

LZ95D71 M

DESCRIPTION

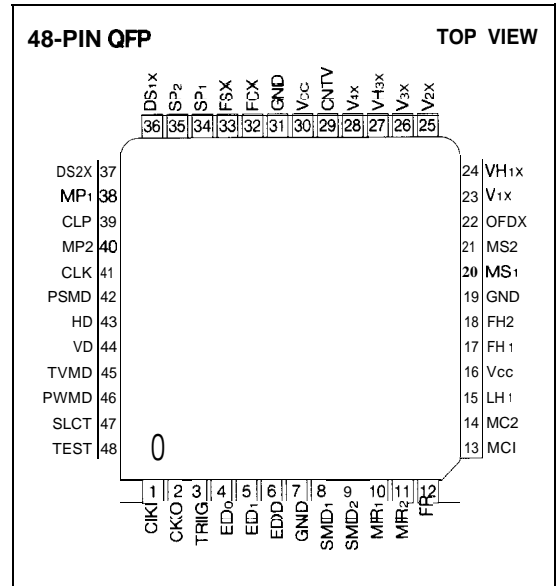
The LZ95D71 M is a CMOS timing generator LSI which provides timing pulses used to drive a CCD area sensor, in combination with the SSG LSI (LZ95D52/M).

FEATURES

- Switchable between 410000 pixels CCD and 470000 pixels CCD
- Switchable between NTSC (EIA) and PAL (CCIR) systems
- . Internal electronic shutter :
 - Shutter speed is selectable from 1 /60 (PAL : 1 /50), 1/1 25, 1 /250, 1 /500, 1/1 000, 1/2 000, 1/4 000 and 1/10 000 s, in addition to this, 1/100 s, (PAL : 1/120 s) in flicker-less mode using parallel code. Shutter speed can also be controlled in 1 H period using a serial code
- Single +5 V power supply
- . Package : 48-pin QFP(QFP048-P-0707)

Timing Pulse Generator LSI for CCD

PIN CONNECTIONS



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Supply voltage	V _{CC}	- 0.3 to +7.0	v
Input voltage	V _I	-0.3 to V _{CC} +0.3	v
Output voltage	V _O	-0.3 to V _{CC} +0.3	v
Operation temperature	T _{opr}	-20 to +70	°c
Storage temperature	T _{stg}	-55 to +150	°c

DC CHARACTERISTICS






(V_{CC} = +5 V ± 10%, T_a = -20 to +70°C)













PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	NOTE
Input Low voltage	V _{IL}				1.5	v	t
Input High voltage	V _{IH}		3.5			v	
Input Low current	$\frac{1}{2} I_{IL1} $	V _I = 0 V			1.0	μA	2
	$ I_{IL2} $	V _I = 0 V	8.0		60	μA	3
Input High current	$ I_{IH1} $	V _I = V _{CC}			1.0	μA	4
	$ I_{IH2} $	V _I = V _{CC}	8.0		60	μA	5
Output High voltage	V _{OH1}	I _{OH} = -2 mA	4.0			v	6
Output Low voltage	V _{OL1}	I _{OL} = 4 mA			0.4	v	
Output High voltage	V _{OH2}	I _{OH} = -3 mA	4.0			v	7
Output Low voltage	V _{OL2}	I _{OL} = 4 mA			0.4	v	
Output High voltage	V _{OH3}	I _{OH} = -4 mA	4.0			v	8
Output Low voltage	V _{OL3}	I _{OL} = 8 mA			0.4	v	
Output High voltage	V _{OH4}	I _{OH} = -8 mA	4.0			v	9
Output Low voltage	V _{OL4}	I _{OL} = 8 mA			0.4	v	
Output High voltage	V _{OH5}	I _{OH} = -8 mA	4.0			v	10
Output Low voltage	V _{OL5}	I _{OL} = 16 mA			0.4	v	



NOTES :

1. Applied to inputs (IC, ICD, ICU, OSC1).
2. Applied to inputs (IC, ICD, OSC1).
3. Applied to input (ICD).
4. Applied to inputs (IC, ICU, OSC1).
5. Applied to input (ICD).
6. Applied to outputs (O, OR1, OSC0).
7. Applied to output (OR1 A).
8. Applied to output (OR1 B).
9. Applied to output (OR1 C).
10. Applied to output (OR1 D).

