

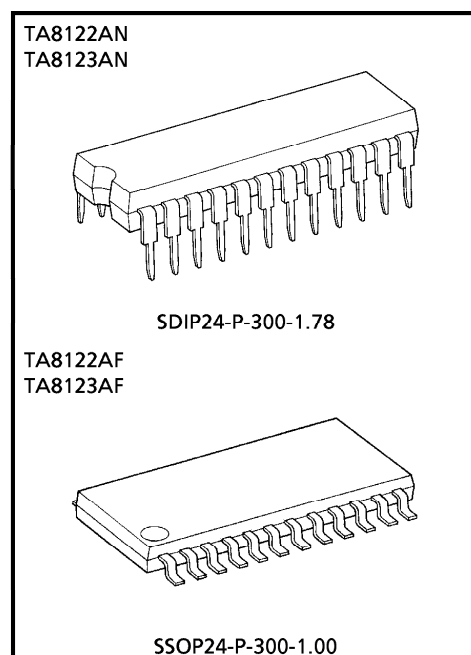
# **TA8122AN, TA8122AF, TA8123AN, TA8123AF**

## **3V AV / FM 1CHIP TUNER IC**

TA8122AN/AF and TA8123AN/AF are the AM/FM 1Chip Tuner ICs, which are designed for Portable Radios and 3V Headphone Radios.

### **FEATURES**

- Built-in
  - FM F/E, AM/FM IF and FM ST DET
- AM Detector Coil, FM IFT and IF Coupling Condenser are not needed.
- For adopting Ceramic Discriminator and Ceramic Resonator, it is not necessary to adjust the FM Quad Detector Circuit and FM ST DET VCO Circuit.
- S curve characteristics of FM detection output in TA8122AN/AF and TA8123AN/AF are reverse to each other.
  - TA8122AN/AF : Reverse characteristic
  - TA8123AN/AF : Normal characteristic
- Compact Package
  - TA8122AN/23AN : Shrink DIP 24 pin (1.78mm pitch)
  - TA8122AF/23AF : Mini Flat Package 24 pin
- Operating Supply Voltage Range
  - $V_{CC} = 1.8 \sim 7.0V$  ( $T_a = 25^\circ C$ )

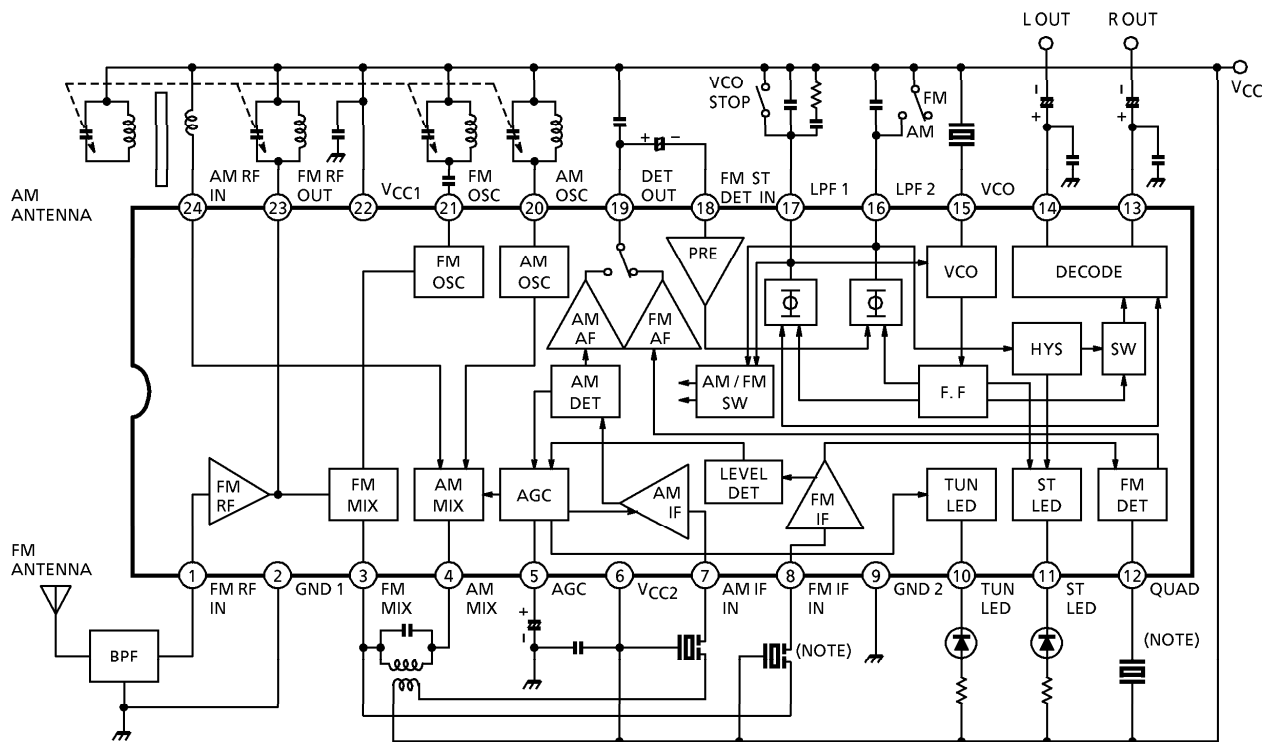


Weight  
 SDIP24-P-300-1.78 : 1.2g (Typ.)  
 SSOP24-P-300-1.00 : 0.31g (Typ.)

961001EBA2

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BLOCK DIAGRAM



(Note)  
We recommend the kit of the ceramic filter and the ceramic resonator which are shown in the table as below.  
It is necessary to meet the center frequency of the ceramic filter and the ceramic resonator, otherwise there are some cases that the characteristics get worse.

