

M5243P,FP

3-ELEMENT (SIMPLE 4-ELEMENT) DUAL CHANNEL GRAPHIC EQUALIZER IC

DESCRIPTION

The M5243 is a dual channel 3-element graphic equalizer IC best suited to Hi-Fi audio systems. Each channel incorporates 3-elements of transistor-based resonance circuits and an output OP amp.

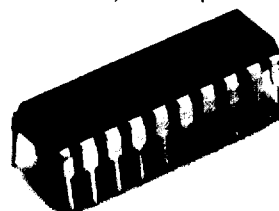
Applications cover radio cassette tape recorders, car stereo sets, and portable stereo systems.

FEATURES

- It is possible to stereo (dual-channel) with single IC
- Large capacitor take off by reference voltage circuit self-contained
- Variable Gv by external resistance
- Low noise..... $V_{No\ FLAT} = 4\mu V_{rms}(typ)$
- Low distortion ratio..... $THD = 0.004\%(typ)$

Type(marking)	Recommended supply voltage	Type(marking)	Recommended supply voltage
M5243P06	4.0~6.0V	M5243FP06	4.0~6.0V
M5243P75	5.0~7.5V	M5243FP75	5.0~7.5V
M5243P09	6.0~9.0V	M5243FP09	6.0~9.0V
M5243P12	8.0~12.0V	M5243FP12	8.0~12.0V

($\odot$) f = 1kHz, Flat)



Outline 20P4(P)

2.54mm pitch 300mil DIP
(6.3mm × 24.0mm × 3.3mm)



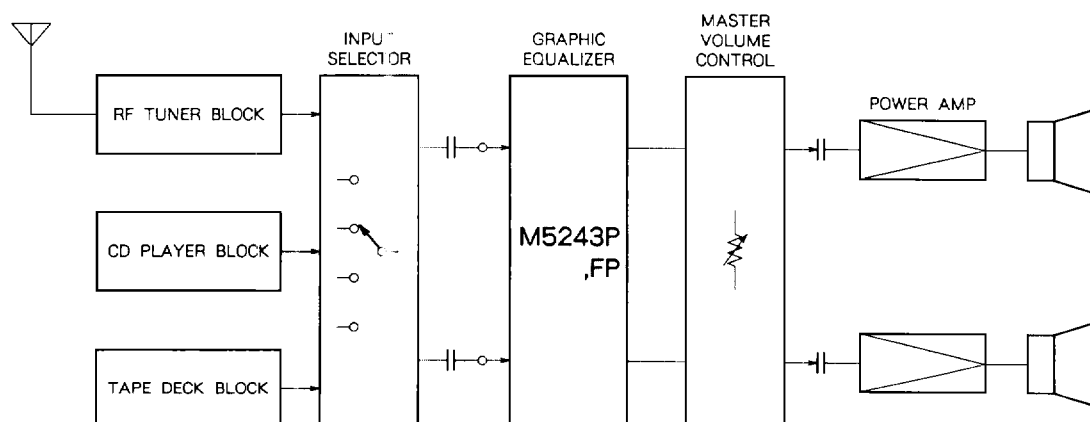
Outline 20P2N-A(FP)

1.27mm pitch 300mil SOP
(5.3mm × 12.6mm × 1.8mm)

RECOMMENDED OPERATING CONDITIONS

Rated dissipation voltage..... 1000mW(P)
550mW(FP)

