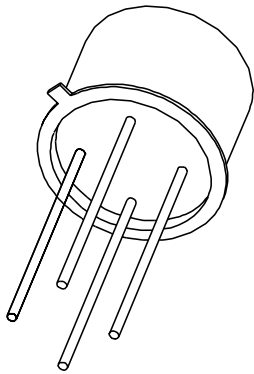


# DATA SHEET



**BR101**

**Silicon controlled switch**

Product specification  
Supersedes data of September 1994  
File under Discrete Semiconductors, SC04

1997 Jul 24

# Silicon controlled switch

BR101

## DESCRIPTION

Silicon planar PNP switch in a TO-72 metal package. It is an integrated PNP/NPN transistor pair, with all electrodes accessible.

## APPLICATIONS

- Time base circuits
- Switching in television circuits
- Trigger device for thyristors.

## PINNING

PIN	DESCRIPTION
1	cathode
2	cathode gate
3	anode gate (connected to case)
4	anode

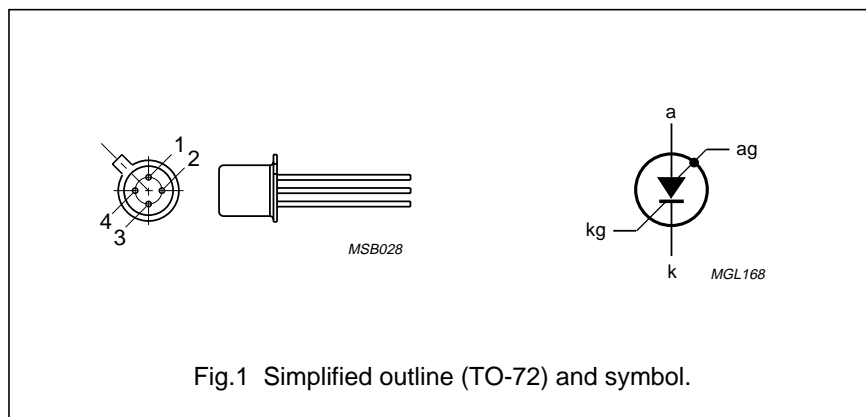


Fig.1 Simplified outline (TO-72) and symbol.

## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
<b>PNP transistor</b>				
$V_{EBO}$	emitter-base voltage	open collector	-50	V
<b>NPN transistor</b>				
$V_{CBO}$	collector-base voltage	open emitter	50	V
$I_{ERM}$	repetitive peak emitter current		-2.5	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	275	mW
$T_j$	junction temperature		150	$^{\circ}\text{C}$
$V_{AK}$	forward on-state voltage	$I_A = 50\text{ mA}; I_{AG} = 0; R_{KG-K} = 10\text{ k}\Omega$	1.4	V
$I_H$	holding current	$I_{AG} = 10\text{ mA}; V_{BB} = -2\text{ V}; R_{KG-K} = 10\text{ k}\Omega$	1	mA

## Silicon controlled switch

BR101

**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
<b>NPN transistor</b>					
V <sub>CBO</sub>	collector-base voltage	open emitter	–	50	V
V <sub>CER</sub>	collector-emitter voltage	R <sub>BE</sub> = 10 kΩ	–	50	V
V <sub>EBO</sub>	emitter-base voltage	open collector; note 1	–	5	V
I <sub>C</sub>	collector current (DC)	note 2	–	175	mA
I <sub>CM</sub>	peak collector current		–	175	mA
I <sub>E</sub>	emitter current (DC)		–	–175	mA
I <sub>ERM</sub>	repetitive peak emitter current	t <sub>p</sub> = 10 μs; δ = 0.01	–	–2.5	A
<b>PNP transistor</b>					
V <sub>CBO</sub>	collector-base voltage	open emitter	–	–50	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	–50	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	–50	V
I <sub>E</sub>	emitter current (DC)		–	175	mA
I <sub>ERM</sub>	repetitive peak emitter current	t <sub>p</sub> = 10 μs; δ = 0.01	–	2.5	A
<b>Combined device</b>					
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	–	275	mW
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	150	°C
T <sub>amb</sub>	operating ambient temperature		–65	+150	°C

**Notes**

1. It is permitted to exceed this voltage during the discharge of a capacitor of max. 390 pF, provided the charge does not exceed 50 nC.
2. Provided the I<sub>E</sub> rating is not exceeded.

