No.952C

LB1410

Monolithic Digital IC

LEVEL METER

Use

- AC level meters such as VU meters.
- DC level meters such as signal meters.

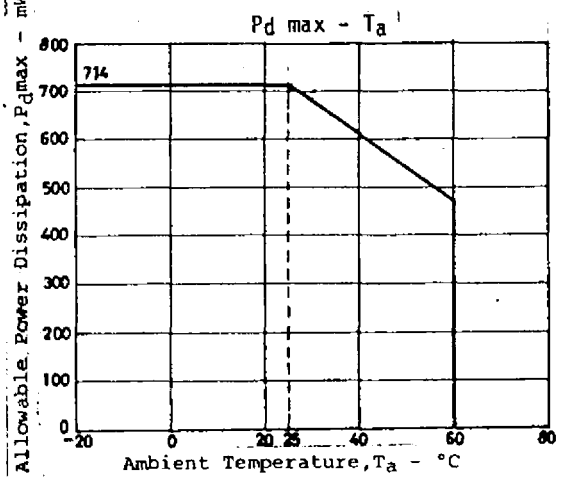
Functions

1. Display format
   Ten red or green LEDs display the input level in the shape of a bar.
2. Input amplifier
   Wide application is available owing to the built-in DC amplifier whose gain is variable with external resistors.
3. Comparator level
   Setting is made by steps of 3dB as follows.
   -21dB, -18dB, -15dB, -12dB, -9dB, -6dB, -3dB, 0dB, +3dB, +6dB.
4. Supply voltage
   Wide recommended supply voltage range : 5.5V to 16 V (If pin V_{ref2} is used, 7V to 16V).
5. Reference voltage
   Constant voltage output is available with an external transistor owing to pin V_{ref2}=5V.

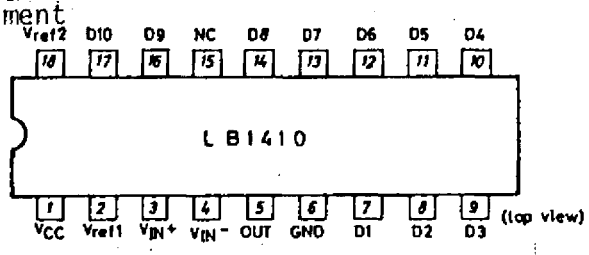
Comparator Level/OUT pin voltage at T_a=25°C, V_{CC}=12V, V_{ref1}=3V

Comparator level	Pin No.	min	typ	max	unit
D1	7	0.06	0.13*	0.17	V
D2	8	0.11	0.18*	0.25	V
D3	9	0.20	0.27*	0.34	V
D4	10	0.30	0.38*	0.46	V
D5	11	0.45	0.53*	0.61	V
D6	12	0.66	0.75	0.84	V
D7	13	0.97	1.06	1.15	V
D8	14	1.40	1.50	1.60	V
D9	16	2.02	2.12	2.22	V
D10	17	2.90	3.00	3.10	V

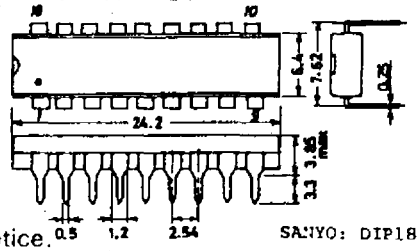
* : No overlap occurs in each individual IC.



Pin Assignment



Case Outline 3007A-D18IC
(unit:mm)



Specifications and information herein are subject to change without notice.

