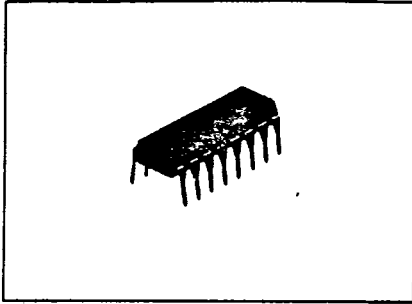


AM/FM IF Amplifier

BA4210

ROHM



Dimensions (Unit: mm)

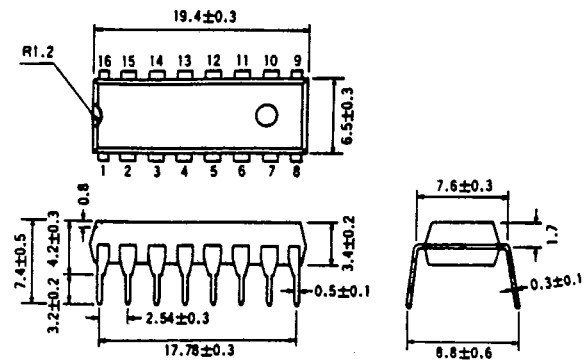


Fig. 1

The BA4210 is a monolithic integrated circuit consisting of two FM IF amplifiers, an AM mixer and an IF amplifier for use in low-voltage FM/AM radios and cassette recorders with built-in radios.

Features

1. Operates stably over a wide range of supply voltages and has excellent characteristics at low voltages ($V_{CC}=2.5\sim6.0V$).
2. High-gain FM section IF amplifier circuit.
3. The AM section includes a mixer, local oscillator, IF amplifier, and AGC circuit, and has excellent AGC and distortion characteristics.

Block Diagram

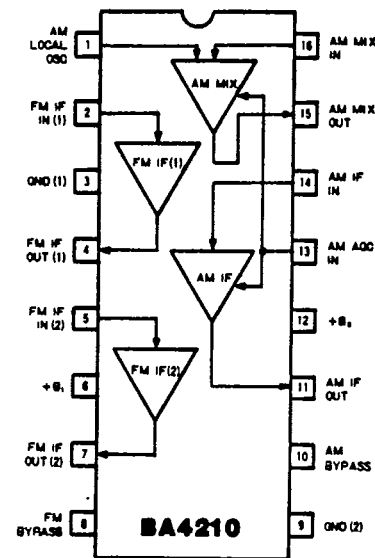


Fig. 2

Applications

AM/FM Radios
Radio cassette recorders

Absolute Maximum Ratings ($T_a=25^\circ C$)

Parameter	Symbol	Limits	Unit
Supply voltage	V_{CC}	9	V
Power dissipation	P_d	550*	mW
Operating temperature range	T_{opr}	$-25\sim75$	$^\circ C$
Storage temperature range	T_{stg}	$-40\sim125$	$^\circ C$

* Derating is done at 5.5mW/ $^\circ C$ for operation above $T_a=25^\circ C$

Recommended Operating Conditions ($T_a=25^\circ C$)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	2.5	4.0	6.0	V

Electrical Characteristics ($T_a=25^\circ C$, $V_{CC}=4.0V$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Test circuit
Quiescent current (AM)	$I_Q (AM)$	4.5	8.0	11.5	mA	—	Fig. 3-1
Voltage gain (MIX)	$A_U (MIF)$	7.5	11.5	15.5	dB	$f=1MHz$, $R=50\Omega$, $R_L=1k\Omega$ (AM)	Fig. 3
Voltage gain (IF)	$A_U (IF)$	44.0	50.0	56.0	dB	$f=455kHz$, $R_0=50\Omega$, $R_L=330\Omega$ (AM)	Fig. 3
Circuit current (FM)	$I_Q (FM)$	5.0	9.0	13.0	mA	—	Fig. 3-2
Voltage gain (IF ₁)	$A_U (IF_1)$	38.0	42.0	46.0	dB	$f=10.7MHz$, $R_0=50\Omega$, $R_L=1k\Omega$ (FM)	Fig. 3
Voltage gain (IF ₂)	$A_U (IF_2)$	27.0	33.0	39.0	dB	$f=10.7MHz$, $R_0=50\Omega$, $R_L=330\Omega$ (FM)	Fig. 3

