

**PRE-BIASED (R1 = R2) SMALL SIGNAL SURFACE MOUNT 100mA NPN TRANSISTOR**

**Features**

- Epitaxial Planar Die Construction
- Ultra-Small Leadless Surface Mount Package
- Ideally Suited for Automated Assembly Processes
- "Lead Free", RoHS Compliant (Note 1)
- Halogen and Antimony Free "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

**Mechanical Data**

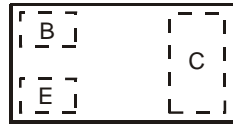
- Case: DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.0009 grams (approximate)

| Part Number | R1 (NOM) | R2 (NOM) | Marking |
|-------------|----------|----------|---------|
| DDTC114ELP  | 10K      | 10K      | N5      |

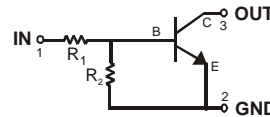
DFN1006-3



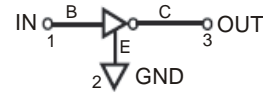
Bottom View



Top View  
Pin-Out



Device Symbol



Equivalent Inverter  
Circuit

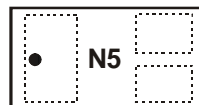
**Ordering Information** (Note 3)

| Product       | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|---------|--------------------|-----------------|-------------------|
| DDTC114ELP-7  | N5      | 7                  | 8               | 3,000             |
| DDTC114ELP-7B | N5      | 7                  | 8               | 10,000            |

- 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>.

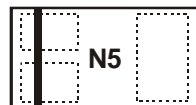
**Marking Information**

DDTC114ELP-7



Top View  
Dot Denotes  
Collector Side

DDTC114ELP-7B



Top View  
Bar Denotes Base  
and Emitter Side

N5 = Product Type Marking Code

**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 | V    |
| Output Current    | I <sub>O</sub>      | 50         | mA   |
| Collector Current | I <sub>C(MAX)</sub> | 100        | mA   |

