

M51292FP

VIDEO SWITCH

DESCRIPTION

The M51292FP is a semiconductor integrated circuit for VCR applications.

It is an analog switch IC with mute function for both audio and video signals.

FEATURES

- Low crosstalk
- Low distortion
- Wide output dynamic range
- 4 Video signal inputs
- 2 Audio signal inputs
- 6 dB Amp for audio signal
- Mute function for video signals
- Relay driver

APPLICATION

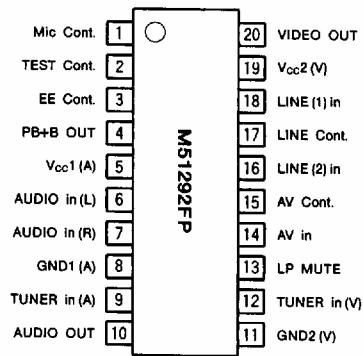
VCR

RECOMMENDED OPERATING CONDITION

Supply voltage range.....11.5V~12.5V

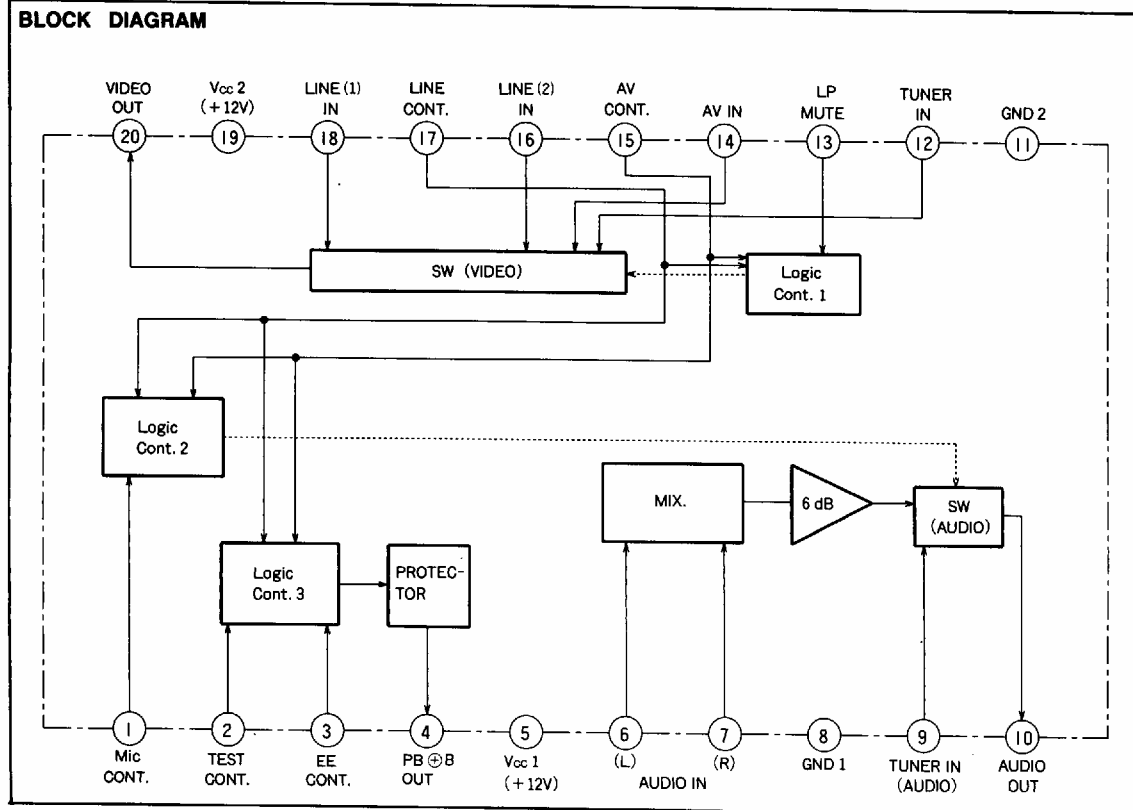
Rated supply voltage.....12V

PIN CONFIGURATION (TOP VIEW)



