

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

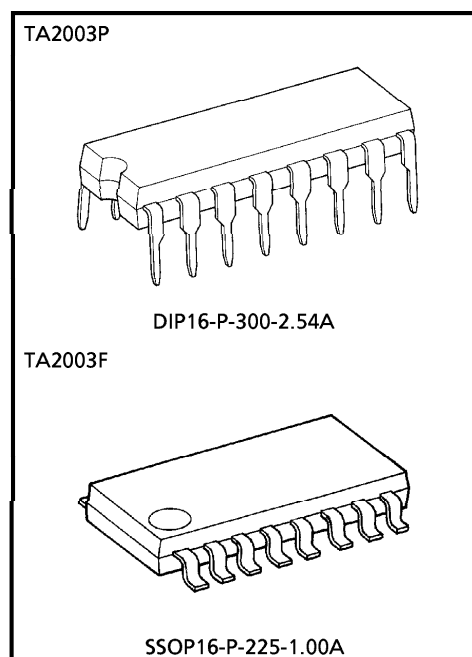
TA2003P, TA2003F

AM / FM RADIO IC

The TA2003P, TA2003F are AM / FM Radio IC (FM F/E + AM / FM IF) which are designed for AM / FM Radios. Combining with the TA7368P (Mono PW IC), a suitable AM / FM Radio System is able to be constituted.

FEATURES

- FM IFT, AM IFT and FM Detector Coil are not needed.
- Pin compatible of TA8164P.
- Operating Supply Voltage Range
: $V_{CC(opr)} = 1.8 \sim 7V$ ($T_a = 25^\circ C$)

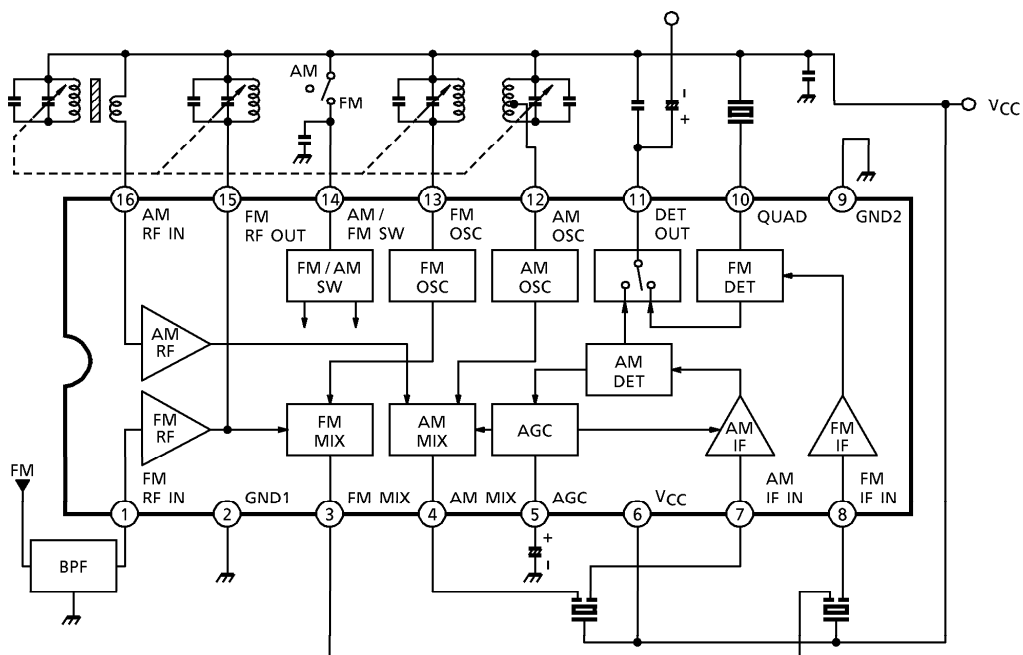


Weight
 DIP16-P-300-2.54A : 1.00g (Typ.)
 SSOP16-P-225-1.00A : 0.14g (Typ.)

