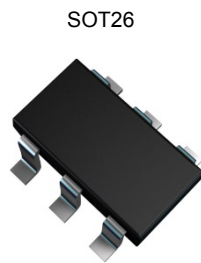


**60V DUAL NPN LOW SATURATION TRANSISTOR IN SOT26**
**Features**

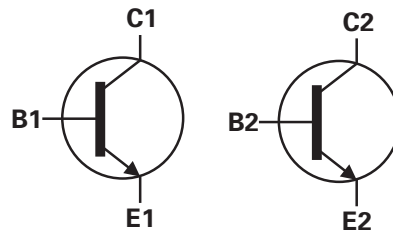
- $BV_{CEO} > 60V$
- $I_C = 1A$  high Continuous Collector Current
- $I_{CM} = 2A$  Peak Pulse Current
- $R_{CE(sat)} = 100m\Omega$  for a Low Equivalent On-Resistance
- Low Saturation Voltage  $V_{CE(sat)} < 250mV @ 1A$
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

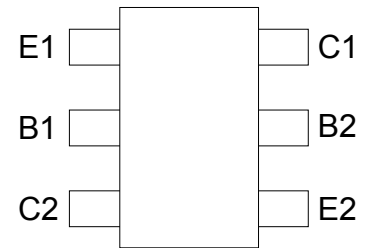
- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 <sup>(e3)</sup>
- Weight: 0.015 grams (approximate)



Top View



Device Symbol

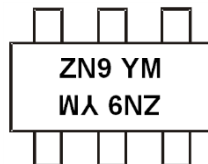


Top View Pin-Out

**Ordering Information** (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DSS4160DS-7	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](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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

**Marking Information**


ZN9 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: A = 2013  
 M = Month ex: 9 = September

## Date Code Key

Year	2013	2014	2015	2016	2017	2018	2019	2020
Code	A	B	C	D	E	F	G	H

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

**Absolute Maximum Ratings – Q1 & Q2 Common** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	80	V
Collector-Emitter Voltage	V <sub>CEO</sub>	60	V
Emitter-Base Voltage	V <sub>EBO</sub>	5	V
Continuous Collector Current	I <sub>C</sub>	1	A
Peak Pulse Collector Current	I <sub>CM</sub>	2	A
Base current	I <sub>B</sub>	300	mA
Peak Pulse Base current	I <sub>BM</sub>	1	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

