SHARP

SPEC No.	EL083156
ISSUE:	Apr 1 1996

To ;

REQUEST FOR CONFIRMATION

SPECIFICATIONS

Product Type CCD CDS/AMP IC

Model No. IR3P66

※This specifications contains 18 pages including the cover and appendix.
If you have any objections, please contact us before issuing purchasing order.

CUSTOMERS ACCEPTANCE

DATE:

BY:

PRESENTED

BY: T. Ohno

T. OHNO
Dept. General Manager

REVIEWED BY: H. Fujita

PREPARED BY: C. Matoba

Devices Engineering Dept.
Tenri Division
Tenri Integrated Circuits Group
SHARP CORPORATION

SHARP CORPORATION 5.15'97. MAIL DATE TENRI GROUP

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●When using the products covered herein, please observe the conditions written herein and the precautions outlined in the following paragraphs. In no event shall the company be liable for any damages resulting from failure to strictly adhere to these conditions and precautions.

(1) The products covered herein are designed and manufactured for the following application areas. When using the products covered herein for the equipment listed in Paragraph (2), even for the following application areas, be sure to observe the precautions given in Paragraph (2). Never use the products for the equipment listed in Paragraph (3).
- ·Office electronics
- ·Instrumentation and measuring equipment
- ·Machine tools
- ·Audiovisual equipment
- ·Home appliances
- ·Communication equipment other than for trunk lines

(2) Those contemplating using the products covered herein for the following equipment which demands high reliability, should first contact a sales representative of the company and then accept responsibility for incorporating into the design fail-safe operation, redundancy, and other appropriate measures for ensuring reliability and safety of the equipment and the overall system.
- ·Control and safety devices for airplanes, trains, automobiles, and other transportation equipment
- ·Mainframe computers
- ·Traffic control systems
- ·Gas leak detectors and automatic cutoff devices
- ·Rescue and security equipment
- ·Other safety devices and safety equipment, etc.

(3) Do not use the products covered herein for the following equipment which demands extremely high performance in terms of functionality, reliability, or accuracy.
- ·Aerospace equipment
- ·Communications equipment for trunk lines
- ·Control equipment for the nuclear power industry
- ·Medical equipment related to life support, etc.

(4) Please direct all queries and comments regarding the interpretation of the above three Paragraphs to a sales representative of the company.

●Please direct all queries regarding the products covered herein to a sales representative of the company.

CONTENTS

1. Description

The IR3P66 is a CDS/AMP IC for a CCD area sensor.

This IC receives the CCD area sensor output, clamps the feed-through level of the sensor output, samples and holds the signal level and then outputs it.

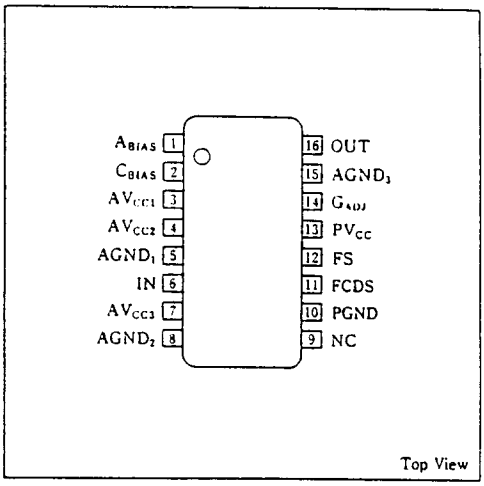
A built-in amplifier varies the gain within the range from 0 to 6dB.

The functions of the IR3P66 are the same as that of the IR3P68 except for an internal amplifier.

2. Features

1. Reduces the low range noise included in the CCD area sensor output
2. Incorporates a clamp capacitor
3. Incorporates variable gain amplifier (0~6dB)
4. 5V single power supply

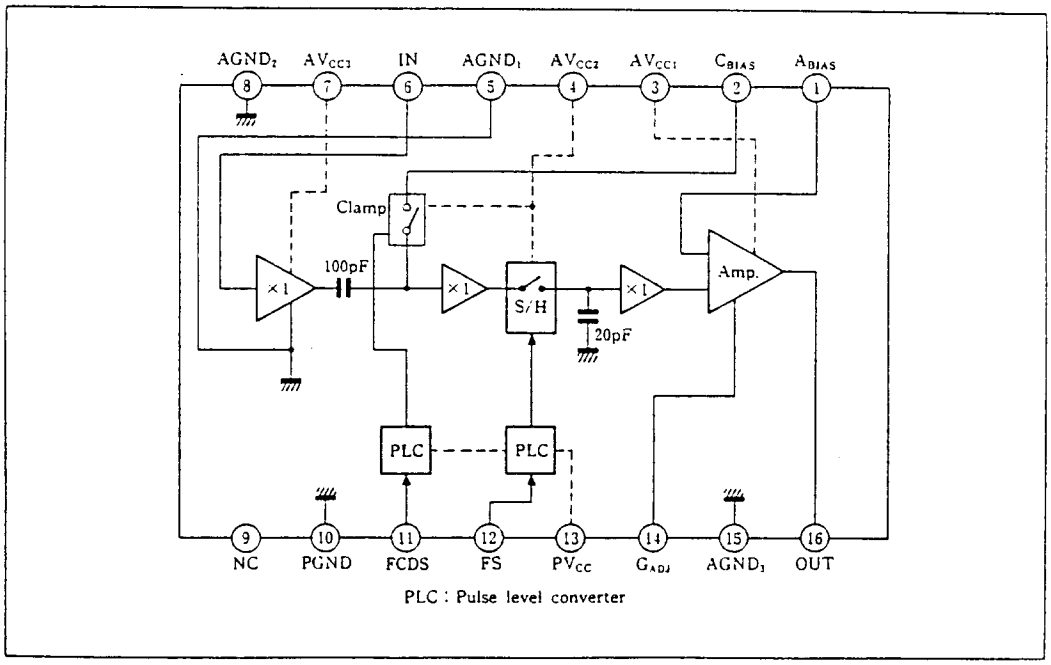
3. Pin Connections



Not designed or rated as radiation hardened.

