SHARP

LZ2547

Single-voltage (5 V) operation 1/5-type
Color CCD Area Sensor for PAL

■ Description

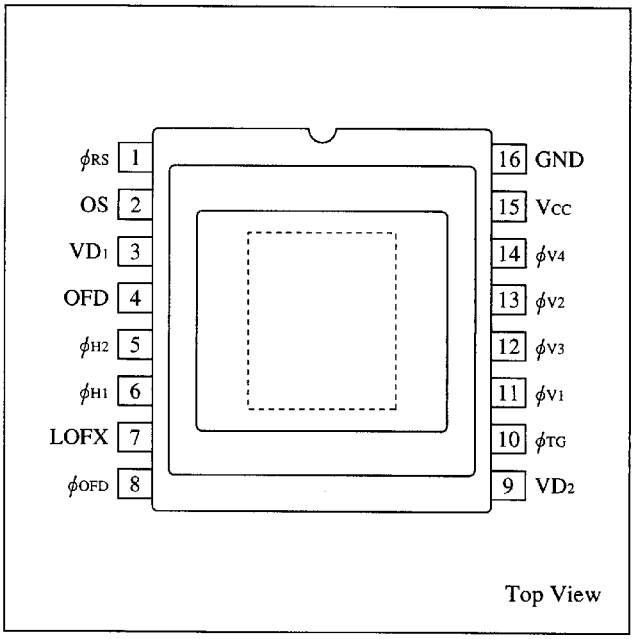
LZ2547 is a 1/5-type (3.6 mm) solid state imaging device driven by only 5 V single power supply.

Having about 220,000 pixels (horizontal 384×vertical 582), it allows a stable color image.

■ Features

1. Single-voltage (5 V) operation
2. Number of video picture elements : 362(H)×582(V)
   Pixel pitch : 8.2 μm(H)×3.8 μm(V)
   Number of optical back pixels : Horizontal; front 2 and rear 20
3. Compatible with PAL standard
4. Reduced fixed pattern noise and lag
5. No sticking and no image distortion
6. Blooming suppression structure
7. Built-in output amplifier, voltage generator, pulse mix circuit
8. Variable electronic shutter (1/50 to 1/10 000 s)
9. Package : 16-pin WDIP [Ceramic] Pin-pich 1.27 mm
   (WDIP016-N-0450)

■ Pin Connections



Top View

■ Pin Description

No.	Symbol	Pin name	Note
1	φ RS	Reset transistor gate clock	1
2	OS	Video output	
3	VD1	Voltage-generator output	2
4	OFD	Overflow drain	3
5	φ H2	Horizontal shift register gate clock	
6	φ H1	Horizontal shift register gate clock	
7	LOFX	Electronic shutter clock	
8	φ OFD	Electronic shutter clock	4
9	VD2	Voltage-generator output	2
10	φ TG	Transfer gate clock	
11	φ V1	Vertical shift register gate clock	5
12	φ V3	Vertical shift register gate clock	
13	φ V2	Vertical shift register gate clock	
14	φ V4	Vertical shift register gate clock	
15	VCC	Power supply	
16	GND	Ground	

Note 1. φ RS : Input the clock through a 0.1 μF capacitor.
Note 2. VD1, VD2 : Connect to GND through a 0.1 μF capacitor and a zener-diode (15.5±0.5 V)
VD1 : Connect to GND through a 1 MΩ variable resistor.
Note 3. OFD : Supply DC voltage with a following emittor-follower circuit (with a 1 MΩ emittor resistance).
- Collector connects VD1
- Emittor connects OFD through a diode
- Base connects a 1 MΩ variable resistor

Note 4. φ OFD : Connect to OFD through a diode and a 0.22 μF capacitor.
Note 5. φ V1- φ V4 : Input the clock through a 0.1 μF capacitor.

