

**SANYO****LB1648****Dual Bidirectional Motor Driver****Overview**

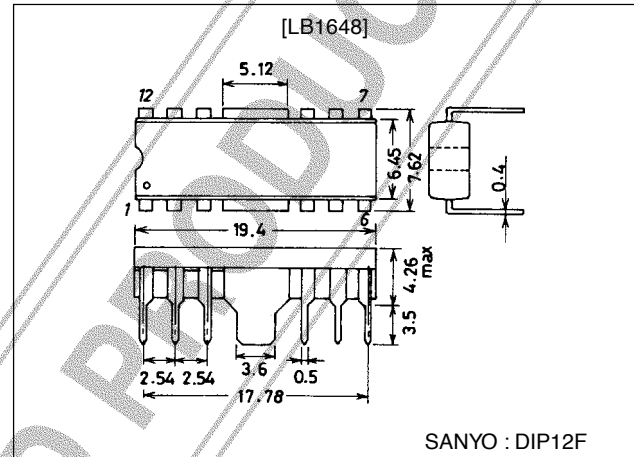
The LB1648 is a dual bidirectional motor driver. It is especially suited for reel motor in cassette deck.

**Features**

- 2-input logic can be used to exercise control of bidirectional driving, braking and open.
- Output voltage variable by use of external Zener diode.
- On-chip thermal protector.

**Package Dimensions**

unit:mm

**3022A-DIP12F****Specifications****Absolute Maximum Ratings at Ta = 25°C**

| Parameter                   | Symbol               | Conditions | Ratings     | Unit |
|-----------------------------|----------------------|------------|-------------|------|
| Maximum supply voltage      | $V_{CC \text{ max}}$ |            | 18          | V    |
| Input voltage               | $V_{IN}$             |            | 18          | V    |
| Output current              | $I_O$                |            | $\pm 0.8$   | A    |
| Allowable power dissipation | $P_d \text{ max}$    |            | 1.9         | W    |
| Operating temperature       | $T_{opr}$            |            | -25 to +75  | °C   |
| Storage temperature         | $T_{stg}$            |            | -55 to +125 | °C   |

**Allowable Operating Conditions at Ta = 25°C**

| Parameter      | Symbol   | Conditions | Ratings  | Unit |
|----------------|----------|------------|----------|------|
| Supply voltage | $V_{CC}$ |            | 7 to +16 | V    |

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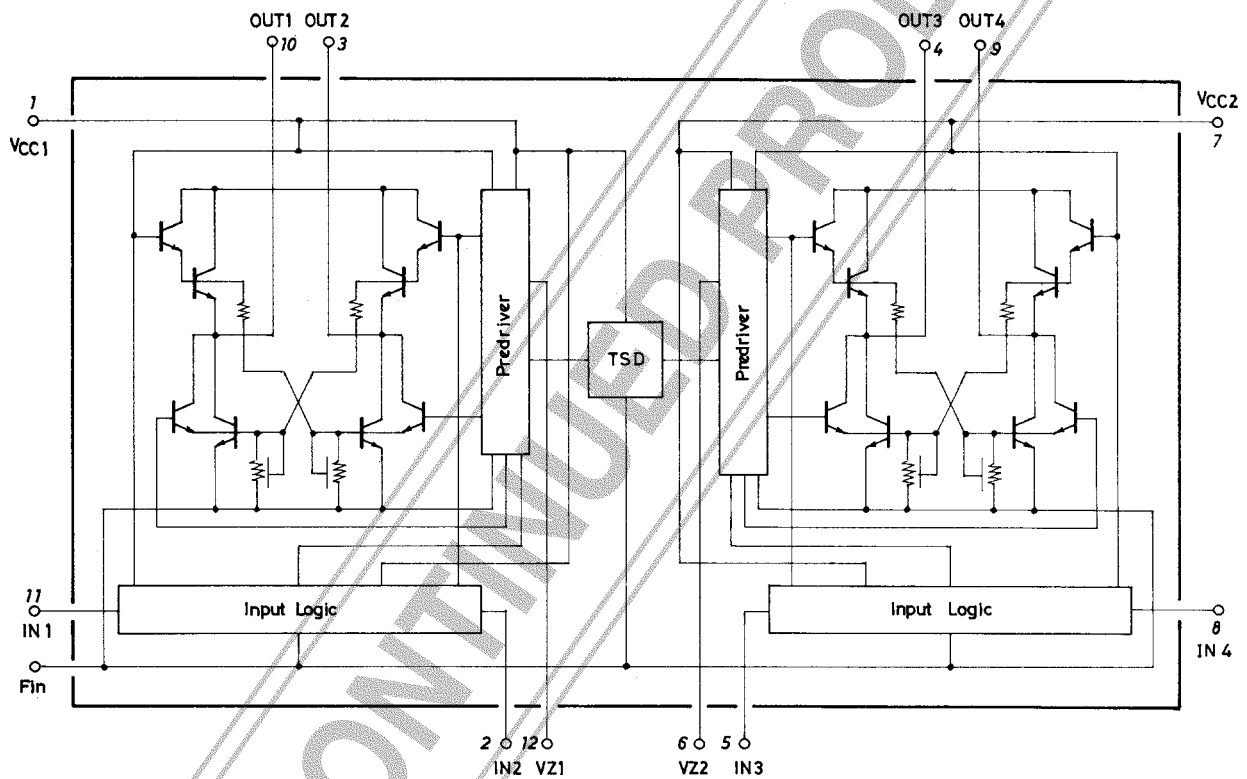
82098HA (KT)/7310TS/1220TA, TS No.3221-1/7

