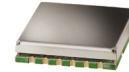


# Frequency Synthesizer **SSND-6013N-119+**

50Ω Dual Frequency 600 and 1390 MHz (fixed)

## The Big Deal

- Dual frequency
- Low phase noise and spurious
- Very small size 0.60" x 0.60" x 0.138"



CASE STYLE: KJ1373

## Product Overview

The SSND-6013N-119+ is a Dual Frequency Synthesizer, designed to operate at two discrete, single frequency synthesizers 600 and 1390 MHz for GPS receiver application. The SSND-6013N-119+ is packaged in a very small metal case (size of 0.60" x 0.60" x 0.138") to shield against unwanted signals and noise.

## Key Features

Feature	Advantages
Dual frequency	For saving in cost and system real estate.
Low phase noise and spurious	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Very small size, 0.60" x 0.60" x 0.138"	The small size enables the SSND-6013N-119+ to be used in compact designs.
Low current consumptions	Can be used in a portable system.



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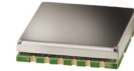
# Frequency Synthesizer

SSND-6013N-119+

50Ω Dual Frequency 600 and 1390 MHz (fixed)

## Features

- Dual frequency
- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC RF-IF=+2.5V, VCC VCO RF=+3.0V, VCC VCO IF=+3.0V)
- Small size 0.60" x 0.60" x 0.138"



CASE STYLE: KJ1373  
PRICE: \$29.95 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.

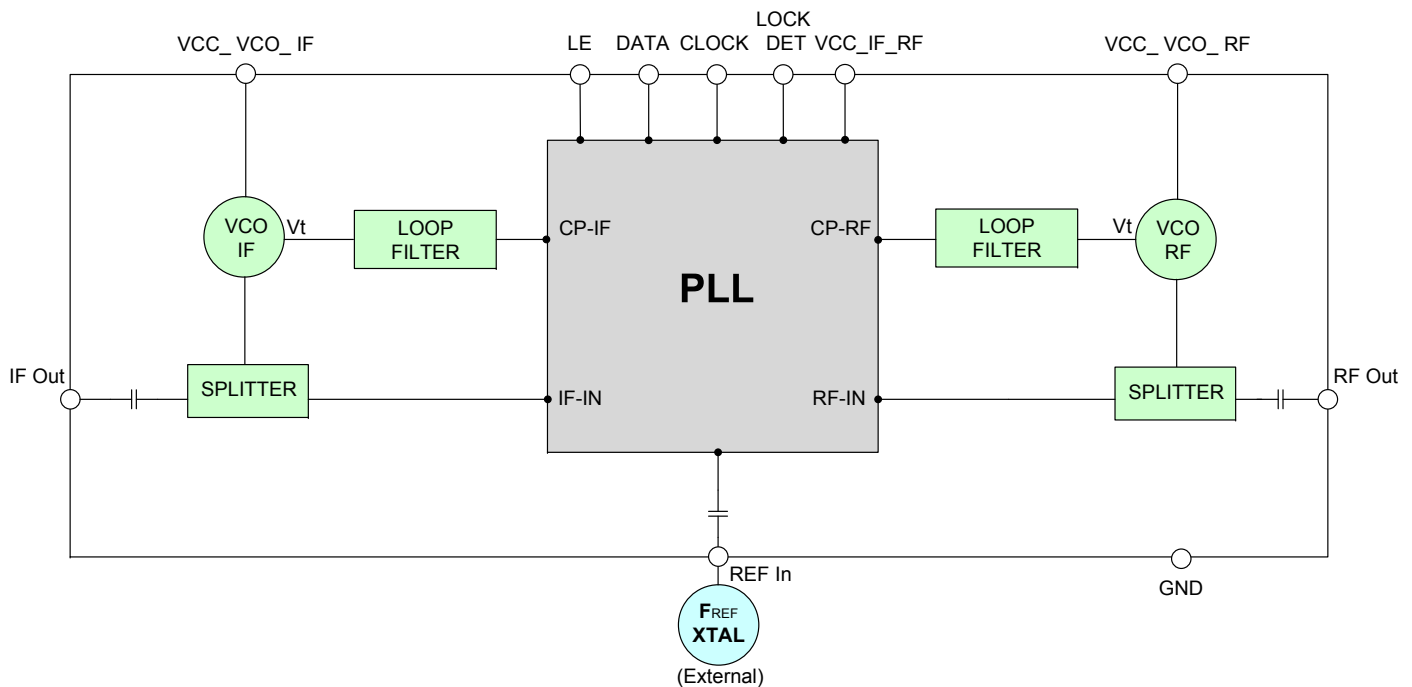
## Applications

- GPS receiver

## General Description

The SSND-6013N-119+ is a Frequency Synthesizer, designed to operate at 600 and 1390 MHz for GPS receiver application. The SSND-6013N-119+ is packaged in a metal case (size of 0.60" x 0.60" x 0.138") to shield against unwanted signals and noise. To enhance the robustness of SSND-6013N-119+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tombstoning during subsequent solder reflow operations by the customer.