Outline 20P2N-A

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V _{cc}	Supply voltage	14.4	V
P _d	Power dissipation	500	mW
T _{opr}	Operating temperature	-20~75	°C
T _{stg}	Storing ambient temperature	-40~125	°C
K _θ	Thermal derating Ta≥25°C	5	mW/°C

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

	Symbol	Parameter	Test conditions	Test circuit	Limits			Unit
					Min.	Typ.	Max.	
	V _{ccR}	Operating supply voltage range	No abnormality in standard application circuit operation		10	12	14	V
AUDIO OUTPUT	I _i	Circuit current (audio block)	only DC bias	A	4.5	6.0	7.5	mA
	V _⑥	6 pin input terminal voltage	only DC bias		7.2	7.5	7.8	V
	Z _⑥	6 pin input impedance	only DC bias		40	50	60	kΩ
	V _⑦	7 pin input terminal voltage	only DC bias		7.2	7.5	7.8	V
	Z _⑦	7 pin input impedance	only DC bias		40	50	60	kΩ
	V _⑨	9 pin input terminal voltage	only DC bias		7.2	7.5	7.8	V
	Z _⑨	9 pin input impedance	only DC bias		40	50	60	kΩ
	G _L	Output gain (Lch) ⑥→⑩	f=1kHz V _i =200mVrms		-0.5	0	0.5	dB
	G _R	Output gain (Rch) ⑦→⑩	f=1kHz V _i =200mVrms		-0.5	0	0.5	dB
	G _{L+R}	Output gain (L+R) ⑥+⑦→⑩	f=1kHz V _i =200mVrms		5.5	6.0	6.5	dB
	G _{T(A)}	Output gain (TUNER) ⑨→⑩	f=1kHz V _i =200mVrms		-0.5	0	0.5	dB
	CT _{LT}	Crosstalk (Lch ↔ TUNER)	No signal pin → AC GND		—	—	-60	dB
	CT _{RT}	Crosstalk (Rch ↔ TUNER)	No signal pin → AC GND		—	—	-60	dB
	THD _L	Distortion (Lch input)	f=1kHz V _i =20mVrms		—	0.03	0.1	%
	THD _R	Distortion (Rch input)	f=1kHz V _i =20mVrms		—	0.03	0.1	%
	THD _T	Distortion (TUNER)	f=1kHz V _i =20mVrms		—	0.01	0.05	%
	V _{DA}	Maximum output voltage	Value when output begins to clip f=1kHz		8.5	—	—	V _{p-p}
	V _⑩	10 pin output terminal voltage	only DC bias		5.1	5.4	5.7	V
ΔV _⑩	10 pin output DC offset	only DC bias	-30	0	30	mV		
I _⑩	10 pin output bias current	only DC bias SW 10 → 2 side	0.7	1.0	1.5	mA		
Z _⑩	10 pin output impedance	only DC bias SW 10 → 2 side	—	26	50	Ω		

ELECTRICAL CHARACTERISTICS (cont.)

