



Use

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

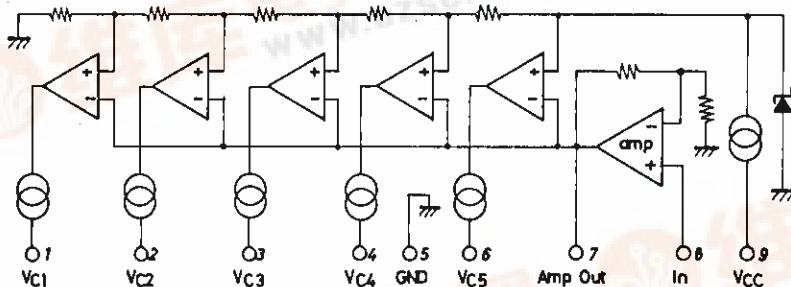
Features and Functions

- Capable of generating a bar-display for input voltage with 5 LEDs.
- Operates from either AC or DC input voltage because of on-chip rectifier amplifier.
- Lighting levels remain stable to line regulation because of on-chip voltage reference.
- LEDs are driven by a constant current ; stable to line regulation.
- Power supply voltage range is wide (3.5 to 16V), for a wide range of applications.
- Five types of ICs constitute the series with various lighting levels of the LEDs and driving currents.
- SEP-9 pin package and fewer externally connected components result in smaller space requirements on the circuit board.
- Low noise at LED lighted mode

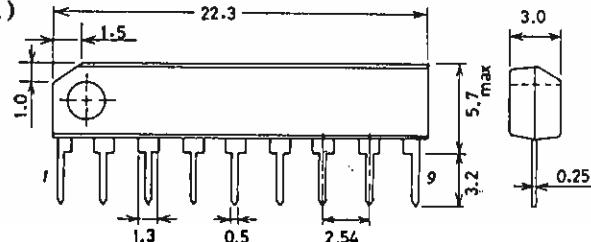
LB1403N Series

| Type No. | V_{C3} lighting sensitivity | Comparator level | Constant LED current |
|----------|-------------------------------|---|----------------------|
| LB1403N | 85 mVrms typ | +6dB, +3dB, 0dB, -5dB, -10dB | 15 mA typ |
| LB1413N | 105 mVrms typ | 1.67Vc3, 1.33Vc3, Vc3, 0.67Vc3, 0.33Vc3 | 15 mA typ |
| LB1423N | 85 mVrms typ | +6dB, +3dB, 0dB, -5dB, -10dB | 7 mA typ |
| LB1433N | 105 mVrms typ | 1.67Vc3, 1.33Vc3, Vc3, 0.67Vc3, 0.33Vc3 | 7 mA typ |
| LB1443N | 85 mVrms typ | +6dB, +3dB, 0dB, -6dB, -12dB | 15 mA typ |

Equivalent Circuit Block Diagram and Pin Assignment



Package Dimensions
(unit: mm)



SANYO: SEP9

LB1403N,1413N,1423N,1433N,1443N

Absolute Maximum Ratings[LB1403N,1413N,1423N,1433N,1443N] at Ta=25°C unit

| | | | |
|-----------------------------|---------------------|-------------|----|
| Maximum Supply Voltage | V _{CC} max | 18 | V |
| Allowable Power Dissipation | P _d max | 1100 | mW |
| Operating Temperature | T _{opr} | -25 to +75 | °C |
| Storage Temperature | T _{stg} | -55 to +125 | °C |

Allowable Operating Conditions[LB1403N,1413N,1423N,1433N,1443N] at Ta=25°C

| Supply Voltage | V _{CC} | min | typ | max | unit |
|----------------|-----------------|-----|-----|-----|------|
| | | 3.5 | 6 | 16 | V |

| | | | | |
|---|---------------------|------|------|-------|
| Electrical Characteristics [LB1403N] at Ta=25°C, V _{CC} =6V, f=1kHz | min | typ | max | unit |
| Current Dissipation I _{CC} V _{IN} =0 | | 5 | 8 | mA |
| Sensitivity V _{IN} Vc3 on-level | 74 | 85 | 96 | mVrms |
| Comparator Level 1 Vc1 | -11.5 | -10 | -8.5 | dB |
| Comparator Level 2 Vc2 | -6 | -5 | -4 | dB |
| Comparator Level 3 Vc3 | Point of adjustment | 0 | | dB |
| Comparator Level 4 Vc4 | | 2.5 | 3 | dB |
| Comparator Level 5 Vc5 | | 5 | 6 | dB |
| LED Constant Current I _{LED} | | 11 | 15 | 18.5 |
| Input Bias Current I _{IN0} | | -1.0 | -0.3 | μA |