## Simplified Schematic



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REV. A  
M127436  
EDR-9423/4F1  
SSND-6013N-119+  
Category-A2  
RAV  
100518  
Page 2 of 11

**Electrical Specifications** (over operating temperature -40°C to +85°C)

Parameters	Test Conditions	Min.	Typ.	Max.	Units	
IF Frequency Range (Fixed)	-	600	-	600	MHz	
RF Frequency Range (Fixed)	-	1390	-	1390		
Comparison Frequency	-	-	2000	-		
Settling Time	Within ± 1 kHz	-	0.4	-	mSec	
IF Output Power	-	-12.0	-10.0	-8.0	dBm	
RF Output Power	-	+1.0	+3.1	+5.0		
IF SSB Phase Noise	@ 100 Hz offset	-	-90	-	dBc/Hz	
	@ 1 kHz offset	-	-96	-91		
	@ 10 kHz offset	-	-94	-91		
	@ 100 kHz offset	-	-121	-117		
	@ 1 MHz offset	-	-147	-141		
RF SSB Phase Noise	@ 100 Hz offset	-	-84	-		
	@ 1 kHz offset	-	-91	-86		
	@ 10 kHz offset	-	-90	-86		
	@ 100 kHz offset	-	-122	-117		
	@ 1 MHz offset	-	-144	-140		
IF Reference Spurious Suppression	Ref. Freq. 10 MHz	-	-84	-74	dBc	
RF Reference Spurious Suppression		-	-100	-67		
IF Comparison Spurious Suppression	Comp. Freq. 2000 kHz	-	-90	-75		
RF Comparison Spurious Suppression		-	-91	-80		
Non - Harmonic Spurious Suppression	-	-	-90	-		
IF Harmonic Suppression	-	-	-24	-15		
RF Harmonic Suppression	-	-	-29	-25		
VCC RF-IF Supply Voltage	+2.50	+2.25	+2.50	+2.75	V	
VCC VCO IF Supply Voltage	+3.00	+2.95	+3.00	+3.05		
VCC VCO RF Supply Voltage	+3.00	+2.95	+3.00	+3.05		
VCC RF-IF Supply Current	-	-	6	11	mA	
VCO IF Supply Current	-	-	7	13		
VCO RF Supply Current	-	-	10	16		
Reference Input (External)	Frequency	10 (square wave)	-	10	MHz	
	Amplitude	1	-	1	V <sub>RPP</sub>	
	Input impedance	-	-	100	KΩ	
	Phase Noise @ 1 kHz offset	-	-	-145	-	dBc/Hz
RF Output port Impedance	-	-	50	-	Ω	
Input Logic Level	Input high voltage	-	2.2	-	V	
	Input low voltage	-	-	0.45	V	
Digital Lock Detect	Locked	-	1.90	-	2.70	V
	Unlocked	-	-	0.40	-	V
Frequency Synthesizer PLL	-	LMX2433				
PLL Programming	-	3-wire serial 2.5V CMOS				
Register Map @ IF+RF Freq.	R0_Register	-	(MSB) 000001000000000000101000 (LSB)			
	R1_Register	-	(MSB) 01000000001010110111001 (LSB)			
	R2_Register	-	(MSB) 0000000000000000000010 (LSB)			
	R3_Register	-	(MSB) 110001000000000000101011 (LSB)			
	R4_Register	-	(MSB) 010000000000100101100100 (LSB)			
	R5_Register	-	(MSB) 00000000000000000000101 (LSB)			

**Absolute Maximum Ratings**

Parameters	Ratings
VCO Supply Voltage	4V
PLL Supply Voltage	3V
VCO Supply Voltage to PLL Supply Voltage	N.A
Reference Frequency Voltage	+0.5Vmin, VCC RF-IF+0.3Vmax
Data, Clock, LE Levels	-0.3Vmin, VCC RF-IF +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		POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURENT (mA)		
		-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
IF	600	-10.35	-10.13	-9.63	6.61	7.61	8.22	6.30	6.53	6.77
RF	1390	1.43	3.17	3.32	8.65	10.56	11.53	6.30	6.53	6.77

FREQUENCY		HARMONICS (dBc)					
		F2			F3		
		-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
IF	600	-18.08	-24.09	-30.32	-48.24	-35.23	-37.37
RF	1390	-29.29	-29.91	-30.05	-45.71	-48.37	-46.12

FREQUENCY		@TEMP.	PHASE NOISE (dBc/Hz)				
			@OFFSETS				
			100Hz	1kHz	10kHz	100kHz	1MHz
IF	600	-45°C	-87.00	-98.08	-95.22	-122.29	-148.61
		+25°C	-89.11	-94.44	-94.62	-121.94	-147.24
		+85°C	-88.70	-94.64	-94.68	-121.14	-145.84
RF	1390	-45°C	-84.81	-90.18	-90.23	-122.48	-145.48
		+25°C	-83.74	-92.65	-90.29	-122.55	-144.79
		+85°C	-85.80	-91.34	-89.58	-121.6	-144.09