	Symbol	Parameter	Test conditions	Test circuit	Limits			Unit
					Min.	Typ.	Max.	
VIDEO OUTPUT	I ₂	Circuit current (video block)	only DC bias	B	2.5	3.5	4.5	mA
	V ₁₂	12 pin input terminal voltage	only DC bias		6.7	7.0	7.3	V
	Z ₁₂	12 pin input impedance	only DC bias		12	15	18	kΩ
	V ₁₄	14 pin input terminal voltage	only DC bias		6.7	7.0	7.3	V
	Z ₁₄	14 pin input impedance	only DC bias		12	15	18	kΩ
	V ₁₆	16 pin input terminal voltage	only DC bias		6.7	7.0	7.3	V
	Z ₁₆	16 pin input impedance	only DC bias		12	15	18	kΩ
	V ₁₈	18 pin input terminal voltage	only DC bias		6.7	7.0	7.3	V
	Z ₁₈	18 pin input impedance	only DC bias		12	15	18	kΩ
	G _{T(V)}	Output gain (TUNER) ⑫→⑳	Video signal input V _i =1V _{P-P} , 100%		-0.5	0	0.5	dB
	G _{AV}	Output gain (AV) ⑮→⑳	Video signal input V _i =1V _{P-P} , 100%		-0.5	0	0.5	dB
	G _{L2}	Output gain (LINE 2) ⑮→⑳	Video signal input V _i =1V _{P-P} , 100%		-0.5	0	0.5	dB
	G _{L1}	Output gain (LINE 1) ⑮→⑳	Video signal input V _i =1V _{P-P} , 100%		-0.5	0	0.5	dB
	CT	Crosstalk (between ⑫ ⑭ ⑮ ⑯)	f=5MHz, 1V _{P-P} No signal pin → AC GND		—	—	-60	dB
	V _{DV}	Maximum output voltage	Value when output begins to clip. Video input		8.5	—	—	V _{P-P}
	V ₂₀	20 pin output terminal voltage	only DC bias (input no signal)		6.0	6.3	6.6	V
	V _M	Mute output DC voltage	only DC bias (input no signal)		6.0	6.3	6.6	V
ΔV ₂₀	20 pin output DC offset	only DC bias	-30	0	30	mV		
I ₂₀	20 pin output bias current	only DC bias	0.7	1.0	1.5	mA		
Z ₂₀	20 pin output impedance	only DC bias	—	26	50	Ω		
PB ⊕ B output	V _{o4}	4 pin terminal voltage at no load (OPEN)	Logic Cont 3 → ON	C	11.0	11.3	11.6	V
	I _{s4}	4 pin terminal current at short	Logic Cont 3 → ON		—	27	35	mA
	V _{L4}	4 pin terminal voltage at I _L =20mA	Logic Cont 3 → ON		10.3	10.5	11.0	V
	I _{max4}	Protector ON maximum current	Logic Cont 3 → ON		45	55	65	mA
AUDIO OUTPUT	CT _{AV}	Audio ↔ Video crosstalk	f=5MHz	A	—	—	-60	dB
	f _A	Audio output frequency characteristic	V _i =200mVrms Output → f -3dB		8	—	—	MHz
	f _V	Video output frequency characteristic	V _i =200mVrms Output → f -3dB	B	8	—	—	MHz
	G _{MUTE}	Video output MUTE reduction value	Video signal input		—	—	-60	dB
	V _N ^{L+R}	Audio output noise voltage (L+R)	Measure after IHF "A" filter	A	—	20	80	μVrms
	V _N ^T	Audio output noise voltage (TUNER)	Measure after IHF "A" filter		—	10	40	μVrms

CONTROL TERMINAL THRESHOLD RATING

Pin No.	Terminal	Threshold	Input Mode	Remarks
①	LINE Cont.	2.5±0.2	PNP Tr Open Base	2 value (L ↔ H)
⑮	AV Cont.			
⑰	Mute Cont.			
①	Mic Cont.			
②	TEST Cont.			
③	EE Cont.			

ELECTRICAL CHARACTERISTICS TEST METHOD

VccR

Supply voltage range with no operating abnormality in standard application circuit.

I1

PIN5 DC current when only DC bias is added.

V⑥

Use only DC bias to measure PIN⑥ terminal voltage.

Z⑥

Where V⑥' is PIN⑥ terminal voltage when current is 0.02mA. Use following formula to determine this value.

$$Z⑥ = (V⑥ - V⑥') / 0.02 [k\Omega]$$

V⑦

Follow procedure for V⑥, Z⑥ and measure PIN⑦ terminal voltage and input impedance.

Z⑦

Same as above.

V⑨

Follow procedure for V⑥, Z⑥ and measure PIN⑨ terminal voltage and input impedance.

Z⑨

Same as above.

G_L

Set either one of SW1, SW15, or SW17 to "H" and input PIN⑥ f=1kHz, Vi=200mVrms as SG1. Where output at Measuring Point 10 is set to Vo. Use formula below to determine this value.

$$G_L = 20 \log \frac{V_o [mVrms]}{200 [mVrms]} \text{ (dB)}$$

G_R

Follow procedure for G_L and input PIN⑦ sine wave of f=1kHz, Vi=200mVrms. Use formula below to determine this value from output Vo at Measuring Point 10.

$$G_R = 20 \log \frac{V_o [mVrms]}{200 [mVrms]} \text{ (dB)}$$

G_{R+L}

Set either one of SW1, SW15, or SW17 to "H" and input PIN⑥ and PIN7 sine wave of f=1kHz, Vi=200mVrms. Use formula below to determine this value from output Vo at Measuring Point 10.