Test Circuits

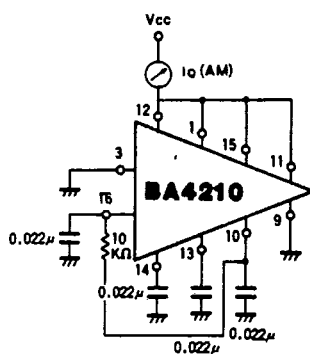


Fig. 3-1

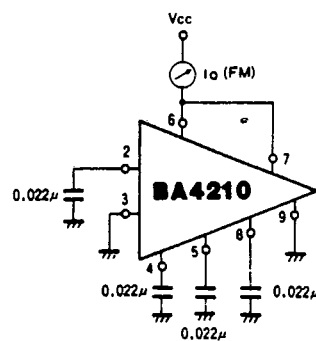


Fig. 3-2

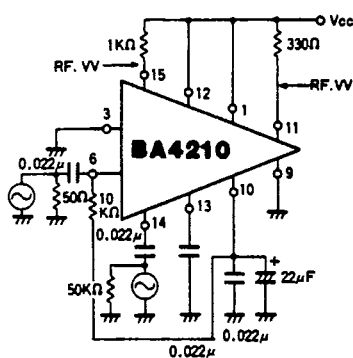


Fig. 3-3

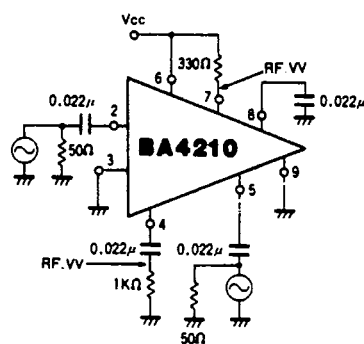


Fig. 3-4

Application Example

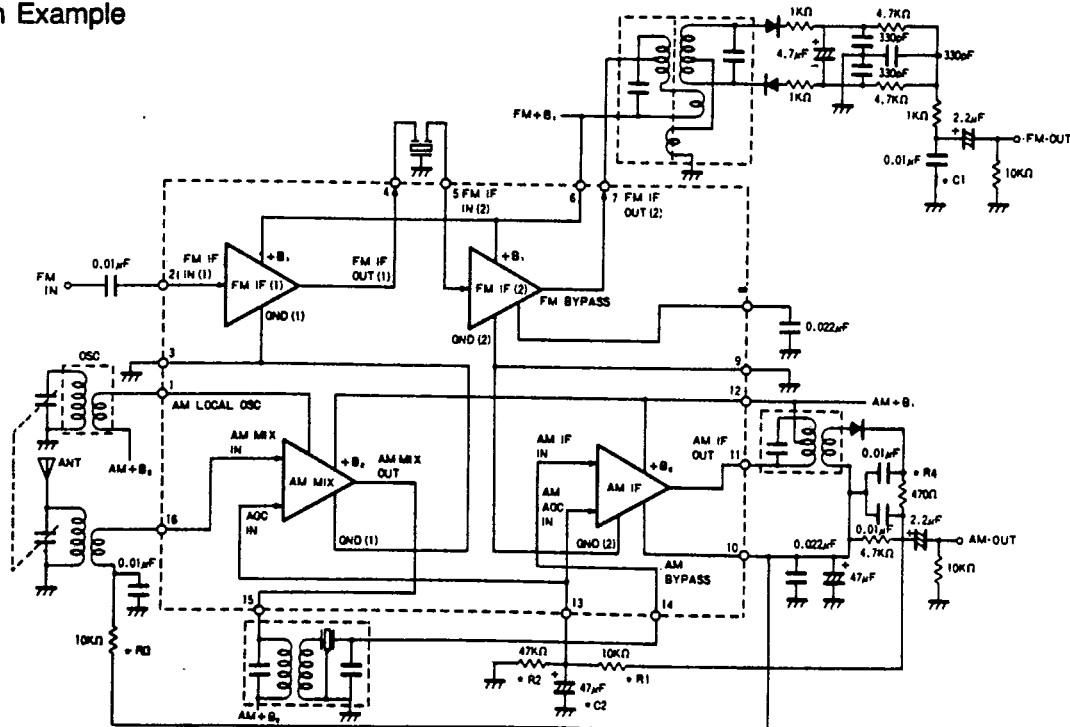


Fig. 4

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Circuit Description

1. FM Section

In the application example shown, the output of the ratio detector after limiting is 180mVrms for 1kHz modulation input and ± 75 kHz deviation. When connecting a ceramic filter to the first IF section stage, if the filter characteristics are not the same as the ceramic filter connected between pin 4 and pin 5, non-coincidence of the passbands of the two filters may result in deterioration of distortion characteristics. Also, it is possible to replace the ceramic filter between pin 4 and pin 5 with a ceramic capacitor. When connecting a stereo demultiplexer IC (MPX IC) to the last stage, capacitor C_1 should be removed.