PIN FUNCTION

PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	FUNCTION															
1	CKI	OscI		Clock input	An input pin for reference clock oscillation. The frequencies are as follows : At NTSC mode : 28.63636 MHz (1820 fH) At PAL mode : 28.37500 MHz (1816 fH) (fH=Horizontal frequency)															
2	CKO	OscO	-	Clock output	An input pin for reference clock oscillation. The output is the inverse CKI (pin 1).															
3	TRIG	ICU	-	Trigger input	An input pin to directly control the shutter speed. For details, see shutter control,															
4	ED ₀	ICU	-	Shutter speed switching input 0	An input pin to control the shutter speed. For details, see shutter control.															
5	ED ₁	ICU	-	Shutter speed switching input 1	An input pin to control the shutter speed. For details, see shutter control.															
6	ED ₂	ICU	-	Shutter speed switching input 2	An input pin to control the shutter speed. For details, see shutter control.															
7	GND	-	-	Ground	A grounding pin.															
8	SMDI	ICU	-	Shutter mode select input 1	An input pin to Select Shutter mode. For details, see shutter control.															
9	SMD2	ICU	-	Shutter mode select input 2	An input pin to Select Shutter mode. For details, see shutter control,															
10	MRI	ICU	-	FR phase control input 1	Pins to control the phase between the rising edge of FHI (pin 17) and FR (pin 12). <table border="1"> <tr> <td>MR₁</td> <td>H</td> <td>L</td> <td>L</td> <td>H</td> </tr> <tr> <td>MR₂</td> <td>H</td> <td>H</td> <td>L</td> <td>L</td> </tr> <tr> <td>Pulse width</td> <td>A</td> <td>A + α</td> <td>A + 2 α</td> <td>A + 3 α</td> </tr> </table>	MR ₁	H	L	L	H	MR ₂	H	H	L	L	Pulse width	A	A + α	A + 2 α	A + 3 α
MR ₁	H	L	L	H																
MR ₂	H	H	L	L																
Pulse width	A	A + α	A + 2 α	A + 3 α																
11	MR2	ICU	-	FR phase control input 2																
12	FR	ORIC		Reset pulse	A reset pulse for CCD. Correct to ϕ_R of CCD through the DC offset circuit.															
13	MCI	ICU	-	FCX phase control input 1	Pins to control the phase between the falling edge of FH ₁ (pin 17) and FCX (pin 32). <table border="1"> <tr> <td>MC₁</td> <td>H</td> <td>L</td> <td>L</td> <td>H</td> </tr> <tr> <td>MC₂</td> <td>H</td> <td>H</td> <td>L</td> <td>L</td> </tr> <tr> <td>Phase difference</td> <td>A</td> <td>A + α</td> <td>A + 2 α</td> <td>A + 3 α</td> </tr> </table>	MC ₁	H	L	L	H	MC ₂	H	H	L	L	Phase difference	A	A + α	A + 2 α	A + 3 α
MC ₁	H	L	L	H																
MC ₂	H	H	L	L																
Phase difference	A	A + α	A + 2 α	A + 3 α																
14	MC2	ICU	-	FCX phase control input 2																
15	LH ₁	ORIA		Last horizontal transfer pulse	A horizontal transfer pulse for last gate of CCD. Connect to ϕ_{LH1} of CCD without inverting driver.															
16	Vcc	-	-	Power supply	Supply +5 V power.															
17	FH ₁	ORI D		Horizontal transfer pulse 1	A horizontal transfer pulse for CCD. Connect to ϕ_{H1} of CCD without inverting driver.															
18	FH2	ORI D		Horizontal transfer pulse 2	A horizontal transfer pulse for CCD. Connect to ϕ_{H2} of CCD without inverting driver.															

PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	FUNCTION															
19	GND	-	-	Ground	A grounding pin.															
20	MS ₁	ICU	-	FSX phase control input 1	Pins to control the phase between the rising edge of FHI (pin 17) and the falling edge of FSX (pin 33). <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>MS₁</td> <td>H</td> <td>L</td> <td>L</td> <td>H</td> </tr> <tr> <td>MS₂</td> <td>H</td> <td>H</td> <td>L</td> <td>L</td> </tr> <tr> <td>Phase difference</td> <td>A</td> <td>A + α</td> <td>A + 2 α</td> <td>A + 3 α</td> </tr> </table>	MS ₁	H	L	L	H	MS ₂	H	H	L	L	Phase difference	A	A + α	A + 2 α	A + 3 α
MS ₁	H	L	L	H																
MS ₂	H	H	L	L																
Phase difference	A	A + α	A + 2 α	A + 3 α																
21	MS ₂	ICU	-	FSX phase control input 2																
22	OFDX	o		OFD pulse output	A pulse that sweeps the charge of the photodiode for electrical shutter. It is held at H level in Normal mode.															
23	VI _x	o		Vertical transfer pulse 1	A vertical transfer pulse for CCD. Connect to the 1A pin of the LR36683N V driver LSI.															
24	VH _{ix}	o		Read out pulse 1	A pulse that transfers the charge of the photodiode to the vertical shift register, Connect to the 1 B pin of the LR36663N V driver LSI.															
25	v _{2x}	o	J-L	Vertical transfer pulse 2	A vertical transfer pulse for CCD. Connect to the 2A pin of the LR36683N V driver LSI.															
26	V3X	o		Vertical transfer pulse 3	A vertical transfer pulse for CCD. Connect to the 3A pin of the LR36683N V driver LSI.															
27	VH3X	o		Read out pulse 2	A pulse that transfers the charge of the photodiode to the vertical shift register. Connect to the 3B pin of the LR36663N V driver LSI.															
28	v _{4x}	o		Vertical transfer pulse 4	A vertical transfer pulse for CCD. Connect to the 4A pin of the LR36683N V driver LSI.															
29	CNTV	ICU	-	Read out pulse control input	An input pin to control VH _{ix} (pin 21), VH3X (pin 27). H level or open : Normal VH _{ix} and VH _{2x} . L level : VH _{ix} and VH _{2x} are held at High level.															
30	V _{CC}	-	-	Power supply	Supply +5 V power.															
31	GND	-	-	Ground	A grounding pin.															
32	FCX	ORI B		CDS pulse 1	A pulse to clamp the feed through level from CCD.															
33	FSX	ORIB		CDS pulse 2	A pulse to sample-hold the signal from CCD.															
34	SP _{1x}	ORI		Color sampling pulse 1	A pin to output the color sampling pulse for color demodulation based upon the output signal from CCD.															
35	SP _{2x}	OR I		Color sampling pulse 2	A pin to output the color sampling pulse for color demodulation based upon the output signal from CCD.															
36	DS _{ix}	ORI		Pulse output 1	A pin to output the driving pulse (DL1 X) for CCD line and the sampling pulse (SHI). These are changed with SLCT (pin 47).															
37	DS _{2X}	OR 1		Pulse output 2	A pin to output the driving pulse (DL2X) for CCD delay line and the sampling pulse (DH2). These are changed with SLCT (pin 47).															


PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	FUNCTION															
38	MPI	ICU	-	SP1X, SP2X phase control input 1	Pins to control the phase between the rising edge of FH1 (pin 17) and the falling edge of SP1X (pin 34) and SP2X (pin 35).															
39	CLP	o	n	Clamp pulse	A pulse to clamp the dummy outputs of CCD.															
40	MP2	ICU	-	SPIX, SP2X phase control input 2	<p>Pins to control the phase between the rising edge of FHI (pin 17) and the falling edge of SP1X (pin 34) and SP2X (pin 35).</p> <table border="1"> <tr> <td>MP1</td> <td>H</td> <td>L</td> <td>L</td> <td>H</td> </tr> <tr> <td>MP2</td> <td>H</td> <td>H</td> <td>L</td> <td>L</td> </tr> <tr> <td>Phase difference</td> <td>A</td> <td>A + α</td> <td>A + 2 α</td> <td>A + 3 α</td> </tr> </table>	MP1	H	L	L	H	MP2	H	H	L	L	Phase difference	A	A + α	A + 2 α	A + 3 α
MP1	H	L	L	H																
MP2	H	H	L	L																
Phase difference	A	A + α	A + 2 α	A + 3 α																
41	CLK	OR1		1/2 dividing	<p>The frequency is 1/2 dividing pulse of a reference clock CKI (pin 1). Connect to clock input terminal of SSG LSI.</p> <p>At NTSC mode : 14.31818 MHz (910 fH) At PAL mode : 14.18750 MHz (908 fH)</p>															
42	PSMD	ICU	-	Shutter mode select input 3	An input pin to select shutter speed data. H level or open : Pararell Data Input mode, L level : Serial Data Input mode.															
43	HD	IC	n	Horizontal reference	An input pin for the horizontal reference signal. Connect to HD pin of SSG LSI.															
44	VD	IC		Vertical reference	An input pin for the vertical reference signal. Connect to VD pin of SSG LSI.															
45	TVMD	ICU	-	TV mode select	An input pin to select TV standards. L level : NTSC mode. H level or open : PAL mode,															
48	PWMD	ICU	-	Power save input	An input pin for Power Save mode, H level or open : All output pulses are occurred. L level : CLK (pin 41) output is occurred.															
47	SLCT	ICU	-	Pulse select input	An input for switching DSI x and DS2X H level or open : DLI x and DL2x L level : SH 1 and SH2.															
48	TEST	ICD	-	Test pin	A test pin. Set open or to L level in the Normal mode,															