Package material:	Plastic
Chip material and wafer substrate type:	P type silicon
Number of pins and package type:	16 PIN SOP package
Process (Structure):	Bipolar

4. Block diagram



PLC : Pulse level converter

5. Pin Functions

Pin No.	Symbol	I/O	Pin function
1	A_{BIAS}	I	Bias level pin for an amplifier An internal bias resistor sets the bias level
2	C_{BIAS}	I	Reference voltage pin to clamp the feedthrough level of a CCD area sensor output
3	AV_{CC1}		Power supply for an amplifier
4	AV_{CC2}		Power supply for a clamp, and sample and hold
5	$AGND_1$		Analog GND (for input)
6	IN	I	Inputs the CCD area sensor output by a capacitor conjunction
7	AV_{CC3}		V_{CC} for inputs (buffer)
8	$AGND_2$		GND for inputs (buffer), clamps and sample and hold
9	NC		
10	PGND		GND for pulses
11	FCDS	I	Pulse input to clamp the feedthrough level of a CCD area sensor output. Clamped by an "High" level
12	FS	I	Pulse input to sample/hold the signal level of a CCD area sensor output. Held by an "Low" level
13	PV_{CC}		Power supply for a pulse level converter
14	G_{ADJ}	I	Amplifier gain adjusting input pin
15	$AGND_3$		GND for an amplifier
16	OUT	O	Amplifier output

6. Absolute Maximum Rating

(Ta=25℃)

Parameter	Symbol	Conditions	Rating	Unit
Supply voltage	AV_{CC1}~AV_{CC3}		7	V
	PV_{CC}		7	V
Input voltage	V_{ia}	Pins 1, 2, 6 and 14	0~AV_{CC}	V
	V_{ip}	Pins 11 and 12	−0.2~PV_{CC}+0.2	V
Output current	$\mid I_O \mid$	Pin 16	5	mA
Power dissipation	P_D	Operating temperature range	300	mW
Operating temperature	T_{opr}		−10~+60	°C
Storage temperature	T_{stg}		−55~+150	°C

7. Electrical Characteristics(1)

(V_{CC}=5V, Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating supply voltage	AV_{CC1}~AV_{CC3} PV_{CC}	Pins 3, 4, 7 and 13 (Ta=−10~60℃)	4.75	5.00	5.25	V
Supply current	I_{CC1}	Pin 3 of the circuit 1	3.3	5.0	7.5	mA
	I_{CC2}	Pin 4 of the circuit 1	0.9	1.4	2.1	
	I_{CC3}	Pin 7 of the circuit 1	1.3	2.0	3.0	
	PI_{CC}	Pin 13 of the circuit 1	5.3	8.0	13	
Open terminal voltage						
Input open terminal voltage	V_6	Pin 6 of the circuit 2	2.4	2.5	2.6	V
	V_2	Pin 2 of the circuit 2	2.95	3.08	3.20	
	V_1	Pin 1 of the circuit 2	2.68	2.80	2.92	
Output voltage	V_{16}	Pin 16 of the circuit 2	1.9	2.15	2.4	V
Input current						
Input current	I_{14}	Pin 14 of the circuit 3	−20	−5	10	μA

Parameter	Symbol	Conditions			MIN.	TYP.	MAX.	Unit
Pulse level converter (For clamp and S/H)								
Input "Low" voltage	V_{IL}	Pin 11 and 12		Circuit 4			0.8	V
Input "High" voltage	V_{IH}				2.0			V
Input "Low" current	I_{IL}		$V_{IL}=0V$	Circuit 3	−1.1	−0.8	−0.5	mA
Input "High" current	I_{IH}		$V_{IL}=5V$		−10	1	10	μA
Input impedance	R_{IN}	Pin 6	Resistors	Circuit 5	8	12		kΩ
	C_{IN}		Capacitors			4	6	pF
	R_{cbias}	Pin 2				9.5		kΩ
	R_{abias}	Pin 1				11.5		kΩ
Output impedance	R_{OUT}	Pin 16 for resistors f=1MHz		Circuit 7		190	300	Ω
Input dynamic range	DR	Pin 6, Gain=6dB			0.6	0.9		V_{P-P}
Gain	G_1	$V_{14}=0V$		Circuit 6	−1	0	1	
	G_2	$V_{14}=1.7V$			2	3	4	dB
	G_3	$V_{14}=5V$			5	6	7	
S/H slew rate	V_{16}	Amp. gain=0dB			0.6	0.9		V/20ns
Hold voltage fluctuation						−20		mV/μs
Hold mode feedthrough		f=1MHz IN=300mV Gain=6dB		Circuit 8		−55	−45	dB
S/H offset error		VFS=10MHz, gain=6dB		Circuit 9		8		mV
Sampling transition noise		VFS=10MHz, gain=6dB				40		mV_{P-P}
Clamp low frequency rejection ratio		f=100kHz IN=0.3V_{P-P}		Circuit 10		−33	−27	dB
Linearity error		$V_{IN}=0.2\sim0.6V_{P-P}$ Sampling=10MHz		Circuit 7		0.5	1	%
Clamp pulse width					20			ns
Sample pulse width					20			ns

* The electrode of current coming into IC is defined as positive.

