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; $R_{CE(sat)}$ = 40mΩ 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**

Mechanical Data

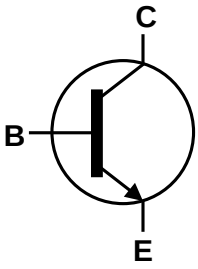
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Lead. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.052 grams (Approximate)

Applications

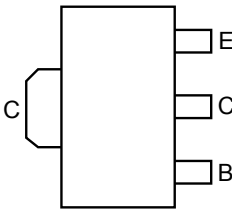
- Emergency Lighting Circuits
- Motor Driving (including DC fans)
- Solenoid, Relay and Actuator Drivers
- DC-DC Modules
- Backlight Inverters
- Power Switches
- MOSFET Gate Drivers

SOT89

Top View



Device Symbol



Top View
Pin-Out

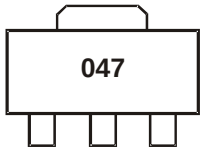
Ordering Information (Note 4)

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.)

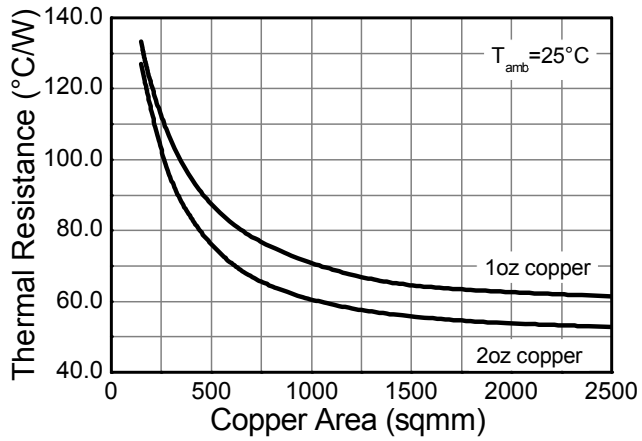
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	1	W
	(Note 6)		1.6	
	(Note 7)		2.0	
Thermal Resistance, Junction to Ambient Air	(Note 5)	$R_{\theta JA}$	125	°C/W
	(Note 6)		78	
	(Note 7)		62.5	
Thermal Resistance, Junction to Lead	(Note 8)	$R_{\theta JL}$	3.6	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

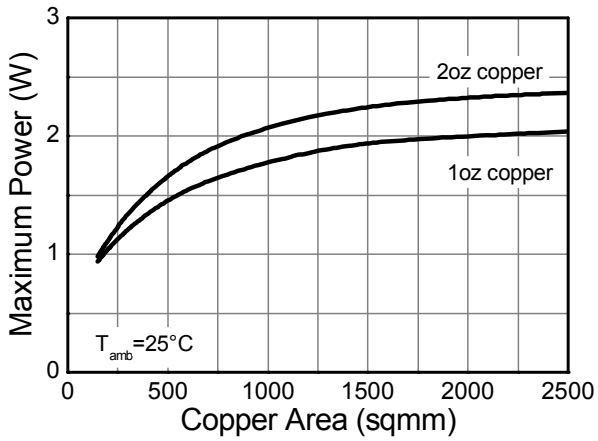
ESD Ratings (Note 9)

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

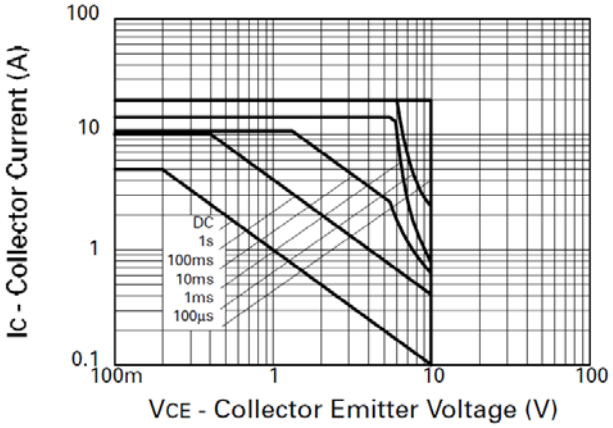
Notes:
5. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
6. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
7. Same as Note 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

