# DDTC (R1 = R2 SERIES) E

**NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR**

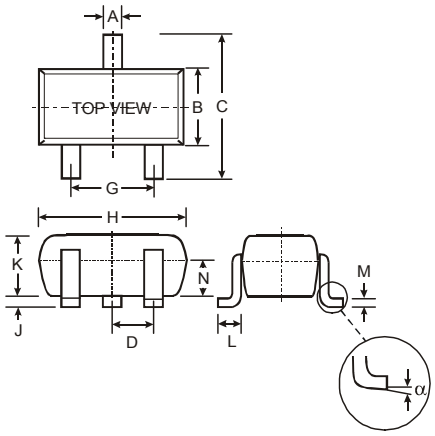
## Features

- 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)**

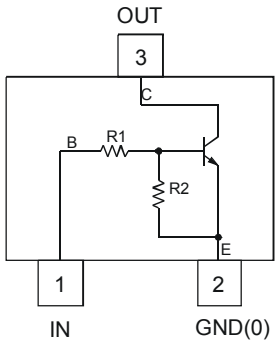
## Mechanical Data

- 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)

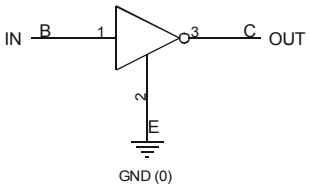
| P/N | R1, RN (NOM) | Marking |
|---|---|---|
| DDTC123EE | 2.2KΩ | N04 |
| DDTC143EE | 4.7KΩ | N08 |
| DDTC114EE | 10KΩ | N13 |
| DDTC124EE | 22KΩ | N17 |
| DDTC144EE | 47KΩ | N20 |
| DDTC115EE | 100KΩ | N24 |




| 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 |
| **α** | 0° | 8° | — |
| **All Dimensions in mm** | | | |




Schematic and Pin Configuration




Equivalent Inverter Circuit

## Maximum Ratings @$T_A$ = 25°C unless otherwise specified

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Supply Voltage (3) to (2) | | $V_{CC}$ | 50 | V |
| Input Voltage (1) to (2) | DDTC123EE | $V_{IN}$ | -10 to +12 | V |
| | DDTC143EE | | -10 to +30 | |
| | DDTC114EE | | -10 to +40 | |
| | DDTC124EE | | -10 to +40 | |
| | DDTC144EE | | -10 to +40 | |
| | DDTC115EE | | -10 to +40 | |
| Output Current | DDTC123EE | $I_O$ | 100 | mA |
| | DDTC143EE | | 100 | |
| | DDTC114EE | | 50 | |
| | DDTC124EE | | 30 | |
| | DDTC144EE | | 100 | |
| | DDTC115EE | | 20 | |
| Power Dissipation | | $P_d$ | 150 | mW |
| Thermal Resistance, Junction to Ambient Air | (Note 2) | $R_{\theta JA}$ | 833 | °C/W |
| Operating and Storage Temperature Range | | $T_j$, $T_{STG}$ | -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.
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 @$T_A$ = 25°C unless otherwise specified

| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| Input Voltage | | $V_{I(off)}$ | 0.5 | 1.1 | — | V | $V_{CC}$ = 5V, $I_O$ = 100mA |
| | | $V_{I(on)}$ | — | 1.9 | 3 | | $V_O$ = 0.3V, $I_O$ = 20mA, DDTC123EE<br>$V_O$ = 0.3V, $I_O$ = 20mA, DDTC143EE<br>$V_O$ = 0.3V, $I_O$ = 10mA, DDTC114EE<br>$V_O$ = 0.3V, $I_O$ = 5mA, DDTC124EE<br>$V_O$ = 0.3V, $I_O$ = 2mA, DDTC144EE<br>$V_O$ = 0.3V, $I_O$ = 1mA, DDTC115EE |
| Output Voltage | | $V_{O(on)}$ | — | 0.1 | 0.3 | V | $I_O/I_I$ =10mA/0.5mA, DDTC123EE<br>$I_O/I_I$ =10mA/0.5mA, DDTC143EE<br>$I_O/I_I$ =10mA/0.5mA, DDTC114EE<br>$I_O/I_I$ =10mA/0.5mA, DDTC124EE<br>$I_O/I_I$ =10mA/0.5mA, DDTC144EE<br>$I_O/I_I$ = 5mA/0.25mA, DDTC115EE |
| Input Current | DDTC123EE<br>DDTC143EE<br>DDTC114EE<br>DDTC124EE<br>DDTC144EE<br>DDTC115EE | $I_I$ | — | — | 3.8□<br>1.8□<br>0.88□<br>0.36<br>0.18□<br>0.15 | mA | $V_I$ = 5V |
| Output Current | | $I_{O(off)}$ | — | — | 0.5 | μA | $V_{CC}$ = 50V, $V_I$ = 0V |
| DC Current Gain | DDTC123EE<br>DDTC143EE<br>DDTC114EE<br>DDTC124EE<br>DDTC144EE<br>DDTC115EE | $G_I$ | 20<br>20<br>30<br>56<br>68<br>82 | — | — | — | $V_O$ = 5V, $I_O$ = 20mA<br>$V_O$ = 5V, $I_O$ = 10mA<br>$V_O$ = 5V, $I_O$ = 5mA<br>$V_O$ = 5V, $I_O$ = 5mA<br>$V_O$ = 5V, $I_O$ = 5mA<br>$V_O$ = 5V, $I_O$ = 5mA |
| Input Resistor (R1) Tolerance | | $\Delta R_1$ | -30 | — | +30 | % | — |
| Resistance Ratio | | $R_2/R_1$ | 0.8 | 1 | 1.2 | — | — |
| Gain-Bandwidth Product* | | $f_T$ | — | 250 | — | MHz | $V_{CE}$ = 10V, $I_E$ = 5mA, f = 100MHz |

