Audio/Video Switch for CANAL Plus decorder

BH7634AS

The BH7634AS is one-chip IC that contains audio and video switches that support 21-pin SECAM and PAL connectors. The I^2C BUS for switch control simplifies applications, while the two expansion ports allow up to two external inputs.

●Applications

VTRs

●Features

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

●Absolute maximum ratings (Ta=25℃)

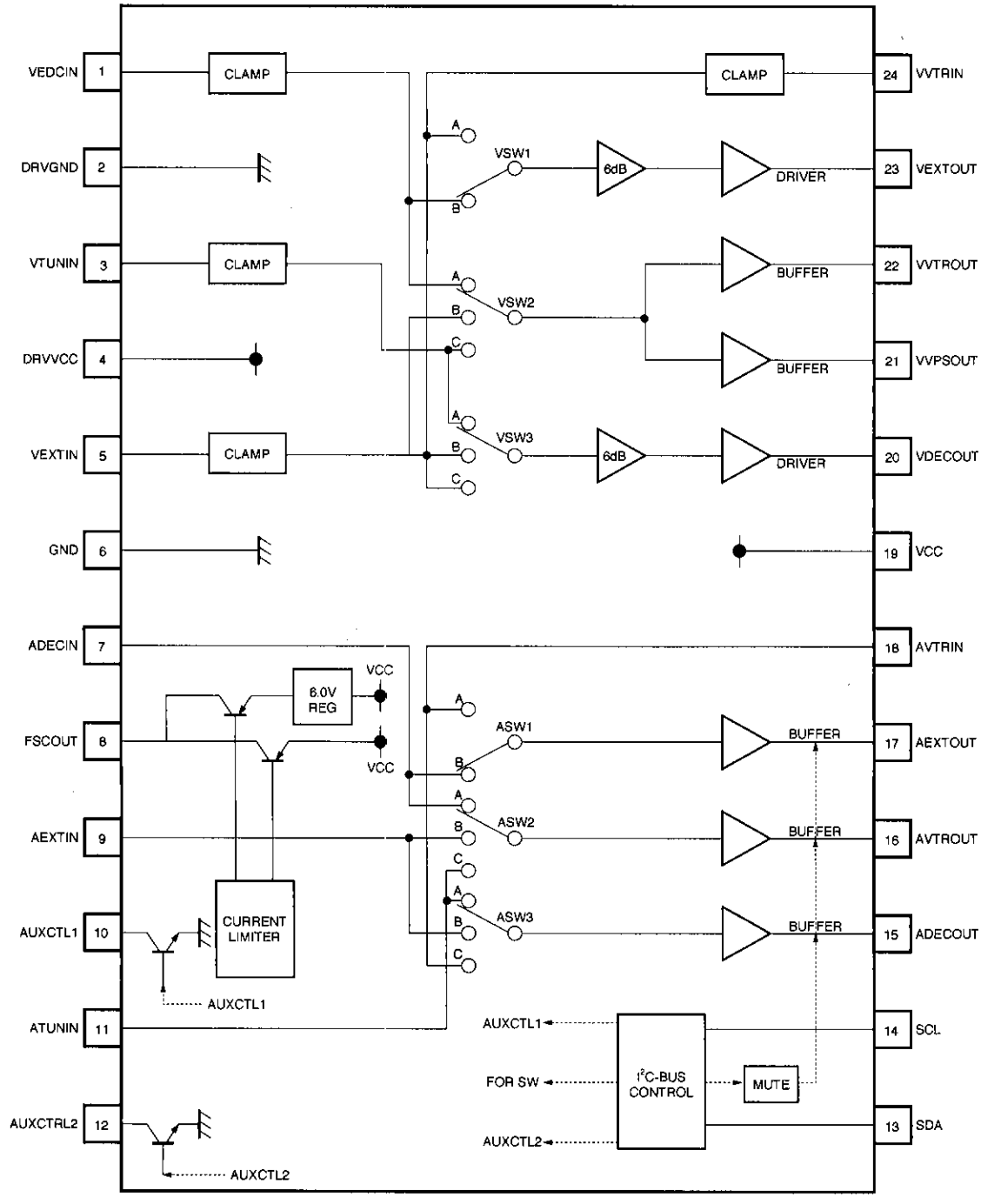
Parameter	Symbol	Limits	Unit
Power supply voltage	Vcc	13.5	V
Power dissipation	Pd	1200	mW
Operating temperature	Topr	−25～+60	℃
Storage temperature	Tstg	−55～+125	℃

