

M51293FP

AUDIO SWITCH

DESCRIPTION

The M51293FP is a semiconductor integrated circuit for HiFi VCR applications. It consists of 2 channel 14dB amplifiers and 2 channel 5 input audio switches.

FEATURES

- Low output DC offset voltage(TYP within 5mV)
- Low switching noise
- Wide dynamic range(output level $\geq 2V_{rms}$)
- Low distortion(THD $\leq 0.03\%$ at $1V_{rms}$ output)
- Low crosstalk(TYP $-90dB$)
- Low power consumption(TYP 130mW)

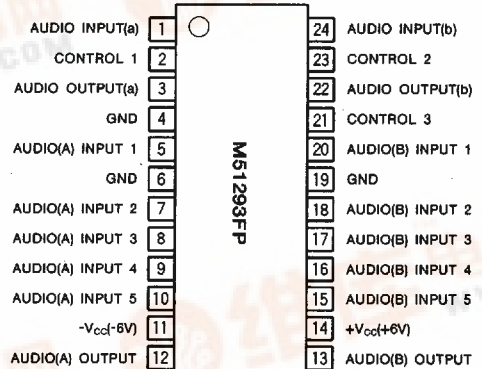
APPLICATION

VCR

RECOMMENDED OPERATING CONDITION

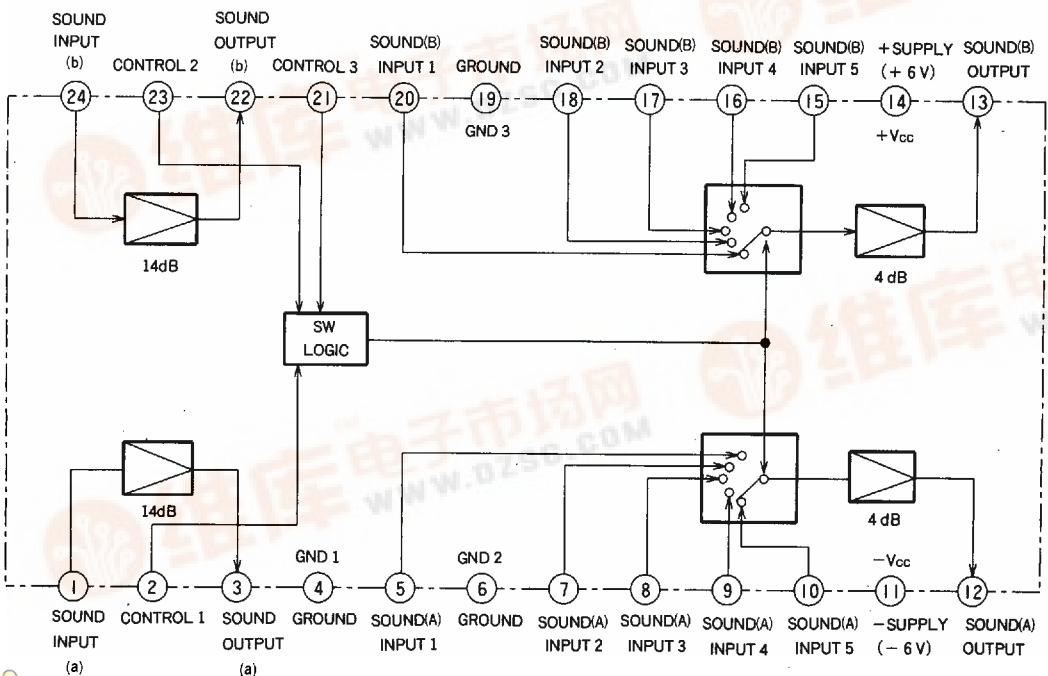
Supply voltage range..... $\pm 5.4 \sim \pm 6.6V$
Rated supply voltage..... $\pm 6.0V$

PIN CONFIGURATION (TOP VIEW)



