20V PNP LOW SATURATION TRANSISTOR IN SOT23

Features

- BV_{CEO} > -20V
- I_C = -2A Continuous Collector Current
- I_{CM} = -3A Peak Pulse Current
- Low Saturation Voltage $V_{CE(sat)}$ < -150mV @ -1A
- $R_{CE(sat)}$ = 113mΩ for a Low Equivalent On-Resistance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**
- **An Automotive-Compliant Part is Available Under Separate Datasheet (DSS5220TQ)**

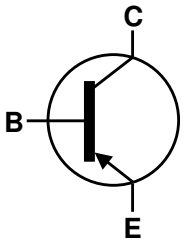
Mechanical Data

- Package: SOT23
- Package 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 (e3)
- Weight: 0.008 grams (Approximate)

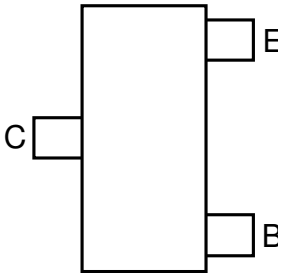
SOT23



Top View



Device Symbol



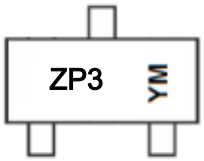
Top View
Pin-Out

Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DSS5220T-7	Standard	ZP3	7	8	3,000
DSS5220T-13	Standard	ZP3	13	8	10,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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 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: J = 2022)
M = Month (ex: 9 = September)

Date Code Key

Year	2016	……	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	D	……	I	J	K	L	M	N	O	P	R	S

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

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Absolute Maximum Ratings (@T_A = +25°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}	-3	A
Continuous Collector Current	I_C	-2	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	600	mW
	(Note 6)		1.2	W
Thermal Resistance, Junction to Ambient Air	(Note 5)	$R_{\theta JA}$	209	°C/W
	(Note 6)		104	
Thermal Resistance, Junction to Leads	(Note 7)	$R_{\theta JL}$	75	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°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 FR-4 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.

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Thermal Characteristics and Derating information

