

NPN PRE-BIASED SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR
Features

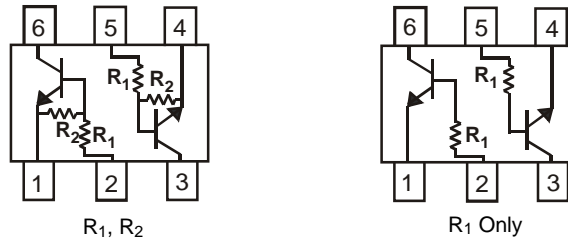
- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

| P/N | R1 | R2 | MARKING |
|----------|---------------|---------------|---------|
| DDC124EH | 22K Ω | 22K Ω | N17 |
| DDC144EH | 47K Ω | 47K Ω | N20 |
| DDC143EH | 4.7K Ω | 4.7K Ω | N08 |
| DDC114YH | 10K Ω | 47K Ω | N14 |
| DDC123JH | 2.2K Ω | 47K Ω | N06 |
| DDC114EH | 10K Ω | 10K Ω | N13 |
| DDC143TH | 4.7K Ω | — | N07 |
| DDC114TH | 10K Ω | — | N12 |

Mechanical Data

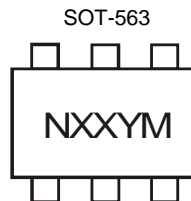
- Case: SOT-563
- Case Material: Molded Plastic; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ^{Ⓔ3}
- Terminal Connections: See Diagram
- Weight: 0.005 grams (Approximate)

SCHEMATIC DIAGRAM, TOP VIEW


Ordering Information (Note 4)

| Device | Packaging | Shipping |
|------------|-----------|-------------------|
| DDC124EH-7 | SOT-563 | 3,000/Tape & Reel |
| DDC144EH-7 | SOT-563 | 3,000/Tape & Reel |
| DDC143EH-7 | SOT-563 | 3,000/Tape & Reel |
| DDC114YH-7 | SOT-563 | 3,000/Tape & Reel |
| DDC123JH-7 | SOT-563 | 3,000/Tape & Reel |
| DDC114EH-7 | SOT-563 | 3,000/Tape & Reel |
| DDC143TH-7 | SOT-563 | 3,000/Tape & Reel |
| DDC114TH-7 | SOT-563 | 3,000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information


Nxx = Product Type Marking Code
 YM = Date Code Marking
 Y = Year ex: T = 2006
 M = Month ex: 9 = September

Date Code Key

| Year | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|------|------|
| Code | 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 |

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|--|-----------------------------------|--|------|
| Supply Voltage | | V _{CC} | 50 | V |
| Input Voltage | DDC124EH DDC144EH DDC143EH DDC114YH DDC123JH DDC114EH DDC143TH DDC114TH | V _{IN} | -10 to +40 -10 to +40 -10 to +30 -6 to +40 -5 to +12 -10 to +40 -5V max -5V max | V |
| Output Current | DDC124EH DDC144EH DDC143EH DDC114YH DDC123JH DDC114EH DDC143TH DDC114TH | I _O | 30 30 100 70 100 50 100 100 | mA |
| Output Current | All | I _C (Max) | 100 | mA |
| Power Dissipation | | P _d | 150 | mW |
| Thermal Resistance, Junction to Ambient Air | (Note 5) | R _{θJA} | 833 | °C/W |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

Note: 5. Mounted on FR4 Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic (DDC143TH & DDC114TH only) | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------|-----|-----|-----|---------------|---|
| Collector-Base Breakdown Voltage | BV_{CBO} | 50 | — | — | V | $I_C = 50\mu\text{A}$ |
| Collector-Emitter Breakdown Voltage | BV_{CEO} | 50 | — | — | V | $I_C = 1\text{mA}$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | 5 | — | — | V | $I_E = 50\mu\text{A}$ |
| Collector Cut-Off Current | I_{CBO} | — | — | 0.5 | μA | $V_{CB} = 50\text{V}$ |
| Emitter Cut-Off Current | I_{EBO} | — | — | 0.5 | μA | $V_{EB} = 4\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | — | 0.3 | V | $I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DDC143TH $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DDC114TH |
| DC Current Transfer Ratio | h_{FE} | 100 | 250 | 600 | — | $I_C = 1\text{mA}$, $V_{CE} = 5\text{V}$ |
| Gain-Bandwidth Product* | f_T | — | 250 | — | MHz | $V_{CE} = 10\text{V}$, $I_E = -5\text{mA}$, $f = 100\text{MHz}$ |

