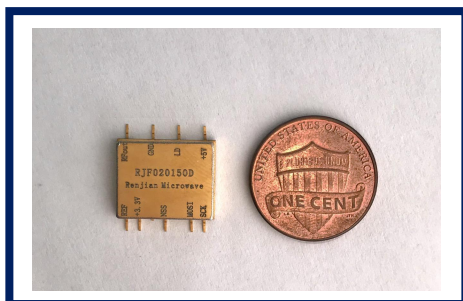


HTCC Miniaturized Frequency Synthesizer



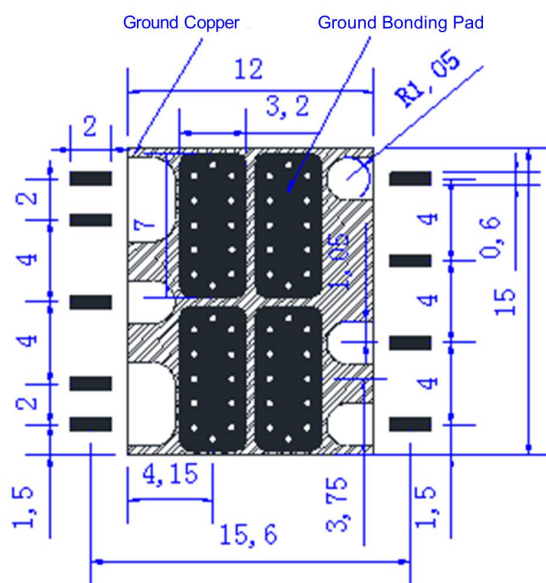
Feature:

1. Compact SMT package: 15x12x3mm
2. High-Integrated, high reliability
3. Low Spurious, Low Phase Noise, Low Power Consumption
4. Cost-effective, in stock.

General Description

HTCC(High Temperature Co-fired Ceramic) process technology is used to the frequency synthesizer, make microwave layer and body are fired in a kiln at the same time at high temperature. The advantages of HTCC packaging technology includes mechanical rigidity and hermeticity, both of which are important in high-reliability and environmentally stressful applications. Also has advantages of high temp. resistant, corrosion resistant, long operating life, temp. uniformity and good thermal conductivity.

Recommend PCB Design



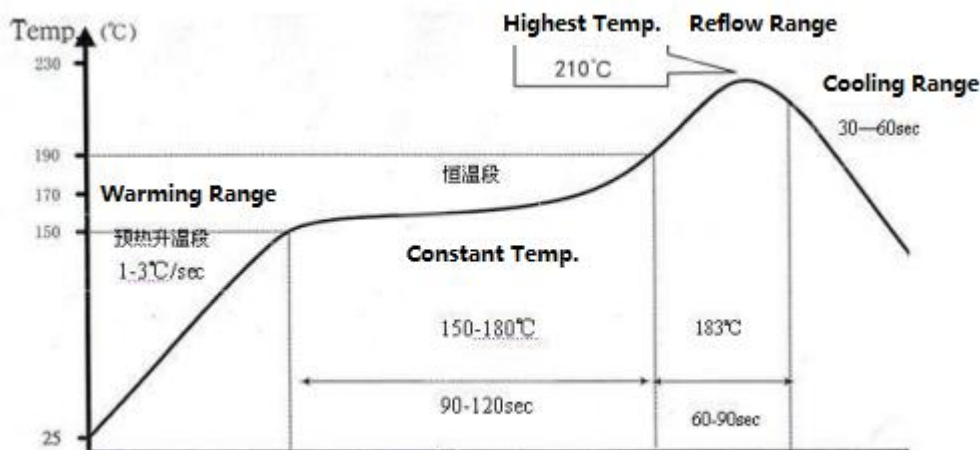
Dimension(unit: mm)

- For reference;
- Be sure PCB body be grounded great, and ground holes are needed on PCB
- PCB layer under package can not put high-frequency control line and RF line, that will cause unlock, Spurious.

Soldering

Temperature: Since components inside are soldered by 220°C soldering flux(SAC305), pls. assembly the synthesizer with 180°C or 150°C soldering flux.

- Recommend reflow soldering to ground paddle of package body, lead have to manual soldering, temperature of soldering iron $290 \pm 10^\circ\text{C}$, less than 2s.;
- Reflow soldering recommend to set as below:



Communication Protocol

Below first timing sequence(CKPOL=0, CKPHA=0) is SPI writing clock,no MISO, LVTTTL level,rate 1MHz.

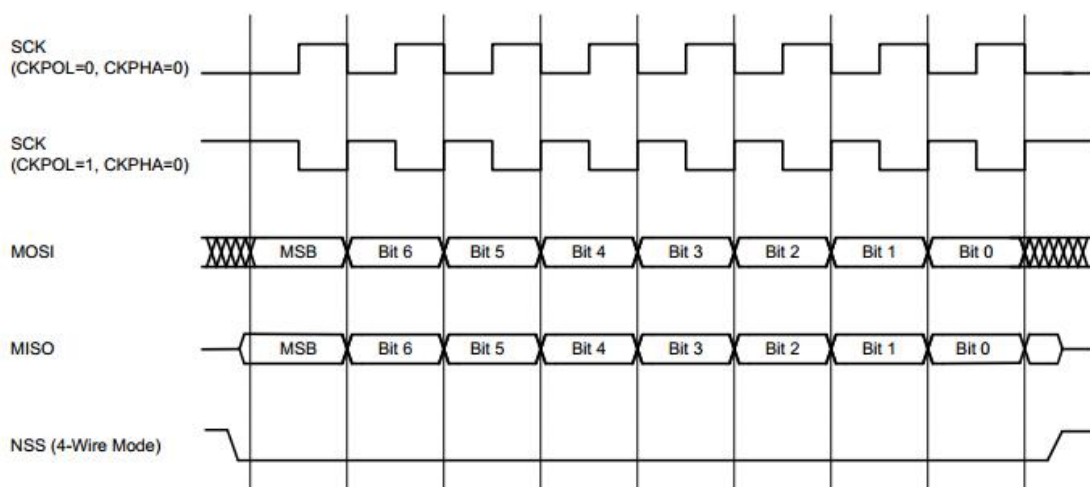


Figure 17.6. Slave Mode Data/Clock Timing (CKPHA = 0)

