

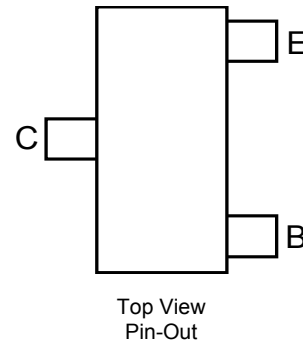
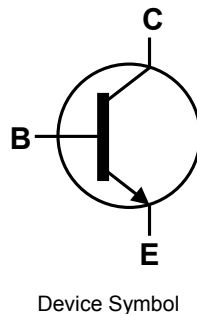
60V NPN LOW SATURATION TRANSISTOR IN SOT23

Features

- $BV_{CEO} > 60V$
- $I_C = 1A$ high Continuous Collector Current
- $I_{CM} = 2A$ Peak Pulse Current
- $R_{CE(sat)} = 280m\Omega$ for a Low Equivalent On-Resistance
- Low Saturation Voltage $V_{CE(sat)} < 280mV @ 1A$
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

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 Plated leads, Solderable per MIL-STD-202, Method 208 **e3**
- Weight: 0.008 grams (Approximate)

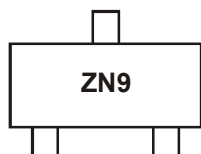


Ordering Information (Note 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DSS4160T-7	AEC-Q101	ZN9	7	8	3,000
DSS4160TQ-7	Automotive	ZN9	7	8	3,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



ZN9 = Product Type Marking Code

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	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	I _B	300	mA
Peak Base Current	I _{BM}	1	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

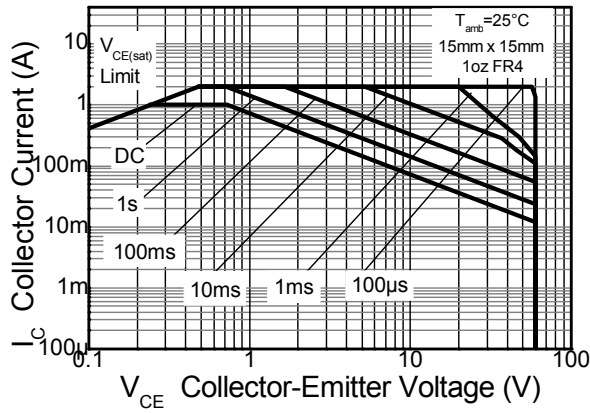
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P _D	725	mW
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	172	°C/W
Thermal Resistance, Junction to Leads (Note 7)	R _{θJL}	79	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 8)

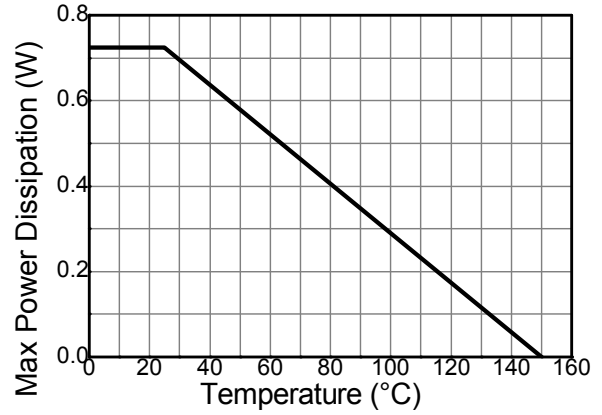
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. For a device mounted with the collector lead on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 7. Thermal resistance from junction to solder-point (at the end of collector lead).
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

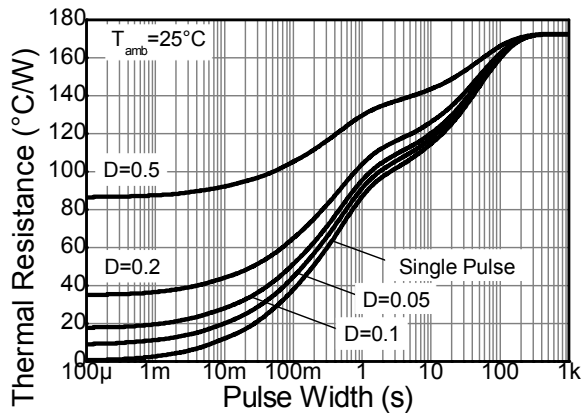
Thermal Characteristics and Derating Information



