

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

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of Automotive Applications.

**Features**

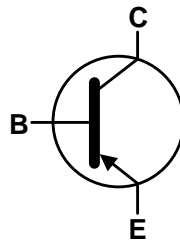
- $BV_{CEO} > -20V$
- $I_C = -2A$  Continuous Collector Current
- $I_{CM} = -3A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(SAT)} < -150mV @ -1A$
- $R_{CE(SAT)} = 113m\Omega$  for a Low Equivalent On-Resistance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

**Mechanical Data**

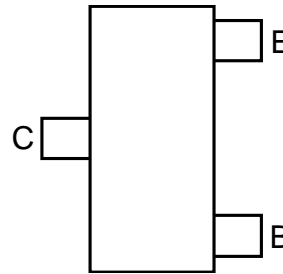
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 <sup>Ⓔ</sup>
- Weight 0.008 grams (Approximate)



Top View



Device Symbol

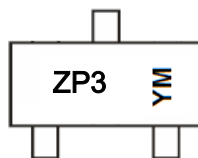


Top View Pin-Out

**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DSS5220TQ-7	Automotive	ZP3	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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

**Marking Information**


ZP3 = Product Type Marking Code (See Table Above)  
 YM = Date Code Marking  
 Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

## Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Code	C	D	E	F	G	H	I	J	K	L	M	N

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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-20	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-20	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Peak Pulse Collector Current	I <sub>CM</sub>	-3	A
Continuous Collector Current	I <sub>C</sub>	-2	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 6) 600	mW
		(Note 7) 1.2	W
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	(Note 6) 209	°C/W
		(Note 7) 104	
Thermal Resistance, Junction to Leads	(Note 8) R <sub>θJL</sub>	75	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 9)

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 on minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  7. Same as note 6, except mounted on 25mm x 25mm 1oz copper.
  8. Thermal resistance from junction to solder-point (at the end of collector lead).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating information**

