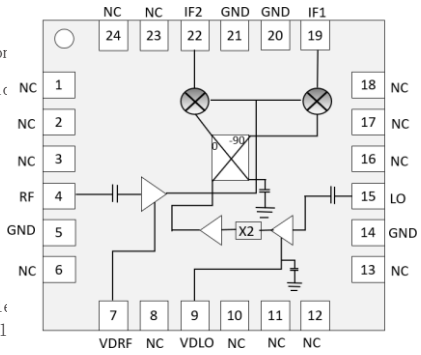
Performance Features

- Conversion gain: 12dB
- Mirror rejection: 18dBc
- 2 LO to IF isolation: 45dB
- Noise factor: 2.5dB
- Input IP3: 1dBm
- Package size: 4mm*4mm 24-pin QFN

Typical Applications

- Point-to-Point Communication
- Radar, satellite communicatior
- Point-to-Multiple Communicatic

Functional Block Diagram



Overview

The CWDC138SP4 is a GaAs MMIC I/Q downconverter that integrates a double balanced mixer, a fundamental quadrature amplifier, and an RF self-biasing l noise amplifier. This downconverter is primarily used in typical commercial communication systems.

Electrical performance table (TA=+25℃, VD=4V,LO=+6dBm, USB, IF=3.3GHz)

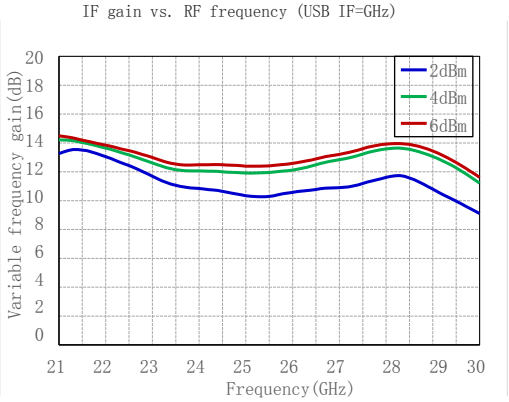
Parameter Name	Description	Minimum value	Typical values	Maximum value	Unit
Frequency range	RF Port		21~30		GHz
Frequency range	LO Port		9~14		GHz
Frequency range	IF Port		DC~3.5		GHz
Conversion gain			12		dB
Noise factor			2.5		dB
Mirror Suppression			18		dBc
Input 1dB compression point			-8		dBm
Isolation degree	2LO to RF port		-45		dB
	2LO to IF port		-20		dB
Enter IP3			2		dBm
Operating current			160		mA

Electrical performance table (TA=+25℃,VD=4V,LO=+6dBm,LSB,IF=3.3GHz)

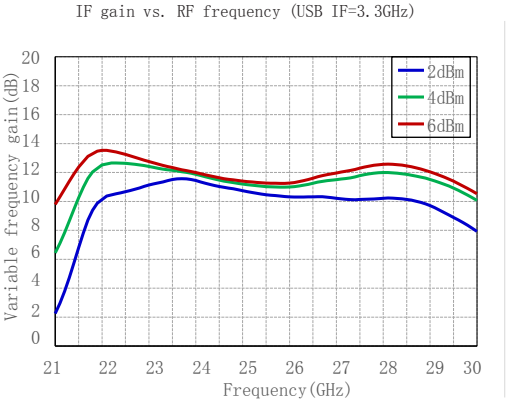
Parameter Name	Description	Minimum value	Typical values	Maximum value	Unit
Frequency range	RF Port		17~27		GHz
Frequency range	LO Port		9~14		GHz
Frequency range	IF Port		DC~3.5		GHz
Conversion gain			13		dB
Noise factor			2.5		dB
Mirror Suppression			20		dBc
Input 1dB compression point			-8		dBm
Isolation degree	2LO to RF port		-45		dB
	2LO to IF port		-20		dB
Enter IP3			1		dBm
Operating current			160		mA

Test Curve

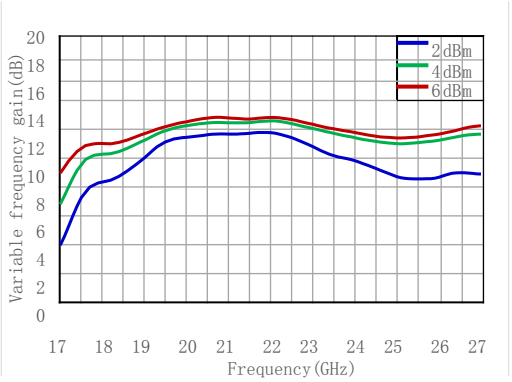
IF gain vs. RF frequency (USB IF=GHz)



