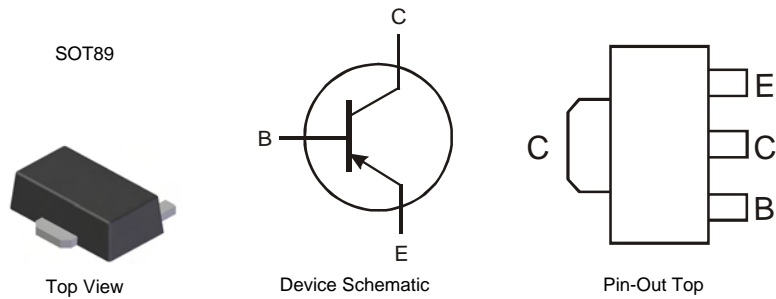


## Features

- Ultra Low Collector-Emitter Saturation Voltage
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- **"Lead Free", RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**

## Mechanical Data

- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin annealed over Copper leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Weight: 0.055 grams (approximate)



## Ordering Information (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DSS5540X-13	ZPS54	13	12mm	2,500

- Notes:
1. No purposefully added lead.
  2. Diodes Inc's "Green" Policy can be found on our website at <http://www.diodes.com>
  3. For packaging details, please go to our website at <http://www.diodes.com>

## Marking Information



ZPS54 = Product Type Marking Code  
 D||| = Manufacturer's Code Marking  
 YWW = Date Code Marking  
 Y = Last digit of year (ex: 8 = 2008)  
 WW = Week code (01 – 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	-40	V
Collector-Emitter Voltage	$V_{CEO}$	-40	V
Emitter-Base Voltage	$V_{EBO}$	-6	V
Peak Pulse Collector Current	$I_{CM}$	-10	A
Repetitive Peak Pulse Collector Current (Note 4)	$I_{CRP}$	-5	A
Continuous Collector Current	$I_C$	-4	A
Peak Pulse Base Current	$I_{BM}$	-2	A
Continuous Base Current	$I_B$	-1	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5) @ $T_A = 25^\circ\text{C}$	$P_D$	0.9	W
Thermal Resistance, Junction to Ambient Air (Note 5) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	139	$^\circ\text{C/W}$
Power Dissipation (Note 6) @ $T_A = 25^\circ\text{C}$	$P_D$	2	W
Thermal Resistance, Junction to Ambient Air (Note 6) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Notes:
- 4. Pulse width  $\leq 10\text{ms}$ ; Duty cycle  $\leq 0.2$
  - 5. Device mounted on FR-4 PCB with minimum recommended pad layout.
  - 6. Device mounted on FR-4 PCB with 1inch<sup>2</sup> copper pad layout.

