



钰地半导体
Tudi Semiconductor

Product Specification

TUDI-88612

Double-balanced mixer and oscillator

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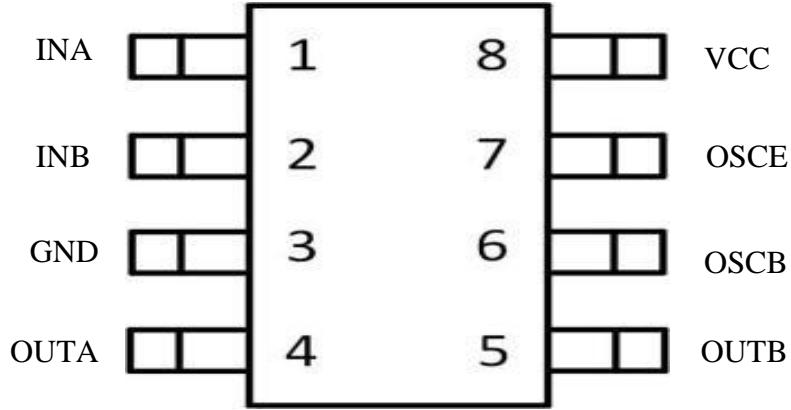
**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

- Low current consumption: 2.8 mA (typical value)
- Excellent noise performance: <4.7 dB@45 MHz (typical value)
- High operating frequency
- The number of peripheral components is small; suitable for crystal/ceramic filters.
- Excellent gain, third-order intermodulation cut-off point, and sensitivity
- Complies with cellular wireless technology requirements



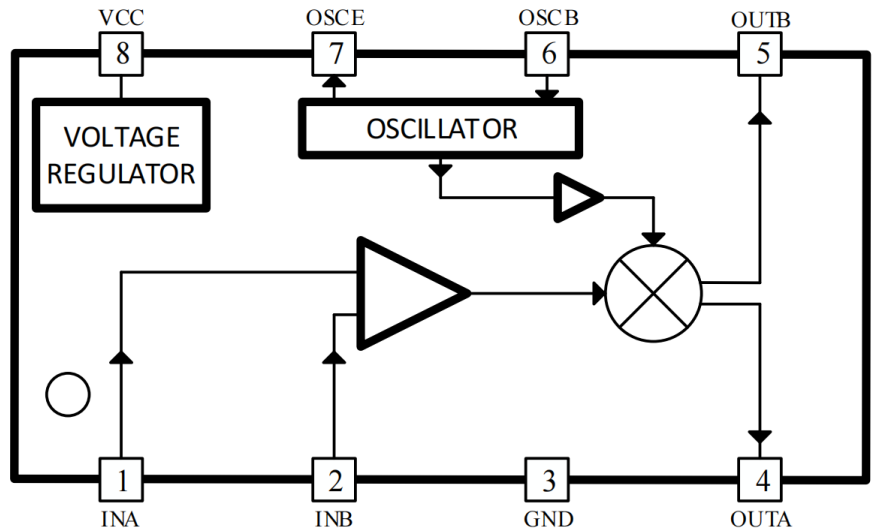
Description

The 88612 is a low-power dual balanced mixer and oscillator with a buffer, on-board oscillator, and voltage regulator. Compatible SA612/SA602. The utilizes a "Gilbert cell" analog multiplier structure, making it suitable for high-performance, low-power communication systems and cellular radio applications. It is available in an SOP8 and DIP8 package.

Applications

- Cellular radio mixer/oscillator
- portable radio
- radio frequency data link
- broadband local network
- VHF transceiver

Internal Module Diagram





Pin description

Order number(No.)	Pin Name	Function Description(Func-tions)
1	INA	RF import A
2	INB	RF import B
3	GND	Power supply location
4	OUTA	Mixing output A
5	OUTB	Mixed output B
6	OSCB	Oscillator output(base)
7	OSCE	Oscillator output (emitter)
8	VCC	Supply voltage

Electrical parameters

(unless otherwise specified, $V_{CC} = +6V, T_{amb} = +25^{\circ}C$)

Characteristic	Symbol	Test condition	Minimum	Typical value	Maximum	Units
Static characteristic						
Supply voltage	Vcc		4.5		7.0	V
Source current	Icc			2.8	3.1	mA
Dynamic Characteristics						
Incoming frequency	li			500		MHZ
Oscillator frequency	fosc			200		MHZ
Noise factor	NF	@45MHZ		5.0	5.5	dB
Enter the third-order intermodulation cutoff point	IP3i	RF input=-45dBm RF1=45.0MHZ RF2=45.06MHZ		-13	-15	dBm
Conversion gain	Gcon	@45MHZ	14	17		dB
Input impedance	Ri(RF)		1.5			kQ
Input capacitance	Ci(RF)			3	3.5	pF
Mixer output impedance	Ro(mix)	Pin4/5		1.5		kQ



