

6249826 MITSUBISHI ELEK (LINEAR)

80C 09161 D

T-52-13-07

M51903L

LED LINEAR LEVEL INDICATOR

DESCRIPTION

The M51903L is a semiconductor integrated circuit consisting of a circuit designed for use in level meters. It is capable of driving 5 LEDs to create a bar-type display. In accordance with the input level, the uppermost LED brightness varies to form a linear indicator, making this device ideal for use in signal meters and VU meters. A low-voltage reference power supply is built in, so that the only external components required are LEDs, resistors and capacitors.

FEATURES

- Bar-type display of input level using 5 LEDs
- The uppermost LED brightness varies linearly with respect to the input level resulting in a high-resolution display with no radiation.
- By changing the external resistance values, the LED brightness can be adjusted $I_O=15\text{mA}(\text{max.})$
- Operates over a wide range of supply voltages $V_{CC}=4\sim 18\text{V}$
- Built-in reference supply
- High input impedance $I_{IN}=100\text{nA}(\text{typ.})$

APPLICATION

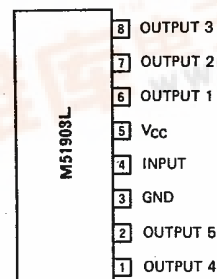
Signal meters, VU meters, tuning meters, and other general display applications

RECOMMENDED OPERATING CONDITIONS

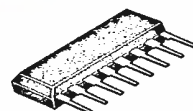
Supply voltage range $4\sim 18\text{V}$

Rated supply voltage 10V

PIN CONFIGURATION (TOP VIEW)

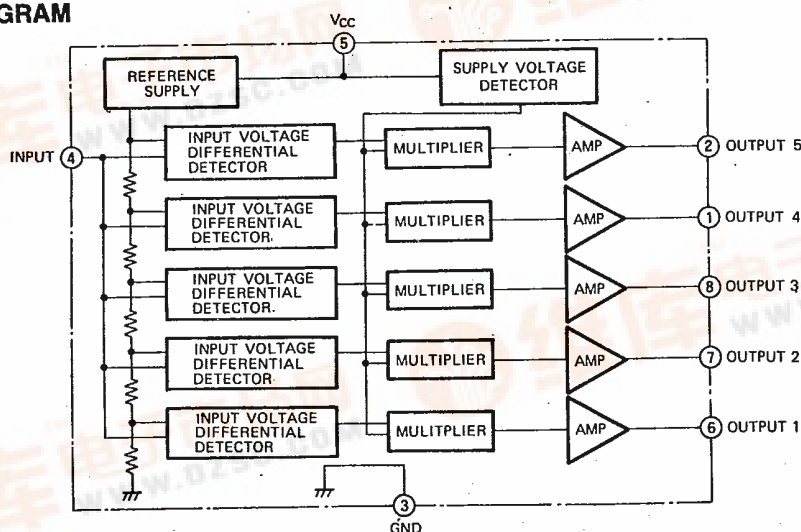


Outline 8P5



8-pin molded plastic SIP

BLOCK DIAGRAM



LED LINEAR LEVEL INDICATOR

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		18	V
V_{IN}	Input voltage		6	V
BV_O	Output breakdown voltage		18	V
I_O	Output current		15 (per pin)	mA
P_{dF}	Power dissipation	With the M51903L soldered to a printed circuit board (copper-clad area $4.5 \times 5.5\text{cm}$, thickness 35μ , board thickness 2.0mm)	550	mW
$K_{\theta F}$	Derating	$T_a \geq 25^\circ\text{C}$	5.5	mW/°C
T_{opg}	Operating temperature		$-20 \sim +75$	°C
T_{stg}	Storage temperature		$-40 \sim +125$	°C

