

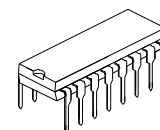
## AM/FM RADIO RECEIVER

### DESCRIPTION

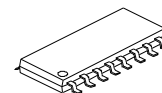
The SA2003 is AM/FM radio IC (FM F/E+AM/FM IF) which is designed for AM/FM radios. Combining with the UTC7368 (Mono PW IC), a suitable AM/FM radio system is able to be constituted.

### FEATURES

- \* FM IFT, AM IFT and FM detector coil are not needed.
- \* Pin compatible of TA8164P.
- \* Operating supply voltage range:  $V_{cc(opr)}=1.8\sim 7V$  ( $T_a=25^\circ C$ )



DIP-16-300-2.54

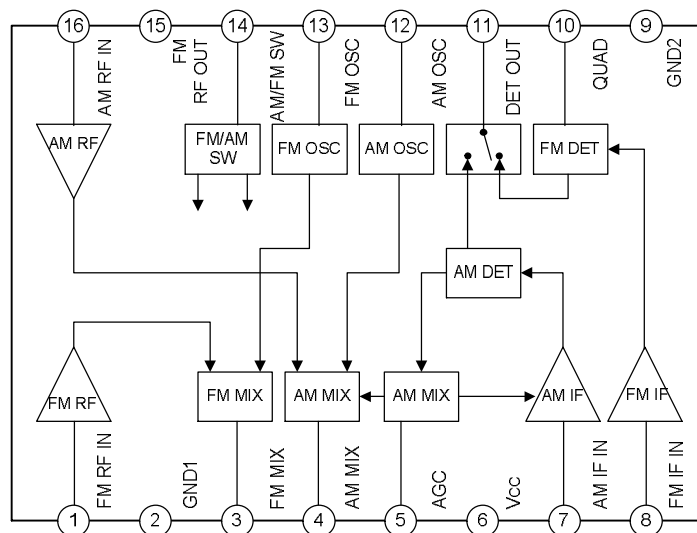


SOP-16-225-1.27

### ORDERING INFORMATION

| Device  | Package         |
|---------|-----------------|
| SA2003  | DIP-16-300-2.54 |
| SA2003S | SOP-16-225-1.27 |

### BLOCK DIAGRAM



### ABSOLUTE MAXIMUM RATINGS ( $T_{amb}=25^\circ C$ )

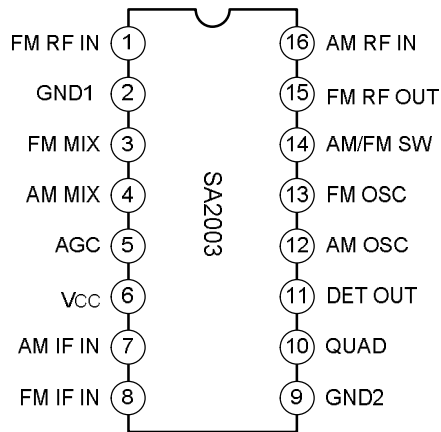
| Characteristic        |        | Symbol    | Ratings | Unit       |
|-----------------------|--------|-----------|---------|------------|
| Supply Voltage        |        | $V_{cc}$  | 8       | V          |
| Power Dissipation     | DIP-16 | PD (Note) | 750     | mW         |
|                       | SOP-16 |           | 350     |            |
| Operating Temperature |        | $T_{opr}$ | -25~75  | $^\circ C$ |
| Storage Temperature   |        | $T_{stg}$ | -55~150 | $^\circ C$ |

NOTE: Derated above  $T_{amb}=25^\circ C$  in the proportion of 6mW/ $^\circ C$  for SA2003 and of 2.8 mW/ $^\circ C$  for SA2002S.

