

# M51524L/P/FP

## AUTO REVERSE PREAMPLIFIER WITH MUSIC SENSOR

### DESCRIPTION

The M51524 is a preamplifier IC developed for car audio systems.

The IC, in addition to 2 channels of high-gain, low-noise preamplifiers, has a lead-in detection function suiting to auto reverse function and is capable of processing analog signals transmitted from the cassette deck.

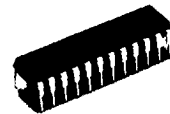
Its applications cover home-use audio systems and portable radio CD/cassette players, as well as car audio systems.

### FEATURES

- Built-in electronic switch for forward/reverse selection offers capability of switching 2 channels with a single switch.
- Built-in switch for forward/reverse switching makes it possible to switch 2 channels with a single switch.
- Use of reference voltage of bias circuit eliminates the need for input coupling capacitor.
- 2 channels of high-gain, low-noise preamplifiers built-in.
- Internal direct connections between each preamplifier output and high-gain mixing amplifier, without using coupling capacitor.
- Built-in filter circuits for prevention of malfunctioning caused by tape pop up noise at music blank.
- Built-in reset circuit to reset music selection at power up.
- Capable of setting timing for music blank by means of external CR combination.



Outline 20P5A(L)  
1.27mm pitch 325mil ZIP  
(2.8mm × 25.2mm × 6.3mm)



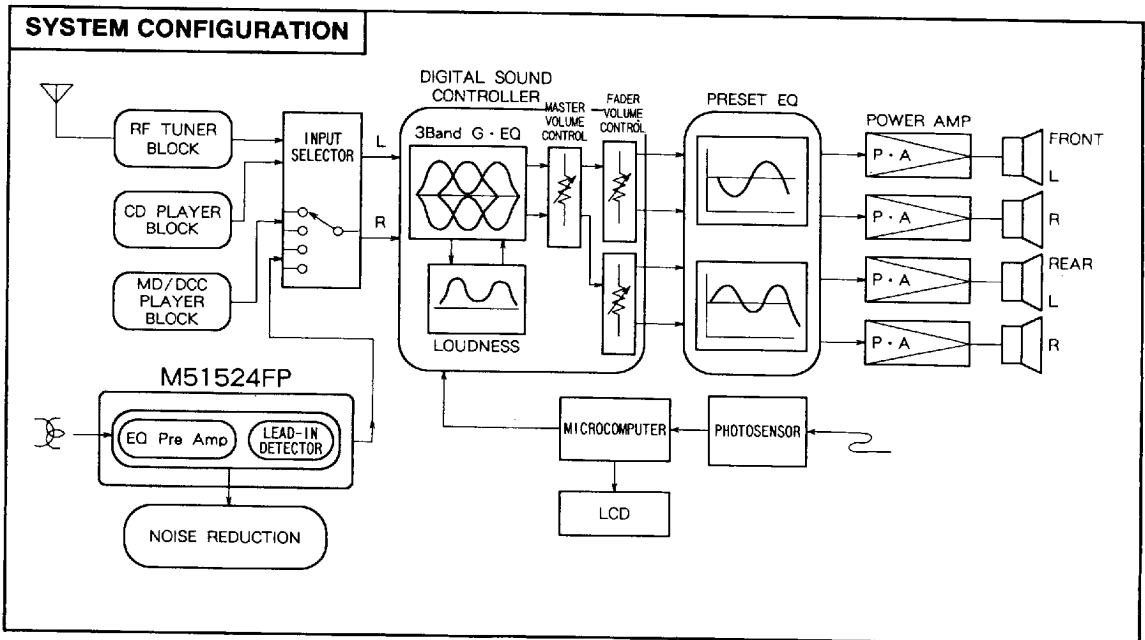
Outline 24P4D(P)  
2.54mm pitch 300mil DIP  
(6.3mm × 29.2mm × 3.3mm)



Outline 24P2N-B(FP)  
1.27mm pitch 300mil SOP  
(5.3mm × 15.02mm × 1.8mm)

