

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

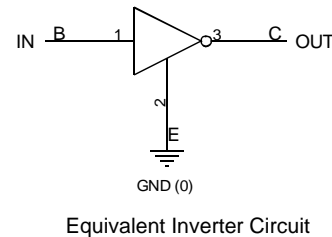
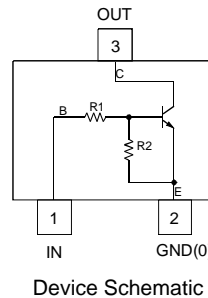
| Part Number | R1 (NOM) | R2 (NOM) |
|-------------|----------|----------|
| DDTC113ZCA | 1KΩ | 10KΩ |
| DDTC123YCA | 2.2KΩ | 10KΩ |
| DDTC123JCA | 2.2KΩ | 47KΩ |
| DDTC143XCA | 4.7KΩ | 10KΩ |
| DDTC143FCA | 4.7KΩ | 22KΩ |
| DDTC143ZCA | 4.7KΩ | 47KΩ |
| DDTC114YCA | 10KΩ | 47KΩ |
| DDTC114WCA | 10KΩ | 4.7KΩ |
| DDTC124XCA | 22KΩ | 47KΩ |
| DDTC144VCA | 47KΩ | 10KΩ |
| DDTC144WCA | 47KΩ | 22KΩ |

Features and Benefits

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1≠R2
- “Lead Free”, RoHS Compliant (Note 1)
- Halogen and Antimony Free “Green” Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

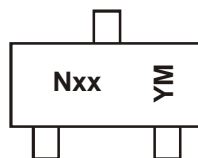
Mechanical Data

- 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)


Ordering Information (Notes 3 & 4)

| Product | Grade | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|------------------|------------|---------|--------------------|-----------------|-------------------|
| DDTC113ZCA-7-F | Commercial | N02 | 7 | 8 | 3,000 |
| DDTC123YCA-7-F | Commercial | N05 | 7 | 8 | 3,000 |
| DDTC123JCA-7-F | Commercial | N06 | 7 | 8 | 3,000 |
| DDTC143XCA-7-F | Commercial | N09 | 7 | 8 | 3,000 |
| DDTC143FCA-7-F | Commercial | N10 | 7 | 8 | 3,000 |
| DDTC143ZCA-7-F | Commercial | N11 | 7 | 8 | 3,000 |
| DDTC143ZCAQ-7-F | Automotive | N11 | 7 | 8 | 3,000 |
| DDTC143ZCAQ-13-F | Automotive | N11 | 13 | 8 | 10,000 |
| DDTC114YCA-7-F | Commercial | N14 | 7 | 8 | 3,000 |
| DDTC114YCAQ-7-F | Automotive | N14 | 7 | 8 | 3,000 |
| DDTC114YCAQ-13-F | Automotive | N14 | 13 | 8 | 10,000 |
| DDTC114WCA-7-F | Commercial | N15 | 7 | 8 | 3,000 |
| DDTC124XCA-7-F | Commercial | N18 | 7 | 8 | 3,000 |
| DDTC144VCA-7-F | Commercial | N21 | 7 | 8 | 3,000 |
| DDTC144WCA-7-F | Commercial | N22 | 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: T = 2006)
 M = Month (ex: 9 = September)

Date Code Key

| Year Code | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | N | P | R | S | T | U | V | W | X | Y | Z | A | B | C | D | E |

