50V NPN LOW SATURATION POWER TRANSISTOR IN SOT89

Features

- BV_{CEO} > 50V
- I_C = 3A High Continuous Collector Current
- I_{CM} up to 6A Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage $V_{CE(sat)}$ < 220mV @ 1A
- $R_{CE(sat)}$ = 87mΩ @ 2.75A for a Low Equivalent On-Resistance
- h_{FE} Characterized up to 6A for High Current Gain Hold-Up
- **Lead-Free Finish; 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

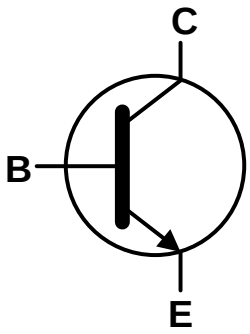
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.052 grams (Approximate)

Applications

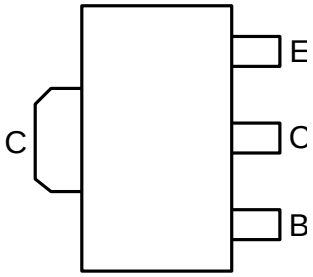
- Load Management Functions
- Motor Control
- DC-DC / DC-AC Converters

SOT89

Top View



Device Symbol



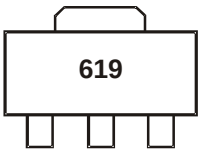
Top View
Pin-Out

Ordering Information (Note 4 and 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FCX619TA	AEC-Q101	619	7	12	1,000
FCX619-13R	AEC-Q101	619	13	12	4,000
FCX619QTA	Automotive	619	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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



619 = Product Type Marking Code

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	50	V
Collector-Emitter Voltage	V_{CEO}	50	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	3	A
Peak Pulse Current	I_{CM}	6	A
Continuous Base Current	I_B	500	mA

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

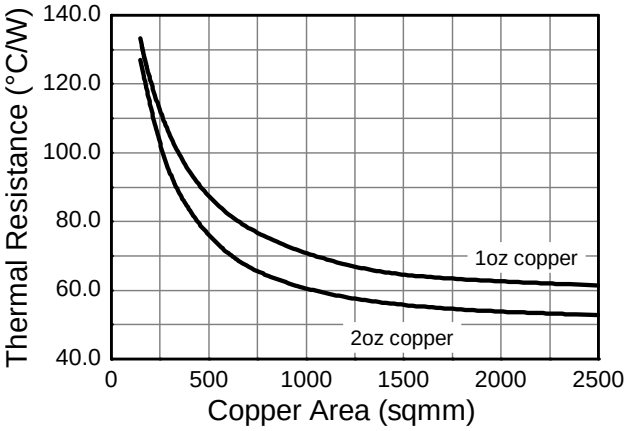
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	0.7	W
	(Note 7)		1.0	
	(Note 8)		1.5	
	(Note 9)		2.0	
Thermal Resistance, Junction to Ambient Air	(Note 6)	$R_{\theta JA}$	178	°C/W
	(Note 7)		125	
	(Note 8)		83	
	(Note 9)		62.5	
Thermal Resistance, Junction to Lead	(Note 10)	$R_{\theta JL}$	6	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

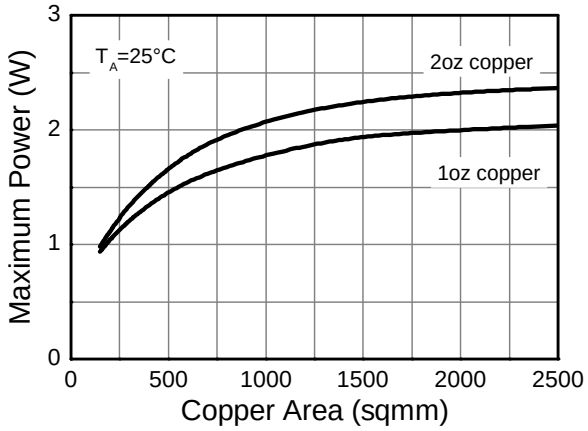
ESD Ratings (Note 10)

