

## VIDEO COLOR SUPERIMPOSER

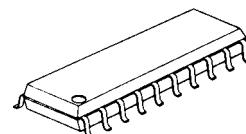
### ■ GENERAL DESCRIPTION

**NJM2256** is the multi-functional color super-imposer IC for videobase band (Y, R-Y, B-Y). Various type of Y, R-Y, B-Y output signals can be made by the digital controlled signals.

The signal control at the base band, made it possible on operation with less external parts, as well as for non adjustment on operation.

**NJM2256** can be operated much higher switching speed comparing to **NJM2247**.

### ■ PACKAGE OUTLINE



**NJM2256M**

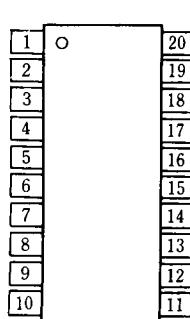
### ■ FEATURES

- 5V single Power Supply
- 8 Types Color Super-imposer
- Burst Flag Insert Function
- Y Inversion, C Inversion Function
- NTSC / PAL Matching
- Non Operational Adjustment
- Less External Parts
- Higher switching speed can be made comparing to **NJM2247**
- Package Outline DMP20
- Bipolar Technology

### ■ RECOMMENDED INPUT CONDITIONS

- Y Signal 0.7V<sub>P-P</sub>
- R-Y Signal 1.0V<sub>P-P</sub>
- B-Y Signal 0.7V<sub>P-P</sub>
- Control Voltage
- Low Level 0 to 0.25V
- High Level 4.75 to 5V

### ■ PIN CONFIGURATION



**NJM2256M**

#### Pin Function

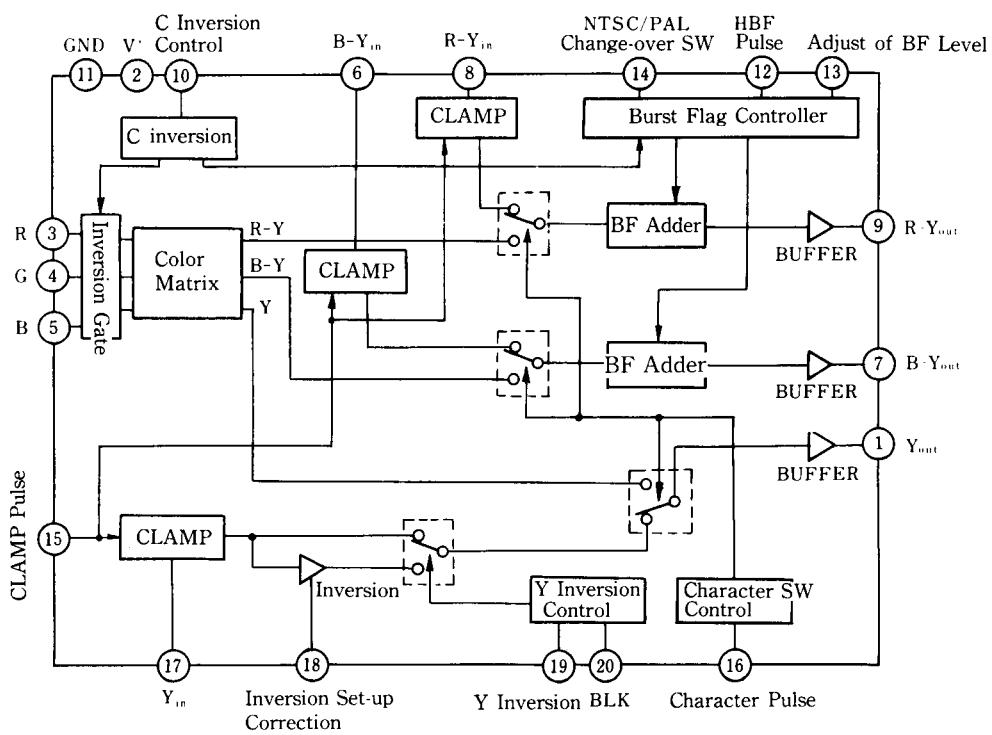
1. Y <sub>out</sub>	11. GND
2. V <sup>+</sup>	12. HBF Pulse
3. R	13. BF Pulse
4. G	14. NTSC/PAL Switching
5. B	15. Clamp Pulse
6. B-Y <sub>in</sub>	16. Character Pulse
7. B-Y <sub>out</sub>	17. Y <sub>in</sub>
8. R-Y <sub>in</sub>	18. Inversion Set Up Correction
9. R-Y <sub>out</sub>	19. Y Inversion
10. C Inversion	20. BLK Pulse

## ■ CONTROL PIN CHARACTERISTICS

(V<sub>+</sub>=5V)

PIN NO.	PIN FUNCTIONS	THRESHOLD LEVEL (V)		SINK / SOURCE CURRENT (μA)	
		LOW	HIGH	0V	5V
3	R				
4	G	0.7	0.8	-500	500
5	B				
3					
4	(at C Inversion)	2.5	2.6	-100	100
5					
10	C Inversion	3.5	4.5	-200	400
12	HBF Pulse	0.5	2.0	-2	1
14	NTSC / PAL	0.7	0.8	0	150
15	Clamp Pulse	2.5	2.8	-2	0
16	Character Pulse	0.5	0.9	-0.5	0
19	Y Inversion	0.4	0.8	-0.5	0
20	BLK Pulse	0.4	0.8	-0.5	0

## ■ BLOCK DIAGRAM



## ■ INFORMATIONS

Following four points are the outstanding function of the **NJM2256**. These functions are to go through three input (Y, R-Y, B-Y) signals control by ten control pins.

