M51397AP

SECAM CHROMA SYSTEM

DESCRIPTION

The M51397AP is a semiconductor integrated circuit for SECAM system color television receivers. It CONTAINS chroma processor, chroma demodulator, DC regenerator and system switches for PAL/SECAM dual system.
Dual system color television receivers can be implemented by M51395AP (PAL chroma system and video processor) and M51397AP (SECAM chroma processor and system switch).

FEATURES

- Automatic mode switching for dual systems.
- Common delay line for dual systems.
- Minimum external components.
- Directly drives chroma output transistors.

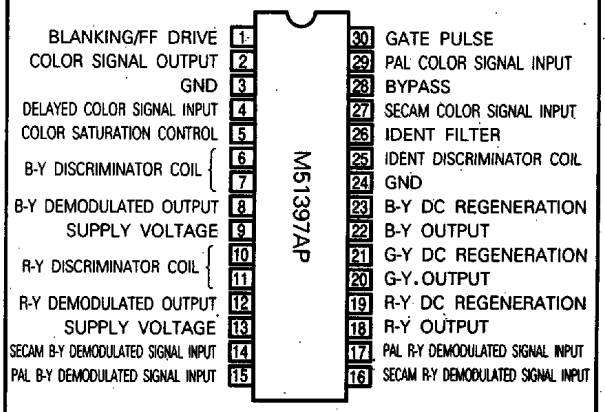
APPLICATION

SECAM system color TV, color signal processors

RECOMMENDED OPERATING CONDITION

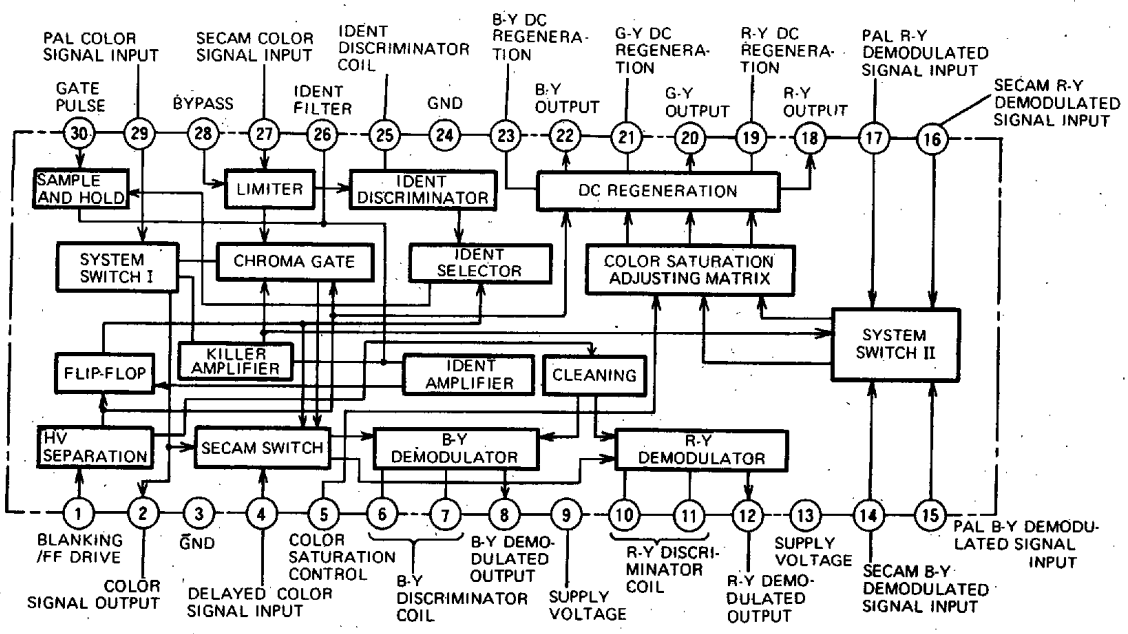
Supply voltage range ..... 11~13V
Rated supply voltage 12V

PIN CONFIGURATION (TOP VIEW)



