

COMPLEMENTARY NPN/PNP PRE-BIASED SMALL SIGNAL SOT-563 DUAL SURFACE MOUNT TRANSISTOR

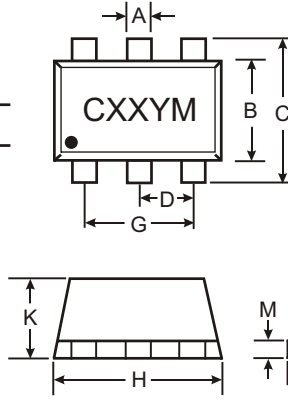
NEW PRODUCT

Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Lead Free By Design/RoHS Compliant (Note 2)

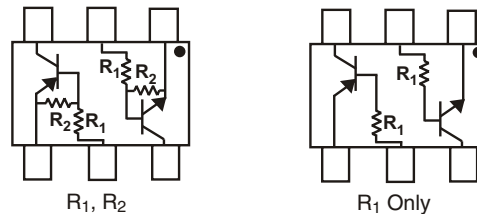
Mechanical Data

- Case: SOT-563
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020C
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Weight: 0.005 grams (approx.)



| SOT-563 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.15 | 0.30 | 0.25 |
| B | 1.10 | 1.25 | 1.20 |
| C | 1.55 | 1.70 | 1.60 |
| D | 0.50 | | |
| G | 0.90 | 1.10 | 1.00 |
| H | 1.50 | 1.70 | 1.60 |
| K | 0.56 | 0.60 | 0.60 |
| L | 0.15 | 0.25 | 0.20 |
| M | 0.10 | 0.18 | 0.11 |
| All Dimensions in mm | | | |

| P/N | R1 | R2 | MARKING |
|----------|---------------|---------------|---------|
| DCX124EH | 22K Ω | 22K Ω | C17 |
| DCX144EH | 47K Ω | 47K Ω | C20 |
| DCX143EH | 4.7K Ω | 4.7K Ω | C08 |
| DCX114YH | 10K Ω | 47K Ω | C14 |
| DCX123JH | 2.2K Ω | 47K Ω | C06 |
| DCX114EH | 10K Ω | 10K Ω | C13 |
| DCX143TH | 4.7K Ω | - | C07 |
| DCX114TH | 10K Ω | - | C12 |



SCHMATIC DIAGRAM, TOP VIEW

Maximum Ratings NPN Section @ T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|--|------|
| Supply Voltage | V _{CC} | 50 | V |
| Input Voltage | V _{IN} | -10 to +40 -10 to +40 -10 to +30 -6 to +40 -5 to +12 -10 to +40 -5 V _{max} -5 V _{max} | V |
| Output Current | I _O | 30 30 100 70 100 50 100 100 | mA |
| Output Current | I _C (Max) | 100 | mA |
| Power Dissipation (Total) | P _d | 150 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 1) | R _{θJA} | 833 | °C/W |
| Operating and Storage and Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

- Notes:
1. Mounted on FR4 Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.
 2. No purposefully added lead.

Maximum Ratings PNP Section @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|--|----------------|--|------------------|
| Supply Voltage | V_{CC} | 50 | V |
| Input Voltage DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH DCX143TH DCX114TH | V_{IN} | +10 to -40 +10 to -40 +10 to -30 +6 to -40 +5 to -12 +10 to -40 +5 V_{max} +5 V_{max} | V |
| Output Current DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH DCX143TH DCX114TH | I_O | -30 -30 -100 -70 -100 -50 -100 -100 | mA |
| Output Current All | I_C (Max) | -100 | mA |
| Power Dissipation (Total) | P_d | 150 | mW |
| Operating and Storage and Temperature Range | T_j, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics NPN Section @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic (DDC143TH & DDC114TH only) | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------|-----|-----|-----|---------------|---|
| Collector-Base Breakdown Voltage | BV_{CBO} | 50 | — | — | V | $I_C = 50\mu\text{A}$ |
| Collector-Emitter Breakdown Voltage | BV_{CEO} | 50 | — | — | V | $I_C = 1\text{mA}$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | 5 | — | — | V | $I_E = 50\mu\text{A}$ |
| Collector Cutoff Current | I_{CBO} | — | — | 0.5 | μA | $V_{CB} = 50\text{V}$ |
| Emitter Cutoff Current | I_{EBO} | — | — | 0.5 | μA | $V_{EB} = 4\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | — | 0.3 | V | $I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DCX143TH $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DCX114TH |
| DC Current Transfer Ratio | h_{FE} | 100 | 250 | 600 | — | $I_C = 1\text{mA}, V_{CE} = 5\text{V}$ |
| Gain-Bandwidth Product* | f_T | — | 250 | — | MHz | $V_{CE} = 10\text{V}, I_E = -5\text{mA}, f = 100\text{MHz}$ |

