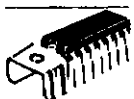


**SANYO**

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  $V_{\text{ref}}$  :  $2.8 \pm 0.2$  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.

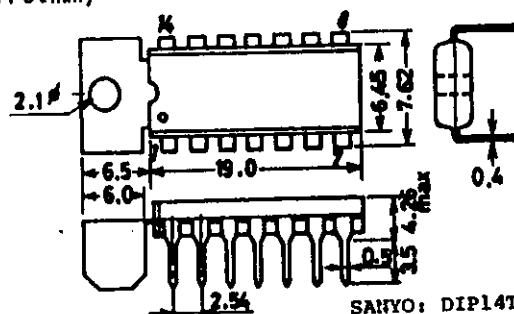
Comparator Level	Symbol	Pin No.	Conditions	LB1416				LB1426			
				min	typ	max	unit	min	typ	max	unit
D5	GD5	Pin 13	$V_{\text{RO2}} = 3.0\text{V}$ $V_{\text{RO1}} = 0\text{V}$	5.5	6.0	6.5	dB	2.9	3.0	3.1	V
D4	GD4	Pin 12		2.5	3.0	3.5	dB	2.3	2.4	2.5	V
D3	GD3	Pin 11		-0.5	0	0.5	dB	1.7	1.8	1.9	V
D2	GD2	Pin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

$V_{\text{RO2}}$  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  $V_{\text{RO2}}$  of the comparator is 3V, 1.5V is taken as 3dB.

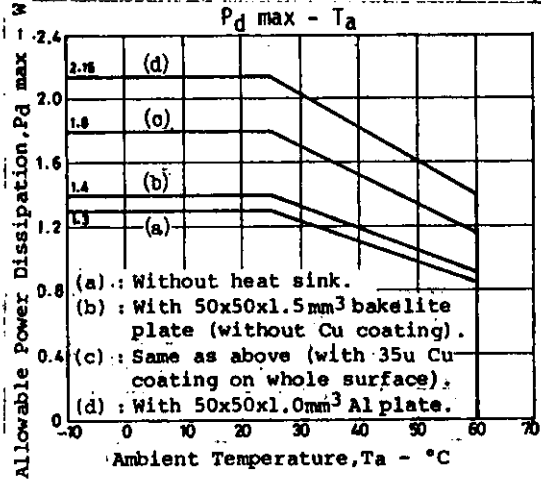
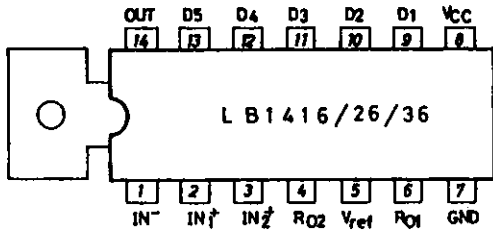
Case Outline 3005A-D14TIC  
(unit:mm)

Specifications and information herein are subject to change without notice.

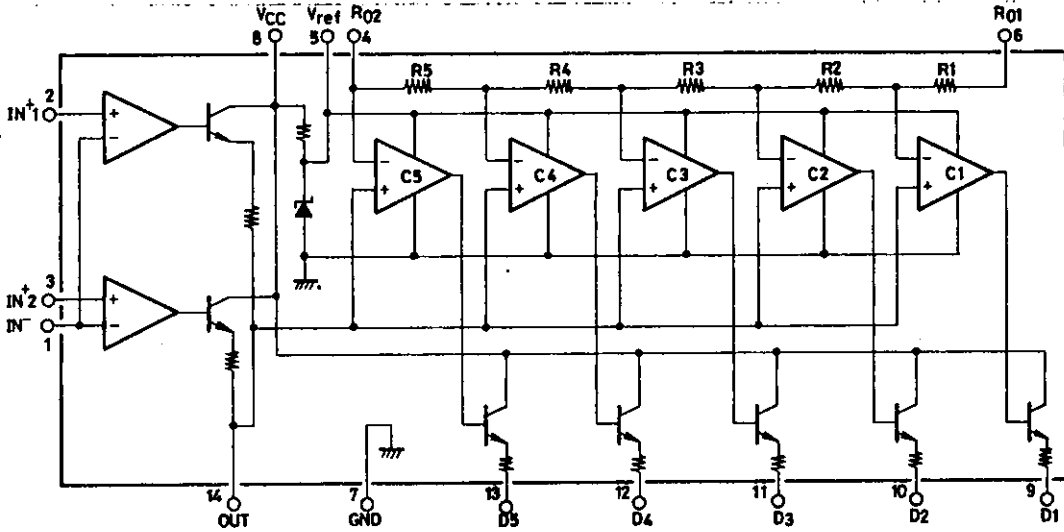
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8297KI/8075MW/7071KI No.624-1/4

