


SANYO 	No.624D	LB1416,1426,1436
	Monolithic Digital IC LEVEL METER	

General Description of Functions

- . Indication format : The input level is indicated in the form of a bar by means of 5 LEDs (green/red LED :drivable).
- . Input amplifier : 2 half-wave rectification amplifiers are built in.
- . Input amplifier output : Of 2 input amplifiers, the amplifier whose input is larger takes precedence.
- . Comparator level : LB1416 : +6, +3, 0, -5, -10 [dB] (Log scale)
 LB1426 : +3, +2.4, +1.8, +1.2, +0.6 [V] (Linear scale)
 LB1436 : +9, +6, +3, 0 -5 [dB] (Log scale)
- . Offset voltage of input amplifier : If the amplifier gain is taken as 20dB, the output voltage is within $\pm 150\text{mV}$.
- . Supply voltage : Wide range of supply voltage : 5.0 to 16V.
- . Reference voltage V_{ref} : $2.8 \pm 0.2 \text{ V}$.
- . LED output voltage : Constant voltage.
- . LED current : Constant current by means of an external resistor.
- . Allowable power dissipation : 1.15W at $T_a = 35^\circ\text{C}$

Comparator Level at $T_a = 25^\circ\text{C}$, $V_{\text{CC}} = 5.0$ to 16V.

Comparator Level	Symbol	Pin No.	Conditions	LB1416				LB1426			
				min	typ	max	unit	min	typ	max	unit
D5	GD5	Pin 13	$V_{\text{RO2}} = 3.0\text{V}$ $V_{\text{RO1}} = 0\text{V}$	5.5	6.0	6.5	dB	2.9	3.0	3.1	V
D4	GD4	Pin 12		2.5	3.0	3.5	dB	2.3	2.4	2.5	V
D3	GD3	Pin 11		-0.5	0	0.5	dB	1.7	1.8	1.9	V
D2	GD2	Pin 10		-6.0	-5.0	-4.0	dB	1.1	1.2	1.3	V
D1	GD1	Pin 9		-12	-10	-8	dB	0.5	0.6	0.7	V

Comparator Level	Symbol	Pin No.	Conditions	LB1436			
				min	typ	max	unit
D5	GD5	Pin 13	$V_{\text{RO2}} = 3.0\text{V}$ $V_{\text{RO1}} = 0\text{V}$	8.5	9.0	9.5	dB
D4	GD4	Pin 12		5.5	6.0	6.5	dB
D3	GD3	Pin 11		2.5	3.0	3.5	dB
D2	GD2	Pin 10		-1	0	1	dB
D1	GD1	Pin 9		-7	-5.0	-3.5	dB

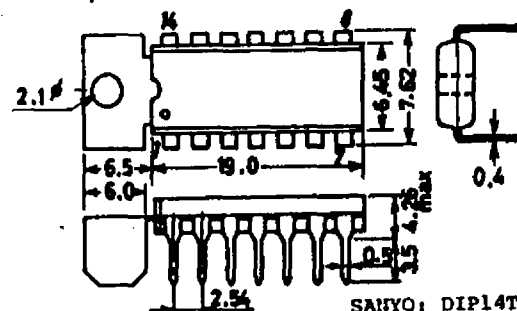
Note) LB1416 : Definition of 0dB in case of $V_{\text{ref}} = 3.0\text{V}$.

When reference voltage V_{RO2} of the comparator is 3V, 1.5V is taken as 0dB.

LB1436 : Definition of 3dB in case of $V_{\text{ref}} = 3.0\text{V}$.

When reference voltage V_{RO2} of the comparator is 3V, 1.5V is taken as 3dB.

Case Outline 3005A-D14TIC
(unit:mm)



Specifications and information herein are subject to change without notice.

