



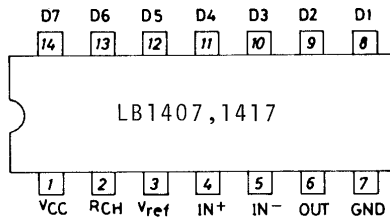
# LB1407, 1417

## AC/DC Voltage Level Meter

### Features and Functions

- The LB1407 and LB1417 are based on dB scale and linear scale respectively.
- The input level is indicated in the form of a bar by means of 7 red/green LEDs.
- The LED current is made variable with an external resistor.
- An input amplifier is built in.
- A wide range of supply voltages is available from 5.5V to 16V.

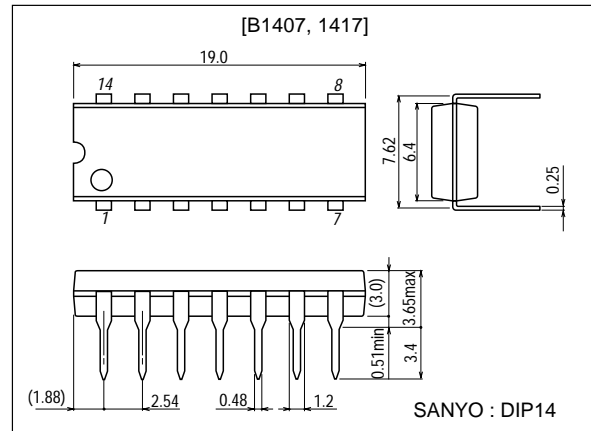
### Pin Assignment



### Package Dimensions

unit:mm

3003B-DIP14



### Comparator Level at $T_a = 25^\circ\text{C}$ , $V_{CC}=12\text{V}$

[LB1407] dB scale

Comparator level	Pin No.	typ	unit
D1	8	-20	dB
D2	9	-10	dB
D3	10	-6	dB
D4	11	-3	dB
D5	12	0	dB
D6	13	3	dB
D7	14	6	dB

(Reference : Linear scale)

typ	unit
150	mV
485	mV
770	mV
1090	mV
1530	mV
2150	mV
3000	mV

[LB1417]

Linear scale

Comparator level	Pin No.	typ	unit
D1	8	430	mV
D2	9	840	mV
D3	10	1280	mV
D4	11	1700	mV
D5	12	2150	mV
D6	13	2570	mV
D7	14	3000	mV

(Reference : dB scale)

typ	unit
-14.0	dB
-8.0	dB
-4.4	dB
-1.9	dB
0	dB
1.6	dB
2.9	dB

■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

■ SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

**SANYO Electric Co.,Ltd. Semiconductor Company**

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

22801TN (KT)/O3195YK/8227KI/8065MW/O071KI, TS No.880-1/4

## Specifications

### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

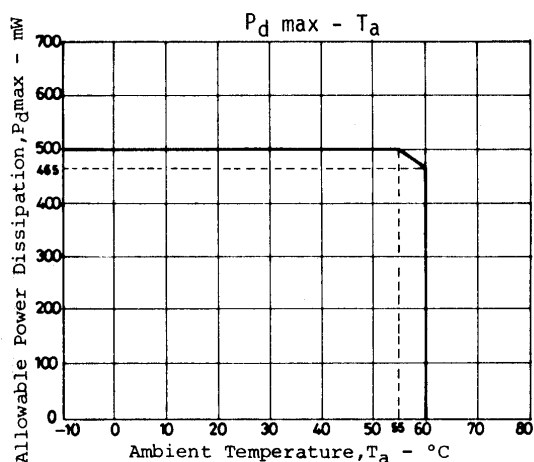
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$	Pin 1	-0.3 to +18	V
Input voltage	$V_{IN}$	Pin 4, 5	-0.3 to $+V_{CC}$	V
D <sub>1</sub> to D <sub>7</sub> output voltage	$V_{OUT(D)}$	D <sub>1</sub> to D <sub>7</sub> OFF	-0.3 to +18	V
D <sub>1</sub> to D <sub>9</sub> output current	$I_{OL(D)}$	Pins 8 to 14, D <sub>1</sub> to D <sub>7</sub> ON	+30	mA
Reference flow-out current	$I_{ref}$	Pin 3	-1 to 0	mA
$V_{OUT}$ supply voltage	$V_{OUT}$	Pin 6	-0.3 to +6	V
Allowable power dissipation	$P_d \text{ max}$	$T_a=55^\circ\text{C}$	500	mW
Operating temperature	$T_{opr}$		-20 to +60	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$	Pin 1	5.5 to 16	V
Input voltage	$V_{IN^+}$ or $V_{IN^-}$	Pin 4 or 5	-0.3 to $V_{CC}$	V
Output pin load resistance	$R_L$	Between pin 6 OUT and pin 7 GND.	15k to 20k	$\Omega$

