

μA720 ✓ AM RADIO SYSTEM

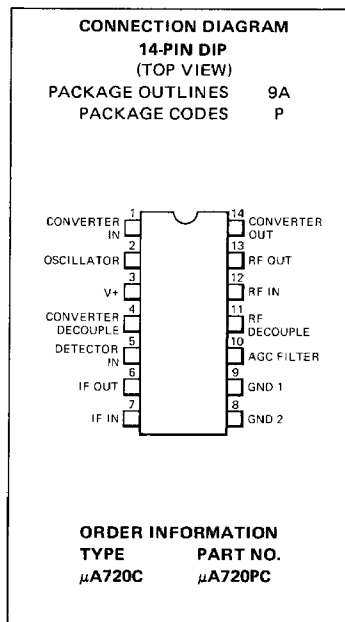
FAIRCHILD LINEAR INTEGRATED CIRCUIT

GENERAL DESCRIPTION — The μA720 is a monolithic AM Radio Receiver System made with the patented Fairchild Planar* epitaxial process. The device contains two amplifiers, a mixer-oscillator, an AGC detector and a voltage regulator. It is intended for superheterodyne AM receiver applications. Since all parts of the circuit are accessible separately, the μA720 can be used in a variety of other applications. The voltage regulator is protected against short term overvoltage transients.

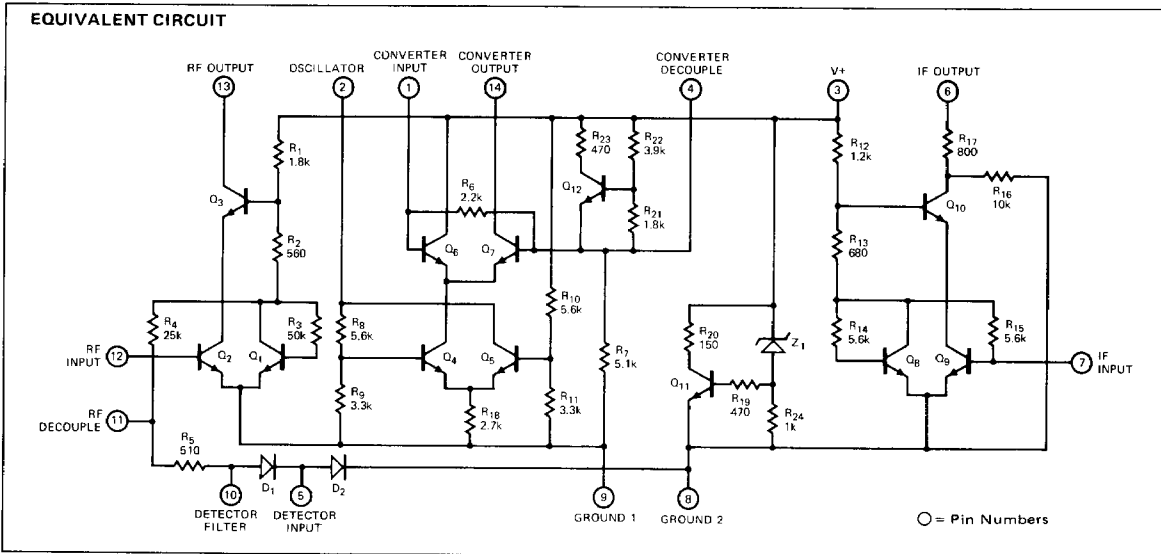
- **AM-RF OSCILLATOR-CONVERTER, IF AMPLIFIER ON ONE CHIP**
- **REGULATED SUPPLY**
- **OVERVOLTAGE PROTECTION**
- **AMPLIFIERS SEPARATELY ACCESSIBLE**
- **AGC FOR RF STAGE**

ABSOLUTE MAXIMUM RATINGS

Operating Voltage	16V
Current into Supply Terminal (Pin 3)	40 mA
Power Dissipation (Note 1)	670 mW
Current into RF Output Terminal (Pin 13)	20 mA
Current into RF Input Terminal (Pin 12)	10 mA
Current into IF Input Terminal (Pin 7)	10 mA
Current into or out of Detector Input Terminal (Pin 5)	±10 mA
Current into AGC Filter Terminal (Pin 10)	10 mA
Negative Voltage on RF Input, IF Input, and Detector Input Terminals	-5V
Negative Voltage on Converter Input Terminal	0V
Operating Temperature Range	-40°C to +85°C
Storage Temperature Range	-55°C to +125°C
Pin Temperature	
Molded DIP (Soldering, 10 s)	260°C



4



See notes on following page.