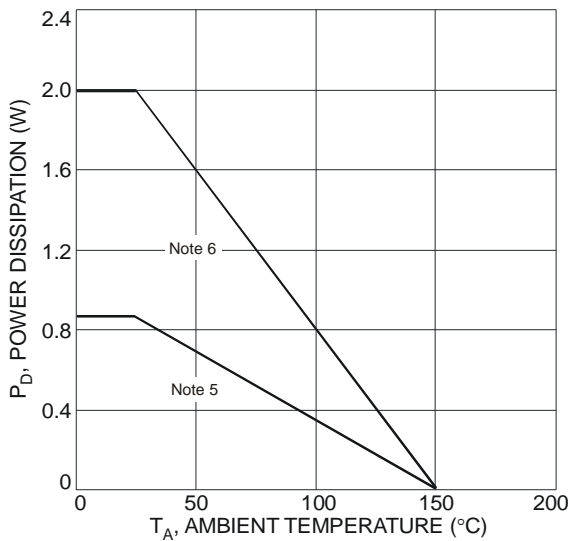


Fig. 1 Power Dissipation vs. Ambient Temperature

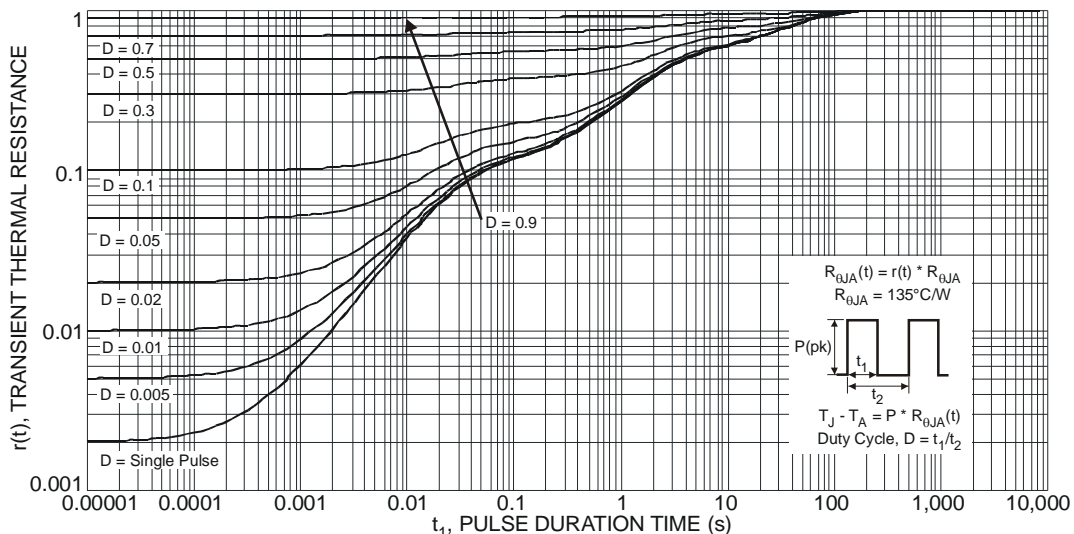


Fig. 2 Transient Thermal Response

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector-Base Breakdown Voltage	$BV_{CBO}$	-40	—	—	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 7)	$BV_{CEO}$	-40	—	—	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-6	—	—	V	$I_E = -100\mu\text{A}$
Collector-Base Cutoff Current	$I_{CBO}$	—	—	-100	nA	$V_{CB} = -30\text{V}, I_E = 0$
		—	—	-50	$\mu\text{A}$	$V_{CB} = -30\text{V}, I_E = 0, T_A = 150^\circ\text{C}$
Emitter-Base Cutoff Current	$I_{EBO}$	—	—	-100	nA	$V_{EB} = -5\text{V}, I_C = 0$
DC Current Gain (Note 6)	$h_{FE}$	250	—	—	—	$V_{CE} = -2\text{V}, I_C = -0.5\text{A}$
		200	350	—		$V_{CE} = -2\text{V}, I_C = -1\text{A}$
		150	—	—		$V_{CE} = -2\text{V}, I_C = -2\text{A}$
		50	—	—		$V_{CE} = -2\text{V}, I_C = -5\text{A}$
Collector-Emitter Saturation Voltage (Note 7)	$V_{CE(sat)}$	—	—	-120	mV	$I_C = -0.5\text{A}, I_B = -5\text{mA}$
		—	—	-170		$I_C = -1\text{A}, I_B = -10\text{mA}$
		—	-70	-160		$I_C = -2\text{A}, I_B = -200\text{mA}$
		—	-165	-340		$I_C = -4\text{A}, I_B = -200\text{mA}$
		—	-150	-375		$I_C = -5\text{A}, I_B = -500\text{mA}$
Equivalent On-Resistance	$R_{CE(sat)}$	—	-30	-75	$\text{m}\Omega$	$I_C = -5\text{A}, I_B = -500\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	-1.1	V	$I_C = -4\text{A}, I_B = -200\text{mA}$
		—	—	-1.2		$I_C = -5\text{A}, I_B = -500\text{mA}$
Base-Emitter Turn-on Voltage	$V_{BE(on)}$	—	—	-1.0	V	$V_{CE} = -2\text{V}, I_C = -2\text{A}$
Transition Frequency	$f_T$	60	—	—	MHz	$V_{CE} = -10\text{V}, I_C = -0.1\text{A}, f = 100\text{MHz}$
Collector Capacitance	$C_C$	—	—	105	pF	$V_{CB} = -10\text{V}, I_E = 0\text{A}, f = 1\text{MHz}$
Turn-On Time	$t_{on}$	—	63	—	ns	$V_{CC} = -10\text{V}, I_C = -2\text{A}, I_{B1} = -I_{B2} = -200\text{mA}$
Delay Time	$t_d$	—	15	—	ns	
Rise Time	$t_r$	—	48	—	ns	
Turn-Off Time	$t_{off}$	—	280	—	ns	
Storage Time	$t_s$	—	232	—	ns	
Fall Time	$t_f$	—	48	—	ns	

