

60V NPN MEDIUM POWER HIGH GAIN TRANSISTOR IN SOT89

Features

- $BV_{CEO} > 60V$
- $I_C = 1A$ high Continuous Collector Current
- $I_{CM} = 2A$ Peak Pulse Current
- High Gain device > 500 at $I_C = 150mA$
- **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

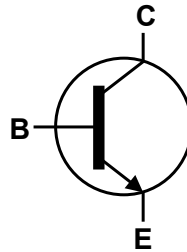
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 ③
- Weight: 0.055 grams (Approximate)

Applications

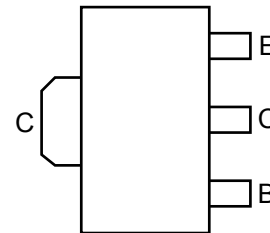
- Voltage Regulator Transistors
- Startup Switches
- Darlington Replacement
- DC Fans
- Relays and Solenoid Driving



Top View



Equivalent Circuit



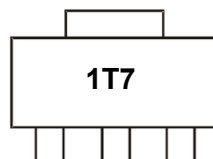
Top View
Pin-Out

Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FCX493ATA	1T7	7	12mm	1,000
FCX493ATC	1T7	13	12mm	4,000

- 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



1T7= Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	120	V
Collector-Emitter Voltage	V _{CEO}	60	V
Emitter-Base Voltage	V _{EBO}	7	V
Continuous Collector Current	I _C	1	A
Peak Pulse Current	I _{CM}	2	A

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

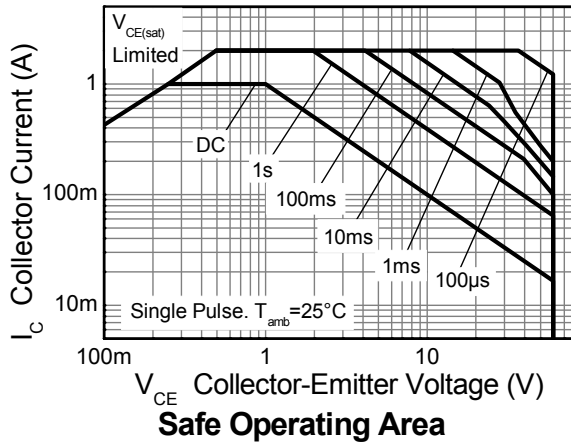
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	(Note 4)	1
		(Note 5)	1.5
		(Note 6)	2.0
Thermal Resistance, Junction to Ambient Air	R _{θJA}	(Note 4)	125
		(Note 5)	83
		(Note 6)	60
Thermal Resistance, Junction to Lead	R _{θJL}	22	°C/W
Thermal Resistance, Junction to Case	R _{θJC}	16	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 9)

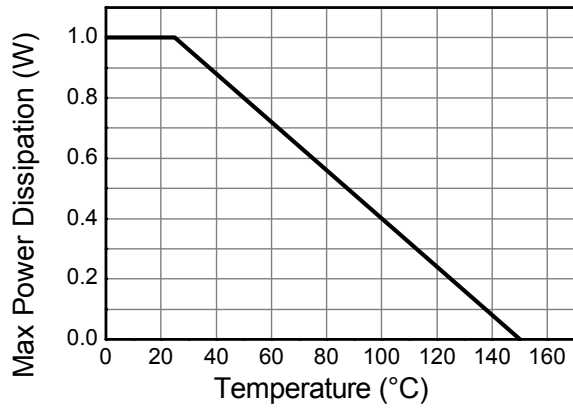
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
4. 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.
 5. Same as note (4), except the device is mounted on 25mm x 25mm 1oz copper.
 6. Same as note (4), except the device is mounted on 50mm x 50mm 1oz copper.
 7. Thermal resistance from junction to solder-point (on the exposed collector pad).
 8. Thermal resistance from junction to the top of the case.
 9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

