

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

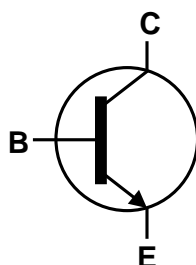
- Emergency Lighting Circuits
- Motor Driving (including DC fans)
- Solenoid, Relay and Actuator Drivers
- DC-DC Modules
- Backlight Inverters
- Power Switches
- MOSFET Gate Drivers

Mechanical Data

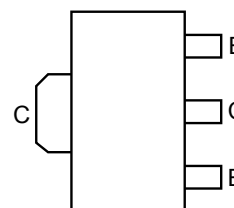
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Lead.
Solderable per MIL-STD-202, Method 208 (B3)
- Weight: 0.052 grams (Approximate)

SOT89


Top View



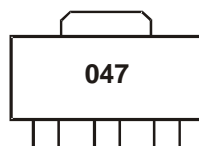
Device Symbol


 Top View
Pin-Out

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°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

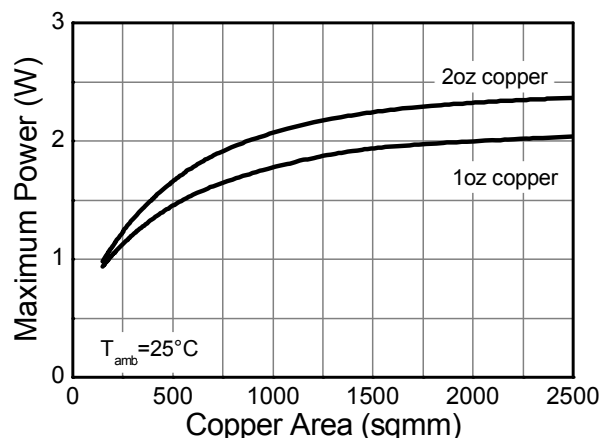
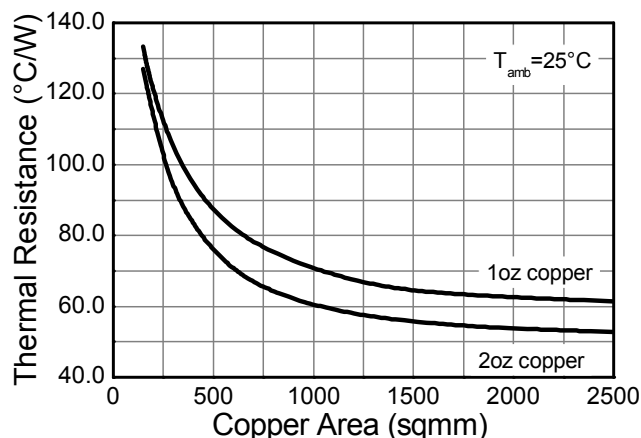
Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	1	W
		1.6	
		2.0	
Thermal Resistance, Junction to Ambient Air	R _{θJA}	125	°C/W
		78	
		62.5	
Thermal Resistance, Junction to Lead	R _{θJL}	3.6	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

