## Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1 = R2
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

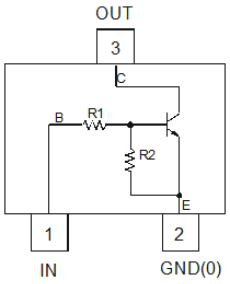
## Mechanical Data

- Case: SOT-523
- Case Material: Molded Plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.002 grams (Approximate)

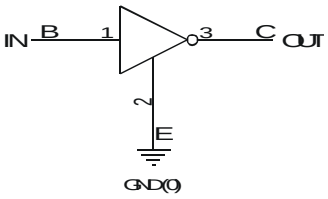
| Part Number | R1, R2 (NOM) |
|---|---|
| DDTC123EE | 2.2KΩ |
| DDTC143EE | 4.7KΩ |
| DDTC114EE | 10KΩ |
| DDTC124EE | 22KΩ |
| DDTC144EE | 47KΩ |
| DDTC115EE | 100KΩ |

SOT523

Top View




Device Schematic



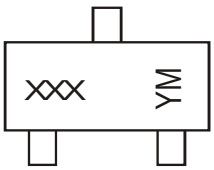

Equivalent Inverter Circuit

## Ordering Information (Note 4)

| Product | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|---|
| DDTC123EE-7-F | AEC-Q101 | N04 | 7 | 8 | 3,000 |
| DDTC143EE-7-F | AEC-Q101 | N08 | 7 | 8 | 3,000 |
| DDTC114EE-7-F | AEC-Q101 | N13 | 7 | 8 | 3,000 |
| DDTC124EE-7-F | AEC-Q101 | N17 | 7 | 8 | 3,000 |
| DDTC144EE-7-F | AEC-Q101 | N20 | 7 | 8 | 3,000 |
| DDTC115EE-7-F | AEC-Q101 | N24 | 7 | 8 | 3,000 |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-Free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http"//www.diodes.com/products/packages.html.

## Marking Information




XXX = Product Type Marking Code, See Table Above
YM = Date Code Marking
Y = Year ex: B = 2014
M = Month ex: 9 = September

Date Code Key

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| Code | Z | A | B | C | D | E | F | G |

| 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 |

## Absolute Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Supply Voltage <Pin: (3) to (2)> | | $V_{CC}$ | 50 | V |
| Input Voltage <Pin: (1) to (2)> | DDTC123EE<br>DDTC143EE<br>DDTC114EE<br>DDTC124EE<br>DDTC144EE<br>DDTC115EE | $V_{IN}$ | -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 | DDTC123EE<br>DDTC143EE<br>DDTC114EE<br>DDTC124EE<br>DDTC144EE<br>DDTC115EE | $I_O$ | 100<br>100<br>50<br>30<br>100<br>20 | mA |
| Output Current | | $I_C$ (Max) | 100 | mA |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Notes 5 & 6) | $P_D$ | 150 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 5) | $R_{\theta JA}$ | 833 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## 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, $I_O$ = 100µA |
| | | $V_{I(on)}$ | — | 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 Tolerance | | $\Delta R_1$ | -30 | — | +30 | % | — |
| Resistance Ratio Tolerance | | $\Delta R_2/R_1$ | 0.8 | 1 | 1.2 | % | — |
| Gain-Bandwidth Product (Note 7) | | $f_T$ | — | 250 | — | MHz | $V_{CE}$ = -10V, $I_E$ = 5mA, f = 100MHz |

Notes: 5. Mounted on FR4 PC Board with minimum recommended pad layout.
6. 150mW per element must not be exceeded.
7. Transistor only.

