

LG Semicon. Co., LTD.

Description

The GCD4402 is designed to perform the basic signal processing in CCD monochrome camera through a single chip. This bipolar IC is most suitable for compact usage and low power consumption.

Feature

- Processing from CCD output to 75Ω video output with a single chip
- Wide variable AGC (1 to 32 dB Typ.)
- Built-in operational amplifier for AGC loop
- 75Ω line capacitance minimized using sag compensation function
- Variable white clip level realize wide dynamic range (140 IRE)
- 32pin TQFP

Application

CCD monochrome camera

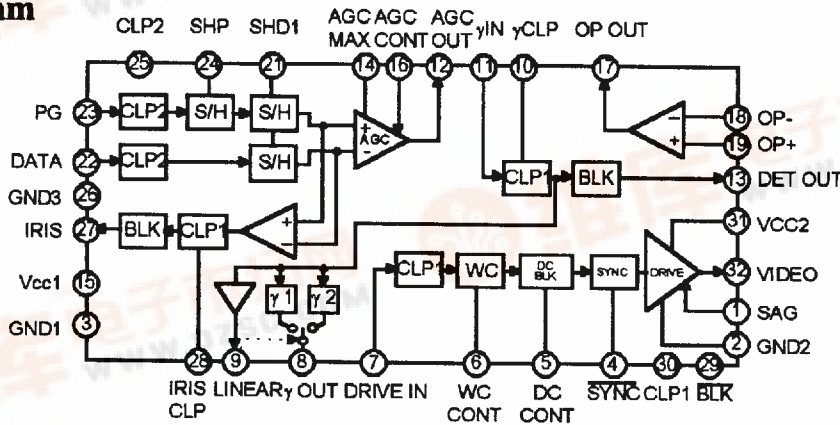
Absolute Maximum Ratings (Ta = 25 °C)

Symbol	Parameter	Rating	Unit
Vcc	Supply Voltage	7	V
TSTG	Storage Temperature	-65 ~ +150	°C
TOPR	Operating Temperature	-20 ~ +75	°C
Pd	Allowable Power Dissipation	500	mW

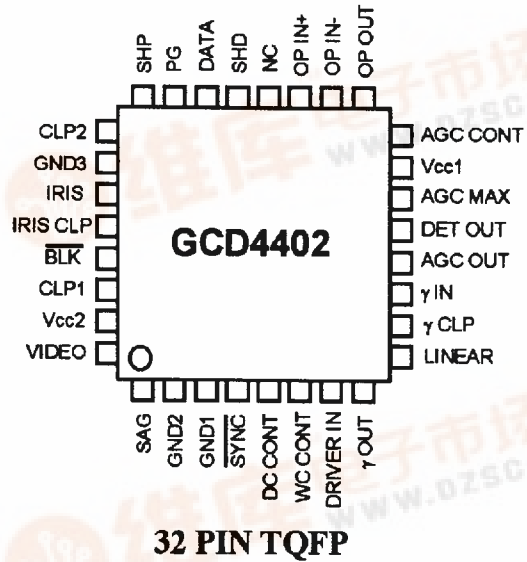
Operating Conditions

Symbol	Parameter	Rating	Unit
Vcc	Supply Voltage	4.75 ~ 5.25	V

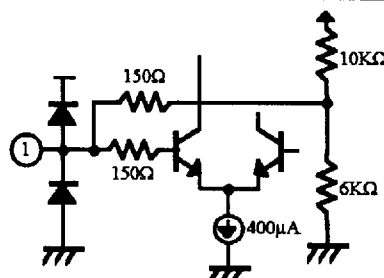
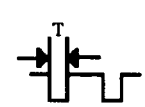
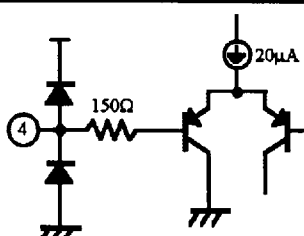
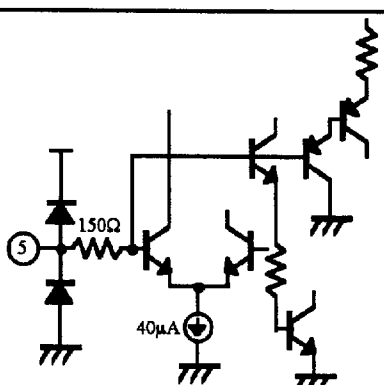
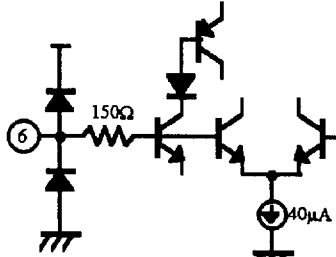
Block Diagram



