



SANYO Semiconductors

# DATA SHEET

## LA1407 — Monolithic Digital IC LA1417 AC/DC Voltage Level Meter

### Overview

The LA1407 and LA1417 are AC/DC voltage level meter. The LA1407 is based on dB scale and the LA1417 is based on linear scale respectively. The input level is indicated in the form of a bar by means of 7 LED's.

### Functions

- 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

### Comparator Level at Ta = 25°C, VCC=12V

LB1407 Comparator level	Pin No.	dB scale		(Reference: Linear scale)	
		typ	unit	typ	unit
D1	8	-20	dB	150	mV
D2	9	-10	dB	485	mV
D3	10	-6	dB	770	mV
D4	11	-3	dB	1090	mV
D5	12	0	dB	1530	mV
D6	13	3	dB	2105	mV
D7	14	6	dB	3000	mV

LB1417 Comparator level	Pin No.	Linear scale		(Reference: dB scale)	
		typ	unit	typ	unit
D1	8	430	mV	-14.0	dB
D2	9	840	mV	-8.0	dB
D3	10	1280	mV	-4.4	dB
D4	11	1700	mV	-1.9	dB
D5	12	2150	mV	0	dB
D6	13	2570	mV	1.6	dB
D7	14	3000	mV	2.9	dB

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# LB1407, LB1417

## 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 +VCC	V
D1 to D7 output voltage	$V_{OUT(D)}$	D1 to D7 OFF	-0.3 to +18	V
D1 to D7 output current	$I_{OL(D)}$	Pins 8 to 14, D1 to D7	+30	mA
Reference flow-out current	$I_{ref}$	Pin 3	-1 to 0	mA
VOUT 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	$T_{opr}$	[LB1407]	-20 to +70	$^\circ\text{C}$
		[LB1417]	-20 to +60	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

### Allowable Operating Conditions 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	$V_{IN}^+$ to $V_{IN}^-$	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	$\Omega$

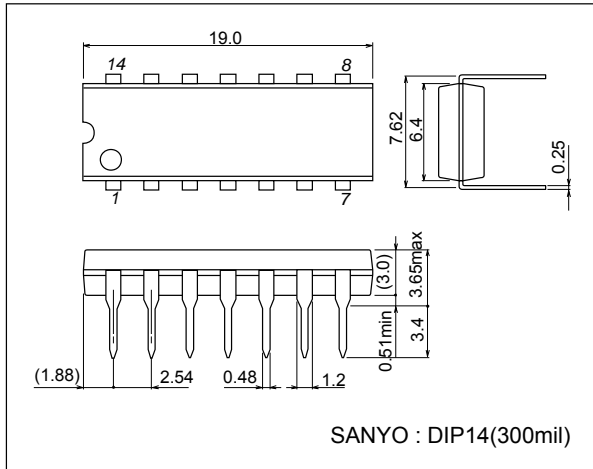
### Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 12\text{V}$ (Unless $V_{CC}$ is otherwise specified)

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	Voffset(1)	Pin 6, $V_{CC}=6\text{V}$ , $V_{IN}^+=V_{IN}^-=0\text{V}$ , GND=-6V, GAIN=20dB	-150		+150	mV
	Voffset(2)	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	$V_G$	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	$V_{OL(D)}$	Pins 8 to 14, D1 to D7, $I_{OL}=20\text{mA}$ , $V_{IN}^+=3\text{V}$ , $V_{IN}^-=0\text{V}$			1.2	V
Pin D output leak current	$I_{OH(D)}$	Pins 8 to 14, D1 to D7, $V_{IN}^+=0\text{V}$ , $V_{IN}^-=3\text{V}$ , VD1 to D7=12V			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