Outline 24P2N-B

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V _{CC}	Supply voltage	±7	V
P _d	Power dissipation	0.5	W
T _{opr}	Operating temperature	-20~75	°C
T _{stg}	Storing ambient temperature	-40~125	°C
K _θ	Derating (T _a ≥25°C)	5	mW/°C

ELECTRICAL CHARACTERISTICS (T_a=25°C, unless otherwise noted)

Symbol	Parameter	Test point	Input	SW 1	SW 2	SW 5	SW 7	SW 8	SW 9	SW 10	SW 15	SW 16	SW 17	SW 18	SW 20	SW 21	SW 23	SW 24	Test conditions	Limits			Unit		
																				Min.	Typ.	Max.			
I _{CC1}	Positive supply circuit current	14																		Terminal 14 current without signal input	8.2	11.0	13.8	mA	
I _{CC2}	Negative supply circuit current	11																		Terminal 11 current without signal input	-13.7	-10.9	-8.1	mA	
G _a	14dB AMP GAIN a	3	1	a																SG 1 : CW 1kHz Input level 0.5V _{r-p}	13.0	14.0	15.0	dB	
G _b	14dB AMP GAIN b	22	24																a	Input level 0.5V _{r-p}	↓	↓	↓	dB	
F _a	14dB AMP Frequency characteristics a	3	1	a																SG 1 : CW 20kHz Input level 0.5V _{r-p}	-0.5	0	0.5	dB	
F _b	14dB AMP Frequency characteristics b	22	24																a	Gain difference between CW 1kHz mode and CW 20kHz mode	↓	↓	↓	dB	
G _{A1}	4dB AMP-A GAIN A1	12	5			a														SG 2 : CW 1kHz Input level 0.5V _{r-p}	3.5	4.0	4.5	dB	
G _{A2}	4dB AMP-A GAIN A2		7		a		a												a						dB
G _{A3}	4dB AMP-A GAIN A3		8					a																	dB
G _{A4}	4dB AMP-A GAIN A4		9						a																dB
G _{A5}	4dB AMP-A GAIN A5		10		a					a															dB
F _{A1}	4dB AMP-A Frequency Characteristics A1	12	5			a														SG 2 : CW 20kHz Input level 0.5V _{r-p} Gain difference between CW 1kHz mode and CW 20kHz mode	-0.5	0	0.5	dB	
F _{A2}	4dB AMP-A Frequency Characteristics A2		7		a		a																		dB
F _{A3}	4dB AMP-A Frequency Characteristics A3		8					a																	dB
F _{A4}	4dB AMP-A Frequency Characteristics A4		9						a																dB
F _{A5}	4dB AMP-A Frequency Characteristics A5		10		a					a															dB
G _{B1}	4dB AMP-B GAIN B1	13	20													a				SG 3 : CW 1kHz Input level 0.5V _{r-p}	3.5	4.0	4.5	dB	
G _{B2}	4dB AMP-B GAIN B2		18		a												a		a						dB
G _{B3}	4dB AMP-B GAIN B3		17										a						a						dB
G _{B4}	4dB AMP-B GAIN B4		16									a							a						dB
G _{B5}	4dB AMP-B GAIN B5		15		a						a														dB

N.B. Unless otherwise specified, SW condition is "b".

