

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

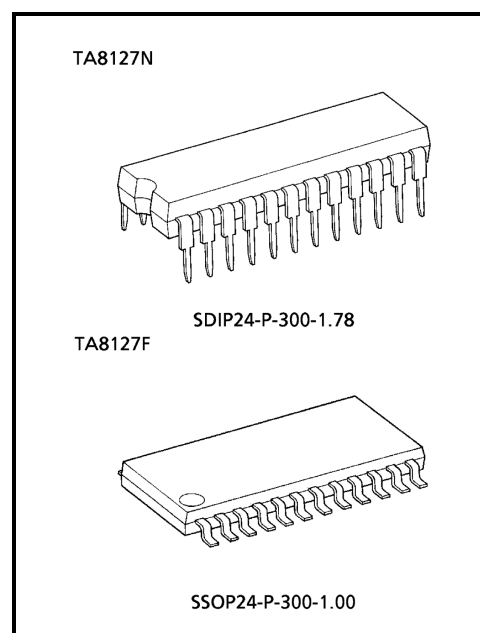
# TA8127N,TA8127F

3V AM / FM 1chip Tuner IC

TA8127N and TA8127F 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 MPX
- AM detector coil and IF coupling condenser are not needed.
- Compact package  
TA8127N: Shrink DIP 24 pin (1.78mm pitch)  
TA8127F: Mini flat package 24 pin
- Operating supply voltage range  
 $V_{CC} = 1.8 \sim 7.0V$  ( $T_a = 25^\circ C$ )

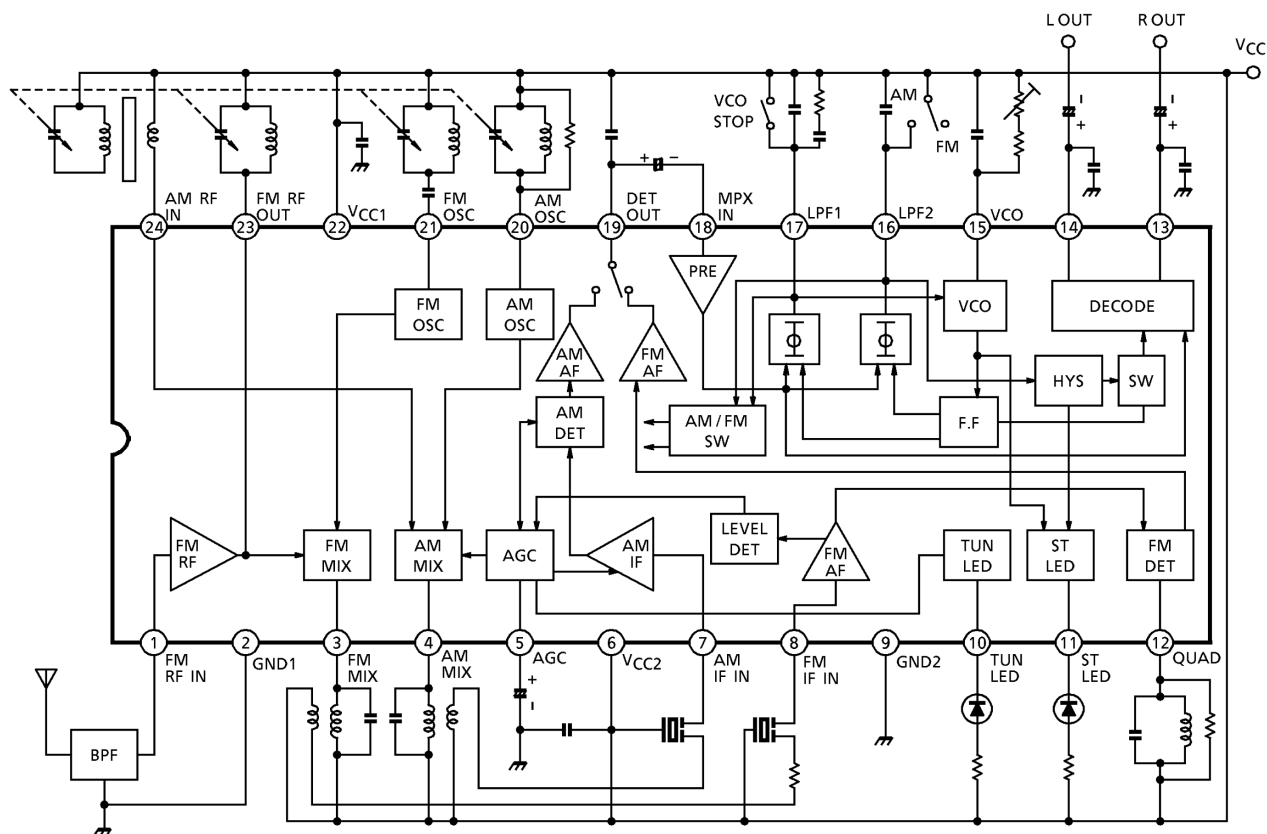


Weight

SDIP24-P-300-1.78: 1.2g (typ.)

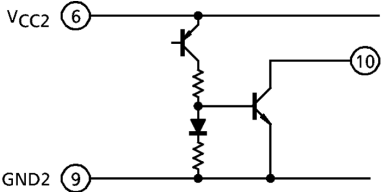
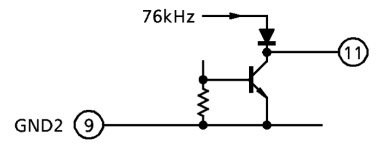
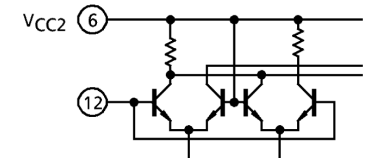
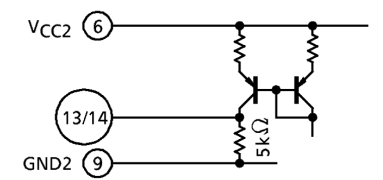
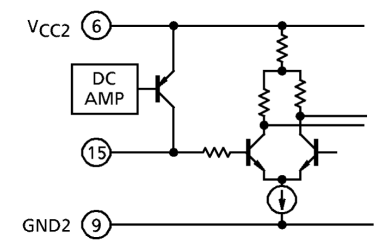
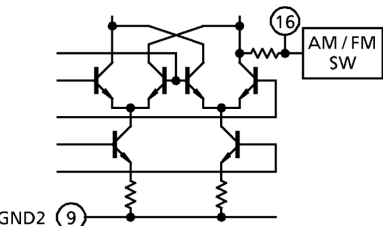
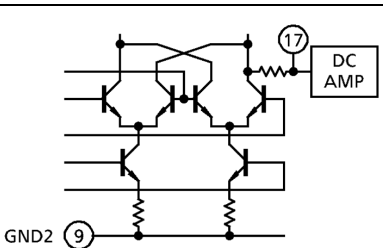
SSOP24-P-300-1.00: 0.31 (typ.)