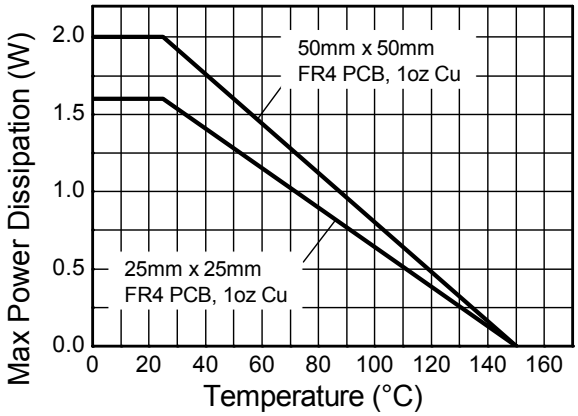




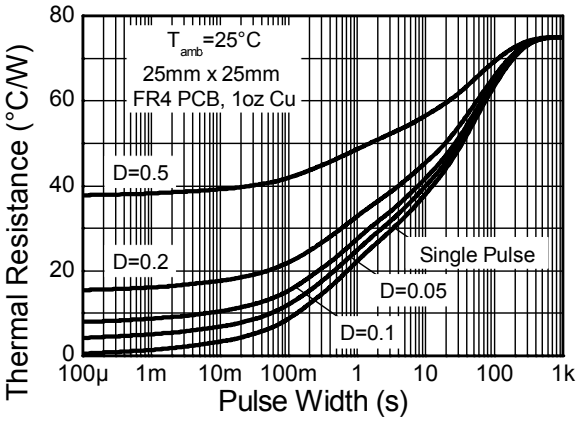
Thermal Characteristics and Derating Information (continued)



