

MITSUBISHI ICs (TV)
M51307BSP

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION

The M51307BSP is a semiconductor integrated circuit with signal processing functions for video IF, sound IF, video, color, deflection signals and a single chip capable of processing color TV signals.

Combined with tuner and simple output stage of discrete transistors, it enables more rationalized designs of color TV sets.

FEATURES

- Large integration enables rationalization and high equipment reliability with low power consumption.
- A direct output pin for sound FM detector is provided, applicable to sound multiplexing.
- The most appropriate constants can be set by the synchronization separation input pins for horizontal and vertical deflection.
- No horizontal free run frequency adjustment.
- AFT defeat and sound muting capability.
- DC voltage controls picture quality, contrast, luminance, color saturation, Tint and volume.
- A52-pin shrink DIL package enables mounting in compact equipment.

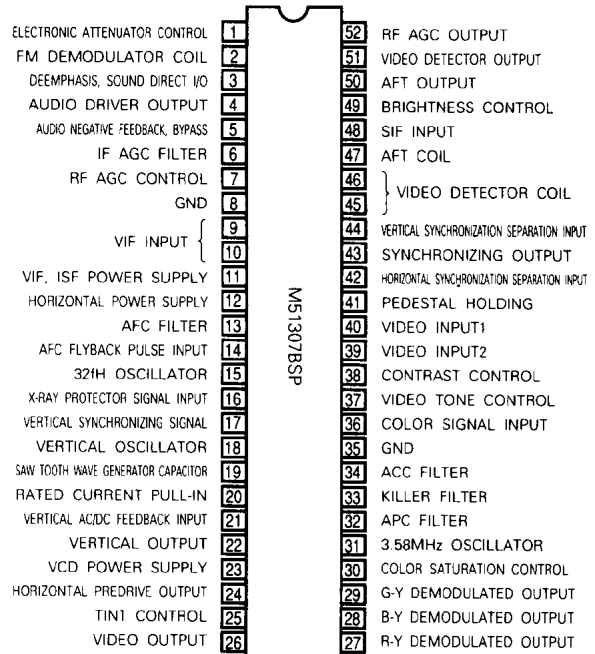
APPLICATION

NTSC system color television set

RECOMMENDED OPERATING CONDITION

Supply voltage	9V
Horizontal supply current	14mA
Operating supply voltage	8.5~9.5V
Operating horizontal supply currents	12~16mA

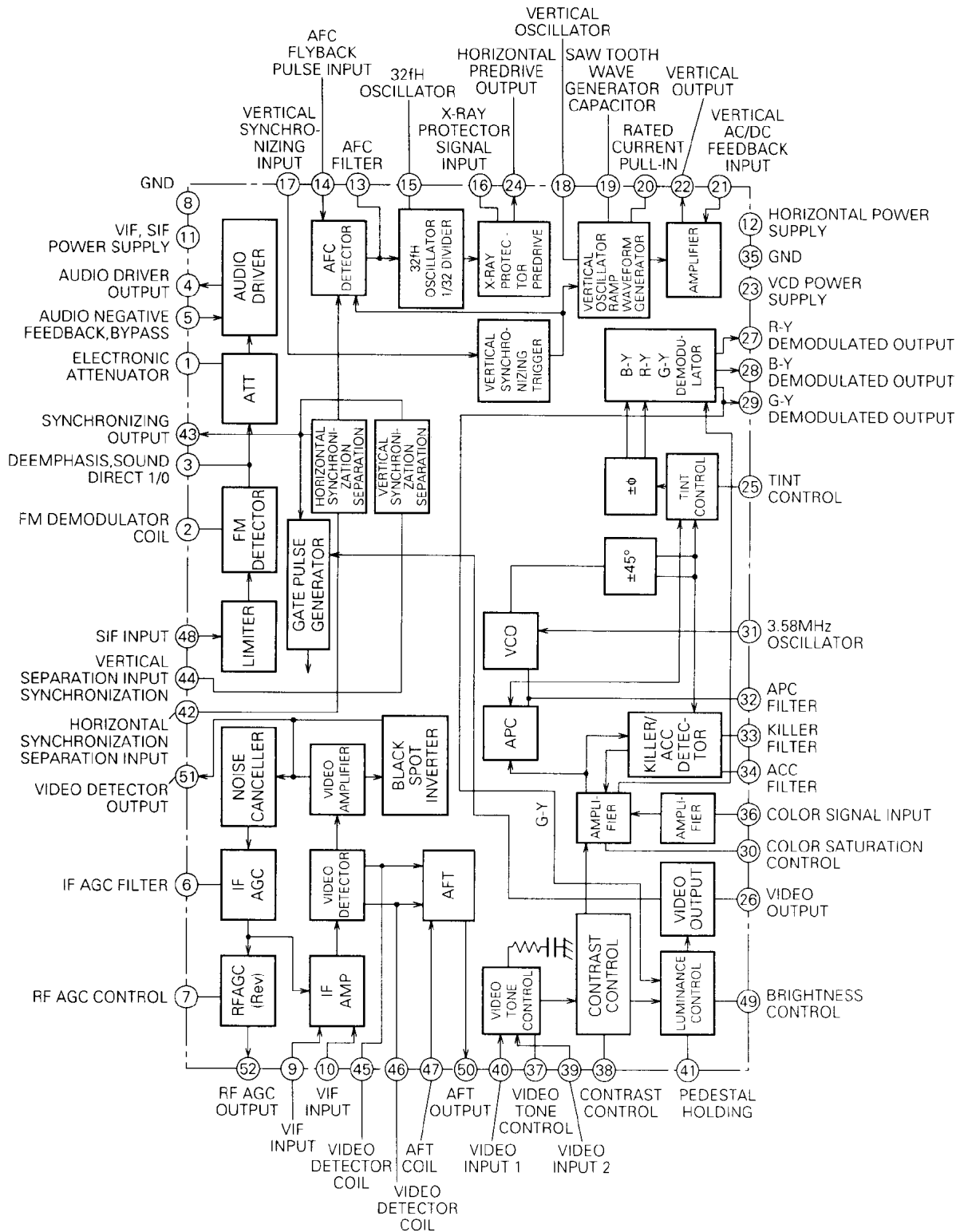
PIN CONFIGURATION (TOP VIEW)



