1. General description

NPN general-purpose transistor in an ultra small DFN1110D-3 (SOT8015) leadless Surface-Mounted Device (SMD) plastic package with side-wettable flanks.

Table 1. Product overview

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>JEDEC Name</th>
<th>Version</th>
<th>PNP complement</th>
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<tbody>
<tr>
<td>BC817-16QBH-Q</td>
<td>DFN1110D-3</td>
<td>MO340-BA</td>
<td>SOT8015</td>
<td>BC807-16QBH-Q</td>
</tr>
<tr>
<td>BC817-25QBH-Q</td>
<td></td>
<td></td>
<td></td>
<td>BC807-25QBH-Q</td>
</tr>
<tr>
<td>BC817-40QBH-Q</td>
<td></td>
<td></td>
<td></td>
<td>BC807-40QBH-Q</td>
</tr>
</tbody>
</table>

2. Features and benefits

- High power dissipation capability
- High current
- Three current gain selections
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- Smaller footprint compared to conventional leaded SMD packages
- Low package height of 0.5 mm
- High-temperature applications up to 175 °C
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- General-purpose switching and amplification
- Space restricted applications

4. Quick reference data

Table 2. 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>VCEO</td>
<td>collector-emitter voltage</td>
<td>open base; T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>-</td>
<td>-</td>
<td>45</td>
<td>V</td>
</tr>
<tr>
<td>IC</td>
<td>collector current</td>
<td>T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>-</td>
<td>-</td>
<td>500</td>
<td>mA</td>
</tr>
<tr>
<td>ICM</td>
<td>peak collector current</td>
<td>single pulse; t&lt;sub&gt;p&lt;/sub&gt; ≤ 1 ms; T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>hFE</td>
<td>DC current gain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Conditions</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC817-16QBH-Q</td>
<td>V&lt;sub&gt;CE&lt;/sub&gt; = 1 V; I&lt;sub&gt;C&lt;/sub&gt; = 100 mA T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>100</td>
</tr>
<tr>
<td>BC817-25QBH-Q</td>
<td></td>
<td>160</td>
</tr>
<tr>
<td>BC817-40QBH-Q</td>
<td></td>
<td>250</td>
</tr>
</tbody>
</table>

[1] pulsed; t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02
5. Pinning information

Table 3. Pinning

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

6. Ordering information

Table 4. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC817-16QBH-Q</td>
<td>DFN1110D-3</td>
<td>DFN1110D-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body: 1.1 x 1.0 x 0.5 mm</td>
<td>SOT8015 (MO340-BA)</td>
</tr>
<tr>
<td>BC817-25QBH-Q</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BC817-40QBH-Q</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Marking

Table 5. Marking

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
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<tbody>
<tr>
<td>BC817-16QBH-Q</td>
<td>F9</td>
</tr>
<tr>
<td>BC817-25QBH-Q</td>
<td>G2</td>
</tr>
<tr>
<td>BC817-40QBH-Q</td>
<td>G3</td>
</tr>
</tbody>
</table>
8. Limiting values

Table 6. 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_{CBO}</td>
<td>collector-base voltage</td>
<td>open emitter; T_{amb} = 25 °C</td>
<td>-</td>
<td>50</td>
<td>V</td>
</tr>
<tr>
<td>V_{CEO}</td>
<td>collector-emitter voltage</td>
<td>open base; T_{amb} = 25 °C</td>
<td>-</td>
<td>45</td>
<td>V</td>
</tr>
<tr>
<td>V_{EBO}</td>
<td>emitter-base voltage</td>
<td>open collector; T_{amb} = 25 °C</td>
<td>-</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>I_{C}</td>
<td>collector current</td>
<td>T_{amb} = 25 °C</td>
<td>-</td>
<td>500</td>
<td>mA</td>
</tr>
<tr>
<td>I_{CM}</td>
<td>peak collector current</td>
<td>single pulse; t_{p} ≤ 1 ms; T_{amb} = 25 °C</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>I_{BM}</td>
<td>peak base current</td>
<td>single pulse; t_{p} ≤ 1 ms; T_{amb} = 25 °C</td>
<td>-</td>
<td>200</td>
<td>mA</td>
</tr>
</tbody>
</table>

