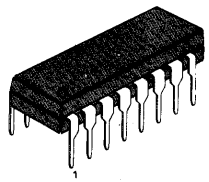
INTRODUCTION

KA22427C is a monolithic integrated circuit designed for the portable AM/FM radio or AM/FM clock radios.

16-DIP-300A



FUNCTIONS

- AM RF & MIX
- AM AGC
- AM/FM DET
- Regulator
- AM Local OSC
- AM/FM IF AMP
- Audio Power AMP
- FM AFC Control

FEATURE

- Portable AM/FM 1-chip radio
- Wide operating supply voltage range: V_{CC} = 3V ~ 12V (Approximately) (Depending on the internal regulator tolerance)
- Recommended operating suply voltage: V_{CC} = 4.5V ~ 9V

ORDERING INFORMATION

Device	Package	Operating Temperature
KA22427C	16-DIP-300A	20°C ~+70°C

V_{CC} / R_L	4.5V	6.0V	7.5V	9.OV	Line Operated
8Ω	O	O	O	X	X
16Ω	O	O	O	O	X
45Ω	O	O	O	O	O

- On using AC line as an internal shunt regulator mode, it is possible to use low cost application without a transformer (approximately 42mA).
- IF AMP gain is determined by DC voltage appeared at IC Pin 16.
- Power output: P_O =0.28W (Min.) at THD =10% (V_{CC} = 5.5V/8Ω).

BLOCK DIAGRAM

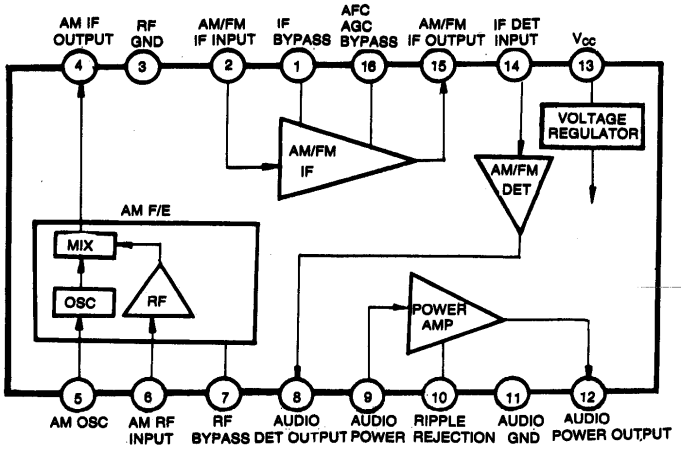


Fig. 1

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Character istic	Symbol	Value	Unit
Supply Voltage	V_{CC}	13	V
Power Dissipation	P_D	600	mW
Supply Current	I_{CC}	44	mA
Thermal Resistance Junction to Ambient	R_{EJA}	100	°C /W
Operating Temperature	T_{OPR}	-20 ~ +70	°C
Storage Temperature	T_{STG}	-55 ~ +150	°C

ELECTRICAL CHARACTERISTICS

(Ta =25°C, V_{CC} = 5.5V, fm = 1KHz, AM: f=1MHz, 30% Mod, FM: f =10.7MHz
Δf = 22.5KHz, Unless otherwise specified)

Characteristic		Symbol	Test Conditions	Min	Typ	Max	Unit
FM	Qulescent Circuit Current	I_{CCQ}	SW: FM, V_{CC} = 3V	7	12	17	mA
			SW: FM, V_{CC} = 9V	10	17	23	
	Pin 16 Terminal Voltage	V_{16}(FM)	SW: FM, V_{cc} = 9V, V_i = 0	2.0	2.4	3.1	V
	-3dB Limiting Sensitivity	$V_{I(LIM)}$	SW: FM, -3dB V_{16} = 2.4V, V_R Min		57		dB
AM	Internal Regulated Vtg.	V_{CC}	SW: AM, I_{CC} = 42mA	12	13.2	14.0	V
	Pin 16 Voltage	V_{16} (AM)	SW: AM, V_{CC} = 9V, V_I = 0	1.4		1.9	V
	Maximum Sensitivity	S_{MAX}	SW: AM, V_{CC} = 12V V_I = 37dBμ , R_L = 8Ω	1.5	3.0		V
	Signal to Noise Ratio	S/N	V_I = 37.5dBμ , R_L = 8Ω P_O = 50mW	15	20		dB
PWR AMP	Output Power	P_O	f = 1KHz, THD = 10% V_R Min, R_L = 8Ω	0.28			W
	Total Harmonic Distortion	THD	I_{CC} = 42mA, R_L = 45Ω f = 1KHz, V_O = 2V V_R Min		0.5	4.0	%
	Voltage gain	G_V	f = 1kHZ, R_L = 8Ω P_O = 50mW		41		dB

