SGS-THOMSON
MICROELECTRONICS

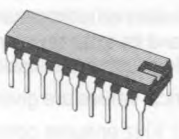
UAA4009

REMOTE CONTROL RECEIVER

- ON-CHIP OSCILLATOR
- USED WITH IR OR ULTRASONIC TRANSMISSION SYSTEM
- 5 BITS PPM MODULATION, FIRST TRANSMITTED MUST BE ZERO
- 2 SUCCESSIVE CODEWORDS COMPARISON
- 12 CHANNELS SET EITHER BY REMOTE CONTROL OR OUTPUT PIN GROUNDING
- MUTING DURING CHANNEL CHANGE
- PRIORITY CHANNEL SET BY EXTERNAL CAPACITOR
- V_{CC} = 12 V
- I_{CC} = 15 mA
- PPM PULSES :

- CHANNEL OUTPUT : OPEN NPN COLLECTOR WITH FEED-BACK INFORMATION
- STAND-BY OUTPUT : OPEN NPN COLLECTOR
- V_{max}, OUTPUT : 35 V

- This device :
- receives 15 of the 32 codes transmitted by the UAA4000 (PPM)
- commutes tuning voltage for 12 TV channels
- provides 0 to 6 V voltage (16 steps) for one electronic potentiometer
- gives "stand-by" information

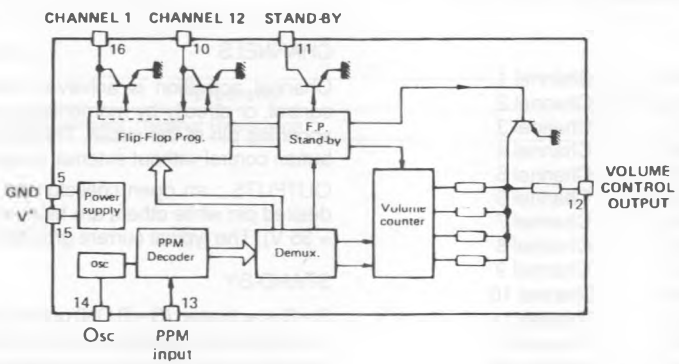


UAA4009
DIP18
(Plastic Package)

DESCRIPTION

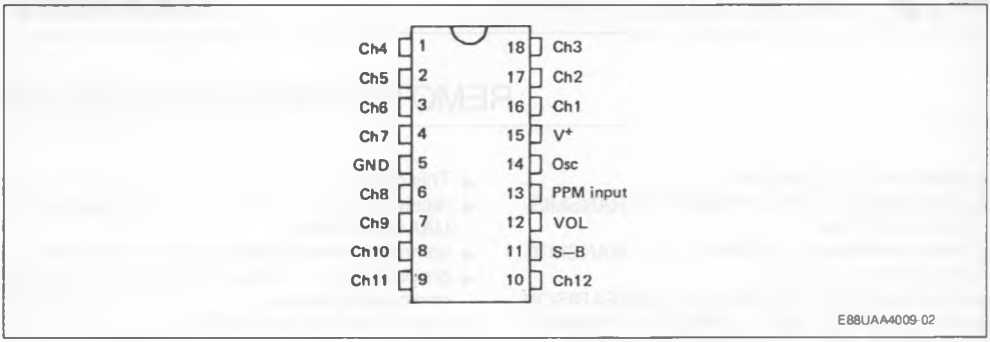
UAA4009 is an I2L/BIPOLAR circuit for use as a receiver of remote control signals for television control applications.

BLOCK DIAGRAM



E88UAA4009-01

PIN CONNECTIONS



GENERAL DESCRIPTION

PPM DEMODULATION

The receiver operates on a timescale fixed by an internal oscillator and its external timing components. Frequency is linked with transmission rate.

Following numerical values are given at f = 5.1 KHz.

For example, 5.1 KHz ensures potentiometer up or down travelling to be completed in about 5.5 s and channel 1 is set in 120 ms.

Each pulse that is received starts a counter. Input is masked for first 3.5 ms. Windows from 3.5 to 7 ms and from 7 to 13 ms determine whether a 1 or a 0 is present. Periods between pulses of 13 to 25.5 ms are recognized as word intervals.

