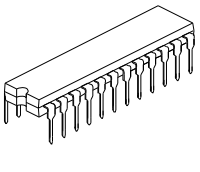
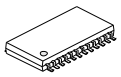
# INFRARED REMOTE CONTROL TRANSMITTER OF 50462 CODE FORMAT

## DESCRIPTION

The SC50462 is a remote control transmitter utilizing CMOS technology specially designed for use on infrared applications. It has 64 functions and a total of 76 commands can be transmitted. Housed in 24 pins DIP package, SC50462 has 2 address bits.



SDIP-24



SOP-24

## FEATURES

* High performance CMOS technology
* Low power consumption
* Least external components.
* Up to 76 instructions
* Double key operation is possible.

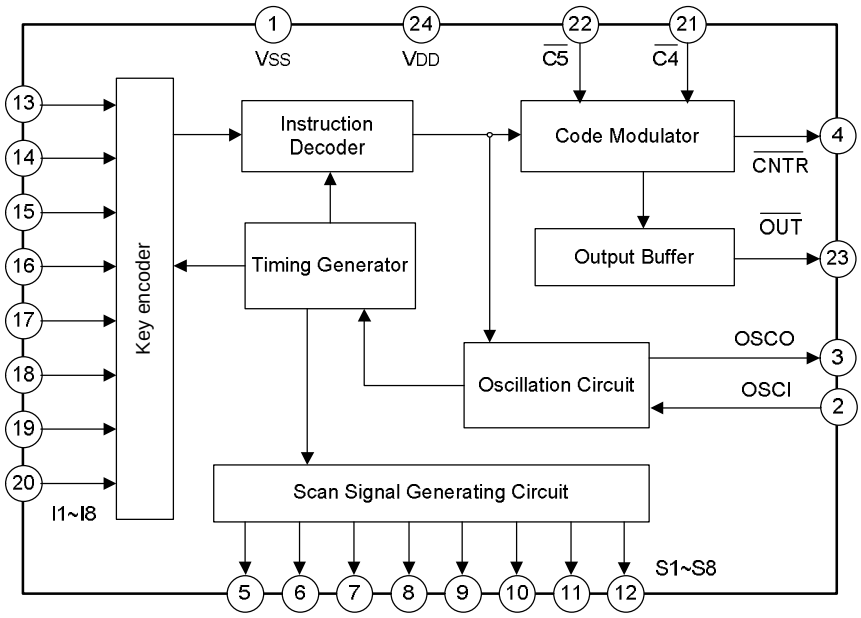
## APPLICATIONS

* Television remote control transmitter
* Video cassette recorder(VCR) remote control transmitter

## ORDERING INFORMATION

| Device | Package |
|---|---|
| SC50462 | SDIP-24-300-2.54 |
| SC50462S | SOP-24-375-1.27 |

## BLOCK DIAGRAM



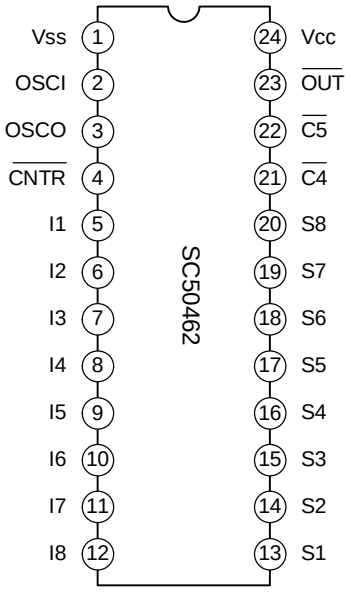
## ABSOLUTE MAXIMUM RATINGS($T_{amb}$=25°C)

| Characteristic | Symbol | Ratings | Unit |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | -0.3 ~ 5.5 | V |
| Input Voltage | $V_{IN}$ | $V_{SS}$-0.3V ~ $V_{CC}$+0.3V | V |
| Output Voltage | $V_{OUT}$ | $V_{SS}$ ~ $V_{CC}$ | V |
| Power Dissipation | $P_D$ | 300 | mW |
| Operating Temperature | $T_{opr}$ | -10 ~ +70 | °C |
| Storage Temperature | $T_{stg}$ | -40 ~ +125 | °C |

