

SANYO

No. 2119D

LC7461M**Infrared Remote Control Transmitter IC****Functions**

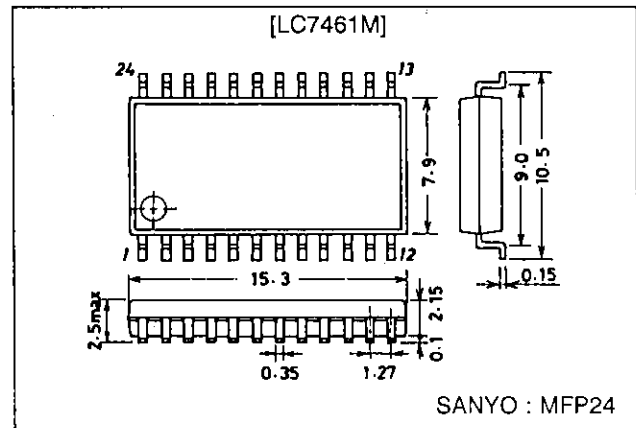
- 32⊕3 function keys
- 13-bit custom codes
- Operating supply voltage range $V_{DD} = 1.8$ to 3.6 V
- Supply current at the standby mode $I_{DD} = 1$ μ A or less
- Double-press operation keys (no priority given)
- On-chip oscillator (ceramic resonator : connected externally)

Features

- The custom code consists of 7 bits to be fixed by the on-chip ROM and 6 bits being pin-settable. Sixty-four custom codes may be selected externally (no diode required).
- Minimum number of external parts required

Package Dimensions

unit : mm

3045B-MFP24**Specifications****Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$**

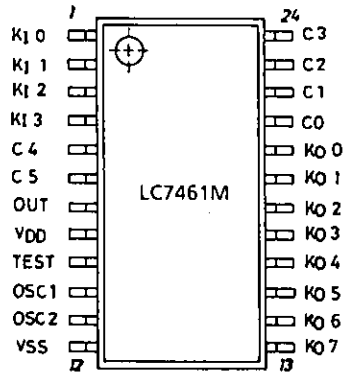
| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|----------------------|-----------------------------|----------------------------------|------------------|
| Maximum supply voltage | $V_{DD \text{ max}}$ | V_{DD} | $V_{SS} - 0.3$ to $+5.5$ | V |
| Input voltage | V_{IN} | Each input pin | $V_{SS} - 0.3$ to $V_{DD} + 0.3$ | V |
| Output voltage | V_{OUT} | Each output pin | $V_{SS} - 0.3$ to $V_{DD} + 0.3$ | V |
| Output current | I_{OUT} | OUT | -35 | mA |
| Allowable power dissipation | $P_d \text{ max}$ | $T_a \leq 85^\circ\text{C}$ | 150 | mW |
| Operating temperature | T_{opr} | | -40 to +85 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -50 to +125 | $^\circ\text{C}$ |

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

| Parameter | Symbol | Pin Name | Conditions | min | typ | max | Unit |
|--------------------------|-----------|------------------------------------------|---------------------|--------------|-----|-------------|------|
| Supply voltage | V_{DD} | V_{DD} | $f_{OSC} = 455$ kHz | 1.8 | 3.0 | 3.6 | V |
| Input high-level voltage | V_{IH} | K_{j0} to K_{j3} , C_0 to C_5 | | $0.7 V_{DD}$ | | V_{DD} | V |
| Input low-level voltage | V_{IL} | K_{j0} to K_{j3} , C_0 to C_5 | | V_{SS} | | $0.3V_{DD}$ | V |
| Oscillation frequency | f_{OSC} | | | 400 | 455 | 500 | kHz |

