P-Channel 30-V (D-S) MOSFET

**PRODUCT SUMMARY**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>5 s Limit</th>
<th>Steady State Limit</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>$V_{DS}$</td>
<td>-30</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>$V_{GS}$</td>
<td>±20</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current ($T_J = 150 , ^\circ C$)</td>
<td>$I_D$</td>
<td>$-3.2$</td>
<td>$-2.5$</td>
<td>A</td>
</tr>
<tr>
<td>Continuous Source Current (Diode Conduction)</td>
<td>$I_S$</td>
<td>$-1.25$</td>
<td>$-0.75$</td>
<td>A</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>$P_D$</td>
<td>$1.25$</td>
<td>$0.75$</td>
<td>W</td>
</tr>
<tr>
<td>Operating Junction and Storage Temperature Range</td>
<td>$T_J, T_{stg}$</td>
<td>-55 to 150</td>
<td></td>
<td>°C</td>
</tr>
</tbody>
</table>

**FEATURES**

- Halogen-free Option Available
- TrenchFET® Power MOSFET

**ABSOLUTE MAXIMUM RATINGS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>5 s Steady State</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>$V_{DS}$</td>
<td>-30</td>
<td>V</td>
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<tr>
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<td>$V_{GS}$</td>
<td>±20</td>
<td>V</td>
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<td>$P_D$</td>
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</tr>
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<td>Operating Junction and Storage Temperature Range</td>
<td>$T_J, T_{stg}$</td>
<td>-55 to 150</td>
<td>°C</td>
</tr>
</tbody>
</table>

**THERMAL RESISTANCE RATINGS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Typical</th>
<th>Maximum</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Junction-to-Ambient</td>
<td>$R_{thJA}$</td>
<td>80</td>
<td>100</td>
<td>°C/W</td>
</tr>
<tr>
<td>Maximum Junction-to-Ambient</td>
<td>$R_{thJA}$</td>
<td>130</td>
<td>166</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

Notes:

a. Pulse width limited by maximum junction temperature.

b. Surface Mounted on FR4 board, $t \leq 5 \, s$.

c. Surface Mounted on FR4 board.

For SPICE model information via the Worldwide Web: [http://www.vishay.com/www/product/spice.htm](http://www.vishay.com/www/product/spice.htm)
Si2307BDS
Vishay Siliconix

**SPECIFICATIONS**  \( T_J = 25 \, ^\circ\text{C}, \) unless otherwise noted

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Limits</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Static</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain-Source Breakdown Voltage ( V_{DS} )</td>
<td>( V_{DS} )</td>
<td>( V_{GS} = 0 , \text{V}, , I_D = - 10 , \text{µA} )</td>
<td>- 30</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Threshold Voltage ( V_{GS(th)} )</td>
<td>( V_{GS(th)} )</td>
<td>( V_{DS} = V_{GS}, , I_D = - 250 , \text{µA} )</td>
<td>- 1.0</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Body Leakage ( I_{GSS} )</td>
<td>( I_{GSS} )</td>
<td>( V_{DS} = 0 , \text{V}, , V_{GS} = \pm 20 , \text{V} )</td>
<td>\pm 100</td>
<td>nA</td>
</tr>
<tr>
<td>Zero Gate Voltage Drain Current ( I_{DSS} )</td>
<td>( I_{DSS} )</td>
<td>( V_{DS} = - 30 , \text{V}, , V_{GS} = 0 , \text{V} )</td>
<td>- 1</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( V_{DS} = - 30 , \text{V}, , V_{GS} = 0 , \text{V}, , T_J = 55 , ^\circ\text{C} )</td>
<td>- 10</td>
<td></td>
</tr>
<tr>
<td>On-State Drain Currenta ( I_{D(on)} )</td>
<td>( I_{D(on)} )</td>
<td>( V_{DS} \leq - 10 , \text{V}, , V_{GS} = - 10 , \text{V} )</td>
<td>- 6</td>
<td>A</td>
</tr>
<tr>
<td>Drain-Source On-Resistancea ( R_{DS(on)} )</td>
<td>( R_{DS(on)} )</td>
<td>( V_{GS} = - 10 , \text{V}, , I_D = - 3.2 , \text{A} )</td>
<td>0.063</td>
<td>0.078</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( V_{GS} = - 4.5 , \text{V}, , I_D = - 2.5 , \text{A} )</td>
<td>0.105</td>
<td>0.130</td>
</tr>
<tr>
<td>Forward Transconductancea ( g_{fs} )</td>
<td>( g_{fs} )</td>
<td>( V_{DS} = - 10 , \text{V}, , I_D = - 3.2 , \text{A} )</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>Diode Forward Voltage ( V_{SD} )</td>
<td>( V_{SD} )</td>
<td>( I_S = - 0.75 , \text{A}, , V_{GS} = 0 , \text{V} )</td>
<td>- 0.85</td>
<td>- 1.2</td>
</tr>
<tr>
<td><strong>Dynamicb</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Gate Charge ( Q_g )</td>
<td>( Q_g )</td>
<td>( V_{DS} = - 15 , \text{V}, , V_{GS} = - 10 , \text{V} )</td>
<td>9.0</td>
<td>15</td>
</tr>
<tr>
<td>Gate-Source Charge ( Q_{gs} )</td>
<td>( Q_{gs} )</td>
<td>( I_D \leq - 1.7 , \text{A} )</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Gate-Drain Charge ( Q_{gd} )</td>
<td>( Q_{gd} )</td>
<td></td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>Gate Resistance ( R_g )</td>
<td>( R_g )</td>
<td>( f = 1.0 , \text{MHz} )</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Input Capacitance ( C_{iss} )</td>
<td>( C_{iss} )</td>
<td>( V_{DS} = - 15 , \text{V}, , V_{GS} = 0 , \text{V}, , f = 1 , \text{MHz} )</td>
<td>380</td>
<td></td>
</tr>
<tr>
<td>Output Capacitance ( C_{oss} )</td>
<td>( C_{oss} )</td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Reverse Transfer Capacitance ( C_{rss} )</td>
<td>( C_{rss} )</td>
<td></td>
<td>75</td>
<td></td>
</tr>
<tr>
<td><strong>Switchingc</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-On Time ( t_{d(on)} )</td>
<td>( t_{d(on)} )</td>
<td>( V_{DD} = - 15 , \text{V}, , R_L = 15 , \text{Ω} )</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( I_D \leq - 1.0 , \text{A}, , V_{GEN} = - 4.5 , \text{V} )</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( R_g = 6 , \text{Ω} )</td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td>Turn-Off Time ( t_{d(off)} )</td>
<td>( t_{d(off)} )</td>
<td></td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

