

Second Mixer IF for digital mobile phones

BH4128FV

The BH4128FV is an IC equipped with internal second mixer and IF amplifier circuits, developed for use with digital portable telephones.

●Applications

Digital mobile phones

●Features

- 1) Equipped with internal mixer, IF, and RSSI circuits.
- 2) Can be operated at mixer input frequencies ranging from 10MHz to 200MHz.
- 3) IF amplifier gain is 100 dB.
- 4) Equipped with a battery power saving function.

●Absolute maximum ratings (Ta=25°C, for measurement circuit)

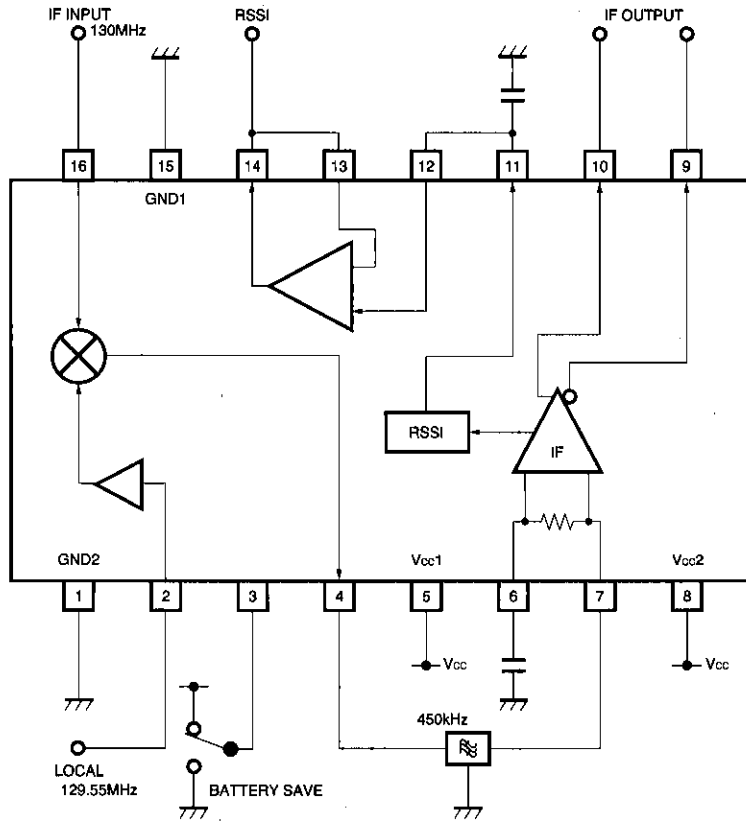
Parameter	Symbol	Limits	Unit
Power supply voltage	V _{cc}	7.0	V
Power dissipation	P _d	350 *	mW
Storage temperature	T _{stg}	-55~+125	°C

* 1 Reduced by 3.5mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta=25°C, for measurement circuit)

Parameter	Symbol	Limits	Unit
Operating voltage	V _{cc}	2.3~5.5	V
Operating temperature	T _{por}	-40~+85	°C

● Block diagram



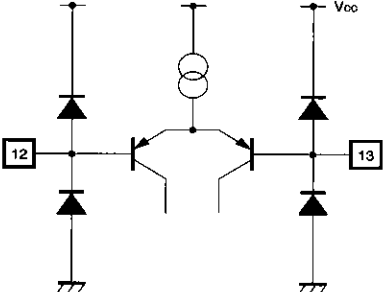
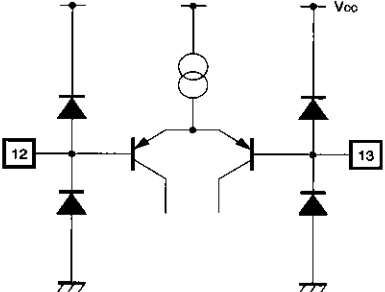
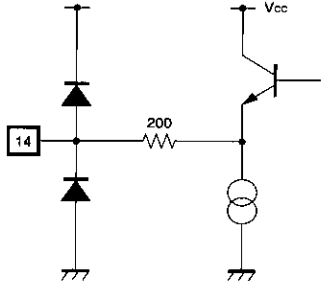
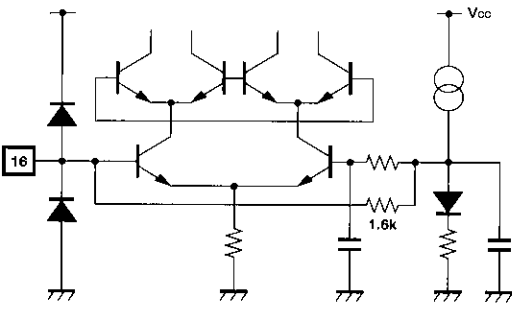
Cellular phones / PHS / Pagers
IFs for radio communications

