

**50V NPN LOW SATURATION SWITCHING TRANSISTOR**

**Features**

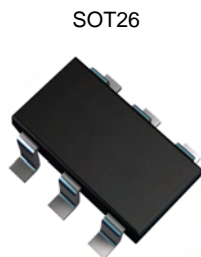
- $BV_{CEO} > 50V$
- $I_C = 4A$  Continuous Collector Current
- $I_{CM} = 10A$  Peak Pulse Current
- $R_{CE(sat)} = 36m\Omega$  for a low equivalent On-Resistance
- Low Saturation Voltage (100mV max @ 1A)
- $h_{FE}$  characterized up to 10A
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

**Mechanical Data**

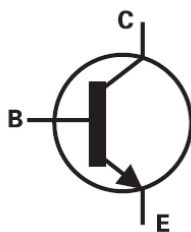
- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208
- Weight: 0.015 grams (approximate)

**Applications**

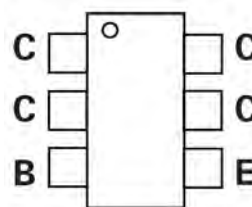
- DC – DC Converters
- Power Management Functions
- Power Switches
- Motor Control



Top View



Device Symbol



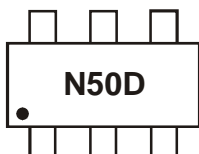
Pin-Out Top

**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> 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.
  5. For packaging details, go to our website at <http://www.diodes.com>

**Marking Information**



N50D = Product Type Marking Code

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

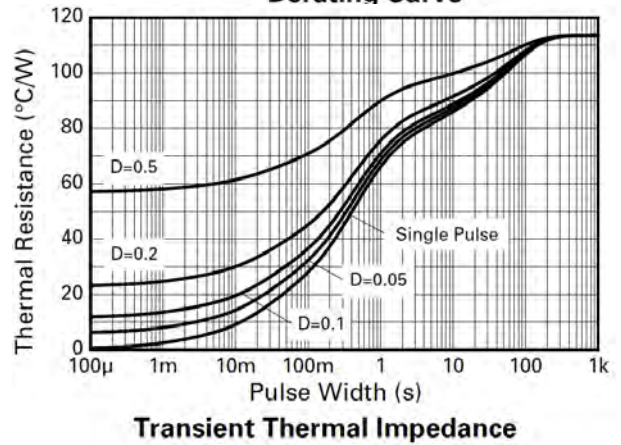
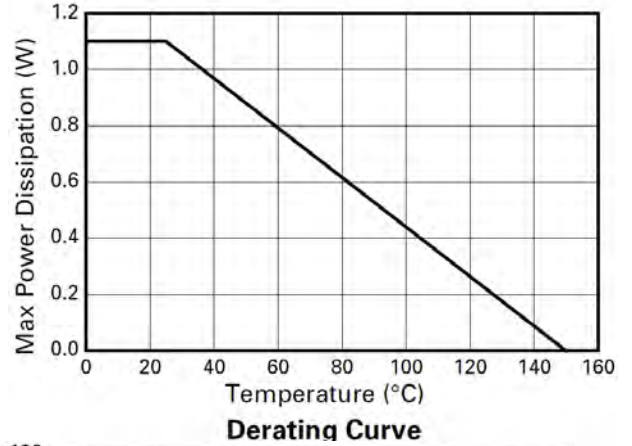
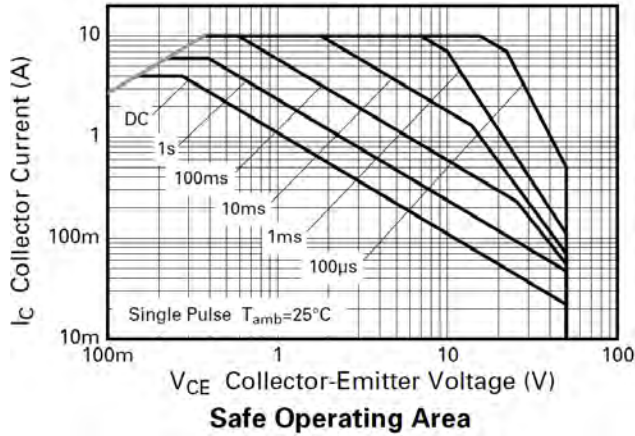
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	100	V
Collector-Emitter Voltage	$V_{CEO}$	50	V
Emitter-Base Voltage	$V_{EBO}$	7.5	V
Base Current	$I_B$	500	mA
Continuous Collector Current	$I_C$	4	A
Peak Pulse Collector Current	$I_{CM}$	10	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	1.1	W
		8.8	
Linear Derating Factor		1.7	mW/°C
		13.6	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	113	°C/W
		73	
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	18.61	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	°C

