

SMALL SIGNAL COMPLEMENTARY PRE-BIASED DUAL TRANSISTOR
Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Surface Mount Package Suited for Automated Assembly
- **Totally Lead-Free & Fully RoHS compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

| Part Number | R1 (NOM) | R2 (NOM) |
|-------------|---------------|---------------|
| DCX124EU | 22K Ω | 22K Ω |
| DCX144EU | 47K Ω | 47K Ω |
| DCX114YU | 10K Ω | 47K Ω |
| DCX123JU | 2.2K Ω | 47K Ω |
| DCX114EU | 10K Ω | 10K Ω |
| DCX143EU | 4.7K Ω | 4.7K Ω |

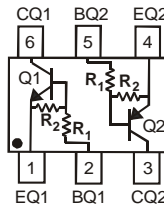
Mechanical Data

- Case: SOT363
- Case material: Molded Plastic. "Green" Molding Compound.
- Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.006 grams (approximate)

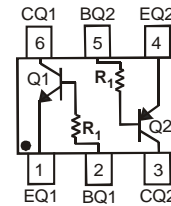
| Part Number | R1 Only |
|-------------|---------------|
| DCX143TU | 4.7K Ω |
| DCX114TU | 10K Ω |



Top View



R1, R2



R1 Only

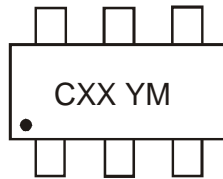
Device Schematic

Ordering Information (Note 3 & 4)

| Product | Grade | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-----------------|------------|---------|--------------------|-----------------|-------------------|
| DCX124EU-7-F | Commercial | C17 | 7 | 8 | 3,000 |
| DCX124EUQ-7-F | Automotive | C17 | 7 | 8 | 3,000 |
| DCX124EUQ-13-F | Automotive | C17 | 13 | 8 | 10,000 |
| DCX124EUQ-13R-F | Automotive | C17 | 13 | 8 | 10,000 |
| DCX144EU-7-F | Commercial | C20 | 7 | 8 | 3,000 |
| DCX144EU-7R-F | Commercial | C20 | 7 | 8 | 3,000 |
| DCX144EUQ-7-F | Automotive | C20 | 7 | 8 | 3,000 |
| DCX114YU-7-F | Commercial | C14 | 7 | 8 | 3,000 |
| DCX114YUQ-7-F | Automotive | C14 | 7 | 8 | 3,000 |
| DCX114YUQ-13-F | Automotive | C14 | 13 | 8 | 10,000 |
| DCX114YUQ-13R-F | Automotive | C14 | 13 | 8 | 10,000 |
| DCX123JU-7-F | Commercial | C06 | 7 | 8 | 3,000 |
| DCX114EU-7-F | Commercial | C13 | 7 | 8 | 3,000 |
| DCX114EUQ-7-F | Automotive | C13 | 7 | 8 | 3,000 |
| DCX114EUQ-13-F | Automotive | C13 | 13 | 8 | 10,000 |
| DCX143TU-7-F | Commercial | C07 | 7 | 8 | 3,000 |
| DCX143EU-7-F | Commercial | C08 | 7 | 8 | 3,000 |
| DCX114TU-7-F | Commercial | C12 | 7 | 8 | 3,000 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 3. -7R and -13R are parts rotated in the pocket tape by 180°. For packaging details, go to our website at <http://www.diodes.com>.
 4. Products with Q-suffix are automotive grade. Automotive products are electrical and thermal the same as the commercial, except where specified.

Marking Information



CXX = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: X = 2010)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|------|
| Code | X | Y | Z | A | B | C | D | E |

| 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°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|----------------------------------|----------------------|--|------|
| Supply Voltage <Pin: (6) to (1)> | V _{CC} | 50 | V |
| Input Voltage <Pin: (2) to (1)> | V _{IN} | DCX124EU -10 to +40 DCX144EU -10 to +40 DCX114YU -6 to +40 DCX123JU -5 to +12 DCX114EU -10 to +40 DCX143TU -5V max DCX143EU -10 to +30 DCX114TU -5V max | V |
| Output Current | I _O | DCX124EU 30 DCX144EU 30 DCX114YU 70 DCX123JU 100 DCX114EU 50 DCX143TU 100 DCX143EU 100 DCX114TU 100 | mA |
| Output Current | I _C (Max) | 100 | mA |

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

| Characteristic | Symbol | Value | Unit |
|----------------------------------|----------------------|--|------|
| Supply Voltage <Pin: (4) to (3)> | V _{CC} | 50 | V |
| Input Voltage <Pin: (5) to (4)> | V _{IN} | DCX124EU +10 to -40 DCX144EU +10 to -40 DCX114YU +6 to -40 DCX123JU +5 to -12 DCX114EU +10 to -40 DCX143TU +5V max DCX143EU +10 to -30 DCX114TU +5V max | V |
| Output Current | I _O | DCX124EU -30 DCX144EU -30 DCX114YU -70 DCX123JU -100 DCX114EU -50 DCX143TU -100 DCX143EU -100 DCX114TU -100 | mA |
| Output Current | I _C (Max) | -100 | mA |

Thermal Characteristics @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5 & 6) | P _D | 100 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 5) | R _{θJA} | 625 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Notes: 5. Mounted on FR4 PC Board with minimum recommended pad layout
6. 150mW per element must not be exceeded.

