

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

# TA2003PG, TA2003FG

## AM / FM Radio IC

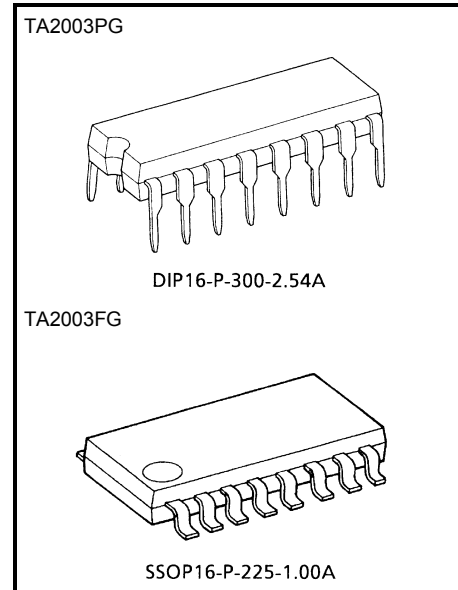
The TA2003PG, TA2003FG are AM / FM radio IC (FM F / E+AM / FM IF) which are designed for AM / FM radios.

Combining with the TA7368P (Mono PW IC), a suitable AM / FM radio system is able to be constituted.

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### Features

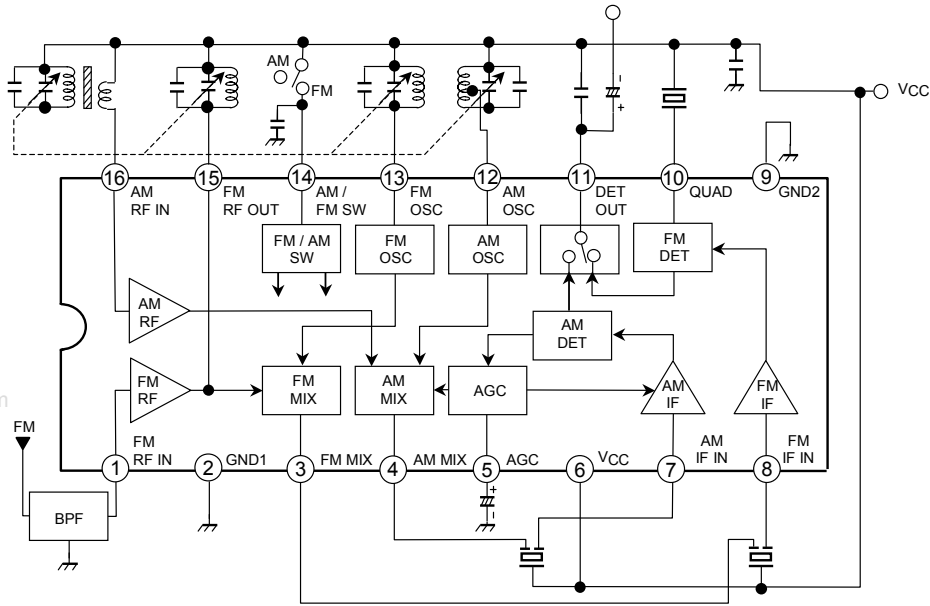
- FM IFT, AM IFT and FM detector coil are not needed.
- Pin compatible of TA8164P.
- Operating supply voltage range  
:  $V_{CC(opr)} = 1.8 \sim 7V$  ( $T_a = 25^\circ C$ )



#### Weight

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

## Block Diagram



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## Explanation Of Terminals

Terminal voltage: Typical DC voltage at Ta = 25°C, VCC = 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	VCC	—	—	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 MGF. CO., LTD)		2.5	2.2
11	DET out	Output of FM / AM detector	<p>                     (a) Low→FM, High→AM                      (b) Low→AM, High→FM                 </p>	1.4	1.1
12	AM OSC	AM local oscillator terminal oscillator coil is connected.		3.0	3.0

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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 Pin(14) $V_{CC}$ →FM mode Pin(14) 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

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## Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	8	V
Power dissipation	DIP-16	750	mW
	SSOP-16	350	
Operating temperature	T <sub>opr</sub>	-25~75	°C
Storage temperature	T <sub>stg</sub>	-55~150	°C

(Note) Derated above Ta = 25°C in the proportion of 6mW / °C for TA2003PG and of 2.8mW / °C for TA2003FG.