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|--|------------------------------------|--|---------------|--|
| Input Voltage DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | $V_{I(off)}$ | 0.5 0.5 0.5 0.3 0.5 0.5 | 1.1 1.1 1.1 — — 1.1 | — | V | $V_{CC} = 5\text{V}, I_O = 100\mu\text{A}$ |
| Input Voltage DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | $V_{I(on)}$ | — | 1.9 1.9 1.9 — — 1.9 | 3.0 3.0 3.0 1.4 1.1 3.0 | V | $V_O = 0.3\text{V}, I_O = 5\text{mA}$ $V_O = 0.3\text{V}, I_O = 2\text{mA}$ $V_O = 0.3\text{V}, I_O = 20\text{mA}$ $V_O = 0.3\text{V}, I_O = 1\text{mA}$ $V_O = 0.3\text{V}, I_O = 5\text{mA}$ $V_O = 0.3\text{V}, I_O = 10\text{mA}$ |
| Output Voltage DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | $V_{O(on)}$ | — | 0.1 | 0.3 | V | $I_O/I_I = 10\text{mA} / 0.5\text{mA}$ $I_O/I_I = 10\text{mA} / 0.5\text{mA}$ $I_O/I_I = 10\text{mA} / 0.5\text{mA}$ $I_O/I_I = 5\text{mA} / 0.25\text{mA}$ $I_O/I_I = 5\text{mA} / 0.25\text{mA}$ $I_O/I_I = 10\text{mA} / 0.5\text{mA}$ |
| Input Current DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | I_I | — | — | 0.36 0.18 1.8 0.88 3.6 0.88 | mA | $V_I = 5\text{V}$ |
| Output Current | $I_{O(off)}$ | — | — | 0.5 | μA | $V_{CC} = 50\text{V}, V_I = 0\text{V}$ |
| DC Current Gain DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | G_I | 56 68 20 68 80 30 | — | — | — | $V_O = 5\text{V}, I_O = 5\text{mA}$ $V_O = 5\text{V}, I_O = 5\text{mA}$ $V_O = 5\text{V}, I_O = 10\text{mA}$ $V_O = 5\text{V}, I_O = 10\text{mA}$ $V_O = 5\text{V}, I_O = 10\text{mA}$ $V_O = 5\text{V}, I_O = 5\text{mA}$ |

* Transistor - For Reference Only

Electrical Characteristics PNP Section @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic (DCX143TH & DCX114TH only) | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------|-----|-----|------|---------------|---|
| Collector-Base Breakdown Voltage | BV_{CBO} | -50 | — | — | V | $I_C = -50\mu\text{A}$ |
| Collector-Emitter Breakdown Voltage | BV_{CEO} | -50 | — | — | V | $I_C = -1\text{mA}$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | -5 | — | — | V | $I_E = -50\mu\text{A}$ |
| Collector Cutoff Current | I_{CBO} | — | — | -0.5 | μA | $V_{CB} = -50\text{V}$ |
| Emitter Cutoff Current | I_{EBO} | — | — | -0.5 | μA | $V_{EB} = -4\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | — | -0.3 | V | $I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DCX143TH $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DCX114TH |
| DC Current Transfer Ratio | h_{FE} | 100 | 250 | 600 | — | $I_C = -1\text{mA}, V_{CE} = -5\text{V}$ |
| Gain-Bandwidth Product* | f_T | — | 250 | — | MHz | $V_{CE} = -10\text{V}, I_E = 5\text{mA}, f = 100\text{MHz}$ |

| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------|--|--------------|----------------------------------|------|--|---------------|--|
| Input Voltage | DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | $V_{I(off)}$ | -0.5 | -1.1 | — | V | $V_{CC} = -5\text{V}, I_O = -100\mu\text{A}$ |
| | DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | | $V_{I(on)}$ | — | -1.9 | | |
| Output Voltage | DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | $V_{O(on)}$ | — | -0.1 | -0.3 | V | $I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -5\text{mA} / -0.25\text{mA}$ $I_O/I_I = -5\text{mA} / -0.25\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$ |
| Input Current | DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | I_I | — | — | -0.36 -0.18 -1.8 -0.88 -3.6 -0.88 | mA | $V_I = -5\text{V}$ |
| Output Current | | $I_{O(off)}$ | — | — | -0.5 | μA | $V_{CC} = 50\text{V}, V_I = 0\text{V}$ |
| DC Current Gain | DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH | G_I | 56 68 20 68 80 30 | — | — | — | $V_O = -5\text{V}, I_O = -5\text{mA}$ $V_O = -5\text{V}, I_O = -5\text{mA}$ $V_O = -5\text{V}, I_O = -10\text{mA}$ $V_O = -5\text{V}, I_O = -10\text{mA}$ $V_O = -5\text{V}, I_O = -10\text{mA}$ $V_O = -5\text{V}, I_O = -5\text{mA}$ |
| Gain-Bandwidth Product* | | f_T | — | 250 | — | MHz | $V_{CE} = -10\text{V}, I_E = -5\text{mA}, f = 100\text{MHz}$ |

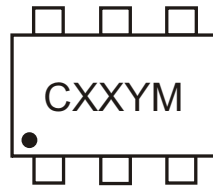
* Transistor - For Reference Only

Ordering Information (Note 3)

| Device | Packaging | Shipping |
|------------|-----------|------------------|
| DCX124EH-7 | SOT-563 | 3000/Tape & Reel |
| DCX144EH-7 | SOT-563 | 3000/Tape & Reel |
| DCX143EH-7 | SOT-563 | 3000/Tape & Reel |
| DCX114YH-7 | SOT-563 | 3000/Tape & Reel |
| DCX123JH-7 | SOT-563 | 3000/Tape & Reel |
| DCX114EH-7 | SOT-563 | 3000/Tape & Reel |
| DCX143TH-7 | SOT-563 | 3000/Tape & Reel |
| DCX114TH-7 | SOT-563 | 3000/Tape & Reel |

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

Marking Information



CXX = Product Type Marking Code (See Page 1)
 YM = Date Code Marking
 Y = Year ex: P = 2003
 M = Month ex: 9 = September

Date Code Key

| Year | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|------|------|------|------|------|------|------|------|
| Code | 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 - DCX143EH NPN SECTION

