

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from Europe, America and south Asia, supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

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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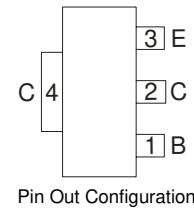
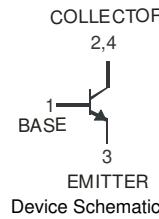
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

**Features**

- Complementary PNP Type Available (DSS5540X)
- Ultra Low Collector-Emitter Saturation Voltage
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- **Lead Free By Design/RoHS Compliant (Note 1)**
- "Green" Device (Note 2)



Top View

**Mechanical Data**

- Case: SOT89-3L
- 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: 0.072 grams (approximate)

**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
Continuous Collector Current	$I_C$	4	A
Repetitive Collector Current (Note 3)	$I_{CRM}$	5	A
Peak Pulse Collector Current	$I_{CM}$	10	A
Continuous Base Current	$I_B$	1	A
Peak Pulse Base Current	$I_{BM}$	2	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4) @ $T_A = 25^\circ\text{C}$	$P_D$	0.9	W
Thermal Resistance, Junction to Ambient Air (Note 4) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	139	°C/W
Power Dissipation (Note 5) @ $T_A = 25^\circ\text{C}$	$P_D$	2	W
Thermal Resistance, Junction to Ambient Air (Note 5) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	62.5	°C/W
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	°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. Operated under pulsed conditions: pulse width  $\leq 10\text{ms}$ ; duty cycle  $\leq 0.2$ .
4. Device mounted on FR-4 PCB with minimum recommended pad layout.
5. 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-Base Breakdown Voltage	$V_{(\text{BR})\text{CBO}}$	40	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 6)	$V_{(\text{BR})\text{CEO}}$	40	—	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$V_{(\text{BR})\text{EBO}}$	6	—	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cutoff Current	$I_{\text{CBO}}$	—	—	100	nA	$V_{\text{CB}} = 30\text{V}$ , $I_E = 0$
		—	—	50	$\mu\text{A}$	$V_{\text{CB}} = 30\text{V}$ , $I_E = 0$ , $T_A = 150^\circ\text{C}$
Collector-Emitter Cut-Off Current	$I_{\text{CES}}$	—	—	100	nA	$V_{\text{CE}} = 30\text{V}$ , $V_{\text{BE}} = 0\text{V}$
Emitter-Base Cutoff Current	$I_{\text{EBO}}$	—	—	100	nA	$V_{\text{EB}} = 5\text{V}$ , $I_C = 0$
<b>ON CHARACTERISTICS (Note 6)</b>						
DC Current Gain	$h_{\text{FE}}$	300	—	—	—	$V_{\text{CE}} = 2\text{V}$ , $I_C = 0.5\text{A}$
		300	—	—	—	$V_{\text{CE}} = 2\text{V}$ , $I_C = 1\text{A}$
		250	—	—	—	$V_{\text{CE}} = 2\text{V}$ , $I_C = 2\text{A}$
		100	—	—	—	$V_{\text{CE}} = 2\text{V}$ , $I_C = 5\text{A}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{SAT})}$	—	—	90	—	$I_C = 0.5\text{A}$ , $I_B = 5\text{mA}$
		—	—	120	—	$I_C = 1\text{A}$ , $I_B = 10\text{mA}$
		—	80	150	mV	$I_C = 2\text{A}$ , $I_B = 200\text{mA}$
		—	160	290	—	$I_C = 4\text{A}$ , $I_B = 200\text{mA}$
		—	185	355	—	$I_C = 5\text{A}$ , $I_B = 500\text{mA}$
Equivalent On-Resistance	$R_{\text{CE}(\text{SAT})}$	—	37	71	$\text{m}\Omega$	$I_C = 5\text{A}$ , $I_B = 500\text{mA}$
Base-Emitter Saturation Voltage	$V_{\text{BE}(\text{SAT})}$	—	—	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	$V_{\text{BE}(\text{ON})}$	—	—	1.1	V	$V_{\text{CE}} = 2\text{V}$ , $I_C = 2\text{A}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	$f_T$	70	—	—	MHz	$V_{\text{CE}} = 10\text{V}$ , $I_C = 0.1\text{A}$ , $f = 100\text{MHz}$
Collector Capacitance	$C_C$	—	—	75	pF	$V_{\text{CB}} = 10\text{V}$ , $I_E = 0\text{A}$ , $f = 1\text{MHz}$
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Time	$t_{\text{on}}$	—	135	—	ns	$V_{\text{CC}} = 10\text{V}$ , $I_C = 2\text{A}$ , $I_{B1} = 40\text{mA}$
Delay Time	$t_d$	—	60	—	ns	
Rise Time	$t_r$	—	75	—	ns	
Turn-Off Time	$t_{\text{off}}$	—	670	—	ns	
Storage Time	$t_s$	—	570	—	ns	
Fall Time	$t_f$	—	100	—	ns	$I_{B1} = I_{B2} = 40\text{mA}$

