

# DDTA (R1 = R2 SERIES) E

## PNP PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR

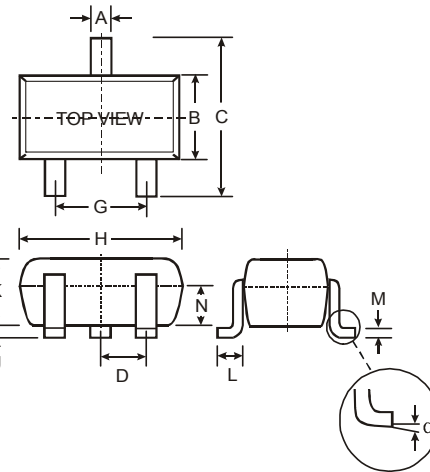
NEW PRODUCT

### Features

- Epitaxial Planar Die Construction
- Complementary NPN Types Available (DDTC)
- Built-In Biasing Resistors, R1 = R2
- **Lead Free/RoHS Compliant (Note 2)**
- **"Green" Device (Note 3 and 4)**

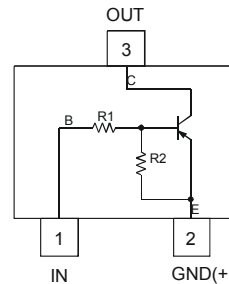
### Mechanical Data

- Case: SOT-523
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Finish - Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Marking & Date Code Information: See Table Below & Page 4
- Ordering Information: See Page 4
- Weight: 0.002 grams (approximate)

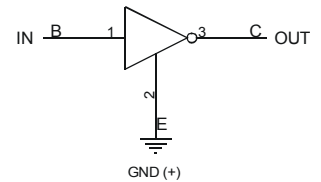


| SOT-523              |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.15 | 0.30 | 0.22 |
| B                    | 0.75 | 0.85 | 0.80 |
| C                    | 1.45 | 1.75 | 1.60 |
| D                    | —    | —    | 0.50 |
| G                    | 0.90 | 1.10 | 1.00 |
| H                    | 1.50 | 1.70 | 1.60 |
| J                    | 0.00 | 0.10 | 0.05 |
| K                    | 0.60 | 0.80 | 0.75 |
| L                    | 0.10 | 0.30 | 0.22 |
| M                    | 0.10 | 0.20 | 0.12 |
| N                    | 0.45 | 0.65 | 0.50 |
| $\alpha$             | 0°   | 8°   | —    |
| All Dimensions in mm |      |      |      |

| P/N       | R1, R2 (NOM)  | Marking |
|-----------|---------------|---------|
| DDTA123EE | 2.2K $\Omega$ | P04     |
| DDTA143EE | 4.7K $\Omega$ | P08     |
| DDTA114EE | 10K $\Omega$  | P13     |
| DDTA124EE | 22K $\Omega$  | P17     |
| DDTA144EE | 47K $\Omega$  | P20     |
| DDTA115EE | 100K $\Omega$ | P24     |



Schematic and Pin Configuration



Equivalent Inverter Circuit

### Maximum Ratings @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                                       | Symbol                            | Value  | Unit |
|--|-----------------------------------|--|------|
| Supply Voltage, (2) to (3)                           | V <sub>CC</sub>                   | -50  | V    |
| Input Voltage, (1) to (2)                            | V <sub>IN</sub>                   | +10 to -12<br>+10 to -30<br>+10 to -40<br>+10 to -40<br>+10 to -40<br>+10 to -40 | V    |
| Output Current                                       | I <sub>O</sub>                    | -100<br>-100<br>-50<br>-30<br>-30<br>-20   | mA   |
| Power Dissipation                                    | P <sub>d</sub>                    | 150  | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 1) | R <sub>θJA</sub>                  | 833  | °C/W |
| Operating and Storage Temperature Range              | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150  | °C   |

