

NEC
ELECTRONIC DEVICE

BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC1028H

FM IF AMPLIFIER WITH DIFFERENTIAL PEAK DETECTOR

SILICON BIPOLAR MONOLITHIC INTEGRATED CIRCUIT

DESCRIPTION

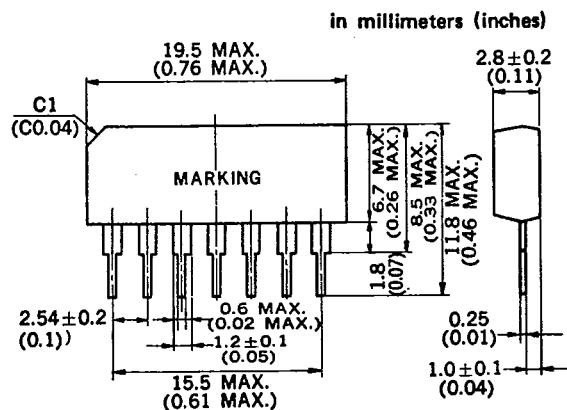
The μ PC1028H is a silicon monolithic integrated circuit intended for an FM IF amplifier with a differential peak detector.

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

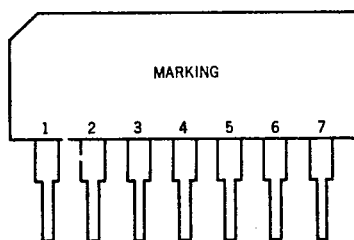
PACKAGE DIMENSIONS



FEATURES

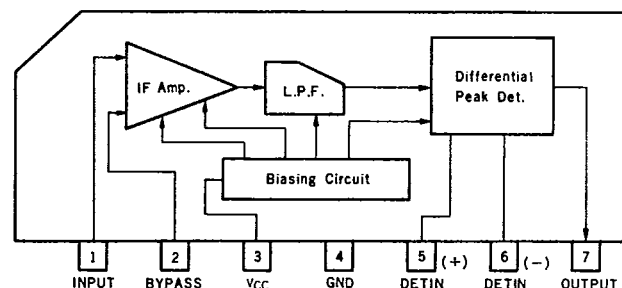
- Few external components required.
- Only one coil necessary in detector circuit, all tuning performed with the coil.
- Low distortion: T.H.D. = 0.3 % TYP. at 100 % modulation.
- SIP assures easy mounting on a printed circuit board.

CONNECTION DIAGRAM

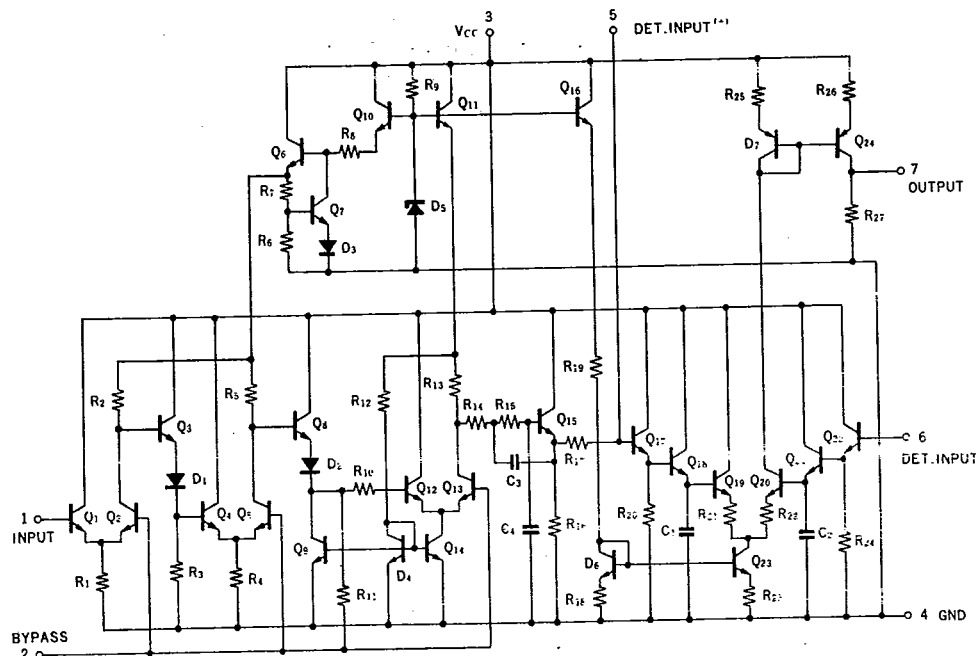


Pin No.	Electrical Connection
1	INPUT
2	BYPASS
3	VCC
4	GROUND
5	DET. IN(+)
6	DET. IN(-)
7	OUTPUT

