M52354FP

ADAPTIVE-TYPE Y/C SEPARATION

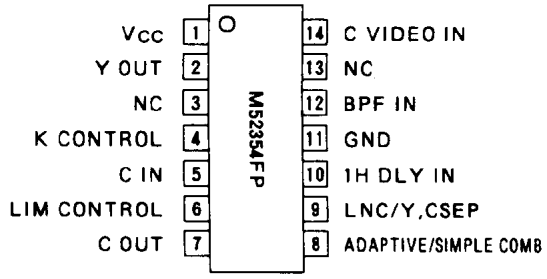
DESCRIPTION

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)



Outline 14P2N-A

NC : NO CONNECTION

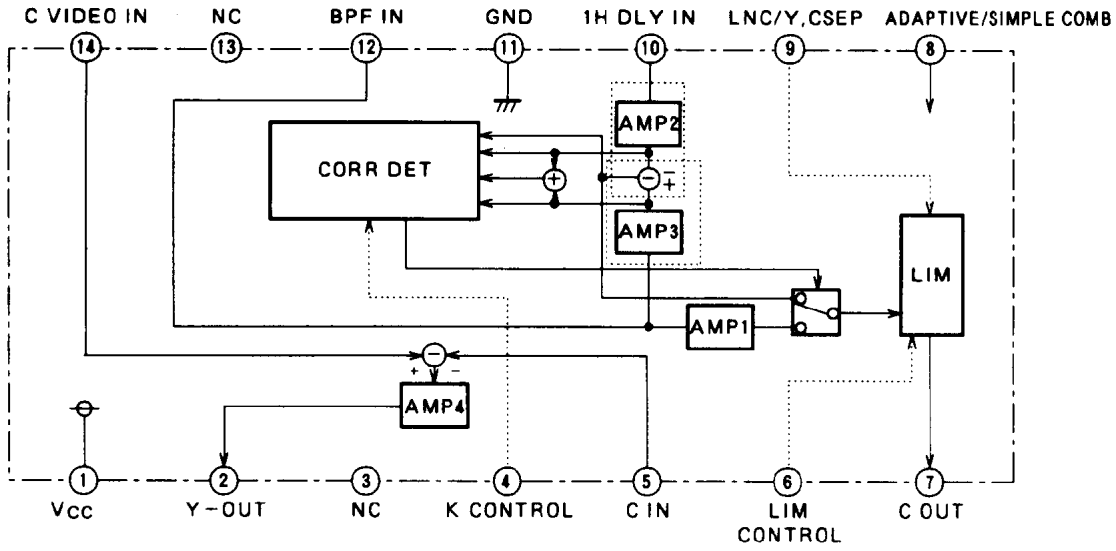
APPLICATION

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

RECOMMENDED OPERATING CONDITION

Rated supply voltage 5.0V

BLOCK DIAGRAM



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

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	6.0	V
Pd	Power dissipation	900	mW
T_{opr}	Operating temperature	−20～+75	℃
T_{stg}	Storage temperature	−40～+125	℃
K_θ	Thermal derating (Ta≧25℃)	9.0	mW/℃

