

NPN PRE-BIASED SMALL SIGNAL SOT23 SURFACE MOUNT TRANSISTOR
Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1 = R2
- **Totally Lead-Free & Fully RoHS compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

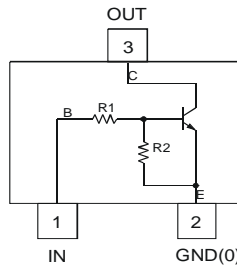
Mechanical Data

- 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)

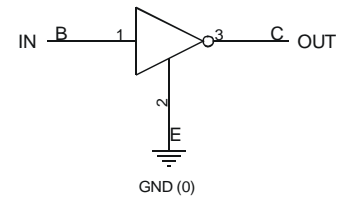
| Part Number | R1, R2 (NOM) |
|-------------|--------------|
| DDTC123ECA | 2.2KΩ |
| DDTC143ECA | 4.7KΩ |
| DDTC114ECA | 10KΩ |
| DDTC124ECA | 22KΩ |
| DDTC144ECA | 47KΩ |
| DDTC115ECA | 100KΩ |



Top View



Device Schematic

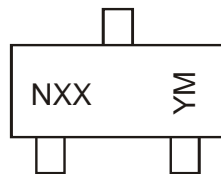


Equivalent Inverter Circuit

Ordering Information (Note 3 & 4)

| Product | Grade | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|------------------|------------|---------|--------------------|-----------------|-------------------|
| DDTC123ECA-7-F | Commercial | N04 | 7 | 8 | 3,000 |
| DDTC123ECAQ-7-F | Automotive | N04 | 7 | 8 | 3,000 |
| DDTC143ECA-7-F | Commercial | N08 | 7 | 8 | 3,000 |
| DDTC114ECA-7-F | Commercial | N13 | 7 | 8 | 3,000 |
| DDTC114ECAQ-7-F | Automotive | N13 | 7 | 8 | 3,000 |
| DDTC114ECAQ-13-F | Automotive | N13 | 13 | 8 | 10,000 |
| DDTC124ECA-7-F | Commercial | N17 | 7 | 8 | 3,000 |
| DDTC144ECA-7-F | Commercial | N20 | 7 | 8 | 3,000 |
| DDTC144ECAQ-7-F | Automotive | N20 | 7 | 8 | 3,000 |
| DDTC144ECAQ-13-F | Automotive | N20 | 13 | 8 | 10,000 |
| DDTC115ECA-7-F | Commercial | N24 | 7 | 8 | 3,000 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 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

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2015 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | N | P | 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 | | | | |

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)> | DDTC123ECA | V _{IN} | -10 to +12 | V |
| | DDTC143ECA | | -10 to +30 | |
| | DDTC114ECA | | -10 to +40 | |
| | DDTC124ECA | | -10 to +40 | |
| | DDTC144ECA | | -10 to +40 | |
| DDTC115ECA | -10 to +40 | | | |
| Output Current | DDTC123ECA | I _O | 100 | mA |
| | DDTC143ECA | | 100 | |
| | DDTC114ECA | | 50 | |
| | DDTC124ECA | | 30 | |
| | DDTC144ECA | | 30 | |
| DDTC115ECA | 20 | | | |
| Output Current | | I _C (Max) | 100 | mA |

Thermal Characteristics @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 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 |
|----------------------------|---------------------------------|--|-----|--|------|---|
| | | | | | | V _{CC} = 5V, I _O = 100µA |
| Input Voltage | V _{I(off)} | 0.5 | 1.1 | — | V | V _O = 0.3V, I _O = 20mA, DDTC123ECA V _O = 0.3V, I _O = 20mA, DDTC143ECA V _O = 0.3V, I _O = 10mA, DDTC114ECA V _O = 0.3V, I _O = 5mA, DDTC124ECA V _O = 0.3V, I _O = 2mA, DDTC144ECA V _O = 0.3V, I _O = 1mA, DDTC115ECA |
| | V _{I(on)} | — | 1.9 | 3 | | |
| Output Voltage | V _{O(on)} | — | 0.1 | 0.3 | V | I _O /I _I = 10mA/0.5mA DDTC123ECA I _O /I _I = 10mA/0.5mA DDTC143ECA I _O /I _I = 10mA/0.5mA DDTC114ECA I _O /I _I = 10mA/0.5mA DDTC124ECA I _O /I _I = 10mA/0.5mA DDTC144ECA I _O /I _I = 5mA/0.25mA DDTC115ECA |
| Input Current | I _I | — | — | 3.8 1.8 0.88 0.36 0.18 0.15 | mA | V _I = 5V |
| Output Current | I _{O(off)} | — | — | 0.5 | µA | V _{CC} = 50V, V _I = 0V |
| DC Current Gain | G _I | 20 20 30 35 56 68 80 82 | — | — | — | V _O = 5V, I _O = 20mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 5mA 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 | 0.8 | 1 | 1.2 | % | — |
| Gain-Bandwidth Product | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = 5mA, f = 100MHz |

