

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

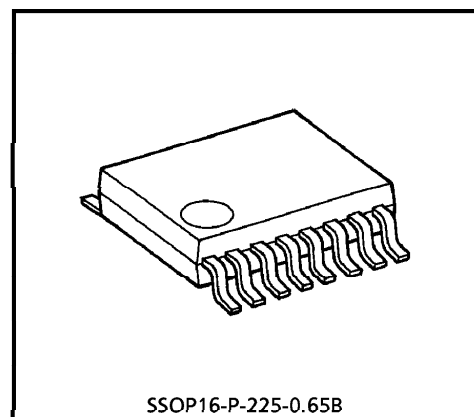
TA2030FN**TV / FM SYSTEM F / E (1.5V USE)**

The TA2030FN is a TV / FM SYSTEM FRONT END IC, which is developed for headphone radio in 1.5V use.

It is built in FM F/E and TV F/E (Japanese VHF band).

FEATURES

- Built-in FM F/E and TV F/E
FM mode : 75~109MHz
TV mode : 175~225MHz
- Suitable for combination with Digital Tuning System.
- Built-in power switch
- Built-in FM/TV switch
- Built-in IF amplifier
- Built-in OSC buffer circuit
- Improved Inter-Modulation characteristics by Double Balanced Type Mixer circuit.
- Supply current ($V_{CC} = 1.2V$, $T_a = 25^\circ C$)
FM mode : $I_{CC} = 4.4mA$ (Typ.)
TV mode : $I_{CC} = 6.3mA$ (Typ.)
- Operating supply voltage range ($T_a = 25^\circ C$)
 $V_{CC} (opr) = 0.95 \sim 4V$



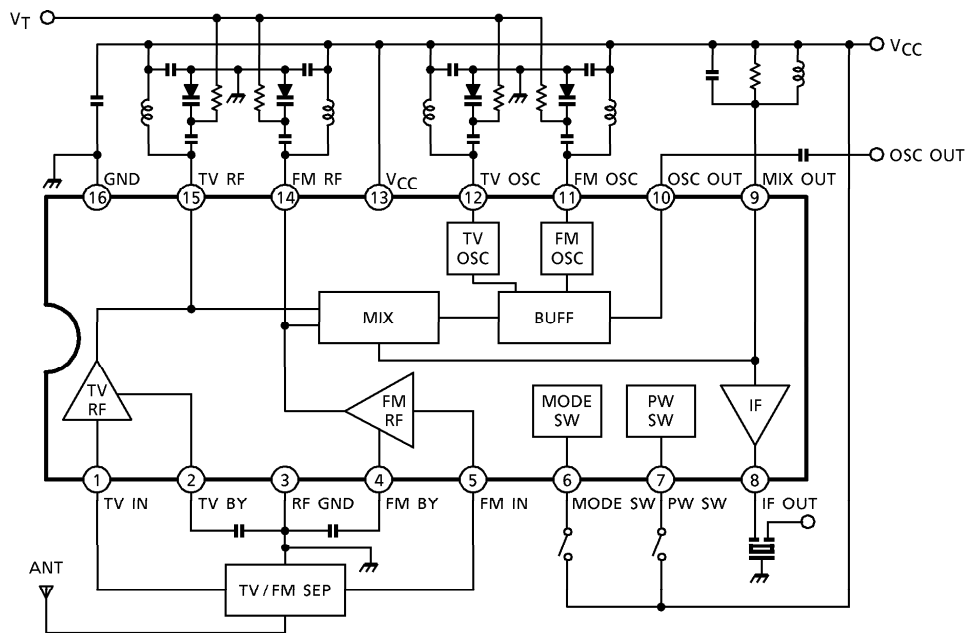
SSOP16-P-225-0.65B

Weight : 0.09g (Typ.)