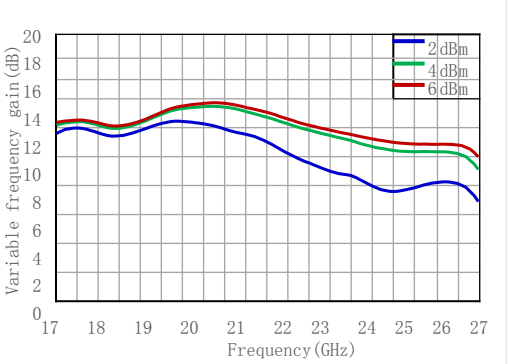
IF gain vs. RF frequency (USB IF=3.3GHz)



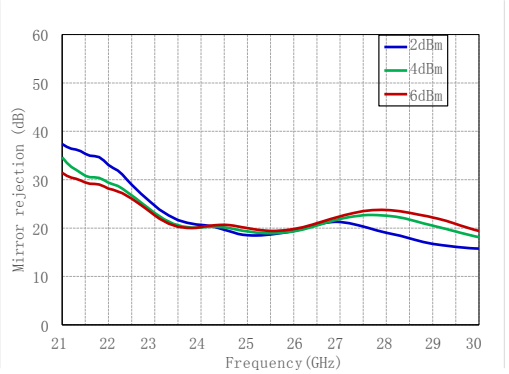
IF gain vs. RF frequency (LSB IF=1GHz)



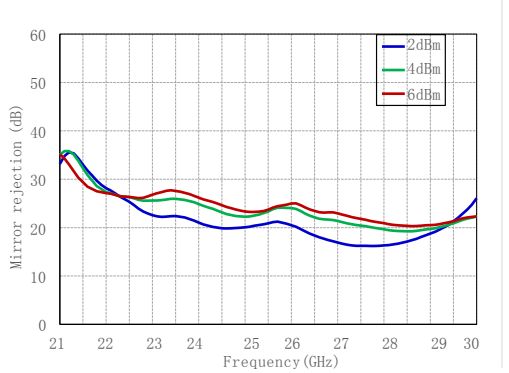
IF gain vs. RF frequency (LSB IF=3.3GHz)



Mirror rejection vs. RF frequency (USB IF=1GHz)



Mirror rejection vs. RF frequency (USB IF=3.3GHz)



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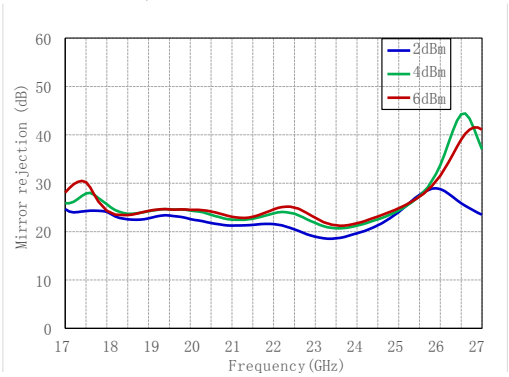
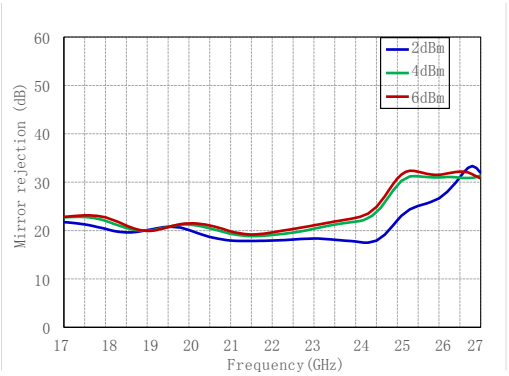
Test Curve