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition | |
|-------------------------|--------------|----------------------------------|-----|--|---------------|---|--|
| Input Voltage | $V_{I(off)}$ | DDC124EH | 0.5 | 1.1 | — | V | $V_{CC} = 5\text{V}$, $I_O = 100\mu\text{A}$ |
| | | DDC144EH | 0.5 | 1.1 | | | |
| DDC143EH | | 0.5 | 1.1 | | | | |
| DDC114YH | | 0.3 | — | | | | |
| DDC123JH | | 0.5 | — | | | | |
| DDC114EH | | 0.5 | 1.1 | | | | |
| Input Voltage | $V_{I(on)}$ | DDC124EH | — | 1.9 | 3.0 | V | $V_O = 0.3\text{V}$, $I_O = 5\text{mA}$ $V_O = 0.3\text{V}$, $I_O = 2\text{mA}$ $V_O = 0.3\text{V}$, $I_O = 20\text{mA}$ $V_O = 0.3\text{V}$, $I_O = 1\text{mA}$ $V_O = 0.3\text{V}$, $I_O = 5\text{mA}$ $V_O = 0.3\text{V}$, $I_O = 10\text{mA}$ |
| | | DDC144EH | — | 1.9 | 3.0 | | |
| | | DDC143EH | — | 1.9 | 3.0 | | |
| | | DDC114YH | — | — | 1.4 | | |
| | | DDC123JH | — | — | 1.1 | | |
| | | DDC114EH | — | 1.9 | 3.0 | | |
| Output Voltage | $V_{O(on)}$ | — | 0.1 | 0.3 | V | $I_O/I_I = 10\text{mA} / 0.5\text{mA}$ $I_O/I_I = 10\text{mA} / 0.5\text{mA}$ $I_O/I_I = 10\text{mA} / 0.5\text{mA}$ $I_O/I_I = 5\text{mA} / 0.25\text{mA}$ $I_O/I_I = 5\text{mA} / 0.25\text{mA}$ $I_O/I_I = 10\text{mA} / 0.5\text{mA}$ | |
| Input Current | I_I | — | — | 0.36 0.18 1.8 0.88 3.6 0.88 | mA | $V_I = 5\text{V}$ | |
| Output Current | $I_{O(off)}$ | — | — | 0.5 | μA | $V_{CC} = 50\text{V}$, $V_I = 0\text{V}$ | |
| DC Current Gain | G_I | 56 68 20 68 80 30 | — | — | — | $V_O = 5\text{V}$, $I_O = 5\text{mA}$ $V_O = 5\text{V}$, $I_O = 5\text{mA}$ $V_O = 5\text{V}$, $I_O = 10\text{mA}$ $V_O = 5\text{V}$, $I_O = 10\text{mA}$ $V_O = 5\text{V}$, $I_O = 10\text{mA}$ $V_O = 5\text{V}$, $I_O = 5\text{mA}$ | |
| Gain-Bandwidth Product* | f_T | — | 250 | — | MHz | $V_{CE} = 10\text{V}$, $I_E = 5\text{mA}$, $f = 100\text{MHz}$ | |

