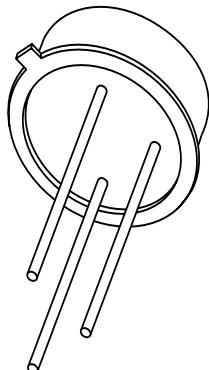


# DATA SHEET



## **2N2907; 2N2907A PNP switching transistors**

Product specification

1997 May 30

Supersedes data of September 1994

File under Discrete Semiconductors, SC04

**PNP switching transistors****2N2907; 2N2907A****FEATURES**

- High current (max. 600 mA)
- Low voltage (max. 60 V).

**APPLICATIONS**

- Switching and linear amplification.

**DESCRIPTION**

PNP switching transistor in a TO-18 metal package.  
NPN complements: 2N2222 and 2N2222A.

**PINNING**

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

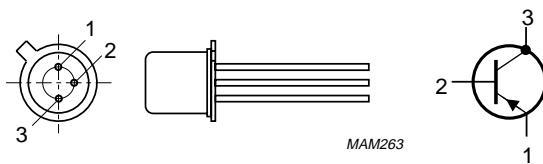


Fig.1 Simplified outline (TO-18) and symbol.

**QUICK REFERENCE DATA**

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	-60	V
$V_{CEO}$	collector-emitter voltage 2N2907 2N2907A	open base	– –	-40 -60	V V
$I_C$	collector current (DC)		–	-600	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	–	400	mW
$h_{FE}$	DC current gain	$I_C = -150 \text{ mA}; V_{CE} = -10 \text{ V}$	100	300	
$f_T$	transition frequency	$I_C = -50 \text{ mA}; V_{CE} = -20 \text{ V}; f = 100 \text{ MHz}$	200	–	MHz
$t_{off}$	turn-off time	$I_{Con} = -150 \text{ mA}; I_{Bon} = -15 \text{ mA}; I_{Boff} = 15 \text{ mA}$	–	300	ns

## PNP switching transistors

2N2907; 2N2907A

**LIMITING VALUES**

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

<b>SYMBOL</b>	<b>PARAMETER</b>	<b>CONDITIONS</b>	<b>MIN.</b>	<b>MAX.</b>	<b>UNIT</b>
$V_{CBO}$	collector-base voltage	open emitter	–	-60	V
$V_{CEO}$	collector-emitter voltage 2N2907 2N2907A	open base; $I_C < -100$ mA	–	-40 –60	V V
$V_{EBO}$	emitter-base voltage	open collector	–	-5	V
$I_C$	collector current (DC)		–	-600	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	–	400	mW
		$T_{case} \leq 25$ °C	–	1.2	W
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		–	200	°C
$T_{amb}$	operating ambient temperature		-65	+150	°C

**THERMAL CHARACTERISTICS**

<b>SYMBOL</b>	<b>PARAMETER</b>	<b>CONDITIONS</b>	<b>VALUE</b>	<b>UNIT</b>
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air	438	K/W
$R_{th\ j-c}$	thermal resistance from junction to case		146	K/W

## PNP switching transistors

2N2907; 2N2907A

**CHARACTERISTICS** $T_{amb} = 25^\circ C$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{CBO}$	collector cut-off current 2N2907	$I_E = 0; V_{CB} = -50 V$	—	-20	nA
		$I_E = 0; V_{CB} = -50 V; T_{amb} = 150^\circ C$	—	-20	$\mu A$
$I_{CBO}$	collector cut-off current 2N2907A	$I_E = 0; V_{CB} = -50 V$	—	-10	nA
		$I_E = 0; V_{CB} = -50 V; T_{amb} = 150^\circ C$	—	-10	$\mu A$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = -5 V$	—	-50	nA
$h_{FE}$	DC current gain 2N2907	$V_{CE} = -10 V$			
		$I_C = -0.1 mA$	35	—	
		$I_C = -1 mA$	50	—	
		$I_C = -10 mA$	75	—	
		$I_C = -150 mA; \text{ note 1}$	100	300	
		$I_C = -500 mA; \text{ note 1}$	30		
$h_{FE}$	DC current gain 2N2907A	$V_{CE} = -10 V$			
		$I_C = -0.1 mA$	75	—	
		$I_C = -1 mA$	100	—	
		$I_C = -10 mA$	100	—	
		$I_C = -150 mA; \text{ note 1}$	100	300	
		$I_C = -500 mA; \text{ note 1}$	50	—	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -150 mA; I_B = -15 mA; \text{ note 1}$		-400	mV
		$I_C = -500 mA; I_B = -50 mA; \text{ note 1}$		-1.6	V
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -150 mA; I_B = -15 mA; \text{ note 1}$		-1.3	V
		$I_C = -500 mA; I_B = -50 mA; \text{ note 1}$		-2.6	V
$C_c$	collector capacitance	$I_E = i_e = 0; V_{CB} = -10 V; f = 1 MHz$	—	8	pF
$C_e$	emitter capacitance	$I_C = i_c = 0; V_{EB} = -2 V; f = 1 MHz$	—	30	pF
$f_T$	transition frequency	$I_C = -50 mA; V_{CE} = -20 V; f = 100 MHz; \text{ note 1}$	200	—	MHz