Typical Characteristics – DDTC143ECA

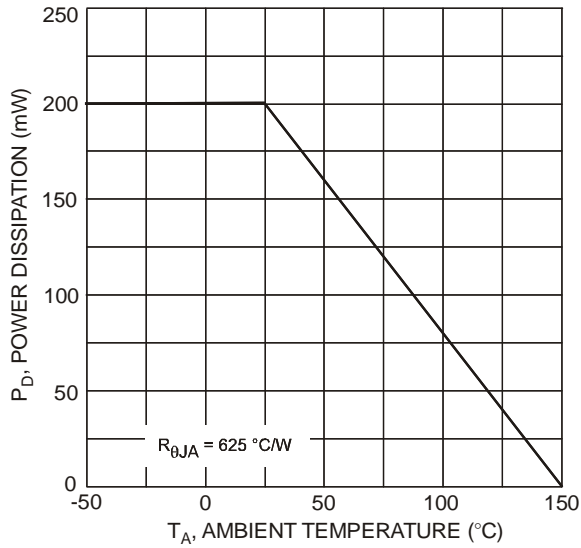


Fig. 1 Power Dissipation vs. Ambient Temperature

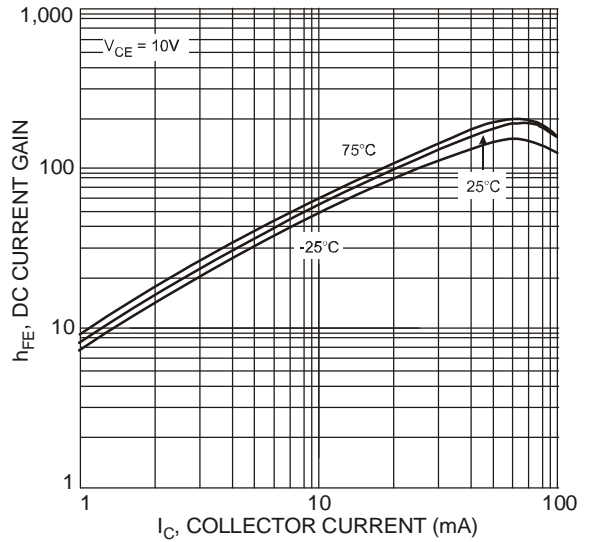


Fig. 2 Typical DC Current Gain vs. Collector Current

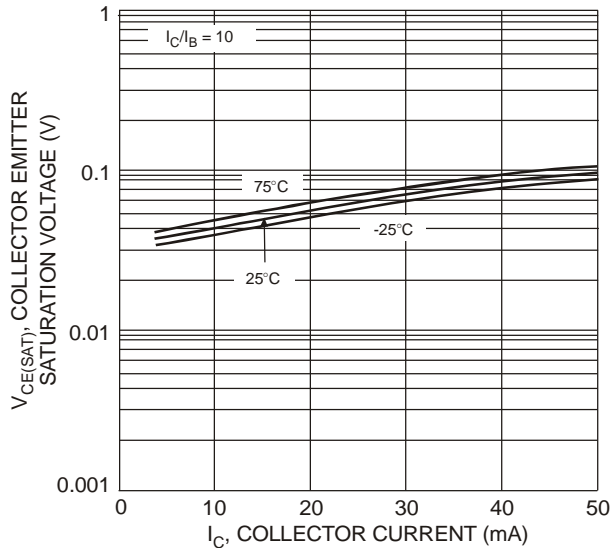


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

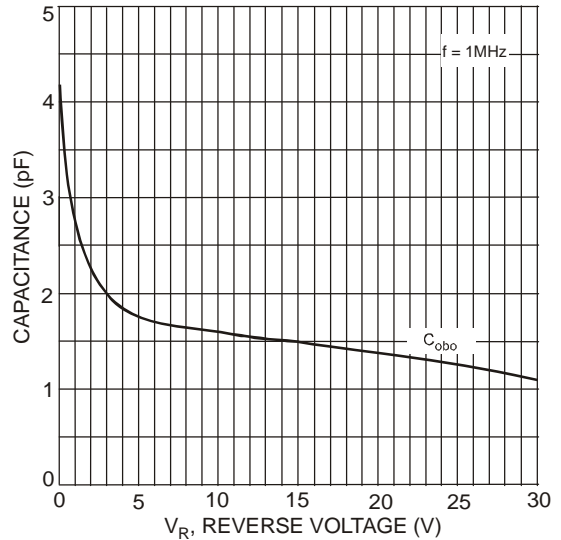