NEW PRODUCT

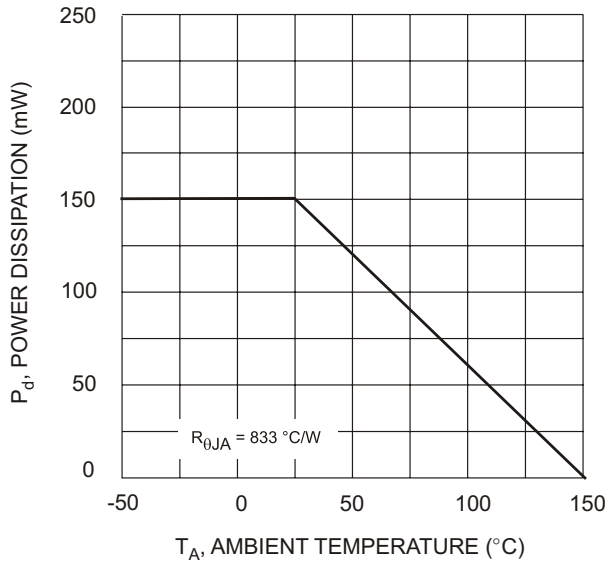


Fig. 1 Derating Curve - Total

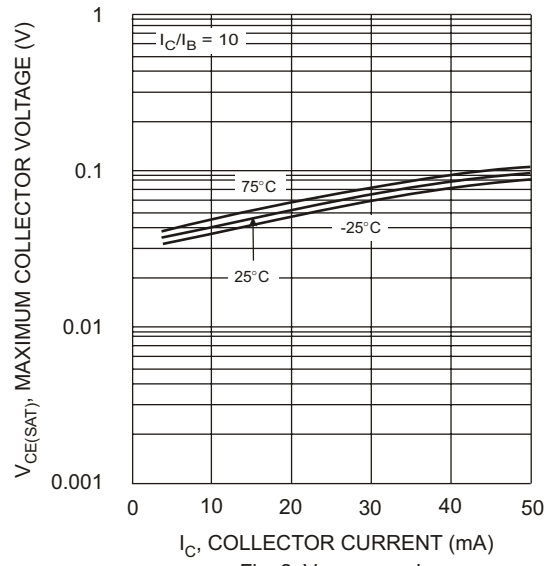


Fig. 2 $V_{CE(SAT)}$ vs. I_C

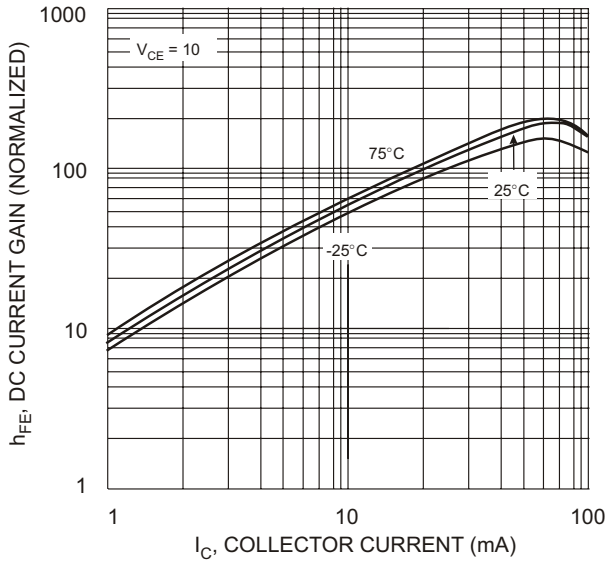


Fig. 3 DC CURRENT GAIN

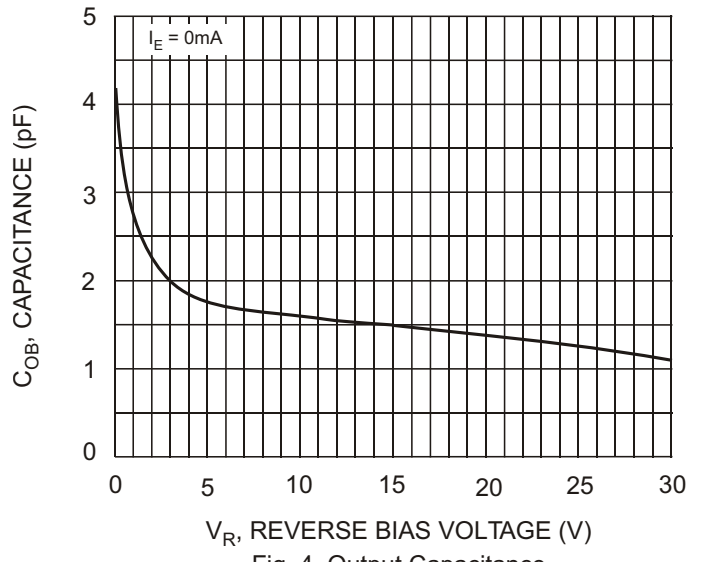


Fig. 4 Output Capacitance

