

The BA1404 and BA1404F are monolithic FM stereo transmitters. The devices contain a stereo modulator, an FM modulator, and an RF amplifier. The stereo modulator creates a stereo composite signal (which consists of a main (L+R), sub (L-R), and pilot signals) from a 38 kHz quartz controlled frequency. The FM modulator oscillates a carrier in the FM broadcast band (76 to 108 MHz) and modulates it with the composite signal. The RF amplifier creates energy to emit the modulated FM signal. It also functions as a buffer for the FM modulator.

Features

1. Low-voltage, low-power design.
2. Stereo modulator, FM modulator, and transmitter implemented on a single chip.
3. Few external components required.
4. High separation (45 dB typ.).

Applications

FM stereo transmitters
 Wireless microphones

Dimensions (Unit: mm)

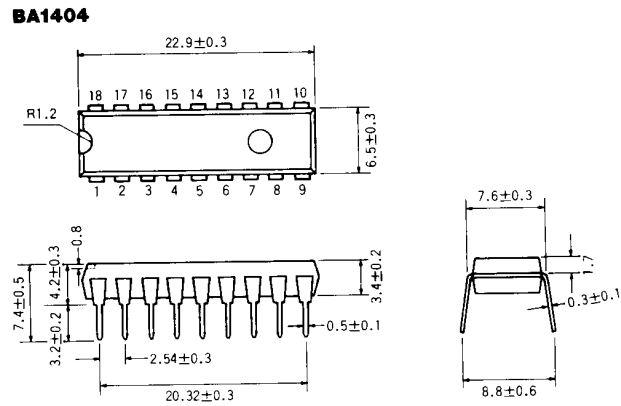


Fig. 1

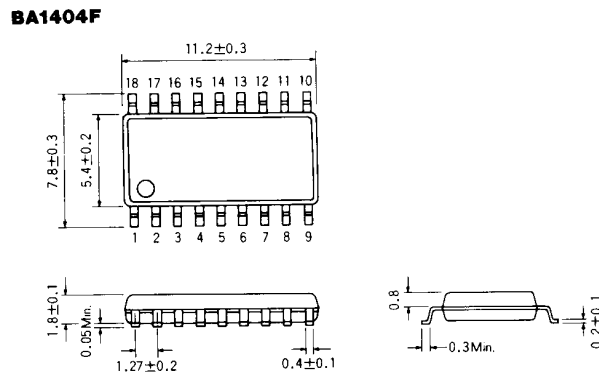


Fig. 2

Block Diagram

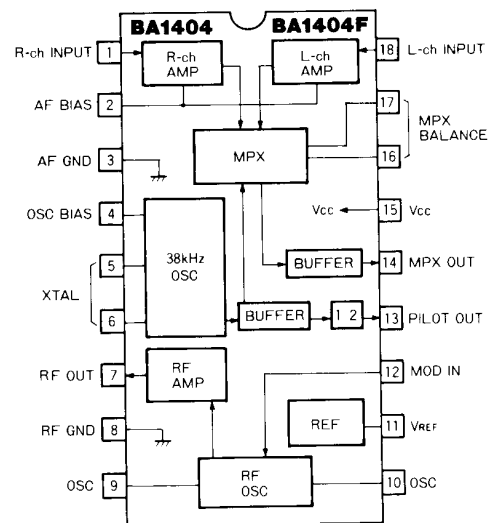


Fig. 3

Special Applications

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Supply voltage	V _{CC}	3.6	V
Power dissipation	P _d	500*	mW
Operating temperature range	T _{opr}	-25 ~ 75	°C
Storage temperature range	T _{stg}	-50 ~ 125	°C

*Derating is done at 5mW/°C for operation above Ta=25°C.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply voltage	V _{CC}	1	1.25	3	V	—