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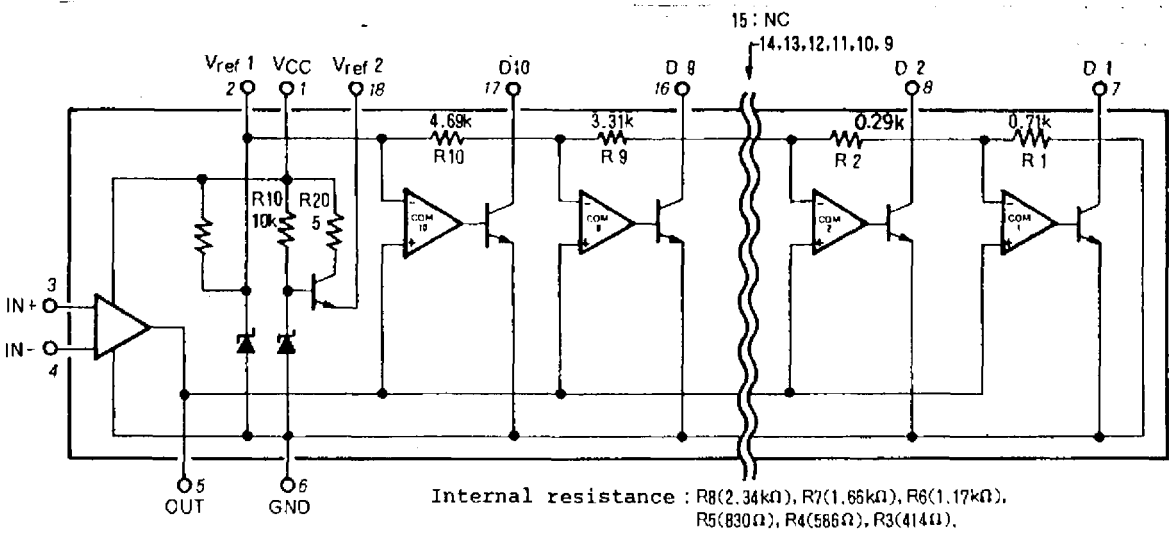
Equivalent Circuit



Absolute Maximum Ratings at T_a=25°C

				unit
Maximum Supply Voltage	V_{CC}max	Pin 1	-0.3 to +18	V
Input Voltage	V_{IN}	Pin 3, 4	-0.3 to V_{CC}	V
D1 to D10 Output Voltage	$V_{OUT(D)}$	D1 to D10 OFF	-0.3 to +18	V
D1 to D10 Output Current	$I_{OL(D)}$	Pins 7 to 17, D1 to D10 ON (Pin 15 NC)	+30	mA
First Reference Flow-out Current	$I_{ref(1)}$	Pin 2	-1 to 0	mA
Second Reference Flow-out Current	$I_{ref(2)}$	Pin 18	-6 to 0	mA
V_{OUT} Supply Voltage	V_{OUT}	Pin 5	-0.3 to 6	V
Allowable Power Dissipation	$P_d$max	T_a=55°C	500	mW
Operating Temperature	T_{opg}		-10 to +60	°C
Storage Temperature	T_{stg}		-40 to +125	°C

Allowable Operating Conditions at T_a=25°C

				unit
Supply Voltage	V_{CC}	Pin 1, ( ): Using V_{ref2}	-5.5 to +16 (+7 to +16)	V V
Input Voltage	V_{IN}+orV_{IN}-	Pin 3 or 4	-0.3 to V_{CC}	V
Output Pin Load Resistance	R_L	Between pin 5 OUT and pin 6 GND.	15k to 20k	ohm

Electrical Characteristics at T_a=25°C, V_{CC}=12V

			min	typ	max	unit
Input Bias Current (Amplifier)	I_{IN}+(A)	Pin3, V_{IN}+=0V, V_{IN}-=3V, GND=0V	-2		0	uA
	I_{IN}-(A)	Pin4, V_{IN}+=3V, V_{IN}-=0V, GND=0V	-2		0	uA
Input Bias Current (Comparator) + Output Leak Current	I_{IN}+(C)+ I_{OL}(A)	Pin5, V_{IN}+=0V, V_{IN}-=3V, OUT=0V, GND=0V	-10		0	uA
Offset Voltage (1)	$V_{offset(1)}$	Pin5, V_{CC}=6V, V_{IN}+=V_{IN}-=0V, GND=-6V, GAIN=20dB	-180		+180	mV
Offset Voltage (2)	$V_{offset(2)}$	Pin5, V_{IN}+=V_{IN}-=0V, GND=0V, GAIN=20dB	0		+180	mV
First Reference Voltage	$V_{ref(1)}$	Pin2, I_{ref}=0 to 1mA	2.6		3.0	V
Second Reference Voltage	$V_{ref(2)}$	Pin18, I_{ref}=5mA	4.2	4.7	5.2	V
Current Dissipation	I_{CC}	Pin1, V_{IN}+=3V, V_{IN}-=0V		10	20	mA
Amplifier Gain	VC	Open loop	30			dB

