

**20V PNP LOW SATURATION TRANSISTOR IN SOT23**

**Features**

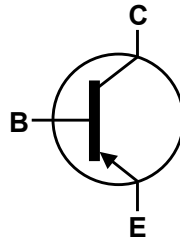
- $BV_{CEO} > -20V$
- $I_C = -2A$  Continuous Collector Current
- $I_{CM} = -4A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(sat)} < -120mV @ -1A$
- $R_{CE(SAT)} = 40m\Omega$  for a low equivalent on-resistance
- Complimentary NPN Type : DSS20201L
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

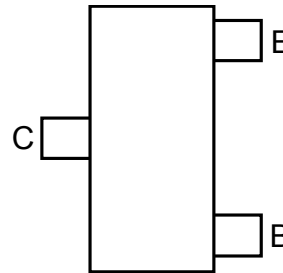
- Case: SOT23
- Case Material: molded plastic, "Green" molding compound  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 ③
- Weight: 0.008 grams (approximate)



Top View



Device Symbol



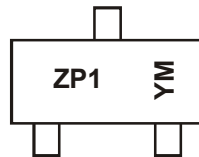
Top View  
Pin-Out

**Ordering Information** (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DSS20200L-7	ZP1	7	8	3,000
DSS20200L-13	ZP1	13	8	10,000

- 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**



ZP1 = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: A = 2013)  
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

**Absolute Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	-20	V
Collector-Emitter Voltage	$V_{CEO}$	-20	V
Emitter-Base Voltage	$V_{EBO}$	-7	V
Peak Pulse Collector Current	$I_{CM}$	-4	A
Continuous Collector Current	$I_C$	-2	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	(Note 5) 600	mW
		(Note 6) 1.2	
Thermal Resistance, Junction to Ambient Air	$R_{\theta JA}$	(Note 5) 209	$^\circ\text{C/W}$
		(Note 6) 104	
Thermal Resistance, Junction to Leads	$R_{\theta JL}$	(Note 7) 75	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**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:
5. For a device mounted on minimum recommended pad layout with 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 mounted on 25mm x 25mm 1oz copper.
  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**