Outline 52P4B

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

BLOCK DIAGRAM



NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V _{CC}	Supply voltage	11	V
P _d	Power dissipation	1.4	W
T _{opr}	Operating temperature	-20~65	°C
T _{stg}	Storage temperature	-40~125	°C

ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise noted)

Symbol	Parameter	Test conditions (test circuit)											Limits			Unit		
		Test point	Input signal		External power supply (V)			Switch setting					Test method	Min.	Typ.		Max.	
			V _{IF}	S _{IF}	V ₁	V ₆	V ₇	1	2	6	11	47						
VIF, SIF																		
I _{CC(1)}	Circuit current I1	A11			0		3	ON	OFF	OFF	2	OFF			27	36	48	mA
V _{SD1}	Video detector output DC voltage	TP.51			0	0	3	ON	ON	ON	1	OFF			4.5	4.9	5.3	V
V _{O det}	Video detector output	TP.51	SG2 90dB _μ		0		3	ON	ON	OFF	1	OFF			1.7	2.0	2.3	V _{P-P}
f _{B(V)}	Video frequency characteristics	TP.51	SG5		0		3	ON	ON	OFF	1	OFF	(Refer to V-1)		-3	0	3	dB
P/N	Video S/N	TP.51A	SG1 90dB _μ		0		3	ON	ON	OFF	1	OFF	Insert an LPF (which decreases the output voltage by 3dB at 5MHz) between TP.51 and TP.51A and measure output voltage in rms at TP.51A. $P/N=20\log \left\{ \frac{V_{odet}(V_{p-p}) \times 0.714}{noise(V_{rms})} \right\}$		46	54		dB
V _{in(min)}	Input sensitivity	TP.51	SG2 variable level		0		3	ON	ON	OFF	1	OFF	Input level at which detector output at TP.51 is decreased by 3dB from the measured V _{odet} by decreasing SG2 level.		44	51	57	dB _μ
V _{in(max)}	Permissible maximum input	TP.51	SG3 variable level		0		3	ON	ON	OFF	1	OFF	Input level at which detector output is decreased by 3dB from V _A by increasing SG3 level when SG3 of 90dB _μ is input and TP51 detector output = V _A		107	113		dB _μ
GR	IF AGC control range												GR = V _{in(max)} - V _{in(min)}		54	62		dB
V _{SD}	AFT output voltage	50			0	0	3	ON	ON	ON	1	OFF			3.0	4.3	5.6	V
f _{AFT}	AFT detector sensitivity	50	SG6 90dB _μ		0		3	ON	ON	OFF	1	OFF	(Refer to V-2)		40	60	100	mV/kHz
V _{SDH}	AFT control voltage	50	SG7 90dB _μ		0		3	ON	ON	OFF	1	OFF			8.0	8.6		V
V _{SDL}			SG8 90dB _μ														0.4	1.0
AFT _{SW}	AFT switch operation	50	SG6 90dB _μ		0		3	ON	ON	OFF	1	ON	(Refer to V-3)		4.35	4.5	4.65	V
V _{SDH}	RF AGC control voltage	52	SG1 90dB _μ		0		1.5	ON	ON	OFF	1	OFF			6.8	7.7		V
V _{SDL}					4.5													0.01
V _{BTH}	Black spot inverter threshold level	TP.51	SG6 90dB _μ		0	Variable	3	ON	ON	ON	1	OFF	Measure each DC voltage 		1.6	1.9	2.2	V
V _{BCL}	Black spot inverter clamp level																3.1	3.6
V ₄	AF output DC voltage	4	—	—	0	0	3	ON	OFF	—	1	ON			2.7	3.3	4.0	V
V _{O AFmax}	AF maximum output	4	—	SG11 100dB _μ	9	0	3	ON	OFF	ON	1	ON			0.55	0.9	1.4	V _{rms}
ATT	Maximum attenuation	4	—	SG11 100dB _μ	0	0	3	ON	OFF	ON	1	ON	Measure pin 4 output ATT = 20log $\left\{ \frac{V_{O AFmax}(mV_{rms})}{Measured V_{rms} output} \right\}$		60	70		dB
THD _{AF}	AF output distortion	4	—	SG11 100dB _μ	0	3	OFF	OFF	ON	—	1	ON				0.5	1.0	%
V _{in(lim)}	Input limiting sensitivity	4	—	SG11 variable level	9	0	3	ON	OFF	ON	1	ON	Input level at which detector output at pin 4 is decreased by 3dB from V _{O AFmax} by decreasing SG11 level			50	58	dB _μ
AMR	AMR	4	—	SG12 100dB _μ	9	0	3	ON	OFF	ON	1	ON	Measure pin 4 output voltage AMR = 20log $\left\{ \frac{V_{O AFmax}(mV_{rms})}{Measured V_{rms} output} \right\}$		40	55		dB

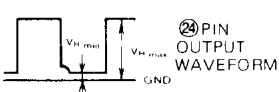
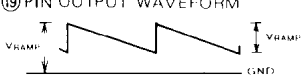


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NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test conditions (test circuit)										Limits			Unit				
		Test point	Input signal		External power supply (V)			Switch setting				Test method	Min.	Typ.		Max.			
			VIF	SIF	V ₁	V ₆	V ₇	1	2	6	11	47							
VIF, SIF																			
S/N	AF S/N	4	—	SG10 100dB _#	9	0	3	ON	OFF	ON	1	ON	S/N=20log $\left\{ \frac{V_{OAFmax}(mVrms)}{\text{Measured Value } mVrms} \right\}$			60	70		dB
V _{OAF3}		TP.3	—	SG11 100dB _#	0	0	3	ON	OFF	ON	1	ON				0.5	0.7	1.0	Vrms
MUTE		TP.3	—	SG11 100dB _#	0	0	3	ON	ON	ON	1	ON	(Refer to S-1)			60	70		dB