- Notes:
6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  7. Same as note (6), except the device is measured at  $t \leq 5$  sec.
  8. Thermal resistance from junction to solder-point (at the end of the collector lead).

**Thermal Characteristics**

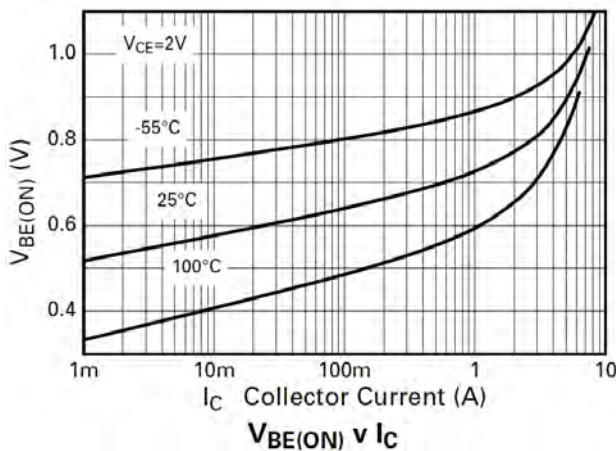
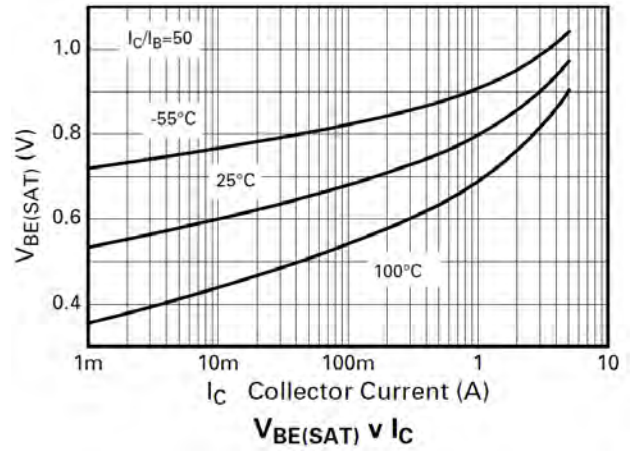
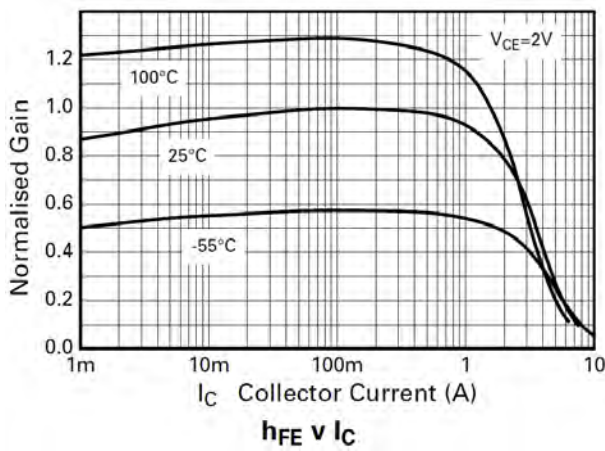
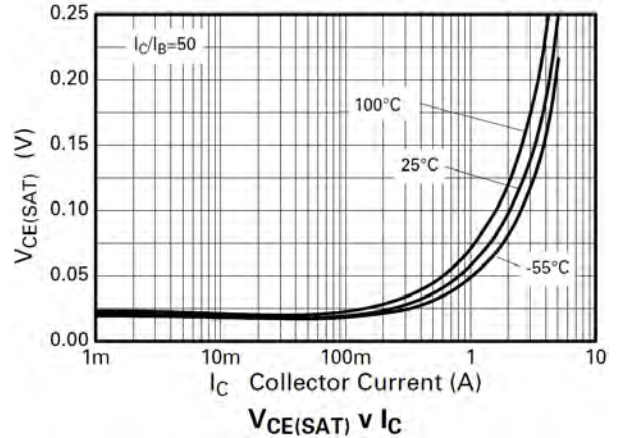
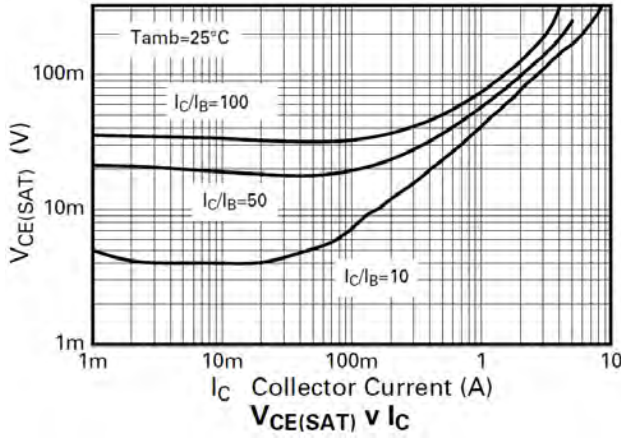


