1. Product profile

1.1 General description
PNP general-purpose transistors in a leadless ultra small DFN1010D-3 (SOT1215) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

Table 1. Product overview

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>JEITA</th>
<th>JEDEC</th>
<th>NPN complement</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC857AQA</td>
<td>DFN1010D-3 (SOT1215)</td>
<td>-</td>
<td>-</td>
<td>BC847AQA</td>
</tr>
<tr>
<td>BC857BQA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>BC847BQA</td>
</tr>
<tr>
<td>BC857CQA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>BC847CQA</td>
</tr>
</tbody>
</table>

1.2 Features and benefits
- General-purpose transistors
- Three current gain selections
- Low package height of 0.37 mm
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- AEC-Q101 qualified

1.3 Applications
- General-purpose switching and amplification
- Mobile applications

1.4 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>$V_{CEO}$</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-</td>
<td>-45</td>
<td>V</td>
</tr>
<tr>
<td>$I_C$</td>
<td>collector current</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-100</td>
<td>mA</td>
</tr>
<tr>
<td>$h_{FE}$</td>
<td>DC current gain</td>
<td>$V_{CE} = -5 \text{ V}$; $I_C = -2 \text{ mA}$</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BC857AQA</td>
<td></td>
<td>125</td>
<td>-</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BC857BQA</td>
<td></td>
<td>220</td>
<td>-</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BC857CQA</td>
<td></td>
<td>420</td>
<td>-</td>
<td>800</td>
<td></td>
</tr>
</tbody>
</table>

$T_{amb} = 25 \degree C$ unless otherwise specified.
2. 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>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>base</td>
<td><img src="image" alt="Simplified outline" /></td>
<td>Transparent top view</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>
<tr>
<td>4</td>
<td>C</td>
<td>collector</td>
<td></td>
<td></td>
</tr>
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</table>

3. Ordering information

Table 4. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC857AQA</td>
<td>DFN1010D-3</td>
<td>plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body: 1.1 \times 1.0 \times 0.37 mm</td>
<td>SOT1215</td>
</tr>
</tbody>
</table>
4. Marking

Table 5. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC857AQA</td>
<td>00 11 10</td>
</tr>
<tr>
<td>BC857BQA</td>
<td>00 11 11</td>
</tr>
<tr>
<td>BC857CQA</td>
<td>01 00 01</td>
</tr>
</tbody>
</table>

4.1 Binary marking code description

Fig 1. SOT1215 binary marking code description
5. 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</td>
<td>-</td>
<td>-50</td>
<td>V</td>
</tr>
<tr>
<td>(V_{CEO})</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-45</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>-100</td>
<td>mA</td>
</tr>
<tr>
<td>(I_{CM})</td>
<td>peak collector current</td>
<td>single pulse; (t_p \leq 1) ms</td>
<td>-</td>
<td>-200</td>
<td>mA</td>
</tr>
<tr>
<td>(I_{BM})</td>
<td>peak base current</td>
<td>single pulse; (t_p \leq 1) ms</td>
<td>-</td>
<td>-100</td>
<td>mA</td>
</tr>
<tr>
<td>(P_{tot})</td>
<td>total power dissipation</td>
<td>(T_{amb} \leq 25) °C</td>
<td>1</td>
<td>-</td>
<td>280</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>-</td>
<td>440</td>
</tr>
<tr>
<td>(T_J)</td>
<td>junction temperature</td>
<td></td>
<td></td>
<td></td>
<td>+150</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>


[2] Device mounted on an FR4 PCB, 4-layer copper; tin-plated and standard footprint.

Fig 2. Power derating curves

(1) FR4 PCB, 4-layer copper, standard footprint

(2) FR4 PCB, standard footprint
6. 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</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[1]</td>
<td></td>
<td>446</td>
<td></td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[2]</td>
<td></td>
<td>284</td>
<td></td>
<td>K/W</td>
</tr>
</tbody>
</table>

[2] Device mounted on an FR4 PCB, 4-layer copper; tin-plated and standard footprint.

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values
### 7. Characteristics

