

Second Mixer IF for digital cellular phones

BH4128FV

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

●Applications

Digital cellular 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)

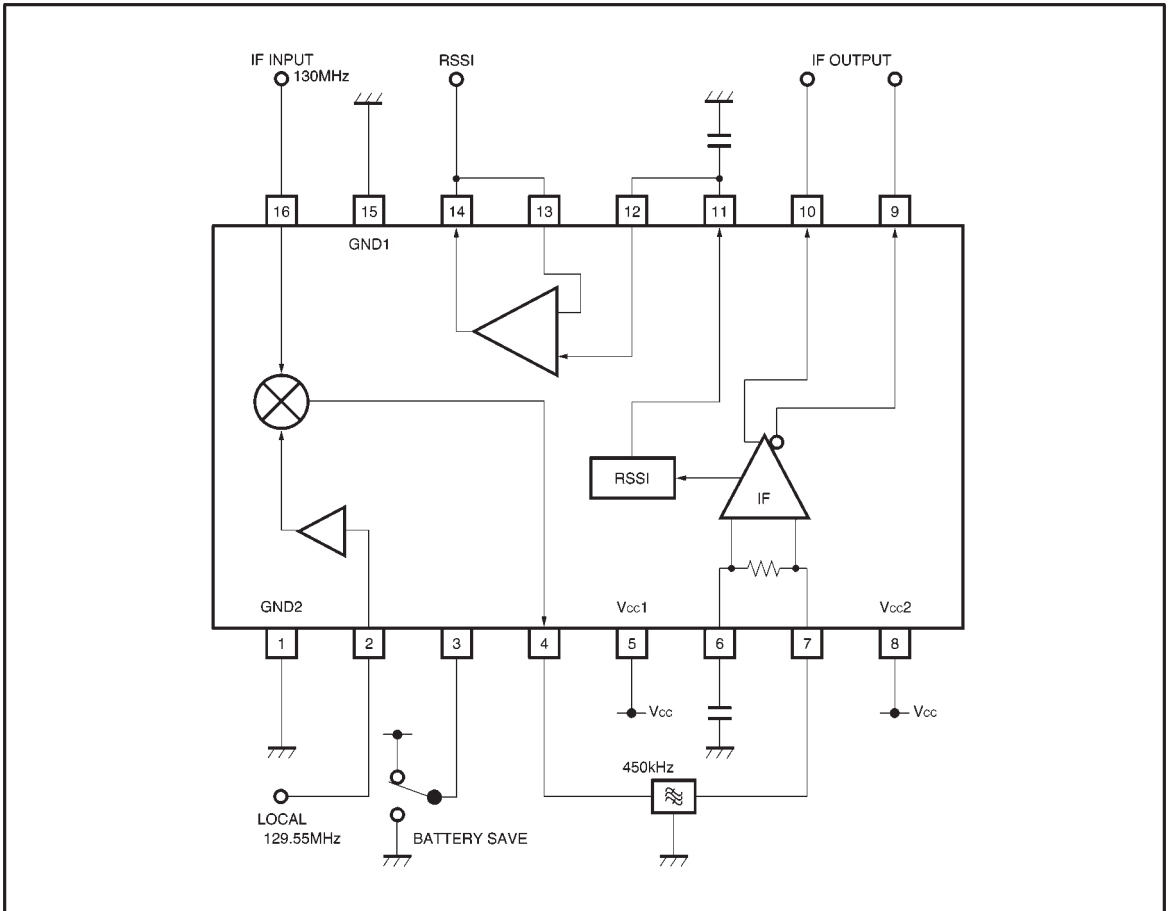
Parameter	Symbol	Limits	Unit
Power supply voltage	V _{cc}	7.0	V
Power dissipation	P _d	350*	mW
Storage temperature	T _{stg}	-55~+125	°C

* 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
Power supply voltage	V _{cc}	2.3~5.5	V
Operating temperature	T _{por}	-40~+85	°C