TEST CIRCUIT

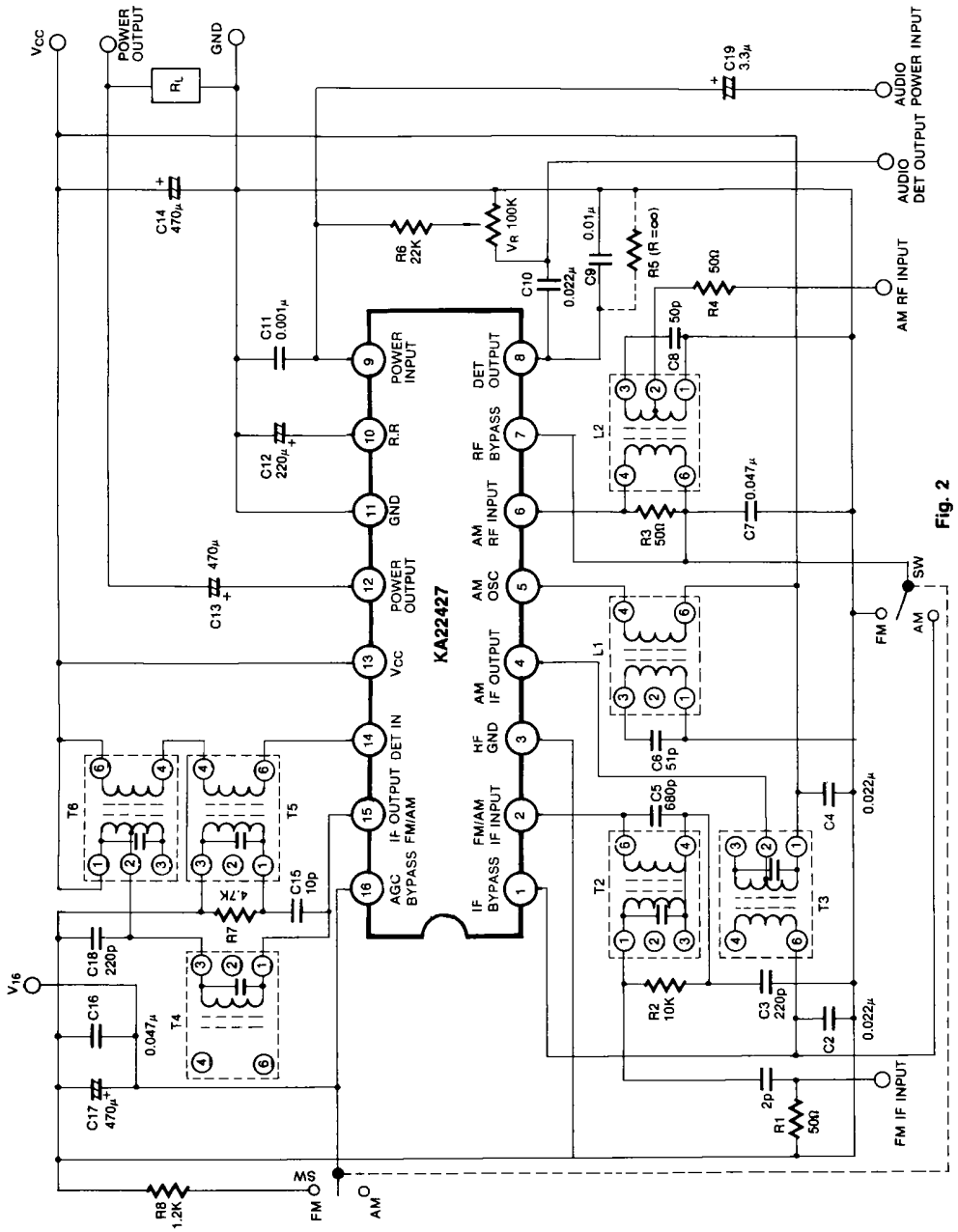


Fig. 2

APPLICATION INFORMATION

- EXTERNAL COMPONENTS

Parts Number	Purpose	Typical	Influence	
			Smaller Than Typ	Greater Than Typ
R5	AM Gain Control	47KΩ (33K ~∞)	Low AM Gain	AGC Distortion Increase, High Gain
R7	FM Detector Damper	4.7KΩ	Low Detector Output, Stable IF Gain, Low FM Gain	Sharp IF AMP Curve
R8	FM Gain Adjust	470	Low FM Gain	High Gain, but Noise Increase
C2	IF Bypass	0.022μF	Should Not Be Less Than 0.005μF	High IF Gain, S/N Ratio Degrade
C4	IF Filter	0.022μF	Removal May Cause IF Oscillation	No Influence
C7	AM Bypass	0.047μF	Low Gain	Using over 1μF Will Cause FM Distortion at Small Signal
C9	Detector Filter	0.01μF	Unstable IF AMP Oscillation	Poor FM Frequency Response