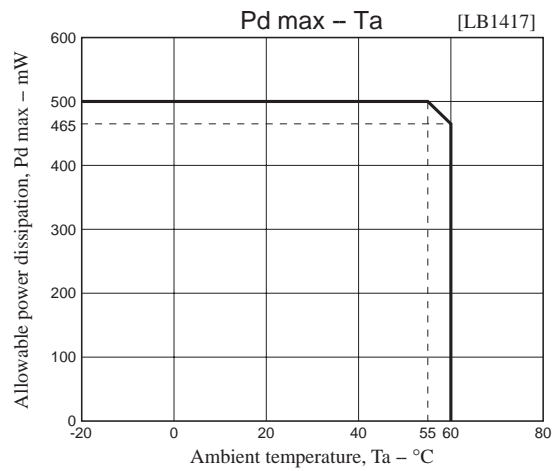
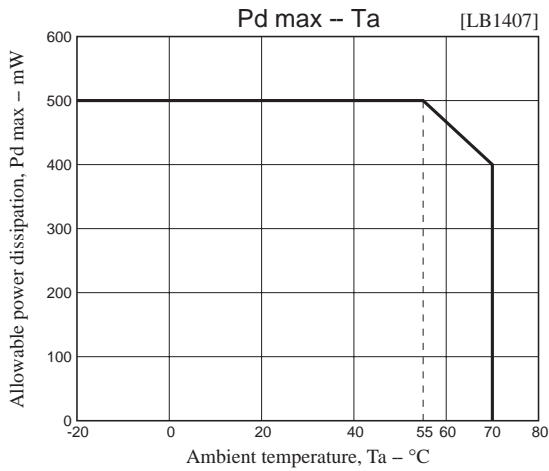
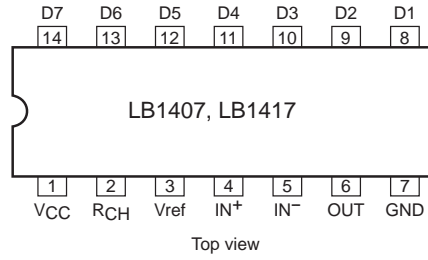
# LB1407, LB1417

## Package Dimensions

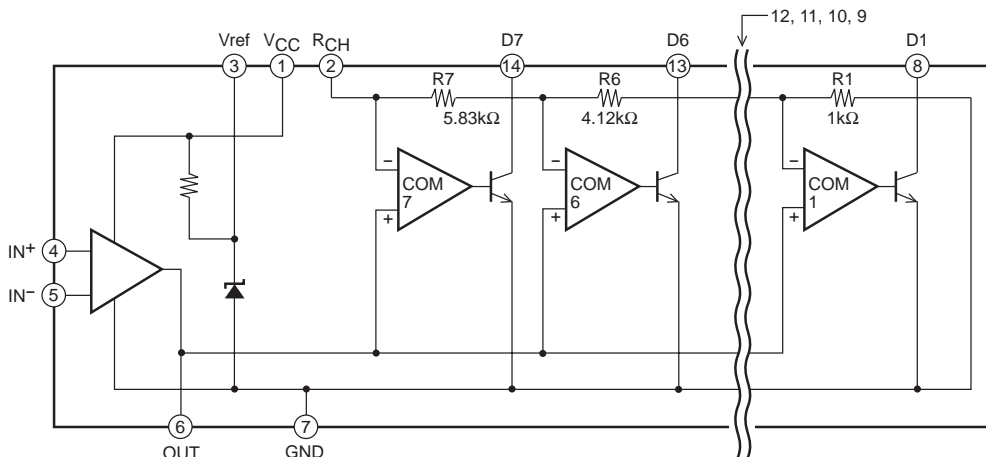
unit : mm (typ)  
3003B



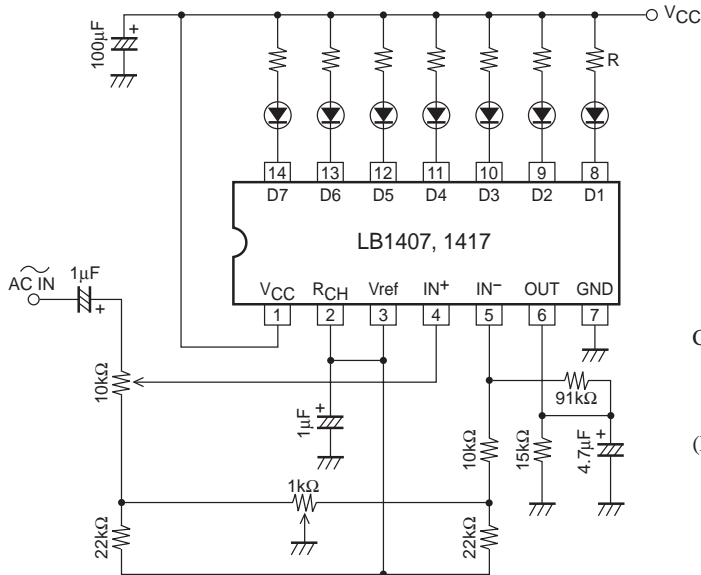
## Pin Assignment



## Equivalent Circuit



Application Circuit Example



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:

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

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