

NPN PRE-BIASED SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR
Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- "Lead Free", 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) |
|-------------|---------------|--------------|
| DDC124EU | 22K Ω | 22K Ω |
| DDC144EU | 47K Ω | 47K Ω |
| DDC114YU | 10K Ω | 47K Ω |
| DDC123JU | 2.2K Ω | 47K Ω |
| DDC114EU | 10K Ω | 10K Ω |

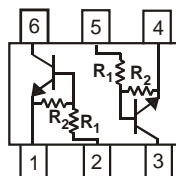
Mechanical Data

- 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)

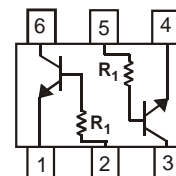
| Part Number | R1 Only |
|-------------|---------------|
| DDC113TU | 1K Ω |
| DDC143TU | 4.7K Ω |
| DDC114TU | 10K Ω |



Top View



R1, R2



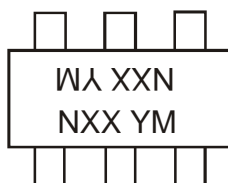
R1 Only

Device Schematic

Ordering Information (Note 3 & 4)

| Product | Grade | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|----------------|------------|---------|--------------------|-----------------|-------------------|
| DDC124EU-7-F | Commercial | N17 | 7 | 8 | 3,000 |
| DDC124EUQ-7-F | Automotive | N17 | 7 | 8 | 3,000 |
| DDC124EUQ-13-F | Automotive | N17 | 13 | 8 | 10,000 |
| DDC144EU-7-F | Commercial | N20 | 7 | 8 | 3,000 |
| DDC114YU-7-F | Commercial | N14 | 7 | 8 | 3,000 |
| DDC114YUQ-7-F | Automotive | N14 | 7 | 8 | 3,000 |
| DDC123JU-7-F | Commercial | N06 | 7 | 8 | 3,000 |
| DDC114EU-7-F | Commercial | N13 | 7 | 8 | 3,000 |
| DDC114EUQ-7-F | Automotive | N13 | 7 | 8 | 3,000 |
| DDC114EUQ-13-F | Automotive | N13 | 13 | 8 | 10,000 |
| DDC113TU-7-F | Commercial | N01 | 7 | 8 | 3,000 |
| DDC143TU-7-F | Commercial | N07 | 7 | 8 | 3,000 |
| DDC114TU-7-F | Commercial | N12 | 7 | 8 | 3,000 |
| DDC114TUQ-7-F | Automotive | N12 | 7 | 8 | 3,000 |

- Notes:
1. No purposefully added lead.
 2. Diodes Inc's "Green" policy can be found on our website at <http://www.diodes.com>.
 3. 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


NXX = Product Type Marking Code
 See Page 1 Diagrams
 YM = Date Code Marking
 Y = Year (ex: T = 2006)
 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 @T_A = 25°C unless otherwise specified

| Characteristic | | Symbol | Value | Unit |
|----------------|----------|---------------------|------------|------|
| Supply Voltage | | V _{CC} | 50 | V |
| Input Voltage | DDC124EU | V _{IN} | -10 to +40 | V |
| | DDC144EU | | -10 to +40 | |
| | DDC114YU | | -6 to +40 | |
| | DDC123JU | | -5 to +12 | |
| | DDC114EU | | -10 to +40 | |
| | DDC113TU | | -5V max | |
| | DDC143TU | | -5V max | |
| DDC114TU | -5V max | | | |
| Output Current | | I _{C(MAX)} | 100 | mA |

Thermal Characteristics @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | P _D | 150 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 5) | R _{θJA} | 833 | °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

