

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

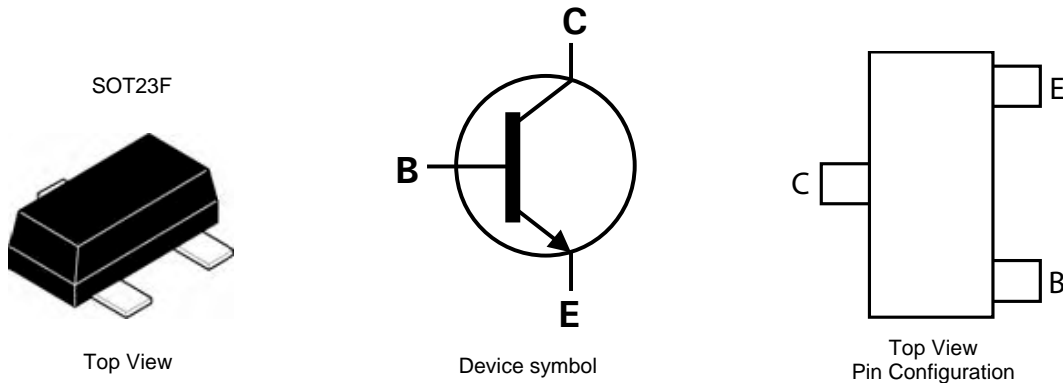
This low voltage NPN transistor has been designed for applications requiring high gain and very low saturation voltage. The SOT23F package is pin compatible with the industry standard SOT23 footprint but offers lower profile and higher dissipation for applications where power density is of utmost importance.

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

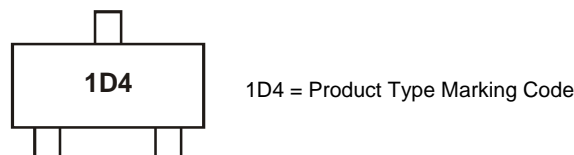


Ordering Information (Note 3)

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

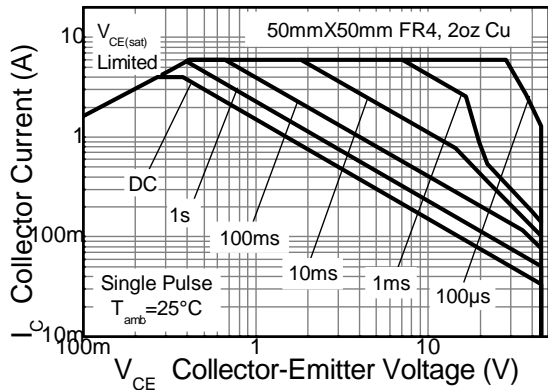
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	45	V
Collector-Emitter Voltage	V_{CEO}	45	V
Emitter-Collector Voltage (Reverse Blocking)	V_{ECO}	6	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	4	A
Peak Pulse Current	I_{CM}	6	A
Base Current	I_B	1	A

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

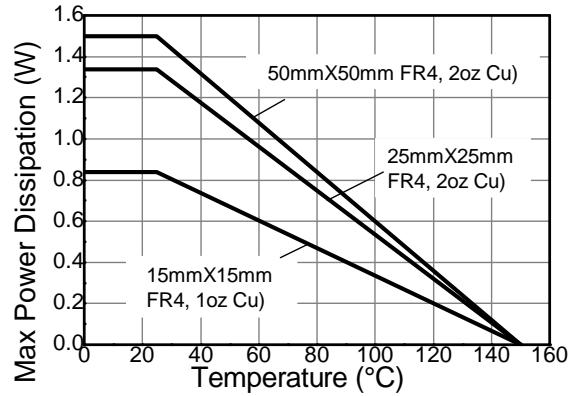
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P_D	0.84	W
		6.72	
		1.34	
		10.72	
		1.50	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	12.0	$^\circ\text{C/W}$
		2.0	
		16.0	
		149	
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	93	$^\circ\text{C/W}$
		83	
		60	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- 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).

