

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 crosstalk 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 operating power supply voltage range (3V to 14V).

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

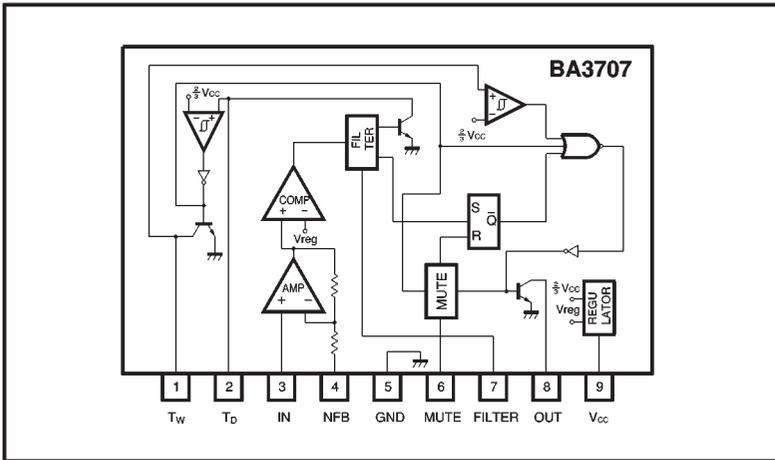
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	16	V
Power dissipation	P_d	500*	mW
Operating temperature	T_{opr}	$-20 \sim +60$	$^\circ\text{C}$
Storage temperature	T_{stg}	$-55 \sim +125$	$^\circ\text{C}$
Maximum output current	I_{OUT}	300	mA

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

●Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{CC}	3	6	14	V

●Block diagram



●Electrical characteristics (unless otherwise noted, $T_a = 25^\circ\text{C}$, $V_{CC} = 6\text{V}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I_Q	—	5	10	mA	—
Input discrimination level	V_{IN}	-63	-60	-57	dBV	$f=10\text{kHz}$ $R_{NF}=0\Omega$, $R_N=51\text{k}\Omega$
Mute detect timing	T_D	95	130	165	ms	$R_D=220\text{k}\Omega$, $R_N=51\text{k}\Omega$ $C_D=0.47\mu\text{F}$, $C_N=0.47\mu\text{F}$
Output pulse width	T_W	80	110	140	ms	$R_W=220\text{k}\Omega$, $C_W=0.47\mu\text{F}$
Song detection time	T_C	20	40	80	ms	$R_C=33\text{k}\Omega$, $C_C=10\mu\text{F}$
Pin 6 threshold potential	V_{6TH-1}	0.5	0.8	1.1	V	MUTE ON
Pin 6 threshold potential	V_{6TH-2}	—	2.1	—	V	For selection detect operation
Output saturation voltage	V_{OUT}	—	0.8	1.4	V	$I_{OUT}=300\text{mA}$

