20V NPN HIGH GAIN TRANSISTOR IN SOT89

Features

- BV_{CEO} > 20V
- I_C = 6.0A Continuous Current
- Low Saturation Voltage $V_{CE(sat)}$ < 48mV @ 1A
- R_{sat} = 30mΩ for a Low Equivalent On-Resistance
- P_D = 2.4W Power Dissipation
- Complementary part number: ZXTP25020DZ
- **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/**

Mechanical Data

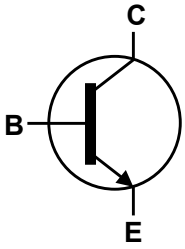
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.05 grams (Approximate)

Application

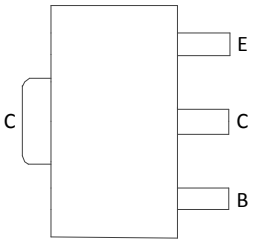
- Emergency lighting circuits
- Motor driving
- Camera strobe
- Boost converters
- Backlight inverters
- MOSFET gate drivers
- LED Driving

SOT89

Top View



Device Symbol



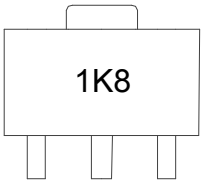
Top View
Pin Out

Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
ZXTN25020DZTA	Standard	1K8	7	12	1,000

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



1K8 = Product Type Marking Code

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

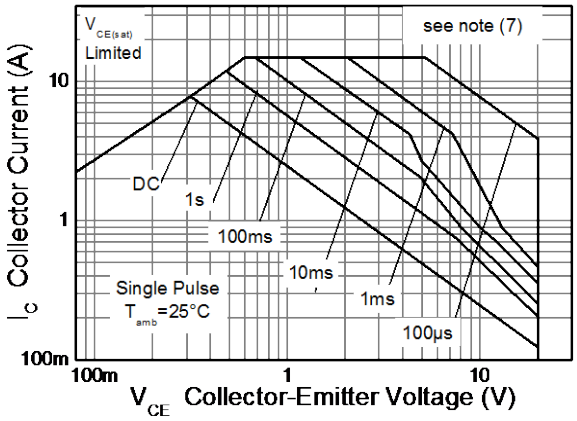
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	100	V
Collector-Emitter Voltage (forward blocking)	V_{CEX}	100	V
Collector-Emitter Voltage	V_{CEO}	20	V
Emitter-collector voltage (reverse blocking)	V_{ECO}	6	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	6	A
Peak Pulse Collector Current (single pulse)	I_{CM}	15	A
Base current	I_B	1	A

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

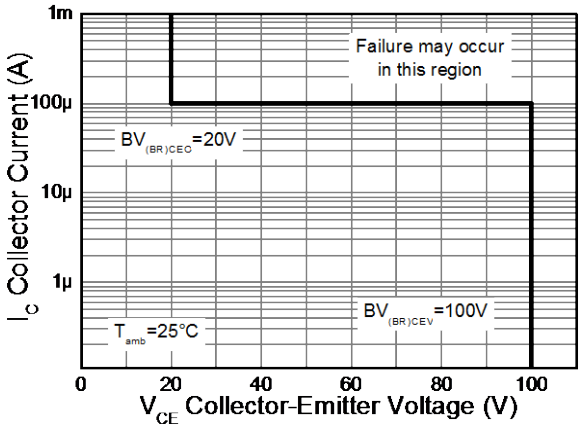
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5) Linear Derating Factor	P_D	1.1 8.8	W mW/°C
Power Dissipation (Note 6) Linear Derating Factor		1.8 14.4	
Power Dissipation (Note 7) Linear Derating Factor		2.4 19.2	
Power Dissipation (Note 8) Linear Derating Factor		4.46 35.7	
Power Dissipation (Note 9) Linear Derating Factor		19.2 153	
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	117	°C/W
Thermal Resistance, Junction to Ambient (Note 6)		68	
Thermal Resistance, Junction to Ambient (Note 7)		51	
Thermal Resistance, Junction to Ambient (Note 8)		28	
Junction to case (Note 9)	$R_{\theta JC}$	7.95	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:
5. For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; device measured when operating in steady state condition.
6. Same as note (5), except the device is mounted on 25mm x 25mm x 1.6mm single sided 2oz weight copper.
7. Same as note (5), except the device is mounted on 50mm x 50mm x 1.6mm single sided 2oz weight copper.
8. Same as note (5), except the device is measured at t<5 seconds.
9. Junction to case (collector tab). Typical.

