

120V NPN MEDIUM POWER DARLINGTON TRANSISTOR IN TO252

Features

- $BV_{CEO} > 120V$
- $BV_{CBO} > 140V$
- $I_C = 1.5A$ High Continuous current
- $h_{FE} > 2k$ for High Gain @ 1A
- **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**

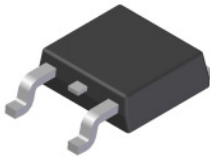
Mechanical Data

- Case: TO252 (DPAK)
- 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: 0.34 grams (approximate)

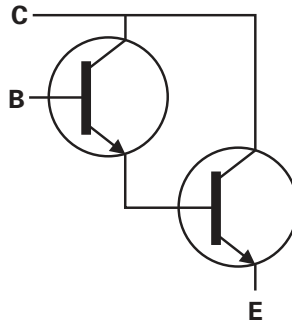
Applications

- DC Fans
- Regulator Transistors
- Relays
- Solenoid Driving

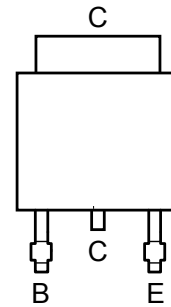
TO252 (DPAK)



Top View



Equivalent Circuit



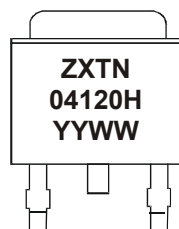
Top View Pin-Out

Ordering Information (Note 4)

Product	Package	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN04120HKTC	TO252 (DPAK)	ZXTN04120H	13	16	2,500

- 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

Marking Information



ZXTN04120H = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year, (ex: 13 = 2013)
 WW = Week Code 01 - 52

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	140	V
Collector-Emitter Voltage	V _{CEO}	120	V
Emitter-Base Voltage	V _{EBO}	14	V
Continuous Collector Current	I _C	1.5	A
Peak Pulse Current	I _{CM}	4	A

