

Frequency Synthesizer

RSN-1618AF-119+

50Ω 1543 to 1618 MHz

The Big Deal

- Fast settling time, 35μs max
- Low phase noise and spurious
- High reliability over temperature changes
- Small size 0.910" x 0.910" x 0.252"



CASE STYLE: JG1228

Product Overview

The RSN-1618AF-119+ is a Frequency Synthesizer, designed to operate from 1543 to 1618 MHz for GSM application. The RSN-1618AF-119+ is packaged in a metal case (size of 0.910" x 0.910" x 0.252") to shield against unwanted signals and noise. The RSN-1618AF-119+ Frequency Synthesizer can be used as local oscillators in the upconversion and down-conversion sections of wireless receivers and transmitters, with very high reliability over temperature changes due to use of high quality components which are secured to substrate with chip adhesive in addition to solder.

Key Features

Feature	Advantages
Low phase noise and spurious: • Phase Noise: -98 dBc/Hz typ. @ 10 kHz offset • Step Size Spurious: -68 dBc typ. • Comparison Spurious: -102 dBc typ. • Reference Spurious: -98 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Fast settling time	Less than 35 μsec Max within ±7deg can be used for fast settling applications.
Small size, 0.910" x 0.910" x 0.252"	The small size enables the RSN-1618AF-119+ to be used in compact designs.



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50Ω 1543 to 1618 MHz

Features

- Fractional N synthesizer
- Fast settling time, 35μs Max
- Low phase noise and spurious
- High reliability over temperature changes
- Low operating voltage
(VCC VCO=+5.5V, VCC PLL=+3.3V, VCC CP=+5.0V)
- Small size 0.910" x 0.910" x 0.252"



CASE STYLE: JG1228

PRICE: \$45.95 ea. QTY (1-9)

+ RoHS compliant in accordance
with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS
Compliance. See our web site for RoHS Compliance
methodologies and qualifications.

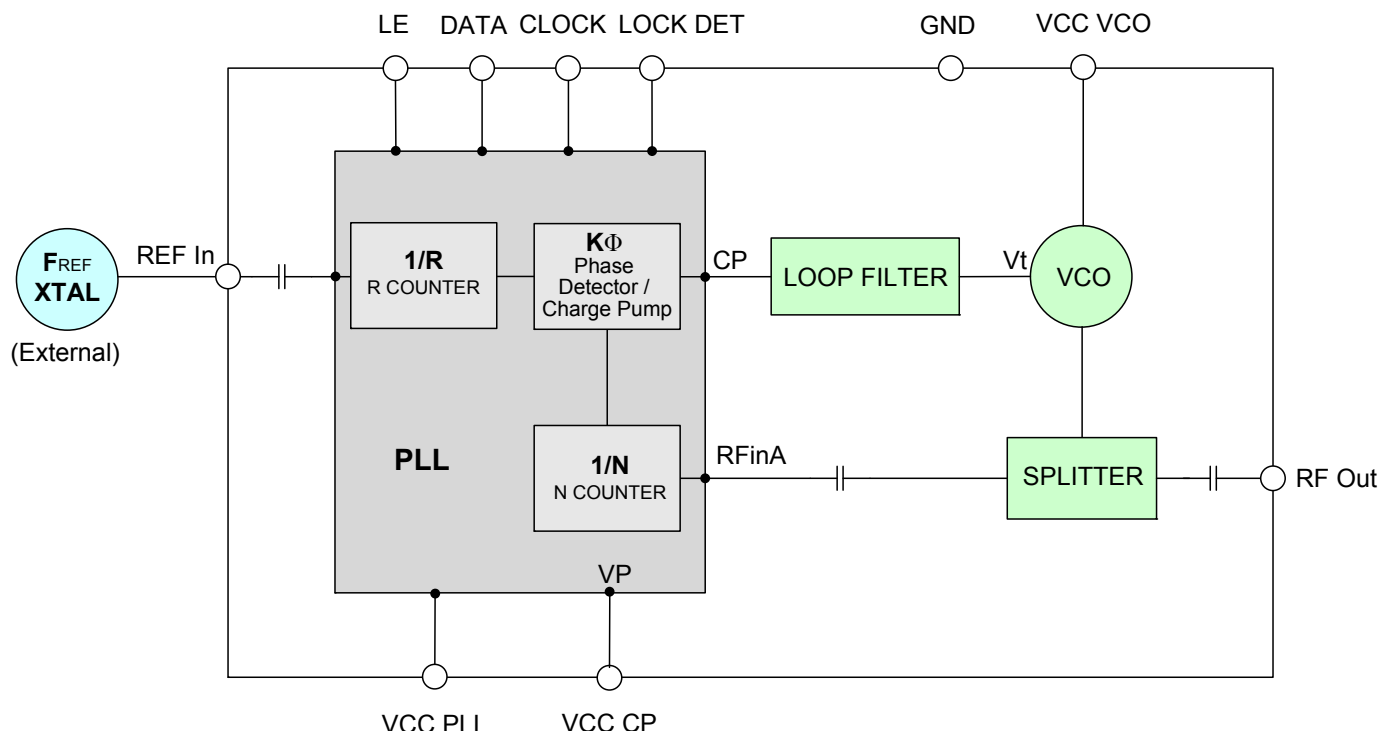
Applications

- GSM

General Description

The RSN-1618AF-119+ is a Frequency Synthesizer, designed to operate from 1543 to 1618 MHz for GSM application. The RSN-1618AF-119+ is packaged in a metal case (size of 0.910" x 0.910" x 0.252") to shield against unwanted signals and noise. The RSN-1618AF-119+ Frequency Synthesizer can be used as local oscillators in the upconversion and down-conversion sections of wireless receivers and transmitters, with very high reliability over temperature changes due to use of high quality components which are secured to substrate with chip adhesive in addition to solder.