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test point	Test conditions	Limits			Unit
				Min.	Typ.	Max.	
AMP1							
$A1_G$	Gain	⑦	⑫3.58MHz 0.15Vp-pCW LIMOFF ④GND ②Vcc	5.1	6.6	7.1	dB
$A1_{fd}$	Lower frequency characteristics	⑦	⑫200kHz 3.58MHz 0.15Vp-pCW LIMOFF ④GND ②Vcc	−4.5	−3.0	−1.5	dB
$A1_{fu}$	Upper frequency characteristics	⑦	⑫3.58MHz 0.15Vp-p 0.45Vp-pCW LIMOFF ④GND ②Vcc	−2.5	−1.0	−0.5	dB
$A1_L$	Linearity	⑦	⑫10MHz 3.58MHz 0.15Vp-pCW LIMOFF ④GND ②Vcc	95	100	105	%
AMP2							
$A2_G$	Gain	⑦	⑩3.58MHz 50mVp-pCW LIMOFF ④GND	3.6	5.1	6.6	dB
$A2_{fd}$	Lower frequency characteristics	⑦	⑩220kHz 3.58MHz 50mVp-pCW LIMOFF ④GND	−4.5	−3.0	−1.5	dB
$A2_{fu}$	Upper frequency characteristics	⑦	⑩10MHz 3.58MHz 80mVp-pCW	−2.3	−0.8	0.7	dB
$A2_L$	Linearity	⑦	⑩3.58MHz 80mVp-pCW LIMOFF ④GND	95	100	105	%
AMP3							
$A3_G$	Gain	⑦	⑫3.58MHz 0.15Vp-pCW LIMOFF ④GND	−1.4	0.6	2.6	dB
$A3_{fd}$	Lower frequency characteristics	⑦	⑫200kHz 3.58MHz 0.15Vp-pCW LIMOFF ④GND	−4.5	−3.0	−1.5	dB
$A3_{fu}$	Upper frequency characteristics	⑦	⑫3.58MHz 10MHz 0.15Vp-pCW LIMOFF ④GND	−3.1	−1.6	−0.5	dB
$A3_L$	Linearity	⑦	⑫3.58MHz 0.15&0.75Vp-pCW LIMOFF ④GND	95	100	105	%
AMP4							
$A4_{G1}$	Gain 1	②	⑭100kHz 0.5Vp-pCW	4.6	5.6	6.6	dB
$A4_{f1}$	Frequency characteristics 1	②	⑭100kHz 5MHz 0.5Vp-pCW	−0.5	0.0	0.5	dB
$A4_{L1}$	Linearity 1	②	⑭100kHz 0.5&1.0Vp-pCW	95	100	105	%
$A4_{G2}$	Gain 2	②	⑤3.58MHz 0.3Vp-pCW	4.6	5.6	6.6	dB
$A4_{f2}$	Frequency characteristics 2	②	⑤100kHz 3.58MHz 0.3Vp-pCW	−0.5	0.0	0.5	dB
$A4_{L2}$	Linearity 2	②	⑤3.58MHz 0.3&0.6Vp-pCW	95	100	105	%
Y-COMB AMP							
YC_{G1}	Gain 1	②	⑩3.58MHz 80mVp-pCW ④GND	6.6	8.6	10.6	dB
YC_{f1}	Frequency characteristics 1	②	⑩100kHz 3.58MHz 50mVp-pCW ④GND	−1.5	0	1.5	dB
YC_{L1}	Linearity	②	⑩3.58MHz 50mVp-p 240mVp-pCW ④GND	95	100	105	%
YC_{G2}	Gain 2	②	⑫3.58MHz 150mVp-pCW ④GND	2.7	4.2	5.7	dB

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

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Test conditions	Limits			Unit
				Min.	Typ.	Max.	
YC_{f2}	Frequency characteristics 2	②	⑫100kHz 5MHz 150mVP-PCW ④GND	−1.5	0	1.5	dB
YC_{L2}	Linearity 2	②	⑫3.58MHz 150mVP-P 450mVP-PCW ④GND	95	100	105	%
LIM							
L_1	LIM characteristics 1	⑦	⑫1MHz 0.2VP-PCW ④GND ②Vcc ⑥5V ⑨Vcc/GND Change in each case.	−1.0	0	1.0	dB
L_2	LIM characteristics 2	⑦	⑫1MHz 0.2VP-PCW ④GND ②Vcc ⑥3V ⑨Vcc/GND Change in each case.	−5.0	−4.0	−3.0	dB
L_3	LIM characteristics 3	⑦	⑫1MHz 0.2VP-PCW ④GND ②Vcc ⑥2V ⑨Vcc/GND Change in each case.	−7.2	−6.2	−5.2	dB
L_4	LIM characteristics 4	⑦	⑫1MHz 0.2VP-PCW ④GND ②Vcc ⑥1V ⑨Vcc/GND Change in each case.	−20	−18	−16	dB
L_5	LIM characteristics 5	⑦	⑫1MHz 0.2VP-PCW ④GND ②Vcc ⑥0V ⑨Vcc/GND Change in each case.	−30	−27	−24	dB
Mode switching							
T_{YC}	Y/C selection threshold	②	⑫3.58MHz 0.2VP-PCW ④GND/Vcc	−	0.9	1.2	V
T_{BPF}	BPF selection threshold	⑦	⑩3.58MHz 50mVP-PCW ④GND ②OPEN/Vcc	4.1	4.4	−	V
T_L	LIM ON/OFF threshold	⑦	⑫1MHz 0.2VP-PCW ④GND ②Vcc ⑥GND ⑨Vcc/GND	2.1	2.4	2.7	V
T_{AS}	Adaptive/simple comb threshold	⑦ ⑧	⑩3.58MHz 80mVP-P ④5V, ⑨0V	2.2	2.5	2.8	V
Others							
I_{CC1}	Circuit current	①	④2.5V ⑥2.5V ⑧5V ⑨GND	17	22	27	mA