Pin Configuration

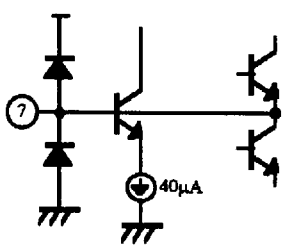

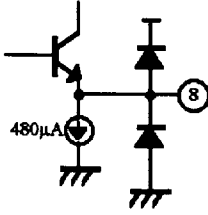

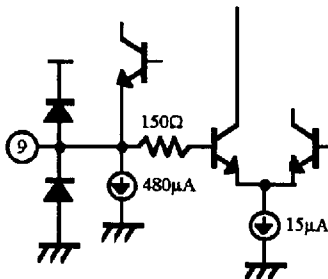
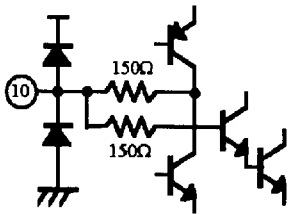


Pin Description

NO.	Symbol	I/O signal	Equivalent circuit	Description
1	SAG	Inputs VIDEO OUT through capacitor		Input pin of sag compensation signal
2	GND2	* GND		GND for driver and IRIS
3	GND1	* GND		GND for other than driver and sample hold and IRIS
4	SYNC	 HI : 4.5V and above LO : 0.5V and below T : 5 μs		Sync pulse input pin (active at LO)
5	DC CONT	* GND * 2 to 3.5V * Vcc		Dark clip level adjusting pin Turns to preset mode 1 Control mode Turns to preset mode 2
6	WC CONT	* GND * 2 to 3.5V		White clip level adjusting pin Preset mode Control mode


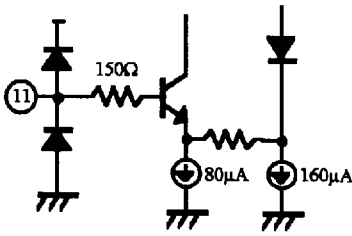

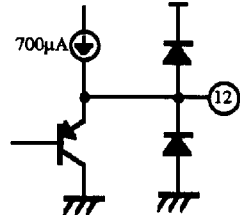

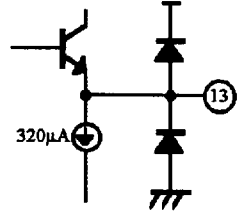
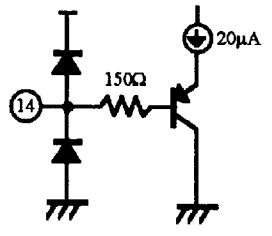
*External applied voltage



NO.	Symbol	I/O signal	Equivalent circuit	Description
7	DRIVE IN	Inputs γ OUT through capacitor or LINEAR		Input pin to driver
8	γ OUT	 DC 2V		Gamma compensation signal output pin. Outputs $\gamma 1$ when Pin 9 at OPEN outputs $\gamma 2$ when Pin 9 turned to 5V
9	LINEAR	 DC 1.8V * Vcc		Linear signal (γ - OFF signal) output pin Pin 8 output signal turns to $\gamma 2$ output
10	γ CLP			Capacitor connecting pin for gamma input clamp

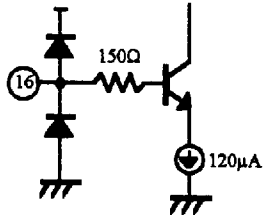
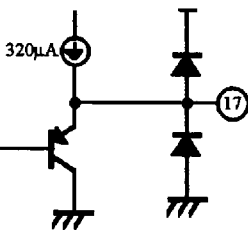
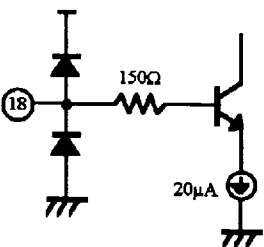
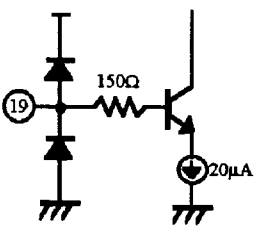
*External applied voltage



NO.	Symbol	I/O signal	Equivalent circuit	Description
11	γ IN	 Input DC permissible range *DC2 to 3V		Input pin of the gamma compensation circuit
12	AGC OUT	 V _{pp} MAX 1300mV V _{pp} TYP 500mV DC 2.55V		Output pin of signal passed through AGC
13	DET OUT	 MAX 1500mV TYP 500mV DC 2V		Output pin of AGC detection signal
14	AGC MAX	* DC		Maximum gain setting pin of AGC amplifier
15	V _{cc1}	*5V		Power supply for other than driver and IRIS

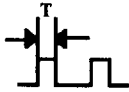
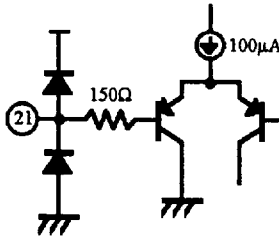