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input	SW 1	SW 2	SW 5	SW 7	SW 8	SW 9	SW 10	SW 15	SW 16	SW 17	SW 18	SW 20	SW 21	SW 23	SW 24	Test conditions	Limits			Unit				
																				Min.	Typ.	Max.					
FB1	4dB AMP-B Frequency Characteristics B1	13	20												a					SG3 : CW 20kHz Input level 0, 5V _{p-p} Difference in gain between CW 1kHz mode and CW 20kHz mode	-0.5	0	0.5	dB			
FB2	4dB AMP-B Frequency Characteristics B2		18		a																				dB		
FB3	4dB AMP-B Frequency Characteristics B3		17											a												dB	
FB4	4dB AMP-B Frequency Characteristics B4		16									a														dB	
FB5	4dB AMP-B Frequency Characteristics B5		15		a						a															dB	
VOa	Output terminal voltage a	3																		Output terminal DC voltage without signal input	-100	40	100	mV			
VOb	Output terminal voltage b	22																								mV	
VOA	Output terminal voltage A	12																									mV
VOB	Output terminal voltage B	13																									mV
VIa	Input terminal voltage a	1																		Input terminal DC voltage without signal input	-10.0	-2.0	5	mV			
VIb	Input terminal voltage b	24																									mV
VA1	Input terminal voltage A1	5																		Input terminal DC voltage without signal input	-0.5	-1.0	5	mV			
VA2	Input terminal voltage A2	7		a																							mV
VA3	Input terminal voltage A3	8																									mV
VA4	Input terminal voltage A4	9																									mV
VA5	Input terminal voltage A5	10		a																							mV
VB1	Input terminal voltage B1	20																									mV
VB2	Input terminal voltage B2	18		a																							mV
VB3	Input terminal voltage B3	17																									mV
VB4	Input terminal voltage B4	16																									mV
VB5	Input terminal voltage B5	15		a																							mV
I2H	Control terminal current 2H	2		a																Terminal current when ②, ③, ④ pins are 6V	0	2.0	8.0	μA			
I21H	Control terminal current 21H	21																									μA
I23H	Control terminal current 23H	23																									μA
I2L	Control terminal current 2L	2																		Terminal current when ②, ③, ④ pins are 0V		1.0	6.0	μA			
I21L	Control terminal current 21L	21																									μA
I23L	Control terminal current 23L	23																									μA

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input	SW 1	SW 2	SW 5	SW 7	SW 8	SW 9	SW 10	SW 15	SW 16	SW 17	SW 18	SW 20	SW 21	SW 23	SW 24	Test conditions	Limits			Unit	
																				Min.	Typ.	Max.		
V _{S1L}	Control input 1 threshold voltage S1L	12	5	C Variable	a															SG2 : CW 1kHz	1.0	---	3.6	V
V _{S1H}	Control input 1 threshold voltage S1H		10	C Variable						a										Input level 0.5V _{P-P}		---		V
V _{S2L}	Control input 2 threshold voltage S2L		5		a												C Variable			SG2 : CW 1kHz		---		V
V _{S2H}	Control input 1 threshold voltage S2H		9						a								C Variable			Input level 0.5V _{P-P}		---		V
V _{S3L}	Control input 3 threshold voltage S3L	12	5		a												C Variable			SG2 : CW 1kHz	1.0	---	3.6	V
V _{S3H}	Control input 3 threshold voltage S3H		8					a									C Variable			Input level 0.5V _{P-P}		---		V
THD _{Da}	14dB AMP Dynamic range Da	3	1	a																SG1 : CW 1kHz	---	0.10	0.15	%
THD _{Db}	14dB AMP Dynamic range Db	22	24															a		Input level 1.0V _{P-P}	---			%
THD _{DA1}	4dB AMP Dynamic range DA1	12	5		a															SG2 : CW 1kHz Input level 3.0V _{P-P}	---	0.04	0.10	%
THD _{DB1}	14dB AMP Dynamic range DB1	13	20											a						SG3 : CW 1kHz Input level 3.0V _{P-P}	---			%
THD _{Ta}	14dB AMP Harmonic distortion Ta	3	1	a																SG1 : CW 1kHz	---	0.05	0.08	%
THD _{Tb}	14dB AMP Harmonic distortion Tb	22	24															a		Input level 0.5V _{P-P}	---			%
THD _{TA1}	4dB AMP Harmonic distortion TA1	12	5		a															SG2 : CW 1kHz Input level 0.5V _{P-P}	---	0.01	0.05	%
THD _{TB1}	4dB AMP Harmonic distortion TB1	13	20											a						SG3 : CW 1kHz Input level 0.5V _{P-P}	---			%
CA12	4dB AMP-SW Crosstalk A1-A2	12	5	b a	a															SG2 : CW 1kHz	---	-90	-80	dB
CA21	4dB AMP-SW Crosstalk A2-A1		7	a b		a														Input level 0.5V _{P-P}	---			dB
CB12	4dB AMP-SW Crosstalk B1-B2	13	20	b a											a					SG3 : CW 1kHz	---			dB
CB21	4dB AMP-SW Crosstalk B2-B1		18	a b									a							Input level 0.5V _{P-P}	---			dB
C1AB	Crosstalk between A and B A1-B1		5		a																---			dB
C2AB	Crosstalk between A and B A2-B2		7		a		a														---			dB
C3AB	Crosstalk between A and B A3-B3		8				a									a				SG2 : CW 1kHz Input level 0.5V _{P-P}	---			dB
C4AB	Crosstalk between A and B A4-B4		9					a													---			dB
C5AB	Crosstalk between A and B A5-B5		10		a					a											---			dB