$$G_{R+L} = 20 \log \frac{V_o [mVrms]}{200 [mVrms]} \text{ (dB)}$$

G_{T(A)}

Set SW11, SW15, and SW17 to "L" and input PIN⑨ sine wave of f=1kHz, Vi=200mVrms. Use formula below to determine this value from output Vo at Measuring Point 10.

$$G_{T(A)} = 20 \log \frac{V_o [mVrms]}{200 [mVrms]} \text{ (dB)}$$

CT_{LT}

Input PIN⑥ sine wave of f=1kHz, Vi=200mVrms and set PIN⑦ and PIN⑨ to AC GND. Use formula below to determine this

value from output Vo when SW1, SW15, and SW17 are set to "L".

$$CT_{LT} = 20 \log \frac{V_o [mVrms]}{200 [mVrms]} \text{ (dB)}$$

CT_{RT}

Input PIN⑦ sine wave and set PIN⑥ and PIN⑨ to AC GND. Use above formula CT_{LT}.

THD_L

Set either one of SW1, SW15, or SW17 to "H" and input PIN⑥ sine wave of f=1kHz, Vi=200mVrms. THD_L is value when output at Measuring Point 10 is measured with distortion meter.

THD_R

Follow procedure for THD_L and input PIN⑦ sine wave. Measure output distortion THD_R at Measuring Point 10.

THD_T

Set SW1, SW15, and SW17 to "L" and input PIN⑨ sine wave of f=1kHz, Vi=200mVrms. THD_T is value when output at Measuring Point 10 is measured with distortion meter.

V_{DA}

Follow procedure for THD_T. V_{DA} is output amplitude when input amplitude is increased gradually and output waveform at Measuring Point 10 begins to clip.

V⑩

Set either one of SW1, SW15, or SW17 to "H". V⑩ is DC terminal voltage output with no signal input at Measuring Point 10.

ΔV⑩

Set SW1, SW15, and SW17 to "L" and set PIN⑩ terminal voltage measured as in V⑩ to V⑩'. Use following formula to determine this value.

$$\Delta V⑩ = V⑩ - V⑩'$$

I⑩

Set SW10 to 2. I⑩ is DC current flowing into PIN⑩ terminal when V⑩=12V.

Z⑩

Set SW10 to 2. Where Z⑩" is set to DC terminal voltage at Measuring Point 10 when PIN ⑩ current is I=1mA. Use following formula to determine this value.

$$V⑩ = \frac{V⑩ - V⑩' [mA]}{1 [mA]} \text{ (}\Omega\text{)}$$

I2

DC current flowing into PIN⑨ when only DC bias is added.

V⑫

Use only DC bias to measure PIN⑫ terminal voltage at Measuring Point 12.

Z⑫

Where V⑫' is set to PIN⑫ terminal voltage with 0.1mA current. Use following formula to determine this value.

$$Z⑫ = (V⑫ - V⑫') / 0.1 [k\Omega]$$

V⑭

Follow procedure for V⑫, and Z⑫ and measure PIN⑭ terminal voltage and input impedance.

Z⑭

Same as above.

V₁₆

Follow procedure for V₁₂, and Z₁₂ and measure PIN₁₆ terminal voltage and input impedance.

Z₁₆

Same as above.

V₁₈

Follow procedure for V₁₂, and Z₁₂ and measure PIN₁₈ terminal voltage and input impedance.

Z₁₈

Same as above.

G_{T(V)}

Set SW13, SW15, and SW17 to "L". Where V_o is set to output amplitude at Measuring Point 20 when inputting PIN₁₄ video signal V_i=1Vp-p as SG2. Use following formula to determine this value.

$$G_{T(V)} = 20 \log \frac{V_o[Vp-p]}{1[Vp-p]} \text{ (dB)}$$

G_{AV}

Set SW13 and SW17 to "L" and SW15 to "H" and input PIN₁₄ 1Vp-p video signal. Use following formula to determine this value(same as (32)).

$$G_{AV} = 20 \log \frac{V_o[Vp-p]}{1[Vp-p]} \text{ (dB)}$$

G_{L2}

Set SW13 to "L" and SW15 and SW17 to "H" and calculate this value as in PIN₁₆ video input.

$$G_{L2} = 20 \log \frac{V_o[Vp-p]}{1[Vp-p]} \text{ (dB)}$$

G_{L1}

Set SW13 and SW15 to "L" and SW17 to "H" and calculate this value as in PIN₁₈ video input.

