

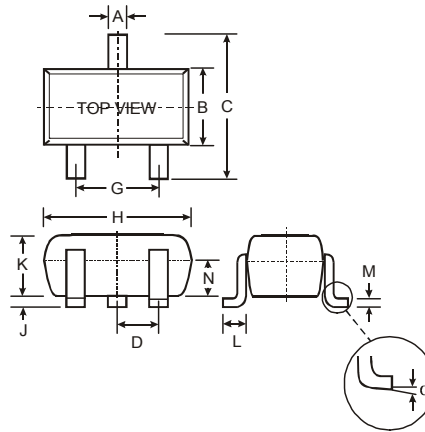
### Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1 = R2
- **Lead Free/RoHS Compliant (Note 1)**
- **"Green" Device (Note 3 and 4)**

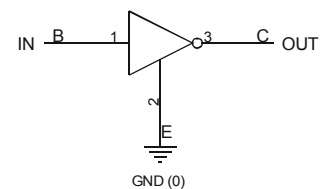
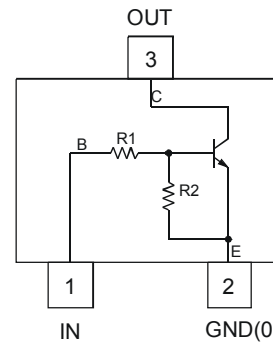
### Mechanical Data

- Case: SOT-523
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Diagram
- Terminals: Finish - Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Marking Information: See Table Below and Page 7
- Ordering Information: See Page 7
- Weight: 0.002 grams (approximate)

| P/N       | R1, RN (NOM)  | Marking |
|-----------|---------------|---------|
| DDTC123EE | 2.2K $\Omega$ | N04     |
| DDTC143EE | 4.7K $\Omega$ | N08     |
| DDTC114EE | 10K $\Omega$  | N13     |
| DDTC124EE | 22K $\Omega$  | N17     |
| DDTC144EE | 47K $\Omega$  | N20     |
| DDTC115EE | 100K $\Omega$ | N24     |



| 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 |      |      |      |



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>                   | -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>100<br>20  | mA   |
| Power Dissipation                                    | P <sub>d</sub>                    | 150  | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 2) | R <sub>θJA</sub>                  | 833  | °C/W |
| Operating and Storage Temperature Range              | T <sub>i</sub> , T <sub>STG</sub> | -55 to +150  | °C   |

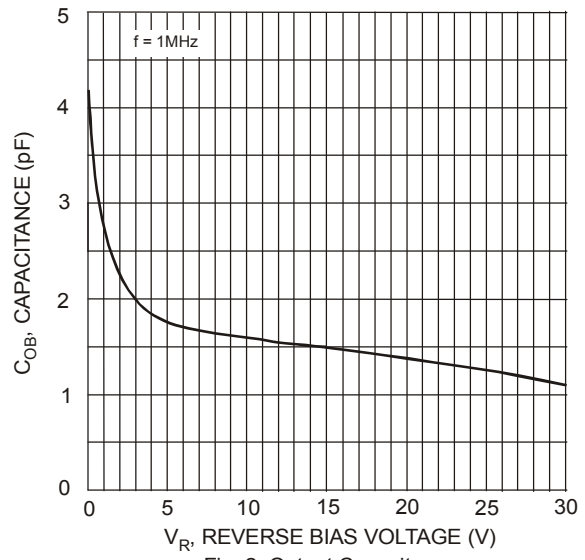
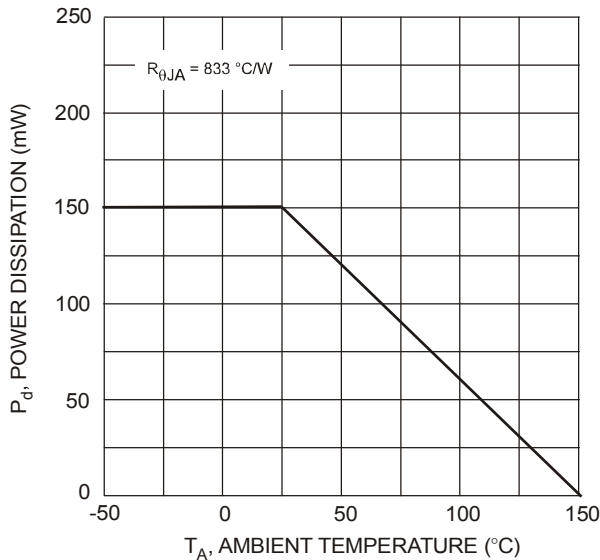
- Notes:
1. No purposefully added lead.
  2. Mounted on FR4 PC Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.
  3. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  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> = 100mA  |
|  |  | V <sub>I(on)</sub>             | —                                | 1.9 | 3  |      | V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA, DDTC123EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA, DDTC143EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 10mA, DDTC114EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA, DDTC124EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA, DDTC144EE<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA, DDTC115EE |
| Output Voltage                             |  | V <sub>O(on)</sub>             | —                                | 0.1 | 0.3  | V    | I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC123EE<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC143EE<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC114EE<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC124EE<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC144EE<br>I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA, DDTC115EE    |
| Input Current                              | DDTC123EE<br>DDTC143EE<br>DDTC114EE<br>DDTC124EE<br>DDTC144EE<br>DDTC115EE | 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                            | DDTC123EE<br>DDTC143EE<br>DDTC114EE<br>DDTC124EE<br>DDTC144EE<br>DDTC115EE | 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, f = 100MHz   |