Notes: 6. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

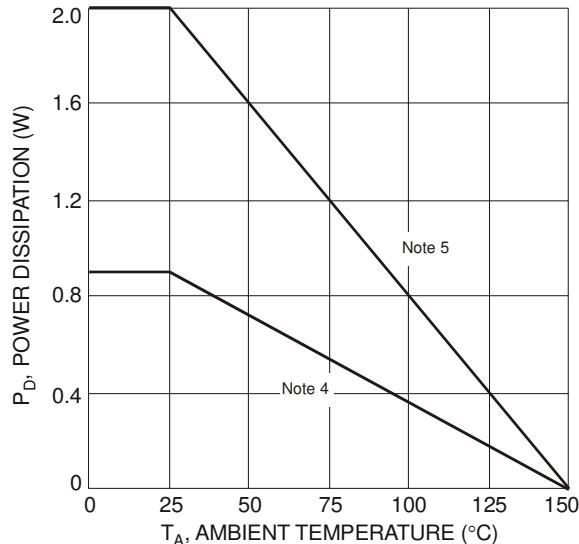


Fig. 1 Power Dissipation vs. Ambient Temperature

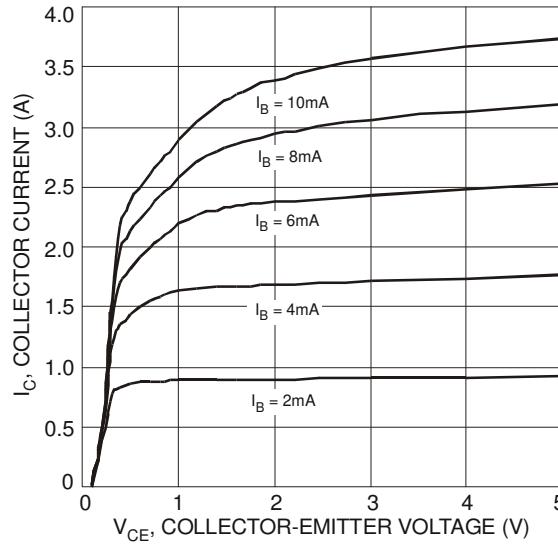


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage

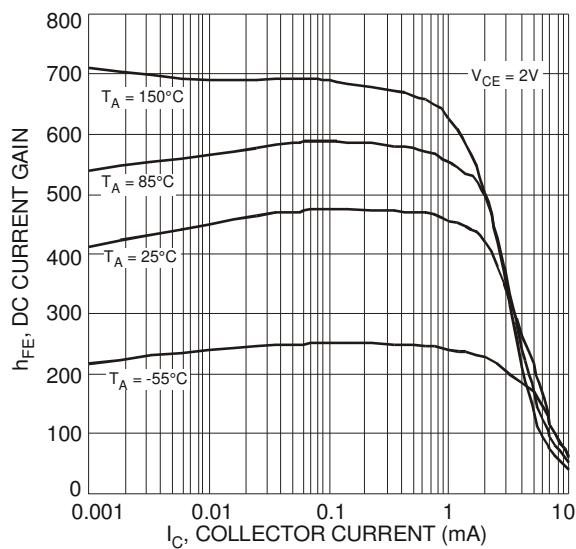


Fig. 3 Typical DC Current Gain vs. Collector Current

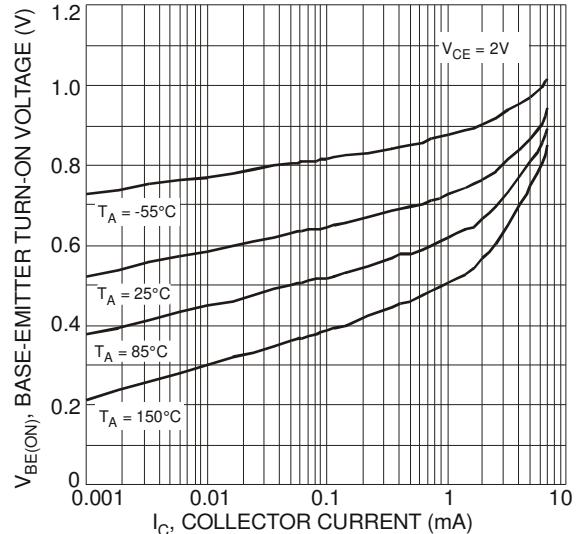


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

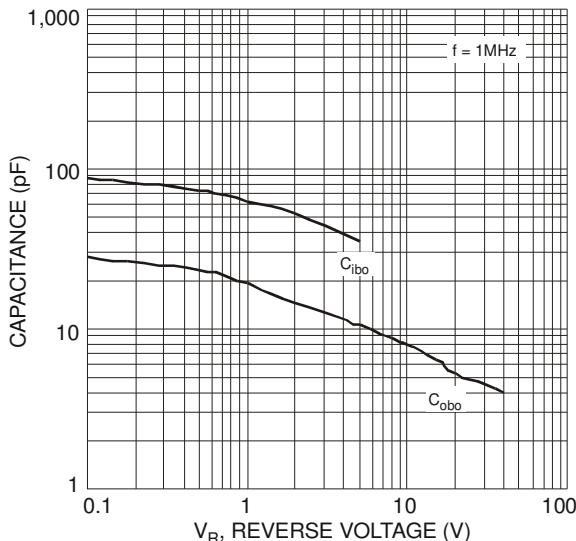


Fig. 7 Typical Capacitance Characteristics

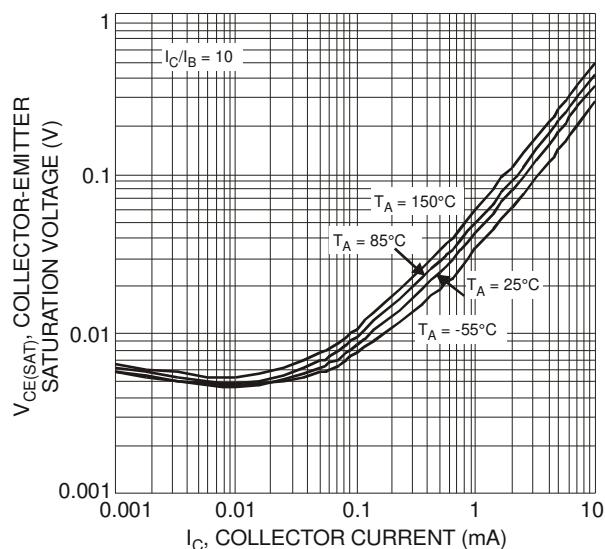


