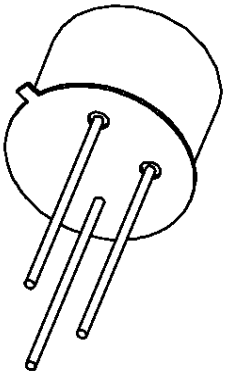
Jameco Part Number 38228PHILIPS

DATA SHEET



2N2219; 2N2219A
NPN switching transistors

Product specification
Supersedes data of 1997 May 07
File under Discrete Semiconductors, SC04

1997 Sep 03

Philips
Semiconductors

PHILIPS

NPN switching transistors 2N2219; 2N2219A

FEATURES

- High current (max. 800 mA)
- Low voltage (max. 40 V).

APPLICATIONS

- High-speed switching
- DC and VHF/UHF amplification, for 2N2219 only.

DESCRIPTION

NPN switching transistor in a TO-39 metal package.
PNP complement: 2N2905 and 2N2905A.

PINNING

PIN	DESCRIPTION
1	emitter
2	base
3	collector, connected to case

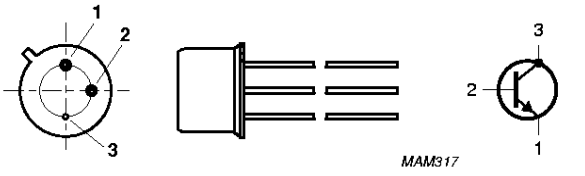


Fig.1 Simplified outline (TO-39) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter			
	2N2219		–	60	V
	2N2219A		–	75	V
V_{CEO}	collector-emitter voltage	open base			
	2N2219		–	30	V
	2N2219A		–	40	V
I_C	collector current (DC)		–	800	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	800	mW
h_{FE}	DC current gain	I_C = 10 mA; V_{CE} = 10 V	75	–	
f_T	transition frequency	I_C = 20 mA; V_{CE} = 20 V; f = 100 MHz			
	2N2219		250	–	MHz
	2N2219A		300	–	MHz
t_{off}	turn-off time	I_{Con} = 150 mA; I_{Bon} = 15 mA; I_{Boff} = −15 mA	–	250	ns

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter			
	2N2219		–	60	V
	2N2219A		–	75	V
V_{CEO}	collector-emitter voltage				
	2N2219	open base	–	30	V
	2N2219A	open base; $I_C \leq 500$ mA	–	40	V
V_{EBO}	emitter-base voltage	open collector			
	2N2219		–	5	V
	2N2219A		–	6	V
I_C	collector current (DC)		–	800	mA
I_{CM}	peak collector current		–	800	mA
I_{BM}	peak base current		–	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	800	mW
		$T_{case} \leq 25$ °C	–	3	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{amb}	operating ambient temperature		–65	+150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air	190	K/W
$R_{th\ j\text{-}c}$	thermal resistance from junction to case		50	K/W

CHARACTERISTICS

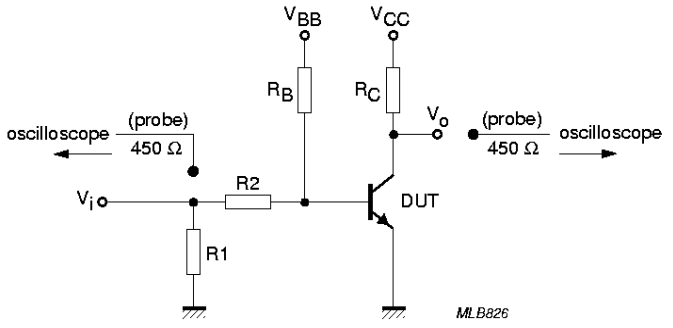
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current				
	2N2219	I_E = 0; V_{CB} = 50 V	–	10	nA
		I_E = 0; V_{CB} = 50 V; T_{amb} = 150 °C	–	10	µA
I_{CBO}	collector cut-off current				
	2N2219A	I_E = 0; V_{CB} = 60 V	–	10	nA
		I_E = 0; V_{CB} = 60 V; T_{amb} = 150 °C	–	10	µA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 3 V	–	10	nA
h_{FE}	DC current gain	I_C = 0.1 mA; V_{CE} = 10 V	35	–	
h_{FE}	DC current gain	I_C = 1 mA; V_{CE} = 10 V	50	–	
h_{FE}	DC current gain	I_C = 10 mA; V_{CE} = 10 V	75	–	
h_{FE}	DC current gain	I_C = 10 mA; V_{CE} = 10 V; T_{amb} = –55 °C			
	2N2219A		35	–	
h_{FE}	DC current gain	I_C = 150 mA; V_{CE} = 1 V; note 1	50	–	
h_{FE}	DC current gain	I_C = 150 mA; V_{CE} = 10 V; note 1	100	300	
h_{FE}	DC current gain	I_C = 500 mA; V_{CE} = 10 V; note 1			
	2N2219		30	–	
	2N2219A		40	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 150 mA; I_B = 15 mA; note 1			
	2N2219		–	400	mV
	2N2219A		–	300	mV
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 50 mA; note 1			
	2N2219		–	1.6	V
	2N2219A		–	1	V
V_{BEsat}	base-emitter saturation voltage	I_C = 150 mA; I_B = 15 mA; note 1			
	2N2219		–	1.3	V
	2N2219A		0.6	1.2	V
V_{BEsat}	base-emitter saturation voltage	I_C = 500 mA; I_B = 50 mA; note 1			
	2N2219		–	2.6	V
	2N2219A		–	2	V
C_c	collector capacitance	I_E = i_e = 0; V_{CB} = 10 V	–	8	pF
C_e	emitter capacitance	I_C = i_c = 0; V_{EB} = 500 mV			
	2N2219A		–	25	pF
f_T	transition frequency	I_C = 20 mA; V_{CE} = 20 V; f = 100 MHz;			
	2N2219		250	–	MHz
	2N2219A		300	–	MHz
F	noise figure	I_C = 0.2 mA; V_{CE} = 5 V; R_S = 2 kΩ; f = 1 kHz; B = 200 Hz			
	2N2219A		–	4	dB

