SGS-THOMSON MICROELECTRONICS

TEA5703

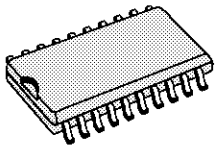
ADVANCED 3-HEAD PLAY-BACK AND RECORD AMPLIFIER FOR VCR

PLAY-BACK MODE

- LOW NOISE AND WIDE BAND AMPLIFIERS FOR 3 HEADS
- AUTOMATIC OFFSET CANCELLATION BETWEEN THE 3 SELECTED HEADS
- ONE PLAY-BACK OUTPUT WITHOUT AGC
- ONE PLAY-BACK OUTPUT INCLUDING AGC (OPPOSITE PHASE)
- RECORD AMPLIFIER INHIBITION AND RECORD OUTPUT GROUNDED
- OUTPUT FOR TRACKING VIDEO INFORMATION (TRIV)

RECORD MODE

- ONE INTEGRATED I/I CONVERTER WITH ACCURATE CONTROL OF TRANSCONDUCTANCE
- AUTOMATIC PLAY-BACK/RECORD SWITCHING BY SCANNING OF RECORD SUPPLY
- PLAY-BACK LOOP INHIBITION
- RECORD AMPLIFIER WITH AUTOMATIC PROTECTION AGAINST SHORT CIRCUIT



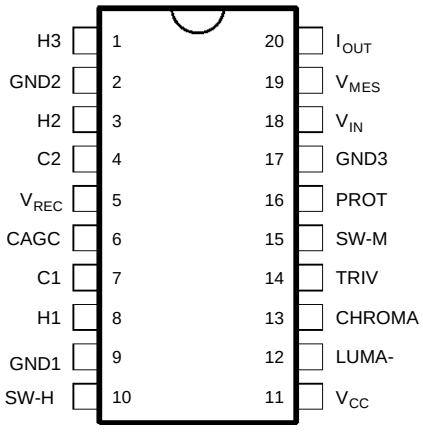
SO20 LARGE
(plastic micropackage)

ORDER CODE : TEA5703

DESCRIPTION

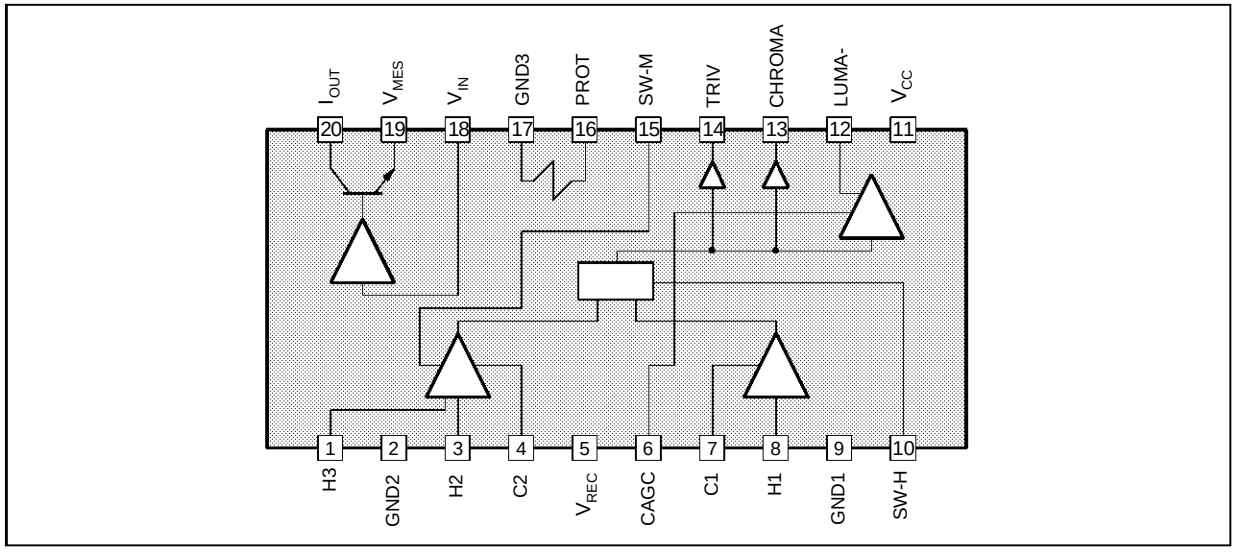
The TEA5703 is an advanced three head record and play-back amplifier for VCR.

