# 50V PNP LOW SATURATION POWER TRANSISTOR IN SOT89

## Features

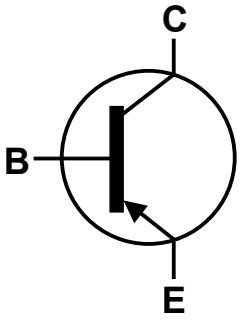
- $BV_{CEO}$ > -50V
- $I_C$ = -3A High Continuous Collector Current
- $I_{CM}$ up to -5A Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage $V_{CE(sat)}$ < -180mV @ 1A
- $R_{CE(sat)}$ = 67mΩ @ 2A for a Low Equivalent On-Resistance
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

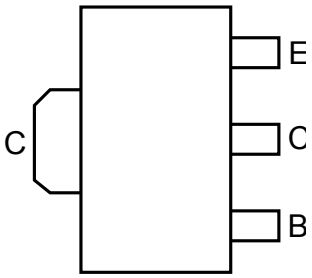
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.052 grams (Approximate)

SOT89

Top View




Device Symbol




Top View
Pin-Out

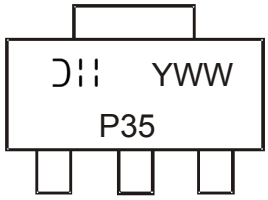
## Ordering Information (Note 4)

| Part Number | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|
| DPLS350Y-13 | P35 | 13 | 12 | 2,500 |
| DPLS350Y-13R | P35 | 13 | 12 | 4,000 |

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/products/packages.html

## Marking Information

(Top View)




P35 = Product Type Marking Code:
YWW = Date Code Marking
Y = Last digit of year ex: 1 = 2011
WW = Week code 01 - 52

## Absolute Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -50 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -50 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -6 | V |
| Continuous Collector Current | $I_C$ | -3 | A |
| Peak Pulse Current | $I_{CM}$ | -5 | A |
| Base Current | $I_B$ | -500 | mA |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

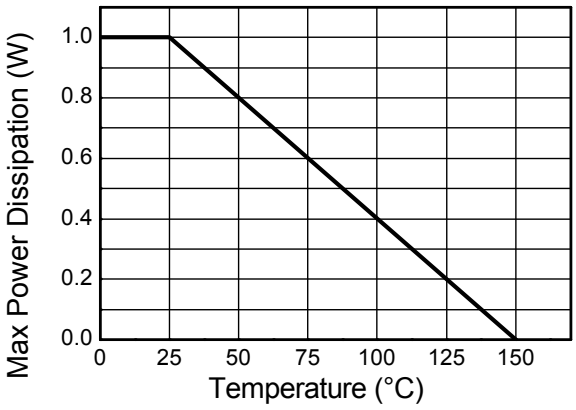
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 5) | $P_D$ | 1 | W |
| | (Note 6) | | 1.6 | |
| | (Note 7) | | 2.0 | |
| Thermal Resistance, Junction to Ambient Air | (Note 5) | $R_{\theta JA}$ | 125 | °C/W |
| | (Note 6) | | 78 | |
| | (Note 7) | | 62.5 | |
| Thermal Resistance, Junction to Lead | (Note 8) | $R_{\theta JL}$ | 5.7 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## ESD Ratings (Note 9)

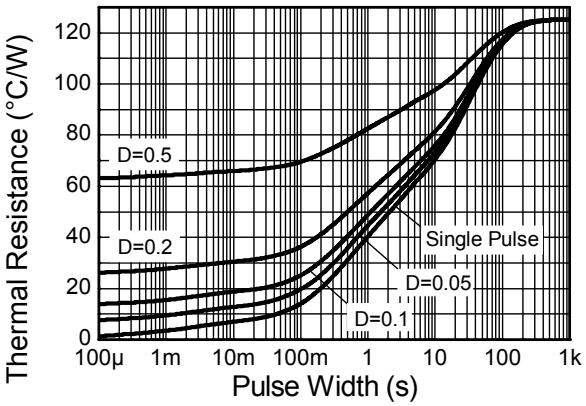
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

