IT 87222

CCD VERTICAL DRIVER

Features

- **Input Voltage: 3.3V/5V**
- **Output Voltage: Three levels,15V,0V and -8.5V**
- **Built-in seven circuits:**
  - **2-level output:**
    2 circuits for CCD vertical driver output level (typ.) =-8.5V to 0V
  - **3-level output:**
    2 circuits for CCD vertical driver output level (typ.) =-8.5V to 15V
  - **2-level output:**
    1 circuit for shutter driver output voltage level (typ.) =-8.5V to 15V
- **Switchable between NTSC and PAL modes**
- **16-pin TSSOP package is used.**

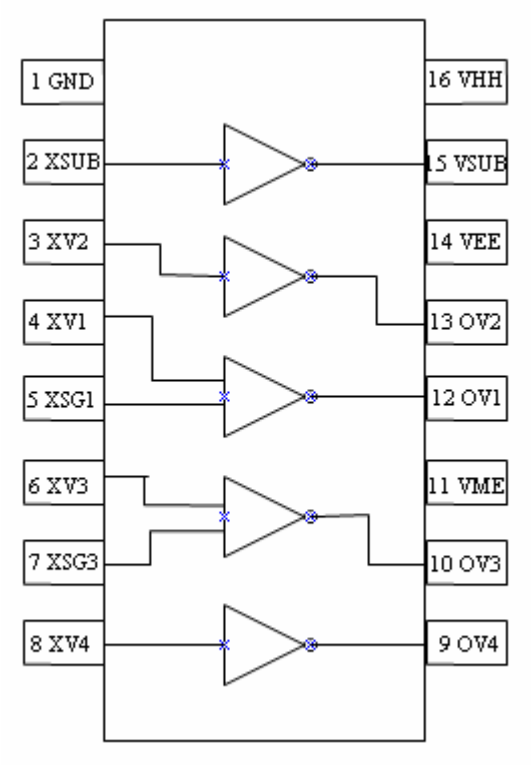
General Description

The IT87222 is a vertical clock driver for CCD image sensors. It contains a CCD vertical register driver (4 channels) and a VOD shutter driver (1 channel).

Applications

●CCD cameras

Pin ASSIGNMENT & BLOCK DIAGRAM



Pin Description

PIN NO.	SYMBOL	TYPE	NAME & Function
1	GND	-	Ground pin
2	XSUB	I	Input signal pin --control VSUB
3	XV2	I	Input signal pin --control OV2
4	XV1	I	Input signal pin --control OV1
5	XSG1	I	Input signal pin --control OV1
6	XV3	I	Input signal pin --control OV3
7	XSG3	I	Input signal pin --control OV3
8	XV4	I	Input signal pin --control OV4
9	OV4	O	Output signal pin –2 level, VEE & VME
10	OV3	O	Output signal pin—3 level, VEE, VHH & VME
11	VME	-	Power pin (0v)
12	OV1	O	Output signal pin—3 level, VEE, VHH & VME
13	OV2	O	Output signal pin –2 level, VEE & VME
14	VEE	-	-8.5V power supply pin
15	VSUB	O	Output signal pin –2 level, VEE & VHH
16	VHH	-	+15V power supply pin

Absolute Maximum Ratings

SYMBOL	PARAMETER	RATING	UNIT
VEE	Supply Voltage	-10 to 0	V
VHH	Supply Voltage	-3.0 to VEE+30	V
VME	Supply Voltage	VEE-0.3 to 3	V
VI	Input Voltage	-0.3 to VHH+0.3	V
OV1,OV3,VSUB	Output Voltage	VEE-0.3 to VHH+0.3	V
OV2,OV4	Output Voltage	VEE-0.3 to VME+0.3	V
Ta	Operating Ambient Temperature	-25 to 85	℃
Ts	Storage Temperature	-45 to 125	℃

