

Video Signal Driver for DVD Player

Monolithic IC MM1540

Outline

This IC is a video signal driver IC for DVD players.

It outputs the composite signal, S signal and component signal required for DVD player video signals.

This IC has built-in low pass filter, clamp (ON/OFF), amp, 75Ω driver and Y/C-MIX circuits. + power supply or ± power supply voltages can be selected, so the number of external parts can be greatly reduced.

Features

1. + power supply or ± power supply voltage can be selected.
 - + power supply: small input coupling capacitance
 - ± power supply: I/O coupling capacitor not required
2. 2-line drive possible for 75Ω driver (with mute function).
3. Fourth order low pass filter built-in
 - frequency response: 6.75MHz ± 1dB/27MHz - 27dB max.
4. Select between two amp gains: 6dB and 9dB. (A: 6dB, B: 9dB)
5. Clamp ON/OFF
6. Power save function provided.

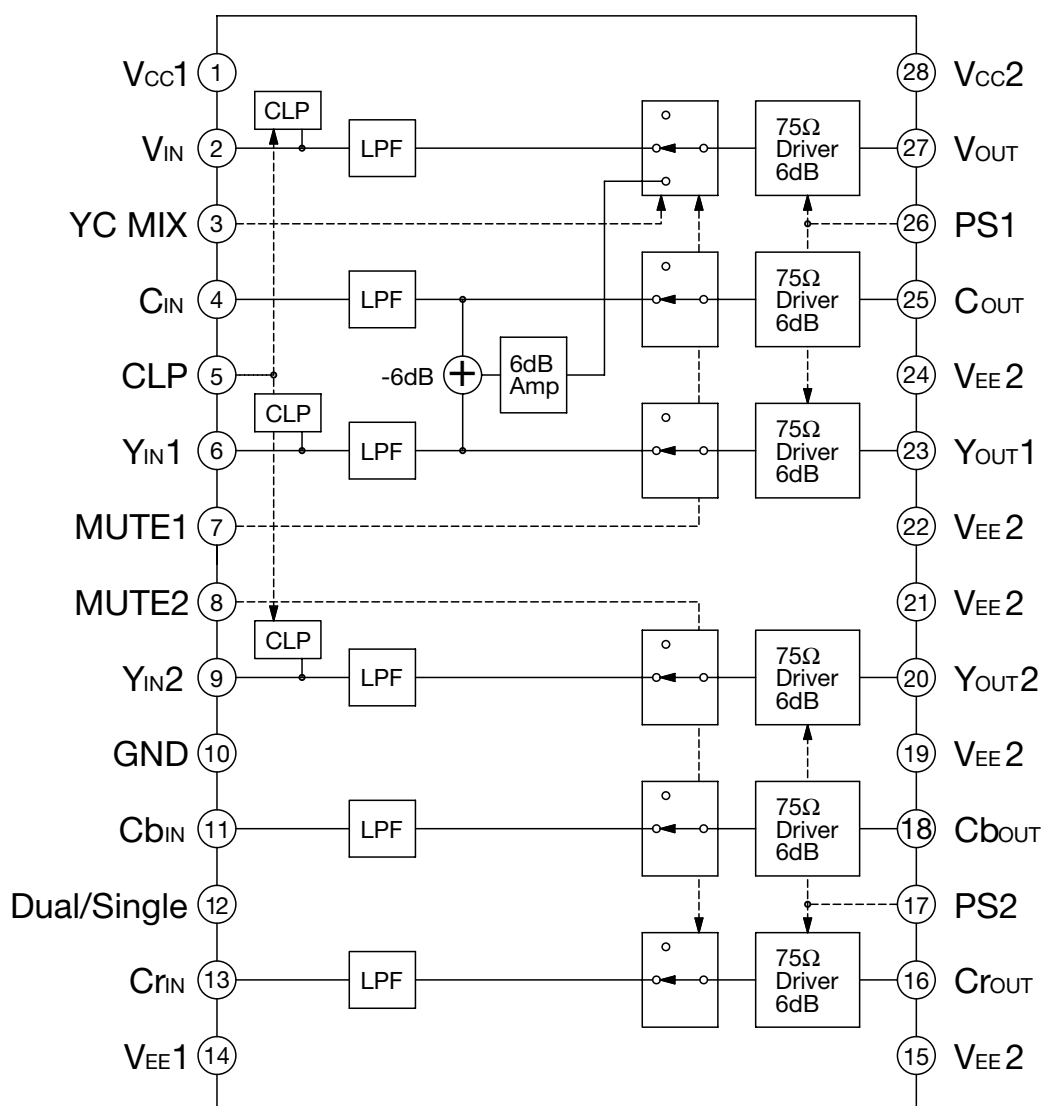
Package

SOP-28B

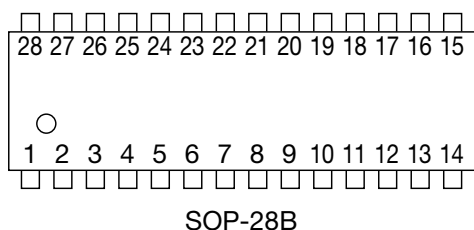
Applications

1. DVD player
2. Digital set-top box
3. Other digital video equipment

Block Diagram Typical model: MM1540A



Pin Assignment

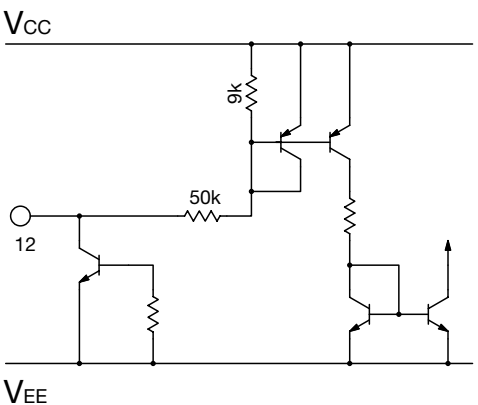
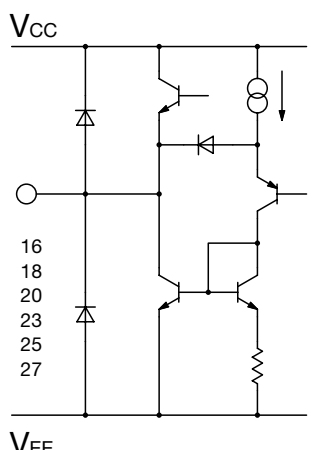
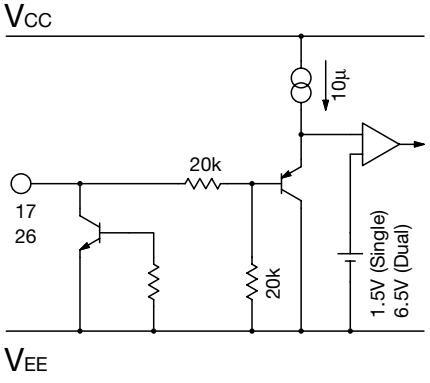


1	Vcc1	15	VEE2
2	VIN	16	CrOUT
3	YC MIX	17	PS2
4	CIN	18	CbOUT
5	CLP	19	VEE2
6	YIN1	20	YOUT2
7	MUTE1	21	VEE2
8	MUTE2	22	VEE2
9	YIN2	23	YOUT1
10	GND	24	VEE2
11	CbIN	25	COUT
12	Dual/Single	26	PS1
13	CrIN	27	VOUT
14	VEE1	28	Vcc2

Pin Description

Pin No.	Pin name	Function	Internal equivalent circuit diagram
1 28	V _{CC1} V _{CC2}	V _{CC}	
2 6 9	V _{IN} Y _{IN1} Y _{IN2}	Video input (Composite or Y) Sync tip clamp (The clamp operates when the CLP terminal is connected with V _{EE} .)	
3	YC MIX	YC MIX select	
4	C _{IN}	Croma input	

