μA720

AM RADIO SYSTEM

FAIRCHILD LINEAR INTEGRATED CIRCUIT

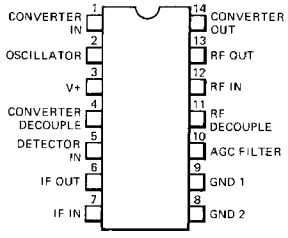
GENERAL DESCRIPTION – The μA720 is a monolithic AM Radio Receiver System made with the patented Fairchild Planar* epitaxial process. The device contains two amplifiers, a mixer-oscillator, an AGC detector and a voltage regulator. It is intended for superheterodyne AM receiver applications. Since all 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)	40mA
Power Dissipation (Note 1)	670mW
Current into RF Output Terminal (Pin 13)	20mA
Current into RF Input Terminal (Pin 12)	10mA
Current into IF Input Terminal (Pin 7)	10mA
Current into or out of Detector Input Terminal (Pin 5)	±10mA
Current into AGC Filter Terminal (Pin 10)	10mA
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

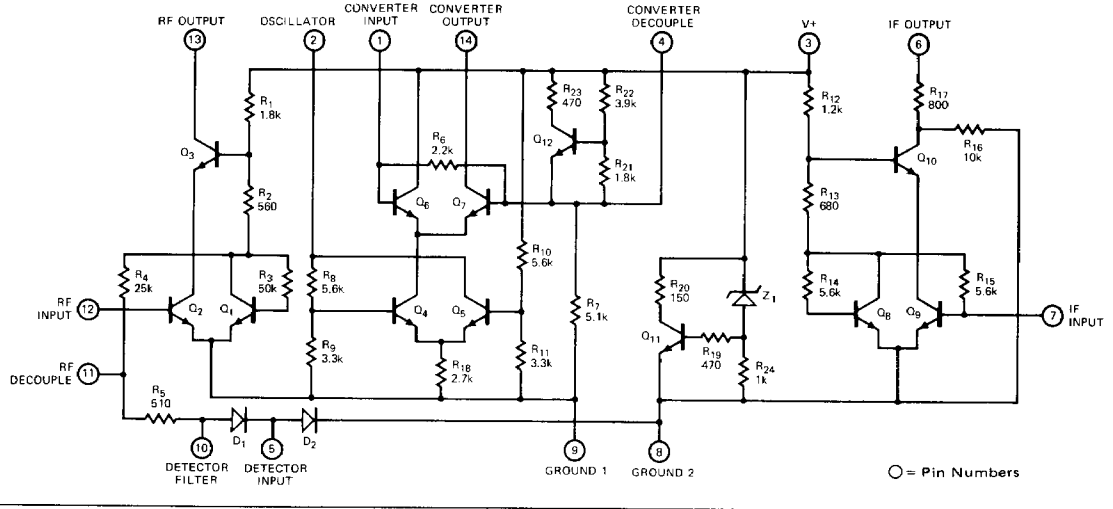
CONNECTION DIAGRAM
14-PIN DIP
(TOP VIEW)
PACKAGE OUTLINES 9A
PACKAGE CODES P



ORDER INFORMATION

TYPE	PART NO.
μA720C	μA720PC

EQUIVALENT CIRCUIT



See notes on following page.

*Planar is a patented Fairchild process.

μA720C

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

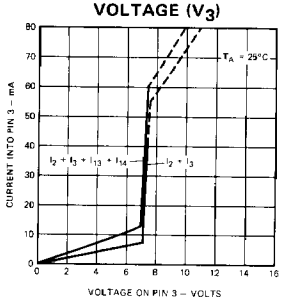
CHARACTERISTICS	CONDITIONS	MIN	TYP	MAX	UNITS
DC CHARACTERISTICS (Oscillator OFF, S_1 in Pos 2, S_3 in Pos 2, unless otherwise indicated)					
Voltage on Supply Terminal (V_3)	$I_2 + I_3 = 15$ mA	6.6	7.0	7.5	V
Voltage on Supply Terminal (V_3)	$I_2 + I_3 + I_{13} + I_{14} = 22$ mA, S_3 in Pos 1	6.6	7.0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

Note 1. Rating applies for ambient temperatures to +70°C. Derate at 8.3 mW/°C between +70°C and +85°C.

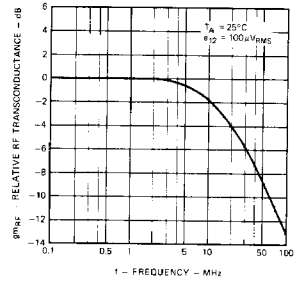
TYPICAL PERFORMANCE CURVES FOR μA720C

TEST CIRCUIT 1, unless otherwise specified.

