

**COMPLEMENTARY NPN/PNP PRE-BIASED  
SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR**
**Features**

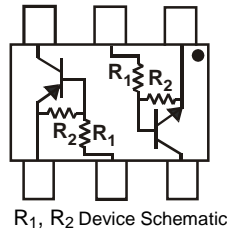
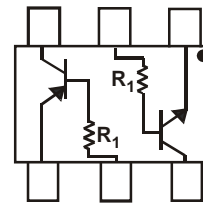
- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

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

**Mechanical Data**

- Case: SOT-563
- 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 Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208<sup>(e3)</sup>
- Terminal Connections: See Diagram
- Weight: 0.005 grams (Approximate)

SCHEMATIC DIAGRAM, TOP VIEW


 R<sub>1</sub>, R<sub>2</sub> Device Schematic

 R<sub>1</sub> Only Device Schematic

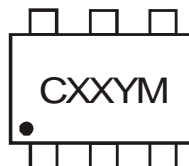
**Ordering Information (Note 4)**

| Device     | Packaging | Shipping          |
|------------|-----------|-------------------|
| DCX124EH-7 | SOT-563   | 3,000/Tape & Reel |
| DCX144EH-7 | SOT-563   | 3,000/Tape & Reel |
| DCX143EH-7 | SOT-563   | 3,000/Tape & Reel |
| DCX114YH-7 | SOT-563   | 3,000/Tape & Reel |
| DCX123JH-7 | SOT-563   | 3,000/Tape & Reel |
| DCX114EH-7 | SOT-563   | 3,000/Tape & Reel |
| DCX143TH-7 | SOT-563   | 3,000/Tape & Reel |
| DCX114TH-7 | SOT-563   | 3,000/Tape & Reel |

- 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](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**

SOT-563



CXX = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: P = 2003  
 M = Month ex: 9 = September

Date Code Key

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|
| Code | 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   |

**Maximum Ratings NPN Section** (@ $T_A = +25^\circ\text{C}$  unless otherwise specified.)

| Characteristic                              |  | Symbol          | Value  | Unit               |
|---|--|-----------------|--|--------------------|
| Supply Voltage                              |  | $V_{CC}$        | 50   | V                  |
| Input Voltage                               | DCX124EH<br>DCX144EH<br>DCX143EH<br>DCX114YH<br>DCX123JH<br>DCX114EH<br>DCX143TH<br>DCX114TH | $V_{IN}$        | -10 to +40<br>-10 to +40<br>-10 to +30<br>-6 to +40<br>-5 to +12<br>-10 to +40<br>-5V max<br>-5V max | V                  |
| Output Current                              | DCX124EH<br>DCX144EH<br>DCX143EH<br>DCX114YH<br>DCX123JH<br>DCX114EH<br>DCX143TH<br>DCX114TH | $I_O$           | 30<br>30<br>100<br>70<br>100<br>50<br>100<br>100   | mA                 |
| Output Current                              | All  | $I_C$ (Max)     | 100  | mA                 |
| Power Dissipation                           | (Total)  | $P_d$           | 150  | mW                 |
| Thermal Resistance, Junction to Ambient Air | (Note 5)   | $R_{\theta JA}$ | 833  | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range     |  | $T_j, T_{STG}$  | -55 to +150  | $^\circ\text{C}$   |

Note: 5. Mounted on FR4 Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.