980508EBA2

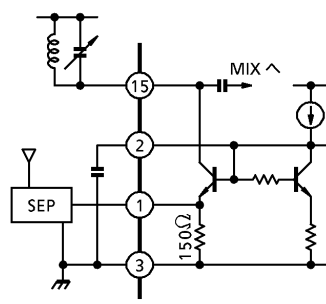
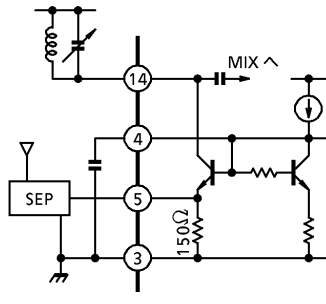
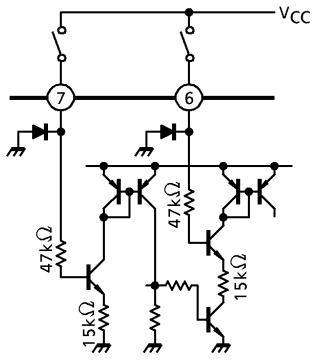
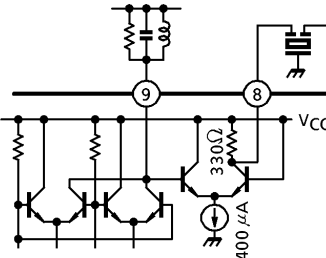
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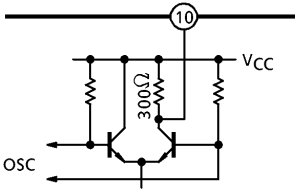
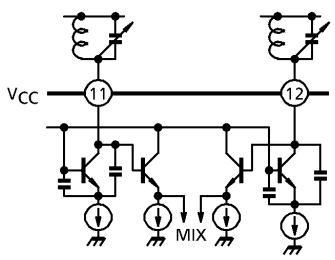
BLOCK DIAGRAM



TERMINAL EXPLANATION

Terminal voltage : Typical terminal voltage at no signal with test circuit. ($V_{CC} = 1.2V$, $T_a = 25^\circ C$)

| TERMI- NAL No. | TERMINAL NAME | FUNCTION | INTERNAL CIRCUIT | TERMINAL VOLTAGE (V) | |
|----------------------|------------------|---|--|-------------------------|-----|
| | | | | FM | TV |
| 1 | TV IN | Input of TV RF signal (Common-base type) |  | — | 0.1 |
| 2 | TV BY | By-pass terminal of TV RF and MIX (Radiation is lightened by connected capacitor.) | | — | 0.7 |
| 15 | TV RF | TV RF tuning circuit is connected. | | 1.2 | 1.2 |
| 3 | RF GND | — | — | 0 | 0 |
| 4 | FM BY | By-pass terminal of FM RF and MIX (Radiation is lightened by connected capacitor.) |  | 0.7 | — |
| 5 | FM IN | Input of FM RF signal (Common-base type) | | 0.1 | — |
| 14 | FM RF | FM RF tuning circuit is connected. | | 1.2 | 1.2 |
| 6 | MODE SW | Mode switch (V_{CC} : TV Mode Open / GND : FM Mode) |  | 0 | 1.2 |
| 7 | PW SW | Power switch (V_{CC} : Power on Open / GND : Power off) | | 1.2 | 1.2 |
| 8 | IF OUT | Output of TV / FM IF signal. Output impedance 330Ω (Typ.) |  | 1.1 | 1.1 |
| 9 | MIX OUT | MIX coil is connected. | | 1.2 | 1.2 |

| TERMI- NAL No. | TERMINAL NAME | FUNCTION | INTERNAL CIRCUIT | TERMINAL VOLTAGE (V) | |
|----------------------|------------------|---|--|-------------------------|-----|
| | | | | FM | TV |
| 10 | OSC OUT | Output of OSC buffer circuit. |  | 1.1 | 1.1 |
| 11 | FM OSC | FM OSC tank circuit is connected. (Colpitts type oscillator) |  | 1.2 | 1.2 |
| 12 | TV OSC | TV OSC tank circuit is connected. (Colpitts type oscillator) | | 1.2 | 1.2 |
| 13 | VCC | VCC | | 1.2 | 1.2 |
| 16 | GND | GND (Except RF Part) | | 0 | 0 |

APPLICATION NOTE

1. PW SW

It is necessary to connect an external pull-down resistor with the terminal PW SW (pin⑦), in case that this IC is turned on due to external noise etc.

