

## Description

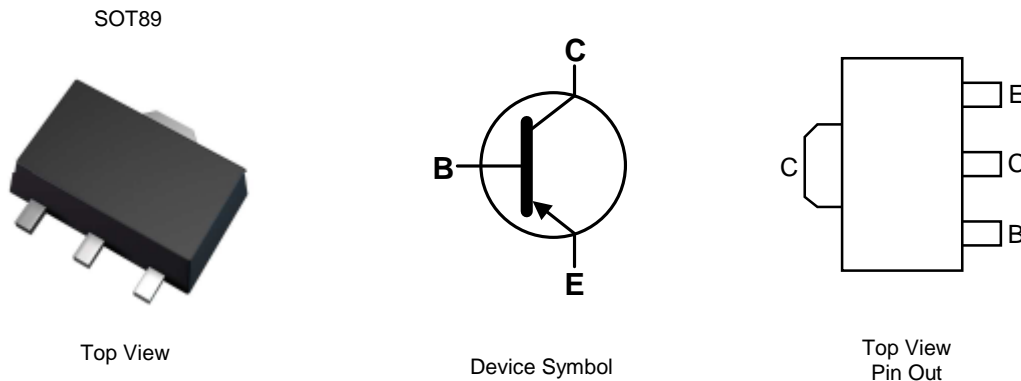
This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirement of Automotive Applications.

## Features

- $BV_{CEO} > -50V$
- $I_C = -2A$  High Continuous Collector Current
- High Gain Holds up
- **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**
- **PPAP Capable (Note 4)**

## 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: 0.052 grams (Approximate)

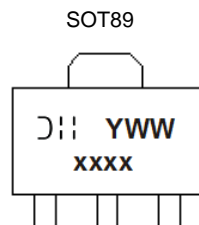


## Ordering Information (Notes 4 and 5)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
2DA1213YQ-13	P25Y	13	12	2,500

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



- Diodes symbol = Manufacturer's Marking
- xxxx = P25Y = Product Type Marking Code
- YWW = Date Code Marking
- Y = Last Digit of Year (ex: 8 = 2018)
- WW = Week Code (01 to 53)

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

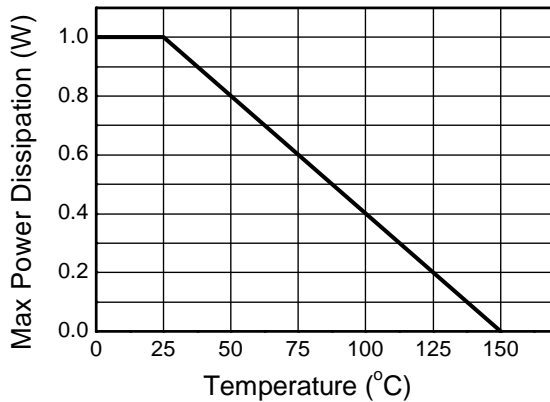
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-50	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-50	V
Emitter-Base Voltage	V <sub>EBO</sub>	-6	V
Continuous Collector Current	I <sub>C</sub>	-2	A
Peak Pulse Current	I <sub>CM</sub>	-2.5	A
Base Current	I <sub>B</sub>	-500	mA

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

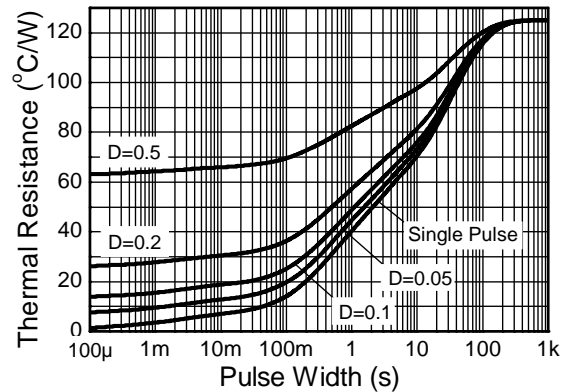
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P <sub>D</sub>	1	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	125	°C/W
Thermal Resistance, Junction to Leads (Note 7)	R <sub>θJL</sub>	18.3	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
- 6. For a device surface mounted on 15mm x 15mm x 0.6mm FR-4 PCB with high coverage of single sided 1 oz copper, in still air conditions; the device is measured when operating in steady state condition.
  - 7. Thermal resistance from junction to solder-point (on the exposed collector pad).

