

**45V NPN MEDIUM POWER PLANAR TRANSISTOR IN SOT23F**

**Features and Benefits**

- $BV_{CEO} > 45V$
- $I_C = 4A$  Continuous Collector Current
- Low Saturation Voltage  $V_{CE(sat)} < 80mV @ 1A$
- $R_{CE(sat)} = 50m\Omega$
- $h_{FE}$  characterised up to 4A
- High  $h_{FE}$  min 400 @ 1A
- 1.5W power dissipation
- Complementary part number ZXTP07040DFF
- **Totally Lead-Free & Fully RoHS compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Description**

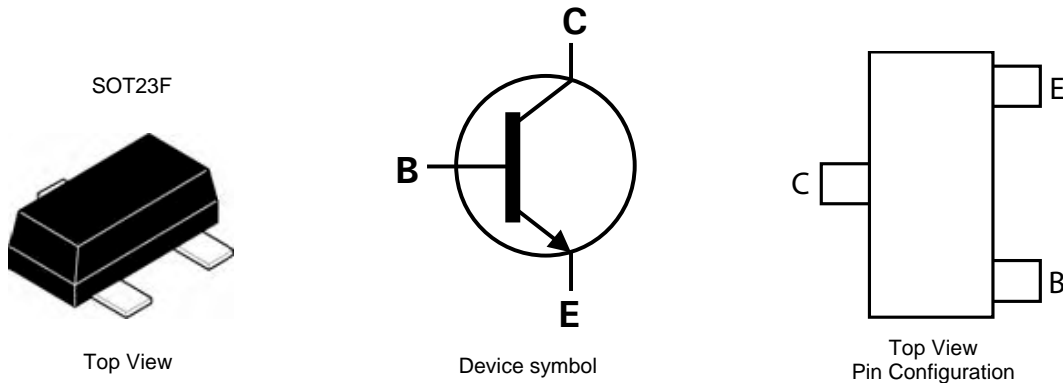
This low voltage NPN transistor has been designed for applications requiring high gain and very low saturation voltage. The SOT23F package is pin compatible with the industry standard SOT23 footprint but offers lower profile and higher dissipation for applications where power density is of utmost importance.

**Mechanical Data**

- Case: SOT23F
- Case material: Molded Plastic. "Green" Molding Compound (Note 2) UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (Approximate)

**Applications**

- Boost converters
- MOSFET and IGBT gate drivers
- Lamp and relay driver
- Motor drive
- Siren driver

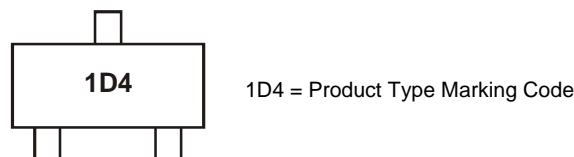


**Ordering Information** (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN07045EFFTA	1D4	7	8	3,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  3. For packaging details, go to our website at <http://www.diodes.com>.

**Marking Information**



**Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

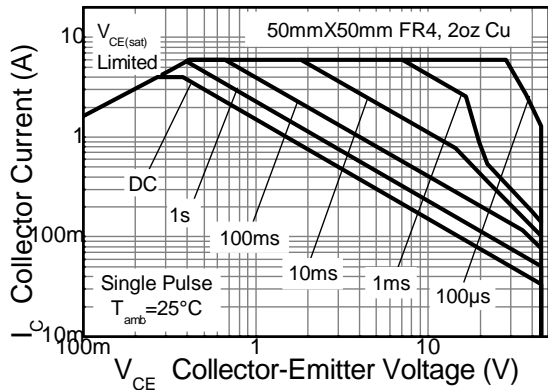
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	45	V
Collector-Emitter Voltage	V <sub>CEO</sub>	45	V
Emitter-Collector Voltage (Reverse Blocking)	V <sub>ECO</sub>	6	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	4	A
Peak Pulse Current	I <sub>CM</sub>	6	A
Base Current	I <sub>B</sub>	1	A