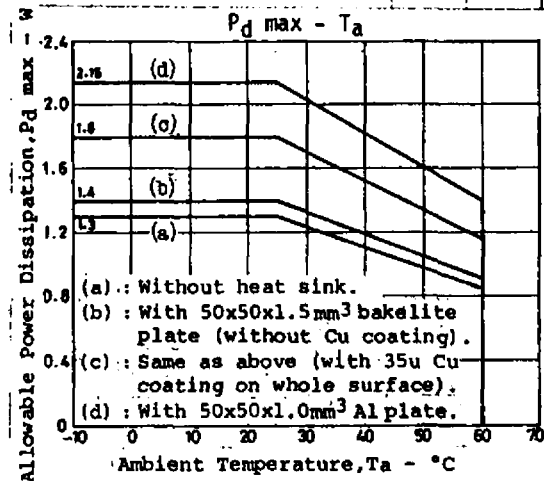
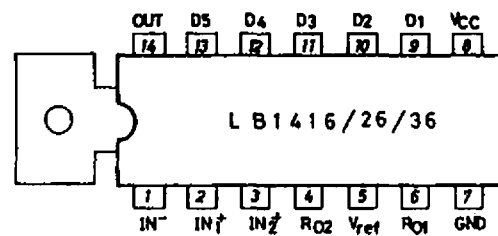
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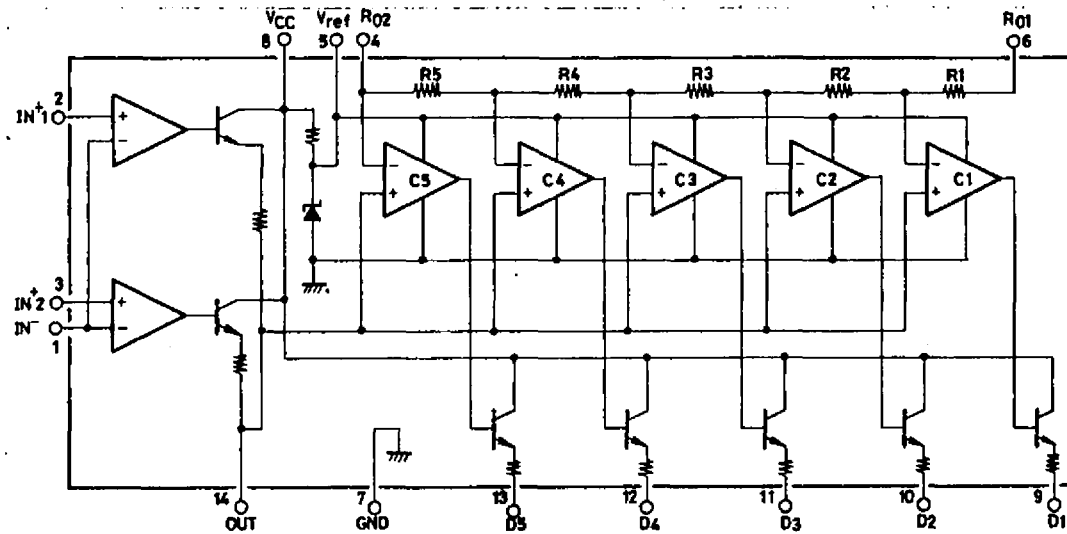
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Pin Assignment



Equivalent Circuit Block Diagram



Absolute Maximum Ratings at $T_a=25^\circ\text{C}$		Pin No.	Conditions	unit
Maximum Supply Voltage	V_{CCmax}	8		-0.3 to +18 V
Input Voltage	V_{IN}	1,2,3		-0.3 to V_{CC} V
Output Voltage	V_{OUT}	14		-0.3 to +8 V
	$V_{OUT(D)}$	9 to 13	$V_{OUT(D)} \leq V_{CC}$ at output (D_1 to D_5) OFF	-0.3 to +10 V
Reference Flow-out Current	I_{ref}	5		-1.0 to 0 mA
Allowable Power Dissipation	P_{dmax}		Without heat sink	1.3 W
			With 50 x 50 x 1 mm ³ Al plate	2.15 W
Operating Temperature	T_{opg}			-10 to +60 °C
Storage Temperature	T_{stg}			-40 to +125 °C
(Note)				
. A voltage of $V_{CC}+0.3\text{V}$ or more must not be applied to the input and output pins.				
. For the details of allowable power dissipation, refer to the $P_d - T_a$ characteristics.				