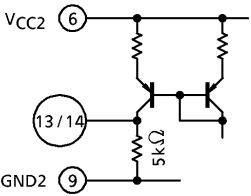
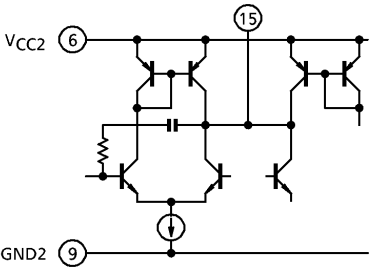
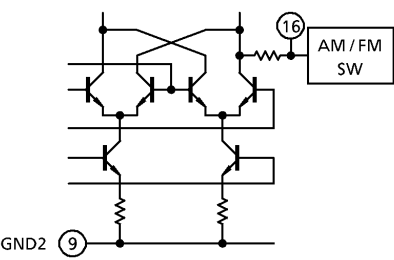
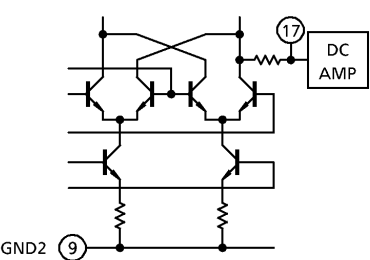
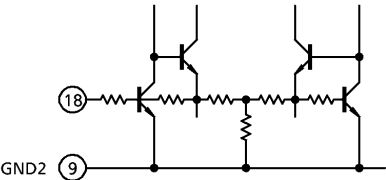
| KIT NAME  | COMBINATION    |      |                   |      |
|-----------|----------------|------|-------------------|------|
|           | CERAMIC FILTER | Q'ty | CERAMIC RESONATOR | Q'ty |
| KMFC403-Z | SFE10.7MA5-Z   | 2    | CDA10.7MG16-Z     | 1    |
| KMFC411-Z | SFE10.7MA5-Z   | 1    | CDA10.7MG16-Z     | 1    |
| KMFC422-Z | SFE10.7MA2-Z   | 2    | CDA10.7MG16-Z     | 1    |
| KMFC435-Z | SFE10.7MA5L-Z  | 2    | CDA10.7MG16-Z     | 1    |
| KMFC445-Z | SFE10.7MA5L-Z  | 1    | CDA10.7MG16-Z     | 1    |

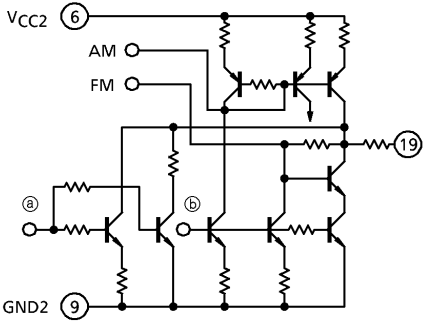
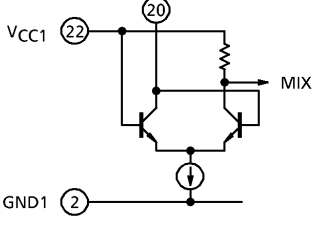
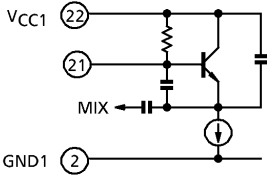
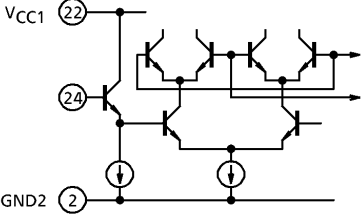
MANUFACTURER : MURATA MFG. CO., LTD

**EXPLANATION OF TERMINALS**

| PIN No. | CHARACTERISTIC              | INTERNAL CIRCUIT | DC VOLTAGE (V)<br>(AT NO SIGNAL) |     |
|---------|-----------------------------|------------------|----------------------------------|-----|
|         |                             |                  | AM                               | FM  |
| 1       | FM-RF IN                    |                  | 0                                | 0.7 |
| 2       | GND1 (GND For RF Stage)     | —                | 0                                | 0   |
| 3       | FM MIX                      |                  | 2.3                              | 1.8 |
| 4       | AM MIX                      |                  | 2.3                              | 1.8 |
| 5       | AGC (AM AGC)                |                  | 0                                | 0   |
| 6       | VCC2 (VCC For IF/MPX Stage) | —                | 3.0                              | 3.0 |

| PIN No. | CHARACTERISTIC                | INTERNAL CIRCUIT | DC VOLTAGE (V)<br>(AT NO SIGNAL) |     |
|---------|-------------------------------|------------------|----------------------------------|-----|
|         |                               |                  | AM                               | FM  |
| 7       | AM IF IN                      |                  | 3.0                              | 3.0 |
| 8       | FM IF IN                      |                  | 3.0                              | 3.0 |
| 9       | GND2 (GND For IF / MPX Stage) | —                | 0                                | 0   |
| 10      | TUN LED (Tuning LED)          |                  | —                                | —   |
| 11      | ST LED (Stereo LED)           |                  | —                                | —   |
| 12      | QUAD (FM QUAD. Detector)      |                  | 2.4                              | 2.1 |

