

NEC
 ELECTRON DEVICE

BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC1243C

AM TUNER

SILICON BIPOLAR MONOLITHIC INTEGRATED CIRCUIT

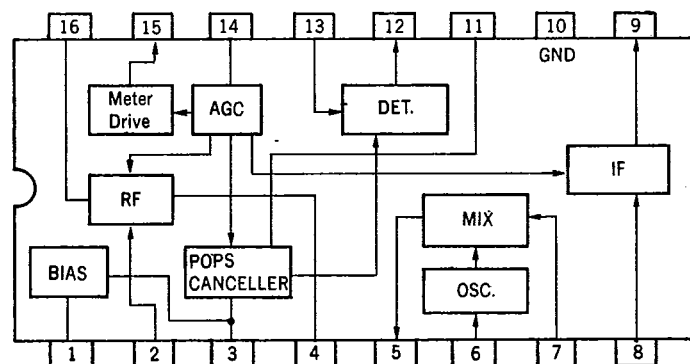
DESCRIPTION

μ PC1243C is a silicon monolithic integrated circuit designed for AM tuner and the most suitable for high class tuner. It is composed of an RF amplifier, a mixer, a local oscillator, an IF amplifier, a detector, a turn on and turn off pops canceller, an AGC amplifier and a signal meter driver. Package is the 16 lead Dual In-Line Plastic Package (DIP).

FEATURES

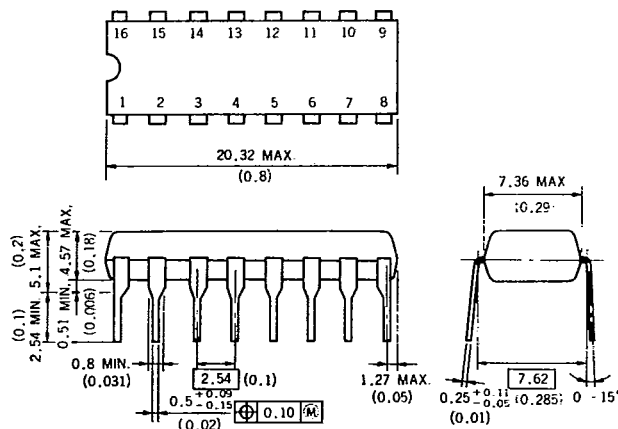
- Internally turn on and turn off pops canceller.
The pop level is one eighth that of NEC's conventional circuit.
- High signal to noise ratio.
 $S/N = 57$ dB TYP. ($V_{in} = 100$ dB/m, $f_{MOD} = 400$ Hz, MOD = 30 %)
- Low harmonic distortion in wide range of input level.
T.H.D. = 0.3 % TYP. ($V_{in} = 100$ dB/m, $f_{MOD} = 400$ Hz, MOD = 30 %)
T.H.D. = 0.9 % TYP. ($V_{in} = 130$ dB/m, $f_{MOD} = 400$ Hz, MOD = 80 %)
- A three-stage delay-type AGC.
- High tweet ratio.
Tweet ratio = 22 dB TYP. ($V_{in} = 60$ dB/m, 2 IF)
- High usable sensitivity.
U.S. = 46 dB/m TYP. ($f = 1$ MHz, $S/N = 20$ dB)
- Signal meter driver provides excellent linearity.
Driving current = 500 μ A MAX.

CONNECTION DIAGRAM (Top View)



