

AN6888, AN6889

Dual 5-Dot LED Driver Circuits

Outline

The AN6888 and the AN6889 are integrated circuits designed for driving 5-dot \times 2-channel LED and enable a logarithmic (dB) bar graph display in response to the input signal.

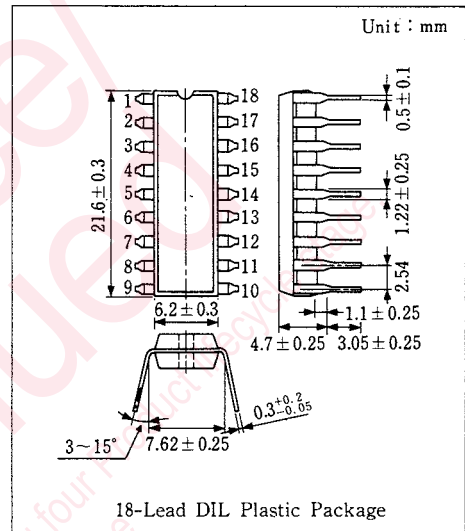
The built-in high gain rectifier Amp. is widely applicable for VU meter, signal meter, etc.

Because the output is the constant-current drawing system, the constant-current value can be varied with the external resistor.

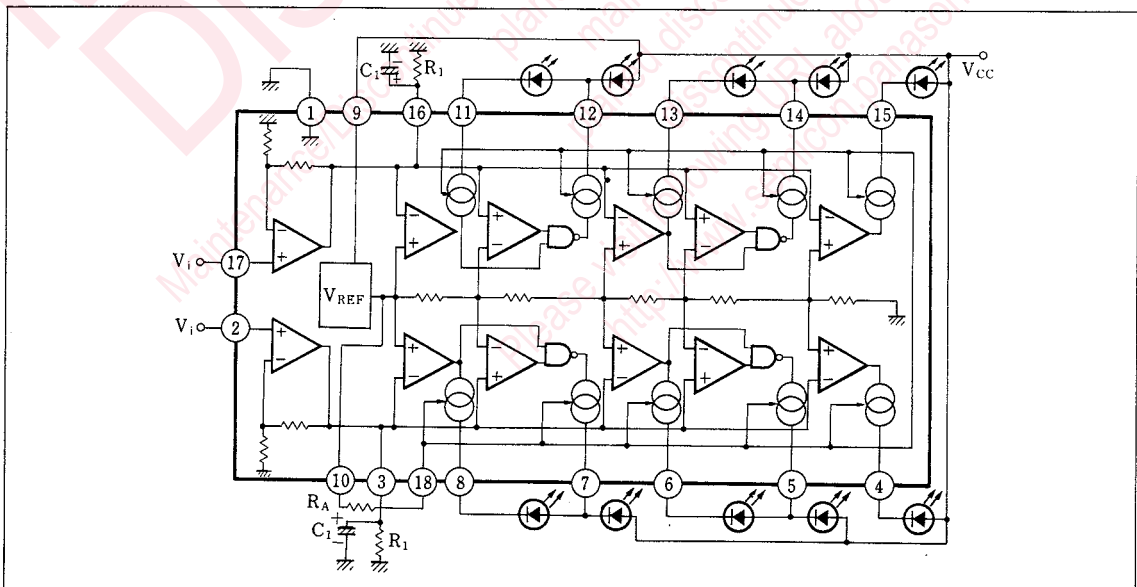
10-dot \times 2-channel LED can be driven by combining the AN6888 and the AN6889.

Features

- Wide range of operating voltage : $V_{CC(oper.)} = 5 \sim 16V$
- Power consumption can be reduced due to series connection of LEDs
- Wide range of fixed currents : $5 \sim 25mA$
- Built-in high gain Amp. : $G_v = 26dB$ (typ.)



Block Diagram



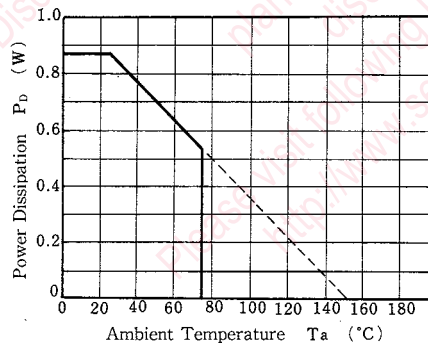
■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	GND	10	Ref. Voltage
2	Amp. 1 Input	11	LED 6 Output
3	Amp. 1 Output	12	LED 7 Output
4	LED 1 Output	13	LED 8 Output
5	LED 2 Output	14	LED 9 Output
6	LED 3 Output	15	LED 10 Output
7	LED 4 Output	16	Amp. 2 Output
8	LED 5 Output	17	Amp. 2 Input
9	V _{CC}	18	LED Current Set Input

