

5-Input 6-Output Video Driver Monolithic IC MM1692

Outline

This IC is a 6dB video amplifier IC supporting various video signals and includes an LPF that attenuates noise components occurring during DVD conversion. It provides channels for the interlace signal and progressive signal.

Features

1. 5 input channels: S-Video (Y, C), Y color difference (Y, Cb, Cr)
2. 6 output channels: Composite video (Y + C), S-Video (Y, C), Y color difference (Y, Cb, Cr)
3. Every output is a 75Ω output and can drive two channels.
4. Includes a 4th-order LPF
5. High S/N ratio: 83dB (typ.)
6. Ultra-small package: TSOP-16B (0.65mm pitch)
7. ESD protection: ±15kV (IEC standard (aerial discharge))

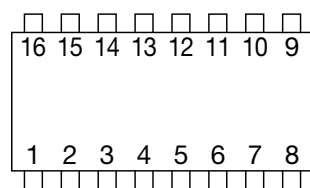
Package

TSOP-16B

Applications

1. DVD players and recorder
2. STB

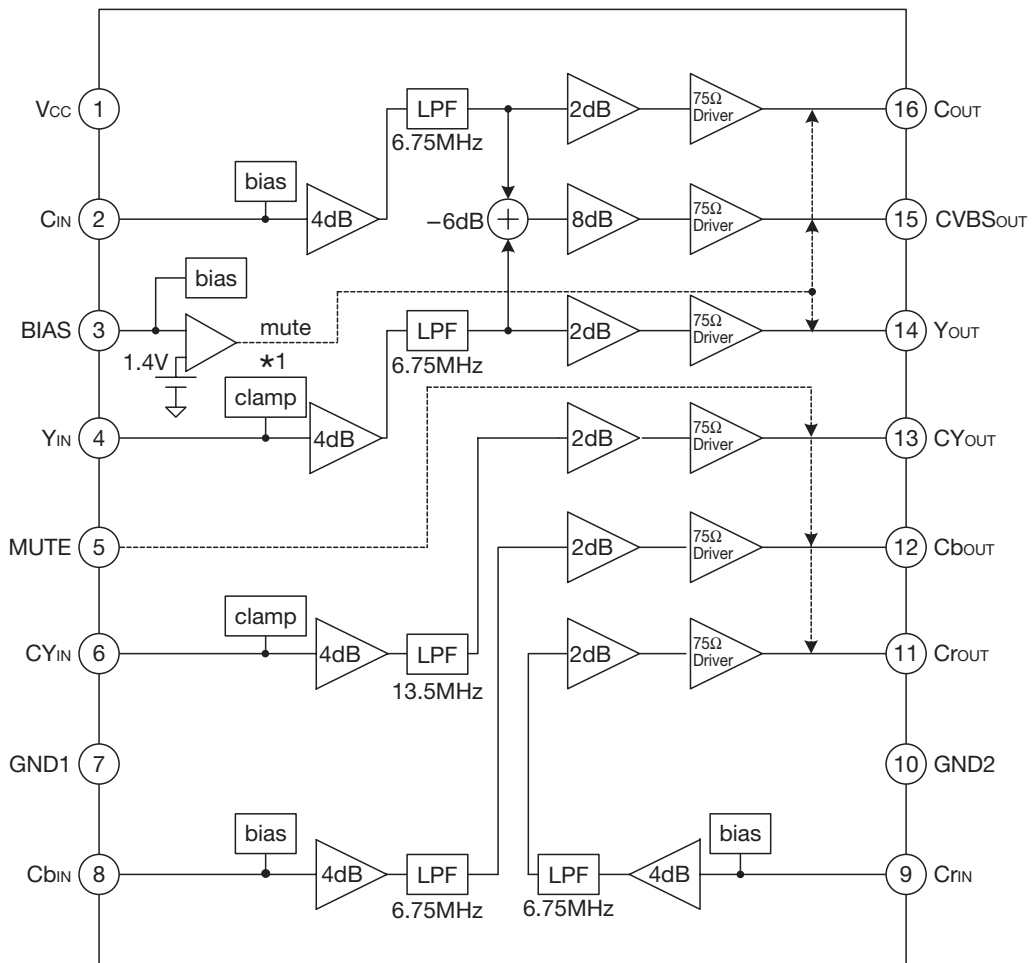
Pin Assignment



TSOP-16B
(TOP VIEW)

1	V _{CC}	9	C _{IN}
2	C _{IN}	10	GND2
3	BIAS	11	C _{ROUT}
4	Y _{IN}	12	C _{bOUT}
5	MUTE	13	C _{YOUT}
6	C _{YIN}	14	Y _{OUT}
7	GND1	15	CVBS _{OUT}
8	C _{bIN}	16	C _{OUT}

Block Diagram



Note1: *1 When 3 pin (BIAS) terminal is controlled by the external power supply, a MUTE function is possible to Cout, CVBSout and Yout.