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COMPARISON SPURIOUS ORDER	(IF) COMPARISON SPURIOUS @Fcarrier 600MHz+(n*Fcomparison) (dBc) note 1			(RF) COMPARISON SPURIOUS @Fcarrier 1390MHz+(n*Fcomparison) (dBc) note 1		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
	n					
-4	-93.31	-99.13	-95.64	-107.76	-103.14	-103.21
-3	-93.19	-104.56	-97.58	-96.89	-99.96	-98.68
-2	-100.28	-100.40	-97.19	-101.95	-98.96	-94.43
-1	-88.76	-93.22	-95.21	-103.99	-92.75	-90.23
0 <sup>note 2</sup>	-	-	-	-	-	-
+1	-91.74	-94.81	-90.34	-104.63	-92.54	-90.60
+2	-93.84	-98.55	-92.46	-101.93	-99.06	-95.44
+3	-92.86	-104.80	-92.62	-106.50	-101.52	-100.67
+4	-88.61	-90.35	-90.91	-108.55	-102.81	-104.54

Note 1: Comparison frequency 2000 kHz

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

REFERENCE SPURIOUS ORDER	(IF) REFERENCE SPURIOUS @Fcarrier 600MHz+(n*Freference) (dBc) note 3			(RF) REFERENCE SPURIOUS @Fcarrier 1390MHz+(n*Freference) (dBc) note 3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
	n					
-5	-100.29	-99.36	-98.94	-113.64	-118.54	-108.12
-4	-92.15	-91.79	-92.98	-117.75	-114.01	-113.15
-3	-85.19	-90.08	-87.37	-75.28	-76.25	-72.06
-2	-84.58	-83.42	-82.56	-108.32	-115.38	-107.33
-1	-86.15	-85.78	-83.94	-102.93	-123.72	-104.80
0 <sup>note 4</sup>	-	-	-	-	-	-
+1	-83.47	-82.98	-80.48	-102.88	-102.16	-106.49
+2	-86.47	-89.85	-89.81	-109.25	-106.65	-113.69
+3	-96.39	-106.06	-89.75	-77.94	-76.89	-74.73
+4	-98.63	-101.20	-97.09	-113.21	-112.03	-108.96
+5	-98.11	-102.45	-97.90	-102.21	-110.71	-86.29

