

# FM front end

## BA4402 / BA4404

The BA4402 and BA4404 are front end ICs for FM radio receivers. These devices can be used in a wide range of applications, from 3V portable radios to home stereo tuners.

The BA4402 and BA4404 consist of an RF amplifier, oscillator circuit, mixer circuit, and a variable capacitor-diode for AFC. They are pin compatible, and either can be selected depending on the amount of gain needed and other requirements of the application.

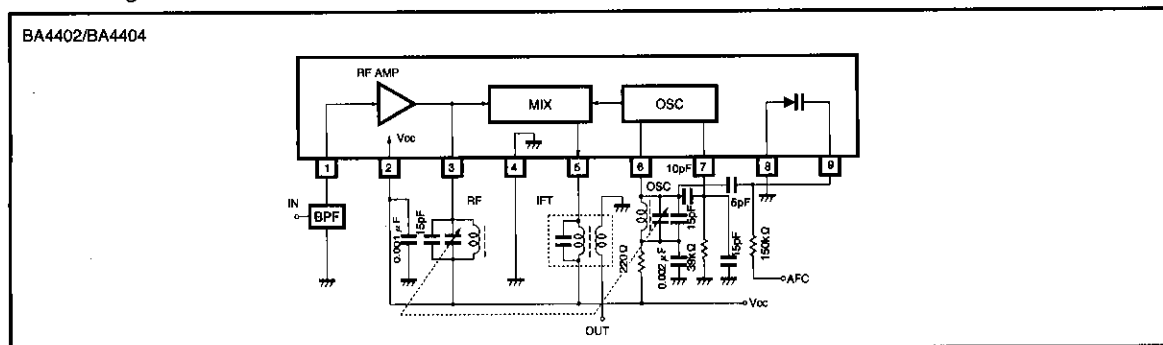
### ●Applications

FM pocket radios  
Radio cassette players  
Home stereos

### ●Features

- 1) Wide operating voltage range : 1.8 to 9V.
- 2) High gain with good stability.
- 3) An appropriate device can be selected depending on the need for AFC and the amount of gain required.

### ●Block diagram



Product name	Variable capacitor	Gain	RF amplifier
BA4402	Yes	32dB	Common base
BA4404	Yes	38dB	Common emitter

● Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Supply voltage	V <sub>CC</sub>	9	V
Power dissipation	P <sub>d</sub>	1000*1	mW
Operating temperature	T <sub>opr</sub>	−25~75	°C
Storage temperature	T <sub>stg</sub>	−55~125	°C

\* 1 At temperatures above Ta = 25°C, decreases 10 mW per degree.

● Electrical characteristics (unless otherwise indicated, Ta = 25°C and V<sub>CC</sub> = 3V)

BA4402

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement Circuit
Quiescent current	I <sub>Q</sub>	—	2.5	4.0	mA	—	Fig.1
Output voltage 1	V <sub>O1</sub>	25	40	55	mV	f <sub>IN</sub> =100MHz, 60dB $\mu$ V	Fig.1
Output voltage 2	V <sub>O2</sub>	80	120	160	mV	f <sub>IN</sub> =100MHz, 100dB $\mu$ V	Fig.1
Oscillator voltage	V <sub>OSC</sub>	180	250	340	mV	V <sub>CC</sub> =2V	Fig.1
Oscillation stop voltage	V <sub>STOP</sub>	—	1.4	1.6	V	—	Fig.1

BA4404

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement Circuit
Quiescent current	I <sub>Q</sub>	—	3.0	5.0	mA	—	Fig.1
Output voltage 1	V <sub>O1</sub>	55	80	120	mV	f <sub>IN</sub> =100MHz, 60dB $\mu$ V	Fig.1
Output voltage 2	V <sub>O2</sub>	80	120	160	mV	f <sub>IN</sub> =100MHz, 100dB $\mu$ V	Fig.1
Oscillator voltage	V <sub>OSC</sub>	180	250	340	mV	V <sub>CC</sub> =2V	Fig.1
Oscillation stop voltage	V <sub>STOP</sub>	—	1.4	1.6	V	—	Fig.1