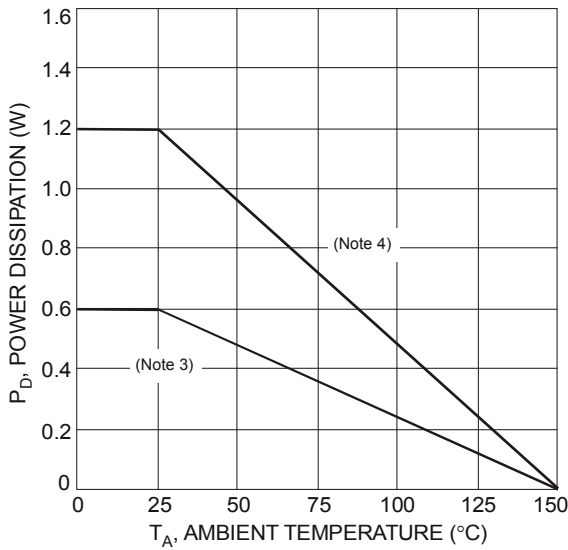


Figure 1 Power Dissipation vs. Ambient Temperature

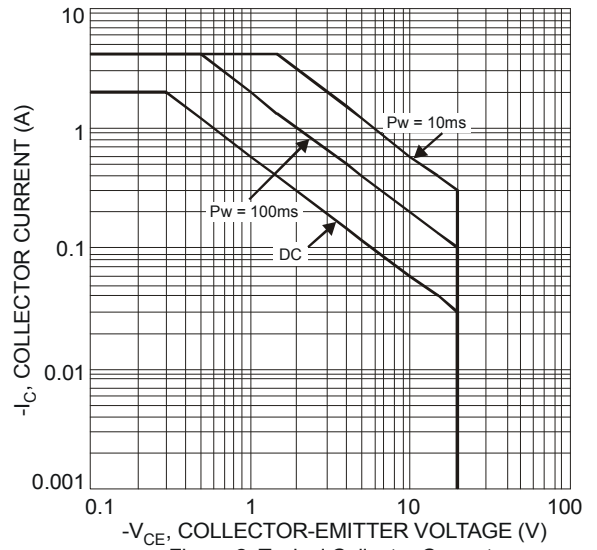


Figure 2 Typical Collector Current vs. Collector-Emitter Voltage

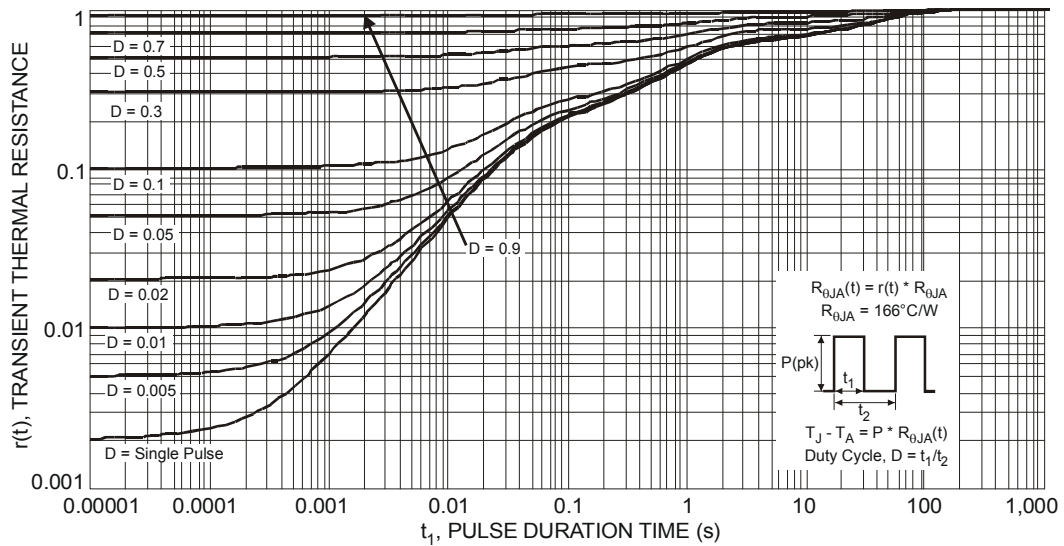


Figure 3 Transient Thermal Response

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	-20	—	—	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 9)	$BV_{CEO}$	-20	—	—	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	—	—	V	$I_E = -100\mu\text{A}$
Collector-Base Cutoff Current	$I_{CBO}$	—	—	-100	nA	$V_{CB} = -20\text{V}, I_E = 0$
Emitter-Base Cutoff Current	$I_{EBO}$	—	—	-100	nA	$V_{EB} = -7\text{V}, I_C = 0$
<b>ON CHARACTERISTICS (Note 9)</b>						
DC Current Gain	$h_{FE}$	250	—	—	—	$V_{CE} = -2\text{V}, I_C = -10\text{mA}$
		250	—	—		$V_{CE} = -2\text{V}, I_C = -500\text{mA}$
		180	—	—		$V_{CE} = -2\text{V}, I_C = -1\text{A}$
		150	—	—		$V_{CE} = -2\text{V}, I_C = -2\text{A}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	—	-13	mV	$I_C = -0.1\text{A}, I_B = -10\text{mA}$
		—	-50	-90		$I_C = -1\text{A}, I_B = -100\text{mA}$
		—	-100	-120		$I_C = -1\text{A}, I_B = -10\text{mA}$
		—	-80	-180		$I_C = -2\text{A}, I_B = -200\text{mA}$
Equivalent On-Resistance	$R_{CE(SAT)}$	—	40	90	$\text{m}\Omega$	$I_C = -2\text{A}, I_B = -200\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	-0.9	V	$I_C = -1\text{A}, I_B = -10\text{mA}$
Base-Emitter Turn-on Voltage	$V_{BE(ON)}$	—	—	-0.9	V	$V_{CE} = -2\text{V}, I_C = -1\text{A}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	$f_T$	100	—	—	MHz	$V_{CE} = -5\text{V}, I_C = -100\text{mA}, f = 100\text{MHz}$
Output Capacitance	$C_{obo}$	—	—	100	pF	$V_{CB} = -3\text{V}, f = 1\text{MHz}$
Input Capacitance	$C_{ibo}$	—	—	330	pF	$V_{EB} = -0.5\text{V}, f = 1\text{MHz}$
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Time	$t_{on}$	—	—	180	ns	$V_{CC} = -15\text{V}, I_C = -750\text{mA}, I_{B1} = -15\text{mA}$
Delay Time	$t_d$	—	—	60	ns	
Rise Time	$t_r$	—	—	120	ns	
Turn-Off Time	$t_{off}$	—	—	430	ns	$V_{CC} = -15\text{V}, I_C = -750\text{mA}, I_{B1} = I_{B2} = -15\text{mA}$
Storage Time	$t_s$	—	—	300	ns	
Fall Time	$t_f$	—	—	130	ns	

Note: 9. 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.)