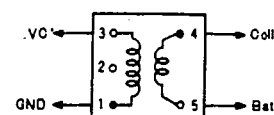
2. AM Section

In the application example shown, for direct input to the 50 Ω input at pin 16, 60mVrms output is obtainable with 60dB μ V modulation of 30% at 1kHz frequency.

By adjusting the ratio of R_1 and R_2 , the input level at which AGC begins to take effect can be selected. R_1 and C_2 form a filter so that the value of R_1 should be chosen to be approximately 10k Ω . Note that the C_2 47 μ F, if made a value approximately 10 μ F, will cause filter characteristics to deteriorate, resulting in increased distortion in the low and high frequency ranges. C_2 should be kept in the range 33~47 μ F.

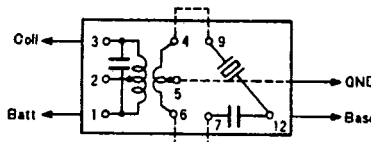
Coil Specifications

1. AM Oscillator Coil (MW) 7BR-4398X (TOKO)
Type: 7P 1-3 65T
Color coding: Black 4-6 11T



2. AM Interstage Coil CFZ-455C (TOKO)

$L=150\mu\text{H}$ ($\pm 6\%$)
 $Q_u > 80$ ($f=1.4\text{MHz}$)

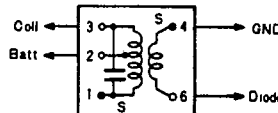


Bandwidth: 6kHz (min.)
Selectivity: 20dB (min.) or better (at ± 10 kHz detuning)

3. AM Detector Coil (455kHz) 7LC-252222 No. (TOKO)

Type: 7P
Color coding: Black

1-3 146T
2-3 37T
4-6 33T



Internal capacitor $C=180\text{pF}$
 $Q_u=70\pm 20\%$

4. FM Detector Transformer (10.7MHz) (TOKO)

Internal C

Primary 119AC-470085L₈ (Gray) 47pF 4-2 5 1/2T 2-3 8T 1-5 5 1/2T
Secondary 119FC-560061N₆ (Blue) 56pF 1-2 6T 2-3 6T 4-6 1T
Type 7P

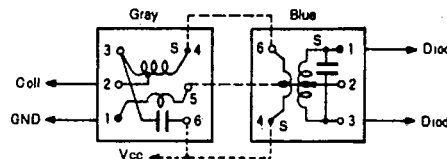


Fig. 5 Coil used in the application example

Electrical Characteristic Curves

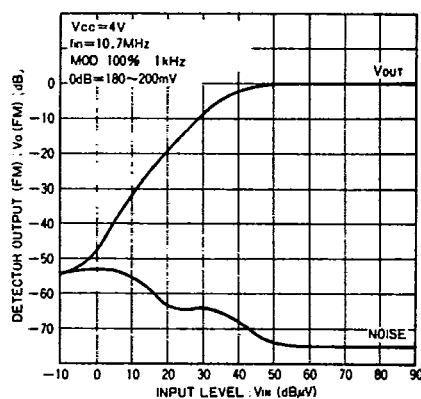


Fig. 6 FM input/output characteristics

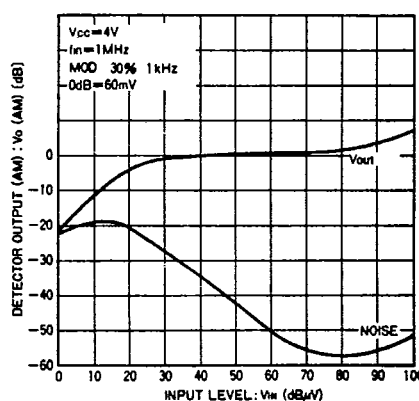


Fig. 7 AM input/output characteristics

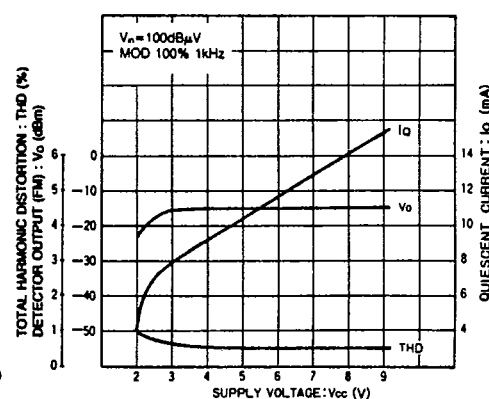


Fig. 8 FM low-voltage performance

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Electrical Characteristic Curves

