

**180V NPN MEDIUM POWER HIGH GAIN TRANSISTOR IN TO252**
**Features**

- $BV_{CEO} > 180V$
- $I_C = 0.5A$  high Continuous Collector Current
- $I_{CM} = 1A$  Peak Pulse Current
- High gain device  $> 500$  at  $I_C = 100mA$
- **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**

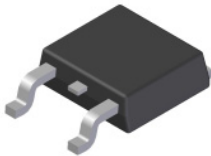
**Mechanical Data**

- 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)

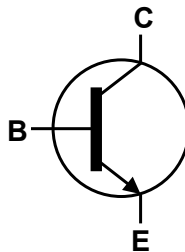
**Applications**

- Voltage Regulator Transistors
- Startup Switches
- Darlington Replacement
- DC Fans
- Relays and Solenoid Driving

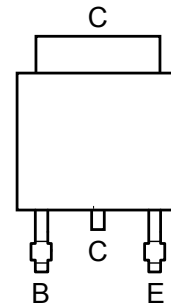
TO252 (DPAK)



Top View



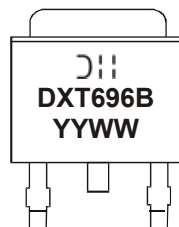
Equivalent Circuit


 Top View  
Pin-Out

**Ordering Information** (Note 4)

Product	Package	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DXT696BK-13	TO252 (DPAK)	DXT696B	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](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**


- DII = Manufacturers' code marking
- DXT 696B = Product Type Marking Code
- YYWW = Date Code Marking
- YY = Last Digit of Year, (ex: 13 = 2013)
- WW = Week Code 01 - 52

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	180	V
Collector-Emitter Voltage	$V_{CEO}$	180	V
Emitter-Base Voltage	$V_{EBO}$	7	V
Continuous Collector Current	$I_C$	0.5	A
Peak Pulse Current	$I_{CM}$	1	A
Peak Base Current	$I_{BM}$	0.5	A