\* Transistor – For Reference Only

## Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified



**Typical Curves – DDTC123EE**

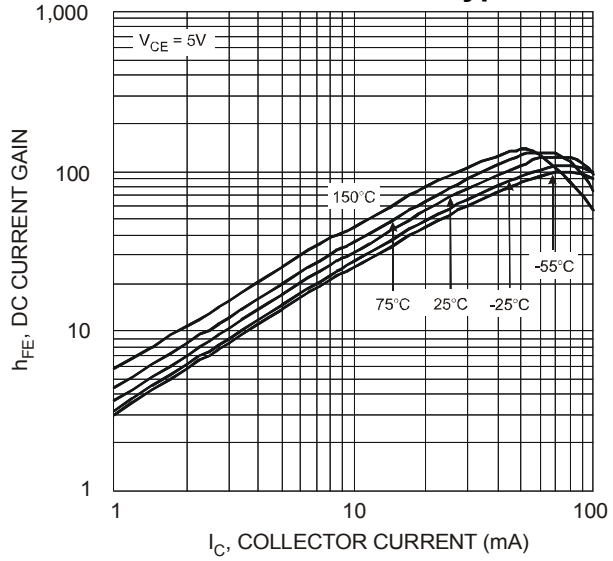


Fig. 3 Typical DC Current Gain vs. Collector Current

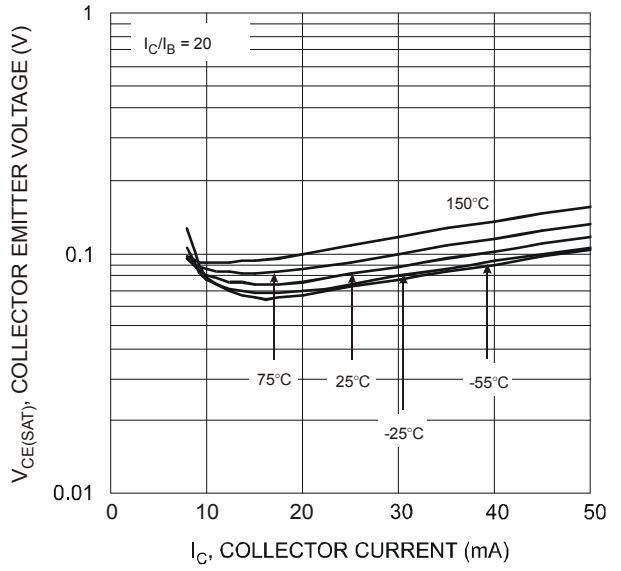


Fig. 4  $V_{CE(SAT)}$  vs.  $I_C$

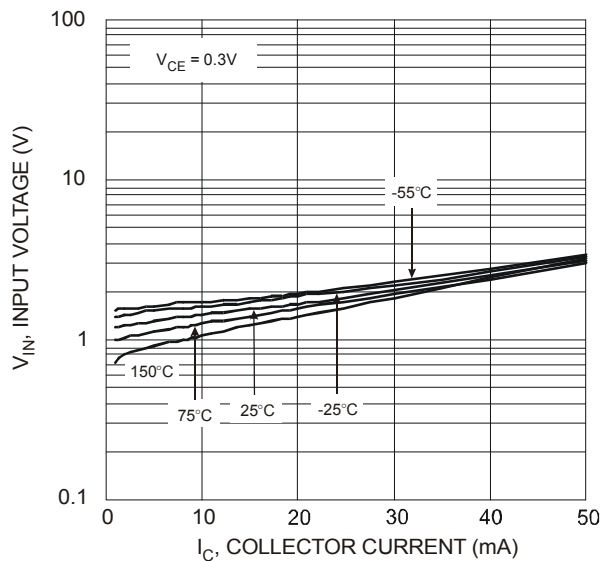


Fig. 5 Input Voltage vs. Collector Current

**Typical Curves – DDTC143EE**

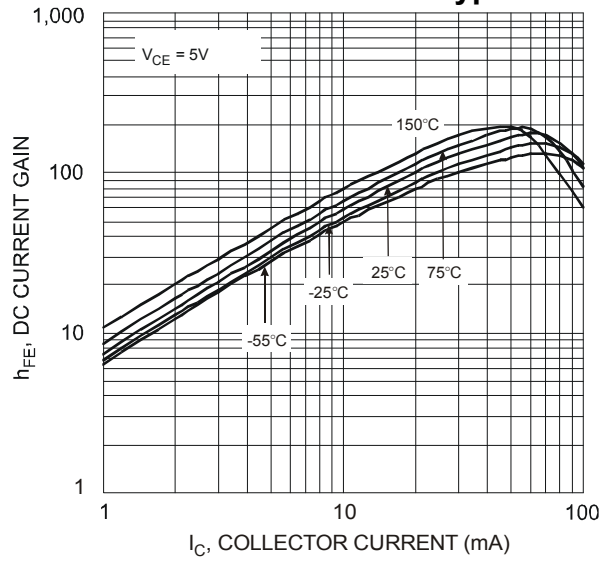