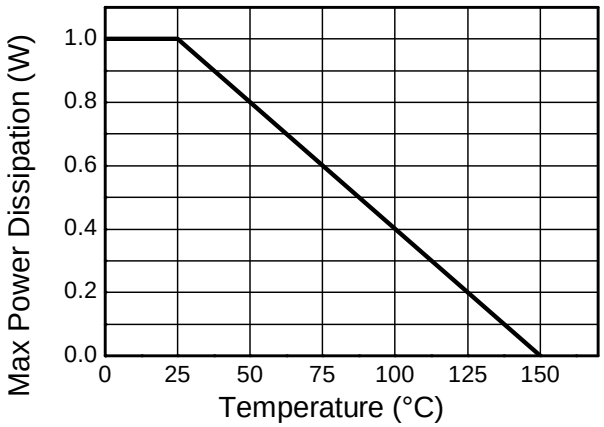
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
6. For a device mounted with the exposed collector pad on minimum recommended pad layout (MRP) 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.
7. Same as Note 5, except the device is mounted with the exposed collector pad on 15mm x 15mm 1oz copper.
8. Same as Note 5, except the device is mounted with the exposed collector pad on 25mm x 25mm 1oz copper.
9. Same as Note 5, except the device is mounted with the exposed collector pad on 40mm x 40mm 1oz copper.
10. Thermal resistance from junction to solder-point (on the exposed collector pad).
11. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

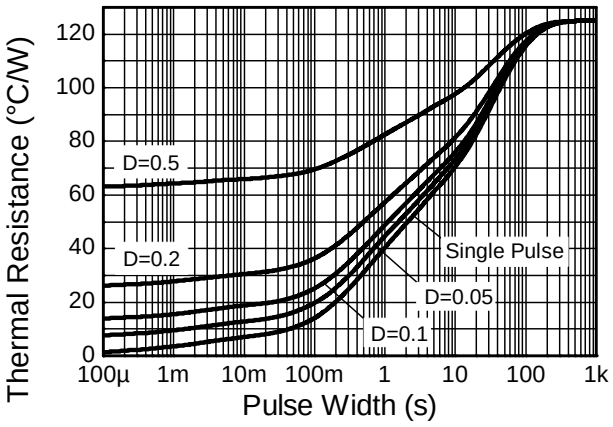
Thermal Characteristics and Derating Information



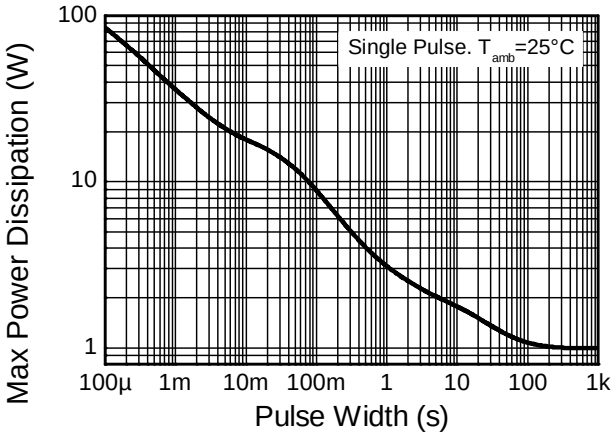




Derating Curve



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}	50	190	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	50	65	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.3	—	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	—	—	100	nA	V_{CB} = 40V
Emitter Cutoff Current	I_{EBO}	—	—	100	nA	V_{EB} = 5.6V
Emitter Cutoff Current	I_{CES}	—	—	100	nA	V_{CES} = 40V
DC Current Transfer Static Ratio (Note 9)	h_{FE}	200 300 200 100 —	400 450 400 200 30	—	—	I_C = 10mA, V_{CE} = 2V I_C = 200mA, V_{CE} = 2V I_C = 1A, V_{CE} = 2V I_C = 2A, V_{CE} = 2V I_C = 6A, V_{CE} = 2V
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(sat)}$	—	13 150 190 240	25 220 260 320	V	I_C = 100mA, I_B = 10mA I_C = 1A, I_B = 10mA I_C = 2A, I_B = 50mA I_C = 2.75A, I_B = 100mA
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(sat)}$	—	0.97	1.1	V	I_C = 2.75A, I_B = 100mA
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(on)}$	—	0.89	1.0	V	I_C = 2.75A, V_{CE} = 2V
Transitional Frequency	f_T	100	165	—	MHz	I_C = 50mA, V_{CE} = 10V f = 100MHz
Output Capacitance	C_{obo}	—	12	20	pF	V_{CB} = 10V, f = 1MHz,
Turn-On Time	$t_{(on)}$	—	170	—	ns	V_{CC} =10V, I_C =1A
Turn-Off Time	$t_{(off)}$	—	750	—	ns	I_{B1} = -I_{B2} = 10mA