* Transistor – For Reference Only

## Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

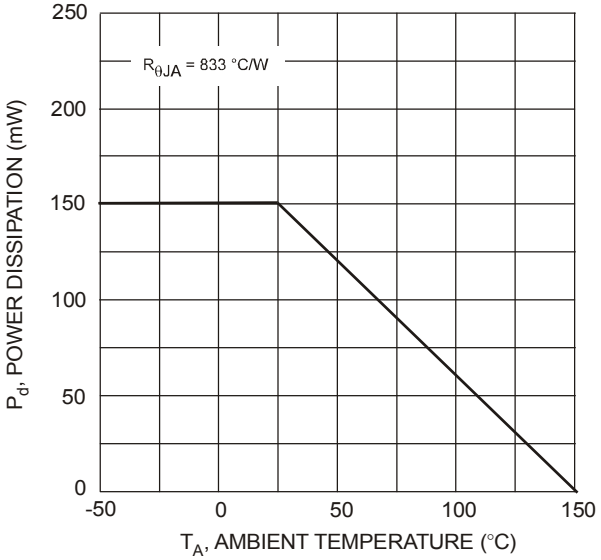


Fig. 1 Derating Curve

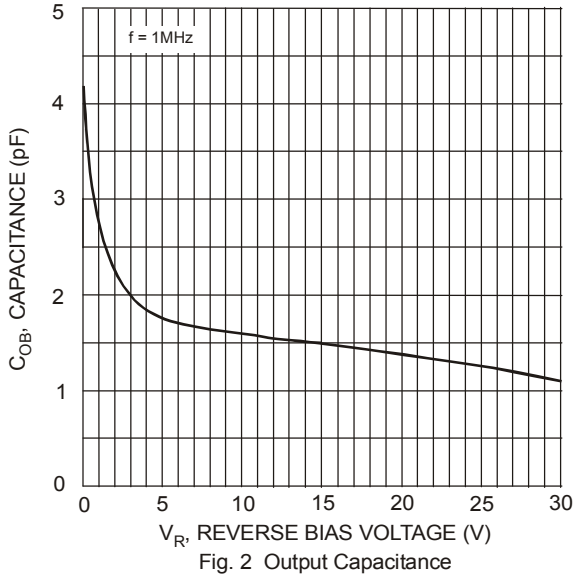


Fig. 2 Output Capacitance

## Typical Curves – DDTC123EE

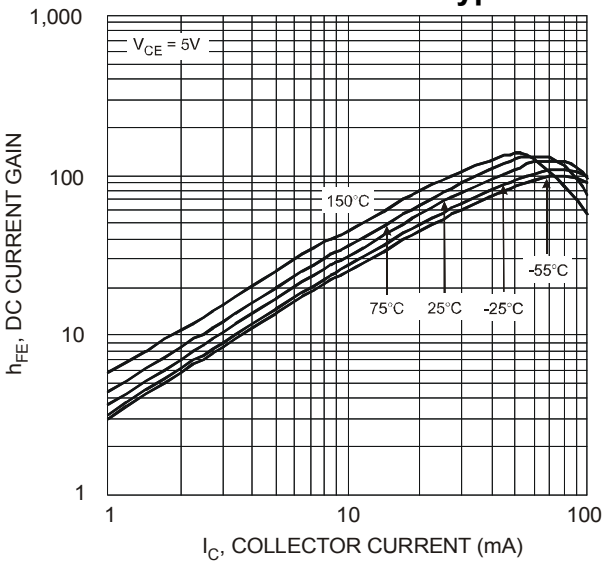



Fig. 3 Typical DC Current Gain vs. Collector Current

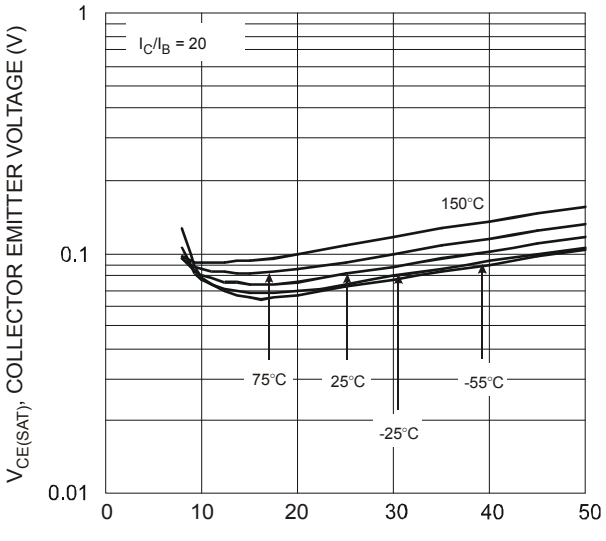



Fig. 4 $V_{CE(SAT)}$ vs. $I_C$

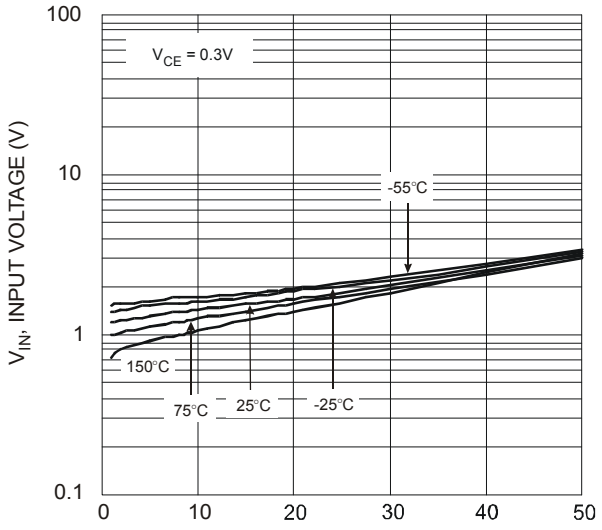