Example: at output frequency 10000MHz

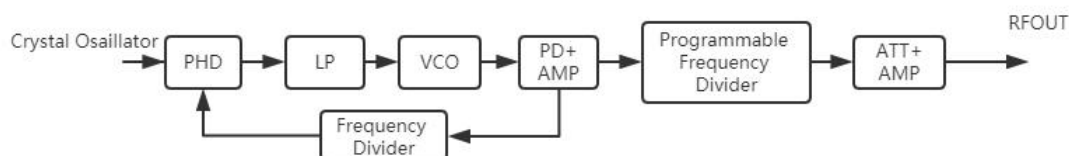
No	Byte	Definition	Content	Note
1	2bytes	Frequency	0x2710	10000MHz
Note: when frequency out of specified frequency band,the output is recent frequency.				

HTCC Miniaturized Frequency Synthesizer Series B

Product Feature:

1. Freq. Range: 4~20GHz
2. Compact SMT package: 15x12x3mm
3. Miniaturization, easy integration into various systems
4. Frequency Step: $\geq 5\text{MHz}$;
5. Low Spurious, Low Phase Noise, Low Power Consumption
6. External Reference
7. Operating Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$;

Functional Diagram



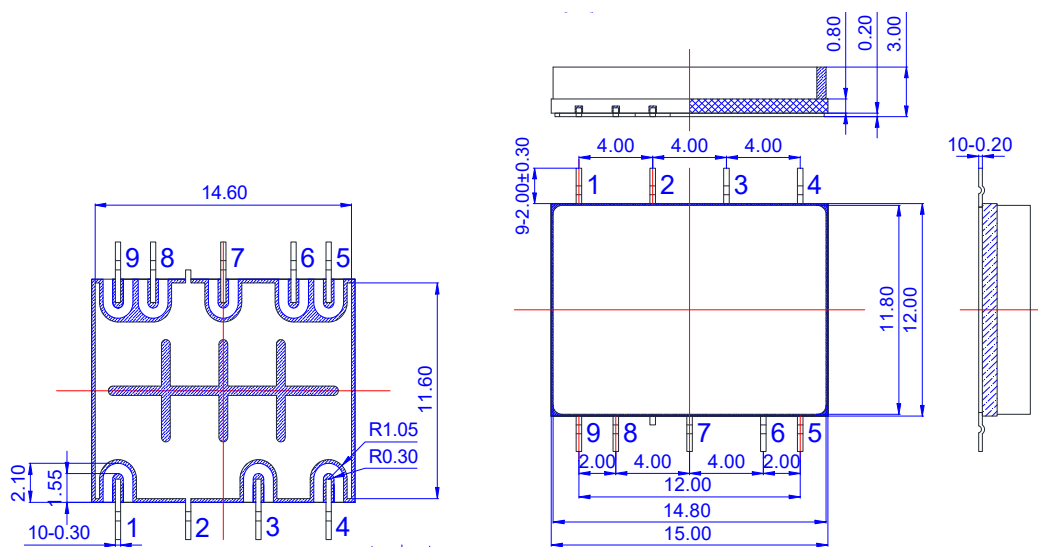
Electrical Specifications

At reference: 100MHz (-155dBc/Hz@1KHz)

P/N	Freq. Range (GHz)	Freq. Step (Hz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)	Setting Time (us)	Power Supply
RJB040080C	4~8	5M	≥ 10	-94	-65	-10	≤ 150	+5V/300mA +18V/20mA
RJB040080D	4~8	10M	≥ 10	-98	-65	-10	≤ 100	
RJB040080E	4~8	20M	≥ 10	-98	-65	-10	≤ 80	
RJB040080F	4~8	25M	≥ 10	-98	-65	-10	≤ 70	
RJB040080G	4~8	50M	≥ 10	-98	-65	-10	≤ 60	
RJB040080H	4~8	100M	≥ 10	-98	-65	-10	≤ 50	
RJB100200C	10~20	5M	≥ 0	-85	-60	-10	≤ 150	+5V/300mA +12V/20mA
RJB100200D	10~20	10M	≥ 0	-90	-65	-10	≤ 100	
RJB100200E	10~20	20M	≥ 0	-90	-65	-10	≤ 80	
RJB100200F	10~20	25M	≥ 0	-90	-65	-10	≤ 70	
RJB100200G	10~20	50M	≥ 0	-90	-65	-10	≤ 60	
RJB100200H	10~20	100M	≥ 0	-90	-65	-10	≤ 50	

- Control Interface: SPI three lines;
- Hopping time no include communication time;
- Note: Reference, frequency, step can be customized.

Outline Drawing(unit:mm)



Notes:

1. Power supply need to be filtered to make sure that no interference from power ripple to the sensitive components;
2. Make sure antistatic protection when shipping and using.