P_{tot} total power dissipation

- T_{amb} = 25 °C
- [1] - 420 mW
- [2] - 550 mW

T_{j} junction temperature
- 175 °C

T_{amb} ambient temperature
- -65 °C
- 175 °C

T_{stg} storage temperature
- -65 °C
- 175 °C


Fig. 1. Power derating curves for SOT8015
9. Thermal characteristics

Table 7. 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>$R_{th(j-a)}$</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air; $T_{amb} = 25 , ^\circ C$</td>
<td>[1]</td>
<td>-</td>
<td>358</td>
<td>K/W</td>
</tr>
</tbody>
</table>


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

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values
## Table 8. 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>$V_{(BR)CBO}$</td>
<td>collector-base breakdown voltage</td>
<td>$I_C = 100 \mu A; I_E = 0 \mu A; T_{amb} = 25 ^\circ C$</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_{(BR)CEO}$</td>
<td>collector-emitter breakdown voltage</td>
<td>$I_C = 10 mA; I_E = 0 A; T_{amb} = 25 ^\circ C$</td>
<td>45</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_{(BR)EBO}$</td>
<td>emitter-base breakdown voltage</td>
<td>$I_E = 100 \mu A; I_C = 0 A; T_{amb} = 25 ^\circ C$</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$I_{CBO}$</td>
<td>collector-base cut-off current</td>
<td>$V_{CB} = 20 V; I_E = 0 A; T_{amb} = 25 ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CB} = 20 V; I_E = 0 A; T_j = 150 ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>µA</td>
</tr>
<tr>
<td>$I_{EBO}$</td>
<td>emitter-base cut-off current</td>
<td>$V_{EB} = 5 V; I_C = 0 A; T_{amb} = 25 ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>$h_{FE}$</td>
<td>DC current gain</td>
<td>$V_{CE} = 1 V; I_C = 100 mA; T_{amb} = 25 ^\circ C$</td>
<td>[1]</td>
<td>100</td>
<td>-</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CE} = 1 V; I_C = 500 mA; T_{amb} = 25 ^\circ C$</td>
<td>[1]</td>
<td>160</td>
<td>-</td>
<td>600</td>
</tr>
<tr>
<td>$V_{CEsat}$</td>
<td>collector-emitter saturation voltage</td>
<td>$I_C = 500 mA; I_B = 50 mA; T_{amb} = 25 ^\circ C$</td>
<td>[1]</td>
<td>-</td>
<td>-</td>
<td>700 mV</td>
</tr>
<tr>
<td>$V_{BE}$</td>
<td>base-emitter voltage</td>
<td>$V_{CE} = 1 V; I_C = 500 mA; T_{amb} = 25 ^\circ C$</td>
<td>[1]</td>
<td>-</td>
<td>-</td>
<td>1.2 V</td>
</tr>
<tr>
<td>$f_T$</td>
<td>transition frequency</td>
<td>$V_{CE} = 5 V; I_C = 10 mA; f = 100 MHz; T_{amb} = 25 ^\circ C$</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>MHz</td>
</tr>
<tr>
<td>$C_c$</td>
<td>collector capacitance</td>
<td>$V_{CB} = 10 V; I_E = I_E = 0 A; f = 1 MHz; T_{amb} = 25 ^\circ C$</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>

[1] pulsed; $t_p \leq 300 \mu s; \delta \leq 0.02$

[2] $V_{BE}$ decreases by about 2 mV/K with increasing temperature.
Fig. 4. BC817-16QBH-Q: DC current gain as a function of collector current; typical values

\[ V_{CE} = 1 \text{ V} \]

(1) \(T_{amb} = 150 \degree C\)

(2) \(T_{amb} = 25 \degree C\)

(3) \(T_{amb} = -55 \degree C\)

Fig. 5. BC817-16QBH-Q: Collector current as a function of collector-emitter voltage; typical values

\[ IC/IB = 10 \]

(1) \(T_{amb} = -55 \degree C\)

(2) \(T_{amb} = 25 \degree C\)

(3) \(T_{amb} = 150 \degree C\)

Fig. 6. BC817-16QBH-Q: Base-emitter saturation voltage as a function of collector current; typical values

\[ IC/IB = 10 \]

(1) \(T_{amb} = 150 \degree C\)

(2) \(T_{amb} = 25 \degree C\)

(3) \(T_{amb} = -55 \degree C\)