Symbol	Parameter	Test conditions (test circuit)						Limits			Unit			
		Test point	Input signal		Test method *SW is off, unless otherwise stated. The number in the ○ shows pin no.			Min.	Typ.	Max.				
			J	V										
VCD														
V _{43HH}	Synchronization separation operation	43	SG22 +12dB	SW16=ON→0V, SW18,21,23=1, SW41=2				8.0	8.9		V _{O-P}			
V _{43HL}				SW44=HH, HL=ON				2.6	3.1	3.6				
V _{43VH}				SW42=VH, VL=ON				8.0	8.9					
V _{43VL}				(Refer to J _S -1)				2.6	3.1	3.6				
T _{RGP-I}	Gate pulse timing	41	SG22 +12dB	SW16=ON→0V, SW18,21,23=1, SW41=3				0	0.8	1.5	μs			
T _{BGP-II}				(Refer to J _S -2)				2.5	3.5	5.0				
f _H	Free run frequency	24		Pin ⑭ output frequency when only ⑫ H, V _{CC} 9V is applied when SW16 = ON → 0V, SW18, 21, 23 = 1, SW41 = 2, SW42, 44 = ON				15.000	15.734	16.000	kHz			
V _{I2min}	Oscillator starting voltage	12 24		Applied voltage at pin ⑫ when the cycle of output waveform at pin ⑭ is approximately 63.5μs and the high voltage time span period is ≈ 31μs by gradually increasing the ⑫ H, V _{CC} from low voltage (≈ 2.0V) with SW = f _H .					4.3	5.3	V			
f _{PH}	Pull-in range	24	SG22 +12dB Note	SW16=ON→0V, SW18,21,23=1, SW41=2 (Refer to J _H -1)					±500		Hz			
V _{H min}	Output voltage	24		SW16=ON→0V SW42,44=ON SW18,21,23=1 SW41=2							0.3	V		
V _{H max}				(Refer to J _H -2)				3.0	4.0					
V _{PRO}	Overvoltage protector circuit operating voltage	16		SW16=ON→ variable SW18, 21, 23=1 SW41=2, SW42, 44=ON (Refer to J _H -2)				0.66	0.78	0.90	V			
f _V	Free run frequency	21		SW16=ON→0V, SW22, 44=ON SW18, 23=1 SW21, 41=2 Frequency at test point 21. Externally connected CRs at pin ⑩ are a capacitor of 0.27μF and a resistor of 107kΩ.				47	51.3	56	Hz			
V _{V min}	Output voltage	22		SW16=ON→0V SW18, 21, 23=1 SW41=2 SW44=ON				Pin ⑫ output voltage minimum voltage level (V _{V min})			0.3	V _{O-P}		
V _{V max}								Pin ⑫ output voltage maximum voltage level (V _{V max})			4.0		5.2	
V _{RAMP}	Ramp peak voltage	19		SW16=ON→0V ⑰ PIN OUTPUT WAVEFORM SW18, 23=1 SW21, 41=2 SW22, 44=ON							6.0	6.4	6.8	V _{O-P}
V _{P-P}	Ramp amplitude							1.4	1.7	2.0	V _{P-P}			
f _{PV}	Pull-in range	21	SG22 +12dB	SW16=ON→0V SW23=1 SW18, 21, 41=2 SW22, 42, 44=ON (Refer to J _V -1)				-15	-12		Hz			
V _{23min}	Oscillator starting voltage	21 23		SW16=ON→0V, SW21, 41=2 SW18, 23=1, SW22=ON (Refer to J _V -2)					4.0	5.0	V			
V _{23-P1}	Power supply voltage detector circuit operating voltage	I 22 23 24		SW16=ON→0V SW18, 21=1 SW23=1 variable SW41=2 (Refer to P-1 and P-2)				9.7	10.1	10.5	V			
V _{23-P2}		II 22 23					3.7	4.1	4.5					