Electrical Characteristics NPN Section @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition | |
|--|--|--------------------------------|--|-------------------------------------|---|---|--|
| R1 Only (DCX143TU & DCX114TU) | | | | | | | |
| Collector-Base Breakdown Voltage | BV _{CBO} | 50 | — | — | V | I _C = 50μA | |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | 50 | — | — | V | I _C = 1mA | |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 5 | — | — | V | I _E = 50μA | |
| Collector Cutoff Current | I _{CBO} | — | — | 0.5 | μA | V _{CB} = 50V | |
| Emitter Cutoff Current | I _{EBO} | — | — | 0.5 | μA | V _{EB} = 4V | |
| Collector-Emitter Saturation Voltage | V _{CE(sat)} | — | — | 0.3 | V | I _C /I _B = 2.5mA / 0.25mA DCX143TU I _C /I _B = 1mA / 0.1mA DCX114TU | |
| DC Current Transfer Ratio | h _{FE} | 100 | 250 | 600 | — | I _C = 1mA, V _{CE} = 5V | |
| Input Resistor (R ₁) Tolerance | ΔR ₁ | -30 | — | +30 | % | — | |
| Gain-Bandwidth Product | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = -5mA, f = 100MHz | |
| R1/R2 Only | | | | | | | |
| Input Voltage | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU | V _{I(off)} | 0.5 0.5 0.3 0.5 0.5 0.5 | 1.1 1.1 - - 1.1 1.16 | — | V | V _{CC} = 5V, I _O = 100μA |
| | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU | V _{I(on)} | — | 1.9 1.9 - - 1.9 1.99 | 3.0 3.0 1.4 1.1 3.0 3.0 | | |
| Output Voltage | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU | V _{O(on)} | — | 0.1 | 0.3 | V | I _O /I _I = 10mA / 0.5mA I _O /I _I = 10mA / 0.5mA I _O /I _I = 5mA / 0.25mA I _O /I _I = 5mA / 0.25mA I _O /I _I = 10mA / 0.5mA I _O /I _I = 10mA / 0.5mA |
| Input Current | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU | I _I | — | — | 0.36 0.18 0.88 3.6 0.88 0.88 | mA | V _I = 5V |
| Output Current | | I _{O(off)} | — | — | 0.5 | μA | V _{CC} = 50V, V _I = 0V |
| DC Current Gain | DCX124EU DCX124EUQ DCX144EU DCX114YU DCX114YUQ DCX123JU DCX114EU DCX143EU | G _I | 56 60 68 68 80 80 30 50 | — | — | — | V _O = 5V, I _O = 5mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA |
| Input Resistor (R ₁) Tolerance | | ΔR ₁ | -30 | — | +30 | % | — |
| Resistance Ratio Tolerance | | R ₂ /R ₁ | -20 | — | +20 | % | — |
| Gain-Bandwidth Product | | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = 5mA, f = 100MHz |

Electrical Characteristics PNP Section @T_A = 25°C unless otherwise specified

| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--|--------------------------------|--|---|---|------|--|
| R1 Only (DCX143TU & DCX114TU) | | | | | | | |
| Collector-Base Breakdown Voltage | | BV _{CBO} | -50 | — | — | V | I _C = -50μA |
| Collector-Emitter Breakdown Voltage | | BV _{CEO} | -50 | — | — | V | I _C = -1mA |
| Emitter-Base Breakdown Voltage | | BV _{EBO} | -5 | — | — | V | I _E = -50μA |
| Collector Cutoff Current | | I _{CBO} | — | — | -0.5 | μA | V _{CB} = -50V |
| Emitter Cutoff Current | | I _{EBO} | — | — | -0.5 | μA | V _{EB} = -4V |
| Collector-Emitter Saturation Voltage | | V _{CE(sat)} | — | — | -0.3 | V | I _C /I _B = 2.5mA / 0.25mA DCX143TU I _C /I _B = 1mA / 0.1mA DCX114TU |
| DC Current Transfer Ratio | | h _{FE} | 100 | 250 | 600 | — | I _C = -1mA, V _{CE} = -5V |
| Input Resistor (R ₁) Tolerance | | ΔR ₁ | -30 | — | +30 | % | — |
| Gain-Bandwidth Product | | f _T | — | 250 | — | MHz | V _{CE} = -10V, I _E = 5mA, f = 100MHz |
| R1/R2 Only | | | | | | | |
| Input Voltage | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU | V _{I(off)} | -0.5 -0.5 -0.3 -0.5 -0.5 -0.5 | -1.1 -1.1 - - -1.1 -1.16 | — | — | V _{CC} = -5V, I _O = -100μA |
| | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU | V _{I(on)} | — | -1.9 -1.9 - - -1.9 -2.5 | -3.0 -3.0 -1.4 -1.1 -3.0 -3.0 | V | V _O = -0.3, I _O = -5mA V _O = -0.3, I _O = -2mA V _O = -0.3, I _O = -1mA V _O = -0.3, I _O = -5mA V _O = -0.3, I _O = -10mA V _O = -0.3, I _O = -20mA |
| Output Voltage | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU | V _{O(on)} | — | -0.1 | -0.3 | V | I _O /I _I = -10mA / -0.5mA I _O /I _I = -10mA / -0.5mA I _O /I _I = -5mA / -0.25mA I _O /I _I = -5mA / -0.25mA I _O /I _I = -10mA / -0.5mA I _O /I _I = -10mA / -0.5mA |
| Input Current | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU | I _I | — | — | -0.36 -0.18 -0.88 -3.6 -0.88 -0.88 | mA | V _I = -5V |
| Output Current | | I _{O(off)} | — | — | -0.5 | μA | V _{CC} = 50V, V _I = 0V |
| DC Current Gain | DCX124EU DCX124EUQ DCX144EU DCX114YU DCX114YUQ DCX123JU DCX114EU DCX143EU | G _I | 56 60 68 68 80 80 30 40 | — | — | — | V _O = -5V, I _O = -5mA V _O = -5V, I _O = -5mA V _O = -5V, I _O = -5mA V _O = -5V, I _O = -10mA V _O = -5V, I _O = -10mA V _O = -5V, I _O = -10mA V _O = -5V, I _O = -5mA V _O = -5V, I _O = -10mA |
| Input Resistor (R ₁) Tolerance | | ΔR ₁ | -30 | — | +30 | % | — |
| Resistance Ratio Tolerance | | R ₂ /R ₁ | -20 | — | +20 | % | — |
| Gain-Bandwidth Product | | f _T | — | 250 | — | MHz | V _{CE} = -10V, I _E = -5mA, f = 100MHz |