NOTE: Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability**.**

TRUTH TABLE

INPUT				OUTPUT		
XV1, 3	XSG1, 3	XV2, 4	XSUB	OV1, 3	OV2, 4	VSUB
L	L	X	X	VHH	X	X
H	L	X	X	Z	X	X
L	H	X	X	VME	X	X
H	H	X	X	VEE	X	X
X	X	L	X	X	VME	X
X	X	H	X	X	VEE	X
X	X	X	L	X	X	VHH
X	X	X	H	X	X	VEE

D.C. Characteristics

VHH=15v,VME=GND,VEE=-8.5V;Ta=25℃

SYMBOL	PARAMETER	VALUE			UNIT	CONDITION
		MIN	TYP	MAX		
VHH	Power Supply	14.5	15	15.5	V	
VEE		-9.5	-8.5	-7.5	V	
IHH	Operation Current		4.4	6.6	mA	(*1)
IEE		-9.6	-3.5		mA	
IME			1	5.9	mA	
VIH	Input Voltage	2.2			V	
VIL				1.3	V	
IL	Input Current	-0.1		0.1	μA	VIN=0~5V (*2)
IOL	Output Current	25			mA	OV1~4=-8.0V
IOM1			-9	-8.5	mA	OV1~4=-0.5V
IOM2		10			mA	OV1,3=0.5V
IOH				-22	mA	OV1,3=14.5V
IOSL		8	9		mA	VSUB=-8.0V
IOSH			-9	-8	mA	VSUB=14.5V