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

**Electrical Characteristics NPN Section** (@T<sub>A</sub> = +25°C unless otherwise specified.)

| Characteristic (DDC143TH & DDC114TH only) | Symbol               | Min      | Typ | Max | Unit | Test Condition  |   |
|---|----------------------|----------|-----|-----|------|---|---|
| Collector-Base Breakdown Voltage          | BV <sub>CB0</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>EB0</sub>    | 5        | —   | —   | V    | I <sub>E</sub> = 50μA   |   |
| Collector Cut-Off Current                 | I <sub>CB0</sub>     | —        | —   | 0.5 | μA   | V <sub>CB</sub> = 50V   |   |
| Emitter Cut-Off Current                   | I <sub>EB0</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 DCX143TH<br>I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DCX114TH |   |
| DC Current Transfer Ratio                 | h <sub>FE</sub>      | 100      | 250 | 600 | —    | I <sub>C</sub> = 1mA, V <sub>CE</sub> = 5V  |   |
| 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>  | DCX124EH | 0.5 | 1.1 | —    | V   | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA  |
|   |                      | DCX144EH | 0.5 | 1.1 |      |   |   |
| DCX143EH                                  |                      | 0.5      | 1.1 |     |      |   |   |
| DCX114YH                                  |                      | 0.3      | —   |     |      |   |   |
| DCX123JH                                  |                      | 0.5      | —   |     |      |   |   |
| DCX114EH                                  |                      | 0.5      | 1.1 |     |      |   |   |
| Input Voltage                             | V <sub>I(on)</sub>   | DCX124EH | —   | 1.9 | —    | —   | V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA   |
|   |                      | DCX144EH | —   | 1.9 |      |   |   |
|   |                      | DCX143EH | —   | 1.9 |      |   |   |
|   |                      | DCX114YH | —   | 1.4 |      |   |   |
|   |                      | DCX123JH | —   | 1.1 |      |   |   |
|   |                      | DCX114EH | —   | 3.0 |      |   |   |
| Output Voltage                            | V <sub>O(on)</sub>   | DCX124EH | —   | 0.1 | 0.3  | V   | I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA |
|   |                      | DCX144EH | —   |     |      |   |   |
|   |                      | DCX143EH | —   |     |      |   |   |
|   |                      | DCX114YH | —   |     |      |   |   |
|   |                      | DCX123JH | —   |     |      |   |   |
|   |                      | DCX114EH | —   |     |      |   |   |
| Input Current                             | I <sub>I</sub>       | DCX124EH | —   | —   | 0.36 | mA  | V <sub>I</sub> = 5V                           |
|   |                      | DCX144EH | —   | —   | 0.18 |   |   |
|   |                      | DCX143EH | —   | —   | 1.8  |   |   |
|   |                      | DCX114YH | —   | —   | 0.88 |   |   |
|   |                      | DCX123JH | —   | —   | 3.6  |   |   |
|   |                      | DCX114EH | —   | —   | 0.88 |   |   |
| 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>       | DCX124EH | 56  | —   | —    | —   | V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA     |
|   |                      | DCX144EH | 68  |     |      |   |   |
|   |                      | DCX143EH | 20  |     |      |   |   |
|   |                      | DCX114YH | 68  |     |      |   |   |
|   |                      | DCX123JH | 80  |     |      |   |   |
|   |                      | DCX114EH | 30  |     |      |   |   |

