# TA8100N/F

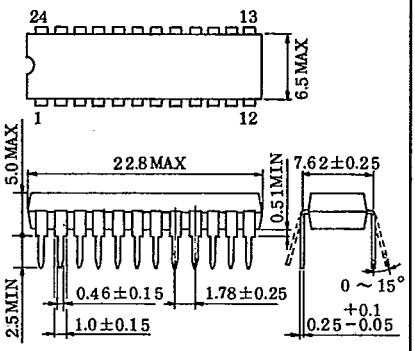
3V AM/FM IF IC WITH POWER AMPLIFIER

TA8100N/F is AM/FM IF IC with power amplifier and suitable for low voltage portable radio.
This IC is able to drive LED for Turning Indication.

- It can drive 4Ω load directly
  : $P_O$=220mW (Typ.), THD=10% (3V/4Ω)
- Incorporates, AM RF Amp, AM Local Oscillator, AM Mixer, AM/FM IF Amp, AM/FM Detector, AM AGC Circuit and B Class-Audio Power Amplifier.
- Low Overload Distortion at AM.
- Wide Power Supply Voltage Range
  : $V_{opr}$=1.8~5V (Ta=25°C)

Unit in mm

TA8100N



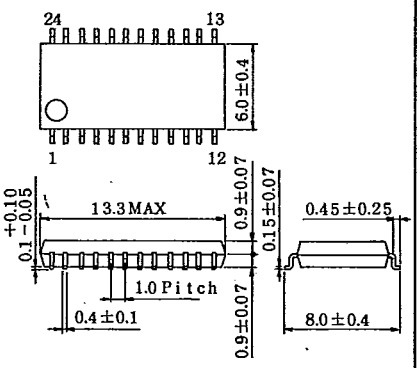

Lead pitch is 1.78 and tolerance is ±0.25 against theoretical center of each lead that is obtained on the basis of No.1 and No.24 leads.

| | |
|---|---|
| JEDEC | — |
| TOSHIBA | 3D24C-P |

Weight : 1.2g

Unit in mm

TA8100F




| | |
|---|---|
| JEDEC | — |
| TOSHIBA | F24GD-P |

Weight : 0.31g

MAXIMUM RATINGS (Ta=25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Supply Voltage | | $V_{CC}$ | 6 | V |
| Output Current (Peak) | | $I_{O(peak)}$ | 550 | mA |
| LED Current | | $I_{LED}$ | 15 | mA |
| Power Dissipation (Note) | TA8100F | $P_D$ | 800 | mW |
| | TA8100N | | 1200 | |
| Operating Temperature | | Topr | -25~75 | °C |
| Storage Temperature | | Tstg | -55~150 | °C |

Note : Derated above Ta=25°C in the proportion of 6.4mW/°C for TA8100F and of 9.6mW/°C for TA8100N.

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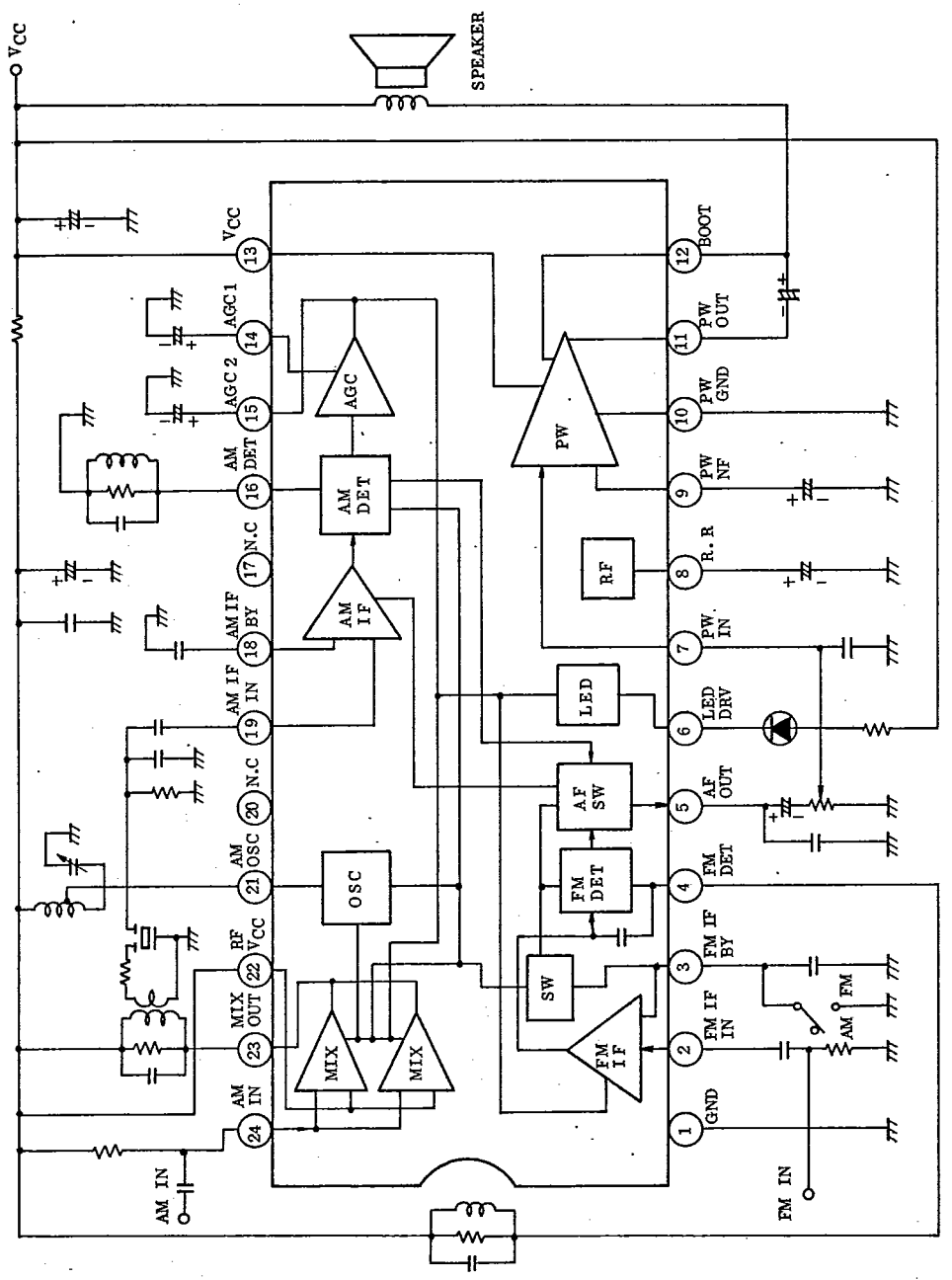
BLOCK DIAGRAM




