



PRELIMINARY

CCD VERTICAL DRIVER

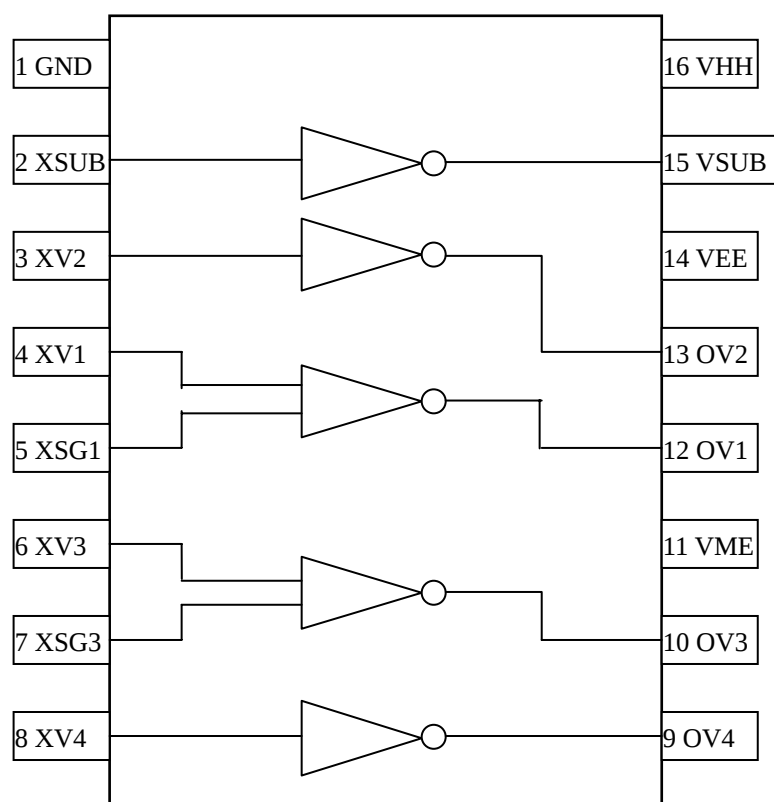
■ **FEATURES**

- 3 levels of output voltage, 15V, 0V and -8.5V
- 3.3V / 5V input voltage

■ **DESCRIPTION**

AA87222AP is a vertical driver with 3 levels of output voltage processed in a standard CMOS.

■ **PIN ASSIGNMENT & BLOCK DIAGRAM**





PRELIMINARY

CCD VERTICAL DRIVER

■ **PIN DESCRIPTION**

Symbol	Pin No.	Type	Name & Function
POWER			
VHH	16	-	+15V power supply pin
GND	1	-	Ground pin
VEE	14	-	-8.5V power supply pin
VME	11	-	Power pin(0v)
INPUT SIGNAL			
XSUB	2	I	Input signal pin --control VSUB
XV1	4	I	Input signal pin --control OV1
XV2	3	I	Input signal pin --control OV2
XV3	6	I	Input signal pin --control OV3
XV4	8	I	Input signal pin --control OV4
XSG1	5	I	Input signal pin --control OV1
XSG3	7	I	Input signal pin --control OV3
OUTPUT SIGNAL			
VSUB	15	O	Output signal pin --2 level, VEE & VHH
OV1	12	O	Output signal pin—3 level, VEE, VHH & VME
OV2	13	O	Output signal pin --2 level, VEE & VME
OV3	10	O	Output signal pin—3 level, VEE, VHH & VME
OV4	9	O	Output signal pin --2 level, VEE & VME



PRELIMINARY

CCD VERTICAL DRIVER

■ **ABSOLUTE MAXIMUM RATINGS** (See NOTE)

Parameter	Symbol	Rating			UNIT
		MIN	TYP	MAX	
Supply Voltage	VEE	-10		0	V
	VHH	-0.3		VEE+30	V
	VME	VEE-0.3		3	V
Input Voltage	VI	-0.3		VHH+0.3	V
Output Voltage	OV1, OV3, VSUB	VEE-0.3		VHH+0.3	V
	OV2, OV4	VEE-0.3		VME+0.3	V
Operating Ambient Temperature	Ta	-25		85	
Storage Temperature	Ts	-45		125	

NOTE: Stress above those listed under “Absolute Maximum Rating” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for the extended periods of time may affect device reliability.

