

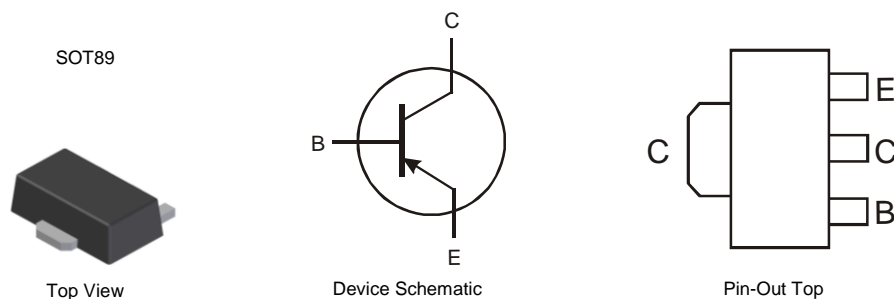
Features

- $BV_{CEO} > -40V$
- $I_C = -4A$ 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

- Package: SOT89
- Package 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 Ⓔ③
- 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 <100ppm 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
- J|| = Manufacturer's Code Marking
- YWW = Date Code Marking
- Y = Last digit of year (ex: 2 = 2022)
- WW = Week code (01 – 53)

Absolute 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 5)	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 6) @ $T_A = 25^\circ\text{C}$	P_D	0.9	W
Thermal Resistance, Junction to Ambient Air (Note 6) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	139	$^\circ\text{C/W}$
Power Dissipation (Note 7) @ $T_A = 25^\circ\text{C}$	P_D	2	W
Thermal Resistance, Junction to Ambient Air (Note 7) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 6) @ $T_A = 25^\circ\text{C}$	$R_{\theta JC}$	17	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
5. Pulse width $\leq 10\text{ms}$; 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^2 copper pad layout.

Thermal Characteristics and Derating Information

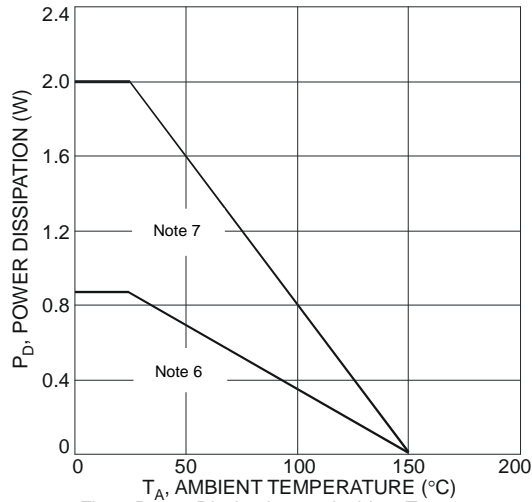


Fig. 1 Power Dissipation vs. Ambient Temperature

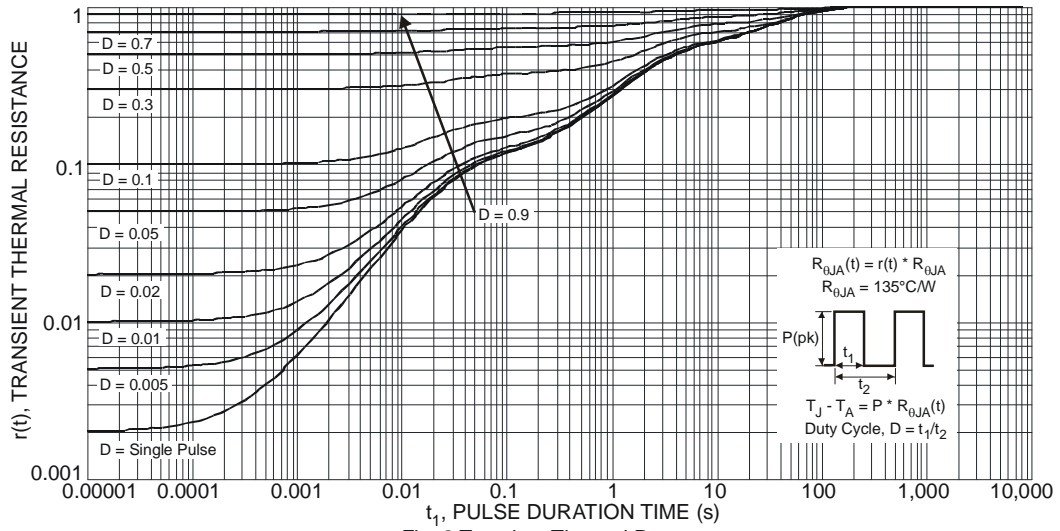


Fig. 2 Transient Thermal Response

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	μA	$V_{CB} = -30\text{V}, I_E = 0, T_A = 150^\circ\text{C}$
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)

