# ON SCREEN DISPLAY MIX IC

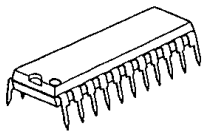
## ■ GENERAL DESCRIPTION

NJM2252 is the IC that has been developed for VCR application, which has the super-impose function as well as the function to drive the S-VHS, S-output pin by putting the extemal transistor.

NJM2252 has Y signal pin and C singal pin of each independent circuit in it. Y signal line is selectable of 4 inputs, and C signal line is selectable of 3 inpots, each by the inside switches.

Further more, it has function to adjust the output level of S-VHS, Spin.

## ■ PACKAGE OUTLINE



NJM2252L

## ■ FEATURES

- 9V spec, (Recommended operational voltage range 8.6~9.4V)
- Voltage gain can be controlled by the external resistor (Typ. ±3dB)
- Wide band (Y signal line 10MHz, C signal line 8MHz)
- Output sag. correction circuit incorporated (Y signal line)
- Video switch incorporated (Y signal line 4 input, C signal line 3 input)
- Clamp circuit (Y signal line) Bias circuit (C signal line) incorporated
- Package Outline SDIP22
- Bipolar Technology

## ■ APPLICATION

- ,VCR (Correspond to S-VHS)
- Laser Disc

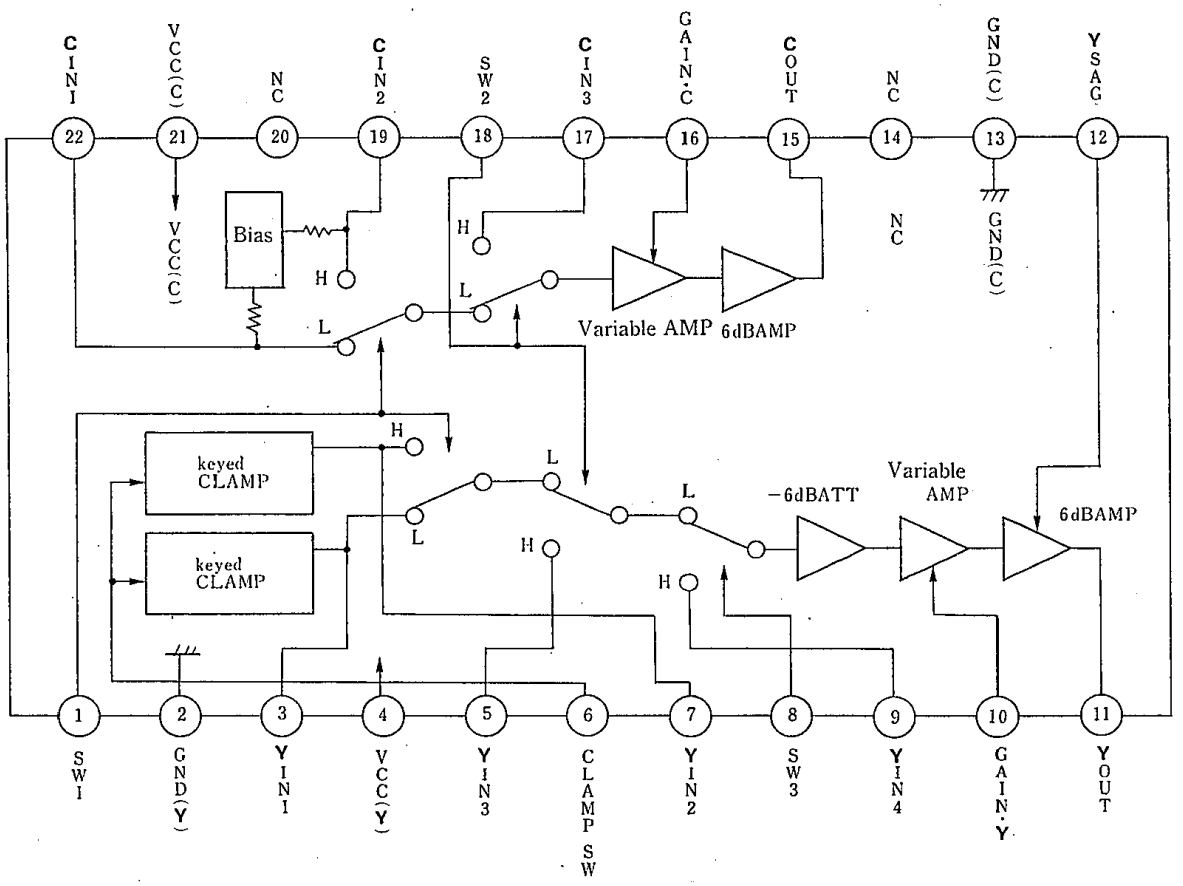
## ■ PIN FUNCTION

| PIN NO. | FUNCTION | PIN NO. | FUNCTION |
|---|---|---|---|
| 1 | SW1 | 12 | Y Line Sag Correction Pin |
