

MW3758H

11mm (2/3 inch) Wide CCD Area Image Sensor

■ Overview

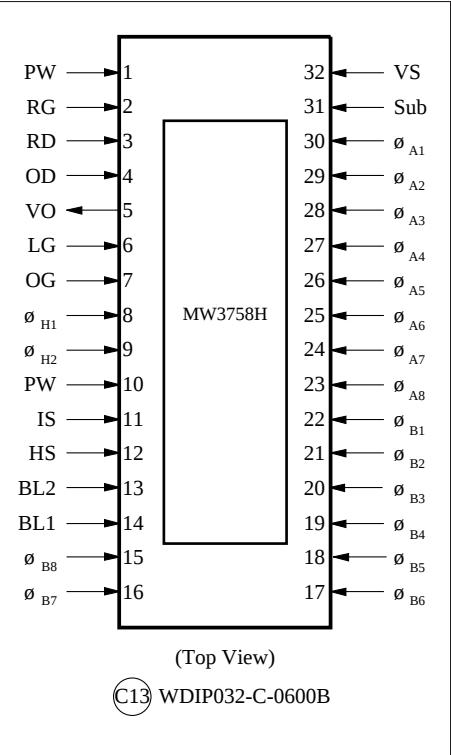
The MW3758H is a 11mm (2/3 inch) Multiple Frame Interline Transfer CCD (M-FIT-CCD) solid state image sensor device. This device uses photodiodes in the optoelectric conversion section and CCDs for signal read out. The electronic shutter function has made possible an exposure time of 1/10000 seconds. Further, this device has the features of high sensitivity, low noise, broad dynamic range, and low smear. This device has a total of 510K pixels (1020 horizontal × 491 vertical) and provides stable and clear images with a resolution of 700 horizontal TV-lines and 350 vertical TV-lines.

Type No.	Size	System	Color or B/W
MW3758H	11mm (2/3 inch)	Wide	B/W

■ Features

- Total number of pixels: 1020 (horizontal) × 491 (vertical)
- High sensitivity
- Low noise
- Broad dynamic range
- Low smear
- Low image lag
- Electronic shutter function present
- No image distortion
- High reliability
- Aspect ratio selectable between 16:9 and 4:3
- Progressing-scan operation capability
- 32 Pin DIL ceramic package