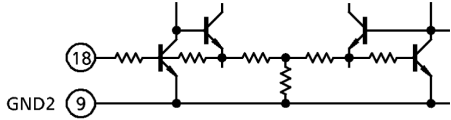
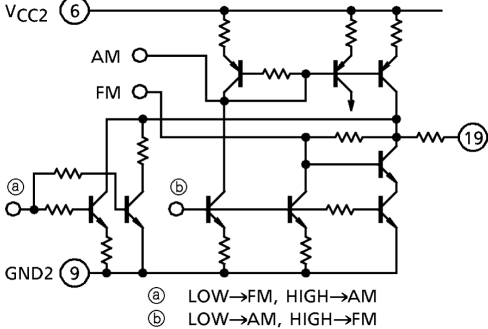
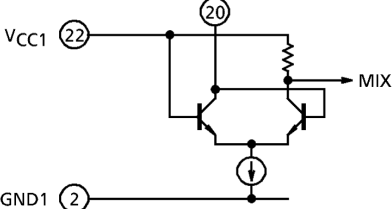
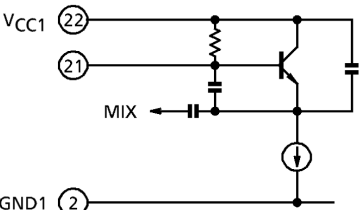
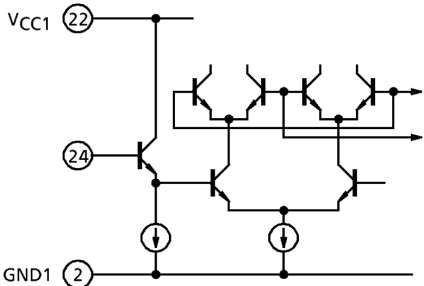
## Block Diagram



**Explanation Of Terminals**

| Pin No. | Item                          | 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                        |                  | 3.0                              | 3.0 |
| 4       | AM MIX                        |                  | 3.0                              | 3.0 |
| 5       | AGC (AM AGC)                  |                  | 0                                | 0   |
| 6       | VCC2 (VCC for IF / MPX stage) | —                | 3.0                              | 3.0 |
| 7       | AM IF IN                      |                  | 3.0                              | 3.0 |
| 8       | FM IF IN                      |                  | 3.0                              | 3.0 |

| Pin No.  | Item                                                                                                                                                                          | Internal Circuit                                                                     | DC Voltage (V)<br>(at no Signal) |                            |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------|----------------------------|
|          |                                                                                                                                                                               |                                                                                      | AM                               | FM                         |
| 9        | GND2 (GND for IF / MPX stage)                                                                                                                                                 | —                                                                                    | 0                                | 0                          |
| 10       | TUN LED (tuning LED)                                                                                                                                                          |    | —                                | —                          |
| 11       | ST LED (stereo LED)                                                                                                                                                           |    | —                                | —                          |
| 12       | QUAD (FM QUAD. Detector)                                                                                                                                                      |    | 3.0                              | 3.0                        |
| 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>• LPF terminal for synchronous detector<br>• Bias terminal for AM / FM SW circuit<br>V <sub>16</sub> = V <sub>CC</sub> → AM (VCO stop)<br>V <sub>16</sub> = OPEN → FM |  | 3.0                              | 2.2<br>(VCO stop mode 2.7) |
| 17       | LPF1<br>• LPF terminal for phase detector<br>• VCO stop terminal<br>V <sub>7</sub> = V <sub>CC</sub> → VCO stop                                                               |  | 2.7                              | 2.2                        |

| Pin No. | Item                                            | Internal Circuit                                                                                                                 | DC Voltage (V)<br>(at no Signal) |     |
|---------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----|
|         |                                                 |                                                                                                                                  | AM                               | FM  |
| 18      | MPX IN                                          |                                                | 0.7                              | 0.7 |
| 19      | DET OUT                                         | <br>(a) LOW→FM, HIGH→AM<br>(b) LOW→AM, HIGH→FM | 1.5                              | 1.2 |
| 20      | AM OSC                                          |                                               | 3.0                              | 3.0 |
| 21      | FM OSC                                          |                                              | 3.0                              | 3.0 |
| 22      | V <sub>CC1</sub> (V <sub>CC</sub> for RF stage) | —                                                                                                                                | 3.0                              | 3.0 |
| 23      | FM RF OUT                                       | Cf. Pin(1)                                                                                                                       | 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 dissipation     | TA8127N | P <sub>D</sub><br>(Note) | 1200    | mW   |
|                       | TA8127F |                          | 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 TA8127N and of 3.2mW / °C for TA8127F.

