

# M52354FP

## ADAPTIVE-TYPE Y/C SEPARATION

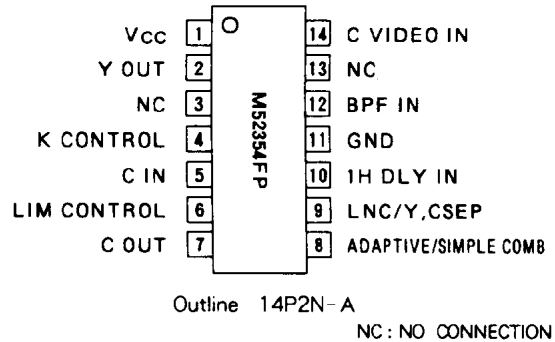
### DESCRIPTION

The M52354FP is a semiconductor integrated circuit for large-sized high-resolution color TV and new-standard VCR (S-VHS, Hi8). Low-system-cost Y/C separation and luminance signal noise canceller (LNC, for VCR playback) are built-in single-chip.

### FEATURES

- By attaching 1H delay line externally, Y/C separation and noise canceller are realized. So costs can be cut.
- Switching between comb filter and band pass filter is conducted by pattern recognition. This IC shows excellent Y/C separation characteristics including few dot interference and color dropping.
- Differences from the M52099P
  - (1) Switching between adaptive-type comb and simple comb type is possible by pin 8 control. (M52099P: power save)
  - (2) Correlation and non-correlation thresholds are distinguished by pin 4 control. The threshold variable range of the M52354FP is wider than that of the M52099P.
    - Pin 4 Lo (> 1.2V): easily recognized as correlation threshold
    - Pin 4 Hi: easily recognized as non-correlation threshold
  - (3) By lowering the gain of amplifier of pin 10 input, this IC can be used with CCD.

### PIN CONFIGURATION (TOP VIEW)



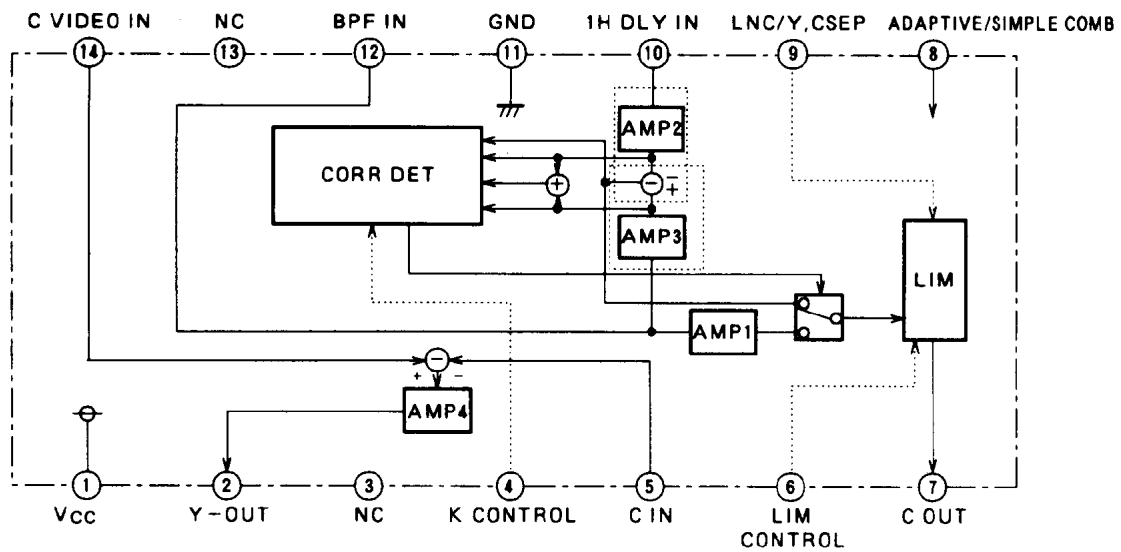
### APPLICATION

VCR (VHS, beta, 8mm VCR), TV (for NTSC)

### RECOMMENDED OPERATING CONDITION

Rated supply voltage.....5.0V

### BLOCK DIAGRAM



ADAPTIVE-TYPE Y/C SEPARATION

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C, unless otherwise noted)

Symbol	Parameter	Ratings	Unit
V <sub>CC</sub>	Supply voltage	6.0	V
P <sub>d</sub>	Power dissipation	900	mW
T <sub>opr</sub>	Operating temperature	-20~+75	°C
T <sub>stg</sub>	Storage temperature	-40~+125	°C
K <sub>θ</sub>	Thermal derating (Ta ≥ 25°C)	9.0	mW/°C