## ELECTRICAL CHARACTERISTICS($T_{amb}$=25°C,$V_{CC}$=3.0V,$V_{SS}$=0,Unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Operating Supply Voltage | $V_{CC}$ | $T_{amb}$=20 ~ 70°C | 1.8 | 3 | 5 | V |
| Operating Supply Current | $I_{CC1}$ | $f_{osc}$=455kHz | | | 0.3 | mA |
| Stand-by Current | $I_{CC2}$ | | | | 1 | μA |
| High level Output Current($\overline{OUT}$) | $I_{OH}$ | $V_{OH}$=2V | 5 | | | mA |
| Low level Output Current($\overline{OUT}$) | $I_{OL}$ | $V_{OL}$=1V | -3 | | | mA |
| High level Output Current($\overline{CNTR}$) | $I_{OH}$ | $V_{OH}$=2V | 1 | | | mA |
| Low level Output Current($\overline{CNTR}$) | $I_{OL}$ | $V_{OL}$=1V | -3 | | | mA |

## PIN CONFIGURATION



## PIN DESCRIPTION

| Pin No. | Pin Name | Description |
|---|---|---|
| 1,24 | $V_{SS}$, $V_{CC}$ | Power Supply: $V_{CC}$=3.0V,$V_{SS}$=0V |
| 2,3 | OSCI,OSCO | Oscillator Input/Output Pin, 455 or 480kHz Crystal is connected between these pins. |
| 4 | $\overline{CNTR}$ | Transmitting Indicator. An LED and resistor are connected from this pin to Vcc. |
| 5~12 | I1~I8 | Key Scan Signal Input pins. |
| 13~20 | S1~S8 | Key Scan Signal Output pins. |
| 21,22 | $\overline{C4}$ , $\overline{C5}$ | Custom Code |
| 23 | $\overline{OUT}$ | Modulation Pin |

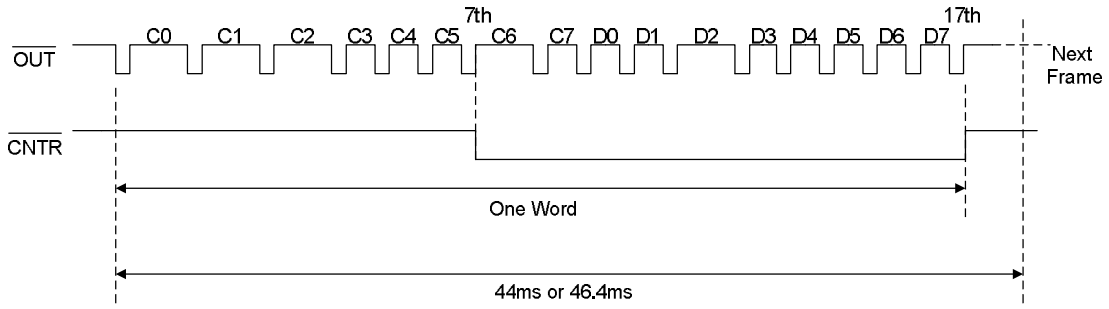
## FUNCTIONAL DESCRIPTION

SC50462 is a sending signal IC on infrared remote control. Consisting of timing generating circuit, scan signal generating circuit, key input encoder, instruction decoder, custom code circuit, code encoder, and output buffer. It has 8*8 key matrix input and custom code with 16 bit PCM which shows 76 instructions.76Instruction are devided in 64 one shot signal and 12 2-shot signal.

When Input Signal(I1~I8) and/or in combination with the Scan Signals(S1~S8) are activated, SC50462 checks the ID and the Custom Code Bits-- $\overline{C4}$ and $\overline{C5}$ --setting before finally sending out the remote control signal.

### 1. $\overline{CNTR}$ OUTPUT

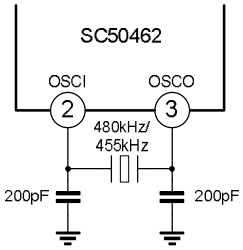
The $\overline{CNTR}$ Pin is the LED transmission Indicator. This means that Whenever a valid transmission is sent, the LED lights up. The $\overline{CNTR}$ output becomes “L” in the 7th pulse-rising and “H” in the 17th pulse-rising.




