# DUAL NPN SMALL SIGNAL SURFACE MOUNT TRANSISTOR

## Features

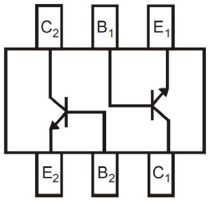
- Ultra-Small Surface Mount Package
- Ideally Suited for Automated Insertion
- For switching and AF Amplifier Application
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

## Mechanical Data

- Case: SOT363
- 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 Finish. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.006 grams (approximate)

SOT363

Top View



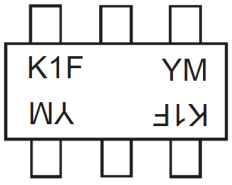

Device Schematic
Top View

## Ordering Information (Notes 4 & 5)

| Part Number | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|---|
| BC847BS-7-F | AEC-Q101 | K1F | 7 | 8 | 3,000 |
| BC847BSQ-7-F | Automotive | K1F | 7 | 8 | 3,000 |
| BC847BS-13-F | AEC-Q101 | K1F | 13 | 8 | 10,000 |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
5. For packaging details, go to our website at http://www.diodes.com.

## Marking Information




K1F = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: Y = 2011)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|
| Code | X | Y | Z | A | B | C | D | E |

| 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 |

## 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 | $V_{EBO}$ | 6 | V |
| Collector Current | $I_C$ | 100 | mA |
| Peak Collector Current | $I_{CM}$ | 200 | mA |
| Peak Base Current | $I_{BM}$ | 200 | mA |

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

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Note 6) | $P_D$ | 200 | mW |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 625 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -65 to +150 | °C |

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

| Characteristic (Note 7) | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | 50 | — | — | V | $I_C$ = 100μA, $I_B$ = 0 |
| Collector-Emitter Breakdown Voltage | $BV_{CEO}$ | 45 | — | — | V | $I_C$ = 10mA, $I_B$ = 0 |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | 6 | — | — | V | $I_E$ = 100μA, $I_C$ = 0 |
| DC Current Gain | $h_{FE}$ | 200 | — | 450 | — | $V_{CE}$ = 5.0V, $I_C$ = 2.0mA |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | — | 100<br>400 | mV | $I_C$ = 10mA, $I_B$ = 0.5mA<br>$I_C$ = 100mA, $I_B$ = 5.0mA |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | — | 755 | — | mV | $I_C$ = 10mA, $I_B$ = 0.5mA |
| Base-Emitter Voltage | $V_{BE(on)}$ | 580 | 665 | 700 | mV | $V_{CE}$ = 5.0V, $I_C$ = 2.0mA |
| Collector-Cutoff Current | $I_{CBO}$ | —<br>— | —<br>— | 20<br>5.0 | nA<br>μA | $V_{CB}$ = 40V<br>$V_{CB}$ = 40V, $T_A$ = +125°C |
| Emitter-Cutoff Current | $I_{EBO}$ | — | — | 100 | nA | $V_{EB}$ = 5.0V, $I_C$ = 0 |
| Gain Bandwidth Product | $f_T$ | 100 | — | — | MHz | $V_{CE}$ = 5.0V, $I_C$ = 10mA, f = 100MHz |
| Collector-Base Capacitance | $C_{CBO}$ | — | 2.0 | 3.0 | pF | $V_{CB}$ = 10V, f = 1.0MHz |
| Emitter-Base Capacitance | $C_{EBO}$ | — | 11 | — | pF | $V_{EB}$ = 0.5V, f = 1.0MHz |

Notes: 6. For the device mounted on minimum recommended pad layout FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
7. Short duration pulse test used to minimize self-heating effect.

