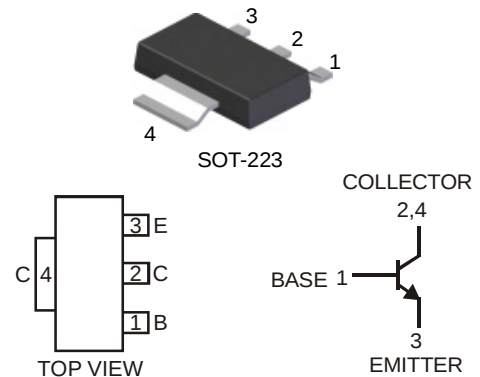


## Features

- Epitaxial Planar Die Construction
- Low Collector-Emitter Saturation Resistance  $R_{CE(SAT)} = 80\text{m}\Omega$  at 3A
- High DC Current Gain  $h_{FE} > 400$  at  $I_C = 2\text{A}$
- 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 @ $T_A = 25^\circ\text{C}$ 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    |
| Continuous Collector Current | $I_C$     | 3     | A    |
| Peak Pulse Current           | $I_{CM}$  | 8     | A    |

## Thermal Characteristics

| Characteristic                                                                  | Symbol          | Value       | Unit               |
|---------------------------------------------------------------------------------|-----------------|-------------|--------------------|
| Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 3)                           | $P_D$           | 1           | W                  |
| Thermal Resistance, Junction to Ambient Air (Note 3) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 125         | $^\circ\text{C/W}$ |
| 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. 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 Condition                                         |
|--------------------------------------|----------------------|-----|------|------|------|--------------------------------------------------------|
| Off Characteristics                  |                      |     |      |      |      |                                                        |
| Collector-Base Breakdown Voltage     | V <sub>(BR)CBO</sub> | 20  | —    | —    | V    | I <sub>C</sub> = 100μA, I <sub>E</sub> = 0             |
| Collector-Emitter Breakdown Voltage  | V <sub>(BR)CEO</sub> | 20  | —    | —    | V    | I <sub>C</sub> = 10mA, I <sub>B</sub> = 0              |
| Emitter-Base Breakdown Voltage       | V <sub>(BR)EBO</sub> | 5   | —    | —    | V    | I <sub>E</sub> = 100μA, I <sub>C</sub> = 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)          |                      |     |      |      |      |                                                        |
| Collector-Emitter Saturation Voltage | V <sub>CE(SAT)</sub> | —   | 0.04 | 0.10 | V    | I <sub>C</sub> = 0.1A, I <sub>B</sub> = 0.5mA          |
|                                      |                      | —   | 0.18 | 0.50 |      | I <sub>C</sub> = 2A, I <sub>B</sub> = 10mA             |
|                                      |                      | —   | 0.24 | 0.45 |      | I <sub>C</sub> = 3A, I <sub>B</sub> = 20mA             |
| Base-Emitter Saturation Voltage      | V <sub>BE(SAT)</sub> | —   | —    | 0.9  | V    | I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA             |
| Base-Emitter Turn-On Voltage         | V <sub>BE(ON)</sub>  | —   | —    | 0.9  | V    | V <sub>CE</sub> = 2V, I <sub>C</sub> = 1A              |
| DC Current Gain                      | h <sub>FE</sub>      | 500 | —    | —    | —    | V <sub>CE</sub> = 2V, I <sub>C</sub> = 0.1A            |
|                                      |                      | 400 | —    | —    |      | V <sub>CE</sub> = 2V, I <sub>C</sub> = 2A              |
|                                      |                      | 150 | —    | —    |      | V <sub>CE</sub> = 2V, I <sub>C</sub> = 6A              |
| AC Characteristics                   |                      |     |      |      |      |                                                        |
| Transition Frequency                 | f <sub>T</sub>       | 150 | —    | —    | MHz  | V <sub>CE</sub> = 5V, I <sub>C</sub> = 50mA, f = 50MHz |
| Input Capacitance                    | C <sub>ibo</sub>     | —   | 230  | —    | pF   | V <sub>EB</sub> = 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 <sub>CC</sub> = 10V, I <sub>C</sub> = 500mA          |
|                                      | t <sub>off</sub>     | —   | 220  | —    | ns   | I <sub>B1</sub> = -I <sub>B2</sub> = 50mA              |