980910EBA2

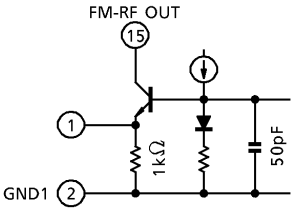
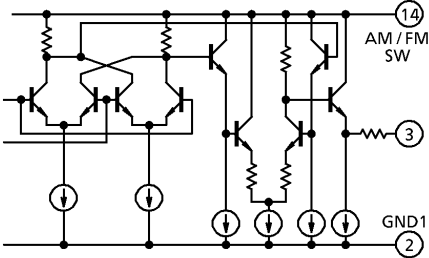
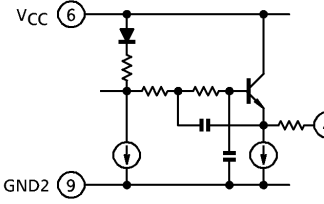
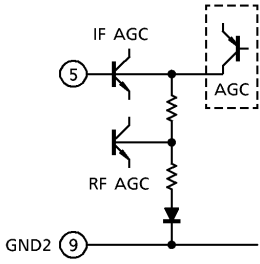
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BLOCK DIAGRAM



EXPLANATION OF TERMINAL

TERMINAL VOLTAGE : Typical DC voltage at Ta = 25°C, V_{CC} = 3V and no signal with Test Circuit 1

| PIN No. | SYMBOL | CONTENTS | INTERNAL CIRCUIT | TERMINAL VOLTAGE (V) | |
|---------|-----------------|-------------------------------|--|----------------------|-----|
| | | | | AM | FM |
| 1 | FM RF IN | Input of FM RF Amplifier |  | 0 | 0.7 |
| 2 | GND1 | GND for RF, OSC and MIX Stage | — | 0 | 0 |
| 3 | FM MIX | Output of FM MIX |  | 0.4 | 1.7 |
| 4 | AM MIX | Output of AM MIX |  | 0.6 | 0 |
| 5 | AGC | By-pass of AM AGC |  | 0 | 0 |
| 6 | V _{CC} | — | — | 3.0 | 3.0 |

| PIN No. | SYMBOL | CONTENTS | INTERNAL CIRCUIT | TERMINAL VOLTAGE (V) | |
|---------|----------|---|--|----------------------|-----|
| | | | | AM | FM |
| 7 | AM IF IN | Input of AM IF Amplifier | | 3.0 | 3.0 |
| 8 | FM IF IN | Input of FM IF Amplifier | | 3.0 | 3.0 |
| 9 | GND2 | GND for IF stage | — | 0 | 0 |
| 10 | QUAD | FM QUAD Detector Ceramic Discriminator is connected. Recommendation CDA10.7MG31 (MURATA MFG.CO., LTD) | | 2.5 | 2.2 |
| 11 | DET OUT | Output of FM / AM Detector | <p>① LOW→FM, HIGH→AM ② LOW→AM, HIGH→FM</p> | 1.4 | 1.1 |
| 12 | AM OSC | AM Local Oscillator Terminal Oscillator Coil is connected. | | 3.0 | 3.0 |

| PIN No. | SYMBOL | CONTENTS | INTERNAL CIRCUIT | TERMINAL VOLTAGE (V) | |
|---------|------------|--|------------------|----------------------|-----|
| | | | | AM | FM |
| 13 | FM OSC | FM Local Oscillator Terminal Oscillator Coil is connected. | | 0.9 | 3.0 |
| 14 | AM / FM SW | AM / FM switch connected to Pin⑭ V_{CC} →FM mode Pin⑭ OPEN→AM mode | | 0.9 | 3.0 |
| 15 | FM RF OUT | FM RF Coil is connected. | cf. PIN① | 3.0 | 3.0 |
| 16 | AM RF IN | Input of AM RF Amplifier | | 3.0 | 3.0 |

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|-----------------------|---------|-----------------------|----------|------|
| Supply Voltage | | V _{CC} | 8 | V |
| Power Dissipation | DIP-16 | P _D (Note) | 750 | mW |
| | SSOP-16 | | 350 | |
| Operating Temperature | | T _{opr} | – 25~75 | °C |
| Storage Temperature | | T _{stg} | – 55~150 | °C |

