

## Excellent Integrated System Limited

Stocking Distributor

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[Diodes Incorporated](#)  
[DSS20201L-7](#)

For any questions, you can email us directly:

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**DSS20201L**

**LOW  $V_{CE(SAT)}$  NPN SURFACE MOUNT TRANSISTOR**

**Features**

- Ideal for Medium Power Amplification and Switching
- Complementary PNP Type Available (DSS20200L)
- Ultra Low Collector-Emitter Saturation Voltage
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **“Green” Device (Note 2)**

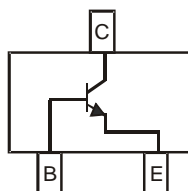
**Mechanical Data**

- Case: SOT-23
- 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 leadframe. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.008 grams (approximate)

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Top View



Device Schematic

**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	$V_{EBO}$	6	V
Peak Pulse Current	$I_{CM}$	4	A
Continuous Collector Current	$I_C$	2	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$	$P_D$	600	mW
Thermal Resistance, Junction to Ambient Air (Note 3) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	209	$^\circ\text{C/W}$
Power Dissipation (Note 4) @ $T_A = 25^\circ\text{C}$	$P_D$	1.2	mW
Thermal Resistance, Junction to Ambient Air (Note 4) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	104	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Notes:
1. No purposefully added lead.
  2. Diodes 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.
  4. Device mounted on FR-4 PCB with 1 inch<sup>2</sup> copper pad layout.

**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	20	—	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 5)	V <sub>(BR)CEO</sub>	20	—	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	6	—	—	V	I <sub>E</sub> = 100μA
Collector-Base Cutoff Current	I <sub>CBO</sub>	—	—	100	nA	V <sub>CB</sub> = 20V, I <sub>E</sub> = 0
Emitter-Base Cutoff Current	I <sub>EBO</sub>	—	—	100	nA	V <sub>EB</sub> = 6V, I <sub>C</sub> = 0
<b>ON CHARACTERISTICS (Note 5)</b>						
DC Current Gain	h <sub>FE</sub>	200	—	—	—	V <sub>CE</sub> = 2V, I <sub>C</sub> = 10mA
		200	330	—		V <sub>CE</sub> = 2V, I <sub>C</sub> = 500mA
		200	—	—		V <sub>CE</sub> = 2V, I <sub>C</sub> = 1A
		200	—	—		V <sub>CE</sub> = 2V, I <sub>C</sub> = 2A
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	—	—	10	mV	I <sub>C</sub> = 0.1A, I <sub>B</sub> = 10mA
		—	40	50		I <sub>C</sub> = 1.0A, I <sub>B</sub> = 100mA
		—	75	90		I <sub>C</sub> = 1.0A, I <sub>B</sub> = 10mA
		—	70	100		I <sub>C</sub> = 2.0A, I <sub>B</sub> = 200mA
Equivalent On-Resistance	R <sub>CE(SAT)</sub>	—	35	50	mΩ	I <sub>E</sub> = 2A, I <sub>B</sub> = 200mA
Base-Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	—	—	0.9	V	I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA
Base-Emitter Turn-on Voltage	V <sub>BE(ON)</sub>	—	—	0.9	V	V <sub>CE</sub> = 2V, I <sub>C</sub> = 1A
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	f <sub>T</sub>	150	—	—	MHz	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100mA, f = 100MHz
Output Capacitance	C <sub>obo</sub>	—	—	45	pF	V <sub>CB</sub> = 3V, f = 1MHz
Input Capacitance	C <sub>ibo</sub>	—	—	450	pF	V <sub>EB</sub> = 0.5V, f = 1MHz
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Time	t <sub>on</sub>	—	—	200	ns	V <sub>CC</sub> = 15V, I <sub>C</sub> = 750mA, I <sub>B1</sub> = 15mA
Delay Time	t <sub>d</sub>	—	—	100	ns	
Rise Time	t <sub>r</sub>	—	—	100	ns	
Turn-Off Time	t <sub>off</sub>	—	—	610	ns	V <sub>CC</sub> = 15V, I <sub>C</sub> = 750mA, I <sub>B1</sub> = I <sub>B2</sub> = 15mA
Storage Time	t <sub>s</sub>	—	—	500	ns	
Fall Time	t <sub>f</sub>	—	—	110	ns	

Notes: 5. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤2%.

