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)**
- **The DSS5220TQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

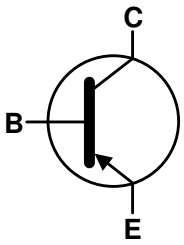
Mechanical Data

- 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)

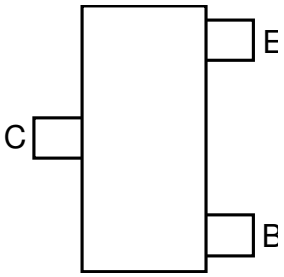
SOT23



Top View



Device Symbol



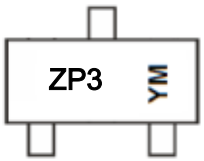
Top View
Pin-Out

Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
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) & 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	2015	……	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	C	……	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

© Diodes Incorporated

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.

© Diodes Incorporated

Thermal Characteristics and Derating information

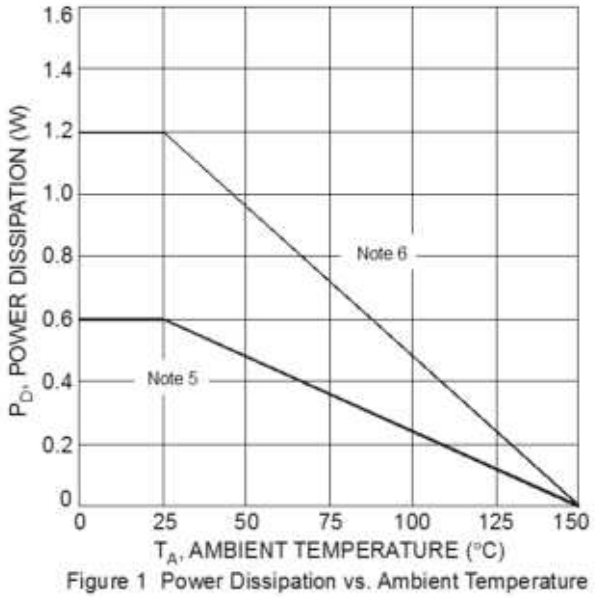


Figure 1 Power Dissipation vs. Ambient Temperature

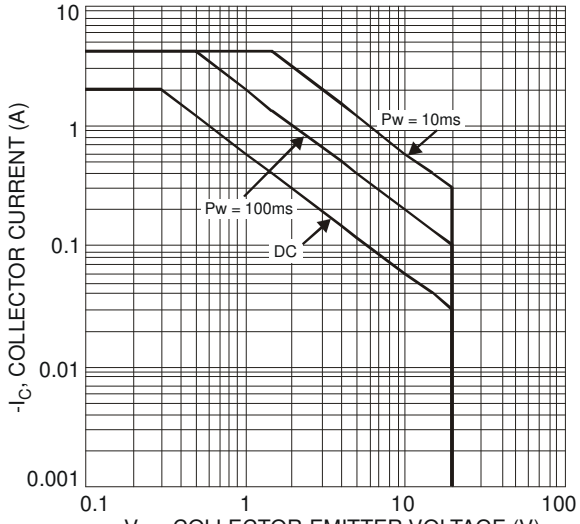


Figure 2 Typical Collector Current vs. Collector-Emitter Voltage

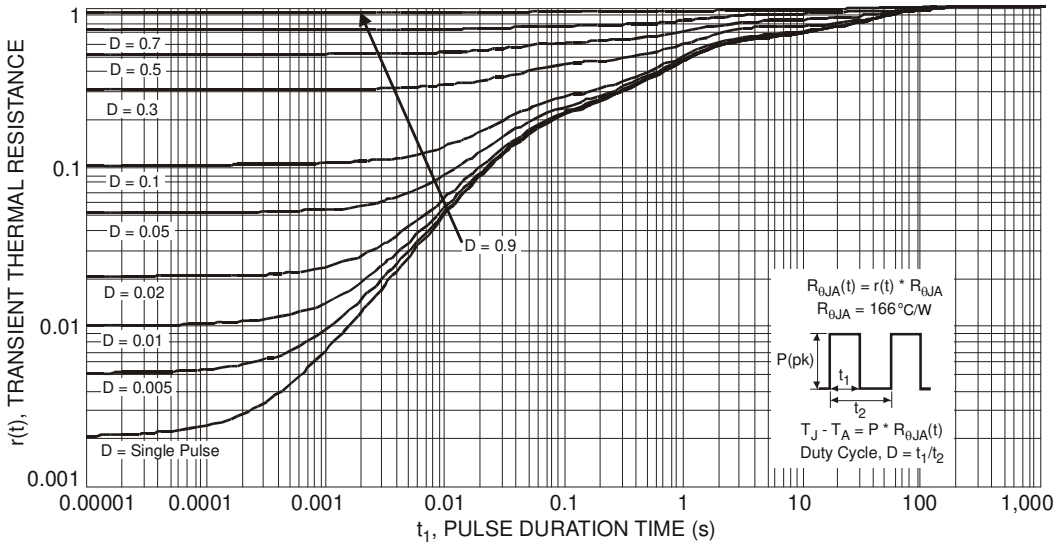


Figure 3 Transient Thermal Response

© Diodes Incorporated

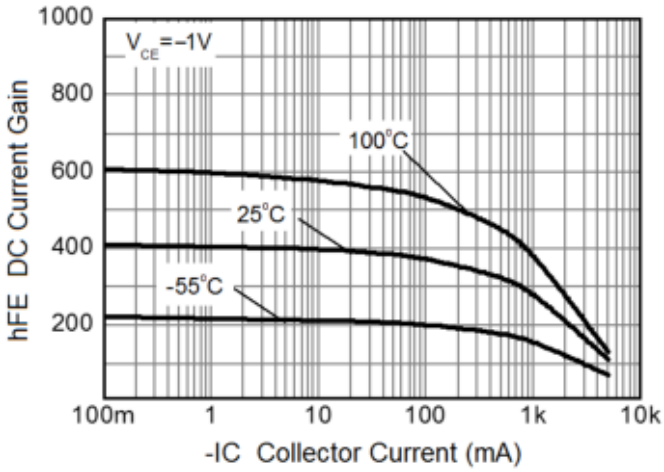
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

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
Delay Time	t_d	—	108	—	ns	V_{CC} = -10V, I_C = -100mA, I_{B1} = -I_{B2} = -10mA
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	
Delay Time	t_d	—	108	—	ns	

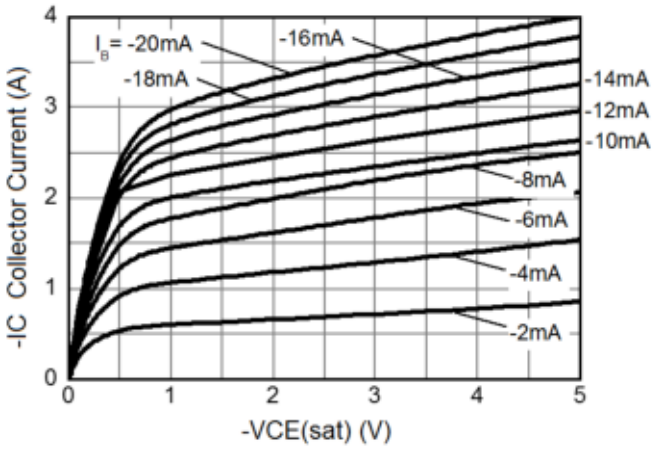
Note: 9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

© Diodes Incorporated

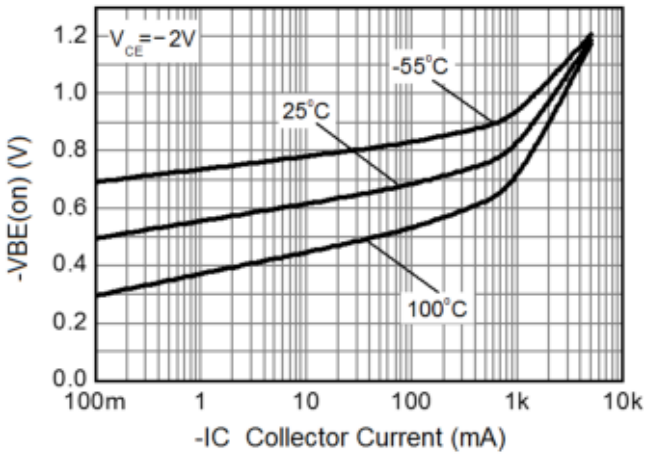
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