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test conditions (test circuit)				Limits			Unit
		Test point	Input signal		Test method *SW is off, unless otherwise stated. The number in the ○ shows pin no.	Min.	Typ.	Max.	
VCD									
I _{CC23}	Circuit current	A23	SG22 +12dB		SW16=ON→0V, SW22=ON SW18=1, SW21,23,41=2	20	27	36	mA
Y _{max}	Maximum output	26		SG23 +20dB	SW16=ON→0V, SW21=2, SW38=6.5V SW18,23,41=1, SW22,42,44=ON Adjust pin ④ externally applied voltage so that pin ⑤ DC voltage becomes 4.5V.	5.0	6.5		V _{P-P}
G _Y	Standard gain	26		SG23	SW16=ON→0V, SW18,23,41=1 SW21=2, SW22,42,44=ON (Refer to Y-1)	8.5	11.5	14.5	dB
G _{Y norm}	Contrast variation characteristics	26		SG23	SW16=ON→0V SW18,23,41=1 SW21=2 (Refer to Y-2) SW22,42,44=ON SW38=4.5V→2.5V→6.5V	-2	0	2	dB
G _{Y min}							-30	-26	
G _{Y max}						2	5	8	
V _{BRT norm}	Luminance variation characteristics	26	SG22 +12dB		SW16=ON→0V SW18,23=1 SW21,41=2 SW22=ON SW49=5.2V→3.2V→7.2V Measure DC voltage level during scanning of pin ⑥ output.	2.6	3.4	4.2	V _{O-P}
V _{BRT L}							1.2	2.0	
V _{BRT H}						5.4	6.0		
G _P	Peaking value	26		SG23 SG24	SW16=ON→0V, SW21=2 SW18,23,41=1, SW22,42,44=ON (Refer to Y-3)	6	9.5	13	dB
G _{T norm}	Picture quality variation characteristics	26		SG24	SW16=ON→0V SW18,23,41=1 SW21=2 (Refer to Y-4) SW22,42,44=ON SW37=4.5V→6.5V→2.5V	-2	0	2	dB
G _{T min}							-14	-10	
G _{T max}						2	4	8	
f _{BY}	Frequency characteristics	26		SG26	SW16=ON→0V, SW21=2 SW18,23,41=1, SW22,42,44=ON (Refer to Y-5)	7	10.5	13	dB
DG _(Y)	Differential gain characteristics	26		SG23	SW16=ON→0V, SW21=2 SW18,23,41=1, SW22,42,44=ON (Refer to Y-6)		1	5	%
C _{max}	Demodulated maximum output	28	SG22 +12dB	SG28	SW16=ON→0V, SW21,41=2, SW30,38=6.5V SW18,23=1, SW22,24,26=ON (Refer to C-1)	3.3	4.2		V _{P-P}
C _{norm}	Demodulated typical output	27	SG22 +12dB	SG28	SW16=ON→0V, SW21,41=2 SW18,23=1, SW22,24,26=ON	2.1	2.6	3.1	V _{P-P}
ACC-I	ACC characteristics	27	SG22 +12dB	SG28 -20dB	SW16=ON→0V SW18,23=1 SW21,41=2 SW22,24,26=ON V _A , V _B and V _C are output signal voltages at pin ⑦ when input levels are changed to 0, -20 and +6dB. A _{CC I} = 20 log $\frac{V_B}{V_A}$, A _{CC II} = 20 log $\frac{V_C}{V_A}$	-7.3	-2.3	2.7	dB
ACC-II				SG28 +6dB		-3.2	-0.2	2.8	
C _{S norm}	Color control variation characteristics I	27	SG22 +12dB	SG28	SW16=ON→0V SW18,23=1 SW21,41=2 SW22,24,26=ON SW30=4.5V→2.5V→6.5V C _{S norm} is shown by the variance against C _{norm} . V _A , V _B and V _C are output signal voltages at pin ⑦ when color control voltages at pin ⑧ are changed to 4.5V, 2.5V and 6.5V. C _{S min} = 20 log $\frac{V_B}{V_A}$, C _{S max} = 20 log $\frac{V_C}{V_A}$	-2	0	2	dB
C _{S min}							-43	-32	
C _{S max}						2	4.5	8	
C _{U norm}	Color control variation characteristics II	27	SG22 +12dB	SG28	SW16=ON→0V SW18,23=1 SW21,41=2 SW22,24,26=ON SW38=4.5V→2.5V→6.5V C _{U norm} is shown by the variance against C _{norm} . V _A , V _B and V _C are output signal voltages at pin ⑦ when contrast control voltages at pin ⑨ are changed to 4.5V, 2.5V and 6.5V. C _{U min} = 20 log $\frac{V_B}{V_A}$, C _{U max} = 20 log $\frac{V_C}{V_A}$	-1.5	0.5	2.5	dB
C _{U min}							-40	-30	
C _{U max}						2	4	8	
f _{PC}	APC pull-in range	27	SG22 +12dB	SG29 variable f	SW16=ON→0V, SW22,24,26=ON SW18,23=1, SW21,41=2 (Refer to C-2)	±250	±500		Hz
V _{IK}	Killer operating input level	27	SG22 +12dB	SG29 variable level	SW16=ON→0V, SW21,41=2 SW18,23=1, SW22,24,26=ON (Refer to C-3)	-42	-35	-28	dB
V _{OK}	Killer color residual	28	SG22 +12dB	SG29 no burst	SW16=ON→0V, SW21,41=2, SW38=6.5V SW18,23=1, SW22,24,26=ON (Refer to C-4)		20	100	mV _{P-P}
R-Y	Demodulated output amplitude ratio	27	SG27 +12dB	SG29 f _c = 100 kHz	SW16=ON→0V SW18,23=1 SW21,41=2 SW22,24,26=ON (Refer to C-5)	0.84	0.91	0.98	-
B-Y		28				0.24	0.29	0.34	
G-Y		29							
B-Y	28								



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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test conditions (test circuit)				Limits			Unit	
		Test point	Input signal		Test method	Min.	Typ.	Max.		
VCD										
V ₂₇	Demodulated output voltage level	27	SG22 +12dB		SW16=ON→0V SW18,23=1 SW21,41=2 SW22,24,26=ON	4.7	5.1	5.5	V	
V ₂₈		28								
V ₂₉		29								
V ₂₇₋₂₈	Demodulated output offset voltage	27	SG22 +12dB		SW16=ON→0V, SW22,24,26=ON SW18,23=1 SW21,41=2	-0.3	0	0.3	V	
V ₂₈₋₂₉		28								
V ₂₉₋₂₇		29								
C _{L-27}	Demodulated output residual carrier	27	SG22 +12dB		SW16=ON→0V SW18,23=1 SW21,41=2 SW22,24,26=ON			0.2	V _{p-p}	
C _{L-28}		28								
C _{L-29}		29								
T	Tint control variation	27 28	SG22 +12dB	SG29	SW16=ON→0V, SW21,41=2, SW25=2.5V→6.5V SW18,23=1, SW22,24,26=ON (Refer to C-6)	75	90		deg	
T _{min}	Tint control characteristics	27 28	SG22 +12dB	SG29	SW16=ON→0V SW18,23=1 SW21,41=2 SW22,24,26=ON	-60	-40	-20	deg	
T _{grad}										SW25= { T _{min} 4.5V→2.5V T _{grad} 4.5V→4.0V T _{max} 4.5→6.5V (Refer to C-7)
T _{max}										
∠ _{R-Y}	Demodulated phase angle	27	SG22 +12dB	SG29	SW16=ON→0V SW18,23=1 SW21,41=2 SW22,24,26=ON		106		deg	
∠ _{G-Y}		29								f _c =100 kHz
ΔV _{Y,C}	Color tracking characteristics	26	SG22 +12dB	V input SG23	SW16=ON→0V, SW21=2, SW38=4.0V→4.5V SW18,23,41=1, SW22,42,44=ON (Refer to C-8)	-3	0	3	dB	
		28		C input SG28						
V _{30K}	Pin 30 voltage	30	SG28 +12dB		SW16=ON→0V, SW21,41=2 SW18,23=1, SW22,24,26=ON		0.2	0.35	V	