Pin Descriptions

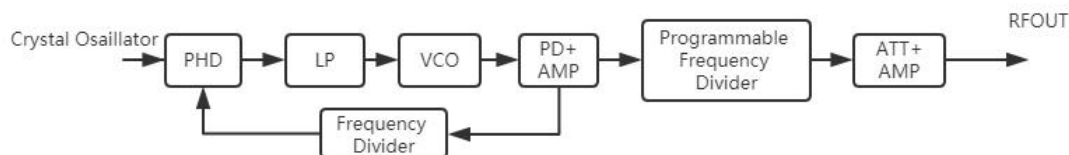
Pin Number	Function	Description
1	RFout	RF Output
2	GND	Ground
3	LD	Locked
4	VCC2	+12V/18V
5	SCK	Clock
6	MOSI	Data
7	NSS	Enable
8	VCC1	+5V
9	REF	REF Input

HTCC Miniaturized Frequency Synthesizer Series C

Product Feature:

1. Freq. Range: 2.5-17.5GHz
2. Compact SMT package: 15x12x3mm
3. Miniaturization, easy integration into various systems
4. Frequency Step: $\geq 5\text{MHz}$;
5. Low Spurious, Low Power Consumption
6. External Reference
7. Operating Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$;

Functional Diagram



Electrical Specifications

At reference: 100MHz (-155dBc/Hz@1KHz)

P/N	Freq. Range (GHz)	Freq. Step (Hz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)	Setting Time (us)
RJC025033 *	2.5~3.3	5M~100M	≥ 5	-105	-65	-10	50~150
RJC030038 *	3~3.8	5M~100M	≥ 5	-104	-65	-10	50~150
RJC035045 *	3.5~4.5	5M~100M	≥ 5	-103	-65	-10	50~150
RJC043050 *	4.3~5	5M~100M	≥ 5	-102	-65	-10	50~150
RJC048060 *	4.8~6	5M~100M	≥ 5	-100	-65	-10	50~150
RJC058068 *	5.8~6.8	5M~100M	≥ 5	-99	-65	-10	50~150
RJC065080 *	6.5~8	5M~100M	≥ 5	-98	-65	-10	50~150
RJC070085 *	7~8.5	5M~100M	≥ 5	-97	-65	-10	50~150
RJC075087 *	7.5~8.7	5M~100M	≥ 5	-97	-65	-10	50~150
RJC080100 *	8~10	5M~100M	≥ 5	-96	-65	-10	50~150
RJC097105 *	9.7~10.5	5M~100M	≥ 5	-95	-65	-10	50~150
RJC103108 *	10.3~10.8	5M~100M	≥ 5	-95	-65	-10	50~150
RJC085110 *	8.5~11	5M~100M	≥ 5	-95	-65	-10	50~150
RJC103110 *	10.3~11	5M~100M	≥ 5	-95	-65	-10	50~150
RJC092112 *	9.2~11.2	5M~100M	≥ 5	-95	-65	-10	50~150
RJC100115 *	10~11.5	5M~100M	≥ 5	-95	-65	-10	50~150
RJC085120 *	8.5~12	5M~100M	≥ 5	-94	-65	-10	50~150
RJC105120 *	10.5~12	5M~100M	≥ 5	-94	-65	-10	50~150
RJC105125 *	10.5~12.5	5M~100M	≥ 5	-94	-65	-10	50~150

HTCC Miniaturized Frequency Synthesizer

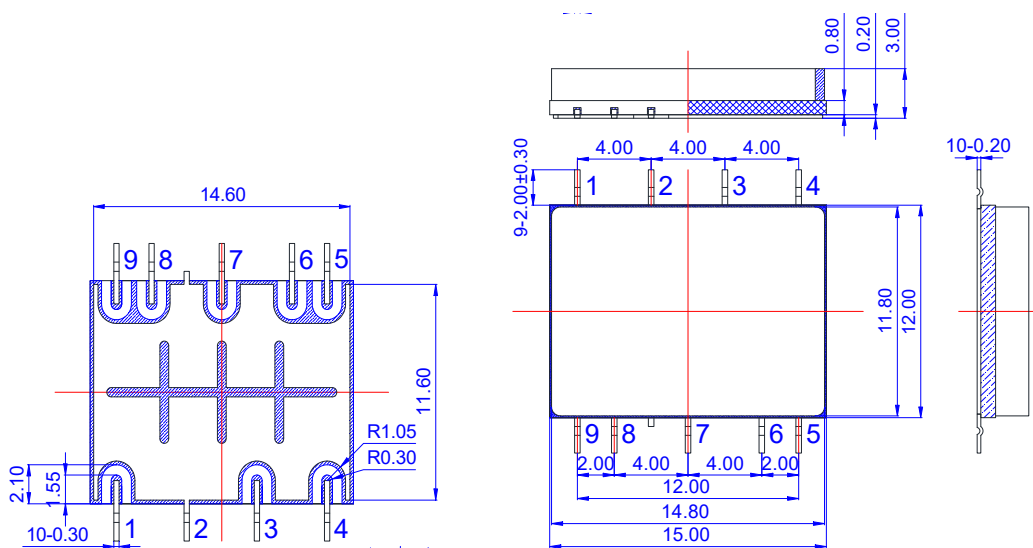
P/N	Freq. Range (GHz)	Freq. Step (Hz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)	Setting Time (us)
RJC105130 *	10.5~13	5M~100M	≥5	-93	-65	-10	50~150
RJC112130 *	11.2~13	5M~100M	≥5	-93	-60	-10	50~150
RJC130145 *	13~14.5	5M~100M	≥5	-92	-60	-10	50~150
RJC130155 *	13~15.5	5M~100M	≥5	-92	-60	-10	50~150
RJC155175 *	15.5~17.5	5M~100M	≥5	-91	-60	-10	50~150

- Control Interface: SPI three lines;
- Power Supply: +5V/300mA;
- Setting time don't include communication- time;
- Maximum Output power15dBm;
- Bigger Step, faster switching speed and better spurious;
- Note: Reference,step can be customized.