Typical Curves – Total Device

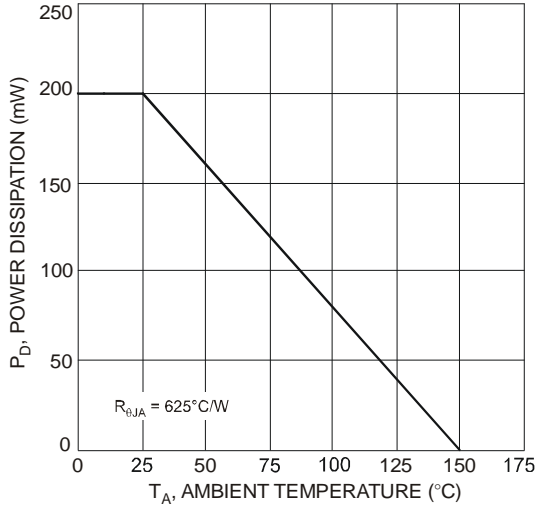


Fig. 1 Power Derating Curve

Typical Curves – DCX123JU PNP Section

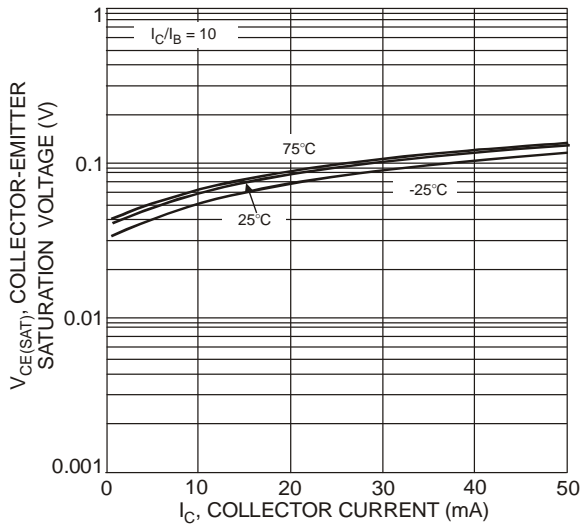


Fig. 2 Typical $V_{CE(SAT)}$ vs. I_C

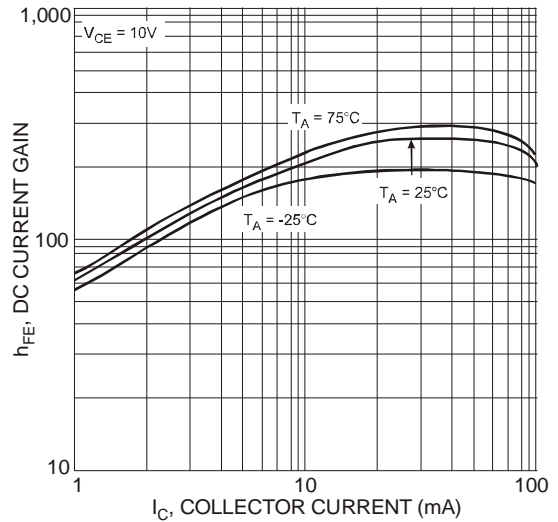


Fig. 3 Typical DC Current Gain

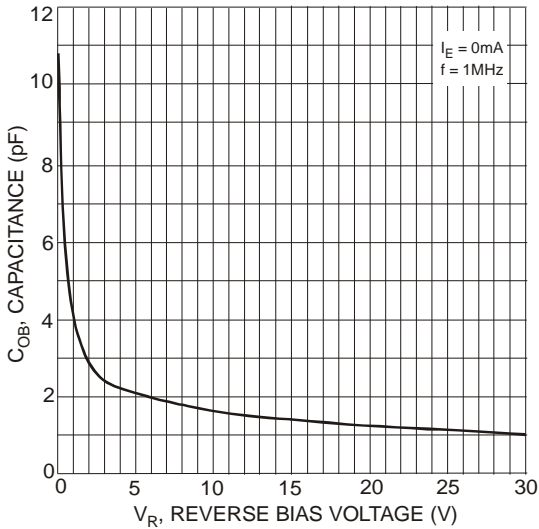


Fig. 4 Typical Output Capacitance

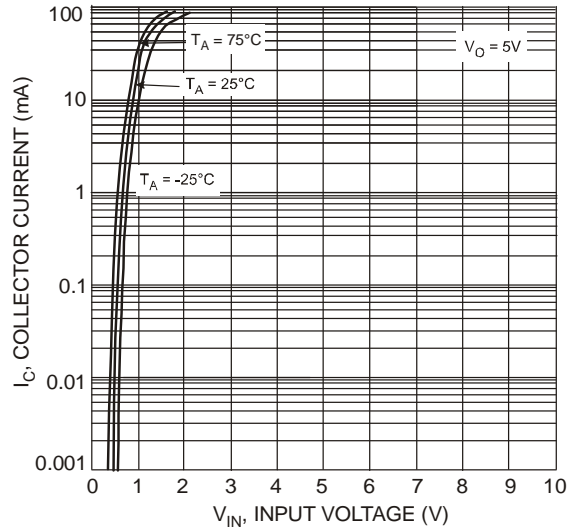


Fig. 5 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU PNP Section (cont.)

