

**40V NPN SURFACE MOUNT TRANSISTOR IN SOT89**
**Features**

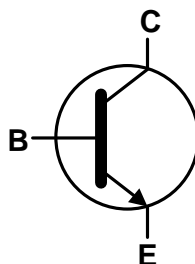
- $BV_{CEO} > 40V$
- $I_C = 600mA$  High Collector Current
- Complementary PNP Type: DXT2907A
- Ideal for Medium Power Switching or Amplification Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

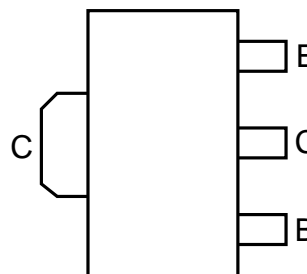
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.072 grams (Approximate)



Top View



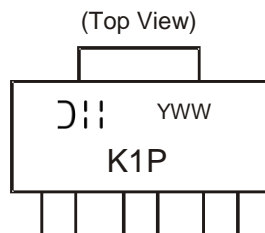
Device Symbol


 Top View  
Pin-Out

**Ordering Information** (Note 4)

| Product     | Compliance | Marking | Reel size (inches) | Tape Width (mm) | Quantity per Reel |
|-------------|------------|---------|--------------------|-----------------|-------------------|
| DXT2222A-13 | AEC-Q101   | K1P     | 13                 | 12              | 2,500             |
| DXT2222ATC  | AEC-Q101   | K1P     | 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](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**


D11 = Manufacturer's Code Marking  
 K1P = Product Type Marking Code:  
 YWW = Date Code Marking  
 Y = Last Digit of Year ex: 5 = 2015  
 WW = Week Code 01 to 53

## Absolute Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CBO</sub> | 75    | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | 40    | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | 6     | V    |
| Peak Pulse Current           | I <sub>CM</sub>  | 800   | mA   |
| Continuous Collector Current | I <sub>C</sub>   | 600   | mA   |

## Thermal Characteristics

| Characteristic                              | Symbol                            | Value       | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation                           | P <sub>D</sub>                    | 0.75        | W    |
|   |                                   | 1.2         |      |
| Thermal Resistance, Junction to Ambient Air | R <sub>θJA</sub>                  | 166         | °C/W |
|   |                                   | 104         |      |
| Operating and Storage Temperature Range     | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

## ESD Ratings (Note 7)

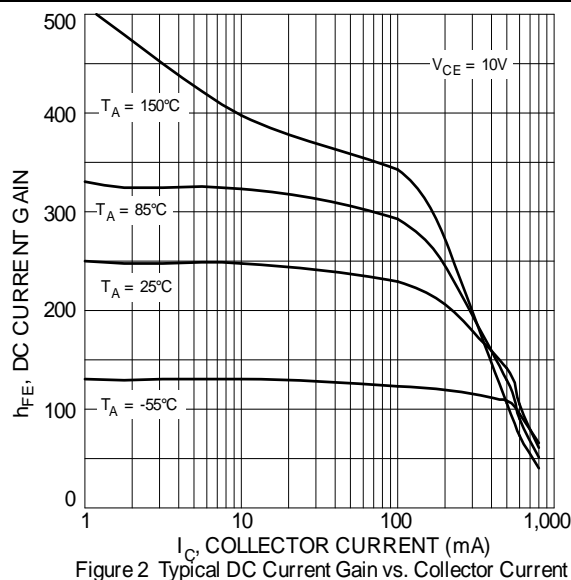
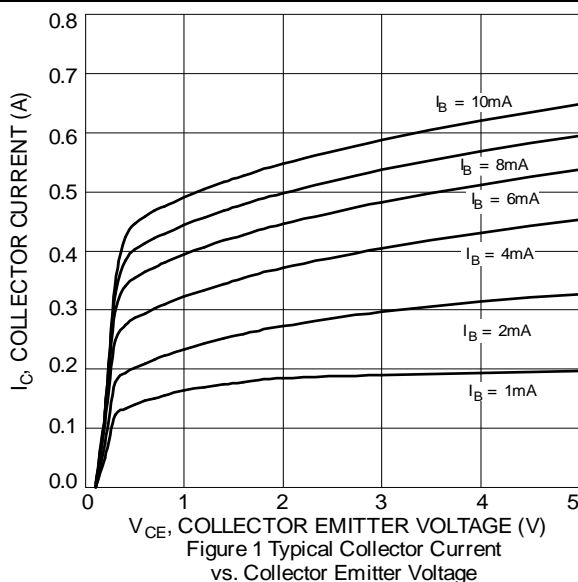
| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V    | 3A          |
| Electrostatic Discharge - Machine Model    | ESD MM  | 400   | V    | C           |

