

60V LOW $V_{CE(sat)}$ NPN SURFACE MOUNT TRANSISTOR

Features

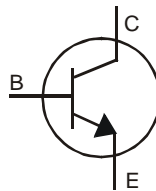
- Epitaxial Planar Die Construction
- Ideal for Medium Power Amplification and Switching
- "Lead Free", RoHS Compliant (Note 1)
- Halogen and Antimony Free. "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

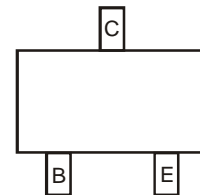
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)



Top View



Device Symbol



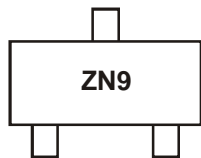
Pin-Out Top

Ordering Information (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DSS4160T-7	ZN9	7	8	3,000

- 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, go to our website at <http://www.diodes.com>

Marking Information



ZN9 = Product Type Marking Code

Maximum Ratings @T_A = 25°C unless otherwise specified

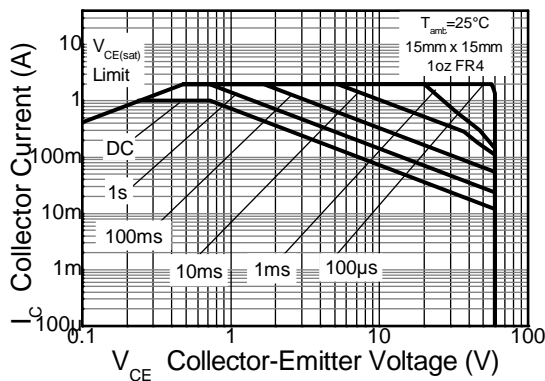
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	80	V
Collector-Emitter Voltage	V _{CEO}	60	V
Emitter-Base Voltage	V _{EBO}	5	V
Continuous Collector Current	I _C	1	A
Peak Pulse Collector Current	I _{CM}	2	A
Base Current (DC)	I _B	300	mA
Peak Base Current	I _{BM}	1	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

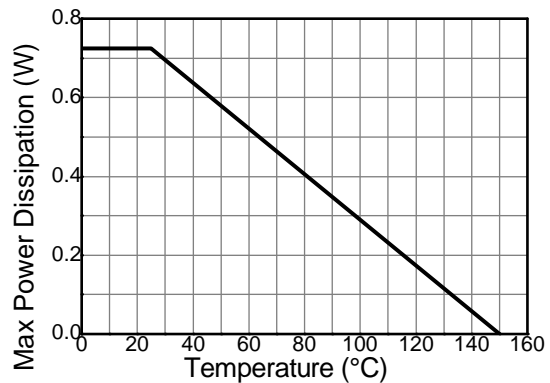
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P _D	725	mW
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	172	°C/W
Thermal Resistance, Junction to Ambient Air (Note 4)	R _{θJA}	79	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Notes: 4. Operated under pulsed conditions: pulse width ≤100ms, duty cycle ≤ 0.25.
5. Device mounted on 15mm x 15mm x1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

