

**SANYO**

No.2003B

**LC8910 Series**

Remote Control LSI

**Overview**

The LC8910 series are LSIs designed for transmit/receive use in remote control system applications. The adoption of a statistical processing circuit entirely original with Sanyo enhances noise-resisting capability greatly.

**Applications**

- HA (home automation) use :  
Air-conditioning equipment, lighting equipment, solar system, radio equipment, home appliances
- Crime preventing monitor system, disaster preventing monitor system :  
Smoke detector, gas detector, fire detector, burglarproof system, electronic key
- Communication system :  
Radio pager, remote data collecting system

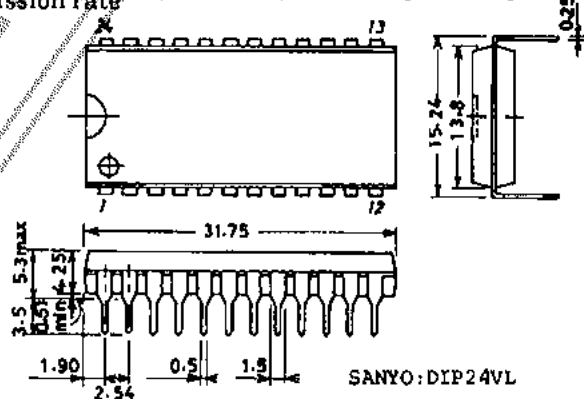
| Type No. | Application | Unique Address Length (bits)* | Data Length (bits) | Package |
|----------|-------------|-------------------------------|--------------------|---------|
| LC8910   | Controller  | 0                             | 20 max             | DIP24   |
| LC8912   | Terminal    | 8                             | 4                  | DIP28   |
| LC8913   | Terminal    | 12                            | 8                  | DIP40   |

\*: Unique address designates individually assigned network addresses.

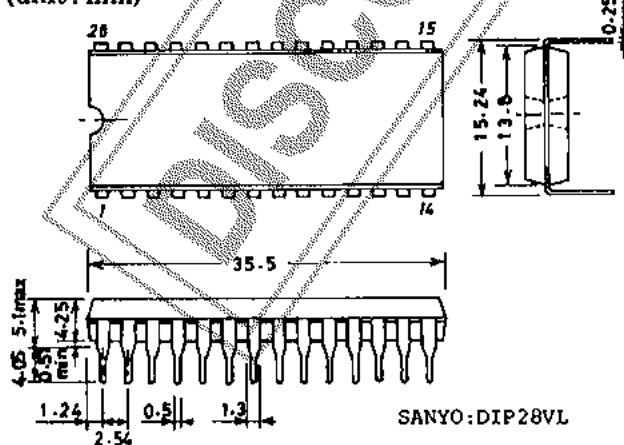
**Features**

- LSIs designed for transmit/receive use
- Transmission line access control : Master polling and CSMA/CD
- Biphase data transmission codes and variable transmission rate
- Modulation : Base band/AM (by on-chip modulation/demodulation circuit)
- Statistical processing circuit adopted to enhance noise-resisting capability greatly
- The LC8910 is capable of interfacing to any microcomputer.
- The LC8912, 8913 require a minimum number of external parts to make up a system.
- Answerback function and broadcast communication function
- CMOS process for low power dissipation

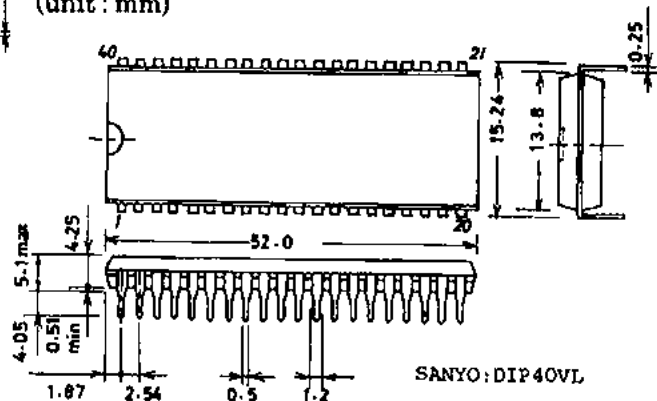
Package Dimensions 3068A [LC8910]  
(unit : mm)



Package Dimensions 3069A [LC8912]  
(unit : mm)



Package Dimensions 3077 [LC8913]  
(unit : mm)



**SANYO Electric Co., Ltd. Semiconductor Business Headquarters**  
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito ku, TOKYO, 110 JAPAN

