

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

- Epitaxial Planar Die Construction
- Complementary NPN Types Available (DDC)
- 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)     |
|-------------|---------------|--------------|
| DDA124EU    | 22K $\Omega$  | 22K $\Omega$ |
| DDA144EU    | 47K $\Omega$  | 47K $\Omega$ |
| DDA114YU    | 10K $\Omega$  | 47K $\Omega$ |
| DDA123JU    | 2.2K $\Omega$ | 47K $\Omega$ |
| DDA114EU    | 10K $\Omega$  | 10K $\Omega$ |

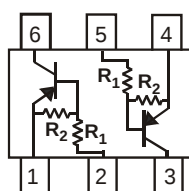
**Mechanical Data**

- 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)

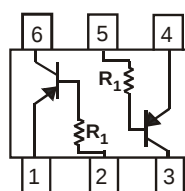
| Part Number | R1 Only       |
|-------------|---------------|
| DDA113TU    | 1K $\Omega$   |
| DDA143TU    | 4.7K $\Omega$ |
| DDA114TU    | 10K $\Omega$  |



Top View



R1, R2



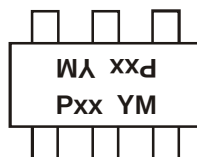
R1 Only

Device Schematic

**Ordering Information** (Notes 3 & 4)

| Product        | Grade      | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|----------------|------------|---------|--------------------|-----------------|-------------------|
| DDA124EU-7-F   | Commercial | P17     | 7                  | 8               | 3,000             |
| DDA124EUQ-7-F  | Automotive | P17     | 7                  | 8               | 3,000             |
| DDA124EUQ-13-F | Automotive | P17     | 13                 | 8               | 10,000            |
| DDA144EU-7-F   | Commercial | P20     | 7                  | 8               | 3,000             |
| DDA144EUQ-7-F  | Automotive | P20     | 7                  | 8               | 3,000             |
| DDA114YU-7-F   | Commercial | P14     | 7                  | 8               | 3,000             |
| DDA114YUQ-7-F  | Automotive | P14     | 7                  | 8               | 3,000             |
| DDA123JU-7-F   | Commercial | P06     | 7                  | 8               | 3,000             |
| DDA114EU-7-F   | Commercial | P13     | 7                  | 8               | 3,000             |
| DDA114EUQ-7-F  | Automotive | P13     | 7                  | 8               | 3,000             |
| DDA113TU-7-F   | Commercial | P01     | 7                  | 8               | 3,000             |
| DDA143TU-7-F   | Commercial | P07     | 7                  | 8               | 3,000             |
| DDA143TUQ-7-F  | Automotive | P07     | 7                  | 8               | 3,000             |
| DDA143TUQ-13-F | Automotive | P07     | 13                 | 8               | 10,000            |
| DDA114TU-7-F   | Commercial | P12     | 7                  | 8               | 3,000             |
| DDA114TUQ-7-F  | Automotive | P12     | 7                  | 8               | 3,000             |
| DDA114TUQ-13-F | Automotive | P12     | 13                 | 8               | 10,000            |

- 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**


Pxx = Product Type Marking Code (See Ordering Information)  
 YM = Date Code Marking  
 Y = Year (ex: T = 2006)  
 M = Month (ex: 9 = September)

**Date Code Key**

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | R    | S    | T    | U    | V    | W    | 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   |

DDA(xxxx)U

Document number: DS30346 Rev. 10 - 2

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 October 2011  
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## Maximum Ratings @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                             |          | Symbol              | Value      | Unit |
|--------------------------------------------|----------|---------------------|------------|------|
| Supply Voltage (1) to (6) and (4) to (3)   |          | V <sub>CC</sub>     | -50        | V    |
| Input Voltage<br>(1) to (2) and (4) to (5) | DDA124EU | V <sub>IN</sub>     | +10 to -40 | V    |
|                                            | DDA144EU |                     | +10 to -40 |      |
|                                            | DDA114YU |                     | +6 to -40  |      |
|                                            | DDA123JU |                     | +5 to -12  |      |
|                                            | DDA114EU |                     | +10 to -40 |      |
|                                            | DDA113TU |                     | +5V max    |      |
|                                            | DDA143TU |                     | +5V max    |      |
| Output Current                             | DDA114TU | I <sub>O</sub>      | +5V max    | mA   |
|                                            | DDA124EU |                     | -30        |      |
|                                            | DDA144EU |                     | -30        |      |
|                                            | DDA114YU |                     | -70        |      |
|                                            | DDA123JU |                     | -100       |      |
|                                            | DDA114EU |                     | -50        |      |
|                                            | DDA113TU |                     | -100       |      |
| Output Current                             | DDA143TU | I <sub>C(MAX)</sub> | -100       | mA   |
|                                            | DDA114TU |                     | -100       |      |

