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

Product Summary

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

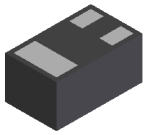
Features

- 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**
-

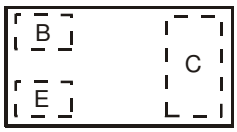
Mechanical Data

- 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 e4
- Weight: 0.0009 grams (Approximate)

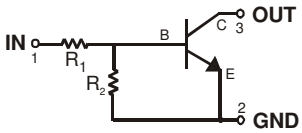
X1-DFN1006-3



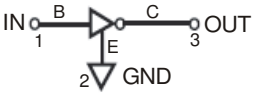
Bottom View



Top View
Pin-Out



Device Symbol



Equivalent Inverter Circuit

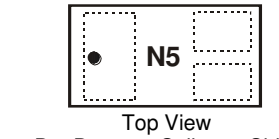
Ordering Information (Note 4)

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

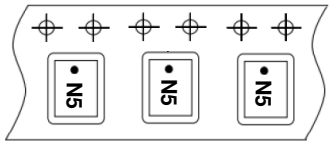
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "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

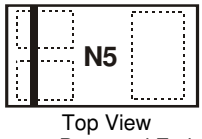
DDTC114ELP-7



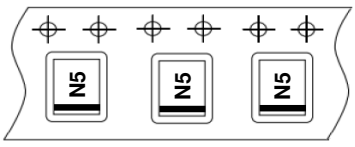
Top View
Dot Denotes Collector Side



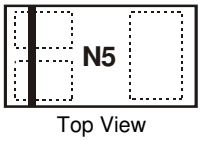
From date code 1527 (YYWW), this changes to:



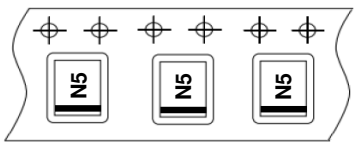
Top View
Bar Denotes Base and Emitter Side



DDTC114ELP-7B



Top View
Bar Denotes Base and Emitter Side



N5 = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	50	V
Input Voltage	V_{IN}	-10 to +40	V
Output Current	I_O	50	mA
Collector Current	$I_{C(MAX)}$	100	mA

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	250	mW
Power Derating above +25°C	P_{der}	2	mW/°C
Thermal Resistance, Junction to Ambient Air (Note 5) (Equivalent to one heated junction of NPN)	$R_{\theta JA}$	500	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Off Characteristics (Note 6)						
Collector-Base Breakdown Voltage	BV_{CBO}	50	—	—	V	I_C = 50µA, I_E = 0
Collector-Emitter Breakdown Voltage	BV_{CEO}	50	—	—	V	I_C = 1.0mA, I_B = 0
Collector Cutoff Current	I_{CEX}	—	—	0.5	µA	V_{CE} = 50V, $V_{EB(OFF)}$ = 3.0V
Collector-Base Cut Off Current	I_{CBO}	—	—	0.1	µA	V_{CB} = 50V, I_E = 0
Collector-Emitter Cut Off Current, $I_{O(OFF)}$	I_{CES}	—	—	0.1	µA	V_{CB} = 50V, I_B = 0
Emitter-Base Cut Off Current	I_{EBO}	—	—	800	µA	V_{EB} = 10V, I_C = 0
Input Off Voltage	$V_{I(off)}$	0.5	1.16	—	V	V_{CC} = 5V, I_O = 100µA
Input On Voltage	$V_{I(on)}$	—		2.5	V	V_{CC} = 0.3V, I_O = 10mA
On Characteristics (Notes 6 & 7)						
DC Current Gain	h_{FE}	10	—	—	—	V_{CE} = 5V, I_C = 1mA
		15	—	—	—	V_{CE} = 5V, I_C = 2mA
		60	—	—	—	V_{CE} = 5V, I_C = 10mA
		100	—	—	—	V_{CE} = 5V, I_C = 50mA
		90	—	—	—	V_{CE} = 5V, I_C = 70mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	0.15	V	I_C = 10mA, I_B = 1mA
		—	—	0.2	V	I_C = 50mA, I_B = 5mA
		—	—			
		—	—	0.25	V	I_C = 50mA, I_B = 10mA
		—	—	0.3	V	I_C = 70mA, I_B = 10mA
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	—	0.85	V	V_{CE} = 5V, I_C = 2mA
		—	—	0.95	V	V_{CE} = 5V, I_C = 10mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	0.98	V	I_C = 10mA, I_B = 1mA
		—	—	1.2	V	I_C = 50mA, I_B = 5mA
Input Current	I_I	—	—	0.88	mA	V_I = 5V
Output On Voltage (Same as $V_{CE(sat)}$)	$V_{O(on)}$	—	—	0.25	V	I_I = 2.5mA, I_O = 50mA
Input Resistance	R1	7	10	13	kΩ	—
Resistance Ratio	(R2/R1)	0.8	1	1.2	—	—
Small Signal Characteristics						
Current Gain-Bandwidth Product	f_T	—	250	—	MHz	V_{CE} = 10V, I_E = 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.