### RECOMMENDED OPERATING CONDITIONS

Supply voltage range.....Vcc = 6 to 15V  
Rated supply voltage.....Vcc = 8V



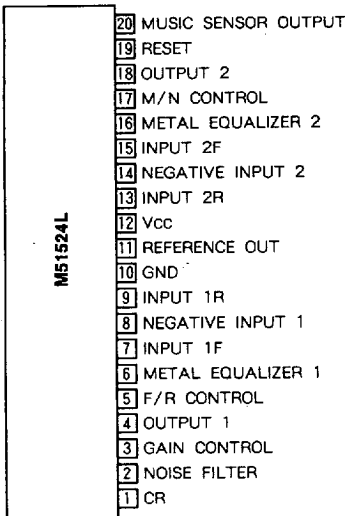
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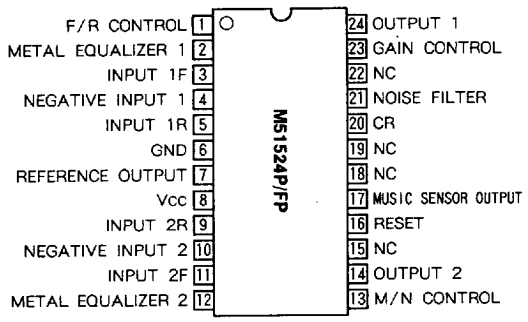
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## AUTO REVERSE PREAMPLIFIER WITH MUSIC SENSOR

### PIN CONFIGURATION (TOP VIEW)



Outline 20P5A(L)



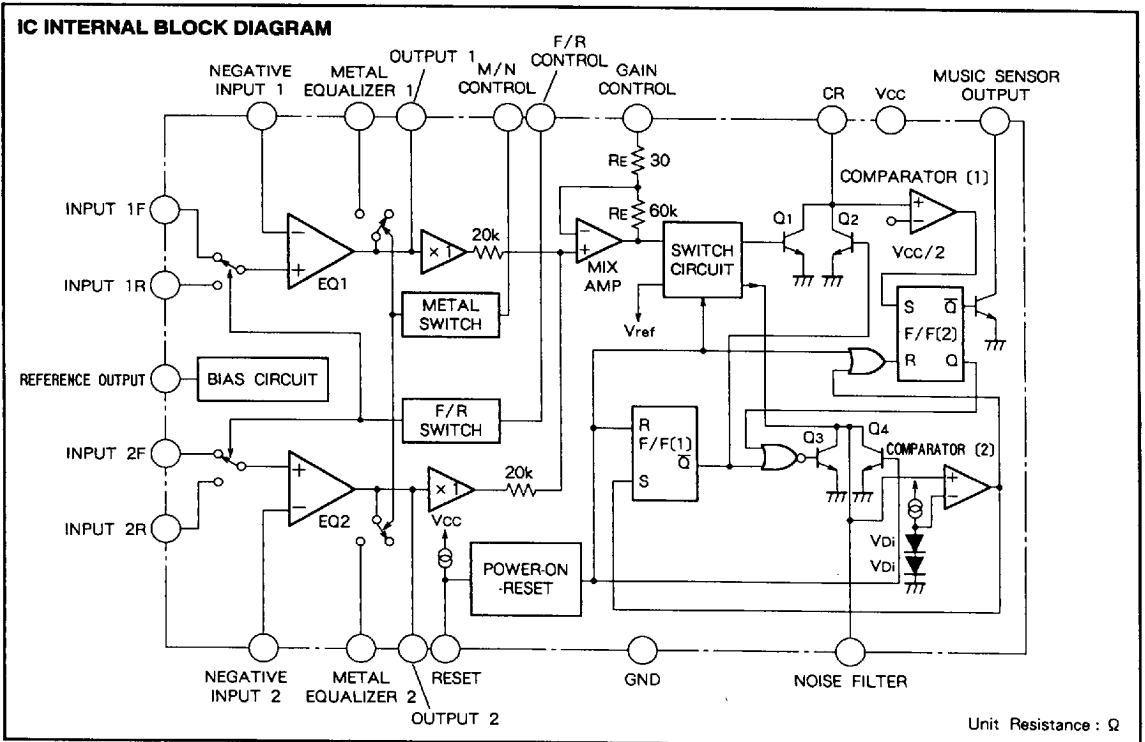
Outline 24P4D(P)  
24P2N-B(FP)

NC : NO CONNECTION

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## AUTO REVERSE PREAMPLIFIER WITH MUSIC SENSOR

## ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		16	V
Icc	Circuit current		40	mA
Pd	Power dissipation	(M51524L)	800	mW
		(M51524P)	1000	
		(M51524FP)	500	
K $\theta$	Thermal derating	(M51524L)	8	mW/°C
		(M51524P)	10	
		(M51524FP)	5	
Topr	Operating temperature		- 20 to + 75	°C
Tstg	Storage temperature		- 40 to + 125	°C

