

**50V NPN PRE-BIASED (R1=R2) SMALL SIGNAL TRANSISTOR IN DFN1006**
**Product Summary**

Part Number	R1 (NOM)	R2 (NOM)	Marking
DDTC114ELP	10kΩ	10kΩ	N5

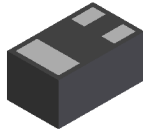
**Features**

- Epitaxial Planar Die Construction
- Ultra-Small Leadless Surface Mount Package
- Ideally Suited for Automated Assembly Processes
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

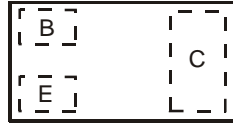
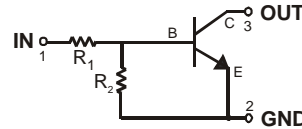
**Mechanical Data**

- Case: X1-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
- Solderable per MIL-STD-202, Method 208 <sup>e4</sup>
- Weight: 0.0009 grams (Approximate)

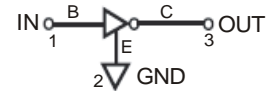
X1-DFN1006-3



Bottom View


 Top View  
Pin-Out


Device Symbol


 Equivalent Inverter  
Circuit

**Ordering Information** (Note 4)

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 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>.

**Marking Information**

<b>DDTC114ELP-7</b>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Top View Dot Denotes Collector Side</p> </div> <div style="text-align: center;"> <p>From date code 1527 (YYWW), this changes to:</p> <p>Top View Bar Denotes Base and Emitter Side</p> </div> </div>
<b>DDTC114ELP-7B</b>	<div style="text-align: center;"> <p>Top View Bar Denotes Base and Emitter Side</p> </div> <p style="text-align: right;">N5 = Product Type Marking Code</p>

**Absolute 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 5)	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 5) (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 6)</b>						
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	50	—	—	V	I <sub>C</sub> = 50μA, 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
Collector Cutoff Current	I <sub>CEX</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>	—	—	0.1	μA	V <sub>CB</sub> = 50V, I <sub>B</sub> = 0
Collector-Emitter Cut Off Current, I <sub>O(OFF)</sub>	I <sub>CES</sub>	—	—	0.1	μA	V <sub>CB</sub> = 50V, I <sub>E</sub> = 0
Emitter-Base Cut Off Current	I <sub>EBO</sub>	—	—	800	μA	V <sub>EB</sub> = 10V, I <sub>C</sub> = 0
Input Off Voltage	V <sub>I(off)</sub>	0.5	1.16	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
Input On Voltage	V <sub>I(on)</sub>	—	—	2.5	V	V <sub>CC</sub> = 0.3V, I <sub>O</sub> = 10mA
<b>On Characteristics (Notes 6 &amp; 7)</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> = 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
		—	—	1.2	V	I <sub>C</sub> = 50mA, I <sub>B</sub> = 5mA
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>	—	—	0.25	V	I <sub>I</sub> = 2.5mA, I <sub>O</sub> = 50mA
Input Resistance	R1	7	10	13	kΩ	—
Resistance Ratio	(R2/R1)	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:
5. For the device mounted on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady state condition. The entire exposed collector pad is attached to the heatsink.
  6. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.
  7. Guaranteed by design.