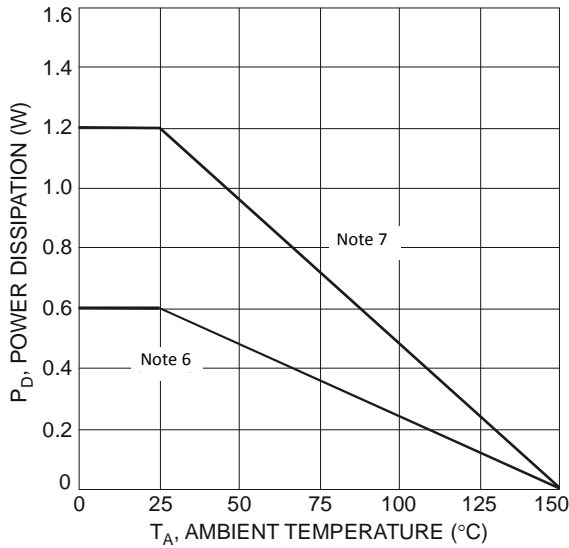


Figure 1 Power Dissipation vs. Ambient Temperature

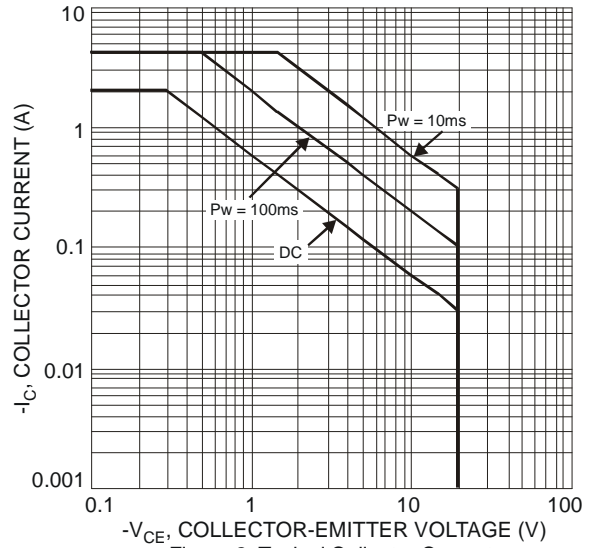


Figure 2 Typical Collector Current vs. Collector-Emitter Voltage

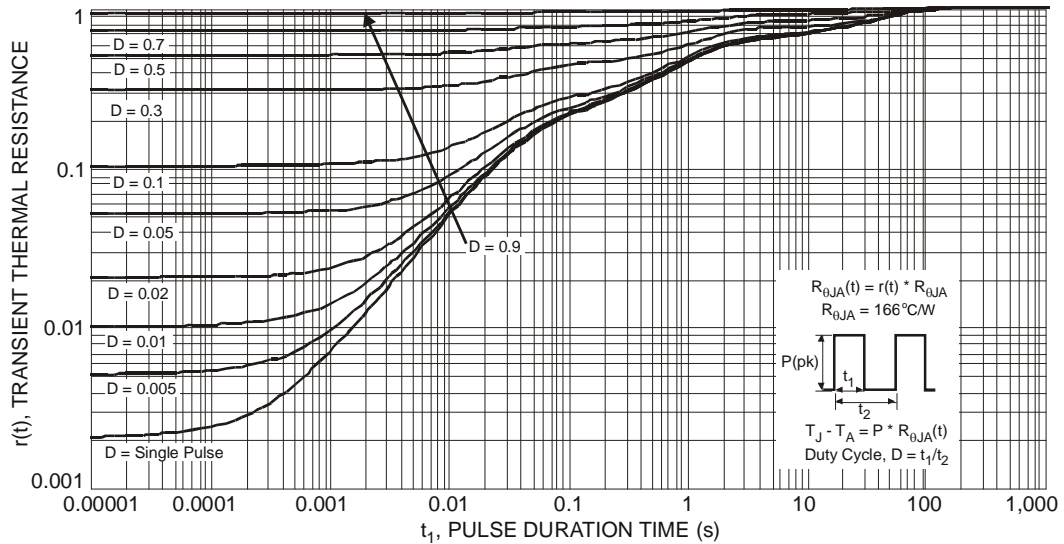


