

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8122AN, TA8122AF, TA8123AN, TA8123AF

3V AV / FM 1CHIP TUNER IC

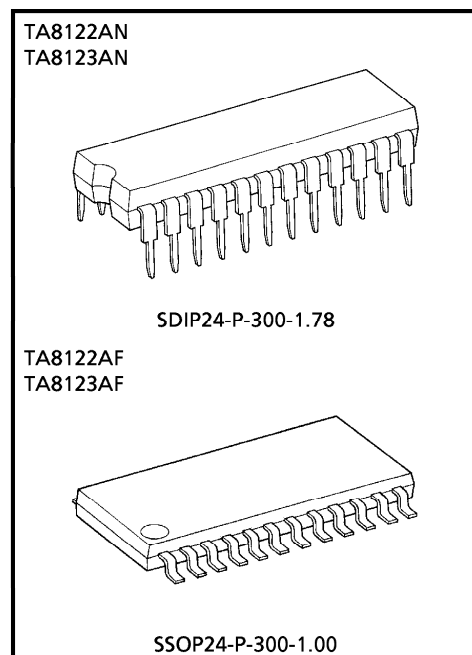
TA8122AN/AF and TA8123AN/AF are the AM/FM 1Chip Tuner ICs, which are designed for Portable Radios and 3V Headphone Radios.

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

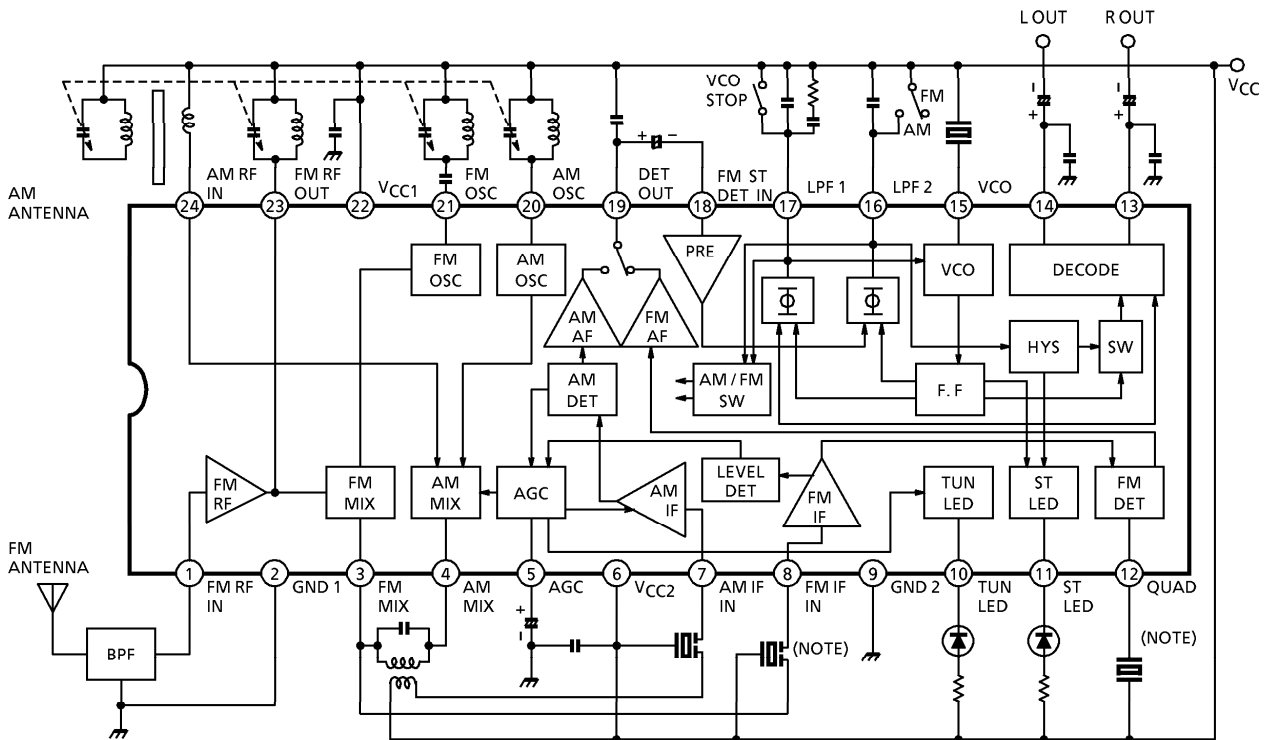
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BLOCK DIAGRAM