BLOCK DIAGRAM



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

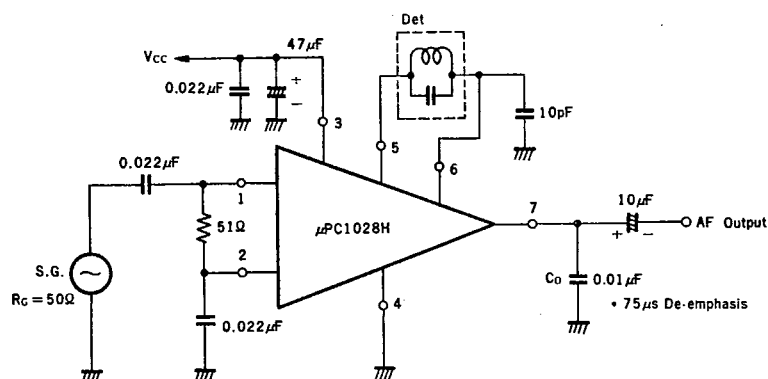
Operating Supply Voltage	10	V
Supply Voltage Range	8 to 15	V

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	$V_{in}(\text{lim.})$		48		dB μ	Input voltage, -3 dB Limiting
AM Rejection	A.M.R.		40		dB	$V_{in} = 80\text{ dB}\mu$, AM = 30 %
Detector Output Voltage	$V_o\text{ AF}$		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 Ω	$f = 400\text{ Hz}$

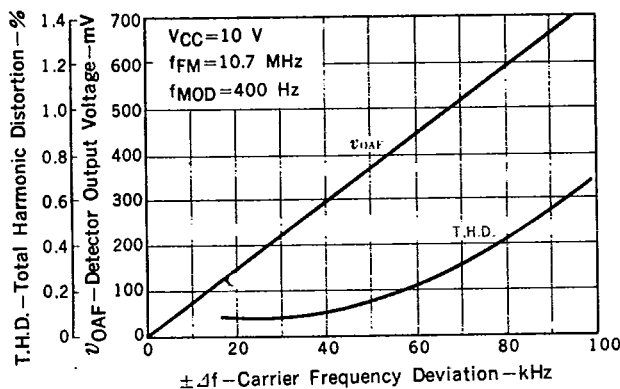
TEST CIRCUIT



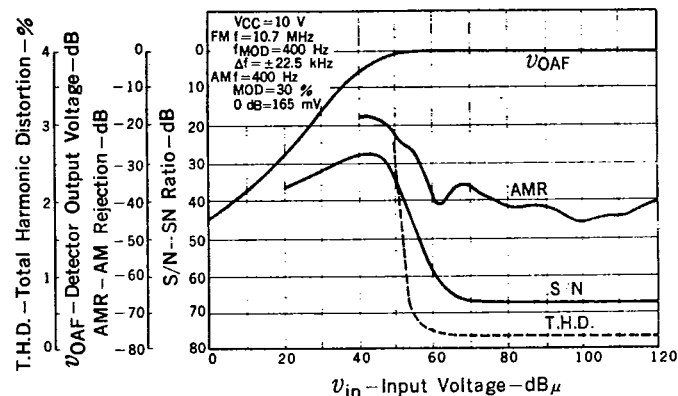
Det, Coil:
 $L = 9 \mu\text{H}$, $C = 22 \text{ pF}$, $Q_U = 50$
 TKACA-17473
 TOKO INC., or Equivalent.

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

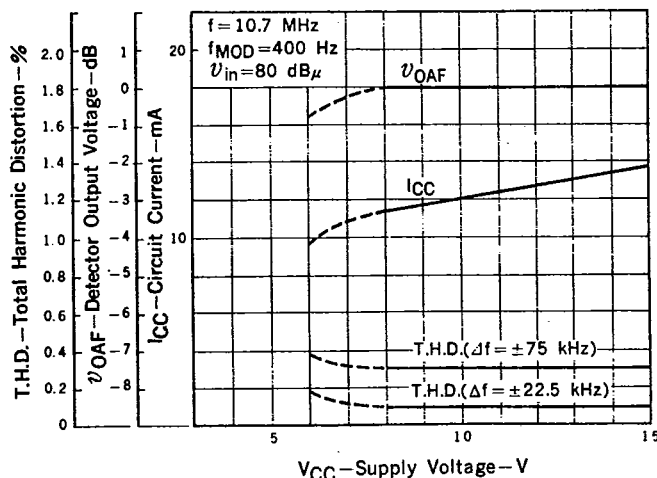
DETECTOR OUTPUT VOLTAGE, TOTAL HARMONIC DISTORTION vs. CARRIER FREQUENCY DEVIATION



