

# M5243AP/FP

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

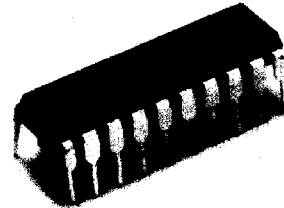
### DESCRIPTION

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

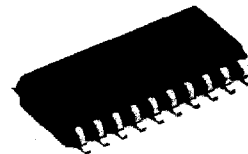
- It is possible to stereo (dual-channel) with single IC
- Large capacitor take off by reference voltage circuit self-contained
- Variable Gv by external resistance
- Low noise..... $V_{No\ FLAT} = 4\ \mu V_{rms}(typ)$
- Low distortion ratio..... $THD = 0.004\ \%(typ)$   
(@ f = 1kHz, Flat)



Outline 20P4 (AP)

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

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

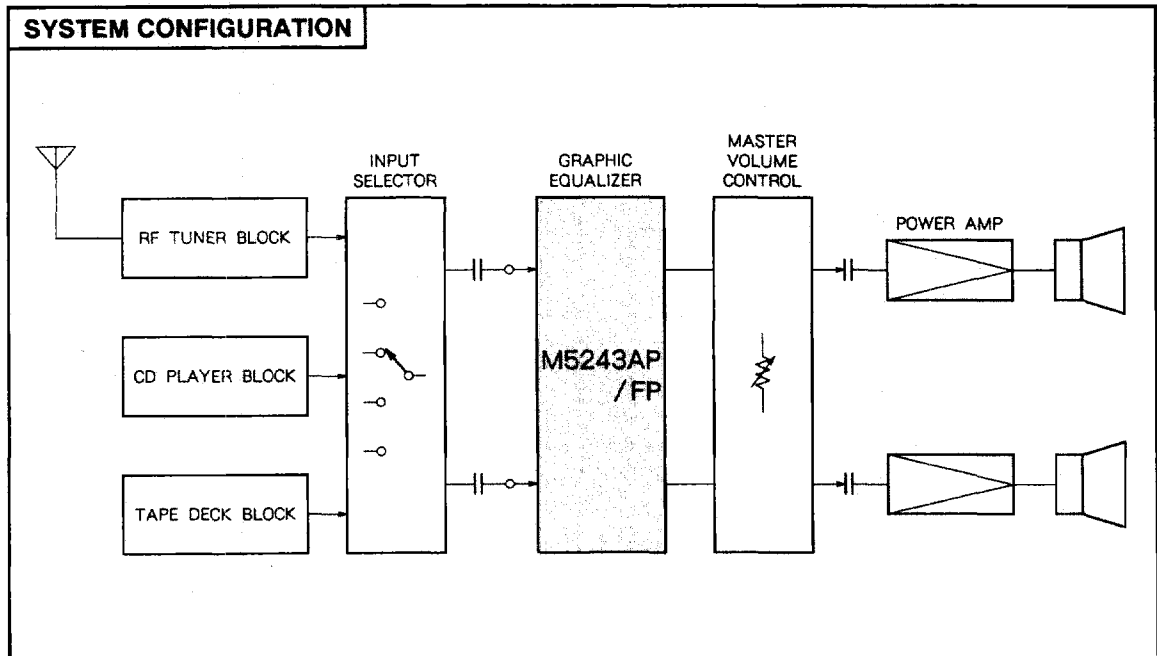


Outline 20P2N-A (AFP)

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

### RECOMMENDED OPERATING CONDITIONS

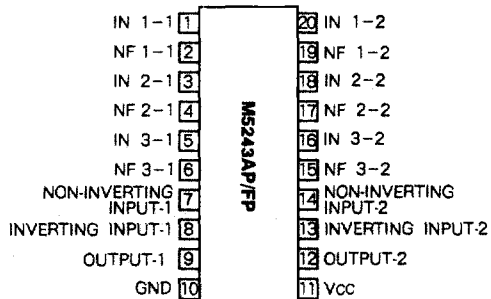
Rated dissipation voltage.....1000mW(AP)  
550mW(AFP)