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

| PIN No. | CHARACTERISTIC | INTERNAL CIRCUIT | DC VOLTAGE (V) (AT NO SIGNAL) | |
|---------|-------------------------|---|----------------------------------|-----|
| | | | AM | FM |
| 19 | DET OUT | <p> (a) LOW→FM, HIGH→AM (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 _{CC} | 8 | V |
| LED Current | | I _{LED} | 10 | mA |
| LED Voltage | | V _{LED} | 8 | V |
| Power | TA8122AN / 23AN | P _D (Note) | 1200 | mW |
| Dissipation | TA8122AF / 23AF | | 400 | |
| Operating Temperature | | T _{opr} | - 25~75 | °C |
| Storage Temperature | | T _{stg} | - 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

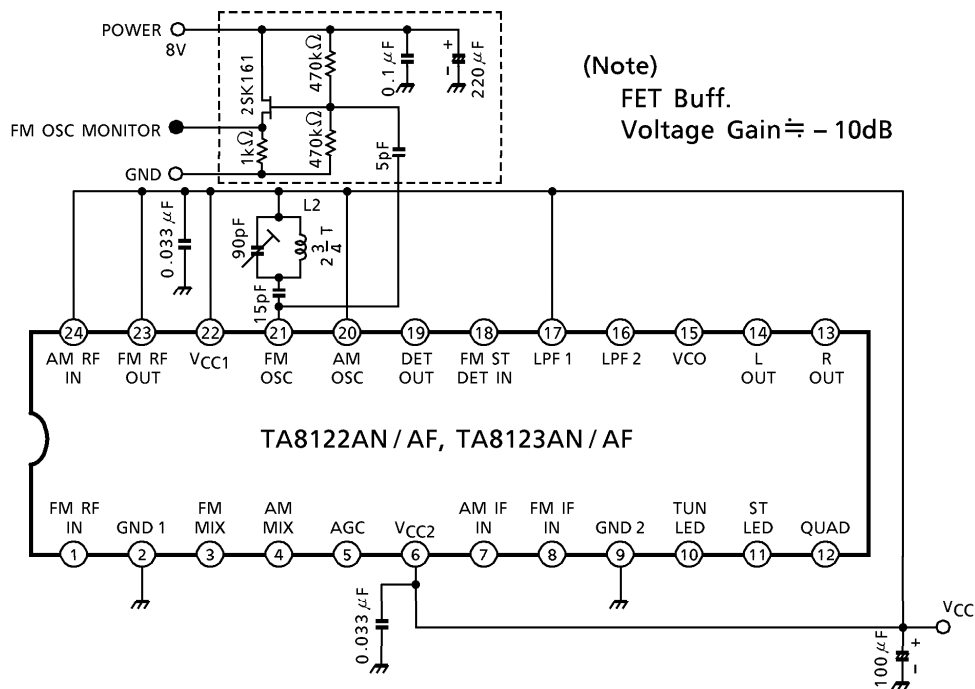
Unless otherwise specified,

Ta = 25°C, VCC = 3V, F/E : f = 83MHz, fm = 1kHz
 FM IF : f = 10.7MHz, Δf = ± 22.5kHz, fm = 1kHz
 AM : f = 1MHz, MOD = 30%, fm = 1kHz
 FM ST DET : fm = 1kHz

