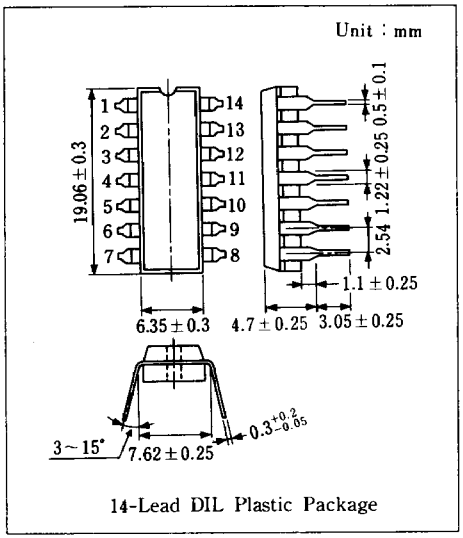
AN6886

5-Dot LED Driver Circuit

■ Outline

The AN6886 is an integrated circuit designed for driving 5-dot LED and enables a logarithmic (dB) bar graph display.
Two gain-adjustable rectifier Amp. with external resistor are built in and adopt the large input priority system.
Because the output is the constant-current drawing system, the constant-current value can be varied by changing the external resistor.

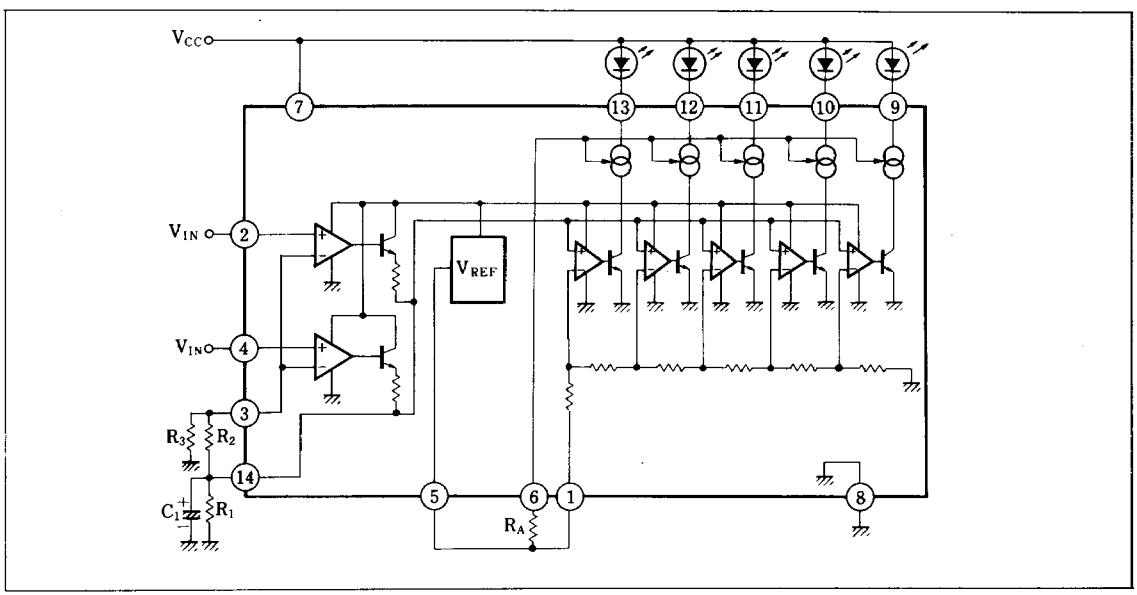


14-Lead DIL Plastic Package

■ Features

- Wide range of operating voltage : $V_{CC(opr.)}$=4~16V
- Wide range of fixed currents : 5~25mA
- Two built-in high-gain amplifiers
- Operation start voltage can be freely set.
  (When reference voltage is not used.)

