

**75V NPN MEDIUM POWER TRANSISTOR IN SOT89**

**Features**

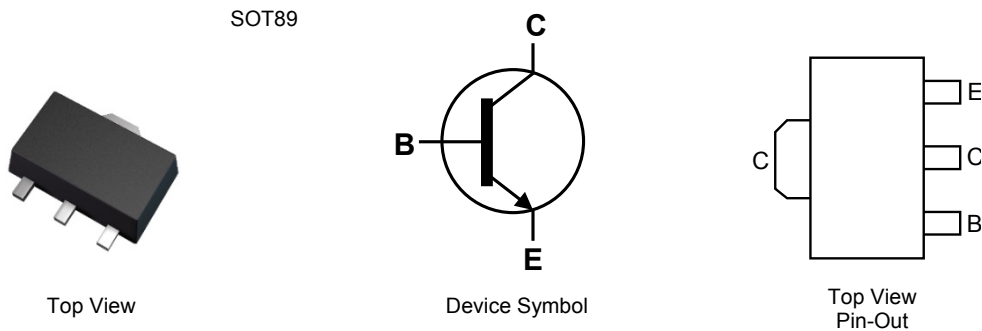
- $BV_{CEO} > 75V$
- $I_C = 3A$  high Continuous Current
- $I_{CM} = 10A$  Peak Pulse Current
- High Gain Holds up  $h_{FE} > 300 @ I_C=1A$
- Low Equivalent On-Resistance;  $R_{CE(sat)} = 78m\Omega$  at 4.5A
- Excellent  $h_{FE}$  characteristics up to 10A
- **Totally Lead-Free & Fully RoHS compliant (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  $\text{E3}$
- 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

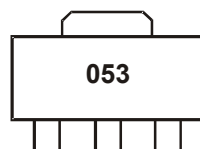


**Ordering Information (Note 4)**

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FCX1053ATA	053	7	12	1,000
FCX1053A-13R	053	13	12	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](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**



053 = Product Type Marking Code

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	150	V
Collector-Emitter Voltage	V <sub>CEO</sub>	75	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	3	A
Base Current	I <sub>B</sub>	500	mA
Peak Pulse Current	I <sub>CM</sub>	10	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

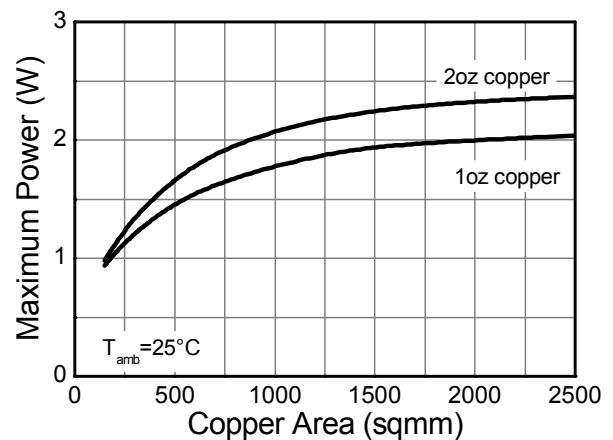
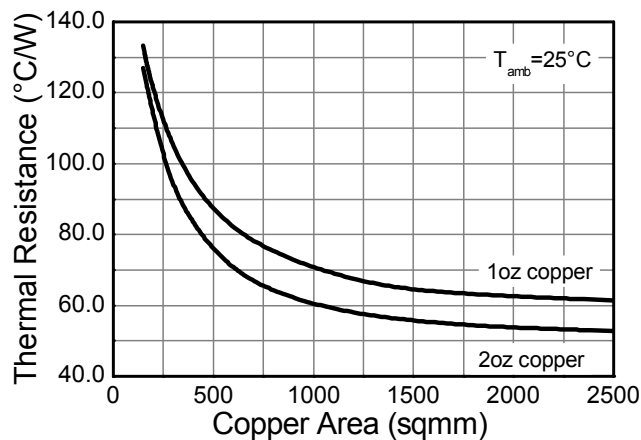
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 5)	1
		(Note 6)	1.6
		(Note 7)	2.0
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	(Note 5)	125
		(Note 6)	78
		(Note 7)	62.5
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	3.6	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