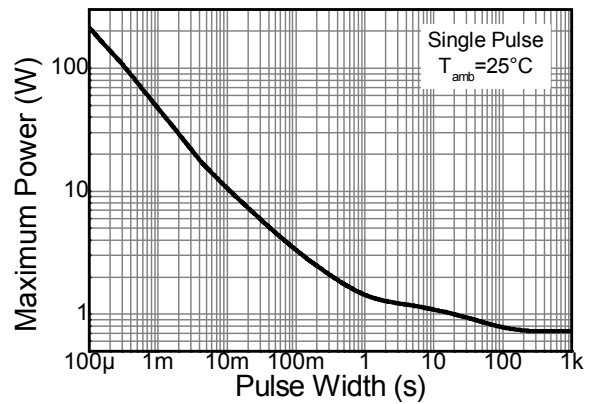
Safe operating Area



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 9)	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 9)	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 9)	$V_{CE(sat)}$	—	—	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	

Note: 9. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

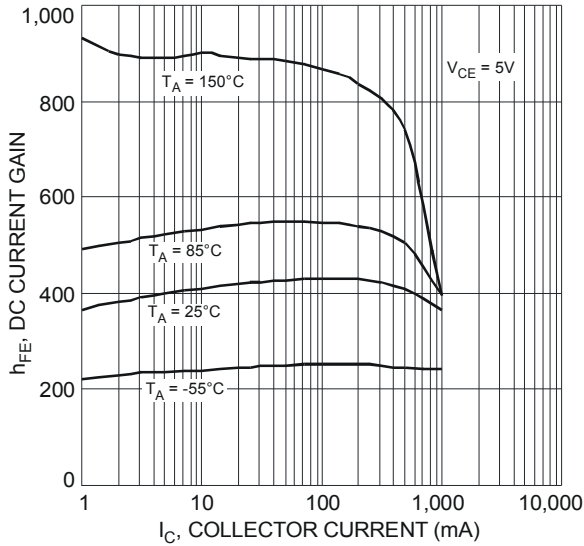


Fig. 5 Typical DC Current Gain vs. Collector Current

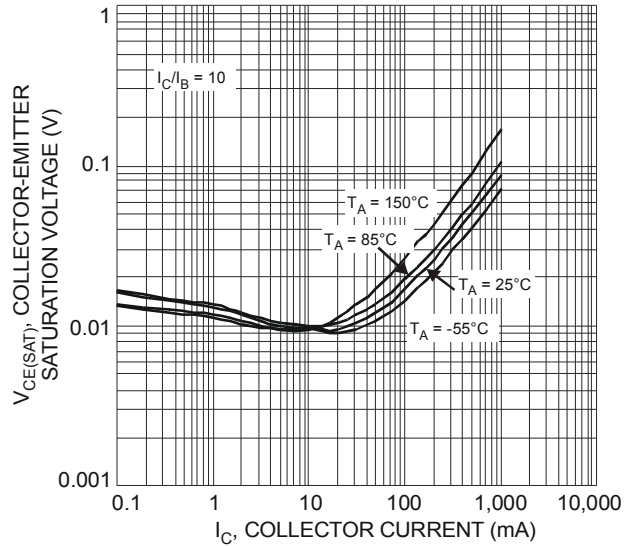


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