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	100	190	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	50	70	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7.5	8.5	—	V	I <sub>E</sub> = 100μA
Collector-Base Cutoff Current	I <sub>CBO</sub>	—	—	100	nA	V <sub>CB</sub> = 80V
Emitter Cutoff Current	I <sub>EBO</sub>	—	—	100	nA	V <sub>EB</sub> = 6V
Collector-Emitter Cutoff Current	I <sub>CES</sub>	—	—	100	nA	V <sub>CES</sub> = 80V
<b>ON CHARACTERISTICS (Note 9)</b>						
DC Current Gain	h <sub>FE</sub>	250	400	—	—	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V
		300	450	900		I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V
		100	220	—		I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V
		10	30	—		I <sub>C</sub> = 10A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	—	8	12	mV	I <sub>C</sub> = 100mA, I <sub>B</sub> = 10mA
		—	75	100		I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA
		—	150	200		I <sub>C</sub> = 3A, I <sub>B</sub> = 50mA
		—	175	230		I <sub>C</sub> = 4A, I <sub>B</sub> = 100mA
		—	145	180		I <sub>C</sub> = 4A, I <sub>B</sub> = 400mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	—	—	1.0	V	I <sub>C</sub> = 4A, I <sub>B</sub> = 100mA
Base-Emitter Turn-On Voltage	V <sub>BE(on)</sub>	—	—	0.9	V	I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Current Gain-Bandwidth Product	f <sub>T</sub>	—	115	—	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 50mA, f = 50MHz
Output Capacitance	C <sub>obo</sub>	—	31	—	pF	V <sub>CB</sub> = 10V, f = 1MHz
Turn-On Time	t <sub>(on)</sub>	—	220	—	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 1A
Turn-Off Time	t <sub>(off)</sub>	—	830	—	ns	I <sub>B1</sub> = I <sub>B2</sub> = 20mA

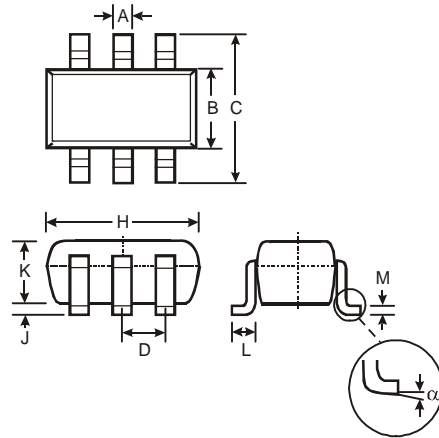
Notes: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

**Typical Electrical Characteristics**



## Package Outline Dimensions

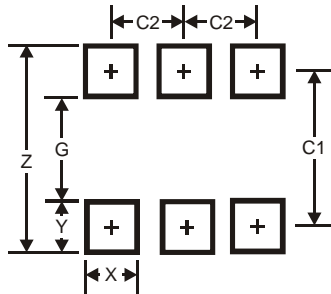
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT26			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
$\alpha$	0°	8°	—
<b>All Dimensions in mm</b>			

## Suggested Pad Layout

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



Dimensions	Value (in mm)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

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