●Measurement circuit

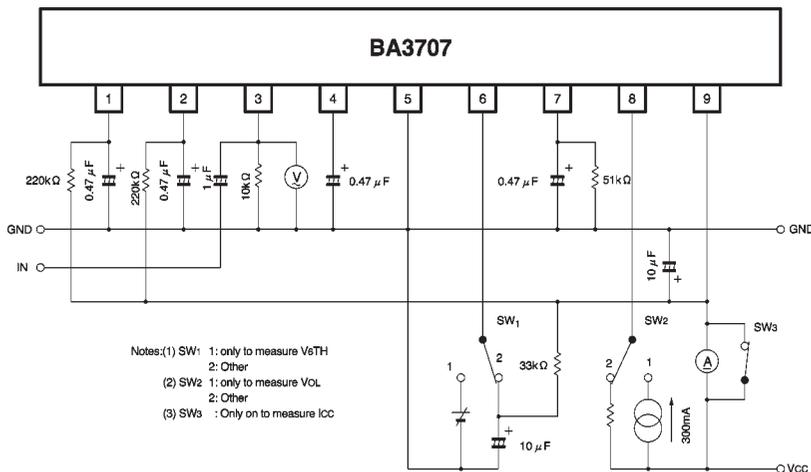


Fig. 1

● Application example

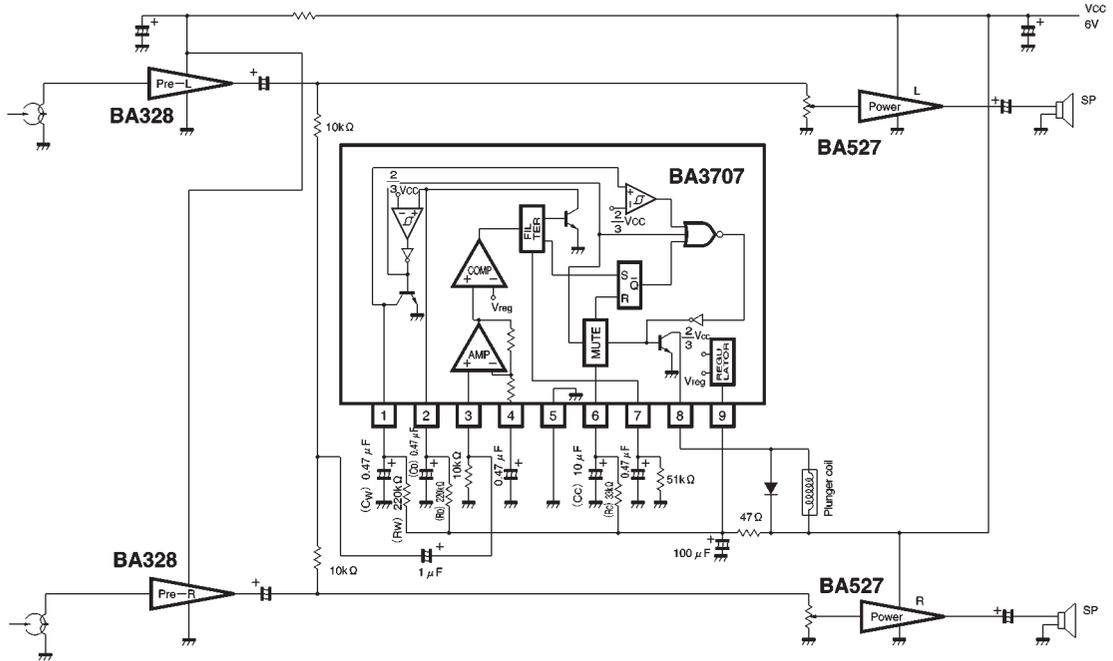


Fig. 2

● Electrical characteristics curves

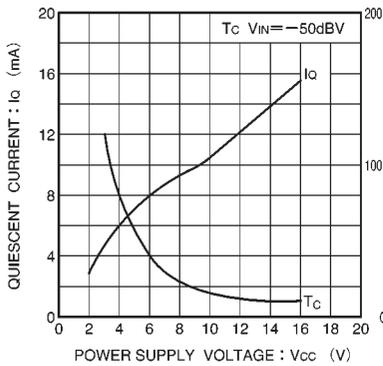


Fig. 3 Quiescent current and song detection time vs. power supply voltage

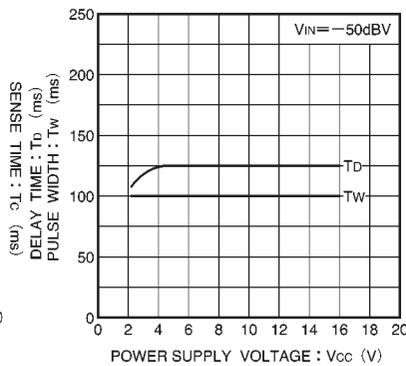


Fig. 4 Mute time and pulse width vs power supply voltage

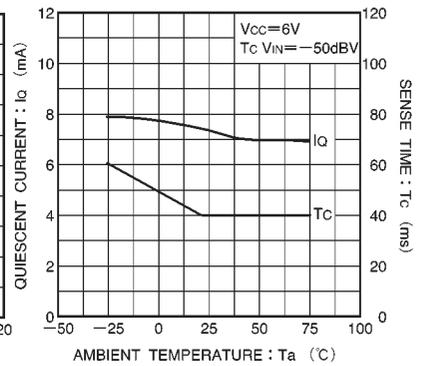


Fig. 5 Quiescent current and song detection time vs. ambient temperature

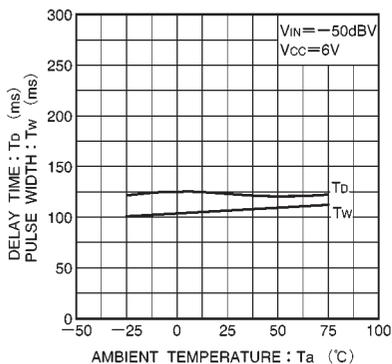


Fig. 6 Td, Tw vs. ambient temperature

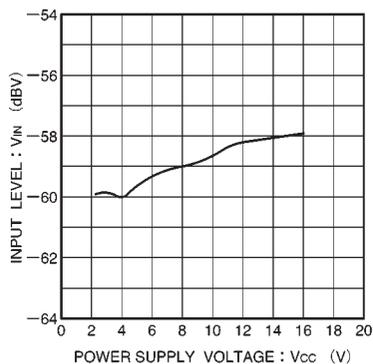


Fig. 7 Input discrimination level vs. power supply voltage

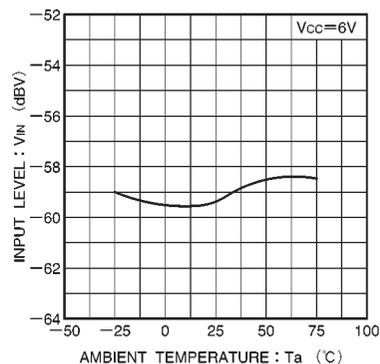