# LC8910 Series

## Specifications

- Transmission mode : Half-duplex transmission
- Transmission line access control : CSMA/CD
- Modulation : Base band/AM
- Code : Biphase code
- Transmission rate : 15kb/s to 10b/s
- Error detection : Bit rule error  
CKSM error  
Overrun error  
Underrun error  
Transmission error by collision detection
- Answerback : Output data/input data
- Broadcast communication : General broadcast/group broadcast
- Supply voltage : Single 5V
- Power dissipation : 15mW typ

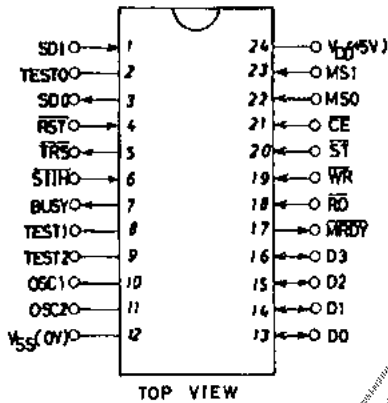
## Signal Format

| PR | ID | DC | ADRS | DATA | CKSM |
|----|----|----|------|------|------|
|----|----|----|------|------|------|

PR : Preamble 12/32 bits  
 ID : Control code 4 bits  
 DC : Data count 4 bits  
 ADRS : Address 0 to 12 bits  
 DATA : Data 0 to 20 bits  
 CKSM : Checksum 4 bits

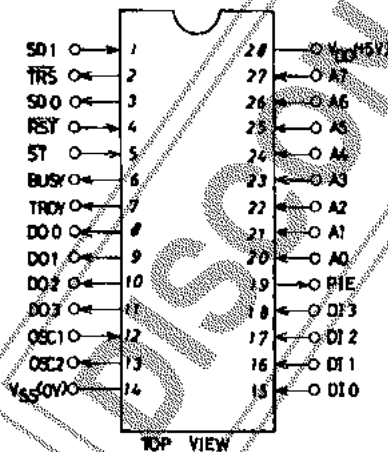
## Pin Description

### 1) LC8910



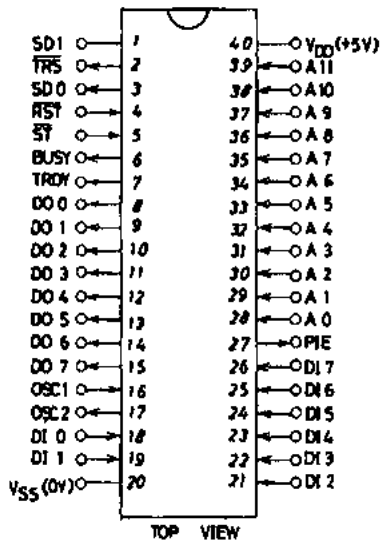
- SDI : Receive signal input
- SDO : Transmit signal output
- RST : Reset input
- TRS : Transmit mode output
- STIH : Receive disable signal input
- BUSY : Busy signal output
- TEST0 to 2 : Test input
- OSC1, 2 : Clock pins
- D0 to 3 : Data input/output
- MRDY : Reception completed signal output
- ST : Start input
- RD : Read input
- WR : Write input
- CE : Chip enable input
- MS0, 1 : Mode select signal input

### 2) LC8912



- SDI : Receive signal input
- TRS : Transmit mode output
- SDO : Transmit signal output
- RST : Reset input
- ST : Start input
- BUSY : Busy signal output
- TRDY : Terminal ready
- DO0 to 3 : Data output
- OSC1, 2 : Clock pins
- DI0 to 3 : Data input
- PIE : Parameter/address select signal output
- A0 to 7 : Address/parameter input

3) LC8913



- SDI : Receive signal input
- TR $\bar{S}$  : Transmit mode output
- SDO : Transmit signal output
- R $\bar{S}\bar{T}$  : Reset input
- ST : Start input
- BUSY : Busy signal output
- TRDY : Terminal ready
- DO0 to 7 : Data output
- OSC1, 2 : Clock pins
- DI0 to 7 : Data output
- PIE : Parameter/address select signal output
- A0 to 11 : Address/parameter input

**Absolute Maximum Ratings at  $T_a = 25^\circ\text{C}$ ,  $V_{SS} = 0\text{V}$**

| Parameter              | Symbol        | Range                  | unit             |
|------------------------|---------------|------------------------|------------------|
| Maximum Supply Voltage | $V_{DD\ max}$ | -0.3 to +7.0           | V                |
| Input Voltage          | $V_I, V_O$    | -0.3 to $V_{DD} + 0.3$ | V                |
| Storage Temperature    | $T_{opr}$     | -55 to +125            | $^\circ\text{C}$ |
| Operating Temperature  | $T_{opg}$     | -30 to +70             | $^\circ\text{C}$ |