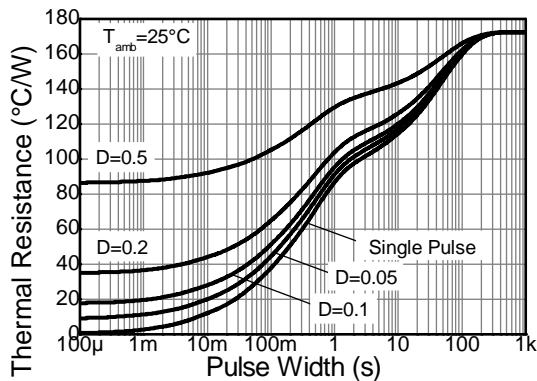
Thermal Characteristics



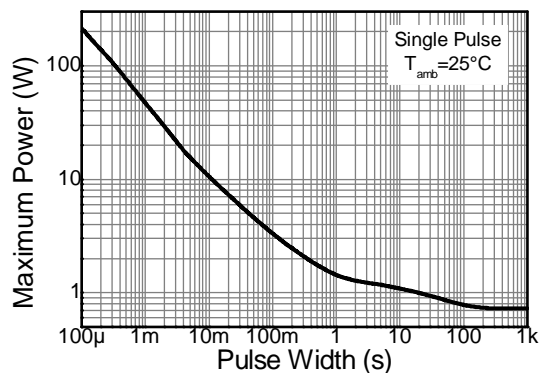
Safe operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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}	80	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 6)	BV_{CEO}	60	—	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	BV_{EBO}	5	—	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cutoff Current	I_{CBO}	—	—	100	nA	$V_{CB} = 60\text{V}, I_E = 0$
		—	—	50	μA	$V_{CB} = 60\text{V}, I_E = 0, T_A = 150^\circ\text{C}$
Collector Cutoff Current	I_{CES}	—	—	100	nA	$V_{EB} = 60\text{V}, I_{BE} = 0$
Emitter-Base Cutoff Current	I_{EBO}	—	—	100	nA	$V_{EB} = 5\text{V}, I_C = 0$
DC Current Gain (Note 6)	h_{FE}	250	—	—	—	$V_{CE} = 5\text{V}, I_C = 1\text{mA}$
		200	—	—		$V_{CE} = 5\text{V}, I_C = 500\text{mA}$
		100	—	—		$V_{CE} = 5\text{V}, I_C = 1\text{A}$
Collector-Emitter Saturation Voltage (Note 6)	$V_{CE(sat)}$	—	—	115	mV	$I_C = 100\text{mA}, I_B = 1\text{mA}$
		—	—	150		$I_C = 500\text{mA}, I_B = 50\text{mA}$
		—	—	280		$I_C = 1\text{A}, I_B = 100\text{mA}$
Equivalent On-Resistance	$R_{CE(sat)}$	—	—	280	m Ω	$I_E = 1\text{A}, I_B = 100\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	1.1	V	$I_C = 1\text{A}, I_B = 50\text{mA}$
Base-Emitter Turn-on Voltage	$V_{BE(on)}$	—	—	0.9	V	$V_{CE} = 5\text{V}, I_C = 1\text{A}$
Transition Frequency	f_T	150	—	—	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$
Output Capacitance	C_{obo}	—	—	10	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Turn-On Time	t_{on}	—	63	—	ns	$V_{CC} = 10\text{V}, I_C = 0.5\text{A}, I_{B1} = I_{B2} = 25\text{mA}$
Delay Time	t_d	—	33	—	ns	
Rise Time	t_r	—	30	—	ns	
Turn-Off Time	t_{off}	—	420	—	ns	
Storage Time	t_s	—	380	—	ns	
Fall Time	t_f	—	40	—	ns	