ELECTRICAL CHARACTERISTICS (f = 1kHz, Rg = 620 $\Omega$ , Vcc = 8V, Normal equalizer, Ta = 25 °C, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
Icc	Circuit current	Quiescent circuit current	-	9	14	mA
Gvo	Open loop gain	C <sub>E</sub> = 220 $\mu$ F	68	80	-	dB
Gvc	Closed loop gain		38.5	40.5	42.5	dB
THD	Total harmonic distortion	V <sub>o</sub> = 0.5V <sub>rms</sub>	-	0.06	0.2	%
Vomax	Maximum output voltage	THD = 1 %	1.5	2.0	-	V <sub>rms</sub>
No	Output noise voltage	BW = 20Hz to 20kHz	-	85	160	$\mu$ V <sub>rms</sub>
Sep	Separation	V <sub>o</sub> = 0dBm, BW = 20Hz to 20kHz	45	63	-	dB
CT	Cross talk	V <sub>o</sub> = 0dBm, BW = 20Hz to 20kHz	60	78	-	dB
Iin1(20)	CR circuit input current		-	- 0.1	- 0.6	$\mu$ A
VoL	Music sensor output voltage Low		-	0.15	0.4	V
Vth1(20)	Comparator (1) threshold voltage		3.5	4.0	4.5	V
I19(16)	Reset charging current		- 3	- 9	- 30	$\mu$ A
V19(16)	Reset completion voltage		1.0	1.4	1.7	V
Vth19(16)	Reset threshold voltage		0.8	1.2	1.7	V
I2(21)	Noise filter charging current		- 30	- 60	- 110	$\mu$ A
Vth2(21)	Comparator (2) threshold voltage		1.1	1.5	1.7	V
Rs(1)	Input impedance pin ⑤ (1)	V <sub>s(1)</sub> = 1V	70	100	150	k $\Omega$
R17(13)	Input impedance pin ⑩ (13)	V17(13) = 1V	70	100	150	k $\Omega$

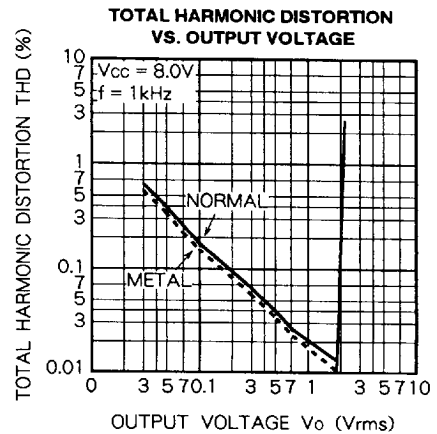
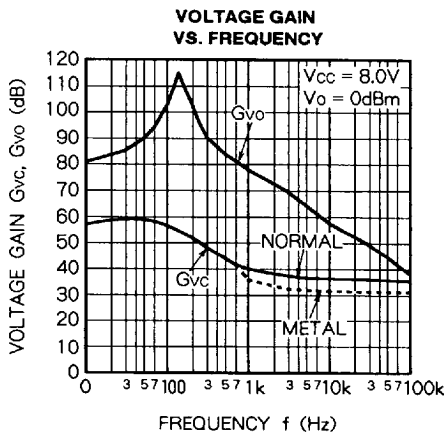
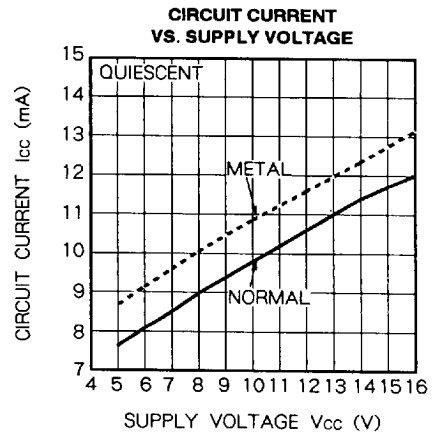
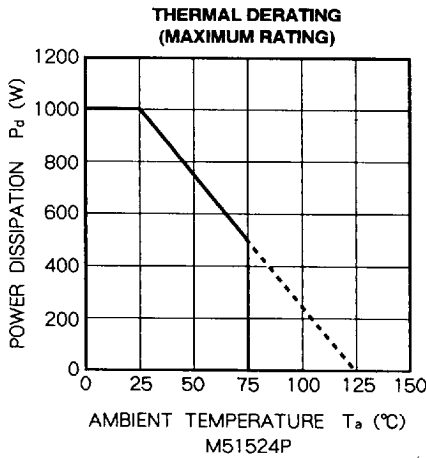
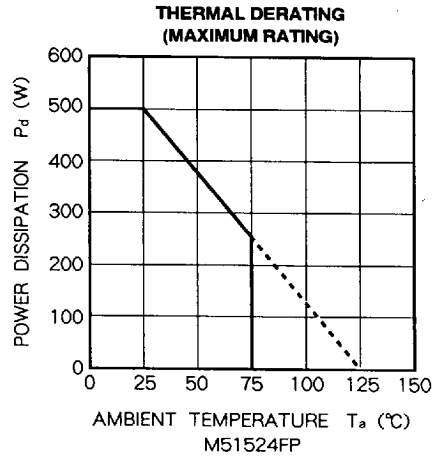
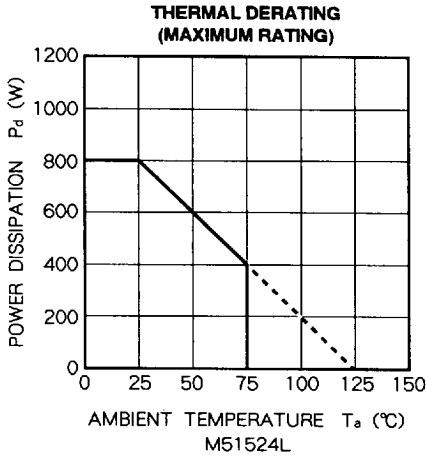
Note1. ( ) M51524P,FP,AFP