PACKAGE DIMENSIONS

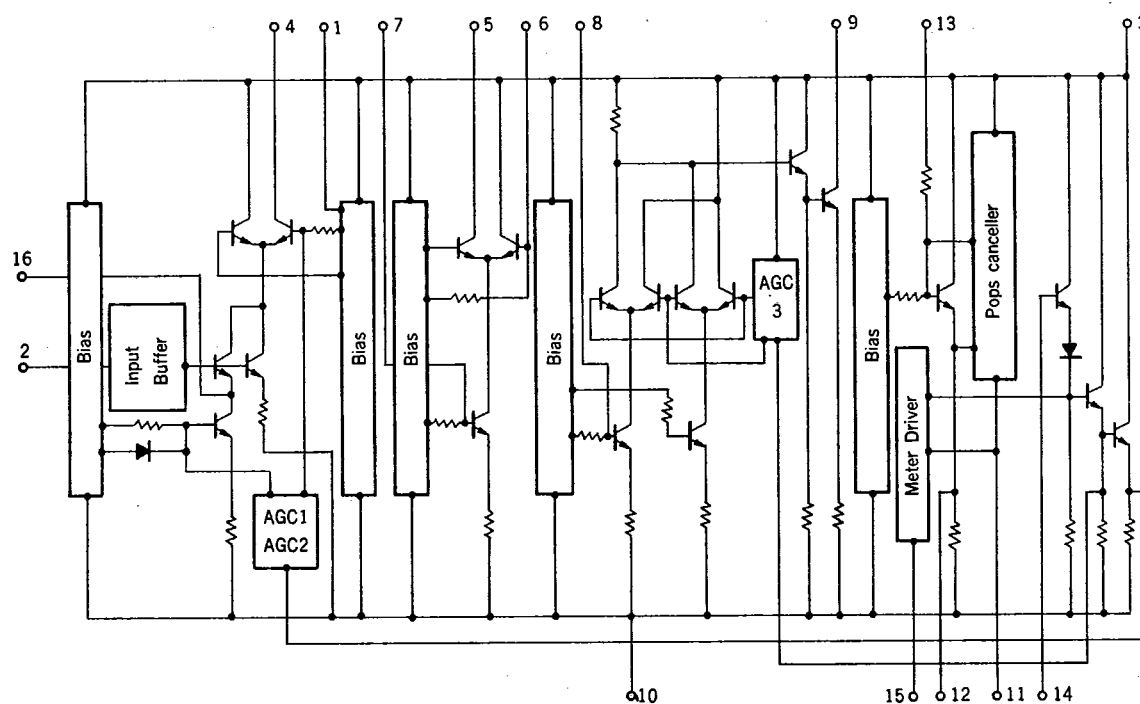
in millimeters (inches)



CONNECTIONS

Pin No.	Connection	Pin No.	Connection
1	Bias	9	IF output
2	RF input	10	GND
3	VCC	11	Timing condenser
4	RF output	12	DET. output
5	MIX output	13	DET. input
6	Local osc.	14	AGC input
7	MIX input	15	Signal meter
8	IF input	16	Bypass

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Supply Voltage	V_{CC}	15	V	
Input Voltage	V_{in}	7	V_{p-p}	
Power Dissipation	P_D	350	mW	($T_a = 75^\circ\text{C}$)
Operating Temperature	T_{opt}	-20 to +75	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-40 to +125	$^\circ\text{C}$	

RECOMMENDED OPERATING CONDITION ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	9	12	15	V