# M5243AP/FP

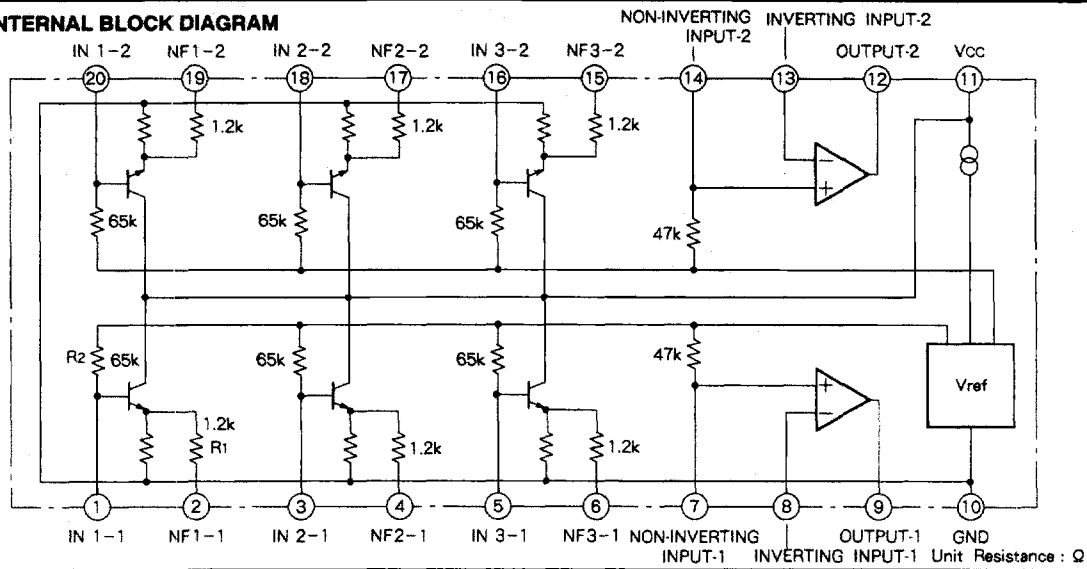
## 3-ELEMENT (SIMPLE 4-ELEMENT) DUAL CHANNEL GRAPHIC EQUALIZER IC

### PIN CONFIGURATION (TOP VIEW)



Outline 20P4(AP)  
20P2N-A(AFP)

### IC INTERNAL BLOCK DIAGRAM



**M5243AP/FP**

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

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

Symbol	Parameter	Ratings	Unit
V <sub>cc</sub>	Supply voltage	20	V
I <sub>LP</sub>	Load current	30	mA
P <sub>d</sub>	Power dissipation	AFP : 550 / AP : 1	mW/W
T <sub>opr</sub>	Operating temperature	- 20 to + 75	°C
T <sub>stg</sub>	Storage temperature	- 55 to + 125	°C

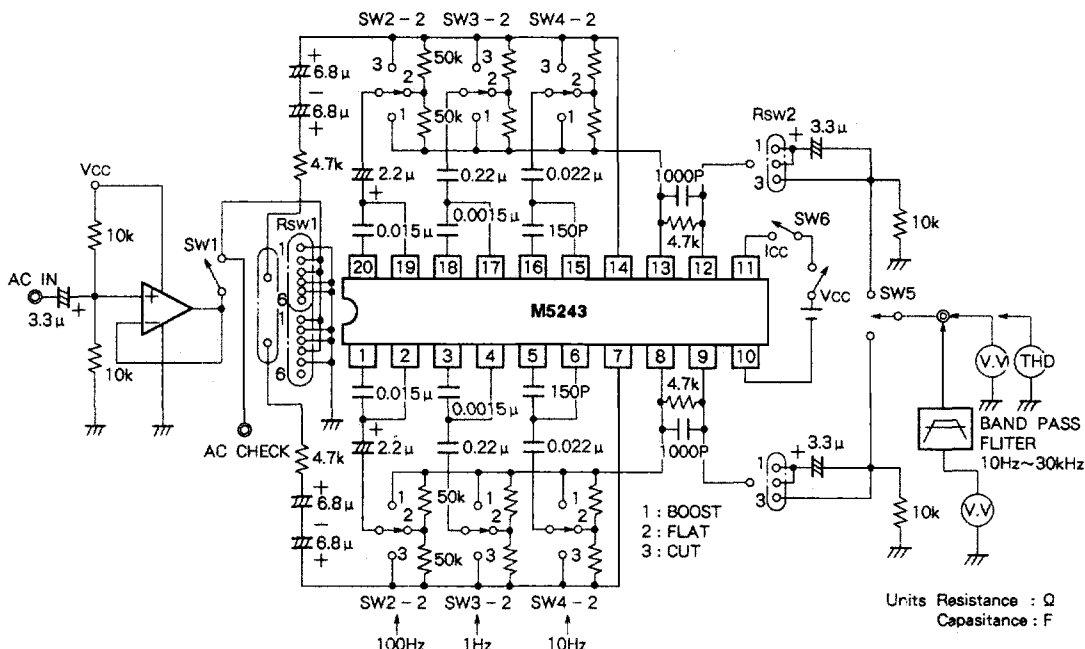
**ELECTRICAL CHARACTERISTICS** (Ta = 25 °C)

