

# Mute detector IC

## BA3707

The BA3707 is a mute detector, with an on-chip output transistor that can directly drive a solenoid. It features low operating voltage, and a wide power supply voltage range.

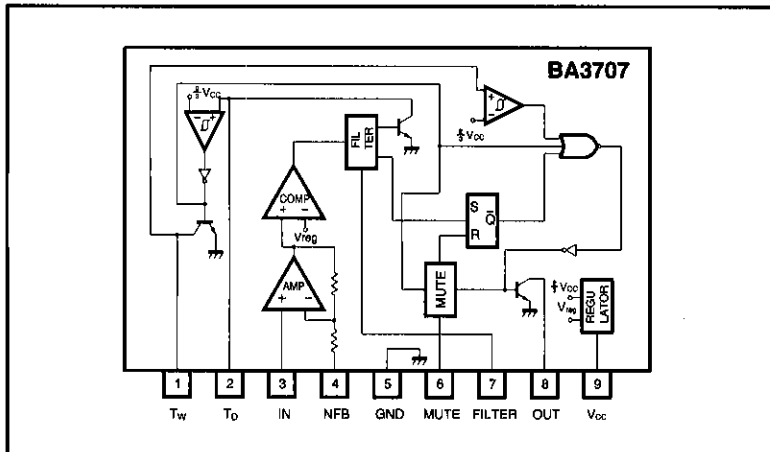
### ● Applications

Mute, and end-of-tape detector for tape players

### ● Features

- 1) Open-collector output transistor with 300mA drive capacity.
- 2) Sense time,  $T_c$ , can be set to the desired length using an external RC circuit.
- 3) By grounding the MUTE input (pin 6), song selection can be forcibly halted.
- 4) When muted, the input impedance at the input (pin 3) is several hundred ohms, which prevents cross-talk between left and right channels in stereo equipment.
- 5) The circuit has been designed to prevent incorrect operation due to tape noise between songs.
- 6) A wide power supply voltage range (3V to 14V).

### ● Block diagram



### ● Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Limits	Unit
Supply voltage	$V_{CC}$	16	V
Power dissipation	$P_d$	500*	mW
Operating temperature	$T_{opr}$	-20~60	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55~125	$^\circ\text{C}$
Maximum output current	$I_{out}$	300	mA

\* Reduced by 5.0mW for each increase in  $T_a$  of  $1^\circ\text{C}$  over  $25^\circ\text{C}$ .

● Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V <sub>CC</sub>	3	6	14	V

● Electrical characteristics (unless otherwise indicated, Ta = 25°C, V<sub>CC</sub> = 6V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I <sub>Q</sub>	—	5	10	mA	—
Input decision level	V <sub>IN</sub>	-63	-60	-57	dBV	f=10kHz R <sub>NF</sub> =0Ω, R <sub>N</sub> =51kΩ
Mute detect timing	T <sub>D</sub>	95	130	165	ms	R <sub>D</sub> =220kΩ, R <sub>N</sub> =51kΩ C <sub>D</sub> =0.47μF, C <sub>N</sub> =0.47μF
Output pulse width	T <sub>W</sub>	80	110	140	ms	R <sub>W</sub> =220kΩ, C <sub>W</sub> =0.47μF
Song detect time	T <sub>C</sub>	20	40	80	ms	R <sub>C</sub> =33kΩ, C <sub>C</sub> =10μF
Pin 6 threshold potential	V <sub>6TH-1</sub>	0.5	0.8	1.1	V	MUTE ON
Pin 6 threshold potential	V <sub>6TH-2</sub>	—	2.1	—	V	For selection detect operation
Output saturation voltage	V <sub>OUT</sub>	—	0.8	1.4	V	I <sub>OUT</sub> =300mA