PIN CONNECTIONS



5703-01.EPS

BLOCK DIAGRAM



FUNCTIONAL DESCRIPTION

TEA5703 is intended for 3 heads VCR applications. It includes all the electrical functions necessary to achieve play-back and record processing for VHS and S-VHS applications.

High performance technology allows very low noise levels (current and voltage). In play-back mode a special feature suppresses the DC offset when switching two channels. Optimized play-back output stage gives to the TEA5703 large capability to drive directly a coaxial cable in order to reduce number of external components.

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

A tracking information for video signal (TRIV) is Luma amplitude proportional and allows automatic phase correction.

An automatic scanning of record supply voltage permits TEA5703 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 the 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 $\pm$ 5% transconductance accuracy is guaranteed.

Against short circuit on the recording transconductance components, the recording amplifier includes an overheating protection system for the IC and the application board.

TEA5703 is fully protected against ESD.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Power Supply Voltage	6	V
V_{REC}	Power Supply Voltage Record	15	V
T_J	Junction Temperature	150	^oC

5703-01.TBL

THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{th\ (j-a)}$	Junction-ambient Thermal Resistance	Typ.	70	$^oC/W$

5703-02.TBL

ELECTRICAL OPERATING CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Power Consumption

Parameter		Play-Back		Record (1)	
		Typ.	Max.	Typ.	Max.
V_{CC}		45mA	55mA	35mA	45mA
V_{REC}		0mA	0mA	30mA	40mA
Total Consumption	V_{CC} = 5, V_{REC} = 10	225mW		450mW	
	V_{CC} = 5.25, V_{REC} = 10.5		290mW		620mW

5703-03.TBL

Notes : 1. R1 = 10Ω

Play-back Mode (V_{CC} = 5V, no load on Pins CHROMA, LUMA-.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CC1}	Supply Current		30	45	55	mA
V_{CC}	Supply Voltage		4.75	5	5.25	V
CHROMA OUTPUT (no AGC)						
G_{PB}	Pre-amplification Gain	Sinus wave 600 kHz 400mV$_{PP}$ on output Input on Pin H1, H2 or H3	57	60	63	dB
ΔG_{PB}	Gain Difference of Output Signal on Pin CHROMA between Channel 1 and Channel 2	Sinus wave 3.8MHz 0.4mV$_{PP}$ on inputs H1, H2 or H3			1.2	dB
e_N	Equivalent Input Voltage Noise Level	Input grounded via switching transistor on Pins H1, H2, H3		0.45	0.63	nV/$\sqrt{Hz}$
i_N	Equivalent Input Current Noise	Pins H1, H2, H3		2.6	3.4	pA/$\sqrt{Hz}$
CRT21/31 CRT	Crosstalk	Sinus wave 3.8MHz, 400µV$_{PP}$, H2-H1, H3-H1 All combinations but H2-H1, H3-H1			- 25.5 - 40	dB dB
F_{LCPB} F_{HCPB}	Bandwidth Cut-off Frequency	-3dB attenuation 50Ω in parallel on the input, 0dB at 600kHz Low High	8		0.1	MHz MHz
C_{IN}	Input Capacitance Pins H1, H2,H3			35	50	pF
R_{IN}	Pre-amplifier Input Resistance Pins H1, H2, H3		350	600	850	Ω
Z_{CPB}	Output Impedance	Sinus wave 0.1MHz 400µV$_{PP}$ on input		30	50	Ω
V_{DCPB1}	DC Level at Chroma		1	1.5	2	V
ΔV_{DC}	Head Switch Offset				50	mV
SH_{PB1}	Second Harmonic	Sinus wave 3.8MHz H1, H2, H3 400µV$_{PP}$ on input with load resistor 500Ω		- 45	- 40	dB
LUMA- OUTPUT (with AGC)						
Z_{LPB}	Output Impedance	Sinus wave 0.1MHz 400µV$_{PP}$ on input		30	50	Ω
V_{DCPB2}	DC Level		1	1.6	2.2	V
V_{LPB}	Output Amplitude	Input signal 200µV$_{PP}$ at 3.8MHz on Pins H1, H2, H3	140	200	270	mV$_{PP}$
ΔV_{LPB}	AGC Control Sensitivity	Input signal 200µV$_{PP}$ at +6dB or -5dB on Pins H1, H2, H3	-2		+1	dB
SH_{PB2}	Second Harmonic Play-back Output	Input Signal 3.8MHz 400µV$_{PP}$ on Pins H1, H2, H3 500Ω//100pF		- 43	- 38	dB

