

# High-performance 5-channel video driver IC for DVD

## BH7865FS

BH7865FS is a 5-channel video driver IC developed for DVD player/recorder. Special filters adjusted to each band of various video signals are incorporated into a single chip. Extended definition, size reduction, and high cost performance can be achieved in DVD players.

### ●Application

DVD players, DVD recorders

### ●Features

- 1) Each high-performance filter, 6dB amplifier, and 75Ω driver for DVD are incorporated into a single chip.
- 2) Driver 5ch (Y, C, MIX, Cb, Cr)
- 3) Group delay difference between chroma signal and luminance signal is a small number of nsec.
- 4) Drive 2 lines of each signal
- 5) Operating by 5V single power supply
- 6) Built-in mute circuit

### ●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Impressed voltage	V <sub>cc max</sub>	6.0	V
Power dissipation	P <sub>d</sub>	0.95*	W
Operating temperature range	T <sub>opr</sub>	-10 to +70	°C
Storage temperature range	T <sub>stg</sub>	-55 to +150	°C

\* Reduced by 7.6mW for each increase in Ta of 1°C over 25°C.  
PCB (70mm×70mm, t=1.6mm) glass epoxy mounting.

### ●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V <sub>cc</sub>	4.5	–	5.5	V

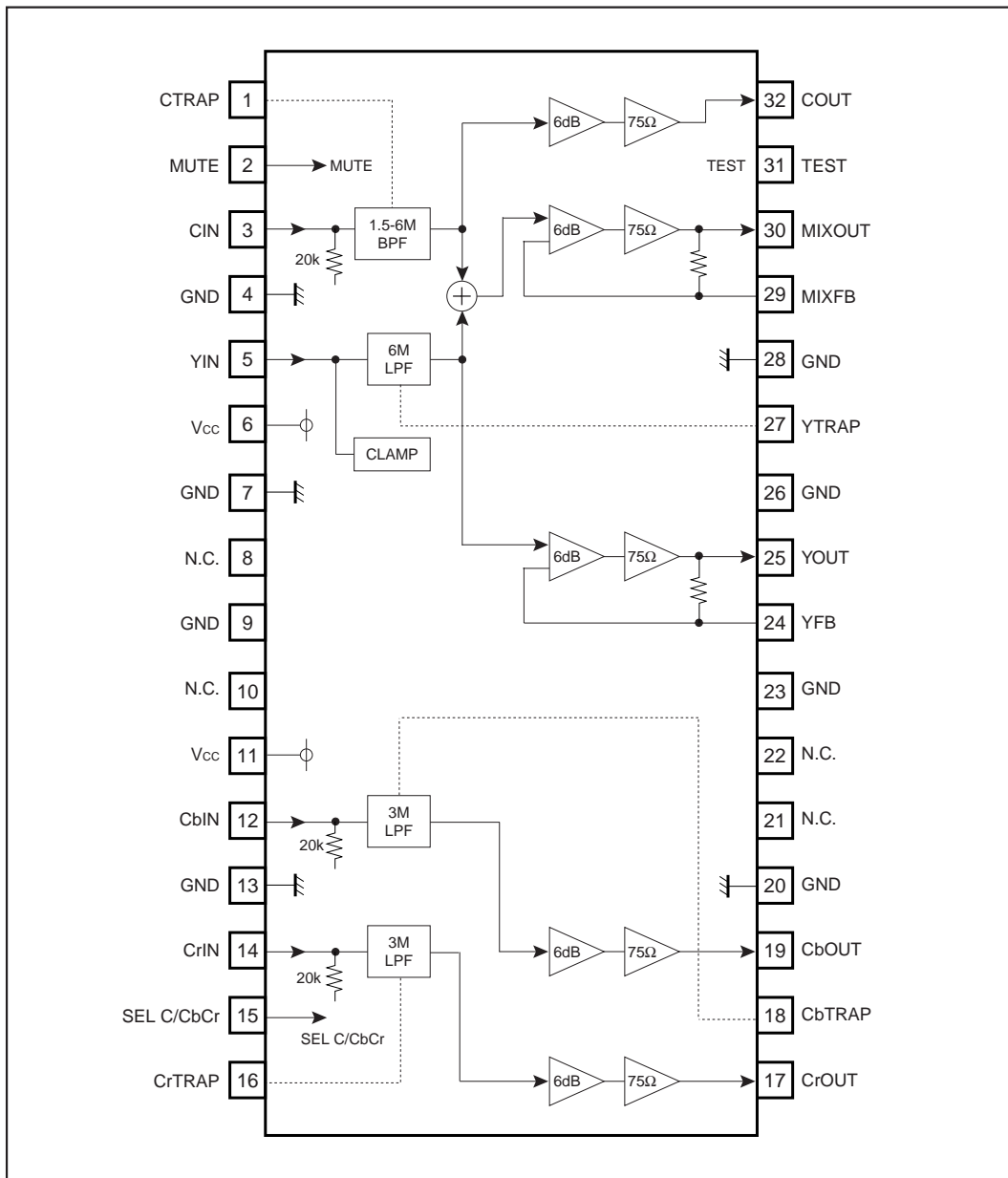
©Radiation resistance is not included in the design.

