## Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of automotive applications.

## Features

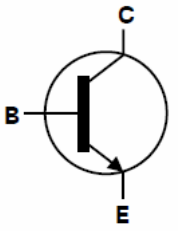
- $BV_{CEO}$ > 45V
- $I_C$ = 0.5A Continuous Collector Current
- $I_{CM}$ = 1A Peak Pulse Current
- Complementary PNP Types: BC807-xxQ
- Ideally Suited for Automatic Insertion
- Epitaxial Planar Die Construction
- For Switching and AF Amplifier Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The BC817-16Q /-25Q/-40Q are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  **https://www.diodes.com/quality/product-definitions/**

## Mechanical Data

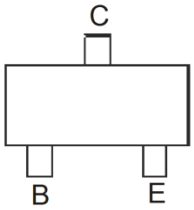
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (e3)
- Weight 0.008 grams (Approximate)

SOT23

Top View




Device Symbol




Top View
Pin-Out

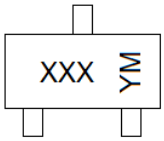
## Ordering Information (Note 4)

| Part Number | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity Per Reel |
|---|---|---|---|---|---|
| BC817-16Q-7-F | Automotive | K6A | 7 | 8 | 3,000 |
| BC817-25Q-7-F | Automotive | K6B | 7 | 8 | 3,000 |
| BC817-40Q-7-F | Automotive | K6C | 7 | 8 | 3,000 |
| BC817-40Q-13-F | Automotive | K6C | 13 | 8 | 10,000 |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

## Marking Information

SOT23




XXX = Product Type Marking Code (See Ordering Information)
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: I = 2021)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2033 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | I | J | K | L | M | N | O | P | R | S | T | U |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

## Absolute Maximum Ratings (@ $T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 50 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 45 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 5.0 | V |
| Collector Current | $I_C$ | 0.5 | A |
| Peak Pulse Collector Current (single pulse) | $I_{CM}$ | 1.0 | A |
| Peak Pulse Base Current (single pulse) | $I_{BM}$ | 200 | mA |

## Thermal Characteristics (@ $T_A$ = +25°C, unless otherwise specified.)

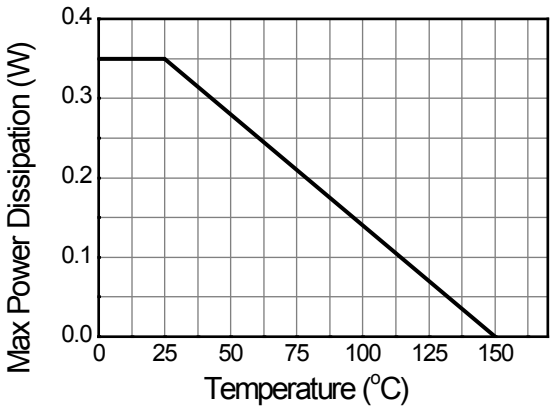
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 5) | $P_D$ | 310 | mW |
| | (Note 6) | | 350 | |
| Thermal Resistance, Junction to Ambient | (Note 5) | $R_{\theta JA}$ | 403 | °C/W |
| | (Note 6) | | 357 | |
| Thermal Resistance, Junction to Leads | (Note 7) | $R_{\theta JL}$ | 350 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -65 to +150 | °C |

## ESD Ratings (Note 8)

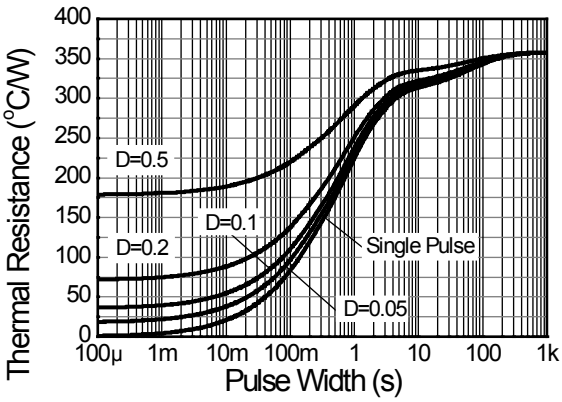
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge - Human Body Model | ESD HBM | 8,000 | V | 3B |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