Simplified Schematic



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REV. OR
M126591
EDR-8431/2F1
RSN-1618AF-119+
Category-F8
RAV
100324
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Electrical Specifications (over operating temperature -40°C to +85°C)

Parameters	Test Conditions	Min.	Typ.	Max.	Units
Frequency Range	-	1543	-	1618	MHz
Step Size	-	-	200	-	kHz
Comparison Frequency	-	-	13	-	MHz
Settling Time	Within ± 7 deg	-	25	35	μ Sec
Output Power	-	+1	+4.6	+7	dBm
SSB Phase Noise	@ 100 Hz offset	-	-90	-	dBc/Hz
	@ 1 kHz offset	-	-95	-90	
	@ 10 kHz offset	-	-98	-93	
	@ 100 kHz offset	-	-106	-102	
	@ 1 MHz offset	-	-144	-138	
Integrated SSB Phase Noise	@ 1kHz to 100kHz	-	-45	-	dBc
Step Size Spurious Suppression	Step Size 200 kHz	-	-68	-46	dBc
0.5 Step Size Spurious Suppression	0.5 Step Size 100 kHz	-	-95	-79	
Reference Spurious Suppression	Ref. Freq. 52 MHz	-	-98	-74	
Comparison Spurious Suppression	Comp. Freq. 13 MHz	-	-102	-78	
Non - Harmonic Spurious Suppression	-	-	-90	-	
Harmonic Suppression	-	-	-27	-17	V
VCO Supply Voltage	+5.5	+5.20	+5.50	+5.80	
PLL Supply Voltage	+3.3	+3.15	+3.30	+3.45	
CP Supply Voltage	+5.0	+4.80	+5.00	+5.20	mA
VCO Supply Current	-	-	42	49	
PLL Supply Current	-	-	19	27	
CP Supply Current	-	-	42	48	
Reference Input (External)	Frequency	52 (square wave)	-	52	MHz
	Amplitude	1	-	1	V _{P-P}
	Input impedance	-	-	100	K Ω
	Phase Noise @ 1 kHz offset	-	-	-145	dBc/Hz
RF Output port Impedance	-	-	50	-	Ω
Input Logic Level	Input high voltage	-	2.80	-	V
	Input low voltage	-	-	0.60	V
Digital Lock Detect	Locked	-	2.75	-	V
	Unlocked	-	-	0.40	V
Frequency Synthesizer PLL	-	ADF4193			
PLL Programming (Note*)	-	3-wire serial 3.3V CMOS			
Register Map @ 1618 MHz	R0_Register	-	(MSB) 1111100000000011110000 (LSB)		
	R1_Register	-	(MSB) 10100010000001000001001 (LSB)		
	R2_Register	-	(MSB) 111001010 (LSB)		
	R3_Register	-	(MSB) 1111011 (LSB)		
	R4_Register	-	(MSB) 100010011010100 (LSB)		
	R5_Register	-	(MSB) 101 (LSB)		
	R6_Register	-	(MSB) 1001000000001110 (LSB)		
	R7_Register	-	(MSB) 111 (LSB)		

Note* : Tested with GSM_RX_PHASE CODE (PCS1800/PCS1900 RX, version 2.0)
from "Analog Devices" recommendation for ADF4193 PLL.

[Download Phase Code file](#)

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	+6.3V
PLL Supply Voltage	+3.6V
CP Supply Voltage	+5.8V
CP Supply Voltage to PLL Supply Voltage	-0.3V to +5.8V
Reference Frequency Voltage	-0.3Vmin, VCC PLL+0.3Vmax
Data, Clock, LE Levels	-0.3Vmin, VCC PLL+0.3Vmax
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C

Permanent damage may occur if any of these limits are exceeded



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Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURENT (mA)			CP CURENT (mA)		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1543	4.07	4.56	4.67	41.02	42.40	43.67	16.74	18.39	21.08	42.54	42.83	42.49
1550	4.11	4.58	4.67	41.05	42.39	43.67	16.54	18.21	20.88	42.37	42.67	42.33
1560	4.17	4.62	4.67	40.97	42.36	43.65	16.23	17.91	20.56	42.12	42.43	42.11
1570	4.17	4.62	4.65	40.96	42.34	43.64	16.53	18.23	20.89	41.89	42.20	41.89
1580	4.18	4.64	4.63	40.97	42.31	43.62	16.62	18.34	20.98	41.65	41.98	41.68
1590	4.22	4.69	4.64	40.95	42.28	43.60	16.75	18.47	21.11	41.42	41.75	41.45
1600	4.26	4.73	4.64	40.90	42.24	43.59	16.92	18.66	21.30	41.18	41.52	41.24
1610	4.30	4.75	4.64	40.55	42.21	43.57	16.62	18.35	20.99	40.95	41.29	41.04
1618	4.29	4.72	4.59	40.86	42.20	43.56	16.82	18.57	21.20	40.77	41.11	40.87