Note 3: Reference frequency 10 MHz

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



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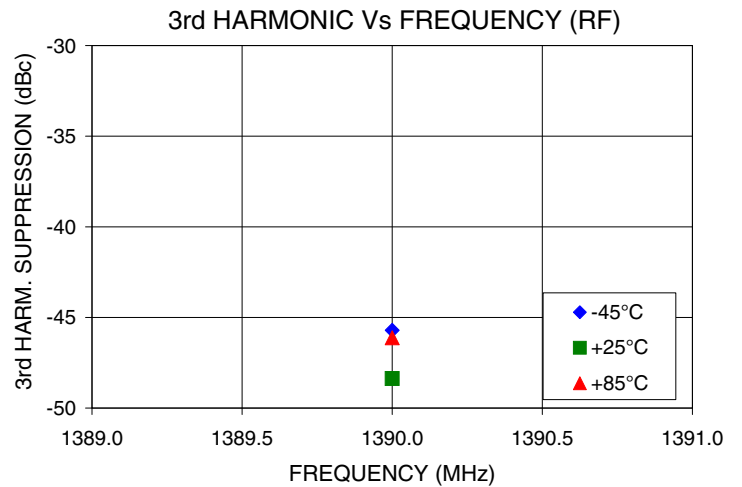
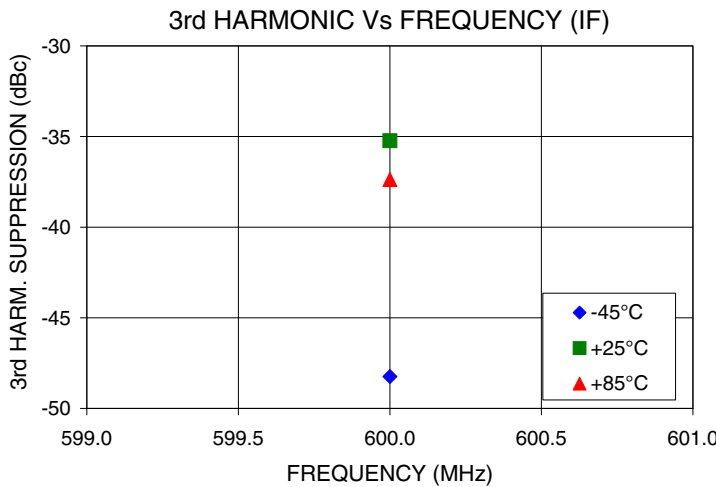
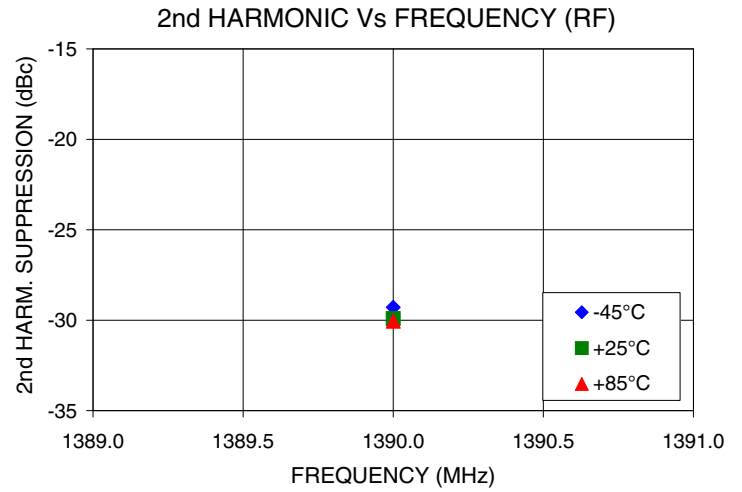
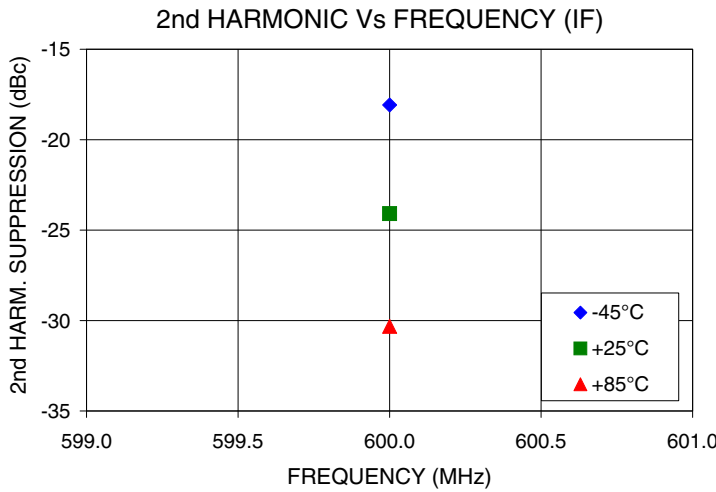
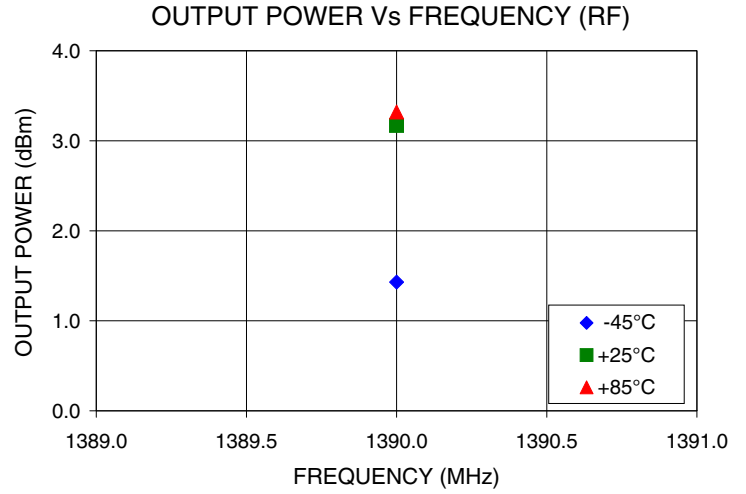
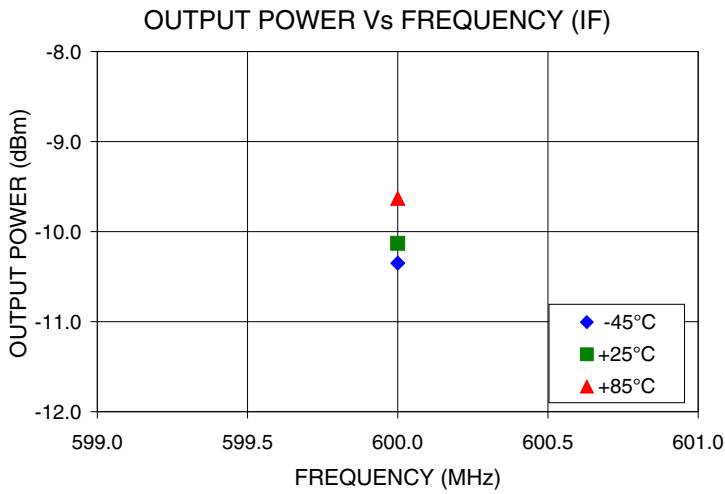


