

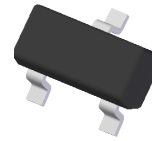


## Features

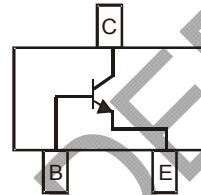
- Epitaxial Planar Die Construction
- Ideal for Medium Power Amplification and Switching
- Complimentary PNP Type Available (DPLS320A)
- **Lead Free By Design/RoHS Compliant (Note 1)**
- “Green” Device (Note 2)
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

- Case: SOT-23
- 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. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.008 grams (approximate)



SOT-23



Schematic and Pin Configuration

## Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	20	V
Collector-Emitter Voltage	$V_{CEO}$	20	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Peak Pulse Current	$I_{CM}$	5	A
Repetitive Peak Pulse Current (Note 3)	$I_{CRP}$	3	A
Continuous Collector Current	$I_C$	2	A
Base Current	$I_B$	0.5	A

## Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4) @ $T_A = 25^\circ\text{C}$	$P_D$	600	mW
Thermal Resistance, Junction to Ambient Air (Note 3) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	209	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- 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](http://www.diodes.com/products/lead_free/index.php).
  3. Operated under pulse conditions: Pulse width  $\leq 100\text{ms}$ , duty cycle  $\leq 0.25$ .
  4. 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	Typ	Max	Unit	Test Conditions
<b>OFF CHARACTERISTICS (Note 5)</b>						
Collector-Base Cutoff Current	I <sub>CBO</sub>	—	—	100	nA	V <sub>CB</sub> = 20V, I <sub>E</sub> = 0
Emitter-Base Cutoff Current	I <sub>EBO</sub>	—	—	50	μA	V <sub>CB</sub> = 20V, I <sub>E</sub> = 0, T <sub>A</sub> = 150°C
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	20	—	—	V	I <sub>C</sub> = 100μA
Collector-Emmitter Breakdown Voltage	V <sub>(BR)CEO</sub>	20	—	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	5	—	—	V	I <sub>E</sub> = 100μA
<b>ON CHARACTERISTICS (Note 5)</b>						
DC Current Gain	h <sub>FE</sub>	220	—	—	—	V <sub>CE</sub> = 2V, I <sub>C</sub> = 0.1A
		220	—	—	—	V <sub>CE</sub> = 2V, I <sub>C</sub> = 0.5A
		220	—	—	—	V <sub>CE</sub> = 2V, I <sub>C</sub> = 1A
		200	—	—	—	V <sub>CE</sub> = 2V, I <sub>C</sub> = 2A
		150	—	—	—	V <sub>CE</sub> = 2V, I <sub>C</sub> = 3A
Collector-Emmitter Saturation Voltage	V <sub>CE(SAT)</sub>	—	—	70	—	I <sub>C</sub> = 0.5A, I <sub>B</sub> = 50mA
		—	—	120	—	I <sub>C</sub> = 1A, I <sub>B</sub> = 50mA
		—	—	230	—	I <sub>C</sub> = 2A, I <sub>B</sub> = 40mA
		—	—	210	—	I <sub>C</sub> = 2A, I <sub>B</sub> = 200mA
		—	—	310	—	I <sub>C</sub> = 3A, I <sub>B</sub> = 300mA
Equivalent On-Resistance	R <sub>CE(SAT)</sub>	—	85	105	mΩ	I <sub>E</sub> = 2A, I <sub>B</sub> = 200mA
Base-Emmitter Saturation Voltage	V <sub>BE(SAT)</sub>	—	—	1.1	V	I <sub>C</sub> = 2A, I <sub>B</sub> = 40mA
		—	—	1.2	V	I <sub>C</sub> = 3A, I <sub>B</sub> = 300mA
Base-Emmitter Turn-on Voltage	V <sub>BE(ON)</sub>	—	—	1.2	V	V <sub>CE</sub> = 2V, I <sub>C</sub> = 1A
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	f <sub>T</sub>	100	220	—	MHz	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100mA, f = 100MHz
Output Capacitance	C <sub>ob</sub>	—	—	35	pF	V <sub>CB</sub> = 10V, f = 1MHz

Notes: 5. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤2%.