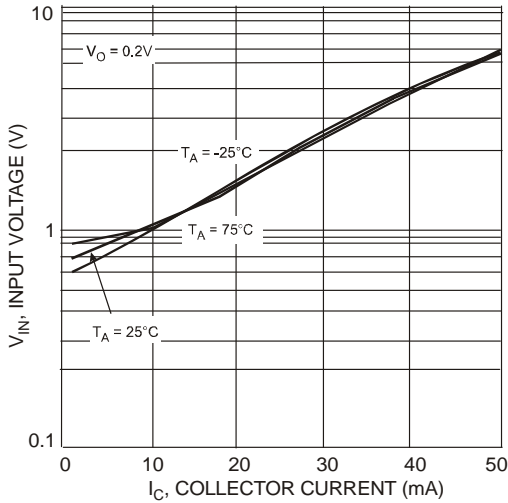


Fig. 6 Typical Input Voltage vs. Collector Current

Typical Curves – DCX123JU NPN Section

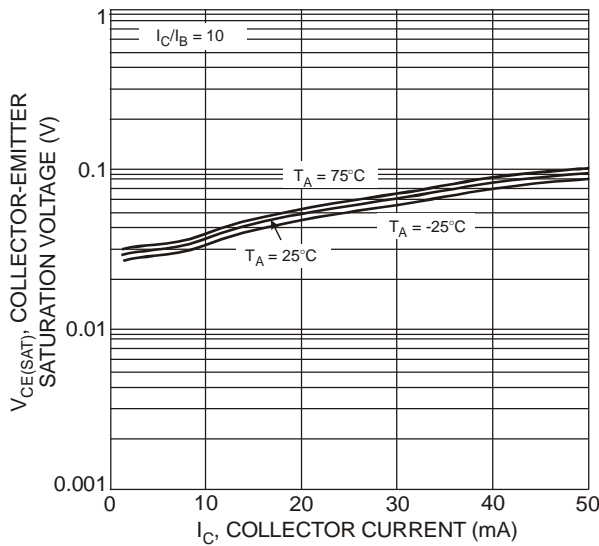


Fig. 7 Typical $V_{CE(SAT)}$ vs. I_C

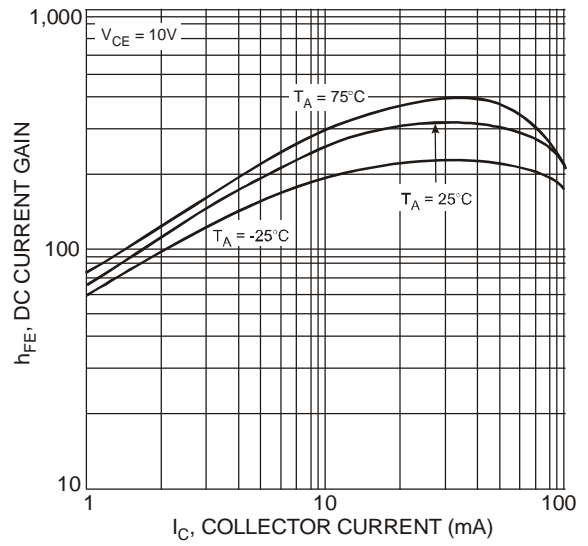


Fig. 8 Typical DC Current Gain

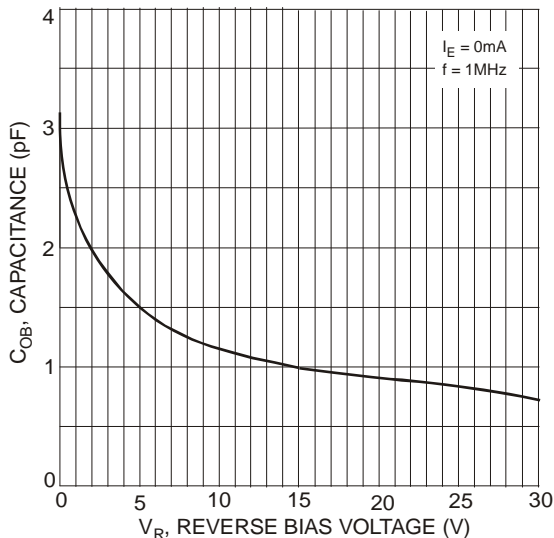


Fig. 9 Typical Output Capacitance

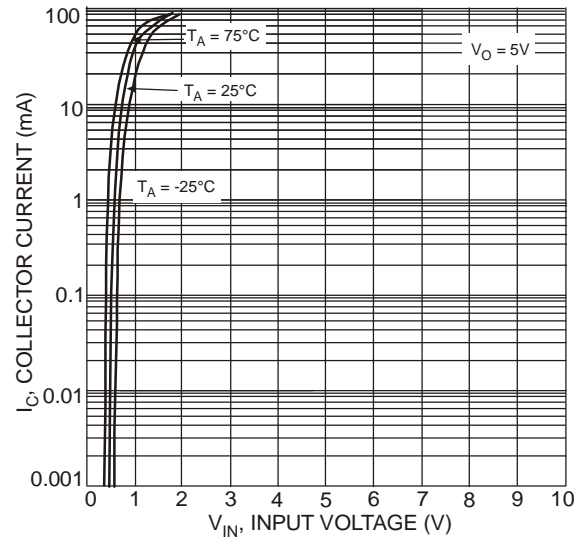


Fig. 10 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU NPN Section (cont.)

