



# BIPOLAR ANALOG INTEGRATED CIRCUIT $\mu$ PC1028H

## FM IF AMPLIFIER WITH DIFFERENTIAL PEAK DETECTOR SILICON BIPOLAR MONOLITHIC INTEGRATED CIRCUIT

### DESCRIPTION

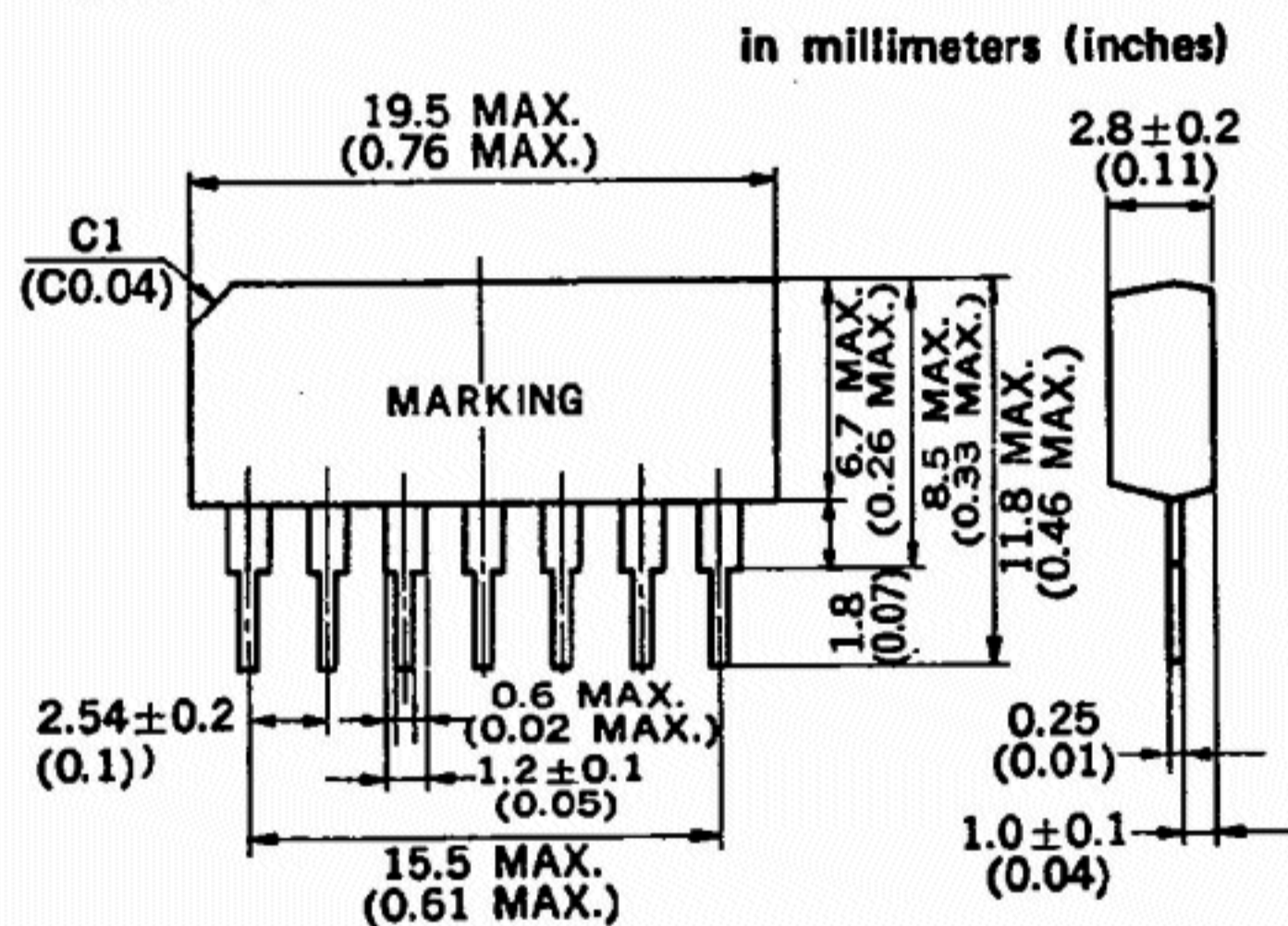
The  $\mu$ PC1028H is a silicon monolithic integrated circuit intended for an FM IF amplifier with a differential peak detector.

The device contains a three-stage direct coupled differential amplifier, a low pass filter, and a differential peak detector.

The differential peak detector has such feature as simplifying external circuits and components compared with a ratio detector.

The  $\mu$ PC1028H is packaged in a plastic single in-line package (SIP) for easy mounting on a printed circuit board.

