BA684A

LED level meter driver, 8-point, linear scale

The BA684A monolithic IC is an 8-point, bar-type LED level meter driver.

The IC is provided with two inputs. A comparator is used to determine the larger signal. The larger signal is used to drive the output.

Eight signal comparators are built in. As provided, the comparators operate at input voltage steps of about 25 mV_{rms}. Therefore, all LEDs are turned on at an input voltage of about 200 mV_{rms}.

Features

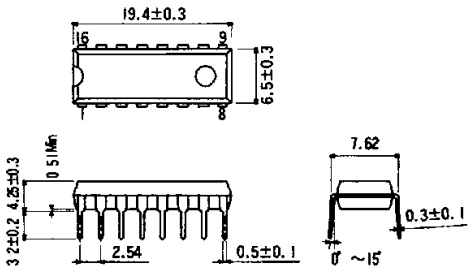
- available in a DIP16 package
- wide supply voltage range (6.5 ~ 14 V)
- direct ac or dc input
- includes 2 half-wave rectifier amplifiers
- constant current driver selectable for 10 mA or 20 mA direct drive LED output
- operating voltage is generated internally to eliminate variations in performance or output due to supply voltage fluctuations
- LEDs connected in series to save power

Applications

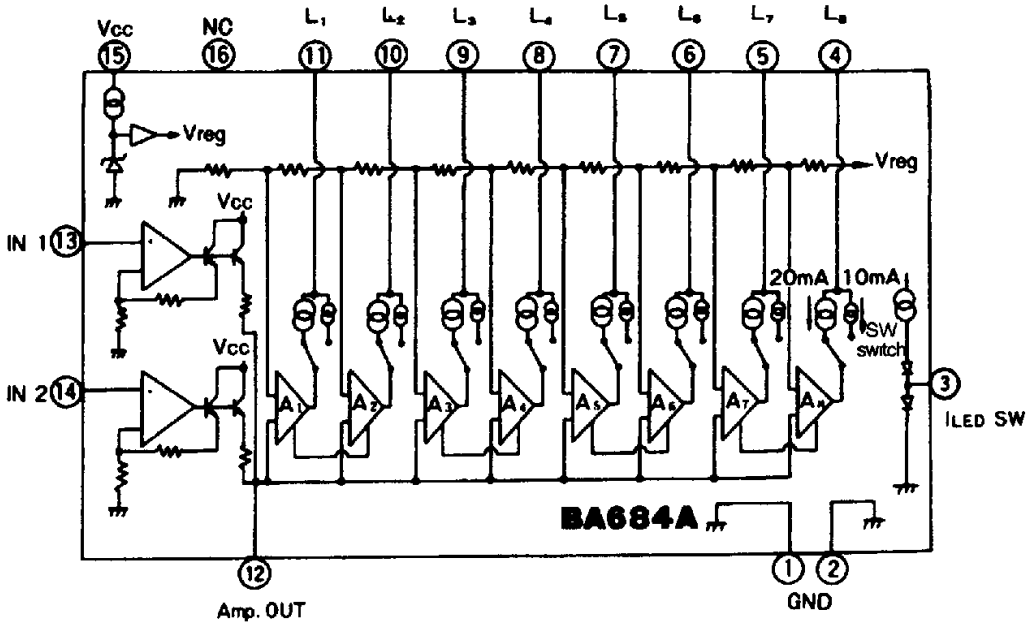
- radio cassette tape recorder
- car stereo radio and cassette player

Dimensions (Units : mm)

BA684A (DIP16)



Block diagram



Absolute maximum ratings (T_a = 25°C)

Parameter	Symbol	Limits	Unit	Conditions
Power supply voltage	V_{CC}	15	V	
Power dissipation	P_d	1400	mW	Reduce power by 14 mW for each degree above 25°C.
Operating temperature	T_{opr}	−10 ~ +60	°C	
Storage temperature	T_{stg}	−55 ~ +150	°C	
Junction temperature	T_j	150	°C	

Electrical characteristics (T_a = 25°C, V_{CC} = 12 V, f = 1 kHz)

Parameter	Symbol	Min	Typical	Max	Unit	Conditions
Power supply voltage	V_{CC}	6.5	12	14	V	
Quiescent current	I_Q		9	14	mA	V_{IN} = 0 V
Comparator level - 1	V_{C1}	−17	−12	−8.5	mV_{rms}	Pin 3 open or grounded
Comparator level - 2	V_{C2}	−8	−6.0	−4.5	mV_{rms}	Pin 3 open or grounded
Comparator level - 3	V_{C3}	−4	−2.5	−1.5	mV_{rms}	Pin 3 open or grounded
Comparator level - 4	V_{C4}		0		mV_{rms}	Pin 3 open or grounded
Comparator level - 5	V_{C5}	1.2	1.9	2.7	mV_{rms}	Pin 3 open or grounded
Comparator level - 6	V_{C6}	2.9	3.5	4.1	mV_{rms}	Pin 3 open or grounded
Comparator level - 7	V_{C7}	4.2	4.9	5.4	mV_{rms}	Pin 3 open or grounded
Comparator level - 8	V_{C8}	5.4	6.0	6.6	mV_{rms}	Pin 3 open or grounded
LED drive current-green	I_{LED-GR}		20	25	mA	Pin 3 open
LED drive current-red	I_{LED-RD}		10	15	mA	Pin 3 grounded

Comparison between ac and dc input

	V_{C1}	V_{C2}	V_{C3}	V_{C4}	V_{C5}	V_{C6}	V_{C7}	V_{C8}
ac input (mV_{rms})	25	50	75	100	125	150	175	200
dc input (mV)	32.5	65	97.5	130	162.5	195	227.5	260

Note: The numerical values in this comparison table are not guaranteed. Please use as reference data only.

