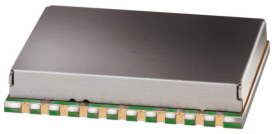
Frequency Synthesizer DSN-2620A-119+

50Ω 2000 to 2620 MHz

The Big Deal

- Fractional N synthesizer
- Low phase noise and spurious



CASE STYLE: KL1294

Product Overview

The DSN-2620A-119+ is a Frequency Synthesizer, designed to operate from 2000 to 2620 MHz for Military and Avionics application. The DSN-2620A-119+ is packaged in a metal case (size of 1.250" x 1.000" x 0.232") to shield against unwanted signals and noise.

Key Features

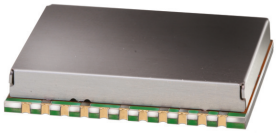
Feature	Advantages
Low phase noise and spurious: • Phase Noise: -96 dBc/Hz typ. @ 10 kHz offset • Step Size Spurious: -80 dBc typ. • Comparison Spurious: -98 dBc typ. • Reference Spurious: -98 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of DSN-2620A-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.

Surface Mount

Frequency Synthesizer

DSN-2620A-119+

50Ω 2000 to 2620 MHz



CASE STYLE: KL1294
PRICE: $45.95 ea. QTY (1-9)

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

Features

- Fractional N synthesizer
- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Operating voltage (VCC VCO=+8V, VCC PLL=+15V)

