

Audio / video switch for CANAL - Plus decoder

BH7634AS

The BH7634AS is one-chip IC that contains audio and video switches that support 21-pin SECAM and PAL connectors.

The I²C BUS for switch control simplifies applications, while the two expansion ports allow up to two external inputs.

●Applications

VCRs

●Features

- 1) I²C BUS control.
- 2) Video input is sync tip clamped, and includes a small-capacity (0.022μF) input capacitor.
- 3) Three FSCOUT values.
- 4) Two expansion ports.
- 5) Audio mute function.
- 6) 75Ω driver output (pins 20 and 23) requires no attached capacitor.

●Absolute maximum ratings (Ta = 25°C)

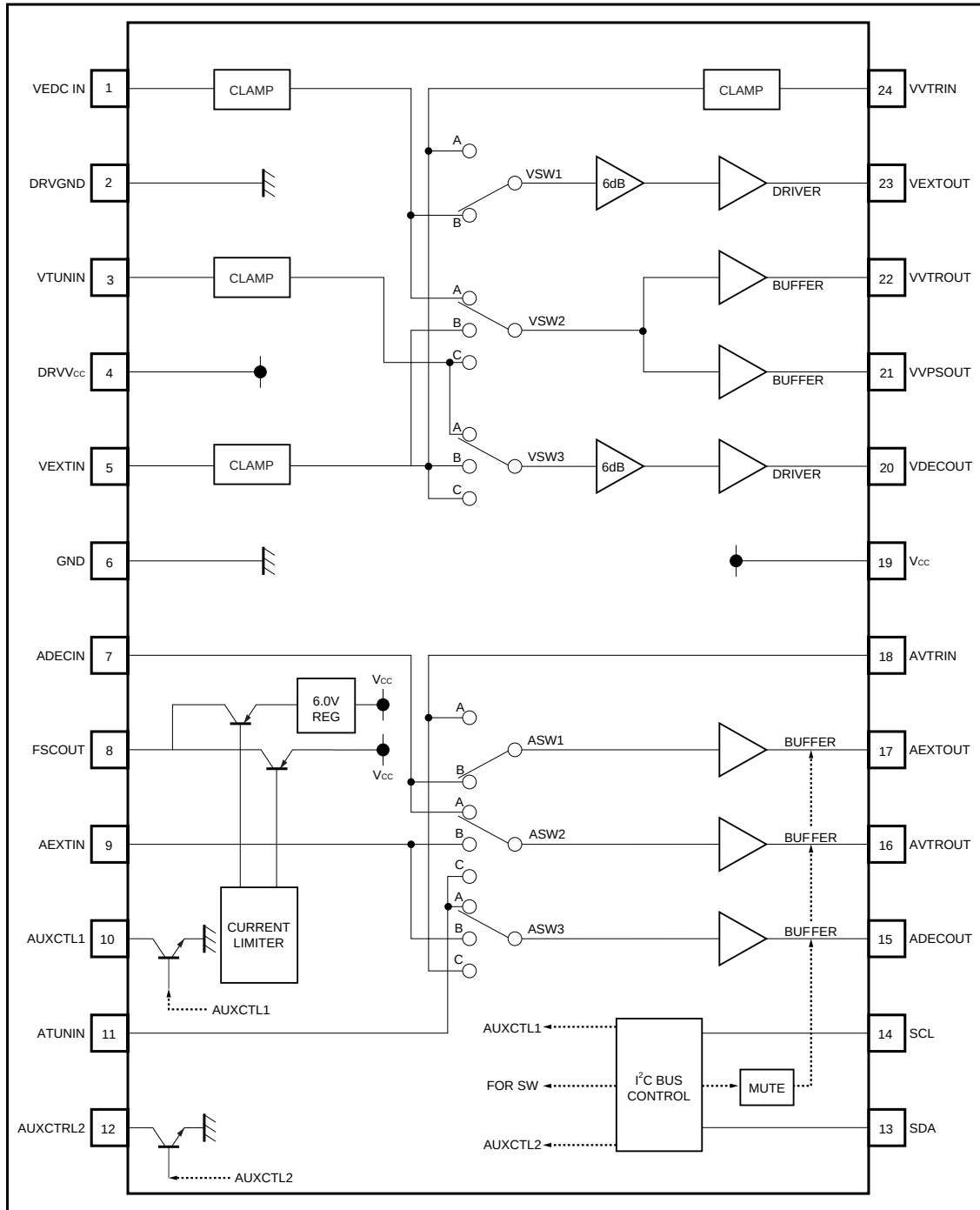
Parameter	Symbol	Limits	Unit
Power supply voltage	V _{CC}	13.5	V
Power dissipation	P _d	1200	mW
Operating temperature	T _{opr}	– 25 ~ + 60	°C
Storage temperature	T _{stg}	– 55 ~ + 125	°C

