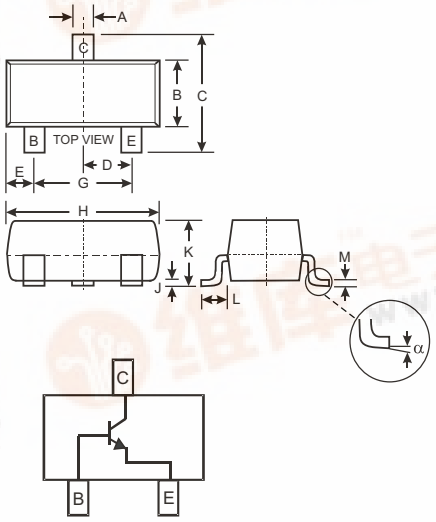
# DNBT8105

## 1A NPN SURFACE MOUNT TRANSISTOR

Lead-free Green

## Features

- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- High Collector Current Rating
- Complementary Version Available (DPBT8105)
- **Lead Free By Design/RoHS Compliant (Note 2)**
- **"Green Device" (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**




| SOT-23 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 0.37 | 0.51 |
| **B** | 1.20 | 1.40 |
| **C** | 2.30 | 2.50 |
| **D** | 0.89 | 1.03 |
| **E** | 0.45 | 0.60 |
| **G** | 1.78 | 2.05 |
| **H** | 2.80 | 3.00 |
| **J** | 0.013 | 0.10 |
| **K** | 0.903 | 1.10 |
| **L** | 0.45 | 0.61 |
| **M** | 0.085 | 0.180 |
| | 0 | 8 |
| **All Dimensions in mm** | | |

## 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-020C
- Terminals: Finish Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking (See Page 4): K81
- Ordering & Date Code Information: See Page 4
- Weight: 0.008 grams (approximate)

## Maximum Ratings @ $T_A$ = 25 C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 80 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 60 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 5 | V |
| Collector Current - Continuous | $I_C$ | 1 | A |
| Peak Pulse Collector Current | $I_{CM}$ | 2 | A |

## Thermal Characteristics

| Characteristic | Symbol | Typ | Max | Unit |
|---|---|---|---|---|
| Power Dissipation (Note 1) @ $T_A$ = 25 C | $P_d$ | | 300 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) @ $T_A$ = 25 C | $R_{JA}$ | | 417 | C/W |
| Operating and Storage Temperature Range | $T_j$, $T_{STG}$ | -55 to +150 | | C |

Notes:
1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.
2. No purposefully added lead.
3. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.

## Electrical Characteristics @ $T_A$ = 25 C unless otherwise specified

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 4)** | | | | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 80 | | V | $I_C$ = 100 A, $I_E$ = 0 |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | 60 | | V | $I_C$ = 10mA, $I_B$ = 0 |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | 5 | | V | $I_E$ = 100 A, $I_C$ = 0 |
| Collector Cutoff Current | $I_{CBO}$ | | 100 | nA | $V_{CB}$ = 60V, $I_E$ = 0 |
| Collector Cutoff Current | $I_{CES}$ | | 100 | nA | $V_{CES}$ = 60V |
| Emitter Cutoff Current | $I_{EBO}$ | | 100 | nA | $V_{EB}$ = 4V, $I_C$ = 0 |
| **ON CHARACTERISTICS (Note 4)** | | | | | |
| DC Current Gain | $h_{FE}$ | 100<br>100<br>80<br>30 | 300 | V | $I_C$ = 1mA, $V_{CE}$ = 5V<br>$I_C$ = 500mA, $V_{CE}$ = 5V<br>$I_C$ = 1A, $V_{CE}$ = 5V<br>$I_C$ = 2A, $V_{CE}$ = 5V |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | | 0.25<br>0.5 | V | $I_C$ = 500mA, $I_B$ = 50mA<br>$I_C$ = 1A, $I_B$ = 100mA |
| Base-Emitter Saturation Voltage | $V_{BE(SAT)}$ | | 1.1 | V | $I_C$ = 1A, $I_B$ = 100mA |
| Base-Emitter Turn On Voltage | $V_{BE(ON)}$ | | 1.0 | V | $I_C$ = 1A, $V_{CE}$ = 5V |
| **SMALL SIGNAL CHARACTERISTICS** | | | | | |
| Output Capacitance | $C_{obo}$ | | 10 | pF | $V_{CB}$ = 10V, f = 1.0MHz |
| Current Gain-Bandwidth Product | $f_T$ | 150 | | MHz | $V_{CE}$ = 10V, $I_C$ = 50mA, f = 100MHz |

Note: 4. Short duration pulse test used to minimize self-heating effect.

