M51906P

6-STEP BAR TYPE LED LEVEL INDICATOR

DESCRIPTION

The M51906P is a semiconductor integrated circuit consisting of a circuit designed for LED level meters. It is capable of bar type display for 6 LEDs according to a input level.
AC or DC signal can be used because of built-in superior half-wave rectification OP Amp.

FEATURES

- Built-in superior half-wave rectification OP Amp.
  Cut off frequency ..... 500kHz(typ.)
  Input offset voltage ..... 2mV(typ.)
- Output can sink high current ..... 30mA(typ.)
- Range of supply voltage is wide ..... 4V~15V
- In no signal condition, circuit current is small.
  ..... 0.9mA(typ.)
- Small power dissipation and capable of low voltage operating because of open collector outputs.
- Amp gain can be variabled by resistor.
- Be easily shifted on level of LED by LOWER REF INPUT terminal.

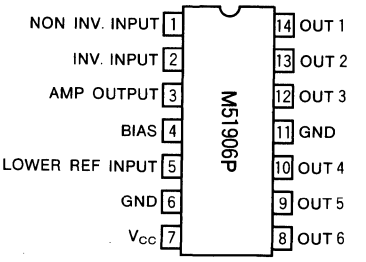
APPLICATION

Signal meters, VU meters, tuning meters, and other general display applications.

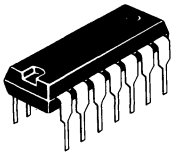
RECOMMENDED OPERATING CONDITIONS

Supply voltage range ..... 4~15V
Rated supply voltage ..... 9V±10%

PIN CONFIGURATION (TOP VIEW)

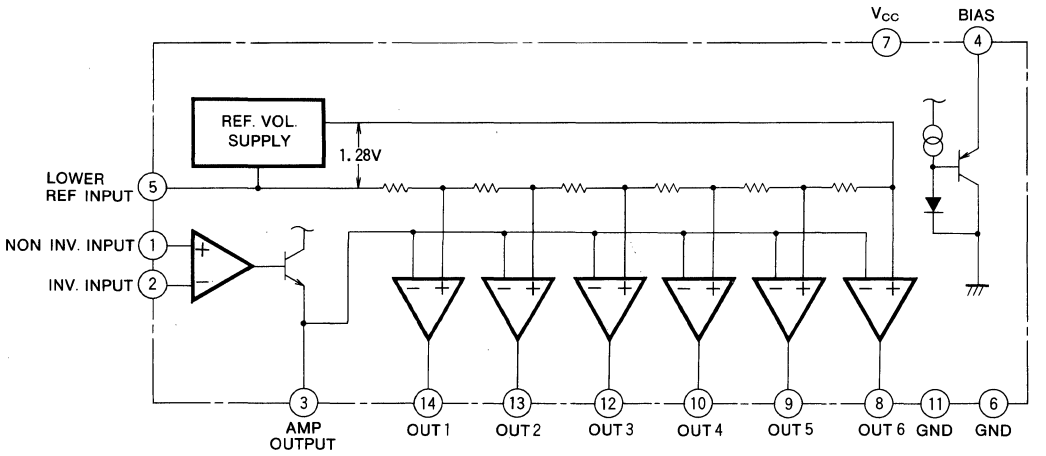


Outline 14P4



14-pin molded plastic DIL

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_a=25℃, unless otherwise noted)

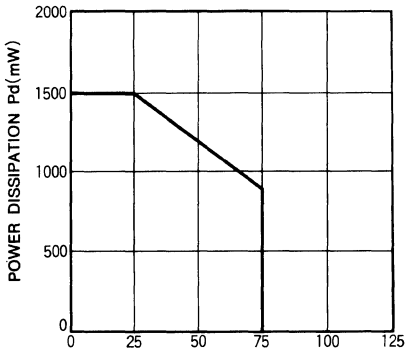
Symbol	Parameter	Conditions	Limits	Unit
V_{CC}	Supply voltage		16	V
BV_O	Output voltage		16	V
I_O	Output sink current		30	mA
V_{IN}	Input voltage	Input terminal to GND	−3 ~ V_{CC}−0.8	V
$\lvert V_{①}-V_{②}\rvert$	Difference input voltage	Between pin① and pin②	5	V
$V_{⑤}$	Pin⑤ voltage	Pin⑤ to GND	4	V
$I_{④}$	Pin④ sink current		1.5	mA
$I_{③}$	Pin③ issued current	Static value	−1	mA
$V_{③}$	Pin③ voltage	Pin③ to GND	6	V
P_d	Power dissipation		1500	mW
K_θ	Thermal derating	T_a≧25℃	12	mW/℃
T_{OPr}	Operating temperature		−20~+75	℃
T_{stg}	Storage temperature		−40~+125	℃

ELECTRICAL CHARACTERISTICS (T_a=25℃, V_{CC}=9V)