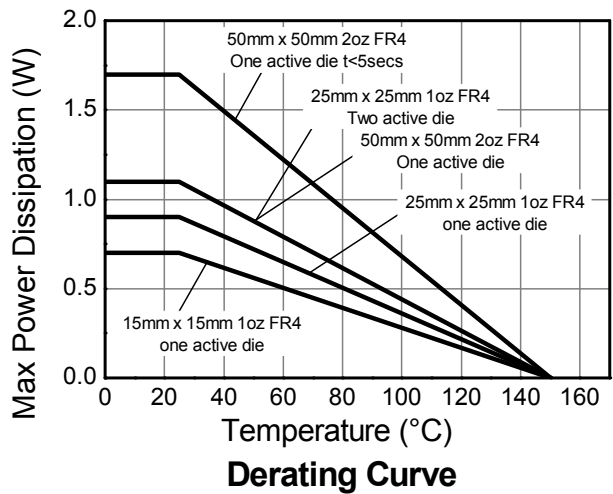
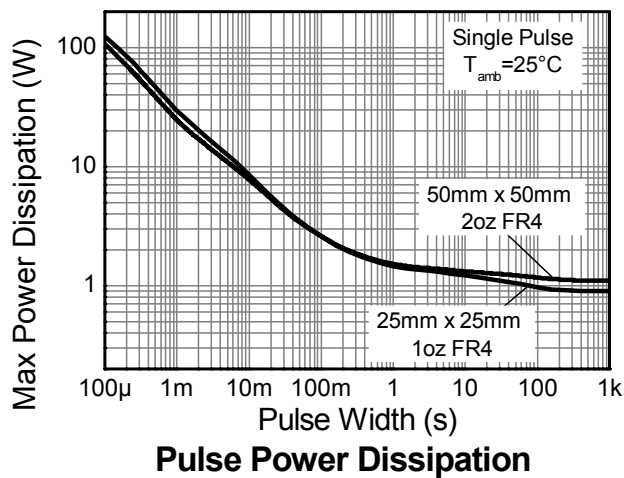
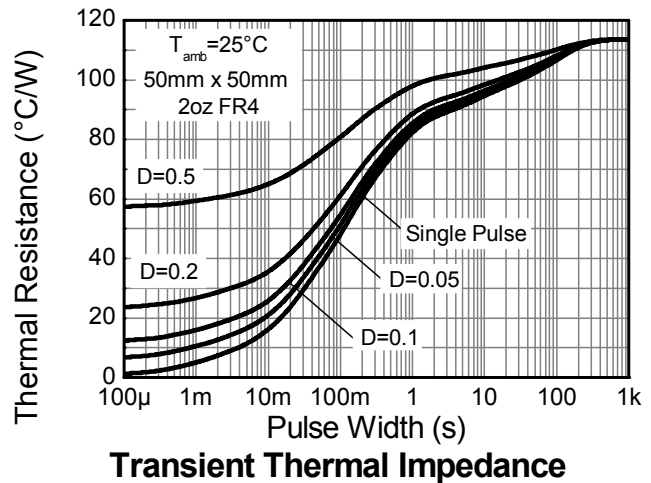
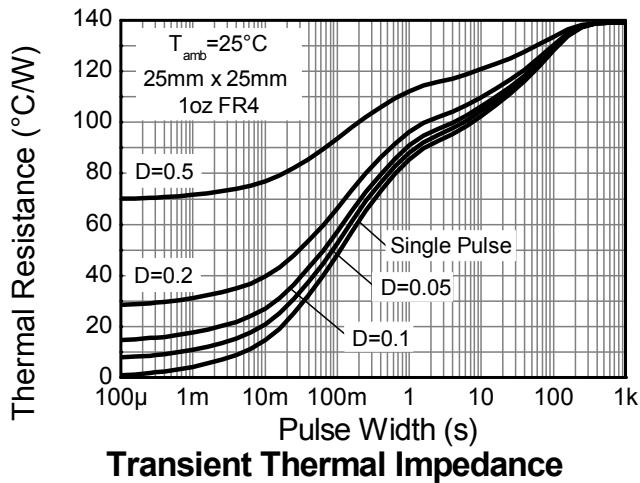
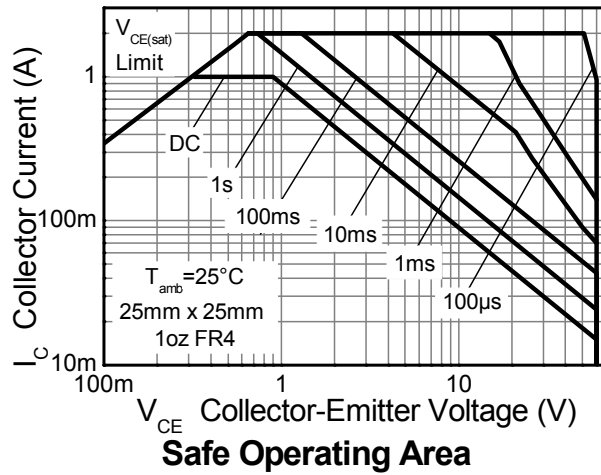
Characteristic	Symbol	Value	Unit	
Power Dissipation Linear Derating Factor	P <sub>D</sub>	0.7	W mW/°C	
		(Notes 5 & 9)		5.6
		(Notes 6 & 9)		0.9
				7.2
		(Notes 6 & 10)		1.1
				8.8
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Notes 5 & 9)	179	
		(Notes 6 & 9)	139	
		(Notes 6 & 10)	113	
		(Notes 7 & 9)	113	
		(Notes 8 & 9)	73	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	96	°C/W	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C	

**ESD Ratings** (Note 12)

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:
5. 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.
  6. Same as note (5), except the device is mounted on 25mm x 25mm 1oz copper.
  7. Same as note (5), except the device is mounted on 50mm x 50mm 2oz copper.
  8. Same as note (7), except the device is measured at t < 5 seconds.
  9. One active die operating with the collector attached to the heatsink.
  10. Two active dice running at equal power with heatsink split 50% to each collector.
  11. Thermal resistance from junction to solder-point (at the end of the collector lead).
  12. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**



