

## Features

- $BV_{CEO} > -120V$
- $I_C = -1A$  Continuous Collector Current
- Saturation Voltage  $V_{CE(SAT)} < -1.1V @ -1A$
- $h_{FE}$  Characterized Up to -6A
- High  $h_{FE}$  (Min) = 3,000 @ -1A
- 1.5W Power Dissipation
- Complementary NPN Type: ZXTN04120HFF
- **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**

## Description

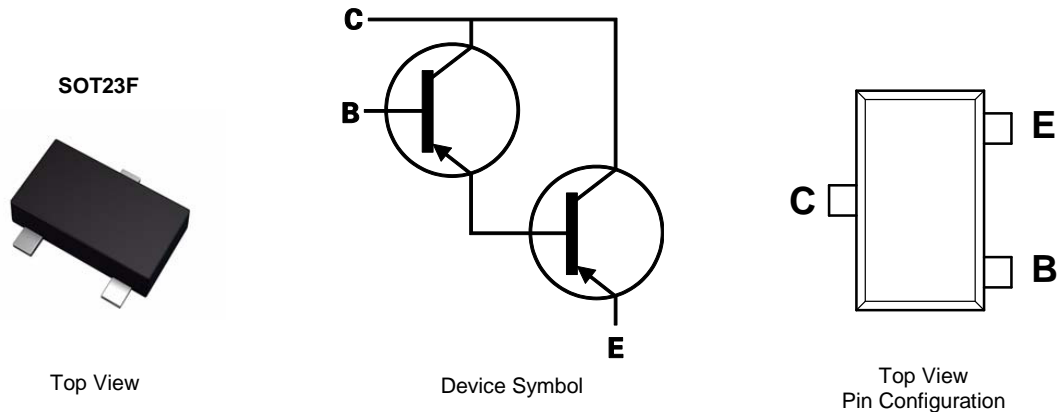
This high performance PNP Darlington transistor is designed for applications requiring high gain and very low saturation voltage. The SOT23F package is pin compatible with the industry standard SOT23 footprint but offers lower profile and higher dissipation for applications where power density is of utmost importance.

## Mechanical Data

- Case: SOT23F
- 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 (3)
- Weight: 0.012 grams (Approximate)

## Applications

- Boost Converters
- MOSFET and IGBT Gate Drivers
- Lamp and Relay Driver
- Motor Drive
- Siren Driver

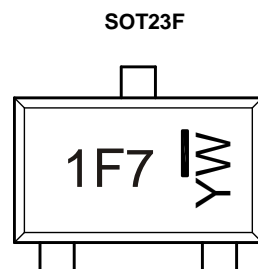


## Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXTP05120HFFTA	AEC-Q101	1F7	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/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



- 1F7 = Product Type Marking Code  
 YW = Date Code Marking  
 Y = Year : 0~9  
 W = Week : A~Z : 1~26  
 a~z : 27~52  
 z represents 52 & 53 week

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-140	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-120	V
Emitter-Base Voltage	V <sub>EBO</sub>	-10	V
Continuous Collector Current	I <sub>C</sub>	-1	A
Peak Pulse Current	I <sub>CM</sub>	-4	A
Base Current	I <sub>B</sub>	-0.5	A