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

ELECTRICAL CHARACTERISTICS TEST METHOD

	Parameter	Test method	Test conditions
AMP1	Gain	The amplitude at TP7 is defined as AV_{P-P}. $A1_G = 20\log \frac{A}{0.15}$ (dB)	SW12=b SW2=ON V2=5V V4=0V V8=5V V9=0V SG12=3.58MHz, 0.15V_{P-P}CW
	Lower frequency characteristics	The amplitude when 200kHz is input at TP7 is defined as AV_{P-P} and the amplitude when 3.58MHz is input is defined as BV_{P-P}. $A1_{fd} = 20\log \frac{A}{0.15} - 20\log \frac{B}{0.15}$ (dB)	SW12=b SW2=ON V2=5V V4=0V V8=5V V9=0V SG12=200kHz and 3.58MHz 0.15V_{P-P}CW
	Upper frequency characteristics	The amplitude when 10MHz is input at TP7 is defined as AV_{P-P} and the amplitude when 3.58MHz is input is defined as BV_{P-P}. $A1_{fu} = 20\log \frac{A}{0.15} - 20\log \frac{B}{0.15}$ (dB)	SW12=b SW2=ON V2=5V V4=0V V8=5V V9=0V SG12=10MHz and 3.58MHz 0.15V_{P-P}CW
	Linearity	The amplitude when 0.15V_{P-P} is input at TP7 is defined as AV_{P-P} and the amplitude when 0.45V_{P-P} is input is defined as BV_{P-P}. $A1_L = \frac{B}{3 \times A} \times 100(\%)$	SW12=b SW2=ON V2=5V V4=0V V8=5V V9=0V SG12=3.58MHz 0.15&0.45V_{P-P}CW
AMP2	Gain	The amplitude at TP7 is defined as AmV_{P-P}. $A2_G = 20\log \frac{A}{80}$ (dB)	SW10=b V4=0V V8=5V V9=0V SG10=3.58MHz 50mV_{P-P}CW
	Lower frequency characteristics	The amplitude when 200kHz is input at TP7 is defined as AV_{P-P} and the amplitude when 3.58MHz is input is defined as BV_{P-P}. $A2_{fd} = 20\log \frac{A}{80} - 20\log \frac{B}{80}$ (dB)	SW10=b V4=0V V8=5V V9=0V SG10=220kHz&3.58MHz 80mV_{P-P}CW
	Upper frequency characteristics	The amplitude when 10MHz is input at TP7 is defined as AmV_{P-P} and the amplitude when 3.58MHz is input is defined as BmV_{P-P}. $A2_{fu} = 20\log \frac{A}{80} - 20\log \frac{B}{80}$ (dB)	SW10=b V4=0V V8=5V V9=0V SG10=10MHz&3.58MHz 80mV_{P-P}CW
	Linearity	The amplitude when 50mVp-p is input at TP7 is defined as AV_{P-P} and the amplitude when 250mV_{P-P} is input is defined as BV_{P-P}. $A2_L = \frac{B}{3 \times A} \times 100(\%)$	SW10=b V4=0V V8=5V V9=0V SG10=3.58MHz 50&250mV_{P-P}CW
AMP3	Gain	The amplitude at TP7 is defined as AV_{P-P}. $A3_G = 20\log \frac{A}{0.15}$ (dB)	SW12=b V4=0V V8=5V V9=0V SG12=10MHz and 3.58MHz 0.15V_{P-P}CW
	Lower frequency characteristics	The amplitude when 200kHz is input at TP7 is defined as AV_{P-P} and the amplitude when 3.58MHz is input is defined as BV_{P-P}. $A3_{fd} = 20\log \frac{A}{0.15} - 20\log \frac{B}{0.15}$ (dB)	SW12=b V4=0V V8=5V V9=0V SG12=200kHz and 3.58MHz 0.15V_{P-P}CW
	Upper frequency characteristics	The amplitude when 10MHz is input at TP7 is defined as AV_{P-P} and the amplitude when 3.58MHz is input is defined as BV_{P-P}. $A3_{fu} = 20\log \frac{A}{0.15} - 20\log \frac{B}{0.15}$ (dB)	SW12=b V4=0V V8=5V V9=0V SG12=10MHz and 3.58MHz 0.15V_{P-P}CW

ELECTRICAL CHARACTERISTICS TEST METHOD (cont.)