\* Transistor - For Reference Only

**Electrical Characteristics PNP Section** (@T<sub>A</sub> = +25°C unless otherwise specified.)

| Characteristic (DCX143TH & DCX114TH only) | Symbol               | Min | Typ | Max  | Unit | Test Condition  |
|---|----------------------|-----|-----|------|------|---|
| Collector-Base Breakdown Voltage          | BV <sub>CB0</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 Cut-Off Current                 | I <sub>CBO</sub>     | —   | —   | -0.5 | μA   | V <sub>CB</sub> = -50V  |
| Emitter Cut-Off 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 DCX143TH<br>I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DCX114TH |
| DC Current Transfer Ratio                 | h <sub>FE</sub>      | 100 | 250 | 600  | —    | I <sub>C</sub> = -1mA, V <sub>CE</sub> = -5V  |
| 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   |       |
|                         |                     | DCX144EH | -0.5 |       |      |  | -1.1  |
| DCX143EH                |                     | -0.5     | -1.1 |       |      |  |       |
| DCX114YH                |                     | -0.3     | —    |       |      |  |       |
| DCX123JH                |                     | -0.5     | —    |       |      |  |       |
| DCX114EH                |                     | -0.5     | -1.1 |       |      |  |       |
| Input Voltage           | V <sub>I(on)</sub>  | —        | -1.9 | -3.0  | V    | V <sub>O</sub> = -0.3V, I <sub>O</sub> = -5mA<br>V <sub>O</sub> = -0.3V, I <sub>O</sub> = -2mA<br>V <sub>O</sub> = -0.3V, I <sub>O</sub> = -20mA<br>V <sub>O</sub> = -0.3V, I <sub>O</sub> = -1mA<br>V <sub>O</sub> = -0.3V, I <sub>O</sub> = -5mA<br>V <sub>O</sub> = -0.3V, I <sub>O</sub> = -10mA           |       |
|                         |                     | DCX144EH | —    | -1.9  |      |  | -3.0  |
|                         |                     | DCX143EH | —    | -1.9  |      |  | -3.0  |
|                         |                     | DCX114YH | —    | —     |      |  | -1.4  |
|                         |                     | DCX123JH | —    | —     |      |  | -1.1  |
|                         |                     | DCX114EH | —    | -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> = -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 |       |
|                         |                     | DCX144EH | —    | -0.1  |      |  | -0.3  |
|                         |                     | DCX143EH | —    | -0.1  |      |  | -0.3  |
|                         |                     | DCX114YH | —    | —     |      |  | —     |
|                         |                     | DCX123JH | —    | —     |      |  | —     |
|                         |                     | DCX114EH | —    | -0.1  |      |  | -0.3  |
| Input Current           | I <sub>I</sub>      | —        | —    | -0.36 | mA   | V <sub>I</sub> = -5V   |       |
|                         |                     | DCX144EH | —    | —     |      |  | -0.18 |
|                         |                     | DCX143EH | —    | —     |      |  | -1.8  |
|                         |                     | DCX114YH | —    | —     |      |  | -0.88 |
|                         |                     | DCX123JH | —    | —     |      |  | -3.6  |
|                         |                     | DCX114EH | —    | —     |      |  | -0.88 |
| 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> = -10mA<br>V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA                      |       |
|                         |                     | DCX144EH |      |       |      |  | 68    |
|                         |                     | DCX143EH |      |       |      |  | 20    |
|                         |                     | DCX114YH |      |       |      |  | 68    |
|                         |                     | DCX123JH |      |       |      |  | 80    |
|                         |                     | DCX114EH |      |       |      |  | 30    |
| Gain-Bandwidth Product* | f <sub>T</sub>      | —        | 250  | —     | MHz  | V <sub>CE</sub> = -10V, I <sub>E</sub> = -5mA, f = 100MHz  |       |