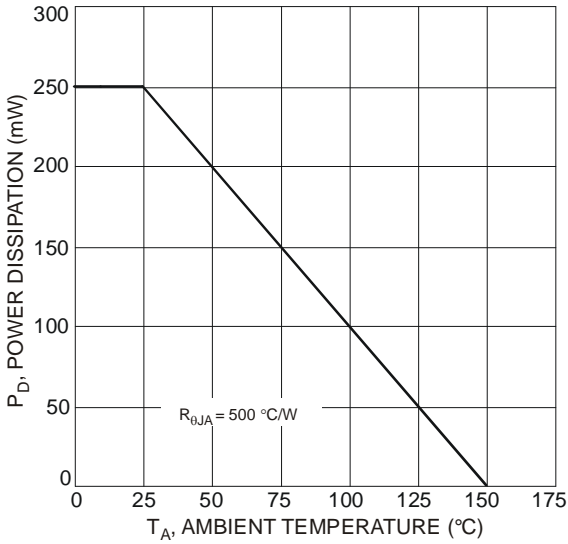


Fig. 1 Power Dissipation vs. Ambient Temperature

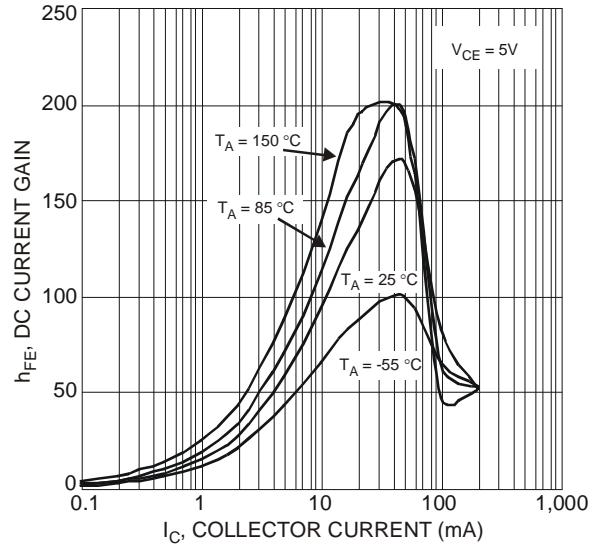


Fig. 2 Typical DC Current Gain vs. Collector Current

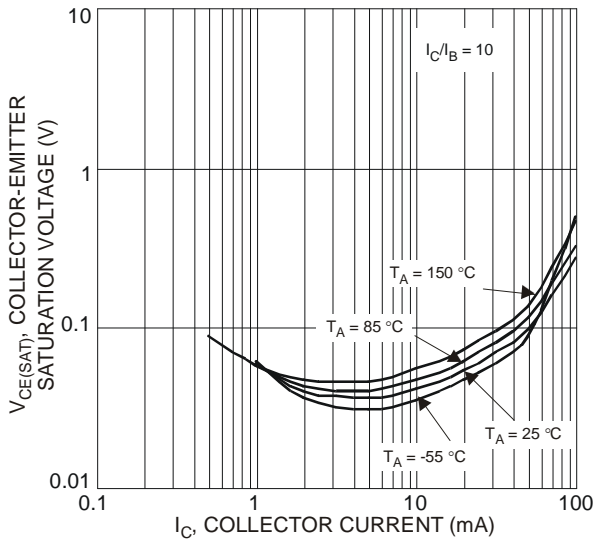


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

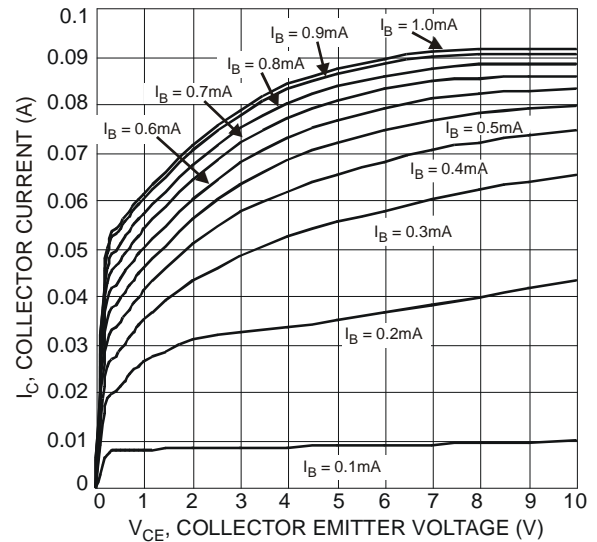


Fig. 4 Typical Collector Current vs. Collector Emitter Voltage

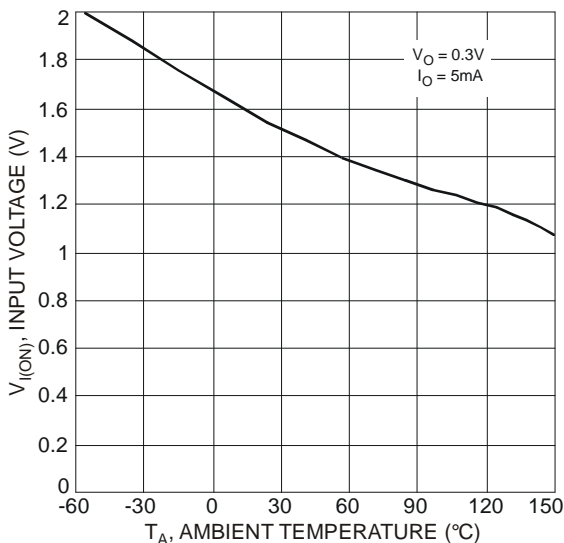


Fig. 5 Typical Input Voltage vs. Ambient Temperature

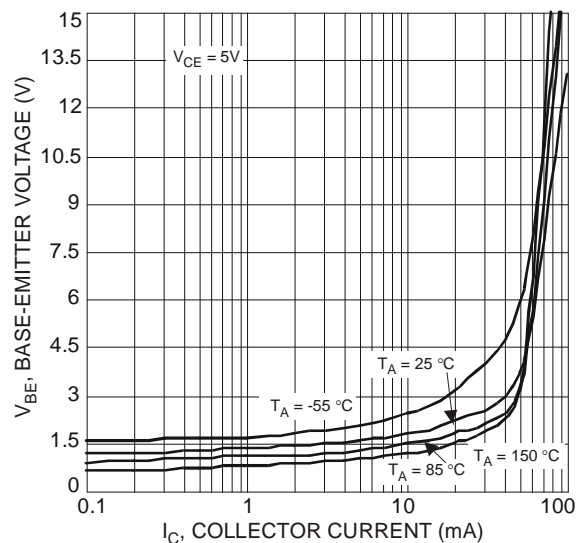


Fig. 6 Typical Base-Emitter Voltage vs. Collector Current