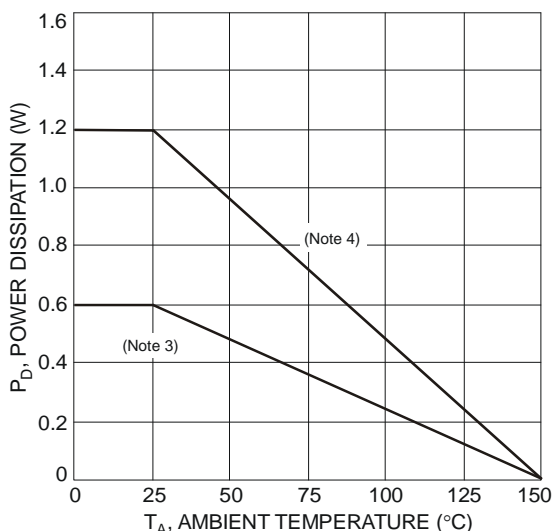


Fig. 1 Power Dissipation vs. Ambient Temperature

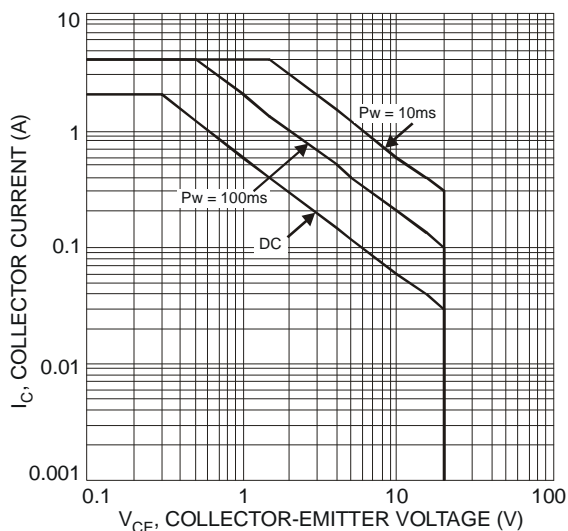


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage



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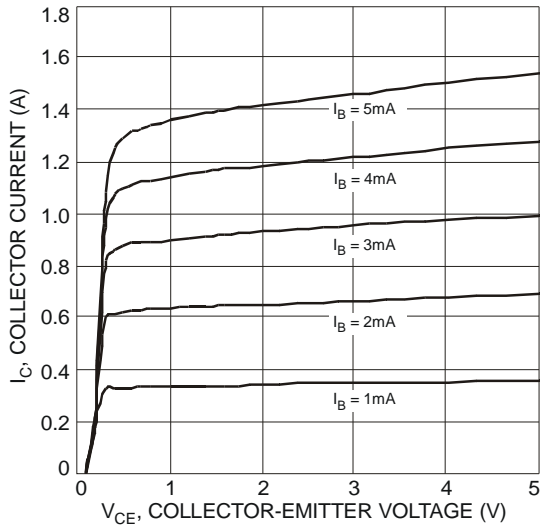


