

# Audio level sensor

## BA335

The BA335 is a 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 mute detection.

### ●Applications

Tape end detection  
Tape mute detection

### ●Features

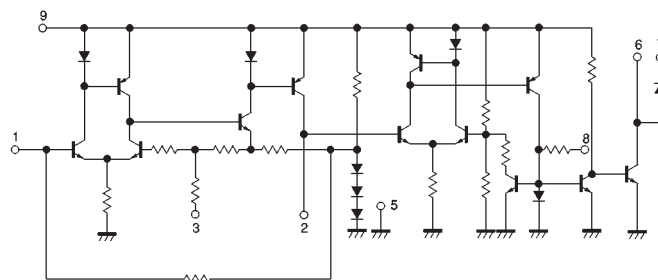
- 1) Built-in comparator with stable hysteresis under power supply voltage and temperature fluctuations.
- 2) Built-in transistor and diode capable of driving an inductive load at 600mA.
- 3) Time delays can be created as needed with an external CR circuit.

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

Parameter	Symbol	Limits	Unit
Power 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</sub> Max.	750	mA
Maximum diode forward current	I <sub>C</sub> Max.	750	mA

\* Reduced by 5.0mW for each increase in Ta of 1°C over 25°C.

### ●Internal circuit schematic



●Electrical characteristics (unless otherwise noted,  $T_a = 25^\circ\text{C}$  and  $V_{CC} = 9.0\text{V}$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	$I_Q$	—	6	13	mA	—
Output transistor leak current	$I_{L1}$	—	—	100	$\mu\text{A}$	—
Output diode leak current	$I_{L2}$	—	—	100	$\mu\text{A}$	—
Output transistor saturation voltage	$V_{CE(sat)}$	—	1.5	2.0	V	$I_C=600\text{mA}$
Output diode forward voltage	$V_F$	—	1.5	2.0	V	$I_F=600\text{mA}$
Input discrimination off level	$V_{IN}$	-54	-50	-43	dBm	$f=1\text{kHz}$
Comparator on level	$V_{TH1}$	3.0	3.5	4.0	V	—
Comparator off level	$V_{TH2}$	1.8	2.2	2.6	V	—
Pin 8 high level	$V_{P8}$	0.45	0.55	—	V	—

●Measurement circuit

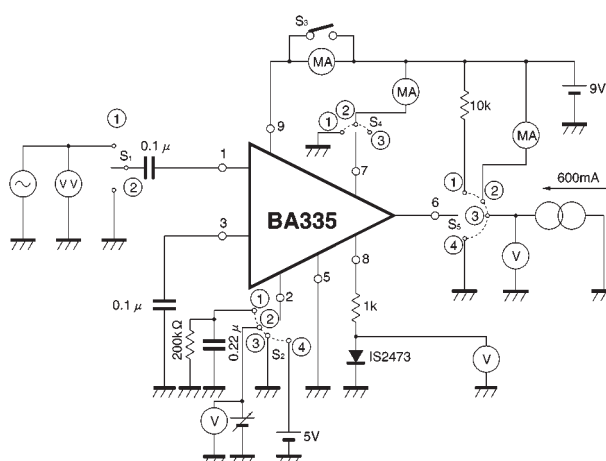
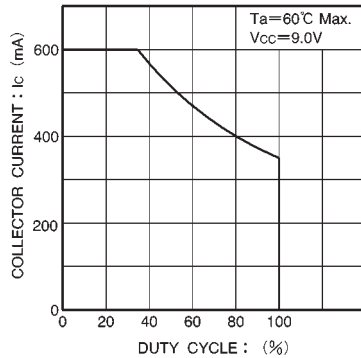


Fig. 1

	S1	S2	S3	S4	S5	
$I_{CC1}$	2	1	Open	3	1	Current test
$I_{L1}$	2	4	Short	2	2	Pin 7 current test
$I_{L2}$	2	4	Short	2	2	Pin 6 current test
$V_{CE(sat)}$	2	3	Short	3	3	Pin 6 voltage test
$V_F$	2	4	Short	1	3	Pin 6 voltage test
$V_{IN}$	1	1	Short	3	1	V.V test when Pin 6 inverted
$V \rightarrow H1$	2	2	Short	3	1	Pin 2 voltage test when Pin 6 inverted
$V \rightarrow H2$	2	2	Short	3	1	Pin 2 voltage test when Pin 6 inverted
$V_{P8}$	2	4	Short	3	1	Pin 8 voltage test

