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.

Surface Mount

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
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

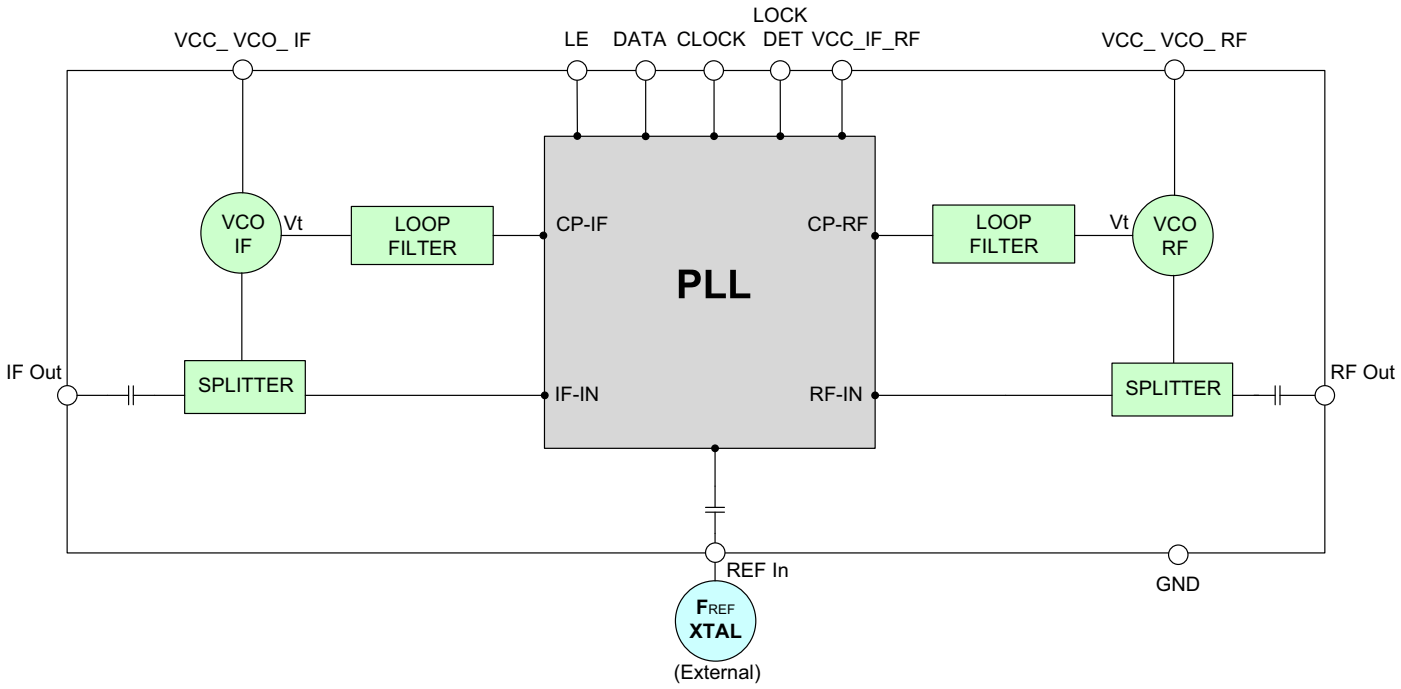
Applications

- 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



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	-	kHz
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	-89	
	@ 100 kHz offset	-	-121	-115	
	@ 1 MHz offset	-	-147	-140	
RF SSB Phase Noise	@ 100 Hz offset	-	-84		
	@ 1 kHz offset	-	-90	-84	
	@ 10 kHz offset	-	-90	-86	
	@ 100 kHz offset	-	-120	-116	
	@ 1 MHz offset	-	-143	-138	
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	-	-	-24	-20	
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	

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

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Reference Input (External)	Frequency	10 (square wave)	-	10	-	MHz
	Amplitude	1	-	1	-	V_{P-P}
	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 NOTE 1

R0_Register	*Prescaler Value*	*RF Counter Reset*	*RF CP Tri-State*	*RF CP Gain*	*PD Polarity*	*RF Reference Counter (15 bits)*		*Address*
	00	0	0	0	1	000000000000101		000
R1_Register	*RF Power-Down*	*RF Prescalar*	*RF B Counter (15 bits)*				*RF A Counter (4 bits)*	*Address*
	0	1	000000000101011				0111	001
R2_Register	*Reserved (9 bits)*					*RF Timeout Counter (12 bits)*		*Address*
	000000000					000000000000		010
R3_Register	*Prescaler Value*	*RF Counter Reset*	*RF CP Tri-State*	*RF CP Gain*	*PD Polarity*	*RF Reference Counter (15 bits)*		*Address*
	11	0	0	0	1	000000000000101		011
R4_Register	*IF Power-Down*	*IF Prescalar*	*IF B Counter (15 bits)*				*IF A Counter (4 bits)*	*Address*
	0	1	000000000010010				1100	100
R5_Register	*Reserved (9 bits)*					*IF Timeout Counter (12 bits)*		*Address*
	000000000					000000000000		101

Note 1: Registers load sequence is R5_Register, followed by R2_Register, R3_Register, R0_Register, R4_Register and R1_Register last.

