

AN6886

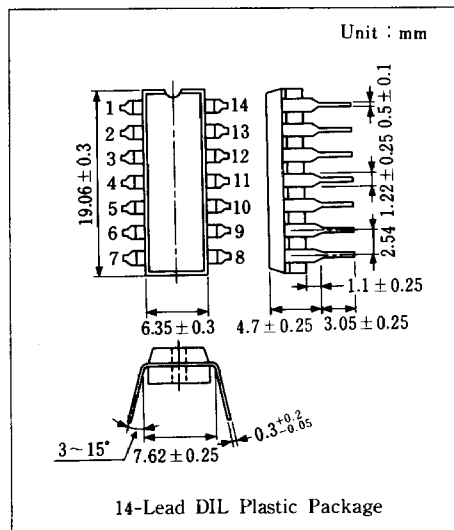
5-Dot LED Driver Circuit

■ Outline

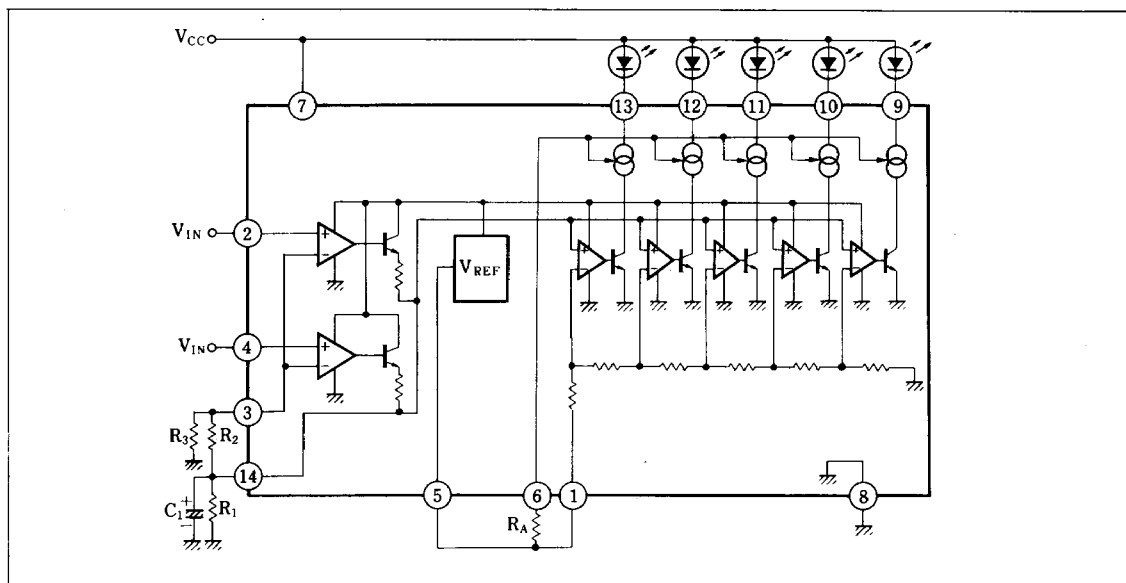
The AN6886 is an integrated circuit designed for driving 5-dot LED and enables a logarithmic (dB) bar graph display. Two gain-adjustable rectifier Amp. with external resistor are built in and adopt the large input priority system. Because the output is the constant-current drawing system, the constant-current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

■ Features

- Wide range of operating voltage : $V_{CC(oper.)} = 4 \sim 16V$
- Wide range of fixed currents : $5 \sim 25mA$
- 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

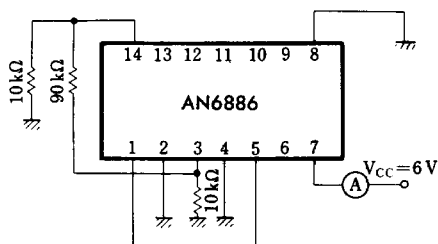
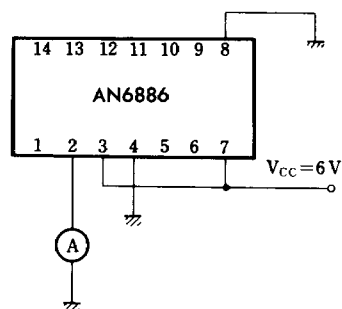
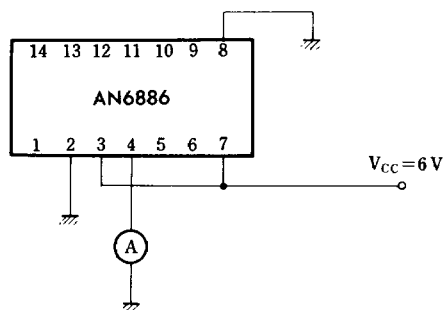
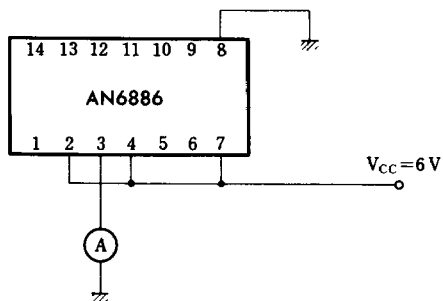
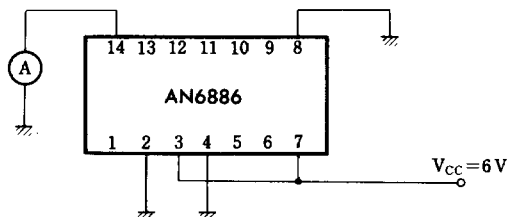
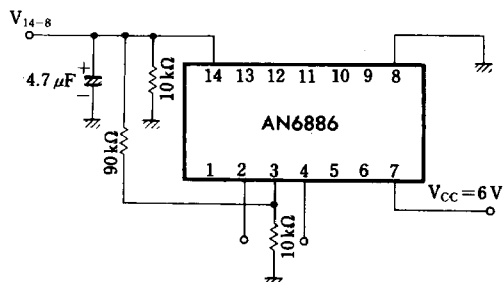
■ Absolute Maximum Ratings (Ta=25°C)

