



## TA2003

Preliminary

LINEAR INTEGRATED CIRCUIT

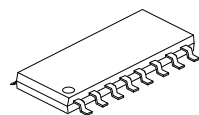
### AM/FM RADIO IC

#### DESCRIPTION

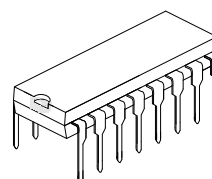
The UTC **TA2003** is AM/FM Radio IC (FM F/E + AM/FM IF) which is designed for AM/FM Radios.

#### FEATURES

- \* FM IFT, AM IFT and FM Detector Coil are unnecessary.
- \* Operating Supply Voltage Range
- \*  $V_{CC(oper)} = 1.8 \sim 7V$  ( $T_a=25^{\circ}C$ )



SOP-16



DIP-16

#### ORDERING INFORMATION

| Ordering Number |               | Package | Packing   |
|-----------------|---------------|---------|-----------|
| Lead Free       | Halogen Free  |         |           |
| TA2003L-S16-R   | TA2003G-S16-R | SOP-16  | Tape Reel |
| TA2003L-D16-T   | TA2003G-D16-T | DIP-16  | Tube      |

TA2003L-S16-R

- (1) Packing Type
- (2) Package Type
- (3) Lead Free

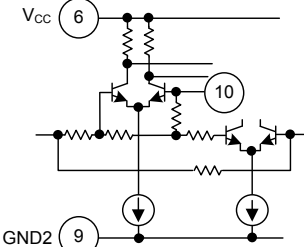
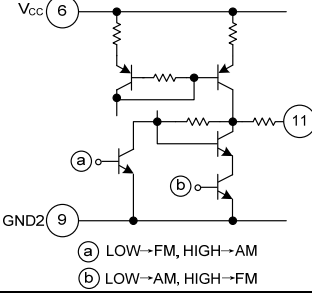
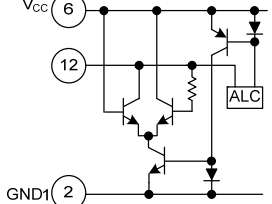
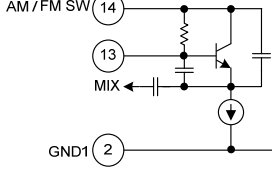
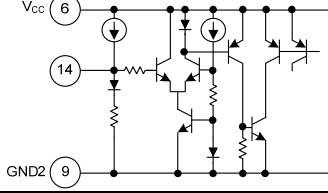
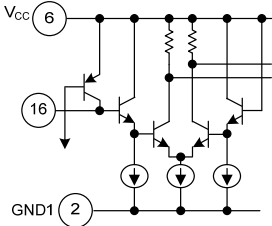
- (1) R: Tape Reel, T: Tube
- (2) S16: SOP-16, D16: DIP-16
- (3) G: Halogen Free, L: Lead Free