Pin Description

Pin no.	Pin name	Function	Internal equivalent circuit diagram
1	Vcc	Vcc	
2	Cin	Chroma signal input	<p>The diagram shows the internal equivalent circuit for Pin 2 (Cin). It includes a pull-up resistor connected to Vcc, a diode connected to ground, a 150k resistor connected to the base of a transistor, and a 100µF capacitor connected to ground.</p>

Pin no.	Pin name	Function	Internal equivalent circuit diagram
3	BIAS	Bias	
4	Y _{IN}	Luminance signal input 1	
5	MUTE	Mute	
6	CY _{IN}	Luminance signal input 2	
7, 10	GND	Ground	

Pin no.	Pin name	Function	Internal equivalent circuit diagram
8 9	CbIN CrIN	Component input	
11 12	CrOUT CbOUT	Component output	
13	CYOUT	Luminance signal output 1	
14	YOUT	Luminance signal output 2	

Pin no.	Pin name	Function	Internal equivalent circuit diagram
15	CVBS _{OUT}	Composite signal output	
16	C _{OUT}	Chroma signal output	

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T _{STG}	-65~+150	°C
Operating temperature	T _{OPR}	-40~+75	°C
Supply voltage	V _{CC max.}	7	V
Allowable loss (*1)	P _d	1.0	W

Note 1: *1 Board mounting allowable loss. Board size 40 × 40 × 1.6mm

Recommended Operating Conditions

Item	Symbol	Ratings	Units
Operating temperature	T _{OPR}	-40~+75	°C
Operating voltage	V _{CCOP}	4.5~5.5	V

Electrical Characteristics (Except where noted otherwise, Ta=25°C, Vcc=5V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units	
Supply current							
Supply current 1	I _{CC1}	No signal	53	80	98	mA	
Supply current 2	I _{CC2}	No signal Mute: ON	35	50	65	mA	
Supply current 3	I _{CC3}	No signal BIAS Mute : ON	32	45	58	mA	
Supply current 4	I _{CC4}	No signal Mute and BIAS Mute : ON	1	3	5	mA	
Input pin voltage							
Chroma signal input	V _{CIN}	2 pin	1.9	2.4	2.9	V	
Luminance signal input 1	V _{YIN}	4 pin	1.15	1.4	1.65	V	
Luminance signal input 2	V _{CYIN}	6 pin					
Color difference signal input 1	V _{CbIN}	8 pin	1.9	2.4	2.9	V	
Color difference signal input 2	V _{CrIN}	9 pin					
Output pin voltage							
Chroma signal output	V _{COU} T	16 pin		2.4		V	
Composite video signal output	V _{CVBSOU} T	15 pin		1.1		V	
Luminance signal output 1	V _{YOU} T	14 pin		1.1		V	
Luminance signal output 2	V _{CYOU} T	13 pin					
Color difference signal output 1	V _{CbOU} T	12 pin		2.4		V	
Color difference signal output 2	V _{CrOU} T	11 pin					
Mute pin input current							
MUTE pin input current	H	I _{IHmute}	5 pin V _H =4.5V		350	μA	
MUTE pin input current	L	I _{ILmute}	5 pin V _H =0.4V		35	μA	
Mute pin input voltage							
MUTE pin input voltage	H	V _{thHmute}	5 pin		2.1	V	
MUTE pin input voltage	L	V _{thLmute}	5 pin		0.7	V	
*1, 2 Bias pin control output current							
BIAS pin control output current	H	I _{thHbias}	3 pin V _H =2.1V		100	μA	
BIAS pin control output current	L	I _{thLbias}	3 pin V _H =0.7V		430	μA	
*3 Bias pin control input voltage							
BIAS pin control input voltage	H	V _{thHbias}	3 pin		2.1	V	
BIAS pin control input voltage	L	V _{thLbias}	3 pin		0.7	V	
Input impedance							
C _{IN} Input impedance	Z _{CIN}	2 pin	100	150	200	kΩ	
C _{bIN} Input impedance	Z _{CbIN}	8 pin					
C _{rIN} Input impedance	Z _{CrIN}	9 pin					
C_{OUT} electrical characteristics							
C _{OUT} Voltage gain	G _{V1} (*4)	SIN wave: 1V f=100kHz		5.7	6.0	6.3	dB
C _{OUT} Frequency characteristic at 6.75MHz	f ₁₁ (*4)	SIN wave: 1V 6.75MHz/100kHz		-1.0	0	1.0	dB
C _{OUT} Frequency characteristic at 27MHz	f ₂₁ (*4)	SIN wave: 1V 27MHz/100kHz			-35	-27	dB
C _{OUT} Output dynamic range	DR ₁ (*4)	SIN wave: 100kHz THD=1.0%		2.6	3.0		V
C _{OUT} S/N	SN ₁ (*4)	BW: 100k~6MHz			-80		dB
C _{OUT} Group delay	t _{GD1} (*4)	at 100kHz			50		ns
C _{OUT} Group delay deviation 1	Δt _{1GD1} (*4)	to 3.58MHz			4		ns
C _{OUT} Group delay deviation 2	Δt _{2GD1} (*4)	to 4.43MHz			7		ns
C _{OUT} Group delay deviation 3	Δt _{3GD1} (*4)	to 6MHz			12		ns