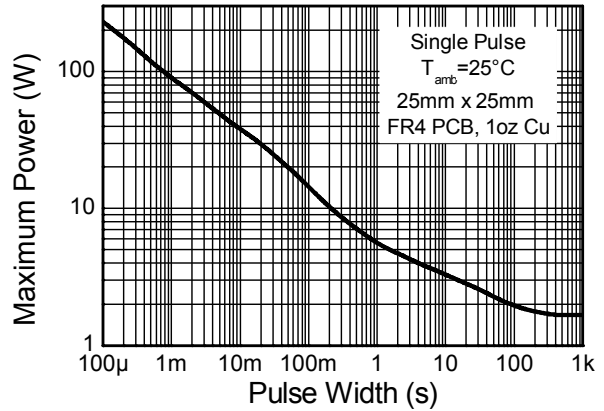
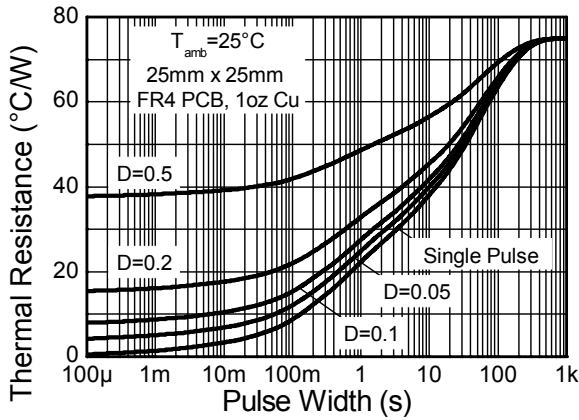
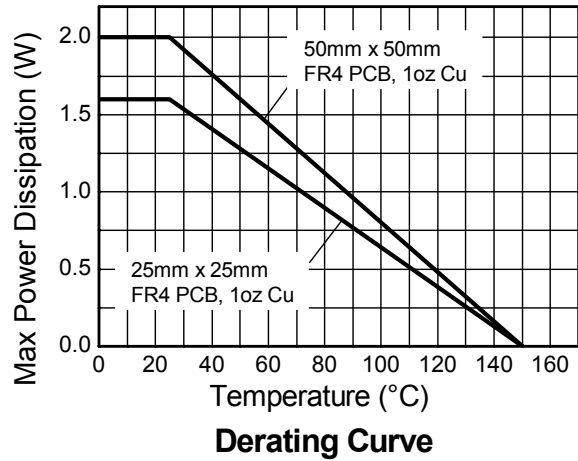
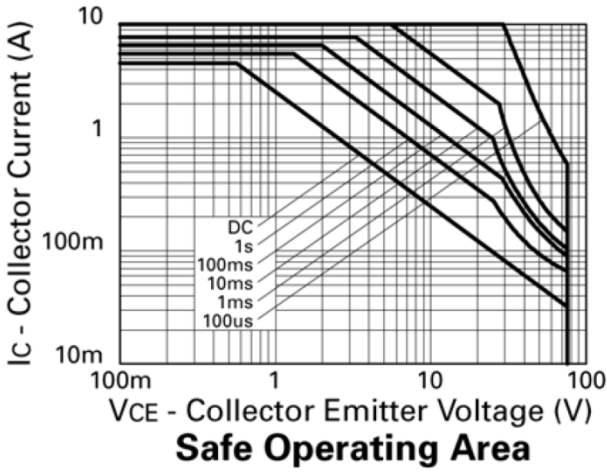
**ESD Ratings** (Note 9)

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.

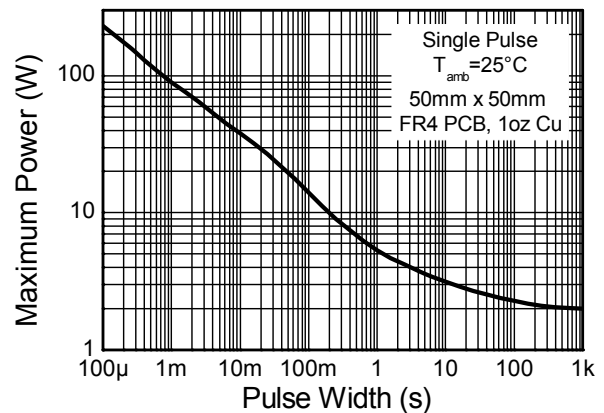
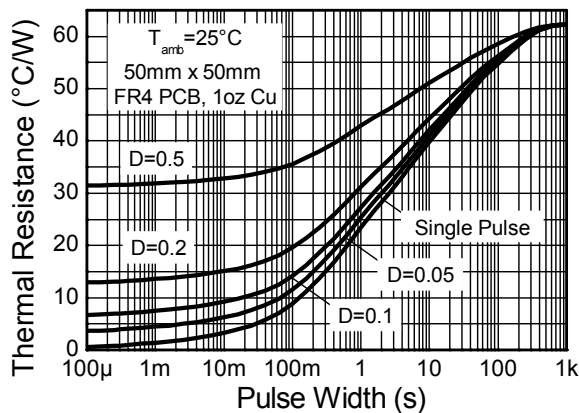
**Thermal Characteristics and Derating Information**