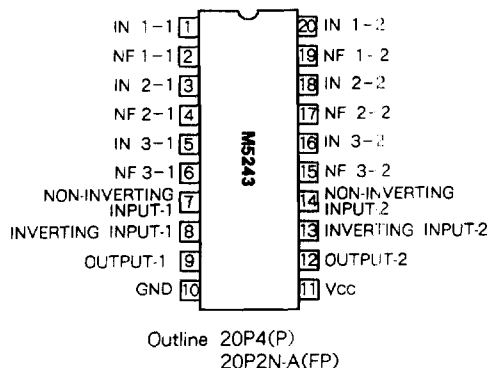
SYSTEM CONFIGURATION



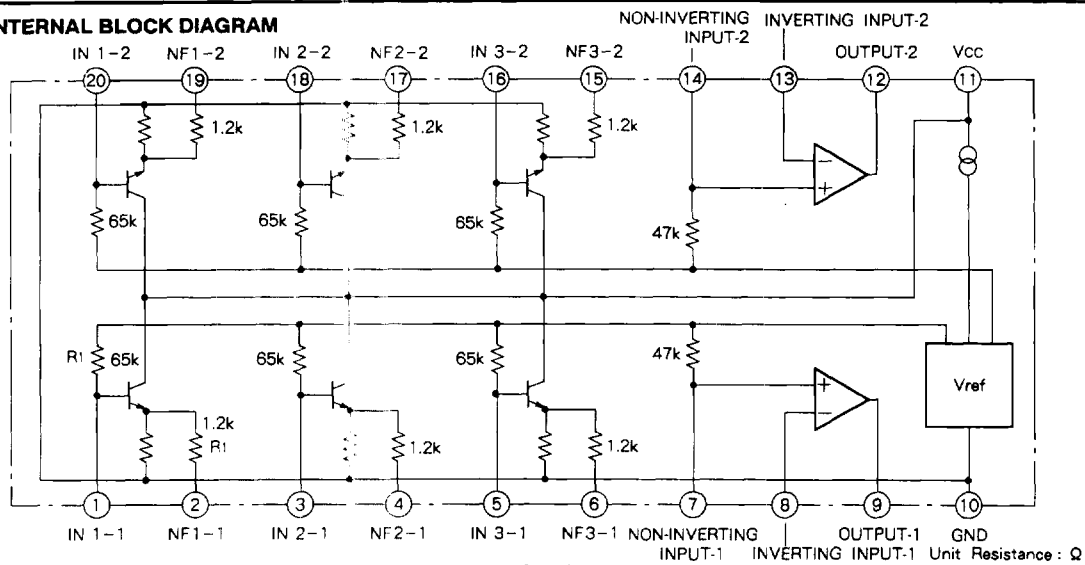
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PIN CONFIGURATION



IC INTERNAL BLOCK DIAGRAM



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

Symbol	Parameter	Ratings	Unit
V _{CC}	Supply voltage	20	V
I _{LP}	Load current	30	mA
P _d	Power dissipation	FP : 550/P : 1	mW/W
T _{opr}	Operating temperature	- 20 ~ + 75	°C
T _{stg}	Storage temperature	- 55 ~ + 125	°C

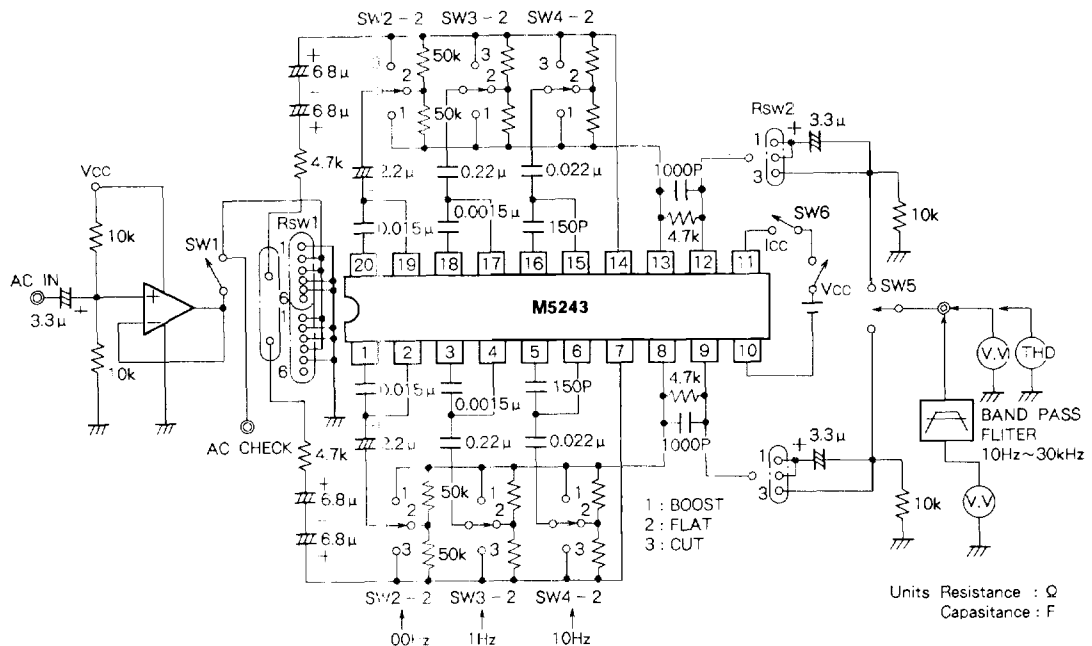
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Symbol	Parameter		Test conditions	f(Hz)	Limits			Unit
					Min	Typ	Max	
I _{CC}	Circuit current			—	5.0	7.5	12.0	mA
G _v (FLAT)	Voltage gain	Flat	V _i = -10dBm, R _g = 4.7k Ω	1k	-2.0	-0.5	1.0	dB
				100	8.0	10.0	12.0	
G _v (BOOST)		Boos		1k	8.0	10.0	12.0	
				10k	8.8	10.0	12.0	
				100	-13.0	-11.0	-9.0	
G _v (CUT)		Cut		1k	-13.0	-11.0	-9.0	
				10k	-13.0	-11.0	-9.0	
THD	Total harmonic distortion		V _i = 1Vrms, All flat	1k	—	0.004	0.1	%
V _{OM}	Maximum output voltage	M5243X06	THD = 0.1%, All flat	1k	0.5	1.0	—	Vrms
		M5243X75			1.0	1.5	—	
		M5243X09			1.5	1.9	—	
		M5243X12			2.0	2.9	—	
CS	Channel separation		V _i = -10dBm, All flat	1k	60	75	—	dB
RR	Ripple rejection		V _i = -10dBm, All flat	120	55	65	—	dB
V _{NO}	Output noise voltage		All flat BW : 10Hz~30kHz	—	—	4	15	μVrms
V _M	Middle point voltage	M5243X06		—	2.1	3.0	3.9	V
		M5243X75			2.7	3.75	4.8	
		M5243X09			3.5	4.5	5.5	
		M5243X12			5.0	6.0	7.0	

