

# DDTC (R1 = R2 SERIES) UA

NPN PRE-BIASED SMALL SIGNAL SOT-323  
SURFACE MOUNT TRANSISTOR

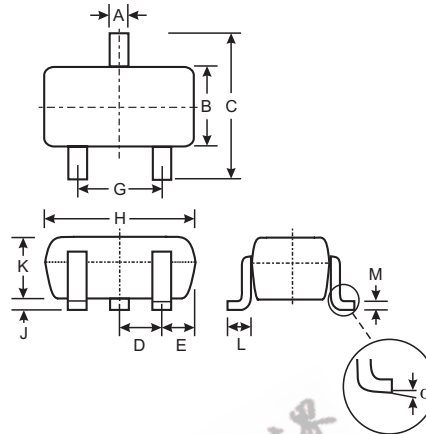
## Features

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

## Mechanical Data

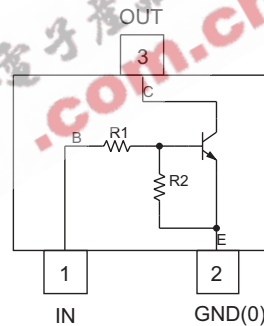
- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound, Note 4. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Diagram
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Marking: Date Code and Type Code, See Page 2
- Ordering Information (See Page 2)
- Type Code: See Table Below
- Weight: 0.006 grams (approximate)

| P/N        | R1, R2 (NOM)  | Type Code |
|------------|---------------|-----------|
| DDTC123EUA | 2.2K $\Omega$ | N04       |
| DDTC143EUA | 4.7K $\Omega$ | N08       |
| DDTC114EUA | 10K $\Omega$  | N13       |
| DDTC124EUA | 22K $\Omega$  | N17       |
| DDTC144EUA | 47K $\Omega$  | N20       |
| DDTC115EUA | 100K $\Omega$ | N24       |

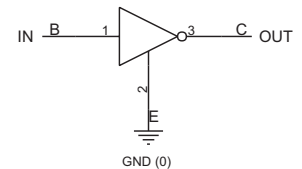


| SOT-323  |              |      |
|----------|--------------|------|
| Dim      | Min          | Max  |
| A        | 0.25         | 0.40 |
| B        | 1.15         | 1.35 |
| C        | 2.00         | 2.20 |
| D        | 0.65 Nominal |      |
| E        | 0.30         | 0.40 |
| G        | 1.20         | 1.40 |
| H        | 1.80         | 2.20 |
| J        | 0.0          | 0.10 |
| K        | 0.90         | 1.00 |
| L        | 0.25         | 0.40 |
| M        | 0.10         | 0.18 |
| $\alpha$ | 0°           | 8°   |

All Dimensions in mm



Schematic and Pin Configuration



Equivalent Inverter Circuit

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

| Characteristic                                       | Symbol                            | Value  | Unit |
|--|-----------------------------------|--|------|
| Supply Voltage, (3) to (2)                           | V <sub>CC</sub>                   | 50   | V    |
| Input Voltage, (1) to (2)                            | V <sub>IN</sub>                   | DDTC123EUA<br>-10 to +12<br>DDTC143EUA<br>-10 to +30<br>DDTC114EUA<br>-10 to +40<br>DDTC124EUA<br>-10 to +40<br>DDTC144EUA<br>-10 to +40<br>DDTC115EUA<br>-10 to +40 | V    |
| Output Current                                       | I <sub>O</sub>                    | DDTC123EUA<br>100<br>DDTC143EUA<br>100<br>DDTC114EUA<br>50<br>DDTC124EUA<br>30<br>DDTC144EUA<br>100<br>DDTC115EUA<br>20  | mA   |
| Output Current All                                   | I <sub>C</sub> (Max)              | 100  | mA   |
| Power Dissipation                                    | P <sub>d</sub>                    | 200  | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 1) | R <sub>θJA</sub>                  | 625  | °C/W |
| Operating and Storage and Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150  | °C   |

- Note:
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 0609 (week 9, 2006) and newer are built with Green Molding Compound. Product manufactured prior to date code 0609 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, DDTC123EUA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA, DDTC143EUA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 10mA, DDTC114EUA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA, DDTC124EUA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA, DDTC144EUA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA, DDTC115EUA |
| Output Voltage                             |  | V <sub>O(on)</sub>             | —                                | 0.1 | 0.3  | V    | I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC123EUA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC143EUA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC114EUA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC124EUA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC144EUA<br>I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA, DDTC115EUA    |
| Input Current                              | DDTC123EUA<br>DDTC143EUA<br>DDTC114EUA<br>DDTC124EUA<br>DDTC144EUA<br>DDTC115EUA | 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                            | DDTC123EUA<br>DDTC143EUA<br>DDTC114EUA<br>DDTC124EUA<br>DDTC144EUA<br>DDTC115EUA | 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  |