2. MODE SW

It is necessary to connect an external pull-down resistor with the terminal MODE SW (pin⑥), in case that this IC doesn't operate normally due to external noise etc.

3. RF GND

This IC has two GND terminals (pin③ : RF GND, pin⑯ : GND). External parts shown in below should be connected with RF GND (pin③), and other parts should be connected with GND (pin⑯).

- By-pass capacitor at pin⑭ (FM RF) and pin⑮ (TV RF)
- By-pass capacitor at pin④ (FM BY) and pin② (TV BY)

The pattern diagram of capacitor connected with pin② and pin④ should be shortly, because RF circuit and MIX circuit operate on the voltage of pin② or pin④.

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|--------------------------|------------------|----------|------|
| Supply Voltage | V _{CC} | 4.5 | V |
| Power Dissipation (Note) | P _D | 400 | mW |
| Operating Temperature | T _{opr} | - 25~75 | °C |
| Storage Temperature | T _{stg} | - 55~150 | |

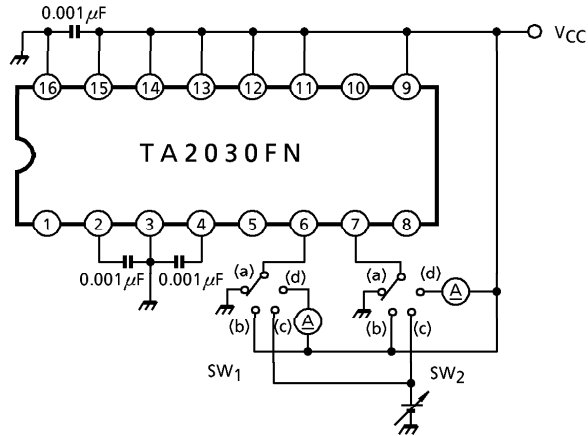
(Note) Derated above Ta = 25°C in the proportion of 3.2mW/°C.

ELECTRICAL CHARACTERISTICS

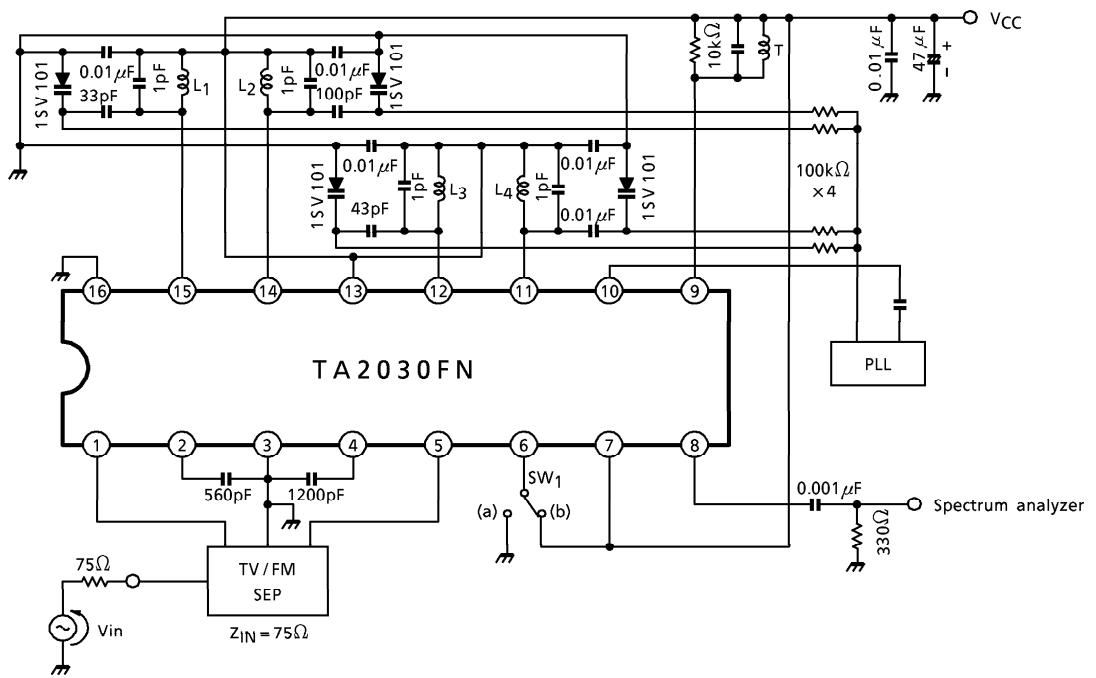
Unless otherwise specified, V_{CC} = 1.2V, Ta = 25°C, f_{FM} = 92MHz, f_{TV} = 200MHz
 Δf = ± 22.5kHz, f_m = 1kHz, SW₂ : b

