

LZ9FD34

Single-chip Driver IC for 270 k/320 k/
410 k/470 k-pixel B/W CCDs

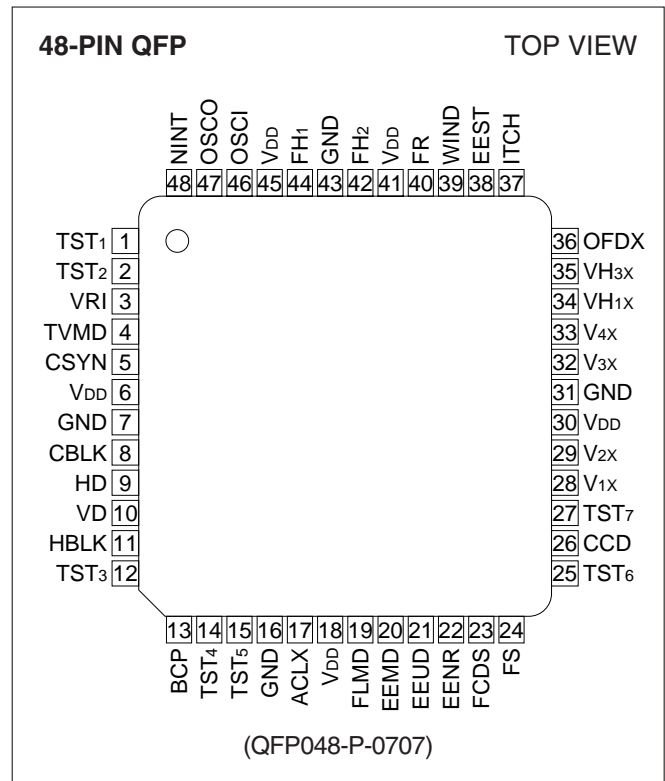
DESCRIPTION

The LZ9FD34 is a CMOS single-chip driver IC which generates timing pulses for driving 270 k/320 k/410 k/470 k-pixel B/W CCD area sensors, synchronous pulses for TV signals and processing for video signals.