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
CVBS_{OUT} (C_{IN}) electrical characteristics						
CVBS _{OUT} (C _{IN}) Voltage gain	Gv ₂ (★4)	SIN wave: 1V f=100kHz Y _{IN} =DC2.05V	5.7	6.0	6.3	dB
CVBS _{OUT} (C _{IN}) Frequency characteristic at 6.75MHz	f ₁₂ (★4)	SIN wave: 1V 6.75MHz/100kHz	-1.0	0	1.0	dB
CVBS _{OUT} (C _{IN}) Frequency characteristic at 27MHz	f ₂₂ (★4)	SIN wave: 1V 27MHz/100kHz		-35	-27	dB
CVBS _{OUT} (C _{IN}) Output dynamic range	DR ₂ (★4)	SIN wave: 100kHz THD=1.0% Y _{IN} =DC2.05V	2.6	3.0		V
CVBS _{OUT} (C _{IN}) S/N	SN ₂ (★4)	BW: 100k~6MHz at MIX out Y _{IN} =DC2.05V		-74		dB
CVBS _{OUT} (C _{IN}) Group delay	t _{GD2} (★4)	at 100kHz Y _{IN} =DC2.05V		50		ns
CVBS _{OUT} (C _{IN}) Group delay deviation 1	Δt _{1GD2} (★4)	to 3.58MHz Y _{IN} =DC2.05V		4		ns
CVBS _{OUT} (C _{IN}) Group delay deviation 2	Δt _{2GD2} (★4)	to 4.43MHz Y _{IN} =DC2.05V		7		ns
CVBS _{OUT} (C _{IN}) Group delay deviation 3	Δt _{3GD2} (★4)	to 6MHz Y _{IN} =DC2.05V		12		ns
CVBS_{OUT} (Y_{IN}) electrical characteristics						
CVBS _{OUT} (Y _{IN}) Voltage gain	Gv ₃ (★4)	SIN wave: 1V f=100kHz	5.7	6.0	6.3	dB
CVBS _{OUT} (Y _{IN}) Frequency characteristic at 6.75MHz	f ₁₃ (★4)	SIN wave: 1V 6.75MHz/100kHz	-1.0	0	1.0	dB
CVBS _{OUT} (Y _{IN}) Frequency characteristic at 27MHz	f ₂₃ (★4)	SIN wave: 1V 27MHz/100kHz		-35	-27	dB
CVBS _{OUT} (Y _{IN}) Output dynamic range	DR ₃ (★4)	SIN wave: 100kHz THD=1.0%	2.6	3.0		V
CVBS _{OUT} (Y _{IN}) S/N	SN ₃ (★4)	BW: 100k~6MHz at MIX out		-74		dB
CVBS _{OUT} (Y _{IN}) Group delay	t _{GD3} (★4)	at 100kHz		50		ns
CVBS _{OUT} (Y _{IN}) Group delay deviation 1	Δt _{1GD3} (★4)	to 3.58MHz		4		ns
CVBS _{OUT} (Y _{IN}) Group delay deviation 2	Δt _{2GD3} (★4)	to 4.43MHz		7		ns
CVBS _{OUT} (Y _{IN}) Group delay deviation 3	Δt _{3GD3} (★4)	to 6MHz		12		ns
CVBS_{OUT} (MIX) electrical characteristics						
Differential gain	DG	Staircase signal 1V		1.0	1.5	%
Differential phase	DP	Staircase signal 1V		1.0	1.5	°