Fig. 5 Input Voltage vs. Collector Current

## Typical Curves – DDTC143EE

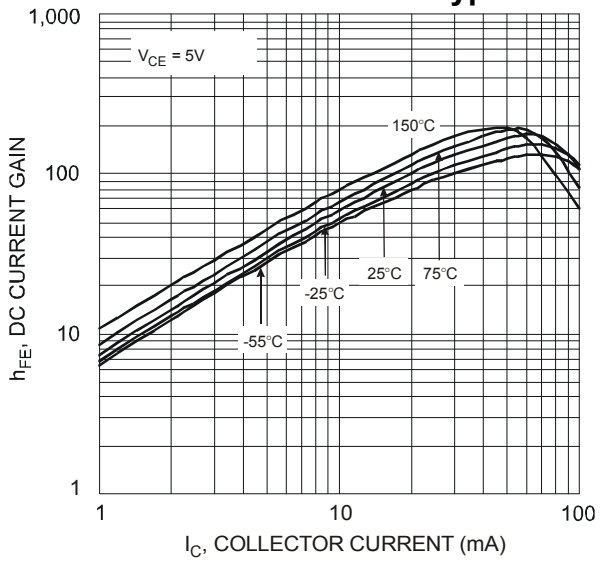



Fig. 6 Typical DC Current Gain vs. Collector Current

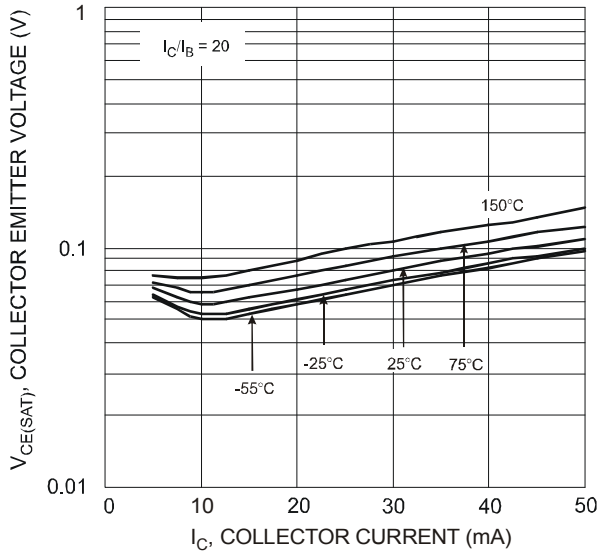



Fig. 7 $V_{CE(SAT)}$ vs. $I_C$

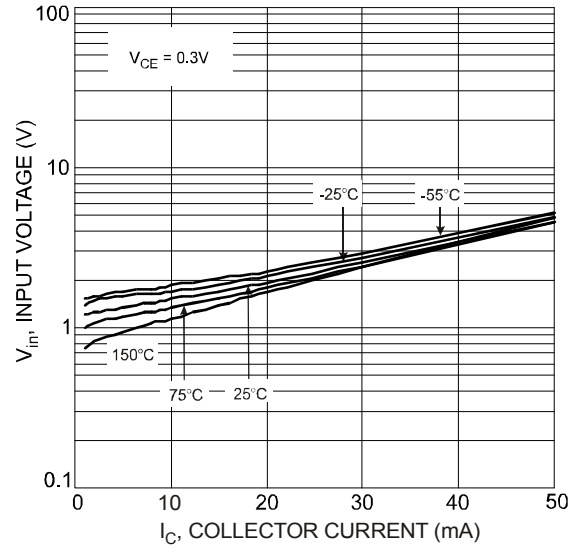



Fig. 8 Input Voltage vs. Collector Current

## Typical Curves – DDTC114EE

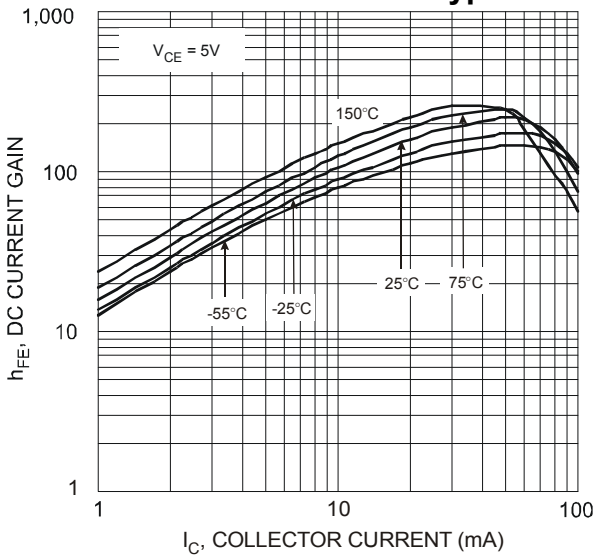



Fig. 9 Typical DC Current Gain vs. Collector Current

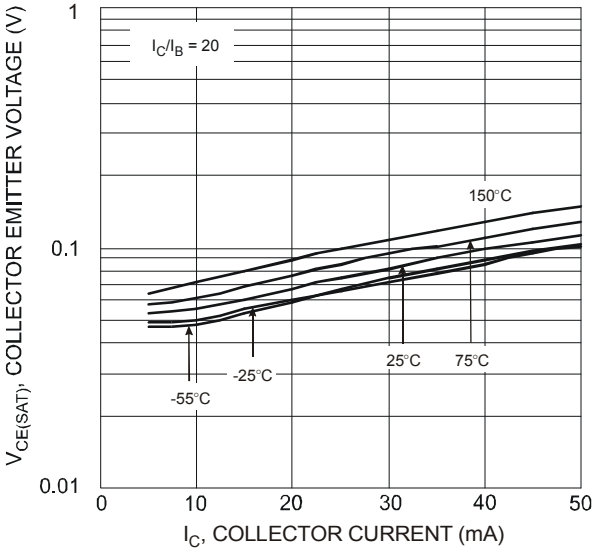