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

●Recommended operating conditions (Ta=25℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating supply voltage	Vcc	8.5	12	13	V

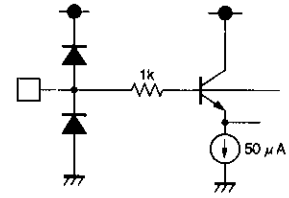
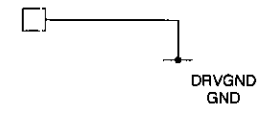
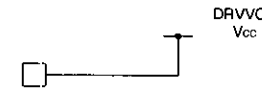
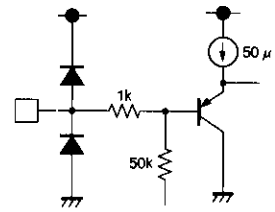
●Block diagram



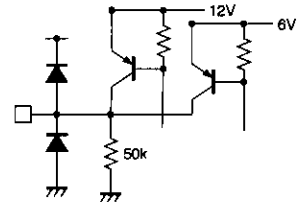
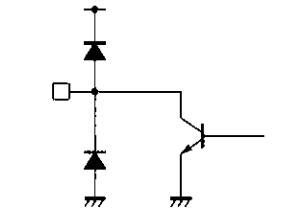
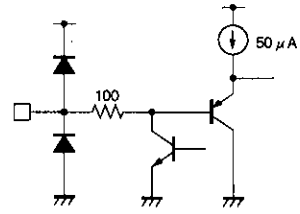
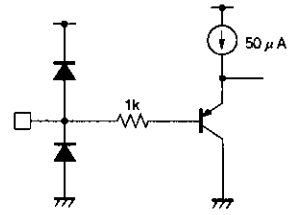
●Pin descriptions

Pin No.	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	DRVVCC	The driver power supply. Not internally connected to VCC (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 (11.8 V, 5.9 V or 0.2 V) as controlled by the I²C BUS.
9	AEXTIN	Audio signal input.
10	AUXCTL1	Open collector. Normally pulled up to roughly 10 k
11	ATUNIN	Audio signal output.
12	AUXCTL2	Open collector. Normally pulled up to roughly 10 k
13	SDA	I²C BUS Serial Data input.
14	SCL	I²C BUS Serial Clock input.
15	ADECOUT	Audio output.
16	AVTROUT	Audio output.
17	AEXTOUT	Audio output.
18	AVTRIN	Audio input.
19	VCC	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).

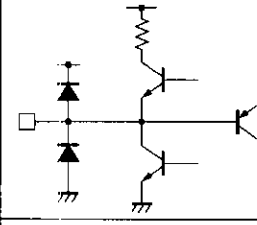
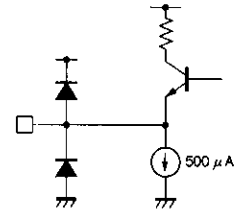
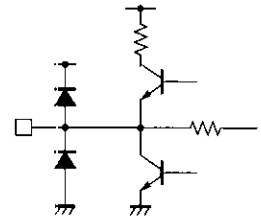
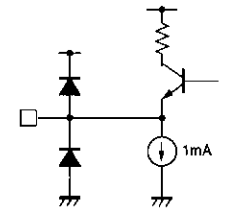
●Pin descriptions and input output equivalent circuits

Pin No.	Name	IN	OUT	Typ. voltage	I/O equivalent circuits	Pin description
1 3 5 24	VDECIN VTUNIN VEXTIN VVTRIN	○	—	1.6V		Video signal input For composite video signal input (sink chip clamp input).
2 6	DRVGND GND	—	—	0V		Ground DRVGND is the driver ground. GND is the ground for the circuit itself. GND and DRVGND are not connected internally.
4 19	DRVVCC VCC	—	—	12V		Power supply DRVVCC is the driver power supply. VCC is the power supply for the circuit itself. VCC and DRVVCC are not connected internally.
7 9 11 18	ADECIN AEXTIN ATUNIN AVTRIN	○	—	5.3V		Audio signal input For audio signal input. Input impedance is 50 k.