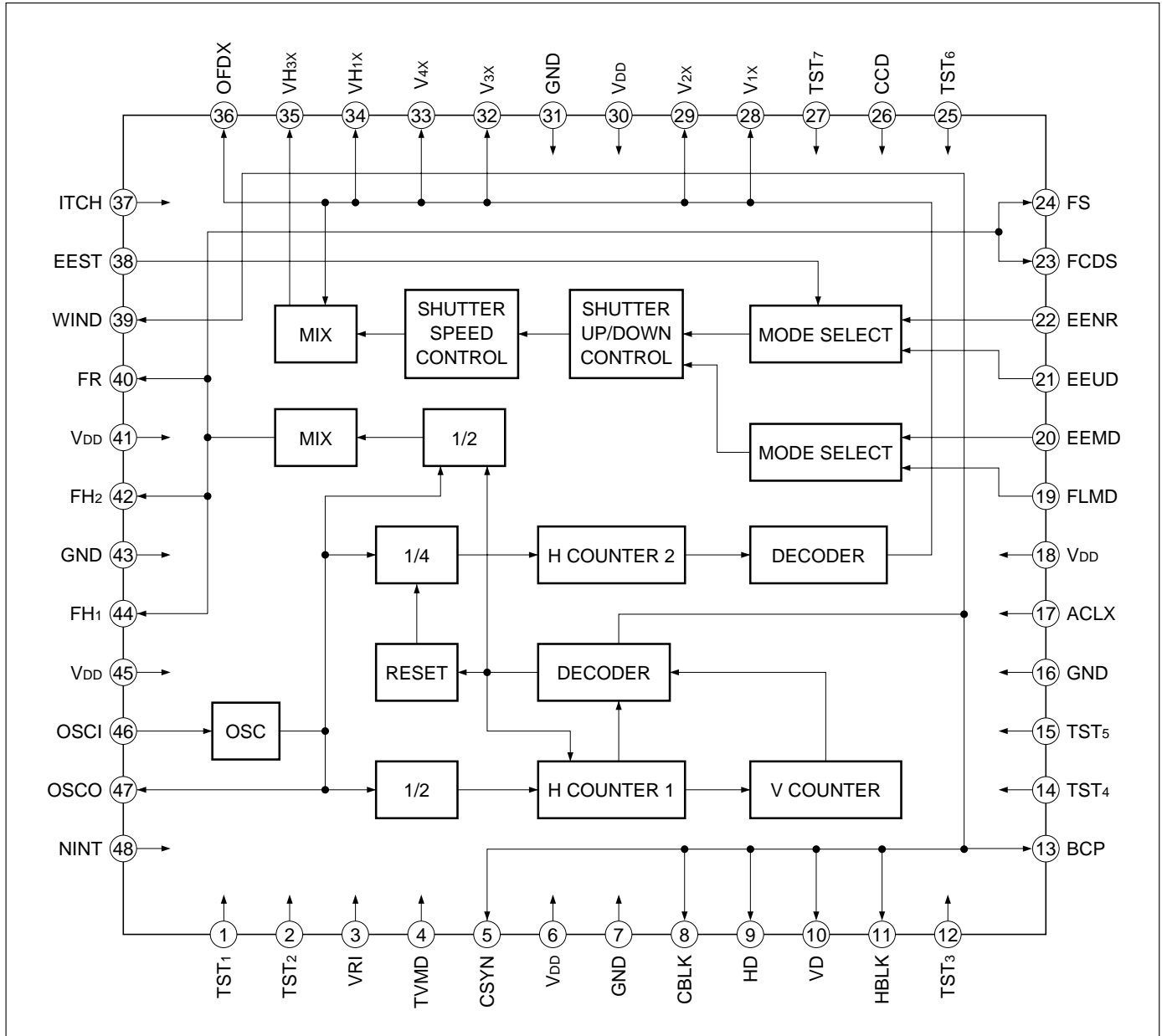
FEATURES

- Designed for B/W CCD area sensors with 270 k/320 k/410 k/470 k-pixel
- Switchable between EIA and CCIR modes
- Electronic shutter and EE control are possible
- Maximum shutter speed is 1/100 000 s
- Flicker-less function
- Non-interlace mode is possible
- External synchronization is possible
- Single +5 V power supply
- Field accumulation mode and frame accumulation mode are possible
- Package :
48-pin QFP (QFP048-P-0707) 0.5 mm pin-pitch

PIN CONNECTIONS








BLOCK DIAGRAM



PIN DESCRIPTION

PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	DESCRIPTION																				
1	TST ₁	ICD	–	Test pin 1	A test pin. Set open or to L level in the normal mode.																				
2	TST ₂	ICD	–	Test pin 2	A test pin. Set open or to L level in the normal mode.																				
3	VRI	ICSU	–	Vertical reset input	An input pin for resetting internal vertical counter. The input pulse is VSYNC. (negative polarity)																				
4	TVMD	ICU	–	TV mode selection input	An input pin to select TV standards. L level : EIA mode H level or open : CCIR mode																				
5	CSYN	O		Composite synchronizing pulse output	An output pin of composite synchronous signal pulse.																				
6	VDD	–	–	Power supply	Supply of +5 V power.																				
7	GND	–	–	Ground	A grounding pin.																				
8	CBLK	O		Composite blanking pulse output	An output pin of composite blanking pulse.																				
9	HD	O		Horizontal drive pulse output	The pulse occurs at the start of every line.																				
10	VD	O		Vertical drive pulse output	The pulse occurs at the start of every field.																				
11	HBLK	O		Horizontal blanking pulse output	A pulse that corresponds to the cease period of the horizontal transfer pulse.																				
12	TST ₃	ICD	–	Test pin 3	A test pin. Set open or to L level in the normal mode.																				
13	BCP	O		Optical black clamp pulse output	A pulse to clamp the optical black signal. This pulse stays low during the absence of effective pixels within the vertical blanking.																				
14	TST ₄	ICD	–	Test pin 4	A test pin. Set open or to L level in the normal mode.																				
15	TST ₅	ICD	–	Test pin 5	A test pin. Set open or to L level in the normal mode.																				
16	GND	–	–	Ground	A grounding pin.																				
17	ACLX	ICU	–	All clear input	An input pin for resetting all internal circuits at power on. Connect VDD through the diode and through the capacitor.																				
18	VDD	–	–	Power supply	Supply of +5 V power.																				
19	FLMD	ICU	–	Electronic exposure and WIND pulse control input 1	An input pin to control electronic exposure mode, flickerless mode and WIND (pin 39) pulse output. <table border="1"> <thead> <tr> <th>FLMD</th> <th>EEMD</th> <th>Electronic Shutter mode</th> <th>WIND</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>L</td> <td>EIA : 1/60 s, CCIR : 1/50 s</td> <td>WIND1</td> </tr> <tr> <td>H</td> <td>L</td> <td>EIA : 1/100 s, CCIR : 1/120 s</td> <td>WIND1</td> </tr> <tr> <td>L</td> <td>H</td> <td>Electronic exposure mode</td> <td>WIND1</td> </tr> <tr> <td>H</td> <td>H</td> <td>Electronic exposure mode</td> <td>WIND2</td> </tr> </tbody> </table>	FLMD	EEMD	Electronic Shutter mode	WIND	L	L	EIA : 1/60 s, CCIR : 1/50 s	WIND1	H	L	EIA : 1/100 s, CCIR : 1/120 s	WIND1	L	H	Electronic exposure mode	WIND1	H	H	Electronic exposure mode	WIND2
FLMD	EEMD	Electronic Shutter mode	WIND																						
L	L	EIA : 1/60 s, CCIR : 1/50 s	WIND1																						
H	L	EIA : 1/100 s, CCIR : 1/120 s	WIND1																						
L	H	Electronic exposure mode	WIND1																						
H	H	Electronic exposure mode	WIND2																						
20	EEMD	ICU	–	Electronic exposure and WIND pulse control input 2																					
					WIND1 : Vertical pulse																				
					WIND2 : Composite pulse (vertical and horizontal)																				

PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	DESCRIPTION												
21	EEUD	IC	–	Electronic exposure control input 1	An input pin to control electronic exposure. <table border="1"> <thead> <tr> <th>EEUD</th> <th>EENR</th> <th>Shutter Speed</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>L</td> <td>up</td> </tr> <tr> <td>H</td> <td>H</td> <td>control stopped</td> </tr> <tr> <td>L</td> <td>H</td> <td>down</td> </tr> </tbody> </table>	EEUD	EENR	Shutter Speed	H	L	up	H	H	control stopped	L	H	down
EEUD	EENR	Shutter Speed															
H	L	up															
H	H	control stopped															
L	H	down															
22	EENR	IC	–	Electronic exposure control input 2													
23	FCDS	O4MA2		CDS pulse output 1	A pulse to clamp the feed-through level from CCD.												
24	FS	O4MA2		CDS pulse output 2	A pulse to sample-hold the signal from CCD.												
25	TST6	ICD	–	Test pin 6	A test pin. Set open or to L level in the normal mode.												
26	CCD	ICU	–	CCD selection input	An input pin to select sensor type. H level or open : 410 k, 470 k pixel CCD L level : 270 k, 320 k pixel CCD												
27	TST7	ICD	–	Test pin 7	A test pin. Set open or to L level in the normal mode.												
28	V1X	O		Vertical transfer pulse output 1	A vertical transfer pulse for CCD. Connect to V1AX pin of vertical driver IC.												
29	V2X	O		Vertical transfer pulse output 2	A vertical transfer pulse for CCD. Connect to V2AX pin of vertical driver IC.												
30	VDD	–	–	Power supply	Supply of +5 V power.												
31	GND	–	–	Ground	A grounding pin.												
32	V3X	O		Vertical transfer pulse output 3	A vertical transfer pulse for CCD. Connect to V3AX pin of vertical driver IC.												
33	V4X	O		Vertical transfer pulse output 4	A vertical transfer pulse for CCD. Connect to V4AX pin of vertical driver IC.												
34	VH1X	O		Readout pulse output	A pulse that transfers the charge of the photo-diode to the vertical shift register. Connect to VH1AX pin or VH1BX pin of vertical driver IC.												
35	VH3X	O		Readout pulse output	A pulse that transfers the charge of the photo-diode to the vertical shift register. Connect to VH3AX pin or VH3BX pin of the vertical driver IC.												
36	OFDX	O		OFD pulse output	A pulse that sweeps the charge of the photo-diode for the electronic shutter. Connect to OFD pin of CCD through the vertical driver IC and DC offset circuit. Held at H level at normal mode.												
37	ITCH	ICU	–	Accumulation mode selection input	An input pin to select accumulation mode. H level or open : Field accumulation mode L level : Frame accumulation mode												
38	EEST	ICU	–	Electronic exposure control input 3	An input pin to control electronic exposure using EEUD (pin 21) and EENR (pin 22). H level or open : Electronic exposure is operated. L level : Electronic exposure is stopped.												

PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	DESCRIPTION															
39	WIND	ON (N-ch Open Drain)		Window pulse output	<p>An output pin for window pulse.</p> <table border="1"> <thead> <tr> <th>EEMD</th> <th>FLMD</th> <th>WIND</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>L</td> <td rowspan="2">WIND1 (vertical pulse)</td> </tr> <tr> <td>L</td> <td>H</td> </tr> <tr> <td>H</td> <td>L</td> <td rowspan="2">WIND2 (composite pulse)</td> </tr> <tr> <td>H</td> <td>H</td> </tr> </tbody> </table> <p>WIND1 : When connected to EEST (pin 38), the operation of electronic exposure can be stopped at the upper side of monitor.</p> <p>WIND2 : A pulse that picks out the center of CCD output. At this time, set H level or open at EEST (pin 38). As the output circuit of WIND is N-ch open drain, connect to V_{DD} with R (≥ 47 kΩ).</p>	EEMD	FLMD	WIND	L	L	WIND1 (vertical pulse)	L	H	H	L	WIND2 (composite pulse)	H	H		
EEMD	FLMD	WIND																		
L	L	WIND1 (vertical pulse)																		
L	H																			
H	L	WIND2 (composite pulse)																		
H	H																			
40	FR	O4MA3		Reset pulse output	<p>A pulse to reset the charge of output circuit.</p> <p>Connect to φ_R pin of CCD through the DC offset circuit.</p>															
41	V _{DD}	–	–	Power supply	Supply of +5 V power.															
42	FH ₂	O4MA3		Horizontal transfer pulse output 2	<p>A pulse to drive horizontal CCD shift register.</p> <p>Connect to φ_{H2} pin of CCD.</p>															
43	GND	–	–	Ground	A grounding pin.															
44	FH ₁	O4MA3		Horizontal transfer pulse output 1	<p>A pulse to drive horizontal CCD shift register.</p> <p>Connect to φ_{H1} pin of CCD.</p>															
45	V _{DD}	–	–	Power supply	Supply of +5 V power.															
46	OSCI	OSCI	–	Clock input	<p>An input pin for reference clock oscillation.</p> <p>Connect to OSCO (pin 47) with R.</p> <p>The frequencies are as follows :</p> <table border="1"> <thead> <tr> <th>TVMD</th> <th>CCD</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>L</td> <td>19.0699 MHz (1 212 fH)</td> </tr> <tr> <td>L</td> <td>H</td> <td>28.6364 MHz (1 820 fH)</td> </tr> <tr> <td>H</td> <td>L</td> <td>19.3125 MHz (1 236 fH)</td> </tr> <tr> <td>H</td> <td>H</td> <td>28.3750 MHz (1 816 fH)</td> </tr> </tbody> </table> <p>fH = Horizontal frequency</p>	TVMD	CCD	Frequency	L	L	19.0699 MHz (1 212 fH)	L	H	28.6364 MHz (1 820 fH)	H	L	19.3125 MHz (1 236 fH)	H	H	28.3750 MHz (1 816 fH)
TVMD	CCD	Frequency																		
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H	H	28.3750 MHz (1 816 fH)																		
47	OSCO	OSC3M	–	Clock output	<p>An output pin for reference clock oscillation.</p> <p>The output is the inverse of OSCI (pin 46).</p>															

PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	DESCRIPTION									
48	NINT	ICD	–	Non-interlace selection input	An input pin to select non-interlace mode. L level or open : Interlace mode H level : Non-interlace mode Period of field (at non-interlace mode) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>TVMD</th> <th>Field</th> <th>Number of Line</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>ODD</td> <td>262H</td> </tr> <tr> <td>H</td> <td>1st</td> <td>312H</td> </tr> </tbody> </table>	TVMD	Field	Number of Line	L	ODD	262H	H	1st	312H
TVMD	Field	Number of Line												
L	ODD	262H												
H	1st	312H												

IC : Input pin (CMOS level)

ICU : Input pin (CMOS level with pull-up resistor)

ICSU : Input pin (CMOS schmitt-trigger level with pull-up resistor)

ICD : Input pin (CMOS level with pull-down resistor)

O : Output pin

O4MA2 : Output pin

O4MA3 : Output pin

ON : Output pin (N-ch open drain)

OSCI : Input pin for oscillation

OSC3M : Output pin for oscillation

SUPPLEMENTARY EXPLANATION

Shutter speed changes at electronic exposure control mode.