### 1. Color Superimpose

DC Level of each equivalent colors shall be supplied to Y, R-Y and B-Y inputs.

### 2. Burst Flag Insertion

150 mV burst flag shall be added to R-Y, B-Y input signals.

Burst flag is selected by the NTSC / PAL switch.

### 3. C Inversion

The color phase of the picture shall be inverted for one hundred and eighty degrees. The color phase of the imposed character shall not be altered. This function shall be proceeded when inverting the burst flag, and at the same time, the imposed character level shall be inverted too.

### 4. Y Inversion

It is the brightness level inversion. The imposed character color shall not be changed. This function shall be proceeded the switching Y signal output to the inverter side.

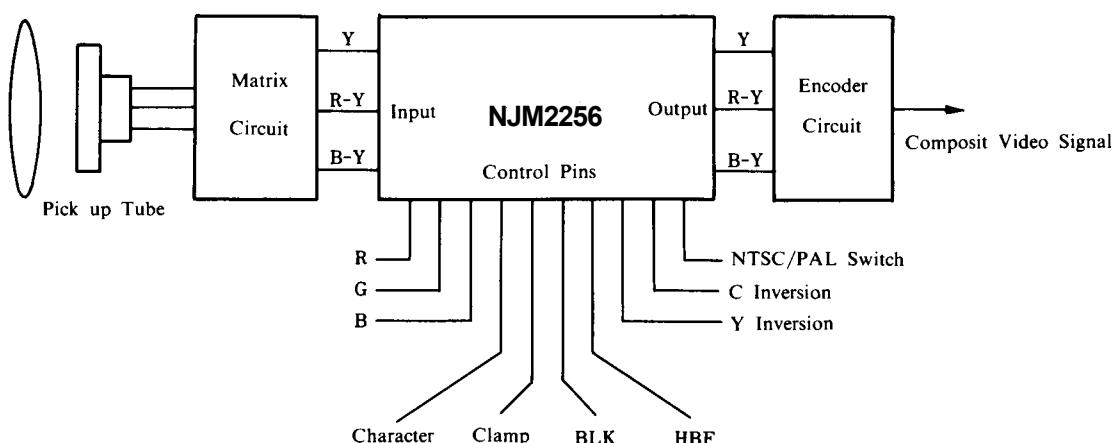
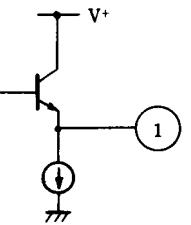
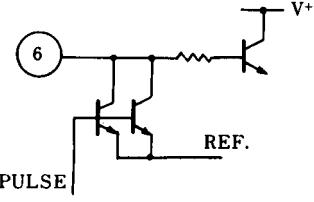
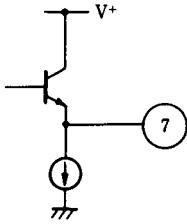
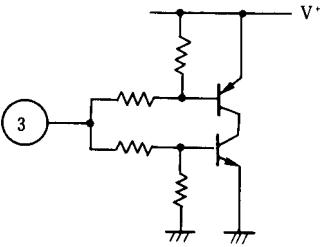
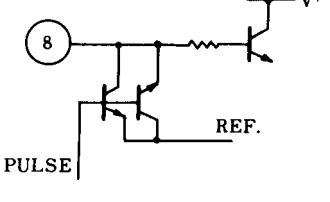
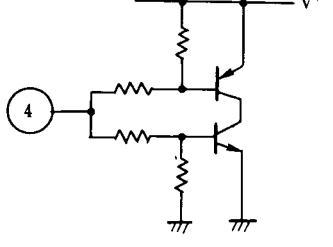
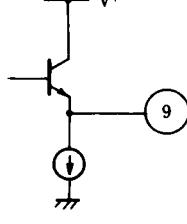
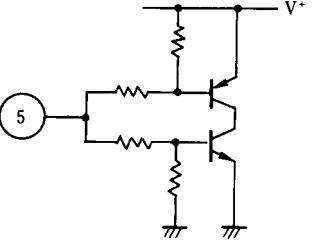


