EDE9907141
4702-NVV390-07

AN5539

Panasonic
MEC IC Div.

AN5539 is a bipolar monolithic vertical deflection output IC for use in televisions, monitors and displays which are introducing bus control system as IIC. This IC amplifies sawtooth signal processed by previous stage signal processing IC and is able to drive CRT deflection yoke directly.

< FEATURE > · Built-in pump-up circuit
· Built-in thermal protection circuit
· Single-In-Line 7pin package with fin
· Introducing dimple formed leads

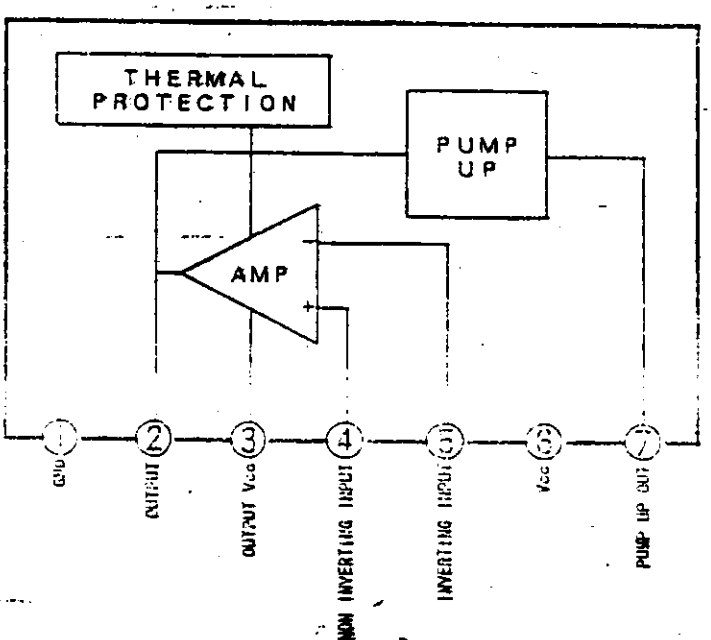
< Maximum Ratings >

· supply voltage(pin6)	Vcc6max	30	V
· supply voltage(pin3)	Vcc3max	60	V
· deflection current	I2max	±1.5	A0-P
· thermal resistance	θ j −c	4	°C
· maximum power dissipation	Pd	9	W

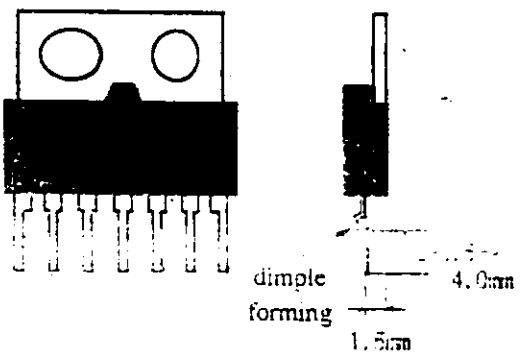
< Operating Conditions >

· recommended supply voltage	Vcc6	24	V
· operating supply voltage range	Vcc6 op	10∼29	V
· recommended deflection current	I2p-p	∼2.0	AP-P

< Block Diagram >



< Package > FP-7S



TENTATIVE	PRODUCT STANDARDS	AN5539			
		total pages		page	1

Type	Silicon Monolithic Bipolar IC
Package	7-Pin Plastic Package with Fin
Application	TV Vertical Deflection Output Circuit

A Absolute Maximum Ratings

No.	Parameter	Symbol	Rating		Unit	Note
1	Storage temperature	Tstg	−55～+150		℃	Note1
2	Operating ambient temperature	Topr	−20～+70		℃	Note1
3	Operating ambient atmospheric pressure	Popr	$1.013\times10^5\pm0.61\times10^5$ (1.0±0.6)		Pa (atm)	
4	Operating constant gravity	Gopr	9,810 (1,000)		m/S^2 (G)	
5	Operating shock	Sopr	4,900 (500)		m/S^2 (G)	
6	Supply voltage	Vcc6	30		V	
7	Supply current	Icc6	360		mA	
8	Power dissipation	P_D	1.5		W	Note2
9	Circuit voltage	V2-1	0	60	V	
10	Circuit voltage	V3-1	0	60	V	
11	Circuit voltage	V4-1	0	V6-1	V	
12	Circuit voltage	V5-1	0	V6-1	V	
13	Circuit current	I2	−2.2	2.2	A0-P	
14	Circuit current	I7	−1.8	1.8	A0-P	