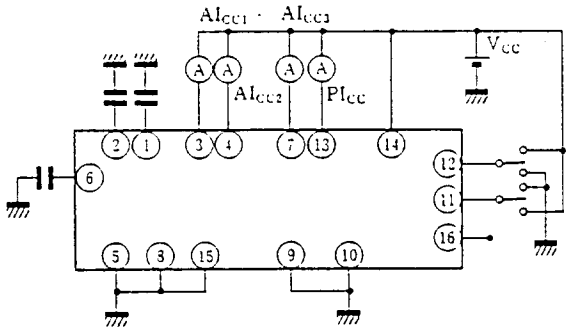
8. Electrical Characteristics(2)

($AV_{CC}=PV_{CC}=4.75\sim5.25V$, $Ta=-10\sim+60°C$)

Parameter	Symbol	Conditions		MIN.	TYP.	MAX.	Unit
Supply current	AI_{CC1}	Pin 3		2.8		10.3	mA
	AI_{CC2}	Pin 4		0.7		2.3	mA
	AI_{CC3}	Pin 7		1.1		3.5	mA
	PI_{CC}	Pin 13		4.5		15	mA
Input "Low" voltage	V_{IL}	FCDS FS				0.7	V
Input "High" voltage	V_{IH}			2.0			V
Input "Low" current	I_{IL}		$V_{IN}=0V$	−1.2		−0.4	μA
Input "High" current	I_{IH}		$V_{IN}=5V$	−10		10	μA
Input current	I_I	Pin 14		−25		25	μA
Open input voltage	V_{IN}	Pin 6		2.2		2.8	V
	V_{cbias}	Pin 2		2.75		3.40	V
	V_{abias}	Pin 1		2.5		3.1	V
Open output voltage	V_{OUT}	$V_{11}=V_{12}=V_{CC}$		1.65		2.55	V
Amplifier gain	G	$V_{14}=0\sim1V$		−1.5		1.5	dB
		$V_{14}=1.7V_{CC}/5$		1.5		4.5	
		$V_{14}=2.5\sim5V$		4.5		7.5	

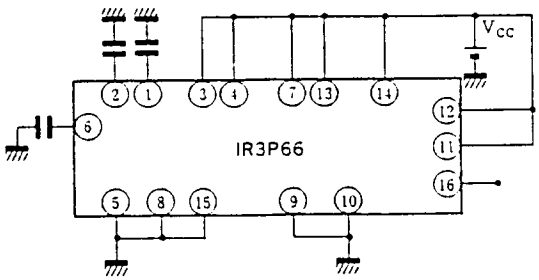
9. Test circuit

(1) AI_{CC}, PI_{CC}

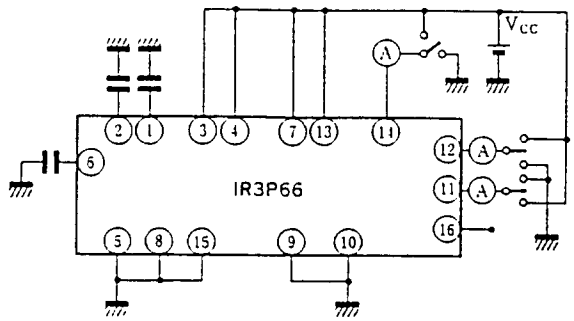


- $AI_{CC1}\sim AI_{CC3}$ must be measured under conditions that $V_{CC}=5V$, and pins 11 and $12=5V$.
- PI_{CC} must be measured under conditions that $V_{CC}=5V$, and pins 11 and $12=0V$.

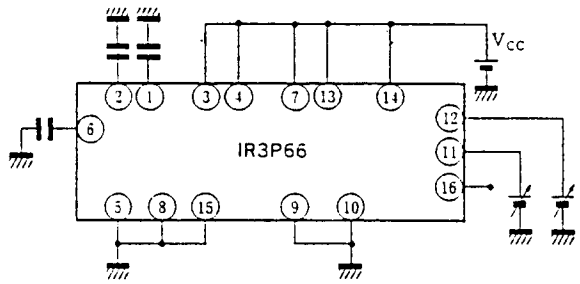
(2) Open input terminal voltage, Open output terminal voltage