Front end

High-frequency signal processors

## ● Measurement circuit

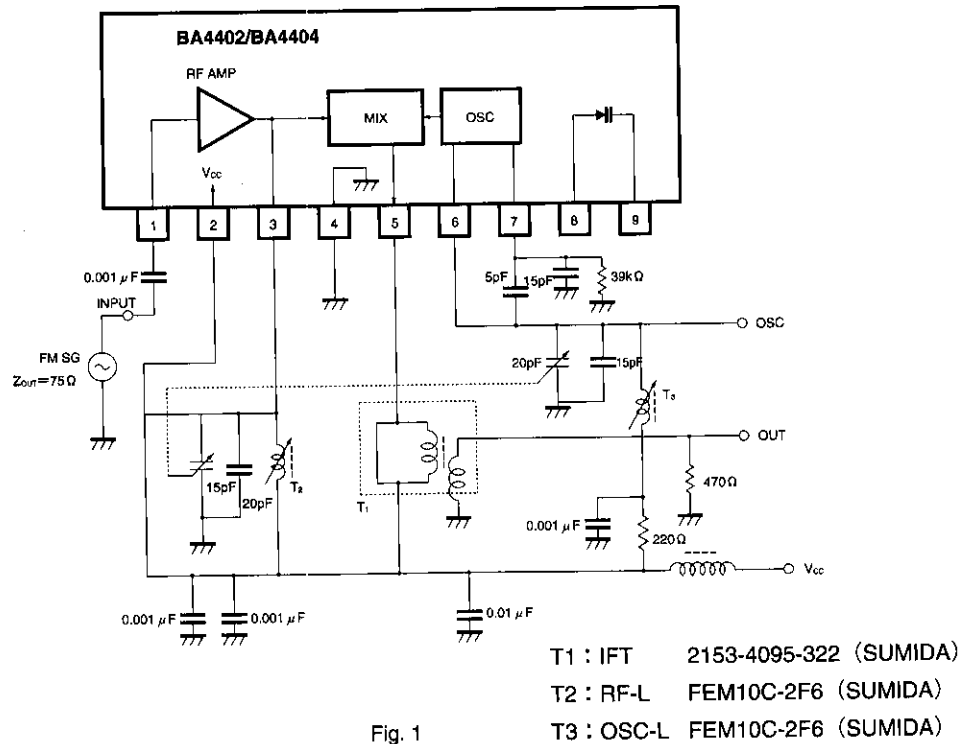


Fig. 1

## ● Application example

## BA4402/BA4404

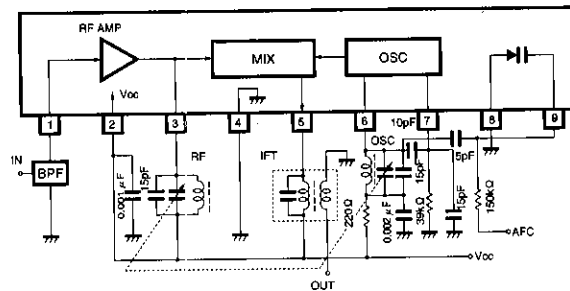


Fig. 2

## ● Electrical characteristic curves

BA4402

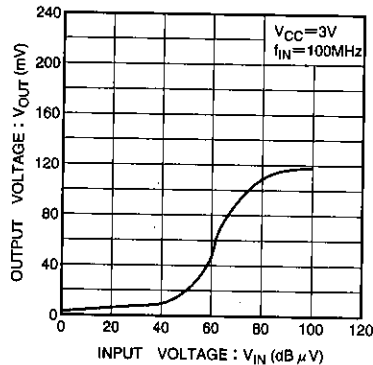


Fig. 3 Output voltage vs. input voltage

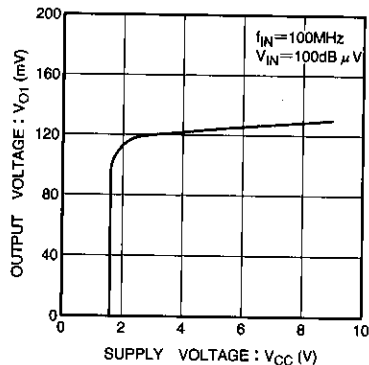


Fig. 4 Output voltage 1 vs. supply voltage

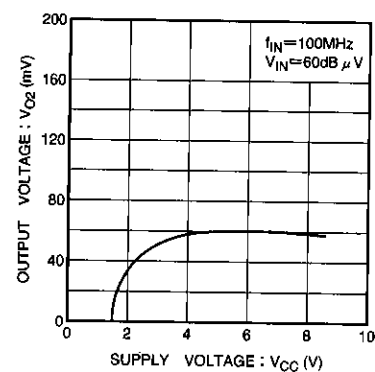


Fig. 5 Output voltage 2 vs. supply voltage

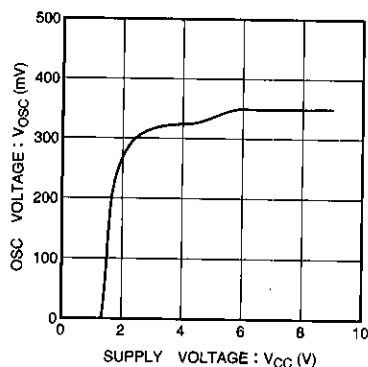


Fig. 6 Oscillator voltage vs. supply voltage

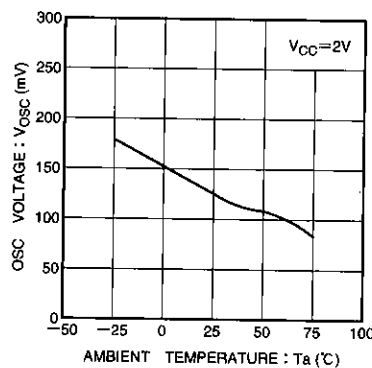


Fig. 7 Oscillator voltage vs. ambient temperature

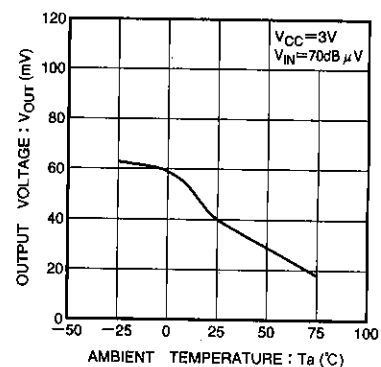


Fig. 8 Output voltage vs. ambient temperature

BA4404

