NEW PRODUCT

Lead-free Green

DSS4540X

LOW $V_{CE(SAT)}$ NPN SURFACE MOUNT TRANSISTOR

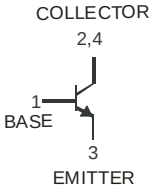
Features

- 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)**

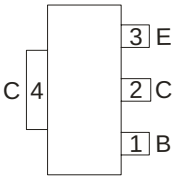
Mechanical Data

- 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)

Top View



Device Schematic



Pin Out Configuration

Maximum Ratings @T_A = 25°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°C	P_D	0.9	W
Thermal Resistance, Junction to Ambient Air (Note 4) @ T_A = 25°C	$R_{\theta JA}$	139	°C/W
Power Dissipation (Note 5) @ T_A = 25°C	P_D	2	W
Thermal Resistance, Junction to Ambient Air (Note 5) @ T_A = 25°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.
3. Operated under pulsed conditions: pulse width ≤ 10ms; duty cycle ≤ 0.2.
4. Device mounted on FR-4 PCB with minimum recommended pad layout.
5. Device mounted on FR-4 PCB with 1 inch^2 copper pad layout.

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Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	40	—	—	V	I_C = 100μA
Collector-Emitter Breakdown Voltage (Note 6)	$V_{(BR)CEO}$	40	—	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6	—	—	V	I_E = 100μA
Collector-Base Cutoff Current	I_{CBO}	—	—	100	nA	V_{CB} = 30V, I_E = 0
		—	—	50	μA	V_{CB} = 30V, I_E = 0, T_A = 150°C
Collector-Emitter Cut-Off Current	I_{CES}	—	—	100	nA	V_{CE} = 30V, V_{BE} = 0V
Emitter-Base Cutoff Current	I_{EBO}	—	—	100	nA	V_{EB} = 5V, I_C = 0
ON CHARACTERISTICS (Note 6)						
DC Current Gain	h_{FE}	300	—	—	—	V_{CE} = 2V, I_C = 0.5A
		300	—	—		V_{CE} = 2V, I_C = 1A
		250	—	—		V_{CE} = 2V, I_C = 2A
		100	—	—		V_{CE} = 2V, I_C = 5A
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	—	90	mV	I_C = 0.5A, I_B = 5mA
		—	—	120		I_C = 1A, I_B = 10mA
		—	80	150		I_C = 2A, I_B = 200mA
		—	160	290		I_C = 4A, I_B = 200mA
		—	185	355		I_C = 5A, I_B = 500mA
Equivalent On-Resistance	$R_{CE(SAT)}$	—	37	71	mΩ	I_C = 5A, I_B = 500mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	1.1	V	I_C = 4A, I_B = 200mA
		—	—	1.2		I_C = 5A, I_B = 500mA
Base-Emitter Turn-on Voltage	$V_{BE(ON)}$	—	—	1.1	V	V_{CE} = 2V, I_C = 2A
SMALL SIGNAL CHARACTERISTICS						
Transition Frequency	f_T	70	—	—	MHz	V_{CE} = 10V, I_C = 0.1A, f = 100MHz
Collector Capacitance	C_c	—	—	75	pF	V_{CB} = 10V, I_E = 0A, f = 1MHz
SWITCHING CHARACTERISTICS						
Turn-On Time	t_{on}	—	135	—	ns	V_{CC} = 10V, I_C = 2A, I_{B1} = 40mA
Delay Time	t_d	—	60	—	ns	
Rise Time	t_r	—	75	—	ns	
Turn-Off Time	t_{off}	—	670	—	ns	V_{CC} = 10V, I_C = 2A, I_{B1} = I_{B2} = 40mA
Storage Time	t_s	—	570	—	ns	
Fall Time	t_f	—	100	—	ns	

Notes: 6. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤2%.