## Typical Characteristics @ $T_A$ = 25 C unless otherwise specified

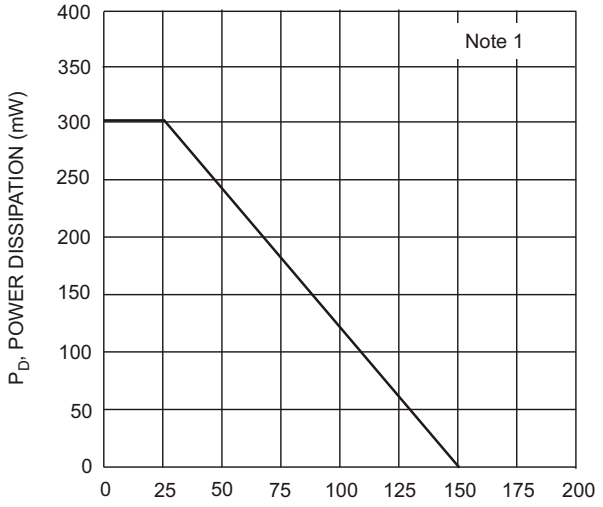



Fig. 1, Max Power Dissipation vs Ambient Temperature

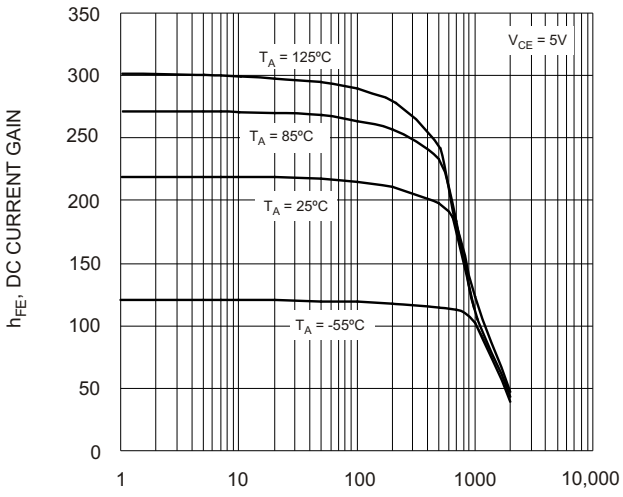



Fig. 2, DC Current Gain vs. Collector Current

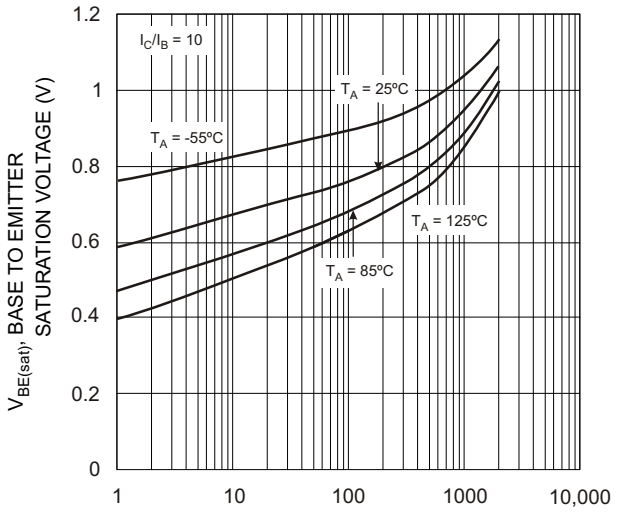



Fig. 3, Base-Emitter Saturation Voltage vs. Collector Current

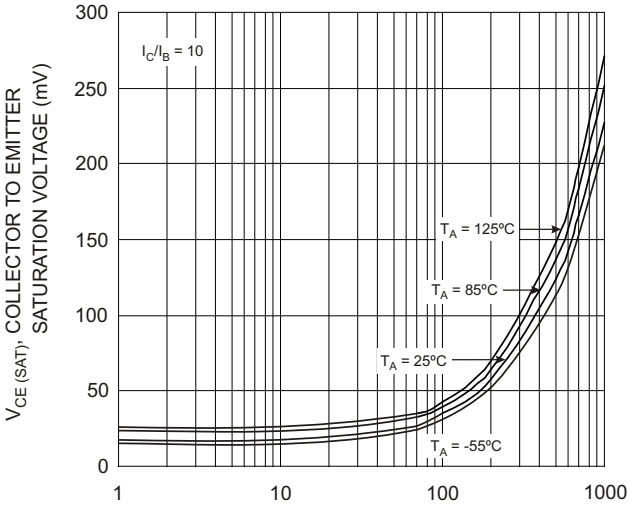



Fig. 4, Collector-Emitter Saturation Voltage vs. Collector Current

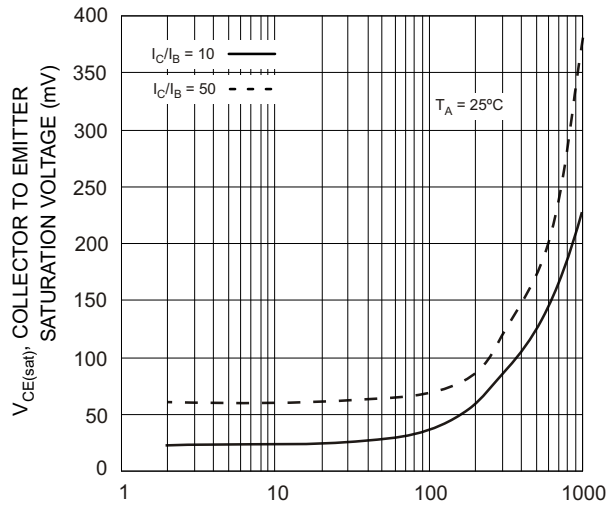



Fig. 5, Collector-Emitter Saturation Voltage vs. Collector Current

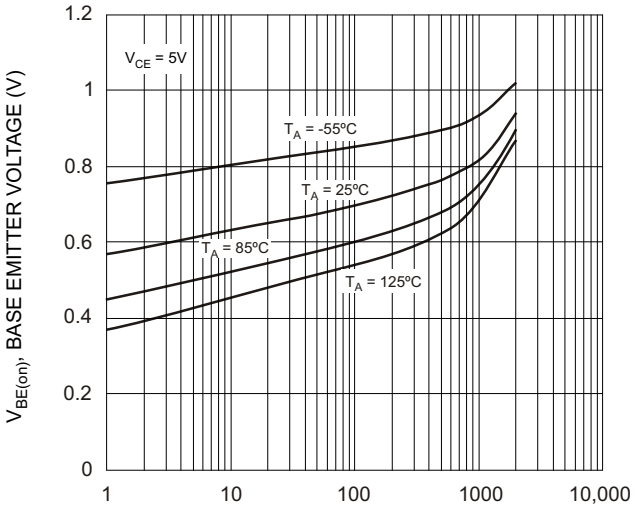



Fig. 6, Base-Emitter Voltage vs. Collector Current

