LR38620

Timing Generator IC for 4 200 k-pixel CCD

DESCRIPTION

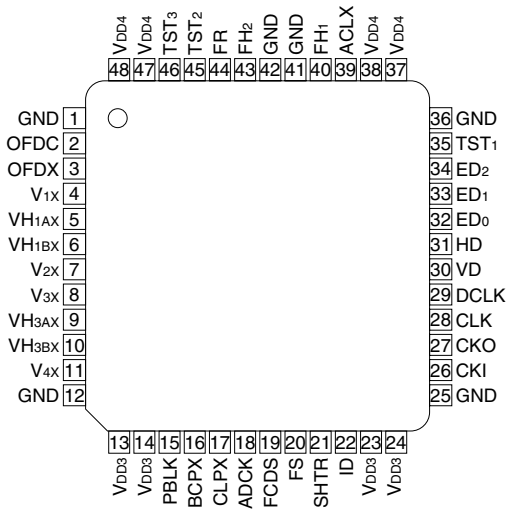
The LR38620 is a CMOS timing generator IC which generates timing pulses for driving 4 200 k-pixel CCD area sensor and processing pulses.

FEATURES

- Designed for 1/1.8-type 4 200 k-pixel CCD area sensor
- Frequency of driving horizontal CCD : 24.54545 MHz
- In monitoring mode, it can be obtained 30 fields/s
- External shutter control function with serial data input is possible
- +3.3 V and +4.5 V power supplies
- Package :
  48-pin QFP (P-QFP048-0707) 0.5 mm pin-pitch

