

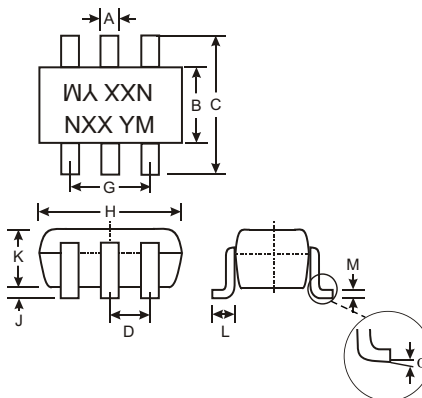
## NPN PRE-BIASED SMALL SIGNAL SOT-26 DUAL SURFACE MOUNT TRANSISTOR

### Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors

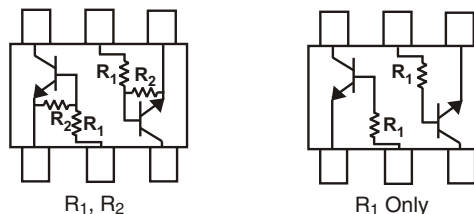
### Mechanical Data

- Case: SOT-26, Molded Plastic
- Case material - UL Flammability Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking: Date Code and Marking Code (See Diagrams & Page 3)
- Weight: 0.015 grams (approx.)
- Ordering Information (See Page 3)



| SOT-26               |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 0.35  | 0.50 | 0.38 |
| B                    | 1.50  | 1.70 | 1.60 |
| C                    | 2.70  | 3.00 | 2.80 |
| D                    | 0.95  |      |      |
| G                    | 1.90  |      |      |
| H                    | 2.90  | 3.10 | 3.00 |
| J                    | 0.013 | 0.10 | 0.05 |
| K                    | 1.00  | 1.30 | 1.10 |
| L                    | 0.35  | 0.55 | 0.40 |
| M                    | 0.10  | 0.20 | 0.15 |
| $\alpha$             | 0°    | 8°   | —    |
| All Dimensions in mm |       |      |      |

| P/N      | R1            | R2           | MARKING |
|----------|---------------|--------------|---------|
| DDC124EK | 22K $\Omega$  | 22K $\Omega$ | N17     |
| DDC144EK | 47K $\Omega$  | 47K $\Omega$ | N20     |
| DDC114YK | 10K $\Omega$  | 47K $\Omega$ | N14     |
| DDC123JK | 2.2K $\Omega$ | 47K $\Omega$ | N06     |
| DDC114EK | 10K $\Omega$  | 10K $\Omega$ | N13     |
| DDC143TK | 4.7K $\Omega$ | -            | N07     |
| DDC114TK | 10K $\Omega$  | -            | N12     |



SCHEMATIC DIAGRAM

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

| Characteristic                                       | Symbol                            | Value                                                                                                          | Unit |
|------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------|------|
| Supply Voltage, (3) to (1)                           | V <sub>CC</sub>                   | 50                                                                                                             | V    |
| Input Voltage, (2) to (1)                            | V <sub>IN</sub>                   | -10 to +40<br>-10 to +40<br>-6 to +40<br>-5 to +12<br>-10 to +40<br>-5 V <sub>max</sub><br>-5 V <sub>max</sub> | V    |
| Output Current                                       | I <sub>O</sub>                    | 30<br>30<br>70<br>100<br>50<br>100<br>100                                                                      | mA   |
| Output Current All                                   | I <sub>C</sub> (Max)              | 100                                                                                                            | mA   |
| Power Dissipation (Total)                            | P <sub>d</sub>                    | 300                                                                                                            | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 1) | R <sub>θJA</sub>                  | 416.7                                                                                                          | °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. 200mW per element must not be exceeded.

