Ordering number: EN※2120B

CMOS LSI

No.※ 2120B

LC7462M

SANYO

Infrared Remote Control Transmitter IC

Preliminary

Functions

- 32 ⊕ 3 function keys
- 8-bit custom codes
- Operating supply voltage range V_{DD} = 1.8 to 3.6 V
- Supply current at the standby mode I_{DD} = 1 μA or less
- Double-pressable operation keys (no priority given)
- Oscillator built in (ceramic resonator: connected externally)

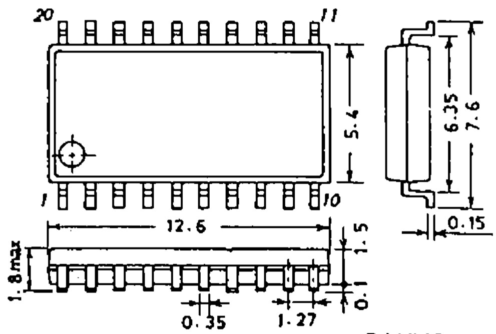
Features

- Two selections of custom code (8 bits) (SEL pin-selectable ... option)
- Since the custom code is set internally, no external diode is required.
- Since double-press operation provides no priority, the number of external parts can be reduced.

Package Dimensions

unit : mm

3036B-MFP20



Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{DD} 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	Pd max	Ta ≦ 85°C	150	mW
Operating temperature	Topr		–40 to +85	°C
Storage temperature	Tstg		–50 to +125	°C

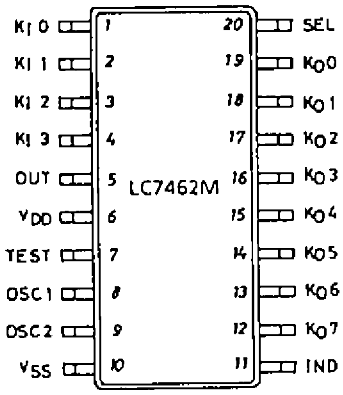
Allowable Operating Conditions at Ta = 25°C

Parameter	Symbol	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_I0 to K_I3, SEL	0.7V_{DD}		V_{DD}	V
Input low-level voltage	V_{IL}	K_I0 to K_I3, SEL	V_{SS}		0.3V_{DD}	V
Oscillation frequency	f_{osc}		400	455	500	kHz