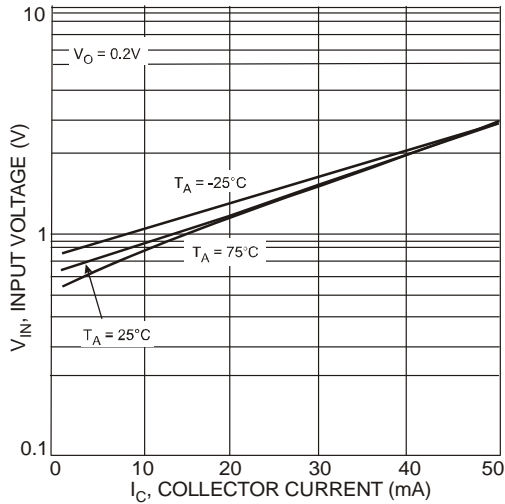


Fig. 11 Typical Input Voltage vs. Collector Current

Typical Curves – DCX143EU PNP Section

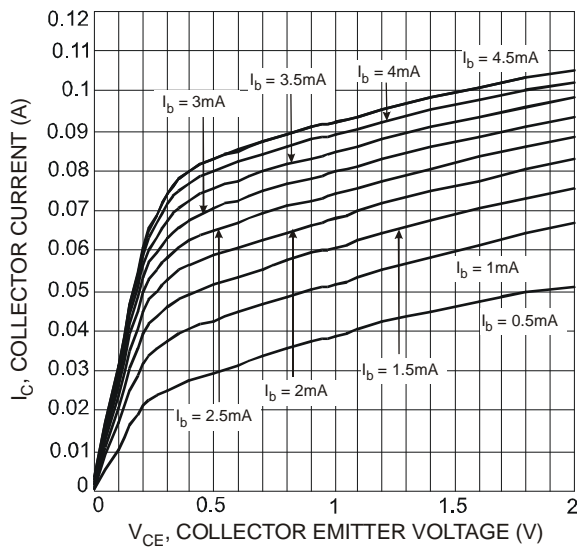


Fig. 12 Typical V_{CE} vs. I_C

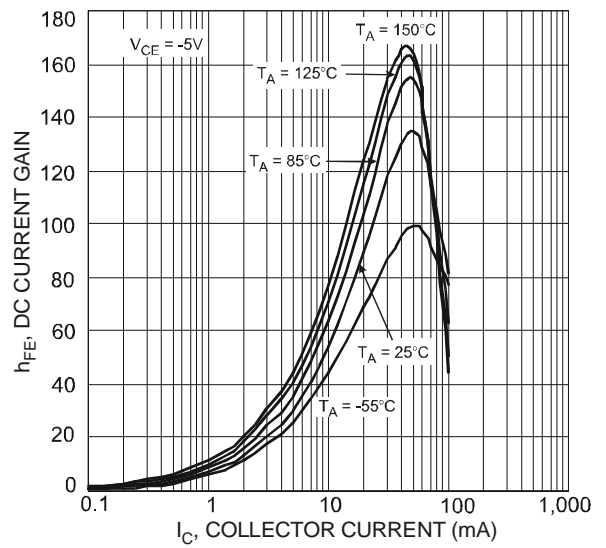


Fig. 13 Typical DC Current Gain

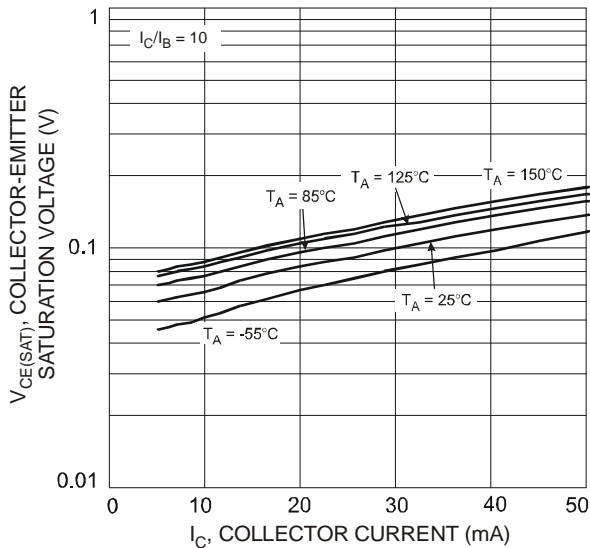


Fig. 14 Typical $V_{CE(SAT)}$ vs. I_C

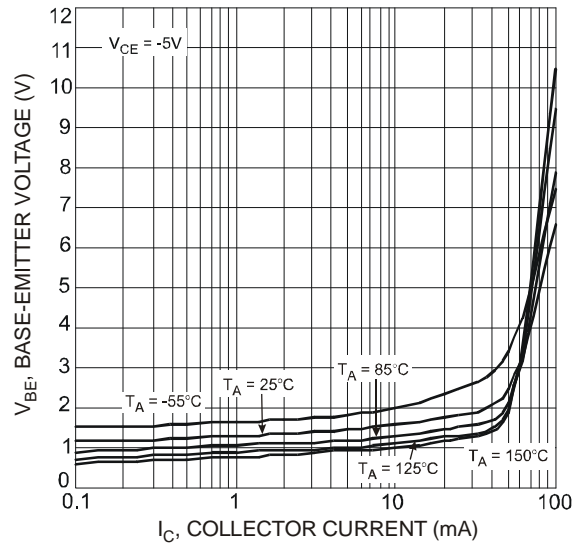


Fig. 15 Typical V_{BE} vs. I_C

Typical Curves – DCX143EU PNP Section (cont.)

