

**NPN PRE-BIASED SMALL SIGNAL SOT23 SURFACE MOUNT TRANSISTOR**
**Product Summary**

| Part Number | R1 (NOM)      |
|-------------|---------------|
| DDTC113TCA  | 1K $\Omega$   |
| DDTC123TCA  | 2.2K $\Omega$ |
| DDTC143TCA  | 4.7K $\Omega$ |
| DDTC114TCA  | 10K $\Omega$  |
| DDTC124TCA  | 22K $\Omega$  |
| DDTC144TCA  | 47K $\Omega$  |
| DDTC115TCA  | 100K $\Omega$ |
| DDTC125TCA  | 200K $\Omega$ |

**Features and Benefits**

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1 only
- "Lead Free", RoHS Compliant (Note 1)
- Halogen and Antimony Free "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

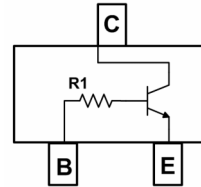
**Mechanical Data**

- Case: SOT23
- Case material: Molded Plastic. "Green" Molding Compound.
- Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.008 grams (approximate)

SOT23



Top View

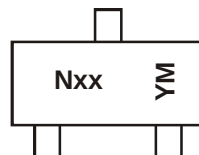


Device Schematic – Top View

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

| Product          | Grade      | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|------------------|------------|---------|--------------------|-----------------|-------------------|
| DDTC113TCA-7-F   | Commercial | N01     | 7                  | 8               | 3,000             |
| DDTC123TCA-7-F   | Commercial | N03     | 7                  | 8               | 3,000             |
| DDTC143TCA-7-F   | Commercial | N07     | 7                  | 8               | 3,000             |
| DDTC143TCAQ-7-F  | Automotive | N07     | 7                  | 8               | 3,000             |
| DDTC143TCAQ-13-F | Automotive | N07     | 13                 | 8               | 10,000            |
| DDTC114TCA-7-F   | Commercial | N12     | 7                  | 8               | 3,000             |
| DDTC124TCA-7-F   | Commercial | N16     | 7                  | 8               | 3,000             |
| DDTC144TCA-7-F   | Commercial | N19     | 7                  | 8               | 3,000             |
| DDTC115TCA-7-F   | Commercial | N23     | 7                  | 8               | 3,000             |
| DDTC125TCA-7-F   | Commercial | N25     | 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 Table above)  
 YM = Date Code Marking  
 Y = Year (ex: X = 2010)  
 M = Month (ex: 9 = September)

**Date Code Key**

Date Code Key

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|------|------|------|------|
| Code | T    | U    | V    | W    | X    | Y    | Z    | A    | B    | C    |

| 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 |
|---------------------------|----------------------|-------|------|
| Collector-Base Voltage    | V <sub>CBO</sub>     | 50    | V    |
| Collector-Emitter Voltage | V <sub>CEO</sub>     | 50    | V    |
| Emitter-Base Voltage      | V <sub>EBO</sub>     | 5     | V    |
| Collector Current         | I <sub>C</sub> (Max) | 100   | mA   |

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

| Characteristic                                       | Symbol                            | Value       | Unit |
|------------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Notes 5 & 6)                      | 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   |

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

| 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> = 10mA/1mA DDTC113TCA<br>I <sub>C</sub> /I <sub>B</sub> = 5mA/0.5mA DDTC123TCA<br>I <sub>C</sub> /I <sub>B</sub> = 2.5mA/.25mA DDTC143TCA<br>I <sub>C</sub> /I <sub>B</sub> = 1mA/.1mA DDTC114TCA<br>I <sub>C</sub> /I <sub>B</sub> = 5mA/0.5mA DDTC124TCA<br>I <sub>C</sub> /I <sub>B</sub> = 2.5mA/.25mA DDTC144TCA<br>I <sub>C</sub> /I <sub>B</sub> = 1mA/0.1mA DDTC115TCA<br>I <sub>C</sub> /I <sub>B</sub> = .5mA/.05mA DDTC125TCA |
| DC Current Transfer Ratio                  | h <sub>FE</sub>      | 100<br>120 | 250<br>- | 600<br>630 | —    | I <sub>C</sub> = 1mA, V <sub>CE</sub> = 5V<br>I <sub>C</sub> = 5mA, V <sub>CE</sub> = 5V DDTC143TCAQ                                                                                                                                                                                                                                                                                                                                                                    |
| Input Resistor (R <sub>1</sub> ) Tolerance | ΔR <sub>1</sub>      | -30        | —        | +30        | %    | —                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Gain-Bandwidth Product*                    | f <sub>T</sub>       | —          | 250      | —          | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = -5mA,<br>f = 100MHz                                                                                                                                                                                                                                                                                                                                                                                                             |

