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We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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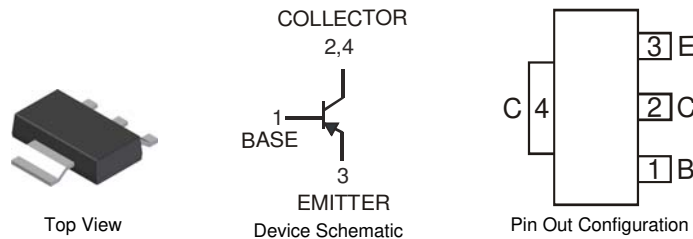


## Features

- Ideally Suited for Automated Assembly Processes
- Low Collector-Emitter Saturation Voltage
- 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 4
- Ordering Information: See Page 4
- Weight: 0.115 grams (approximate)



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

| Characteristic               | Symbol    | Value | Unit |
|------------------------------|-----------|-------|------|
| Collector-Base Voltage       | $V_{CBO}$ | -45   | V    |
| Collector-Emitter Voltage    | $V_{CEO}$ | -30   | V    |
| Emitter-Base Voltage         | $V_{EBO}$ | -6    | V    |
| Peak Pulse Current           | $I_{CM}$  | -5    | A    |
| Continuous Collector Current | $I_C$     | -3    | A    |
| Continuous Base Current      | $I_B$     | -1    | A    |

## Thermal Characteristics

| Characteristic  | Symbol          | Value       | Unit               |
|---|-----------------|-------------|--------------------|
| Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$                           | $P_D$           | 1.2         | W                  |
| Thermal Resistance, Junction to Ambient Air (Note 3) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 104         | $^\circ\text{C/W}$ |
| Power Dissipation (Note 4) @ $T_A = 25^\circ\text{C}$                           | $P_D$           | 2           | W                  |
| Thermal Resistance, Junction to Ambient Air (Note 4) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 62.5        | $^\circ\text{C/W}$ |
| Power Dissipation @ $T_C = 25^\circ\text{C}$                                    | $P_D$           | 3           | W                  |
| Thermal Resistance, Junction to Case @ $T_C = 25^\circ\text{C}$                 | $R_{\theta JA}$ | 42          | $^\circ\text{C/W}$ |
| 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 with minimum recommended pad layout.
  4. Device mounted on FR-4 PCB with 1 inch<sup>2</sup> copper pad layout.

