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 ±750kHzdev.
5) FM detector circuit demodulates up to 2.6Mbps.

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

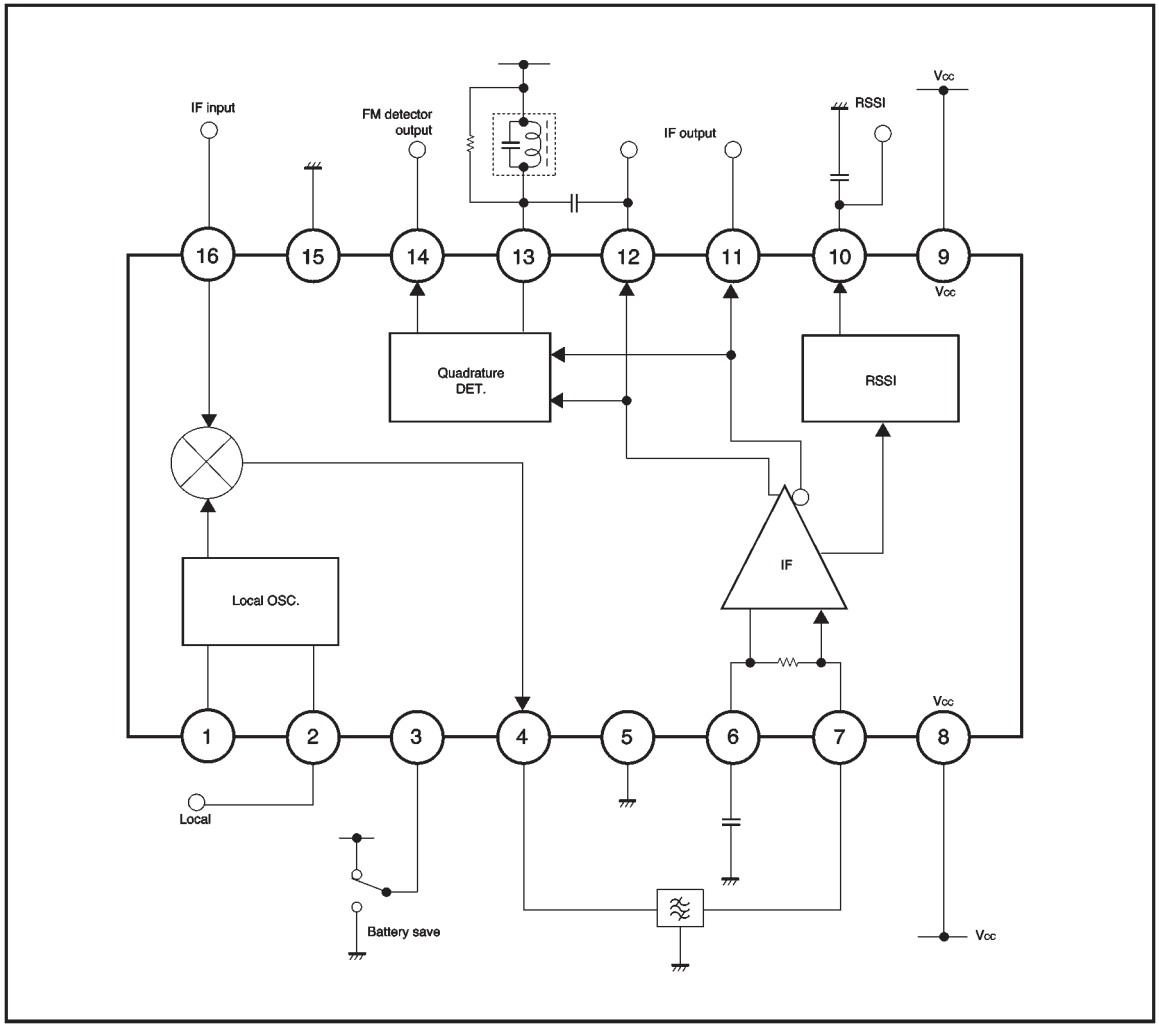
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	7.0	V
Power dissipation	P_D	350*	mW
Storage temperature	Tstg	−55～+125	℃

