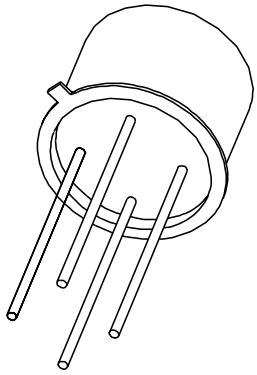
DATA SHEET



BR101
Silicon controlled switch

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

1997 Jul 24

Philips
Semiconductors

PHILIPS

Silicon controlled switch BR101

DESCRIPTION

Silicon planar PNPN 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

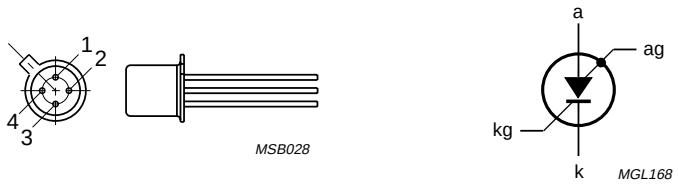


Fig.1 Simplified outline (TO-72) and symbol.

QUICK REFERENCE DATA

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

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
NPN transistor					
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CER}	collector-emitter voltage	R_{BE} = 10 kΩ	–	50	V
V_{EBO}	emitter-base voltage	open collector; note 1	–	5	V
I_C	collector current (DC)	note 2	–	175	mA
I_{CM}	peak collector current		–	175	mA
I_E	emitter current (DC)		–	–175	mA
I_{ERM}	repetitive peak emitter current	t_p = 10 μs; δ = 0.01	–	–2.5	A
PNP transistor					
V_{CBO}	collector-base voltage	open emitter	–	–50	V
V_{CEO}	collector-emitter voltage	open base	–	–50	V
V_{EBO}	emitter-base voltage	open collector	–	–50	V
I_E	emitter current (DC)		–	175	mA
I_{ERM}	repetitive peak emitter current	t_p = 10 μs; δ = 0.01	–	2.5	A
Combined device					
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	275	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	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_E rating is not exceeded.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air	0.45	K/mW

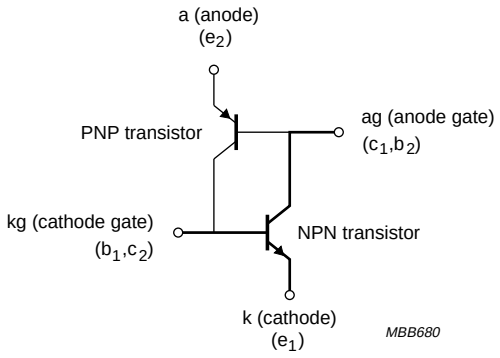


Fig.2 Two transistor equivalent circuit.

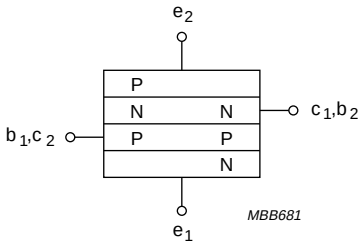


Fig.3 PNPN silicon controlled switch structure.

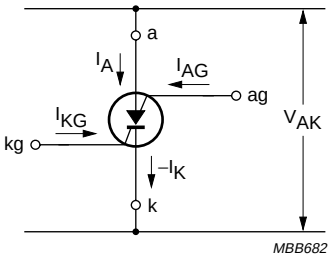


Fig.4 Silicon controlled switch symbol.

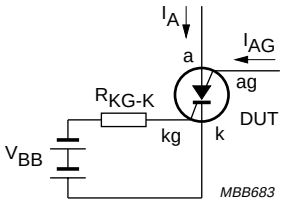


Fig.5 Equivalent test circuit for holding current.

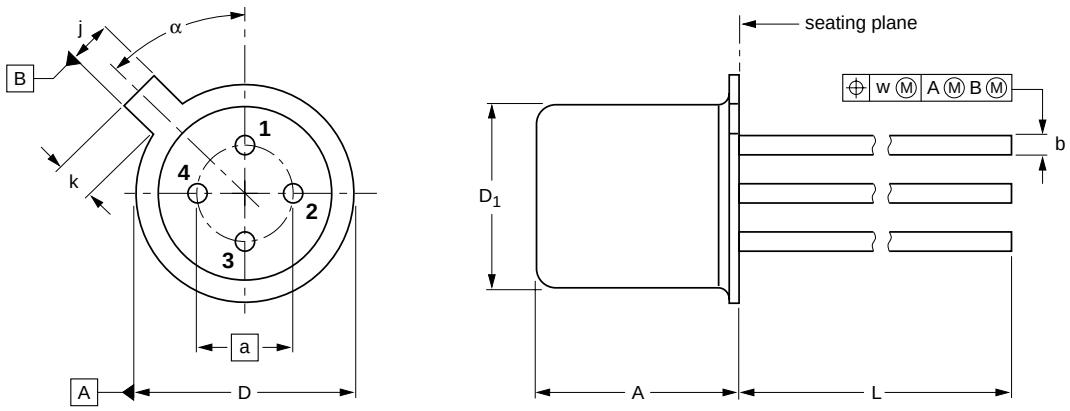
CHARACTERISTICS

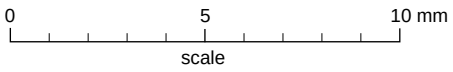
T_{amb} = 25 °C unless otherwise specified.

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

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_1	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

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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