Checks are made to ensure 5 bits are received for a word to be valid ; two consecutive and identical words allow corresponding function activation, 13 ms after receiving last pulse of the 2nd word (max 109 ms after first pulse of the first word).

CODES

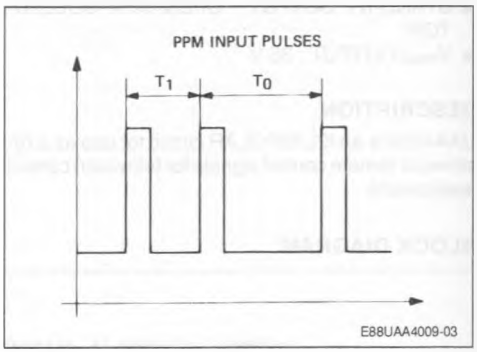
00001	Channel 1
00010	Channel 2
00011	Channel 3
00100	Channel 4
00101	Channel 5
00110	Channel 6
00111	Channel 7
01000	Channel 8
01001	Channel 9
01010	Channel 10
01011	Channel 11
01100	Channel 12
01101	Stand-by ON
01110	Volume UP
01111	Volume DOWN

NOTES : • 00001

1st last to be transmitted.

• Other codes are ignored

PPM INPUT PULSES



CHANNELS

Channel activation is achieved either by remote control, or directly by momentary grounding corresponding pin of the circuit. This allows local push-button control without external components.

OUTPUTS : an open collector transistor grounds desired pin while others are high impedance (V_{max} = 35 V). The typical current grounded is 10 mA.

STAND-BY

S – B is activated (S – B ON) only by remote control : it is disabled by activation of any channel either by remote control or front-panel switches.

S – B ON activates muting.

OUTPUT : Open collector S – B ON : high impedance
S – B OFF : grounded

MUTING

During channel change or while S – B is on, volume is reduced to minimum by grounding external capacitor. When muting is released, volume goes back to previous value by charging capacitor with RC constant to be adjusted at desired value (R is 2 KΩ typ).

VOLUME

A four bits binary counter drives a resistors array. It provides 0 to 6 V variation in 16 steps. Output impedance is 2 KΩ (50 Ω if muting is on).

Increment is inhibited when S – B is ON.

BEHAVIOUR AT START

When power is switched on :

- volume is preset at 0111 digital state, that is 2.8 V on volume output
- channel with greatest capacitor to the ground is activated

Ex. : on "typ. app. fig.", 22 nF has been connected to channel N

OSCILLATOR

The minimum resistor value on pin 14 is 30 KΩ.

T = C (160 R+ 1660) for V_{CC} = 12 V.
T = oscillator period (µs)
C = capacitance (µF)
R = resistance (KΩ)

NB (important) :

- When S – B is ON, 33 V tuning voltage must keep present. Otherwise all outputs are going to ground and consequently S – B is disabled.
- V^+ 12 V must be present to ensure output can accept 33 V.
- In any case, V_{CC} must be present on the circuit when V_{CHoff} is present (typically 33 V).

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	10 → 15	V
V_{CHoff}	Voltage on "Channel off" Pins	35	V
I_{CHon}	Current on "Channel on" Pins	20	mA
V_{in}	PPM Input High Voltage	20	V
V_{SBon}	Stand–by on Voltage	15	V
I_{SBoff}	Stand–by off Current	2	mA
I_{VOL}	Volume Output Current (available)	2	mA
T_{oper}	Operating Ambient Temperature	0 to 70	°C
P_{tot}	Max Power Dissipation	500	mW

THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction–ambient Thermal Resistance	70	°C/W

ELECTRICAL CHARACTERISTICS

V_{CC} = 12 V ; T_{amb} = + 25 °C (unless otherwise noted)