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

| Characteristic                                       | Symbol                            | Value       | Unit |
|------------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)                           | P <sub>D</sub>                    | 200         | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 5) | R <sub>θJA</sub>                  | 625         | °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

| Characteristic<br>(DDA113TU & DDA143TU & DDA114TU only) | 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 DDA143TU<br>I <sub>C</sub> /I <sub>B</sub> = -1mA / -0.1mA DDA114TU<br>I <sub>C</sub> /I <sub>B</sub> = -10mA / -1mA DDA113TU |
| DC Current Transfer Ratio                               | h <sub>FE</sub>      | 100<br>160 | 250<br>- | 600<br>- | —    | I <sub>C</sub> = -1mA, V <sub>CE</sub> = -5V<br>I <sub>C</sub> = -1mA, V <sub>CE</sub> = -5V DDA143TUQ                                                                          |
| 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                                                                                                                        |

| Characteristic                             | Symbol                                                                | Min                                  | Typ                            | Max                                      | Unit | Test Condition                                                                                                                                                                                                                                                                           |
|--------------------------------------------|-----------------------------------------------------------------------|--------------------------------------|--------------------------------|------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Voltage                              | DDA124EU<br>DDA144EU<br>DDA114YU<br>DDA123JU<br>DDA114EU              | -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    | V <sub>CC</sub> = -5V, I <sub>O</sub> = -100μA                                                                                                                                                                                                                                           |
|                                            | DDA124EU<br>DDA144EU<br>DDA114YU<br>DDA123JU<br>DDA114EU              | —                                    | -1.9<br>-1.9<br>—<br>—<br>-1.9 | -3.0<br>-3.0<br>-1.4<br>-1.1<br>-3.0     |      |                                                                                                                                                                                                                                                                                          |
| Output Voltage                             | DDA124EU<br>DDA144EU<br>DDA114YU<br>DDA123JU<br>DDA114EU              | —                                    | -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                              | DDA124EU<br>DDA144EU<br>DDA114YU<br>DDA123JU<br>DDA114EU              | —                                    | —                              | -0.36<br>-0.18<br>-0.88<br>-3.6<br>-0.88 | mA   | V <sub>I</sub> = -5V                                                                                                                                                                                                                                                                     |
| Output Current                             | I <sub>O(off)</sub>                                                   | —                                    | —                              | -0.5                                     | μA   | V <sub>CC</sub> = -50V, V <sub>I</sub> = -0V                                                                                                                                                                                                                                             |
| DC Current Gain                            | DDA124EU<br>DDA124EUQ<br>DDA144EU<br>DDA114YU<br>DDA123JU<br>DDA114EU | 56<br>60<br>68<br>68<br>80<br>30     | —                              | —                                        | —    | 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> = -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> = -5mA |
| 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                     | 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 – DDA123JU