Operating supply voltage range	Vcc6	12 V ～ 29 V

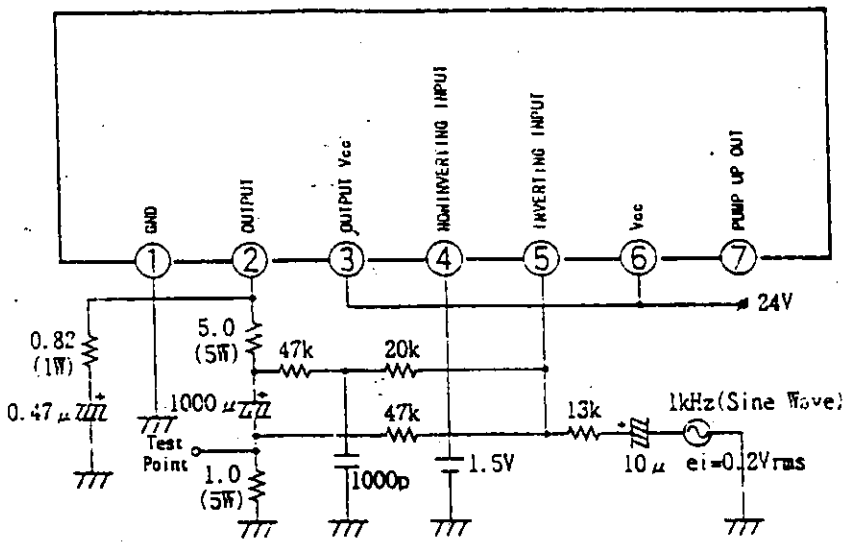
Note1 : The temperature of all parameters shall be Ta=25℃ except storage temperature, operating ambient temperature and power dissipation.

Note2 : The power dissipation shall be at Ta=70℃ in free air, without heat sink. (refer to sheet No.10)

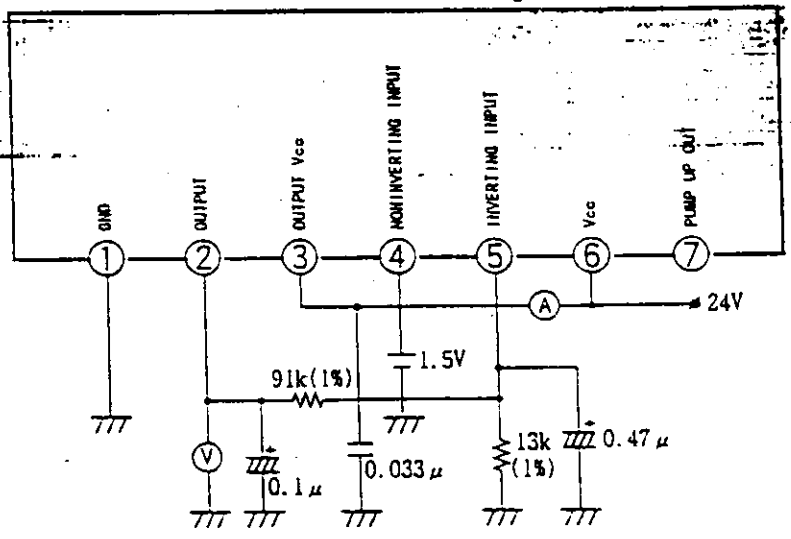
8 Electrical Characteristics (T_a=25°C±2°C unless otherwise specified)

No.	Parameter	Symbol	Test Circuit	Conditions	Limits min	Limits typ	Limits max	Unit	Note
1	Deflection current	I_{HP-P}	1	Vcc=24V ei=0.2Vrms,1kHz	1.8	2.0	2.2	A_{P-P}	
2	Vertical amp. distortion	THD_H	1	Vcc=24V ei=0.2Vrms,1kHz		1.0	3.0	%	
3	Mid-point voltage	V_{MID}	2	Vcc=24V	11	12	13	V	
4	Idling current	I_3	2	Vcc=24V	10	20	30	mA	
5	Output saturation voltage (Lower)	V_{2-1}	3	Vcc=24V I2=0.9A		1.5	2.2	V	
6	Output saturation voltage (Upper)	V_{3-2}	4	Vcc=24V I2=−0.9A		2.9	3.7	V	
7	Pump-up charge saturation voltage	V_{7-1}	5	Vcc=24V I7=20mA		0.2	0.5	V	
8	Pump-up discharge saturation voltage	V_{6-7}	6	Vcc=24V I7=−0.9A		2.2	2.9	V	

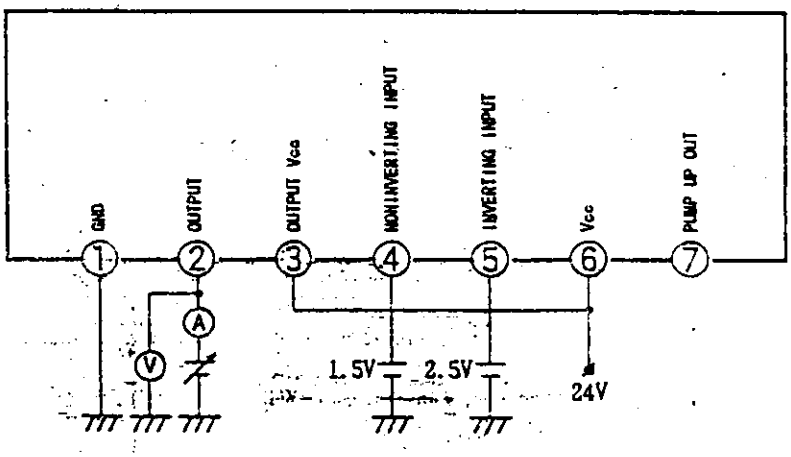
Test Circuit-1 (Deflection current , Vertical amp. distortion)