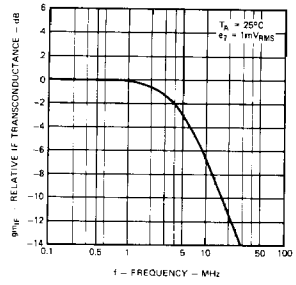
CURRENTS AS A FUNCTION OF VOLTAGE (V_3)



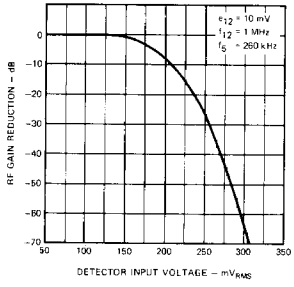
RF TRANSCONDUCTANCE AS A FUNCTION OF FREQUENCY



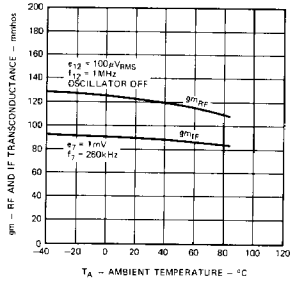
IF TRANSCONDUCTANCE AS A FUNCTION OF FREQUENCY



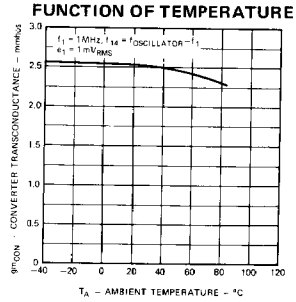
RF AGC CHARACTERISTIC



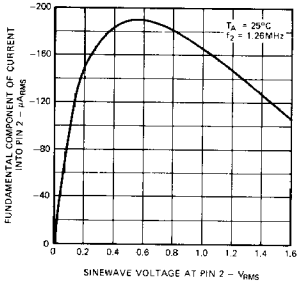
RF AND IF TRANSCONDUCTANCE AS A FUNCTION OF TEMPERATURE



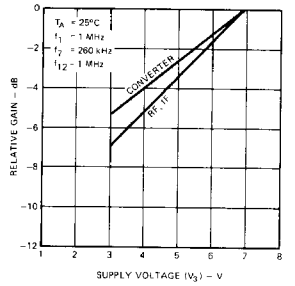
CONVERTER TRANSCONDUCTANCE AS A FUNCTION OF TEMPERATURE



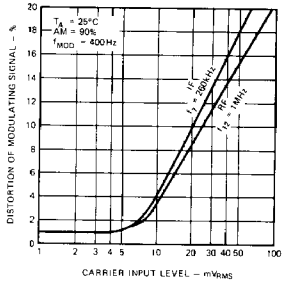
OSCILLATOR TERMINAL (PIN 2) V/I CHARACTERISTIC



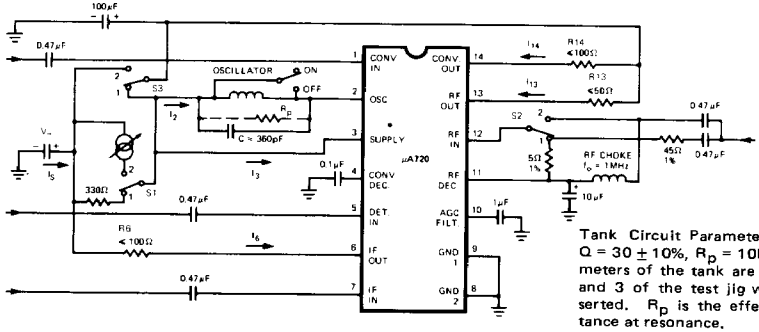
RELATIVE GAIN AS A FUNCTION OF SUPPLY TERMINAL VOLTAGE



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

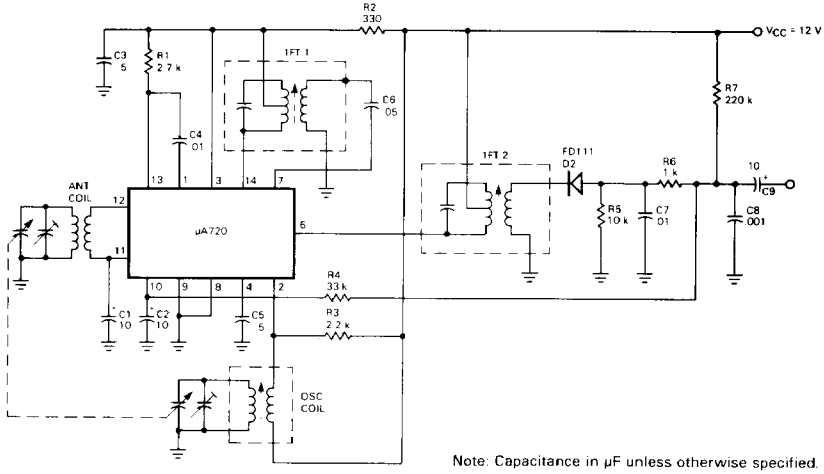


TEST CIRCUIT 1



Tank Circuit Parameters: f_o = 1.26MHz, Q = 30 ± 10%, R_p = 10kΩ ± 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)

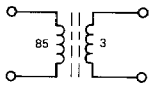


Note: Capacitance in μF unless otherwise specified.