## Electrical Characteristics

Unless Otherwise Specified,

Ta = 25°C, V<sub>CC</sub> = 3V, F / E: f = 83MHz, f<sub>m</sub> = 1kHz

FM IF: f = 10.7MHz, Δf = ±22.5kHz, f<sub>m</sub> = 1kHz

AM: f = 1MHz, MOD = 30%, f<sub>m</sub> = 1kHz

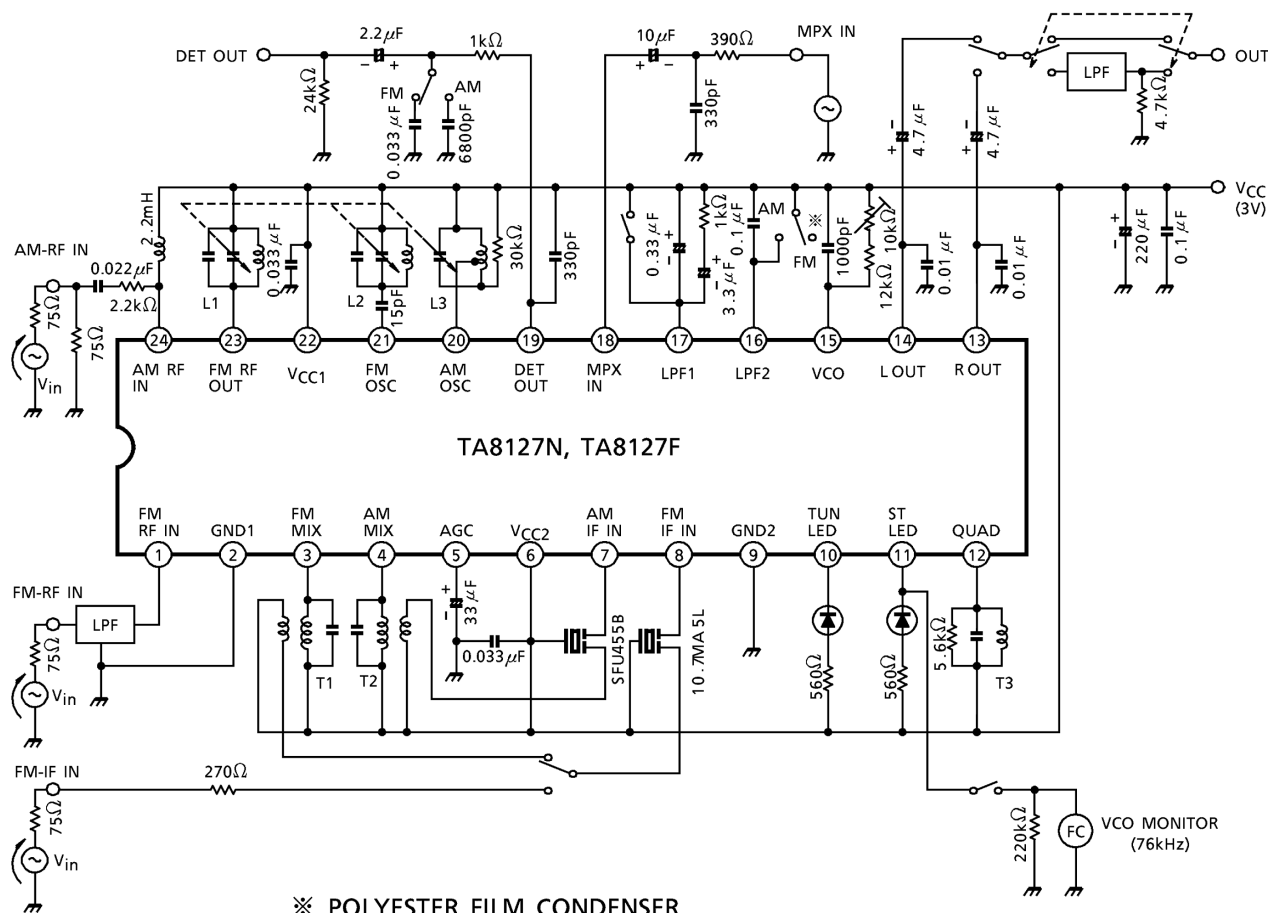
MPX: f<sub>m</sub> = 1kHz

| Characteristic            |                           | Symbol                       | Test Circuit | Test Condition               | Min. | Typ. | Max. | Unit              |
|---------------------------|---------------------------|------------------------------|--------------|------------------------------|------|------|------|-------------------|
| Supply current            |                           | I <sub>CC</sub> (FM)         | 1            | V <sub>in</sub> = 0, FM mode | —    | 13.2 | 20.0 | mA                |
|                           |                           | I <sub>CC</sub> (AM)         | 1            | V <sub>in</sub> = 0, AM mode | —    | 8.4  | 13.5 |                   |
| F / E                     | Input limiting voltage    | V <sub>in</sub> (lim.)       | 1            | – 3dB limiting               | —    | 10.0 | —    | dBμV EMF          |
|                           | Local OSC voltage         | V <sub>OSC</sub>             | 2            | f <sub>OSC</sub> = 72.3MHz   | —    | 105  | —    | mV <sub>rms</sub> |
| FM IF                     | Input limiting voltage    | V <sub>in</sub> (lim.)<br>IF | 1            | – 3dB limiting               | 40   | 46   | 53   | dBμV EMF          |
|                           | Recovered output voltage  | V <sub>OD</sub>              | 1            | V <sub>in</sub> = 80dBμV EMF | 55   | 80   | 110  | mV <sub>rms</sub> |
|                           | Signal to noise ratio     | S / N                        | 1            | V <sub>in</sub> = 80dBμV EMF | —    | 70   | —    | dB                |
|                           | Total harmonic distortion | THD                          | 1            | V <sub>in</sub> = 80dBμV EMF | —    | 0.4  | —    | %                 |
|                           | AM rejection ratio        | AMR                          | 1            | V <sub>in</sub> = 80dBμV EMF | —    | 32   | —    | dB                |
|                           | Lamp on sensitivity       | V <sub>L</sub>               | 1            | I <sub>L</sub> = 1mA         | 45   | 51   | 56   | dBμV EMF          |
| AM                        | Gain                      | G <sub>V</sub>               | 1            | V <sub>in</sub> = 26dBμV EMF | 40   | 70   | 110  | mV <sub>rms</sub> |
|                           | Recovered output voltage  | V <sub>OD</sub>              | 1            | V <sub>in</sub> = 60dBμV EMF | 55   | 80   | 110  |                   |
|                           | Signal to noise ratio     | S / N                        | 1            | V <sub>in</sub> = 60dBμV EMF | —    | 42   | —    | dB                |
|                           | Total harmonic distortion | THD                          | 1            | V <sub>in</sub> = 60dBμV EMF | —    | 1.0  | —    | %                 |
|                           | Lamp on sensitivity       | V <sub>L</sub>               | 1            | I <sub>L</sub> = 1mA         | 20   | 25   | 30   | dBμV EMF          |
| Pin(19) output resistance |                           | R <sub>19</sub>              | 1            | FM mode                      | —    | 0.75 | —    | kΩ                |
|                           |                           |                              |              | AM mode                      | —    | 12.5 | —    |                   |