ELECTRICAL CHARACTERISTICS TEST METHOD

V-1 Video Frequency characteristics f_{B(V)}

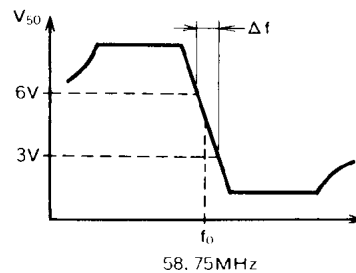
- Set SG5 as follows.
 - f₁=58.75MHz, V_{in}=90dBμ } mixed signal
 - f₂=57.75MHz, V_{in}=66dBμ }
- Measure the element of 1MHz at TP51 as V_A.
- Set SG5 as follows.
 - f₁=58.75MHz, V_{in}=90dBμ } mixed signal
 - f₂=52.75MHz, V_{in}=86dBμ }
- Measure the element of 6MHz at TP51 as V_B.

$$5. f_{B(V)} = 20 \log \frac{V_B}{V_A} \text{ [dB]}$$

V-2 AFT Detector Sensitivity μAFT

- Input SG6 by 90dBμ.
- Measure frequency difference when the DC voltage at pin 50 changes from 3.0V to 6.0V as Δf.

$$3. \mu AFT = \frac{3 \times 10^{-3} \text{ [MV]}}{\Delta f \text{ [kHz]}} \text{ [mV/kHz]}$$



V-3 AFT Switching Operation AFT_{sw}

Switching operation is determined when the sweep waveform in the above fig. Reaches DC voltage level of approximately 4.5V with S47 on. The serial resistor is 1kΩ.

S-1 Muting Switching Operation MUTE

- Measure output voltage at pin 4 when SG11 is input and S2 is on.

$$2. MUTE = 20 \log \left\{ \frac{V_{OAF \max} \text{ (mV}_{rms})}}{\text{Measured Value (mV}_{rms})} \right\} \text{ [dB]}$$

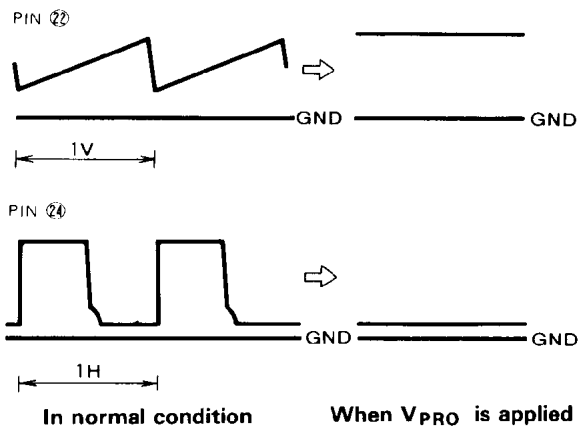
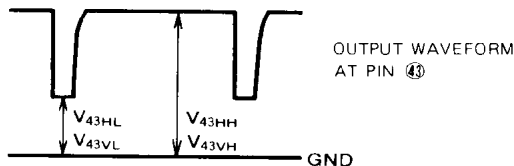
The serial resistor is 1kΩ.

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JS-1 Sync, Separation Operation V_{43HH} , V_{43HL} , V_{43VH} , V_{43VL}

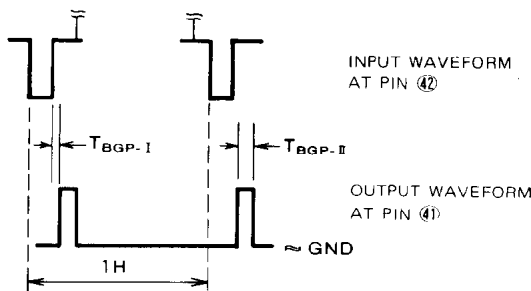
1. Measure output waveform at pin ④ when SG22 is input by +12dB ($2V_{p-p}$).
2. V_{43HH} is the maximum voltage at pin ④ when S44 is on and V_{43HL} is the minimum voltage.
3. V_{43VH} is the maximum voltage at pin ④ when S42 is on and V_{43VL} is the minimum voltage.



JS-2 Gate Pulse Timing T_{BGP-1} , T_{BGP-11}

T_{BGP-1} is the delayed time after H SYNC of the input signal at pin ④.

T_{BGP-11} is waveform time span at pin ④.



JH-1 Pull-in Range f_{PH}

1. Set input signal and output waveform at pin ④ unsynchronized by decreasing the frequency of SG22 input signal by a certain level.
2. Measure input signal frequency at the moment when input signal and output waveform at pin ④ is pulled in on synchronization by gradually increasing input signal frequency.
3. The pull-in range of the upperside is measured in the same manner.
4. f_{PH} is shown by the difference from standard frequency of 15734Hz.

JH-2 Overvoltage Protector Circuit Operating Voltage V_{PRO}

The voltage is shown by the applied voltage at pin ⑩ when output waveforms at pins ② and ④ become as in the following fig. by gradually increasing externally applied voltage with S16 on.

Jv-1 Pull-in Range f_{PV}

Measure frequency at test point 21 by increasing the externally connected resistor at pin ⑩ from the pulled in condition and fixing it at the instant when the input signal is not synchronized by turning the input signal off.

Jv-2 Oscillator Starting Voltage V_{23min}

The voltage is the applied voltage at pin ③ which enables signal generation of approximately 19ms at test point 21 by gradually increasing the VCD system V_{cc} at pin ③ from low voltage ($\approx 2.0V$).

P1 Supply Voltage Detector Circuit Operating Voltage

I $V_{23(P1)}$

1. Apply 9V to H.Vcc at pin ⑩.
2. Voltage is shown by applied voltage at pin ③ when the V.out waveform at pin ② and H.out waveform at pin ④ can show the same movement as V_{PRO} , shown in the previous parameter, by gradually increasing VCD system V_{cc} from the standard voltage (9.0V).

P2 Supply Voltage Detector Circuit Operating Voltage

II $V_{23(P2)}$

1. Apply 9V to H.Vcc at pin ⑩.
2. Voltage is shown by applied voltage at pin ③ when the V.out waveform at pin ② and H.out waveform at pin ④ can show the same movement as V_{PRO} , shown in the previous parameter, by gradually decreasing VCD system V_{cc} at pin 12 from standard voltage (9.0V). (Note: H.out at pin ④ is not affected.)