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

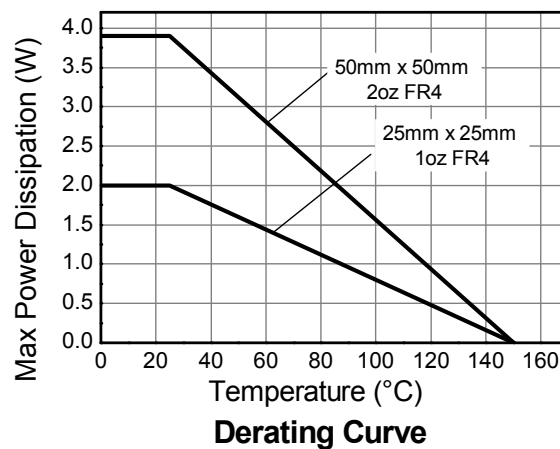
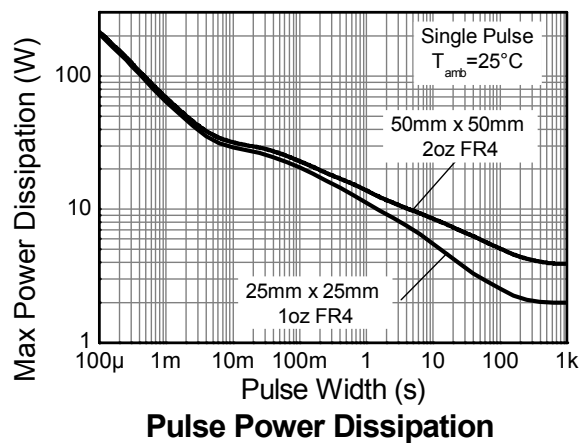
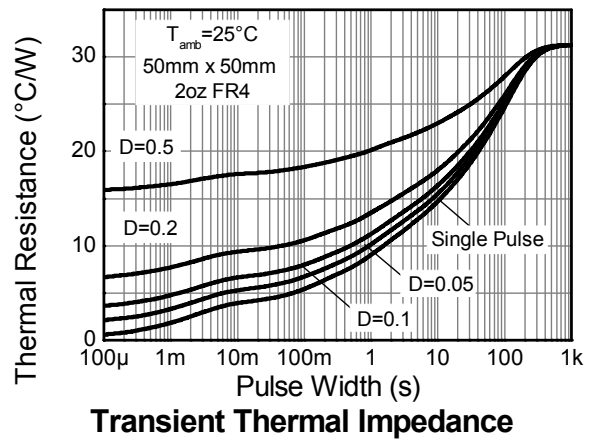
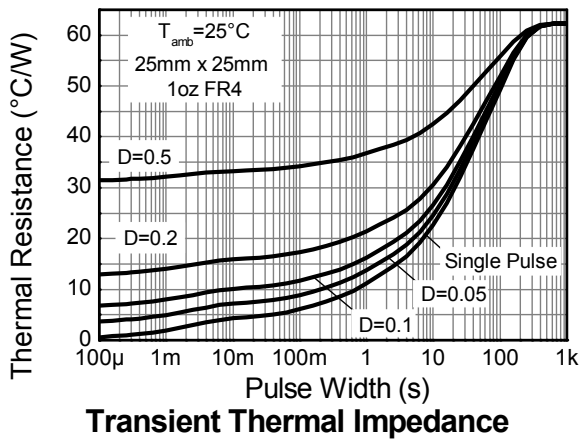
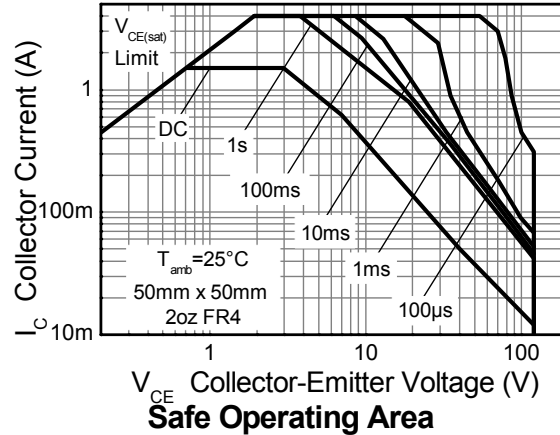
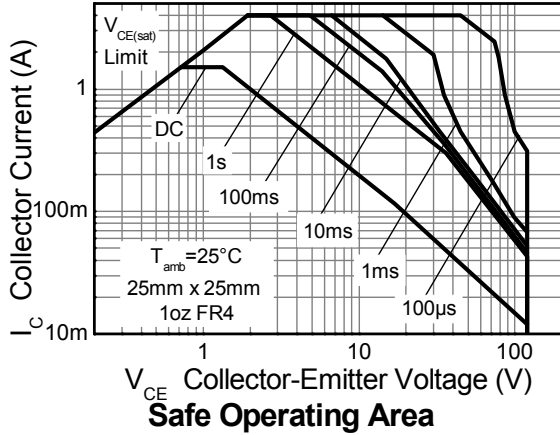
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	(Note 5)	3.9
		(Note 6)	2
		(Note 7)	1.5
Thermal Resistance, Junction to Ambient Air	R _{θJA}	(Note 5)	32
		(Note 6)	62.5
		(Note 7)	80
Thermal Resistance, Junction to Leads	R _{θJL}	9	°C/W
Thermal Resistance, Junction to Case	R _{θJC}	11	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 10)

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:
- For a device mounted with the exposed collector pad on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 - Same as note (5), except mounted on 25mm x 25mm 1oz copper.
 - Same as note (5), except mounted on minimum recommended pad (MRP) layout.
 - Thermal resistance from junction to solder-point (on the exposed collector pad).
 - Thermal resistance from junction to the top of the case.
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