| Characteristic |                                        | Symbol                    | Test<br>Cir-<br>cuit | Test Condition                                           |                                     | Min. | Typ. | Max. | Unit              |
|----------------|----------------------------------------|---------------------------|----------------------|----------------------------------------------------------|-------------------------------------|------|------|------|-------------------|
| MPX            | Input resistance                       | $R_{IN}$                  | —                    | —                                                        |                                     | —    | 24   | —    | k $\Omega$        |
|                | Output resistance                      | $R_{OUT}$                 | —                    | —                                                        |                                     | —    | 5    | —    |                   |
|                | Max. Composite<br>signal input voltage | $V_{in (max.)}$<br>stereo | 1                    | L+R = 90%, P = 10%<br>$f_m = 1\text{kHz}$ , THD = 3%     |                                     | —    | 350  | —    | mV <sub>rms</sub> |
|                | Separation                             | Sep                       | 1                    | L+R =<br>135mV <sub>rms</sub><br>P = 15mV <sub>rms</sub> | $f_m = 100\text{Hz}$                | —    | 42   | —    | dB                |
|                |                                        |                           |                      |                                                          | $f_m = 1\text{kHz}$                 | 35   | 42   | —    |                   |
|                |                                        |                           |                      |                                                          | $f_m = 10\text{kHz}$                | —    | 42   | —    |                   |
|                | Total<br>harmonic<br>distortion        | Monaural                  | 1                    | $V_{in} = 150\text{mV}_{rms}$                            |                                     | —    | 0.2  | —    | %                 |
|                |                                        | Stereo                    |                      | L+R = 135mV <sub>rms</sub> ,<br>P = 15mV <sub>rms</sub>  |                                     | —    | 0.2  | —    |                   |
|                | Voltage gain                           |                           | $G_V$ (MPX)          | 1                                                        | $V_{in} = 150\text{mV}_{rms}$       |      | −5   | −3   | dB                |
|                | Channel balance                        |                           | C. B.                | 1                                                        | $V_{in} = 150\text{mV}_{rms}$       |      | −2   | 0    |                   |
|                | Stereo lamp<br>sensitivity             | On                        | $V_L$ (ON)           | 1                                                        | Pilot input                         | —    | 8    | 16   | mV <sub>rms</sub> |
|                |                                        | Off                       | $V_L$ (OFF)          |                                                          | Pilot input                         | 2    | 6    | —    |                   |
|                | Stereo lamp<br>hysteresis              |                           | $V_H$                | 1                                                        | To LED turn off from<br>LED turn on |      | —    | 2    | mV <sub>rms</sub> |
|                | Caputure range                         |                           | C. R.                | 1                                                        | P = 15mV <sub>rms</sub>             |      | —    | ±3   | %                 |
|                | Signal to noise ratio                  |                           | S / N                | 1                                                        | $V_{in} = 150\text{mV}_{rms}$       |      | —    | 70   | dB                |



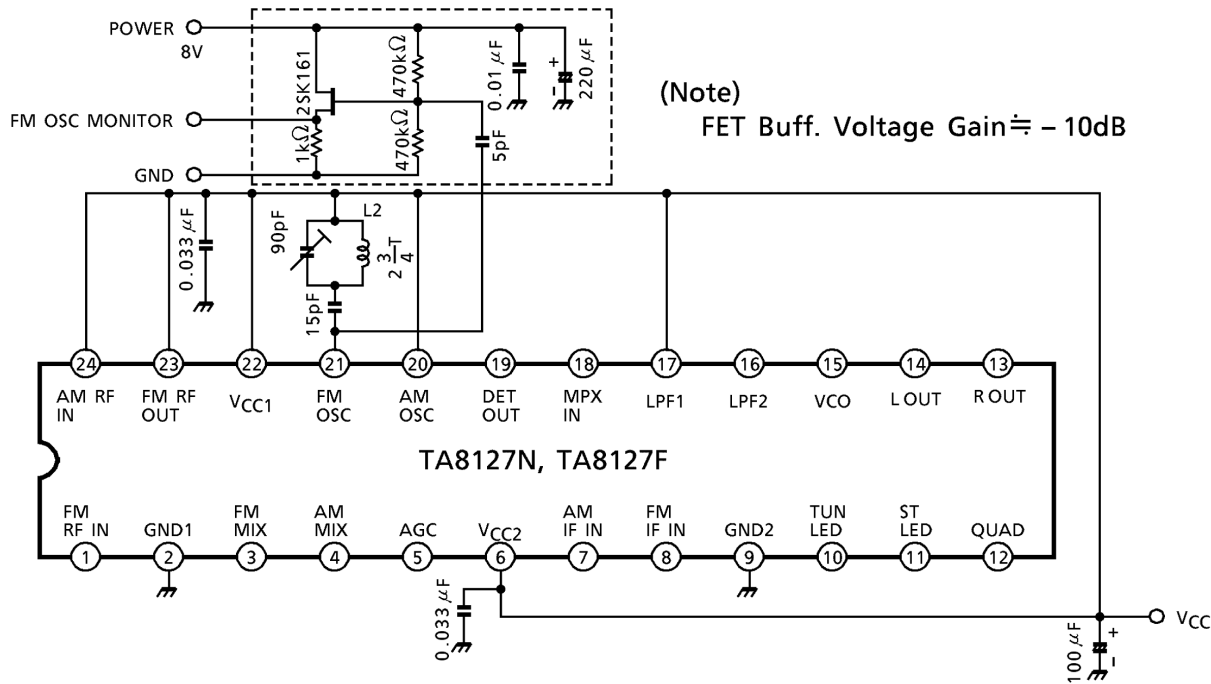
## Test Circuit 1



### ※ POLYESTER FILM CONDENSER

Using other types of condensers, there are some cases that the MPX does not do normal stereo action at high temperature or low temperature.

