50V PNP MEDIUM POWER TRANSISTOR IN SOT23

Description

Advanced process capabilities and package design have been used to maximize the power handling and performance of this small outline transistor. The compact size and ratings of this device make it ideally suited to applications where space is at a premium.

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)

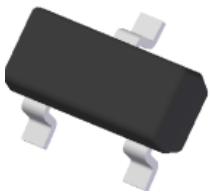
Features

- BV_{CEO} > -50V
- I_C = -5A High Continuous Collector Current
- I_{CM} = -10A Peak Pulse Current
- Low Saturation Voltage -60mV max @ I_C = -1A
- $R_{CE(sat)}$ = 30mΩ
- 1.2W Power Dissipation
- Complimentary NPN Type: ZXTN2031F
- **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-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**

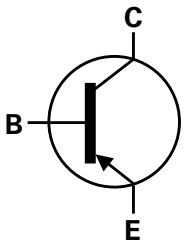
Application

- MOSFET and IGBT gate driving
- Motor drives
- Relays, lamps, and solenoid drives
- High-side switches
- DC-DC converters

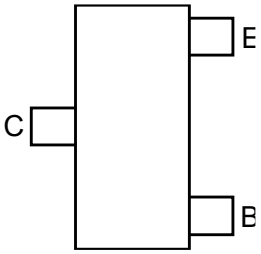
SOT23 (Type DN)



Top View



Device Symbol



Top View
Pinout

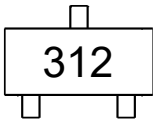
Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
ZXTP2025FTA	SOT23 (Type DN)	312	7	8	3,000	Reel

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

SOT23 (Type DN)



312 = Product Type Marking Code

Absolute Maximum Ratings (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-50	V
Collector-Emitter Voltage	V_{CEO}	-50	V
Emitter-Base Voltage	V_{EBO}	-7	V
Peak Pulse Collector Current	I_{CM}	-10	A
Continuous Collector Current	I_C	-5	A
Base Current	I_B	-1.2	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	1.0	W
Power Dissipation (Note 6)	P_D	1.2	W
Power Dissipation (Note 7)	P_D	1.56	W
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	125	°C/W
Thermal Resistance, Junction to Ambient Air (Note 6)	$R_{\theta JA}$	104	°C/W
Thermal Resistance, Junction to Ambient Air (Note 7)	$R_{\theta JA}$	80	°C/W
Thermal Resistance, Junction to Case (Note 5)	$R_{\theta JC}$	32	°C/W
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
Electrostatic Discharge – Charged Device Model	ESD CDM	1,000	V	IV

Notes:
5. For a device mounted with the collector lead on 18mm x 18mm 2oz 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 the device is mounted on 30mm x 30mm 2oz copper.
7. Same as Note 6, except measured at t < 5secs.
8. Refer to JEDEC specifications JESD22-A114, JESD22-A115 & JESD22-C101.