● Measurement circuit

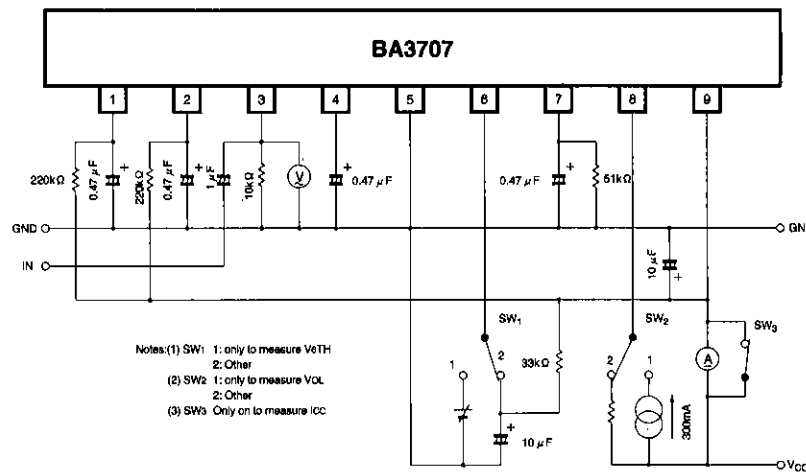


Fig. 1

Mute detectors

Audio accessory components

● Application example

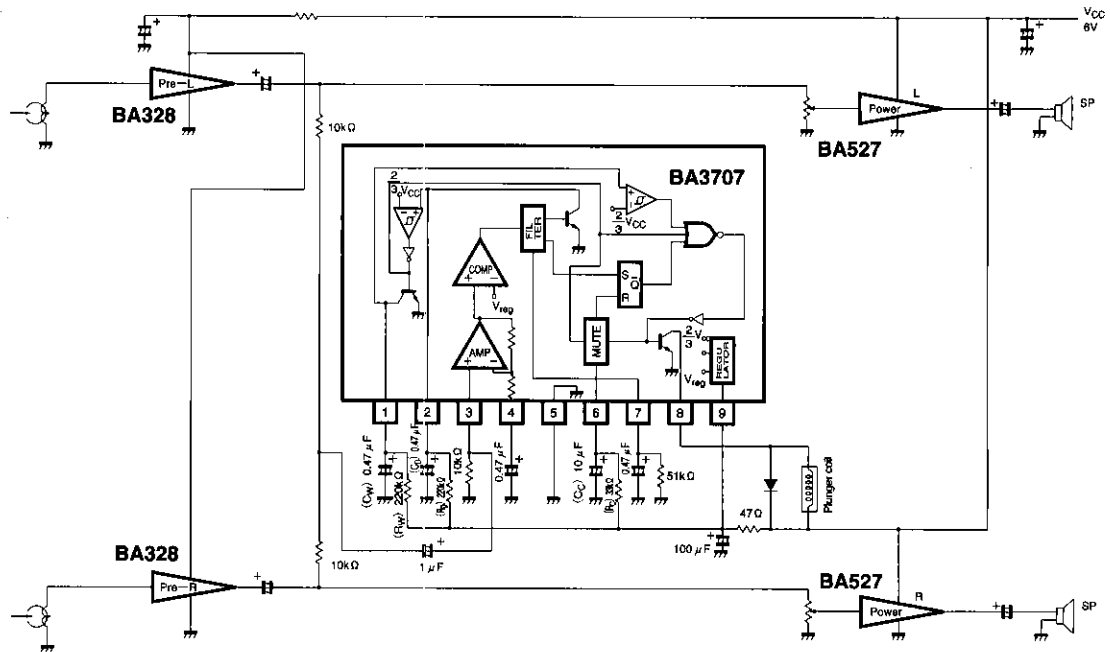


Fig. 2

● Electrical characteristics curves

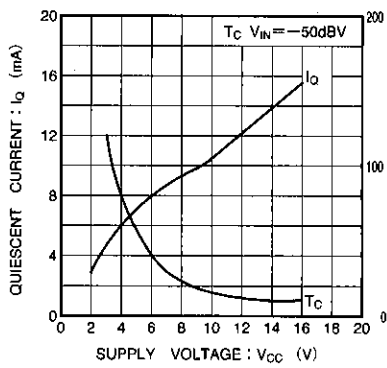


Fig. 3 Quiescent current and song detection time vs. supply voltage

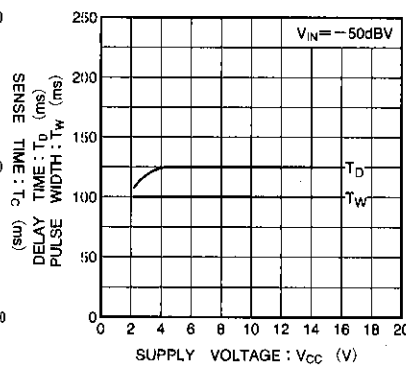


Fig. 4 Mute time and pulse width vs. supply voltage

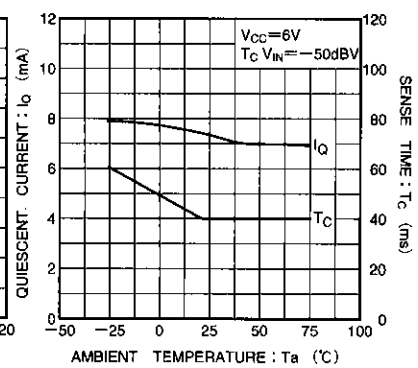


Fig. 5 Quiescent current and song detection time vs. ambient temperature

●Electrical characteristics curves

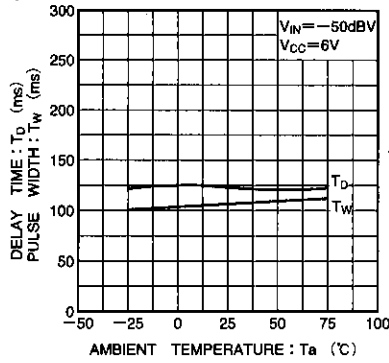


Fig. 6 Td, Tw vs. ambient temperature