* Transistor - For Reference Only

Typical Curves – DDC143EH

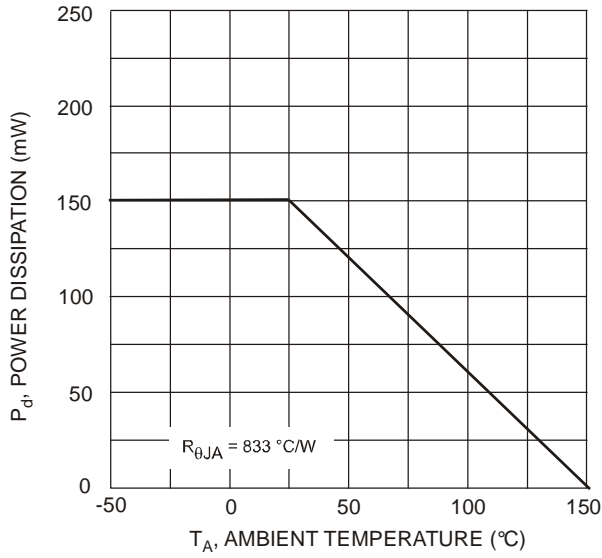


Fig. 1 Derating Curve

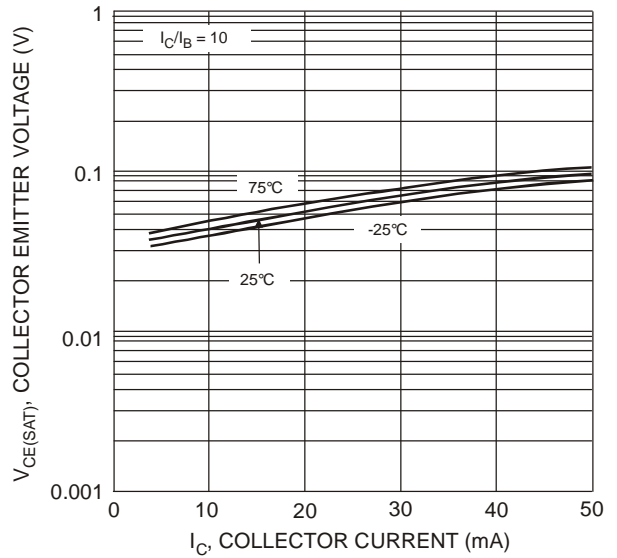


Fig. 2 $V_{CE(SAT)}$ vs. I_C

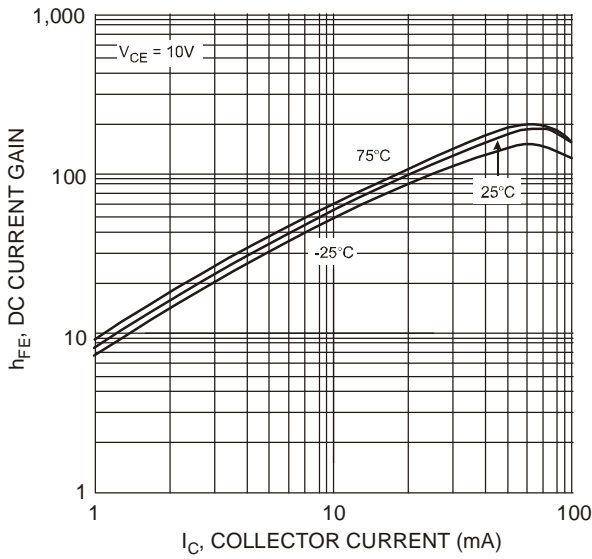


Fig. 3 DC Current Gain

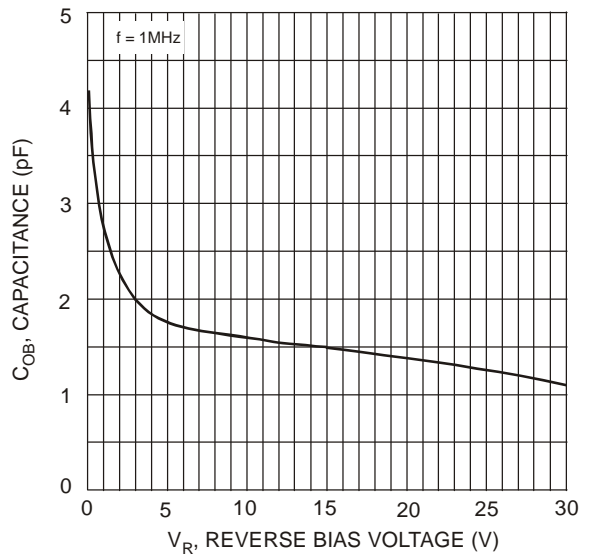


Fig. 4 Output Capacitance

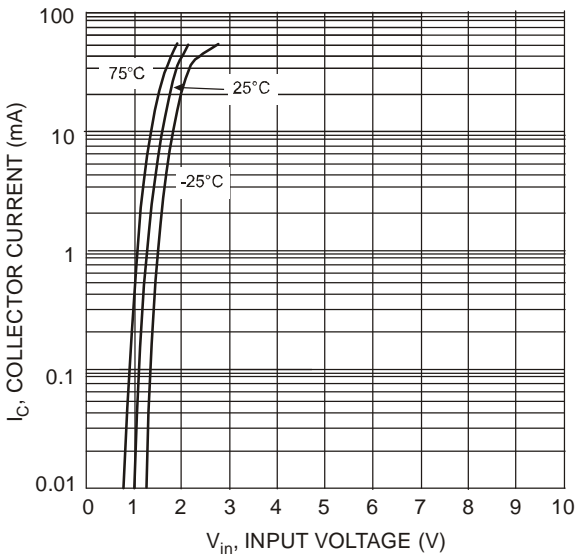


Fig. 5 Collector Current vs. Input Voltage

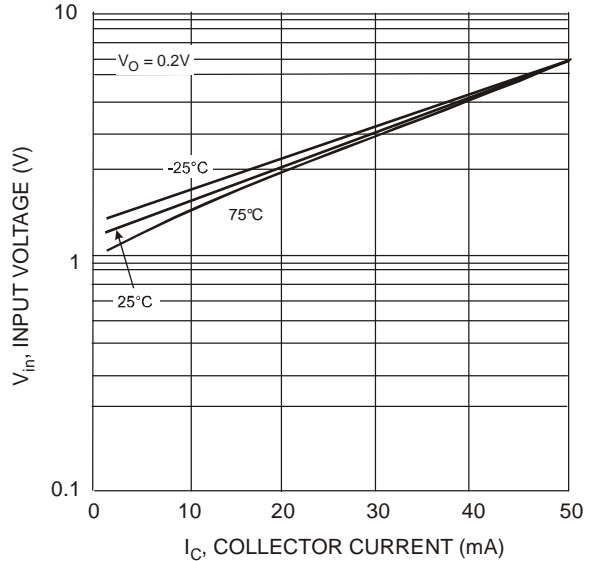
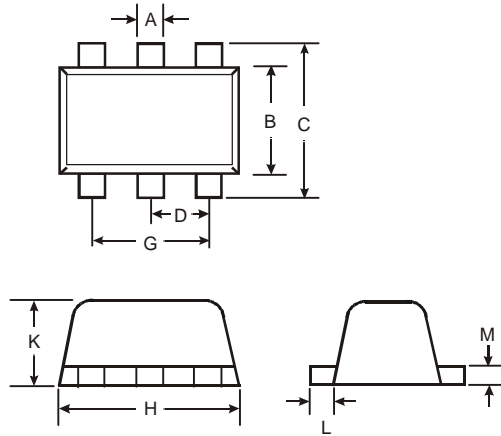


Fig. 6 Input Voltage vs. Collector Current

Package Outline Dimensions

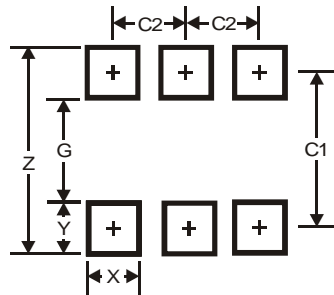
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT563 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.15 | 0.30 | 0.20 |
| B | 1.10 | 1.25 | 1.20 |
| C | 1.55 | 1.70 | 1.60 |
| D | - | - | 0.50 |
| G | 0.90 | 1.10 | 1.00 |
| H | 1.50 | 1.70 | 1.60 |
| K | 0.55 | 0.60 | 0.60 |
| L | 0.10 | 0.30 | 0.20 |
| M | 0.10 | 0.18 | 0.11 |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.2 |
| G | 1.2 |
| X | 0.375 |
| Y | 0.5 |
| C1 | 1.7 |
| C2 | 0.5 |

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