| CHARACTERISTIC | | SYMBOL | TEST CIR-CUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|------------------------------------|---------------------------|------------------------------|---------------|---|------|------|------|-----------------------|
| Supply Current | | I _{CC} (FM) | 1 | V _{in} = 0, FM mode | — | 14.0 | 18.5 | mA |
| | | I _{CC} (AM) | 1 | V _{in} = 0, AM mode | — | 6.0 | 8.3 | |
| F/E | Input Limiting Voltage | V _{in} (lim.) | 1 | - 3dB limiting | — | 14.0 | — | dB _μ V EMF |
| | Local OSC Voltage | V _{OSC} | 2 | f _{OSC} = 72.3MHz | 70 | 105 | 140 | mV _{rms} |
| | Input Limiting Voltage | V _{in} (lim.) IF | 1 | - 3dB limiting | 39 | 44 | 49 | dB _μ V EMF |
| FM IN | Recovered Output Voltage | V _{OD} | 1 | V _{in} = 80dB _μ V EMF | 55 | 80 | 110 | mV _{rms} |
| | Signal To Noise Ratio | S/N | 1 | V _{in} = 80dB _μ V EMF | — | 70 | — | dB |
| | Total Harmonic Distortion | THD | 1 | V _{in} = 80dB _μ V EMF | — | 0.4 | — | % |
| | AM Rejection Ratio | AMR | 1 | V _{in} = 80dB _μ V EMF | — | 50 | — | dB |
| | LED ON Sensitivity | V _L | 1 | I _L = 1mA | 43 | 48 | 53 | dB _μ V EMF |
| AM | Gain | G _V | 1 | V _{in} = 23dB _μ V EMF | 20 | 40 | 80 | mV _{rms} |
| | Recovered Output Voltage | V _{OD} | 1 | V _{in} = 60dB _μ V EMF | 50 | 60 | 100 | mV _{rms} |
| | Signal To Noise Ratio | S/N | 1 | V _{in} = 60dB _μ V EMF | — | 44 | — | dB |
| | Total Harmonic Distortion | THD | 1 | V _{in} = 60dB _μ V EMF | — | 1.0 | — | % |
| | LED ON Sensitivity | V _L | 1 | I _L = 1mA | 19 | 24 | 29 | dB _μ V EMF |
| Pin ^① Output Resistance | | R ₁₉ | 1 | FM mode | — | 0.75 | — | kΩ |
| | | | | AM mode | — | 12.5 | — | |

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

TEST CIRCUIT 2

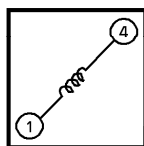


COIL DATA

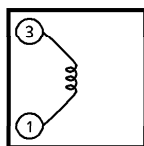
| COIL No. | TEST FREQ. | L (μH) | C ₀ (pF) | Q ₀ | TURNS | | | | | WIRE (mm φ) | REFERENCE |
|-----------------------|------------|--------|---------------------|----------------|-------|-----|-----------------|-----------------|-----|-------------|-----------------|
| | | | | | 1-2 | 2-3 | 1-3 | 1-4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

Ⓢ : SUMIDA ELECTRIC CO., LED.