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage (both VCO)	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

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	-9.60	-9.29	-8.85	7.61	7.61	8.40	6.46	6.69	6.88
RF	1390	1.39	2.84	4.22	8.46	10.49	11.83	6.46	6.69	6.88

FREQUENCY		HARMONICS (dBc)					
		F2			F3		
		-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
IF	600	-20.60	-24.68	-32.99	-55.43	-38.01	-34.66
RF	1390	-24.69	-27.77	-28.69	-41.44	-43.42	-43.19

FREQUENCY		@TEMP.	PHASE NOISE (dBc/Hz) @OFFSETS				
			100Hz	1kHz	10kHz	100kHz	1MHz
IF	600	-45°C	-87.01	-94.81	-92.91	-122.36	-147.52
		+25°C	-87.94	-95.02	-93.57	-121.12	-146.47
		+85°C	-86.89	-94.81	-93.71	-119.48	-143.93
RF	1390	-45°C	-81.80	-88.31	-90.57	-120.65	-144.19
		+25°C	-85.19	-89.95	-89.95	-120.04	-142.96
		+85°C	-80.81	-89.14	-89.20	-119.46	-142.72

COMPARISON SPURIOUS ORDER	(IF) COMPARISON SPURIOUS @Fcarrier 600MHz+(n*Fcomparison) (dBc) note 1			(RF) COMPARISON SPURIOUS @Fcarrier 1390MHz+(n*Fcomparison) (dBc) note 1		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-4	-90.59	-91.97	-92.81	-103.71	-105.57	-100.66
-3	-91.79	-109.42	-87.83	-103.12	-104.99	-98.97
-2	-86.39	-95.21	-85.60	-98.55	-111.36	-96.24
-1	-83.34	-86.97	-83.56	-92.74	-101.98	-89.65
0 note 2	-	-	-	-	-	-
+1	-78.49	-82.76	-81.60	-94.76	-102.12	-90.55
+2	-79.42	-86.91	-82.18	-98.53	-113.61	-96.81
+3	-81.34	-90.70	-84.06	-102.75	-103.06	-101.27
+4	-99.00	-86.46	-89.35	-107.76	-103.93	-103.32

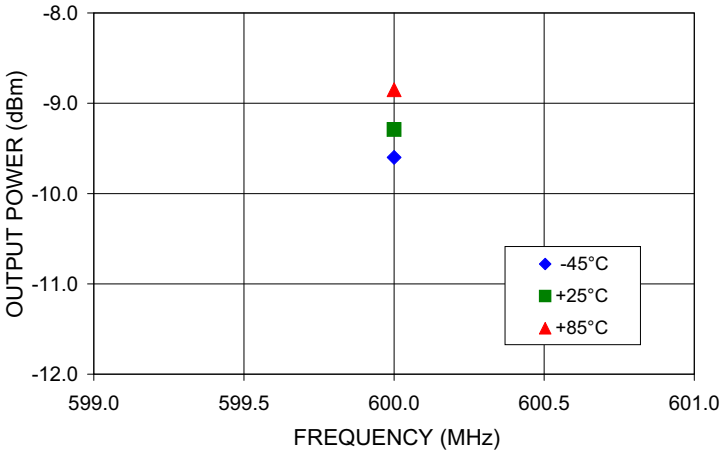
Note 1: Comparison frequency 2000 kHz
Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	(IF) REFERENCE SPURIOUS @Fcarrier 600MHz+(n*Freference) (dBc) note 3			(RF) REFERENCE SPURIOUS @Fcarrier 1390MHz+(n*Freference) (dBc) note 3		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-91.45	-97.66	-97.27	-109.38	-114.01	-115.12
-4	-95.57	-95.70	-94.41	-112.16	-111.78	-114.18
-3	-89.28	-91.00	-85.40	-87.97	-86.68	-81.41
-2	-89.34	-84.54	-81.63	-108.96	-107.20	-107.83
-1	-82.61	-84.28	-81.49	-102.42	-107.20	-111.38
0 note 4	-	-	-	-	-	-
+1	-78.39	-81.03	-79.87	-114.70	-108.24	-108.25
+2	-83.17	-87.18	-88.52	-116.28	-115.62	-113.83
+3	-90.99	-103.49	-98.57	-91.98	-87.94	-81.72
+4	-96.55	-98.84	-94.61	-114.73	-118.41	-119.04
+5	-98.59	-102.29	-94.56	-117.12	-116.68	-116.01