Notes:
5. For a device mounted on minimum recommended pad layout FR-4 PCB with high coverage of single sided 1oz copper; device is measured under still air conditions whilst operating in a steady-state.
6. Same as Note 5, except mounted on 15mm x 15mm 1oz copper.
7. Thermal resistance from junction to solder-point (at the end of the collector lead).
8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

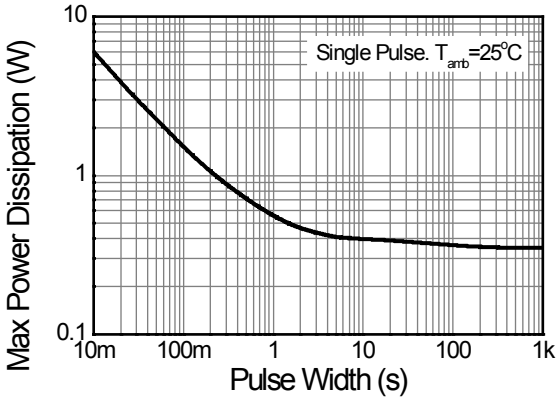
## Thermal Characteristics and Derating Information




**Derating Curve**




**Transient Thermal Impedance**



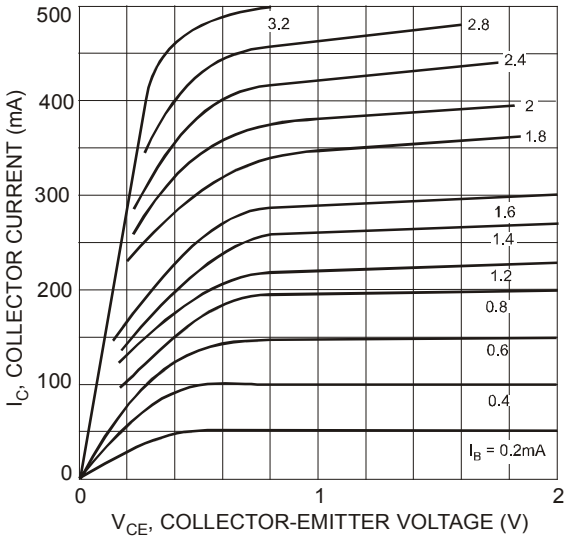

**Pulse Power Dissipation**

## Electrical Characteristics (@ $T_A$ = +25°C, unless otherwise specified.)

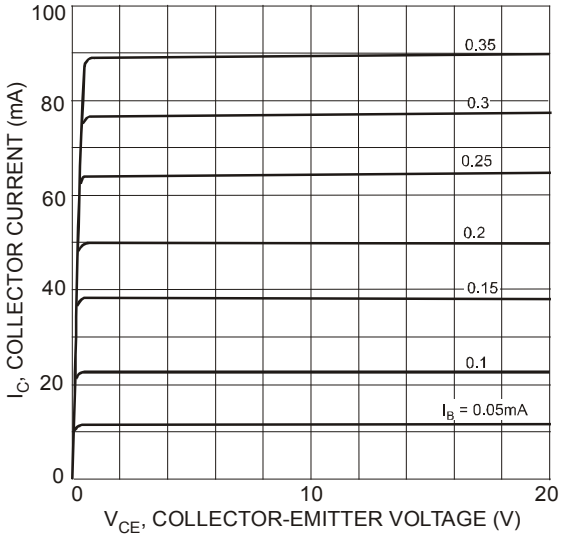
| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | | $BV_{CBO}$ | 50 | — | — | V | $I_C$ = 100µA |
| Collector-Emitter Breakdown Voltage (Note 9) | | $BV_{CEO}$ | 45 | — | — | V | $I_C$ = 10mA |
| Emitter-Base Breakdown Voltage | | $BV_{EBO}$ | 5 | — | — | V | $I_C$ = 100µA |
