Ordering number: EN 查1588464供应商

CMOS LSI



No. ※ 3588

LC7464M

Infrared Remote Control Transmitter IC

Preliminary

OVERVIEW

The LC7464M is a 64-key infrared remote control transmitter IC that incorporates all key-scanning, oscillator and timing functions on-chip, resulting in a very low external component count.

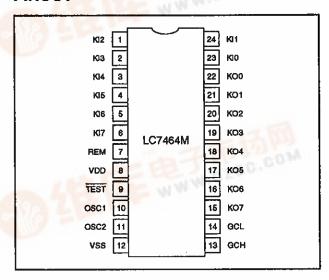
The LC7464M generates 71 function codes using the 64 function keys. The output data format comprises the mask-programmed custom code, the parity field, the mask-programmed system code, the product code, the function code and the data check code.

The LC7464M operates from a 2.0 to 3.6 V supply and is available in 24-pin MFPs.

FEATURES

- Low external component count
- 64 function keys
- 71 function codes
- Mask-programmable custom and system codes
- 64 product codes
- Output conforms to Japan's Association for Electric Home Appliances recommended standards for infrared remote controls.
- · On-chip input pull-down resistors
- 2.0 to 3.6 V supply
- 24-pin MFP

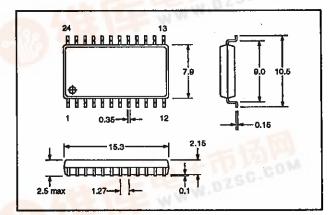
PINOUT



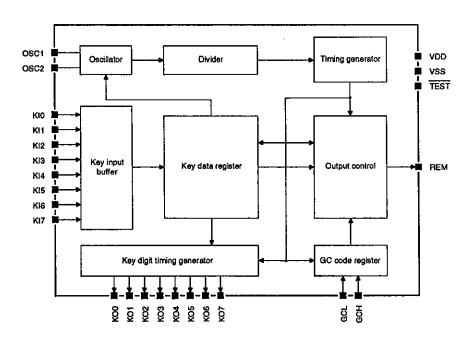
PACKAGE DIMENSIONS

Unit: mm

3045B-MFP24



BLOCK DIAGRAM



PIN DESCRIPTION

Number	Name	Equivalent clrcult	Description
1 to 6, 23, 24	Kio to Ki7	■	Keyswitch scanning inputs
7	REM	■——	LED driver output
8	VDD		Supply voltage
9	TEST	•	Test input. TEST should be tied HIGH or left open for normal operation.
10	OSC1		Ceramic oscillator input connection
11	OSC2		Ceramic oscillator output connection
12	VSS		Ground
13, 14	GCL, GCH	— >	Product code select inputs
15 to 22	KO0 to KO7	■	Keyswitch scanning outputs

SPECIFICATIONS

Absolute Maximum Ratings

Parameter	Symbol	Raling	Unit	
Supply voltage range	V _{DD}	V _{SS} - 0.3 to 5.5		
Input voltage range	Vi	V _{SS} - 0.3 to V _{DD} + 0.3	V	
Output vollage range	Vo	V _{SS} - 0.3 to V _{DD} + 0.3	V	
Output current	l ₀	-35	mA	
Power dissipation	PD	150	mW	
Operating temperature range	Topr	-40 to 85	°C	
Storage temperature range	T _{atg}	-50 to 125	°C	

Recommended Operating Conditions

 $T_a = 25 \, ^{\circ}C$

Parameter	Symbol	Rating	Unit
Supply voltage	V_{DD}	3	V
Supply voltage range	V _{DD}	2.0 to 3.6	٧