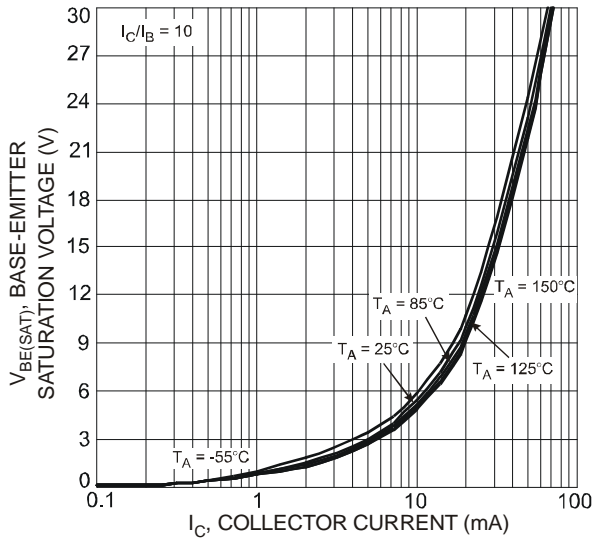


Fig. 16 Typical $V_{BE(SAT)}$ vs. I_C

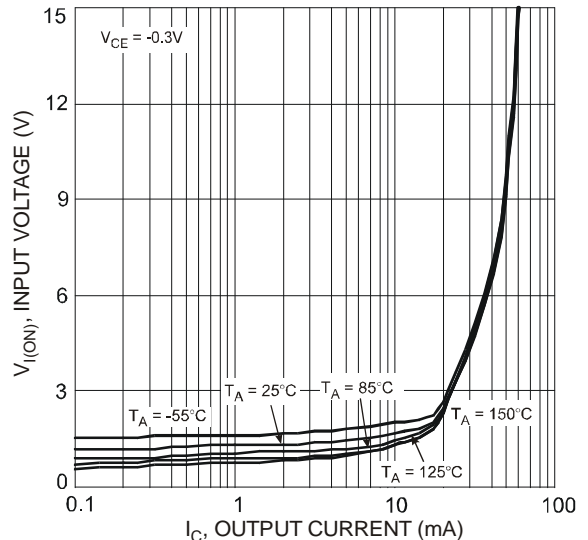


Fig. 17 Typical $V_{I(ON)}$ vs. I_C

Typical Curves – DCX143EU NPN Section

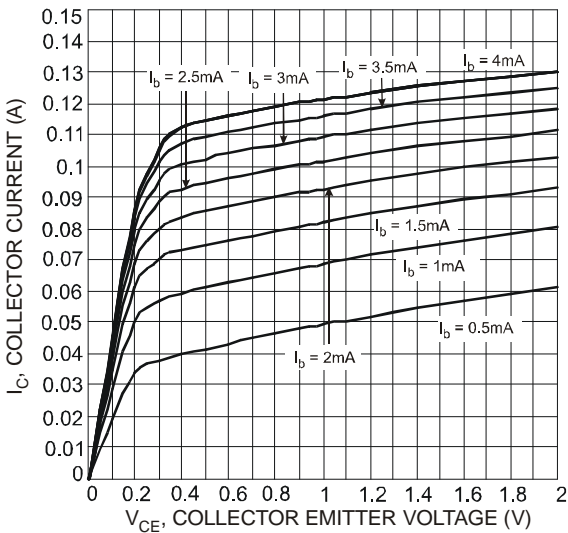


Fig. 18 Typical V_{CE} vs. I_C

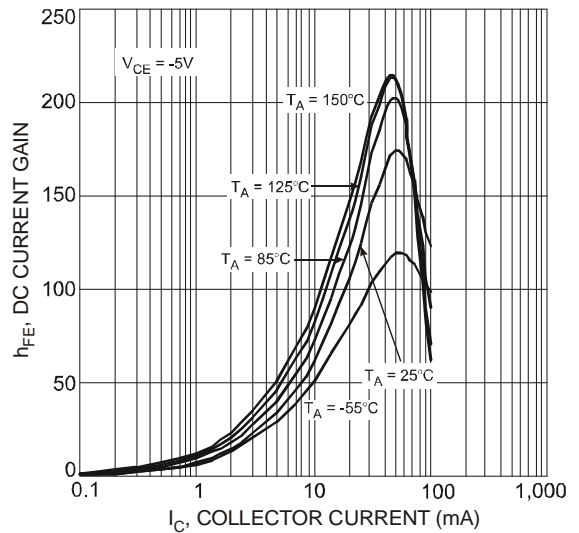


Fig. 19 Typical DC Current Gain

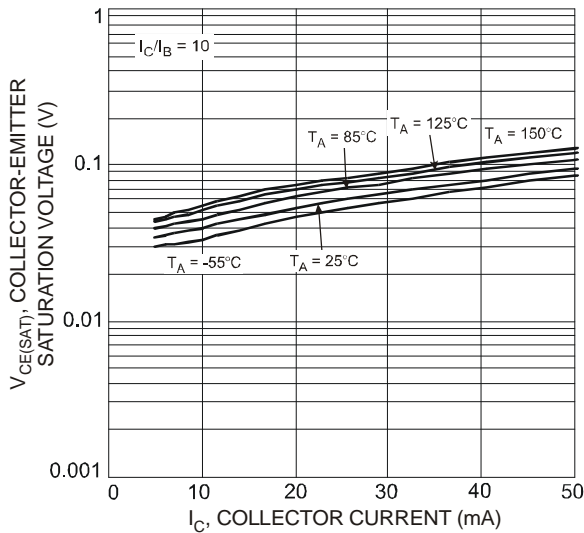


Fig. 20 Typical $V_{CE(SAT)}$ vs. I_C

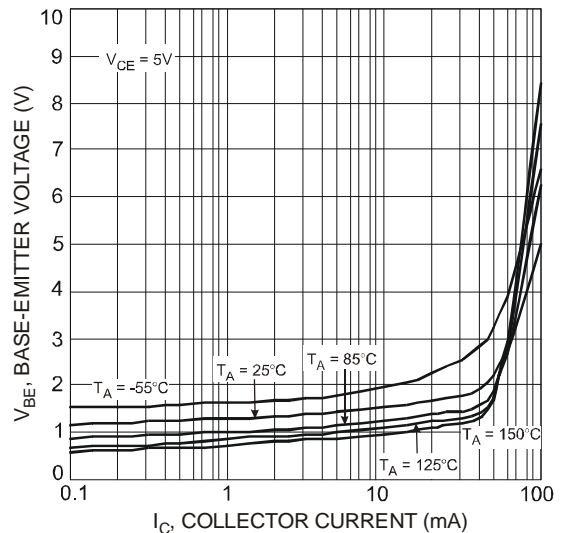


Fig. 21 Typical V_{BE} vs. I_C

Typical Curves – DCX143EU NPN Section (cont.)