Test Circuit-2 (Mid-point voltage , Idling current)

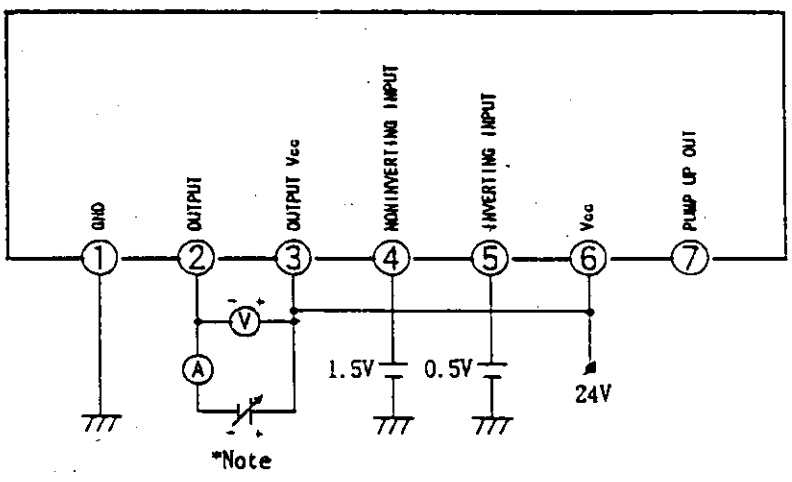


Test Circuit-3 (Output saturation voltage (Lower))



Monitor the voltage when the current is 0.9A.

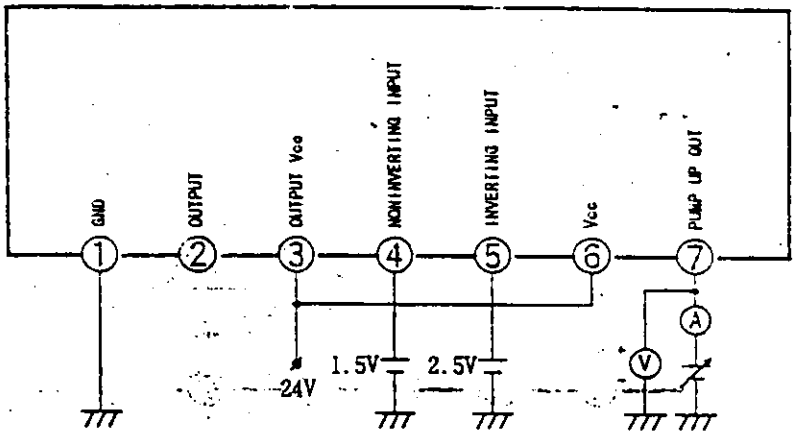
Test Circuit-4 (Output saturation voltage (Upper))



Monitor the voltage when the current is 0.9A.

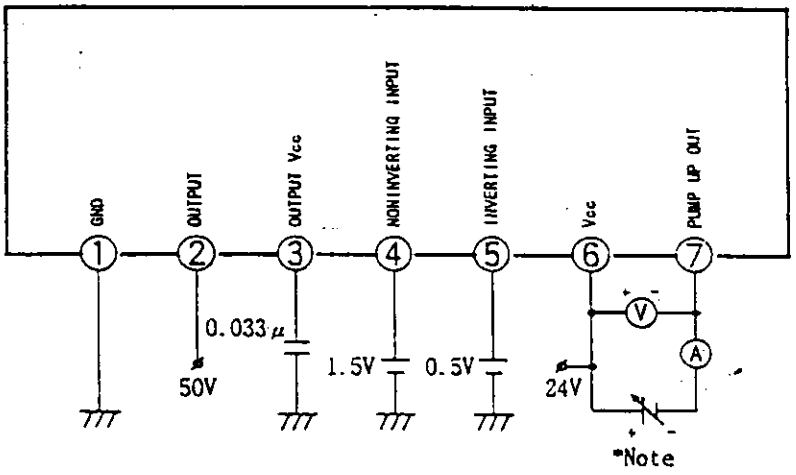
*Note : In case an external power supply is used, set the GND terminal open(floating).

Test Circuit-5 (Pump-up charge saturation voltage)



Monitor the voltage when the current is 20mA.