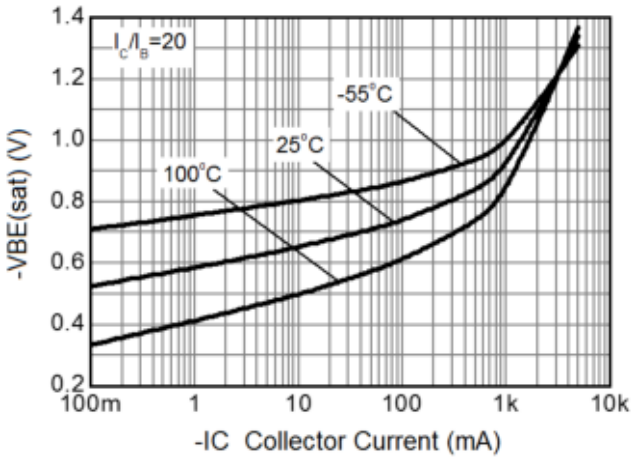
h_{FE} vs I_C



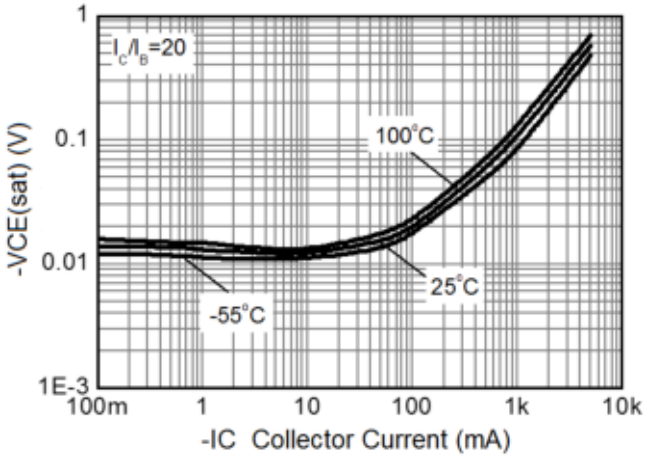
$V_{CE(sat)}$ vs I_C



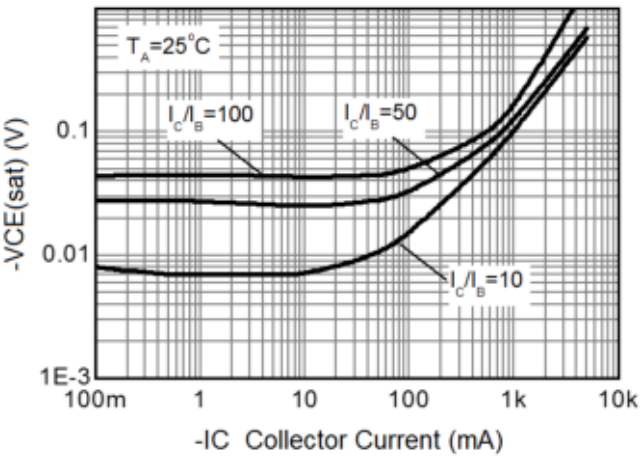
$V_{BE(on)}$ vs I_C



$V_{BE(sat)}$ vs I_C



$V_{CE(sat)}$ vs I_C



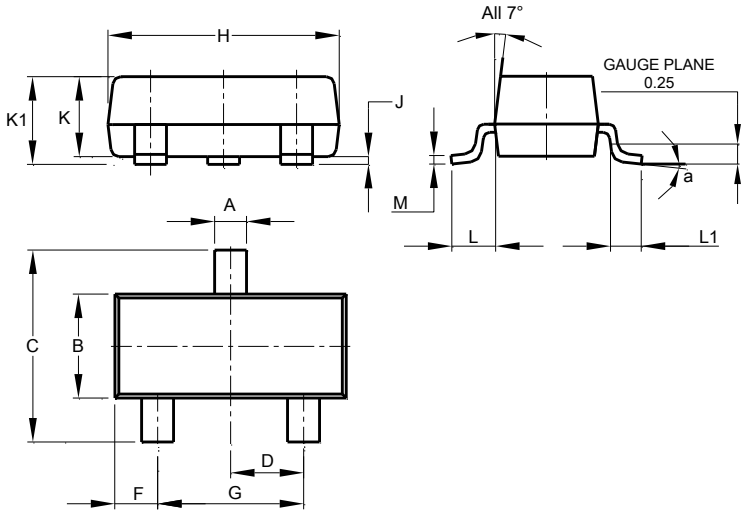
$V_{CE(sat)}$ vs I_C

© Diodes Incorporated

Package Outline Dimensions

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

SOT23

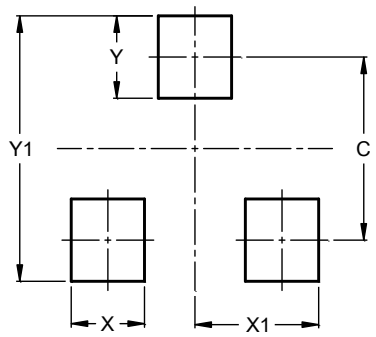


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

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

© Diodes Incorporated

IMPORTANT NOTICE

1. DIODES INCORPORATED AND ITS SUBSIDIARIES ("DIODES") MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes products. Diodes products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of the Diodes products for their intended applications, (c) ensuring their applications, which incorporate Diodes products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

Copyright © 2022 Diodes Incorporated

www.diodes.com