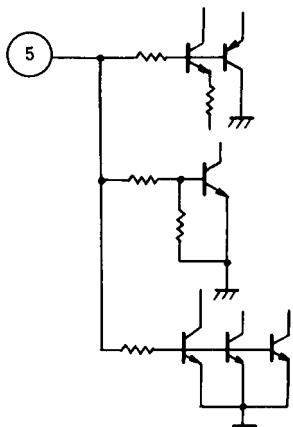
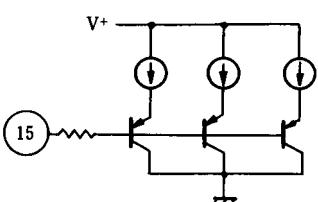
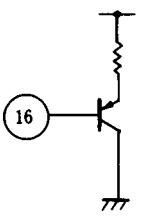
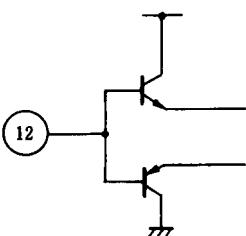
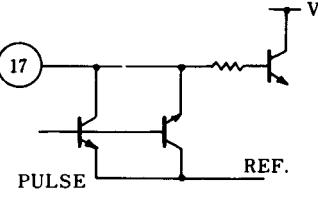
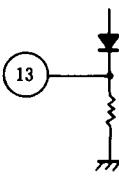
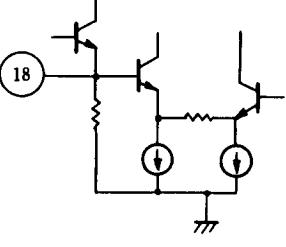
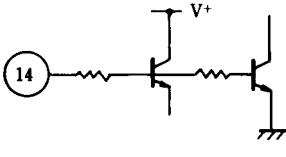
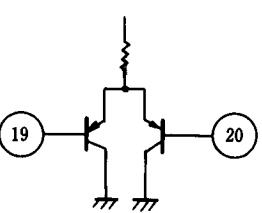
Fig.1 Video Camera Application

# NJM2256

## ■ EQUIVALENT CIRCUIT

PIN NO.	PIN FUNCTION	INSIDE EQUIVALENT CIRCUIT	PIN NO.	PIN FUNCTION	INSIDE EQUIVALENT CIRCUIT
1	$Y_{out}$		6	$B-Y_{in}$	
2	$V_+$	—	7	$B-Y_{out}$	
3	R		8	$R-Y_{in}$	
4	G		9	$R-Y_{out}$	
5	B				

## ■ EQUIVALENT CIRCUIT

PIN NO.	PIN FUNCTION	INSIDE EQUIVALENT CIRCUIT	PIN NO.	PIN FUNCTION	INSIDE EQUIVALENT CIRCUIT
10	C Inversion		15	Clamp Pulse	
11	GND	—	16	Character Pulse	
12	HBF Pulse		17	$Y_{in}$	
13	BF Level		18	Inversion Set up Correction	
14	NTSC / PAL		19 20	$Y$ Inversion BLK	

# NJM2256

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup>	8	V
Power Dissipation	P <sub>D</sub>	350	mW
Operating Temperature Range	T <sub>opr</sub>	-20 to +75	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