**Electrical Characteristics - Q1 & Q2 common** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	80	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 13)	$BV_{CEO}$	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	$V_{CB} = 60\text{V}, I_E = 0\text{A}$
		—	—	50	$\mu\text{A}$	$V_{CB} = 60\text{V}, I_E = 0\text{A}, T_J = +150^\circ\text{C}$
Collector-Emitter Cutoff Current	$I_{CES}$	—	—	100	nA	$V_{CES} = 60\text{V}, V_{BE} = 0\text{V}$
Emitter-Base Cutoff Current	$I_{EBO}$	—	—	100	nA	$V_{EB} = 5\text{V}, I_C = 0\text{A}$
DC Current Gain (Note 13)	$h_{FE}$	250	380	—	—	$I_C = 1\text{mA}, V_{CE} = 5\text{V}$
		200	420	—	—	$I_C = 500\text{mA}, V_{CE} = 5\text{V}$
		100	380	—	—	$I_C = 1\text{A}, V_{CE} = 5\text{V}$
Collector-Emitter Saturation Voltage (Note 13)	$V_{CE(sat)}$	—	60	110	mV	$I_C = 100\text{mA}, I_B = 1\text{mA}$
		—	70	140	mV	$I_C = 500\text{mA}, I_B = 50\text{mA}$
		—	100	250	mV	$I_C = 1\text{A}, I_B = 100\text{mA}$
Equivalent On-Resistance	$R_{CE(sat)}$	—	100	250	m $\Omega$	$I_C = 1\text{A}, I_B = 100\text{mA}$
Base-Emitter Saturation Voltage (Note 13)	$V_{BE(sat)}$	—	940	1100	mV	$I_C = 1\text{A}, I_B = 50\text{mA}$
Base-Emitter Turn-On Voltage (Note 13)	$V_{BE(on)}$	—	780	900	mV	$I_C = 1\text{A}, V_{CE} = 5\text{V}$
Output Capacitance	$C_{obo}$	—	5.5	10	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Transition Frequency	$f_T$	150	220	—	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}$ $f = 100\text{MHz}$
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: 13. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