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

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

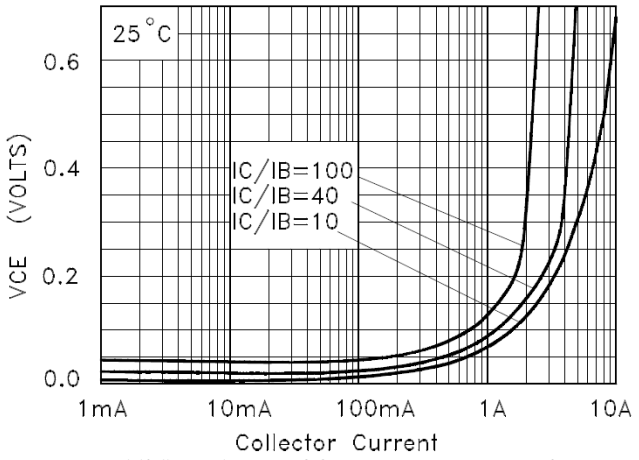


FIG. 1 $V_{CE(SAT)}$ vs I_C

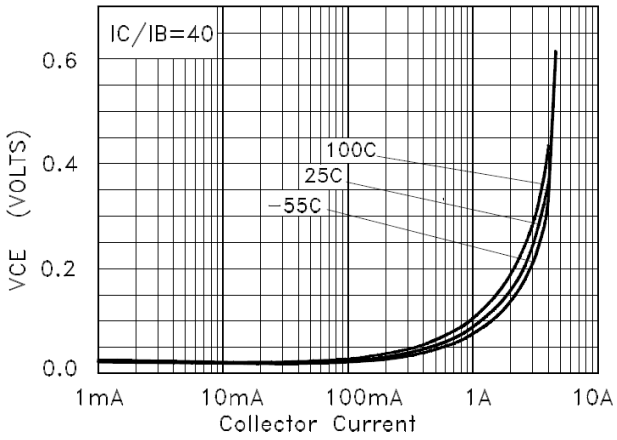


FIG. 2 $V_{CE(SAT)}$ vs I_C

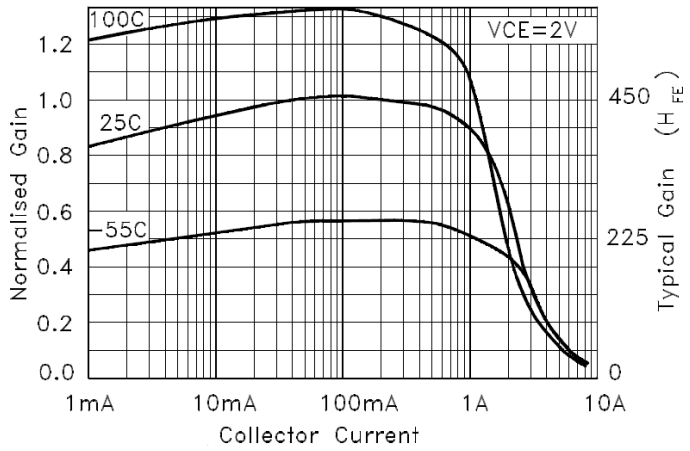


FIG. 3 H_{FE} vs I_C

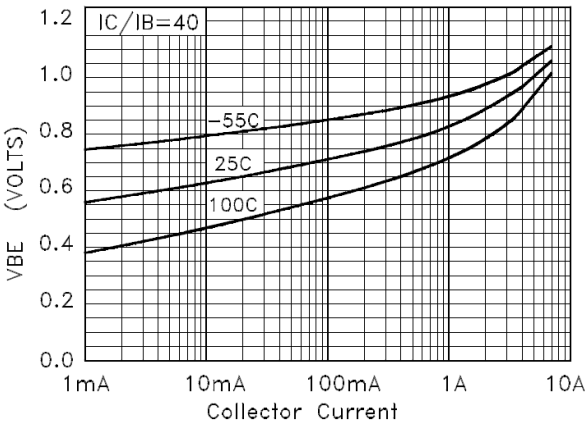


FIG. 4 $V_{BE(SAT)}$ vs I_C