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	thermal resistance from junction to ambient	in free air	0.45	K/mW

Silicon controlled switch

BR101

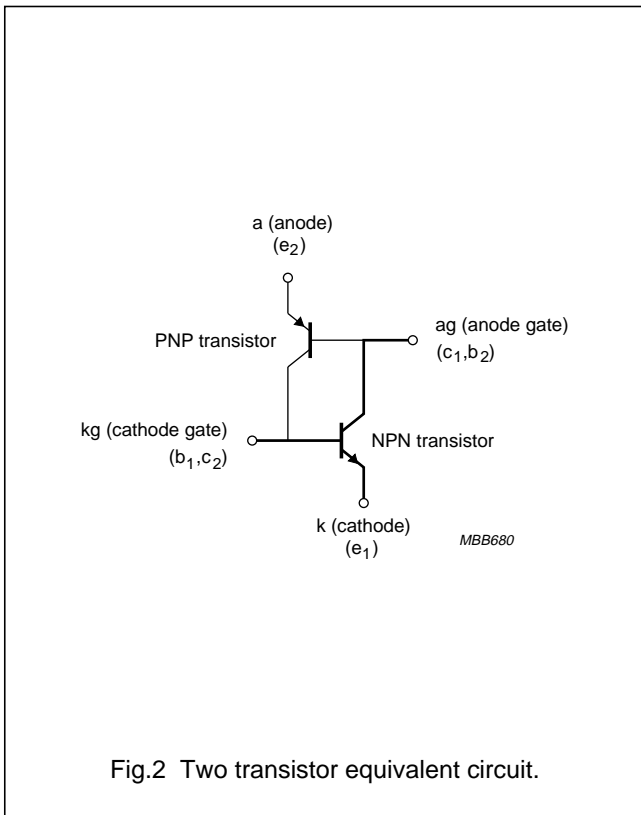


Fig.2 Two transistor equivalent circuit.

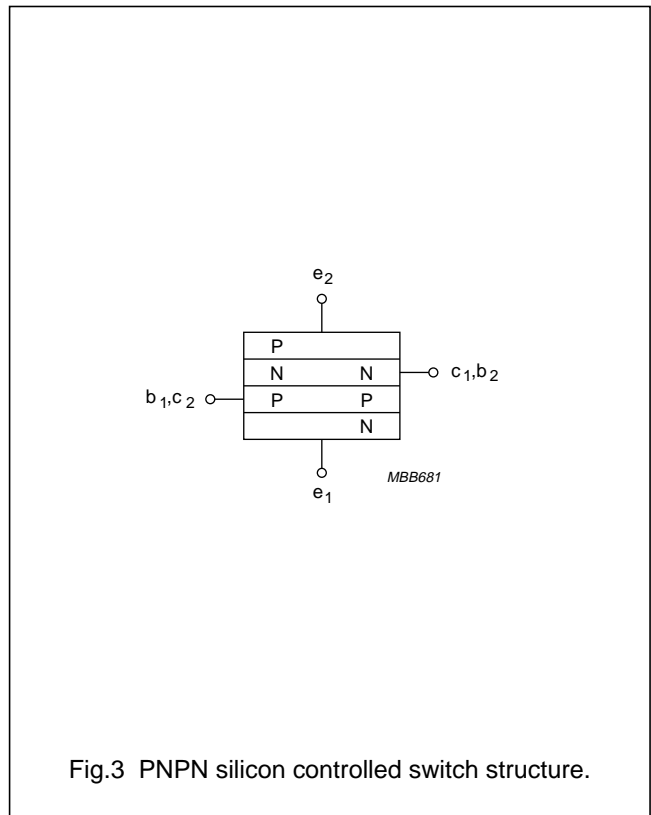


Fig.3 PNPN silicon controlled switch structure.