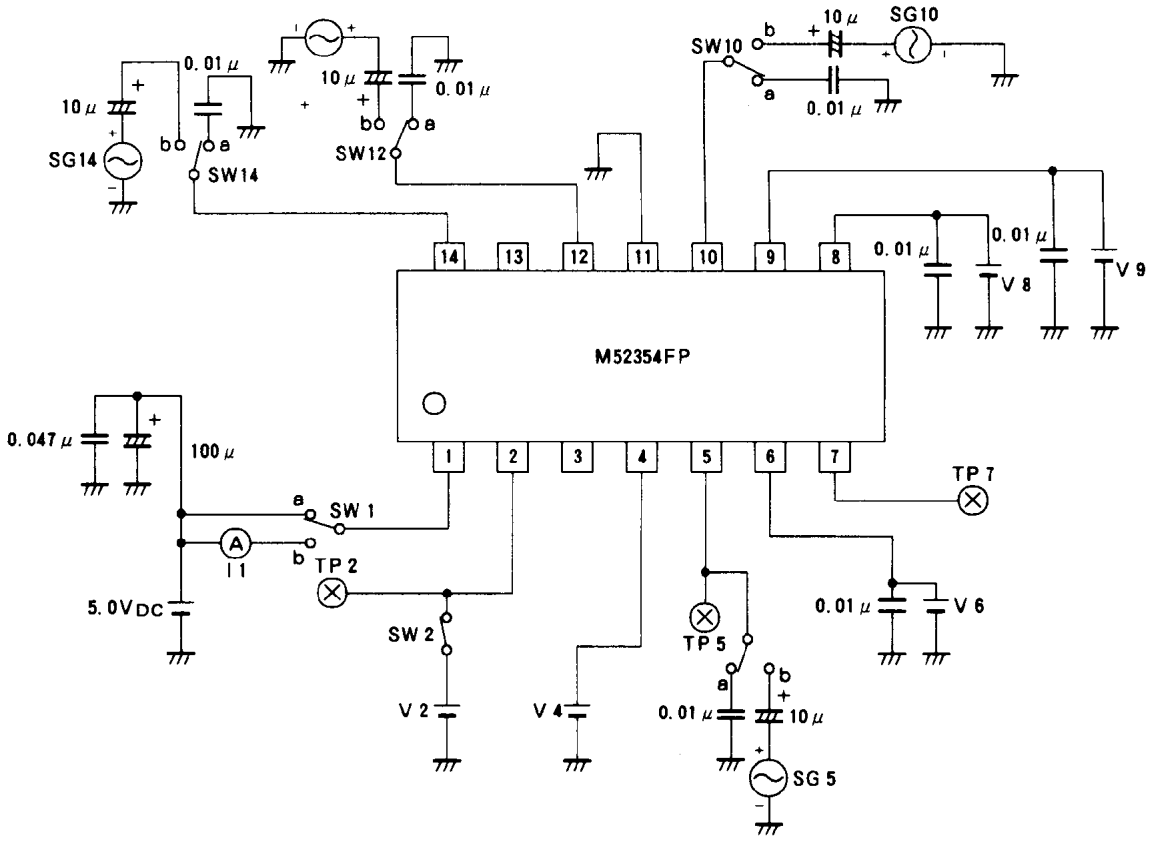
	Parameter	Test method	Test conditions
AMP3	Linearity	The amplitude when 0.15V_{P-P} is input at TP7 is defined as AVp-p and the amplitude when 0.75V_{P-P} is input is defined as BV_{P-P}. $A3_L = \frac{B}{5 \times A} \times 100(\%)$	SW12=b V4=0V V8=5V V9=0V SG12=3.58MHz, 0.15&0.75V_{P-P}CW
AMP4	Gain 1	The amplitude at TP2 is defined as AmV_{P-P}. $A4_{G1} = 20\log \frac{A}{0.5}$ (dB)	SW14=b V8=5V SG14=100KHz, 0.5V_{P-P}CW
	Frequency characteristics 1	The amplitude when 5MHz is input at TP2 is defined as AV$_{P-P}$ and the amplitude when 100kHz is input is defined as BV_{P-P}. $A4_{f1} = 20\log \frac{A}{0.5} - 20\log \frac{B}{0.5}$ (dB)	SW14=b V8=5V SG14=100KHz& 5MHz 0.5V_{P-P}CW
	Linearity 1	The amplitude when 0.5V_{P-P} is input at TP2 is defined as AV$_{P-P}$ and the amplitude when 1.0V_{P-P} is input is defined as BV_{P-P}. $A4_{L1} = \frac{B}{2 \times A} \times 100(\%)$	SW14=b V8=5V SG14=100KHz 0.5&1.0V_{P-P}CW
	Gain 2	The amplitude at TP2 is defined as AmV_{P-P}. $A4_{G2} = 20\log \frac{A}{0.3}$ (dB)	SW5=b V8=5V SG5=3.58MHz 0.3V_{P-P}CW
	Frequency characteristics 2	The amplitude when 5MHz is input at TP2 is defined as AV$_{P-P}$ and the amplitude when 100kHz is input is defined as BV_{P-P}. $A4_{f2} = 20\log \frac{A}{0.3} - 20\log \frac{B}{0.3}$ (dB)	SW5=b V8=5V SG5=3.58MHz 0.3V_{P-P}CW
	Linearity 2	The amplitude when 0.3V_{P-P} is input at TP2 is defined as AV$_{P-P}$ and the amplitude when 0.6V_{P-P} is input is BV_{P-P}. $A4_{L2} = \frac{B}{2 \times A} \times 100(\%)$	SW5=b V8=5V SG5=3.58MHz, 0.3&0.6V_{P-P}CW
Y-COMB AMP	Gain 1	The amplitude at TP2 is defined as AV$_{P-P}$. $YC_{G1} = 20\log \frac{A}{80}$ (dB)	SW10=b V4=0V V8=5V SG10=3.58MHz 80mV_{P-P}CW
	Frequency characteristics 1	The amplitude when 5MHz is input at TP2 is defined as AV$_{P-P}$ and the amplitude when 100kHz is input is defined as BV_{P-P}. $YC_{f1} = 20\log \frac{A}{80} - 20\log \frac{B}{80}$ (dB)	SW10=b V4=0V V8=5V SG10=10MHz and 3.58MHz 80mV_{P-P}CW
	Linearity 1	The amplitude when 80mV_{P-P} is input at TP2 is defined as AmV_{P-P} and the amplitude when 240mV_{P-P} is input is BmV_{P-P}. $YC_{L1} = \frac{B}{3 \times A} \times 100(\%)$	SW10=b V4=0V V8=5V SG10=3.58MHz 80&240mV_{P-P}CW
	Gain 2	The amplitude at TP2 is defined as AV$_{P-P}$. $YC_{G2} = 20\log \frac{A}{0.15}$ (dB)	SW12=b V4=0V V8=5V SG12=3.58MHz 0.15V_{P-P}CW