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

		Pin No.	Conditions	unit
Supply Voltage	V_{CC}	8		+5 to +16 V
Input Voltage	V_{IN1+2}	2,3		-0.3 to V_{CC} V
Output Pin Load Resistance	$R_{L OUT}$	14	Between OUT (pin14) and GND (pin7).	15k to 20k ohm

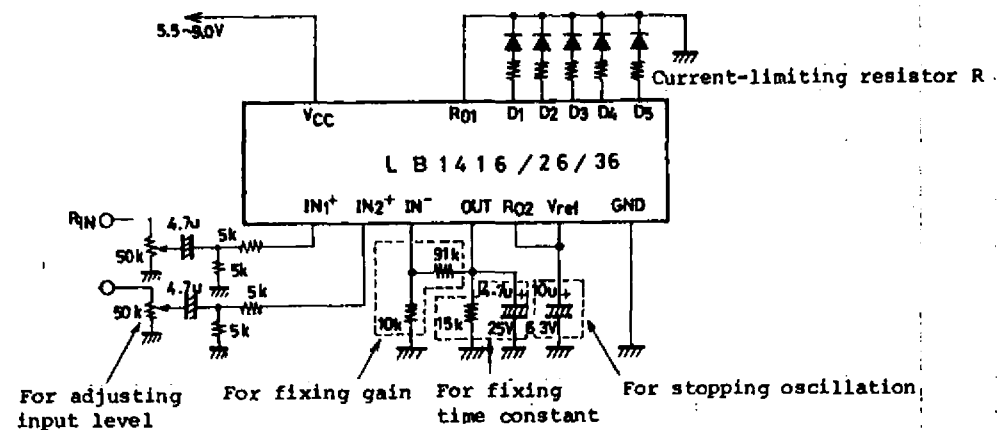
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Electrical Characteristics at $T_a=25^{\circ}\text{C}$, $V_{CC}=5$ to 16V

		Pin No.	Conditions	min	typ	max	unit
Input Bias Current (Amplifier)	$I_{DC}(IN^-)$	1	$V_{IN^-}=0\text{V}$, $V_{IN1^+}=V_{IN2^+}=1\text{V}$	-4		0	μA
	$I_{DC}(IN1^+)$	2	$V_{IN^-}=1\text{V}$, $V_{IN1^+}=V_{IN2^+}=0\text{V}$	-2		0	μA
	$I_{DC}(IN2^+)$	3	$V_{IN^-}=1\text{V}$, $V_{IN1^+}=V_{IN2^+}=0\text{V}$	-2		0	μA
Input Bias Current (Comparator)	$I_{DC}(-C)$	4, 6	$V_{IN^-}=0\text{V}$, $V_{IN1^+}=V_{IN2^+}=1\text{V}$, $V_{RO1}=V_{RO2}=0\text{V}$	-5		0	μA
	$I_{DC}(+C)$	14	$V_{IN^-}=1\text{V}$, $V_{IN1^+}=V_{IN2^+}=0\text{V}$, $V_{OUT}=0\text{V}$, $V_{RO1}=V_{RO2}=V_{ref}$	-5		0	μA
Amplifier Offset Voltage (Amplifier)	$V_{OFF}(1)$	14	$V_{CC}=6$ to 12V , amp gain= 20dB	-150		+150	mV
	$V_{OFF}(2)$	14	$V_{CC}=6$ to 12V , amp gain= 20dB	-150		+150	mV
Reference Voltage	V_{ref}	5	$I_{ref}=0$ to -0.3mA	2.6		3.0	V
Pin D Output Current	$I_{OL}(D)$	9 to 13	$V_{IN^-}=0\text{V}$, $V_{IN1^+}=V_{IN2^+}=1\text{V}$, V_{D1} to $5=2.0$ to 2.3V	-25	-18	-10	mA
Pin D Output Leak Current	$I_{OFF}(D)$	9 to 13	$V_{IN^-}=1\text{V}$, $V_{IN1^+}=V_{IN2^+}=0\text{V}$, V_{D1} to $5=0\text{V}$	-50		0	μA
Output Pin Output Flow-out Current	$I_{OH}(1)$	14	$V_{IN^-}=1\text{V}$, $V_{IN1^+}=V_{CC}$, $V_{IN2^+}=0\text{V}$, $V_{OUT}=0\text{V}$			-3	mA
	$I_{OH}(2)$	14	$V_{IN^-}=1\text{V}$, $V_{IN1^+}=0\text{V}$, $V_{IN2^+}=V_{CC}$, $V_{OUT}=0\text{V}$			-3	mA
Current Dissipation	I_{CC}	8	$V_{IN^-}=1\text{V}$, $V_{IN1^+}=V_{IN2^+}=0\text{V}$		12	25	mA
Amplifier Gain	$VG1$		Open loop	30			dB
	$VG2$		Open loop	30			dB