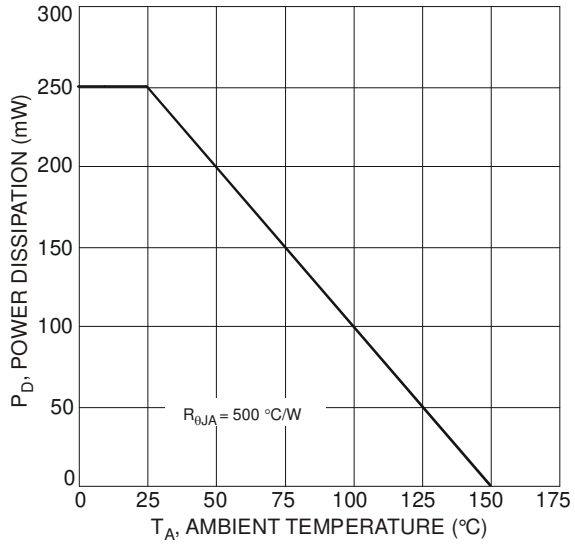


Fig. 1 Power Dissipation vs. Ambient Temperature

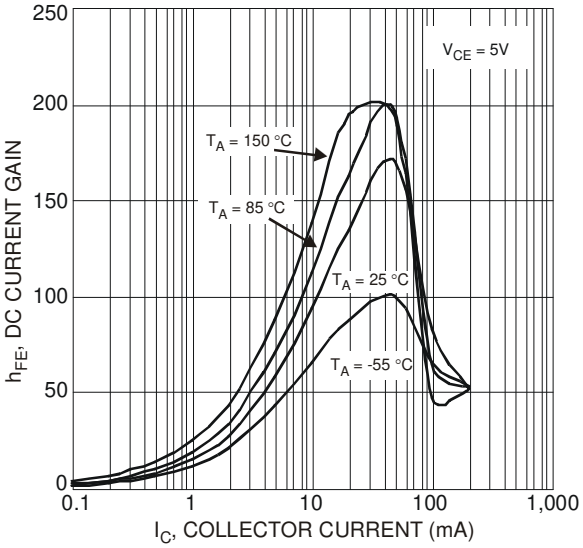


Fig. 2 Typical DC Current Gain vs. Collector Current

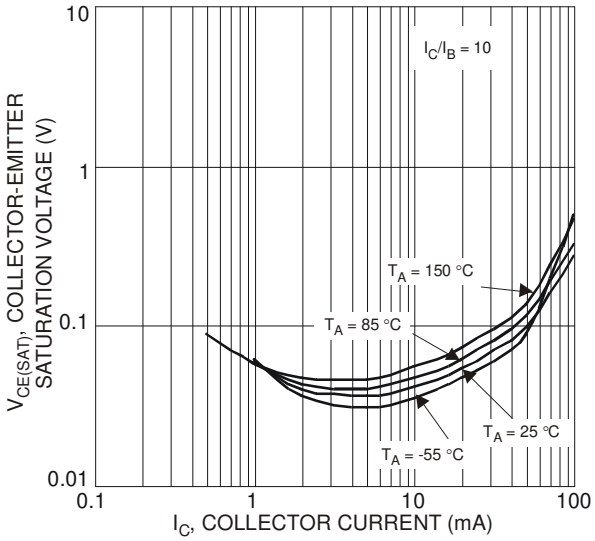


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

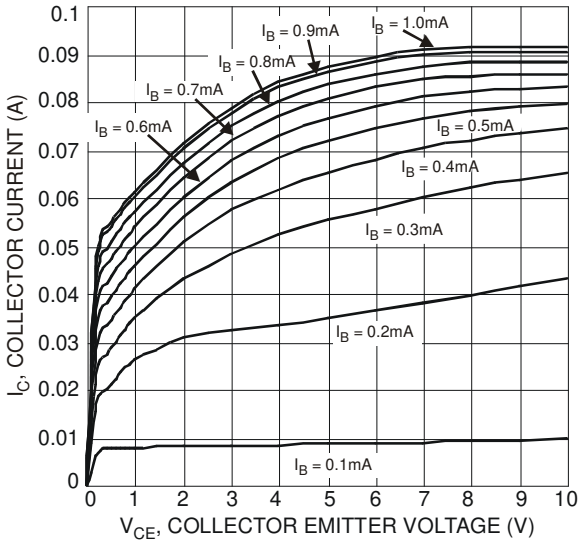


Fig. 4 Typical Collector Current vs. Collector Emitter Voltage

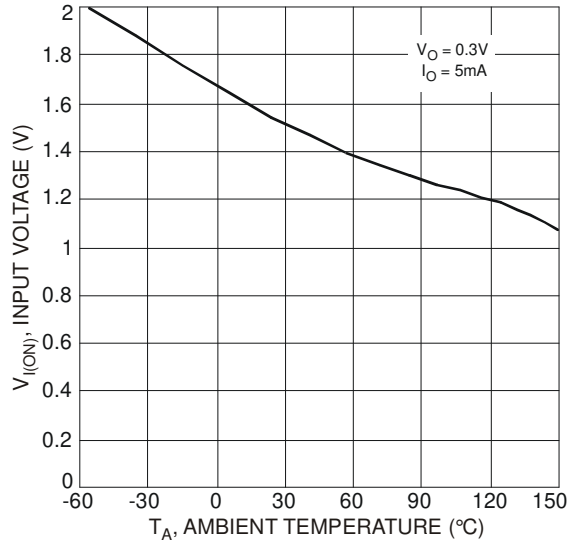


