Ordering number: EN※2120B

CMOS LSI

No.※ 2120B

LC7462M

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)

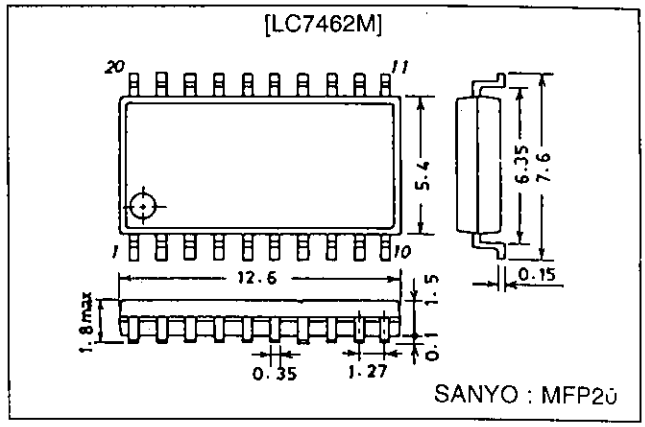
Features

- 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

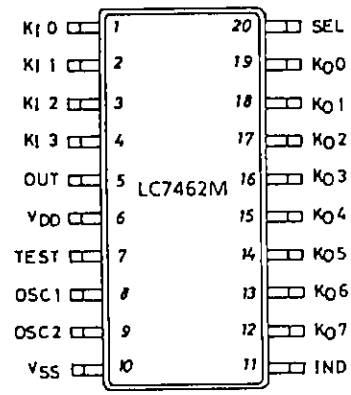
Parameter	Symbol	Conditions	min	typ	max	Unit
Supply voltage	V_{DD}	V_{DD} = f_{osc} = 455 kHz	1.8	3.0	3.6	V
Input high-level voltage	V_{IH}	K_I0 to K_I3, SEL	0.7V_{DD}		V_{DD}	V
Input low-level voltage	V_{IL}	K_I0 to K_I3, SEL	V_{SS}		0.3V_{DD}	V
Oscillation frequency	f_{osc}		400	455	500	kHz

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

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

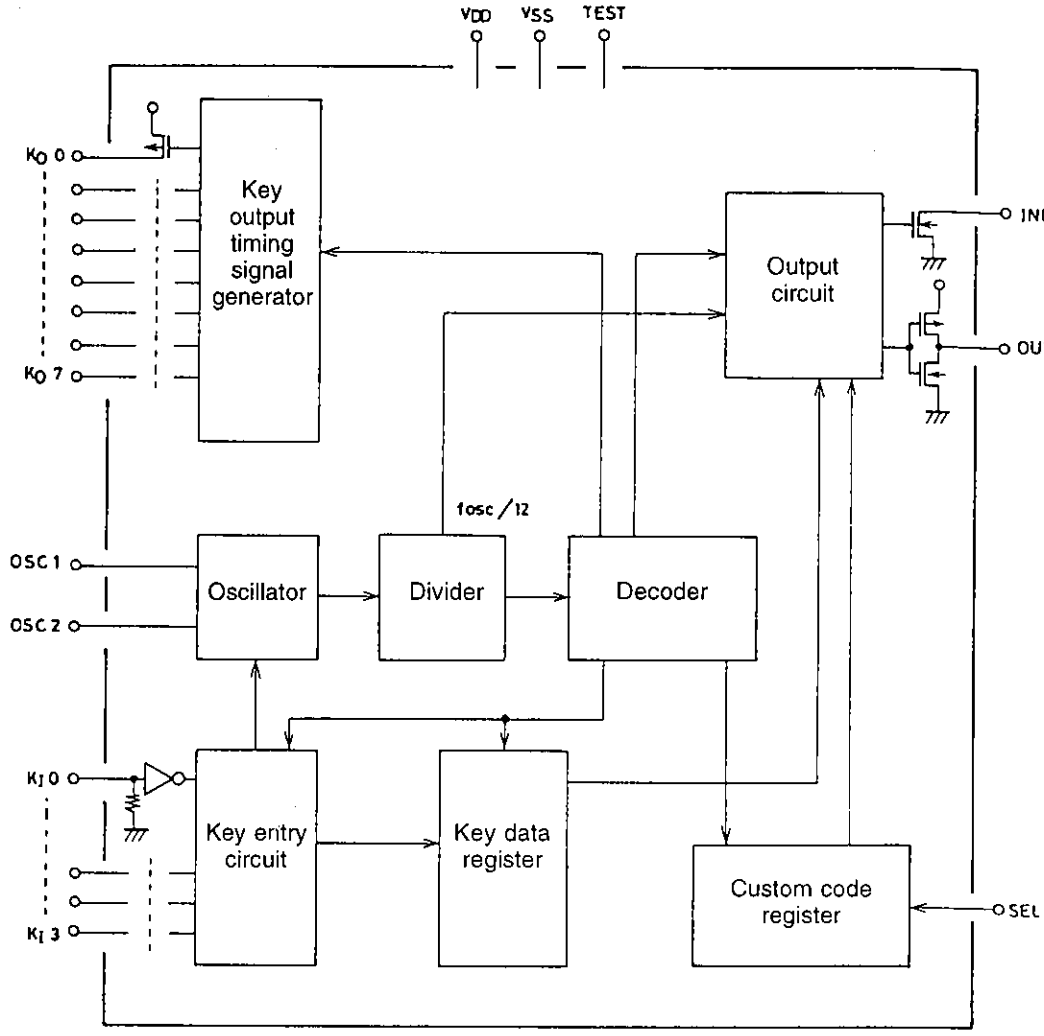
Parameter	Symbol	Conditions	min	typ	max	Unit
Operating supply current	I_{DD}	V_{DD} = Key ON, output: no load			1	mA
Quiescent supply current	I_{DS}	V_{DD} = All keys OFF, OSC stop			1	μA
Output high-level current	$I_{OH}1$	OUT = V_{DD} = 1.8 V, V_{OH} = 1.0 V		–8		mA
	$I_{OH}2$	OUT = V_{DD} = 3.0 V, 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