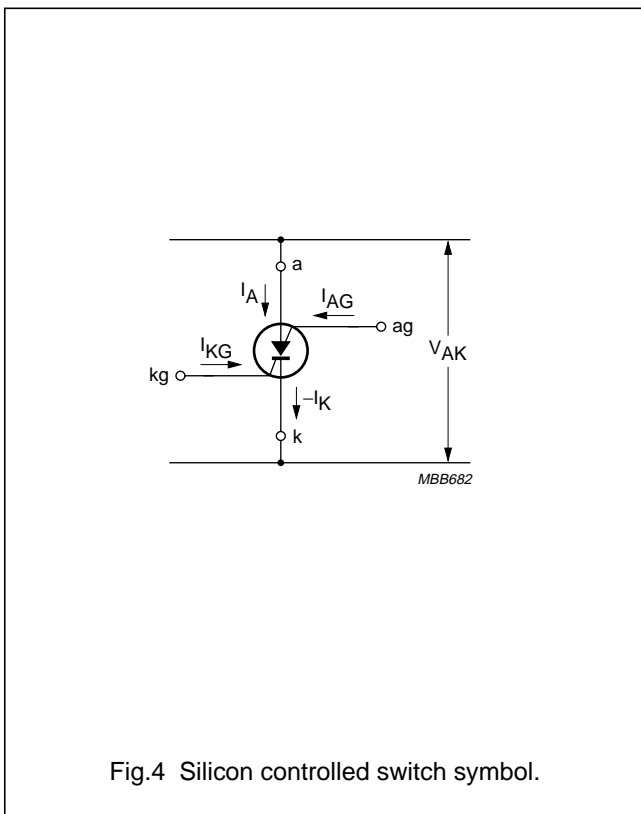


Fig.4 Silicon controlled switch symbol.

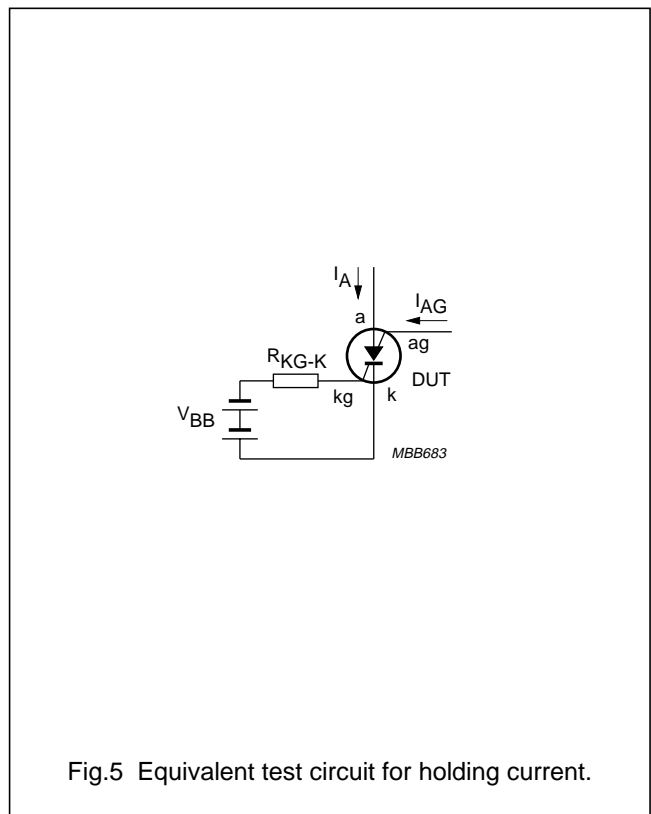


Fig.5 Equivalent test circuit for holding current.