Electrical Characteristics

 V_{DD} = 2.0 to 3.6 V, T_{a} = -40 to 85 °C unless otherwise noted

Parameter	Symbol	Condition		Unit			
i araiiatoi	- Symbol	Condition	mln	typ	max		
Operating supply current	loo	Key pressed, no load	-	_	1	mA	
Standby supply current	Ips	No key pressed, oscillator stopped	-		1	μA	
KIO to KI7, GCL and GCH LOW-level input voltage	VIL		V _{SS}		0.3V _{DD}	٧	
KIO to KI7, GCL and GCH HIGH-level input voltage	V _{IH}		0.7V _{DD}	-	V _{DD}	٧	
KO0 to KO7 and REM LOW-level output voltage	VoL	lot = 0.1 mA	-	_	0.3	٧	
KO0 to KO7 HIGH-level output voltage	V _{OH}	l _{OH} = -0.1 mA	V _{DD} - 0.3	-	-	٧	
GCL and GCH LOW-level input current	I _{IL}	V _I = V _{SS}	-1	-	-	μА	
GCL and GCH HIGH-level input current	l _{1H}	V _I = V _{DD}	-	-	1	μΑ	
DEM HIGH level cutert current		V _{DD} = 2 V, V _{OH} = V _{DD} - 1 V	-	-2.5	-		
REM HIGH-level output current	Іон	V _{DD} = 3 V ₁ V _{OH} = V _{DD} - 1 V	-	-11	-	- mA	
KIO to KI7 input floating voltage	V _{IF}		-	_	0.1V _{DD}	V	
KIO to KI7 input pull-down resistance	Rin		75	100	125	kΩ	
Oscillator frequency	fosc		433	455	477	kHz	

FUNCTIONAL DESCRIPTION

Key Inputs

An eight-by-eight matrix is formed with the keyswitch scanning outputs KO0 to KO7 and the keyswitch scanning inputs KI0 to KI7 as shown in the following figure.

	KI0	KH	KI2	KI3	KI4	KI5	KI6	KI7
коо -	1	9	17	25	33	41	49	57
КО1 -	2	10	18	26	34	42	50	58
KO2 -	3	11	19	27	35	43	51	59
коз -	4	12	20	28	36	44	52	60
KO4 -	5	13	21	29	37	45	53	61
ко5 -	6	14	22	30	38	46	54	62
KO6 -	7	15	23	31	39	47	55	63
ко7 -	8	16	24	32	40	48	56	64

When a key is held down, either the normal or abbreviated continuation code is output continuously, depending on the mask option selected.

Output Data Configuration

The 48-bit output data configuration is shown in the following figure. Note that the data is sent least-significant bit first.

Normally, only one key can be pressed at a time. If more than one key is pressed, all keys are ignored and no output is generated. However, when the appropriate mask option is selected, up to three extra codes can be generated by holding down key 8 and either key 16, 24, 32, 40, 48, 56 or 64 as shown in table 1.

Table 1. Function code generation

Key combination		Function code											
Key Compiliation	FC0	FC1	FC2	FC3	FC4	FC5	FC6	FC7					
8, 16	1	1	1	0	1	0	0	1					
8, 24	1	1	1	0	0	1	0	1					
8, 32	1	1	1	0	1	1	0	1					
8, 40	1	1	1	0	0	0	1	1					
8, 48	1	1	1	0	1	0	1	1					
8, 56	1	1	1	0	0	1	1	1					
8, 64	1	1	1	0	1	1	1	1					

C0 to C15	P0 to P3	SC0 to SC3	GC0 to GC7	FC0 to FC7	DC0 to DC7
16-bit custom code	4-bit parity	4-bit system code	8-bit product code	8-bit function code	8-bit data check code

Custom code

The 16-bit mask-programmable custom code (C0 to C15) is a unique code registered with the Association for Electric Home Appliances.

Parity bits

The four parity bits (P0 to P3) are used for error detection. Their value is given by the following equation

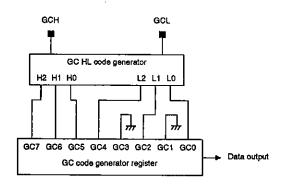
$$Pn = Cn \oplus C(n + 4) \oplus C(n + 8) \oplus (n + 12)$$
where $n = 0$ to 3.

System code

The four-bit system code (SC0 to SC3) is mask-programmed into the LC7464M during fabrication.

Product code

The eight-bit product code (GC0 to GC7) consists of two mask-programmable bits and six bits that are set by connecting each of GCL and GCH to one of KO0 to KO7. The block diagram of the product code generator is shown in the following figure. GC1 and GC3 are the mask-programmable bits, shown set to zero.