CT

Set switches to TUNER signal output mode(SW13, SW15 and SW17"L"). Input PIN₁₄, PIN₁₆, or PIN₁₈ f=5MHz, V_i=1Vp-p and set PIN₂₀ to AC GND. Where V_{CT} is set to output crosstalk component at Measuring Point 20. Use following formula to determine this value.

$$CT = 20 \log \frac{V_{CT}[Vp-p]}{1[Vp-p]} \text{ (dB)}$$

Measure all other modes in the same way.

V_{DV}

Set switches to TUNER signal output mode.V_{DV} is output amplitude when PIN₂₀ input video signal is gradually increased and output waveform at Measuring Point 20 begins to clip. V₂₀

V₂₀ is DC terminal voltage with no signal input at Measuring Point 20. (SW13,SW15 and SW17 "L")

V_M

V_M is DC output voltage at Measuring Point 20 when SW13 is set to "H".

ΔV₂₀

Measure DC offset with no signal input at Measuring Point

20 in each mode: TUNER, AV, LINER1, LINE2, MUTE.

I₂₀

Set SW20 to 2. I₂₀ is DC current flowing into 20 pin when V₂₀=12V.

Z₂₀

Set SW20 to 2. Where V₂₀ is set to DC voltage at Measuring Point 20 when PIN₂₀ current is I=1mA. Use following formula to determine this value.

$$Z_{20} = 20 \log \frac{V_{20} - V_{20}[mV]}{1[mA]} \text{ (}\Omega\text{)}$$

V_{o4}

Set Logic Cont.3(protector)to Logic ON and measure PIN₄ open terminal voltage.

I_{s4}

Follow procedure for V_{o4}: I_{s4} is current flowing out of PIN₄ when short-circuited to GND by ammeter.

V_{L4}

Follow procedure for V_{o4} and set SW4 to 2. V_{L4} is terminal voltage when PIN₄ current is I_L=20mA.

I_{g_{max}}

Set Logic Cont.3 to ON and SW4 to 2 and gradually decrease PIN₄ load resistance. Measure PIN₄ maximum current just before current protector is activated.

CT_{AV}

Set all video input terminals to AC GND. Measure audio signal crosstalk component of video output pin at Measuring Point 20 when f=1kHz, V_i=200mVp-p are input to audio input terminal.Similarly, set all audio input terminals to AC GND and measure video signal crosstalk component of audio output pin at Measuring Point 10 when 1Vp-p video signal is input to video input terminal.

f_A

Follow procedure for G_L, G_R and G_{T(A)} and measure input frequency when input sine wave frequency is increased and output reduces by 3dB.

f_V

Follow procedure for G_{T(V)}, G_{AV}, G_{L2} and G_{L1}. Input sine wave of V_i=200mVp-p and measure input frequency when output reduces by 3dB in the same way as above.

G_{MUTE}

Follow procedure for G_{T(V)}.V_o is output amplitude at Measuring Point 20 when 1Vp-p video signal is input from PIN₁₂, and V_{MUTE} is output amplitude when SW13 is set to "H"(Mute). Use following formula to determine this value.

$$G_{MUTE} = 20 \log \frac{V_{MUTE}[Vp-p]}{V_o[Vp-p]} \text{ (dB)}$$

V_N^{L+R}

Set audio input to no signal input and (L+R)output mode. Measure output noise voltage after passing through JIS "A" filter at Measuring Point 10.

V_N^T

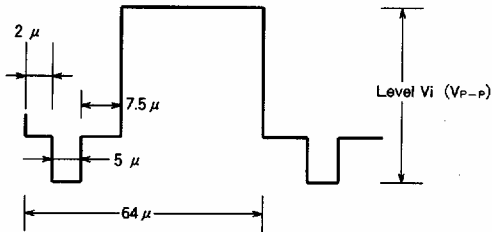
Measure output noise voltage in TUNER mode as in V_N^{L+R}.