## Silicon controlled switch

BR101

**CHARACTERISTICS** $T_{amb} = 25\text{ °C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>NPN transistor</b>						
$I_{CER}$	collector cut-off current	$V_{CE} = 50\text{ V}; R_{BE} = 10\text{ k}\Omega$	–	–	500	nA
		$V_{CE} = 50\text{ V}; R_{BE} = 10\text{ k}\Omega; T_j = 150\text{ °C}$	–	–	50	$\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = 5\text{ V}; T_j = 150\text{ °C}$	–	–	50	$\mu\text{A}$
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 1\text{ mA}$	–	–	500	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 1\text{ mA}$	–	–	900	mV
$h_{FE}$	DC current gain	$I_C = 10\text{ mA}; V_{CE} = 2\text{ V}$	50	–	–	
$f_T$	transition frequency	$I_C = 10\text{ mA}; V_{CE} = 2\text{ V}$	–	300	–	MHz
$C_c$	collector capacitance	$I_E = i_e = 0; V_{CB} = 20\text{ V}; f = 1\text{ MHz}$	–	–	5	pF
$C_e$	emitter capacitance	$I_C = i_c = 0; V_{EB} = 1\text{ V}$	–	–	25	pF
<b>PNP transistor</b>						
$I_{CEO}$	collector cut-off current	$I_B = 0; V_{CE} = -50\text{ V}; T_j = 150\text{ °C}$	–	–	-50	$\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = -50\text{ V}; T_j = 150\text{ °C}$	–	–	-50	$\mu\text{A}$
$h_{FE}$	DC current gain	$I_E = 1\text{ mA}; V_{CB} = 0\text{ V}$	0.25	–	2.5	
<b>Combined device</b>						
$V_{AK}$	forward on-state voltage	$R_{KG-K} = 10\text{ k}\Omega$ $I_A = 50\text{ mA}; I_{AG} = 0$	–	–	1.4	V
		$I_A = 1\text{ mA}; I_{AG} = 10\text{ mA}$	–	–	1.2	V
$I_H$	holding current	$R_{KG-K} = 10\text{ k}\Omega; I_{AG} = 10\text{ mA}; V_{BB} = -2\text{ V}$	–	–	1	mA

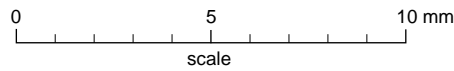
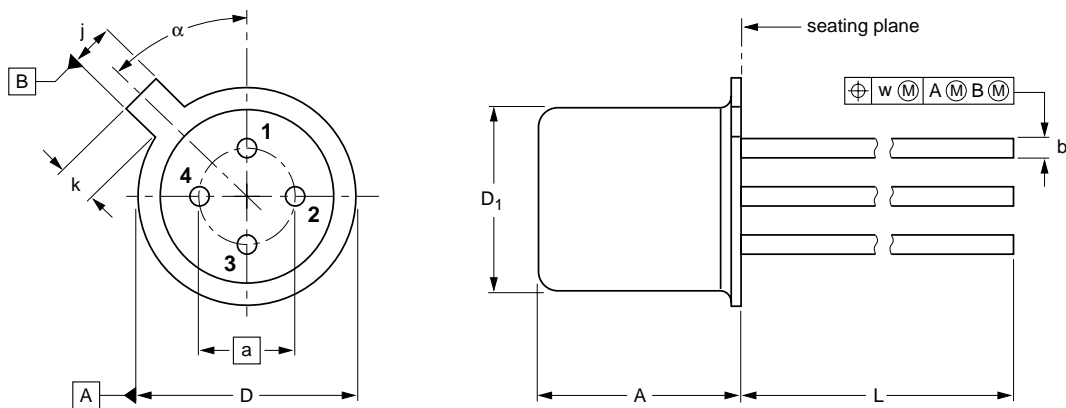
Silicon controlled switch

BR101

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 4 leads

SOT18/9



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	0.46 0.42	5.45 5.30	4.70 4.55	1.05 0.95	1.0 0.9	14.5 13.5	0.36	45°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT18/9	B12/C7 type 3	TO-72				97-04-18

## Silicon controlled switch

BR101

**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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