| PIN No.  | CHARACTERISTIC                                                                                                                                                                                                                        | INTERNAL CIRCUIT                                                                     | DC VOLTAGE (V)<br>(AT NO SIGNAL) |                               |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------|-------------------------------|
|          |                                                                                                                                                                                                                                       |                                                                                      | AM                               | FM                            |
| 13<br>14 | R-OUT (R-ch Output)<br>L-OUT (L-ch Output)                                                                                                                                                                                            |    | 1.0                              | 1.0                           |
| 15       | VCO                                                                                                                                                                                                                                   |    | 2.5                              | 2.5<br>(VCO stop mode)        |
| 16       | LPF2<br><ul style="list-style-type: none"> <li>LPF Terminal For Synchronous Detector</li> <li>Bias Terminal For AM / FM SW Circuit</li> </ul> $V_{16} = V_{CC} \rightarrow \text{AM}$<br>$V_{16} = \text{Open} \rightarrow \text{FM}$ |   | 3.0                              | 2.2<br>(VCO stop mode)<br>2.7 |
| 17       | LPF1<br>LPF Terminal For Phase Detector<br>VCO Stop Terminal<br>$V_{17} = V_{CC} \rightarrow \text{VCO Stop}$                                                                                                                         |  | 2.7                              | 2.2                           |
| 18       | FM ST DET IN                                                                                                                                                                                                                          |  | 0.7                              | 0.7                           |

| PIN No. | CHARACTERISTIC          | INTERNAL CIRCUIT                                                                                                                                                 | DC VOLTAGE (V)<br>(AT NO SIGNAL) |     |
|---------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----|
|         |                         |                                                                                                                                                                  | AM                               | FM  |
| 19      | DET OUT                 |  <p>           a LOW→FM, HIGH→AM<br/>           b LOW→AM, HIGH→FM         </p> | 1.5                              | 1.2 |
| 20      | AM OSC                  |                                                                               | 3.0                              | 3.0 |
| 21      | FM OSC                  |                                                                              | 3.0                              | 3.0 |
| 22      | VCC1 (VCC For RF Stage) | —                                                                                                                                                                | 3.0                              | 3.0 |
| 23      | FM RF OUT               | cf. pin①                                                                                                                                                         | 3.0                              | 3.0 |
| 24      | AM RF IN                |                                                                              | 3.0                              | 3.0 |

**MAXIMUM RATINGS** (Ta = 25°C)

| CHARACTERISTIC        |                 | SYMBOL                | RATING   | UNIT |
|-----------------------|-----------------|-----------------------|----------|------|
| Supply Voltage        |                 | V <sub>CC</sub>       | 8        | V    |
| LED Current           |                 | I <sub>LED</sub>      | 10       | mA   |
| LED Voltage           |                 | V <sub>LED</sub>      | 8        | V    |
| Power                 | TA8122AN / 23AN | P <sub>D</sub> (Note) | 1200     | mW   |
| Dissipation           | TA8122AF / 23AF |                       | 400      |      |
| Operating Temperature |                 | T <sub>opr</sub>      | – 25~75  | °C   |
| Storage Temperature   |                 | T <sub>stg</sub>      | – 55~150 | °C   |

Note : Derated above 25°C in the proportion of 9.6mW/°C for TA8122AN / 23AN and of 3.2mW/°C for TA8122AF / 23AF

## ELECTRICAL CHARACTERISTICS

Unless otherwise specified,

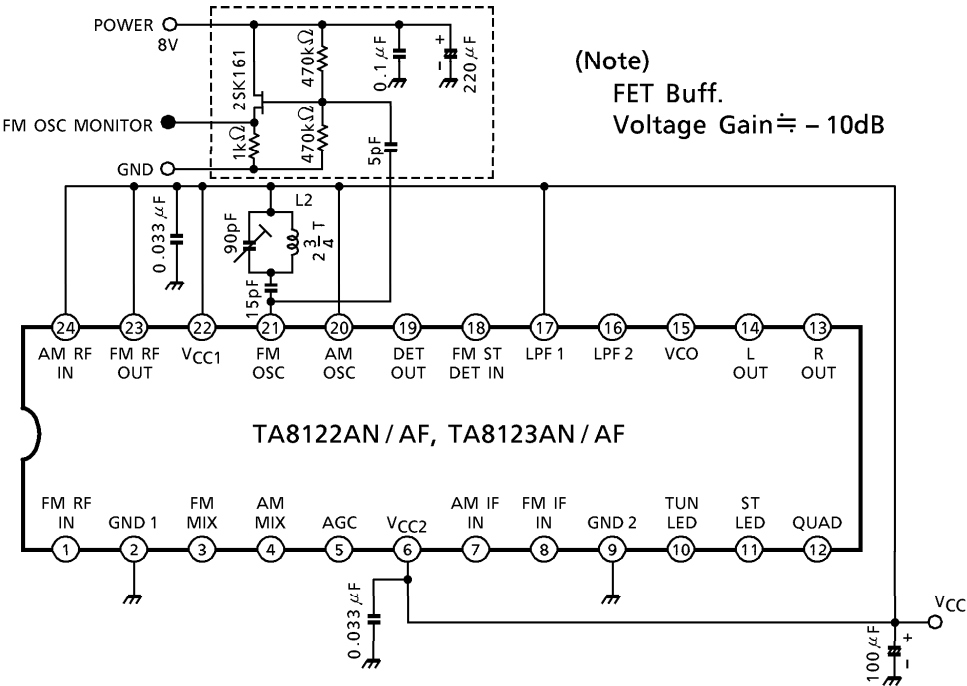
$T_a = 25^\circ\text{C}$ ,  $V_{CC} = 3\text{V}$ , F/E :  $f = 83\text{MHz}$ ,  $f_m = 1\text{kHz}$   
 FM IF :  $f = 10.7\text{MHz}$ ,  $\Delta f = \pm 22.5\text{kHz}$ ,  $f_m = 1\text{kHz}$   
 AM :  $f = 1\text{MHz}$ ,  $\text{MOD} = 30\%$ ,  $f_m = 1\text{kHz}$   
 FM ST DET :  $f_m = 1\text{kHz}$