(Note) 17, 20 pin: Non Connection

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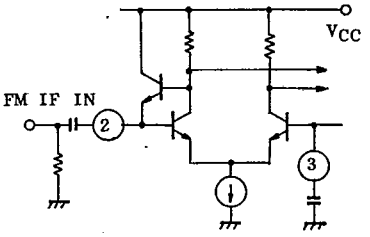
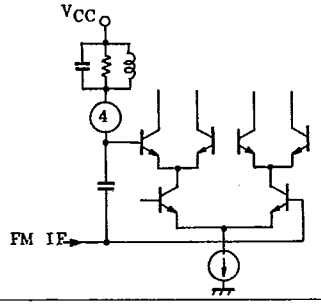
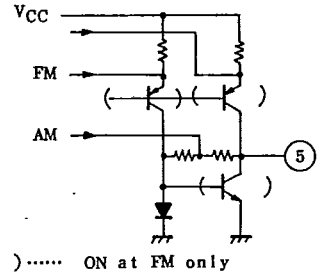
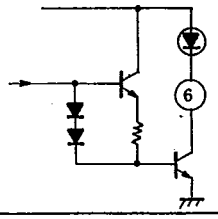
## TERMINAL EXPLANATION

TERMINAL VOLTAGE: Typical Terminal Voltage at No Signal with Test Circuit
($V_{CC}$=3.0V, Ta=25°C)

| No. | TERMINAL NAME | CONTENTS | EQUIVALENT CIRCUIT | VOLTAGE | |
|---|---|---|---|---|---|
| | | | | AM(V) | FM(V) |
| 1 | GND | IF GND | - | 0 | 0 |
| 2 | FM IF IN | FM IF (10.7MHz) Input Terminal |  | 2.4 | 2.0 |
| 3 | FM IF BY | FM IF BYPASS | | 0 | 2.0 |
| 4 | FM DET | FM Quad Rature Detection Circuit |  | 3.0 | 3.0 |
| 5 | AF OUT | Audio Signal Output Terminal |  | 0.3 | 0.8 |
| 6 | LED DRIVER | LED Terminal |  | - | - |

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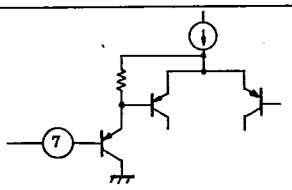
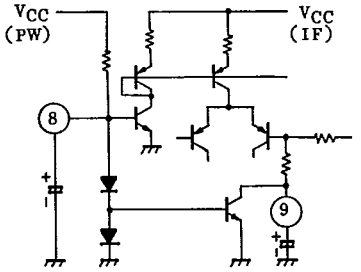
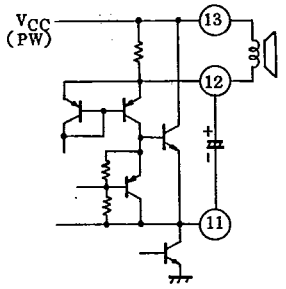
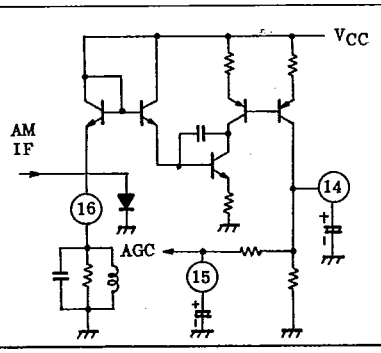
TERMINAL EXPLANATION

| No. | TERMINAL NAME | CONTENTS | EQUIVALENT CIRCUIT | VOLTAGE AM(V) | VOLTAGE FM(V) |
|---|---|---|---|---|---|
| 7 | PW IN | Audio Signal Input Terminal |  | 0.01 | 0.01 |
| 8 | RIPPLE | Ripple Filter Terminal |  | 1.4 | 1.4 |
| 9 | PW NF | NF Terminal | | 0.6 | 0.6 |
| 10 | PW GND | GND | - | 0 | 0 |
| 11 | PW OUT | Audio Signal Output Terminal |  | 1.5 | 1.5 |
| 12 | BOOT | Bootstrap | | 2.8 | 2.8 |
| 13 | $V_{CC}$ | Power Supply | - | 3.0 | 3.0 |
| 14 | AGC 1 | AM AGC 1 |  | 0.6 | 0 |
| 15 | AGC 2 | AM AGC 2 | | 0.6 | 0 |
| 16 | AM DET | AM Detector | | 0 | 0 |