Notes:
5. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
6. Same as note (5), except the device is mounted on 25mm x 25mm 1oz copper.
7. Same as note (5), except the device is mounted on 50mm x 50mm 1oz copper.
8. Thermal resistance from junction to solder-point (on the exposed collector pad).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

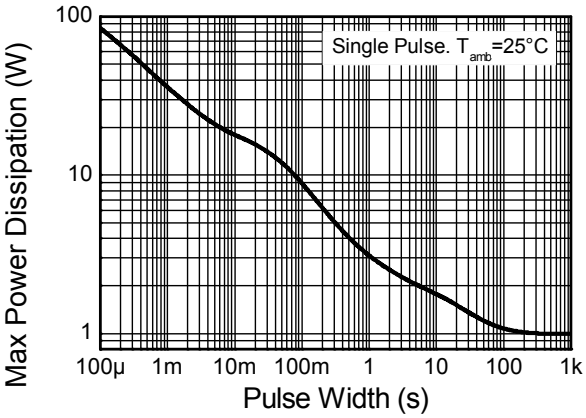
## Thermal Characteristics and Derating Information



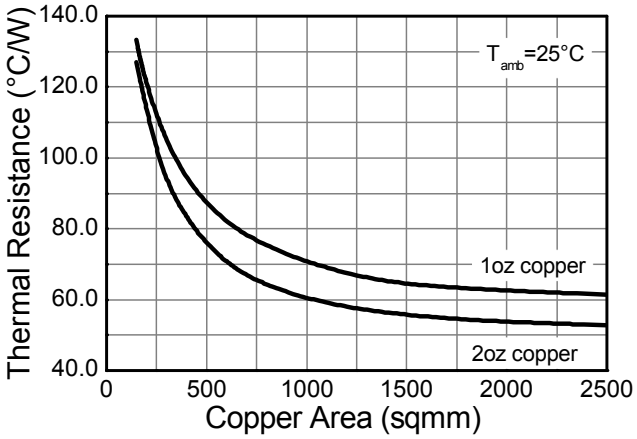

**Derating Curve**

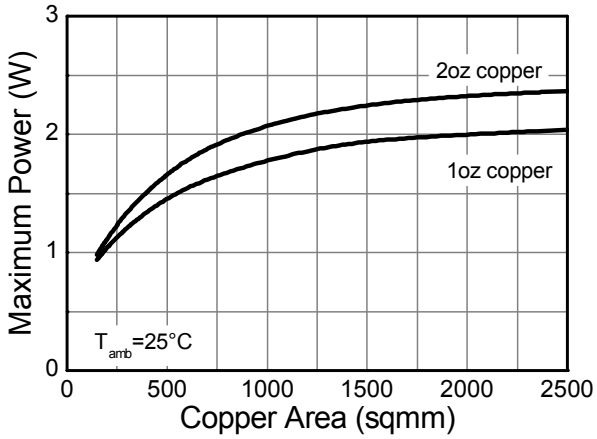



**Transient Thermal Impedance**




**Pulse Power Dissipation**



## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | -50 | — | — | V | $I_C$ = -100µA |
| Collector-Emitter Breakdown Voltage (Note 10) | $BV_{CEO}$ | -50 | — | — | V | $I_C$ = -10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | -6 | — | — | V | $I_E$ = -100µA |
| Collector-Emitter Cut-off Current | $I_{CES}$ | — | — | -100 | nA | $V_{CE}$ = -50V |
| Collector Cut-off Current | $I_{CBO}$ | — | — | -100 | nA | $V_{CB}$ = -50V |
| | | | | -50 | µA | $V_{CB}$ = -50V, $T_A$ = +150°C |
| Emitter Cut-off Current | $I_{EBO}$ | — | — | -100 | nA | $V_{EB}$ = -5V |
| Static Forward Current Transfer Ratio (Note 10) | $h_{FE}$ | 200 | — | — | — | $I_C$ = -100mA, $V_{CE}$ = -2V |
| | | 200 | | — | | $I_C$ = -500mA, $V_{CE}$ = -2V |