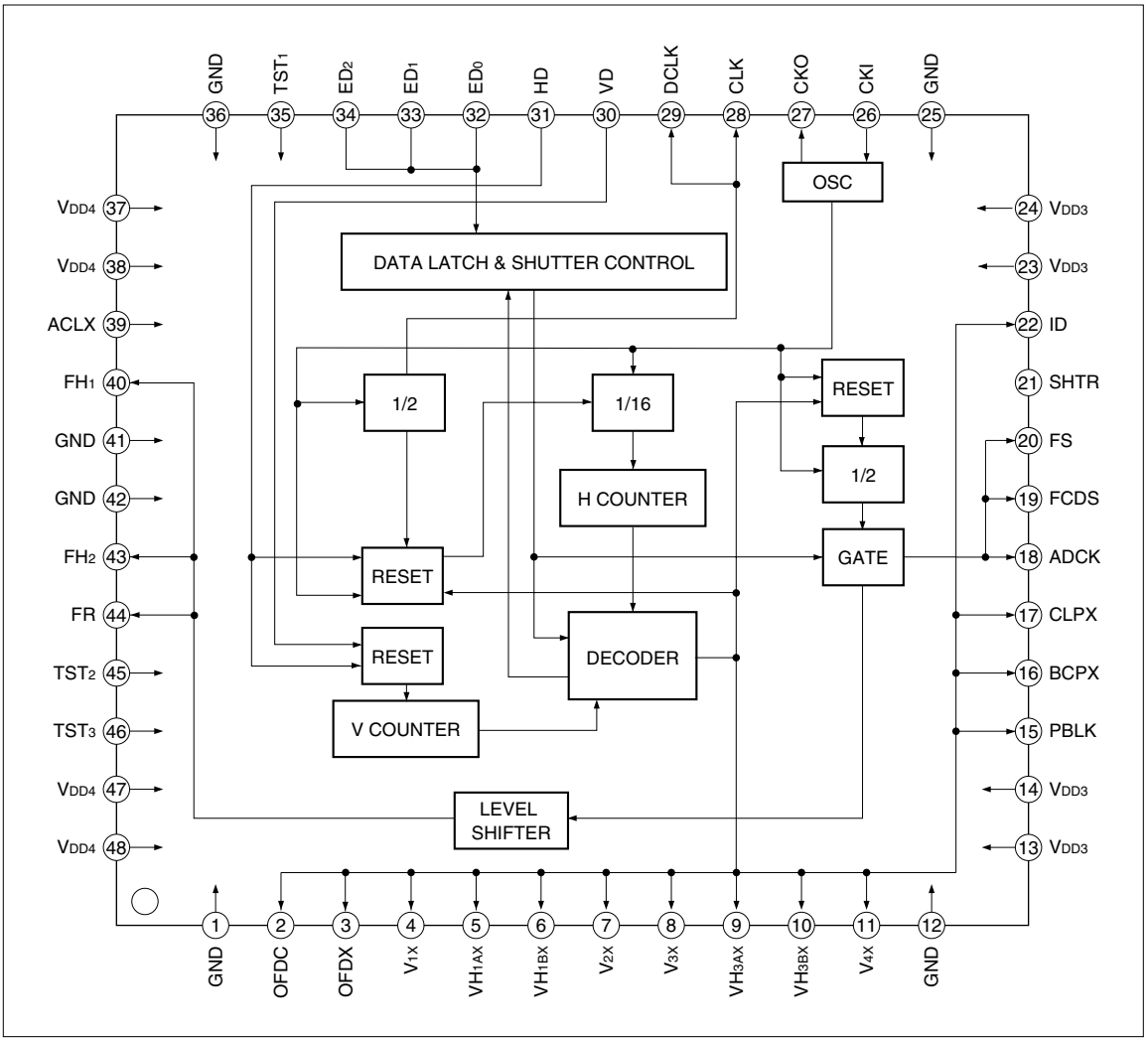
PIN CONNECTIONS

48-PIN QFP TOP VIEW



(P-QFP048-0707)

BLOCK DIAGRAM



PIN DESCRIPTION

PIN NO.	SYMBOL	IO SYMBOL	POLARITY	PIN NAME	DESCRIPTION
1	GND	–	–	Ground	A grounding pin.
2	OFDC	O3MR1	⎍	Control pulse output for OFD voltage	A pulse to control OFD voltage.
3	OFDX	O3MR1	⎎	OFD pulse output	A pulse that sweeps the charge of the photo-diode for the electronic shutter. Connect to OFD pin of the CCD through the vertical driver IC and DC offset circuit. Held at H level in normal mode.
4	V_{1X}	O3MR1	⎍	Vertical transfer pulse output 1	A vertical transfer pulse for the CCD. Connect to V_{1X} pin of vertical driver IC.
5	VH_{1AX}	O3MR1	⎎	Readout pulse output 1A	A pulse that transfers the charge of the photo-diode to the vertical shift register. Connect to VH_{1AX} pin of vertical driver IC.
6	VH_{1BX}	O3MR1	⎎	Readout pulse output 1B	A pulse that transfers the charge of the photo-diode to the vertical shift register. Connect to VH_{1BX} pin of vertical driver IC.
7	V_{2X}	O3MR1	⎍	Vertical transfer pulse output 2	A vertical transfer pulse for the CCD. Connect to V_{2X} pin of vertical driver IC.
8	V_{3X}	O3MR1	⎎	Vertical transfer pulse output 3	A vertical transfer pulse for the CCD. Connect to V_{3X} pin of vertical driver IC.
9	VH_{3AX}	O3MR1	⎎	Readout pulse output 3A	A pulse that transfers the charge of the photo-diode to the vertical shift register. Connect to VH_{3AX} pin of vertical driver IC.
10	VH_{3BX}	O3MR1	⎎	Readout pulse output 3B	A pulse that transfers the charge of the photo-diode to the vertical shift register. Connect to VH_{3BX} pin of vertical driver IC.
11	V_{4X}	O3MR1	⎎	Vertical transfer pulse output 4	A vertical transfer pulse for the CCD. Connect to V_{4X} pin of vertical driver IC.
12	GND	–	–	Ground	A grounding pin.
13	V_{DD3}	–	–	Power supply	Supply of +3.3 V power.
14	V_{DD3}	–	–	Power supply	Supply of +3.3 V power.
15	PBLK	O3MR1	⎎	Pre-blanking pulse output	A pulse for pre-blanking. This pulse is controlled by serial data BLKCNT. BLKCNT = H; This pulse stays low during the absence of effective pixels within the vertical blanking or during the sweepout signal. BLKCNT = L; Continuous pulse The output phase of PBLK is selected by serial data.