## Typical Electrical Characteristics

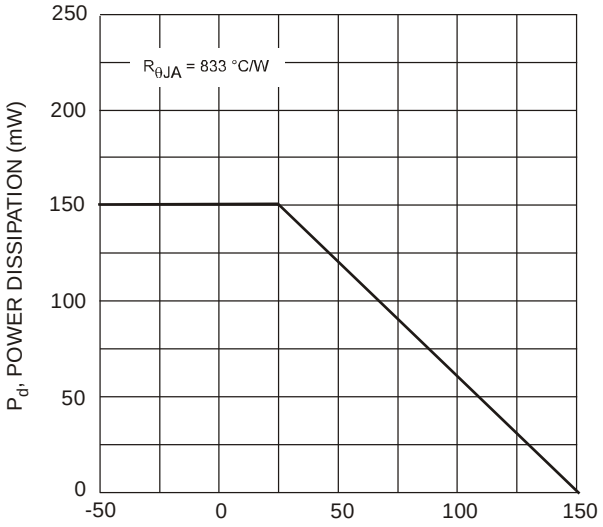



Fig. 1 Derating Curve

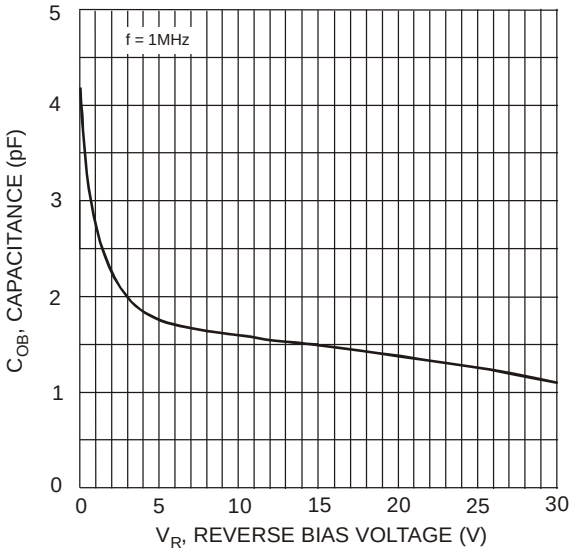



Fig. 2 Output Capacitance

## Typical Electrical Characteristics – DDTC123EE

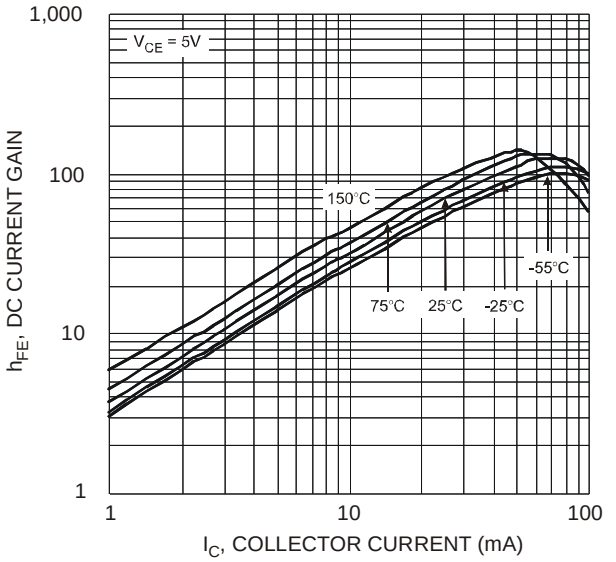



Fig. 3 Typical DC Current Gain vs. Collector Current

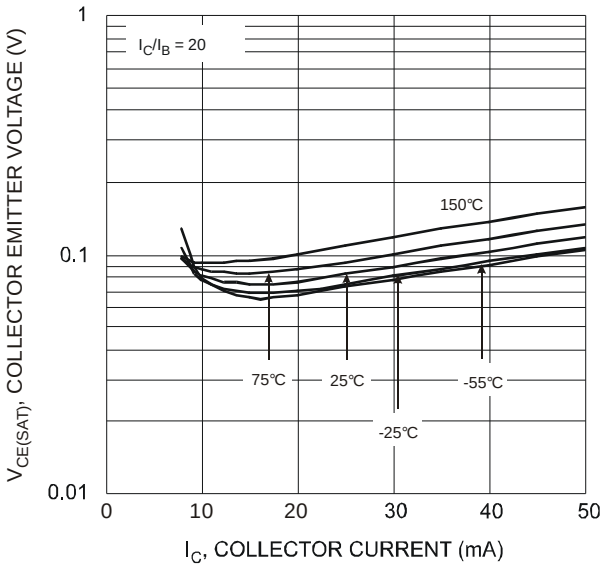



Fig. 4 $V_{CE(SAT)}$ vs. $I_C$

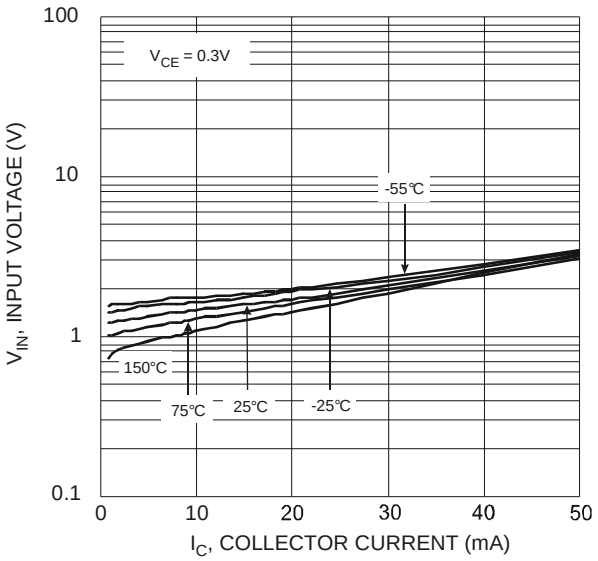



