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, 75W 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.

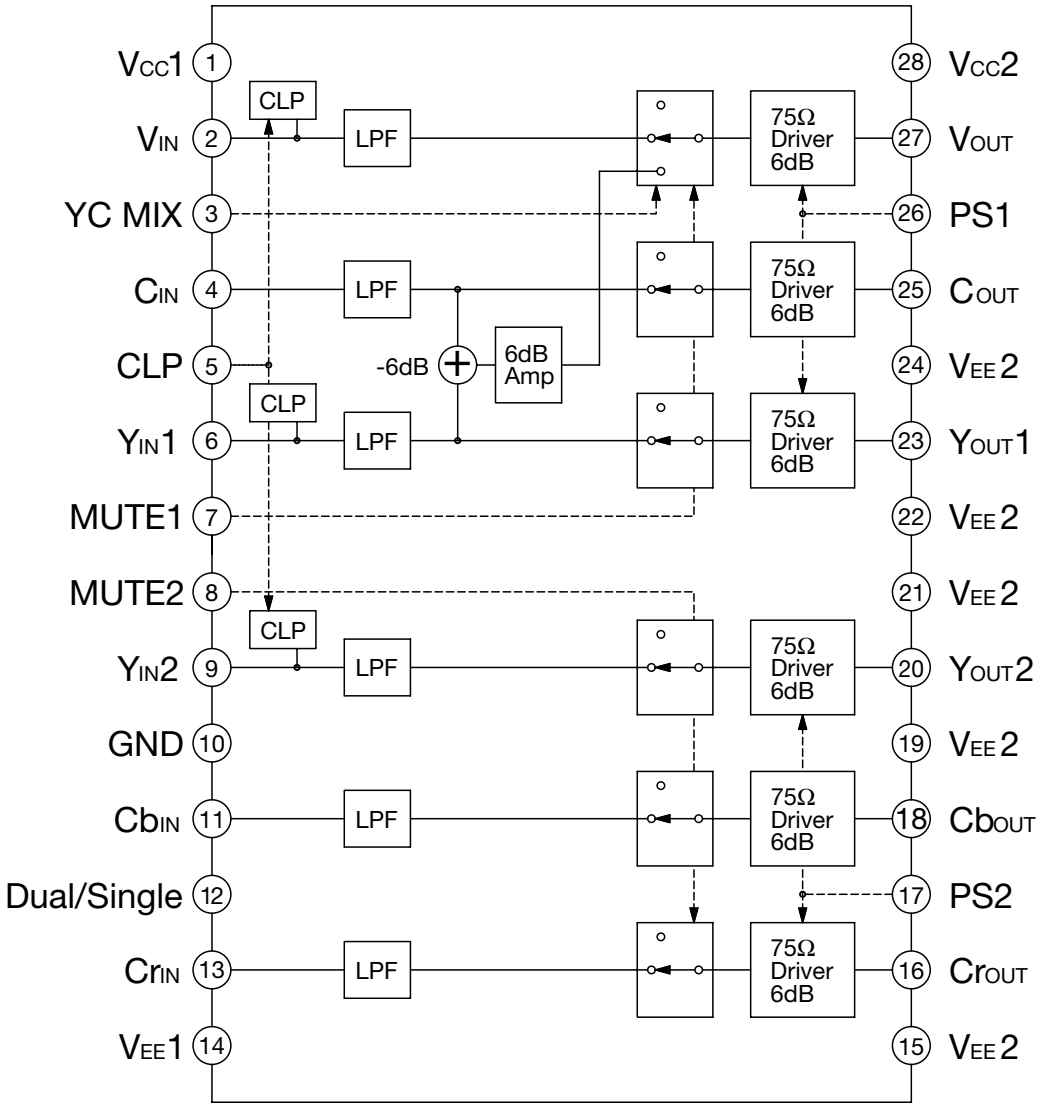
Package

SOP-28B

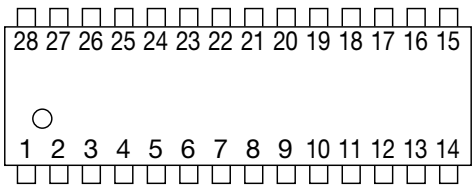
Applications

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

Block Diagram Typical model: MM1540A