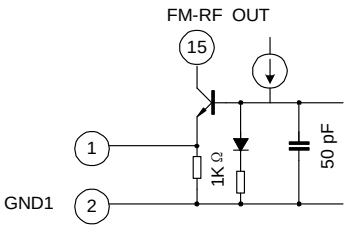
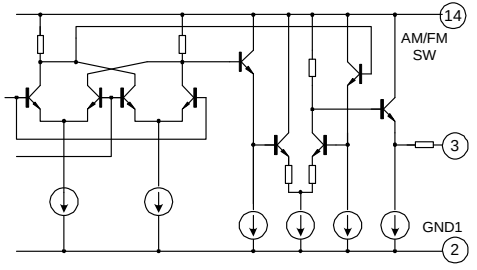
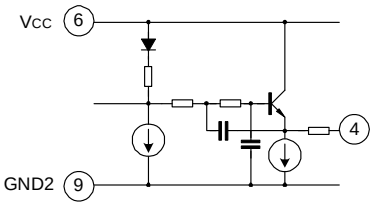
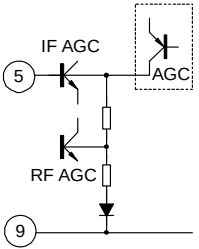
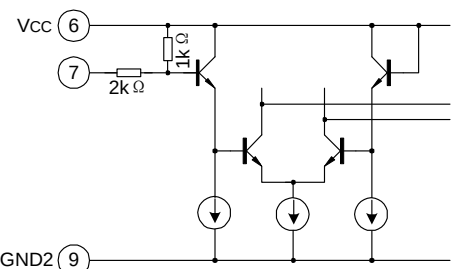
ELECTRICAL CHARACTERISTICS (Unless otherwise specified,  $T_a=25^{\circ}\text{C}$ ,  $V_{CC}=3\text{ V}$ , F/E :  $f=98\text{ MHz}$ ,  $f_m=1\text{ kHz}$  ; FM IF :  $f=10.7\text{ MHz}$ ,  $\Delta f=\pm 22.5\text{ kHz}$ ,  $f_m=1\text{ kHz}$  ; AM :  $f=1\text{ MHz}$ ,  $\text{MOD}=30\%$ ,  $f_m=1\text{ kHz}$ )

| Characteristic |                           | Symbol                         | Test Condition                       | Min. | Typ. | Max. | Unit                       |
|----------------|---------------------------|--------------------------------|--------------------------------------|------|------|------|----------------------------|
| Supply Current |                           | $I_{CC}(\text{FM})$            | FM mode, $V_{in}=0$                  | --   | 10.5 | 16.5 | mA                         |
|                |                           | $I_{CC}(\text{AM})$            | AM mode, $V_{in}=0$                  | --   | 5.0  | 8.0  |                            |
| F/E            | Input Limiting Voltage    | $V_{in}(\text{lim})$           | -3dB limiting point                  | --   | 12   | --   | $\text{dB}\mu\text{V EMF}$ |
|                | Quiescent Sensitivity     | QS                             | S/N=40dB                             | --   | 12   | --   | $\text{dB}\mu\text{V EMF}$ |
|                | Local OSC Voltage         | $V_{osc}$                      | $f_{osc}=108\text{ MHz}$             | 160  | 240  | 320  | mVrms                      |
|                | Local OSC Stop Voltage    | $V_{stop}(\text{FM})$          | $V_{in}=0$                           | --   | 1.2  | --   | V                          |
| FM IF          | Input Limiting Voltage    | $V_{in}(\text{lim})\text{ IF}$ | -3dB limiting point                  | 42   | 47   | 52   | $\text{dB}\mu\text{V EMF}$ |
|                | Recovered Output Voltage  | $V_{OD}$                       | $V_{in}=80\text{ dB}\mu\text{V EMF}$ | 50   | 70   | 90   | mVrms                      |
|                | Signal to Noise Ratio     | S/N                            | $V_{in}=80\text{ dB}\mu\text{V EMF}$ | --   | 62   | --   | dB                         |
|                | Total Harmonic Distortion | THD                            | $V_{in}=80\text{ dB}\mu\text{V EMF}$ | --   | 0.4  | --   | %                          |
|                | AM Rejection Ratio        | AMR                            | $V_{in}=80\text{ dB}\mu\text{V EMF}$ | --   | 33   | --   | dB                         |
| AM             | Voltage Gain              | GV                             | $V_{in}=27\text{ dB}\mu\text{V EMF}$ | 15   | 32   | 50   | mVrms                      |
|                | Recovered Output Voltage  | $V_{OD}$                       | $V_{in}=60\text{ dB}\mu\text{V EMF}$ | 35   | 60   | 85   | mVrms                      |
|                | Signal to Noise Ratio     | S/N                            | $V_{in}=60\text{ dB}\mu\text{V EMF}$ | --   | 43   | --   | dB                         |
|                | Total Harmonic Distortion | THD                            | $V_{in}=60\text{ dB}\mu\text{V EMF}$ | --   | 1.0  | --   | %                          |
|                | Local OSC Stop Voltage    | $V_{stop}(\text{AM})$          | $V_{in}=0$                           | --   | 1.6  | --   | V                          |

