

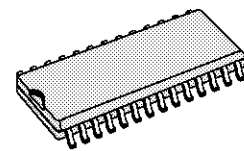
**ADVANCED 4-HEAD  
PLAY-BACK AND RECORD AMPLIFIER FOR VCR**

**PLAY-BACK MODE**

- LOW NOISE AND WIDE BAND AMPLIFIERS FOR 4 HEADS
- AUTOMATIC OFFSET CANCELLATION BETWEEN THE 2 SELECTED HEADS
- ONE PLAY-BACK OUTPUT WITHOUT AGC
- ONE PLAY-BACK OUTPUT INCLUDING AGC
- RECORD AMPLIFIER INHIBITION AND RECORD OUTPUTS GROUNDED
- OUTPUT FOR TRACKING VIDEO INFORMATION (TRIV) WITH ADJUSTABLE GAIN
- SHORT PLAY/LONG PLAY ENVELOPE COMPARATOR WITH SCHMIDT TRIGGER OUTPUT

**RECORD MODE**

- TWO INTEGRATED I/I CONVERTERS WITH ACCURATE CONTROL OF TRANSCONDUCTANCE
- AUTOMATIC PLAY-BACK/RECORD SWITCHING BY SCANNING OF RECORD SUPPLY
- PLAY-BACK LOOP INHIBITION



**SO28 LARGE**  
(Plastic Micropackage)

**ORDER CODE : TEA5705**

**PIN DESCRIPTION**

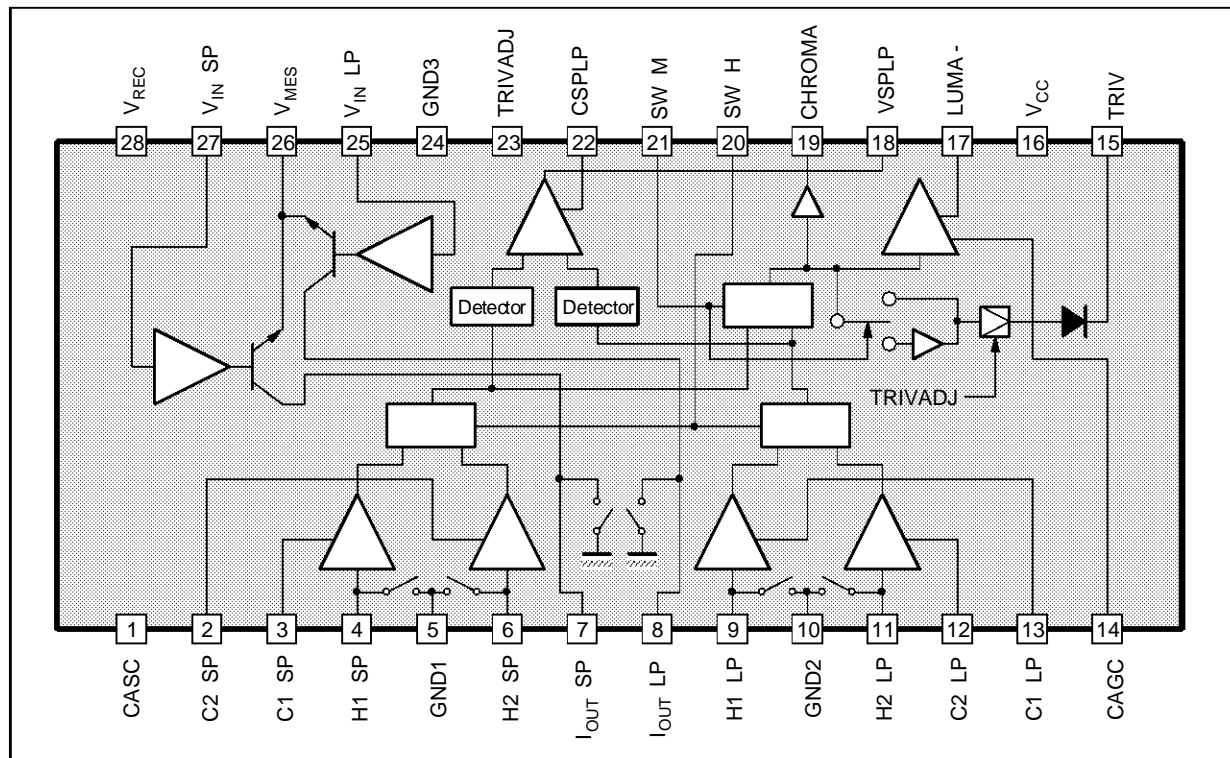
CASC	1	28	$V_{REC}$
C2-SP	2	27	$V_{IN} -SP$
C1-SP	3	26	$V_{MES}$
H1-SP	4	25	$V_{IN} -LP$
GND1	5	24	GND3
H2-SP	6	23	TRIVADJ
$I_{OUT} -SP$	7	22	CSPLP
$I_{OUT} -LP$	8	21	SW-M
H1-LP	9	20	SW-H
GND2	10	19	CHROMA
H2-LP	11	18	VSPLP
C2-LP	12	17	LUMA-
C1-LP	13	16	$V_{CC}$
CAGC	14	15	TRIV

**DESCRIPTION**

The TEA5705 is an advanced four head record and play-back amplifier for VCR.

5705-01.EPS

## BLOCK DIAGRAM



5705-02.EPS

## FUNCTIONAL DESCRIPTION

TEA5705 is intended for 4 heads VCR applications. It includes all the electrical functions necessary to achieve play-back and record processing for VHS and S-VHS applications (10MHz bandwidth).