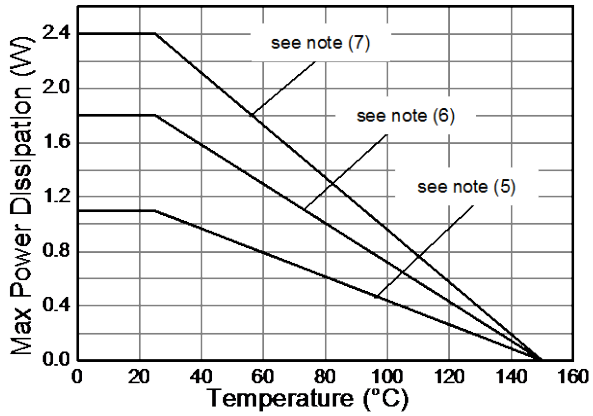
Thermal Characteristics and Derating Information



Safe Operating Area

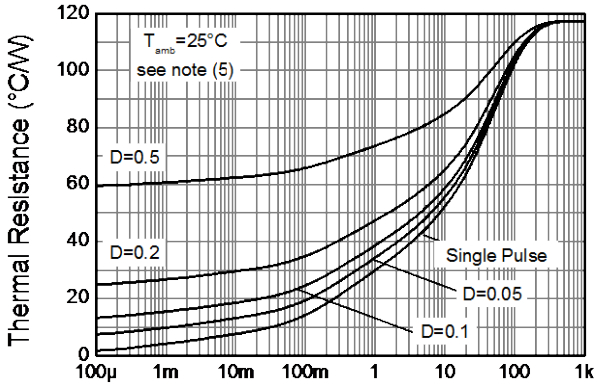


Safe Operating Area

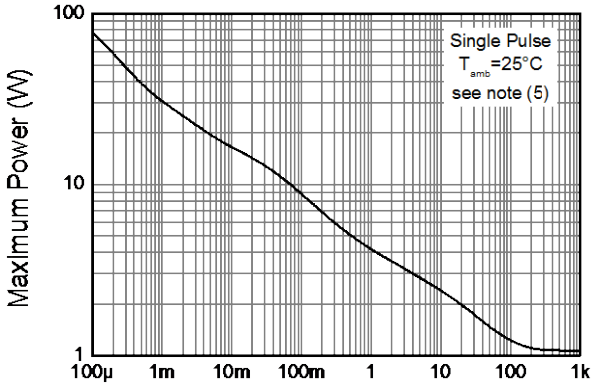


Derating Curve

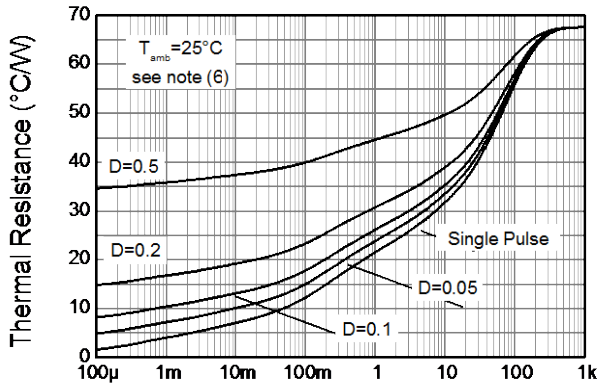
Thermal Characteristics and Derating Information