Electrical Characteristics @T_A = 25°C unless otherwise specified

For R1 only devices: DDC113TU & DDC143TU & DDC114TU

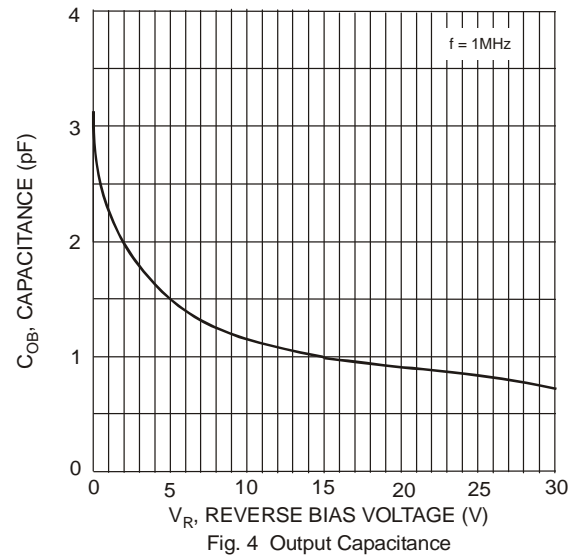
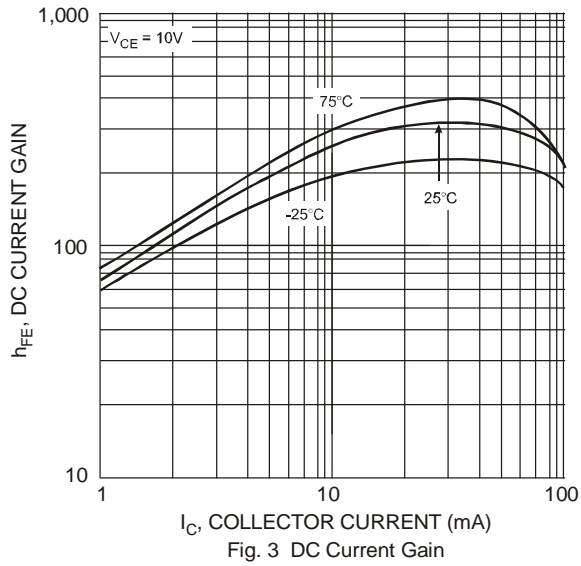
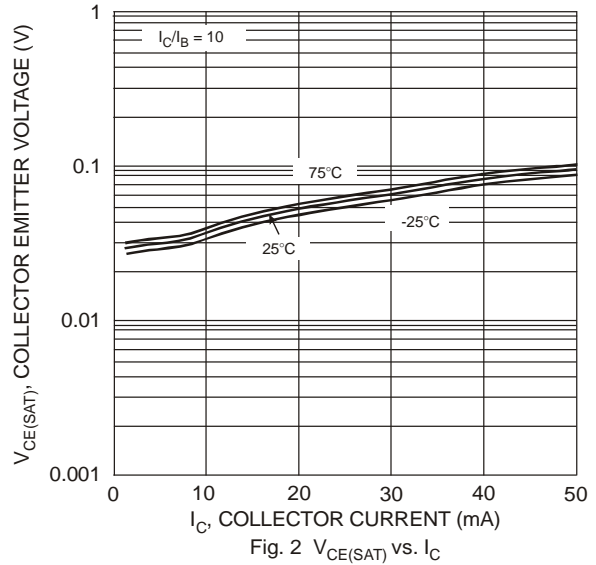
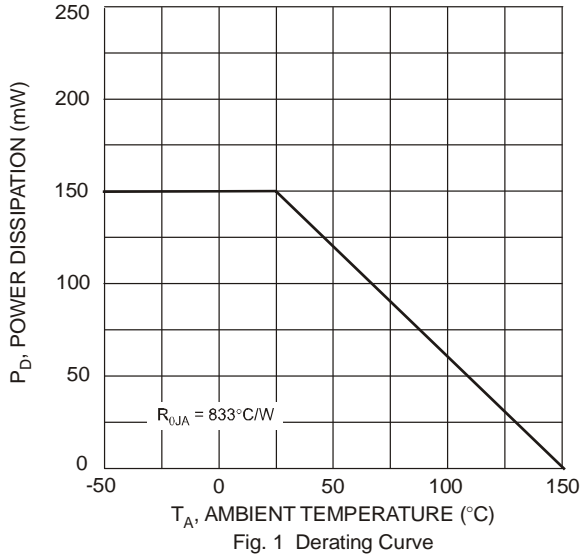
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|----------------------|-----|-----|-----|------|---|
| Collector-Base Breakdown Voltage | BV _{CBO} | 50 | — | — | V | I _C = 50μA |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | 50 | — | — | V | I _C = 1mA |
| Emitter-Base 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 DDC143TU I _C /I _B = 1mA / 0.1mA DDC114TU I _C /I _B = 10mA / 1mA DDC113TU |
| 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 (Note 6) | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = -5mA, f = 100MHz |