Fig. 10 $V_{CE(SAT)}$ vs. $I_C$

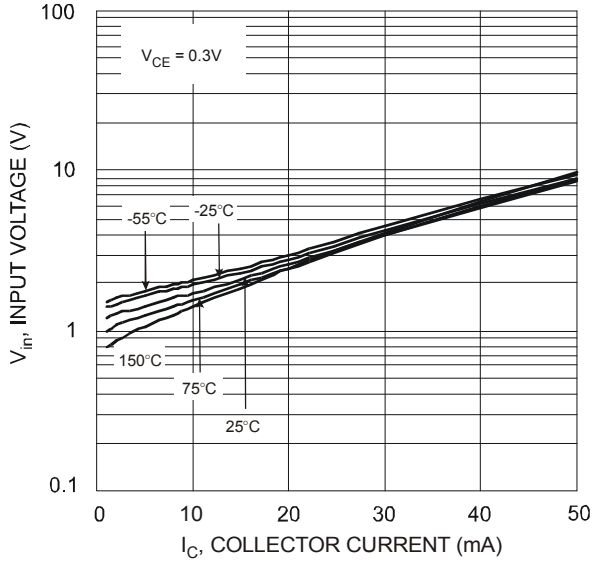



Fig. 11 Input Voltage vs. Collector Current

## Typical Curves – DDTC124EE

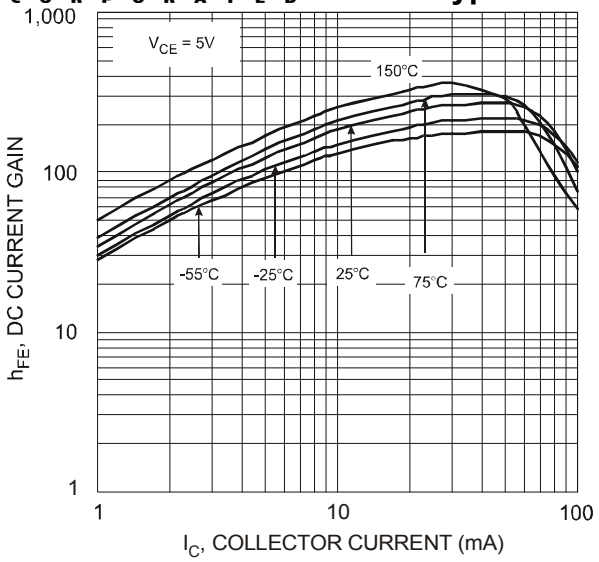



Fig. 12 Typical DC Current Gain vs. Collector Current

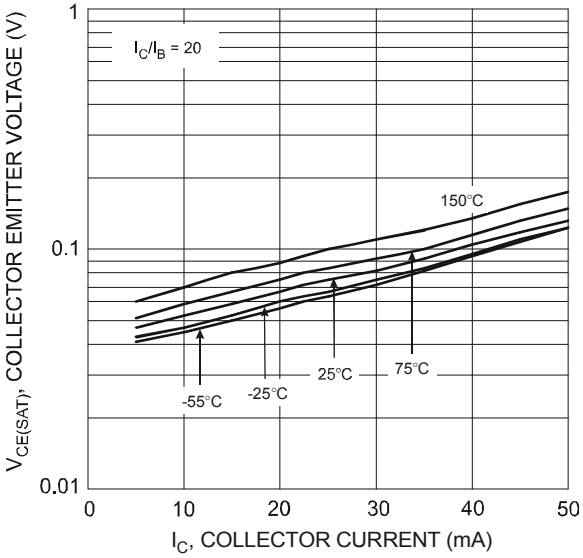



Fig. 13 $V_{CE(SAT)}$ vs. $I_C$

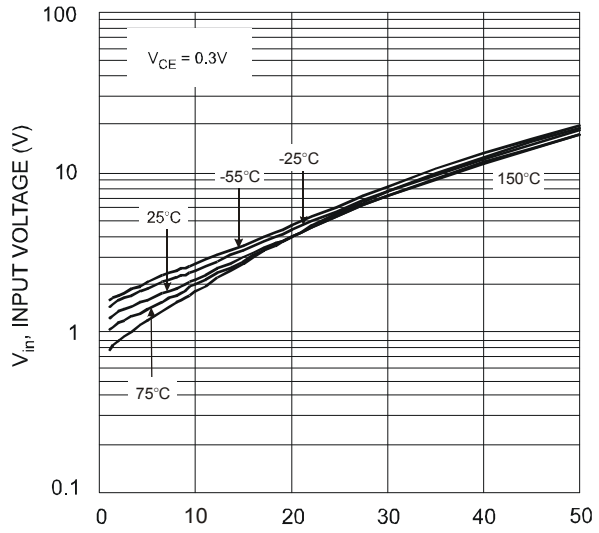



Fig. 14 Input Voltage vs. Collector Current

## Typical Curves – DDTC144EE

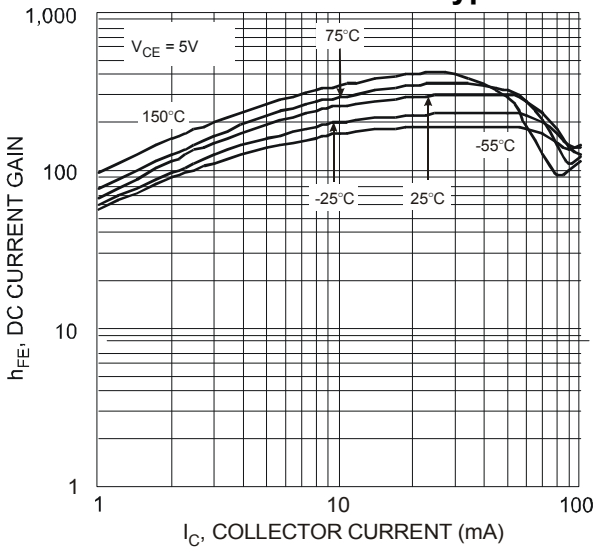