*Planar is a patented Fairchild process.

$\mu A720C$

ELECTRICAL CHARACTERISTICS: $T_A = 25^\circ C$, $V_+ = 12 V$, Test Circuit 1, unless otherwise indicated

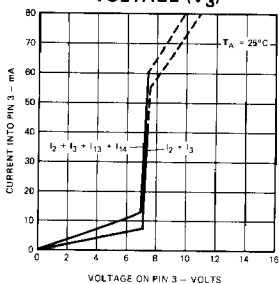
CHARACTERISTICS	CONDITIONS	MIN	TYP	MAX	UNITS
DC CHARACTERISTICS (Oscillator OFF, S_1 in Pos 2, S_3 in Pos 2, unless otherwise indicated)					
Voltage on Supply Terminal (V_3)	$I_2 + I_3 = 15 \text{ mA}$	6.6	7.0	7.5	V
Voltage on Supply Terminal (V_3)	$I_2 + I_3 + I_{13} + I_{14} = 22 \text{ mA}$, S_3 in Pos 1	6.6	7.0	7.5	V
Current into Oscillator and Supply Terminal ($I_2 + I_3$)	$V_3 = 5 V$, S_1 in Pos 1	4.0	6.0	8.0	mA
Current into Oscillator, Supply, RF Out, and Conv. Out Terminals ($I_2 + I_3 + I_{13} + I_{14}$)	$V_3 = 5 V$, S_1 in Pos 1, S_3 in Pos 1	6.0	9.0	12	mA
Oscillator Current (I_2)	$I_2 + I_3 = 15 \text{ mA}$		1.2		mA
RF Output Current (I_{13})	$I_2 + I_3 = 15 \text{ mA}$		4.0		mA
IF Output Current (I_6)	$I_2 + I_3 = 15 \text{ mA}$		4.0		mA
Voltage on Converter Input (V_1)	$I_2 + I_3 = 15 \text{ mA}$		5.8		V
Voltage on IF Input (V_7)	$I_2 + I_3 = 15 \text{ mA}$		0.75		V
Voltage on RF Input (V_{12})	$I_2 + I_3 = 15 \text{ mA}$		0.67		V
Internal Power Dissipation	$I_2 + I_3 + I_{13} + I_{14} = 22 \text{ mA}$, S_3 in Pos 1		200		mW
AC CHARACTERISTICS (Signals are measured at the device pins)					
RF Transconductance ($gm_{RF} = i_{13}/e_{12}$)	$f_{12} = 1 \text{ MHz}$, $e_{12} = 100 \mu V_{RMS}$, $e_5 = 0$ Oscillator OFF	80	120	180	mmhos
RF Input Resistance (R_{IN12})	$f_{12} = 1 \text{ MHz}$, $e_{12} = 100 \mu V_{RMS}$, S_2 in Pos 2	500	1000		Ω
RF Input Capacitance (C_{IN12})	$f_{12} = 1 \text{ MHz}$, $e_{12} = 100 \mu V_{RMS}$, S_2 in Pos 2		50		pF
RF Output Resistance (R_{OUT13})	$f_{13} = 1 \text{ MHz}$		50		k Ω
RF Output Capacitance (C_{OUT13})	$f_{13} = 1 \text{ MHz}$		10		pF
RF Noise Voltage, $\sqrt{en^2}$	Referred to Input, $R_S = 50 \Omega$, $f_{13} = 1 \text{ MHz}$		3.0		nV/ $\sqrt{\text{Hz}}$
Detector Input Voltage (e_5)	RF Stage Gain Reduction				
	$\Delta gm_{RF} = 3 \text{ dB}$, $f_{13} = 1 \text{ MHz}$, $f_5 = 260 \text{ kHz}$ $\Delta gm_{RF} = 40 \text{ dB}$, $f_{13} = 1 \text{ MHz}$, $f_5 = 260 \text{ kHz}$	140 220	180 270	250 330	mV $_{RMS}$ mV $_{RMS}$
IF Transconductance ($gm_{IF} = i_6/e_7$)	$f_7 = 260 \text{ kHz}$, $e_7 = 1 \text{ mV}_{RMS}$	50	90	130	mmhos
IF Input Resistance (R_{IN7})	$f_7 = 260 \text{ kHz}$	600	1000		Ω
IF Input Capacitance (C_{IN7})	$f_7 = 260 \text{ kHz}$		70		pF
IF Output Resistance (R_{OUT6})	$f_6 = 260 \text{ kHz}$		10		k Ω
IF Output Capacitance (C_{OUT6})	$f_6 = 260 \text{ kHz}$		8		pF
Converter Transconductance ($gm_{CON} = i_{14}/e_1$)	$f_1 = 1 \text{ MHz}$, $e_1 = 1 \text{ mV}_{RMS}$, $f_{14} = f_{oscillator} - f_1$	1.5	2.5	3.4	mmhos
Converter Input Resistance (R_{IN1})	$f_1 = 1 \text{ MHz}$	1000	1400		Ω
Converter Input Capacitance (C_{IN1})	$f_1 = 1 \text{ MHz}$		8		pF
Converter Output Resistance (R_{OUT14})	$f_{14} = 260 \text{ kHz}$		50		k Ω
Converter Output Capacitance (C_{OUT14})	$f_{14} = 260 \text{ kHz}$		10		pF
Oscillator Output Voltage (e_2)			1.2		V $_{RMS}$

