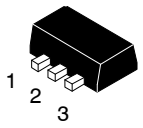
Bipolar Transistor

50 V, 2 A, Low V_{CE}(sat), NPN Single

2SC5994



SOT−89 / PCP−1
CASE 419AU

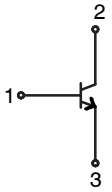
Features

- Adoption of MBIT Process
- Low Collector to Emitter Saturation Voltage
- Large Current Capacity
- High Speed Switching

Applications

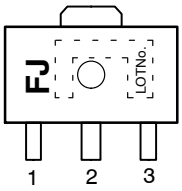
- Voltage Regulators
- Relay Drivers
- Lamp Drivers
- Electrical Equipment

ELECTRICAL CONNECTION



1: Base
2: Collector
3: Emitter

MARKING DIAGRAM



FJ = Specific Device Code

SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS at Ta = 25°C

Parameter	Symbol	Value	Unit
Collector to Base Voltage	V_{CBO}	100	V
Collector to Emitter Voltage	V_{CES}	100	V
	V_{CEO}	50	V
Emitter to Base Voltage	V_{EBO}	6	V
Collector Current	I_C	2	A
Collector Current (Pulse)	I_{CP}	4	A
Base Current	I_B	400	mA
Collector Dissipation (Note 1) T_C = 25°C	P_C	 1.3 3.5	W
Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	−55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface mounted on ceramic substrate (450 mm^2 x 0.8 mm).

ORDERING INFORMATION

Device	Package	Shipping†
2SC5994−TD−E	SOT−89 / PCP−1	1000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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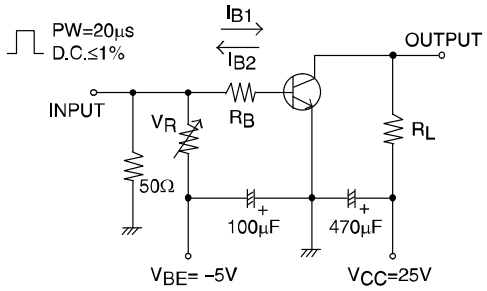
ELECTRICAL CHARACTERISTICS at T_A = 25°C

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Collector Cutoff Current	I_{CBO}	V_{CB} = 50 V, I_E = 0 A			1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 4 V, I_C = 0 A			1	μA
DC Current Gain	$h_{FE}1$	V_{CE} = 2 V, I_C = 100 mA	200		560	
	$h_{FE}2$	V_{CE} = 2 V, I_C = 1.5 A	40			
Gain−Bandwidth Product	f_T	V_{CE} = 10 V, I_C = 300 mA		420		MHz
Output Capacitance	Cob	V_{CB} = 10 V, f = 1 MHz		9		pF
Collector to Emitter Saturation Voltage	V_{CE}(sat)	I_C = 1 A, I_B = 50 mA		135	300	mV
Base to Emitter Saturation Voltage	V_{BE}(sat)	I_C = 1 A, I_B = 50 mA		0.9	1.2	V
Collector to Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 10 μA, I_E = 0 A	100			V
Collector to Emitter Breakdown Voltage	$V_{(BR)CES}$	I_C = 100 μA, R_{BE} = 0 Ω	100			V
	$V_{(BR)CEO}$	I_C = 1 mA, R_{BE} = ∞	50			V
Emitter to Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 10 μA, I_C = 0 A	6			V
Turn−On Time	t_{on}	See specified Test Circuit		30		ns
Storage Time	t_{stg}			330		ns
Fall Time	t_f			40		ns

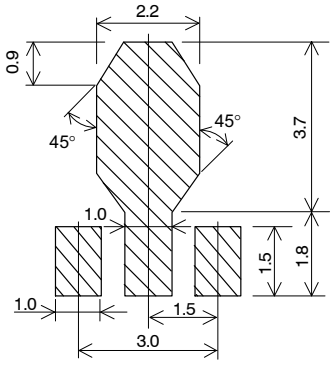
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