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

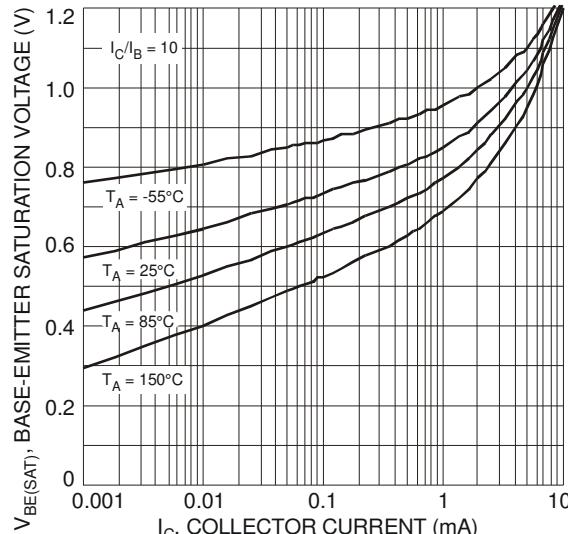


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

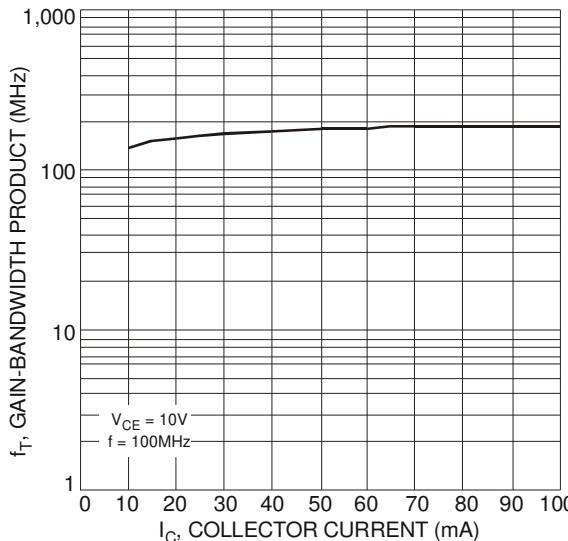


Fig. 8 Typical Gain-Bandwidth Product vs. Collector Current

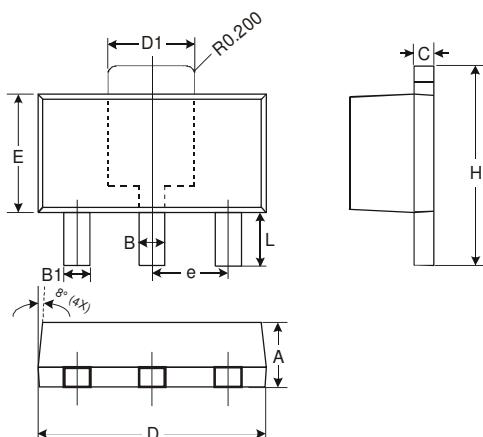
**Ordering Information** (Note 7)

Part Number	Case	Packaging
DSS4540X-13	SOT89-3L	2500/Tape & Reel

Notes: 7. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

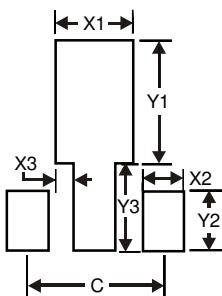
**Marking Information**


ZNS54 = Product Type Marking Code  
 DII = Manufacturer's Code Marking  
 YWW = Date Code Marking  
 Y = Last digit of year (ex: 8 = 2008)  
 WW = Week code 01 - 52

**Package Outline Dimensions**


SOT89-3L			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.45	0.55	0.50
B1	0.37	0.47	0.42
C	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.50	1.70	1.60
E	2.40	2.60	2.50
e	—	—	1.50
H	3.95	4.25	4.10
L	0.90	1.20	1.05

All Dimensions in mm

**Suggested Pad Layout**


Dimensions	Value (in mm)
X1	1.7
X2	0.9
X3	0.4
Y1	2.7
Y2	1.3
Y3	1.9
C	3.0

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