Note: Oscillator Frequency=480 or 455kHz

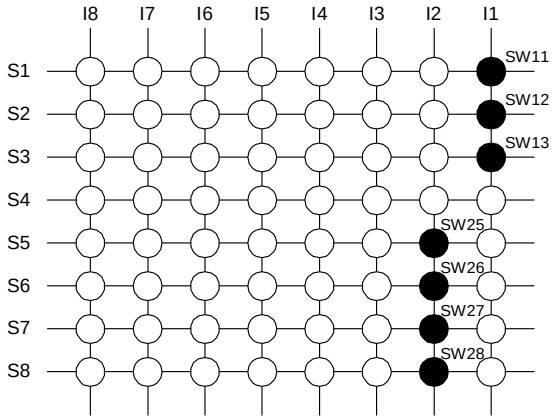
### 2. OSCILLATING CIRCUIT

An oscillator circuit may be constructed by using a 480kHz or 455kHz Crystal Resonator and two capacitors. Please refer to the following diagram. The carrier frequency transmitted is 40kHz or 37.9kHz.Unless any legal key input is activated, the oscillation is automatically stopped. Thus ,power consumption is considerably reduced.



## 3. KEY INPUT

A total of 64 keys may be connected by Input Pins(I1~I8) and Output Pins(S1~S8) to form an 8x8 Key Matrix. Double key operation is possible for only one of the keys—SW25~SW28 in combination with any one of the keys –SW11~SW13. Any other key combination are regards as illegal and will not generate any activity. Thus, only the following key combinations may be used for the doubled key operation:




SW25 and SW11
SW25 and SW12
SW25 and SW13

SW26 and SW11
SW26 and SW12
SW26 and SW13

SW27 and SW11
SW27 and SW12
SW27 and SW13

SW28 and SW11
SW28 and SW12
SW28 and SW13

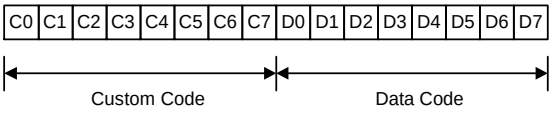
Note:

SC50462 permits two keys function but only "●" key are allowed.

When you push one key of SW11/12/13, you can push with another key of SW25/26/27/28. Otherwise, other conditions are illegal.

## 4. TRANSMISSION CODE

The transmission Code consists of 16 bits, namely: 8 bits custom code(C0~C7 ) and 8 bits data code (D0~D7). Please refer to the table below:




One frame of the Transmission Code

If a Single Shot Key is depressed, data Codes—D6 and d7 will be given the value of (0,0).Please refer to the table1.If a valid double key operation is performed, the data codes will receive the values described in Table 2.

*Table 1: Key Matrix/Code*

| Scan Output | Data | | | Octal display |
|---|---|---|---|---|
| | D0 | D1 | D2 | |
| S1 | 0 | 0 | 0 | 0 |
| S2 | 1 | 0 | 0 | 1 |
| S3 | 0 | 1 | 0 | 2 |
| S4 | 1 | 1 | 0 | 3 |
| S5 | 0 | 0 | 1 | 4 |
| S6 | 1 | 0 | 1 | 5 |
| S7 | 0 | 1 | 1 | 6 |
| S8 | 1 | 1 | 1 | 7 |

| Key Input | Data | | | Octal display |
|---|---|---|---|---|
| | D3 | D4 | D5 | |
| I1 | 0 | 0 | 0 | 0 |
| I2 | 1 | 0 | 0 | 1 |
| I3 | 0 | 1 | 0 | 2 |
| I4 | 1 | 1 | 0 | 3 |
| I5 | 0 | 0 | 1 | 4 |
| I6 | 1 | 0 | 1 | 5 |
| I7 | 0 | 1 | 1 | 6 |
| I8 | 1 | 1 | 1 | 7 |