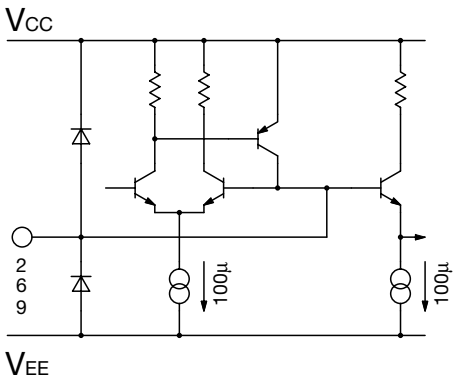
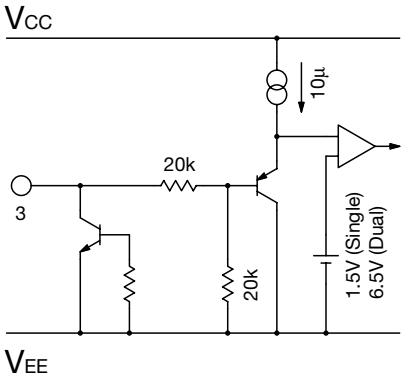
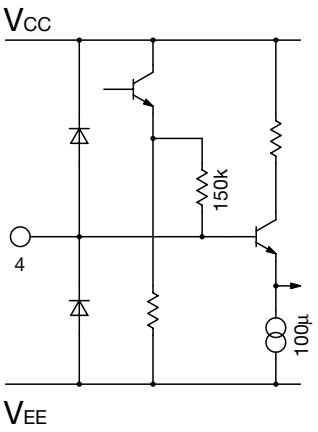
Pin Assignment

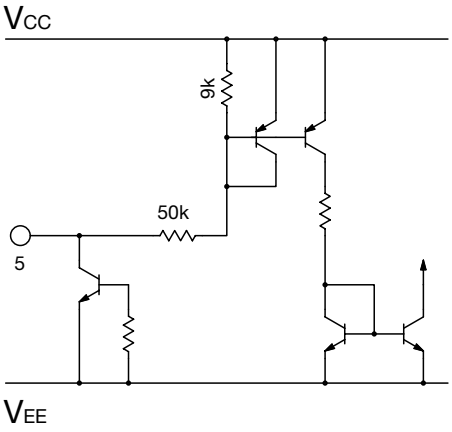
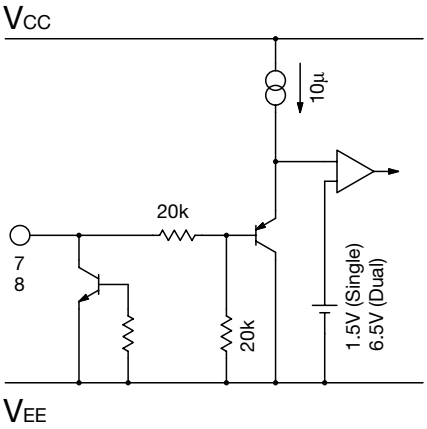
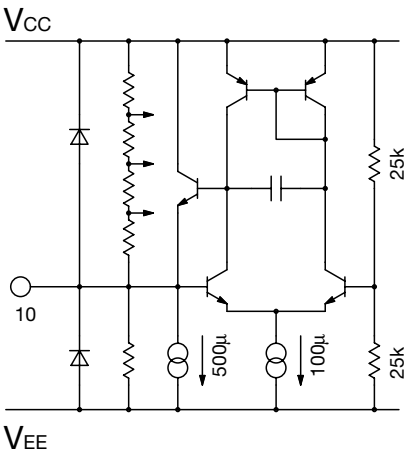
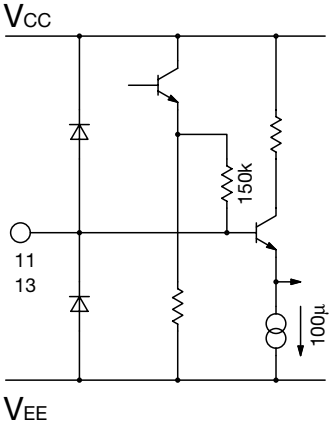