- Frequency step VS Switching speed

Freq. step	Switching speed	Freq. step	Switchin g speed
5MHz	≤150us	25MHz	≤70us
10MHz	≤100us	50MHz	≤60us
20MHz	≤80us	100MHz	≤50us

Outline Drawing (unit:mm)



1. Power supply need to be filtered to make sure that no interference from power ripple to the sensitive components;
2. Make sure antistatic protection when shipping and using.

Pin Descriptions

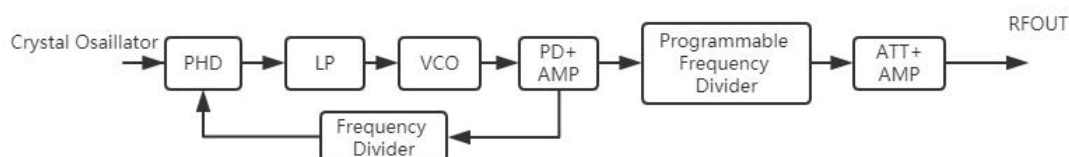
Pin Number	Function	Description
1	RFout	RF Output
2	GND	Ground
3	LD	Locked
4	VCC2	+5V
5	SCK	Clock
6	MOSI	Data
7	NSS	Enable
8	VCC1	+5V
9	REF	REF Input

HTCC Miniaturized Frequency Synthesizer Series C

Product Feature:

1. Freq. Range: 2.5-24GHz
2. Compact SMT package: 15x12x3mm
3. Miniaturization, easy integration into various systems
4. Frequency Step: $\geq 5\text{MHz}$;
5. Low Spurious, Low Power Consumption
6. External Reference
7. Operating Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$;

Functional Diagram



Electrical Specifications

At reference: 100MHz (-155dBc/Hz@1KHz)

P/N	Freq. Range (GHz)	Freq. Step (Hz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)	Setting Time (us)
RJD025045 *	2.5~4.5	5M~100M	≥ 5	-106	-65	-10	50~150
RJD035063*	3.5~6.3	5M~100M	≥ 5	-100	-65	-10	50~150
RJD048075 *	4.8~7.5	5M~100M	≥ 5	-98	-65	-10	50~150
RJD075108 *	7.5~10.8	5M~100M	≥ 5	-95	-65	-10	50~150
RJD065110 *	6.5~11	5M~100M	≥ 5	-95	-65	-10	50~150
RJD070110 *	7~11	5M~100M	≥ 5	-95	-65	-10	50~150
RJD100120*	10~12	5M~100M	≥ 5	-94	-65	-10	50~150
RJD103120 *	10.3~12	5M~100M	≥ 5	-94	-65	-10	50~150
RJD080125*	8~12.5	5M~100M	≥ 5	-94	-65	-10	50~150
RJD103125 *	10.3~12.5	5M~100M	≥ 5	-94	-65	-10	50~150
RJD080130 *	8~13	5M~100M	≥ 5	-93	-65	-10	50~150
RJD105142*	10.5~14.2	5M~100M	≥ 5	-93	-65	-10	50~150
RJD100145 *	10~14.5	5M~100M	≥ 5	-92	-65	-10	50~150
RJD100150 *	10~15	5M~100M	≥ 5	-92	-65	-10	50~150
RJD112152 *	11.2~15.2	5M~100M	≥ 5	-92	-65	-10	50~150
RJD085153 *	8.5~15.3	5M~100M	≥ 5	-92	-65	-10	50~150
RJD100155 *	10~15.5	5M~100M	≥ 5	-92	-65	-10	50~150
RJD130162 *	13~16.2	10M~100M	≥ 5	-91	-65	-10	50~150
RJD130200 *	13~20	10M~100M	≥ 5	-90	-65	-10	50~150

HTCC Miniaturized Frequency Synthesizer

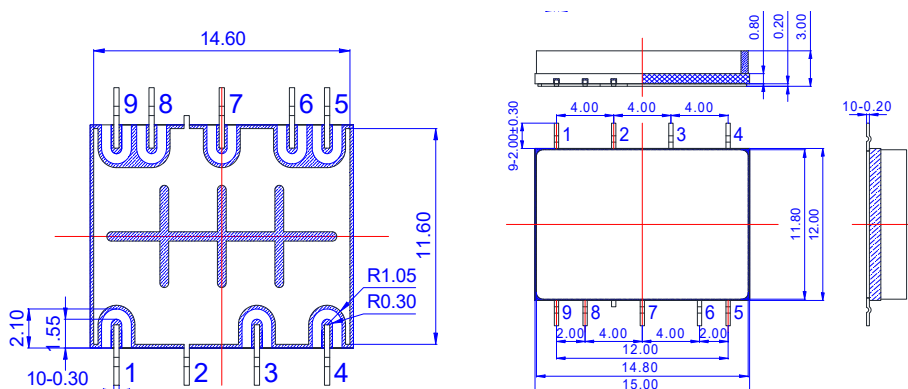
P/N	Freq. Range (GHz)	Freq. Step (Hz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)	Setting Time (us)
RJD155212 *	15.5~21.2	10M~100M	≥5	-88	-65	-10	50~150
RJD130230 *	13~23	10M~100M	≥5	-88	-65	-10	50~150
RJD153240 *	15.3~24	10M~100M	≥5	-88	-65	-10	50~150

- Control interface: SPI three lines;
- Power Supply: +5V/300mA,+12V/20mA,(note:13~23GHz and 15.3~24GHz both model needs +5V/300mA,+20V/20mA) ;
- Setting time don't include communication- time; ;
- Maximum Output power 15dBm;
- Bigger Step, faster switching speed and better spurious;
- Note: Reference, step can be customized.