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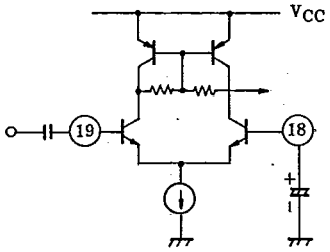
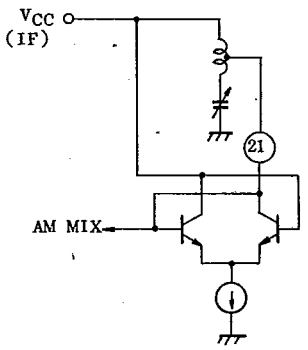
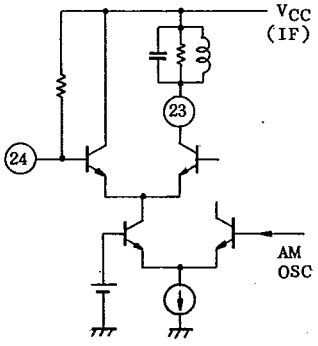
TERMINAL EXPLANATION

| No. | TERMINAL NAME | CONTENTS | EQUIVALENT CIRCUIT | VOLTAGE AM(V) | VOLTAGE FM(V) |
|---|---|---|---|---|---|
| 17 | N.C | Non Connection | - | - | - |
| 18 | AM IF BY | AM IF Amplifier Bypass |  | 1.3 | 0 |
| 19 | AM IF IN | AM IF (455kHz) Input Terminal | | 1.3 | 0 |
| 20 | N.C | Non Connection | - | - | - |
| 21 | AM OSC | AM Oscillation Terminal |  | 3.0 | 3.0 |
| 22 | $V_{CC}$ | Power Supply | - | 3.0 | 3.0 |
| 23 | AM MIX OUT | AM MIXER Output Terminal |  | 3.0 | 3.0 |
| 24 | AM IN | AM RF Signal Input Terminal | | 3.0 | 3.0 |

## ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $V_{CC}$=3V, Ta=25°C

FM : f=10.7MHz, $\Delta$f=±22.5kHz dev., $f_m$=1kHz

AM : f=1MHz, Mod=30%, $f_m$=1kHz

PW : f=1kHz, $R_L$=4Ω, Rg=600Ω

| CHARACTERISTIC | | SYMBOL | TEST CIR-CUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|---|
| Power Supply Current (Including PW Amplifier) | | $I_{CC(FM)}$ | - | $V_{IN}$=0 | - | 12 | 20 | mA |
| | | | | $V_{IN}$=0, $V_{CC}$=4.5V | - | 14 | 23 | |
| | | $I_{CC(AM)}$ | - | $V_{IN}$=0 | - | 11 | 19 | |
| | | | | $V_{IN}$=0, $V_{CC}$=4.5V | - | 13 | 22 | |
| FM | Input Limiting Voltage | $V_{IN(lim)}$ | - | -3dB Limiting Point | - | 36 | 42 | dBμ |
| | Recovered Output Voltage | $V_{OD}$ | - | $V_{IN}$=80dBμ | 22 | 31 | 44 | mVrms |
| | Signal to Noise Ratio | S/N | - | $V_{IN}$=80dBμ | - | 70 | - | dB |
| | Total Harmonic Distortion | THD | - | $V_{IN}$=80dBμ | - | 0.3 | - | % |
| | AM Rejection Ratio | AMR | - | $V_{IN}$=80dBμ, Mod=30% | - | 33 | - | dB |
| | LED Sensitivity | $V_L$ | - | $I_L$=1mA | 44 | 50 | 56 | dBμ |
| AM | Gain | $G_V$ | - | $V_{IN}$=30dBμ | 5 | 11 | 17 | mVrms |
| | Recovered Output Voltage | $V_{OD}$ | - | $V_{IN}$=66dBμ | 22 | 31 | 44 | mVrms |
| | Signal to Noise Ratio | S/N | - | $V_{IN}$=66dBμ | - | 46 | - | dB |
| | Total Harmonic Distortion | THD 1 | - | $V_{IN}$=66dBμ | - | 1.5 | - | % |
| | | THD 2 | - | $V_{IN}$=106dBμ | - | 4.0 | - | |
| | Local OSC Stop Voltage | $V_{stop}$ | - | $V_{OSC}$:-6dB down point | - | - | 1.5 | V |
| | LED Sensitivity | $V_L$ | - | $I_L$=1mA | 24 | 30 | 36 | dBμ |
| PW | Voltage Gain | $G_V$ | - | $V_{IN}$=-40dBm (7.7mV) | 37 | 40 | 43 | dB |
| | Output Power | $P_{o1}$ | - | THD=10% | 180 | 220 | - | mW |
| | | $P_{o2}$ | - | $V_{CC}$=4.5V, THD=10% | - | 500 | - | |
| | Total Harmonic Distortion | THD | - | $P_o$=50mW | - | 0.5 | 2 | % |
| | Output Noise | $V_{NO}$ | - | Rg=10kΩ BW=30Hz~20kHz | - | 0.18 | - | mVrms |