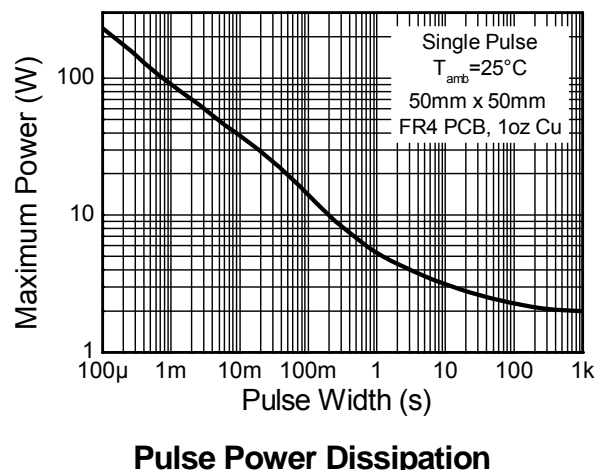
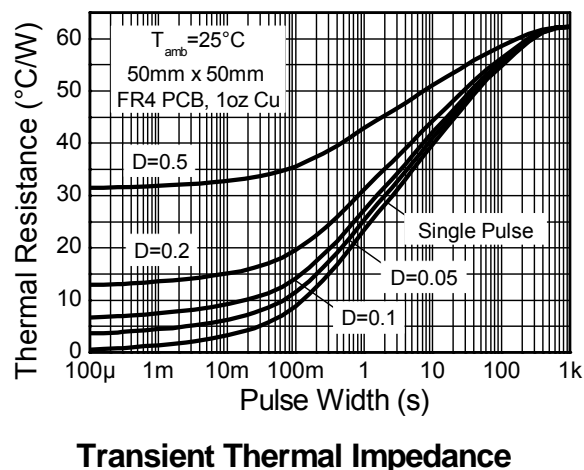
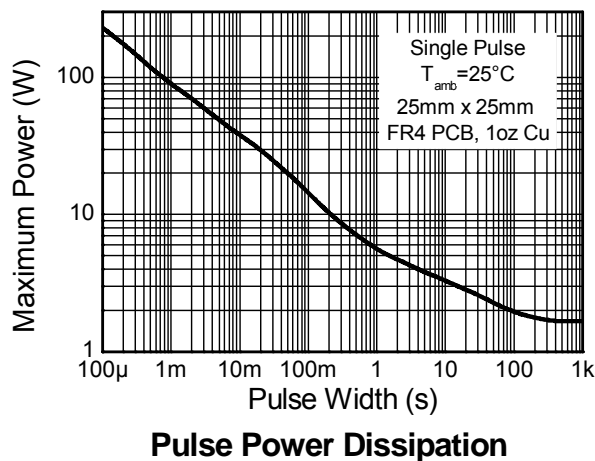
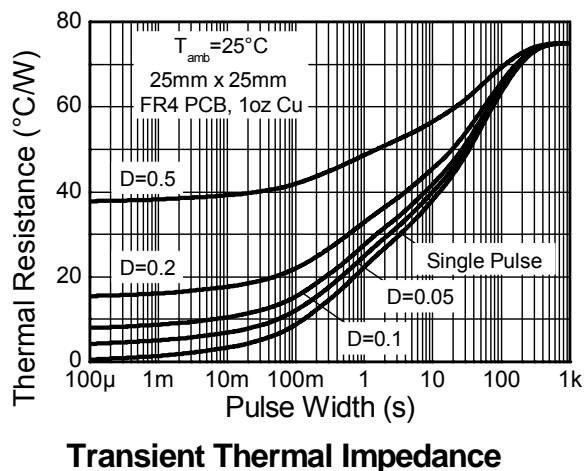
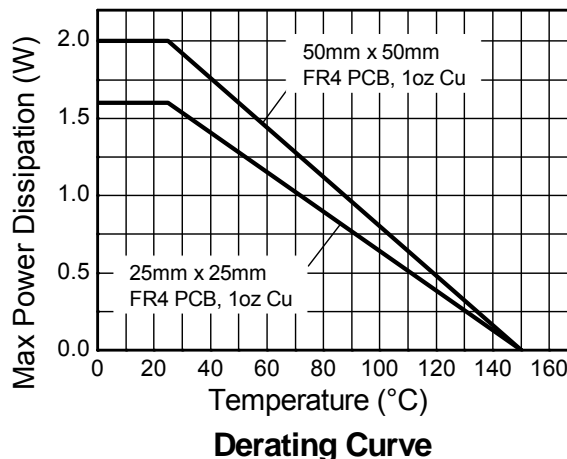
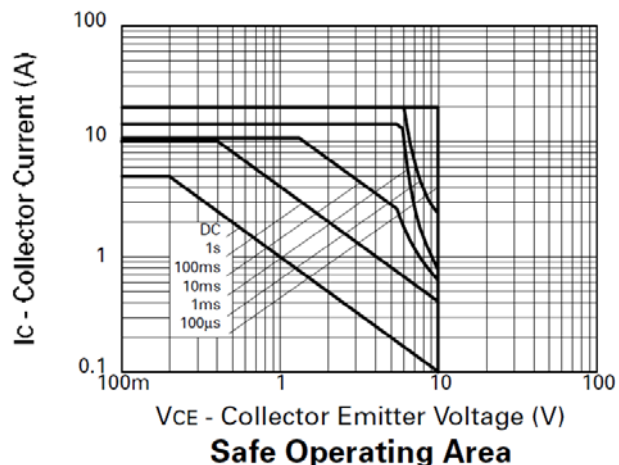
ESD Ratings (Note 9)