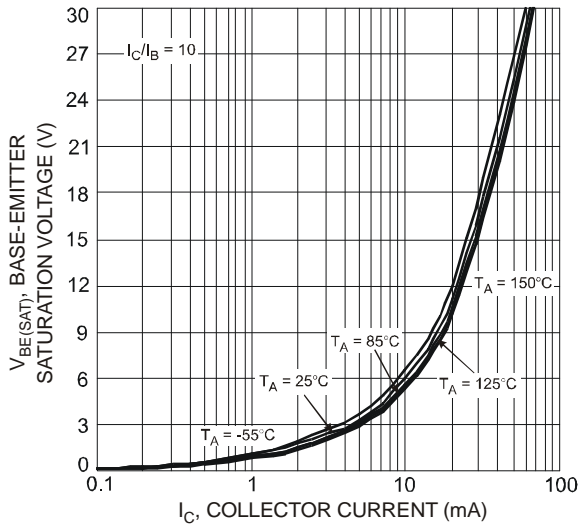


Fig. 22 Typical $V_{BE(SAT)}$ vs. I_C

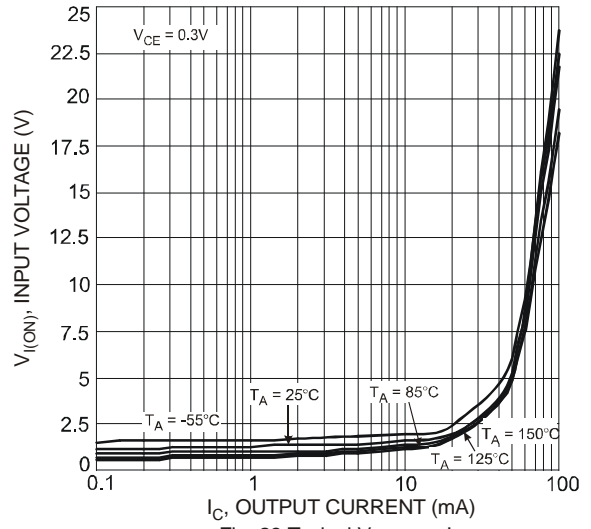


Fig. 23 Typical $V_{I(ON)}$ vs. I_C

Typical Curves – DCX114TU PNP Section

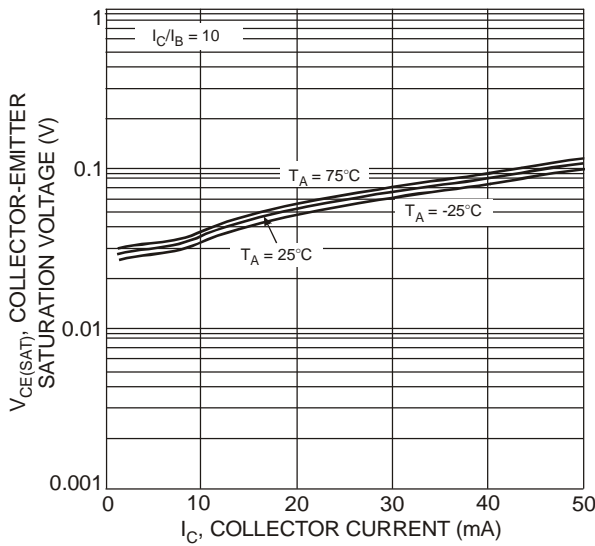


Fig. 24 Typical $V_{CE(SAT)}$ vs. I_C

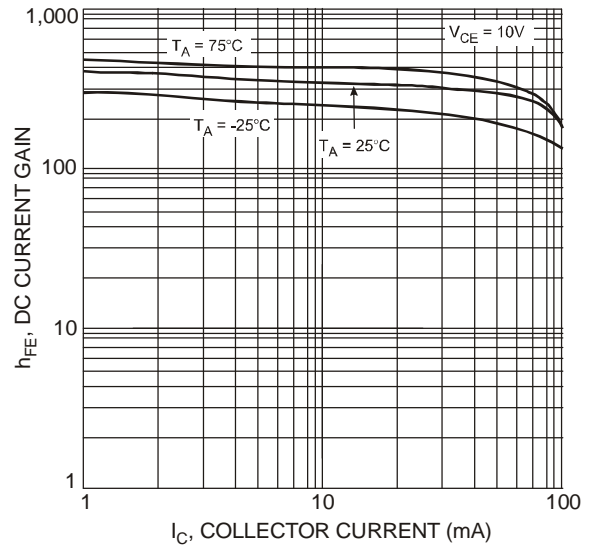


Fig. 25 Typical DC Current Gain

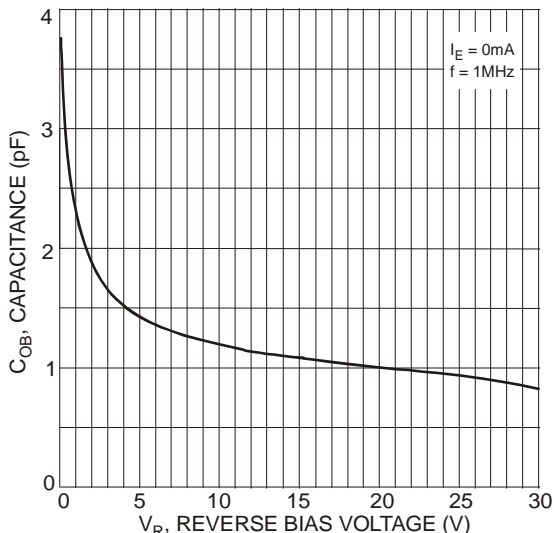


Fig. 26 Typical Output Capacitance

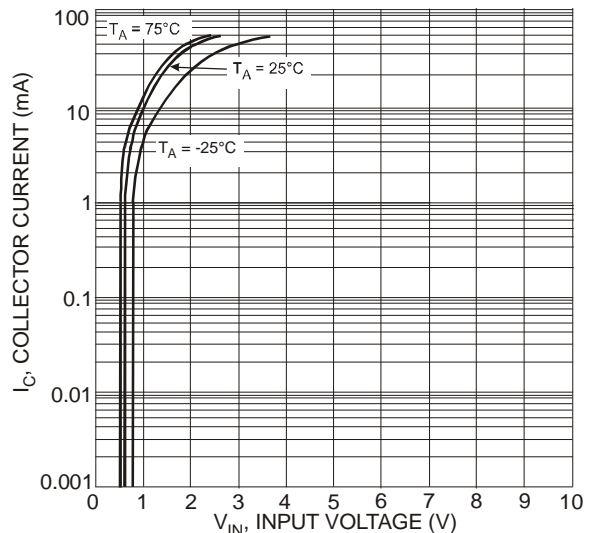


Fig. 27 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU PNP Section (cont.)