5703-04.TBL

ELECTRICAL OPERATING CHARACTERISTICS (T_A = 25°C unless otherwise specified) (continued)
Play-back Mode (V_{CC} = 5V, no load on Pins CHROMA, LUMA-.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
LUMA- OUTPUT (with AGC) (continued)						
I+	Positive Output Current on Pin CAGC	Input Signal 3.8MHz 200μV_{PP} on H1	15	30	45	µA
I-	Negative Output Current on Pin CAGC	Input Signal 3.8MHz 200μV_{PP} on H1	-45	-30	-15	µA
	Input Capacitance on Pin CAGC		4.7			nF
TRIV						
R_{TRIV}	Downloading Resistance		20	40	80	kΩ
V_{TRIV1} V_{TRIV2} V_{TRIV3} V_{TRIV4}	Output Level	V_{CHROMA} = 0mV_{PP} V_{CHROMA} = 100mV_{PP} V_{CHROMA} = 400mV_{PP} V_{CHROMA} = 600mV_{PP}	0.2	0.4 1.6 3.5	 4.5	V V V V
G_{TRIV1} G_{TRIV2}	Gain	V_{CHROMA} = 300, 400mV_{PP} V_{CHROMA} = 50, 100mV_{PP}		3 12		V/V_{PP} V/V_{PP}

5703-05.TBL

Record Mode (V_{REC} = 10V, V_{CC} = 5V, Load resistor 100Ω on Pin I_{OUT})
Transconductance network defined by : R1 = 10Ω 1% Pins PROT/V_{MES}
R2 = 1kΩ 1% Pins V_{MES}/V_{IN}
R3 = 750Ω 1% Pins V_{IN}

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{REC} I_{CC2}	Current Supply	V_{REC} = 10V V_{CC} = 5V	20 25	30 35	40 45	mA mA
I_{OUT}						
I_{max}	Max. Record Current	3.8MHz	35			mA_{PP}
TR	Transconductance	V_{IN} = 300mV_{PP}		140		mA/V
SH_{REC}	Second Harmonic	Output Current 30mA_{PP} at 3.8MHz		- 40	-38	dB
F_{LCREC} F_{HCREC}	Bandwidth Cut-off Frequency	-3dB attenuation Output current 30mA_{PP} Low High	 8		0.1	 MHz MHz
	Output Resistance		7	100		kΩ
	Maximum Input Current on Pin PROT	5V on Pin PROT	150	250	400	mA
	Maximum Saturation Voltage on Pin PROT	Input current 50mA		100	150	mV
	Input Resistance	Equivalent value of R3 resistor		700		Ω

5703-06.TBL

Switching Levels

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SWH1}	Head Selection Pin SW-H	Head number 1	2.4		V_{CC}	V
V_{SWL1}		Head number 2	0		1.5	V
I_{SWHH}		Input Current (high level)		20	50	µA
I_{SWHL}		Output Current (low level)		20	50	µA
V_{SWH2}	Head Selection Pin SW-M	Head number 2 or 1	2.4		V_{CC}	V
V_{SWL2}		Head number 3	0		1.5	V
I_{SWMH}		Input Current (high level)		20	50	µA
I_{SWML}		Output Current (low level)		20	50	µA

