

IF detector IC for 900MHz spread spectrum cordless phones

BH4127FV

The BH4127FV is a mixer, IF amplifier, and FM detector IC developed for use with 900MHz spread spectrum cordless phones

●Applications

900MHz spread spectrum cordless phones

●Features

- 1) Built-in mixer circuit, IF circuit, RSSI circuit, and FM detector circuit.
- 2) Operates at mixer input frequencies ranging from 20 to 300 MHz.
- 3) Equipped with a battery save function.
- 4) FM detector circuit demodulates up to $\pm 750\text{kHzdev}$.
- 5) FM detector circuit demodulates up to 2.6Mbps.

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

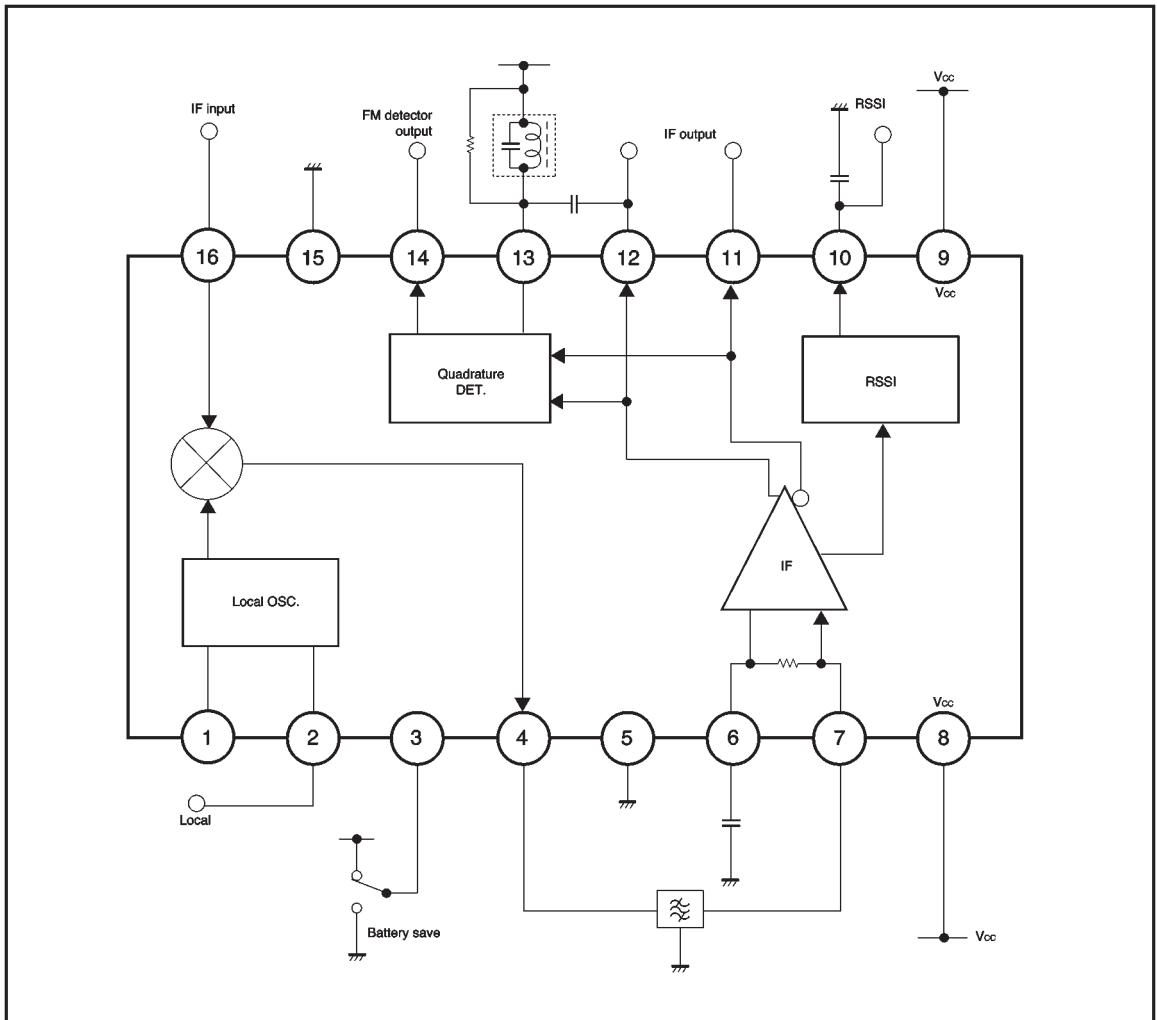
Parameter	Symbol	Limits	Unit
Power supply voltage	V _{CC}	7.0	V
Power dissipation	P _D	350*	mW
Storage temperature	T _{stg}	-55~+125	°C