Tables 2 and 3 show the relationships between GCL and L0 to L2, and between GCH and H0 to H2, respectively. Table 2. GCL product codes

Pln	Code generated							
F#1	Lo	Lı	L2					
KO0	0	0	0					
KO1	1	0	0					
KO2	0	1	0					
КОз	1	1	0					
KO4	0	0	1					
KO5	1	0	1					
KO6	0	1	1					
КО7	1	1	1					

Table 3. GCH product codes

Pin	Code generated									
	НО	H1	H2							
KO0	0	0	0							
KO1	1	0	0							
KO2	0	1	0							
КОз	1	1	0							
KO4	0	0	1							
KO5	1	0	1							
KO6	0	1	1							
КО7	1	1	1							

Function code

The eight-bit function code (FC0 to FC7) is determined by the number of the key pressed as shown in the following figure. Note that when the appropriate mask option is selected, function codes 97H, A7H, B7H, C7H, D7H, E7H and F7H can be generated by holding down key 8 and one of keys 16, 24, 32, 40, 48, 56 and 64.

				Ļ	Jpp	er-l	eve	l cc	жe	(∝	orre	spc	nd	s to	Κī)	
		0	1	2	3	4	5	6	7	8	9	Α	В	С	D	Ε	F
	0	*															
1	1																
l o	2																
×																	
8	4																
ξ	5		8														
1 25	6		***							١.							
ΙĀΙ	7	***	8		<u> </u>						***	88	**	33			
9	8																
8	9																
1	A	l															
Lower-level code (corresponds to KO)	В	Ī															
Į.	¢																
2	D																
	E																
	F	_															

Data check code

The eight-bit data check code (DC0 to DC7) is generated by adding the carry bits from the system code to the product and function code bits. This code is used for error detection. The data check code is calculated using the following equation.

$$DC = SC + GC0$$
 to $GC3 + GC4$ to $GC7 + FC0$ to $FC3 + FC4$ to $FC7$

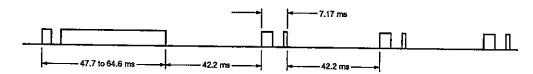
For example, when

$$SC = OH$$
, $GC = OB1H$, $FC = 35H$

$$DC = 0H + 1H + 0BH + 5H + 3H = 14H$$

Data Transmission Waveforms

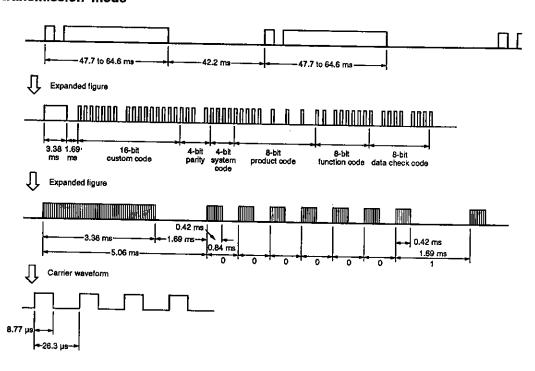
Abbreviated transmission mode



Abbreviated mode detail

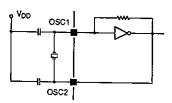


Normal transmission mode

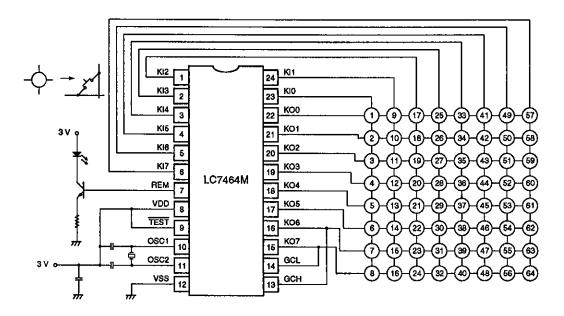


Oscillator

The LC7464M contains a self-biasing CMOS inverter that is used as an oscillator when connected to a ceramic resonator as shown in the following figure. To reduce power, the oscillator operates only when a key is pressed.



TYPICAL APPLICATION



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