$V_{IN}$ : Open Measurement

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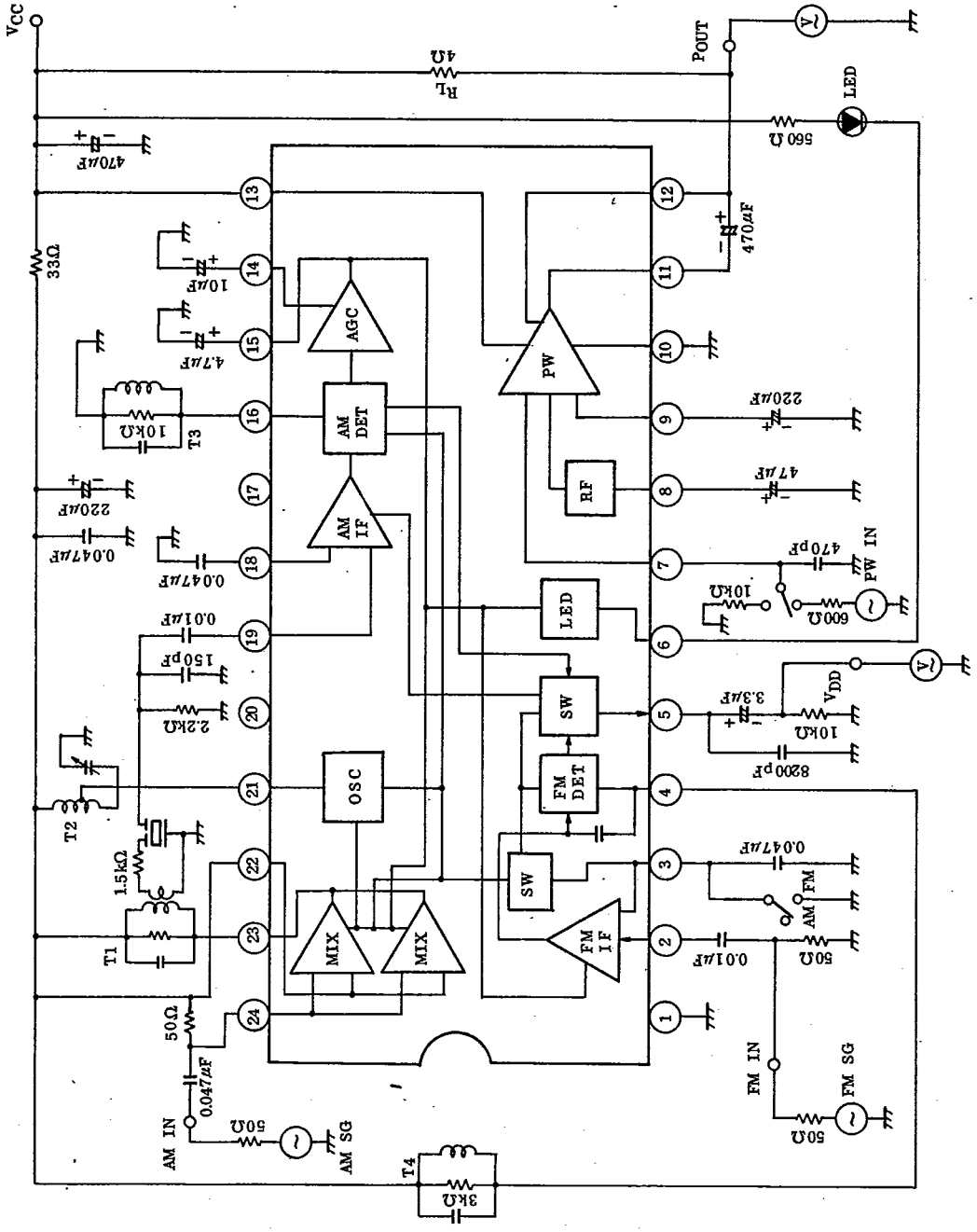
TEST CIRCUIT



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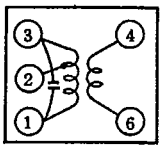
## COIL DATA

### T1 AM MIX

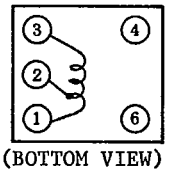


(BOTTOM VIEW)

| Co(pF) | f | Qo | TURNS | | |
|---|---|---|---|---|---|
| 1-3 | (MHz) | 1-3 | 1-2 | 2-3 | 4-6 |
| 1500 | 455 | 60 | 12 | 51 | 17 |

SUMIDA ELECTRIC Co.,Ltd
2150-2105-261
WIRE : 0.1mmφ UEW

### T2 AM OSC

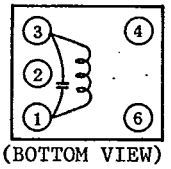


(BOTTOM VIEW)

| f | L(μH) | Qo | TURNS | |
|---|---|---|---|---|
| (kHz) | 1-3 | 1-3 | 1-2 | 2-3 |
| 796 | 268 | 125 | 15 | 89 |

SUMIDA ELECTRIC Co.,Ltd
2157-2239-213A
WIRE : 0.06mmφ UEW

### T3 AM DET

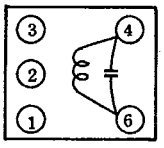


(BOTTOM VIEW)

| Co(pF) | f | Qo | TURNS |
|---|---|---|---|
| 1-3 | (kHz) | 1-3 | 1-3 |
| 330 | 455 | 105 | 127 |

SUMIDA ELECTRIC Co.,Ltd
2150-2083-061
WIRE : 0.06mmφ UEW

### T4 FM DET



(BOTTOM VIEW)

| Co(pF) | f | Qo | TURNS |
|---|---|---|---|
| 4-6 | (MHz) | 4-6 | 4-6 |
| 150 | 10.7 | 95 | 10 |

SUMIDA ELECTRIC Co.,Ltd
2153-4095-331
WIRE : 0.14mmφ UEW

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APPLICATION NOTE

1. AM IF INPUT

AM IF signal (455kHz) is fed to pin (19). To keep stability at weak signal, connect the external resistor and capacitor as shown in Fig.1.