For R1, R2 devices: DDC124EU & DDC144EU & DDC114YU & DDC123JU & DDC114EU

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--------------------------------|-----|-----|------|------|--|
| Input Voltage | V _{I(off)} | 0.5 | 1.1 | — | V | V _{CC} = 5V, I _O = 100μA |
| | | 0.5 | 1.1 | — | | |
| Input Voltage | V _{I(on)} | 0.3 | — | — | 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 |
| | | 0.5 | — | — | | |
| | | 0.5 | 1.9 | 3.0 | | |
| | | — | 1.9 | 3.0 | | |
| | | — | 1.4 | 1.1 | | |
| Output Voltage | 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 |
| | | — | — | — | | |
| | | — | — | — | | |
| | | — | — | — | | |
| | | — | — | — | | |
| Input Current | I _I | — | — | 0.36 | mA | V _I = 5V |
| | | — | — | 0.18 | | |
| | | — | — | 0.88 | | |
| | | — | — | 3.6 | | |
| | | — | — | 0.88 | | |
| Output Current | I _{O(off)} | — | — | 0.5 | μA | V _{CC} = 50V, V _I = 0V |
| DC Current Gain | G _I | 56 | — | — | — | V _O = 5V, I _O = 5mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 5mA |
| | | 68 | — | — | | |
| | | 68 | — | — | | |
| | | 80 | — | — | | |
| | | 80 | — | — | | |
| | | 30 | — | — | | |
| Input Resistor (R ₁) Tolerance | ΔR ₁ | -30 | — | +30 | % | — |
| Resistance Ratio Tolerance | R ₂ /R ₁ | -20 | — | +20 | % | — |
| Gain-Bandwidth Product (Note 6) | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = 5mA, f = 100MHz |