| 2 | GND (Y Line) | 13 | GND (C Line) |
| 3 | Y Line Input Pin | 14 | NC |
| 4 | $V^+$ (L Line) | 15 | C Line Output Pin |
| 5 | Y Line Input Pin 3 | 16 | c Line Gain Control |
| 6 | Clamp SW | 17 | c Line Input Pin 3 |
| 7 | Y Line Input Pin | 18 | SW 2 |
| 8 | SW 3 | 19 | C Line Input Pin |
| 9 | Y Line Input Pin 4 | 20 | NC |
| 10 | Y Line Gain Control | 21 | $V^+$ (C Line) |
| 11 | Y Line Output Pin | 22 | C Line Input Pin 1 |

## ■ RECOMMENDED OPERATING CONDITION

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| Supply Voltage Range | $V^+$ | | 8.6 | 9.0 | 9.4 | V |
| Y Signal Input Amlitude Range | | $Y_{IN}$ | — | — | 3.0 | $V_{P-P}$ |
| Y Signal Output Amplitude Range | | $Y_{OUT}$ | — | — | 3.0 | $V_{P-P}$ |
| C Signal Input Amplitude Range | | $C_{IN}$ | — | — | 2.0 | $V_{P-P}$ |
| C Signal Output Amplitude Range | | $C_{OUT}$ | — | — | 2.5 | $V_{P-P}$ |
| Gain Control Voltage Range | | TP10, TP21 Input Voltage | 2.0 | — | 3.0 | V |

## ■ BLOCK DIAGRAM




NJM2252L

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25℃)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage | $V^+$ | 12 | V |
| Power Dissipation | $P_D$ | 700 | mW |
| Operating Temperature Range | $T_{opr}$ | −20~+75 | ℃ |
| Storage Temperature Range | $T_{stg}$ | −40~+125 | ℃ |