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

# M5243AP/FP

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

### STANDARD TEST CIRCUIT



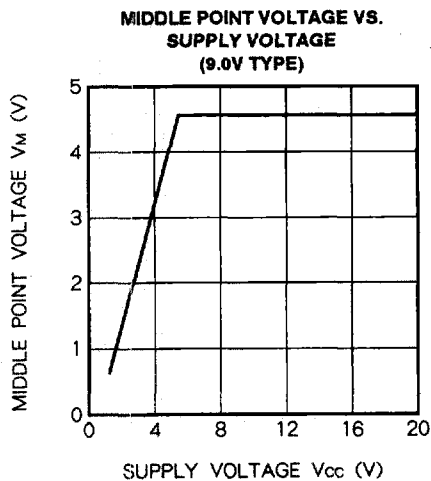
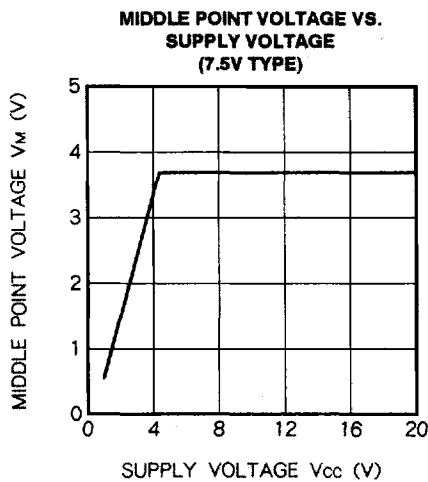
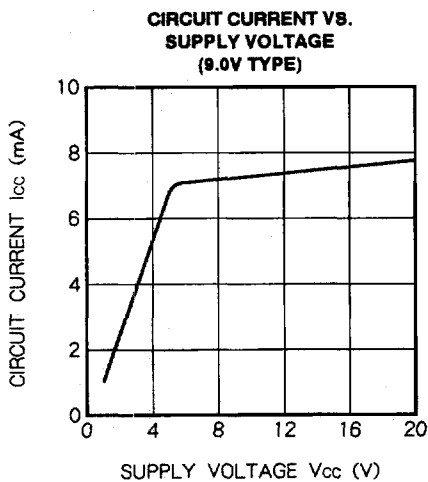
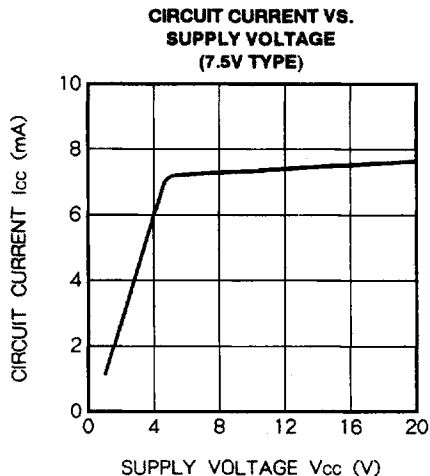
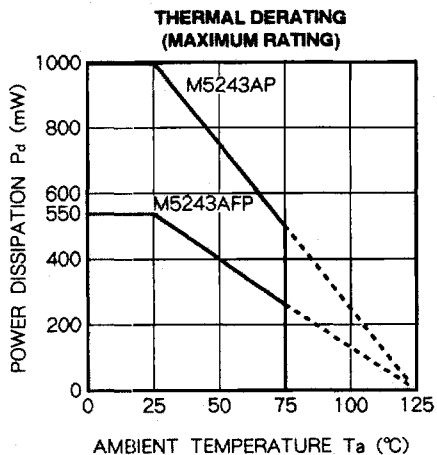
### SWITCH MATRIX

