

### Performance Features

- Operating frequency band: 12.17GHz~13.33GHz
- Output Power: 12dBm
- Phase noise: -112dBc/Hz@100kHz
- Package size: 32-pin QFN, 5mmx5mm

### Overview

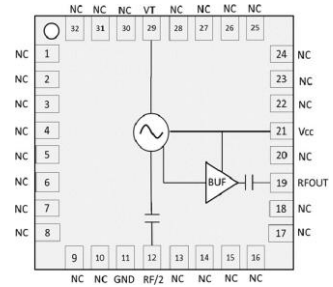
The CWV093SP5 is a monolithic microwave integrated circuit (MMIC) voltage controlled oscillator with an integrated resonator, negative resistor device and varactor diode, and RF/2 output. It features low phase noise, low power consumption, and flat output power.

The CWV093SP5 is a 32-pin 5mmx5mm surface mount leadless plastic package. The pin pads are coated with NiPdAuAg.

### Typical Applications

- Point-to-point and multi-point radios
- Test equipment and industrial control
- Very Small Aperture Terminal (VSAT)

### Functional Block Diagram



### Electrical performance table (TA=-40°C~+85°C, VCC=5V)

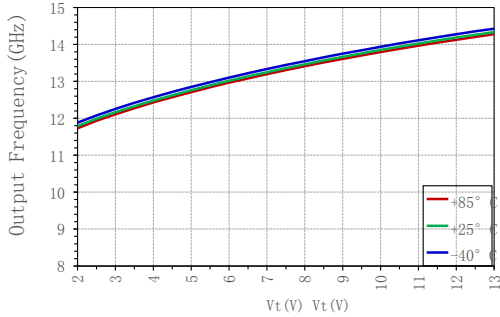
Parameter Name	Port/symbol	Minimum value	Typical values	Maximum value	Unit
Frequency range		12.17		13.33	GHz
Output power	RFOUT	8	12	16	dBm
	RF/2	0		8	dBm
Single-sideband phase noise @ 10kHz frequency bias	RFOUT		-86		dBc/Hz
Single-sideband phase noise @ 100kHz frequency bias	RFOUT		-112		dBc/Hz
Single-sideband phase noise @ 1MHz frequency bias	RFOUT		-131		dBc/Hz
Single sideband phase noise @ 10MHz frequency bias	RFOUT			-150	dBc/Hz
Tuning voltage	VT	2		13	V
Bias voltage	VCC	4.75	5.0	5.25	V
Bias current	Icc		190	230	mA
Tuning sensitivity	Kv	100		550	MHz/V
Leakage current at the tuning end (VT=13V)				100	uA
RF-side harmonic suppression	1/2		22		dBc
	3/2		25		dBc
	2nd		17		dBc
	3rd		35		dBc
Output Return Loss			6		dB
Push frequency factor			15		MHz/V
Frequency temperature drift			1		MHz/° C

#### Test Curve

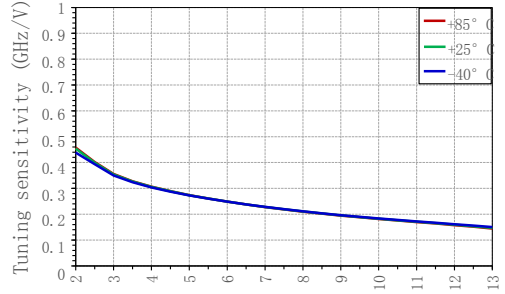
CWV

Voltage Controlled Oscillator Series

RFOUT output frequency VS tuning voltage

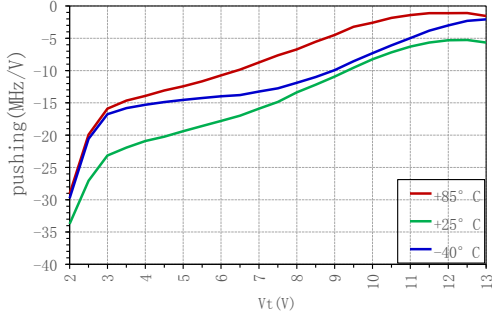


Tuning sensitivity vs. tuning voltage

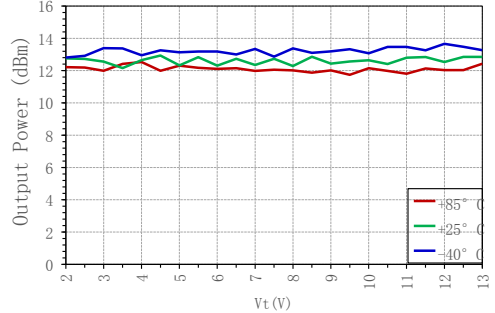


Note: affected by the wafer batch fluctuations and other factors, the output frequency of different chips will fluctuate up and down within a certain range, the output frequency range guarantee value please refer to the product electrical performance table.