PARTS LIST

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

Antenna Coil:

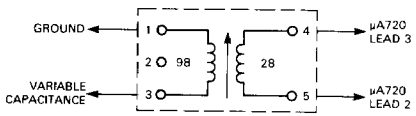


Variable Capacitance: PVC — LX20T/MITSUMI ELECTRIC
Antenna: 5-140 pF
Oscillator: 4.5-82 pF

OSCILLATOR COIL (BOTTOM VIEW)

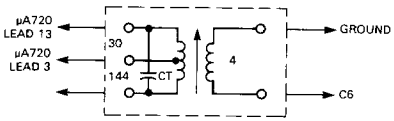
$L_{(1-3)} = 360\ \mu H$
$Q_U = 140$
$f = 796\ kHz$

TOKO: RBO-6A5105BM



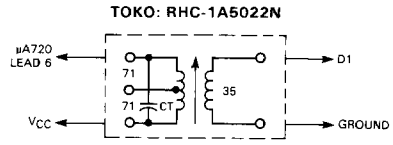
1FT 1 (BOTTOM VIEW)

TOKO: RLC-4A5130N

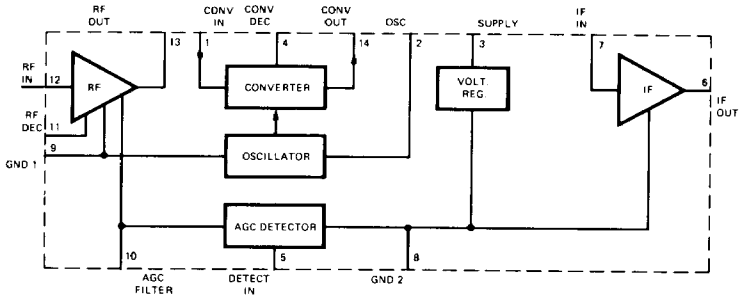


1FT 2 (BOTTOM VIEW)

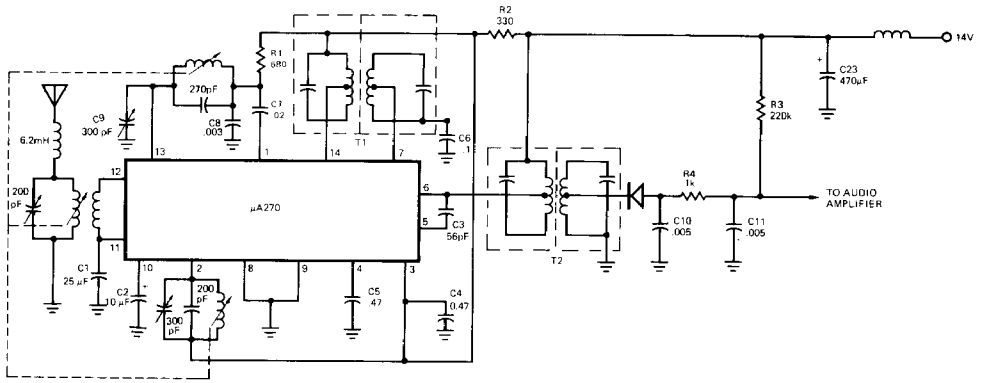
TOKO: RHC-1A5022N



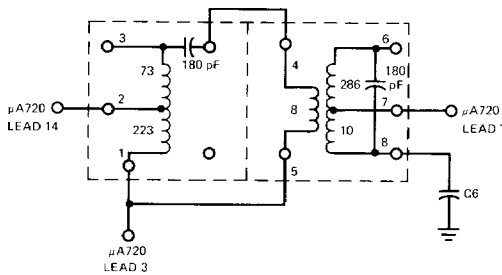
BLOCK DIAGRAM AND TYPICAL APPLICATIONS



AM CAR RADIO APPLICATION (SLUG TUNED)

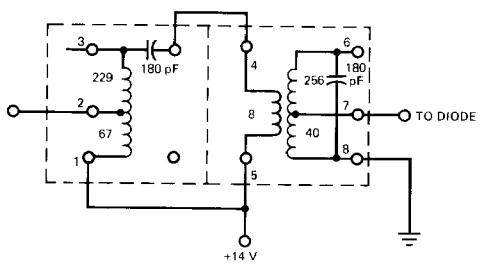


TRANSFORMER (T1)



Q_o = 60, f = 262.5 kHz
TOKO: WYOC–60021QAN
WYOC–60022SDG

TRANSFORMER (T2)



Q_o = 60, f = 262.5 kHz
TOKO: WYOC–60025QAN
WYOC–60026SDG