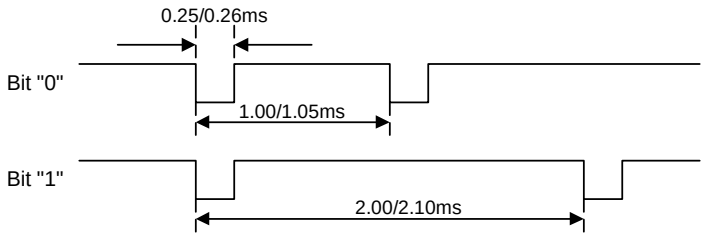
*Table 2: Double Key Signal/Code*

| Scan Output | | Data Code | | | | | | | | Octal Display | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D0~D2 | D3~D5 | D6~D7 |
| S1/I1 (SW11) | S5/I2 (SW25) | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 4 | 1 | 1 |
| | S6/I2 (SW26) | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 5 | 1 | 1 |
| | S7/I2 (SW27) | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 6 | 1 | 1 |
| | S8/I2 (SW28) | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 7 | 1 | 1 |
| S2/I1 (SW12) | S5/I2 (SW25) | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 4 | 1 | 2 |
| | S6/I2 (SW26) | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 5 | 1 | 2 |
| | S7/I2 (SW27) | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 6 | 1 | 2 |
| | S8/I2 (SW28) | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 7 | 1 | 2 |
| S3/I1 (SW13) | S5/I2 (SW25) | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 4 | 1 | 3 |
| | S6/I2 (SW26) | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 5 | 1 | 3 |
| | S7/I2 (SW27) | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 6 | 1 | 3 |
| | S8/I2 (SW28) | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 7 | 1 | 3 |

## 5. CUSTOM CODE

SC50462 has a total of 8 bits custom code (C0~C7). Custom Code Bits –C4 and C5 can be externally selected using the $\overline{C4}$ and $\overline{C5}$ Terminals. The $\overline{C4}$ and $\overline{C5}$ pins are inversed; therefore, if the $\overline{C4}$ and $\overline{C5}$ terminals are pulled HIGH, then the Custom Code Bits—C4 and C5 would have the Value(0,0). Likewise, when pulled LOW, then C4 and C5 bits will be (1,1),The other Customs Code Bits,namely:C0~C3 and C6,C7 are fixed at (1,1,1,0) and (1,0 ):

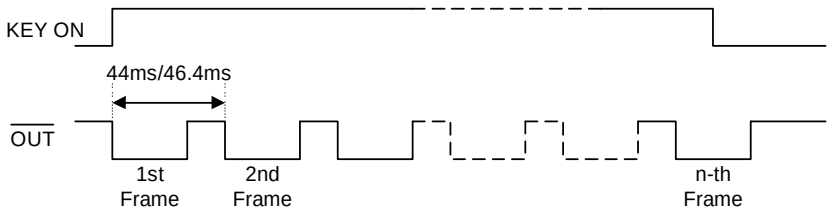
The waveform of bits are given below:




Note: Oscillator Frequency=480 or 455kHz

## 6. KEY ON TIMING

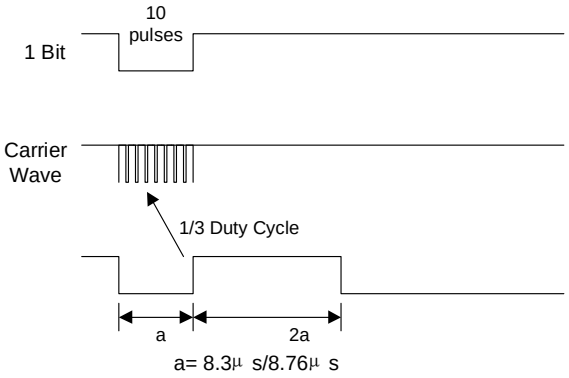
When any key is pressed, the output pin-- $\overline{OUT}$ continuously generates the waveform described below until the key is released.