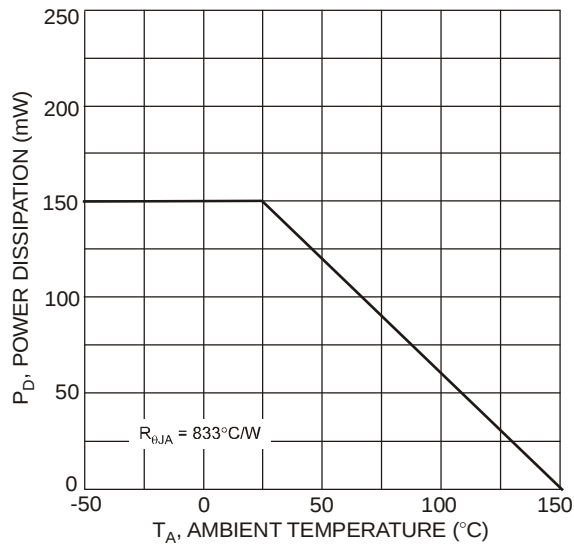


Fig. 1 Power Dissipation vs. Ambient Temperature

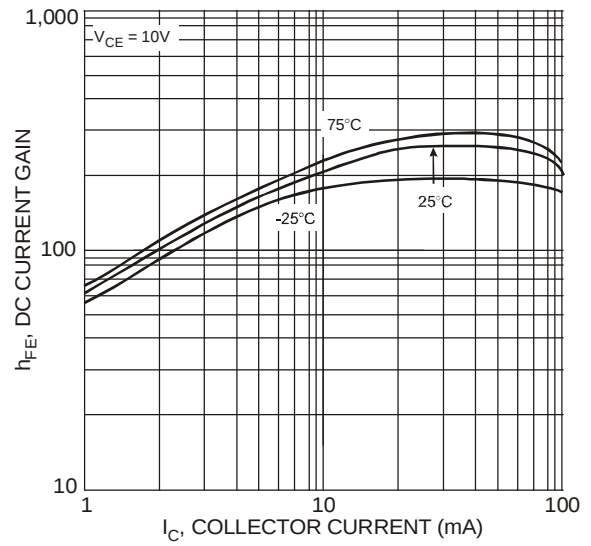


Fig. 2 Typical DC Current Gain vs. Collector Current

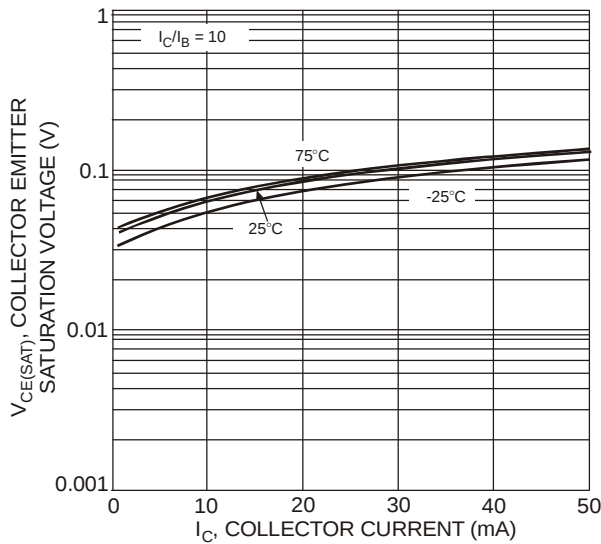


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

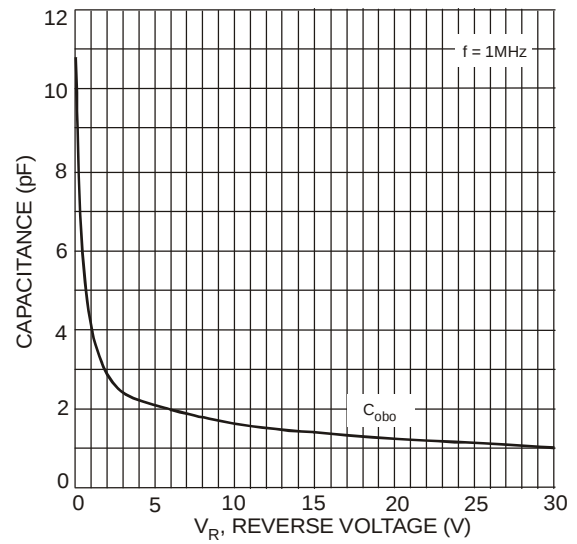


Fig. 4 Typical Capacitance Characteristics

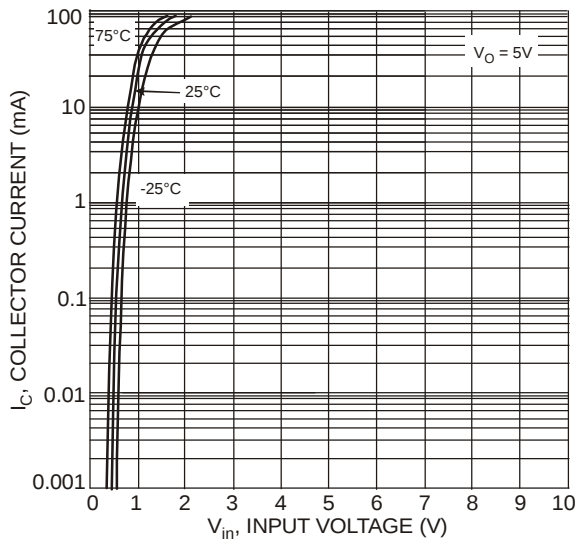


Fig. 5 Collector Current vs. Input Voltage