INPUT SIGNAL

SG1 Sine wave

- f=1kHz
- Total harmonic distortion (THD) not more than 0.01%

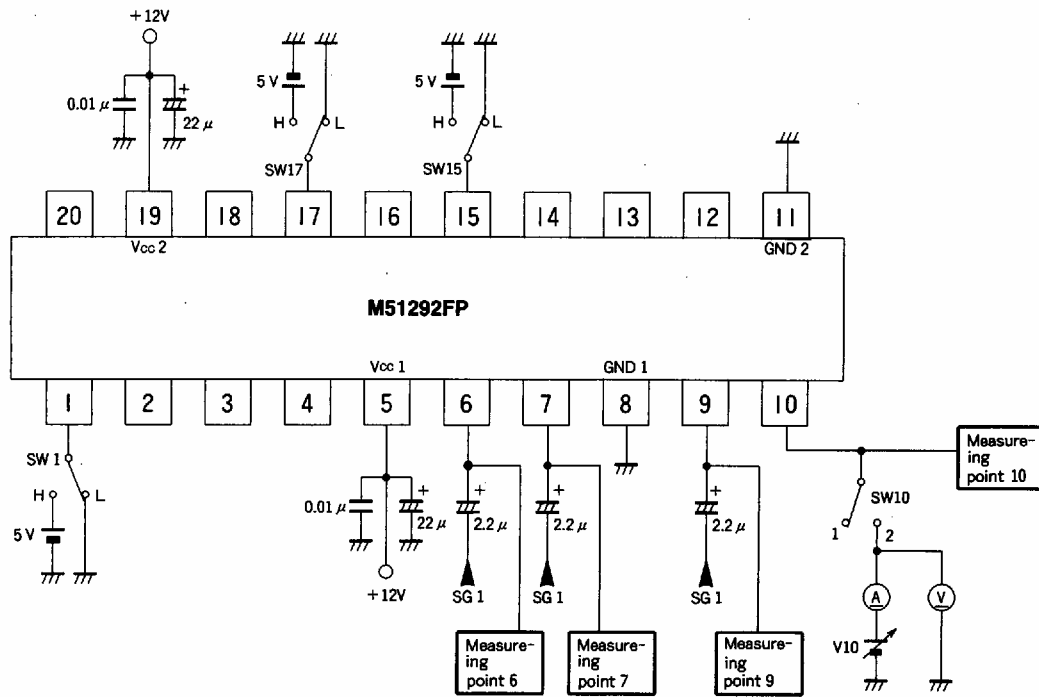
SG2 Video signal(APL 100%, No V synchronism)