IC : Input pin (CMOS level).
 ICU : Input pin (CMOS level with pull up resistor).
 ICD : Input pin (CMOS level with pull down resistor).
 O, ORI, ORIA,
 ORIB, ORIC, ORID : Output pin.
 Osci : Input pin for oscillation.
 Osci : Output pin for oscillation.

NOTES :

Shutter Speed Control

Shutter mode

TRIG	SMD ₁	SMD ₂	SHUTTER MODE	DESCRIPTION
—	H	x	Normal mode	This mode is Normal Shutter mode. 1/60 s at NTSC mode, 1/50 s at PAL mode
—	L	L	Flicker-less Shutter mode	Flicker-less mode. 1/100 s at NTSC mode, 1/120 s at PAL mode.
H	H	H	High Speed Shutter mode	This mode is higher shutter speed than Normal mode.
	L	x	External Shutter mode	This mode is effective at High Speed Shutter mode. OFDX pulse is held at H level after TRIG input is "Low". Whenever TRIG input is "Low" the shutter is stopped at Flicker-less Shutter mode or High Speed Shutter mode. It is necessary with ED ₀ = ED ₁ = ED ₂ = L (1/1 0000 s) for wide variable shutter speed.

Input format of shutter speed control data

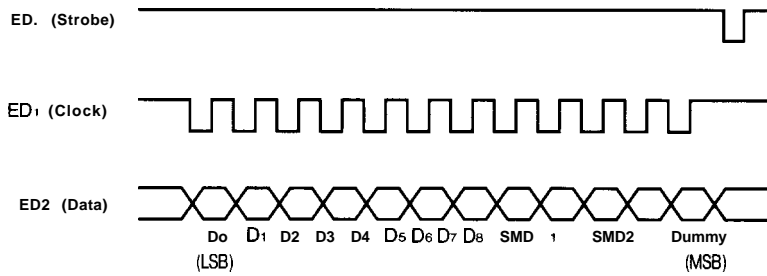
PSMD	INPUT FORMAT	DESCRIPTION
H	Pararell data input	There are 8-shutter speed. 1 /60 (NTSC), 1 /50 (PAL), 1/1 25, 1 /250, 1 /500, 1/1 000, 1/2 000, 1/4000, 1/10 000
L	Serial data input	It is possible to switching per 1 H period. ED ₀ = strobe, ED ₁ = clock, ED ₂ = data

Pararell data input

MODE	TVMD	PSMD	SMD ₁	SMD ₂	ED ₀	ED ₁	ED ₂	SHUTTER SPEED (a)
Normal mode	L	x	H	x	x	x	x	1 /60
	H	x	H	x	x	x	x	1 /50
Flicker-less mode	L	x	L	L	x	x	x	1/100
	H	x	L	L	x	x	x	1/120
High Speed Shutter mode	L	H	L	H	H	H	H	1/60
	H	H	L	H	H	H	H	1/50
	x	H	L	H	L	H	H	1/125
	x	H	L	H	H	L	H	1 /250
	x	H	L	H	L	L	H	1 /500
	x	H	L	H	H	H	L	1/1 000
	x	H	L	H	L	H	L	1/2 000
	x	H	L	H	H	L	L	1/4 000
x	H	L	H	L	L	L	1/10000	

