

**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

**Mechanical Data**

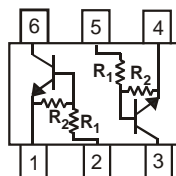
- Case: SOT363
- Case material: Molded Plastic. "Green" Molding Compound.
- Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.006 grams (approximate)

| Part Number | R1 (NOM)      | R2 (NOM)     |
|-------------|---------------|--------------|
| DDC124EU    | 22K $\Omega$  | 22K $\Omega$ |
| DDC144EU    | 47K $\Omega$  | 47K $\Omega$ |
| DDC114YU    | 10K $\Omega$  | 47K $\Omega$ |
| DDC123JU    | 2.2K $\Omega$ | 47K $\Omega$ |
| DDC114EU    | 10K $\Omega$  | 10K $\Omega$ |

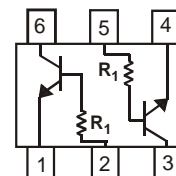
| Part Number | R1 Only       |
|-------------|---------------|
| DDC113TU    | 1K $\Omega$   |
| DDC143TU    | 4.7K $\Omega$ |
| DDC114TU    | 10K $\Omega$  |



Top View



R1, R2



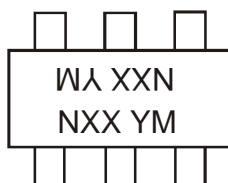
R1 Only

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<sub>A</sub> = 25°C unless otherwise specified

| Characteristic |          | Symbol              | Value      | Unit |
|----------------|----------|---------------------|------------|------|
| Supply Voltage |          | V <sub>CC</sub>     | 50         | V    |
| Input Voltage  | DDC124EU | V <sub>IN</sub>     | -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 <sub>C(MAX)</sub> | 100        | mA   |

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                                       | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)                           | P <sub>D</sub>                    | 150         | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 5) | R <sub>θJA</sub>                  | 833         | °C/W |
| Operating and Storage Temperature Range              | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