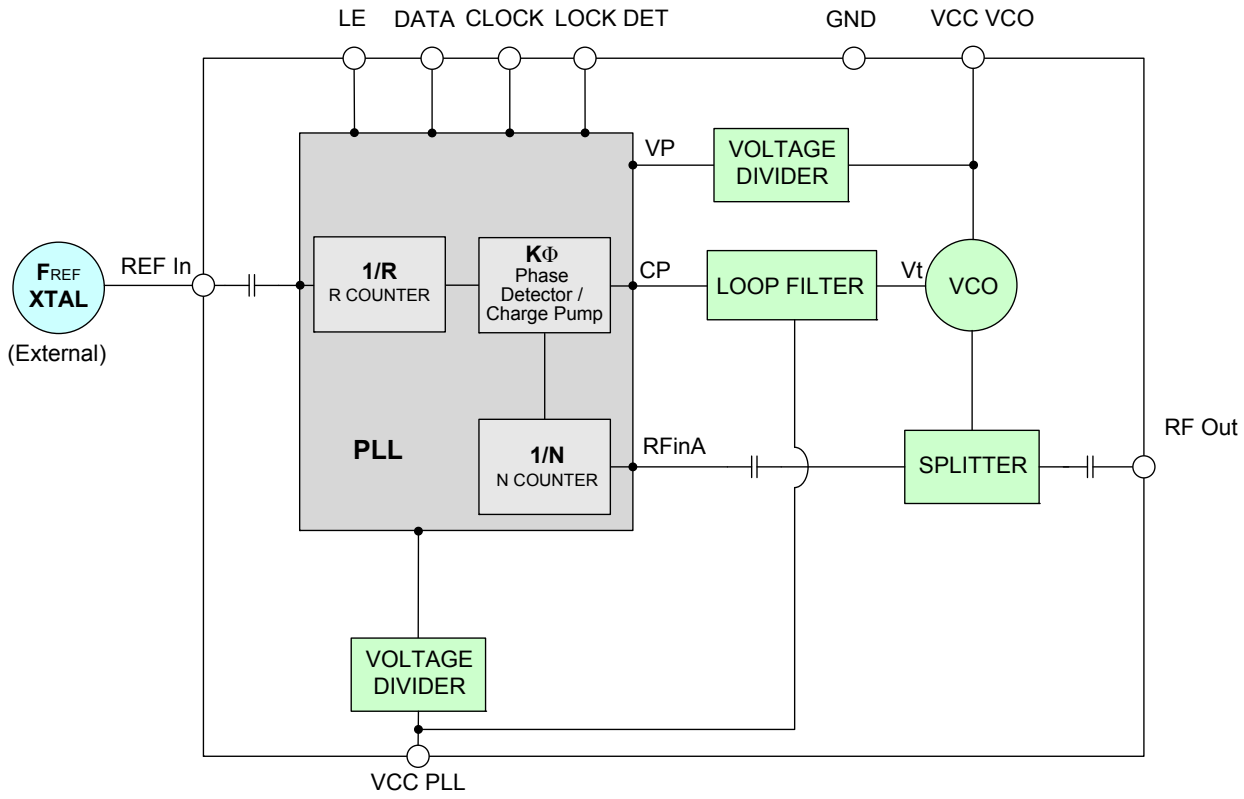
Applications

- Military and Avionics

General Description

The DSN-2620A-119+ is a Frequency Synthesizer, designed to operate from 2000 to 2620 MHz for Military and Avionics application. The DSN-2620A-119+ is packaged in a metal case (size of 1.250" x 1.000" x 0.232") to shield against unwanted signals and noise. To enhance the robustness of DSN-2620A-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 -32°C to +75°C)*

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	2000	-	2620	MHz
Step Size		-	-	500	-	KHz
Comparison Frequency		-	-	10	-	MHz
Settling Time		Within ± 1 kHz	-	1.3	-	mSec
Output Power		-	+0.5	+3.2	+5.5	dBm
SSB Phase Noise		@ 100 Hz offset	-	-76	-	dBc/Hz
		@ 1 kHz offset	-	-95	-88	
		@ 10 kHz offset	-	-96	-90	
		@ 100 kHz offset	-	-112	-106	
		@ 1 MHz offset	-	-138	-133	
Integrated SSB Phase Noise		@ 100 Hz to 1MHz	-	-48	-	dBc
Step Size Spurious Suppression		Step Size 500 kHz	-	-80	-60	dBc
0.5 Step Size Spurious Suppression		0.5 Step Size 250 KHz	-	-70	-50	
Reference & Comparison Spurious Suppression		Ref. & Comp. Freq. 10 MHz	-	-98	-77	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-33	-23	
VCO Supply Voltage		+8	+7.75	+8.00	+8.25	V
PLL Supply Voltage		+15	+14.75	+15.00	+15.25	
VCO Supply Current		-	-	67	74	mA
PLL Supply Current		-	-	22	30	
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	-	2.55	-	-	V
	Input low voltage	-	-	-	0.60	V
Digital Lock Detect	Locked	-	2.05	-	2.90	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4153			
PLL Programming		-	3-wire serial 3V CMOS			

Register Map @ 2620 MHz[Note 1]

R0_Register	Fast lock	9 Bit Integer Counter								12 Bit Frac Counter						Control Bits
	0	100000110								000000000000						00
R1_Register	Load	Muxout	Reserved	Prescalar	R Counter					12 Bit Interpolator Modulous						Control Bits
	0	001	0	1	0001					000000010100						01
R2_Register*	N/A					Resync	Ref Doubler	CP/2	CP Current	PD Polarity	Lock Detect	Power Down	CP Three State	Counter Reset	Control Bits	
	00000000					0000	0	0	XYZ	0	1	0	0	0	10	
R3_Register	N/A							Reserved	Noise & Spur Mode	Reserved				Lowest Noise	Control Bits	
	0000000000000							0	1111	000				1	11	

Note 1: Registers Load Sequence: R0 Register, R1 Register, R2 Register , R3 Register.

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage [Note 2]	8.5V
PLL Supply Voltage [Note 2]	17.0V
VCO Supply Voltage to PLL Supply Voltage	**Note 2**
Reference Frequency Amplitude	$3.45V_{P-P}$
Data, Clock, LE Levels	0Vmin, 3.45Vmax
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

Note 2: Power on/off Sequence: Power on: VCO Supply Voltage,followed by PLL Supply Voltage.
Power off: PLL Supply Voltage, followed by VCO Supply Voltage.