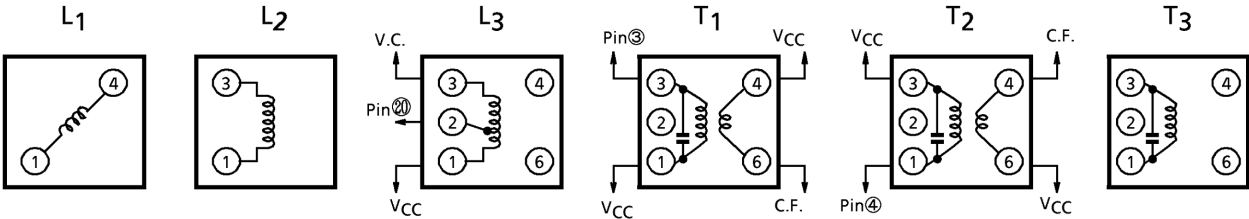
Test Circuit 2



Coil Data

| Coil No.              | Test Freq. (Hz) | L (μH) | C <sub>O</sub> (pF) | Q <sub>O</sub> | Turns |     |                 |                 |     | Wire (mmφ) | Reference         |
|-----------------------|-----------------|--------|---------------------|----------------|-------|-----|-----------------|-----------------|-----|------------|-------------------|
|                       |                 |        |                     |                | 1-2   | 2-3 | 1-3             | 1-4             | 4-6 |            |                   |
| L <sub>1</sub> FM RF  | 100M            | —      | —                   | 100            | —     | —   | —               | 2 $\frac{1}{2}$ | —   | 0.5UEW     | (S) 53T-037-202   |
| L <sub>2</sub> FM OSC | 100M            | —      | —                   | 100            | —     | —   | 2 $\frac{3}{4}$ | —               | —   | 0.5UEW     | (S) 0258-244      |
| L <sub>3</sub> AM OSC | 796k            | 288    | —                   | 115            | 13    | 73  | —               | —               | —   | 0.08UEW    | (S) 4147-1356-038 |
| T <sub>1</sub> FM MIX | 10.7M           | —      | 75                  | 100            | —     | —   | 13              | —               | 2   | 0.1UEW     | (S) 2153-414-041  |
| T <sub>2</sub> AM MIX | 455k            | —      | 180                 | 120            | —     | —   | 180             | —               | 15  | 0.08UEW    | (S) 2150-2162-165 |
| T <sub>3</sub> FM DET | 10.7M           | —      | 47                  | 165            | —     | —   | 16              | —               | —   | 0.09UEW    | (S) 2153-4095-122 |

(S): SUMIDA electric CO., LTD



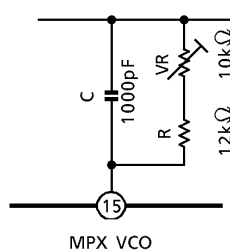
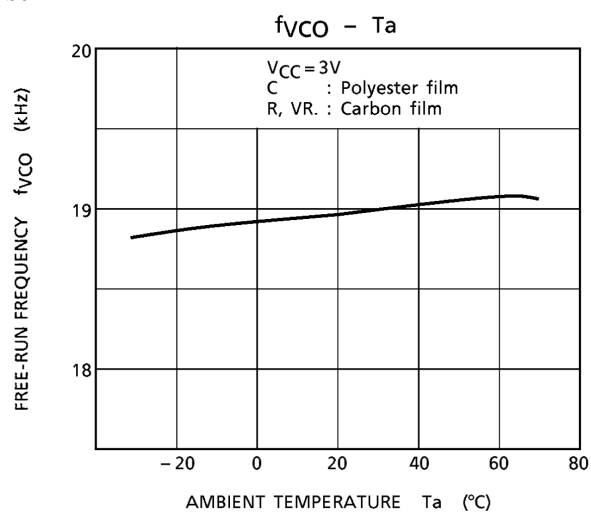
## Hint On Use Of TA8127N And TA8127F

External parts of MPX VCO

- (1) Temperature characteristic of MPX VCO free-run frequency. The temperature characteristic of MPX VCO is shown in the diagram as below. Select one with a better temperature characteristic (C, R and VR. ) in use. We recommend,

C : Polyester film

R, VR: Carbon film



- (2) Value of the external parts

We recommend to set up these value as below.

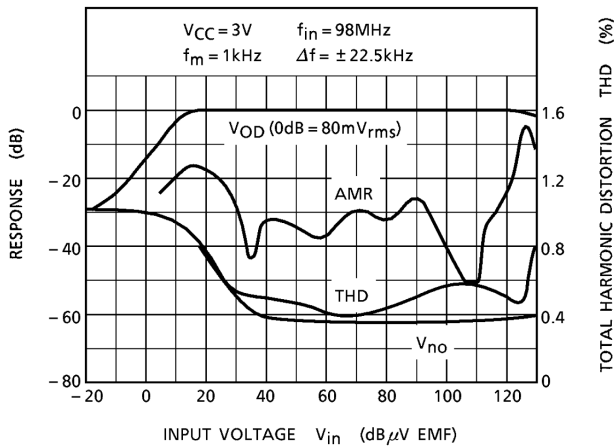
R = 12kΩ

VR = 10kΩ

C = 1000pF

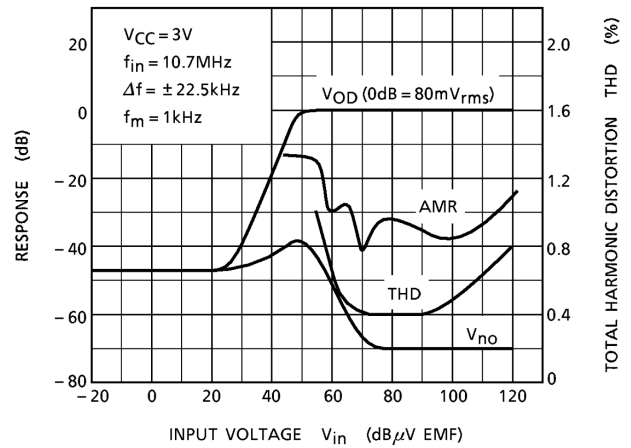
FM (F/E + IF)

$V_{OD}$ ,  $V_{no}$ , THD, AMR -  $V_{in}$



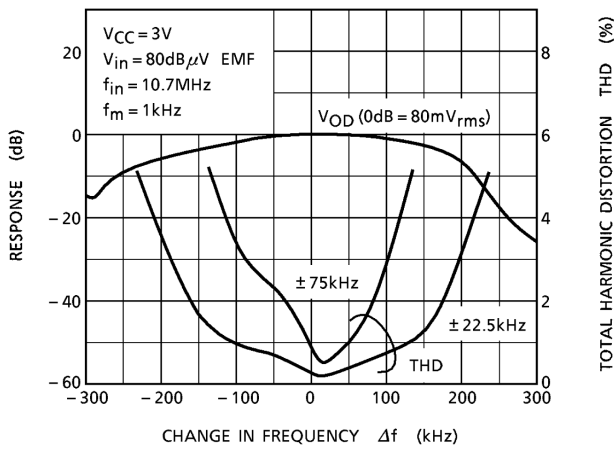
FM (IF)