## PIN CONFIGURATION

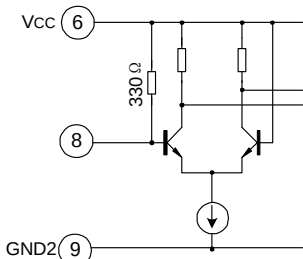
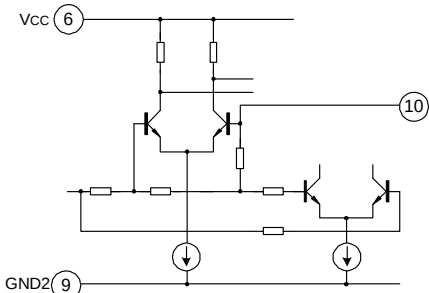
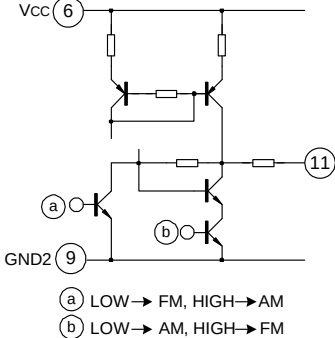
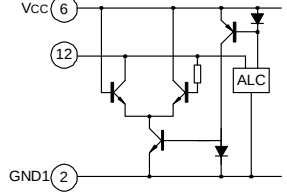
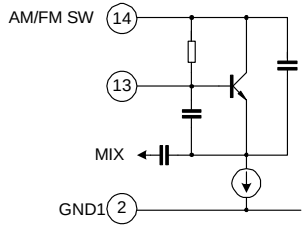


PIN DESCRIPTION TERMINAL VOLTAGE : Typical DC voltage at Ta=25°C,VCC=3V and no signal with Test Circuit 1

| Pin No. | Symbol   | Internal Circuit                                                                     | Terminal Voltage (V) |     |
|---------|----------|--------------------------------------------------------------------------------------|----------------------|-----|
|         |          |                                                                                      | AM                   | FM  |
| 1       | FM RF IN |     | 0                    | 0.7 |
| 2       | GND1     | -                                                                                    | 0                    | 0   |
| 3       | FM MIX   |   | 0.4                  | 1.7 |
| 4       | AM MIX   |   | 0.6                  | 0   |
| 5       | AGC      |   | 0                    | 0   |
| 6       | VCC      | -                                                                                    | 3.0                  | 3.0 |
| 7       | AM IF IN |  | 3.0                  | 3.0 |

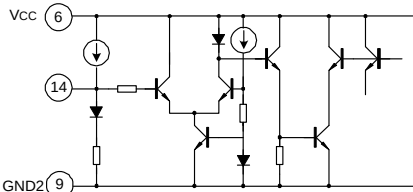
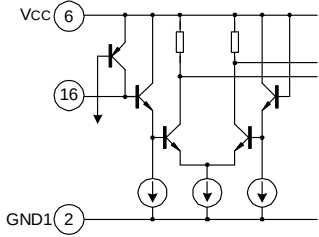
(TO be continued)