C10	Audio Coupling	0.022μF	Lower Sensitivity, Poor Low Frequency Response	Bass Boost Affects De-emphasis Curve
C11	Audio Input High-Cut	0.001μF	Audio Oscillation	Poor Response
C12	Ripple Filter	220μF	Poor Frequency Response & Low Gain	Improve AC Hum
C13	Audio Output Coupling	470μF	Poor Low Frequency Response	Can Achieve Optimum Output Power
C14	Power Line Filter	470μF	Poor AC Hum	Improve AC Hum
C15	FM Detector Phase-Shift	10pF	Narrow IF Bandwidth	Wide IF Bandwidth
C16	High Freq. (IF) Bypass	0.047μF	Removal Will Cause FM Oscillation	No Influence
C17	AN AGC Time Constant and High Frequency (IF) Bypass	0.047μF	Not Recommend to Charge	

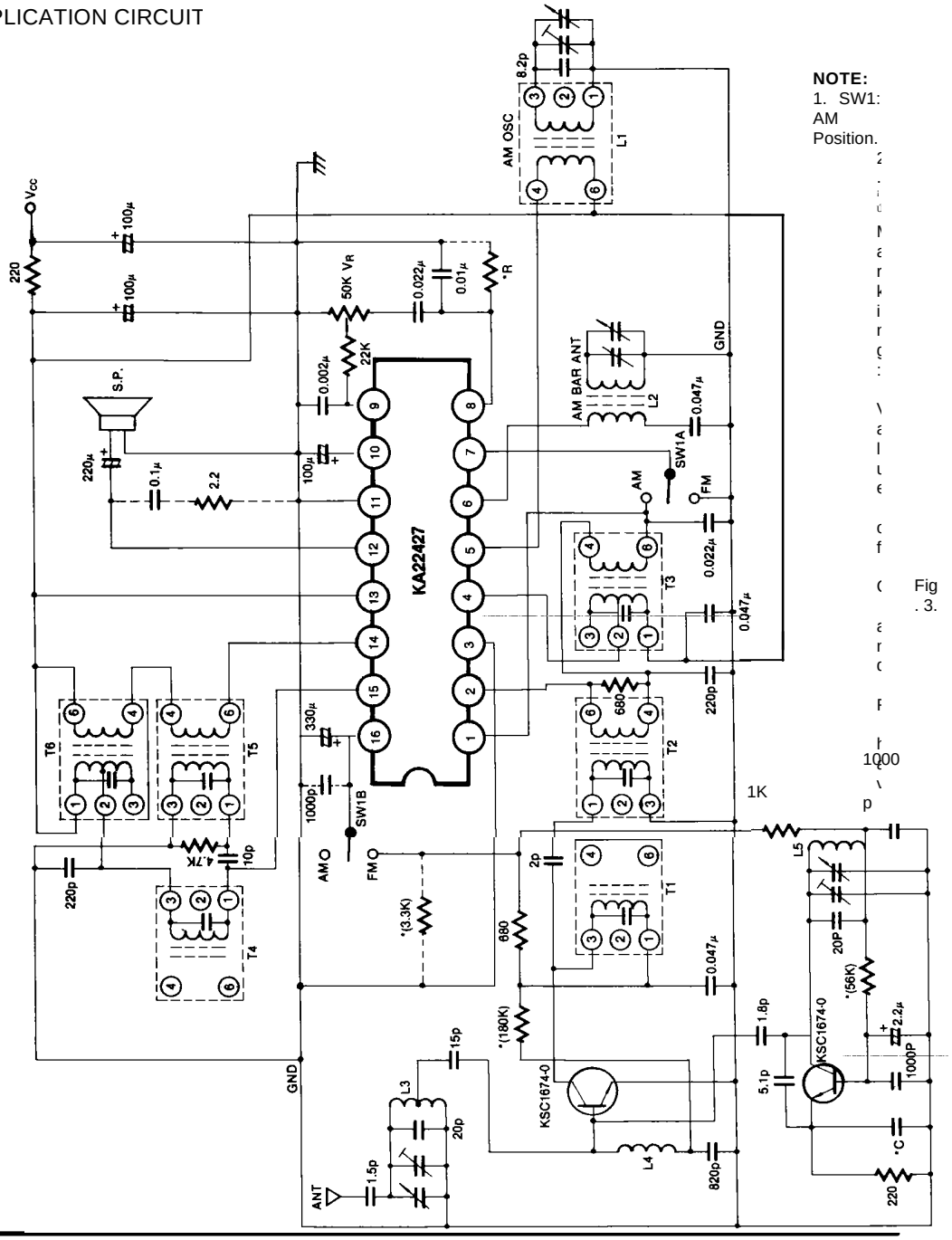
FUNCTION DESCRIPTION (Pin 16 DC Voltage)