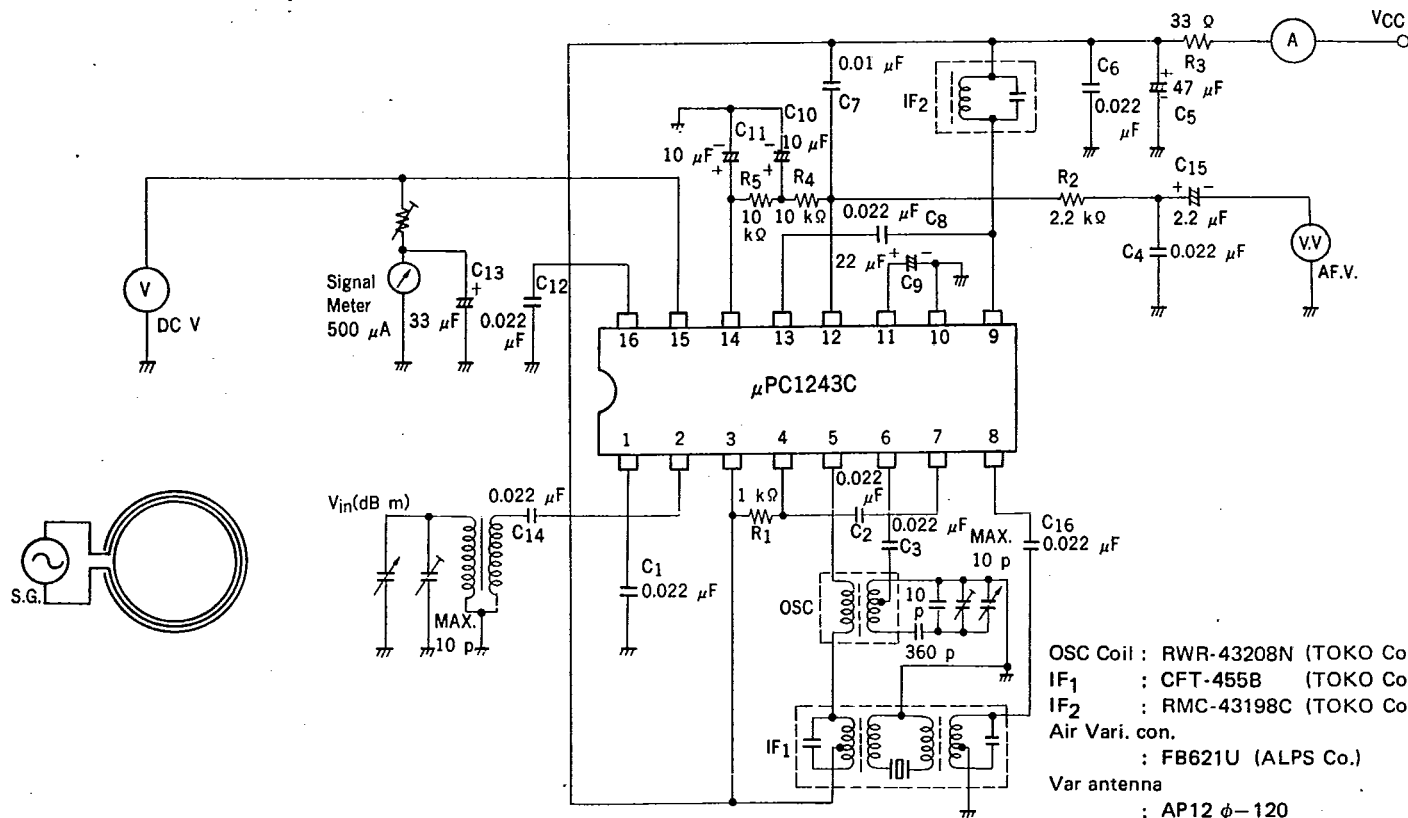
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$, $V_{CC} = 12\text{ V}$, $f_{MOD} = 400\text{ Hz}$, $f = 1\text{ MHz}$, $MOD = 30\%$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Supply Current	I_{CC}	10	14.5	21	mA	$V_{in} = 0$
Usable Sensitivity	U. Sens	—	46	—	dB/m	$S/N = 20\text{ dB}$
Detector Output	V_o	120	180	240	mV _{r.m.s.}	$V_{in} = 100\text{ dB/m}$
Harmonic Distortion	T.H.D. 1	—	0.3	0.8	%	$V_{in} = 100\text{ dB/m}$
Harmonic Distortion	T.H.D. 2	—	0.9	—	%	$V_{in} = 130\text{ dB/m}$, $MOD = 80\%$
AGC FOM	FOM	75	83	—	dB	-10 dB point
Signal to Noise Ratio	S/N	50	57	—	dB	$V_{in} = 100\text{ dB/m}$
Max. Sensitivity	M.S.	31	38	45	dB/m	$V_o = 30\text{ mV}_{r.m.s.}$