## ■ ELECTRICAL CHARACTERISTICS

($V^+$: 9V, $V_C$: 5V, TP10, TP21: 2.5V, Ta: 25℃)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Operating Current | $I_{CC}$ | 4pin, 21pin Sink Current | 25 | 37 | 45 | mA |
| **Y Signal Line** | | | | | | |
| Input Open Voltage | Vif | TP1, TP2: Measurement | 4.0 | 4.1 | 4.2 | V |
| Output Open Voltage | Voy | | 3.60 | 3.95 | 4.30 | V |
| Output Offset Voltage 1 | Vofy | TP1, 2,2: 5V, TP5:Measurement | −20 | — | 20 | mV |
| Output Offset Voltage 2 | Vofy | TP1,4: 5V, TP5: Measurement | −10 | 20 | 50 | mV |
| Clamp Sink Current | Ii | $V_C$: 5V, SW4: 2 Measurement | 0.8 | 1.0 | 1.2 | mA |
| Voltage Gain | Gvy1 | $Y_{IN}$: 1MHz CW wave, $Y_{OUT}$: 2.0$V_{P-P}$ | −0.5 | 0.5 | 1.5 | dB |
| Voltage Gain Variable Width | Gvy | $Y_{IN}$: 1MHz CW Wave, $Y_{OUT}$: 2.0$V_{P-P}$ | −2.0 | — | 2.0 | dB |
| Frequency Gain | Gfy | 10MHz/1MHz | −1.0 | — | 1.0 | dB |
| Sag Gain | Gys | TP16: 100kHz,50m$V_{P-P}$ $V_{OUT}$: Measurement | 15 | 20 | — | dB |
| Differential Gain | DG | $Y_{OUT}$: 2.0$V_{P-P}$ Standard Staircase Signal | — | 1.0 | 3.0 | % |
| Differential Phase | DP | $Y_{OUT}$: 2.0$V_{P-P}$ Standard Staircase Signal | — | 1.0 | — | deg |
| Crosstalk | CTy | $Y_{IN}$: 4.43MHz, 2.0$V_{P-P}$ CW Wave Input | — | −70 | — | dB |
| Output Impedance | Roy | | — | 6 | — | Ω |
| **C Signal Line** | | | | | | |
| Input Open Voltage | Vic | TP6, TP7: Measurement | 3.9 | 4.1 | 4.3 | V |
| Output Open Voltage | Voc | TP21: 2.5V | 5.05 | 5.35 | 5.65 | V |
| Output Offset Voltage | Vofc | TP6, 7, 8: 5.0V, TP9: Measurement | −50 | — | 50 | mV |
| Voltage Gain | Gvc1 | $C_{IN}$: 1MHz CW Wave, $C_{OUT}$: 2$V_{P-P}$ | 6.0 | 7.0 | 8.0 | dB |
| Voltage Gain Variable Width | Gvc | $C_{IN}$: 1MHz CW Wave, $C_{OUT}$: 2$V_{P-P}$ | 4.5 | — | 8.5 | dB |
| Frequency Gain | Gfc | 8MHz/1MHz | −1.0 | — | 1.0 | dB |
| Crosstalk | Ctc | $C_{IN}$: 4.43MHz, 1.0$V_{P-P}$ CW Wave Input | — | −70 | — | dB |
| Input Impedance | Ric | 19pin, 22pin Input Impedance | 11 | 15 | 19 | Ω |
| Output Impedance | Roc | | — | 6 | — | Ω |
| **Common Line** | | | | | | |
| Control On Voltage | Vc1 | Inner Switch on Level Guarantee | 2.5 | — | — | V |
| Control Off Voltage | Vc2 | Inner Switch Off Level Guarantee | — | — | 1.5 | V |
| Key Clamp Control Voltage | Vc3 | 1 Pin Threshold Voltage | 1.5 | 2.0 | 2.5 | V |