Outline 30P4

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	16.0	V
Pd	Power dissipation	1400	mW
Topr	Operating temperature	−20～65	℃
Tstg	Storage temperature	−40～125	℃

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

Symbol	Parameter		Input signal	Conditions		Meas. point	Limits			Unit	Note
				Input	V_s		Min.	Typ.	Max.		
V_{CC}	Supply voltage		SG1	27	6	9, 13	10	12	14	V	—
I_{CC}	Circuit current		SG1	27	6	a	55	75	88	mA	—
V_{OLIM}	Limiting output level		SG2	27	—	2	1.9	2.2	2.7	V_{P-P}	1
G_{LIM}	Gain of limiter						28	32	36	dB	2
V_{OSS}	Output level of SECAM SW		SG1	27	—	6, 10	1.4	1.7	2.0	V_{P-P}	—
G_{SW}	Gain of SECAM SW limiter		SG2	4			12	18	24	dB	3
V_{ODIS}	Output level of ident Disc.		SG2	27	—	25	0.48	0.59	0.70	V_{P-P}	4
V_{IK}	Ident killer threshold level		SG1	27	6	20	38	48	58	dB	5
V_{OK}	Killed output level				8	18, 20 22	—	5	20	mV_{P-P}	6
E_{OB-Y}	Demodulated output level	B-Y	SG1	27	—	b, c	0.86	0.98	1.13	V_{P-P}	7
E_{OR-Y}		R-Y					0.58	0.68	0.78		
$\frac{E_{OR-Y}}{E_{OB-Y}}$	Ratio of dem. output R-Y/B-Y	R-Y/B-Y					0.60	0.70	0.80	—	8
Lin I	Lineality of dem. output	I	SG2	27	—	b, c	2.4	2.8	3.2	—	9
Lin II		II					2.2	2.6	3.0		
ΔE_{OIH}	Offset voltage of SECAM-SW		OFF	—	—	b, c	—	5	20	mV	10
$\Delta E_{O/IN}$	Offset voltage vs input level		SG2	27	—	b, c	—	4	10	mV	11
AMR	AMR		SG2	27	—		—	−30	−25	dB	12
V_{COL}	Color control voltage		OFF	—	—	5	5.6	6.0	6.4	V_{DC}	13
$V_{SAT\ min}$	Color saturation control	MIN	SG1	27	5	18, 20	—	—	−20	dB	14
$V_{SAT\ grad}$		GRAD			5.78	22	−9.7	−5.7	−1.7		
$V_{SAT\ max}$		MAX			7		1.6	4.1	6.6		
$V_{SAT\ nor}$		NOR			5.88	22	2.8	4.0	5.6	V_{P-P}	
$V_{OB-Y\ max}$	Maximum non distortion output voltage	B-Y	SG1	27	—	22	4.1	5.1	—	V_{P-P}	15
$V_{OR-Y\ max}$		R-Y				18	3.0	3.8	—		
$V_{OG-Y\ max}$		G-Y				20	1.8	2.3	—		
$V_{B-Y/R-Y}$	Output ratio of matrix (B-Y)/(R-Y)		SG1	27	—	22, 18	115	130	145	%	16
$V_{G-Y/R-Y}$	(G-Y)/(R-Y)					20, 18	52	60	68		
V_{18}	Demodulated output DC voltage		SG1	27	4	18	6.6	7.2	7.8	V_{DC}	17
V_{20}						20					
V_{22}						22					
ΔV_{18-20}	Offset voltage among output terminals		SG1	27	4	18 20 22	−0.1	0	0.1	V_{DC}	18
ΔV_{20-22}											
ΔV_{22-18}											
$V_{CR\ B-Y}$	Cross talk of system SW (PAL-SECAM)	I	SG3	14, 16	6	22, 18	—	40	100	mV_{P-P}	19
$V_{CR\ R-Y}$		II		15, 17							
$V_{OB-Y\ min}$	Output voltage at minimum color control	I	SG3	14, 16	4	18, 20 22	—	20	50	mV_{P-P}	20
$V_{OR-Y\ min}$		II		15, 17							
$E_{CR\ B-Y}$	Cross talk of demodulator	B-Y	SG1	27	8	22	33	38	—	dB	21
$E_{CR\ R-Y}$		R-Y				18					