PIN NO.	SYMBOL	IO SYMBOL	POLARITY	PIN NAME	DESCRIPTION
16	BCPX	O3MR1		Optical black clamp pulse output	A pulse to clamp the optical black signal. This pulse is controlled by serial data BCPCNT. BCPCNT = H; This pulse stays high during the absence of effective pixels within the vertical blanking or during the sweepout signal. BCPCNT = L; This pulse stays high during the sweepout signal.
17	CLPX	O3MR1		Clamp pulse output	A pulse to clamp the dummy outputs of the CCD signal. This pulse stays high during the sweepout period.
18	ADCK	O6M32		AD clock output	An output pin for AD converter. The output phase of ADCK is selected by serial data in 90˚ steps.
19	FCDS	O6M32		CDS pulse output 1	A pulse to clamp the feed-through level for the CCD. The output phase and output polarity of FCDS are selected by serial data.
20	FS	O6M32		CDS pulse output 2	A pulse to sample-hold the signal for the CCD. The output phase and output polarity of FS are selected by serial data.
21	SHTR	O3MR1		Trigger output	A trigger pulse for effective signal period.
22	ID	O3MR1		Line index pulse output	The pulse is used in the color separator. The signal switches between high and low at every line.
23	V_{DD3}	–	–	Power supply	Supply of +3.3 V power.
24	V_{DD3}	–	–	Power supply	Supply of +3.3 V power.
25	GND	–	–	Ground	A grounding pin.
26	CKI	OSCI3	–	Clock input	An input pin for reference clock oscillation. The frequency is 49.0909 MHz.
27	CKO	OSCO3	–	Clock output	An output pin for reference oscillation. The output is the inverse of CKI (pin 26).
28	CLK	O6M32		Clock output	An output pin to generate HD and VD pulses. The frequency is 24.54545 MHz.
29	DCLK	O6M32		Clock output	An output pin for DSP IC. The frequency is 24.54545 MHz. The output phase of DCLK is selected by serial data in 90˚ steps.
30	VD	IC3		Vertical reference pulse input	An input pin for reference of vertical pulse. Connect to VD pin of DSP IC.
31	HD	IC3		Horizontal drive pulse input	An input pin for reference of horizontal pulse. Connect to HD pin of DSP IC.
32	ED_0	ICSD3	–	Strobe pulse input	An input pin for the strobe pulse, to control the functions of LR38620. For details, see "**Serial Data Control**".
33	ED_1	ICSD3	–	Shift register clock input	An input pin for the clock of the shift register, to control the functions of LR38620. For details, see "**Serial Data Control**".

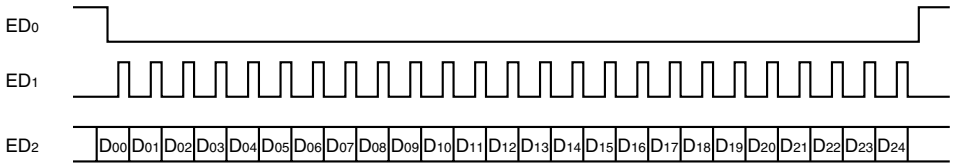
PIN NO.	SYMBOL	IO SYMBOL	POLARITY	PIN NAME	DESCRIPTION
34	ED_2	ICSD3	–	Shift register data input	An input pin for the data of the shift register, to control the functions of LR38620. For details, see **"Serial Data Control"**.
35	TST_1	ICD3	–	Test pin 1	A test pin. Set open or to L level in normal mode.
36	GND	–	–	Ground	A grounding pin.
37	V_{DD4}	–	–	Power supply	Supply of +4.5 V power.
38	V_{DD4}	–	–	Power supply	Supply of +4.5 V power.
39	ACLX	ICU4	–	All clear input	An input pin for resetting all internal circuit at power-on. Connect to V_{DD3} through the diode and GND through the capacitor.
40	FH_1	O8M43		Horizontal transfer pulse output 1	A horizontal transfer pulse for the CCD. Connect to ϕ_{H1} pin of the CCD.
41	GND	–	–	Ground	A grounding pin.
42	GND	–	–	Ground	A grounding pin.
43	FH_2	O8M43		Horizontal transfer pulse output 2	A horizontal transfer pulse for the CCD. Connect to ϕ_{H2} pin of the CCD.
44	FR	O8M43		Reset pulse output	A pulse to reset the charge of output circuit. The output phase of FR is selected by serial data.
45	TST_2	ICD4	–	Test pin 2	A test pin. Set open or to L level in normal mode.
46	TST_3	ICD4	–	Test pin 3	A test pin. Set open or to L level in normal mode.
47	V_{DD4}	–	–	Power supply	Supply of +4.5 V power.
48	V_{DD4}	–	–	Power supply	Supply of +4.5 V power.