$V_{OD}$ ,  $V_{no}$ , THD, AMR -  $V_{in}$



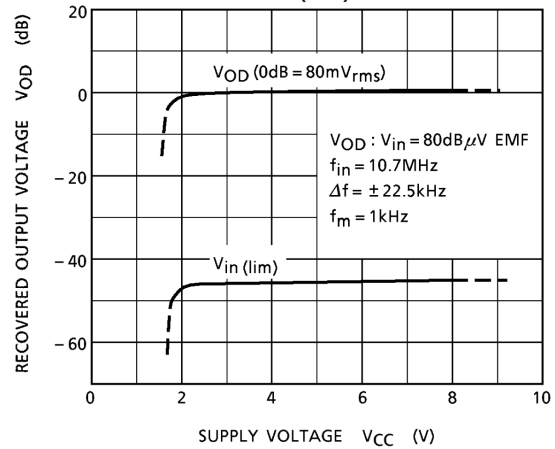
FM (IF)

$V_{OD}$ , THD -  $\Delta f$



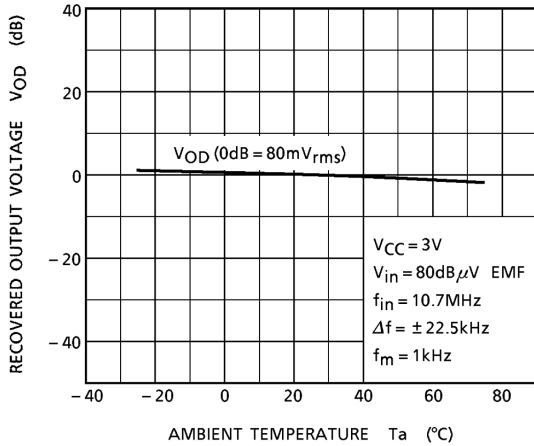
FM (IF)

$V_{OD}$ ,  $V_{in}(lim.)$  -  $V_{CC}$



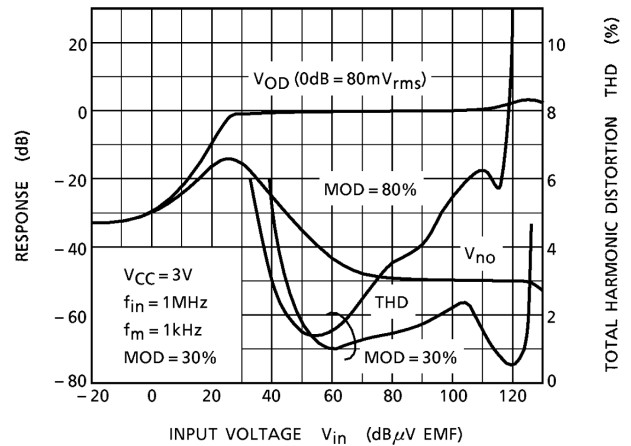
FM (IF)

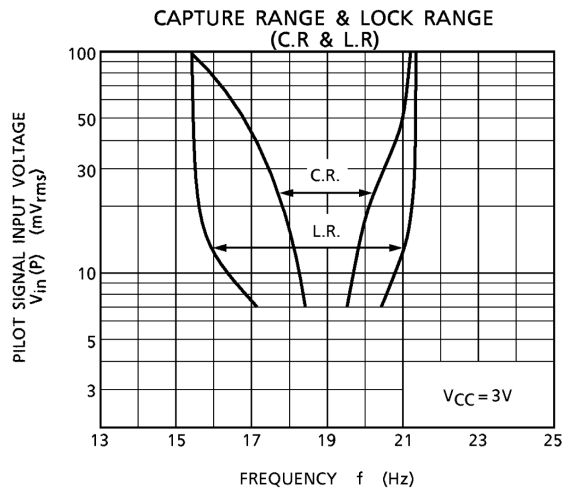
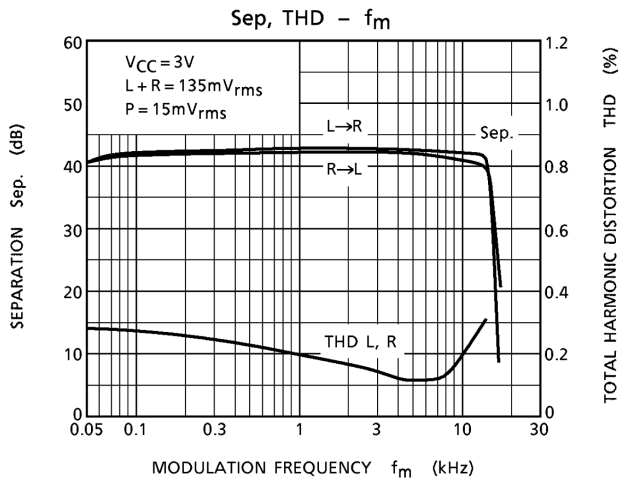
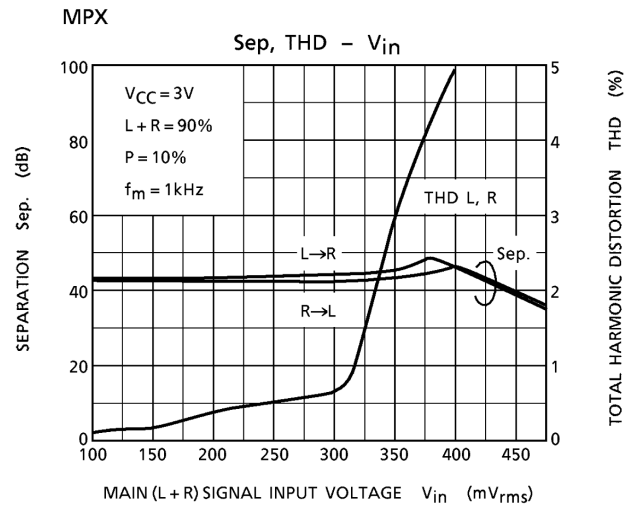
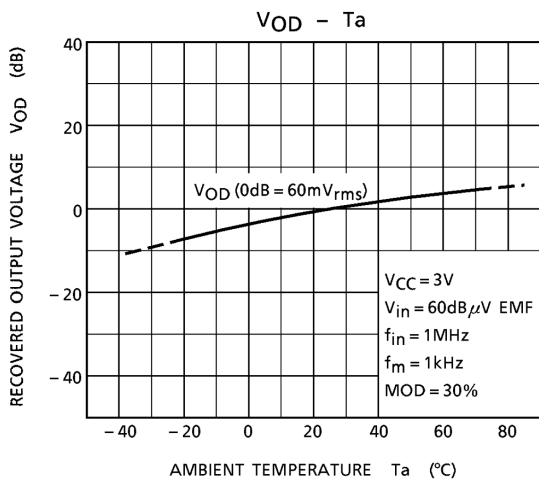
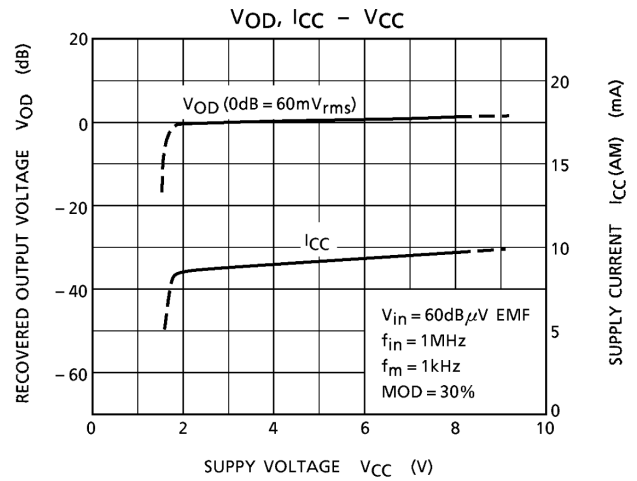
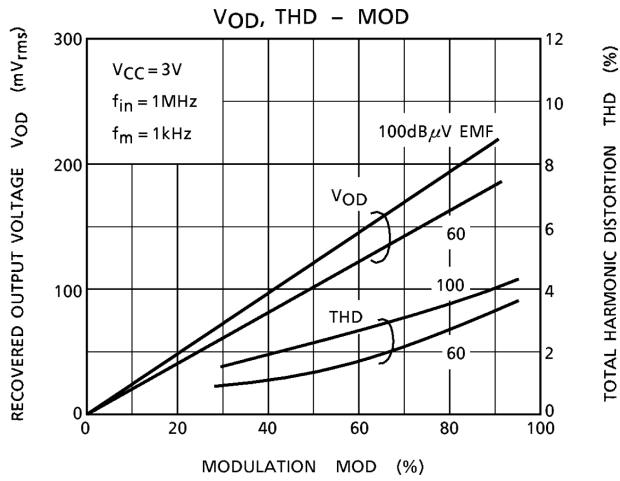
$V_{OD}$  -  $T_a$

