

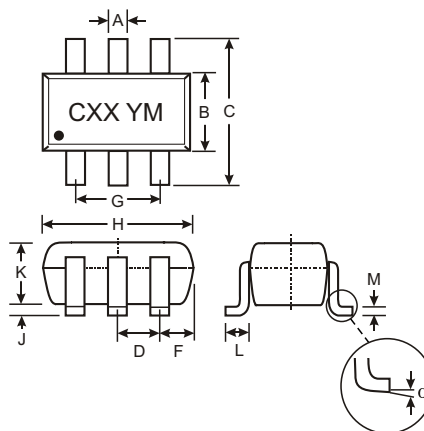
## COMPLEMENTARY NPN/PNP PRE-BIASED SMALL SIGNAL SOT-363 DUAL SURFACE MOUNT TRANSISTOR

### Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Also Available in Lead Free Version

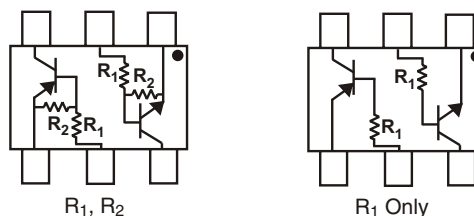
### Mechanical Data

- Case: SOT-363, 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
- Also Available in Lead Free Plating (Matte Tin Finish). Please see Ordering Information, Note 4, on Page 3
- Terminal Connections: See Diagram
- Marking: Date Code and Marking Code (See Diagrams & Page 4)
- Weight: 0.006 grams (approx.)
- Ordering Information (See Page 3)



| 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 |
| $\alpha$             | 0°           | 8°   |
| All Dimensions in mm |              |      |

| P/N      | R1            | R2           | MARKING |
|----------|---------------|--------------|---------|
| DCX124EU | 22K $\Omega$  | 22K $\Omega$ | C17     |
| DCX144EU | 47K $\Omega$  | 47K $\Omega$ | C20     |
| DCX114YU | 10K $\Omega$  | 47K $\Omega$ | C14     |
| DCX123JU | 2.2K $\Omega$ | 47K $\Omega$ | C06     |
| DCX114EU | 10K $\Omega$  | 10K $\Omega$ | C13     |
| DCX143TU | 4.7K $\Omega$ | -            | C07     |
| DCX114TU | 10K $\Omega$  | -            | C12     |



SCHEMATIC DIAGRAM

### Maximum Ratings NPN Section @ 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>                    | 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.

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

| Characteristic                                                                                                | Symbol          | Value                                                                                            | Unit               |
|---------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------|--------------------|
| Supply Voltage, (3) to (1)                                                                                    | $V_{CC}$        | 50                                                                                               | V                  |
| Input Voltage, (2) to (1)<br>DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU<br>DCX143TU<br>DCX114TU | $V_{IN}$        | +10 to -40<br>+10 to -40<br>+6 to -40<br>+5 to -12<br>+10 to -40<br>+5 $V_{max}$<br>+5 $V_{max}$ | V                  |
| Output Current<br>DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU<br>DCX143TU<br>DCX114TU            | $I_O$           | -30<br>-30<br>-70<br>-100<br>-50<br>-100<br>-100                                                 | mA                 |
| Output Current All                                                                                            | $I_C$ (Max)     | -100                                                                                             | mA                 |
| Power Dissipation (Total)                                                                                     | $P_d$           | 200                                                                                              | mW                 |
| Thermal Resistance, Junction to Ambient Air (Note 1)                                                          | $R_{\theta JA}$ | 625                                                                                              | $^\circ\text{C/W}$ |
| Operating and Storage and Temperature Range                                                                   | $T_j, T_{STG}$  | -55 to +150                                                                                      | $^\circ\text{C}$   |

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.

