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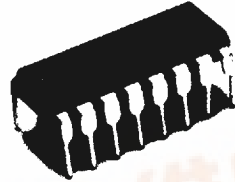
# M5226P/FP 5-ELEMENT GRAPHIC EQUALIZER IC

## DESCRIPTION

The M5226 is a 5-element graphic equalizer IC best suited to audio systems. It has a built-in 5-element resonance circuits with transistor system and an output OP amp. The IC can be used in hybrid ICs and compact sets of high-density assemblies. Its applications include radio cassette tape players, car audio systems, and music centers.

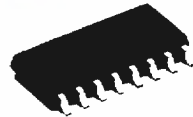
## FEATURES

- The number of part can be reduced drastically for compact size.
- Graphic equalizer can be easily composed
- Low distortion.....THD = 0.02% (typ)  
@ Flat input short
- Low noise..... $V_{NO} = 5 \mu V_{rms}$  (typ)  
@  $f = 1kHz$ , Flat
- Large allowable input voltage..... $V_i = 2.3V_{rms}$  (typ)  
@  $V_{CC} = 9V$ ,  $f = 1kHz$ , Flat



Outline 16P4(P)

2.54mm pitch 300mil DIP  
(6.3mm × 19.0mm × 3.3mm)



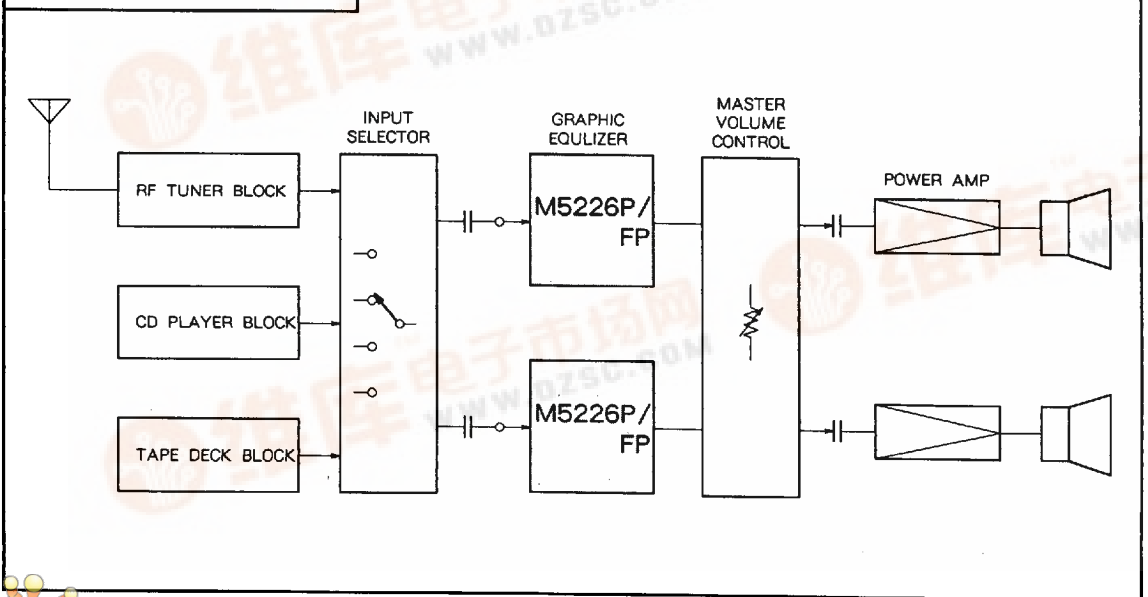
Outline 16P2S-A(FP)

1.27mm pitch 225mil SOP  
(4.4mm × 10.0mm × 1.5mm)

## RECOMMENDED OPERATING CONDITIONS

- Supply voltage range..... $V_{CC} = 4$  to  $20V$
- Rated supply voltage..... $V_{CC} = 20V$
- Rated power dissipation..... $700mW$  (P)  
 $550mW$ (FP)