# LB1648

## Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC}=12\text{V}$ , per channel

| Parameter                                    | Symbol     | Conditions                                    | Ratings |      |      | Unit          |
|--|------------|---|---------|------|------|---------------|
|  |            |   | min     | typ  | max  |               |
| Current drain                                | $I_{CC1}$  | Pin 1 forward, $R_L=\infty$ , $V_Z=4\text{V}$ |         | 15   | 22   | mA            |
|  | $I_{CC2}$  | Pin 7 forward, $R_L=\infty$ , $V_Z=4\text{V}$ |         | 14   | 20   | mA            |
|  | $I_{CC3}$  | Pin 7 open, $R_L=\infty$                      |         | 1.5  | 3    | mA            |
| Output leakage current                       | $I_{OL}$   | Braking mode, $R_L=\infty$ , per output pin   |         | 40   | 120  | $\mu\text{A}$ |
| Input threshold voltage                      | $V_{th}$   | $R_L=\infty$                                  | 0.9     | 1.05 | 1.20 | V             |
| Output voltage                               | $V_O$      | $V_Z=4\text{V}$ , $I_{OUT}=85\text{mA}$       | 3.75    | 4.0  | 4.25 | V             |
| Output transistor saturation voltage (upper) | $V_{sat1}$ | $I_{OUT}=200\text{mA}$                        |         | 1.9  | 2.3  | V             |
|  |            | $I_{OUT}=400\text{mA}$                        |         | 2.0  | 2.4  | V             |
| Output transistor saturation voltage (lower) | $V_{sat2}$ | $I_{OUT}=200\text{mA}$                        |         | 0.3  | 0.55 | V             |
|  |            | $I_{OUT}=400\text{mA}$                        |         | 0.5  | 0.7  | V             |
| $V_Z$ pin flow-out current                   | $I_Z$      | $V_Z=4\text{V}$ , $I_{OUT}=0\text{mA}$        | 0.55    | 0.85 | 1.15 | mA            |