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test point	Test conditions	Limits			Unit
				Min.	Typ.	Max.	
<b>AMP1</b>							
A1G	Gain	⑦	②3.58MHz 0.15V <sub>p</sub> -PCW LIMOFF ④GND ②V <sub>CC</sub>	5.1	6.6	7.1	dB
A1fd	Lower frequency characteristics	⑦	②200kHz 3.58MHz 0.15V <sub>p</sub> -PCW LIMOFF ④GND ②V <sub>CC</sub>	-4.5	-3.0	-1.5	dB
A1fu	Upper frequency characteristics	⑦	②3.58MHz 0.15V <sub>p</sub> -p 0.45V <sub>p</sub> -PCW LIMOFF ④GND ②V <sub>CC</sub>	-2.5	-1.0	-0.5	dB
A1L	Linearity	⑦	②10MHz 3.58MHz 0.15V <sub>p</sub> -PCW LIMOFF ④GND ②V <sub>CC</sub>	95	100	105	%
<b>AMP2</b>							
A2G	Gain	⑦	⑩3.58MHz 50mV <sub>p</sub> -PCW LIMOFF ④GND	3.6	5.1	6.6	dB
A2fd	Lower frequency characteristics	⑦	⑩220kHz 3.58MHz 50mV <sub>p</sub> -PCW LIMOFF ④GND	-4.5	-3.0	-1.5	dB
A2fu	Upper frequency characteristics	⑦	⑩10MHz 3.58MHz 80mV <sub>p</sub> -PCW	-2.3	-0.8	0.7	dB
A2L	Linearity	⑦	⑩3.58MHz 80mV <sub>p</sub> -PCW LIMOFF ④GND	95	100	105	%
<b>AMP3</b>							
A3G	Gain	⑦	②3.58MHz 0.15V <sub>p</sub> -PCW LIMOFF ④GND	-1.4	0.6	2.6	dB
A3fd	Lower frequency characteristics	⑦	②200kHz 3.58MHz 0.15V <sub>p</sub> -PCW LIMOFF ④GND	-4.5	-3.0	-1.5	dB
A3fu	Upper frequency characteristics	⑦	②3.58MHz 10MHz 0.15V <sub>p</sub> -PCW LIMOFF ④GND	-3.1	-1.6	-0.5	dB
A3L	Linearity	⑦	②3.58MHz 0.15&0.75V <sub>p</sub> -PCW LIMOFF ④GND	95	100	105	%
<b>AMP4</b>							
A4G1	Gain 1	②	④100kHz 0.5V <sub>p</sub> -PCW	4.6	5.6	6.6	dB
A4f1	Frequency characteristics 1	②	④100kHz 5MHz 0.5V <sub>p</sub> -PCW	-0.5	0.0	0.5	dB
A4L1	Linearity 1	②	④100kHz 0.5&1.0V <sub>p</sub> -PCW	95	100	105	%
A4G2	Gain 2	②	⑤3.58MHz 0.3V <sub>p</sub> -PCW	4.6	5.6	6.6	dB
A4f2	Frequency characteristics 2	②	⑤100kHz 3.58MHz 0.3V <sub>p</sub> -PCW	-0.5	0.0	0.5	dB
A4L2	Linearity 2	②	⑤3.58MHz 0.3&0.6V <sub>p</sub> -PCW	95	100	105	%
<b>Y-COMB AMP</b>							
YCG1	Gain 1	②	⑩3.58MHz 80mV <sub>p</sub> -PCW ④GND	6.6	8.6	10.6	dB
YCF1	Frequency characteristics 1	②	⑩100kHz 3.58MHz 50mV <sub>p</sub> -PCW ④GND	-1.5	0	1.5	dB
YCL1	Linearity	②	⑩3.58MHz 50mV <sub>p</sub> -p 240mV <sub>p</sub> -PCW ④GND	95	100	105	%
YCG2	Gain 2	②	②3.58MHz 150mV <sub>p</sub> -PCW ④GND	2.7	4.2	5.7	dB

Note 1. Each parameter is measured at Ta = 25°C and supply voltage = 5.00VDC.  
2. + current is input to pin.