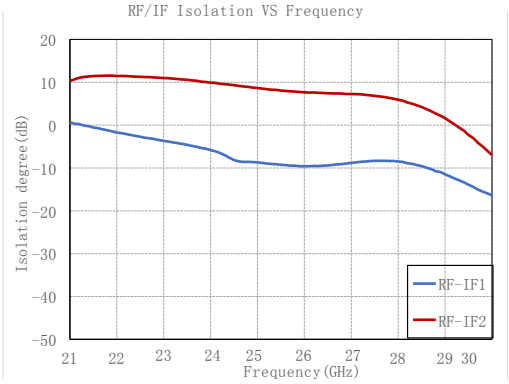
Mirror rejection vs. RF frequency (LSB IF=1GHz)



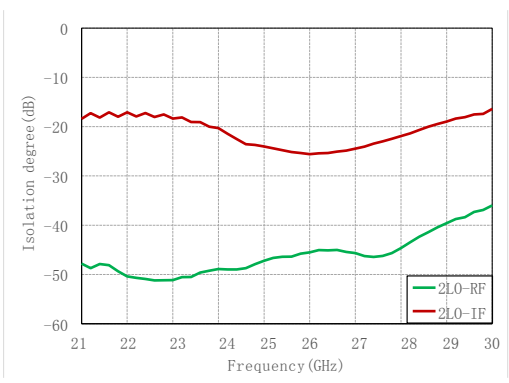
Mirror rejection vs. RF frequency (LSB IF=3.3GHz)



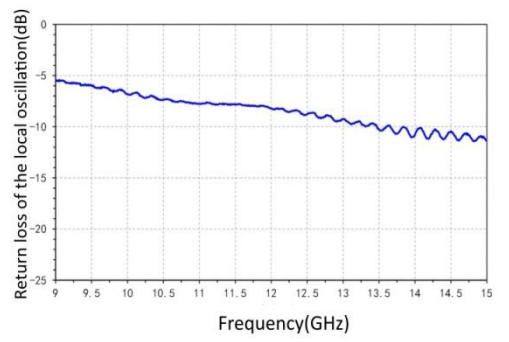
Isolation vs. frequency (RF-IF1,RF-IF2)



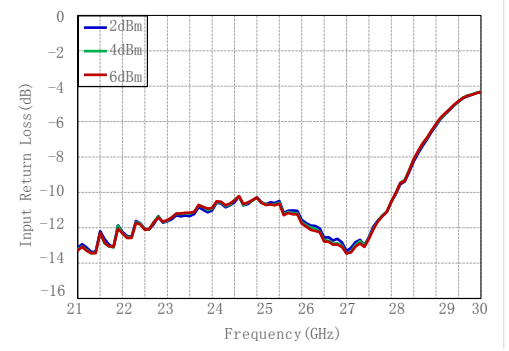
Isolation vs. frequency (2LO-IF, 2LO-RF)



Return loss of the local oscillation VS frequency (power of 6dBm)

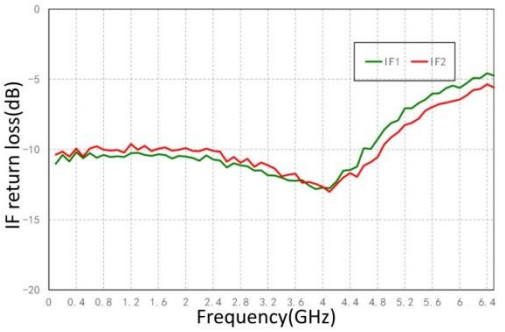


RF return loss vs. frequency (USB IF=1GHz)

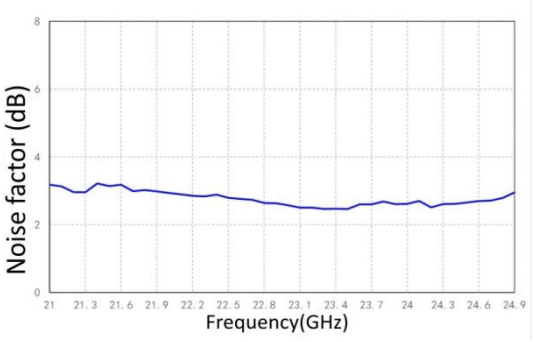


Test Curve

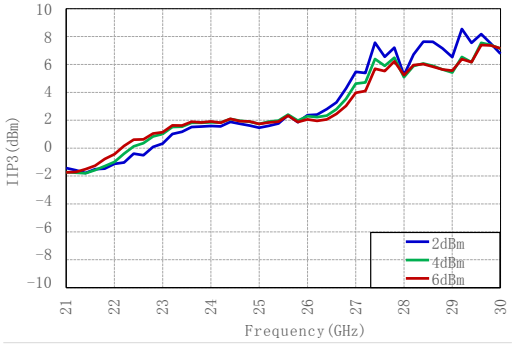
IF return loss vs. RF frequency (LSB@LO=10.5GHz power is 6dBm)



