Ultra Low On-Resistance  
- P-Channel MOSFET  
- SOT-23 Footprint  
- Low Profile (<1.1mm)  
- Available in Tape and Reel  
- Fast Switching  
- Lead-Free

Description
These P-Channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET® power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in battery and load management.

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>-20</td>
<td>V</td>
</tr>
<tr>
<td>I_D @ T_A = 25°C</td>
<td>-3.7</td>
<td>A</td>
</tr>
<tr>
<td>I_D @ T_A = 70°C</td>
<td>-2.2</td>
<td>A</td>
</tr>
<tr>
<td>I_DM @ T_A = 25°C</td>
<td>-22</td>
<td></td>
</tr>
<tr>
<td>P_D @ T_A = 25°C</td>
<td>1.3</td>
<td>W</td>
</tr>
<tr>
<td>P_D @ T_A = 70°C</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Linear Derating Factor</td>
<td>0.01</td>
<td>W/℃</td>
</tr>
<tr>
<td>E_AS</td>
<td>11</td>
<td>mJ</td>
</tr>
<tr>
<td>V_GS</td>
<td>±12</td>
<td>V</td>
</tr>
<tr>
<td>T_J, T_STG</td>
<td>-55 to +150</td>
<td>℃</td>
</tr>
</tbody>
</table>

Thermal Resistance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>R_JUA</td>
<td>75</td>
<td>100</td>
<td>℃/W</td>
</tr>
</tbody>
</table>

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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>$V_{BRDSS}$</td>
<td>-20</td>
<td>——</td>
<td>——</td>
<td>V</td>
<td>$V_{GS} = 0V$, $I_D = -250\mu A$</td>
</tr>
<tr>
<td>$\Delta V_{BRDSS}/\Delta T_J$</td>
<td>——</td>
<td>-0.009</td>
<td>——</td>
<td>V/$^\circ$C</td>
<td>Reference to $25^\circ C$, $I_D = -1mA$</td>
</tr>
<tr>
<td>$R_{DS(on)}$</td>
<td>0.050</td>
<td>0.065</td>
<td>——</td>
<td>$\Omega$</td>
<td>$V_{GS} = -4.5V$, $I_D = -3.7A$</td>
</tr>
<tr>
<td></td>
<td>0.080</td>
<td>0.135</td>
<td>——</td>
<td>$V_{GS} = -2.5V$, $I_D = -3.1A$</td>
<td></td>
</tr>
<tr>
<td>$V_{GS(th)}$</td>
<td>-0.40</td>
<td>-0.55</td>
<td>-1.2</td>
<td>V</td>
<td>$V_{DS} = V_{GS}, I_D = -250\mu A$</td>
</tr>
<tr>
<td>$g_{fs}$</td>
<td>6.0</td>
<td>——</td>
<td>——</td>
<td>S</td>
<td>$V_{DS} = -10V$, $V_{GS} = 0V$</td>
</tr>
<tr>
<td>$I_{DSS}$</td>
<td>——</td>
<td>-1.0</td>
<td>——</td>
<td>$\mu A$</td>
<td>$V_{DS} = -20V$, $V_{GS} = 0V$, $T_J = 70^\circ C$</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>29</td>
<td>43</td>
<td>——</td>
<td>ns</td>
<td>$d/dt = -100A/\mu s$</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>Continuous Source Current (Body Diode)</td>
<td>——</td>
<td>-1.3</td>
<td>A</td>
<td>MOSFET symbol showing the integral reverse p-n junction diode.</td>
</tr>
<tr>
<td>$I_{SM}$</td>
<td>Pulsed Source Current (Body Diode)</td>
<td>——</td>
<td>-22</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>$V_{SD}$</td>
<td>Diode Forward Voltage</td>
<td>——</td>
<td>-1.2</td>
<td>V</td>
<td>$T_J = 25^\circ C$, $I_S = -1.0A$, $V_{GS} = 0V$</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>Reverse Recovery Time</td>
<td>——</td>
<td>29</td>
<td>43</td>
<td>ns</td>
</tr>
<tr>
<td>$Q_{rr}$</td>
<td>Reverse RecoveryCharge</td>
<td>11</td>
<td>17</td>
<td>nC</td>
<td>$d/dt = -100A/\mu s$</td>
</tr>
</tbody>
</table>

Notes:

1. Repetitive rating; pulse width limited by max. junction temperature.
2. Pulse width ≤ 400µs; duty cycle ≤ 2%.
3. Surface mounted on 1" square single layer 1oz. copper FR4 board, steady state.

For recommended footprint and soldering techniques refer to application note #AN-994.
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 10. Maximum Avalanche Energy Vs. Drain Current

Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient
**Fig. 12.** Typical On-Resistance Vs. Gate Voltage

**Fig. 13.** Typical On-Resistance Vs. Drain Current
Micro3 (SOT-23/TO-263AB) Package Outline

Dimensions are shown in millimeters (inches)

RECOMMENDED FOOTPRINT

NOTES
2. DIMENSIONS ARE ShOWN IN MILLIMETERS AND INCHES.
3. CONTROLLING DIMENSION: MILLIMETER.
4. DATUM A AND B TO BE DETERMINED AT DATUM PLANE H.
5. DIMENSIONS D AND E1 ARE MeASURED AT DATUM PLANE H.
6. DIMENSION L IS THE LEAD LENGTH FOR SOLDERING TO A SUBSTRATE.
7. OUTLINE CONFORMS TO JEDEC OUTLINE TO-236AB.

Micro3 (SOT-23/TO-263AB) Part Marking Information

PART NUMBER CODE REFERENCE:
A = IRLML2402
B = IRLML2803
C = IRLML6302
D = IRLML5103
G = IRLML2502
F = IRLML6401
E = IRLML6402
H = IRLML5203

PART NUMBER

Y = YEAR
W = WEEK

PART NUMBER CODE REFERENCE:
A = IRLML2402
B = IRLML2803
C = IRLML6302
D = IRLML5103
G = IRLML2502
F = IRLML6401
E = IRLML6402
H = IRLML5203

Note: If the above line were used (or similar YMD system), Last-Four.
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Micro3™(SOT-23/TO-263AB) Tape & Reel Information
Dimensions are shown in millimeters (inches)

NOTES:
1. CONTROLLING DIMENSION: MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

Data and specifications subject to change without notice.

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