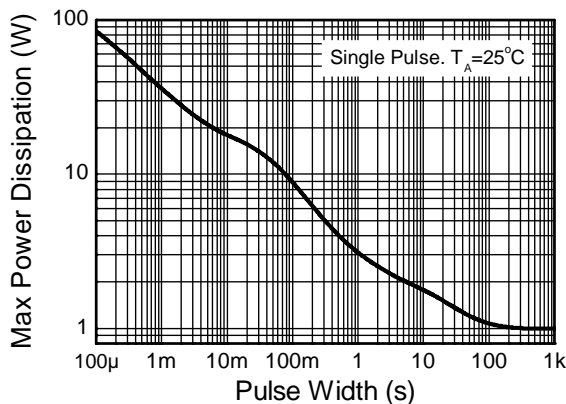
**Thermal Characteristics and Derating Information**



**Derating Curve**



**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>	-50	—	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 8)	BV <sub>CEO</sub>	-50	—	—	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-6	—	—	V	I <sub>E</sub> = -100μA
Collector Cut-off Current	I <sub>CBO</sub>	—	—	-100	nA	V <sub>CB</sub> = -50V
Emitter Cut-off Current	I <sub>EBO</sub>	—	—	-100	nA	V <sub>EB</sub> = -5V
DC Current Gain (Note 8)	h <sub>FE</sub>	120	—	240	—	I <sub>C</sub> = -500mA, V <sub>CE</sub> = -2V
		20		—		I <sub>C</sub> = -2A, V <sub>CE</sub> = -2V
Collector-Emitter Saturation Voltage (Note 8)	V <sub>CE(sat)</sub>	—	—	-0.5	V	I <sub>C</sub> = -1A, I <sub>B</sub> = -50mA
Base-Emitter Saturation Voltage (Note 8)	V <sub>BE(sat)</sub>	—	—	-1.2	V	I <sub>C</sub> = -1A, I <sub>B</sub> = -50mA
Transition Frequency	f <sub>T</sub>	—	160	—	MHz	I <sub>C</sub> = -100mA, V <sub>CE</sub> = -2V, f = 100MHz
Output Capacitance	C <sub>obo</sub>	—	17	—	pF	V <sub>CB</sub> = -10V, I <sub>E</sub> = 0, f = 1MHz
Turn-On Time	t <sub>on</sub>	—	25	—	ns	V <sub>CE</sub> = -2V, I <sub>C</sub> = -1A, I <sub>B1</sub> = -I <sub>B2</sub> = -50mA
Storage Time	t <sub>(s)</sub>	—	130	—	ns	
Fall Time	t <sub>(f)</sub>	—	12	—	ns	