## Equivalent Circuit Block Diagram



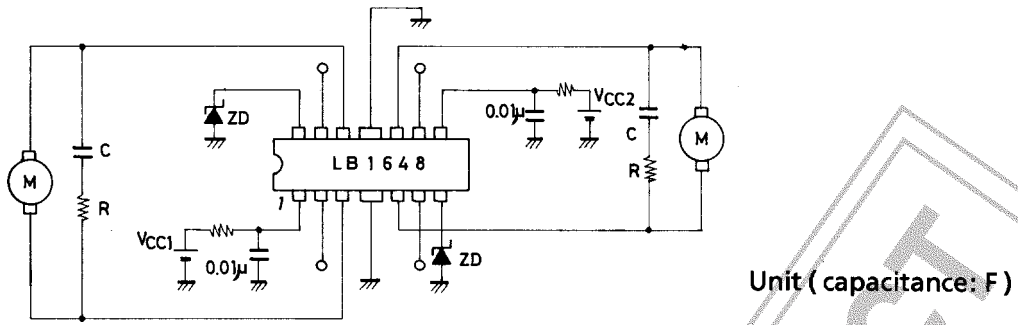
## Logic Section Truth Table

| Mode    | IN1 | IN2 | OUT1 | OUT2 | IN3 | IN4 | OUT3 | OUT4 |
|---------|-----|-----|------|------|-----|-----|------|------|
| Open    | 0   | 0   | Open | Open | 0   | 0   | Open | Open |
| Forward | 1   | 0   | H    | L    | 1   | 0   | H    | L    |
| Reverse | 0   | 1   | L    | H    | 0   | 1   | L    | H    |
| Brake   | 1   | 1   | L    | L    | 1   | 1   | L    | L    |

Note : A capacitor of  $0.01\mu\text{F}$  or greater must be connected across  $V_{CC1,2}$  and GND

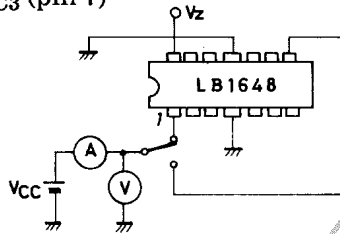
# LB1648

## Sample Application Circuit

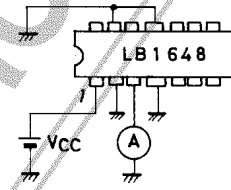


## Test Circuit (1channel)

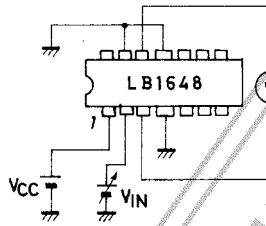
- (1)  $I_{CC1}$  (pin 1)
- $I_{CC2}$  (pin 7)
- $I_{CC3}$  (pin 7)



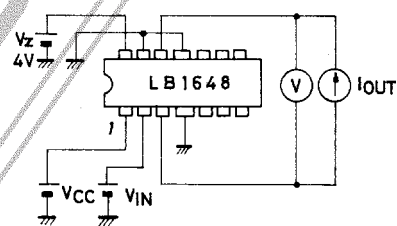
- (2)  $I_{OL}$



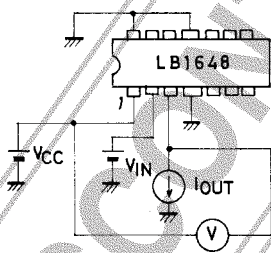
- (3)  $V_{th}$



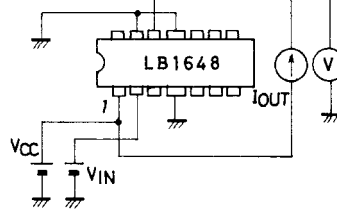
- (4)  $V_o$



- (5)  $V_{sat1}$



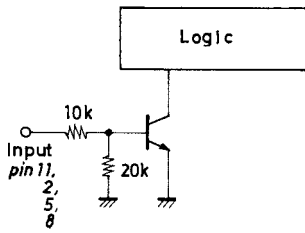
- (6)  $V_{sat2}$



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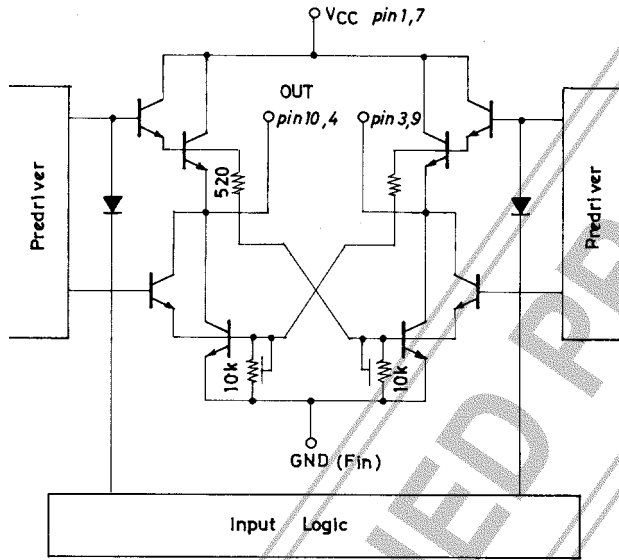
## Internal Circuits Input Circuit