**Transient Thermal Impedance**

**Pulse Power Dissipation**



**Transient Thermal Impedance**

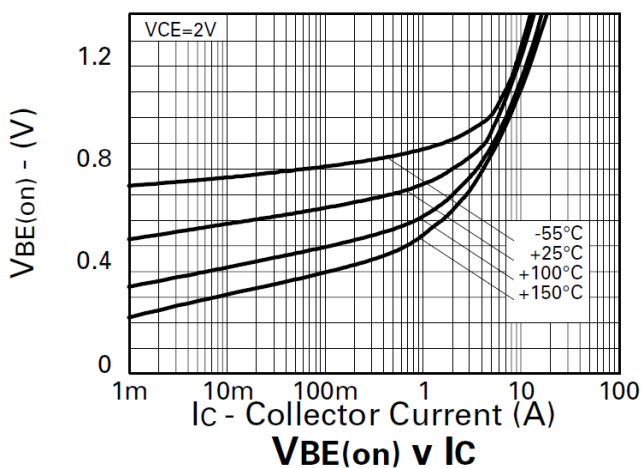
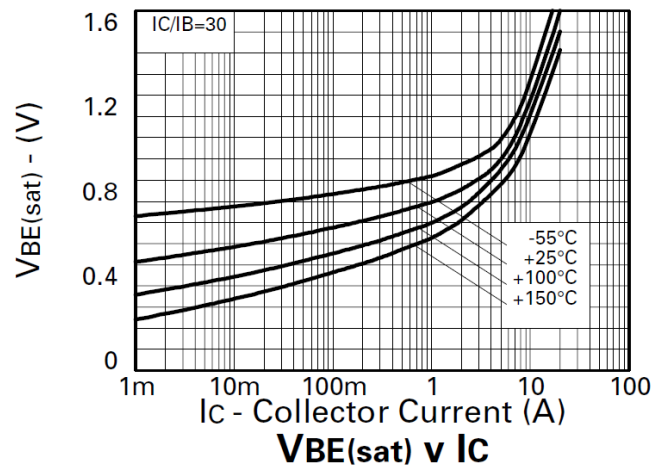
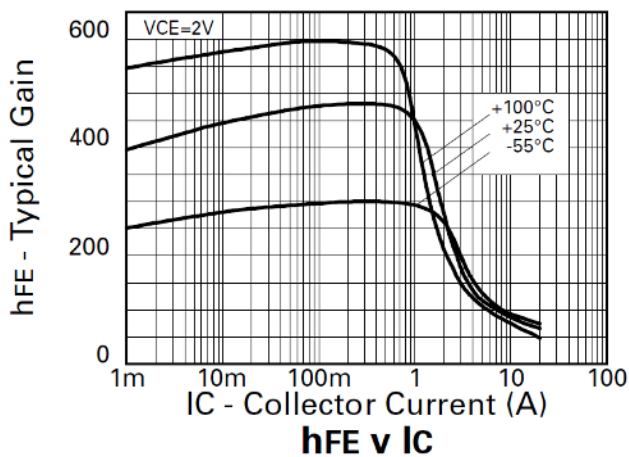
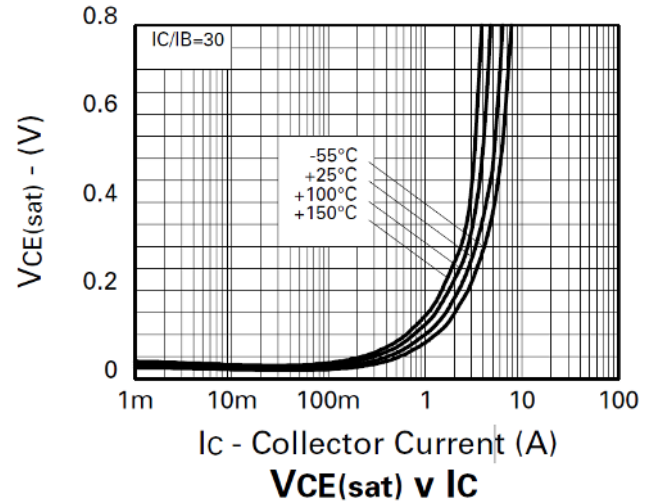
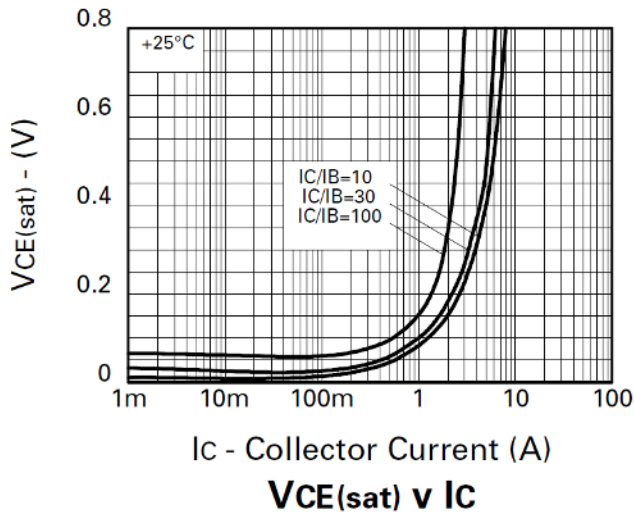
**Pulse Power Dissipation**