| CHARACTERISTIC                      |                           | SYMBOL                      | TEST CIRCUIT | TEST CONDITION                        | MIN. | TYP. | MAX. | UNIT                       |
|-------------------------------------|---------------------------|-----------------------------|--------------|---------------------------------------|------|------|------|----------------------------|
| Supply Current                      |                           | $I_{CC}(\text{FM})$         | 1            | $V_{in} = 0$ , FM mode                | —    | 14.0 | 18.5 | mA                         |
|                                     |                           | $I_{CC}(\text{AM})$         | 1            | $V_{in} = 0$ , AM mode                | —    | 6.0  | 8.3  |                            |
| F/E                                 | Input Limiting Voltage    | $V_{in}(\text{lim.})$       | 1            | -3dB limiting                         | —    | 14.0 | —    | $\text{dB}\mu\text{V EMF}$ |
|                                     | Local OSC Voltage         | $V_{OSC}$                   | 2            | $f_{OSC} = 72.3\text{MHz}$            | 70   | 105  | 140  | $\text{mV}_{rms}$          |
|                                     | Input Limiting Voltage    | $V_{in}(\text{lim.})$<br>IF | 1            | -3dB limiting                         | 39   | 44   | 49   | $\text{dB}\mu\text{V EMF}$ |
| FM IN                               | Recovered Output Voltage  | $V_{OD}$                    | 1            | $V_{in} = 80\text{dB}\mu\text{V EMF}$ | 55   | 80   | 110  | $\text{mV}_{rms}$          |
|                                     | Signal To Noise Ratio     | S/N                         | 1            | $V_{in} = 80\text{dB}\mu\text{V EMF}$ | —    | 70   | —    | dB                         |
|                                     | Total Harmonic Distortion | THD                         | 1            | $V_{in} = 80\text{dB}\mu\text{V EMF}$ | —    | 0.4  | —    | %                          |
|                                     | AM Rejection Ratio        | AMR                         | 1            | $V_{in} = 80\text{dB}\mu\text{V EMF}$ | —    | 50   | —    | dB                         |
|                                     | LED ON Sensitivity        | $V_L$                       | 1            | $I_L = 1\text{mA}$                    | 43   | 48   | 53   | $\text{dB}\mu\text{V EMF}$ |
| AM                                  | Gain                      | $G_V$                       | 1            | $V_{in} = 23\text{dB}\mu\text{V EMF}$ | 20   | 40   | 80   | $\text{mV}_{rms}$          |
|                                     | Recovered Output Voltage  | $V_{OD}$                    | 1            | $V_{in} = 60\text{dB}\mu\text{V EMF}$ | 50   | 60   | 100  | $\text{mV}_{rms}$          |
|                                     | Signal To Noise Ratio     | S/N                         | 1            | $V_{in} = 60\text{dB}\mu\text{V EMF}$ | —    | 44   | —    | dB                         |
|                                     | Total Harmonic Distortion | THD                         | 1            | $V_{in} = 60\text{dB}\mu\text{V EMF}$ | —    | 1.0  | —    | %                          |
|                                     | LED ON Sensitivity        | $V_L$                       | 1            | $I_L = 1\text{mA}$                    | 19   | 24   | 29   | $\text{dB}\mu\text{V EMF}$ |
| Pin <sup>①⑨</sup> Output Resistance |                           | $R_{19}$                    | 1            | FM mode                               | —    | 0.75 | —    | $\text{k}\Omega$           |
|                                     |                           |                             |              | AM mode                               | —    | 12.5 | —    |                            |

| CHARACTERISTIC        |                                     |          | SYMBOL                        | TEST CIR-<br>CUIT                      | TEST CONDITION                                             |                        | MIN. | TYP. | MAX. | UNIT              |
|-----------------------|-------------------------------------|----------|-------------------------------|----------------------------------------|------------------------------------------------------------|------------------------|------|------|------|-------------------|
| FM ST DET             | Input Resistance                    |          | R <sub>IN</sub>               | —                                      | —                                                          |                        | —    | 24   | —    | kΩ                |
|                       | Output Resistance                   |          | R <sub>OUT</sub>              | —                                      | —                                                          |                        | —    | 5    | —    |                   |
|                       | Max. Composite Signal Input Voltage |          | V <sub>in</sub> (MAX.) STEREO | 1                                      | L + R = 90%, P = 10%<br>f <sub>m</sub> = 1kHz, THD = 3%    |                        | —    | 350  | —    | mV <sub>rms</sub> |
|                       | Separation                          |          | Sep.                          | 1                                      | L + R =<br>135mV <sub>rms</sub><br>P = 15mV <sub>rms</sub> | f <sub>m</sub> = 100Hz | —    | 42   | dB   |                   |
|                       |                                     |          |                               |                                        |                                                            | f <sub>m</sub> = 1kHz  | 35   | 42   |      |                   |
|                       |                                     |          |                               |                                        | f <sub>m</sub> = 10kHz                                     | —                      | 42   |      |      |                   |
|                       | Total Harmonic Distortion           | Monaural | THD (MONAURAL)                | 1                                      | V <sub>in</sub> = 150mV <sub>rms</sub>                     |                        | —    | 0.2  | —    | %                 |
|                       |                                     | Stereo   | THD (STEREO)                  |                                        | L + R = 135mV <sub>rms</sub> ,<br>P = 15mV <sub>rms</sub>  |                        | —    | 0.2  | —    |                   |
|                       | Voltage Gain                        |          | G <sub>V</sub> (FM ST DET)    | 1                                      | V <sub>in</sub> = 150mV <sub>rms</sub>                     |                        | − 5  | − 3  | − 1  | dB                |
|                       | Channel Balance                     |          | C.B.                          | 1                                      | V <sub>in</sub> = 150mV <sub>rms</sub>                     |                        | − 2  | 0    | 2    |                   |
|                       | Stereo LED Sensitivity              | ON       | V <sub>L</sub> (ON)           | 1                                      | Pilot Input                                                |                        | —    | 8    | 15   | mV <sub>rms</sub> |
|                       |                                     | OFF      | V <sub>L</sub> (OFF)          |                                        |                                                            |                        | 2    | 6    | —    |                   |
|                       | Stereo LED Hysteresis               |          | V <sub>H</sub>                | 1                                      | To LED turn off from LED turn on                           |                        | —    | 2    | —    | mV <sub>rms</sub> |
| Capture Range         |                                     | C.R.     | 1                             | P = 15mV <sub>rms</sub>                |                                                            | —                      | 1.3  | —    | %    |                   |
| Signal To Noise Ratio |                                     | S / N    | 1                             | V <sub>in</sub> = 150mV <sub>rms</sub> |                                                            | —                      | 70   | —    | dB   |                   |