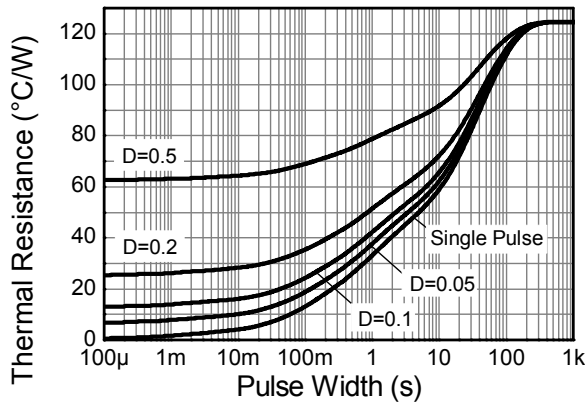
Thermal Characteristics and Derating Information



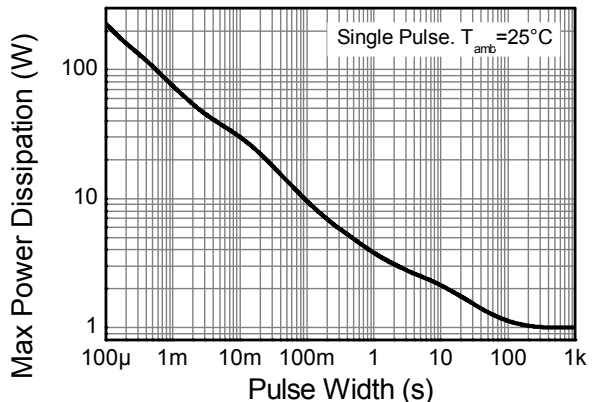
Safe Operating Area



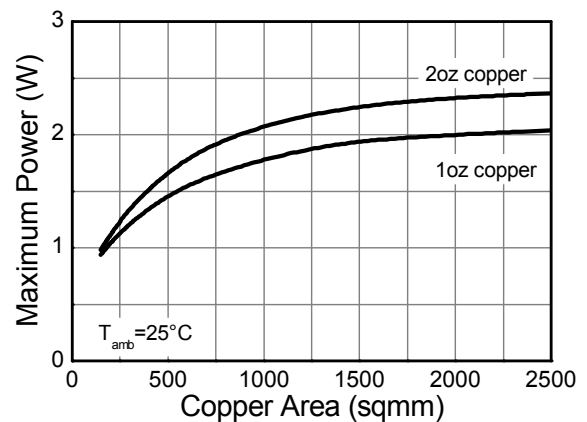
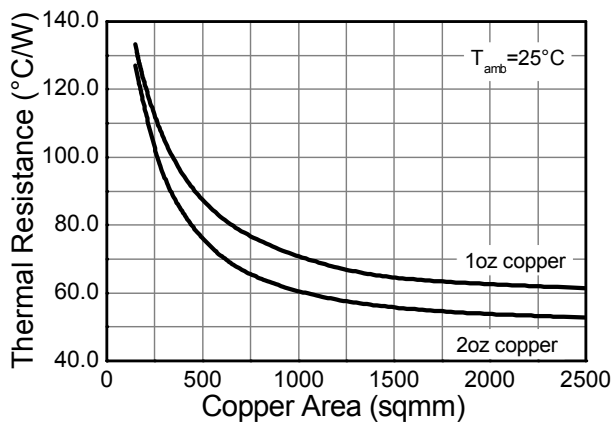
Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