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 ₉₋₁₃₋₈	V _{CC}	V
Current	Supply Current	I _{CC}	15	mA
	LED Output Pin Current	I ₉₋₁₃	30	mA
	Reference Voltage Output Current	I ₅	-5	mA
	RA Pin Input Current	I ₆	10	mA
Power Dissipation (Ta ≤ 75°C)		P _O	480	mW
Temperature	Operating Ambient Temperature	T _{opr}	-30 ~ +75	°C
	Storage Temperature	T _{stg}	-55 ~ +150	°C

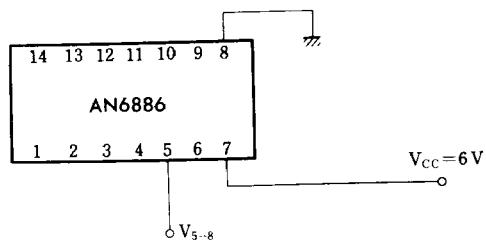
■ Electrical Characteristics (Ta=25°C, V_{CC}=6V)

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 _{SINK9-13}	8	R _A =Open	4		9	mA
	I _{SINK9-13}	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	-5.5	-5	-4.5	dB
	GD ₃	8	Pin ⑪	-0.5	0	0.5	dB
	GD ₄	8	Pin ⑫	2.5	3	3.5	dB
	GD ₅	8	Pin ⑬	5	6	7	dB

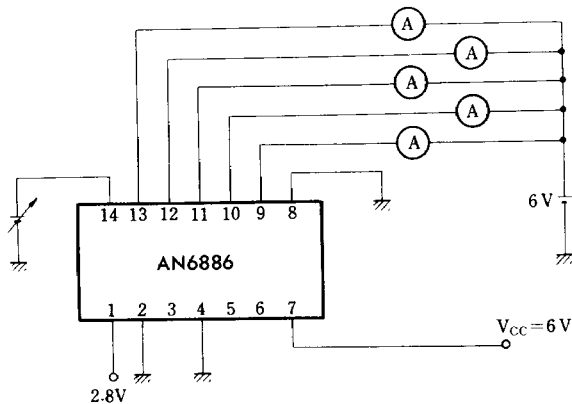
*1 Operating Supply Voltage Range: V_{CC(oper)} = 4 ~ 16V*2 V₁₄₋₈=1.12V is assumed to be 0dB.

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 ($V_{O(offset)}$)

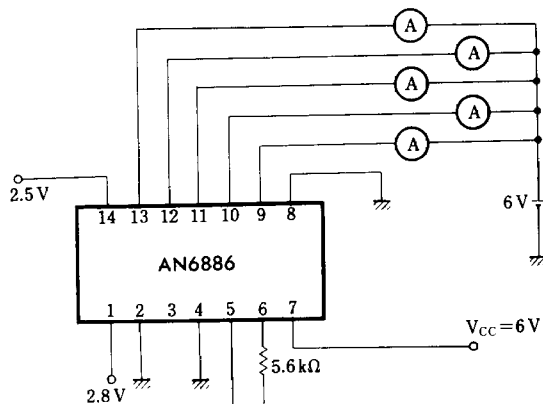
Test Circuit 7 (V_{REF})



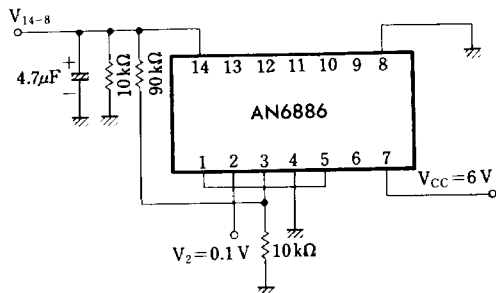
Test Circuit 8 ($I_{(SINK)9-13}$, $GD_1 \sim GD_5$)