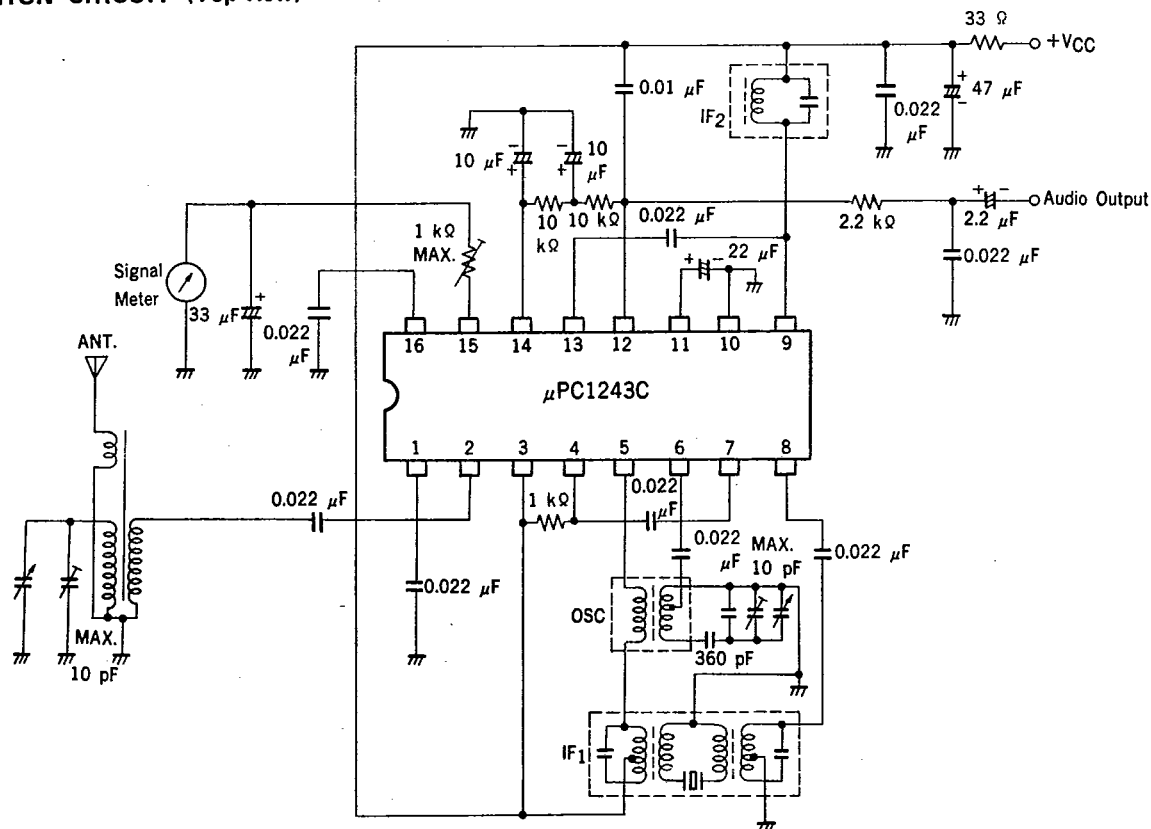
CHARACTERISTICS FOR REFERENCE ($T_a = 25^\circ\text{C}$, $V_{CC} = 12.0\text{ V}$)

CHARACTERISTIC	TYP.	UNIT	TEST CONDITION
IF Response Ratio	42	dB	$f = 1\text{ MHz}$, $V_o = 50\text{ mV}_{r.m.s.}$, $IF = 455\text{ kHz}$
Image Response Ratio	60	dB	$f = 1\text{ MHz}$, $V_o = 50\text{ mV}_{r.m.s.}$, $f + 2\text{ IF}$
Selectivity	30	dB	$f = 1\text{ MHz}$, $\Delta f = \pm 10\text{ kHz}$
Tweak Ratio	22	dB	$V_i = 60\text{ dB/m}$, $2\text{ IF} = 910\text{ kHz}$
	48	dB	$V_i = 100\text{ dB/m}$, $3\text{ IF} = 1\text{ }365\text{ kHz}$
RF Input Impedance	5.5	k Ω	$f = 1\text{ MHz}$
RF Input Capacitance	5	pF	$f = 1\text{ MHz}$
RF Output Impedance	80	k Ω	$f = 1\text{ MHz}$
RF Output Capacitance	2	pF	$f = 1\text{ MHz}$
MIX Input Impedance	8	k Ω	$f = 1\text{ MHz}$
MIX Input Capacitance	5	pF	$f = 1\text{ MHz}$
MIX Output Impedance	80	k Ω	$f = 1\text{ MHz}$
MIX Output Capacitance	2	pF	$f = 1\text{ MHz}$
IF Input Impedance	3.3	k Ω	$f = 455\text{ kHz}$
IF Input Capacitance	10	pF	$f = 455\text{ kHz}$
IF Output Impedance	80	k Ω	$f = 455\text{ kHz}$
IF Output Capacitance	2	pF	$f = 455\text{ kHz}$
Det. Input Impedance	6.5	k Ω	$f = 455\text{ kHz}$
Det. Input Capacitance	5	pF	$f = 455\text{ kHz}$

TEST CIRCUIT (Top view)

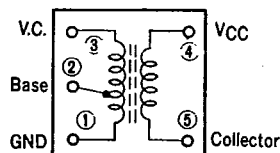


APPLICATION CIRCUIT (Top view)



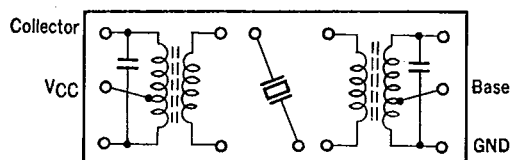
COIL SPECIFICATION (Bottom view)

- (1) OSC Coil RWR-43208N (TOKO Co.)



