

**400V PNP HIGH VOLTAGE SWITCHING TRANSISTOR IN SOT89**


**Features**

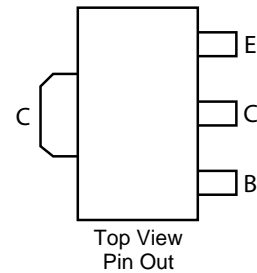
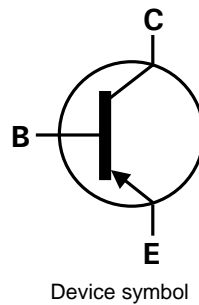
- $BV_{CEO} > -400V$
- Max Continuous Current  $I_C = -0.5A$
- High Gain Holds up  $h_{FE} \geq 140 @ I_C = -100mA$
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Applications**

- High Voltage Switching

**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 
- Weight: 0.05 grams (Approximate)

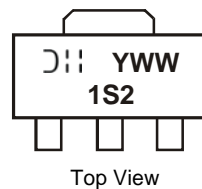


**Ordering Information** (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
2DA1971-7	1S2	7	12	1,000
2DA1971-13	1S2	13	12	2,500

- 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> 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>

**Marking Information**



1S2 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y = Last digit of year (ex: 1 = 2011)  
 WW = Week code (01 – 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-400	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-400	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	I <sub>C</sub>	-0.5	A
Peak Pulse Current	I <sub>CM</sub>	-1	A
Base Current	I <sub>B</sub>	-250	mA

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

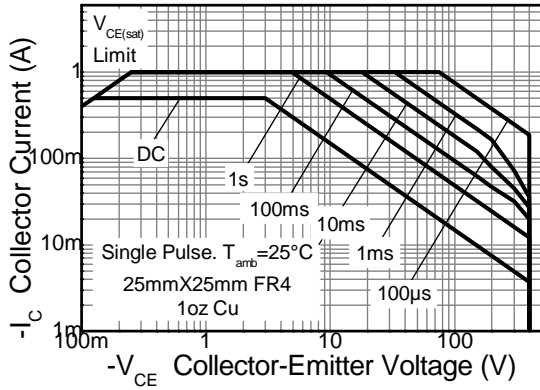
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	1.5	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	83	°C/W
Thermal Resistance, Junction to Leads (Note 6)	R <sub>θJL</sub>	10.4	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### ESD Ratings (Note 7)

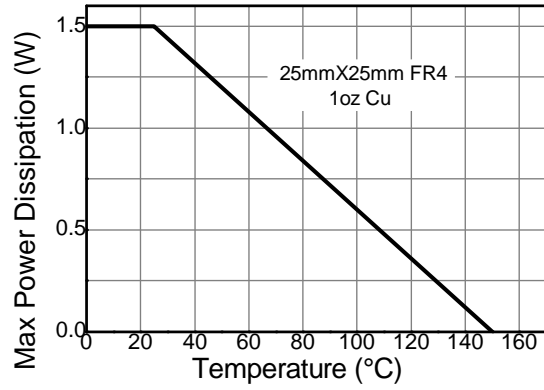
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	≥ 8,000	V	3B
Electrostatic Discharge - Machine Model	ESD MM	≥ 400	V	C

- Notes:
5. For a device surface mounted on 25mm X 25mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions.
  6. Thermal resistance from junction to solder-point (at the end of the collector lead).
  7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

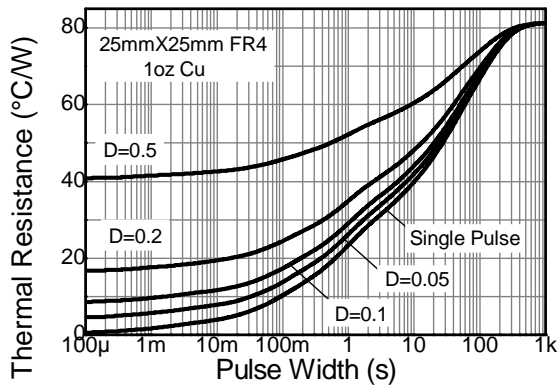
**Thermal Characteristics and Derating information**