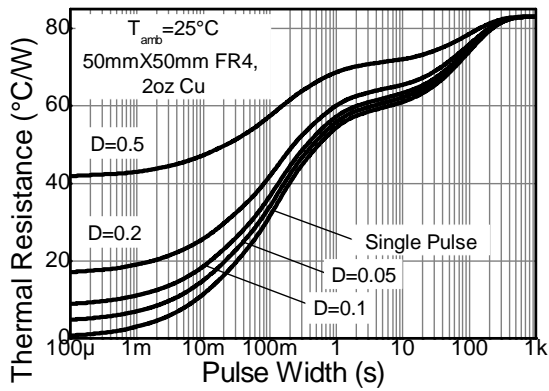
Typical Thermal Characteristics



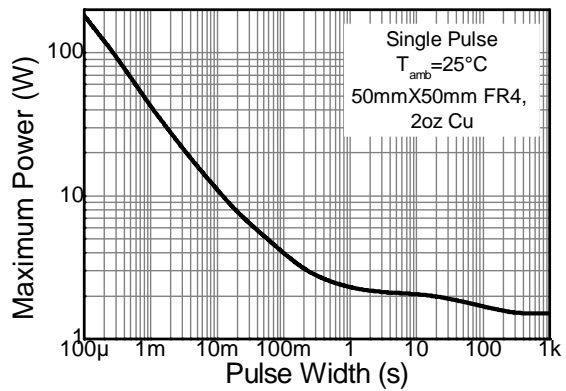
Safe Operating Area



Derating Curve



Transient Thermal Impedance



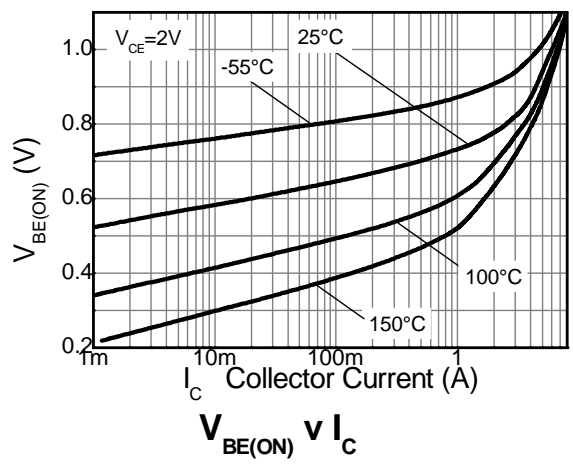
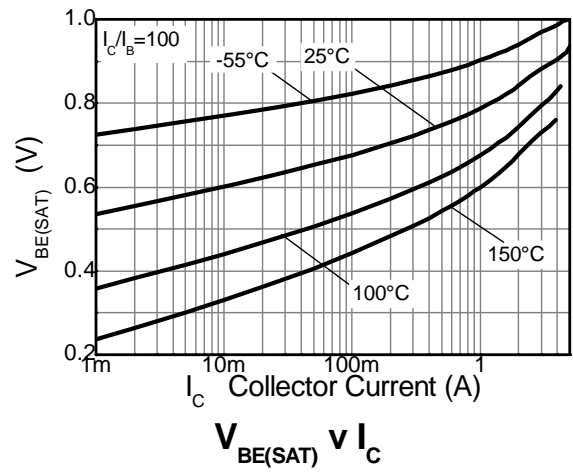
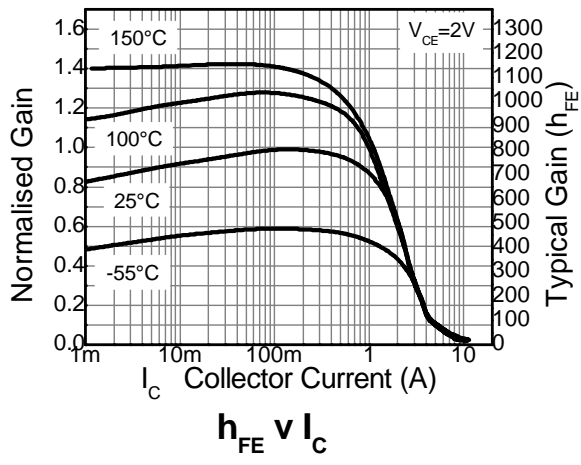
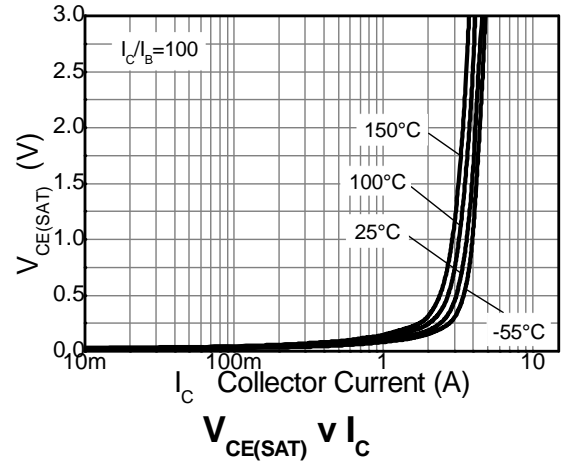
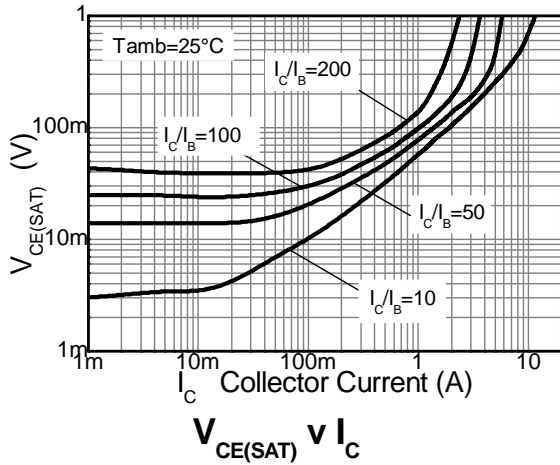
Pulse Power Dissipation