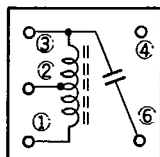
$Q_u = 110 \sim (796 \text{ kHz})$
 ① ~ ② ② ~ ③ ④ ~ ⑥
 4T 58T 10T
 $L = 160 \mu\text{H} \pm 6\%$

- (2) IFT₁ (IF transformer) CFT455B (TOKO Co.)



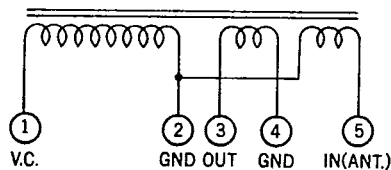
Centre freq. 455 kHz $\pm 3.5 \text{ kHz}$
 Selectivity $\pm 10 \text{ kHz}$ 26 dB Mini.

- (3) IFT₂ (IF transformer) RMC-43198C (TOKO Co.)



Centre freq. 455 kHz
 180 pF (Included)
 $Q_u = 80 \sim (455 \text{ kHz})$
 ① ~ ③
 164T

- (4) Bar antenna AR12φ-120 (Coil Snake Co.)

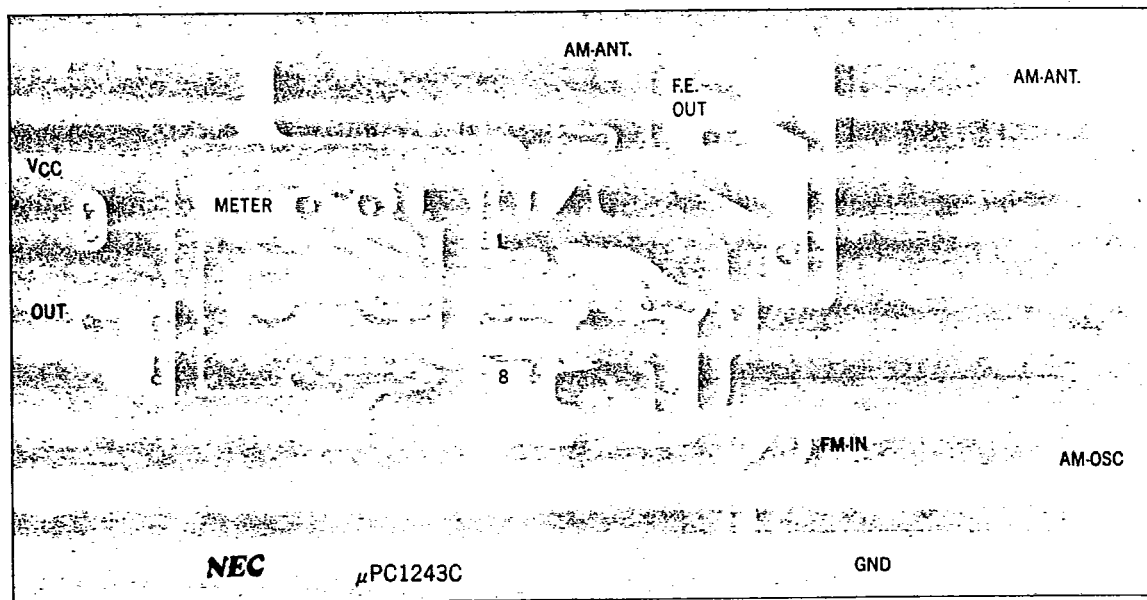


① ~ ② ③ ~ ④ ② ~ ⑤
 58T 6T 5T

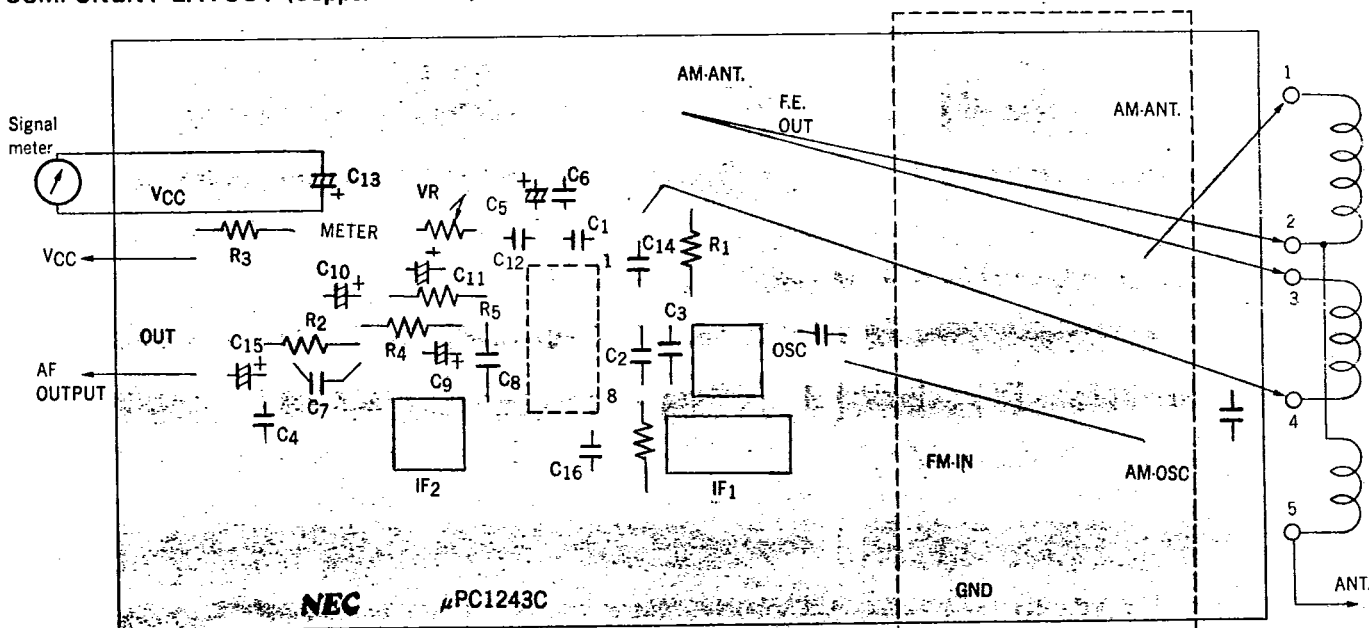
- (5) Air variable FB621U (Alps Electric Co.)