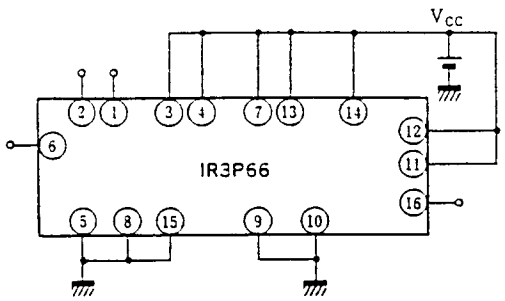
(3) I_{IL}, I_{IH}, I_{14}



(4) V_{IL}, V_{IH}

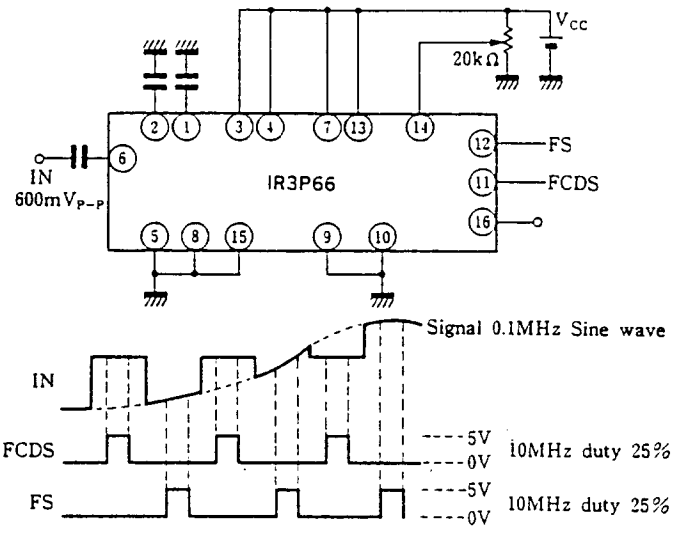


(5) Input terminal impedance, output terminal impedance

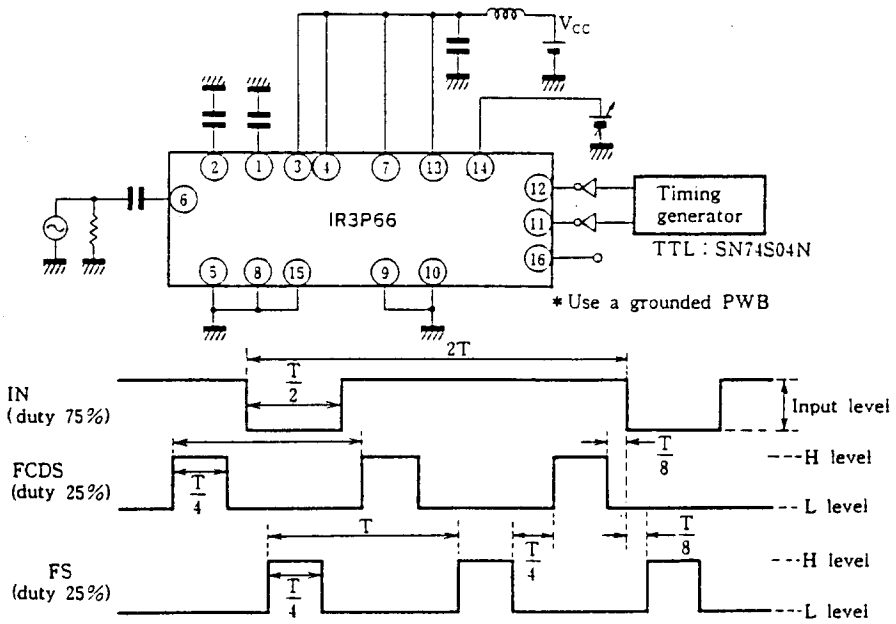


On a vector impedance meter f=1MHz

(6) Gain

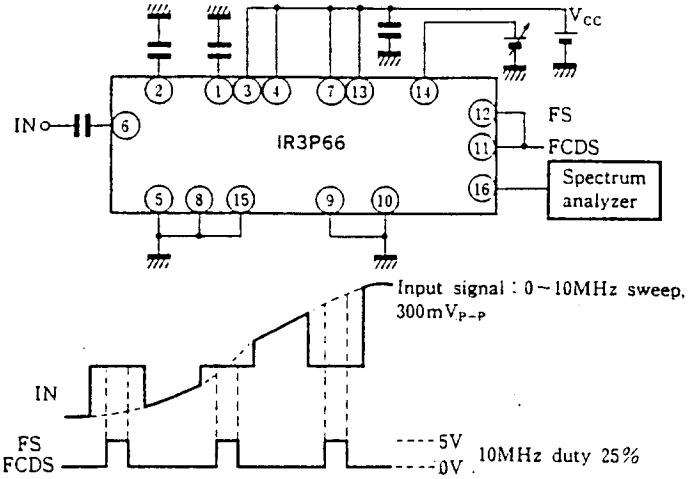


(7) S/H slew rate

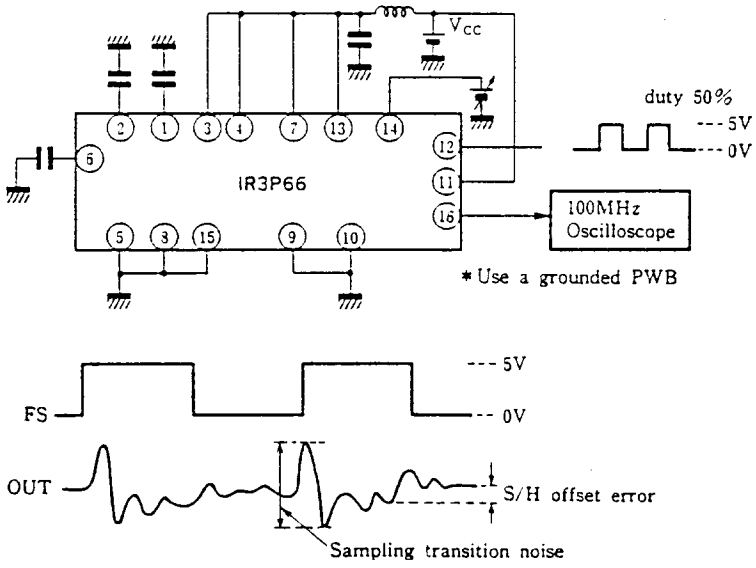


$T = \frac{1}{f}$ f : Sampling rate f = 10MHz

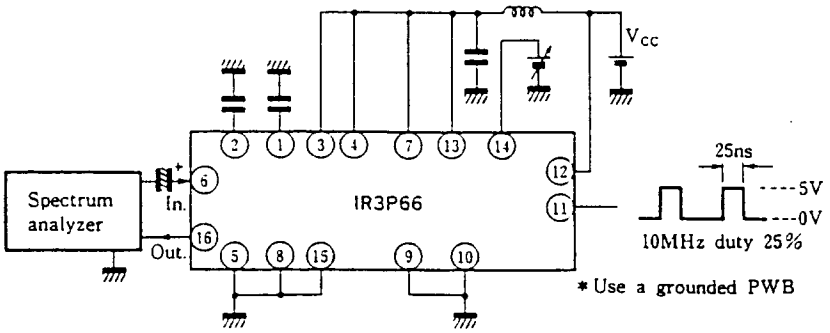
(8) Hold mode feedthrough



(9) Sample and hold offset error, sampling transition noise

