

12V NPN HIGH GAIN POWER TRANSISTOR IN SOT23F

Features

- $BV_{CEO} > 12V$
- $BV_{ECO} > 3V$
- $I_C = 4.5A$ Continuous Collector Current
- Low Saturation Voltage $V_{CE(sat)} < 70mV @ 1A$
- $R_{CE(sat)} = 43m\Omega$
- 1.5W Power Dissipation
- Complementary PNP Type: ZXTP07012EFF
- **Totally Lead-Free & Fully RoHS Compliant (Note 1&2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description

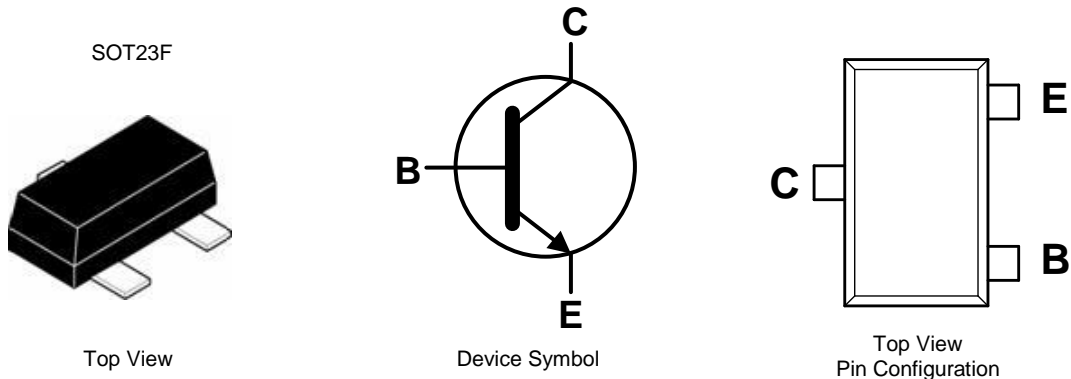
This low voltage NPN transistor has been designed for applications requiring high gain and very low saturation voltage. The SOT23F package is pin compatible with the industry standard SOT23 footprint but offers lower profile and higher dissipation for applications where power density is of utmost importance.

Mechanical Data

- Case: SOT23F
- Case Material: Molded Plastic. "Green" Molding Compound. 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

- LED Driver
- Boost Converters
- Logic Interface
- Motor Drive

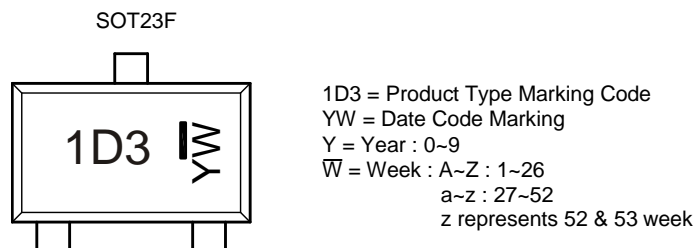


Ordering Information (Note 4)

Part number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN07012EFFTA	1D3	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 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



Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	20	V
Collector-Emitter Voltage	V _{CEO}	12	V
Emitter-Collector Voltage (Reverse Blocking)	V _{ECO}	3	V
Emitter-Base Voltage	V _{EBO}	7	V
Continuous Collector Current	I _C	4.5	A
Peak Pulse Current	I _{CM}	10	A
Base Current	I _B	1	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