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter		Input signal	Conditions		Meas. point	Limits			Unit	Note
				Input	V_s		Min.	Typ.	Max.		
V_4	DC voltage at SECAM SW ④	I	OFF	—	—	4	2.2	2.8	3.4	V_{DC}	22
$V_{4\ min}$		II					—	0	0.5		
ΔE_O I	Offset voltage of demodulated voltage between each H	I	SG1	27	—	b, c	—	10	20	mV_{DC}	23
ΔE_O II		II	SG2	27, 4			—	20	50		
$\Delta V_{OR-Y/H}$	Offset voltage of output between each H		SG1	27	6	18	—	20	30	mV_{DC}	24
$\Delta V_{OB-Y/H}$						22					
$\Delta V_{R-Y/COL}$	DC offset voltage vs color control		OFF	—	—	18	−30	0	30	mV_{DC}	25
$\Delta V_{G-Y/COL}$						20					
$\Delta V_{B-Y/COL}$						22					
$\Delta V_{B-R/COL}$	DC offset voltage among outputs vs color control		OFF	—	—	18	−30	0	30	mV_{DC}	26
$\Delta V_{R-G/COL}$						20					
$\Delta V_{G-B/COL}$						22					
$V_{OR-YS\,II}$	Output voltage of system SW II/DC-clamp	I	SG3	14, 16	8	18	2.1	2.6	3.1	V_{P-P}	27
$V_{OB-YS\,II}$		II		15, 17		22					
$V_{OS\,I}$	Output voltage of system SW I		SG2	29	—	2	1.5	1.9	2.3	V_{P-P}	30
$\Delta E_{OCR\,I}$	Crosstalk of system SW I	I	SG2	27	—	2	—	40	100	mV_{P-P}	31
$\Delta E_{OCR\,II}$		II		29			—	70	150		
$\Delta E_{OB-Y/V_{CC}}$	Change of demodulated output vs V		SG1	27	—	b	0.06	0.09	0.12	1/V	28
$\Delta E_{OR-Y/V_{CC}}$						c					
$\Delta E_{OB-Y/Ta}$	Change of demodulated output vs T		SG1	27	—	b	−2	0	2	mV/℃	29
$\Delta E_{OR-Y/Ta}$						c					
$\Delta V_{OR-Y/V_{CC}}$	Change of output voltage vs V		SG1	27	8	18	0.09	0.13	0.16	1/V	28
$\Delta V_{OG-Y/V_{CC}}$						20					
$\Delta V_{OB-Y/V_{CC}}$						22					
$\Delta V_{OR-Y/Ta}$	Change of output voltage vs T		SG1	27	8	18	−30	0	30	mV/℃	29
$\Delta V_{OG-Y/Ta}$						20					
$\Delta V_{OB-Y/Ta}$						22					
$\Delta V_{OB-R/V_{CC}}$	Offset voltage among output terminals vs V		OFF	—	—	18	−25	0	25	mV/V	32
$\Delta V_{OR-G/V_{CC}}$						20					
$\Delta V_{OG-B/V_{CC}}$						22					
$\Delta V_{OB-R/Ta}$	Offset voltage among output terminals vs T		OFF	—	—	18	−1	0	1	mV/℃	29
$\Delta V_{OR-G/Ta}$						20					
$\Delta V_{OG-B/Ta}$						22					

Symbol	Parameter		Meas. point	Limits			Unit
				Min.	Typ.	Max.	
$V_{G\ on}$	Gate pulse	On level	30	1.4	—	—	V_{O-P}
$V_{G\ off}$		Off level		—	—	0.5	
$V_{BLK\ on}$	Blanking pulse	On level	1	6.8	—	—	V_{O-P}
$V_{BLK\ off}$		Off level		—	—	5.6	
$V_{FF\ on}$	F.F. drive pulse	On level	1	10.8	—	—	V_{O-P}
$V_{FF\ off}$		Off level		—	—	8.9	
$V_{i\ max}$	Maximum chroma input signal at limiter		27	—	—	3.0	V_{P-P}
$V_{i\ dly}$	Input signal level at delayed input of SECAM SW		4	0.6	0.8	1.2	V_{P-P}
$V_{ISS\ max}$	Maximum input level of system SW		14-17	—	—	1.2	V_{P-P}