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

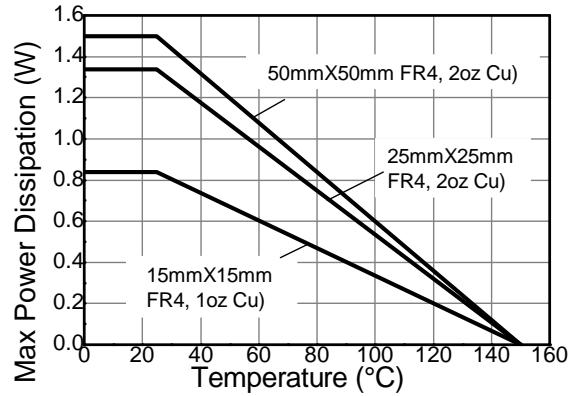
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub> -	0.84	W mW/°C
		6.72	
		1.34	
		10.72	
		1.50	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	12.0	°C/W
		2.0	
		16.0	
		149	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	93	°C/W
		83	
		60	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
4. For a device surface mounted on 15mm X 15mm X 1.6mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  5. For a device surface mounted on 25mm X 25mm X 1.6mm FR4 PCB with high coverage of single sided 2 oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  6. For a device surface mounted on 50mm X 50mm X 1.6mm FR4 PCB with high coverage of single sided 2 oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  7. As note 6 above, measured at t < 5 seconds
  8. Thermal resistance from junction to solder-point (at the end of the collector lead).

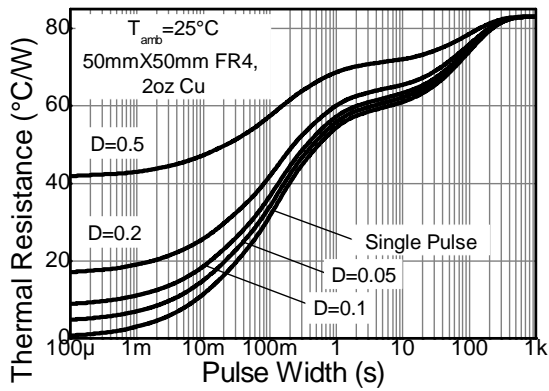
**Typical Thermal Characteristics**



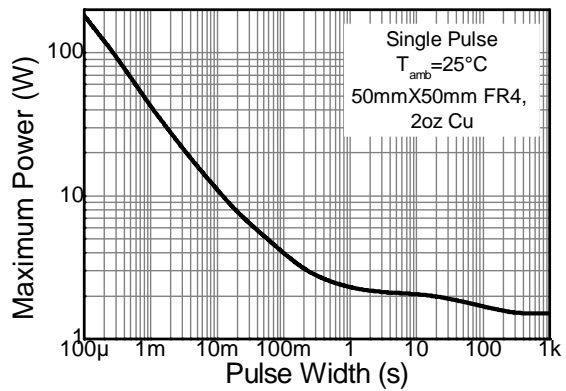
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