Notes: 5. Mounted on FR4 PC Board with minimum recommended pad layout

**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

**For R1 only devices: DDC113TU & DDC143TU & DDC114TU**

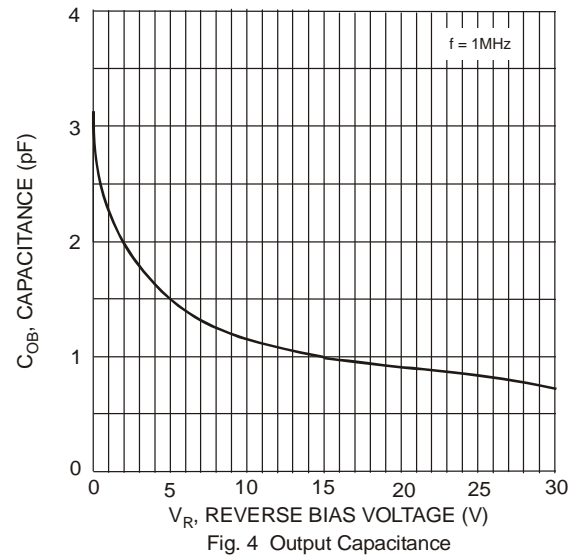
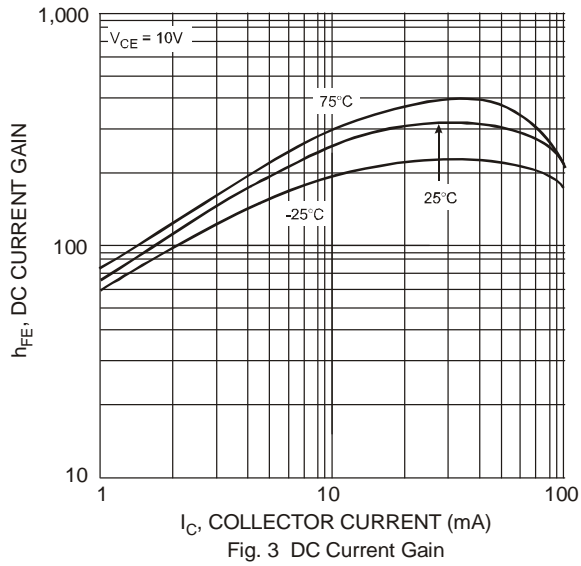
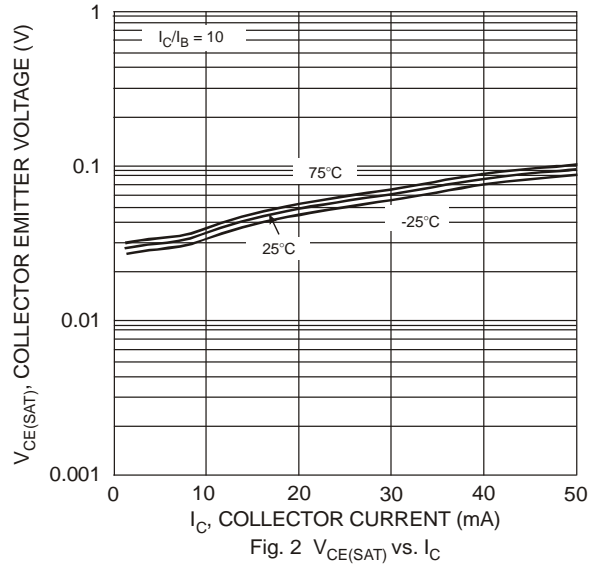
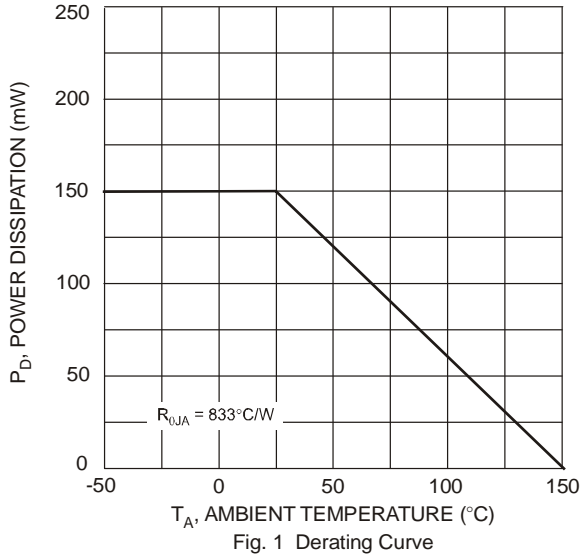
| Characteristic                             | Symbol               | Min | Typ | Max | Unit | Test Condition  |
|--|----------------------|-----|-----|-----|------|---|
| Collector-Base Breakdown Voltage           | BV <sub>CBO</sub>    | 50  | —   | —   | V    | I <sub>C</sub> = 50μA   |
| Collector-Emitter 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 Cutoff Current                   | I <sub>CBO</sub>     | —   | —   | 0.5 | μA   | V <sub>CB</sub> = 50V   |
| Emitter Cutoff 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 DDC143TU<br>I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DDC114TU<br>I <sub>C</sub> /I <sub>B</sub> = 10mA / 1mA DDC113TU |
| DC Current Transfer Ratio                  | h <sub>FE</sub>      | 100 | 250 | 600 | —    | I <sub>C</sub> = 1mA, V <sub>CE</sub> = 5V  |
| Input Resistor (R <sub>1</sub> ) Tolerance | ΔR <sub>1</sub>      | -30 | —   | +30 | %    | —   |
| Gain-Bandwidth Product (Note 6)            | f <sub>T</sub>       | —   | 250 | —   | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = -5mA, f = 100MHz  |