**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                               | Symbol        | Min | Typ  | Max   | Unit          | Test Conditions  |
|--|---------------|-----|------|-------|---------------|--|
| <b>OFF CHARACTERISTICS</b>                   |               |     |      |       |               |  |
| Collector-Emitter Breakdown Voltage (Note 5) | $V_{(BR)CEO}$ | -30 | —    | —     | V             | $I_C = -10\text{mA}$   |
| Emitter-Base Breakdown Voltage               | $V_{(BR)EBO}$ | -6  | —    | —     | V             | $I_E = -50\mu\text{A}$   |
| Collector-Base Cutoff Current                | $I_{CER}$     | —   | —    | -20   | $\mu\text{A}$ | $V_{CB} = -25\text{V}, R_{BE} = 200\Omega$                                 |
|  |               | —   | —    | -200  | $\mu\text{A}$ | $V_{CB} = -25\text{V}, R_{BE} = 200\Omega, T_A = 125^\circ\text{C}$        |
| Emitter-Base Cutoff Current                  | $I_{EBO}$     | —   | —    | -10   | $\mu\text{A}$ | $V_{EB} = -5\text{V}, I_C = 0$   |
| <b>ON CHARACTERISTICS (Note 5)</b>           |               |     |      |       |               |  |
| DC Current Gain                              | $h_{FE}$      | 125 | —    | —     | —             | $V_{CE} = -1\text{V}, I_C = -0.8\text{A}$                                  |
|  |               | 110 | —    | —     | —             | $V_{CE} = -1\text{V}, I_C = -1.2\text{A}$                                  |
|  |               | 90  | —    | —     | —             | $V_{CE} = -1\text{V}, I_C = -3\text{A}$                                    |
| Collector-Emitter Saturation Voltage         | $V_{CE(SAT)}$ | —   | -100 | -210  | mV            | $I_C = -0.8\text{A}, I_B = -20\text{mA}$                                   |
|  |               | —   | —    | -275  | mV            | $I_C = -1.2\text{A}, I_B = -20\text{mA}$                                   |
|  |               | —   | -250 | -550  | mV            | $I_C = -3\text{A}, I_B = -300\text{mA}$                                    |
| Equivalent On-Resistance                     | $R_{CE(SAT)}$ | —   | 83   | 183   | m $\Omega$    | $I_C = -3.0\text{A}, I_B = -300\text{mA}$                                  |
| Base-Emitter Saturation Voltage              | $V_{BE(SAT)}$ | —   | —    | -1.25 | V             | $I_C = -3\text{A}, I_B = -300\text{mA}$                                    |
| Base-Emitter Turn-on Voltage                 | $V_{BE(ON)}$  | —   | —    | -1.1  | V             | $V_{CE} = -4\text{V}, I_C = -1.2\text{A}$                                  |
| <b>SMALL SIGNAL CHARACTERISTICS</b>          |               |     |      |       |               |  |
| Transition Frequency                         | $f_T$         | —   | 160  | —     | MHz           | $V_{CE} = -10\text{V}, I_C = -100\text{mA}, f = 100\text{MHz}$             |
| Output Capacitance                           | $C_{obo}$     | —   | 45   | 150   | pF            | $V_{CB} = -10\text{V}, f = 1\text{MHz}$                                    |
| Input Capacitance                            | $C_{ibo}$     | —   | 140  | —     | pF            | $V_{EB} = -8\text{V}, f = 1\text{MHz}$                                     |
| <b>SWITCHING CHARACTERISTICS</b>             |               |     |      |       |               |  |
| Turn-On Time                                 | $t_{on}$      | —   | 200  | —     | ns            | $V_{CC} = -15\text{V}, I_C = -1.2\text{A}, I_{B1} = -20\text{mA}$          |
| Delay Time                                   | $t_d$         | —   | 90   | —     | ns            |  |
| Rise Time                                    | $t_r$         | —   | 110  | —     | ns            |  |
| Turn-Off Time                                | $t_{off}$     | —   | 155  | —     | ns            | $V_{CC} = -15\text{V}, I_C = -1.2\text{A}, I_{B1} = I_{B2} = -20\text{mA}$ |
| Storage Time                                 | $t_s$         | —   | 100  | —     | ns            |  |
| Fall Time                                    | $t_f$         | —   | 55   | —     | ns            |  |