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Y-1 Standard Gain G_Y

1. Adjust externally applied voltage at pin ④① so that DC voltage at pin ②⑥ becomes 3.0V.
2. $G_Y = 20 \log \frac{\text{Output Signal Voltage } mV_{p-p}}{200mV_{p-p}}$ [dB]

Y-2 Contrast Variation Characteristics G_Y norm, G_Y min, G_Y max

1. Adjust externally applied voltage at pin ④① so that the DC voltage at pin ②⑥ becomes 3.0V.
2. Measure output signal voltages of V_A , V_B , and V_C when contrast control voltages are changed to 4.5, 2.5 and 6.5V at pin ③⑧.

$$G_{Y \min} = 20 \log \frac{V_B}{V_A} \text{ [dB]},$$

$$G_{Y \max} = 20 \log \frac{V_C}{V_A} \text{ [dB]},$$

Y-3 Peaking Voltage G_P

1. Adjust the externally applied voltage at pin ④① so that DC voltage at pin ②⑥ becomes 3.0V.
2. V_A is the output signal voltage at pin ②⑥ when SG23 is input and V_B is output signal voltage at pin ②⑥ when SG24 is input.
3. $G_P = 20 \log \frac{V_B}{V_A}$ [dB]

Y-4 Picture Quality Variation Characteristics G_T , G_T norm, G_T min, G_T max

1. Adjust externally applied voltage at pin ④① so that DC voltage at pin ②⑥ becomes 3.0V.
2. Measure output signal voltages of Y_A , Y_B and Y_C at pin ②⑥ when video control voltages at pin ③⑦ are changed to 4.5, 6.5 and 2.5V.

$$G_{T \min} = 20 \log \frac{V_B}{V_A} \text{ [dB]},$$

$$G_{T \max} = 20 \log \frac{V_B}{V_A} \text{ [dB]},$$

$G_{T \text{ norm}}$ [dB] is the variation [dB] from V_B when G_P is measured.

Y-5 Frequency Characteristics $f_{B(Y)}$

1. Adjust externally applied voltage at pin ④① so that DC voltage at pin ②⑥ becomes 3.0V.
2. V_A is the output signal voltage at pin 26 when SG23 is input and V_B is output signal voltage at pin 26 when SG26 is input.
3. $f_{B(Y)} = 20 \log \frac{V_B}{V_A}$ [dB]

Y-6 Differential Gain Characteristics $D_{G(Y)}$

1. V_A and V_B are output signal voltages at pin ②⑥ when DC voltages at pin ②⑥ are changed to 4.0V and 2.0V by adjusting the externally applied voltage at pin ④①.

$$D_{G(Y)} = \frac{V_A - V_B}{V_B} \times 100 \text{ [%]}$$

C-1 Demodulated Maximum Output C_{\max}

Measure output signal voltage at pin ③⑧ when color control voltage at pin ③④ is 6.5V and contrast control voltage at pin ②⑥ is 6.5 with input of SG28 (NTSC standard color bar signal).

C-2 APC Pull-in Range f_{pc}

Frequency range from the point that output signal voltage at pin ②⑦ is non-existent, to the point that it occurs when SG29 is input and burst and chroma frequencies ($f_{SB} = f_{SC}$) are changed. Standard value is 3.57945MHz.

C-3 Killer Operation Input Level V_{ik}

Input level at which output signal voltage at pin ②⑦ occurs from non-existent state by changing levels.

C-4 Killer Color Residual V_{ok}

Output signal at pin ②⑧ when input conditions are set in which burst signal amplitude is $e_b = 0mV_{p-p}$. Chroma signal amplitude is $e_c = 100mV_{p-p}$ and frequency $f_{SC} = 3.57945MHz$.

C-5 Demodulated Output Ratio $\frac{R-Y}{B-Y}, \frac{G-Y}{B-Y}$

Ratio of output signal at pins ②⑦ and ②⑧ against output signal voltage at pin ②⑥, in input conditions that burst signal amplitude is $e_b = 50mV_{p-p}$, chroma signal amplitude is $e_c = 100mV_{p-p}$, burst signal frequency $f_{SB} = 3.57945MHz$, chroma signal frequency $f_{SC} = 3.47945MHz$, ($f_{SB} = -100kHz$).

C-6 Color Phase Control Variation T

Measure phase difference of output signal voltage at pin ②⑦ when tint control voltage at pin ②⑤ is changed to 2.5V and 6.5V with input SG29, on the synchroscope (X-Y display).

C-7 Color Phase Control Characteristics $T_{\min}, T_{\text{grad}}, T_{\max}$

Measure phase difference of output signal voltage at pin ②⑦ when tint control voltage at pin ②⑤ is changed to 4.5V, 2.5V, 4.0V and 6.5V with input of SG29, on synchroscope (X-Y display). Standard phase is at 4.5V.

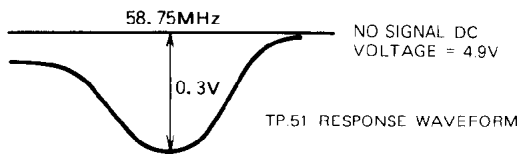
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C-8 Color Tracking Characteristics $\Delta V_{\gamma-c}$

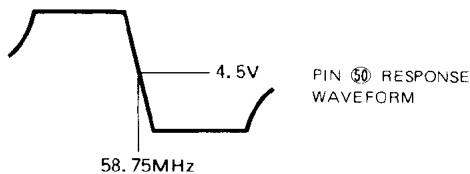
1. Adjust externally applied voltage at pin ④ so that DC voltage at pin ② becomes 3.0V and supply SG23 to input V.
2. Measure output signal voltage at pin ② when contrast control voltage at pin ③ is changed to 4.0V and 4.5V as V_A and V_B .
3. Supply the SG22(+12dB) to input J.
4. Input SG28 and measure output signal voltage at pin ② when contrast control voltage is changed to 4.0V and 4.5V as V_C and V_D .
5. $\Delta V_{\gamma-c} = 20 \log \frac{V_B}{V_A} - 20 \log \frac{V_D}{V_C}$ [dB]

Method of Adjusting the Coils

1. Set measurement conditions equal to V_{BTH} parameter.
2. The AFT coil must be unadjusted.
3. Check tank response at TP51 as shown in the fig. by setting the V6 (IF AGC filter pin voltage) variable. Adjust LLD coil so that peak is at 58.75MHz.