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STANDARD TEST CIRCUIT



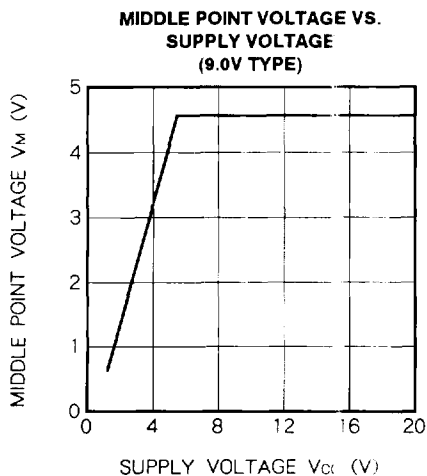
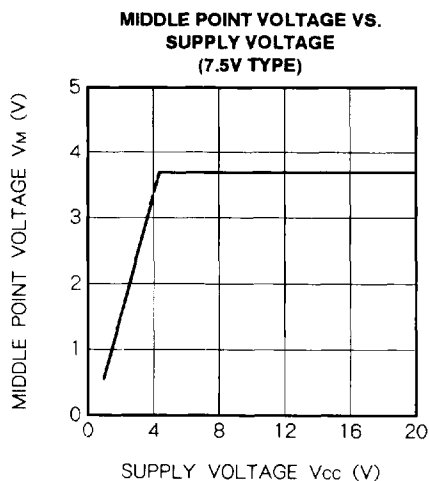
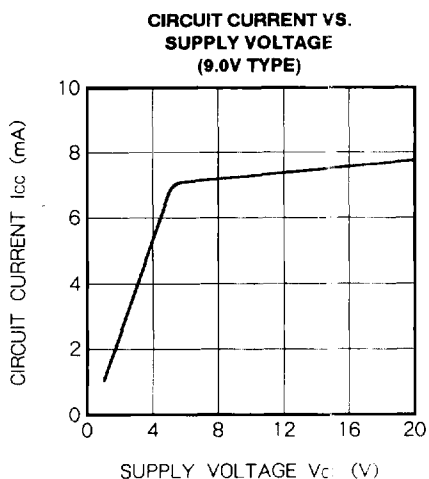
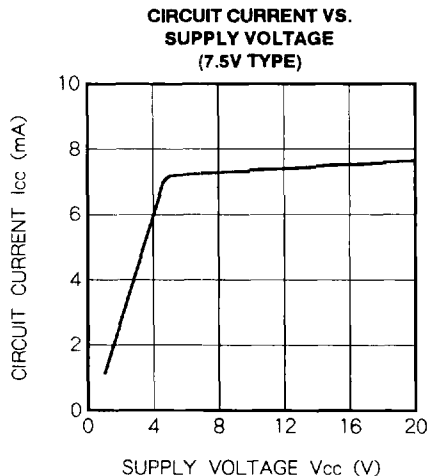
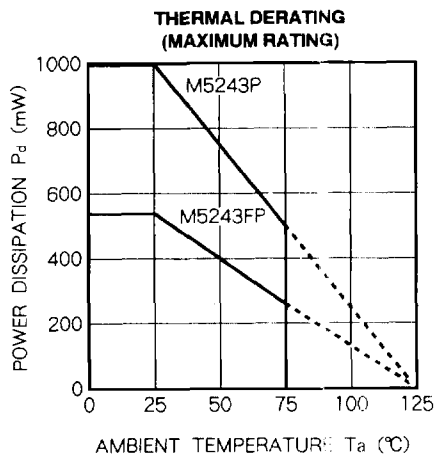
SWITCH MATRIX