* Reduce by 12mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating power supply voltage	V _{CC}	8.5	12	13	V

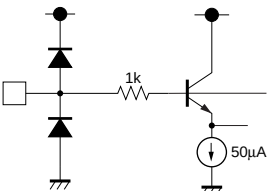
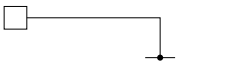
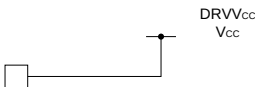
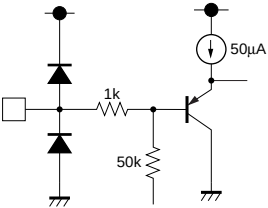
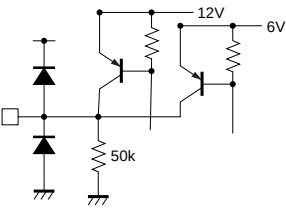
●Block diagram

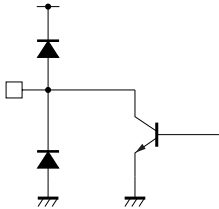
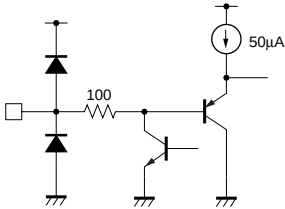
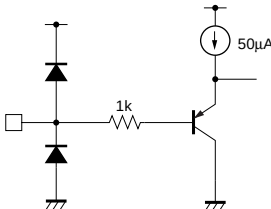
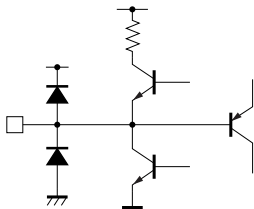
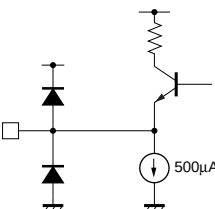


● Pin descriptions

Pin No.	Pin name	Function
1	VDECIN	Composite video signal input (sink chip clamp).
2	DRVGND	The driver ground. Not internally connected to the ground (pin 6).
3	VTUNIN	Composite video signal input (sink chip clamp).
4	DRVV _{CC}	The driver power supply. Not internally connected to V _{CC} (pin 19).
5	VEXTIN	Composite video signal input (sink chip clamp).
6	GND	Ground
7	ADECIN	Audio signal input.
8	FSCOUT	Outputs one of three values (11.8V, 5.9V or 0.2V) as controlled by the I ² C BUS.
9	AEXTIN	Audio signal input.
10	AUXCTL1	Open collector. Normally pulled up to roughly 10k.
11	ATUNIN	Audio signal output.
12	AUXCTL2	Open collector. Normally pulled up to roughly 10k.
13	SDA	I ² C BUS Serial Data input.
14	SCL	I ² C BUS Serial Clock input.
15	ADECOUT	Audio output.
16	AVTROUT	Audio output.
17	AEXTOUT	Audio output.
18	AVTRIN	Audio input.
19	V _{CC}	Power supply.
20	VDECOUT	Composite video signal output.
21	VVPSOUT	Composite video signal output.
22	VVTROUT	Composite video signal output.
23	VEXTOUT	Composite video signal output.
24	VVTRIN	Composite video signal input (sink chip clamp).

●Pin descriptions and input output equivalent circuits

Pin No.	Pin name	IN	OUT	Typ. voltage	I / O equivalent circuits	Pin description
1	VDECIN	○	—	1.6V		Video signal input
3	VTUNIN					For composite video signal input (sink chip clamp input).
5	VEXTIN					
24	VVTRIN					
2	DRVGN	—	—	0V		Ground
6	GND					DRVGN is the driver ground. GND is the ground for the circuit itself. GND and DRVGN are not connected internally.
4	DRVV _{CC}	—	—	12V		Power supply
19	V _{CC}					DRVV _{CC} is the driver power supply. V _{CC} is the power supply for the circuit itself. V _{CC} and DRVV _{CC} are not connected internally.
7	ADECIN	○	—	5.3V		Audio signal input
9	AEXTIN					For audio signal input. Input impedance is 50k.
11	ATUNIN					
18	AVTRIN					
8	FSCOUT	—	○	—		FS control
						Three voltages are output via I ² C BUS control: 11.8V, 5.9V, 0.2V.