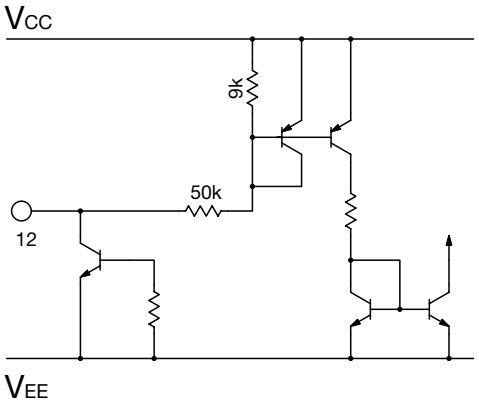
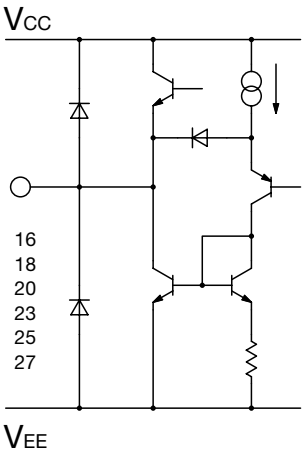
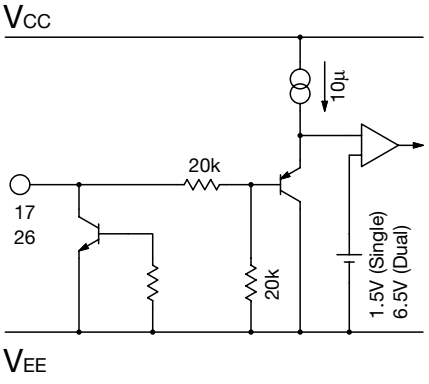
SOP-28B

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	$V_{CC}1$ $V_{CC}2$	V_{CC}	
2 6 9	V_{IN} $Y_{IN}1$ $Y_{IN}2$	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 15 19 21 22 24	VEE1 VEE2 VEE2 VEE2 VEE2 VEE2	VEE	
16 18 20 23 25 27	COUT CbOUT YOUT2 YOUT1 COUT VOUT	Video output	
17 26	PS2 PS1	Power-save select	

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temparature	T_{STG}	–40~+150	°C
Operating temparature	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)	Pd	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 temparature	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_{COUT}	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		$I_{CC}1$	PS1 is high	22	31	40	mA
Current of power-save 2		$I_{CC}2$	PS2 is high	22	31	40	mA
Current of power-save 3		$I_{CC}3$	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 therwise, 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	º
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		$V1_{SNn}$ ✶7	BW: 100k~4.5MHz		–79		dB
S/N 2		$V2_{SN2,3}$ ✶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