Switching Time Test Circuit



I_C = 10 I_{B1} = −10 I_{B2} = 700 mA

Recommended Soldering Footprint



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TYPICAL CHARACTERISTICS

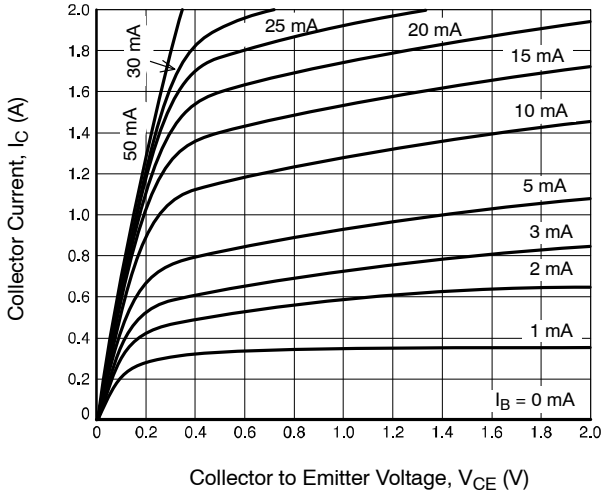

Figure 1. I_C – V_{CE}

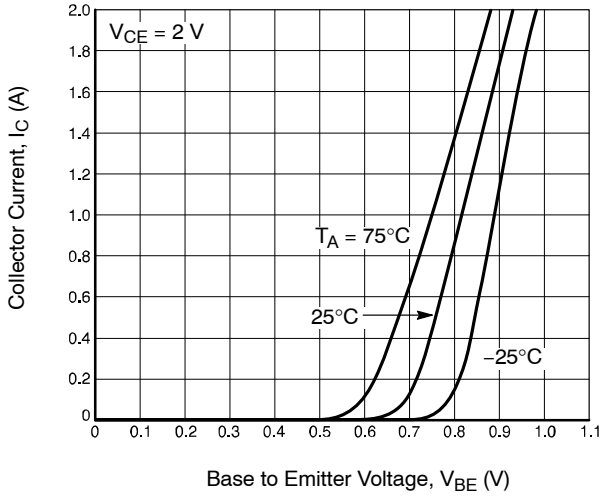

Figure 2. I_C – V_{BE}

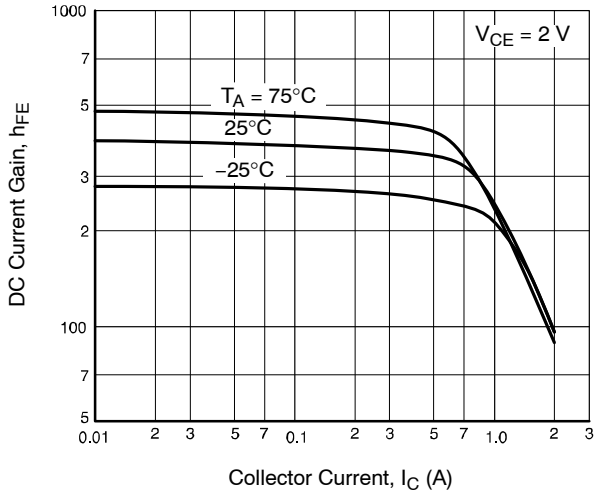

Figure 3. h_{FE} – I_C

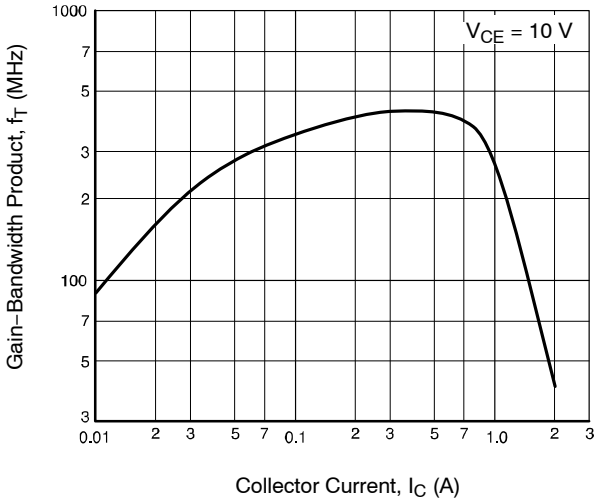

Figure 4. f_T – I_C

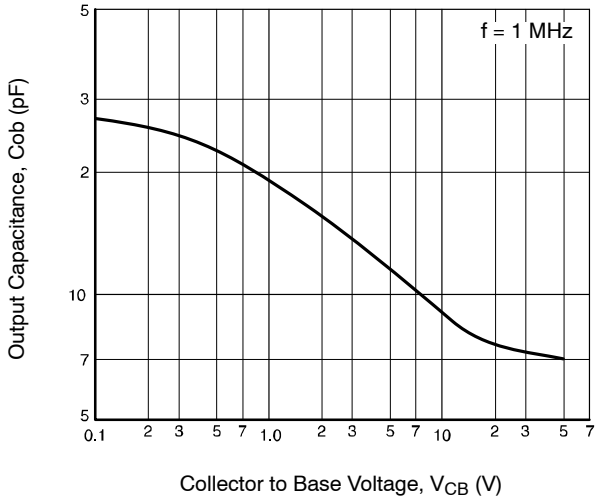

Figure 5. Cob – V_{CB}

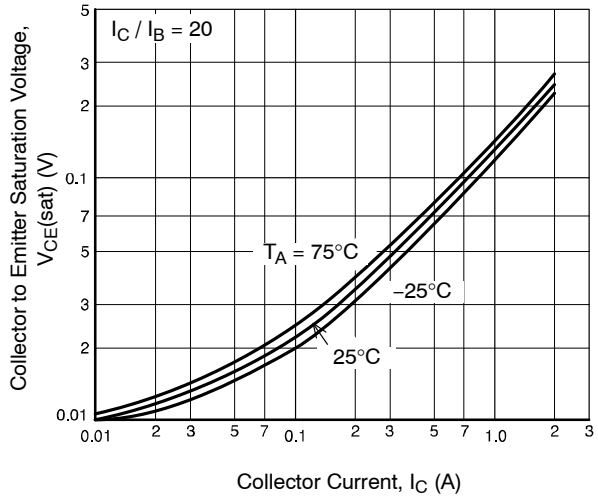

Figure 6. V_{CE}(sat) – I_C

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TYPICAL CHARACTERISTICS (continued)