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

| Characteristic (DDC143TU & DDC114TU 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 | $\mu\text{A}$ | $V_{CB} = 50\text{V}$                                                                               |
| Emitter Cutoff Current                    | $I_{EBO}$     | —   | —   | 0.5 | $\mu\text{A}$ | $V_{EB} = 4\text{V}$                                                                                |
| Collector-Emitter Saturation Voltage      | $V_{CE(sat)}$ | —   | —   | 0.3 | V             | $I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DCX143TU<br>$I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DCX114TU |
| DC Current Transfer Ratio                 | $h_{FE}$      | 100 | 250 | 600 | —             | $I_C = 1\text{mA}, V_{CE} = 5\text{V}$                                                              |
| Input Resistor ( $R_1$ ) Tolerance        | $\Delta R_1$  | -30 | —   | +30 | %             | —                                                                                                   |
| 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<br>DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU   | $V_{I(off)}$ | 0.5<br>0.5<br>0.3<br>—<br>0.5 | 1.1<br>1.1<br>—<br>—<br>1.1 | —                                   | V             | $V_{CC} = 5\text{V}, I_O = 100\mu\text{A}$                                                                                                                                                                     |
| Input Voltage<br>DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU   | $V_{I(on)}$  | —                             | 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             | $V_O = 0.3, I_O = 5\text{mA}$<br>$V_O = 0.3, I_O = 2\text{mA}$<br>$V_O = 0.3, I_O = 1\text{mA}$<br>$V_O = 0.3, I_O = 5\text{mA}$<br>$V_O = 0.3, I_O = 10\text{mA}$                                             |
| Output Voltage<br>DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU  | $V_{O(on)}$  | —                             | 0.1                         | 0.3                                 | V             | $I_O/I_I = 10\text{mA} / 0.5\text{mA}$<br>$I_O/I_I = 10\text{mA} / 0.5\text{mA}$<br>$I_O/I_I = 5\text{mA} / 0.25\text{mA}$<br>$I_O/I_I = 5\text{mA} / 0.25\text{mA}$<br>$I_O/I_I = 10\text{mA} / 0.5\text{mA}$ |
| Input Current<br>DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU   | $I_I$        | —                             | —                           | 0.36<br>0.18<br>0.88<br>3.6<br>0.88 | mA            | $V_I = 5\text{V}$                                                                                                                                                                                              |
| Output Current                                                              | $I_{O(off)}$ | —                             | —                           | 0.5                                 | $\mu\text{A}$ | $V_{CC} = 50\text{V}, V_I = 0\text{V}$                                                                                                                                                                         |
| DC Current Gain<br>DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU | $G_I$        | 56<br>68<br>68<br>80<br>30    | —                           | —                                   | —             | $V_O = 5\text{V}, I_O = 5\text{mA}$<br>$V_O = 5\text{V}, I_O = 5\text{mA}$<br>$V_O = 5\text{V}, I_O = 10\text{mA}$<br>$V_O = 5\text{V}, I_O = 10\text{mA}$<br>$V_O = 5\text{V}, I_O = 5\text{mA}$              |
| Input Resistor ( $R_1$ ) Tolerance                                          | $\Delta R_1$ | -30                           | —                           | +30                                 | %             | —                                                                                                                                                                                                              |
| Resistance Ratio Tolerance                                                  | $R_2/R_1$    | -20                           | —                           | +20                                 | %             | —                                                                                                                                                                                                              |
| 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

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

| Characteristic (DCX143TU & DCX114TU 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 | $\mu\text{A}$ | $V_{CB} = -50\text{V}$                                                                              |
| Emitter Cutoff Current                    | $I_{EBO}$     | —   | —   | -0.5 | $\mu\text{A}$ | $V_{EB} = -4\text{V}$                                                                               |
| Collector-Emitter Saturation Voltage      | $V_{CE(sat)}$ | —   | —   | -0.3 | V             | $I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DCX143TU<br>$I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DCX114TU |
| DC Current Transfer Ratio                 | $h_{FE}$      | 100 | 250 | 600  | —             | $I_C = -1\text{mA}$ , $V_{CE} = -5\text{V}$                                                         |
| Input Resistor ( $R_1$ ) Tolerance        | $\Delta R_1$  | -30 | —   | +30  | %             | —                                                                                                   |
| 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                      | DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU | $V_{I(off)}$ | -0.5<br>-0.5<br>-0.3<br>-0.5<br>-0.5 | -1.1<br>-1.1<br>—<br>—<br>-1.1       | —                                        | $V_{CC} = -5\text{V}$ , $I_O = -100\mu\text{A}$                                                                                                                                                                                 |
|                                    | DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU |              | —<br>—<br>—<br>—<br>—                | -1.9<br>-1.9<br>-1.4<br>-1.1<br>-1.9 | -3.0<br>-3.0<br>-3.0<br>-3.0<br>-3.0     |                                                                                                                                                                                                                                 |
| Output Voltage                     | DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU | $V_{O(on)}$  | —                                    | -0.1                                 | -0.3                                     | $V$<br>$I_O/I_I = -10\text{mA} / -0.5\text{mA}$<br>$I_O/I_I = -10\text{mA} / -0.5\text{mA}$<br>$I_O/I_I = -5\text{mA} / -0.25\text{mA}$<br>$I_O/I_I = -5\text{mA} / -0.25\text{mA}$<br>$I_O/I_I = -10\text{mA} / -0.5\text{mA}$ |
| Input Current                      | DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU | $I_I$        | —                                    | —                                    | -0.36<br>-0.18<br>-0.88<br>-3.6<br>-0.88 | $\text{mA}$<br>$V_I = -5\text{V}$                                                                                                                                                                                               |
| Output Current                     |                                                          | $I_{O(off)}$ | —                                    | —                                    | -0.5                                     | $\mu\text{A}$<br>$V_{CC} = 50\text{V}$ , $V_I = 0\text{V}$                                                                                                                                                                      |
| DC Current Gain                    | DCX124EU<br>DCX144EU<br>DCX114YU<br>DCX123JU<br>DCX114EU | $G_I$        | 56<br>68<br>68<br>80<br>30           | —                                    | —                                        | $V_O = -5\text{V}$ , $I_O = -5\text{mA}$<br>$V_O = -5\text{V}$ , $I_O = -5\text{mA}$<br>$V_O = -5\text{V}$ , $I_O = -10\text{mA}$<br>$V_O = -5\text{V}$ , $I_O = -10\text{mA}$<br>$V_O = -5\text{V}$ , $I_O = -5\text{mA}$      |
| Input Resistor ( $R_1$ ) Tolerance | $\Delta R_1$                                             | -30          | —                                    | +30                                  | %                                        | —                                                                                                                                                                                                                               |
| Resistance Ratio Tolerance         | $R_2/R_1$                                                | -20          | —                                    | +20                                  | %                                        | —                                                                                                                                                                                                                               |
| Gain-Bandwidth Product*            | $f_T$                                                    | —            | 250                                  | —                                    | MHz                                      | $V_{CE} = -10\text{V}$ , $I_E = -5\text{mA}$ ,<br>$f = 100\text{MHz}$                                                                                                                                                           |