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

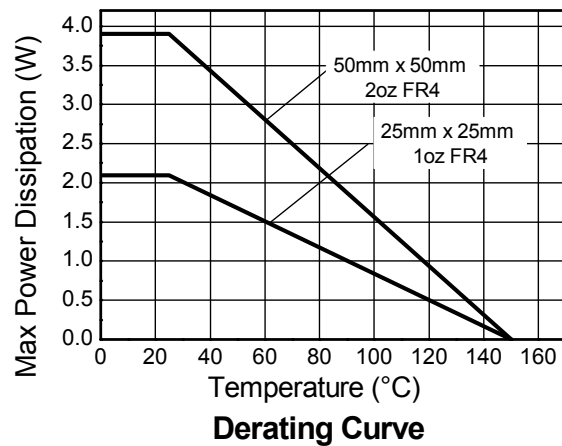
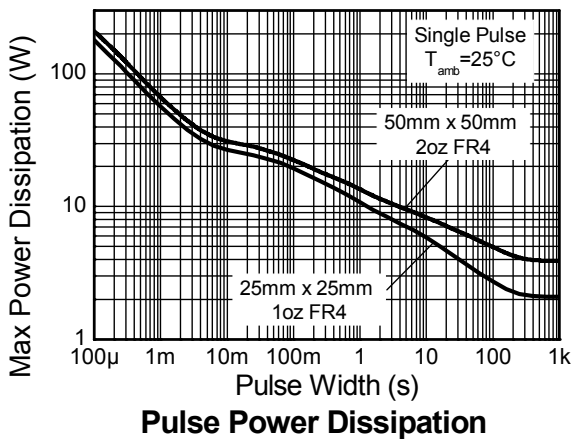
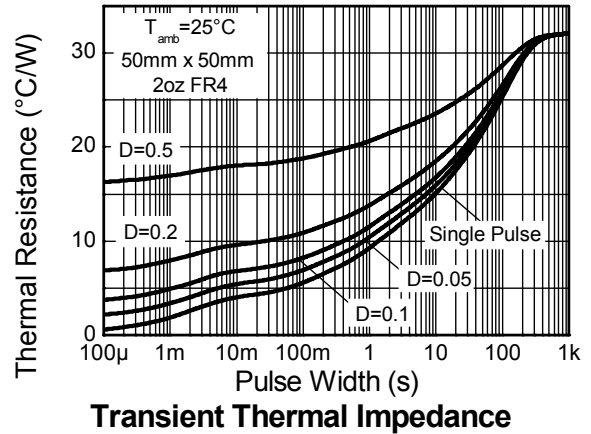
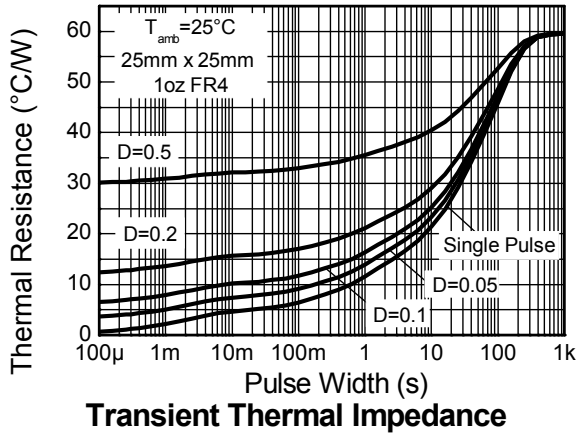
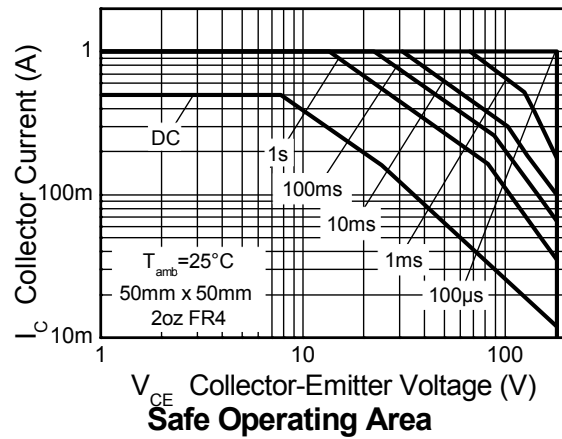
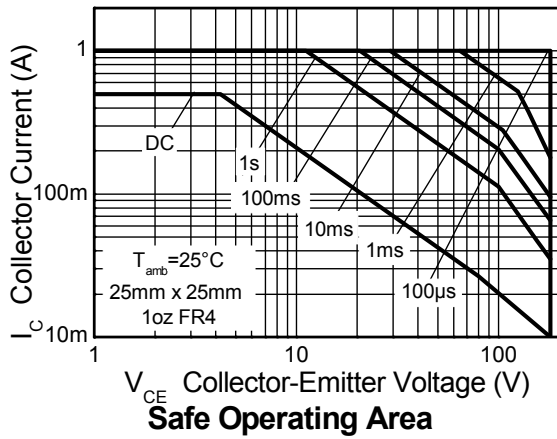
Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	(Note 5)	3.9
		(Note 6)	2.1
		(Note 7)	1.6
Thermal Resistance, Junction to Ambient Air	$R_{\theta JA}$	(Note 5)	32
		(Note 6)	59
		(Note 7)	80
Thermal Resistance, Junction to Leads	$R_{\theta JL}$	8.4	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	14.6	
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**