Fig. 5 Input Voltage vs. Collector Current

## Typical Electrical Characteristics – DDTC143EE

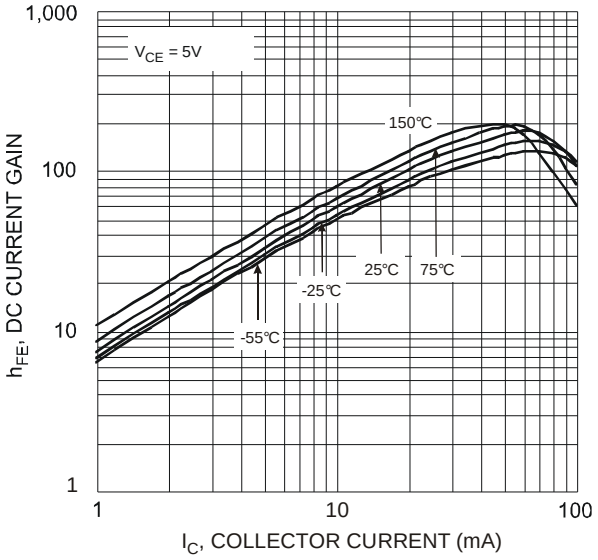



Fig. 6 Typical DC Current Gain vs. Collector Current

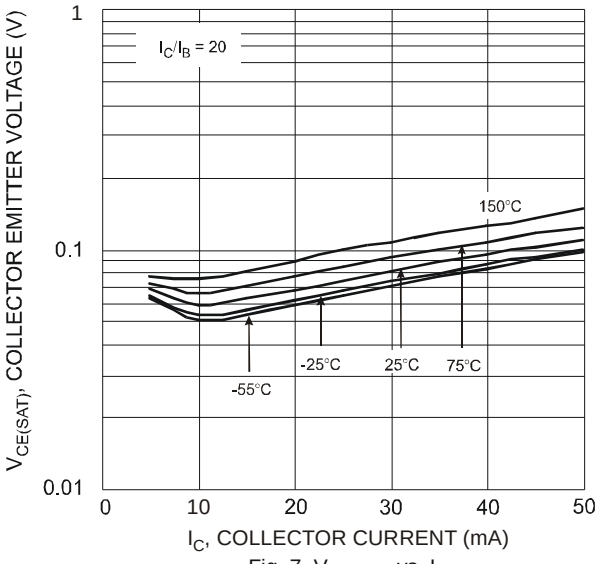



Fig. 7 $V_{CE(SAT)}$ vs. $I_C$

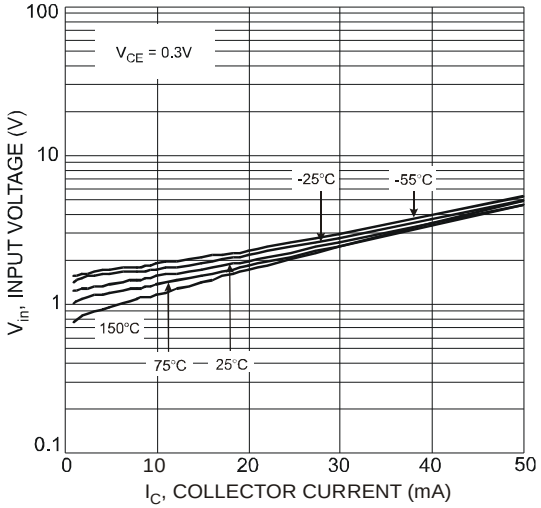



Fig. 8 Input Voltage vs. Collector Current

## Typical Electrical Characteristics – DDTC114EE

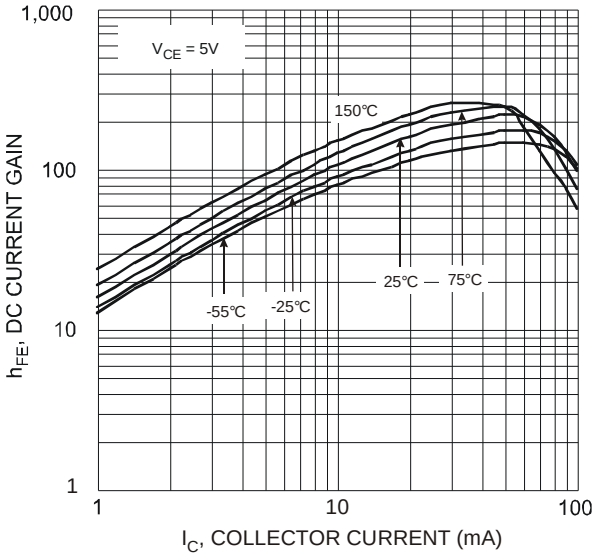