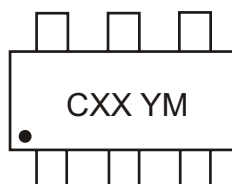
\* Transistor - For Reference Only

**Ordering Information** (Note 3)

| Device     | Packaging | Shipping         |
|------------|-----------|------------------|
| DCX124EU-7 | SOT-363   | 3000/Tape & Reel |
| DCX144EU-7 | SOT-363   | 3000/Tape & Reel |
| DCX114YU-7 | SOT-363   | 3000/Tape & Reel |
| DCX123JU-7 | SOT-363   | 3000/Tape & Reel |
| DCX114EU-7 | SOT-363   | 3000/Tape & Reel |
| DCX143TU-7 | SOT-363   | 3000/Tape & Reel |
| DCX114TU-7 | SOT-363   | 3000/Tape & Reel |

- Notes: 3. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.  
4. For Lead Free version (with Lead Free terminal finish) part number, please add "-F" suffix to part number above.  
Example: DCX114TU-7-F.

## Marking Information



CXX = 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 - DCX123JU**
**PNP SECTION**

NEW PRODUCT

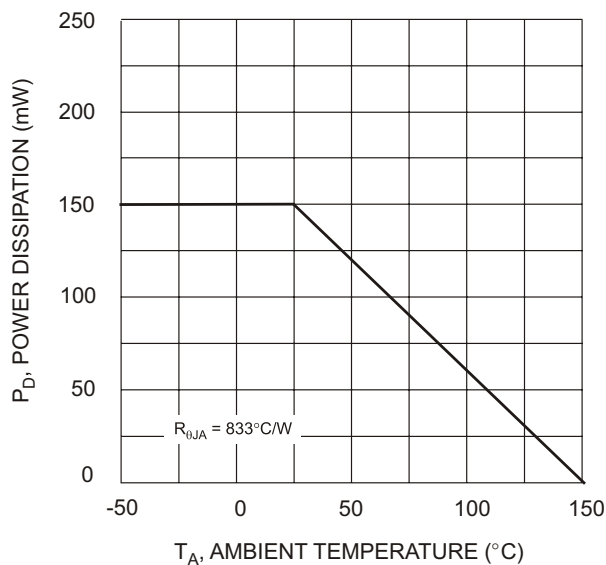


Fig. 1 Derating Curve

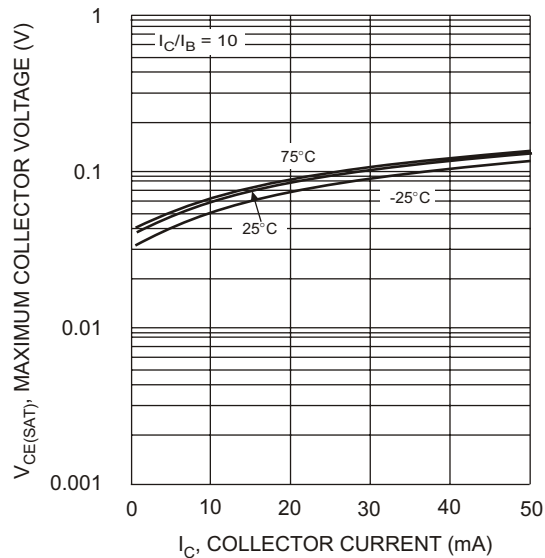
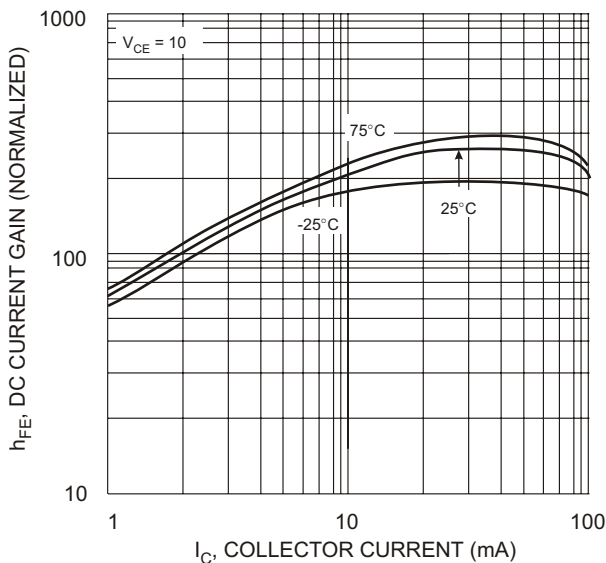

 Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$ 


Fig. 3 DC Current Gain

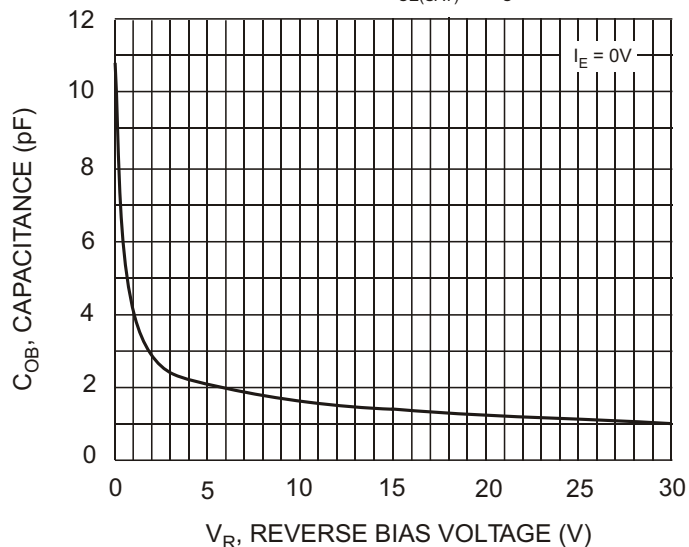


Fig. 4 Output Capacitance

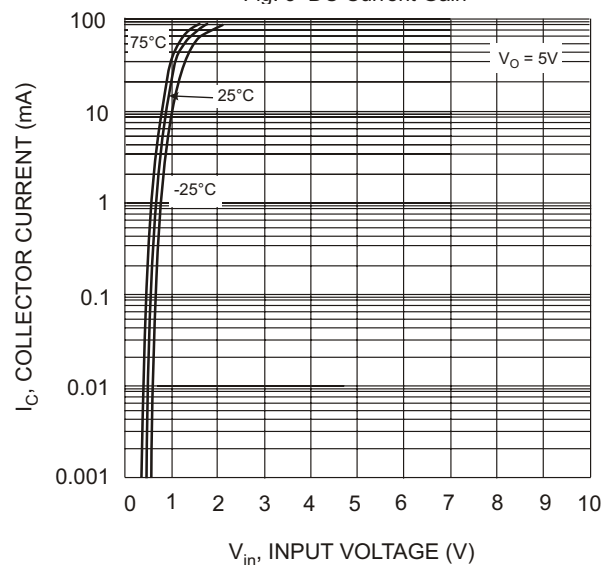


Fig. 5 Collector Current Vs. Input Voltage

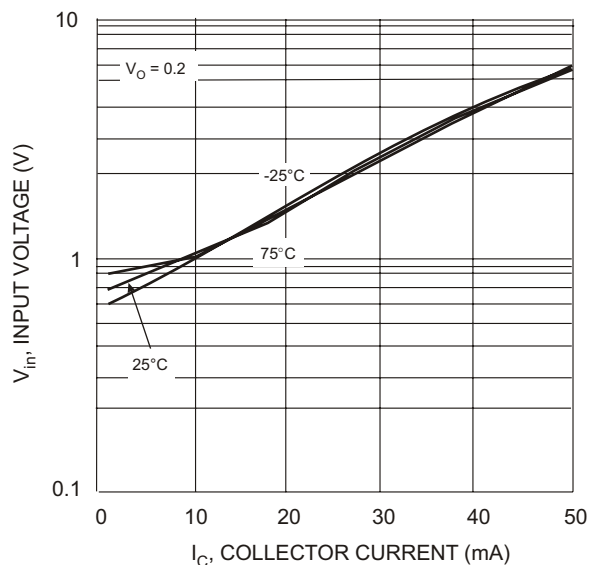


Fig. 6 Input Voltage vs. Collector Current

# TYPICAL CURVES - DCX123JU NPN SECTION

NEW PRODUCT

