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

Product Summary

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

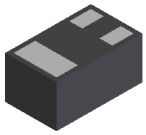
Features

- 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**
-

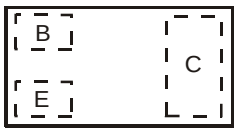
Mechanical Data

- 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)

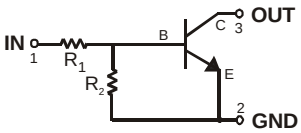
X1-DFN1006-3



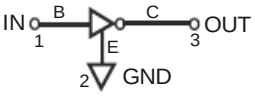
Bottom View



Top View
Pin-Out



Device Symbol



Equivalent Inverter Circuit

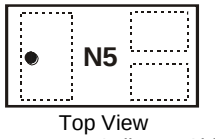
Ordering Information (Note 4)

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

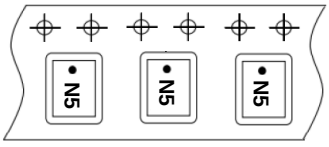
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free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

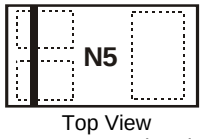
DDTC114ELP-7



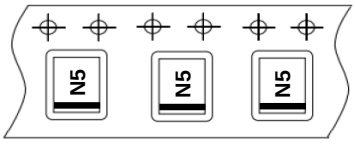
Top View
Dot Denotes Collector Side



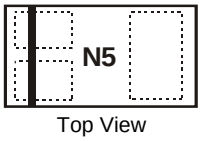
From date code 1527 (YYWW), this changes to:



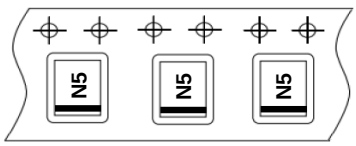
Top View
Bar Denotes Base and Emitter Side



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.