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Typical Performance Curves



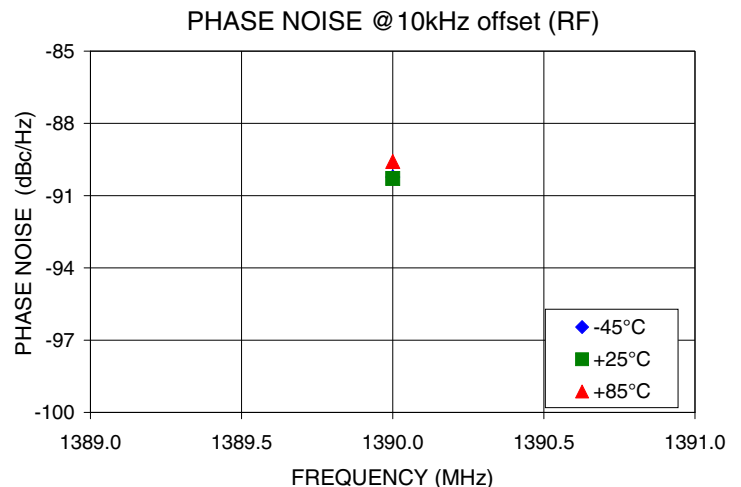
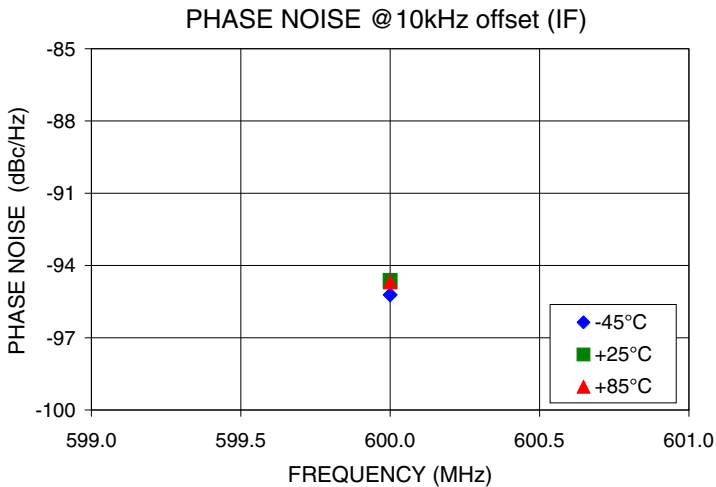
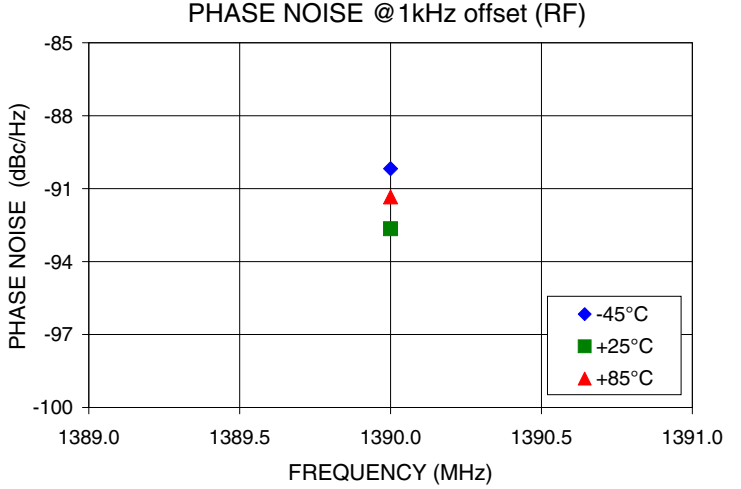
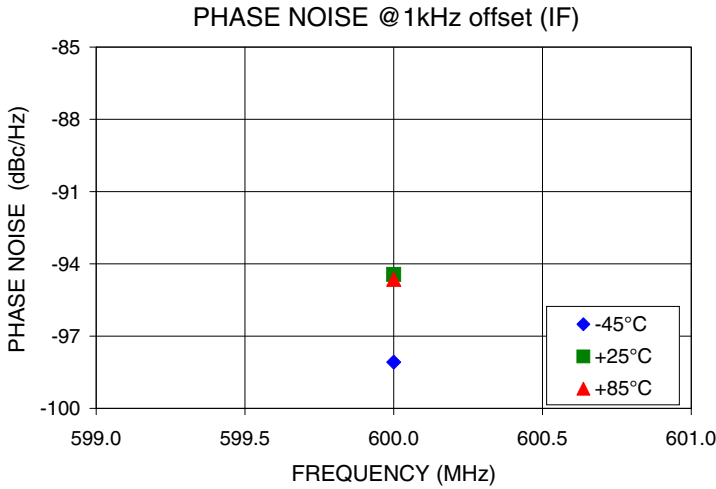
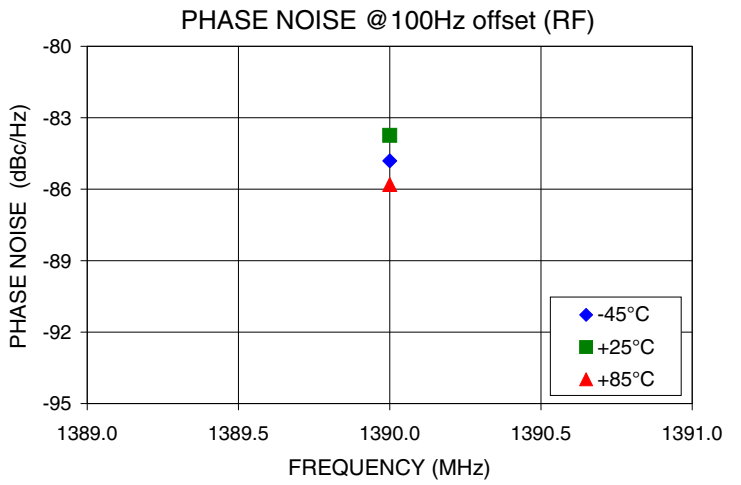
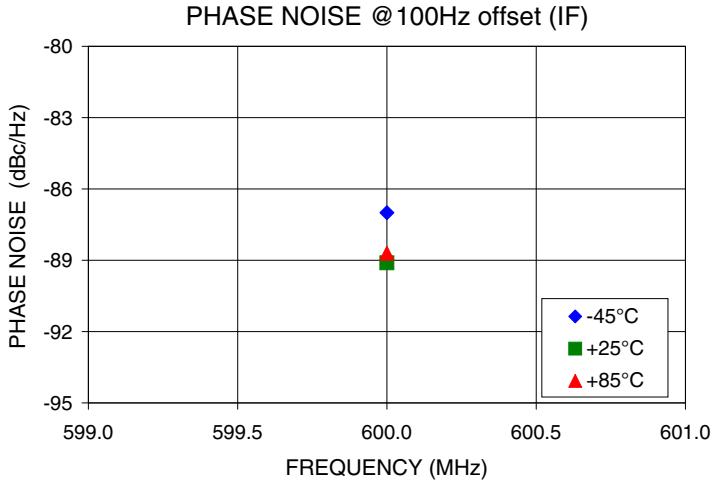
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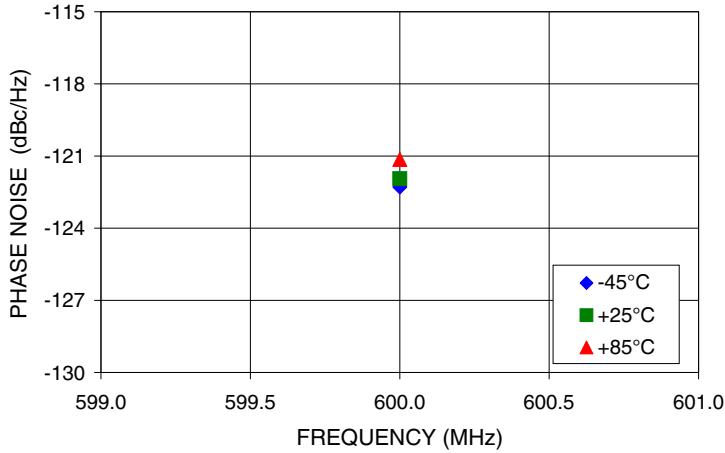