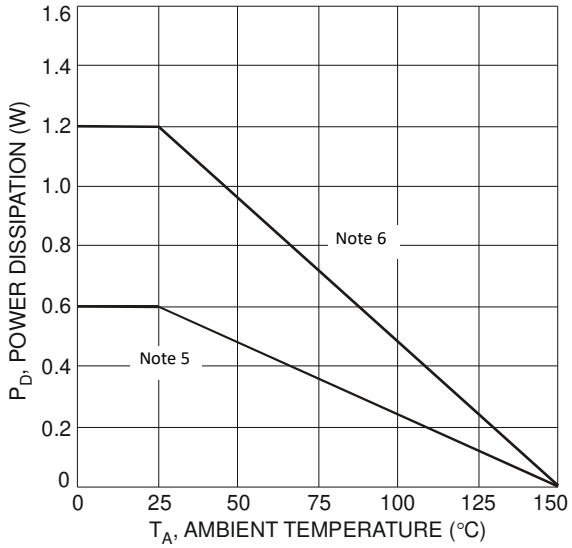


Figure 1 Power Dissipation vs. Ambient Temperature

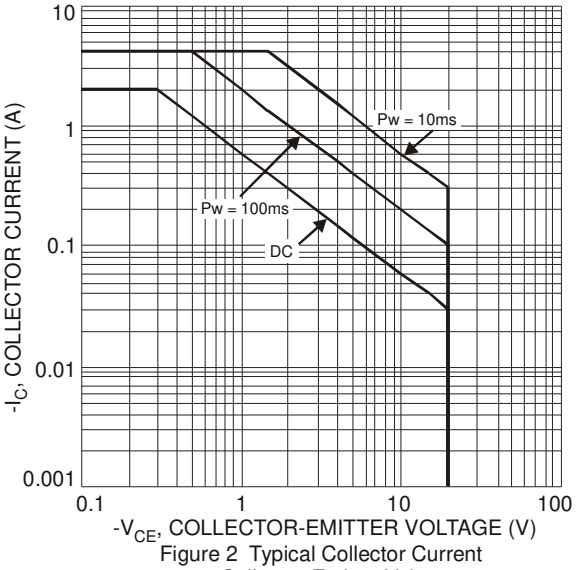


Figure 2 Typical Collector Current vs. Collector-Emitter Voltage

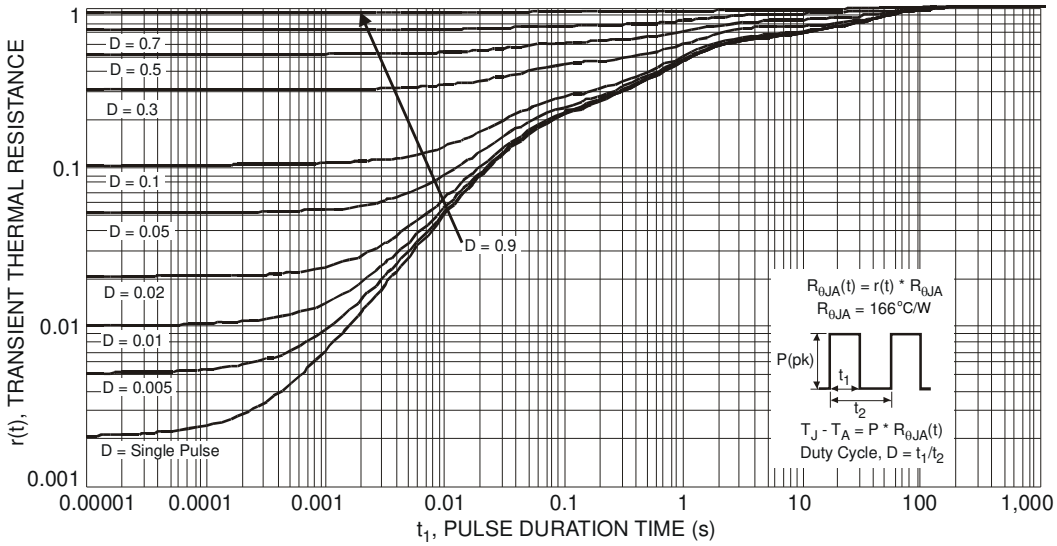


Figure 3 Transient Thermal Response

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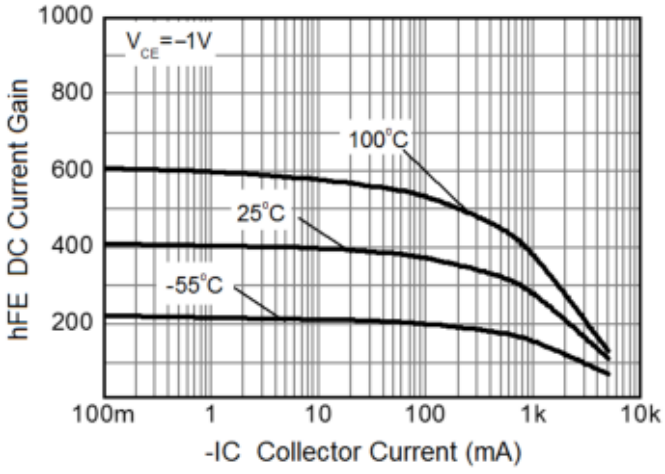
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	-20	—	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	-20	—	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	—	—	V	I_E = -100µA
Collector-Base Cutoff Current	I_{CBO}	—	—	-100	nA	V_{CB} = -20V, I_E = 0
				-50	µA	V_{CB} = -20V, I_E = 0, T_J = +150°C
Emitter-Base Cutoff Current	I_{EBO}	—	—	-100	nA	V_{EB} = -6V, I_C = 0
ON CHARACTERISTICS (Note 9)						
DC Current Gain	h_{FE}	225	—	—	—	V_{CE} = -2V, I_C = -100mA
		225	—	—		V_{CE} = -2V, I_C = -500mA
		200	—	—		V_{CE} = -2V, I_C = -1A
		150	—	—		V_{CE} = -2V, I_C = -2A
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	-80	mV	I_C = -500mA, I_B = -50mA
		—	—	-150		I_C = -1A, I_B = -50mA
		—	—	-250		I_C = -2A, I_B = -100mA
		—	—	-225		I_C = -2A, I_B = -200mA
Equivalent On-Resistance	$R_{CE(sat)}$	—	—	113	mΩ	I_C = -2A, I_B = -200mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	-1.1	V	I_C = -2A, I_B = -100mA
Base-Emitter Turn-on Voltage	$V_{BE(on)}$	—	—	-1.2	V	V_{CE} = -2V, I_C = -1A
SMALL SIGNAL CHARACTERISTICS						
Transition Frequency	f_T	100	—	—	MHz	V_{CE} = -5V, I_C = -100mA, f = 100MHz
Collector-Base Capacitance	C_{cbo}	—	—	50	pF	V_{CB} = -10V, f = 1MHz
Turn-On Time	t_{on}	—	190	—	ns	V_{CC} = -10V, I_C = -100mA, I_{B1} = -I_{B2} = -10mA
Delay Time	t_d	—	108	—	ns	
Rise Time	t_r	—	82	—	ns	
Turn-Off Time	t_{off}	—	205	—	ns	
Storage Time	t_s	—	156	—	ns	
Fall Time	t_f	—	49	—	ns	