[illegible]

TEST CIRCUIT 2

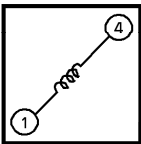


COIL DATA

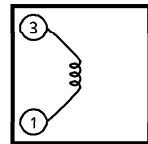
| COIL No.              | TEST FREQ. | L<br>(μH) | C <sub>0</sub><br>(pF) | Q <sub>0</sub> | TURNS |     |                 |                 |     | WIRE<br>(mm φ) | REFERENCE       |
|-----------------------|------------|-----------|------------------------|----------------|-------|-----|-----------------|-----------------|-----|----------------|-----------------|
|                       |            |           |                        |                | 1-2   | 2-3 | 1-3             | 1-4             | 4-6 |                |                 |
| L <sub>1</sub> FM RF  | 100MHz     | —         | —                      | 100            | —     | —   | —               | 2 $\frac{1}{2}$ | —   | 0.5UEW         | ⑤ 53T-037-202   |
| L <sub>2</sub> FM OSC | 100MHz     | —         | —                      | 100            | —     | —   | 2 $\frac{3}{4}$ | —               | —   | 0.5UEW         | ⑤ 0258-244      |
| T <sub>1</sub> AM OSC | 796kHz     | 288       | —                      | 115            | 13    | 73  | —               | —               | —   | 0.08UEW        | ⑤ 4147-1356-038 |
| T <sub>2</sub> AM IFT | 455kHz     | —         | 180                    | 120            | —     | —   | 180             | —               | 15  | 0.08UEW        | ⑤ 2150-2162-165 |

⑤ : SUMIDA ELECTRIC CO., LED.

