

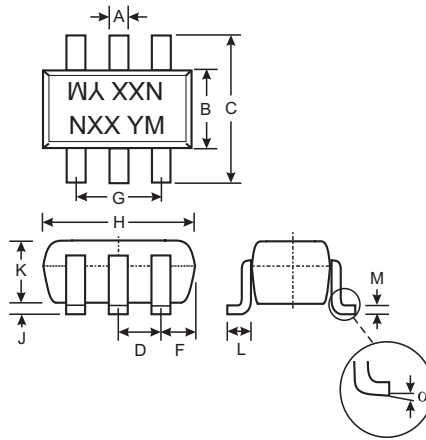
## NPN PRE-BIASED SMALL SIGNAL SOT-363 DUAL SURFACE MOUNT TRANSISTOR

### Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- **Lead Free/RoHS Compliant (Note 3)**

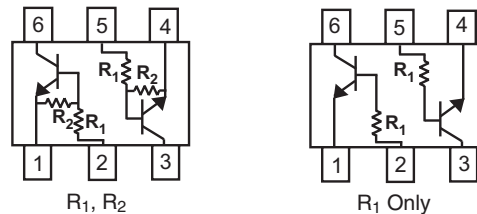
### Mechanical Data

- Case: SOT-363
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Marking: Date Code and Marking Code (See Diagrams & Page 3)
- Ordering Information (See Page 3)
- Weight: 0.006 grams (approximate)



| SOT-363              |              |      |
|----------------------|--------------|------|
| Dim                  | Min          | Max  |
| A                    | 0.10         | 0.30 |
| B                    | 1.15         | 1.35 |
| C                    | 2.00         | 2.20 |
| D                    | 0.65 Nominal |      |
| F                    | 0.30         | 0.40 |
| H                    | 1.80         | 2.20 |
| J                    | —            | 0.10 |
| K                    | 0.90         | 1.00 |
| L                    | 0.25         | 0.40 |
| M                    | 0.10         | 0.25 |
| α                    | 0°           | 8°   |
| All Dimensions in mm |              |      |

| P/N      | R1    | R2   | MARKING |
|----------|-------|------|---------|
| DDC124EU | 22KΩ  | 22KΩ | N17     |
| DDC144EU | 47KΩ  | 47KΩ | N20     |
| DDC114YU | 10KΩ  | 47KΩ | N14     |
| DDC123JU | 2.2KΩ | 47KΩ | N06     |
| DDC114EU | 10KΩ  | 10KΩ | N13     |
| DDC113TU | 1KΩ   | —    | N01     |
| DDC143TU | 4.7KΩ | —    | N07     |
| DDC114TU | 10KΩ  | —    | N12     |



SCHEMATIC DIAGRAM

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

| Characteristic                                       | Symbol                            | Value   | Unit |
|--|-----------------------------------|---|------|
| Supply Voltage, (6) to (1) and (3) to (4)            | V <sub>CC</sub>                   | 50  | V    |
| Input Voltage, (2) to (1) and (5) to (4)             | 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><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<br>100  | mA   |
| Output Current                                       | I <sub>C</sub> (Max)              | 100   | mA   |
| Power Dissipation (Total)                            | 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. 150mW per element must not be exceeded.  
 3. No purposefully added lead.

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

| Characteristic (DDC113TU & DDC143TU & DDC114TU 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 DDC143TU<br>I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DDC114TU<br>I <sub>C</sub> /I <sub>B</sub> = 10mA / 1mA DDC113TU |
| 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                              | V <sub>I(off)</sub>            | 0.5 | 1.1 | ---                                 | V    | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA  |
|  |                                | 0.5 | 1.1 | ---                                 |      |   |
| Input Voltage                              | V <sub>I(on)</sub>             | 0.3 | --- | ---                                 | V    | 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               |
|  |                                | 0.5 | --- | ---                                 |      |   |
| Input Voltage                              | V <sub>I(on)</sub>             | 0.5 | 1.1 | ---                                 | 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 |
|  |                                | --- | 1.9 | 3.0                                 |      |   |
| Output Voltage                             | V <sub>O(on)</sub>             | --- | 1.9 | 3.0                                 | V    | 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               |
|  |                                | --- | 1.9 | 3.0                                 |      |   |
| Output Voltage                             | 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 |
|  |                                | --- | 0.1 | 0.3                                 |      |   |
| Input Current                              | 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                            | G <sub>I</sub>                 | 56  | --- | ---                                 | ---  | 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                   |
|  |                                | 68  | --- | ---                                 |      |   |
| DC Current Gain                            | G <sub>I</sub>                 | 68  | --- | ---                                 | ---  | 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   |
|  |                                | 80  | --- | ---                                 |      |   |
| DC Current Gain                            | G <sub>I</sub>                 | 30  | --- | ---                                 | ---  | 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  |