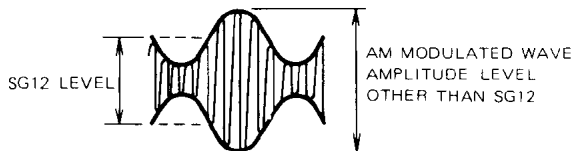
4. Adjust AFT coil to the condition in the μAFT parameter.



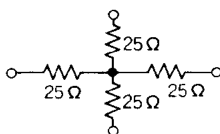
5. Adjust AFT coil conditions equal to THD_{AF} parameter so that distortion is minimized.

Precautions for Input Signal

- Amplitude level of AM modulated waves other than SG12 is the peak level.



- Use the mixer depicted in the following fig. Signal source impedance is 50Ω.



INPUT SIGNAL

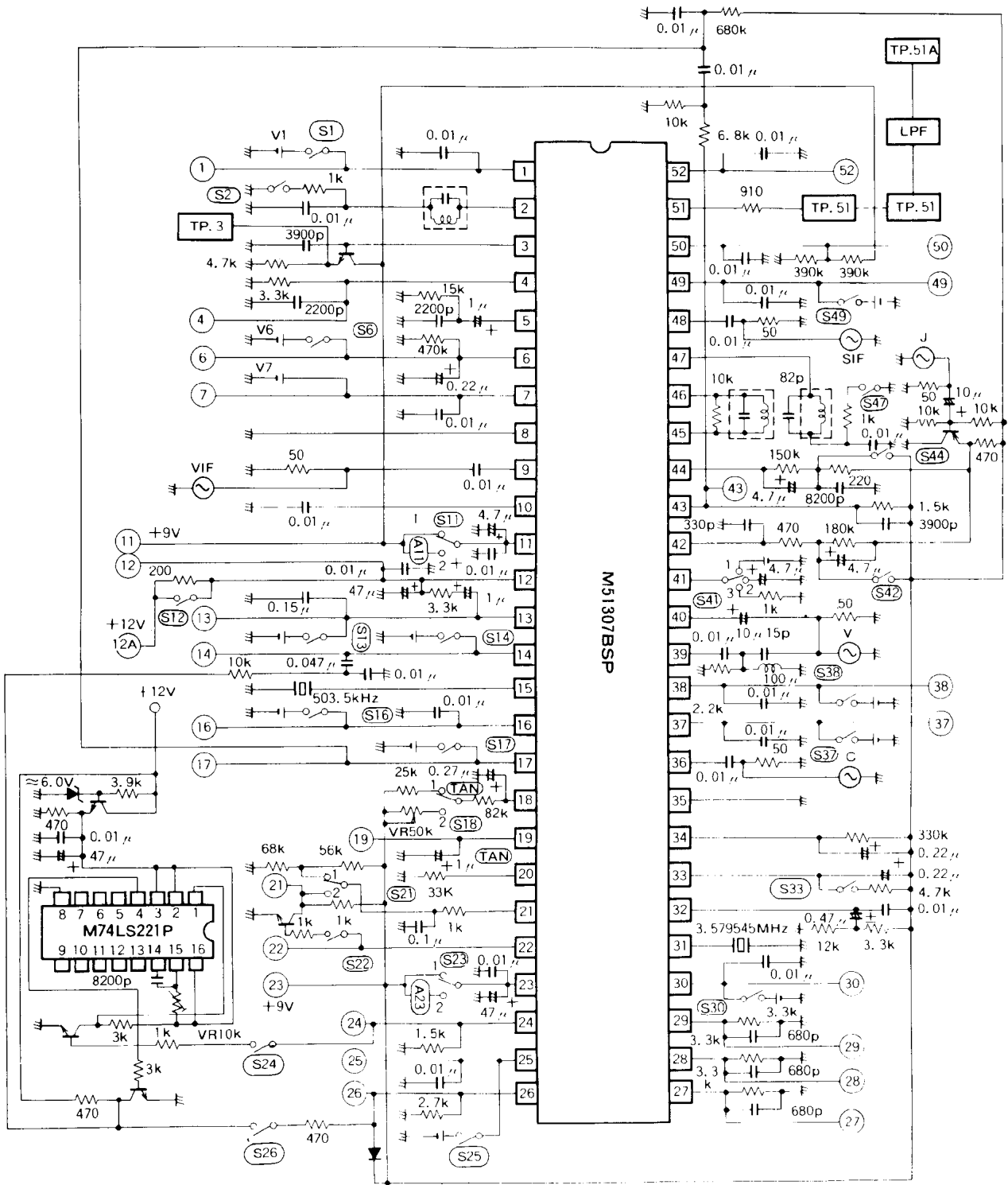
SG. No.	Signal contents
SG1	58.75MHz CW
SG2	58.75MHz AM77.8%MOD. f_m 20kHz
SG3	58.75MHz AM16%MOD. f_m 20kHz
SG4	58.75MHz CW(90dB μ) + 55.17MHz CW(76dB μ) + 54.25MHz CW(76dB μ)
SG5	58.75MHz CW(90dB μ) + 57.75MHz CW(66dB μ) + 52.75MHz CW(66dB μ)
SG6	58.75MHz \pm 2MHz CW
SG7	57.75MHz CW
SG8	59.75MHz CW
SG9	58.75MHz, 87.5% video standard 10-stage wave modulator ($f_{sc} = 3.58$ MHz)
SG10	4.5MHz CW
SG11	4.5MHz FM \pm 25kHzDEV. f_m 400Hz
SG12	4.5MHz AM30%MOD. f_m 400Hz
SG21	Typical synchronizing signal (0dB) Includes V. synch. 5 μ s, 63.5 μ s, 0.143V _{p-p}
SG22	APL100% typical signal (0dB) Includes V. synch. 2 μ s, 5 μ s, 7.5 μ s, 63.5 μ s, 0.357V _{p-p} , 0.143V _{p-p}
SG23	200kHz CW (0dB) 5 μ s, 0.2V _{p-p}
SG24	2MHz CW (0dB) 0.5 μ s, 0.2V _{p-p}
SG25	4MHz CW (0dB) 0.25 μ s, 0.2V _{p-p}
SG26	6MHz CW (0dB) 0.166 μ s, 0.2V _{p-p}
SG27	3.579545MHz CW (0dB) 0.2V _{p-p}
SG28	NTSC standard color bar signal f_{sb} burst signal frequency f_{sc} chroma signal frequency $f_{sb} = f_{sc} = 3.579545$ MHz 0dB $e_b = 50$ mV _{p-p} $e_c = 100$ mV _{p-p}
SG29	NTSC simple chroma signal $f_{sb} = f_{sc} = 3.579545$ MHz (similar phase) 0dB $e_b = 50$ mV _{p-p} $e_c = 100$ mV _{p-p}