Pin Assignment



Equivalent Circuit Block Diagram



Absolute Maximum Ratings at Ta=25°C	Pin No.	Conditions	unit
Maximum Supply Voltage	VCCmax 8		-0.3 to +18 V
Input Voltage	VIN 1, 2, 3		-0.3 to VCC V
Output Voltage	VOUT 14		-0.3 to +8 V
	VOUT(D) 9 to 13	VOUT(D) ≤ VCC at output (D1 to D5) OFF	-0.3 to +10 V
Reference Flow-out Current Iref	5		-1.0 to 0 mA
Allowable Power Dissipation Pdmax		Without heat sink	1.3 W
		With 50 x 50 x 1 mm <sup>3</sup> Al plate	2.15 W
Operating Temperature Topg			-10 to +60 °C
Storage Temperature Tstg			-40 to +125 °C

(Note)

- . A voltage of VCC + 0.3V or more must not be applied to the input and output pins.
- . For the details of allowable power dissipation, refer to the Pd - Ta characteristics.

Allowable Operating Conditions at Ta=25°C

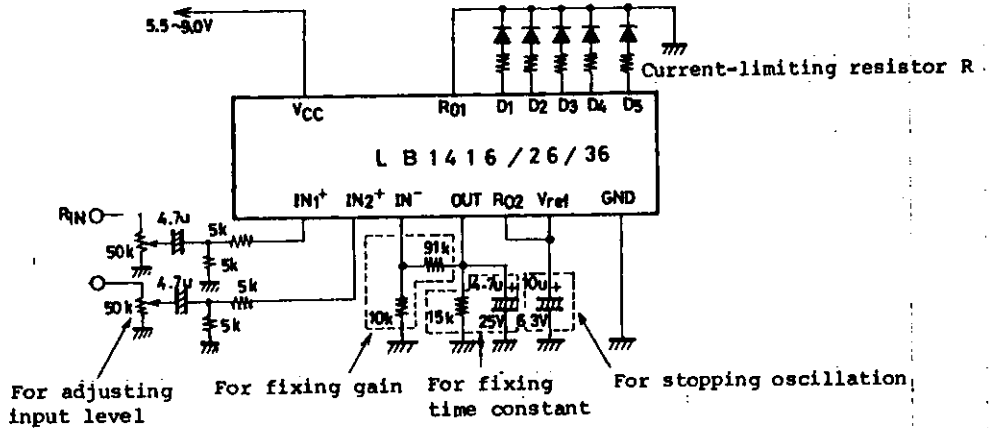
Supply Voltage	VCC	Pin No.	Conditions	unit
Supply Voltage	VCC 8			+5 to +16 V
Input Voltage	VIN1+2 2, 3			-0.3 to VCC V
Output Pin Load Resistance RL OUT	14		Between OUT (pin14) and GND (pin7).	15k to 20k ohm