●Pin descriptions and input output equivalent circuits

Pin No.	Name	IN	OUT	Typ. voltage	I/O equivalent circuits	Pin description
8	FSCOUT	—	○	—		FS control Three voltages are output via I²C BUS control: 11.8 V, 5.9 V, 0.2 V.
10 12	AUXCTL1 AUXCTL2	—	○	—		External control An open collector. Normally pulled up with a (roughly) 10 kΩ resistor.
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.

●Pin descriptions and input output equivalent circuits

Pin No.	Name	IN	OUT	Typ. voltage	I/O equivalent circuits	Pin description
15 17	ADECOUT AEXTOUT	—	○	6V		Audio signal output Outputs the audio signal. ADECOUT and AEXTOUT are respectively for decoder output and external output.
16	AVTROUT	—	○	5.3V		Audio signal output Outputs the audio signal. AVRTOUT outputs to the signal processor.
20 23	VDECOUT VEXTOUT	—	○	1.7V		Video signal output Outputs the composite video signal. VDECOUT and VEXTOUT are respectively for decoder output and external output.
21 22	VVPSOUT VVTROUT	—	○	1.0V		Video signal output Outputs the composite video signal. VVPSOUT is output for VPS, VVTSOUT outputs to the signal processor.

●Electrical characteristics (unless otherwise noted, Ta=25℃, Vcc=12 V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
《Device》						
Circuit current	I_{CC}	30	46	62	mA	No signal
FSCOUT voltage, H	V_{FSCH}	11.0	11.8	12.0	V	R_L=10kΩ
FSCOUT voltage, M	V_{FSCM}	5.2	5.9	6.8	V	R_L=10kΩ
FSCOUT voltage, L	V_{FSCL}	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 characteristic	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}=1Vrms, f=1kHz
Maximum output level	V_{OMA}	3.0	3.6	—	Vrms	f=1kHz, THD=0.5%
Total harmonic distortion	THD	—	0.005	0.1	%	V_{IN}=1Vrms, f=1kHz
Input conversion noise voltage	$V_{Min.}$	—	20	100	μVrms	DIN AUDIO Rg=600Ω
Input impedance	Z_{IN}	40	50	60	kΩ	
Offset voltage	$\triangle V_{OF}$	—	—	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.

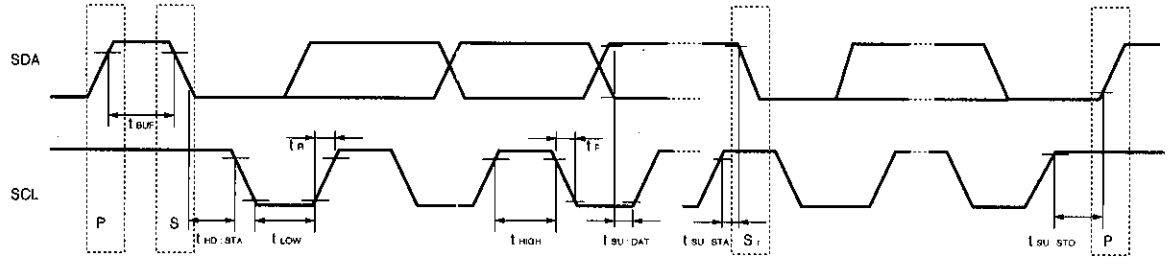
●Guaranteed performance (unless otherwise noted, Ta=25℃, Vcc=12 V)

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}=1Vrms, f=1kHz
Mute attenuation	V_{MTA}	—	−90	−70	dB	V_{IN}=1Vrms, f=1kHz