Resistance variations (including temperature characteristics)  
- 35 to +50%

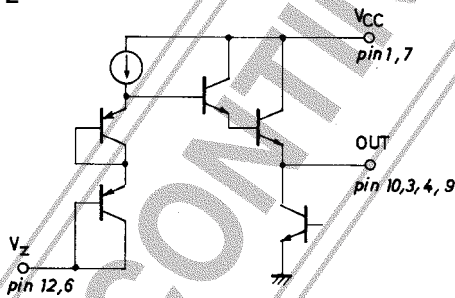
Unit (resistance:  $\Omega$ )

## Output Circuit



Unit (resistance:  $\Omega$ )

## Circuit of Pin $V_z$



$V_{BE}$  of 2 output NPN transistors  
is canceled by  $V_{BE}$  of 2 PNP transistors.  
 $V_o \approx V_z$

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**Design Notes**

1 : Maximum voltage, maximum current

A voltage greater than the supply voltage, 7 to 16V, specified in the Allowable Operating Conditions must not be applied to pins 1 and 7. The maximum current is 0.8A (peak). The rush current at the time of start must not exceed the peak current.

2 : Output transistor protection

A resistor (or for fuse resistor) must be connected to the  $V_{CC}$  line to provide protection against output short, output pin-to-GND short.

3 : Wiring

The bypass capacitors connected across pins 1, 7 and GND must not have an impedance common to other lines, The GND line must be separated from other circuits.

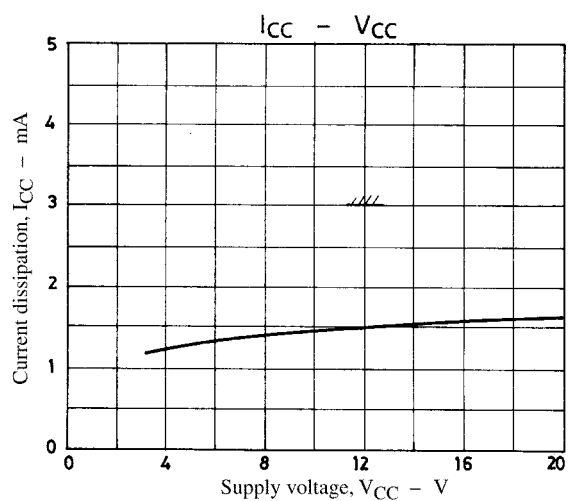
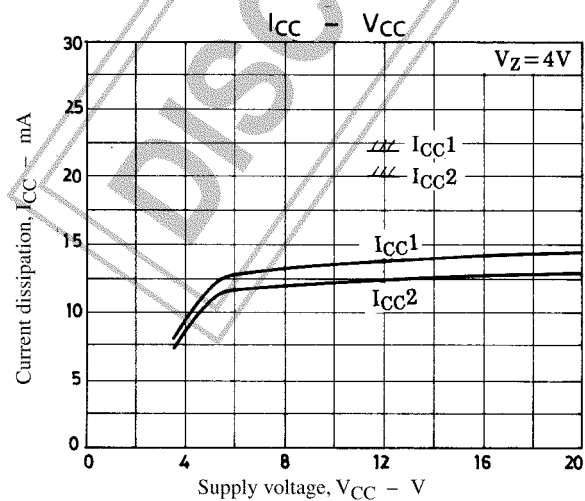
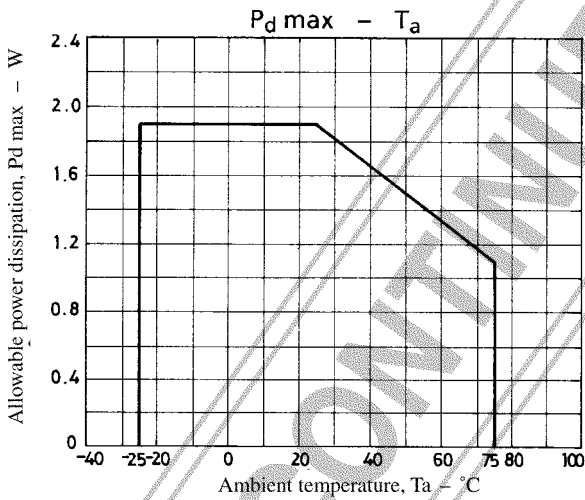
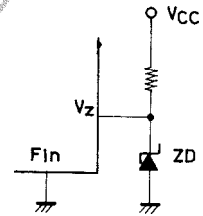
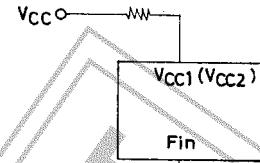
4 : Provision against oscillation