IC3 : Input pin (CMOS level)
ICD3 : Input pin (CMOS level with pull-down resistor)
ICSD3 : Input pin (CMOS schmitt-trigger level with pull-down resistor)
ICD4 : Input pin (CMOS level with pull-down resistor)
ICU4 : Input pin (CMOS level with pull-up resistor)

O3MR1 : Output pin (output high level is V_{DD3}.)
O6M32 : Output pin (output high level is V_{DD3}.)
O8M43 : Output pin (output high level is V_{DD4}.)
OSCI3 : Input pin for oscillation
OSCO3 : Output pin for oscillation

Serial Data Control

SERIAL DATA INPUT TIMING



ED_2 is shifted by the rising edge of ED_1, and is latched by the pulse #1 which is generated after 122 to 162 ns delay from the rising edge of ED_0. (See **Fig. 2**.)

The latched serial data are divided into two types by the data of D_{00}, and are relatched by the pulse #2 which is generated after 203 to 243 ns delay from the rising edge of ED_0. (See **Fig. 1**.)

INMD is effective at the start of #3 horizontal line, and shutter control data are effective at the start of #11 horizontal line in monitoring mode and #93 horizontal line in still mode, and other data are effective at pulse #2.

ED_0 should be at low level during data inputs of ED_1 and ED_2 or while ACLX is at low level.

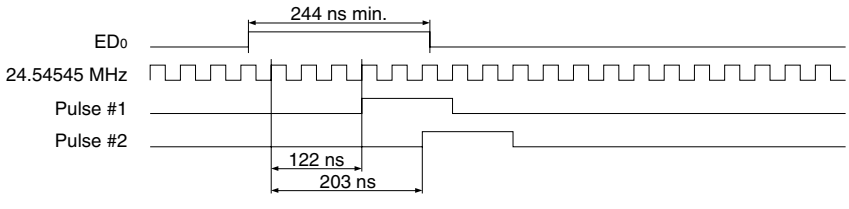


Fig. 1 Data Latch Timing

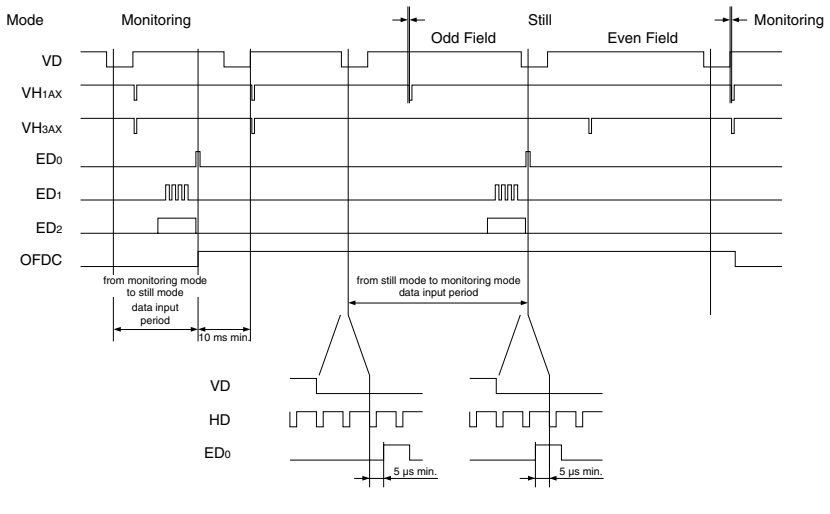


Fig. 2 Input Pulse Timing of ED_0, ED_1 and ED_2

SERIAL DATA INPUTS

D_{00} = L

DATA	NAME	FUNCTION	DATA = L	DATA = H	AT ACLX = L
D_{01}-D_{09}	SDV_0-SDV_8	Integration time control in field period step by horizontal period.	–		All L
D_{10}-D_{15}	SDH_0-SDH_5	Dummy	Fix to L level		All L
D_{16}	SDF_0	Integration time control by field period.	–		All L
D_{17}	SDF_1				
D_{18}	SDF_2				
D_{19}	SMD	Electronic shutter mode control	–		L
D_{20}	PWSA	Power save control	Normal	Power save	L
D_{21}	INMD	Integration mode control	Monitoring	Still	L
D_{22}	Dummy	Dummy	Fix to L level		L
D_{23}	Dummy	Dummy	Fix to L level		L
D_{24}	VHCNT	VH_{1AX} to VH_{3BX} control	Output	Held at H level	L