Thermal Characteristics and Derating Information

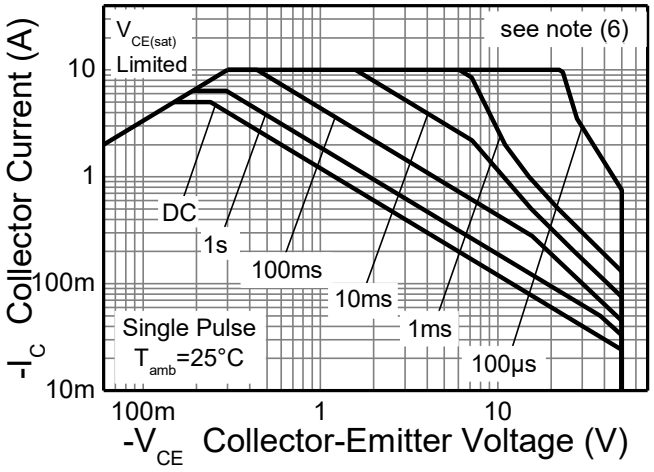


Fig 1. Safe Operating Area

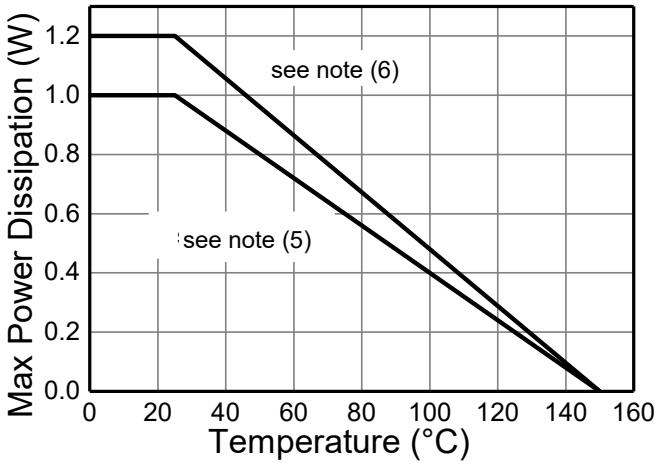


Fig 2. Derating Curve

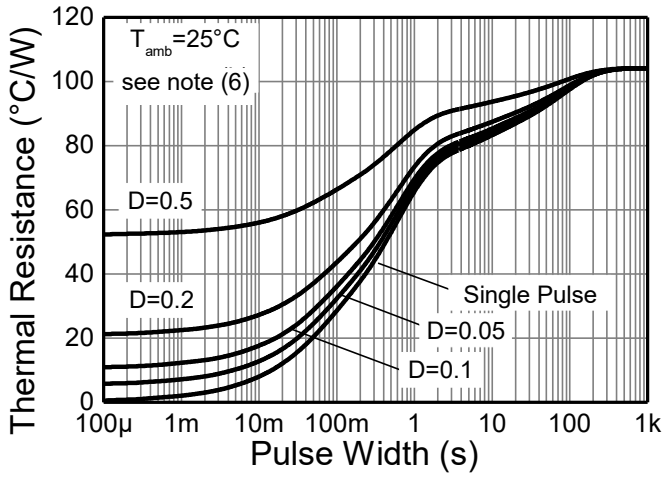


Fig 3. Transient Thermal Impedance

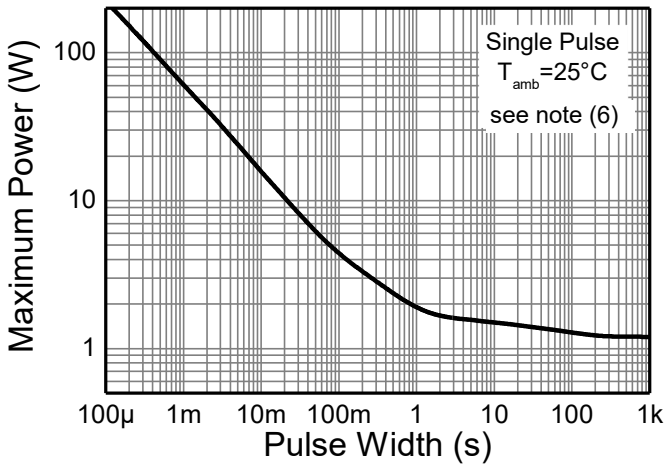


Fig 4. Pulse Power Dissipation

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}	-50	-100	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	-50	-70	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-7.0	-8.2	—	V	I_E = -100µA
Collector-Emitter Cutoff Current	I_{CEV}	—	—	-20	nA	V_{CE} = -40V, V_{BE} = 1V
Collector-Base Cutoff Current	I_{CBO}	—	—	-20	nA	V_{CB} = -40V, I_E = 0
Emitter-Base Cutoff Current	I_{EBO}	—	—	-10	nA	V_{EB} = -6V, I_C = 0
ON CHARACTERISTICS (Note 9)						
DC Current Gain	h_{FE}	180	380	—	—	V_{CE} = -2V, I_C = -10mA
		200	350	560		V_{CE} = -2V, I_C = -500mA
		70	120	—		V_{CE} = -2V, I_C = -5A
		12	30	—		V_{CE} = -2V, I_C = -10A
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	-11	-20	mV	I_C = -100mA, I_B = -10mA
		—	-40	-60		I_C = -1A, I_B = -100mA
		—	-150	-230		I_C = -2A, I_B = -40mA
		—	-150	-200		I_C = -5A, I_B = -500mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	— —	-0.81 -0.95	-0.88 -1.05	V	I_C = -2A, I_B = -40mA I_C = -5A, I_B = -500mA
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	-0.82	-0.92	V	V_{CE} = -2V, I_C = -5A
SMALL-SIGNAL CHARACTERISTICS						
Switching Time	t_d	—	14	—	ns	V_{CC} = -12V, I_C = -2.5A, I_{B1} = -I_{B2} = -125mA
	t_r	—	23	—		
	t_s	—	240	—		
	t_f	—	30	—		
Transition Frequency	f_T	—	190	—	MHz	V_{CE} = -10V, I_C = -500mA, f = 50MHz
Output Capacitance	C_{obo}	—	42	—	pF	V_{CB} = -10V, f = 1MHz

