

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 1Vrms output)
- Low crosstalk(TYP -90dB)
- Low power consumption(TYP 130mW)

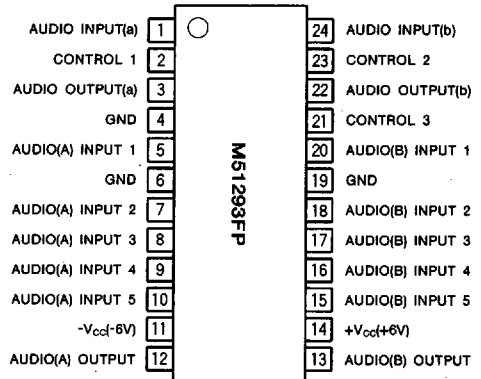
APPLICATION

VCR

RECOMMENDED OPERATING CONDITION

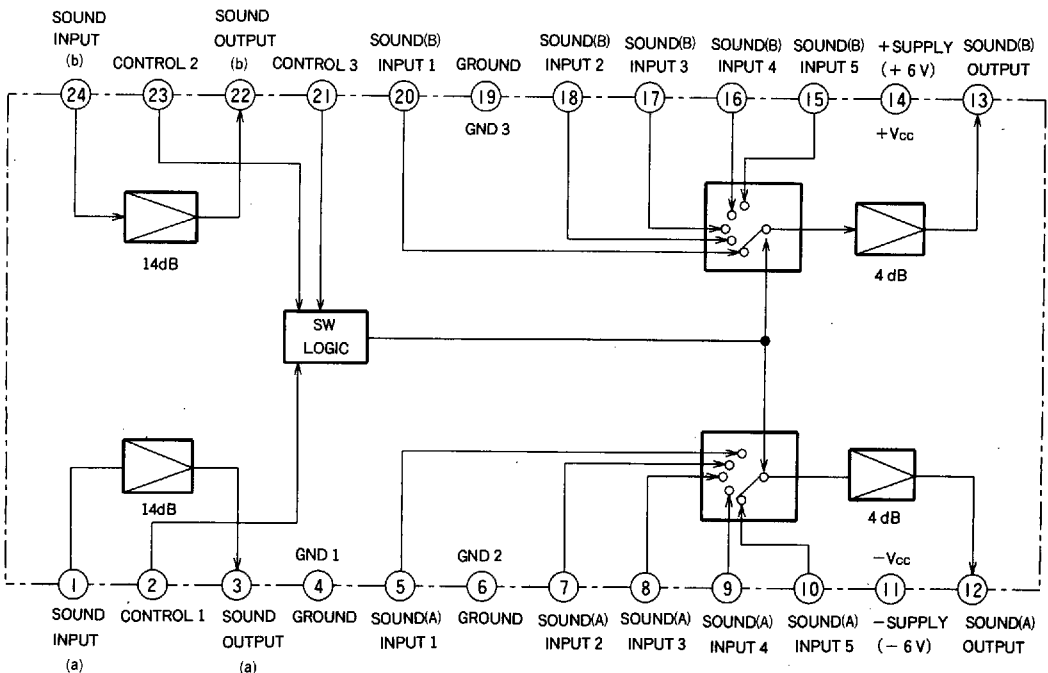
Supply voltage range..... $\pm 5.4 \sim \pm 6.6V$
 Rated supply voltage..... $\pm 6.0V$

PIN CONFIGURATION (TOP VIEW)



Outline 24P2N-B

BLOCK DIAGRAM



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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	13.0	14.0	15.0	dB	
G _b	14dB AMP GAIN b	22	24																a	Input level 0.5V _{p-p}	↓	↓	↓	dB	
F _a	14dB AMP Frequency characteristics a	3	1	a																SG 1 : CW 20kHz Input level 0.5V _{p-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 _{p-p}	3.5	4.0	4.5	dB	
G _{A2}	4dB AMP-A GAIN A2		7			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 _{p-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 _{p-p}	3.5	4.0	4.5	dB	
G _{B2}	4dB AMP-B GAIN B2		18			a											a								dB
G _{B3}	4dB AMP-B GAIN B3		17										a					a							dB
G _{B4}	4dB AMP-B GAIN B4		16											a											dB
G _{B5}	4dB AMP-B GAIN B5		15			a									a										dB

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

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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.			
FB1	4dB AMP-B Frequency Characteristics B1	13	20												a					SG3 : CW 20kHz Input level 0, 5V _{r-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										a			a					dB			
FB3	4dB AMP-B Frequency Characteristics B3	17											a				a					dB			
FB4	4dB AMP-B Frequency Characteristics B4	16										a						a				dB			
FB5	4dB AMP-B Frequency Characteristics B5	15		a							a											dB			
Vo _a	Output terminal voltage a	3																		Output terminal DC voltage without signal input	-100	40	100	mV	
Vo _b	Output terminal voltage b	22																						mV	
Vo _A	Output terminal voltage A	12																						25	mV
Vo _B	Output terminal voltage B	13																							mV
Vi _a	Input terminal voltage a	1																		Input terminal DC voltage without signal input	-10.0	-2.0	5	mV	
Vi _b	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														a							mV
VA3	Input terminal voltage A3	8																a							mV
VA4	Input terminal voltage A4	9																	a						mV
VA5	Input terminal voltage A5	10		a																					mV
VB1	Input terminal voltage B1	20																							mV
VB2	Input terminal voltage B2	18		a															a						mV
VB3	Input terminal voltage B3	17																	a						mV
VB4	Input terminal voltage B4	16																			a				mV
VB5	Input terminal voltage B5	15		a																					mV
I _{2H}	Control terminal current 2H	2		a																Terminal current when ②, ③, ④ pins are 6V	0	2.0	8.0	μA	
I _{21H}	Control terminal current 21H	21																	a						μA
I _{23H}	Control terminal current 23H	23																			a				μA
I _{2L}	Control terminal current 2L	2																		Terminal current when ②, ③, ④ pins are 0V		1.0	6.0	μA	
I _{21L}	Control terminal current 21L	21																							μA
I _{23L}	Control terminal current 23L	23																							μA

