

**NEC**  
 ELECTRON DEVICE

# BIPOLAR ANALOG INTEGRATED CIRCUIT

## $\mu$ PC1248V

### ELECTRONIC TUNING AM RADIO RECEIVER SUBSYSTEM SILICON BIPOLAR MONOLITHIC INTEGRATED CIRCUIT

#### DESCRIPTION

The  $\mu$ PC1248V is a monolithic integrated circuit used in an electronic tuner (E.T.) for AM radio which consists of double balanced mixer (D.B.M.), oscillator, IF amplifier, AM detector and station detector for E.T. system.

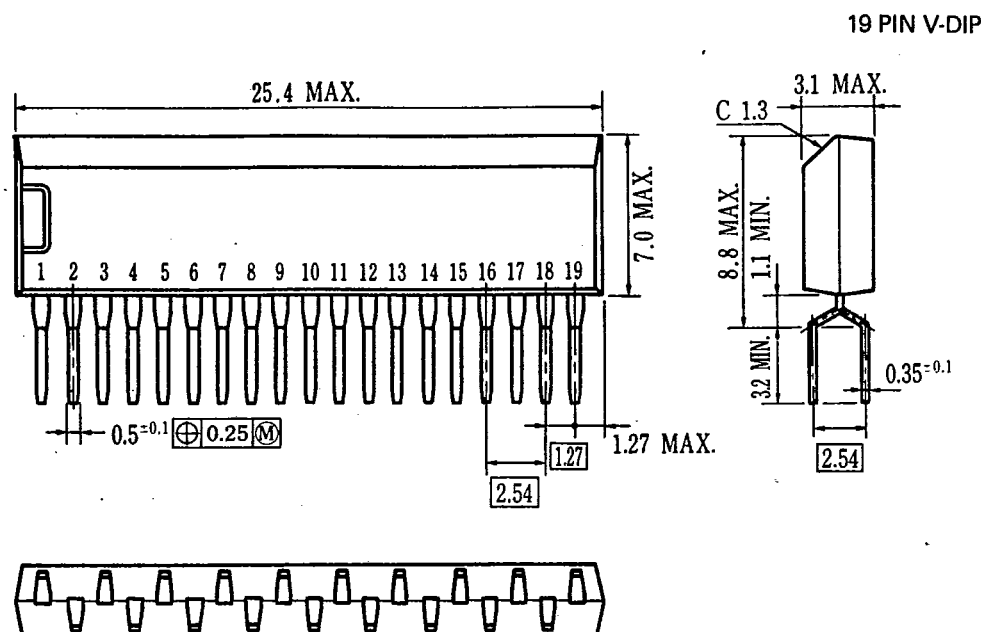
This IC also provides internal AGC circuit for the IF and RF amplifier stages, delayed output for an optional RF amplifier and an oscillator buffer amplifier to drive a logic section.

The  $\mu$ PC1248V is suitable for use in automotive radio receivers, specially where compact mounting is required such as car radio and car stereo sets, because it is packaged in 19-lead vertical dual in-line plastic package (V-DIP).

#### FEATURES

- Good sensitivity and S/N.
- Excellent cross modulation characteristic and IF rejection.
- Wide supply voltage range.
- On channel detector for auto scan stop.
- Occupation of minimum area in P.C. Board.

#### PACKAGE DIMENSIONS (Unit : mm)



19V-127-880

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

|                       |           |                                  |                  |
|-----------------------|-----------|----------------------------------|------------------|
| DC Supply Voltage     | $V_{CC}$  | 16                               | V                |
| Input Voltage         | $V_i$     | 3.0                              | V <sub>p-p</sub> |
| Package Dissipation   | $P_D$     | 430 ( $T_a = 75^\circ\text{C}$ ) | mW               |
| Operating Temperature | $T_{opt}$ | -30 to +75                       | $^\circ\text{C}$ |
| Storage Temperature   | $T_{stg}$ | -40 to +125                      | $^\circ\text{C}$ |

## RECOMMENDED OPERATING CONDITION

|                         |          |           |   |
|-------------------------|----------|-----------|---|
| DC Supply Voltage Range | $V_{CC}$ | 7.0 to 16 | V |
|-------------------------|----------|-----------|---|

ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 8\text{ V}$ ,  $f = 1\text{ MHz}$ ,  $f_{mod} = 400\text{ Hz}$ ,  $m = 30\%$ ,  $R_L = 100\text{ k}\Omega$ )

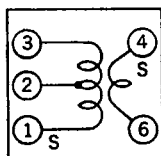
| CHARACTERISTIC        | SYMBOL     | MIN. | TYP. | MAX. | UNIT                 | TEST CONDITION                   |
|-----------------------|------------|------|------|------|----------------------|----------------------------------|
| Circuit Current       | $I_{CC}$   | 10   | 16   | 22   | mA                   | no signal                        |
| Maximum Sensitivity   | MS         | 10   | 17   | 24   | dB $\mu\text{V}$     | $V_O = 25\text{ mV}_{r.m.s.}$    |
| Signal-to-Noise Ratio | $S/N_1$    | 16   | 20   |      | dB                   | $V_i = 26\text{ dB}\mu\text{V}$  |
| Signal-to-Noise Ratio | $S/N_2$    | 47   | 52   |      | dB                   | $V_i = 74\text{ dB}\mu\text{V}$  |
| Detector Output Volt. | $V_O$      | 80   | 110  | 150  | mV <sub>r.m.s.</sub> | $V_i = 74\text{ dB}\mu\text{V}$  |
| Harmonic Distortion   | T.H.D.     |      | 0.8  | 1.0  | %                    | $V_i = 126\text{ dB}\mu\text{V}$ |
| On Channel Signal     | $V_{SD-L}$ |      |      | 0.5  | V                    | $V_i = 0\text{ dB}\mu\text{V}$   |
|                       | $V_{SD-H}$ | 7.0  |      |      | V                    | $V_i = 74\text{ dB}\mu\text{V}$  |

TUNER PERFORMANCE CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 8.0\text{ V}$ ,  $f = 1.0\text{ MHz}$ ,  $f_{mod} = 400\text{ Hz}$ ,  $m = 30\%$ )

| CHARACTERISTIC            | SYMBOL        | VALUE   | UNIT                 | TEST CONDITION                                                                                                                  |
|---------------------------|---------------|---------|----------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Maximum Sensitivity       | MS            | 17      | dB $\mu\text{V}$     | $V_O = 25\text{ mV}_{r.m.s.}$                                                                                                   |
| Usable Sensitivity        | US            | 26      | dB $\mu\text{V}$     | $S/N = 20\text{ dB}$                                                                                                            |
| Signal-to-Noise Ratio     | $S/N$         | 52      | dB                   | $V_i = 74\text{ dB}\mu\text{V}$                                                                                                 |
| Det. Output Voltage       | $V_O$         | 110     | mV <sub>r.m.s.</sub> | $V_i = 74\text{ dB}\mu\text{V}$                                                                                                 |
| Total Harmonic Distortion | T.H.D.1       | 0.8     | %                    | $V_i = 74\text{ dB}\mu\text{V}$                                                                                                 |
|                           | T.H.D.2       | 0.8     | %                    | $V_i = 126\text{ dB}\mu\text{V}$                                                                                                |
|                           | T.H.D.3       | 1.5     | %                    | $V_i = 74\text{ dB}\mu\text{V}$ , $m = 80\%$                                                                                    |
| Image Rejection Ratio     | IMR           | 60      | dB                   | $f = 1.4\text{ MHz}$                                                                                                            |
| IF Rejection Ratio        | IFR           | > 110   | dB                   | $f = 0.6\text{ MHz}$                                                                                                            |
| Sensitivity               | ACA           | 45      | dB                   | $\Delta f = \pm 9\text{ kHz}$                                                                                                   |
| Tweet                     | Tweet 1       | 24      | dB                   | $V_i = 40\text{ dB}\mu\text{V}$ , 2IF, 3IF                                                                                      |
|                           | Tweet 2       | 50      | dB                   | $V_i = 100\text{ dB}\mu\text{V}$ , 2IF, 3IF                                                                                     |
| X-mod Rejection Ratio     | X-mod         | 100     | dB $\mu\text{V}$     | $V_i = 74\text{ dB}\mu\text{V}$ , $f_{ud} = f_d \pm 40\text{ kHz}$ , $f_d = 1.4\text{ MHz}$<br>$V_O - V_{O-ud} = -23\text{ dB}$ |
| Oscillation Voltage       | $V_{osc}$     | 150     | mV <sub>r.m.s.</sub> |                                                                                                                                 |
| Osc Buffer Output Volt.   | $V_{osc-out}$ | 2.7     | V <sub>p-p</sub>     | $R_{L1} = 100\text{ k}\Omega$                                                                                                   |
| On-Channel Bandwidth      | $BW_{SD}$     | $\pm 3$ | kHz                  | $V_{SH} = 0.7 V_{CC}$ , $V_i = 74\text{ dB}\mu\text{V}$                                                                         |
| DX Sensitivity            | SS            | 21      | dB $\mu\text{V}$     | $V_{SH} = 0.7 V_{CC}$ , $R_{L2} = 22\text{ k}\Omega$                                                                            |
| LO Sensitivity            | SS-LO         | 68      | dB $\mu\text{V}$     | $V_{SH} = 0.7 V_{CC}$                                                                                                           |