In applications where motors with brush are used, a capacitor may be connectd across both terminals to prevent the spark-caused noise. This capacitor is connected across the output pins of the LB1648, which may cause oscillation to occur. In this case, the capacitor value must be made as small as possible or a resistor must be connected in series.

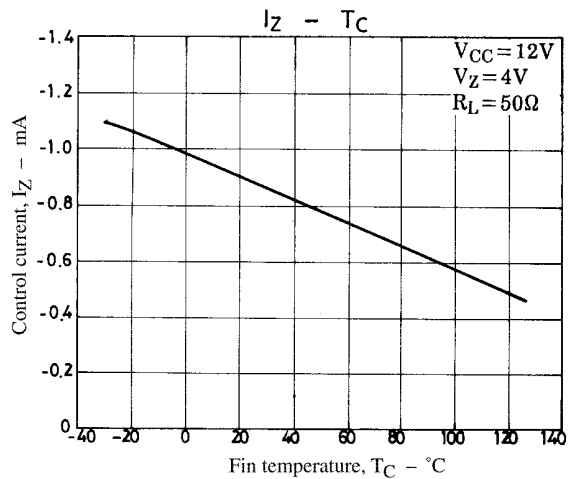
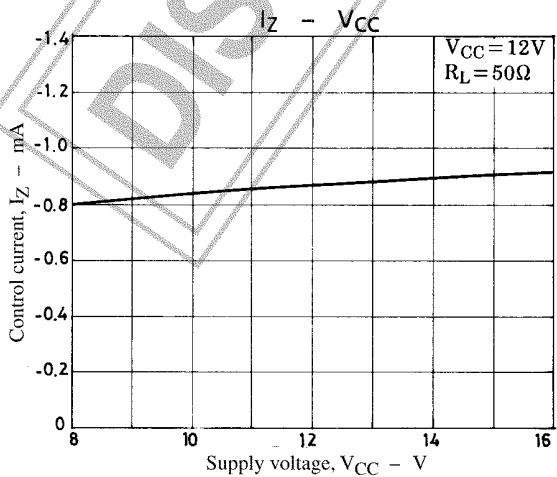
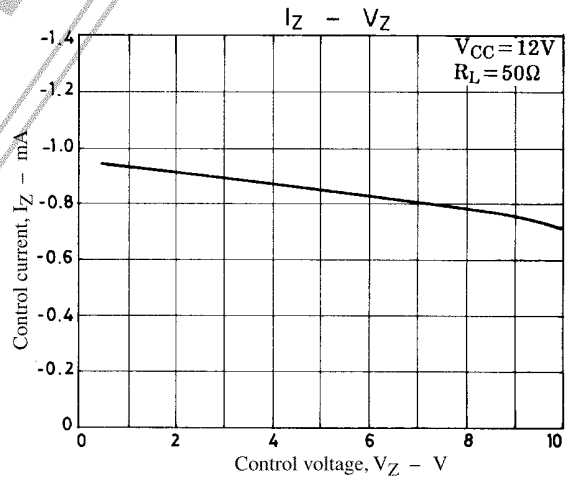
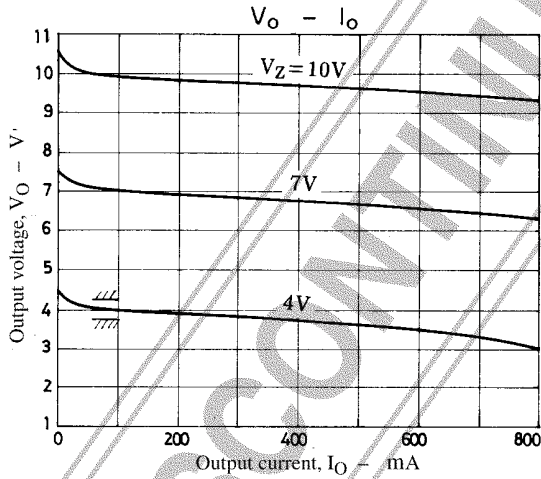