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input	SW 1	SW 2	SW 5	SW 7	SW 8	SW 9	SW 10	SW 15	SW 16	SW 17	SW 18	SW 20	SW 21	SW 23	SW 24	Test conditions	Limits			Unit		
																				Min.	Typ.	Max.			
C1BA	Crosstalk between A and B B1-A1	12	20												a					SG3 : CW 1kHz Input level 0.5V _{p-p}	—	-90	-80	dB	
C2BA	Crosstalk between A and B B2-A2		18	a										a			a				—				dB
C3BA	Crosstalk between A and B B3-A3		17										a				a				—				dB
C4BA	Crosstalk between A and B B4-A4		16							a								a			—				dB
C5BA	Crosstalk between A and B B5-A5		15	a							a										—				dB
C ab	14dB AMP Crosstalk between a and b	22	1	a																SG1 : CW 1kHz Input level 0.5V _{p-p}	—				dB
C ba	14dB AMP Crosstalk between b and a	3	24															a			—				dB
C aA	Crosstalk between a and A a-A	12	1	a																SG1 : CW 1kHz Input level 0.5V _{p-p}	—				dB
C bB	Crosstalk between b and B b-B	13	24			a															—				dB
DC _{A1}	DC offset A1	12			b a															Without input signal	-10	0	10	mV	
DC _{A2}	DC offset A2																		b a						mV
DC _{A3}	DC offset A3				b a														b a						mV
DC _{A4}	DC offset A4																		b a						mV
DC _{A5}	DC offset A5				a b														b a						mV
DC _{A6}	DC offset A6				a														b a						mV
DC _{A7}	DC offset A7				a														b a						mV
DC _{A8}	DC offset A8				b a														a						mV
DC _{A9}	DC offset A9																		b a		a				mV
DC _{A10}	DC offset A10				a														b a		a				mV

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MITSUBISHI ICs (AV COMMON)
M51293FP