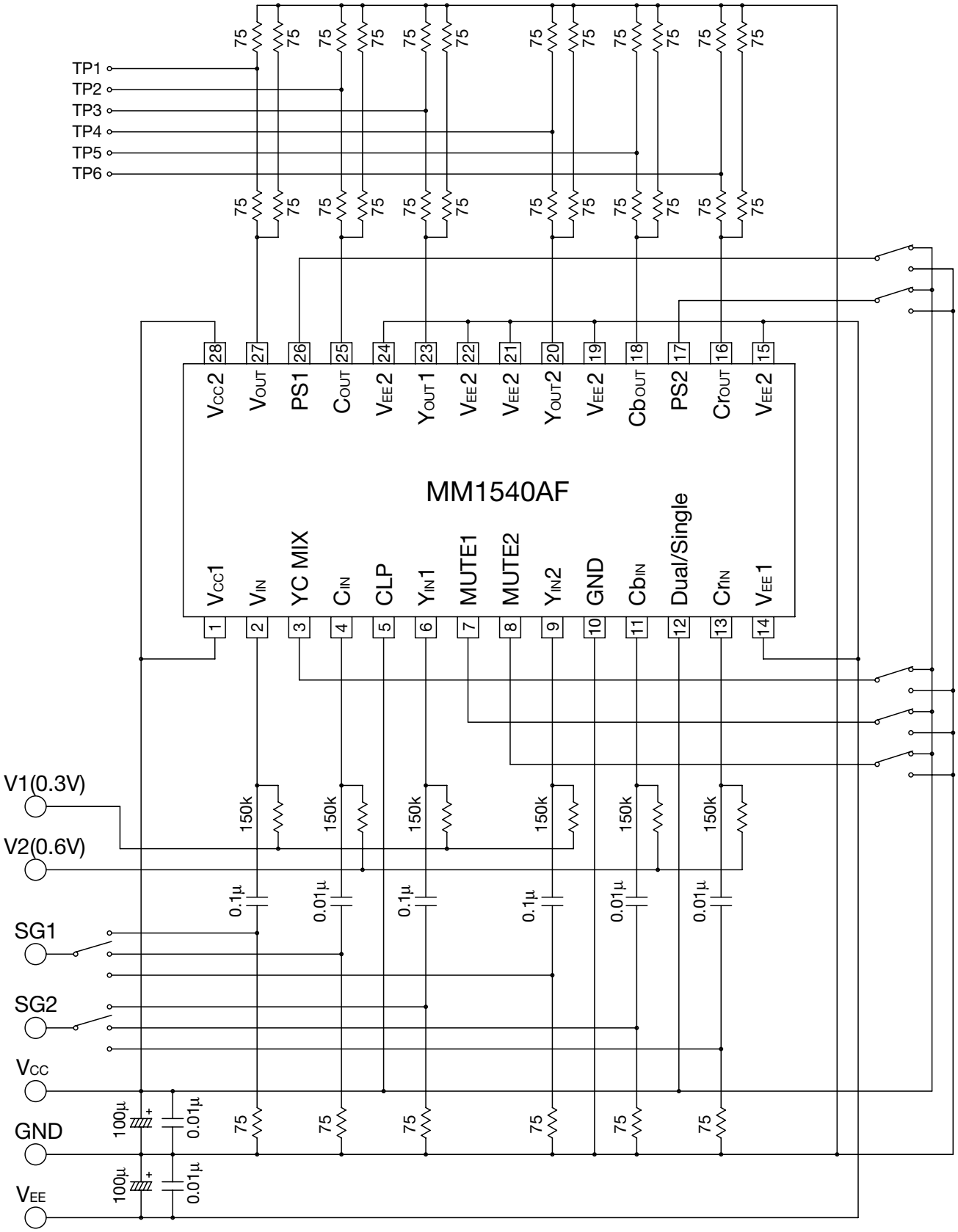
The subscript number "n" is the combination of under table.

n	Input	Output
1	V_{IN}	V_{OUT}
2	C_{IN}	V_{OUT}
3	$Y_{IN}1$	V_{OUT}
4	C_{IN}	C_{OUT}
5	$Y_{IN}1$	$Y_{OUT}1$
6	$Y_{IN}2$	$Y_{OUT}2$
7	C_{bIN}	C_{bOUT}
8	C_{rIN}	C_{rOUT}

