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J111 / J112 / J113 / MMBFJ111 / MMBFJ112 / 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.

Ordering Information

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<th>Top Mark</th>
<th>Package</th>
<th>Packing Method</th>
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<td>J111</td>
<td>TO-92 3L</td>
<td>Bulk</td>
</tr>
<tr>
<td>J111_D26Z</td>
<td>J111</td>
<td>TO-92 3L</td>
<td>Tape and Reel</td>
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<tr>
<td>J111_D74Z</td>
<td>J111</td>
<td>TO-92 3L</td>
<td>Ammo</td>
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<td>Ammo</td>
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<td>MMBFJ111</td>
<td>6P</td>
<td>SOT-23 3L</td>
<td>Tape and Reel</td>
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<td>MMBFJ112</td>
<td>6R</td>
<td>SOT-23 3L</td>
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<td>MMBFJ113</td>
<td>6S</td>
<td>SOT-23 3L</td>
<td>Tape and Reel</td>
</tr>
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Figure 1. J111 / J112 / J113 Device Package
Figure 2. MMBFJ111 / MMBFJ112 / MMBFJ113 Device Package

Note: Source & Drain are interchangeable
**Absolute Maximum Ratings**

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_A = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
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</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>
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</table>

**Notes:**
1. These ratings are based on a maximum junction temperature of 150°C.
2. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty-cycle operations.

**Thermal Characteristics**

Values are at $T_A = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_D$</td>
<td>Total Device Dissipation</td>
<td>625</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td>Derate Above 25°C</td>
<td>5.0</td>
<td>mW/°C</td>
</tr>
<tr>
<td>$R_{JUC}$</td>
<td>Thermal Resistance, Junction-to-Case</td>
<td>125</td>
<td>°C/W</td>
</tr>
<tr>
<td>$R_{JUA}$</td>
<td>Thermal Resistance, Junction-to-Ambient</td>
<td>200</td>
<td>°C/W</td>
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</tbody>
</table>

**Notes:**
3. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.
4. Device mounted on FR-4 PCB 36mm x 18mm x 1.5mm; mounting pad for the collector lead minimum 6cm².
### Electrical Characteristics

Values are at $T_A = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
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<td></td>
<td><strong>Off Characteristics</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{BR(GS)}$</td>
<td>Gate-Source Breakdown Voltage</td>
<td>$I_D = -1.0 \mu A$, $V_{DS} = 0$</td>
<td>-35</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$I_{GSS}$</td>
<td>Gate Reverse Current</td>
<td>$V_{GS} = -15 V$, $V_{DS} = 0$</td>
<td>-1.0</td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>$V_{GS(\text{off})}$</td>
<td>Gate-Source Cut-Off Voltage</td>
<td>$V_{DS} = 15 V$, $I_D = 1.0 \mu A$</td>
<td>111</td>
<td>-3.0</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>112</td>
<td>-1.0</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>113</td>
<td>-0.5</td>
<td>V</td>
</tr>
<tr>
<td>$I_D(\text{off})$</td>
<td>Drain Cutoff Leakage Current</td>
<td>$V_{DS} = 5.0 V$, $V_{GS} = -10 V$</td>
<td>1.0</td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td><strong>On Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{DS}$</td>
<td>Zero-Gate Voltage Drain Current(5)</td>
<td>$V_{DS} = 15 V$, $V_{GS} = 0$</td>
<td>111</td>
<td>20</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>112</td>
<td>5.0</td>
<td>mA</td>
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<td></td>
<td></td>
<td></td>
<td>113</td>
<td>2.0</td>
<td>mA</td>
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<tr>
<td>$r_{DS(\text{on})}$</td>
<td>Drain-Source On Resistance</td>
<td>$V_{DS} \leq 0.1 V$, $V_{GS} = 0$</td>
<td>111</td>
<td>30</td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>112</td>
<td>50</td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>113</td>
<td>100</td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td><strong>Small Signal Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$C_{dg(on)}$</td>
<td>Drain-Gate &amp;Source-Gate On Capacitance</td>
<td>$V_{DS} = 0$, $V_{GS} = 0$, $f = 1.0$ MHz</td>
<td>28</td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>$C_{sg(on)}$</td>
<td>Drain-Gate Off Capacitance</td>
<td>$V_{DS} = 0$, $V_{GS} = -10 V$, $f = 1.0$ MHz</td>
<td>5.0</td>
<td></td>
<td>pF</td>
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<tr>
<td>$C_{dg(\text{off})}$</td>
<td>Source-Gate Off Capacitance</td>
<td>$V_{DS} = 0$, $V_{GS} = -10 V$, $f = 1.0$ MHz</td>
<td>5.0</td>
<td></td>
<td>pF</td>
</tr>
</tbody>
</table>