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

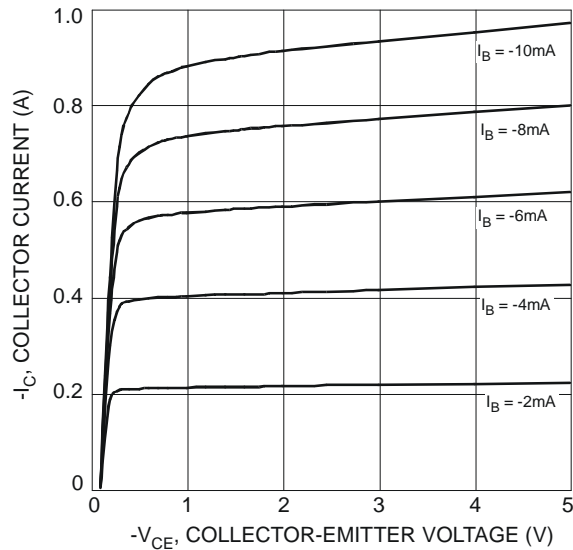


Figure 1 Typical Collector Current vs. Collector-Emitter Voltage

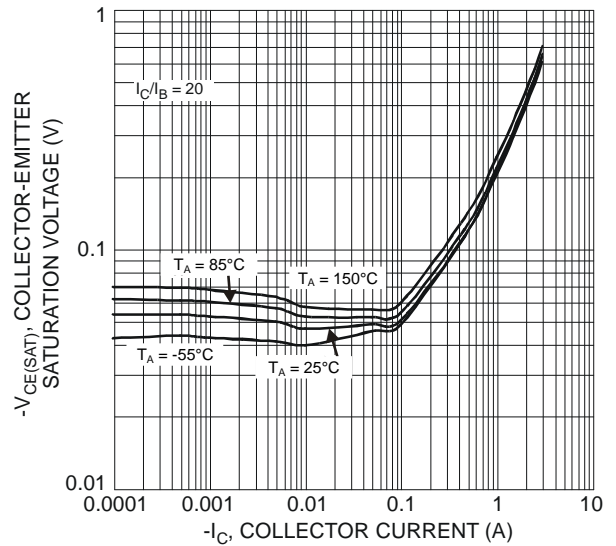


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

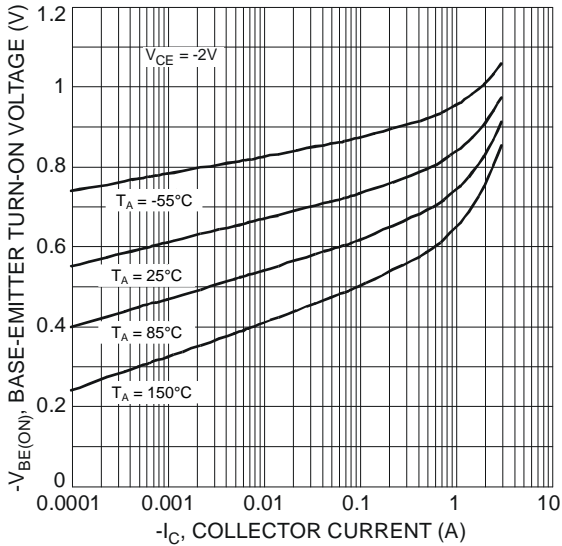


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

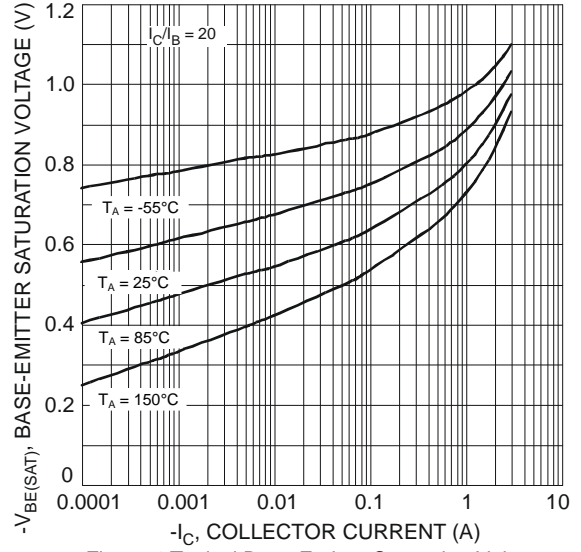


Figure 4 Typical Base-Emitter Saturation Voltage vs. Collector Current

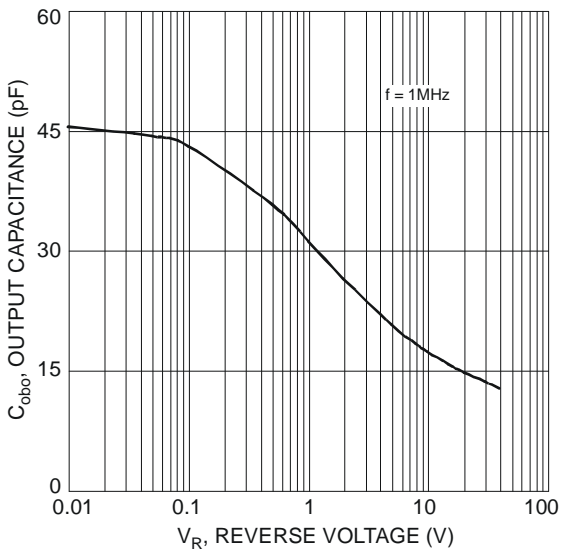


Figure 5 Typical Output Capacitance Characteristics