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic   | Symbol                            | Value       | Unit  |
|--|-----------------------------------|-------------|-------|
| Power Dissipation (Note 4)   | P <sub>D</sub>                    | 250         | mW    |
| Power Derating above 25°C  | P <sub>der</sub>                  | 2           | mW/°C |
| Thermal Resistance, Junction to Ambient Air (Note 4)<br>(Equivalent to one heated junction of NPN) | R <sub>θJA</sub>                  | 500         | °C/W  |
| Operating and Storage Temperature Range  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic   | Symbol                            | Min | Typ  | Max  | Unit | Test Condition  |
|--|-----------------------------------|-----|------|------|------|---|
| <b>Off Characteristics (Note 5)</b>                    |                                   |     |      |      |      |   |
| Collector-Base Breakdown Voltage                       | BV <sub>CBO</sub>                 | 50  | —    | —    | V    | I <sub>C</sub> = 10μA, I <sub>E</sub> = 0                         |
| Collector-Emitter Breakdown Voltage                    | BV <sub>CEO</sub>                 | 50  | —    | —    | V    | I <sub>C</sub> = 1.0mA, I <sub>B</sub> = 0                        |
| Emitter-Base Breakdown Voltage                         | BV <sub>EBO</sub>                 | 5   | —    | —    | V    | I <sub>E</sub> = 50μA, I <sub>C</sub> = 0                         |
| Collector Cutoff Current                               | I <sub>CEX</sub>                  | —   | —    | 0.5  | μA   | V <sub>CE</sub> = 50V, V <sub>EB(OFF)</sub> = 3.0V                |
| Base Cutoff Current (I <sub>BEX</sub> )                | I <sub>BL</sub>                   | —   | —    | 0.5  | μA   | V <sub>CE</sub> = 50V, V <sub>EB(OFF)</sub> = 3.0V                |
| Collector-Base Cut Off Current                         | I <sub>CBO</sub>                  | —   | —    | 0.5  | μA   | V <sub>CB</sub> = 50V, I <sub>E</sub> = 0                         |
| Collector-Emitter Cut Off Current, I <sub>O(OFF)</sub> | I <sub>CEO</sub>                  | —   | —    | 1    | μA   | V <sub>CB</sub> = 50V, I <sub>B</sub> = 0                         |
| Emitter-Base Cut Off Current                           | I <sub>EBO</sub>                  | —   | —    | 0.4  | mA   | V <sub>EB</sub> = 4V, I <sub>C</sub> = 0                          |
| Input Off Voltage                                      | V <sub>I(off)</sub>               | —   | 1.16 | 0.5  | V    | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100uA                      |
| <b>On Characteristics (Notes 5 &amp; 6)</b>            |                                   |     |      |      |      |   |
| DC Current Gain  | h <sub>FE</sub>                   | 10  | —    | —    | —    | V <sub>CE</sub> = 5V, I <sub>C</sub> = 1mA                        |
|  |                                   | 15  | —    | —    | —    | V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA                        |
|  |                                   | 60  | —    | —    | —    | V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA                       |
|  |                                   | 100 | —    | —    | —    | V <sub>CE</sub> = 5V, I <sub>C</sub> = 50mA                       |
|  |                                   | 90  | —    | —    | —    | V <sub>CE</sub> = 5V, I <sub>C</sub> = 70mA                       |
| Collector-Emitter Saturation Voltage                   | V <sub>CE(sat)</sub>              | —   | —    | 0.15 | V    | I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA                       |
|  |                                   | —   | —    | 0.2  | V    | I <sub>C</sub> = 50mA, I <sub>B</sub> = 5mA                       |
|  |                                   | —   | —    | 0.25 | V    | I <sub>C</sub> = 50mA, I <sub>B</sub> = 2.5mA                     |
|  |                                   | —   | —    | 0.25 | V    | I <sub>C</sub> = 50mA, I <sub>B</sub> = 10mA                      |
|  |                                   | —   | —    | 0.3  | V    | I <sub>C</sub> = 70mA, I <sub>B</sub> = 10mA                      |
| Base-Emitter Turn-On Voltage                           | V <sub>BE(on)</sub>               | —   | —    | 0.85 | V    | V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA                        |
|  |                                   | —   | —    | 0.95 | V    | V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA                       |
| Base-Emitter Saturation Voltage                        | V <sub>BE(sat)</sub>              | —   | —    | 0.98 | V    | I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA, V <sub>CE</sub> = 5V |
|  |                                   | —   | —    | 1.2  | V    | I <sub>C</sub> = 50mA, I <sub>B</sub> = 5mA, V <sub>CE</sub> = 5V |
| Input-On Voltage                                       | V <sub>I(on)</sub>                | 2.5 | 1.6  | —    | V    | V <sub>O</sub> = 0.3V, I <sub>O</sub> = 50mA                      |
| Input Current  | I <sub>I</sub>                    | —   | —    | 0.88 | mA   | V <sub>I</sub> = 5V   |
| Output On Voltage (Same as V <sub>CE(sat)</sub> )      | V <sub>O(on)</sub>                | —   | —    | 0.3  | V    | I <sub>I</sub> = 2.5mA, I <sub>O</sub> = 50mA                     |
| Input Resistance                                       | R <sub>1</sub>                    | 7   | 10   | 13   | KΩ   | —   |
| Resistance Ratio                                       | (R <sub>2</sub> /R <sub>1</sub> ) | 0.8 | 1    | 1.2  | —    | —   |
| <b>Small Signal Characteristics</b>                    |                                   |     |      |      |      |   |
| Current Gain-Bandwidth Product                         | f <sub>T</sub>                    | —   | 250  | —    | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA, f = 1MHz             |

- Notes: 4. Device mounted on FR-4 PCB, 1" x 0.85" x 0.062"  
5. Short duration pulse test used to minimize self-heating effect. Pulse Test: Pulse width tp < 300 μs, Duty Cycle, d ≤ 2%.  
6. Guaranteed by design.