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

| 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   |
|  |                                | 0.5 | 1.1 | —    |      |  |
| Input Voltage                              | V <sub>I(on)</sub>             | 0.3 | —   | —    | V    | V <sub>O</sub> = 0.3, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 0.3, I <sub>O</sub> = 2mA<br>V <sub>O</sub> = 0.3, I <sub>O</sub> = 1mA<br>V <sub>O</sub> = 0.3, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 0.3, I <sub>O</sub> = 10mA  |
|  |                                | 0.5 | —   | —    |      |  |
|  |                                | 0.5 | 1.9 | 3.0  |      |  |
|  |                                | —   | 1.9 | 3.0  |      |  |
|  |                                | —   | 1.4 | 1.1  |      |  |
| 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> = 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                            |
|  |                                | —   | —   | —    |      |  |
|  |                                | —   | —   | —    |      |  |
|  |                                | —   | —   | —    |      |  |
|  |                                | —   | —   | —    |      |  |
| Input Current                              | I <sub>I</sub>                 | —   | —   | 0.36 | mA   | V <sub>I</sub> = 5V  |
|  |                                | —   | —   | 0.18 |      |  |
|  |                                | —   | —   | 0.88 |      |  |
|  |                                | —   | —   | 3.6  |      |  |
|  |                                | —   | —   | 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> = 5mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA |
|  |                                | 68  | —   | —    |      |  |
|  |                                | 68  | —   | —    |      |  |
|  |                                | 80  | —   | —    |      |  |
|  |                                | 80  | —   | —    |      |  |
|  |                                | 30  | —   | —    |      |  |
| Input Resistor (R <sub>1</sub> ) Tolerance | ΔR <sub>1</sub>                | -30 | —   | +30  | %    | —  |
| Resistance Ratio Tolerance                 | R <sub>2</sub> /R <sub>1</sub> | -20 | —   | +20  | %    | —  |
| Gain-Bandwidth Product (Note 6)            | f <sub>T</sub>                 | —   | 250 | —    | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA, f = 100MHz  |