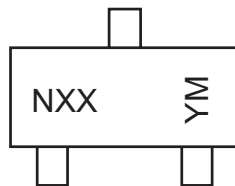
\* Transistor - For Reference Only

## Ordering Information (Note 4 & 5)

| Device         | Packaging | Shipping         |
|----------------|-----------|------------------|
| DDTC123EUA-7-F | SOT-323   | 3000/Tape & Reel |
| DDTC143EUA-7-F | SOT-323   | 3000/Tape & Reel |
| DDTC114EUA-7-F | SOT-323   | 3000/Tape & Reel |
| DDTC124EUA-7-F | SOT-323   | 3000/Tape & Reel |
| DDTC144EUA-7-F | SOT-323   | 3000/Tape & Reel |
| DDTC115EUA-7-F | SOT-323   | 3000/Tape & Reel |

- Notes: 4. Product manufactured with date code 0609 (week 9, 2006) and newer are built with Green Molding Compound. Product manufactured prior to date code 0609 are built with Non-Green Molding Compound and may contain Halogens or Sb<sub>2</sub>O<sub>3</sub> Fire Retardants.  
5. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Marking Information



NXX = Product Type Marking Code, See Table on Page 1  
YM = Date Code Marking  
Y = Year ex: T = 2006  
M = Month ex: 9 = September

### Date Code Key

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | N    | P    | R    | 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   |

