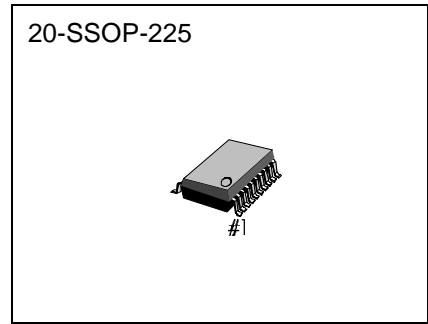


INTRODUCTION

The S5C7221X01 is a Vertical CCD Driver LSI which is fabricated by CMOS process for high voltage

FEATURES

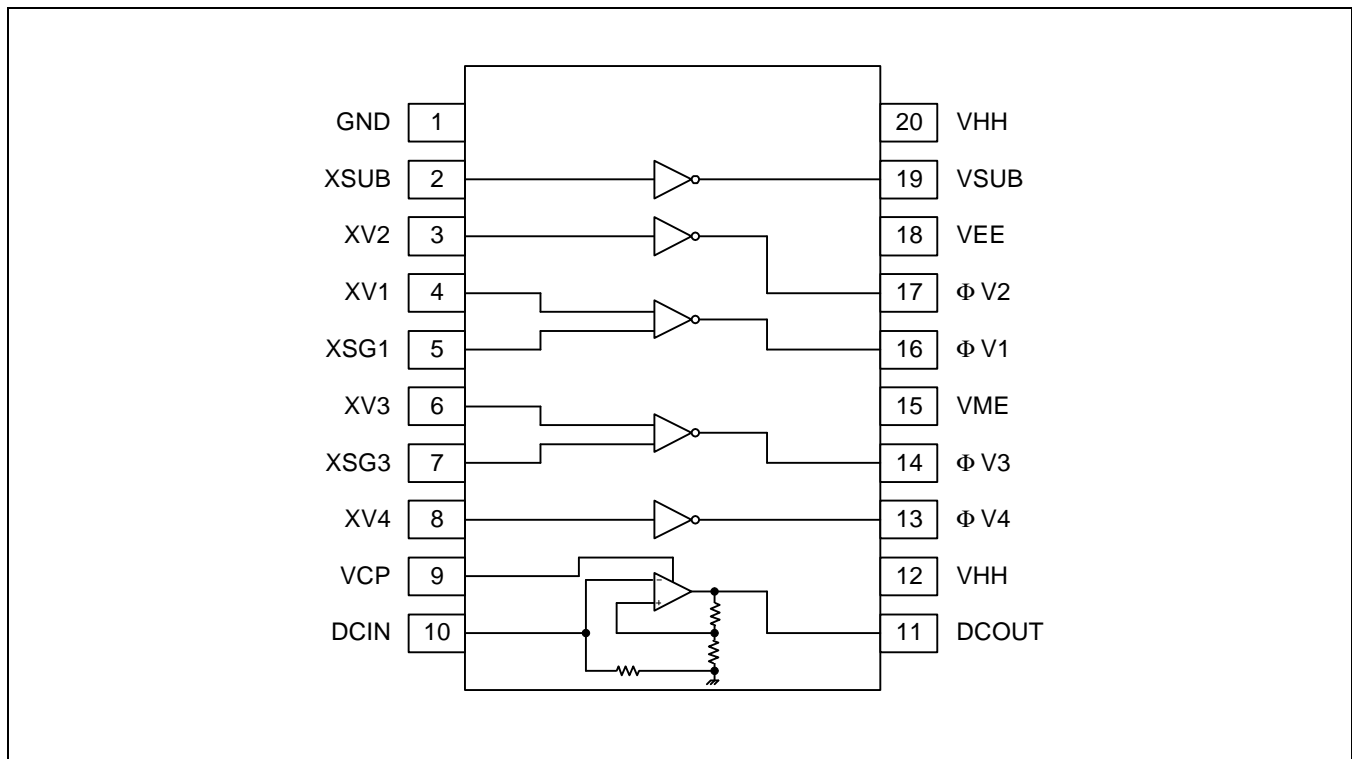
- Includes voltage source circuit for CCD image sensor
- Input voltage : 5V / 3.3V
- Package : 20 SSOP