## ■ ELECTRICAL CHARACTERISTICS

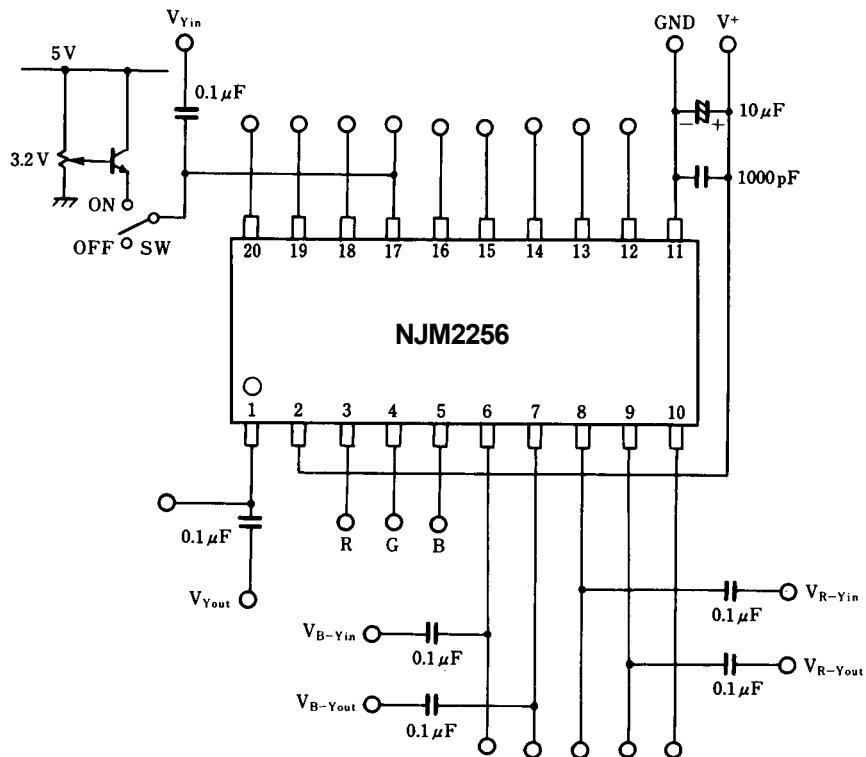
PARAMETER	SYMBOL	CONTROL PIN										TEST CONDITION	MIN.	TYP.	MAX.	UNIT
		③	④	⑤	⑩	⑫	⑭	⑮	⑯	⑯	⑳					
Operating Current	I <sub>cc</sub>	0	0	0	0	0	0	0	0	0	0		12	18.5	26	mA
Terminal Sink Current 1	I <sub>17</sub>	0	0	0	0	0	0	0	0	0	0	V(17)= 2.5V Current when application	0		10	μA
Terminal Sink Current 1	I <sub>6</sub>	0	0	0	0	0	0	0	0	0	0	V(6)= 3.0V Current when application	0		6	μA
Terminal Sink Current 3	I <sub>8</sub>	0	0	0	0	0	0	0	0	0	0	V(8)= 3.0V Current when application	0		6	μA
Terminal Voltage 1	V <sub>1</sub>	0	0	0	0	0	5	0	0	0	0	① Open Voltage	1.68		1.92	V
Terminal Voltage 2	V <sub>7</sub>	0	0	0	0	0	5	0	0	0	0	⑦ Open Voltage	2.18		2.42	V
Terminal Voltage 3	V <sub>9</sub>	0	0	0	0	0	5	0	0	0	0	⑨ Open Voltage	2.18		2.42	V
Terminal Voltage 4	V <sub>13</sub>	0	0	0	0	0	5	0	0	0	0	⑬ Open Voltage	0.23		0.37	V
Terminal Voltage 5	V <sub>18</sub>	0	0	0	0	0	5	0	0	0	0	⑯ Open Voltage	1.68		1.92	V
Y Non Inversion																
Voltage Gain	G <sub>YP</sub>	0	0	0	0	0	0	0	0	0	0	V(Y <sub>IN</sub> ) = 1V <sub>PP</sub> , 1MHz	-0.5	0	0.5	dB
Frequency	DG <sub>P</sub>	0	0	0	0	0	0	0	0	0	0	G <sub>YP</sub> (6MHz) - G <sub>YP</sub> (1MHz)	-1	0	1	dB
Differential Gain	DP <sub>P</sub>	0	0	0	0	0	0	0	0	0	0	V(Y <sub>IN</sub> ) = 1V <sub>PP</sub> , Standard Staircase	-3	0	3	%
Differential Phase	DP <sub>P</sub>	0	0	0	0	0	0	0	0	0	0		-3	0	3	deg
Y Inversion																
Voltage Gain	G <sub>YN</sub>	0	0	0	0	0	0	0	0	5	5	V(Y <sub>IN</sub> ) = 0.6V <sub>PP</sub> , 1MHz	-2.3	-1.3	0.3	dB
Frequency	G <sub>FYN</sub>	0	0	0	0	0	0	0	0	5	5	G <sub>YN</sub> (6MHz) - G <sub>YN</sub> (1MHz)	-2	-0.1	1	dB
Differential Gain	DG <sub>N</sub>	0	0	0	0	0	0	0	0	5	5	V(Y <sub>IN</sub> ) = 0.5V <sub>PP</sub> , Standard Staircase	-8		8	%
Differential Phase	DP <sub>P</sub>	0	0	0	0	0	0	0	0	5	5		-3	0	3	deg
Inversion Block Level	BL <sub>N</sub>	0	0	0	0	0	0	5	0	5	5	① Voltage: a BL <sub>N</sub> = a - b	0.59	0.68	0.77	V
		0	0	0	0	0	0	5	0	5	5	① Voltage: b BL <sub>N</sub> = a - b				
Inversion BLK		0	0	0	0	0	0	5	0	5	0	① Voltage: c BLK = c - b	-0.1	0	0.1	V
R-Y																
Voltage Gain	G <sub>R-Y</sub>	0	0	0	0	0	0	5	0	0	0	V(R-Y <sub>IN</sub> ) = 1V <sub>PP</sub> , 1MHz	-0.5		0.5	dB
Burst Level	BF <sub>RP</sub>	0	0	0	0	0	0	5	0	0	0	⑨ Voltage: d BF <sub>RP</sub> = e - d	135	150	165	mV
Non Inversion		0	0	0	5	5	0	5	0	0	0	⑨ Voltage: e BF <sub>RP</sub> = e - d				
Burst Level Inversion	BF <sub>RN</sub>	0	0	0	5	5	0	5	0	0	0	⑨ Voltage: f BF <sub>RN</sub> = f - d	-165	-150	-135	mV
B-Y																
Voltage Gain	G <sub>R-Y</sub>	0	0	0	0	0	0	5	0	0	0	V(B-Y <sub>IN</sub> ) = 1V <sub>PP</sub> , 1MHz	-0.5	0	0.5	dB
Burst Level	BF <sub>HP</sub>	0	0	0	0	5	5	5	0	0	0	⑦ Voltage: g BF <sub>HP</sub> = g - h	135	150	165	mV
Non Inversion		0	0	0	0	0	5	5	0	0	0	⑦ Voltage: h BF <sub>HP</sub> = g - h				
Burst Level Inversion	BF <sub>RN</sub>	0	0	0	5	5	5	5	0	0	0	⑦ Voltage: i BF <sub>RN</sub> = g - i	-165	-150	-135	mV
R-Y Switching Speed		X	0	0	0	0	0	5	5	0	0	X = 1MHz 5V <sub>PP</sub> Rectangular Wave		*100	nS	
B-Y Switching Speed		X	0	0	0	0	0	5	5	0	0	X = 1MHz 5V <sub>PP</sub> Rectangular Wave		*100	nS	