\* Transistor - For Reference Only

Typical Curves – DCX143EH NPN Section

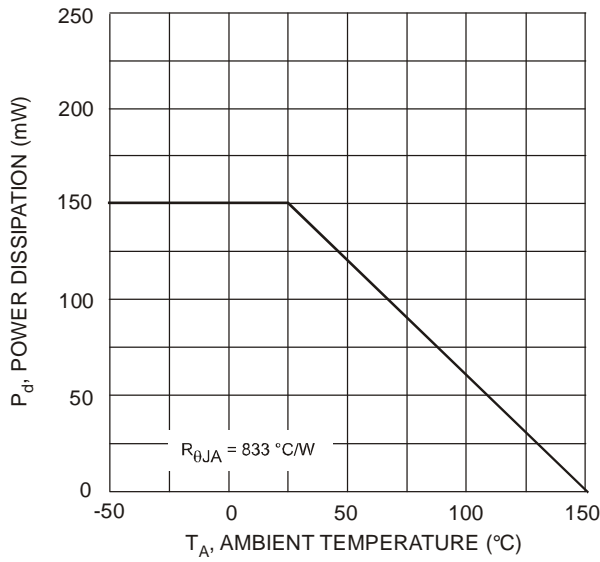


Fig. 1 Derating Curve - Total

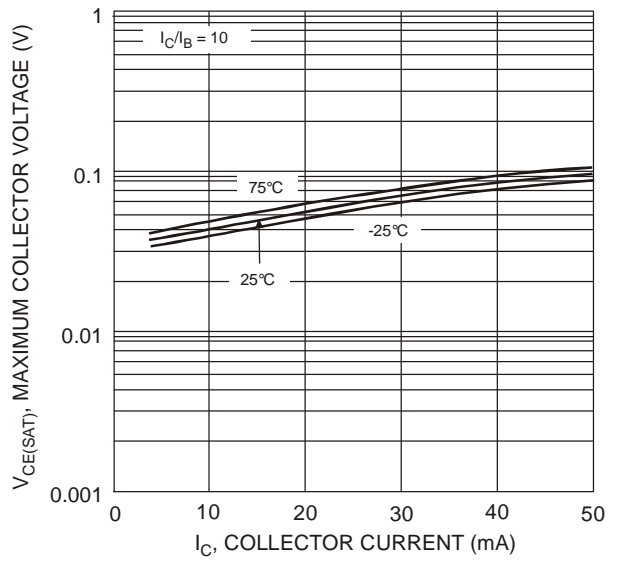


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

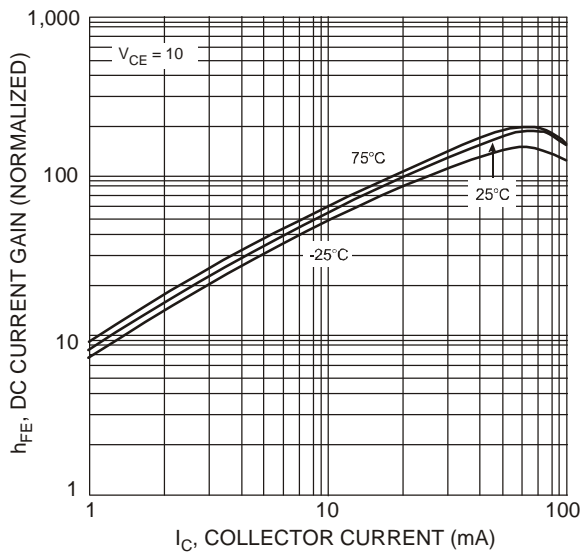


Fig. 3 DC Current Gain

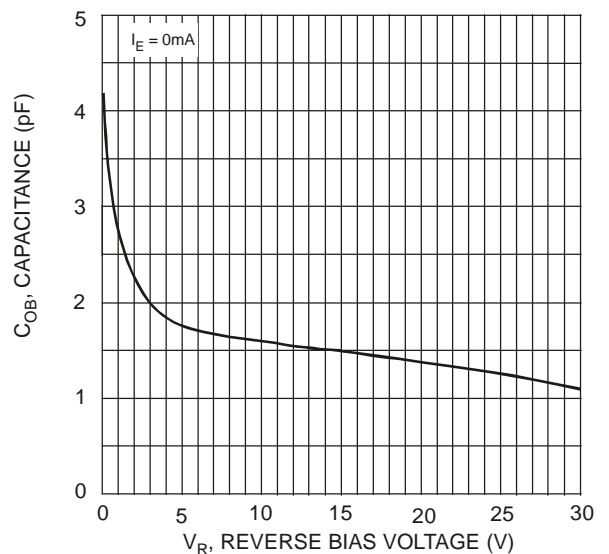