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■ Absolute Maximum Ratings

(Ta=25 ℃)

Parameter	Symbol	Rating	Unit
Power supply	V_{CC}	0 to +7.3	V
Overflow drain voltage	V_{OFD}	0 to +35	V
Reset gate clock P-P level	$V\phi_{RS}$	0 to +V_{CC}	V
Vertical shift register clock P-P level	$V\phi_{V}$	0 to +V_{CC}	V
Horizontal shift register clock voltage	$V\phi_{H}$	0 to +V_{CC}	V
Transfer gate clock voltage	$V\phi_{TG}$	0 to +V_{CC}	V
Electronic shutter clock voltage	V_{LOFX}	0 to +V_{CC}	V
Storage temperature	T_{stg}	−40 to +85	℃
Operating ambient temperature	T_{opr}	0 to +60	℃

■ Recommended Operating Conditions

Parameter		Symbol	MIN.	TYP.	MAX.	Unit
Operating ambient temperature		T_{opr}		25		℃
Power supply voltage		V_{CC}	4.75	5.0	5.25	V
Overflow drain voltage	When DC is a applied	V_{OFD}	3.0	(adjust)	16	V
	When pulse is applied P-P level	$V\phi_{OFD}$			16	V
Ground voltage		GND		0		V
Reset gate clock	P-P level	$V\phi_{RS}$		V_{CC}		V
Vertical shift register clock	P-P level	$V\phi_{V1}$, $V\phi_{V2}$, $V\phi_{V3}$, $V\phi_{V4}$		V_{CC}		V
Horizontal shift register clock	LOW level	$V\phi_{H1L}$, $V\phi_{H2L}$		0		V
	HIGH level	$V\phi_{H1H}$, $V\phi_{H2H}$		V_{CC}		V
Transfer gate clock	LOW level	$V\phi_{TGL}$		0		V
	HIGH level	$V\phi_{TGH}$		V_{CC}		V
Electronic shutter clock	LOW level	V_{LOFXL}		0		V
	HIGH level	V_{LOFXH}		V_{CC}		V
Vertical shift register clock frequency		$f\phi_{V1}$, $f\phi_{V2}$, $f\phi_{V3}$, $f\phi_{V4}$		15.63		kHz
Horizontal shift register clock frequency		$f\phi_{H1}$, $f\phi_{H2}$		6.75		MHz
Reset gate clock frequency		$f\phi_{RS}$		6.75		MHz

■ Electrical Characteristics

- Drive method : Field accumulation
- DC and AC conditions : The typical values under the recommended operating conditions.
- Ta=25 ℃
- Temperature of light source : 3 200 K
- Infrared absorbing filter (CM-500,1 mm) is used.

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Note
Standard output voltage	V_O		150		mV	5
Photo response non-uniformity	PRNU			15	%	6
Saturation signal	V_{sat}	450			mV	7
Dark output voltage	V_{dark}		0.5		mV	4, 8
Dark signal non-uniformity	DSNU		0.5		mV	4, 9
Sensitivity	R		170		mV	10
Smear ratio	SMR		−85		dB	11
Image lag	AI			1.0	%	12
Blooming suppression ratio	ABL	1000				13
Current dissipation	I_{OD}		4.0	8.0	mA	
Output impedance	R_O		400		Ω	
Vector breakup				10	°, %	14
Line crawling				3.0	%	15
Luminance flicker				2.0	%	16

Note 4. Ta=60 ℃

Note 5. The standard exposure level is defined when the average output voltage is 150 mV under uniform illumination.

Note 6. The image area is divided into 10×10 segments. The voltage of a segment is the average of output voltage from all the pixels within the segment.
PRNU is defined by (Vmax−Vmin)/Vo, where Vmax and Vmin are the maximum and the minimum values of each segment's voltage respectively, when the average output voltage Vo is 150 mV.

Note 7. The image area is divided into 10×10 segments. The saturation signal is defined as the minimum of each segment's voltage which is the average of output voltage from all the pixels within the segment, when the exposure level is set as 10 times, compared to standard level.

Note 8. The average output voltage under a non-exposure condition.

Note 9. The image area is divided into 10×10 segments.
DSNU is defined by (Vdmax−Vdmin) under the non-exposure condition where Vdmax and Vdmin are the maximum and the minimum values of each segment's voltage, respectively that is the average output voltage over all pixels in the segment.