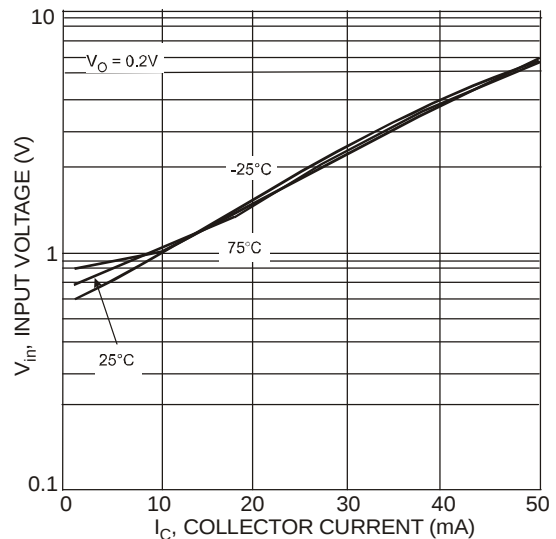


Fig. 6 Input Voltage vs. Collector Current

# Typical Curves – DDA114TU

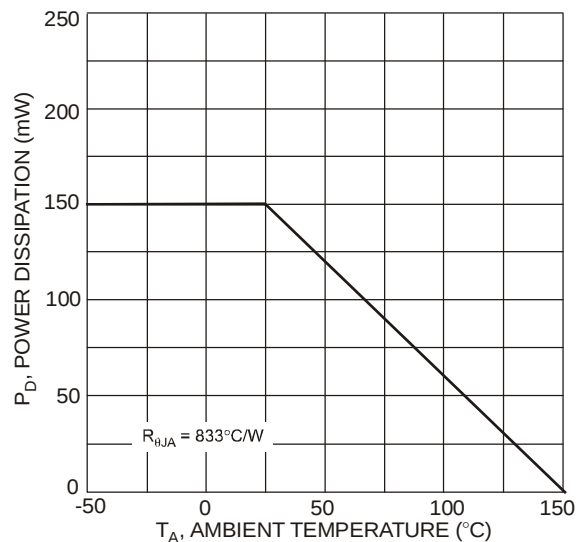


Fig. 1 Power Dissipation vs. Ambient Temperature

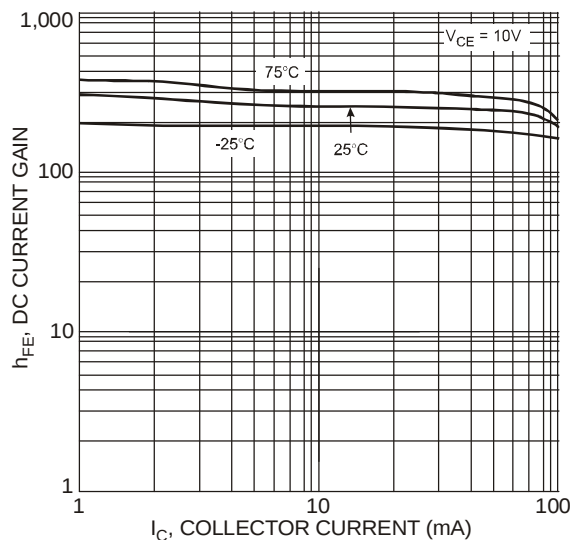


Fig. 2 Typical DC Current Gain vs. Collector Current

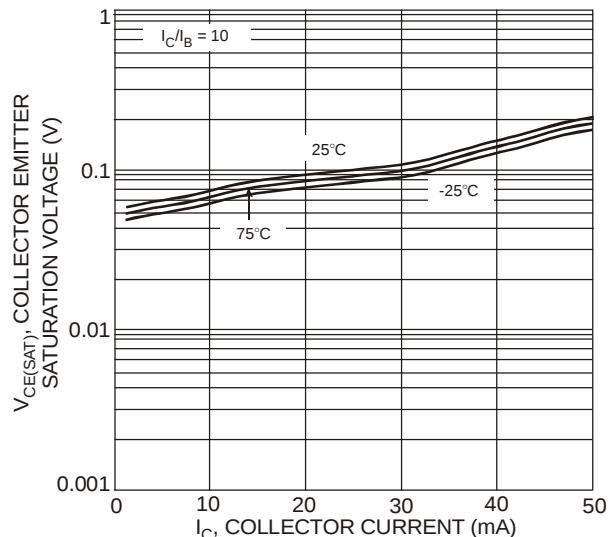


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

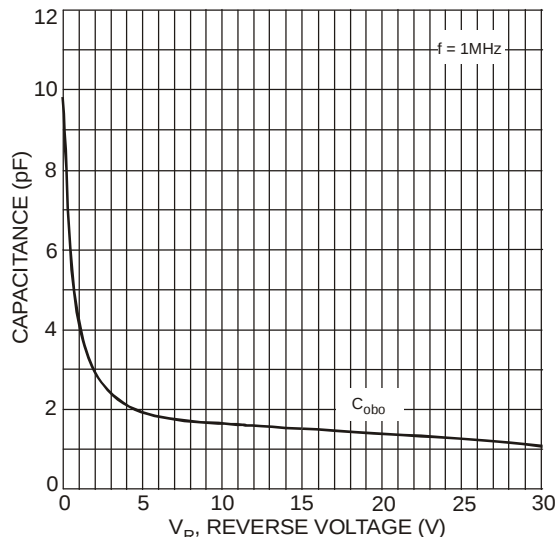


Fig. 4 Typical Capacitance Characteristics