\*Remark 1) \*Item indicates design assurance rating.

## ■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONTROL PIN										TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
		③	④	⑤	⑩	⑫	⑭	⑮	⑯	⑯	⑯						
Character Output Level 1																	
White	Y	M <sub>PWY</sub>	5	5	5	0	0	0	5	5	0	0	① Voltage: A, M <sub>PWY</sub> =A - V <sub>1</sub>	630	700	770	mV
	R-Y	M <sub>PWR</sub>										⑨ Voltage: B, M <sub>PWR</sub> =B - V <sub>9</sub>	-16	0	16	mV	
	B-Y	M <sub>PWB</sub>										⑦ Voltage: C, M <sub>PWB</sub> =C - V <sub>7</sub>	-14	0	14	mV	
Yellow	Y	M <sub>PYY</sub>	5	5	0	0	0	0	5	5	0	0	① Voltage: A, M <sub>PYY</sub> =A - V <sub>1</sub>	472	525	578	mV
	R-Y	M <sub>PYR</sub>										⑨ Voltage: B, M <sub>PYR</sub> =B - V <sub>9</sub>	13	33	53	mV	
	B-Y	M <sub>PYB</sub>										⑦ Voltage: C, M <sub>PYB</sub> =C - V <sub>7</sub>	-165	-146	-127	mV	
Cyanoge	Y	M <sub>PCY</sub>	0	5	5	0	0	0	5	5	0	0	① Voltage: A, M <sub>PCY</sub> =A - V <sub>1</sub>	409	455	501	mV
	R-Y	M <sub>PCR</sub>										⑨ Voltage: B, M <sub>PCR</sub> =B - V <sub>9</sub>	-232	-209	-186	mV	
	B-Y	M <sub>PCB</sub>										⑦ Voltage: C, M <sub>PCB</sub> =C - V <sub>9</sub>	28	50	72	mV	
Green	Y	M <sub>PGY</sub>	0	5	0	0	0	0	5	5	0	0	① Voltage: A, M <sub>PGY</sub> =A - V <sub>1</sub>	252	280	308	mV
	R-Y	M <sub>PGR</sub>										⑨ Voltage: B, M <sub>PGR</sub> =B - V <sub>9</sub>	-197	-176	-155	mV	
	B-Y	M <sub>PGB</sub>										⑦ Voltage: C, M <sub>PGB</sub> =C - V <sub>7</sub>	-117	-97	-77	mV	
Magenta	Y	M <sub>PMY</sub>	5	0	5	0	0	0	5	5	0	0	① Voltage: A, M <sub>PMY</sub> =A - V <sub>1</sub>	378	420	462	mV
	R-Y	M <sub>PMR</sub>										⑦ Voltage: B, M <sub>PMR</sub> =B - V <sub>9</sub>	155	176	197	mV	
	B-Y	M <sub>PMB</sub>										⑦ Voltage: C, M <sub>PMB</sub> =C - V <sub>7</sub>	77	97	117	mV	
Red	Y	M <sub>PRY</sub>	5	0	0	0	0	0	5	5	0	0	① Voltage: A, M <sub>PRY</sub> =A - V <sub>1</sub>	220	245	270	mV
	R-Y	M <sub>PRR</sub>										⑨ Voltage: B, M <sub>PRR</sub> =B - V <sub>9</sub>	186	209	232	mV	
	B-Y	M <sub>PRB</sub>										⑦ Voltage: C, M <sub>PRB</sub> =C - V <sub>7</sub>	-72	-50	-28	mV	
Blue	Y	M <sub>PBY</sub>	0	0	0	0	0	0	5	5	0	0	① Voltage: C, M <sub>PBY</sub> =A - V <sub>1</sub>	156	175	194	mV
	R-Y	M <sub>PBR</sub>										⑨ Voltage: B, M <sub>PBR</sub> =B - V <sub>9</sub>	-53	-33	-13	mV	
	B-Y	M <sub>PBB</sub>										⑦ Voltage: C, M <sub>PBB</sub> =C - V <sub>7</sub>	127	146	165	mV	
Black	Y	M <sub>PPY</sub>	0	0	0	0	0	0	5	5	0	0	① Voltage: A, M <sub>PPY</sub> =A - V <sub>1</sub>	-20	0	20	mV
	R-Y	M <sub>PPR</sub>										⑨ Voltage: B, M <sub>PPR</sub> =B - V <sub>9</sub>	-14	0	14	mV	
	B-Y	M <sub>PPB</sub>										⑦ Voltage: C, M <sub>PPB</sub> =C - V <sub>7</sub>	-12	0	12	mV	
Character Output Level 2																	
White	Y	M <sub>NWY</sub>	5	5	5	0	0	0	5	5	0	0	① Voltage: A, M <sub>NWY</sub> =A - V <sub>1</sub>	630	700	770	mV