- Notes:
1. Mounted on FR4 PC Board with recommended pad layout 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** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                             |  | Symbol                         | Min                                    | Typ  | Max  | Unit | Test Condition  |
|--|--|--------------------------------|--|------|--|------|---|
| Input Voltage                              |  | V <sub>I(off)</sub>            | -0.5                                   | -1.1 | —  | V    | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA  |
|  |  | V <sub>I(on)</sub>             | —                                      | -1.9 | -3   |      | V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA, DDTA123EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA, DDTA143EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 10mA, DDTA114EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA, DDTA124EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA, DDTA144EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA, DDTA115EE |
| Output Voltage                             |  | V <sub>O(on)</sub>             | —                                      | -0.1 | -0.3   | V    | I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTA123EE<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTA143EE<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTA114EE<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTA124EE<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTA144EE<br>I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA, DDTA115EE    |
| Input Current                              | DDTA123EE<br>DDTA143EE<br>DDTA114EE<br>DDTA124EE<br>DDTA144EE<br>DDTA115EE | I <sub>I</sub>                 | —                                      | —    | -3.8<br>-1.8<br>-0.88<br>-0.36<br>-0.18<br>-0.15 | mA   | V <sub>I</sub> = -5V  |
| Output Current                             |  | I <sub>O(off)</sub>            | —                                      | —    | 0.5  | μA   | V <sub>CC</sub> = -50V, V <sub>I</sub> = 0V   |
| DC Current Gain                            | DDTA123EE<br>DDTA143EE<br>DDTA114EE<br>DDTA124EE<br>DDTA144EE<br>DDTA115EE | G <sub>I</sub>                 | -20<br>-20<br>-30<br>-56<br>-68<br>-82 | —    | —  | —    | V <sub>O</sub> = -5V, I <sub>O</sub> = -20mA<br>V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA<br>V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA<br>V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA<br>V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA<br>V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA  |
| Input Resistor (R <sub>1</sub> ) Tolerance |  | ΔR <sub>1</sub>                | -30                                    | —    | +30  | %    | —   |
| Resistance Ratio                           |  | R <sub>2</sub> /R <sub>1</sub> | 0.8                                    | 1    | 1.2  | —    | —   |
| Gain-Bandwidth Product*                    |  | f <sub>T</sub>                 | —                                      | 250  | —  | MHz  | V <sub>CE</sub> = -10V, I <sub>E</sub> = 5mA,<br>f = 100MHz   |