■ Block Diagram



■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	LED ON Voltage Set Input	8	GND
2	Non Inverting Input(1)	9	LED1 Output
3	Inverting Input	10	LED2 Output
4	Non Inverting Input(2)	11	LED3 Output
5	Ref. Voltage	12	LED4 Output
6	LED Current Set Input	13	LED5 Output
7	V_{CC}	14	Amp. Output

■ Absolute Maximum Ratings (Ta=25℃)

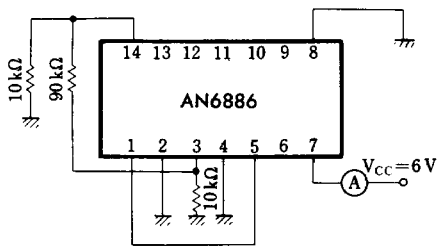
Item		Symbol	Rating	Unit
Voltage	Supply Voltage	V_{CC}	18	V
	Circuit Voltage	V_{14-8}	12	V
	Operational Amp. Input Voltage	$V_{2,3,4-8}$	−0.5 ~ V_{CC}	V
	LED-ON Set Voltage	V_{1-8}	V_{CC}	V
	LED Output Pin Voltage	$V_{9\sim13-8}$	V_{CC}	V
Current	Supply Current	I_{CC}	15	mA
	LED Output Pin Current	$I_{9\sim13}$	30	mA
	Reference Voltage Output Current	I_5	−5	mA
	RA Pin Input Current	I_6	10	mA
Power Dissipation ($T_a \leqq 75$℃)		P_D	480	mW
Temperature	Operating Ambient Temperature	T_{opr}	−30 ~ +75	℃
	Storage Temperature	T_{stg}	−55 ~ +150	℃

■ Electrical Characteristics (Ta=25℃, V_{CC}=6V)

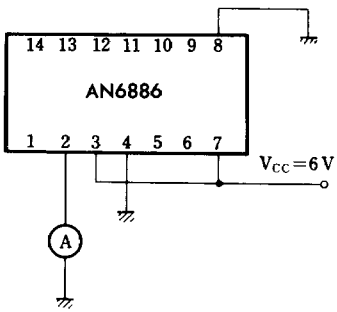
Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Current Consumption	I_{tot}	1	$V_{2,4-8}$=0V, R_A=Open		4	8	mA
Input Bias Current	I_{Bias2}	2		−1		0	μA
	I_{Bias4}	3		−1		0	μA
	I_{Bias3}	4		−2		0	μA
	I_{Bias14}	5		−5		0	μA
Output Offset Voltage	$V_{O(offset)}$	6	V_{2-8}=30mV, V_{4-8}=0V, G_V=20dB	200		400	mV
	$V_{O(offset)}$	6	V_{4-8}=30mV, V_{2-8}=0V, G_V=20dB	200		400	mV
Reference Voltage	V_{REF}	7		2.6	2.8	3	V
Output Sink Current	$I_{SINK9\sim13}$	8	R_A=Open	4		9	mA
	$I_{SINK9\sim13}$	9	R_A=5.6kΩ	11		21	mA
Voltage Gain	G_{V1}	10	V_{2-8}=0.1V, V_{4-8}=0V	19	20	21	dB
	G_{V2}	11	V_{4-8}=0.1V, V_{2-8}=0V	19	20	21	dB
Comparator Level	GD_1	8	Pin ⑨	−11	−10	−9	dB
	GD_2	8	Pin ⑩ V_{1-8}=2.8V	−5.5	−5	−4.5	dB
	GD_3	8	Pin ⑪ V_{2-8}=0V	−0.5	0	0.5	dB
	GD_4	8	Pin ⑫ V_{4-8}=0V	2.5	3	3.5	dB
	GD_5	8	Pin ⑬	5	6	7	dB

*1 Operating Supply Voltage Range : $V_{CC(opr)}$=4~16V
*2 V_{14-8}=1.12V is assumed to be 0dB.

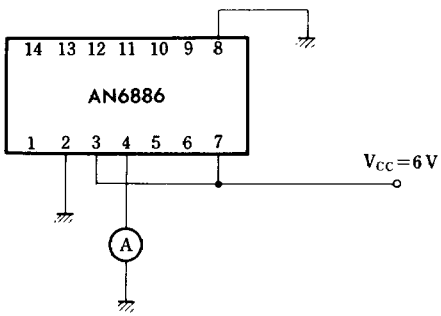
Test Circuit 1 (I_{tot})



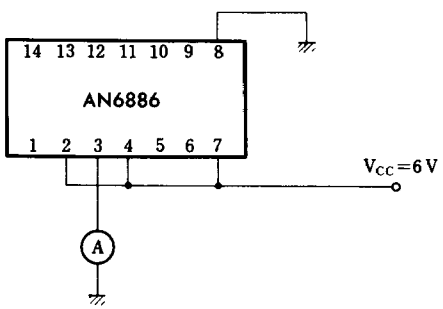
Test Circuit 2 (I_{Bias2})