Pin No.	Pin name	IN	OUT	Typ. voltage	I / O equivalent circuits	Pin description
10	AUXCTL1	—	○	—		External control An open collector. Normally pulled up with a (roughly) 10kΩ resistor.
12	AUXCTL2	—	○	—		
13	SDA	○	—	—		I²C BUS data input For serial data input compliant with the I²C BUS.
14	SCL	○	—	—		I²C BUS clock input For clock input compliant with the I²C BUS.
15	ADECOUT	—	○	6V		Audio signal output Outputs the audio signal. ADECOUT and AEXTOUT are respectively for decoder output and external output.
17	AEXTOUT	—	○	6V		
16	AVRTOUT	—	○	5.3V		Audio signal output Outputs the audio signal. AVRTOUT outputs to the signal processor.

Pin No.	Pin name	IN	OUT	Typ. voltage	I / O equivalent circuits	Pin description
20	VDECOUT	—	○	1.7V		Video signal output Outputs the composite video signal. VDECOUT and VEXTOUT are respectively for decoder output and external output.
23	VEXTOUT	—	○			
21	VVPSOUT	—	○	1.0V		Video signal output Outputs the composite video signal. VVPSOUT is output for VPS, VVTSOUT outputs to the signal processor.
22	VVTROUT	—	○			

●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC} = 12V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
〈Device〉						
Supply current	I _{CC}	30	46	62	mA	No signal
FSCOUT voltage, H	V _{FSC H}	11.0	11.8	12.0	V	R _L = 10kΩ
FSCOUT voltage, M	V _{FSC M}	5.2	5.9	6.8	V	R _L = 10kΩ
FSCOUT voltage, L	V _{FSC L}	0	0.2	1.0	V	R _L = 10kΩ
FSCOUT restriction current	I _{FSC}	—	—	20	mA	V _{FSCO} = 0V
External controller sink current	I _{SYN}	1.0	—	—	mA	R _L = 10kΩ
External controller voltage, L	V _{AUXL}	0	0.2	1.0	V	R _L = 10kΩ
〈Video switches〉						
Voltage gain	G _{VV}	− 1	0	1	dB	V _{IN} = 1V _{P-P} , f = 4.43MHz
Frequency characteristics	V _F	− 3	0	1	dB	V _{IN} = 1V _{P-P} , f = 100k / 7MHz
〈Audio switches〉						
Voltage gain	G _{VA}	− 1	0	1	dB	V _{IN} = 1V _{rms} , f = 1kHz
Maximum output level	V _{OMA}	3.0	3.6	—	V _{rms}	f = 1kHz, THD = 0.5%
Total harmonic distortion	THD	—	0.005	0.1	%	V _{IN} = 1V _{rms} , f = 1kHz
Input conversion noise voltage	V _{Min.}	—	20	100	μV _{rms}	DIN AUDIO R _g = 600Ω
Input impedance	Z _{IN}	40	50	60	kΩ	
Offset voltage	ΔV _{OF}	—	—	20	mV	
〈Control〉						
"H" level voltage	V _H	3.0	—	—	V	
"L" level voltage	V _L	0	—	1.5	V	

Note: Supports I²C BUS input.

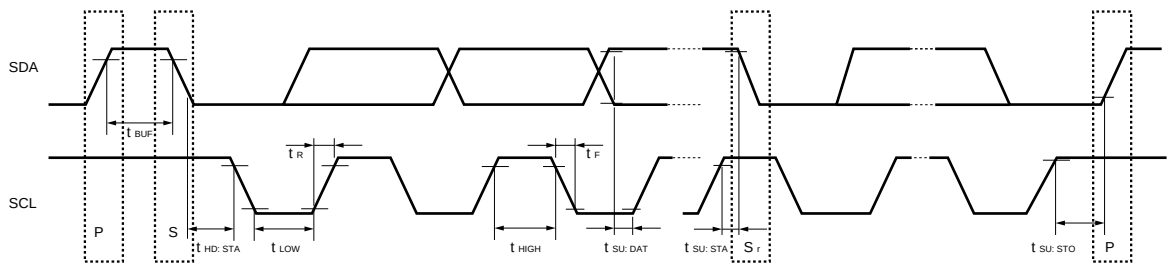
●Guaranteed design parameters (unless otherwise noted, Ta = 25°C, V_{CC} = 12V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
〈Video switches〉						
Interchannel crosstalk	CT _V	—	− 70	− 50	dB	V _{IN} = 1V _{P-P} , f = 4.43MHz
Secondary harmonics	HD ₂	—	− 45	− 40	dB	V _{IN} = 1V _{P-P} , f = 4.43MHz
Tertiary harmonics	HD ₃	—	− 50	− 45	dB	V _{IN} = 1V _{P-P} , f = 4.43MHz
〈Audio switches〉						
Interchannel crosstalk	CT _A	—	− 90	− 70	dB	V _{IN} = 1V _{rms} , f = 1kHz
Mute attenuation	V _{MTA}	—	− 90	− 70	dB	V _{IN} = 1V _{rms} , f = 1kHz