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

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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												b a		SG2 : CW 1kHz	---	-90	-80	dB	
CA21	4dB AMP—SW Crosstalk A2—A1		7		a b		a											a b		Input level 0.5V _{p-p}	---			dB	
CB12	4dB AMP—SW Crosstalk B1—B2	13	20		b a										a			b a		SG3 : CW 1kHz	---			dB	
CB21	4dB AMP—SW Crosstalk B2—B1		18		a b									a				a b		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												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										a		---			dB	
C5AB	Crosstalk between A and B A5—B5		10		a					a											---			dB	

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

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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
DCA1	DC offset A1	12			b a															Without input signal	-10	0	10	mV	
DCA2	DC offset A2																	b a							mV
DCA3	DC offset A3				b a													b a							mV
DCA4	DC offset A4															b a									mV
DCA5	DC offset A5				a b													b a							mV
DCA6	DC offset A6				a													b a							mV
DCA7	DC offset A7				a													b a							mV
DCA8	DC offset A8				b a													a							mV
DCA9	DC offset A9																	b a	a						mV
DCA10	DC offset A10				a													b a	a						mV

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

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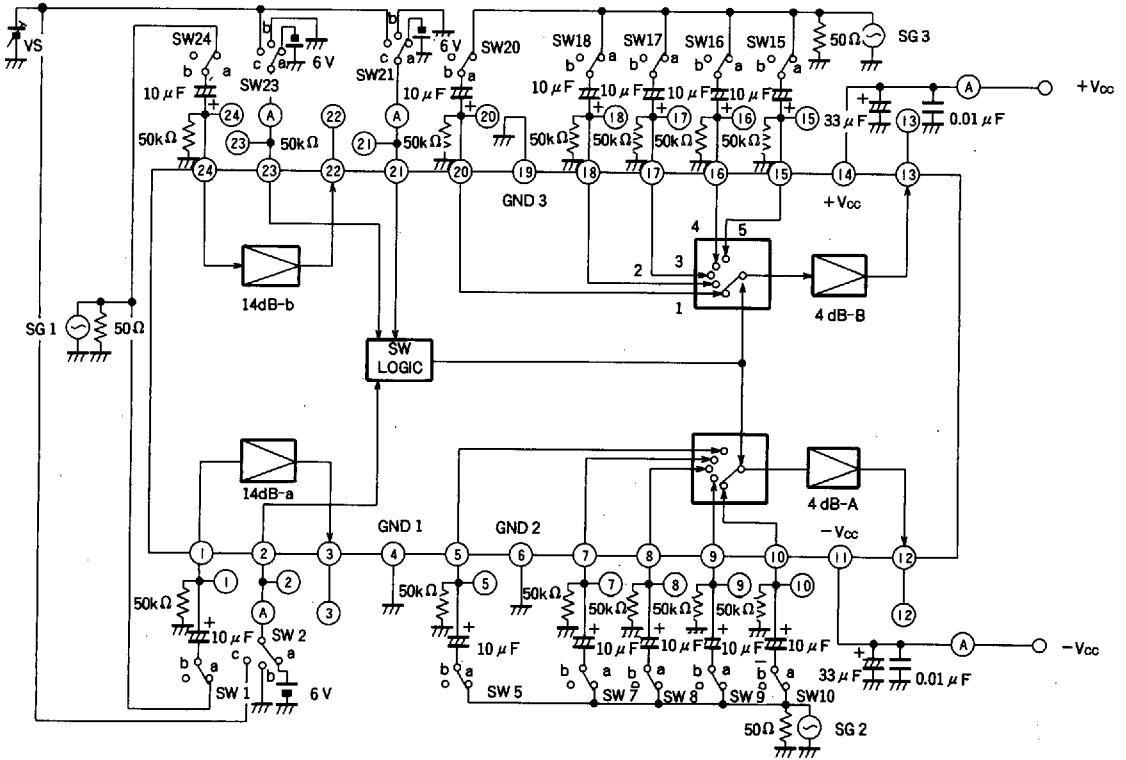


ELECTRICAL CHARACTERISTICS (cont.)

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.			
DC _{B1}	DC offset B1	13			b a															Without input signal	-10	0	10	mV	
DC _{B2}	DC offset B2																								mV
DC _{B3}	DC offset B3				b a																				mV
DC _{B4}	DC offset B4																b a								mV
DC _{B5}	DC offset B5				a b																				mV
DC _{B6}	DC offset B6				a																				mV
DC _{B7}	DC offset B7				a																				mV
DC _{B8}	DC offset B8				b a																				mV
DC _{B9}	DC offset B9																								mV
DC _{B10}	DC offset B10				a																				mV

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

TEST CIRCUIT



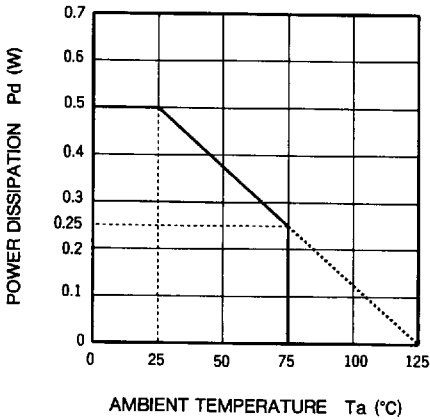
Unit Resistance : Ω
Capacitance : F

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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.