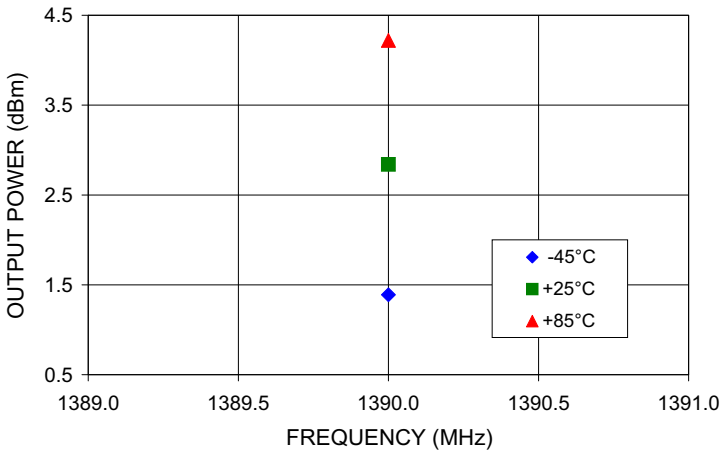
Note 3: Reference frequency 10 MHz
Note 4: All spurs are referenced to carrier signal (n=0).

Typical Performance Curves

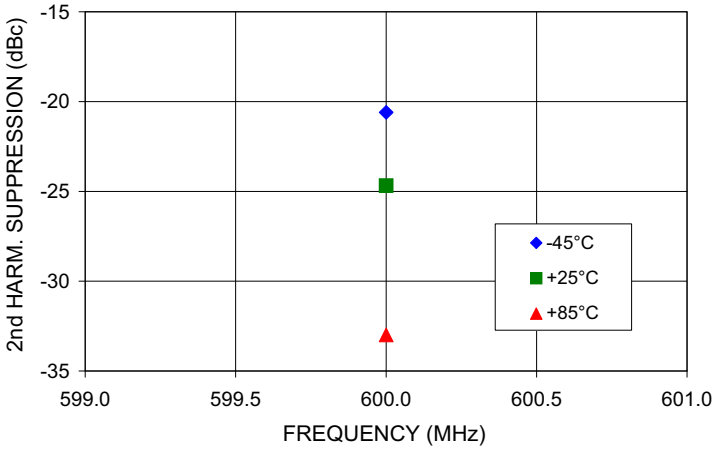
OUTPUT POWER Vs FREQUENCY (IF)



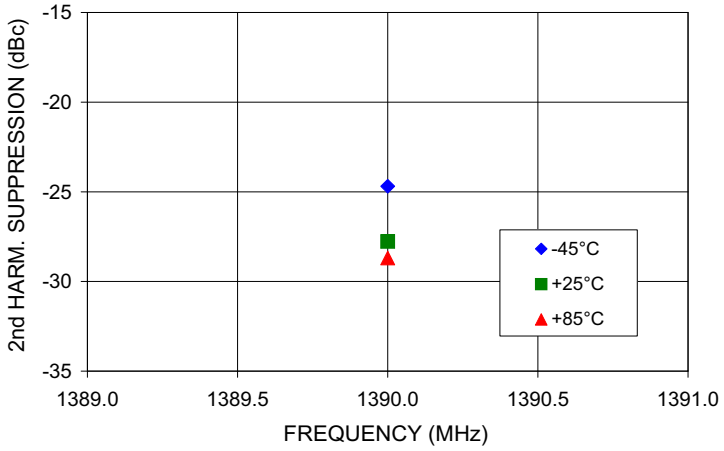
OUTPUT POWER Vs FREQUENCY (RF)