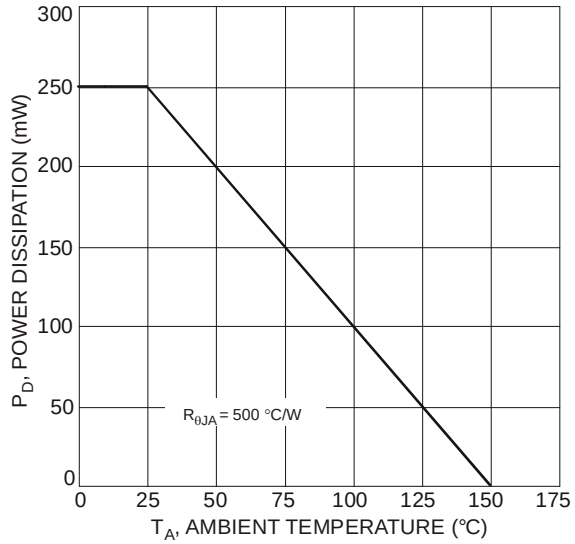


Fig. 1 Power Dissipation vs. Ambient Temperature

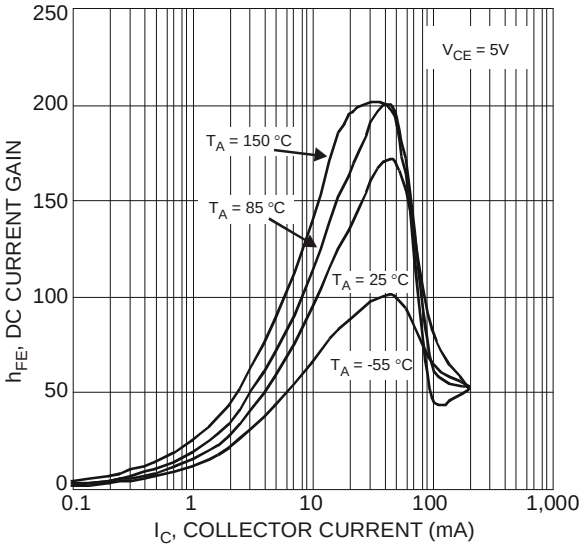


Fig. 2 Typical DC Current Gain vs. Collector Current

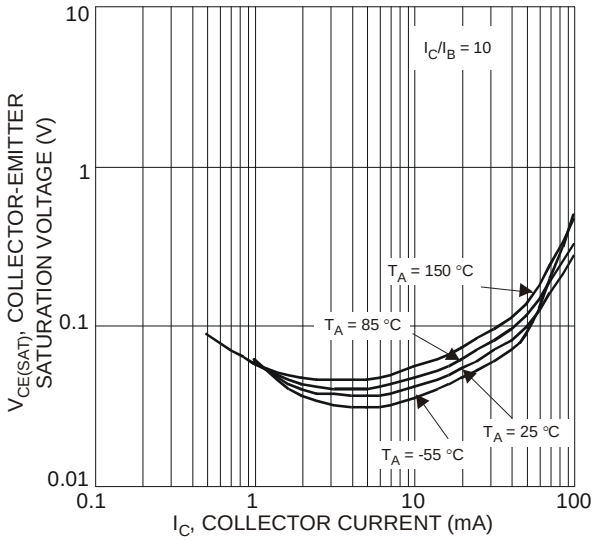


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

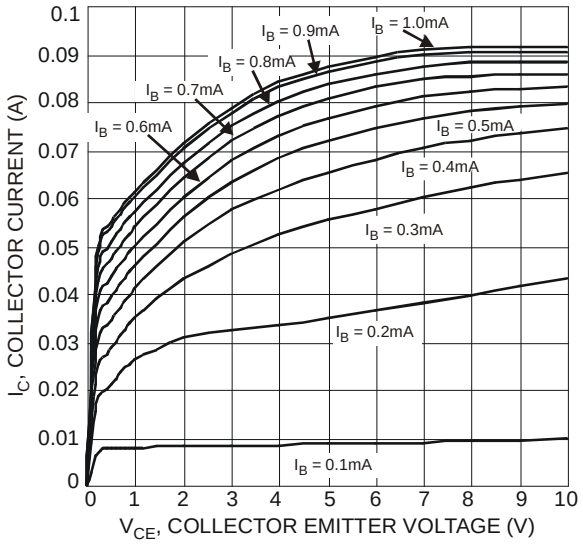


Fig. 4 Typical Collector Current vs. Collector Emitter Voltage

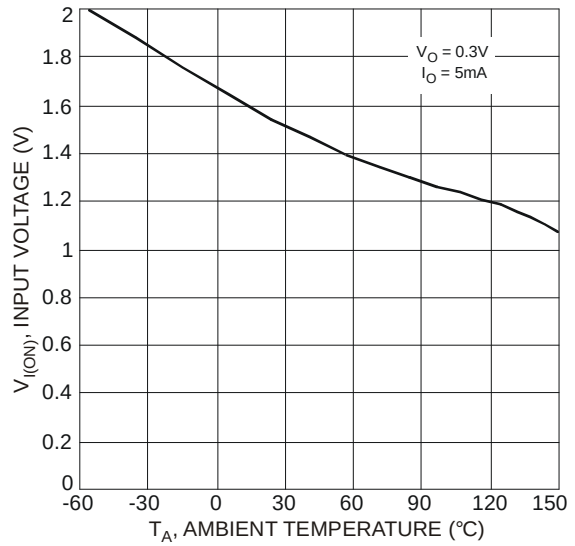


Fig. 5 Typical Input Voltage vs. Ambient Temperature

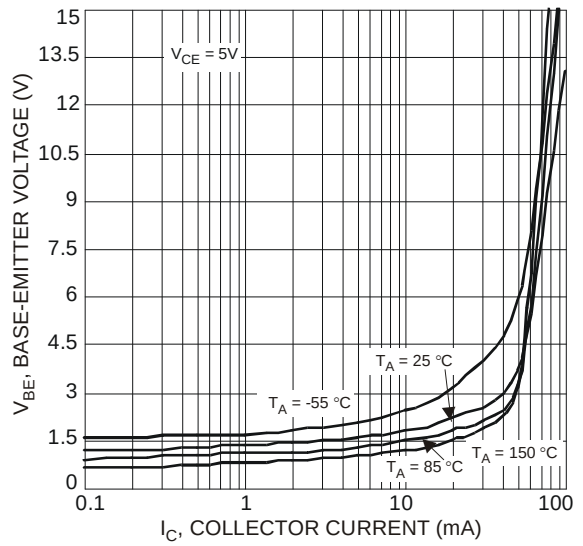


Fig. 6 Typical Base-Emitter Voltage vs. Collector Current

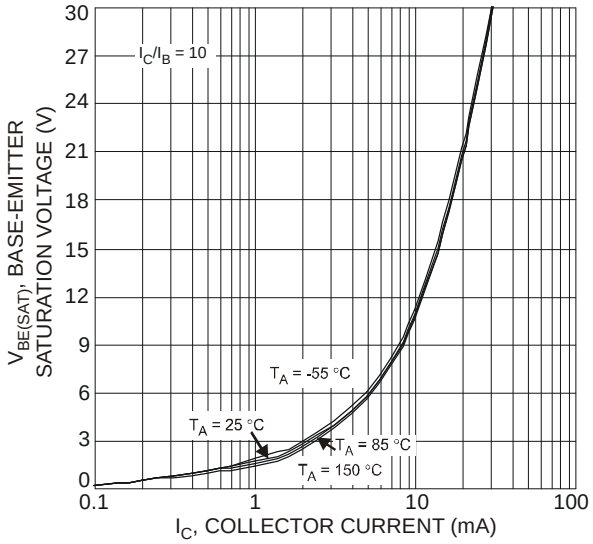
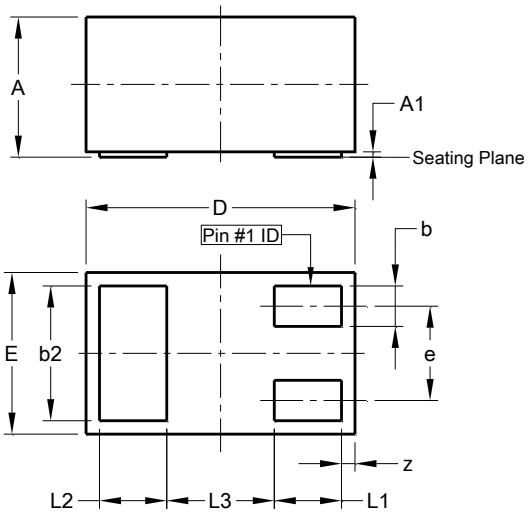


Fig. 7 Typical Base Emitter Saturation Voltage vs. Collector Current

Package Outline Dimensions

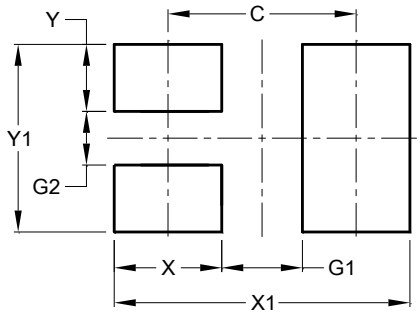
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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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