## ADAPTIVE-TYPE Y/C SEPARATION

## ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Test conditions	Limits			Unit
				Min.	Typ.	Max.	
Y <sub>Cf2</sub>	Frequency characteristics 2	②	⑫100kHz 5 MHz 150mV <sub>P-P</sub> CW ④GND	-1.5	0	1.5	dB
Y <sub>CL2</sub>	Linearity 2	②	⑫3.58MHz 150mV <sub>P-P</sub> 450mV <sub>P-P</sub> CW ④GND	95	100	105	%
LIM							
L <sub>1</sub>	LIM characteristics 1	⑦	⑫1 MHz 0.2V <sub>P-P</sub> CW ④GND ②V <sub>CC</sub> ⑥5 V ⑨V <sub>CC</sub> /GND Change in each case.	-1.0	0	1.0	dB
L <sub>2</sub>	LIM characteristics 2	⑦	⑫1 MHz 0.2V <sub>P-P</sub> CW ④GND ②V <sub>CC</sub> ⑥3 V ⑨V <sub>CC</sub> /GND Change in each case.	-5.0	-4.0	-3.0	dB
L <sub>3</sub>	LIM characteristics 3	⑦	⑫1 MHz 0.2V <sub>P-P</sub> CW ④GND ②V <sub>CC</sub> ⑥2 V ⑨V <sub>CC</sub> /GND Change in each case.	-7.2	-6.2	-5.2	dB
L <sub>4</sub>	LIM characteristics 4	⑦	⑫1 MHz 0.2V <sub>P-P</sub> CW ④GND ②V <sub>CC</sub> ⑥1 V ⑨V <sub>CC</sub> /GND Change in each case.	-20	-18	-16	dB
L <sub>5</sub>	LIM characteristics 5	⑦	⑫1 MHz 0.2V <sub>P-P</sub> CW ④GND ②V <sub>CC</sub> ⑥0 V ⑨V <sub>CC</sub> /GND Change in each case.	-30	-27	-24	dB
Mode switching							
T <sub>YC</sub>	Y/C selection threshold	②	⑫3.58MHz 0.2V <sub>P-P</sub> CW ④GND/V <sub>CC</sub>	-	0.9	1.2	V
T <sub>BPF</sub>	BPF selection threshold	⑦	⑩3.58MHz 50mV <sub>P-P</sub> CW ④GND ②OPEN/V <sub>CC</sub>	4.1	4.4	-	V
T <sub>L</sub>	LIM ON/OFF threshold	⑦	⑫1 MHz 0.2V <sub>P-P</sub> CW ④GND ②V <sub>CC</sub> ⑥GND ⑨V <sub>CC</sub> /GND	2.1	2.4	2.7	V
T <sub>AS</sub>	Adaptive/simple comb threshold	⑦ ⑧	⑩3.58MHz 80mV <sub>P-P</sub> ④5 V, ⑨0 V	2.2	2.5	2.8	V
Others							
I <sub>CC1</sub>	Circuit current	①	④2.5V ⑥2.5V ⑧5 V ⑩GND	17	22	27	mA

Note 1. Each parameter is measured at T<sub>a</sub> = 25°C and supply voltage = 5.00VDC.  
2. + current is input to pin.

ADAPTIVE-TYPE Y/C SEPARATION

ELECTRICAL CHARACTERISTICS TEST METHOD

	Parameter	Test method	Test conditions
AMP1	Gain	The amplitude at TP7 is defined as AVP-P. $A1G = 20 \log \frac{A}{0.15} \text{ (dB)}$	SW12=b SW2=0N V2=5V V4=0V V8=5V V9=0V SG12=3.58MHz, 0.15VP-PCW
	Lower frequency characteristics	The amplitude when 200kHz is input at TP7 is defined as AVP-P and the amplitude when 3.58MHz is input is defined as BVP-P. $A1fd = 20 \log \frac{A}{0.15} - 20 \log \frac{B}{0.15} \text{ (dB)}$	SW12=b SW2=0N V2=5V V4=0V V8=5V V9=0V SG12=200kHz and 3.58MHz 0.15VP-PCW
	Upper frequency characteristics	The amplitude when 10MHz is input at TP7 is defined as AVP-P and the amplitude when 3.58MHz is input is defined as BVP-P. $A1fu = 20 \log \frac{A}{0.15} - 20 \log \frac{B}{0.15} \text{ (dB)}$	SW12=b SW2=0N V2=5V V4=0V V8=5V V9=0V SG12=10MHz and 3.58MHz 0.15VP-PCW
	Linearity	The amplitude when 0.15VP-P is input at TP7 is defined as AVP-P and the amplitude when 0.45VP-P is input is defined as BVP-P. $A1L = \frac{B}{3 \times A} \times 100 \text{ (%)}$	SW12=b SW2=0N V2=5V V4=0V V8=5V V9=0V SG12=3.58MHz 0.15 & 0.45VP-PCW
AMP2	Gain	The amplitude at TP7 is defined as AmVP-P. $A2G = 20 \log \frac{A}{80} \text{ (dB)}$	SW10=b V4=0V V8=5V V9=0V SG10=3.58MHz 50mVP-PCW
	Lower frequency characteristics	The amplitude when 200kHz is input at TP7 is defined as AVP-P and the amplitude when 3.58MHz is input is defined as BVP-P. $A2fd = 20 \log \frac{A}{80} - 20 \log \frac{B}{80} \text{ (dB)}$	SW10=b V4=0V V8=5V V9=0V SG10=220kHz & 3.58MHz 80mVP-PCW
	Upper frequency characteristics	The amplitude when 10MHz is input at TP7 is defined as AmVP-P and the amplitude when 3.58MHz is input is defined as BmVP-P. $A2fu = 20 \log \frac{A}{80} - 20 \log \frac{B}{80} \text{ (dB)}$	SW10=b V4=0V V8=5V V9=0V SG10=10MHz & 3.58MHz 80mVP-PCW
	Linearity	The amplitude when 50mVP-p is input at TP7 is defined as AVP-P and the amplitude when 250mVP-P is input is defined as BVP-P. $A2L = \frac{B}{3 \times A} \times 100 \text{ (%)}$	SW10=b V4=0V V8=5V V9=0V SG10=3.58MHz 50 & 250mVP-PCW
AMP3	Gain	The amplitude at TP7 is defined as AVP-P. $A3G = 20 \log \frac{A}{0.15} \text{ (dB)}$	SW12=b V4=0V V8=5V V9=0V SG12=10MHz and 3.58MHz 0.15VP-PCW
	Lower frequency characteristics	The amplitude when 200kHz is input at TP7 is defined as AVP-P and the amplitude when 3.58MHz is input is defined as BVP-P. $A3fd = 20 \log \frac{A}{0.15} - 20 \log \frac{B}{0.15} \text{ (dB)}$	SW12=b V4=0V V8=5V V9=0V SG12=200kHz and 3.58MHz 0.15VP-PCW
	Upper frequency characteristics	The amplitude when 10MHz is input at TP7 is defined as AVP-P and the amplitude when 3.58MHz is input is defined as BVP-P. $A3fu = 20 \log \frac{A}{0.15} - 20 \log \frac{B}{0.15} \text{ (dB)}$	SW12=b V4=0V V8=5V V9=0V SG12=10MHz and 3.58MHz 0.15VP-PCW

