

**COMPLEMENTARY PAIR SMALL SIGNAL SURFACE MOUNT TRANSISTOR**
**Features**

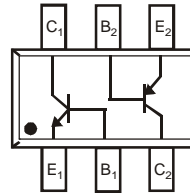
- Epitaxial Die Construction
- Two Internally Isolated NPN/PNP Transistors in one package
- Ultra-Small Surface Mount Package
- **Lead Free/RoHS Compliant (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **"Green" Device (Notes 3 and 4)**

**Mechanical Data**

- Case: SOT-363
- Case Material: Molded Plastic, "Green" Molding Compound, Note 4. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating) Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.006 grams (approximate)



Top View



Device Schematic

**Maximum Ratings, NPN Section** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic            | Symbol    | Value | Unit |
|---------------------------|-----------|-------|------|
| Collector-Base Voltage    | $V_{CBO}$ | 50    | V    |
| Collector-Emitter Voltage | $V_{CEO}$ | 45    | V    |
| Emitter-Base Voltage      | $V_{EBO}$ | 6.0   | V    |
| Collector Current         | $I_C$     | 100   | mA   |
| Peak Collector Current    | $I_{CM}$  | 200   | mA   |
| Peak Emitter Current      | $I_{EM}$  | 200   | mA   |

**Maximum Ratings, PNP Section** @ $T_A = 25^\circ\text{C}$  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         | $I_C$     | -100  | mA   |
| Peak Collector Current    | $I_{CM}$  | -200  | mA   |
| Peak Emitter Current      | $I_{EM}$  | -200  | mA   |

**Thermal Characteristics**

| Characteristic  | Symbol          | Value       | Unit               |
|---|-----------------|-------------|--------------------|
| Power Dissipation (Note 1) @ $T_A = 25^\circ\text{C}$ Total Device          | $P_D$           | 200         | mW                 |
| Thermal Resistance, Junction to Ambient (Note 1) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 625         | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range                                     | $T_J, T_{STG}$  | -65 to +150 | $^\circ\text{C}$   |

- Notes:
1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
  2. No purposefully added lead.
  3. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  4. Product manufactured with Date Code UO (week 40, 2007) and newer are built with Green Molding Compound. Product manufactured prior to Date Code UO are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants

**Electrical Characteristics, NPN Section** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                                | Symbol                 | Min | Typ        | Max        | Unit                | Test Condition  |
|---|------------------------|-----|------------|------------|---------------------|---|
| Collector-Base Breakdown Voltage (Note 5)     | $V_{(BR)CBO}$          | 50  | —          | —          | V                   | $I_C = 10\mu\text{A}, I_B = 0$  |
| Collector-Emitter Breakdown Voltage (Note 5)  | $V_{(BR)CEO}$          | 45  | —          | —          | V                   | $I_C = 10\text{mA}, I_B = 0$  |
| Emitter-Base Breakdown Voltage (Note 5)       | $V_{(BR)EBO}$          | 6   | —          | —          | V                   | $I_E = 1\mu\text{A}, I_C = 0$   |
| DC Current Gain (Note 5)                      | $h_{FE}$               | 200 | 290        | 450        | —                   | $V_{CE} = 5.0\text{V}, I_C = 2.0\text{mA}$  |
| Collector-Emitter Saturation Voltage (Note 5) | $V_{CE(SAT)}$          | —   | 90<br>200  | 250<br>600 | mV                  | $I_C = 10\text{mA}, I_B = 0.5\text{mA}$<br>$I_C = 100\text{mA}, I_B = 5.0\text{mA}$                                   |
| Base-Emitter Saturation Voltage (Note 5)      | $V_{BE(SAT)}$          | —   | 700<br>900 | —          | mV                  | $I_C = 10\text{mA}, I_B = 0.5\text{mA}$<br>$I_C = 100\text{mA}, I_B = 5.0\text{mA}$                                   |
| Base-Emitter Voltage (Note 5)                 | $V_{BE(ON)}$           | 580 | 660        | 700<br>720 | mV                  | $V_{CE} = 5.0\text{V}, I_C = 2.0\text{mA}$<br>$V_{CE} = 5.0\text{V}, I_C = 10\text{mA}$                               |
| Collector-Cutoff Current (Note 5)             | $I_{CBO}$<br>$I_{CBO}$ | —   | —          | 15<br>5.0  | nA<br>$\mu\text{A}$ | $V_{CB} = 30\text{V}$<br>$V_{CB} = 30\text{V}, T_A = 150^\circ\text{C}$   |
| Gain Bandwidth Product                        | $f_T$                  | 100 | 300        | —          | MHz                 | $V_{CE} = 5.0\text{V}, I_C = 10\text{mA}, f = 100\text{MHz}$  |
| Collector-Base Capacitance                    | $C_{CBO}$              | —   | 3.5        | 6.0        | pF                  | $V_{CB} = 5.0\text{V}, f = 1.0\text{MHz}$   |
| Noise Figure                                  | NF                     | —   | 2.0        | 10         | dB                  | $V_{CE} = 5\text{V}, I_C = 200\mu\text{A}, R_G = 2.0\text{k}\Omega$ ,<br>$f = 1.0\text{kHz}, \Delta f = 200\text{Hz}$ |