Notes: 6. Transistor - For Reference Only

**Typical Curves – DDC123JU One Section**



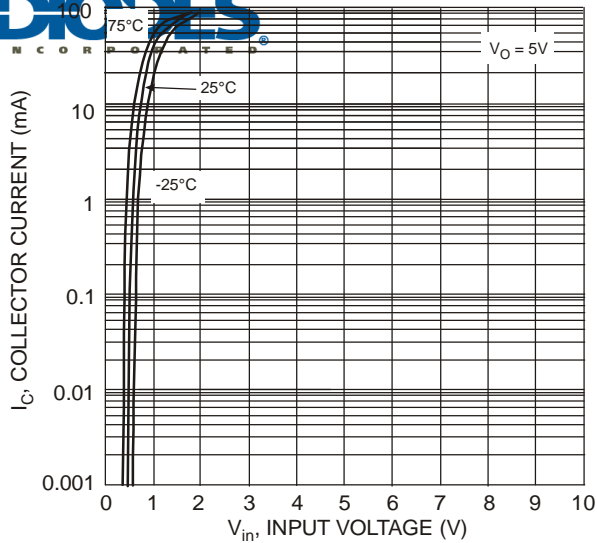


Fig. 5 Collector Current vs. Input Voltage

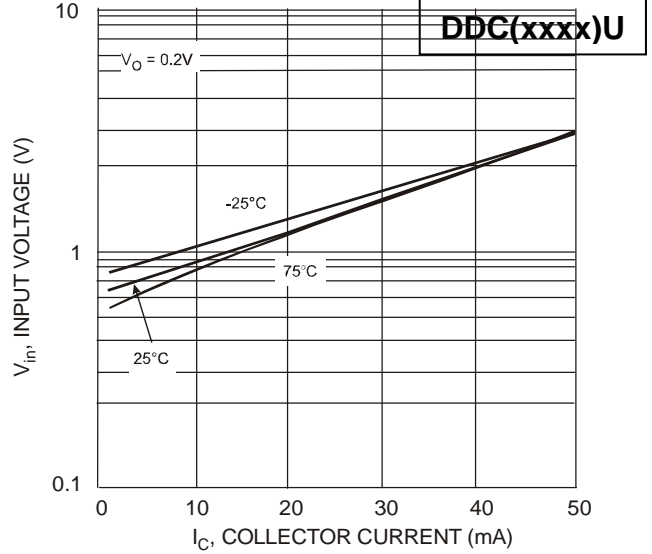


Fig. 6 Input Voltage vs. Collector Current

**Typical Curves – DDC114YU One Section**

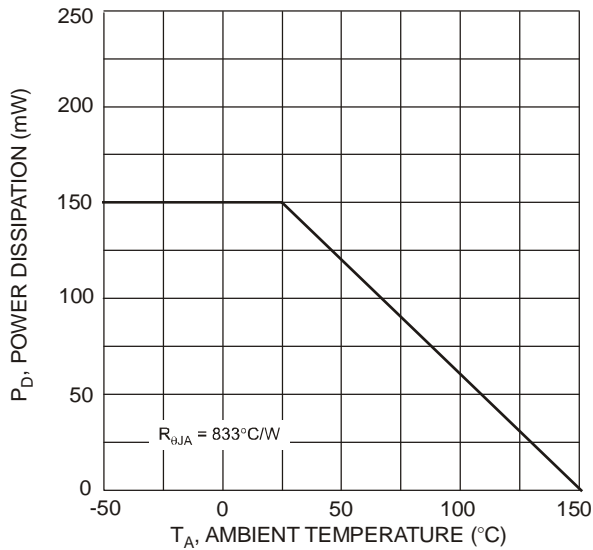


Fig. 1 Derating Curve

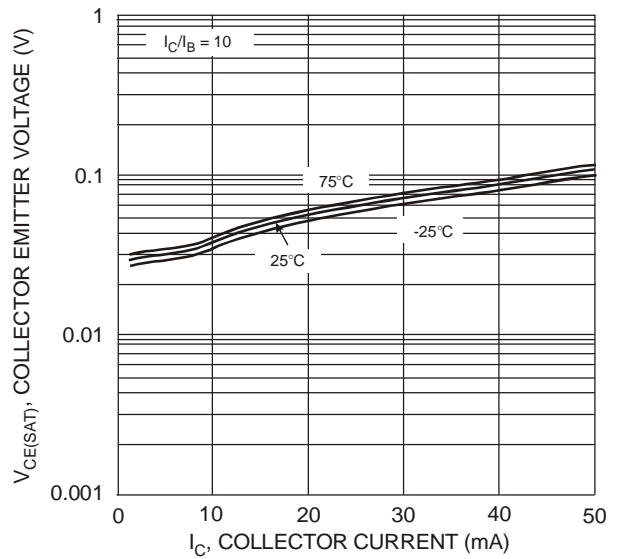


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

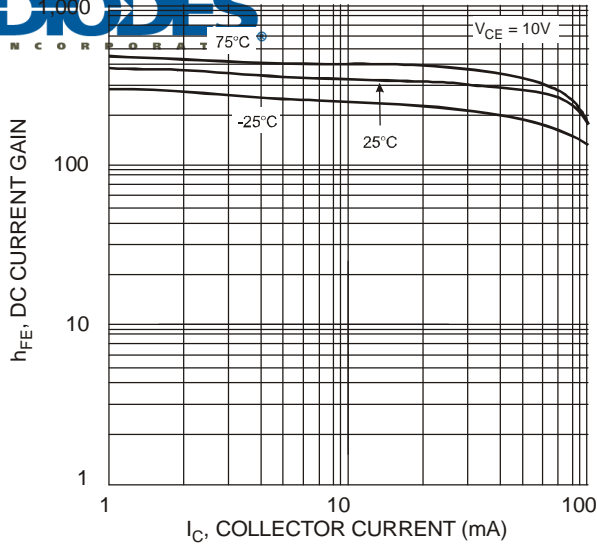


Fig. 3 DC Current Gain

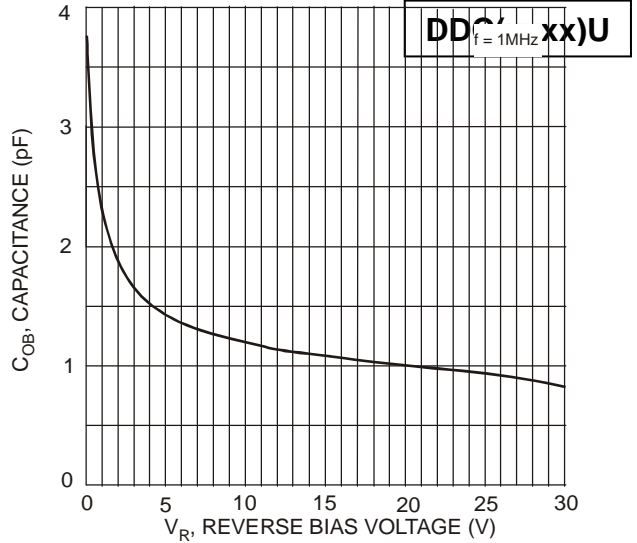