Notes: 6. Transistor - For Reference Only

Typical Curves – DDC123JU One Section



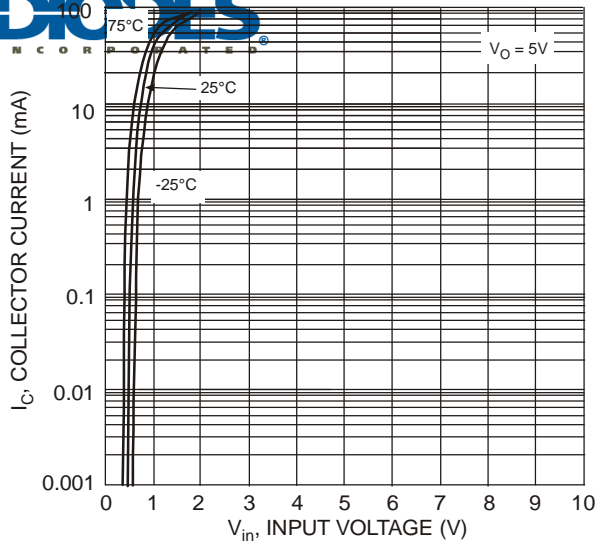


Fig. 5 Collector Current vs. Input Voltage

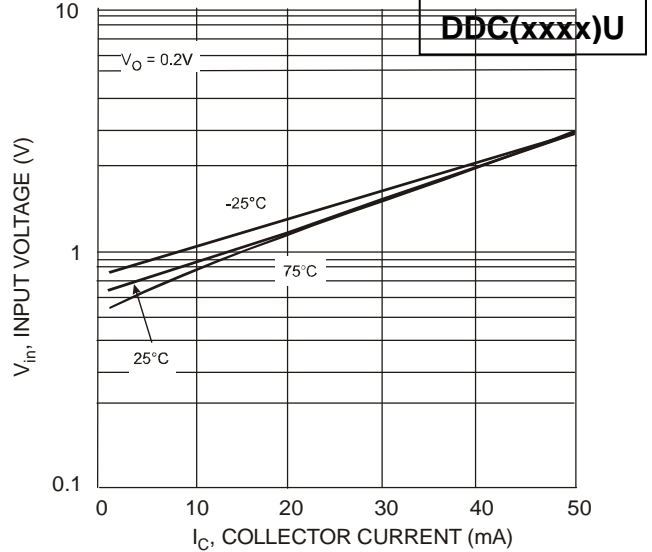


Fig. 6 Input Voltage vs. Collector Current

Typical Curves – DDC114YU One Section

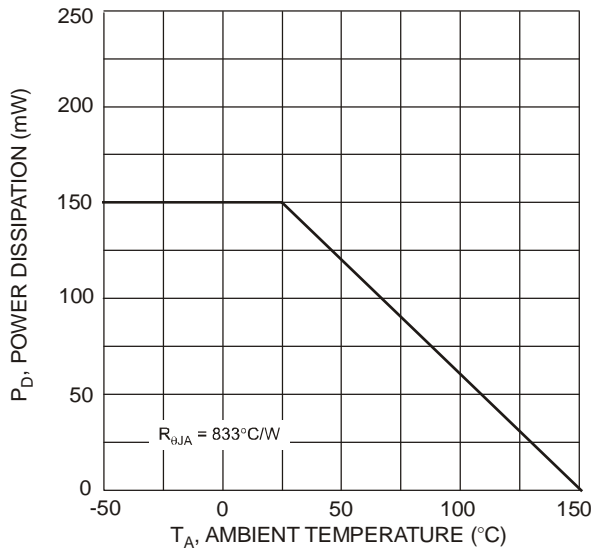


Fig. 1 Derating Curve

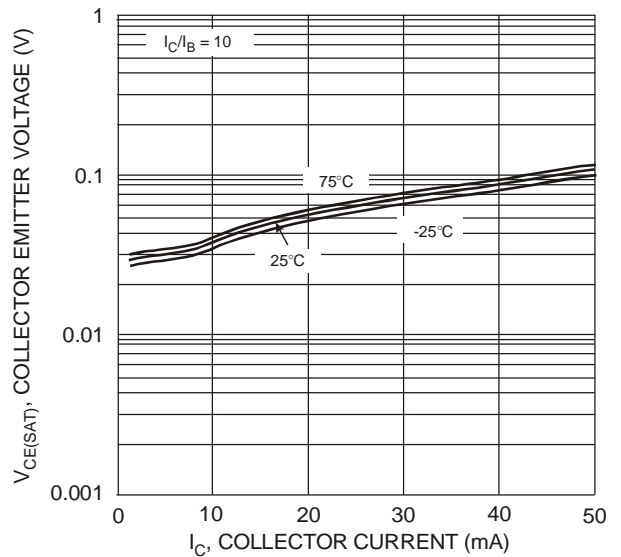


Fig. 2 $V_{CE(SAT)}$ vs. I_C