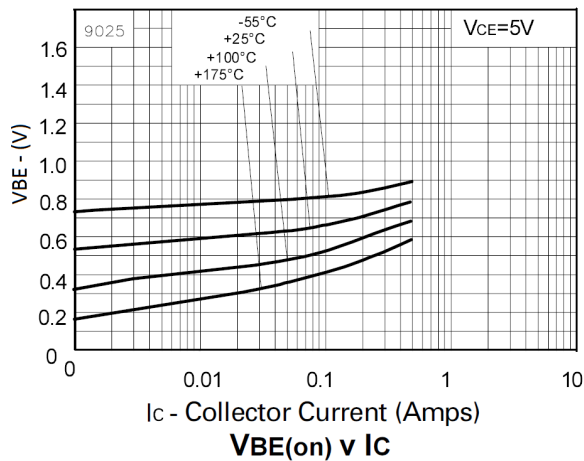
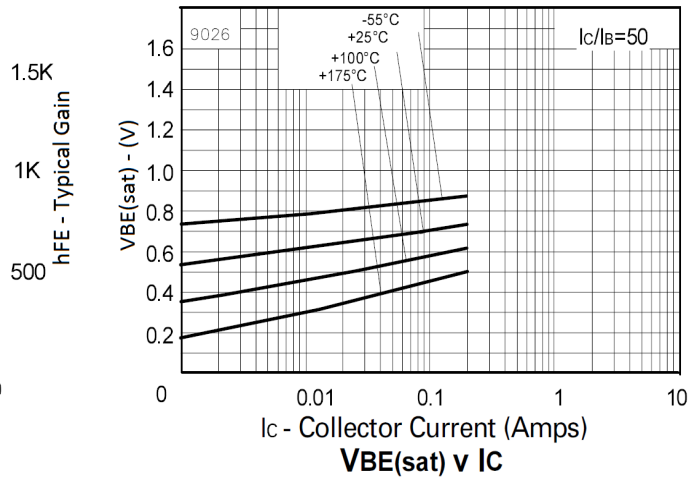
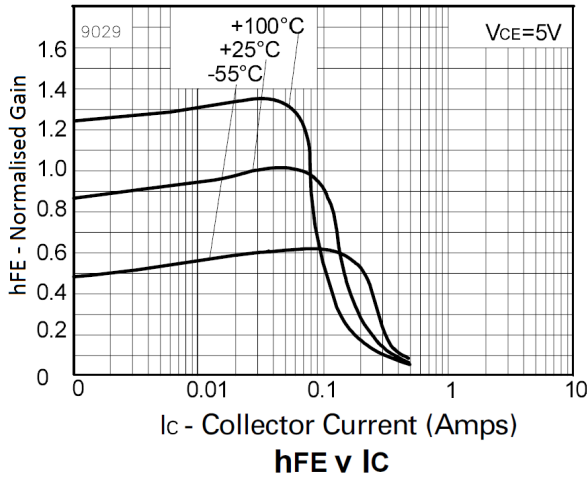
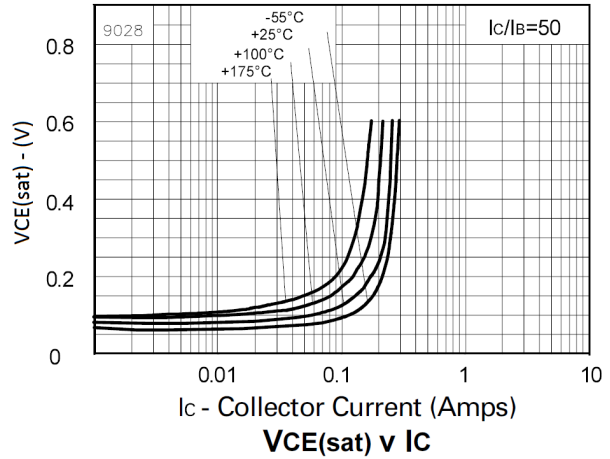
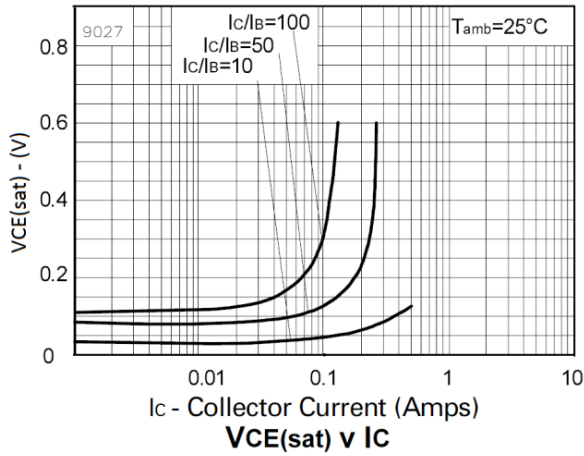


