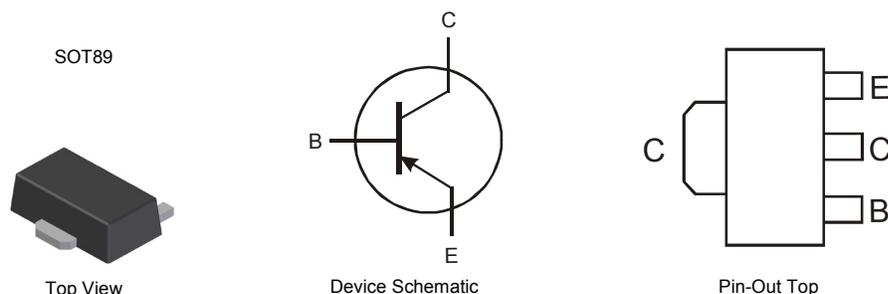


## Features

- $BV_{CEO} > -40V$
- $I_C = -4A$  Continuous Collector Current
- Ultra Low Collector-Emitter Saturation Voltage
- Ideally Suited for Automated Assembly Processes
- 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q101, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

## 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 Plates Leads. Solderable per MIL-STD-202, Method 208
- Weight: 0.055 grams (Approximate)



## Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DSS5540X-13	ZPS54	13	12mm	2500
DSS5540XTC	ZPS54	13	12mm	4000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



ZPS54 = Product Type Marking Code  
 $\text{D} \parallel$  = Manufacturer's Code Marking  
 YWW = Date Code Marking  
 Y = Last digit of year (ex: 0 = 2020)  
 WW = Week code (01 – 53)

**Absolute Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-40	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-40	V
Emitter-Base Voltage	V <sub>EBO</sub>	-6	V
Peak Pulse Collector Current	I <sub>CM</sub>	-10	A
Repetitive Peak Pulse Collector Current (Note 5)	I <sub>CRP</sub>	-5	A
Continuous Collector Current	I <sub>C</sub>	-4	A
Peak Pulse Base Current	I <sub>BM</sub>	-2	A
Continuous Base Current	I <sub>B</sub>	-1	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6) @ T <sub>A</sub> = 25°C	P <sub>D</sub>	0.9	W
Thermal Resistance, Junction to Ambient Air (Note 6) @ T <sub>A</sub> = 25°C	R <sub>θJA</sub>	139	°C/W
Power Dissipation (Note 7) @ T <sub>A</sub> = 25°C	P <sub>D</sub>	2	W
Thermal Resistance, Junction to Ambient Air (Note 7) @ T <sub>A</sub> = 25°C	R <sub>θJA</sub>	62.5	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
- 5. Pulse width ≤ 10ms; Duty cycle ≤ 0.2
  - 6. For a device mounted on FR-4 PCB with minimum recommended pad layout.
  - 7. For a device mounted on FR-4 PCB with 1inch<sup>2</sup> copper pad layout.