## Electrical Characteristics

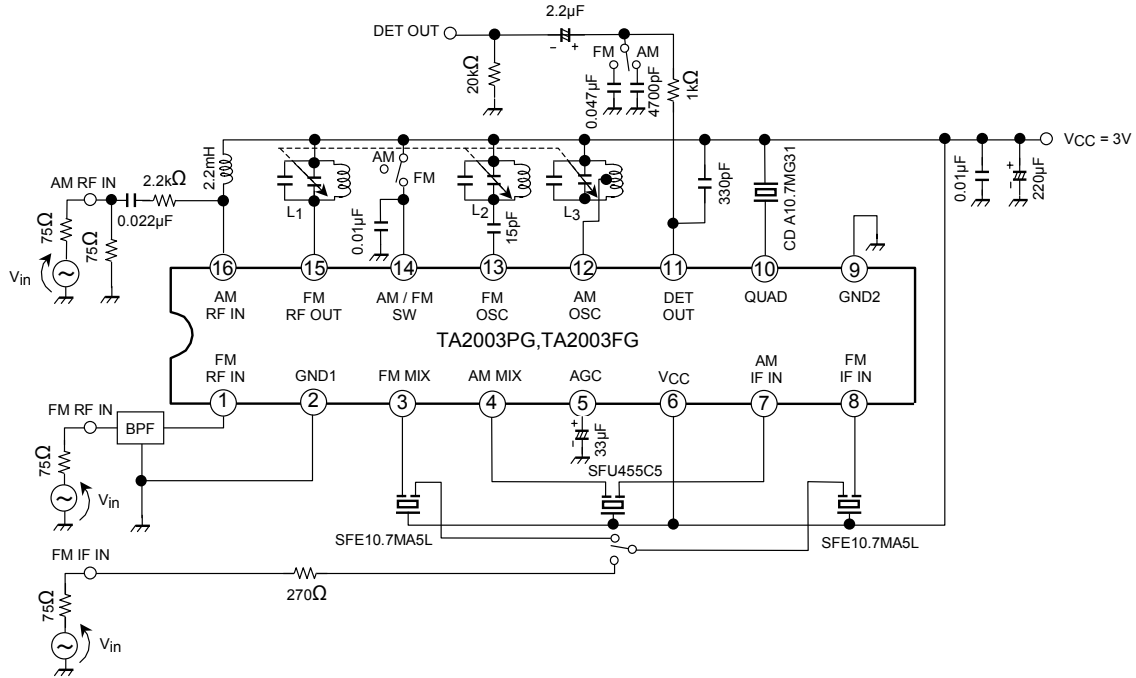
Unless otherwise specified, Ta = 25°C, V<sub>CC</sub> = 3V, F / E: f = 98MHz, f<sub>m</sub> = 1kHz

FM IF: f = 10.7MHz, Δf = ±22.5kHz, f<sub>m</sub> = 1kHz

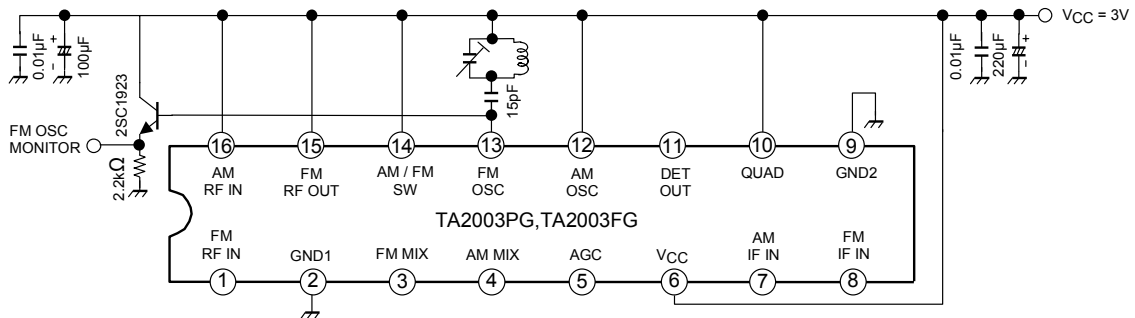
AM: f = 1MHz, MOD = 30%, f<sub>m</sub> = 1kHz

Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Supply current	I <sub>CC</sub> (FM)	1	FM mode, V <sub>in</sub> = 0	—	10.5	16.5	mA
	I <sub>CC</sub> (AM)	1	AM mode, V <sub>in</sub> = 0	—	5.0	8.0	
F / E	Input limiting voltage	V <sub>in</sub> (lim)	-3dB limiting point	—	12	—	dBμV EMF
	Quiescent sensitivity	Q <sub>S</sub>	S / N = 30dB	—	12	—	dBμV EMF
	Local OSC voltage	V <sub>OSC</sub>	f <sub>OSC</sub> = 108MHz	160	240	320	mV <sub>rms</sub>
	Local OSC stop voltage	V <sub>stop</sub> (FM)	V <sub>in</sub> = 0	—	1.2	—	V
FM IF	Input limiting voltage	V <sub>in</sub> (lim) IF	-3dB limiting point	42	47	52	dBμV EMF
	Recovered output voltage	V <sub>OD</sub>	V <sub>in</sub> = 80dBμV EMF	50	70	90	mV <sub>rms</sub>
	Signal to noise ratio	S / N	V <sub>in</sub> = 80dBμV EMF	—	62	—	dB
	Total harmonic distortion	THD	V <sub>in</sub> = 80dBμV EMF	—	0.4	—	%
	AM rejection ratio	AMR	V <sub>in</sub> = 80dBμV EMF	—	33	—	dB
AM	Voltage gain	G <sub>V</sub>	V <sub>in</sub> = 27dBμV EMF	15	32	50	mV <sub>rms</sub>
	Recovered output voltage	V <sub>OD</sub>	V <sub>in</sub> = 60dBμV EMF	35	60	85	mV <sub>rms</sub>
	Signal to noise ratio	S / N	V <sub>in</sub> = 60dBμV EMF	—	43	—	dB
	Total harmonic distortion	THD	V <sub>in</sub> = 60dBμV EMF	—	1.0	—	%
	Local OSC stop voltage	V <sub>stop</sub> (AM)	V <sub>in</sub> = 0	—	1.6	—	V

## Test Circuit 1



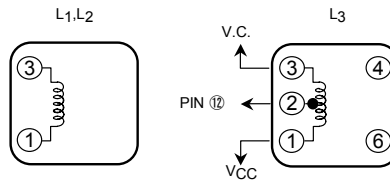
## Test Circuit 2



## Coil Data(Test circuit)

Coil No.	Test Freq. (Hz)	L ( $\mu$ H)	C <sub>O</sub> (pF)	Q <sub>O</sub>	Turns					Wire (mm $\phi$ )	Reference
					1-2	2-3	1-3	1-4	4-6		
L <sub>1</sub> FM RF	100M	—	—	100	—	—	—	2 $\frac{1}{4}$	—	0.5UEW	(S)0258-000-021
L <sub>2</sub> FM OSC	100M	—	—	100	—	—	1 $\frac{3}{4}$	—	—	0.5UEW	(S)0258-000-020
L <sub>3</sub> AM OSC	796k	268	—	125	14	86	—	—	—	0.06UEW	(S)2157-2239-213A

(S): SUMIDA ELECTRIC CO., LTD.