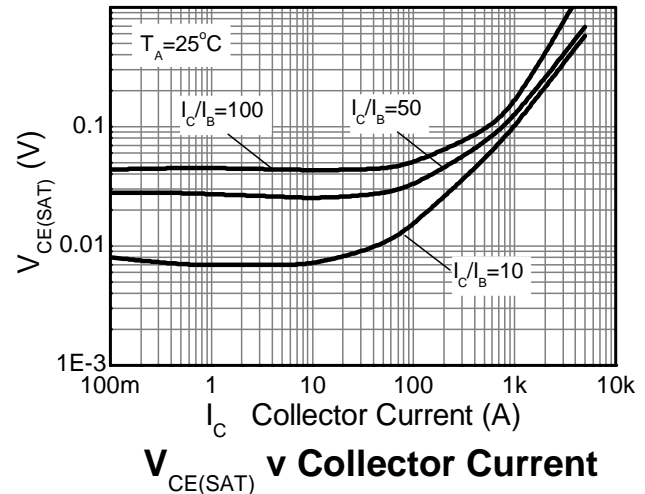
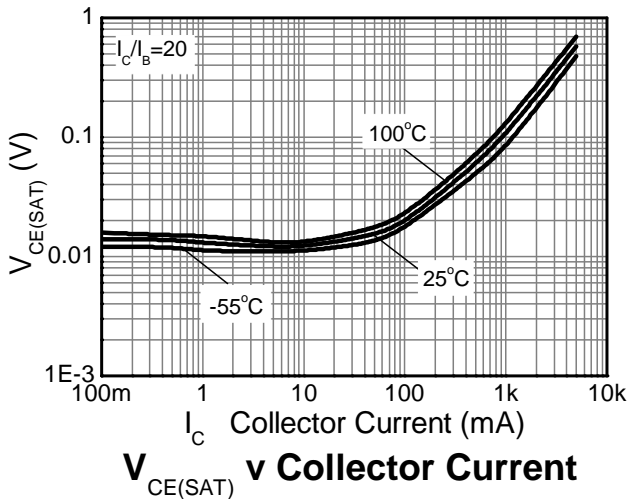
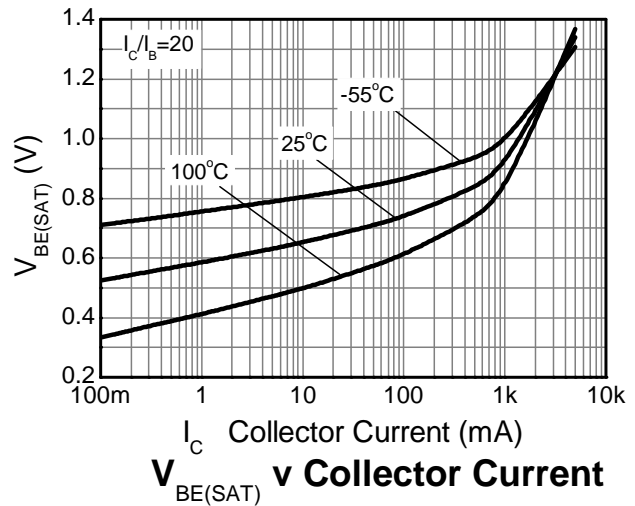
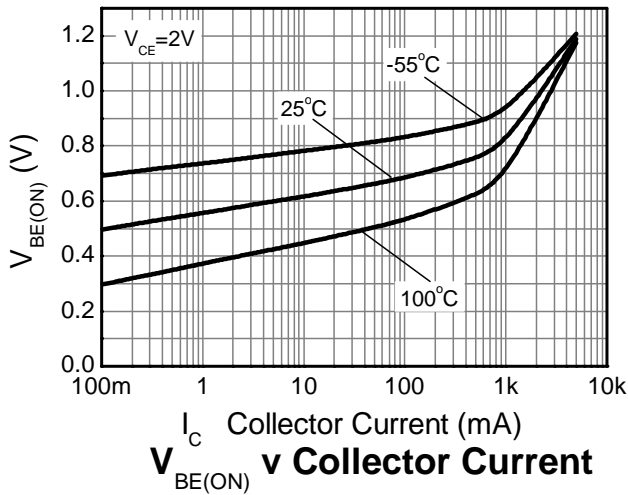
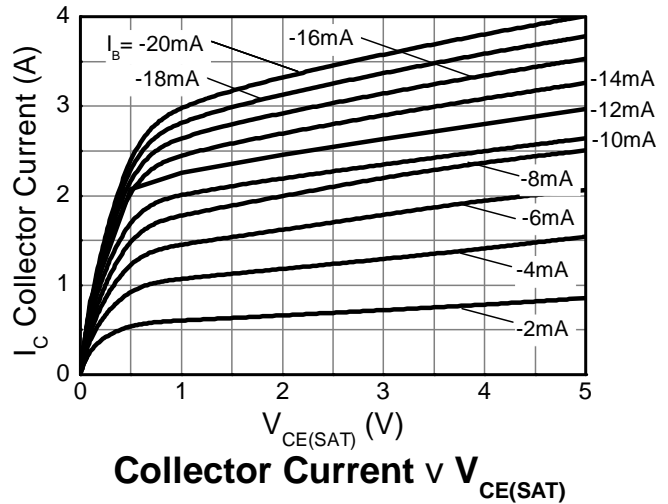
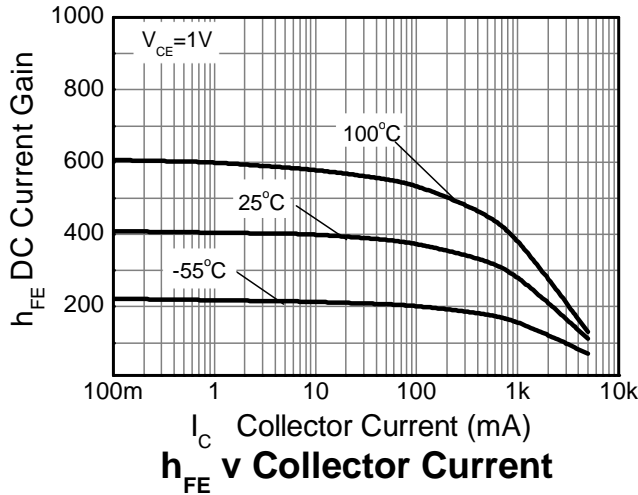
Figure 3 Transient Thermal Response