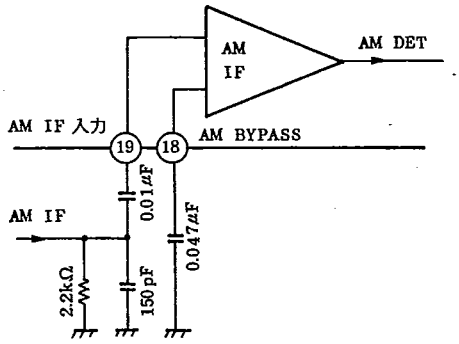


Fig.1 AM IF

2. BOOTSTRAP

When the load resistor, $R_L$ is 16Ω, oscillation may occur just before clipping of the output wave. (Except for $R_L$=8Ω, 4Ω) So, connect the small resistor as shown in Fig.2.

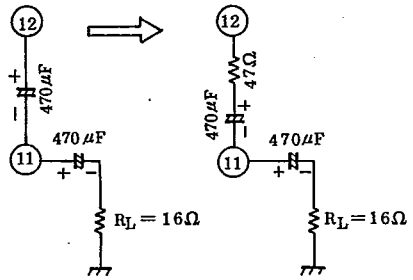


Fig.2 BOOTSTRAP

3. FM IF INPUT

It is not needed to use a transistor between F/E and AM/FM IF to get a high gain because this IC has a enough gain ($V_{IN(lim)}$=36dBμ).

When the signal sourse impedance is high, be careful of the value of R1 and pattern layout to keep stability at weak signal (Fig.3).

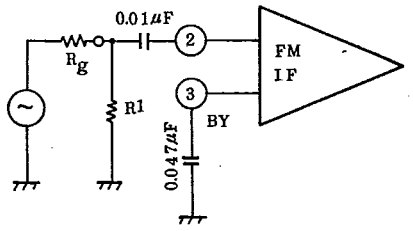


Fig.3 FM IF

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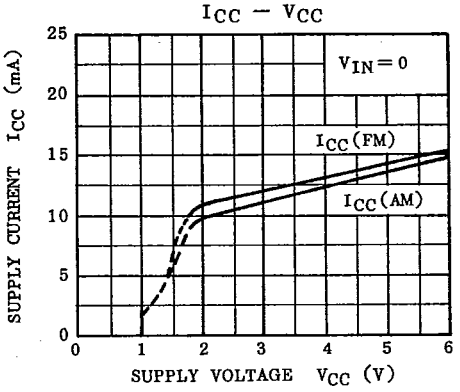
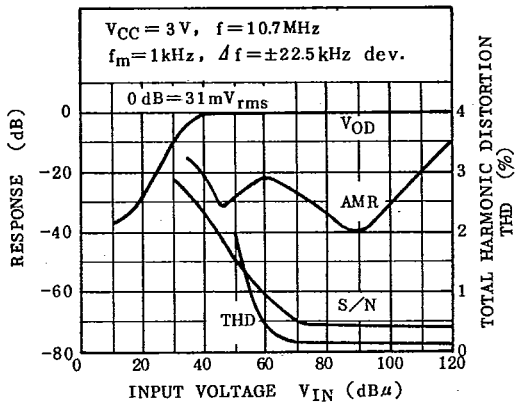
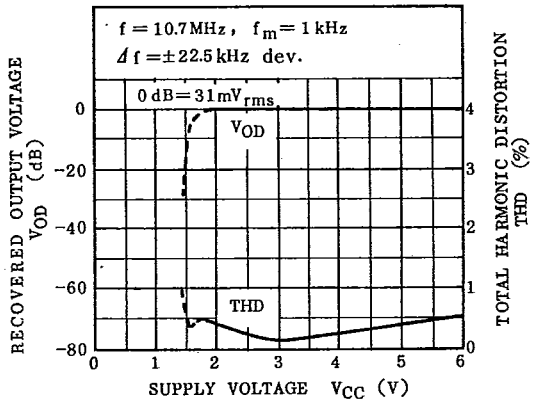
$I_{CC} - V_{CC}$