- Notes:
5. For a device mounted with the exposed collector pad on minimum recommended pad layout 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 with the exposed collector pad on 25mm x 25mm 1oz copper.
  7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                       | Symbol        | Min                                     | Max                               | Unit          | Test Conditions   |
|--------------------------------------|---------------|---|-----------------------------------|---------------|---|
| OFF CHARACTERISTICS (Note 8)         |               |   |                                   |               |   |
| Collector-Base Breakdown Voltage     | $BV_{CBO}$    | 75                                      | —                                 | V             | $I_C = 10\mu A$   |
| Collector-Emitter Breakdown Voltage  | $BV_{CEO}$    | 40                                      | —                                 | V             | $I_C = 10mA$  |
| Emitter-Base Breakdown Voltage       | $BV_{EBO}$    | 6.0                                     | —                                 | V             | $I_E = 10\mu A$   |
| Collector Cutoff Current             | $I_{CBO}$     | —                                       | 10                                | nA<br>$\mu A$ | $V_{CB} = 60V$<br>$V_{CB} = 60V, T_A = +150^{\circ}C$   |
| Collector Cutoff Current             | $I_{CEX}$     | —                                       | 10                                | nA            | $V_{CE} = 60V, V_{EB(OFF)} = 3.0V$  |
| Emitter Cutoff Current               | $I_{EBO}$     | —                                       | 10                                | nA            | $V_{EB} = 3.0V$   |
| Base Cutoff Current                  | $I_{BL}$      | —                                       | 20                                | nA            | $V_{CE} = 60V, V_{EB(OFF)} = 3.0V$  |
| ON CHARACTERISTICS (Note 8)          |               |   |                                   |               |   |
| DC Current Gain                      | $h_{FE}$      | 35<br>50<br>75<br>100<br>40<br>35<br>50 | —<br>—<br>—<br>300<br>—<br>—<br>— | —             | $I_C = 100\mu A, V_{CE} = 10V$<br>$I_C = 1.0mA, V_{CE} = 10V$<br>$I_C = 10mA, V_{CE} = 10V$<br>$I_C = 150mA, V_{CE} = 10V$<br>$I_C = 500mA, V_{CE} = 10V$<br>$I_C = 10mA, V_{CE} = 10V, T_A = -55^{\circ}C$<br>$I_C = 150mA, V_{CE} = 1.0V$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | —<br>—                                  | 0.3<br>1.0                        | V             | $I_C = 150mA, I_B = 15mA$<br>$I_C = 500mA, I_B = 50mA$  |
| Base-Emitter Saturation Voltage      | $V_{BE(SAT)}$ | 0.6<br>—                                | 1.2<br>2.0                        | V             | $I_C = 150mA, I_B = 15mA$<br>$I_C = 500mA, I_B = 50mA$  |
| SMALL SIGNAL CHARACTERISTICS         |               |   |                                   |               |   |
| Output Capacitance                   | $C_{obo}$     | —                                       | 8                                 | pF            | $V_{CB} = 10V, f = 1.0MHz$  |
| Input Capacitance                    | $C_{ibo}$     | —                                       | 25                                | pF            | $V_{EB} = 0.5V, f = 1.0MHz$   |
| Current Gain-Bandwidth Product       | $f_T$         | 300                                     | —                                 | MHz           | $V_{CE} = 20V, I_C = 20mA, f = 100MHz$  |
| Noise Figure                         | NF            | —                                       | 4.0                               | dB            | $V_{CE} = 10V, I_C = 150\mu A,$<br>$R_S = 1.0k\Omega, f = 1.0kHz$   |
| SWITCHING CHARACTERISTICS            |               |   |                                   |               |   |
| Delay Time                           | $t_d$         | —                                       | 10                                | ns            | $V_{CC} = 30V, I_C = 150mA,$  |
| Rise Time                            | $t_r$         | —                                       | 25                                | ns            | $V_{EB(OFF)} = 0.5V, I_{B1} = 15mA$   |
| Storage Time                         | $t_s$         | —                                       | 225                               | ns            | $V_{CC} = 30V, I_C = 150mA,$  |
| Fall Time                            | $t_f$         | —                                       | 60                                | ns            | $I_{B1} = I_{B2} = 15mA$  |

Note: 8. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)