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Y_{OUT} electrical characteristics						
Y_{OUT} Voltage gain	Gv ₄ (*4)	SIN wave: 1V f=100kHz	5.7	6.0	6.3	dB
Y _{OUT} Frequency characteristic at 6.75MHz	f1 ₄ (*4)	SIN wave: 1V 6.75MHz/100kHz	-1.0	0	1.0	dB
Y _{OUT} Frequency characteristic at 27MHz	f2 ₄ (*4)	SIN wave: 1V 27MHz/100kHz		-35	-27	dB
Y_{OUT} Output dynamic range	DR ₄ (*4)	SIN wave: 100kHz THD=1.0%	2.6	3.0		V
Y_{OUT} S/N	SN ₄ (*4)	BW: 100k~6MHz		-80		dB
Y_{OUT} Group delay	t _{GD4} (*4)	at 100kHz		50		ns
Y_{OUT} Group delay deviation 1	Δt1 _{GD4} (*4)	to 3.58MHz		4		ns
Y_{OUT} Group delay deviation 2	Δt2 _{GD4} (*4)	to 4.43MHz		7		ns
Y_{OUT} Group delay deviation 3	Δt3 _{GD4} (*4)	to 6MHz		12		ns
CY_{OUT} electrical characteristics						
CY_{OUT} Voltage gain	Gv ₅ (*4)	SIN wave: 1V f=100kHz	5.7	6.0	6.3	dB
CY _{OUT} Frequency characteristic at 13.5MHz	f1 ₅ (*4)	SIN wave: 1V 13.5MHz/100kHz	-1.0	0	1.0	dB
CY _{OUT} Frequency characteristic at 54MHz	f2 ₅ (*4)	SIN wave: 1V 54MHz/100kHz		-40	-24	dB
CY_{OUT} Output dynamic range	DR ₅ (*4)	SIN wave: 100kHz THD=1.0%	2.6	3.0		V
CY_{OUT} S/N	SN ₅ (*4)	BW: 100k~6MHz		-80		dB
CY_{OUT} Group delay	t _{GD5} (*4)	at 100kHz		30		ns
CY_{OUT} Group delay deviation 1	Δt1 _{GD5} (*4)	to 3.58MHz		4		ns
CY_{OUT} Group delay deviation 2	Δt2 _{GD5} (*4)	to 4.43MHz		7		ns
CY_{OUT} Group delay deviation 3	Δt3 _{GD5} (*4)	to 12MHz		12		ns
Cb_{OUT} electrical characteristics						
Cb_{OUT} Voltage gain	Gv ₆ (*4)	SIN wave: 1V f=100kHz	5.7	6.0	6.3	dB
Cb _{OUT} Frequency characteristic at 6.75MHz	f1 ₆ (*4)	SIN wave: 1V 6.75MHz/100kHz	-1.0	0	1.0	dB
Cb _{OUT} Frequency characteristic at 54MHz	f2 ₆ (*4)	SIN wave: 1V 54MHz/100kHz		-40	-24	dB
Cb_{OUT} Output dynamic range	DR ₆ (*4)	SIN wave: 100kHz THD=1.0%	2.6	3.0		V
Cb_{OUT} S/N	SN ₆ (*4)	BW: 100k~6MHz		-80		dB
Cb_{OUT} Group delay	t _{GD6} (*4)	at 100kHz		30		ns
Cb_{OUT} Group delay deviation 1	Δt1 _{GD6} (*4)	to 3.58MHz		4		ns
Cb_{OUT} Group delay deviation 2	Δt2 _{GD6} (*4)	to 4.43MHz		7		ns
Cb_{OUT} Group delay deviation 3	Δt3 _{GD6} (*4)	to 6MHz		12		ns
Cr_{OUT} electrical characteristics						
Cr_{OUT} Voltage gain	Gv ₇ (*4)	SIN wave: 1V f=100kHz	5.7	6.0	6.3	dB
Cr _{OUT} Frequency characteristic at 6.75MHz	f1 ₇ (*4)	SIN wave: 1V 6.75MHz/100kHz	-1.0	0	1.0	dB
Cr _{OUT} Frequency characteristic at 54MHz	f2 ₇ (*4)	SIN wave: 1V 54MHz/100kHz		-40	-24	dB
Cr_{OUT} Output dynamic range	DR ₇ (*4)	SIN wave: 100kHz THD=1.0%	2.6	3.0		V
Cr_{OUT} S/N	SN ₇ (*4)	BW: 100k~6MHz		-80		dB
Cr_{OUT} Group delay	t _{GD7} (*4)	at 100kHz		30		ns
Cr_{OUT} Group delay deviation 1	Δt1 _{GD7} (*4)	to 3.58MHz		4		ns
Cr_{OUT} Group delay deviation 2	Δt2 _{GD7} (*4)	to 4.43MHz		7		ns
Cr_{OUT} Group delay deviation 3	Δt3 _{GD7} (*4)	to 6MHz		12		ns