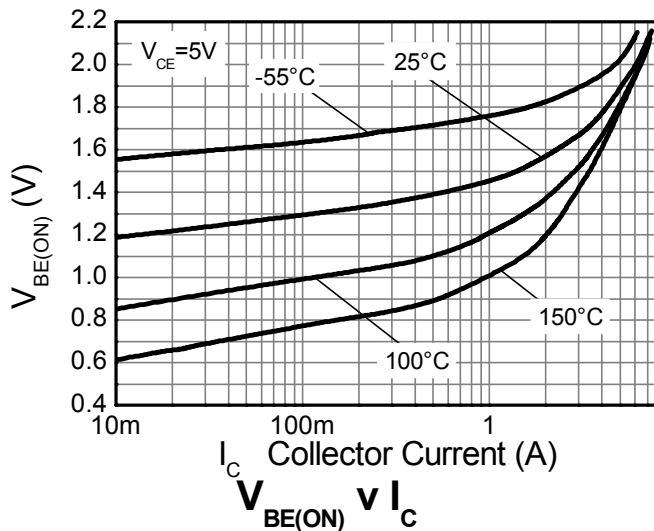
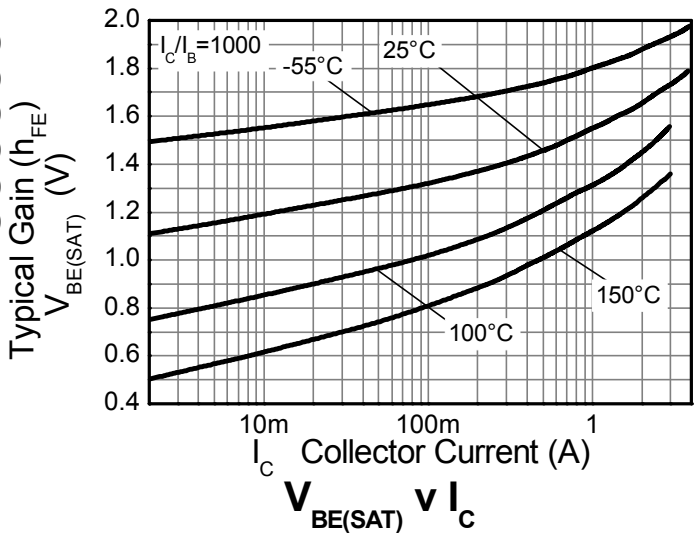
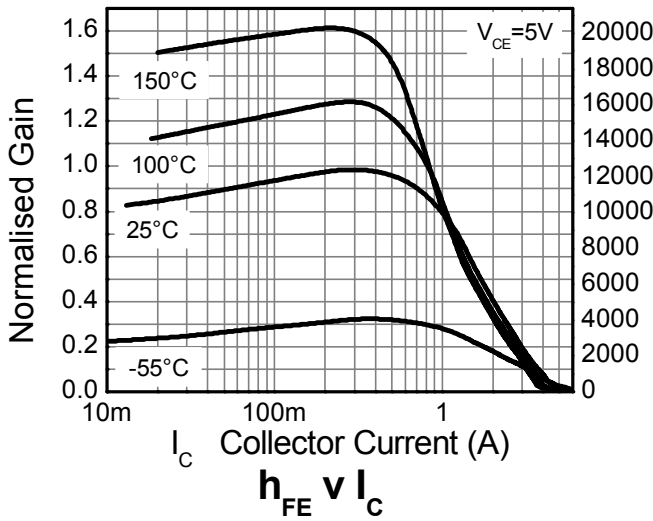
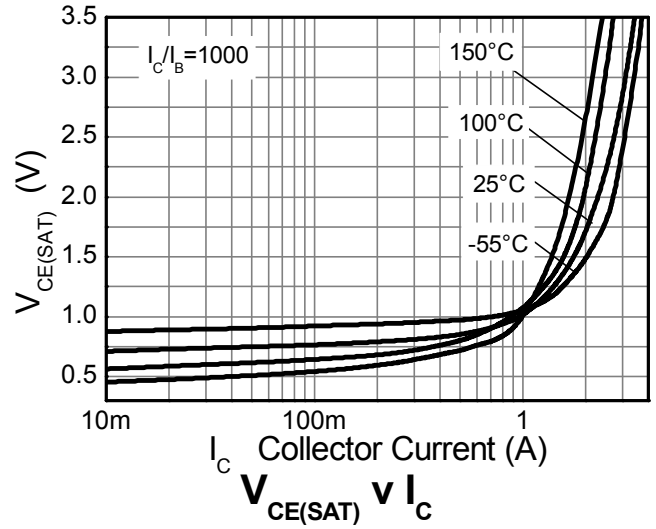
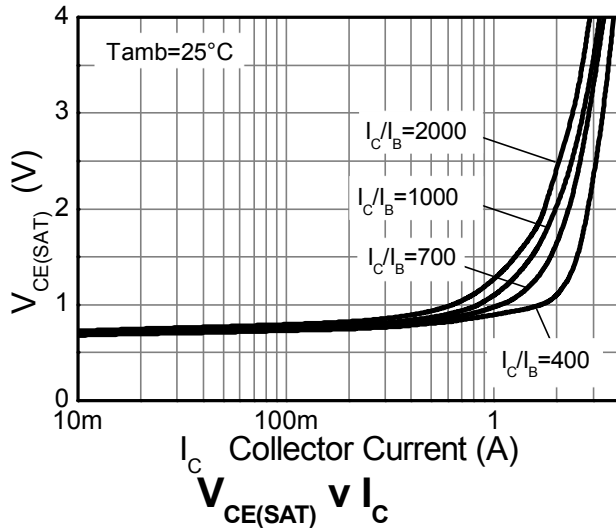