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

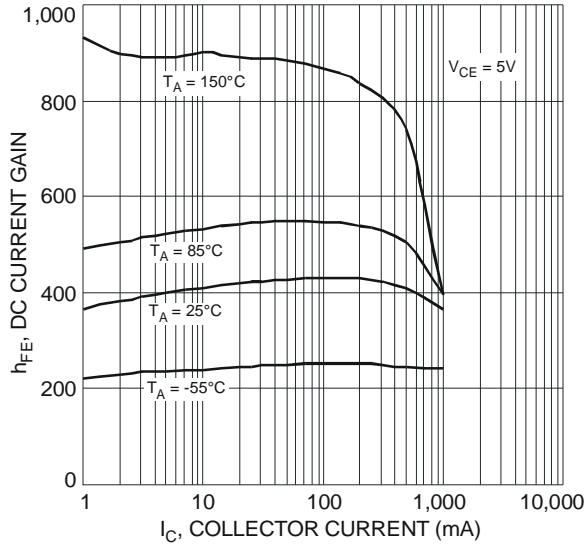


Fig. 5 Typical DC Current Gain vs. Collector Current

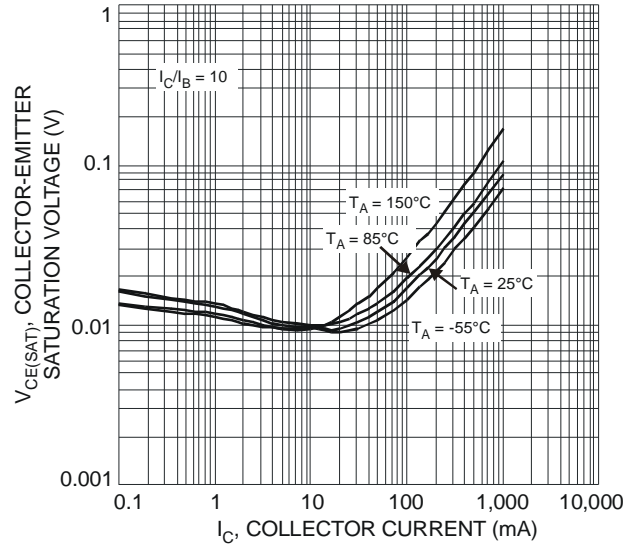


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

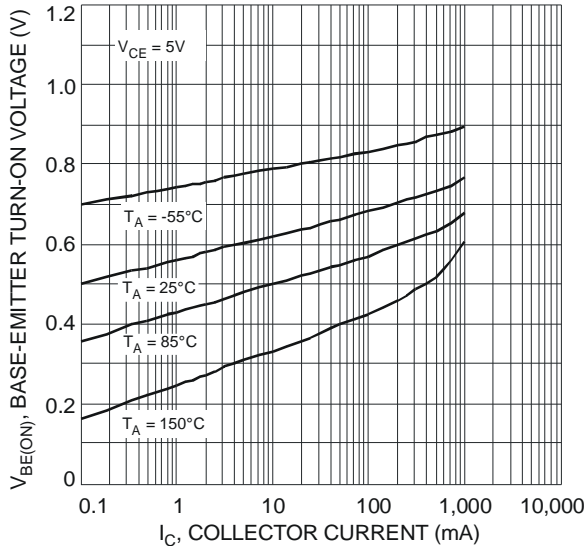


Fig. 7 Typical Base-Emitter Turn-On Voltage vs. Collector Current

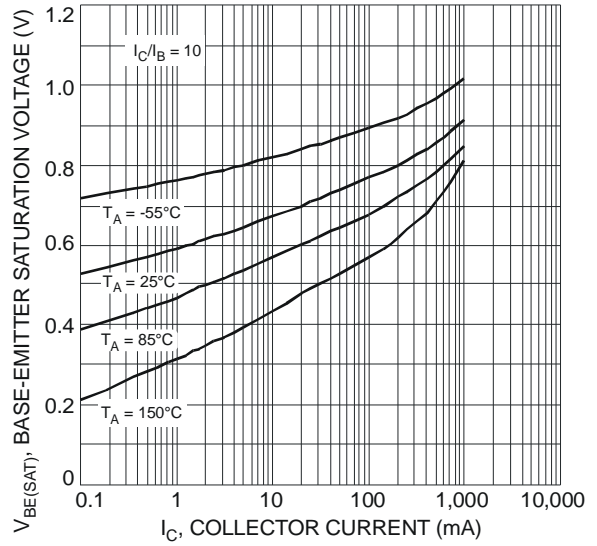


Fig. 8 Typical Base-Emitter Saturation Voltage vs. Collector Current

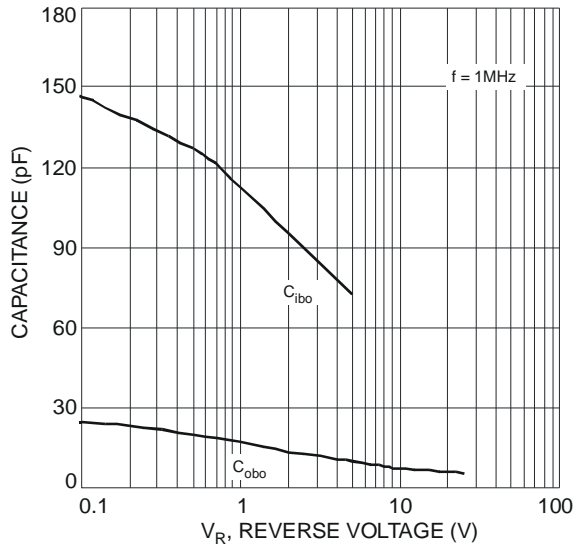
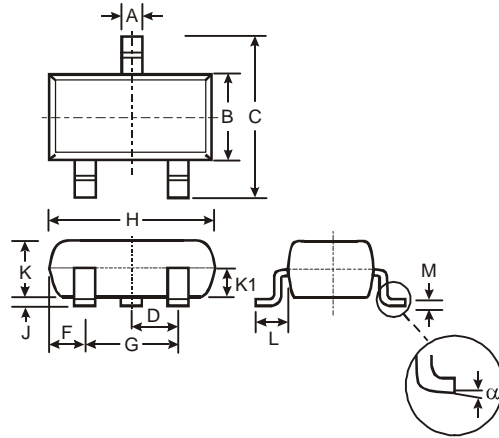


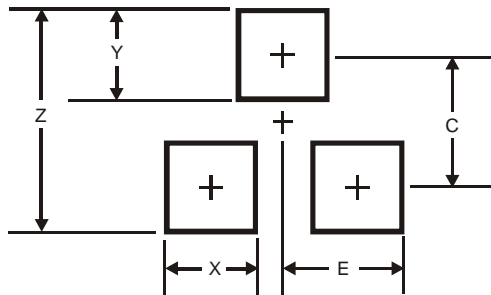
Fig. 9 Typical Capacitance Characteristics

Package Outline Dimensions



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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