 Capacitor

$C_{MAX.} = 326 \text{ pF}$
 $C_{MIN.} = 9 \text{ pF}$

EXAMPLE FOR PRINTED CIRCUIT BOARD (Copper foil side)



COMPONENT LAYOUT (Copper foil side)



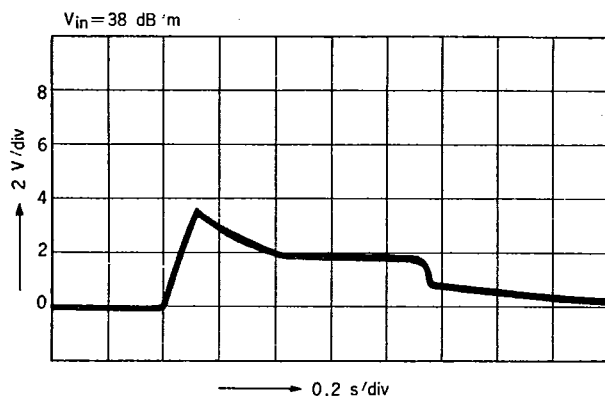
R1 : 1k Ω
R2 : 2.2 k Ω
R3 : 33 Ω
R4 : 10 k Ω
R5 : 10 k Ω

C1 : 0.022 μ F Ceramic
C2 : 0.022 μ F Ceramic
C3 : 0.022 μ F Ceramic
C4 : 0.022 μ F Ceramic
C5 : 47 μ F Chemical
C6 : 0.022 μ F Ceramic
C7 : 0.01 μ F Ceramic
C8 : 0.022 μ F Ceramic
C9 : 22 μ F Chemical
C10 : 10 μ F Chemical
C11 : 10 μ F Chemical
C12 : 0.022 μ F Ceramic
C13 : 33 μ F Chemical
C14 : 0.022 μ F Ceramic
C15 : 2.2 μ F Chemical
C16 : 0.022 μ F Ceramic

