Pseudo inductance for telephones
BA8201 / BA8201F

The BA8201 and BA8201F are ICs with a choke coil action, capable of extracting the DC current from a telephone line while maintaining a high inductance on the telephone line side. This eliminates the need for a choke coil, and facilitates use of the telephone set line in a variety of applications.

●Applications
Household telephones

●Features
1) Corresponds to choke coil of several henries.
2) Extracts DC current while maintaining high inductance on telephone line side.
3) Capable of extracting large output current.
4) Wide dynamic range.
5) Two output voltage modes available for selection.
    • Line voltage seek mode
    • Constant voltage mode
6)   DIP 8 and SOP 8 pin packages available.

●Absolute maximum ratings (Ta = 25°C)

| Parameter	Symbol	Limits		Unit
Power supply voltage	V_{CC}	18		V
Power dissipation	Pd	800 （BA8201） *1		mW
		450 （BA8201F） *2		
Operating temperature	Topr	$-25\sim+75$		℃
Storage temperature	Tstg	$-55\sim+125$		℃

*1 Reduced by 8mW for each increase in Ta of 1℃ over 25℃.
*2 Reduced by 4.5mW for each increase in Ta of 1℃ over 25℃.

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Line voltage	V_{LN}	2	—	18	V

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●Block diagram
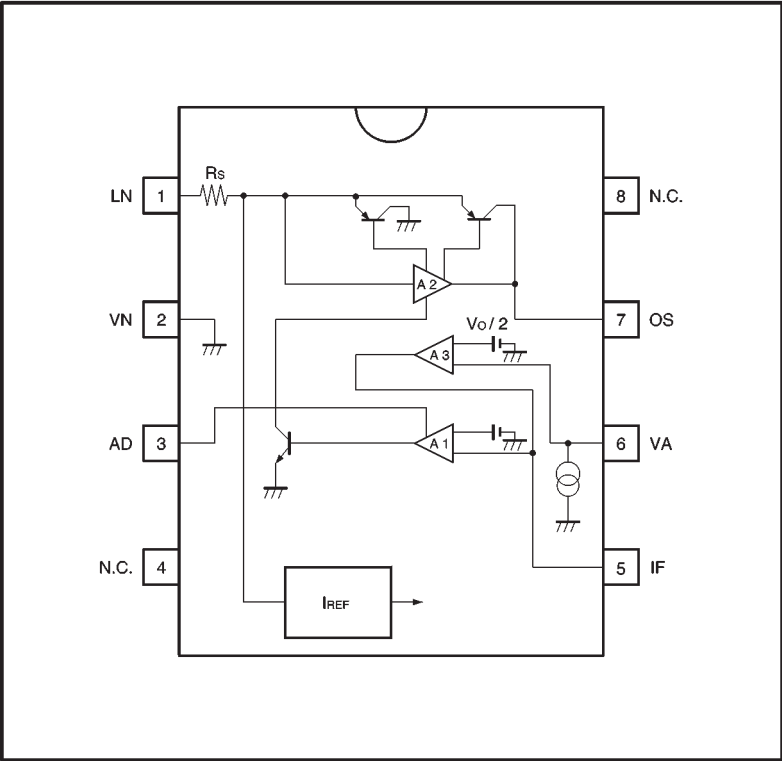
●Pin descriptions

Pin No.	Pin name	Function
1	LN	This is the power supply pin. It supplies power to the IC and is connected to the (+) side of the diode bridge.
2	VN	This is the GND pin. It has the lowest potential of the IC and is connected to the (-) side of the diode bridge.
3	AD	This is the phase compensation pin for the internal amplifier. They are connected to Pins 1 - 3 and Pins 3 - 6.
4	N.C.	This is the N.C. pin. It is left open and is not connected inside the IC.
5	IF	This is the bias pin for the internal amplifier. It is used to input signals from the V_L pin to which it is coupled. This signal is compared to the internal potential, and maintains the inductance from the telephone line at a high level.
6	VA	This is the output voltage regulator. The output voltage can be clamped by connecting a resistor between pins 6 and 7.
7	OS	This is the output pin through which DC current is output.
8	N.C.	This is the N.C. pin. It is left open and is not connected inside the IC.