Parameter			Vcc	Rsw1	Rsw2	SW1	SW2-1	SW3-1	SW4-1	SW2-2	SW3-2	SW4-2	SW5	SW6	Remarks	
Circuit current			Icc	ON	--	ch1	2	--	--	--	--	--	--	OFF		
Voltage gain	Gv(FLAT)	ch1	ON	ch1	ch1	ON	2	2	2	--	--	--	ch1	ON		
		ch2	ON	ch2	ch2	ON	--	--	--	2	2	2	ch2	ON		
	Gv(BOOST)	ch1	100Hz	ON	ch1	ch1	ON	1	2	2	--	--	--	ch1	ON	
			1kHz	ON	ch1	ch1	ON	2	1	2	--	--	--	ch1	ON	
			10kHz	ON	ch1	ch1	ON	2	2	1	--	--	--	ch1	ON	
		ch2	100Hz	ON	ch2	ch2	ON	--	--	--	1	2	2	ch2	ON	
			1kHz	ON	ch2	ch2	ON	--	--	--	2	1	2	ch2	ON	
			10kHz	ON	ch2	ch2	ON	--	--	--	2	2	1	ch2	ON	
	Gv(CUT)	ch1	100Hz	ON	ch1	ch1	ON	3	2	2	--	--	--	ch1	ON	
			1kHz	ON	ch1	ch1	ON	2	3	2	--	--	--	ch1	ON	
			10kHz	ON	ch1	ch1	ON	2	2	3	--	--	--	ch1	ON	
		ch2	100Hz	ON	ch2	ch2	ON	--	--	--	3	2	2	ch2	ON	
			1kHz	ON	ch2	ch2	ON	--	--	--	2	3	2	ch2	ON	
			10kHz	ON	ch2	ch2	ON	--	--	--	2	2	3	ch2	ON	
Maximum output voltage VOM		ch1	ON	ch1	ch1	ON	2	2	2	--	--	--	ch1	ON		
		ch2	ON	ch2	ch2	ON	--	--	--	2	2	2	ch2	ON		
Total harmonic distortion THD (FLAT)		ch1	ON	ch1	ch1	ON	2	2	2	--	--	--	ch1	ON	BOOST : SW2~4① CUT : SW 2~4③	
		ch2	ON	ch2	ch2	ON	--	--	--	2	2	2	ch2	ON		
Output noise voltage VNO (FLAT)		ch1	ON	VNO	ch1	OFF	2	2	2	--	--	--	ch1	ON		
		ch2	ON	VNO	ch2	OFF	--	--	--	2	2	2	ch2	ON		
Channel separation CS		ch1	ON	ch1	ch1	ON	2	2	2	--	--	--	ch1	ON		
		ch2	ON	ch2	ch2	ON	--	--	--	2	2	2	ch2	ON		
Ripple rejection RR		ch1	ON	HR	ch1	OFF	2	2	2	--	--	--	ch1	ON		
		ch2	ON	HR	ch2	OFF	--	--	--	2	2	2	ch2	ON		
Middle point voltage VM		ch1	ON	VM	VM	OFF	--	--	--	--	--	--	ch1	ON		
		ch2	ON	VM	VM	OFF	--	--	--	--	--	--	ch2	ON		