Fig. 8 Input discrimination level vs. ambient temperature

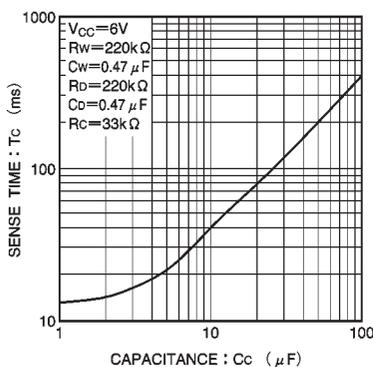


Fig. 9 Song detection time vs. capacitance (cc)

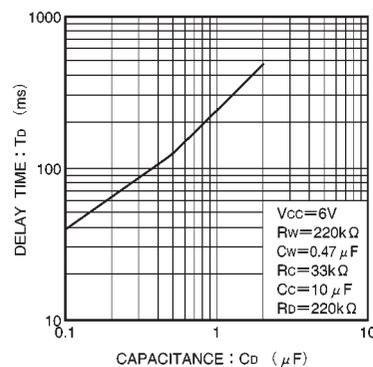


Fig. 10 Mute detection time vs. capacitance (Cd)

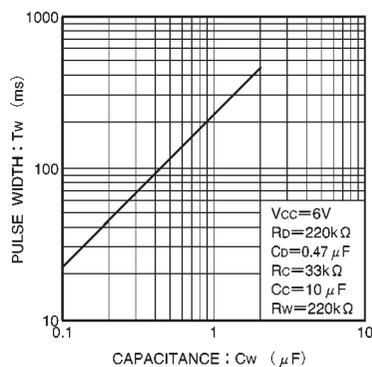


Fig. 11 Output pulse width vs. capacitance (Cv)

● 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 _{CC}	3~14	4.5~14	V
Mute detection time	T _D	$0.8 \times C_N \times R_N + 1.1 \times C_D \times R_D$	$0.8 \times C_N \times R_N + 0.7 \times C_D \times R_D$	ms
Output pulse width	T _W	$1.1 \times C_W \times R_W$	$0.7 \times C_W \times R_W$	ms
Song detection time	T _C	$V_{CC}=6V, 0.12 \times C_C \times R_C$	$V_{CC}=9V, 0.24 \times C_C \times R_C$	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.