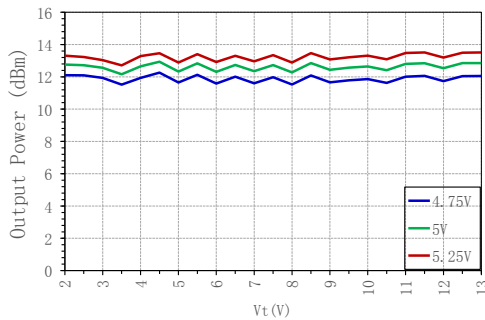
Push factor vs. tuning voltage



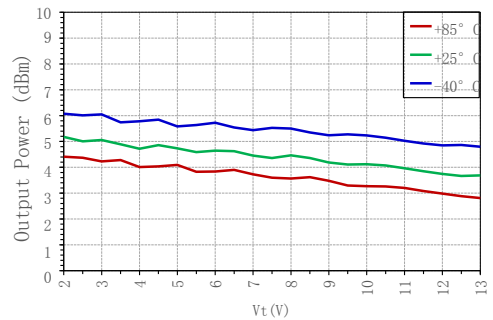
RFOUT output power vs. tuning voltage



RFOUT Power VS VCC

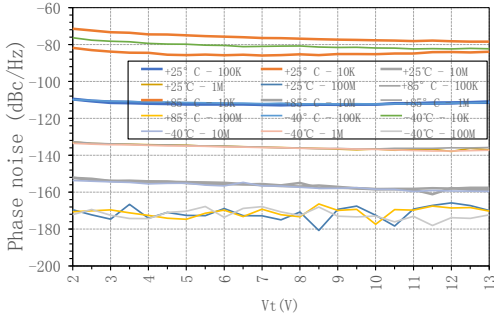


RF/2 output power vs. tuning voltage

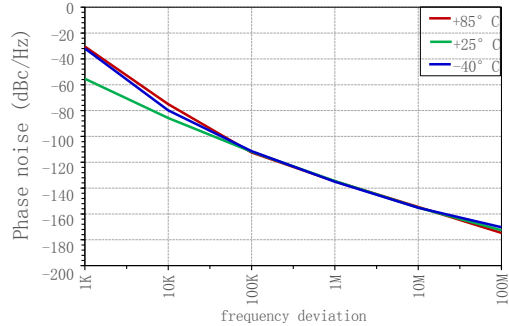


Test Curve

RFOUT phase noise vs. tuning voltage

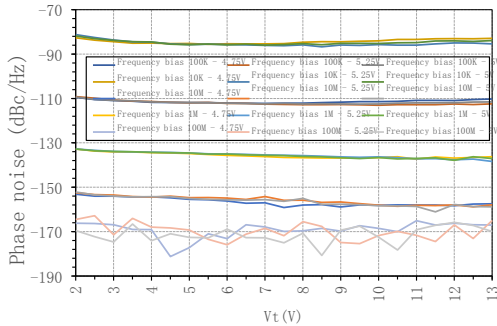


RFOUT phase noise vs. offset frequency @Vt=5V

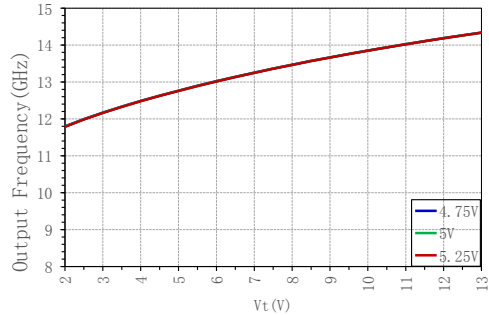


Note: High and low temperature frequency deviation 1K, 10K phase noise data by the test system error caused by inaccurate testing