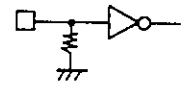
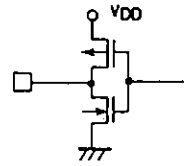
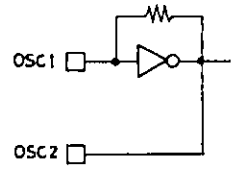
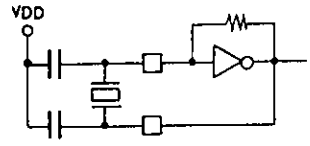
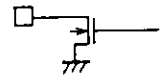
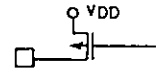
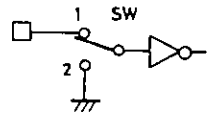


Top view

Block Diagram

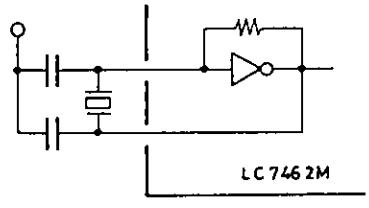


Pin Description

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)

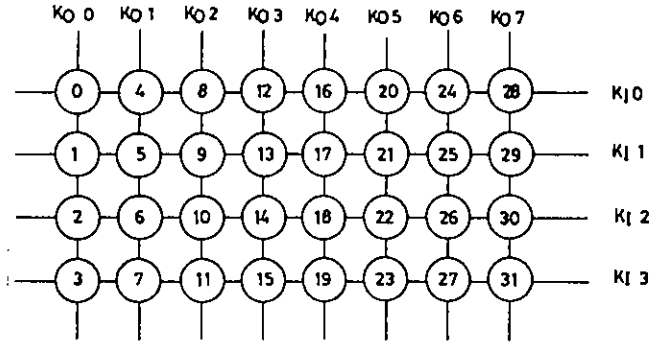
General Description of Function

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



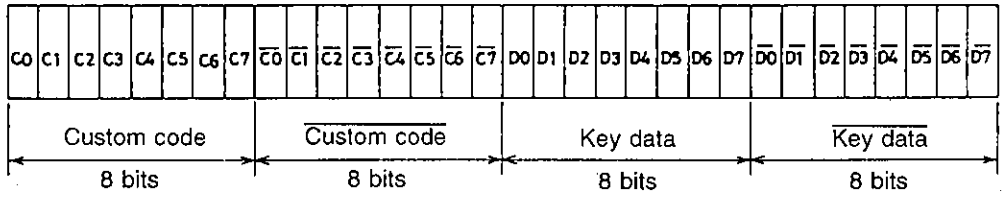
To minimize power dissipation, the oscillator stops oscillating except when key operation is performed.