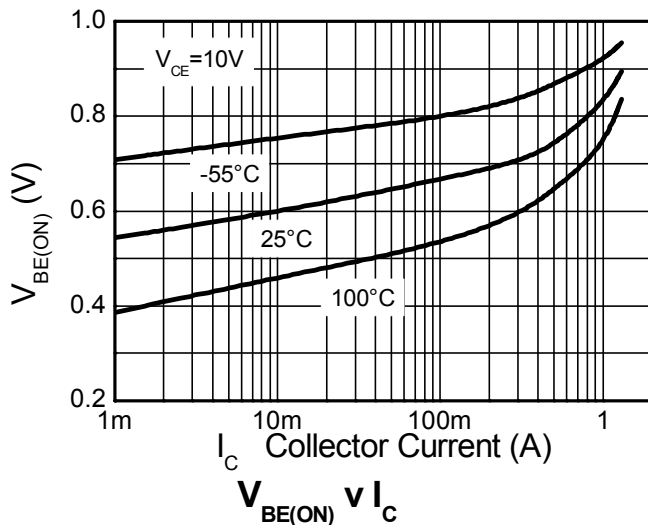
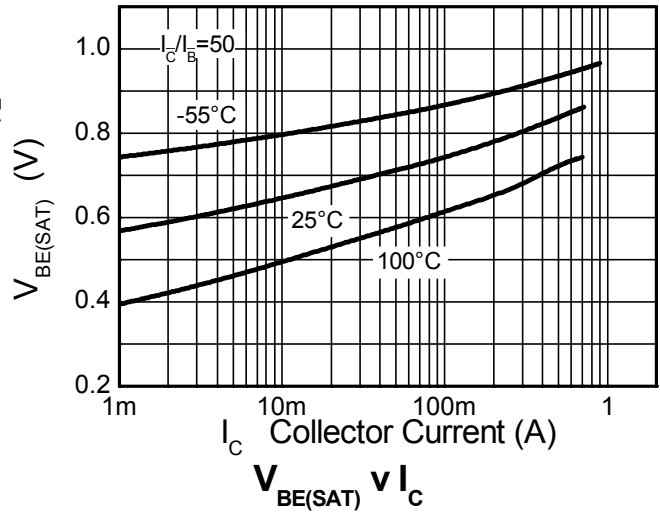
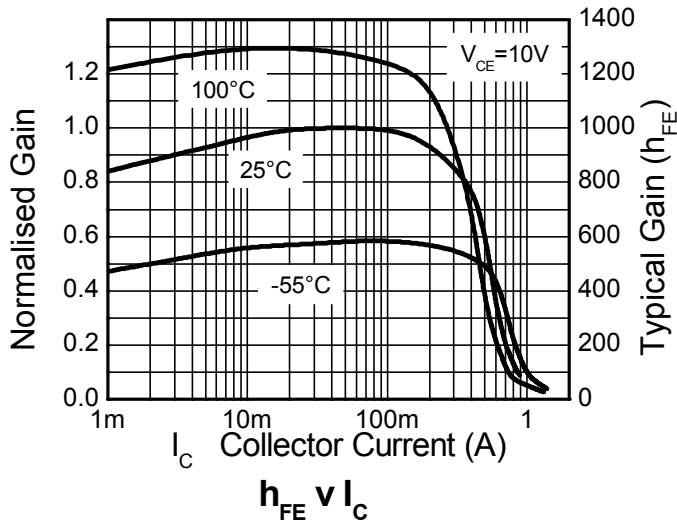
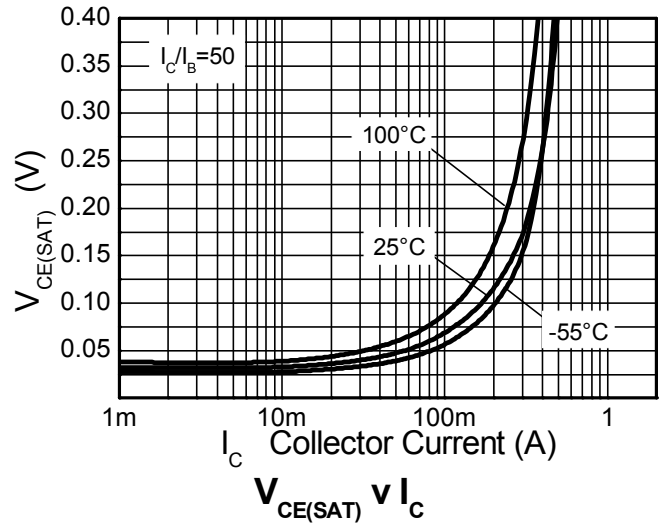
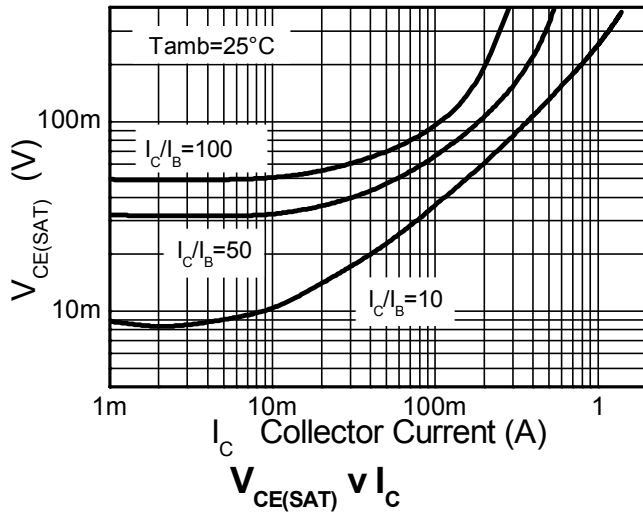