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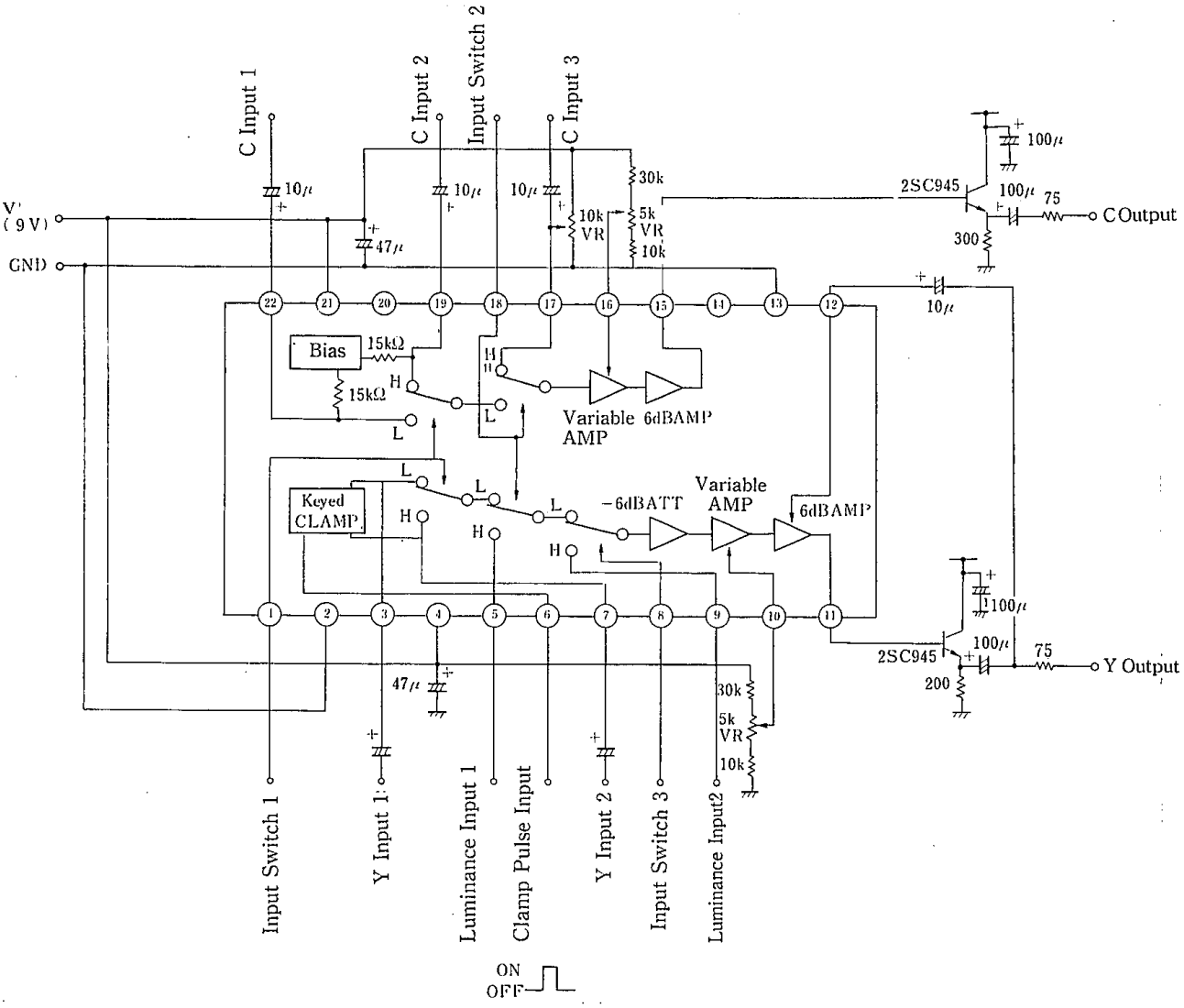