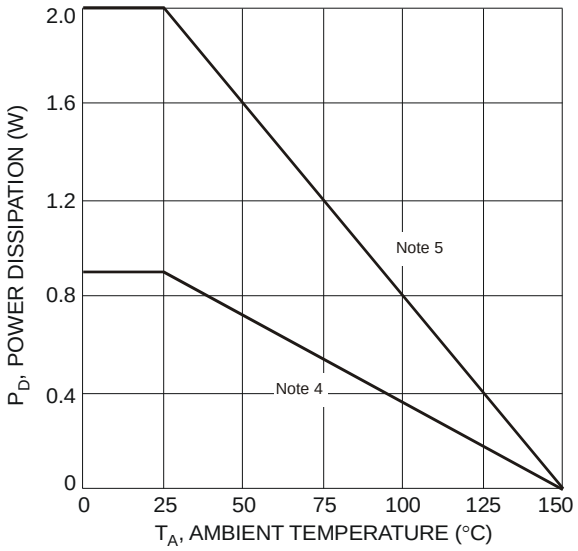

Fig. 1 Power Dissipation vs. Ambient Temperature

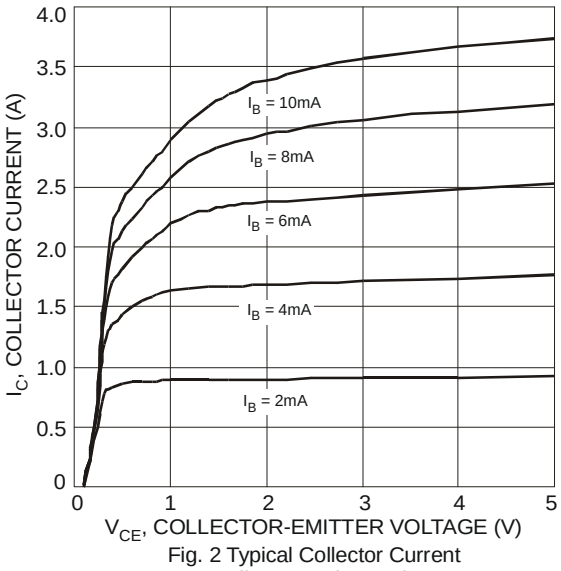

Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage

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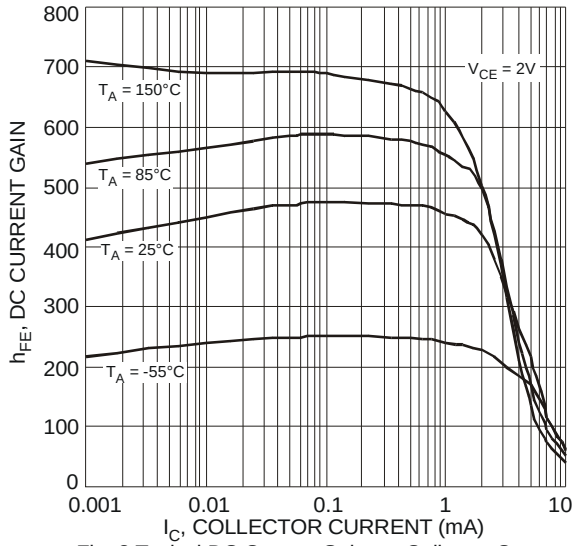

