

# DDTC (R1≠R2 SERIES) CA

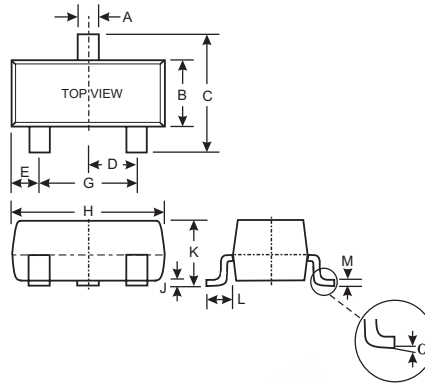
## NPN PRE-BIASED SMALL SIGNAL SOT-23 SURFACE MOUNT TRANSISTOR

### Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1≠R2
- Lead Free/RoHS Compliant (Note 2)

### Mechanical Data

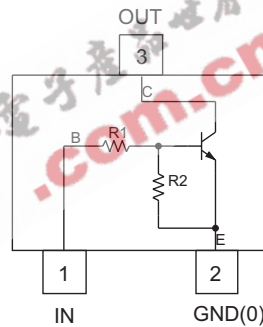
- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Marking: Date Code and Marking Code (See Table Below & Page 3)
- Ordering Information (See Page 2)
- Weight: 0.008 grams (approximate)



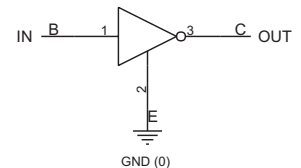
| SOT-23 |       |       |
|--------|-------|-------|
| Dim    | Min   | Max   |
| A      | 0.37  | 0.51  |
| B      | 1.20  | 1.40  |
| C      | 2.30  | 2.50  |
| D      | 0.89  | 1.03  |
| E      | 0.45  | 0.60  |
| G      | 1.78  | 2.05  |
| H      | 2.80  | 3.00  |
| J      | 0.013 | 0.10  |
| K      | 0.903 | 1.10  |
| L      | 0.45  | 0.61  |
| M      | 0.085 | 0.180 |
| α      | 0°    | 8°    |

All Dimensions in mm

| P/N        | R1 (NOM) | R2 (NOM) | Type Code |
|------------|----------|----------|-----------|
| DDTC113ZCA | 1KΩ      | 10KΩ     | N02       |
| DDTC123YCA | 2.2KΩ    | 10KΩ     | N05       |
| DDTC123JCA | 2.2KΩ    | 47KΩ     | N06       |
| DDTC143XCA | 4.7KΩ    | 10KΩ     | N09       |
| DDTC143FCA | 4.7KΩ    | 22KΩ     | N10       |
| DDTC143ZCA | 4.7KΩ    | 47KΩ     | N11       |
| DDTC114YCA | 10KΩ     | 47KΩ     | N14       |
| DDTC114WCA | 10KΩ     | 4.7KΩ    | N15       |
| DDTC124XCA | 22KΩ     | 47KΩ     | N18       |
| DDTC144VCA | 47KΩ     | 10KΩ     | N21       |
| DDTC144WCA | 47KΩ     | 22KΩ     | N22       |



Schematic and Pin Configuration



Equivalent Inverter Circuit

### Maximum Ratings @ TA = 25°C unless otherwise specified

| Characteristic                                       | Symbol                            | Value   | Unit |
|--|-----------------------------------|---|------|
| Supply Voltage, (3) to (2)                           | V <sub>CC</sub>                   | 50  | V    |
| Input Voltage, (1) to (2)                            | V <sub>IN</sub>                   | -5 to +10<br>-5 to +12<br>-5 to +12<br>-7 to +20<br>-6 to +30<br>-5 to +30<br>-6 to +40<br>-10 to +30<br>-10 to +40<br>-15 to +40<br>-10 to +40 | V    |
| Output Current                                       | I <sub>O</sub>                    | 100<br>100<br>100<br>100<br>100<br>100<br>70<br>100<br>50<br>30<br>30   | mA   |
| Output Current                                       | I <sub>C</sub> (Max)              | 100   | mA   |
| Power Dissipation                                    | P <sub>d</sub>                    | 200   | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 1) | R <sub>θJA</sub>                  | 625   | °C/W |
| Operating and Storage and Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150   | °C   |

Note: 1. Mounted on FR4 PC Board with recommended pad layout which can be found at <http://www.diodes.com/datasheets/ap02001.pdf>.  
2. No purposefully added lead.