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>I_{CBO}</td>
<td>collector-base cut-off current</td>
<td>V_{CB} = −30 V; I_{E} = 0 A</td>
<td>-</td>
<td>-</td>
<td>−15</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_{CB} = −30 V; I_{E} = 0 A; T_{J} = 150 °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</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} = −5 V; I_{C} = −2 mA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BC857AQA</td>
<td>125</td>
<td>-</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>BC857BQA</td>
<td>220</td>
<td>-</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>BC857CQA</td>
<td>420</td>
<td>-</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>V_{CEsat}</td>
<td>collector-emitter saturation voltage</td>
<td>I_{C} = −10 mA; I_{B} = −0.5 mA</td>
<td>-</td>
<td>-</td>
<td>−200</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_{C} = −100 mA; I_{B} = −5 mA</td>
<td>[1]</td>
<td>-</td>
<td>-</td>
<td>−400</td>
</tr>
<tr>
<td>V_{BEsat}</td>
<td>base-emitter saturation voltage</td>
<td>I_{C} = −10 mA; I_{B} = −0.5 mA</td>
<td>-</td>
<td>−760</td>
<td>-</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_{C} = −100 mA; I_{B} = −5 mA</td>
<td>[1]</td>
<td>-</td>
<td>−900</td>
<td>-</td>
</tr>
<tr>
<td>V_{BE}</td>
<td>base-emitter voltage</td>
<td>I_{C} = −2 mA; V_{CE} = −5 V</td>
<td>−600</td>
<td>-</td>
<td>−750</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_{C} = −10 mA; V_{CE} = −5 V</td>
<td>-</td>
<td>-</td>
<td>−820</td>
<td>mV</td>
</tr>
<tr>
<td>f_{T}</td>
<td>transition frequency</td>
<td>V_{CE} = −5 V; I_{C} = −10 mA; f = 100 MHz</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_{o} = 0 A; f = 1 MHz</td>
<td>-</td>
<td>-</td>
<td>2.5</td>
<td>pF</td>
</tr>
<tr>
<td>C_{e}</td>
<td>emitter capacitance</td>
<td>V_{EB} = −0.5 V; I_{C} = I_{C} = 0 A; f = 1 MHz</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>NF</td>
<td>noise figure</td>
<td>I_{C} = −200 μA; V_{CE} = −5 V; R_{S} = 2 kΩ; f = 1 kHz; B = 200 Hz</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>dB</td>
</tr>
</tbody>
</table>

[1] Pulse test: \( t_{p} \leq 300 \mu s; \delta = 0.02 \)
**BC857XQA series**

45 V, 100 mA PNP general-purpose transistors

---

**Fig 5. BC857AQA: DC current gain as a function of collector current; typical values**

- $V_{CE} = -5 \text{ V}$
  - (1) $T_{\text{amb}} = 150^\circ \text{C}$
  - (2) $T_{\text{amb}} = 25^\circ \text{C}$
  - (3) $T_{\text{amb}} = -55^\circ \text{C}$

**Fig 6. BC857AQA: Base-emitter voltage as a function of collector current; typical values**

- $V_{CE} = -5 \text{ V}$
  - (1) $T_{\text{amb}} = -55^\circ \text{C}$
  - (2) $T_{\text{amb}} = 25^\circ \text{C}$
  - (3) $T_{\text{amb}} = 150^\circ \text{C}$

**Fig 7. BC857AQA: Collector-emitter saturation voltage as a function of collector current; typical values**

- $I_C/I_E = 20$
  - (1) $T_{\text{amb}} = 150^\circ \text{C}$
  - (2) $T_{\text{amb}} = 25^\circ \text{C}$
  - (3) $T_{\text{amb}} = -55^\circ \text{C}$

**Fig 8. BC857AQA: Base-emitter saturation voltage as a function of collector current; typical values**

- $I_C/I_E = 20$
  - (1) $T_{\text{amb}} = -55^\circ \text{C}$
  - (2) $T_{\text{amb}} = 25^\circ \text{C}$
  - (3) $T_{\text{amb}} = 150^\circ \text{C}$
Nexperia

BC857XQA series

45 V, 100 mA PNP general-purpose transistors

Fig 9. BC857BQA: DC current gain as a function of collector current; typical values

Fig 10. BC857BQA: Base-emitter voltage as a function of collector current; typical values

Fig 11. BC857BQA: Collector-emitter saturation voltage as a function of collector current; typical values

Fig 12. BC857BQA: Base-emitter saturation voltage as a function of collector current; typical values
BC857XQA series

45 V, 100 mA PNP general-purpose transistors

Fig 13. BC857CQA: DC current gain as a function of collector current; typical values

Fig 14. BC857CQA: Base-emitter voltage as a function of collector current; typical values

Fig 15. BC857CQA: Collector-emitter saturation voltage as a function of collector current; typical values

Fig 16. BC857CQA: Base-emitter saturation voltage as a function of collector current; typical values
8. **Test information**

8.1 **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.

9. **Package outline**

![Package outline DFN1010D-3 (SOT1215)](image-url)
10. Soldering

Footprint information for reflow soldering of DFN1010D-3 package

Fig 18. Reflow soldering footprint DFN1010D-3 (SOT1215)
11. 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>BC857XQA_SER v.1</td>
<td>20150826</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
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</table>
12. Legal information

12.1 Data sheet status

<table>
<thead>
<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
</tr>
</thead>
<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 URL http://www.nexperia.com.

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BC857XQA series
45 V, 100 mA PNP general-purpose transistors

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12.4 Trademarks

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13. Contact information

For more information, please visit: http://www.nexperia.com

For sales office addresses, please send an email to: salesaddresses@nexperia.com
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