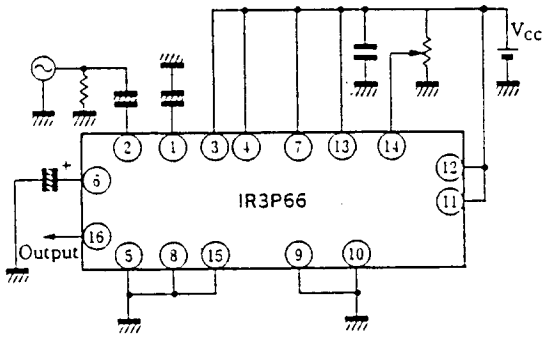


(10) Clamp frequency characteristics

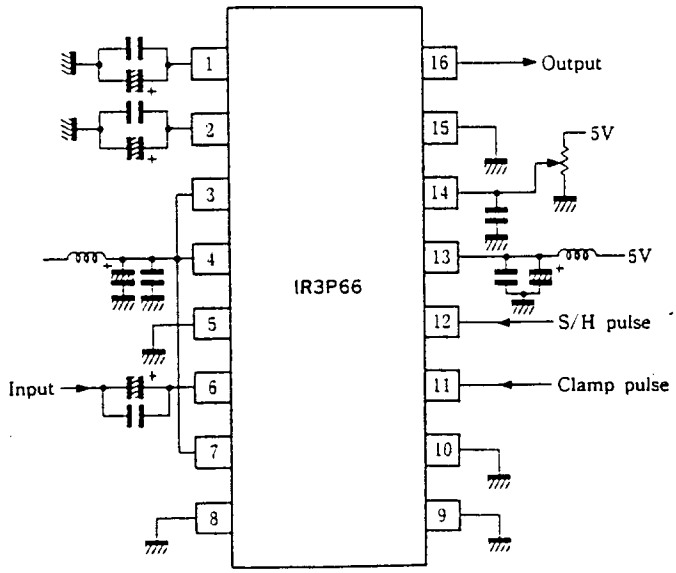


Input : 0~10MHz Sweep signal
$0.3V_{P-P}$

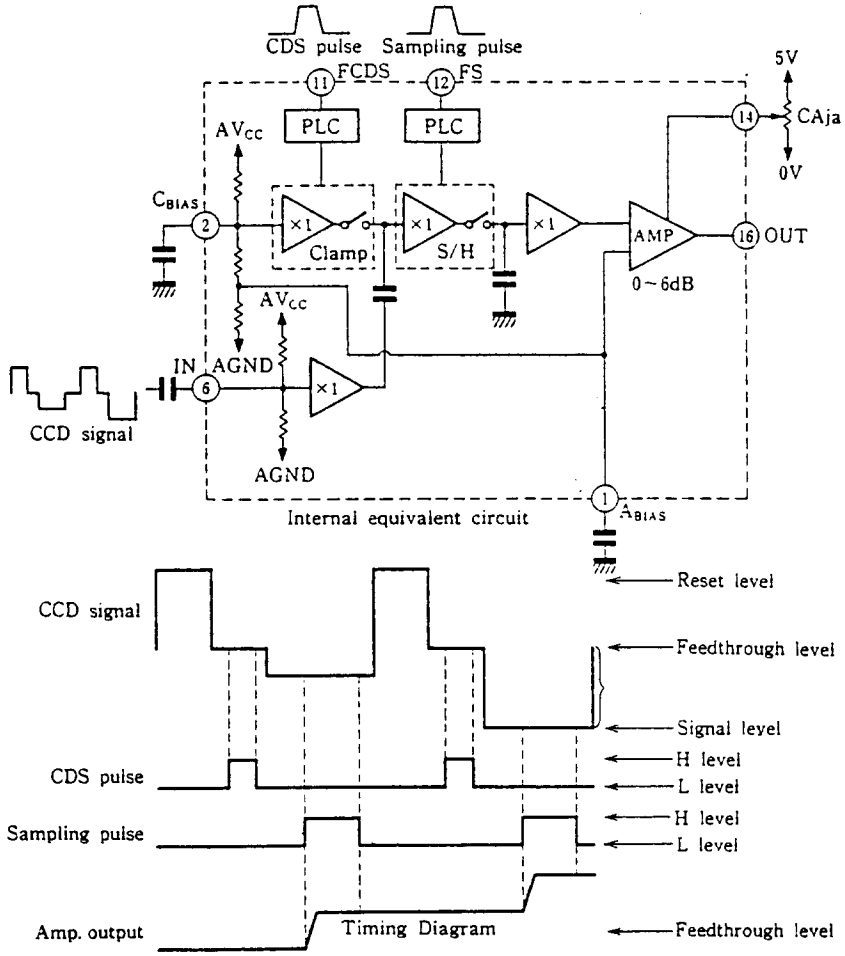
(11) Frequency characteristics



10. Basic Connection Diagram



11. Description of Operation



The IR3P66 inputs a CCD area sensor output by a capacitor conjunction, and clamps its feedthrough level at pin 2 (C_{BIAS} electrode). Then it samples and holds the difference between the signal level and the feedthrough level, which is amplified through a reverse amplifier to output.