High performance technology allows very low noise levels (current and voltage), which are frequency independent in all the frequency range. In play-back mode a special feature suppresses the DC offset when switching two channels. Optimized play-back output stage gives to the TEA5705 large capability to drive directly a coaxial cable in order to reduce number of external components.

Two play-back outputs are available : one, dedicated to Chroma processing, is a 60dB voltage amplifier output, the other, dedicated to Luma processing, is phase opposite signal with a constant AC output level of  $200\text{mV}_{PP}$  at 3.8MHz signal.

A tracking information for video signal (TRIV) is Luma amplitude proportional and allows automatic phase correction. The transfer function has a gain of 2.5dB higher when a LP channel is selected. Adding to this, a gain control bloc allows to modify the gain ( $\pm 6\text{dB}$ ) of the TRIV function for all the channels by applying a bias on pin TRIVADJ.

An automatic scanning of record supply voltage

permits TEA5705 automatically switching either in play-back or in record mode. The switching threshold voltage is fixed to a value which forbids high current peaking through the heads.

During play-back mode, record output is grounded via an internal transistor and during record mode preamplifiers are turned off.

There is one output current for two recording heads, the DC current and the AC characteristics can be very precisely controlled with accurate external resistors. If recommended resistances are used, a  $\pm 3\%$  transconductance accuracy is guaranteed. Feedback loop gains of SP channel and LP channel can be different.

A particular feature is the SP/LP envelope comparator and detector. This system can be used in search mode, still mode, slow mode... The output signal is an output current feeding a capacitor (CSPLP) which is buffered through a schmidt trigger circuit to VSPLP. This output is high in record mode. By varying the capacitance on CSPLP a good compromise can be found between short delay time and spike free signal.

TEA5705 is fully protected against ESD.

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Power Supply Voltage	6	V
V <sub>REC</sub>	Power Supply Voltage Record	15	V
T <sub>J</sub>	Junction Temperature	+150	°C
T <sub>oper</sub>	Operating Temperature	0, +70	°C

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**THERMAL DATA**

Symbol	Parameter	Value	Unit
R <sub>th(j-a)</sub>	Junction-ambient Thermal Resistance	Typ. 70	°C/W

5705-02.TBL

**RECOMMENDED OPERATING CONDITIONS (T<sub>amb</sub> = 25°C)**

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>CC</sub>	Power Supply Voltage	4.5	5	5.5	V
V <sub>REC</sub>	Power Supply Voltage Record	4.75	11.3	12.6	V
CAGC	Capacitance at Pin CAGC	4.7			nF
CSPLP	Capacitance at Pin CSPLP		4.7		nF

5705-03.TBL

**ELECTRICAL OPERATING CHARACTERISTICS (T<sub>amb</sub> = 25°C unless otherwise specified)****Power Consumption**

Parameter	Play-Back		Record (1)	
	Typ.	Max.	Typ.	Max.
V <sub>CC</sub>	55mA	70mA	40mA	50mA
V <sub>REC</sub>	0mA	0mA	27mA	33mA
Total Consumption (2)	V <sub>CC</sub> = 5V, V <sub>REC</sub> = 9V		478mW	
	V <sub>CC</sub> = 5.5V, V <sub>REC</sub> = 9.45V		630mW	

5705-04.TBL

- Notes :** 1. R1 = 18Ω  
2. Taking in account only the consumption through the IC.

A great care should be taken to the maximum power consumption : V<sub>REC</sub> can be increased to 12.6V if the DC current flowing through the head is reduced. This can be done by increasing R1 value. V<sub>REC</sub> can be reduced as long as voltage on Pins I<sub>OUT-SP</sub>, I<sub>OUT-LP</sub> is not going under 1V (to forbid output stage saturation).

**Play-back Mode**

V<sub>CC</sub> = 5V, no load on Pins CHROMA, LUMA-

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CC1</sub>	Supply Current		45	55	70	mA

**CHROMA OUTPUT (no AGC)**

G <sub>PB</sub>	Pre-amplification Gain	Sinewave 600 kHz 400mV <sub>PP</sub> on output Input on Pin H1-SP or H2-SP, H1-LP or H2-LP	57	60	63	dB
ΔG <sub>PB1</sub>	Difference of Output Signal on Pin CHROMA between Channel 1 and Channel 2 in SP Mode	Sinewave 600kHz 0.4mV <sub>PP</sub> on inputs H1-SP and H2-SP	-1.2	0	1.2	dB
ΔG <sub>PB2</sub>	Difference of Output Signal on Pin CHROMA between Channel 1 and Channel 2 in LP Mode	Sinewave 600kHz 0.4mV <sub>PP</sub> on inputs H1-LP and H2-LP	-1.2	0	1.2	dB
e <sub>N</sub>	Equivalent Input Voltage Noise Level	Input grounded via switching transistor on Pins H1-SP, H2-SP, H1-LP, H2-LP, F = 600kHz		0.6		nV/√Hz
i <sub>N</sub>	Equivalent Input Current Noise	Pins H1-SP, H2-SP, H1-LP, H2-LP		1.7		pA/√Hz

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**ELECTRICAL OPERATING CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise specified) (continued)**Play-back Mode** $V_{CC} = 5\text{V}$ , no load on Pins CHROMA, LUMA-