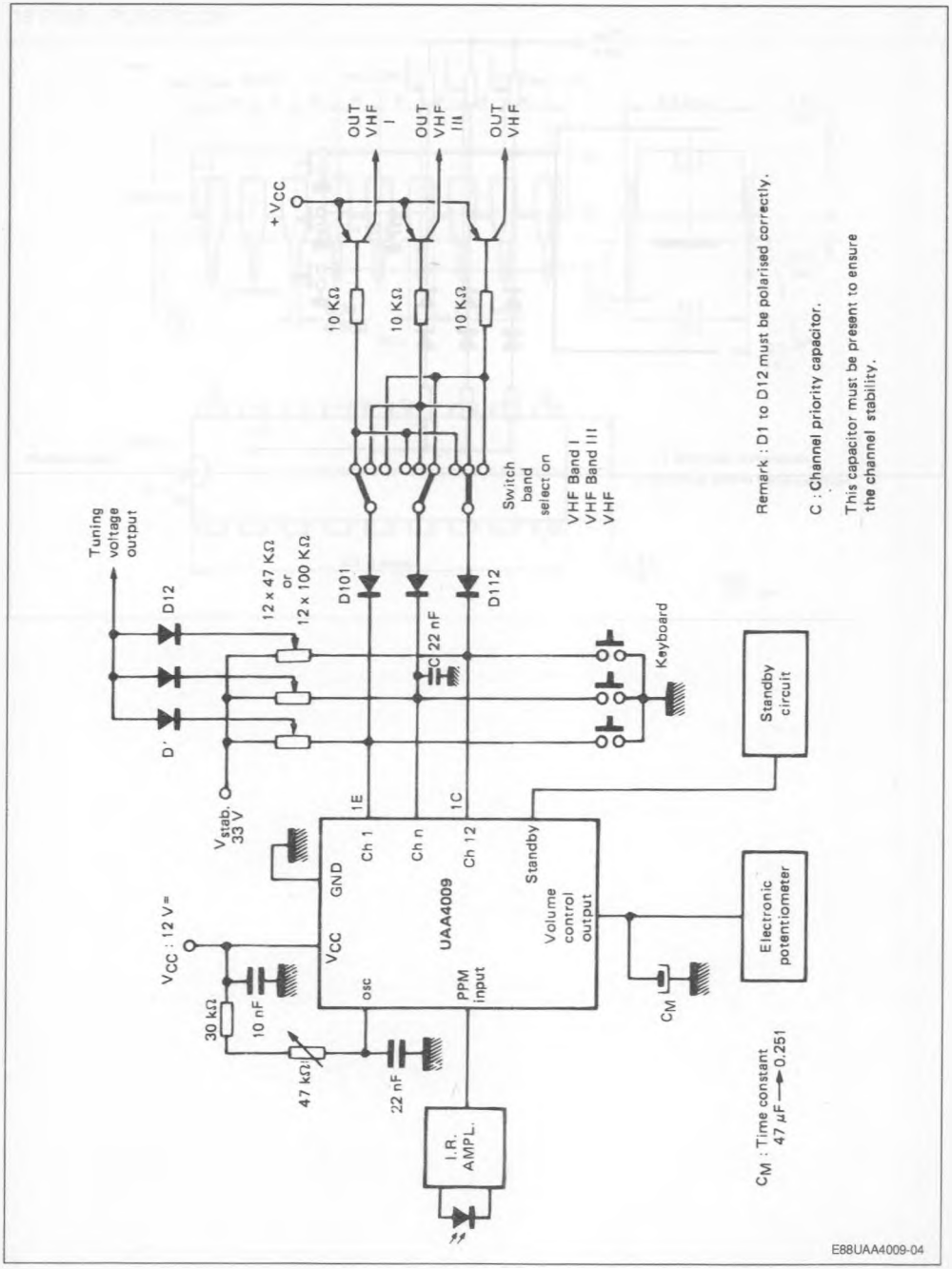
Symbol	Parameter	Min.	Typ.	Max.	Unit
I_{CC}	Supply Current	10	15	30	mA
V_{CHoff}	Voltage on "Channel off" Pins		33	35	V
I_{CHoff}	Current on "Channel off" Pins (V_{CHoff} = 33 V)			1	µA
V_{CHon}	Voltage on "Channel on" Pins (I_{CHon} = 10 mA)		50	80	mV
I_{CHon}	Current on "Channel on" PIns		10	20	mA
ΔV_{CHon}	Temperature coefficient		150	300	µV/°C
$\overline{\Delta\theta}$					
V_{in}	PPM Input Low Voltage		0 to 3		V
I_{in}	PPm Input Low Current (V_{in} = 0 V)		– 30		µA
V_{in}	PPM Input High Voltage		5	20	V
I_{in}	PPM Input High Current (V_{in} = V_{CC} = 12 V)		2		µA
V_{SBon}	Stand–by on Voltage		V_{CC}	15	V
I_{SBon}	Stand–by on Current (V_{SBon} = 12 V)			1	µA
V_{SBoff}	Stand–by off Voltage (at I_{SBoff} = 1 mA)			0.15	V
I_{SBoff}	Stand–by off Current		1	2	mA
ΔV_{VOL}	Volume Voltage Swing (unloaded)	4.9	6	7	V
V_{VOL}	Volume Voltage (step zero)		50	100	mV
V_{VOLst}	Starting Volume Voltage		2.8		V
R_{OUTvol}	Volume Output Impedance (S–B off)	1.4	2	2.6	kΩ
R_{OUTVOL}	(S–B on)	35	50	65	Ω
I_{VOL}	Volume Output Current (available)			2	mA
ΔV_{VOL}	Temp. Coefficient Volume–voltage (Load = 20 kΩ)		2		mV/°C
$\overline{\Delta\theta}$					
	V_{CC} Ripple Rejection (100 Hz)	30	40		dB
F_{osc}	Oscillator Frequency	0.5	5.1	10	kHz
T*	Optimum Oscillator Adjustement with UAA4000 Transmitter		1/29		t"1" transmitted
	Input Pulse Width	10			µs
t"1"	PPM Window for "1"	19.5		34.5	T*
t"0"	for "0"	35.5		66.5	T*
t"s"	for "synchro"	67.5		130.5	T*
f_{osc}	Oscillator Max Allowable Dispersion (transmitter f_{osc} = cst)			± 20	%
T_{ch}	Channel change delay		2 words+ 67 T*		
T_{VOL}	Volume Swing Average Delay	2.8	2.8×10^4 T*		s