X=H or L

Serial data input



The calculate method of shutter speed,

NTSC : $T = 1 / (n - 249) \times 63.56 + 25.28$ [μs] ($250 \leq n \leq 509$)

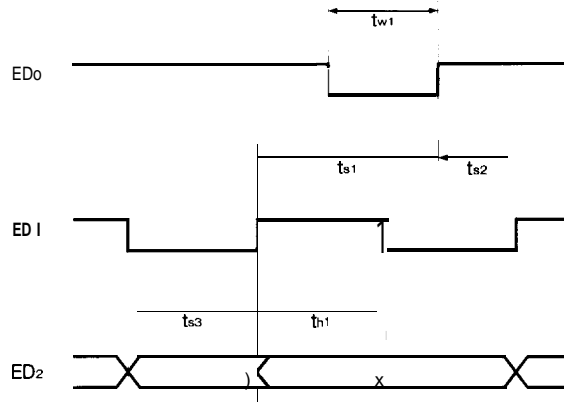
PAL : $T = 1 / (n - 299) \times 64.00 + 25.52$ [μs] ($200 \leq n \leq 509$)

Shutter speed table

VMD <small>n 45)</small>	SMD1 <small>(Pin 8)</small>	SMD2 <small>(Pin 9)</small>	PSMD <small>[Fin 42]</small>	SERIAL DATA										HEX	SHUTTER SPEED <small>(s)</small>	CALCULATION <small>(s)</small>	
				Do	D1	D2	D3	D4	D5	D6	D7	D8	SMD1				SMD2
L	x	x	L	L	H	L	H	H	H	H	H	L	L	H	4FA	1/10000	1/1 1256
				L	L	H	H	H	H	H	H	L	L	H	4FC	1/4 000	1/4 630
				L	L	L	L	L	L	L	L	H	L	H	500	1/2 000	1/2127
				L	L	L	H	L	L	L	L	H	L	H	508	1/1 000	1/1 022
				L	L	L	H	H	L	L	L	H	L	H	518	1 /500	1 /501
				H	H	H	L	H	H	L	L	H	L	H	537	1 /250	1 /252
				L	H	H	L	H	H	H	L	H	L	H	576	1/125	1/125
				L	H	H	L	H	L	L	H	H	L	H	596	1/100	1/100
				H	L	H	H	H	H	H	H	H	L	H	5FD	1 /60	1 /60
H	x	x	L	L	L	L	H	L	L	H	H	L	L	H	4C8	1/10000	1/11 171
				L	H	L	H	L	L	H	H	L	L	H	4CA	1/4 000	1/4 597
				L	H	H	H	L	L	H	H	L	L	H	4CE	1/2 000	1/2112
				L	H	H	L	H	L	H	H	L	L	H	4D6	1/1 000	1/1 015
				L	H	H	L	L	H	H	H	L	L	H	4E6	1 /500	1 /498
				H	L	H	L	L	L	L	L	H	L	H	505	1 /250	1 /250
				H	H	L	L	L	L	H	L	H	L	H	543	1/125	1/125
				H	L	L	H	L	L	H	L	H	L	H	549	1/120	1/120
				H	L	H	H	H	H	H	H	H	L	H	5FD	1 /50	1 /50
L	x	x	L	x	x	x	x	x	x	x	x	x	L	L	-	1/100	1/100
H	x	x	L	x	x	x	x	x	x	x	x	x	L	L	-	1/120	1/120
L	x	x	L	x	x	x	x	x	x	x	x	x	H	H	-	1 /60	1 /60
H	x	x	L	x	x	x	x	x	x	x	x	x	H	H	-	1 /50	1 /50

X=H or L

AC Electrical Characteristics of Input Serial Data



SYMBOL	CONDITIONS	MIN.	MAX.
t_{w1}	EDo pulse width L	20 ns	50 μ s
t_{s1}	Setup time ED ₁ to EDo	20 ns	-
t_{s2}	Setup time ED ₁ to EDo	20 ns	-
t_{s3}	Setup time ED ₁ to ED ₂	20 ns	-
t_{h1}	Hold time ED ₁ to E.D.2	20 ns	-