# ■ EXPLANATION OF TERMINAL

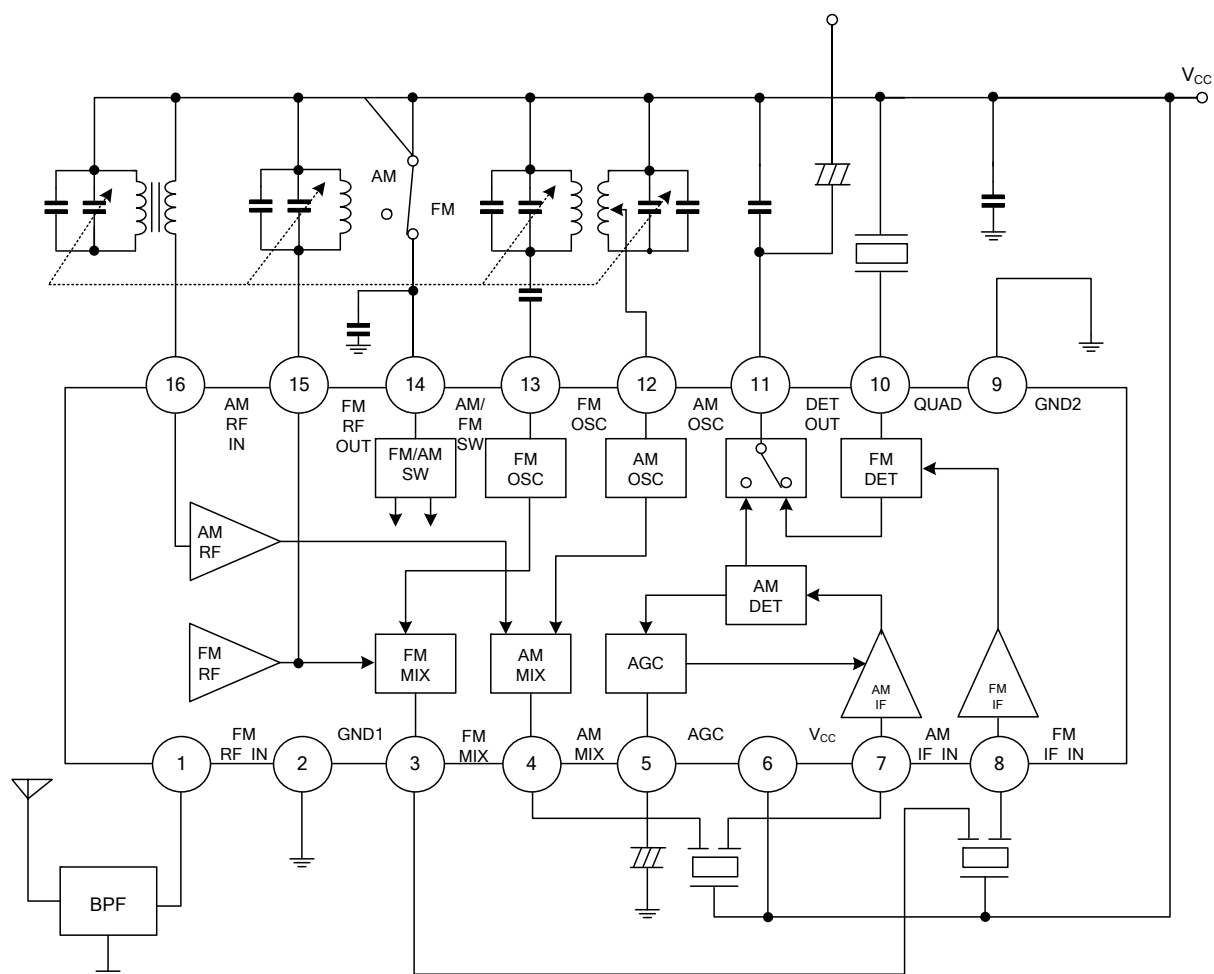
Terminal Voltage: Typical DC voltage at Ta=25°C, V<sub>CC</sub>=3V and no signal with Test Circuit

| PIN NO. | PIN NAME        | DESCRIPTION                   | INTERNAL CIRCUIT | TERMINAL VOLTAGE |     |
|---------|-----------------|-------------------------------|------------------|------------------|-----|
| 1       | FM AF IN        | Input of FM RF Amplifier      |                  | 0                | 0.7 |
| 2       | GND1            | GND for RF, DSC 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 <sub>CC</sub> |                               |                  | 3.0              | 3.0 |
| 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 |