Fig. 4 Output Capacitance

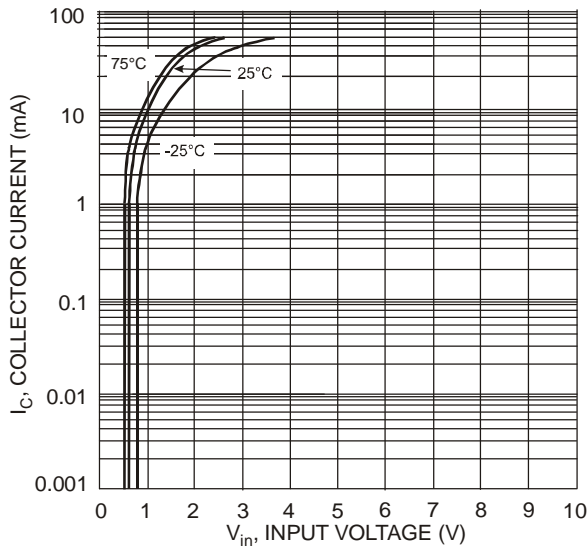


Fig. 5 Collector Current vs. Input Voltage

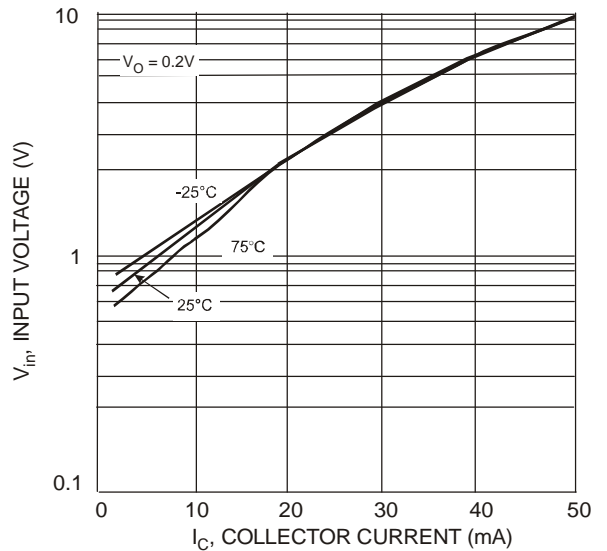


Fig. 6 Input Voltage vs. Collector Current

**Typical Curves – DDC124EU One Section**

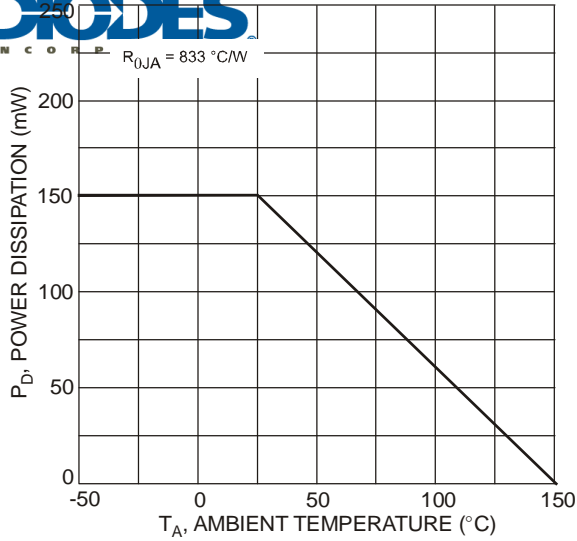


Fig. 1 Power Dissipation vs. Ambient Temperature

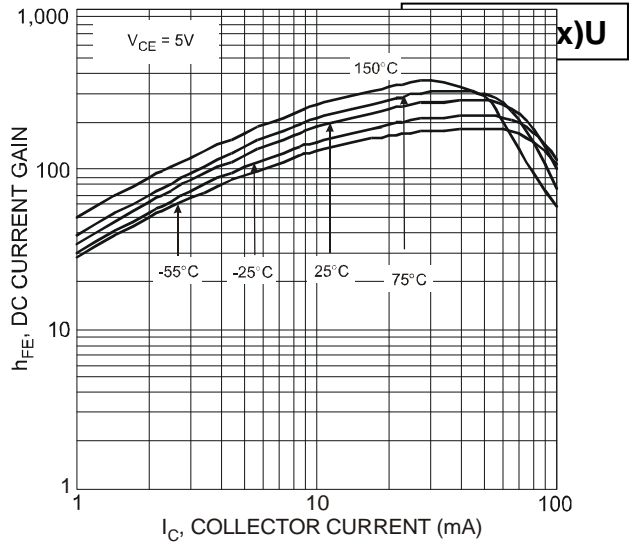


Fig. 2 Typical DC Current Gain vs. Collector Current

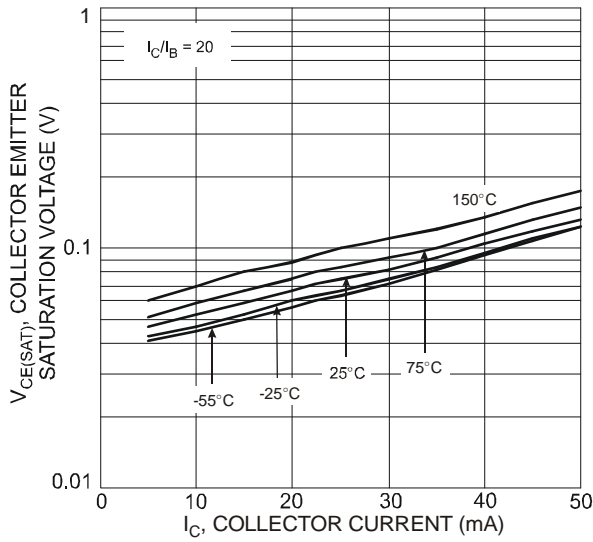


Fig. 3 Collector Emitter Saturation Voltage vs. Collector Current

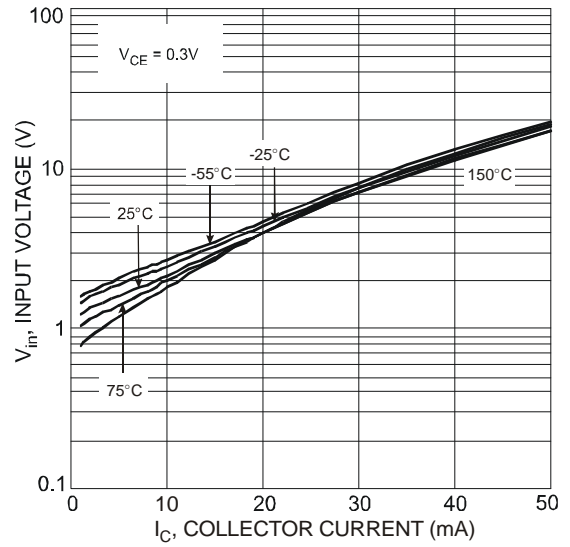
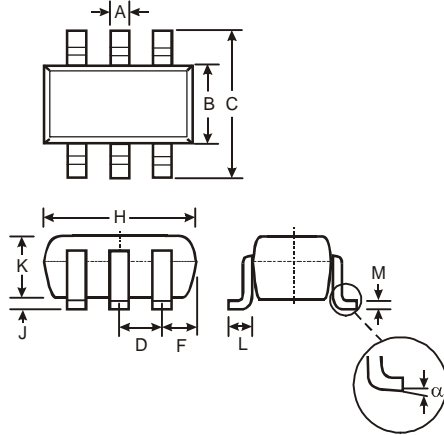


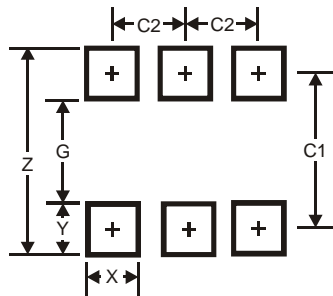
Fig. 4 Input Voltage vs. Collector Current

**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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- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
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- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

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- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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