MTM131270BBF
Silicon P-channel MOS FET

For switching

- **Features**
  - Low Drain-source On-state Resistance: $R_{DS(on)} = 92 \, \text{m} \Omega$ ($V_{GS} = -4.0 \, \text{V}$)
  - Low drive voltage: 1.8 V drive
  - Halogen-free / RoHS compliant
    (EU RoHS / UL-94 V-0 / MSL : Level 1 compliant)

- **Marking Symbol**: EU

- **Packaging**
  Embossed type (Thermo-compression sealing) : 3 000 pcs / reel (standard)

### Absolute Maximum Ratings $T_a = 25 \, ^\circ \text{C}$

<table>
<thead>
<tr>
<th>項目</th>
<th>記号</th>
<th>定格</th>
<th>單位</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-source Voltage</td>
<td>VDS</td>
<td>-20</td>
<td>V</td>
</tr>
<tr>
<td>Gate-source Voltage</td>
<td>VGS</td>
<td>±10</td>
<td></td>
</tr>
<tr>
<td>Drain current</td>
<td>ID</td>
<td>-2</td>
<td>A</td>
</tr>
<tr>
<td>Peak drain current $^1$</td>
<td>IDp</td>
<td>-8</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation $^2$</td>
<td>PD</td>
<td>700</td>
<td>mW</td>
</tr>
<tr>
<td>Channel temperature</td>
<td>Tch</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>Operating ambient temperature</td>
<td>Topr</td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>Tstg</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

*Note*

$^1$ Pulse width $\leq 10 \, \mu\text{s}$, Duty cycle $\leq 1 \%$

$^2$ Measuring on ceramic board at $40 \times 38 \times 0.1 \, \text{mm}$.

Absolute maximum rating PD without heat sink shall be made 200 mW.
# Electrical Characteristics \(\text{Ta} = 25 \degree\text{C} \pm 3 \degree\text{C}\)

<table>
<thead>
<tr>
<th>項目</th>
<th>記号</th>
<th>条件</th>
<th>最小</th>
<th>標準</th>
<th>最大</th>
<th>単位</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-source surrender voltage</td>
<td>VDSS</td>
<td>(\text{ID} = -1 \text{mA}, \text{VGS} = 0 \text{V})</td>
<td>-20</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Drain-source cutoff current</td>
<td>IDSS</td>
<td>(\text{VDS} = -20 \text{V}, \text{VGS} = 0 \text{V})</td>
<td></td>
<td>-1</td>
<td></td>
<td>(\mu\text{A})</td>
</tr>
<tr>
<td>Gate-source cutoff current</td>
<td>IGSS</td>
<td>(\text{VGS} = -8 \text{V}, \text{VDS} = 0 \text{V})</td>
<td></td>
<td>+10</td>
<td></td>
<td>(\mu\text{A})</td>
</tr>
<tr>
<td>Gate threshold voltage</td>
<td>Vth</td>
<td>(\text{ID} = -1 \text{mA}, \text{VDS} = -10 \text{V})</td>
<td>-0.4</td>
<td>-0.75</td>
<td>-1.1</td>
<td>V</td>
</tr>
<tr>
<td>Drain-source ON resistance (^1)</td>
<td>RDS(on)1</td>
<td>(\text{ID} = -1 \text{A}, \text{VGS} = -4 \text{V})</td>
<td>92</td>
<td>130</td>
<td></td>
<td>(m\Omega)</td>
</tr>
<tr>
<td></td>
<td>RDS(on)2</td>
<td>(\text{ID} = -1 \text{A}, \text{VGS} = -2.5 \text{V})</td>
<td>115</td>
<td>210</td>
<td></td>
<td>(m\Omega)</td>
</tr>
<tr>
<td></td>
<td>RDS(on)3</td>
<td>(\text{ID} = -0.5 \text{A}, \text{VGS} = -1.8 \text{V})</td>
<td>161</td>
<td>280</td>
<td></td>
<td>(m\Omega)</td>
</tr>
<tr>
<td>Forward transfer admittance (^1)</td>
<td>(</td>
<td>Yfs</td>
<td>)</td>
<td>(\text{ID} = -1 \text{A}, \text{VDS} = -10 \text{V}, f = 1 \text{kHz})</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Short-circuit input capacitance (Common source)</td>
<td>Ciss</td>
<td>(\text{VDS} = -10 \text{V}, \text{VGS} = 0 \text{V})</td>
<td>300</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Short-circuit output capacitance (Common source)</td>
<td>Coss</td>
<td>(f = 1 \text{MHz})</td>
<td>30</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Reverse transfer capacitance (Common source)</td>
<td>Crss</td>
<td></td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-on Delay Time (^2)</td>
<td>td(on)</td>
<td>(\text{VDD} = -10 \text{V}, \text{VGS} = 0 \text{to} -4 \text{V})</td>
<td>6</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Rise Time (^2)</td>
<td>tr</td>
<td>(\text{ID} = -1 \text{A})</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-off Delay Time (^2)</td>
<td>td(off)</td>
<td>(\text{VDD} = -10 \text{V}, \text{VGS} = -4 \text{to} 0 \text{V})</td>
<td>57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Time (^2)</td>
<td>tf</td>
<td>(\text{ID} = -1 \text{A})</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:  1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 Measuring methods for transistors.
2. \(^1\) Pulse test
3. \(^2\) Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time
*2 Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time
Product Standards