- Frequency step VS Switching speed

Freq. step	Switching speed	Freq. step	Switching speed
5MHz	≤150us	25MHz	≤70us
10MHz	≤100us	50MHz	≤60us
20MHz	≤80us	100MHz	≤50us

Outline Drawing (unit:mm)



1. Power supply need to be filtered to make sure that no interference from power ripple to the sensitive components;
2. Make sure antistatic protection when shipping and using.

Pin Descriptions

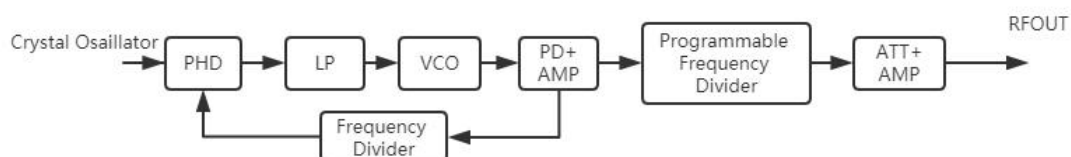
Pin Number	Function	Description
1	RFout	RF Output
2	GND	Ground
3	LD	Locked
4	VCC2	+12V/20V
5	SCK	Clock
6	MOSI	Data
7	NSS	Enable
8	VCC1	+5V
9	REF	REF Input

HTCC Miniaturized Frequency Synthesizer Series E

Product Feature:

1. Freq. Range: 2.3-24GHz
2. Compact SMT package: 15x12x3mm
3. Miniaturization, easy integration into various systems
4. Frequency Step: $\geq 5\text{MHz}$;
5. Low Spurious, Low Power Consumption
6. External Reference
7. Operating Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$;

Functional Diagram



Electrical Specifications

At reference: 100MHz (-155dBc/Hz@1KHz)

P/N	Freq. Range (GHz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)
RJE023	2.3	≥ 10	-108	-70	-10
RJE040	4	≥ 10	-104	-70	-10
RJE057	5.75	≥ 10	-101	-70	-10
RJE060	6	≥ 10	-100	-70	-10
RJE065	6.5	≥ 10	-100	-70	-10
RJE072	7.2	≥ 10	-99	-70	-10
RJE075	7.5	≥ 10	-99	-70	-10
.....					
RJE087	8.75	≥ 10	-97	-70	-10
RJE105	10.51	≥ 10	-96	-70	-10
RJE130	13	≥ 10	-94	-70	-10
RJE157	15.76	≥ 10	-92	-70	-10
RJE165	16.5	≥ 10	-92	-70	-10
RJE175	17.5	≥ 10	-91	-70	-10
RJE180	18	≥ 10	-90	-70	-10
RJE200	20	≥ 10	-90	-70	-10
RJE240	24	≥ 10	-90	-70	-10



- ## Typical Phase Noise



Pin Descriptions

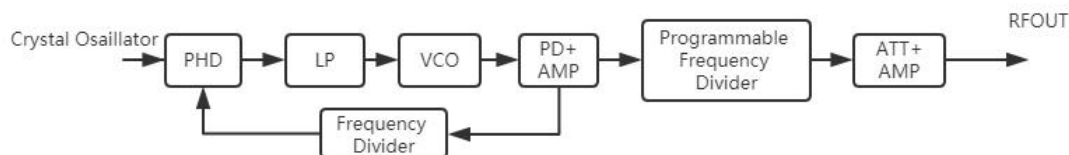
Pin Number	Function	Description
1	RFout	RF Output
2	GND	Ground
3	LD	Locked
4	VCC2	+(5~20)V
5	NC	The pin is not connected
6	NC	The pin is not connected
7	NC	The pin is not connected
8	VCC1	+5V
9	REF	REF Input

HTCC Miniaturized Frequency Synthesizer Series F

Product Feature:

1. Freq. Range: 0.1~15GHz
2. Compact SMT package: 15x12x3mm
3. Miniaturization, easy integration into various systems
4. Frequency Step: $\geq 5\text{MHz}$;
5. Low Spurious, Low Power Consumption
6. External Reference
7. Operating Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$;

Functional Diagram



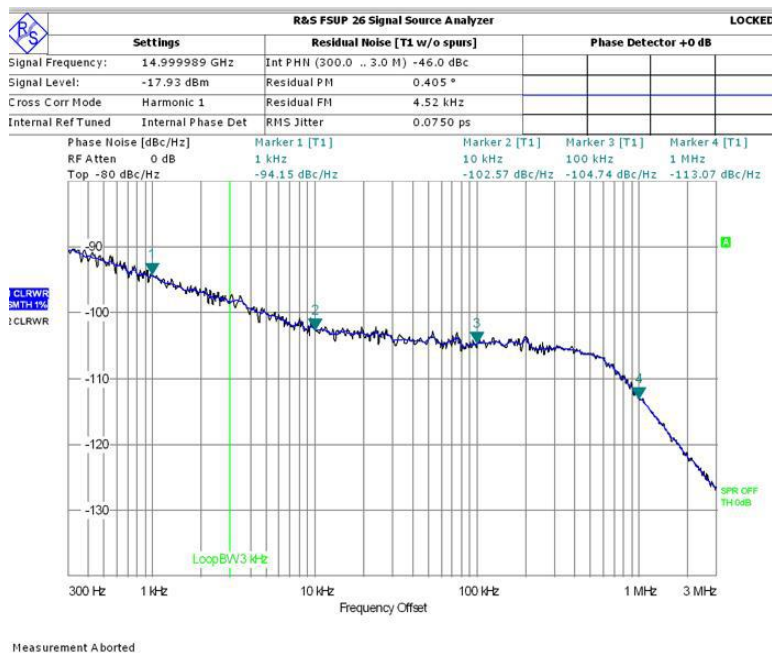
Electrical Specifications

At reference:100MHz (-155dBc/Hz@1KHz)