**Note:**

5. Pulse test: pulse width $\leq 300 \mu s$, duty cycle $\leq 2\%$. 

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J111 / J112 / J113 / MMBFJ111 / MMBFJ112 / MMBFJ113 — N-Channel Switch
Typical Performance Characteristics

Figure 3. Common Drain-Source

Figure 4. Parameter Interactions

Figure 5. Transfer Characteristics

Figure 6. Transfer Characteristics

Figure 7. Transfer Characteristics

Figure 8. Transfer Characteristics
Typical Performance Characteristics (Continued)

Figure 9. On Resistance vs. Drain Current

Figure 10. Normalized Drain Resistance vs. Bias Voltage

Figure 11. Transconductance vs. Drain Current

Figure 12. Output Conductance vs. Drain Current

Figure 13. Capacitance vs. Voltage

Figure 14. Noise Voltage vs. Frequency
Typical Performance Characteristics (Continued)

Figure 15. Noise Voltage vs. Current

Figure 16. Power Dissipation vs. Ambient Temperature

Figure 17. Switching Turn-On Time vs. Gate-Source Voltage

Figure 18. Switching Turn-Off Time vs. Drain Current
Physical Dimensions

Figure 19. 3-Lead, TO-92, JEDEC TO-92 Compliant Straight Lead Configuration, Bulk Type
Physical Dimensions (Continued)

Figure 20. 3-Lead, TO-92, Molded, 0.2 In Line Spacing Lead Form, Ammo, Tape and Reel Type

NOTES: UNLESS OTHERWISE SPECIFIED
A. DRAWING CONFORMS TO JEDC MS-013.
B. VARIATION AC.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DRAWING CONFORMS TO ASME Y14.5M-2009.
E. DRAWING FILENAME: MMT--Z43FiREvX.
F. FAIRCHILD SEMICONDUCTOR.

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Physical Dimensions (Continued)

Figure 21. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE

NOTES: UNLESS OTHERWISE SPECIFIED
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B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
E) DRAWING FILE NAME: MA03DREV10

SCALE: 2X

DETAIL A

SEE DETAIL A

LAND PATTERN RECOMMENDATION

GAGE PLANE

SEATING PLANE

0.20 MIN

0.20 MAX

0.23

0.80

0.25

0.10

0.10

0.10

0.10

0.08

0.20

2.40±0.30

1.90

1.90

1.40

2.20

1.90

1.00

1.90

0.95

0.95

0.60

0.37

0.95

0.95

1.30±0.15

2.92±0.20

0.95

0.95

0.10

0.10

0.10

0.10

0.93

0.55

0.55

0.55

(0.29)

(0.29)

(0.29)

(0.29)

(0.29)

(0.29)

(0.29)

(0.29)

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<th>Datasheet Identification</th>
<th>Product Status</th>
<th>Definition</th>
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<td>Advance Information</td>
<td>Formative / In Design</td>
<td>Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.</td>
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<tr>
<td>Preliminary</td>
<td>First Production</td>
<td>Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.</td>
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<td>No Identification Needed</td>
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