●Recommended I^2C 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	$t_{HD:STA}$	4.0	—	μS	
SCL「L」, holding time	t_{LOW}	4.7	—	μS	
SCL「H」, holding time	t_{HIGH}	4.0	—	μS	
Start setup time	$t_{SU:STA}$	4.7	—	μS	
Data setup time	$t_{SU:DAT}$	250	—	nS	
Signal rise time	t_R	—	1000	nS	
Signal fall time	t_F	—	300	nS	
Stop setup time	$t_{SU:STO}$	4.0	—	μS	

I^2C - BUS control signal



●I²C - BUS control input

I²C - BUS format

S	SLAVE ADDRESS	A	DATA1	A	DATA2	A	P

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

1st byte

MSB							LSB
D9	D8	D7	D6	D5	D4	D3	D2

2nd byte

MSB							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

* When D2 is "H", only audio switches become mute.

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

●Measurement circuit

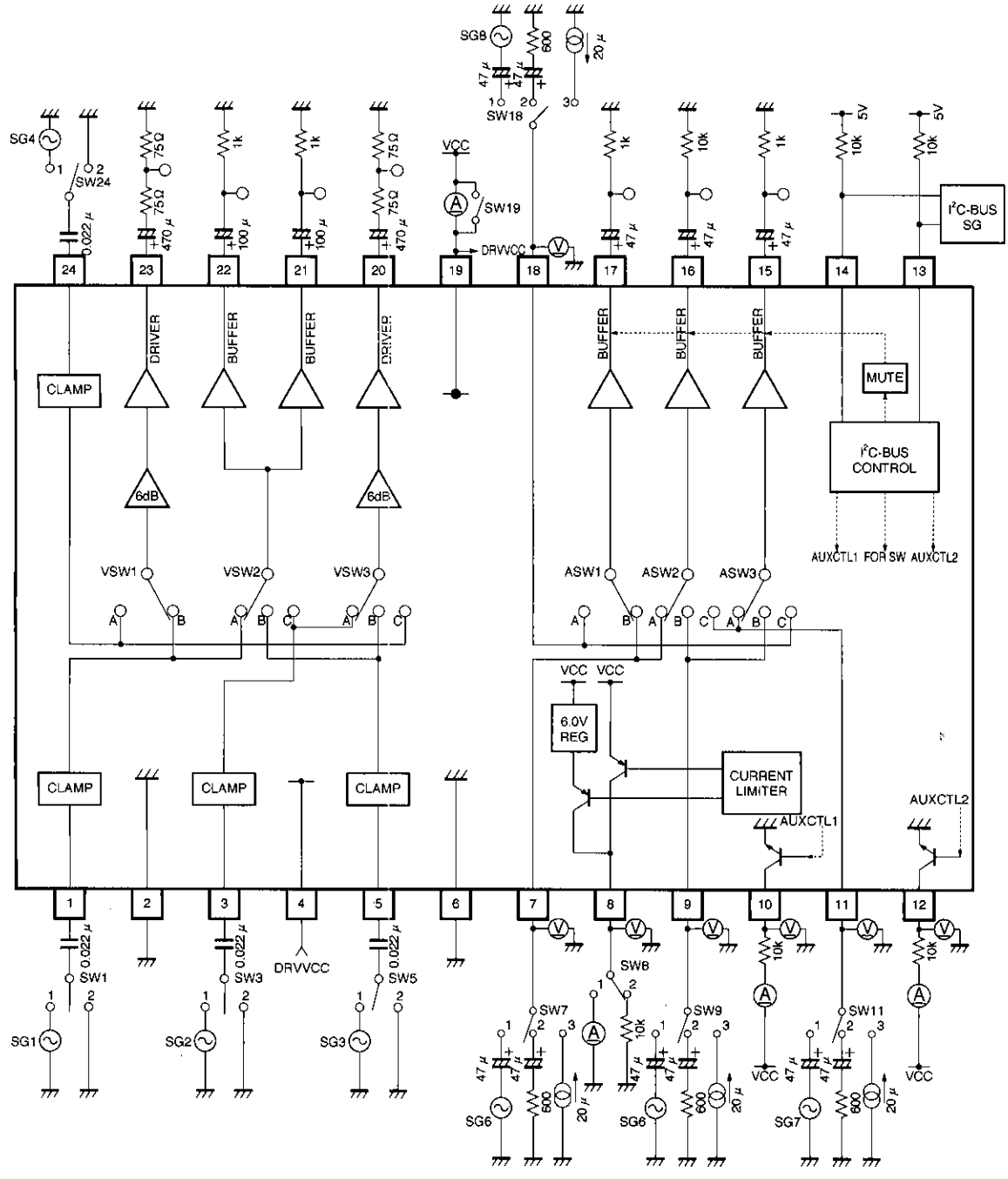


Fig.1

●Application example

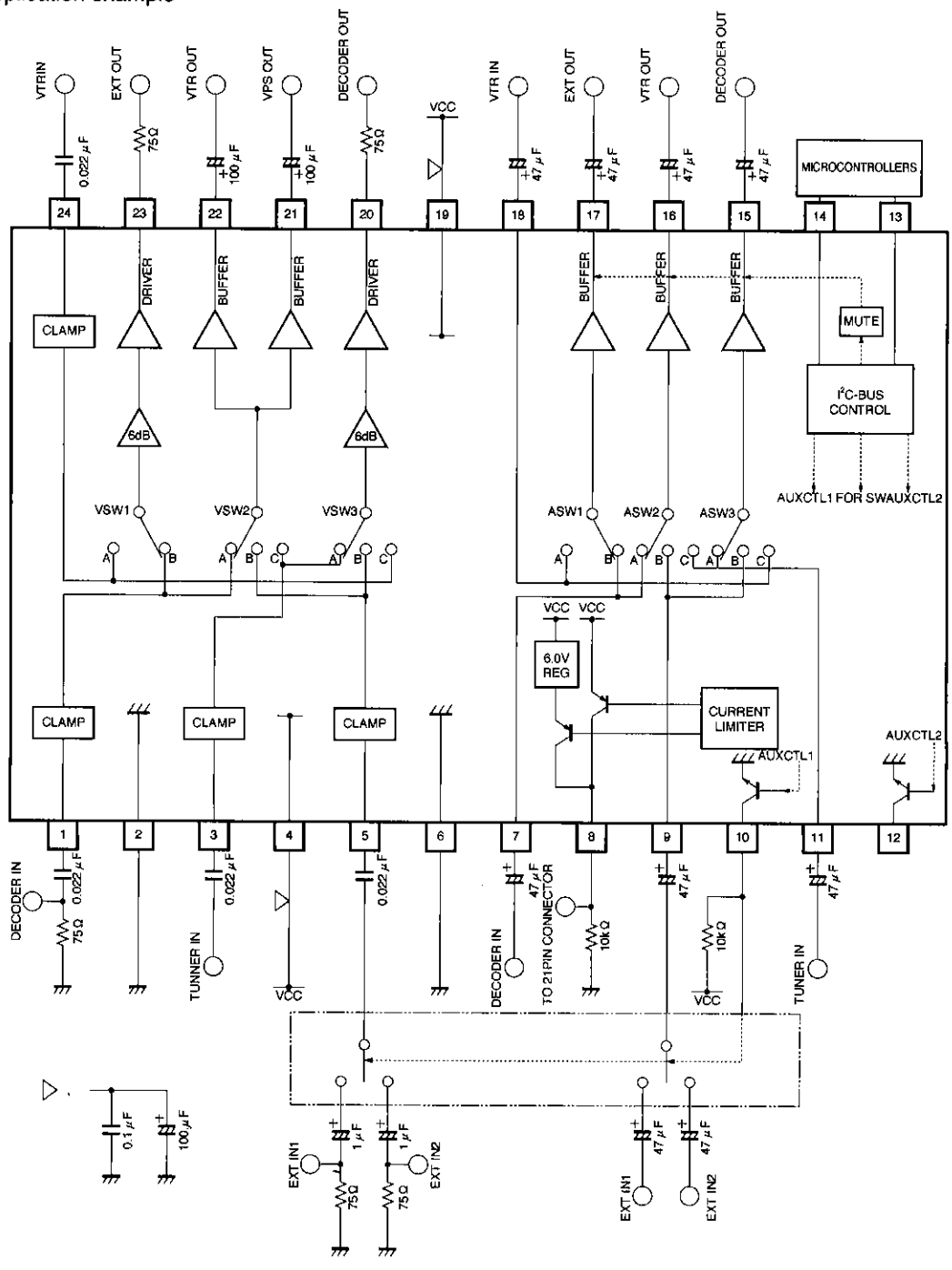


Fig.2

●Electrical characteristic curves

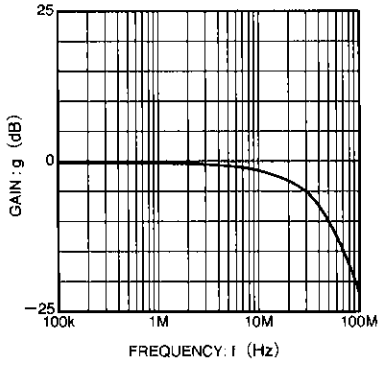