Pin No.	Pin name	Function	Internal equivalent circuit diagram
5	CLP	Clamp select	
7 8	MUTE1 MUTE2	Mute select	
10	GND	GND	
11 13	CbIN CrIN	Component input	

Pin No.	Pin name	Function	Internal equivalent circuit diagram
12	Dual/Single	Power select	
14	V _{EE1}	V _{EE}	
15	V _{EE2}		
19	V _{EE2}		
21	V _{EE2}		
22	V _{EE2}		
24	V _{EE2}		
16	C _{ROUT}	Video output	
18	C _{bOUT}		
20	Y _{OUT2}		
23	Y _{OUT1}		
25	C _{OUT}		
27	V _{OUT}		
17	PS2	Power-save select	
26	PS1		

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T _{STG}	-40~+150	°C
Operating temperature	T _{OPR}	-30~+75	°C
Supply voltage (*1)	V _{CC} max.1	+7	V
Supply voltage (*1)	V _{EE} max.1	-7	V
Supply voltage (*2)	V _{CC} max.2	+14	V
Allowable loss (*3)	P _d	1.4	W

Note: *1 It is a power supply voltage when dual power supply is used.

*2 It is a power supply voltage when single power supply is used.

*3 Board mounting power dissipation. Board size 100mm×100mm×1.6mm

Recommended Operating Conditions

Item	Symbol	Ratings	Units
Operating temperature	T _{OPR}	-30~+75	°C
Operating voltage (*1)	V _{CCOP1}	-4.5~+5.5	V
Operating voltage (*1)	V _{EEOP1}	-4.5~+5.5	V
Operating voltage (*2)	V _{CCOP2}	+7~+11	V

Note: *1 It is a power supply voltage when dual power supply is used.

*2 It is a power supply voltage when single power supply is used.

Electrical Characteristics Typical model: MM1540A (At the dual power supply Ta=25°C, V_{CC}=5V, V_{EE}=-5V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Supply current	I _{CC}	No signal	38	54	70	mA
Current of power-save 1	I _{CC1}	PS1 is high	22	31	40	mA
Current of power-save 2	I _{CC2}	PS2 is high	22	31	40	mA
Current of power-save 3	I _{CC3}	PS1 and PS2 are high	5	7	9	mA
Video output	V _{VOUT, YOUTm}	20, 23, 27 pin *4	-0.1	0.0	0.1	V
Croma output	V _{COU}	25 pin *5	-0.1	0.0	0.1	V
Component output	V _{CbOUT, CrOUT}	16, 18 pin *6	-0.1	0.0	0.1	V
SW terminal input current	H	I _{IH}	3, 7, 8, 17, 26 pin V _H =4.5V		300	μA
	L	I _{IL}	3, 7, 8, 17, 26 pin V _L =0.4V		200	μA

Note: *1 It is a output terminal voltage when input terminal (2, 6, 9pin) is 0.3V.

*2 It is a output terminal voltage when input terminal (4pin) is 0.6V.

*3 It is a output terminal voltage when input terminal (11, 13pin) is 0.6V.

Electrical Characteristics

Typical model: MM1540A (At the single power supply Ta=25°C, V_{CC}=9V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Supply current	I _{CC}	No signal	38	54	70	mA
Current of power-save 1	I _{CC1}	PS1 is high	22	31	40	mA
Current of power-save 2	I _{CC2}	PS2 is high	22	31	40	mA
Current of power-save 3	I _{CC3}	PS1 and PS2 are high	5	7	9	mA
Video input	V _{VIN,YIN1m}	2,6,9 pin	4.3	4.8	5.3	V
Croma input	V _{CIN}	4 pin	4.4	4.9	5.4	V
Component input	V _{CbIN,CrIN}	11,13 pin	4.4	4.9	5.4	V
Video output	V _{VOUT,YOUTm}	20,23,27 pin	4.0	4.5	5.0	V
Croma output	V _{COUT}	25 pin	3.8	-4.3	4.8	V
Component output	V _{CbOUT,CrOUT}	16,18 pin	3.8	4.3	4.8	V
SW terminal input current	H	I _{IH}	3,7,8,17,26 pin V _H =4.5V		150	μA
	L	I _{IL}	3,7,8,17,26 pin V _L =0.4V		15	μA