**TYPICAL CURVES - DDTC143EUA**

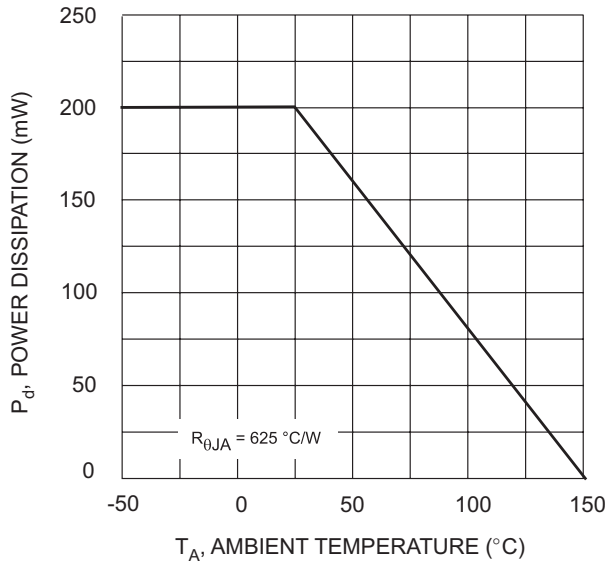


Fig. 1 Derating Curve

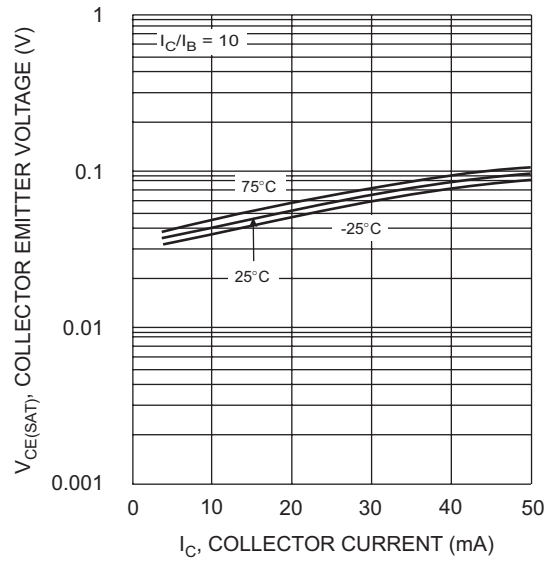


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

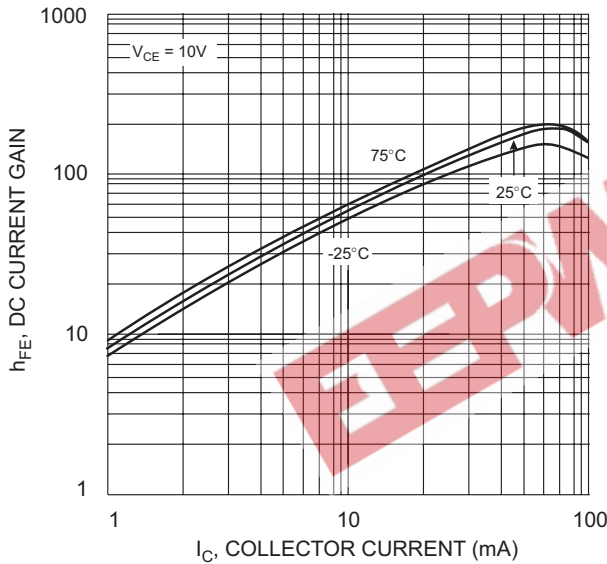


Fig. 3 DC CURRENT GAIN

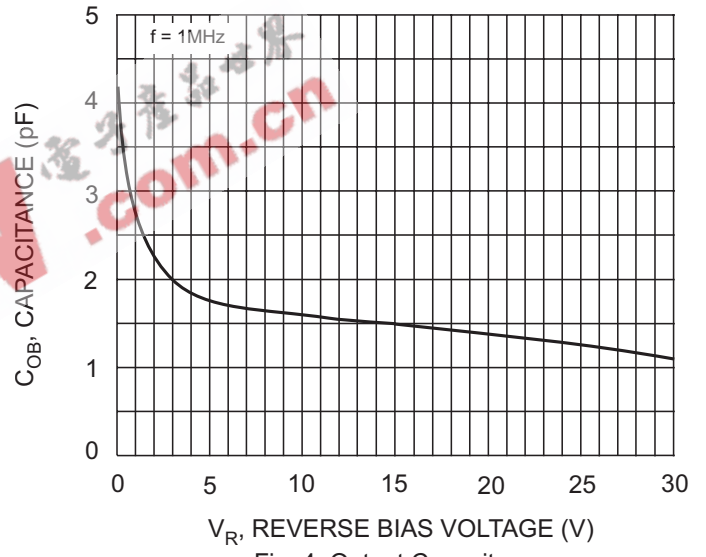


Fig. 4 Output Capacitance

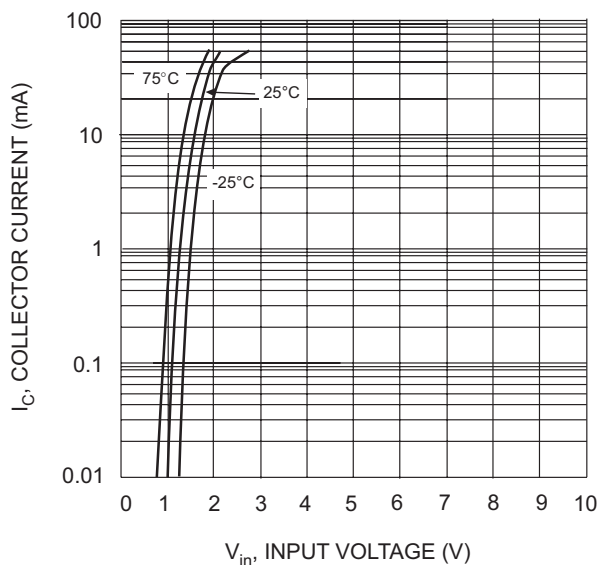


Fig. 5 Collector Current Vs. Input Voltage

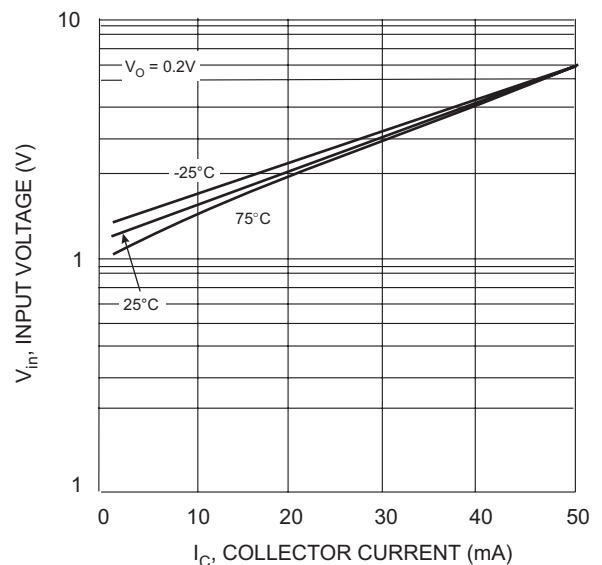


Fig. 6 Input Voltage vs. Collector Current



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