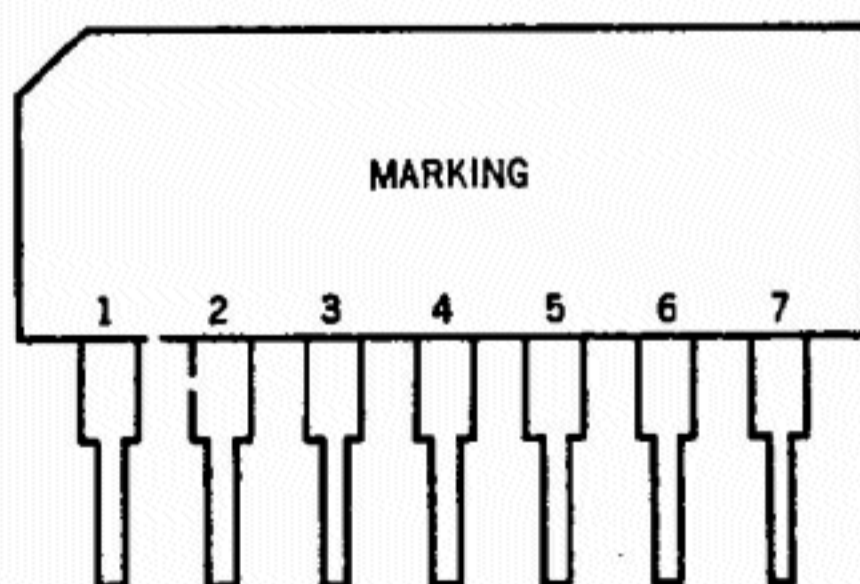
### PACKAGE DIMENSIONS



### FEATURES

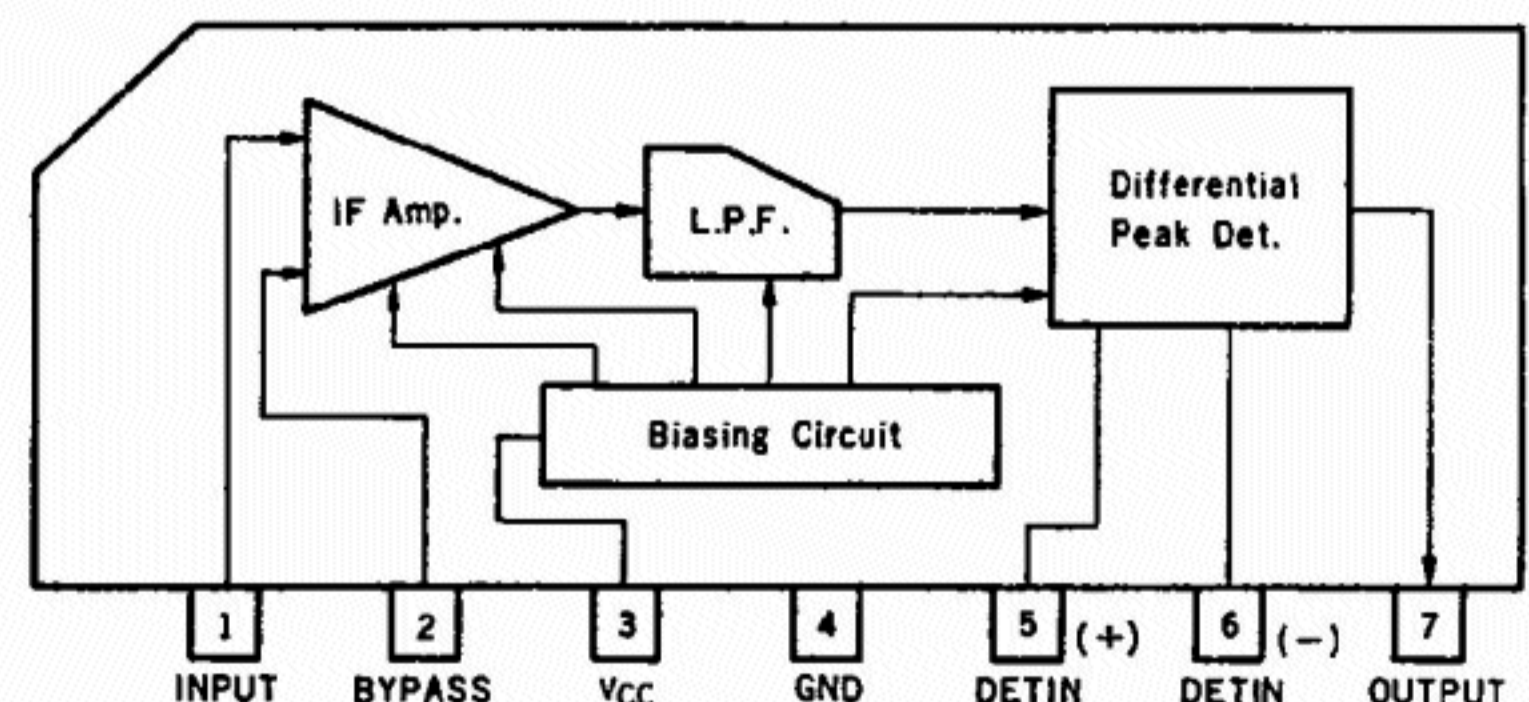
- Few external components required.
- Only one coil necessary in detector circuit, all tuning performed with the coil.
- Low distortion: T.H.D. = 0.3 % TYP. at 100 % modulation.
- SIP assures easy mounting on a printed circuit board.

### CONNECTION DIAGRAM



Pin No.	Electrical Connection
1	INPUT
2	BYPASS
3	V <sub>CC</sub>
4	GROUND
5	DET. IN(+)
6	DET. IN(-)
7	OUTPUT

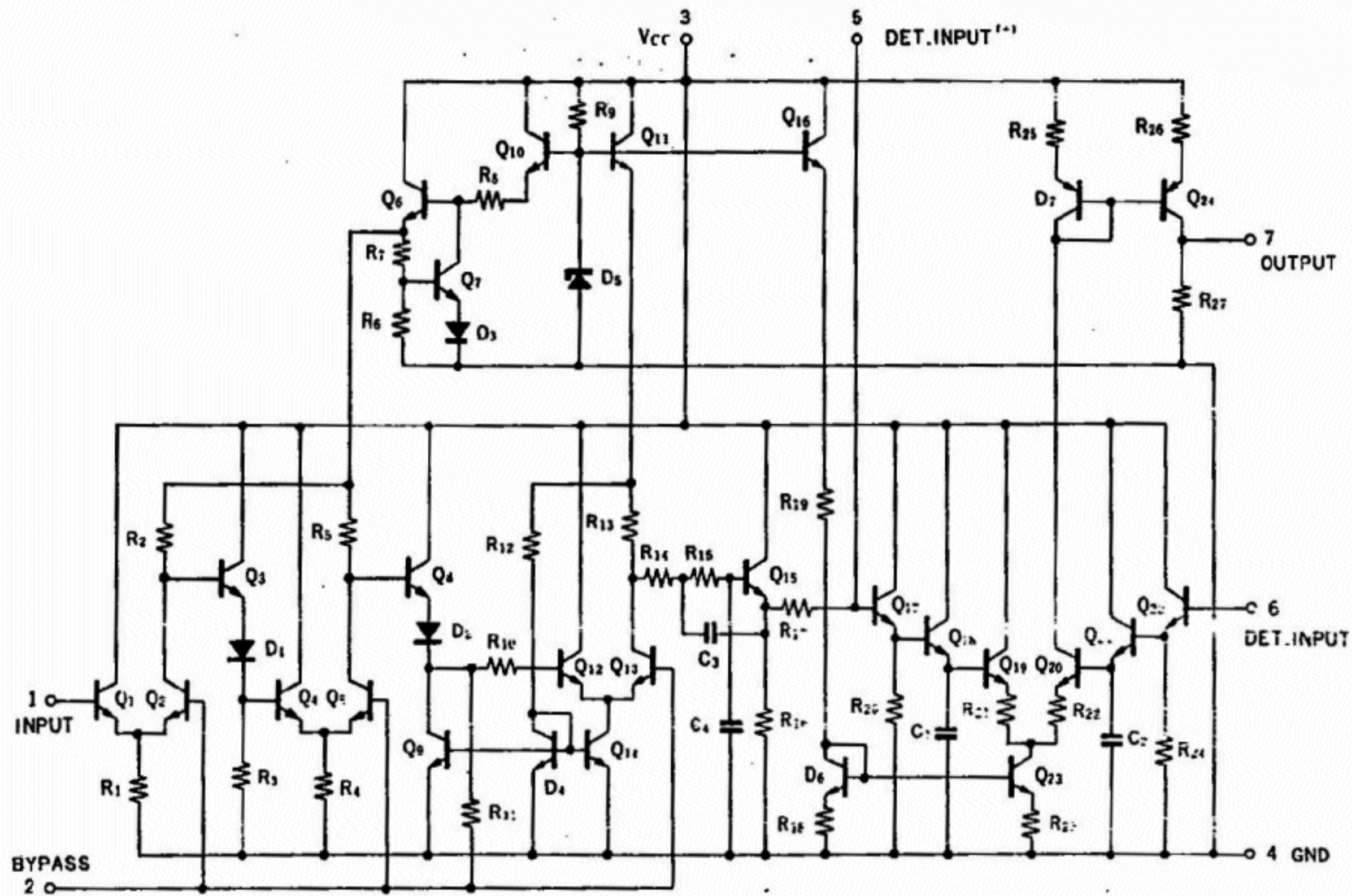
### BLOCK DIAGRAM



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Nippon Electric Co., Ltd.