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Pin Assignment



Top view

Pin Description

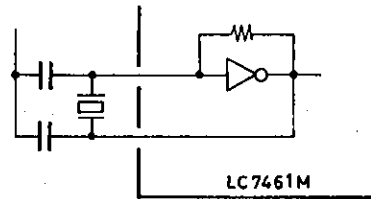
| Pin Name | Pin No. | Input/Output | Internal Equivalent Circuit | Pin Function |
|--------------------------------------|-------------------|--------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------|
| V _{DD} , V _{SS} | 8, 12 | | | Power supply pins V _{SS} = GND |
| K ₀ 0 to K ₀ 7 | 13 to 20 | Output | | Key scan timing signal output pins |
| K ₁ 0 to K ₁ 3 | 1 to 4 | Input | | Keys return signal entry pins |
| OSC1 OSC2 | 10 11 | Input/output | | Input/output pins for ceramic resonator-used oscillation Oscillator configuration |
| C ₀ to C ₅ | 21 to 24, 5, 6 | Input | | Input pins for custom code setting Capable of externally setting 6 bits of 13 bits in all that provide a custom code |
| OUT | 7 | Output | | Output pin for transmit LED drive |
| TEST | 9 | Input | | LSI test pin Normally set to high-level or brought to open state |

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General Description of Function

1. Oscillator

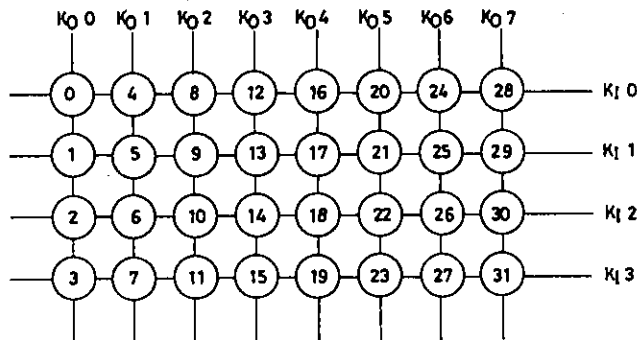
Since a self-bias type amplifier of CMOS inverter is contained, an oscillator can be formed by connecting a ceramic resonator.



To minimize power dissipation, the oscillator stops oscillating except when key operation is performed.

2. Key entry

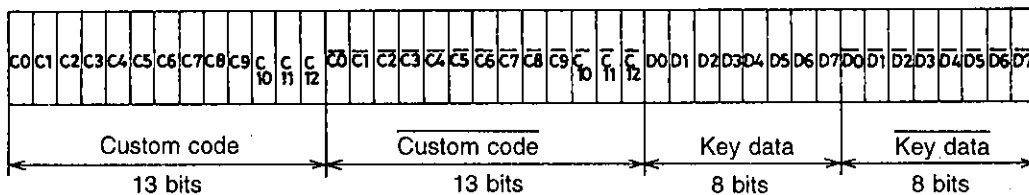
Key entry pins K_10 to K_13 and timing signal output pins K_00 to K_07 provide a key matrix of $4 \times 8 = 32$.



Multi-press of key No. 20 and one of key No. 21, 22, 23 may be done, with no priority given in key entry. When the two keys are kept pressed, a series of pulses will be output according to each key entry. If multi-press of keys which are not allowed multi-press is done, no output will be delivered.

3. Data organization

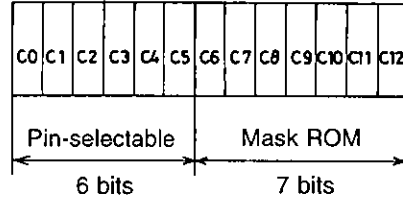
Data consists of 42 bits in all: 13 bits of custom code, 8 bits of key data, and their inverted codes.



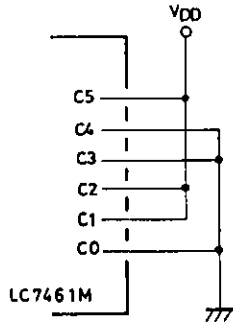
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(a) Custom code

The custom code, which consists of 13 bits (C_0 to C_{12}) in all, is used to distinguish between receiving sets.



C_6 to C_{12} are fixed by the mask ROM and C_0 to C_5 are pin-settable.