| CHARACTERISTIC | SYMBOL | TEST CIR-CUIT | SW ₁ | TEST CONDITION | MIN. | TYP. | MAX. | UNIT | |
|--------------------|-------------------------------|-------------------|-----------------|---|-----------------------------|------|------|------|-------------------|
| Supply Current | I _{CC1} | 1 | a | V _{in} < - 20dBμV EMF | IC OFF, SW ₂ : a | — | 0.1 | 5 | μA |
| | I _{CC2} | | | | FM mode | — | 4.4 | 6.6 | mA |
| | I _{CC3} | | | | TV mode | — | 6.3 | 9.5 | |
| FM | Conversion Gain | G _{C1} | a | V _{in} = 65dBμV EMF f _{osc} = 65MHz | 29 | 33 | — | dB | |
| | Local Oscillator Voltage | V _{osc1} | | | — | 360 | — | | mV _{rms} |
| | OSC Buffer Output Voltage | V _{BUF1} | | | 3 | — | 50 | — | |
| | Local Oscillator Stop Voltage | V _{STP1} | | | — | 0.89 | 0.95 | V | |
| TV | Conversion Gain | G _{C2} | b | V _{in} = 65dBμV EMF f _{osc} = 165MHz | 25 | 29 | — | dB | |
| | Local Oscillator Voltage | V _{osc2} | | | — | 180 | — | | mV _{rms} |
| | OSC Buffer Output Voltage | V _{BUF2} | | | 3 | — | 22 | — | |
| | Local Oscillator Stop Voltage | V _{STP2} | | | — | 0.86 | 0.95 | V | |
| Power On Current | I ₇ | 1 | a | V _{CC} = 0.95V, V ₂ ≤ 0.2V SW ₂ : d V ₄ ≥ 0.4V | 5 | — | — | μA | |
| Power Off Voltage | V ₇ | | a | V _{CC} = 0.95V, V ₂ ≤ 0.2V SW ₂ : c V ₄ ≤ 0.2V | 0 | — | 0.3 | V | |
| TV Mode On Current | I ₆ | | d | V _{CC} = 0.95V, V ₂ ≥ 0.4V V ₄ ≤ 0.2V | 5 | — | — | μA | |
| FM Mode On Voltage | V ₆ | | c | V _{CC} = 0.95V, V ₂ ≤ 0.2V V ₄ ≥ 0.4V | 0 | — | 0.3 | V | |