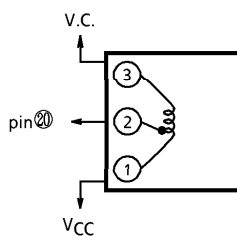
L₁ : FM RF



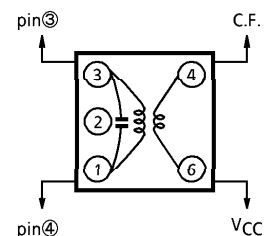
L₂ : FM OSC



T₁ : AM OSC

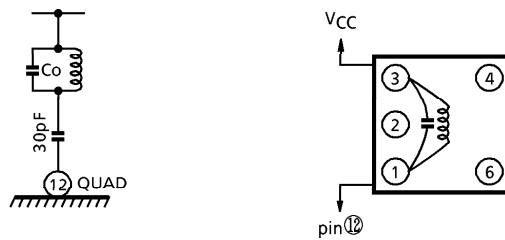


T₂ : AM IFT

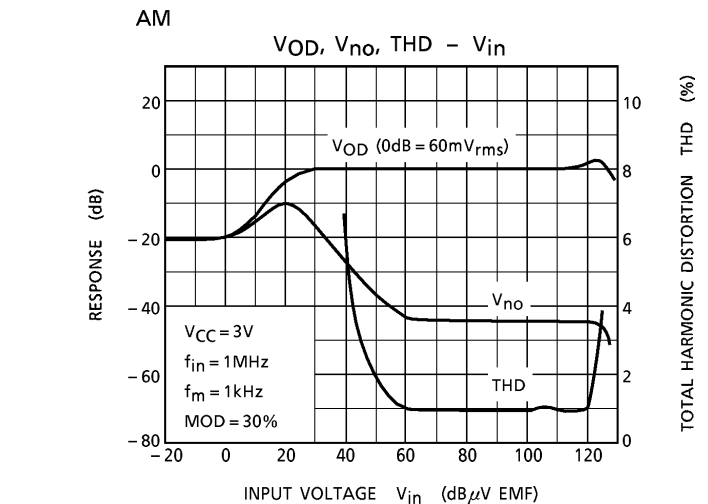