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

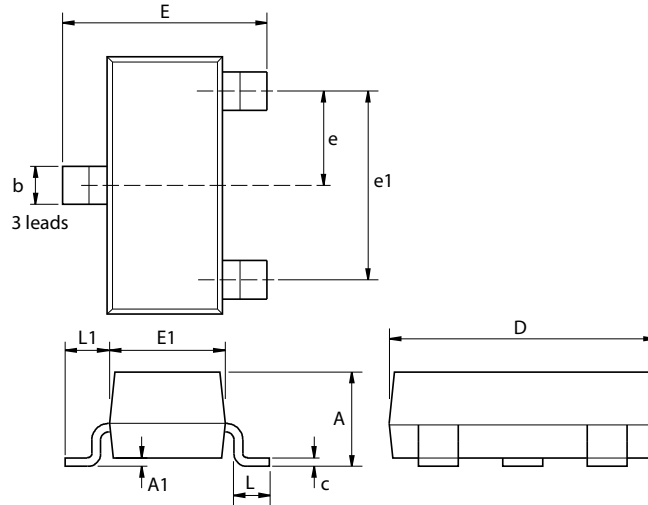
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	45	160	-	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (base open) (Note 9)	BV_{CEO}	45	60	-	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.3	-	V	$I_E = 100\mu\text{A}$
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	$V_{CB} = 35\text{V}$, $T_A = 100^\circ\text{C}$
ON CHARACTERISTICS (Note 9)						
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	$I_C = 4\text{A}$, $V_{CE} = 2\text{V}$
SMALL SIGNAL CHARACTERISTICS (Note 9)						
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



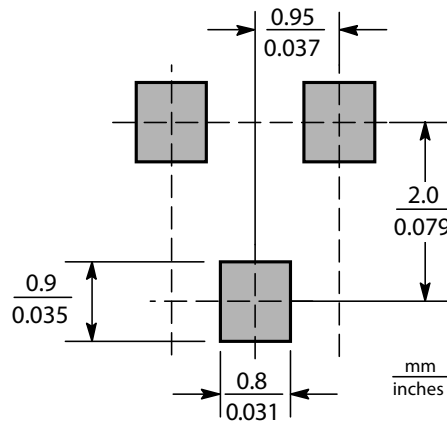
Package Outline Dimensions



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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