Fig. 3 Typical Collector Current vs. Collector-Emitter Voltage

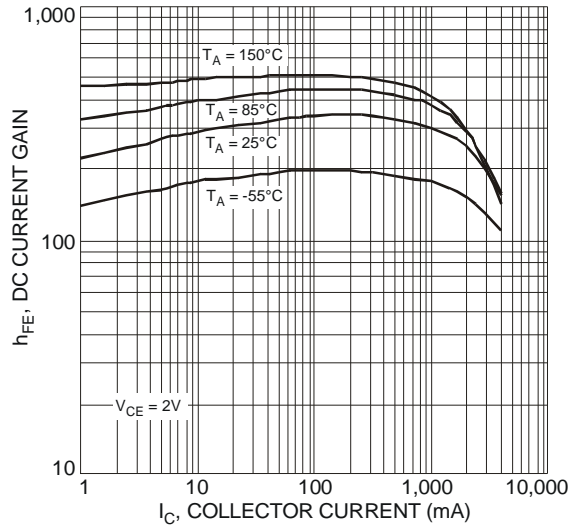


Fig. 4 Typical DC Current Gain vs. Collector Current

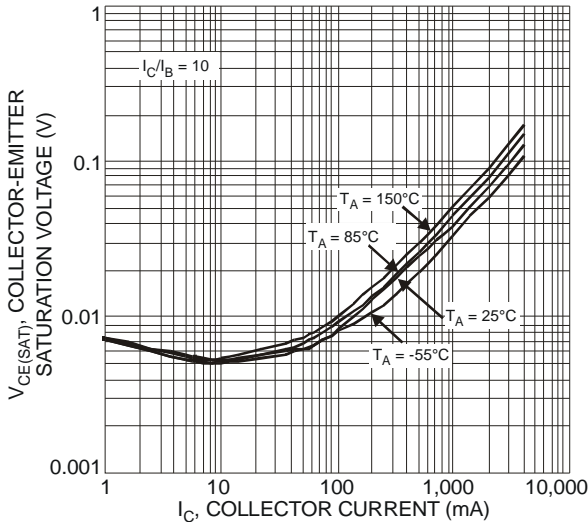


Fig. 5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

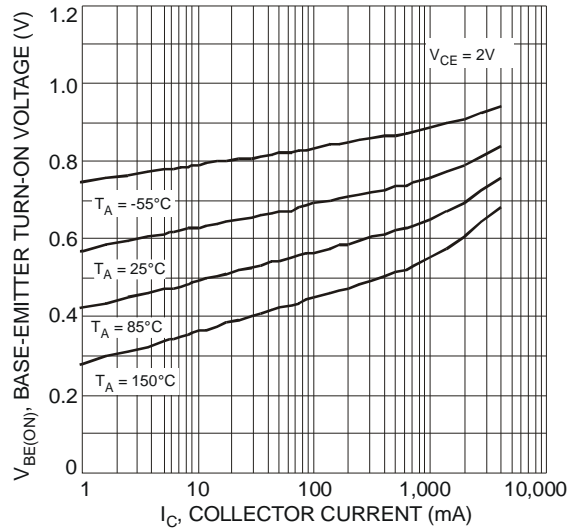


Fig. 6 Typical Base-Emitter Turn-On Voltage vs. Collector Current

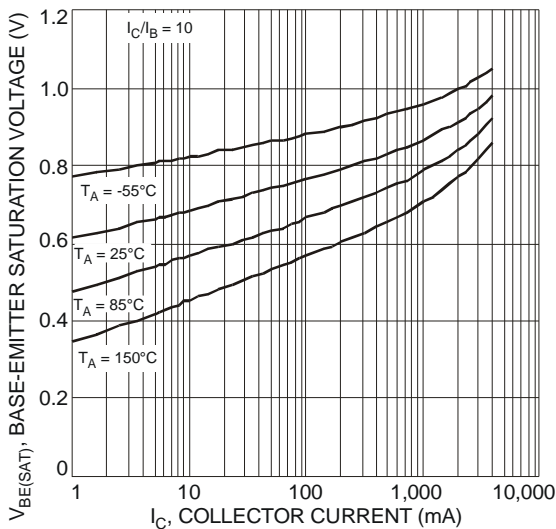


Fig. 7 Typical Base-Emitter Saturation Voltage vs. Collector Current

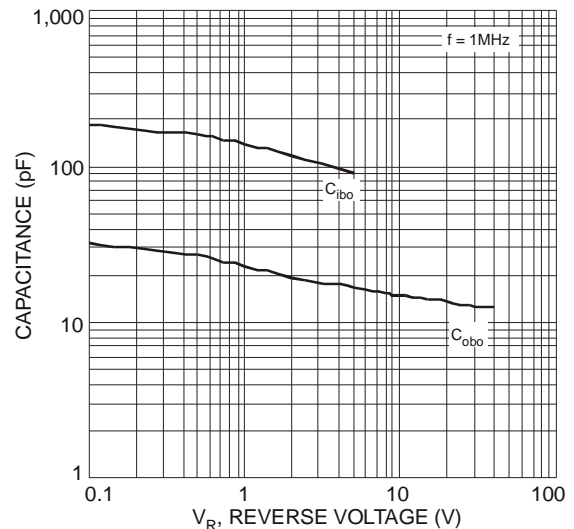


Fig. 8 Typical Capacitance Characteristics



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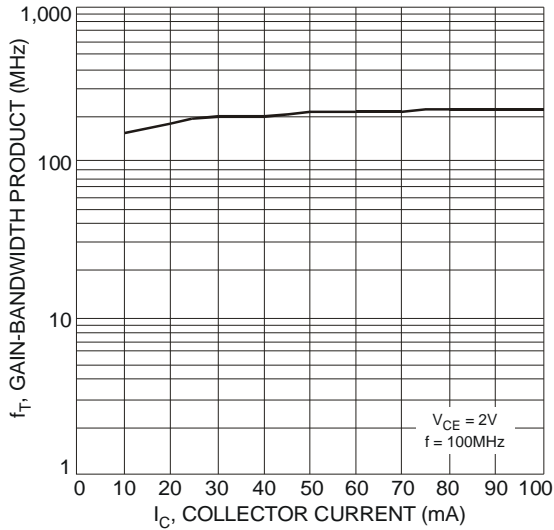


Fig. 9 Typical Gain-Bandwidth Product vs. Collector Current

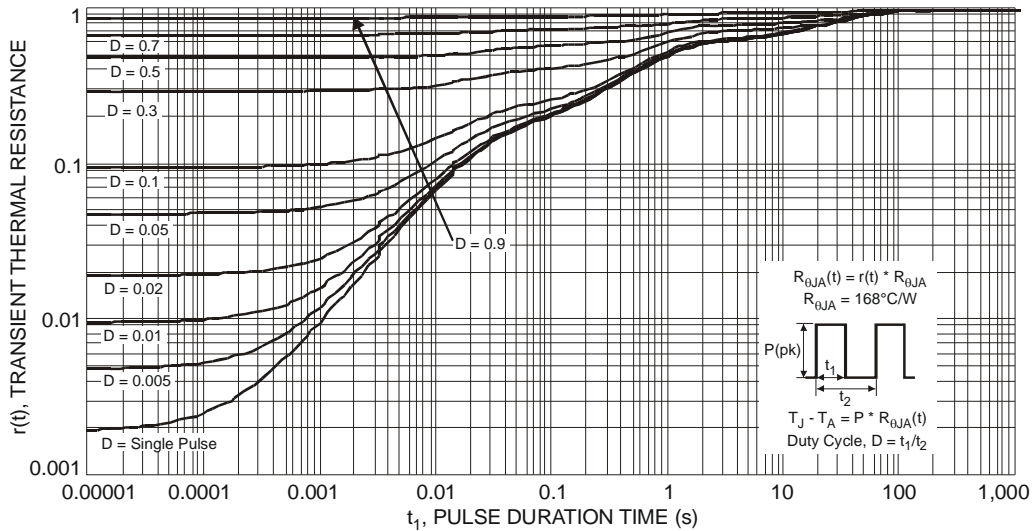


