

10V NPN MEDIUM POWER TRANSISTOR IN SOT89

Features

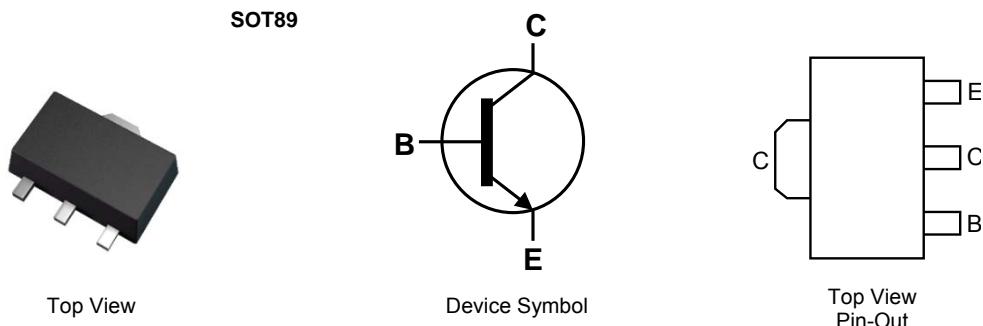
- $BV_{CEO} > 10V$
- $I_C = 4A$ High Continuous Current
- $I_{CM} = 20A$ Peak Pulse Current
- High Gain Holds up $h_{FE} > 300$ @ $I_C=1A$
- Low Equivalent On-Resistance; $R_{CE(sat)} = 40m\Omega$ at 4A
- Excellent h_{FE} Characteristics up to 20A
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

Applications

- Emergency Lighting Circuits
- Motor Driving (including DC fans)
- Solenoid, Relay and Actuator Drivers
- DC-DC Modules
- Backlight Inverters
- Power Switches
- MOSFET Gate Drivers

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 Lead. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.052 grams (Approximate)



Ordering Information (Note 4)

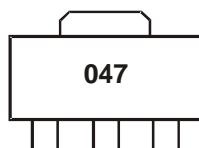
Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FCX1047ATA	047	7	12	1,000

Notes:

1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
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

SOT89



047 = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	35	V
Collector-Emitter Voltage	V_{CEO}	10	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	4	A
Peak Pulse Current	I_{CM}	20	A

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

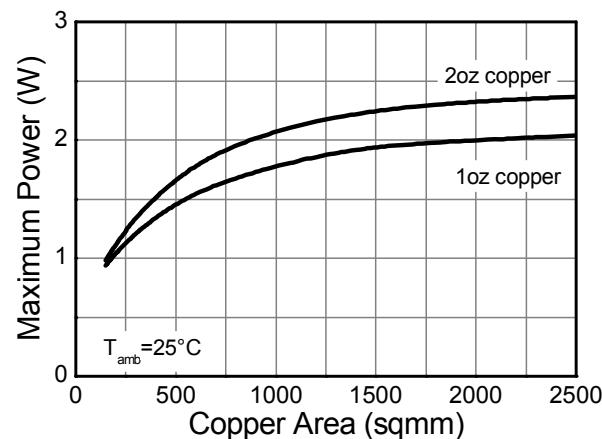
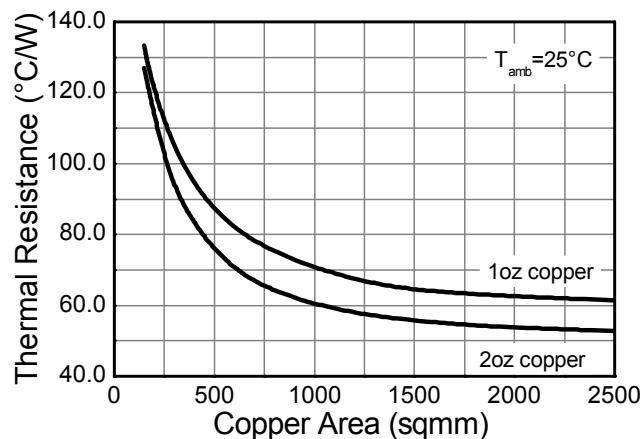
Characteristic	Symbol	Value	Unit
Power Dissipation	P_D	1	W
		1.6	
		2.0	
Thermal Resistance, Junction to Ambient Air	$R_{\theta JA}$	125	°C/W
		78	
		62.5	
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	3.6	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 9)