■ EXPLANATION OF TERMINAL

| PIN NO. | PIN NAME  | DESCRIPTION                                                                                                      | INTERNAL CIRCUIT                                                                     | TERMINAL VOLTAGE |     |
|---------|-----------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------|-----|
| 9       | GND2      | GND for IF stage                                                                                                 |                                                                                      | 0                | 0   |
| 10      | QUAD      | FM QUAD Detector<br>Ceramic Discriminator is connected.<br>Recommendation<br>CDA 10.7MG31 (MURATA MFG. CO., LTD) |    | 2.5              | 2.2 |
| 11      | DET OUT   | Output of FM/AM Detector                                                                                         |    | 1.4              | 1.1 |
| 12      | AM OSC    | AM local Oscillator Terminal<br>Oscillator Coil is connected.                                                    |   | 3.0              | 3.0 |
| 13      | FM OSC    | FM local Oscillator Terminal<br>Oscillator Coil is connected                                                     |  | 0.9              | 3.0 |
| 14      | AM/FM SW  | AM/FM switch connected to Pin14<br>Vcc→FM mode<br>Pin14 OPEN→AM mode                                             |  | 0.9              | 3.0 |
| 15      | FM RF OUT | FM RF Coil is connected                                                                                          | cf. PIN 1                                                                            | 3.0              | 3.0 |
| 16      | AM RF IN  | Input of AM RF Amplifier                                                                                         |  | 3.0              | 3.0 |

## ■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

| PARAMETER             |        | SYMBOL    | RATINGS   | UNIT |
|-----------------------|--------|-----------|-----------|------|
| Supply Voltage        |        | $V_{CC}$  | 8         | V    |
| Power Dissipation     | DIP-16 | $P_D$     | 750       | mW   |
|                       | SOP-16 |           | 350       |      |
| Operating Temperature |        | $T_{OPR}$ | -25 ~ 75  | °C   |
| Storage Temperature   |        | $T_{STG}$ | -55 ~ 150 | °C   |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ ELECTRICAL CHARACTERISTICS

Unless otherwise specified, Ta=25°C,  $V_{CC}=3V$ , FE: f = 98MHz,  $f_m = 1KHz$ ,

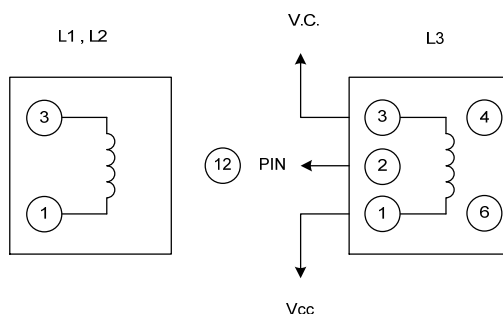
FM IF: f = 10.7MHz,  $\Delta f = \pm 22.5kHz$ ,  $f_m = 1KHz$