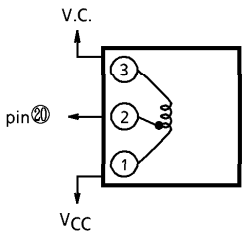
L<sub>1</sub> : FM RF



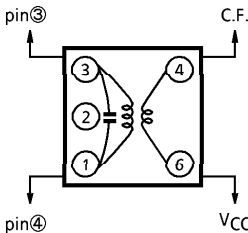
L<sub>2</sub> : FM OSC



T<sub>1</sub> : AM OSC

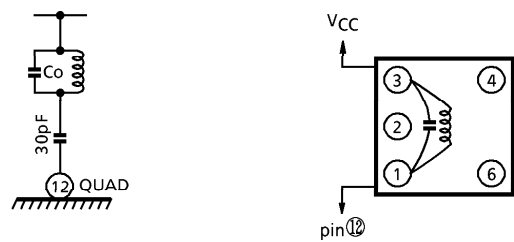


T<sub>2</sub> : AM IFT

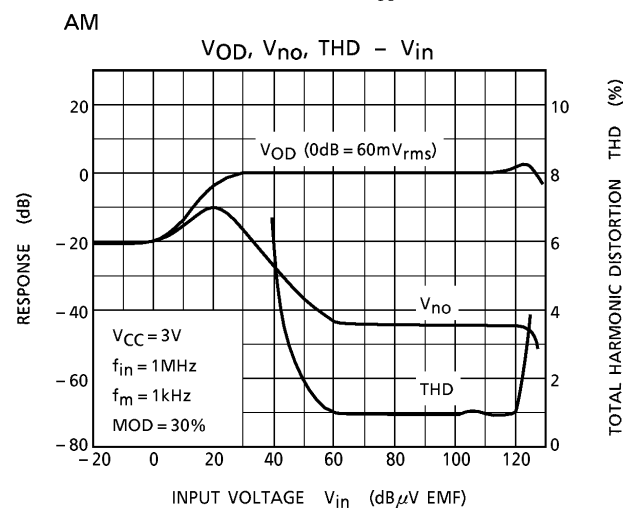
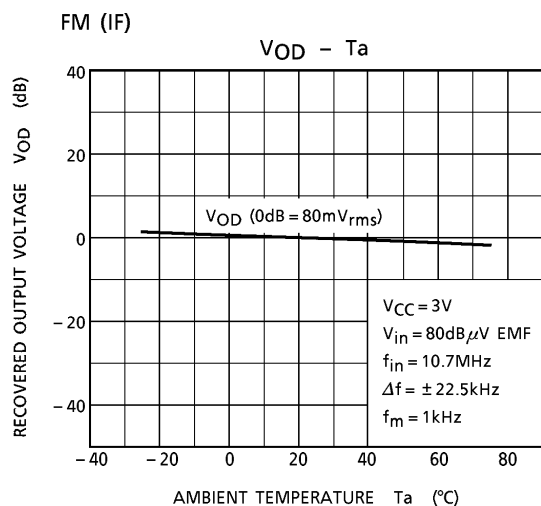
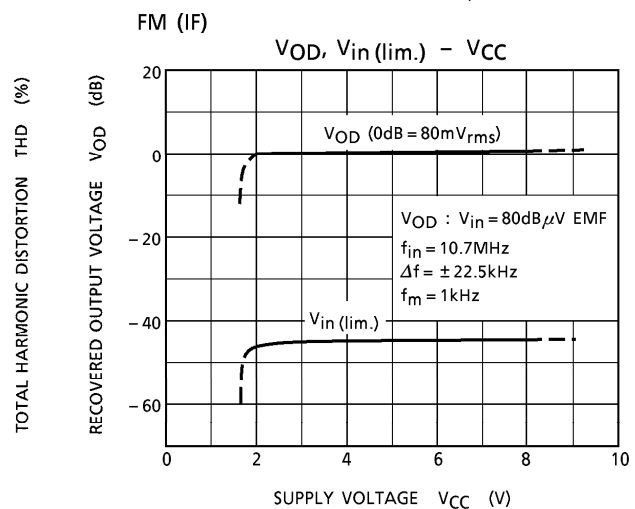
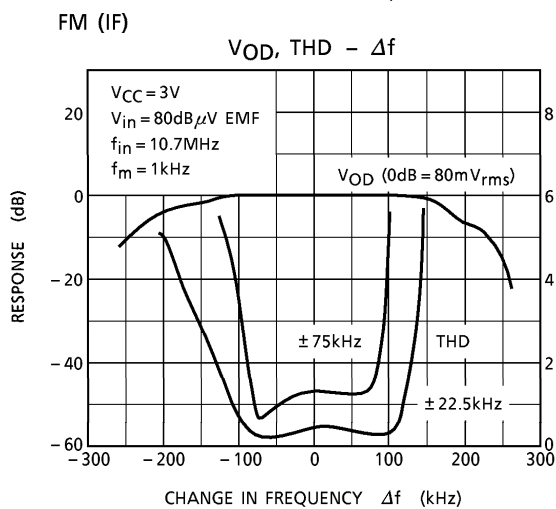
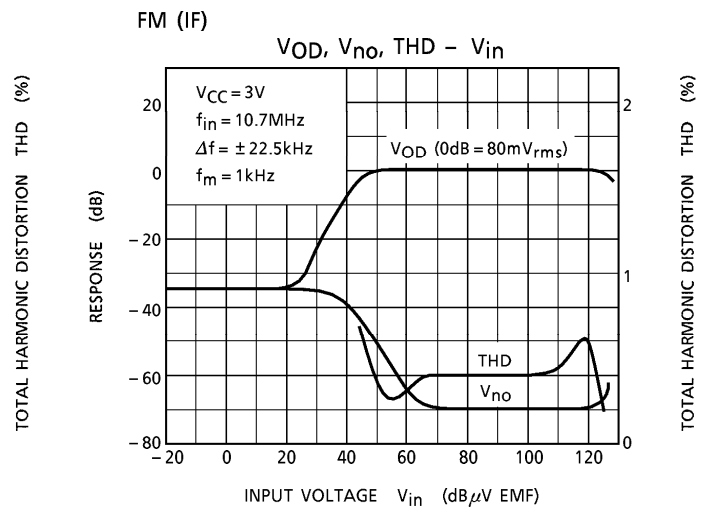
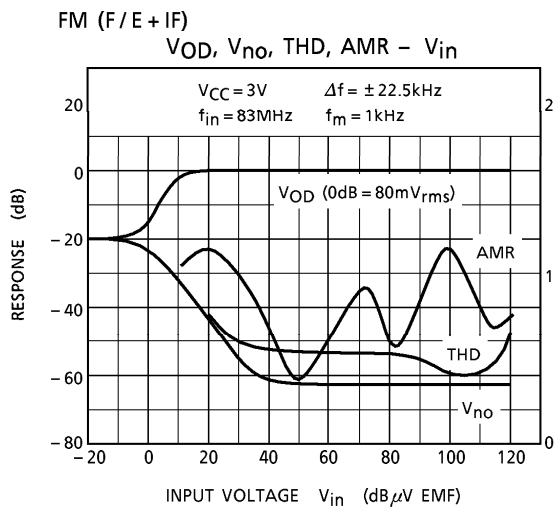