## EQUIVALENT CIRCUIT



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

Supply Voltage	$V_{CC}$	15	V
Package Dissipation ( $T_a = 75^\circ\text{C}$ )	$P_D$	270	mW
Operating Temperature	$T_{opt}$	-20 to +75	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to +125	$^\circ\text{C}$

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

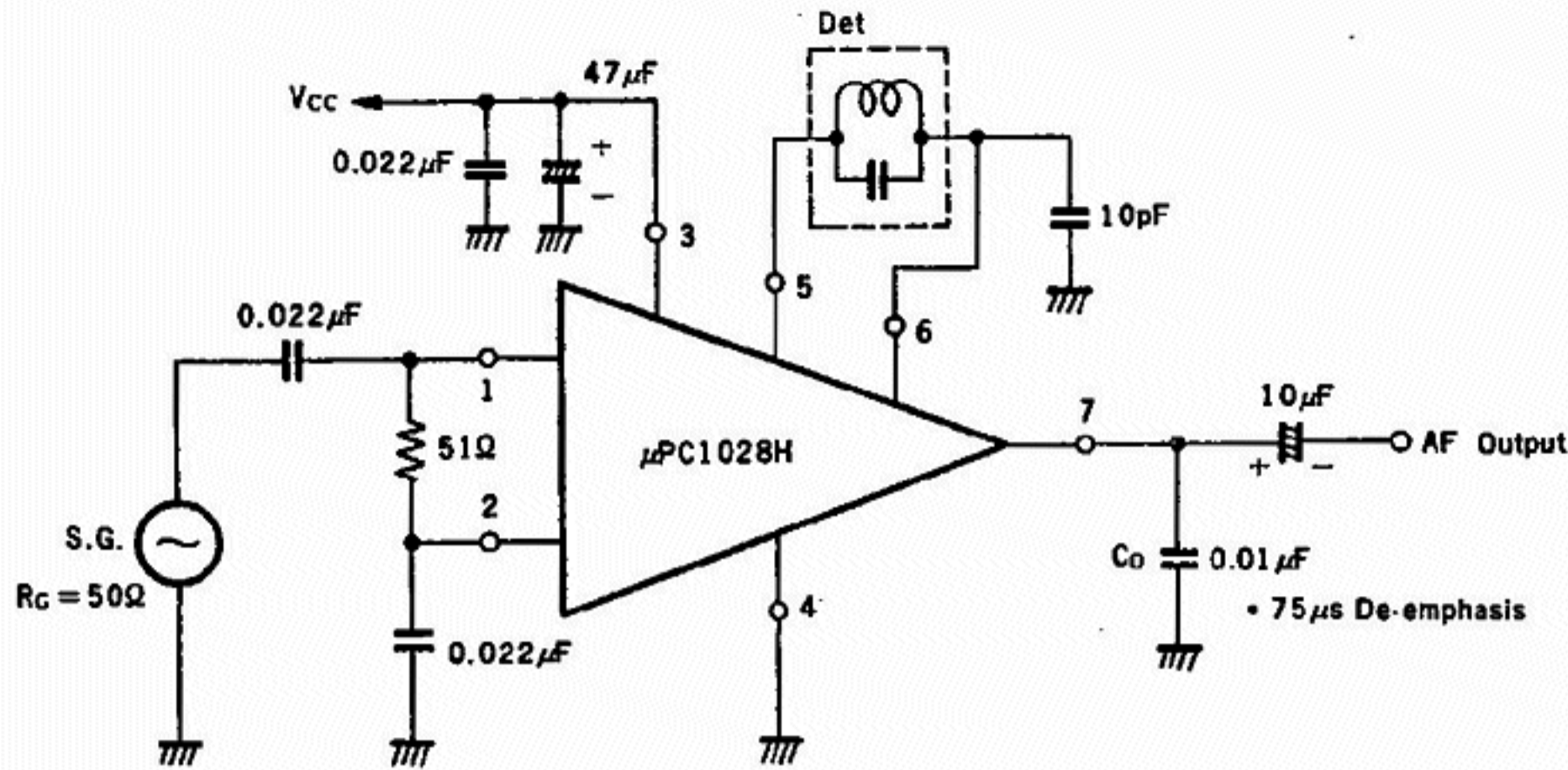
Operating Supply Voltage	10	V
Supply Voltage Range	8 to 15	V

### ELECTRICAL CHARACTERISTICS

( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 10\text{ V}$ ,  $f_o = 10.7\text{ MHz}$ ,  $f_{MLO} = 400\text{ Hz}$ ,  $\Delta f = \pm 22.5\text{ kHz}$ , Dev., Peak separation = 1.2 MHz,  $R_G = 50\ \Omega$ )

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Circuit Current	$I_{CC}$	8	12	16	mA	$V_{in} = 0$
Voltage Gain (IF Amp. stage)	$A_v$		67		dB	$V_{in} = 40\text{ dB}\mu$ , carrier signal only
Limiting Sensitivity	$V_{in}(lim.)$		48		dB $\mu$	Input voltage, -3 dB Limiting
AM Rejection	A.M.R.		40		dB	$V_{in} = 80\text{ dB}\mu$ , AM = 30 %
Detector Output Voltage	$V_o AF$		165		mV	$V_{in} = 80\text{ dB}\mu$
Total Harmonic Distortion	T.H.D. 1		0.3		%	$V_{in} = 80\text{ dB}\mu$ , $\Delta f = \pm 75\text{ kHz}$ Dev.
Total Harmonic Distortion	T.H.D. 2		0.1		%	$V_{in} = 80\text{ dB}\mu$ , $\Delta f = \pm 22.5\text{ kHz}$ Dev.
S/N Ratio	S/N		65		dB	$V_{in} = 80\text{ dB}\mu$
Output Impedance	$R_o$		7.5		k $\Omega$	$f = 400\text{ Hz}$