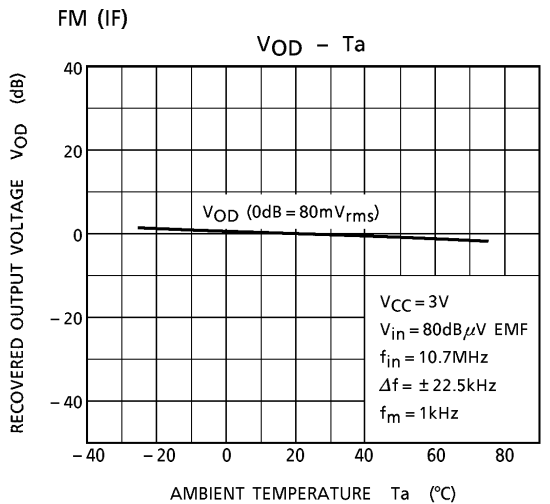
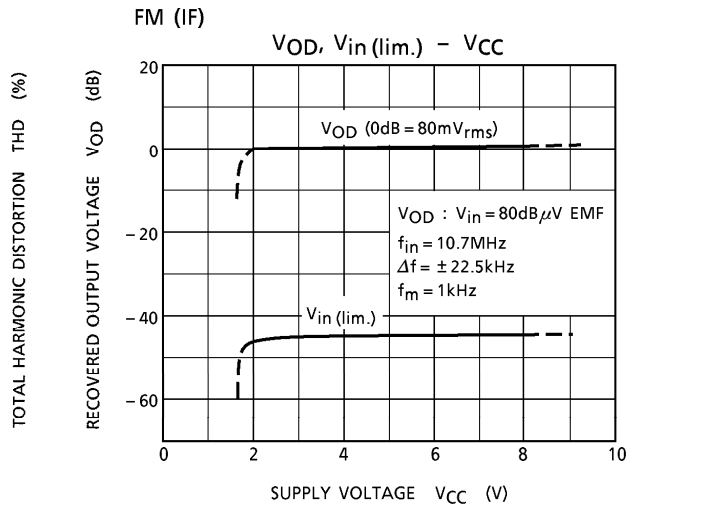
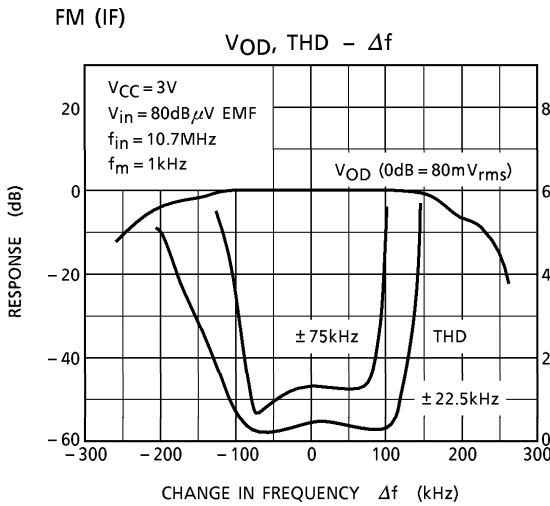
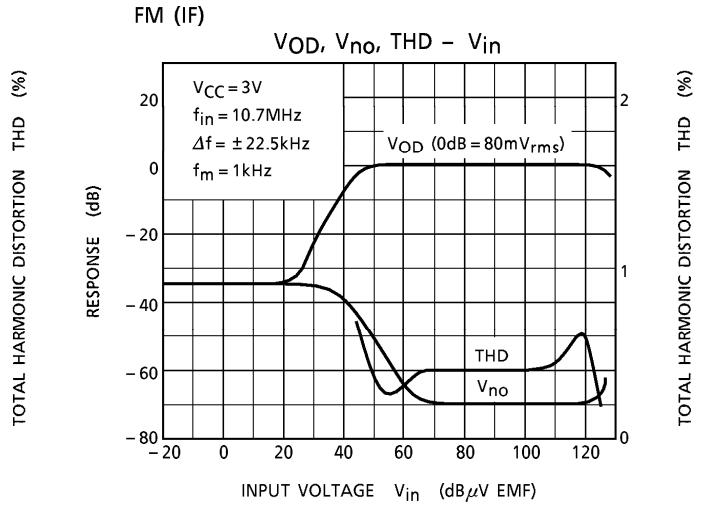
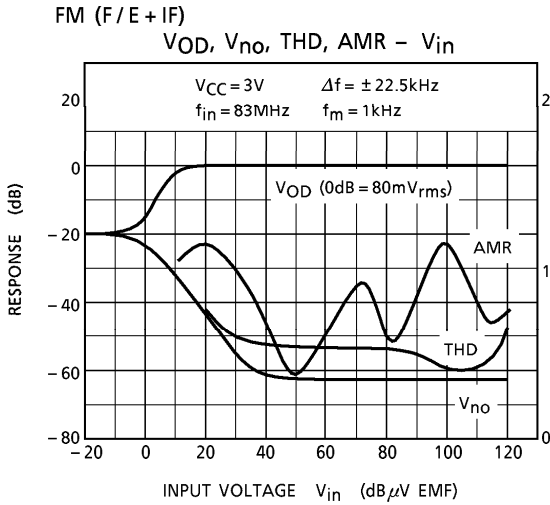