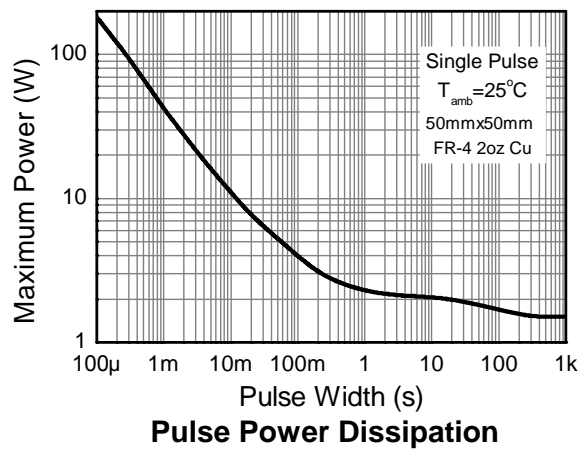
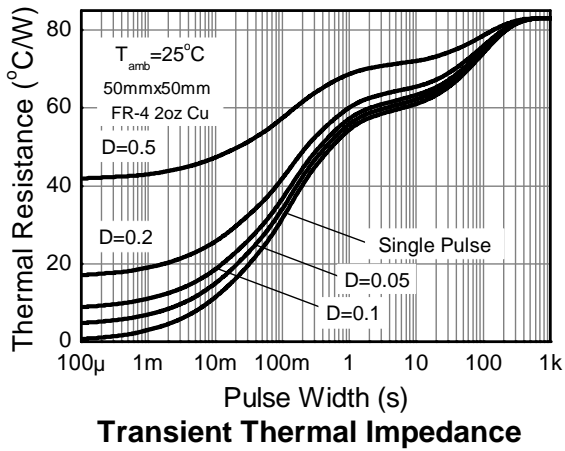
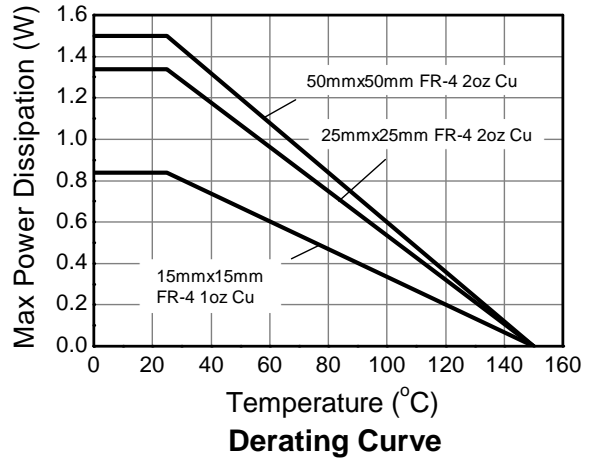
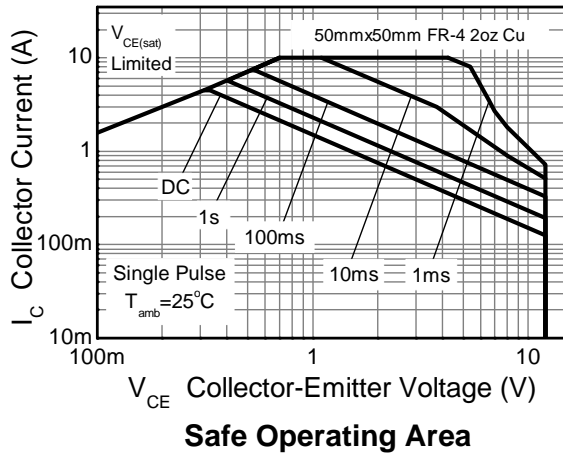
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P _D	0.84	W mW/°C
		6.72	
		1.34	
		10.72	
		1.50	
Thermal Resistance, Junction to Ambient	R _{θJA}	12.0	°C/W
		2.0	
		16.0	
		149	
Thermal Resistance, Junction to Ambient	R _{θJA}	93	°C/W
		83	
		60	
Thermal Resistance, Junction to Lead	R _{θJL}	43.77	°C/W
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:
5. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as Note 5, except the device is mounted on 25mm x 25mm 2oz copper.
 7. Same as Note 5, except the device is mounted on 50mm x 50mm 2oz copper.
 8. Same as Note 7, whilst measured at t < 5 seconds.
 9. Thermal resistance from junction to solder-point (at the end of the collector lead).
 10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