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

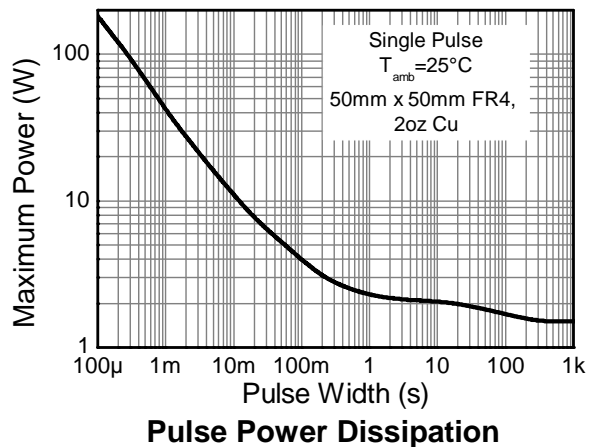
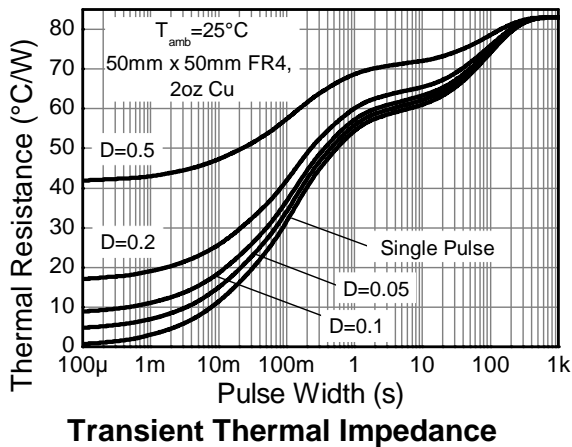
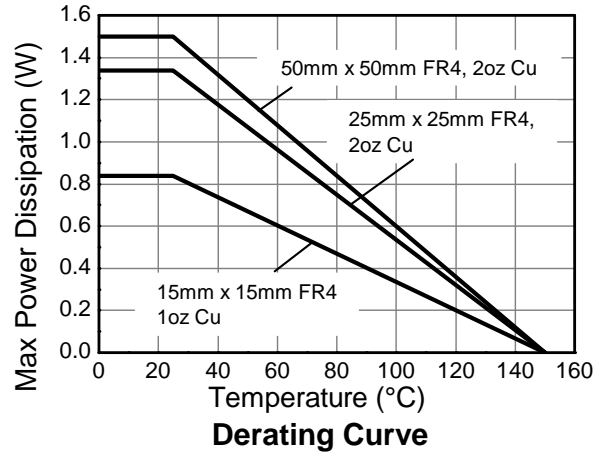
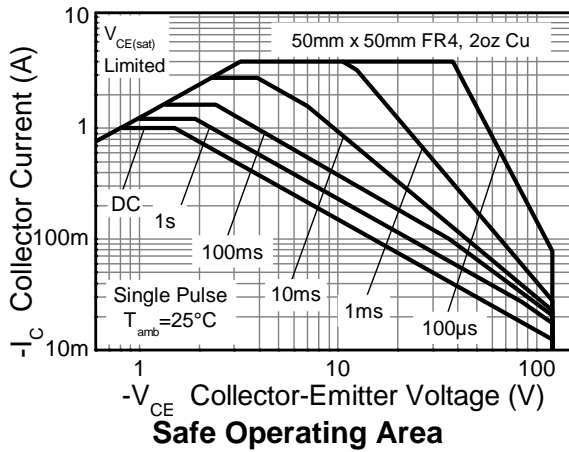
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	0.84	W mW/°C
		6.72	
		1.34	
		10.72	
		1.50	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	12.0	°C/W
		2.0	
		16.0	
		60	
Thermal Resistance, Junction to Leads	R <sub>θJL</sub>	43.8	°C/W
Operating and 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	2,000	V	2
Electrostatic Discharge – Machine Model	ESD MM	200	V	B

- Notes:
- For a device mounted with the exposed collector pad on 15mm x 15mm 1oz 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 the device is mounted on 25mm x 25mm 2oz copper.
  - Same as Note 5, except the device is mounted on 50mm x 50mm 2oz copper.
  - Same as Note 7, whilst measured at t < 5 seconds.
  - Thermal resistance from junction to solder-point (at the end of the leads).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**