5703-07.TBL

ELECTRICAL OPERATING CHARACTERISTICS (T_A = 25°C unless otherwise specified) (continued)

Switching Levels

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{ON}	Selection Pin SW-H Transient Response	Delay time selection ON (output signal appears on Pin CHROMA)		250	1000	ns
t_{OFF}		Delay time selection OFF (output signal disappears on Pin CHROMA)		250	1000	ns
t_{H2}	Selection Pin SW-M Transient Response	Delay time H2 selection (output signal appears on Pin CHROMA)		1	10	ms
t_{H3}		Delay time H3 selection (output signal appears on Pin CHROMA)		1	10	ms
V_{TH1}	Inhibition Threshold 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)		30		µs
t_2		Delay from record to play-back (signal appears on Pin CHROMA)		20*		ms
t_3		Delay from play-back to record (signal appears on Pin I_{OUT})		0.2		ms
t_4		Delay from record to play-back (signal disappears on Pin I_{OUT})		4*		ms

5703-08.TBL

* Depending on capacitance on Pin V_{REC}.

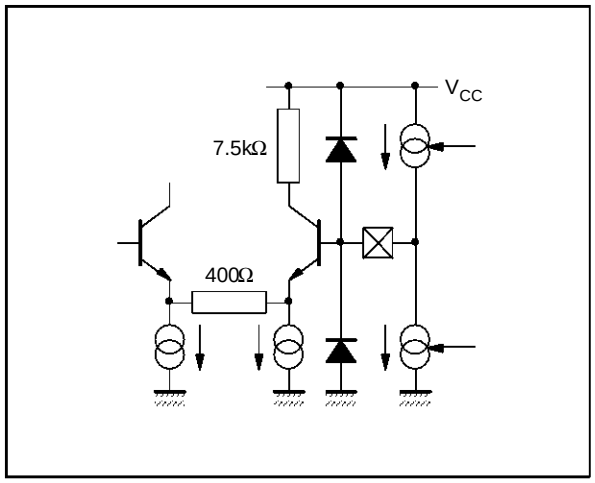
Power Supply

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{CC}	Positive Supply Voltage Pin V_{CC}		4.75	5	5.25	V
V_{REC}	Record Voltage Pin V_{REC}		4.75	10	12.6	V
SVR	Supply Voltage Rejection	0.5mV_{PP} on Pin V_{CC} 75µV_{PP} on Pin H1, H2,H3 Measurement on Pin Chroma	15	20		dB

5703-09.TBL

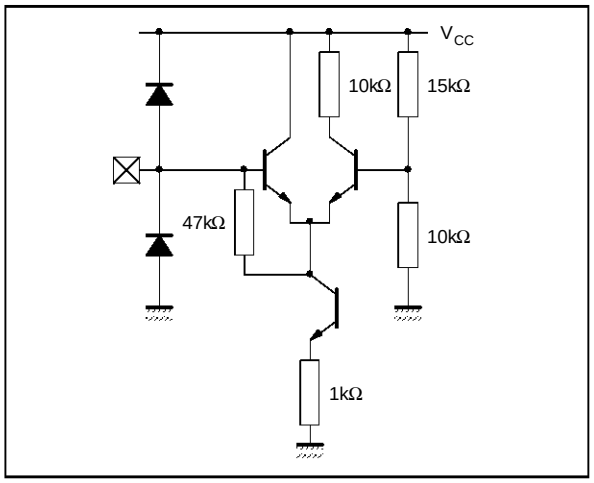
INPUT/OUTPUTS EQUIVALENT INTERNAL DIAGRAM