| | | | | |
|---|------|------|------|-------|
| Electrical Characteristics [LB1413N] at Ta=25°C, V _{CC} =6V, f=1kHz | min | typ | max | unit |
| Current Dissipation I _{CC} V _{IN} =0 | | 5 | 8 | mA |
| Sensitivity V _{IN} Vc3 on-level | 91 | 105 | 119 | mVrms |
| Comparator Level 1 Vc1 | 0.28 | 0.33 | 0.40 | mVrms |
| Comparator Level 2 Vc2 | ·Vc3 | ·Vc3 | ·Vc3 | mVrms |
| Comparator Level 3 Vc3 | 0.59 | 0.67 | 0.75 | mVrms |
| Comparator Level 4 Vc4 | ·Vc3 | ·Vc3 | ·Vc3 | mVrms |
| Comparator Level 5 Vc5 | VIN | 1.25 | 1.33 | 1.42 |
| LED Constant Current I _{LED} | ·Vc3 | 1.48 | 1.67 | mVrms |
| Input Bias Current I _{IN0} | ·Vc3 | 11 | 15 | 18.5 |
| | | -1.0 | -0.3 | μA |

| | | | | |
|---|---------------------|------|------|-------|
| Electrical Characteristics [LB1423N] at Ta=25°C, V _{CC} =6V, f=1kHz | min | typ | max | unit |
| Current Dissipation I _{CC} V _{IN} =0 | | 5 | 8 | mA |
| Sensitivity V _{IN} Vc3 on-level | 74 | 85 | 96 | mVrms |
| Comparator Level 1 Vc1 | -11.5 | -10 | -8.5 | dB |
| Comparator Level 2 Vc2 | -6 | -5 | -4 | dB |
| Comparator Level 3 Vc3 | Point of adjustment | 0 | | dB |
| Comparator Level 4 Vc4 | | 2.5 | 3 | dB |
| Comparator Level 5 Vc5 | | 5 | 6 | dB |
| LED Constant Current I _{LED} | | 5 | 7 | 9.5 |
| Input Bias Current I _{IN0} | | -1.0 | -0.3 | μA |

| | | | | |
|---|------|------|------|-------|
| Electrical Characteristics [LB1433N] at Ta=25°C, V _{CC} =6V, f=1kHz | min | typ | max | unit |
| Current Dissipation I _{CC} V _{IN} =0 | | 5 | 8 | mA |
| Sensitivity V _{IN} Vc3 on-level | 91 | 105 | 119 | mVrms |
| Comparator Level 1 Vc1 | 0.28 | 0.33 | 0.40 | mVrms |
| Comparator Level 2 Vc2 | ·Vc3 | ·Vc3 | ·Vc3 | mVrms |
| Comparator Level 3 Vc3 | 0.59 | 0.67 | 0.75 | mVrms |
| LED Constant Current I _{LED} | ·Vc3 | 11 | 15 | 18.5 |
| Input Bias Current I _{IN0} | ·Vc3 | -1.0 | -0.3 | μA |

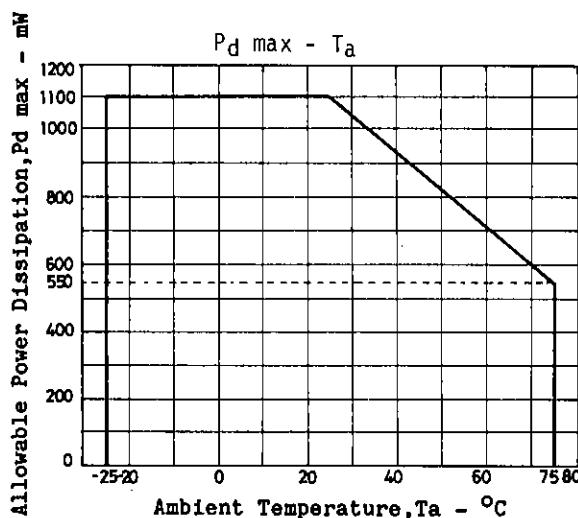
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LB1403N, 1413N, 1423N, 1433N, 1443N

