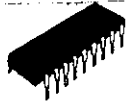


SANYO

No.952C

**LB1410**

Monolithic Digital IC

LEVEL METER**Use**

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

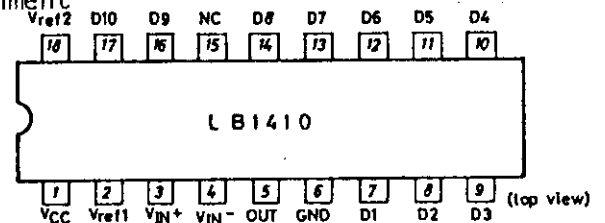
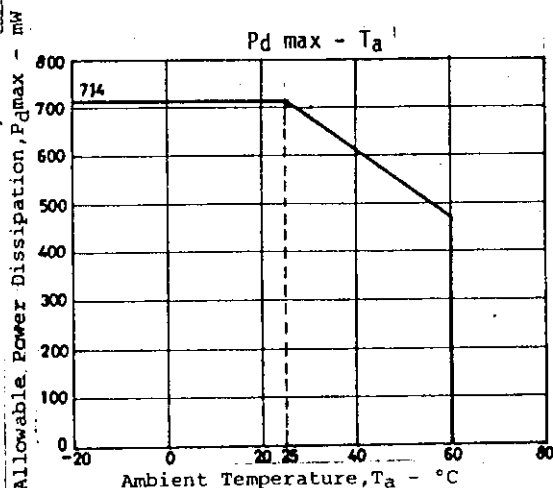
Functions

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 Vref2 is used, 7V to 16V).
5. Reference voltage
Constant voltage output is available with an external transistor owing to pin Vref2=5V.

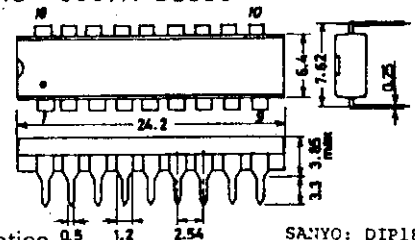
Comparator Level/OUT pin voltage at $T_a=25^\circ\text{C}$, $V_{CC}=12\text{V}$, $V_{ref1}=3\text{V}$

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)

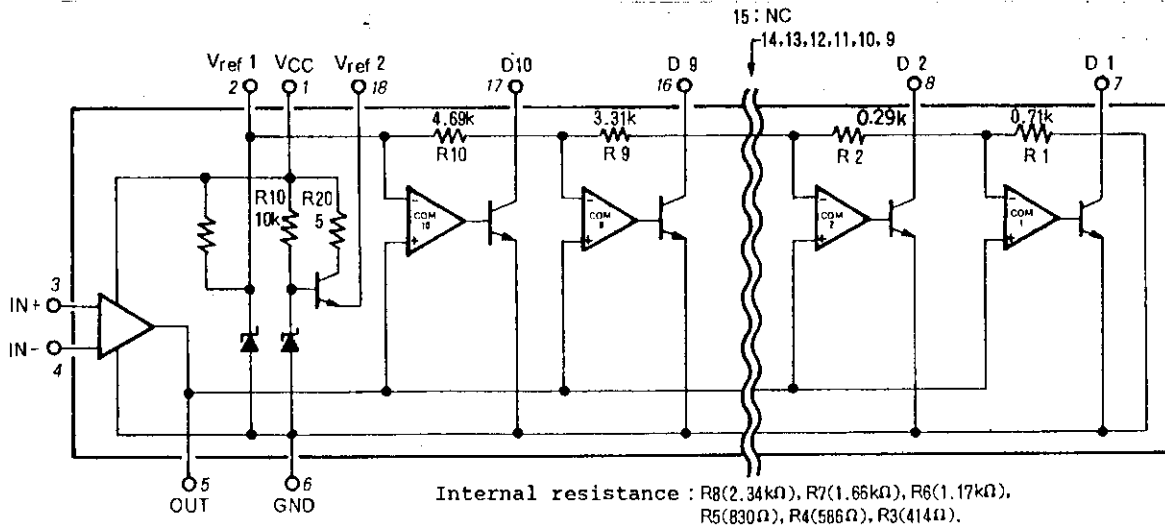


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8277KI/8225MW/9124KI/3052KI, TS No.952-1/3