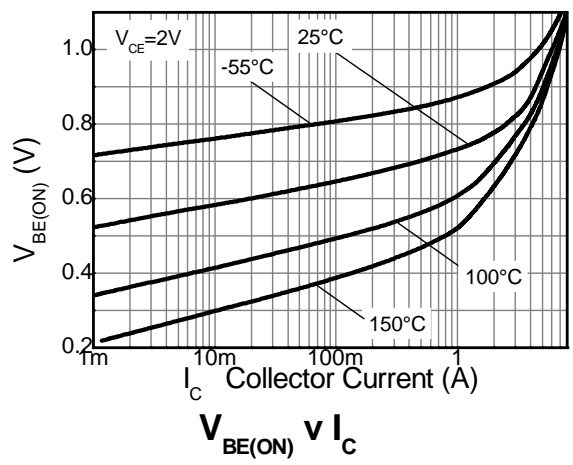
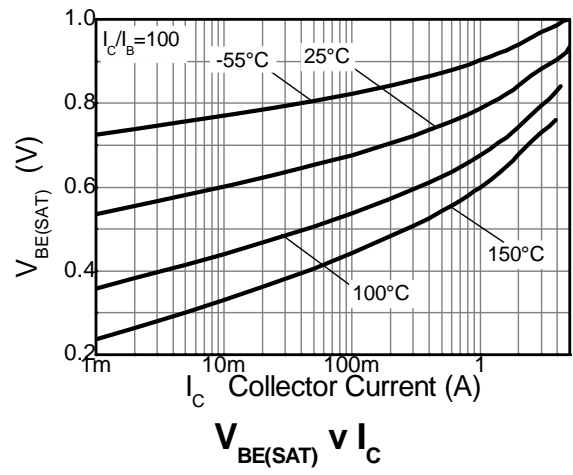
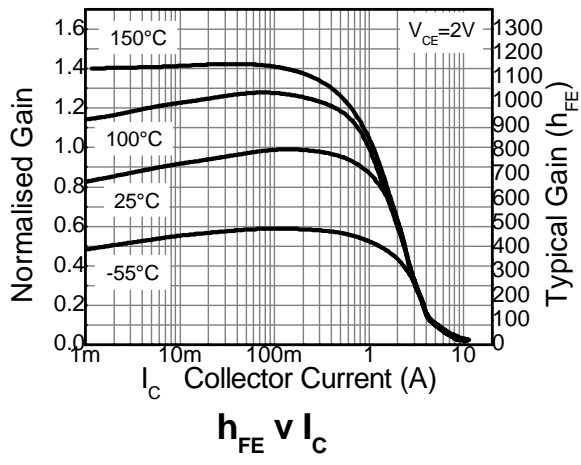
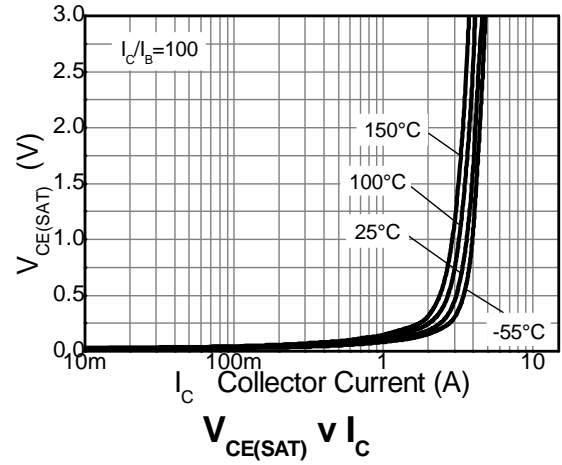
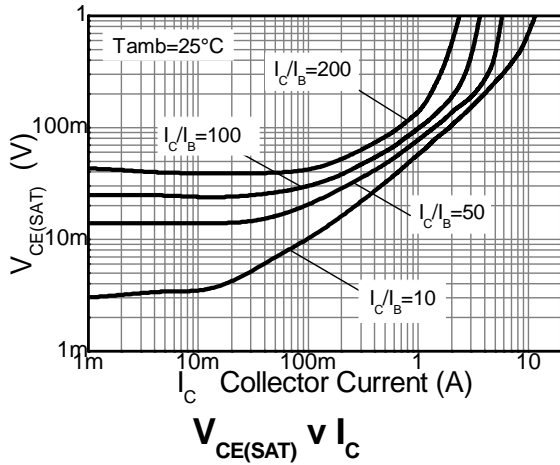
**Pulse Power Dissipation**