■ **LOGIC 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



PRELIMINARY

CCD VERTICAL DRIVER

■ **DC CHARACTERISTICS** (V_{HH}=15, V_{ME}=GND, V_{EE}=-8.5V; T_a = 25)

Parameter	Symbol	Value			Unit	Condition
		Min	Typ	Max		
Power Supply	V _{HH}	14.5	15	15.5	V	
	V _{EE}	-9.5	-8.5	-7.5	V	
Supply Current	I _{HH}		2.4	6	mA	(*1)
	I _{EE}	-8	-4.2		mA	
	I _{ME}		0.6	2.5	mA	
Input Voltage	V _{IH}	2.3			V	
	V _{IL}			1.3	V	
Input Current	I _I	-1	0	1	uA	V _{IN} =0~5V (*2)
Output Current	I _{OL}	24	30		mA	OV1~4=-8.0V
	I _{OM1}		-18	-25	mA	OV1~4=-0.5V
	I _{OM2}		18	25	mA	OV1,3=0.5V
	I _{OH}		-15	-25	mA	OV1,3=14.5V
	I _{OSL}		21	30	mA	V _{SUB} =-8.0V
	I _{OSH}		-10	-30	mA	V _{SUB} =14.5V

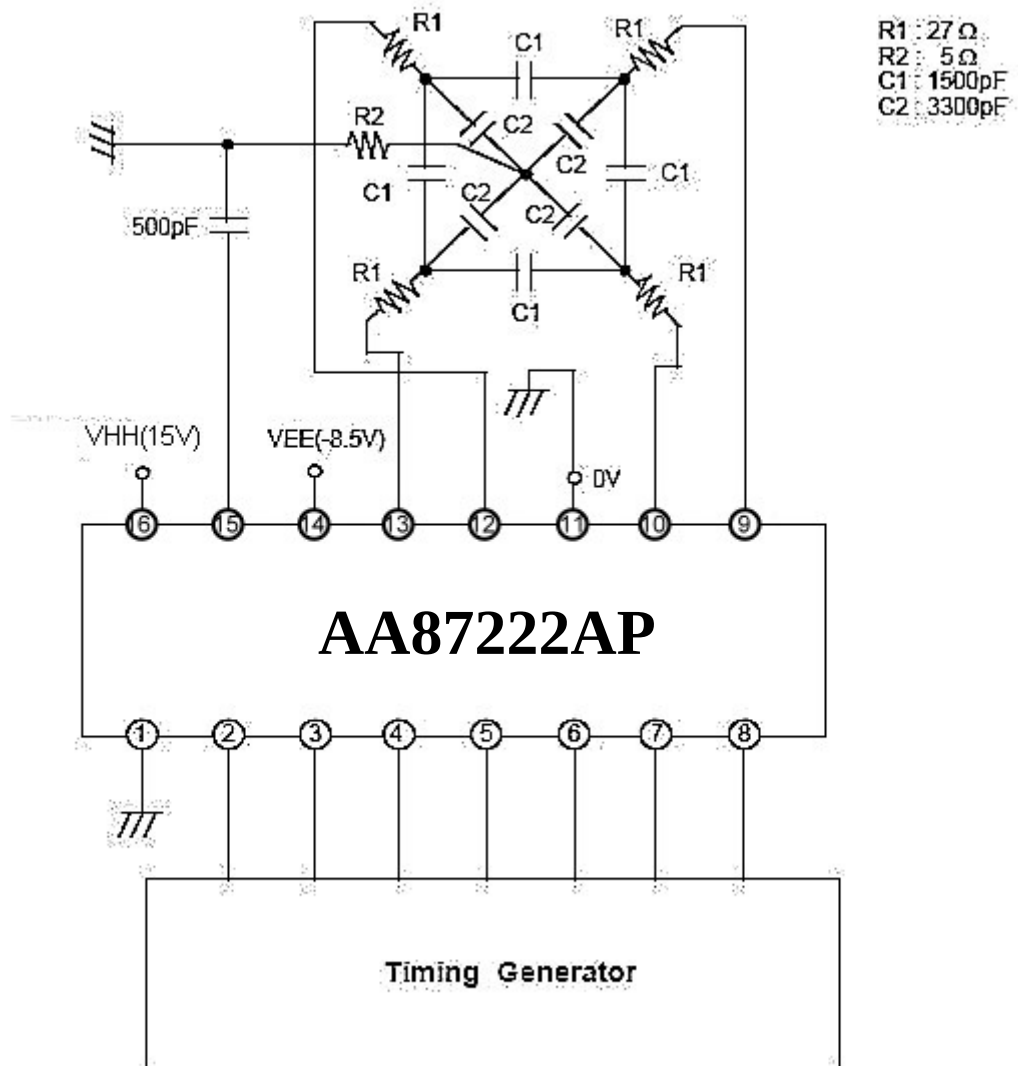
(*1) Refer the measurement circuit. Shutter speed: 1/40us