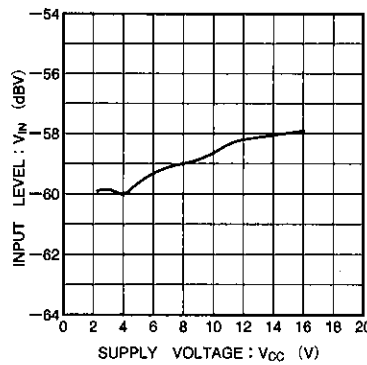


Fig. 7 Input decision level vs. supply voltage

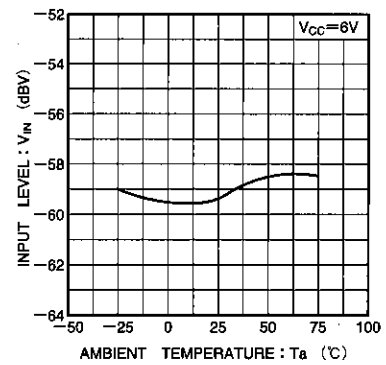


Fig. 8 Input decision level vs. ambient temperature

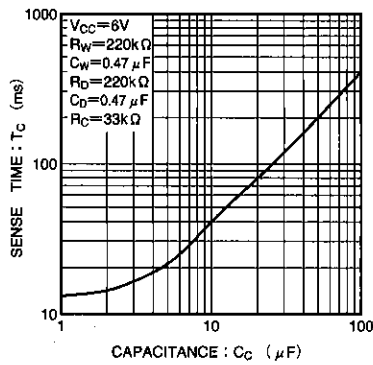


Fig. 9 Song detection time vs. capacitance (cc)

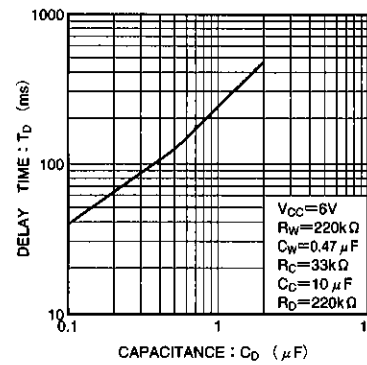


Fig. 10 Mute detection time vs. capacitance (Cd)

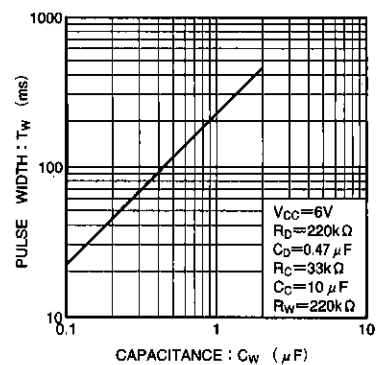


Fig. 11 Output pulse width vs. capacitance (Cw)

●Differences between BA3707 and BA3706

The basic operation and pin layout for the two chips are the same, but the BA3707 is designed for low-voltage operation, and uses a modified version of the BA3706 circuit.