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Group delay deviation between each channels						
Group delay deviation 1 between each channels	$\Delta t_{c1GD1} (*1)$	$\Delta t_{GD4} - \Delta t_{GD1}$ at 3.58MHz		9	20	ns
Group delay deviation 2 between each channels	$\Delta t_{c2GD5} (*1)$	$\Delta t_{GD4} - \Delta t_{GD6}$ at 1MHz		9	20	ns
Group delay deviation 3 between each channels	$\Delta t_{c3GD6} (*1)$	$\Delta t_{GD4} - \Delta t_{GD7}$ at 1MHz		9	20	ns
Crosstalk						
Crosstalk (C _{IN}) 1	CT1 _{CIN} (*1)	Y _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (C _{IN}) 2	CT2 _{CIN} (*1)	CY _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (C _{IN}) 3	CT3 _{CIN} (*1)	Cb _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (C _{IN}) 4	CT4 _{CIN} (*1)	Cr _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Y _{IN}) 1	CT1 _{YIN} (*1)	C _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Y _{IN}) 2	CT2 _{YIN} (*1)	CY _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Y _{IN}) 3	CT3 _{YIN} (*1)	Cb _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Y _{IN}) 4	CT4 _{YIN} (*1)	Cr _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (CY _{IN}) 1	CT1 _{CYIN} (*1)	C _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (CY _{IN}) 2	CT2 _{CYIN} (*1)	CVBS _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (CY _{IN}) 3	CT3 _{CYIN} (*1)	Y _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (CY _{IN}) 4	CT4 _{CYIN} (*1)	Cb _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (CY _{IN}) 5	CT5 _{CYIN} (*1)	Cr _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cb _{IN}) 1	CT1 _{CBIN} (*1)	C _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cb _{IN}) 2	CT2 _{CBIN} (*1)	CVBS _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cb _{IN}) 3	CT3 _{CBIN} (*1)	Y _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cb _{IN}) 4	CT4 _{CBIN} (*1)	CY _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cb _{IN}) 5	CT5 _{CBIN} (*1)	Cr _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cr _{IN}) 1	CT1 _{CRIN} (*1)	C _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cr _{IN}) 2	CT2 _{CRIN} (*1)	CVBS _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cr _{IN}) 3	CT3 _{CRIN} (*1)	Y _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cr _{IN}) 4	CT4 _{CRIN} (*1)	CY _{OUT} f=4.43MHz, 1V		-60	-55	dB
Crosstalk (Cr _{IN}) 5	CT5 _{CRIN} (*1)	Cb _{OUT} f=4.43MHz, 1V		-60	-55	dB

Note1: *1 It is output current when impressing external power supply 2.1V (at the time of MUTE OFF) to 3 pin (BIAS) terminal.

Note2: *2 It is output current when impressing external power supply 0.7V (at the time of MUTE ON) to 3 pin (BIAS) terminal.

Note3: *3 It is the threshold voltage at the time of using a MUTE function for 3 pin (BIAS) terminal.

It is set to MUTE ON less than 0.7V , and is set to MUTE OFF more than by 2.1V.

Note4: *4 The subscript number is the combination of table below.