Pins : C1, C2



5703-03.EPS

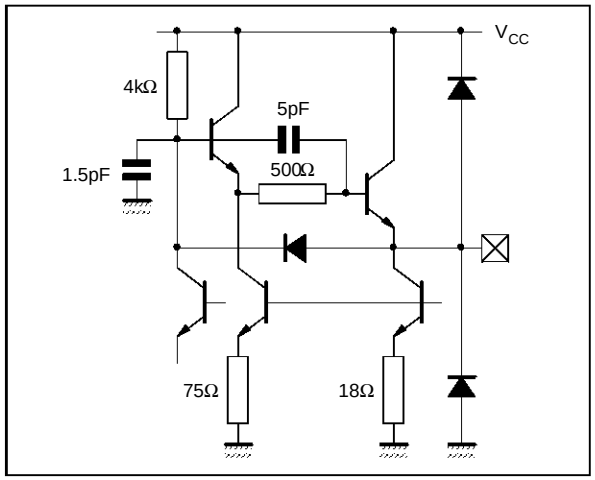
Pin : SW-H, SW-M



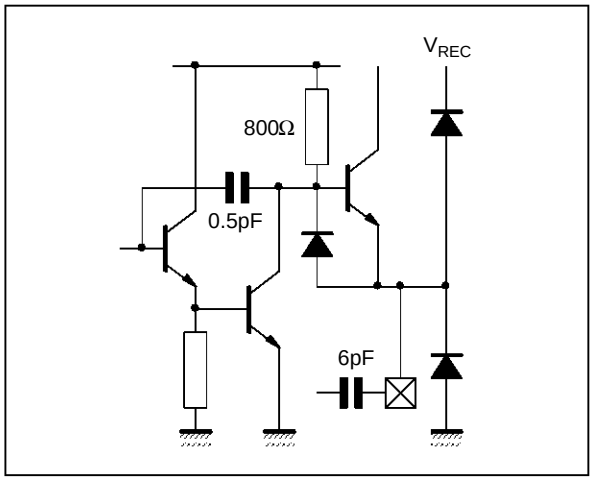
5703-04.EPS

INPUT/OUTPUTS EQUIVALENT INTERNAL DIAGRAM (continued)

