Lead-free Green

60V PNP MEDIUM POWER TRANSISTOR

Features

- BV_{CEO} > -60V
- I_C = -4A Continuous Collector Current
- Low Saturation Voltage $V_{CE(sat)}$ < -75mV @ 1A
- $R_{CE(sat)}$ = 45mΩ
- h_{FE} Characterised up to 4A
- High h_{FE} Min 160 @ 1A
- 1.5W Power Dissipation
- Complementary NPN type: ZXTN19060CFF
- **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**

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 e3
- Weight: 0.012 grams (Approximate)

Description

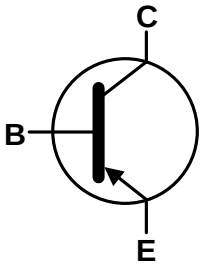
This medium voltage PNP transistor is designed for applications requiring high-gain and low-saturation voltage. The SOT23F package is PIN compatible with the industry standard SOT23 footprint while offering a lower profile and higher power dissipation for applications where power density is of utmost importance.

Applications

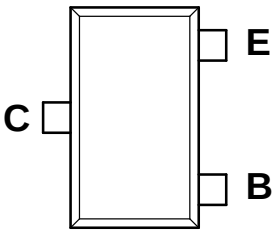
- High-Side Driver
- Motor Drive
- Load Disconnect Switch

SOT23F

Top View



Device Symbol



Top View
Pin Configuration

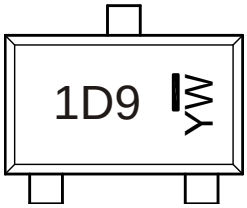
Ordering Information (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTP19060CFFTA	AEC-Q101	1D9	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

SOT23F



1D9 = 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_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-60	V
Collector-Emitter Voltage	V_{CEO}	-60	V
Emitter-Collector Voltage (Reverse Blocking)	V_{ECO}	-7	V
Emitter-Base Voltage	V_{EBO}	-7	V
Continuous Collector Current	I_C	-4	A
Peak Pulse Current	I_{CM}	-7	A
Base Current	I_B	-1	A

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

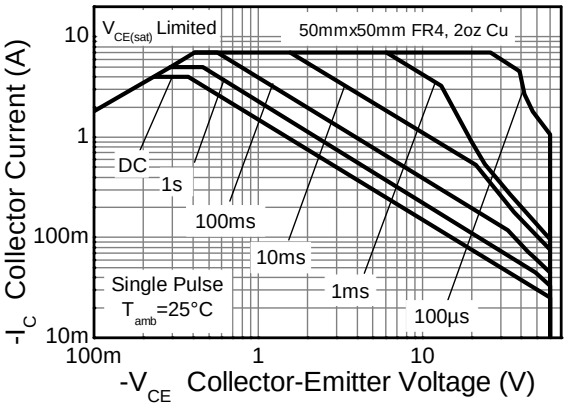
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 5)	P_D	0.84 6.72	W mW/°C
	(Note 6)		1.34 10.72	
	(Note 7)		1.50 12.0	
	(Note 8)		2.0 16.0	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	149	°C/W
	(Note 6)		93	
	(Note 7)		83	
	(Note 8)		60	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	43.77	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 10)

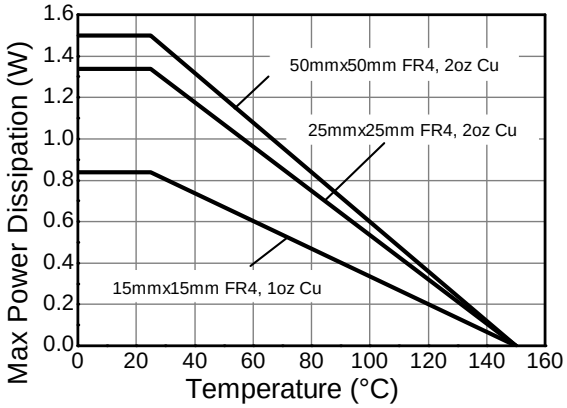
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

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 FR4 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.

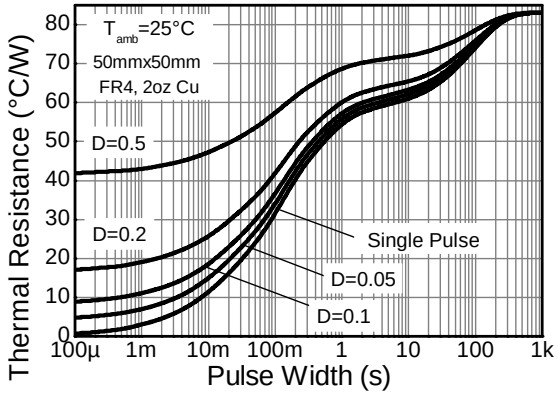
Thermal Characteristics and Derating Information