Fig. 7. BC817-16QBH-Q: Collector-emitter saturation voltage as a function of collector current; typical values
**BC817QBH-Q series**

45 V, 500 mA NPN general-purpose transistors

---

### Fig. 8. BC817-25QBH-Q: DC current gain as a function of collector current; typical values

- $V_{CE} = 1 \text{ V}$
- $T_{\text{amb}} = 150 ^\circ \text{C}$
- $T_{\text{amb}} = 25 ^\circ \text{C}$
- $T_{\text{amb}} = -55 ^\circ \text{C}$

### Fig. 9. BC817-25QBH-Q: Collector current as a function of collector-emitter voltage; typical values

- $T_{\text{amb}} = 25 ^\circ \text{C}$
- $I_B = 13.0 \text{ mA}$
- $I_B = 11.7 \text{ mA}$
- $I_B = 10.4 \text{ mA}$
- $I_B = 9.1 \text{ mA}$
- $I_B = 7.8 \text{ mA}$
- $I_B = 6.5 \text{ mA}$
- $I_B = 5.2 \text{ mA}$
- $I_B = 3.9 \text{ mA}$
- $I_B = 2.6 \text{ mA}$
- $I_B = 1.3 \text{ mA}$

### Fig. 10. BC817-25QBH-Q: Base-emitter saturation voltage as a function of collector current; typical values

- $IC/IB = 10$
- $T_{\text{amb}} = -55 ^\circ \text{C}$
- $T_{\text{amb}} = 25 ^\circ \text{C}$
- $T_{\text{amb}} = 150 ^\circ \text{C}$

### Fig. 11. BC817-25QBH-Q: Collector-emitter saturation voltage as a function of collector current; typical values

- $IC/IB = 10$
- $T_{\text{amb}} = 150 ^\circ \text{C}$
- $T_{\text{amb}} = 25 ^\circ \text{C}$
- $T_{\text{amb}} = -55 ^\circ \text{C}$
Fig. 12. BC817-40QBH-Q: DC current gain as a function of collector current; typical values

\[ V_{CE} = 1 \text{ V} \]

(1) \( T_{amb} = 150 \degree C \)
(2) \( T_{amb} = 25 \degree C \)
(3) \( T_{amb} = -55 \degree C \)

Fig. 13. BC817-40QBH-Q: Transition frequency as a function of collector current; typical values

\[ T_{amb} = 25 \degree C \]

(1) \( I_B = 12.0 \text{ mA} \)
(2) \( I_B = 10.8 \text{ mA} \)
(3) \( I_B = 9.6 \text{ mA} \)
(4) \( I_B = 8.4 \text{ mA} \)
(5) \( I_B = 7.2 \text{ mA} \)
(6) \( I_B = 6.0 \text{ mA} \)
(7) \( I_B = 4.8 \text{ mA} \)
(8) \( I_B = 3.6 \text{ mA} \)
(9) \( I_B = 2.4 \text{ mA} \)
(10) \( I_B = 1.2 \text{ mA} \)

Fig. 14. BC817-40QBH-Q: Base-emitter saturation voltage as a function of collector current; typical values

\[ IC/IB = 10 \]

(1) \( T_{amb} = -55 \degree C \)
(2) \( T_{amb} = 25 \degree C \)
(3) \( T_{amb} = 150 \degree C \)

Fig. 15. BC817-40QBH-Q: Collector-emitter saturation voltage as a function of collector current; typical values

\[ IC/IB = 10 \]

(1) \( T_{amb} = 150 \degree C \)
(2) \( T_{amb} = 25 \degree C \)
(3) \( T_{amb} = -55 \degree C \)
11. Test information

11.1. Quality information

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

12. Package outline

![Package outline DFN1110D-3 (SOT8015)](image-url)

Fig. 16. Package outline DFN1110D-3 (SOT8015)
13. Soldering

Footprint information for reflow soldering of DFN1110D-3 package

Fig. 17. Reflow soldering footprint for DFN1110D-3 (SOT8015)
14. Revision history

Table 9. Revision history

<table>
<thead>
<tr>
<th>Document ID</th>
<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<tbody>
<tr>
<td>BC817QBH-Q_SER v.1</td>
<td>20220125</td>
<td>Product data sheet</td>
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15. Legal information

Data sheet status

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<tbody>
<tr>
<td>Objective [short] data sheet</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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