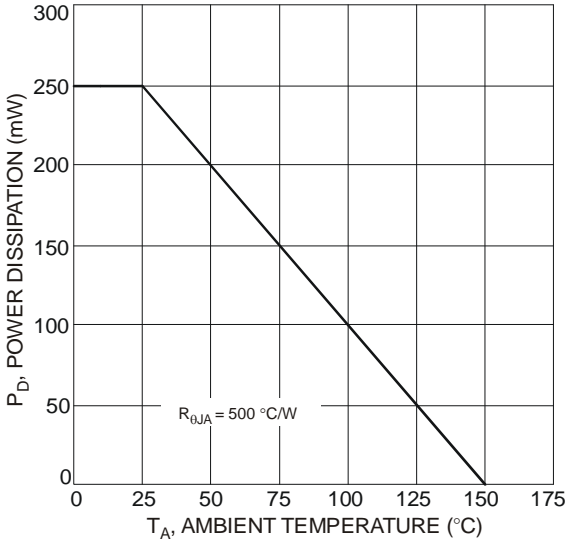


Fig. 1 Power Dissipation vs. Ambient Temperature

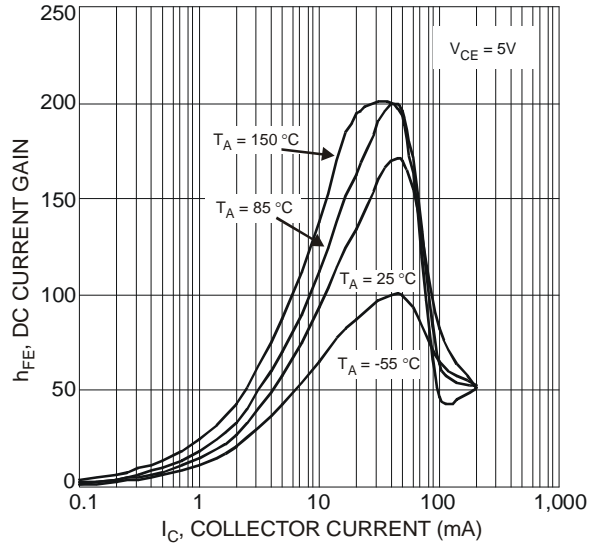


Fig. 2 Typical DC Current Gain vs. Collector Current

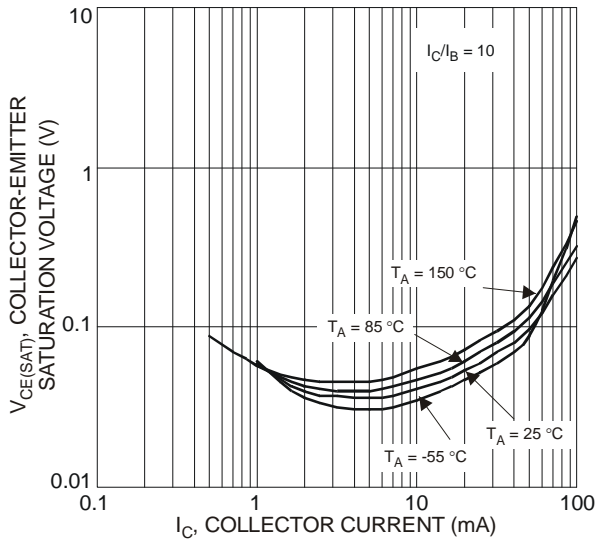


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

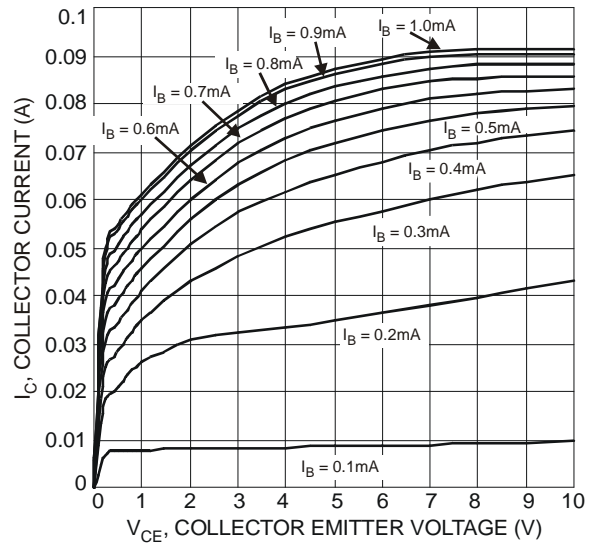


Fig. 4 Typical Collector Current vs. Collector Emitter Voltage

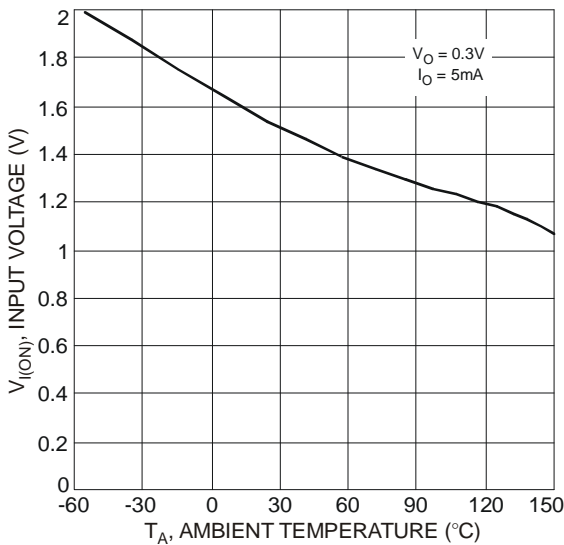


Fig. 5 Typical Input Voltage vs. Ambient Temperature

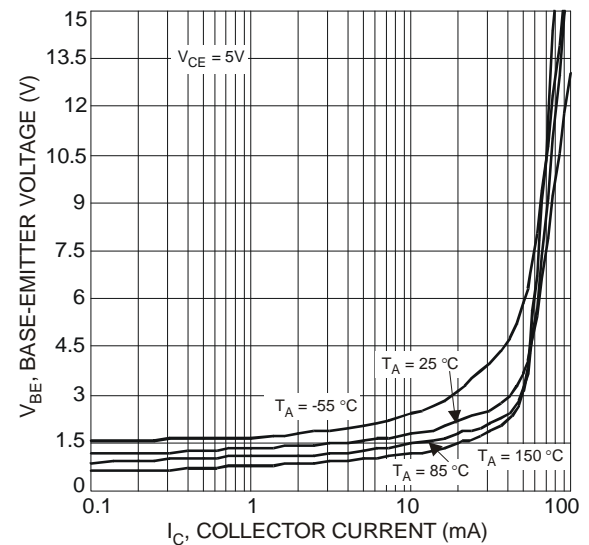


Fig. 6 Typical Base-Emitter Voltage vs. Collector Current

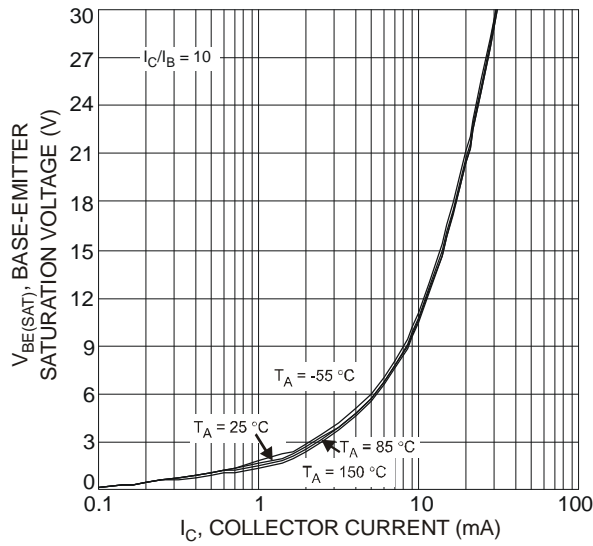
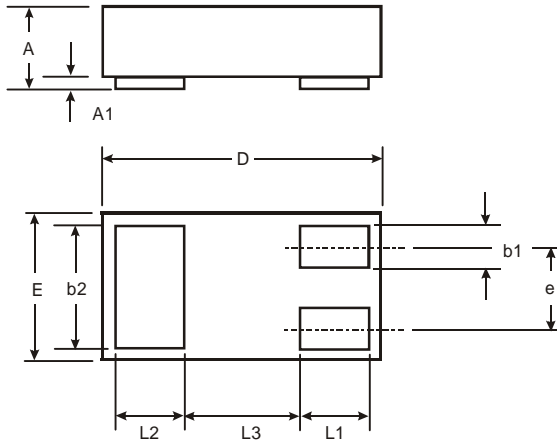


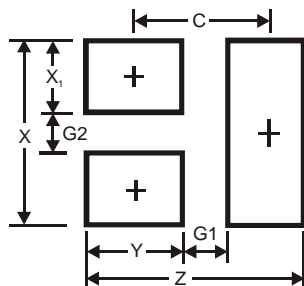
Fig. 7 Typical Base Emitter Saturation Voltage vs. Collector Current

**Package Outline Dimensions**



| DFN1006-3            |      |       |      |
|----------------------|------|-------|------|
| Dim                  | Min  | Max   | Typ  |
| A                    | 0.47 | 0.53  | 0.50 |
| A1                   | 0    | 0.05  | 0.03 |
| b1                   | 0.10 | 0.20  | 0.15 |
| b2                   | 0.45 | 0.55  | 0.50 |
| D                    | 0.95 | 1.075 | 1.00 |
| E                    | 0.55 | 0.675 | 0.60 |
| e                    | —    | —     | 0.35 |
| L1                   | 0.20 | 0.30  | 0.25 |
| L2                   | 0.20 | 0.30  | 0.25 |
| L3                   | —    | —     | 0.40 |
| All Dimensions in mm |      |       |      |

**Suggested Pad Layout**



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 1.1           |
| G1         | 0.3           |
| G2         | 0.2           |
| X          | 0.7           |
| X1         | 0.25          |
| Y          | 0.4           |
| C          | 0.7           |

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