>
</tr>
<tr>
<td>Q_PO</td>
<td>2.3</td>
<td>3.5</td>
<td></td>
<td></td>
<td>V_DS = -24V</td>
</tr>
<tr>
<td>Q_PG</td>
<td>1.6</td>
<td>2.4</td>
<td></td>
<td></td>
<td>V_GS = -10V</td>
</tr>
<tr>
<td>t(d(on))</td>
<td>12</td>
<td></td>
<td></td>
<td>ns</td>
<td>V_DD = -15V</td>
</tr>
<tr>
<td>t_r</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td>I_D = -1.0A</td>
</tr>
<tr>
<td>t(d(off))</td>
<td>88</td>
<td></td>
<td></td>
<td></td>
<td>R_G = 6.0Ω</td>
</tr>
<tr>
<td>t_f</td>
<td>52</td>
<td></td>
<td></td>
<td></td>
<td>V_GS = -10V</td>
</tr>
<tr>
<td>C_Is</td>
<td>510</td>
<td></td>
<td></td>
<td>pF</td>
<td>V_DS = 0V</td>
</tr>
<tr>
<td>C_OS</td>
<td>71</td>
<td></td>
<td></td>
<td></td>
<td>V_DS = -25V</td>
</tr>
<tr>
<td>C/rss</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
<td>f = 1.0MHz</td>
</tr>
</tbody>
</table>

Source-Drain Ratings and Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_S</td>
<td>-1.3</td>
<td></td>
<td></td>
<td>A</td>
<td>MOSFET symbol showing the p-n junction diode.</td>
</tr>
<tr>
<td>I_DSM</td>
<td>-24</td>
<td></td>
<td></td>
<td></td>
<td>T_J = 25°C, I_S = -1.3A, V_DDS = 0V</td>
</tr>
<tr>
<td>V_SD</td>
<td>-1.2</td>
<td></td>
<td></td>
<td>V</td>
<td>T_J = 25°C, I_F = -1.3A</td>
</tr>
<tr>
<td>t_r</td>
<td>17</td>
<td>26</td>
<td></td>
<td>ns</td>
<td>T_J = 25°C, I_F = -1.3A</td>
</tr>
<tr>
<td>Q_RT</td>
<td>12</td>
<td>18</td>
<td></td>
<td>nC</td>
<td>di/dt = -100A/μs</td>
</tr>
</tbody>
</table>

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.
② Surface mounted on FR-4 board, t ≤ 5sec.
③ Pulse width ≤ 400μs; duty cycle ≤ 2%.
**Fig 1.** Typical Output Characteristics

**Fig 2.** Typical Output Characteristics

**Fig 3.** Typical Transfer Characteristics

**Fig 4.** Normalized On-Resistance Vs. Temperature
Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

Fig 7. Typical Source-Drain Diode Forward Voltage

Fig 8. Maximum Safe Operating Area
Fig 9. Maximum Drain Current Vs. Case Temperature

Fig 10a. Switching Time Test Circuit

Fig 10b. Switching Time Waveforms

Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient
Fig 11. Typical On-Resistance Vs. Gate Voltage

Fig 12. Typical On-Resistance Vs. Drain Current

Fig 13a. Basic Gate Charge Waveform

Fig 13b. Gate Charge Test Circuit
**Fig 14.** Threshold Voltage Vs. Temperature

**Fig 15.** Typical Power Vs. Time
Micro3 (SOT-23 / TO-236AB) Part Marking Information

Notes: This part marking information applies to devices produced after 02/26/2001

Note: For the most current drawing please refer to IR website at [http://www.irf.com/package](http://www.irf.com/package)
Micro3™ Tape & Reel Information
Dimensions are shown in millimeters (inches)

Notes:
2. Outline conforms to EIA-481 & EIA-541.

Note: For the most current drawing please refer to IR website at http://www.irf.com/package
Qualification information

<table>
<thead>
<tr>
<th>Qualification level</th>
<th>Consumer (per JEDEC JESD47†† guidelines)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Sensitivity Level</td>
<td>Micro3™ (SOT-23)</td>
</tr>
<tr>
<td>RoHS compliant</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Qualification standards can be found at International Rectifier's web site: [http://www.irf.com/product-info/reliability](http://www.irf.com/product-info/reliability)

†† Applicable version of JEDEC standard at the time of product release

Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
</table>
| 4/28/2014  | • Updated data sheet with new IR corporate template.  
            • Updated package outline & part marking on page 8.  
            • Added Qualification table -Qual level "Consumer" on page 10.  
            • Added bullet point in the Benefits "RoHS Compliant, Halogen -Free" on page 1. |

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To contact International Rectifier, please visit [http://www.irf.com/whoto-call/](http://www.irf.com/whoto-call/)