Fig. 6 Typical DC Current Gain vs. Collector Current

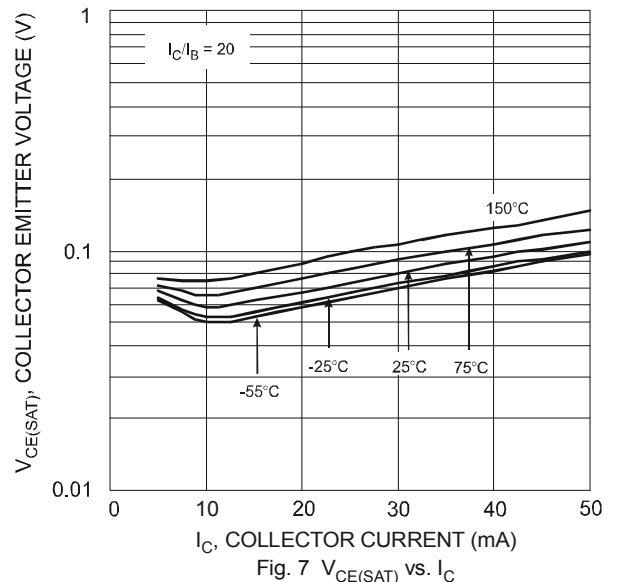


Fig. 7  $V_{CE(SAT)}$  vs.  $I_C$

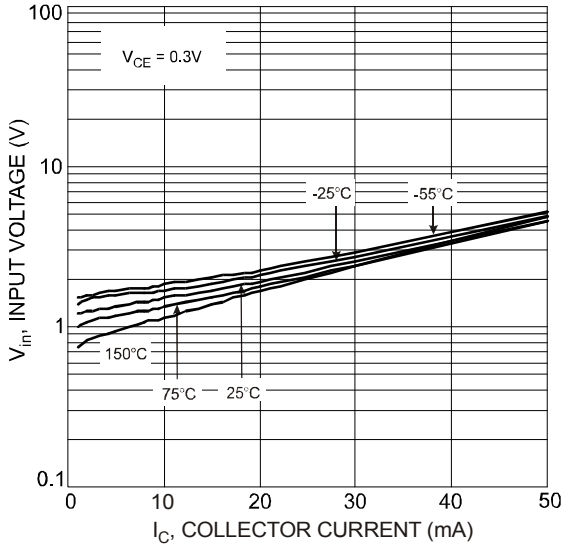


Fig. 8 Input Voltage vs. Collector Current

**Typical Curves – DDTC114EE**

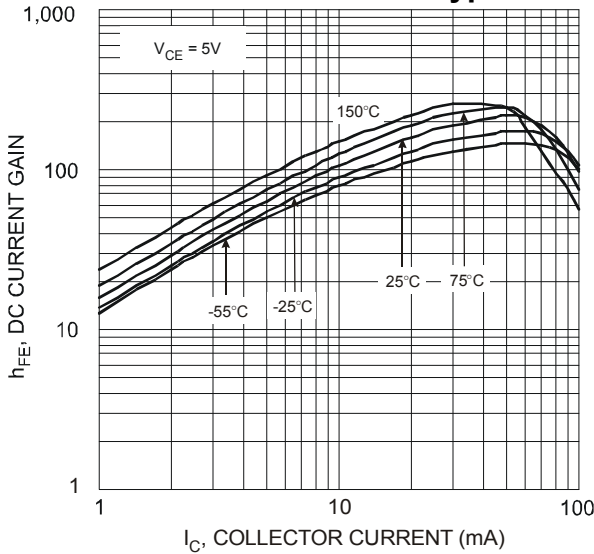


Fig. 9 Typical DC Current Gain vs. Collector Current

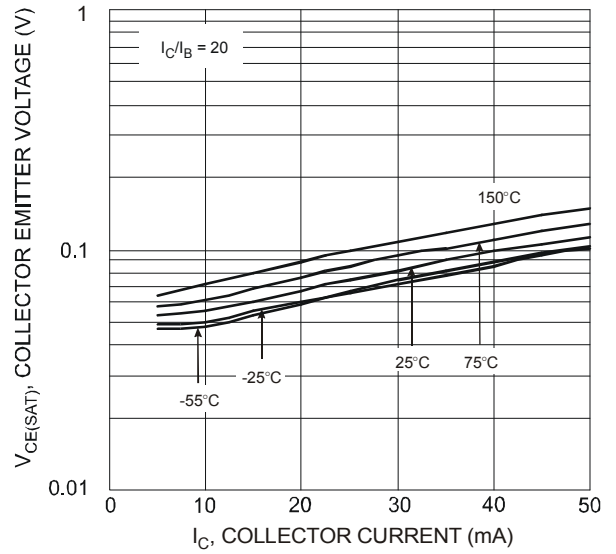


Fig. 10  $V_{CE(SAT)}$  vs.  $I_C$