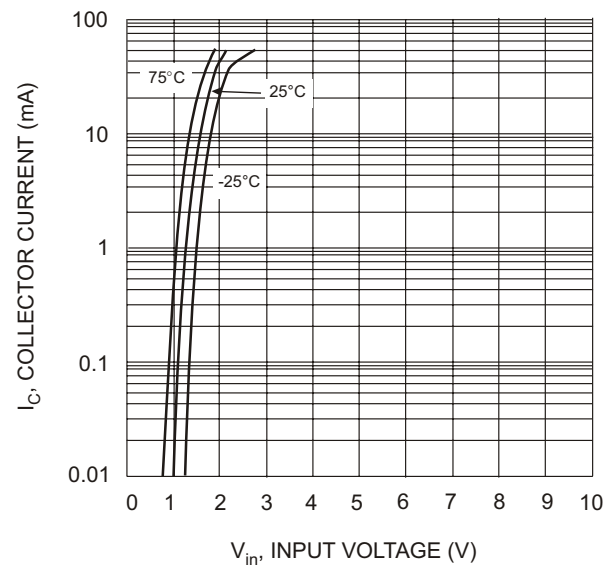


Fig. 5 Collector Current Vs. Input Voltage

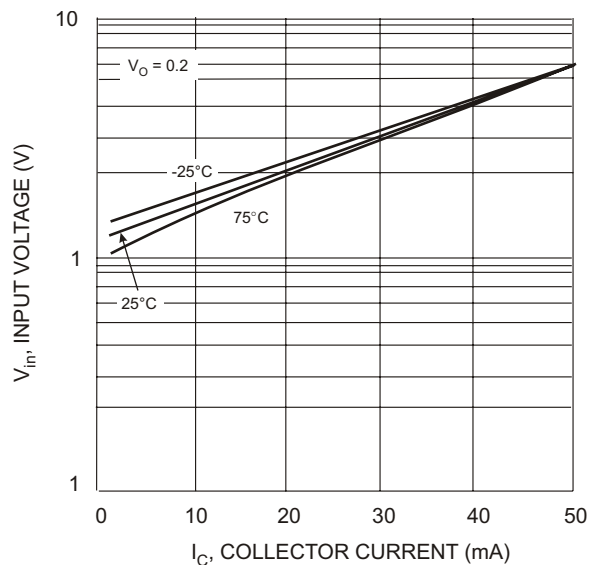


Fig. 6 Input Voltage vs. Collector Current

TYPICAL CURVES - DCX143EH PNP SECTION

NEW PRODUCT

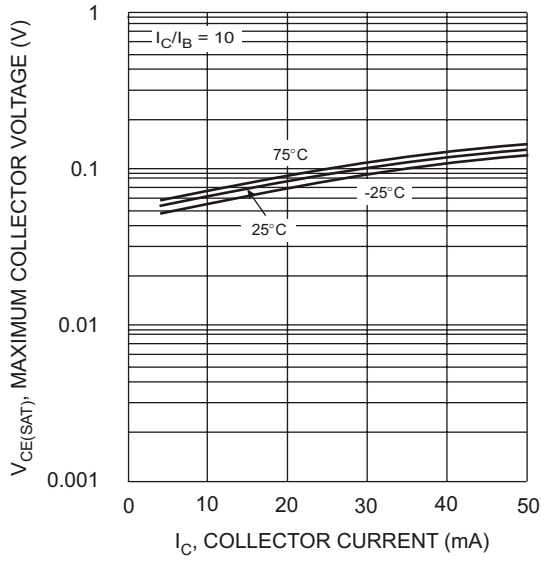


Fig. 7 $V_{CE(SAT)}$ vs. I_C