ADAPTIVE-TYPE Y/C SEPARATION

ELECTRICAL CHARACTERISTICS TEST METHOD (cont.)

	Parameter	Test method	Test conditions
AMP3	Linearity	The amplitude when 0.15V <sub>P-P</sub> is input at TP7 is defined as AV <sub>P-P</sub> and the amplitude when 0.75V <sub>P-P</sub> is input is defined as BV <sub>P-P</sub> . $A_{3L} = \frac{B}{5 \times A} \times 100(\%)$	SW12=b V4=0V V8=5V V9=0V SG12=3.58MHz, 0.15&0.75V <sub>P-P</sub> CW
	Gain 1	The amplitude at TP2 is defined as AmV <sub>P-P</sub> . $A_{4G1} = 20 \log \frac{A}{0.5} \text{ (dB)}$	SW14=b V8=5V SG14=100KHz, 0.5V <sub>P-P</sub> CW
AMP4	Frequency characteristics 1	The amplitude when 5MHz is input at TP2 is defined as AV <sub>P-P</sub> and the amplitude when 100kHz is input is defined as BV <sub>P-P</sub> . $A_{4f1} = 20 \log \frac{A}{0.5} - 20 \log \frac{B}{0.5} \text{ (dB)}$	SW14=b V8=5V SG14=100KHz & 5MHz 0.5V <sub>P-P</sub> CW
	Linearity 1	The amplitude when 0.5V <sub>P-P</sub> is input at TP2 is defined as AV <sub>P-P</sub> and the amplitude when 1.0V <sub>P-P</sub> is input is defined as BV <sub>P-P</sub> . $A_{4L1} = \frac{B}{2 \times A} \times 100(\%)$	SW14=b V8=5V SG14=100KHz 0.5&1.0V <sub>P-P</sub> CW
	Gain 2	The amplitude at TP2 is defined as AmV <sub>P-P</sub> . $A_{4G2} = 20 \log \frac{A}{0.3} \text{ (dB)}$	SW5=b V8=5V SG5=3.58MHz 0.3V <sub>P-P</sub> CW
	Frequency characteristics 2	The amplitude when 5MHz is input at TP2 is defined as AV <sub>P-P</sub> and the amplitude when 100kHz is input is defined as BV <sub>P-P</sub> . $A_{4f2} = 20 \log \frac{A}{0.3} - 20 \log \frac{B}{0.3} \text{ (dB)}$	SW5=b V8=5V SG5=3.58MHz 0.3V <sub>P-P</sub> CW
	Linearity 2	The amplitude when 0.3V <sub>P-P</sub> is input at TP2 is defined as AV <sub>P-P</sub> and the amplitude when 0.6V <sub>P-P</sub> is input is BV <sub>P-P</sub> . $A_{4L2} = \frac{B}{2 \times A} \times 100(\%)$	SW5=b V8=5V SG5=3.58MHz, 0.3&0.6V <sub>P-P</sub> CW
	Gain 1	The amplitude at TP2 is defined as AV <sub>P-P</sub> . $Y_{CG1} = 20 \log \frac{A}{80} \text{ (dB)}$	SW10=b V4=0V V8=5V SG10=3.58MHz 80mV <sub>P-P</sub> CW
Y-COMB AMP	Frequency characteristics 1	The amplitude when 5MHz is input at TP2 is defined as AV <sub>P-P</sub> and the amplitude when 100kHz is input is defined as BV <sub>P-P</sub> . $Y_{Cf1} = 20 \log \frac{A}{80} - 20 \log \frac{B}{80} \text{ (dB)}$	SW10=b V4=0V V8=5V SG10=10MHz and 3.58MHz 80mV <sub>P-P</sub> CW
	Linearity 1	The amplitude when 80mV <sub>P-P</sub> is input at TP2 is defined as AmV <sub>P-P</sub> and the amplitude when 240mV <sub>P-P</sub> is input is BmV <sub>P-P</sub> . $Y_{CL1} = \frac{B}{3 \times A} \times 100(\%)$	SW10=b V4=0V V8=5V SG10=3.58MHz 80&240mV <sub>P-P</sub> CW
	Gain 2	The amplitude at TP2 is defined as AV <sub>P-P</sub> . $Y_{CG2} = 20 \log \frac{A}{0.15} \text{ (dB)}$	SW12=b V4=0V V8=5V SG12=3.58MHz 0.15V <sub>P-P</sub> CW