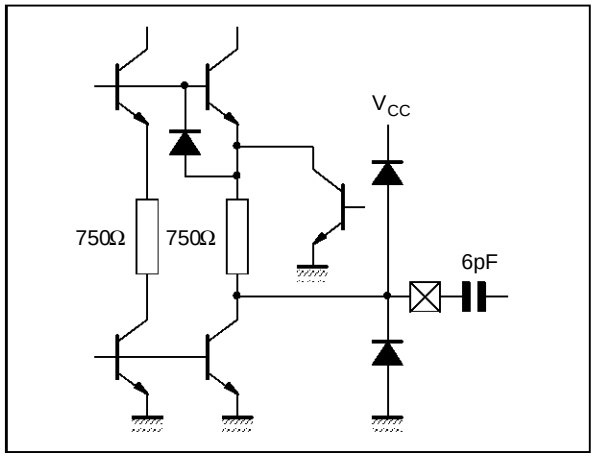
Pins : Chroma, Luma-



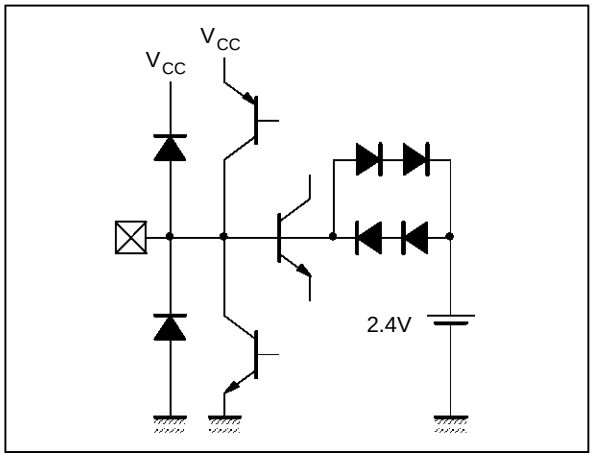
Pin : V_{MES}



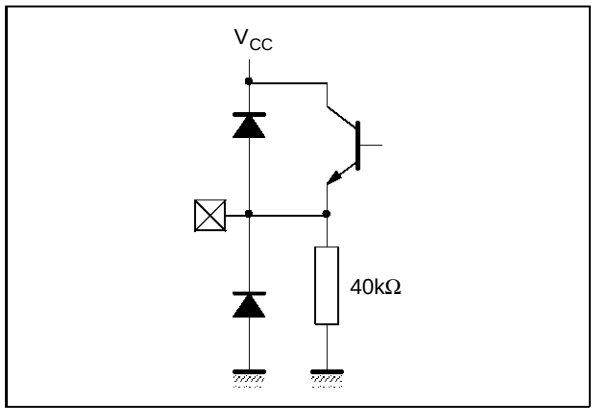
Pin : V_{IN}



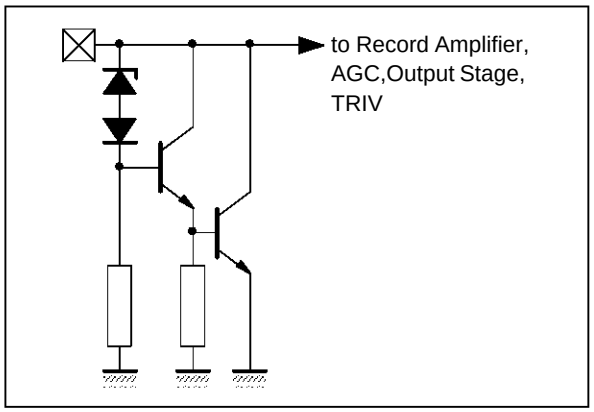
Pin : CAGC



Pin : TRIV

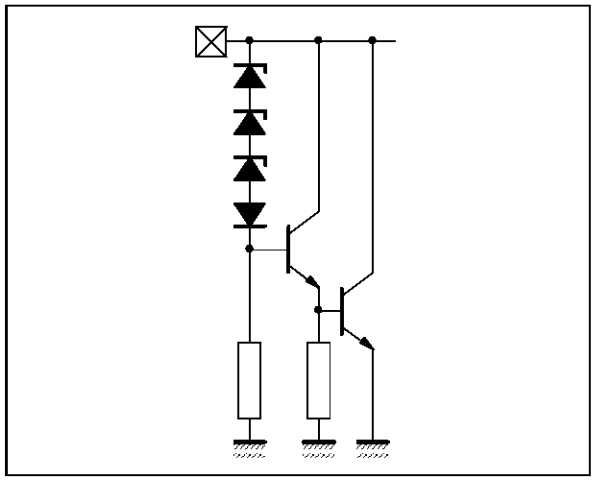


Pin : V_{CC1}

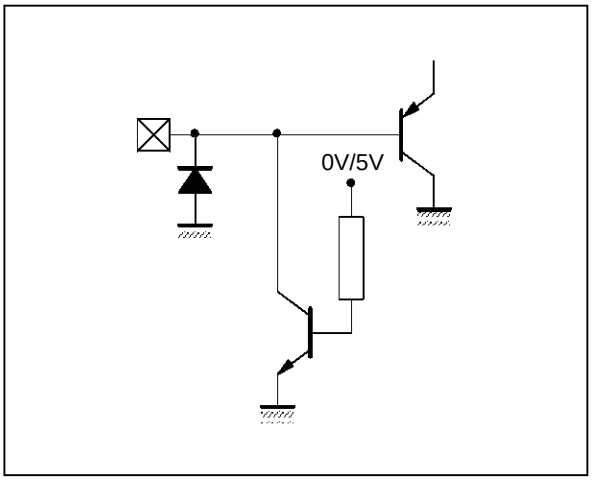


INPUT/OUTPUTS EQUIVALENT INTERNAL DIAGRAM (continued)