Electrical Characteristics at Ta = 25°C, V_{DD} = 3.0 V

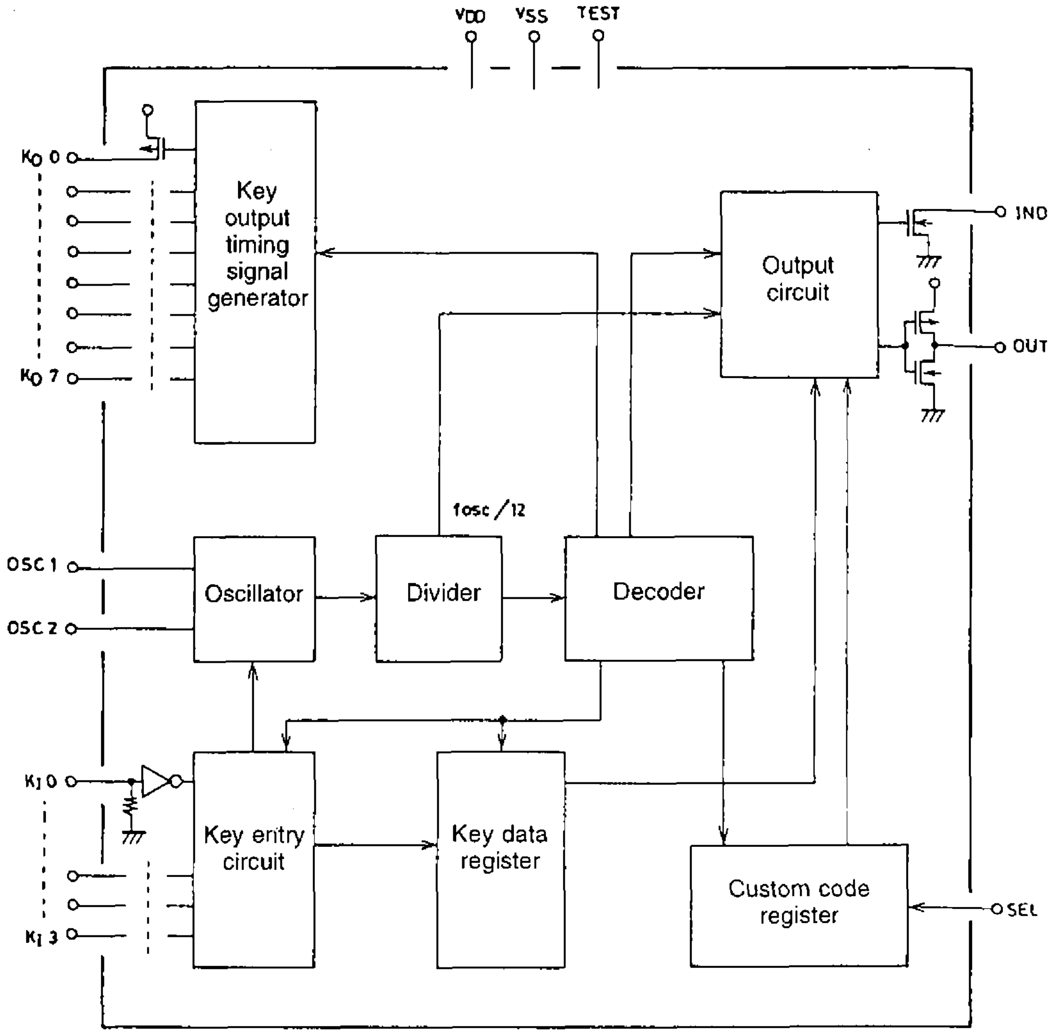
Parameter	Symbol	Conditions	min	typ	max	Unit
Operating supply current	I_{DD}	V_{DD} = Key ON, output: no load			1	mA
Quiescent supply current	I_{DS}	V_{DD} = All keys OFF, OSC stop			1	μA
Output high-level current	$I_{OH}1$	OUT = V_{DD} = 1.8 V, V_{OH} = 1.0 V		–8		mA
	$I_{OH}2$	OUT = V_{DD} = 3.0 V, V_{OH} = 1.0 V		–25		mA
Display output current	$I_{OL}1$	IND = V_{DD} = 1.8 V, V_{OH} = 1.0 V		2		mA
	$I_{OL}2$	IND = V_{DD} = 3.0 V, V_{OH} = 1.0 V		5		mA
Output high-level voltage	V_{OH}	K_O0 to K_O7 = I_{OH} = –0.1 mA			0.3	V
Output low-level voltage	V_{OL}	OUT = I_{OL} = 0.1 mA			0.3	V
Output OFF-state leakage current	I_{OFF}	K_O0 to K_O7, IND			1	μA
Input high-level current	I_{IH}	SEL = V_{IN} = V_{DD}			1	μA
Input low-level current	I_{IL}	SEL = V_{IN} = V_{SS}	–1			μA
Input floating voltage	V_{IF}	K_I0 to K_I3			$0.1V_{DD}$	V
Input pull-down resistance	R_{IN}	K_I0 to K_I3	75	100	125	kΩ

Pin Assignment

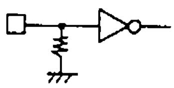
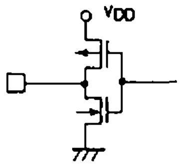
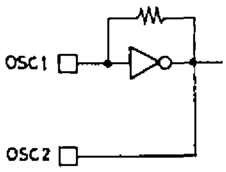
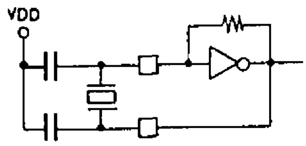
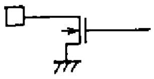
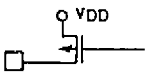
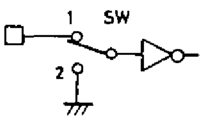