*** Refer to Charge Pump Settings**

FREQ.LOCK [MHz]	Charge Pump Settings		
	X	Y	Z
2000.0 - 2079.5	1	0	0
2080.0 - 2219.5	1	0	1
2220.0 - 2319.5	1	1	0
2320.0 - 2620.0	1	1	1

Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURENT (mA)		
	-37°C	+25°C	+80°C	-37°C	+25°C	+80°C	-37°C	+25°C	+80°C
2000	3.31	3.03	2.41	64.84	67.02	67.98	18.99	20.82	23.19
2046	3.39	3.11	2.48	64.92	67.09	68.04	19.95	21.82	24.21
2112	3.46	3.18	2.54	65.04	67.20	68.15	19.84	21.73	24.12
2178	3.60	3.32	2.66	65.29	67.28	68.22	19.86	21.77	24.17
2244	3.57	3.27	2.60	65.40	67.38	68.33	19.94	21.86	24.26
2310	3.54	3.28	2.59	65.43	67.44	68.38	18.98	20.89	23.28
2376	3.53	3.27	2.57	65.52	67.51	68.47	19.93	21.87	24.28
2442	3.49	3.19	2.49	65.56	67.54	68.50	19.83	21.77	24.18
2508	3.43	3.21	2.50	65.55	67.55	68.51	19.85	21.79	24.21
2574	3.27	3.06	2.35	65.59	67.56	68.53	19.91	21.87	24.28
2620	3.22	2.96	2.25	65.37	67.55	68.54	18.97	20.90	23.30

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-37°C	+25°C	+80°C	-37°C	+25°C	+80°C
2000	-32.22	-31.04	-27.86	-42.72	-42.48	-43.41
2046	-32.80	-31.28	-28.44	-41.45	-41.34	-41.54
2112	-32.65	-31.21	-28.57	-40.83	-40.70	-41.02
2178	-32.81	-31.76	-29.40	-40.67	-40.31	-39.77
2244	-32.84	-33.15	-31.46	-40.33	-39.40	-40.29
2310	-33.52	-35.84	-33.94	-41.72	-39.89	-39.79
2376	-34.87	-39.13	-36.52	-42.35	-37.89	-39.35
2442	-37.03	-39.39	-37.09	-42.62	-41.08	-44.86
2508	-39.65	-40.59	-38.16	-40.63	-42.87	-43.56
2574	-38.44	-38.90	-37.89	-45.36	-42.53	-44.33
2620	-36.50	-38.30	-37.81	-43.44	-42.45	-44.35

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2000	-88.18	-96.79	-97.44	-112.37	-138.57
2046	-87.37	-95.40	-96.31	-112.93	-138.59
2112	-89.31	-94.01	-96.75	-112.68	-138.64
2178	-89.52	-94.65	-96.27	-113.20	-138.82
2244	-85.39	-94.86	-96.64	-112.97	-138.87
2310	-86.45	-96.54	-96.72	-112.59	-138.88
2376	-85.22	-93.39	-96.62	-112.35	-138.52
2442	-83.70	-94.02	-96.13	-112.36	-138.45
2508	-83.15	-94.96	-95.25	-111.70	-137.95
2574	-83.50	-96.51	-94.82	-111.42	-137.62
2620	-85.42	-94.81	-94.77	-111.10	-137.46

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS -37°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2000	-84.65	-95.63	-97.53	-112.52	-139.25
2046	-83.81	-94.95	-96.62	-113.17	-139.10
2112	-84.57	-94.14	-96.33	-112.88	-139.11
2178	-85.45	-95.55	-96.22	-113.26	-139.29
2244	-84.47	-94.56	-96.61	-112.95	-139.12
2310	-84.40	-94.61	-96.48	-112.91	-139.30
2376	-83.43	-94.59	-96.48	-112.43	-139.04
2442	-83.48	-92.25	-96.17	-112.44	-138.84
2508	-82.58	-93.98	-95.13	-111.64	-138.33
2574	-82.75	-93.19	-94.64	-111.49	-137.93
2620	-84.95	-94.42	-94.56	-111.21	-137.95