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AUTO REVERSE PREAMPLIFIER WITH MUSIC SENSOR

TYPICAL CHARACTERISTICS

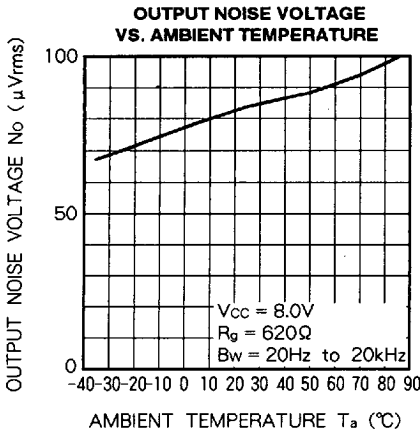
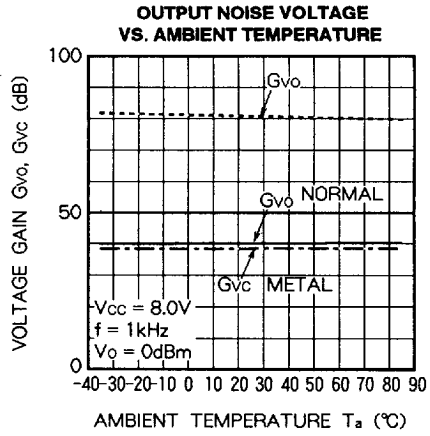
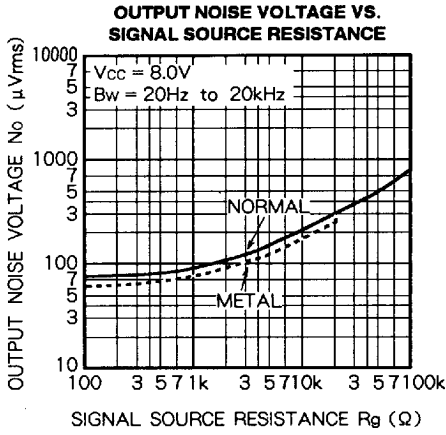