Sine wave

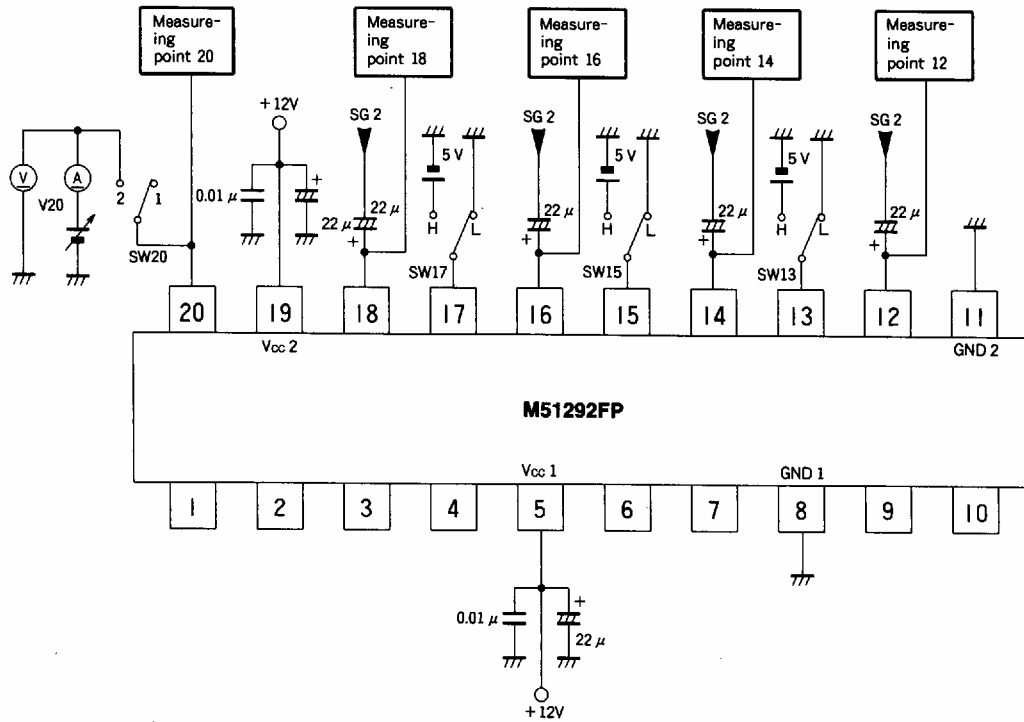
- f=5kHz
- Vi=1Vp-p

TEST CIRCUIT A (AUDIO OUTPUT)

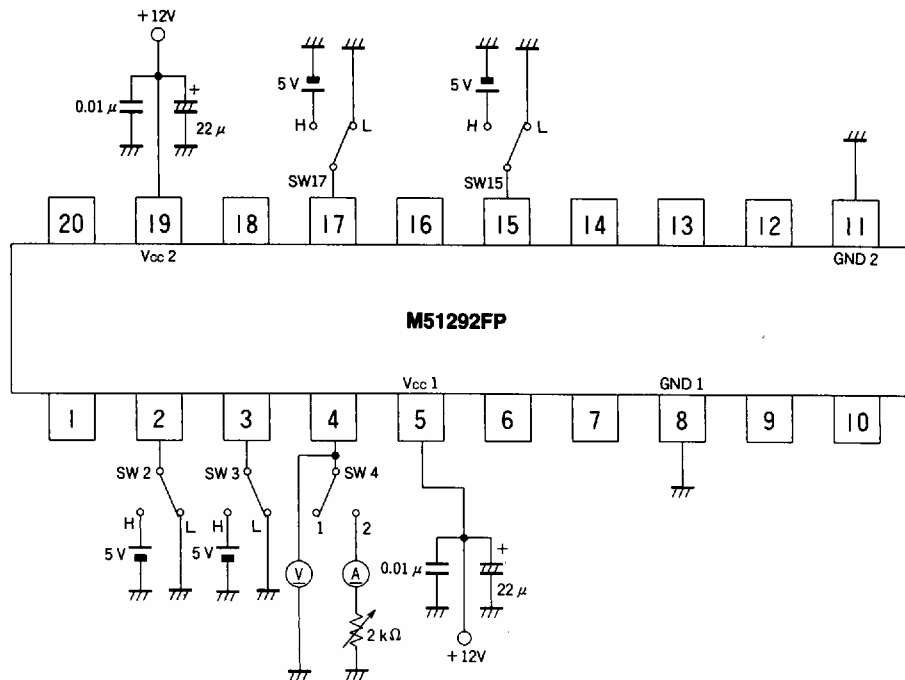


Unit Resistance : Ω
 Capacitance : F

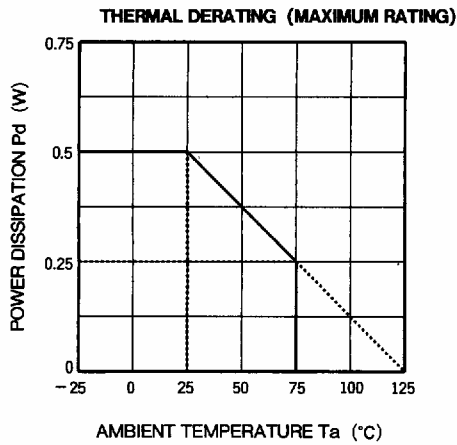
TEST CIRCUIT B (VIDEO OUTPUT)