D_{00} = H

DATA	NAME	FUNCTION	DATA = L	DATA = H	AT ACLX = L
D_{01}	ML1	Phase control	–		All L
D_{02}	ML2				
D_{03}	MR1		–		All L
D_{04}	MR2				
D_{05}	MR3				
D_{06}	MC1		–		All L
D_{07}	MC2				
D_{08}	MC3				
D_{09}	MS1		–		All L
D_{10}	MS2				
D_{11}	MS3				
D_{12}	MD1		–		All L
D_{13}	MD2				
D_{14}	MD3				
D_{15}	MA1		–		All L
D_{16}	MA2				
D_{17}	Dummy	Dummy	Fix to L level		All L
D_{18}	Dummy				
D_{19}	Dummy				
D_{20}	MP1	Phase control	–		All L
D_{21}	MP2				
D_{22}	PLCH	Polarity control of FCDS and FS pulses	Negative	Positive	L
D_{23}	BLKCNT	PBLK control	Continuous	Discontinuous	L
D_{24}	BCPCNT	BCPX control	Continuous	Discontinuous	L

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Supply voltage	V_{DD3}, V_{DD4}	−0.3 to +5.5	V
Input voltage	V_{I3}	−0.3 to V_{DD3} + 0.3	V
	V_{I4}	−0.3 to V_{DD4} + 0.3	V
Output voltage	V_{O3}	−0.3 to V_{DD3} + 0.3	V
	V_{O4}	−0.3 to V_{DD4} + 0.3	V
Operating temperature	T_{OPR}	−20 to +70	˚C
Storage temperature	T_{STG}	−55 to +150	˚C

ELECTRICAL CHARACTERISTICS

DC Characteristics

(V_{DD3} = 3.3±10%, V_{DD4} = 4.5±10%, T_{OPR} = −20 to +70˚C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	NOTE
Input "Low" voltage	V_{IL3-1}				0.2V_{DD3}	V	1, 2
Input "High" voltage	V_{IH3-1}		0.8V_{DD3}			V	
Input "Low" voltage	V_{IL3-2}	Schmitt-buffer	0.2V_{DD3}			V	3
Input "High" voltage	V_{IH3-2}				0.75V_{DD3}	V	
Hysteresis voltage	$V_{T+} - V_{T-}$		0.14V_{DD3}			V	
Input "Low" voltage	V_{IL4}				0.2V_{DD4}	V	4, 5
Input "High" voltage	V_{IH4}		0.8V_{DD4}			V	
Input "Low" current	$\lvert I_{IL3-1} \rvert$	V_I = 0 V			1.0	µA	1
Input "High" current	$\lvert I_{IH3-1} \rvert$	V_I = V_{DD3}			1.0	µA	
Input "Low" current	$\lvert I_{IL3-2} \rvert$	V_I = 0 V			3.0	µA	2, 3
Input "High" current	$\lvert I_{IH3-2} \rvert$	V_I = V_{DD3}	8.0		100	µA	
Input "Low" current	$\lvert I_{IL4-1} \rvert$	V_I = 0 V	20		300	µA	4
Input "High" current	$\lvert I_{IH4-1} \rvert$	V_I = V_{DD4}			5.0	µA	
Input "Low" current	$\lvert I_{IL4-2} \rvert$	V_I = 0 V			5.0	µA	5
Input "High" current	$\lvert I_{IH4-2} \rvert$	V_I = V_{DD4}	20		300	µA	
Output "Low" voltage	V_{OL3-1}	I_{OL} = 3 mA			0.4	V	6
Output "High" voltage	V_{OH3-1}	I_{OH} = −2.5 mA	V_{DD3} − 0.5			V	
Output "Low" voltage	V_{OL3-2}	I_{OL} = 12 mA			0.4	V	7
Output "High" voltage	V_{OH3-2}	I_{OH} = −10 mA	V_{DD3} − 0.5			V	
Output "Low" voltage	V_{OL4}	I_{OL} = 20 mA			0.4	V	8
Output "High" voltage	V_{OH4}	I_{OH} = −20 mA	V_{DD4} − 0.5			V	

NOTES :

1. Applied to inputs (IC3, OSCI3).
2. Applied to input (ICD3).
3. Applied to input (ICSD3).
4. Applied to input (ICU4).
5. Applied to input (ICD4).
6. Applied to outputs (OSCO3, O3MR1). (Output (OSCO3) measures on condition that input (OSCI3) level is 0 V or V_{DD3}.)
7. Applied to output (O6M32).
8. Applied to output (O8M43).

PACKAGE OUTLINES

48 QFP (P-QFP048-0707)

(Unit : mm)