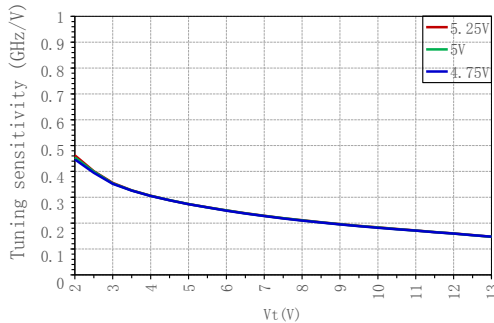
RFOUT phase noise VS VCC



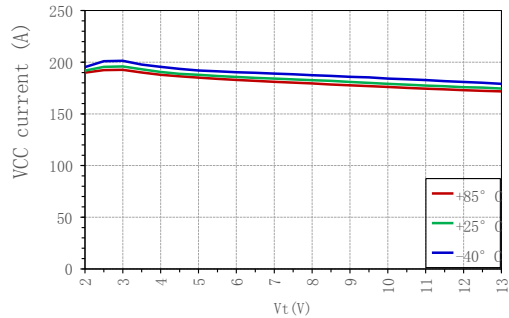
RFOUT output frequency VS VCC



Tuning sensitivity vs VCC



VCC current VS Vt



#### Extreme operating parameters

Bias voltage (VCC)	5.5V
Tuning Voltage (VT)	0V to 15V
Storage temperature range	-65°C~+150°C
Operating temperature range	-40°C~+85°C
Maximum junction temperature (T <sub>jmax</sub> )	135° C
Thermal resistance (θ <sub>jb</sub> ) Junction to GND Paddle	46°C/W
ESD (HBM)	Class 0b
ESD (CDM)	Class 1A

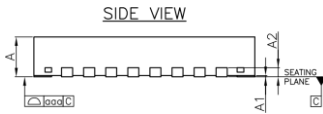
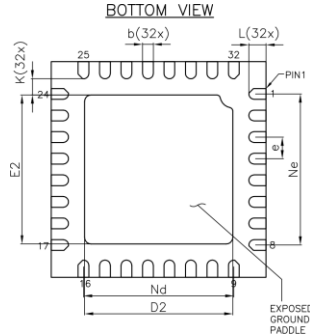
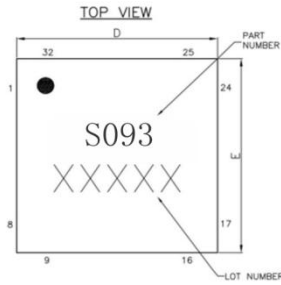
#### Package Information

Model	Packaging Materials	Solder plate plating	MSL level [1]	Package identification [2]	Environmental requirements
CWV093SP5	Green resin compounds	NiPdAu	MSL 3	S093 XXXXX	RoHS compliant

[1] Maximum reflow temperature 260° C

[2] XXXXX is the lot number

### Dimension



Description:

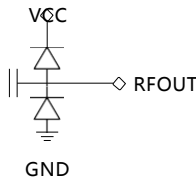
1. Unit: mm
2. Lead frame material: copper alloy
3. Package surface warpage: not more than 0.05mm
4. All ground pins should be connected to PCB RF ground

Symbol	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.20Ref		
b	0.20	0.25	0.30
D	4.90	5.00	5.10
D2	3.35	3.45	3.55
e	0.50BSC		
Ne	3.50BSC		
Nd	3.50BSC		
E	4.90	5.00	5.10
E2	3.35	3.45	3.55
K	0.20	---	---
L	0.30	0.40	0.50
aaa	0.08		

### Pin Definition

Pin Number	Function Symbols	Function Description	Pin Number	Function Symbols	Function Description
1	NC	Vacant	17	NC	Vacant
2	NC	Vacant	18	NC	Vacant
3	NC	Vacant	19	RFOUT	RF Output
4	NC	Vacant	20	NC	Vacant
5	NC	Vacant	21	VCC	DC Bias
6	NC	Vacant	22	NC	Vacant
7	NC	Vacant	23	NC	Vacant
8	NC	Vacant	24	NC	Vacant
9	NC	Vacant	25	NC	Vacant
10	NC	Vacant	26	NC	Vacant
11	GND	RF Ground	27	NC	Vacant
12	RF/2	RF Output	28	NC	Vacant
13	NC	Vacant	29	VT	DC Control
14	NC	Vacant	30	NC	Vacant
15	NC	Vacant	31	NC	Vacant
16	NC	Vacant	32	NC	Vacant