## SYSTEM CONFIGURATION

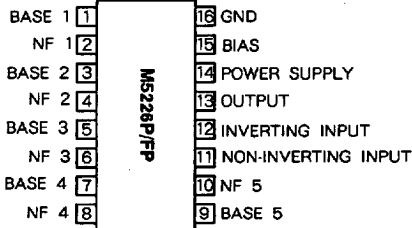


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M5226P/FP

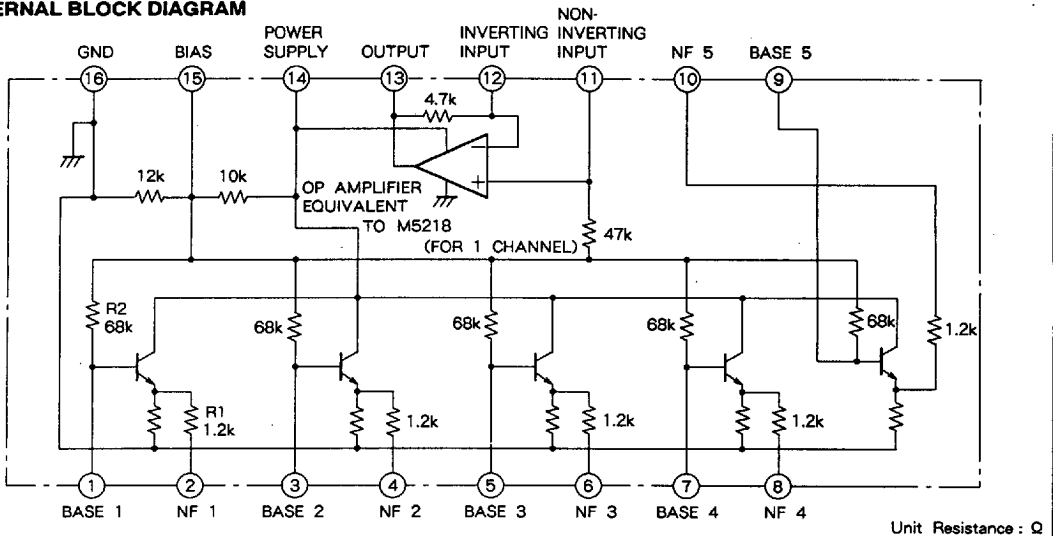
5-ELEMENT GRAPHIC EQUALIZER IC

PIN CONFIGURATION (TOP VIEW)



Outline 16P4(P)  
16P2S-A(FP)

IC INTERNAL BLOCK DIAGRAM



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5-ELEMENT GRAPHIC EQUALIZER IC

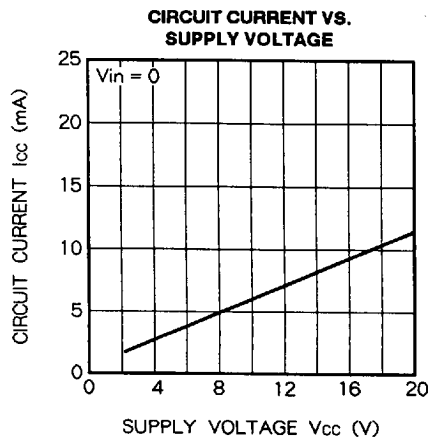
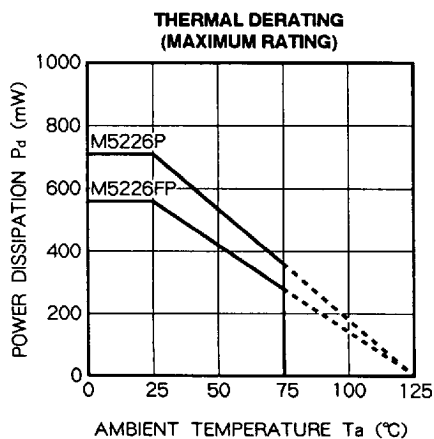
**ABSOLUTE MAXIMUM RATINGS** (Ta = 25 °C, unless otherwise noted)

Symbol	Parameter	Ratings	Unit
Vcc	Supply voltage	20	V
ILP	Load current	30	mA
Pd	Power dissipation	550(FP)/1000(DIP)	mW
Topr	Operating temperature	- 20 to + 75	°C
Tstg	Storage temperature	- 55 to + 125	°C