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	120			V	$I_C = 100 \mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	60			V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	BV_{EBO}	7			V	$I_E = 100 \mu\text{A}$
Collector-Base Cutoff Current	I_{CBO}			100	nA	$V_{CB} = 45\text{V}$
Collector Cutoff Current	I_{CES}			100	nA	$V_{CES} = 45\text{V}$
Emitter Cutoff Current	I_{EBO}			100	nA	$V_{EB} = 5\text{V}$
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$			250 500	mV	$I_C = 500\text{mA}, I_B = 50\text{mA}$ $I_C = 1\text{A}, I_B = 100\text{mA}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$			1.15	V	$I_C = 1\text{A}, I_B = 100\text{mA}$
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$			1.0	V	$I_C = 1\text{A}, V_{CE} = 10\text{V}$
DC Current Gain (Note 10)	h_{FE}	300 500 300 100 20		1200		$I_C = 1\text{mA}, V_{CE} = 10\text{V}$ $I_C = 150\text{mA}, V_{CE} = 10\text{V}$ $I_C = 250\text{mA}, V_{CE} = 10\text{V}$ $I_C = 500\text{mA}, V_{CE} = 10\text{V}$ $I_C = 1\text{A}, V_{CE} = 10\text{V}$
Transitional Frequency	f_T	150			MHz	$I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output capacitance	C_{obo}		10		pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$

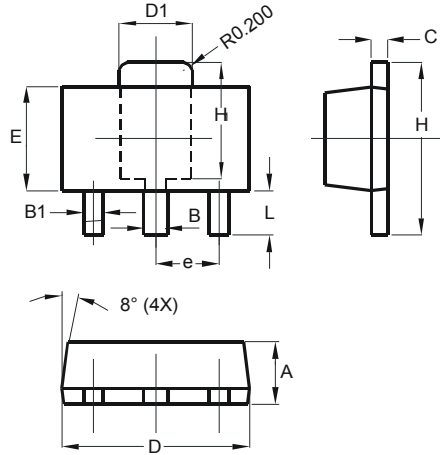
Notes: 10. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$

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



Package Outline Dimensions

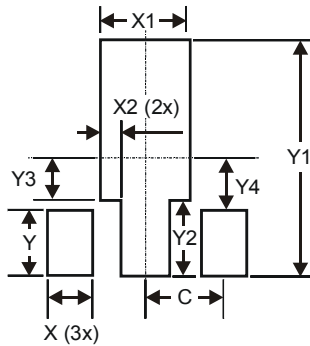
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	3.94	4.25
H1	2.63	2.93
L	0.89	1.20
All Dimensions in mm		

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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