	R-Y	M <sub>NWR</sub>										⑨ Voltage: B, M <sub>NWR</sub> =B - V <sub>9</sub>	-16	0	16	mV	
	B-Y	M <sub>NWB</sub>										⑦ Voltage: C, M <sub>NWB</sub> =C - V <sub>7</sub>	-14	0	14	mV	
Yellow	Y	M <sub>NYY</sub>	5	5	0	5	0	0	5	5	0	0	① Voltage: A, M <sub>NYY</sub> =A - V <sub>1</sub>	472	525	578	mV
	R-Y	M <sub>NYR</sub>										⑨ Voltage: B, M <sub>NYR</sub> =B - V <sub>9</sub>	-53	-33	-13	mV	
	B-Y	M <sub>NYB</sub>										⑦ Voltage: C, M <sub>NYB</sub> =C - V <sub>7</sub>	127	146	165	mV	
Cyanoge	Y	M <sub>NCY</sub>	0	5	5	5	0	0	5	5	0	0	① Voltage: A, M <sub>NCY</sub> =A - V <sub>1</sub>	409	455	501	mV
	R-Y	M <sub>NCR</sub>										⑨ Voltage: B, M <sub>NCR</sub> =B - V <sub>9</sub>	186	209	232	mV	
	B-Y	M <sub>NCB</sub>										⑦ Voltage: C, M <sub>NCB</sub> =C - V <sub>7</sub>	-72	-50	-28	mV	
Green	Y	M <sub>NGY</sub>	0	5	0	5	0	0	5	5	0	0	① Voltage: A, M <sub>NGY</sub> =A - V <sub>1</sub>	252	280	308	mV
	R-Y	M <sub>NGR</sub>										⑨ Voltage: B, M <sub>NGR</sub> =B - V <sub>9</sub>	155	176	197	mV	
	B-Y	M <sub>NGB</sub>										⑦ Voltage: C, M <sub>NGB</sub> =C - V <sub>7</sub>	77	97	117	mV	
Magenta	Y	M <sub>NMY</sub>	5	0	5	5	0	0	5	5	0	0	⑨ Voltage: A, M <sub>NMY</sub> =A - V <sub>1</sub>	378	420	462	mV
	R-Y	M <sub>NMR</sub>										⑨ Voltage: B, M <sub>NMR</sub> =B - V <sub>9</sub>	-197	-176	-155	mV	
	B-Y	M <sub>NMB</sub>										⑦ Voltage: C, M <sub>NMB</sub> =C - V <sub>7</sub>	-117	-97	-77	mV	
Red	Y	M <sub>NRY</sub>	5	0	0	5	0	0	5	5	0	0	① Voltage: A, M <sub>NRY</sub> =A - V <sub>1</sub>	220	245	270	mV
	R-Y	M <sub>NRR</sub>										⑨ Voltage: B, M <sub>NRR</sub> =B - V <sub>9</sub>	-232	-209	-186	mV	
	B-Y	M <sub>NRB</sub>										⑦ Voltage: C, M <sub>NRB</sub> =C - V <sub>7</sub>	28	50	72	mV	
Blue	Y	M <sub>NBY</sub>	0	0	5	5	0	0	5	5	0	0	① Voltage: A, M <sub>NBY</sub> =A - V <sub>1</sub>	156	175	194	mV
	R-Y	M <sub>NBR</sub>										⑨ Voltage: B, M <sub>NBR</sub> =B - V <sub>9</sub>	13	33	53	mV	
	B-Y	M <sub>NBR</sub>										⑦ Voltage: C, M <sub>NBR</sub> =C - V <sub>7</sub>	-165	-146	-127	mV	
Black	Y	M <sub>NPY</sub>	0	0	0	5	0	0	5	5	0	0	① Voltage: A, M <sub>NPY</sub> =A - V <sub>1</sub>	-20	0	20	mV
	R-Y	M <sub>NPR</sub>										⑨ Voltage: B, M <sub>NPR</sub> =B - V <sub>9</sub>	-14	0	14	mV	
	B-Y	M <sub>NPB</sub>										⑦ Voltage: C, M <sub>NPB</sub> =C - V <sub>7</sub>	-12	0	12	mV	

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## ■ APPLICATION NOTES

### I / O Explanation

• Supply Voltage	V <sup>+</sup>	5V	(2)
	GND		(11)
• Input Signals	Y	0.7V <sub>P-P</sub>	(17)
	R - Y	1.0V <sub>P-P</sub>	(8)
	B - Y	0.7V <sub>P-P</sub>	(6)
• Output Signals	Y	0.7V <sub>P-P</sub>	(1)
	R - Y	1.0V <sub>P-P</sub>	(9)
	B - Y	0.7V <sub>P-P</sub>	(7)



### 3. Character Color adjustment

Superimposed color adjustment of the character can be determined in eight different colors, by choosing R, G, B input levels.