Measuring Circuit

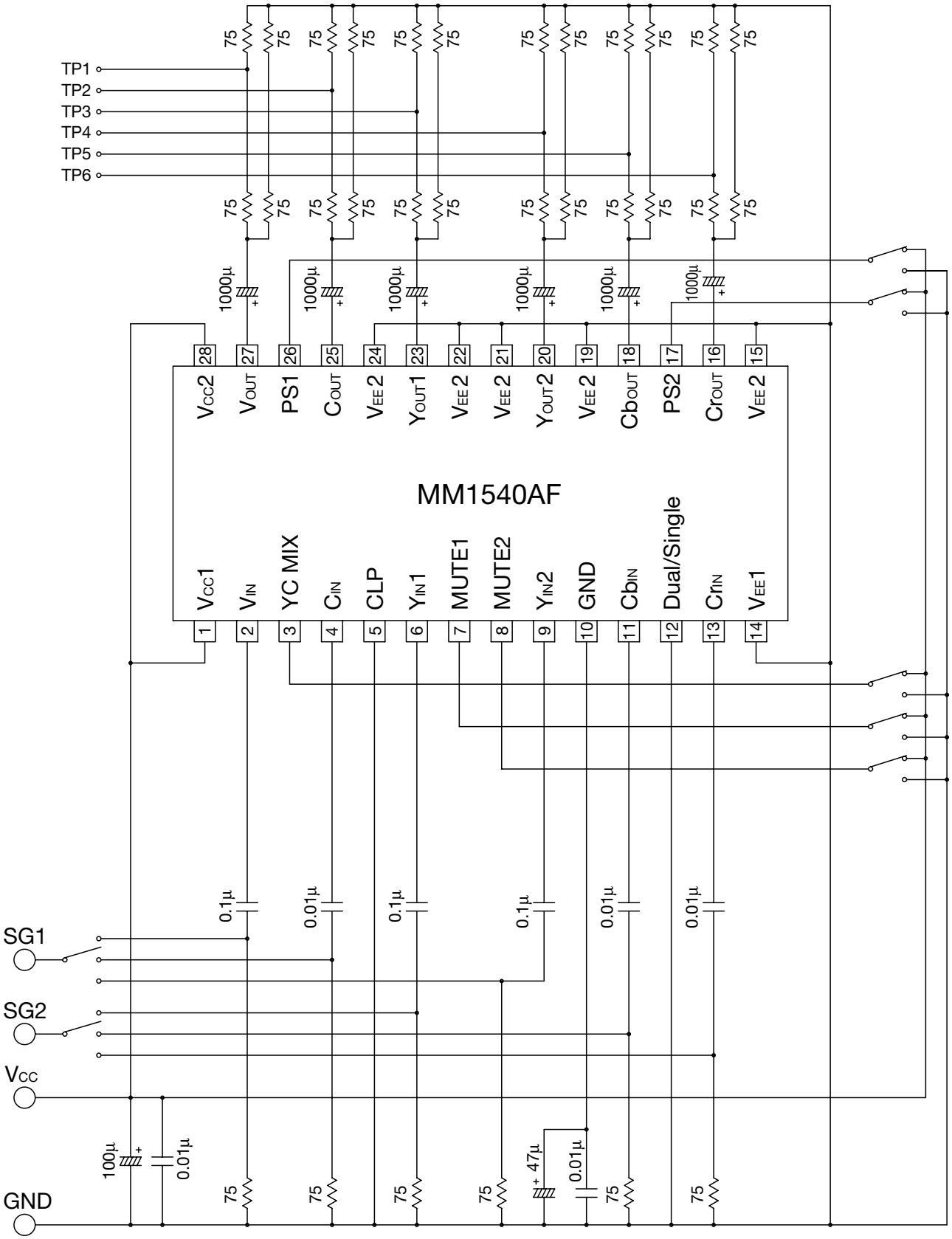
Measuring Circuit 1

(At the dual power supply)



Measuring Circuit 2

(At the single power supply)



Switch Control Table

	Control terminal			Select
	YC MIX	MUTE1	MUTE2	
VOUT	Low	High	*	VIN
	High	High		YIN1+CIN
	*	Low		Mute
YOUT1	*	High	*	YIN1
		Low		Mute
COUT	*	High	*	CIN
		Low		Mute
YOUT2	*	*	High	YIN2
			Low	Mute
CbOUT	*	*	High	CbIN
			Low	Mute
CrOUT	*	*	High	CrIN
			Low	Mute