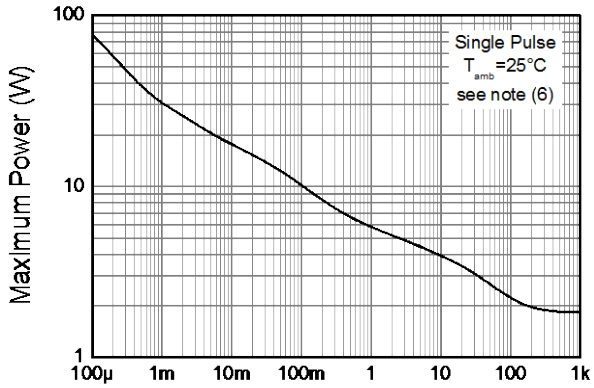
Transient Thermal Impedance



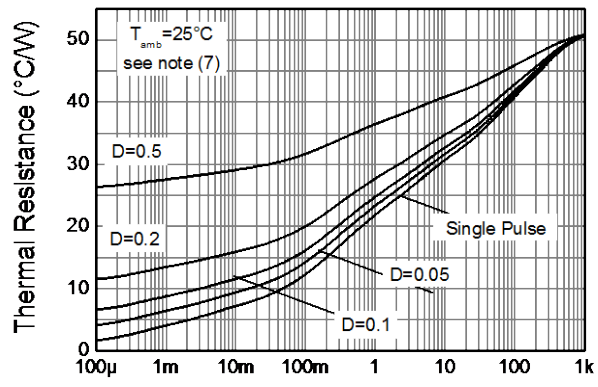
Pulse Power Dissipation



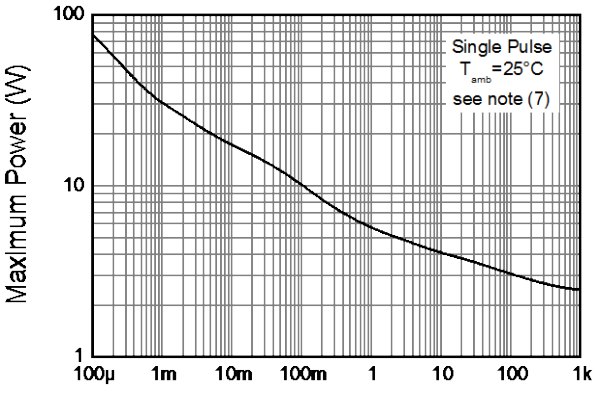
Transient Thermal Impedance



Pulse Power Dissipation



Transient Thermal Impedance



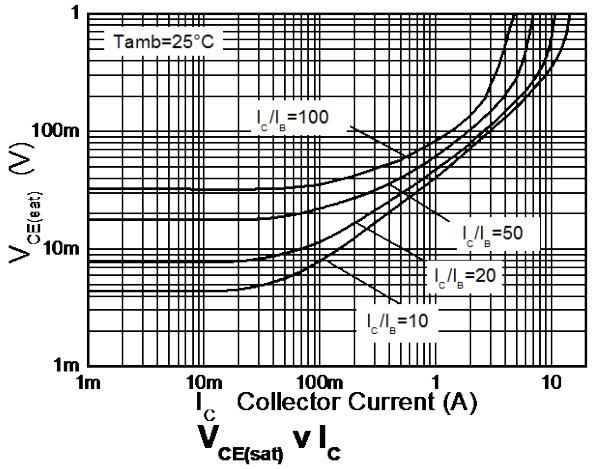
Pulse Power Dissipation

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

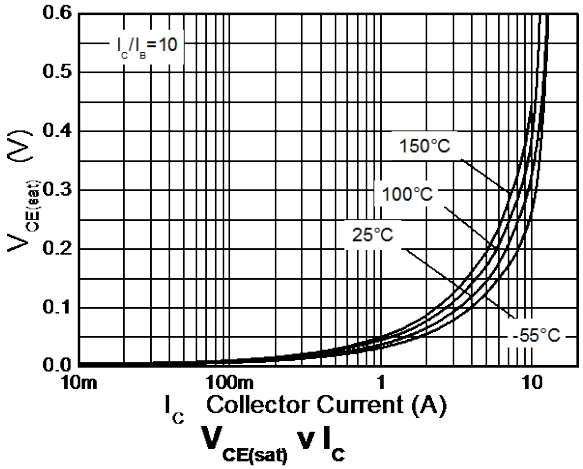
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	100	125	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (forward blocking)	BV_{CEX}	100	120	—	V	I_C = 100µA, R_{BE} ≤ 1kΩ or -1V < V_{BE} < 0.25V
Collector- Emitter Breakdown Voltage (Note 10)	BV_{CEO}	20	35	—	V	I_C = 10mA
Emitter-Collector Breakdown Voltage (reverse blocking)	BV_{ECX}	6	8	—	V	I_E = 100µA, R_{BC} ≤ 1kΩ or 0.25V > V_{BC} > -0.25V
Emitter-Base Breakdown Voltage	BV_{EBO}	5.0	6.0	—	V	I_E = 100µA
Emitter-Collector Breakdown Voltage	BV_{ECO}	7.0	8.3	—	V	I_E = 100µA
Collector Base Cut-Off Current	I_{CBO}	—	1 —	50 0.5	nA µA	V_{CB} = 100V V_{CB} = 100V, T_A = +100°C
Collector Emitter Cut-Off Current	I_{CEX}	—	—	100	nA	V_{CE} = 100V; R_{BE} ≤ 1kΩ or -1V < V_{BE} < 0.25V