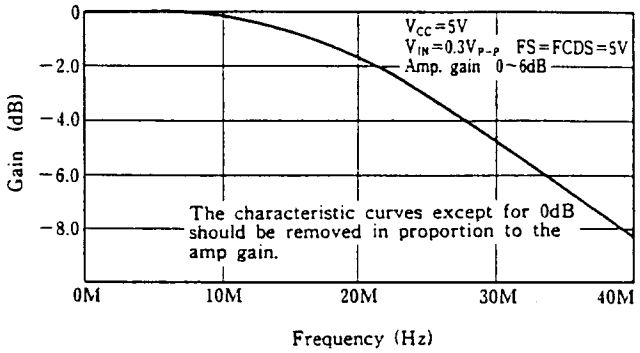
Switches of a clamp and a S/H circuit should be closed by turning a pulse input to "H" and opened to "L".

To apply voltages to pin 14 (G_{ADJ}) sets the amplifier gain within the range from 0 to 6dB.

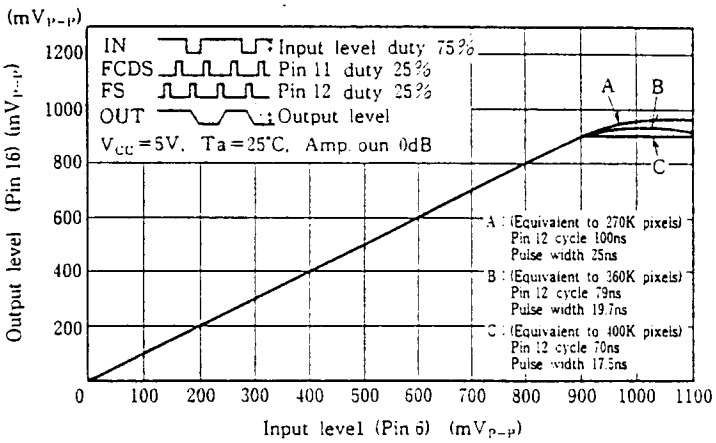
(Higher the voltage on pin 14, higher the gain.)

12. Electrical Characteristic Curves

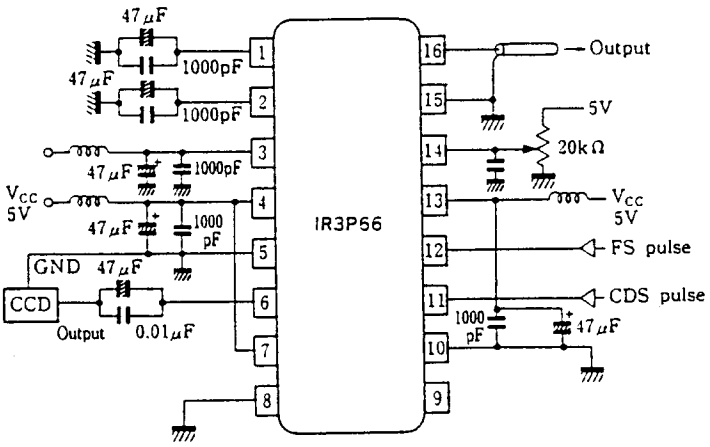
Frequency Characteristics



S/H, I/O Characteristics



13. Peripheral circuit Example



- For the addition and removal of any external part, consider them in the mounted condition.
- The ground plane type with grounded on one side is recommended for the circuit board.
- $AGND_1$ (pin 5), $AGND_2$ (pin 8) and $AGND_3$ (pin 15) should be connected using the minimum distance and kept at low impedance.
- The bypass capacitor between the power source and GND should be connected using the minimum distance. The use of a chip capacitor is recommended.
- For the peaking coil of the power source, use the one with the self-oscillation frequency of about 100MHz.
- Use pin 5 for GND of the CCD area sensor, pin 10 for GND of FS and FCDS pulses, and pin 15 for GND of outputs.
- It is preferable that the NC pin is connected to GND.
- If there is any external influence, provide a shield plate on the top and bottom of the IC to prevent noise.

14 Package and packing specification

1. Package Outline Specification

Refer to drawing No.AA863

2. Markings

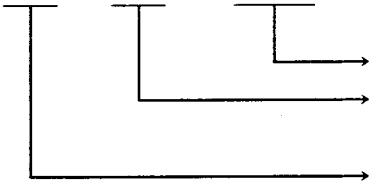
2－1. Marking contents

(1) Product name : IR3P66

(2) Company name : S

(3) Date code

(Example) YY WW ×××



Indicates the product was manufactured in the WWth week of 19YY.

Denotes the production ref.code (1~3)

Denotes the production week. (01,02,03, ・・・・・52,53)

Denotes the production year. (Lower two digit of the year.)

2－2. Marking layout

Refer to drawing No.AA863

(This layout do not define the dimensions of marking character and marking position.)

3. Packing Specification (Dry packing for surface mount packages)

Dry packing is used for the purpose of maintaining IC quality after mounting packages on the PCB (Printed Circuit Board).

When the epoxy resin which is used for plastic packages is stored at high humidity, it may absorb 0.15% or more of its weight in moisture. If the surface mount type package for a relatively large chip absorbs a large amount of moisture between the epoxy resin and insert material (e.g. chip, lead frame) this moisture may suddenly vaporize into steam when the entire package is heated during the soldering process (e.g. VPS). This causes expansion and results in separation between the resin and insert material, and sometimes cracking of the package. This dry packing is designed to prevent the above problem from occurring in surface mount packages.