TEST CIRCUIT 1



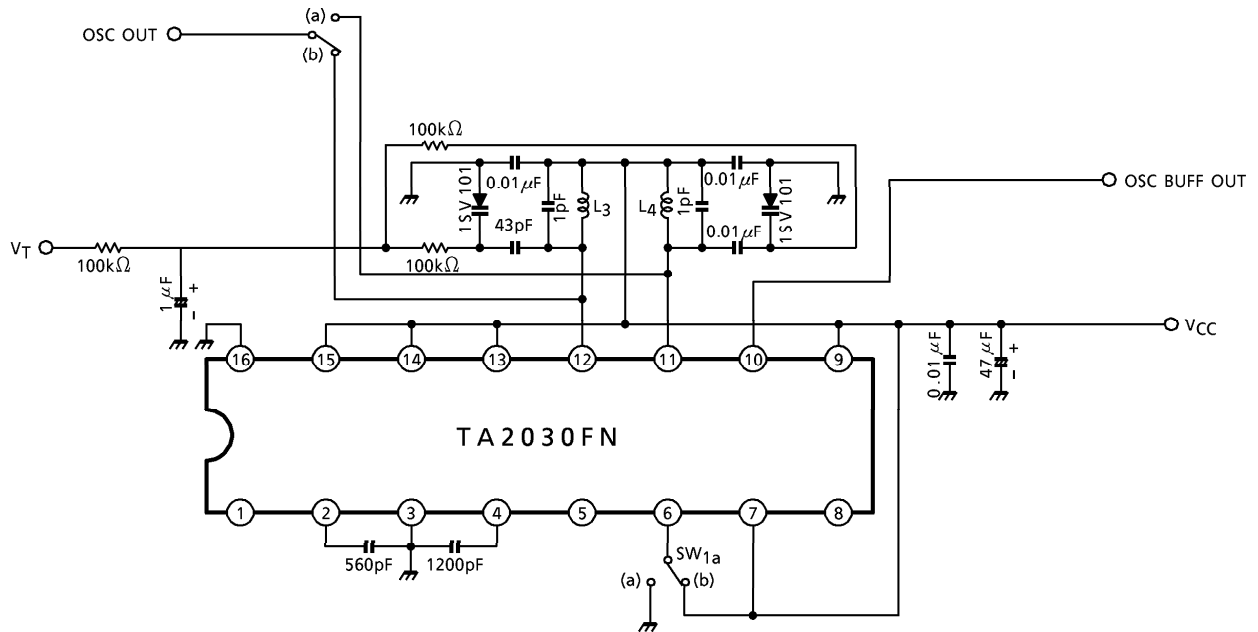
TEST CIRCUIT 2



$$G_C \text{ (dB)} = 20 \log V_{IF} (\mu\text{V}_{\text{rms}}) - (V_{in} \text{ (dB}\mu\text{V EMF)} - 6\text{dB})$$

TV / FM Separator : GTVS05 (SOSHIN ELECTRIC CO., LTD.)

