

## Features

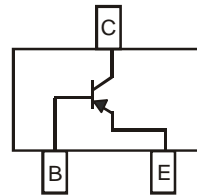
- Epitaxial Planar Die Construction
- Low Collector-Emitter Saturation Voltage,  $V_{CE(SAT)}$
- Complementary NPN Type Available (DSS4160U)
- Ultra-Small Surface Mount Package
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green Device" (Note 2)**



Top View

## Mechanical Data

- Case: SOT-323
- 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 Plated Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.006 grams (approximate)



Device Schematic

## Maximum Ratings @ $T_A = 25^\circ\text{C}$ 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
Collector Current - Continuous	$I_C$	-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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$	$P_D$	400	mW
Thermal Resistance, Junction to Ambient (Note 3) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	313	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Notes:
1. No purposefully added lead.
  2. Diode's 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. Device mounted on FR-4 PCB with minimum recommended pad layout.

**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-80	—	—	V	$I_C = -100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 4)	$V_{(BR)CEO}$	-60	—	—	V	$I_C = -10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5	—	—	V	$I_E = -100\mu\text{A}, I_C = 0$
Collector Cutoff Current	$I_{CBO}$	—	—	-100	nA	$V_{CB} = -60\text{V}, I_E = 0$
Collector Cutoff Current	$I_{CES}$	—	—	-100	nA	$V_{CE} = -60\text{V}, V_{BE} = 0$
Emitter Cutoff Current	$I_{EBO}$	—	—	-100	nA	$V_{EB} = -5\text{V}, I_C = 0$
<b>ON CHARACTERISTICS (Note 4)</b>						
DC Current Gain	$h_{FE}$	200 150 100	— — —	— — —	—	$V_{CE} = -5\text{V}, I_C = -1\text{mA}$ $V_{CE} = -5\text{V}, I_C = -500\text{mA}$ $V_{CE} = -5\text{V}, I_C = 1\text{A}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	— — —	— — —	-175 -180 -340	mV	$I_C = -100\text{mA}, I_B = -1\text{mA}$ $I_C = -500\text{mA}, I_B = -50\text{mA}$ $I_C = -1\text{A}, I_B = -100\text{mA}$
Collector-Emitter Saturation Resistance	$R_{CE(SAT)}$	—	—	340	m $\Omega$	$I_C = -1\text{A}, I_B = -100\text{mA}$
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	$V_{CE} = 5\text{V}, I_C = 1\text{A}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{obo}$	—	—	15	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	$f_T$	150	—	—	MHz	$V_{CE} = -10\text{V}, I_C = -50\text{mA}, f = 100\text{MHz}$
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Time	$t_{on}$	—	75	—	ns	$V_{CC} = -10\text{V}$ $I_C = -0.5\text{A}, I_{B1} = I_{B2} = -25\text{mA}$
Delay Time	$t_d$	—	35	—	ns	
Rise Time	$t_r$	—	40	—	ns	
Turn-Off Time	$t_{off}$	—	265	—	ns	
Storage Time	$t_s$	—	230	—	ns	
Fall Time	$t_f$	—	35	—	ns	

Notes: 4. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

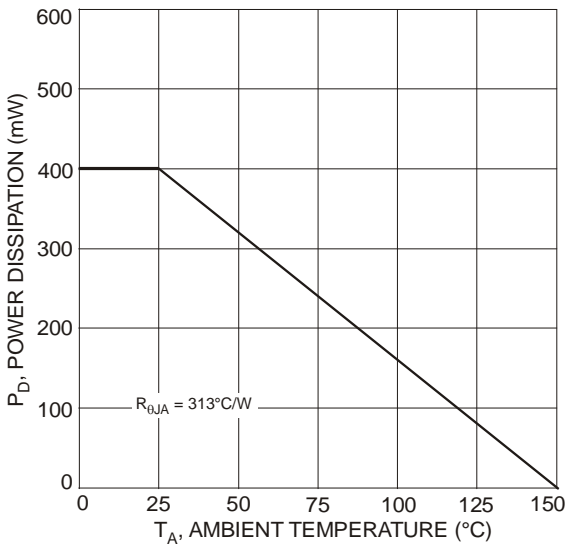


Fig. 1 Power Dissipation vs. Ambient Temperature (Note 3)

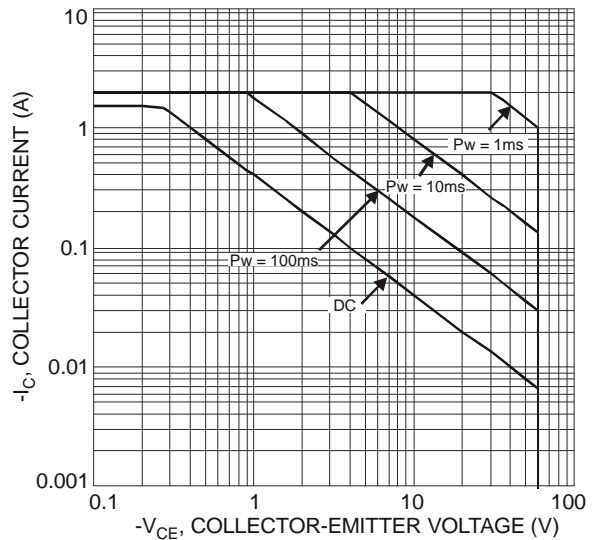


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage (Note 3)