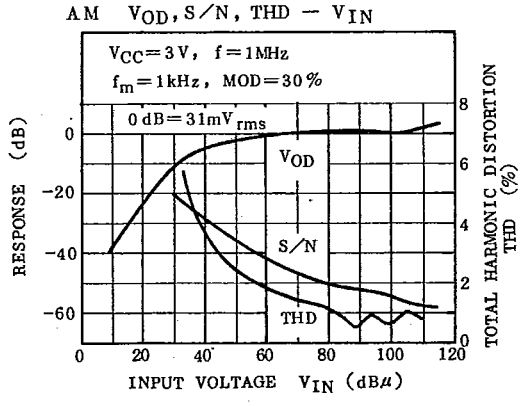

FM $V_{OD}$, AMR, S/N, THD $- V_{IN}$



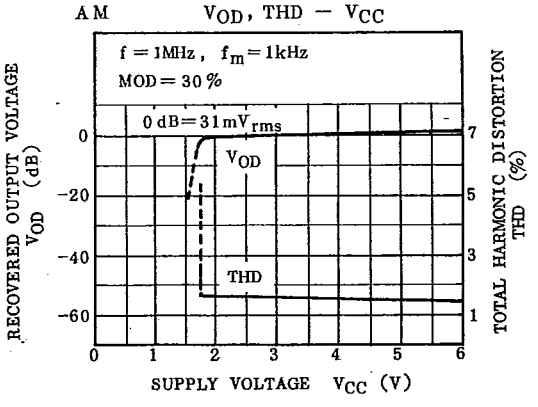

FM $V_{OD}$, THD $- V_{CC}$




AM $V_{OD}$, S/N, THD $- V_{IN}$




AM $V_{OD}$, THD $- V_{CC}$



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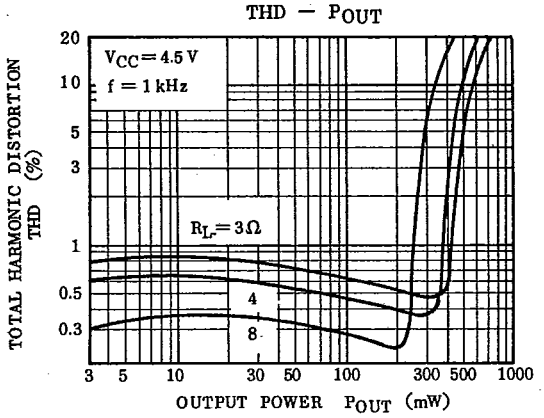
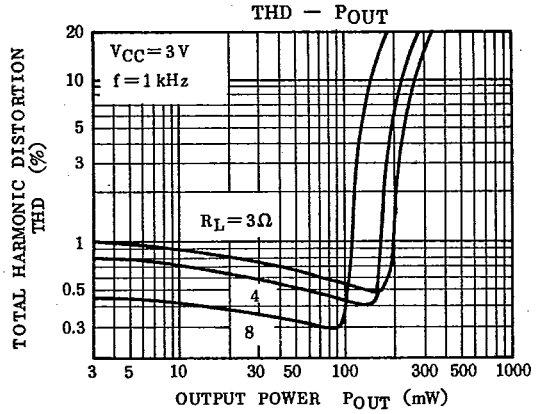
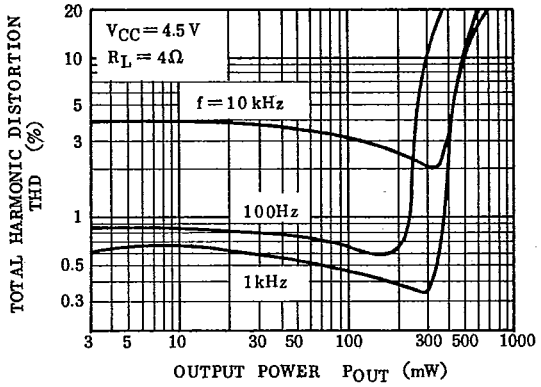
THD – $P_{OUT}$