■ Absolute Maximum Ratings (Ta=25°C)

Item		Symbol	Rating	Unit
Voltage	Supply Voltage	V _{CC}	18	V
	Operational Amp. Input Voltage	V _{2,17-1}	-0.5 V _{CC}	V
	LED Output Pin Voltage	V _{4-8,11-15-1}	V _{CC}	V
	Reference Pin Input Voltage	V ₁₀₋₁	6	V
	Circuit Voltage	V _{3,16-1}	6	V
Current	Supply Current	I _{CC}	15	mA
	LED Output Pin Current	I _{4-8,11-15}	30	mA
	Reference Voltage Output Current	I ₁₀	-5	mA
	R _A Pin Input Current	I ₁₈	10	mA
Power Dissipation (Ta ≤ 75°C)		P _D	540	mW
Temperature	Operating Ambient Temperature	T _{opr}	-30 ~ +75	°C
	Storage Temperature	T _{stg}	-55 ~ +150	°C

P_D - T_a

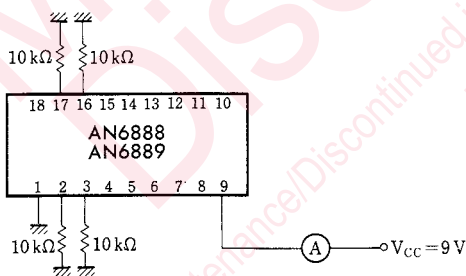


■ Electrical Characteristics (Ta=25°C, V_{CC}=9V)

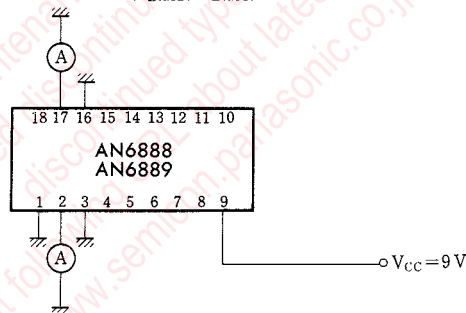
Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Current Consumption	I _{tot}	1	V ₂₋₁ =0V, R _A =open		5	9	mA
Input Bias Current	I _{Bias2}	2		-1		0	μA
	I _{Bias17}	2		-1		0	μA
	I _{Bias3}	3	V ₂₋₁ = -0.1V	-3		0	μA
	I _{Bias6}	3	V ₁₇₋₁ = -0.1V	-3		0	μA
Reference Voltage	V _{REF}	4		2.5	2.7	2.9	V
Output Sink Current	I _{SINK1-8,11-15}	5	R _A = open	4		9	mA
	I _{SINK3-8,11-15}	6	R _A = 5.6kΩ	11		21	mA
Amp. Gain	G _{V1}	7	V ₂₋₁ = 0.1V	24	26	28	dB
	G _{V2}	7	V ₁₇₋₁ = 0.1V	24	26	28	dB
Comparator Level (AN6888)	GD ₁	8	Pin④,⑮	-11	-10	-9	dB
	GD ₂	8	Pin⑤,⑭	-6	-5	-4	dB
	GD ₃	8	Pin⑥,⑬	-0.5	0	0.5	dB
	GD ₄	8	Pin⑦,⑫	2.5	3	3.5	dB
	GD ₅	8	Pin⑧,⑩	5	6	7	dB
Comparator Level (AN6889)	GD ₁	8	Pin④,⑮	-5	-4	-3	dB
	GD ₂	8	Pin⑤,⑭	-2.5	-2	-1.5	dB
	GD ₃	8	Pin⑥,⑬	-0.5	0	0.5	dB
	GD ₄	8	Pin⑦,⑫	1.5	2	2.5	dB
	GD ₅	8	Pin⑧,⑩	3	4	5	dB

Note) Operating Supply Voltage Range : V_{CC(OPP)} = 5 ~ 16V_O * AN6888 : V₃₋₁, V₁₆₋₁ = 1.4V is assumed to be 0dB. * AN6889 : V₃₋₁, V₁₆₋₁ = 1.76V is assumed to be 0dB.