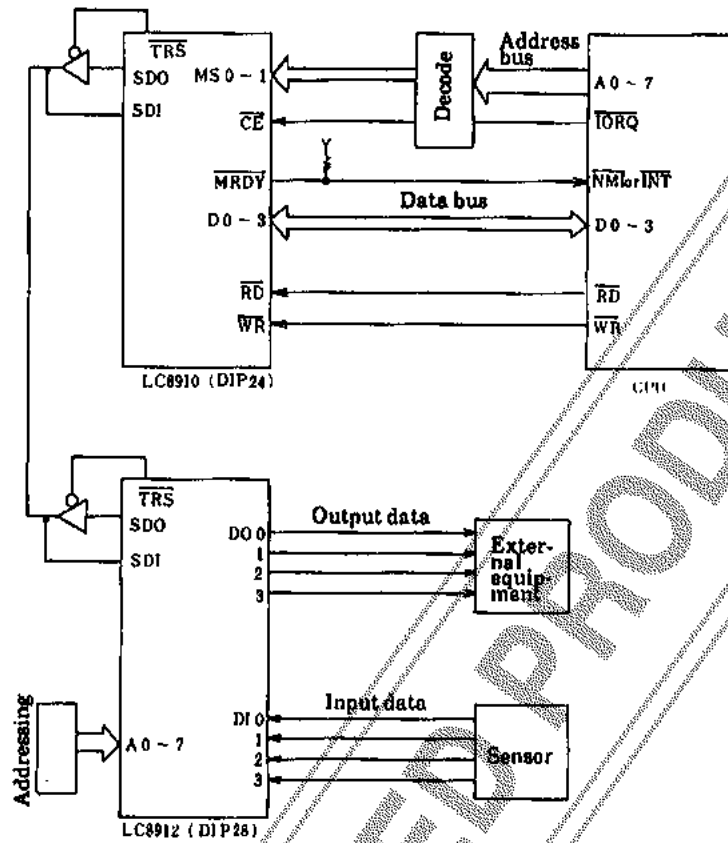
**Allowable Operating Conditions at  $T_a = -30$  to  $+70^\circ\text{C}$**

| Parameter           | Symbol   | min | typ | max      | unit |
|---------------------|----------|-----|-----|----------|------|
| Supply Voltage      | $V_{DD}$ | 4.5 | 5.0 | 5.5      | V    |
| Input Voltage Range | $V_{IN}$ | 0   |     | $V_{DD}$ | V    |

**Electrical Characteristics at  $V_{DD} = 4.5$  to  $5.5\text{V}$ ,  $T_a = -30$  to  $+70^\circ\text{C}$**

| Parameter                       | Symbol      | Condition                  | min  | typ | max            | unit          |
|---------------------------------|-------------|----------------------------|------|-----|----------------|---------------|
| 'H'-Level Input Voltage         | $V_{IH1}$   | Schmitt trigger            | 2.5  |     |                | V             |
|                                 | $V_{IH2}$   |                            | 2.2  |     |                | V             |
|                                 | $V_{IH3}$   | RST pin                    |      |     | $V_{DD} - 0.9$ | V             |
| 'L'-Level Input Voltage         | $V_{IL1}$   | Schmitt trigger            |      |     | 0.6            | V             |
|                                 | $V_{IL2}$   |                            |      |     | 0.8            | V             |
|                                 | $V_{IL3}$   | RST pin                    |      |     | 0.6            | V             |
| 'H'-Level Output Voltage        | $V_{OH}$    | $I_{OH} = -0.4\text{mA}$   | 2.4  |     |                | V             |
| 'L'-Level Output Voltage        | $V_{OL}$    | $I_{OL} = 2\text{mA}$      |      |     | 0.4            | V             |
| Input Leakage Current           | $I_L$       | $V_I = V_{SS}, V_{DD}$     | -25  |     | 25             | $\mu\text{A}$ |
| Output Leakage Current          | $I_{OZ}$    | Output pin : 'H' impedance | -100 |     | 100            | $\mu\text{A}$ |
| OSC Amp 'H'-Level Input Voltage | $V_{IHOSC}$ |                            | 0.8  |     |                | $V_{DD}$      |
| OSC Amp 'L'-Level Input         | $V_{ILOSC}$ |                            |      |     | 0.2            | $V_{DD}$      |

Sample Application Circuit



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