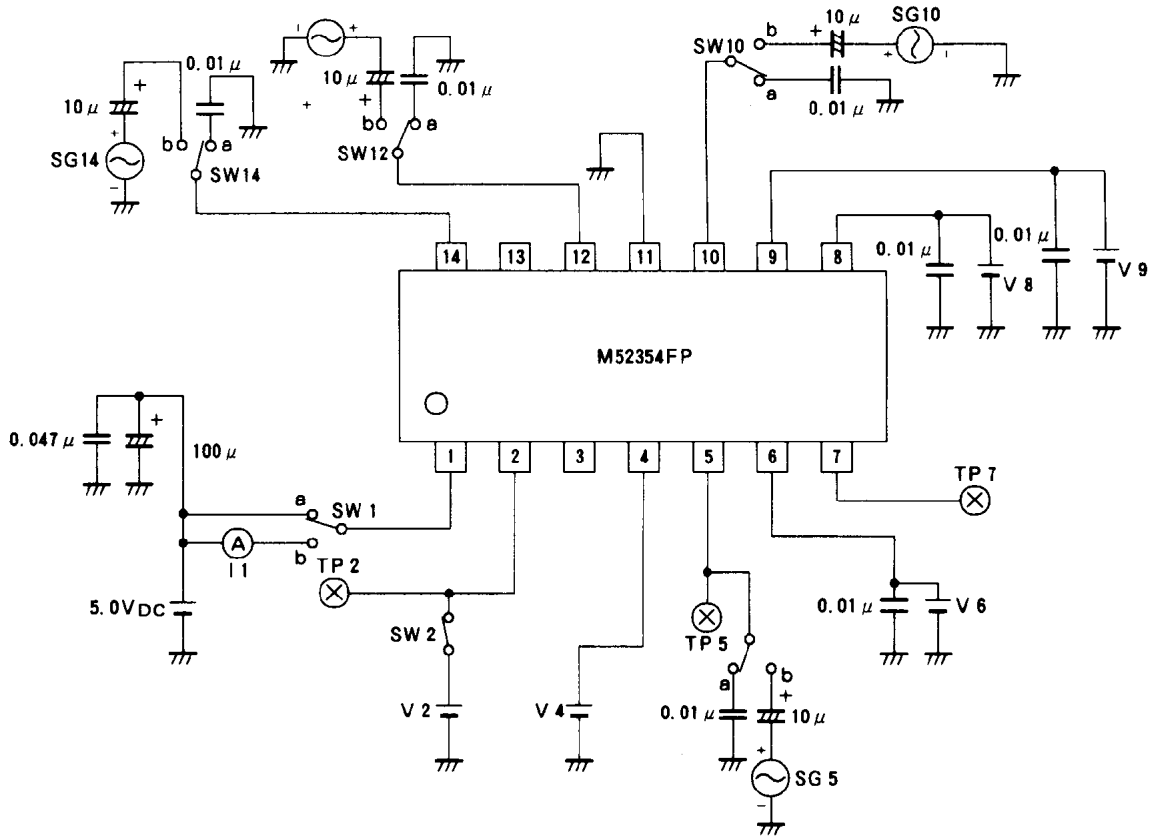
ADAPTIVE-TYPE Y/C SEPARATION

ELECTRICAL CHARACTERISTICS TEST METHOD (cont.)