| Collector-Emitter Cut-Off Current | | $I_{CES}$ | — | — | 100<br>5.0 | nA<br>µA | $V_{CE}$ = 45V<br>$V_{CE}$ = 25V, $T_J$ = +150°C |
| Emitter-Base Cut-Off Current | | $I_{EBO}$ | — | — | 100 | nA | $V_{EB}$ = 5.0V |
| DC Current Gain (Note 9) | BC817-16Q<br>BC817-25Q<br>BC817-40Q | $h_{FE}$ | 100<br>160<br>250 | — | 250<br>400<br>600 | — | $V_{CE}$ = 1.0V, $I_C$ = 100mA |
| | BC817-16Q<br>BC817-25Q<br>BC817-40Q | | 60<br>100<br>170 | | — | | $V_{CE}$ = 1.0V, $I_C$ = 300mA |
| Collector-Emitter Saturation Voltage (Note 9) | | $V_{CE(sat)}$ | — | — | 0.7 | V | $I_C$ = 500mA, $I_B$ = 50mA |
| Base-Emitter Voltage (Note 9) | | $V_{BE}$ | — | — | 1.2 | V | $V_{CE}$ = 1.0V, $I_C$ = 300mA |
| Transition frequency | | $f_T$ | 100 | — | — | MHz | $V_{CE}$ = 5.0V, $I_C$ = 10mA, f = 50MHz |
| Collector-Base Capacitance | | $C_{CBO}$ | — | — | 12 | pF | $V_{CB}$ = 10V, f = 1.0MHz |

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

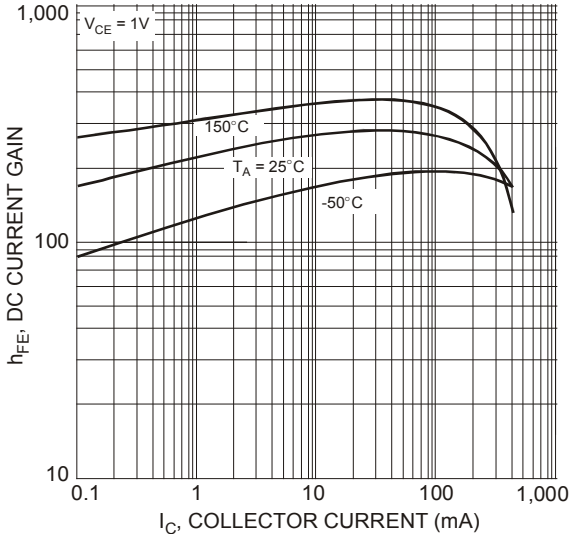
## Typical Electrical Characteristics (@ $T_A$ = +25°C, unless otherwise specified.)