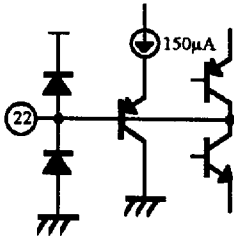

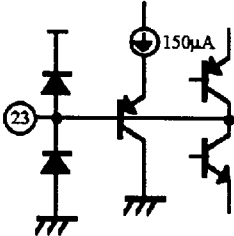
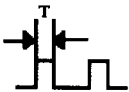
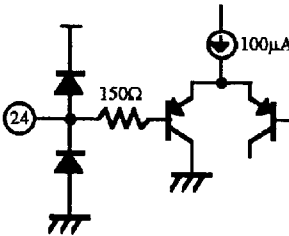
*External applied voltage



NO.	Symbol	I/O signal	Equivalent circuit	Description
16	AGC CONT	* DC		Gain control pin of AGC amplifier
17	OP OUT			Output pin of the operational amplifier
18	OP IN-			Inverted input pin of the operational amplifier
19	OP IN+			Non inverted input pin of the operational amplifier (AGC detection signal input pin)

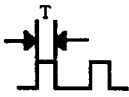
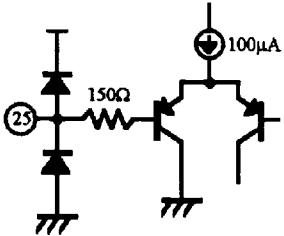

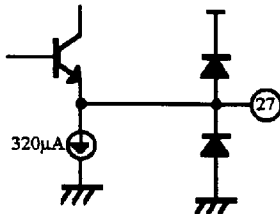
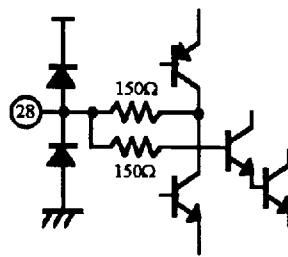
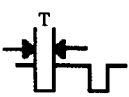
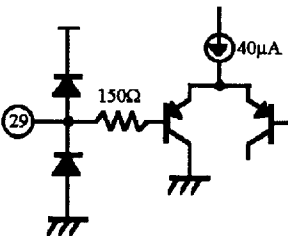
*External applied voltage



NO.	Symbol	I/O signal	Equivalent circuit	Description
20	NC			
21	SHD	 <p>* HI : 4.5V and above LO : 0.5V and below T : 15ns and above</p>		Input pin of the sample hold pulse (active at HI)
22	DATA	 <p>① MAX 800mV ② MAX 800mV</p>		CCD signal input pin
23	PG	 <p>① MAX 800mV ② MAX 800mV</p>		CCD signal input pin
24	SHP	 <p>* HI : 4.5V and above LO : 0.5V and below T : 15ns</p>		Input pin of the sample hold pulse (active at HI)

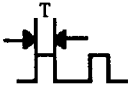
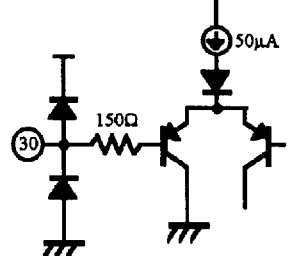

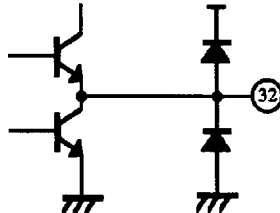
*External applied voltage



NO.	Symbol	I/O signal	Equivalent circuit	Description
25	CLP2	 <p>* HI : 4.5V and above LO : 0.5V and below T : 2 μs</p>		CLP2 pulse input pin (active at HI)
26	GND3	*GND		Sample hold GND
27	IRIS	 <p>DC 1.3V</p>		Output pin of the IRIS control signal
28	IRIS CLP			Capacitor connecting pin for IRIS output clamp
29	BLK	 <p>* HI : 4.5V and above LO : 0.5V and below T : 11 μs</p>		BLK pulse input pin (active at LO)

*External applied voltage



NO.	Symbol	I/O signal	Equivalent circuit	Description
30	CLP1	 <p>* HI : 4.5V and above LO : 0.5V and below T : 2 μs</p>		CLP1 pulse input pin (active at HI)
31	Vcc2	* 5V		Driver and IRIS power supply
32	VIDEO	 <p>BLK level 1.5V</p>		VIDEO signal output pin