Limit Parameter

Description	Symbol		Parameter	Unit
Supply voltage	Vcc		8	V
Operating temperature range	TA		-40~+85	°C
Storage temperature range	Tstg		-65~150	°C
Maximum junction temperature	T		150	°C
Thermal resistance (between the junction and the environment)	ReJA	SOP8	130	°C/W

The parameters in the table above represent the maximum operating range of the circuit. Exceeding these parameters will cause the circuit to malfunction and significantly increase the risk of damage. Prolonged operation at critical limit parameters also substantially elevates the likelihood of failure.

Functional Description

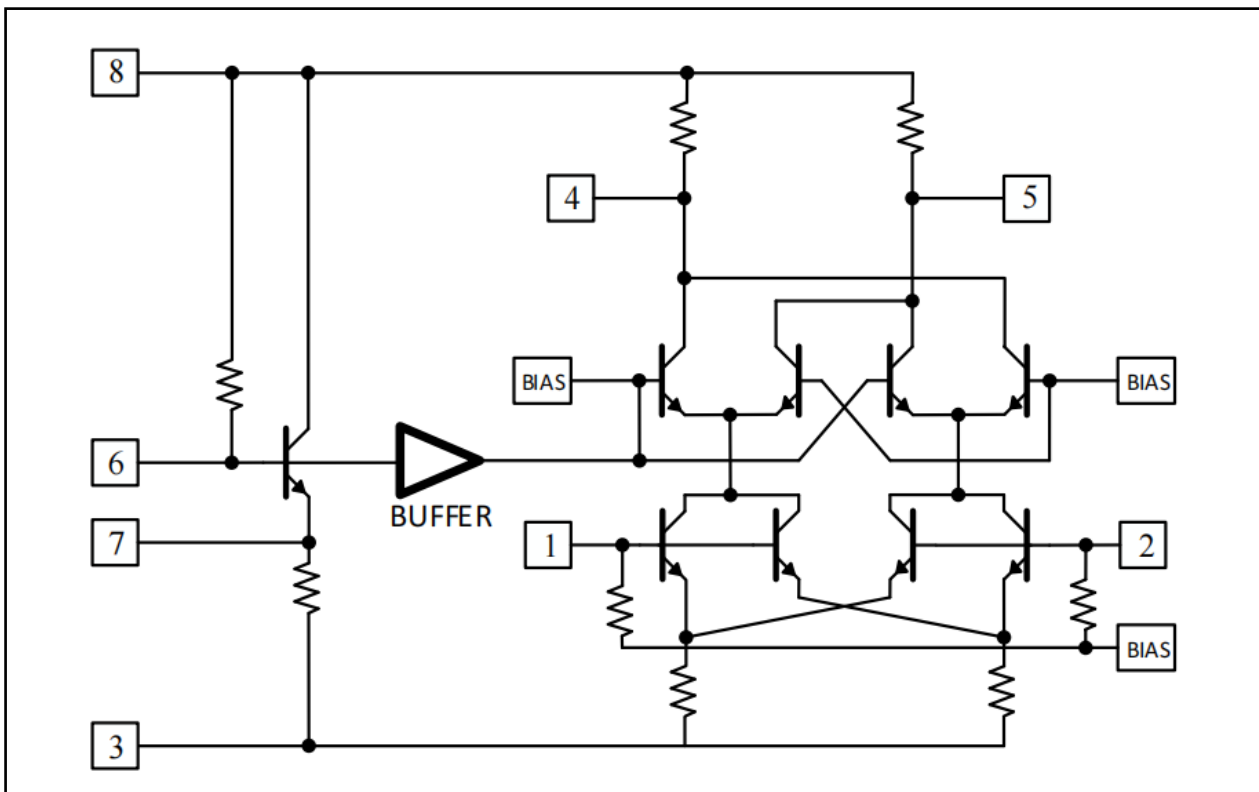


Figure 1: Equivalent Circuit

The 88612 consists of a Gilbert cell, an oscillator, a buffer, and a temperature-compensated bias network. The Gilbert cell operates primarily on a dual-balanced differential circuit architecture, utilizing differential circuits to achieve signal multiplication. It functions as a differential amplifier that drives a balanced switching unit. The differential input stage provides gain and determines the circuit's noise figure and signal processing capability. The 88612 features flexible design, with its oscillator, inputs, and mixer output supporting various configurations.