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

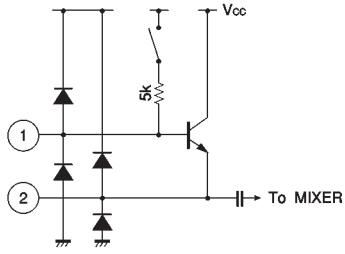
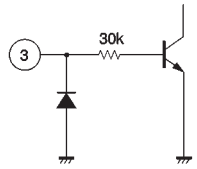
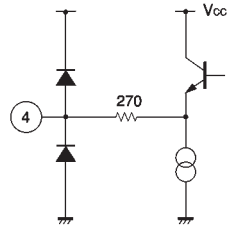
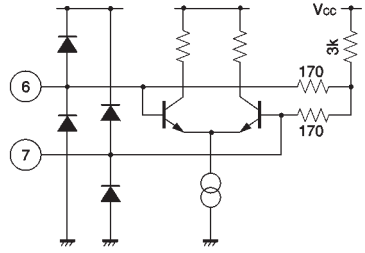
●Recommended operating conditions

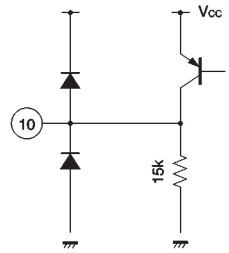
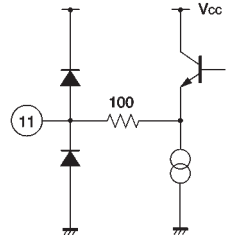
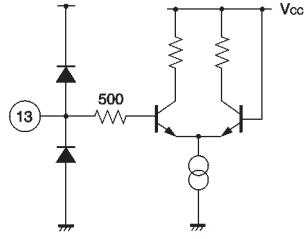
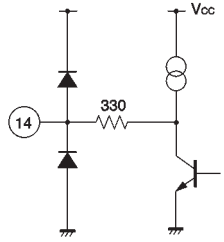
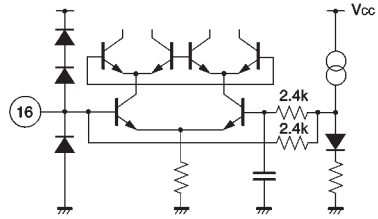
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	2.3～5.5	V
Operating temperature	Topr	−40～+85	℃

●Block diagram



●Pin descriptions

Pin No.	Function	Internal peripheral circuit	DC voltage (V)
1	Local oscillator pin (base) Connect crystal resonator and capacitor		Vcc−0.6
2	Local oscillator pin (emitter) Connect crystal resonator or inject from external capacitor		Vcc
3	Battery save pin Pin 3 voltage≦ 0.2V: Battery save 2V ≦ pin 3 voltage ≦ Vcc: Active		—
4	Mixer output pin Connect ceramic filter Output impedance: 330Ω		Vcc−1.5
5	Ground pin	GND for IF stage and FM detection stage	GND
6	IF amplifier bypass pin Connect capacitor		Vcc
7	IF amplifier input pin Connect ceramic filter Input impedance: 330Ω		Vcc
8	Vcc pin 1	Vcc for MIX stage and IF early stage	Vcc
9	Vcc pin 2	Vcc for IF later stage and FM detection stage	Vcc

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 360Ω		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, 100dBμV, $f_{IN\ (IF)}$ = 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	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〉						
Mixer operating frequency	f_{MIX}	20	—	300	MHz	—
Mixer conversion gain	G_{VC}	16	20	24	dB	$V_{IN(MIX)}$=60dBμV
—1dB compression output level	V_{OM}	—	103	—	dBμV	—
3rd order intercept point	IP_3	—	110	—	dBμV	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	dBμV	—
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}	$V_{IN(IF)}$=80dBμV
IF output duty ratio	D_R	40	50	60	%	$V_{IN(IF)}$=80dBμV, 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	$V_{IN(IF)}$=70dBμV
Output voltage 3	V_{RSSI3}	1.8	2.0	2.2	V	$V_{IN(IF)}$=100dBμV
Dynamic range	D_R	—	70	—	dB	—
Output resistance	$R_{O(RSSI)}$	12	15	18	kΩ	—
Rise time at power on	T_{ON}	—	20	—	μs	C_L=100pF, $V_{IN(MIX)}$=60dBμV
Fall time at power off	T_{OFF}	—	5	—	μs	C_L=100pF, $V_{IN(MIX)}$=60dBμV
RSSI rise time	T_R	—	9	—	μs	C_L=100pF, $V_{IN(MIX)}$=60dBμV
RSSI fall time	T_F	—	11	—	μs	C_L=100pF, $V_{IN(MIX)}$=60dBμV