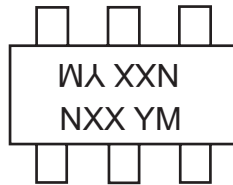
\* Transistor - For Reference Only

## Ordering Information (Note 4)

| Device       | Packaging | Shipping         |
|--------------|-----------|------------------|
| DDC124EU-7-F | SOT-363   | 3000/Tape & Reel |
| DDC144EU-7-F | SOT-363   | 3000/Tape & Reel |
| DDC114YU-7-F | SOT-363   | 3000/Tape & Reel |
| DDC123JU-7-F | SOT-363   | 3000/Tape & Reel |
| DDC114EU-7-F | SOT-363   | 3000/Tape & Reel |
| DDC113TU-7-F | SOT-363   | 3000/Tape & Reel |
| DDC143TU-7-F | SOT-363   | 3000/Tape & Reel |
| DDC114TU-7-F | SOT-363   | 3000/Tape & Reel |

Notes: 4. 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: 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 - DDC123JK**  
**ONE SECTION**

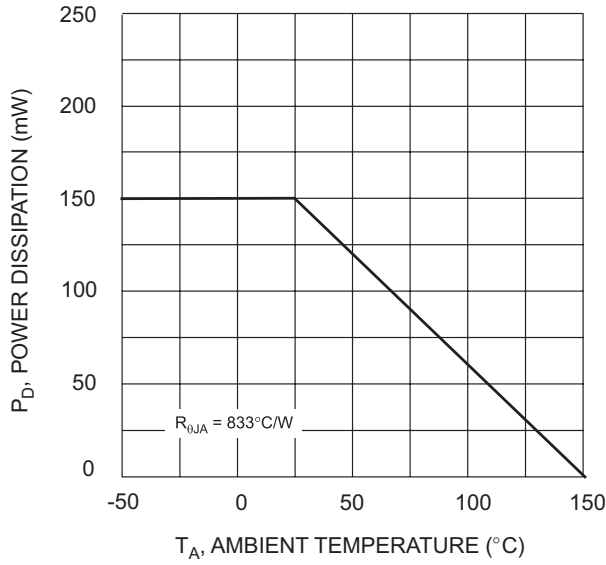


Fig. 1 Derating Curve

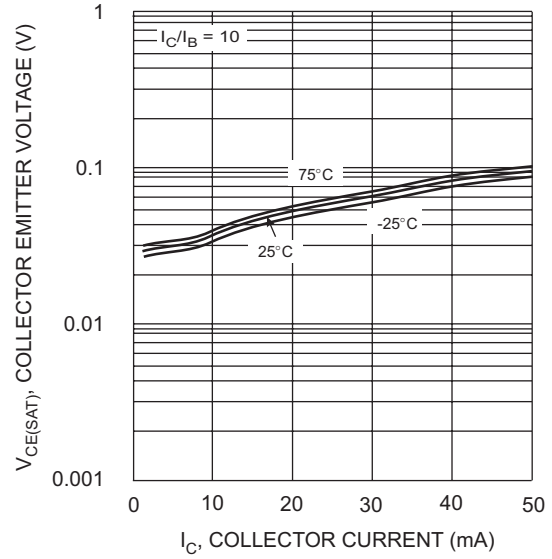


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