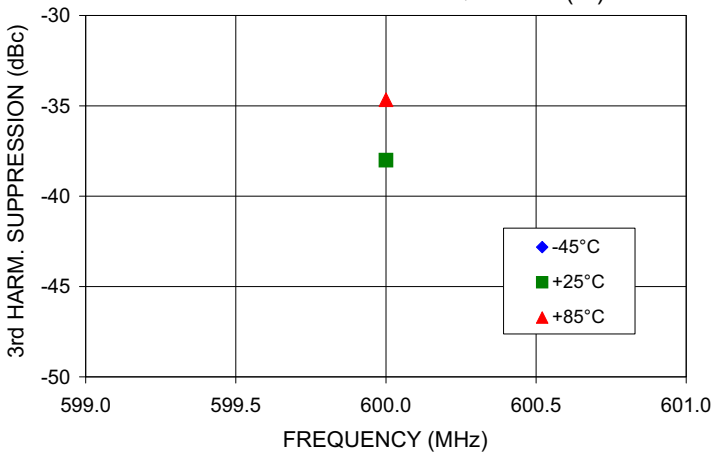
2nd HARMONIC Vs FREQUENCY (IF)



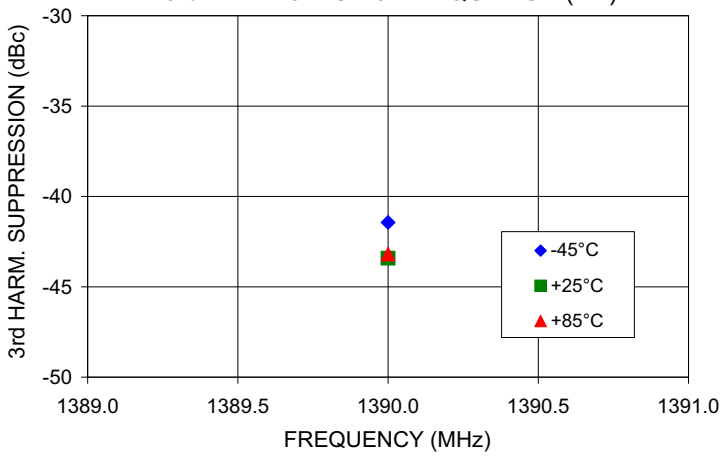
2nd HARMONIC Vs FREQUENCY (RF)



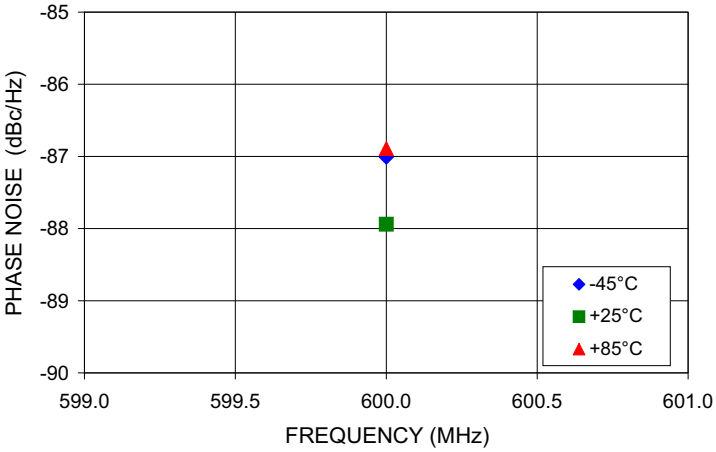
3rd HARMONIC Vs FREQUENCY (IF)



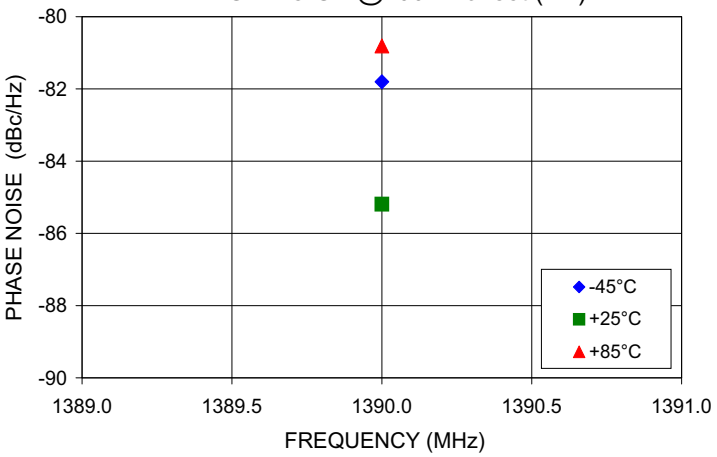
3rd HARMONIC Vs FREQUENCY (RF)



