



LB1403N Series

5-Dot Red/Green LED Level Meter

Use

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

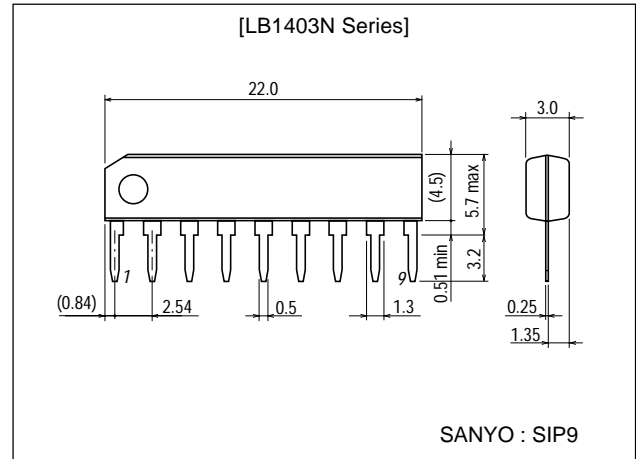
Features and Functions

- 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.
- SIP-9 pin package and fewer externally connected components result in smaller space requirements on the circuit board.
- Low noise at LED lighted mode.

Package Dimensions

unit:mm

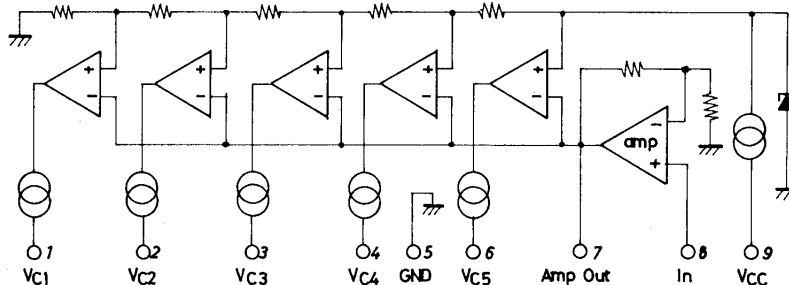
3017D-SIP9



LB1403N Series

| Type No. | VC3 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



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

Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|---------------------|------------|-------------|------|
| Maximum supply voltage | V _{CC} max | | 18 | V |
| Allowable power dissipation | Pd max | | 1100 | mW |
| Operating temperature | T _{opr} | | -25 to +75 | °C |
| Storage temperature | T _{stg} | | -55 to +125 | °C |

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

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|----------------|-----------------|------------|---------|-----|-----|------|
| | | | min | typ | max | |
| Supply voltage | V _{CC} | | 3.5 | 6 | 16 | V |

Electrical Characteristics [LB1403N] at Ta = 25°C, V_{CC}=6V, f=1kHz

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|----------------------|------------------|---------------------|---------|------|------|-------|
| | | | min | typ | max | |
| Current drain | 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 | 3.5 | dB |
| Comparator level 5 | Vc5 | | 5 | 6 | 7 | dB |
| LED constant current | I _{LED} | | 11 | 15 | 18.5 | mA |
| Input bias current | I _{INO} | | -1.0 | -0.3 | | µA |

Electrical Characteristics [LB1413N] at Ta = 25°C, V_{CC}=6V, f=1kHz

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|----------------------|------------------|---------------------|---------------|-----------------|---------------|-------|
| | | | min | typ | max | |
| Current drain | I _{CC} | V _{IN} =0 | | 5 | 8 | mA |
| Sensitivity | V _{IN} | Vc3 on-level | 91 | 105 | 119 | mVrms |
| Comparator level 1 | Vc1 | | 0.28 · Vc3 | 0.33 · Vc3 | 0.40 · Vc3 | mVrms |
| Comparator level 2 | Vc2 | | 0.59 · Vc3 | 0.67 · Vc3 | 0.75 · Vc3 | mVrms |
| Comparator level 3 | Vc3 | Point of adjustment | | V _{IN} | | mVrms |
| Comparator level 4 | Vc4 | | 1.25 · Vc3 | 1.33 · Vc3 | 1.42 · Vc3 | mVrms |
| Comparator level 5 | Vc5 | | 1.48 · Vc3 | 1.67 · Vc3 | 1.87 · Vc3 | mVrms |
| LED constant current | I _{LED} | | 11 | 15 | 18.5 | mA |
| Input bias current | I _{INO} | | -1.0 | -0.3 | | µA |

Electrical Characteristics [LB1423N] at Ta = 25°C, V_{CC}=6V, f=1kHz

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|----------------------|------------------|---------------------|---------|------|------|-------|
| | | | min | typ | max | |
| Current drain | 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 | 3.5 | dB |
| Comparator level 5 | Vc5 | | 5 | 6 | 7 | dB |
| LED constant current | I _{LED} | | 5 | 7 | 9.5 | mA |
| Input bias current | I _{INO} | | -1.0 | -0.3 | | µA |