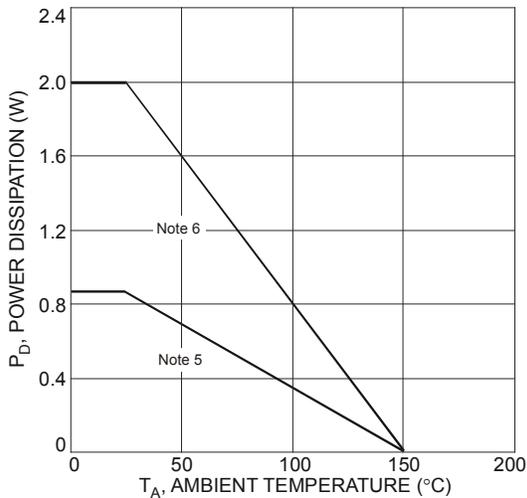


Fig. 1 Power Dissipation vs. Ambient Temperature

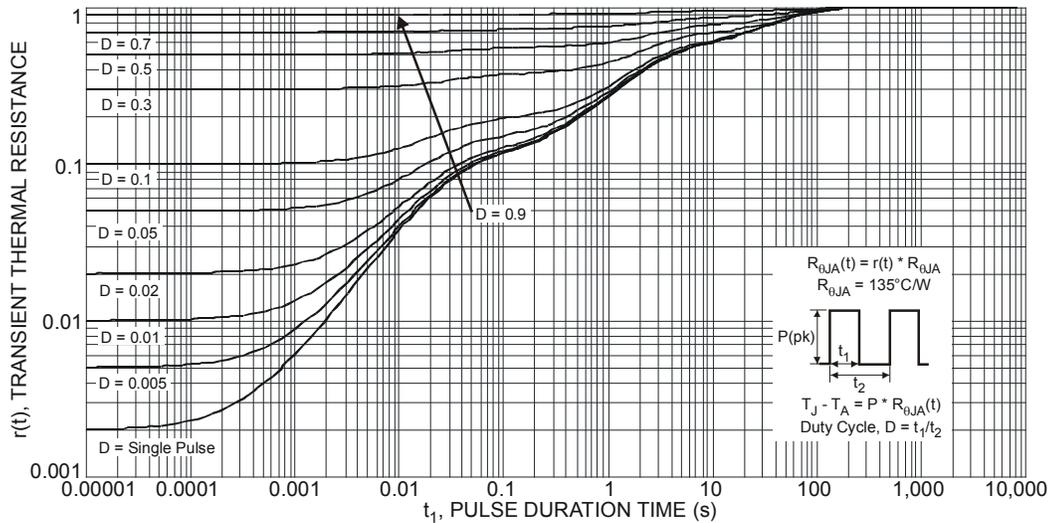


Fig. 2 Transient Thermal Response

**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 8)	$BV_{CEO}$	-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 8)	$h_{FE}$	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 8)	$V_{CE(sat)}$	—	—	-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: 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)

