

# Audio level sensor

## BA335

The BA335 is sensor amplifier which consists of three blocks : a small signal audio amplifier, a hysteresis comparator, and a driver. Housed in a 9-pin SIP package, it is optimal for tape recorder end detection and tape song gap detection.

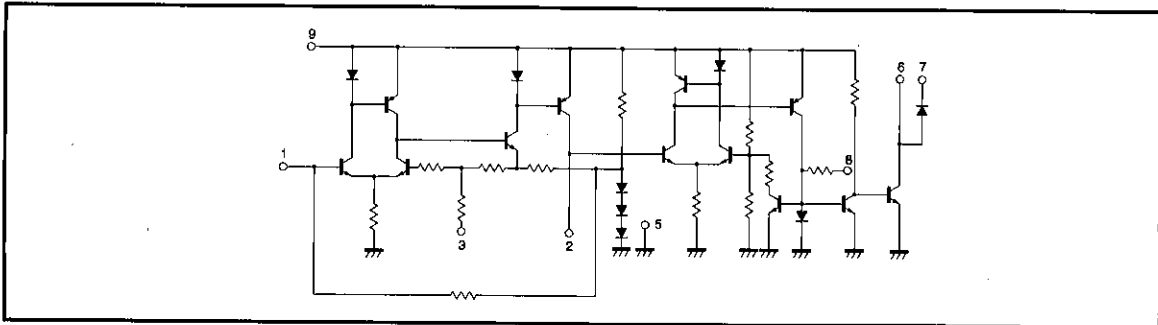
### ●Applications

Tape end detection  
Tape song gap detection

### ●Features

- 1) Built-in comparator with stable hysteresis under supply voltage and temperature fluctuations.
- 2) Built-in transistor and diode capable of driving an inductive load at 600mA.
- 3) Time delays can be created as needed with an external RC circuit.

### ●Internal circuit schematic



### ●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Supply voltage	V <sub>CC</sub>	15	V
Power dissipation	P <sub>d</sub>	500*	mW
Operating temperature	T <sub>opr</sub>	-20~75	°C
Storage temperature	T <sub>stg</sub>	-50~125	°C
Maximum transistor collector current	I <sub>F Max.</sub>	750	mA
Maximum diode forward current	I <sub>C Max.</sub>	750	mA

\* When used above Ta = 25°C, decreases 5.0 mW per degree.

●Electrical characteristics (unless otherwise indicated, Ta = 25°C and Vcc = 9.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement Circuit
Quiescent current	I <sub>Q</sub>	—	6	13	mA	—	Fig.5
Output transistor leak current	I <sub>L1</sub>	—	—	100	μA	—	Fig.5
Output diode leak current	I <sub>L2</sub>	—	—	100	μA	—	Fig.5
Output transistor saturation voltage	V <sub>CE(sat)</sub>	—	1.5	2.0	V	I <sub>C</sub> =600mA	Fig.5
Output diode forward voltage	V <sub>F</sub>	—	1.5	2.0	V	I <sub>F</sub> =600mA	Fig.5
Input judgement OFF level	V <sub>IN</sub>	-54	-50	-43	dBm	f=1kHz	Fig.5
Comparator on level	V <sub>TH1</sub>	3.0	3.5	4.0	V	—	Fig.5
Comparator off level	V <sub>TH2</sub>	1.8	2.2	2.6	V	—	Fig.5
Pin 8 high level	V <sub>P8</sub>	0.45	0.55	—	V	—	Fig.5