Note 10. The average output voltage when a 1 000 lux light source attached with a 90% reflector is imaged by a lens of F4, f50 mm.

Note 11. The sendor is adjusted to position a V/10 square at the center of image area where V is the vertical lenght of the image area. SMR is defined by the ratio of the output voltage detected during the vertical blanking period to the maximum of the pixel voltage in the V/10 square.

Note 12. The sensor is exposed at the exposure level corresponding to the standard condition preceding non-exposure condition. Al is defined by the ratio between the output voltage measured at the 1st field during the non-exposure period and the standard output voltage.

Note 13. The sensor is adjusted to position a V/10 square at the center of image area. ABL is the ratio between the exposure at the standard condition and the exposure at a point where a blooming is observed.

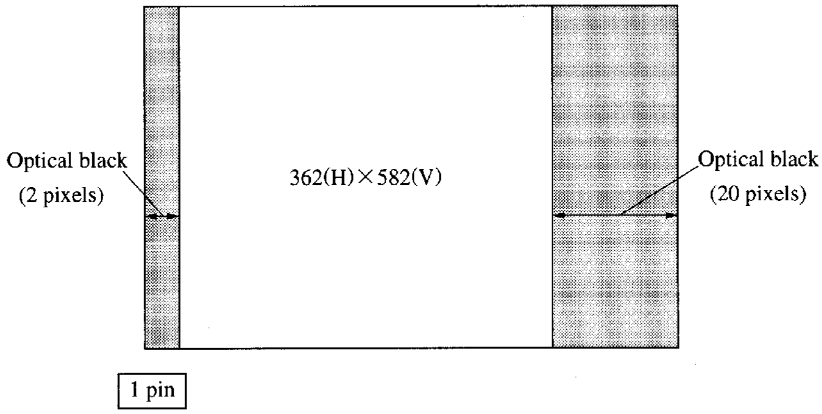
Note 14. Observed with a vector scope when the color bar chart is imaged under the standard exposure condition.

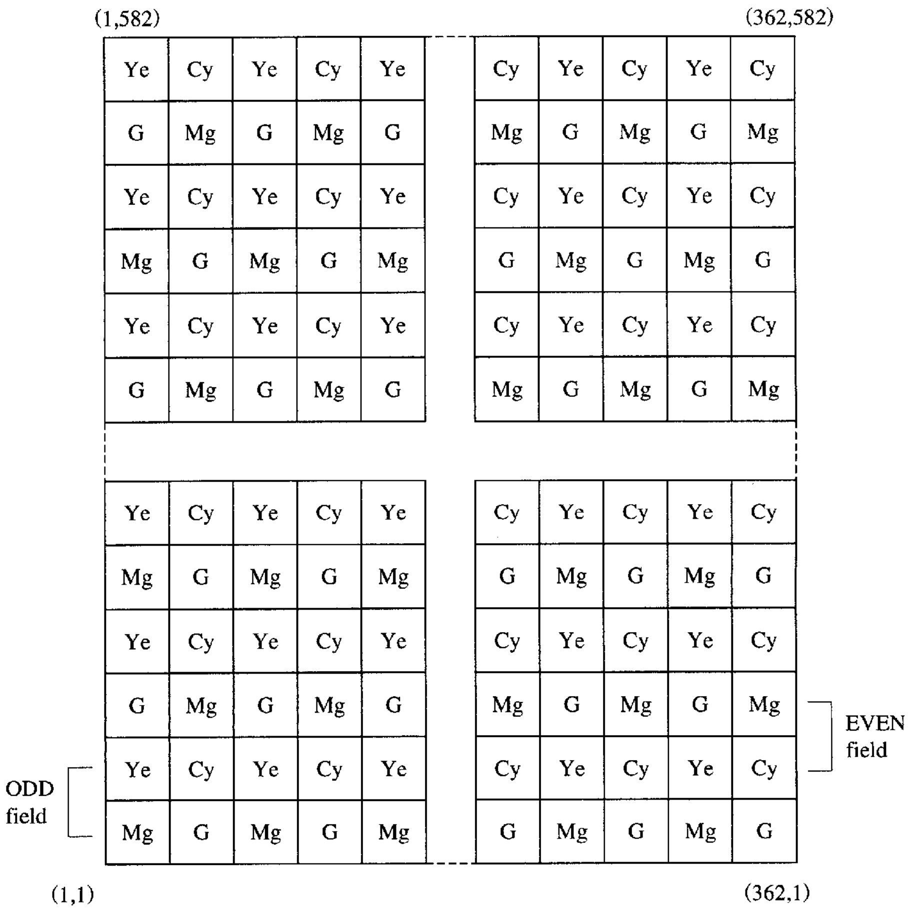
Note 15. The difference between the average output voltage of the (Mg+Ye), (G+Cy) line and the (Mg+Cy), (G+Ye) line under the standard exposure condition.