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Switching times (between 10% and 90% levels) for type 2N2219A; see Fig.2					
t_{on}	turn-on time	I_{Con} = 150 mA; I_{Bon} = 15 mA; I_{Boff} = −15 mA	–	35	ns
t_d	delay time		–	15	ns
t_r	rise time		–	20	ns
t_{off}	turn-off time		–	250	ns
t_s	storage time		–	200	ns
t_f	fall time		–	60	ns

Note

1. Pulse test: $t_p \leq 300\ \mu s$; $\delta \leq 0.02$.

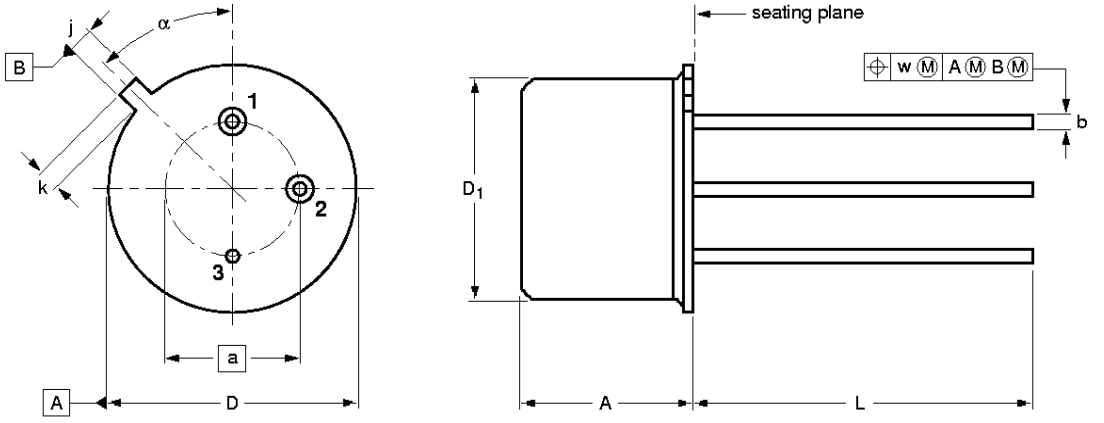


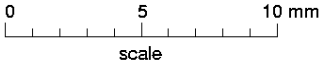
V_i = 9.5 V; T = 500 μs; t_p = 10 μs; $t_r = t_f \leq 3$ ns.
R1 = 68 Ω; R2 = 325 Ω; R_B = 325 Ω; R_C = 160 Ω.
V_{BB} = −3.5 V; V_{CC} = 29.5 V.
Oscilloscope: input impedance Z_i = 50 Ω.

Fig.2 Test circuit for switching times.

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads **SOT5/11**





DIMENSIONS (mm are the original dimensions)

UNIT	A	a	b	D	D_1	j	k	L	w	α
mm	6.60 6.35	5.08	0.48 0.41	9.39 9.08	8.33 8.18	0.85 0.75	0.95 0.75	14.2 12.7	0.2	45°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT5/11		TO-39				97-04-11

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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