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

| Characteristic             |  | Symbol                          | Min   | Typ | Max  | Unit | Test Condition  |  |
|----------------------------|--|---------------------------------|---|-----|--|------|---|--|
| Input Voltage              | DDTC113ZCA<br>DDTC123YCA<br>DDTC123JCA<br>DDTC143XCA<br>DDTC143FCA<br>DDTC143ZCA<br>DDTC114YCA<br>DDTC114WCA<br>DDTC124XCA<br>DDTC144VCA<br>DDTC144WCA | V <sub>I(off)</sub>             | 0.3<br>0.3<br>0.5<br>0.3<br>0.3<br>0.5<br>0.3<br>0.8<br>0.4<br>1.0<br>0.8 | —   | —  | —    | V   | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA   |
|                            | DDTC113ZCA<br>DDTC123YCA<br>DDTC123JCA<br>DDTC143XCA<br>DDTC143FCA<br>DDTC143ZCA<br>DDTC114YCA<br>DDTC114WCA<br>DDTC124XCA<br>DDTC144VCA<br>DDTC144WCA | V <sub>I(on)</sub>              | —   | —   | 3.0<br>3.0<br>1.1<br>2.5<br>1.3<br>1.3<br>1.4<br>3.0<br>2.5<br>5.0<br>4.0      | —    | V   | V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 3mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA |
| Output Voltage             |  | V <sub>O(on)</sub>              | —   | 0.1 | 0.3  | V    | I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA DDCT123JCA<br>I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA DDCT143ZCA<br>I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA DDCT114YCA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA All Others  |  |
| Input Current              | DDTC113ZCA<br>DDTC123YCA<br>DDTC123JCA<br>DDTC143XCA<br>DDTC143FCA<br>DDTC143ZCA<br>DDTC114YCA<br>DDTC114WCA<br>DDTC124XCA<br>DDTC144VCA<br>DDTC144WCA | I <sub>I</sub>                  | —   | —   | 7.2<br>3.8<br>3.6<br>1.8<br>1.8<br>1.8<br>0.88<br>0.88<br>0.36<br>0.16<br>0.16 | 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            | DDTC113ZCA<br>DDTC123YCA<br>DDTC123JCA<br>DDTC143XCA<br>DDTC143FCA<br>DDTC143ZCA<br>DDTC114YCA<br>DDTC114WCA<br>DDTC124XCA<br>DDTC144VCA<br>DDTC144WCA | G <sub>I</sub>                  | 33<br>33<br>80<br>30<br>68<br>80<br>68<br>24<br>68<br>33<br>56            | —   | —  | —    | 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> = 10mA<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<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> = 5mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA |  |
| Input Resistor Tolerance   |  | ΔR <sub>1</sub>                 | -30   | —   | +30  | %    | —   |  |
| Resistance Ratio Tolerance |  | ΔR <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,<br>f = 100MHz  |  |

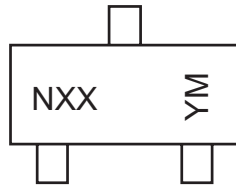
\* Transistor - For Reference Only

### Ordering Information (Note 3)

| Device         | Packaging | Shipping         |
|----------------|-----------|------------------|
| DDTC113ZCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC123YCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC123JCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC143XCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC143FCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC143ZCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC114YCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC114WCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC124XCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC144VCA-7-F | SOT-23    | 3000/Tape & Reel |
| DDTC144WCA-7-F | SOT-23    | 3000/Tape & Reel |

