50V NPN LOW SATURATION SWITCHING TRANSISTOR

Features

- BV_{CEO} > 50V
- I_C = 4A Continuous Collector Current
- I_{CM} = 10A Peak Pulse Current
- $R_{CE(SAT)}$ = 36mΩ for a Low Equivalent On-Resistance
- Low Saturation Voltage (100mV max @ 1A)
- h_{FE} Characterized up to 10A
- **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)**

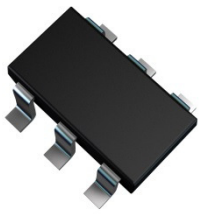
Mechanical Data

- Case: SOT26
- 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 e3
- Weight: 0.015 grams (Approximate)

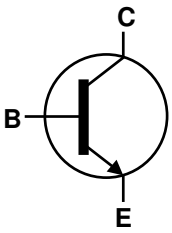
Applications

- DC–DC Converters
- Power Management Functions
- Power Switches
- Motor Control

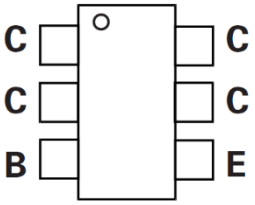
SOT26



Top View



Device Symbol



Top View
Pin-Out

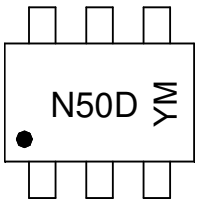
Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXT13N50DE6TA	AEC-Q101	N50D	7	8	3,000
ZXT13N50DE6TC	AEC-Q101	N50D	13	8	10,000
ZXT13N50DE6QTA	Automotive	N50D	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 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. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information

SOT26



N50D = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: C = 2015)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

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

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_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	100	V
Collector-Emitter Voltage	V_{CEO}	50	V
Emitter-Base Voltage	V_{EBO}	7.5	V
Base Current	I_B	500	mA
Continuous Collector Current	I_C	4	A
Peak Pulse Collector Current	I_{CM}	10	A

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

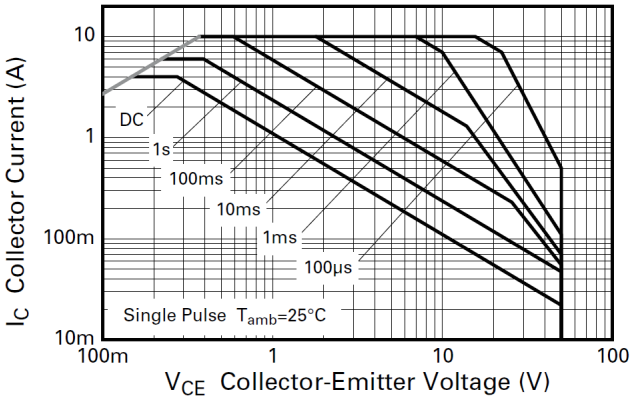
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 6)	P_D	1.1 8.8	W mW/°C
	(Note 7)		1.7 13.6	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	113	°C/W
	(Note 7)		73	
Thermal Resistance, Junction to Lead	(Note 8)	$R_{\theta JL}$	18.6	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 9)

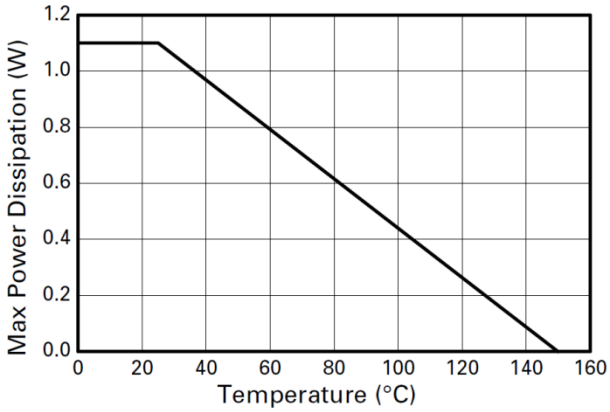
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
6. For a device mounted with the collector lead on 25mm x 25mm 1oz copper that is on single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
7. Same as Note 6, except the device is measured at t ≤ 5 sec.
8. Thermal resistance from junction to solder-point (at the end of the collector lead).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