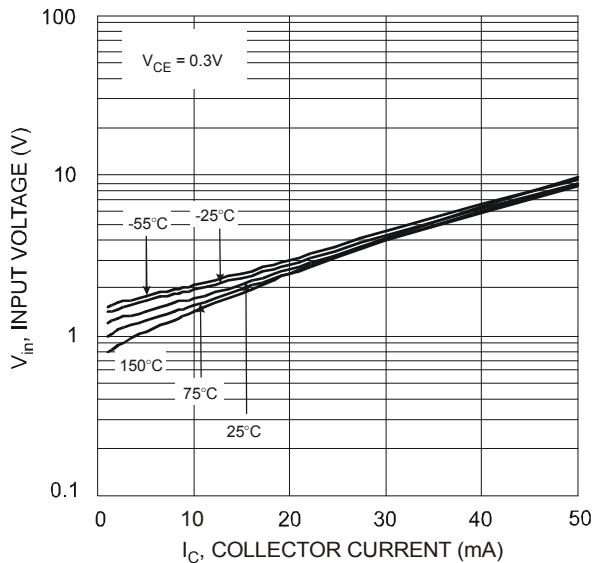


Fig. 11 Input Voltage vs. Collector Current

**Typical Curves – DDTC124EE**

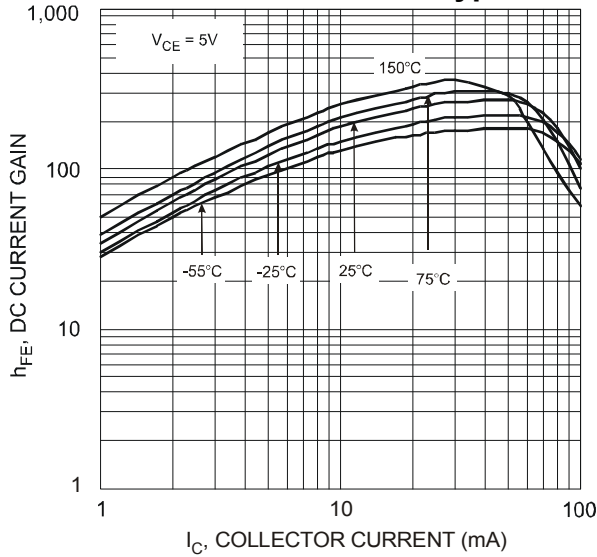


Fig. 12 Typical DC Current Gain vs. Collector Current

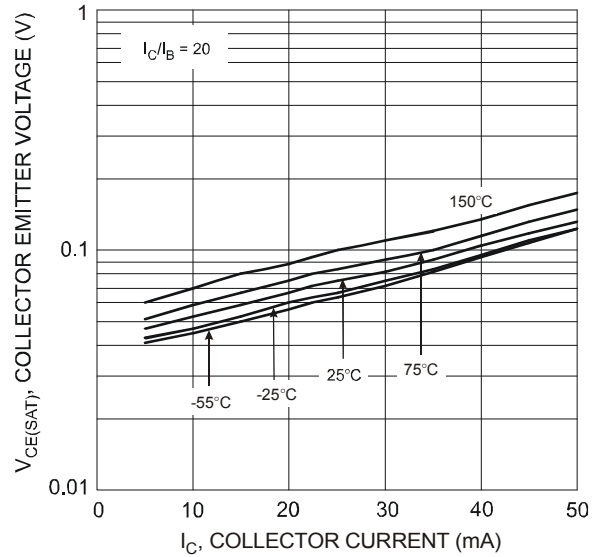


Fig. 13  $V_{CE(SAT)}$  vs.  $I_C$

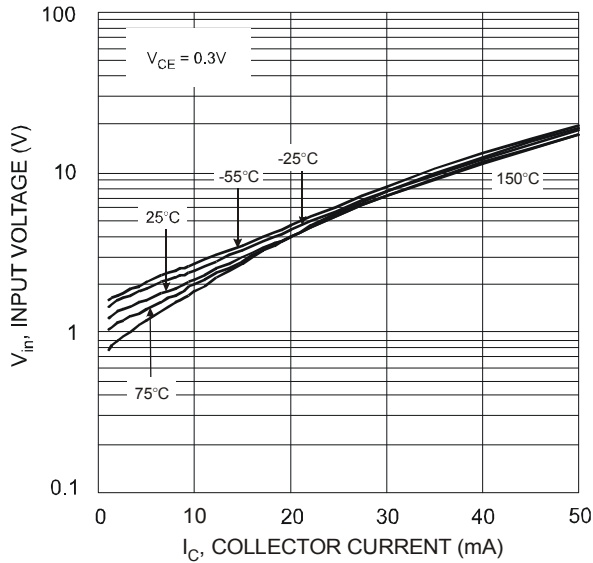


Fig. 14 Input Voltage vs. Collector Current

**Typical Curves – DDTC144EE**

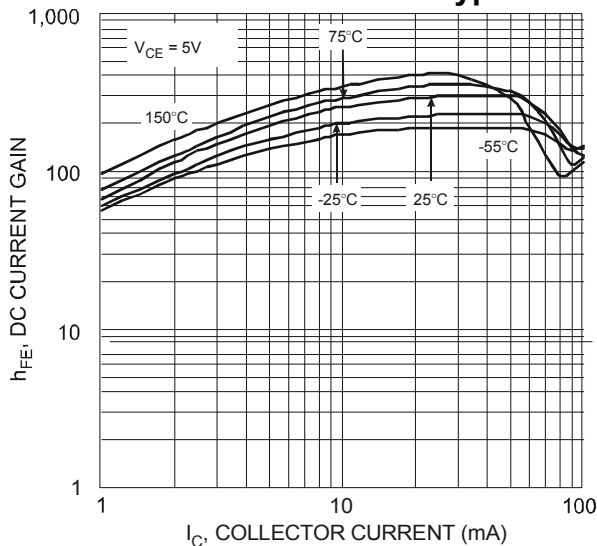