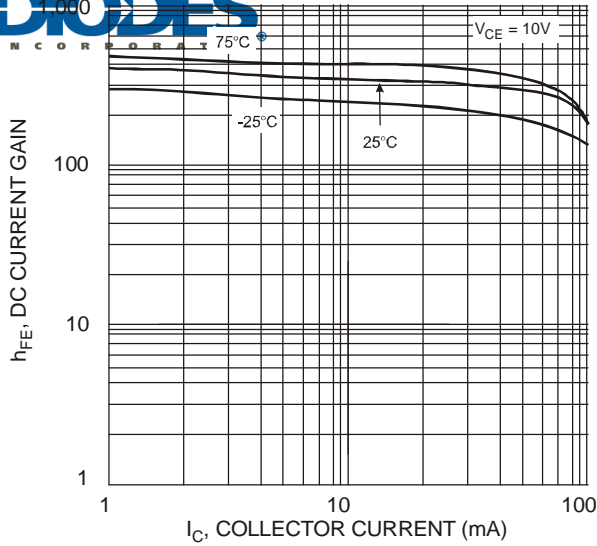


Fig. 3 DC Current Gain

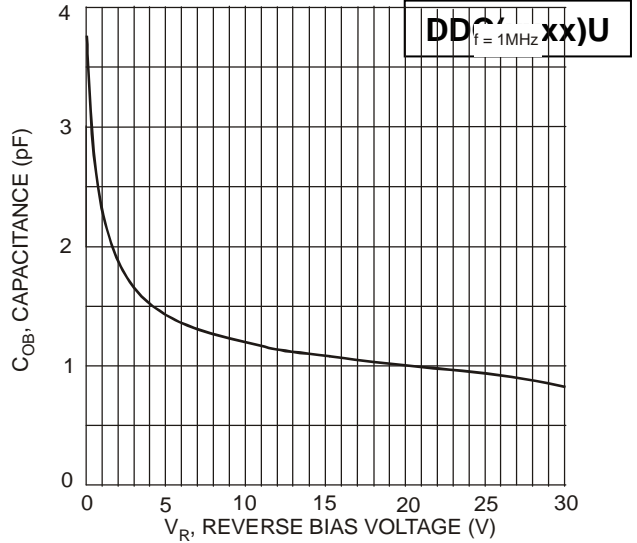


Fig. 4 Output Capacitance

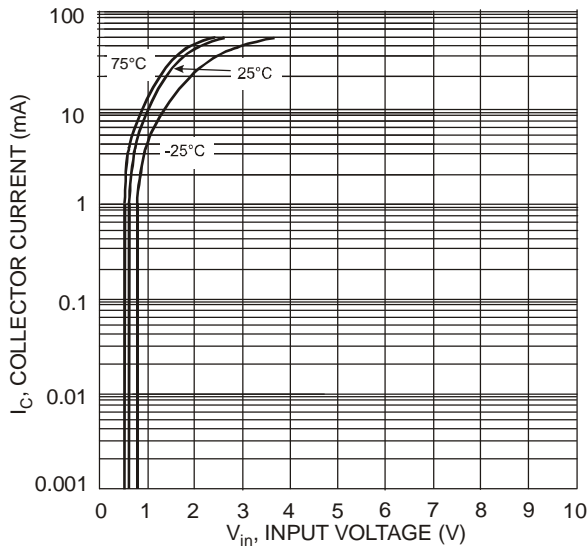


Fig. 5 Collector Current vs. Input Voltage

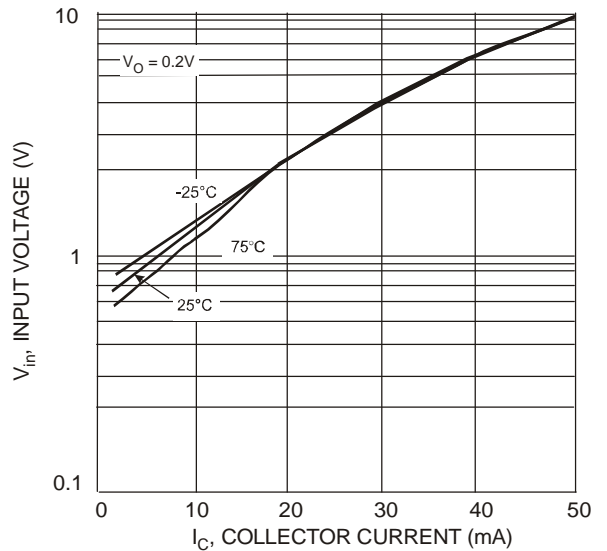


Fig. 6 Input Voltage vs. Collector Current

Typical Curves – DDC124EU One Section

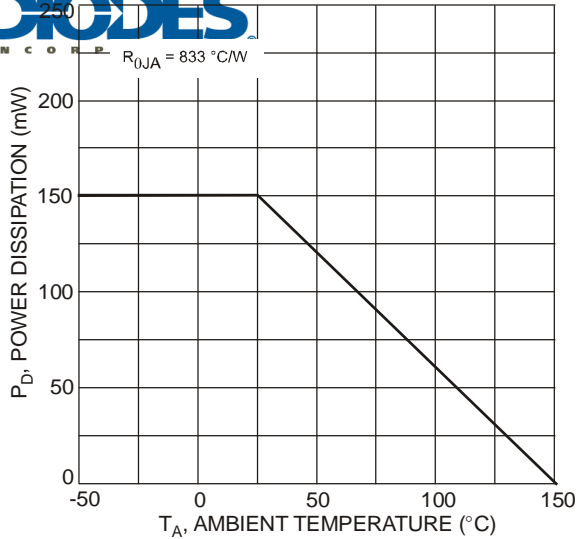


Fig. 1 Power Dissipation vs. Ambient Temperature

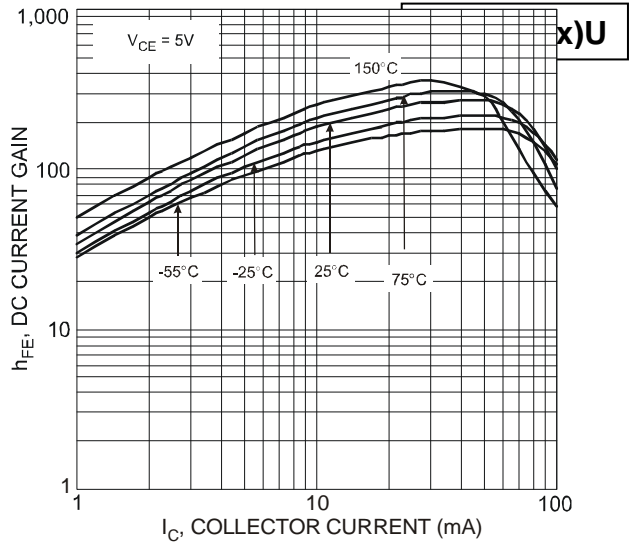


