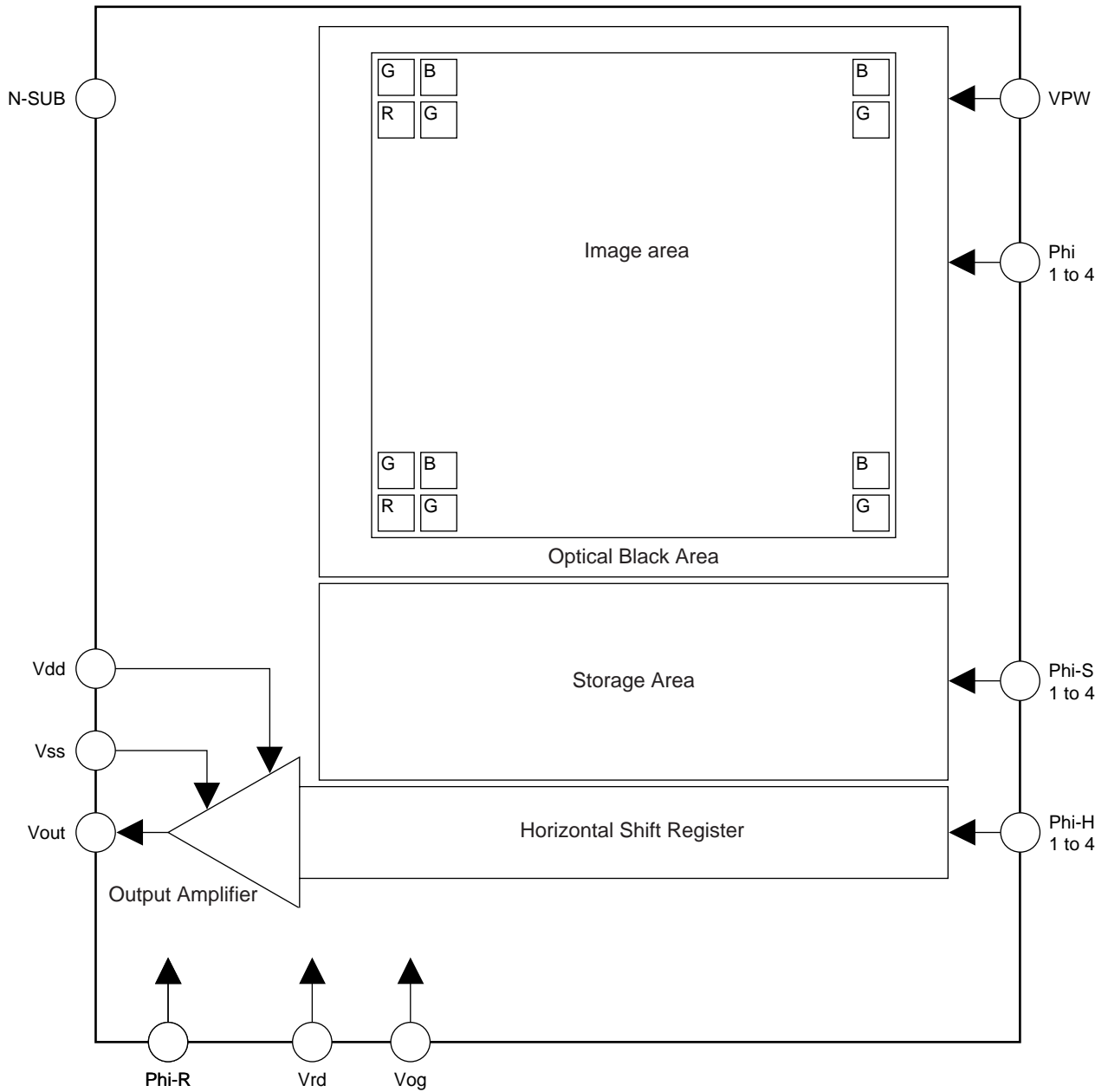




Block Diagram and Pixel Arrangement



A12757

Pin Function

Symbol	Description	Symbol	Description
N-sub	N-Substrate	Phi 1 to 4	Image area clock
Vpw	P-Well	Phi-S 1 to 4	Storage area clock
Vdd	Power supply	Phi-H 1 to 4	Horizontal register clock
Vss	Power supply Source	Phi-R	Reset gate
Vog	CCD output gate		
Vrd	Reset drain		
Vout	CCD output		

## Modes of Operation

The LC99452 has been especially designed for high-resolution low cost digital photography in color full 1600 × 1280 resolution and real-time monitoring (preview) mode in color at reduced resolution. Two main modes of operation are possible:

Still picture mode (mode-1)

In still picture mode, a 1600 (H) × 1280 (V) progressive scan image can be read out. A 'single shot' mechanical shutter is required to obtain a 100% smear free image.