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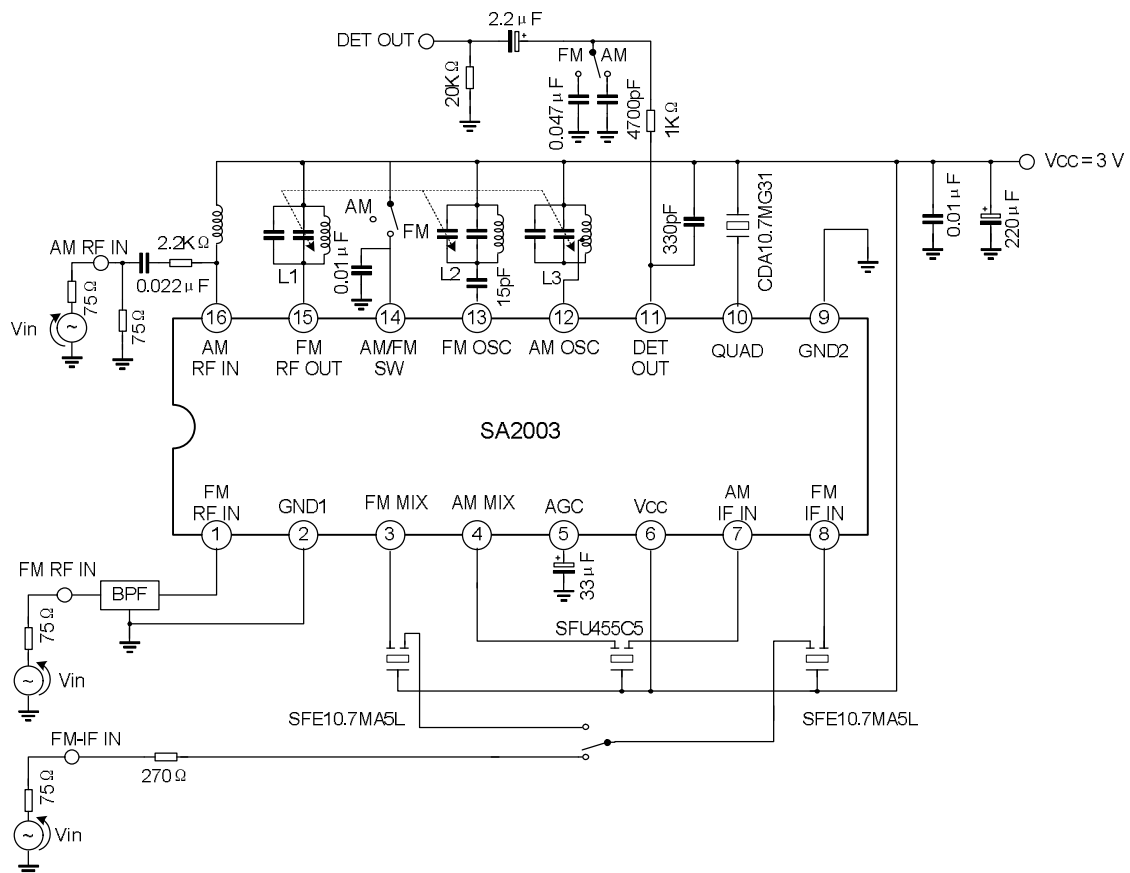
| Pin No. | Symbol   | Internal Circuit                                                                    | Terminal Voltage (V) |     |
|---------|----------|-------------------------------------------------------------------------------------|----------------------|-----|
|         |          |                                                                                     | AM                   | FM  |
| 8       | FM IF IN |    | 3.0                  | 3.0 |
| 9       | GND2     | -                                                                                   | 0                    | 0   |
| 10      | QUAD     |   | 2.5                  | 2.2 |
| 11      | DET OUT  |  | 1.4                  | 1.1 |
| 12      | AM OSC   |  | 3.0                  | 3.0 |
| 13      | FM OSC   |  | 0.9                  | 3.0 |

(TO be continued)

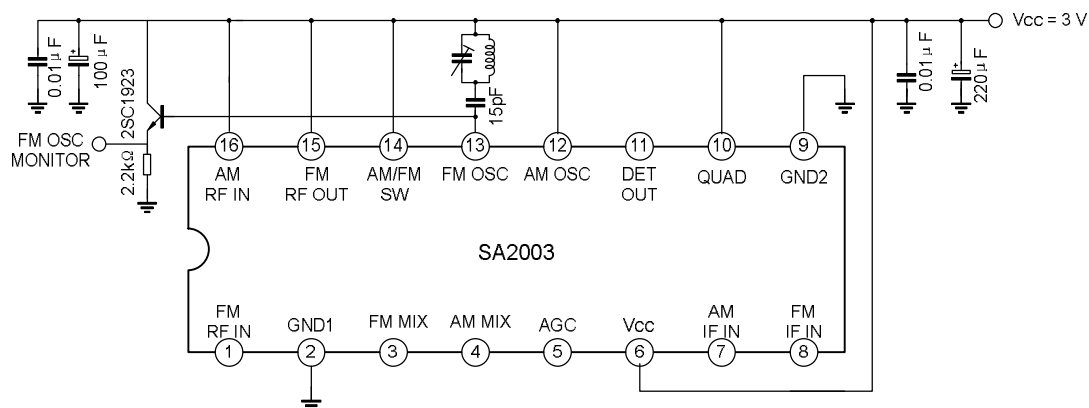
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| Pin No. | Symbol    | Internal Circuit                                                                   | Terminal Voltage (V) |     |
|---------|-----------|------------------------------------------------------------------------------------|----------------------|-----|
|         |           |                                                                                    | AM                   | FM  |
| 14      | AM/FM SW  |  | 0.9                  | 3.0 |
| 15      | FM RF OUT | Cf. PIN①                                                                           | 3.0                  | 3.0 |
| 16      | AM RF IN  |   | 3.0                  | 3.0 |

