

# FZT600BTA Datasheet

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DiGi Electronics Part Number	FZT600BTA-DG
Manufacturer	<a href="#">Diodes Incorporated</a>
Manufacturer Product Number	FZT600BTA
Description	TRANS NPN DARL 140V 2A SOT223-3
Detailed Description	Bipolar (BJT) Transistor NPN - Darlington 140 V 2 A 250MHz 2 W Surface Mount SOT-223-3



Tel: +00 852-30501935

RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

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## Purchase and inquiry

Manufacturer Product Number:

FZT600BTA

Series:

-

Transistor Type:

NPN - Darlington

Voltage - Collector Emitter Breakdown (Max):

140 V

Current - Collector Cutoff (Max):

10 $\mu$ A

Power - Max:

2 W

Operating Temperature:

-55°C ~ 150°C (TJ)

Package / Case:

TO-261-4, TO-261AA

Base Product Number:

FZT600

Manufacturer:

Diodes Incorporated

Product Status:

Active

Current - Collector (Ic) (Max):

2 A

Vce Saturation (Max) @ Ib, Ic:

1.2V @ 10mA, 1A

DC Current Gain (hFE) (Min) @ Ic, Vce:

10000 @ 500mA, 10V

Frequency - Transition:

250MHz

Mounting Type:

Surface Mount

Supplier Device Package:

SOT-223-3

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0075

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99





**FZT600 / FZT600B**

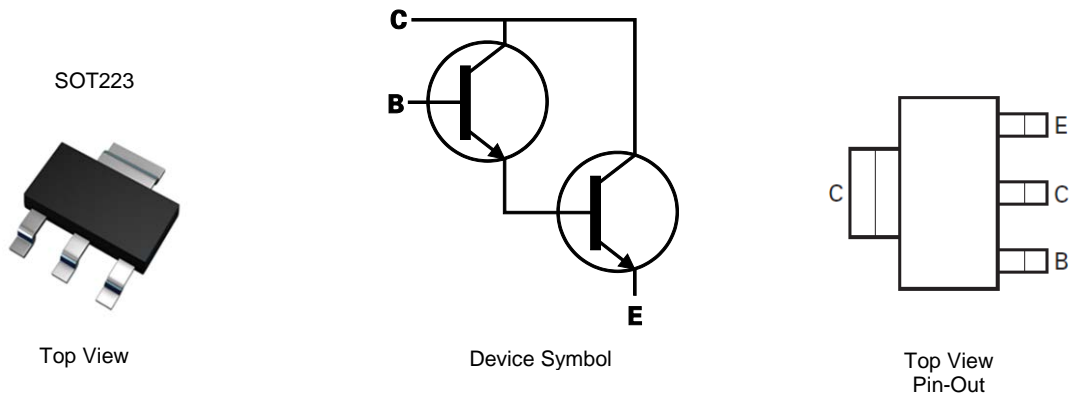
**140V NPN DARLINGTON TRANSISTOR IN SOT223**

**Features**

- $BV_{CE0} > 140V$
- $BV_{CBO} > 160V$
- $I_C = 2A$  High Continuous Current
- NPN Darlington With Gain  $> 10k$
- Guaranteed  $h_{FE}$  Specified up to 1A
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([FZT600BQ](#))**

**Mechanical Data**

- Case: SOT223 (Type DN)
- 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 ③
- Weight: 0.112 grams (Approximate)

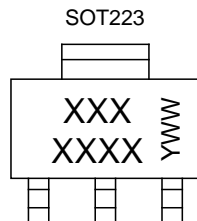


**Ordering Information** (Note 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FZT600TA	AEC-Q101	FZT600	7	12	1000
FZT600BTA	AEC-Q101	FZT600B	7	12	1000

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  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, see <http://www.diodes.com/products/packages.html>.

**Marking Information**



XXX XXXX = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 8= 2018)  
 WW or  $\bar{W}W$  = Week Code (01-53)



FZT600 / FZT600B

### Absolute Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	160	V
Collector-Emitter Voltage	V <sub>CEO</sub>	140	V
Emitter-Base Voltage	V <sub>EBO</sub>	10	V
Continuous Collector Current	I <sub>C</sub>	2	A
Peak Pulse Current	I <sub>CM</sub>	4	A