**Electrical Characteristics, PNP Section** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                                | Symbol                 | Min  | Typ          | Max          | Unit                | Test Condition  |
|---|------------------------|------|--------------|--------------|---------------------|---|
| Collector-Base Breakdown Voltage (Note 5)     | $V_{(BR)CBO}$          | -50  | —            | —            | V                   | $I_C = -10\mu\text{A}, I_B = 0$   |
| Collector-Emitter Breakdown Voltage (Note 5)  | $V_{(BR)CEO}$          | -45  | —            | —            | V                   | $I_C = -10\text{mA}, I_B = 0$   |
| Emitter-Base Breakdown Voltage (Note 5)       | $V_{(BR)EBO}$          | -5   | —            | —            | V                   | $I_E = -1\mu\text{A}, I_C = 0$  |
| DC Current Gain (Note 5)                      | $h_{FE}$               | 220  | 290          | 475          | —                   | $V_{CE} = -5.0\text{V}, I_C = -2.0\text{mA}$  |
| Collector-Emitter Saturation Voltage (Note 5) | $V_{CE(SAT)}$          | —    | -75<br>-250  | -300<br>-650 | mV                  | $I_C = -10\text{mA}, I_B = -0.5\text{mA}$<br>$I_C = -100\text{mA}, I_B = -5.0\text{mA}$                                 |
| Base-Emitter Saturation Voltage (Note 5)      | $V_{BE(SAT)}$          | —    | -700<br>-850 | —            | mV                  | $I_C = -10\text{mA}, I_B = -0.5\text{mA}$<br>$I_C = -100\text{mA}, I_B = -5.0\text{mA}$                                 |
| Base-Emitter Voltage (Note 5)                 | $V_{BE(ON)}$           | -600 | -650         | -750<br>-820 | mV                  | $V_{CE} = -5.0\text{V}, I_C = -2.0\text{mA}$<br>$V_{CE} = -5.0\text{V}, I_C = -10\text{mA}$                             |
| Collector-Cutoff Current (Note 5)             | $I_{CBO}$<br>$I_{CBO}$ | —    | —            | -15<br>-4.0  | nA<br>$\mu\text{A}$ | $V_{CB} = -30\text{V}$<br>$V_{CB} = -30\text{V}, T_A = 150^\circ\text{C}$   |
| Gain Bandwidth Product                        | $f_T$                  | 100  | 200          | —            | MHz                 | $V_{CE} = -5.0\text{V}, I_C = -10\text{mA}, f = 100\text{MHz}$  |
| Collector-Base Capacitance                    | $C_{CBO}$              | —    | 3            | 4.5          | pF                  | $V_{CB} = -10\text{V}, f = 1.0\text{MHz}$   |
| Noise Figure                                  | NF                     | —    | —            | 10           | dB                  | $V_{CE} = -5\text{V}, I_C = -200\mu\text{A}, R_G = 2.0\text{k}\Omega$ ,<br>$f = 1.0\text{kHz}, \Delta f = 200\text{Hz}$ |

Notes: 5. Short duration pulse test used to minimize self-heating effect.

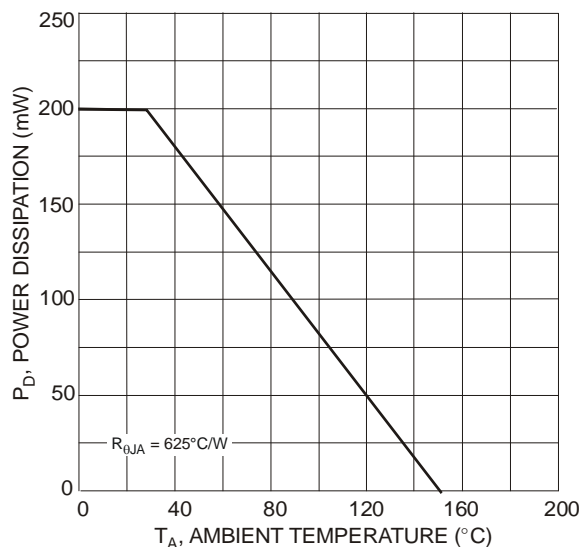


Fig. 1 Power Dissipation vs. Ambient Temperature (Total Device, Note 1)