**ELECTRICAL CHARACTERISTICS** (Ta = 25 °C, Vcc = 9V)

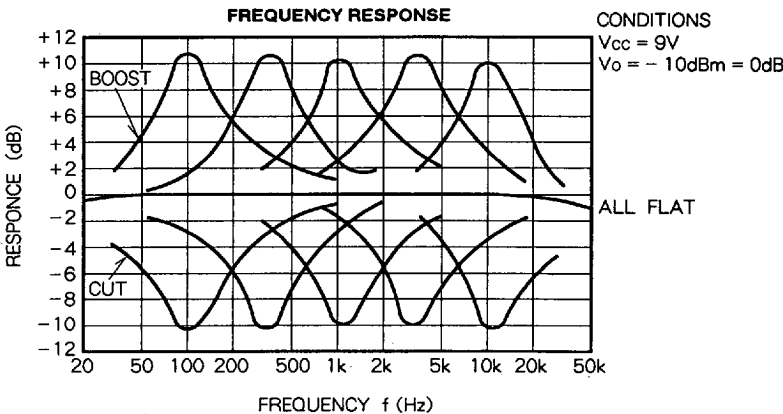
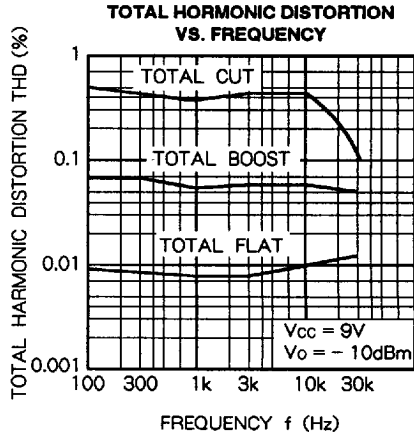
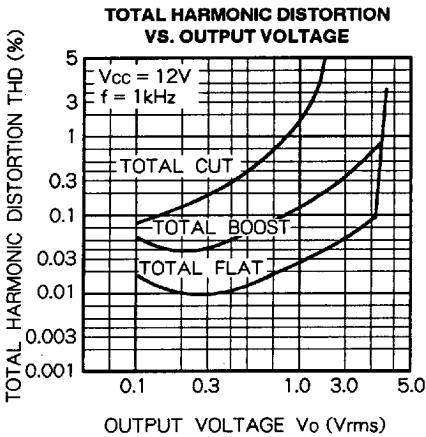
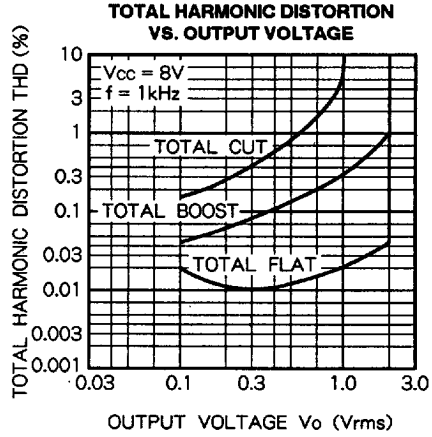
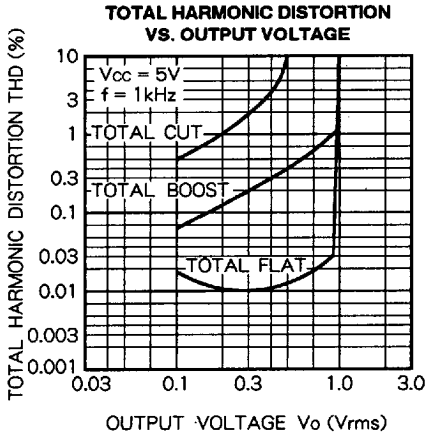
Symbol	Parameter		f (Hz)	Test conditions	Limits			Unit
					Min	Typ	Max	
Icc	Circuit current		-	Vin = 0	3.0	5.2	8.0	mA
Gv(FLAT)	Voltage gain	Flat	1k	Vin = - 10dBm	- 3.8	- 0.8	+ 2.2	dB
Gv(BOOST)		Boost	108	Vin = - 10dBm	7.2	9.7	11.2	dB
			343		7.2	9.7	11.2	
			1.08k		7.2	9.7	11.2	
			3.43k		7.2	9.7	11.2	
			10.8k		7.2	9.7	11.2	
Gv(CUT)		Cut	108	Vin = - 10dBm	- 12.8	- 11.3	- 8.8	dB
			343		- 12.8	- 11.3	- 8.8	
			1.08k		- 12.8	- 11.3	- 8.8	
			3.43k		- 12.8	- 11.3	- 8.8	
	10.8k		- 12.8		- 11.3	- 8.8		
THD	Total harmonic distortion		1k	Vin = 1Vrms	-	0.02	0.1	%
VNo	Output noise voltage		Input short BW: 10Hz to 30kHz (3dB) flat		-	5.0	20	µVrms