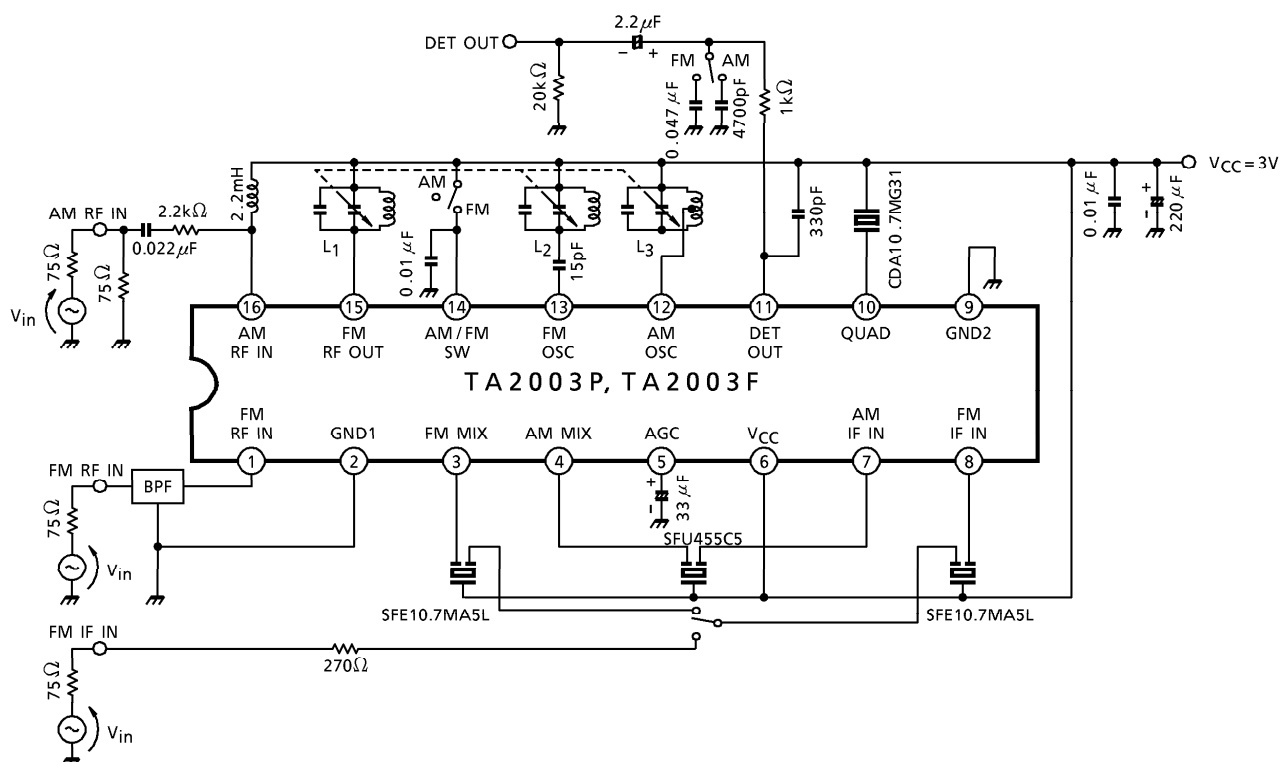
(Note) Derated above Ta = 25°C in the proportion of 6mW/°C for TA2003P and of 2.8mW/°C for TA2003F.

ELECTRICAL CHARACTERISTICS

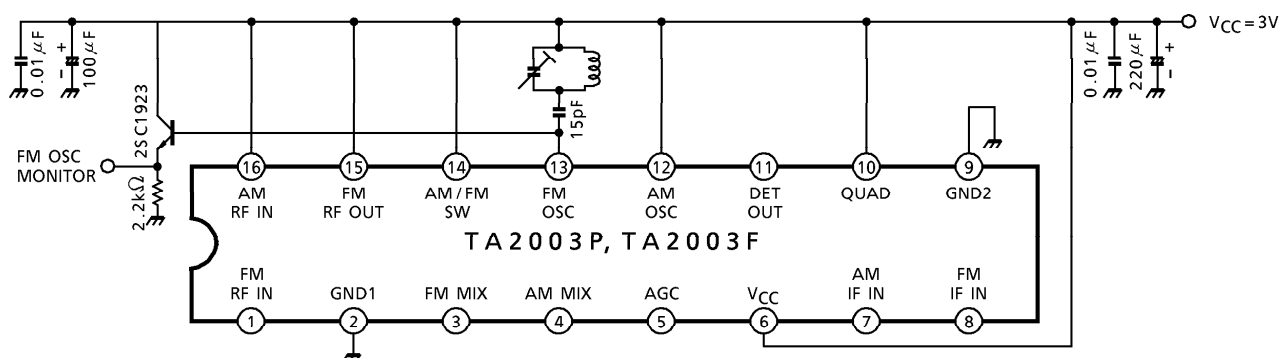
Unless otherwise specified, Ta = 25°C, V_{CC} = 3V, F/E : f = 98MHz, f_m = 1kHz
 FM IF : f = 10.7MHz, Δf = ±22.5kHz, f_m = 1kHz
 AM : f = 1MHz, MOD = 30%, f_m = 1kHz