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 AV_{P-P} and the amplitude when 100kHz is input is defined as BV_{P-P}. $YC_{f2}=20\log\frac{A}{0.15}-20\log\frac{B}{0.15}$ (dB)	SW12=b V4=0V V8=5V SG12=100KHz & 5MHz 0.15V_{P-P}CW
	Linearity 2	The amplitude when 0.15V_{P-P} is input at TP2 is defined as AV_{P-P} and the amplitude when 0.45V_{P-P} is input is defined as BV_{P-P}. $YC_{L2}=\frac{B}{3\times A}\times 100(\%)$	SW12=b V4=0V V8=5V SG12=3.58MHz, 0.15&0.45V_{P-P}CW
LIM	LIM characteristics 1	Find the variance between V9=5V and V9=0V at TP7. $L_1=20\log\frac{\text{Amplitude at V9=5V}}{\text{Amplitude at V9=0V}}$ (dB)	SW12=b V2=5V V4=0V V6=5V V9=5V/0V SG12=1MHz 0.2V_{P-P}CW
	LIM characteristics 2	Find the variance between V9=5V and V9=0V at TP7. $L_2=20\log\frac{\text{Amplitude at V9=5V}}{\text{Amplitude at V9=0V}}$ (dB)	SW12=b V2=5V V4=0V V6=3V V9=5V/0V SG12=1MHz 0.2V_{P-P}CW
	LIM characteristics 3	Find the variance between V9=5V and V9=0V at TP7. $L_3=20\log\frac{\text{Amplitude at V9=5V}}{\text{Amplitude at V9=0V}}$ (dB)	SW12=b V2=5V V4=0V V6=2V V9=5V/0V SG12=1MHz 0.2V_{P-P}CW
	LIM characteristics 4	Find the variance between V9=5V and V9=0V at TP7. $L_4=20\log\frac{\text{Amplitude at V9=5V}}{\text{Amplitude at V9=0V}}$ (dB)	SW12=b V2=5V V4=0V V6=1V V9=5V/0V SG12=1MHz 0.2V_{P-P}CW
	LIM characteristics 5	Find the variance between V9=5V and V9=0V at TP7. $L_5=20\log\frac{\text{Amplitude at V9=5V}}{\text{Amplitude at V9=0V}}$ (dB)	SW12=b V2=5V V4=0V V6=0V V9=5V/0V SG12=1MHz 0.2V_{P-P}CW
Mode switching	Y/C selection threshold	Increase the voltage gradually from V4=0V until signal output (3.58MHz, 0.32V_{P-P} in approx.) at TP2 ceases. V2 (V) at that time is defined as TBPF.	SW12=b Increase voltage from V4=V0. SG12=3.58MHz 0.2V_{P-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, 0.17V_{P-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 50mV_{P-P}CW (Note) Voltage which is lower than open voltage of pin ②should never be applied to pin ②.
	LIM ON/OFF threshold	Increase the voltage gradually from V9=5V until signal output (1MHz, 0.43V_{P-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 0.2V_{P-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, 80mV_{P-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