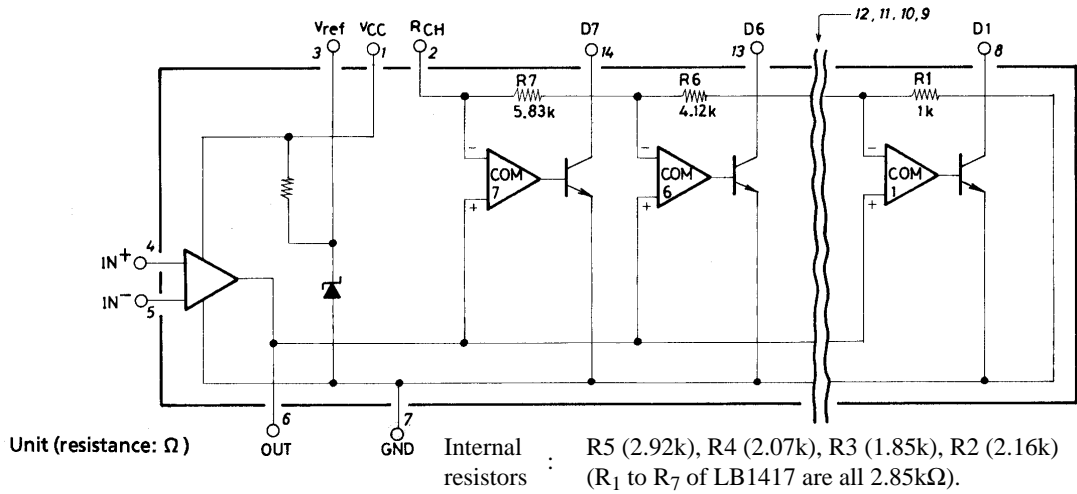
### Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC}=12\text{V}$ (Unless $V_{CC}$ is otherwise specified)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input bias current (Amplifier)	$I_{IN^+(A)}$	Pin 4, $V_{IN^+}=0\text{V}$ , $V_{IN^-}=3\text{V}$ , GND=0V	-2		0	$\mu\text{A}$
	$I_{IN^-(A)}$	Pin 5, $V_{IN^+}=3\text{V}$ , $V_{IN^-}=0\text{V}$ , GND=0V	-2		0	$\mu\text{A}$
Input bias current (Comparator)+output leak current	$I_{IN^+(C)+I_{OL(A)}}$	Pin 6, $V_{IN^+}=0\text{V}$ , $V_{IN^-}=3\text{V}$ , OUT=0V, GND=0V	-10		0	$\mu\text{A}$
Offset voltage (1)	$V_{offset1}$	Pin 6, $V_{CC}=6\text{V}$ , $V_{IN^+}=V_{IN^-}=0\text{V}$ , GND=-6V, GAIN=20dB	-150		+150	mV
Offset voltage (2)	$V_{offset2}$	Pin 6, $V_{IN^+}=V_{IN^-}=0\text{V}$ , GND=0V, GAIN=20dB	0		+150	mV
Reference voltage	$V_{ref}$	Pin 2, $I_{ref}=0$ to 1mA	2.7		3.1	V
Current drain	$I_{CC}$	Pin 1, $V_{IN^+}=3\text{V}$ , $V_{IN^-}=0\text{V}$		8	15	mA
Amplifier gain	VG	Open loop	30			dB
Output flow-out current	$I_{OH}$	Pin 6, $V_{IN^+}=3\text{V}$ , $V_{IN^-}=0\text{V}$ , $V_{OUT}=0\text{V}$			-10	mA
Pin D output ON voltage	$V_{OL(D)}$	Pin 8 to 14, D <sub>1</sub> to D <sub>7</sub> , $I_{OL}=20\text{mA}$ , $V_{IN^+}=3\text{V}$ , $V_{IN^-}=0\text{V}$			1.2	V
Pin D output leak current	$I_{OH(D)}$	Pin 8 to 14, D <sub>1</sub> to D <sub>7</sub> , $V_{IN^+}=0\text{V}$ , $V_{IN^-}=3\text{V}$ , $V_{D1}$ to $D7=12\text{V}$			10	$\mu\text{A}$
Output voltage (Amplifier)	$V_{OH}$	Pin 6, $V_{CC}=5.5\text{V}$ , $V_{IN^+}=3\text{V}$ , $V_{IN^-}=0\text{V}$ , $R_L=15\text{k}\Omega$	4			V
		Pin 6, $V_{CC}=12\text{V}$ , $V_{IN^+}=3\text{V}$ , $V_{IN^-}=0\text{V}$ , $R_L=15\text{k}\Omega$	9.5			V



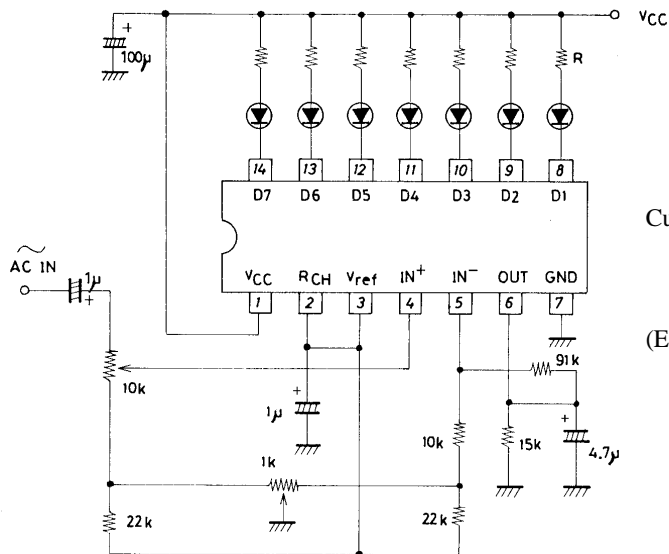
# LB1407, 1417

## Equivalent Circuit



## Application Circuit

Unit (resistance:  $\Omega$ , capacitance: F)



Current flowing to LED :

$$I_{LED} = \frac{V_{CC} - 3}{R}$$

(Example) Assuming  $I_{LED} = 10\text{mA}$  at  $V_{CC} = 12\text{V}$ , R is :

$$R = \frac{12 - 3}{10 \times 10^{-3}} = \frac{9}{10 \times 10^{-3}} = 900\Omega$$

- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of February, 2001. Specifications and information herein are subject to change without notice.