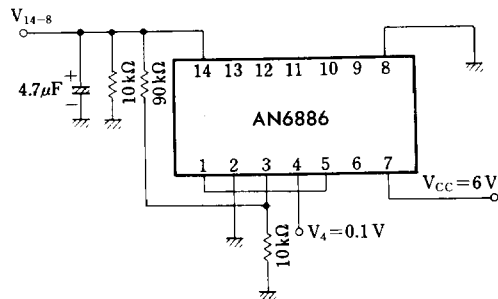
Test Circuit 9 ($I_{(SINK)9-13}$)

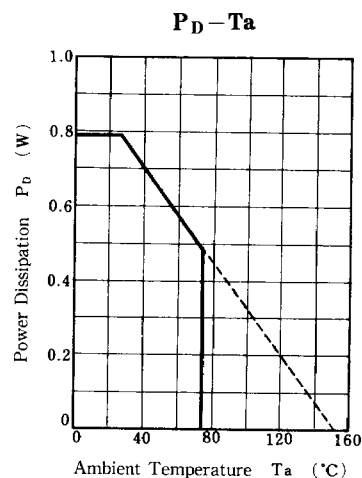
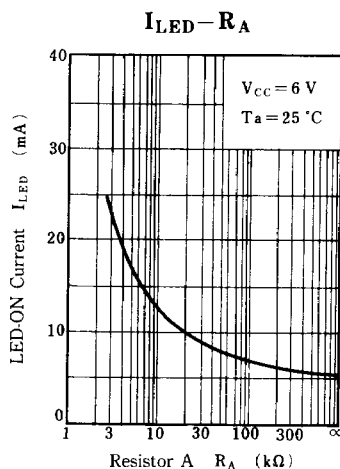
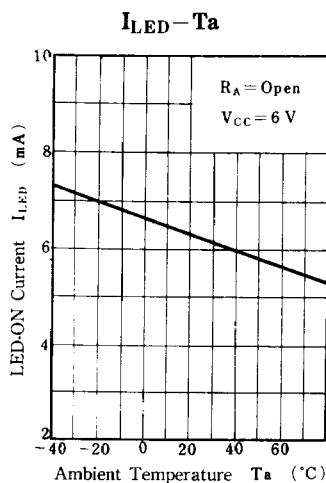
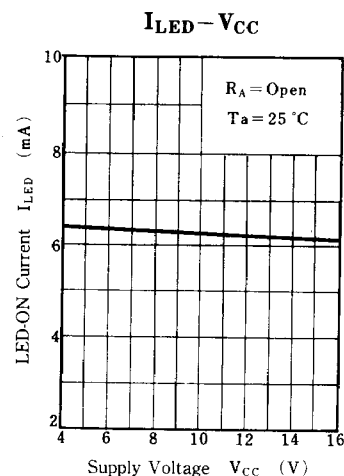
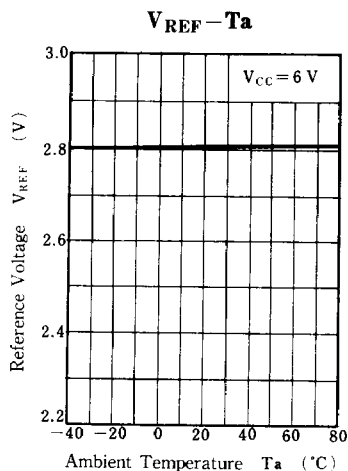
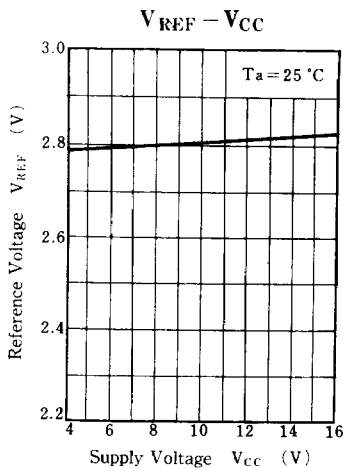


Test Circuit 10 (G_{V1})

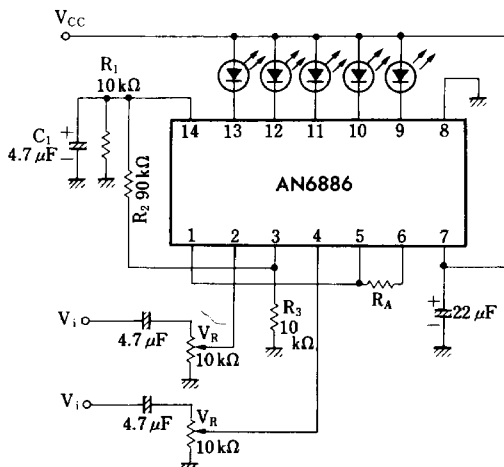


Test Circuit 11 (G_{V2})





■ Application Circuit



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

R_2, R_3 : Resistors used 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.