Notes: 5. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

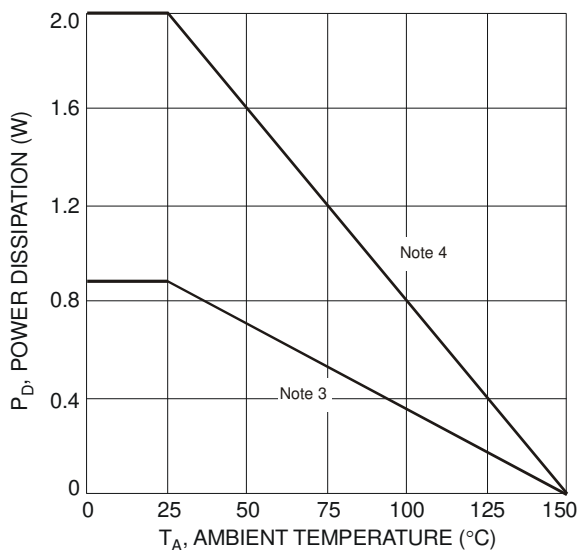


Fig. 1 Power Dissipation vs. Ambient Temperature

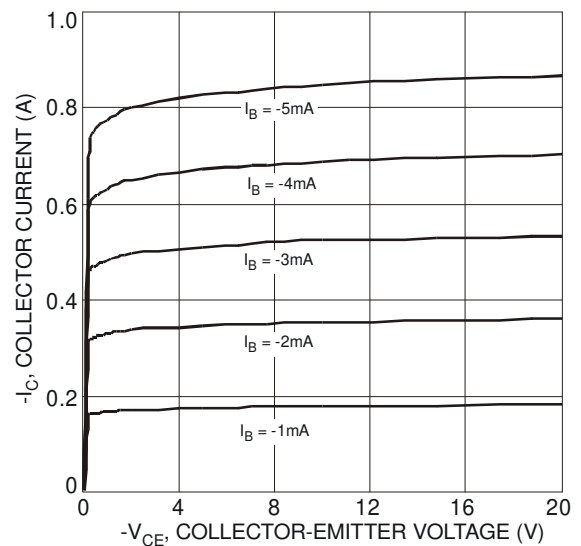


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage

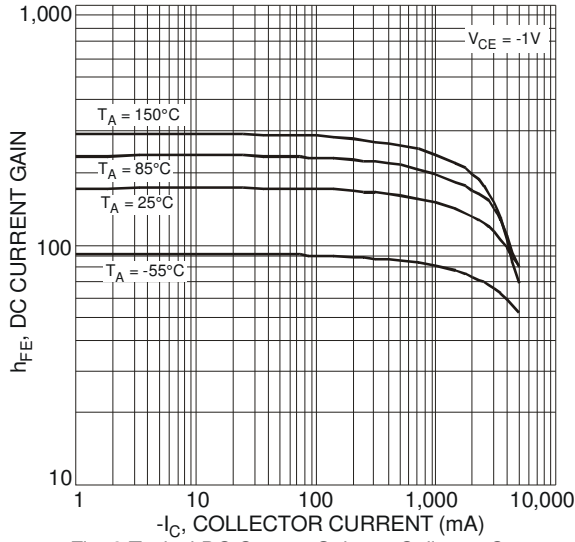


Fig. 3 Typical DC Current Gain vs. Collector Current

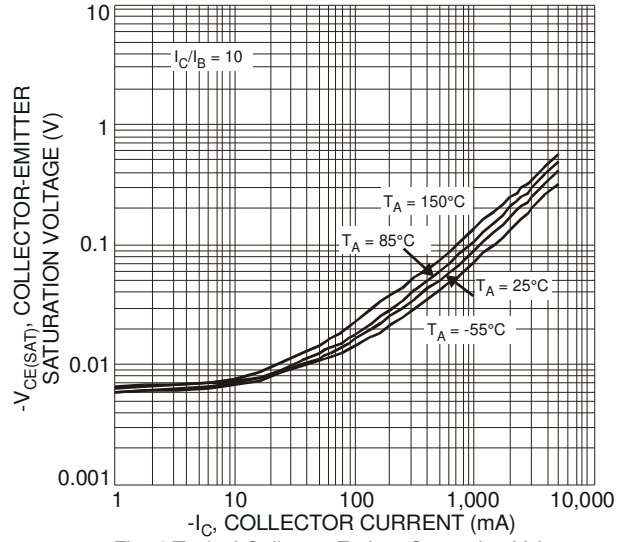


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

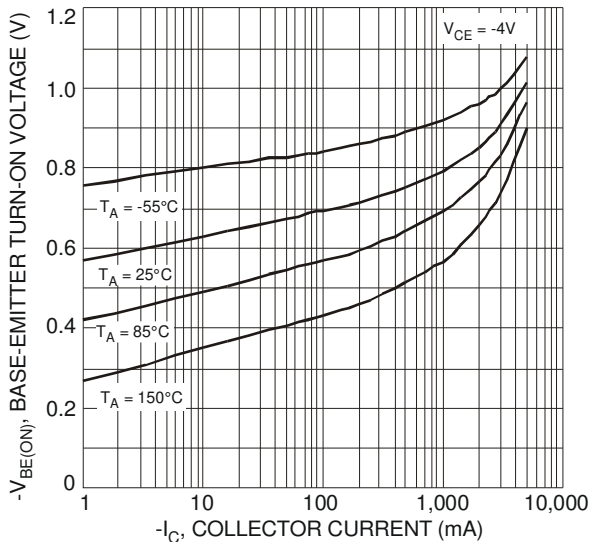


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

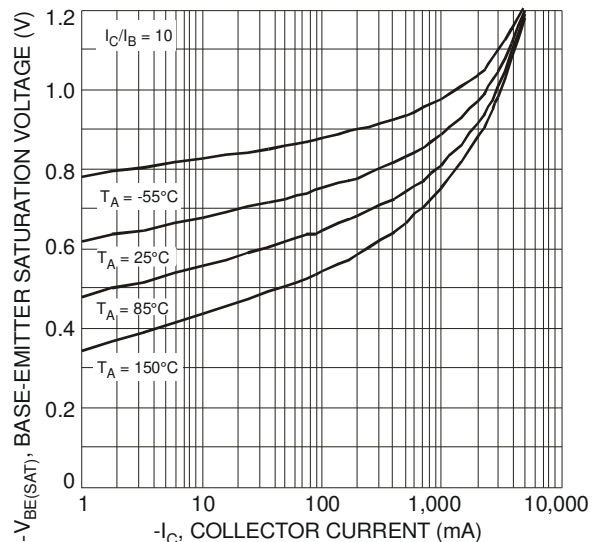


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

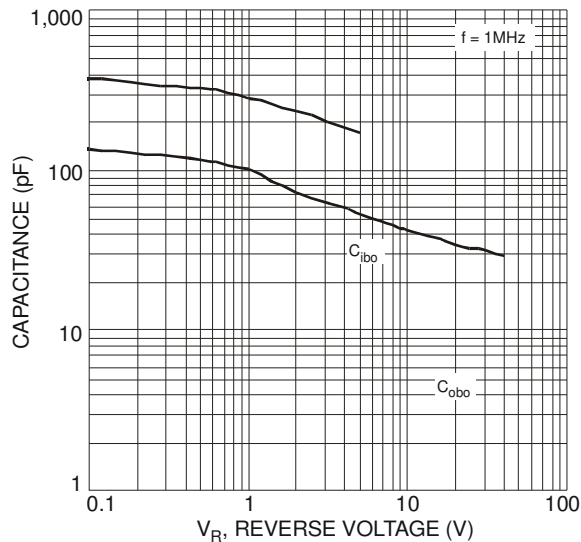


Fig. 7 Typical Capacitance Characteristics

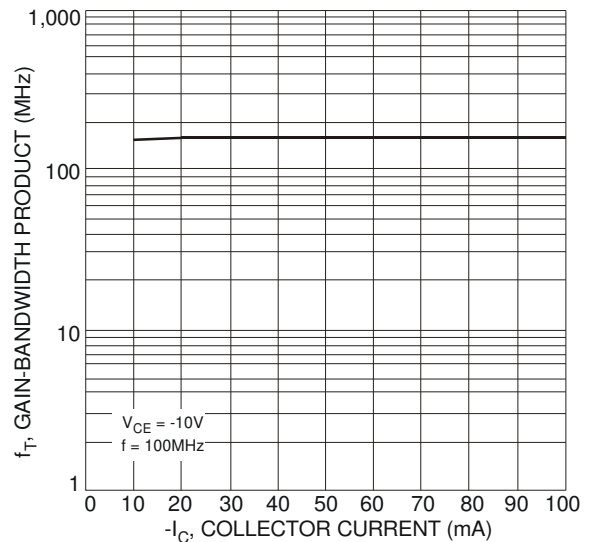
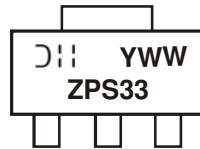