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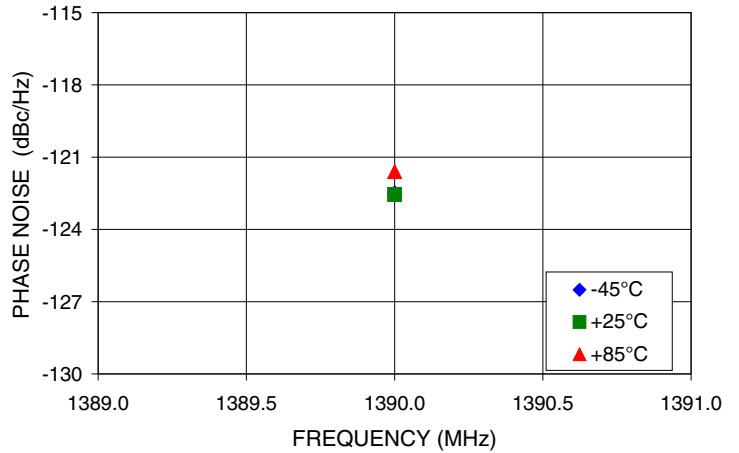


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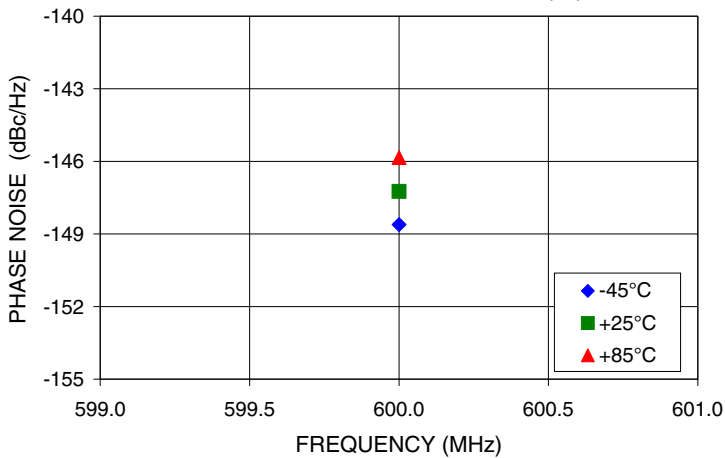
PHASE NOISE @ 100kHz offset (IF)



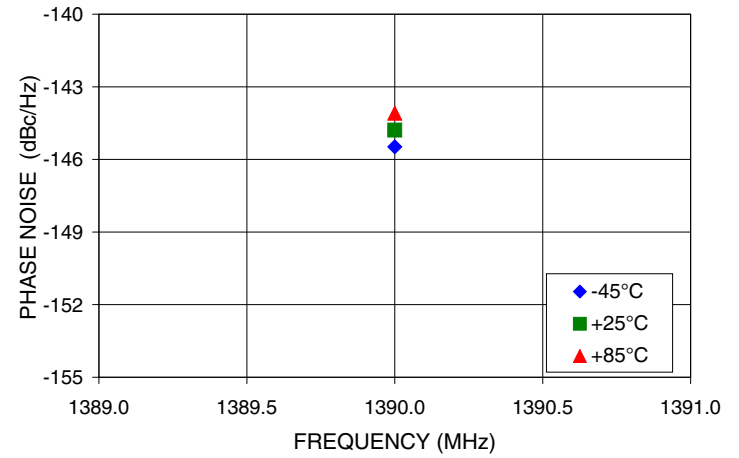
PHASE NOISE @ 100kHz offset (RF)