| CHARACTERISTIC | | SYMBOL | TEST CIRCUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------|---------------------------|--------------------------|--------------|------------------------------------|------|------|------|-------------------|
| Supply Current | | I _{CC} (FM) | 1 | FM mode, V _{in} = 0 | — | 10.5 | 16.5 | mA |
| | | I _{CC} (AM) | 1 | AM mode, V _{in} = 0 | — | 5.0 | 8.0 | |
| F / E | Input Limiting Voltage | V _{in} (lim) | 1 | – 3dB limiting point | — | 12 | — | dB μ V EMF |
| | Quiescent Sensitivity | Q _S | 1 | S / N = 30dB | — | 12 | — | dB μ V EMF |
| | Local OSC Voltage | V _{OSC} | 2 | f _{OSC} = 108MHz | 160 | 240 | 320 | mV _{rms} |
| | Local OSC Stop Voltage | V _{stop} (FM) | 2 | V _{in} = 0 | — | 1.2 | — | V |
| FM IF | Input Limiting Voltage | V _{in} (lim) IF | 1 | – 3dB limiting point | 42 | 47 | 52 | dB μ V EMF |
| | Recovered Output Voltage | V _{OD} | 1 | V _{in} = 80dB μ V EMF | 50 | 70 | 90 | mV _{rms} |
| | Signal To Noise Ratio | S / N | 1 | V _{in} = 80dB μ V EMF | — | 62 | — | 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 | — | 33 | — | dB |
| AM | Voltage Gain | G _V | 1 | V _{in} = 27dB μ V EMF | 15 | 32 | 50 | mV _{rms} |
| | Recovered Output Voltage | V _{OD} | 1 | V _{in} = 60dB μ V EMF | 35 | 60 | 85 | mV _{rms} |
| | Signal To Noise Ratio | S / N | 1 | V _{in} = 60dB μ V EMF | — | 43 | — | dB |
| | Total Harmonic Distortion | THD | 1 | V _{in} = 60dB μ V EMF | — | 1.0 | — | % |
| | Local OSC Stop Voltage | V _{stop} (AM) | 1 | V _{in} = 0 | — | 1.6 | — | V |

TEST CIRCUIT 1



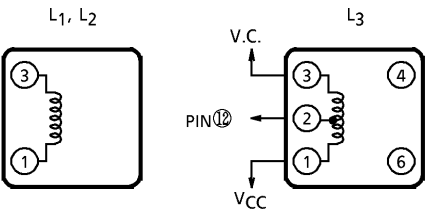
TEST CIRCUIT 2



COIL DATA (Test circuit)

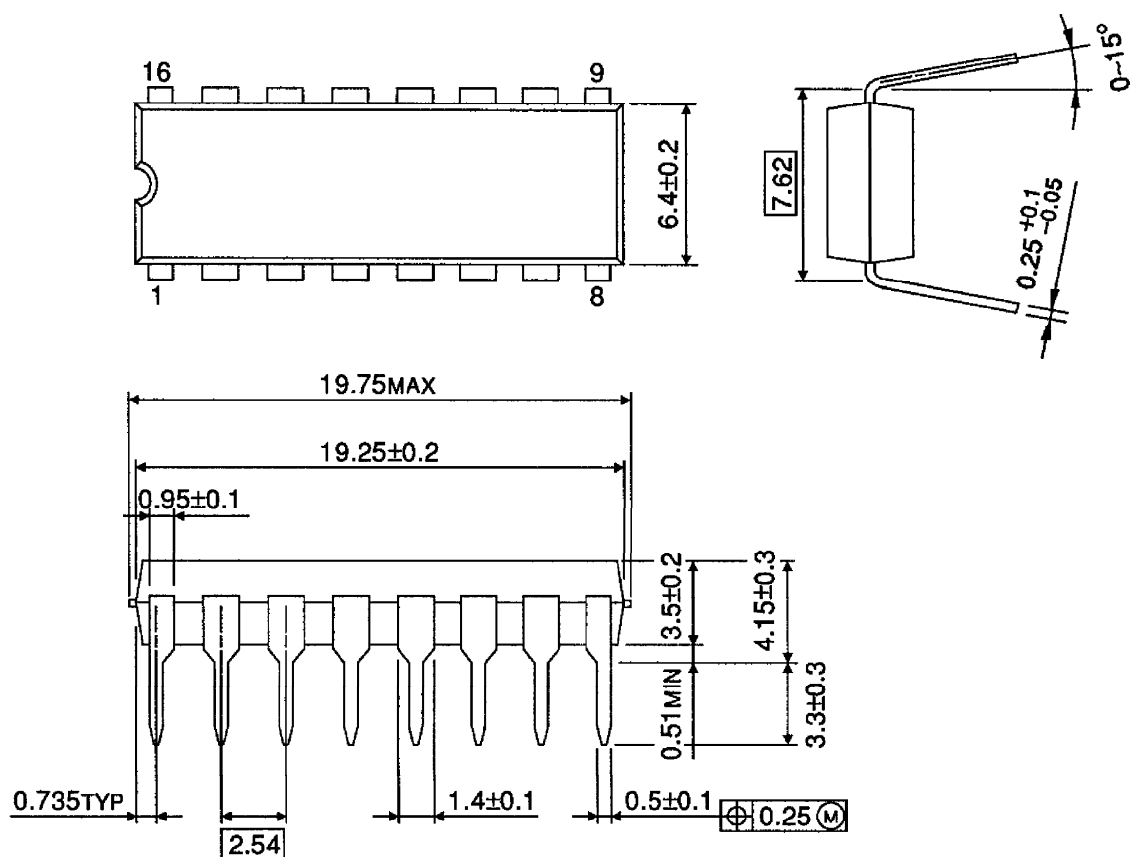
| COIL No. | TEST FREQ. (Hz) | L (μ H) | C _o (pF) | Q _o | TURNS | | | | | WIRE (mm ϕ) | REFERENCE |
|-----------------------|--------------------|-----------------|------------------------|----------------|-------|-----|-----------------|-----------------|-----|----------------------|-----------------|
| | | | | | 1-2 | 2-3 | 1-3 | 1-4 | 4-6 | | |
| L ₁ FM RF | 100M | — | — | 100 | — | — | — | 2 $\frac{1}{4}$ | — | 0.5 UEW | Ⓔ0258-000-021 |
| L ₂ FM OSC | 100M | — | — | 100 | — | — | 1 $\frac{3}{4}$ | — | — | 0.5 UEW | Ⓔ0258-000-020 |
| L ₃ AM OSC | 796k | 268 | — | 125 | 14 | 86 | — | — | — | 0.06 UEW | Ⓔ2157-2239-213A |