ROHM

● Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{LN} = 4V, υ_{LN} = 100mVrms, Io = 5mA, f = 1kHz)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement circuit
Peak maximum line voltage	V_{LN2}	—	—	18	V	υ_{LN}=0Vrms	—
Internal supply current	I_{CC}	—	0.87	1.7	mA	Io=0mA	Fig.1
Line current 1	I_{LN1}	—	5.9	—	mA	υ_{LN}=0Vrms, Io=5mA	Fig.1
Line current 2	I_{LN2}	—	30.0	—	mA	υ_{LN}=1.5Vrms, Io=15mA	Fig.1
Line current 3	I_{LN3}	—	5.9	—	mA	υ_{LN}=0Vrms, Io=5mA	Fig.2
Line current 4	I_{LN4}	—	30.0	—	mA	υ_{LN}=1.5Vrms, Io=15mA	Fig.2
Output saturation voltage 1	V_{drp1}	—	0.57	0.85	V	V_{LN} - V_O tested at Io=0mA	Fig.1
Output saturation voltage 2	V_{drp2}	—	1.3	1.8	V	V_{LN} - V_O tested at U_{LN}=1.5V rms Io=15mA	Fig.1
Output voltage	V_O	2.2	3.3	4.4	V		Fig.2
Output current	$I_{OMax.}$	—	—	30	mA	∗	—
Rs resistance	Rs	—	20	—	Ω		—
Distortion	dtot	—	—	2.0	%	υ_{LN}=1.5Vrms	Fig.1
Return loss	BRL	25	—	—	dB	Standard impedance 600Ω	Fig.3
2nd high-frequency line output level	V_{LN2H}	—	−58	—	dBm	f=500Hz υ_{LN}=0dBm Z_{line}=600Ω	Fig.1
3nd high-frequency line output level	V_{LN3H}	—	−60	—	dBm		Fig.1
V_{LN} pin noise output level	V_{ni}	—	−83	—	dBmp	υ_{LN}=0V, R_L=600Ω CCITT P53 BPF used	Fig.1

∗ The maximum output current is restricted by the power dissipation, and should be set so that the temperature and other factors do not cause the power dissipation to be exceeded. The internal power dissipation for the IC is expressed using the equation below.

(Internal IC power dissipation) = (power applied to LN pin) - (output power)
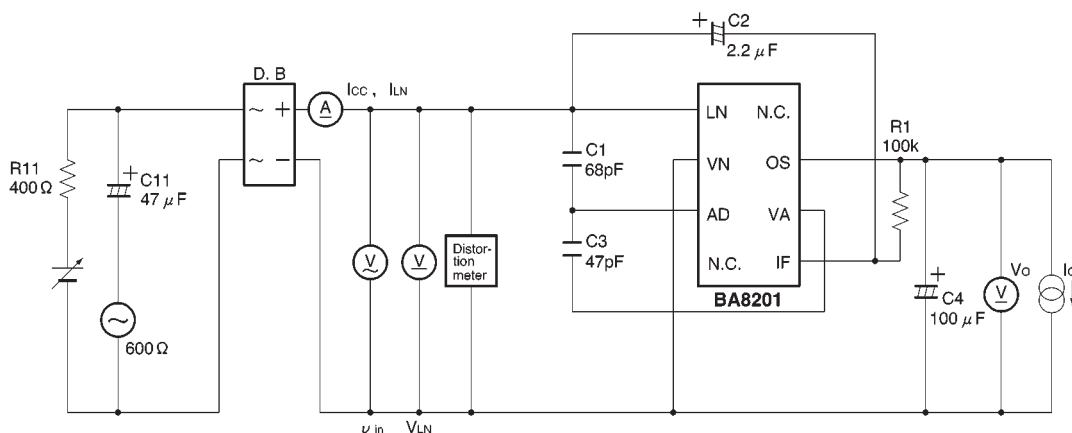$Pd = 2 \cdot V_{LN} \cdot Io - V_O \cdot Io$
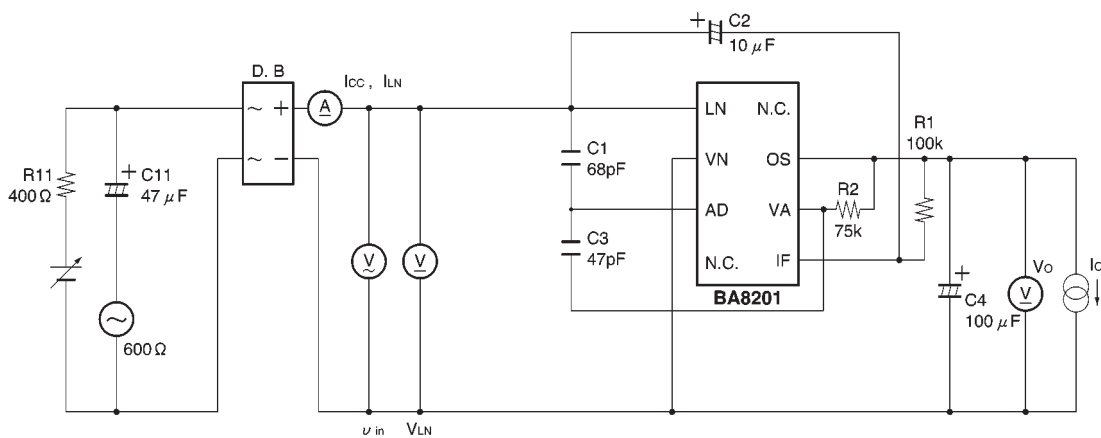
● Measurement circuits