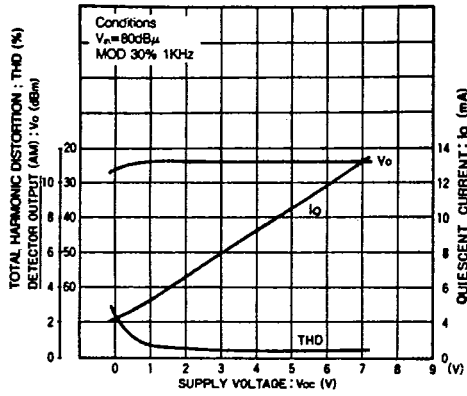


Fig. 9 AM low-voltage performance

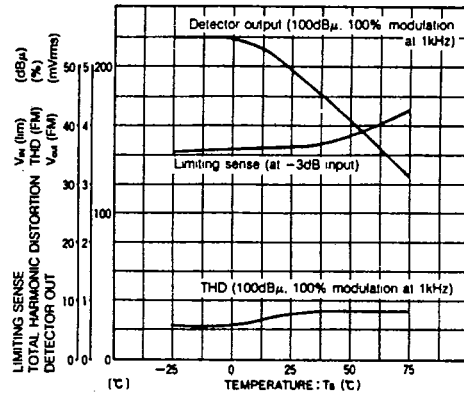


Fig. 10 FM temperature characteristics

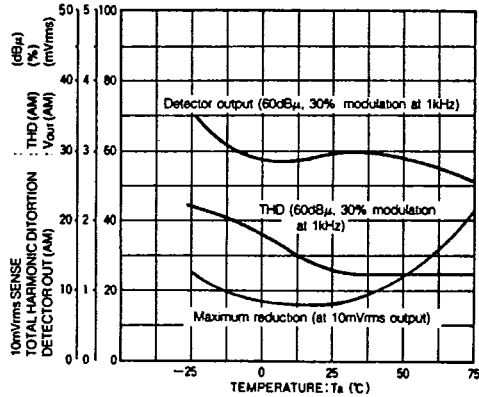


Fig. 11 AM temperature characteristics

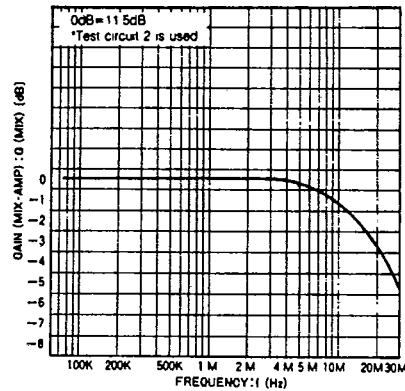


Fig. 12 AM-Mixer stage frequency characteristics

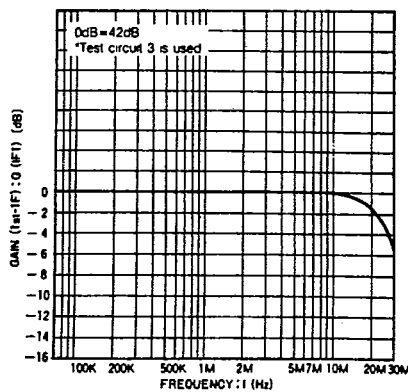


Fig. 13 1st FM IF stage frequency characteristics

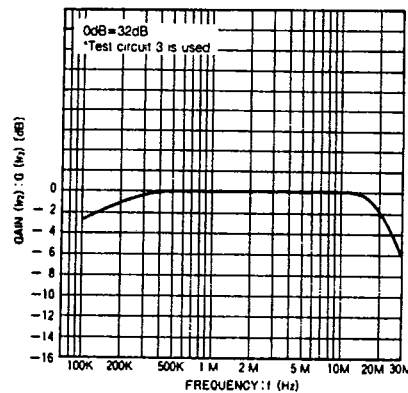


Fig. 14 2nd FM IF stage frequency characteristics