Fig. 5 Typical Input Voltage vs. Ambient Temperature

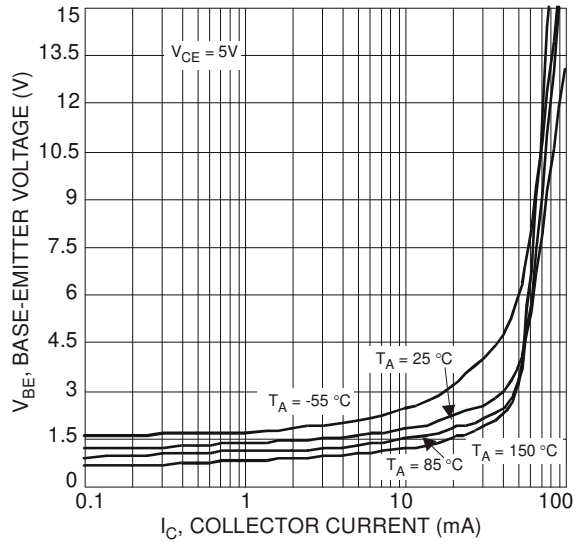


Fig. 6 Typical Base-Emitter Voltage vs. Collector Current

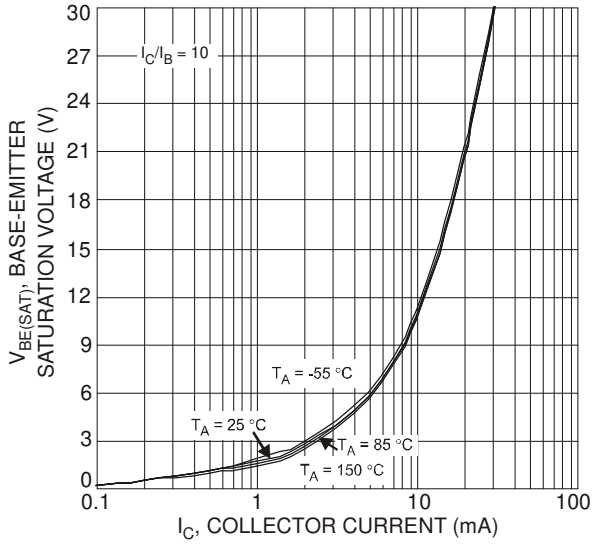
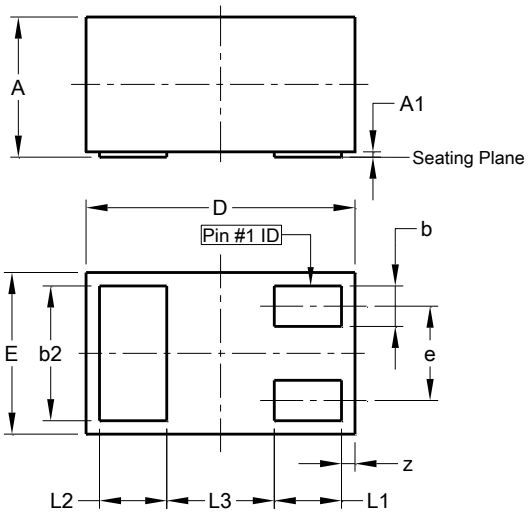


Fig. 7 Typical Base Emitter Saturation Voltage vs. Collector Current

Package Outline Dimensions

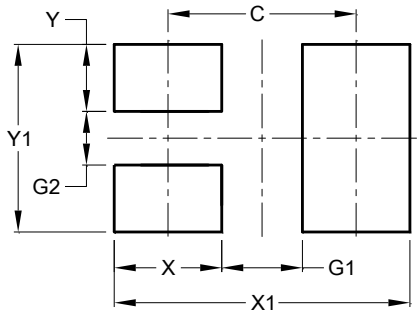
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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