*External applied voltage



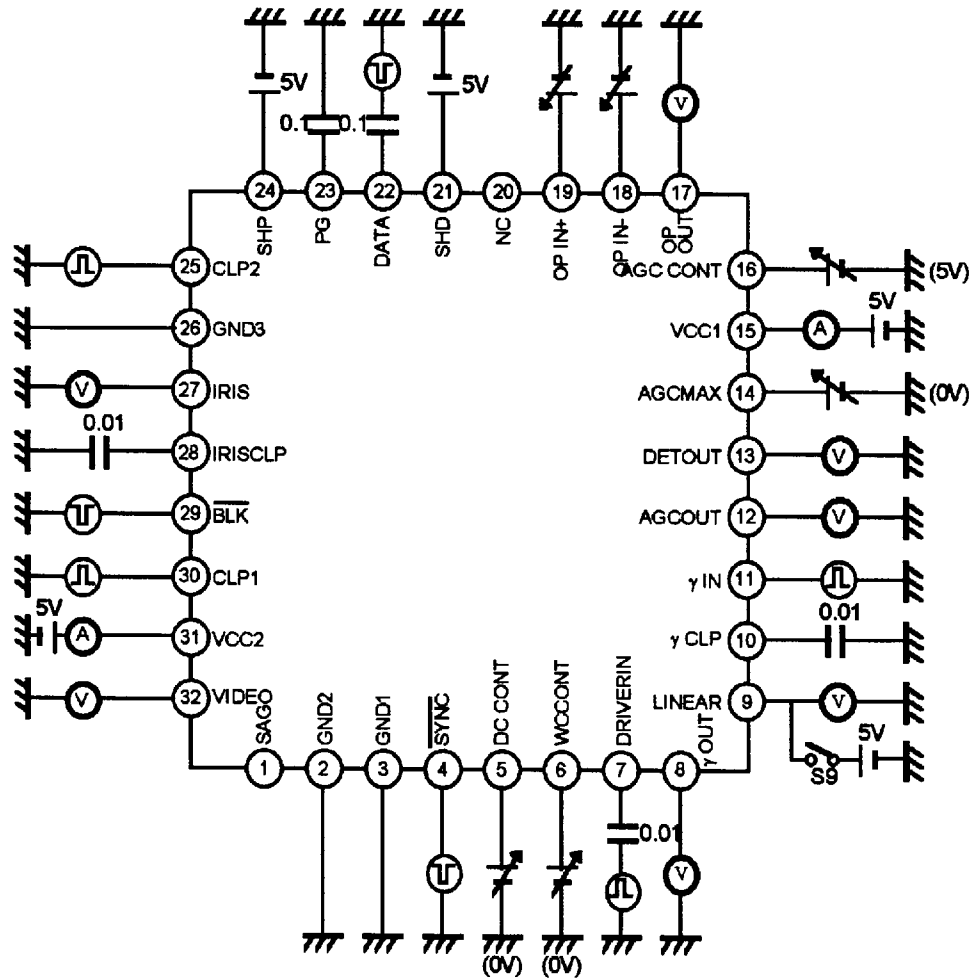
Electrical Characteristics (Ta=25°C, Vcc=5V, See Electrical Characteristics Test Circuit)

No.	Symbol	Item	Conditions	Min	Typ	Max	Unit
1	Icc	Current consumption	Current value of Vcc1 and Vcc2 AGC CONT = 1.5V	45	50	65	mA
2	MAX	Min. value of AGC MAX	GAIN between DATA input and AGC OUT DATA input = 100mV AGC MAX = 4V, AGC CONT = 1.5V	-	18	20	dB
3	AG1	Min. value of AGC CONT	GAIN between DATA input and AGC OUT DATA input = 500mV, AGC CONT = 5V	-	1	4	dB
4	AG2	Max. value of AGC CONT	GAIN between DATA input and AGC OUT DATA input = 30mV, AGC CONT = 1.5V	30	32	-	dB
5	AG3	AGC CONT 10dB	GAIN between DATA input and AGC OUT DATA input = 320mV, AGC CONT = 3.55V	8	10	12	dB
6	ADC	AGC OUT DC	DC output level of AGC OUT	2.25	2.55	2.85	V
7	γ 1	γ 1 output level	Test value of γ 1 output level γ IN input = 500mV	530	630	730	mV
8	γ 2	γ 2 output level	Test value of γ 2 output level γ IN input = 500mV, S9 ON	580	680	780	mV
9	LG	LINEAR AMP GAIN	GAIN between γ IN input level and LINEAR γ IN input = 500mV	1.5	2.6	3.5	dB
10	DDC	DET OUT DC	DC output level of DET OUT	1.8	2.0	2.2	V
11	IG	IRIS AMP GAIN	GAIN between DATA input and IRIS DATA input = 300mV	8	10	12	dB
12	IDC	IRIS OUT DC	DC output level of IRIS	1.1	1.3	1.5	V
13	DG	DRIVER GAIN	GAIN between DRIVER IN and VIDEO DRIVER IN = 700mV	5.7	6.0	6.3	dB
14	SY	SYNC level	SYNC level / DG* of VIDEO output	270	293	316	mV
15	DC1	Dark clip 1	Dark clip level of preset mode 1 Dark clip level / DG* of VIDEO output	-15	0	15	mV
16	DC2	Dark clip 2	Dark clip level of preset mode 2 Dark clip level / DG* of VIDEO output	0	20	40	mV
17	DC3	Min. value of DC CONT	Dark clip level / DG* of VIDEO output DC CONT = 2V	-	-3	15	mV
18	DC4	Max. value of DC CONT	Dark clip level / DG* of VIDEO output DC CONT = 3.3V	80	130	-	mV
19	WC1	W-CLIP level	W-CLIP level / DG* of VIDEO output DRIVER IN = 1500mV, WC CONT = GND	780	820	860	mV
20	WC2	Min. value of WC CONT	W-CLIP level / DG* of VIDEO output DRIVER IN = 1500mV, WC CONT = 2.2V	-	300	600	mV
21	WC3	Max. value of WC CONT	W-CLIP level / DG* of VIDEO output DRIVER IN = 1500mV, WC CONT = 3.3V	1000	1300	-	mV
22	OPL	OP AMP output D range Low level	DC output level of OP OUT OP IN+ = 2.5V, OP IN- = 4V	-	0.8	1.2	V
23	OPH	OP AMP output D range High level	DC output level of OP OUT OP IN+ = 4V, OP IN- = 2.5V	4.5	4.8	-	V