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	140	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	120	—	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	BV_{EBO}	14	—	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cutoff Current	I_{CBO}	—	—	100 10	nA μA	$V_{CB} = 120\text{V}$ $V_{CB} = 120\text{V}, T_A = +120^\circ\text{C}$
Collector-Emitter Cutoff Current	I_{CES}	—	—	100	nA	$V_{CE} = 120\text{V}$
Emitter Cutoff Current	I_{EBO}	—	—	100	nA	$V_{EB} = 8\text{V}$
DC Current Gain (Note 11)	h_{FE}	2,000 5,000 2,000 500	— — — —	— — 100,000 —	—	$I_C = 50\text{mA}, V_{CE} = 5\text{V}$ $I_C = 500\text{mA}, V_{CE} = 5\text{V}$ $I_C = 1\text{A}, V_{CE} = 5\text{V}$ $I_C = 2\text{A}, V_{CE} = 5\text{V}$
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	— —	— —	1 1.5	V	$I_C = 250\text{mA}, I_B = 0.25\text{mA}$ $I_C = 1\text{A}, I_B = 1\text{mA}$
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	—	—	1.8	V	$I_C = 1\text{A}, I_B = 1\text{mA}$
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	—	—	1.7	V	$I_C = 1\text{A}, V_{CE} = 5\text{V}$
Input Capacitance (Note 11)	C_{ibo}	—	90	—	pF	$V_{EB} = 0.5\text{V}, f = 1\text{MHz}$
Output Capacitance (Note 11)	C_{obo}	—	15	—	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Current Gain-Bandwidth Product (Note 11)	f_T	150	—	—	MHz	$V_{CE} = 10\text{V}, I_C = 100\text{mA}, f = 20\text{MHz}$
Turn-On Time	t_{on}	—	0.5	—	μs	$V_{CC} = 10\text{V}, I_C = 500\text{mA}$
Turn-Off Time	t_{off}	—	1.6	—	μs	$I_{B1} = -I_{B2} = 0.5\text{mA}$

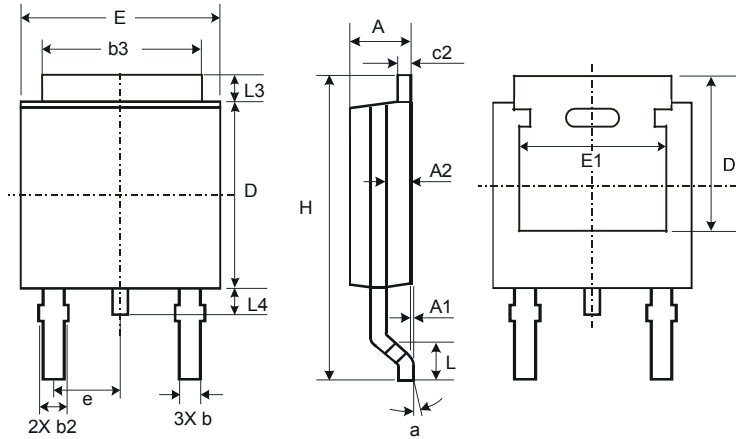
Note: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

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



Package Outline Dimensions

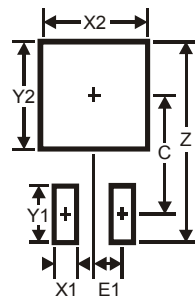
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



TO252			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	–	–
e	–	–	2.286
E	6.45	6.70	6.58
E1	4.32	–	–
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	–
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)
Z	11.6
X1	1.5
X2	7.0
Y1	2.5
Y2	7.0
C	6.9
E1	2.3

Note: 12. For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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