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1543	-25.15	-27.16	-29.03	-21.89	-25.49	-29.84
1550	-25.78	-27.84	-29.58	-21.67	-25.28	-29.78
1560	-27.07	-29.59	-30.96	-22.81	-26.66	-31.75
1570	-27.77	-30.61	-31.43	-23.39	-28.17	-33.81
1580	-27.97	-30.77	-30.98	-22.50	-27.49	-33.56
1590	-28.45	-31.37	-31.59	-22.16	-26.30	-31.84
1600	-28.66	-31.66	-32.66	-22.44	-26.43	-31.82
1610	-28.85	-31.98	-33.40	-21.03	-25.67	-31.49
1618	-28.84	-32.21	-33.79	-21.02	-25.84	-32.09



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1543	-92.95	-95.85	-98.65	-106.22	-145.14
1550	-89.16	-95.99	-98.64	-106.38	-144.55
1560	-90.52	-96.98	-98.64	-106.42	-145.60
1570	-92.54	-95.33	-98.63	-106.54	-144.20
1580	-89.03	-94.97	-98.78	-106.42	-145.54
1590	-91.53	-94.75	-98.94	-106.58	-144.68
1600	-86.98	-95.82	-98.46	-106.62	-145.50
1610	-88.35	-96.14	-98.41	-106.71	-144.36
1618	-88.12	-94.79	-98.38	-106.48	-145.34

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1543	-90.71	-94.88	-98.67	-106.40	-146.62
1550	-88.84	-95.27	-98.41	-106.52	-147.38
1560	-87.78	-96.10	-98.81	-106.37	-147.44
1570	-87.91	-95.48	-98.82	-106.68	-146.70
1580	-86.22	-95.17	-98.58	-106.73	-147.28
1590	-89.33	-95.22	-98.86	-106.83	-147.50
1600	-89.46	-95.97	-98.77	-107.04	-147.46
1610	-92.74	-96.02	-98.46	-106.94	-146.29
1618	-89.59	-95.08	-98.67	-106.91	-147.48

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1543	-90.46	-95.18	-98.24	-105.49	-142.08
1550	-88.82	-96.88	-97.63	-105.76	-142.47
1560	-87.68	-95.69	-97.54	-105.82	-143.18
1570	-93.36	-95.36	-97.79	-105.86	-142.67
1580	-88.61	-96.91	-97.82	-105.90	-143.18
1590	-89.77	-95.22	-97.99	-106.05	-142.40
1600	-90.65	-96.13	-97.59	-106.06	-143.25
1610	-91.88	-96.74	-97.01	-105.99	-143.21
1618	-88.13	-95.30	-97.62	-105.85	-143.22



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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1543MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1580MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1618MHz+(n*Fcomparison) (dBc) note 1		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-99.32	-102.69	-105.11	-99.55	-106.22	-108.48	-103.52	-111.95	-109.85
-4	-99.00	-112.89	-110.91	-102.21	-121.47	-107.27	-105.13	-115.46	-102.22
-3	-100.26	-113.00	-108.90	-101.77	-112.76	-108.50	-109.51	-116.49	-102.18
-2	-98.98	-106.24	-112.11	-101.52	-108.39	-114.43	-110.82	-116.42	-104.37
-1	-96.24	-101.07	-111.61	-101.84	-106.55	-109.58	-109.66	-107.10	-102.82
0 note 2	-	-	-	-	-	-	-	-	-
+1	-95.21	-93.91	-101.18	-96.39	-96.50	-109.58	-98.28	-105.92	-104.38
+2	-97.47	-97.08	-105.68	-98.23	-100.83	-125.60	-100.37	-111.21	-107.99
+3	-98.80	-98.38	-106.08	-98.41	-102.15	-111.50	-100.60	-106.70	-115.21
+4	-100.96	-102.91	-110.03	-99.92	-107.15	-108.23	-102.76	-107.81	-107.53
+5	-105.43	-109.53	-101.00	-106.12	-106.79	-99.64	-102.47	-101.03	-99.11

Note 1: Comparison frequency 13 MHz

Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1543MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1580MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1618MHz+(n*Freference) (dBc) note 3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-93.98	-98.86	-97.75	-92.94	-96.90	-98.53	-92.33	-97.02	-98.36
-4	-95.88	-100.79	-98.00	-93.84	-97.17	-97.11	-94.56	-96.37	-97.03
-3	-95.04	-100.34	-97.53	-95.18	-98.42	-100.00	-94.39	-98.75	-98.86
-2	-80.63	-85.49	-89.13	-89.21	-91.60	-94.01	-94.47	-94.99	-95.27
-1	-106.33	-115.23	-111.43	-111.85	-118.45	-107.71	-107.27	-115.25	-102.24
0 note 4	-	-	-	-	-	-	-	-	-
+1	-117.62	-103.51	-111.25	-107.92	-107.14	-108.41	-114.24	-107.01	-107.49
+2	-79.64	-84.05	-88.58	-85.99	-89.60	-92.76	-87.49	-91.89	-92.17
+3	-96.66	-100.31	-97.20	-100.15	-97.92	-95.75	-104.44	-97.89	-94.44
+4	-91.85	-92.94	-93.01	-90.52	-91.72	-92.92	-89.79	-91.67	-93.07
+5	-89.25	-92.98	-96.72	-89.86	-91.67	-97.67	-90.94	-92.14	-96.93

Note 3: Reference frequency 52 MHz

Note 4: All spurs are referenced to carrier signal (n=0).