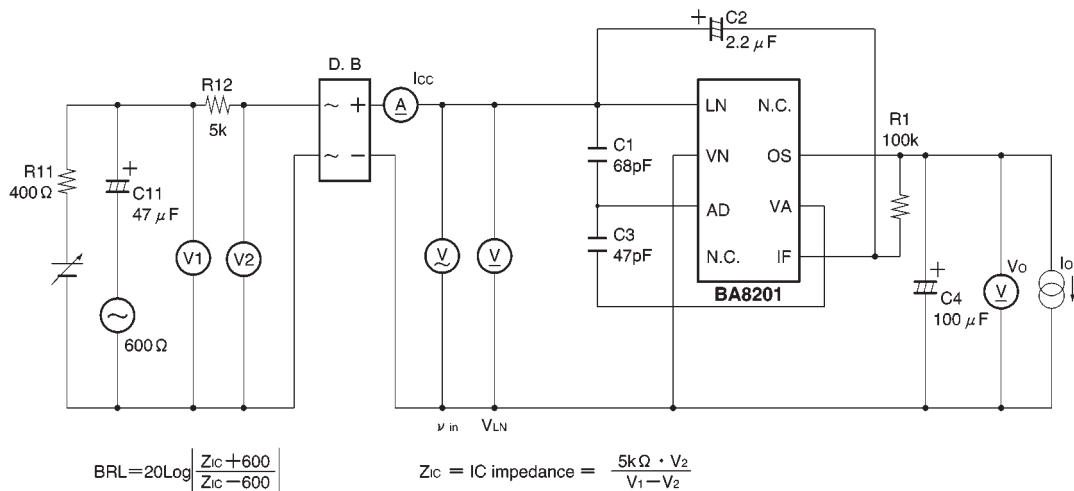Fig. 1 Measurement circuit (1)

Fig. 2 Measurement circuit (2)

$$BRL = 20 Log \left| \frac{Z_{IC} + 600}{Z_{IC} - 600} \right|$$

$$Z_{IC} = IC \text{ impedance} = \frac{5k\Omega \cdot V_2}{V_1 - V_2}$$

Fig. 3 Measurement circuit (3)

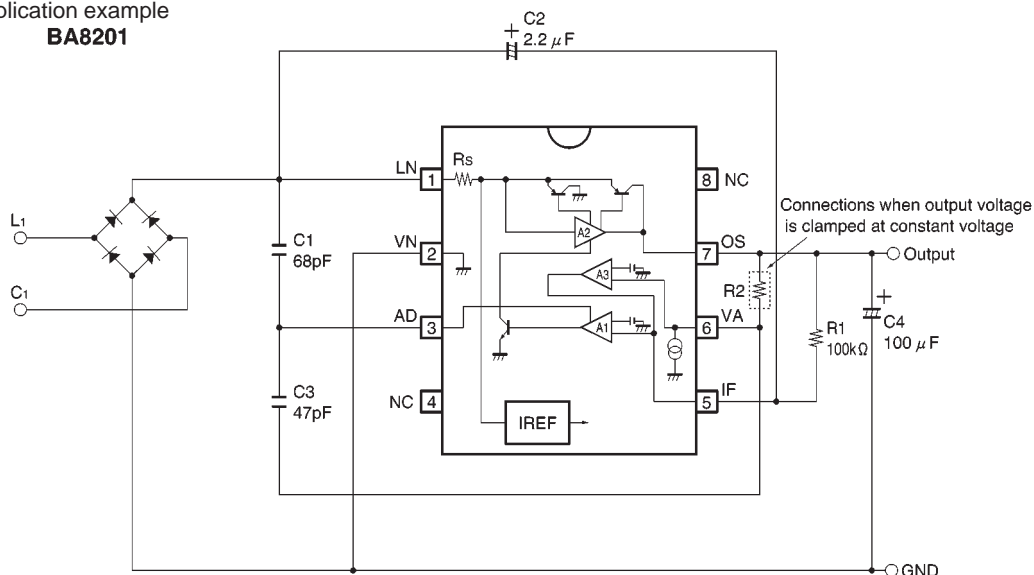●Application example
BA8201

Fig. 4

●Attached components

C1:
This is a capacitor for phase compensation, and is normally connected at 68pF.