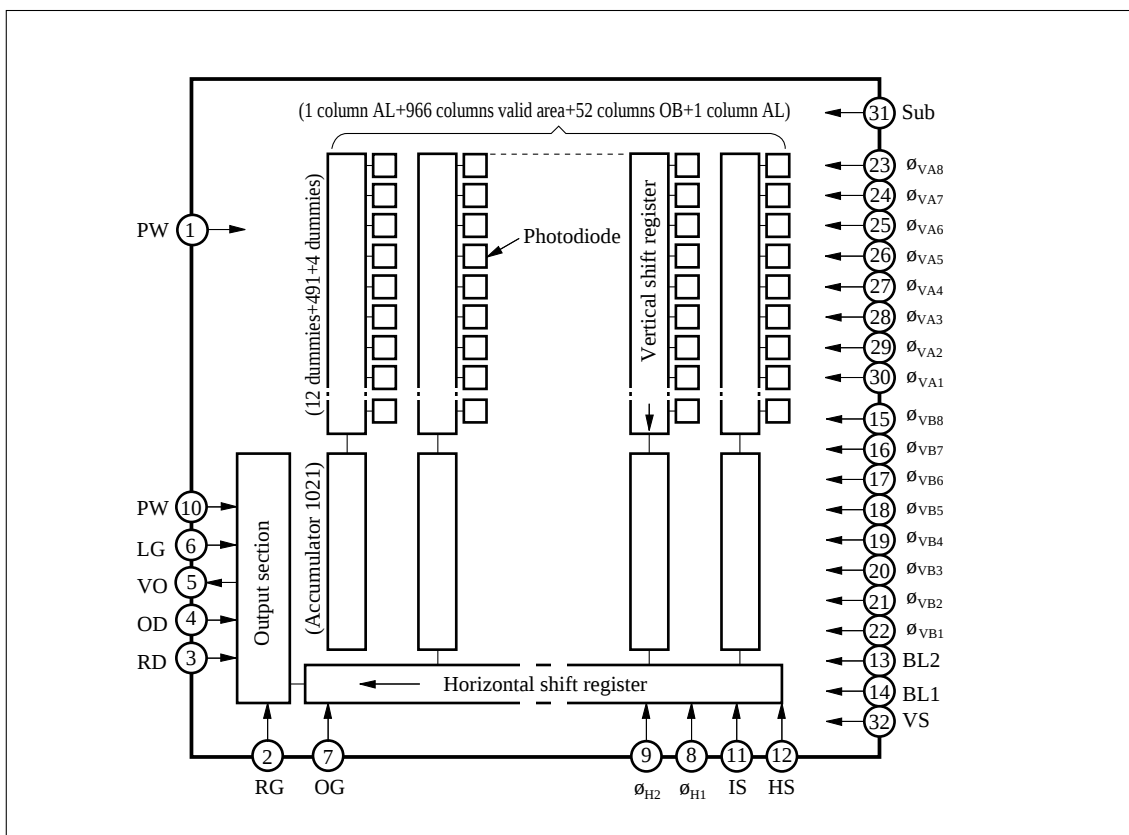
■ Pin Assignments



■ Applications

- Cameras for broadcasting

■ Block Diagram



■ Pin Descriptions

Pin No.	Symbol	Descriptions	Pin No.	Symbol	Descriptions
1	PW	P-well	17	φ _{VB6}	Accumulator vertical CCD gate (6)
2	RG	Reset gate	18	φ _{VB5}	Accumulator vertical CCD gate (5)
3	RD	Reset drain	19	φ _{VB4}	Accumulator vertical CCD gate (4)
4	OD	Output drain	20	φ _{VB3}	Accumulator vertical CCD gate (3)
5	VO	Video output	21	φ _{VB2}	Accumulator vertical CCD gate (2)
6	LG	Load gate	22	φ _{VB1}	Accumulator vertical CCD gate (1)
7	OG	Output gate	23	φ _{VA8}	Photo detector vertical CCD gate (8)
8	φ _{H1}	Horizontal CCD gate (1)	24	φ _{VA7}	Photo detector vertical CCD gate (7)
9	φ _{H2}	Horizontal CCD gate (2)	25	φ _{VA6}	Photo detector vertical CCD gate (6)
10	PW	P-well	26	φ _{VA5}	Photo detector vertical CCD gate (5)
11	IS	Horizontal input gate	27	φ _{VA4}	Photo detector vertical CCD gate (4)
12	HS	Horizontal input source	28	φ _{VA3}	Photo detector vertical CCD gate (3)
13	BL2	Accumulator final gate (2)	29	φ _{VA2}	Photo detector vertical CCD gate (2)
14	BL1	Accumulator final gate (1)	30	φ _{VA1}	Photo detector vertical CCD gate (1)
15	φ _{VB8}	Accumulator vertical CCD gate (8)	31	Sub	Substrate
16	φ _{VB7}	Accumulator vertical CCD gate (7)	32	VS	Vertical input source