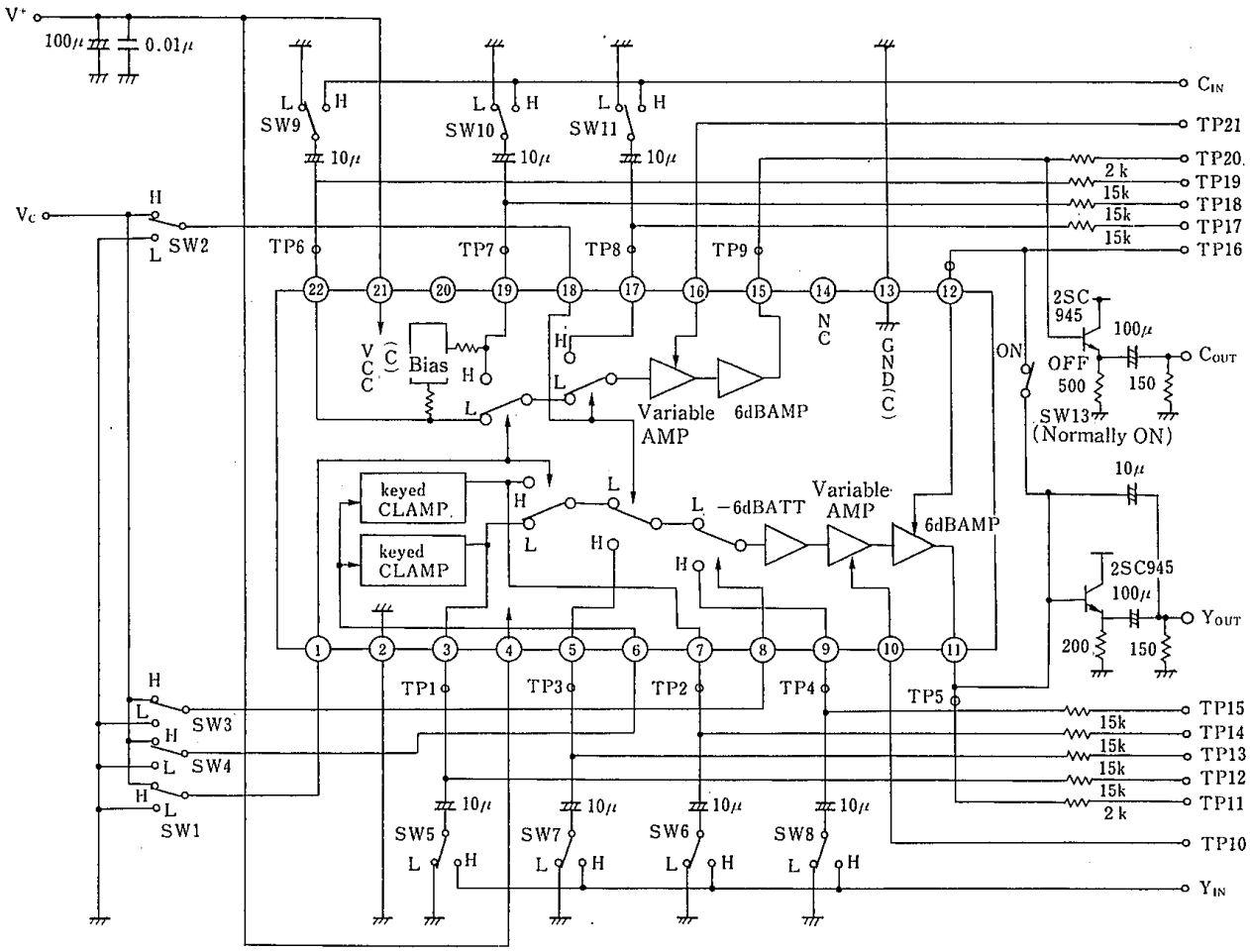
## ■ APPLICATION CIRCUIT