Signal source: $f_{IN\,(IF)}$ = 11.2MHz, Δf = ±100kHz dev, fm = 1kHz
AC level to be indicated by termination

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

●Measurement circuit

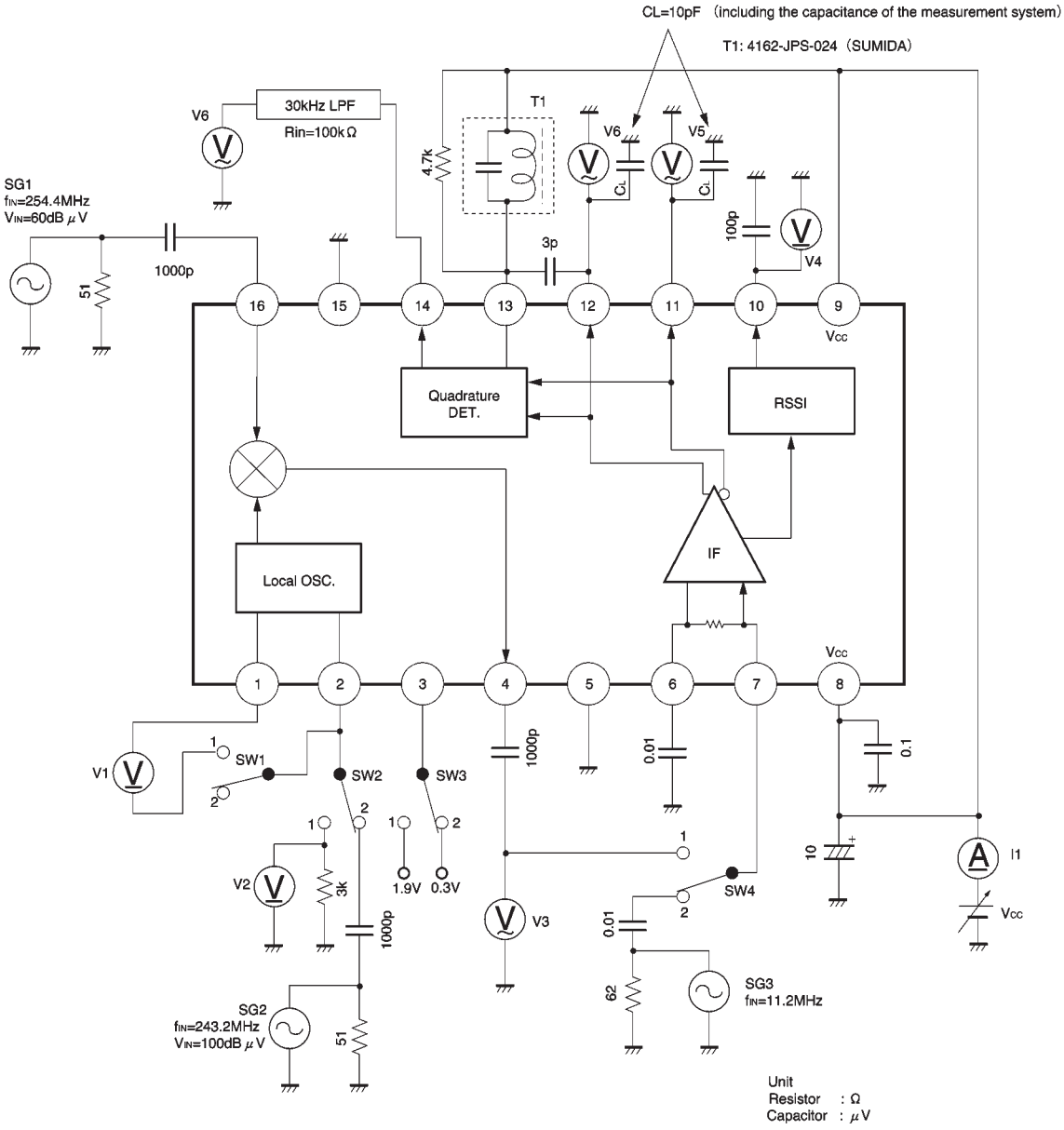