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test terminal	Limits			Unit
			Min.	Typ.	Max.	
$R_{i\,(SEC)}$	SECAM Chroma input resistance	Pin 27	—	2.5	—	kΩ
$C_{i\,(SEC)}$	SECAM Chroma input capacitance	Pin 27	—	1.6	—	pF
$R_{i\,(PAL)}$	PAL Chroma input resistance	Pin 29	—	3.0	—	kΩ
$R_{o\,(C)}$	Chroma output resistance	Pin 2 R_L=1.2kΩ	—	20	—	Ω
$R_{i\,(SW)}$	SECAM Switch input resistance	Pin 4	—	2.0	—	kΩ
$C_{i\,(SW)}$	SECAM Switch input capacitance	Pin 4	—	3.5	—	pF
$R_{o\,(DISC)}$	SECAM SW Output impedance	Pins 6, 10	—	200	—	Ω
$R_{i\,(DISC)}$	Discriminator input resistance	Pins 7, 11	—	1.8	—	kΩ
$C_{i\,(DISC)}$	Discriminator input capacitance	Pins 7, 11	—	3.0	—	pF
$R_{o\,(DISC)}$	Discriminator output resistance	Pins 8, 12	—	300	—	Ω
$R_{i\,(SYS)}$	System switch input resistance	Pins 14, 15, 16, 17	—	4.0	—	kΩ
$R_{o\,(REG)}$	Demodulator output resistance	Pins 18, 20, 22	—	300	—	Ω

ELECTRICAL CHARACTERISTICS TEST METHOD

Note:1 V⑫ (@SW3 → ON. Input signal f=4.3MHz, V⑫=100mVP-P)

Note:2 20log (V⑫ -1/V⑫ -2), where V⑫ -1 (100mVP-P) → V⑫ -2 (@V⑬ → 0), f=4.3MHz

Note:3 Same as Note 2 (input V⑫ -1, 1VP-P, f=4.3MHz)

Note:4 Input signal f=4.328MHz, 200mVP-P

Note:5 20log (V⑫ -1/V⑫ -2) where V⑫ -1 (100mVP-P) → V⑫ -2 (@V⑬ → 0)

Note:6 Measured after eliminating SYNC pulses.

Note:7 Center Value of carrier @SW2 → b,c

Note:8 V_b/V_c

Note:9 Output linearity (I) = $\frac{(Vo \text{ at } fo + 300kHz) - (Vo \text{ at } fo)}{(Vo \text{ at } fo + 100kHz) - (Vo \text{ at } fo)}$

Output linearity (II) = $\frac{(Vo \text{ at } fo - 300kHz) - (Vo \text{ at } fo)}{(Vo \text{ at } fo - 100kHz) - (Vo \text{ at } fo)}$

SW2 → d, e, SW3 → ON,: 2200pF at b, c

Reference Signal at b: 4.406MHz (f_{OR}), 200mVP-P

Reference Signal at c: 4.25MHz (f_{OB}), 200mVP-P

Note:10 Vo at 1H, (SW2 → d, e, SW3 → ON, SW4 → ON, SW5 → ON)

Note:11 ΔVo at 20dB change of input signal

SW2 → d, e, SW3 → ON, SW4 → ON, SW5 → ON

Reference signal at b: 4.406MHz, 200mVP-P

Reference signal at c: 4.25MHz, 200mVP-P

DC Voltage between blanking interval and signal interval are adjusted to same voltage by L_1, L_2.

Note:12 20log VA/VF (db)

SW2 → d, e, SW3 → ON, Input signal voltage 200mVP-P without SYNC

Output voltage VF: SG2 4.25MHz, 4.406MHz FM modulated by fm=400Hz, 75kHz

Output voltage VA: SG2 4.25MHz, 4.406MHz AM modulated by fm=400Hz, 30%

Note:13 V⑤ at No Load.