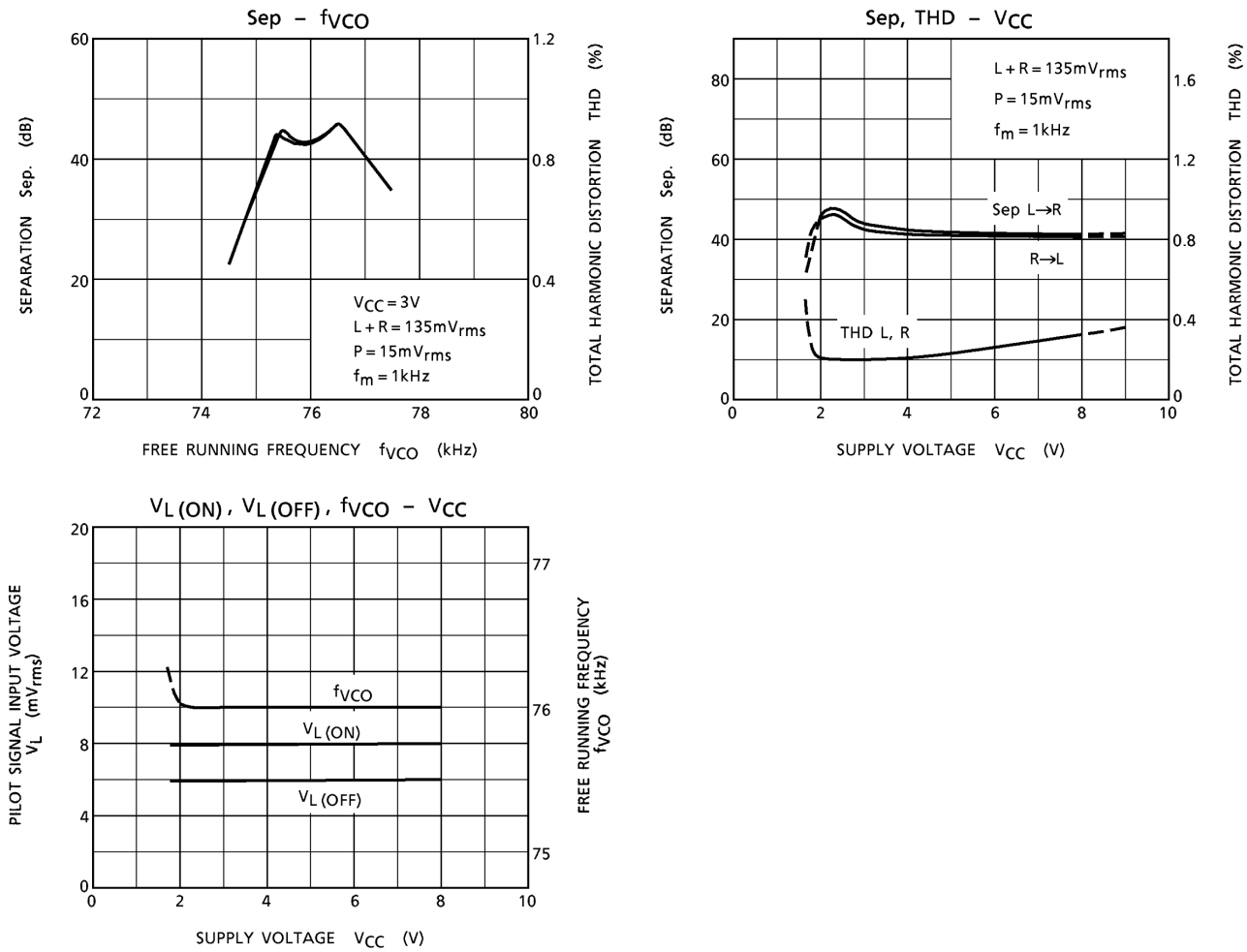


AM

$V_{OD}$ ,  $V_{no}$ , THD -  $V_{in}$



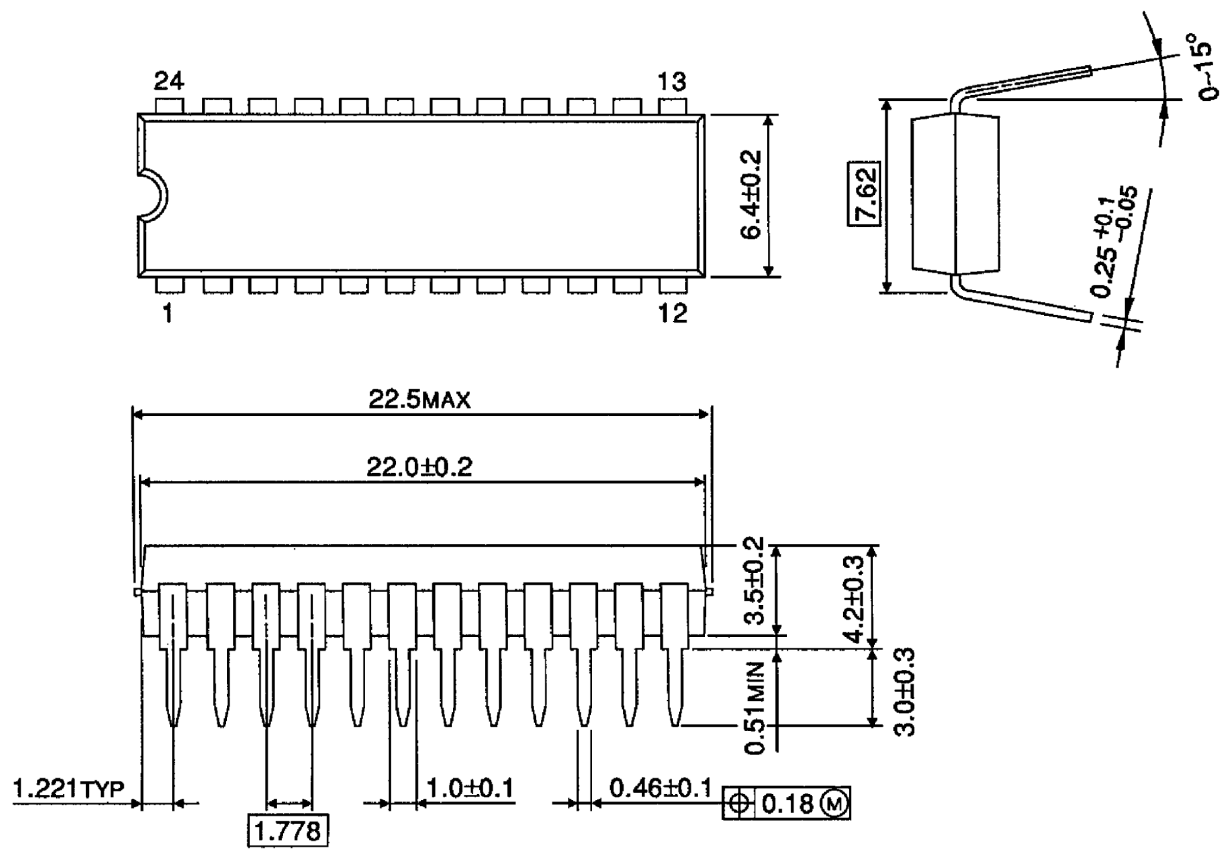




Package Dimensions

SDIP24-P-300-1.78

Unit : mm

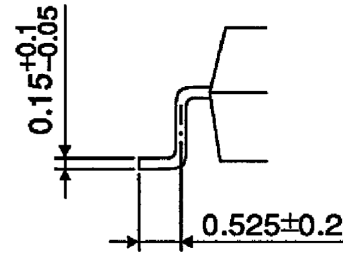
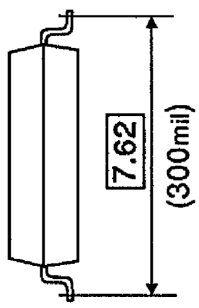