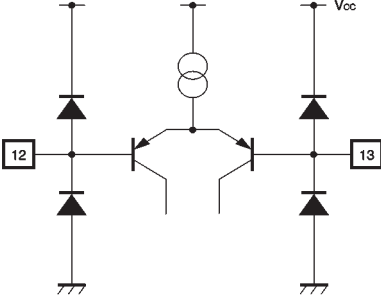
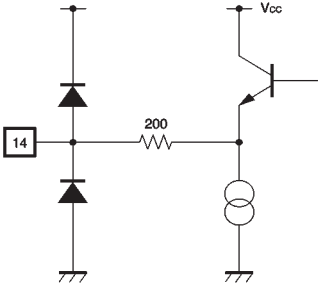
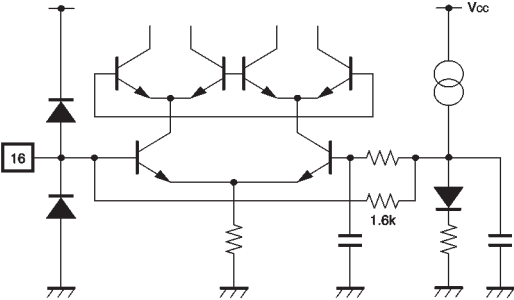
● Block diagram



● 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 “Pin 3 voltage” $\leq 0.2V$: Battery save $2V \leq$ “Pin 3 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	V_{cc}

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	V_{CC} 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

Pin No.	Function	Internal peripheral circuit	DC voltage (V)
12	Buffer amplifier non-inverting input pin		—
13	Buffer amplifier inverting 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, $T_a = 25^\circ\text{C}$, $V_{CC} = 3.0\text{V}$
 Signal source : $f_{IN(MIX)} = 130\text{MHz}$, $f_{IN(LO)} = 129.55\text{MHz}$, $100\text{dB } \mu\text{V}$
 AC level to be indicated by termination)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I_Q	—	3.0	3.9	mA	$V_{IN(LO)} = 100\text{dB } \mu\text{V}$
Battery save quiescent current	$I_Q(BS)$	—	0	5	μA	
Battery save function input voltage	V_{TH-H}	2	—	V_{CC}	V	Active
	V_{TH-L}	GND	—	0.2	V	Battery save
〈MIX - oscillator section〉						
Mixer operating frequency	f_{MIX}	10	130	200	MHz	
Mixer conversion gain	G_{VC}	8.5	12.5	16.5	dB	$V_{IN(MIX)} = 60\text{dB } \mu\text{V}$, $R_L = 1\text{k}\Omega$
−1 dB compression output level	V_{OM}	—	101	—	dB μV	
3rd order intercept point	IP_3	—	115	—	dB μV	$f_1 = 130.05\text{MHz}$, $f_2 = 130.10\text{MHz}$
Noise figure	NF	—	8.5	—	dB	LC matching input
Mixer input admittance	$Y_{IN(MIX)}$	—	$0.38 + j2.75$	—	ms	$f = 130\text{MHz}$
Mixer output resistance	$R_{O(MIX)}$	—	1	—	k Ω	
Local input level	$V_{IN(LO)}$	95	100	105	dB μV	
Local input admittance	$Y_{IN(LO)}$	—	$0.25 + j3.65$	—	ms	$f = 130\text{MHz}$
〈IF section〉						
IF operating frequency	f_{IF}	350	—	500	kHz	
IF amplifier gain	G_V	—	100	—	dB	
IF input resistance	$R_{IN(IF)}$	—	1	—	k Ω	
IF output level	V_{OIF}	0.7	1	1.3	V_{P-P}	$V_{IN(IF)} = 80\text{dB } \mu\text{V}$
IF output duty ratio	D_R	45	50	55	%	$V_{IN(IF)} = 80\text{dB } \mu\text{V}$, $C_L = 10\text{pF}$
〈RSSI section〉						
Output voltage 1	V_{RSSI1}	—	0.15	0.4	V	No input
Output voltage 2	V_{RSSI2}	1.0	1.2	1.4	V	$V_{IN(IF)} = 65\text{dB } \mu\text{V}$
Output voltage 3	V_{RSSI3}	1.9	2.0	2.2	V	$V_{IN(IF)} = 100\text{dB } \mu\text{V}$
Dynamic range	D_R	—	85	—	dB	
Output resistance	$R_{O(RSSI)}$	40	50	60	k Ω	
Rise time at power on	T_{ON}	—	140	—	μs	$C_L = 1000\text{pF}$, $V_{IN(MIX)} = 60\text{dB } \mu\text{V}$
Fall time at power off	T_{OFF}	—	130	—	μs	$C_L = 1000\text{pF}$, $V_{IN(MIX)} = 60\text{dB } \mu\text{V}$
RSSI rise time	T_R	—	270	—	μs	$C_L = 1000\text{pF}$, $V_{IN(MIX)} = 60\text{dB } \mu\text{V}$
RSSI fall time	T_F	—	220	—	μs	$C_L = 1000\text{pF}$, $V_{IN(MIX)} = 60\text{dB } \mu\text{V}$

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