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.

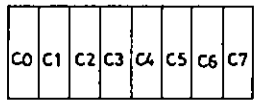


Multi-press of key No. 20 and one of key Nos. 21, 22, 23 may be done, with no priority given in key entry. When the two keys are kept pressed, a series of pulses will be output according to each key entry. If multi-press of keys which are not allowed multi-press is done, no output will be delivered.

3. Data organization
Data consists of 32 bits in all: 8 bits of custom code, 8 bits of key data, and their inverted codes.



(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.



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

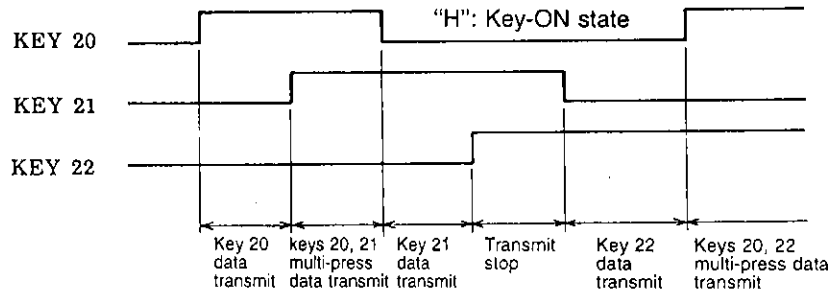
KEY No.	D_0	D_1	D_2	D_3	D_4	D_5	D_6	d_7
0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0
5	1	0	1	0	0	0	0	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
28	0	0	1	1	1	0	0	0
29	1	0	1	1	1	0	0	0
30	0	1	1	1	1	0	0	0
31	1	1	1	1	1	0	0	0

Multi-press

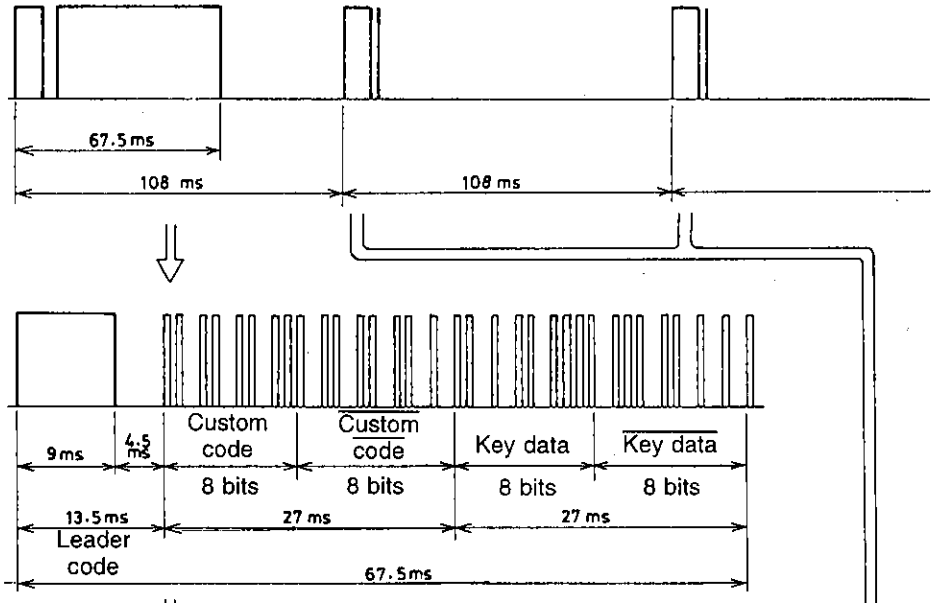
KEY No.	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7
20, 21	1	0	1	0	1	1	0	0
20, 22	0	1	1	0	1	1	0	0
20, 23	1	1	1	0	1	1	0	0

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

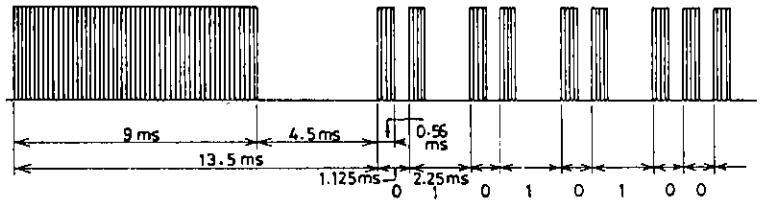
When multi-press of key No. 20 and one of key Nos. 21, 22, 23 is done, multi-bit D_5 will be set to "1", with no priority given in key entry.