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
CHROMA OUTPUT (no AGC) (continued)						
CRT	Crosstalk	Sine wave 3.8MHz 400 $\mu\text{V}_{PP}$ on input, All the other inputs loaded with $R_g = 15\Omega$		-45	-40	dB
$R_{PB}$	Playback Switch-on Resistance	$\Delta I = 10\text{mA}$		2.0	5.0	$\Omega$
$F_{LCPB1}$ $F_{HCPB1}$	Bandwidth Cut-off Frequency	-3dB attenuation 50 $\Omega$ in parallel on the input, 0dB at 600kHz Low High	8	13.5	0.1	MHz MHz
$C_{IN}$	Input Capacitance Pins H1-SP, H2-SP, H1-LP, H2-LP	At 5MHz		30	40	pF
$R_{IN}$	Pre-amplifier Input Resistance Pins H1-SP, H2-SP, H1-LP, H2-LP	At 3.8MHz	400	600	900	$\Omega$
$Z_{CPB}$	Output Impedance Pin CHROMA	DC		24	50	$\Omega$
$V_{DCPB1}$	DC Level at Play-back Output on Pin CHROMA		1.5	1.9	2.3	V
$\Delta V_{DCSP}$ $\Delta V_{DCLP}$	Head Switch Offset Pin CHROMA		-100 -100	0 0	100 100	mV mV
$SH_{PB1}$	Second Harmonic Play-back Output Pin CHROMA	Sinus wave 3.8MHz 400 $\mu\text{V}_{PP}$ on input		-45	-40	dB

**LUMA- OUTPUT (with AGC)**

$Z_{LPB}$	Output Impedance	DC		30	50	$\Omega$
$V_{DCPB2}$	DC Level		1.1	1.5	2.1	V
$F_{LCPB2}$ $F_{HCPB2}$	Bandwidth Cut-off Frequency	-3dB attenuation 50 $\Omega$ in parallel on the input, AGC locked, 0dB at 3.8MHz Low High	10	12.5	0.1	MHz MHz
$V_{LPB}$	Output Amplitude	Input signal 200 $\mu\text{V}_{PP}$ at 3.8MHz on Pins H1-SP, H2-SP, H1-LP, H2-LP	140	200	270	mV $_{PP}$
$\Delta V_{LPB}$	AGC Control Sensitivity	Input signal 200 $\mu\text{V}_{PP}$ at +6dB or -5dB on Pins H1-SP, H2-SP, H1-LP, H2-LP	-2		+1	dB
$SH_{PB2}$	Second Harmonic Play-back Output	Input Signal 3.8MHz 400 $\mu\text{V}_{PP}$ on Pins H1-SP, H2-SP, H1-LP, H2-LP		-44	-40	dB

**CAGC**

I+	Positive Output Current	Input Signal 3.8MHz 200 $\mu\text{V}_{PP}$ on H1-SP	15	30	50	$\mu\text{A}$
I-	Negative Output Current	Input Signal 3.8MHz 200 $\mu\text{V}_{PP}$ on H1-SP	-50	-30	-15	$\mu\text{A}$

**TRIV**

$I_{TRIV}$	Downloading Current		200	300	400	$\mu\text{A}$
$V_{TRIV1}$	Output Level (1)	With no signal, $V_{TRIVADJ} = 2.5\text{V}$ Mode LP (SW-M = high)	0.3	0.6	1	V
$V_{TRIV2}$	Output Level (2)	$V_{CHROMA} = 100\text{mV}_{PP}$ at 4MHz $V_{TRIVADJ} = 2.5\text{V}$ , Mode LP (SW-M = high)	1.91	2.31	2.71	V
$V_{TRIV3}$	Output Level (3)	$V_{CHROMA} = 400\text{mV}_{PP}$ at 4MHz $V_{TRIVADJ} = 2.5\text{V}$ , Mode LP (SW-M = high)	3.525	3.725	3.925	V
$V_{TRIV4}$	Output Level (4)	$V_{CHROMA} = 100\text{mV}_{PP}$ at 4MHz $V_{TRIVADJ} = 1\text{V}$ , Mode LP (SW-M = high)	1.11	1.61	2.11	V
$V_{TRIV5}$	Output Level (5)	$V_{CHROMA} = 100\text{mV}_{PP}$ at 4MHz $V_{TRIVADJ} = 4\text{V}$ , Mode LP (SW-M = high)	2.875	3.075	3.275	V
$V_{TRIV6}$	Output Level (6)	$V_{CHROMA} = 400\text{mV}_{PP}$ at 4MHz $V_{TRIVADJ} = 2.5\text{V}$ , Mode SP (SW-M = low)	3.215	3.415	3.615	V

5705-06.TBL

**ELECTRICAL OPERATING CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise specified) (continued)**Play-back Mode** $V_{CC} = 5\text{V}$ , no load on Pins CHROMA, LUMA-

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
TRIV (continued)						
$V_{TRIV7}$	Output Level (7)	$V_{CHROMA} = 100\text{mV}_{PP}$ at 4MHz $V_{TRIVADJ} = 2.5\text{V}$ , Mode SP (SW-M = low)	1.65	2.05	2.45	V
$f_{TRIV1}$	Response Lower Frequency	$V_{CHROMA} = 360\text{mV}_{PP}$ at 4MHz and 1MHz $V_{TRIVADJ} = 2.5\text{V}$ , Mode LP (SW-M = high)	-10	-6	-3	dB
$f_{TRIV2}$	Response Higher Frequency	$V_{CHROMA} = 360\text{mV}_{PP}$ at 8MHz and 4MHz $V_{TRIVADJ} = 2.5\text{V}$ , Mode LP (SW-M = high)	-2.5	-1	-0	dB
$G_{TRIV}$	High Level Input	LP : $V_{CHROMA} = 100\text{mV}_{PP}$ , $300\text{mV}_{PP}$ at 4MHz, $V_{TRIVADJ} = 2.5\text{V}$	4	5.5	7	V/V