Note: Oscillator Frequency=480 or 455kHz

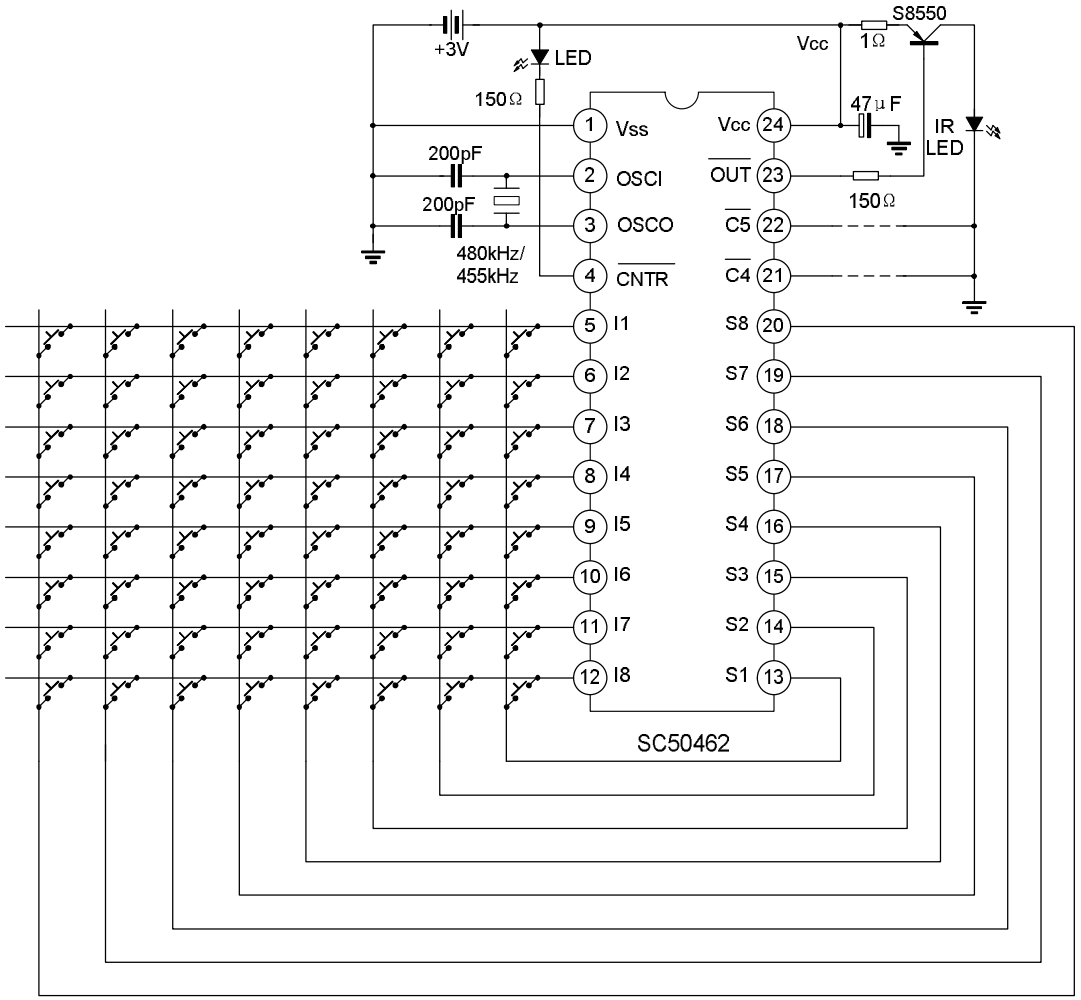
## 7. CARRIER WAVEFORM

The following is the carrier waveform diagram. A bit modulates 10 carrier waveforms.

