





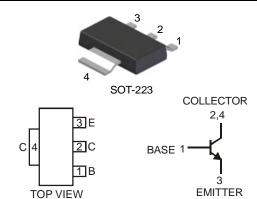
### LOW V<sub>CE(SAT)</sub> NPN SURFACE MOUNT TRANSISTOR

### **Features**

- Epitaxial Planar Die Construction
- Low Collector-Emitter Saturation Resistance  $R_{CE(SAT)} = 80 \text{m}\Omega$  at 3A
- High DC Current Gain h<sub>FE</sub> > 400 at I<sub>C</sub> = 2A
- Complementary PNP Type Available (DPLS325E)
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- Lead Free By Design/RoHS Compliant (Note 1)
- "Green" Device (Note 2)

#### **Mechanical Data**

- Case: SOT-223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish Matte Tin annealed over Copper Leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 3
  Ordering Information: See Page 3
  Weight: 0.112 grams (approximate)



Schematic and Pin Configuration

### **Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	20	V
Collector-Emitter Voltage	V <sub>CEO</sub>	20	V
Emitter-Base Voltage	V <sub>EBO</sub>	5	V
Continuous Collector Current	Ic	3	A
Peak Pulse Current	I <sub>CM</sub>	8	A

### **Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation @T <sub>A</sub> = 25°C (Note 3)	P <sub>D</sub>	1	W
Thermal Resistance, Junction to Ambient Air (Note 3) @T <sub>A</sub> = 25°C	$R_{ hetaJA}$	125	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

#### Notes:

- 1. No purposefully added lead.
- 2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead\_free/index.php.
- 3. Device mounted on FR-4 PCB, pad layout as shown on page 4 or in Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.



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

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
Off Characteristics						
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	20	_	_	V	$I_C = 100 \mu A, I_E = 0$
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	20	_	_	V	$I_C = 10 \text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	5	_	_	V	$I_E = 100 \mu A, I_C = 0$
Collector Cutoff Current	I <sub>CBO</sub>	_	_	100	nA	V <sub>CB</sub> = 16V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EBO</sub>	_	_	100	nA	V <sub>EB</sub> = 4V, I <sub>C</sub> = 0
On Characteristics (Note 4)				•		
		_	0.04	0.10		$I_C = 0.1A$ , $I_B = 0.5mA$
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	_	0.18	0.50	V	$I_C = 2A$ , $I_B = 10mA$
		_	0.24	0.45		$I_C = 3A$ , $I_B = 20mA$
Base-Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	_	_	0.9	V	$I_C = 1A$ , $I_B = 10mA$
Base-Emitter Turn-On Voltage	V <sub>BE(ON)</sub>	_	_	0.9	V	$V_{CE} = 2V$ , $I_C = 1A$
		500	_	_		$V_{CE} = 2V, I_{C} = 0.1A$
DC Current Gain	h <sub>FE</sub>	400	_	_	_	$V_{CE} = 2V, I_{C} = 2A$
		150	_	_		$V_{CE} = 2V$ , $I_C = 6A$
AC Characteristics						
Transition Frequency	f <sub>T</sub>	150	_		MHz	$V_{CE} = 5V, I_{C} = 50mA, f = 50MHz$
Input Capacitance	C <sub>ibo</sub>	_	230	_	pF	$V_{EB} = 0.5V, f = 1MHz$
Output Capacitance	C <sub>obo</sub>	_	23	_	pF	V <sub>CB</sub> = 10V, f = 1MHz
Switching Times	t <sub>on</sub>	_	26	_	ns	$V_{CC} = 10V, I_C = 500mA$
Switching rimes	t <sub>off</sub>	_	220	_	ns	$I_{B1} = -I_{B2} = 50 \text{mA}$

Notes: 4. Pulse Test: Pulse width ≤300µs. Duty cycle ≤2.0%.

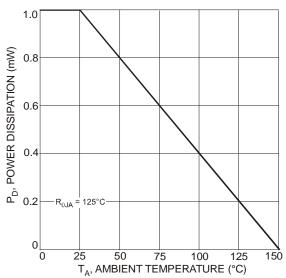


Fig. 1 Max Power Dissipation vs. Ambient Temperature

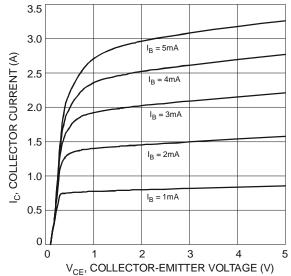


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage



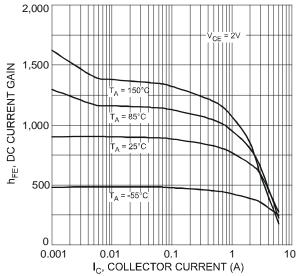
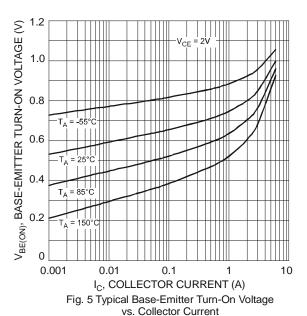


Fig. 3 Typical DC Current Gain vs. Collector Current



0.5 V<sub>CE(SAT)</sub>, COLLECTOR-EMITTER SATURATION VOLTAGE (V) 0.4 0.3 0.2 0.1 0 0.001 0.01 0.1 10

I<sub>C</sub>, COLLECTOR CURRENT (A)
Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

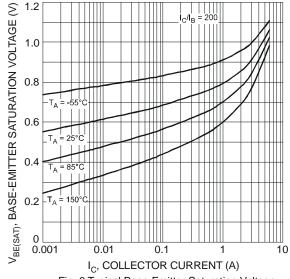


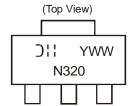
Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

### **Ordering Information (Note 5)**

Device	Packaging	Shipping	
DNLS320E-13	SOT-223	2500/Tape & Reel	

5. For packaging details, go to our website at http://www.diodes.com/ap2007.pdf.

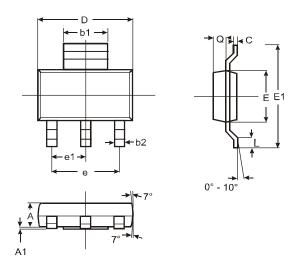
# **Marking Information**



N320 = Product Type Marking Code YWW = Date Code Marking Y = Last digit of year ex: 7 = 2007 WW = Week code 01 - 52

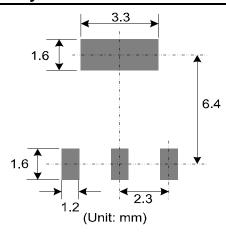


### **Package Outline Dimensions**



SOT-223					
Dim	Min	Max	Тур		
Α	1.55	1.65	1.60		
A1	0.010	0.15	0.05		
b1	2.90	3.10	3.00		
b2	0.60	0.80	0.70		
С	0.20	0.30	0.25		
D	6.45	6.55	6.50		
Е	3.45	3.55	3.50		
E1	6.90	7.10	7.00		
е	_		4.60		
e1			2.30		
L	0.85	1.05	0.95		
Q	0.84	0.94	0.89		
All Dimensions in mm					

## **Suggested Pad Layout:**



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