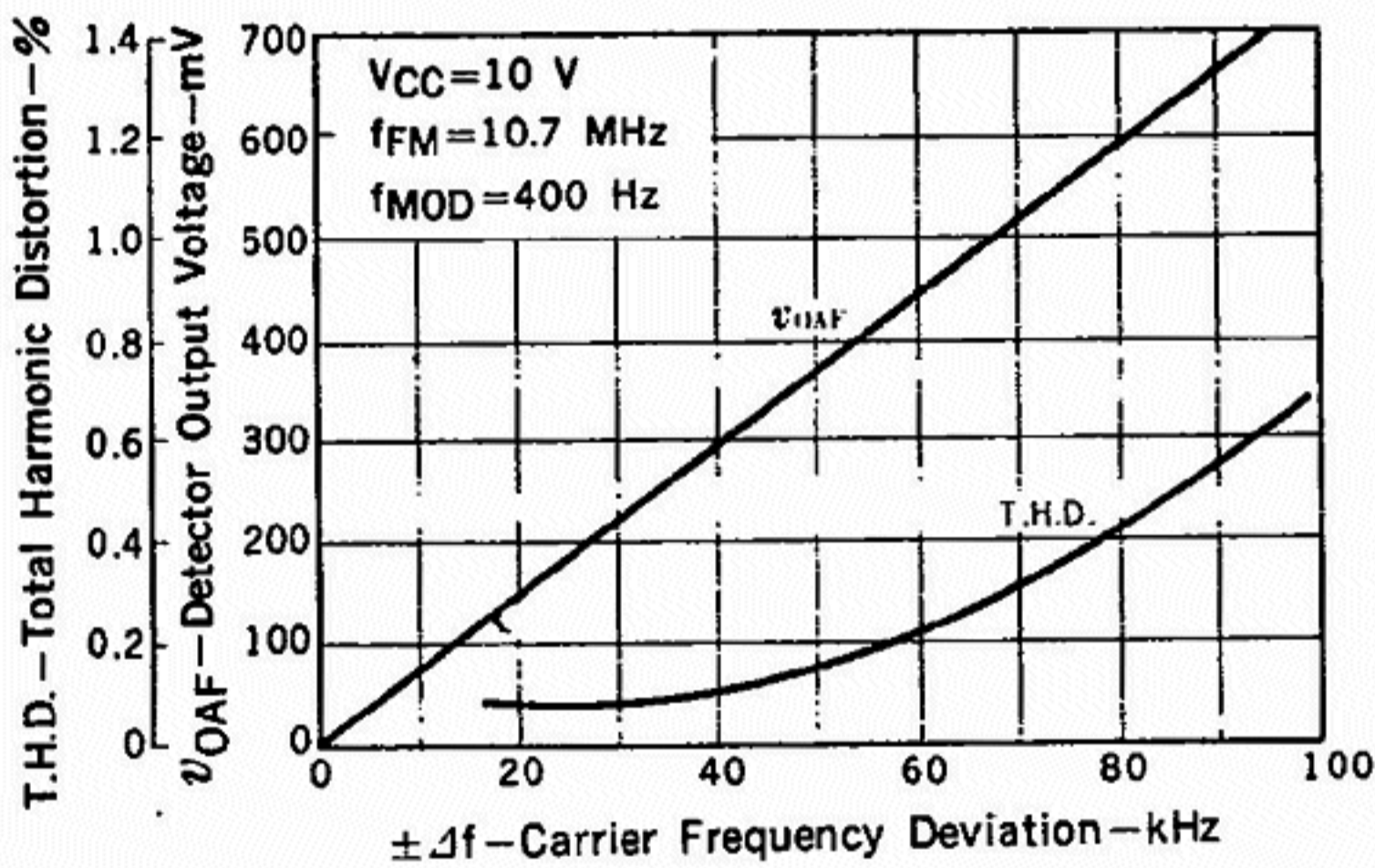
### TEST CIRCUIT



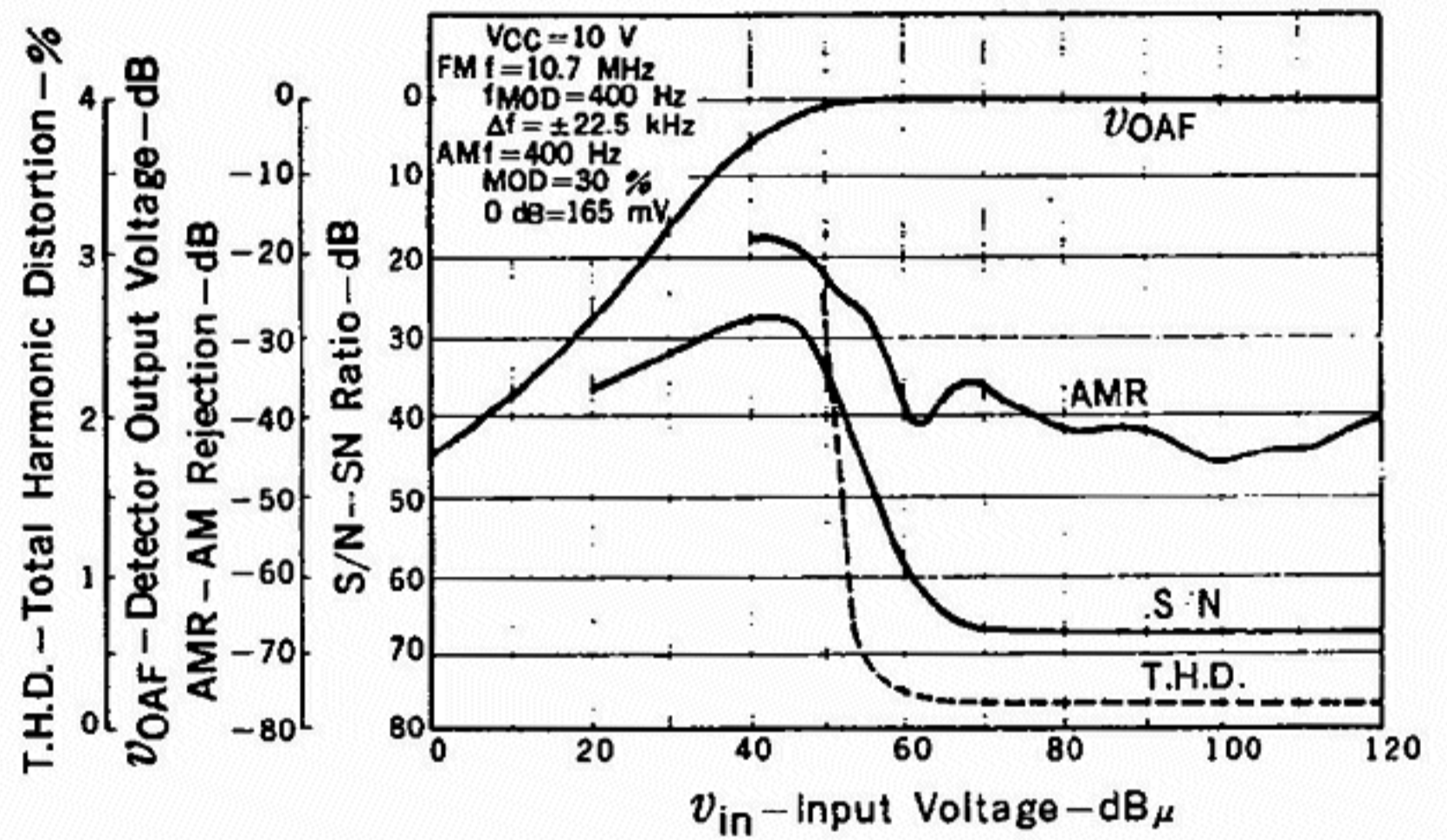
Det. Coil:  
 $L = 9 \mu\text{H}$ ,  $C = 22 \text{ pF}$ ,  $Q_U = 50$   
 TKACA-17473  
 TOKO INC., of Equivalent.