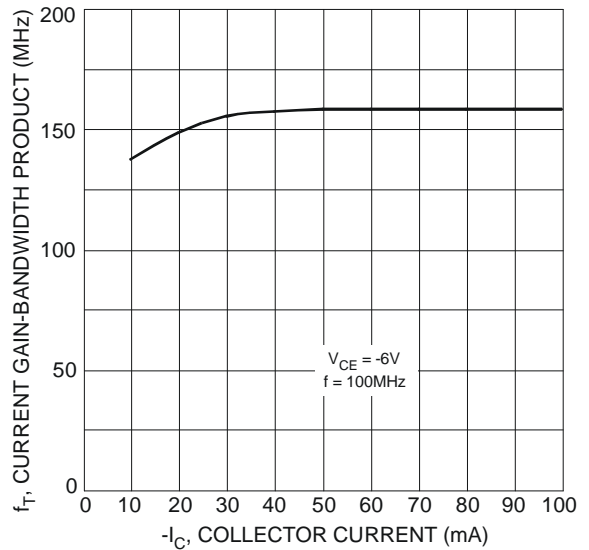
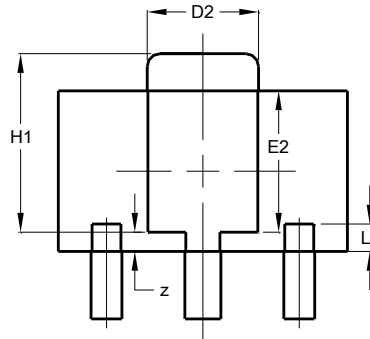
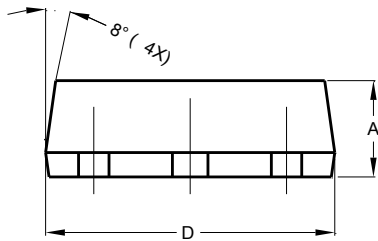
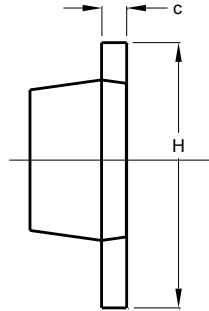
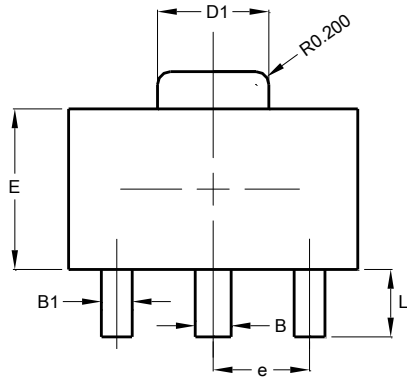


Figure 6 Typical Gain-Bandwidth Product vs. Collector Current

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT89**

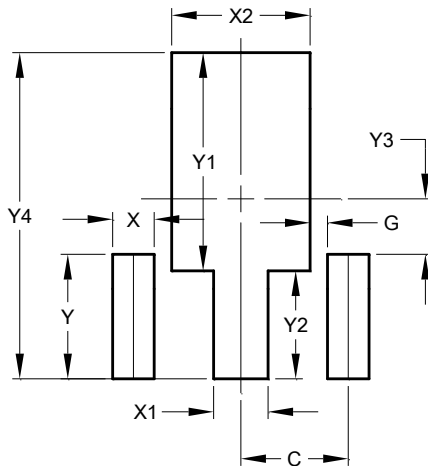


SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT89**



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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