*Characteristics value at DRIVER GAIN item



Electrical Characteristics Test Circuit



Note)

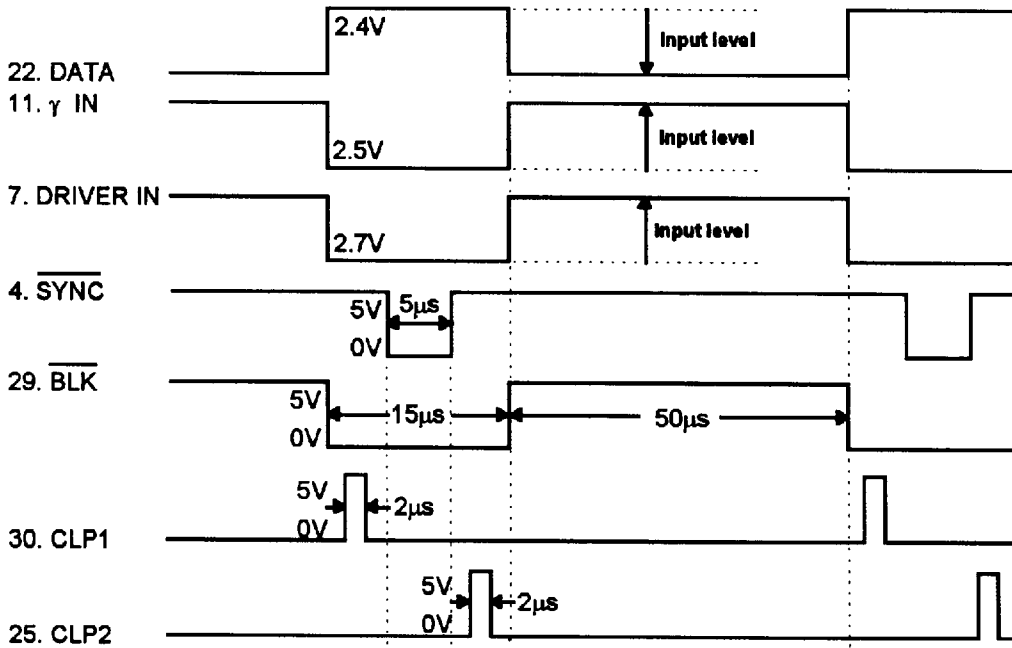
- μF is the capacitance unit of capacitor
- For Pins 5,6,14 and 16 apply voltage in brackets unless otherwise specified in the conditions column of the Electrical Characteristics.
- $\text{\textcircled{V}}$ indicate a test pin. (Test AC, DC voltage)
- For Pins 7,11 and 22, the input signal level is at 0mV, unless otherwise specified in the conditions column of the Electrical Characteristics.