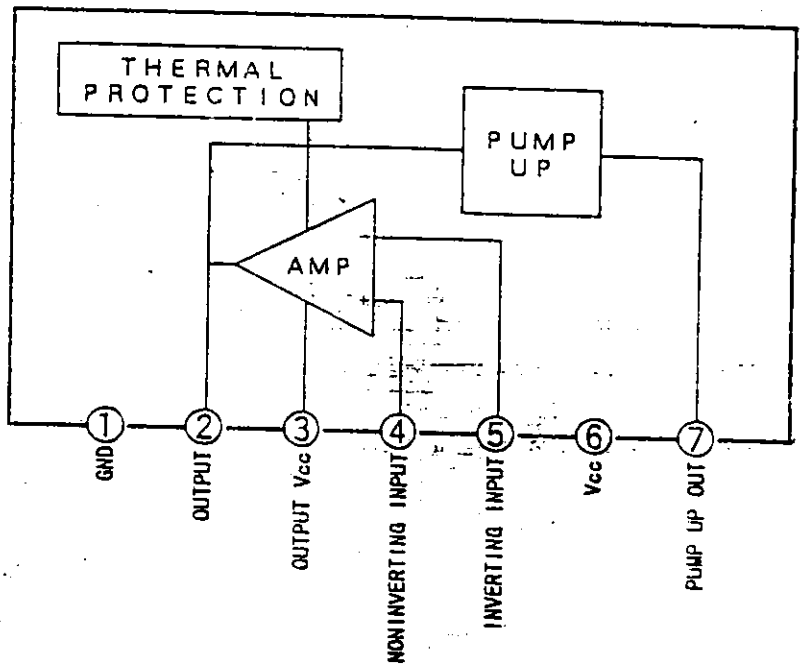
Test Circuit-6 (Pump-up discharge saturation voltage)



Monitor the voltage when the current is 0.9A.

*Note : In case an external power supply is used, set the GND terminal open(floating).

[Block Diagram]



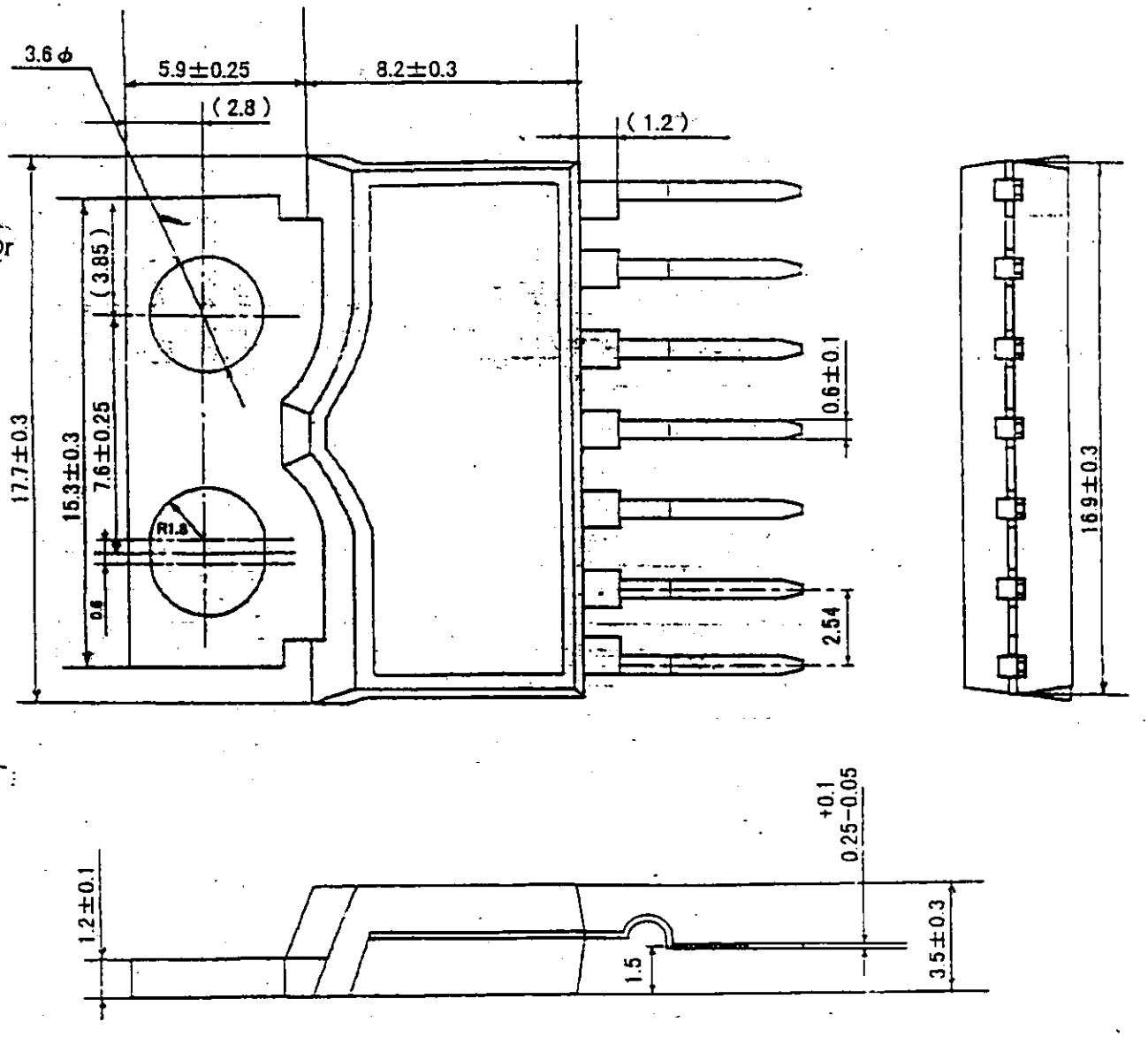
[Pin Assignment]