**SP/LP ENVELOPE DETECTOR**

$I_{DET+}$	Current Output on Pin CSPLP	$200\mu\text{V}_{PP}$ on Pins H1-SP or H2-SP	25	55	85	$\mu\text{A}$
$I_{DET-}$	Current Output on Pin CSPLP	$200\mu\text{V}_{PP}$ on Pins H1-LP or H2-LP	-85	-55	-25	$\mu\text{A}$
$V_{DETH}$	Sensitivity 1 on Pin CSPLP	$50\mu\text{V}_{PP}$ to $600\mu\text{V}_{PP}$ on SP, LP short circuited	4	4.5	5	V
$V_{DETL}$	Sensitivity 2 on Pin CSPLP	$50\mu\text{V}_{PP}$ to $600\mu\text{V}_{PP}$ on LP, SP short circuited	0	0.5	1	V
$V_{TH}$	Upper Threshold on Pin VSPLP	Scanning through Pin CSPLP		3.33		V
$V_{TL}$	Lower Threshold on Pin VSPLP	Scanning through Pin CSPLP		1.66		V
$R_{OH}$ $R_{OL}$	Output Resistance on Pin VSPLP	Output high Output low	7.5 1.5	12.5 2.5	17.5 3.5	$\text{k}\Omega$ $\text{k}\Omega$

**Record Mode** $V_{REC} = 11.3\text{V}$ ,  $V_{CC} = 5\text{V}$ , Load resistor  $50\Omega$  on Pin  $I_{OUT-SP}$ ,  $I_{OUT-LP}$ 

Transconductance network defined by :

- $R_1 = 18\Omega$ , 1% Pins GND/ $V_{MES}$
- $R_2\text{-SP} = 2\text{k}\Omega$ , 1% Pins  $V_{MES}/V_{IN-SP}$
- $R_2\text{-LP} = 1.5\text{k}\Omega$ , 1% Pins  $V_{MES}/V_{IN-SP}$
- $R_3\text{-SP} = 1.5\text{k}\Omega$ , 1% Pin  $V_{IN-SP}$
- $R_3\text{-LP} = 1.5\text{k}\Omega$ , 1% Pin  $V_{IN-LP}$

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{REC}$ $I_{CC2}$	Current Supply	$V_{REC} = 11.3\text{V}$ $V_{CC} = 5\text{V}$	17 30	25 43	33 56	$\text{mA}$ $\text{mA}$
$I_{max}$	Max. Record Current on SP or LP Current Amplifier	3.8MHz	35			$\text{mA}_{PP}$
TR	Transconductance	$V_{IN-SP} = 300\text{mV}_{PP}$ $V_{IN-LP} = 300\text{mV}_{PP}$	55 45	74 55	85 65	$\text{mA}/\text{V}$ $\text{mA}/\text{V}$
$SH_{REC}$	Second Harmonic	Output Current, $30\text{mA}_{PP}$ at 3.8MHz at Pin $I_{OUT-SP}$ at Pin $I_{OUT-LP}$		-54 -54	-38 -38	dB dB
$F_{LCRSP}$ $F_{HCRSP}$	Bandwidth Cut-off Frequency Pin $I_{OUT-SP}$	-3dB attenuation, 0dB at 3.8MHz Output current $30\text{mA}_{PP}$ Low High	10		0.1	MHz MHz
$V_{SPLPV}$	DC Level at Pin VSPLP		4			V
$F_{LCRLP}$ $F_{HCRLP}$	Bandwidth Cut-off Frequency Pin $I_{OUT-LP}$	-3dB attenuation, 0dB at 3.8MHz Output current $30\text{mA}_{PP}$ Low High	10		0.1	MHz MHz
$R_{VIN-SP}$ $R_{VIN-LP}$	Input Resistance on Pins $V_{IN-LP}$ , $V_{IN-SP}$	Equivalent value of R3 resistor	500	700	900	$\Omega$

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**ELECTRICAL OPERATING CHARACTERISTICS** ( $T_{amb} = 25^{\circ}C$  unless otherwise specified) (continued)