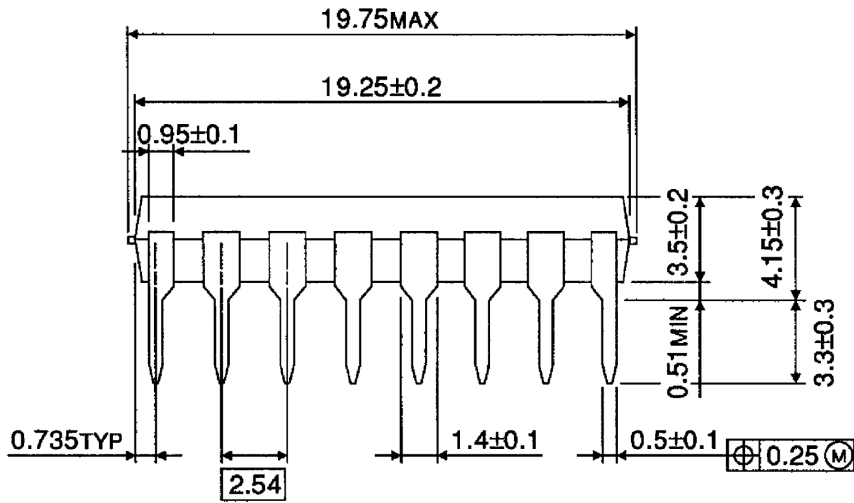
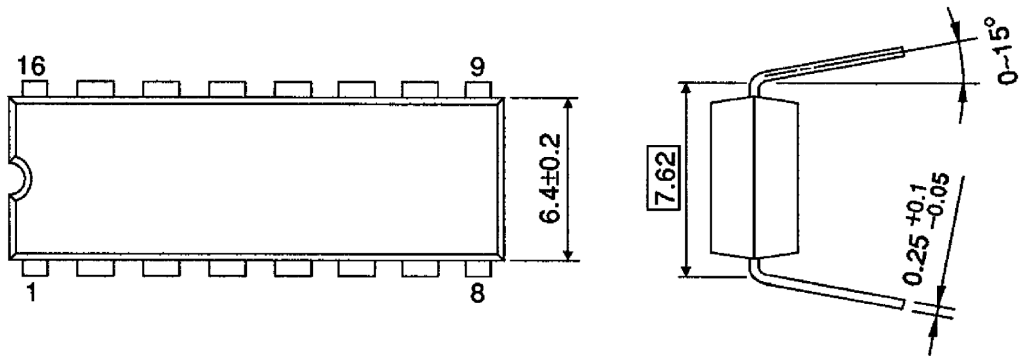
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## Package Dimensions

DIP16-P-300-2.54A

Unit : mm

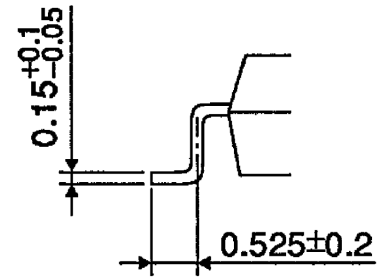
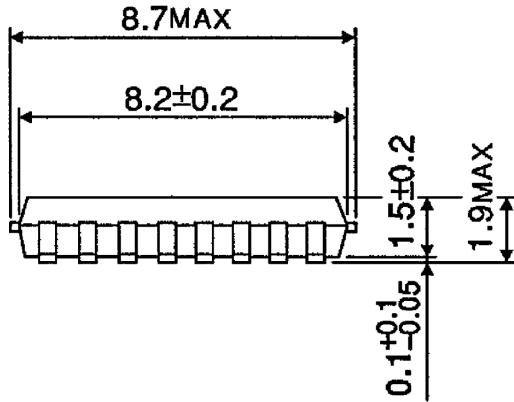
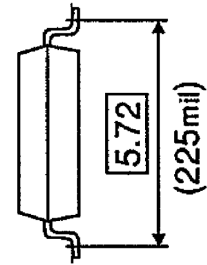
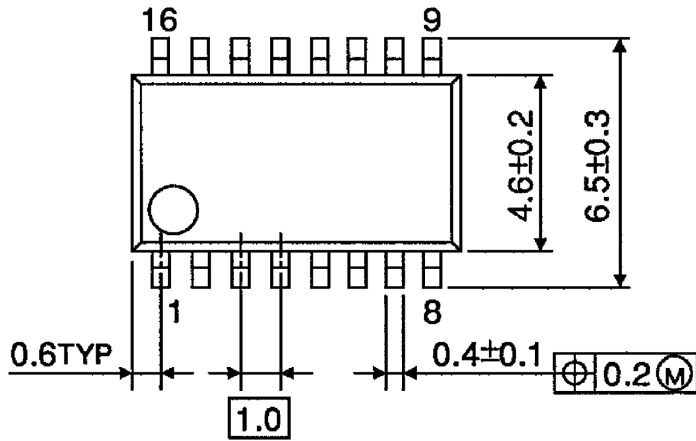


Weight: 1.00g (typ.)

**Package Dimensions**

SSOP16-P-225-1.00A

Unit : mm



Weight: 0.14g (typ.)

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About solderability, following conditions were confirmed

- Solderability
  - (1) Use of Sn-37Pb solder Bath
    - solder bath temperature = 230°C
    - dipping time = 5 seconds
    - the number of times = once
    - use of R-type flux
  - (2) Use of Sn-3.0Ag-0.5Cu solder Bath
    - solder bath temperature = 245°C
    - dipping time = 5 seconds
    - the number of times = once
    - use of R-type flux