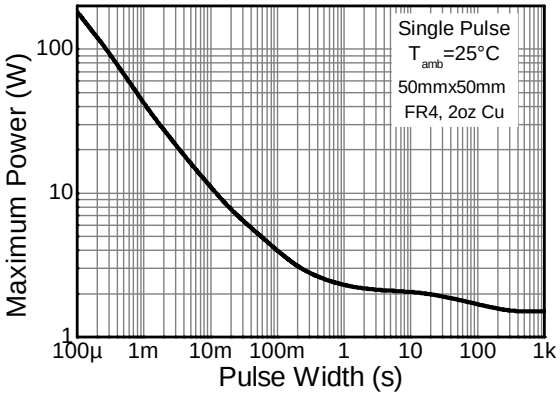
Safe Operating Area



Derating Curve



Transient Thermal Impedance



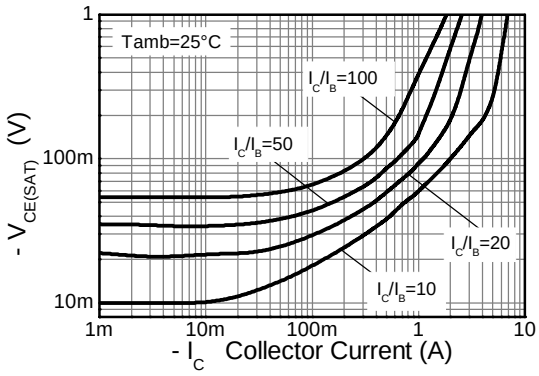
Pulse Power Dissipation

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

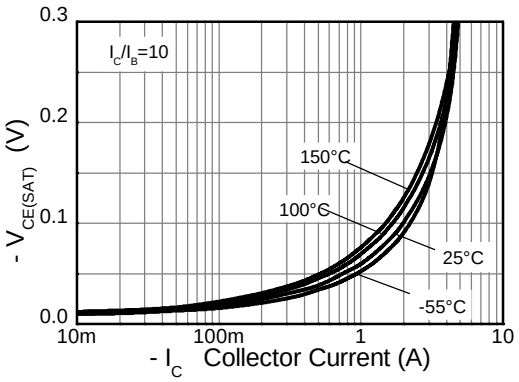
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	-60	-110	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Base Open) (Note 11)	BV_{CEO}	-60	-90	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	-8.4	—	V	I_E = -100µA
Emitter-Collector Breakdown Voltage (Reverse Blocking)	BV_{ECX}	-7	-8.4	—	V	I_E = -100µA; R_{BC} < 1kΩ or 0.25V < V_{BC} < -0.25V
Emitter-Collector Breakdown Voltage (base open)	BV_{ECO}	-7	-8.8	—	V	I_E = -100µA
Collector-Base Cut-Off Current	I_{CBO}	—	<-1 —	-50 -0.5	nA µA	V_{CB} = -60V V_{CB} = -60V, T_A = +100°C
Emitter-Base Cut-Off Current	I_{EBO}	—	<-1	-50	nA	V_{EB} = -5.6V
ON CHARACTERISTICS (Note 11)						
Static Forward Current Transfer Ratio	h_{FE}	200 160 30	350 280 50	500 — —	—	I_C = -100mA, V_{CE} = -2V I_C = -1A, V_{CE} = -2V I_C = -4A, V_{CE} = -2V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	-60 -140 -180	-75 -200 -270	mV	I_C = -1A, I_B = -100mA I_C = -1A, I_B = -20mA I_C = -4A, I_B = -400mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	-935	-1,050	mV	I_C = -4A, I_B = -400mA
Base-Emitter On Voltage	$V_{BE(on)}$	—	-835	-950	mV	I_C = -4A, V_{CE} = -2V
SMALL SIGNAL CHARACTERISTICS						
Transition Frequency	f_T	—	180	—	MHz	I_C = -50mA, V_{CE} = -10V, f = 50MHz
Output Capacitance	C_{obo}	—	29.5	40	pF	V_{CB} = -10V, f = 1MHz
Delay Time	t_d	—	24.3	—	ns	V_{CC} = -10V, I_C = -500mA, I_{B1} = -I_{B2} = -50mA
Rise Time	t_r	—	13.2	—	ns	
Storage Time	t_s	—	456	—	ns	
Fall Time	t_f	—	68.2	—	ns	