Fig. 4 Output Capacitance

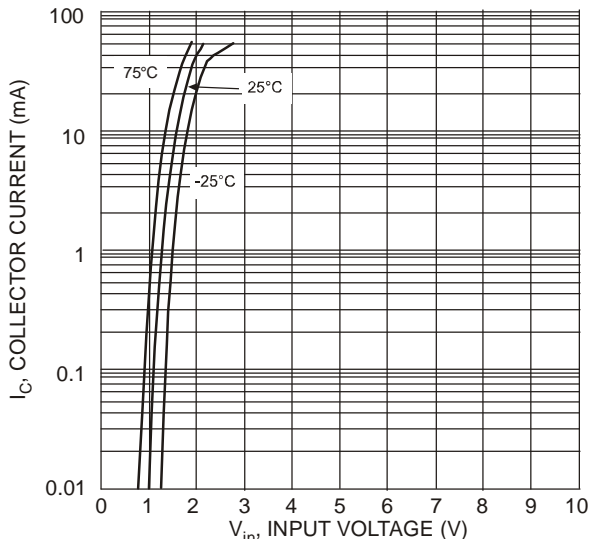


Fig. 5 Collector Current vs. Input Voltage

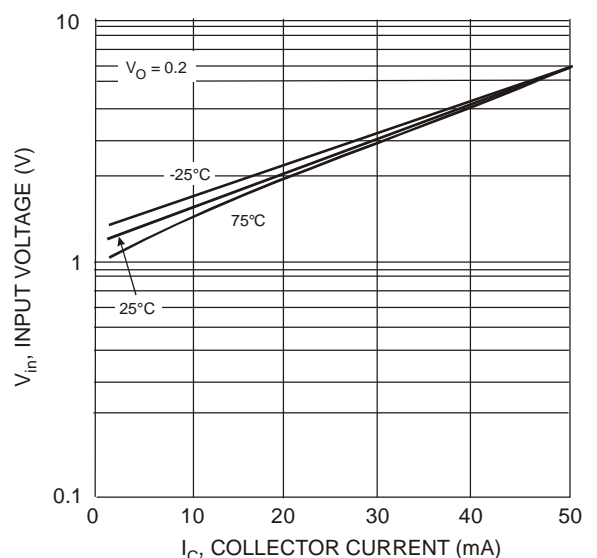
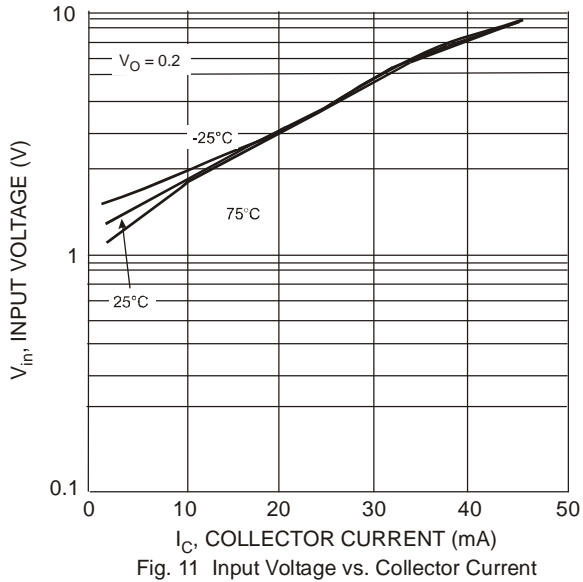
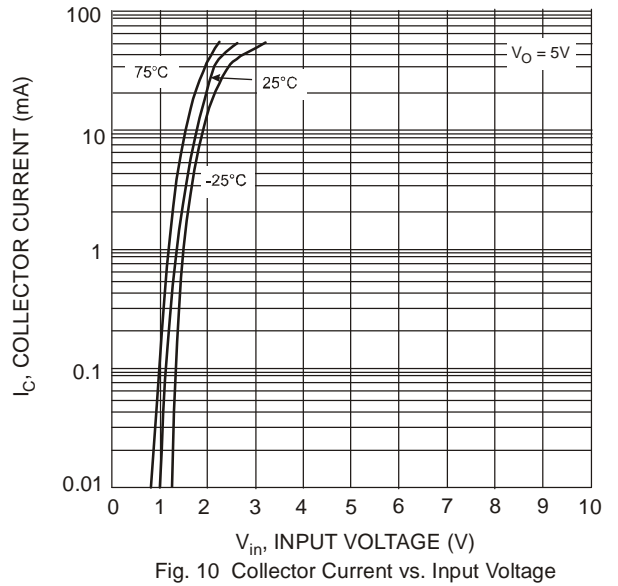
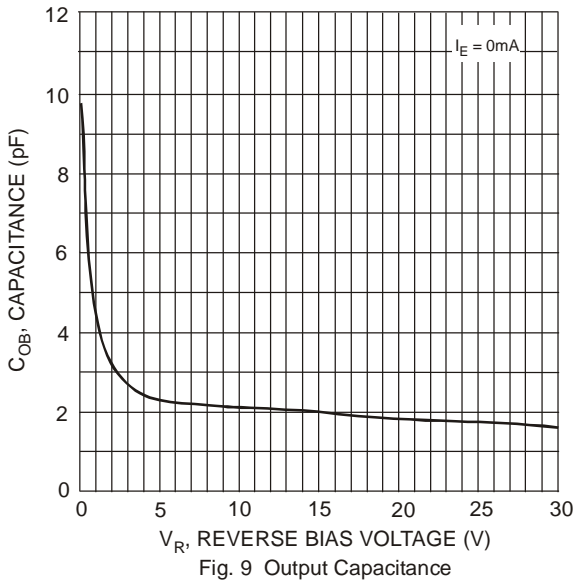
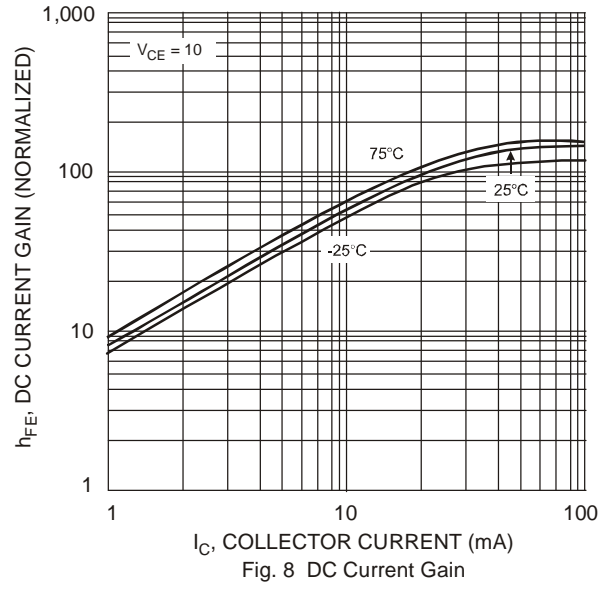
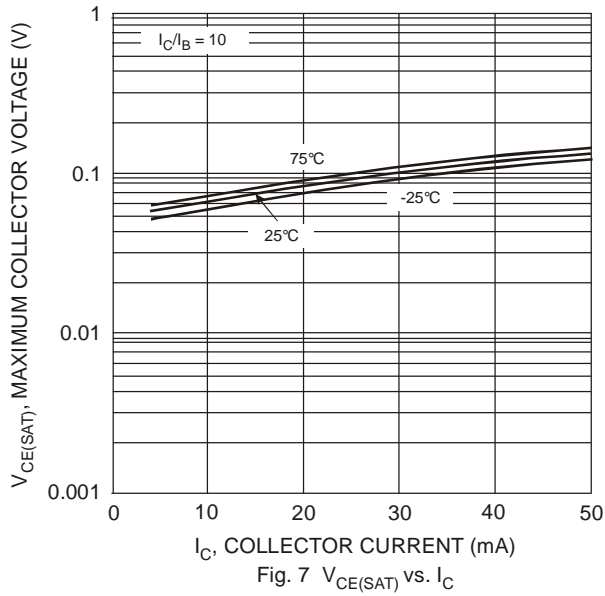