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

| Characteristic (DDC143TK & DDC114TK only)  | Symbol               | Min | Typ | Max | Unit | Test Condition                                                                                                    |
|--------------------------------------------|----------------------|-----|-----|-----|------|-------------------------------------------------------------------------------------------------------------------|
| Collector-Base Breakdown Voltage           | BV <sub>CBO</sub>    | 50  | —   | —   | V    | I <sub>C</sub> = 50μA                                                                                             |
| Collector-Emitter Breakdown Voltage        | BV <sub>CEO</sub>    | 50  | —   | —   | V    | I <sub>C</sub> = 1mA                                                                                              |
| Emitter-Base Breakdown Voltage             | BV <sub>EBO</sub>    | 5   | —   | —   | V    | I <sub>E</sub> = 50μA                                                                                             |
| Collector Cutoff Current                   | I <sub>CBO</sub>     | —   | —   | 0.5 | μA   | V <sub>CB</sub> = 50V                                                                                             |
| Emitter Cutoff Current                     | I <sub>EBO</sub>     | —   | —   | 0.5 | μA   | V <sub>EB</sub> = 4V                                                                                              |
| Collector-Emitter Saturation Voltage       | V <sub>CE(sat)</sub> | —   | —   | 0.3 | V    | I <sub>C</sub> /I <sub>B</sub> = 2.5mA / 0.25mA DDC143TK<br>I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DDC114TK |
| DC Current Transfer Ratio                  | h <sub>FE</sub>      | 100 | 250 | 600 | —    | I <sub>C</sub> = 1mA, V <sub>CE</sub> = 5V                                                                        |
| Input Resistor (R <sub>1</sub> ) Tolerance | ΔR <sub>1</sub>      | -30 | —   | +30 | %    | —                                                                                                                 |
| Gain-Bandwidth Product*                    | f <sub>T</sub>       | —   | 250 | —   | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = -5mA, f = 100MHz                                                          |

| Characteristic                             |                                                          | Symbol                         | Min                             | Typ                         | Max                                 | Unit | Test Condition                                                                                                                                                                                                                                    |
|--------------------------------------------|----------------------------------------------------------|--------------------------------|---------------------------------|-----------------------------|-------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Voltage                              | DDC124EK<br>DDC144EK<br>DDC114YK<br>DDC123JK<br>DDC114EK | V <sub>I(off)</sub>            | 0.5<br>0.5<br>0.3<br>0.5<br>0.5 | 1.1<br>1.1<br>—<br>—<br>1.1 | —                                   | V    | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA                                                                                                                                                                                                      |
|                                            | DDC124EK<br>DDC144EK<br>DDC114YK<br>DDC123JK<br>DDC114EK | V <sub>I(on)</sub>             | —                               | 1.9<br>1.9<br>—<br>—<br>1.9 | 3.0<br>3.0<br>1.4<br>1.1<br>3.0     |      | V <sub>O</sub> = 0.3, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 0.3, I <sub>O</sub> = 2mA<br>V <sub>O</sub> = 0.3, I <sub>O</sub> = 1mA<br>V <sub>O</sub> = 0.3, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 0.3, I <sub>O</sub> = 10mA               |
| Output Voltage                             | DDC124EK<br>DDC144EK<br>DDC114YK<br>DDC123JK<br>DDC114EK | V <sub>O(on)</sub>             | —                               | 0.1                         | 0.3                                 | V    | I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA<br>I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA<br>I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA |
| Input Current                              | DDC124EK<br>DDC144EK<br>DDC114YK<br>DDC123JK<br>DDC114EK | I <sub>I</sub>                 | —                               | —                           | 0.36<br>0.18<br>0.88<br>3.6<br>0.88 | 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                            | DDC124EK<br>DDC144EK<br>DDC114YK<br>DDC123JK<br>DDC114EK | G <sub>I</sub>                 | 56<br>68<br>68<br>80<br>30      | —                           | —                                   | —    | 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> = 10mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA<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 Tolerance                 |                                                          | R <sub>2</sub> /R <sub>1</sub> | -20                             | —                           | +20                                 | %    | —                                                                                                                                                                                                                                                 |
| Gain-Bandwidth Product*                    |                                                          | f <sub>T</sub>                 | —                               | 250                         | —                                   | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA,<br>f = 100MHz                                                                                                                                                                                        |