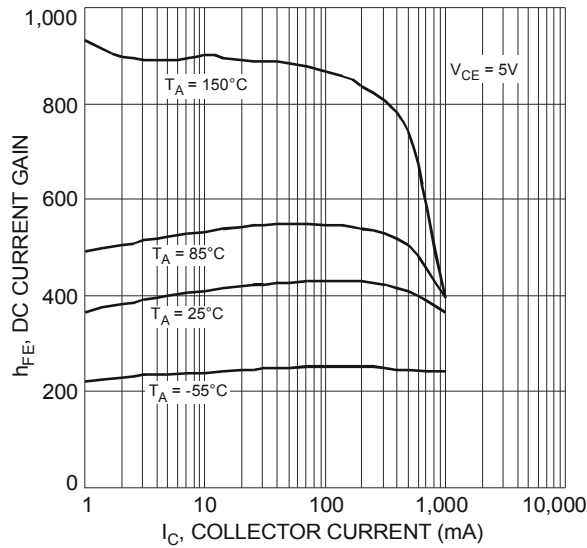


Fig. 5 Typical DC Current Gain vs. Collector Current

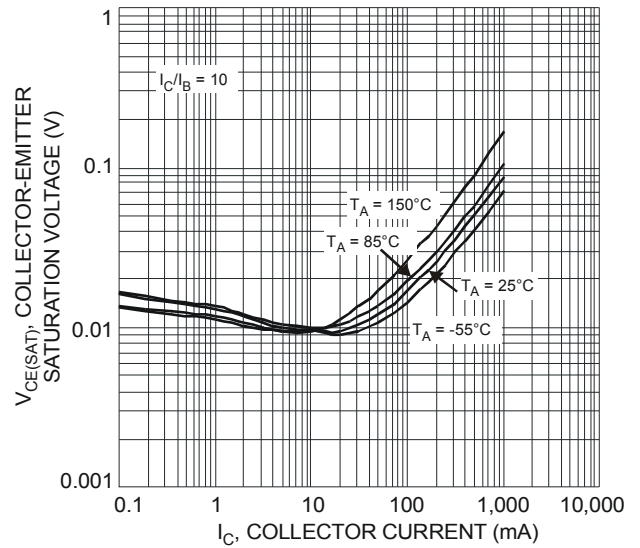


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

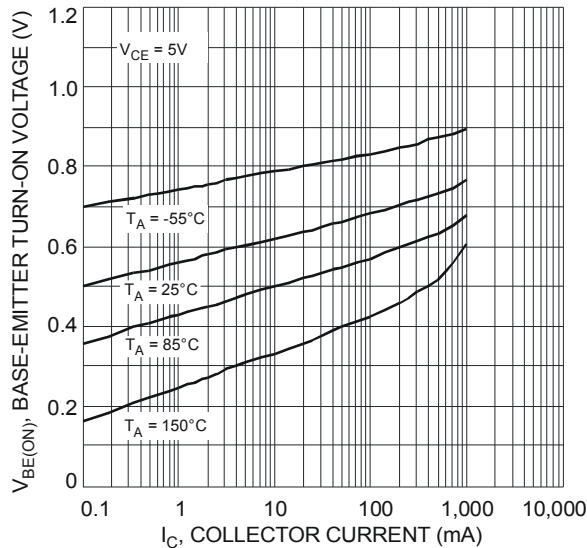


Fig. 7 Typical Base-Emitter Turn-On Voltage vs. Collector Current

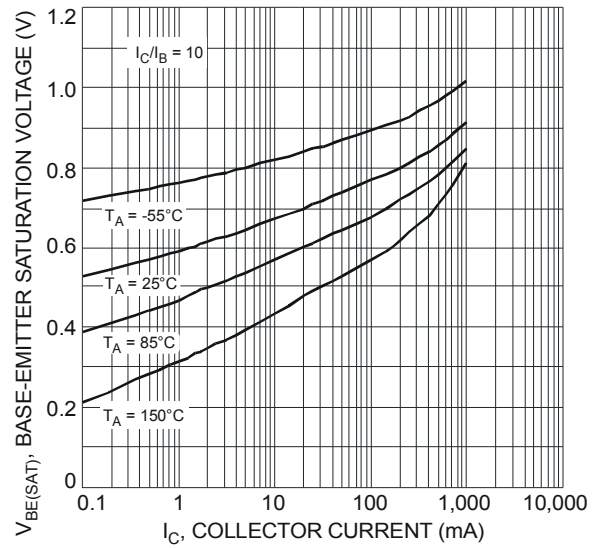


Fig. 8 Typical Base-Emitter Saturation Voltage vs. Collector Current

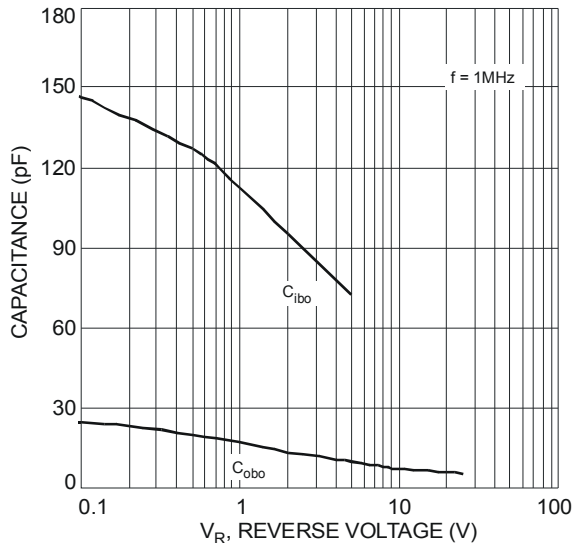
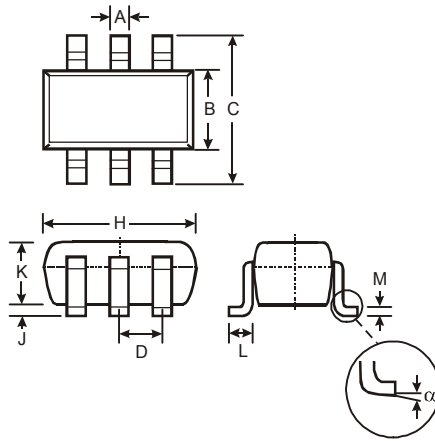


Fig. 9 Typical Capacitance Characteristics

**Package Outline Dimensions**

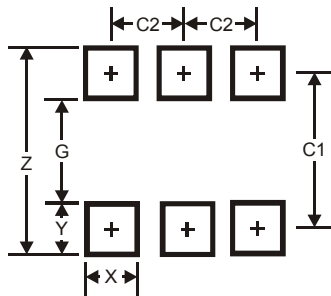
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT26			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
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	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

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