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

●Recommended operating conditions

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{CC}	2.3~5.5	V
Operating temperature	T _{opr}	-40~+85	°C

● Block diagram



● Pin descriptions

Pin No.	Function	Internal peripheral circuit	DC voltage (V)
1	Local oscillator pin (base) Connect crystal resonator and capacitor		$V_{CC}-0.6$
2	Local oscillator pin (emitter) Connect crystal resonator or inject from external capacitor		V_{CC}
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: $330\ \Omega$		$V_{CC}-1.5$
5	Ground pin	GND for IF stage and FM detection stage	GND
6	IF amplifier bypass pin Connect capacitor		V_{CC}
7	IF amplifier input pin Connect ceramic filter Input impedance: $330\ \Omega$		V_{CC}
8	V_{CC} pin 1	V_{CC} for MIX stage and IF early stage	V_{CC}
9	V_{CC} pin 2	V_{CC} for IF later stage and FM detection stage	V_{CC}

Pin No.	Function	Internal peripheral circuit	DC voltage (V)
10	RSSI output pin Connect capacitor		0.1
11 12	IF amplifier output pin Pins 11 and 12 are opposite-phase output		Vcc-1
13	Discriminator pin Connect phase shift coil or ceramic discriminator		Vcc
14	FM demodulated signal output pin Output impedance is 360 Ω		0.9
15	Ground pin	GND for MIX stage	GND
16	Mixer pin Connect first IF signal from DC cutoff		1.0

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

Signal source: f_{IN(MIX)} = 254.4MHz, f_{IN(LO)} = 243.2MHz, 100dB μ V, f_{IN(IF)} = 11.2MHz

AC level to be indicated by termination

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I _Q	4.4	5.5	6.6	mA	With local oscillation OFF
Current during battery save	I _{Q(BS)}	—	0	5	μ A	—
Battery save function input voltage	V _{TH-H}	2	—	V _{CC}	V	Active
	V _{TH-L}	GND	—	0.2	V	Battery save
〈MIX—oscillator〉						
Mixer operating frequency	f _{MIX}	20	—	300	MHz	—
Mixer conversion gain	G _{VC}	16	20	24	dB	V _{IN(MIX)} = 60dB μ V
—1dB compression output level	V _{OM}	—	103	—	dB μ V	—
3rd order intercept point	IP ₃	—	110	—	dB μ V	f ₁ = 248.75MHz, f ₂ = 249.05MHz
Noise index	NF	—	9.7	—	dB	LC matching input
Mixer input admittance	Y _{IN(MIX)}	—	1.25+j7.47	—	ms	f = 250MHz
Mixer output resistance	R _{O(MIX)}	—	330	—	Ω	—
Local oscillator operating frequency	f _{LO}	20	—	120	MHz	—
Local input level	V _{IN(LO)}	95	100	105	dB μ V	—
Local input admittance	Y _{IN(LO)}	—	1.36+j9.72	—	ms	f = 250MHz
〈IF section〉						
IF operating frequency	f _{IF}	4	—	15	MHz	—
IF amplifier gain	G _V	—	75	—	dB	—
IF input resistance	R _{IN(IF)}	—	330	—	Ω	—
IF output level	V _{OIF}	0.4	0.5	0.6	V _{P-P}	V _{IN(IF)} = 80dB μ V
IF output duty ratio	D _R	40	50	60	%	V _{IN(IF)} = 80dB μ V, C _L = 10pF
〈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)} = 70dB μ V
Output voltage 3	V _{RSSI3}	1.8	2.0	2.2	V	V _{IN(IF)} = 100dB μ V
Dynamic range	D _R	—	70	—	dB	—
Output resistance	R _{O(RSSI)}	12	15	18	k Ω	—
Rise time at power on	T _{ON}	—	20	—	μ s	C _L = 100pF, V _{IN(MIX)} = 60dB μ V
Fall time at power off	T _{OFF}	—	5	—	μ s	C _L = 100pF, V _{IN(MIX)} = 60dB μ V
RSSI rise time	T _R	—	9	—	μ s	C _L = 100pF, V _{IN(MIX)} = 60dB μ V
RSSI fall time	T _F	—	11	—	μ s	C _L = 100pF, V _{IN(MIX)} = 60dB μ V