Fig. 9 Typical DC Current Gain vs. Collector Current

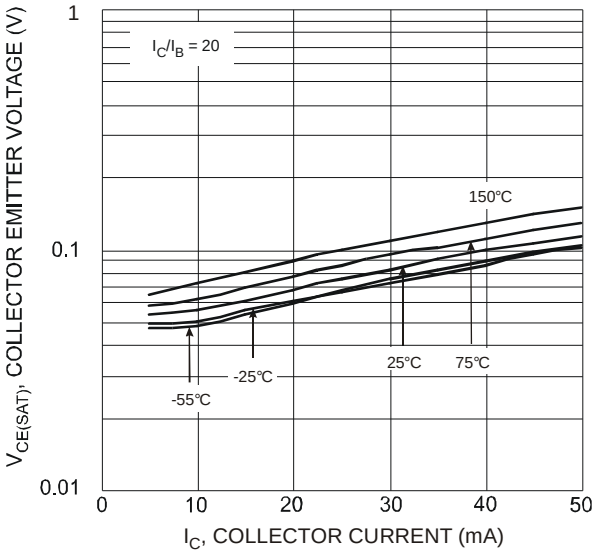



Fig. 10 $V_{CE(SAT)}$ vs. $I_C$

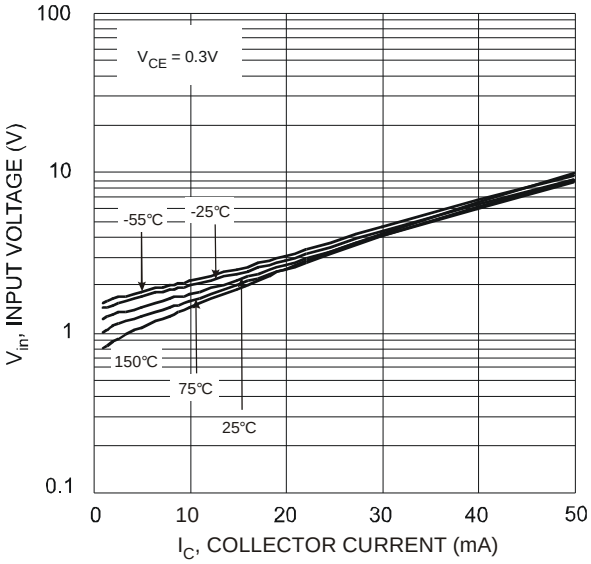



Fig. 11 Input Voltage vs. Collector Current

## Typical Electrical Characteristics – DDTC124EE

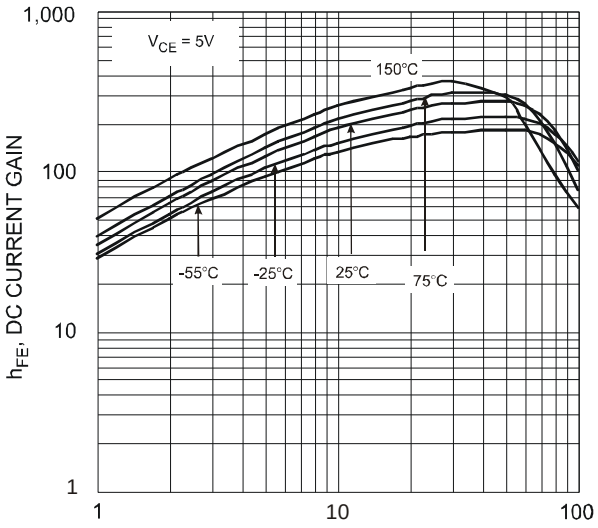



Fig. 12 Typical DC Current Gain vs. Collector Current

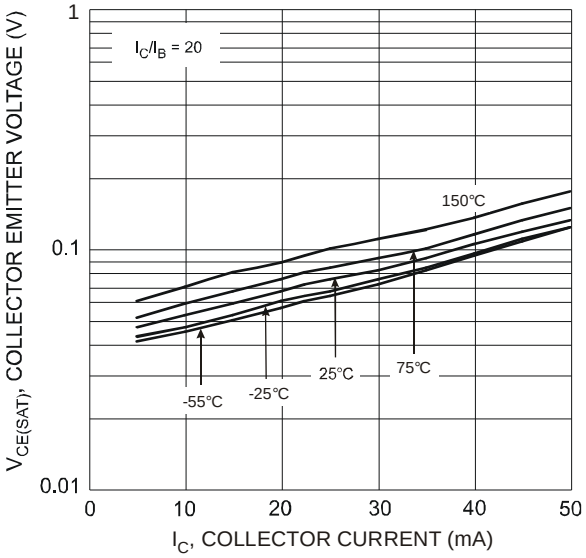



Fig. 13 $V_{CE(SAT)}$ vs. $I_C$