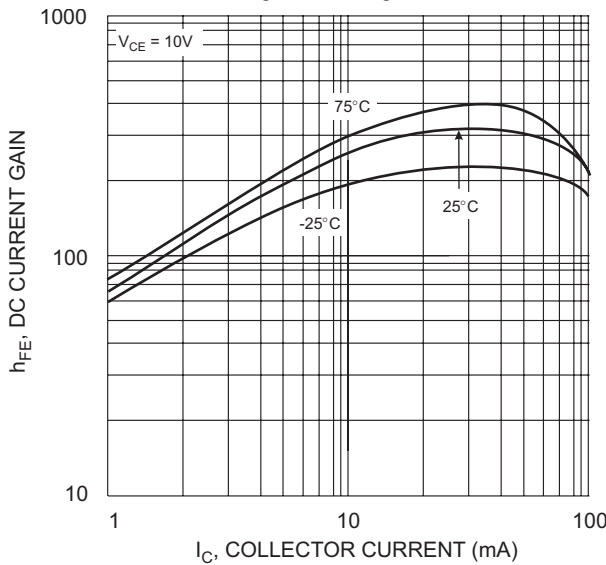


Fig. 3 DC Current Gain

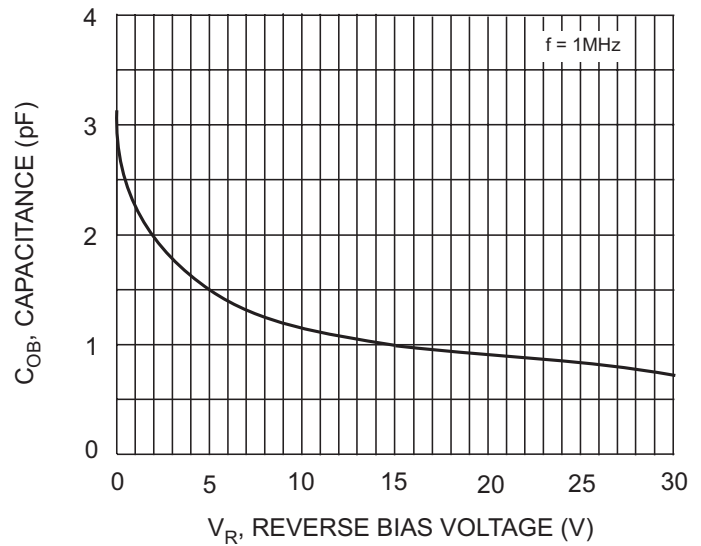


Fig. 4 Output Capacitance

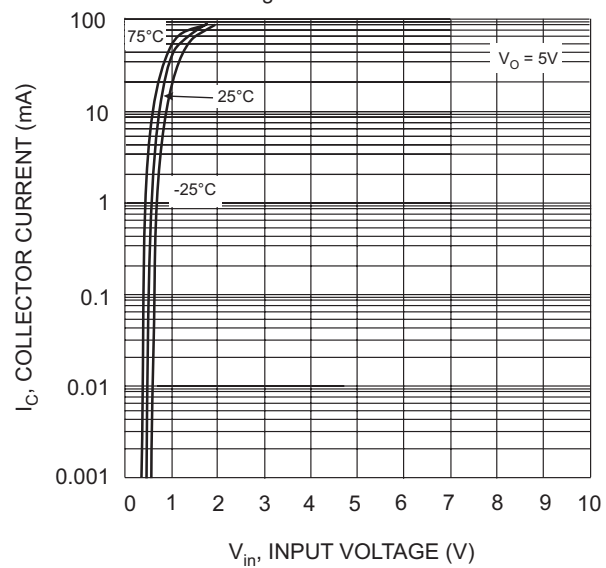


Fig. 5 Collector Current Vs. Input Voltage

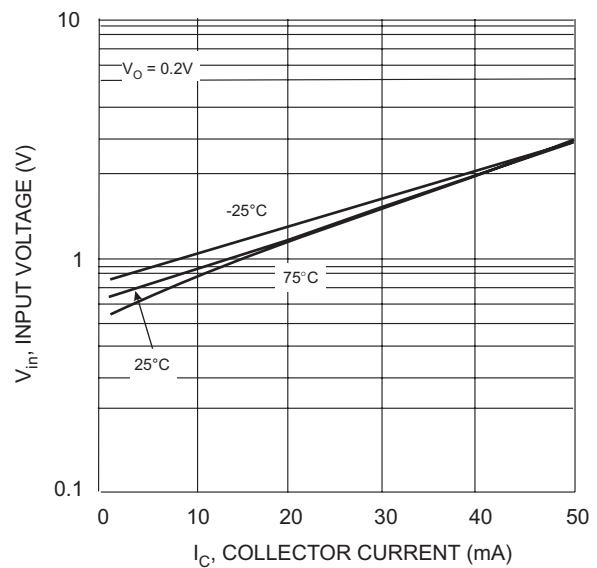


Fig. 6 Input Voltage vs. Collector Current

**TYPICAL CURVES - DDC114TK**

**ONE SECTION**

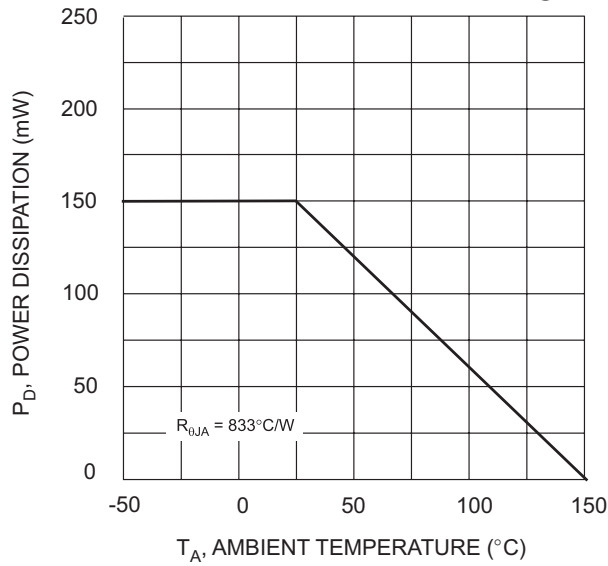


Fig. 1 Derating Curve