Parameter	Test method	Test conditions
Y-COMB AMP	Frequency characteristics 2 The amplitude when 5MHz is input at TP2 is defined as AVP-P and the amplitude when 100kHz is input is defined as BV P-P. $Y_{CF2} = 20 \log \frac{A}{0.15} - 20 \log \frac{B}{0.15}$ (dB)	SW12=b V4 = 0V V8 = 5V SG12=100KHz & 5MHz 0.15VP-P CW
	Linearity 2 The amplitude when 0.15VP-P is input at TP2 is defined as AVP-P and the amplitude when 0.45VP-P is input is defined as BV P-P. $Y_{CL2} = \frac{B}{3 \times A} \times 100(\%)$	SW12=b V4 = 0V V8 = 5V SG12=3.58MHz, 0.15 & 0.45VP-P CW
LIM	LIM characteristics 1 Find the variance between V9 = 5V and V9 = 0V at TP7. $L_1 = 20 \log \frac{\text{Amplitude at } V_9=5V}{\text{Amplitude at } V_9=0V}$ (dB)	SW12=b V2 = 5V V4 = 0V V6 = 5V V9 = 5V / 0V SG12= 1MHz 0.2VP-P CW
	LIM characteristics 2 Find the variance between V9 = 5V and V9 = 0V at TP7. $L_2 = 20 \log \frac{\text{Amplitude at } V_9=5V}{\text{Amplitude at } V_9=0V}$ (dB)	SW12=b V2 = 5V V4 = 0V V6 = 3V V9 = 5V / 0V SG12= 1MHz 0.2VP-P CW
	LIM characteristics 3 Find the variance between V9 = 5V and V9 = 0V at TP7. $L_3 = 20 \log \frac{\text{Amplitude at } V_9=5V}{\text{Amplitude at } V_9=0V}$ (dB)	SW12=b V2 = 5V V4 = 0V V6 = 2V V9 = 5V / 0V SG12= 1MHz 0.2VP-P CW
	LIM characteristics 4 Find the variance between V9 = 5V and V9 = 0V at TP7. $L_4 = 20 \log \frac{\text{Amplitude at } V_9=5V}{\text{Amplitude at } V_9=0V}$ (dB)	SW12=b V2 = 5V V4 = 0V V6 = 1V V9 = 5V / 0V SG12= 1MHz 0.2VP-P CW
	LIM characteristics 5 Find the variance between V9 = 5V and V9 = 0V at TP7. $L_5 = 20 \log \frac{\text{Amplitude at } V_9=5V}{\text{Amplitude at } V_9=0V}$ (dB)	SW12=b V2 = 5V V4 = 0V V6 = 0V V9 = 5V / 0V SG12= 1MHz 0.2VP-P CW
Mode switching	Y/C selection threshold Increase the voltage gradually from V4 = 0V until signal output (3.58MHz, 0.32VP-P in approx.) at TP2 ceases. V2 (V) at that time is defined as TBPF.	SW12=b Increase voltage from V4 = 0V. SG12=3.58MHz 0.2VP-P CW
	BPF selection threshold Apply the same voltage as the open voltage at pin 2 to TP2. Then, increase the voltage gradually until signal output (3.58MHz, 0.17VP-P in approx.) at TP7 ceases. V2 (V) at that time is defined as TBPF.	SW2 : ON SW10=b Increase voltage from V2 = open voltage V4 = 0V SG10=3.58MHz 50mVP-P CW (Note) Voltage which is lower than open voltage of pin ② should never be applied to pin ②.
	LIM ON/OFF threshold Increase the voltage gradually from V9 = 5V until signal output (1MHz, 0.43VP-P in approx.) at TP7 ceases. V9 (V) at that time is defined as TL.	SW2 = ON SW12=b V2 = 5V V4 = 0V V6 = 0V SG12= 1MHz 0.2VP-P CW
	Adaptive/simple comb threshold Decrease the voltage gradually from V8 = 5V until sine wave is output at TP7. V8 (V) at that time is defined as TAS.	SW10=b, SW12=a V4 = 5V, V9 = 0V SG10=3.58MHz, 80mVP-P CW
Circuit current	The current measured at I1 is defined as Icc1.	SW1 = b V4 = 2.5V V6 = 2.5V V8 = 5V V9 = 0V

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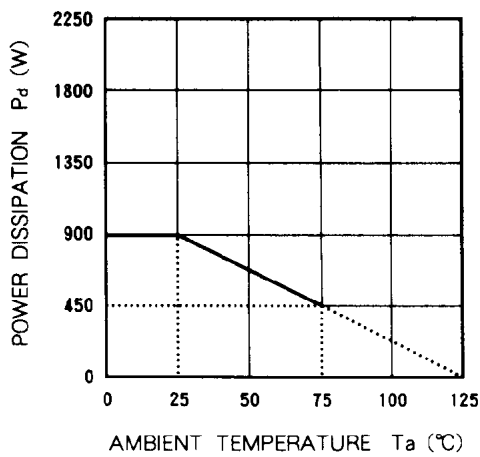
**TEST CIRCUIT**



