J111 / J112 / J113 / MMBFJ111 / MMBFJ112 / MMBFJ112_SB51338 / MMBFJ113
N-Channel Switch

Features

• This device is designed for low level analog switching, sample and hold circuits and chopper stabilized amplifiers.
• Sourced from Process 51.
• Source & Drain are interchangeable.

Absolute Maximum Ratings\* $T_a = 25^\circ C$ unless otherwise noted

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{DG}$</td>
<td>Drain-Gate Voltage</td>
<td>35</td>
<td>V</td>
</tr>
<tr>
<td>$V_{GS}$</td>
<td>Gate-Source Voltage</td>
<td>-35</td>
<td>V</td>
</tr>
<tr>
<td>$I_{GF}$</td>
<td>Forward Gate Current</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>$T_J, T_{stg}$</td>
<td>Operating and Storage Junction Temperature Range</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

NOTES:
1) These ratings are based on a maximum junction temperature of 150 degrees C.
2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Thermal Characteristics $T_a = 25^\circ C$ unless otherwise noted

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>J111-113</td>
<td>*MMBFJ111-113</td>
</tr>
<tr>
<td>$P_D$</td>
<td>Total Device Dissipation</td>
<td>625</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>Derate above 25°C</td>
<td>5.0</td>
<td>2.8</td>
</tr>
<tr>
<td>$R_{JUC}$</td>
<td>Thermal Resistance, Junction to Case</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>$R_{JUA}$</td>
<td>Thermal Resistance, Junction to Ambient</td>
<td>357</td>
<td>556</td>
</tr>
</tbody>
</table>

\* Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06".
Electrical Characteristics  \( T_a = 25^\circ C \) unless otherwise noted

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(BV_{BR(GSS)})</td>
<td>Gate-Source Breakdown Voltage ( I_G = -1.0 \mu A, V_{DS} = 0 )</td>
<td>-35</td>
<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>(I_{GSS})</td>
<td>Gate Reverse Current ( V_{GS} = -15V, V_{DS} = 0 )</td>
<td></td>
<td>-1.0</td>
<td></td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>(V_{GS(0ff)})</td>
<td>Gate-Source Cutoff Voltage ( V_D = 5.0V, I_D = 1.0 \mu A )</td>
<td>111</td>
<td>-3.0</td>
<td></td>
<td>-10</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>112</td>
<td>-1.0</td>
<td></td>
<td>-5.0</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MMBFJ112_SB51338</td>
<td>-3.0</td>
<td></td>
<td>-5.0</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>113</td>
<td>-0.5</td>
<td></td>
<td>-3.0</td>
<td>V</td>
</tr>
<tr>
<td>(I_{D(0ff)})</td>
<td>Drain Cutoff Leakage Current ( V_D = 5.0V, V_{GS} = -10V )</td>
<td>113</td>
<td></td>
<td></td>
<td>1.0</td>
<td>nA</td>
</tr>
</tbody>
</table>

On Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(I_{DSS})</td>
<td>Zero-Gate Voltage Drain Current* ( V_D = 15V, I_G = 0 )</td>
<td>111</td>
<td>20</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>112</td>
<td>5.0</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>113</td>
<td>2.0</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>(r_{DS(on)})</td>
<td>Drain-Source On Resistance ( V_D \leq 0.1V, V_{GS} = 0 )</td>
<td>111</td>
<td>30</td>
<td></td>
<td>(\Omega)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>112</td>
<td>50</td>
<td></td>
<td>(\Omega)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>113</td>
<td>100</td>
<td></td>
<td>(\Omega)</td>
</tr>
</tbody>
</table>

Small Signal Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C_{dg(on)})</td>
<td>Drain &amp; Source Gate On Capacitance ( V_D = 0, V_{GS} = 0, f = 1.0MHz )</td>
<td>28</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>(C_{s(on)})</td>
<td>Drain-Gate Off Capacitance ( V_D = 0, V_{GS} = -10V, f = 1.0MHz )</td>
<td>5.0</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>(C_{s(off)})</td>
<td>Source-Gate Off Capacitance ( V_D = 0, V_{GS} = -10V, f = 1.0MHz )</td>
<td>5.0</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
</tbody>
</table>

* Pulse Test: Pulse Width \( \leq 300 \mu s \), Duty Cycle \( \leq 3.0\% \)

Typical Performance Characteristics

![Common Drain-Source](image)

![Parameter Interactions](image)
Typical Performance Characteristics (continued)

Transfer Characteristics

-3-2-10
0
10
20
30
40
V    - GATE-SOURCE VOLTAGE (V)

I     - DRAIN CURRENT (mA)

V            = - 3.0 V
GS(off)
25°C
125°C
- 55°C
V            = 15 V
DS
V            = - 2.0 V
GS(off)
25°C
125°C
- 55°C
125°C

Transfer Characteristics

-1.5-1-0.50
0
4
8
12
16
V    - GATE-SOURCE VOLTAGE (V)

g     - TRANSCONDUCTANCE (mmhos)

V            = - 1.6 V
GS(off)
25°C
125°C
- 55°C
V            = 15 V
DS
V            = - 1.1 V
GS(off)
25°C
125°C
- 55°C
125°C

On Resistance vs Drain Current

12 5 1 0 2 0 5 0 1 0 0
10
20
50
100
I    - DRAIN CURRENT (mA)

r       - DRAIN "ON" RESISTANCE

V            = - 7.0V
GS(off)
25°C
125°C
- 55°C
V TYP

Normalized Drain Resistance vs Bias Voltage

0 0.2 0.4 0.6 0.8 1
V    /V         - NORMALIZED GATE-SOURCE VOLTAGE (V)
r      - NORMALIZED RESISTANCE

r     =

1 - V
V
V
125°C
V            @ 5.0V, 10μA
G       G
G       (Ω)

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Typical Performance Characteristics (continued)

Transconductance vs Drain Current

Output Conductance vs Drain Current

Capacitance vs Voltage

Noise Voltage vs Frequency

Noise Voltage vs Current

Power Dissipation vs Ambient Temperature
Typical Performance Characteristics (continued)

Switching Turn-On Time vs Gate-Source Voltage

Switching Turn-Off Time vs Drain Current
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<th>Definition</th>
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</thead>
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<td>Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.</td>
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</tr>
</tbody>
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