Note 1. Rating applies for ambient temperatures to $+70^\circ C$. Derate at $8.3 \text{ mW}/^\circ C$ between $+70^\circ C$ and $+85^\circ C$.

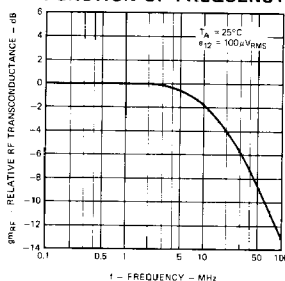
TYPICAL PERFORMANCE CURVES FOR $\mu A720C$

TEST CIRCUIT 1, unless otherwise specified.

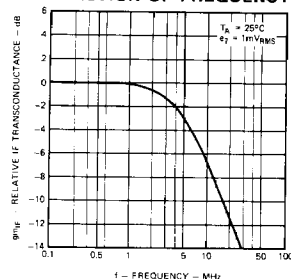
CURRENTS AS A FUNCTION OF VOLTAGE (V_3)



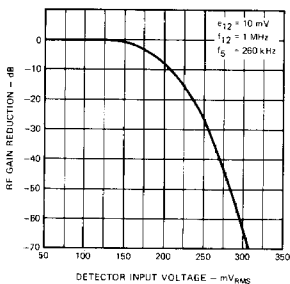
RF TRANSDUCTANCE AS A FUNCTION OF FREQUENCY



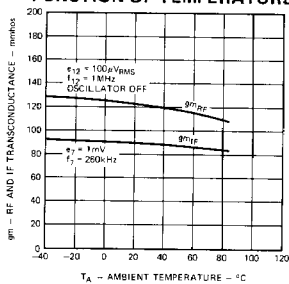
IF TRANSDUCTANCE AS A FUNCTION OF FREQUENCY