PHASE NOISE @ 1MHz offset (IF)



PHASE NOISE @ 1MHz offset (RF)



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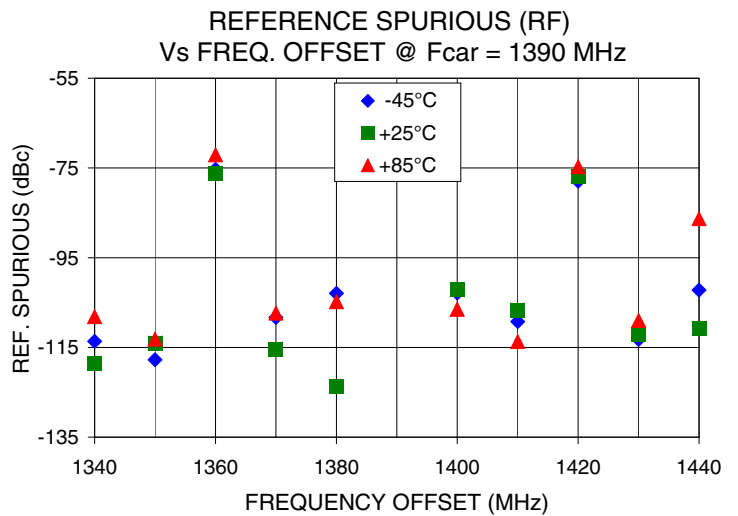
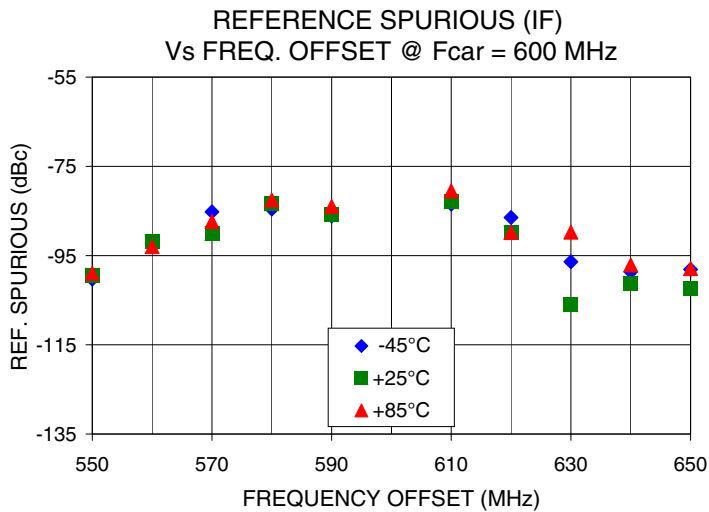
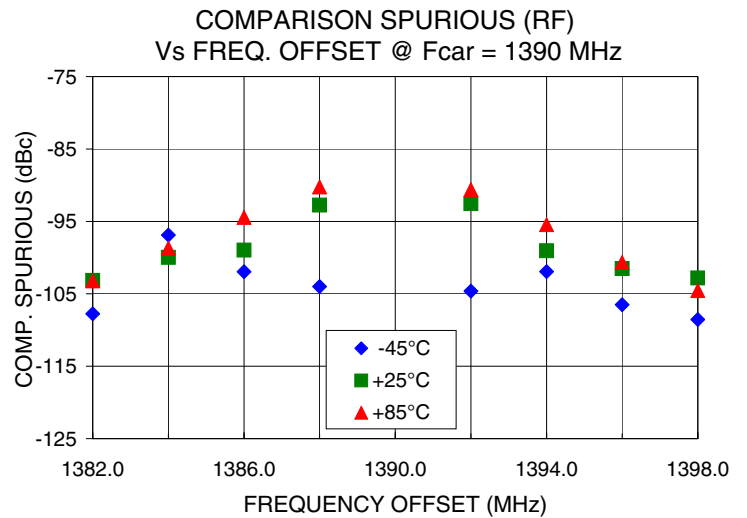
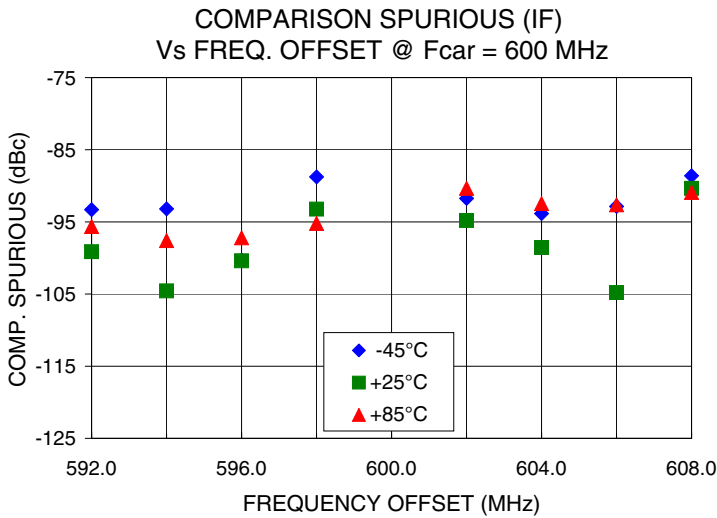