Fig. 2  $I_c$  duty cycle characteristics

●Attached components

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

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

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

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

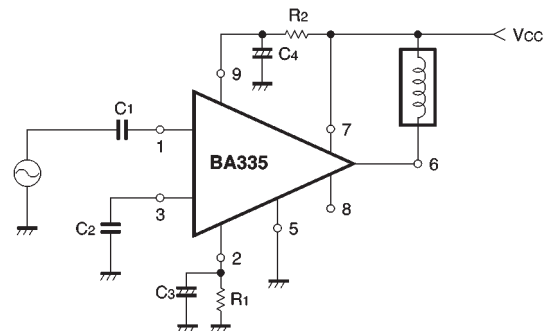


Fig. 3

●Input characteristics

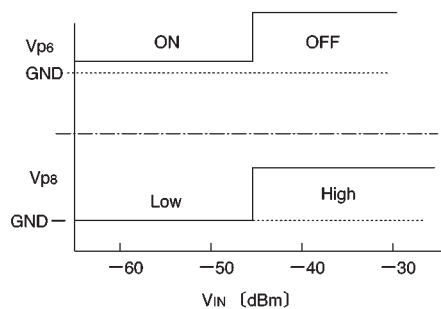


Fig. 4

As shown in Fig. 4,  $V_{P6}$  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.

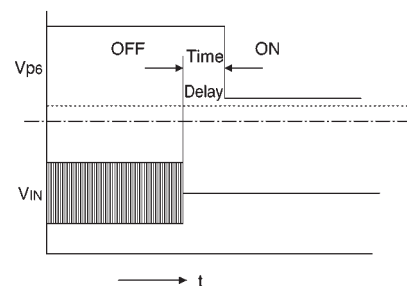


Fig. 5

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 CR 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  $500\text{k}\Omega$ .

### ●Electrical characteristic curves

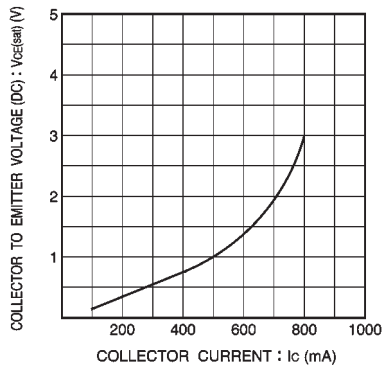


Fig. 6 Output transistor saturation voltage vs. collector current

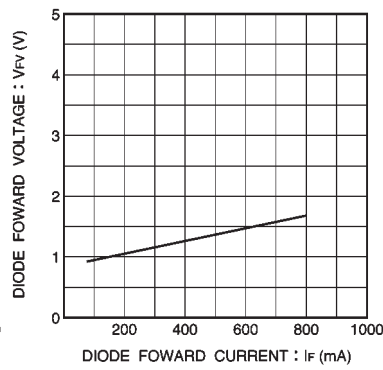


Fig. 7 Output diode forward voltage vs. input voltage

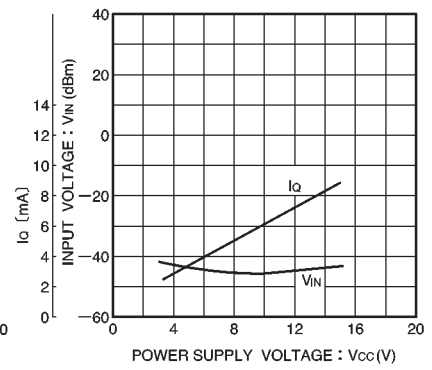


Fig. 8 Quiescent current and input voltage vs. power supply voltage

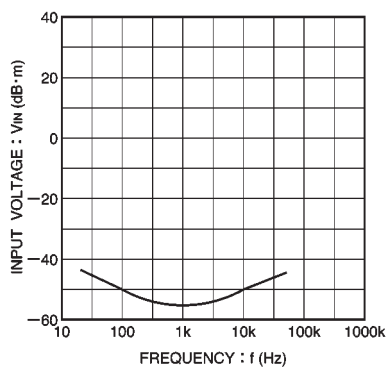


Fig. 9 Input voltage vs. frequency

### ●External dimensions (Units: mm)