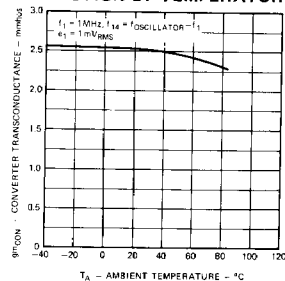
RF AGC CHARACTERISTIC



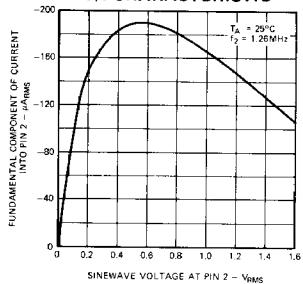
RF AND IF TRANSDUCTANCE AS A FUNCTION OF TEMPERATURE



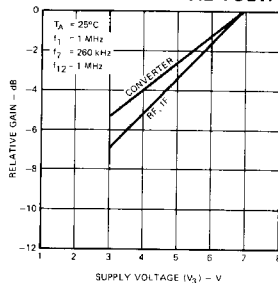
CONVERTER TRANSDUCTANCE AS A FUNCTION OF TEMPERATURE



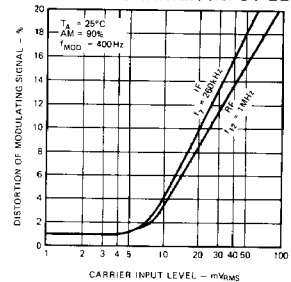
OSCILLATOR TERMINAL (PIN 2) V/I CHARACTERISTIC



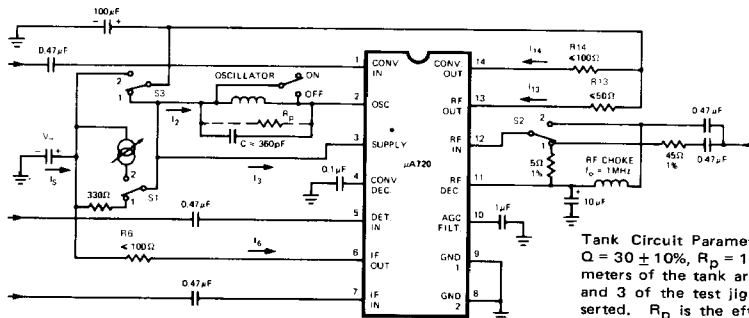
RELATIVE GAIN AS A FUNCTION OF SUPPLY TERMINAL VOLTAGE



TOTAL HARMONIC DISTORTION OF THE MODULATING SIGNAL AS A FUNCTION OF CARRIER INPUT LEVEL

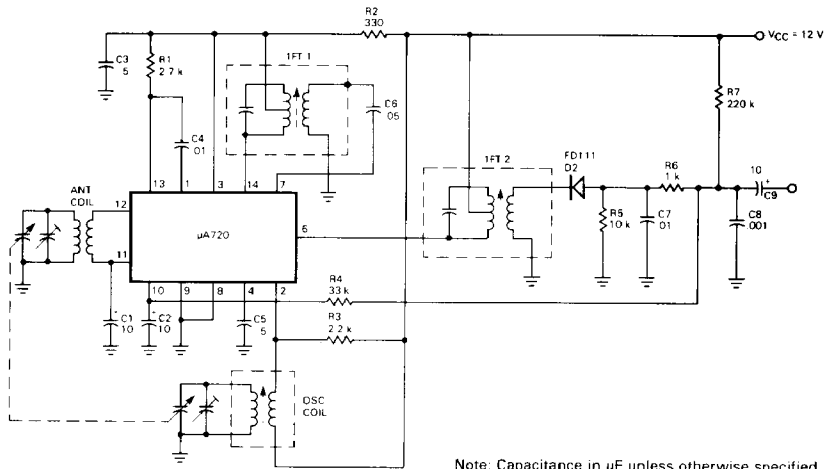


TEST CIRCUIT 1



Tank Circuit Parameters: $f_o = 1.26 \text{ MHz}$, $Q = 30 \pm 10\%$, $R_p = 10 \text{ k}\Omega \pm 5\%$. The parameters of the tank are measured at pins 2 and 3 of the test jig without a device inserted. R_p is the effective parallel resistance at resonance.