3－1. Packing Materials

Material Name	Material Specificaiton	Purpose
Magazine	Anti-static treated plastic (50devices/magazine)	Packing of device
Stopper	Plastic or rubber	Fixing of device
Cap	Plastic (2caps/bag)	Fixing of Magazine
Laminated aluminum bag	Aluminum polyethylene (1bag/case)	Drying of device
Desiccant	Silica gel	Drying of device
Inner case	Card board (3000device/case)	packaging of device
Label	Paper	Indicates part number, quantity and date of manufacture
Outer case	Card board	Outer packing of Magazine

(Devices shall be inserted into a magazine (sleeve) in the same direction.)

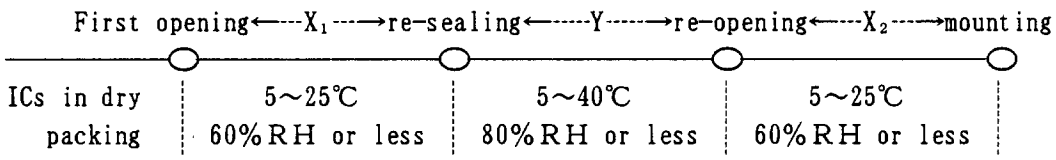
3－2. Outline dimension of tray
Refer to attached drawing.

4. Storage and Opening of Dry Packing

4－1. Store under conditions shown below before opening the dry packing
(1) Temperature range : 5～40℃
(2) Humidity : 80% RH or less

4－2. Notes on opening the dry packing
(1) Before opening the dry packing, prepare a working table which is grounded against ESD and use a grounding strap.
(2) The magazine has been treated to be conductive or anti-static. If the device is transferred to another magazine, use a equivalent magazine.
(3) A stopper is included with the magazine. Before storage, make sure the stopper is inserted.

4－3. Storage after opening the dry packing
Perform the following to prevent absorption of moisture after opening.
(1) After opening the dry packing, store the ICs in an environment with a temperature of 5～25℃ and a relative humidity of 60% or less and mount ICs within 4 days after opening dry packing.
(2) To re-store the ICs for an extended period of time within 4 days after opening the dry packing, use a dry box or re-seal the ICs in the dry packing with desiccant (whoes indicater is blue), and store in an environment with a temperature of 5～40℃ and a relative humidity of 80% or less, and mount ICs within 2 weeks.
(3) Total period of storage after first opening and re-opening is within 4 days, and store the ICs in the same environment as section 4-3.(1).



$X_1 + X_2$: within 4 days
Y : within 2 weeks

4－4. Baking (drying) before mounting
(1) Baking is necessary
(A) If the humidity indicator in the desiccant becomes pink
(B) If the procedure in section 4－3 could not be performed
(2) Recommended baking conditions
If the above conditions (A) and (B) are applicable, bake it before mounting. The recommended conditions are 16～24 hours at 120℃ or 5～10 hours at 150℃. Note that the standard magazine can not be baked. Use the heat resistant magazine.
(3) Storage after baking
After baking ICs, store the ICs in the same environment as section 4-3.(1).

5. Surface Mount Conditions

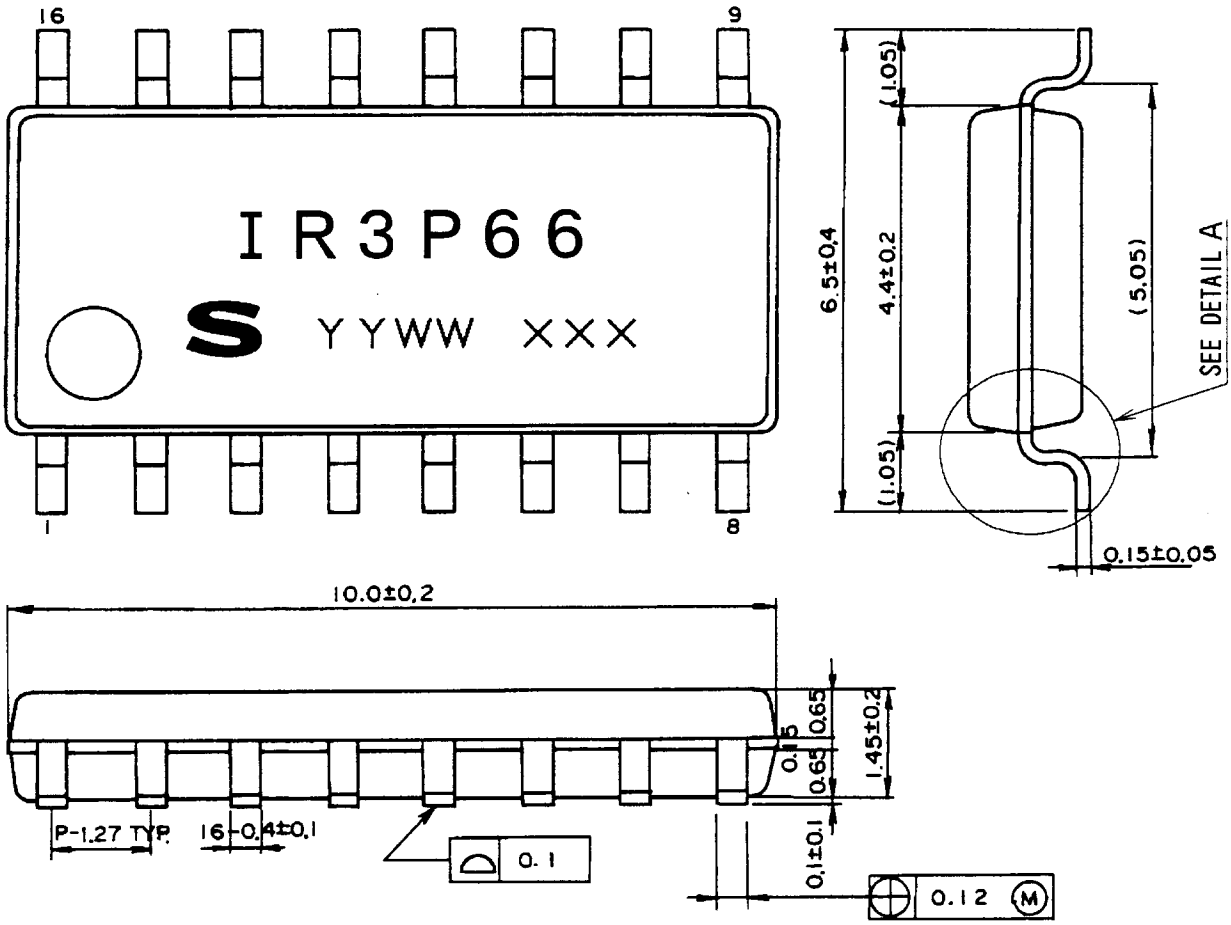
Please perform the following conditions when mounting ICs not to deteriorate IC quality.