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

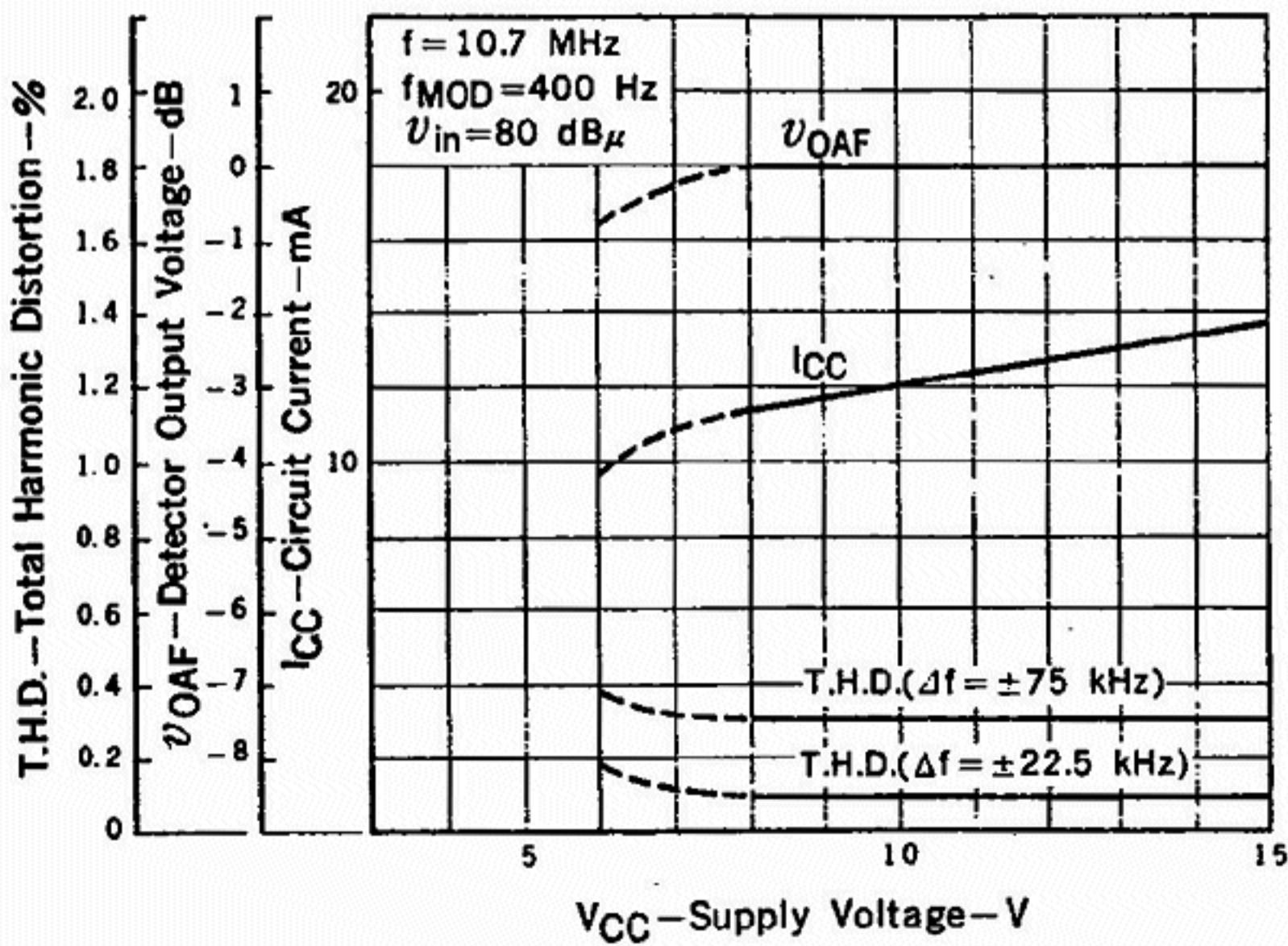
DETECTOR OUTPUT VOLTAGE, TOTAL HARMONIC DISTORTION vs. CARRIER FREQUENCY DEVIATION



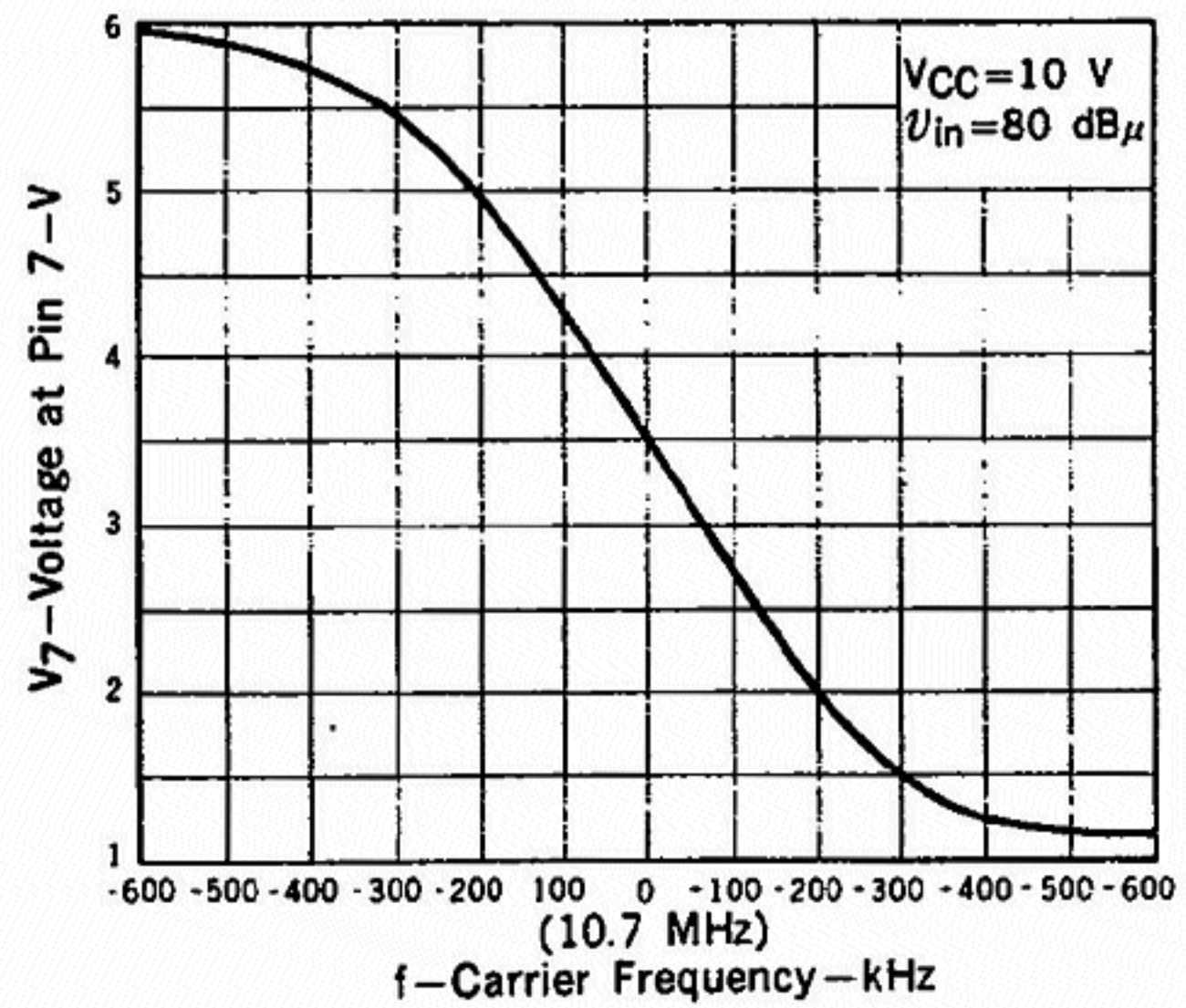
DETECTOR OUTPUT VOLTAGE, AM REJECTION, TOTAL HARMONIC DISTORTION, SN RATIO vs. INPUT VOLTAGE