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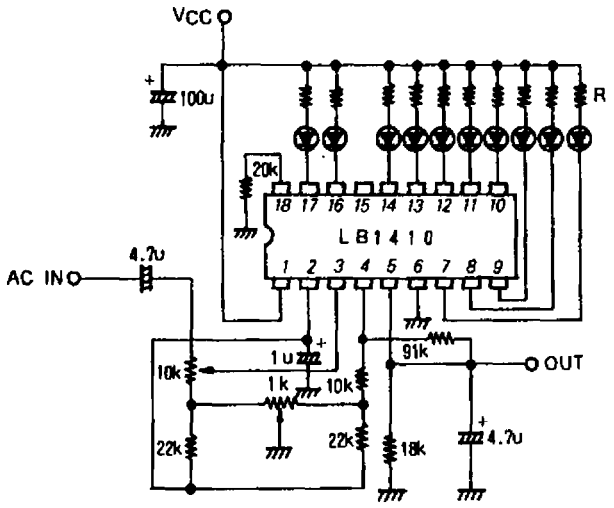
			min	typ	max	unit
Output Flow-out Current	I_{OH}	Pin5, V_{IN}+=3V, V_{IN}-=0V, V_{OUT}=0V			-10	mA
Pin D Output ON Voltage	V_{OL}(D)	Pin7 to 17, D1 to D10, I_{OL}=20mA, V_{IN}+=3V, V_{IN}-=0V (Pin 15 NC)			1.2	V
Pin D Output Leak Current	I_{OH}(D)	Pin7 to 17, D1 to D10, V_{IN}+=0V, V_{IN}-=3V, V_{D1} to D10=12V (Pin 15 NC)			10	uA
Output Voltage (Amplifier)	V_{OH}	Pin5, V_{CC}=5.5V, V_{IN}+=3V, V_{IN}-=0V, R_L=15kohms	4			V
		Pin5, V_{CC}=12V, V_{IN}+=3V, V_{IN}-=0V, R_L=15kohms	9.5			V

Application Circuits (With offset adjustment)

. Circuit not using V_{ref2}



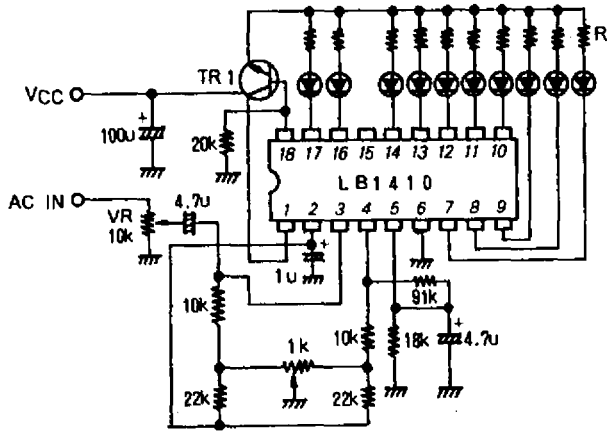
Adjusting procedure

1. Turn the center of 10kohm VR largely to 4.7uF capacitor side.
2. Input AC signal of 50/ 20mV from AC IN.
3. Adjust 1kohm VR so that the output at OUT becomes 500mV DC.

. Equation used in the calculation of R to be inserted in series with LED.
Gain : 20dB

R(red) =(V_{CC}-2.5)/6 kohms
R(green)=(V_{CC}-2.8)/18 kohms

. Circuit using V_{ref2}



Adjusting procedure

. R to be inserted in series with LED is as follows irrespective of V_{CC}.

R(red) =360ohms(App. 6mA)
R(green)=100ohms(App. 18mA)

. TR1 should be chosen with P_C considered. The following transistors are recommended.

Red LED drive 2SD400
Green LED drive 2SD325