■ Absolute Maximum Ratings and Operating Conditions

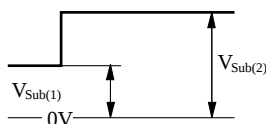
Parameter	Symbol	Rating		Operating condition			Unit
		min	max	min	typ	max	
P well voltage	V_{PW}	Reference voltage		—	0	—	V
Reset gate voltage	(H) $V_{RG(H)}$	—	20.0	9.5	10.0	10.5	V
	(L) $V_{RG(L)}$	0	—	3.5	4.0	4.5	V
Reset drain voltage	V_{RD}	0	20.0	15.5	16.0	16.5	V
Output drain voltage	V_{OD}	0	20.0	15.5	16.0	16.5	V
Video output voltage	V_{VO}	—	—	—	—	—	V
Load gate voltage	V_{LG}	0	20.0	2.5	3.0	3.5	V
Output gate voltage	V_{OG}	0	20.0	0.5	1.0	1.5	V
Horizontal CCD gate voltage (1)	(H) $V_{\theta H1(H)}$	0	20.0	4.7	5.0	5.3	V
	(L) $V_{\theta H1(L)}$	0	—	—	0	—	V
Horizontal CCD gate voltage (2)	(H) $V_{\theta H2(H)}$	0	20.0	4.7	5.0	5.3	V
	(L) $V_{\theta H2(L)}$	0	—	—	0	—	V
P well voltage	V_{PW}	Reference voltage		—	0	—	V
Horizontal input gate voltage	V_{IG}	0	20.0	—	0	—	V
Horizontal input source voltage	V_{HS}	0	20.0	15.5	16.0	16.5	V
Accumulator final gate (2) voltage	(M) $V_{\theta VBL2(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VBL2(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Accumulator final gate (1) voltage	(M) $V_{\theta VBL1(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VBL1(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Accumulator vertical CCD gate (B8) voltage	(M) $V_{\theta VB8(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VB8(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Accumulator vertical CCD gate (B7) voltage	(M) $V_{\theta VB7(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VB7(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Accumulator vertical CCD gate (B6) voltage	(M) $V_{\theta VB6(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VB6(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Accumulator vertical CCD gate (B5) voltage	(M) $V_{\theta VB5(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VB5(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Accumulator vertical CCD gate (B4) voltage	(M) $V_{\theta VB4(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VB4(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Accumulator vertical CCD gate (B3) voltage	(M) $V_{\theta VB3(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VB3(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Accumulator vertical CCD gate (B2) voltage	(M) $V_{\theta VB2(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VB2(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Accumulator vertical CCD gate (B1) voltage	(M) $V_{\theta VB1(M)}$	—	20.0	3.7	4.0	4.3	V
	(L) $V_{\theta VB1(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Photo detector vertical CCD gate (A8) voltage	(M) $V_{\theta VA8(M)}$	—	20.0	1.7	2.0	2.3	V
	(L) $V_{\theta VA8(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Photo detector vertical CCD gate (A7) voltage	(H) $V_{\theta VA7(H)}$	—	20.0	17.7	18.0	18.3	V
	(M) $V_{\theta VA7(M)}$	—	20.0	0.7	1.0	1.3	V
	(L) $V_{\theta VA7(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Photo detector vertical CCD gate (A6) voltage	(M) $V_{\theta VA6(M)}$	—	20.0	1.7	2.0	2.3	V
	(L) $V_{\theta VA6(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Photo detector vertical CCD gate (A5) voltage	(H) $V_{\theta VA5(H)}$	—	20.0	17.7	18.0	18.3	V
	(M) $V_{\theta VA5(M)}$	—	20.0	0.7	1.0	1.3	V
	(L) $V_{\theta VA5(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Photo detector vertical CCD gate (A4) voltage	(M) $V_{\theta VA4(M)}$	—	20.0	1.7	2.0	2.3	V
	(L) $V_{\theta VA4(L)}$	−12.0	—	−9.3	−9.0	−8.7	V
Photo detector vertical CCD gate (A3) voltage	(H) $V_{\theta VA3(H)}$	—	20.0	17.7	18.0	18.3	V
	(M) $V_{\theta VA3(M)}$	—	20.0	0.7	1.0	1.3	V
	(L) $V_{\theta VA3(L)}$	−12.0	—	−9.3	−9.0	−8.7	V

■ Absolute Maximum Ratings and Operating Conditions (continued)

Parameter	Symbol	Rating		Operating condition			Unit	
		min	max	min	typ	max		
Photo detector vertical CCD gate (A2) voltage	(M)	$V_{\theta \text{ VA2 (M)}}$	—	20.0	1.7	2.0	2.3	V
	(L)	$V_{\theta \text{ VA2 (L)}}$	−12.0	—	−9.3	−9.0	−8.7	V
Photo detector vertical CCD gate (A1) voltage	(H)	$V_{\theta \text{ VA1 (H)}}$	—	20.0	17.7	18.0	18.3	V
	(M)	$V_{\theta \text{ VA1 (M)}}$	—	20.0	0.7	1.0	1.3	V
	(L)	$V_{\theta \text{ VA1 (L)}}$	−12.0	—	−9.3	−9.0	−8.7	V
Substrate voltage		$V_{\text{Sub (1)}}$ *1	0	18.0	3.0	Adj	16.0	V
		$V_{\text{Sub (2)}}$ *1	0	50.0	34.5	35.0	35.5	V
Vertical input source voltage		V_{VS}	0	20.0	15.5	16.0	16.5	V

Note 1) The initial setting of V_{Sub} shall be 5.0V and shall be adjusted to the minimum voltage at which no blooming or no overflow charge is caused at a light input of 1600 times the standard value. The standard light input is the one when the exposure is done at an aperture of F/11 using a light source of 2856K and 920nt, and placing a color temperature conversion filter LB-40 (Hoya) and an IR cutting filter CAW-500S ($t=2.5\text{mm}$) in the light path.