This IC requires 1MΩ resistance between INPUT and GND pin for clamp type input since the minute current causes an unstable pin voltage.

## ■ TEST CIRCUIT




## ■ VIDEO SWITCHING MOTION

| SW1 | SW2 | SW3 | Y LINE OUTPUT | C LINE OUTPUT |
|---|---|---|---|---|
| L | L | L | Yin1 | Cin1 |
| H | L | L | Yin2 | Cin2 |
| * | H | L | Yin3 | Cin3 |
| L | L | H | Yin4 | Cin1 |
| H | L | | | Cin2 |
| * | H | | | Cin3 |

*:H or L

## ■ TERMINAL FUNCTION

| PIN | PIN NAME | SYMBOL | FUNCTION |
|---|---|---|---|
| 1 | SW1 | SW1 | Video switch channel change over input.<br>The L level is identified to be input when being left on at open state. |
| 2 | GND (Y Line) | GND Y | |
| 3 | Y Line Input Pin | Yin1 | Video signal input pin (Y line)<br>Key Clamp circuit internalized.<br>The clamp function goes on when the key clamp is on H timing.<br>Kyed clamp at L position indicates the normal sink chip clamp on operatior.<br>The clamp voltage is about 4.1V. |
| 4 | $V_{CC}$ (Y Line) | | Y line alone can not be used when C line supply voltage is of state. |
| 5 | Y Line Input Pin 3 | Yin 3 | Video signal input pin (Y line)<br>The IC does not have bias or clamp function circuit in it, and its easy to have the external circuit, of the brightness level setting.<br>It is most suitable for superinpose input. |
| 6 | Clamp Switch | Yin3 | In case of L level, the sink chip clamp, Yin1, Yin2 on operation.<br>In case of H level, Yin1, Yin2 become the clamp voltage compulsory.<br>If the kye clamp function is not used, apply it with the L level on fixed condition. |
| 7 | Y Line Input Pin 2 | Yin2 | Video signal input pin (Y line)<br>Key clamp circuit internalized.<br>The clamp function goes on when the key clamp is on H timing.<br>Keyed clamp at L position indicates the normal sink chip clamp on operatior.<br>The clamp voltage is about 4.1V. |
| 8 | SW3 | SW3 | Video switch channel change over input.<br>The L level is identified to be input when being left on open state. |
| 9 | Y Line Input Pin 4 | Yin4 | Video signal input pin (Y line)<br>The IC does not have bias or clamp function circuit in it, and its easy to have the external circuit of the brightness level setting.<br>It is most suitable for superimpose input. |
| 10 | Y Line Gain Control | GAIN Y | Y Line voltage gain can be adjusted when input of 2.0~3.0V.<br>2.0V input, at gain min. (−3.0dB)<br>3.0V input at gin max. (+3.0dB)<br>In order to set the gain within the IC, the gain control circuit compares the voltage (Typ 2.5V), the one which was decided by the resistance the voltage (Typ 2.5V), the one which was decided by the resistance division, and the gain control pin voltage, and then it is advisable to apply voltage on the gain control pin after the process of the resistance division of the supply voltage. |
| 11 | Y Line Output Pin | Yout | Its the Y line video signal output pin. It can drive 75Ω line when connecting 25C945 & 2SC1815 directly.<br>No sag output can be performed by applying Y line sag correction at 12 pin. |
| 12 | Y Line Sag Correcting Pin | Y SAGU | In case when applying as 75Ω driver by connecting 2SC945 to Yout, the sag can be generated by output coupling capacitance and load resistance.<br>The output included the sag, when once again, being input at sag correctinn pin through coupling capacitance, and it can be done to take out the output from Y out in which that there is no sag at all.<br>In case when the sag correction function is not required on operation, it is advisable to use it by connecting 11 pin directly. |

## ■ TERMINAL FUNCTION

| PIN | PIN NAME | SYMBOL | FUNCTION |
|---|---|---|---|
| 13 | GND (C Line) | GND C | |
| 14 | NC | | |
| 15 | CLine Output Pin | Cout | It's the C line video signal output pin.<br>It can drive 75Ω line when connecting 2SC945 & 2SC1815 directly. |
| 16 | C line Output Pin | GAIN C | C line voltage gain can be adjusted when input 2.0~3.0V.<br>2.0V input at gain min. (+3.0dB)<br>3.0V input at gain max. (+9.0dB)<br>In order to set the gain within the IC, the gain control circuit compares the voltage (Typ 2.5V), the one which was decided by the resistance division, and the gain control pin voltage, and then it is advisable to apply voltage on the gain control pin, after the process of resistance division of the supply voltage. |
| 17 | C Line Input Pin 3 | Cin3 | Video signal input pin (C line)<br>The IC does not have bias or clamp function circuit in it, and it's easy to set the brightness level with the external circuit. It is most suitable for superimpose input. |
| 18 | SW2 | SW2 | The L level is identified to be input when being left on open state. |
| 19 | C Line Input Pin 2 | Cin2 | Video signal input pin (C line)<br>The bias voltage is about 4.1V, and the input impedance is about 15KΩ |
| 20 | NC | | |
| 21 | $V^+$ (C Line) | $V^+$ C | C line alone can not be used while the Y line supply voltage is off state. |
| 22 | C Line Input Pin 1 | Cin1 | C line Input Pin 1. Video signal input pin (C line)<br>Bias voltage is about 4.1V, input impedance is about 15KΩ |

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## ■ TEST CONDITION

($V^+$: 9V, Vc : 5V, TP10, TP21: 2.5V, Ta: 25℃)