Note: 3. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



NXX = Product Type Marking Code, See Table on Page 1  
 YM = Date Code Marking  
 Y = Year ex: T = 2006  
 M = Month ex: 9 = September

Date Code Key

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | N    | P    | R    | S    | T    | U    | V    | W    | X    | Y    | Z    |

| 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   |



**TYPICAL CURVES - DDTC123JCA**

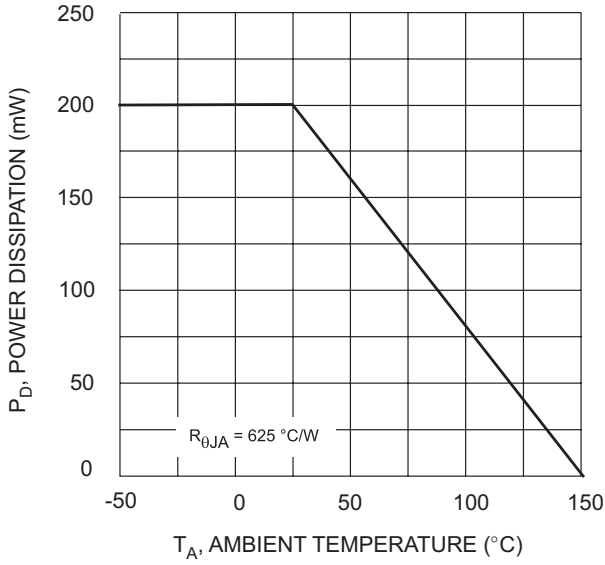