Signal source: $f_{IN(IF)} = 11.2\text{MHz}$, $\Delta f = \pm 100\text{kHz dev}$, $f_m = 1\text{kHz}$

AC level to be indicated by termination

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
<Detector section>						
Detection sensitivity	S_{DET}	—	1.243	—	mV / kHz	$V_{IN(IF)} = 80\text{dB } \mu\text{V}$
Detection output level	V_O	63	87	120	mV _{rms}	$V_{IN(IF)} = 80\text{dB } \mu\text{V}$
Detection frequency	f_{DET}	—	1.3	—	MHz	$V_{IN(IF)} = 80\text{dB } \mu\text{V}$
12dB SINAD sensitivity	$S_{(12dB)}$	12	16	20	dB μV	
S / N ratio	S / N	—	70	—	dB	$V_{IN(IF)} = 80\text{dB } \mu\text{V}$
AM rejection ratio	AMR	—	60	—	dB	$V_{IN(IF)} = 80\text{dB } \mu\text{V}$, AM=30%

● Measurement circuit

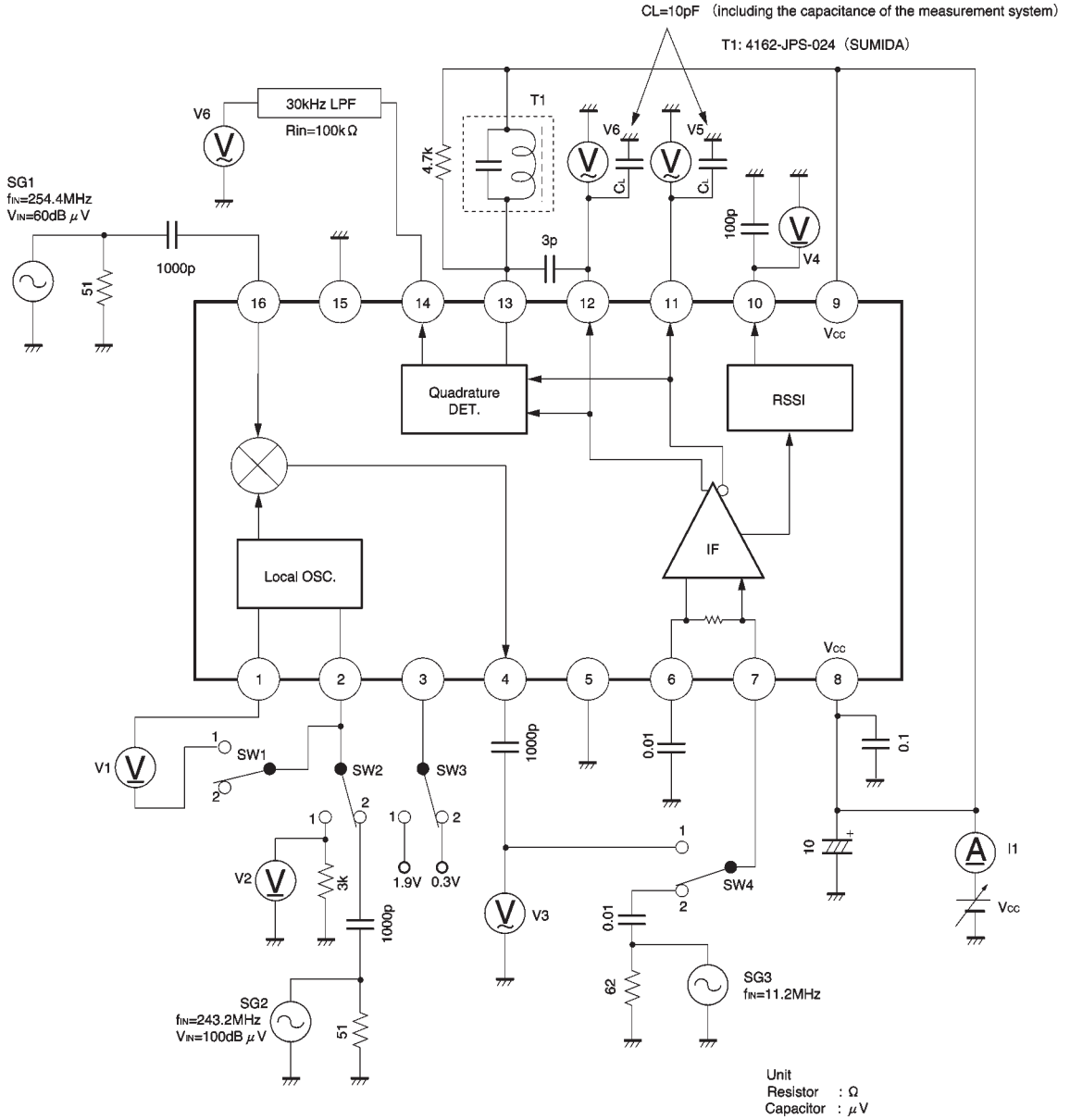


Fig.1

●Application example

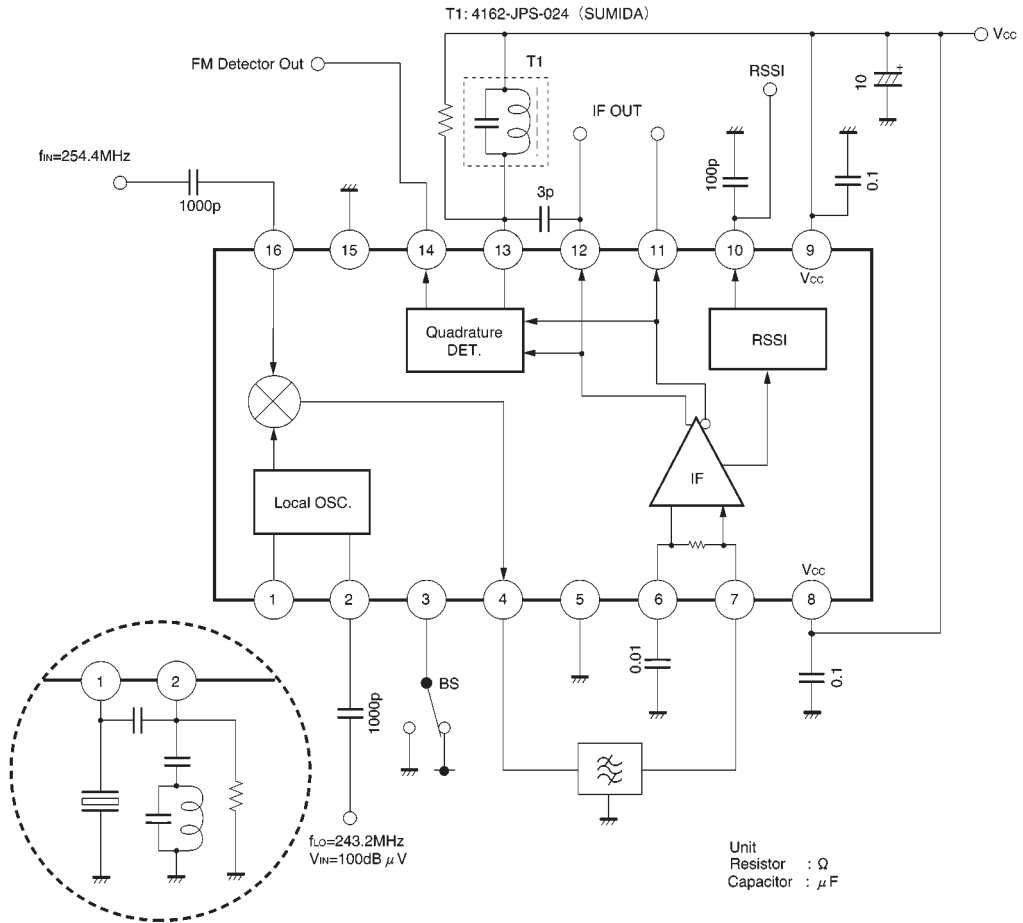
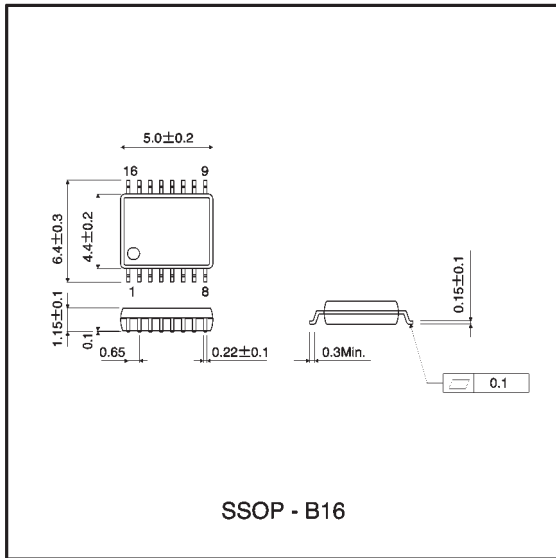


Fig.2

● External dimensions (Units: mm)



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