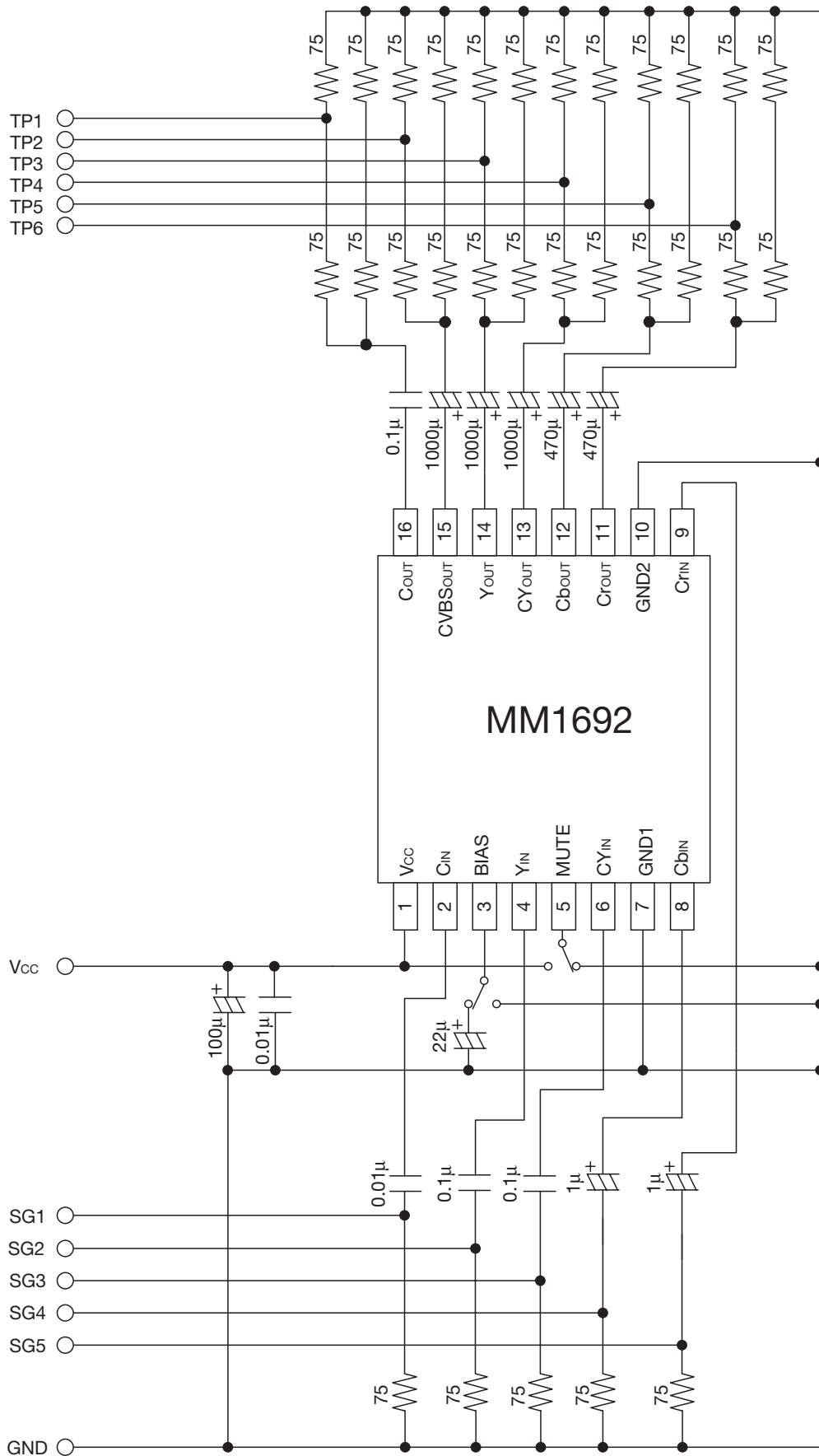
n	Input	Output
1	C _{IN}	C _{OUT}
2	C _{IN}	CVBS _{OUT}
3	Y _{IN}	
4	Y _{IN}	Y _{OUT}
5	CY _{IN}	CY _{OUT}
6	Cb _{IN}	Cb _{OUT}
7	Cr _{IN}	Cr _{OUT}