Note 16. The difference between the average output voltage of the odd field and the even field.

※ The standard output voltage is defined as 150 mV by the average output voltage under uniform illumination.

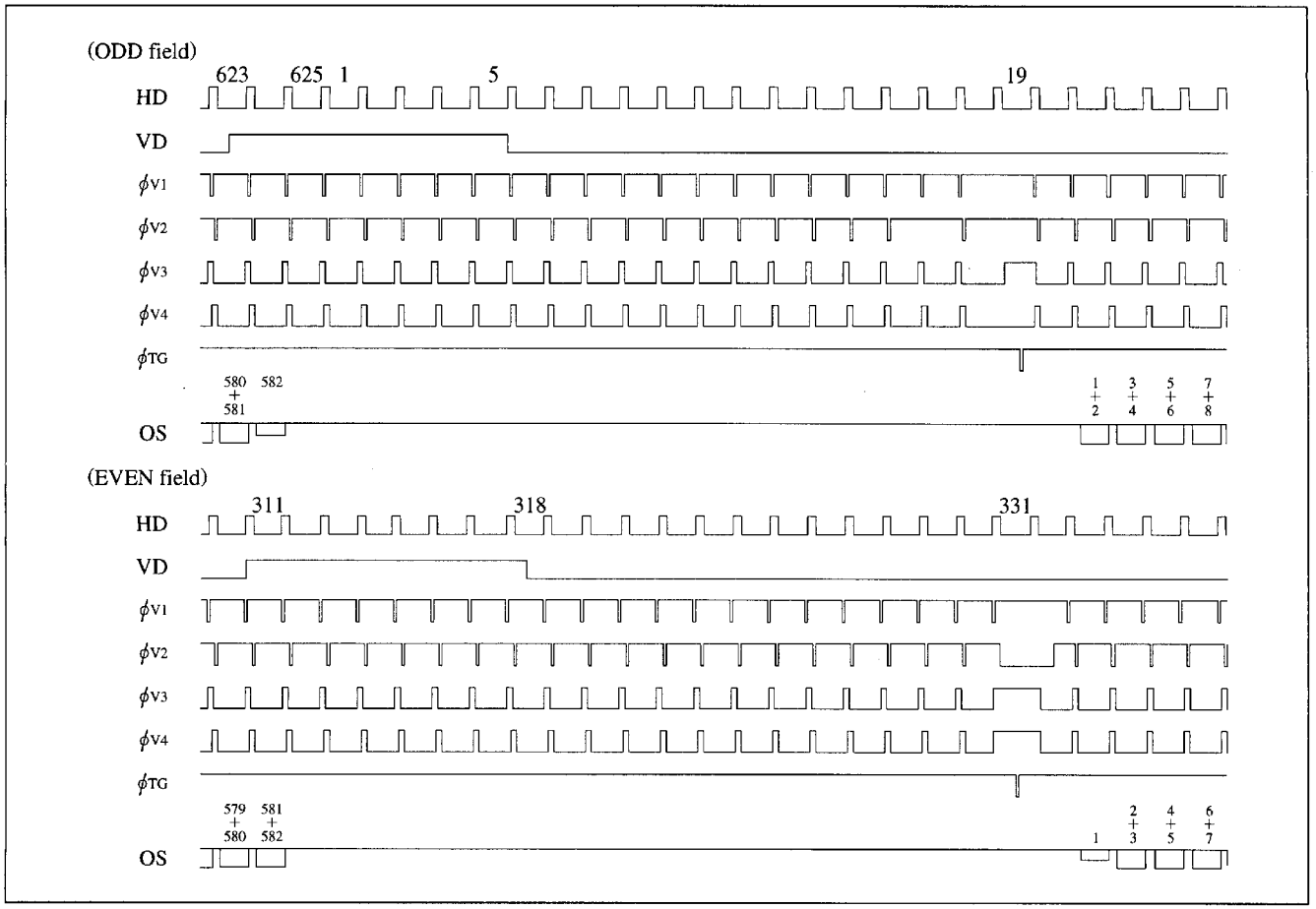
Composition of Pixels and Arrangement of Color Filters