Electrical Characteristics (Ta=25°C, V_{CC}=1.25V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I _Q	0.5	3	5	mA	—
Input impedance	Z _{IN}	360	540	720	Ω	f _{IN} =1kHz
Input gain	G _V	30	37	—	dB	V _{IN} =0.5mV
Channel balance	CB	—	—	2	dB	V _{IN} =0.5mV
MPX maximum output voltage	V _{OM}	200	—	—	mV p-p	THD ≤ 3%
MPX 38kHz leakage	V _{OO}	—	1	—	mV	Quiescent condition
Pilot output voltage	V _{OP}	460	580	—	mV p-p	No-load
Channel separation	Sep	25	45	—	dB	with standard demodulator
Equivalent input noise voltage	V _{NIN}	—	1	—	μV rms	IHF-A at 38kHz stop
RF maximum output voltage	V _{OSC}	350	600	—	mV	—

Test Circuit and Application Example

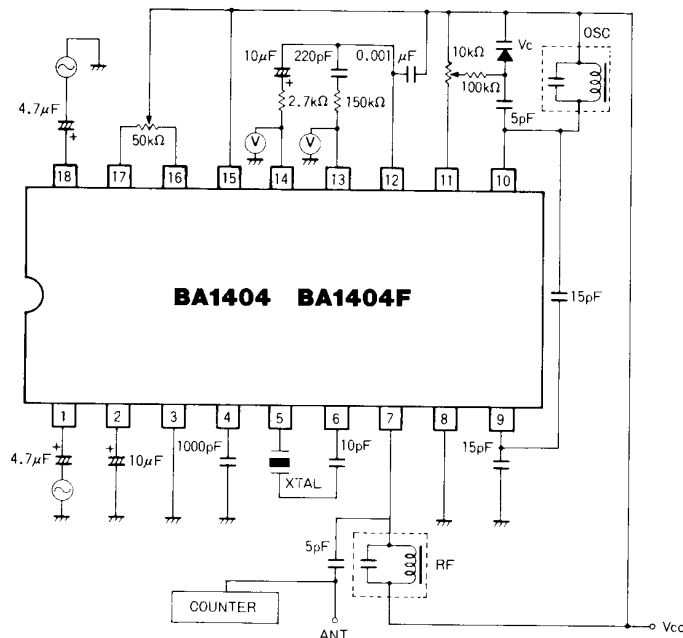


Fig. 4

Coil data (OSC, RF common)
 Bobbin φ5mm with ferrite core
 Coil φ0.5mm enamel wire
 Numbers of turns 2.25 turns
 Capacity 47pF

Precautions

1. To match the frequency response of the transmitter with the FM broadcast receiver, use a pre-emphasis network with a time constant of 50 μs at the input of the AF amplifier. Use the following circuit and components:

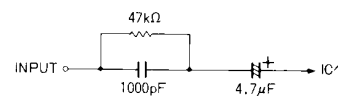


Fig. 5

2. When synthesizing a composite signal from the stereo modulator output with pilot signal, channel separation may deteriorate unless the two signals are in-phase. Note this point if you change the constants of the external components connected to pins 12, 13, and/or 14.

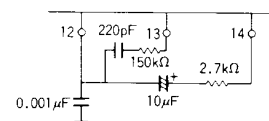


Fig. 6

Precautions

- The carrier for an FM stereo signal can be modulated with an AF signal of up to 19 kHz. If impulse audio input, such as from an electronic musical instrument, is expected, use a low-pass filter at the input of the device to prevent beat interference or deterioration of separation.
- While the device ensures good separation even if the balance control pins (16 and 17) are left open, it provides an even better separation if you connect around 50 kΩ across these pins to optimize the dc balance in the multiplex circuit.
- The output voltage at pin 11 is internally set to $(V_{CC} - 0.7)$ V.