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STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1543MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1580MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1618MHz+(n*Fstep size) (dBc) note 5		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5.0	-106.11	-113.54	-104.90	-99.61	-100.29	-100.90	-104.50	-112.17	-112.92
-4.5	-129.54	-128.51	-129.58	-129.57	-130.40	-128.11	-129.57	-129.37	-127.73
-4.0	-109.92	-107.32	-111.72	-103.15	-99.38	-101.54	-101.32	-99.59	-101.94
-3.5	-127.77	-127.02	-125.88	-127.87	-126.13	-126.02	-128.92	-127.21	-123.64
-3.0	-92.98	-102.04	-109.13	-96.92	-96.52	-94.96	-97.54	-94.81	-91.04
-2.5	-125.15	-124.06	-124.66	-125.78	-120.40	-122.99	-124.28	-124.71	-122.84
-2.0	-85.41	-83.64	-84.27	-91.43	-91.64	-86.29	-81.37	-81.78	-82.11
-1.5	-120.24	-119.57	-115.89	-120.12	-119.45	-115.86	-116.84	-119.15	-116.57
-1.0	-67.38	-66.39	-65.74	-77.11	-72.51	-72.09	-64.46	-63.78	-63.44
-0.5	-95.82	-96.90	-95.33	-97.00	-96.78	-95.80	-96.76	-95.74	-94.72
0 ^{note 6}	-	-	-	-	-	-	-	-	-
+0.5	-96.83	-95.89	-95.50	-95.84	-95.01	-95.75	-96.04	-96.39	-95.23
+1.0	-67.33	-66.42	-65.54	-77.10	-72.54	-72.05	-64.39	-63.76	-63.47
+1.5	-119.97	-119.32	-117.61	-119.60	-119.18	-116.46	-119.35	-118.29	-116.44
+2.0	-85.41	-83.71	-83.86	-91.04	-91.75	-86.14	-81.42	-81.79	-82.04
+2.5	-125.30	-123.94	-121.94	-124.28	-122.21	-122.54	-125.89	-124.78	-124.85
+3.0	-92.77	-101.53	-110.04	-97.40	-96.13	-94.71	-97.68	-94.80	-90.51
+3.5	-127.65	-127.64	-126.54	-128.26	-128.61	-127.93	-127.84	-128.03	-125.97
+4.0	-110.60	-107.01	-112.71	-103.07	-99.18	-100.70	-101.54	-99.44	-101.36
+4.5	-129.92	-129.10	-128.90	-129.56	-129.38	-127.99	-130.43	-129.12	-128.41
+5.0	-106.45	-113.47	-105.67	-99.79	-100.74	-100.83	-104.44	-112.65	-115.94

Note 5: Step size 200 kHz

Note 6: All spurs are referenced to carrier signal (n=0).



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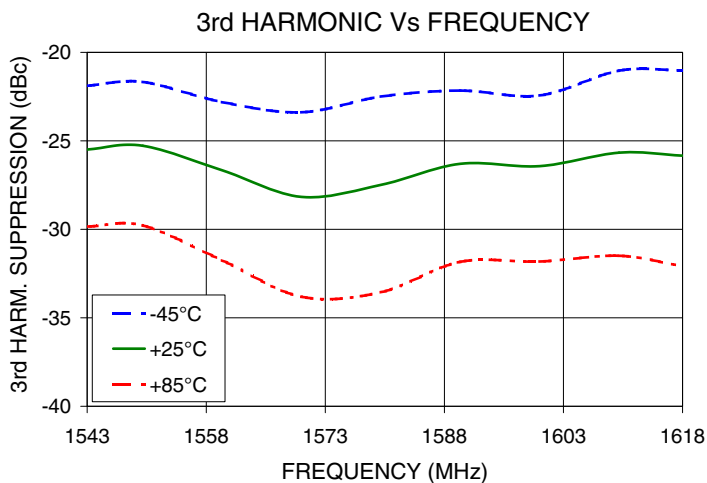
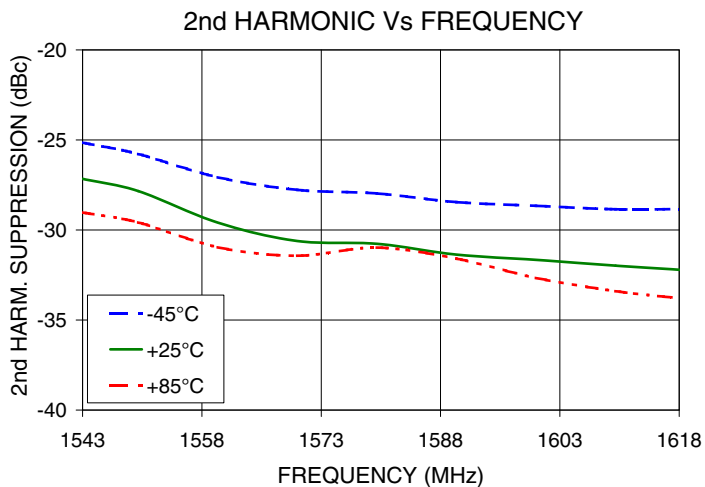
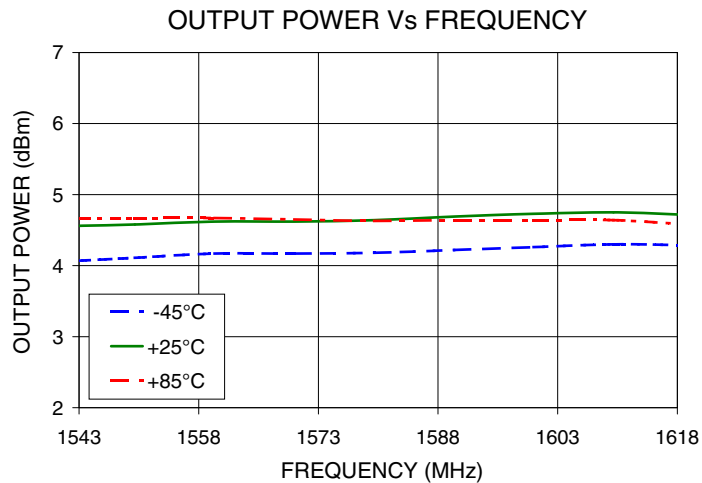