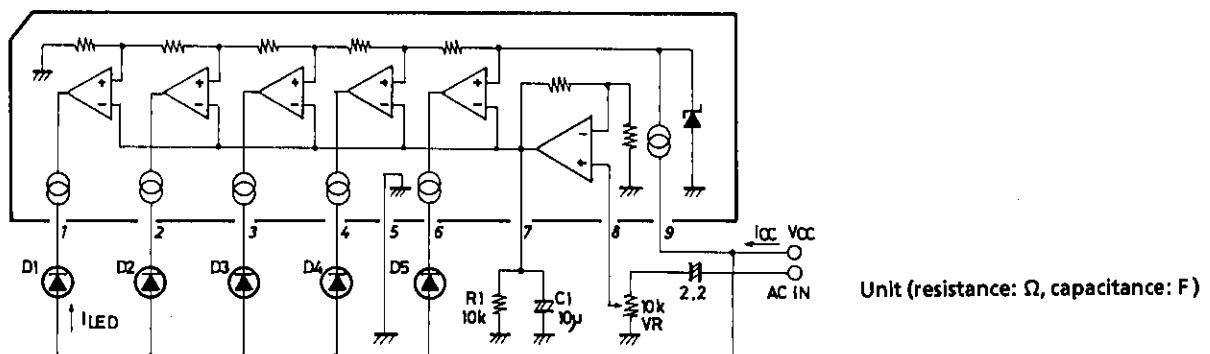
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| | | min | typ | max | unit |
|----------------------|-----------|------------|------------|------------|---------|
| Comparator Level 4 | V_{C4} | 1.25 | 1.33 | 1.42 | mVrms |
| Comparator Level 5 | V_{C5} | - V_{C3} | - V_{C3} | - V_{C3} | mVrms |
| LED Constant Current | I_{LED} | 1.48 | 1.67 | 1.87 | mVrms |
| Input Bias Current | I_{IN0} | - V_{C3} | - V_{C3} | - V_{C3} | μ A |
| LED Constant Current | I_{LED} | 5 | 7 | 9.5 | mA |
| Input Bias Current | I_{IN0} | -1.0 | -0.3 | | μ A |

| | | | min | typ | max | unit | |
|----------------------|-----------|---------------------|------|------|------|---------|-------|
| Current Dissipation | I_{CC} | $V_{IN}=0$ | | 5 | 8 | mA | |
| Sensitivity | V_{IN} | V_{C3} on-level | | 74 | 85 | 96 | mVrms |
| Comparator Level 1 | V_{C1} | | -14 | -12 | -10 | dB | |
| Comparator Level 2 | V_{C2} | | -7 | -6 | -5 | dB | |
| Comparator Level 3 | V_{C3} | Point of adjustment | | 0 | | dB | |
| Comparator Level 4 | V_{C4} | | 2.5 | 3 | 3.5 | dB | |
| Comparator Level 5 | V_{C5} | | 5 | 6 | 7 | dB | |
| LED Constant Current | I_{LED} | | 11 | 15 | 18.5 | mA | |
| Input Bias Current | I_{IN0} | | -1.0 | -0.3 | | μ A | |



Sample Application Circuit and Test Circuit (AC input VU meter)



* Capacitor to be omitted when used as a DC-input signal meter.

C₁, R₁ time constant:

The response time can be varied by varying the C₁, R₁ time constant (mainly the C₁ value).

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LB1403N, 1413N, 1423N, 1433N, 1443N

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When the C_1 , R_1 time constant is larger:

..... The response time (attack time and release time) is made slower.

When the C_1 , R_1 time constant is smaller:

..... The response time (attack time and release time) is made faster.

• Considerations relative to P_d max of the package:

Due to the constant current I_{LED} , most of the power consumed by the circuits is consumed within the IC.

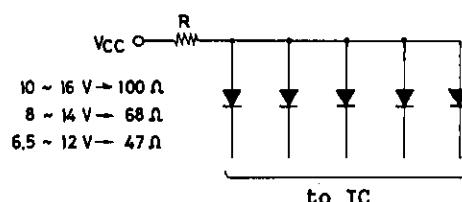
When lighting the five LEDs continuously for a prolonged length of time, make sure that V_{CC} does not exceed:

LB1403N, 1413N, 1443N $V_{CC}=9V$

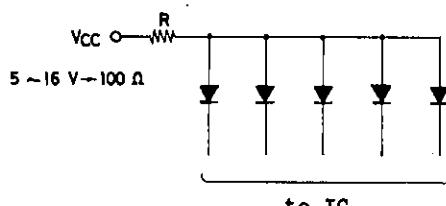
LB1423N, 1433N $V_{CC}=14V$

When using a higher power supply voltage, insert a resistor in series with the LEDs to restrain the power consumed within the IC package.

For LB1403N, 1413N, 1443N:



For LB1423N, 1433N:



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