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

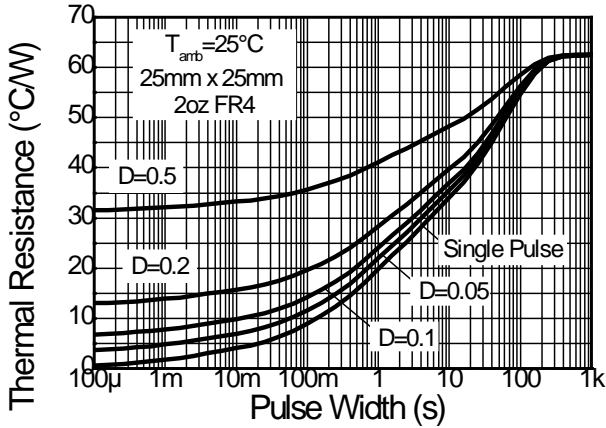
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 5)	3.0
		(Note 6)	2.0
		(Note 7)	1.6
		(Note 8)	1.2
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 5)	41.7
		(Note 6)	62.5
		(Note 7)	78.1
		(Note 8)	104
Thermal Resistance Junction to Lead	R <sub>θJL</sub>	12.9	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### ESD Ratings (Note 10)

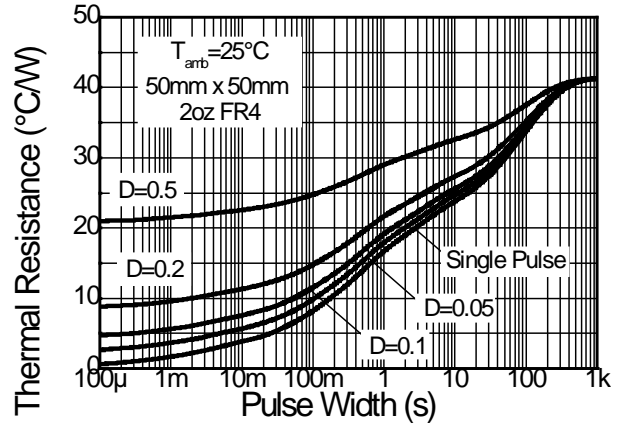
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge—Human Body Model	ESD HBM	2000	V	2
Electrostatic Discharge—Machine Model	ESD MM	200	V	B

- Notes:
- For a device mounted with the collector lead on 50mm × 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 6, except the device is mounted on 25mm × 25mm 2oz copper.
  - Same as Note 6, except the device is mounted on 25mm × 25mm 1oz copper.
  - Same as Note 6, except the device is mounted on minimum recommended pad layout.
  - Thermal resistance from junction to solder-point (at the end of the collector lead).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

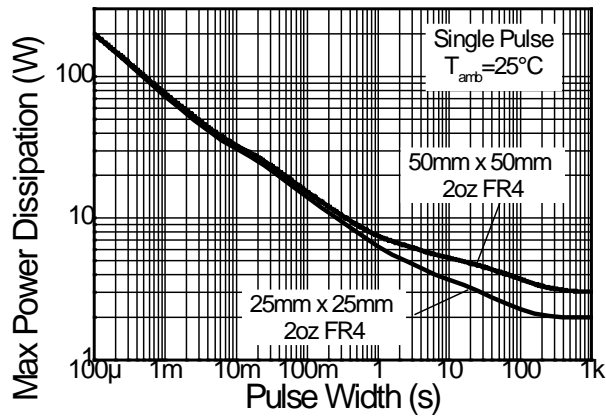
**Thermal Characteristics and Derating Information**



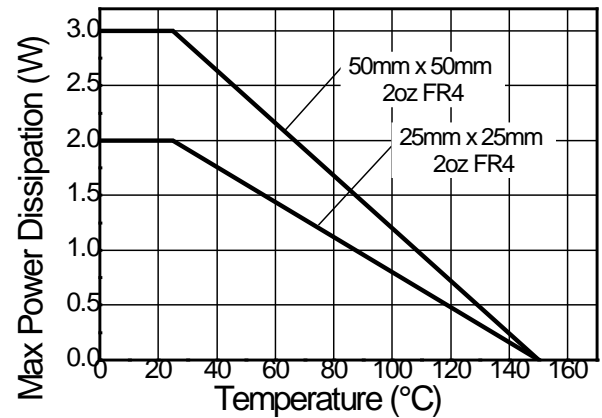
**Transient Thermal Impedance**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