Electrical Characteristics

Typical model: MM1540A (Except where noted otherwise, Ta=25°C, V_{CC}=5V, V_{EE}=-5V [dual power supply] or V_{CC}=9V [single power supply])

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
YC MIX input voltage	H	V _{YCH}	2.4			V
	L	V _{YCL}			0.8	V
MUTE 1 input voltage	H	V _{MU1H}	2.4			V
	L	V _{MU1L}			0.8	V
MUTE 2 input voltage	H	V _{MU2H}	2.4			V
	L	V _{MU2L}			0.8	V
PS 1 input voltage	H	V _{PS1H}	2.4			V
	L	V _{PS1L}			0.8	V
PS 2 input voltage	H	V _{PS2H}	2.4			V
	L	V _{PS2L}			0.8	V
Input impedance	Z _{C,Cb,Cr}	4,11,13 pin	100	150	200	kΩ
Voltage gain	G _n ★7	SIN wave: 1V f=100kHz	5.5	6.0	6.5	dB
Frequency characteristic 1	f _{1n} ★7	SIN wave: 1V 6.75MHz/100kHz	-1.0	0	1.0	dB
Frequency characteristic 2	f _{2n} ★7	SIN wave: 1V 27MHz/100kHz		-33	-27	dB
Differential gain	DG _{1,2,3} ★7	Staircase signal 1V	-1.0	1.3	1.8	%
Differential phase	DP _{1,2,3} ★7	Staircase signal 1V	-1.0	0	1.0	°
Output dynamic range	DR _n ★7	SIN wave: 100kHz THD=1.0%	2.6	3.0		V
Crosstalk	CT _n ★7	f=4.43MHz,1V		-60	-55	dB
S/N 1	V _{1SNn} ★7	BW: 100k~4.5MHz		-79		dB
S/N 2	V _{2SN2,3} ★7	BW: 100k~4.5MHz at MIX OUT		-73		dB
Group delay	t _{GDn} ★7	at 100kHz		60		ns
Group delay deviation	t _{GDn} ★7	to 3.58MHz		4		ns
		to 4.43MHz		7		ns
		to 6MHz		12		ns