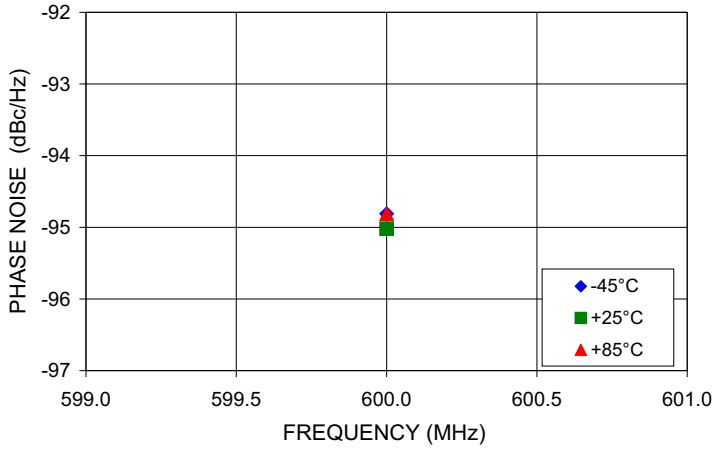
PHASE NOISE @100Hz offset (IF)



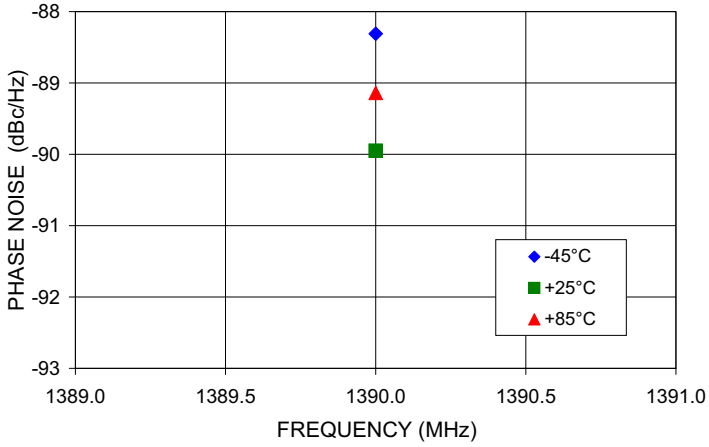
PHASE NOISE @100Hz offset (RF)



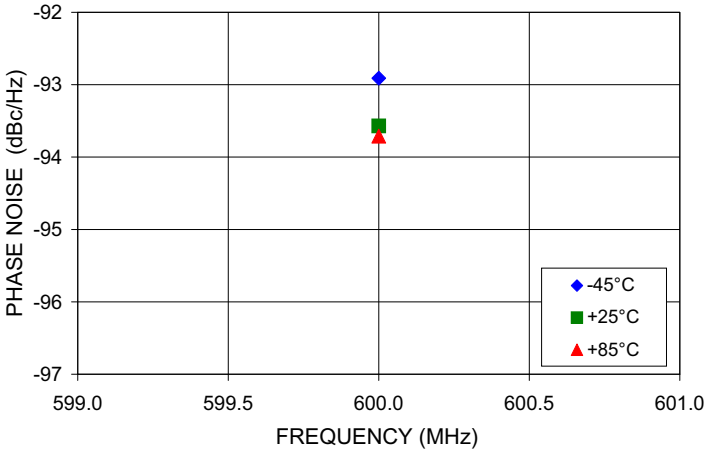
PHASE NOISE @1kHz offset (IF)



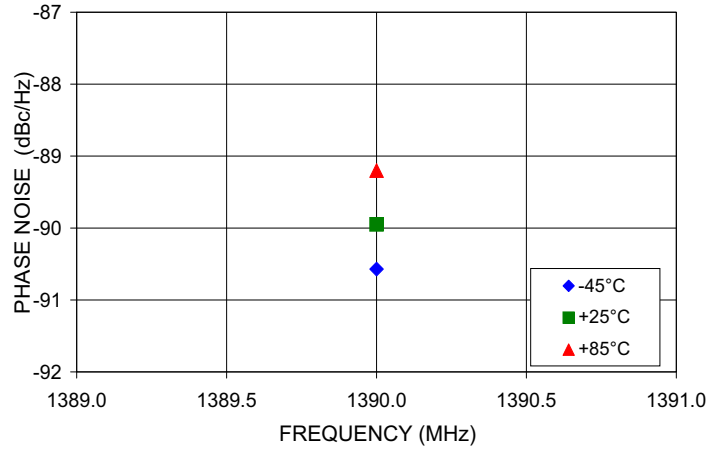
PHASE NOISE @1kHz offset (RF)