C2:
This is a coupling capacitor. The inductance from the telephone line changes based on this value. Normally, a value of 2.2μF to 10μF is appropriate.

C3:
This is a capacitor for phase compensation, and is normally connected at 47pF.

C4:
This is the capacitor for balancing the output. It suppresses rippling in the output and also carries out decoupling for the bias voltage supply of the IF pin. It should be adjusted based on the output current, load, and other factors.

R1:
Bias is applied from this pin to the IF pin. The inductance from the telephone line changes based on this value. Normally, a value of 100kΩ is appropriate.

R2:
This can be connected between Pins 6 and 7 to clamp the output voltage. The output voltage is expressed using the equation below.

$$Vo \ (V) = 2 \times 22 \ (\mu A) \times R2 \ (\Omega) \ \text{(reference value)}$$

∗22μA is the reference internal current source for the IC.

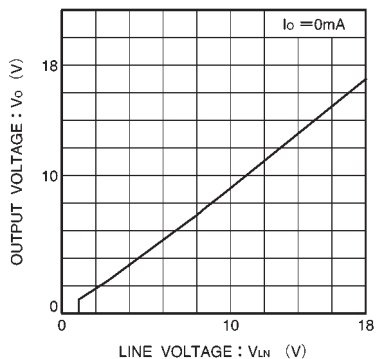●Electrical characteristic curves

Fig. 5 Output voltage vs.
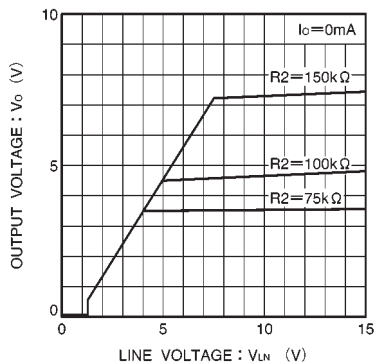line voltage (without R2)

Fig. 6 Output voltage vs.
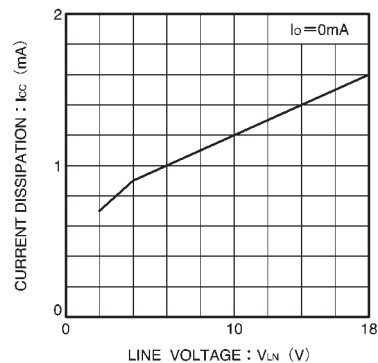line voltage (with R2)
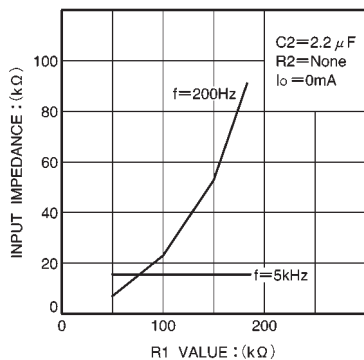

Fig. 7 Current dissipation vs.
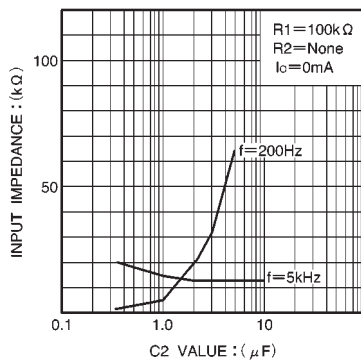line voltage

Fig. 8 LN input impedance vs.
R1

Fig. 9 LN input impedance vs.
C2

●External dimensions (Units: mm)

BA8201

BA8201F

9.3±0.3

6.5±0.3

8   5

1   4

7.62

0.5Min.

3.4±0.3

3.2±0.2

2.54

0.5±0.1

−0.3±0.1

0° ~15°

5.0±0.2

8   5

6.2±0.3

4.4±0.2

1   4

1.5±0.1

0.11

1.27

0.4±0.1

0.3Min.

0.15±0.1

0.15

DIP8   SOP8