ORDERING INFORMATION

Device	Package	Operating
S5C7221X01-V0B0 S5C7221X01-V0T0	20-SSOP-225	-20 °C – 85 °C

BLOCK DIAGRAM



PIN DESCRIPTION

Pin	Symbol	I/O	Description	Remark
1	GND	-	Ground control	
2	Xsub	I	Output Control (Vsub)	
3	XV2	I	Output Control (Φ V2)	
4	XV1	I	Output Control (Φ V1)	
5	XSG1	I	Output Control (Φ V1)	
6	XV3	I	Output Control (Φ V3)	
7	XSG3	I	Output Control (Φ V3)	
8	XV4	I	Output Control (Φ V4)	
9	VCP	I	Power of amp	
10	DCIN	I	OP-Amp input (internal pull-down resistor)	
11	DCOUT	O	OP-Amp output	
12	VHH	-	Power (15V)	
13	Φ V4	O	High Voltage Output (2 level : VME, VEE)	
14	Φ V3	O	High Voltage Output (3 level : VME, VEE, VHH)	
15	VME	-	Power (0V)	
16	Φ V1	O	High Voltage Output (3 level : VME, VEE, VHH)	
17	Φ V2	O	High Voltage Output (2 level : VME, VEE)	
18	VEE	-	Power (-8.5V)	
19	Vsub	O	High Voltage Output (2 level : VEE, VHH)	
20	VHH	-	Power (15V)	

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristics	Symbol	Value	Unit
Supply Voltage	VEE	0 - -10	V
	VHH	-0.3 - VEE +35	
	VME	VEE -0.3 - 3.0	
Input Voltage	VI	-0.3 - VHH +0.3	V
	VCP	-0.3 - VEE+35	
Output Voltage	Φ V1, Φ V2, Φ V3, Φ V4, Φ Vsub	VEE -0.3 - VHH +0.3	V
OP-Amp output Current	I _{OUT}	±5	mA
Operating Temperature	T _{OPR}	-25 - +85	°C
Storage Temperature	T _{STG}	-45 - +120	

LOGIC FUNCTION TABLE

INPUT				OUTPUT		
XV1,3	XSG1,3	XV2,4	XSUB	$\Phi V1, 3$	$\Phi V2, 4$	VSUB
L	L	-	-	VHH	-	-
H	L	-	-	Z	-	-
L	H	-	-	VME	-	-
H	H	-	-	VEE	-	-
-	-	L	-	-	VME	-
-	-	H	-	-	VEE	-
-	-	-	L	-	-	VHH
-	-	-	H	-	-	VEE

AC CHARACTERISTICS

(VHH = 15V, VME = GND, VEE = - 8.5V ; Ta = 25°C)

Description	Symbol	Test Conditions	Min	Typ	Max	Unit
Delay time	TPLM	NO LOAD (1)	10	40	70	ns
	TPMH	NO LOAD (1)	10	30	70	
	TPLH	NO LOAD (1)	10	40	100	
	TPML	NO LOAD (1)	10	100	200	
	TPHM	NO LOAD (1)	10	100	180	
	TPHL	NO LOAD (1)	10	60	100	
Rising time	TTLM	VEE → VME (1)	400	700	930	ns
	TTMH	VME → VHH (1)	400	650	930	
	TTLH	VEE → VHH (1)	10	50	100	
	TTML	VME → VEE (1)	200	300	500	
	TTHM	VHH → VME (1)	400	600	820	
	TTHL	VHH → VEE (1)	10	50	100	
Output noise Voltage	VCLH, VCLL VCMH, VCML	(2)	-	-	0.5	V

NOTES:

1. Refer to Timing Diagram
2. Refer to Noise Diagram

DC CHARACTERISTICS

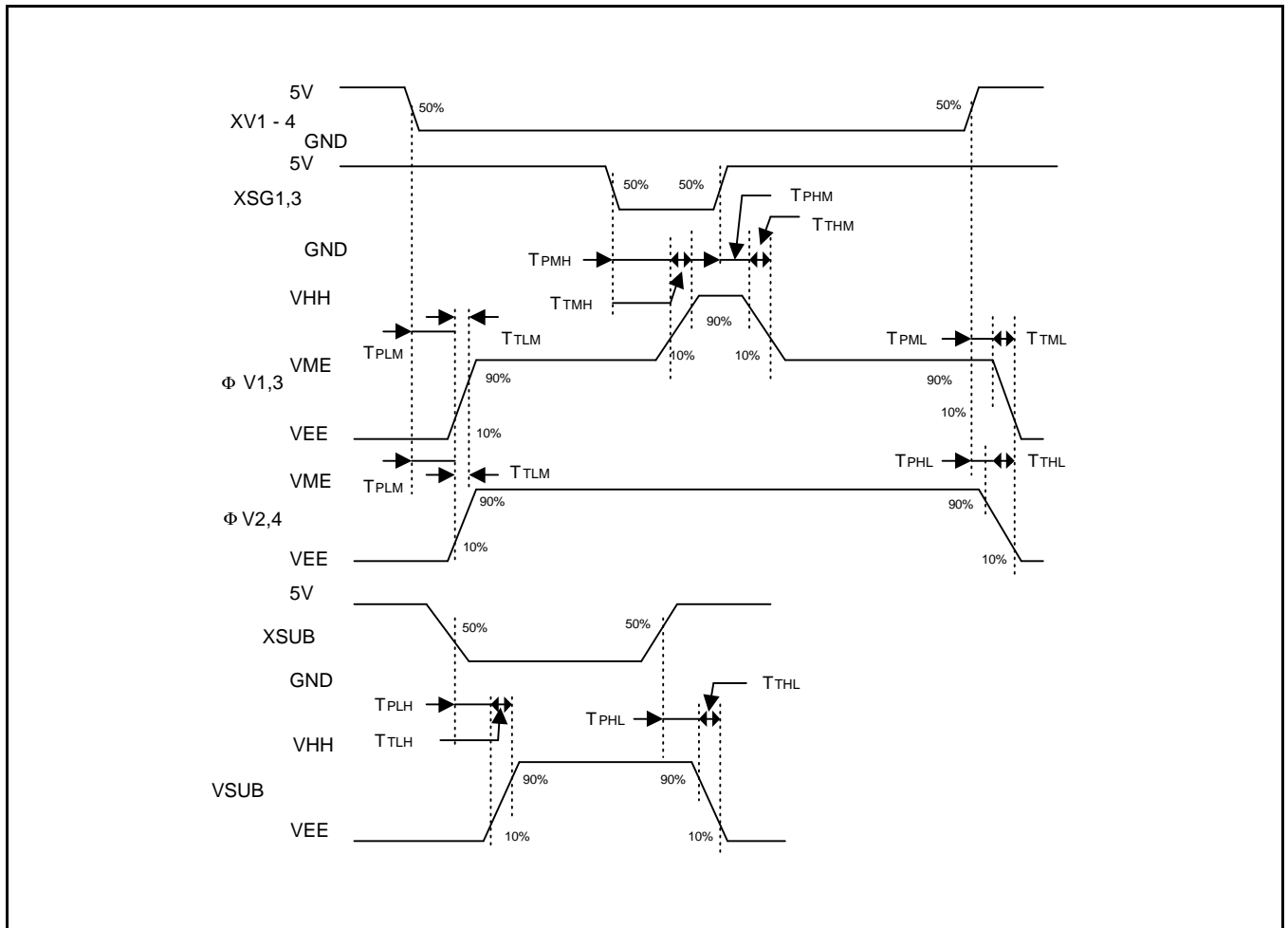
(V_{HH} = 15V, V_{ME} = GND, V_{EE} = -8.5, V_{CP} = 22V, T_a = 25°C)

