

**NPN PRE-BIASED SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR**

**Features**

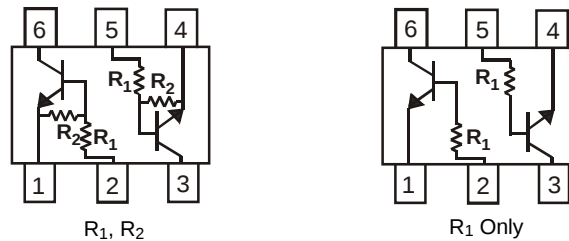
- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

| P/N      | R1            | R2            | MARKING |
|----------|---------------|---------------|---------|
| DDC124EH | 22K $\Omega$  | 22K $\Omega$  | N17     |
| DDC144EH | 47K $\Omega$  | 47K $\Omega$  | N20     |
| DDC143EH | 4.7K $\Omega$ | 4.7K $\Omega$ | N08     |
| DDC114YH | 10K $\Omega$  | 47K $\Omega$  | N14     |
| DDC123JH | 2.2K $\Omega$ | 47K $\Omega$  | N06     |
| DDC114EH | 10K $\Omega$  | 10K $\Omega$  | N13     |
| DDC143TH | 4.7K $\Omega$ | —             | N07     |
| DDC114TH | 10K $\Omega$  | —             | 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 
- Terminal Connections: See Diagram
- Weight: 0.005 grams (Approximate)

SCHEMATIC DIAGRAM, TOP VIEW

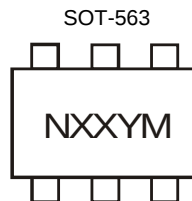


**Ordering Information** (Note 4)

| 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](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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                       |          | Symbol                            | Value       | Unit |
|------------------------------------------------------|----------|-----------------------------------|-------------|------|
| Supply Voltage                                       |          | V <sub>CC</sub>                   | 50          | V    |
| Input Voltage                                        | DDC124EH | V <sub>IN</sub>                   | -10 to +40  | V    |
|                                                      | DDC144EH |                                   | -10 to +40  |      |
|                                                      | DDC143EH |                                   | -10 to +30  |      |
|                                                      | DDC114YH |                                   | -6 to +40   |      |
|                                                      | DDC123JH |                                   | -5 to +12   |      |
|                                                      | DDC114EH |                                   | -10 to +40  |      |
|                                                      | DDC143TH |                                   | -5V max     |      |
|                                                      | DDC114TH |                                   | -5V max     |      |
| Output Current                                       | DDC124EH | I <sub>O</sub>                    | 30          | mA   |
|                                                      | DDC144EH |                                   | 30          |      |
|                                                      | DDC143EH |                                   | 100         |      |
|                                                      | DDC114YH |                                   | 70          |      |
|                                                      | DDC123JH |                                   | 100         |      |
|                                                      | DDC114EH |                                   | 50          |      |
|                                                      | DDC143TH |                                   | 100         |      |
|                                                      | DDC114TH |                                   | 100         |      |
| Output Current                                       | All      | I <sub>C</sub> (Max)              | 100         | mA   |
| Power Dissipation                                    |          | P <sub>d</sub>                    | 150         | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 5) |          | R <sub>θJA</sub>                  | 833         | °C/W |
| Operating and Storage Temperature Range              |          | T <sub>J</sub> , T <sub>STG</sub> | -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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic (DDC143TH & DDC114TH only) | 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 Cut-Off Current                 | I <sub>CBO</sub>     | —   | —   | 0.5 | μA   | V <sub>CB</sub> = 50V                                                                                             |
| Emitter Cut-Off 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> = 2.5mA / 0.25mA DDC143TH<br>I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DDC114TH |
| DC Current Transfer Ratio                 | h <sub>FE</sub>      | 100 | 250 | 600 | —    | I <sub>C</sub> = 1mA, V <sub>CE</sub> = 5V                                                                        |
| Gain-Bandwidth Product*                   | f <sub>T</sub>       | —   | 250 | —   | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = -5mA, f = 100MHz                                                          |