ADAPTIVE-TYPE Y/C SEPARATION

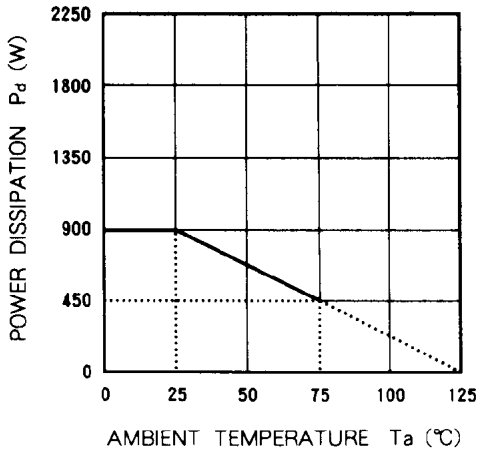
TEST CIRCUIT



Units Resistance : Ω
Capacitance : F

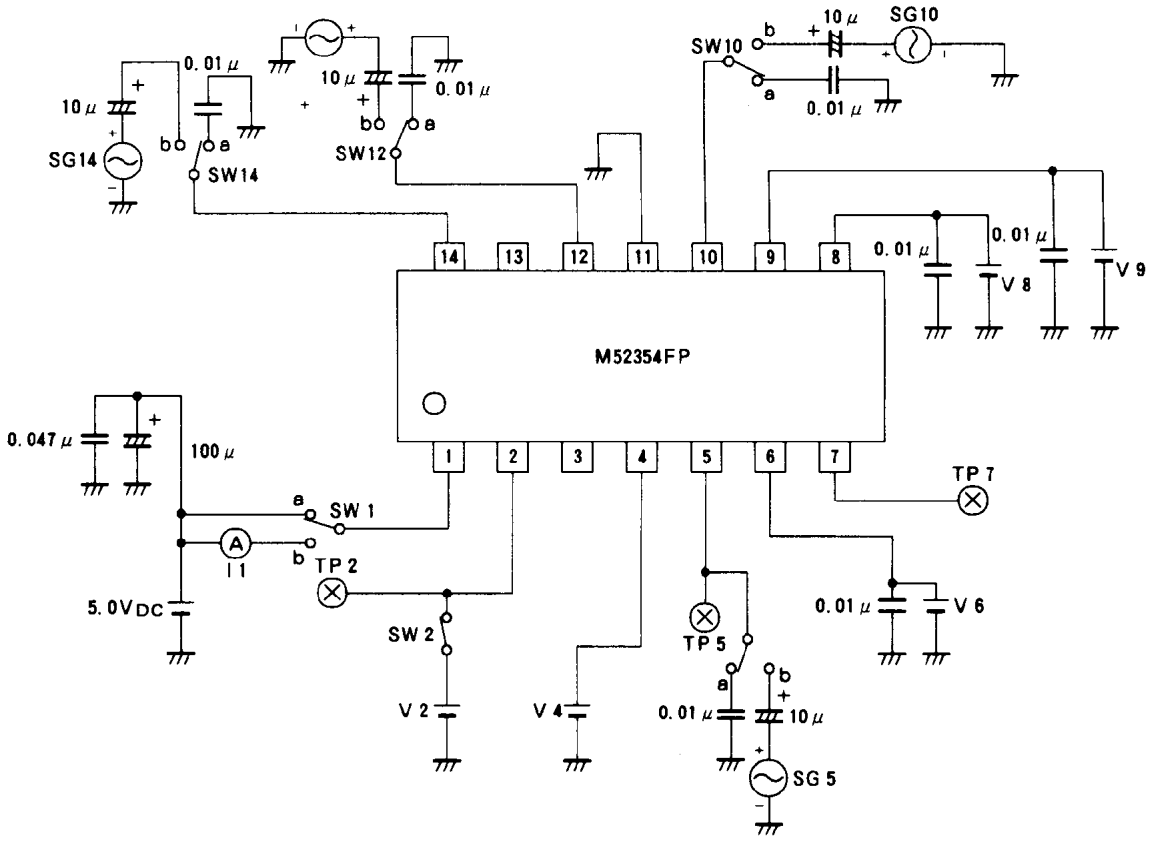
TYPICAL CHARACTERISTICS

THERMAL DERATING (MAXIMUM RATING)