Fig.3 Video output (pins 20, 23) frequency characteristics

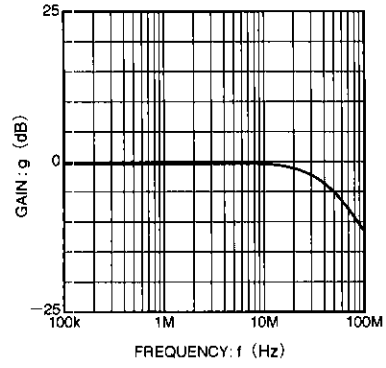


Fig.4 Video output (pins 21, 22) frequency characteristics

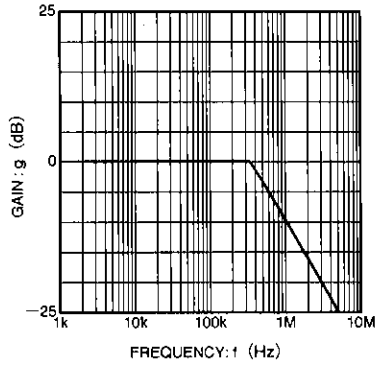


Fig.5 Audio output (pins 15, 17) frequency characteristics

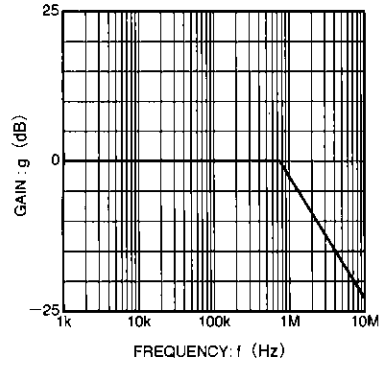
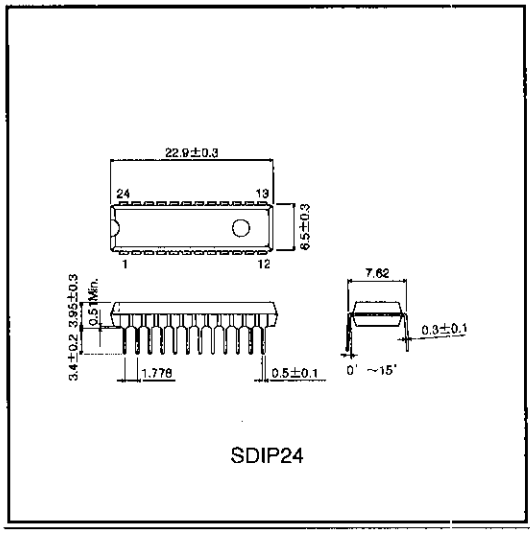


Fig.6 Audio output (pin 16) frequency characteristics

●External dimensions (Units: mm)



SDIP24

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