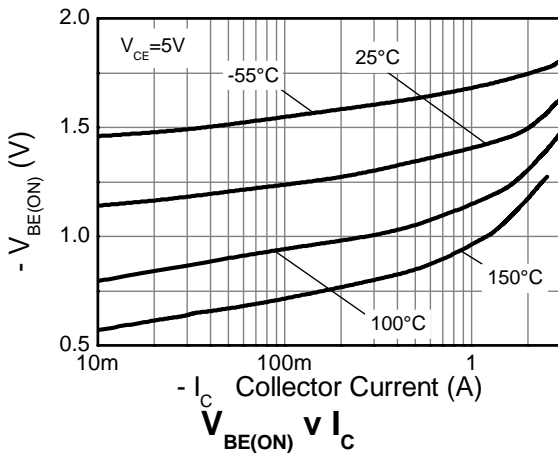
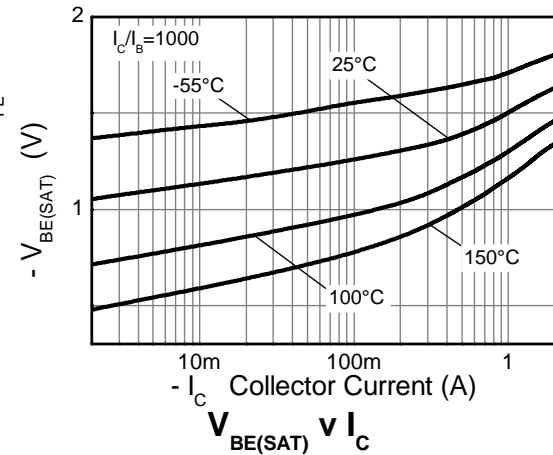
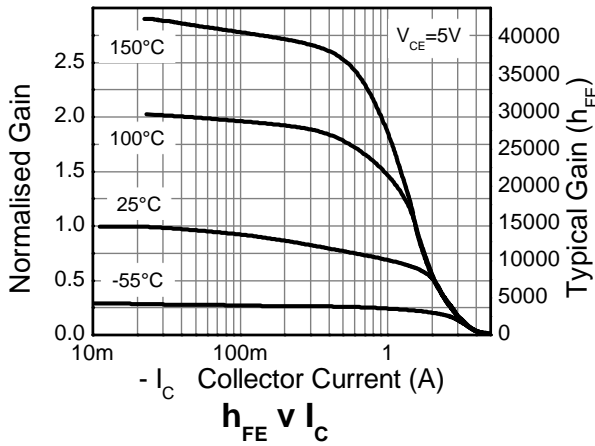
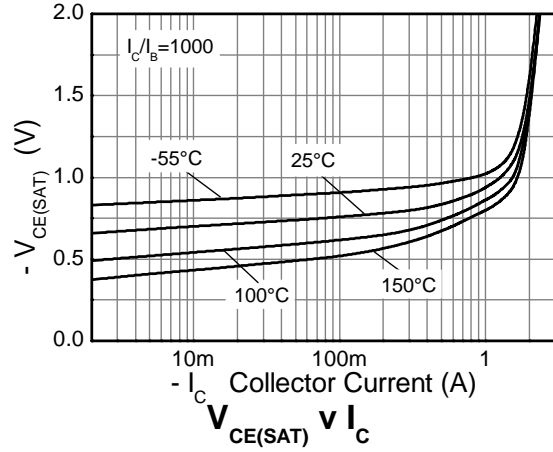
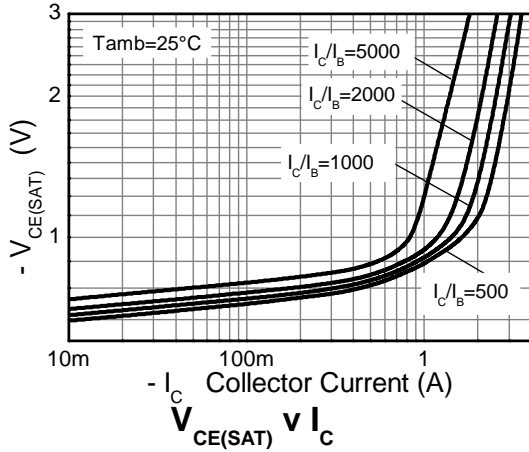