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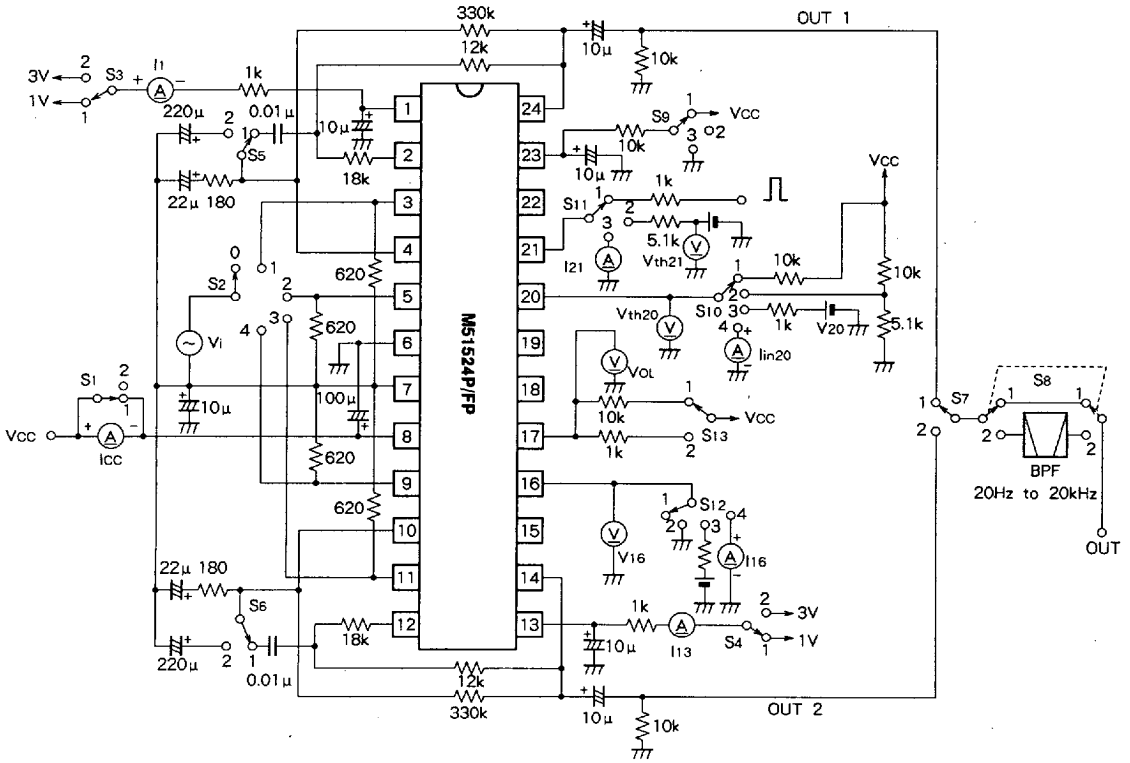




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AUTO REVERSE PREAMPLIFIER WITH MUSIC SENSOR

TEST CIRCUIT (M51524P/FP)



Units Resistance : Ω  
Capacitance : F

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AUTO REVERSE PREAMPLIFIER WITH MUSIC SENSOR

TEST CONDITIONS

Parameter	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	Methods
I <sub>cc</sub>	2	0	1	1	1	1	1	1	2	1	1	1	1	Read value on ammeter
G <sub>vo</sub>	1	1/2 3/4	1/2	1	2/1 1/2	1/1 2/2	1/1 2/2	1	2	1	1	2	1	G <sub>vo</sub> = 20 log (V <sub>o</sub> /V <sub>i</sub> )
G <sub>vc</sub>	1	1/3	1	1	1	1	1/2 2/2	1	2	1	1	2	1	G <sub>vc</sub> = 20 log (V <sub>o</sub> /V <sub>i</sub> )
THD	1	1/3	1	1	1	1	1/2 2/2	1	2	1	1	2	1	Read value on distortion meter at V <sub>o</sub> = 0.5V <sub>rms</sub>
V <sub>omax</sub>	1	1/3	1	1	1	1	1/2 2/2	1	2	1	1	2	1	Measure output voltage at THD = 1%
N <sub>o</sub>	1	0	1/2	1	1	1	1/2 2/2	2	2	1	1	2	1	BW = 20Hz to 20kHz
Sep	1	1/3	1	1	1	1	1,2 1,2	2	2	1	1	2	1	Measure output voltage when another output voltage is 0dBm. BW = 20Hz to 20kHz, Sep = V <sub>o</sub> (dB)
CT	1	1/2 3/4	1,2 1,2	1	1	1	1/2 2/2	2	2	1	1	2	1	Measure crosstalk between Forward and Reverse V <sub>i</sub> = 0dBm, BW = 20Hz to 20kHz
I <sub>in1</sub> (20)	1	0	1	1	1	1	1	1	2	4	1	1	2	Measure current of pin①(20) after preset pulse enters to pin②(21)
V <sub>oL</sub>	1	0	1	1	1	1	1	1	2	4	1	1	2	Measure voltage of pin②(17) after preset pulse enters to pin②(21)
V <sub>th1</sub> (20)	1	0	1	1	1	1	1	1	2	3	1	1	1	Measure voltage of pin①(20) when V <sub>1</sub> increases from 1V and output of pin②(17) changes to High from Low after preset pulse enters to pin②(21)
I <sub>19</sub> (16)	1	0	1	1	1	1	1	1	2	1	1	4	1	Measure current with pin⑨(16)
V <sub>19</sub> (16)	1	0	1	1	1	1	1	1	2	1	1	1	1	Measure voltage with pin⑨(16)
V <sub>th19</sub> (16)	1	0	1	1	1	1	1	1	2	1	1	3	1	Measure voltage of pin⑨(16) when V <sub>19</sub> decreases from 2V and output of pin②(17) changes to Low from High, after preset pulse enters to pin
I <sub>2</sub> (21)	1	0	1	1	1	1	1	1	3	2	3	*	1	Measure current of pin②(21) after S <sub>12</sub> changes to 1→2→1
V <sub>th2</sub> (21)	1	0	1	1	1	1	1	1	2	2	2	*	1	Measure supply voltage of pin②(21) when V <sub>2</sub> increases from 0.5V and voltage of pin①(20) changes to High (≈2.7V) from Low, after S <sub>12</sub> changes to 1→2→1
R <sub>5</sub> (1)	1	0	1	1	1	1	1	1	2	1	1	1	1	Measure current I <sub>Ⓢ</sub> (1) at pin⑤(1) P <sub>Ⓢ</sub> (1) = 1/I <sub>Ⓢ</sub> (1)(kΩ)
R <sub>17</sub> (13)	1	0	1	1	1	1	1	1	2	1	1	1	1	Measure current I <sub>Ⓣ</sub> (13) at pin⑰(13) P <sub>Ⓣ</sub> (13) = 1/I <sub>Ⓣ</sub> (13)(kΩ)