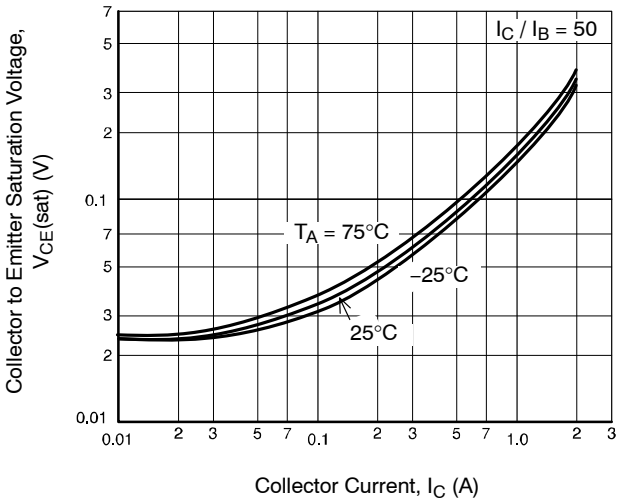

Figure 7. $V_{CE(sat)}$ – I_C

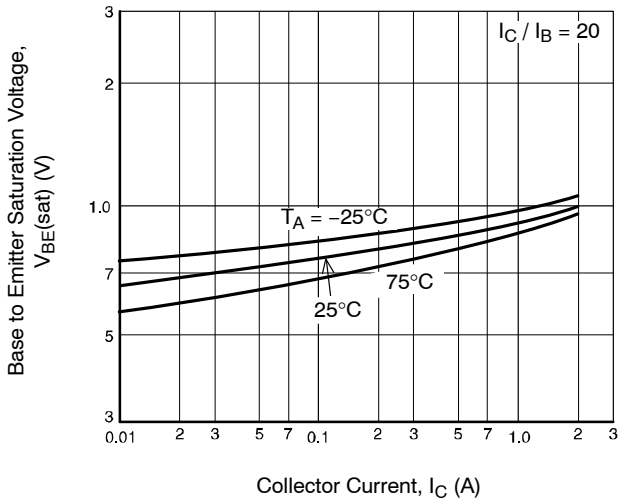

Figure 8. $V_{BE(sat)}$ – I_C

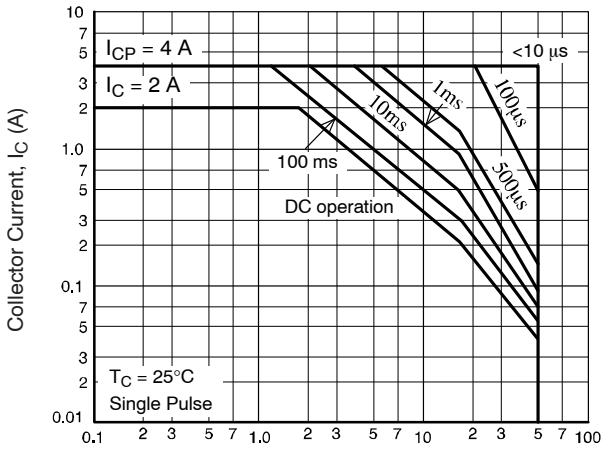

Figure 9. ASO

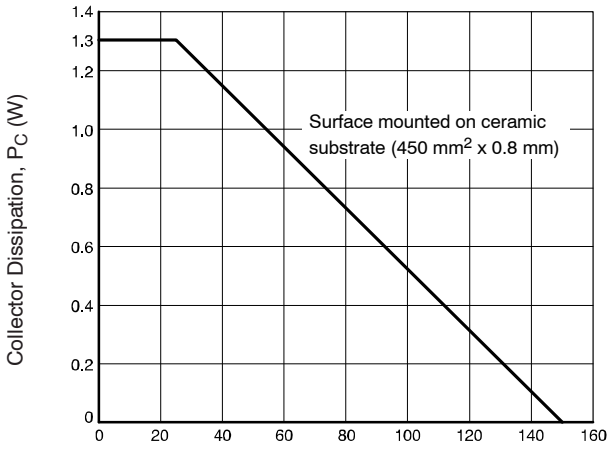

Figure 10. P_C – T_A

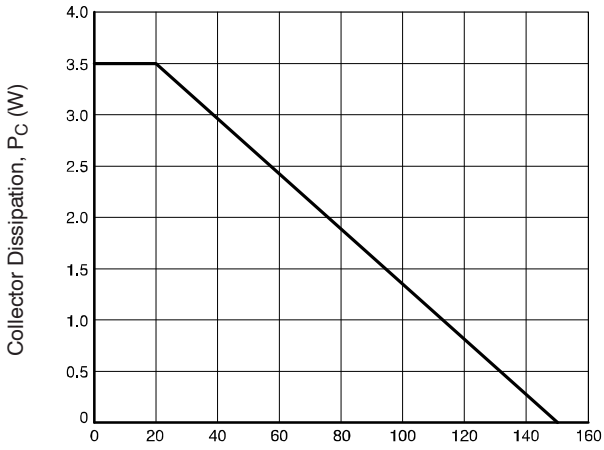

Figure 11. P_C – T_C

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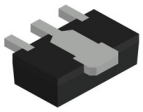
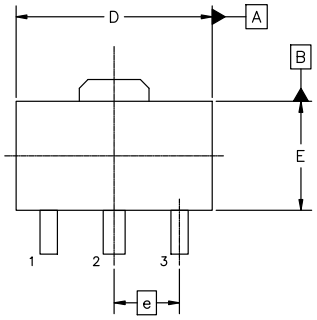
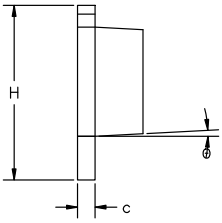


SOT−89 4.50x2.50x1.50 1.50P
CASE 419AU
ISSUE A

DATE 21 MAY 2025



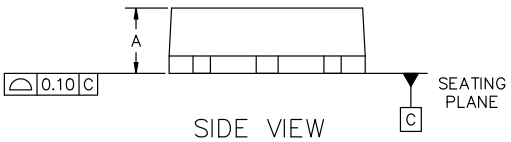
TOP VIEW