T* : Receiver oscillator period at optimal frequency matching between transmitter and receiver.

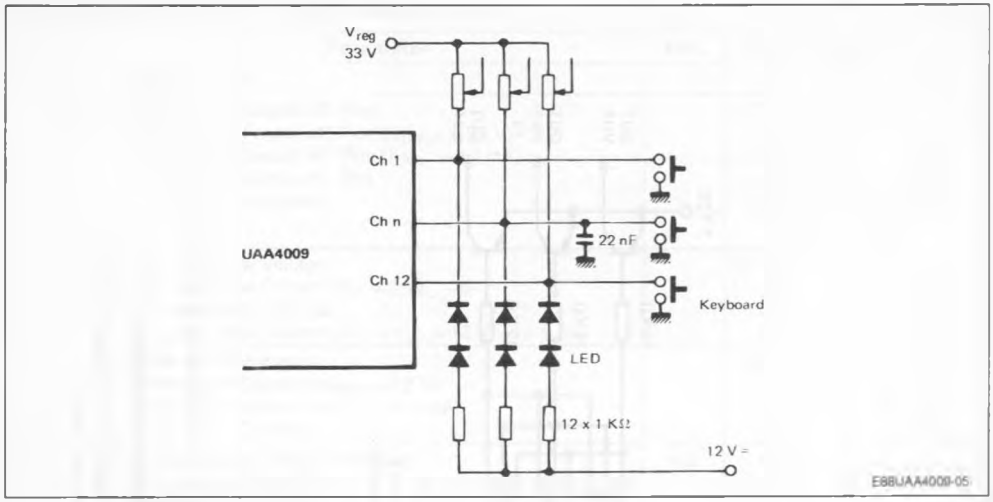
EXTERNAL FORCED SWITCHING

Symbol	Parameter	Min.	Typ.	Max.	Unit
	External Channel Activating Level			3.5	V
	Minimum Switching Time		20		µs

TYPICAL APPLICATION



APPLICATION WITH LED DISPLAY



PACKAGE MECHANICAL DATA

18 PINS – PLASTIC DIP