Description	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	V _{HH}		14.5	15	15.5	V
	V _{EE}		-9.5	-8.5	-7.5	
Input Voltage	V _{CP}	When V _{CP} is used	V _{HH}	22	23.5	
High level input voltage	V _{IH}	(*3)	2.3	-	-	
Low level input voltage	V _{IL}	(*3)	-	-	1.2	
Operation Current	I _I	V _{IN} = 0 – 5V (*3)	-1.0	0.0	1.0	μA
	I _{DCIN}	V _{DCIN} = 1.0V	80	100	140	
Operation Current	I _{HH}	(*1)	-	2.0	3.5	mA
	I _{ME}	(*1)	-	4.5	5.0	
	I _{EE}	(*1)	-8.5	-6.5	-	
Output Current	I _{OL}	ΦV ₁ – 4 = -8.0V	25	37	-	
	I _{OM1}	ΦV ₁ – 4 = -0.5V	-	-15	-10	
	I _{OM2}	ΦV ₁ , 3 = 0.5V	9	13.5	-	
	I _{OH}	ΦV ₁ , 3 = 14.5V	-	-18	-12	
	I _{OSL}	V _{SUB} = -8.0V	12	18	-	
	I _{OSH}	V _{SUB} = 14.5V	-	-10.5	-7	
Op-Amp Gain	G	I _{OUT} = -200μA	x 3.8	x 4.2	x 4.7	
Gain Variation	ΔG	T _a = -20 – 75°C (*2), I _{out} = -200μA, V _{DCIN} = 1.0 – 4.5V	-3	-	+3	%
Operation Current	I _{VCP}	V _{DCIN} = 1.0 – 4.5V, I _{out} = 0μA	0.08	-	1.0	mA

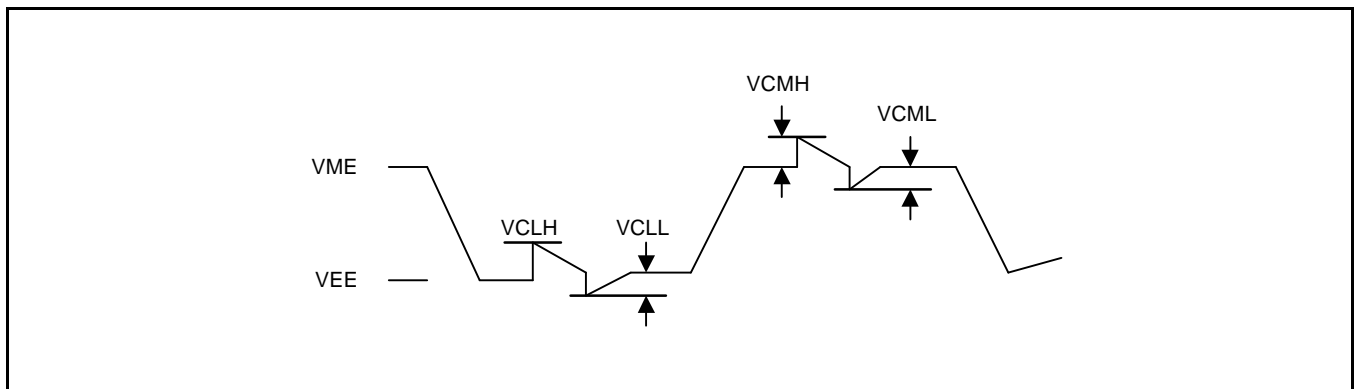
NOTES:

1. Refer to test circuit. Shutter speed : 1/100000 SEC
2. Refer to OP-AMP Gain characteristics
3. X_{V1} – 4, X_{SG1}, X_{SG3}, X_{SUB} PIN