Top view

Block Diagram

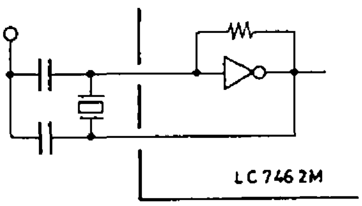


Pin Description

Pin Name	Pin No.	Input/Output	Equivalent Circuit	Pin Function
V_{DD}, V_{SS}	6, 10			Power supply pins: V_{SS} = GND
K_I0 to K_I3	1 to 4	Input		Key return signal entry pins
OUT	5	Output		Output pin for transmit LED drive
TEST	7	Input		LSI test pin Normally set to high-level or brought to open state
OSC1 OSC2	8 9	Input/output		Input/output pins for ceramic resonator-used oscillation  Oscillator configuration
IND	11	Output		Output pin for transmit indicator LED drive
K_O0 to K_O7	12 to 19	Output		Key scan timing signal output pins
SEL	20	Input	Option 	Either of the two shown below may be selected by option. (1) SW position 1 ON Two selections of custom code by SEL "H" or "L" (2) SW position 2 ON SEL pin: NC (No Connection)

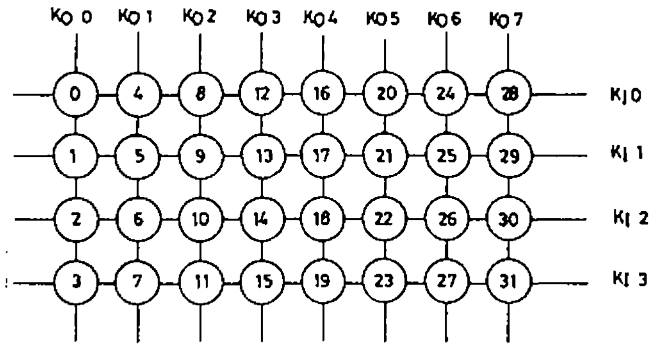
General Description of Function

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_I0 to K_I3 and timing signal output pins K_O0 to K_O7 provide a key matrix of 4 × 8 = 32.



Multi-press of key No. 20 and one of key Nos. 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 32 bits in all: 8 bits of custom code, 8 bits of key data, and their inverted codes.

C0	C1	C2	C3	C4	C5	C6	C7	$\overline{C0}$	$\overline{C1}$	$\overline{C2}$	$\overline{C3}$	$\overline{C4}$	$\overline{C5}$	$\overline{C6}$	$\overline{C7}$	D0	D1	D2	D3	D4	D5	D6	D7	$\overline{D0}$	$\overline{D1}$	$\overline{D2}$	$\overline{D3}$	$\overline{D4}$	$\overline{D5}$	$\overline{D6}$	$\overline{D7}$
Custom code 8 bits								$\overline{\text{Custom code}}$ 8 bits								Key data 8 bits								$\overline{\text{Key data}}$ 8 bits							

(a) Custom code
   The custom code, which consists of 8 bits (C_0 to C_7) in all, is used to distinguish between receiving sets.

C0	C1	C2	C3	C4	C5	C6	C7

C_0 to C_7 are fixed by the internal mask ROM (impossible to fix externally). Two selections of custom code may be made externally by option (SEL pin-selectable).

Custom code option

	Option 1	Option 2
Custom code to be set internally	2 kinds	1 kind
Function of SEL pin	Two selections of custom code by SEL "H" or "L"	NC (No Connection)

(b) Key data

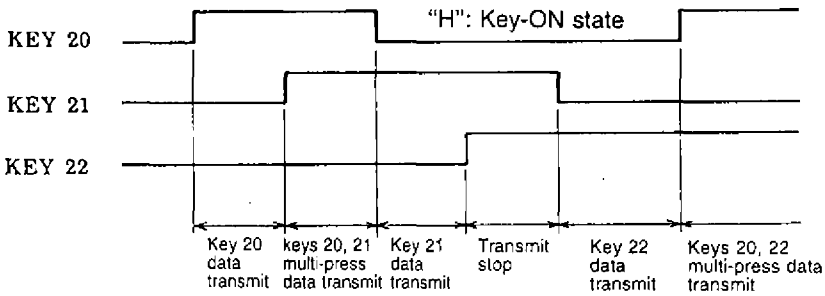
KEY No.	D_0	D_1	D_2	D_3	D_4	D_5	D_6	d_7
0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0
5	1	0	1	0	0	0	0	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
28	0	0	1	1	1	0	0	0
29	1	0	1	1	1	0	0	0
30	0	1	1	1	1	0	0	0
31	1	1	1	1	1	0	0	0

