

## NPN PRE-BIASED SMALL SIGNAL SOT-563 DUAL SURFACE MOUNT TRANSISTOR

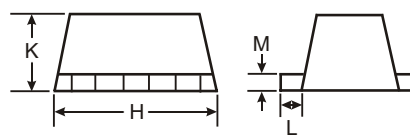
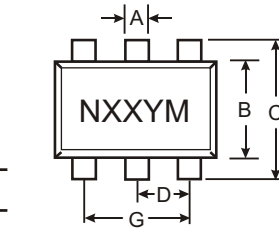
NEW PRODUCT

### Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- Lead-Free Device

### Mechanical Data

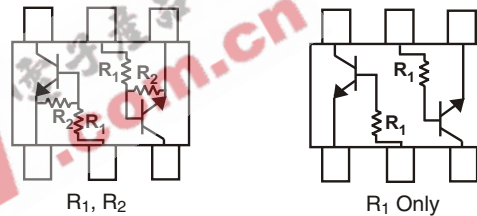
- Case: SOT-563, Molded Plastic
- Case material - UL Flammability Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Finish - Matte Tin Solderable per MIL-STD-202, Method 208 (Note 2)
- Terminal Connections: See Diagram
- Weight: 0.005 grams (approx.)



SEE NOTE 1

| SOT-563              |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.15 | 0.30 | 0.25 |
| 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                    | 0.56 | 0.60 | 0.60 |
| L                    | 0.15 | 0.25 | 0.20 |
| M                    | 0.10 | 0.18 | 0.11 |
| All Dimensions in mm |      |      |      |

| 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     |



SCHEMATIC DIAGRAM, TOP VIEW

### 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  | V <sub>IN</sub>                   | -10 to +40<br>-10 to +40<br>-10 to +30<br>-6 to +40<br>-5 to +12<br>-10 to +40<br>-5 V <sub>max</sub><br>-5 V <sub>max</sub> | V    |
| Output Current                                       | I <sub>O</sub>                    | 30<br>30<br>100<br>70<br>100<br>50<br>100<br>100   | mA   |
| Output Current                                       | I <sub>C</sub> (Max)              | 100  | mA   |
| Power Dissipation                                    | P <sub>d</sub>                    | 150  | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 3) | R <sub>θJA</sub>                  | 833  | °C/W |
| Operating and Storage and Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150  | °C   |

- Note:
1. Package is non-polarized. Parts may be on reel in orientation illustrated, 180° rotated, or mixed (both ways).
  2. If lead-bearing terminal plating is required, please contact your Diodes Inc. sales representative for availability and minimum order details.
  3. 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>CB0</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 Cutoff Current                  | I <sub>CB0</sub>     | —   | —   | 0.5 | μA   | V <sub>CB</sub> = 50V   |
| Emitter Cutoff 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<br>I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA<br>DDC143TH<br>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           | V <sub>I(off)</sub> | 0.5                              | 1.1 | —  | V    | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA   |
|                         |                     | 0.5                              | 1.1 | —  |      |  |
| Input Voltage           | V <sub>I(on)</sub>  | —                                | 1.9 | 3.0  | V    | 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           |
|                         |                     | —                                | 1.9 | 3.0  |      |  |
| Output Voltage          | V <sub>O(on)</sub>  | —                                | 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 |
|                         |                     | —                                | 0.1 | 0.3  |      |  |
| Input Current           | I <sub>I</sub>      | —                                | —   | 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         | G <sub>I</sub>      | 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,<br>f = 100MHz   |

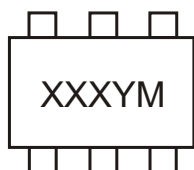
\* Transistor - For Reference Only

**Ordering Information** (Note 4)

| Device     | Packaging | Shipping         |
|------------|-----------|------------------|
| DDC124EH-7 | SOT-563   | 3000/Tape & Reel |
| DDC144EH-7 | SOT-563   | 3000/Tape & Reel |
| DDC143EH-7 | SOT-563   | 3000/Tape & Reel |
| DDC114YH-7 | SOT-563   | 3000/Tape & Reel |
| DDC123JH-7 | SOT-563   | 3000/Tape & Reel |
| DDC114EH-7 | SOT-563   | 3000/Tape & Reel |
| DDC143TH-7 | SOT-563   | 3000/Tape & Reel |
| DDC114TH-7 | SOT-563   | 3000/Tape & Reel |