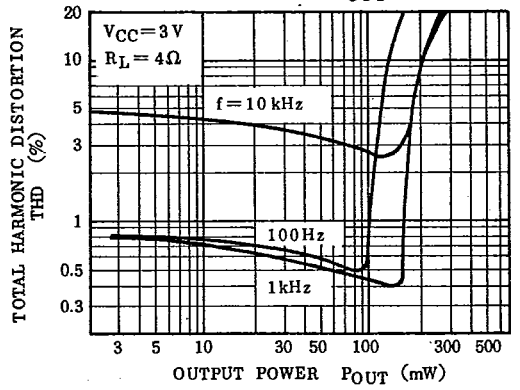

THD – $P_{OUT}$



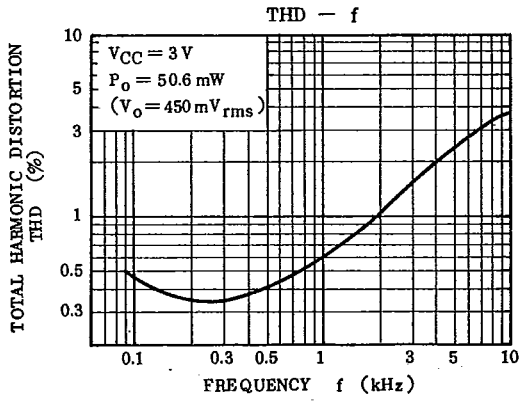

THD – $P_{OUT}$



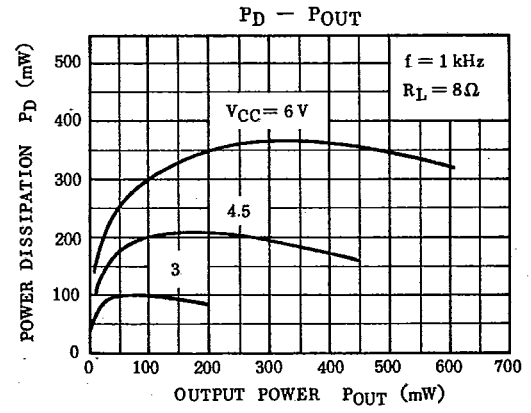

THD – $P_{OUT}$




THD – f




$P_D$ – $P_{OUT}$



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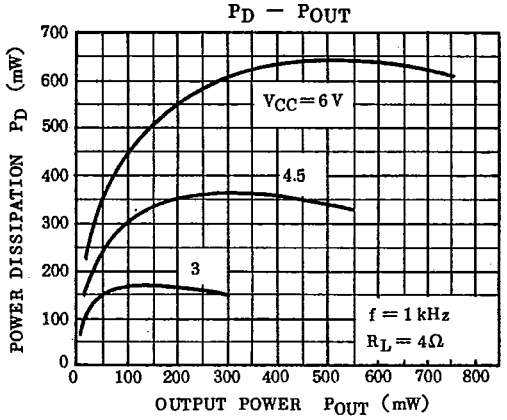
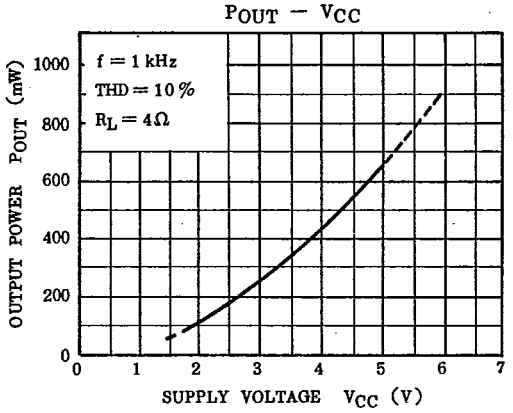
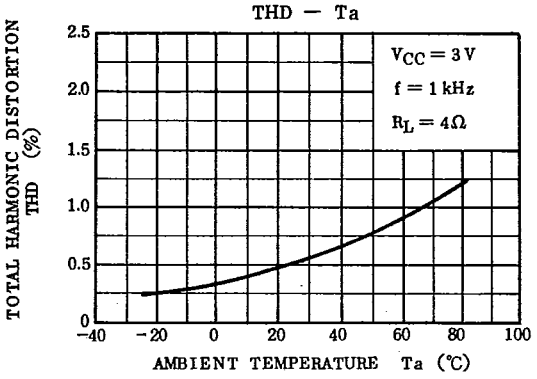
$P_D - P_{OUT}$