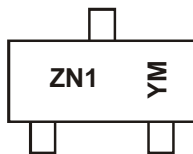
Fig. 10 Transient Thermal Response

**Ordering Information** (Note 6)

Part Number	Case	Packaging
DSS20201L-7	SOT-23	3000/Tape & Reel

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



ZN1 = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: V = 2008)  
M = Month (ex: 9 = September)

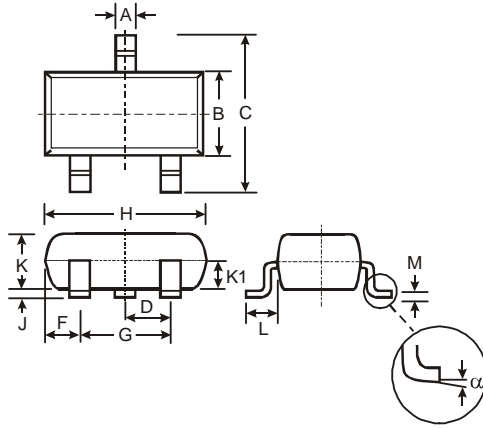
Date Code Key

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

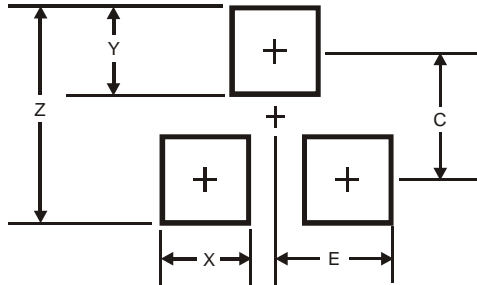
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

**Package Outline Dimensions**



SOT-23			
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
alpha	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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