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

PRELIMINARY

CCD VERTICAL DRIVER

■ **MEASUREMENT CIRCUIT**





PRELIMINARY

CCD VERTICAL DRIVER

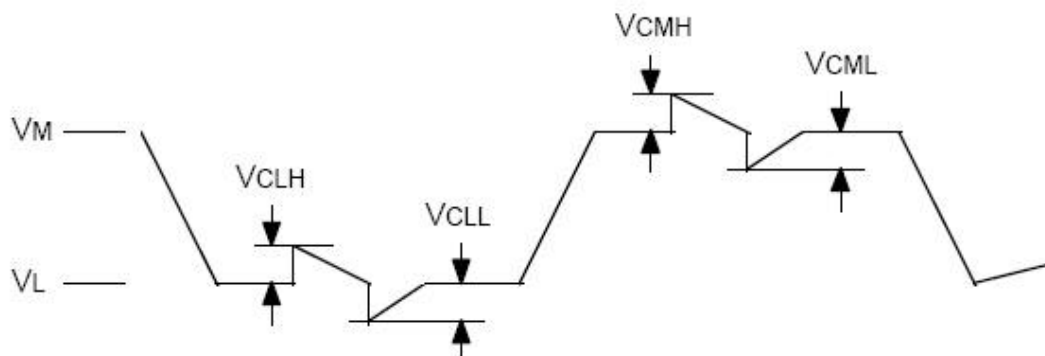
■ **AC CHARACTERISTICS** (V_{HH}=15, V_{ME}=GND, V_{EE}=-8.5V; T_a = 25)

Parameter	Symbol	Value			Unit	Condition
		Min	Typ	Max		
Delay Time	T _{PLM}	30	70	100	nS	No Load (*1)
	T _{PMH}	30	70	100	nS	
	T _{PLH}	30	70	100	nS	
	T _{PML}	30	70	100	nS	
	T _{PHM}	30	70	100	nS	
	T _{PHL}	30	70	100	nS	
Transition Time	T _{TLM}	170	250	330	nS	V _{EE} →V _{ME} (*1)
	T _{TMH}	190	240	310	nS	V _{ME} →V _{HH} (*1)
	T _{TLH}	100	150	210	nS	V _{EE} →V _{HH} (*1)
	T _{TML}	100	200	310	nS	V _{ME} →V _{EE} (*1)
	T _{THM}	60	110	170	nS	V _{HH} →V _{ME} (*1)
	T _{THL}	90	140	210	nS	V _{HH} →V _{EE} (*1)
Output Noise Voltage	V _{CLH} , V _{CLL} V _{CMH} , V _{CML}			0.5	V	(*2)