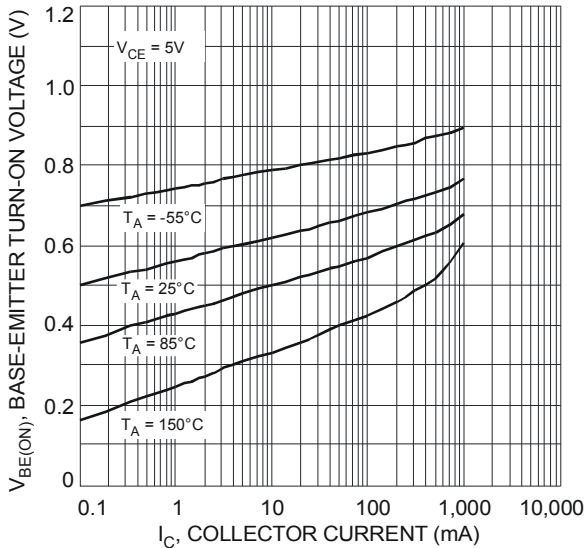


Fig. 7 Typical Base-Emitter Turn-On Voltage vs. Collector Current

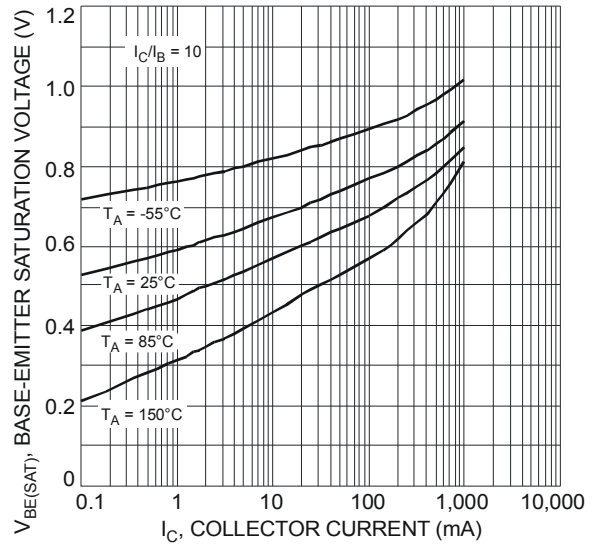


Fig. 8 Typical Base-Emitter Saturation Voltage vs. Collector Current

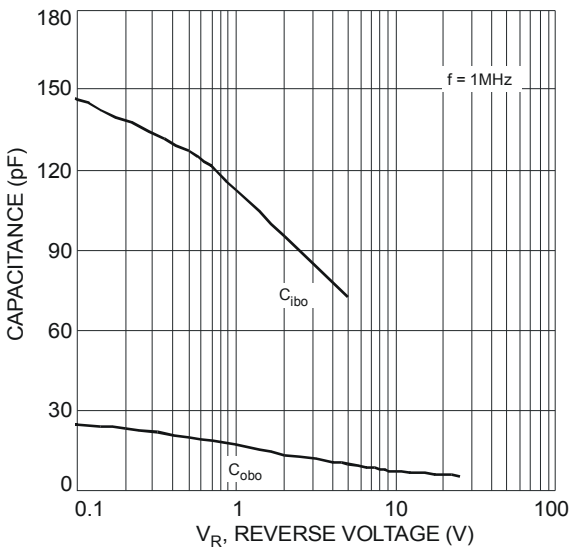
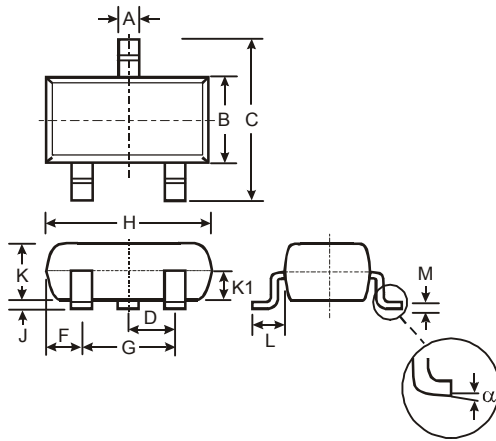


Fig. 9 Typical Capacitance Characteristics

Package Outline Dimensions

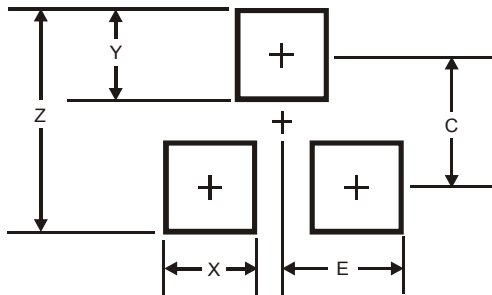
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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

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