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V <sub>cc</sub>	4.5	–	5.5	V

©Radiation resistance is not included in the design.

Multimedia ICs

●Block diagram

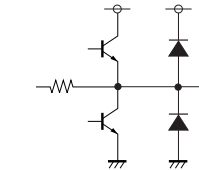
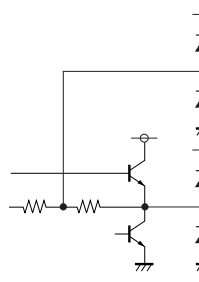
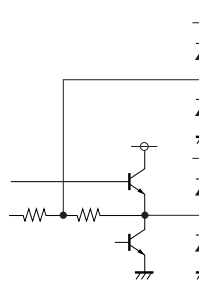
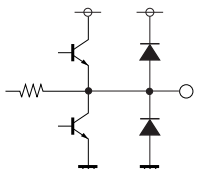


## Multimedia ICs

## ●Pin descriptions and Input / output circuits

Pin No.	Pin name	Standard voltage	Input/output equivalent circuit	Pin description
1 13 15 20	CTPAP CbTRAP CrTRAP YTRAP	2.1V 2.1V 2.1V 1.6V		Terminal for LC resonance
2	MUTE	-		Mute control terminal. Five channels are muted simultaneously by setting MUTE to "L"
3 9 11	CiN CbIN CrIN	2.8V 2.8V 2.8V		Signal Input terminal. Input terminal for chroma signal and color-difference signal. Bias type input. The input impedance is 20kΩ
4 10 17 21	GND	0V		Grounding terminal.
5	YIN	2.2V		Signal Input terminal. Input terminal for luminance signal. Di clamp input.
6 8	Vcc	5V		Power supply voltage. Vcc is separated into Pin6 and Pin8. That is to say C, MiX and Y are partitioned by Pin6 and Cb and Cr by Pin8. They are not connected internally. Connect them externally when using.
12	SEL	-		SEL control terminal. Cb and Cr are muted simultaneously by Setting SEL to "L".

Multimedia ICs

Pin No.	Pin name	Standard voltage	Input/output equivalent circuit	Pin description
14 16	CrOUT CbOUT	2.3V 2.3V		Signal output terminal. Output terminal for color-difference signal.
18 19	YFB YOUT	1.3V 1.2V		Signal output terminal. Output terminal for luminance signal (interlaced type).
22 23	MIXFB MIXOUT	1.3V 1.2V		Signal output terminal. Output terminal for Y/C MIX signal.
24	TEST	0V		Test terminal. Usually, short-circuit this terminal to GND when using it.
25	COUT	2.3V		Signal output terminal. Output terminal for chroma signal.

## Multimedia ICs

●Electrical characteristics (unless otherwise noted, Ta=25°C, V<sub>CC</sub>=5.0V)