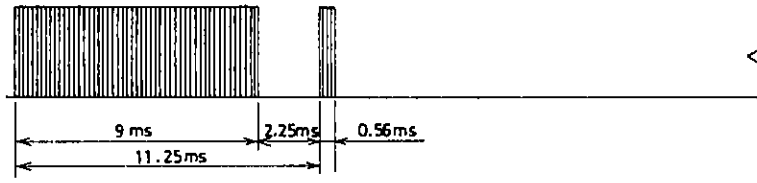
4. Transmit waveforms
The period of time shown below is for f_{OSC} = 455 kHz.



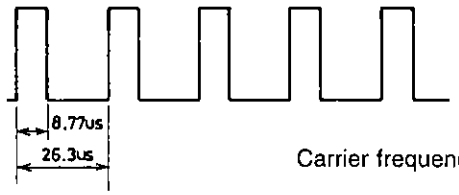
• First time



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

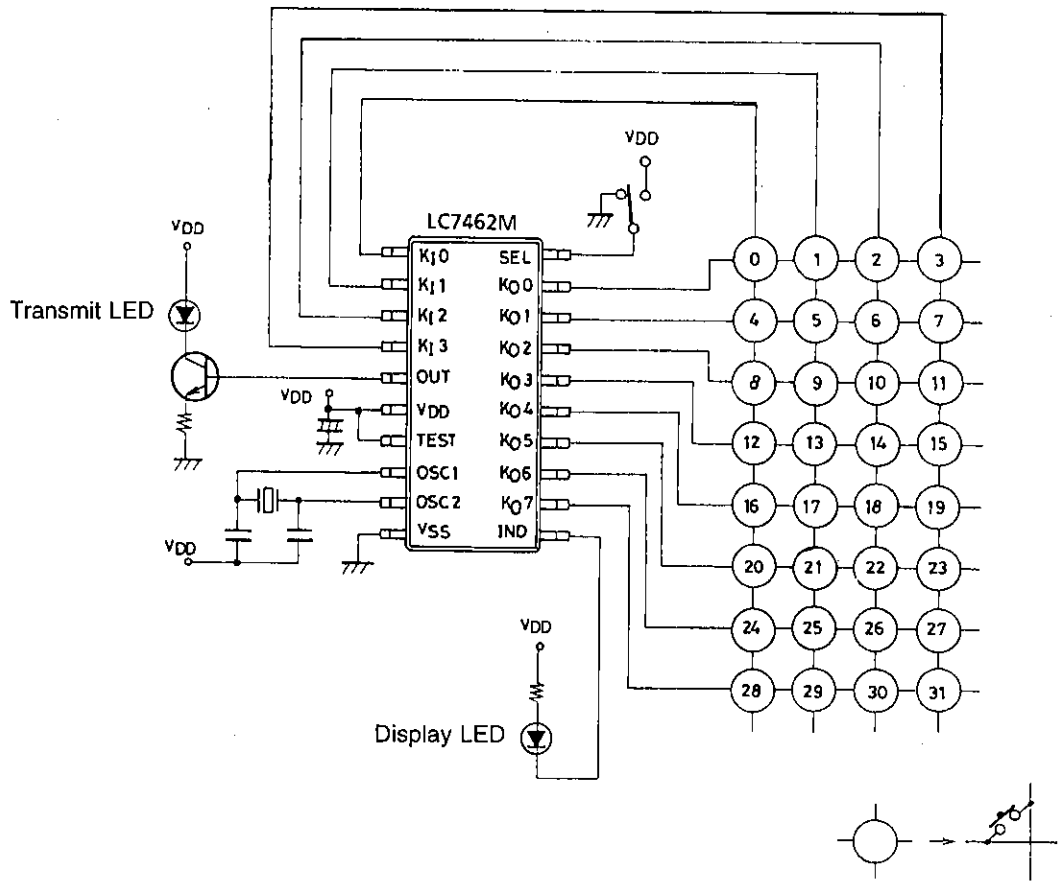


• Carrier waveform



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

Sample Application Circuit



- No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.
- Anyone purchasing any products described or contained herein for an above-mentioned use shall:
  ① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use:
  ② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of November, 1996. Specifications and information herein are subject to change without notice.