Test Circuit I/O Waveform Diagram

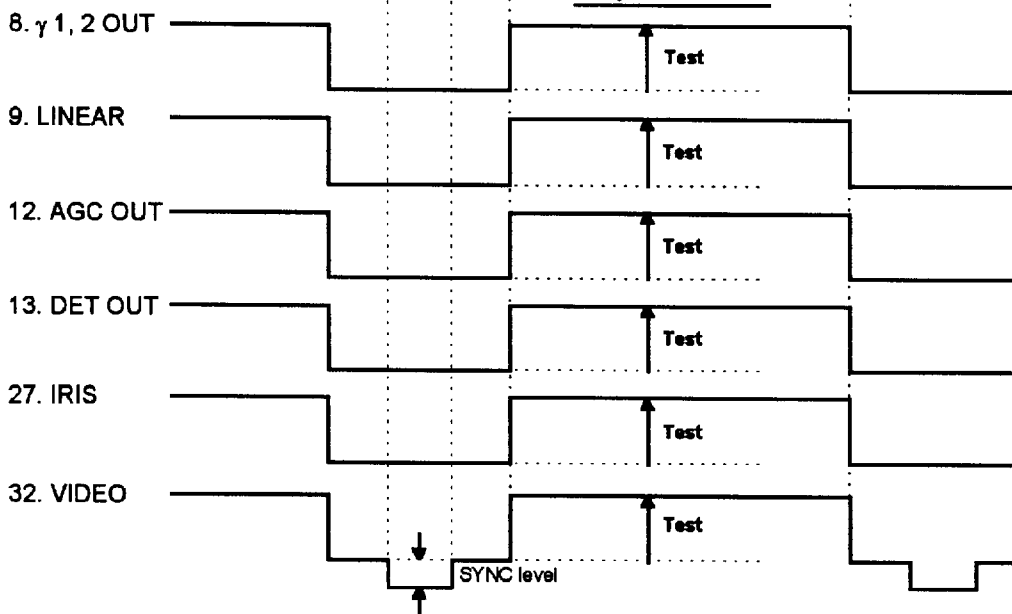
Input pin

Input waveform

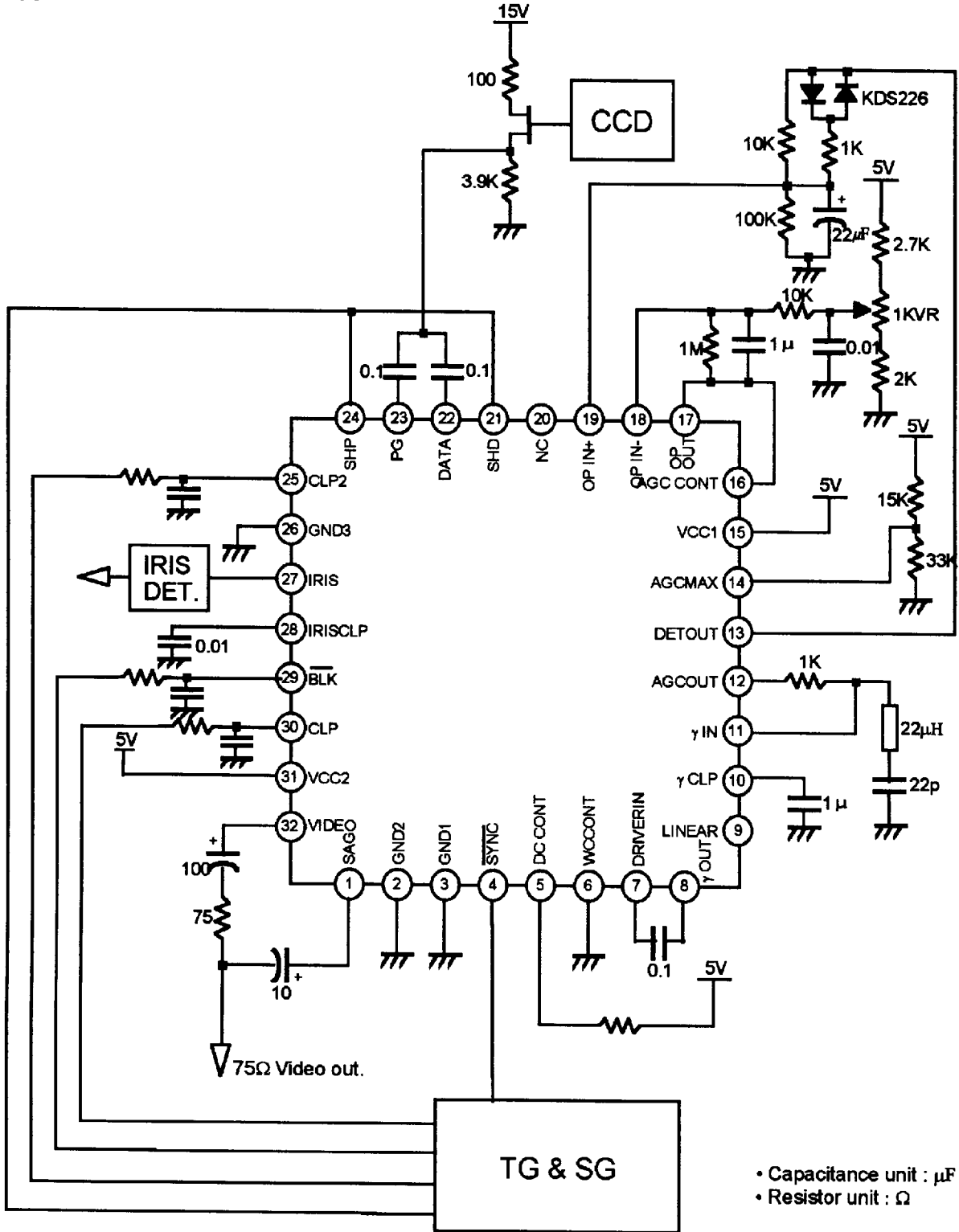


Output pin

Output waveform



Application Circuit



Characteristic Curve ($V_{cc}=5V, T_a=25^\circ C$)