## TEST CIRCUIT 1



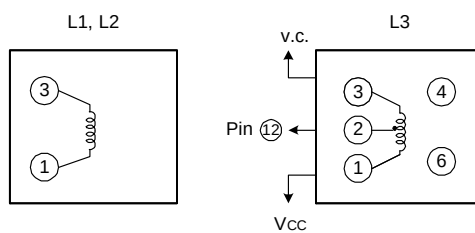
## TEST CIRCUIT 2



## COIL DATA

| Coil No.  | Test Freq. | L (μH) | Co (pF) | Q <sub>0</sub> | Turns |     |                 |                 |     | Wire(mm) | Reference         |
|-----------|------------|--------|---------|----------------|-------|-----|-----------------|-----------------|-----|----------|-------------------|
|           |            |        |         |                | 1-2   | 2-3 | 1-3             | 1-4             | 4-6 |          |                   |
| L1 FM RF  | 100MHz     | --     | --      | 100            | --    | --  | --              | 2 $\frac{1}{4}$ | --  | 0.5 UEW  | (s)0258-000-021   |
| L2 FM OSC | 100MHz     | --     | --      | 100            | --    | --  | 1 $\frac{3}{4}$ | --              | --  | 0.5 UEW  | (s)0258-000-020   |
| L3 AM OSC | 796kHz     | 268    | --      | 125            | 14    | 86  | --              | --              | --  | 0.06 UEW | (s)2157-2239-213A |

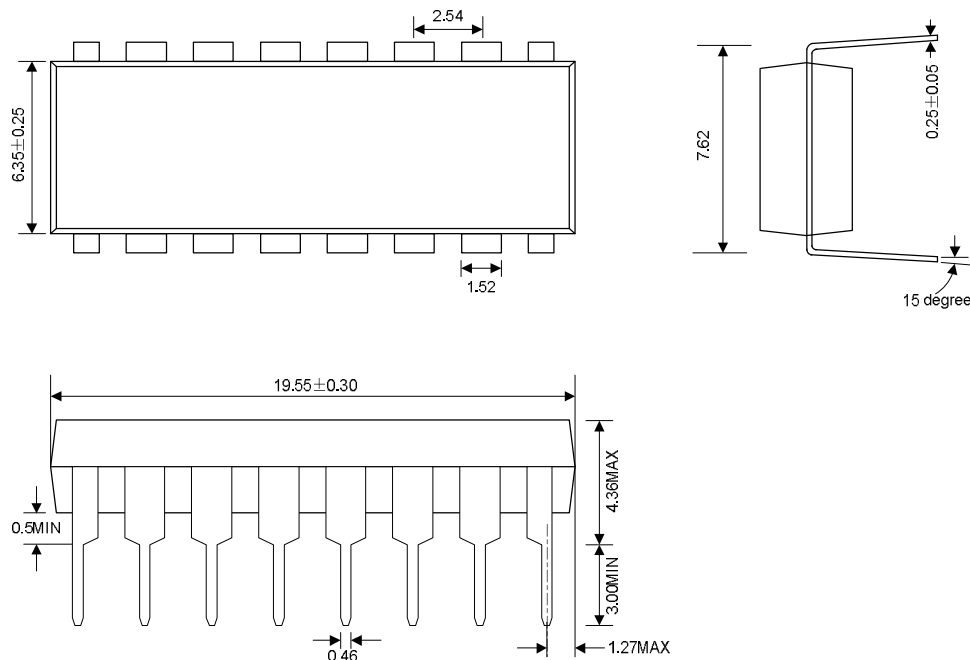
(s): Sumida electric co., ltd.



PACKAGE OUTLINE

DIP-16-300-2.54

UNIT: mm



SOP-16-225-1.27

UNIT: mm