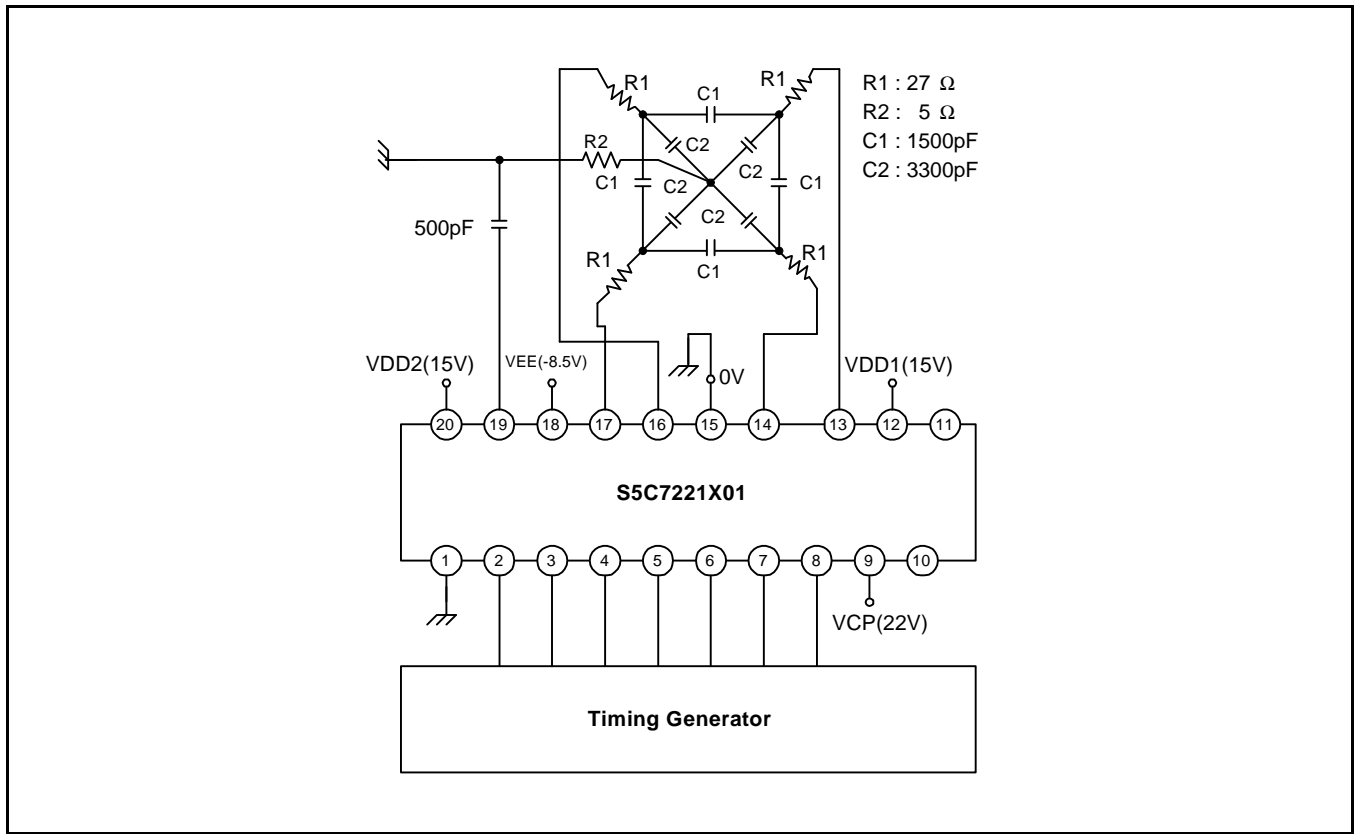
TIMING DIAGRAM



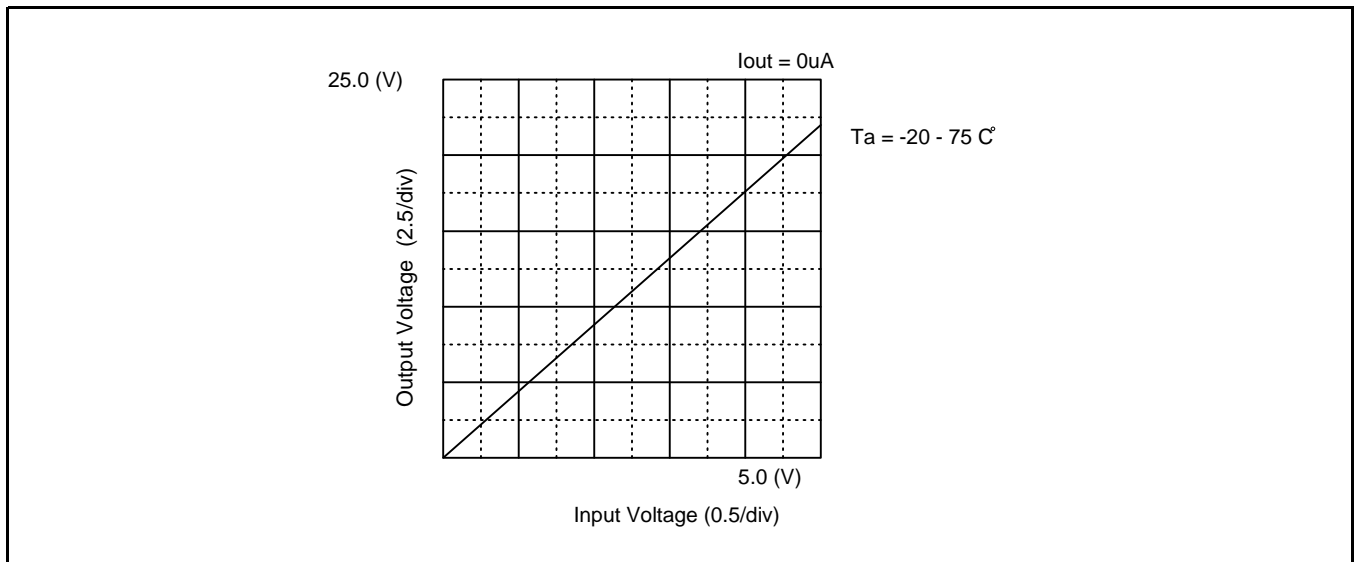
NOISE DIAGRAM



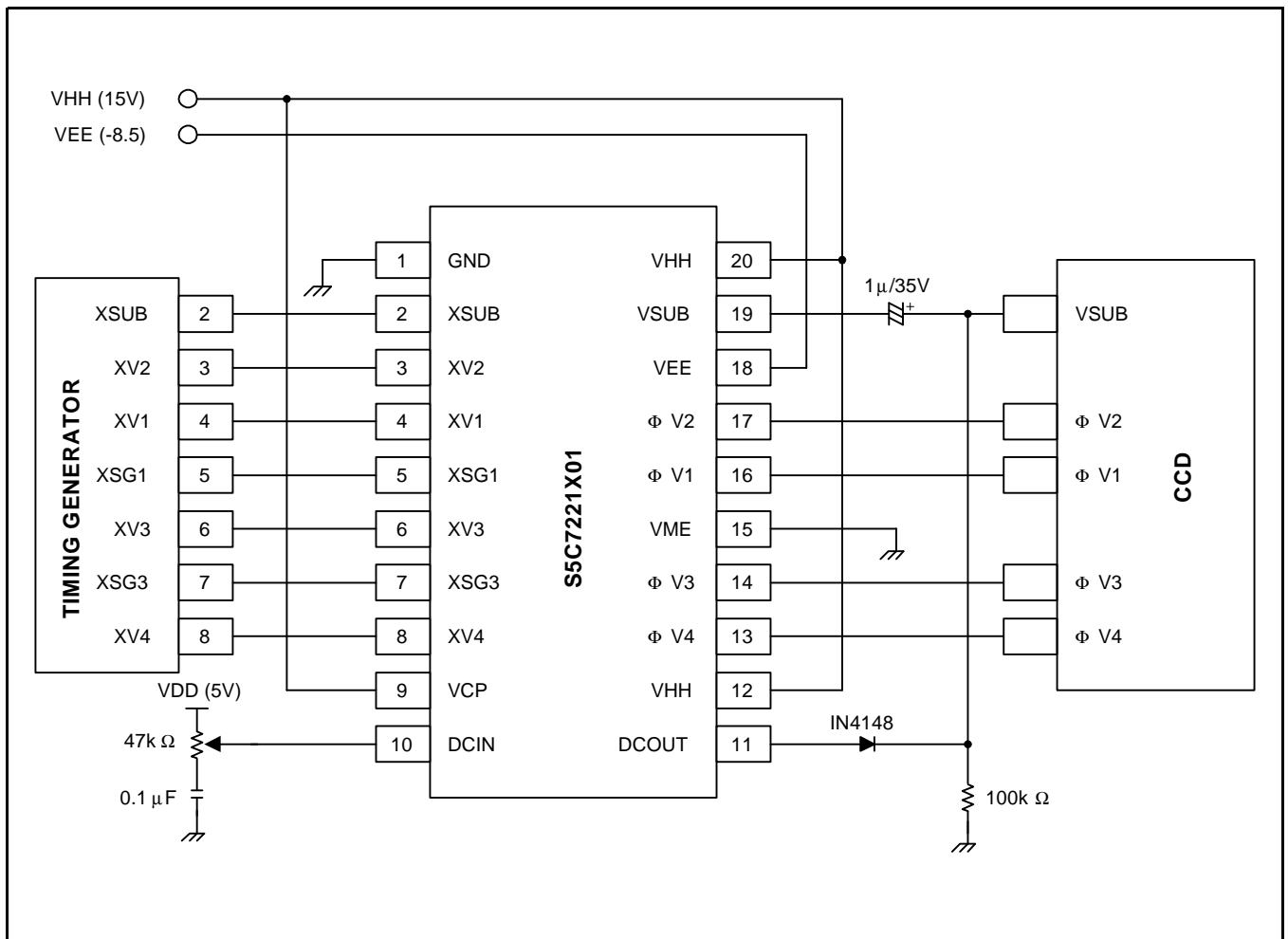
TEST CIRCUIT