| PARAMETER | SYMBOL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | I | TEST CONDITION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Supply Current | $I_{CC}$ | L | L | L | L | L | L | L | L | L | L | L | 4pin, 21pin Total Current |
| **Y Signal Line** | | | | | | | | | | | | | |
| Input Open Voltage | $V_{iy}$ | L | L | L | L | L | L | L | L | L | L | L | Type1: Measurement |
| | | H | L | L | L | L | L | L | L | L | L | L | TP2: Measurement |
| Output Open Voltage | Voy | L | L | L | L | L | L | L | L | L | L | L | TP5: Measurement |
| Output Offset Voltage 1 | Vofy | L | L | L | L | L | L | L | L | L | L | L | TP1, 2, 3: 5V TP5: Measurement→V1 |
| | | H | L | L | L | L | L | L | L | L | L | | V2→ |
| | | L | H | L | L | L | L | L | L | L | L | | V3→ |
| | | | | | | | | | | | | | Vofy=V2−V1<br>Vofy=V=−V2<br>Vofy=V3−V2 } Judgment |
| Output offset Voltage 2 | Vofy | L | L | L | L | L | L | L | L | L | L | L | tp1, 4: 5v tp5: MeasurementV1→ |
| | | L | L | H | L | L | L | L | L | L | L | L | V4→ |
| | | | | | | | | | | | | | Vofy=V4−V1 Judgment |
| Clamp Sink Current | Ii | L | L | H | L | L | L | L | L | L | L | L | ③ pin Sink Current |
| | | L | L | H | L | L | L | L | L | L | L | L | ⑦ pin Sink Current |
| Voltage Gain Width | Gvyl | L | L | L | L | H | L | L | L | L | L | L | At left four switch conditions |
| | | H | L | L | L | L | H | L | L | L | L | L | Tp10: 2.5V voltage gain→Gvl |
| | | L | H | L | L | L | L | H | L | L | L | L | TP10: 2.0V voltage gain→Gv2 |
| | | L | L | H | L | L | L | L | H | L | L | L | TP10: 3.0V voltage gain→Gv3 |
| | | | | | | | | | | | | | Gvy=GV2−Gvl<br>Gvy=Gv3−Gvl } Judgment |
| Frequency Gain | Gfy | L | L | L | L | H | L | L | L | L | L | L | At left four switch |
| | | H | L | L | L | L | H | L | L | LL | L | L | $Y_{IN}$1MHz voltage gain→Gv4 |
| | | L | H | L | L | L | L | H | L | L | L | L | $Y_{IN}$ 10MHz voltage gain→Gv5 |
| | | L | L | H | L | L | L | L | H | L | L | L | Gfy=gV5−Gv4 Judgment |
| Sag Gain | Gys | L | L | L | L | L | L | L | L | L | L | L | SW13: OFF TP16: 100kHz, 50m$V_{P-P}$ input $Y_{OUT}$:Measurement |
| | | | | | | | | | | | | | $Y_{OUT}$/50m$V_{PP}$Judgment |
| Differential Gain | DG | L | L | L | L | H | L | L | L | L | L | L | $Y_{out}$: 2.0$v_{P-P}$Standard Staircase Signal |
| | | H | L | L | L | L | H | L | L | L | L | L | Judgment at left four switch conditions |
| | | L | H | L | L | L | L | H | L | L | L | L | |
| | | L | L | H | L | L | L | L | H | L | L | L | |
| Differential Phase | DP | L | L | L | LH | L | L | L | L | L | L | L | $Y_{OUT}$: 2.0$V_{P-P}$ Standard Staircase Signal |
| | | H | L | L | L | L | H | L | L | L | L | L | Judgment at left four switch conditions |
| | | L | H | L | L | L | L | H | L | L | L | L | |
| | | L | L | H | L | L | L | L | H | L | L | L | |

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## ■ TEST CONDITION

($V^+$: 9V, $V_C$ : 5V, TP10, TP21: 2.5V, Ta: 25℃)