*: Don't care

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

CLP terminal	Input clamp
Low *8	ON
Open (High) *9	OFF

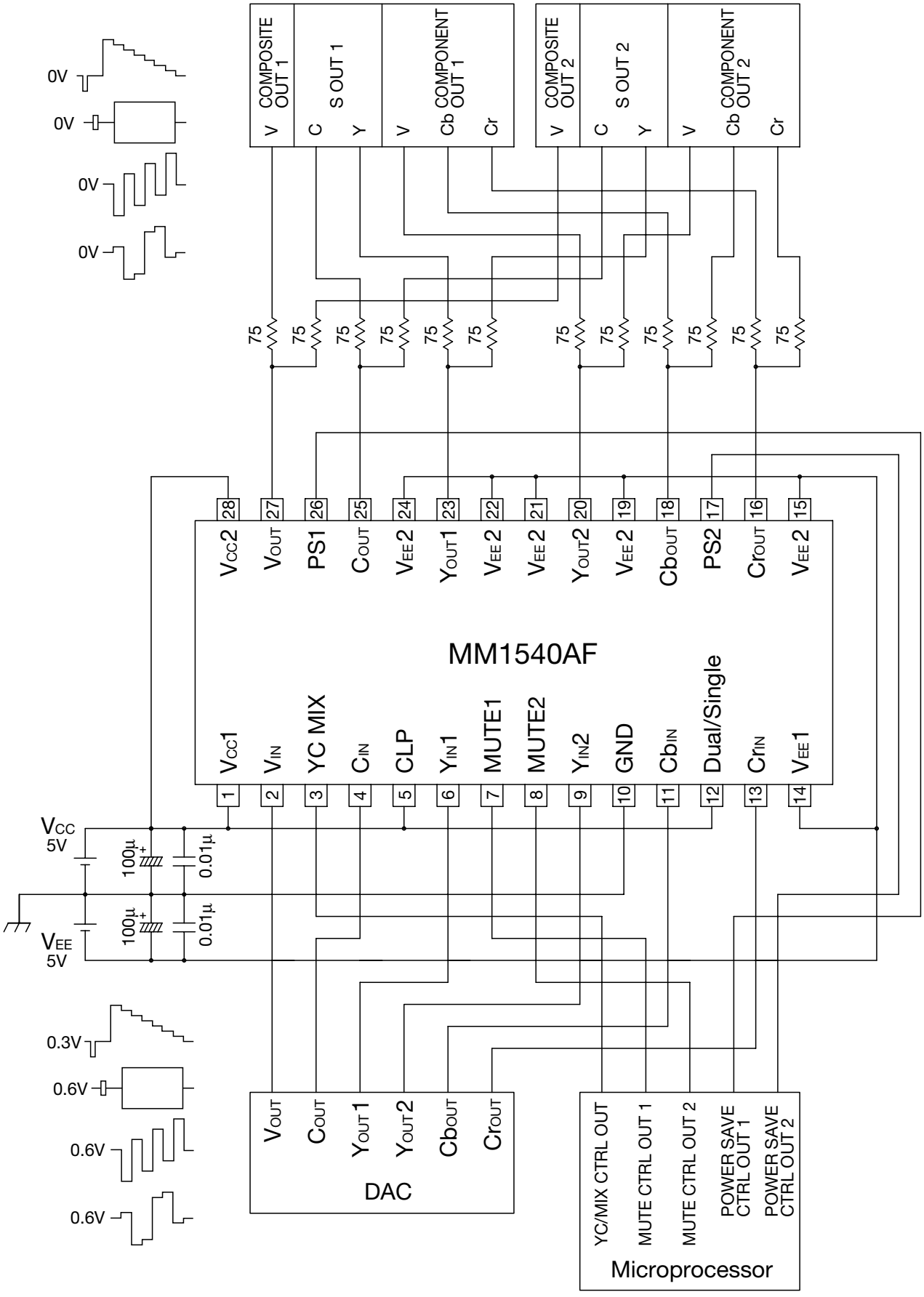
Dual/Single terminal	Power supply
Low *8	single
Open (High) *9	dual

Note: *8 Please connect the Low level with the VEE.
*9 Please connect the High level with the VCC.

Application Circuit

Application Circuit 1

(At the dual power supply)



Application Circuit 2

(At the single power supply)