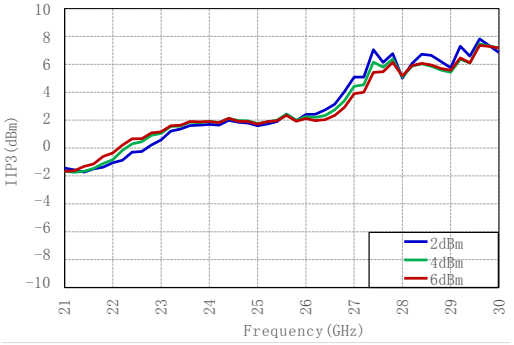
Noise factor vs. frequency (LSB@LO=12.5GHz power is 6dBm)



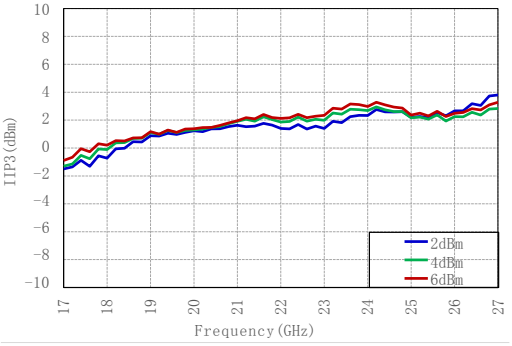
IP3 VS RF frequency (USB IF=1GHz)



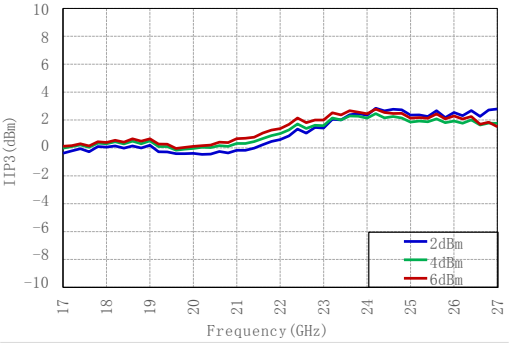
IP3 VS RF frequency (USB IF=3.3GHz)



IP3 VS RF frequency (LSB IF=1GHz)



IP3 VS RF frequency (LSB IF=3.3GHz)



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Working parameters

Operating temperature	-40℃～+85℃

Absolute maximum rating

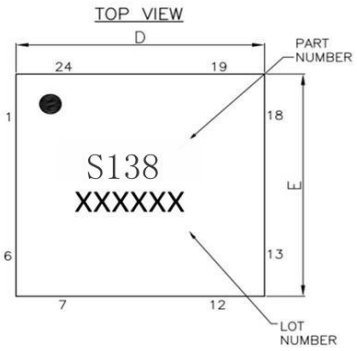
RF input power	2dBm
LO input power	10dBm
VDD	5V
Channel temperature	175° C
Storage temperature	-65℃～+150℃
Operating temperature	-55℃～+85℃
ESD (HBM)	Class 1A

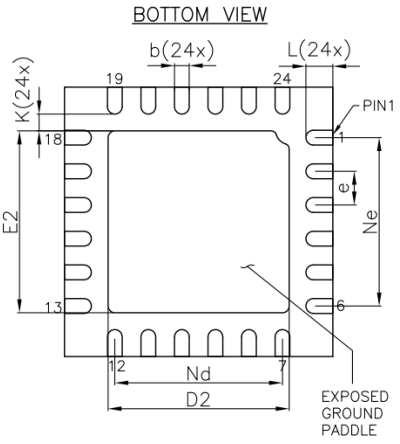
Package Information

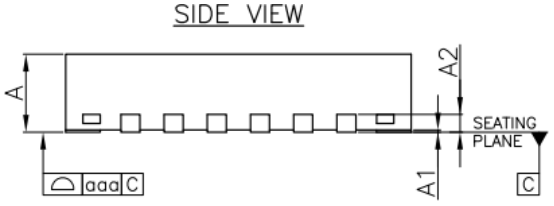
Model	Packaging materials	Solder plate plating	MSL level [1]	Package identification [2]	Environmental requirements
CWDC138SP4	Green resin compounds	NiPdAuAg	MSL 3	S138 XXXXX	RoHS compliant