| Month Code | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 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, <Pin: (3) to (2)> | V _{CC} | 50 | V | |
| Input Voltage, <Pin: (1) to (2)> | V _{IN} | DDTC113ZCA | -5 to +10 | |
| | | DDTC123YCA | -5 to +12 | |
| | | DDTC123JCA | -5 to +12 | |
| | | DDTC143XCA | -7 to +20 | |
| | | DDTC143FCA | -6 to +30 | |
| | | DDTC143ZCA | -5 to +30 | |
| | | DDTC114YCA | -6 to +40 | |
| | | DDTC114WCA | -10 to +30 | |
| | | DDTC124XCA | -10 to +40 | |
| | | DDTC144VCA | -15 to +40 | |
| | | DDTC144WCA | -10 to +40 | |
| Output Current | I _O | DDTC113ZCA | 100 | |
| | | DDTC123YCA | 100 | |
| | | DDTC123JCA | 100 | |
| | | DDTC143XCA | 100 | |
| | | DDTC143FCA | 100 | |
| | | DDTC143ZCA | 100 | |
| | | DDTC114YCA | 70 | |
| | | DDTC114WCA | 100 | |
| | | DDTC124XCA | 50 | |
| | | DDTC144VCA | 30 | |
| DDTC144WCA | 30 | | | |
| Output Current | All | I _{C(MAX)} | 100 | mA |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Notes 5 & 6) | P _D | 200 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 5) | R _{θJA} | 625 | °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
6. 150mW per element must not be exceeded.

Electrical Characteristics @T_A = 25°C unless otherwise specified

| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition | |
|----------------------------|---|---------------------------------|---|-----|--|---|--|--|
| Input Voltage | DDTC113ZCA DDTC123YCA DDTC123JCA DDTC143XCA DDTC143FCA DDTC143ZCA DDTC114YCA DDTC114WCA DDTC124XCA DDTC144VCA DDTC144WCA | V _{I(OFF)} | 0.3 0.3 0.5 0.3 0.3 0.5 0.3 0.8 0.4 1.0 0.8 | — | — | — | V | V _{CC} = 5V, I _O = 100μA |
| | DDTC113ZCA DDTC123YCA DDTC123JCA DDTC143XCA DDTC143FCA DDTC143ZCA DDTC114YCA DDTC114WCA DDTC124XCA DDTC144VCA DDTC144WCA | | V _{I(ON)} | — | — | 3.0 3.0 1.1 2.5 1.3 1.3 1.4 3.0 2.5 5.0 4.0 | | V _O = 0.3V, I _O = 20mA V _O = 0.3V, I _O = 20mA V _O = 0.3V, I _O = 5mA V _O = 0.3V, I _O = 20mA V _O = 0.3V, I _O = 3mA V _O = 0.3V, I _O = 5mA V _O = 0.3V, I _O = 1mA V _O = 0.3V, I _O = 2mA V _O = 0.3V, I _O = 2mA V _O = 0.3V, I _O = 2mA V _O = 0.3V, I _O = 2mA |
| Output Voltage | | V _{O(ON)} | — | 0.1 | 0.3 | V | I _O /I _I = 5mA/0.25mA DDTC123JCA I _O /I _I = 5mA/0.25mA DDTC143ZCA I _O /I _I = 5mA/0.25mA DDTC114YCA I _O /I _I = 10mA/0.5mA All Others | |
| Input Current | DDTC113ZCA DDTC123YCA DDTC123JCA DDTC143XCA DDTC143FCA DDTC143ZCA DDTC114YCA DDTC114WCA DDTC124XCA DDTC144VCA DDTC144WCA | I _I | — | — | 7.2 3.8 3.6 1.8 1.8 1.8 0.88 0.88 0.36 0.16 0.16 | mA | V _I = 5V | |
| Output Current | | I _{O(OFF)} | — | — | 0.5 | μA | V _{CC} = 50V, V _I = 0V | |
| DC Current Gain | DDTC113ZCA DDTC123YCA DDTC123JCA DDTC143XCA DDTC143FCA DDTC143ZCA DDTC114YCA DDTC114YCAQ DDTC114WCA DDTC124XCA DDTC144VCA DDTC144WCA | G _I | 33 33 80 30 68 80 68 80 24 68 33 56 | — | — | — | V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 10mA 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 = 5mA V _O = 5V, I _O = 5mA | |
| Input Resistor Tolerance | | ΔR ₁ | -30 | — | +30 | % | — | |
| Resistance Ratio Tolerance | | ΔR ₂ /R ₁ | -20 | — | +20 | % | — | |
| Gain-Bandwidth Product* | | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = 5mA, f = 100MHz | |

