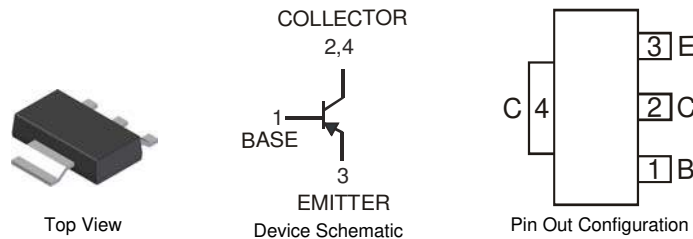


## Features

- 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	$\text{m}\Omega$	$I_C = -3.0\text{A}, I_B = -300\text{mA}$
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  $\leq 2\%$ .

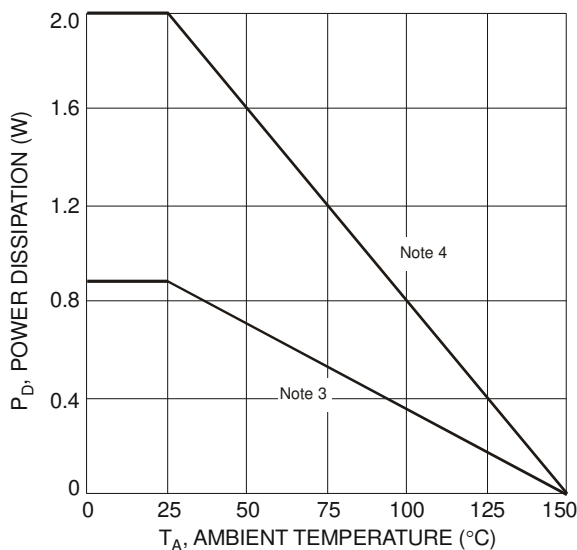


Fig. 1 Power Dissipation vs. Ambient Temperature

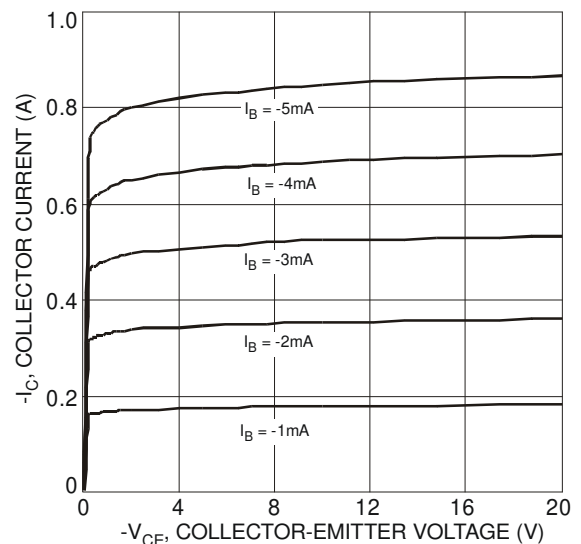


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage

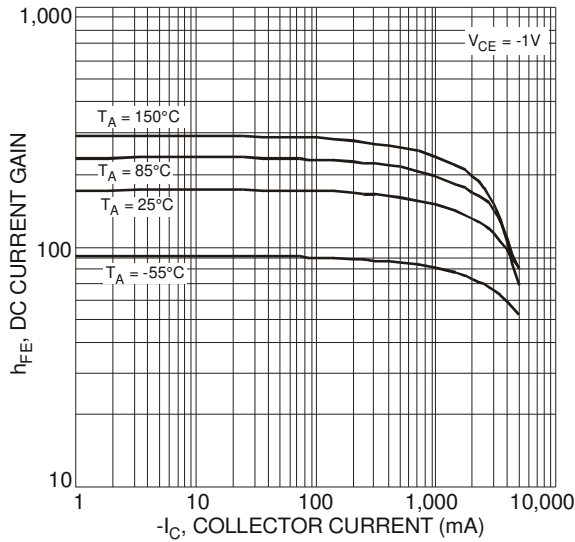


Fig. 3 Typical DC Current Gain vs. Collector Current

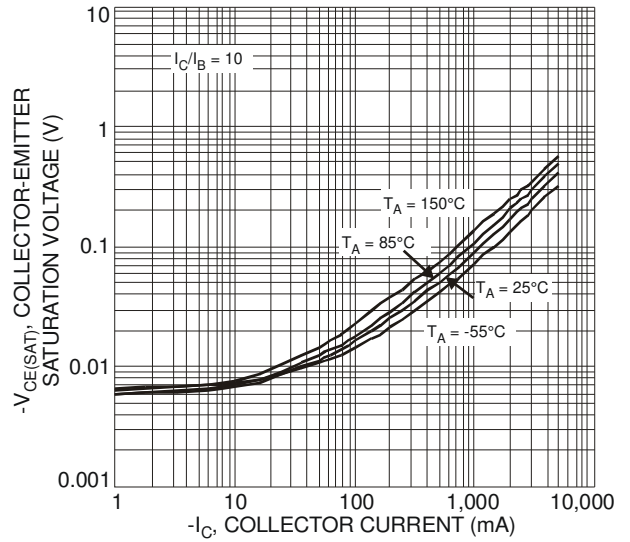


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

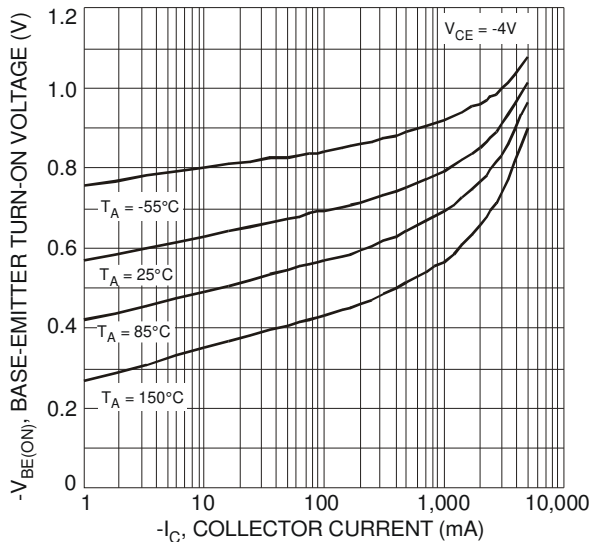