| Characteristic          | Symbol                                                               | Min                                    | Typ                                | Max                                        | Unit | Test Condition                                                                                                                                                                                                                                                                                     |
|-------------------------|----------------------------------------------------------------------|----------------------------------------|------------------------------------|--------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Voltage           | DDC124EH<br>DDC144EH<br>DDC143EH<br>DDC114YH<br>DDC123JH<br>DDC114EH | 0.5<br>0.5<br>0.5<br>0.3<br>0.5<br>0.5 | 1.1<br>1.1<br>1.1<br>—<br>—<br>1.1 | —                                          | V    | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA                                                                                                                                                                                                                                                       |
|                         | DDC124EH<br>DDC144EH<br>DDC143EH<br>DDC114YH<br>DDC123JH<br>DDC114EH | —                                      | 1.9<br>1.9<br>1.9<br>—<br>—<br>1.9 | 3.0<br>3.0<br>3.0<br>1.4<br>1.1<br>3.0     |      | V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 10mA           |
| Output Voltage          | DDC124EH<br>DDC144EH<br>DDC143EH<br>DDC114YH<br>DDC123JH<br>DDC114EH | —                                      | 0.1                                | 0.3                                        | V    | I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA<br>I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA<br>I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA |
| Input Current           | DDC124EH<br>DDC144EH<br>DDC143EH<br>DDC114YH<br>DDC123JH<br>DDC114EH | —                                      | —                                  | 0.36<br>0.18<br>1.8<br>0.88<br>3.6<br>0.88 | 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         | DDC124EH<br>DDC144EH<br>DDC143EH<br>DDC114YH<br>DDC123JH<br>DDC114EH | 56<br>68<br>20<br>68<br>80<br>30       | —                                  | —                                          | —    | 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> = 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                      |
| Gain-Bandwidth Product* | f <sub>T</sub>                                                       | —                                      | 250                                | —                                          | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA, f = 100MHz                                                                                                                                                                                                                                            |