**TYPICAL CHARACTERISTICS**



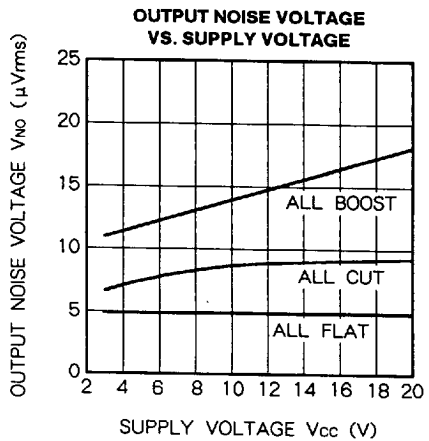
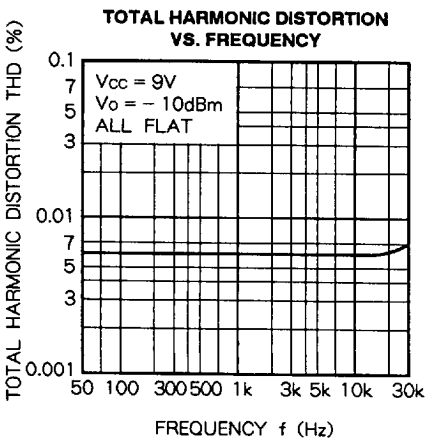
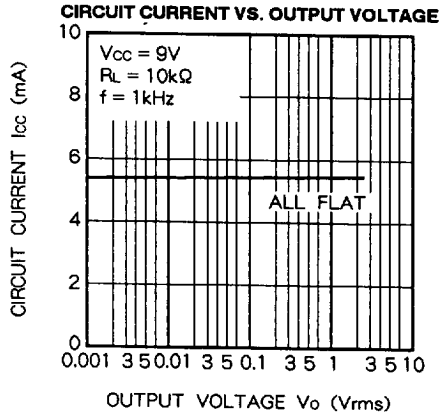
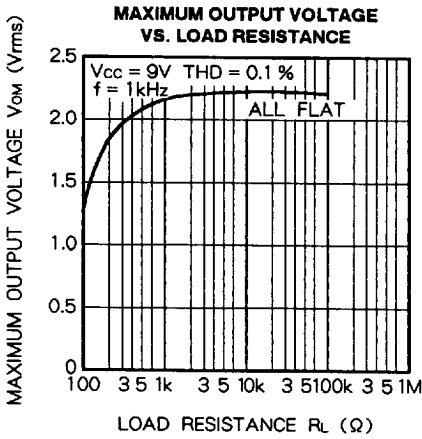
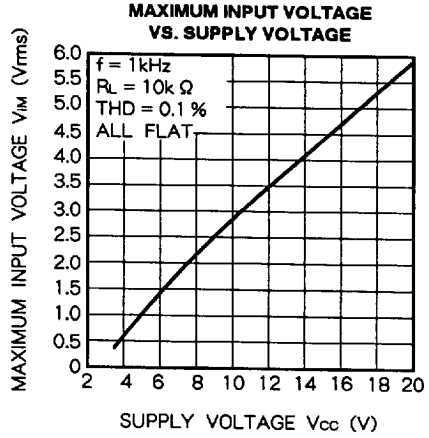
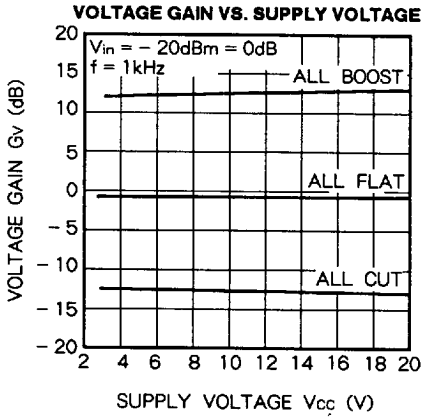
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5-ELEMENT GRAPHIC EQUALIZER IC