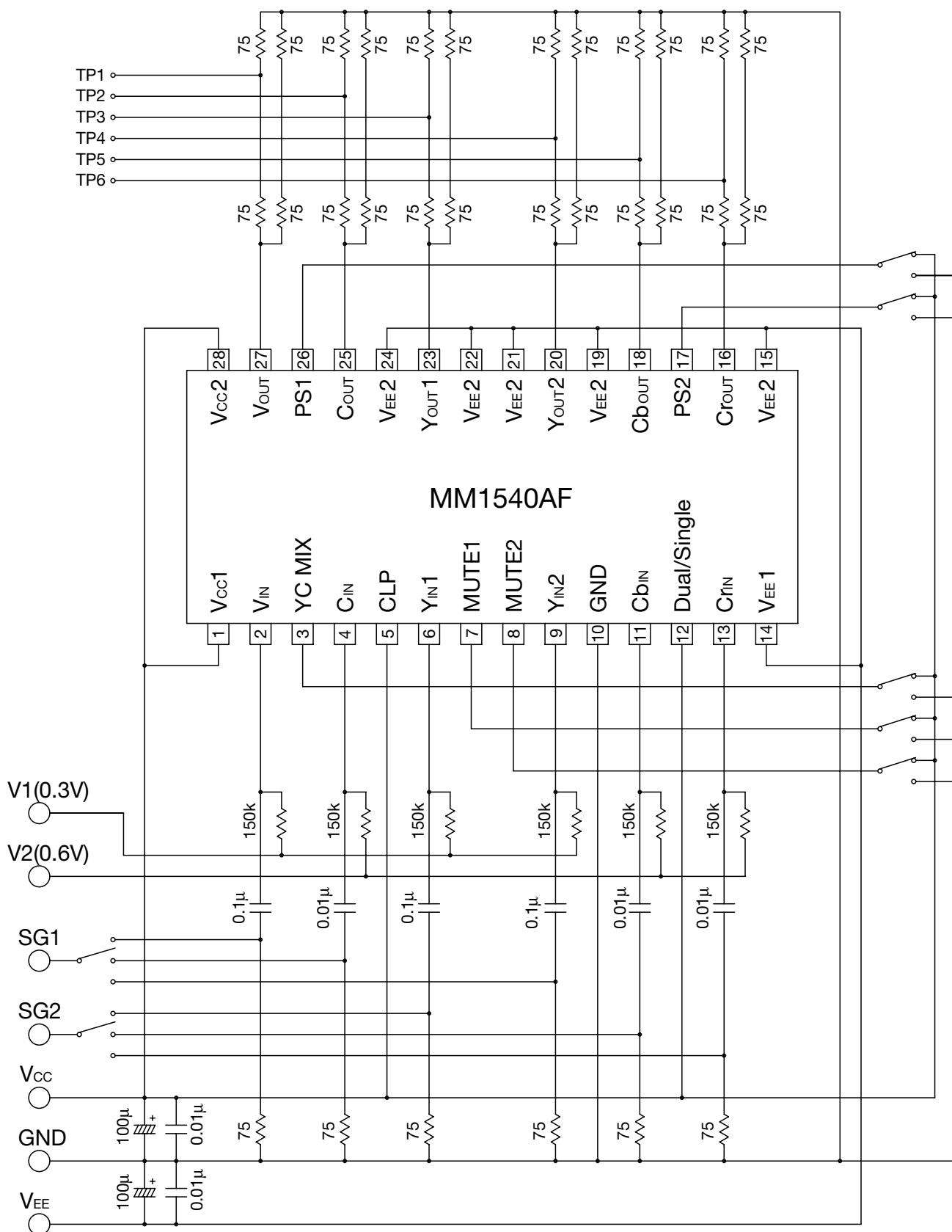
The subscript number "n" is the combination of under table.

n	Input	Output
1	V _{IN}	V _{OUT}
2	C _{IN}	V _{OUT}
3	Y _{IN1}	V _{OUT}
4	C _{IN}	C _{OUT}
5	Y _{IN1}	Y _{OUT1}
6	Y _{IN2}	Y _{OUT2}
7	C _{bIN}	C _{bOUT}
8	C _{rIN}	C _{rOUT}