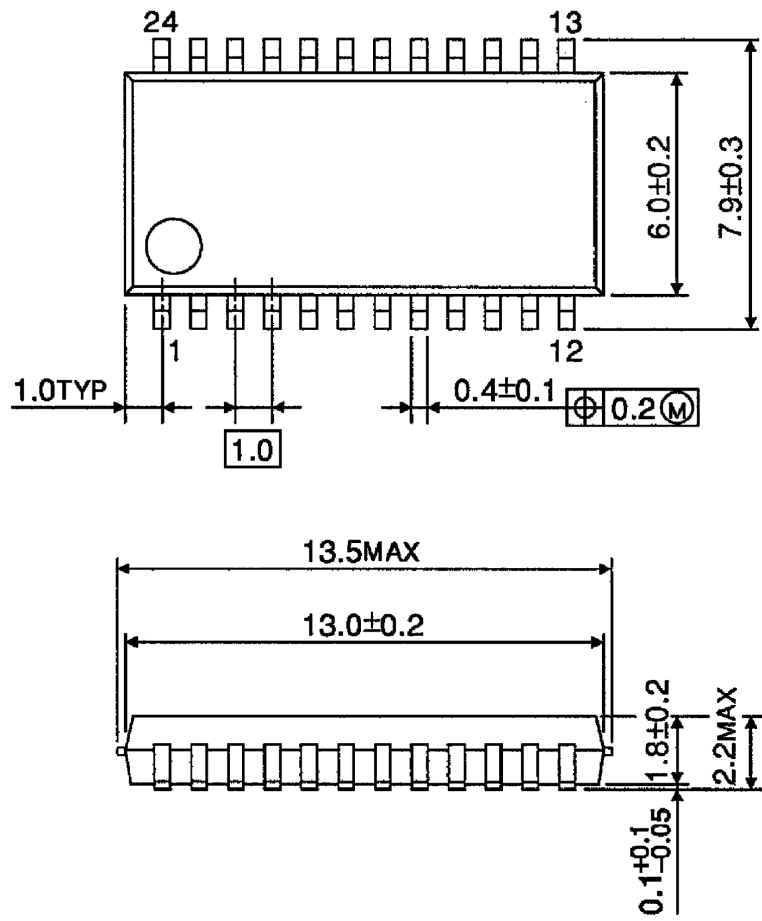


Weight: 1.2g (typ.)

Package Dimensions

SSOP24-P-300-1.00

Unit : mm



Weight: 0.31g (typ.)



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000707EBA

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