| | | 200 | | 450 | | $I_C$ = -1A, $V_{CE}$ = -2V |
| | | 130 | | — | | $I_C$ = -2A, $V_{CE}$ = -2V |
| | | 80 | | — | | $I_C$ = -3A, $V_{CE}$ = -2V |
| Collector-Emitter Saturation Voltage (Note 10) | $V_{CE(sat)}$ | — | — | -90 | mV | $I_C$ = -500mA, $I_B$ = -50mA |
| | | | | -180 | | $I_C$ = -1A, $I_B$ = -50mA |
| | | | | -320 | | $I_C$ = -2A, $I_B$ = -100mA |
| | | | | -270 | | $I_C$ = -2A, $I_B$ = -200mA |
| | | | | -390 | | $I_C$ = -3A, $I_B$ = -300mA |
| Equivalent On-Resistance | $R_{CE(sat)}$ | — | 67 | 135 | mΩ | $I_C$ = -2A, $I_B$ = -200mA |
| Base-Emitter Saturation Voltage (Note 10) | $V_{BE(sat)}$ | — | — | -1.1 | V | $I_C$ = -2A, $I_B$ = -100mA |
| | | | | -1.2 | | $I_C$ = -3A, $I_B$ = -300mA |
| Base-Emitter Turn-On Current (Note 10) | $V_{BE(on)}$ | — | — | -1.1 | V | $I_C$ = -1A, $V_{CE}$ = -2V |
| Transition Frequency | $f_T$ | 100 | — | — | MHz | $I_C$ = -100mA, $V_{CE}$ = -5V, f = 100MHz |
| Collector Output Capacitance | $C_{obo}$ | — | — | 35 | pF | $V_{CB}$ = -10V, $I_E$ = 0, f = 1MHz |
| Turn-On Time | $t_{on}$ | — | 87 | — | ns | $V_{CC}$ = -30v, $I_{CC}$ = 150mA $I_{B1}$ = - $I_{B2}$ =15mA |
| Delay Time | $t_d$ | — | 41 | — | ns | |
| Rise Time | $t_r$ | — | 46 | — | ns | |
| Turn-Off Time | $t_{off}$ | — | 294 | — | ns | |
| Storage Time | $t_s$ | — | 250 | — | ns | |
| Fall Time | $t_f$ | — | 44 | — | ns | |