(*1) Refer to the measurement circuit. Shutter speed: 1/40us

(*2) XV1~ 4, XSG1, 3, XSUB pins

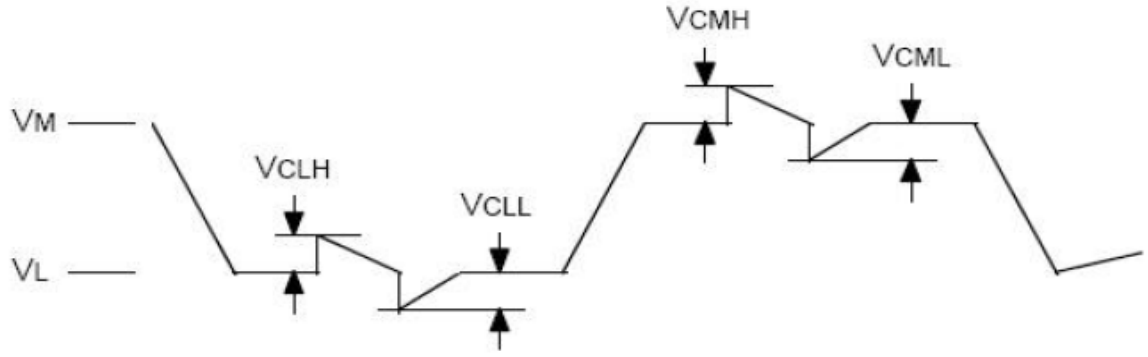
A.C. Characteristics

VHH=15v,VME=GND,VEE=-8.5V;Ta=25℃

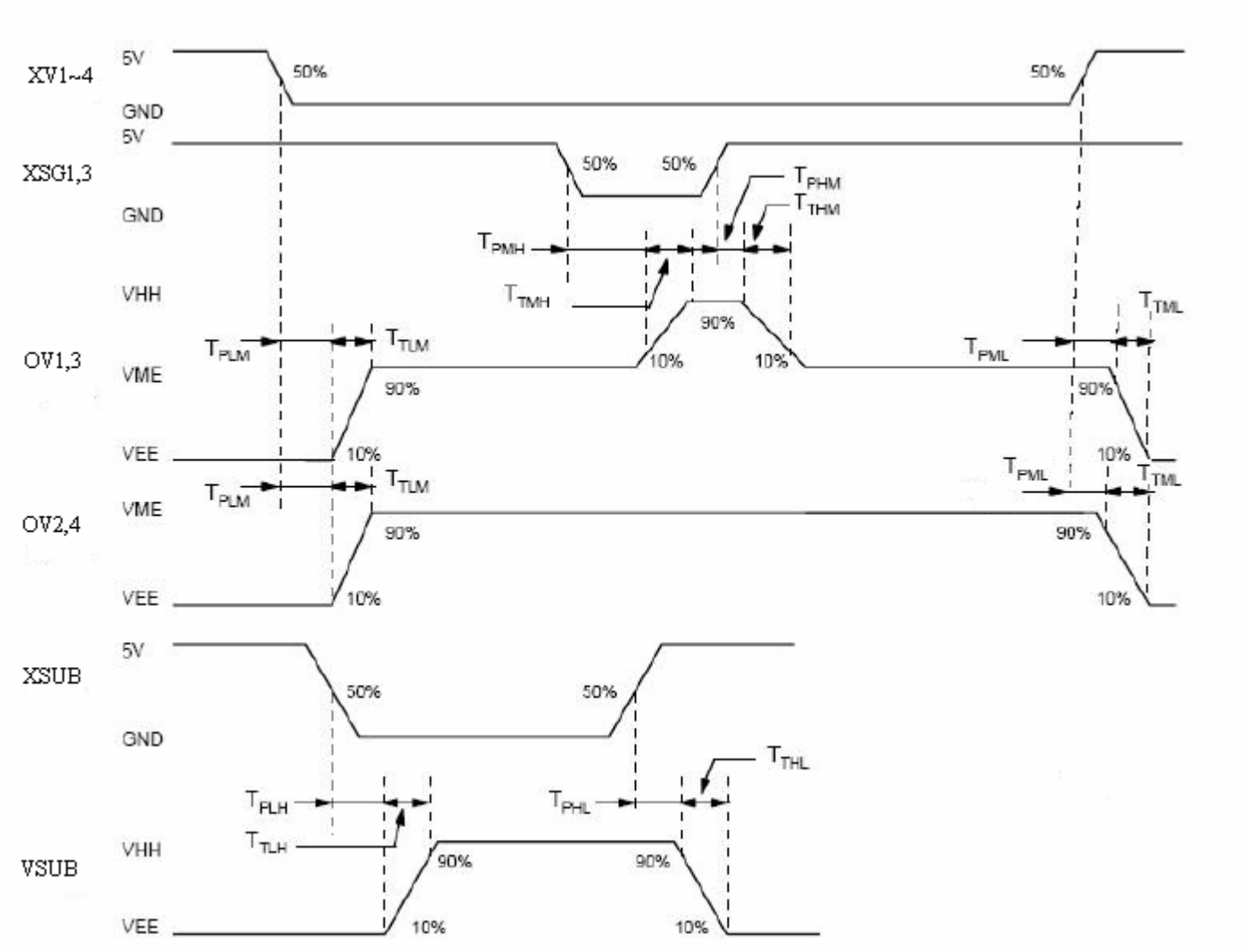
SYMBOL	PARAMETER	VALUE			UNIT	CONDITION
		MIN	TYP	MAX		
TPLM	Delay Time	23	30	60	nS	No Load (*1)
TPMH		23	30	50	nS	
TPLH		23	35	70	nS	
TPML		23	40	80	nS	
TPHM		23	30	60	nS	
TPHL		23	35	75	nS	
TTLM	Transition Time	110	150	240	nS	VEE to VME (*1)
TTMH		220	330	360	nS	VME to VHH (*1)
TTLH		60	80	150	nS	VEE to VHH (*1)
TTML		140	190	230	nS	VME to VEE (*1)
TTHM		220	330	360	nS	VHH to VME (*1)
TTHL		70	100	150	nS	VHH to VEE (*1)
VCLH, VCLL VCMH, VCML	Output Noise Voltage			0.4	V	(*2)