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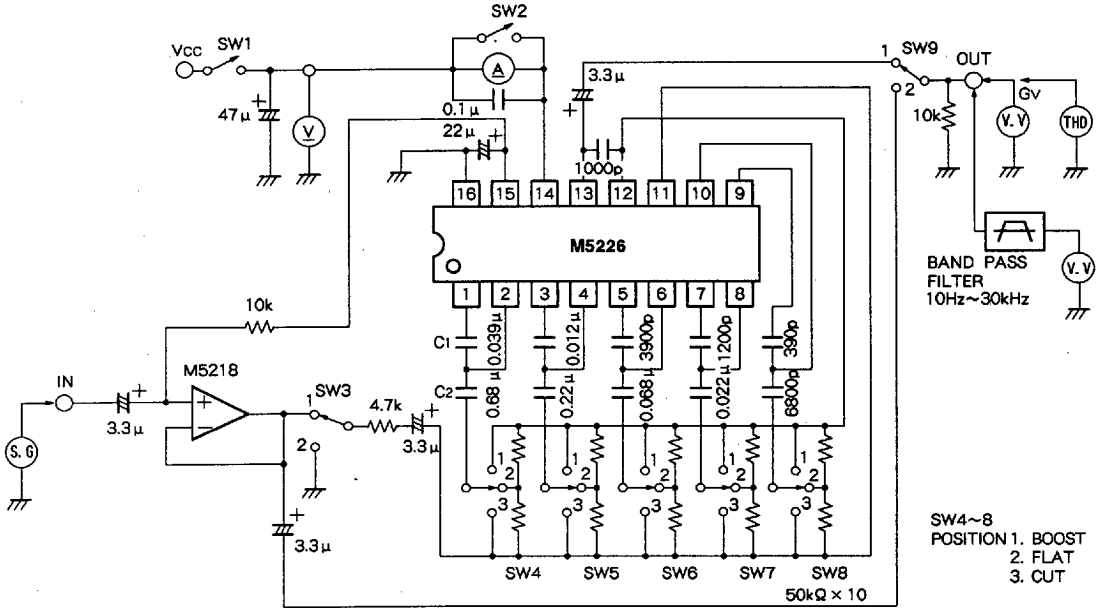
5-ELEMENT GRAPHIC EQUALIZER IC



M5226P/FP

5-ELEMENT GRAPHIC EQUALIZER IC

TEST CIRCUIT (Circuit current  $I_{CC}$ , Voltage gain  $G_v$ , Total harmonic distortion THD, Output noise voltage  $V_{NO}$ )