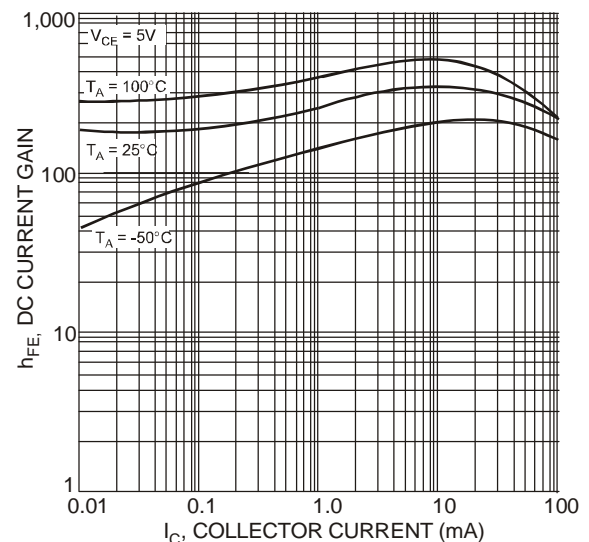


Fig. 2 Typical DC Current Gain vs. Collector Current (NPN)

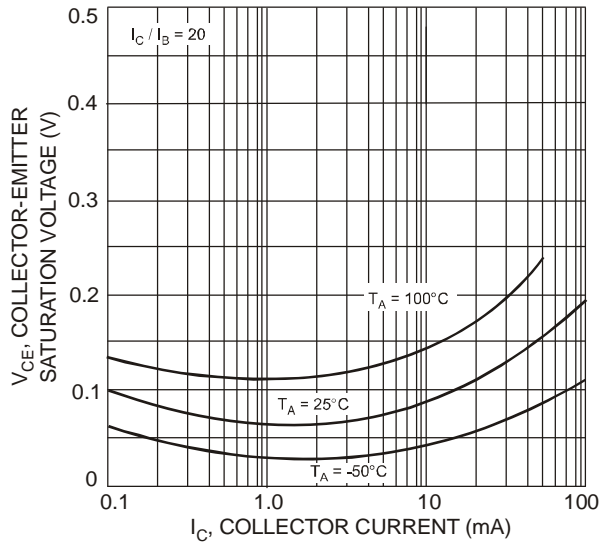


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current (NPN)

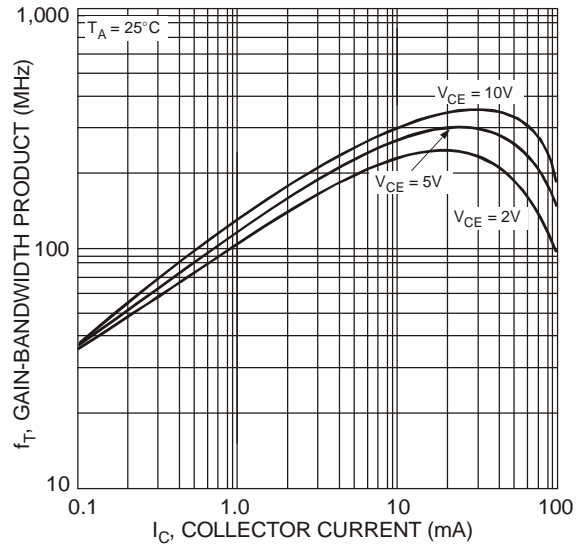


Fig. 4 Typical Gain-Bandwidth Product vs. Collector Current (NPN)

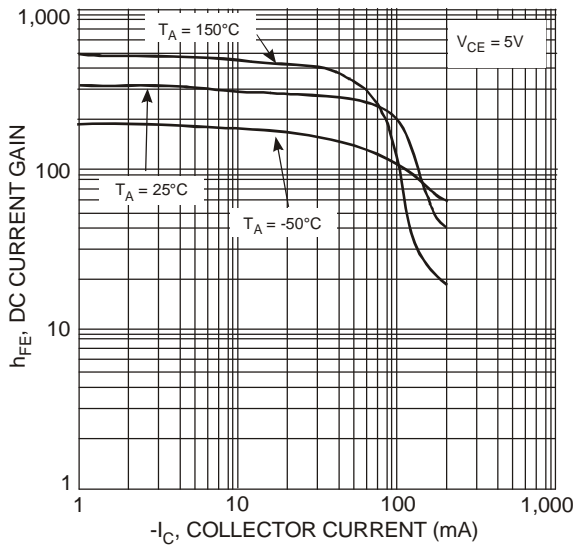


Fig. 5 Typical DC Current Gain vs. Collector Current (PNP)