AM: f = 1MHz, MOD = 30%,  $f_m = 1KHz$

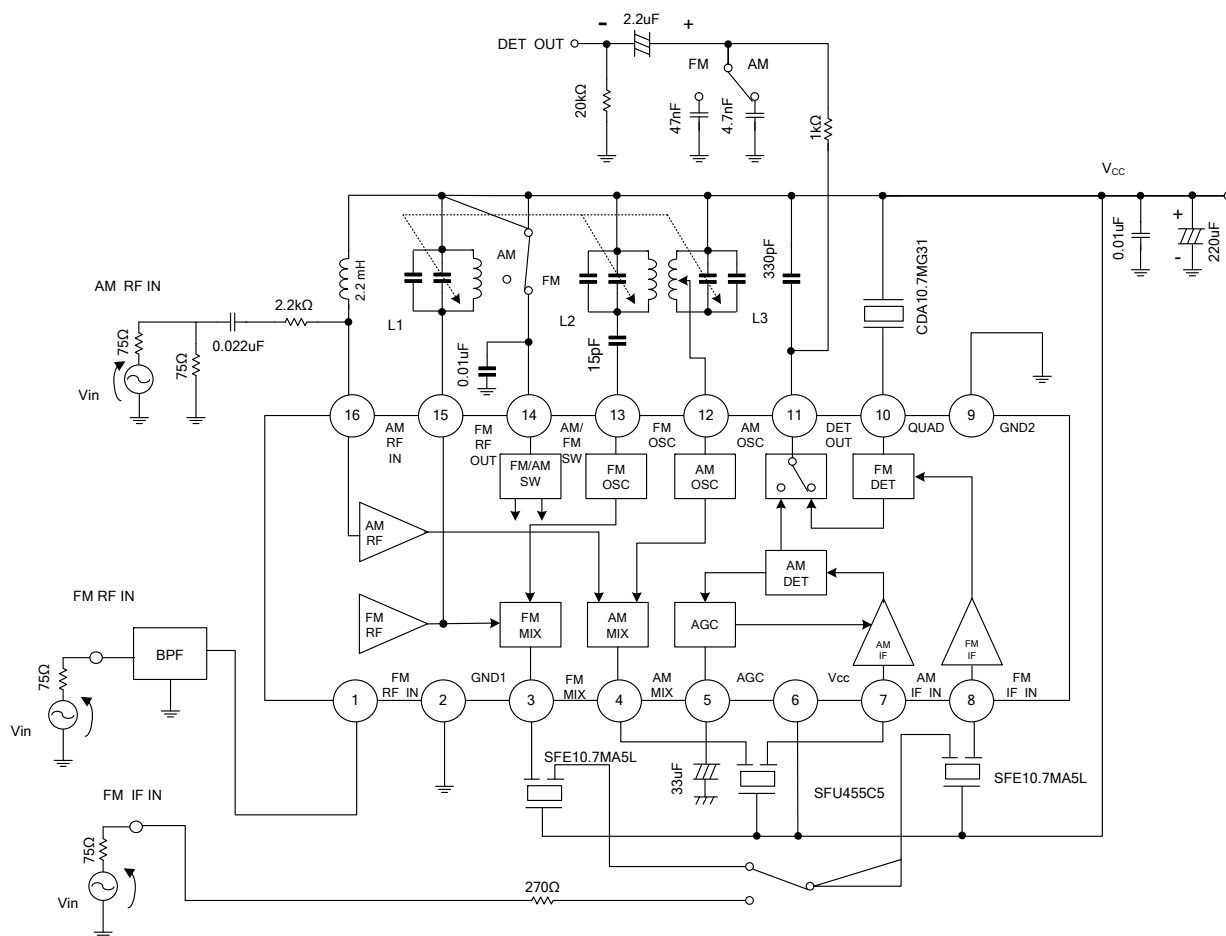
| PARAMETER      |                           | SYMBOL          | TEST CONDITIONS        | MIN | TYP  | MAX  | UNIT           | TEST CIRCUIT |
|----------------|---------------------------|-----------------|------------------------|-----|------|------|----------------|--------------|
| Supply Current |                           | $I_{CC} (FM)$   | FM Mode, $V_{in}=0$    |     | 10.5 | 16.5 | mA             | 1            |
|                |                           | $I_{CC} (AM)$   | AM Mode, $V_{in}=0$    |     | 5.0  | 8.0  |                | 1            |
| F/E            | Input Limiting Voltage    | $V_{in} (lim)$  | -3dB limiting point    |     | 12   |      | dB $\mu$ V EMF | 1            |
|                | Quiescent Sensitivity     | $Q_S$           | S/N=30dB               |     | 12   |      | dB $\mu$ V EMF | 1            |
|                | Local OSC Voltage         | $V_{OSC}$       | $f_{OSC}=108MHz$       | 160 | 240  | 320  | mVrms          | 2            |
|                | Local OSC Stop Voltage    | $V_{stop} (FM)$ | $V_{in}=0$             |     | 1.2  |      | V              | 2            |
| FM IF          | Input Limiting Voltage    | $V_{in}(lim)IF$ | -3dB limiting point    | 42  | 47   | 52   | dB $\mu$ V EMF | 1            |
|                | Recovered Output Voltage  | $V_{OD}$        | $V_{in}=80dB\mu V$ EMF | 50  | 70   | 90   | mVrms          | 1            |
|                | Signal To Noise Ratio     | S/N             | $V_{in}=80dB\mu V$ EMF |     | 62   |      | dB             | 1            |
|                | Total Harmonic Distortion | THD             | $V_{in}=80dB\mu V$ EMF |     | 0.4  |      | %              | 1            |
|                | AM Rejection Ratio        | AMR             | $V_{in}=80dB\mu V$ EMF |     | 33   |      | dB             | 1            |
| AM             | Voltage Gain              | $G_V$           | $V_{in}=27dB\mu V$ EMF | 15  | 32   | 50   | mVrms          | 1            |
|                | Recovered Output Voltage  | $V_{OD}$        | $V_{in}=60dB\mu V$ EMF | 35  | 60   | 85   | mVrms          | 1            |
|                | Signal To Noise Ratio     | S/N             | $V_{in}=60dB\mu V$ EMF |     | 43   |      | dB             | 1            |
|                | Total Harmonic Distortion | THD             | $V_{in}=60dB\mu V$ EMF |     | 1.0  |      | %              | 1            |
|                | Local OSC Stop Voltage    | $V_{stop} (AM)$ | $V_{in}=0$             |     | 1.6  |      | V              | 1            |