Pin No.	Pin Description
1	GND
2	Vertical output
3	Vertical output power supply
4	Noninverting input
5	Inverting input
6	Power supply
7	Pump-up output

Package Name	FP-7S

Tentative

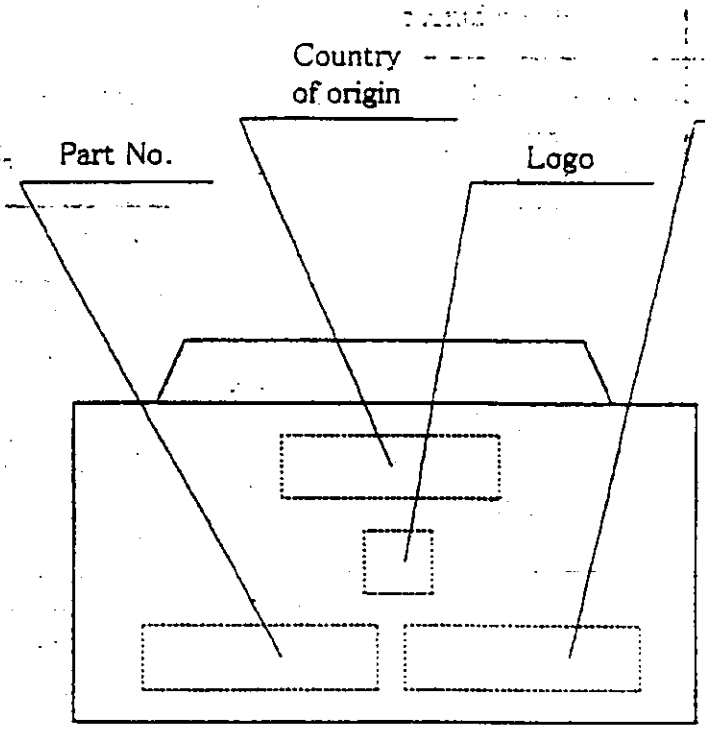
Unit : mm



( ) : Reference data

Tentative

Package Name	FP-7S

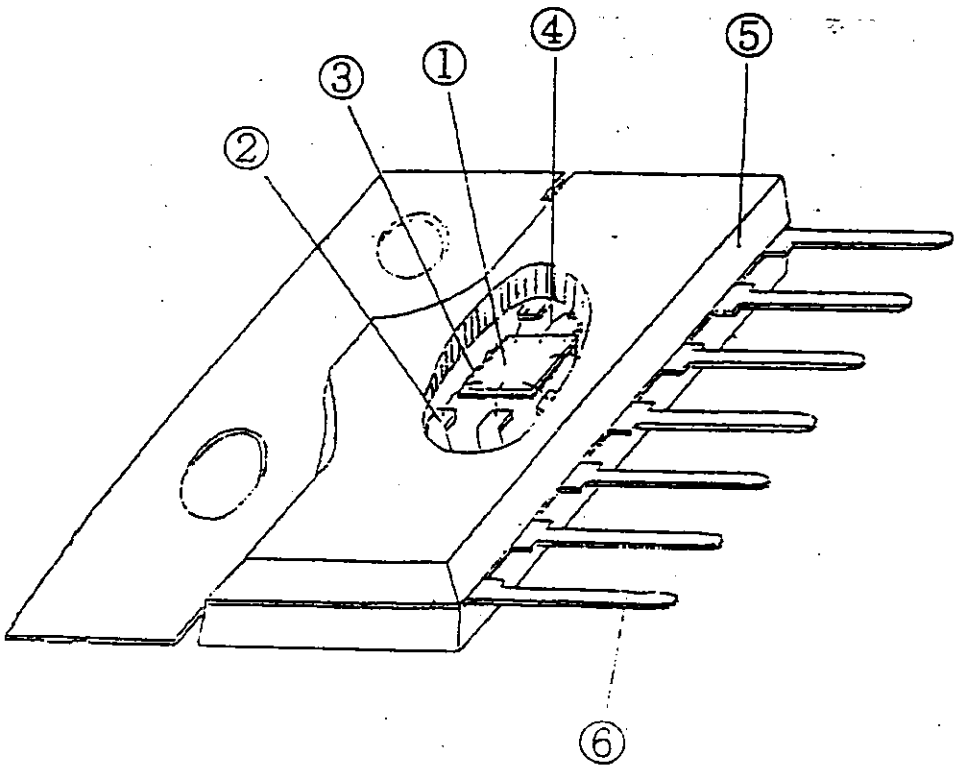


[Structure]