Fig. 15 Typical DC Current Gain vs. Collector Current

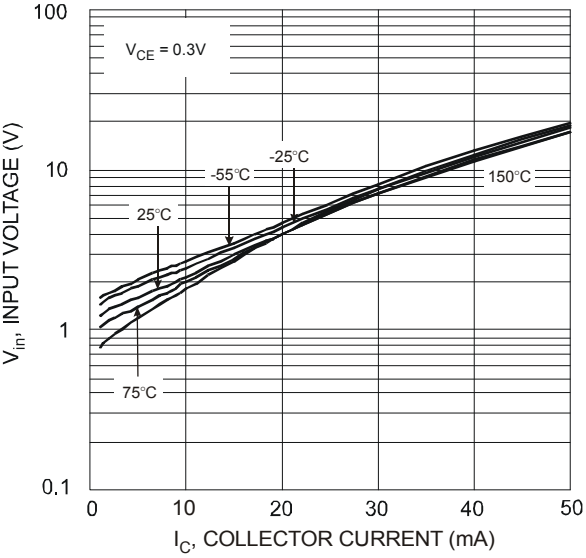



Fig. 16 Input Voltage vs. Collector Current

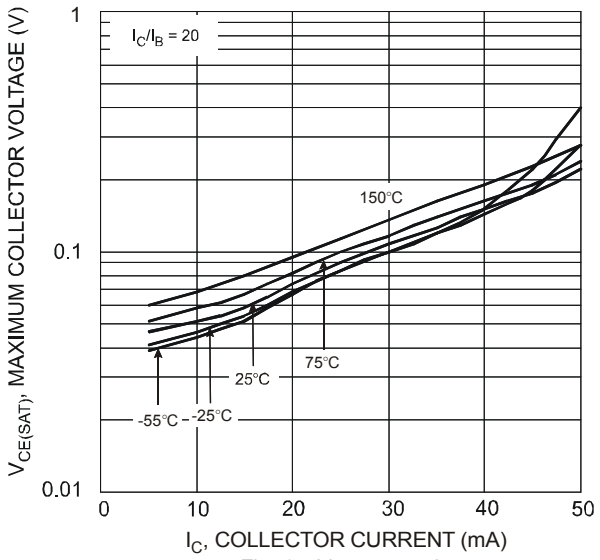


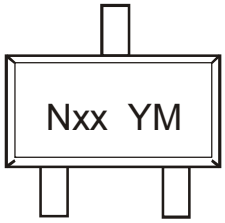
Fig. 17 $V_{CE(SAT)}$ vs. $I_C$

## 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 |

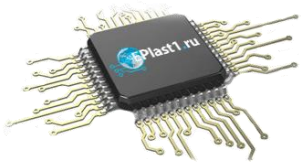
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.




**Как с нами связаться**

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