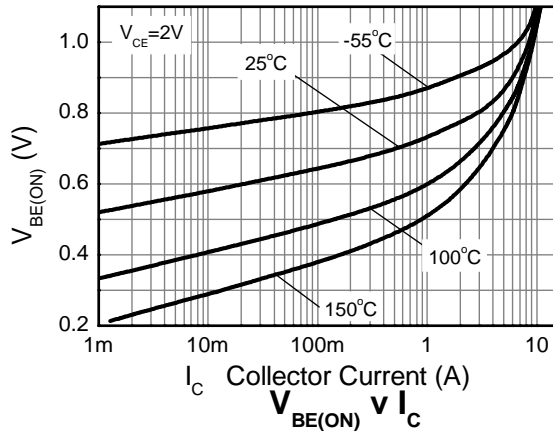
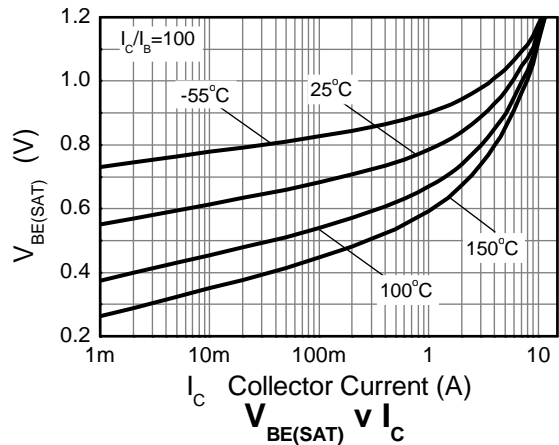
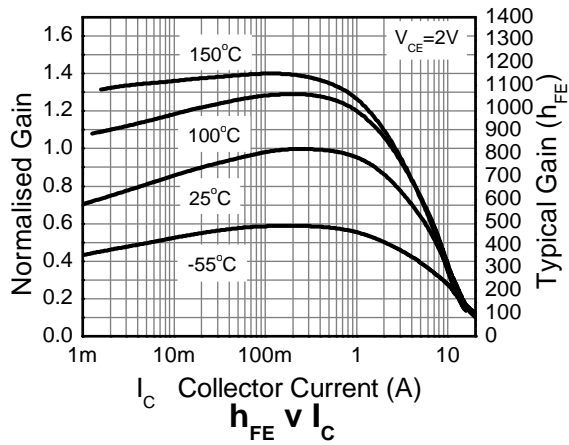
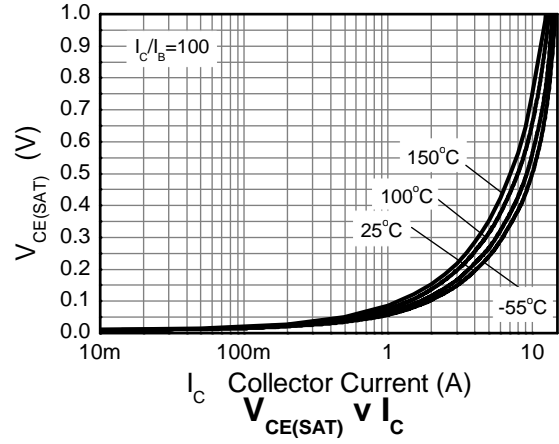
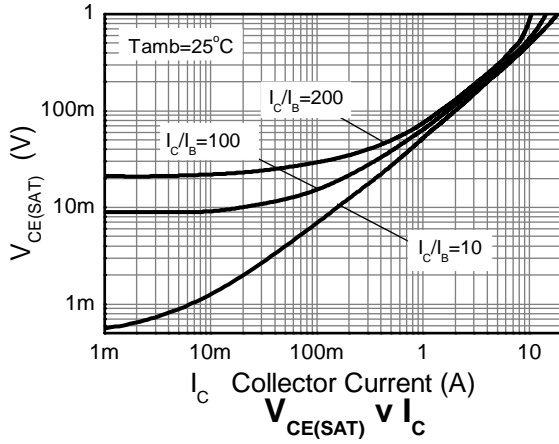