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

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

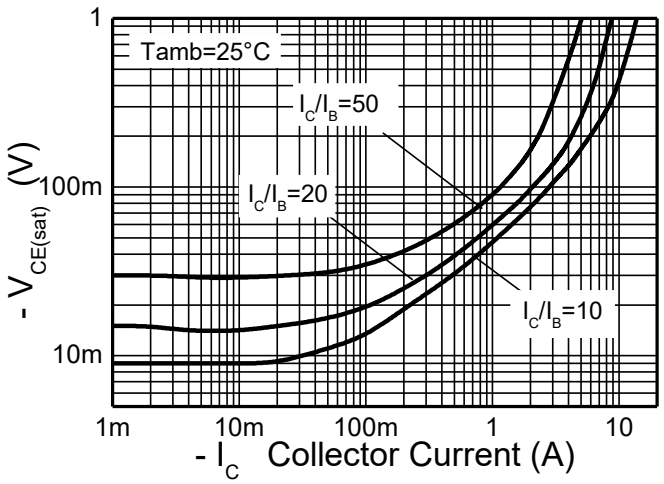


Fig 5. $V_{CE(sat)}$ v I_C

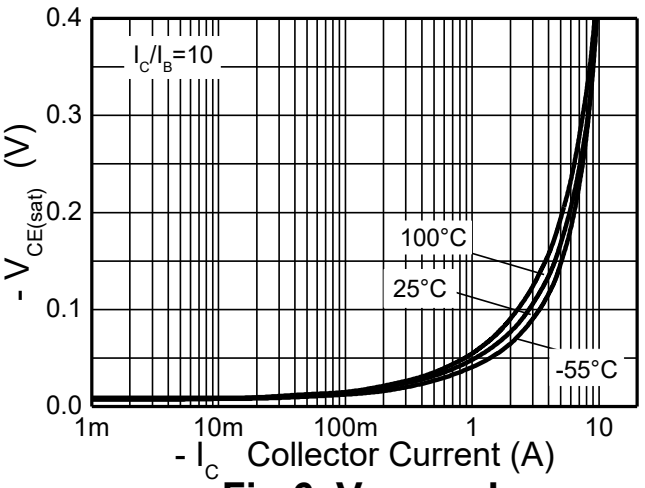


Fig 6. $V_{CE(sat)}$ v I_C

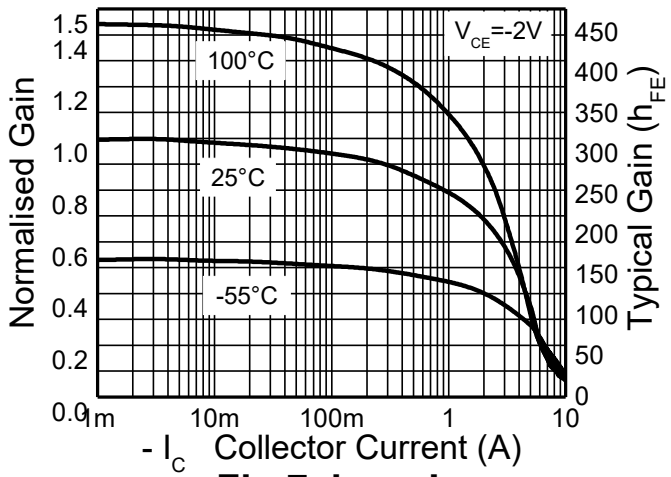


Fig 7. h_{FE} v I_C

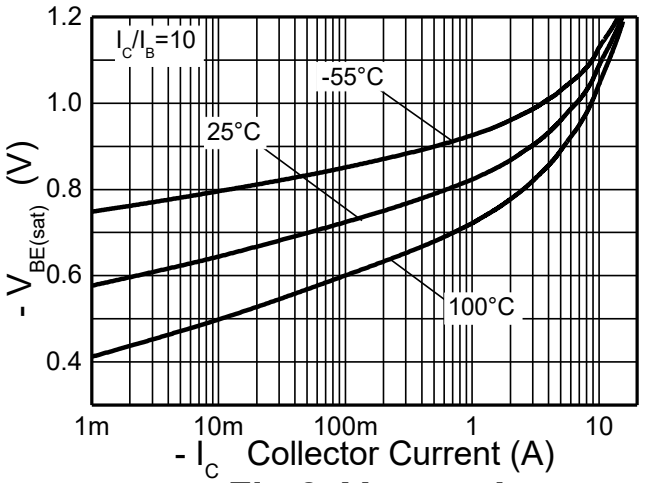


Fig 8. $V_{BE(sat)}$ v I_C

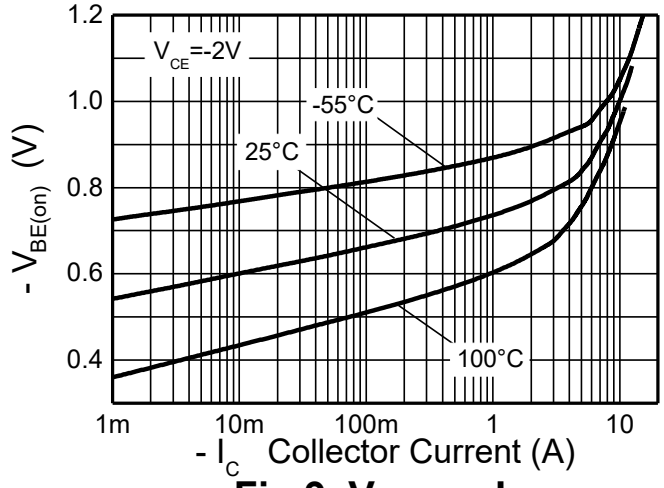
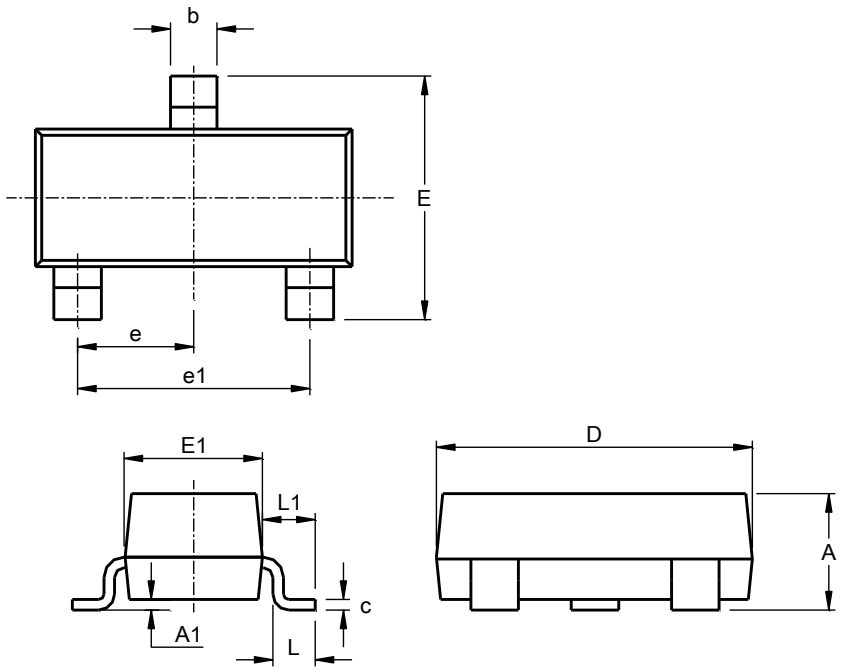


Fig 9. $V_{BE(on)}$ v I_C

Package Outline Dimensions

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

SOT23 (Type DN)

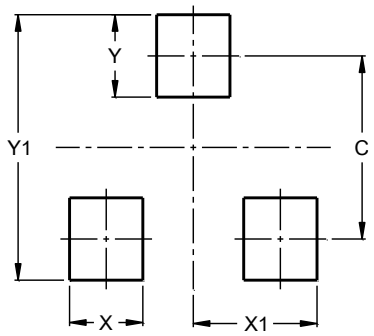


SOT23 Type DN			
Dim	**Min**	**Max**	**Typ**
A	0.89	1.12	1.00
A1	0.01	0.10	0.05
b	0.30	0.51	0.45
c	0.08	0.20	0.10
D	2.80	3.04	3.00
E	2.10	2.64	2.42
E1	1.20	1.40	1.37
e	0.95 REF		
e1	1.90 REF		
L	0.25	0.60	0.30
L1	0.45	0.62	0.54
All Dimensions in mm			

Suggested Pad Layout

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

SOT23 (Type DN)



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

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