| PARAMETER | SYMBOL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | I | TEST CONDITION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crosstalk | CTy | H | L | L | L | H | L | L | L | L | L | L | Judgment by left 12 switch conditions |
| | | L | H | L | L | H | L | L | L | L | L | L | $Y_{IN}$: 4.43MHz, 2.0$V_{P-P}$ CW wave input |
| | | L | H | L | L | H | L | L | L | L | L | L | $Y_{OUT}$Measurement |
| | | L | L | L | L | L | H | L | L | L | L | L | $Y_{out}/y_{IN}$ Judgment |
| | | H | L | L | L | H | L | L | L | L | L | L | |
| | | L | L | H | L | L | H | L | L | L | L | L | |
| | | L | L | L | L | L | L | H | L | L | L | L | |
| | | H | L | L | L | L | L | H | L | L | L | L | |
| | | L | L | H | L | L | L | H | L | L | L | L | |
| | | L | L | L | L | L | L | L | H | L | L | L | |
| | | H | L | L | L | L | L | L | H | L | L | L | |
| | | L | H | L | L | L | L | L | H | L | L | L | |
| Output Impedance | Roy | L | L | L | L | H | L | L | L | L | L | L | |
| **C Signal Line** | | | | | | | | | | | | | |
| Input Open Voltage | Vic | L | L | L | L | L | L | L | L | L | L | L | TP6: Measurement |
| | | H | L | L | L | L | L | L | L | L | L | L | TP7: Measurement |
| Output Open Voltage | Voc | L | L | L | L | L | L | L | L | L | L | L | TP9: Measurement |
| Output Offset Voltage | Vofc | L | L | L | L | L | L | L | L | L | L | L | TP6, 7,8: 5.0V, TP9: Measurement→V1 |
| | | H | L | L | L | L | L | L | L | L | L | L | →V2 |
| | | L | H | L | L | L | | L | L | L | L | L | →V3 |
| | | | | | | | | | | | | | Vofc=V2−V1 |
| | | | | | | | | | | | | | Vofc=V3−V1 |
| Voltage Gain | Gvc1 | L | L | L | L | L | L | L | L | H | L | L | $G_{IN}$: 1MHz wave, $C_{OUT}$: 2.0$V_{P-P}$ |
| | | H | L | L | L | L | L | L | L | L | H | L | |
| | | L | H | L | L | L | L | L | L | L | L | H | Judgment by left three conditions |
| Voltage Gain Variable Width | Gvc | L | L | L | L | L | L | L | L | H | L | L | TP21: 2.5V boltage gain→Vv1 |
| | | H | L | L | L | L | L | L | L | L | H | L | TP21: 2.0V voltage gain |
| | | L | H | L | L | L | L | L | L | L | L | H | TP21: 2.0V voltage gain |
| | | | | | | | | | | | | | At left three switch conditions |
| | | | | | | | | | | | | | Gvc=Gv2−Gv1 } Judgment |
| | | | | | | | | | | | | | Gvc=Gv3−Gv1 } |
| Frequency Gain | Gfc | L | L | L | L | L | L | L | L | H | L | L | At left three switch conditions |
| | | H | L | L | L | L | L | L | L | L | H | L | $G_{IN}$: 1MHz voltage gain→Gv4 |
| | | L | H | L | L | L | L | L | L | L | L | H | $G_{IN}$8MHz voltage gain→Gv5 |
| | | | | | | | | | | | | | Gfc=Gv5-Gv4 Judgment. |
| Crosstalk | CTc | H | L | L | L | L | L | L | L | H | L | L | $C_{IN}$: 4.43MHz, 1.0V~$_{P-P}$ CW wave input |
| | | L | H | L | L | L | L | L | L | H | L | L | $C_{OUT}$: Measurement |
| | | L | L | L | L | L | L | L | L | L | H | L | |
| | | L | H | L | L | L | L | L | L | L | H | L | |
| | | L | L | L | L | L | L | L | L | L | L | H | |
| | | H | L | L | L | L | L | L | L | L | L | H | |
| Input Impedance | Ric | L | L | L | L | L | L | L | L | H | L | L | TP19: 3.0V applied voltage, TP6: voltage measurement |
| | | | | | | | | | | | | | TP19: 5.0V applied voltage, TP6: voltage measurement |
| | | | | | | | | | | | | | Ric=15[kΩ]*(2−V19/(2−(V2−V1)) Judgment |
| | | H | L | L | L | L | L | L | L | L | H | L | TP22: 3.0V applied voltage, TP7: voltage measurement→V1 |
| | | | | | | | | | | | | | TP22: 5.0V applied voltage, TP7: voltage measurement→V2 |
| | | | | | | | | | | | | | Ric=15[kΩ]*(V2−V1)/(2−(V−V1)) Judgment |
| Output Impedance | Roc | L | L | L | L | L | L | L | L | H | L | L | |

■APPLICATION

This IC requires 1MΩ resistance between INPUT and GND pin for clamp type input since the minute current causes an unstable pin voltage.