# COIL DATA

T1 : ANT Coil



7BR-7653N (TOKO)

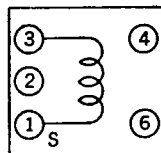
①-② ②-③ ④-⑥

14T 55T 28T

$L=170 \mu H \pm 6 \%$

$Q_u=80$

T2 : RF Coil



7BR-7654Z (TOKO)

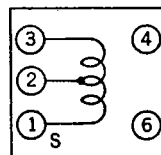
①-③

69T

$L=170 \mu H \pm 6 \%$

$Q_u=80$

T3 : OSC Coil



7BRS-7497Y (TOKO)

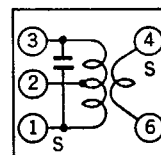
①-② ②-③

27T 27T

$L=105 \mu H \pm 6 \%$

$Q_u=145$

IFT<sub>1</sub>



7MC-4718N (TOKO)

①-② ②-③ ④-⑥

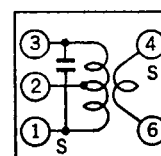
69T 77T 14T

$f_o=455 \text{ kHz} \pm 5\%$

$C_t=180 \text{ pF}$

$Q_u=115 \pm 20 \%$

IFT<sub>2</sub>



7MC-7656N (TOKO)

①-② ②-③ ④-⑥

74T 74T 10T

$f_o=455 \text{ kHz} \pm 3 \%$

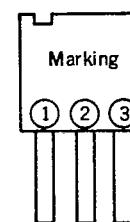
$C_t=180 \text{ pF}$

$Q_u=110 \pm 20 \%$

(TOKO)