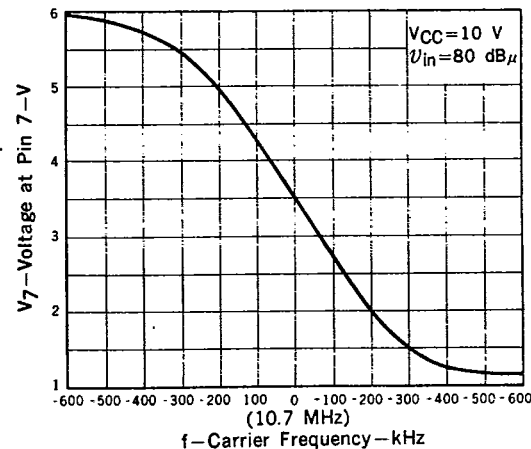
DETECTOR OUTPUT VOLTAGE, AM REJECTION, TOTAL HARMONIC DISTORTION, SN RATIO vs. INPUT VOLTAGE

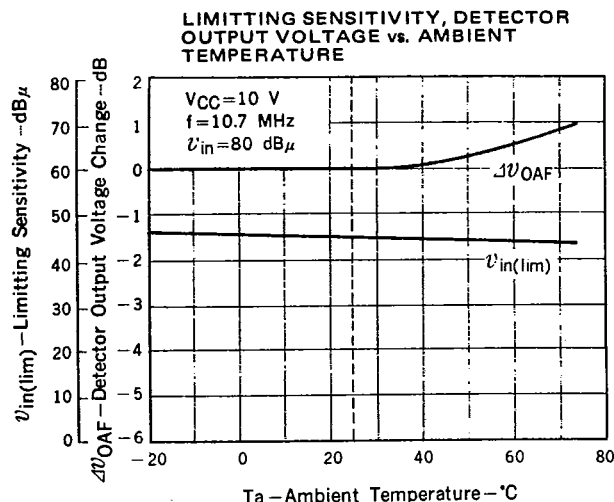
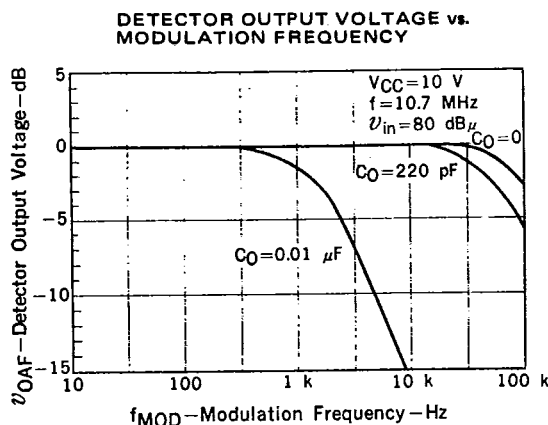


TOTAL HARMONIC DISTORTION, DETECTOR OUTPUT VOLTAGE, CIRCUIT CURRENT vs. SUPPLY VOLTAGE



S CURVE

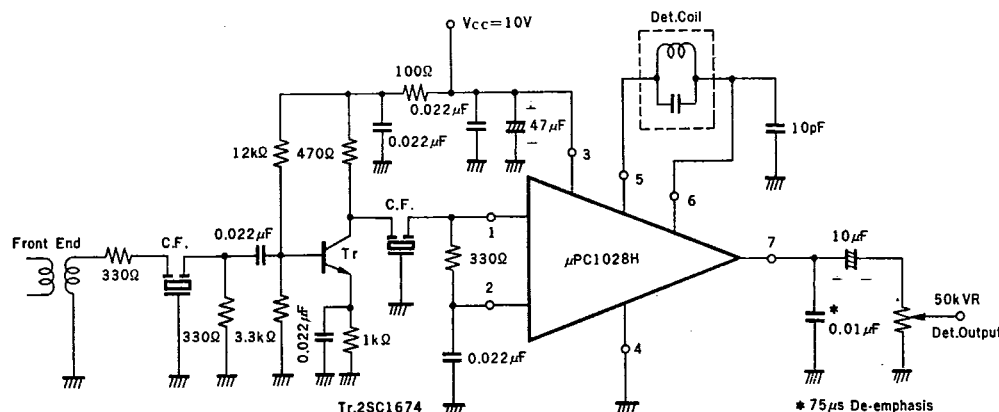




DETECTOR COIL TUNING PROCEDURE

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 mV input level, the procedure of 3 and 4 are repeated.
- (By the tuning at $200\text{ }\mu\text{V}$ and 1 mV input level, the device provides the most stable characteristic from weak to strong input signal level.)