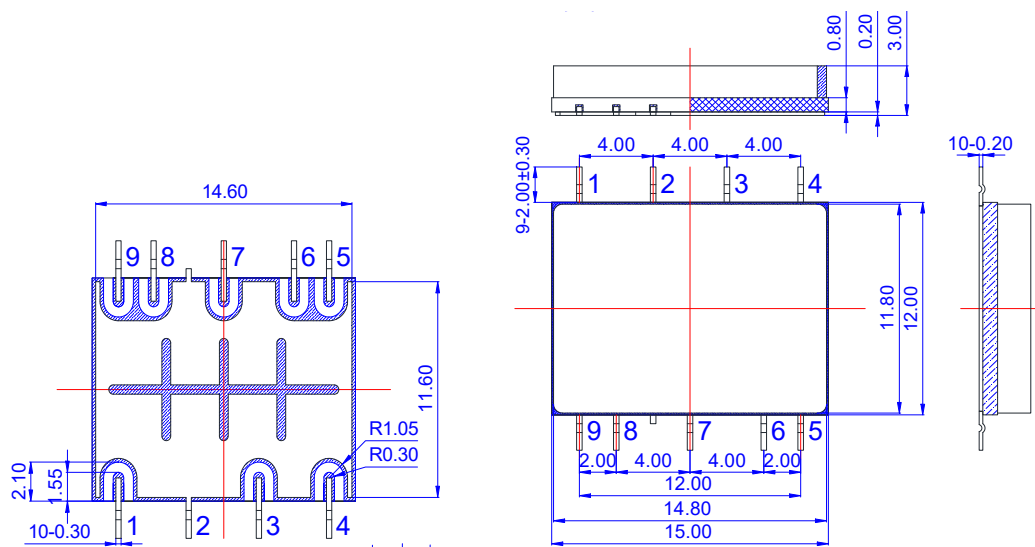
P/N	Freq. Range (GHz)	Freq. Step (Hz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K dBc/Hz@10K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)	Setting Time (us)
RJF001150C	0.1~15	5M	≥ 5	-91/-95	-60	-10	≤ 200
RJF001150D	0.1~15	10M	≥ 5	-91/-95	-63	-10	≤ 200
RJF001150E	0.1~15	20M	≥ 5	-91/-95	-65	-10	≤ 150
RJF001150F	0.1~15	25M	≥ 5	-91/-95	-65	-10	≤ 150
RJF001150G	0.1~15	50M	≥ 5	-91/-95	-65	-10	≤ 150
RJF001150H	0.1~15	100M	≥ 5	-91/-95	-68	-10	≤ 150

- Control interface: SPI three lines;
- Power Supply: +3.3V/400mA; +5V/100mA;
- Setting time don't include communication- time;
- Note: Reference, frequency, step can be customized.

Typical Phase Noise



Outline Drawing (unit:mm)



3. Power supply need to be filtered to make sure that no interference from power ripple to the sensitive components;
4. Make sure antistatic protection when shipping and using.

Pin Descriptions

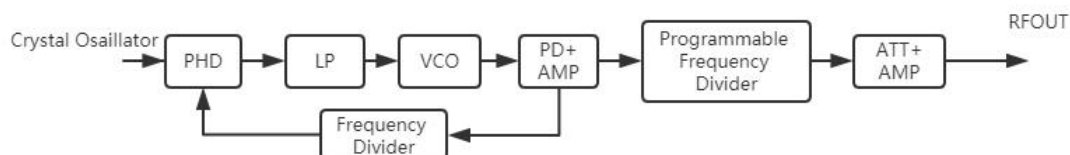
Pin Number	Function	Description
1	RFout	RF Output
2	GND	Ground
3	LD	Locked
4	VCC2	+5V
5	SCK	Clock
6	MOSI	Data
7	NSS	Enable
8	VCC1	+3.3V
9	REF	REF Input

HTCC Miniaturized Frequency Synthesizer Series G

Product Feature:

1. Freq. Range: 0.1~6.2GHz
2. Compact SMT package: 15x12x3mm
3. Miniaturization, easy integration into various systems
4. Frequency Step: $\geq 5\text{MHz}$
5. Low Spurious, Low Power Consumption
6. External Reference
7. Operating Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$;

Functional Diagram



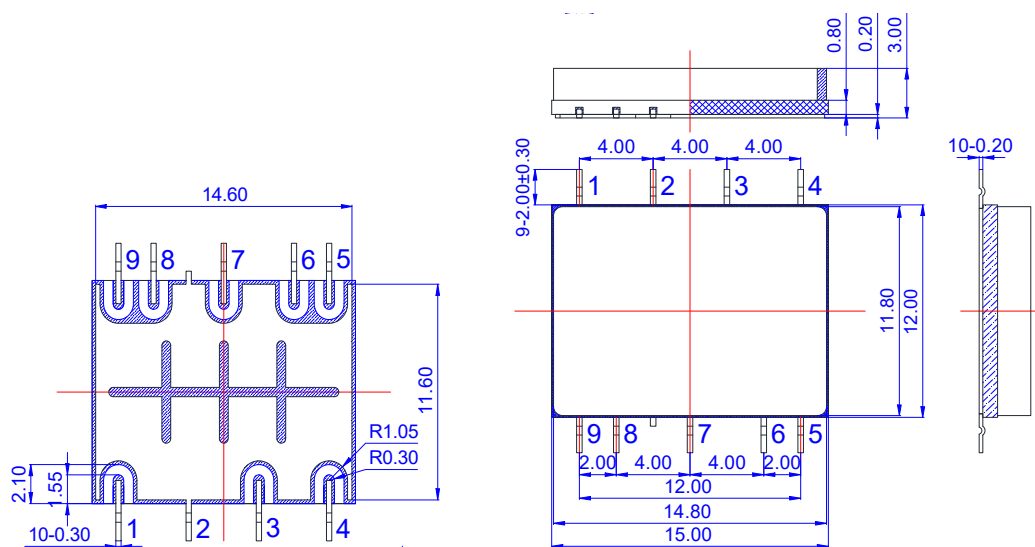
Electrical Specifications

At reference: 100MHz (-155dBc/Hz@1KHz)