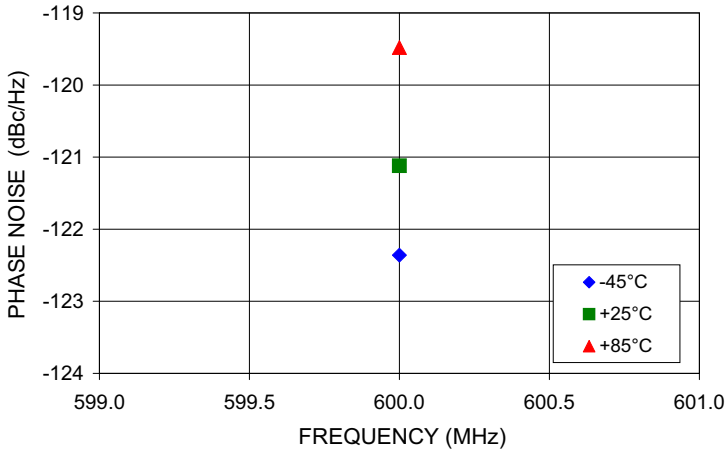
PHASE NOISE @10kHz offset (IF)



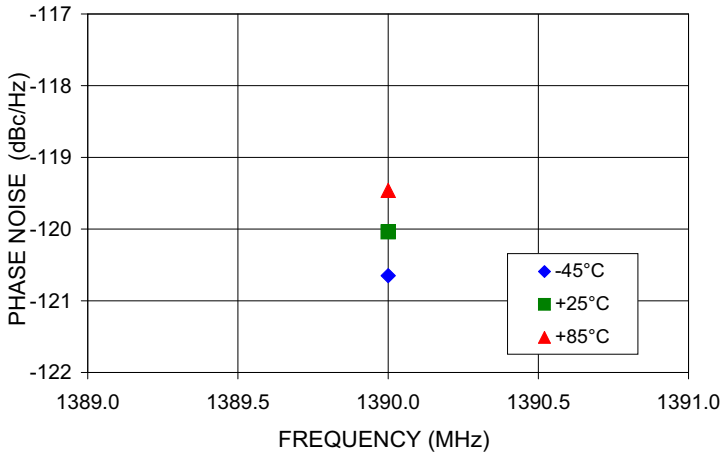
PHASE NOISE @10kHz offset (RF)



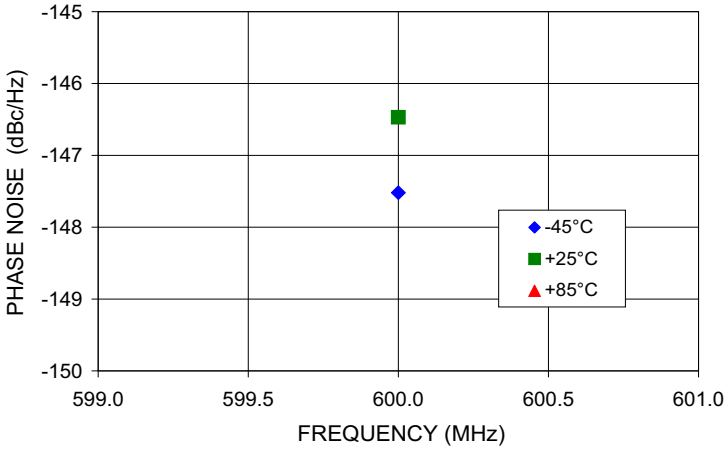
PHASE NOISE @100kHz offset (IF)



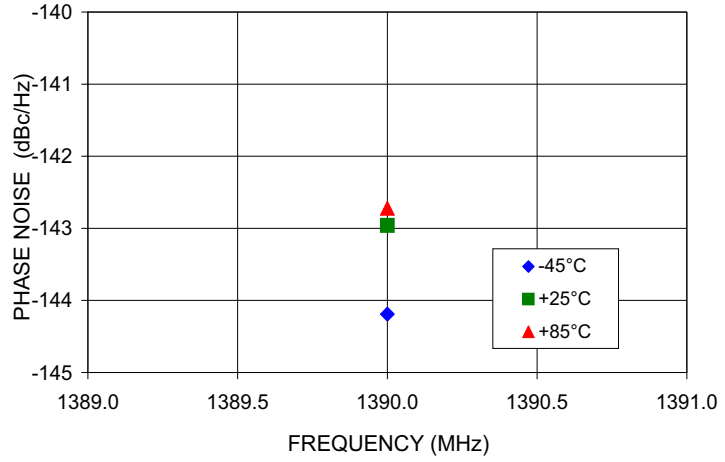
PHASE NOISE @100kHz offset (RF)