(\*The standard values (typical values) below are design value for your reference.)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	
Circuit current	5CH ACTIVE	I <sub>CC1</sub>	–	65	97.5	mA	No signal MUTE : OFF, SEL : ON
	3CH ACTIVE	I <sub>CC2</sub>	–	50	75	mA	No signal MUTE : OFF, SEL : OFF
	MUTE	I <sub>CC3</sub>	–	15	22.5	mA	No signal MUTE : ON, SEL : OFF
Maximum output level	V <sub>OM</sub>	2.6	3.0	–	V <sub>PP</sub>	CIN : f=3.58MHz, YIN, CbIN, CrIN : f=1MHz *1	
Frequency characteristics1	C	G <sub>FC</sub>	–1.5	0	+1.5	dB	CIN : f=1.5/3.58MHz, 6/3.58MHz, 1V <sub>PP</sub>
	MIX1	G <sub>FMIX1</sub>	–1.5	0	+1.5	dB	CIN : f=1.5/3.58MHz, 6/3.58MHz, 1V <sub>PP</sub>
	MIX2	G <sub>FMIX2</sub>	–1.5	0	+1.5	dB	YIN : f=6/1MHz, 1V <sub>PP</sub>
	Y	G <sub>FY</sub>	–1.5	0	+1.5	dB	YIN : f=6/1MHz, 1V <sub>PP</sub>
	Cb	G <sub>FCb</sub>	–1.5	0	+1.5	dB	CbIN : f=3/1MHz, 1V <sub>PP</sub>
	Cr	G <sub>FCr</sub>	–1.5	0	+1.5	dB	CrIN : f=3/1MHz, 1V <sub>PP</sub>
Frequency characteristics2	C	G <sub>FCATT</sub>	–	–40	–	dB	CIN : f=27/3.58MHz, 1V <sub>PP</sub>
	MIX1	G <sub>FMIX1ATT</sub>	–	–40	–	dB	CIN : f=27/3.58MHz, 1V <sub>PP</sub>
	MIX2	G <sub>FMIX2ATT</sub>	–	–40	–	dB	YIN : f=27/1MHz, 1V <sub>PP</sub>
	Y	G <sub>FYATT</sub>	–	–40	–	dB	YIN : f=27/1MHz, 1V <sub>PP</sub>
	Cb	G <sub>FCbATT</sub>	–	–40	–	dB	CbIN : f=13.5/1MHz, 1V <sub>PP</sub>
	Cr	G <sub>FCrATT</sub>	–	–40	–	dB	CrIN : f=13.5/1MHz, 1V <sub>PP</sub>
MUTE attenuation	M <sub>T</sub>	–	–50	–	dB	CIN : f=3.58MHz, 1V <sub>PP</sub> YIN, CbIN, CrIN : f=1MHz, 1V <sub>PP</sub>	
Input impedance	Z <sub>IN</sub>	16	20	24	kΩ	CIN, CbIN, CrIN input terminal *2	
MUTE holding voltage	V <sub>THMH</sub>	4.0	–	V <sub>CC</sub>	V	MUTE OFF	
	V <sub>THML</sub>	GND	–	1.0	V	MUTE ON	
SEL holding voltage	V <sub>THSH</sub>	4.0	–	V <sub>CC</sub>	V	SEL ON (C, Cb, Cr)	
	V <sub>THSL</sub>	GND	–	1.0	V	SEL OFF (C)	
Voltage gain	C	G <sub>VC</sub>	5.3	6.0	6.7	dB	CIN : f=3.58MHz, 1V <sub>PP</sub>
	MIX(C)	G <sub>VMIXC</sub>	5.3	6.0	6.7	dB	CIN : f=3.58MHz, 1V <sub>PP</sub>
	MIX(Y)	G <sub>VMIXY</sub>	5.3	6.0	6.7	dB	YIN : f=1MHz, 1V <sub>PP</sub>
	Y	G <sub>VY</sub>	5.3	6.0	6.7	dB	YIN : f=1MHz, 1V <sub>PP</sub>
	Cb	G <sub>Vcb</sub>	5.3	6.0	6.7	dB	CbIN : f=1MHz, 1V <sub>PP</sub>
	Cr	G <sub>Vcr</sub>	5.3	6.0	6.7	dB	CrIN : f=1MHz, 1V <sub>PP</sub>
Group delay characteristics	Y⇔C	ΔG <sub>D1</sub>	–	5.0	–	nsec	CIN : f=3.58MHz, YIN : f=1MHz, V <sub>IN</sub> =1V <sub>PP</sub> GD difference between Y and C
	Y⇔Cb(Cr)	ΔG <sub>D2</sub>	–	5.0	–	nsec	YIN, CbIN (CrIN) : f=1MHz, V <sub>IN</sub> =1V <sub>PP</sub> GD difference between Y and Cb (Cr)
Differential gain	D <sub>G</sub>	–	1.0	–	%	1V <sub>PP</sub> standard staircase signal	
Differential phase	D <sub>P</sub>	–	0.5	–	deg	1V <sub>PP</sub> standard staircase signal	
Crosstalk between channels	C⇔Y	C <sub>T1</sub>	–	–50	–	dB	YIN : f=1MHz, 1V <sub>PP</sub> CIN : f=3.58MHz, 1V <sub>PP</sub>
	Cb(Cr)⇔Y	C <sub>T2</sub>	–	–50	–	dB	YIN : f=1MHz, 1V <sub>PP</sub> Cb(Cr) : f=1MHz, 1V <sub>PP</sub>
C/N	V <sub>N</sub>	–	–75	–	dB	100% white video signal	

\*1 Add the sine wave of "f=1MHz (C : f=3.58MHz)" to the input V<sub>IN</sub> and adjust the input level so that the tertiary distortion of output can be -30dB. Then, the output voltage shall be a maximum output level V<sub>OM</sub> (V<sub>PP</sub>).