● Recommended I²C BUS operating conditions

Parameter	Symbol	Min.	Max.	Unit	Conditions
SCL clock frequency	f_{SCL}	0	100	kHz	
Data transfer waiting time	t_{BUF}	4.7	—	μs	
Start holding time	$t_{\text{HD: STA}}$	4.0	—	μs	
SCL“L”, holding time	t_{LOW}	4.7	—	μs	
SCL“H”, holding time	t_{HIGH}	4.0	—	μs	
Start setup time	$t_{\text{SU: STA}}$	4.7	—	μs	
Data setup time	$t_{\text{SU: DAT}}$	250	—	ns	
Signal rise time	t_{R}	—	1000	ns	
Signal fall time	t_{F}	—	300	ns	
Stop setup time	$t_{\text{SU: STO}}$	4.0	—	μs	

I²C BUS control signal



● I²C BUS control inputI²C BUS format

S	SLAVE ADDRESS	A	DATA1	A	DATA2	A	P
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S : Start condition
 SLAVE ADDRESS : Slave address

MSB				LSB			
1	0	0	0	0	0	1	0

A : Confirmation response clock pulse
 DATA1, 2 : Data byte

MSB			1st byte			LSB		
D9	D8	D7	D6	D5	D4	D3	D2	

MSB		2nd byte				LSB	
D1	D0	0	0	0	0	0	0

● Switch input and mode selection

SW1

D9	SELECT
H	A
L	B

SW2

D8	D7	SELECT
H	H	A
H	L	A
L	H	B
L	L	C

SW3

D6	D5	SELECT
H	H	A
H	L	A
L	H	B
L	L	C

FSCOUT control

D4	D3	FSC OUT
H	H	LOW
H	L	MIDDLE
L	H	HIGH
L	L	HIGH

External control 1

D1	AUX CTL1 OUT
H	HIGH
L	LOW

External control 2

D0	AUX CTL2 OUT
H	HIGH
L	LOW

MUTE control

D2	MUTE
H	MUTE
L	NORMAL

Note: When D2 is HIGH, only the audio switches are muted.