Notes: 4. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**

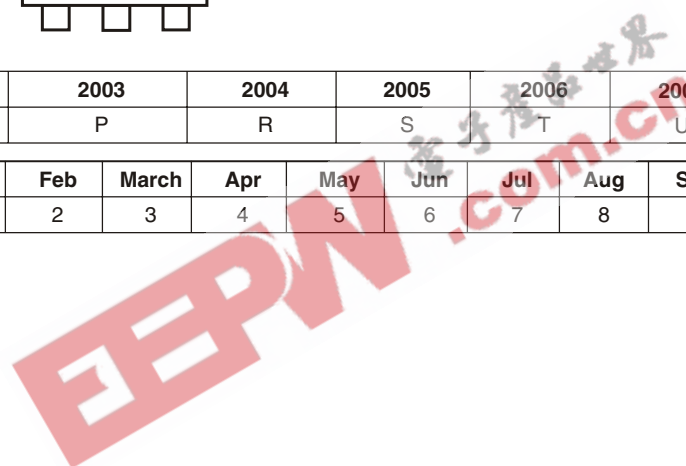


XXX = Product Type Marking Code (See Page 1)  
 YM = Date Code Marking  
 Y = Year ex: P = 2003  
 M = Month ex: 9 = September

Date Code Key

| Year | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|------|------|------|------|------|------|------|------|
| Code | P    | R    | S    | T    | U    | V    | W    |

| Month | Jan | Feb | March | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3     | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |



**TYPICAL CURVES - DDC143EH**

**NEW PRODUCT**

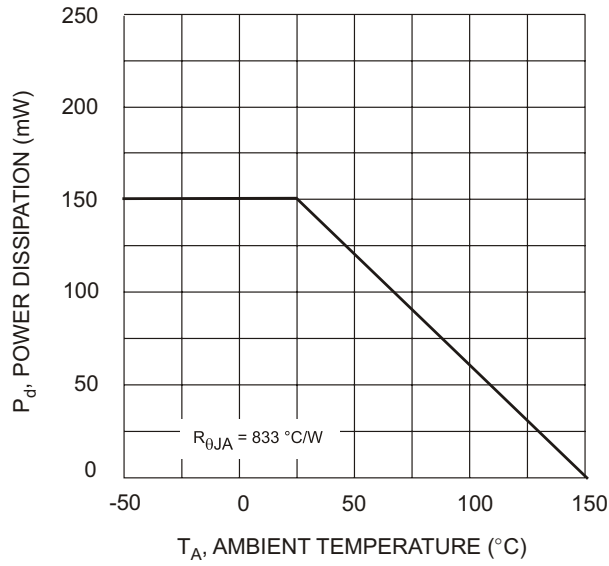


Fig. 1 Derating Curve

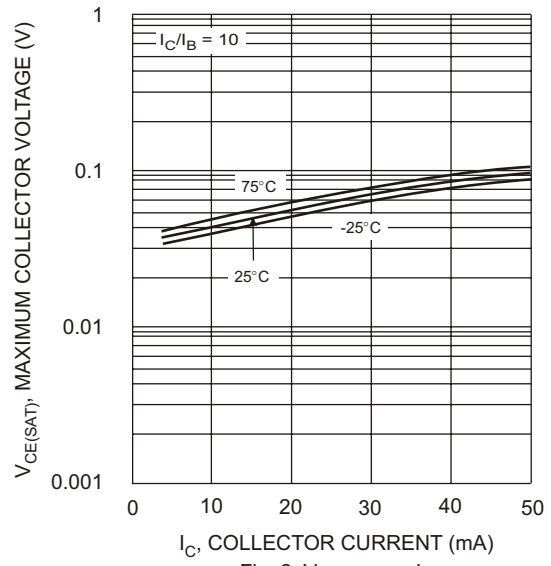


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

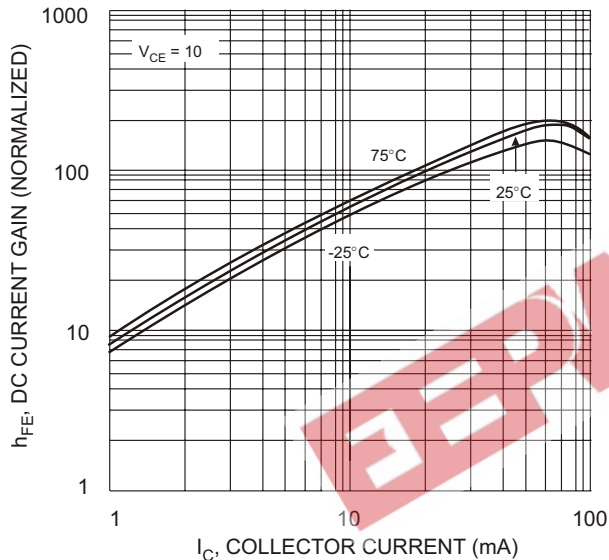


Fig. 3 DC Current Gain

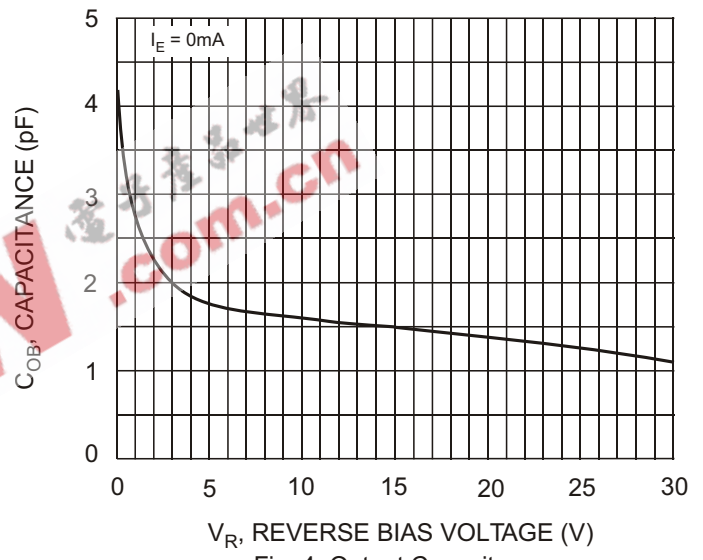


Fig. 4 Output Capacitance

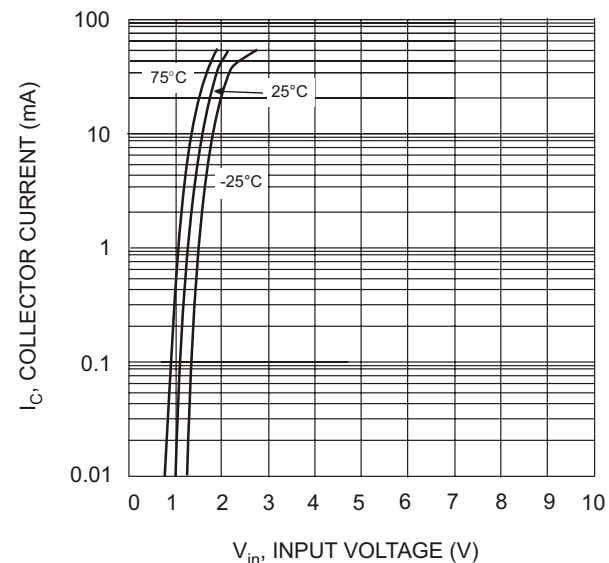


Fig. 5 Collector Current Vs. Input Voltage

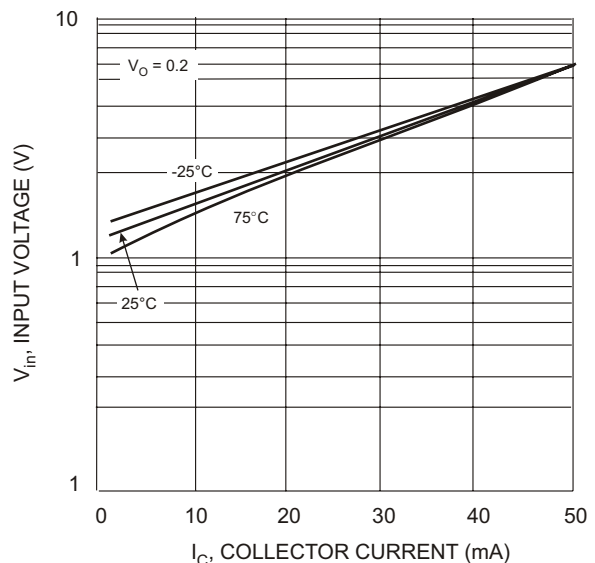


Fig. 6 Input Voltage vs. Collector Current