Equivalent Circuit



Absolute Maximum Ratings at $T_a=25^\circ\text{C}$

				unit
Maximum Supply Voltage	V_{CCmax}	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_{dmax}	$T_a=55^\circ\text{C}$	500	mW
Operating Temperature	T_{opg}		-10 to +60	$^\circ\text{C}$
Storage Temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

Allowable Operating Conditions at $T_a=25^\circ\text{C}$

				unit
Supply Voltage	V_{CC}	Pin 1, (): Using V_{ref2}	-5.5 to +16 (+7 to +16)	V
Input Voltage	V_{IN+} or V_{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 $T_a=25^\circ\text{C}, V_{CC}=12\text{V}$

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

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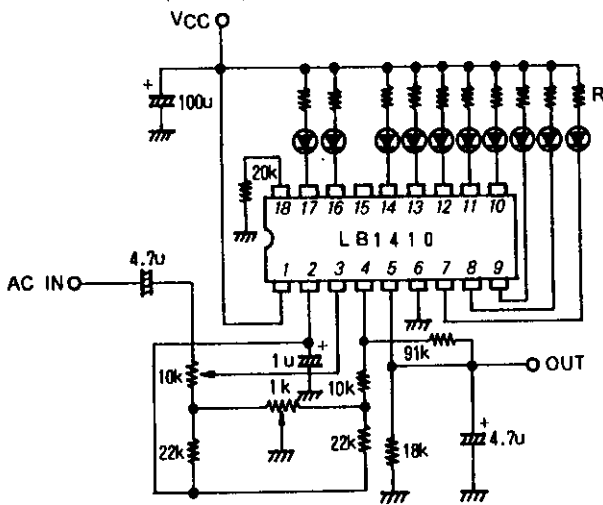
LB1410

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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, $V_{CC}=5.5V, V_{IN+}=3V,$	4			V
		$V_{IN-}=0V, R_L=15kohms$ Pin5, $V_{CC}=12V, V_{IN+}=3V,$	9.5			V
		$V_{IN-}=0V, R_L=15kohms$				

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.

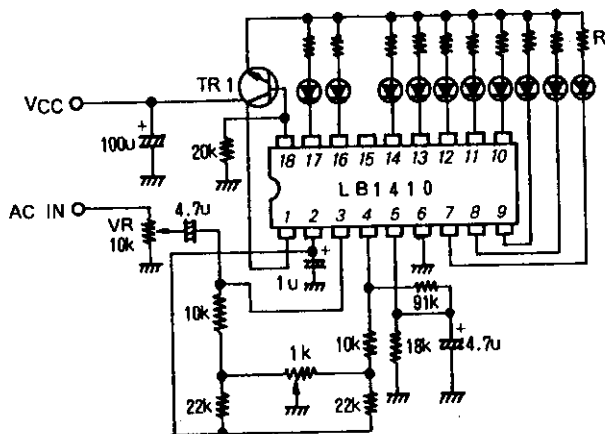
- . Equation used in the calculation of R to be inserted in series with LED.

Gain : 20dB

$$R(\text{red}) = (V_{CC}-2.5)/6 \text{ kohms}$$

$$R(\text{green}) = (V_{CC}-2.8)/18 \text{ kohms}$$

. Circuit using V_{ref2}



Adjusting procedure

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

$$R(\text{red}) = 360\text{ohms (App. 6mA)}$$

$$R(\text{green}) = 100\text{ohms (App. 18mA)}$$

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

Red	LED drive	2SD400
Green	LED drive	2SD325

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