Note:14 $\frac{Vo \text{ at } V⑤}{Vo \text{ at } V⑤=6V}$ (dB) (SW2 → b, c, SW6 → k, l)

Note:15 Maximum Output Voltage without distortion at a change of V⑤

Note:16 $\frac{Vo\ (B\text{-}Y)\ \ Vo\ (G\text{-}Y)}{Vo\ (R\text{-}Y)\ \ Vo\ (R\text{-}Y)}$ (Vo (R-Y)=2VP-P)

Note:17 DC voltage at V⑤=4V

Note:18 V⑧-V⑫, V⑫-V⑫, V⑧-V⑫ (at V⑤=4V)

Note:19 SG3=0.4VP-P, 500kHz V⑤=6V SW2→d, e

I (Crosstalk SECAM → PAL)

Each output level at SW5→ON, SW6→k, l

II (Crosstalk PAL → SECAM)

Each output level at SW3→ON, SW5→OFF, SW6→m,n

Note:20 Same measurement as Note:23 at V⑤ = 4V

Note:21 Ratio of output voltage between each line (dB), at SW2 → d, e, SW4 → ON

Note:22 I V④ DC at SW3 → ON

II V④ DC at SW5 → ON

Note:23 I Difference of output level between each line at SW2 → d, e

II Difference of output level between each line at SW1 → 2 SW2 → d, e, V⑫ → 1VP-P

Frequency at pin 27 and 4 are same (4.25 and 4.406MHz)

V④ 1VP-P+3dB ~ 1VP-P-3dB

Note:24 Difference of output level between each line at SW2 → b, c, SW6 → k, l

Note:25 Difference of DC output voltage between as the change of color control

Note:26 Difference of DC output voltage between each output as the change of color control

Note:27 Output level at SG 0.4 VP-P, 500kHz, SW2 de, color VR max

I SW3 → ON, SW6 → k, l
II SW3 → OFF, SW6 → m, n

Note:28 V㉘-V㉙/4-V㉚
where V㉙, V㉚, V㉘ are output voltages at supply voltage 10, 12, 14V.

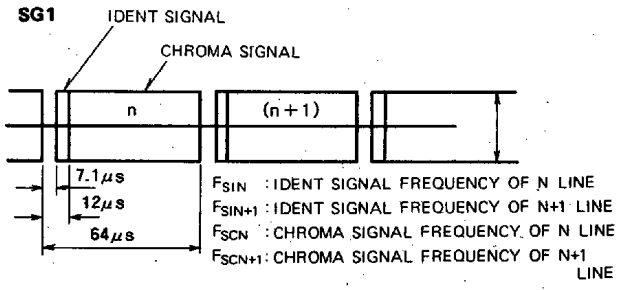
Note:29 Topg–20 ~ +65°C.

Note:30 Output level (after eliminating SYNC pulse) at input Signal 2 V_{P-P}. f=4.3MHz

Note:31 I (Crosstalk SECAM → PAL) Input Signal at ㉗ 100mV_{P-P}, f=4.3MHz, without SYNC pulse
II (Crosstalk PAL → SECAM) Input Signal at ㉖ 2V_{P-P}, f=4.3MHz, SW3 → ON, SW5 → ON without SYNC pulse

Note:32 Change of output voltage via supply voltage 10, 12, 14 volts (mV/V).