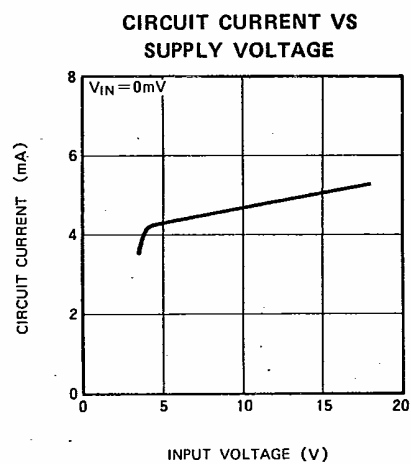
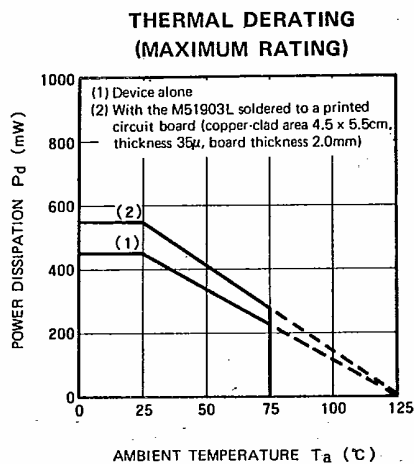
ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$, $V_{CC}=\pm 10\text{V}$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{CC}	Supply voltage range		4	10	18	V
V_{INF}	Fullscale input voltage			1320		mV
V_{step}	Step voltage			210		mV
I_{IN}	Input current	$V_{IN}=0\text{V}$ (Note 1)		0.1	1.0	μA
I_{CC}	Circuit current	$V_{IN}=0\text{V}$		5	8	mA
V_{IT1}	Output 1 LED drive voltage	$R_L = 1.5\text{k}\Omega$ $I_L = 100\mu\text{A}$ Using red GaAlAs LEDs	170	230	300	mV
V_{IT2}	Output 2 LED drive voltage		380	450	530	mV
V_{IT3}	Output 3 LED drive voltage		580	660	730	mV
V_{IT4}	Output 4 LED drive voltage		780	860	940	mV
V_{IT5}	Output 5 LED drive voltage		980	1070	1180	mV

Note 1. Current flowing from pin ④ is taken as positive current.

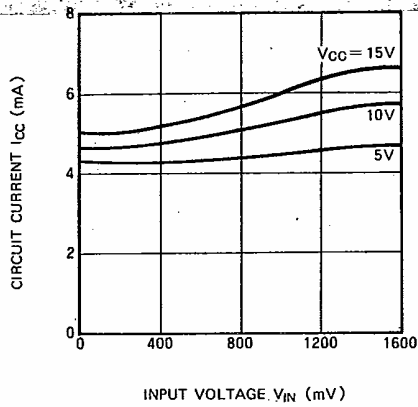
TYPICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$, $V_{CC}=10\text{V}$ unless otherwise noted)

(For the following typical characteristics, R_L in the application example (1) is $1.5\text{k}\Omega$ and red GaAlAs LEDs are used for measurements)

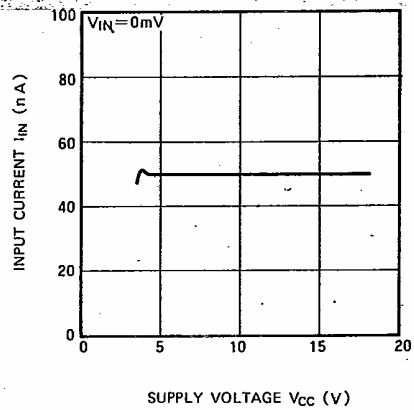


LED LINEAR LEVEL INDICATOR

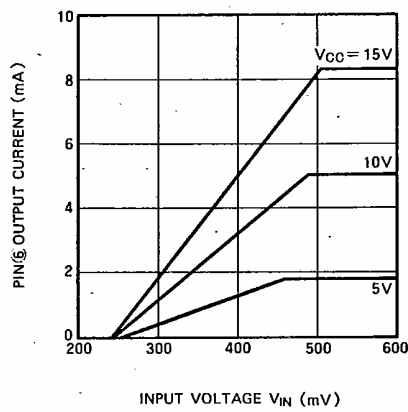
**CIRCUIT CURRENT VS
INPUT VOLTAGE**



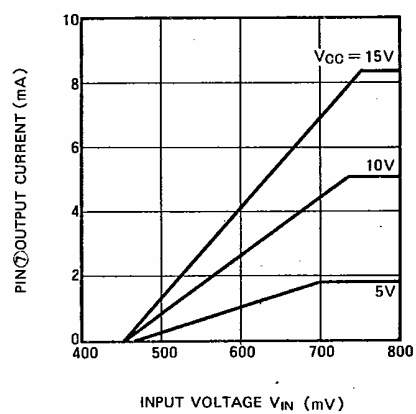
**INPUT CURRENT VS
SUPPLY VOLTAGE**



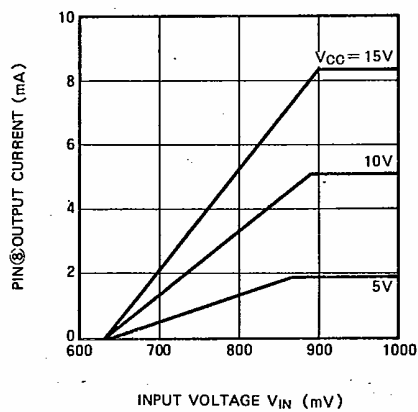
**PIN⑥ OUTPUT CURRENT
VS INPUT VOLTAGE**