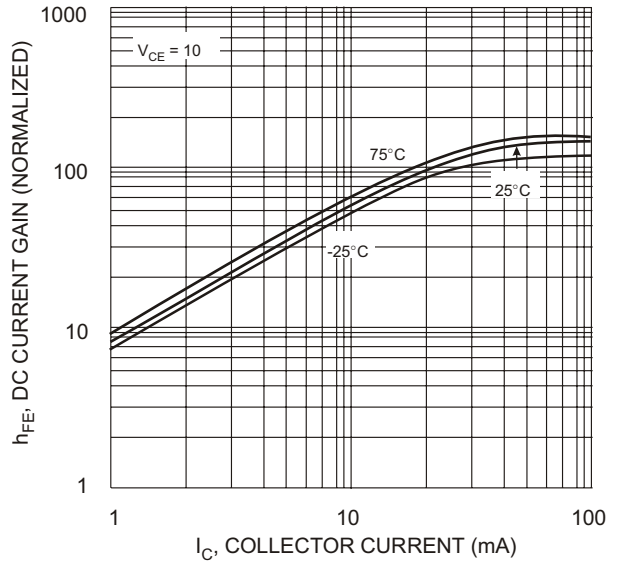


Fig. 8 DC Current Gain

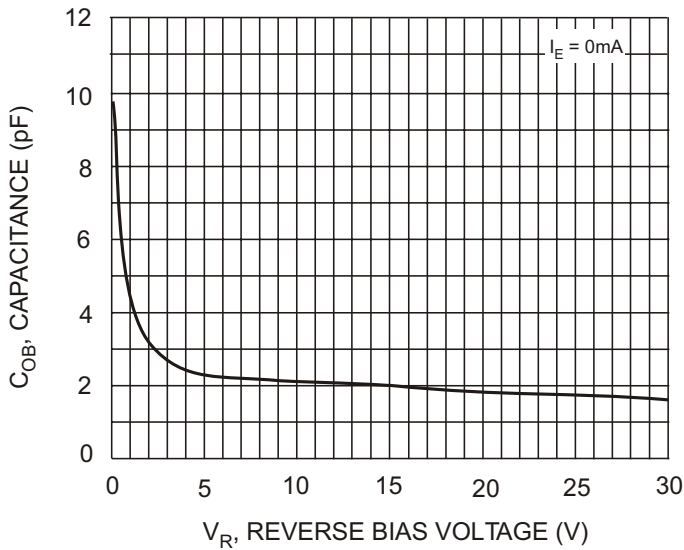


Fig. 9 Output Capacitance

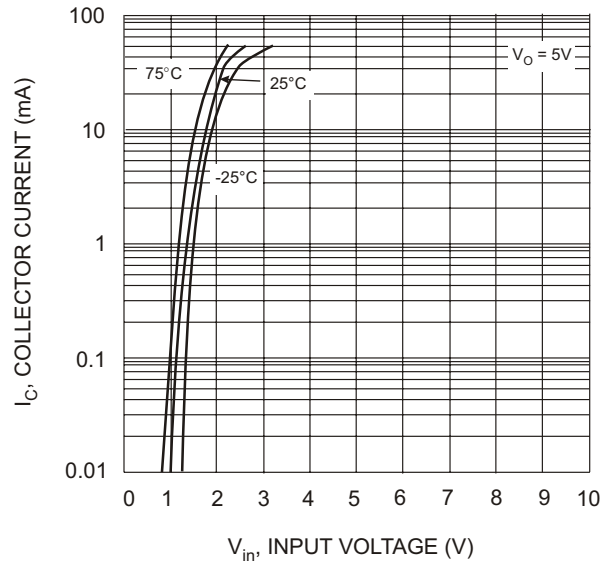


Fig. 10 Collector Current Vs. Input Voltage

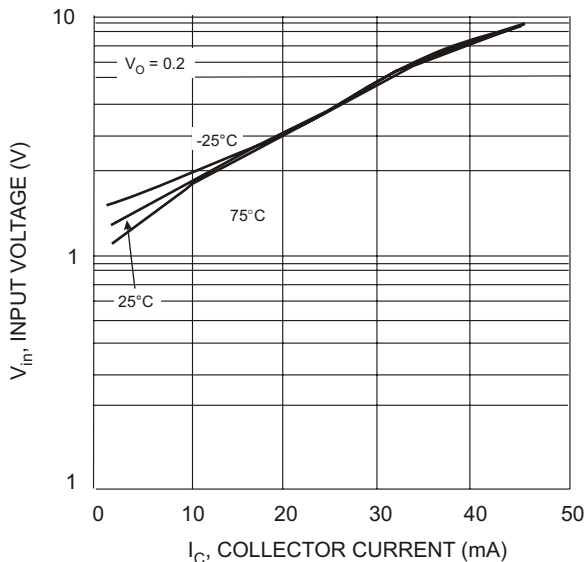


Fig. 11 Input Voltage vs. Collector Current