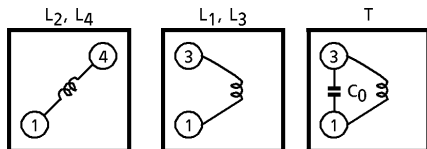
TEST CIRCUIT 3

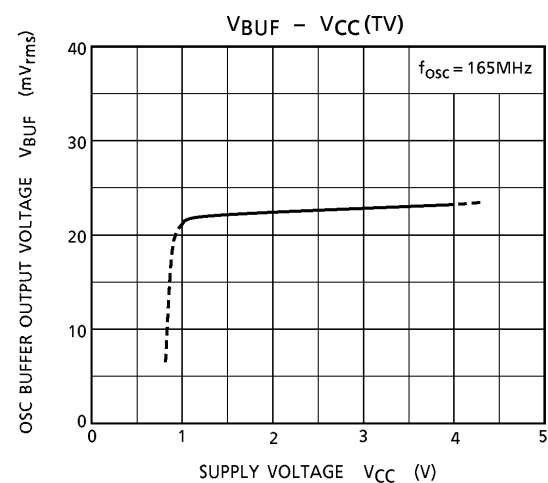
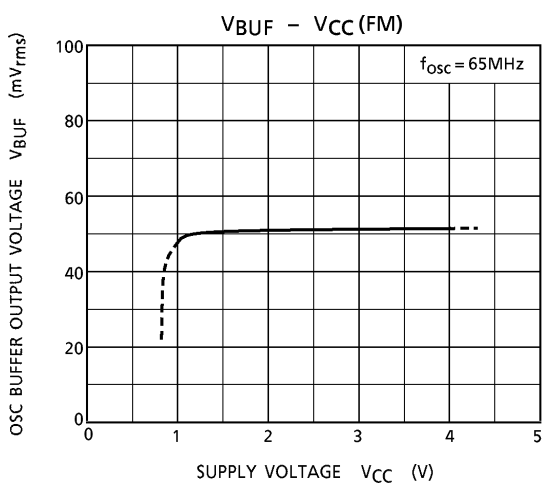
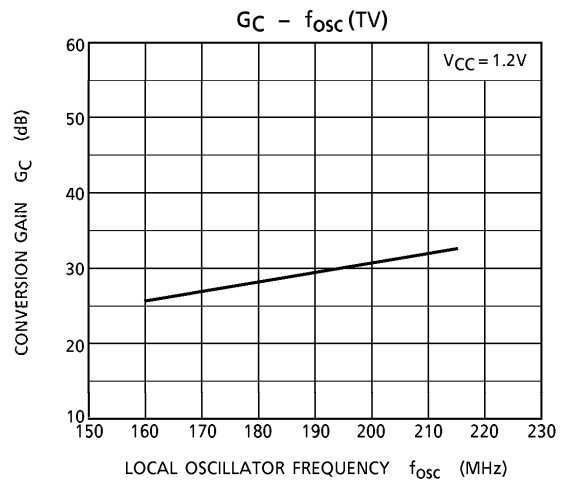
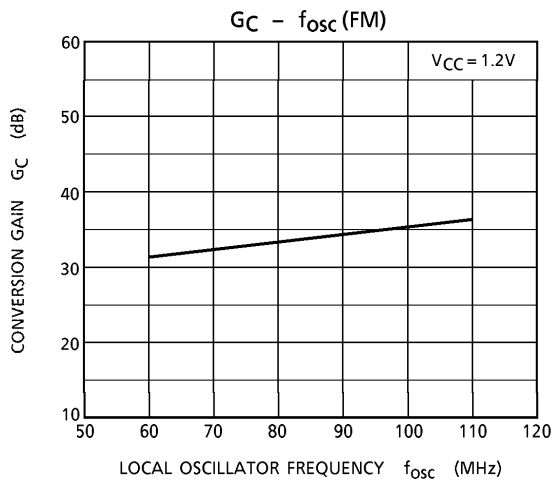
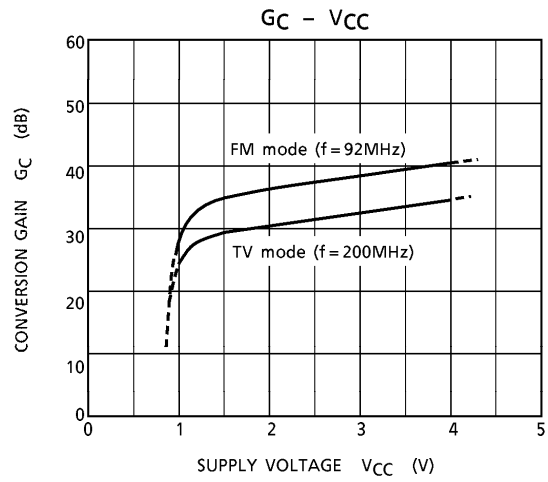
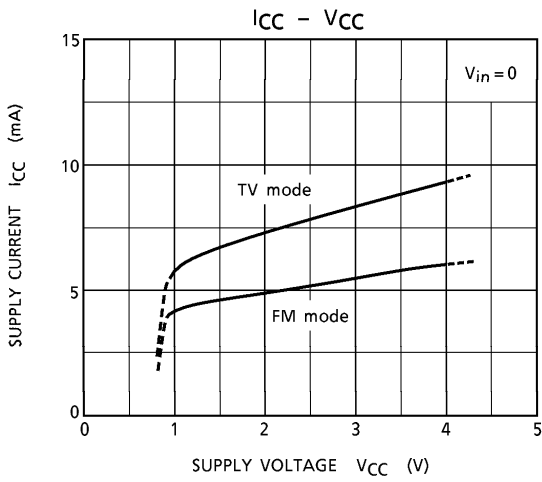