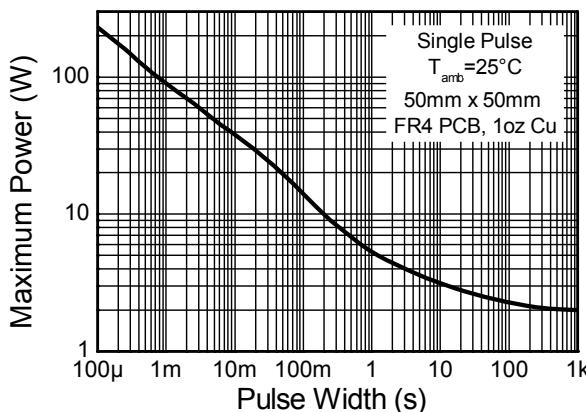
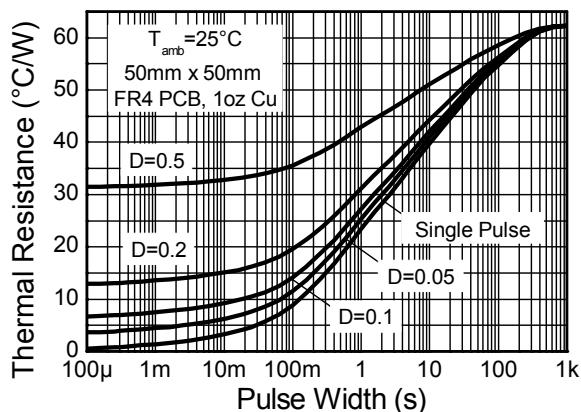
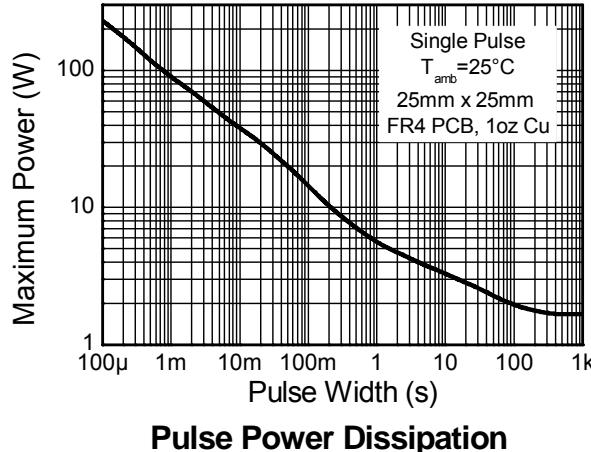
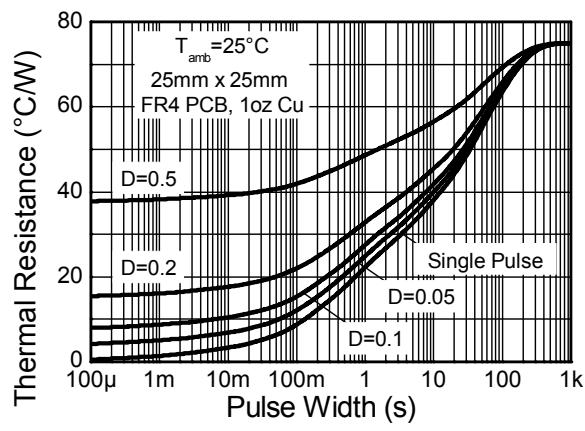
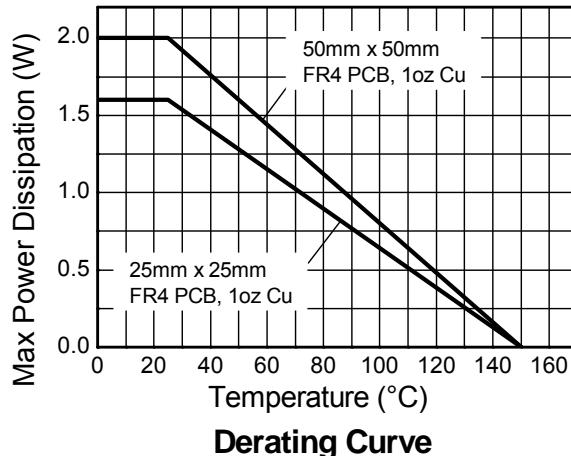
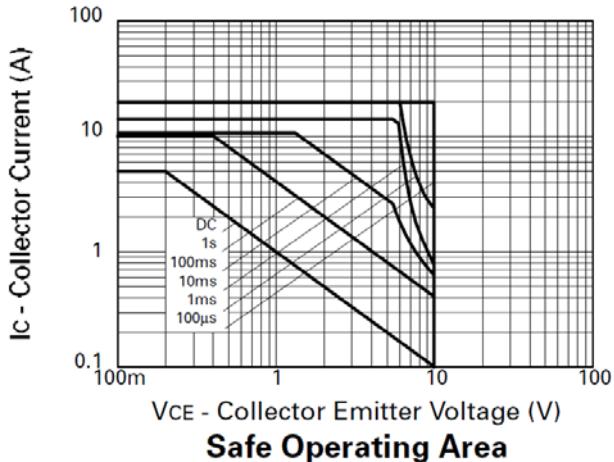
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:

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

Thermal Characteristics and Derating Information


Thermal Characteristics and Derating Information (continued)

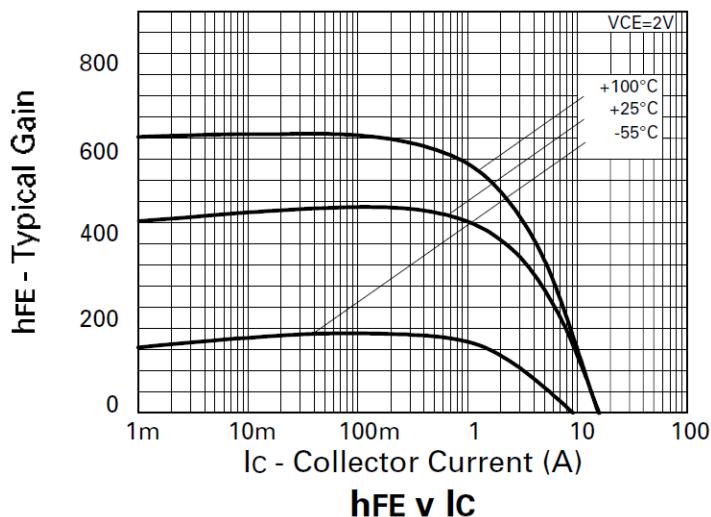
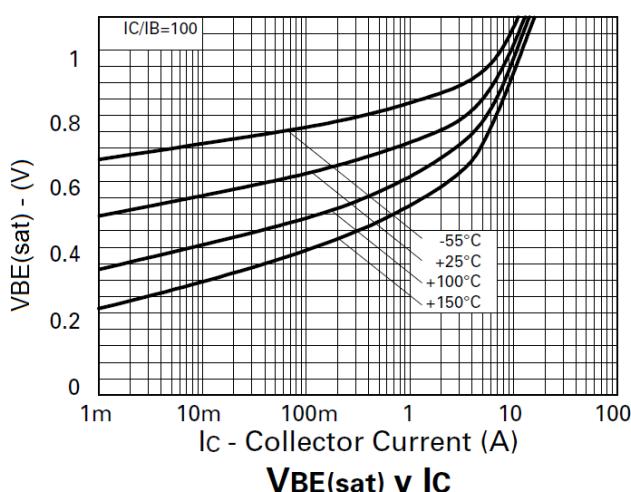
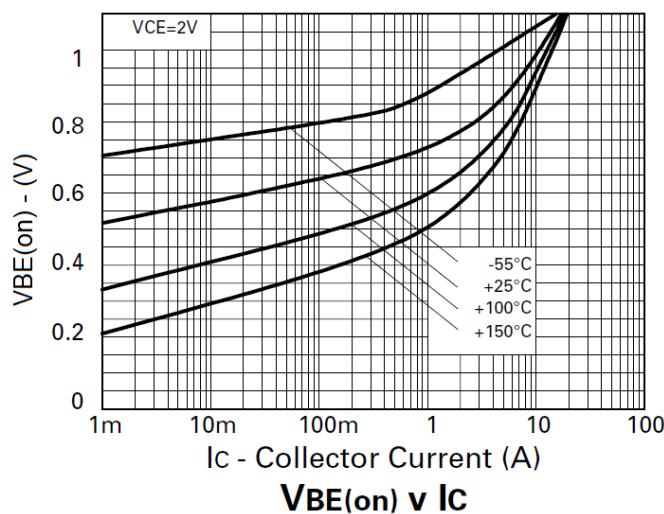
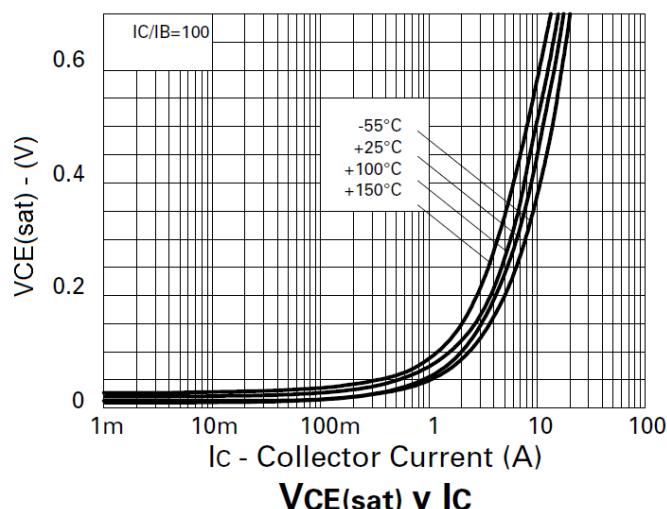
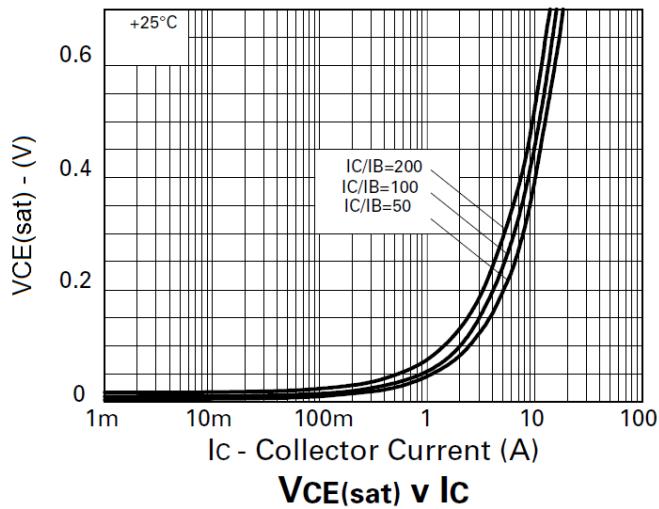