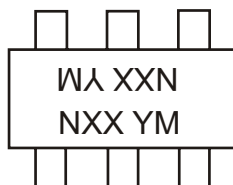
\* Transistor - For Reference Only

## Ordering Information (Note 3)

| Device     | Packaging | Shipping         |
|------------|-----------|------------------|
| DDC124EK-7 | SOT-26    | 3000/Tape & Reel |
| DDC144EK-7 | SOT-26    | 3000/Tape & Reel |
| DDC114YK-7 | SOT-26    | 3000/Tape & Reel |
| DDC123JK-7 | SOT-26    | 3000/Tape & Reel |
| DDC114EK-7 | SOT-26    | 3000/Tape & Reel |
| DDC143TK-7 | SOT-26    | 3000/Tape & Reel |
| DDC114TK-7 | SOT-26    | 3000/Tape & Reel |

Notes: 3. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Marking Information



NXX = Product Type Marking Code  
See Sheet 1 Diagrams  
YM = Date Code Marking  
Y = Year ex: N = 2002  
M = Month ex: 9 = September

Date Code Key

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|------|------|------|------|------|------|------|------|------|
| Code | N    | P    | R    | S    | T    | U    | V    | W    |

| Month | Jan | Feb | March | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3     | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

# TYPICAL CURVES - DDC123JK

## ONE SECTION

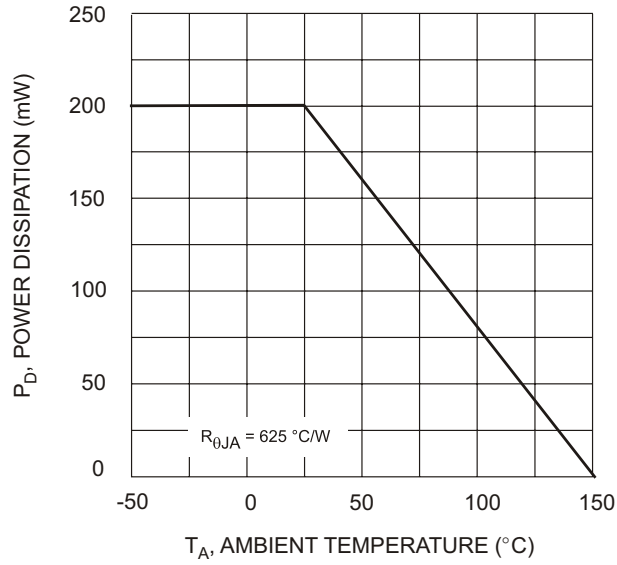


Fig. 1 Derating Curve

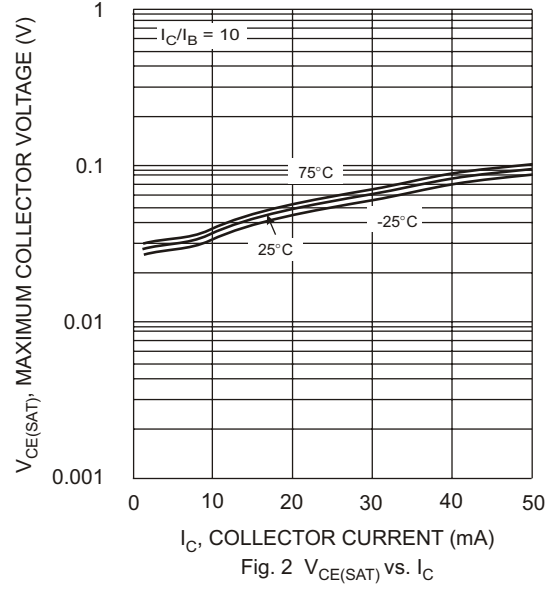


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

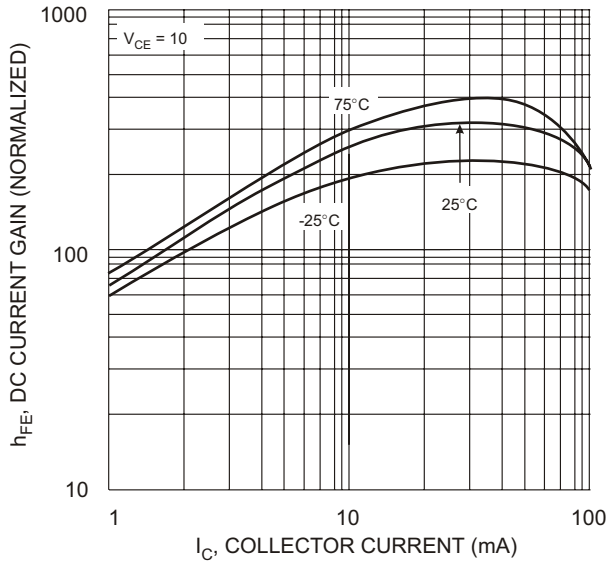


Fig. 3 DC Current Gain

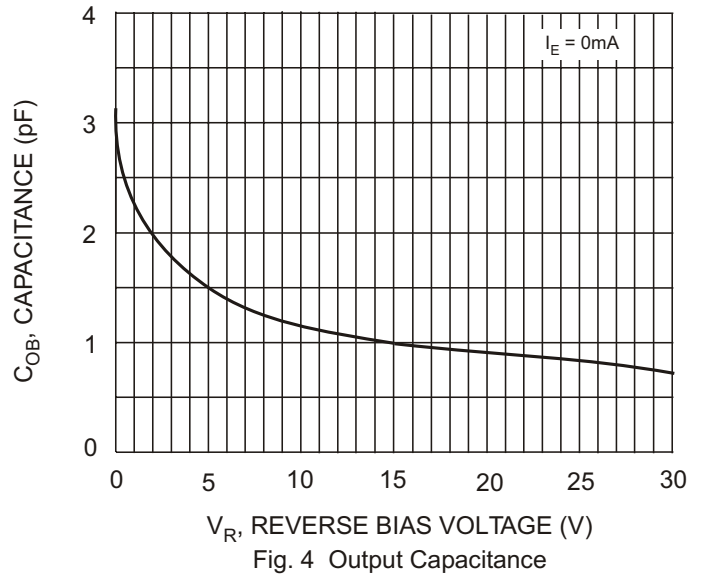


Fig. 4 Output Capacitance

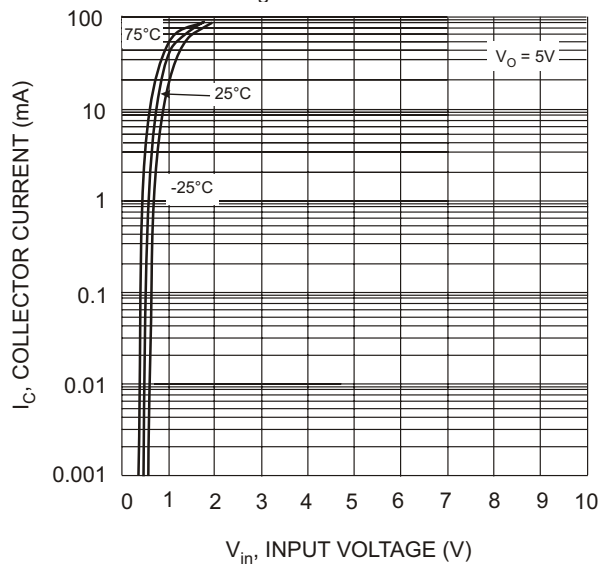


Fig. 5 Collector Current Vs. Input Voltage

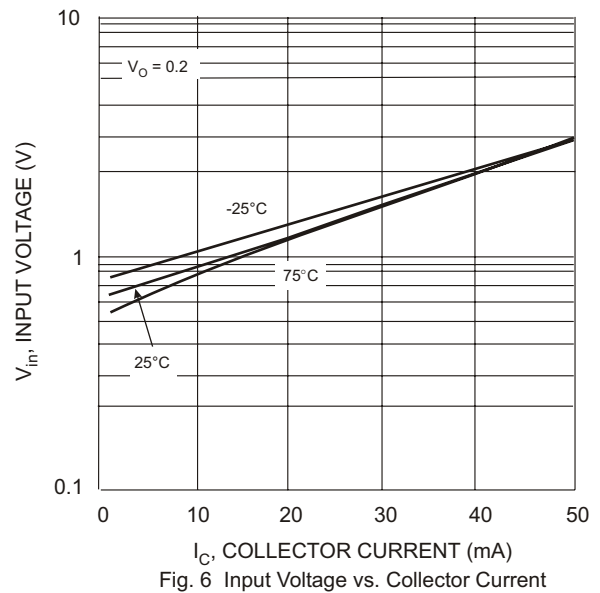


Fig. 6 Input Voltage vs. Collector Current