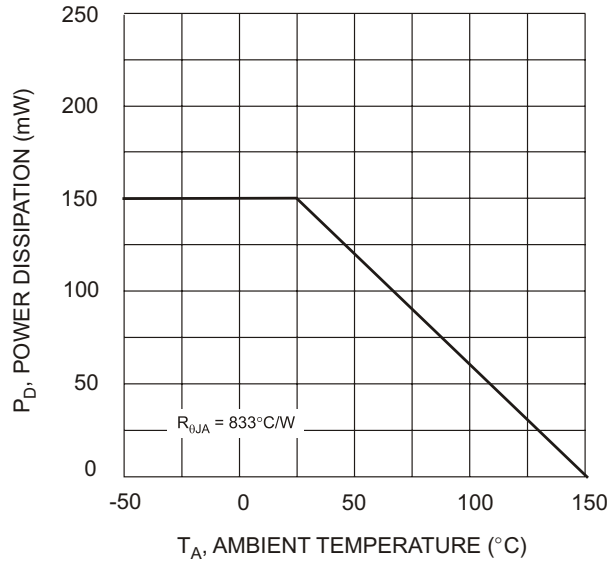


Fig. 1 Derating Curve

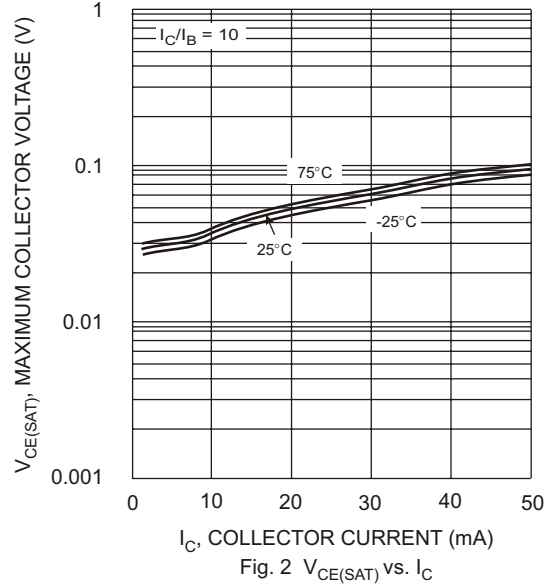


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

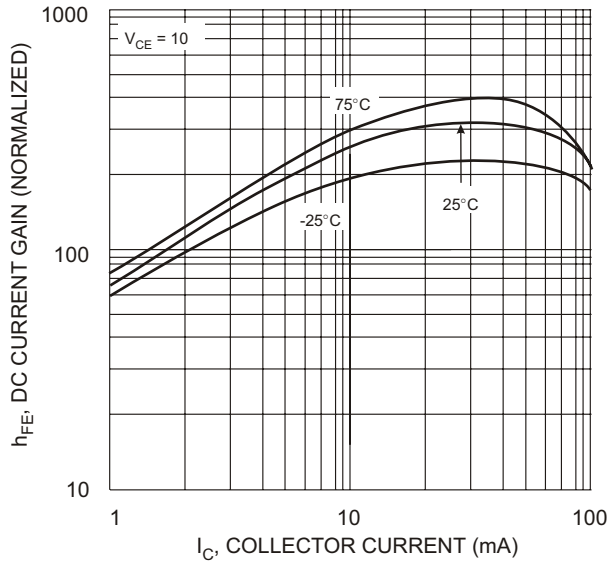


Fig. 3 DC Current Gain

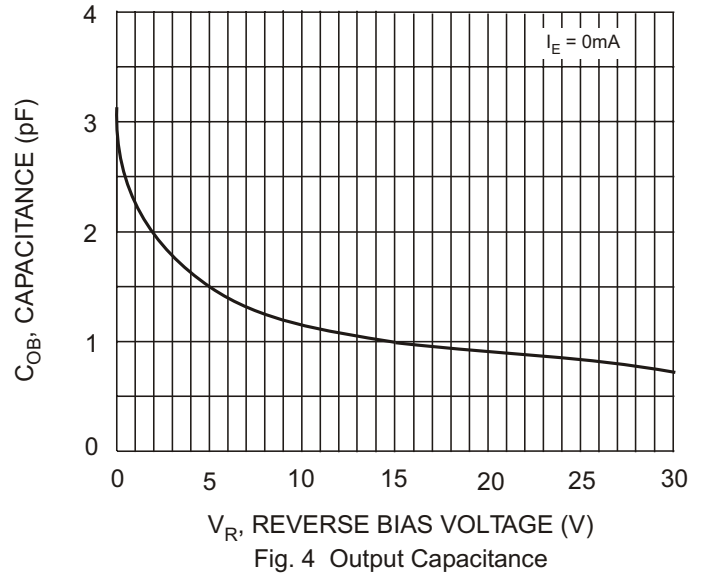


Fig. 4 Output Capacitance

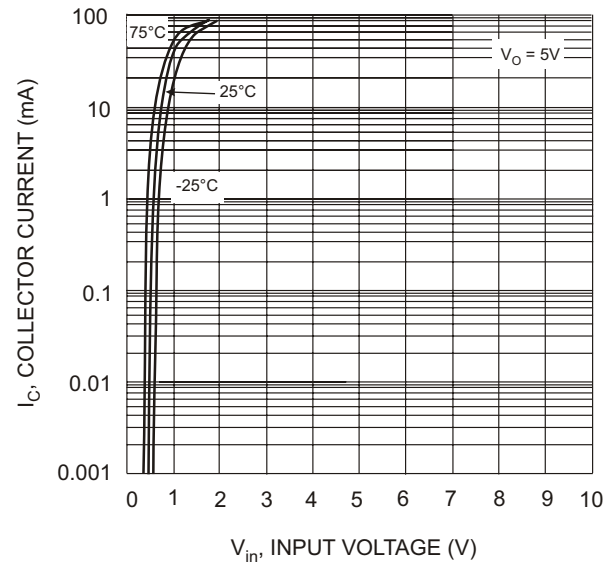


Fig. 5 Collector Current Vs. Input Voltage