ex. Gv1: input=C_{IN}, output=C_{OUT}

f16: input=Cr_{IN}, output=Cr_{OUT}

Δ t_{GD4}; input=Y_{IN}, output=Y_{OUT}

Measuring Circuit



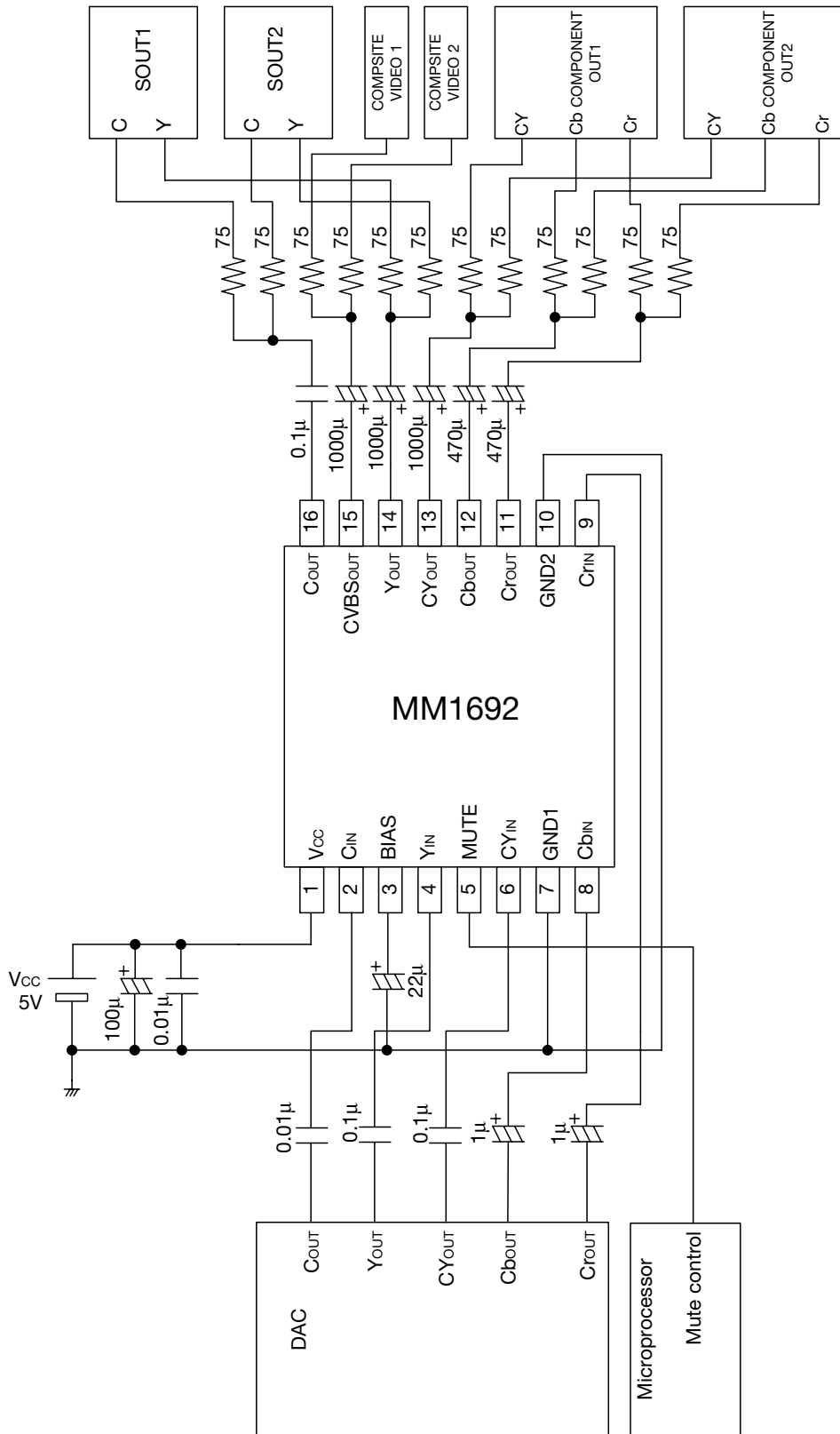
Switch Control Table

Control Pin	Control Pin	Output Pin		
MUTE	BIAS	C _{OUT}	CVBS _{OUT}	Y _{OUT}
Low	Low	MUTE	MUTE	MUTE
High		*1	*1	*1
Low	High	C _{IN}	C _{IN} +Y _{IN}	Y _{IN}
High				

Control Pin	Control Pin	Output Pin		
MUTE	BIAS	C _Y _{OUT}	C _b _{OUT}	C _r _{OUT}
Low	Low	MUTE	MUTE	MUTE
High		*1	*1	*1
Low	High	MUTE	MUTE	MUTE
High		C _Y _{IN}	C _b _{IN}	C _r _{IN}

Note: *1 Since this mode has an invalid MUTE function, it is prohibited to use.