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:
- 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.
 - Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
 - Same as Note 5, except the device is mounted on 50mm x 50mm 1oz copper.
 - Thermal resistance from junction to solder-point (on the exposed collector pad).
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information


Thermal Characteristics and Derating Information (continued)

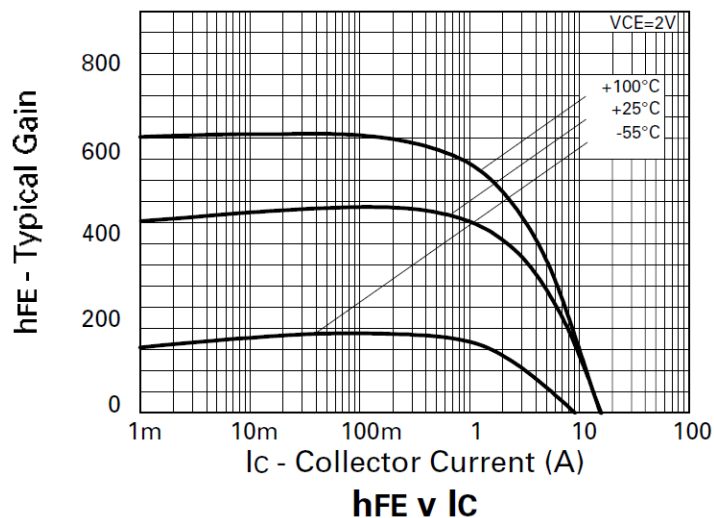
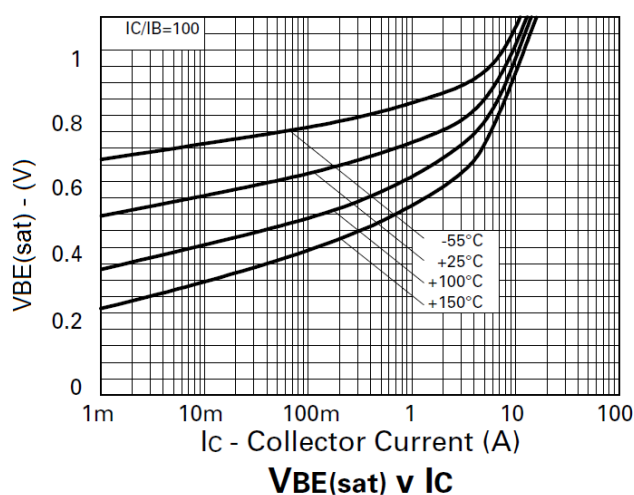
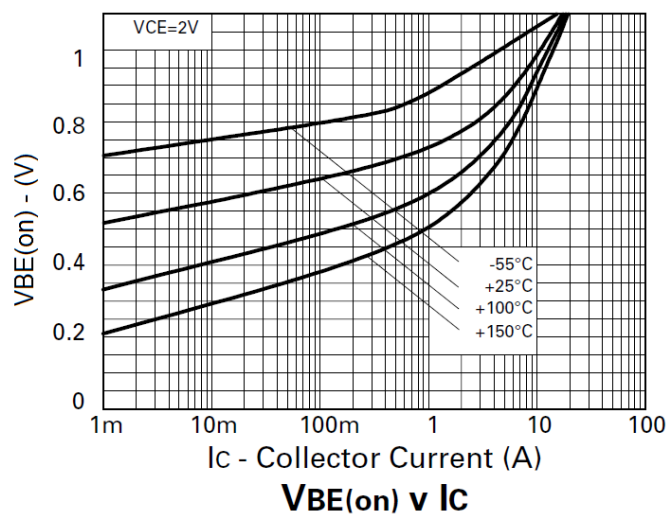
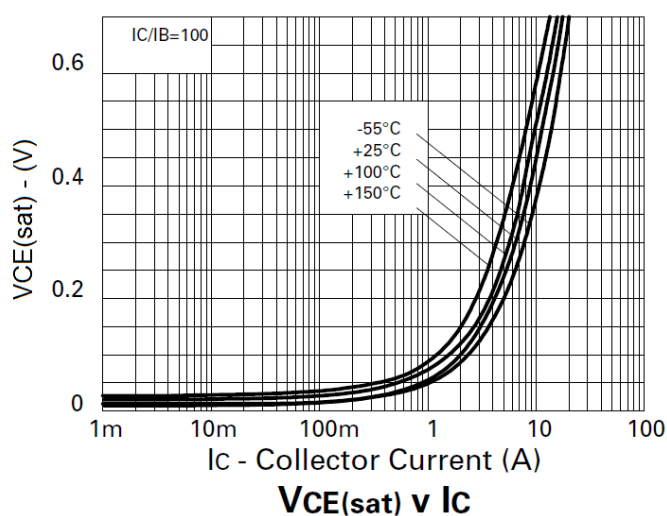
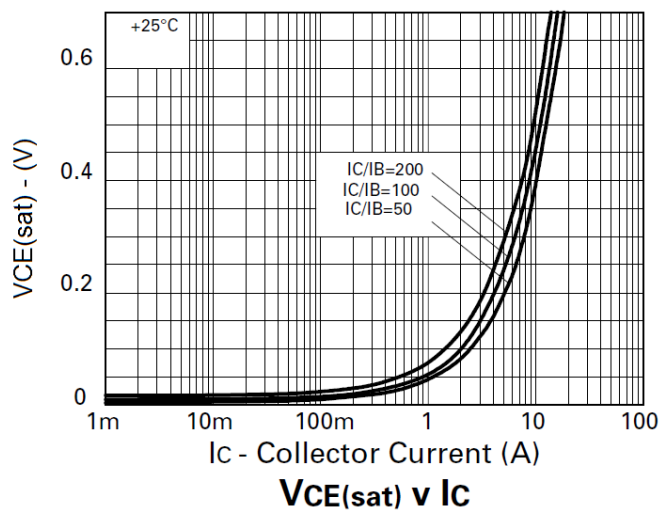