Fig. 2 Typical DC Current Gain vs. Collector Current

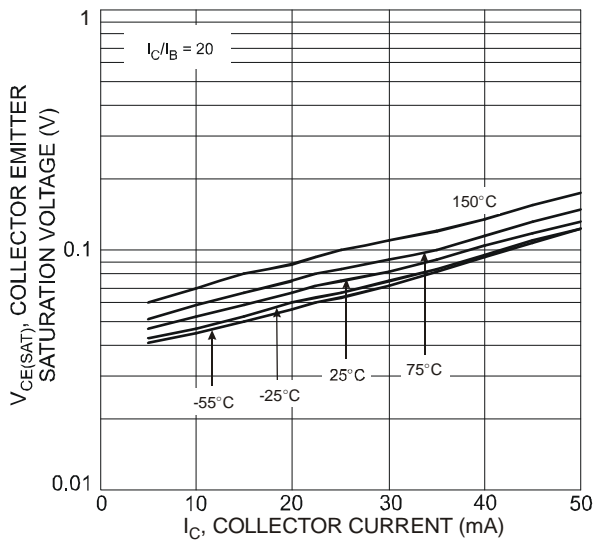


Fig. 3 Collector Emitter Saturation Voltage vs. Collector Current

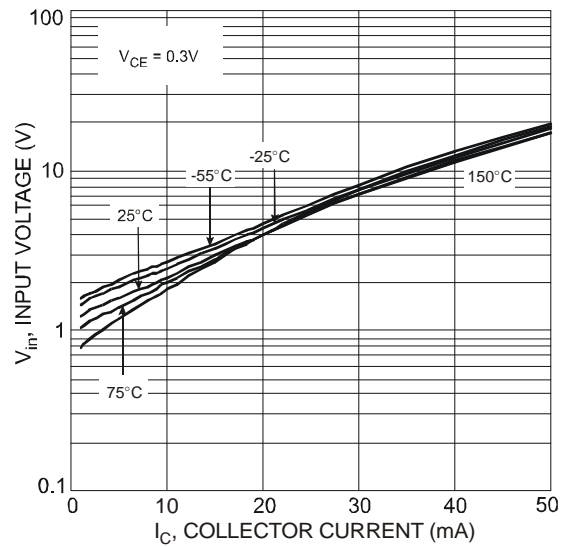
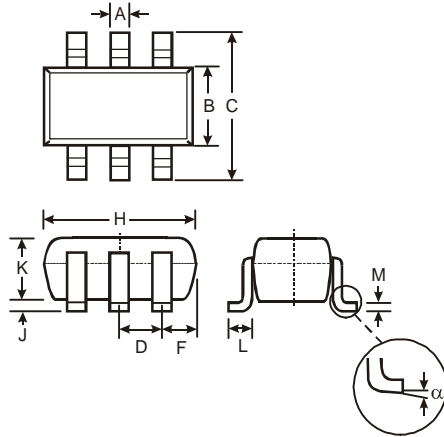


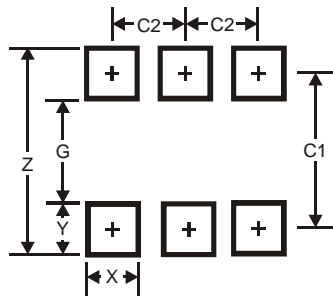
Fig. 4 Input Voltage vs. Collector Current

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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