Notes: 7. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

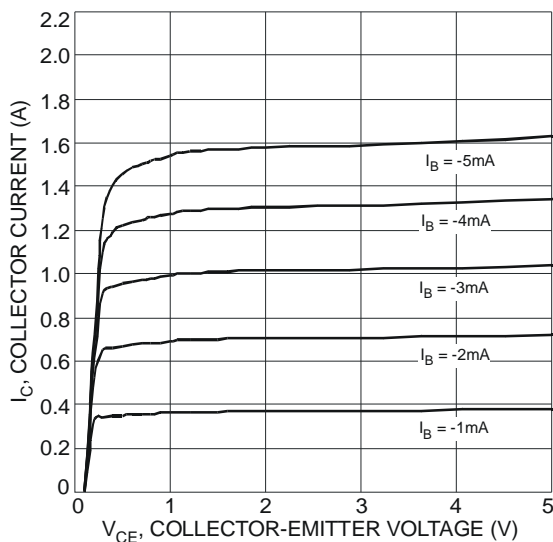


Fig. 3 Typical Collector Current vs. Collector-Emitter Voltage

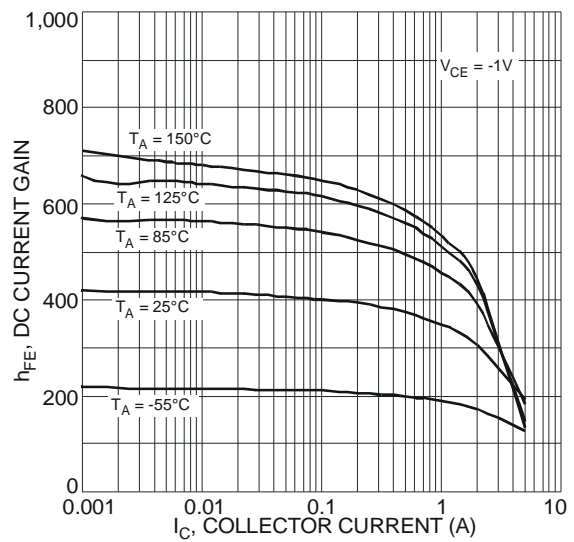


Fig. 4 Typical DC Current Gain vs. Collector Current

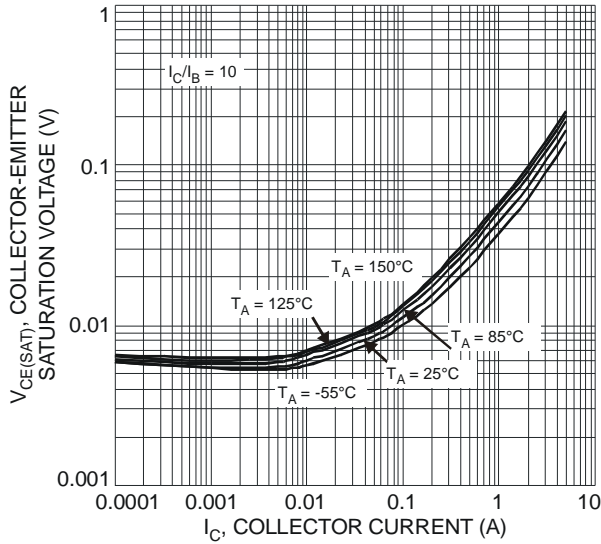


Fig. 5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

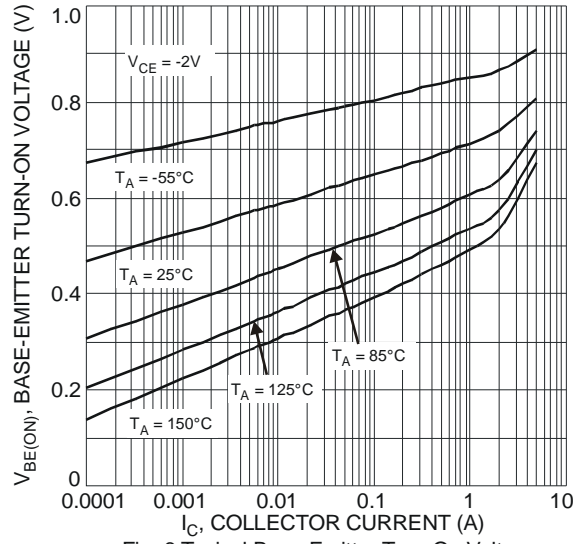


Fig. 6 Typical Base-Emitter Turn-On Voltage vs. Collector Current

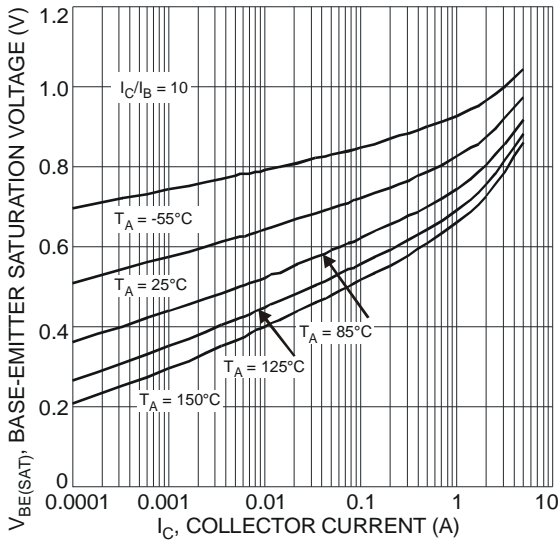