INPUT SIGNAL



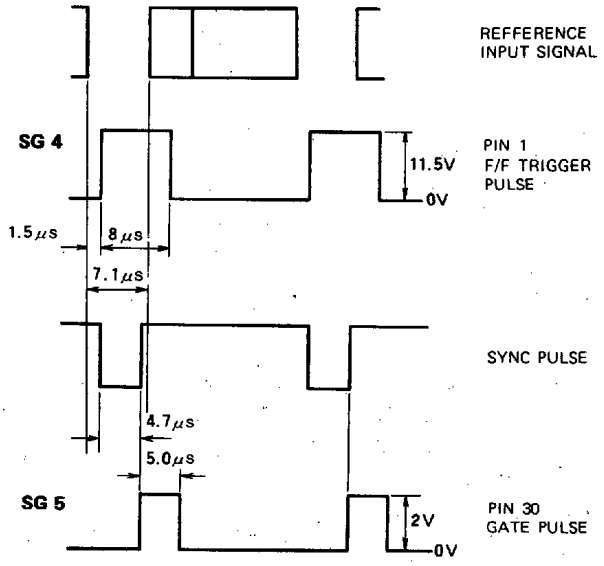
REFERENCE LEVEL 0dB : e_c = 100 mV_{P-P}

FREQUENCY OF SG1

Symbol		n line	n+1 line
fs_1		4.250	4.406
fsc	W = fo	4.250	4.406
	Y	4.020	4.3605
	CY	4.3276	4.686
	G	4.0976	4.6345
	MG	4.4024	4.1715
	R	4.1724	4.126
	B	4.480	4.4515
	BK	4.250	4.406

