Ordering number:ENN1410B

Monolithic Digital IC

LB1403N Series

5-Dot Red/Green LED Level Meter

Use

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

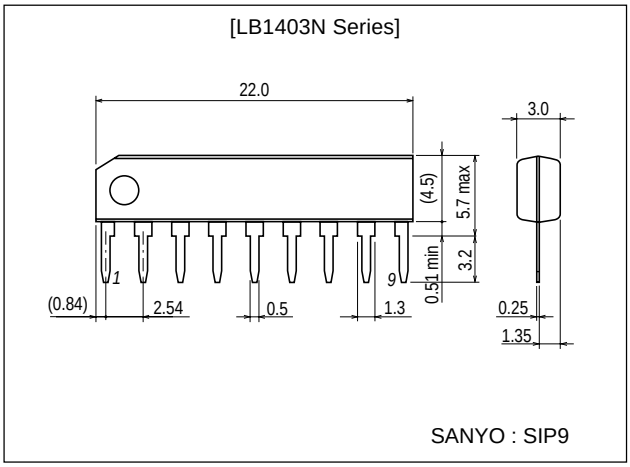
Features and Functions

- 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 resuit in smaller space requirements on the circuit board.
- Low noise at LED lighted mode.

Package Dimensions

unit:mm

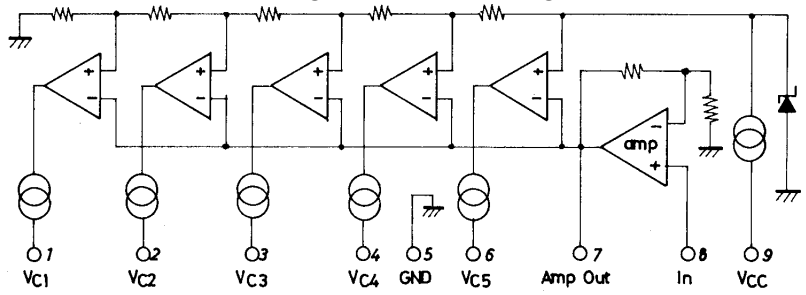
3017D-SIP9



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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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	Topr		–25 to +75	˚C
Storage temperature	Tstg		–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

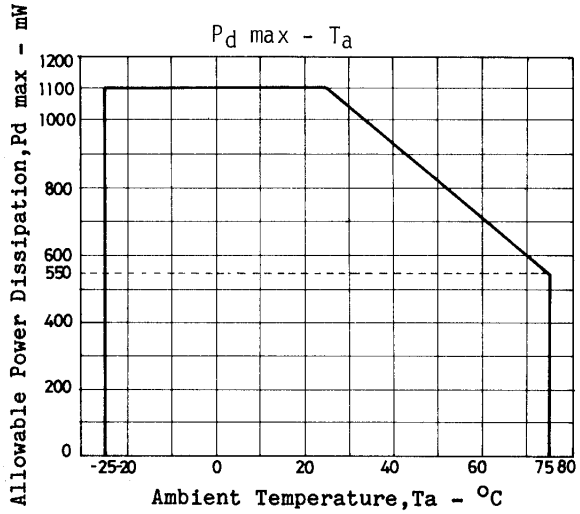
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CC}	V_{IN}=0		5	8	mA
Sensitivity	V_{IN}	Vc3 on-level	74	85	96	mVrms
Comparator level 1	Vc1		–11.5	–10	–8.5	dB
Comparator level 2	Vc2		–6	–5	–4	dB
Comparator level 3	Vc3	Point of adjustment		0		dB
Comparator level 4	Vc4		2.5	3	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

Electrical Characteristics [LB1433N] at Ta = 25˚C, V_{CC}=6V, f=1kHz

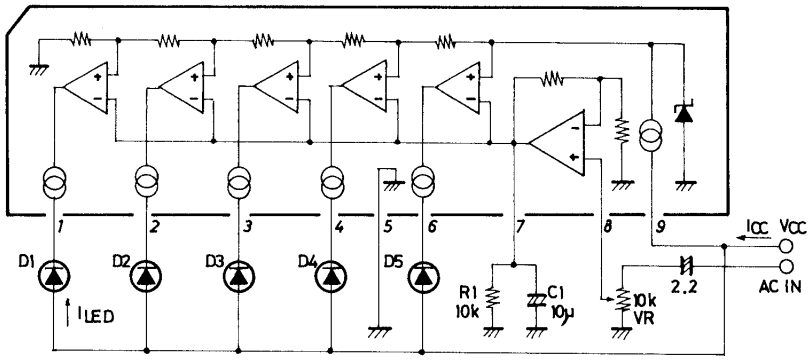
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CC}	V_{IN}=0		5	8	mA
Sensitivity	V_{IN}	Vc3 on-level	91	105	119	mVrms
Comparator level 1	Vc1		0.28 · Vc3	0.33 · Vc3	0.40 · Vc3	mVrms
Comparator level 2	Vc2		0.59 · Vc3	0.67 · Vc3	0.75 · Vc3	mVrms
Comparator level 3	Vc3	Point 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}		5	7	9.5	mA
Input bias current	I_{INO}		–1.0	–0.3		µA

Electrical Characteristics [LB1443N] 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		–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.

· 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 Pd max of the package :

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

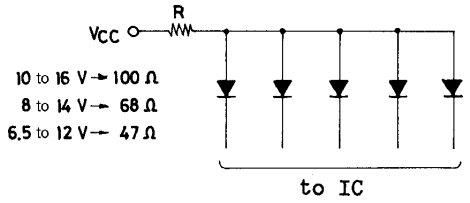
When lighting the five LEDs continuously for a prolonged length of time, make sure that V_{CC} does not exceed :

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