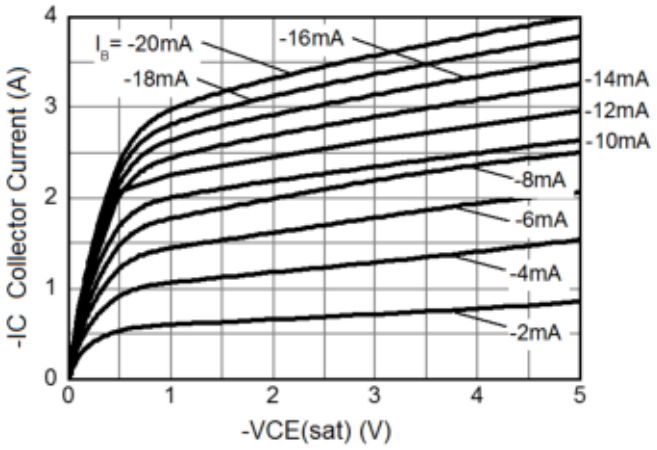
Note: 9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

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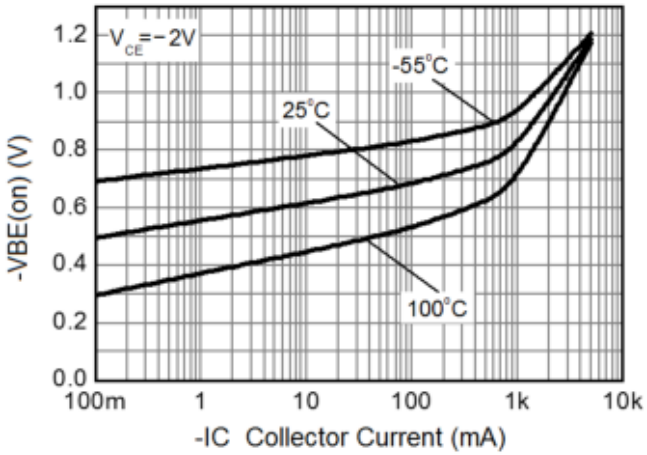
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