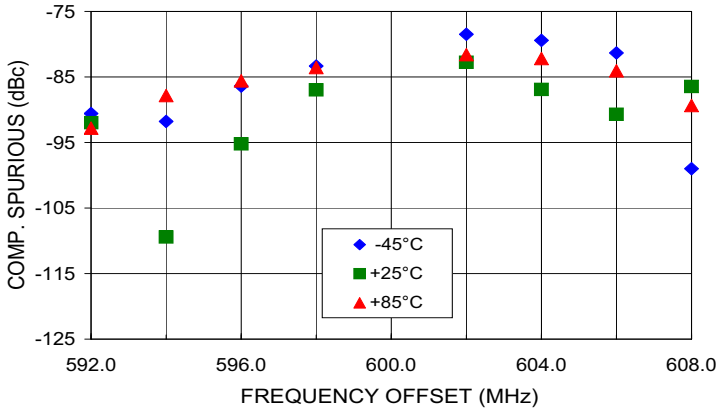
PHASE NOISE @1MHz offset (IF)



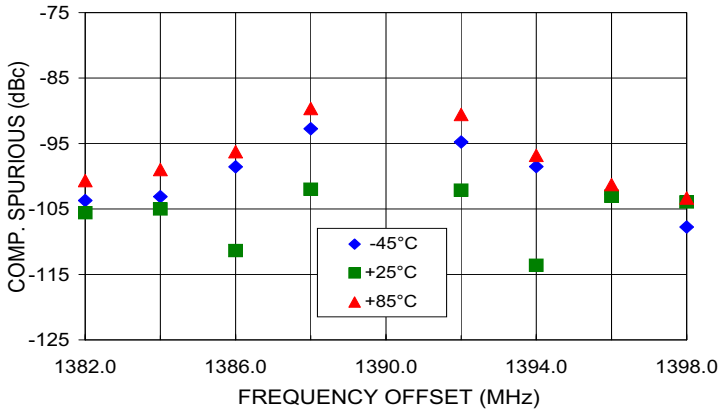
PHASE NOISE @1MHz offset (RF)



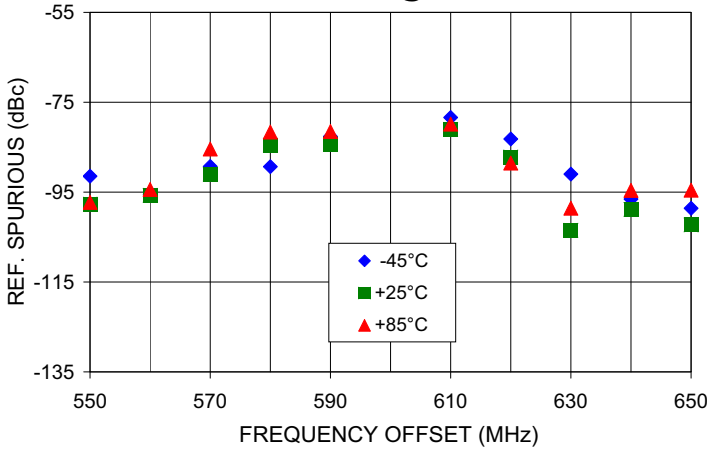
COMPARISON SPURIOUS (IF)
Vs FREQ. OFFSET @ Fcar = 600 MHz



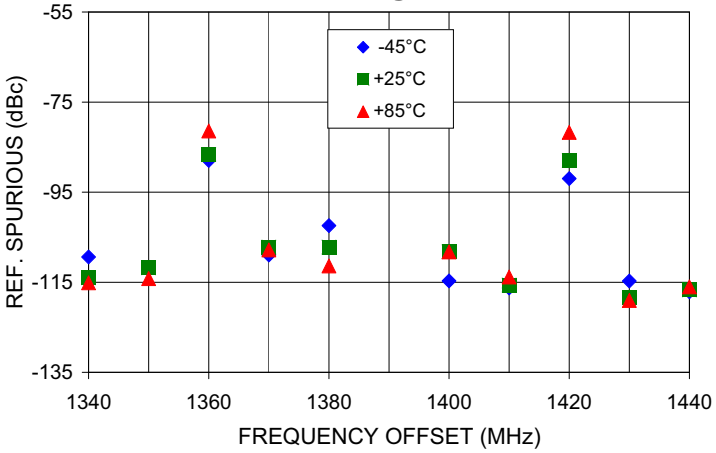
COMPARISON SPURIOUS (RF)
Vs FREQ. OFFSET @ Fcar = 1390 MHz