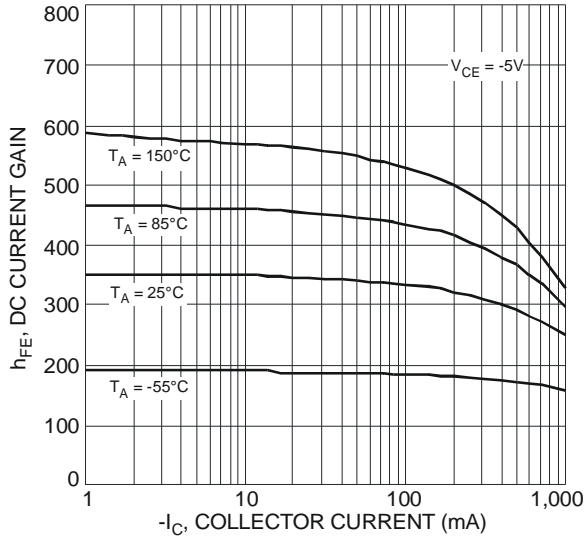


Fig. 3 Typical DC Current Gain vs. Collector Current

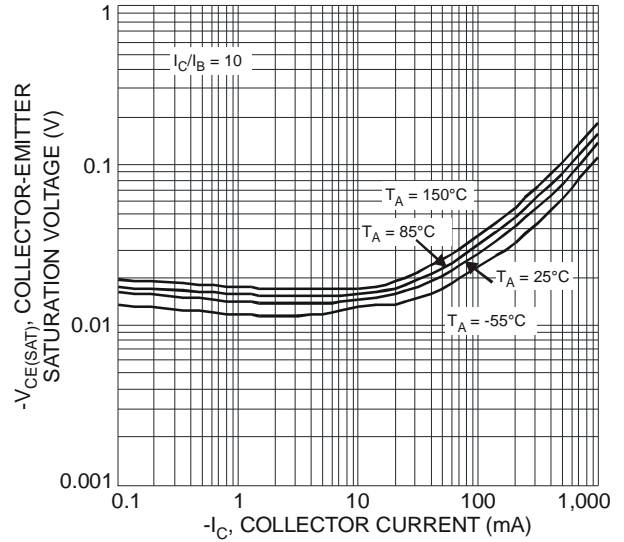


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

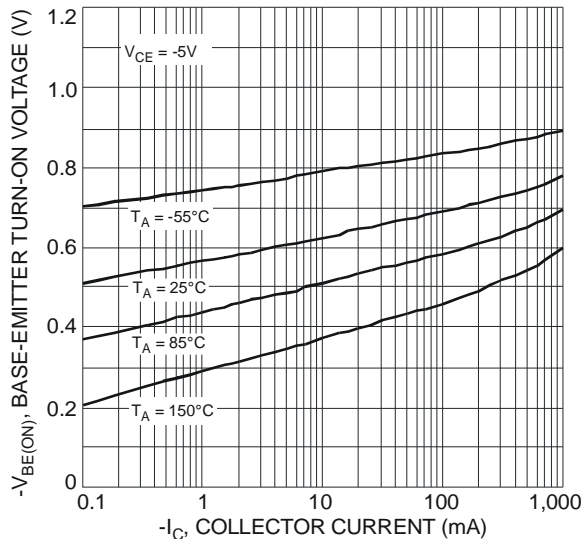


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

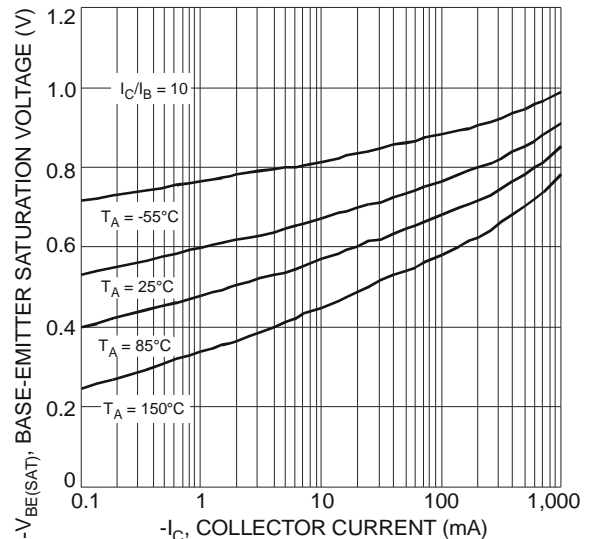


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

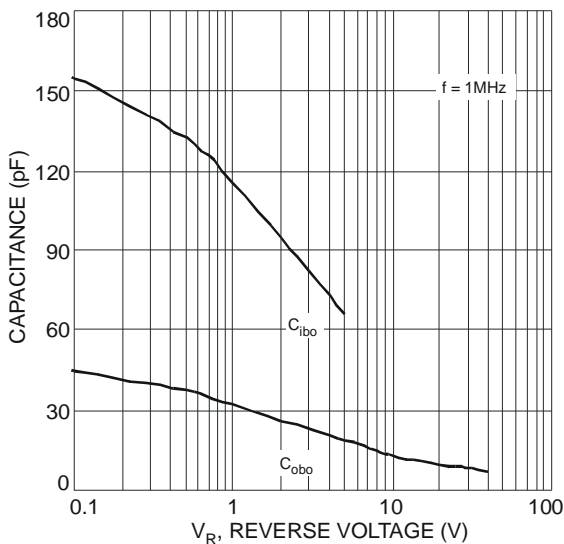


Fig. 7 Typical Capacitance Characteristics

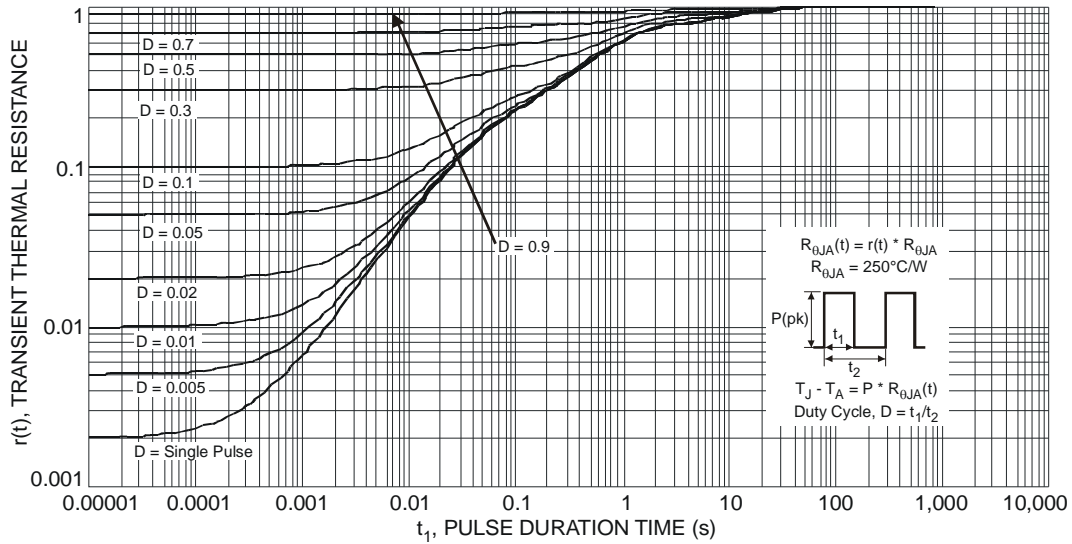


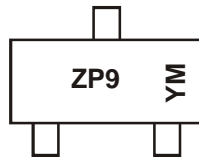
Fig. 8 Transient Thermal Response (Note 3)

**Ordering Information** (Note 5)

Part Number	Case	Packaging
DSS5160U-7	SOT-323	3000/Tape & Reel

Notes: 5. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