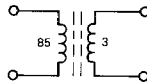
HOME RADIO APPLICATION (Capacitor Tuned)



PARTS LIST

Ferrite Antenna Bar: Q2BAR 1080/TDK Electronics
 Length: 80mm
 Diameter: 10mm

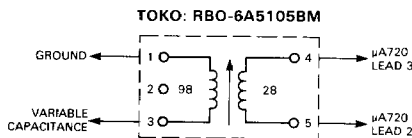
Antenna Coil:



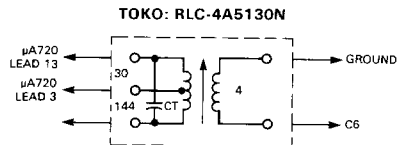
Variable Capacitance: PVC — LX20T/MITSUMI ELECTRIC
 Antenna: 5-140 pF
 Oscillator: 4.5-82 pF

OSCILLATOR COIL (BOTTOM VIEW)

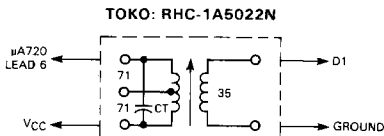
$L_{(1-3)} = 360 \mu$ H
 $Q_U = 140$
 $f = 796$ kHz



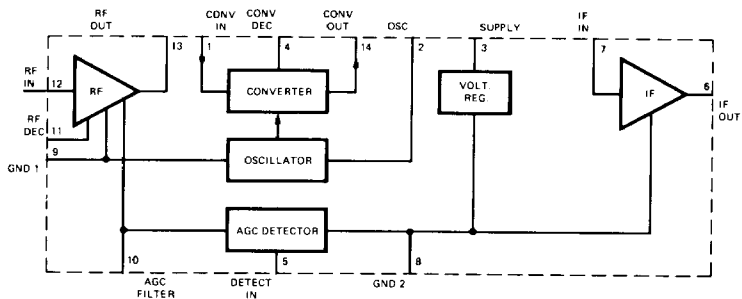
1FT 1 (BOTTOM VIEW)



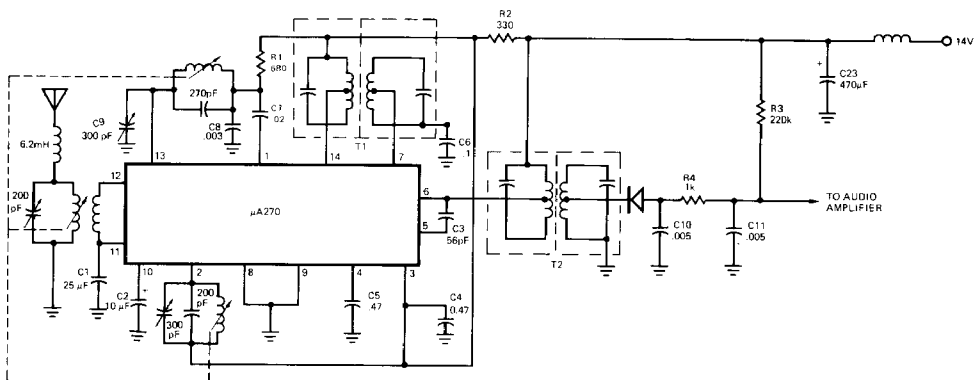
1FT 2 (BOTTOM VIEW)



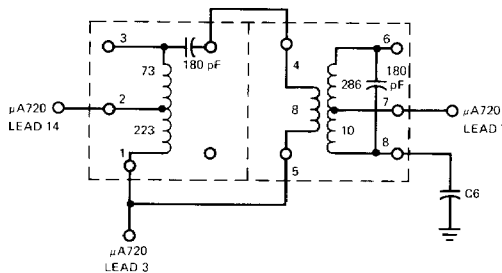
BLOCK DIAGRAM AND TYPICAL APPLICATIONS



AM CAR RADIO APPLICATION (SLUG TUNED)

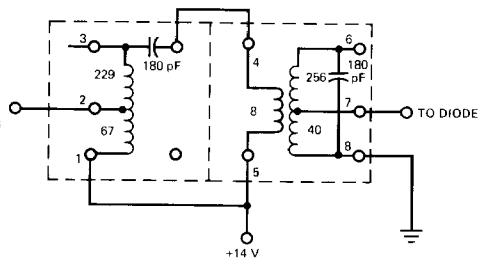


TRANSFORMER (T1)



$Q_o = 60, f = 262.5 \text{ kHz}$
 TOKO: WYOC-60021QAN
 WYOC-60022SDG

TRANSFORMER (T2)



$Q_o = 60, f = 262.5 \text{ kHz}$
 TOKO: WYOC-60025QAN
 WYOC-60026SDG