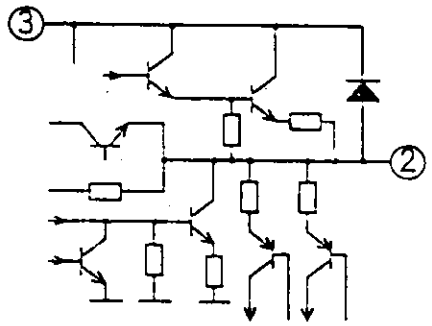
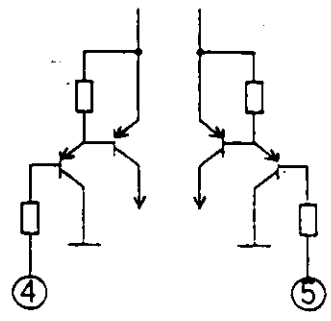
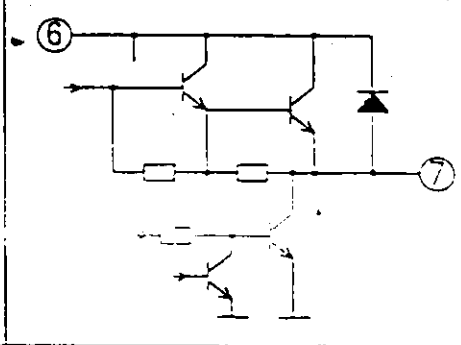
Chip surface passivation	PSG	①
Lead frame material	Cu group	②, ⑥
Internal lead surface treatment	Ag plating	②
External lead surface treatment	Solder dip	⑥
Chip mounting method	Solder	③
Wire bonding method	Thermosonic bonding	④
Wire material, diameter	Au , Diameter : 38 μm	④
Mold material	Epoxy	⑤
Molding method	Transfer mold	⑤