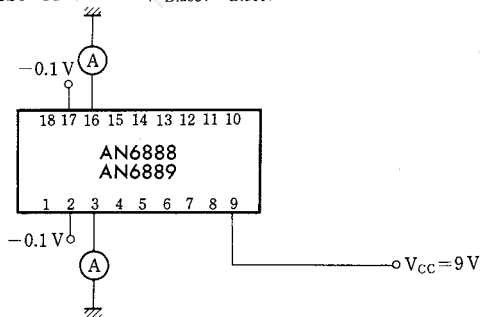
Test Circuit 1 (I_{tot})



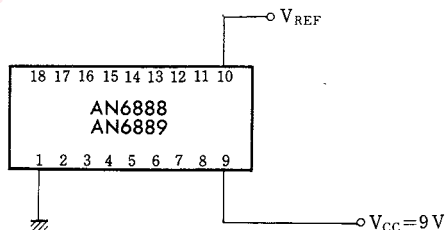
Test Circuit 2 (I_{Bias2}, I_{Bias17})



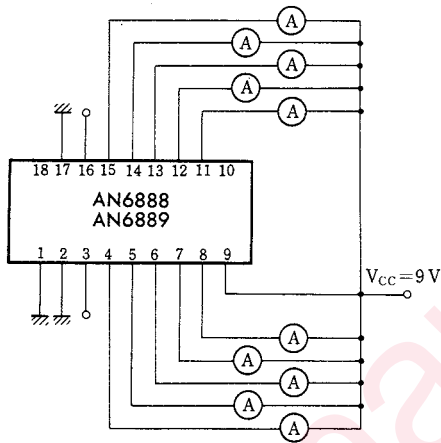
Test Circuit 3 (I_{Bias3}, I_{Bias6})



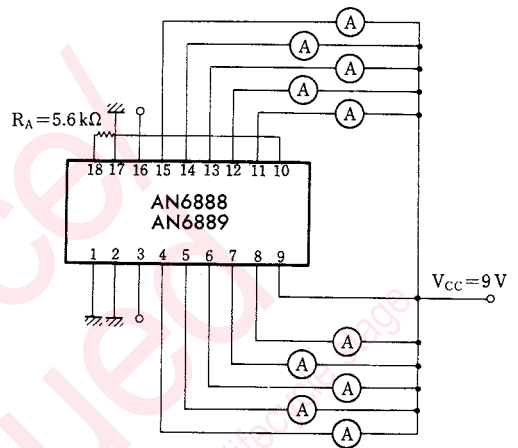
Test Circuit 4 (V_{REF})



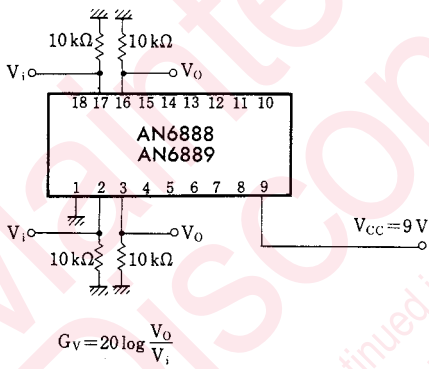
Test Circuit 5 ($I_{(SINK)4-8,11-15}$)



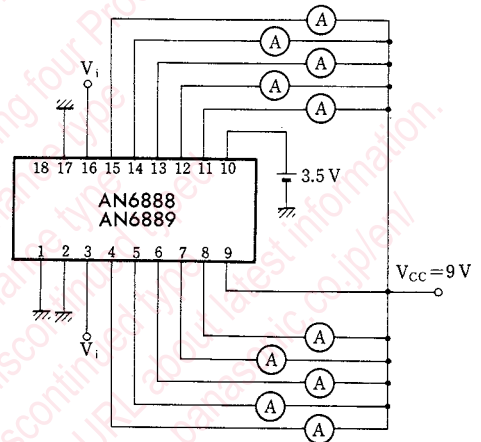
Test Circuit 6 ($I_{(SINK)4-8,11-15}$)



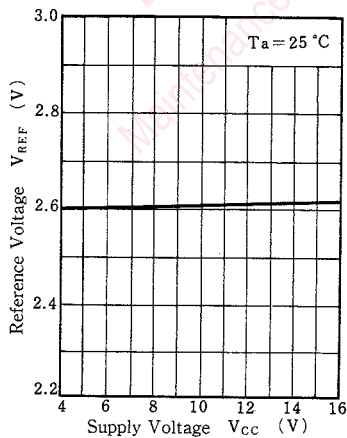
Test Circuit 7 (G_{V1}, G_{V2})