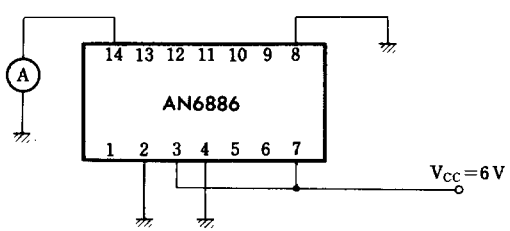
Test Circuit 3 (I_{Bias4})



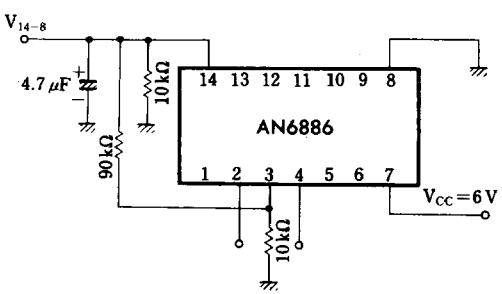
Test Circuit 4 (I_{Bias3})



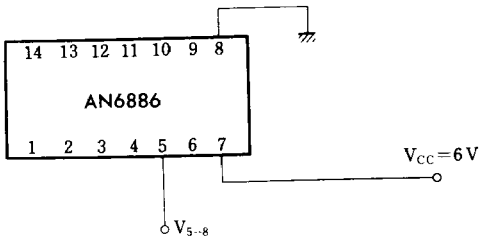
Test Circuit 5 (I_{Bias14})



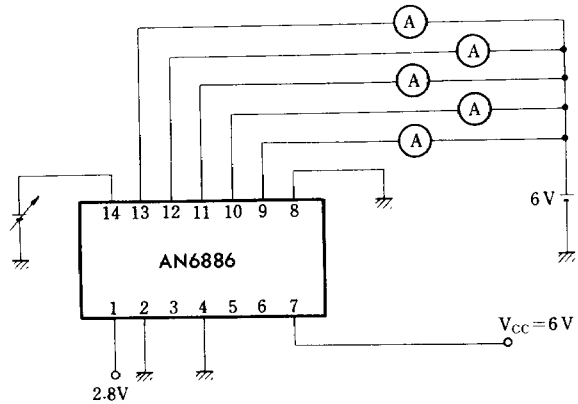
Test Circuit 6 ($V_{O(offset)}$)



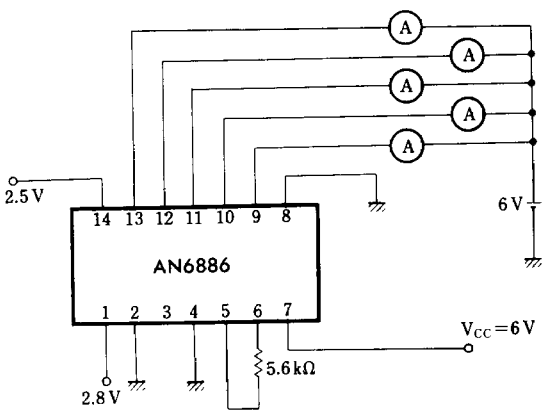
Test Circuit 7 ($V_{REF.}$)



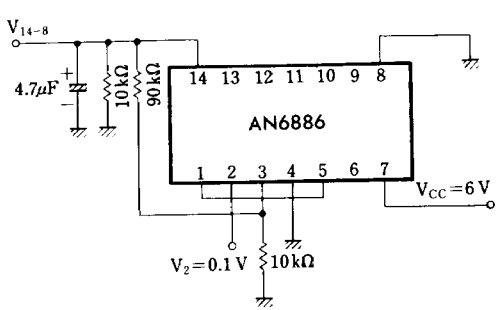
Test Circuit 8 ($I_{(SINK)9-13}$, GD_1~GD_5)



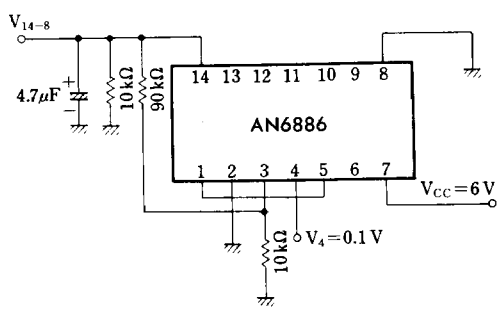
Test Circuit 9 ($I_{(SINK)9-13}$)