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

		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	$\mu\text{A}$
	$I_{DC}(IN1^+)$	2	$V_{IN^-}=1\text{V}, V_{IN1^+}=V_{IN2^+}=0\text{V}$	-2		0	$\mu\text{A}$
	$I_{DC}(IN2^+)$	3	$V_{IN^-}=1\text{V}, V_{IN1^+}=V_{IN2^+}=0\text{V}$	-2		0	$\mu\text{A}$
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	$\mu\text{A}$
	$I_{DC}(+C)$	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	$\mu\text{A}$
Amplifier Offset Voltage (Amplifier)	$V_{OFF}(1)$	14	$V_{CC}=6$ to $12\text{V}$ , amp gain= $20\text{dB}$	-150		+150	$\text{mV}$
	$V_{OFF}(2)$	14	$V_{CC}=6$ to $12\text{V}$ , amp gain= $20\text{dB}$	-150		+150	$\text{mV}$
Reference Voltage	$V_{ref}$	5	$I_{ref}=0$ to $-0.3\text{mA}$	2.6		3.0	$\text{V}$
Pin D Output Current $D_1$ to $D_5$	$I_{OL}(D)$	9 to 13	$V_{IN^-}=0\text{V}, V_{IN1^+}=V_{IN2^+}=1\text{V}, V_{D1}$ to $5=2.0$ to $2.3\text{V}$	-25	-18	-10	$\text{mA}$
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	$\mu\text{A}$
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	$\text{mA}$
	$I_{OH}(2)$	14	$V_{IN^-}=1\text{V}, V_{IN1^+}=0\text{V}, V_{IN2^+}=V_{CC}, V_{OUT}=0\text{V}$			-3	$\text{mA}$
Current Dissipation	$I_{CC}$	8	$V_{IN^-}=1\text{V}, V_{IN1^+}=V_{IN2^+}=0\text{V}$		12	25	$\text{mA}$
Amplifier Gain	$V_{G1}$		Open loop	30			$\text{dB}$
	$V_{G2}$		Open loop	30			$\text{dB}$

Sample Application Circuit

1. VU meter (Using one IC)

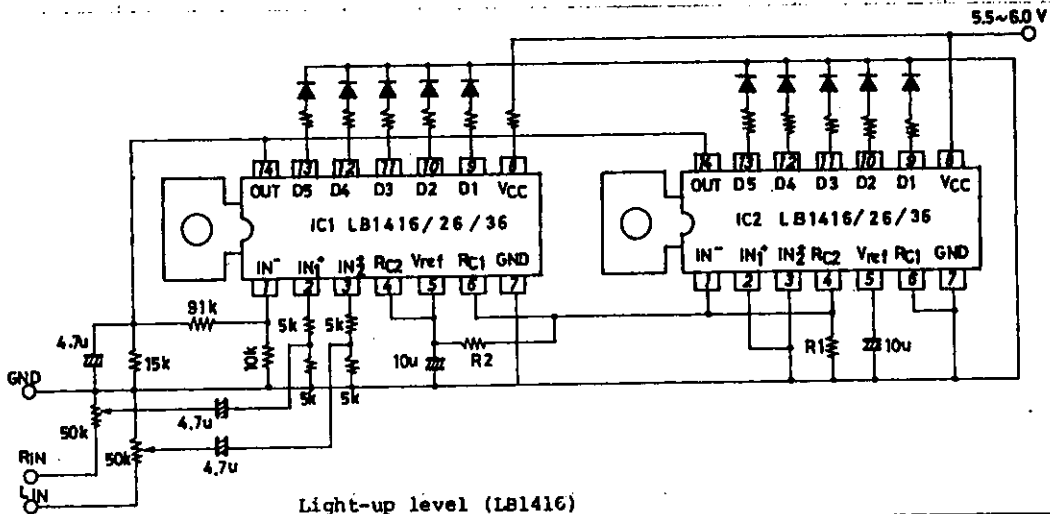


$R=0\text{ohm}$  : LED current  $18\text{mA}$  typ. (Green LED)

$R=150\text{ohms}$  : LED current  $6\text{mA}$  typ. (Red LED)

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

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 (typ.)	-18	-13	-8	-5	-2	-1	0	1.5	2.5	4
2.2k	3.9k		-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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