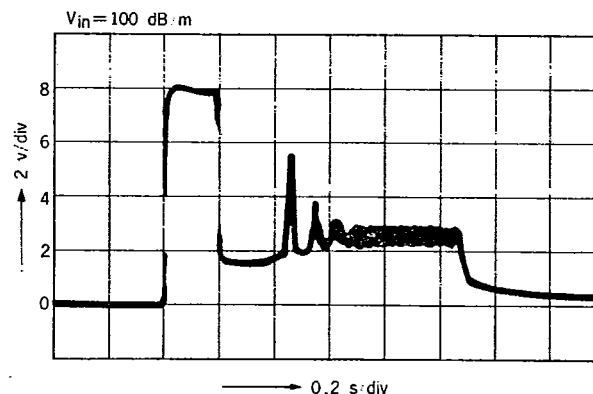
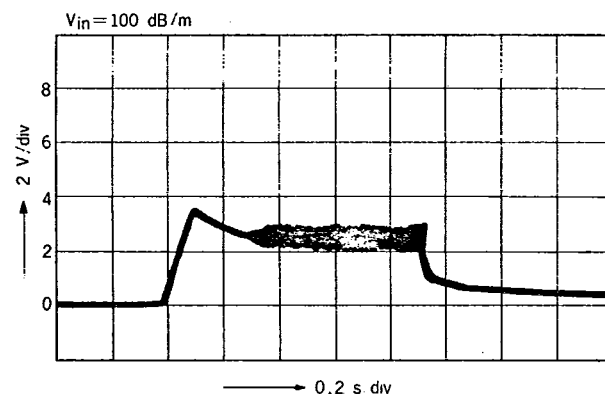
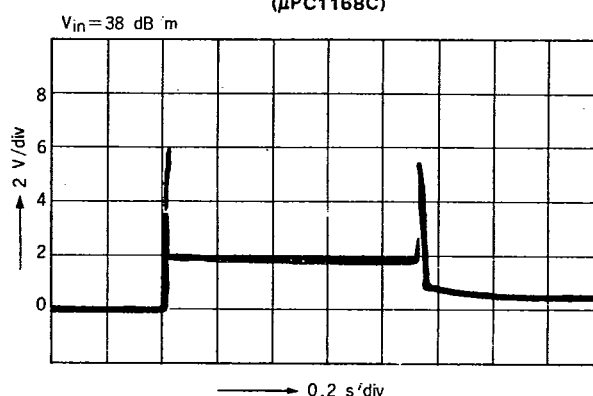
VR : 1 k Ω MAX.
OSC COIL : RWR-43208N
IF1 : CFT-455B
IF2 : RMC-43198C
ANT.CO. : AR12 ϕ - 120
Air vari. con. : FB621U
Signal meter : 500 μ A MAX.

TURN ON-OFF POPS LEVEL

μ PC1243C

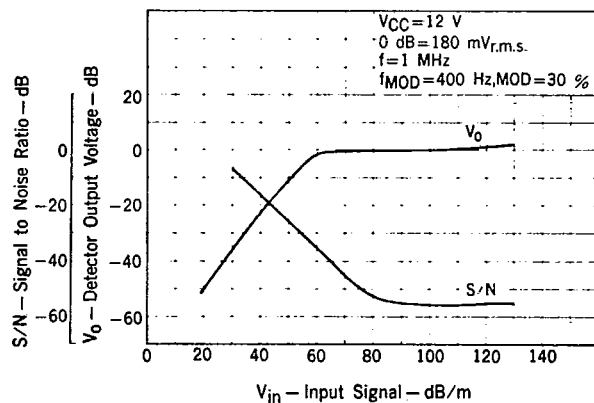


NEC's conventional circuit
(μ PC1168C)