SG2 4.3 ± 0.5 MHz SINE WAVE
SG3 100K ~ 2 MHz SINE WAVE

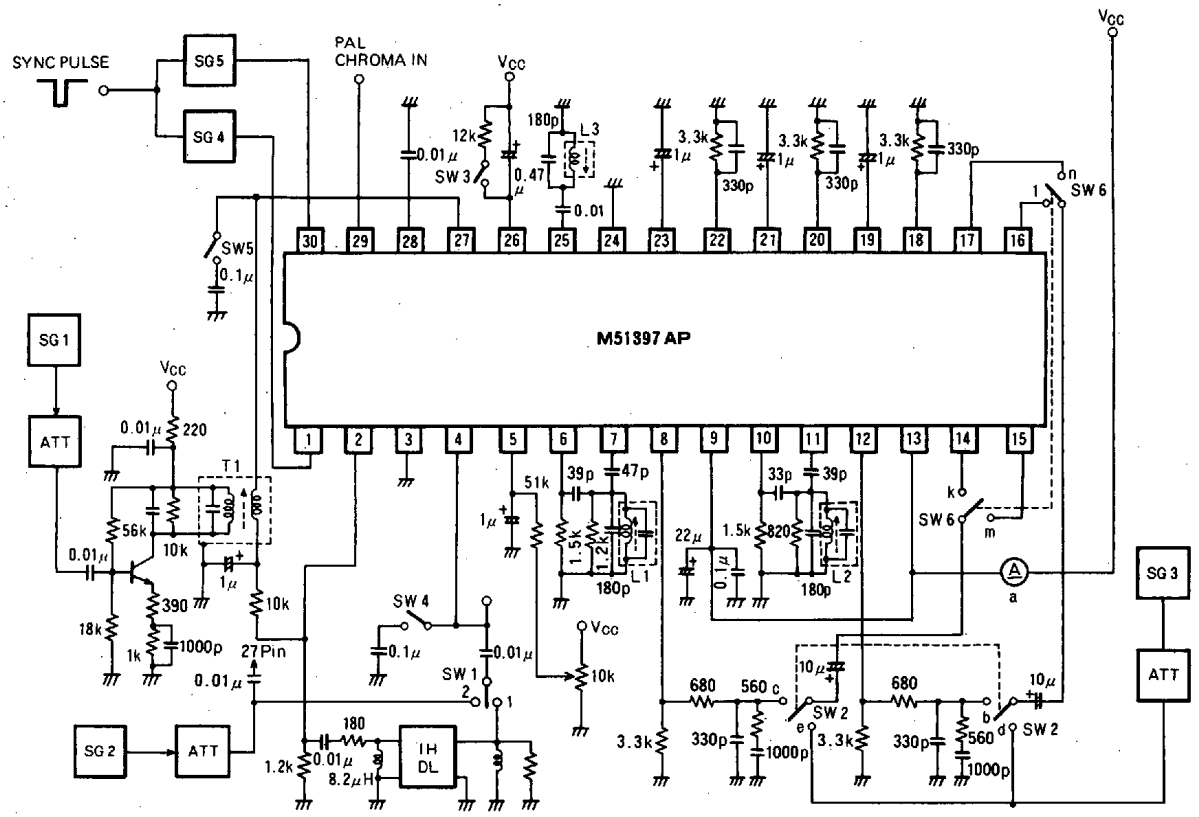
Gate Pulse & F/F Trg. Pulse



M51397AP

SECAM CHROMA SYSTEM

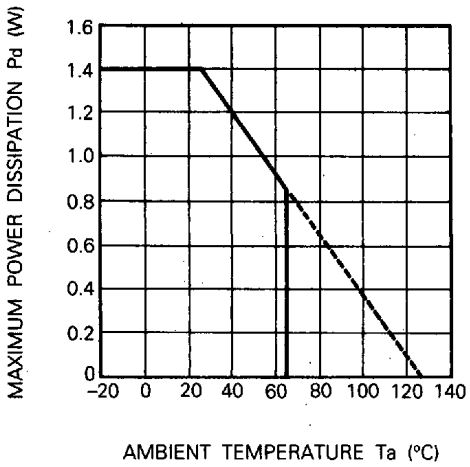
TEST CIRCUIT



Units Resistance: Ω
Capacitance: F

TYPICAL CHARACTERISTICS

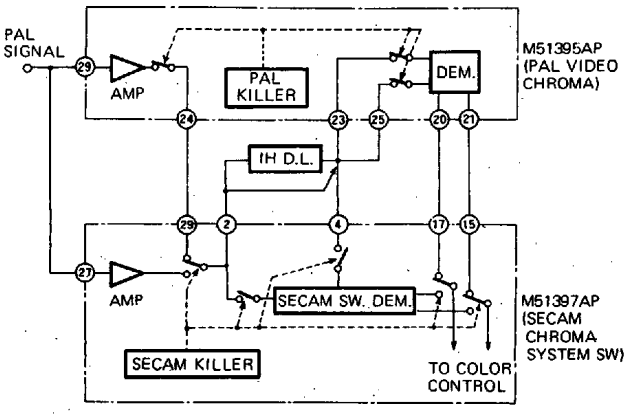
THERMAL DERATING (MAXIMUM RATING)



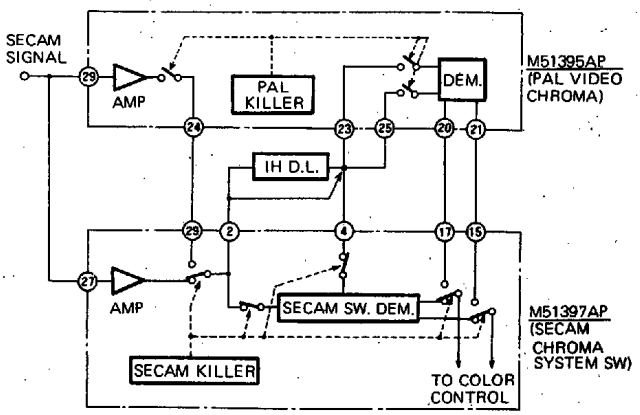
APPLICATION EXAMPLE OF M51395AP, M51397AP FOR PAL SECAM DUAL SYSTEM

MODE OF SYSTEM SW

(a) Mode at PAL signal input

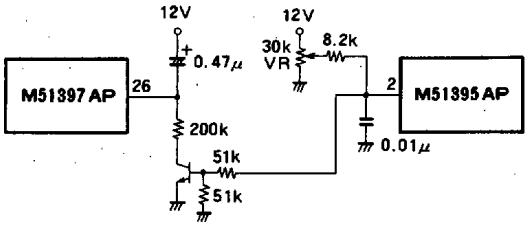


(b) Mode at SECAM signal input

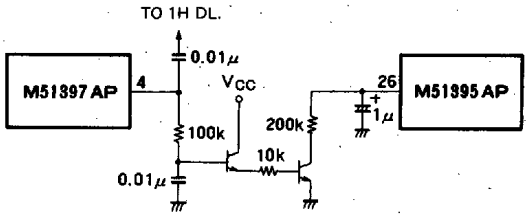


APPLICATION EXAMPLE FOR CONTROL OF THE PRIORITY OF THE DUAL MODE

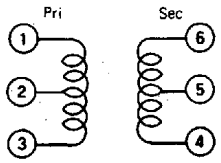
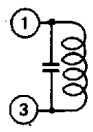
(a) Mode at PAL signal input