Fig. 7 Typical Base-Emitter Saturation Voltage vs. Collector Current

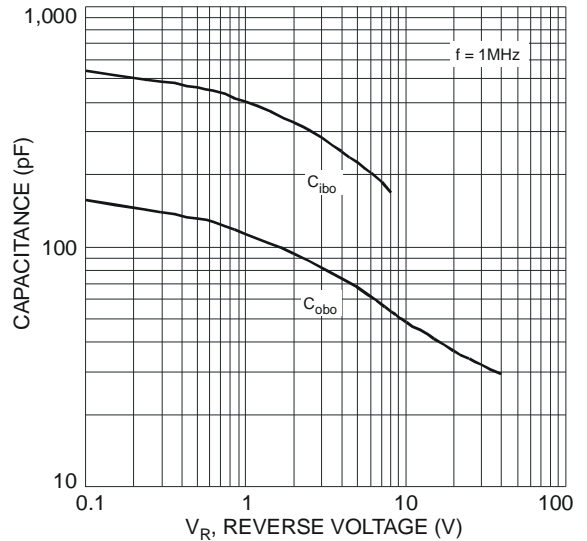
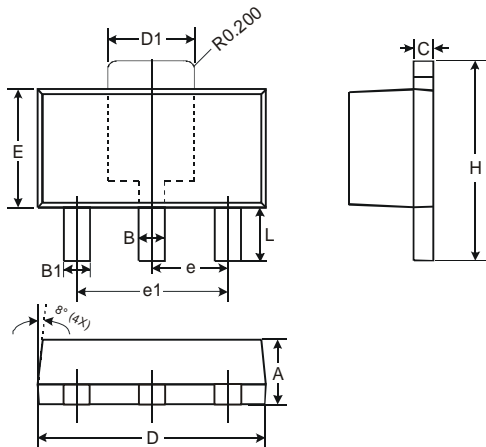


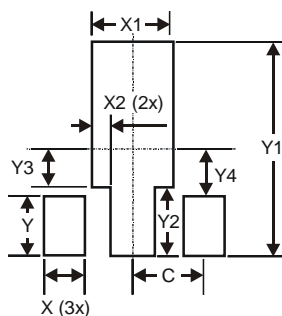
Fig. 8 Typical Capacitance Characteristics

**Package Outline Dimensions**



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.43
D	4.40	4.60
D1	1.52	1.83
E	2.29	2.60
e	1.50 Typ	
e1	3.00 Typ	
H	3.94	4.25
L	0.89	1.20
<b>All Dimensions in mm</b>		

## Suggested Pad Layout



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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