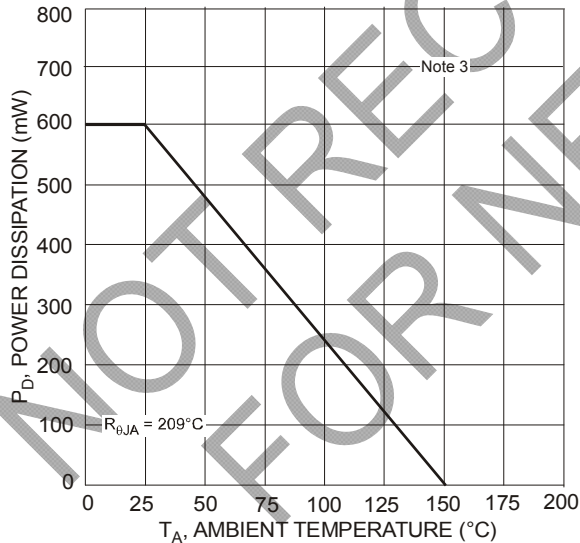


Fig. 1 Max Power Dissipation vs. Ambient Temperature

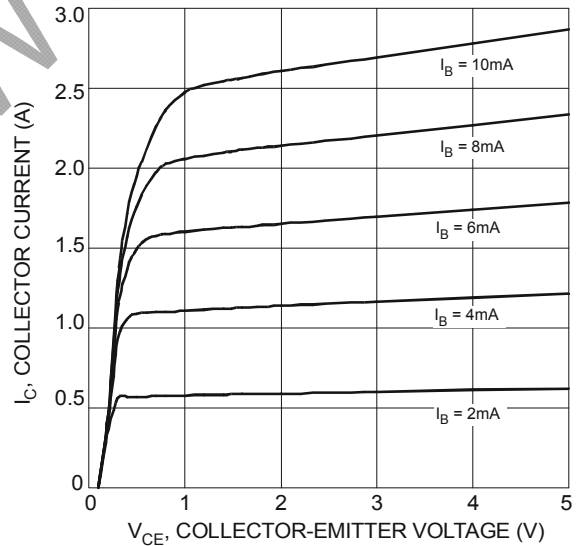


Fig. 2 Typical Collector Current vs. Collector-Emmitter Voltage

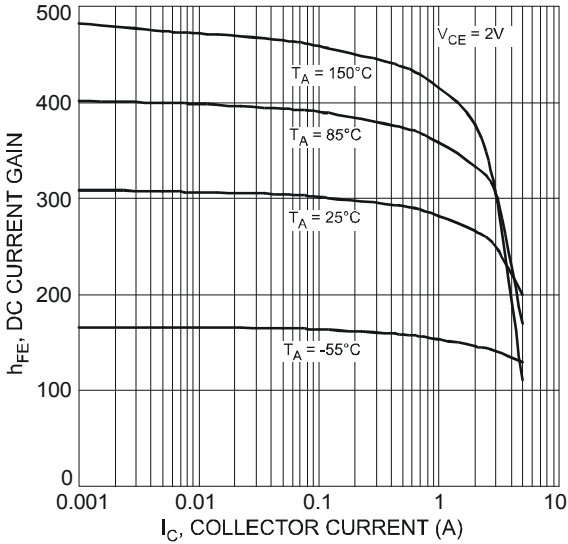


Fig. 3 Typical DC Current Gain vs. Collector Current

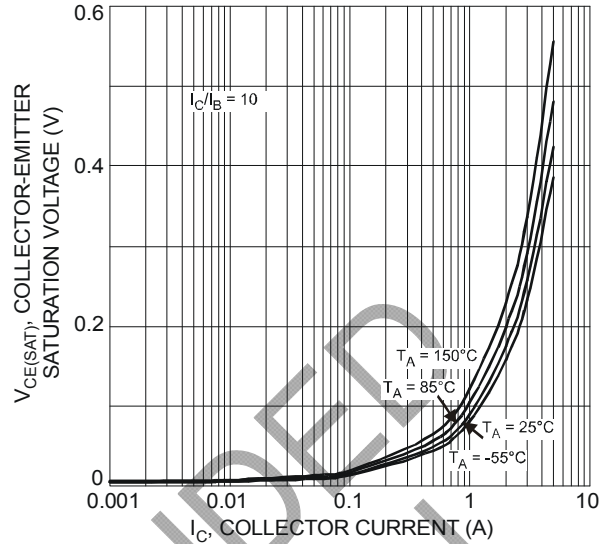


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

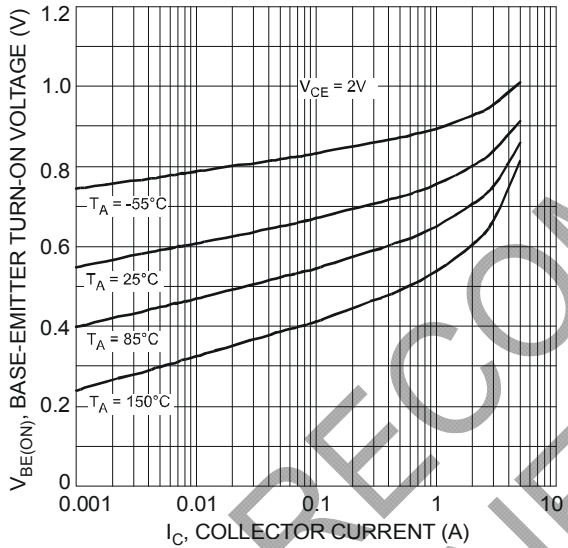


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

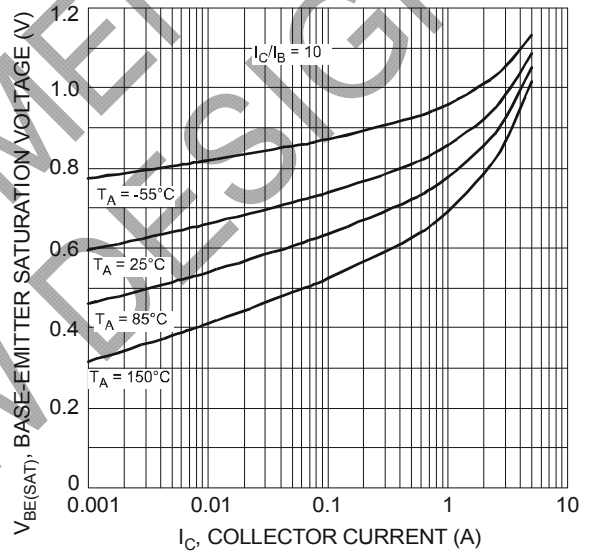


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

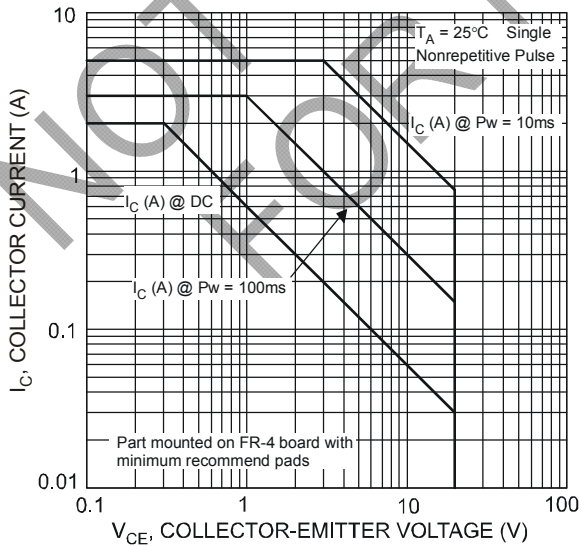


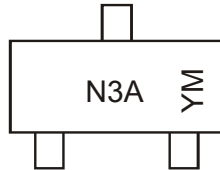
Fig. 7 Safe Operation Area

**Ordering Information** (Note 6)

<b>Device</b> DNLS320A-7	<b>Packaging</b> SOT-23	<b>Shipping</b> 3000/Tape & Reel