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

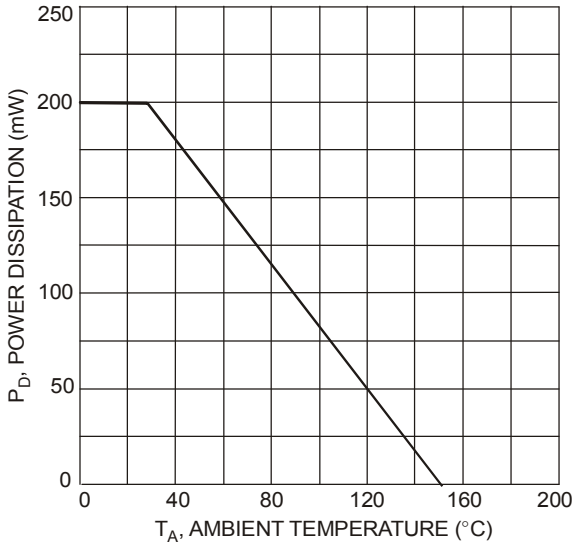



Figure 1 Power Derating Curve

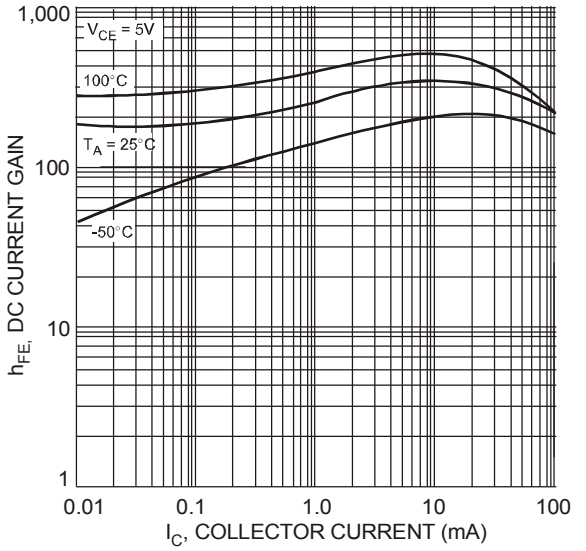



Figure 2 Typical DC Current Gain vs. Collector Current

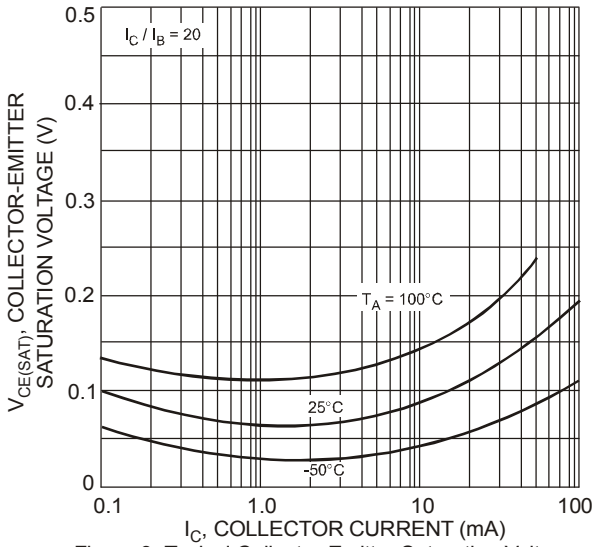



Figure 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

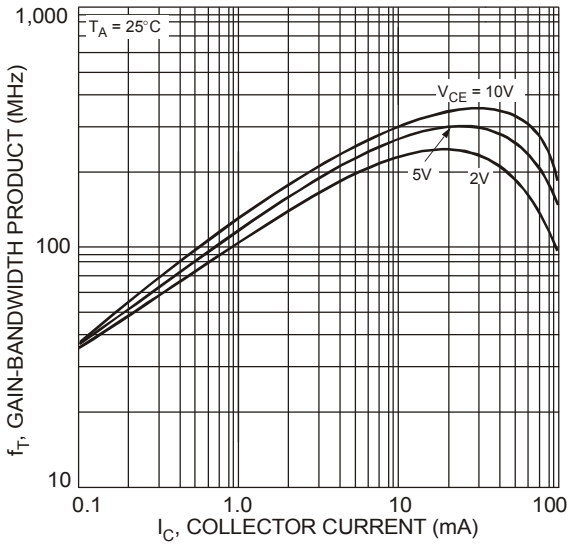
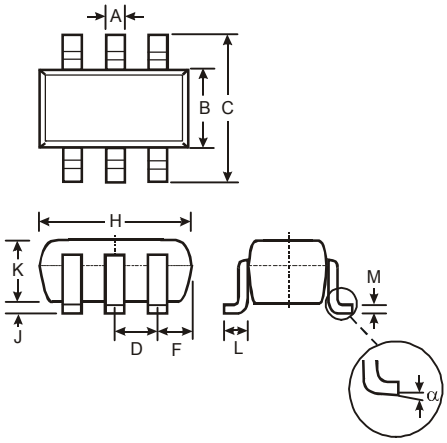



Figure 4 Typical Gain-Bandwidth Product vs. Collector Current

## Package Outline Dimensions

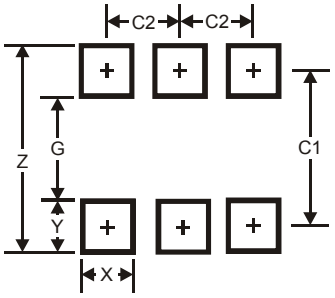
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| SOT363 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.10 | 0.30 | 0.25 |
| **B** | 1.15 | 1.35 | 1.30 |
| **C** | 2.00 | 2.20 | 2.10 |
| **D** | 0.65 Typ | | |
| **F** | 0.40 | 0.45 | 0.425 |
| **H** | 1.80 | 2.20 | 2.15 |
| **J** | 0 | 0.10 | 0.05 |
| **K** | 0.90 | 1.00 | 1.00 |
| **L** | 0.25 | 0.40 | 0.30 |
| **M** | 0.10 | 0.22 | 0.11 |
| **α** | 0° | 8° | - |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.




| Dimensions | Value (in mm) |
|---|---|
| **Z** | 2.5 |
| **G** | 1.3 |
| **X** | 0.42 |
| **Y** | 0.6 |
| **C1** | 1.9 |
| **C2** | 0.65 |

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