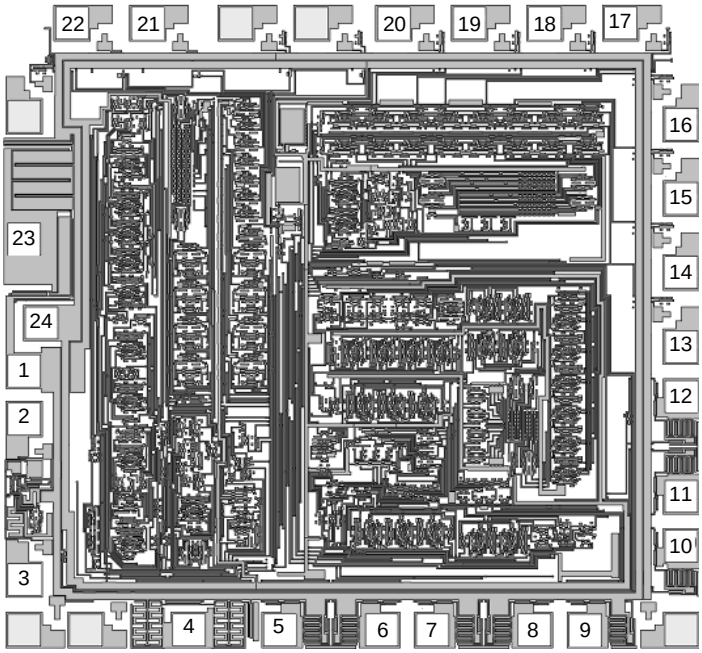



Note: Oscillator Frequency=480 or 455kHz

## TYPICAL APPLICATION CIRCUIT



## CHIP TOPOGRAPHY



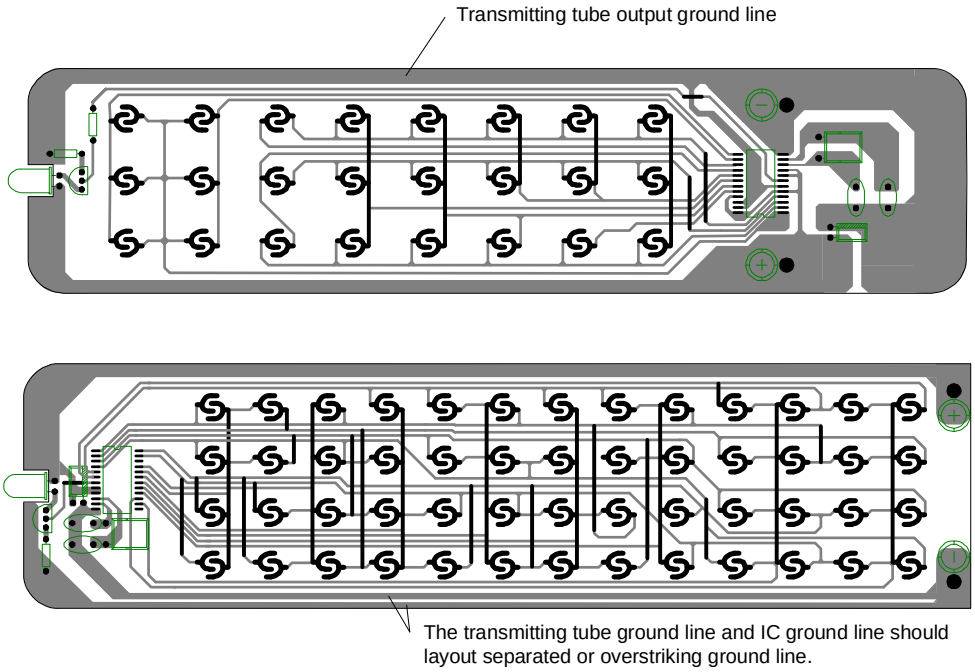

size: 1.96 x 2.07mm$^2$

## PAD COORDINATES (Unit: μm)

| No. | Symbol | X | Y | No. | Symbol | X | Y |
|---|---|---|---|---|---|---|---|
| 1 | P1 | -904.75 | -122.00 | 13 | P13 | 906.00 | 54.50 |
| 2 | P2 | -904.75 | -258.25 | 14 | P14 | 906.00 | 154.00 |
| 3 | P3 | -904.75 | -709.00 | 15 | P15 | 906.00 | 362.50 |
| 4 | P4 | -450.25 | -851.25 | 16 | P16 | 906.00 | 571.00 |
| 5 | P5 | -200.25 | -851.25 | 17 | P17 | 739.00 | 854.75 |
| 6 | P6 | 80.75 | -851.25 | 18 | P18 | 530.50 | 854.75 |
| 7 | P7 | 220.75 | -851.25 | 19 | P19 | 322.00 | 854.75 |
| 8 | P8 | 501.75 | -851.25 | 20 | P20 | 113.50 | 854.75 |
| 9 | P9 | 641.75 | -851.25 | 21 | P21 | -564.75 | 854.75 |
| 10 | P10 | 906.00 | -615.50 | 22 | P22 | -773.25 | 854.75 |
| 11 | P11 | 906.00 | -475.50 | 23 | P23 | -904.75 | 248.00 |
| 12 | P12 | 906.00 | -194.50 | 24 | P24 | -857.00 | 12.00 |

Note: The original point of the coordinate is the die center.