Multi-press

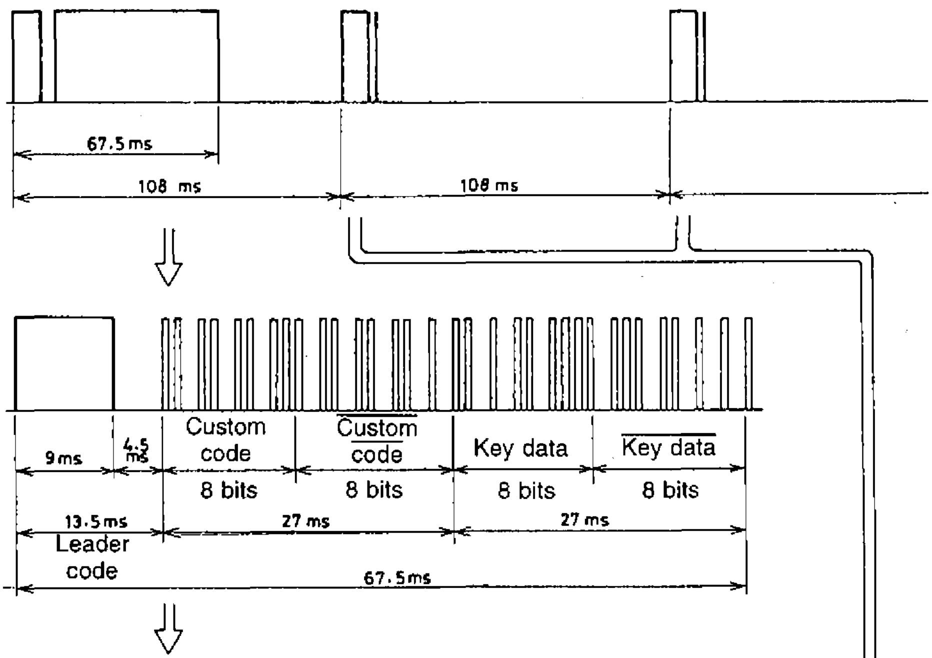
KEY No.	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7
20, 21	1	0	1	0	1	1	0	0
20, 22	0	1	1	0	1	1	0	0
20, 23	1	1	1	0	1	1	0	0

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

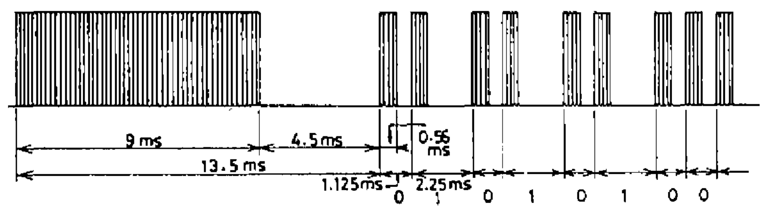
When multi-press of key No. 20 and one of key Nos. 21, 22, 23 is done, multi-bit D_5 will be set to "1", with no priority given in key entry.



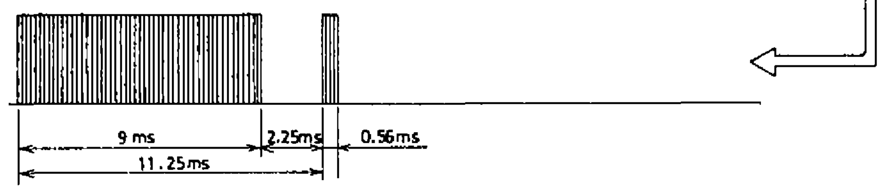
4. Transmit waveforms
   The period of time shown below is for f_{OSC} = 455 kHz.



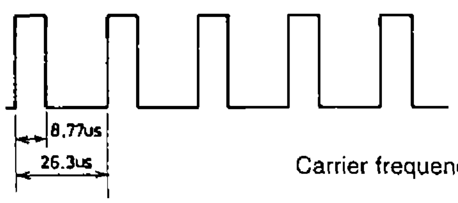
• First time



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



• Carrier waveform



Carrier frequency = 1/12 f_{OSC} ≑ 38 kHz

Sample Application Circuit