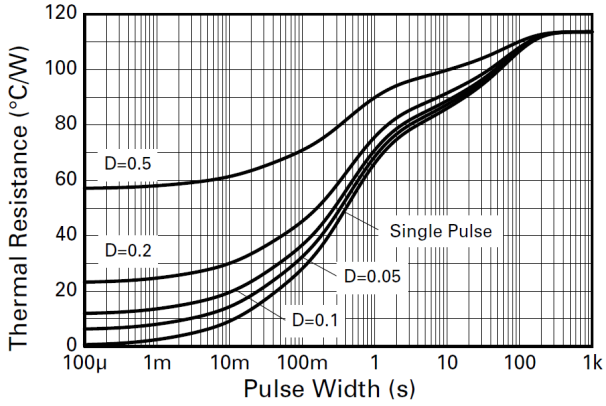
Thermal Characteristics and Derating Information



Safe Operating Area



Derating Curve



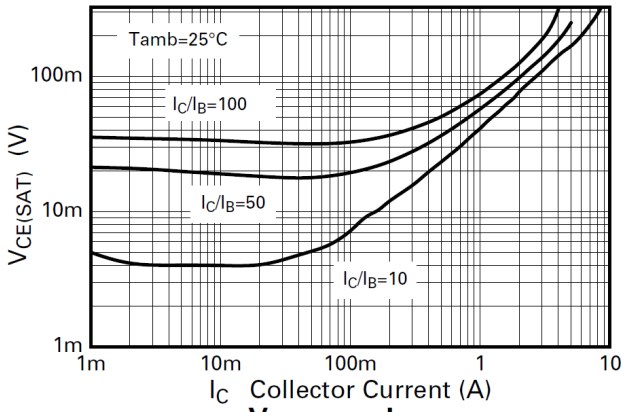
Transient Thermal Impedance

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

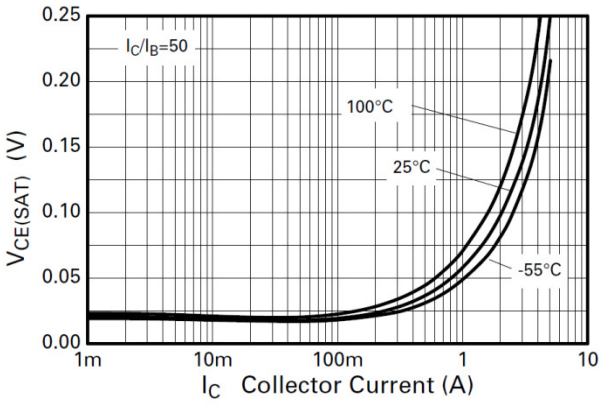
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	100	190	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	50	70	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7.5	8.5	—	V	I_E = 100µA
Collector-Base Cutoff Current	I_{CBO}	—	—	100	nA	V_{CB} = 80V
Emitter Cutoff Current	I_{EBO}	—	—	100	nA	V_{EB} = 6V
Collector-Emitter Cutoff Current	I_{CES}	—	—	100	nA	V_{CES} = 80V
ON CHARACTERISTICS (Note 10)						
DC Current Gain	h_{FE}	250	400	—	—	I_C = 10mA, V_{CE} = 2V
		300	450	900		I_C = 1A, V_{CE} = 2V
		100	220	—		I_C = 4A, V_{CE} = 2V
		10	30	—		I_C = 10A, V_{CE} = 2V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	8	12	mV	I_C = 100mA, I_B = 10mA
		—	75	100		I_C = 1A, I_B = 10mA
		—	150	200		I_C = 3A, I_B = 50mA
		—	175	230		I_C = 4A, I_B = 100mA
		—	145	180		I_C = 4A, I_B = 400mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	1.0	V	I_C = 4A, I_B = 100mA
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	—	0.9	V	I_C = 4A, V_{CE} = 2V
SMALL SIGNAL CHARACTERISTICS						
Current Gain-Bandwidth Product	f_T	—	115	—	MHz	V_{CE} = 10V, I_C = 50mA, f = 50MHz
Output Capacitance	C_{obo}	—	31	—	pF	V_{CB} = 10V, f = 1MHz
Turn-On Time	$t_{(on)}$	—	220	—	ns	V_{CC} = 10V, I_C = 1A
Turn-Off Time	$t_{(off)}$	—	830	—	ns	I_{B1} = I_{B2} = 20mA