\* Transistor - For Reference Only

# Typical Curves – DDC143EH

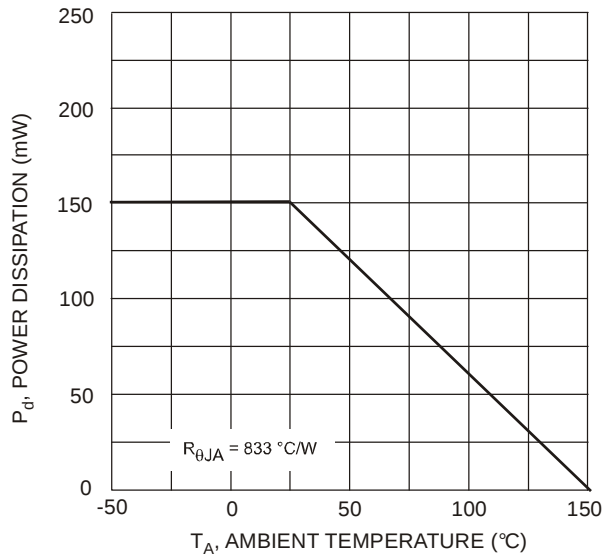


Fig. 1 Derating Curve

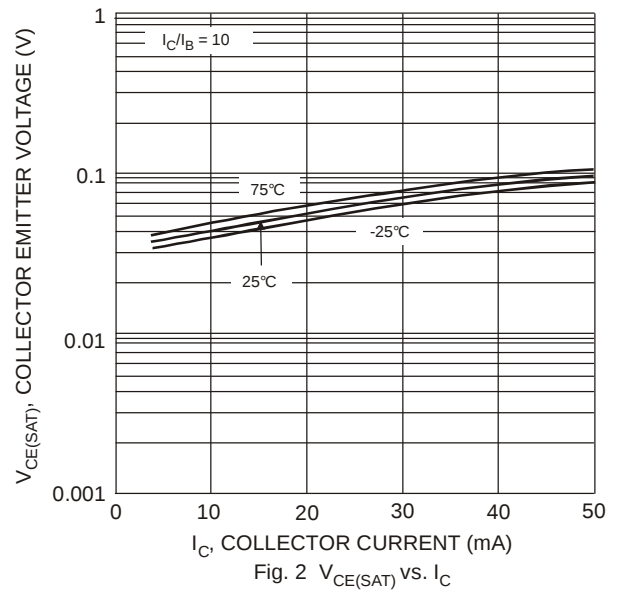


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

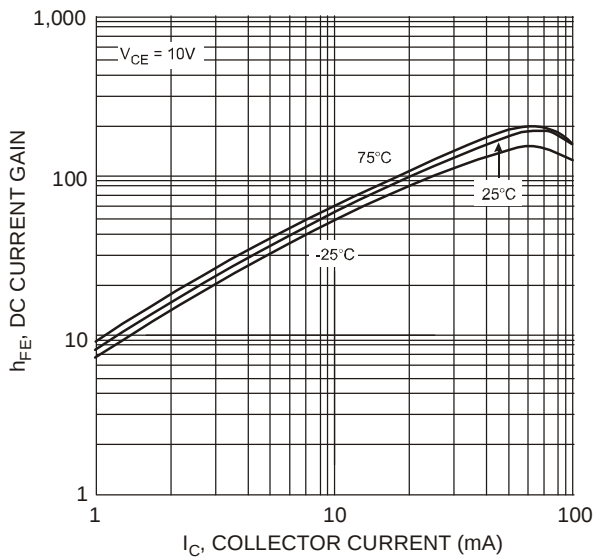


Fig. 3 DC Current Gain

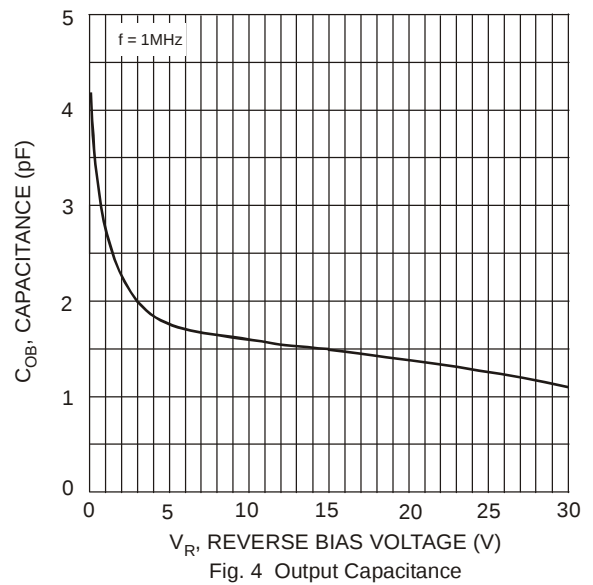


Fig. 4 Output Capacitance

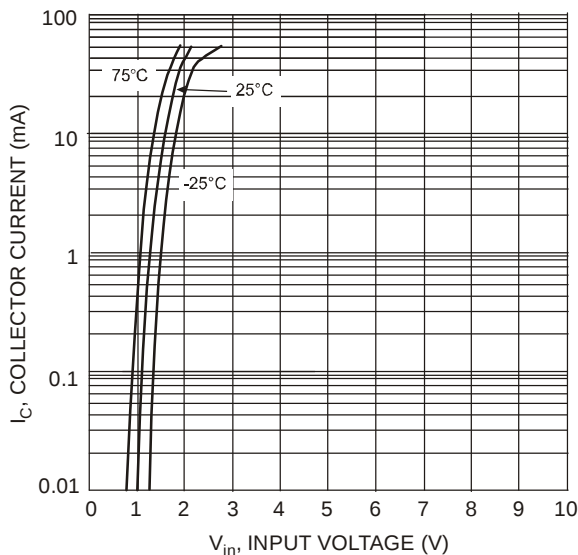


Fig. 5 Collector Current vs. Input Voltage

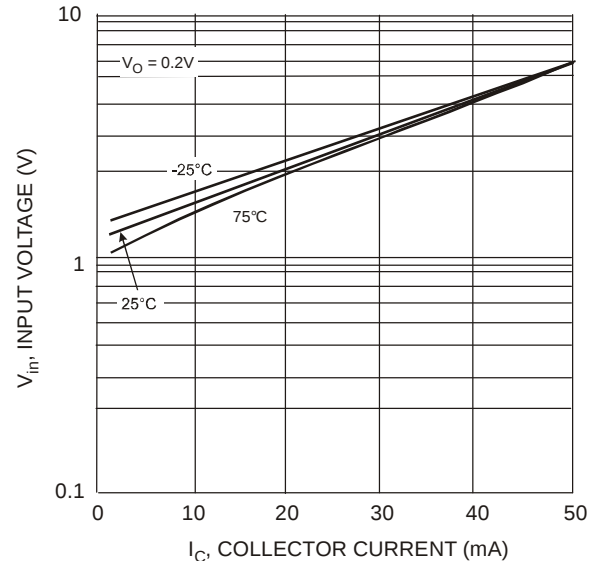
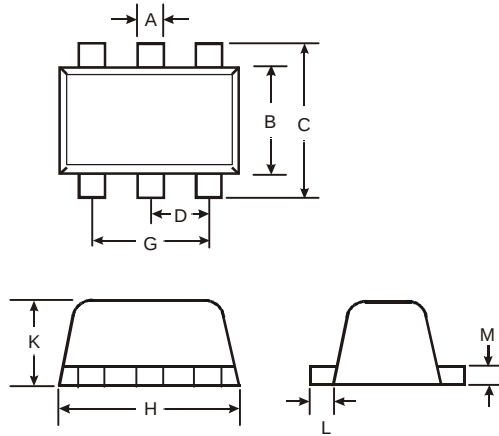


Fig. 6 Input Voltage vs. Collector Current

## Package Outline Dimensions

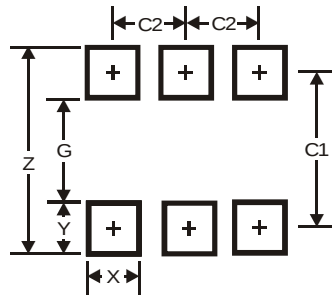
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| 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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