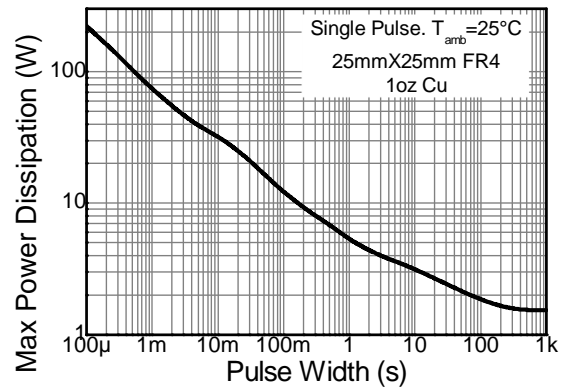
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



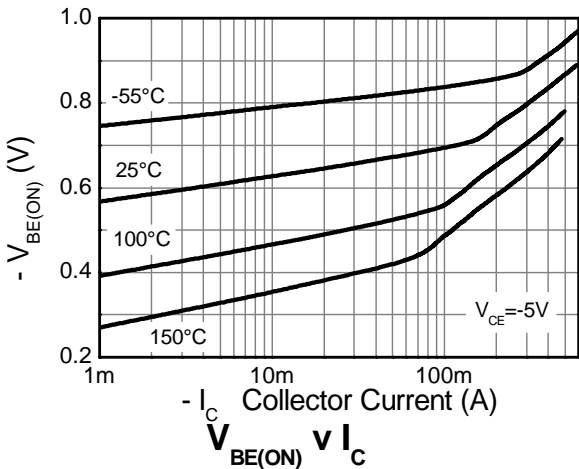
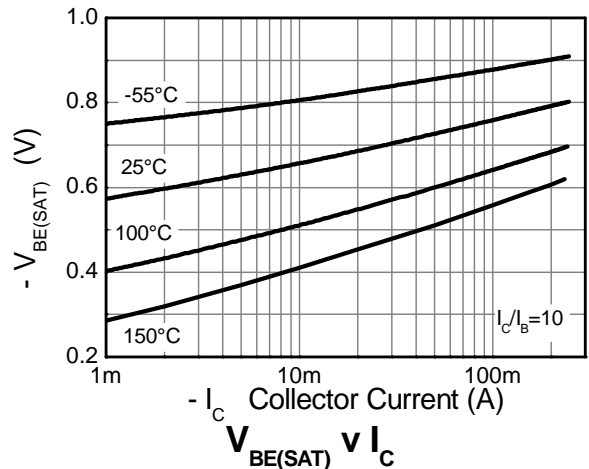
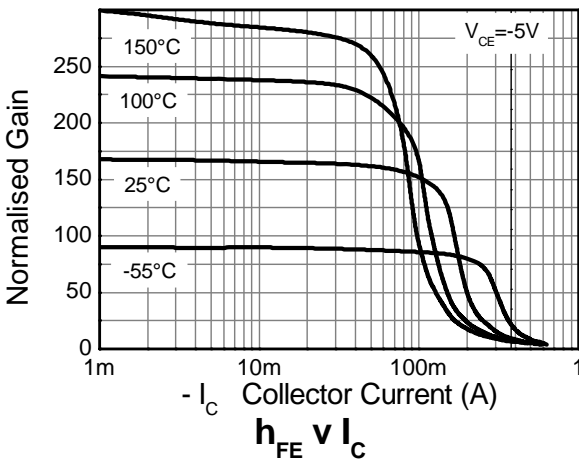
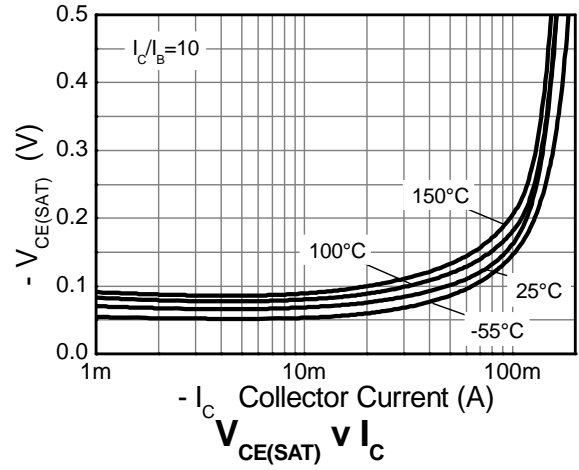
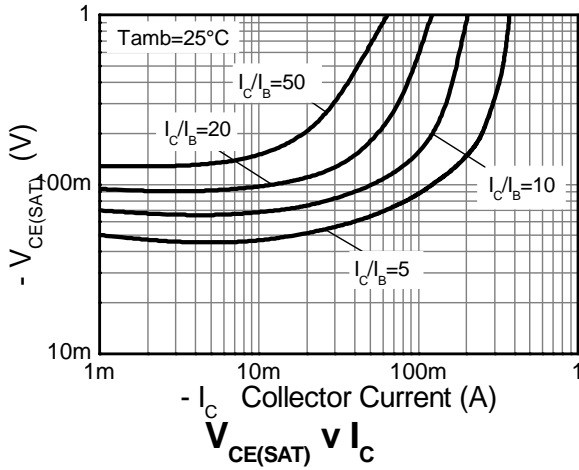
**Pulse Power Dissipation**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	-400	-	-	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 8)	$BV_{CEO}$	-400	-	-	V	$I_C = -1\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	-	-	V	$I_E = -100\mu\text{A}$
Collector-Emitter Cut-off Current	$I_{CES}$	-	-	-100	nA	$V_{CE} = -320\text{V}$
Collector Cut-off Current	$I_{CBO}$	-	-	-100	nA	$V_{CB} = -320\text{V}$
Emitter Cut-off Current	$I_{EBO}$	-	-	-100	nA	$V_{EB} = -6\text{V}$
Static Forward Current Transfer Ratio (Note 8)	$h_{FE}$	140 140	-	450 400	-	$I_C = -20\text{mA}, V_{CE} = -5\text{V}$ $I_C = -100\text{mA}, V_{CE} = -5\text{V}$
Collector-Emitter saturation Voltage (Note 8)	$V_{CE(sat)}$	-	-	-250 -400	mV	$I_C = -100\text{mA}, I_B = -10\text{mA}$ $I_C = -200\text{mA}, I_B = -40\text{mA}$