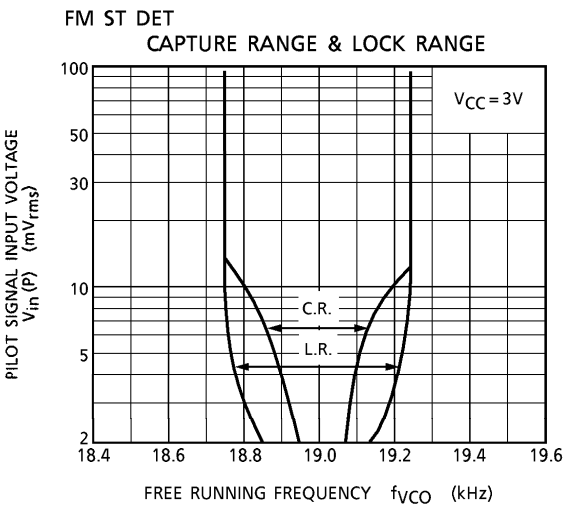
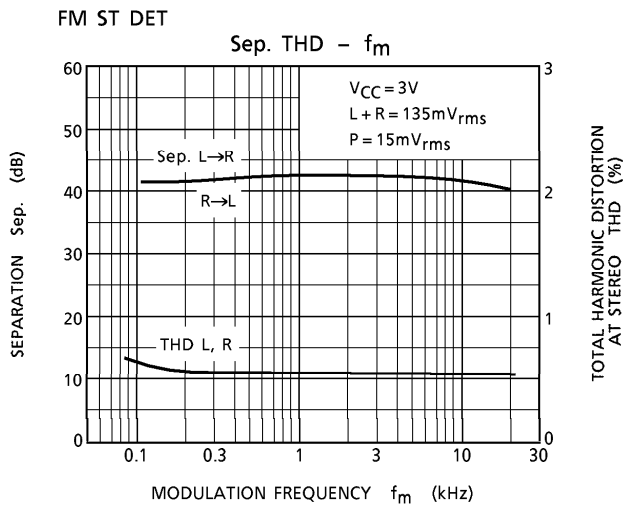
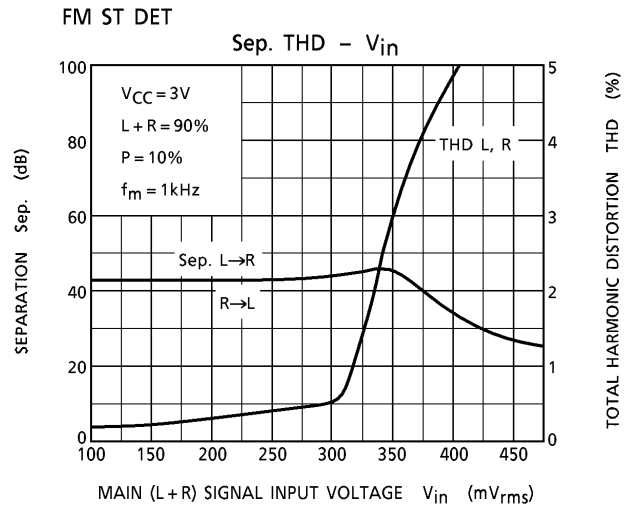
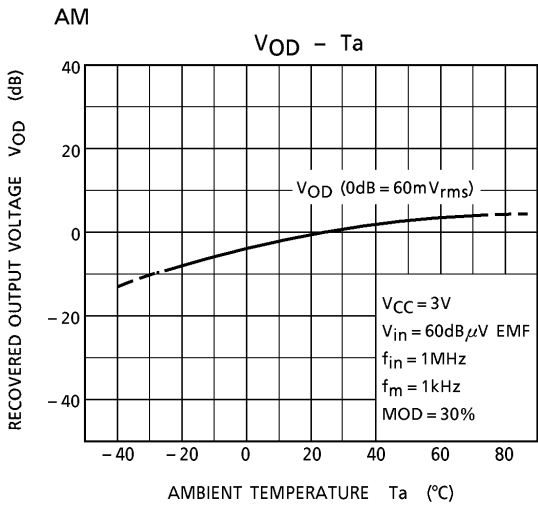
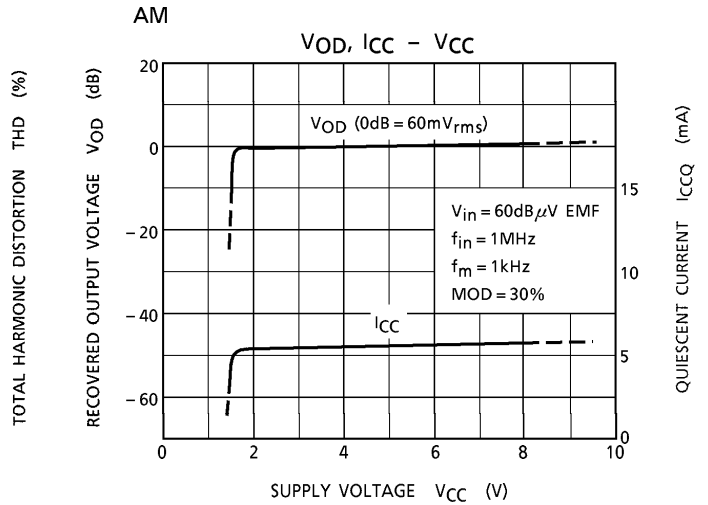
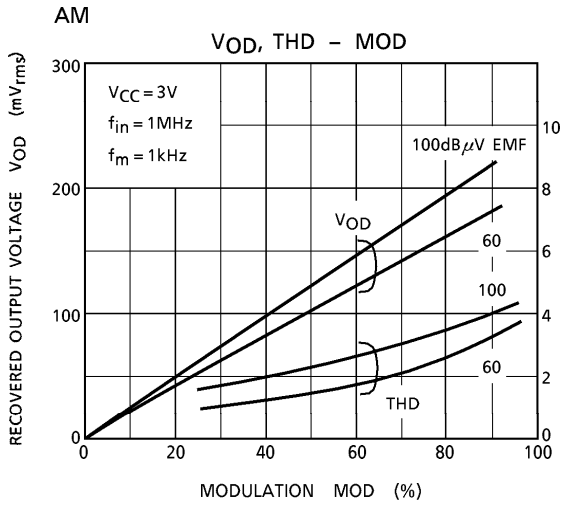
FM DETECTION CIRCUIT