Note) $V_{\text{Sub(1)}}$ is the DC component during normal operation.
 $V_{\text{Sub(2)}}$ is as shown in the figure at right (during electronic shutter operation).

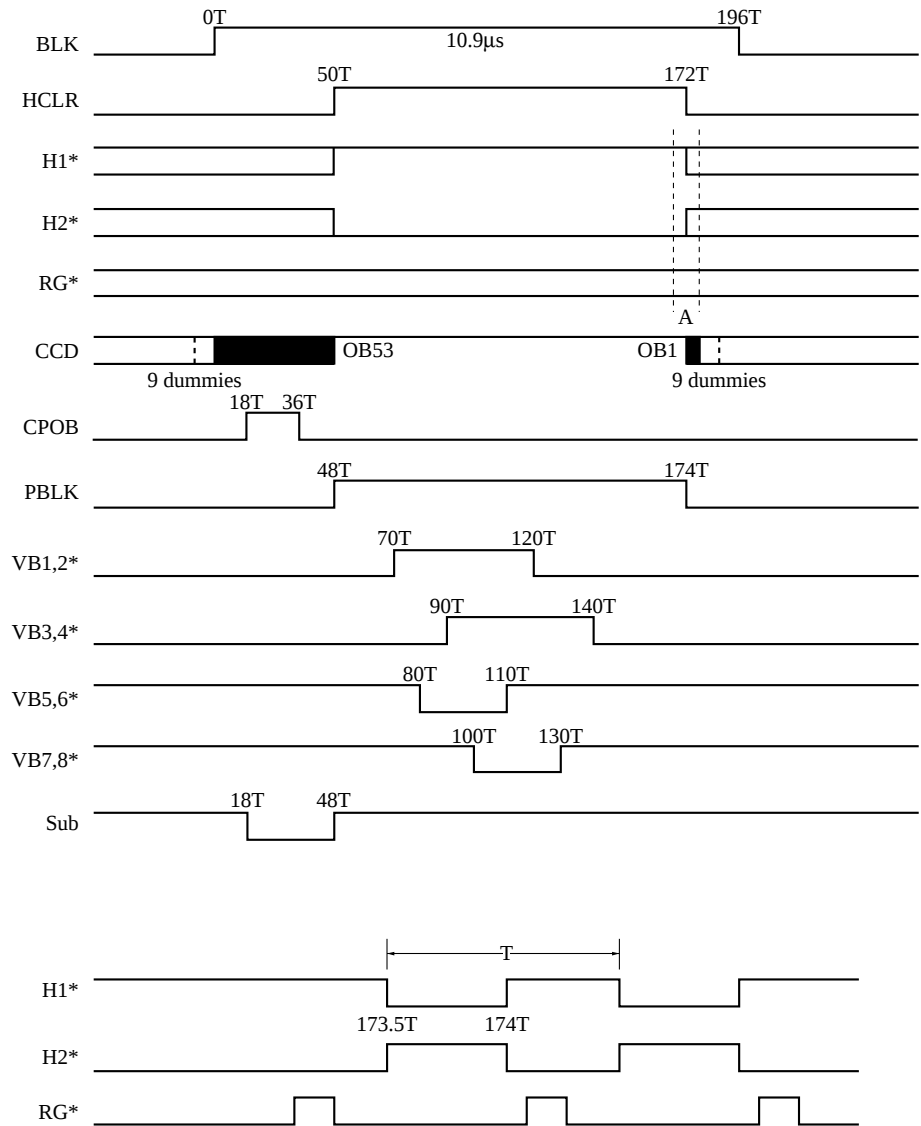


■ Optical Characteristics

Type No.	Color or B/W	Valid pixels		S/N typ. (dB)	Saturation output typ. (mV)			Sensitivity F8 typ. (mV)	Vertical smear Sm typ. (dB)	Image lag typ. (%)	Horizontal resolution typ. (TV-lines)	Vertical resolution typ. (TV-lines)
		H	V		R	G	B					
MW3758H	B/W	966	491	62	1,500	1,500	1,000	600	−130	0	700	350