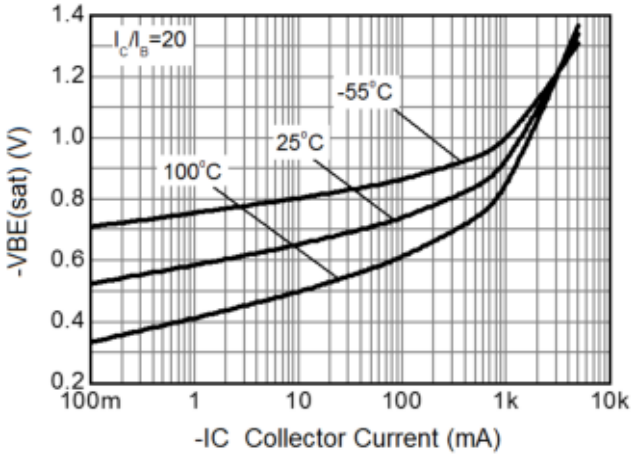
h_{FE} vs I_C



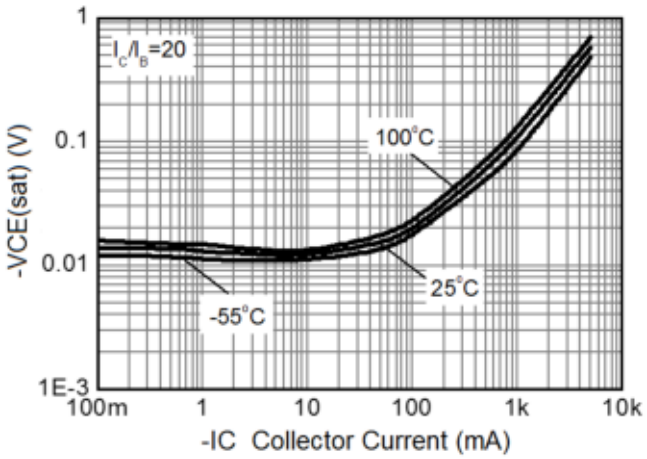
$V_{CE(sat)}$ vs I_C



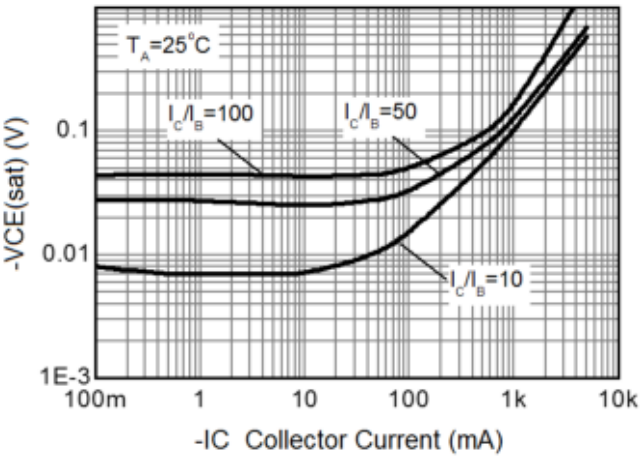
$V_{BE(on)}$ vs I_C



$V_{BE(sat)}$ vs I_C



$V_{CE(sat)}$ vs I_C



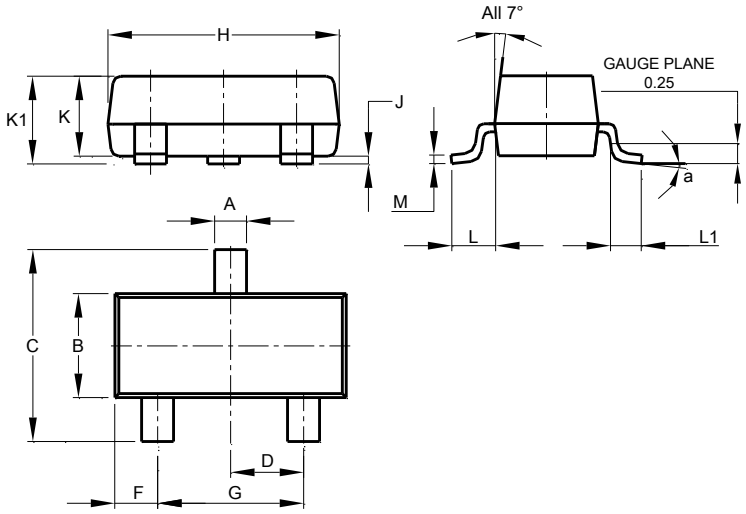
$V_{CE(sat)}$ vs I_C

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Package Outline Dimensions

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

SOT23

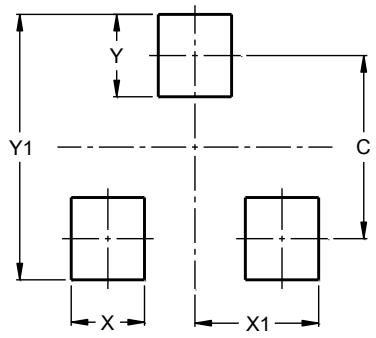


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

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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