* Transistor - For Reference Only

Typical Curves – DDTC123JCA

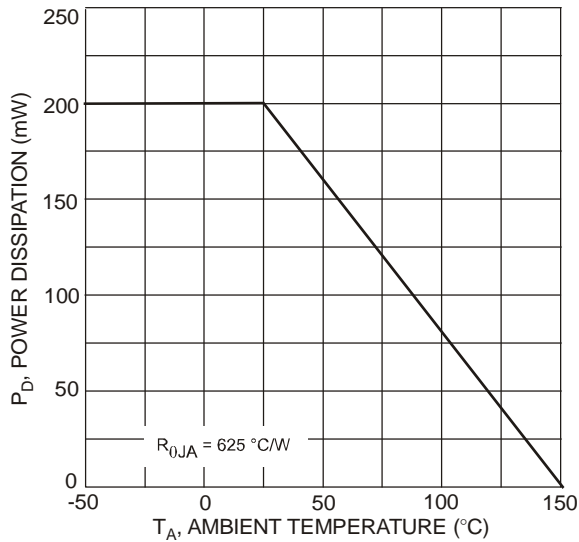


Fig. 1 Power Dissipation vs. Ambient Temperature

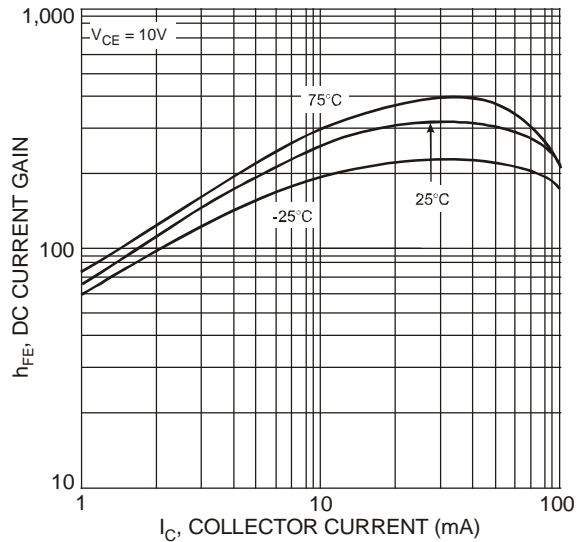


Fig. 2 Typical DC Current Gain vs. Collector Current

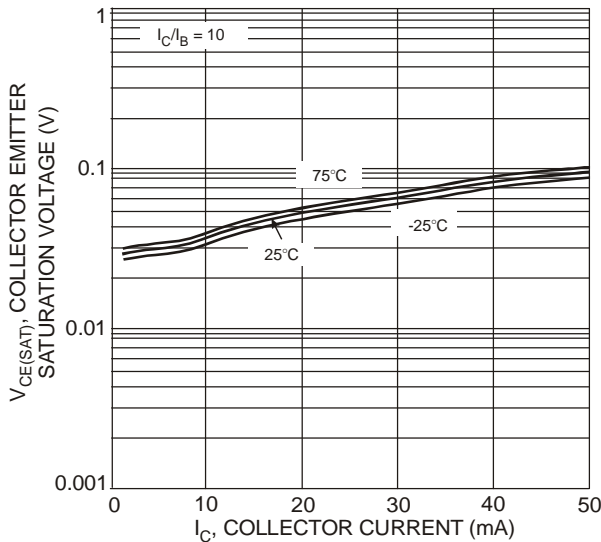


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

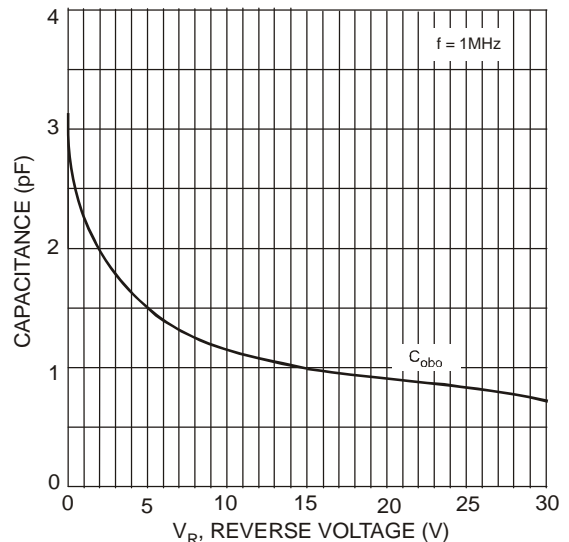


Fig. 4 Typical Capacitance Characteristics

