N-Channel Switch

J111, J112, J113, MMBFJ111, MMBFJ112, MMBFJ113

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
- These are Pb-Free Devices

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted) (Note 1, 2)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDG</td>
<td>Drain–Gate Voltage</td>
<td>35</td>
<td>V</td>
</tr>
<tr>
<td>VGS</td>
<td>Gate–Source Voltage</td>
<td>−35</td>
<td>V</td>
</tr>
<tr>
<td>IGF</td>
<td>Forward Gate Current</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>TJ, TSTG</td>
<td>Operating and Storage Junction</td>
<td>−55 to 150</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. These ratings are based on a maximum junction temperature of 150°C.
2. These are steady–state limits. ON Semiconductor should be consulted on applications involving pulsed or low–duty–cycle operations.

THERMAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>PD</td>
<td>Total Device Dissipation</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td>Derate Above 25°C</td>
<td>mW/°C</td>
</tr>
<tr>
<td>RJC</td>
<td>Thermal Resistance, Junction–to–Case</td>
<td>°C/W</td>
</tr>
<tr>
<td>RJJA</td>
<td>Thermal Resistance, Junction–to–Ambient</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

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 36 mm x 18 mm x 1.5 mm; mounting pad for the collector lead minimum 6 cm².
**ELECTRICAL CHARACTERISTICS** *(T_J = 25°C unless otherwise noted)*

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter Description</th>
<th>Test Condition</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
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<tbody>
<tr>
<td><strong>OFF CHARACTERISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{(BR)GSS}$</td>
<td>Gate–Source Breakdown Voltage</td>
<td>$I_G = -1.0 \mu A, V_{DS} = 0$</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>–</td>
<td>$-1.0$</td>
<td>nA</td>
</tr>
<tr>
<td>$V_{GS(\text{off})}$</td>
<td>Gate–Source Cut–Off Voltage</td>
<td>$V_{DS} = 5 , V, I_G = 1.0 \mu A$</td>
<td>\begin{tabular}{c</td>
<td>c</td>
<td>c} \hline 111 &amp; $-3.0$ &amp; $-10.0$ \hline 112 &amp; $-1.0$ &amp; $-5.0$ \hline 113 &amp; $-0.5$ &amp; $-3.0$ \hline \end{tabular}</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>–</td>
<td>$1.0$</td>
<td>nA</td>
</tr>
<tr>
<td><strong>ON CHARACTERISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{DSS}$</td>
<td>Zero–Gate Voltage Drain Current (Note 5)</td>
<td>$V_{DS} = 15 , V, V_{GS} = 0$</td>
<td>\begin{tabular}{c</td>
<td>c</td>
<td>c} \hline 111 &amp; $20$ &amp; – \hline 112 &amp; $5.0$ &amp; – \hline 113 &amp; $2.0$ &amp; – \hline \end{tabular}</td>
</tr>
<tr>
<td>$r_{DS(on)}$</td>
<td>Drain–Source On Resistance</td>
<td>$V_{DS} \leq 0.1 , V, V_{GS} = 0$</td>
<td>\begin{tabular}{c</td>
<td>c</td>
<td>c} \hline 111 &amp; – &amp; $30$ \hline 112 &amp; – &amp; $50$ \hline 113 &amp; – &amp; $100$ \hline \end{tabular}</td>
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<tr>
<td><strong>SMALL SIGNAL CHARACTERISTICS</strong></td>
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<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>–</td>
<td>$28$</td>
<td>pF</td>
</tr>
<tr>
<td>$C_{dg(off)}$</td>
<td>Drain–Gate Off Capacitance</td>
<td>$V_{DS} = 0, V_{GS} = -10 , V, f = 1.0 , MHz$</td>
<td>–</td>
<td>$5.0$</td>
<td>pF</td>
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<tr>
<td>$C_{sg(off)}$</td>
<td>Source–Gate Off Capacitance</td>
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<td>–</td>
<td>$5.0$</td>
<td>pF</td>
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</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.

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

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**2**
TYPICAL PERFORMANCE CHARACTERISTICS

Figure 1. Common Drain–Source

Figure 2. Parameter Interactions

Figure 3. Transfer Characteristics

Figure 4. Transfer Characteristics

Figure 5. Transfer Characteristics

Figure 6. Transfer Characteristics
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Figure 13. Noise Voltage vs. Current

Figure 14. Power Dissipation vs. Ambient Temperature

Figure 15. Switching Turn–On Time vs. Gate–Source Voltage

Figure 16. Switching Turn–Off Time vs. Drain Current
## ORDERING INFORMATION

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<th>Part Number</th>
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<th>Package</th>
<th>Shipping</th>
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<td>10000 Units / Bulk</td>
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<tr>
<td>J111–D26Z</td>
<td>J111</td>
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†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.
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

TO-92 3 4.825x4.76
CASE 135AN
ISSUE 0

DATE 31 JUL 2016

NOTES: UNLESS OTHERWISE SPECIFIED

A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
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DESCRIPTION: TO-92 3 4.825X4.76

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TO-92 3 4.83x4.76 LEADFORMED
CASE 135AR
ISSUE 0

DATE 30 SEP 2016

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MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

SOT–23 (TO–236)
CASE 318–08
ISSUE AS

DATE 30 JAN 2018

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.

5. MILLIMETERS

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<td>15°</td>
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6. INCHES

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<th>MIN</th>
<th>NOM</th>
<th>MAX</th>
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<td>0.10</td>
<td>0.000</td>
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<td>0.004</td>
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<td>0.20</td>
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</tr>
</tbody>
</table>

RECOMMENDED
SOLDERING FOOTPRINT

DIMENSIONS: MILLIMETERS

PITCH

3X 0.80

0.95

SIDE VIEW

3X 0.90

0.90

TOP VIEW

SIDE VIEW

END VIEW

XXX = Specific Device Code
M = Date Code
Pb-Free indicator, “G” or microdot “

*This information is generic. Please refer to
device data sheet for actual part marking.
Pb-Free indicator, “G” or microdot “*
may or may not be present.

STYLE 1 THRU 5: CANCELLED
STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. CATHODE
2. BASE
3. ANODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE-ANODE

STYLE 12:
PIN 1. SOURCE
2. CATHODE
3. CATHODE

STYLE 13:
PIN 1. CATHODE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. CATHODE

STYLE 19:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 20:
PIN 1. DRAIN
2. CATHODE
3. CATHODE

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. DRAIN
3. SOURCE

STYLE 24:
PIN 1. GATE
2. CATHODE
3. GATE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. DRONE
3.连接

STYLE 27:
PIN 1. CATHODE
2. ANODE
3. CATHODE

STYLE 28:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

NOTE:
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

SOT−23
CASE 318BM
ISSUE O

DATE 31 AUG 2016

LAND PATTERN
RECOMMENDATION

NOTES: UNLESS OTHERWISE SPECIFIED
A) REFERENCE JEDEC REGISTRATION
TO-236, VARIATION AB, ISSUE H.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE INCLUSIVE OF BURRS,
MOLD FLASH AND TIE BAR EXTRUSIONS.
D) DIMENSIONING AND TOLERANCING PER
ASME Y14.5M - 2009.

DETAIL A
SCALE: 2X

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