Fig. 15 Typical DC Current Gain vs. Collector Current

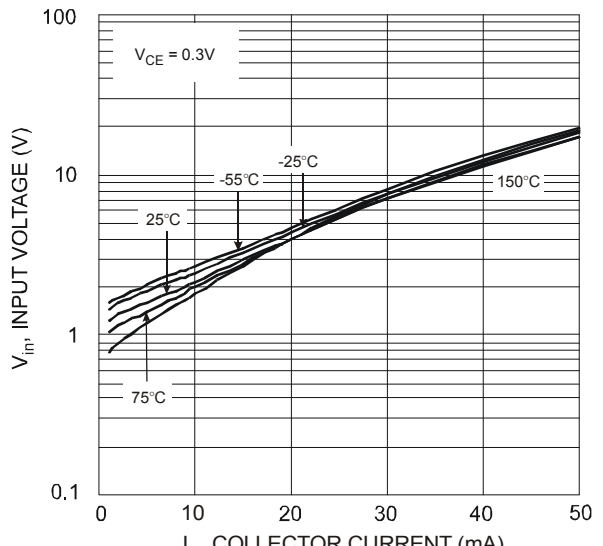


Fig. 16 Input Voltage vs. Collector Current

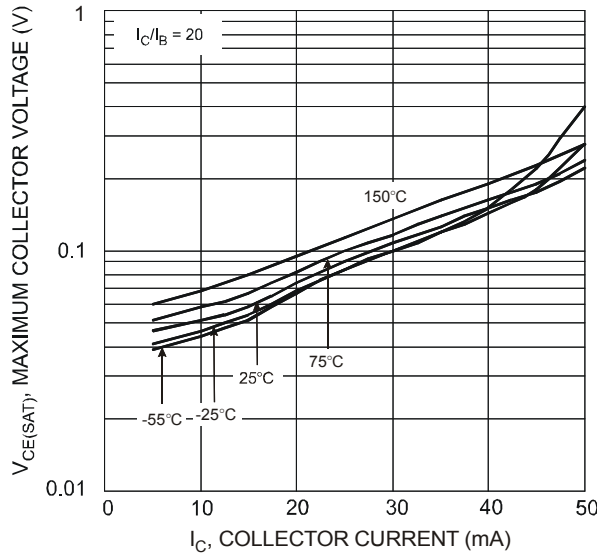


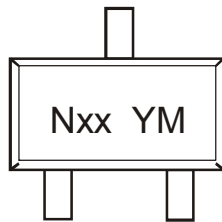
Fig. 17  $V_{CE(SAT)}$  vs.  $I_C$

## Ordering Information (Note 5)

| Device        | Packaging | Shipping         |
|---------------|-----------|------------------|
| DDTC123EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTC143EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTC114EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTC124EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTC144EE-7-F | SOT-523   | 3000/Tape & Reel |
| DDTC115EE-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



Nxx = Product Type Marking Code (See 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   |

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