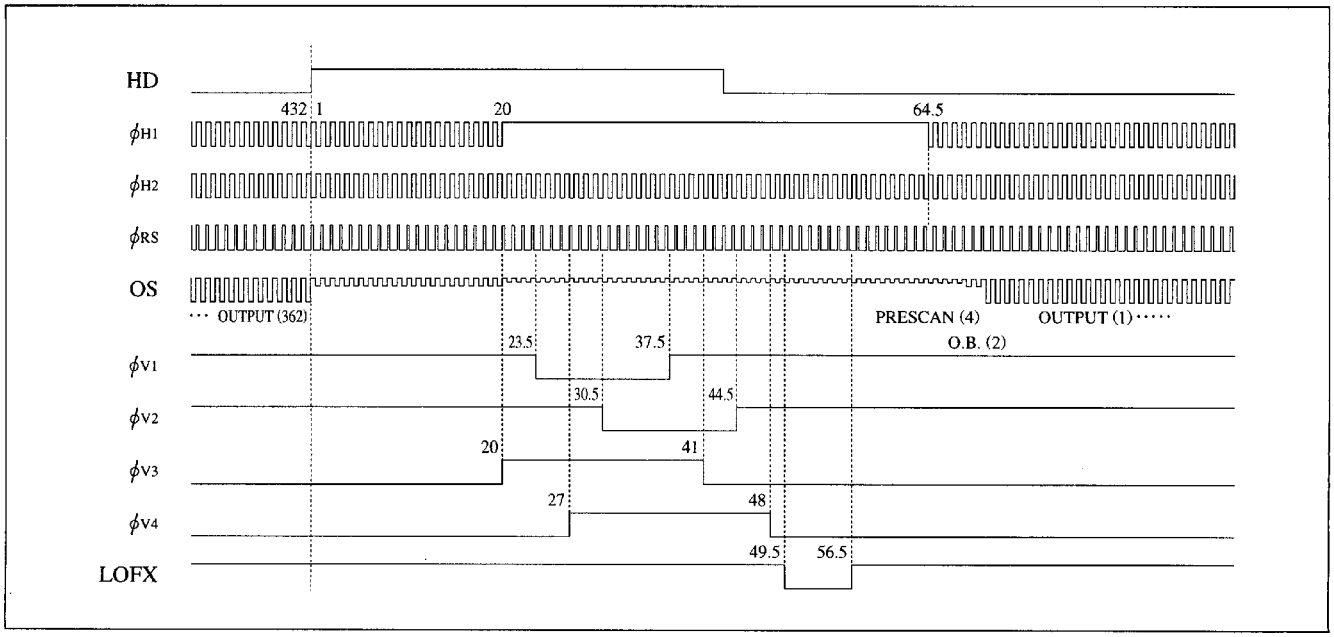


■ Timing Diagram

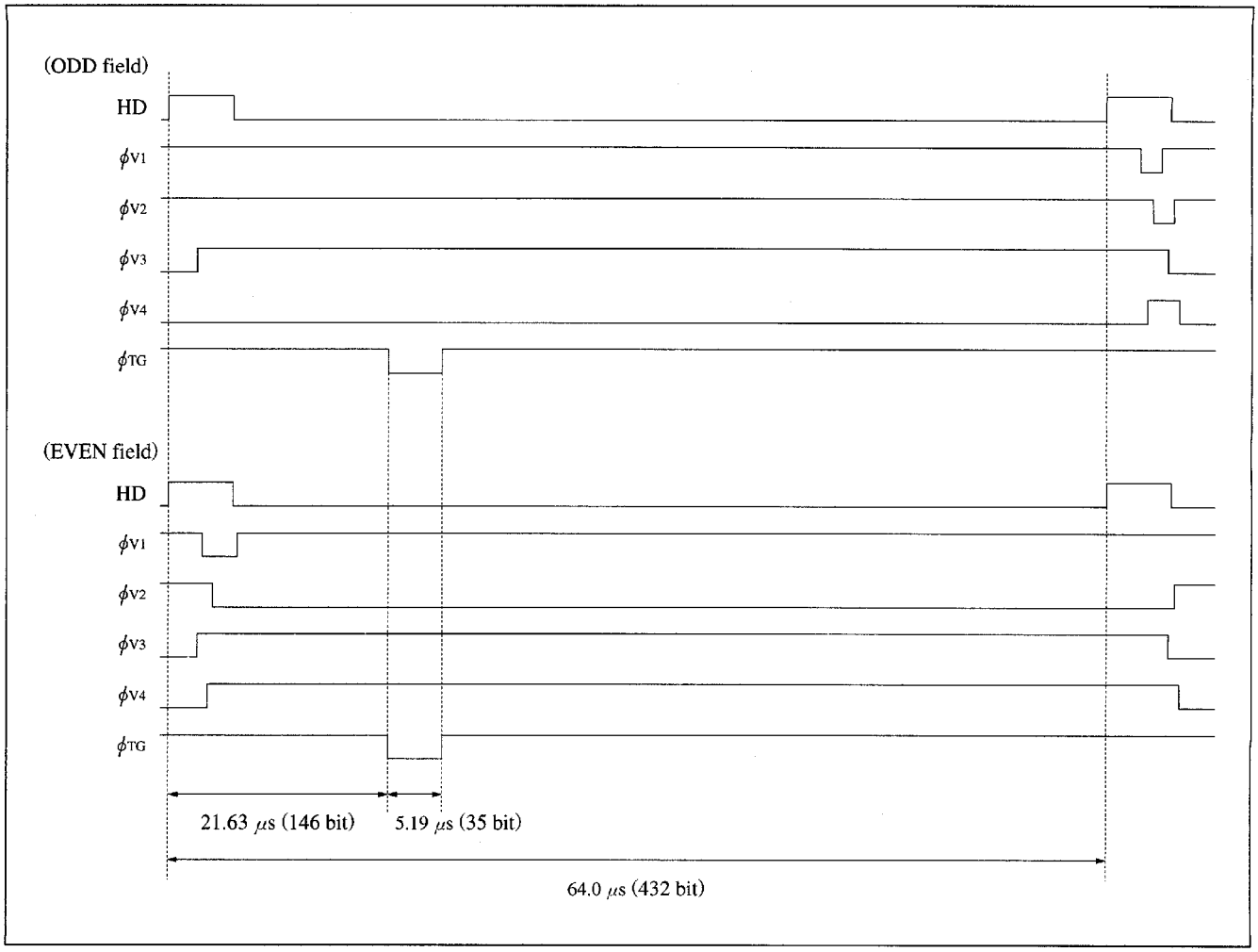
(1) Vertical Transfer Timing



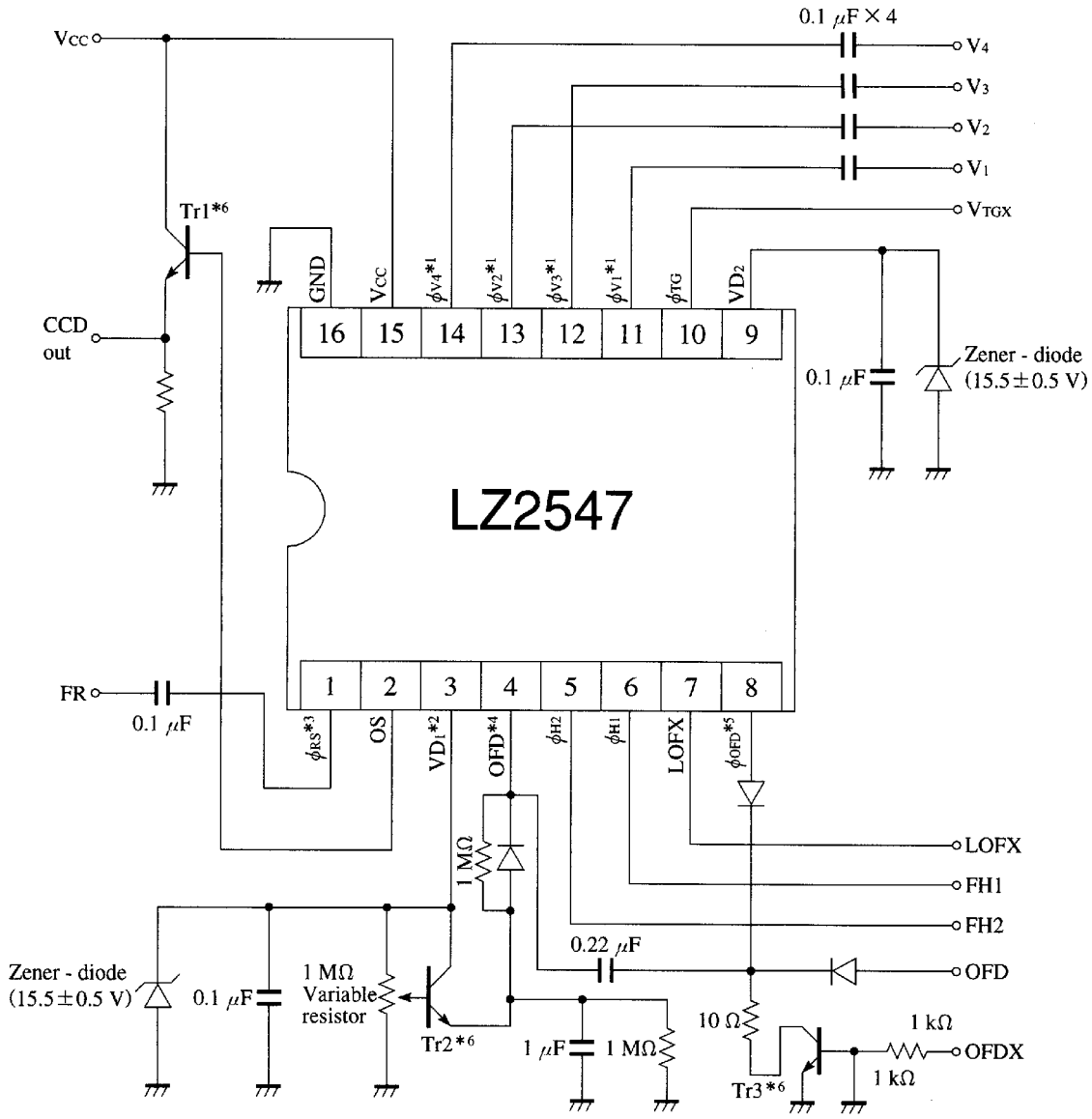
(2) Horizontal Transfer Timing



(3) Read Out Timing



■ System Configuration Example



* 1 φV1- φV4 : Input the clock through a 0.1 μF capacitor.
* 2 VD1, VD2 : Connect to GND through a 0.1 μF capacitor and a zener-diode (15.5 ± 0.5 V)
  VD1 : Connect to GND through a 1 MΩ variable resistor.
* 3 φRS : Input the clock through a 0.1 μF capacitor.
* 4 OFD : Supply DC voltage with a following emittor-follower circuit (with a 1 MΩ emittor resistance).
  - Collector connects VD1
  - Emittor connects OFD through a diode
  - Base connects a 1 MΩ variable resistor
* 5 φOFD : Connect to OFD through a diode and a 0.22 μF capacitor.
* 6 Tr1 : Use transistor for RF amplifier.
  Tr2 : Use transistor for RF amplifier.
  Tr3 : Use transistor for high speed switching.

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