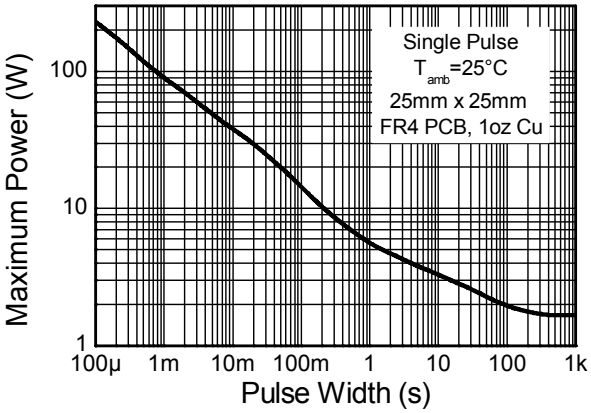
Safe Operating Area



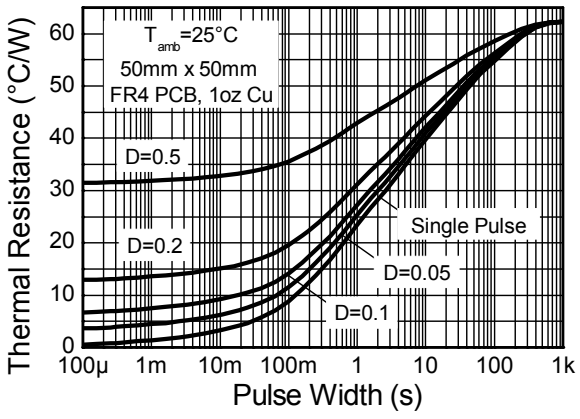
Derating Curve



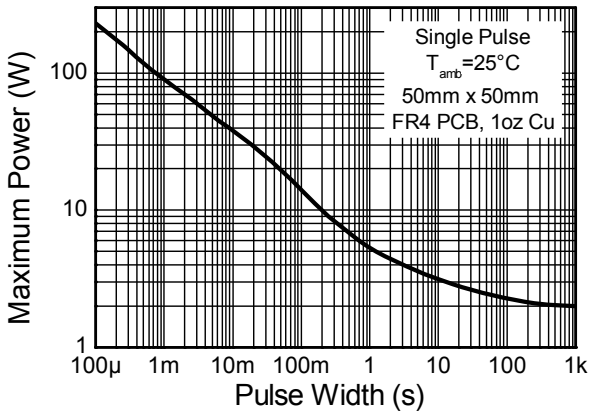
Transient Thermal Impedance



Pulse Power Dissipation



Transient Thermal Impedance



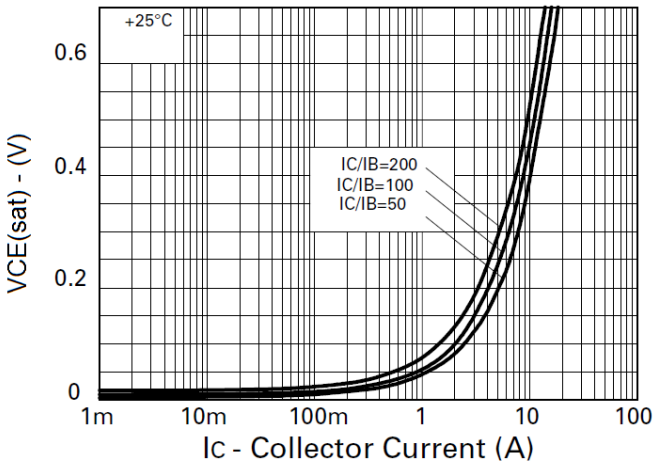
Pulse Power Dissipation

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

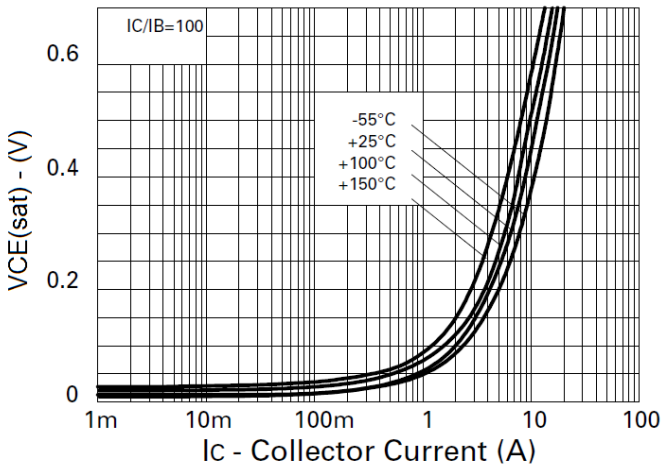
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	35	—	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage	BV_{CES}	35	—	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	10	—	—	V	I_C = 10mA
Collector-Emitter Breakdown Voltage	BV_{CEV}	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%.

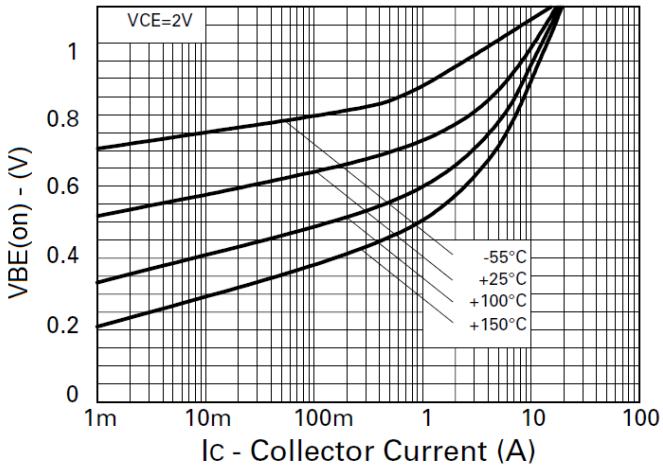
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