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	20	40	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Base Open) (Note 11)	BV_{CEO}	12	17	—	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}	3	5.3	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cut-Off Current	I_{CBO}	—	<1	50	nA	$V_{CB} = 16\text{V}$
Emitter-Base Cut-Off Current	I_{EBO}	—	<1	50	nA	$V_{CB} = 16\text{V}$, $T_A = +100^\circ\text{C}$
ON CHARACTERISTICS (Note 11)						
Static Forward Current Transfer Ratio	h_{FE}	500 400 330 140	800 650 530 230	1500 — — —	—	$I_C = 100\text{mA}$, $V_{CE} = 2\text{V}$ $I_C = 2\text{A}$, $V_{CE} = 2\text{V}$ $I_C = 4.5\text{A}$, $V_{CE} = 2\text{V}$ $I_C = 10\text{A}$, $V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	25 60 50 105 215	40 85 70 150 320	mV	$I_C = 0.1\text{A}$, $I_B = 0.5\text{mA}$ $I_C = 1\text{A}$, $I_B = 10\text{mA}$ $I_C = 1\text{A}$, $I_B = 100\text{mA}$ $I_C = 2\text{A}$, $I_B = 20\text{mA}$ $I_C = 4.5\text{A}$, $I_B = 45\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	945	1050	mV	$I_C = 4.5\text{A}$, $I_B = 45\text{mA}$
Base-Emitter On Voltage	$V_{BE(on)}$	—	850	950	mV	$I_C = 4.5\text{A}$, $V_{CE} = 2\text{V}$
SMALL SIGNAL CHARACTERISTICS						
Transition Frequency	f_T	150	220	—	MHz	$I_C = 50\text{mA}$, $V_{CE} = 5\text{V}$, $f = 50\text{MHz}$
Input Capacitance	C_{ibo}	—	229	—	pF	$V_{EB} = 0.5\text{V}$, $f = 1\text{MHz}$
Output Capacitance	C_{obo}	—	40	50	pF	$V_{CB} = 10\text{V}$, $f = 1\text{MHz}$
Delay Time	t_d	—	26.8	—	ns	$V_{CC} = 10\text{V}$, $I_C = 500\text{mA}$, $I_{B1} = -I_{B2} = 50\text{mA}$
Rise Time	t_r	—	14.2	—	ns	
Storage Time	t_s	—	250	—	ns	
Fall Time	t_f	—	67.7	—	ns	

Note: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

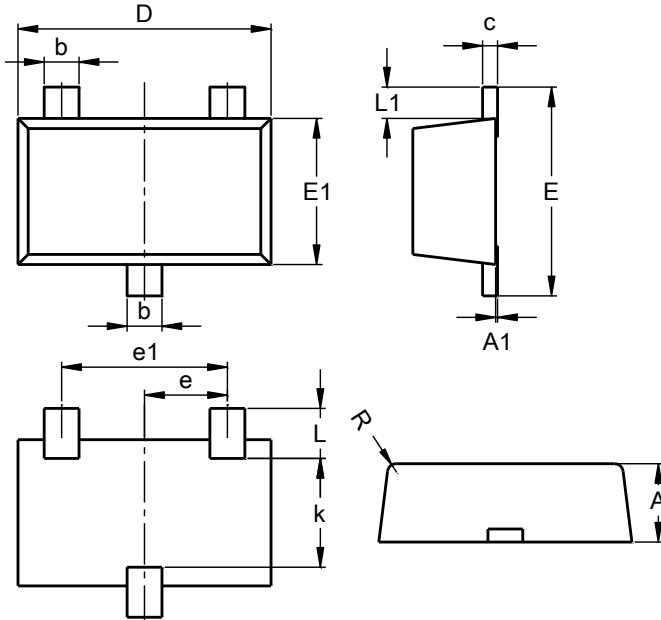
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

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

SOT23F

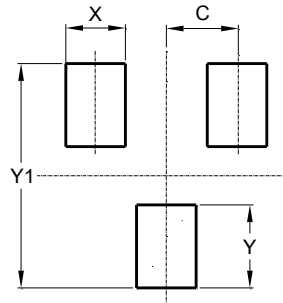


SOT23F			
Dim	Min	Max	Typ
A	0.80	1.00	0.90
A1	0.00	0.10	0.01
b	0.35	0.50	0.44
c	0.10	0.20	0.16
D	2.80	3.00	2.90
e	0.95 REF		
e1	1.90 REF		
E	2.30	2.50	2.40
E1	1.50	1.70	1.65
k	1.20	-	-
L	0.30	0.65	0.50
L1	0.30	0.50	0.40
R	0.05	0.15	-
All Dimensions in mm			

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

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