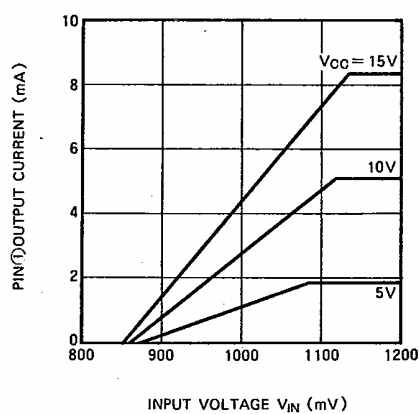
**PIN⑦ OUTPUT CURRENT
VS INPUT VOLTAGE**



**PIN⑧ OUTPUT CURRENT
VS INPUT VOLTAGE**

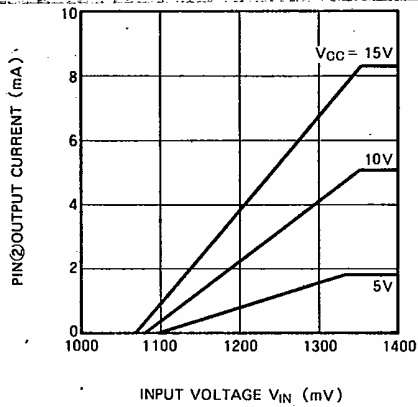


**PIN① OUTPUT CURRENT
VS INPUT VOLTAGE**

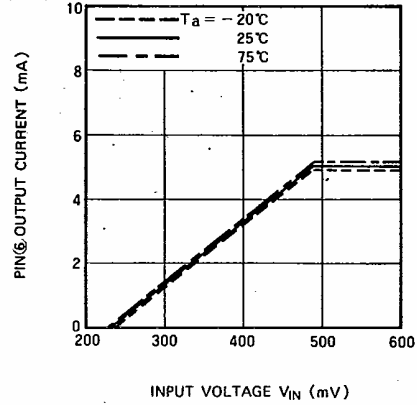


LED LINEAR LEVEL INDICATOR

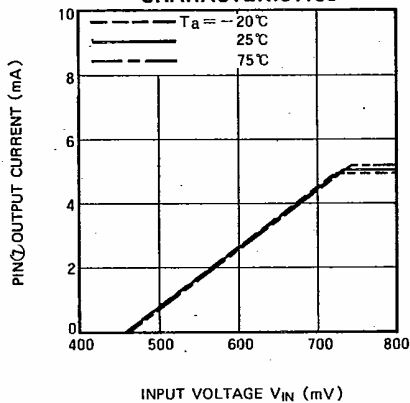
PIN② OUTPUT CURRENT VS INPUT VOLTAGE



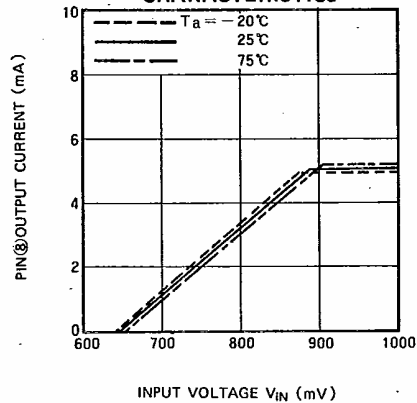
PIN⑥ OUTPUT CURRENT VS INPUT VOLTAGE TEMPERATURE CHARACTERISTICS



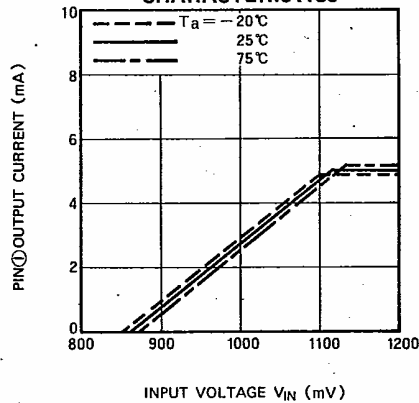
PIN⑦ OUTPUT CURRENT VS INPUT VOLTAGE TEMPERATURE CHARACTERISTICS



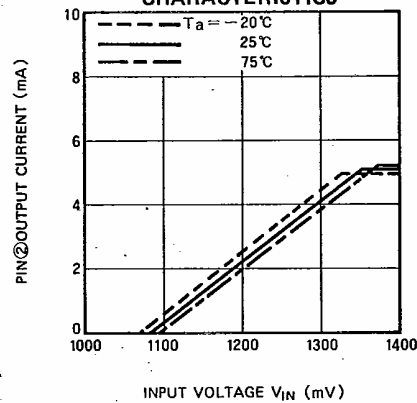
PIN⑧ OUTPUT CURRENT VS INPUT VOLTAGE TEMPERATURE CHARACTERISTICS



PIN① OUTPUT CURRENT VS INPUT VOLTAGE TEMPERATURE CHARACTERISTICS

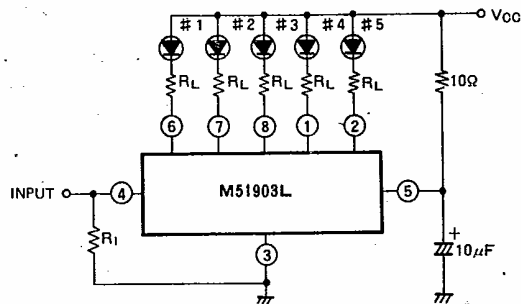