Fig.1

●Application example

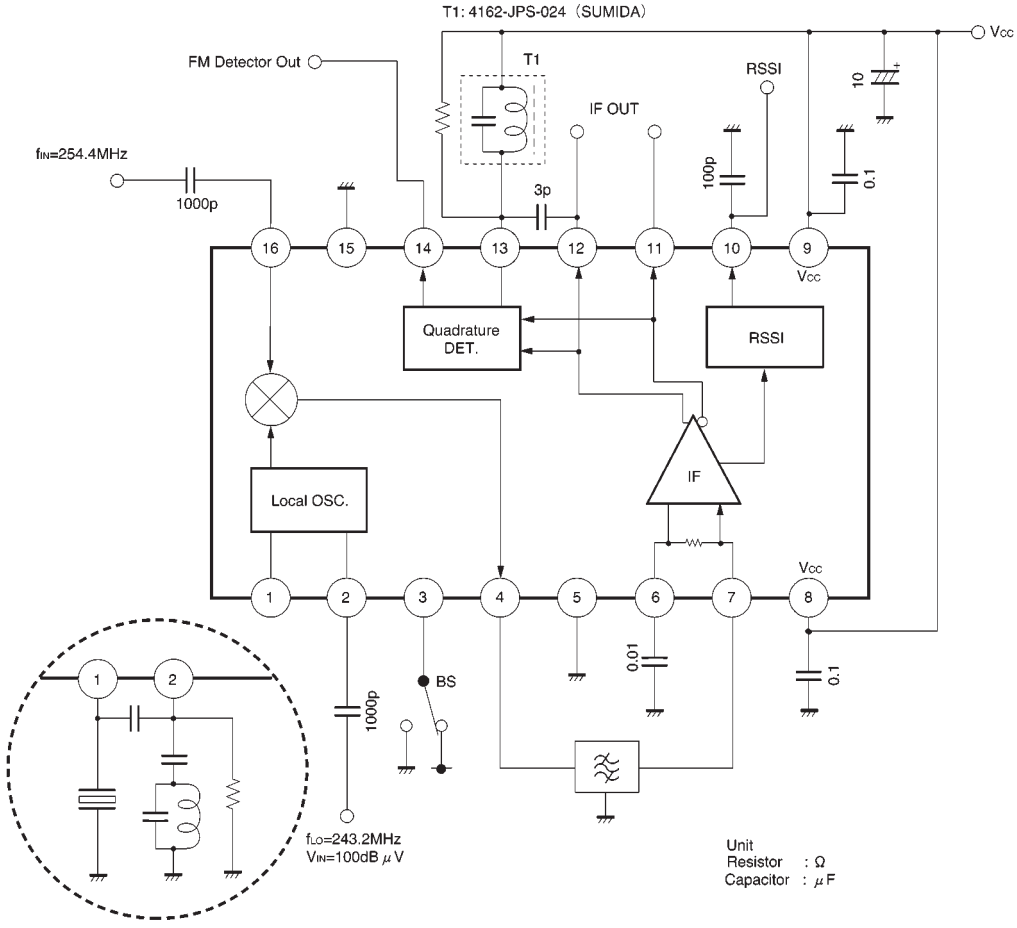
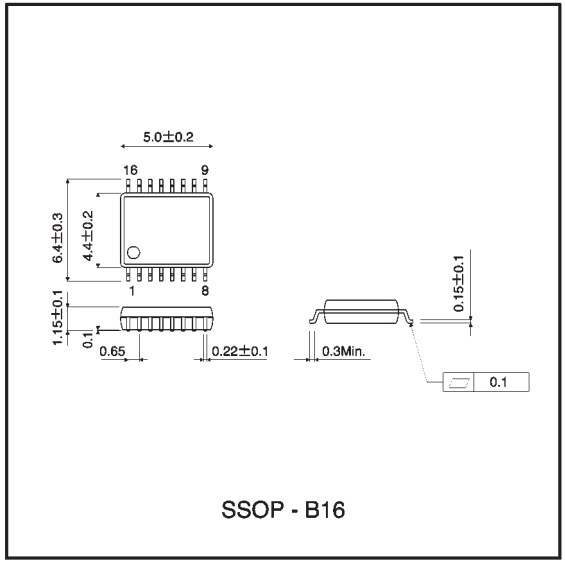


Fig.2

●External dimensions (Units: mm)



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