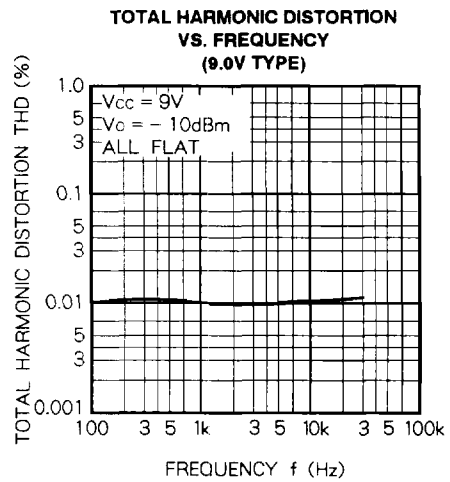
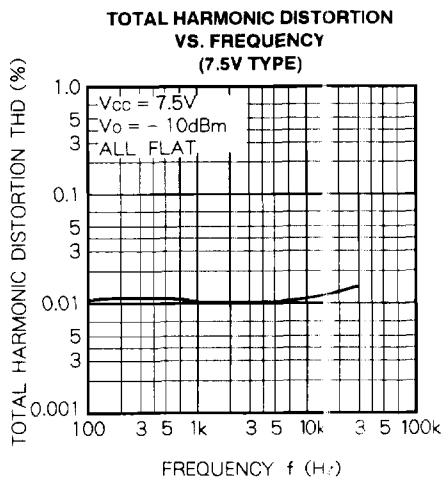
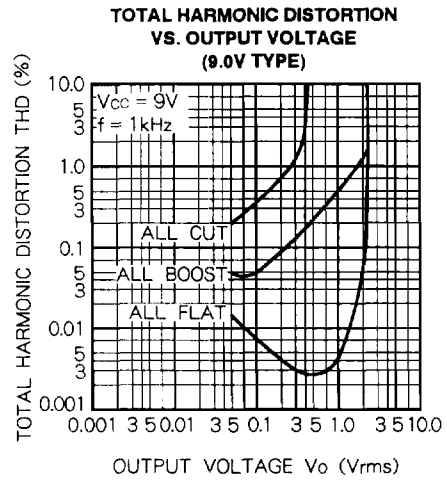
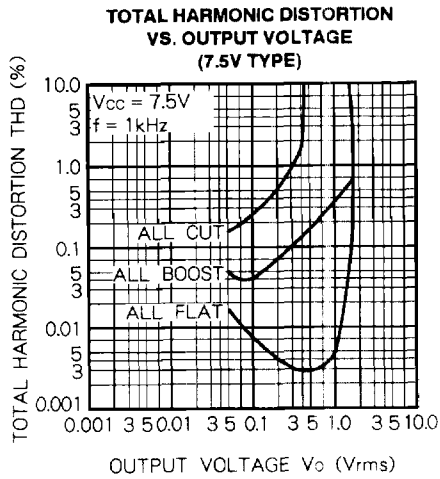
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TYPICAL CHARACTERISTICS