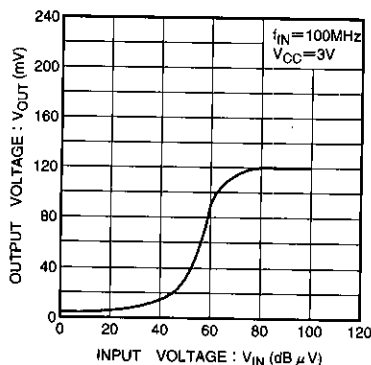


Fig. 9 Output voltage vs. input voltage

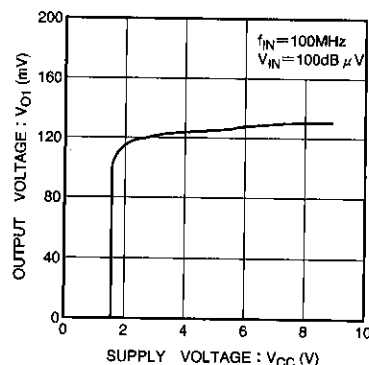


Fig. 10 Output voltage 1 vs. supply voltage

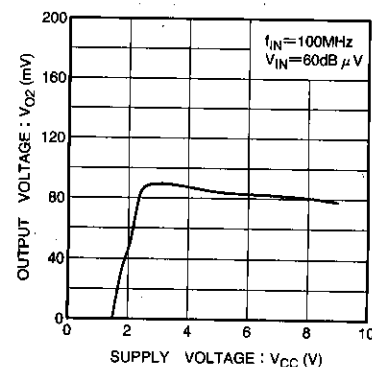


Fig. 11 Output voltage 2 vs. supply voltage

Front end

High-frequency signal processors

## BA4404

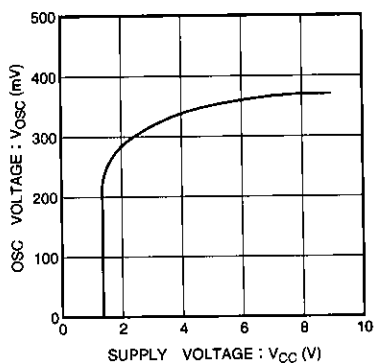
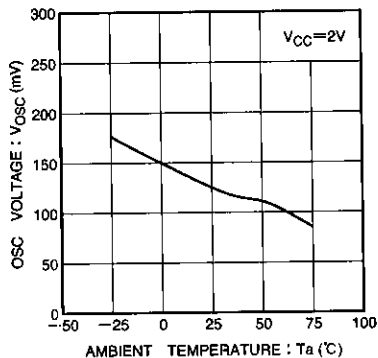


Fig. 12 Oscillator voltage vs. supply voltage



**Fig. 13 Oscillator voltage vs. ambient temperature**

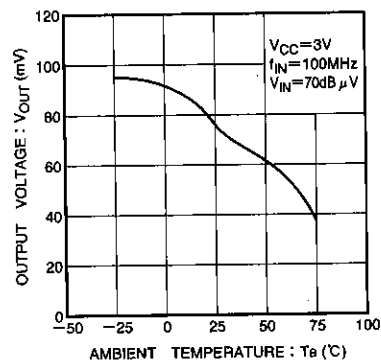


Fig. 14 Output voltage vs. ambient temperature

## BA4402/BA4404

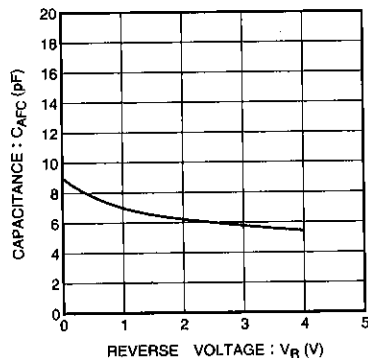
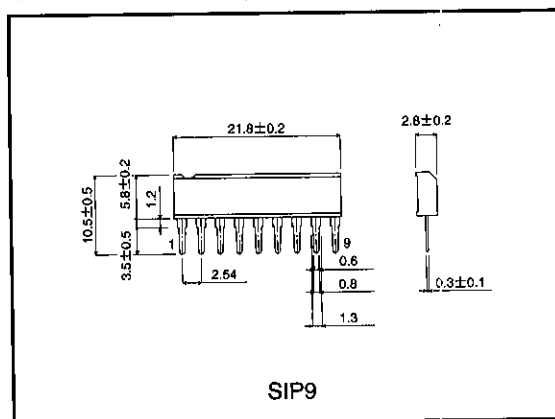


Fig. 15 AFC capacitor capacitance vs. applied voltage

●External dimensions (Unit: mm)



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