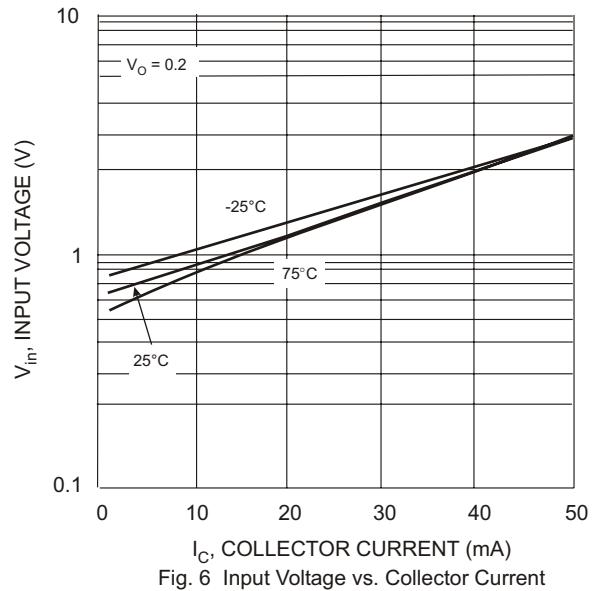


Fig. 6 Input Voltage vs. Collector Current

# TYPICAL CURVES - DCX114TU

## PNP SECTION

NEW PRODUCT

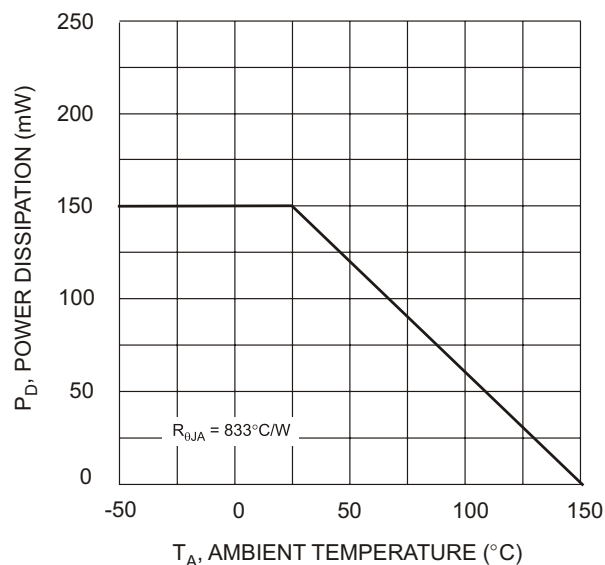


Fig. 1 Derating Curve

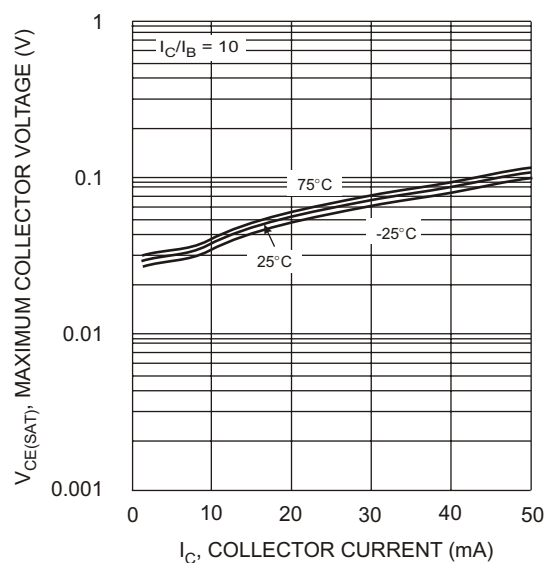


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

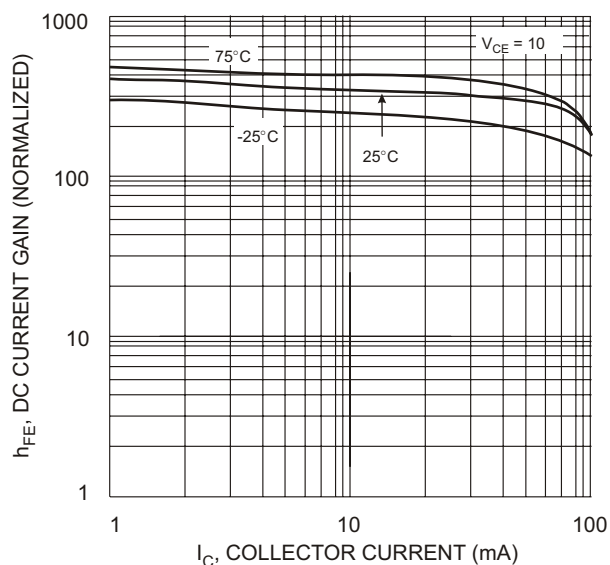


Fig. 3 DC Current Gain