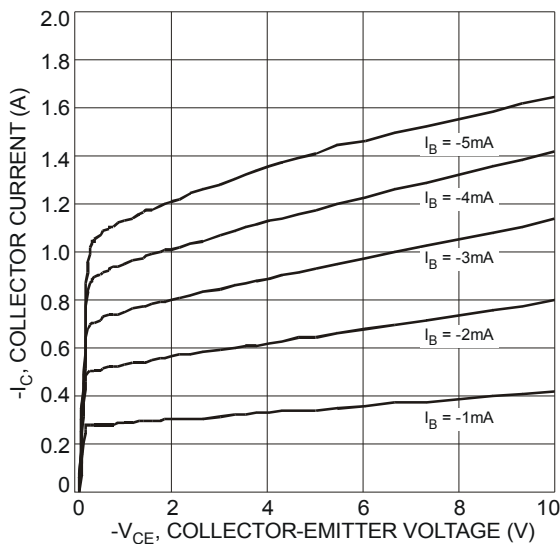


Figure 4 Typical Collector Current vs. Collector-Emitter Voltage

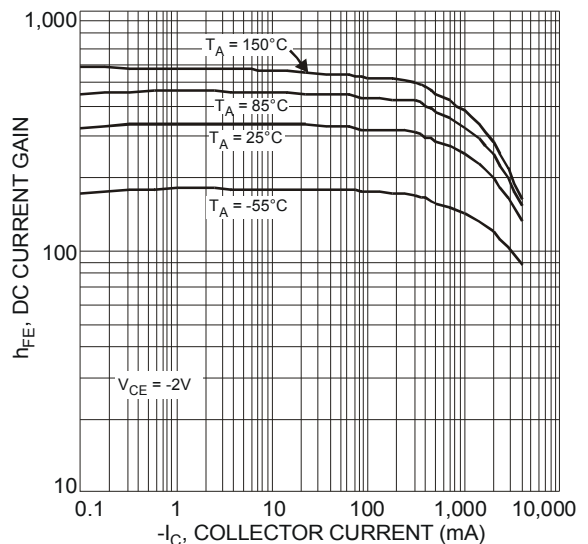


Figure 5 Typical DC Current Gain vs. Collector Current

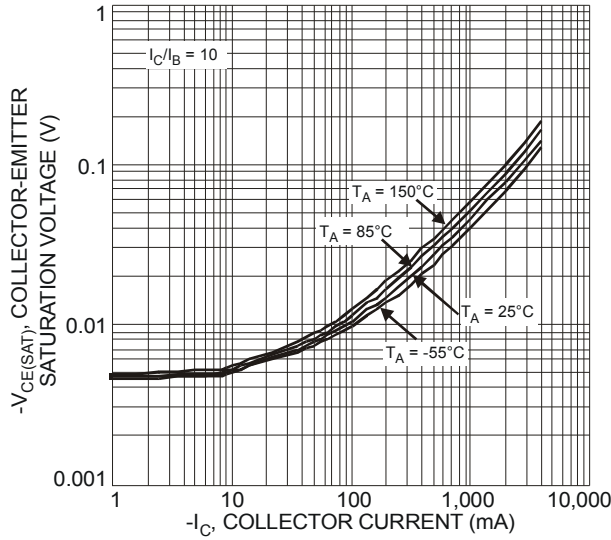


Figure 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

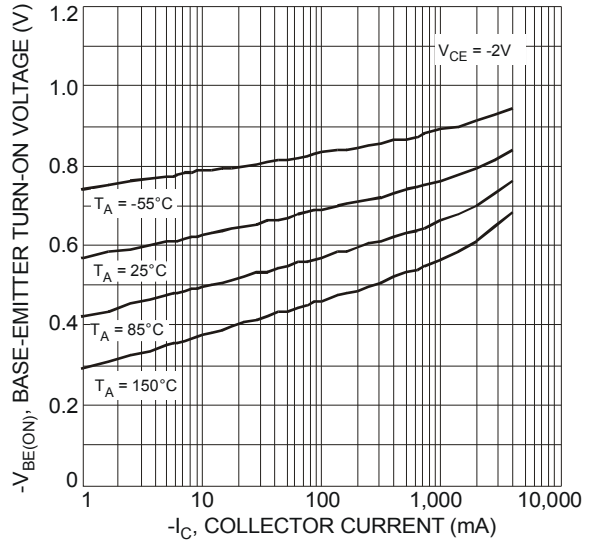


Figure 7 Typical Base-Emitter Turn-On Voltage vs. Collector Current

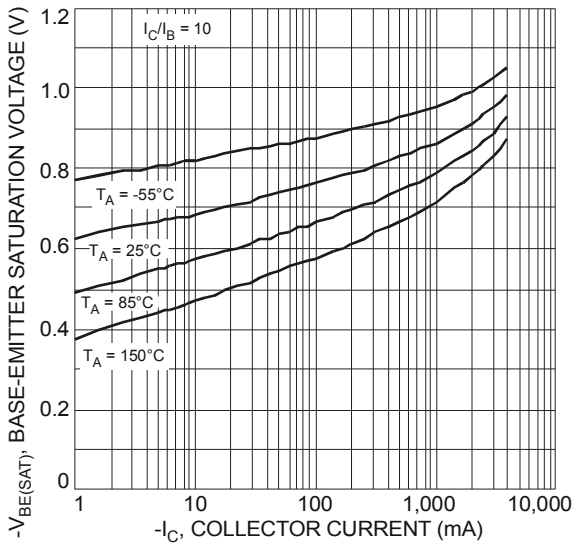