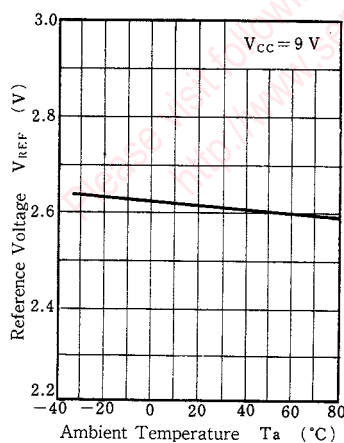
Test Circuit 8 ($GD_1, GD_2, GD_3, GD_4, GD_5$)



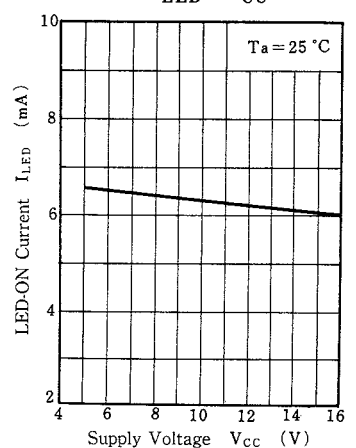
$V_{REF} - V_{CC}$

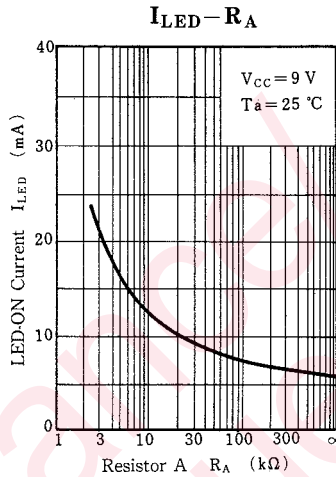
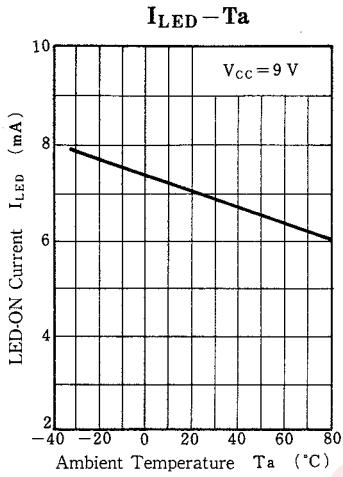


$V_{REF} - T_a$



$I_{LED} - V_{CC}$

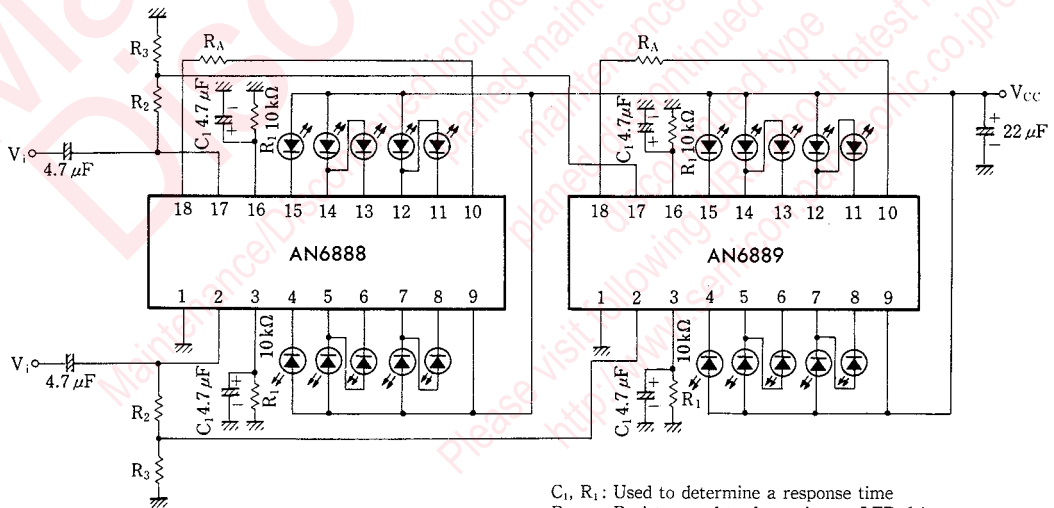




■ Application Circuit

● In case of 10-dot×2 (AN6888 and AN6889) application

LED	1	2	3	4	5	6	7	8	9	10
Level Value	-20	-15	-10	-7	-4	-2	0	2	4	6



C_1, R_1 : Used to determine a response time
 R_A : Resistor used to determine an LED drive current
 R_2, R_3 : Resistors used to determine an LED level

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