Fig. 8 Typical Gain-Bandwidth Product vs. Collector Current

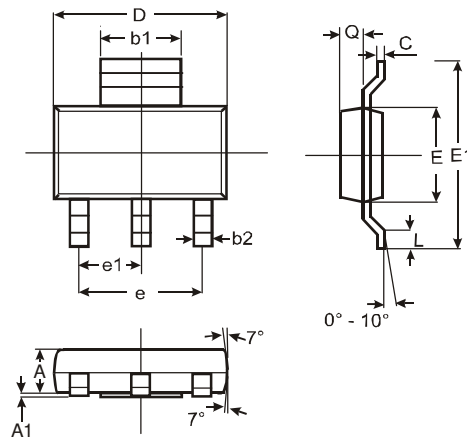
**Ordering Information** (Note 6)

| Part Number | Case    | Packaging        |
|-------------|---------|------------------|
| DMJT9435-13 | SOT-223 | 2500/Tape & Reel |

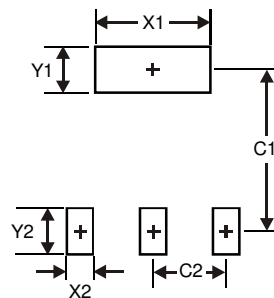
Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**


ZPS33 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y = Last digit of year (ex: 8 = 2008)  
 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**


| Dimensions | Value (in mm) |
|------------|---------------|
| X1         | 3.3           |
| X2         | 1.2           |
| Y1         | 1.6           |
| Y2         | 1.6           |
| C1         | 6.4           |
| C2         | 2.3           |

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