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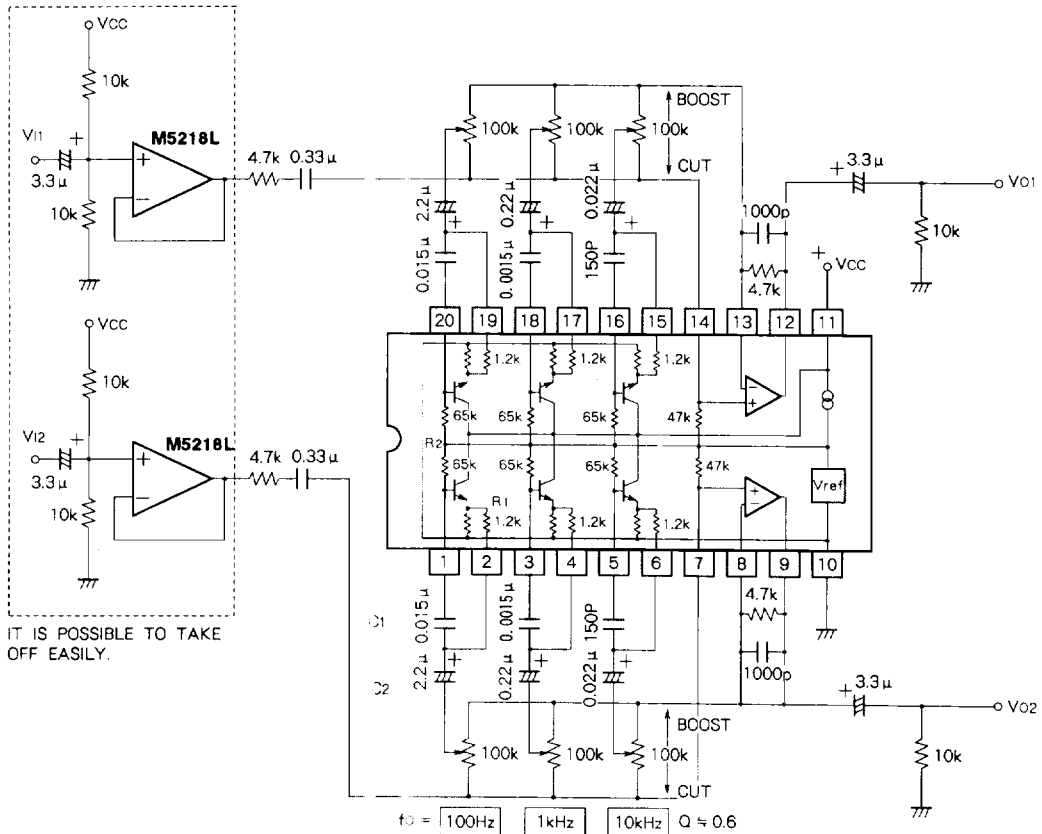


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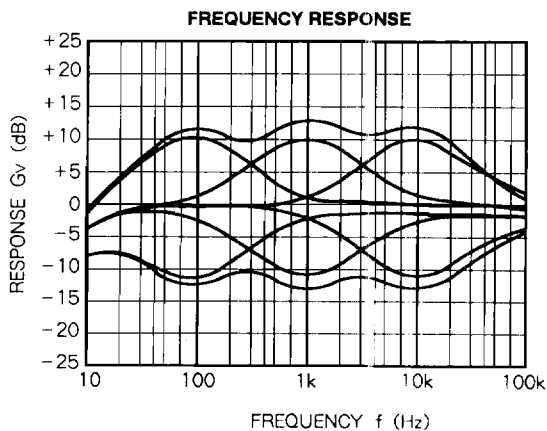
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APPLICATION EXAMPLE - 1

3-Element graphic equalizer (Dual channel)



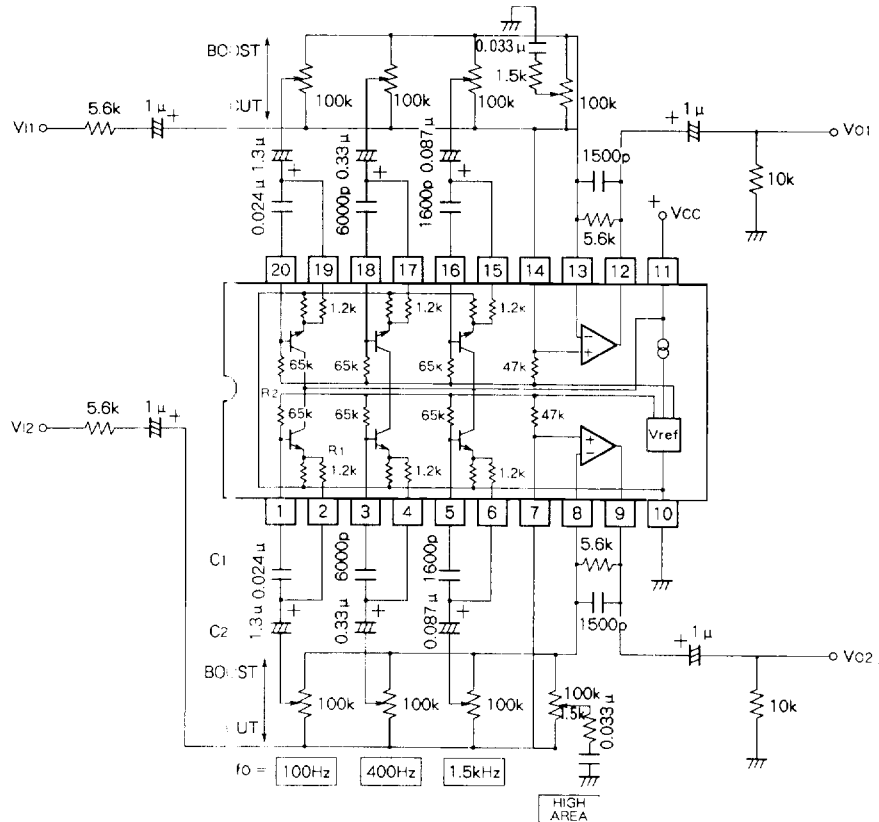
$$\text{RESONANCE FREQUENCY } f_0 = 1/2\pi \sqrt{C_1 \cdot C_2 \cdot R_1 \cdot R_2} \text{ (Hz)} \quad Q = \sqrt{C_1 \cdot R_2 / C_2 \cdot R_1}$$