Parameter	Vcc	Rsw1	Rsw2	SW1	SW2-1	SW3-1	SW4-1	SW2-2	SW3-2	SW4-2	SW5	SW6	Remarks		
Circuit current I <sub>CC</sub>	ON	-	ch1 or 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 V <sub>OM</sub>	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		
	ch2	ON	ch2	ch2	ON	-	-	-	2	2	2	ch2	ON		
Output noise voltage V <sub>NO</sub> (FLAT)	ch1	ON	V <sub>NO</sub>	ch1	OFF	2	2	2	-	-	-	ch1	ON		
	ch2	ON	V <sub>NO</sub>	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 V <sub>M</sub>	ch1	ON	V <sub>M</sub>	V <sub>M</sub>	OFF	-	-	-	-	-	-	ch1	ON		
	ch2	ON	V <sub>M</sub>	V <sub>M</sub>	OFF	-	-	-	-	-	-	ch2	ON		

# M5243AP/FP

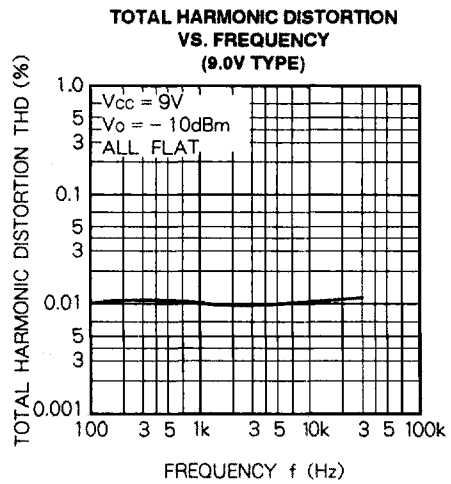
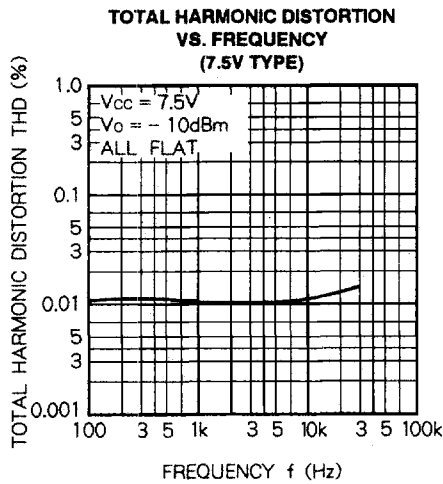
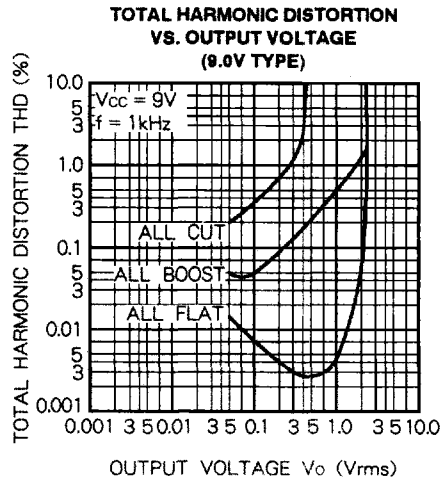
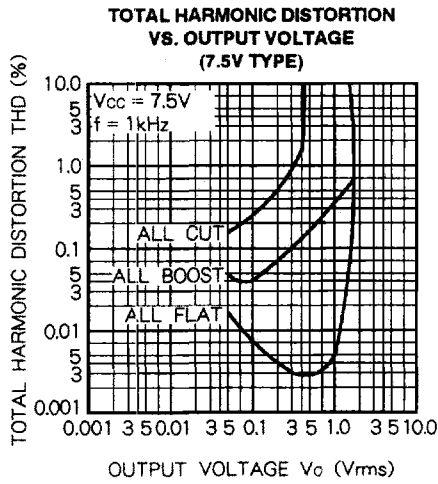
## 3-ELEMENT (SIMPLE 4-ELEMENT) DUAL CHANNEL GRAPHIC EQUALIZER IC