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Typical Performance Curves



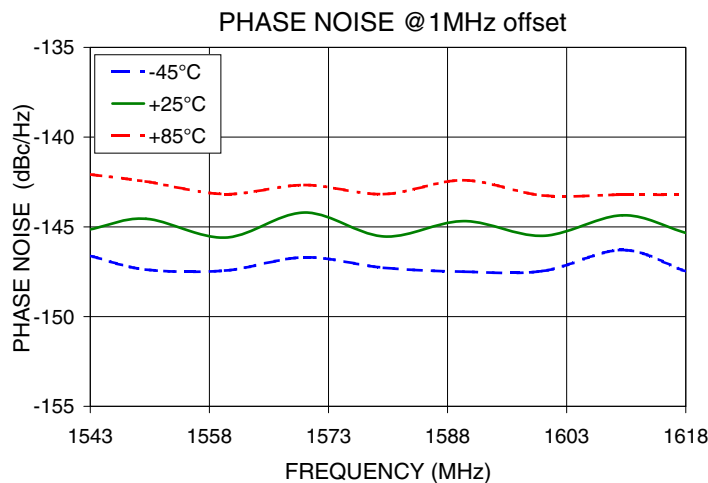
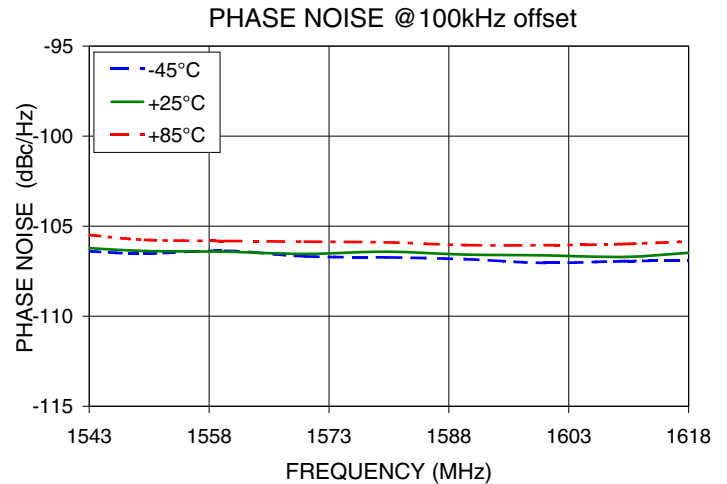
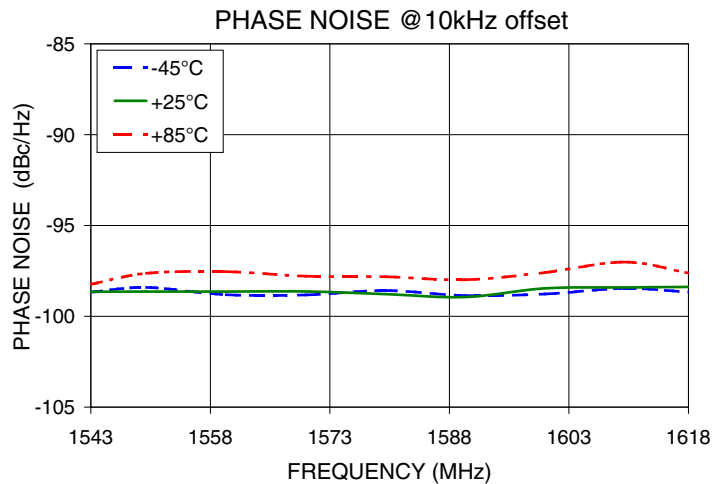
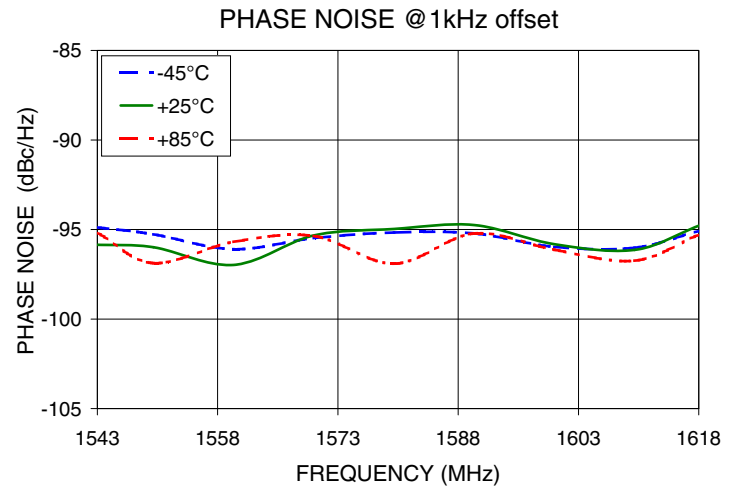
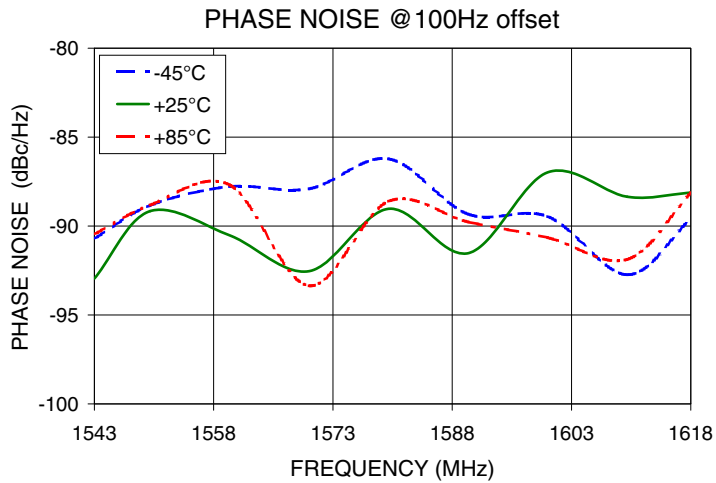
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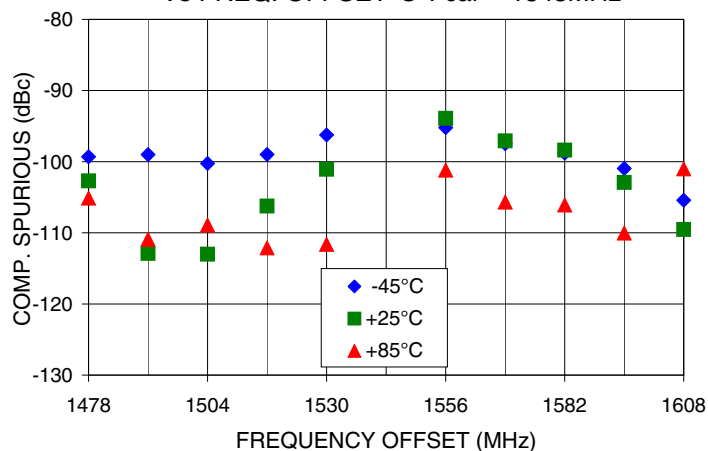