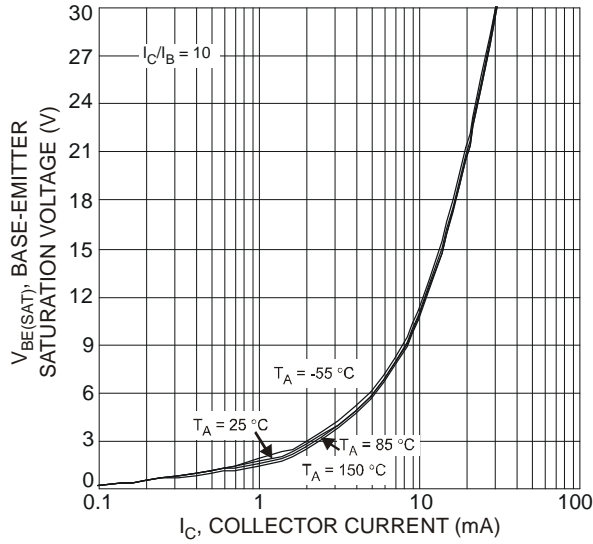
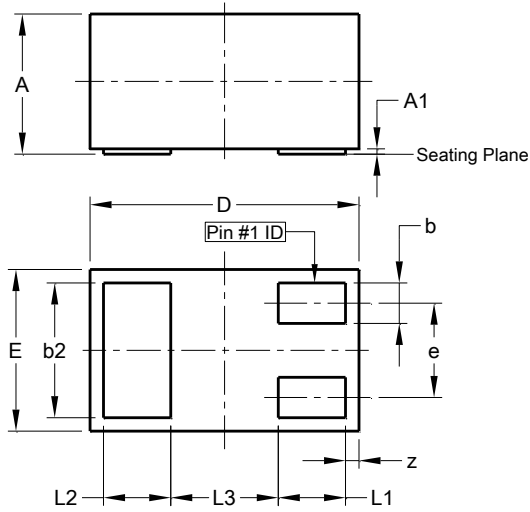


Fig. 7 Typical Base Emitter Saturation Voltage vs. Collector Current

**Package Outline Dimensions**

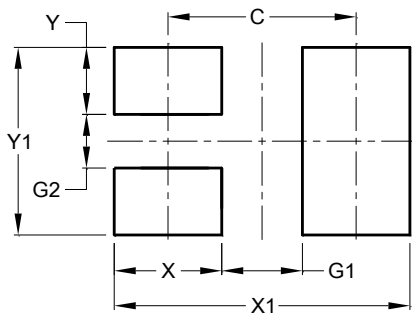
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



X1-DFN1006-3			
Dim	Min	Max	Typ
A	0.47	0.53	0.50
A1	0.00	0.05	0.03
b	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
z	0.02	0.08	0.05
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)
C	0.70
G1	0.30
G2	0.20
X	0.40
X1	1.10
Y	0.25
Y1	0.70

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