(LOW 0V, HIGH 5V)			
R	G	B	COLOR
5	5	5	White
5	5	0	Yellow
0	5	5	Cyan
0	5	0	Green
5	0	5	Magenta
5	0	0	Red
0	0	5	blue
0	0	0	Black

Character Color Selecting Code

### 4. Character Insertion

Pulse informations from outside character generator shall be given input at the character pulse pin (16). During the period of pulse process, the selected color level shall be inserted into each Y, R-Y, B-Y.

### 5. Burst Flag Insertion

Inputting burst period pulse at the HBF pin (12), the burst flag (150mV) can be inserted in the B-Y, R-Y signals. At the same time, by putting NTSC / PAL switch (14), the burst flag can be altered to NTSC or PAL system.

	NTSC / PAL SWITCH (14)	
	LOW 0V (PAL)	HIGH 5V (NTSC)
R-Y Signal	+150mV	non insertion
B-Y Signal	-150mV	-150mV

Burst Flag Inserting

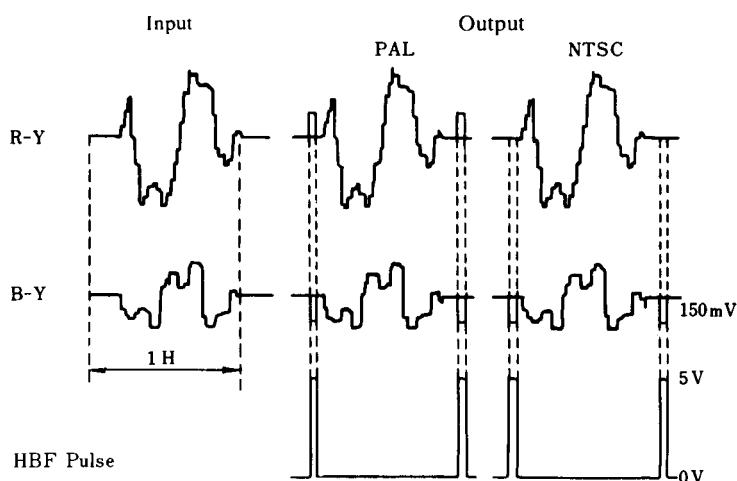


Fig.3 Burst Flag Inserting Example

## 6. C Inversion

The color phase of the picture shall be inverted for one hundred and eighty degrees setting C inversion pin 10. It is applied that the reference signal (burst flag) shall be inverted into one hundred and eighty degrees at the time of de-coding.

Superimposed character color do not change at the picture inversion.

		C INVERSION PIN 10	
		LOW 0V	HIGH 5V
Burst	Non Inversion	Inversion	

C Inversion Form

## 7. Y Inversion

The brightness of the picture shall be inverted by setting Y inversion 19. It is that Y signal shall be inverted by the inverter, and then blanking period signal shall be adjusted to the black level with blanking pulse.

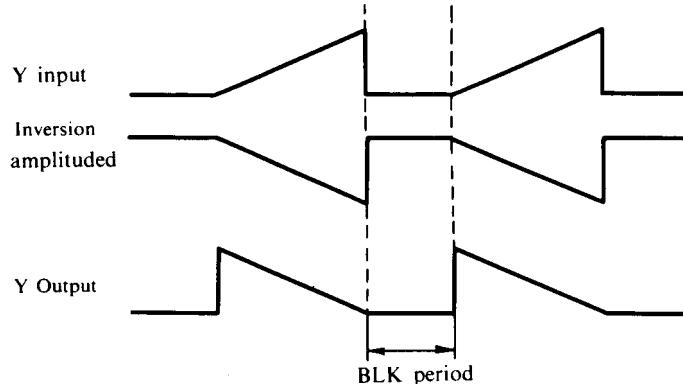


Figure 4. Y Inversion Output Example

		Y INVERSION PIN 19	
		LOW 0V	HIGH 5V
Y Output	Non inversion	Inversion	

Y Inversion Form

## 8. Adjusting pin

### (1) BF Level Pin 13

It is the burst flag minor adjusting pin. The burst level shall be adjusted at the open voltage, 0.3V level adjustment. Therefore, the most recommended on operation with the open condition, as it has been controlled at 135 at 165 mV (burst level) on specification.