1. IF Gain Grouping Table
   (1) Test Condition: V_{CC} = 9V (Pin 13).
   Pin 8 resistance (AM) =47KΩ
   Pin 16 resistance (FM) = 1.2KΩ
   (2) Grouping Table

V16(AM) / V16(FM)	1.4 - 1.7V
2.4 - 2.85V	2B

2. IF gain is determined by DC voltage appeared at IC Pin 16.
   The DC voltage at Pin 16 to the following values:
   AM = 1.4 ~ 1.65V (DC)
   FM = 1.9 ~ 2.10V (DC)
   AM gain can be adjusted by the loading resistor vatue of Pin 8 (AM) from 33KΩto infinity.
   FM gain can be adjusted by the loading resistor value of Pin 16 (FM) from 3KΩto 680Ω.
   Recommended resistance (Pin 8, Pin 16).
   Pin 8 (AM) = 47KΩ
   Pin 16 (FM) = 470Ω

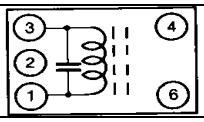
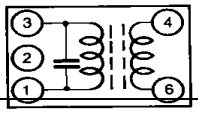
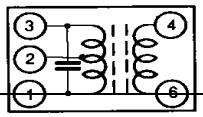
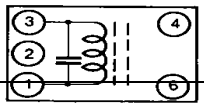
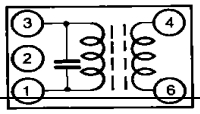
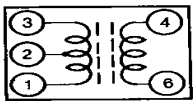
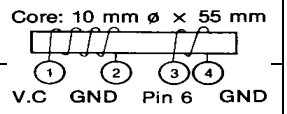
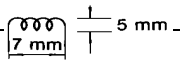
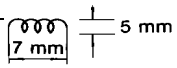
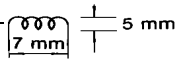
APPLICATION CIRCUIT



NOTE:
1. SW1: AM Position.

Fig. 3.

COIL SPECIFICATION 1

Coil No.	f	Q_o	Turns		C_o	Connections
T1	10.7MHz	120	1-3	8T	150pF	
T2	10.7MHz	70min	1-3 4-6	11T 2T	75±5pF	
T3 (T6)	455KHz	80min	1-2 2-3 4-6	91T 55T 6T	180±5pF	
T4	10.7MHz	45min	1-3	11T	82±3pF	
T5	10.7MHz	25min	1-3 4-6	7T 7T	180pF	
L1	AM Local Oscillator	90min	1-3 4-6	86T 7T		
L2	AM ANT	200	1-2 (L = 560 μ)$_H$ 3-4	138T 9T		
L3	FM ANT		0.8 mmϕ UEW TAP	5T 0.5T		
L4	Trap		0.32 mmϕ UEW	10T		
L5	FM Oscillator		0.8 mmϕ UEW	4T		 