### TYPICAL CHARACTERISTICS



M5243AP/FP

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

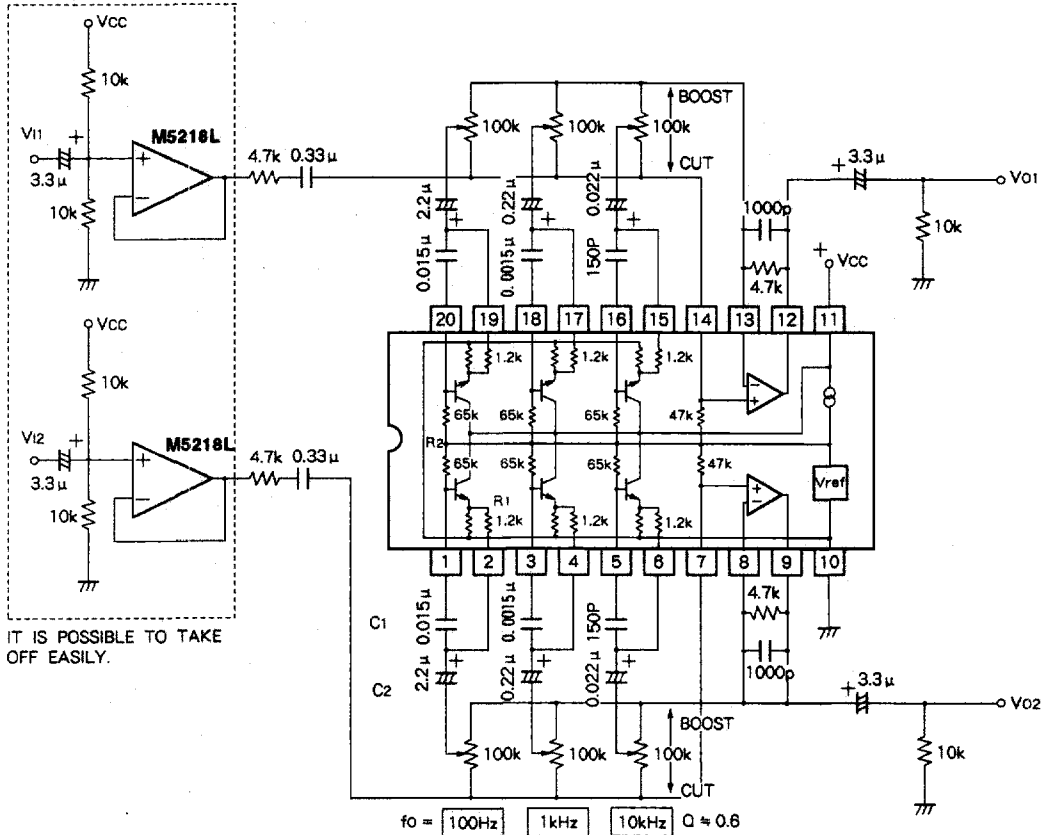


M5243AP/FP

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

APPLICATION EXAMPLE - 1

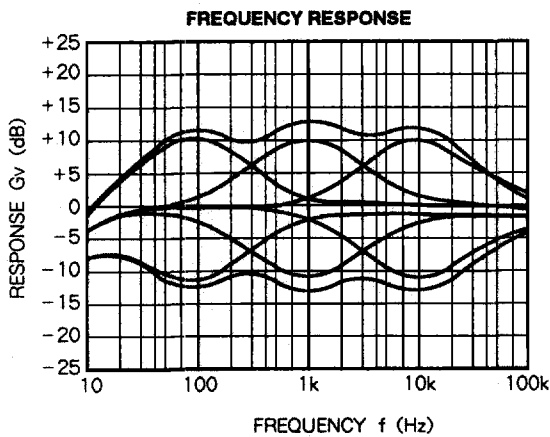
3-Element graphic equalizer (Dual channel)



IT IS POSSIBLE TO TAKE OFF EASILY.