**Switching Levels**

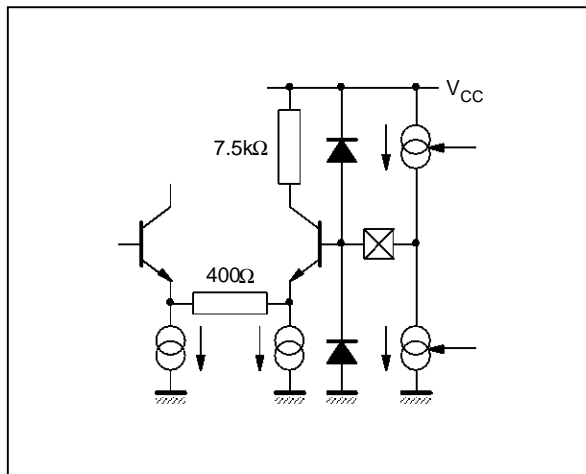
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{SWHH}$	Head Selection Pin SW-H	Head number 1 in SP mode, 2 in LP mode	2.4		$V_{CC}$	V
$V_{SWHL}$		Head number 2 in SP mode, 1 in LP mode	0		1.5	V
$I_{SWHH}$		Input current (5V)	5	15	50	$\mu A$
$I_{SWHL}$		Output current (0V)	-50	-20	0	$\mu A$
$V_{SWMH}$	Mode Selection Pin SW-M (Record mode and play-back mode)	LP Mode	2.4		5	V
$V_{SWML}$		SP mode	0		1.5	V
$I_{SWMH}$		Input current (5V)	5	15	50	$\mu A$
$I_{SWML}$		Output current (0V)	-50	-20	0	$\mu A$
$t_{ON}$ $t_{OFF}$	Selection Pin SW-H or SW-M Transient Response	Output signal appears on Pin CHROMA  Delay time selection ON Delay time selection OFF		100 100	500 500	ns
$V_{TH1}$	Inhibition Threshold Hysteresis for Switching from Play-back to record on Pin $V_{REC}$	$V_{CC} = 5V$	0.15	0.3	0.5	V
$V_{TH2}$	Inhibition Threshold Hysteresis for Switching from Record to Play-back on Pin $V_{REC}$	$V_{CC} = 5V$		80		mV
$t_1$	Transient Response of Record Scanning on Pin $V_{REC}$	Delay from play-back to record (signal disappears on Pin CHROMA)		10		$\mu s$
$t_2$		Delay from record to play-back (signal appears on Pin CHROMA)		32*		ms
$t_3$		Delay from play-back to record (signal appears on Pin $I_{OUT-SP}$ , $I_{OUT-LP}$ )		0.2		ms
$t_4$		Delay from record to play-back (signal disappears on Pin $I_{OUT-SP}$ , $I_{OUT-LP}$ )		11*		ms

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\* Depending on capacitance on Pin  $V_{REC}$  ; above values are according to the application diagram at page 9.

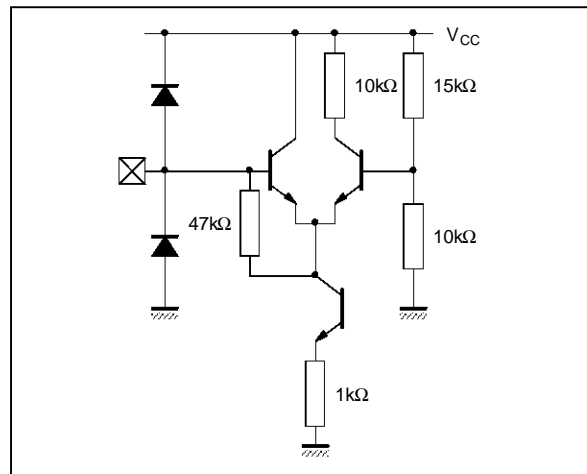
**INPUT/OUTPUTS EQUIVALENT INTERNAL DIAGRAM**

Pins : C1-SP, C2-SP, C1-LP, C2-LP



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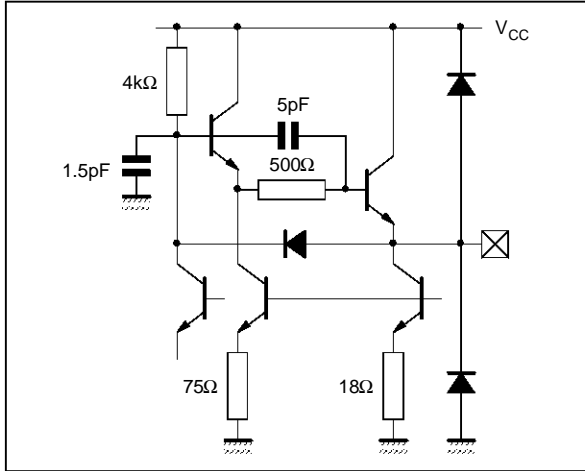
Pins : SW-H, SW-M



5705-04.EPS

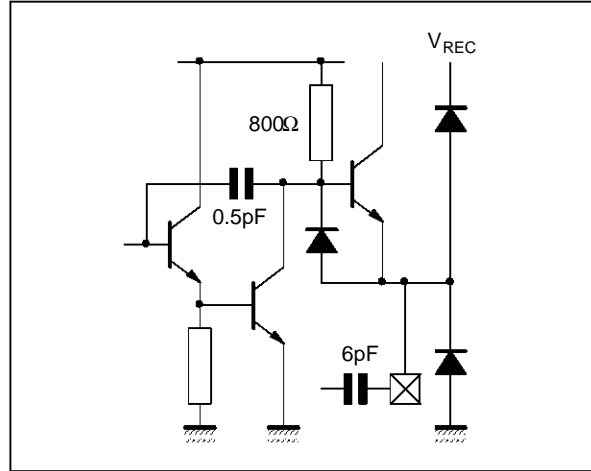
INPUT/OUTPUTS EQUIVALENT INTERNAL DIAGRAM (continued)