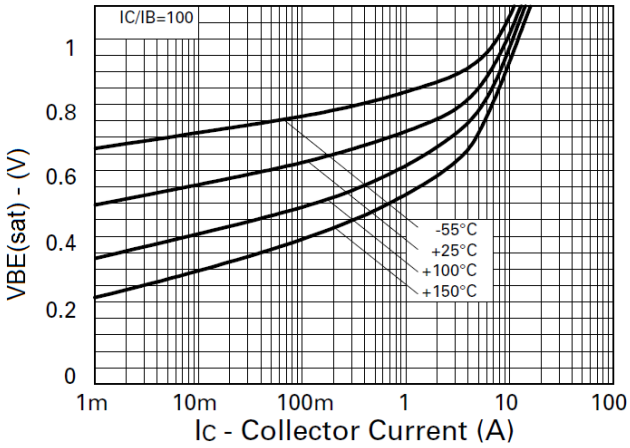
VCE(sat) v IC



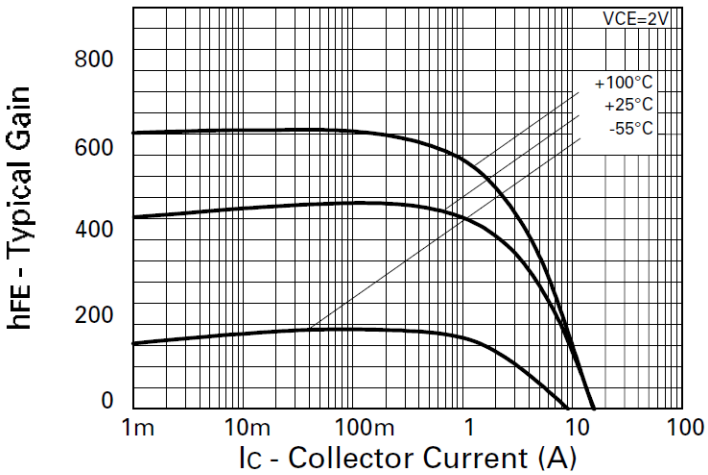
VCE(sat) v IC



VBE(on) v IC



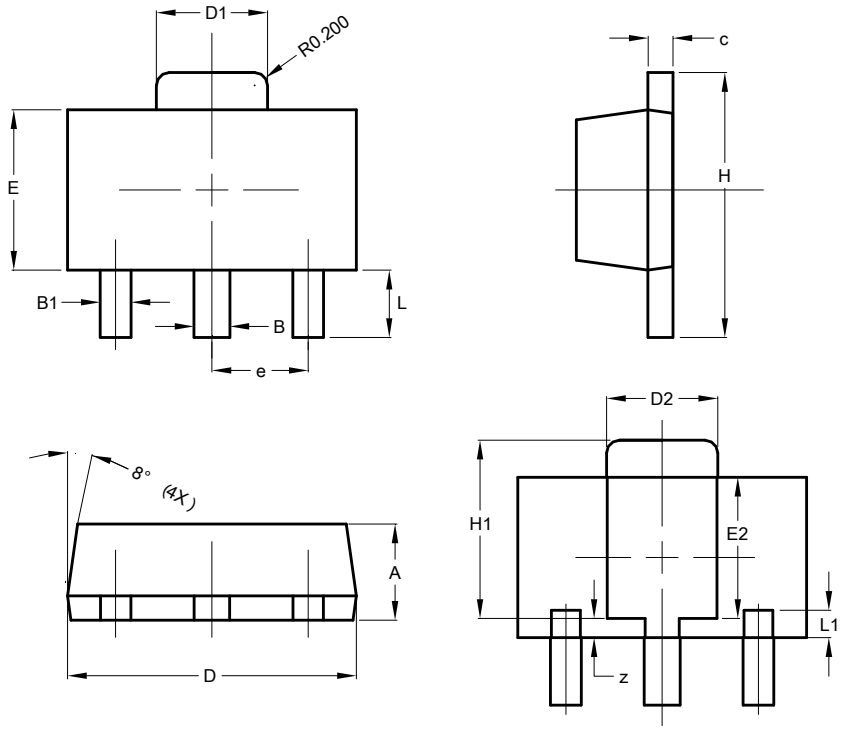
VBE(sat) v IC



hFE v IC

Package Outline Dimensions

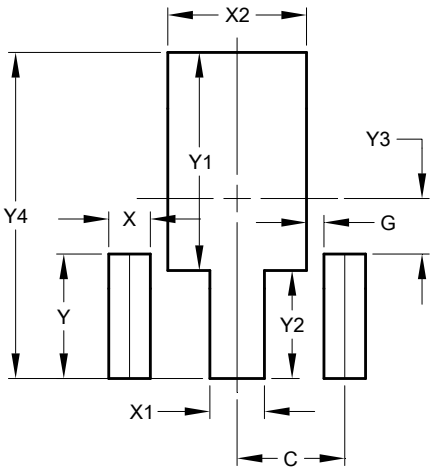
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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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