Note: SG21, 22 and 28 timing must be matched. Refer to conditions and comments for signal levels.

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TEST CIRCUIT

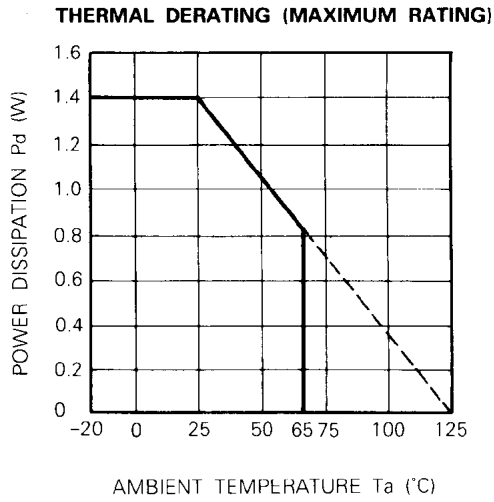


Units Resistance: Ω
 Capacitance: F
 Inductance: H

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NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

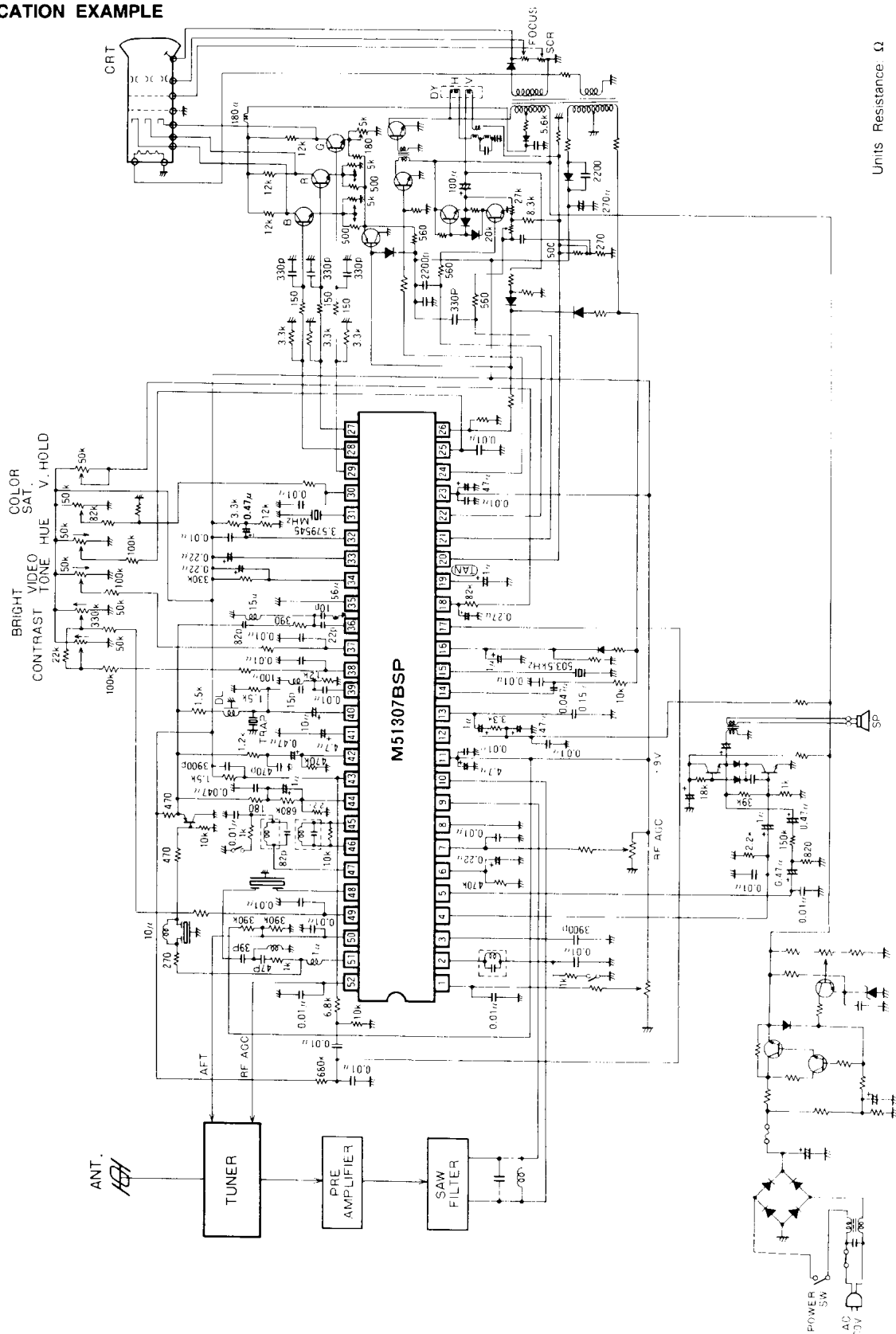
TYPICAL CHARACTERISTICS



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APPLICATION EXAMPLE



Units Resistance: Ω
Capacitance: F