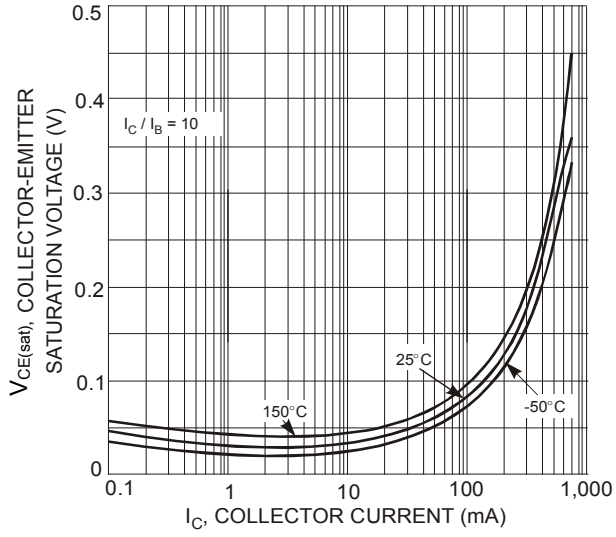

**$I_C$ v $V_{CE}$**



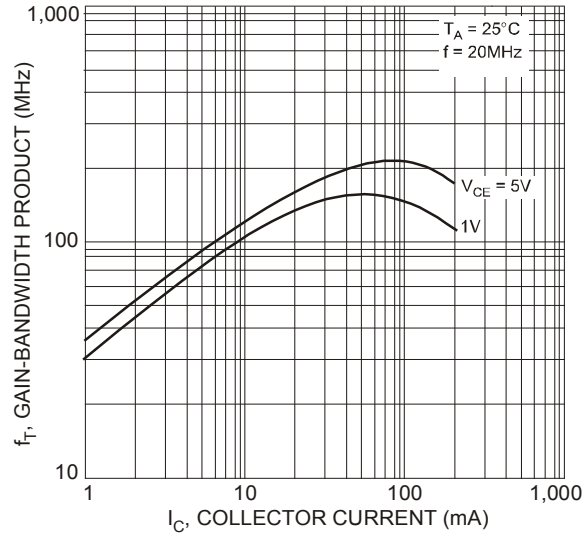

**$I_C$ v $V_{CE}$**




**$h_{FE}$ v $I_C$**




**$V_{CE(sat)}$ v $I_C$**

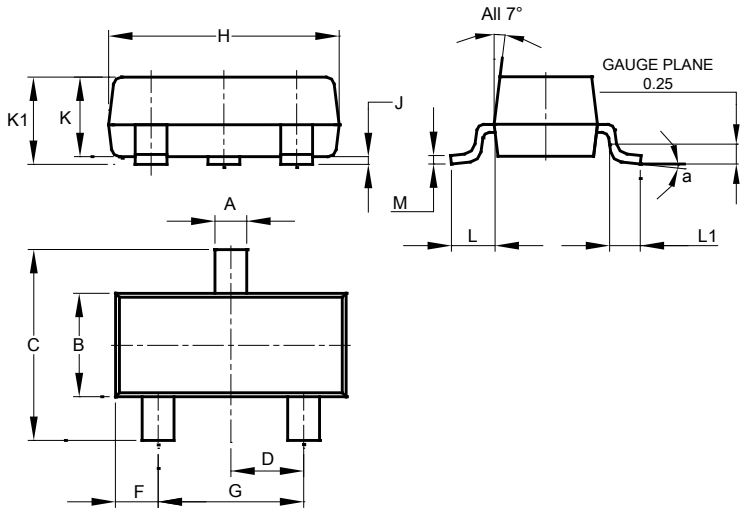



**$f_T$ v $I_C$**

## Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

**SOT23**

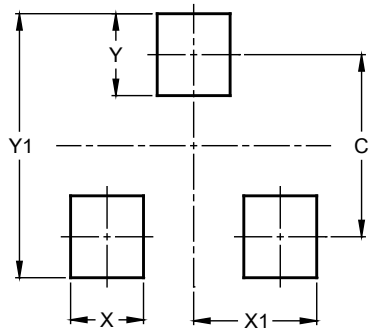



| SOT23 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.37 | 0.51 | 0.40 |
| **B** | 1.20 | 1.40 | 1.30 |
| **C** | 2.30 | 2.50 | 2.40 |
| **D** | 0.89 | 1.03 | 0.915 |
| **F** | 0.45 | 0.60 | 0.535 |
| **G** | 1.78 | 2.05 | 1.83 |
| **H** | 2.80 | 3.00 | 2.90 |
| **J** | 0.013 | 0.10 | 0.05 |
| **K** | 0.890 | 1.00 | 0.975 |
| **K1** | 0.903 | 1.10 | 1.025 |
| **L** | 0.45 | 0.61 | 0.55 |
| **L1** | 0.25 | 0.55 | 0.40 |
| **M** | 0.085 | 0.150 | 0.110 |
| **a** | 0° | 8° | -- |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

**SOT23**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 2.0 |
| **X** | 0.8 |
| **X1** | 1.35 |
| **Y** | 0.9 |
| **Y1** | 2.9 |

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