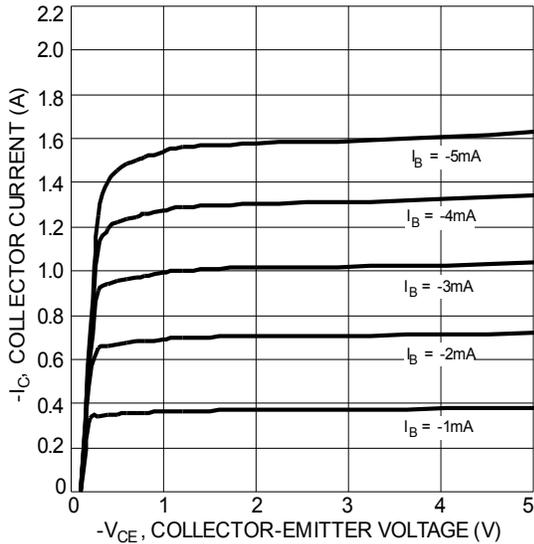


Fig. 3 Typical Collector Current vs. Collector-Emitter Voltage

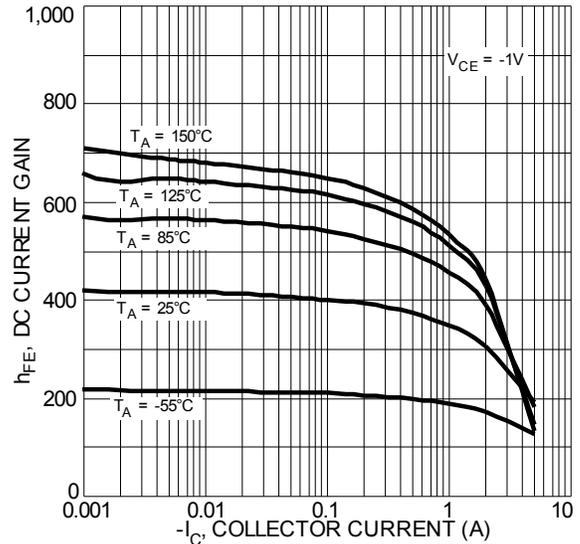


Fig. 4 Typical DC Current Gain vs. Collector Current

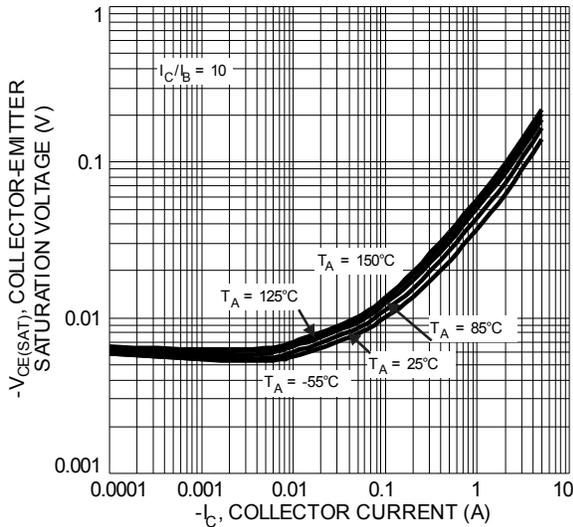


Fig. 5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

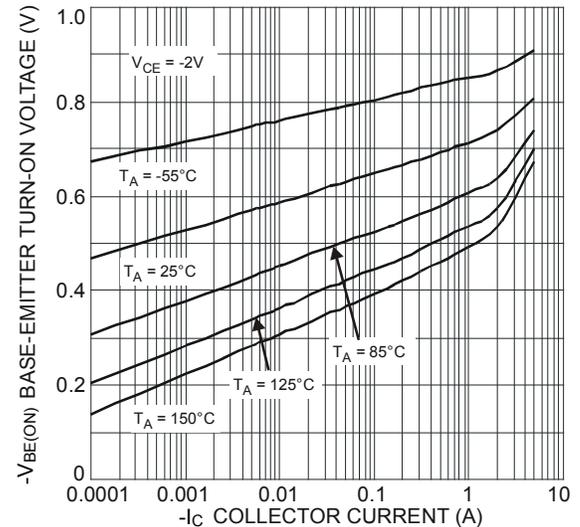


Fig. 6 Typical Base-Emitter Turn-On Voltage vs. Collector Current

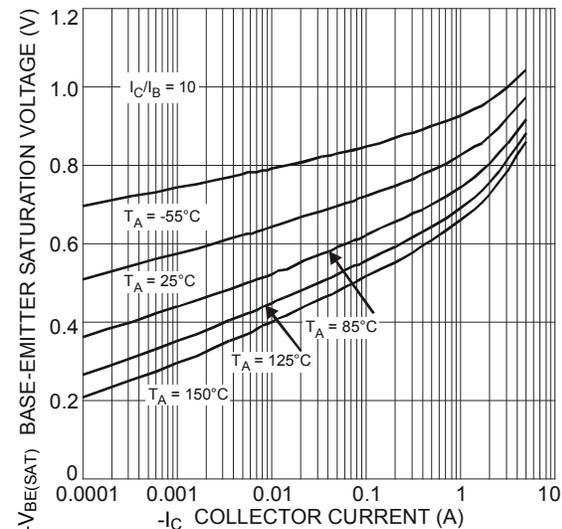


Fig. 7 Typical Base-Emitter Saturation Voltage vs. Collector Current

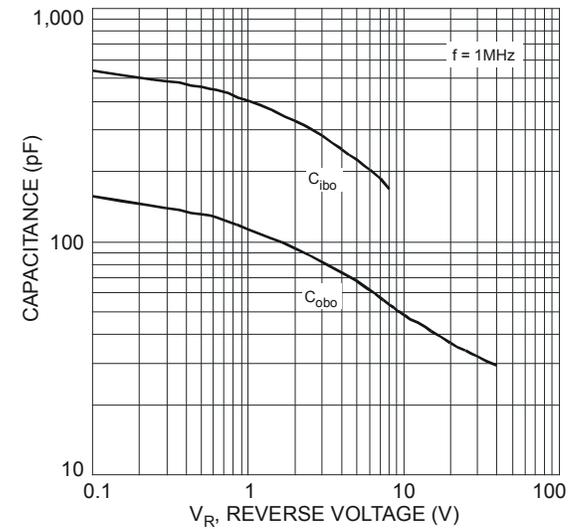
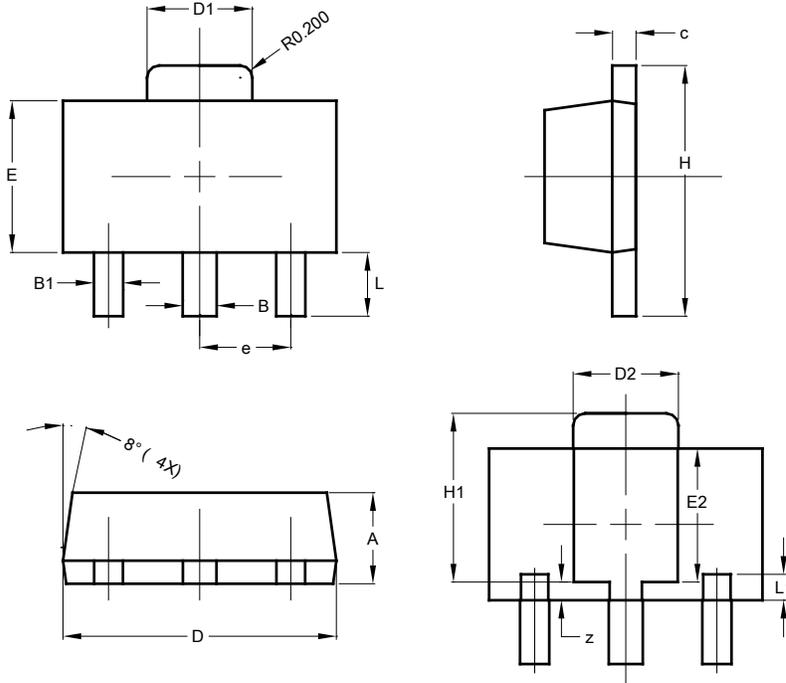


Fig. 8 Typical Capacitance Characteristics

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT89**

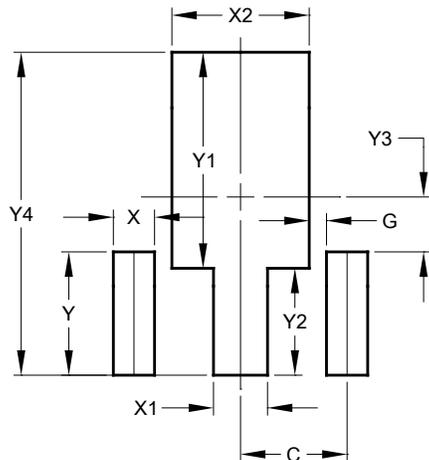


SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> 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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