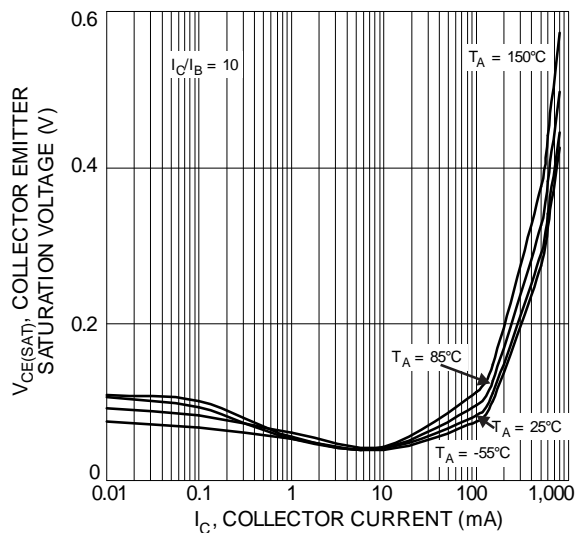


Figure 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

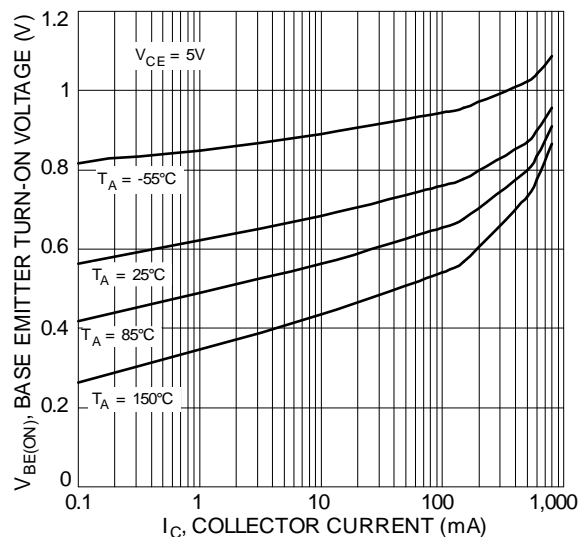


Figure 4 Typical Base Emitter Turn-On Voltage vs. Collector Current

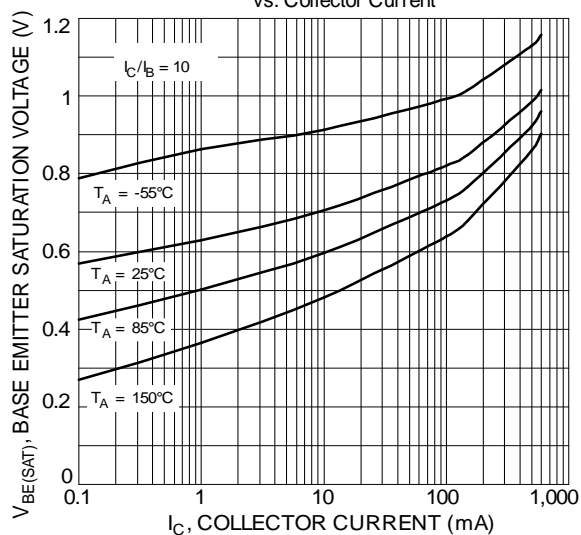


Figure 5 Typical Base Emitter Saturation Voltage vs. Collector Current

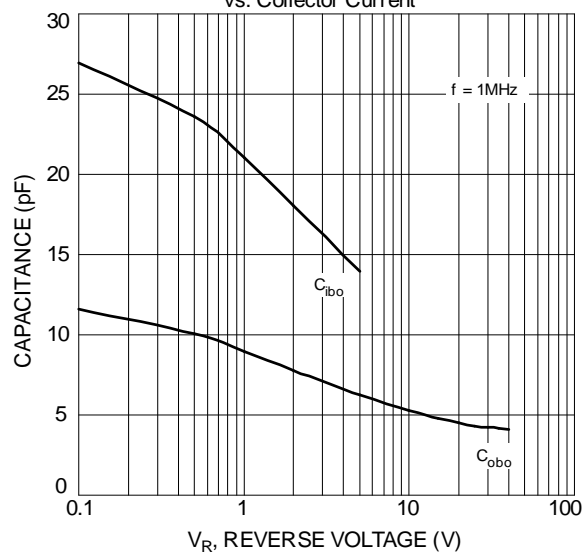


Figure 6 Typical Capacitance Characteristics

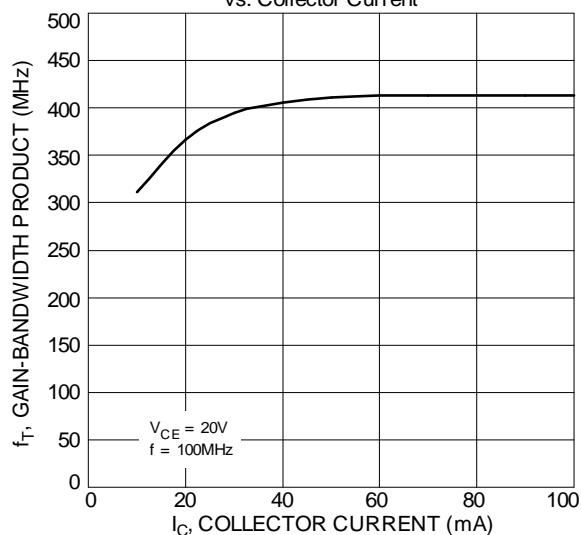
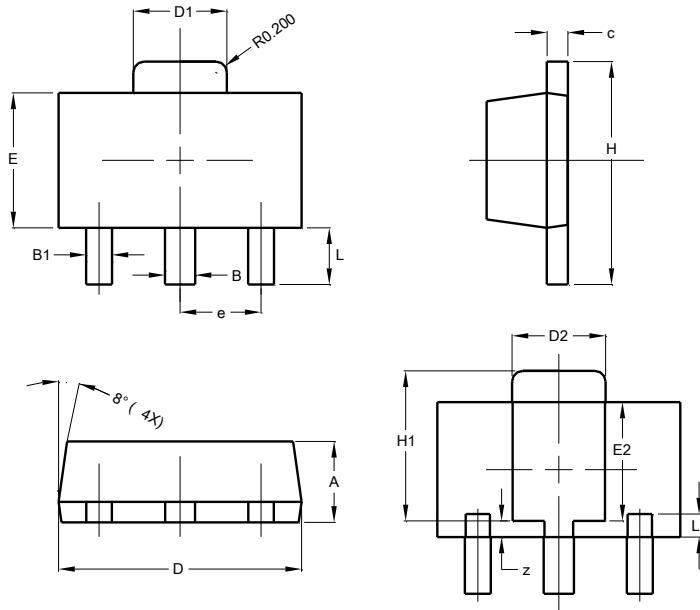


Figure 7 Typical Gain-Bandwidth Product vs. Collector Current

## Package Outline Dimensions

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

### SOT89

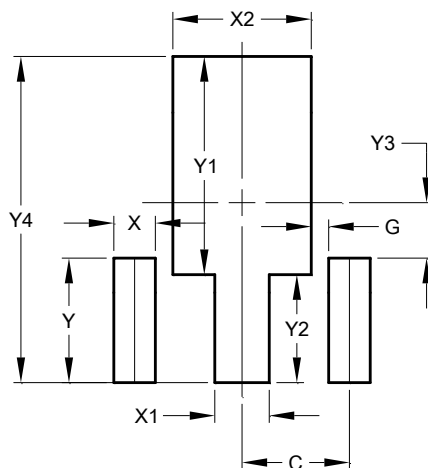


| SOT89                |       |      |       |
|----------------------|-------|------|-------|
| Dim                  | Min   | Max  | Typ   |
| A                    | 1.40  | 1.60 | 1.50  |
| B                    | 0.50  | 0.62 | 0.56  |
| B1                   | 0.42  | 0.54 | 0.48  |
| c                    | 0.35  | 0.43 | 0.38  |
| D                    | 4.40  | 4.60 | 4.50  |
| D1                   | 1.62  | 1.83 | 1.733 |
| D2                   | 1.61  | 1.81 | 1.71  |
| E                    | 2.40  | 2.60 | 2.50  |
| E2                   | 2.05  | 2.35 | 2.20  |
| e                    | -     | -    | 1.50  |
| H                    | 3.95  | 4.25 | 4.10  |
| H1                   | 2.63  | 2.93 | 2.78  |
| L                    | 0.90  | 1.20 | 1.05  |
| L1                   | 0.327 |      |       |
| z                    | 0.20  |      |       |
| All Dimensions in mm |       |      |       |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

### SOT89



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 1.500         |
| G          | 0.244         |
| X          | 0.580         |
| X1         | 0.760         |
| X2         | 1.933         |
| Y          | 1.730         |
| Y1         | 3.030         |
| Y2         | 1.500         |
| Y3         | 0.770         |
| Y4         | 4.530         |

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