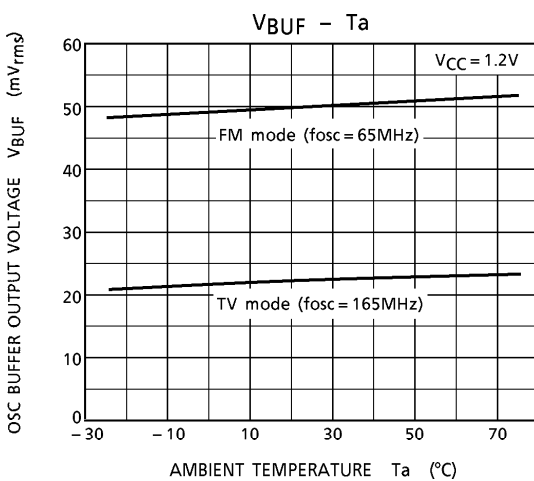
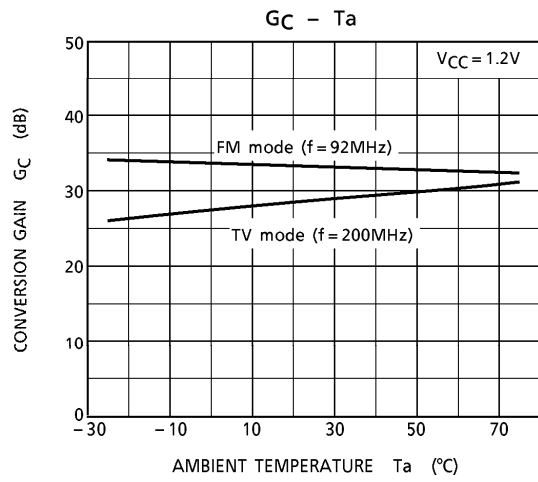
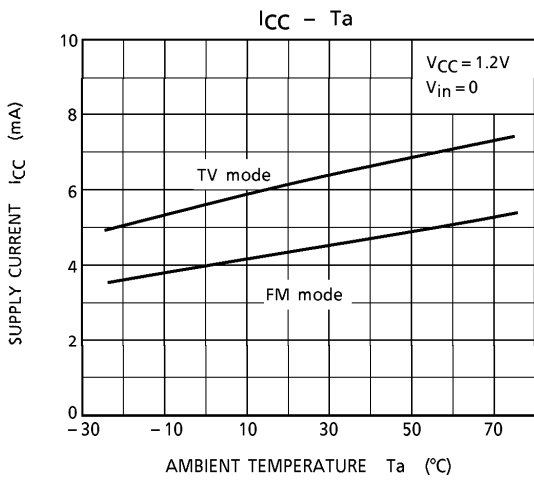
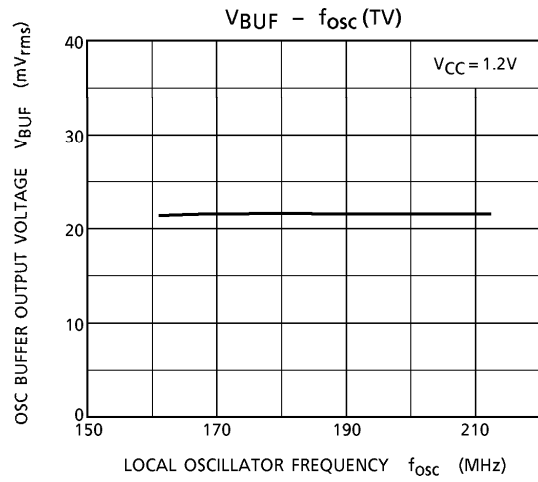
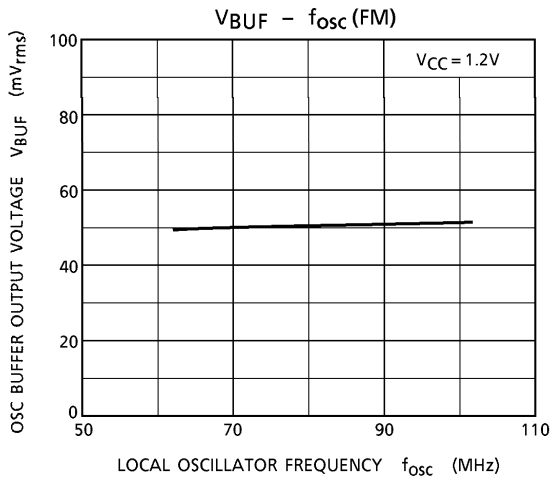
COIL DATA (Test circuit)