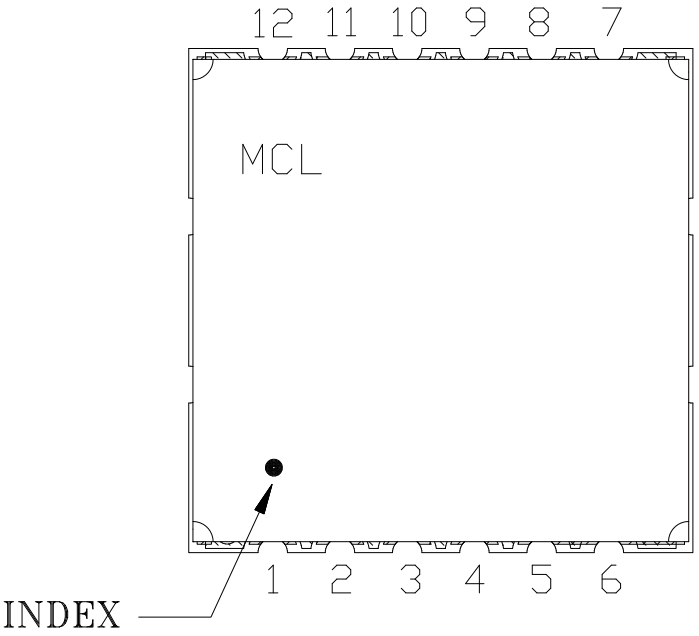
REFERENCE SPURIOUS (IF)
Vs FREQ. OFFSET @ Fcar = 600 MHz



REFERENCE SPURIOUS (RF)
Vs FREQ. OFFSET @ Fcar = 1390 MHz



Pin Configuration

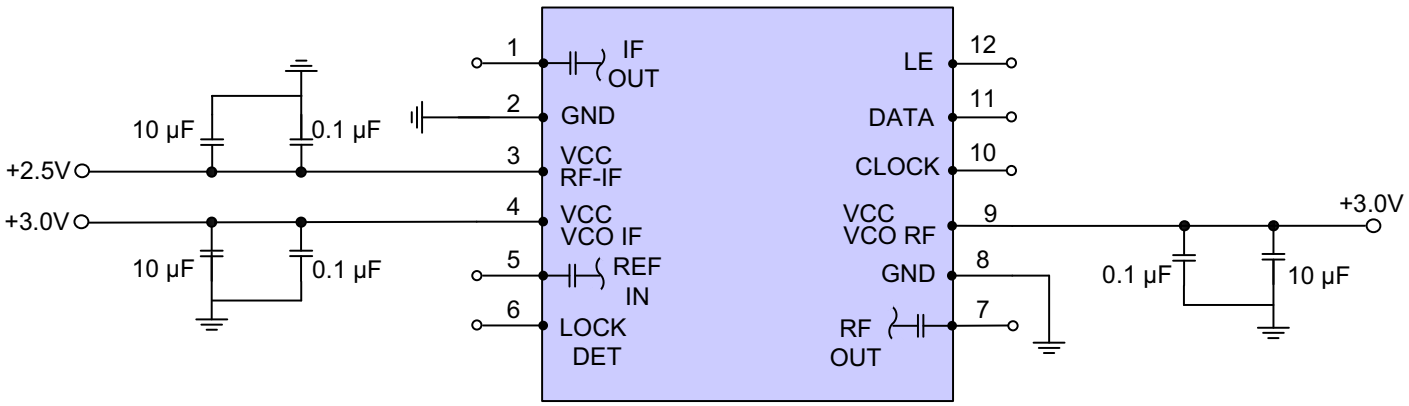


Pin Connection

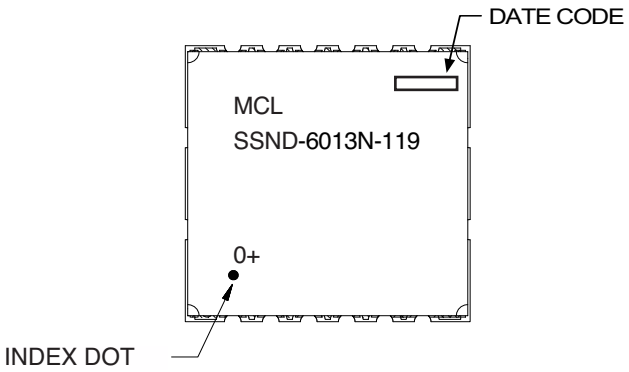
Pin Number	Function
1	IF OUT
2	GND
3	VCC RF-IF
4	VCC VCO IF
5	REF IN
6	LOCK DET
7	RF OUT
8	GND
9	VCC VCO RF
10	CLOCK
11	DATA
12	LE

Recommended Application Circuit

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



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: ENV65T2