Emitter Cut-Off Current	I_{EBO}	—	1	50	nA	V_{EB} = -5.6V
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	—	40 60 100 130 100 210	48 75 120 180 120 270	mV	I_C = 1A, I_B = 100mA I_C = 1A, I_B = 20mA I_C = 2A, I_B = 40mA I_C = 2A, I_B = 20mA I_C = 3A, I_B = 300mA I_C = 6A, I_B = 300mA
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	—	1000	1050	mV	I_C = 6A, I_B = 300mA
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	—	875	950	mV	I_C = 6A, V_{CE} = 2V
DC Current Gain (Note 10)	h_{FE}	300 250 50 —	450 360 110 15	900 — — —	—	I_C = 10mA, V_{CE} = 2V I_C = 2A, V_{CE} = 2V I_C = 6A, V_{CE} = 2V I_C = 15A, V_{CE} = 2V
Transitional frequency	f_T	—	215	—	MHz	I_C = 50mA, V_{CE} = 10V, f = 100MHz
Output Capacitance	C_{ibo}	—	152	—	pF	V_{EB} = 0.5V, f = 1MHz
Output Capacitance	C_{obo}	—	16.5	25	pF	V_{CB} = 10V, f = 1MHz
Delay time	t_d	—	67.7	—	ns	V_{CC} = 10V, I_C = 1A, I_{B1} = -I_{B2}= 10mA
Rise time	t_r		72.2			
Storage time	t_s		361			
Fall time	t_f		63.9			

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

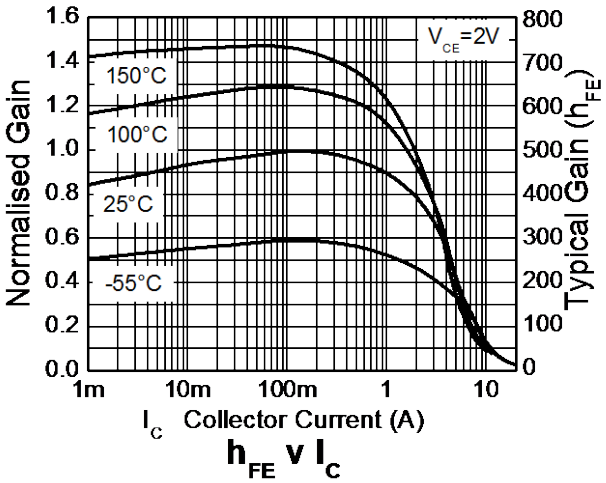
Typical Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)