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	35	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	BV_{CES}	35	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	10	—	—	V	$I_C = 10\text{mA}$
Collector-Emitter Breakdown Voltage	BV_{CEV}	35	—	—	V	$I_C = 100\mu\text{A}, V_{\text{EB}} = 1\text{V}$
Emitter-Base Breakdown Voltage	BV_{EBO}	7	—	—	V	$I_E = 100\mu\text{A}$
Collector Cutoff Current	I_{CBO}	—	0.3	10	nA	$V_{\text{CB}} = 20\text{V}$
Collector Cutoff Current	I_{CES}	—	0.3	10	nA	$V_{\text{CES}} = 20\text{V}$
Emitter Cutoff Current	I_{EBO}	—	0.3	10	nA	$V_{\text{EB}} = 5.6\text{V}$
DC Current Transfer Static Ratio (Note 10)	h_{FE}	280 290 300 200 200 60	430 440 450 350 330 110	1,200	—	$I_C = 10\text{mA}, V_{\text{CE}} = 2\text{V}$ $I_C = 0.5\text{A}, V_{\text{CE}} = 2\text{V}$ $I_C = 1\text{A}, V_{\text{CE}} = 2\text{V}$ $I_C = 4\text{A}, V_{\text{CE}} = 2\text{V}$ $I_C = 5\text{A}, V_{\text{CE}} = 2\text{V}$ $I_C = 20\text{A}, V_{\text{CE}} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 10)	$V_{\text{CE}(\text{sat})}$	—	25 50 140 160 220	40 70 200 240 350	mV	$I_C = 0.5\text{A}, I_B = 10\text{mA}$ $I_C = 1\text{A}, I_B = 10\text{mA}$ $I_C = 3\text{A}, I_B = 15\text{mA}$ $I_C = 4\text{A}, I_B = 50\text{mA}$ $I_C = 5\text{A}, I_B = 25\text{mA}$
Base-Emitter Saturation Voltage (Note 10)	$V_{\text{BE}(\text{sat})}$	—	920	1,000	mV	$I_C = 4\text{A}, I_B = 50\text{mA}$
Base-Emitter Turn-on Voltage (Note 10)	$V_{\text{BE}(\text{on})}$	—	860	950	mV	$I_C = 4\text{A}, V_{\text{CE}} = 2\text{V}$
Transitional Frequency	f_T	—	150	—	MHz	$I_C = 50\text{mA}, V_{\text{CE}} = 10\text{V}, f = 50\text{MHz}$
Output Capacitance	C_{obo}	—	85	—	pF	$V_{\text{CB}} = 10\text{V}, f = 1\text{MHz},$
Switching Time	t_{on}	—	130	—	ns	$V_{\text{CC}} = 10\text{V}, I_C = 4\text{A},$
	t_{off}	—	230	—	ns	$I_{B1} = I_{B2} = \pm 40\text{mA}$

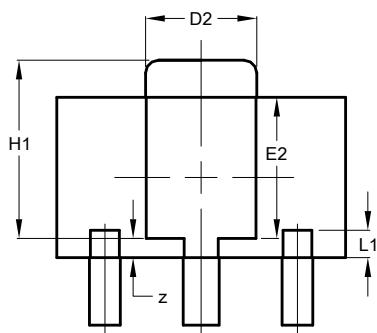
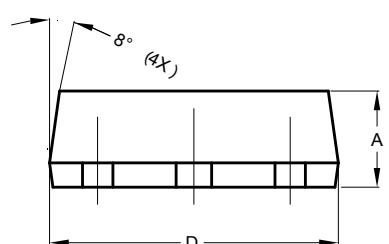
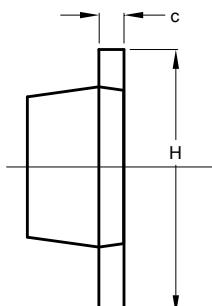
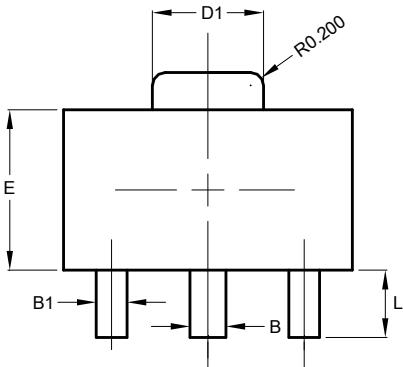
Note: 10. Measured under pulsed conditions. Pulse width = 300 μs . Duty cycle $\leq 2\%$.

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



Package Outline Dimensions

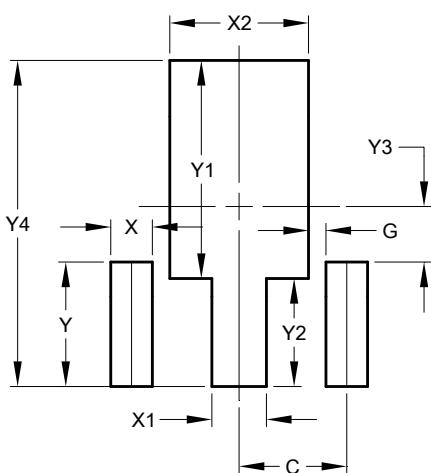
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.427 REF		
Z	0.30 REF		
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)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

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