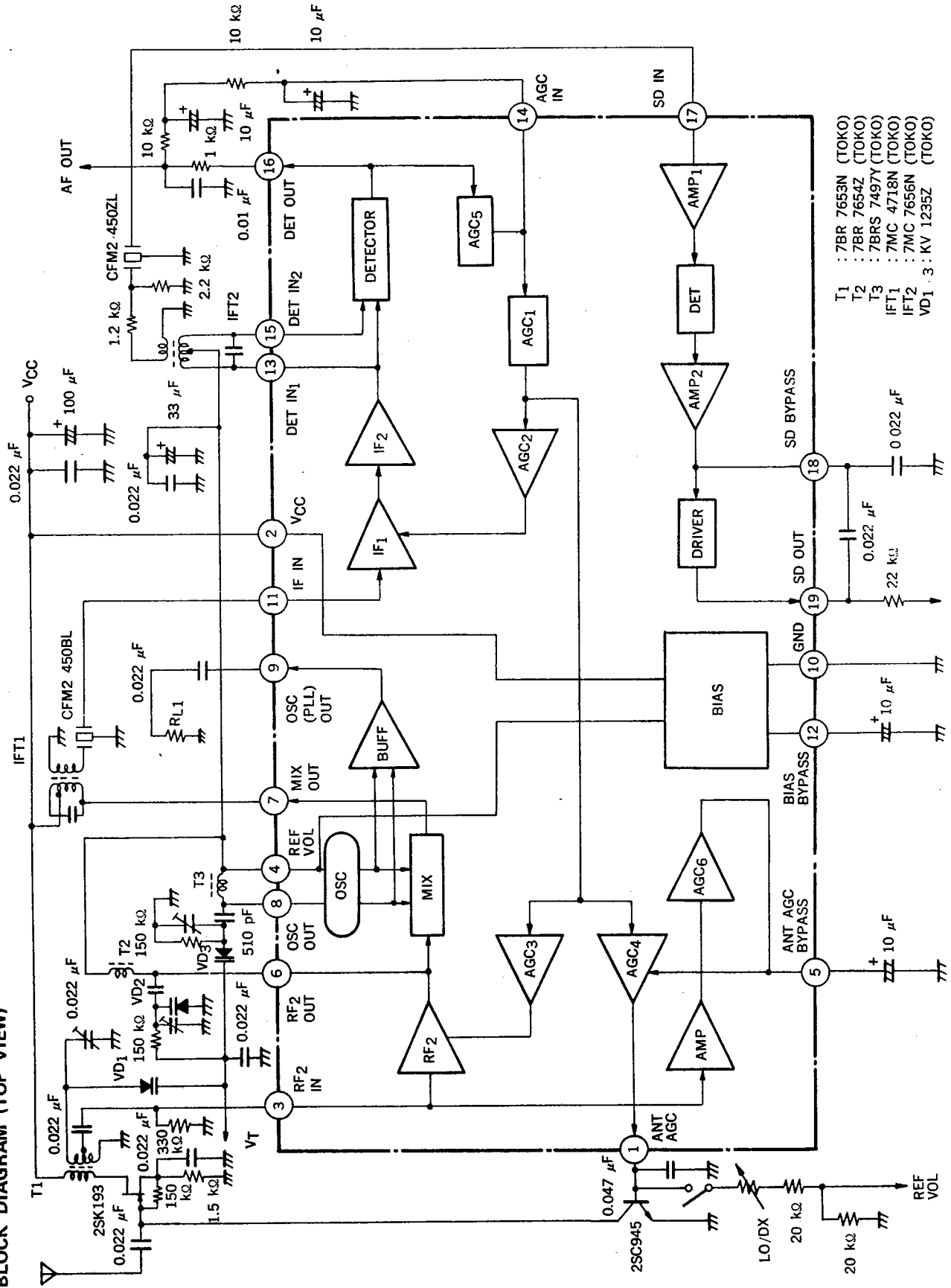
## CERAMIC FILTER

| ITEM                            | CFM2-450BL     | CFM2-450ZL     |
|---------------------------------|----------------|----------------|
| Center Frequency                | 450 kHz        | 450 kHz        |
| 6 dB Bandwidth                  | 6 kHz MIN.     | 4 kHz MIN.     |
| Selectivity $\pm 9 \text{ kHz}$ | 16 dB MIN.     | 18 dB MIN.     |
| Insertion Loss                  | 6 dB MAX.      | 6 dB MAX.      |
| Input Impedance                 | 1.5 k $\Omega$ | 1.0 k $\Omega$ |
| Output Impedance                | 2.0 k $\Omega$ | 1.5 k $\Omega$ |