P/N	Freq. Range (GHz)	Freq. Step (Hz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K dBc/Hz@10K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)	Setting Time (us)
RJG001062C	0.1~6.2	5M	≥ 10	-93/-95	-60	-10	≤ 250
RJG001062D	0.1~6.2	10M	≥ 10	-93/-95	-63	-10	≤ 200
RJG001062E	0.1~6.2	20M	≥ 10	-93/-95	-65	-10	≤ 200
RJG001062F	0.1~6.2	25M	≥ 10	-93/-95	-65	-10	≤ 200
RJG001062G	0.1~6.2	50M	≥ 10	-93/-95	-65	-10	≤ 200
RJG001062H	0.1~6.2	100M	≥ 10	-93/-95	-65	-10	≤ 200

- Control interface: SPI three lines; ;
- Power Supply: +3.3V/150mA; +5V/100mA;
- Setting time don't include communication- time;
- Note: Reference, frequency, step can be customized.

Outline Drawing(unit:mm)



1. Power supply need to be filtered to make sure that no interference from power ripple to the sensitive components;
2. Make sure antistatic protection when shipping and using.

Pin Descriptions

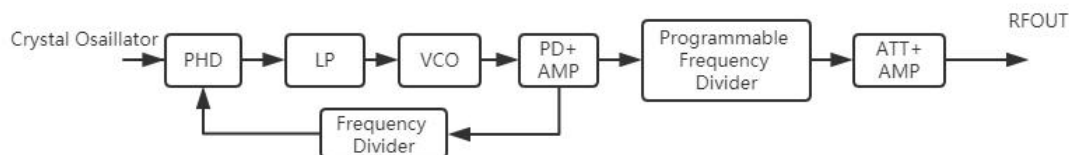
Pin Number	Function	Description
1	RFout	RF Output
2	GND	Ground
3	LD	Locked
4	VCC2	+5V
5	SCK	Clock
6	MOSI	Data
7	NSS	Enable
8	VCC1	+3.3V
9	REF	REF Input

HTCC Miniaturized Frequency Synthesizer Series H

Product Feature:

1. Freq. Range: 0.1~15GHz
2. Compact SMT package: 15x12x3mm
3. Miniaturization, easy integration into various systems
4. Low Spurious, Low Power Consumption
5. External Reference
6. Operating Temperature: -40℃~ +85℃;

Functional Diagram



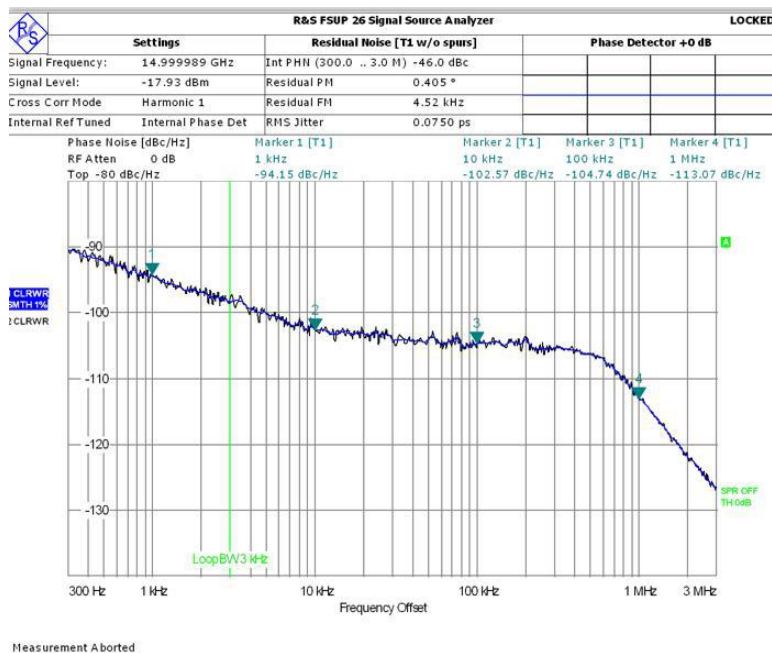
Electrical Specifications

At reference:100MHz (-155dBc/Hz@1KHz)