\* Transistor – For Reference Only

**TYPICAL CURVES – DDTA143E**

**NEW PRODUCT**

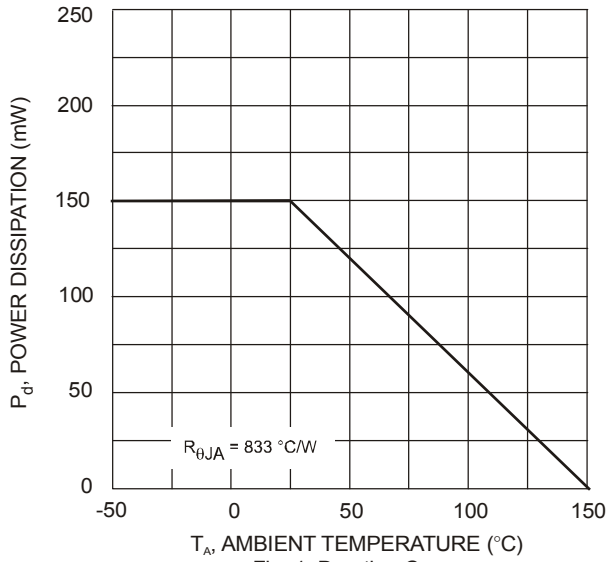


Fig. 1 Derating Curve

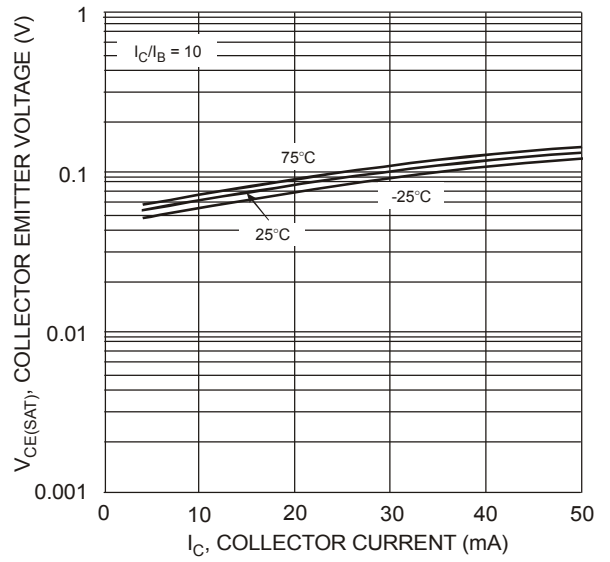


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

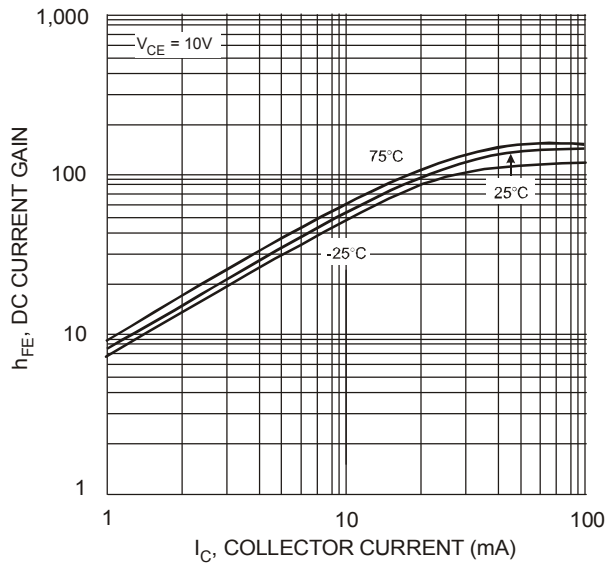


Fig. 3 DC Current Gain

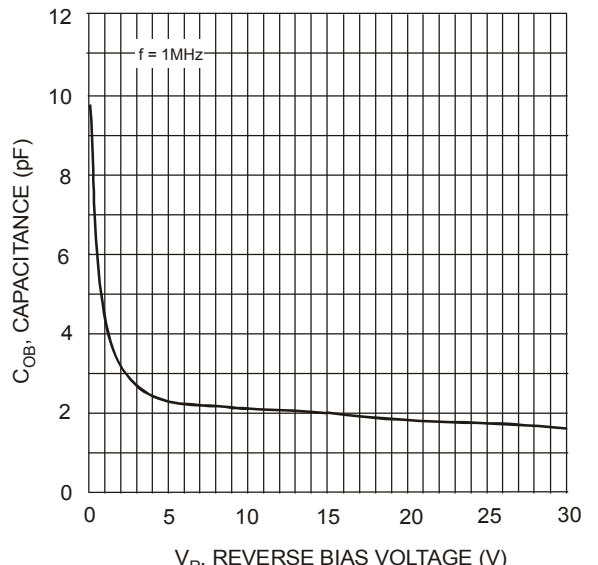


Fig. 4 Output Capacitance

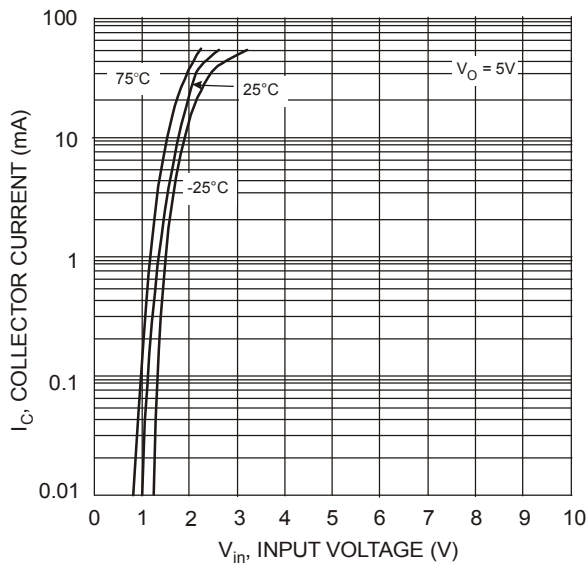


Fig. 5 Collector Current vs. Input Voltage

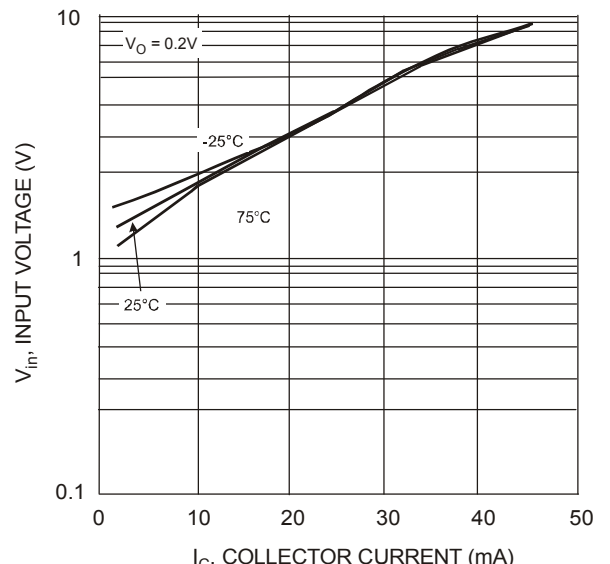


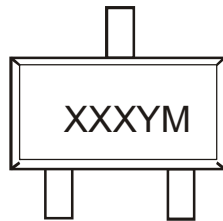
Fig. 6 Input Voltage vs. Collector Current

## Ordering Information (Note 5)

| Device        | Packaging | Shipping         |
|---------------|-----------|------------------|
| DDTA123EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTA143EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTA114EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTA124EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTA144EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTA115EE-7-F | SOT-523   | 3000/Tape & Reel |

Notes: 5. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Marking Information



XXX = Product Type Marking Code (See Page 1, e.g. P04 = DDTA123EE)  
 YM = Date Code Marking  
 Y = Year ex: T = 2006  
 M = Month ex: 9 = September

### Date Code Key

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|
| Code | S    | T    | U    | V    | W    | X    | Y    | Z    |

| 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   |

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