Pins : Chroma, Luma-



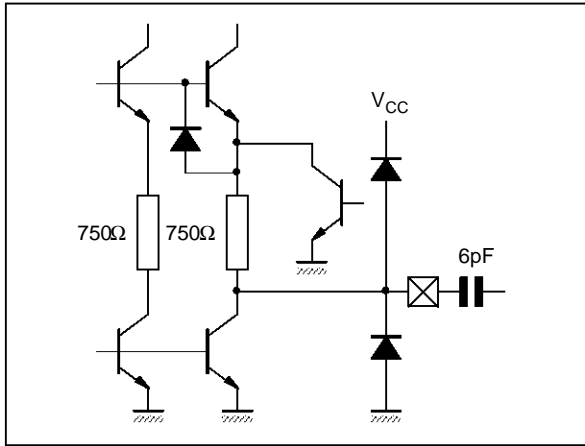
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Pin : VMES



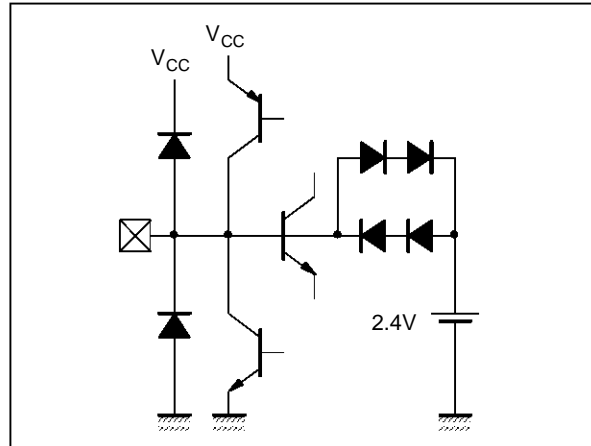
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Pin : VIN-SP, VIN-LP



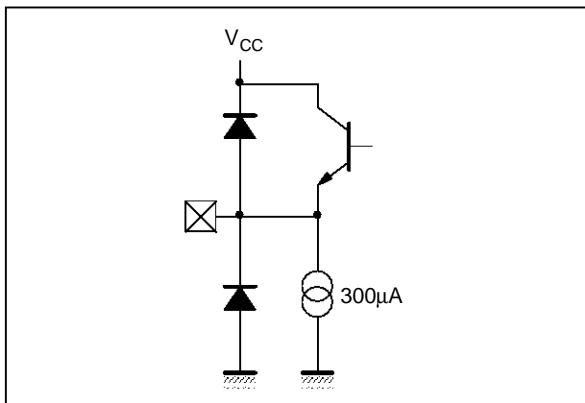
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Pin : CAGC



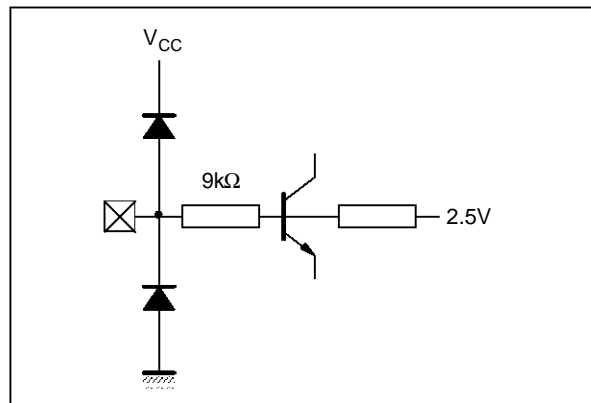
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Pin : TRIV



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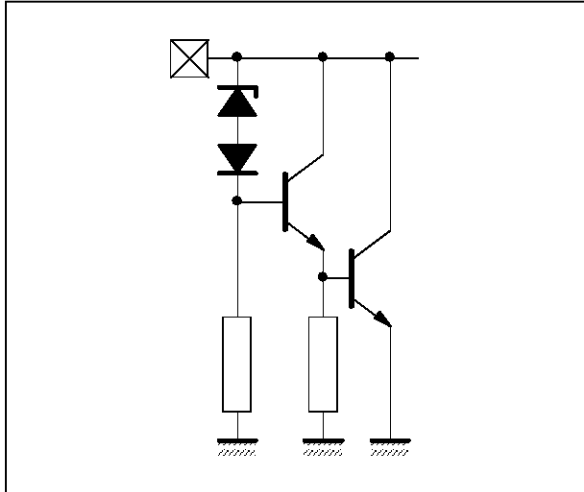
Pin : TRIVADJ



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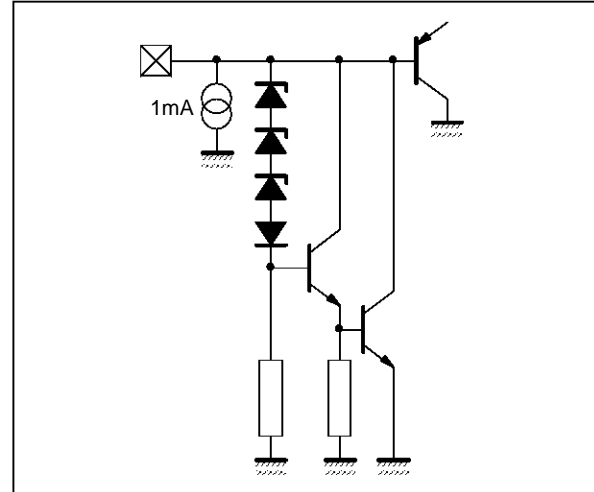
INPUT/OUTPUTS EQUIVALENT INTERNAL DIAGRAM (continued)