APPLICATION CIRCUIT 2

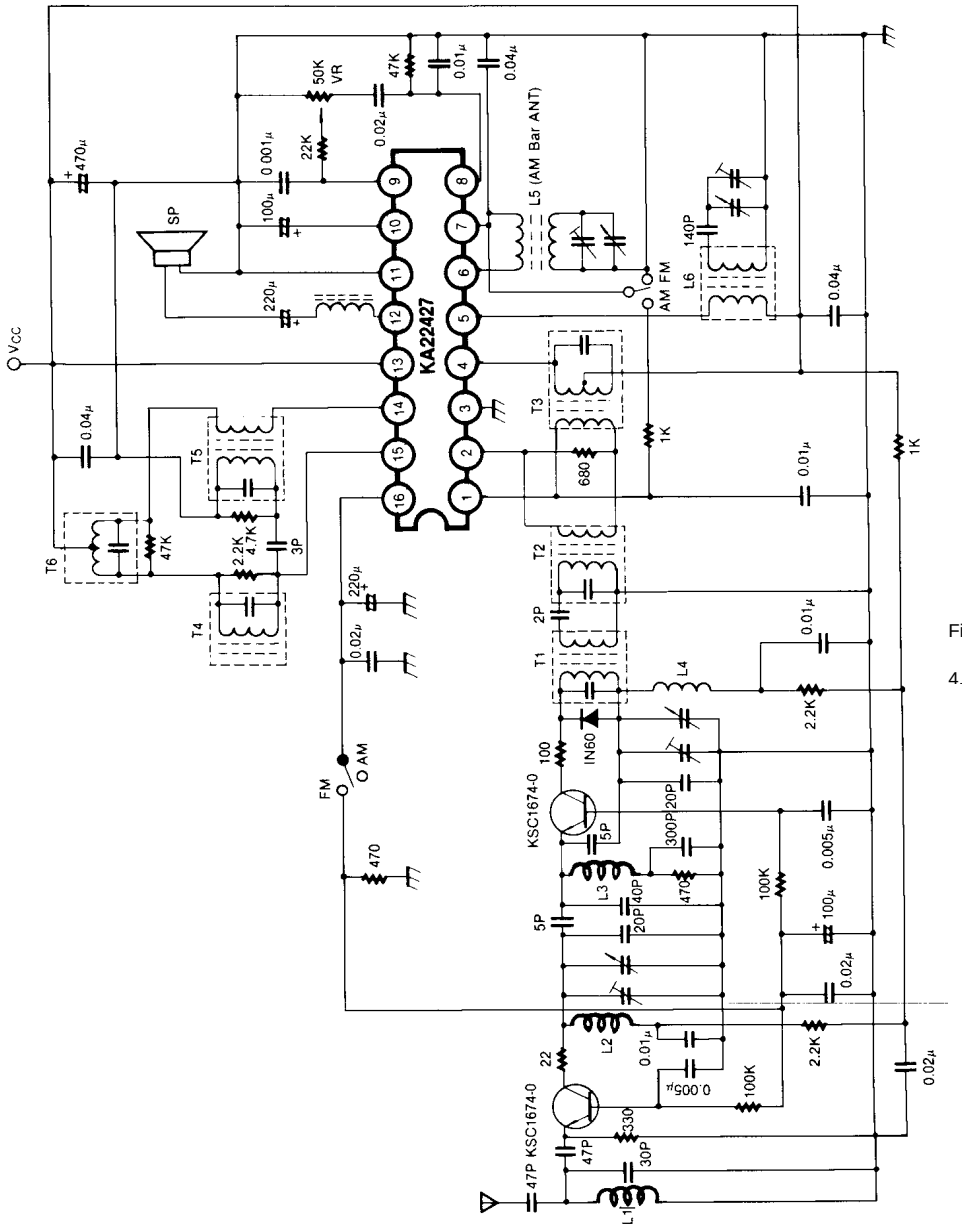
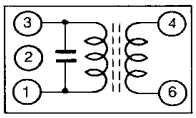
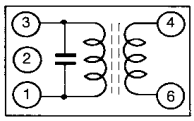
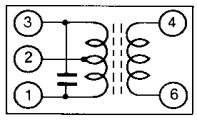
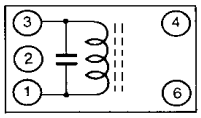
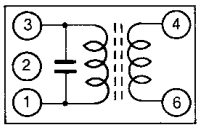
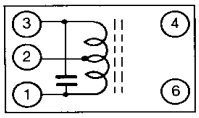


Fig. 4.

COIL SPECIFICATION 2

Coil No.	f	Q_0	Turns		C.L.	Connections
T1	10.7MHz	90	1-3 4-6	113	82pF	
T2	10.7MHz	60	1-3 4-6	52	390 pF	
T3	455 KHz	100	1-2 2-3 4-6	127 28 10	180 pF	
T4	10.7 MHz	45(Min)	1-3	11	82 pF	
T5	10.7 MHz	25(Min)	1-3 4-6	77	180 pF	
T6	455 KHz	100	1-2 2-3	50 50	390 pF	
L6	796KHz	100	1-3 4-6	100 10	360μH