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-20	—	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CEO</sub>	-20	—	—	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7	—	—	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
				-50	μA	V <sub>CB</sub> = -20V, I <sub>E</sub> = 0, T <sub>J</sub> = +150°C
Emitter-Base Cutoff Current	I <sub>EBO</sub>	—	—	-100	nA	V <sub>EB</sub> = -6V, I <sub>C</sub> = 0
<b>ON CHARACTERISTICS (Note 10)</b>						
DC Current Gain	h <sub>FE</sub>	225	—	—	—	V <sub>CE</sub> = -2V, I <sub>C</sub> = -100mA
		225	—	—		V <sub>CE</sub> = -2V, I <sub>C</sub> = -500mA
		200	—	—		V <sub>CE</sub> = -2V, I <sub>C</sub> = -1A
		150	—	—		V <sub>CE</sub> = -2V, I <sub>C</sub> = -2A
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	—	—	-80	mV	I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA
		—	—	-150		I <sub>C</sub> = -1A, I <sub>B</sub> = -50mA
		—	—	-250		I <sub>C</sub> = -2A, I <sub>B</sub> = -100mA
		—	—	-225		I <sub>C</sub> = -2A, I <sub>B</sub> = -200mA
Equivalent On-Resistance	R <sub>CE(SAT)</sub>	—	—	113	mΩ	I <sub>C</sub> = -2A, I <sub>B</sub> = -200mA
Base-Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	—	—	-1.1	V	I <sub>C</sub> = -2A, I <sub>B</sub> = -100mA
Base-Emitter Turn-on Voltage	V <sub>BE(ON)</sub>	—	—	-1.2	V	V <sub>CE</sub> = -2V, I <sub>C</sub> = -1A
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	f <sub>t</sub>	100	—	—	MHz	V <sub>CE</sub> = -5V, I <sub>C</sub> = -100mA, f = 100MHz
Collector-Base Capacitance	C <sub>cbo</sub>	—	—	50	pF	V <sub>CB</sub> = -10V, f = 1MHz

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

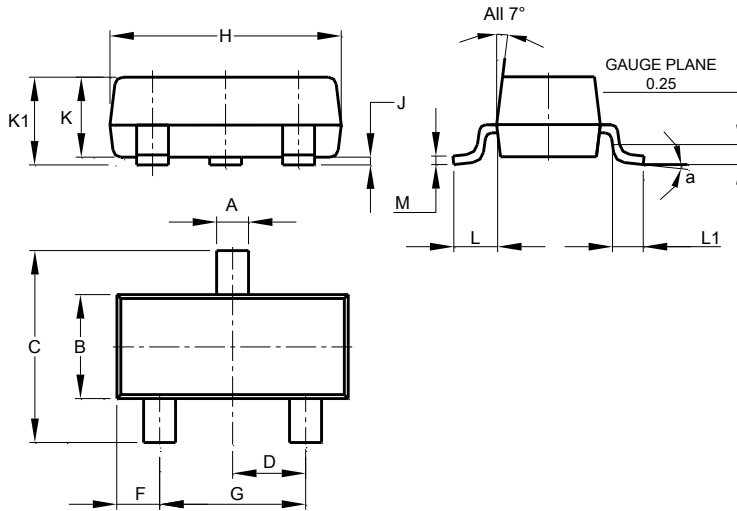
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT23**

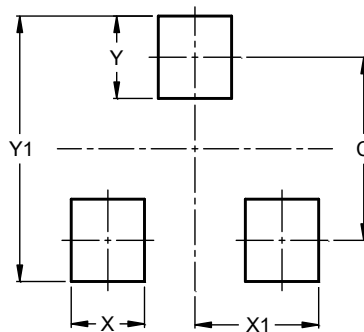


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT23**



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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