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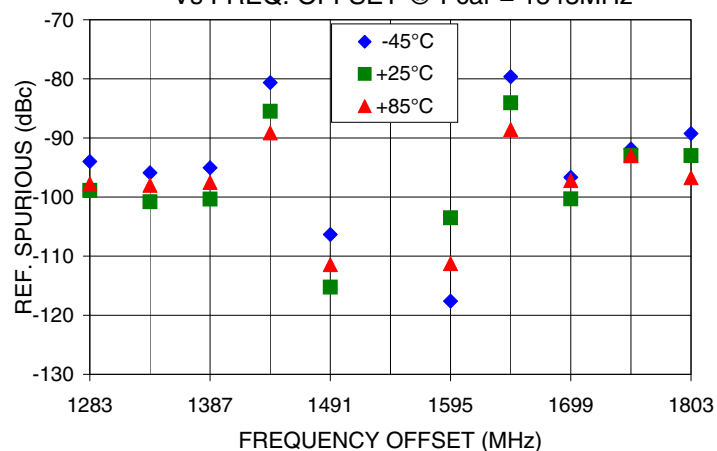


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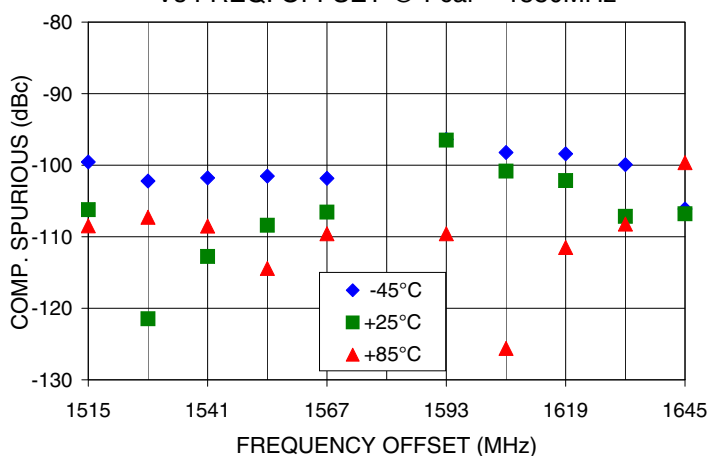
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1543MHz