[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: ≤0.05mm
4. All ground pins please connect PCB RF ground

Dimension Table (unit:mm)			
Symbol	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2		0.20Ref	
b	0.18	0.25	0.30
D	3.90	4.00	4.10
D2	2.55	2.70	2.80
e		0.50BSC	
Ne		2.50BSC	
Nd		2.50BSC	
E	3.90	4.00	4.10
E2	2.55	2.70	2.80
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	13	NC	Vacant
2	NC	Vacant	14	GND	RF Ground
3	NC	Vacant	15	LO	Local oscillator input
4	RF	RF input	16	NC	Vacant
5	GND	RF Ground	17	NC	Vacant
6	NC	Vacant	18	NC	Vacant
7	VDRF	RF amplifier voltage	19	IF1	IF output 1
8	NC	Vacant	20	GND	RF Ground
9	VDLO	Local oscillator amplifier voltage	21	GND	RF Ground
10	NC	Vacant	22	IF2	IF output 2
11	NC	Vacant	23	NC	Vacant
12	NC	Vacant	24	NC	Vacant

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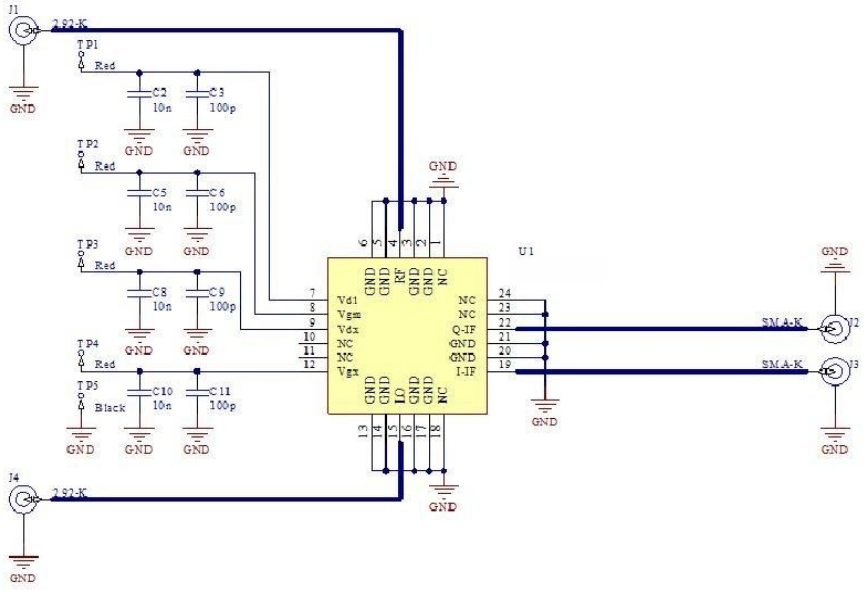
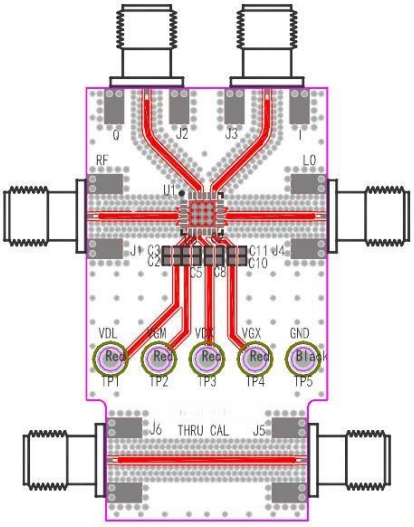
Evaluation Boards





Designator	Description
C2,C5,C8,C10	10nf Ceramic Capacitor 0402
C3,C6,C9,C11	100pf Ceramic Capacitor 0402
TP5	Test point terminal red
TP1,TP2,TP3,TP4	Test point terminal black
J2,J3	SMA-K connector Nanjing Aowen D550B12E01-048
U1	CWDC138SP4
J1,J4,J5,J6 recommended to use 2.92-K connector	

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.