Fig.1 - AGC control characteristics

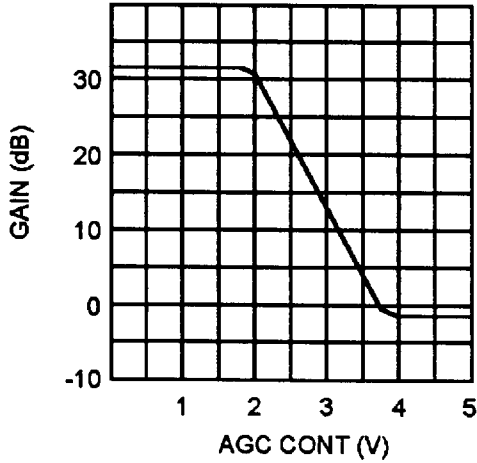


Fig.2 - AGC MAX control characteristics

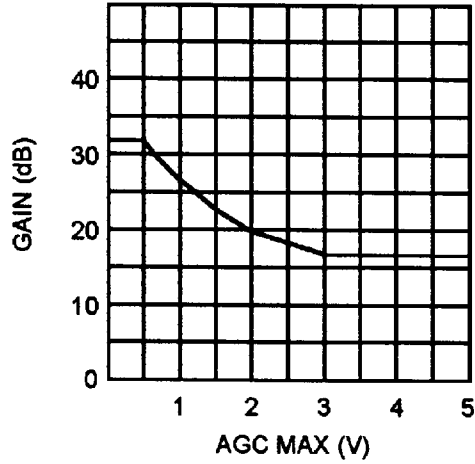


Fig.3A - $\gamma 1$ I/O characteristics

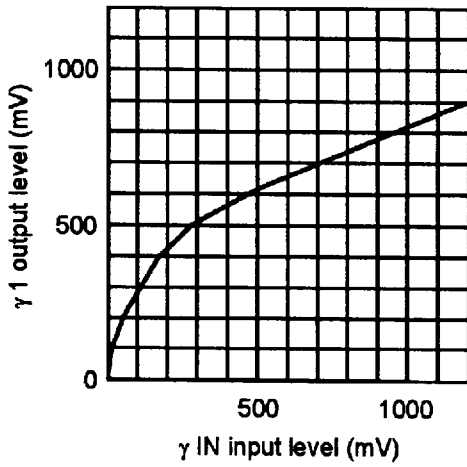


Fig.3B - $\gamma 2$ I/O characteristics

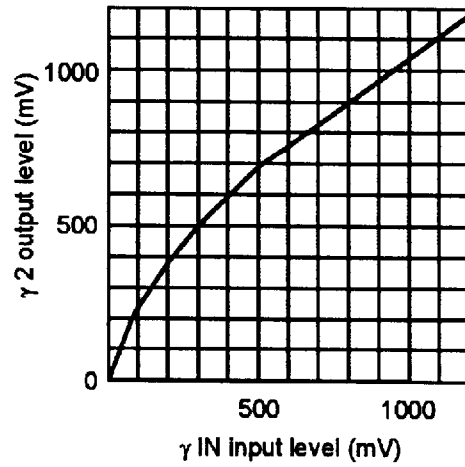


Fig.4 - White Clip control characteristics

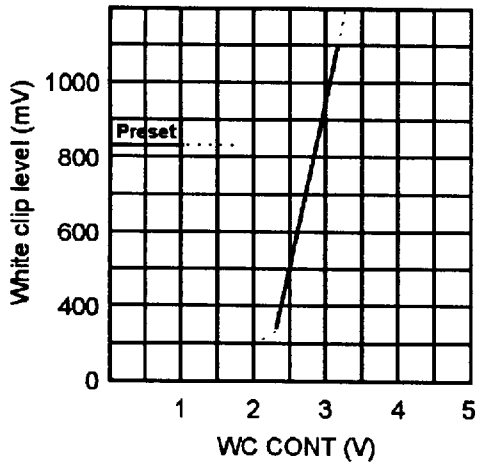