TYPICAL APPLICATION



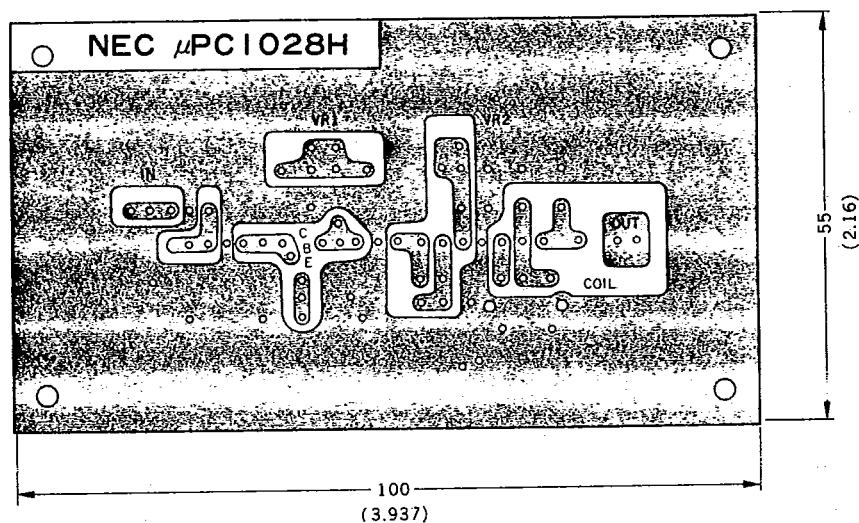
CF: Ceramic Filter
CFSA-107
TOKO INC. made
SFE 10.7MA
MURATA CO. made
or equivalent.

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

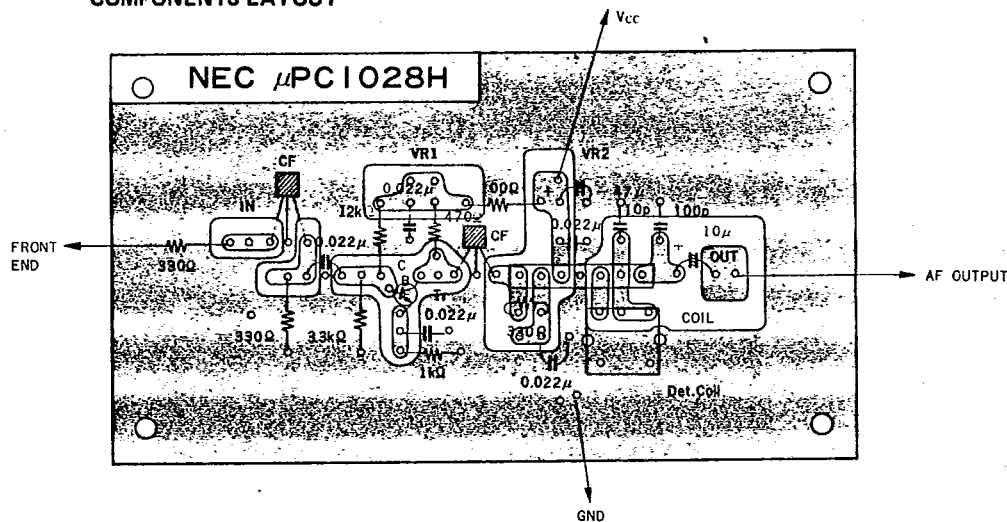
PRINTED CIRCUIT BOARD PATTERN

in millimeters (inches)

FOIL SIDE



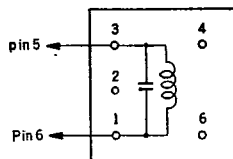
COMPONENTS LAYOUT



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

Tr: 2SC1674
2SC1675

DET COIL DATA



TYPE TKACA-17473Z
TOKO INC., made
 $f_0 = 10.7 \text{ MHz}$
 $C = 22 \text{ pF}$
 $Q_0 = 50$