Base-Emitter saturation Voltage (Note 8)	$V_{BE(sat)}$	-	-0.75	-0.9	V	$I_C = -100\text{mA}, I_B = -10\text{mA}$
Base-Emitter Turn-On Current (Note 8)	$V_{BE(on)}$	-	-	-0.8	V	$I_C = -200\text{mA}, V_{CE} = -10\text{V}$
Transition frequency	$f_T$	-	75	-	MHz	$I_C = -50\text{mA}, V_{CE} = -5\text{V},$ $f = 50\text{MHz}$
Collector Output Capacitance	$C_{obo}$	-	19	-	pF	$V_{CB} = -10\text{V}, I_E = 0, f = 1\text{MHz}$
Delay Time	$t_{(d)}$	-	89	-	ns	$V_{CC} = -200\text{V}, I_C = -100\text{mA},$ $I_{B1} = -10\text{mA}, I_{B2} = 20\text{mA}$
Rise Time	$t_{(r)}$	-	111	-	ns	
Storage Time	$t_{(s)}$	-	2165	-	ns	
Fall Time	$t_{(f)}$	-	185	-	ns	

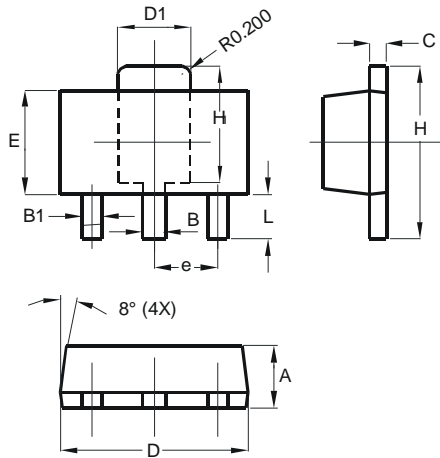
Notes: 8. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$

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



## Package Outline Dimensions

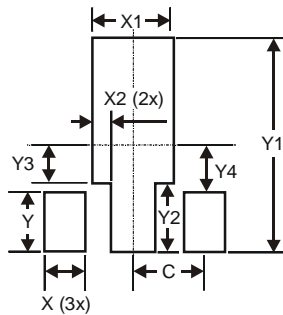
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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