ADAPTIVE-TYPE Y/C SEPARATION

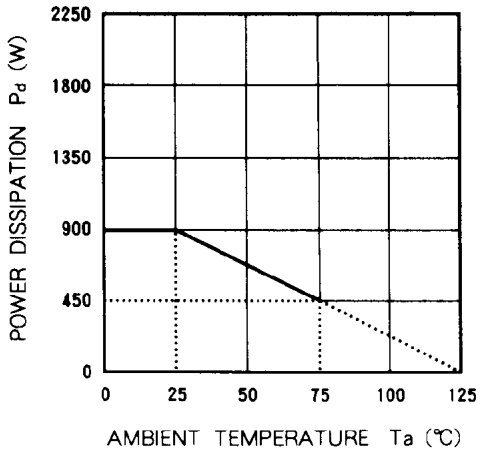
TEST CIRCUIT



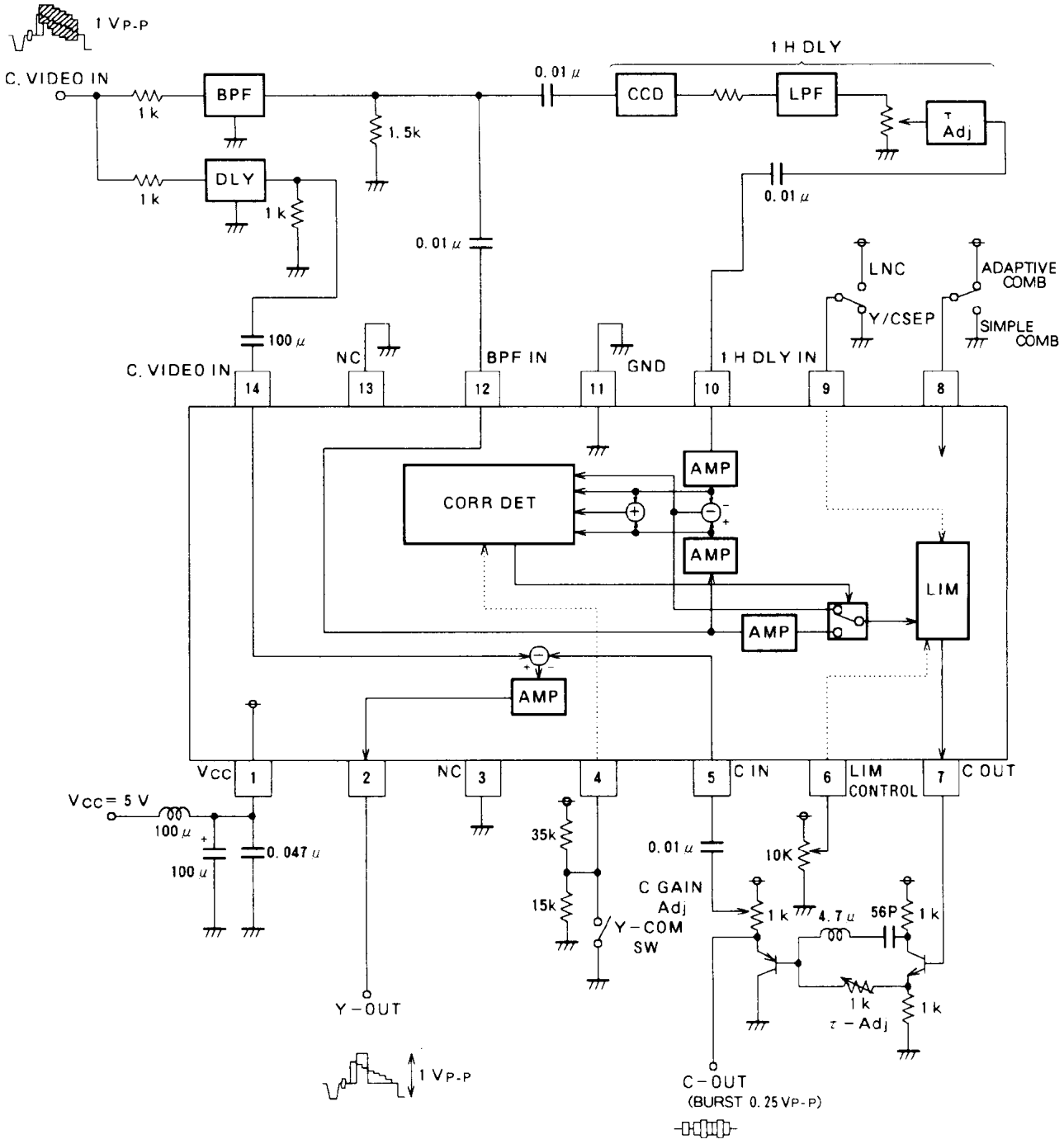
Units Resistance : Ω
Capacitance : F

TYPICAL CHARACTERISTICS

THERMAL DERATING (MAXIMUM RATING)