<Package>

FP-7S



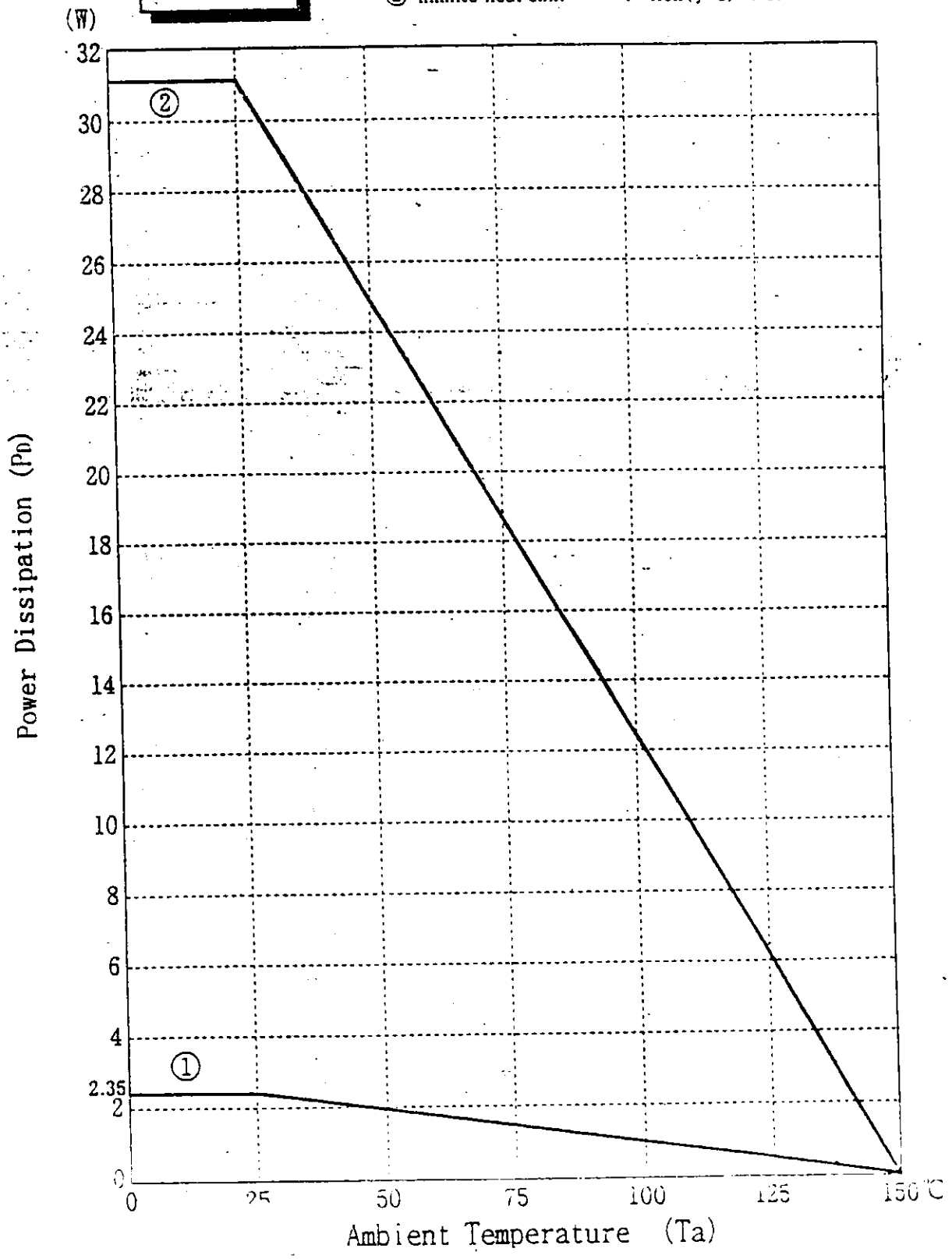
< Pin Description >

Pin No.	Pin Name	Signal Wave Form	Description	Equivalent Circuit
①	GND	DC	——	——
②	Vertical Output	2Vcc, 0V, 1 cycle (f=50～60Hz)	A vertical deflection coil is connected and 1～2A of deflection current is provided through the pin.	
③	Vertical Output Power Supply	2Vcc, Vcc	About Vcc×2 for flyback period and Vcc−VD for the other period are supplied.	——
④	Noninverting Input	DC (External Bias)	About 2V is supplied. Very high sensitivity may cause abnormal oscillation.	
⑤	Inverting Input	V④	Input signal and CR network for feedback are connected. Very high sensitibity.	
⑥	Power supply (Vcc)	DC	10～29V is supplied.	——
⑦	Pump-up Output	Vcc, 0V	A capacitor connected between this pin and pin③ is charged and discharge during flyback pulse in order to supply about Vcc×2 to pin③.	

FP-7S Ambient Temperature(Ta) vs Power Dissipastion(Pt)

Tentative

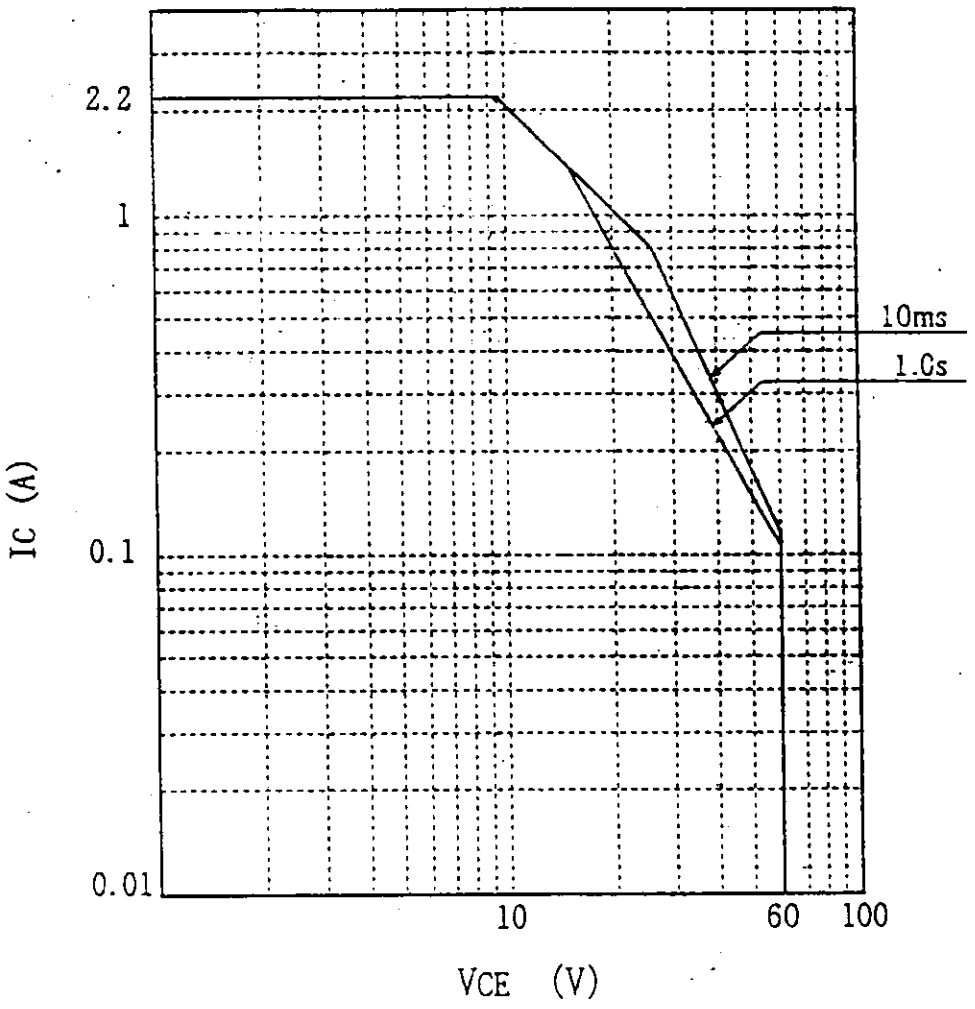
① Without heat sink : Rth(j-a)=53.2℃/W
② Infinite heat sink : Rth(j-c)=4℃/W