Ⓔ : SUMIDA ELECTRIC CO., LTD.



OUTLINE DRAWING
DIP16-P-300-2.54A

Unit : mm

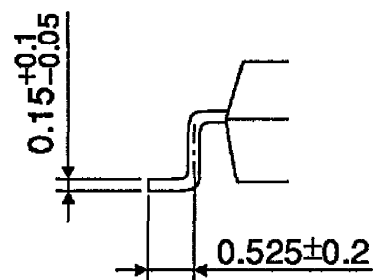
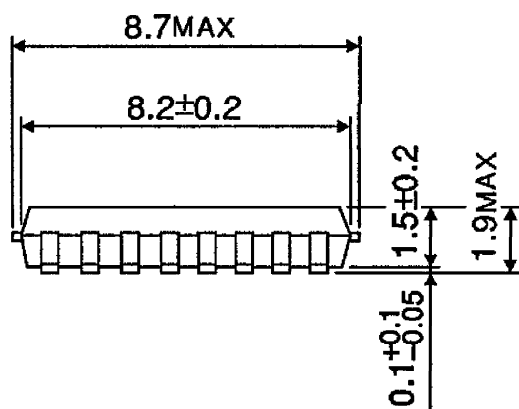
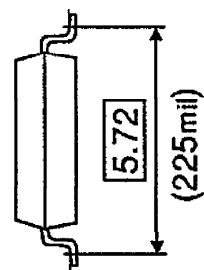
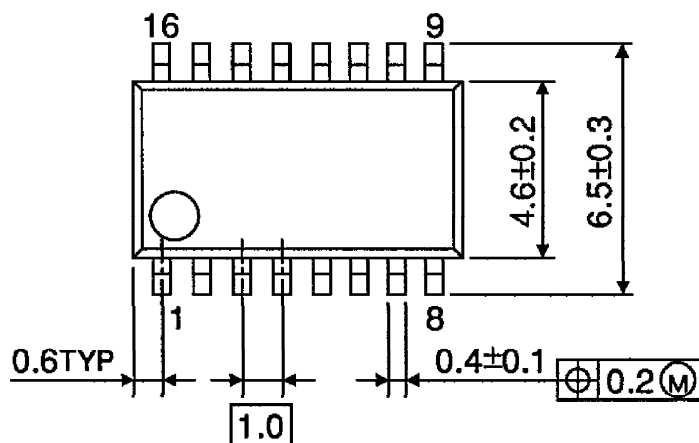


Weight : 1.00g (Typ.)

OUTLINE DRAWING

SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)