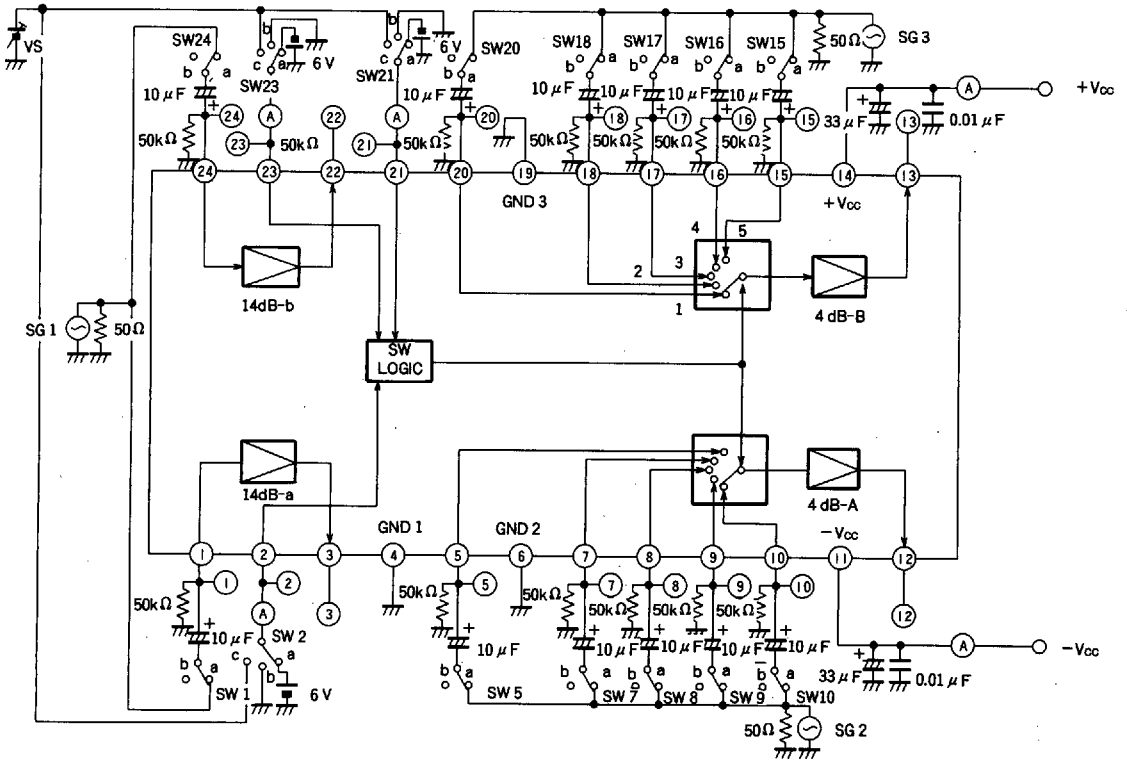
AUDIO SWITCH

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input	SW 1	SW 2	SW 5	SW 7	SW 8	SW 9	SW 10	SW 15	SW 16	SW 17	SW 18	SW 20	SW 21	SW 23	SW 24	Test conditions	Limits			Unit		
																				Min.	Typ.	Max.			
DC _{B1}	DC offset B1	13			b a															Without input signal	-10	0	10	mV	
DC _{B2}	DC offset B2																b a								mV
DC _{B3}	DC offset B3				b a												b a								mV
DC _{B4}	DC offset B4																b a								mV
DC _{B5}	DC offset B5				a b												b a								mV
DC _{B6}	DC offset B6				a												b a								mV
DC _{B7}	DC offset B7				a												b a								mV
DC _{B8}	DC offset B8				b a													a							mV
DC _{B9}	DC offset B9																b a	a							mV
DC _{B10}	DC offset B10				a												b a	a							mV

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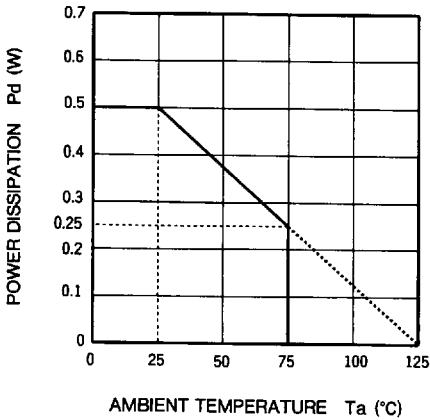
TEST CIRCUIT



Unit Resistance : Ω
Capacitance : F

TYPICAL CHARACTERISTICS

THERMAL DERATING (MAXIMUM RATING)



LOGIC TABLE

Control Input			Selected sound input
3 (21 pin)	2 (23 pin)	1 (2 pin)	
L	L	L	1 (5 pin, 20 pin)
L	L	H	5 (10 pin, 15 pin)
L	H	L	4 (9 pin, 16 pin)
L	H	H	2 (7 pin, 18 pin)
H	—	—	3 (8 pin, 17 pin)

PRECAUTIONS FOR APPLICATION

- In power on/off, turn +supply and -supply on/off simultaneously.
If it is impossible to turn them on/off simultaneously, do so as quickly as possible.
- When simultaneous on/off is difficult, turn -supply on first and turn +supply off first.
- Current flows into each control input terminal at approximately $20k\Omega$ impedance, when +supply is not applied.
- Negative voltage should not be applied to control input.