PIN② OUTPUT CURRENT VS INPUT VOLTAGE TEMPERATURE CHARACTERISTICS



APPLICATION EXAMPLES

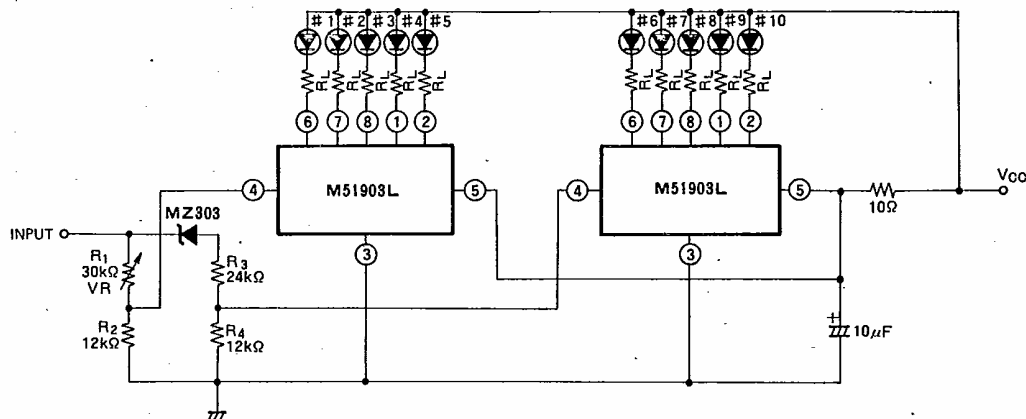
(1) M51903L used alone



Note 1. The value of R_L is chosen to suit the LED devices to be used. The maximum LED current $\pm (V_{CC} - \text{LED forward voltage drop} - 1.0) / R_L \leq 15\text{mA}$

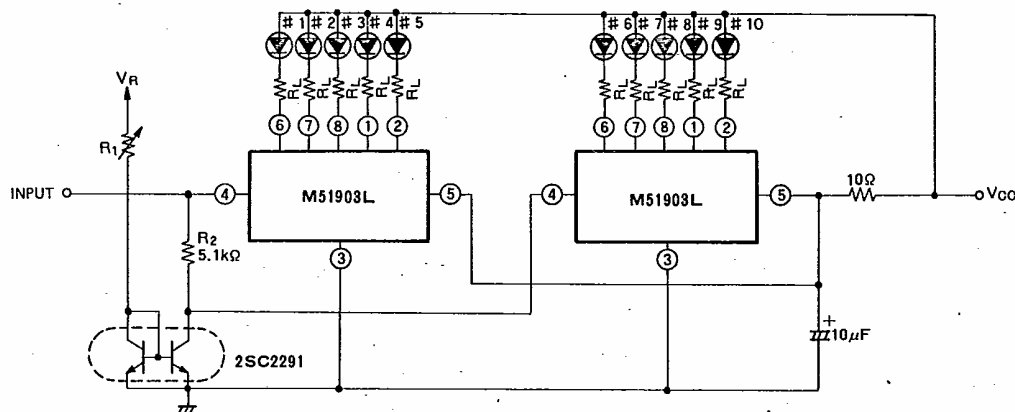
(2) M51903L used in cascade connection

(i) Circuit for a maximum input voltage of 7V



Note 1. Resistance R_1 is selected so that the turn-on voltage for LED #6 is approximately 630mV higher than that of LED #5.

(3) Circuit for a maximum input voltage of 2.3V



Note 1. Resistance R_1 selected so that the turn-on voltage for LED #6 is approximately 210mV higher than that of LED #5.