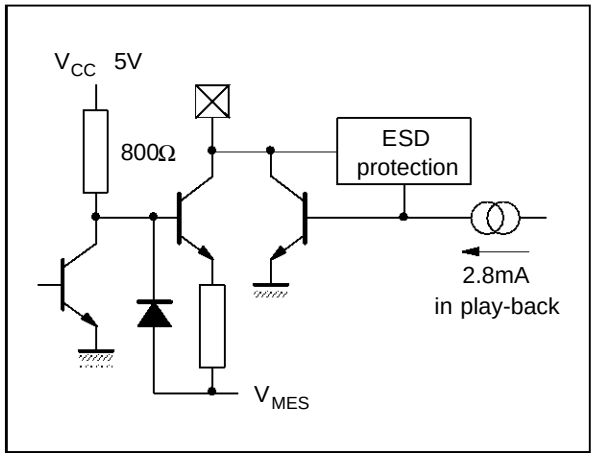
Pin : V_{REC}



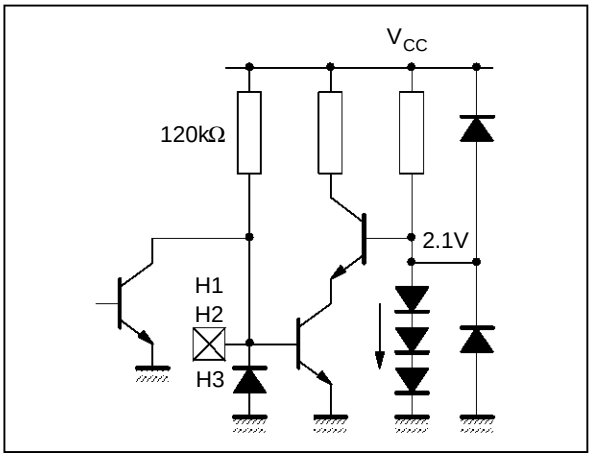
Pin : PROT



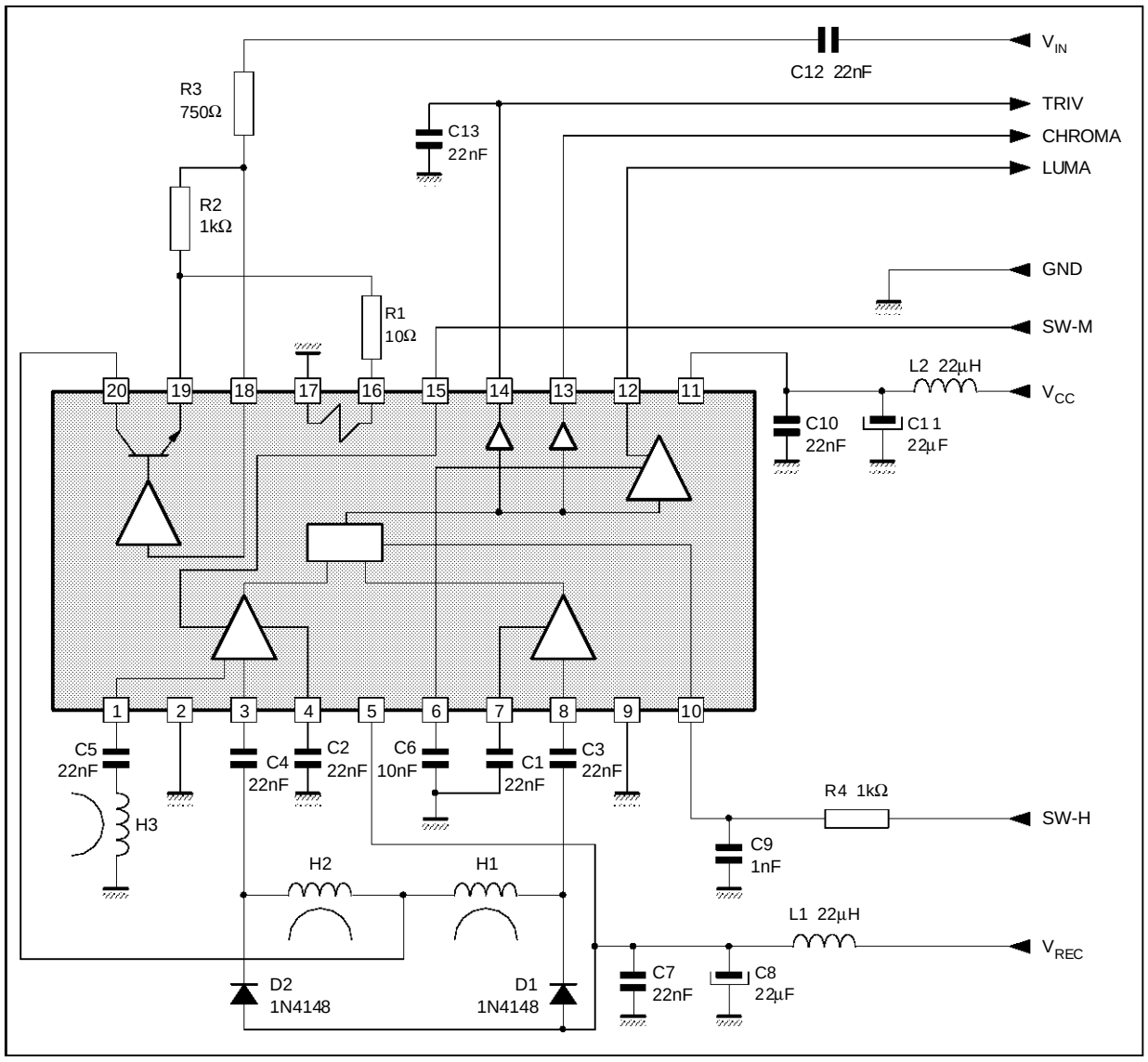
Pin : I_{OUT}



Pins : H1, H2, H3

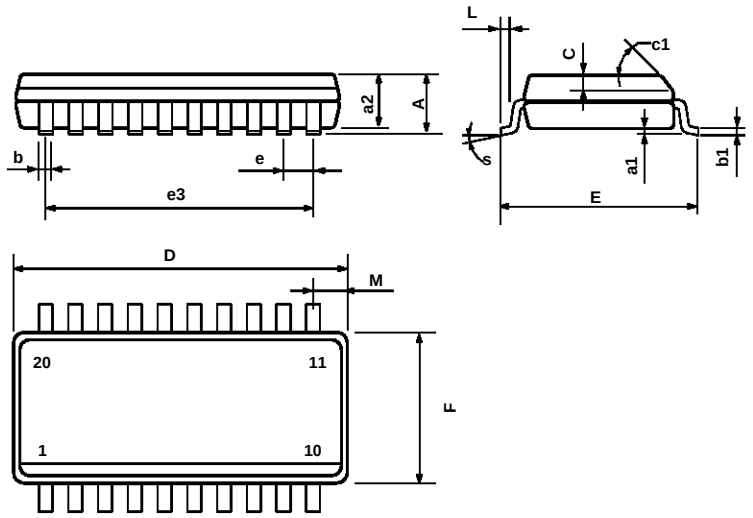


APPLICATION DIAGRAM



PACKAGE MECHANICAL DATA

20 PINS - PLASTIC MICROPACKAGE



PM-SO20L.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			2.65			0.104
a1	0.1		0.2	0.004		0.008
a2			2.45			0.096
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.013
C		0.5			0.020	
c1	45° (typ.)					
D	12.6		13.0	0.496		0.510
E	10		10.65	0.394		0.419
e		1.27			0.050	
e3		11.43			0.450	
F	7.4		7.6	0.291		0.300
L	0.5		1.27	0.020		0.050
M			0.75			0.030
S	8° (max.)					

SO20L.TBL