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

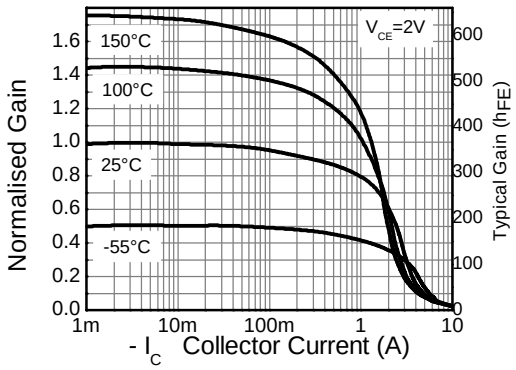
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



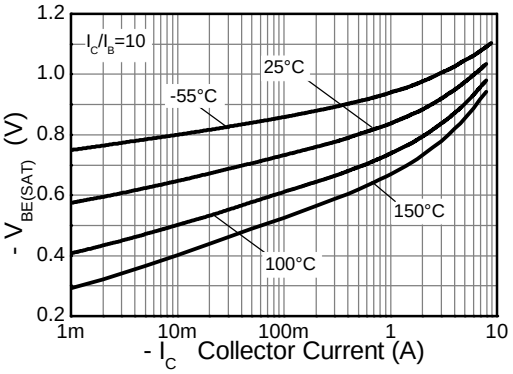
$V_{CE(SAT)}$ v I_C



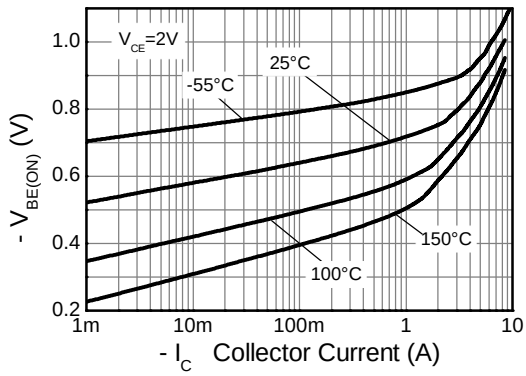
$V_{CE(SAT)}$ v I_C



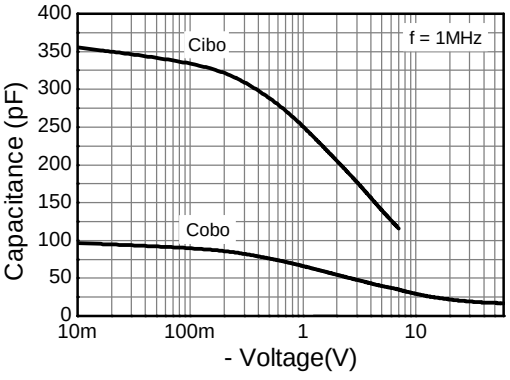
h_{FE} v I_C



$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

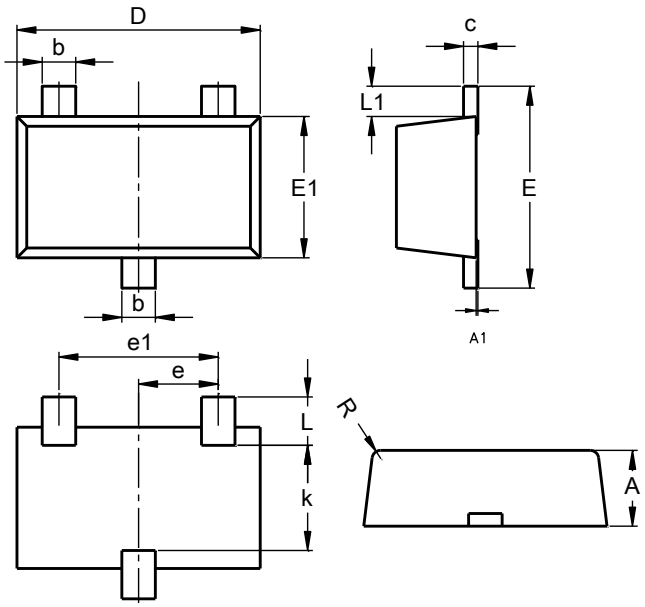


Capacitance v Voltage

Package Outline Dimensions

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

SOT23F

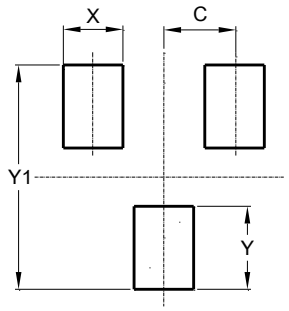


SOT23F			
Dim	**Min**	**Max**	**Typ**
A	0.80	1.00	0.90
b	0.35	0.50	0.44
c	0.10	0.20	0.16
D	2.80	3.00	2.90
e	0.95 REF		
e1	0.190 REF		
E	2.30	2.50	2.40
E1	1.50	1.70	1.65
k	1.20	-	-
L	0.30	0.65	0.50
L1	0.30	0.50	0.40
R	0.05	0.15	-
All Dimensions in mm			

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

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