MOS FET

Technical Data (reference)

**ID - VDS**

- Drain current ID (A)
  - VGS = -4.0 V, -1.8 V, -2.5 V, -1.5 V
  - ID = -2 A, -1 A, -0.5 A

- Drain-source voltage VDS (V)
  - 0, 0.2, 0.4, 0.6, 0.8, 1 V

**ID - VGS**

- Drain current ID (A)
  - VDS = -10 V, -8 V, -6 V, -4 V, -2 V, 0 V
  - VGS = -4 V, -2.5 V, -1.8 V

- Drain-source voltage VDS (V)
  - 0, 1, 2, 4, 6, 8, 10 V

**VDS - VGS**

- Drain current ID (A)
  - VDS = -10 V, -8 V, -6 V, -4 V, -2 V, 0 V
  - VGS = -4 V, -2.5 V, -1.8 V

- Drain-source voltage VDS (V)
  - 0, 1, 2, 4, 6, 8, 10 V

**RDS(on) - ID**

- Drain-source On-state Resistance RDS(on) (mΩ)
  - VGS = -4 V
  - 25 °C, 85 °C, 125 °C

**Capacitance - VDS**

- Capacitance C (pF)
  - Ciss, Coss, Crss

**Dynamic Input/Output Characteristics**

- Gate-source Voltage VGS (V)
  - VDD = -10 V

- Drain-source voltage VDS (V)
  - 0, 2, 4, 6, 8, 10 V

- Total Gate Charge Qg (nC)
  - 0, 2, 4, 6, 8, 10 V
Product Standards

MOS FET

MTM131270BBF

Technical Data (reference)

Gate-source Threshold Voltage \( V_{th} \) - \( T_a \)

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{Temperature (°C)} & -50 & 0 & 50 & 100 & 150 \\
\hline
V_{th} (V) & 1 & 0.8 & 0.6 & 0.4 & 0.2 \\
\hline
\end{array}
\]

Drain-source On-resistance \( R_{DS(on)} \) - \( T_a \)

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{Temperature (°C)} & -50 & 0 & 50 & 100 & 150 \\
\hline
R_{DS(on)} (mΩ) & 200 & 150 & 100 & 50 & 0 \\
\hline
\end{array}
\]

Total Power Dissipation \( PD \) - \( T_a \)

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{Temperature \( T_a \) (°C)} & 0 & 50 & 100 & 150 \\
\hline
PD (W) & 1 & 0.8 & 0.6 & 0.4 \\
\hline
\end{array}
\]

Thermal resistance \( R_{th} \) - \( t_{sw} \)

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{Pulse Width \( t_{sw} \) (s)} & 0.1 & 1 & 10 & 100 & 1000 \\
\hline
R_{th} (°C/W) & 10 & 100 & 1000 & 100 & 10 \\
\hline
\end{array}
\]

Safe Operating Area

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{Drain-source voltage \( V_{DS} \) (V)} & -2.5 & -4.0 & -4.5 & -5.0 \\
\hline
\text{Drain Current \( I_D \) (A)} & -8 & -10 & -12 & -14 \\
\hline
\end{array}
\]

Operation in this area is limited by \( R_{DS(on)} \).

*Glass epoxy board (25.4 × 25.4 × 0.8 mm) coated with copper foil, which has more than 300 mm².

Established: 2011-07-19
Revised: 2014-02-03
Mini3-G3-B

Land Pattern (Reference) (Unit: mm)

- Mini3-G3-B
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