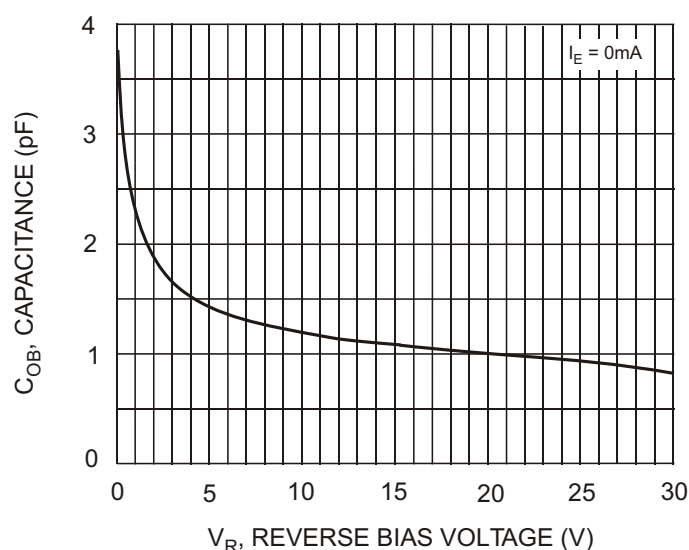


Fig. 4 Output Capacitance

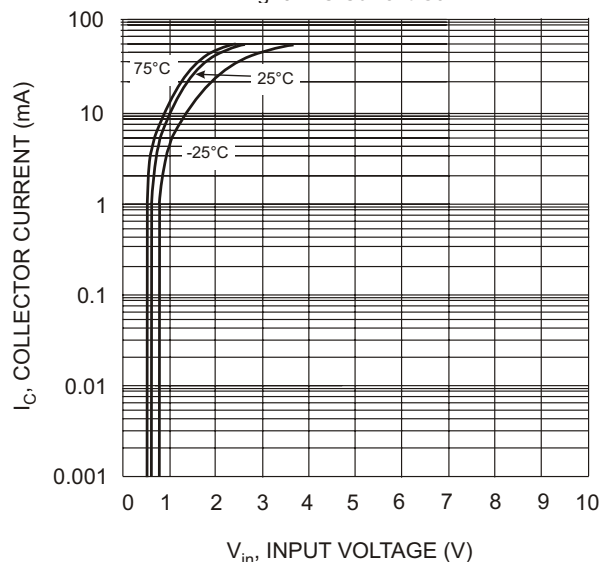


Fig. 5 Collector Current Vs. Input Voltage

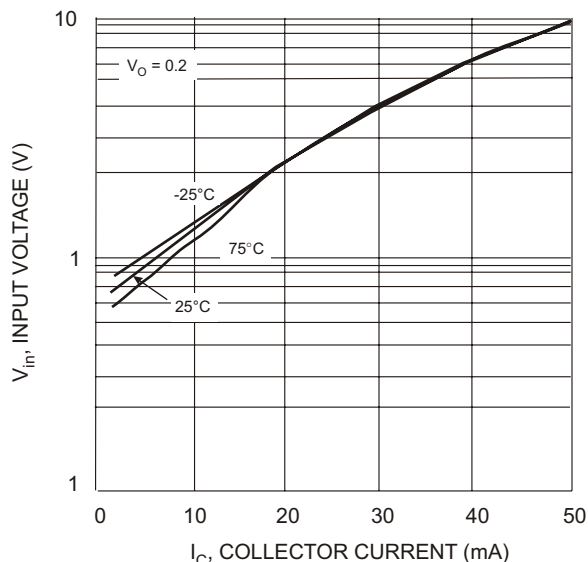


Fig. 6 Input Voltage vs. Collector Current

# TYPICAL CURVES - DCX114TU

## NPN SECTION

NEW PRODUCT

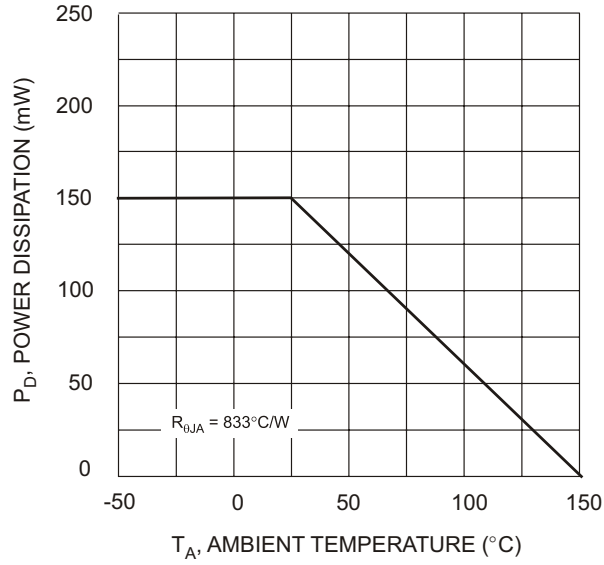


Fig. 1 Derating Curve

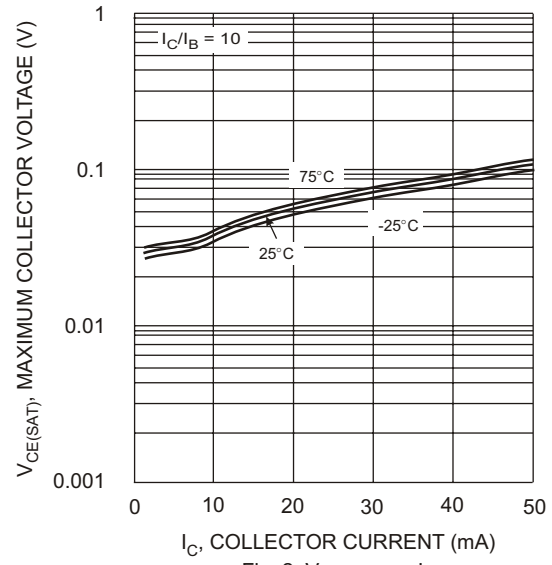