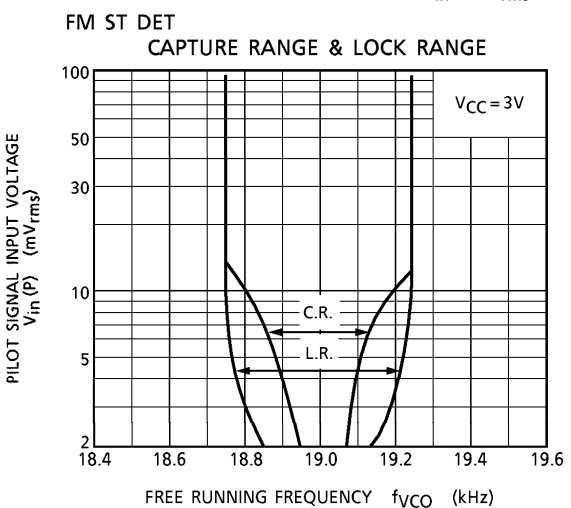
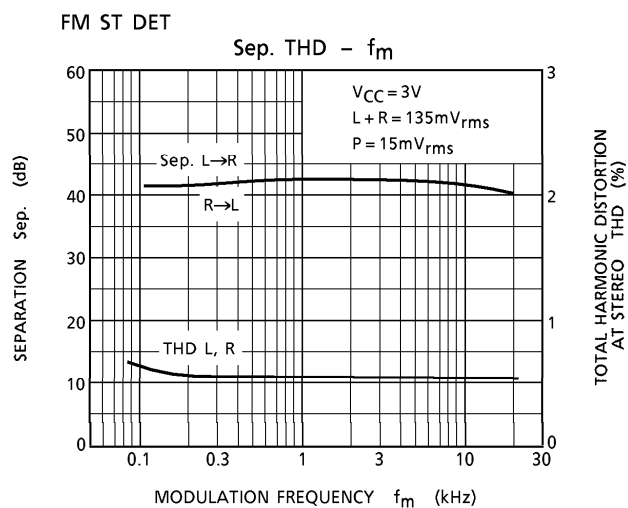
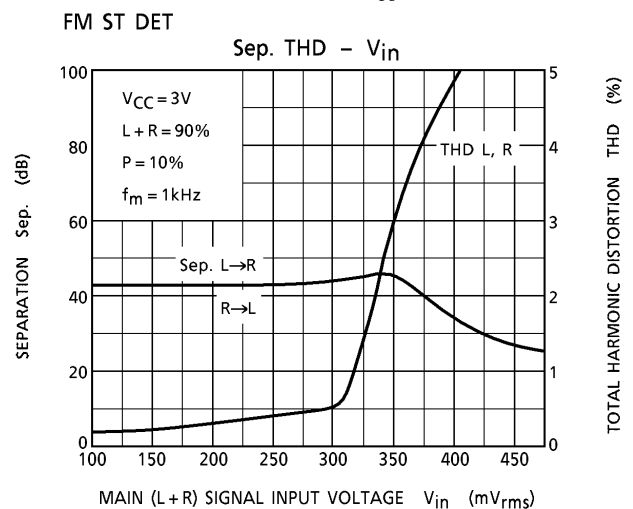
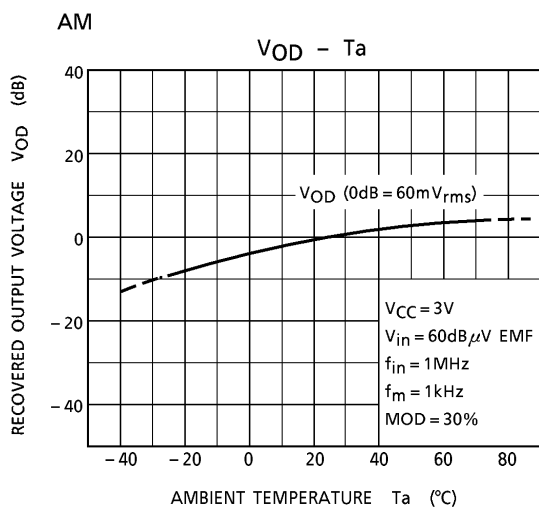
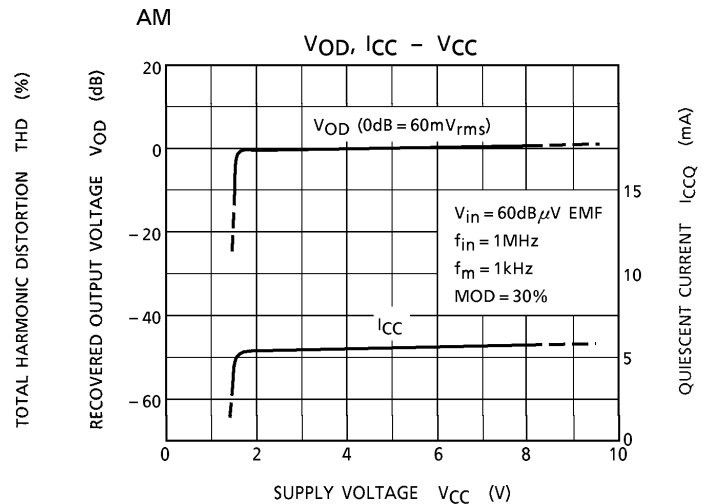
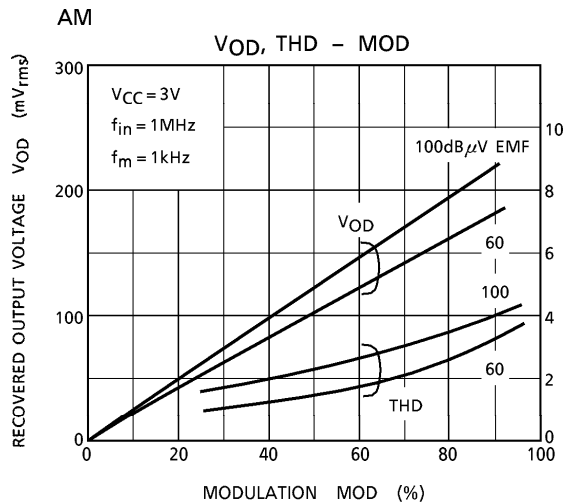
FM DETECTION CIRCUIT

For the FM detection circuit, detection coil is able to use instead of ceramic discriminator.  
Recommended circuit and recommended coil are as follows.  
In this case, please take care that  $V_{in} (lim.)$  falls a little.

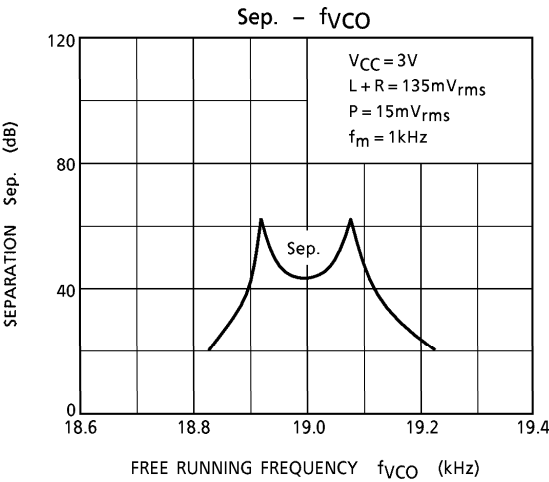


| TEST<br>FREQUENCY | $C_o$<br>(pF) | $Q_o$ | TURNS |     |     |     | WIRE<br>(mm $\phi$ ) | REF                                                     |
|-------------------|---------------|-------|-------|-----|-----|-----|----------------------|---------------------------------------------------------|
|                   |               |       | 1-2   | 2-3 | 1-3 | 4-6 |                      |                                                         |
| 10.7MHz           | 100           | 100   | —     | —   | 12  | —   | 0.12UEW              | SUMIDA ELECTRIC CO., LTD<br>2153-4095-189 or Equivalent |