Figure 1 Test circuit

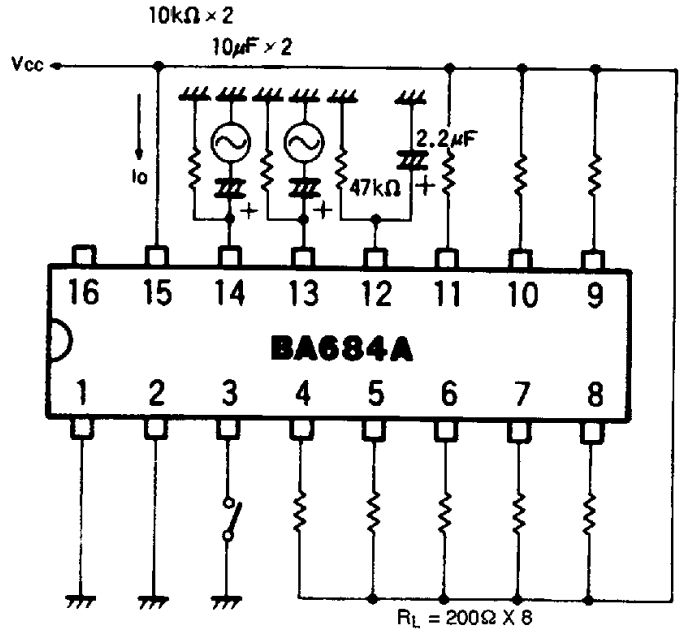
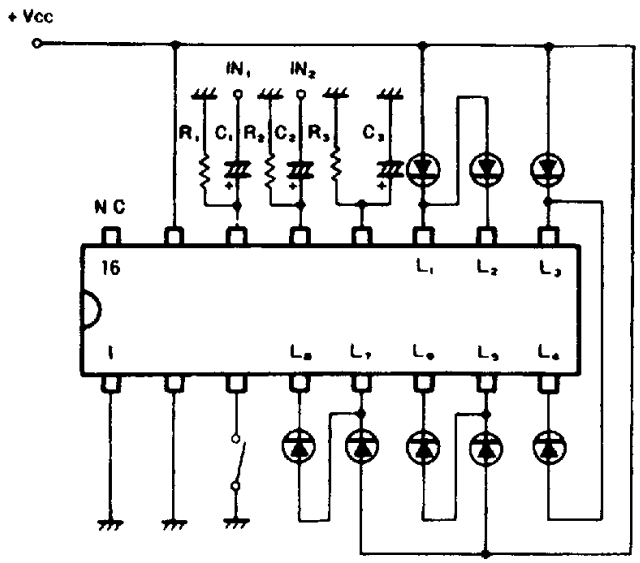


Figure 2 Application example



Circuit operation

The LED constant current can be switched to either 10 or 20 mA. If pin 3 is set to the OPEN state, the current output is 20 mA. If pin 3 is grounded, the output is 10 mA. Be sure to connect the LEDs in pairs as shown in Figure 2.

Explanation of external components

The recommended values for the external components are as follows:

C_1	= 10 µF	R_1	= 10 kΩ
C_2	= 10 µF	R_2	= 10 kΩ
C_3	= 2.2 µF	R_3	= 47 kΩ

Input bias resistors: R_1 and R_2

This resistor sets the input impedance. If the resistance value is too high, the dc bias current becomes too large, and the input offset is too large. This will impact the comparator level.

Input coupling capacitors: C_1 and C_2

These capacitors are used to couple the external input circuit.

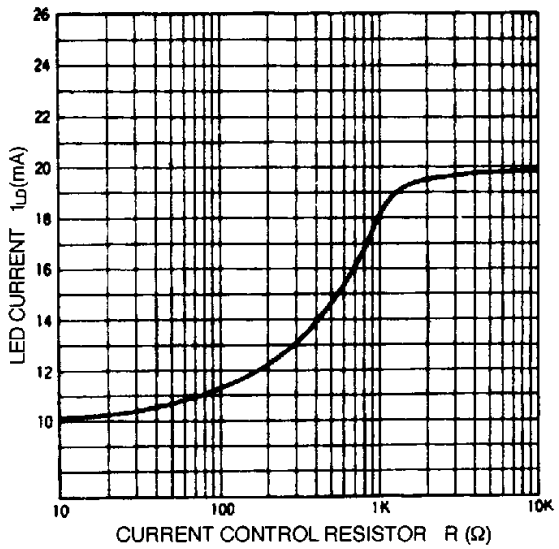
LED discharge time constant: R_3 and C_3

Resistor R_3 and capacitor C_3 are used to set the discharge time constant for the LEDs.

Current switch (pin 3)

Normally, the LED current can be set to 10 mA or 20 mA as indicated above. To set the value between 10 mA and 20 mA, connect a resistor between pin 3 and GND. See Figure 3 to determine the size of the resistor to use.

Figure 3 LED current



Precautions for use

LED current

If you are using some LEDs which require a current of 20 mA and some that require a current of 10 mA, make sure to connect a resistor in parallel to the LEDs that are drawing the smaller current, and set the pin to deliver the larger current (pin 3 open). Be sure to connect all LEDs in pairs.

Comparator voltage

The input voltage when the value of the LED current is half of its normal value (10 mA or 5 mA) is taken as the reference for the comparator voltage.

For the point at which the LED current is 1/2, there are two points: when the LED is turned on and when the LED is turned off. The comparator voltage is the value when the LED is turned on.

Grounding

Make sure to ground the external component GND and the IC GND (pins 1 and 2) at a single point.