## PCB WIRE LAYOUT SCHEMATIC



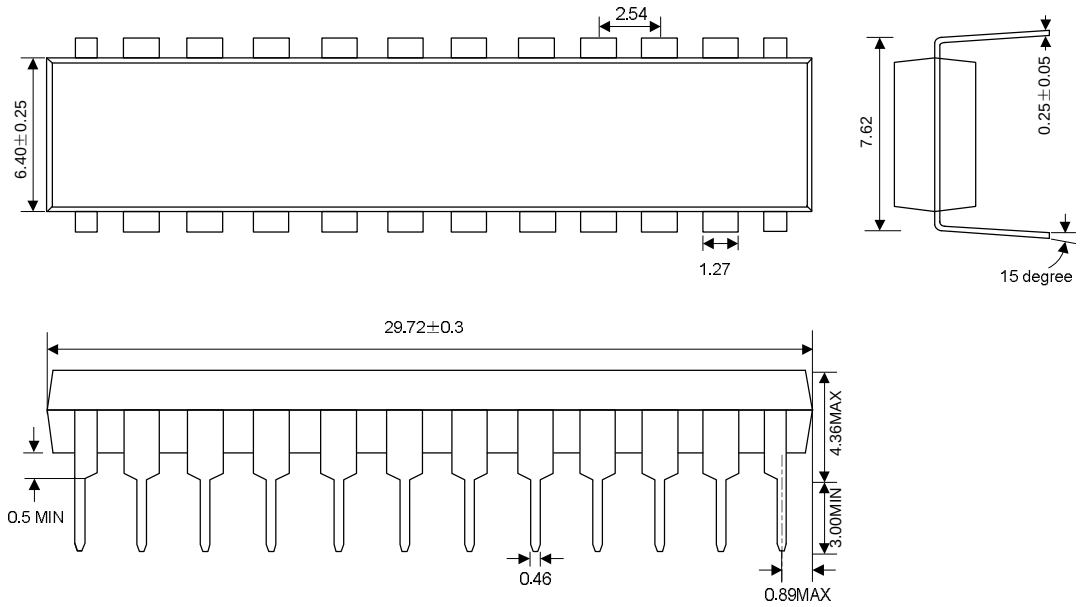

The above IC only use to hint, not to specified.

Note:

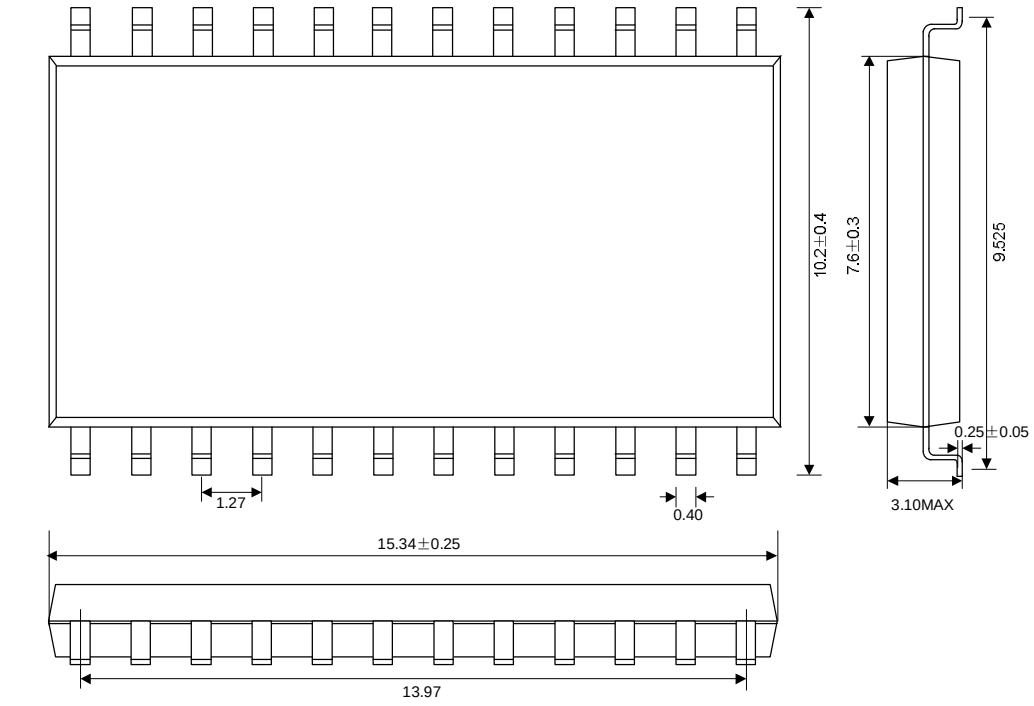
* In wire layout, the power filter capacitor should near to IC.
* In wire layout, should avoid power line and ground line too long.
* Recommended infrared transmit unit and IC ground line should layout separated, or overstriking lines.
* The emitter of triode connect 1 Ω resistor at least.

## PACKAGE OUTLINE

**SDIP-24-300-2.54** UNIT: mm




**SOP-24-375-1.27** UNIT: mm



**HANDLING MOS DEVICES:**

Electrostatic charges can exist in many things. All of our MOS devices are internally protected against electrostatic discharge but they can be damaged if the following precautions are not taken:

- Persons at a work bench should be earthed via a wrist strap.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed for dispatch in antistatic/conductive containers.