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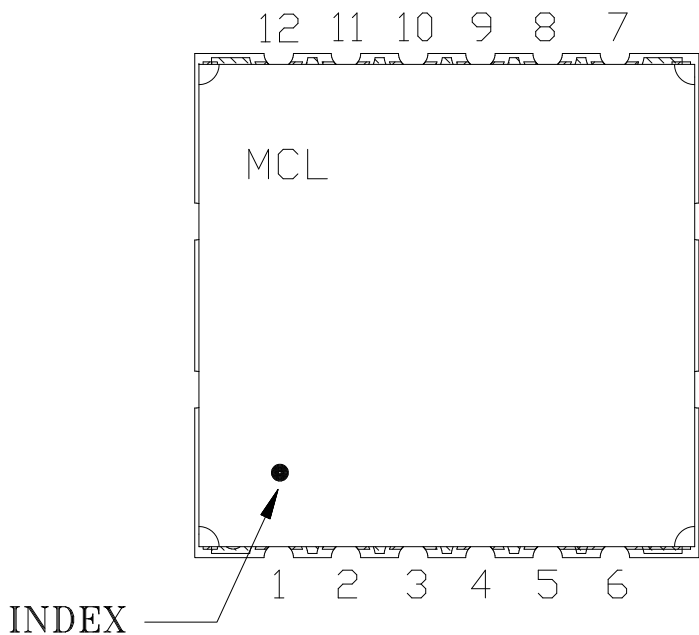


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Pin Configuration

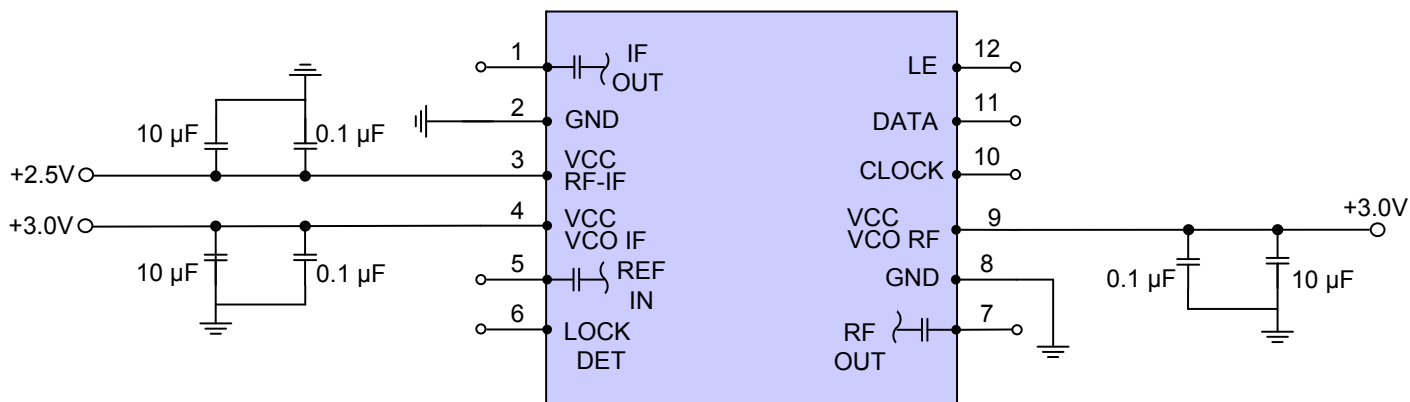


Pin Connection

Pin Number	Function
1	IF OUT
2	GND
3	VCC RF-IF
4	VCC VCO IF
5	REF IN
6	LOCK DET
7	RF OUT
8	GND
9	VCC VCO RF
10	CLOCK
11	DATA
12	LE

Recommended Application Circuit

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



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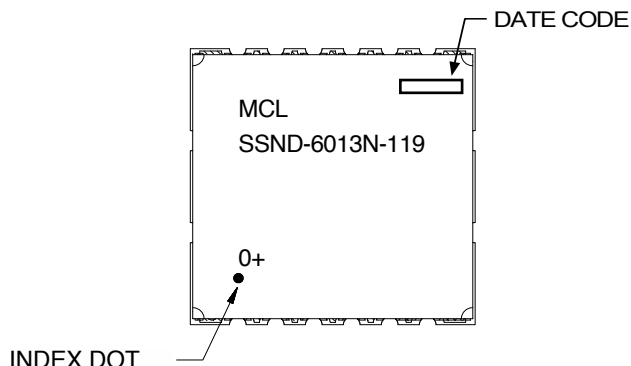


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**Device Marking**



**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:** KJ1373

**Tape & Reel:** TR-F95

**Suggested Layout for PCB Design:** PL-325

**Evaluation Board:** TB-571+

**Environment Ratings:** ENV03T2



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