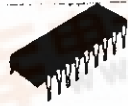


| | | |
|--------------|---------|--|
| SANYO | No.952C | LB1410 Monolithic Digital IC LEVEL METER |
|--------------|---------|--|



Use

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

Functions

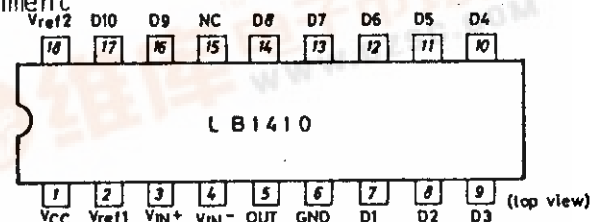
1. Display format
Ten red or green LEDs display the input level in the shape of a bar.
2. Input amplifier
Wide application is available owing to the built-in DC amplifier whose gain is variable with external resistors.
3. Comparator level
Setting is made by steps of 3dB as follows.
-21dB, -18dB, -15dB, -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 $T_a=25^\circ\text{C}$, $V_{CC}=12\text{V}$, $V_{ref1}=3\text{V}$

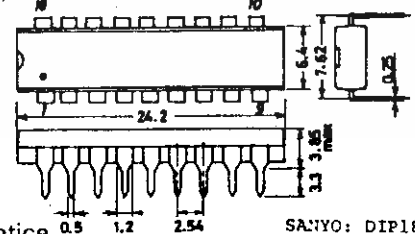
| Comparator level | Pin No. | min | typ | max | unit |
|------------------|---------|------|-------|------|------|
| D1 | 7 | 0.06 | 0.13* | 0.17 | V |
| D2 | 8 | 0.11 | 0.18* | 0.25 | V |
| D3 | 9 | 0.20 | 0.27* | 0.34 | V |
| D4 | 10 | 0.30 | 0.38* | 0.46 | V |
| D5 | 11 | 0.45 | 0.53* | 0.61 | V |
| 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.

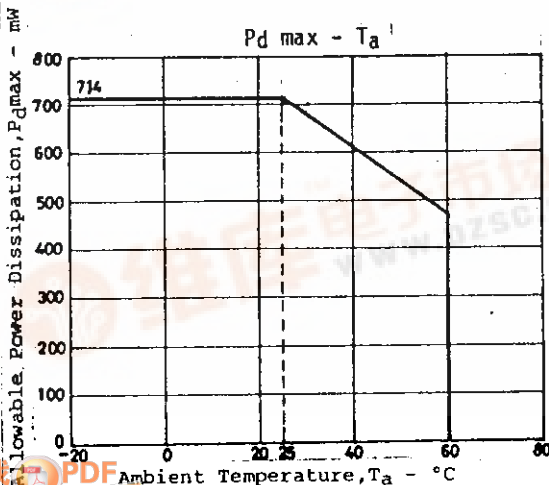
Pin Assignment



Case Outline 3007A-D18IC
(unit:mm)



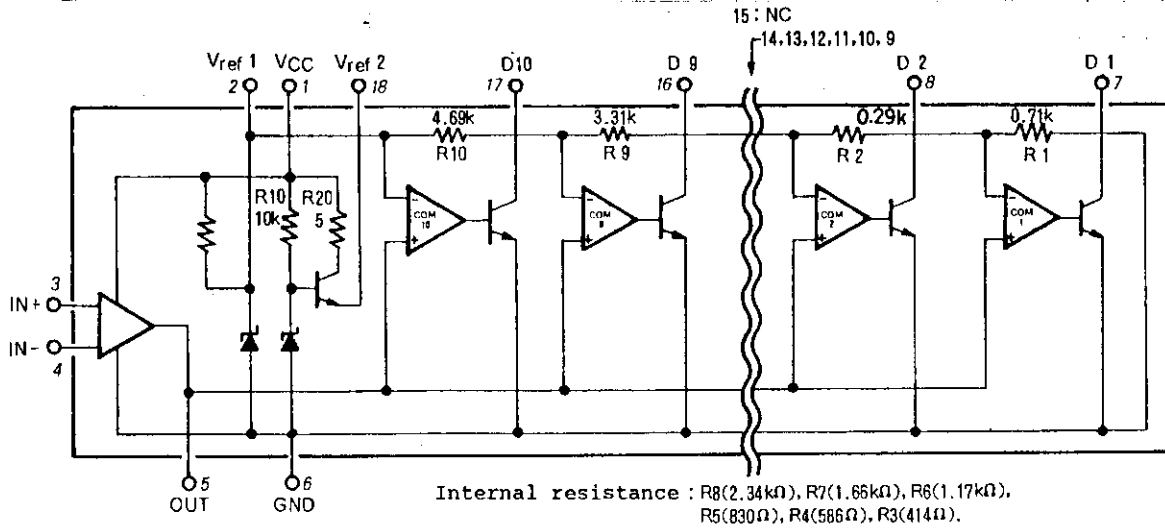
SANYO: DIP18



Specifications and information herein are subject to change without notice.

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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 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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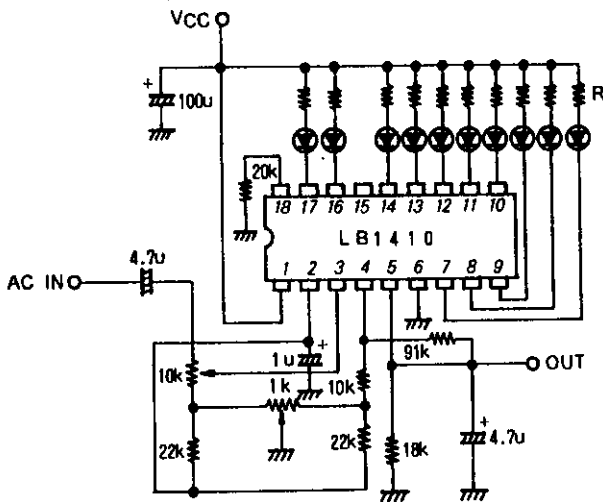
LB1410

Continued from preceding page.

| | | | 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 | μA |
| 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.

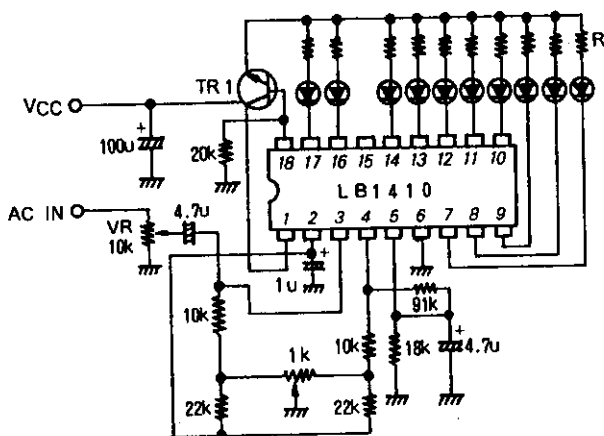
- . Equation used in the calculation of R to be inserted in series with LED.

Gain : 20dB

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

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

. Circuit using V_{ref2}



Adjusting procedure

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

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

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

- . 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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