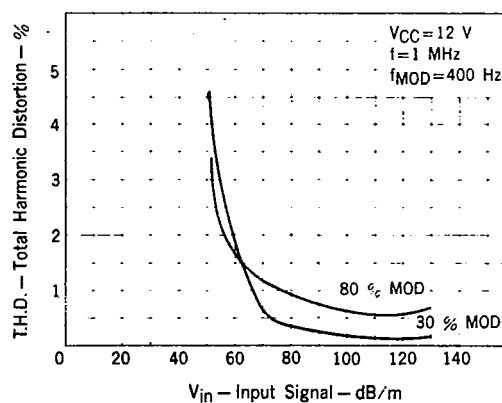


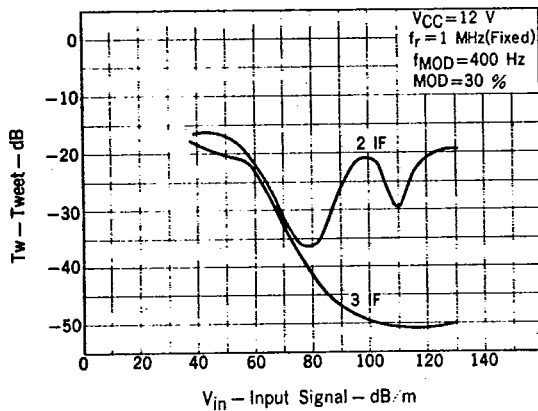
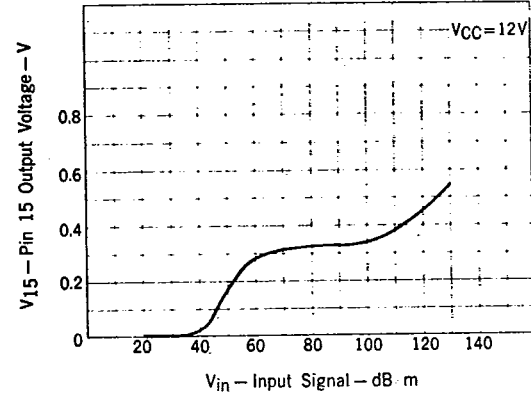
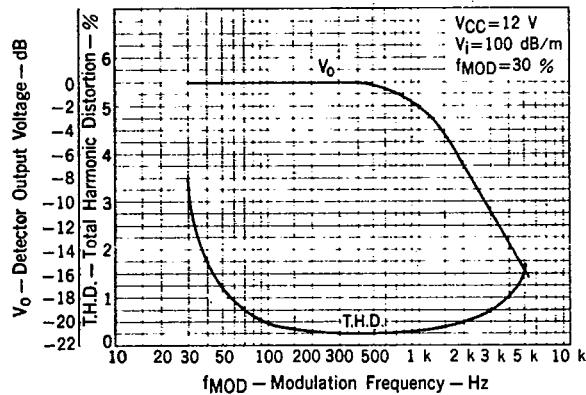
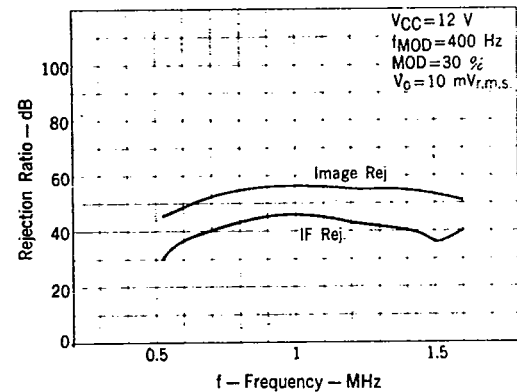
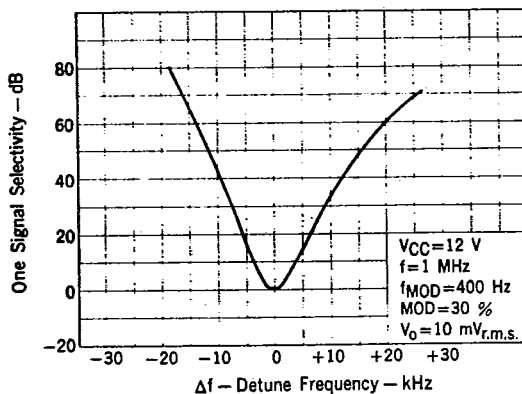
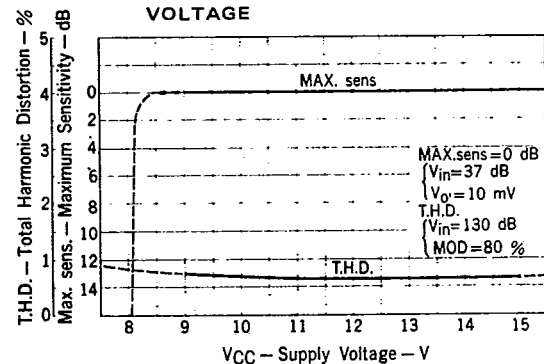
TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

DETECTOR OUTPUT VOLTAGE AND SIGNAL TO NOISE RATIO vs. INPUT SIGNAL



TOTAL HARMONIC DISTORTION vs. INPUT SIGNAL



TWEET vs. INPUT SIGNAL**PIN 15 OUTPUT VOLTAGE vs. INPUT SIGNAL****DETECTOR OUTPUT VOLTAGE AND TOTAL HARMONIC DISTORTION vs. MODULATION FREQUENCY****IF REJECTION AND IMAGE REJECTION vs. FREQUENCY****ONE-SIGNAL SELECTIVITY vs. DETUNE FREQUENCY****MAXIMUM SENSITIVITY AND TOTAL HARMONIC DISTORTION vs. SUPPLY VOLTAGE**

NEC ELECTRON DEVICE

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μ PC1243C