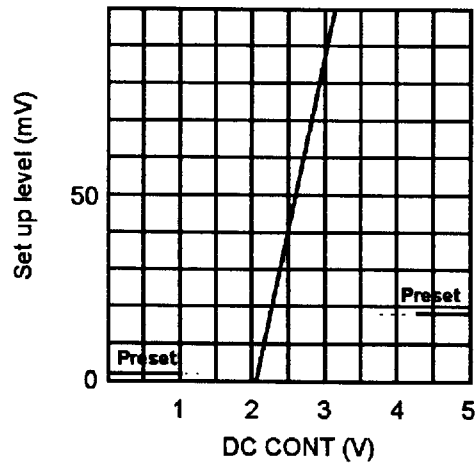
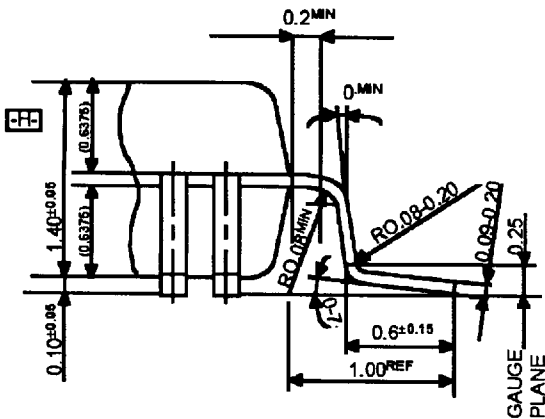
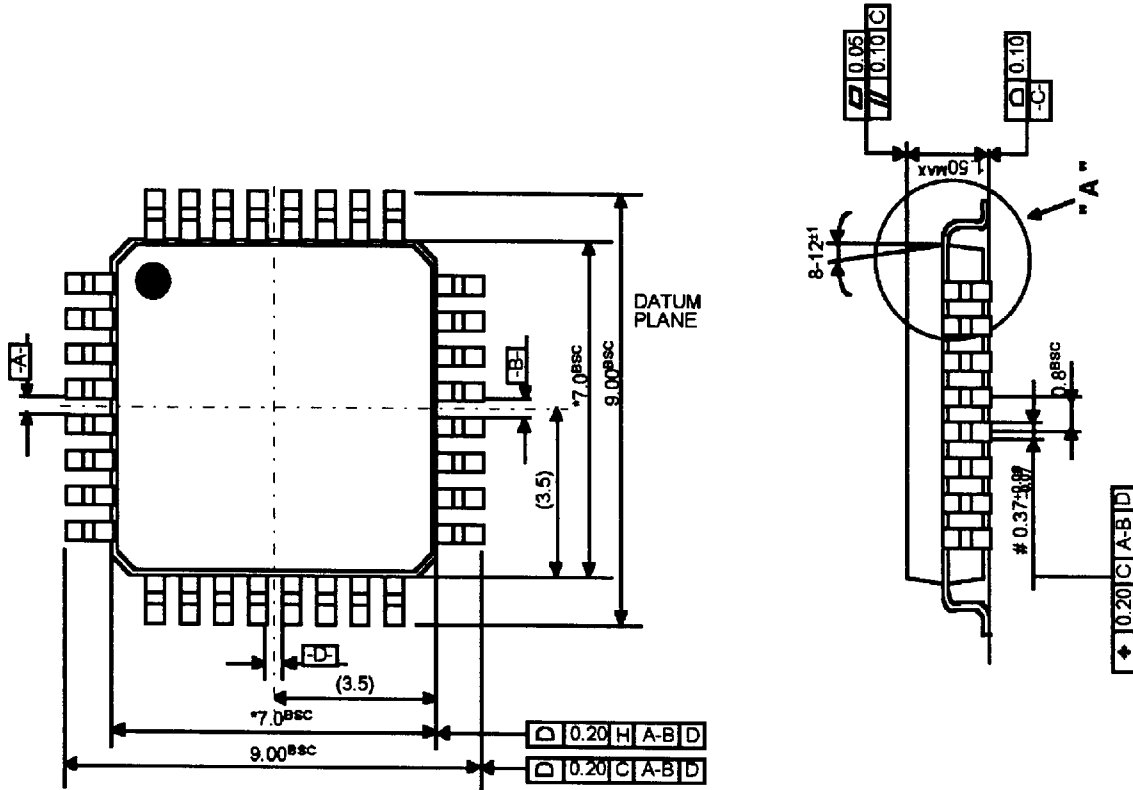


Fig.5 - Dark clip control characteristics



Package Outline

UNIT = mm



DETAIL " A "

Note)

1. DIMENSION * MARK DOES NOT INCLUDE MOLD FLASH
2. DIMENSION # DOES NOT INCLUDE DAMBAR PROTRUSION
3. UNSPECIFIED IS ACCORDING TO JEDEC MO-136, VARIATION "BE"