a. Pulse test: pulse width \( \leq 300 \, \text{µs} \), duty cycle \( \leq 2 \, \% \).
b. For DESIGN AID ONLY, not subject to production testing.
c. Switching time is essentially independent of operating temperature.

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
TYPICAL CHARACTERISTICS  25 °C, unless otherwise noted

Output Characteristics

On-Resistance vs. Drain Current

V_{GS} = 10 thru 5 V

Gate Charge

V_{GS} = 4.5 V

Transfer Characteristics

Capacitance

On-Resistance vs. Junction Temperature

V_{DS} = 15 V

I_{D} = 3 A

Gate Charge

Q_g - Total Gate Charge (nC)

On-Resistance vs. Drain Current

V_{GS} = 10 V

I_{D} = 3.2 A

On-Resistance vs. Junction Temperature

T_{J} - Junction Temperature (°C)
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

- **Source-Drain Diode Forward Voltage**
  - $V_{SD}$ - Source-to-Drain Voltage (V)
  - $I_S$ - Source Current (A)

- **Threshold Voltage**
  - $V_{GS(th)}$ - Gate-to-Source Voltage (V)
  - $T_J$ - Temperature (°C)
  - $I_D = 250 \mu A$

- **On-Resistance vs. Gate-to-Source Voltage**
  - $R_{DSS(on)}$ - On-Resistance (Ω)
  - $I_D = 3.2 A$

- **Safe Operating Area, Junction-to-Case**
  - $V_{DS}$ - Drain-to-Source Voltage (V)
  - $I_D$ - Drain Current (A)
  - $T_A = 25 °C$
  - $T_J = 150 °C$
  - $T_J = 25 °C$
  - $V_{GS} > \text{minimum } V_{GS} \text{ at which } R_{DSS(on)} \text{ is specified}$

- **Single Pulse Power**
  - $P$ - Power (W)
  - $T_A = 25 °C$
  - $I_D = 3.2 A$
  - $T_J = 150 °C$

- **Square Wave Pulse Duration (s)**
  - $10 \mu s$
  - $100 \mu s$
  - $10 ms$
  - $100 ms$
  - $1 s$
  - $10 s, 1 s$
  - $\text{DC, 100 s}$

- **Limited by $R_{DSS(on)}^*$**

* $V_{GS} > \text{minimum } V_{GS} \text{ at which } R_{DSS(on)} \text{ is specified}$
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

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**Notes:**

1. Duty Cycle, \( D = \frac{I_1}{I_2} \)
2. Per Unit Base = \( R_{thJA} = 62.5 \text{ °C/W} \)
3. \( T_{JM} - T_A = P_{D champion}^{(0)} \)
4. Surface Mounted
### Package Information

**SOT-23 (TO-236): 3-LEAD**

![Diagram of SOT-23 (TO-236): 3-LEAD Package](image)

<table>
<thead>
<tr>
<th>Dim</th>
<th>MILLIMETERS</th>
<th>INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.89 - 1.12</td>
<td>0.035 - 0.044</td>
</tr>
<tr>
<td>A₁</td>
<td>0.01 - 0.10</td>
<td>0.0004 - 0.004</td>
</tr>
<tr>
<td>A₂</td>
<td>0.88 - 1.02</td>
<td>0.0346 - 0.040</td>
</tr>
<tr>
<td>b</td>
<td>0.35 - 0.50</td>
<td>0.014 - 0.020</td>
</tr>
<tr>
<td>c</td>
<td>0.085 - 0.18</td>
<td>0.003 - 0.007</td>
</tr>
<tr>
<td>D</td>
<td>2.80 - 3.04</td>
<td>0.110 - 0.120</td>
</tr>
<tr>
<td>E</td>
<td>2.10 - 2.64</td>
<td>0.083 - 0.104</td>
</tr>
<tr>
<td>E₁</td>
<td>1.20 - 1.40</td>
<td>0.047 - 0.055</td>
</tr>
<tr>
<td>e</td>
<td>0.95 BSC</td>
<td>0.0374 Ref</td>
</tr>
<tr>
<td>e₁</td>
<td>1.90 BSC</td>
<td>0.0748 Ref</td>
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<tr>
<td>L</td>
<td>0.40 - 0.60</td>
<td>0.016 - 0.024</td>
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<tr>
<td>L₁</td>
<td>0.64 Ref</td>
<td>0.025 Ref</td>
</tr>
<tr>
<td>S</td>
<td>0.50 Ref</td>
<td>0.020 Ref</td>
</tr>
<tr>
<td>q</td>
<td>3° - 8°</td>
<td>3° - 8°</td>
</tr>
</tbody>
</table>

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DWG: 5479

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09-Jul-01

www.vishay.com
RECOMMENDED MINIMUM PADS FOR SOT-23

Recommended Minimum Pads
Dimensions in Inches/(mm)

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