| COIL No. | TEST FREQ. | C ₀ (pF) | Q ₀ | TURNS | | WIRE (mm φ) | REFERENCE |
|-----------------------|------------|---------------------|----------------|-------|-------|-------------|-------------|
| | | | | 1-3 | 1-4 | | |
| L ₁ TV RF | 100MHz | — | 55 | 1 1/4 | — | 0.5UEW | Ⓢ 0258-250 |
| L ₂ FM RF | 100MHz | — | 90 | — | 3 1/2 | 0.5UEW | Ⓢ 0258-238 |
| L ₃ TV OSC | 100MHz | — | 55 | 1 1/4 | — | 0.5UEW | Ⓢ 0258-250 |
| L ₄ FM OSC | 100MHz | — | 90 | — | 3 1/2 | 0.5UEW | Ⓢ 0258-238 |
| T FM IFT | 10.7MHz | 82 | 45 | 18 | — | 0.09UEW | Ⓢ 4162-083A |

Ⓢ : SUMIDA ELECTRIC CO., LTD.

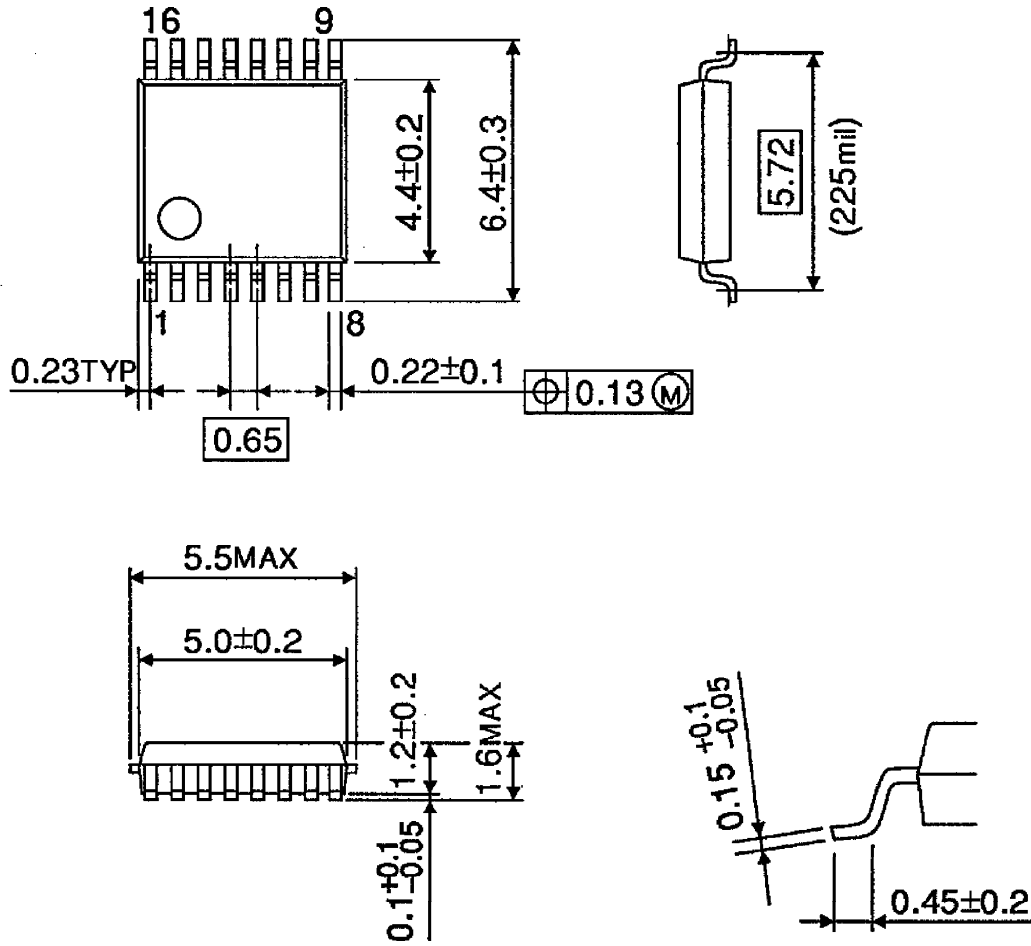






OUTLINE DRAWING
SSOP16-P-225-0.65B

Unit : mm



Weight : 0.09g (Typ.)