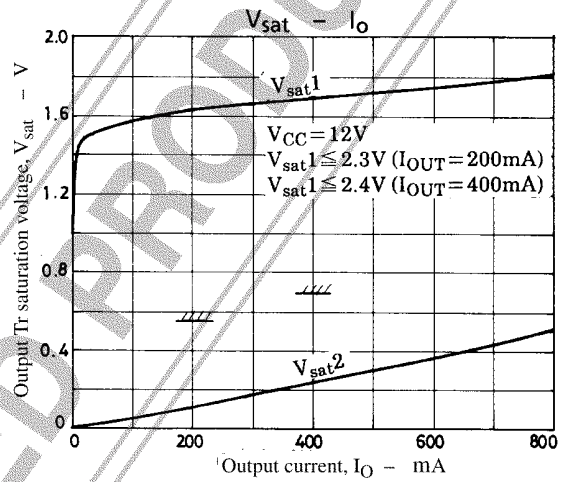
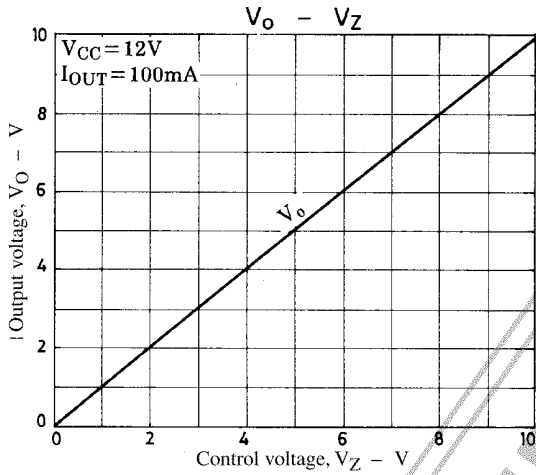
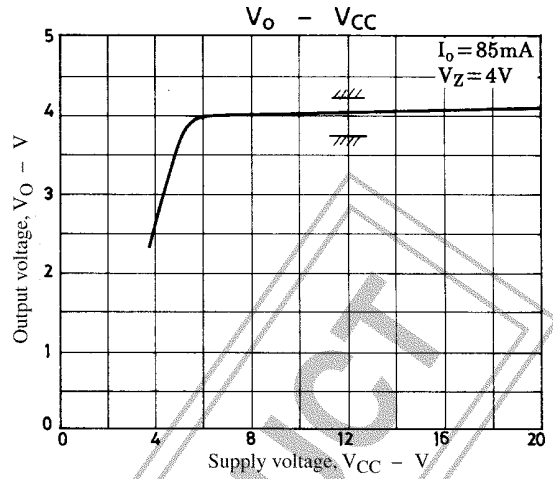
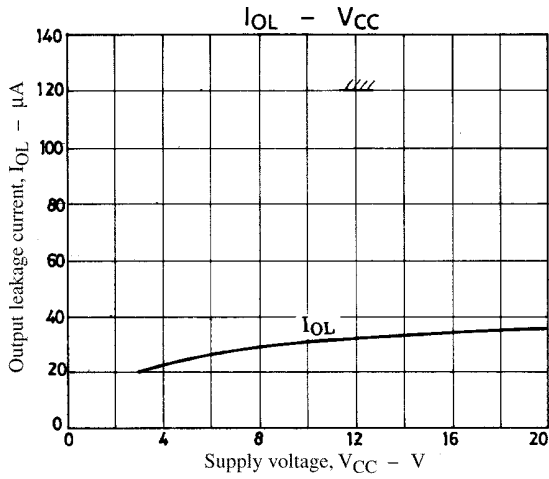
5 : External Zener diode

The current flowing out of the  $V_Z$  pin varies with the load and its maximum value is approximately 1.2mA.

If you use a Zener diode of soft clip type and need an accuracy in voltage, a current required for the Zener diode must be supplied externally.



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