(*1) Refer Timing Diagram

(*2) Refer Noise Diagram

■ **NOISE DIAGRAM**





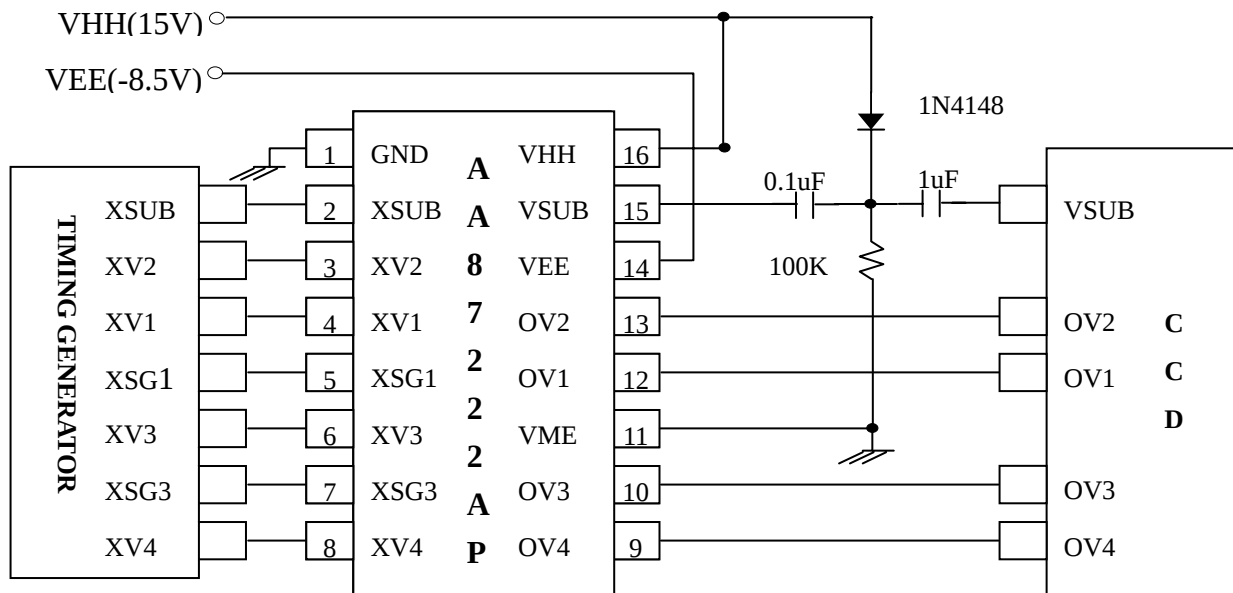
CCD VERTICAL DRIVER



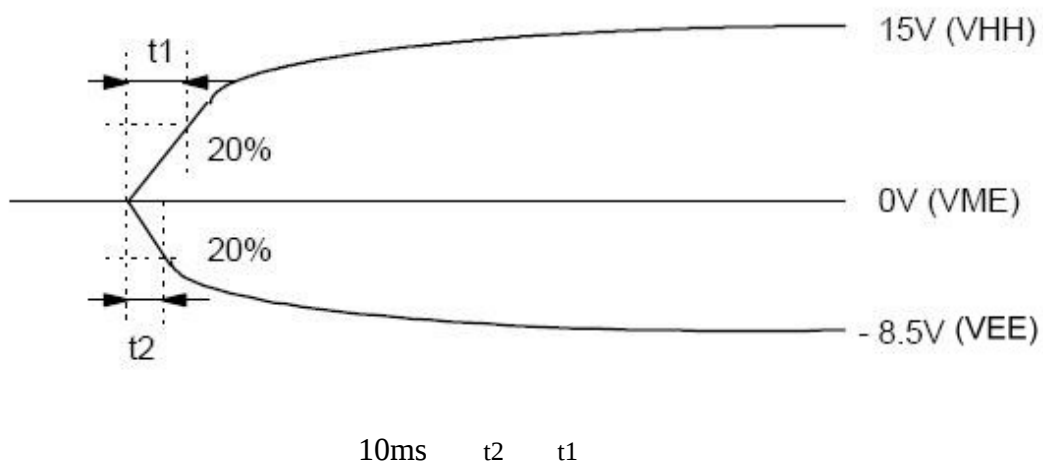
PRELIMINARY

CCD VERTICAL DRIVER

■ **APPLICATION CIRCUIT**



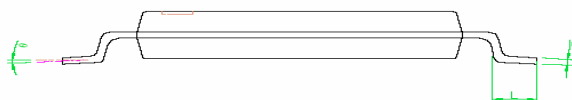
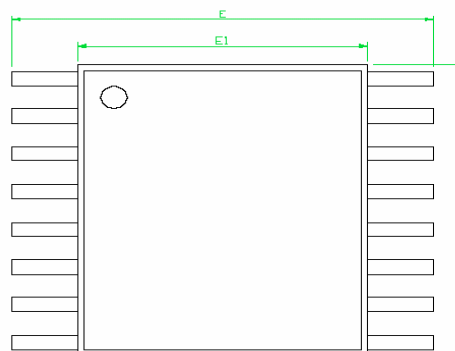
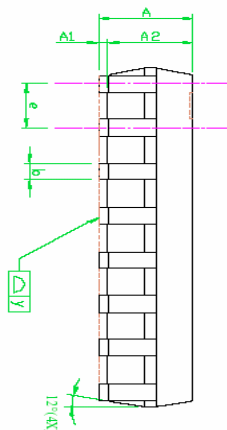
In case of DCOUT VHH-1.0V, Warning: When voltage is biased, you must keep this flow. If you don't, negative voltage is applied to CCD image sensor's SUB.



PRELIMINARY

CCD VERTICAL DRIVER

■ **TSSOP 16L PACKAGE DIMENSION**



NOTE:

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS
2. TOLERANCE $\pm 0.1\text{mm}$ UNLESS OTHERWISE SPECIFIED
3. COPLANARITY: 0.1mm
4. CONTROLLONG 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°