Output Transister Forward Bias ASO(Area of Safe Operation)

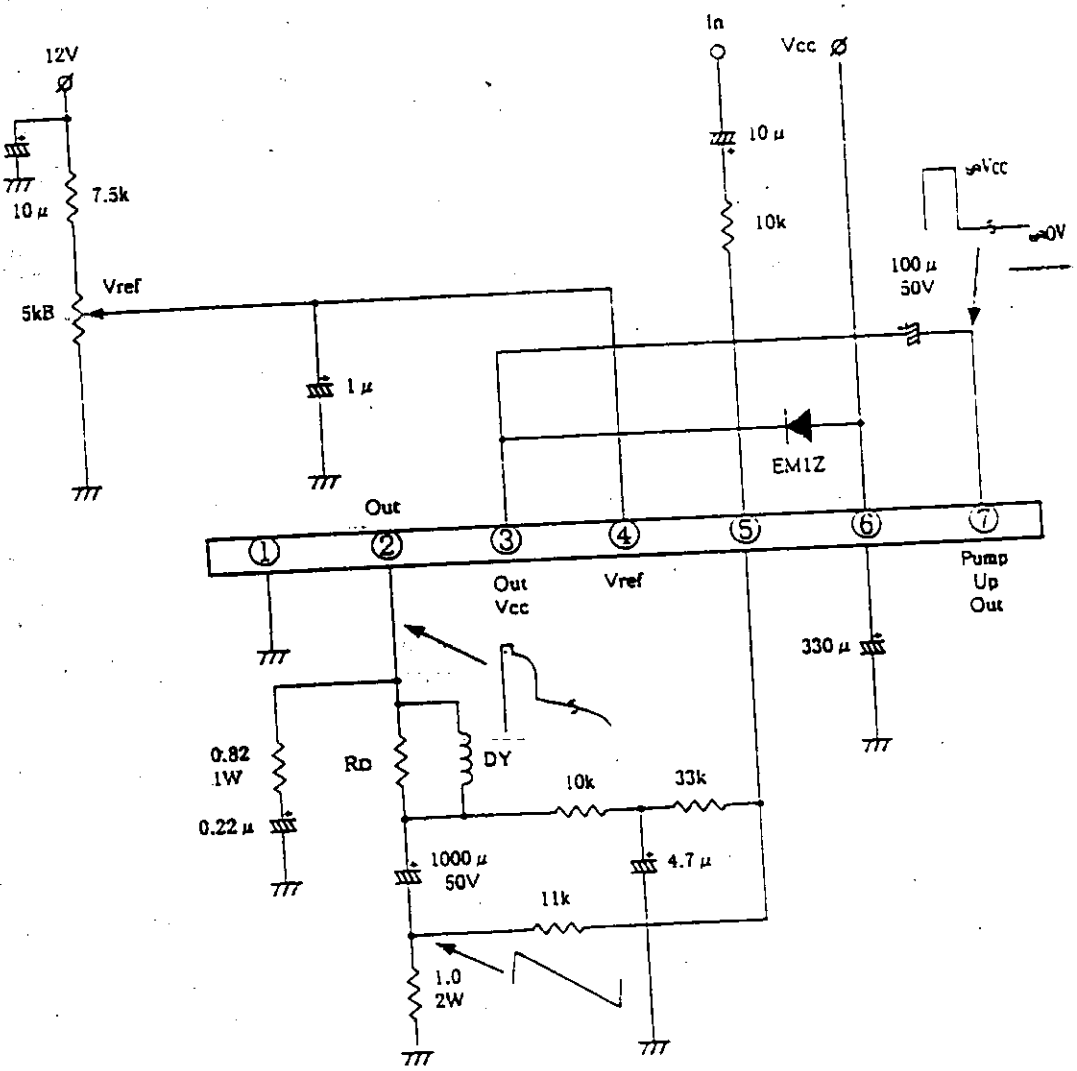
Tentative

Ta=25℃
Single Pulse



Note : The max. deflection current value suitable for practical use is within ±1.5Ao-p(3Ap-p)

< Application Circuit >



< Precautions for application >

Test result of short between pins

Test condition : Vcc=30V
DC Power Supply(30V,5A)

Pin No.	1	2	3	4	5	6	7
1							
2	×						
3	⊗	×					
4	○	○	○				
5	○	○	○	○			
6	⊗	○	○	○	○		
7	○	○	○	○	○	○	

○ : No destruction of IC

× : Destruction of IC

⊗ : No destruction of IC but possible damage of external power supply

※ : A short circuit between pin2(Vertical output) and pin1(GND) or between pin2 and pin3(Vertical output power supply) may cause IC destruction. After the destruction, continuous supply of Vcc may cause smoke from the IC. Therefore full attention should be paid when this IC is used. For example, some external current limiter like a small resistor should be connected to pin6.