● Pin descriptions

Pin No.	Function	Internal peripheral circuit	DC voltage (V)
1	GND pin 2	GND for MIX stage	GND
2	Local oscillation input pin Input from external oscillator		—
3	Battery save pin “Pin3 voltage” $\leq 0.2V$: Battery save $2V \leq$ “Pin3 voltage” $\leq V_{cc}$: Active		—
4	Mixer output pin Connect ceramic filter Output impedance: 1 k Ω		$V_{cc}-1.6$
5	Vcc pin 1	Vcc for MIX stage and IF amplifier early stage	Vcc

Pin No.	Function	Internal peripheral circuit	DC voltage (V)
6	IF amplifier bypass pin Connect capacitor		$V_{cc}-0.6$
7	IF amplifier input pin Connect ceramic filter Output impedance: 1 kΩ		$V_{cc}-0.6$
8	Vcc pin 2	Vcc for IF later stage	V_{cc}
9, 10	IF amplifier output pin Pins 9 and 10 are opposite-phase output		$V_{cc}-1.2$
11	RSSI output pin Connect capacitor		0.15

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Pin No.	Function	Internal peripheral circuit	DC voltage (V)
12	Buffer amplifier non-reversed input pin		-
13	Buffer amplifier reversed input pin		-
14	Buffer amplifier output pin		-
15	GND pin 1	GND for IF stage and RSSI circuit	GND
16	Mixer input pin Connect first IF signal from DC cutoff		1.2

●Electrical characteristics (Unless otherwise noted, Ta=25°C, V_{CC}=3.0V;

Signal source : f_{IN (MIX)}=130MHz

f_{IN (LO)}=129.55MHz, 100dB μV

all AC levels are end display)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I _Q	—	3.0	3.9	mA	V _{IN (LO)} =100dB μV
Battery save quiescent current	I _{Q (BS)}	—	0	5	μA	
Battery save input voltage	V _{TH-H}	2	—	V _{CC}	V	Active
	V _{TH-L}	GND	—	0.2	V	Battery save
MIX - oscillator unit						
Mixer operating frequency	f _{MIX}	10	130	200	MHz	
Mixer conversion gain	G _{VC}	8.5	12.5	16.5	dB	V _{IN (MIX)} =60dB μV, R _L =1kΩ
-1 dB compression output level	V _{OM}	—	101	—	dB μV	
3rd intercept point	IP ₃	—	115	—	dB μV	f ₁ =130.05MHz, f ₂ =130.10MHz
Noise index	NF	—	8.5	—	dB	LC matching input
Mixer input admittance	Y _{IN (MIX)}	—	0.38-j2.75	—	mS	f=130MHz
Mixer output resistance	R _{O (MIX)}	—	1	—	kΩ	
Local input level	V _{IN (LO)}	95	100	105	dB μV	
Local input admittance	Y _{IN (LO)}	—	0.25-j3.65	—	mS	f=130MHz
IF unit						
IF operating frequency	f _{IF}	350	—	500	kHz	
IF amplifier gain	G _V	—	100	—	dB	
IF input resistance	R _{IN (IF)}	—	1	—	kΩ	
IF output level	V _{OIF}	0.7	1	1.3	V _{P-P}	V _{IN (IF)} =80dB μV
IF output duty ratio	D _R	45	50	55	%	V _{IN (IF)} =80dB μV, C _L =10pF
RSSI unit						
Output voltage 1	V _{RSSI1}	—	0.15	0.4	V	No Input
Output voltage 2	V _{RSSI2}	1.0	1.2	1.4	V	V _{IN (IF)} =65dB μV
Output voltage 3	V _{RSSI3}	1.8	2.0	2.2	V	V _{IN (IF)} =100dB μV
Dynamic range	D _R	—	85	—	dB	
Output resistance	R _{O (RSSI)}	40	50	60	kΩ	
Power ON rise time	T _{ON}	—	140	—	μsec	C _L =1000pF, V _{IN (MIX)} =60dB μV
Power OFF fall time	T _{OFF}	—	130	—	μsec	C _L =1000pF, V _{IN (MIX)} =60dB μV
RSSI rise time	T _R	—	270	—	μsec	C _L =1000pF, V _{IN (MIX)} =60dB μV
RSSI fall time	T _F	—	220	—	μsec	C _L =1000pF, V _{IN (MIX)} =60dB μV