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-140	-170	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Base Open) (Note 11)	BV <sub>CEO</sub>	-120	-140	—	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-10	-16	—	V	I <sub>E</sub> = -100μA
Collector-Base Cutoff Current	I <sub>CBO</sub>	—	<-1	-100	nA	V <sub>CB</sub> = -120V
Emitter-Base Cutoff Current	I <sub>CES</sub>	—	<-0.1	-10	μA	V <sub>CB</sub> = -120V, T <sub>A</sub> = +100°C
Emitter-Base Cutoff Current	I <sub>EBO</sub>	—	<-1	-100	nA	V <sub>EB</sub> = -5.6V
<b>ON CHARACTERISTICS (Note 11)</b>						
Static Forward Current Transfer Ratio	h <sub>FE</sub>	3,000 3,000 3,000 2,000	14,000 11,000 11,000 8,000	— — 30,000 —	—	I <sub>C</sub> = -50mA, V <sub>CE</sub> = -5V I <sub>C</sub> = -500mA, V <sub>CE</sub> = -5V I <sub>C</sub> = -1A, V <sub>CE</sub> = -5V I <sub>C</sub> = -2A, V <sub>CE</sub> = -5V
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	—	-0.77 -0.9 -1.3	-0.9 -1.1 -2.0	V	I <sub>C</sub> = -250mA, I <sub>B</sub> = -0.25mA I <sub>C</sub> = -1A, I <sub>B</sub> = -1mA I <sub>C</sub> = -2A, I <sub>B</sub> = -2mA
Base-Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	—	-1.5	-1.7	V	I <sub>C</sub> = -1A, I <sub>B</sub> = -1mA
Base-Emitter On Voltage	V <sub>BE(ON)</sub>	—	-1.4	-1.7	V	I <sub>C</sub> = -1A, V <sub>CE</sub> = -5V
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	f <sub>T</sub>	—	150	—	MHz	I <sub>C</sub> = -100mA, V <sub>CE</sub> = -10V, f = 20MHz
Input Capacitance	C <sub>IBO</sub>	—	67	90	pF	V <sub>EB</sub> = -0.5V, f = 1MHz
Output Capacitance	C <sub>OBO</sub>	—	22	40	pF	V <sub>CB</sub> = -1V, f = 1MHz
Delay Time	t <sub>D</sub>	—	556	—	ns	V <sub>CC</sub> = -10V, I <sub>C</sub> = -0.5A, I <sub>B1</sub> = I <sub>B2</sub> = -0.5mA
Rise Time	t <sub>R</sub>	—	212	—	ns	
Storage Time	t <sub>S</sub>	—	681	—	ns	
Fall Time	t <sub>F</sub>	—	304	—	ns	

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

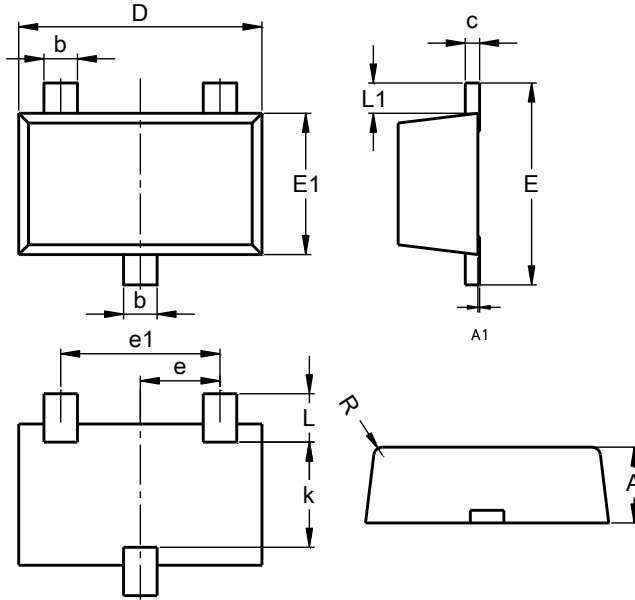
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



**Package Outline Dimensions**

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

**SOT23F**

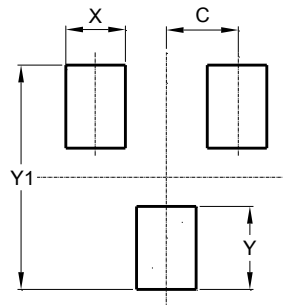


SOT23F			
Dim	Min	Max	Typ
A	0.80	1.00	0.90
b	0.35	0.50	0.44
c	0.10	0.20	0.16
D	2.80	3.00	2.90
e	0.95 REF		
e1	0.190 REF		
E	2.30	2.50	2.40
E1	1.50	1.70	1.65
k	1.20	-	-
L	0.30	0.65	0.50
L1	0.30	0.50	0.40
R	0.05	0.15	-
All Dimensions in mm			

**Suggested Pad Layout**

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

**SOT23F**



Dimensions	Value (in mm)
C	0.95
X	0.80
Y	1.110
Y1	3.000

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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