SW4~8  
POSITION 1. BOOST  
2. FLAT  
3. CUT

Units Resistance : Ω  
Capacitance : F

TEST CIRCUIT SWITCH MATRIX

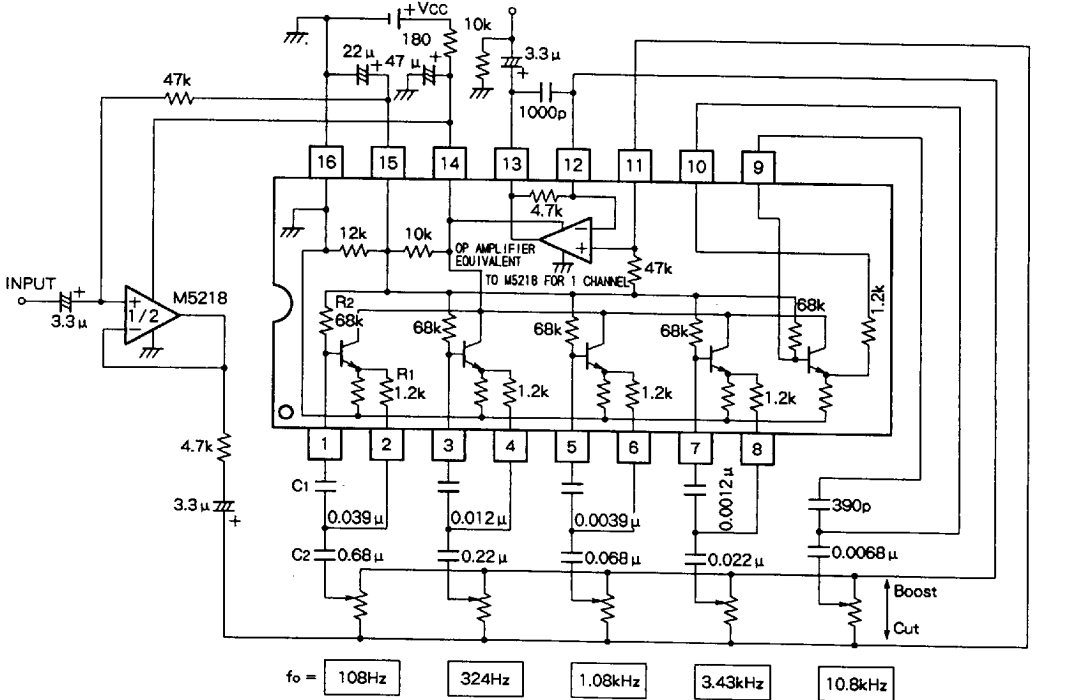
Test item	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9
$I_{CC}$	OFF	1	○	○	○	○	○	1
$G_v$ (FLAT)	ON	1	2	2	2	2	2	1
$G_v$ (BOOST)	f = 108Hz	ON	1	2	2	2	2	1
	f = 343Hz	ON	1	2	1	2	2	1
	f = 1.08kHz	ON	1	2	2	1	2	1
	f = 3.43kHz	ON	1	2	2	2	1	1
	f = 10.8kHz	ON	1	2	2	2	2	1
$G_v$ (CUT)	f = 108Hz	ON	1	3	2	2	2	1
	f = 343Hz	ON	1	2	3	2	2	1
	f = 1.08kHz	ON	1	2	2	3	2	1
	f = 3.43kHz	ON	1	2	2	2	3	1
	f = 10.8kHz	ON	1	2	2	2	2	3
THD	ON	1	2	2	2	2	2	1
$V_{NO}$ (ALLFLAT)	ON	2	2	2	2	2	2	1

Note: The mark "○" applies to both 1 and 2

M5226P/FP

5-ELEMENT GRAPHIC EQUALIZER IC

APPLICATION EXAMPLE

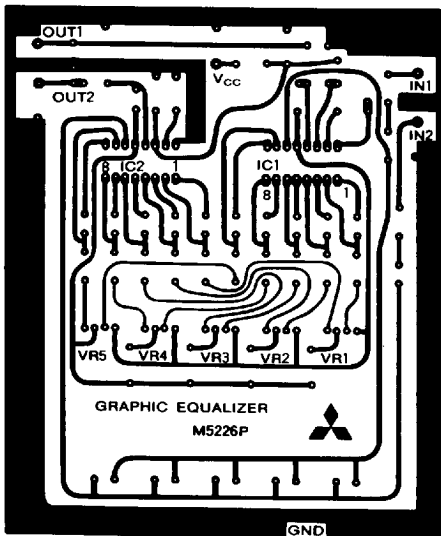


RESONANCE FREQUENCY  $f_o = \frac{1}{2\pi\sqrt{C_1 \cdot C_2 \cdot R_1 \cdot R_2}}$  (Hz)

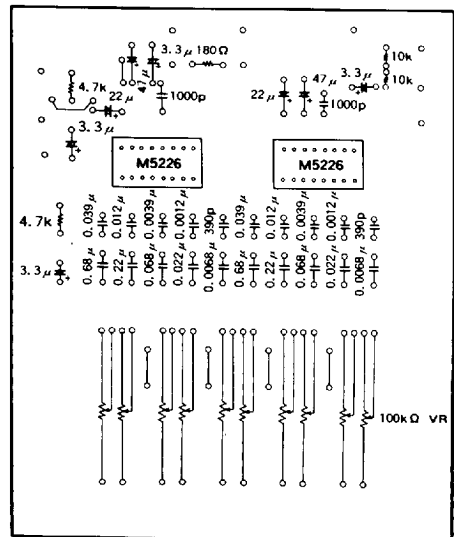
Units Resistance :  $\Omega$   
Capacitance : F

PRINTED CIRCUIT BOARD FOR CIRCUIT TESTING (TYPICAL APPLICATION EXAMPLE)

PC BOARD PARTS-PLACEMENT DIAGRAM (COPPER FOIL SIDE)



PC BOARD PARTS-PLACEMENT-DIAGRAM (PARTS SIDE)



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5-ELEMENT GRAPHIC EQUALIZER IC

APPLICATION EXAMPLE (7-ELEMENT)