Fig. 3 Typical DC Current Gain vs. Collector Current

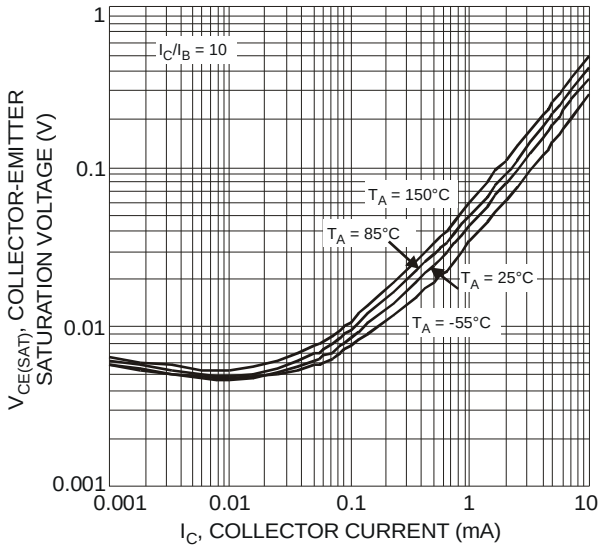

Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

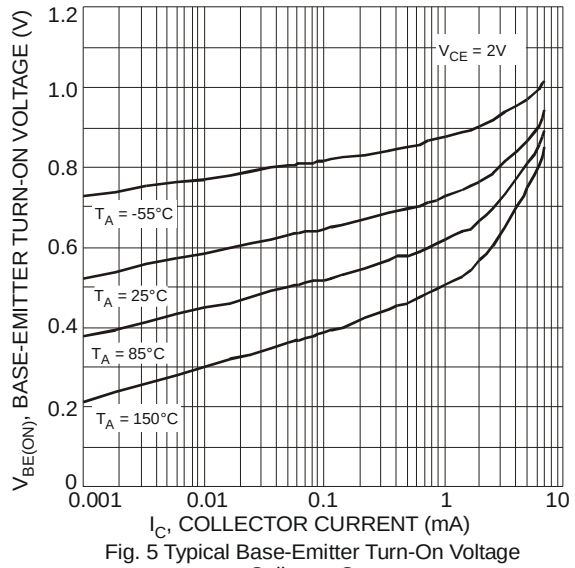

Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

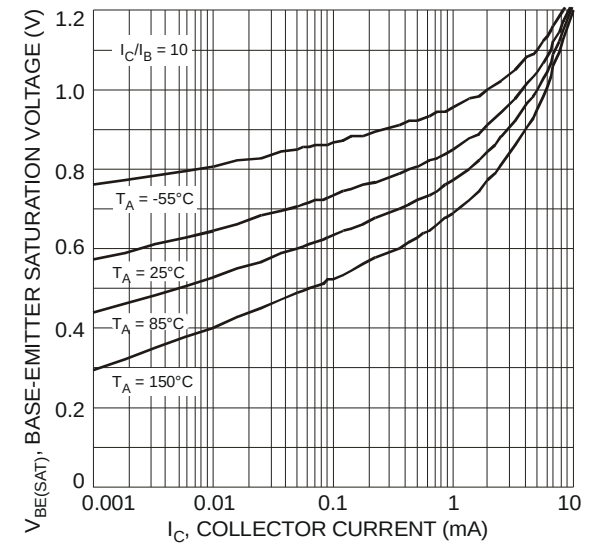

Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

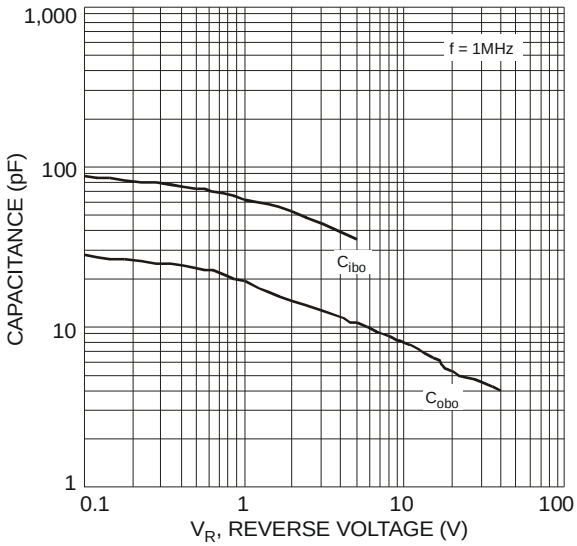

Fig. 7 Typical Capacitance Characteristics

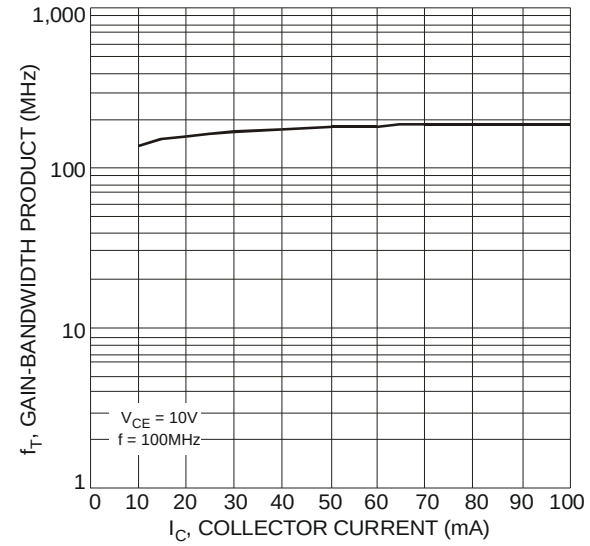

Fig. 8 Typical Gain-Bandwidth Product vs. Collector Current

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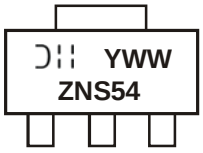
Ordering Information (Note 7)

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

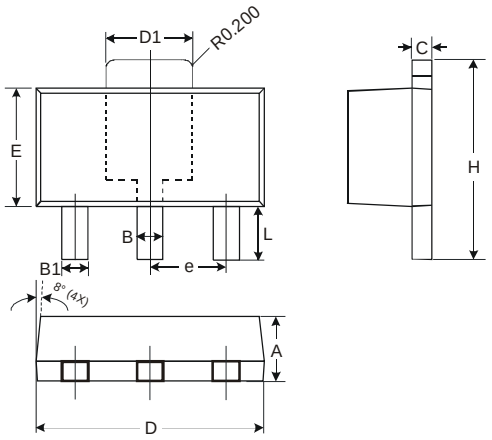
Notes: 7. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

Marking Information



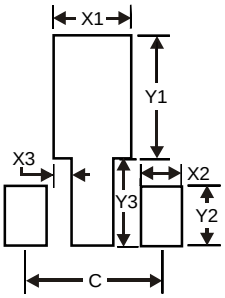
ZNS54 = Product Type Marking Code
= Manufacturer's Code Marking
YWW = Date Code Marking
Y = Last digit of year (ex: 8 = 2008)
WW = Week code 01 - 52

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