Sample Application Circuit

1. VU meter (Using one IC)



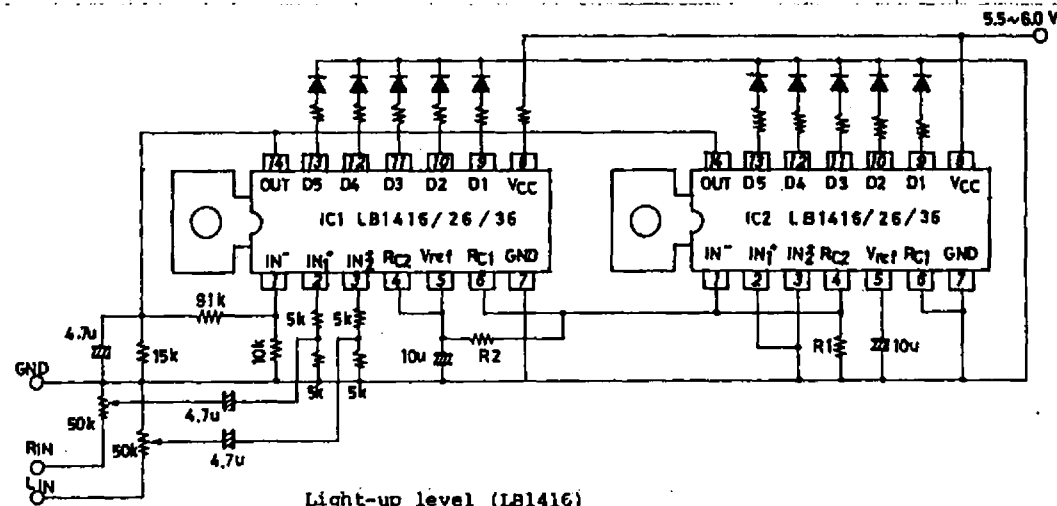
$R=0\Omega$: LED current 18mA typ. (Green LED)

$R=150\Omega$: LED current 6mA typ. (Red LED)

(Note) Use a heat sink so that $P_{dmax.}$ is not exceeded.

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2. VU meter (Using two IC's)



Light-up level (LB1416)

R1	R2	LED No.	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
3.3k	3.3k	dB	-18	-13	-8	-5	-2	-1	0	1.5	2.5	4
2.2k	3.9k	(typ.)	-19	-14	-9	-6	-3	-1.5	0	2	3	5

The variation in the resistance ratio of R1, R2 is desirable to be within $\pm 10\%$.

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