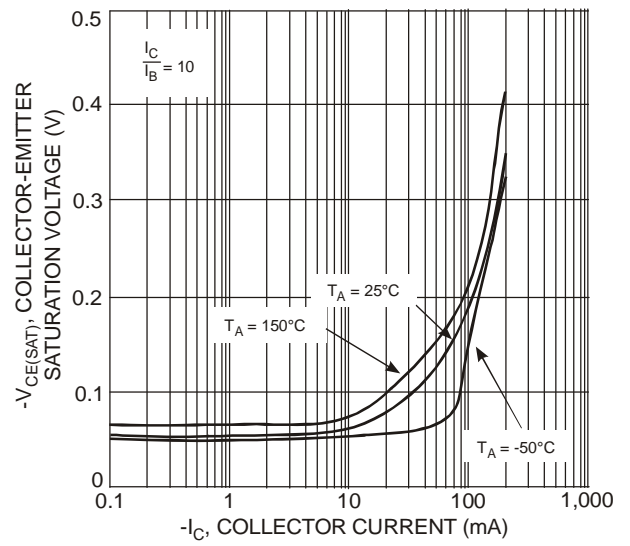


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current (PNP)

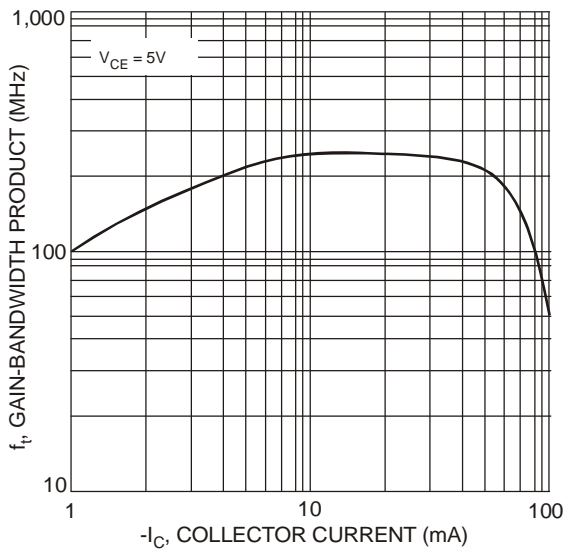
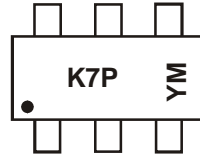


Fig. 7 Typical Gain-Bandwidth Product vs. Collector Current (PNP)

**Ordering Information** (Note 6)

| Part Number | Case    | Packaging        |
|-------------|---------|------------------|
| BC847PN-7-F | SOT-363 | 3000/Tape & Reel |

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**


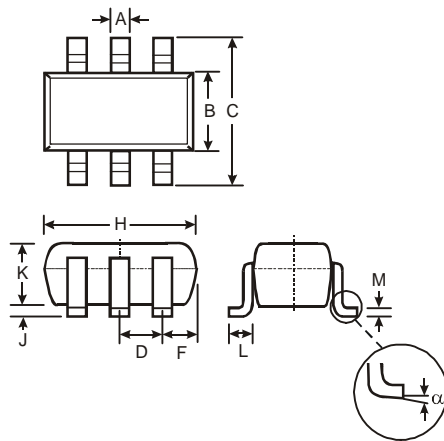
K7P = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: T = 2006)  
 M = Month (ex: 9 = September)

**Date Code Key**

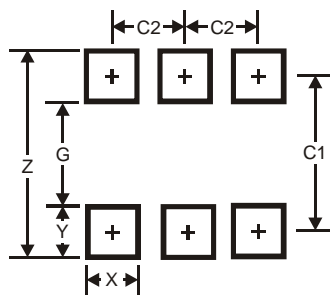
| Year | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | M    | N    | P    | R    | S    | T    | U    | V    | W    | X    | Y    | Z    | A    | B    | C    |

| 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   |

**Package Outline Dimensions**


| SOT-363              |          |      |
|----------------------|----------|------|
| Dim                  | Min      | Max  |
| A                    | 0.10     | 0.30 |
| B                    | 1.15     | 1.35 |
| C                    | 2.00     | 2.20 |
| D                    | 0.65 Typ |      |
| F                    | 0.40     | 0.45 |
| H                    | 1.80     | 2.20 |
| J                    | 0        | 0.10 |
| K                    | 0.90     | 1.00 |
| L                    | 0.25     | 0.40 |
| M                    | 0.10     | 0.22 |
| $\alpha$             | 0°       | 8°   |
| All Dimensions in mm |          |      |

**Suggested Pad Layout**


| 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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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.