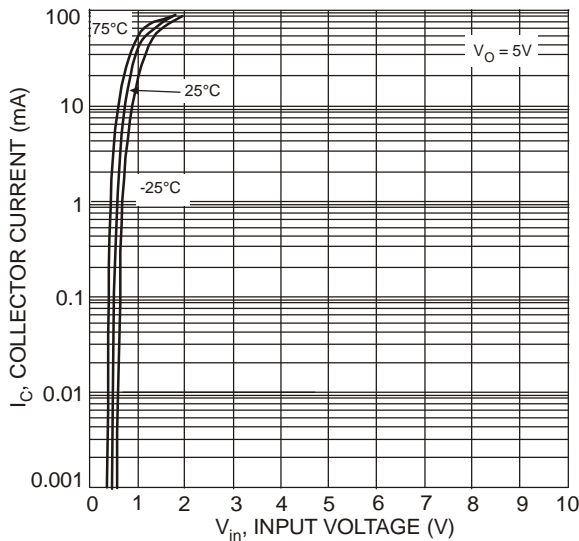


Fig. 5 Collector Current vs. Input Voltage

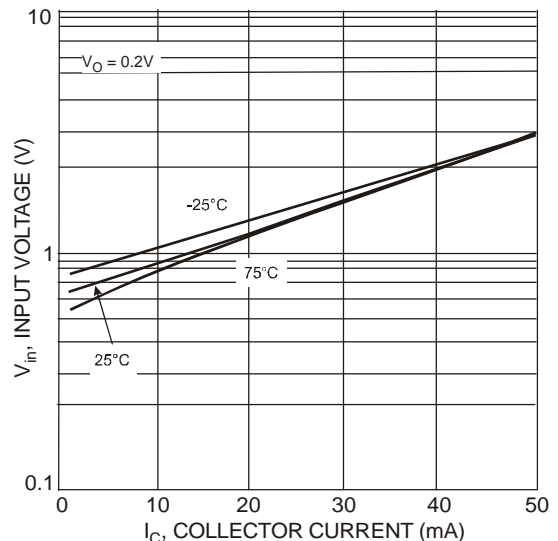
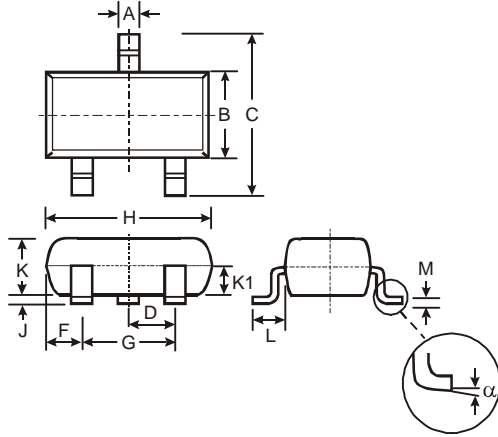


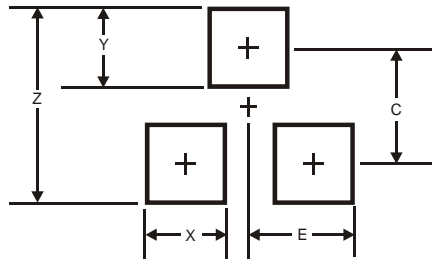
Fig. 6 Input Voltage vs. Collector Current

Package Outline Dimensions



| 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 |
| α | 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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