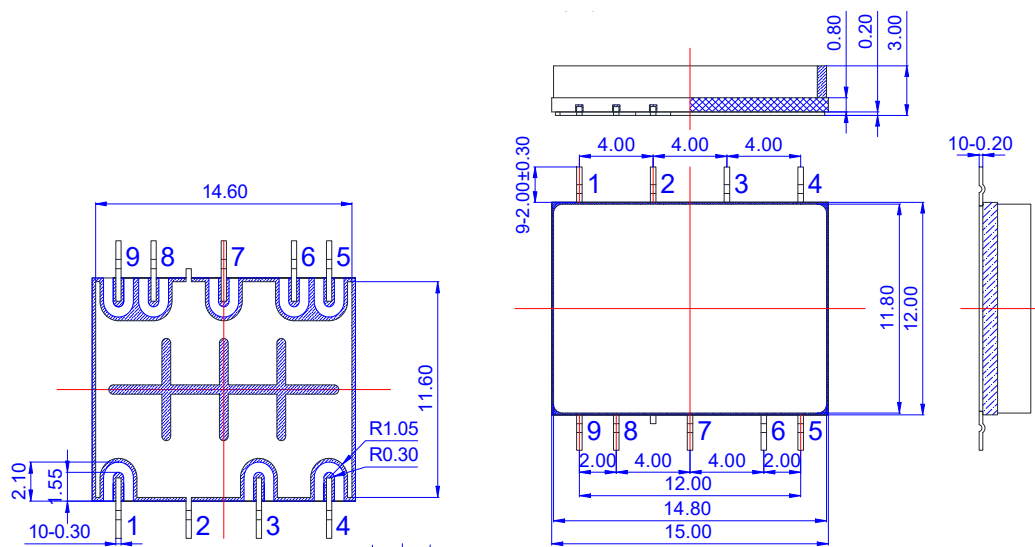
P/N	Freq. Range (GHz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)
RJH001	0.11	≥15	-135	-70	-10
RJH002	0.26	≥15	-125	-70	-10
RJH015	1.58	≥15	-110	-70	-10
RJH028	2.88	≥15	-106	-70	-10
RJH030	3	≥15	-105	-70	-10
RJH050	5	≥15	-102	-70	-10
.....					
RJH065	6.55	≥10	-99	-70	-10
RJH080	8	≥10	-97	-70	-10
RJH100	10	≥5	-95	-70	-10
RJH122	12.25	≥5	-93	-70	-10
RJH130	13	≥5	-93	-70	-10
RJH143	14.34	≥5	-92	-70	-10
RJH150	15	≥5	-92	-70	-10

● Power Supply: +3.3V/400mA; +5V/100mA;
 ● Note: Reference,output frequency between 0.1~ 15GH, output power can be customized.

Typical Phase Noise



Outline Drawing(unit:mm)



1. Power supply need to be filtered to make sure that no interference from power ripple to the sensitive components;
2. Make sure antistatic protection when shipping and using.

Pin Descriptions

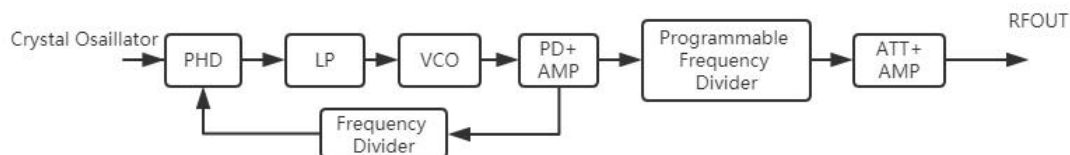
Pin Number	Function	Description
1	RFout	RF Output
2	GND	Ground
3	LD	Locked
4	VCC2	+5V
5	NC	The pin is not connected
6	NC	The pin is not connected
7	NC	The pin is not connected
8	VCC1	+3.3V
9	REF	REF Input

HTCC Miniaturized Frequency Synthesizer Series I

Product Feature:

1. Freq. Range: 0.1~6.2GHz
2. Compact SMT package: 15x12x3mm
3. Miniaturization, easy integration into various systems
4. Low Spurious, Low Power Consumption
5. External Reference
6. Operating Temperature: -40℃~ +85℃;

Functional Diagram



Electrical Specifications

At reference:100MHz (-155dBc/Hz@1KHz)

P/N	Freq. Range (GHz)	Output Power (dBm)	Phase Noise Typ. dBc/Hz@1K	Spurious Typ. (dBc)	Harmonic Typ. (dBc)
RJI001	0.13	≥15	-123	-70	-10
RJI002	0.24	≥15	-118	-70	-10
RJI003	0.36	≥15	-115	-70	-10
RJI005	0.55	≥15	-110	-70	-10
RJI007	0.78	≥15	-108	-70	-10
RJI009	0.98	≥15	-106	-70	-10
RJI012	1.2	≥15	-104	-70	-10
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RJI018	1.85	≥15	-102	-70	-10
RJI021	2.15	≥15	-100	-70	-10
RJI027	2.75	≥15	-98	-70	-10
RJI032	3.25	≥10	-96	-70	-10
RJI045	4.5	≥10	-95	-70	-10
RJI053	5.3	≥10	-93	-70	-10
RJI058	5.81	≥10	-92	-70	-10
RJI062	6.2	≥10	-91	-70	-10

- Power Supply: +3.3V/100mA; +5V/50mA
- Note: Reference,output frequency between 0.1~ 6.2GH, output power can be customized.



The technical drawing shows a square microfluidic chip with the following specifications:

- Main Dimensions:** Overall width and height are both 14.60 mm.
- Internal Channels:** A central cross-shaped channel has a width of 2.10 mm. The vertical channel segments have a length of 11.60 mm. The horizontal channel segment has a width of 10-0.30 mm.
- Inlets/Outlets:** There are four main ports labeled 1, 2, 3, and 4 at the corners. Each port has a diameter of 9-2.00±0.30 mm. Ports 1 and 2 are on the left side, while ports 3 and 4 are on the right side.
- Microstructures:** Eight small rectangular features are located along the top and bottom edges, numbered 5 through 8. They are arranged in two groups of four on each side.
- Radii:** The inner corners of the main chamber have a radius of R1.05. The outer corners have a radius of R0.30.
- Material Properties:** The chip is made of PDMS, indicated by the hatched pattern used for the chip body.

- ## Pin Descriptions

Pin Number	Function	Description
1	RFout	RF Output
2	GND	Ground
3	LD	Locked
4	VCC2	+8V
5	NC	The pin is not connected
6	NC	The pin is not connected
7	NC	The pin is not connected
8	VCC1	+3.3V
9	REF	REF Input