\* Transistor - For Reference Only

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

**Typical Characteristics – DDTC144TCA**

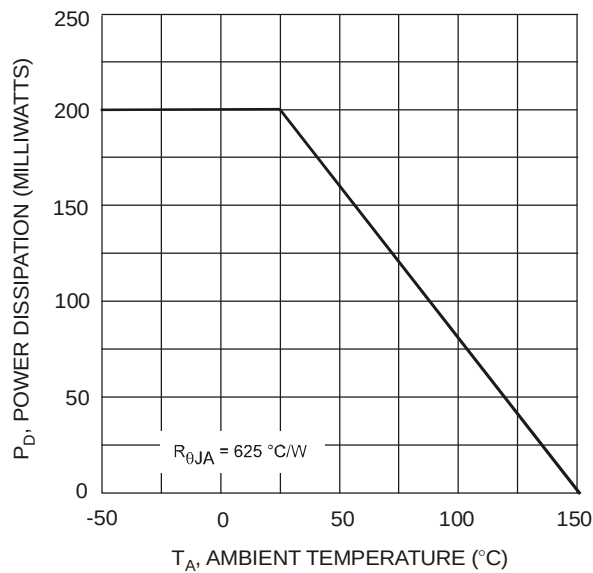


Fig. 1 Derating Curve

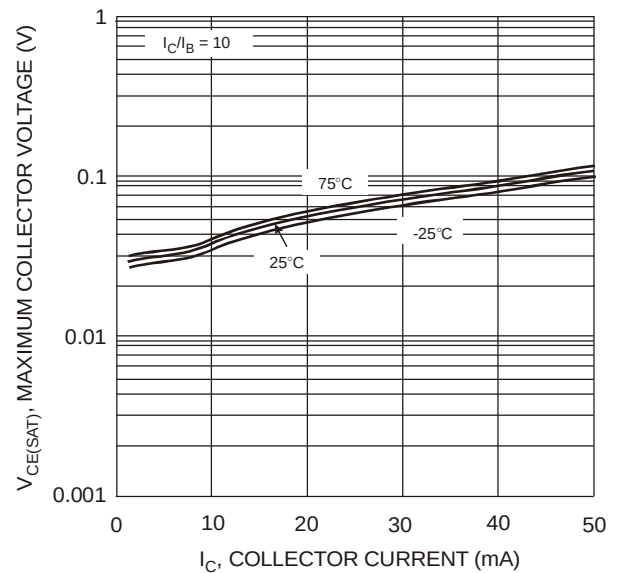


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

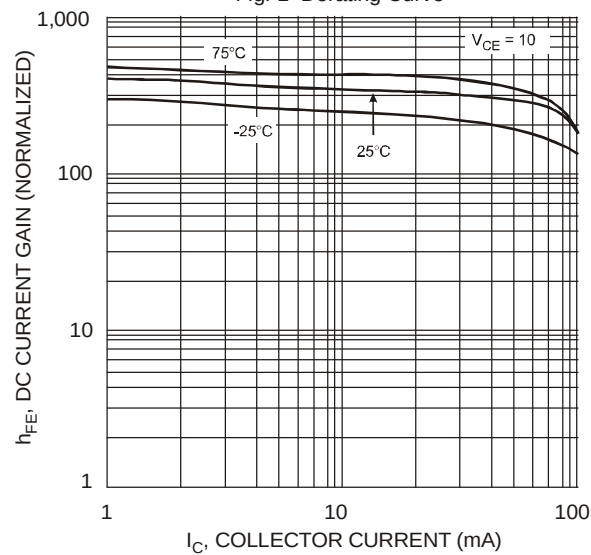


Fig. 3 DC Current Gain

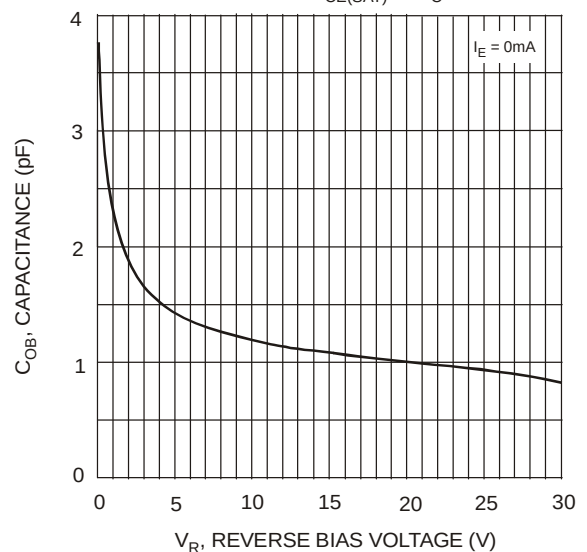


Fig. 4 Output Capacitance

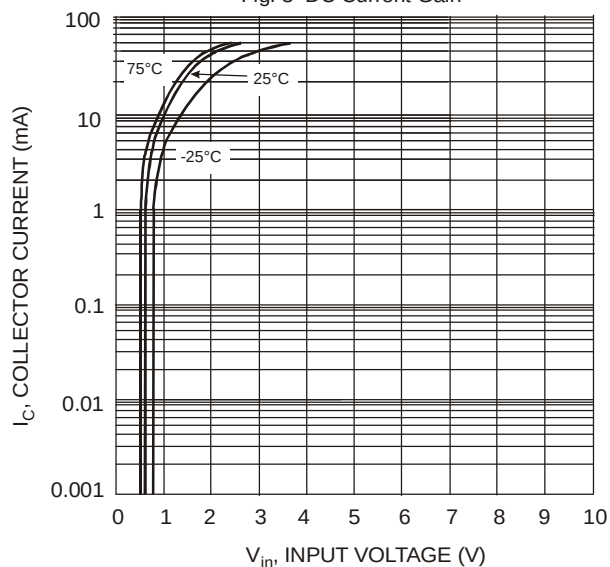


Fig. 5 Collector Current vs. Input Voltage

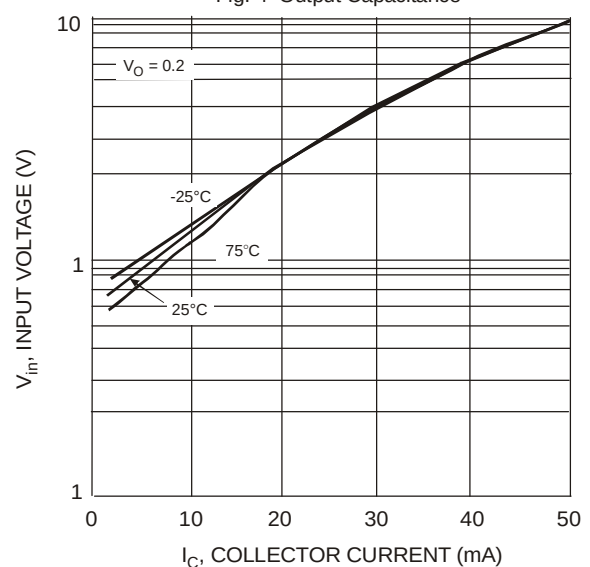
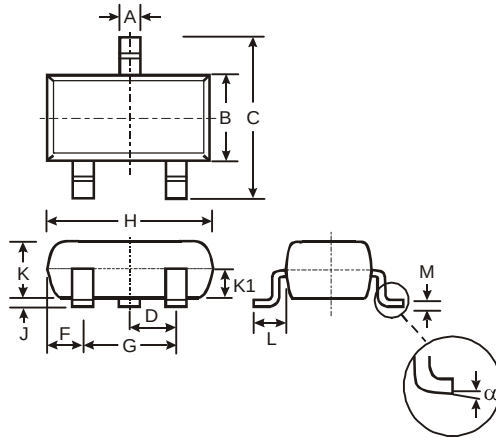


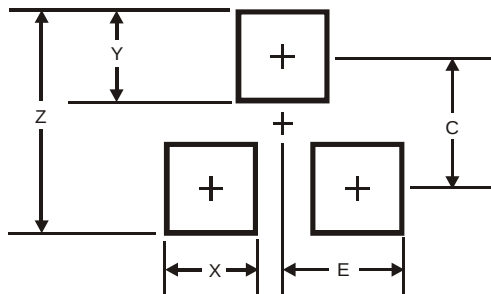
Fig. 6 Input Voltage vs. Collector Current

## Package Outline Dimensions



| SOT23                |       |      |       |
|----------------------|-------|------|-------|
| Dim                  | Min   | Max  | Typ   |
| A                    | 0.37  | 0.51 | 0.40  |
| B                    | 1.20  | 1.40 | 1.30  |
| C                    | 2.30  | 2.50 | 2.40  |
| D                    | 0.89  | 1.03 | 0.915 |
| F                    | 0.45  | 0.60 | 0.535 |
| G                    | 1.78  | 2.05 | 1.83  |
| H                    | 2.80  | 3.00 | 2.90  |
| J                    | 0.013 | 0.10 | 0.05  |
| K                    | 0.903 | 1.10 | 1.00  |
| K1                   | -     | -    | 0.400 |
| L                    | 0.45  | 0.61 | 0.55  |
| M                    | 0.085 | 0.18 | 0.11  |
| $\alpha$             | 0°    | 8°   | -     |
| All Dimensions in mm |       |      |       |

## Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 2.9           |
| X          | 0.8           |
| Y          | 0.9           |
| C          | 2.0           |
| E          | 1.35          |

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