In this example C_0 to C_5 are set as follows:

| C_0 | C_1 | C_2 | C_3 | C_4 | C_5 |
|-------|-------|-------|-------|-------|-------|
| 0 | 1 | 1 | 0 | 0 | 1 |

The custom codes are controlled by Sanyo to avoid duplication.

(b) Key data

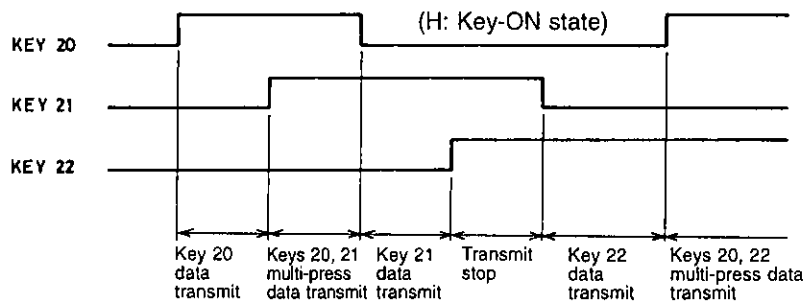
| KEY No. | D_0 | D_1 | D_2 | D_3 | D_4 | D_5 | D_6 | D_7 |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 5 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 28 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| 29 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| 30 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 31 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |

Multi-press

| KEY No. | D_0 | D_1 | D_2 | D_3 | D_4 | D_5 | D_6 | D_7 |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| 20, 21 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| 20, 22 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 20, 23 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |

• D_6, D_7 may be preset to "0", "1" beforehand (mask option).

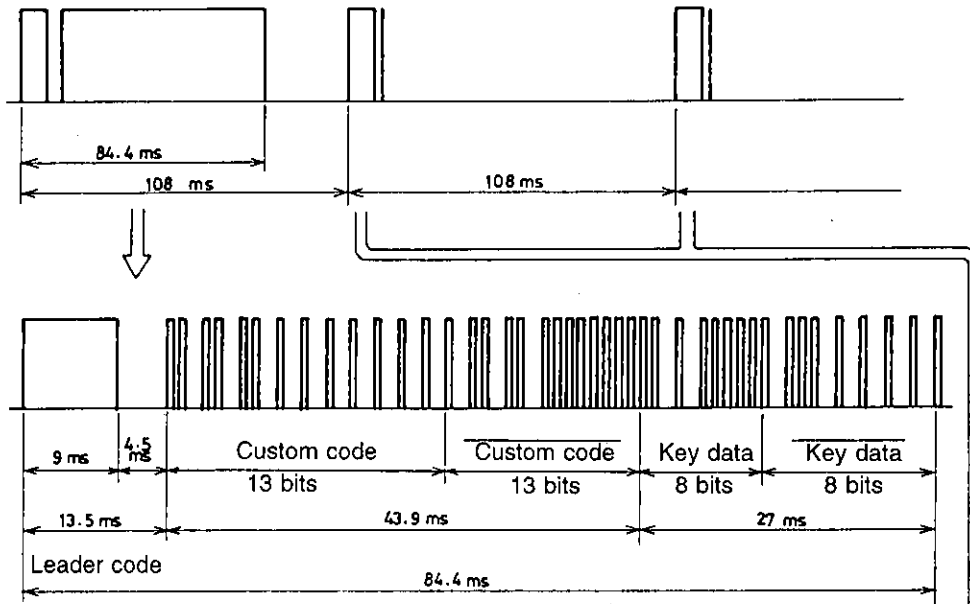
When multi-press of key No.20 and one of key No.21, 22, 23 is done, multi-bit D_5 will be set to "1", with no priority given in key entry.