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Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



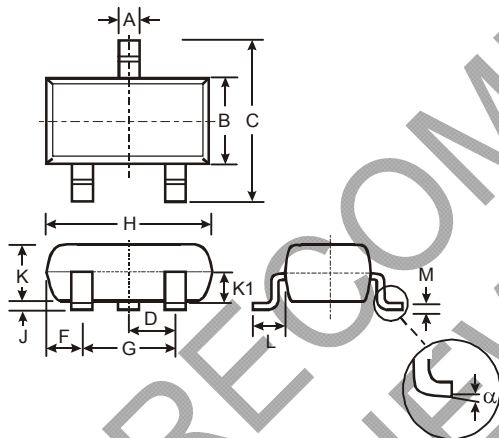
N3A = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: V = 2008)  
M = Month (ex: 9 = September)

**Date Code Key**

<b>Year</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
<b>Code</b>	V	W	X	Y	Z	A	B	C

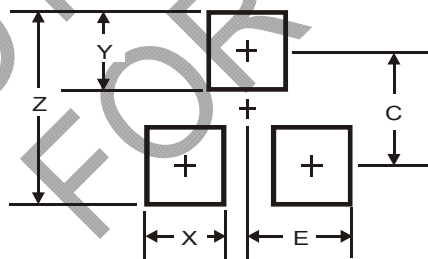
<b>Month</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
<b>Code</b>	1	2	3	4	5	6	7	8	9	O	N	D

**Package Outline Dimensions**



SOT-23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-
All Dimensions in mm			

**Suggested Pad Layout**



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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