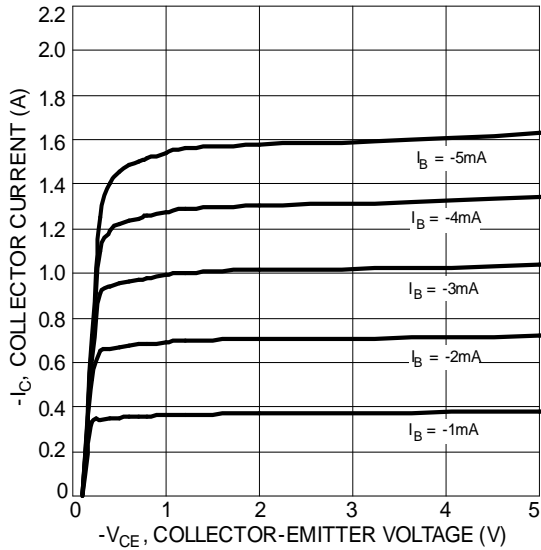


Fig. 3 Typical Collector Current vs. Collector-Emitter Voltage

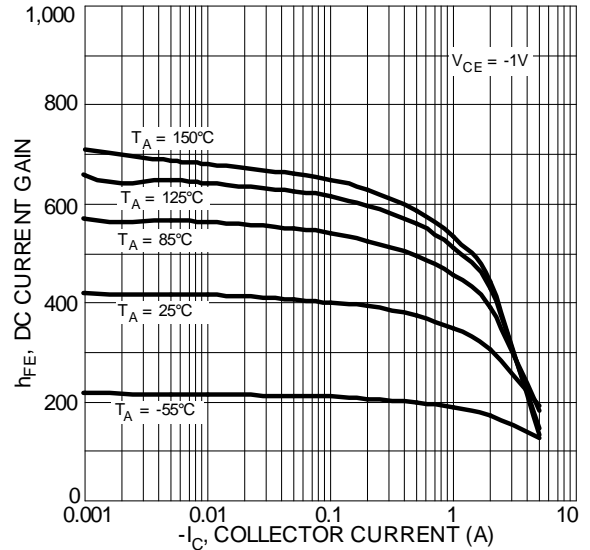


Fig. 4 Typical DC Current Gain vs. Collector Current

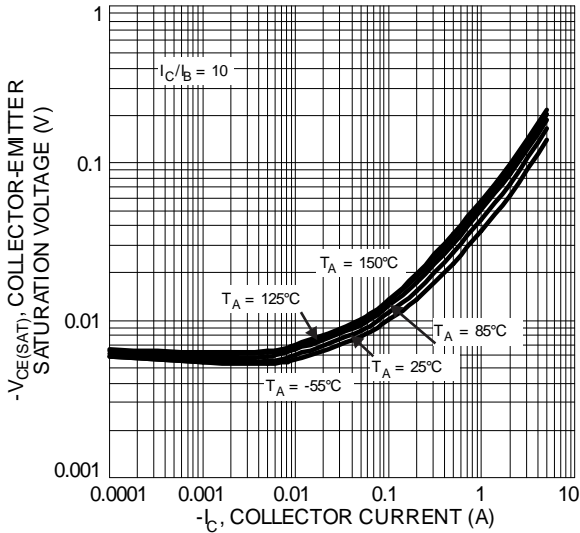


Fig. 5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

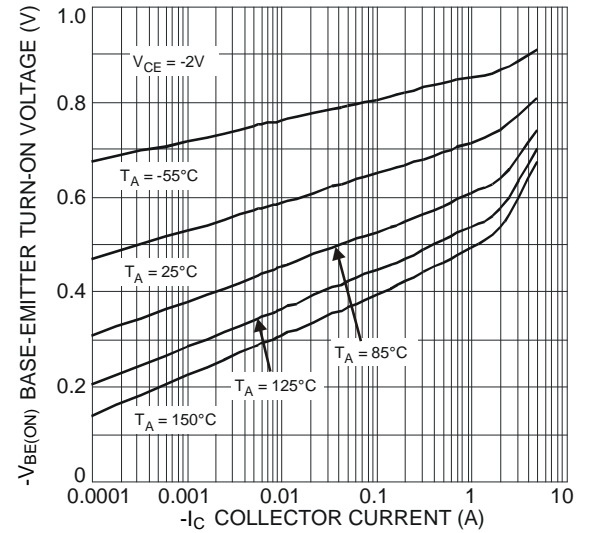


Fig. 6 Typical Base-Emitter Turn-On Voltage vs. Collector Current

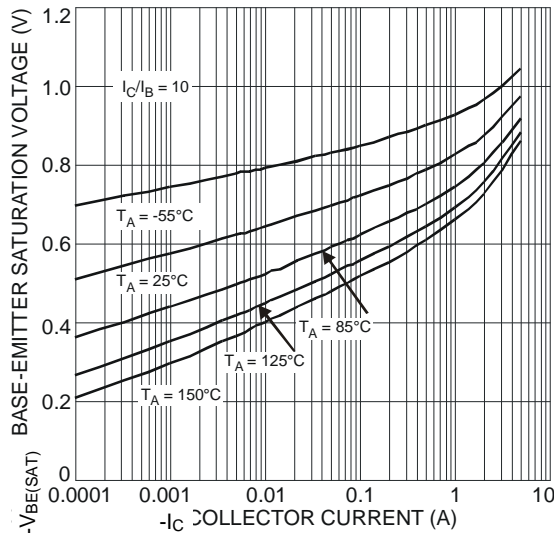


Fig. 7 Typical Base-Emitter Saturation Voltage vs. Collector Current

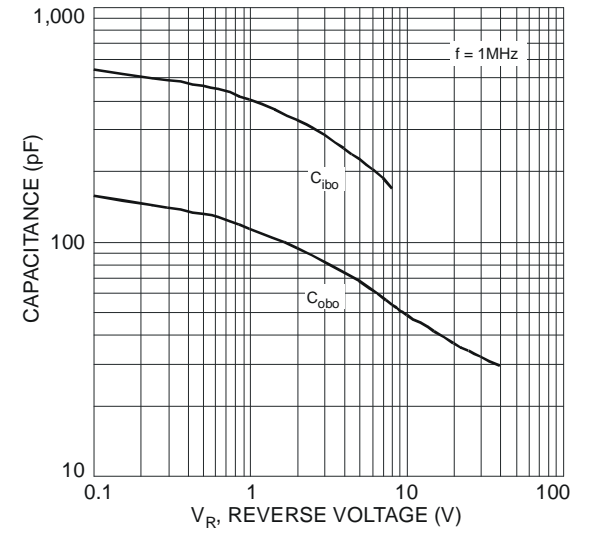
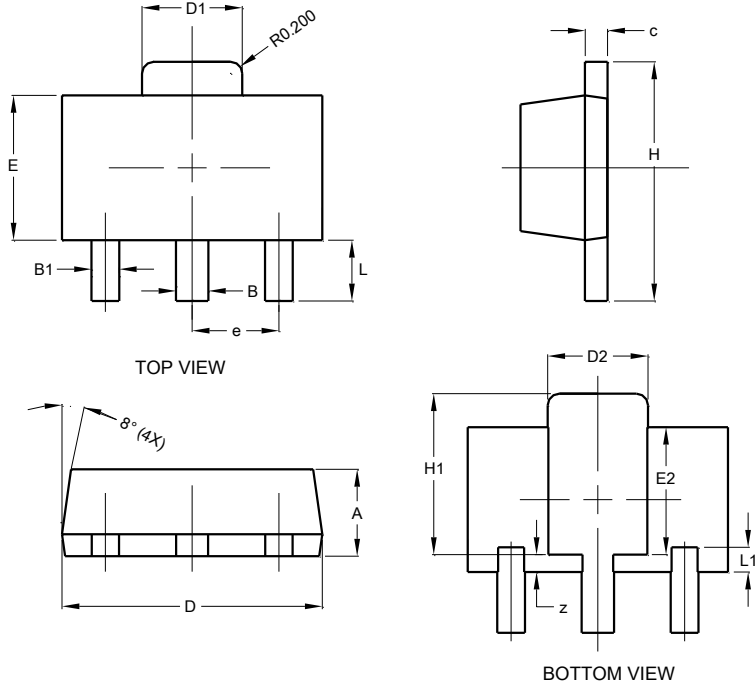


Fig. 8 Typical Capacitance Characteristics

Package Outline Dimensions

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

SOT89

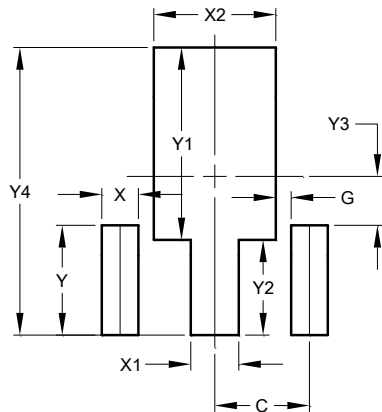


SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in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

IMPORTANT NOTICE

1. DIODES INCORPORATED AND ITS SUBSIDIARIES (“DIODES”) MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).
2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes products. Diodes products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of the Diodes products for their intended applications, (c) ensuring their applications, which incorporate Diodes products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.
3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes’ websites, harmless against all damages and liabilities.
4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes’ website) under this document.
5. Diodes products are provided subject to Diodes’ Standard Terms and Conditions of Sale (<https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/>) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.
6. Diodes products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.
7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.
8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

Copyright © 2022 Diodes Incorporated

www.diodes.com