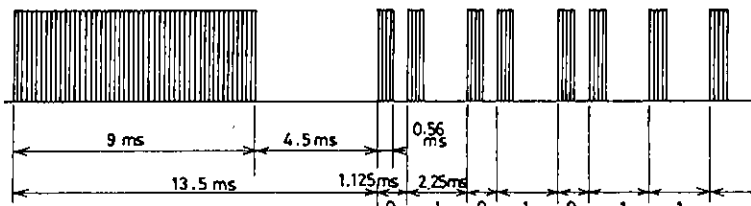
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4. Transmit waveforms

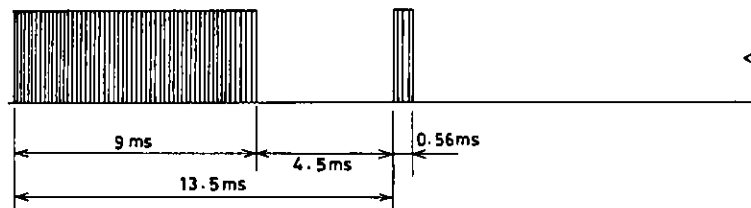
The period of time shown below is for $f_{OSC} = 455 \text{ kHz}$.



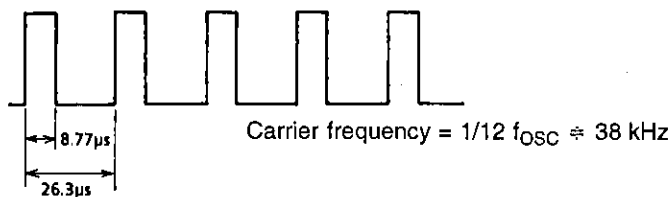
• First time



• Second time onward (Transmission is available only when key entry continues.)

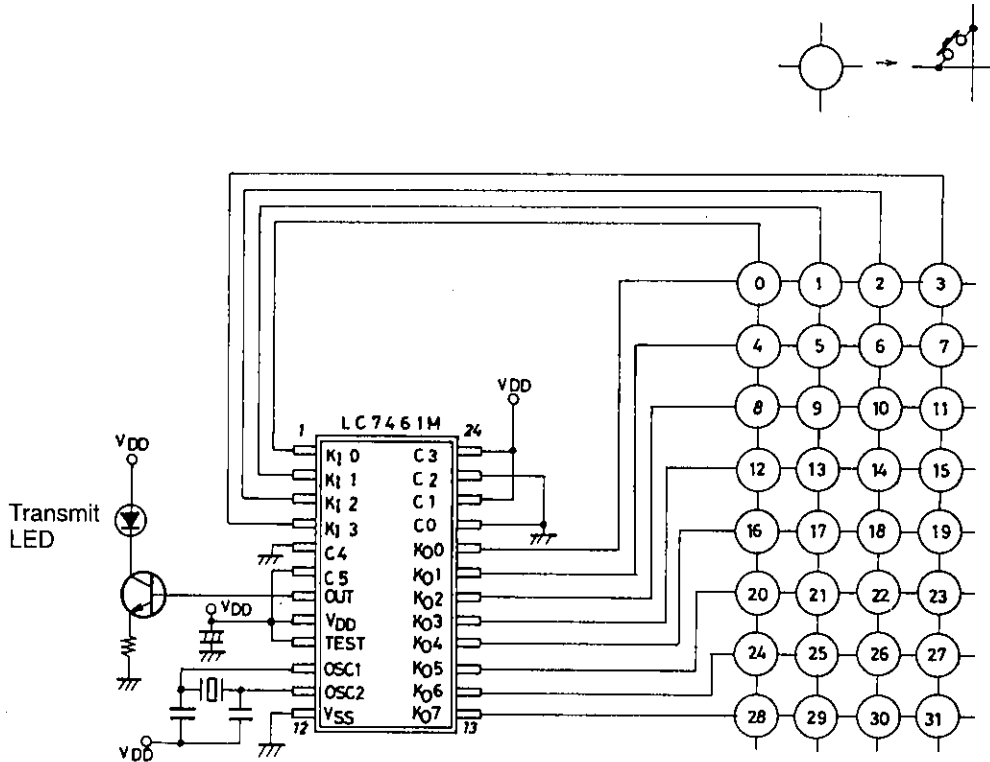


• Carrier waveform



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Sample Application Circuit



In this example custom code C_0 to C_5 is $C_0 \dots C_5$.
0 1 0 1 0 1

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