**Electrical Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

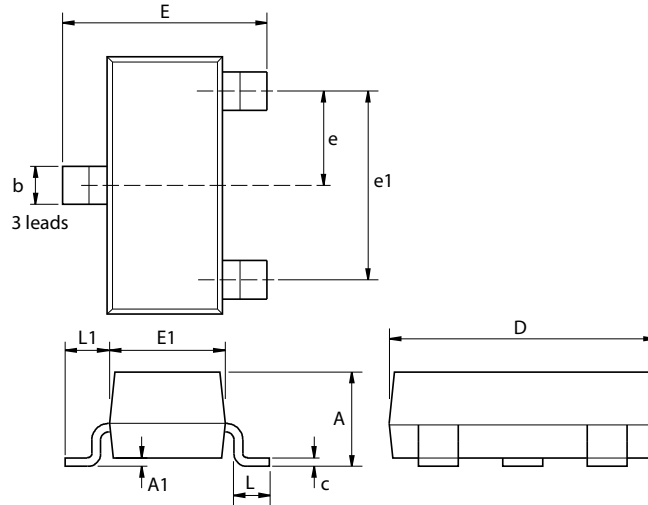
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	45	160	-	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (base open) (Note 9)	$BV_{CEO}$	45	60	-	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	8.3	-	V	$I_E = 100\mu\text{A}$
Emitter-collector breakdown voltage (reverse blocking)	$BV_{ECX}$	6	8.2	-	V	$I_E = 100\mu\text{A}$ ; $R_{BC} < 1\text{k}\Omega$ or $-0.25\text{V} < V_{BC} < 0.25\text{V}$
Emitter-collector breakdown voltage (base open)	$BV_{ECO}$	6	7.2	-	V	$I_E = 100\mu\text{A}$
Collector-base Cut-off Current	$I_{CBO}$	-	<1	50	nA	$V_{CB} = 35\text{V}$
Emitter-base Cut-off Current	$I_{EBO}$	-	<1	50	nA	$V_{CB} = 35\text{V}$ , $T_A = 100^\circ\text{C}$
<b>ON CHARACTERISTICS (Note 9)</b>						
Static Forward Current Transfer Ratio	$h_{FE}$	500 400 250 70	800 710 530 125	1500 -	-	$I_C = 100\text{mA}$ , $V_{CE} = 2\text{V}$ $I_C = 1\text{A}$ , $V_{CE} = 2\text{V}$ $I_C = 2\text{A}$ , $V_{CE} = 2\text{V}$ $I_C = 4\text{A}$ , $V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	-	45 160 60 200 230	70 230 80 270 280	mV	$I_C = 0.1\text{A}$ , $I_B = 0.5\text{mA}$ $I_C = 1\text{A}$ , $I_B = 5\text{mA}$ $I_C = 1\text{A}$ , $I_B = 100\text{mA}$ $I_C = 2\text{A}$ , $I_B = 20\text{mA}$ $I_C = 4\text{A}$ , $I_B = 80\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	-	1000	1100	mV	$I_C = 4\text{A}$ , $I_B = 80\text{mA}$
Base-Emitter On Voltage	$V_{BE(on)}$	-	875	1000	mV	$I_C = 4\text{A}$ , $V_{CE} = 2\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS (Note 9)</b>						
Transition Frequency	$f_T$	150	190	-	MHz	$I_C = 50\text{mA}$ , $V_{CE} = 5\text{V}$ , $f = 50\text{MHz}$
Input Capacitance	$C_{ibo}$	-	225	-	pF	$V_{EB} = 0.5\text{V}$ , $f = 1\text{MHz}$
Output Capacitance	$C_{obo}$	-	18.4	25	pF	$V_{CB} = 10\text{V}$ , $f = 1\text{MHz}$
Delay time	$t_d$	-	22.3	-	ns	$V_{CC} = 10\text{V}$ , $I_C = 500\text{mA}$ , $I_{B1} = I_{B2} = 50\text{mA}$
Rise time	$t_r$	-	10.6	-	ns	
Storage time	$t_s$	-	613	-	ns	
Fall time	$t_f$	-	146	-	ns	

Notes: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$

**Typical Electrical Characteristics**



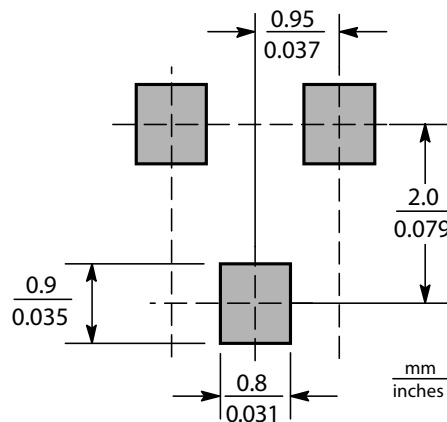
**Package Outline Dimensions**



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	-	1.12	-	0.044	e1	1.90 NOM		0.075 NOM	
A1	0.01	0.10	0.0004	0.004	E	2.10	2.64	0.083	0.104
b	0.30	0.50	0.012	0.020	E1	1.20	1.40	0.047	0.055
c	0.085	0.20	0.003	0.008	L	0.25	0.60	0.0098	0.0236
D	2.80	3.04	0.110	0.120	L1	0.45	0.62	0.018	0.024
e	0.95 NOM		0.037 NOM		-	-	-	-	-

**Note:** Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

**Suggested Pad Layout**



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