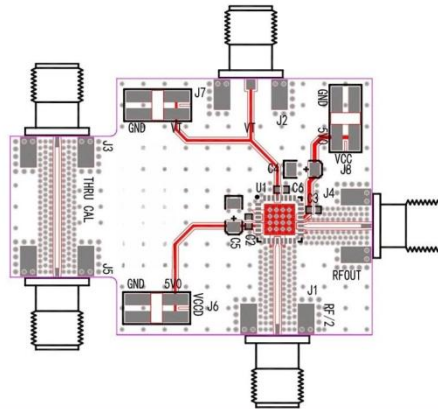
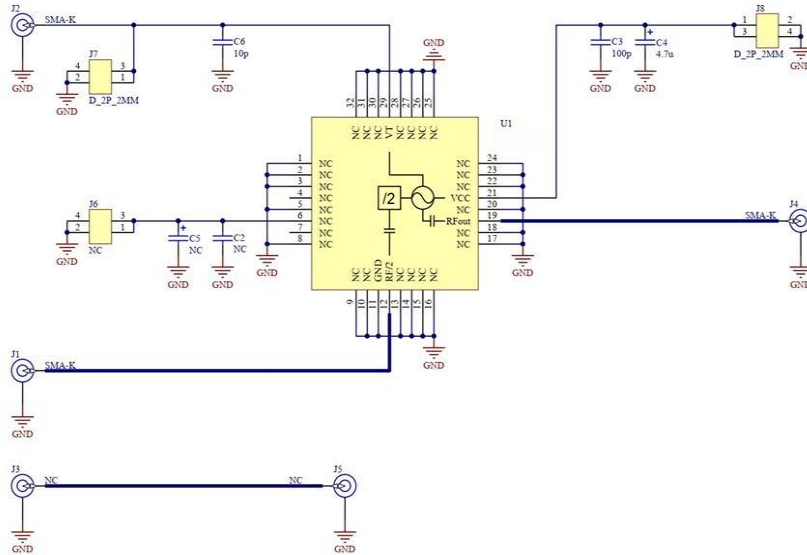
RFOUT port definition:



#### Evaluation Boards

CWV

Voltage Controlled Oscillator Series

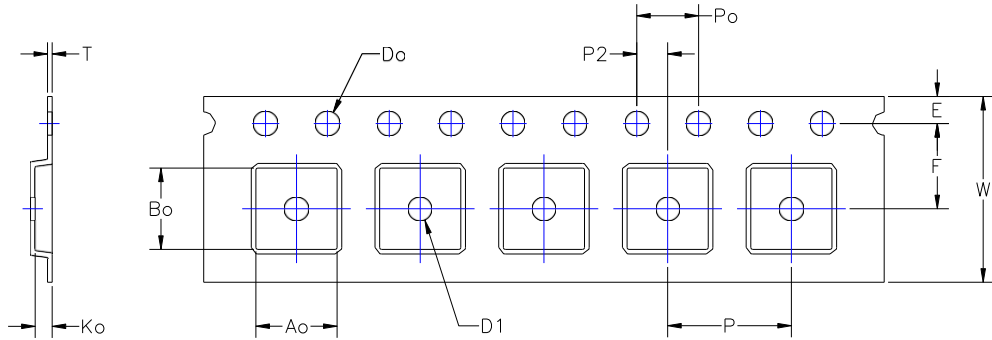


DeCWgnator	Description
C3	Multilayer Ceramic Capacitor 0402 100pF
C4	Tantalum capacitor 1206 4.7uF
C6	Multilayer Ceramic Capacitor 0402 10pF
J1, J2, J4	SMA-K PCB connectors
J7, J8	2.0mm DC pins
U1	CWV093SP5
J1, J2, J4 are recommended to use Nanjing Aowen D550B12E01-023 SMA-K Connector Type	

Circuit board material: Rogers 4350B

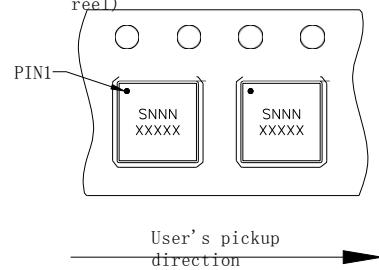
The circuit board of the device application should be designed according to the RF circuit design method, the signal line should be designed according to the 50 ohm impedance, and the ground pin of the package shell should be grounded nearby (similar to the figure), and there should be enough grounding holes to connect the top and bottom ground layers.

#### Packaging Information



DIMEN	WON	SPEC
W		12.00 +/- 0.30
Do		Ø1.50 +0.10/-0.00
Po		4.00 +/- 0.10
E		1.75 +/- 0.10
D1		Ø1.50 MIN
Ao		5.30 +/- 0.10
Bo		5.30 +/- 0.10
P		8.00 +/- 0.10
P2		2.00 +/- 0.10
Ko		1.10 +/- 0.10
T		0.30 +/- 0.05
F		5.50 +/- 0.05

Orientation of the element in the carrier (facing the carrier and the reel)



Description:

1. Unit: mm
2. Material: anti-static polyethylene
3. Color: Black
4. 10 positioning holes center distance (P0) cumulative tolerance  $\pm 0.2$

#### Cautions

1. Attempts to clean the chip surface with wet chemical methods are prohibited.
2. This product is an electrostatic sensitive device, so pay attention to anti-static when storing and using it.
3. Store in a dry, nitrogen atmosphere.