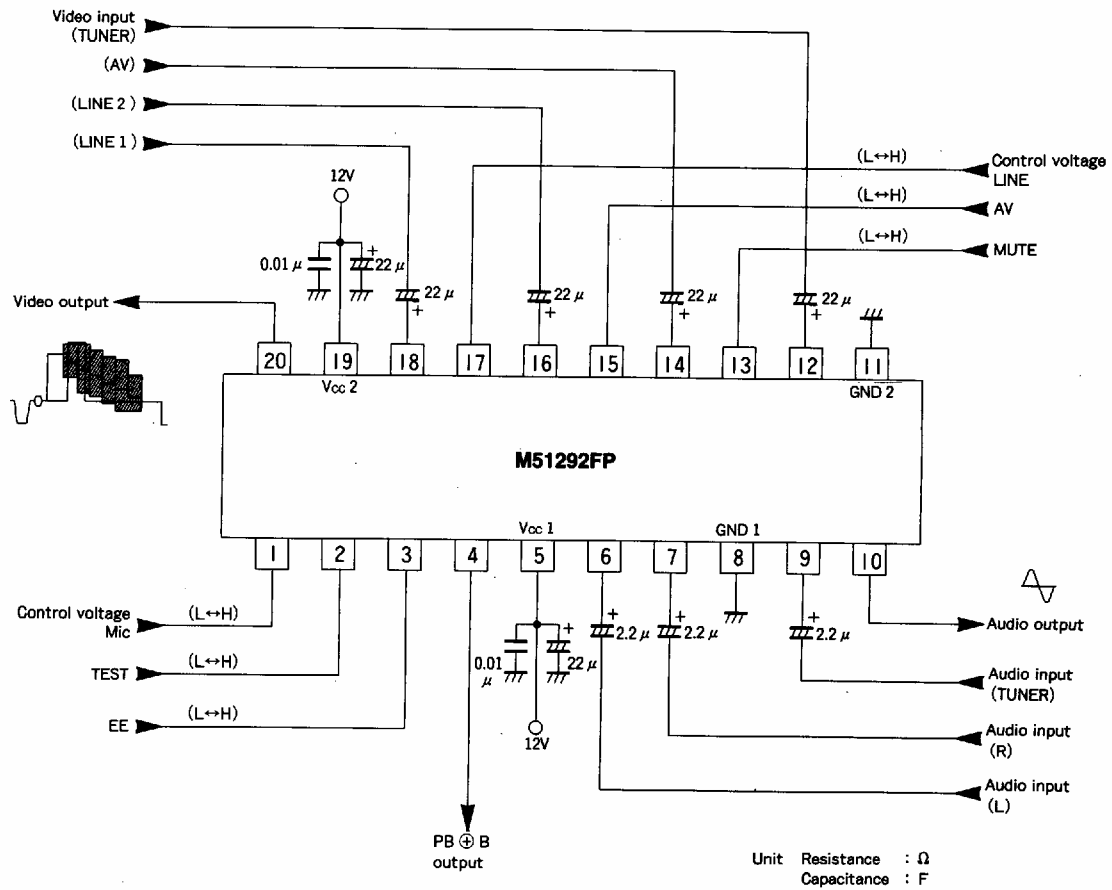
TEST CIRCUIT C (PB + B OUTPUT)



TYPICAL CHARACTERISTICS



APPLICATION EXAMPLE



LOGIC TABLE

LOGIC CONT.1 (VIDEO OUT)

LINE ①	AV ⑫	MUTE ⑬	VIDEO OUT ⑭
L	L	L	TUNER (⑩ pin input)
L	H	L	AV (⑪ pin input)
H	L	L	LINE 1 (⑬ pin input)
H	H	L	LINE 2 (⑭ pin input)
*	*	H	MUTE

Note *……L, H is arbitrary

LOGIC CONT.2 (AUDIO OUT)

LINE ①	AV ⑫	MIC ①	VIDEO OUT ⑭
L	L	L	TUNER (⑨ pin input)
H	*	*	AUDIO { (L) (⑥ pin input) + (R) (⑦ pin input)
*	H	*	
*	*	H	

Note *……L, H is arbitrary

LOGIC CONT.3 (RELAY DRIVER)

LINE ①	AV ⑫	TEST ②	EE ③	PB ⊕ B OUT ④
L	*	*	L	ON
*	L	H	*	
Logic other than the above mentioned				OFF

Note *……L, H is arbitrary