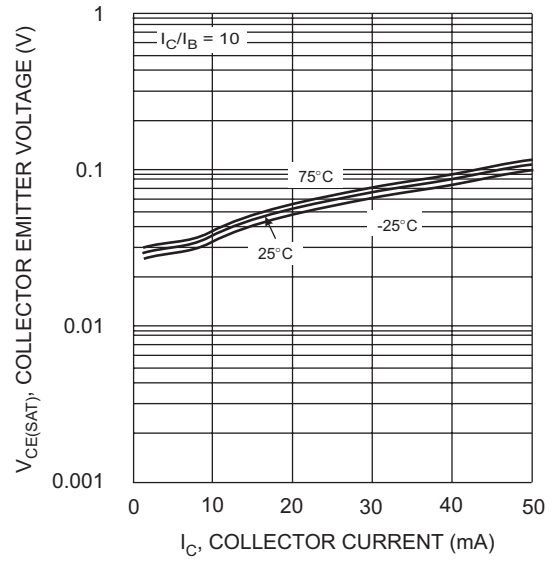


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

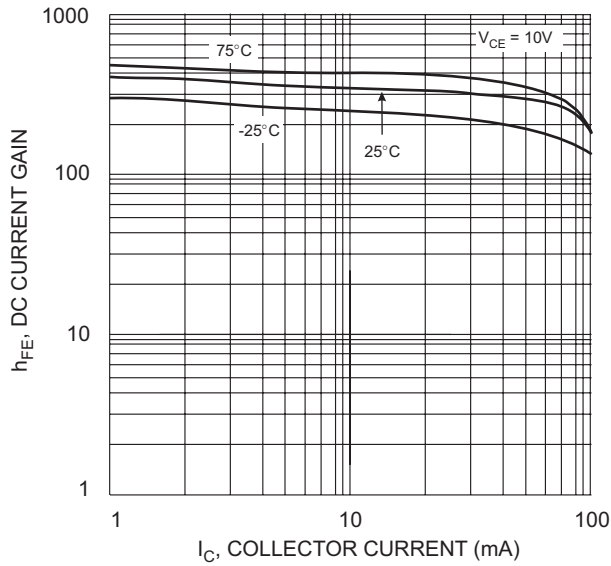


Fig. 3 DC Current Gain

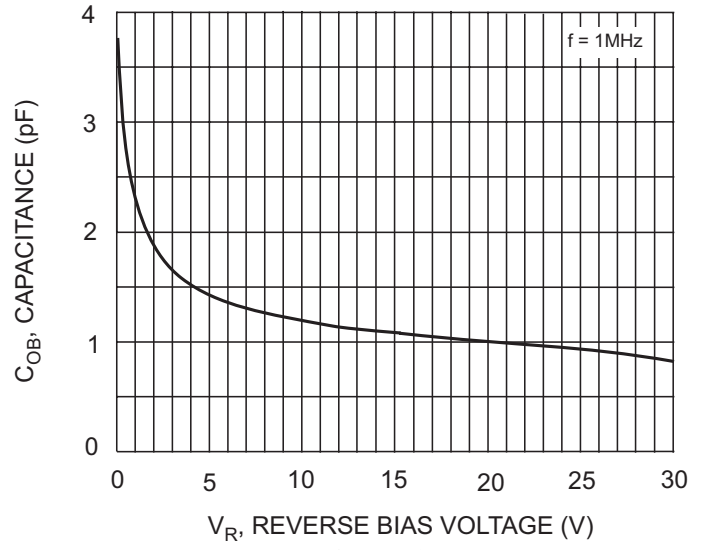


Fig. 4 Output Capacitance

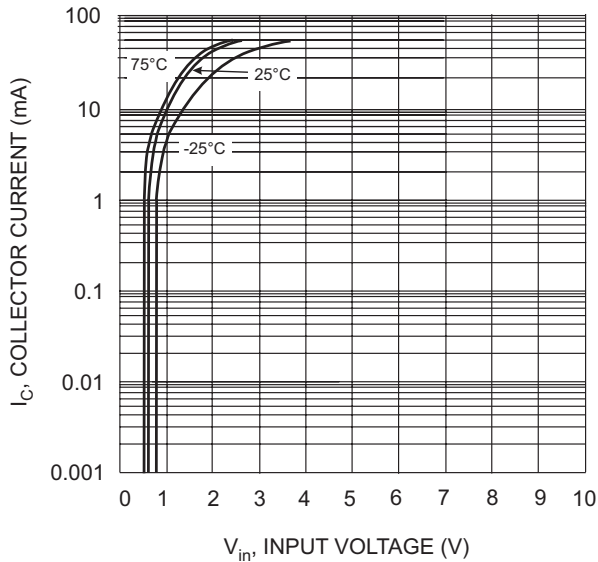


Fig. 7 Collector Current Vs. Input Voltage

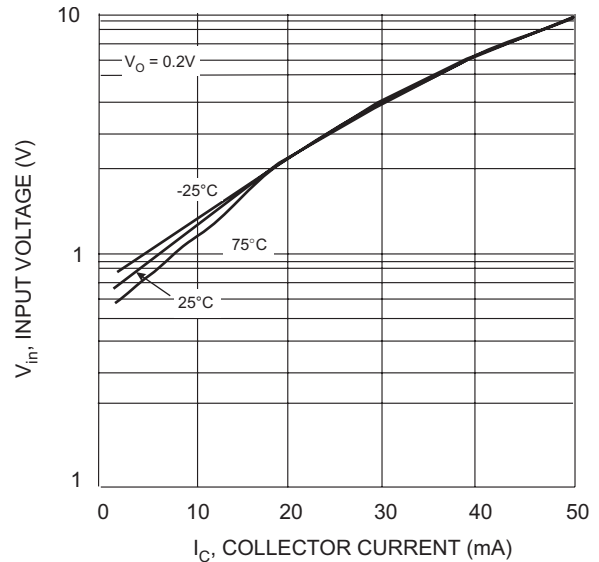


Fig. 6 Input Voltage vs. Collector Current

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