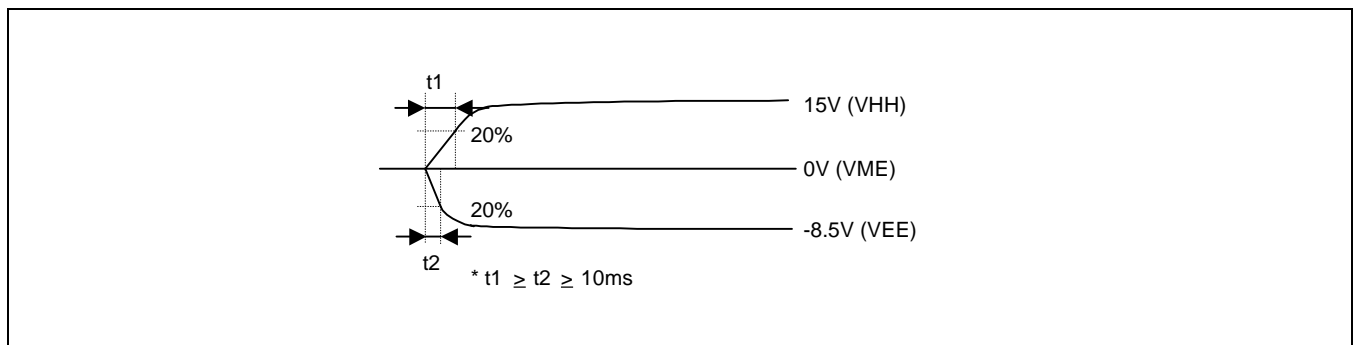
OP- AMP GAIN CHARACTERISTICS



APPLICATION CIRCUIT



* In case of $DCOUT \leq VHH - 1.0V$, VCP PIN connects with VHH.
 Warning : When voltage is biased, You must keep this flow.
 If the flow is interrupted, negative voltage is applied to CCD image sensors SUB.



PACKAGE DIMENSIONS