Application Circuit

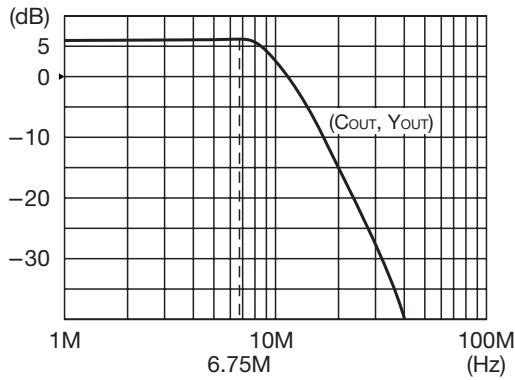


Note: Arrange power supply bypass capacitor near the Vcc terminal (1 pin).

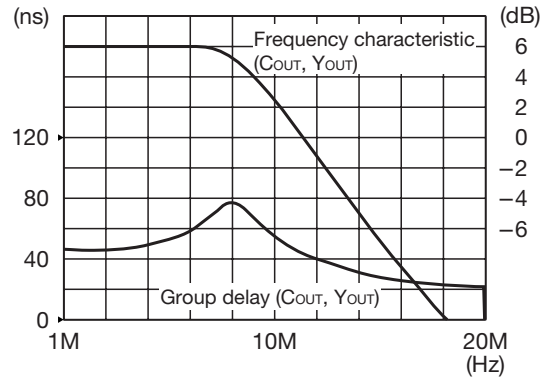
- We shall not be liable for any trouble or damage caused by using this circuit .
- In the event a problem which may affect industrial property or any other rights of us or a third party happens during the use of information in these circuit, we shall not be liable for any problem, nor grant a license therefore.

Characteristics

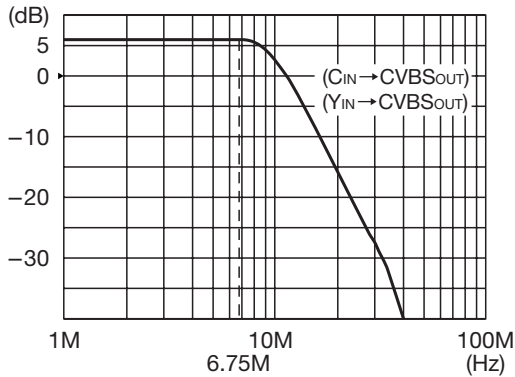
Frequency characteristic (Cout, Yout)



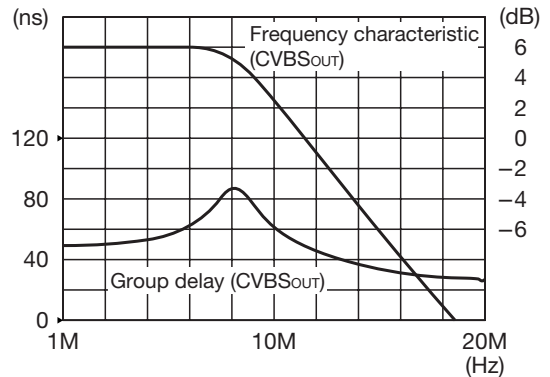
Group delay (Cout, Yout)



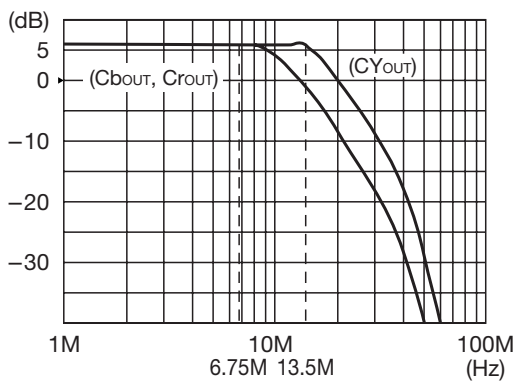
Frequency characteristic (CVBSout)



Group delay (CVBSout)



Frequency characteristic (CYout, Cbout, CrouT)



Group delay (CYout, Cbout, CrouT)