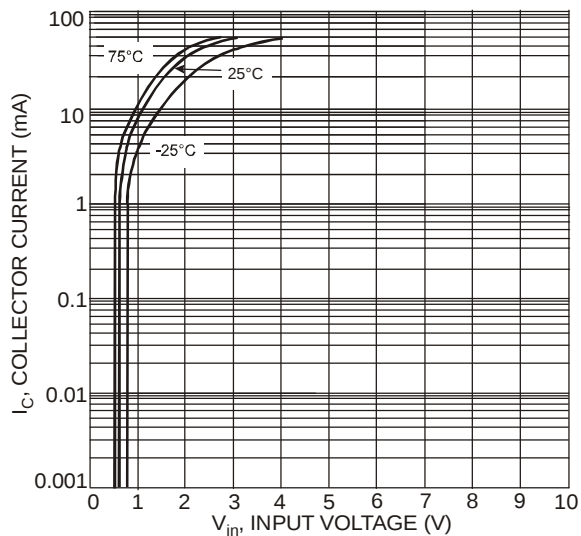


Fig. 5 Collector Current vs. Input Voltage

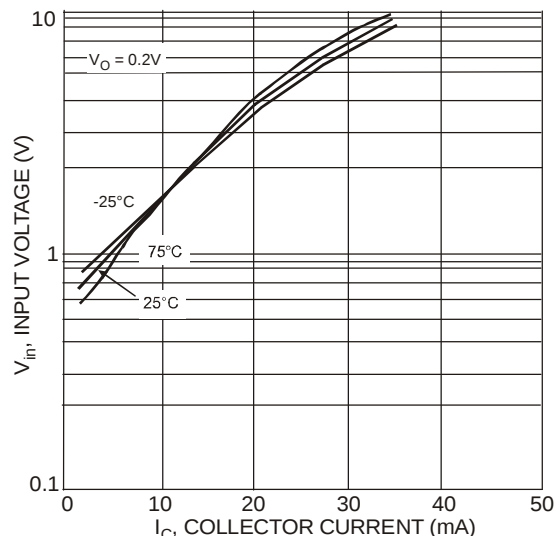
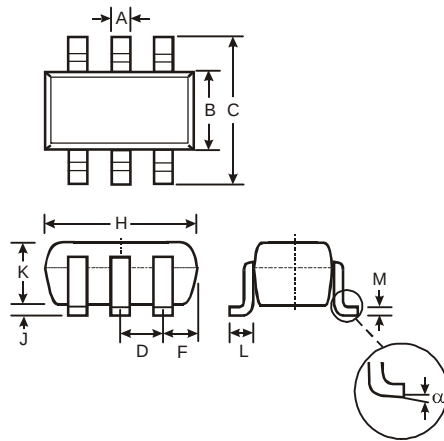


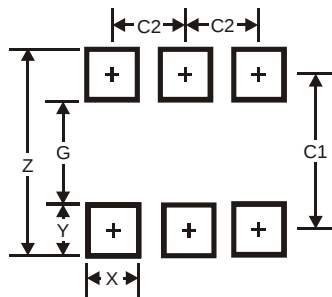
Fig. 6 Input Voltage vs. Collector Current

## 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 |
| $\alpha$             | 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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