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

## Typical Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

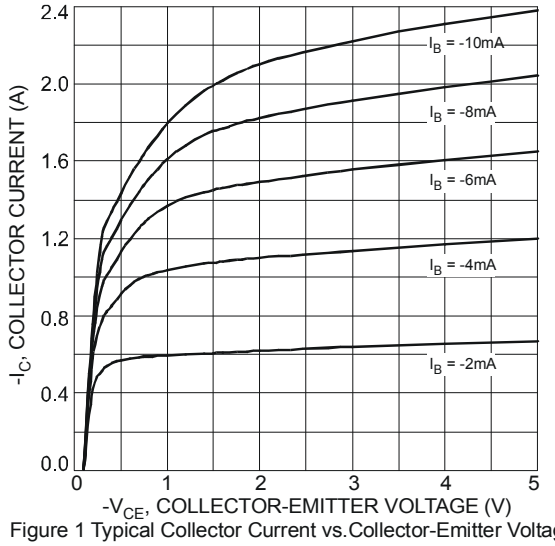



Figure 1 Typical Collector Current vs.Collector-Emitter Voltage

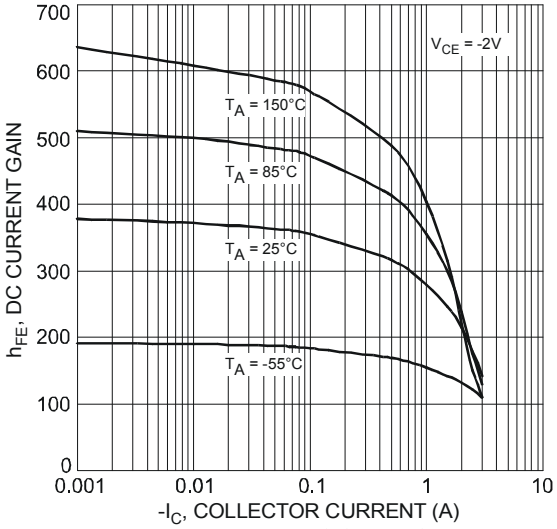



Figure 2 Typical DC Current Gain vs. Collector Current

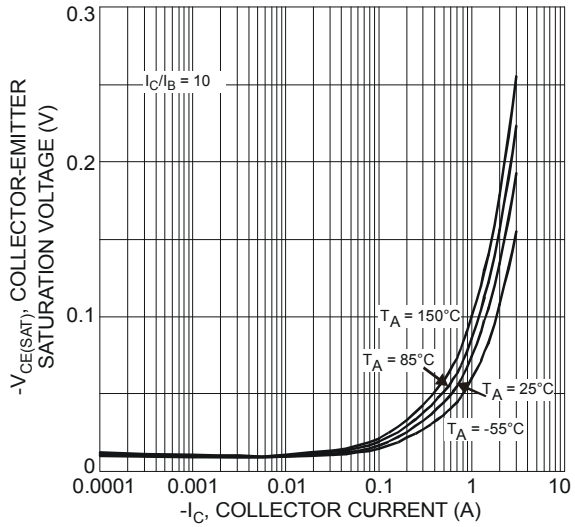



Figure 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

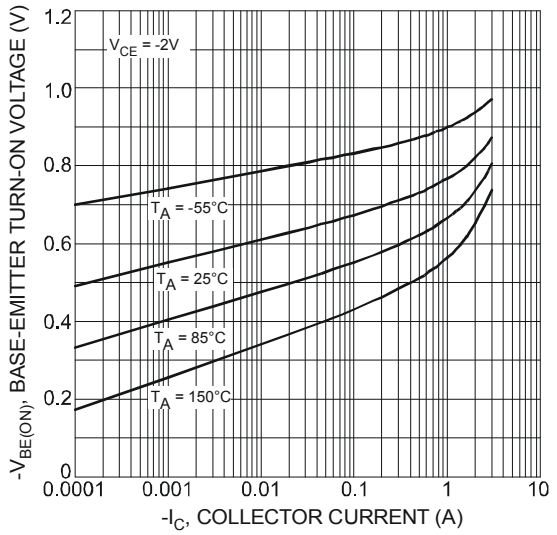



Figure 4 Typical Base-Emitter Turn-On Voltage vs. Collector Current

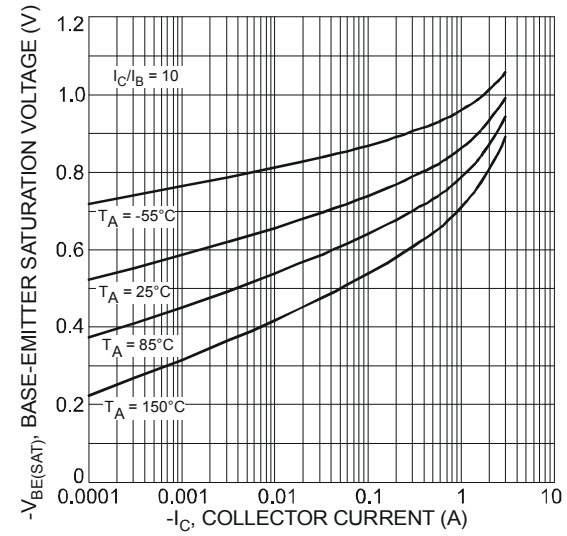



Figure 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

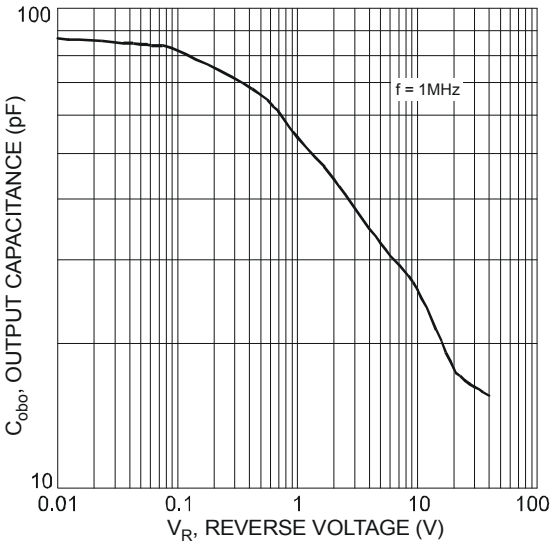



Figure 6 Typical Output Capacitance Characteristics

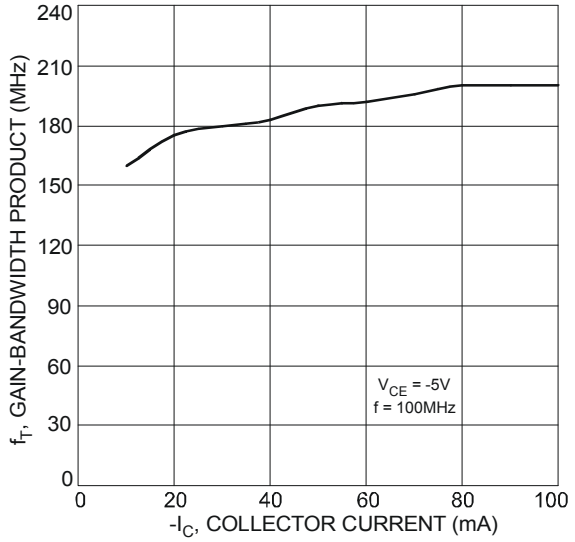
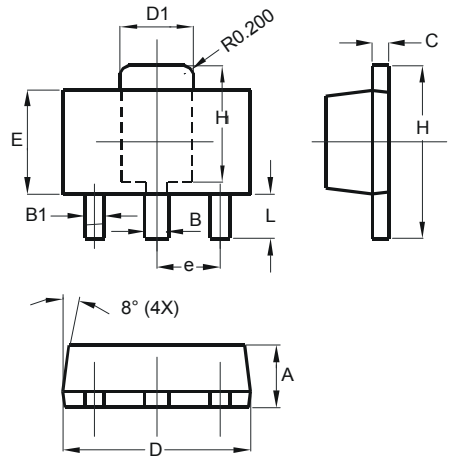