Figure 8 Typical Base-Emitter Saturation Voltage vs. Collector Current

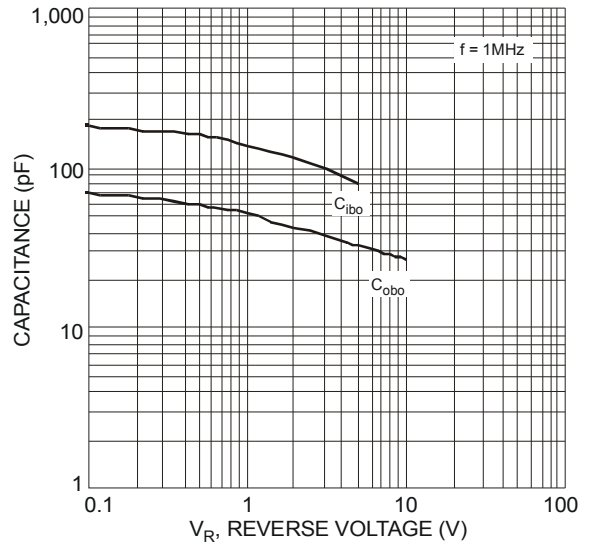


Figure 9 Typical Capacitance Characteristics

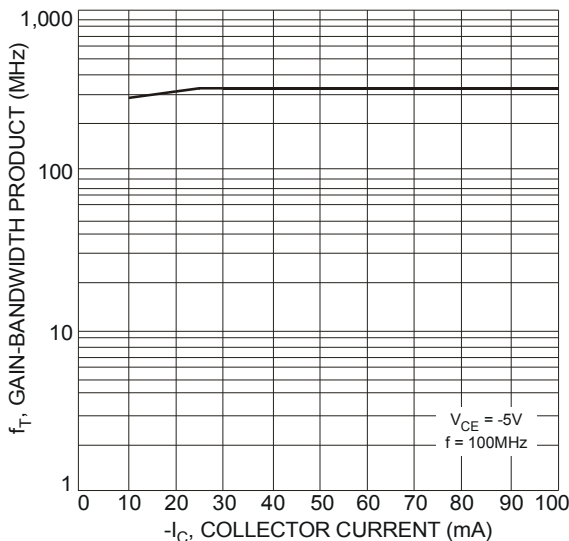
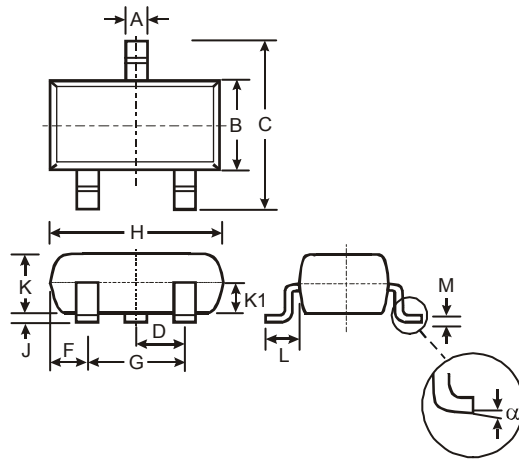


Figure 10 Typical Gain-Bandwidth Product vs. Collector Current

**Package Outline Dimensions**

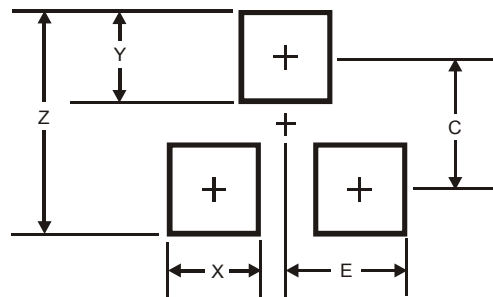
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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