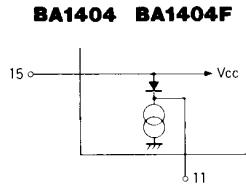


Fig. 7

Electrical Characteristic Curves

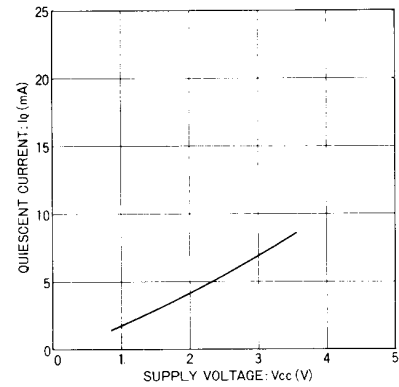


Fig. 8 Quiescent current vs. supply voltage

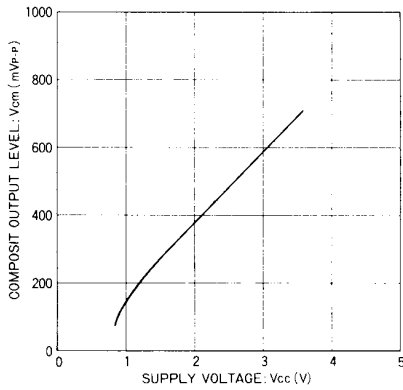


Fig. 9 Composite output level vs. supply voltage

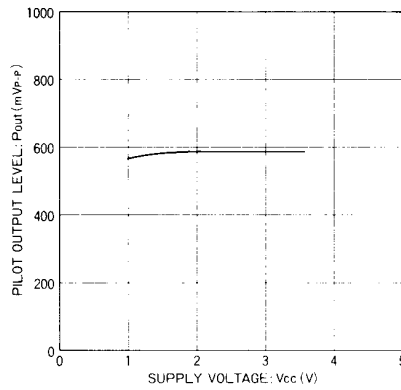


Fig. 10 Pilot output level vs. supply voltage

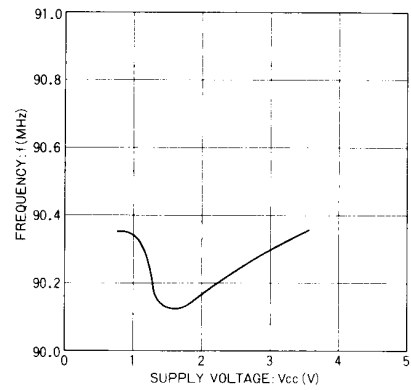


Fig. 11 Frequency vs. supply voltage

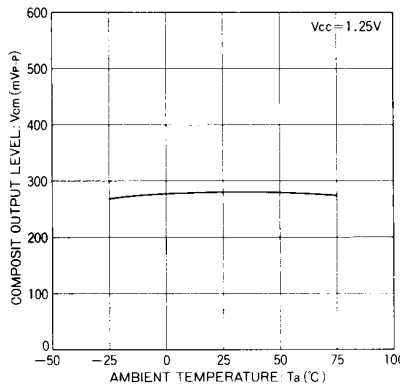


Fig. 12 Composite output level vs. ambient temperature

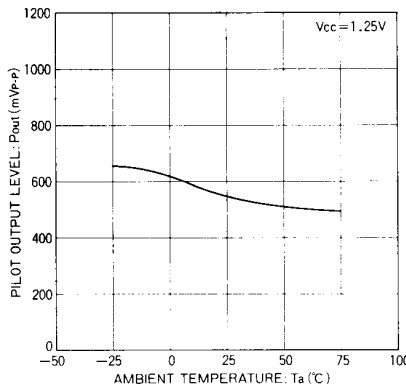


Fig. 13 Pilot output level vs. ambient temperature

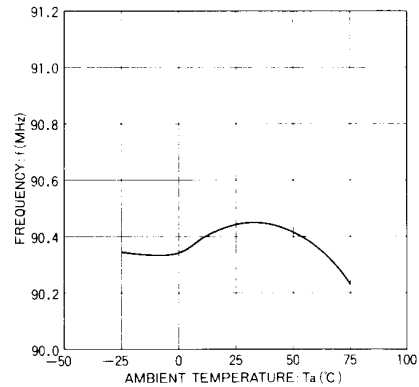


Fig. 14 Frequency vs. ambient temperature

Special Applications