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

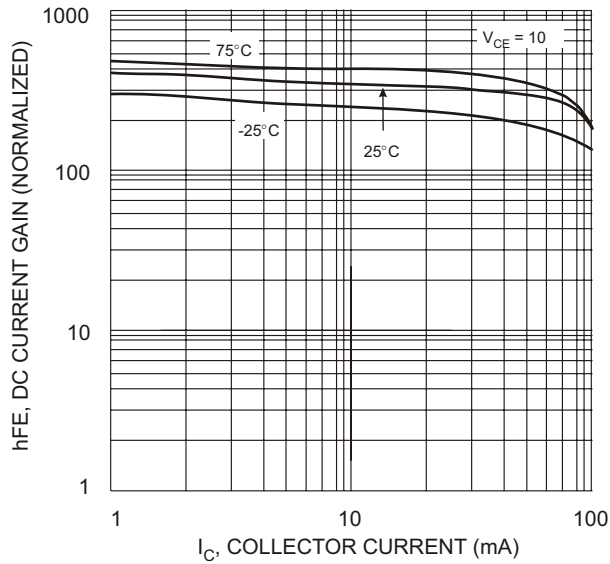


Fig. 3 DC Current Gain

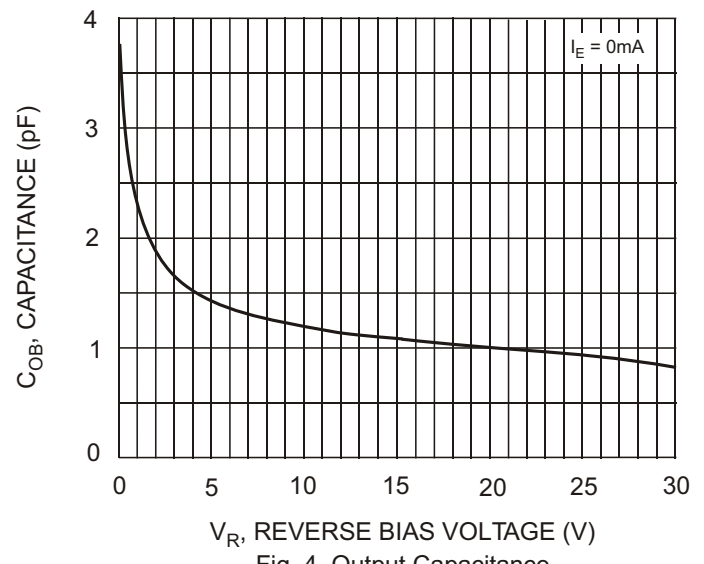


Fig. 4 Output Capacitance

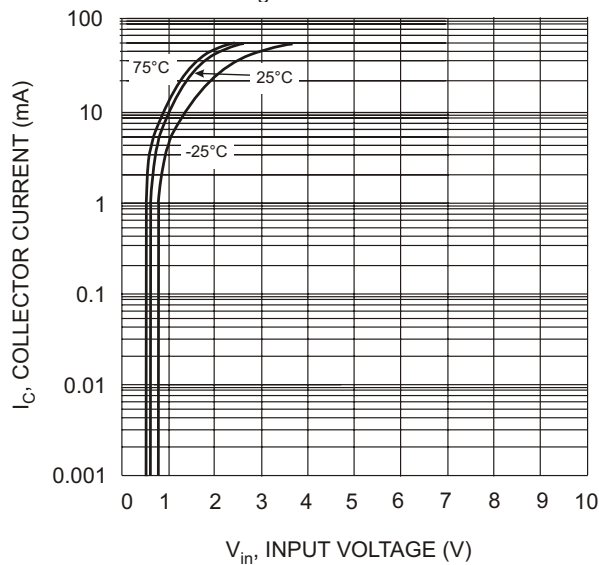


Fig. 5 Collector Current Vs. Input Voltage

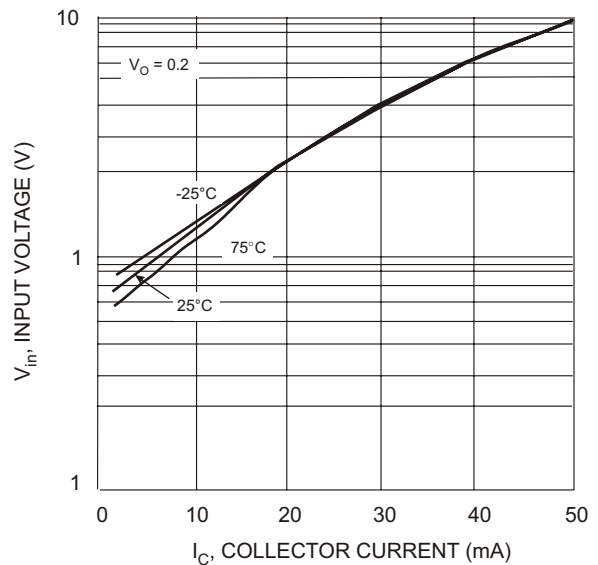


Fig. 6 Input Voltage vs. Collector Current