●Electrical characteristic curves

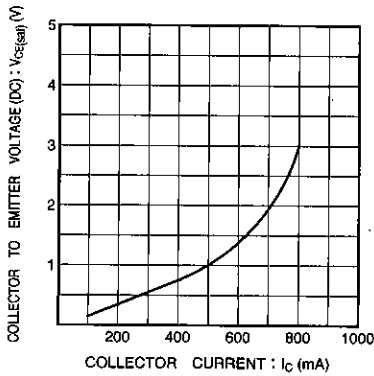


Fig.1 Output transistor saturation voltage vs. collector current

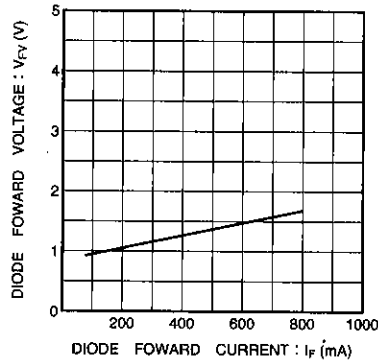


Fig.2 Output diode forward voltage vs. input voltage

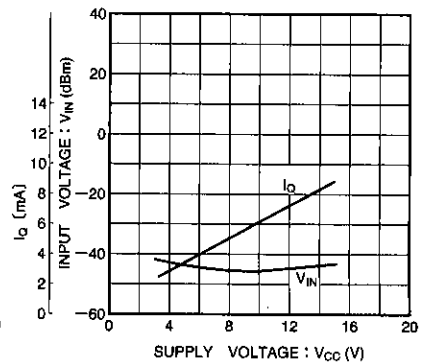


Fig.3 Quiescent current and input voltage vs. supply voltage

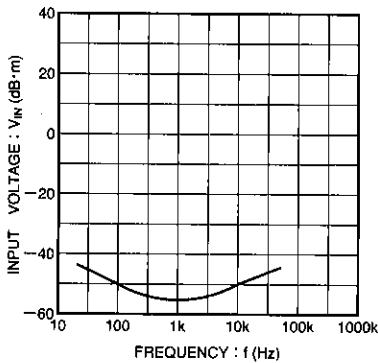


Fig.4 Input voltage vs. frequency

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● Measurement circuit

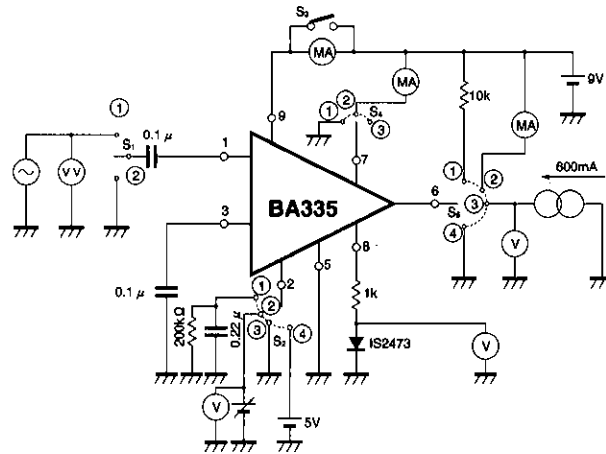


Fig. 5

	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>	S <sub>5</sub>	
I <sub>CC1</sub>	2	1	Open	3	1	Current test
I <sub>L1</sub>	2	4	Short	2	2	Pin 7 current test
I <sub>L2</sub>	2	4	Short	2	2	Pin 6 current test
V <sub>CE (sat)</sub>	2	3	Short	3	3	Pin 6 voltage test
V <sub>F</sub>	2	4	Short	1	3	Pin 6 voltage test
V <sub>IN</sub>	1	1	Short	3	1	V.V test when Pin 6 inverted
V→H1	2	2	Short	3	1	Pin 2 voltage test when Pin 6 inverted
V→H2	2	2	Short	3	1	Pin 2 voltage test when Pin 6 inverted
V <sub>P8</sub>	2	4	Short	3	1	Pin 8 voltage test

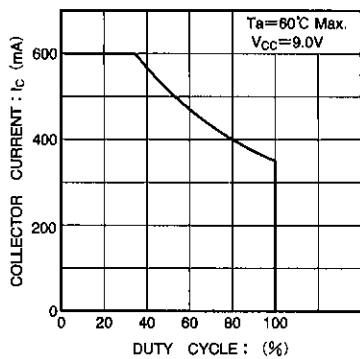


Fig.6 IC duty cycle characteristics

● Explanation of external components

$C_1$  : Input coupling capacitor. 1 to 2.2  $\mu$ F recommended.

$C_2$  : AC bypass capacitor. 0.1 to 0.47  $\mu$ F recommended.

$R_1, C_3$  : Resistor and capacitor for setting time delay.

$R_2, C_4$  : Resistor and capacitor for ripple filter.

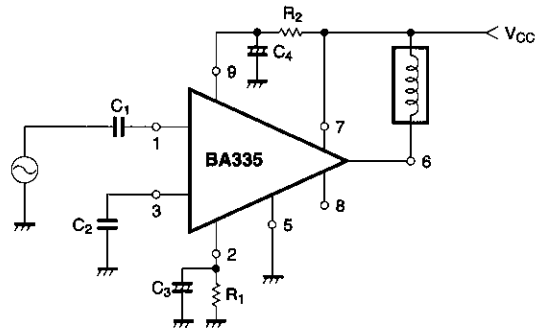


Fig. 7

● Input characteristics

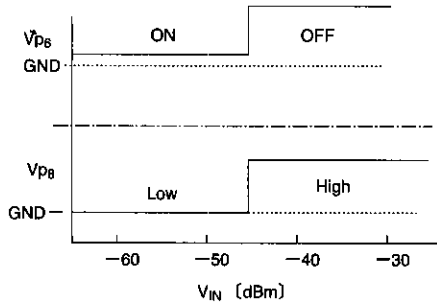


Fig. 8

As shown in Fig. 8,  $V_{p6}$  and  $V_{p8}$  invert when the input reaches approximately  $-45\text{dBm}$ .  $V_{p8}$  is designed to be able to directly drive the NPN small signal transistor at this time. When on,  $V_{p8}$  is capable of accepting a maximum of 600mA of current (this will vary as shown in the duty cycle table). A continuous ON should last for no more than 3 seconds.

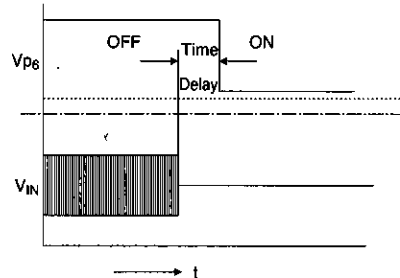
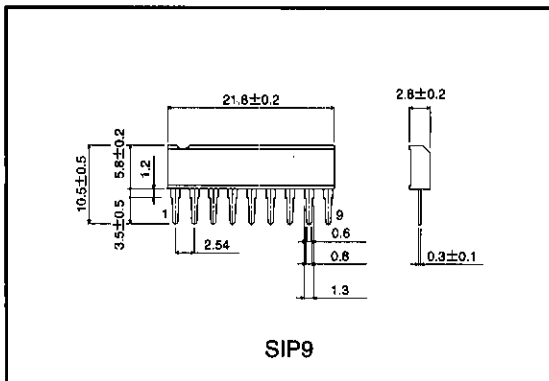


Fig. 9

Time delay using the hysteresis comparator is as follows. When an input signal of  $-45\text{dBm}$  or more goes to nothing ceases, the electrical potential of Pin 2 begins to fall due to the RC circuit connected to Pin 2. The time until the hysteresis comparator inverts is the time delay. When deciding the values of the capacitor and resistor, select a resistor value from 100 to 500k  $\Omega$ .

● External dimensions (Unit: mm)



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