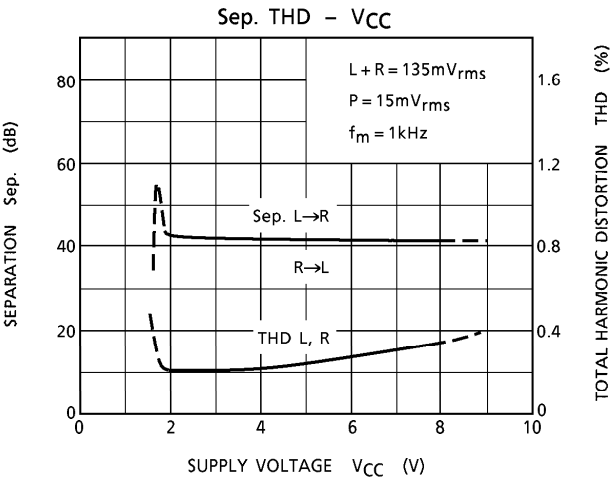




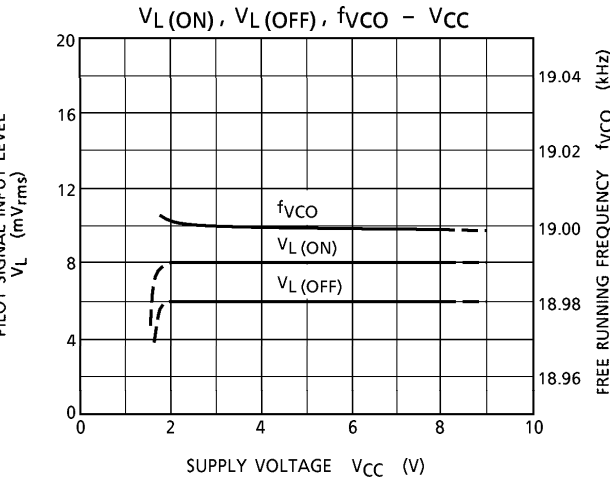
FM ST DET



FM ST DET



FM ST DET

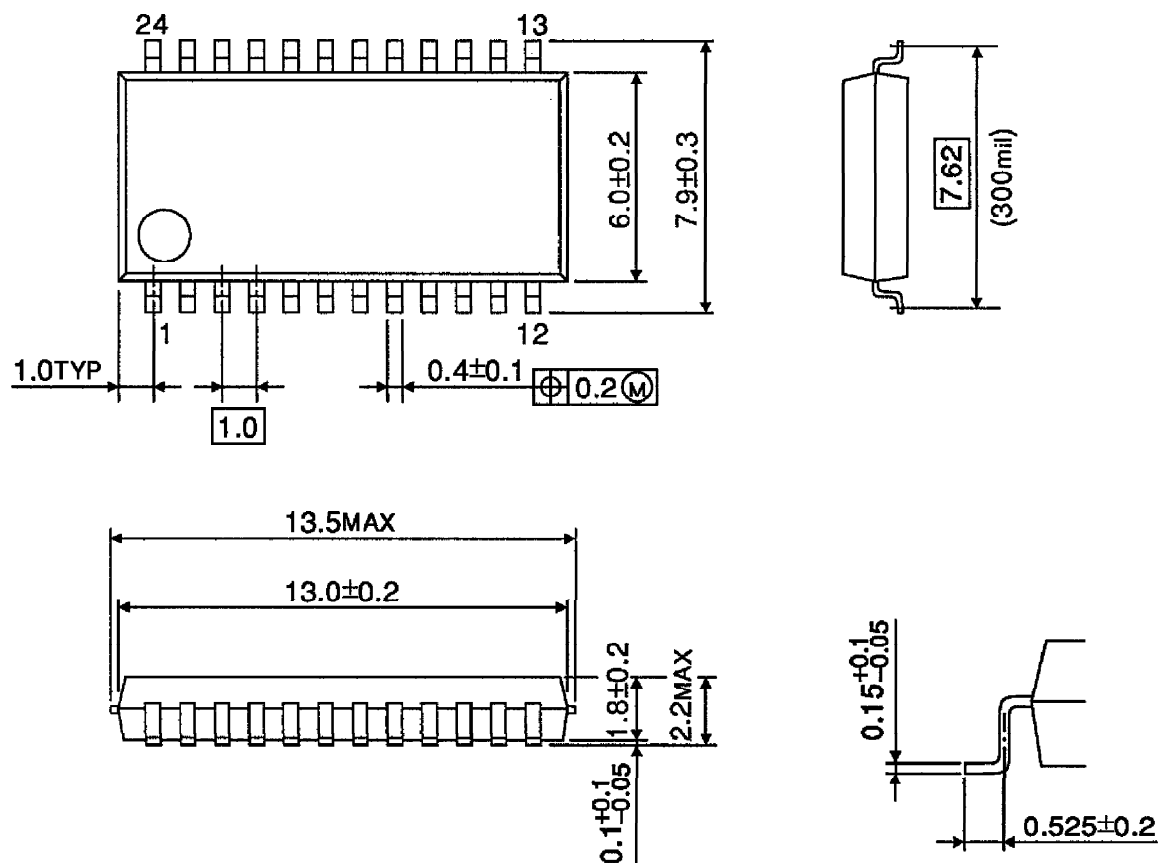




**OUTLINE DRAWING**

SSOP24-P-300-1.00

Unit : mm



Weight : 0.31g (Typ.)