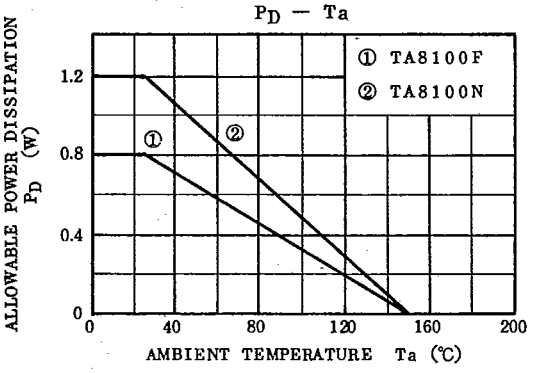

$P_{OUT} - V_{CC}$



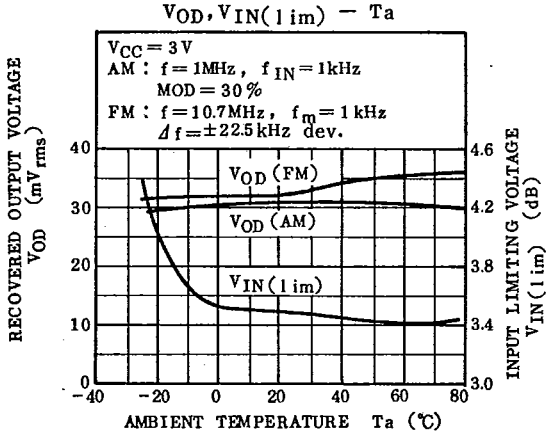

THD − Ta



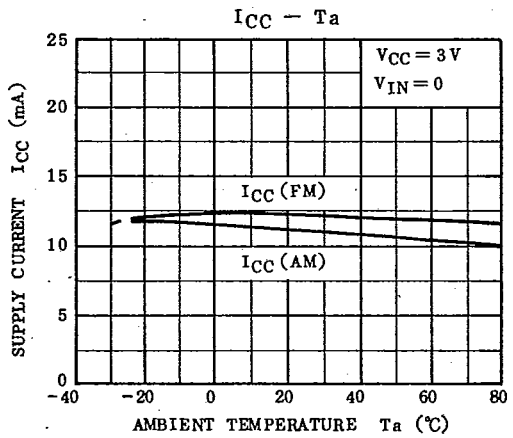

$P_D$ − Ta




$V_{OD}$, $V_{IN(lim)}$ − Ta




$I_{CC}$ − Ta

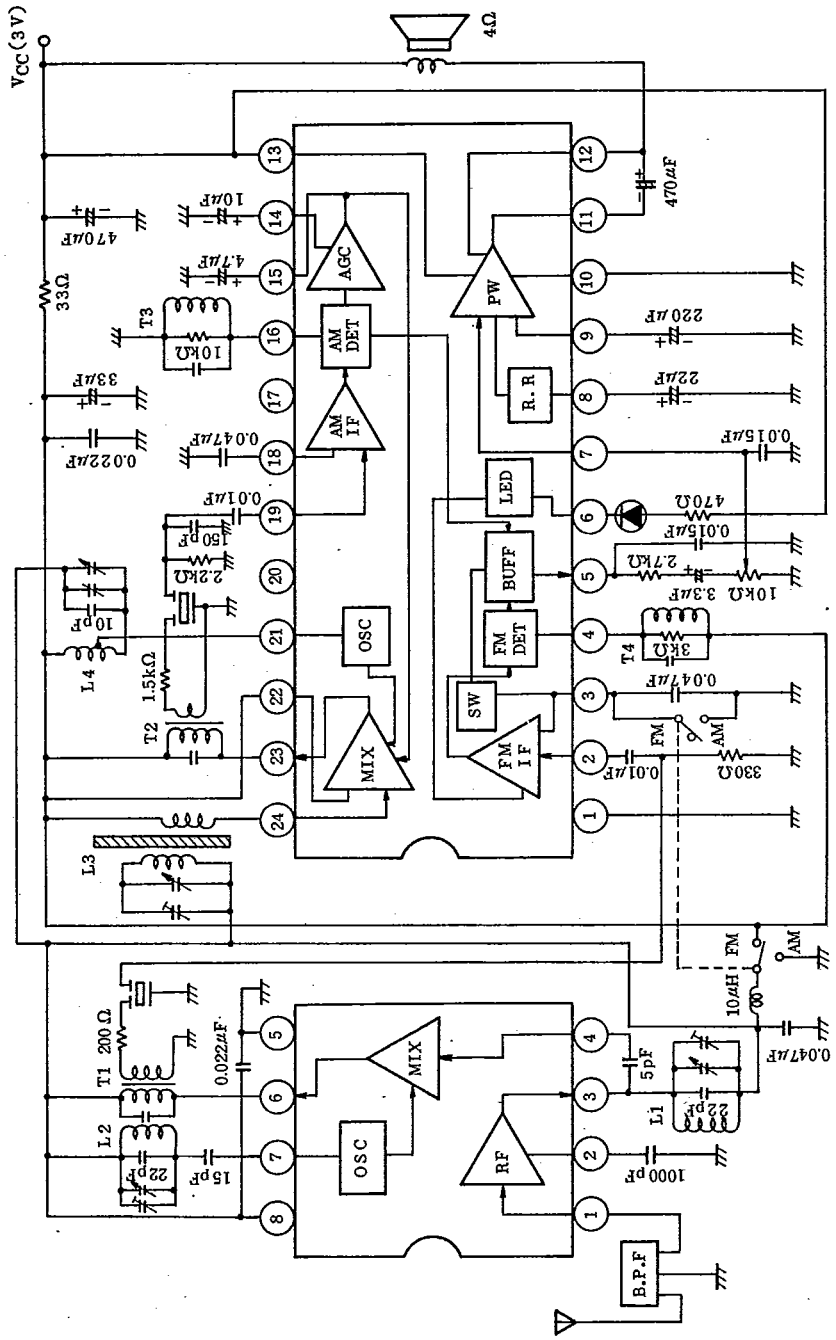


# TA8100N/F

T-77-05-07

APPLICATION CIRCUIT

3V AM/FM RADIO CIRCUIT (for example)

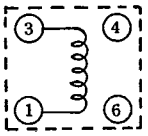


# TA8100N/F

T-77-05-07

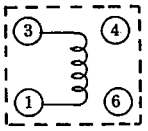
## COIL DATA (APPLICATION CIRCUIT)

L1 : FM RF COIL



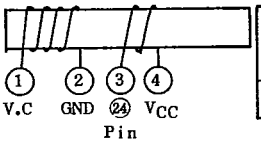

| f (MHz) | L(μH) 1-3 | Qo 1-3 | TURNS 1-3 | WIRE (mm) |
|---|---|---|---|---|
| 100 | 0.06 | 100 | $2\frac{1}{4}$ | 0.5 UEW |

L2 : FM OSC COIL




| f (MHz) | L(μH) 3-1 | Qo 3-1 | TURNS 3-1 | WIRE (mm) |
|---|---|---|---|---|
| 100 | 0.045 | 100 | $1\frac{3}{4}$ | 0.5 UEW |

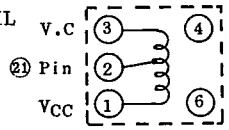
L3 : AM ANT COIL




| f (kHz) | L(μH) 1-2 | Qo 1-2 | TURNS 1-2 | TURNS 3-4 | WIRE (mm) |
|---|---|---|---|---|---|
| 796 | 600 | 200 | 95 | 17 | 7/0.07 USTC |

CORE : 10mmφ × 80mm

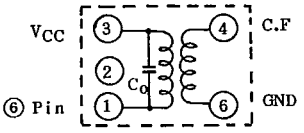
L4 : AM OSC COIL




| f (kHz) | L(μH) 1-3 | Qo 1-3 | TURNS 1-2 | TURNS 2-3 | WIRE (mm) |
|---|---|---|---|---|---|
| 796 | 268 | 90 | 13 | 75 | 0.08 UEW |

MITSUMI YT20582, SUMIDA 2157-2239-213A

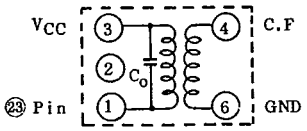
T1 : FM IFT




| f (MHz) | Co(pF) 3-1 | Qo 3-1 | TURNS 6-4 | TURNS 3-1 | WIRE (mm) |
|---|---|---|---|---|---|
| 10.7 | 82 | 90 | 2 | 11 | 0.12 UEW |

MITSUMI YT20580, SUMIDA 2153-414-041(5821)

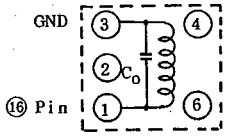
T2 : AM IFT




| f (kHz) | Co(pF) 1-3 | Qo 1-3 | TURNS 4-6 | TURNS 1-3 | WIRE (mm) |
|---|---|---|---|---|---|
| 455 | 330 | 110 | 6 | 114 | 0.07 UEW |

MITSUMI YT20583

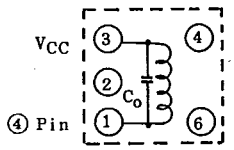
T3 : AM DET




| f (kHz) | Co(pF) 3-1 | Qo 3-1 | TURNS 3-1 | | WIRE (mm) |
|---|---|---|---|---|---|
| 455 | 330 | 105 | 127 | | 0.06 UEW |

SUMIDA 2150-2083-061(4838)

T4 : FM DET




| f (MHz) | Co(pF) 1-3 | Qo 1-3 | TURNS 1-3 | | WIRE (mm) |
|---|---|---|---|---|---|
| 10.7 | 150 | 100 | 10 | | 0.12 UEW |

SUMIDA 2153-4095-331