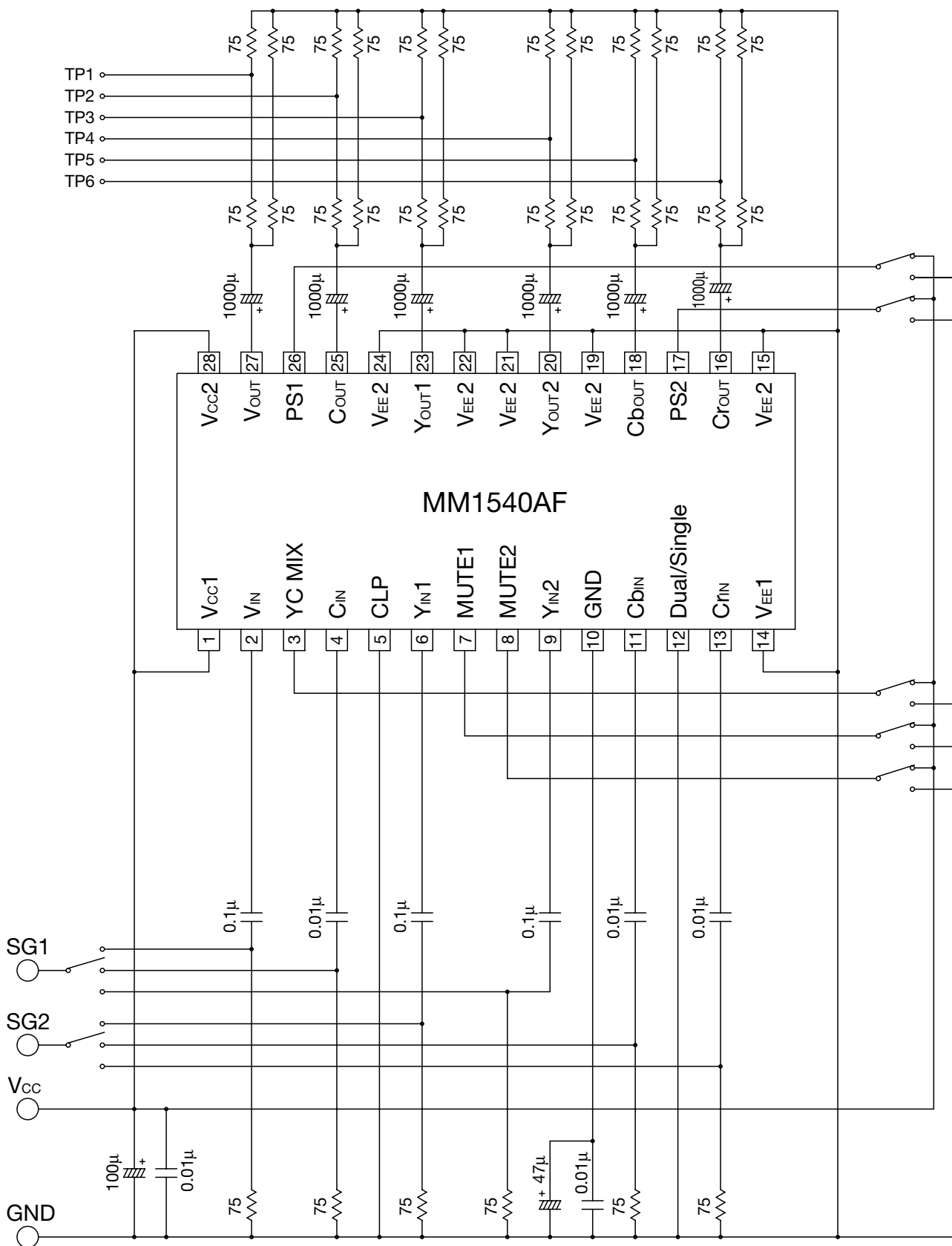
Measuring Circuit

Measuring Circuit 1

(At the dual power supply)



Measuring Circuit 2
 (At the single power supply)



Switch Control Table

	Control terminal			Select
	YC MIX	MUTE1	MUTE2	
V _{OUT}	Low	High	*	V _{IN}
	High	High		Y _{IN1} +C _{IN}
	*	Low		Mute
Y _{OUT1}	*	High	*	Y _{IN1}
		Low		Mute
C _{OUT}	*	High	*	C _{IN}
		Low		Mute
Y _{OUT2}	*	*	High	Y _{IN2}
			Low	Mute
C _{bOUT}	*	*	High	C _{bIN}
			Low	Mute
C _{rOUT}	*	*	High	C _{rIN}
			Low	Mute