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

Units Resistance : Ω  
Capacitance : F

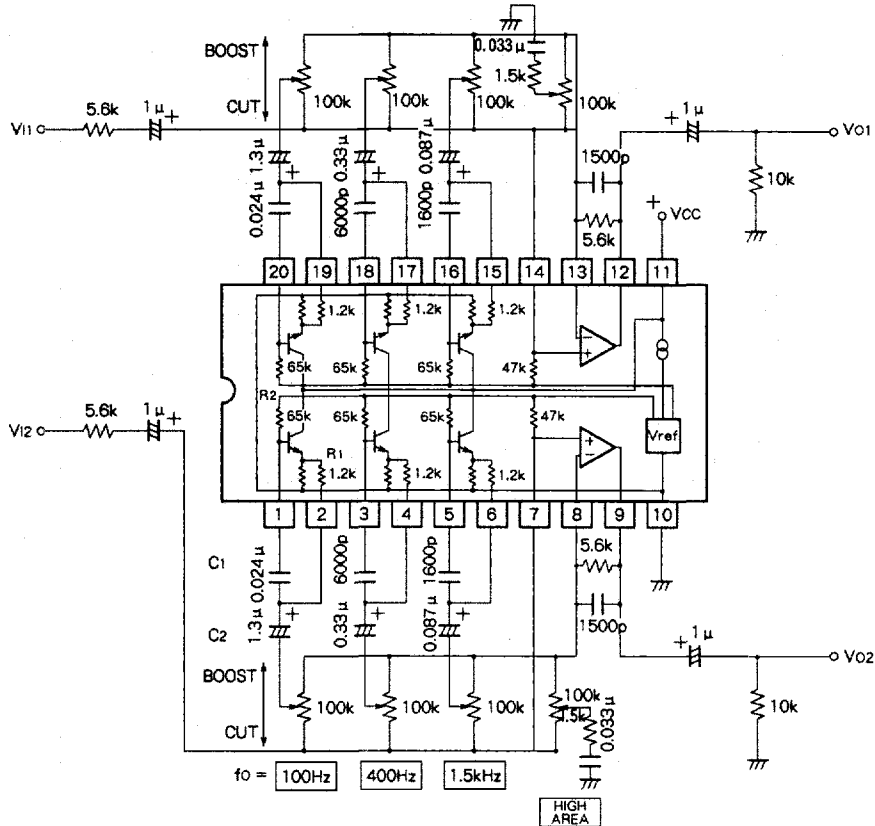


M5243AP/FP

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

APPLICATION EXAMPLE - 2

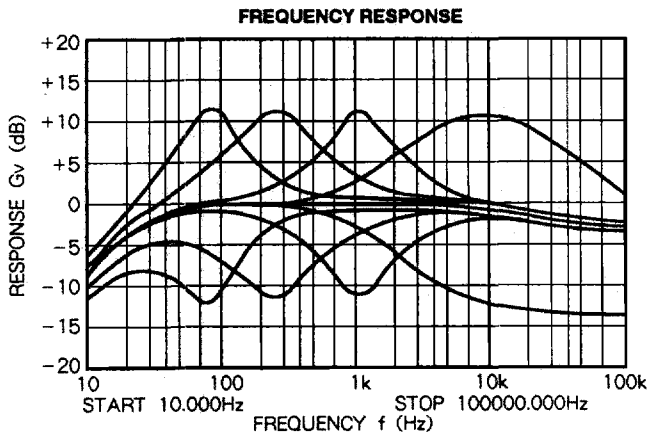
Simplicity 4-element graphic equalizer (Dual channel)



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

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

Units Resistance :  $\Omega$   
Capacitance : F



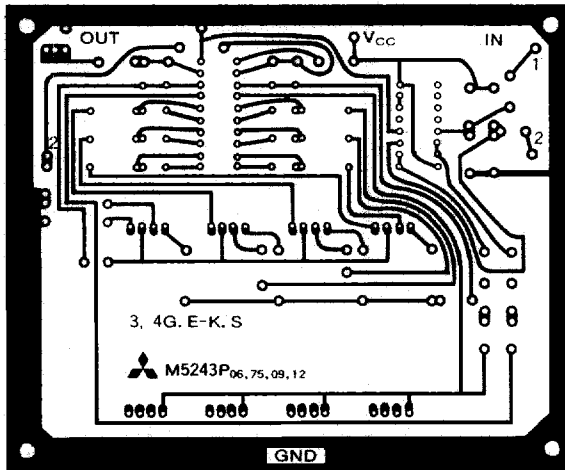


# M5243AP/FP

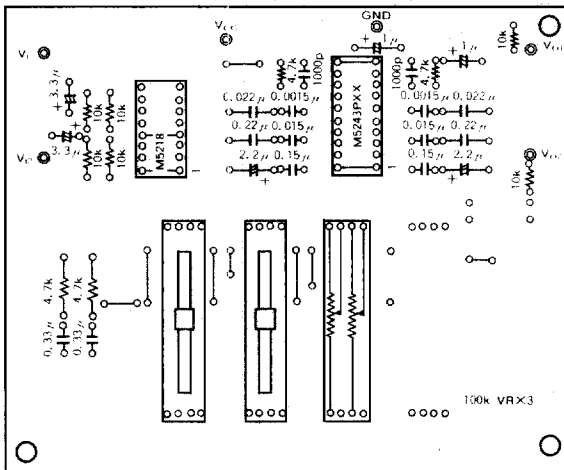
## 3-ELEMENT (SIMPLE 4-ELEMENT) DUAL CHANNEL GRAPHIC EQUALIZER IC

PCB FOR CIRCUIT TESTING

COPPER FOIL SIDE



(TYPICAL APPLICATION EXAMPLE)



(SIMPLICITY 4-ELEMENT GRAPHIC EQUALIZER)

