1. General description

PNP high power bipolar transistor in a power DPAK, TO-252 (SOT428C) Surface-Mounted Device (SMD) plastic package.

NPN complement: MJD44H11A

2. Features and benefits

- High thermal power dissipation capability
- High energy efficiency due to less heat generation
- Electrically similar to popular MJD45H series
- Low collector emitter saturation voltage
- Fast switching speeds
- AEC-Q101 qualified

3. Applications

- Power management
- Load switch
- Linear mode voltage regulator
- Constant current drive backlighting application
- Motor drive
- Relay replacement

4. Quick reference data

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{CEO}$</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-</td>
<td>-80</td>
<td>V</td>
</tr>
<tr>
<td>$I_C$</td>
<td>collector current</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-8</td>
<td>A</td>
</tr>
<tr>
<td>$I_{CM}$</td>
<td>peak collector current</td>
<td>single pulse; $t_p \leq 1$ ms</td>
<td>-</td>
<td>-</td>
<td>-16</td>
<td>A</td>
</tr>
<tr>
<td>$h_{FE}$</td>
<td>DC current gain</td>
<td>$V_{CE} = -1$ V; $I_C = -2$ A; $T_{amb} = 25$ °C</td>
<td>60</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
5. Pinning information

Table 2. Pinning information

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Description</th>
<th>Simplified outline</th>
<th>Graphic symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td>collector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>E</td>
<td>emitter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mb</td>
<td>C</td>
<td>mounting base; connected to collector</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>MJD45H11A</td>
<td>DPAK</td>
<td>Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)</td>
<td>SOT428C</td>
<td></td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
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</thead>
<tbody>
<tr>
<td>MJD45H11A</td>
<td>MJD45H11A</td>
</tr>
</tbody>
</table>

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{CEO}</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-80</td>
<td>V</td>
</tr>
<tr>
<td>V_{EBO}</td>
<td>emitter-base voltage</td>
<td>open collector</td>
<td>-</td>
<td>-6</td>
<td>V</td>
</tr>
<tr>
<td>I_C</td>
<td>collector current</td>
<td></td>
<td>-</td>
<td>8</td>
<td>A</td>
</tr>
<tr>
<td>I_{CM}</td>
<td>peak collector current</td>
<td>single pulse; t_p ≤ 1 ms</td>
<td>-</td>
<td>-16</td>
<td>A</td>
</tr>
<tr>
<td>P_{tot}</td>
<td>total power dissipation</td>
<td>T_{mb} ≤ 25 °C</td>
<td>[1]</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T_{amb} ≤ 25 °C</td>
<td>[2]</td>
<td>-</td>
<td>1.75</td>
</tr>
<tr>
<td>T_j</td>
<td>junction temperature</td>
<td></td>
<td>-</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>T_{amb}</td>
<td>ambient temperature</td>
<td>-55</td>
<td>150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>T_{stg}</td>
<td>storage temperature</td>
<td>-65</td>
<td>150</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

[1] Total power dissipation junction to mounting base.
FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

Fig. 1. Power derating curves SOT428C

9. Thermal characteristics

Table 6. Thermal characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{th(j-mb)}$</td>
<td>thermal resistance from junction to mounting base</td>
<td>in free air</td>
<td>-</td>
<td>-</td>
<td>6.25</td>
<td>K/W</td>
</tr>
<tr>
<td>$R_{th(j-a)}$</td>
<td>thermal resistance from junction to ambient</td>
<td>[1]</td>
<td>-</td>
<td>-</td>
<td>72</td>
<td>K/W</td>
</tr>
</tbody>
</table>

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated mounting pad for collector 1 cm².

FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values
10. Characteristics

Table 7. Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{\text{CES}}$</td>
<td>collector-emitter cut-off current</td>
<td>$V_{\text{CE}} = -64 , \text{V}; , V_{\text{BE}} = 0 , \text{V}; , T_{\text{j}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>-1</td>
<td>µA</td>
</tr>
<tr>
<td>$I_{\text{EBO}}$</td>
<td>emitter-base cut-off current</td>
<td>$V_{\text{EB}} = -5 , \text{V}; , I_{\text{C}} = 0 , \text{A}; , T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>-50</td>
<td>µA</td>
</tr>
<tr>
<td>$h_{\text{FE}}$</td>
<td>DC current gain</td>
<td>$V_{\text{CE}} = -1 , \text{V}; , I_{\text{C}} = -2 , \text{A}; , T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>60</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{\text{CE}} = -1 , \text{V}; , I_{\text{C}} = -4 , \text{A}; , T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>$V_{\text{CEsat}}$</td>
<td>collector-emitter saturation voltage</td>
<td>$I_{\text{C}} = -8 , \text{A}; , I_{\text{B}} = -400 , \text{mA}; , T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>-1</td>
<td>V</td>
</tr>
<tr>
<td>$V_{\text{BEsat}}$</td>
<td>base-emitter saturation voltage</td>
<td>$I_{\text{C}} = -8 , \text{A}; , I_{\text{B}} = -800 , \text{mA}; , T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>-1.5</td>
<td>V</td>
</tr>
<tr>
<td>$t_{\text{on}}$</td>
<td>turn-on time</td>
<td>$I_{\text{C}} = -5 , \text{A}; , I_{\text{Bon}} = -0.5 , \text{A}; , I_{\text{Boff}} = 0.5 , \text{A}; , V_{\text{CC}} = -12.5 , \text{V}; , T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>225</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{\text{s}}$</td>
<td>storage time</td>
<td>-</td>
<td>-</td>
<td>280</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{\text{f}}$</td>
<td>fall time</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{\text{off}}$</td>
<td>turn-off time</td>
<td>-</td>
<td>-</td>
<td>380</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$C_{\text{C}}$</td>
<td>collector capacitance</td>
<td>$V_{\text{CE}} = -10 , \text{V}; , I_{\text{C}} = 0 , \text{A}; , I_{\text{E}} = 0 , \text{A}; , f = 1 , \text{MHz}; , T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>80</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$f_{\text{T}}$</td>
<td>transition frequency</td>
<td>$V_{\text{CE}} = -10 , \text{V}; , I_{\text{C}} = -500 , \text{mA}; , f = 100 , \text{MHz}; , T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>80</td>
<td>-</td>
<td>MHz</td>
</tr>
</tbody>
</table>

Fig. 3. DC current gain as a function of collector current; typical values

Fig. 4. Collector current as a function of collector-emitter voltage; typical values
80 V, 8 A PNP high power bipolar transistor

Fig. 5. Base-emitter voltage as a function of collector current; typical values

Fig. 6. Base-emitter saturation voltage as a function of collector current; typical values

Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values

Fig. 8. Collector-emitter saturation region as a function of base current; typical values
Fig. 9. Input/output capacitance as a function of input/output voltage

$T_{amb} = 25 \, ^{\circ}C$

(1) $C_e$
(2) $C_c$
11. Test information

![Fig. 10. BISS transistor switching time definition](image)

**Fig. 10. BISS transistor switching time definition**

![Fig. 11. Test circuit for switching times](image)

**Fig. 11. Test circuit for switching times**

**Quality information**

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.
12. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)  

Dimensions (mm are the original dimensions)

| Unit | A  | A₁ | b  | b₁ | b₂ | c  | D₁ | D₂ | E  | E₁ | H₀ | L  | L₁ | L₂ | w  | y  |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| max  | 2.38| 0.93| 0.89| 1.10| 5.46| 0.60| 6.22| 6.73| 10.4| 2.95| 1.0| 0.2|
| nom  | 2.22| 0.46| 0.71| 0.72| 5.00| 0.20| 5.98| 4.0| 6.47| 4.57| 2.85| 4.45| 9.6| 2.55| 0.5| 0.5|

Note
1. Plastic body may have 45° chamfer.

Fig. 12. Package outline DPAK (SOT428C)
13. Soldering

Footprint information for reflow soldering of DPAK (SOT428C) package

![Footprint diagram]

Fig. 13. Reflow soldering footprint for DPAK (SOT428C)
## 14. Revision history

Table 8. Revision history

<table>
<thead>
<tr>
<th>Data sheet ID</th>
<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<tr>
<td>MJD45H11A v.4</td>
<td>20210203</td>
<td>Product data sheet</td>
<td>-</td>
<td>MJD45H11A v.3</td>
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<td>Modifications:</td>
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<td></td>
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<tr>
<td>- Characteristics at $I_{CES}$: Conditions added</td>
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<td>MJD45H11A v.3</td>
<td>20190912</td>
<td>Product data sheet</td>
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<td>MJD45H11A v.2</td>
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<td>MJD45H11A v.1</td>
<td>20190528</td>
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15. Legal information

Data sheet status

<table>
<thead>
<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<tr>
<td>[1][2]</td>
<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
</tr>
<tr>
<td>Preliminary [short] data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
</tr>
<tr>
<td>Product [short] data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
</tr>
</tbody>
</table>

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term "short data sheet" is explained in section "Definitions".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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