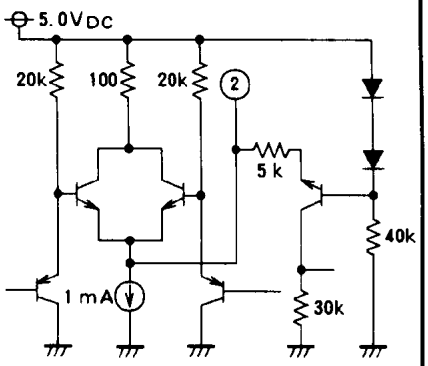
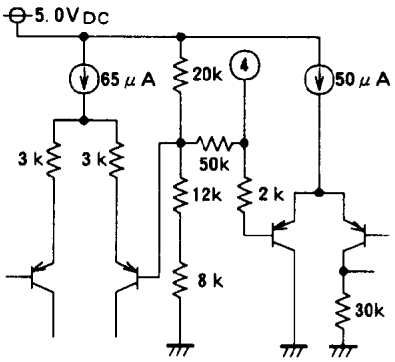
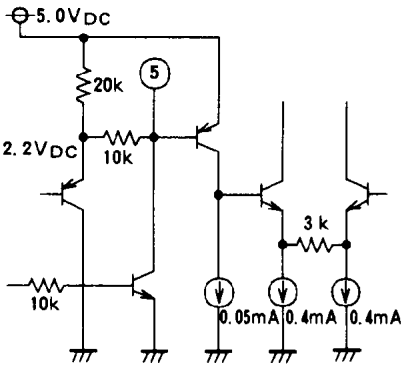


APPLICATION EXAMPLE

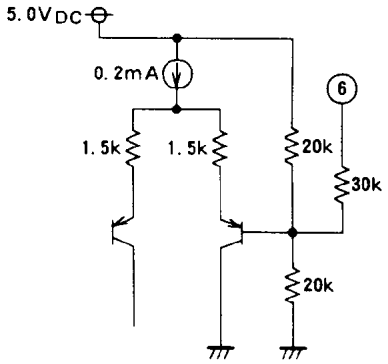
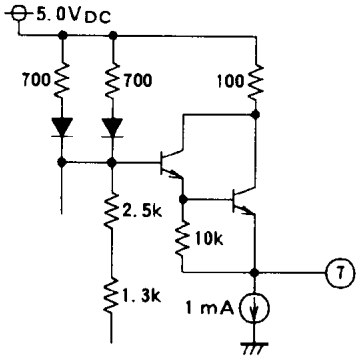
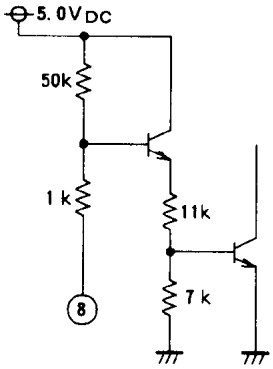
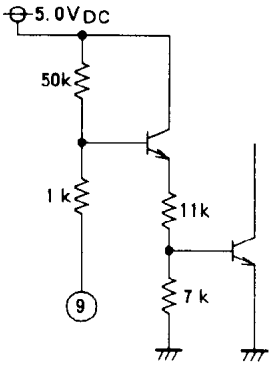


Units Resistance : Ω
Capacitance : F

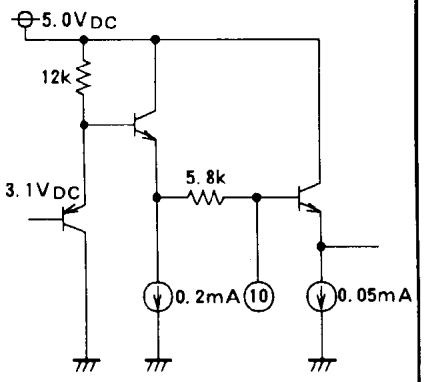
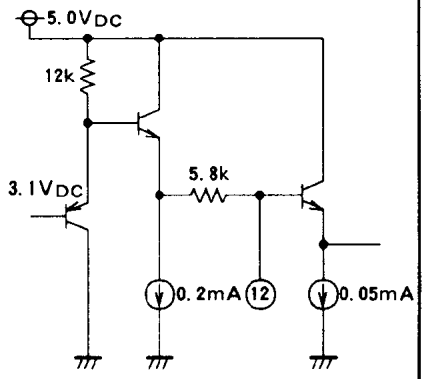
DESCRIPTION OF PIN

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
①	Vcc	5.0VDC	—
②	Y-OUT	2.4VDC Y 1VP-P in approx.	
③	N.C	On board, this pin is connected to ground.	—
④	K-CONTROL	2.5VDC In open state.	
⑤	C-IN	2.9VDC BURST 140mVP-P in approx.	

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.	

DESCRIPTION OF PIN (cont.)

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