(*1) Refer Timing Diagram
(*2) Refer Noise Diagram

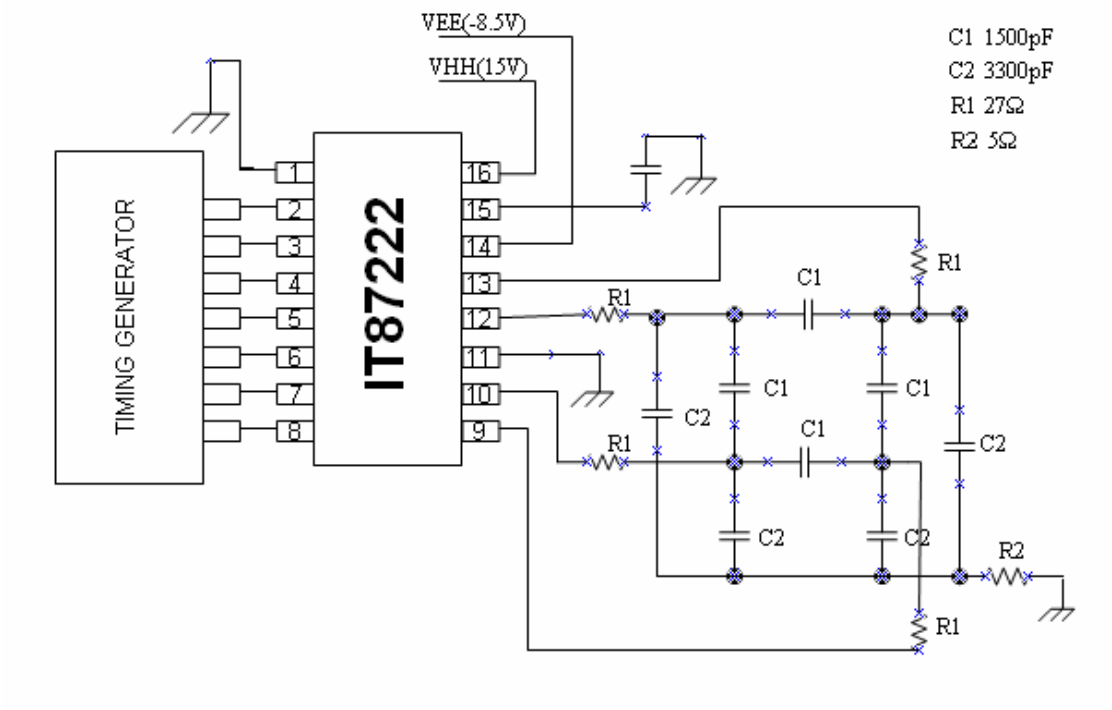
NOISE DIAGRAM



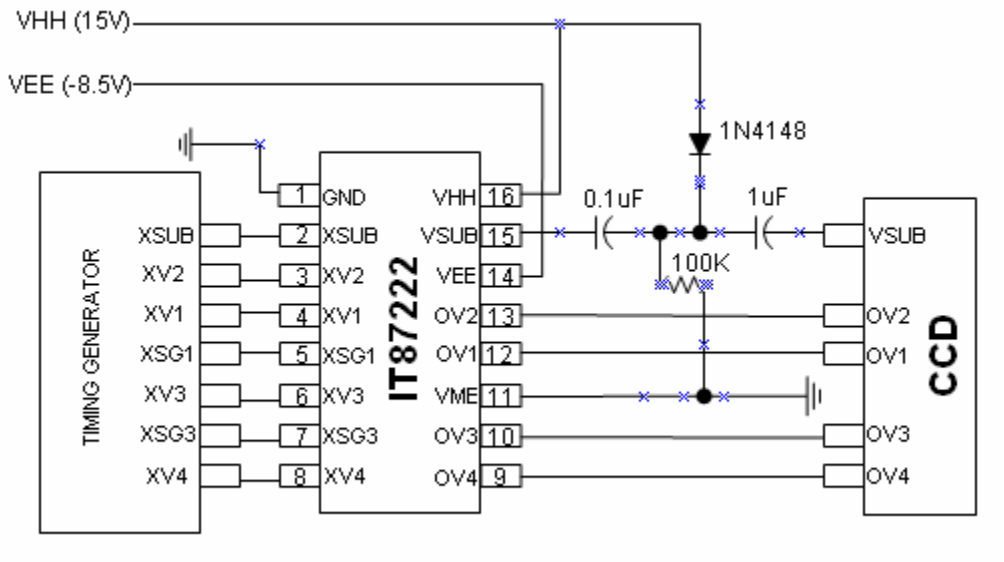
TIMING DIAGRAM



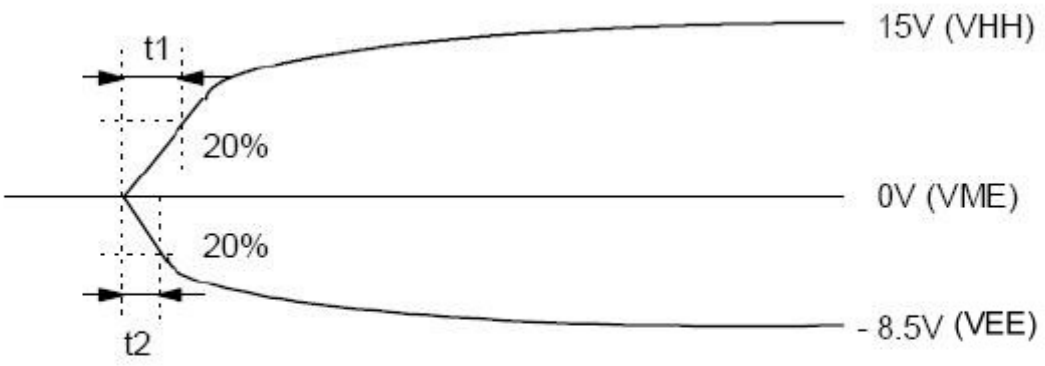
MEASUREMENT CIRCUIT



APPLICATION CIRCUIT

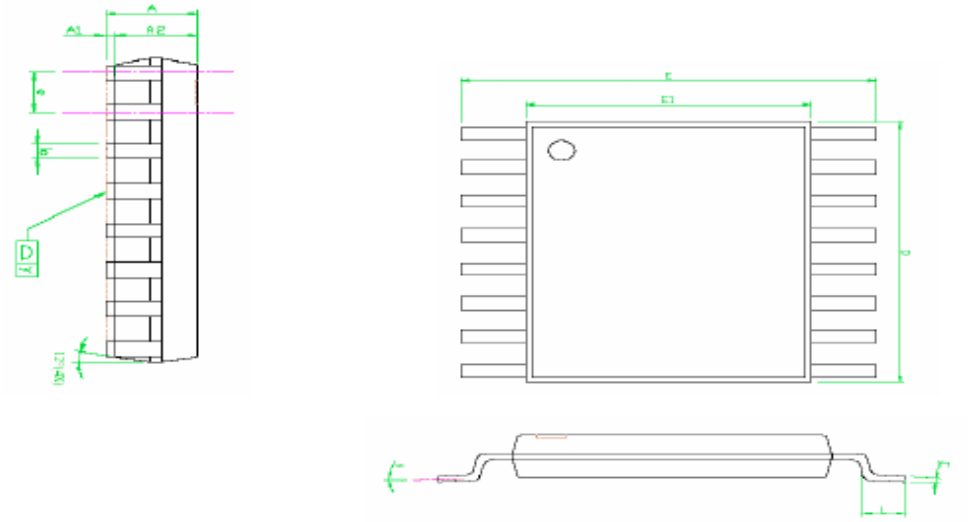


In case of DCOUT≦VHH-1.0V, Warning: When voltage is biased, you must keep this flow. If you don't, negative voltage is applied to CCD image sensor's SUB.



$10ms \leqq t2 \leqq t1$

Package Information: TSSOP-16



NOTE:

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS
2. TOLERANCE +-0.1mm UNLESS OTHERWISE SPECIFIED
3. COPLANARITY: 0.1mm
4. CONTROLLOMG DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. FOLLOWED FROM JEDEC MO-153

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	-	-	1.20	-	-	0.048
A1	0.05	-	0.15	0.002	-	0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19	-	0.30	0.007	-	0.012
C	0.09	-	0.20	0.004	-	0.008
D	4.90	5.00	5.10	0.193	0.197	0.201
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.177
e	-	0.65	-	-	0.026	-
L	0.45	0.60	0.75	0.018	0.024	0.030
y	-	-	0.10	-	-	0.004
θ	0°	-	8°	0°	-	8°