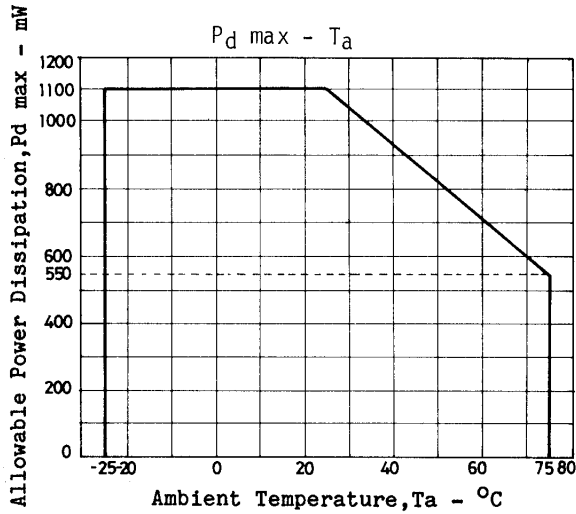
LB1403N, 1413N, 1423N, 1433N, 1443N

Electrical Characteristics [LB1433N] at $T_a = 25^\circ\text{C}$, $V_{CC}=6\text{V}$, $f=1\text{kHz}$

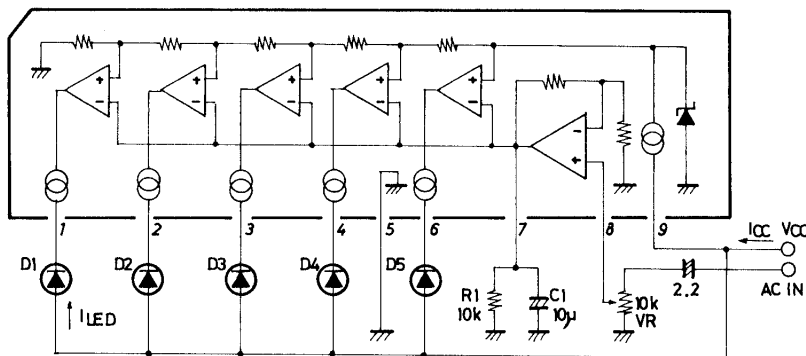
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|----------------------|-----------|---------------------|---------------|---------------|---------------|---------------|
| | | | min | typ | max | |
| Current drain | I_{CC} | $V_{IN}=0$ | | 5 | 8 | mA |
| Sensitivity | V_{IN} | Vc3 on-level | 91 | 105 | 119 | mVrms |
| Comparator level 1 | Vc1 | | 0.28 · Vc3 | 0.33 · Vc3 | 0.40 · Vc3 | mVrms |
| Comparator level 2 | Vc2 | | 0.59 · Vc3 | 0.67 · Vc3 | 0.75 · Vc3 | mVrms |
| Comparator level 3 | Vc3 | Point of adjustment | | V_{IN} | | mVrms |
| Comparator level 4 | Vc4 | | 1.25 · Vc3 | 1.33 · Vc3 | 1.42 · Vc3 | mVrms |
| Comparator level 5 | Vc5 | | 1.48 · Vc3 | 1.67 · Vc3 | 1.87 · Vc3 | mVrms |
| LED constant current | I_{LED} | | 5 | 7 | 9.5 | mA |
| Input bias current | I_{INO} | | -1.0 | -0.3 | | μA |

Electrical Characteristics [LB1443N] at $T_a = 25^\circ\text{C}$, $V_{CC}=6\text{V}$, $f=1\text{kHz}$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|----------------------|-----------|---------------------|---------|------|------|---------------|
| | | | min | typ | max | |
| Current drain | I_{CC} | $V_{IN}=0$ | | 5 | 8 | mA |
| Sensitivity | V_{IN} | Vc3 on-level | 74 | 85 | 96 | mVrms |
| Comparator level 1 | Vc1 | | -14 | -12 | -10 | dB |
| Comparator level 2 | Vc2 | | -7 | -6 | -5 | dB |
| Comparator level 3 | Vc3 | Point of adjustment | | 0 | | dB |
| Comparator level 4 | Vc4 | | 2.5 | 3 | 3.5 | dB |
| Comparator level 5 | Vc5 | | 5 | 6 | 7 | dB |
| LED constant current | I_{LED} | | 11 | 15 | 18.5 | mA |
| Input bias current | I_{INO} | | -1.0 | -0.3 | | μA |



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



Unit (resistance: Ω , capacitance: F)

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

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

· C_1, R_1 time constant :

The response time can be varied by varying the C_1, R_1 time constant (mainly the C_1 value).

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.

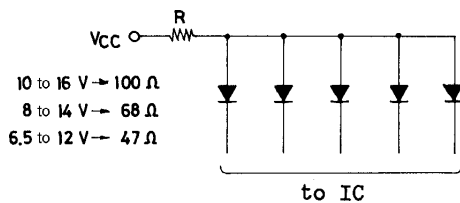
When lighting the five LEDs continuously for a prolonged length of time, make sure that V_{CC} does not exceed :

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

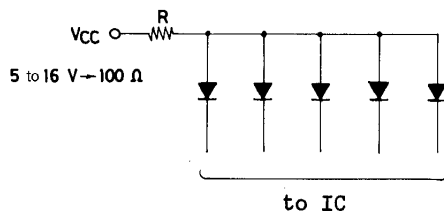
LB1423N, 1433N $V_{CC}=14V$

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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