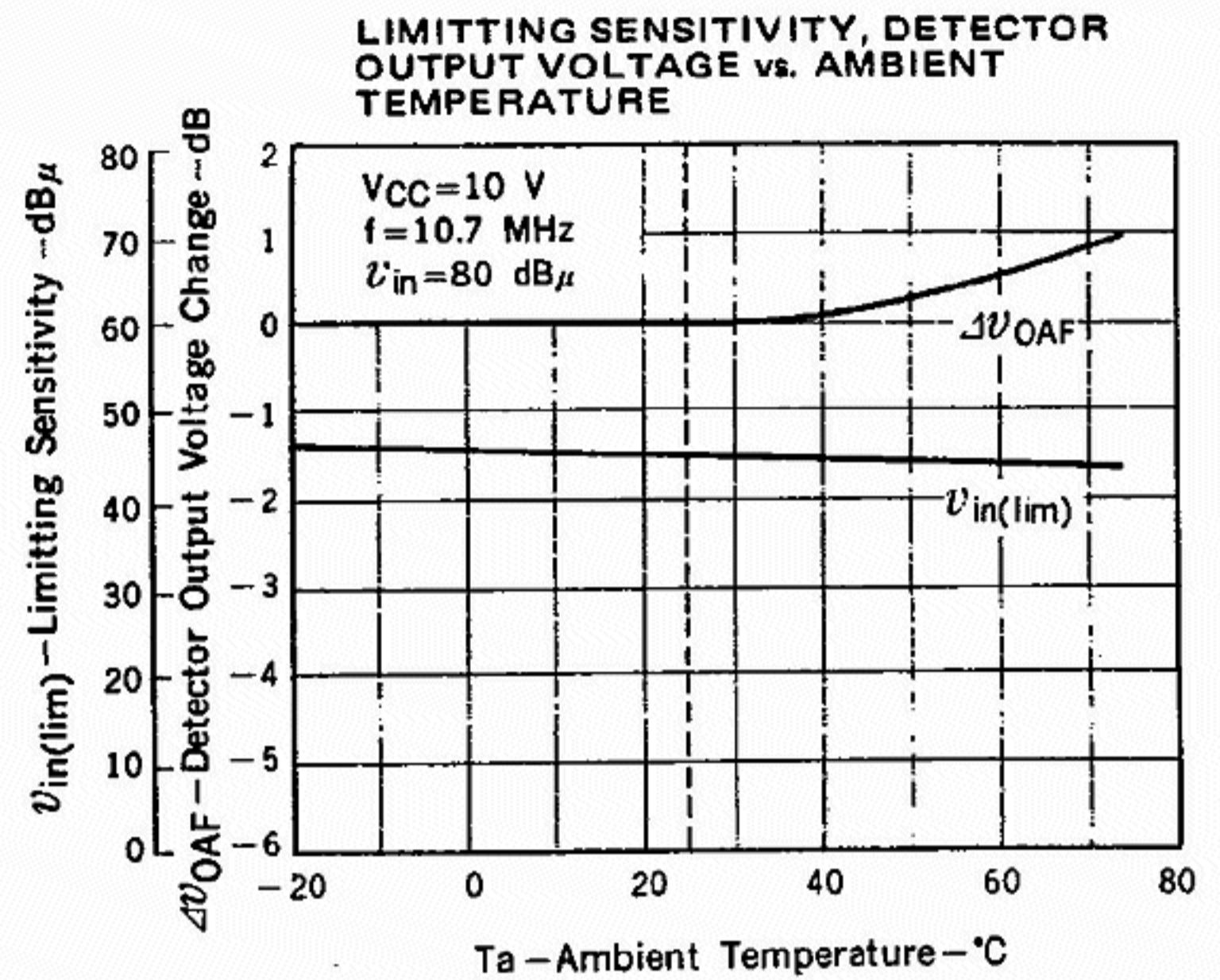
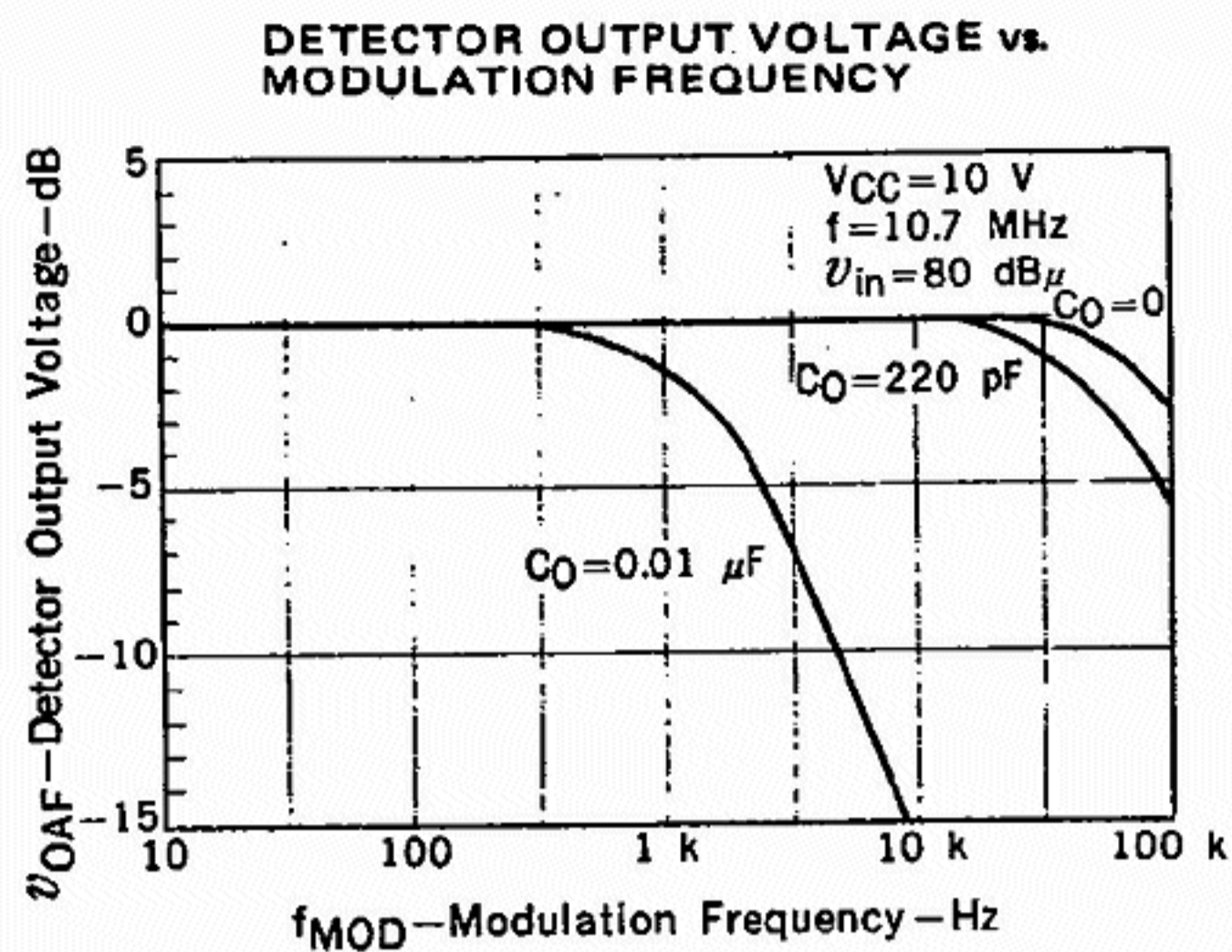