Pin : Vcc



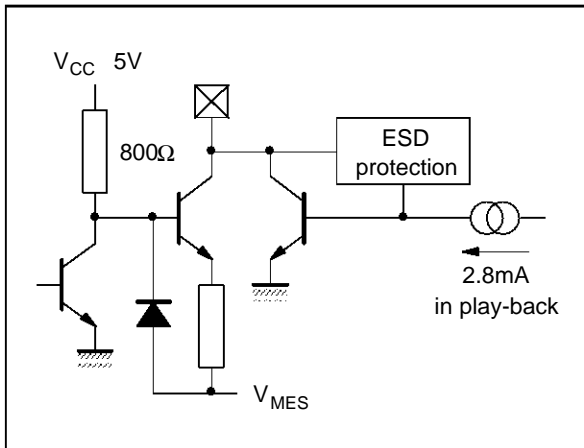
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Pin : VREC



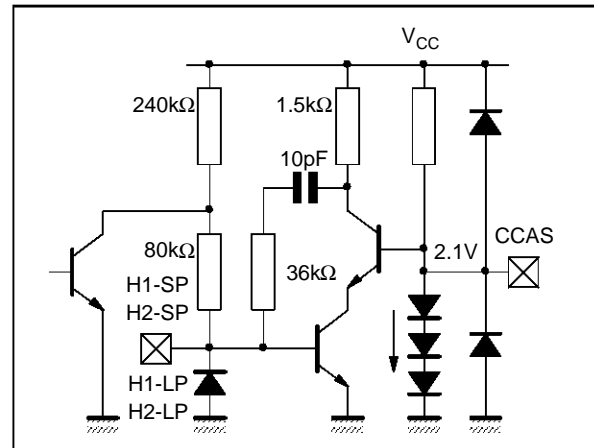
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Pin : IOUT-SP, IOUT-LP



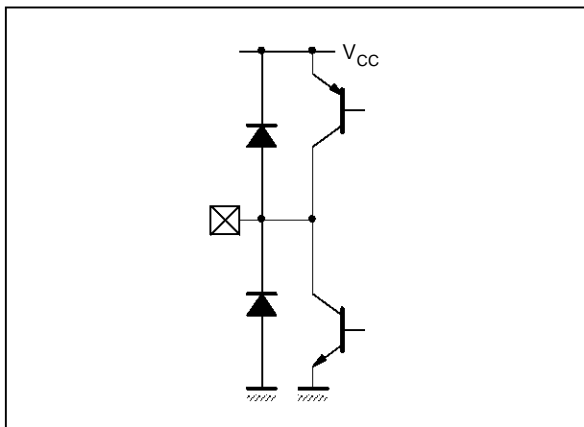
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Pins : CCAS, H1-SP, H2-SP, H1-LP, H2-LP



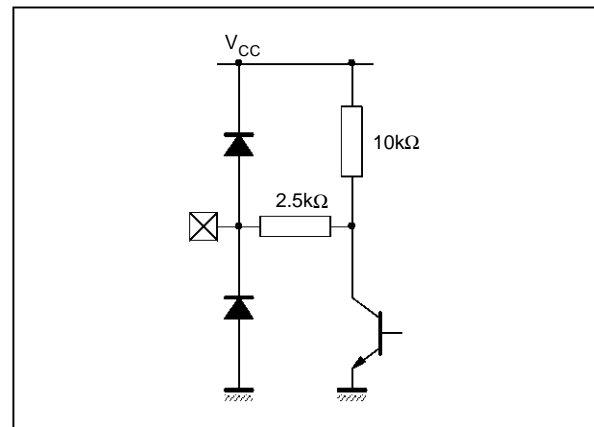
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Pin : CSPLP