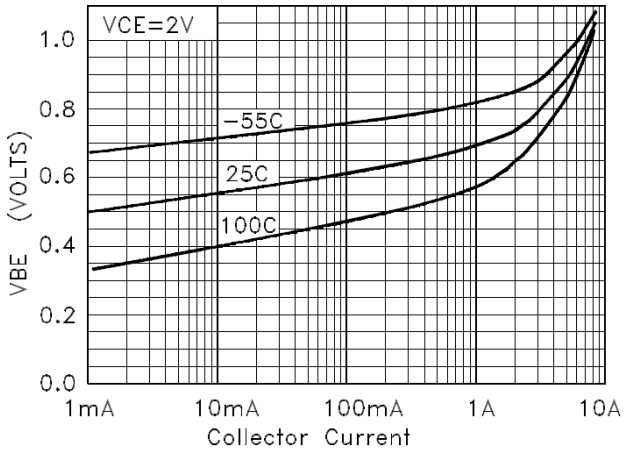
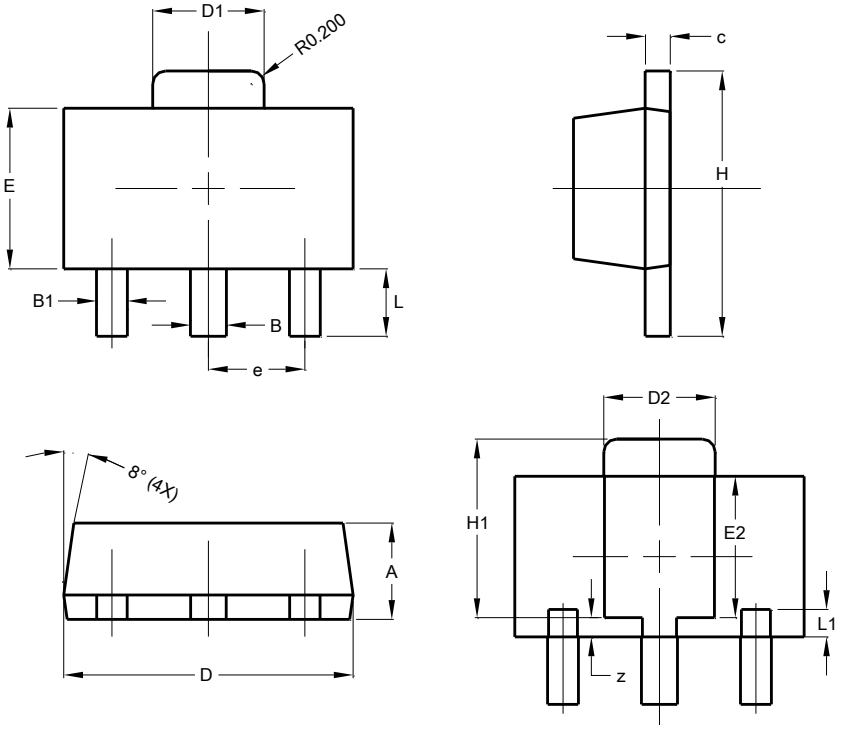


FIG. 5 $V_{BE(ON)}$ vs I_C

Package Outline Dimensions

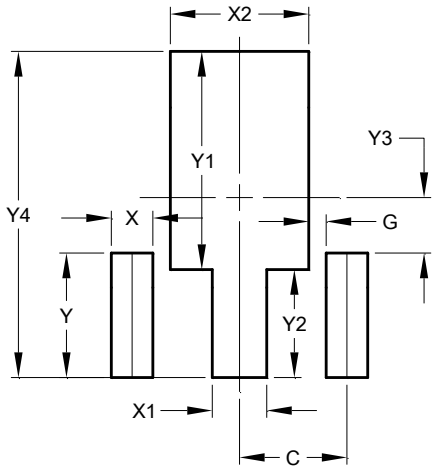
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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	0.327	0.527	0.427
z	0.20	0.40	0.30
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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