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

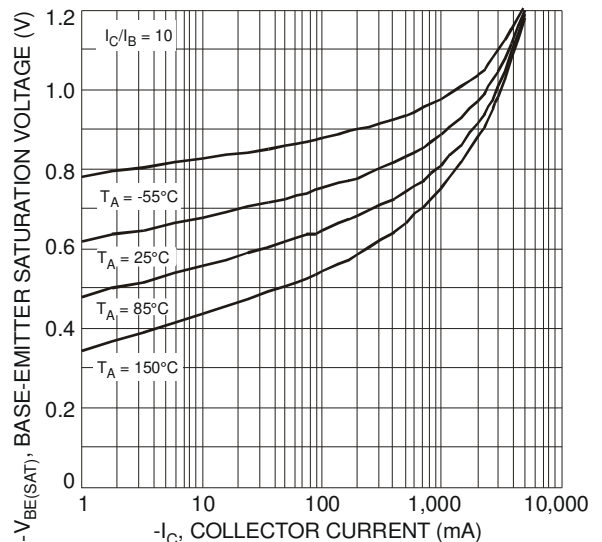


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

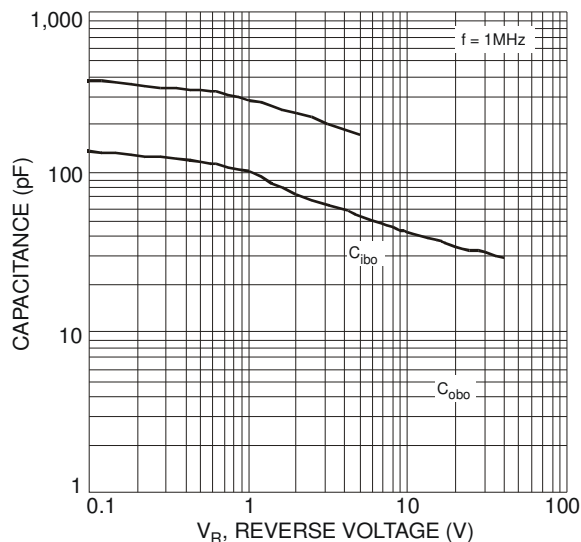


Fig. 7 Typical Capacitance Characteristics

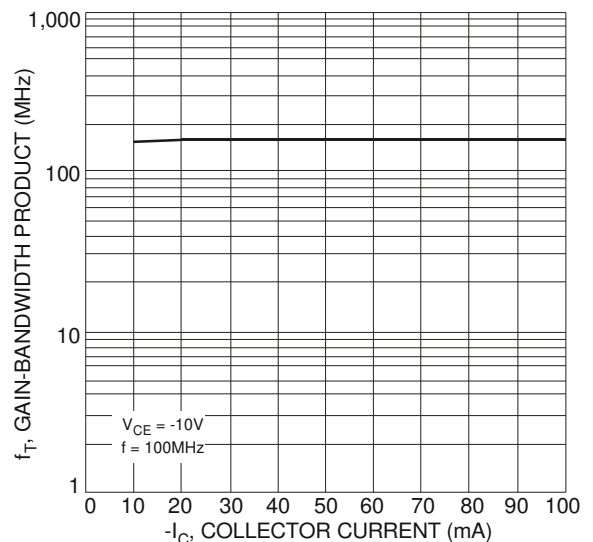
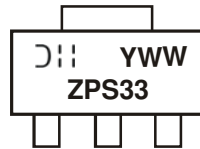


Fig. 8 Typical Gain-Bandwidth Product vs. Collector Current

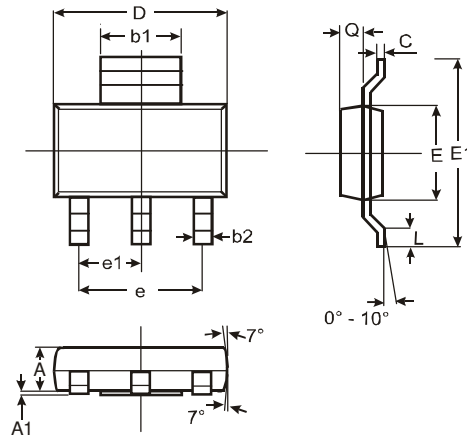
**Ordering Information** (Note 6)

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>.

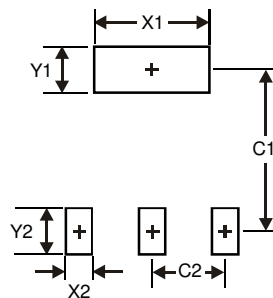
**Marking Information**


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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