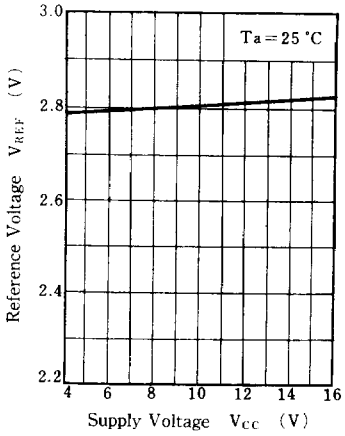
Test Circuit 10 (G_{V1})



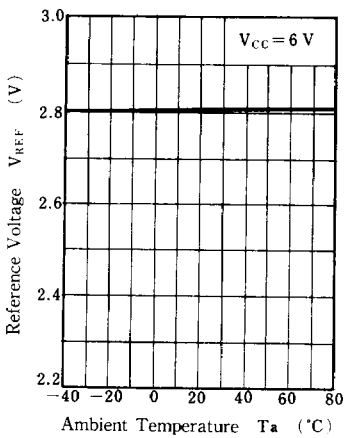
Test Circuit 11 (G_{V2})



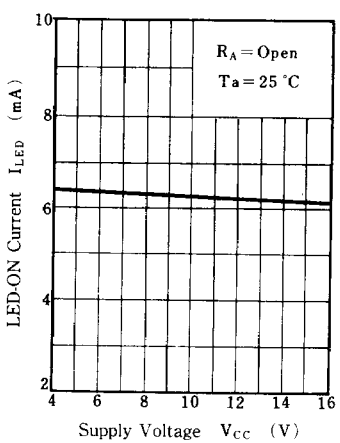
$V_{REF} - V_{CC}$



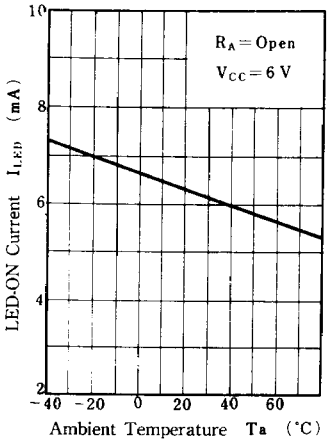
$V_{REF} - Ta$



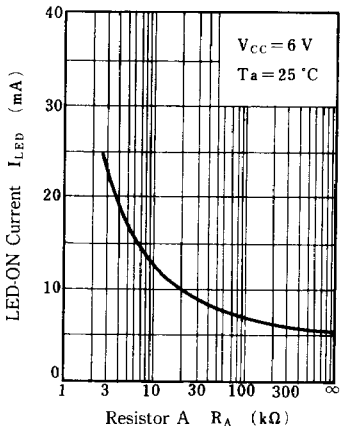
$I_{LED} - V_{CC}$



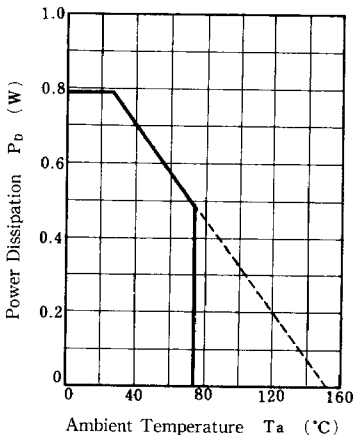
$I_{LED} - Ta$



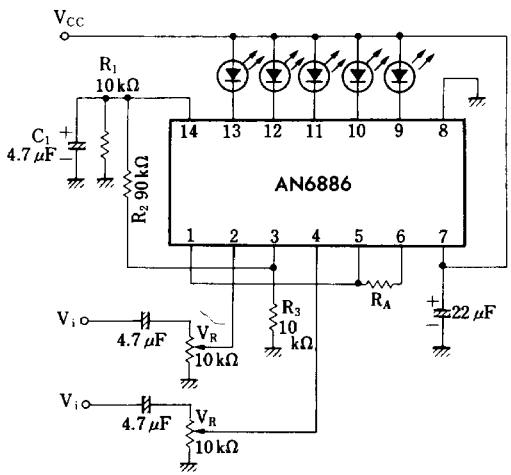
$I_{LED} - R_A$



$P_D - Ta$



■ Application Circuit



$$G_V = 20 \log \frac{R_2 + R_3}{R_3}$$

R_2, R_3: Resistors usd to determine a gain of input Amp.
V_R : Resistor used to determine an input level
C_1, R_1: Used to determine a response time.
R_A : Resistor used to determine an LED drive current.