Note 2. ( ) M51524P, FP

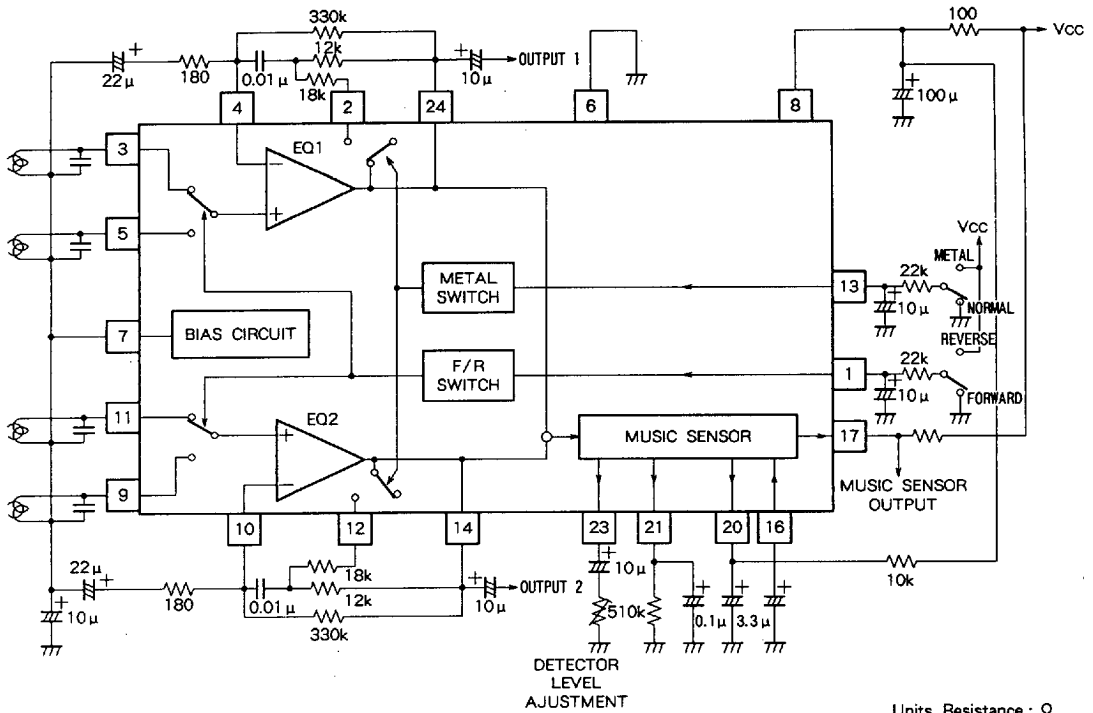
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AUTO REVERSE PREAMPLIFIER WITH MUSIC SENSOR

APPLICATION EXAMPLE (M51524P/FP)



Units Resistance : Ω  
Capacitance : F

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