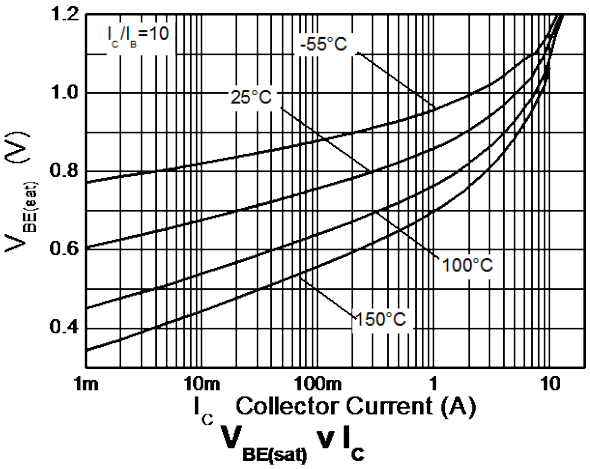
$V_{CE(sat)}$ v I_C



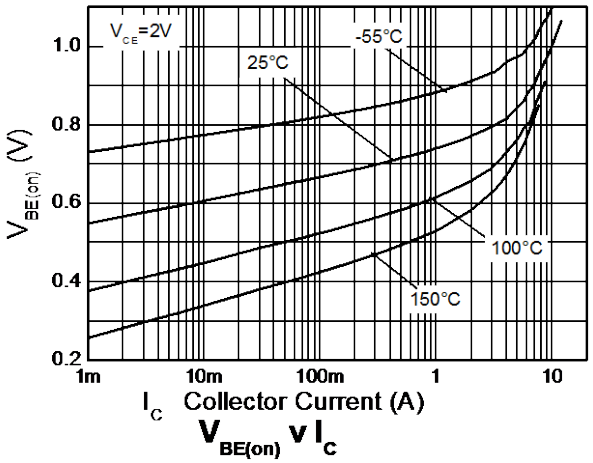
$V_{CE(sat)}$ v I_C



h_{FE} v I_C



$V_{BE(sat)}$ v I_C

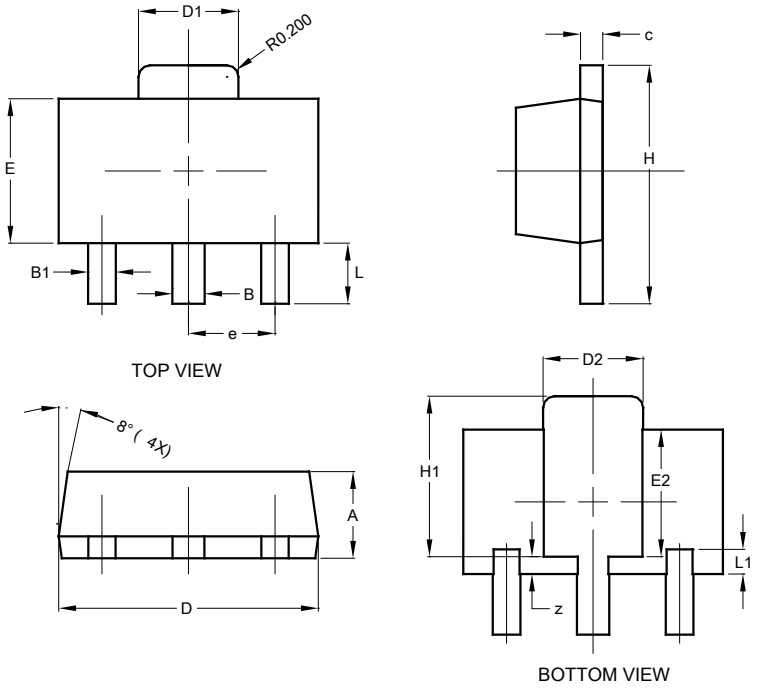


$V_{BE(on)}$ v I_C

Package Outline Dimensions

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

SOT89

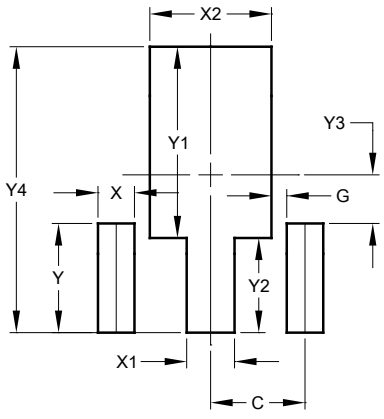


SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			

Suggested Pad Layout

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

SOT89



Dimensions	Value (in mm)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

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