∗: Don't care

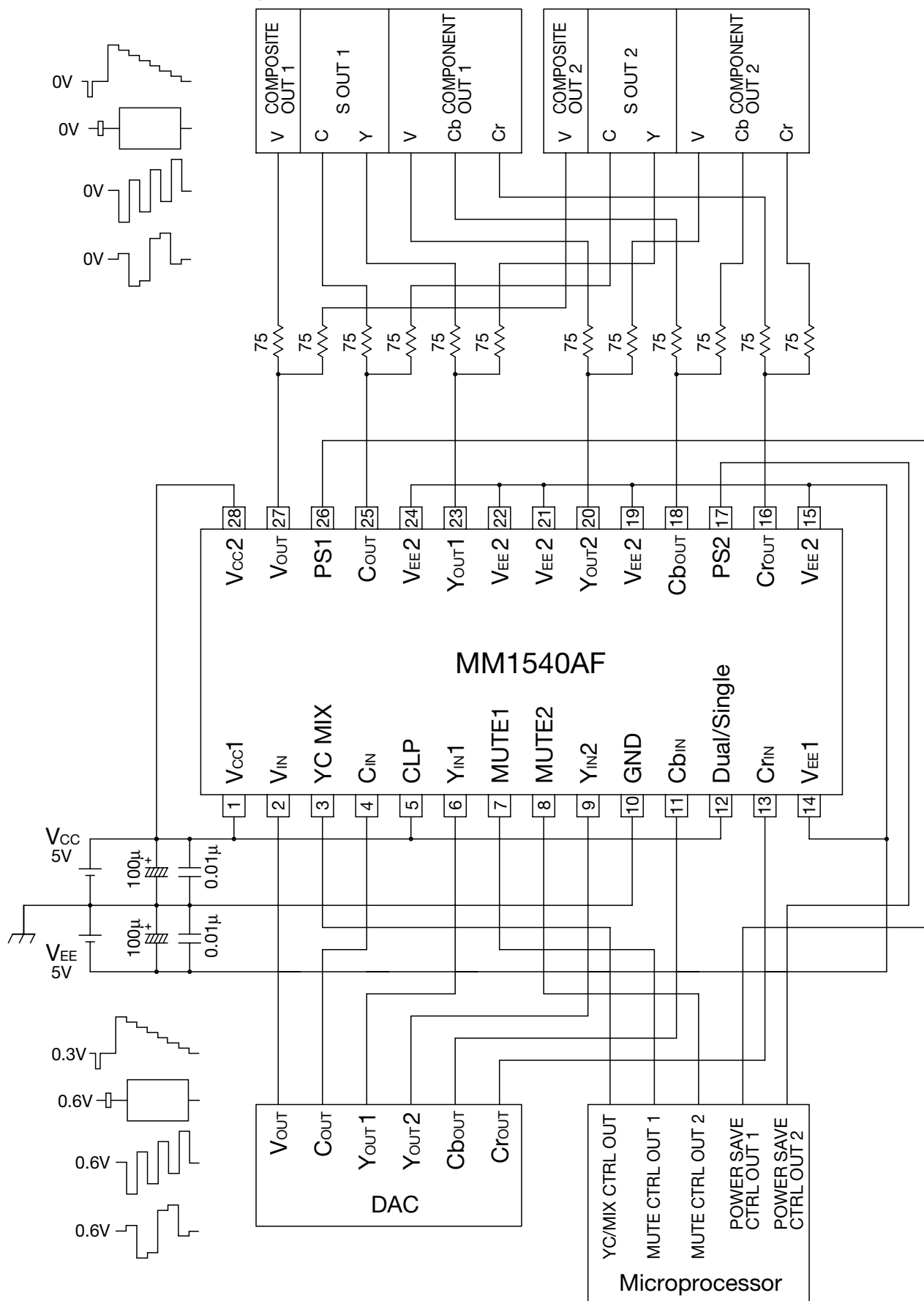
PS1 terminal	PS2 terminal	Power-save
High	High	ON
Open (Low)	Open (Low)	OFF

CLP terminal	Input clamp	Dual/Single terminal	Power supply
Low ∗8	ON	Low ∗8	single
Open (High) ∗9	OFF	Open (High) ∗9	dual

Note: ∗8 Please connect the Low level with the V_{EE}.
 ∗9 Please connect the High level with the V_{CC}.

Application Circuit

Application Circuit 1 (At the dual power supply)



Application Circuit 2
 (At the single power supply)