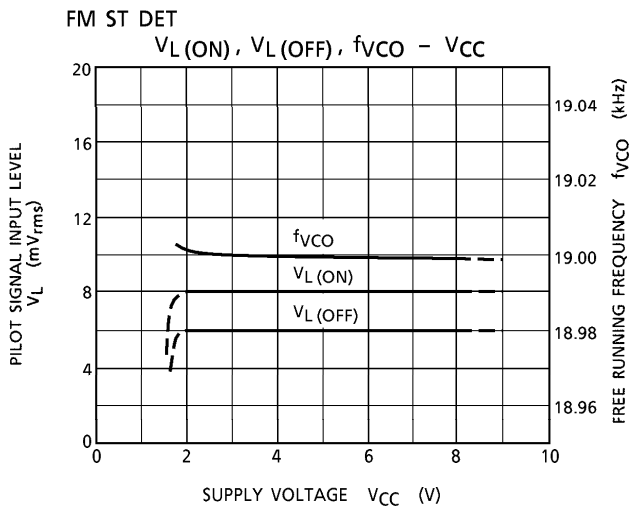
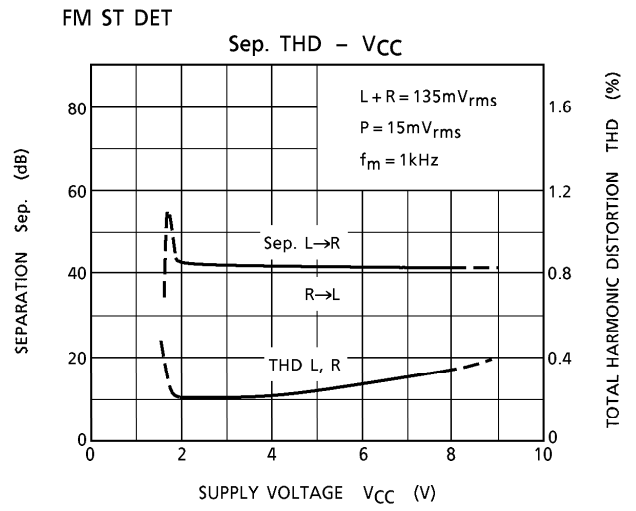
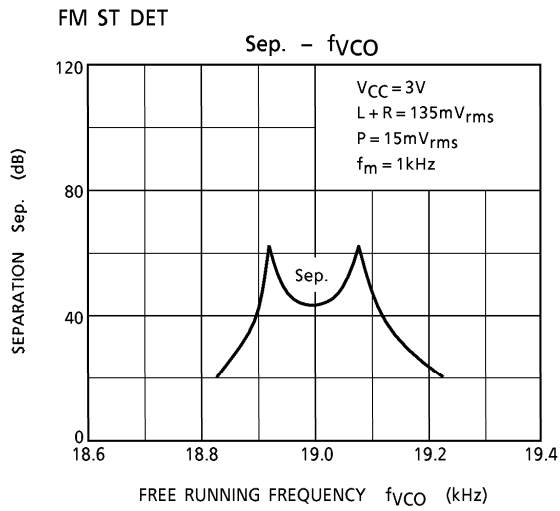
For the FM detection circuit, detection coil is able to use instead of ceramic discriminator.
 Recommended circuit and recommended coil are as follows.
 In this case, please take care that $V_{in} (lim.)$ falls a little.