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

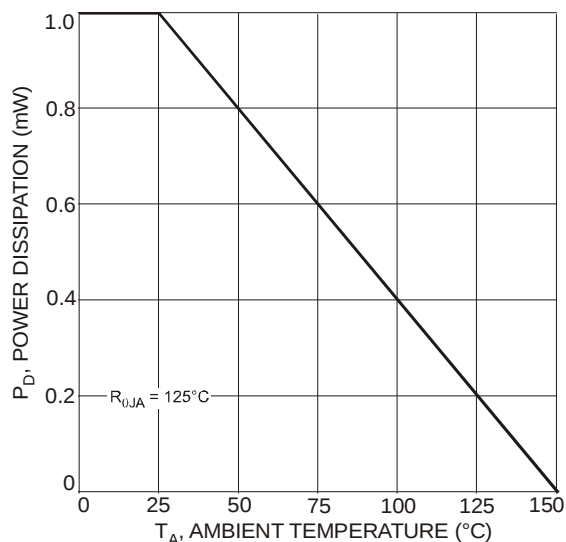


Fig. 1 Max Power Dissipation vs. Ambient Temperature

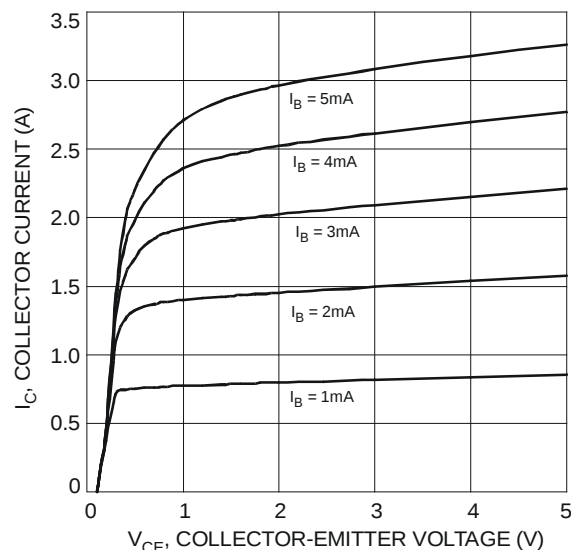


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage

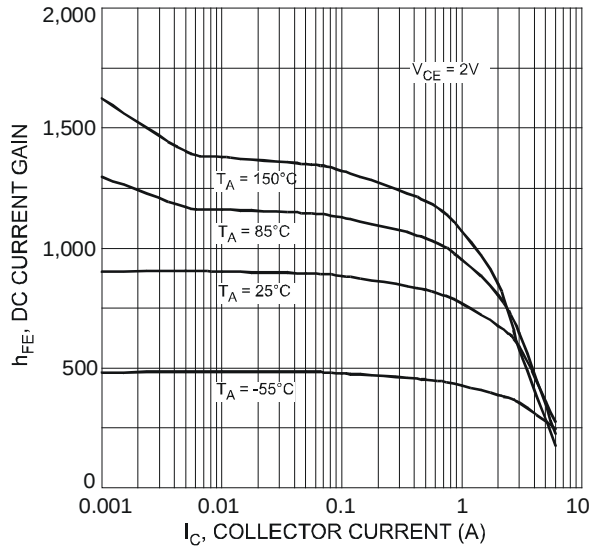


Fig. 3 Typical DC Current Gain vs. Collector Current

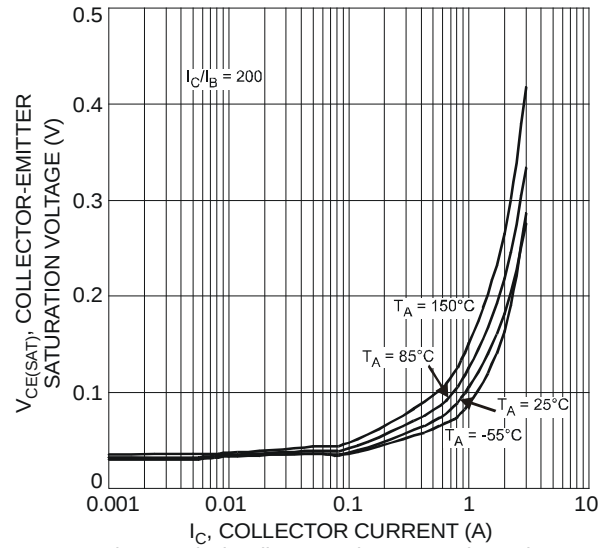


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

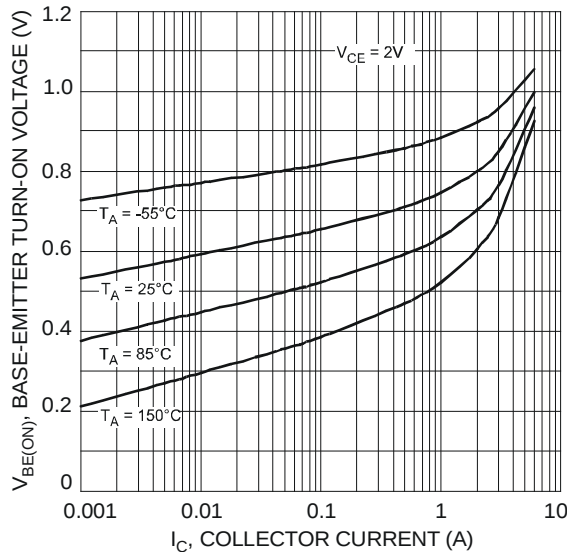


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

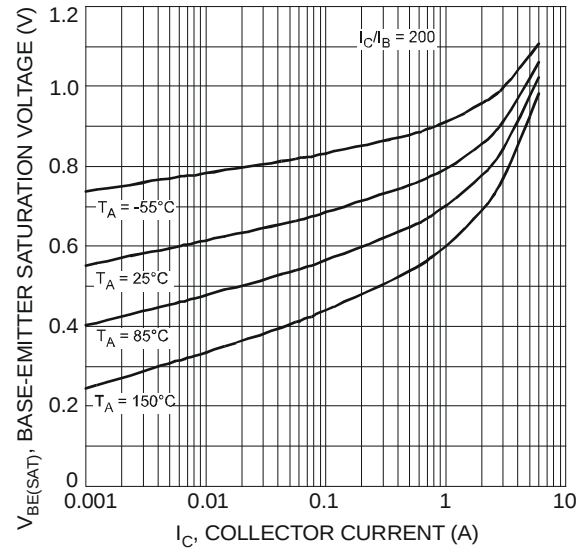


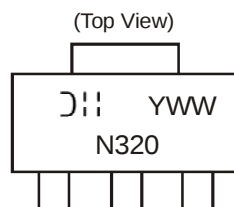
Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

## Ordering Information (Note 5)

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

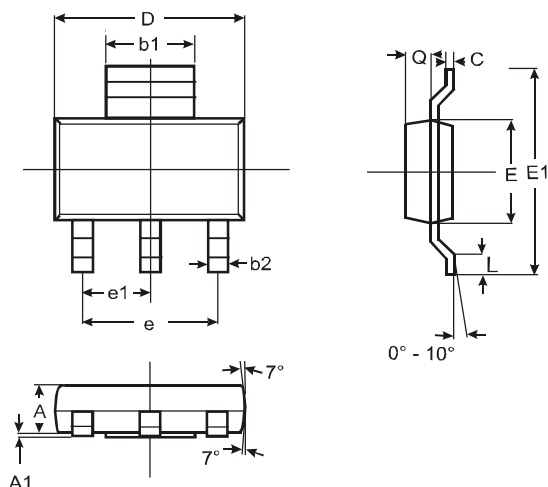
Notes: 5. For packaging details, go to our website at <http://www.diodes.com/ap2007.pdf>.

## Marking Information



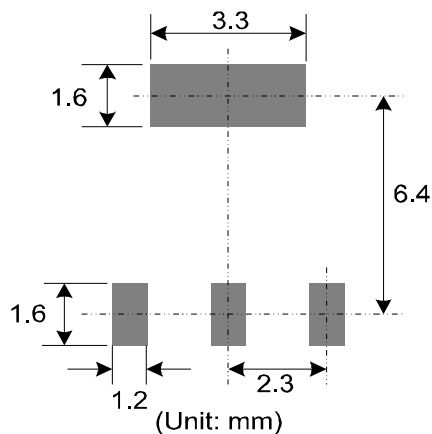
N320 = Product Type Marking Code  
YWW = Date Code Marking  
Y = Last digit of year ex: 7 = 2007  
WW = Week code 01 - 52

## Package Outline Dimensions



| SOT-223              |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 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 |
| C                    | 0.20  | 0.30 | 0.25 |
| D                    | 6.45  | 6.55 | 6.50 |
| E                    | 3.45  | 3.55 | 3.50 |
| E1                   | 6.90  | 7.10 | 7.00 |
| e                    | —     | —    | 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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