● Measurement circuit

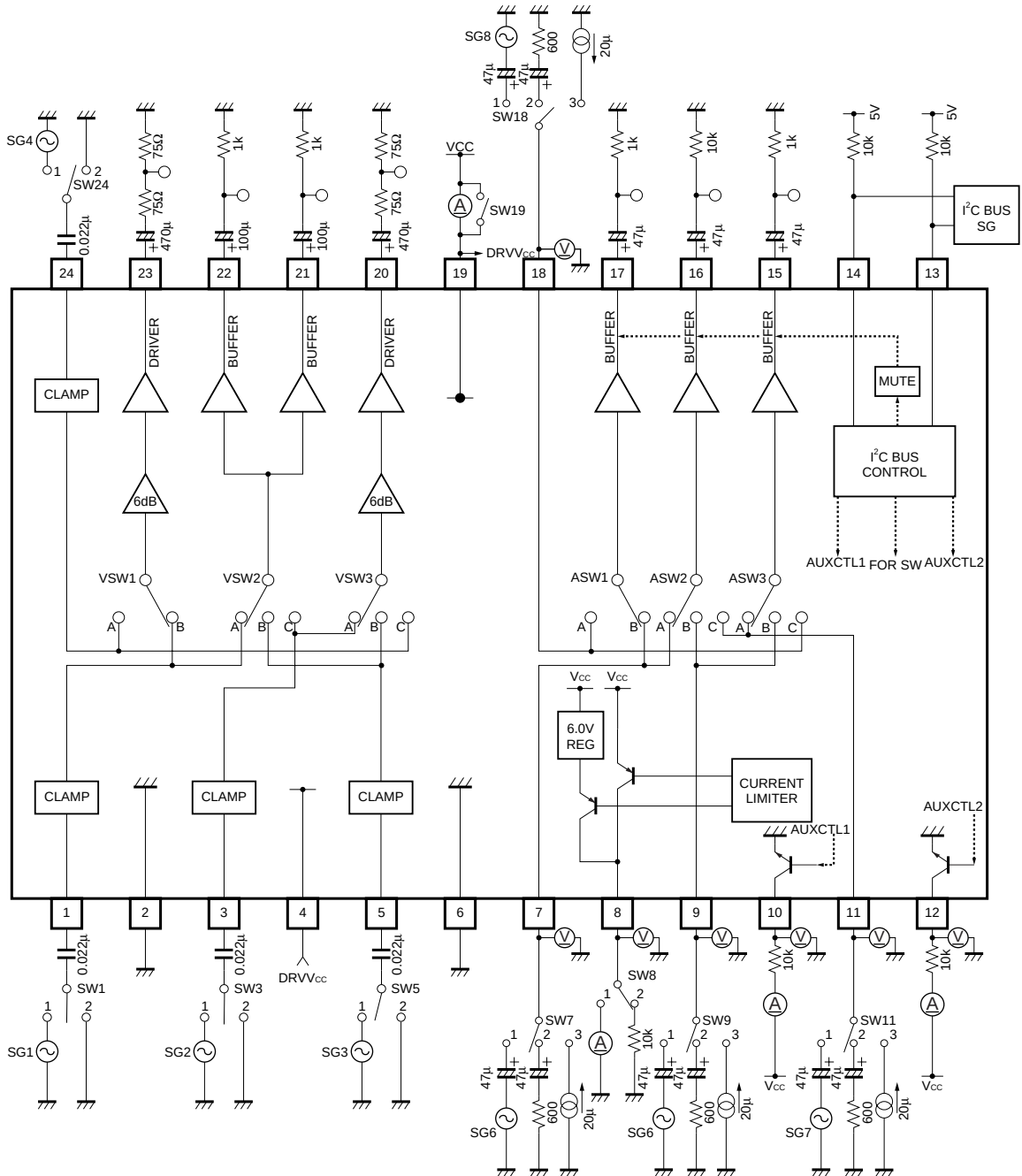


Fig. 1

● Application example

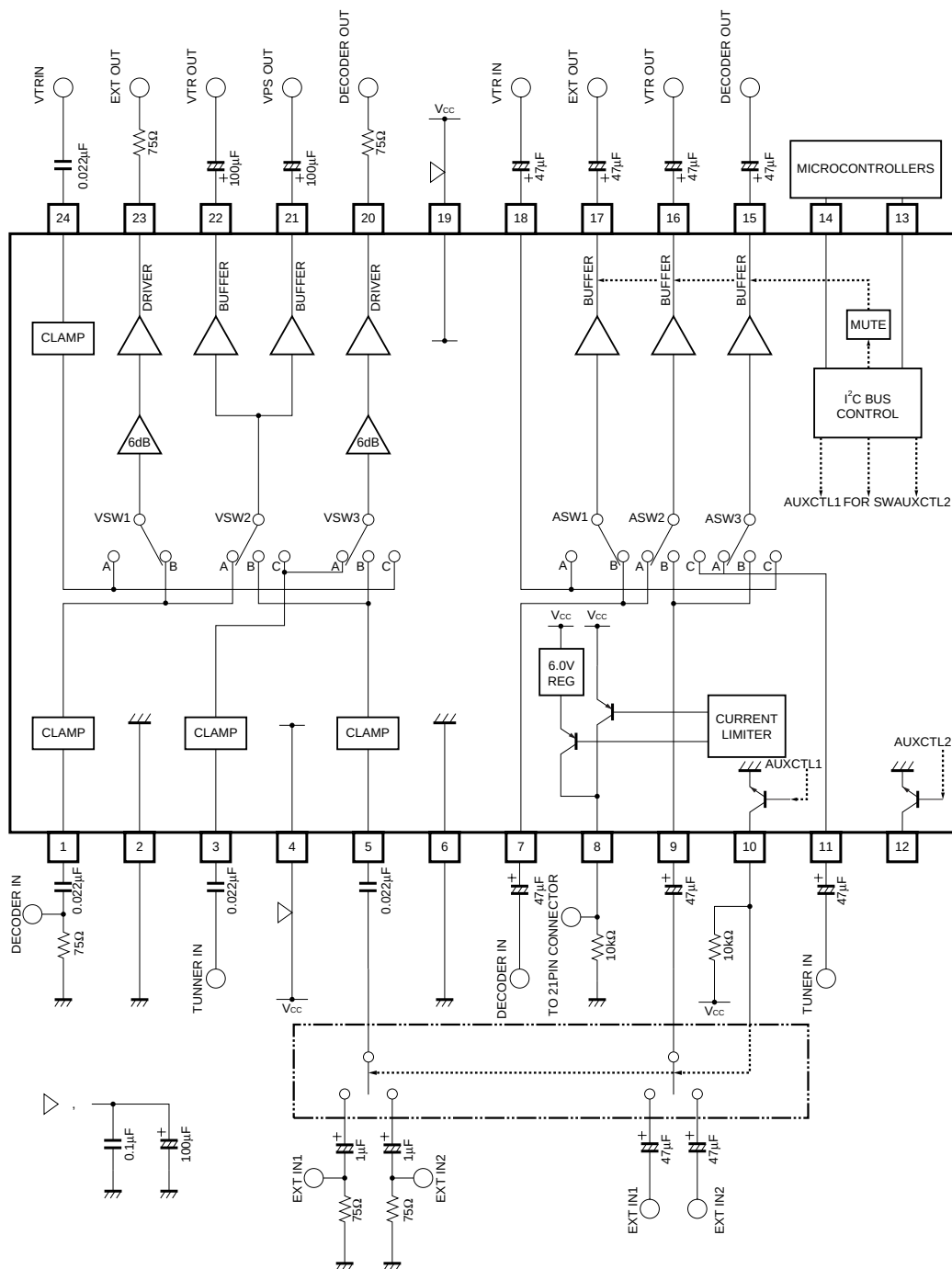


Fig. 2

●Electrical characteristic curves

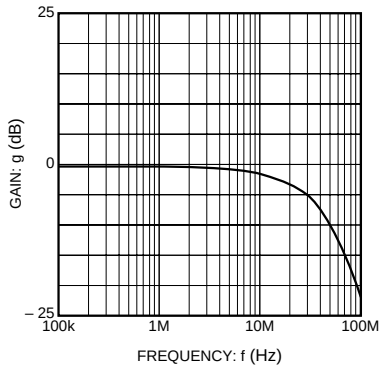


Fig. 3 Video output (pins 20, 23) frequency characteristics

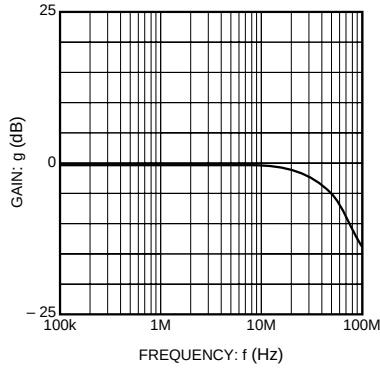


Fig. 4 Video output (pins 21, 22) frequency characteristics

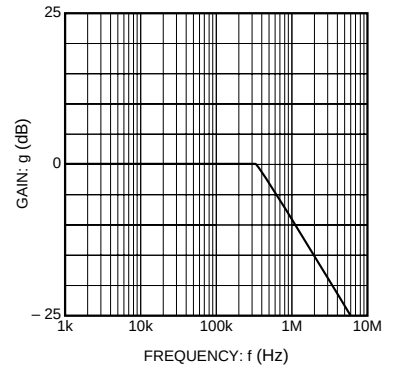


Fig. 5 Audio output (pins 15, 17) frequency characteristics

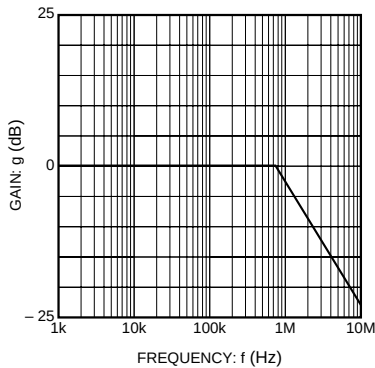


Fig. 6 Audio output (pin 16) frequency characteristics

●External dimensions (Units: mm)