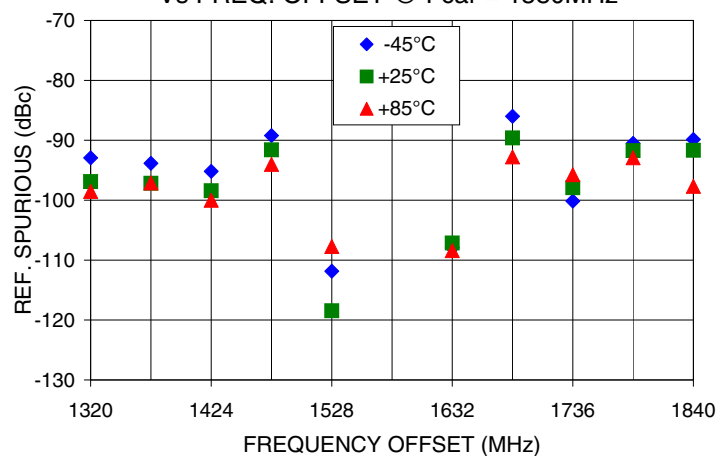
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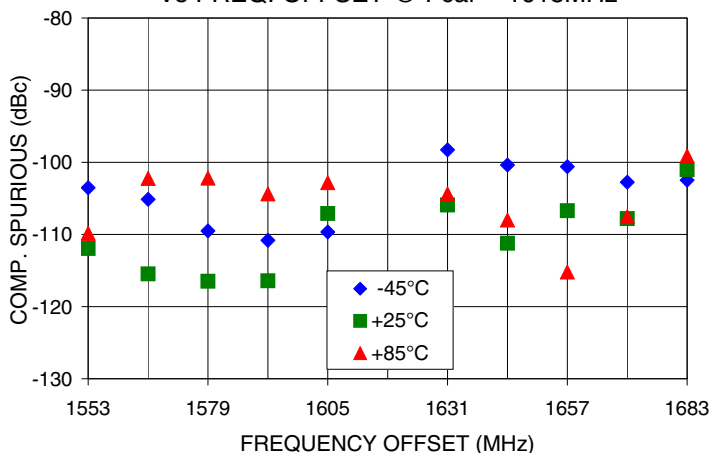
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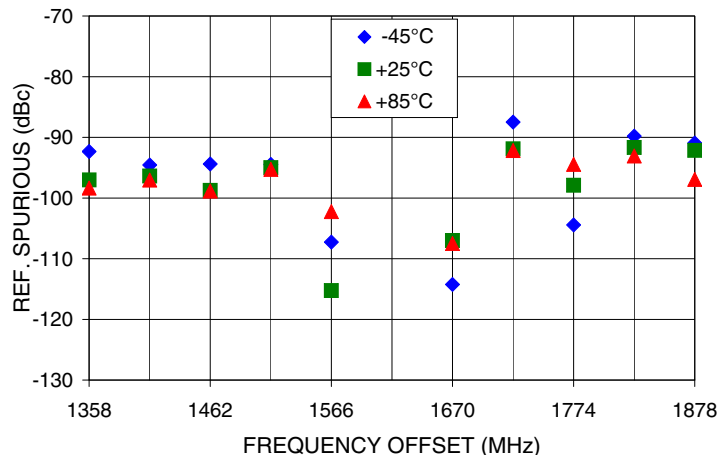
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Vs FREQ. OFFSET @ Fcar = 1580MHz



COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1618MHz



REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1618MHz



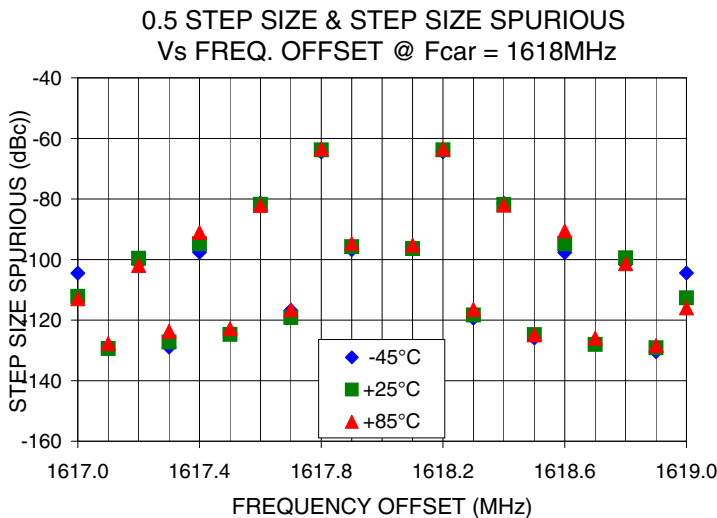
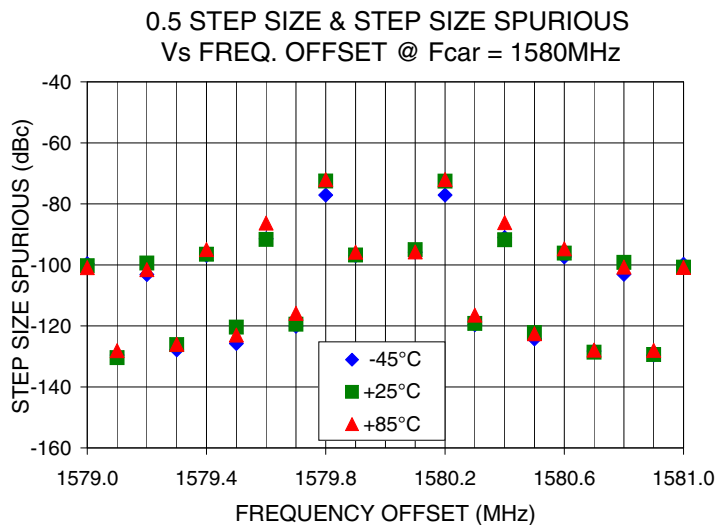
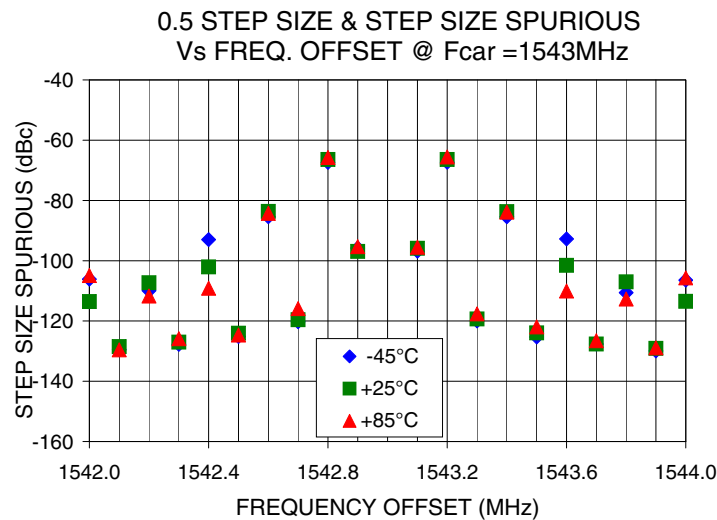
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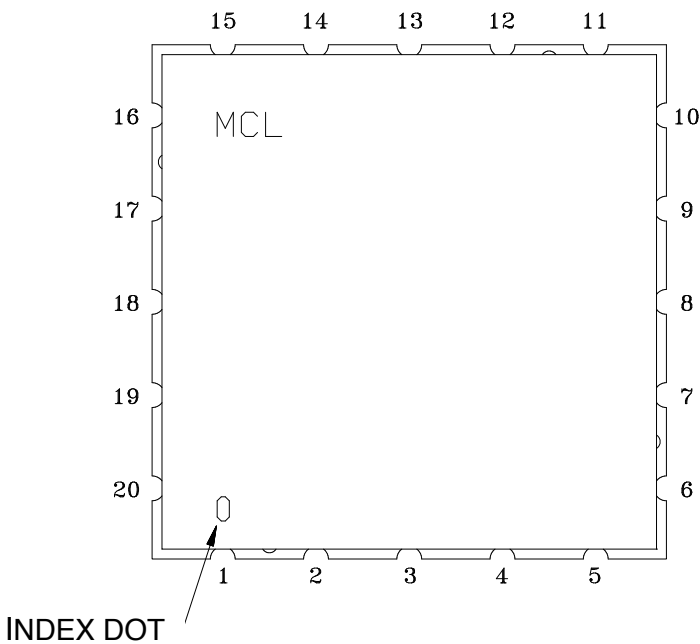