The oscillator can be configured as a crystal oscillator, a tuned oscillator, or an external oscillation signal (injected via the OSC_B pin through a DC-blocking capacitor with a minimum peak-to-peak voltage of 200 mV) serving as the reference frequency for the mixer. The following three configurations are recommended:

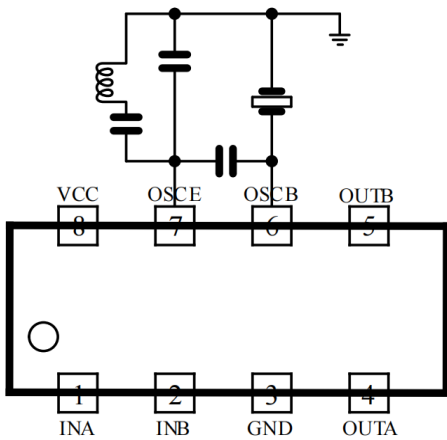


Figure 2 Kelpitz Crystal Oscillator

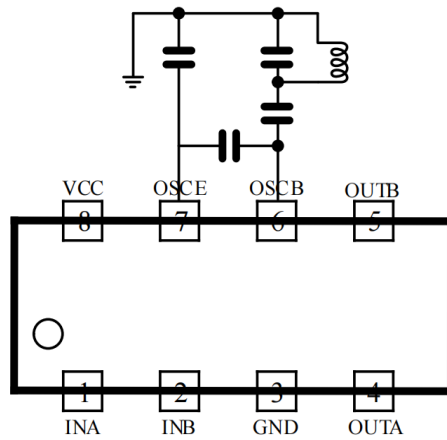


Figure 3 Corpitz L/C Oscillator

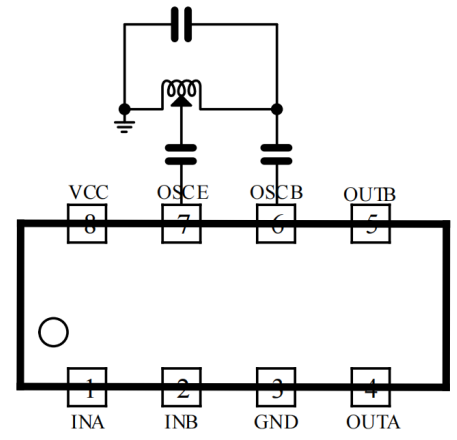


Figure 4 Hartley L/C Oscillator

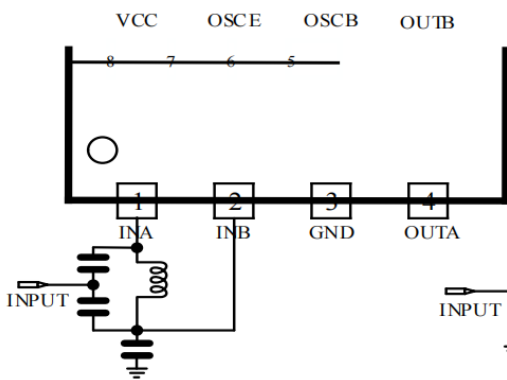


Figure 5: Single-Ended Adjustable Input

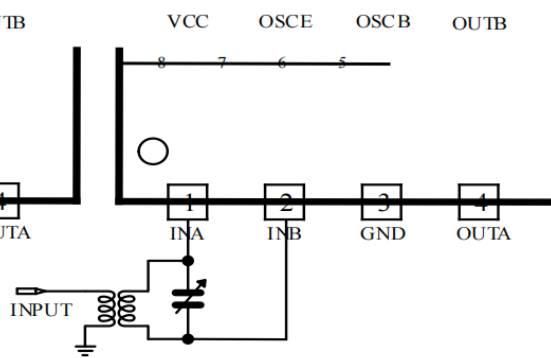


Figure 6: Balanced Input

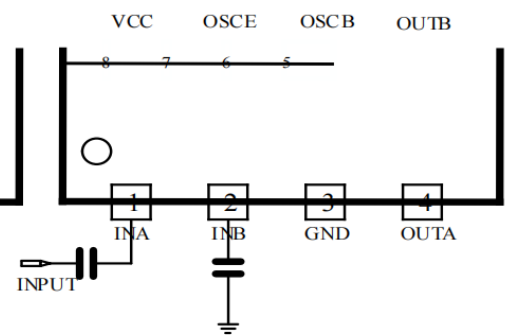


Figure 7: Single-Ended Non-Adjustable Input

The mixer output also features internal biasing, with each output internally connected through a 1.5k resistor. Connect the resistor to the positive terminal of the internal power supply. It supports direct output or balanced output. The recommended configuration is as follows:

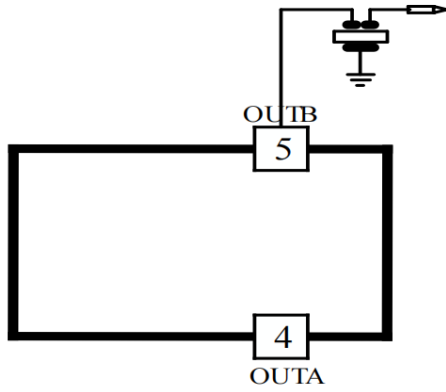


Figure 8 Single-Ended Ceramic Filter

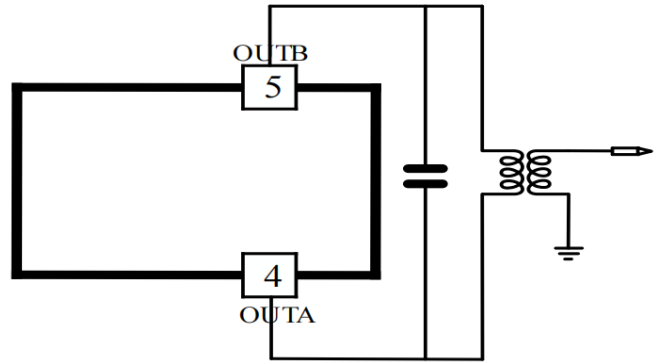


Figure 9 Balanced Output

Typical Application Circuit

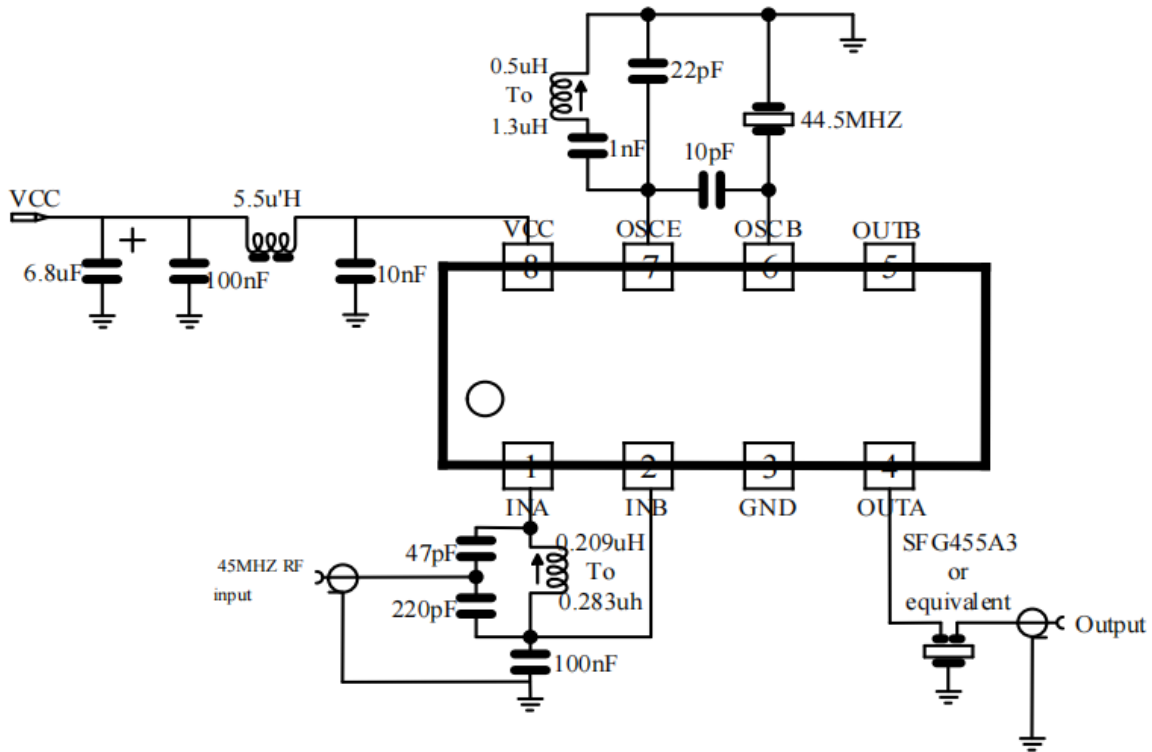
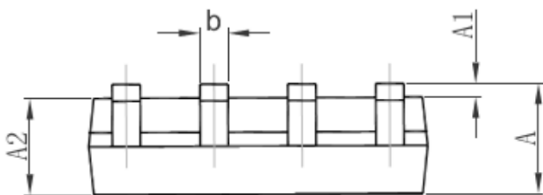
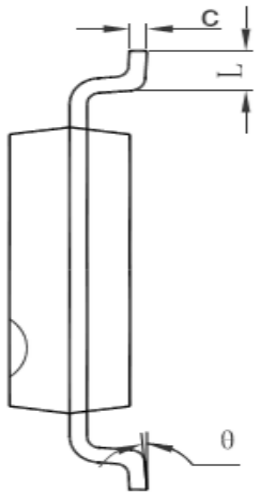
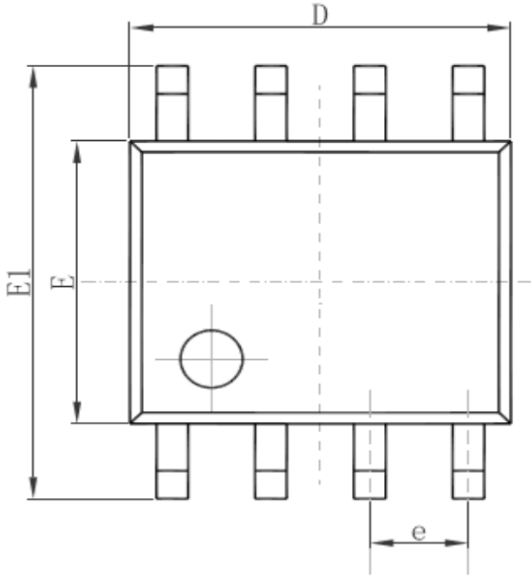