(b) Mode at SECAM signal input



M51395AP (When the M51395AP is applied for PAL and SECAM dual system color TV)

Parts	Specification		
Coil For D.L. CCT		① ~ ② 16 Turns ② ~ ③ 16 Turns ④ ~ ⑤ 16 Turns ⑤ ~ ⑥ 16 Turns	Bobbin 10K type Pot Core: CT-31 Screw Core: C-2 Wire: 0.09φ 2UEW no load Q: 40
Burst Cleaning and CW Phase Shift		① ~ ③ 18 Turns Capacitor : 82PF RH type	Bobbin : 10K type Pot Core : CT-31 Screw Core : C-2 Wire : 0.09φ 2UEW no load Q : 56
D.L.	Type No. ADL-CS11 mfd by ASAHI GLASS CORP. JAPAN		
X'tal	Type no. A9M2 mfd by Kinsekisha, Japan Load C; 16pF		

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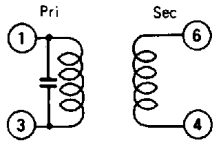
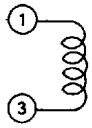
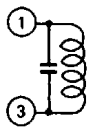
Parts	Specification		
Bell Filter		① ~ ③ 32 Turns ④ ~ ⑥ 8 Turns Capacitor : 82PF RH type	Bobbin: 10K type Pot Core: CT-31 Screw Core: C-2 Wire: 0.1φ 2UEW no load Q: 36
Ident Coil		① ~ ③ 10 Turns with 2 wires (parallel)	Bobbin : 10K type Pot Core: CT-31 Screw Core: C-2 Wire: 0.1φ 2UEW no load Q: 59
Demo Coil		① ~ ③ 18 Turns Capacitor : 82PF RH type	Bobbin: 10K type Pot Core: CT-31 Screw Core: C-2 Wire: 0.1φ 2UEW no load Q: 55
D.L.	The D.L. of M51395AP is applied commonly.		

A pot core and a screw core are manufactured by Taiyo Yuden, Japan.

Adjustment of electrical characteristic for PAL/SECAM dual system circuit M51395AP/M51397AP.

Adjustment is achieved as following sequence.

1. Bell filter transformer "T_1" (M51397AP)
   Apply SECAM color signal to the input.
   Adjust bell filter transformer "T_1" to make the color signal envelope at test point "TP_2" into flat.
2. Ident discriminator coil "L_1" (M51397AP)
   Adjust ident discriminator coil "L_1" to give maximum ident filter voltage value at test point "TP_1".
3. Discriminator (Demodulator) coil "T_3/T_4" (M51397AP)
   Adjust discriminator coil "T_3/T_4" to make the voltage of no color signal equal to the clamp voltage (~7.2V) at pins 18 and 22.
4. 4.433619MHz free run frequency (M51395AP)
   Apply PAL B/W signal (no burst) to input, and connect 0.01μF between pin 1 and GND.
   Connect high input impedance frequency counter at pin 17.
   Adjust the trimmer capicitok "C_t" to frequency 4.433619MHz.
5. Burst cleaning coil "L_{10}" (M51395AP)
   Apply PAL color signal to input.
   Adjust burst cleaning coil "L_{10}" to give minimum chroma output signal value at pin 24.
6. Delay line transformer "T_2", chroma difference signal control "VR_3" (M51395AP)
   Adjust delay line transformer "T_2" and chroma difference signal control "VR_3" to correct demodulated ratios at pins 18, 20 and 22. If demodulated ratios are not correct, readjust burst cleaning coil "L_{10}".

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SECAM CHROMA SYSTEM

APPLICATION EXAMPLE