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Pin Configuration

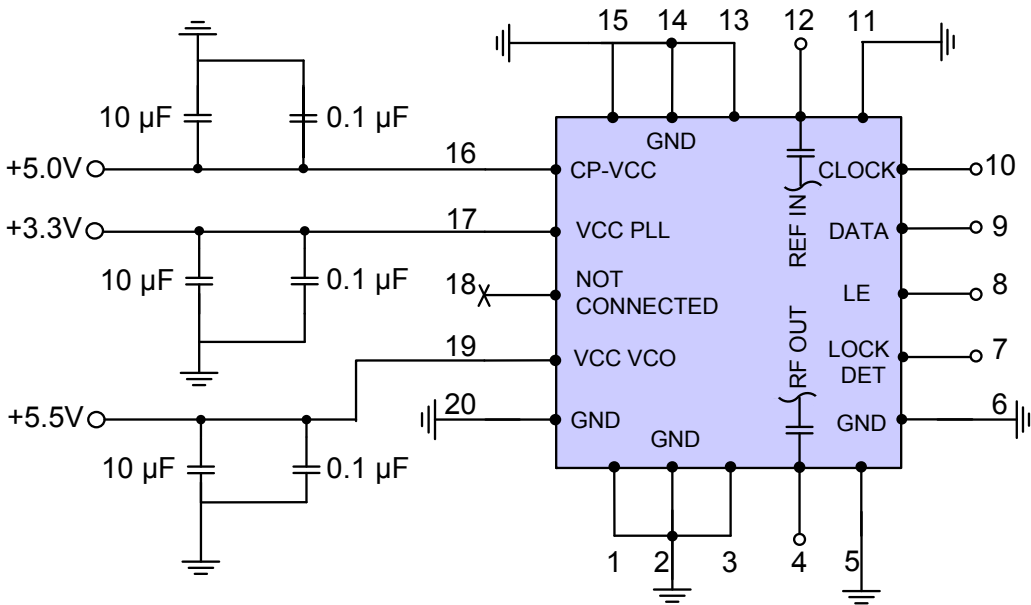


Pin Connection

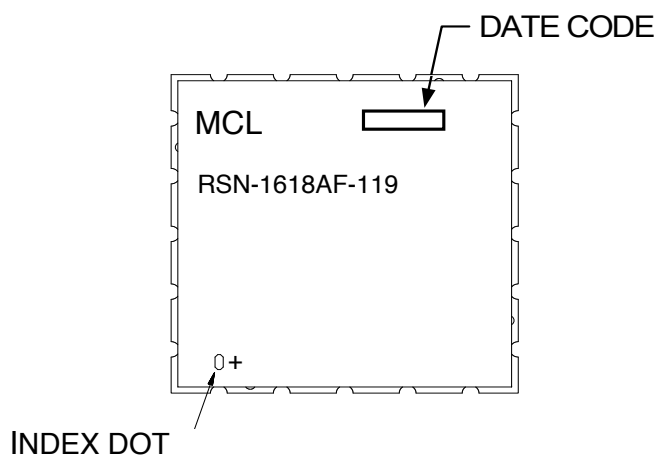
Pin Number	Function
1	GND
2	GND
3	GND
4	RF OUT
5	GND
6	GND
7	LOCK DET
8	LE
9	DATA
10	CLOCK
11	GND
12	REF IN
13	GND
14	GND
15	GND
16	VCC CP
17	VCC PLL
18	Not Connected
19	VCC VCO
20	GND

Recommended Application Circuit

Note: REF IN and RF OUT ports are internally AC coupled.



Device Marking

**Additional Detailed Technical Information**

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Case Style: JG1228

Tape & Reel: TR-F99

Suggested Layout for PCB Design: PL-319

Evaluation Board: TB-554+

Environment Ratings: ENV03T2



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