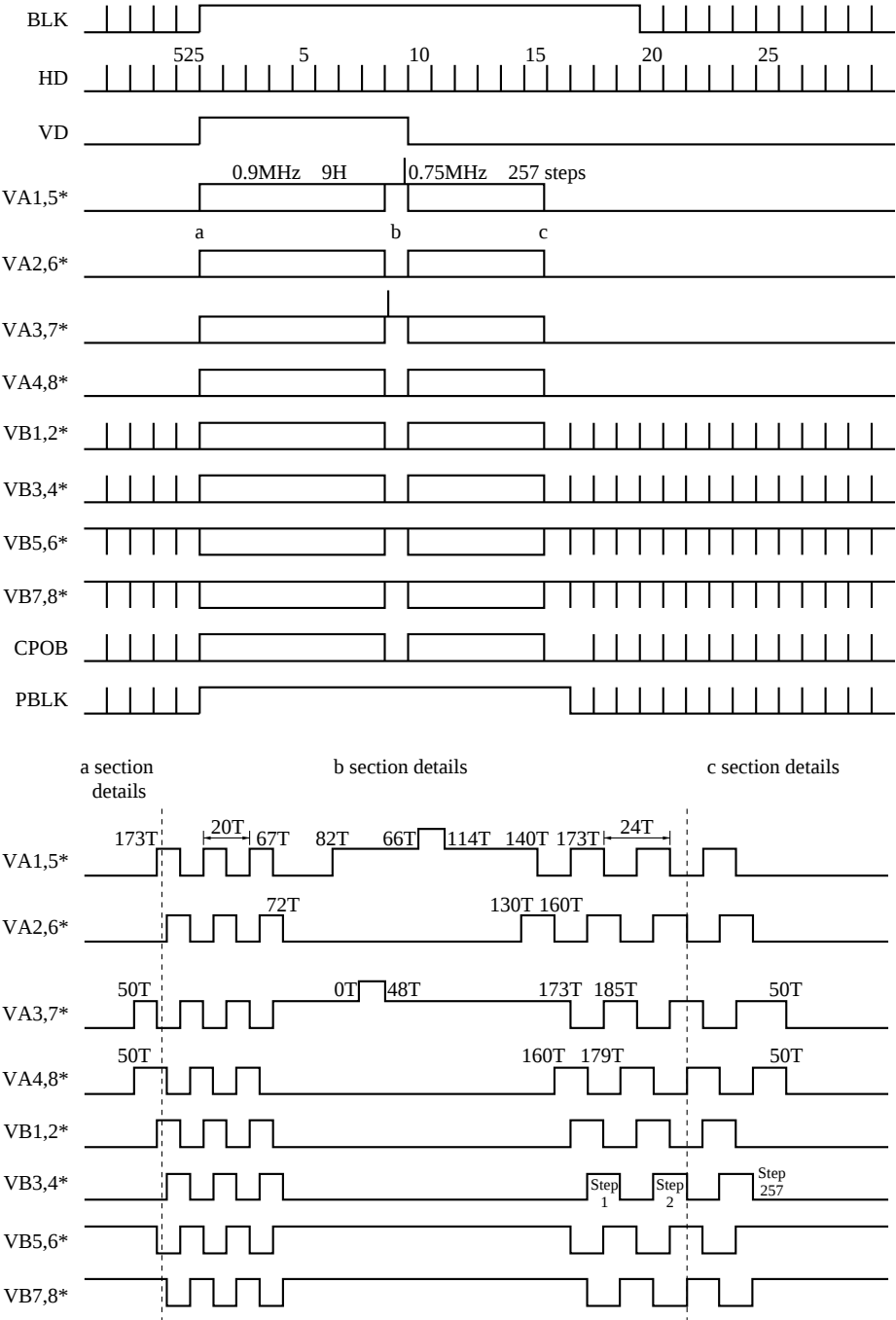
■ Example of Recommended Driving Pulses

< Interace A Mode > Horizontal timing diagram



* Waveform to CCD pins
T=1/1,144fH=55.56ns

< Interace A Mode > Field A



< Interace A ModeÅ >

Field B