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

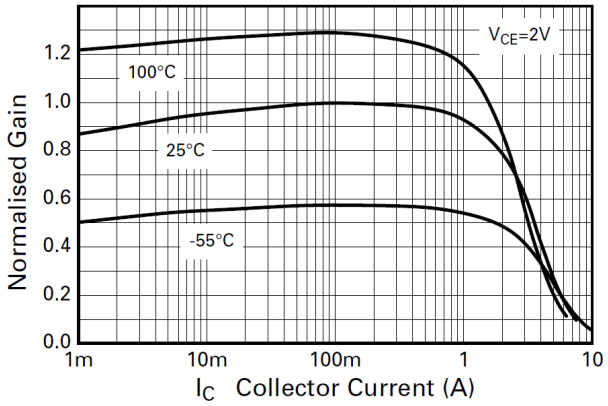
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



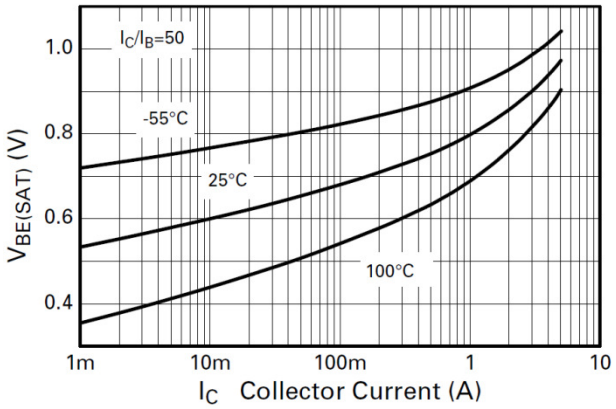
$V_{CE(SAT)}$ v I_C



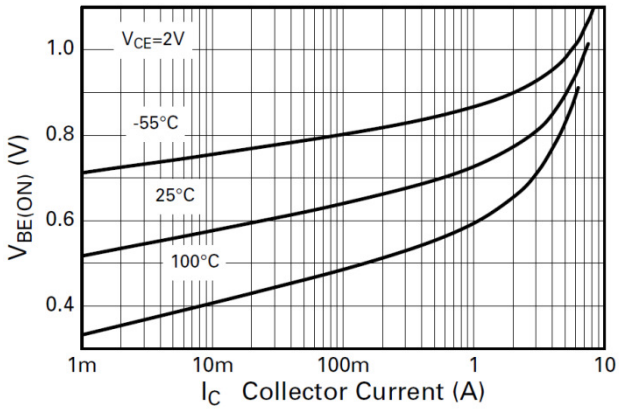
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



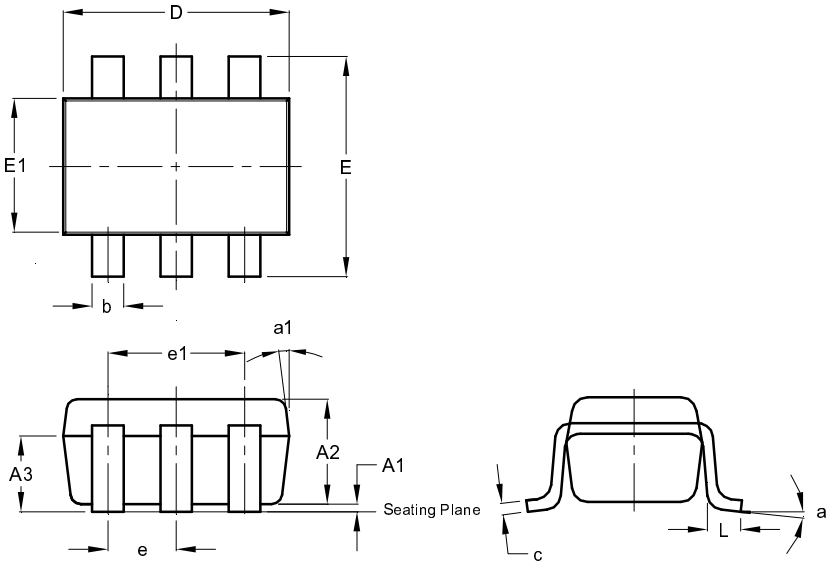
$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

Package Outline Dimensions

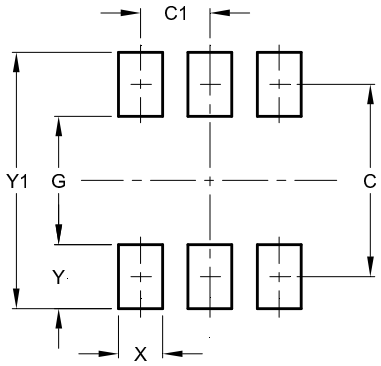
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SOT26			
Dim	**Min**	**Max**	**Typ**
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

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