5705-15.EPS

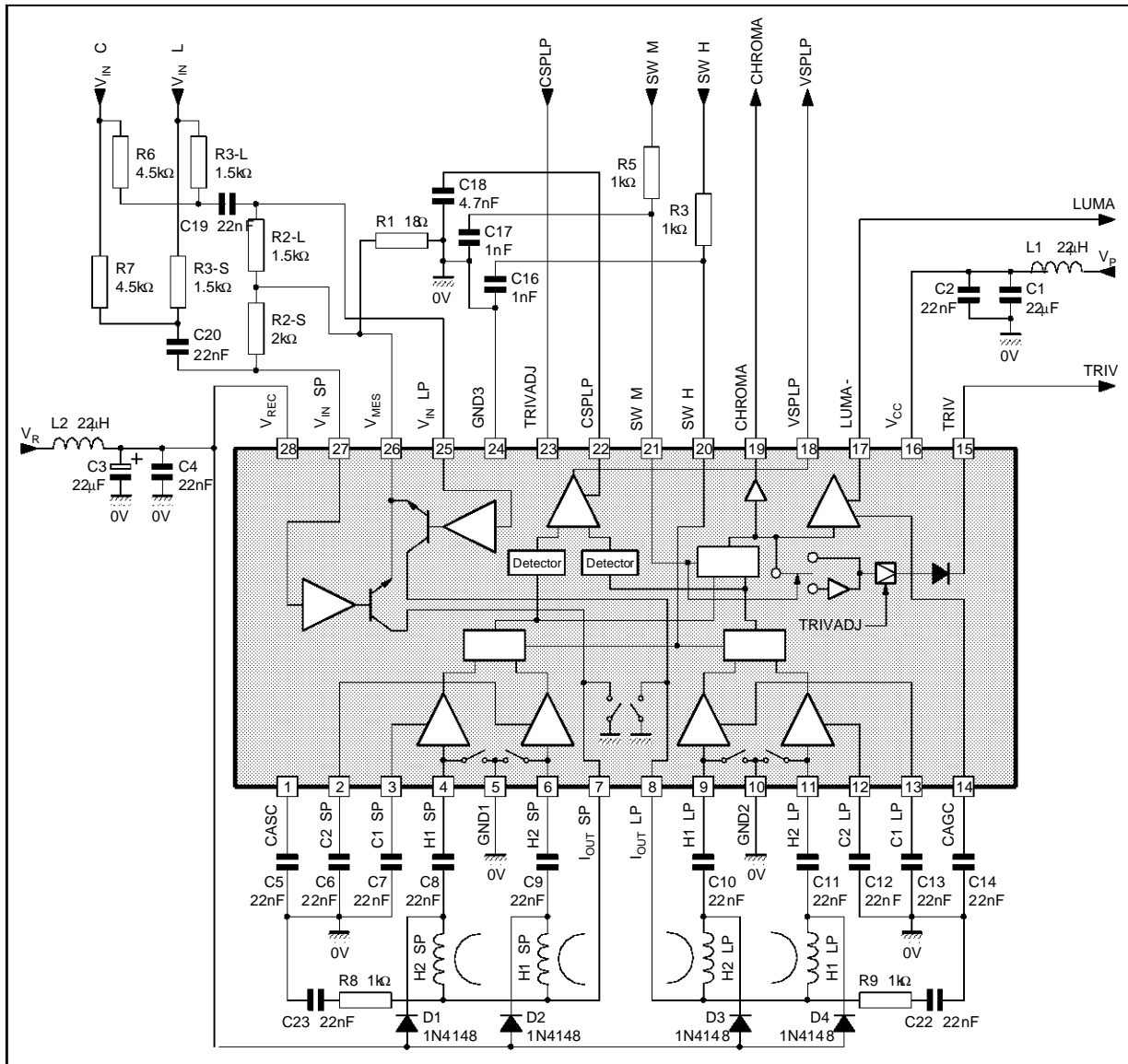
Pin : VSPLP



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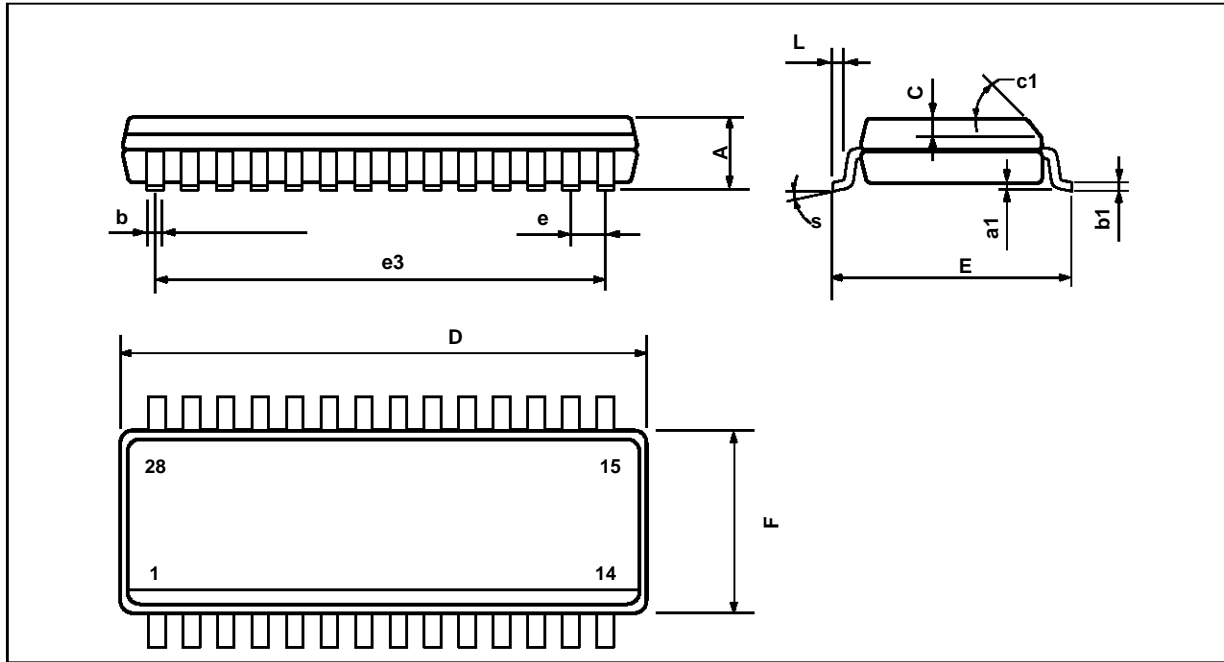


APPLICATION DIAGRAM



5705-17.EPS

**PACKAGE MECHANICAL DATA**  
28 PINS - PLASTIC MICROPACKAGE



PM-S08.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			2.59			0.102
a1	0.05		0.20	0.002		0.008
b	0.31	0.41	0.51	0.012	0.016	0.020
b1	0.15		0.25	0.006		0.010
C		0.33			0.013	
D			18.13			0.714
E	10.11	10.31	10.51	0.399	0.406	0.414
e		1.27			0.050	
e3		16.51			0.65	
F	7.42	7.52	7.62	0.292	0.296	0.300
L	0.48	0.58	0.68	0.019	0.023	0.027
S	8° (max.)					

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