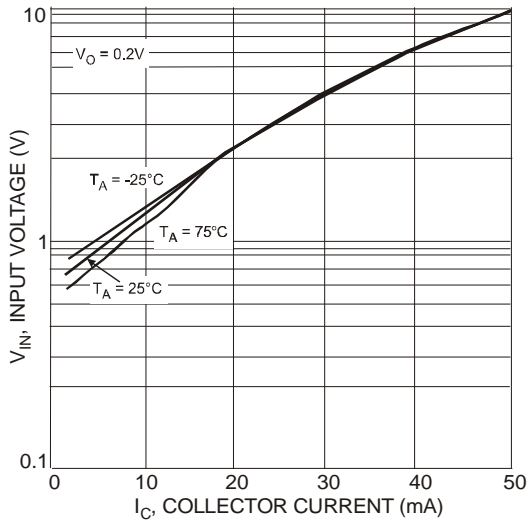


Fig. 28 Typical Input Voltage vs. Collector Current

Typical Curves – DCX114TU NPN Section

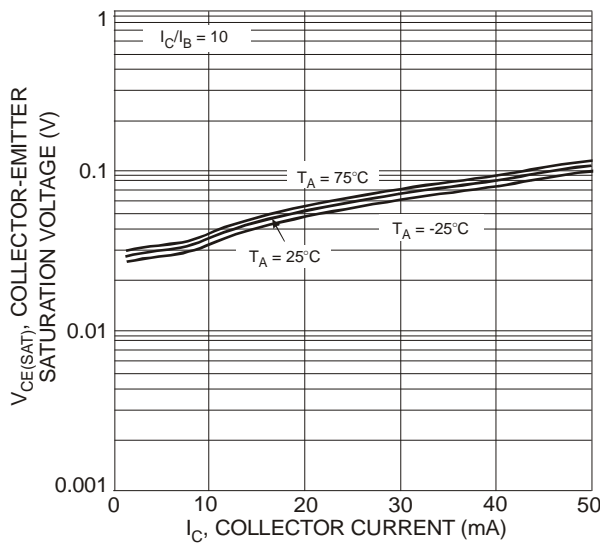


Fig. 29 Typical $V_{CE(SAT)}$ vs. I_C

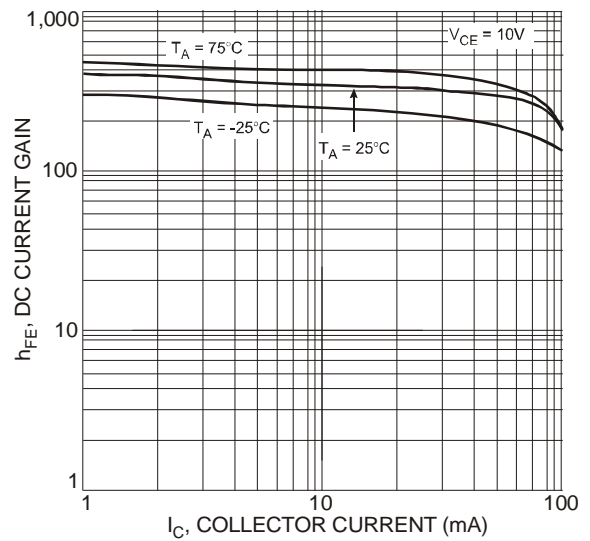


Fig. 30 Typical DC Current Gain

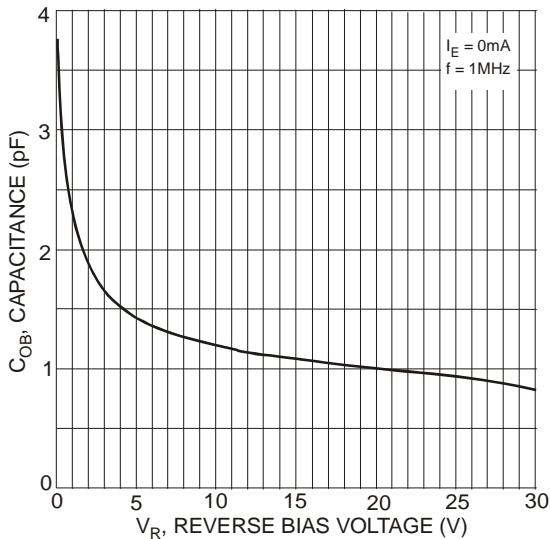


Fig. 31 Typical Output Capacitance

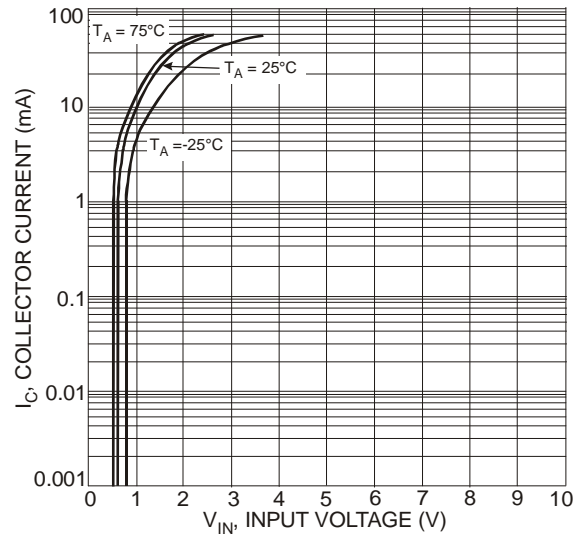


Fig. 32 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU NPN Section (cont.)

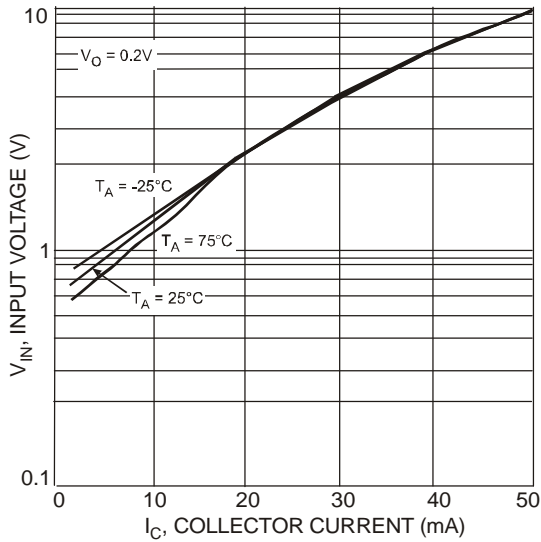
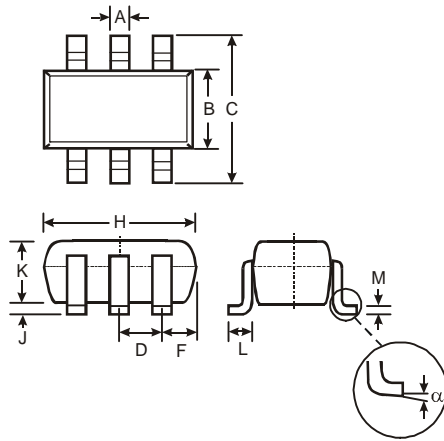


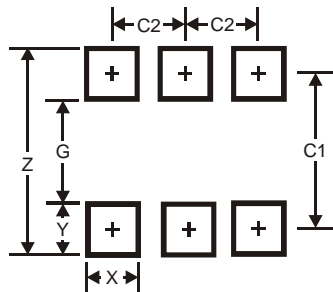
Fig. 33 Typical Input Voltage vs. Collector Current

Package Outline Dimensions



| SOT363 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Typ | |
| F | 0.40 | 0.45 |
| H | 1.80 | 2.20 |
| J | 0 | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.22 |
| α | 0° | 8° |
| All Dimensions in mm | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.5 |
| G | 1.3 |
| X | 0.42 |
| Y | 0.6 |
| C1 | 1.9 |
| C2 | 0.65 |

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