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	150	250	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage	BV <sub>CES</sub>	150	250	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Notes 10)	BV <sub>CEO</sub>	75	100	—	V	I <sub>C</sub> = 10mA
Collector-Emitter Breakdown Voltage	BV <sub>CEV</sub>	150	250	—	V	I <sub>C</sub> = 100μA, V <sub>EB</sub> = 1V
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.8	—	V	I <sub>E</sub> = 100μA
Collector Cutoff Current	I <sub>CBO</sub>	—	0.9	50	nA	V <sub>CB</sub> = 120V
Collector Cutoff Current	I <sub>CES</sub>	—	1.5	50	nA	V <sub>CES</sub> = 120V
Emitter Cutoff Current	I <sub>EBO</sub>	—	0.3	20	nA	V <sub>EB</sub> = 5.6V
DC current transfer Static ratio (Notes 10)	h <sub>FE</sub>	270 300 300 40	440 450 450 60 20	1200		I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 0.5A, V <sub>CE</sub> = 2V I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V I <sub>C</sub> = 4.5A, V <sub>CE</sub> = 2V I <sub>C</sub> = 10A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage (Notes 10)	V <sub>CE(sat)</sub>	—	21 55 150 160 350	30 75 200 210 440	mV	I <sub>C</sub> = 0.2A, I <sub>B</sub> = 20mA I <sub>C</sub> = 0.5A, I <sub>B</sub> = 20mA I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA I <sub>C</sub> = 2A, I <sub>B</sub> = 100mA I <sub>C</sub> = 4.5A, I <sub>B</sub> = 200mA
Base-Emitter Saturation Voltage (Notes 10)	V <sub>BE(sat)</sub>	—	900	1000	mV	I <sub>C</sub> = 3A, I <sub>B</sub> = 100mA
Base-Emitter Turn-on Voltage (Notes 10)	V <sub>BE(on)</sub>	—	825	950	mV	I <sub>C</sub> = 3A, V <sub>CE</sub> = 2V
Transitional Frequency	f <sub>T</sub>	—	140	—	MHz	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V, f = 100MHz
Output capacitance	C <sub>obo</sub>	—	21	30	pF	V <sub>CB</sub> = 10V, f = 1MHz,
Switching Time	t <sub>on</sub>	—	162	—	ns	V <sub>CC</sub> = 50V, I <sub>C</sub> = 2A, I <sub>B1</sub> = I <sub>B2</sub> = ±20mA
	t <sub>off</sub>	—	900	—	ns	

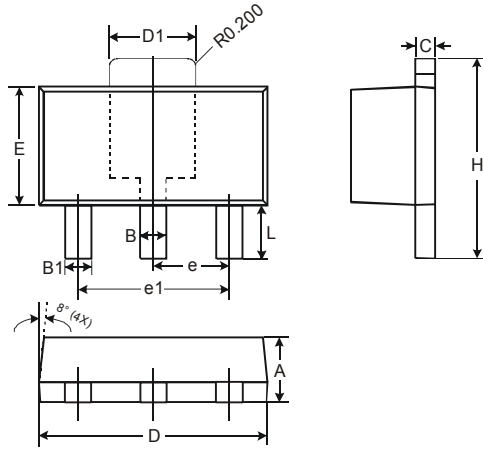
Note: 10. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.

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



## Package Outline Dimensions

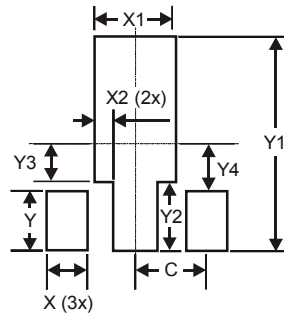
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.43
D	4.40	4.60
D1	1.52	1.83
E	2.29	2.60
e	1.50 Typ	
e1	3.00 Typ	
H	3.94	4.25
L	0.89	1.20
<b>All Dimensions in mm</b>		

## 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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