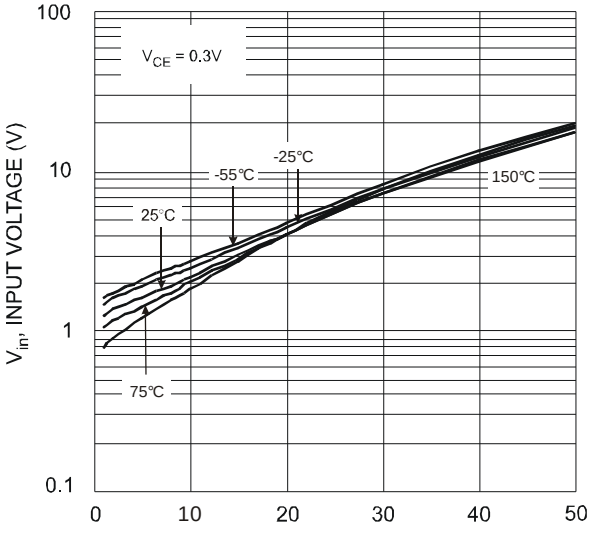



Fig. 14 Input Voltage vs. Collector Current

## Typical Electrical Characteristics – DDTC144EE

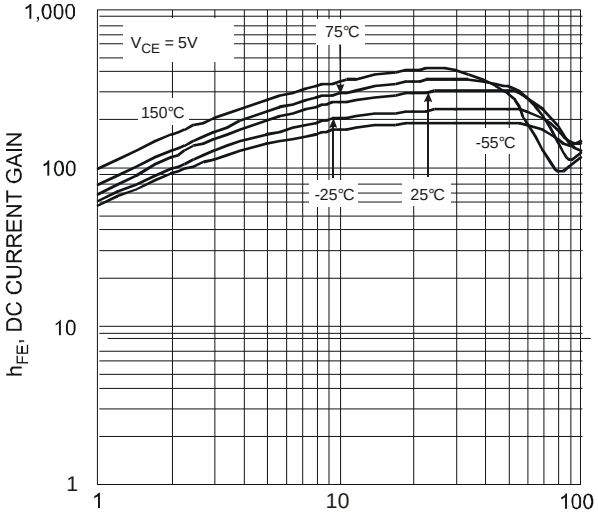



Fig. 15 Typical DC Current Gain vs. Collector Current

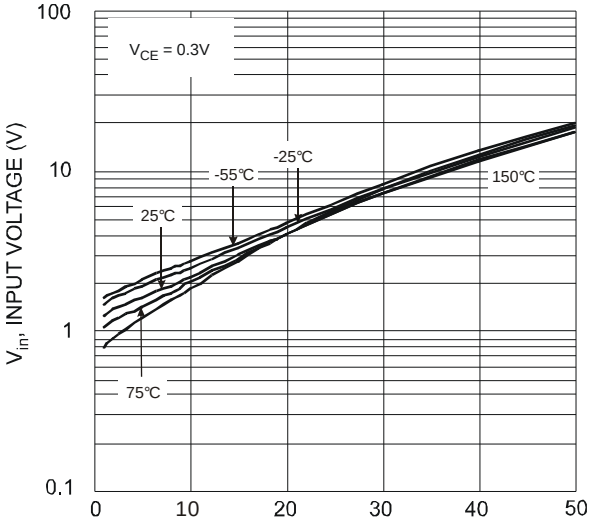



Fig. 16 Input Voltage vs. Collector Current

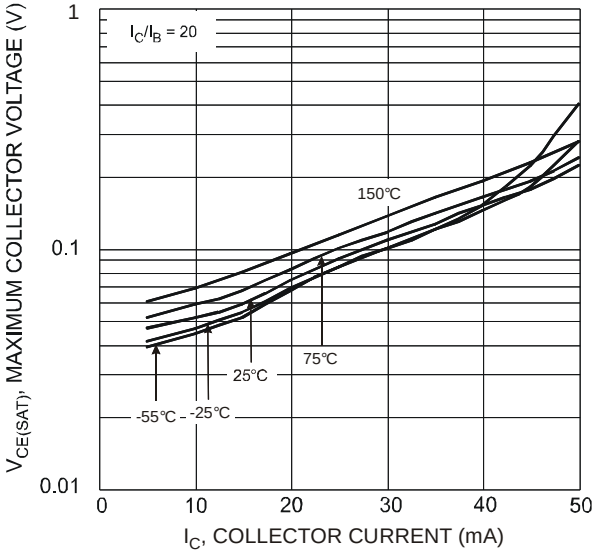
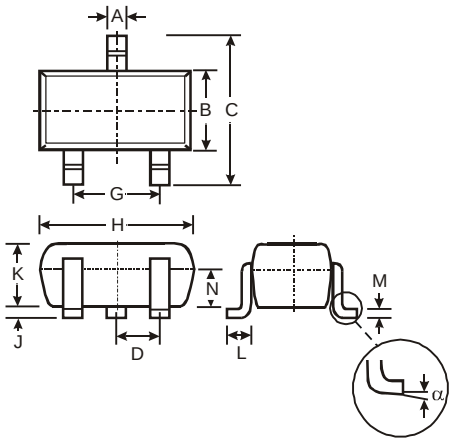



Fig. 17 $V_{CE(SAT)}$ vs. $I_C$

## Package Outline Dimensions

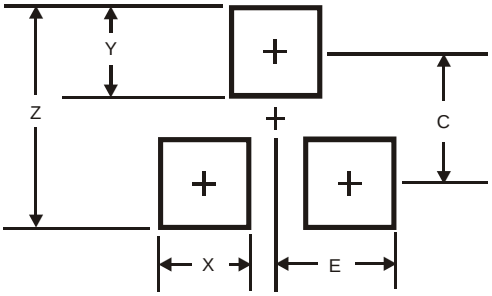
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.




| SOT523 | | | |
|---|---|---|---|
| **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** | | | |

## Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.




| Dimensions | Value (in mm) |
|---|---|
| **Z** | 1.8 |
| **X** | 0.4 |
| **Y** | 0.51 |
| **C** | 1.3 |
| **E** | 0.7 |

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