### ■ COIL DATA (TEST CIRCUIT)

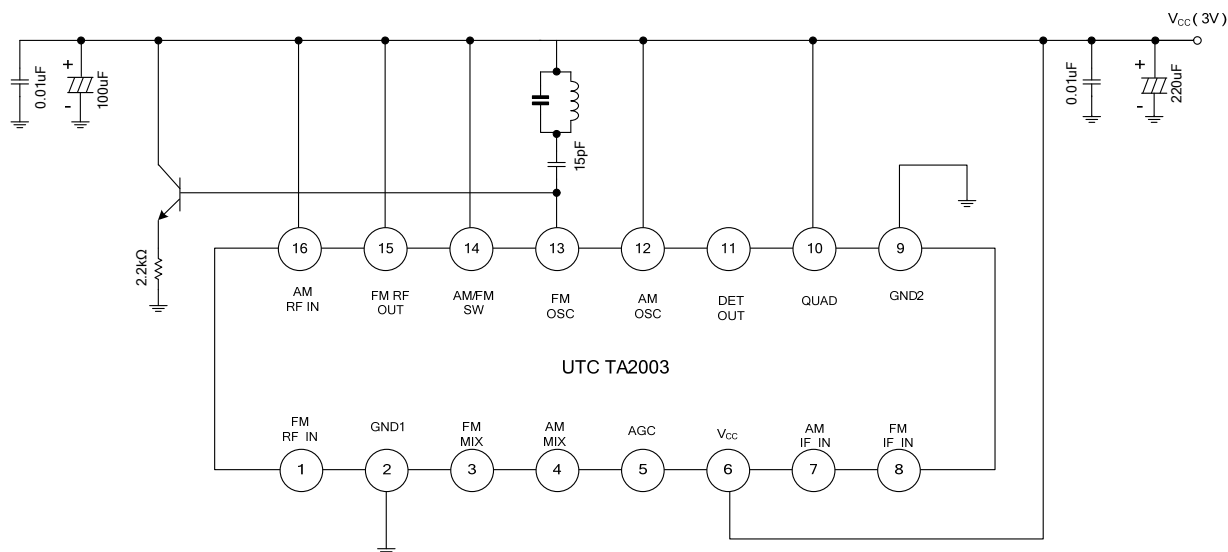
| COIL NO.  | TEST FREQ (Hz) | L ( $\mu H$ ) | $C_O$ (pF) | $Q_O$ | TURNS |     |      |      |     | WIRE (mm $\phi$ ) |
|-----------|----------------|---------------|------------|-------|-------|-----|------|------|-----|-------------------|
|           |                |               |            |       | 1-2   | 2-3 | 1-3  | 1-4  | 4-6 |                   |
| L1 FM RF  | 100M           |               |            | 100   |       |     |      | 2.25 |     | 0.5 UEW           |
| L2 FM OSC | 100M           |               |            | 100   |       |     | 1.75 |      |     | 0.5 UEW           |
| L3 AM OSC | 796K           | 268           |            | 125   | 14    | 86  |      |      |     | 0.06 UEW          |



## ■ TEST CIRCUIT1



## ■ TEST CIRCUIT2



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