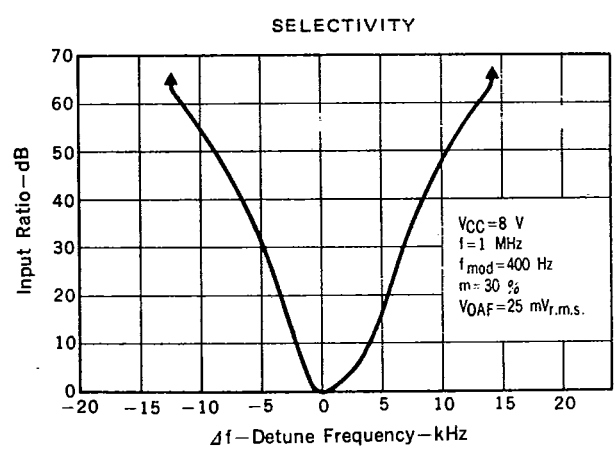
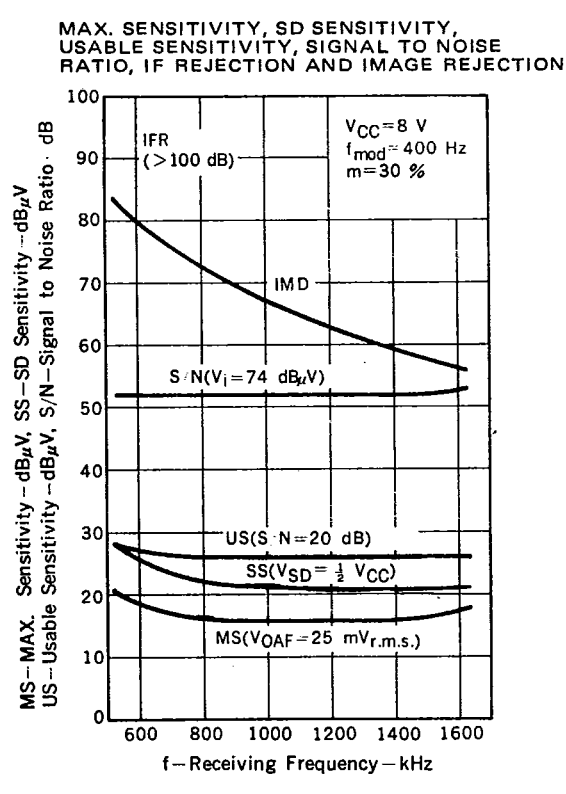
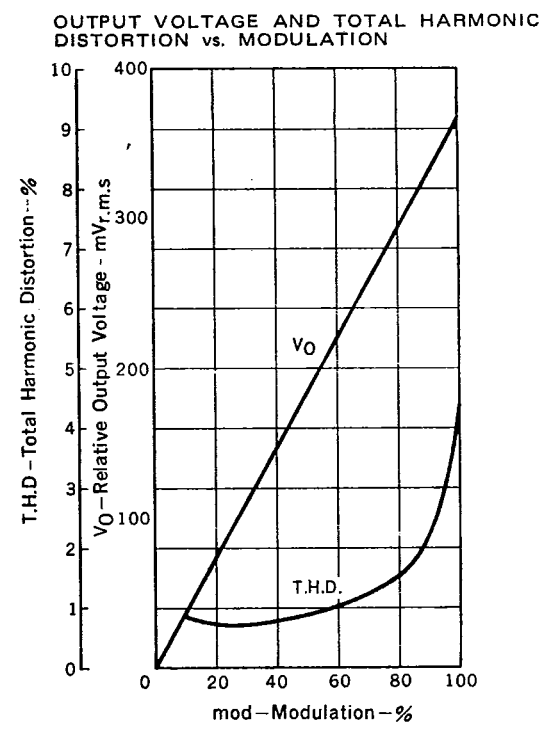
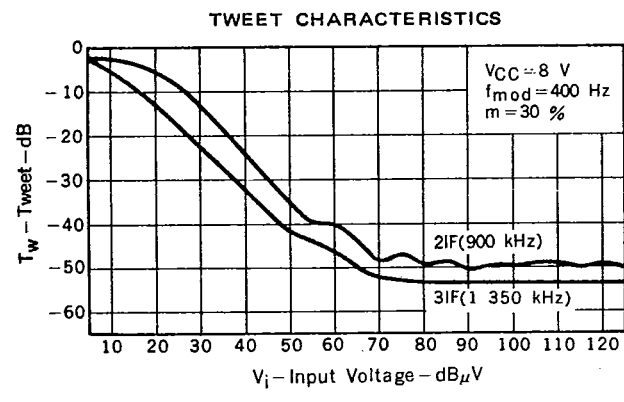
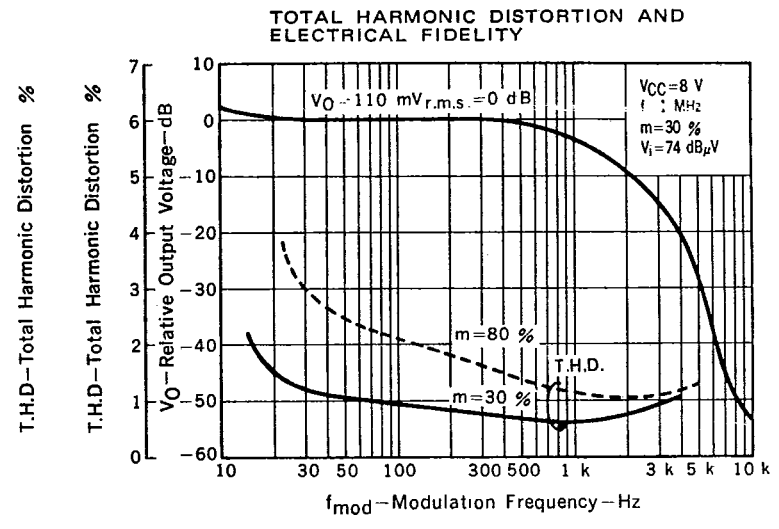
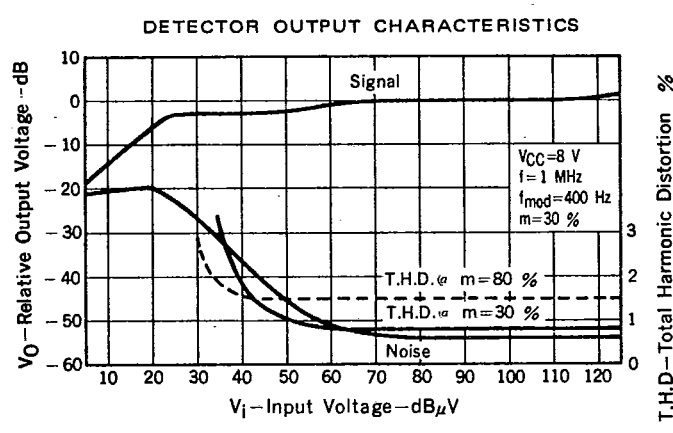
① Input  
② GND  
③ Output

