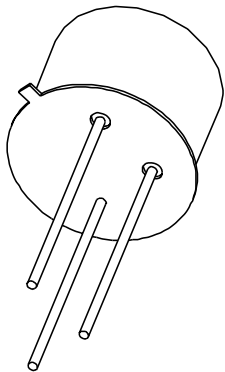


# DATA SHEET



## **2N2219; 2N2219A** **NPN switching transistors**

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

1997 Sep 03

# 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

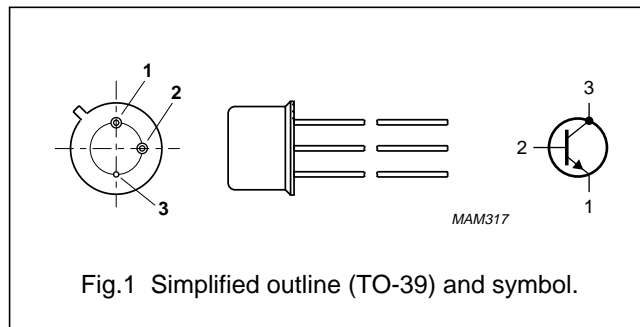


Fig.1 Simplified outline (TO-39) and symbol.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter			
	2N2219		–	60	V
	2N2219A		–	75	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	2N2219		–	30	V
	2N2219A		–	40	V
I <sub>C</sub>	collector current (DC)		–	800	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	–	800	mW
h <sub>FE</sub>	DC current gain	I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 10 V	75	–	
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 20 mA; V <sub>CE</sub> = 20 V; f = 100 MHz			
	2N2219		250	–	MHz
	2N2219A		300	–	MHz
t <sub>off</sub>	turn-off time	I <sub>Con</sub> = 150 mA; I <sub>Bon</sub> = 15 mA; I <sub>Boff</sub> = –15 mA	–	250	ns

## NPN switching transistors

## 2N2219; 2N2219A

**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage 2N2219 2N2219A	open emitter	–	60	V
			–	75	V
V <sub>CEO</sub>	collector-emitter voltage 2N2219 2N2219A	open base	–	30	V
		open base; I <sub>C</sub> ≤ 500 mA	–	40	V
V <sub>EBO</sub>	emitter-base voltage 2N2219 2N2219A	open collector	–	5	V
			–	6	V
I <sub>C</sub>	collector current (DC)		–	800	mA
I <sub>CM</sub>	peak collector current		–	800	mA
I <sub>BM</sub>	peak base current		–	200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	–	800	mW
		T <sub>case</sub> ≤ 25 °C	–	3	W
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	200	°C
T <sub>amb</sub>	operating ambient temperature		–65	+150	°C

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	thermal resistance from junction to ambient	in free air	190	K/W
R <sub>th j-c</sub>	thermal resistance from junction to case		50	K/W

## NPN switching transistors

## 2N2219; 2N2219A

## CHARACTERISTICS

$T_j = 25\text{ °C}$  unless otherwise specified.

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

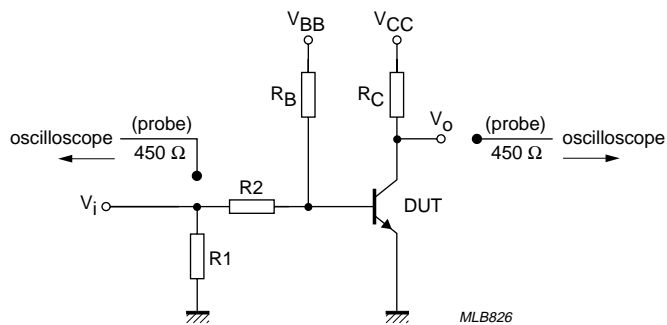
NPN switching transistors

2N2219; 2N2219A

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
<b>Switching times (between 10% and 90% levels) for type 2N2219A; see Fig.2</b>					
$t_{on}$	turn-on time	$I_{Con} = 150 \text{ mA}; I_{Bon} = 15 \text{ mA};$ $I_{Boff} = -15 \text{ mA}$	–	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:  $t_p \leq 300 \mu\text{s}; \delta \leq 0.02$ .



$V_i = 9.5 \text{ V}; T = 500 \mu\text{s}; t_p = 10 \mu\text{s}; t_r = t_f \leq 3 \text{ ns}.$   
 $R_1 = 68 \Omega; R_2 = 325 \Omega; R_B = 325 \Omega; R_C = 160 \Omega.$   
 $V_{BB} = -3.5 \text{ V}; V_{CC} = 29.5 \text{ V}.$   
 Oscilloscope: input impedance  $Z_i = 50 \Omega.$

Fig.2 Test circuit for switching times.

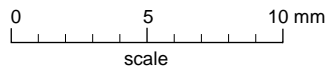
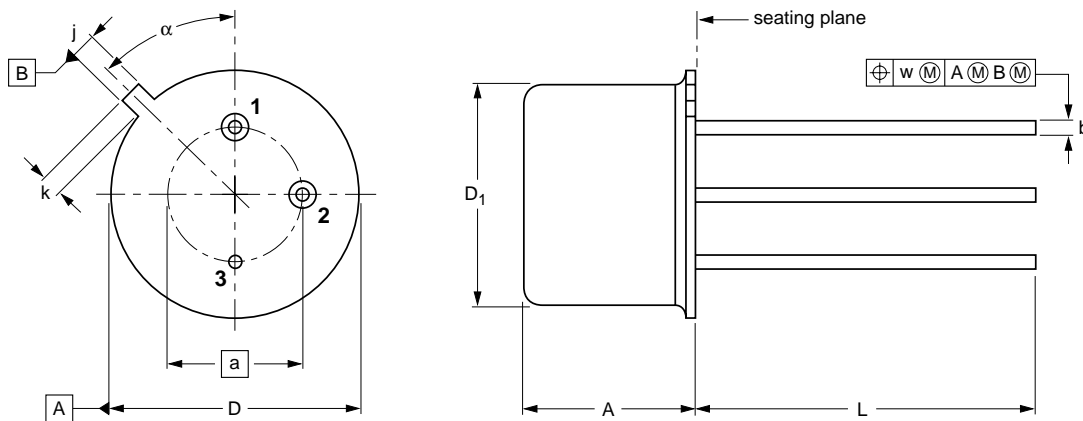
NPN switching transistors

2N2219; 2N2219A

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT5/11



DIMENSIONS (mm are the original dimensions)

UNIT	A	a	b	D	D <sub>1</sub>	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

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**NPN switching transistors****2N2219; 2N2219A**

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**DEFINITIONS**

<b>Data sheet status</b>	
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.
<b>Limiting values</b>	
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<b>Application information</b>	
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