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	180	—	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 11)	BV <sub>CEO</sub>	180	—	—	V	I <sub>C</sub> = 1mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	—	—	V	I <sub>E</sub> = 100μA
Collector-Base Cutoff Current	I <sub>CBO</sub>	—	—	100	nA	V <sub>CB</sub> = 140V
Emitter Cutoff Current	I <sub>EBO</sub>	—	—	100	nA	V <sub>EB</sub> = 5V
DC Current Gain (Note 11)	h <sub>FE</sub>	500 150	— —	— —		I <sub>C</sub> = 100mA, V <sub>CE</sub> = 5V I <sub>C</sub> = 200mA, V <sub>CE</sub> = 5V
Collector-Emitter Saturation Voltage (Note 11)	V <sub>CE(sat)</sub>	— — —	— — —	200 200 250	mV	I <sub>C</sub> = 50mA, I <sub>B</sub> = 0.5mA I <sub>C</sub> = 100mA, I <sub>B</sub> = 2.0mA I <sub>C</sub> = 200mA, I <sub>B</sub> = 5.0mA
Base-Emitter Saturation Voltage (Note 11)	V <sub>BE(sat)</sub>	—	—	900	mV	I <sub>C</sub> = 200mA, I <sub>B</sub> = 5mA
Base-Emitter Turn-On Voltage (Note 11)	V <sub>BE(on)</sub>	—	—	900	mV	I <sub>C</sub> = 200mA, V <sub>CE</sub> = 5V
Input Capacitance	C <sub>ibo</sub>	—	200	—	pF	V <sub>EB</sub> = 0.5V, f = 1MHz
Output Capacitance	C <sub>obo</sub>	—	6	—	pF	V <sub>CE</sub> = 10V, f = 1MHz
Current Gain-Bandwidth Product	f <sub>T</sub>	70	—	—	MHz	V <sub>CE</sub> = 5V, I <sub>C</sub> = 50mA, f=50MHz
Turn-On Time	t <sub>on</sub>	—	80	—	ns	V <sub>CC</sub> = 50V, I <sub>C</sub> = 100mA
Turn-Off Time	t <sub>off</sub>	—	4,400	—	ns	I <sub>B1</sub> = -I <sub>B2</sub> = 10mA

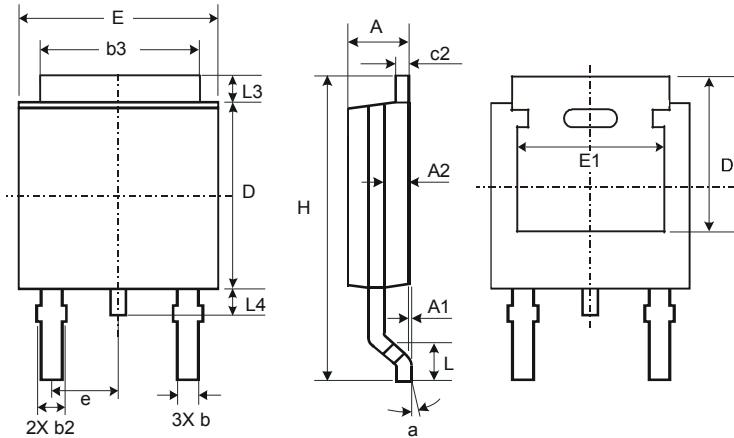
Note: 11. Measured under pulsed conditions. Pulse width ≤ 300 μs. Duty cycle ≤ 2%.

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



**Package Outline Dimensions**

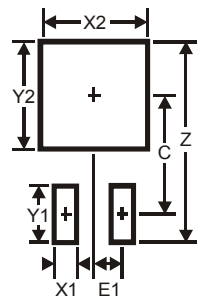
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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: 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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