ZP9 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: V = 2008)  
 M = Month (ex: 9 = September)

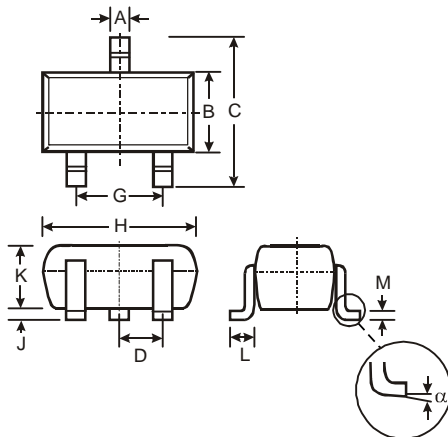
Date Code Key

Year	2008	2009	2010	2011	2012	2013	2014	2015
Code	V	W	X	Y	Z	A	B	C

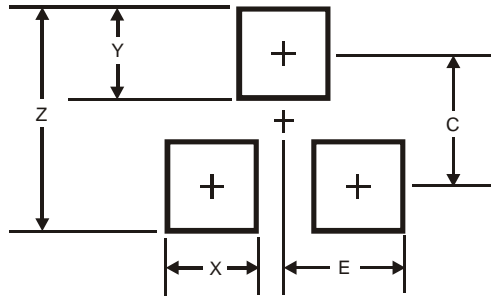
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

**Package Outline Dimensions**



SOT-323			
Dim	Min	Max	Typ
A	0.25	0.40	0.30
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	-	-	0.65
G	1.20	1.40	1.30
H	1.80	2.20	2.15
J	0.0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.18	0.11
α	0°	8°	-
All Dimensions in mm			

**Suggested Pad Layout**



Dimensions	Value (in mm)
Z	2.8
X	0.7
Y	0.9
C	1.9
E	1.0

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