Preview mode (mode-2)

In preview mode, image with a reduced vertical resolution by on-chip data compression can be obtained. Progressive scan images (mode-2), e.g. 120, 240 or 288 lines at up to 40 images/s, suitable for LCD displays can be selected by the timing generator.

## Clock Voltage Conditions

Parameter	Symbol	Ratings			Unit	Cap per phase	
		min	typ	max			
Input resistanImage area pulses Phi 1 to 4	Pulse amplitude	V <sub>PIF</sub>	11	12	13	V	5.5 nF
	Low level	V <sub>LIF</sub>		0		V	
Storage area pulses Phi-S 1 to 4	Pulse amplitude	V <sub>PSL</sub>	11	12	13	V	1.5 nF
	Low level	V <sub>LSL</sub>		0		V	
Horizontal register pulses Phi-H 1 to 4	Pulse amplitude	V <sub>PH</sub>	4.5	5.0	5.25	V	60 pF
	Low level C1,C3	V <sub>LH 13</sub>		0		V	
	Low level C2,C4	V <sub>LH 24</sub>	2.5	3	3.5	V	
Reset gate pulses Phi-R	Pulse amplitude	V <sub>PR</sub>	4.5	5	5.25	V	15 pF *1
	High level	V <sub>HR</sub>	21	22	23	V	
Charge reset pulse on Nsub	V <sub>PSUB</sub>		4.5	5	5.5	V	

Note: \*1. DC setting depends on RG clock-swing.

## DC Electrical Characteristics

Parameter	Symbol	Ratings			Unit	I (mA)
		min	typ	max		
N-sub bias	V <sub>LSUB</sub>	20	24	28	V	2 *1
P-well bias	V <sub>PW</sub>	6	7	9	V	2
Output circuit power supply	V <sub>DD</sub>	19	20	21	V	5.5 *2
	V <sub>SS</sub>	0	0	0	V	1 *2
OG bias	V <sub>OG</sub>	3.5	4.0	4.5	V	*3
Reset drain bias	V <sub>RD</sub>	19	20	21	V	

Notes: 1. V<sub>LSUB</sub> is set for optimal anti-blooming operation.  
 2. with R<sub>L</sub> = 3.3 kΩ, V<sub>DD</sub> should be adjusted at the same voltage as V<sub>RD</sub>.  
 3. OG setting depends on horizontal clock amplitude.

**AC Electrical Characteristics**

Parameter		Conditions	Ratings			Unit
			min	typ	max	
Transport frequency:	- horizontal				25	MHz
	- vertical			1.56 *1	3.125	MHz
Power consumption	mode 1					mW
	mode 2					mW
Output impedance				400		Ω
Amplifier supply current		(R <sub>L</sub> = 3.3 kΩ)		5.2		mA
Bandwidth		(R <sub>L</sub> = 3.3 kΩ, C <sub>L</sub> = 2pF)		90		MHz
RMS readout noise		@ 5 MHz BW (after CDS)		0.240	0.330	mV
Power supply rejection ratio at DC		*2		0.15	0.2	V/V

Notes: 1. Typical value for preview and movie mode.

2. V<sub>DD</sub> must be decoupled properly with a 100 nF decoupling capacitor close to the pin.

**Performance Characteristics**

**Test conditions: Typical conditions**

**Image capture mode (mode-1) of operation**

**Integration time = 1/30 sec.( unless specified differently )**

**Test temperature 60°C; light source 3200 K; IR filter 1.7 mm BG40; F = 16**

Parameter		Ratings			Unit
		min	typ	max	
Sensitivity	green pixels		295		mV / lux·s
	red pixels		240		mV / lux·s
	blue pixels		175		mV / lux·s
Saturation signal		840	1150	1320	mV / lux·s
Qmax		40	50	60	k-electrons
Blooming suppression			100		x Qmax
Dark conditions: Average number of dark signal electrons per pixel after 1/30 sec integration			25		electrons
Dark signal shading			1		mV

- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of November, 1999. Specifications and information herein are subject to change without notice.