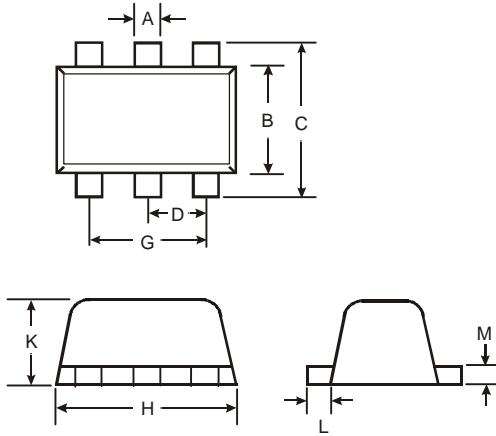
Fig. 6 Input Voltage vs. Collector Current

**Typical Curves – DCX143EH PNP Section**



**Package Outline Dimensions**

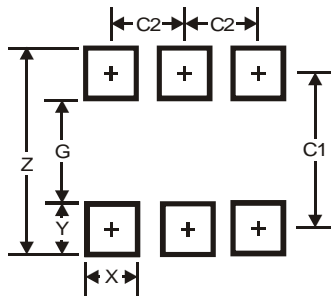
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT563               |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.15 | 0.30 | 0.20 |
| 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                    | 0.55 | 0.60 | 0.60 |
| L                    | 0.10 | 0.30 | 0.20 |
| M                    | 0.10 | 0.18 | 0.11 |
| All Dimensions in mm |      |      |      |

**Suggested Pad Layout**

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



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 2.2           |
| G          | 1.2           |
| X          | 0.375         |
| Y          | 0.5           |
| C1         | 1.7           |
| C2         | 0.5           |

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A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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