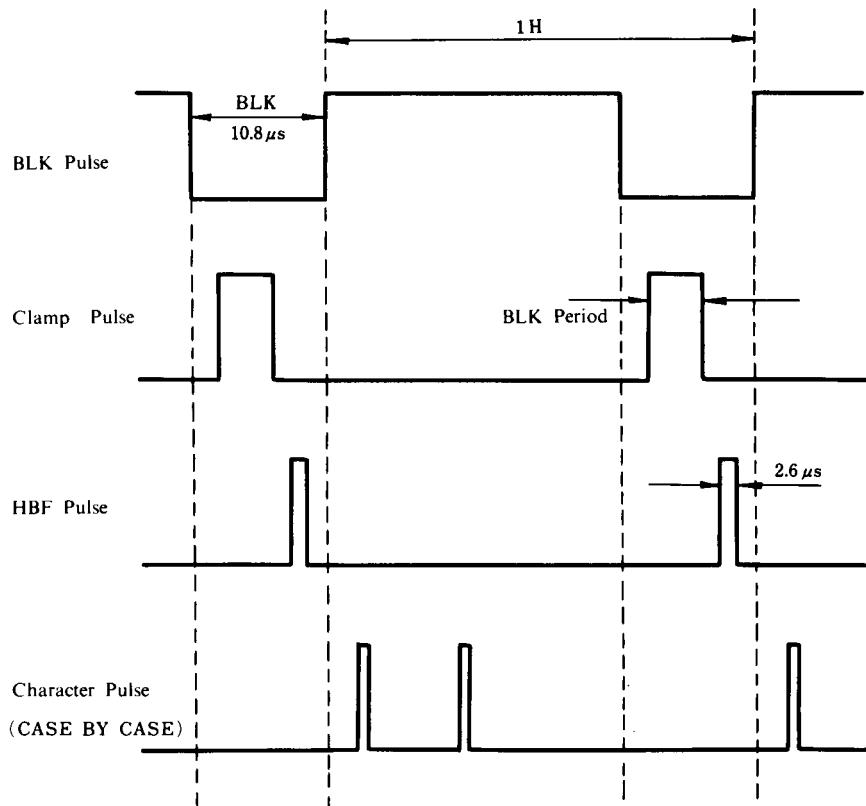
### (2) Inversion Set Up Correction Pin 18

It is the minor adjusting pin of Y inversion signal level. The inverting black level shall be adjusted at the open voltage, 1.8V level adjustment. Therefore, the most recommended on operation with the open condition, as it has been controlled with 0.59 to 0.77 V (inverting black level) on specification.

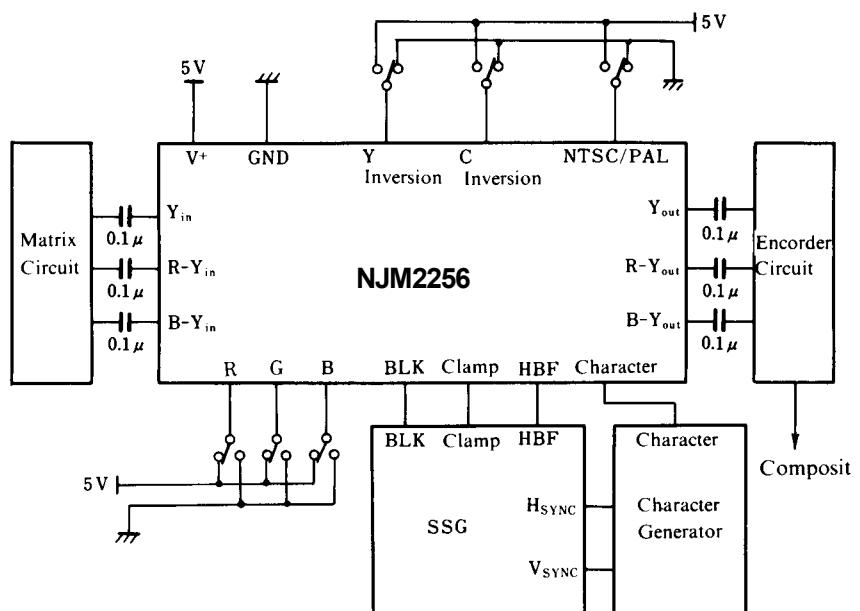
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## 9. Pulse Timing

The pulse input timing should be proceeded as in the following.

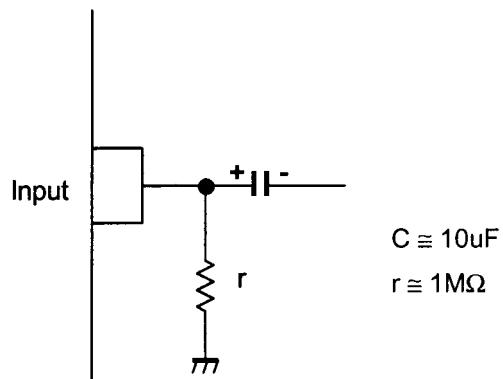


## ■ TYPICAL APPLICATION



## ■ APPLICATION

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



**[CAUTION]**  
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