Figure 10 Typical Application Circuit for Cellular Radio



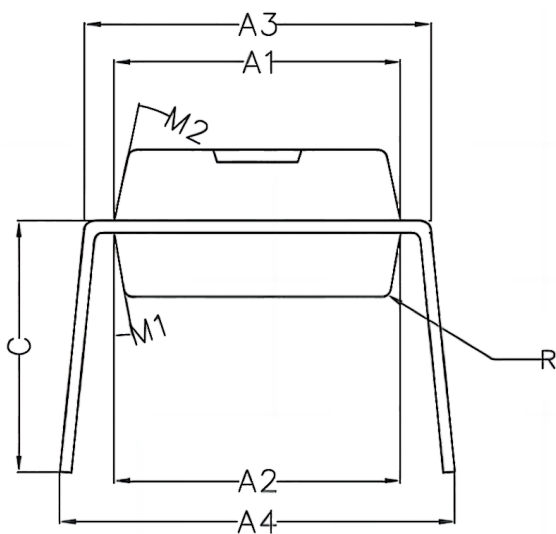
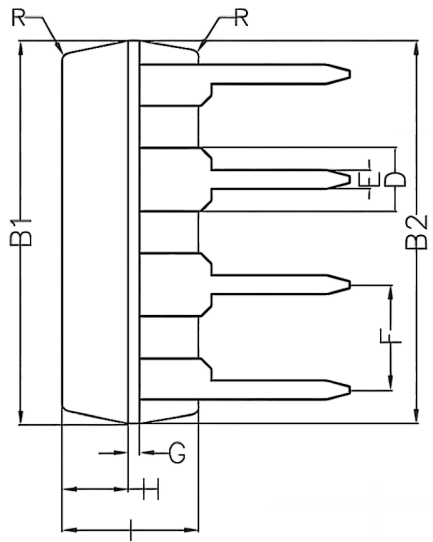
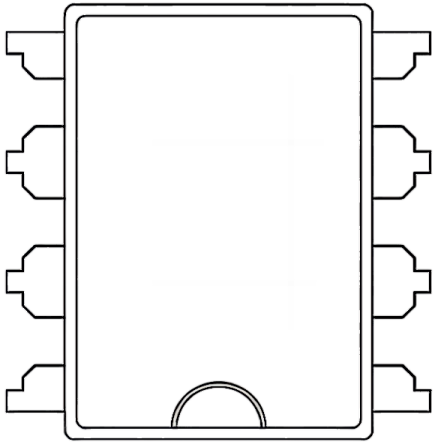
Package SOP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
C	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.700	4.100	0.150	0.157
E1	5.800	6.200	0.228	0.224
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Package DIP8



Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25
B2	9.20	9.25	9.30
C		5.57	
D		1.52	
E	0.43	0.45	0.47
F		2.54	
G		0.25	
H	1.54	1.59	1.64
I	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°



Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
TUDI-88612AD	SOP8	Tape,Reel,2500	88612AD	-40°C to 85°C
TUDI-88612AN	DIP8	Tube,50,A box of 2000	88612AN	



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