**Switching times (between 10% and 90% levels); see Fig.2**

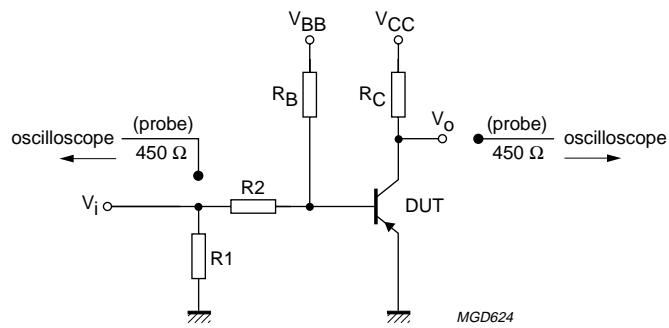
$t_{on}$	turn-on time	$I_{Con} = -150 mA; I_{Bon} = -15 mA; I_{Boff} = 15 mA$	—	45	ns
$t_d$	delay time		—	15	ns
$t_r$	rise time		—	35	ns
$t_{off}$	turn-off time		—	300	ns
$t_s$	storage time		—	250	ns
$t_f$	fall time		—	50	ns

**Note**

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

## PNP switching transistors

2N2907; 2N2907A



$V_i = -9.5$  V;  $T = 500$  μs;  $t_p = 10$  μs;  $t_r = t_f \leq 3$  ns.

$R_1 = 68 \Omega$ ;  $R_2 = 325 \Omega$ ;  $R_B = 325 \Omega$ ;  $R_C = 160 \Omega$ .

$V_{BB} = 3.5$  V;  $V_{CC} = -29.5$  V.

Oscilloscope input impedance  $Z_i = 50 \Omega$ .

Fig.2 Test circuit for switching times.

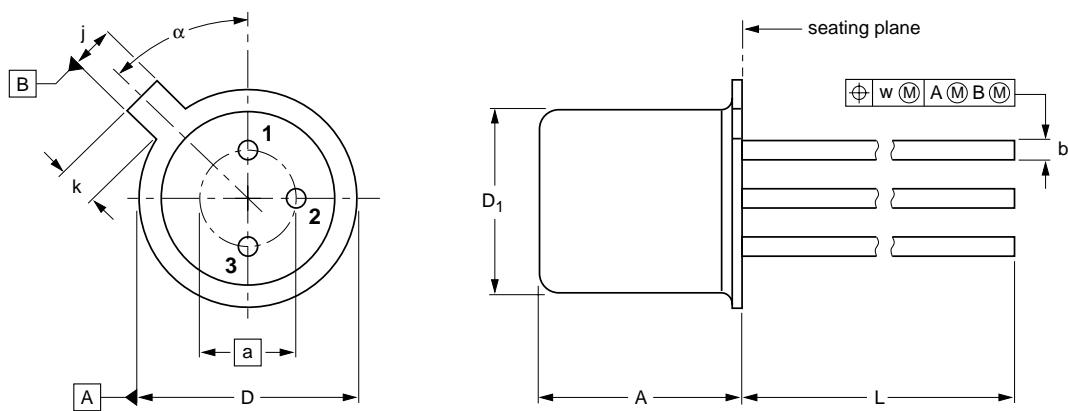
## PNP switching transistors

2N2907; 2N2907A

## PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT18/13



0                    5                    10 mm  
scale

## DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	a	b	D	D <sub>1</sub>	j	k	L	w	α
mm	5.31 4.74	2.54	0.47 0.41	5.45 5.30	4.70 4.55	1.03 0.94	1.1 0.9	15.0 12.7	0.40	45°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT18/13	B11/C7 type 3	TO-18				97-04-18

**PNP switching transistors****2N2907; 2N2907A****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>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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Printed in The Netherlands

117047/00/02/pp8

Date of release: 1997 May 30

Document order number: 9397 750 02224

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