Fig. 4 Typical Capacitance Characteristics

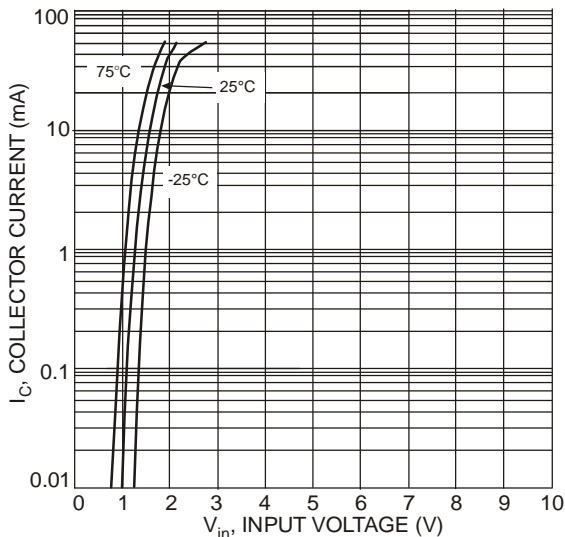


Fig. 5 Collector Current vs. Input Voltage

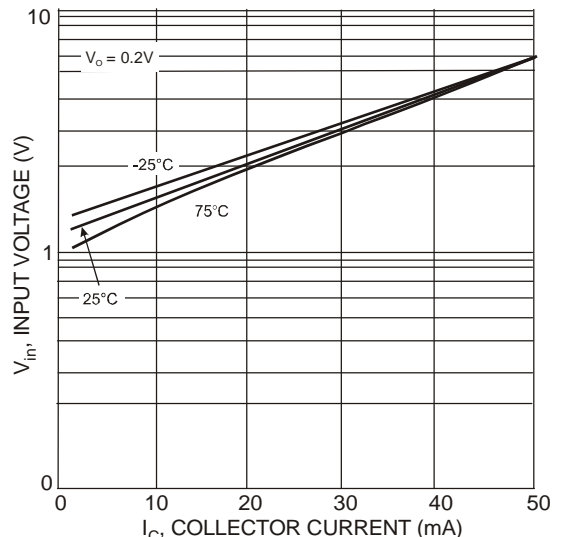
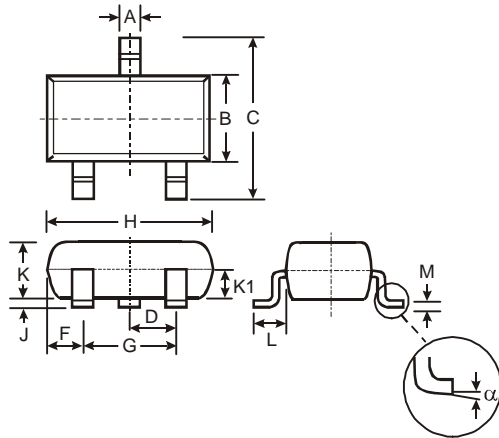


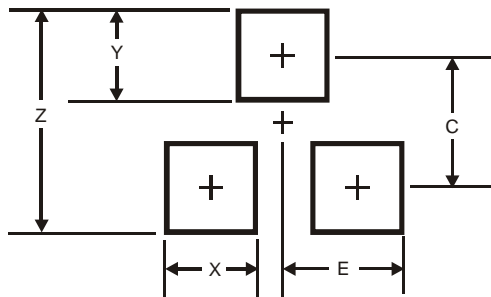
Fig. 6 Input Voltage vs. Collector Current

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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