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

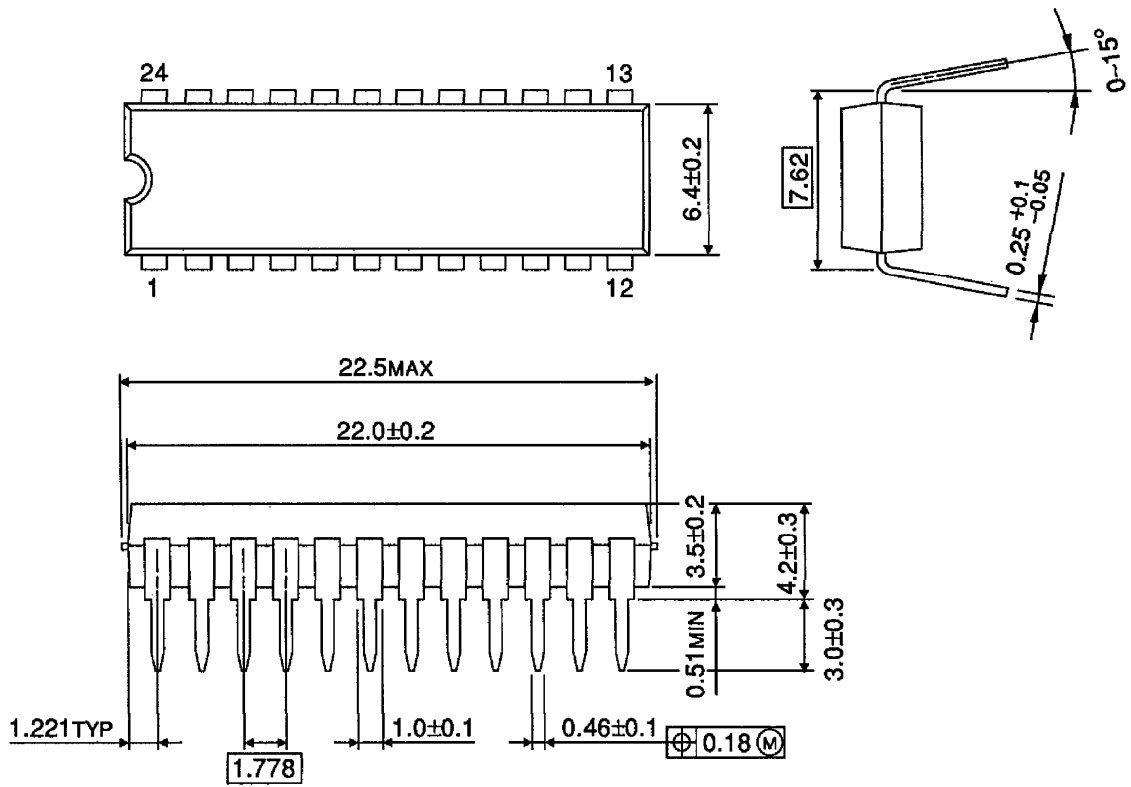






OUTLINE DRAWING
SDIP24-P-300-1.78

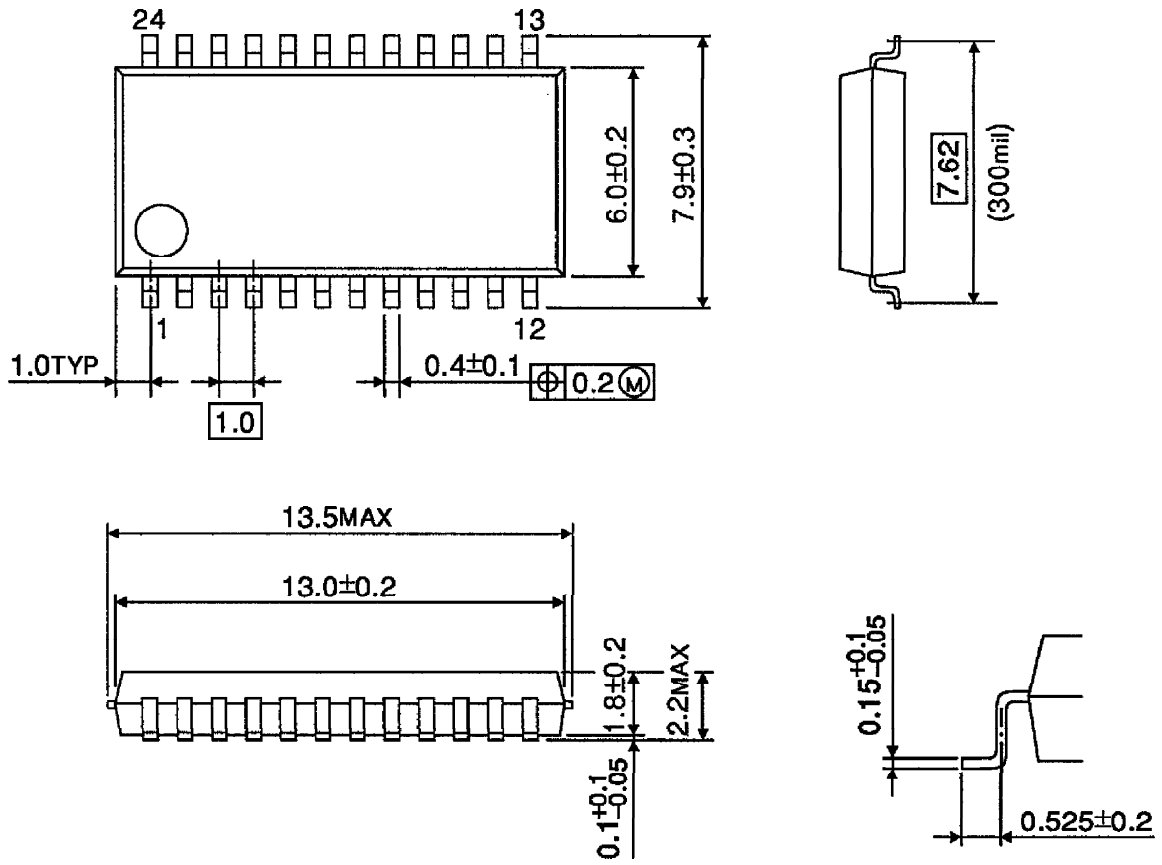
Unit : mm



Weight : 1.2g (Typ.)

OUTLINE DRAWING
SSOP24-P-300-1.00

Unit : mm



Weight : 0.31g (Typ.)