BLOCK DIAGRAM (TOP VIEW)

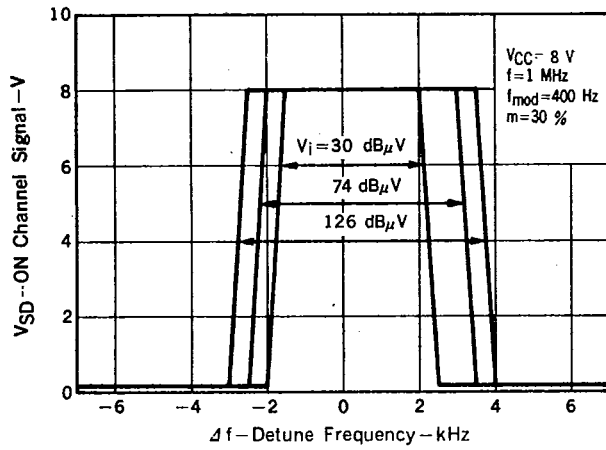


T1 : 7BR 7653N (TOKO)  
T2 : 7BR 7654Z (TOKO)  
T3 : 7BR 7497Y (TOKO)  
IFT1 : 7MC 4718N (TOKO)  
IFT2 : 7MC 7656N (TOKO)  
VD1 : 3 : KV 1235Z (TOKO)

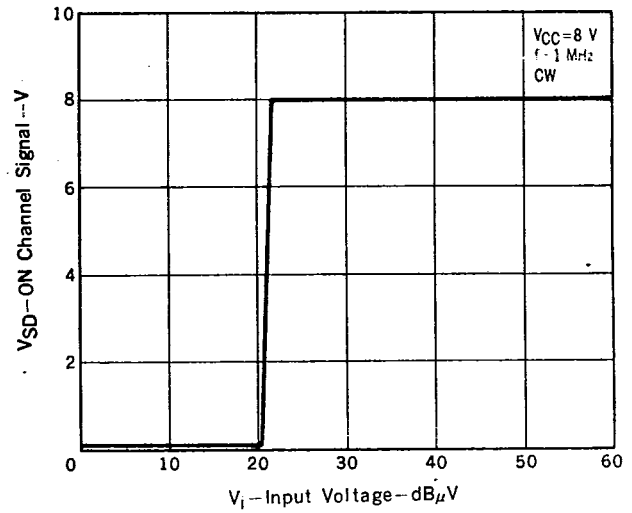
TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



ON CHANNEL BANDWIDTH



ON CHANNEL SENSITIVITY



SUPPLY VOLTAGE CHARACTERISTICS