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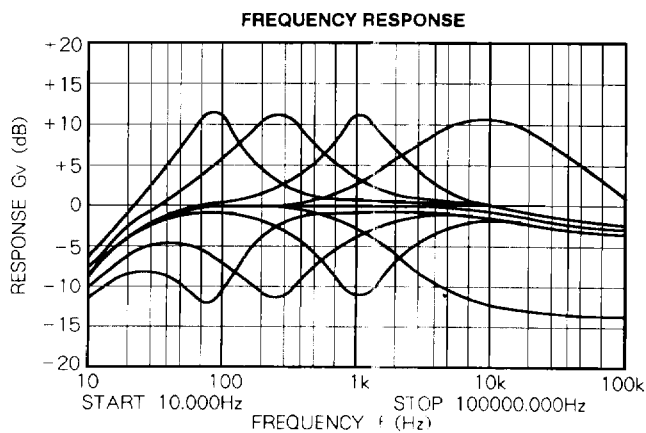
APPLICATION EXAMPLE – 2

Simplicity 4-element graphic equalizer (Dual channel)



$$\text{RESONANCE FREQUENCY } f_0 = 1/2 \pi \sqrt{C_1 \cdot C_2 \cdot R_1 \cdot R_2} \text{ (Hz)}$$

$$Q = \sqrt{C_1 \cdot R_2 / C_2 \cdot R_1} \approx 1.0$$

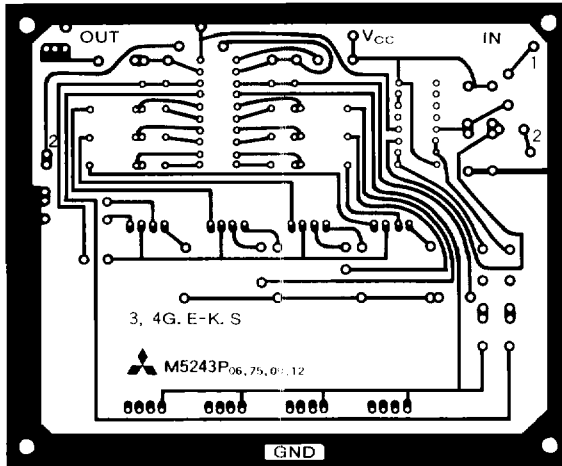


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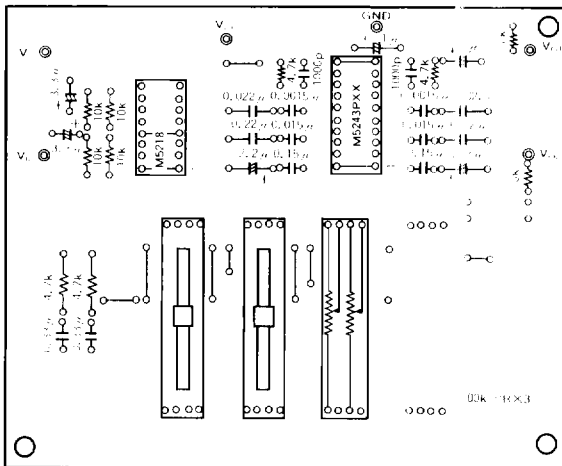
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PCB FOR CIRCUIT TESTING

COPPER FOIL SIDE



(TYPICAL APPLICATION EXAMPLE)



(SIMPLICITY 4-ELEMENT GRAPHIC EQUALIZER)