**Derating Curve**

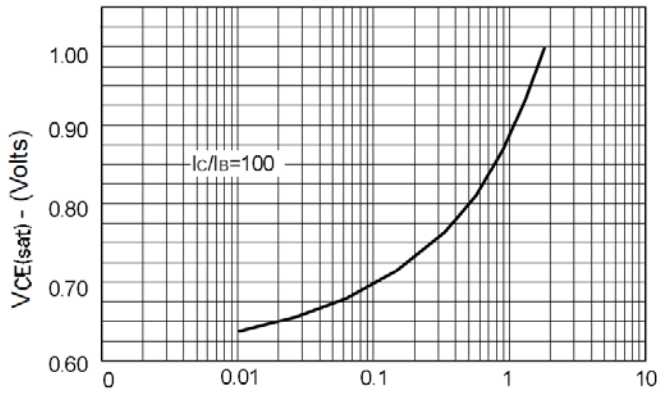

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	160	—	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 12)	BV <sub>CEO</sub>	140	—	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	10	—	—	V	I <sub>E</sub> = 100μA
Collector-Base Cut-Off Current	I <sub>CBO</sub>	—	—	0.01 10	μA μA	V <sub>CB</sub> = 140V V <sub>CB</sub> = 140V, T <sub>A</sub> = +100°C
Collector-Emitter Cut-Off Current	I <sub>CES</sub>	-	—	10	μA	V <sub>CE</sub> = 140V
Emitter Cut-Off Current	I <sub>EBO</sub>	-	—	0.1	μA	V <sub>EB</sub> = 8V
DC Current Gain (Note 12)	h <sub>FE</sub>	Group A (FZT600)		—	—	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V I <sub>C</sub> = 500mA, V <sub>CE</sub> = 10V I <sub>C</sub> = 1A, V <sub>CE</sub> = 10V
		1000 2000 1000	— — —	— 100,000 —	— — —	
DC Current Gain (Note 12)	h <sub>FE</sub>	Group B (FZT600B)		—	—	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V I <sub>C</sub> = 500mA, V <sub>CE</sub> = 10V I <sub>C</sub> = 1A, V <sub>CE</sub> = 10V
		5000 10,000 5000	10,000 20,000 10,000	— 100,000 —	— — —	
Collector-Emitter Saturation Voltage (Note 12)	V <sub>CE(sat)</sub>	—	0.75 0.85	1.1 1.2	V	I <sub>C</sub> = 500mA, I <sub>B</sub> = 5mA I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA
Base-Emitter Saturation Voltage (Note 12)	V <sub>BE(sat)</sub>	—	1.7	1.9	V	I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA
Base-Emitter Turn-On Voltage (Note 12)	V <sub>BE(on)</sub>	—	1.5	1.7	V	I <sub>C</sub> = 1A, V <sub>CE</sub> = 5V
Output Capacitance (Note 12)	C <sub>obo</sub>	—	10	15	pF	V <sub>CB</sub> = 10V, f = 1MHz
Current Gain-Bandwidth Product (Note 12)	f <sub>T</sub>	150	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 100mA, f = 20MHz
Turn-On Time	t <sub>on</sub>	—	0.75	—	μs	V <sub>CC</sub> = 10V, I <sub>C</sub> = 500mA
Turn-Off Time	t <sub>off</sub>	—	2.20	—	μs	I <sub>B1</sub> = -I <sub>B2</sub> = 0.5mA

Note: 12. Measured under pulsed conditions. Pulse width ≤ 300 μs. Duty cycle ≤ 2%.