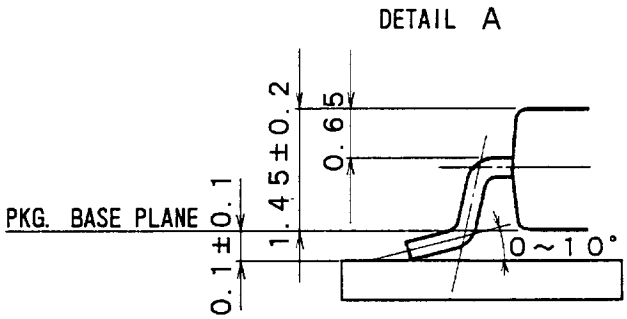
5－1.Soldering conditions(The following conditions are valid only for one time soldering.)

Mounting Method	Temperature and Duration	Measurement Point
Reflow soldering (air)	Peak temperature of 240℃, duration less than 15 seconds above 230℃, temperature increase rate of 1～4℃/second	IC surface
Solder dipping	245℃ or less, duration less than 3 seconds/dip, total of 5 seconds	Solder bath
Vapor phase solderring	215℃ or less, duration less than 40 seconds above 200℃	Steam
Manual soldering (soldering iron)	260℃ or less, duration less than 10 seconds	IC outer lead surface

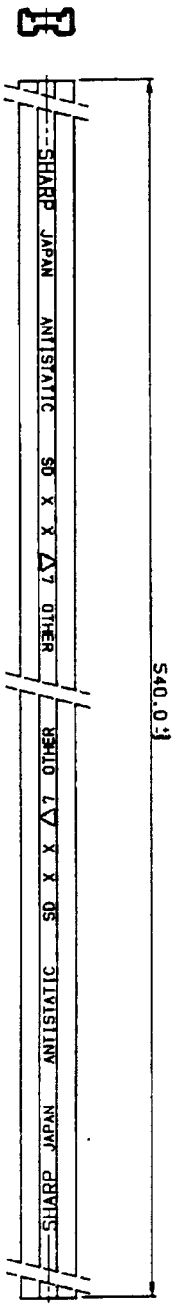
5－2. Conditions for removal of residual flux

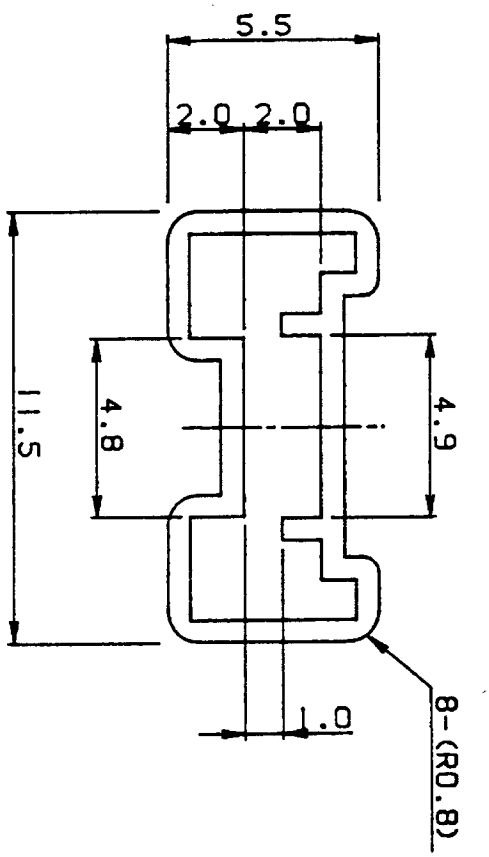
(1) Ultrasonic washing power : 25 Watts/liter or less
(2) Washing time : Total 1 minute maximum
(3) Solvent temperature : 15～40℃





名称 NAME	SOP16-P-225	リード仕上 LEAD FINISH	TIN-LEAD PLATING	備考 NOTE プラスチックパッケージ外形寸法は、バリを含まないものとする。 Plastic body dimensions do not include burr of resin.
DRAWING NO.	AA863	単位 UNIT	mm	





注記 ：マガジン(スリーブ)両側のストッパーは、ゴムストッパーとする。
指示無き寸法公差は全て±０．４mmとする。

NOTES : Stopper which is set at the both ends of magazine (sleeve) is made of rubber.
All tolerances are ±0.4mm unless otherwise specified.

名称 NAME	SOP8SPN−A2		備考 NOTE
DRAWING NO.	CV657	単位 UNIT mm	