EIA			CCIR		
No.	Charge Time	Shutter Speed	No.	Charge time	Shutter Speed
0	262H or 263H	$\approx 1/60$ s	0	312H or 313H	$\approx 1/50$ s
1	$252H + \alpha$	$\approx 1/62$ s	1	$302H + \beta$	$\approx 1/52$ s
•	(by 10H step)		•	(by 10H step)	
19	$72H + \alpha$	$\approx 1/220$ s	24	$72H + \beta$	$\approx 1/220$ s
•	(by 4H step)		•	(by 4H step)	
30	$28H + \alpha$	$\approx 1/555$ s	35	$28H + \beta$	$\approx 1/550$ s
•	(by 2H step)		•	(by 2H step)	
37	$14H + \alpha$	$\approx 1/1100$ s	42	$14H + \beta$	$\approx 1/1090$ s
•	(by 1H step)		•	(by 1H step)	
44	$7H + \alpha$	$\approx 1/2140$ s	49	$7H + \beta$	$\approx 1/2125$ s
•	(by 0.5H step)		•	(by 0.5H step)	
50	$4H + \alpha$	$\approx 1/3610$ s	55	$4H + \beta$	$\approx 1/3590$ s
•	(by 0.25H step)		•	(by 0.25H step)	
62	$1H + \alpha$	$\approx 1/11570$ s	67	$1H + \beta$	$\approx 1/11550$ s
•	(by 0.125H step)		•	(by 0.125H step)	
69	$0.125H + \alpha$	$\approx 1/32450$ s	74	$0.125H + \beta$	$\approx 1/32690$ s
70	0.280H	$\approx 1/56090$ s	75	0.275H	$\approx 1/56800$ s
71	0.155H	$\approx 1/101430$ s	76	0.152H	$\approx 1/102720$ s

$$\alpha = 0.360H$$

$$\beta = 0.353H$$

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Supply voltage	V _{DD}	-0.3 to +6.0	V
Input voltage	V _I	-0.3 to V _{DD} + 0.3	V
Output voltage	V _O	-0.3 to V _{DD} + 0.3	V
Operating temperature	T _{OPR}	-30 to +70	°C
Storage temperature	T _{STG}	-55 to +150	°C

ELECTRICAL CHARACTERISTICS

DC Characteristics

(V_{DD} = 5.0±0.5 V, T_{OPR} = -30 to +70 °C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	NOTE
Input "Low" voltage	V _{IL}				1.5	V	1
Input "High" voltage	V _{IH}		3.5			V	
Input "Low" voltage	V _{T+}				3.7	V	2
Input "High" voltage	V _{T-}		1.0			V	
Hysteresis voltage	V _{T+} - V _{T-}		0.2			V	
Input "Low" current	I _{IL1}	V _I = 0 V			2.0	μA	3
Input "High" current	I _{IH1}	V _I = V _{DD}			2.0	μA	
Input "Low" current	I _{IL2}	V _I = 0 V	8.0		75	μA	4
Input "High" current	I _{IH2}	V _I = V _{DD}			2.0	μA	
Input "Low" current	I _{IL3}	V _I = 0 V			2.0	μA	5
Input "High" current	I _{IH3}	V _I = V _{DD}	8.0		75	μA	
Output "Low" voltage	V _{OL1}	I _{OL} = 3 mA			0.4	V	6
Output "High" voltage	V _{OH1}	I _{OH} = -3 mA	4.0			V	
Output "Low" voltage	V _{OL2}	I _{OL} = 4 mA			0.4	V	7
Output "High" voltage	V _{OH2}	I _{OH} = -2 mA	4.0			V	
Output "Low" voltage	V _{OL3}	I _{OL} = 8 mA			0.4	V	8
Output "High" voltage	V _{OH3}	I _{OH} = -6 mA	4.0			V	
Output "Low" voltage	V _{OL4}	I _{OL} = 12 mA			0.4	V	9
Output "High" voltage	V _{OH4}	I _{OH} = -9 mA	4.0			V	
Output "Low" voltage	V _{OL5}	I _{OL} = 4 mA			0.4	V	10
Output leakage current	I _{OZ}	High-Z			1.0	μA	

NOTES :

- Applied to inputs (IC, ICD, ICU, OSC1).
- Applied to input (ICSU).
- Applied to inputs (IC, OSC1).
- Applied to inputs (ICU, ICSU).
- Applied to input (ICD).
- Applied to output (OSC3M). (Output (OSC3M) measures on condition that input (OSC1) level is 0 V or V_{DD}.)
- Applied to output (O).
- Applied to output (O4MA2).
- Applied to output (O4MA3).
- Applied to output (ON).

PACKAGE

(Unit : mm)

48 QFP (QFP048-P-0707)