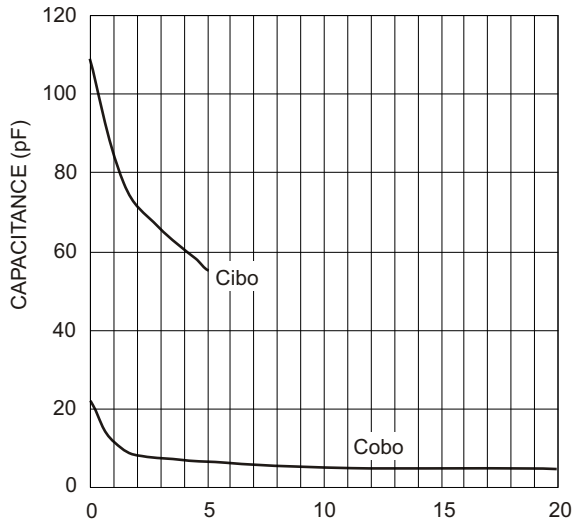


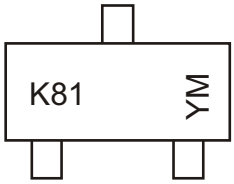

Fig. 7, Capacitance vs. Reverse Voltage

## Ordering Information (Note 5)

| Device | Packaging | Shipping |
|---|---|---|
| DNBT8105-7 | SOT-23 | 3000/Tape & Reel |

Note: 5. For Packaging Details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

## Marking Information




K81 = Product Type Marking Code
YM = Date Code Marking
Y = Year ex: S = 2005
M = Month ex: 9 = September

Date Code Key

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|---|---|
| Code | R | S | T | U | V | W | X | Y | Z |

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