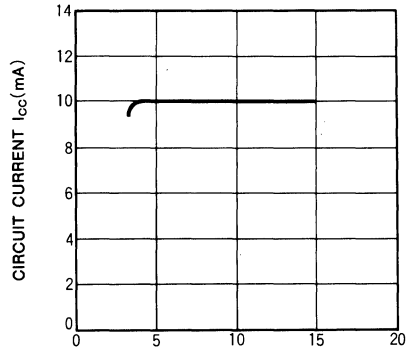
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{CC}	Supply voltage range		4.0		15.0	V
I_{CC1}	Circuit current	All outs are off.		0.9	2	mA
I_{CC2}	Circuit current	All outs are on.		10	20	mA
V_{IO}	Input amp offset voltage	$V_{①}$=2V		2	10	mV
I_{IB}	Input amp bias current	$V_{①}$=2V		50	250	nA
V_{REF}	Reference voltage		1.15	1.35	1.55	V
$I_{⑤}$	Pin⑤ issued current	$V_{⑤}$=0V	−600	−400	−260	μA
V_{SAT}	Output saturation voltage	I_O=30mA		0.3	1	V
V_{th1}	OUT 1 threshold voltage	Amp gain= 1 Threshold voltage is between Pin ③ and Pin⑤.	91	114	144	mV
			−20	−18	−16	dB
V_{th2}	QUT 2 threshold voltage		181	228	287	mV
			−14	−12	−10	dB
V_{th3}	OUT 3 threshold voltage		341	405	481	mV
			−8.5	−7	−5.5	dB
V_{th4}	OUT 4 threshold voltage		572	641	720	mV
			−4	−3	−2	dB
V_{th5}	OUT 5 threshold voltage		807	906	1017	mV
			−1	0	+1	dB
V_{th6}	OUT 6 threshold voltage		1141	1280	1436	mV
			+2	+3	+4	dB
I_{OL}	Output leakage current	V_{OUT}=V_{CC}			1	μA

TYPICAL CHARACTERISTICS (T_a=25℃, V_{CC}= 9V, unless otherwise noted)

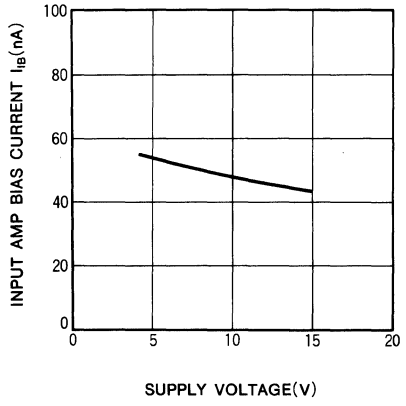
THERMAL DERATING (MAXIMUM RATING)



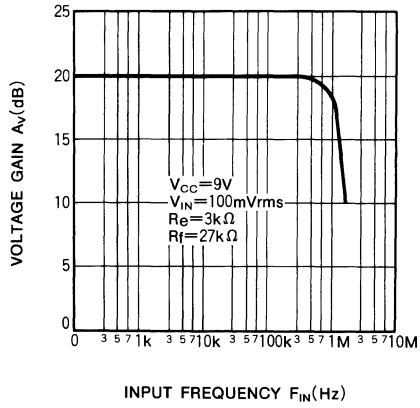
CIRCUIT CURRENT VS SUPPLY VOLTAGE



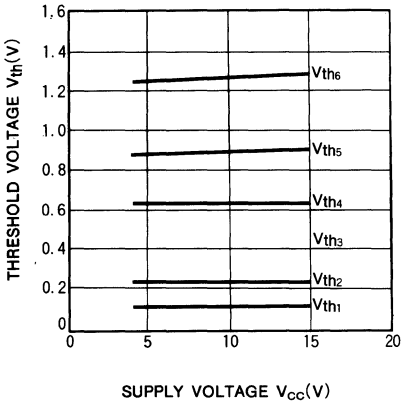
INPUT AMP BIAS CURRENT VS SUPPLY VOLTAGE



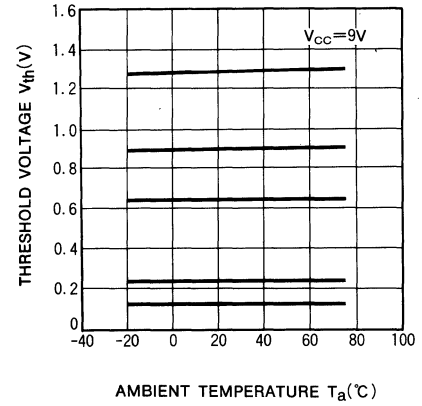
VOLTAGE GAIN VS INPUT FREQUENCY



THRESHOLD VOLTAGE VS SUPPLY VOLTAGE

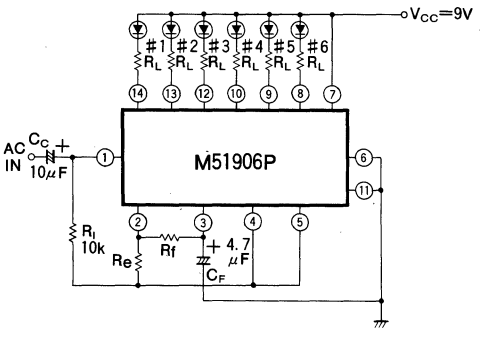


THRESHOLD VOLTAGE VS AMBIENT TEMPERATURE

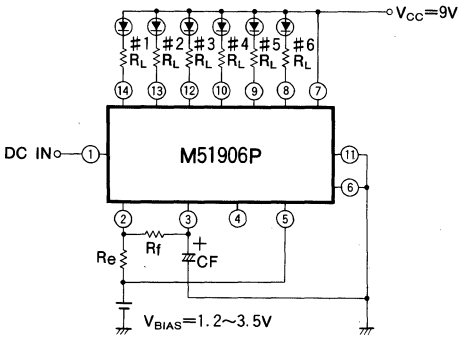


APPLICATION EXAMPLES

(1) AC input application circuit



(2) DC input application circuit



Note : 1. Output current $\sim \frac{V_{CC} - V_{FLED}}{R_L}$

2. Amp gain $\sim \frac{R_e + R_f}{R_e}$ $(R_e + R_f \sim 30k\Omega)$

3. Recovery time : $C_F \times (R_e + R_f)$
4. Attack time : $C_F \times 430\Omega$
5. A thermal coefficient of Pin ④ voltage is about −4mV/℃
6. Open output terminal if wish to use fewer than 6 pieces of LED.

1. In DC, INPUT condition, Be Pin ④ open and connect reference voltage (area of 1.2~3.5V)to Pin ⑤.