Fig. 1 Derating Curve

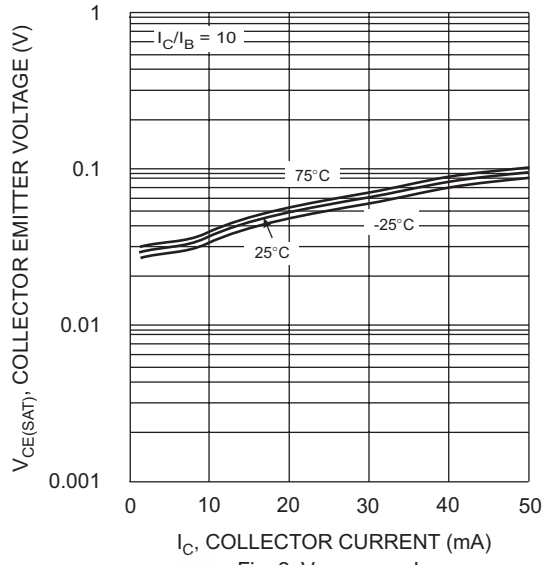


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

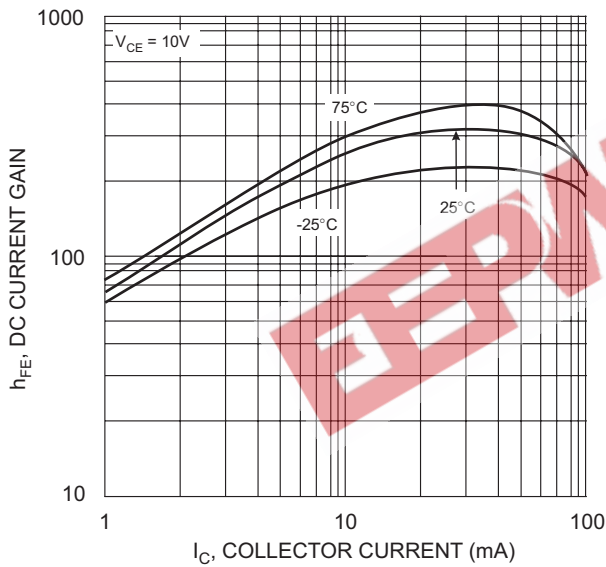


Fig. 3 DC Current Gain

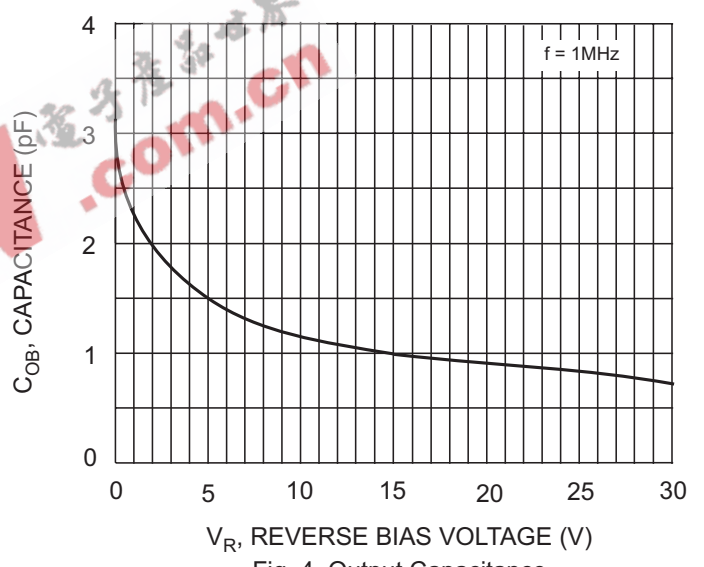


Fig. 4 Output Capacitance

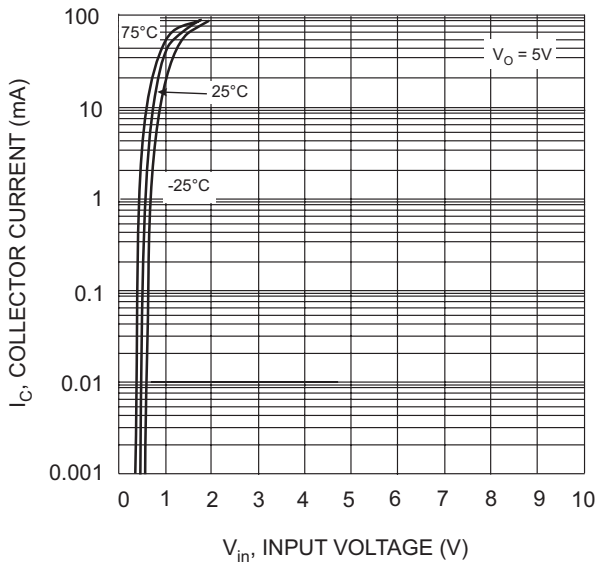


Fig. 5 Collector Current Vs. Input Voltage

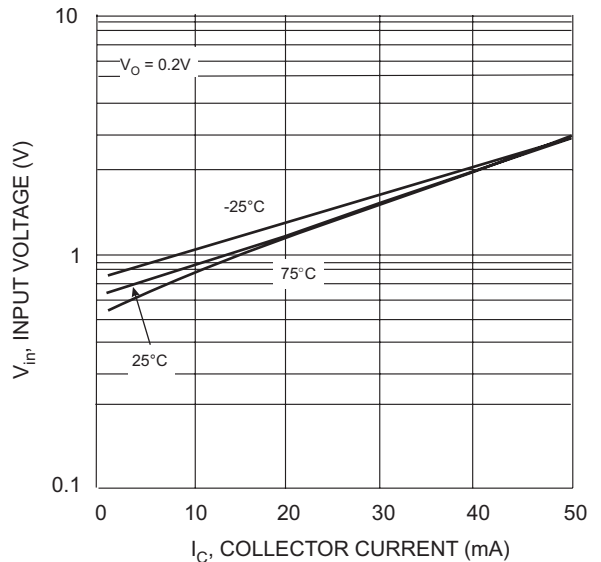


Fig. 6 Input Voltage vs. Collector Current

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