The differences are as follows :

(1) The pulldown discharge resistor for MUTE (pin 6) is built into the BA3706. The BA3707 does not have

this resistor. Be aware of this when using a switch to switch muting on and off (pin 6) with the BA3707.

(2) As the BA3707 is designed for low voltage operation, the threshold level is different to that of the BA3706. For this reason, the circuit time constants differ as given in the table below.

Parameter	Symbol	BA3707	BA3706	Unit
Operating voltage	V <sub>CC</sub>	3~14	4.5~14	V
Mute detection time	T <sub>D</sub>	$0.8 \times C_N \times R_N + 1.1 \times C_D \times R_D$	$0.8 \times C_N \times R_N + 0.7 \times C_D \times R_D$	ms
Output pulse width	T <sub>W</sub>	$1.1 \times C_W \times R_W$	$0.7 \times C_W \times R_W$	ms
Song detection time	T <sub>C</sub>	$V_{CC}=6V, 0.12 \times C_C \times R_C$	$V_{CC}=9V, 0.24 \times C_C \times R_C$	ms

Notes: (1) The units for capacitance are uF, and for resistance, kΩ.

(2) The sense time Tc depends on the power supply voltage Vcc. For lower values of Vcc, Tc comes longer.

●Timing diagram

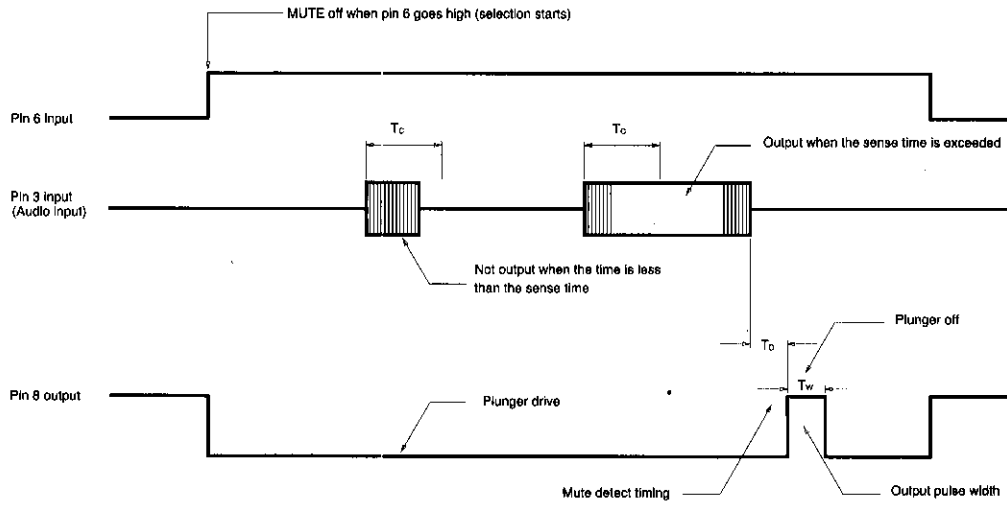
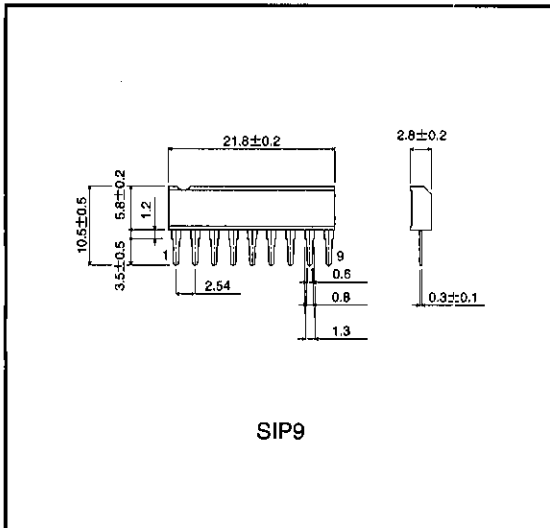


Fig. 12

●External dimensions (Unit: mm)



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