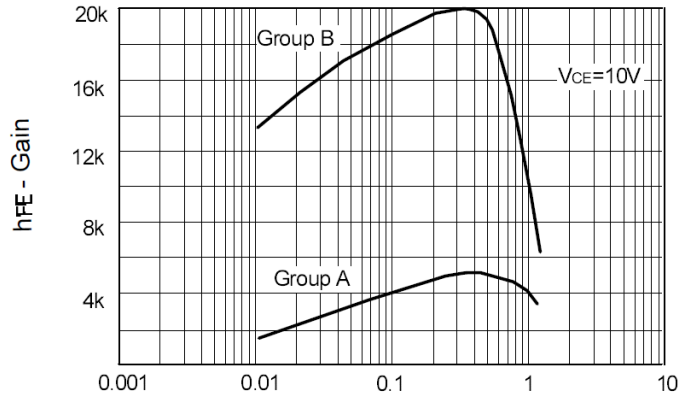


**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



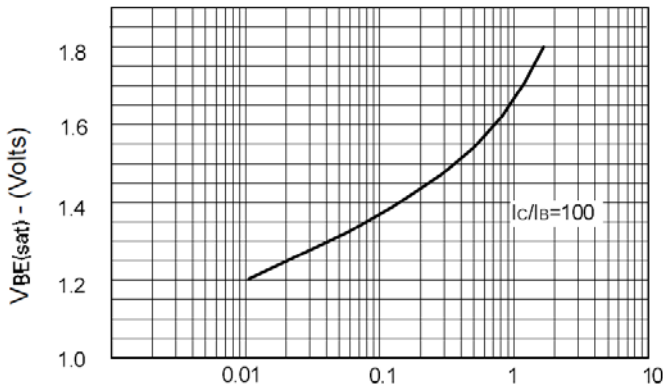
IC - Collector Current (Amps)

**VCE(sat) v IC**



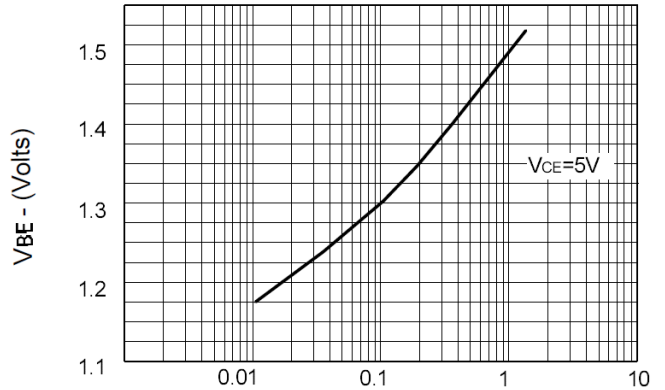
IC - Collector Current (Amps)

**hFE v IC**



IC - Collector Current (Amps)

**VBE(sat) v IC**



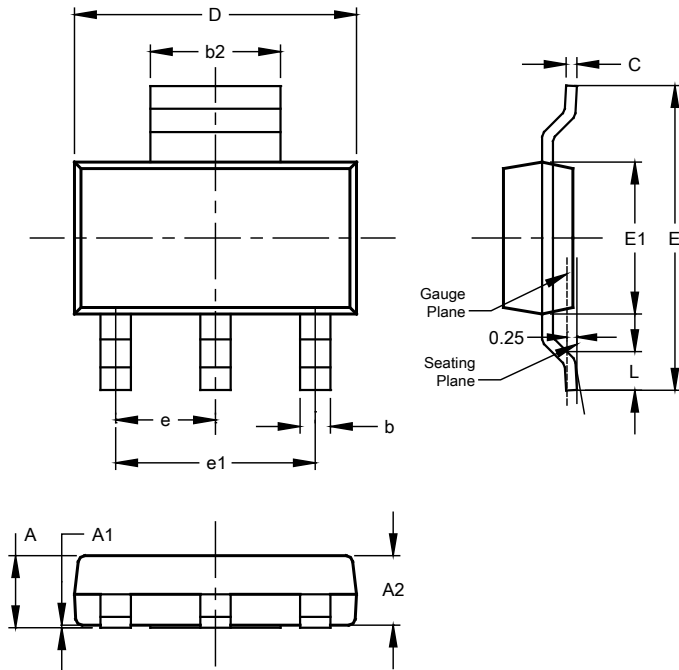
IC - Collector Current (Amps)

**VBE(on) v IC**

## Package Outline Dimensions

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

SOT223 (Type DN)

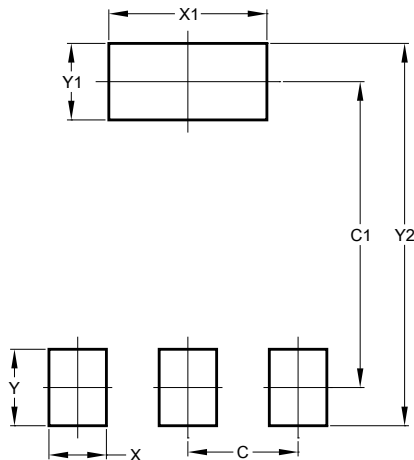


SOT223 (Type DN)			
Dim	Min	Max	Typ
A	—	1.70	—
A1	0.01	0.15	—
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	—
c	0.20	0.32	—
D	6.30	6.70	—
E	6.70	7.30	—
E1	3.30	3.70	—
e	—	—	2.30
e1	—	—	4.60
L	0.85	—	—
All Dimensions in mm			

## Suggested Pad Layout

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

SOT223 (Type DN)



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

Note: 13. 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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