○ Not designed for radiation resistance.

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● Measurement circuit

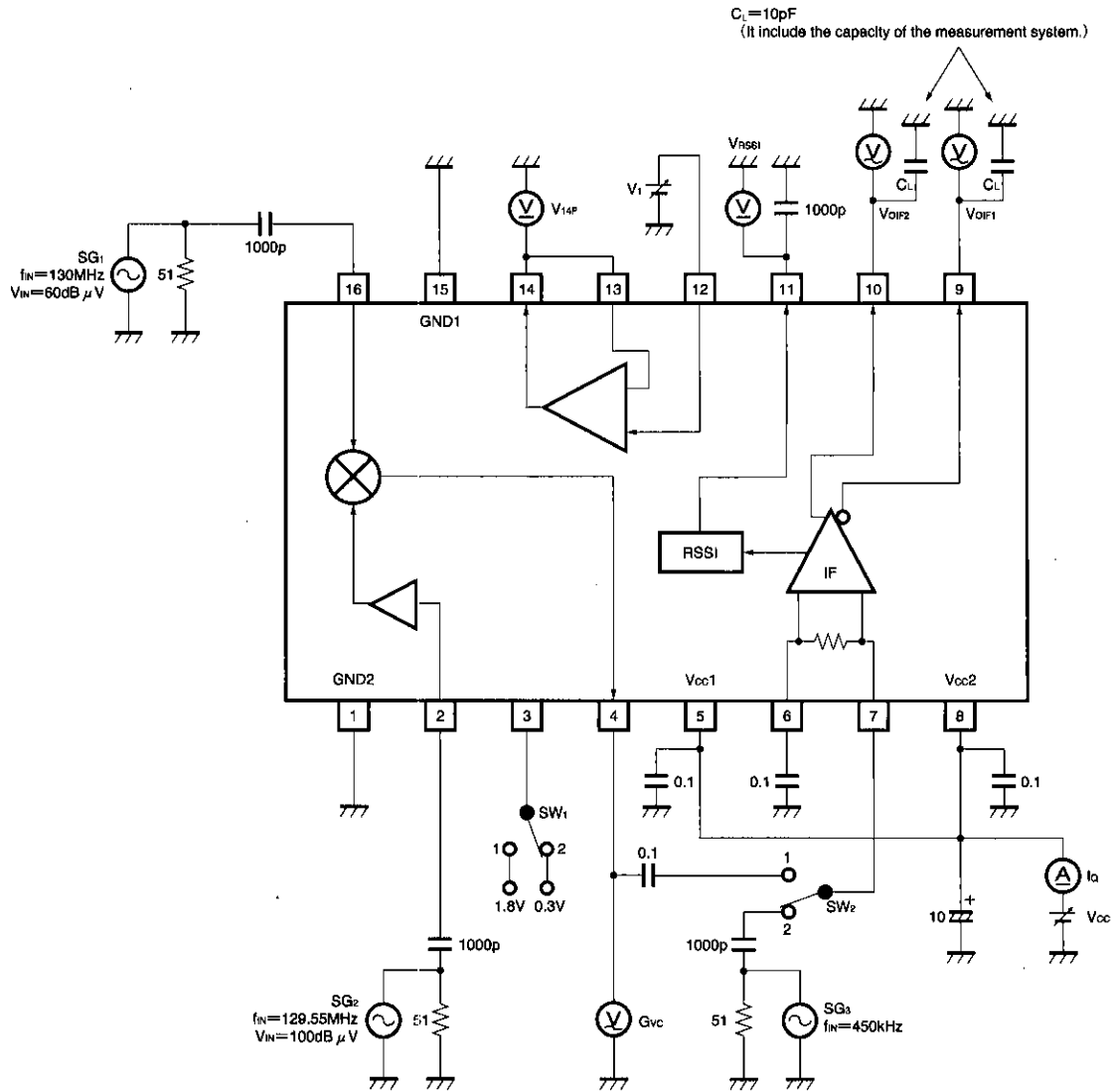
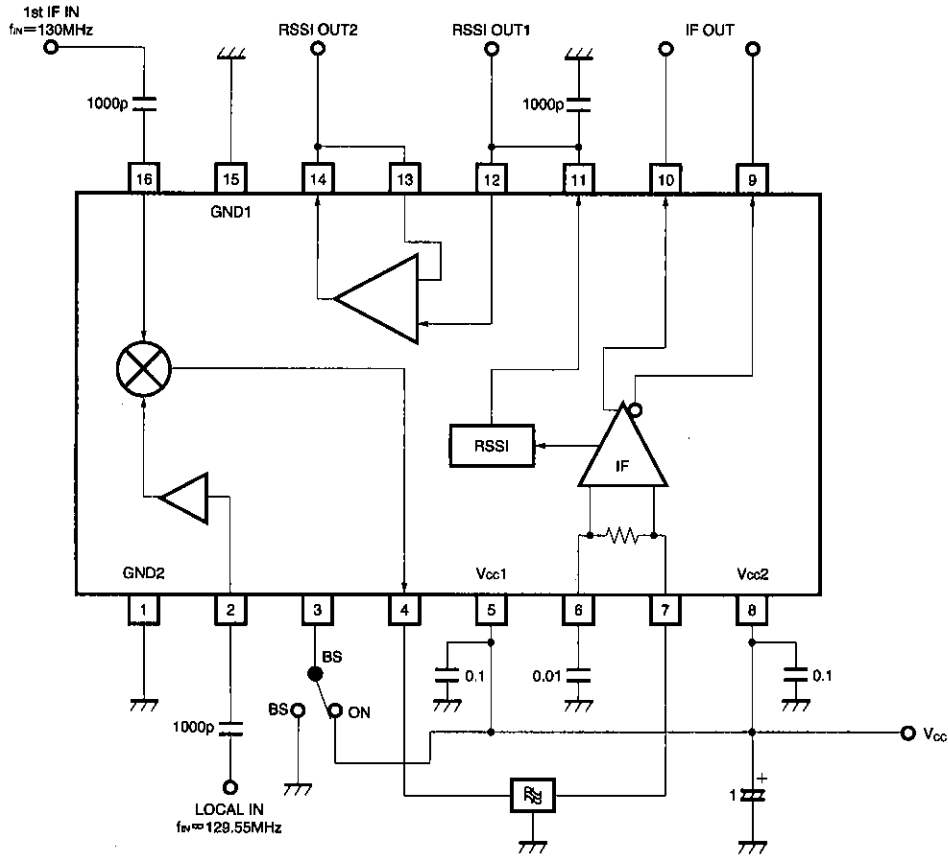


Fig. 1

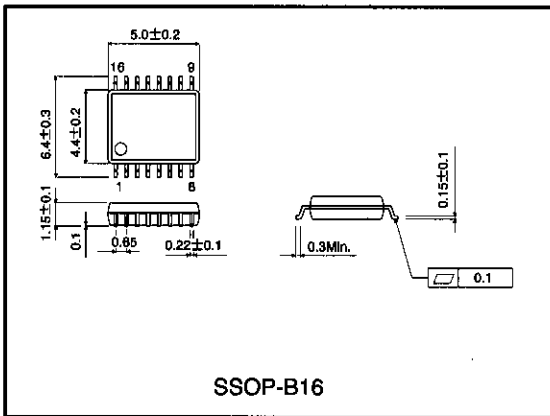
●Application example



Unit Resistance : Ω
Capacitor : μF

Fig. 2

●External dimensions (Units: mm)



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