Units Resistance :  $\Omega$   
Capacitance : F

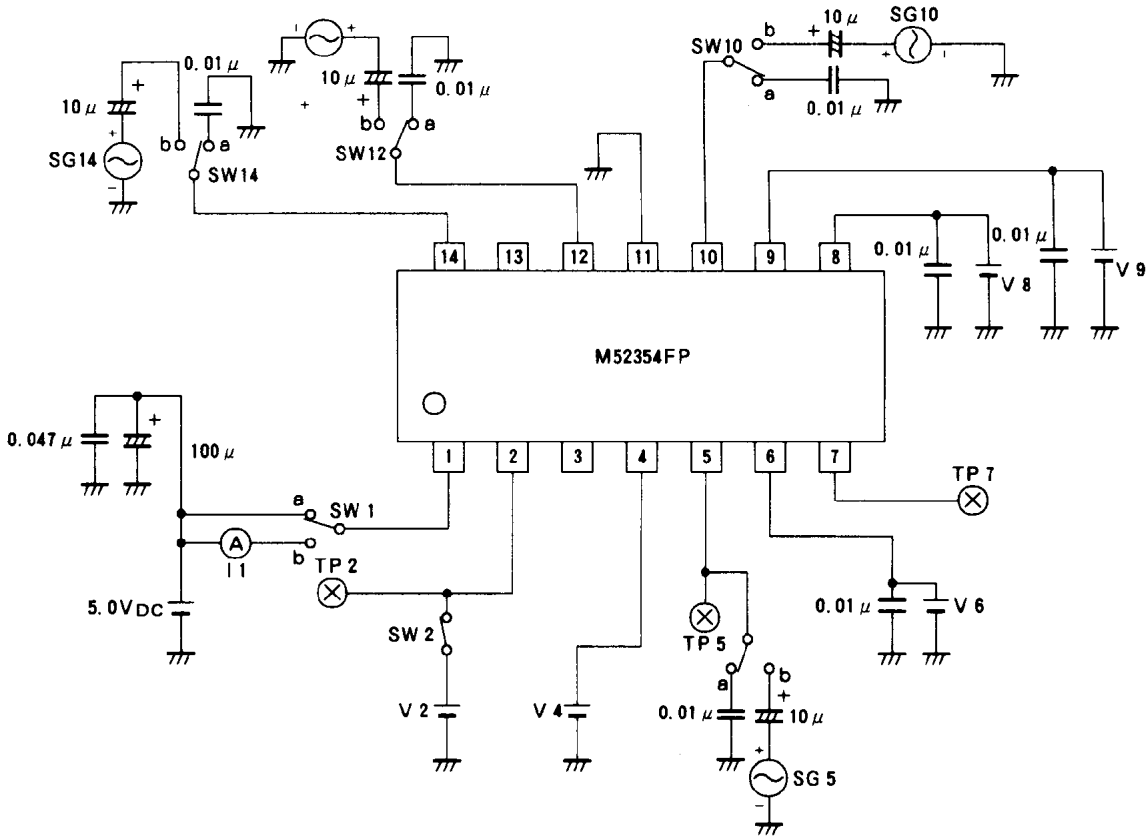
**TYPICAL CHARACTERISTICS**

**THERMAL DERATING (MAXIMUM RATING)**



**ADAPTIVE-TYPE Y/C SEPARATION**

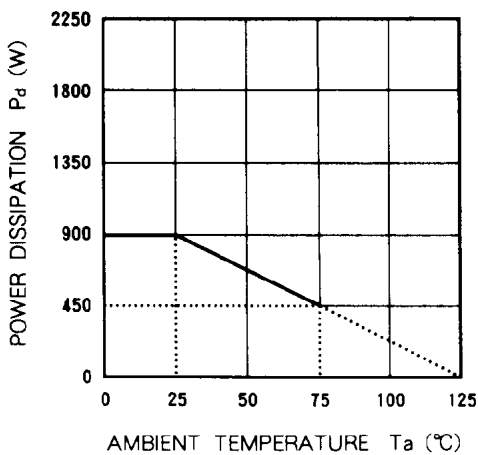
**TEST CIRCUIT**



Units Resistance :  $\Omega$   
Capacitance : F

**TYPICAL CHARACTERISTICS**

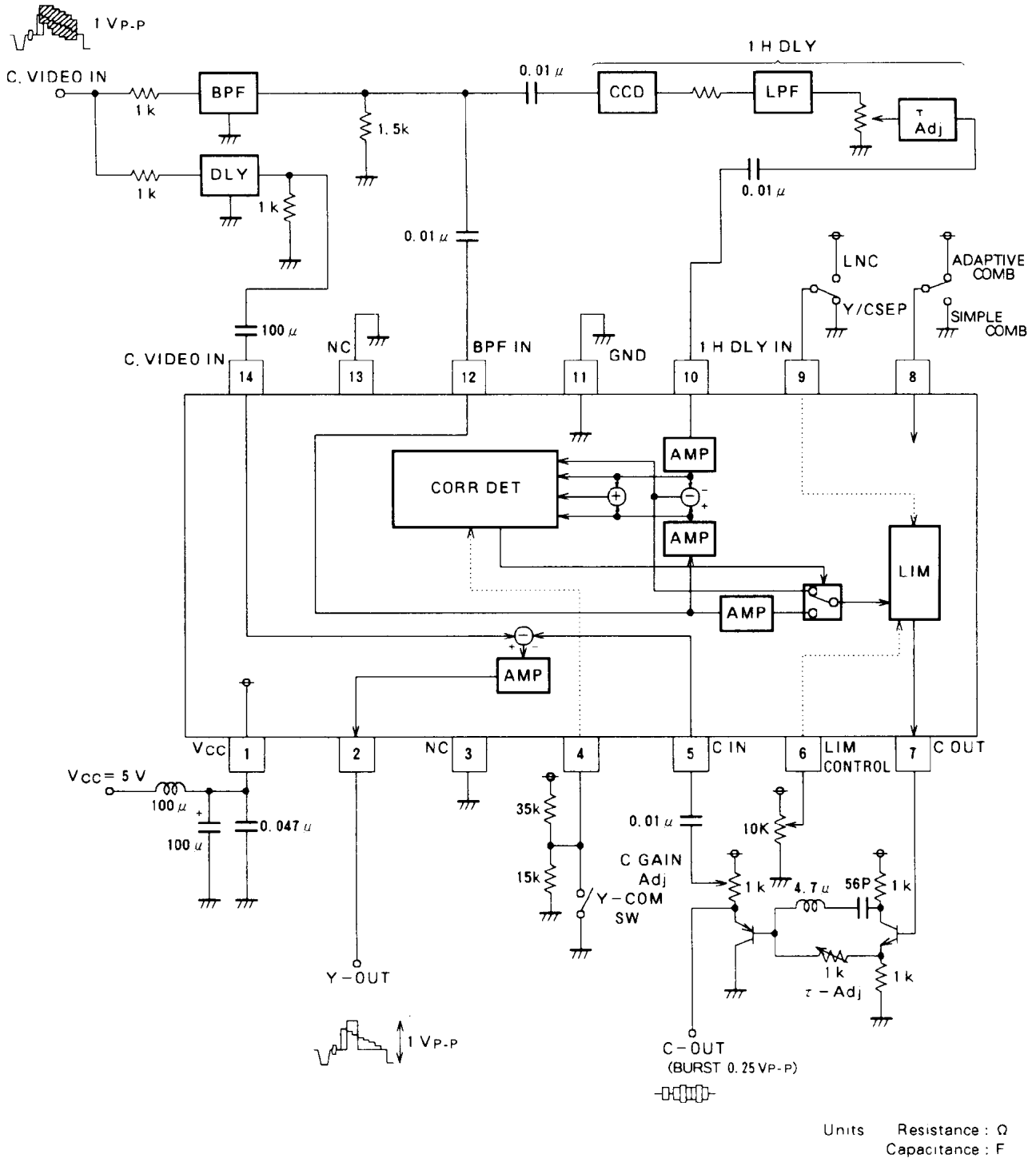
**THERMAL DERATING (MAXIMUM RATING)**





ADAPTIVE-TYPE Y/C SEPARATION

APPLICATION EXAMPLE



**ADAPTIVE-TYPE Y/C SEPARATION**

**DESCRIPTION OF PIN**

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
①	V <sub>CC</sub>	5.0V <sub>DC</sub>	—
②	Y-OUT	2.4V <sub>DC</sub> Y 1V <sub>P-P</sub> in approx.	
③	N.C	On board, this pin is connected to ground.	—
④	K-CONTR OL	2.5V <sub>DC</sub> In open state.	
⑤	C-IN	2.9V <sub>DC</sub> BURST 140mV <sub>P-P</sub> in approx.	

ADAPTIVE-TYPE Y/C SEPARATION

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
⑥	LIMIT CONTROL	2.5VDC In open state.	
⑦	C-OUT	1.8VDC BURST 280mVP-P in approx.	
⑧	ADAPTIVE/ SIMPLE COMB	4.9VDC In open state.	
⑨	LNC (Line Noise Canceller.)/ Y/C SEP	4.9VDC In open state.	

ADAPTIVE-TYPE Y/C SEPARATION

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
⑩	1H DLY IN	3.1V <sub>DC</sub> BURST 70mV <sub>P-P</sub> in approx.	
⑪	GND	0V <sub>DC</sub>	—
⑫	BPF IN	3.1V <sub>DC</sub> BURST 140mV <sub>P-P</sub> in approx.	
⑬	N.C	On board, this pin is connected to ground.	—
⑭	C-VIDEO IN	2.9V <sub>DC</sub> VIDEO 0.5V <sub>P-P</sub> in approx.	