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV _{CBO}	35	—	—	V	I _C = 100μA
Collector-Emitter Breakdown Voltage	BV _{CES}	35	—	—	V	I _C = 100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV _{CEO}	10	—	—	V	I _C = 10mA
Collector-Emitter Breakdown Voltage	BV _{CEV}	35	—	—	V	I _C = 100μA, V _{EB} = 1V
Emitter-Base Breakdown Voltage	BV _{EBO}	7	—	—	V	I _E = 100μA
Collector Cutoff Current	I _{CBO}	—	0.3	10	nA	V _{CB} = 20V
Collector Cutoff Current	I _{CES}	—	0.3	10	nA	V _{CES} = 20V
Emitter Cutoff Current	I _{EBO}	—	0.3	10	nA	V _{EB} = 5.6V
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 = 10mA, V _{CE} = 2V I _C = 0.5A, V _{CE} = 2V I _C = 1A, V _{CE} = 2V I _C = 4A, V _{CE} = 2V I _C = 5A, V _{CE} = 2V I _C = 20A, V _{CE} = 2V
Collector-Emitter Saturation Voltage (Note 10)	V _{CE(sat)}	—	25 50 140 160 220	40 70 200 240 350	mV	I _C = 0.5A, I _B = 10mA I _C = 1A, I _B = 10mA I _C = 3A, I _B = 15mA I _C = 4A, I _B = 50mA I _C = 5A, I _B = 25mA
Base-Emitter Saturation Voltage (Note 10)	V _{BE(sat)}	—	920	1,000	mV	I _C = 4A, I _B = 50mA
Base-Emitter Turn-on Voltage (Note 10)	V _{BE(on)}	—	860	950	mV	I _C = 4A, V _{CE} = 2V
Transitional Frequency	f _T	—	150	—	MHz	I _C = 50mA, V _{CE} = 10V, f = 50MHz
Output Capacitance	C _{obo}	—	85	—	pF	V _{CB} = 10V, f = 1MHz,
Switching Time	t _{on}	—	130	—	ns	V _{CC} = 10V, I _C = 4A, I _{B1} = I _{B2} = ±40mA
	t _{off}		230		ns	

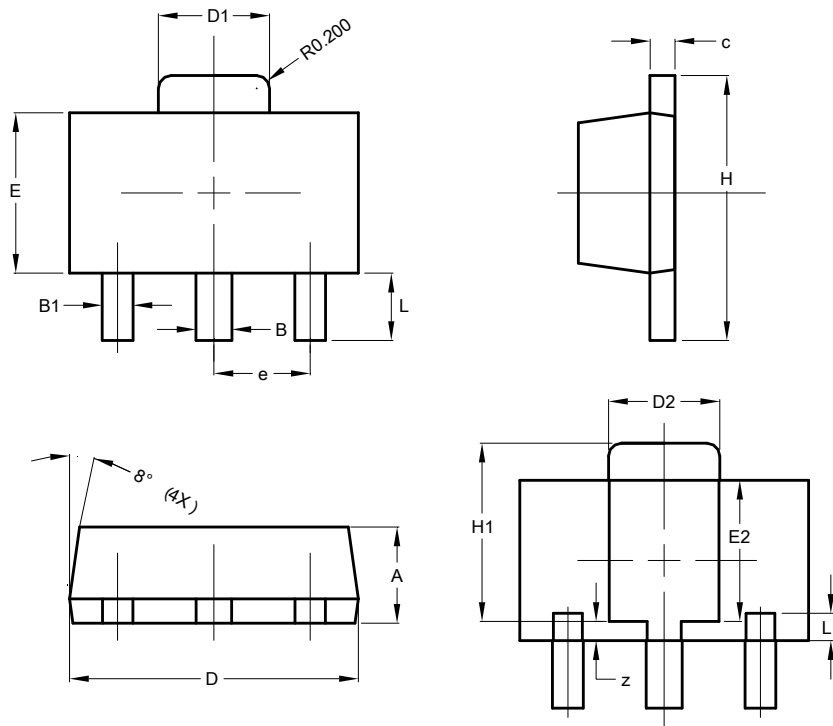
Note: 10. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.

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



Package Outline Dimensions

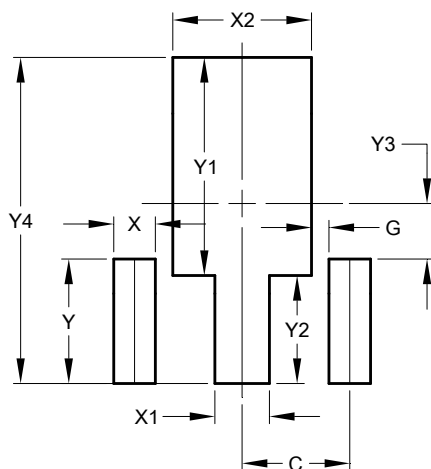
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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