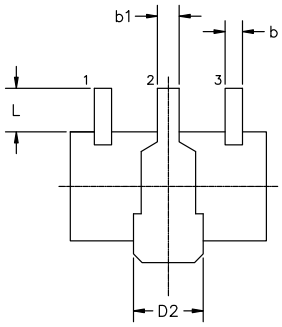
END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. LEAD THICKNESS INCLUDES LEAD FINISH.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

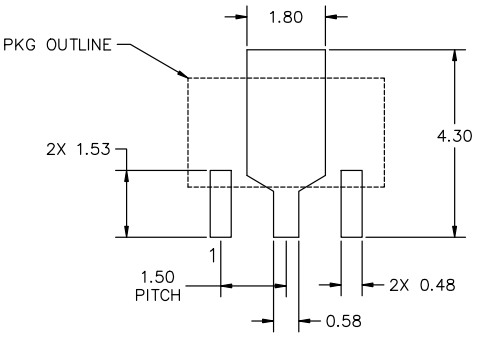
MILLIMETERS			
DIM	MIN	NOM	MAX
A	1.40	1.50	1.60
b	0.35	0.40	0.48
b1	0.40	0.50	0.55
c	0.37	0.40	0.43
D	4.40	4.50	4.60
D2	1.40	1.60	1.80
E	2.40	2.50	2.60
e	1.50 BSC		
H	3.80	4.00	4.20
L	0.80	1.00	1.20
θ	0°	−−−	3°



SIDE VIEW



BOTTOM VIEW



RECOMMENDED MOUNTING FOOTPRINT

*For additional information on our Pb−Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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