# TYPICAL CURVES - DDC114TK

## ONE SECTION

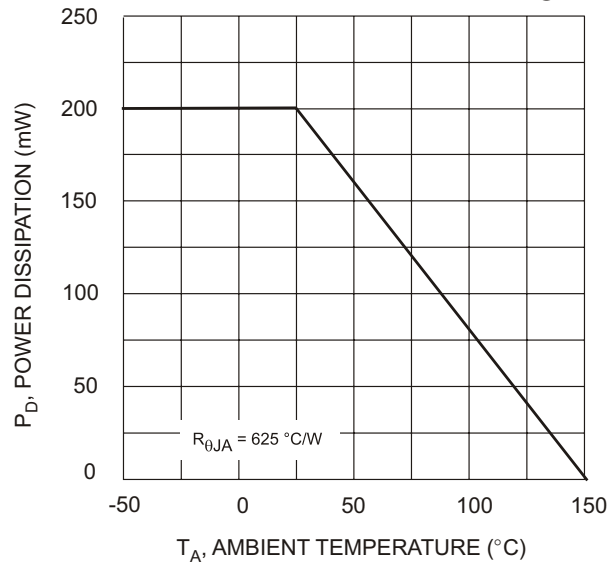


Fig. 1 Derating Curve

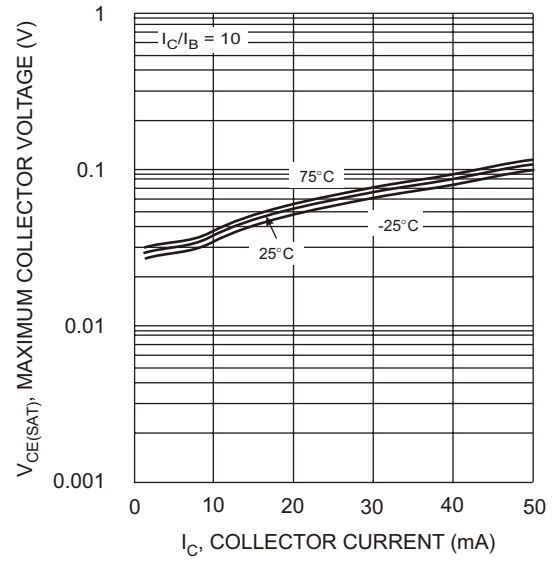


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

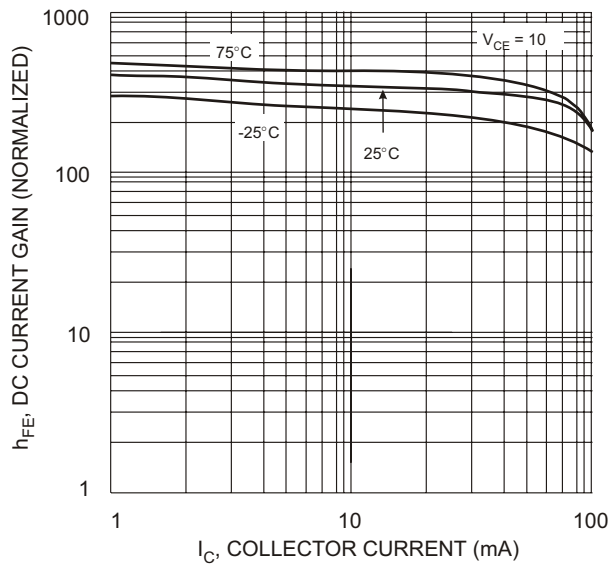


Fig. 3 DC Current Gain

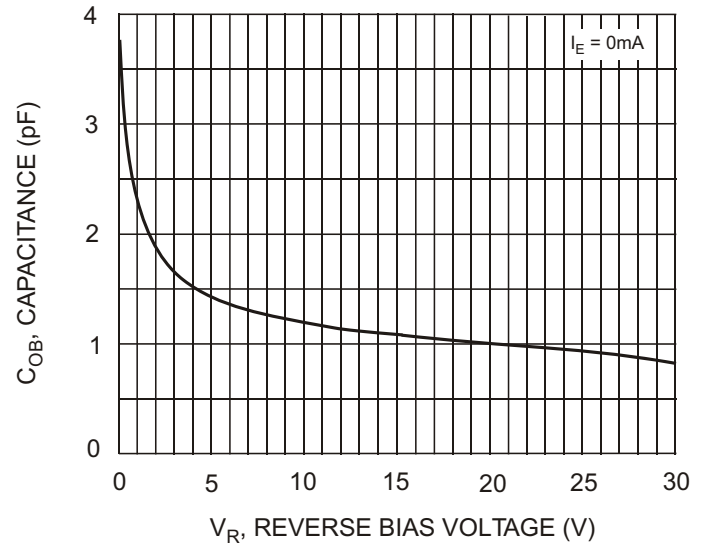


Fig. 4 Output Capacitance

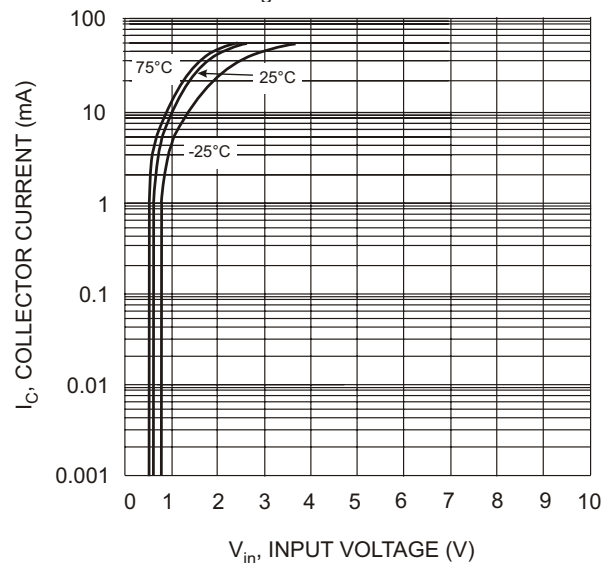


Fig. 5 Collector Current Vs. Input Voltage

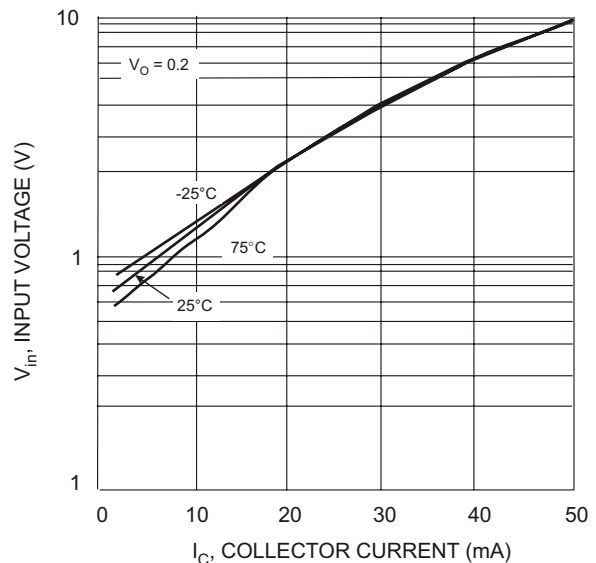


Fig. 6 Input Voltage vs. Collector Current