Figure 7 Typical Gain-Bandwidth Product vs. Collector Current

## Package Outline Dimensions

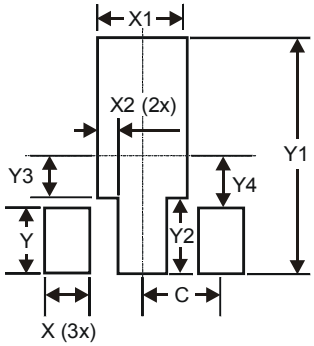
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| SOT89 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 1.40 | 1.60 |
| **B** | 0.44 | 0.62 |
| **B1** | 0.35 | 0.54 |
| **C** | 0.35 | 0.44 |
| **D** | 4.40 | 4.60 |
| **D1** | 1.62 | 1.83 |
| **E** | 2.29 | 2.60 |
| **e** | 1.50 Typ | |
| **H** | 3.94 | 4.25 |
| **H1** | 2.63 | 2.93 |
| **L** | 0.89 | 1.20 |
| **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) |
|---|---|
| **X** | 0.900 |
| **X1** | 1.733 |
| **X2** | 0.416 |
| **Y** | 1.300 |
| **Y1** | 4.600 |
| **Y2** | 1.475 |
| **Y3** | 0.950 |
| **Y4** | 1.125 |
| **C** | 1.500 |

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