\*2 Measure the input voltage V<sub>IN50</sub> (V) and input open circuit voltage V<sub>IN</sub> (V) when 50μA has applied to the input CIN, CbIN and CrIN. Then, the input impedance Z<sub>IN</sub> is as follows : Z<sub>IN</sub>=|V<sub>IN50</sub>-V<sub>IN</sub>| / 50μ [kΩ]

Multimedia ICs

●Measurement circuit

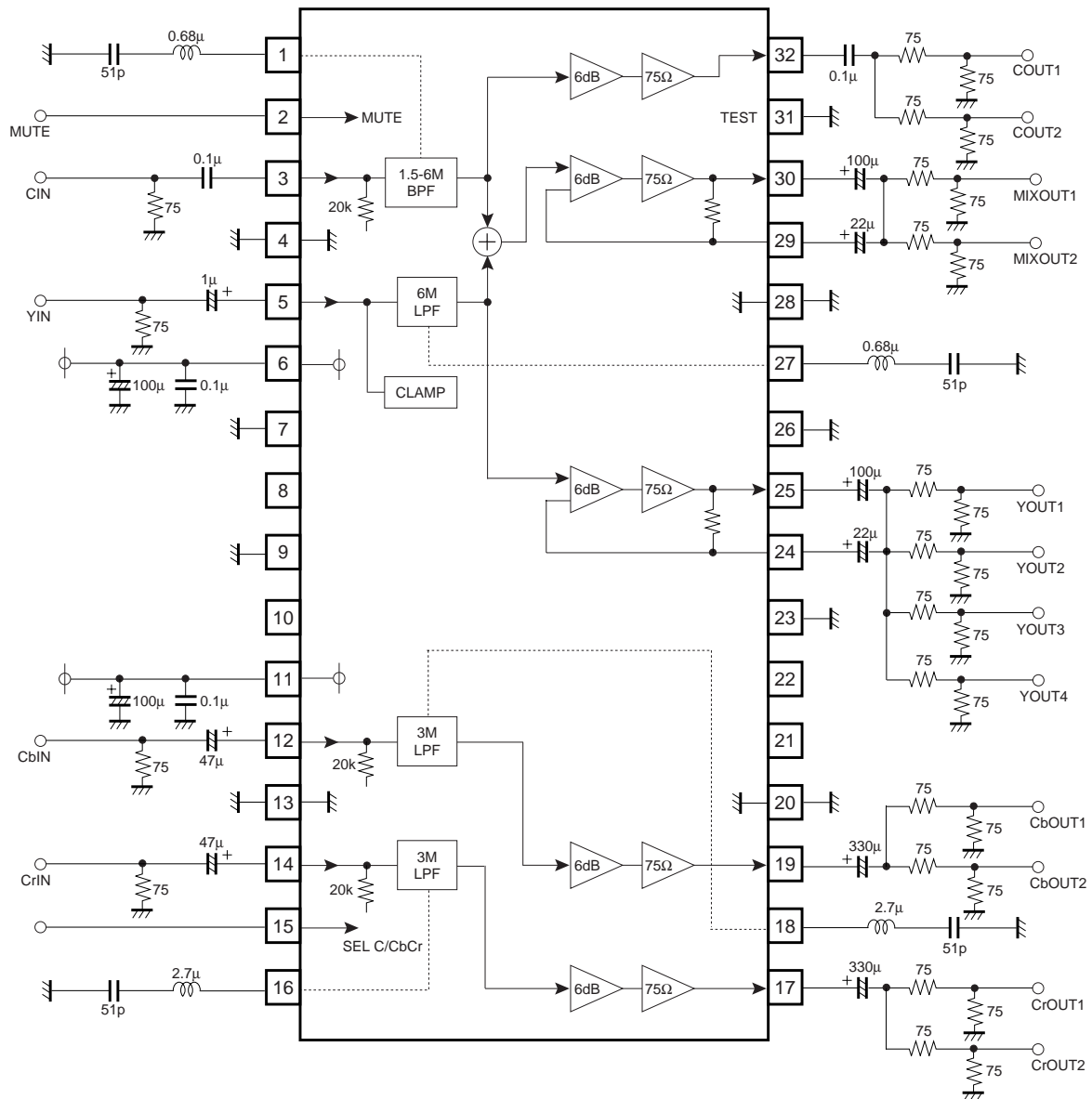


Fig.1

Multimedia ICs

●Application example

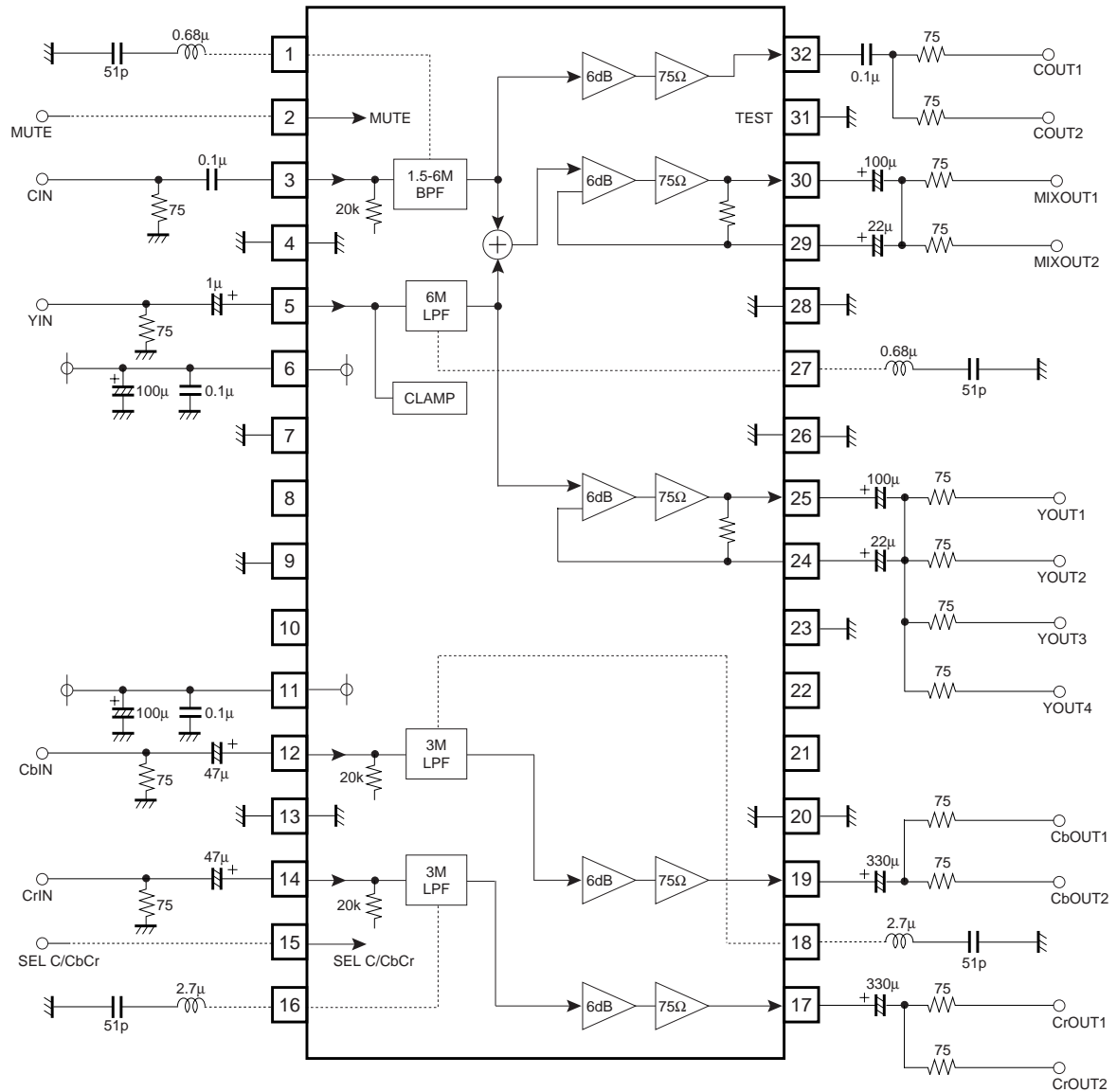


Fig.2

## Multimedia ICs

## ●Operation notes

- (1) Output terminal load resistance can be driven in four channels in Y signal and in two channels in any other signals. Use it within the allowable dissipation range.
- (2) Minimize the common impedance of power supply line of pin6 and pin8.
- (3) Inductor and capacitor of series resonance can be removed. Treat them with great care when removing them, because the terminal may catch noise component. Even if they are removed, attenuation in TRAP frequency are not expected so much.

## ●External dimensions (Unit : mm)