TOTAL HARMONIC DISTORTION, DETECTOR OUTPUT VOLTAGE, CIRCUIT CURRENT vs. SUPPLY VOLTAGE



S CURVE

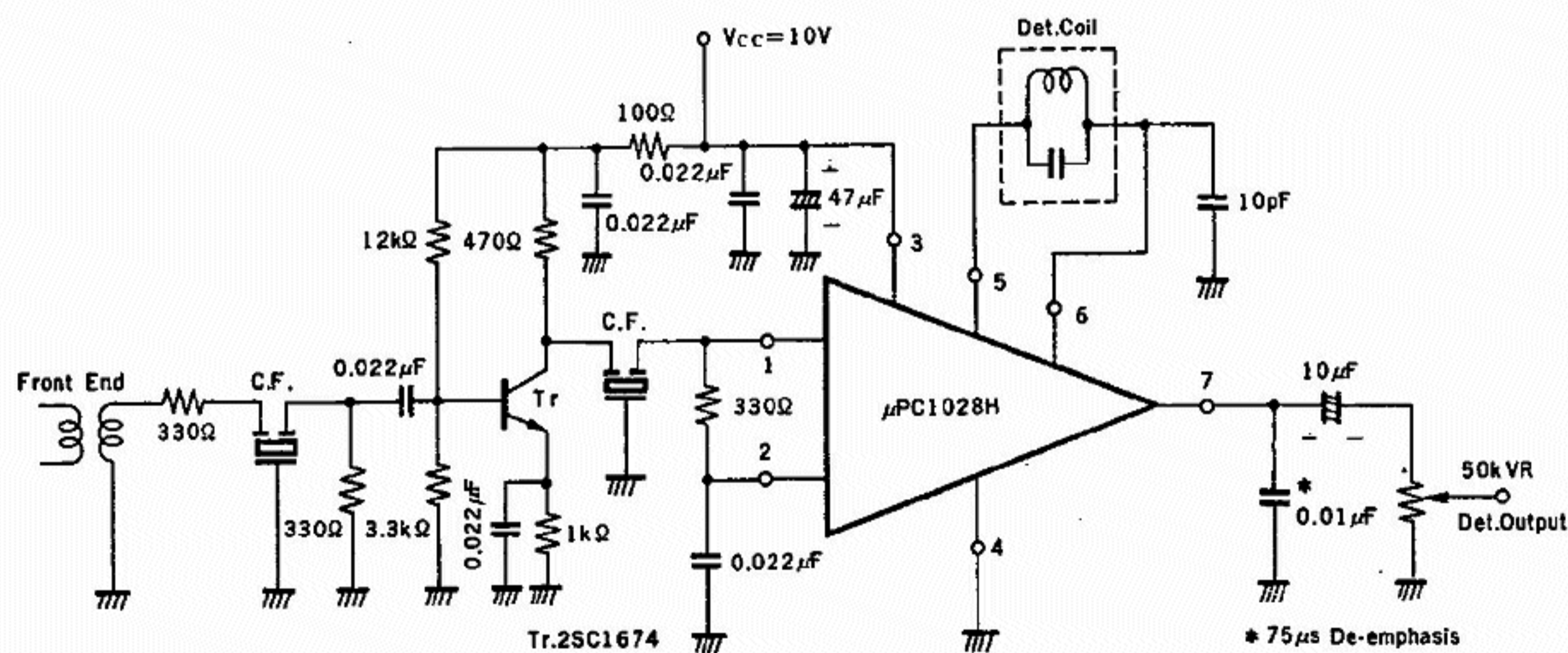




### DETECTOR COIL TUNING PROCEDURE

1. In the test circuit, the signal generator SG is connected to the input terminal pin 1, and the AF voltmeter and the total harmonic distortion meter are connected to the output terminal pin 7.
  2. The SG is set at  $f = 10.7\text{ MHz}$ ,  $f_{MOD} = 400\text{ Hz}$ ,  $\Delta f = \pm 22.5\text{ kHz}$  and the input level to the device under test should be  $200\text{ }\mu\text{V}$ .
  3. After the procedure of 1 and 2, the detector coil is adjusted so that the output level as indicated by the AF voltmeter is maintained the maximum value.
  4. Then the detector coil is finely adjusted so that the total harmonic distortion is obtained the minimum value.
  5. After the setting of  $1\text{ mV}$  input level, the procedure of 3 and 4 are repeated.
- (By the tuning at  $200\text{ }\mu\text{V}$  and  $1\text{ mV}$  input level, the device provides the most stable characteristic from weak to strong input signal level.)

### TYPICAL APPLICATION



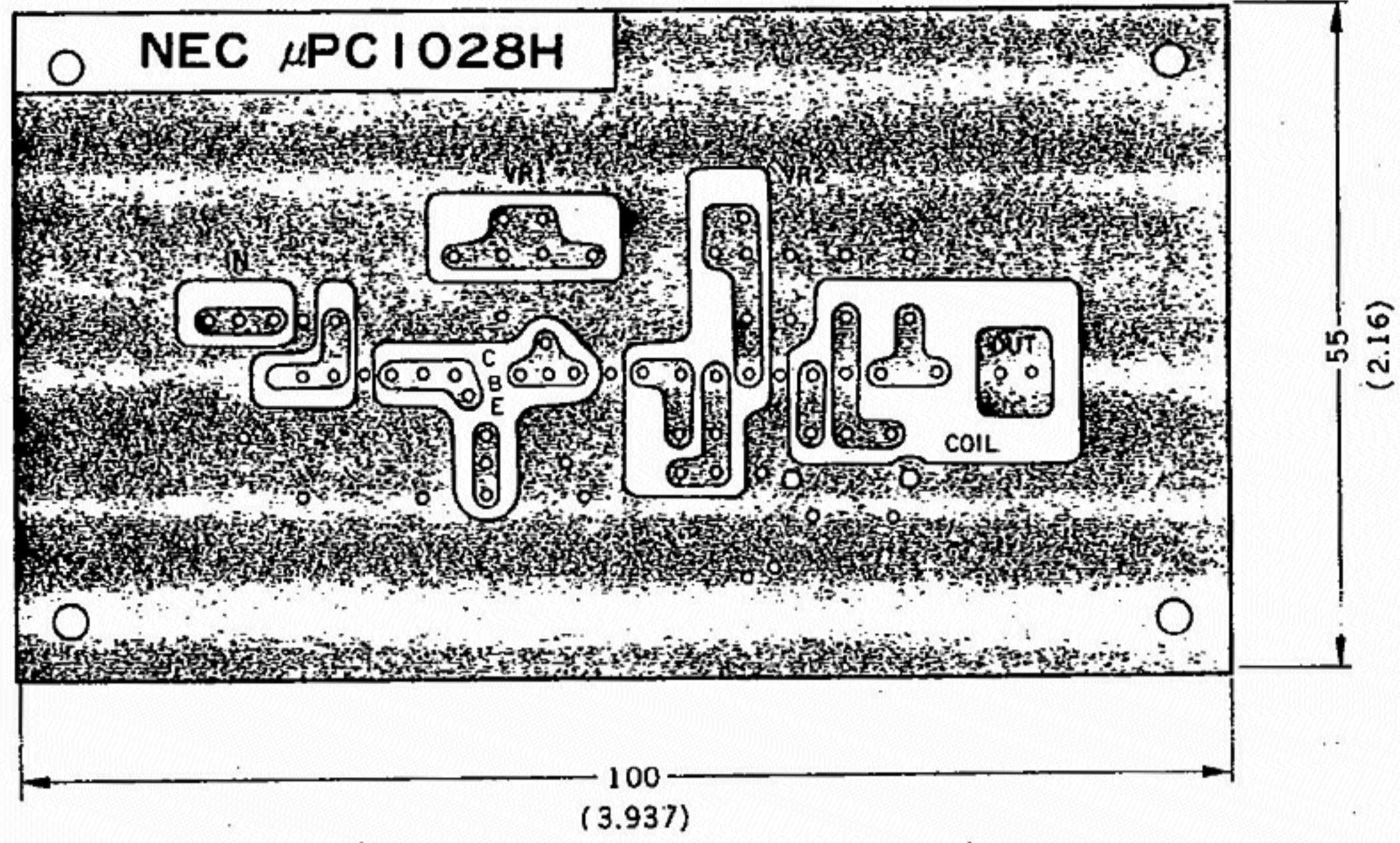
CF: Ceramic Filter  
 CFS-107  
 TOKO INC. made  
 SFE 10.7MA  
 MURATA CO. made  
 or equivalent.

Det. Coil  
 $f_0 = 10.7\text{ MHz}$ ,  $Q_0 = 50$   
 $C = 22\text{ pF}$  (Built in)  
 TKACA-17473Z  
 TOKO INC. made  
 or equivalent.

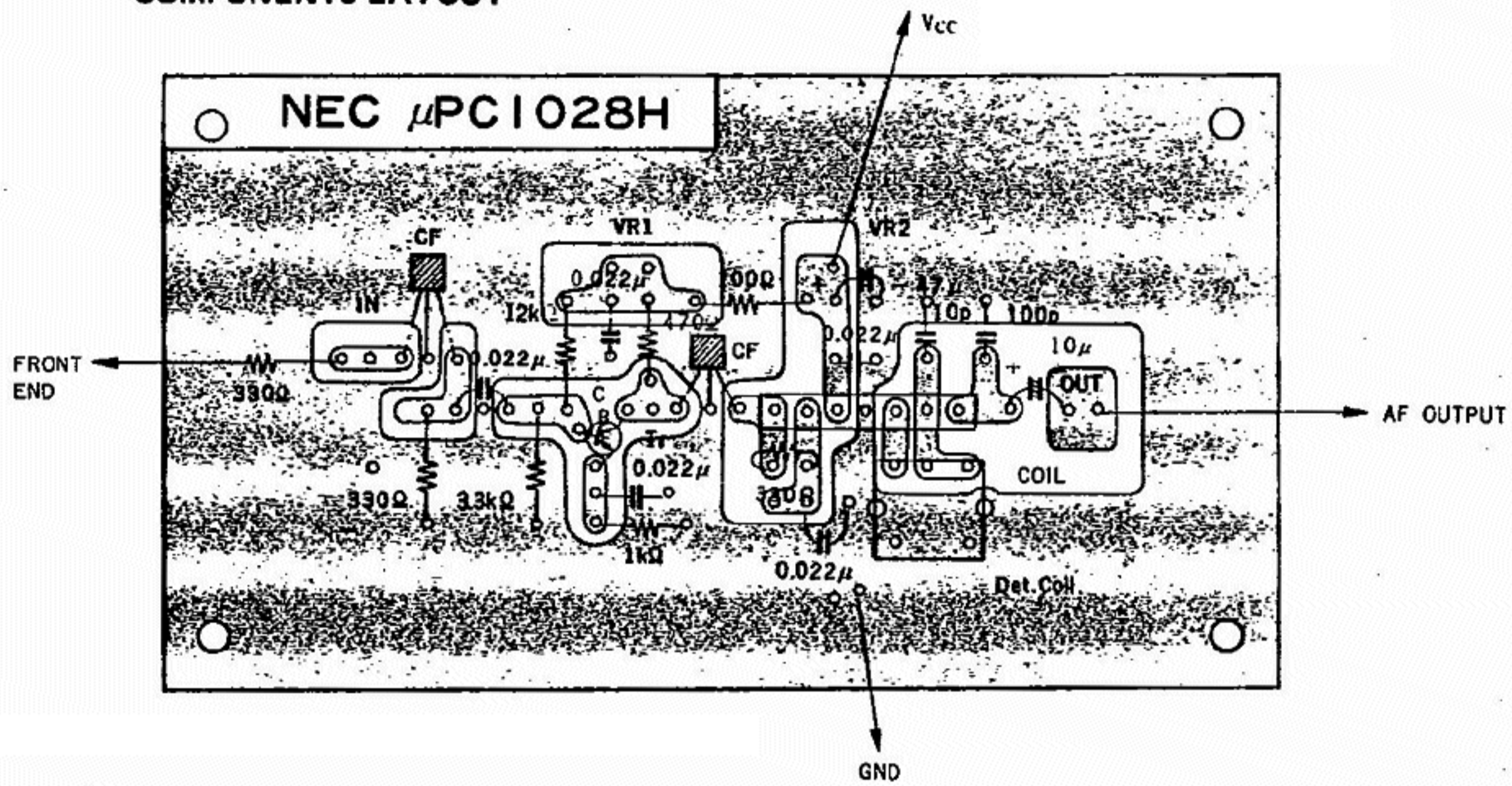
**PRINTED CIRCUIT BOARD PATTERN**

in millimeters (inches)

**FOIL SIDE**



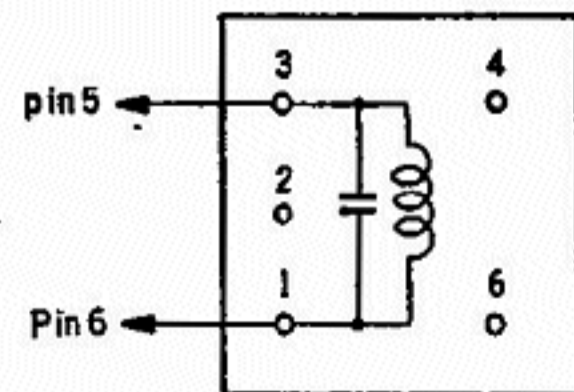
**COMPONENTS LAYOUT**



CF: Ceramic Filter  
SFE10.7 MA (Red)  
MURATA CO. made  
or equivalent

Tr: 2SC1674  
2SC1675

**DET COIL DATA**



TYPE TKACA-17473Z  
TOKO INC., made  
 $f_0 = 10.7 \text{ MHz}$   
 $C = 22 \text{ pF}$   
 $Q_U = 50$