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +80°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2000	-85.27	-95.91	-96.96	-111.11	-137.67
2046	-84.98	-95.66	-96.25	-111.96	-137.63
2112	-85.73	-97.63	-96.12	-111.59	-137.72
2178	-84.74	-97.10	-95.18	-111.96	-137.83
2244	-83.72	-93.57	-95.79	-111.74	-138.12
2310	-85.92	-95.87	-95.42	-111.46	-137.86
2376	-83.47	-93.86	-96.07	-111.04	-137.51
2442	-85.07	-95.14	-96.05	-110.96	-137.48
2508	-85.58	-92.58	-95.11	-110.21	-136.96
2574	-83.87	-95.57	-94.16	-110.28	-136.58
2620	-83.24	-95.35	-94.57	-110.12	-136.49

REFERENCE & COMPARISON SPURIOUS ORDER	REFERENCE & COMPARISON SPURIOUS @Fcarrier 2000MHz+(n*Freference) (dBc) note 1			REFERENCE & COMPARISON SPURIOUS @Fcarrier 2310MHz+(n*Freference) (dBc) note 1			REFERENCE & COMPARISON SPURIOUS @Fcarrier 2620MHz+(n*Freference) (dBc) note 1		
n	-37°C	+25°C	+80°C	-37°C	+25°C	+80°C	-37°C	+25°C	+80°C
-5	-100.26	-98.54	-109.10	-100.47	-101.98	-102.26	-107.32	-117.17	-101.32
-4	-102.01	-99.59	-119.05	-100.23	-102.81	-103.05	-109.17	-122.23	-101.34
-3	-97.44	-104.29	-113.34	-101.70	-100.67	-101.88	-110.52	-115.61	-102.27
-2	-99.79	-105.50	-110.94	-105.47	-100.94	-102.16	-112.32	-109.55	-104.59
-1	-100.27	-103.86	-103.89	-105.47	-97.48	-95.88	-107.21	-105.29	-113.63
0 note 2	-	-	-	-	-	-	-	-	-
+1	-92.92	-98.64	-103.15	-101.67	-103.29	-99.28	-103.99	-104.28	-104.56
+2	-94.90	-98.56	-108.38	-106.04	-101.42	-105.14	-104.62	-101.64	-104.20
+3	-96.44	-100.81	-105.73	-111.11	-102.19	-101.55	-110.33	-104.14	-114.66
+4	-96.10	-100.88	-104.51	-113.14	-101.97	-101.55	-106.68	-103.38	-104.37
+5	-97.15	-100.56	-101.26	-112.32	-103.86	-99.22	-109.21	-101.11	-103.94

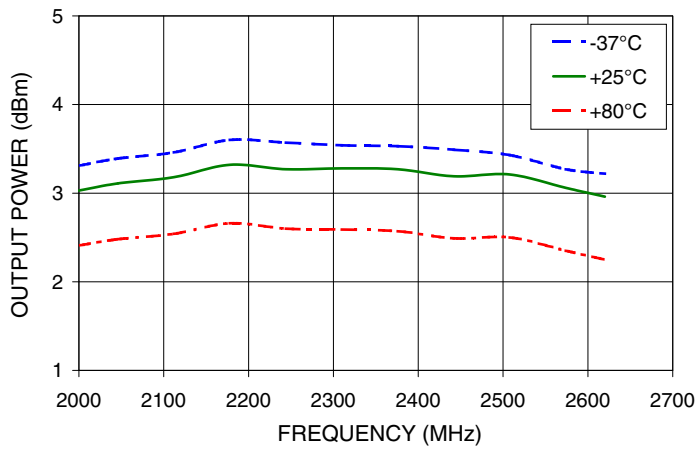
Note 1: Reference frequency = Comparison frequency = 10 MHz
Note 2: All spurs are referenced to carrier signal (n=0).

STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2001.5MHz+(n*Fstep size) (dBc) note 3			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2311.50MHz+(n*Fstep size) (dBc) note 3			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2618.5MHz+(n*Fstep size) (dBc) note 3		
n	-37°C	+25°C	+80°C	-37°C	+25°C	+80°C	-37°C	+25°C	+80°C
-5.0	-99.53	-103.44	-100.12	-101.79	-100.77	-100.87	-92.54	-93.51	-93.16
-4.5	-105.92	-103.36	-102.57	-105.06	-101.90	-104.84	-100.49	-99.29	-100.06
-4.0	-94.78	-95.04	-95.21	-94.71	-95.51	-92.97	-93.98	-94.59	-94.42
-3.5	-100.35	-99.98	-100.51	-101.58	-100.78	-100.73	-98.60	-96.84	-96.63
-3.0	-87.35	-89.58	-92.08	-94.62	-106.70	-92.36	-91.27	-90.62	-91.04
-2.5	-87.47	-85.90	-86.09	-86.53	-86.47	-85.69	-89.51	-89.39	-89.15
-2.0	-82.51	-83.19	-83.18	-82.96	-83.85	-83.28	-110.03	-107.74	-108.25
-1.5	-91.47	-90.32	-87.95	-90.37	-89.45	-89.04	-83.84	-83.72	-82.83
-1.0	-88.38	-86.21	-84.14	-88.77	-85.82	-83.11	-76.50	-77.45	-76.78
-0.5	-73.22	-73.55	-72.70	-69.77	-70.34	-68.97	-71.03	-69.00	-66.85
0 note 4	-	-	-	-	-	-	-	-	-
+0.5	-73.32	-73.59	-72.17	-69.88	-70.68	-68.84	-71.41	-68.96	-66.46
+1.0	-88.03	-86.71	-83.96	-89.03	-85.06	-82.54	-76.58	-77.45	-76.46
+1.5	-92.12	-89.38	-88.29	-90.67	-88.87	-88.74	-84.00	-83.85	-82.79
+2.0	-82.70	-83.17	-83.03	-83.15	-83.95	-83.04	-109.58	-108.39	-109.51
+2.5	-87.43	-86.35	-86.05	-86.92	-86.99	-85.61	-89.23	-89.98	-88.50
+3.0	-87.05	-89.49	-93.86	-93.31	-106.87	-91.69	-92.51	-90.27	-92.89
+3.5	-100.94	-99.16	-102.51	-99.39	-99.45	-99.93	-97.10	-96.91	-97.08
+4.0	-95.18	-94.32	-95.45	-94.83	-95.33	-94.82	-93.37	-94.22	-93.57
+4.5	-108.15	-104.91	-101.88	-103.47	-104.62	-102.56	-100.54	-99.97	-100.74
+5.0	-99.74	-106.03	-101.28	-103.18	-102.79	-103.06	-92.67	-93.85	-92.68

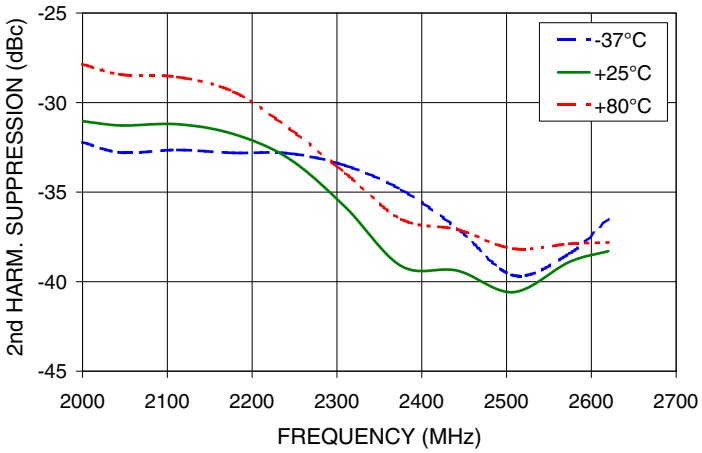
Note 3: Step size 500 kHz
Note 4: All spurs are referenced to carrier signal (n=0).

Typical Performance Curves

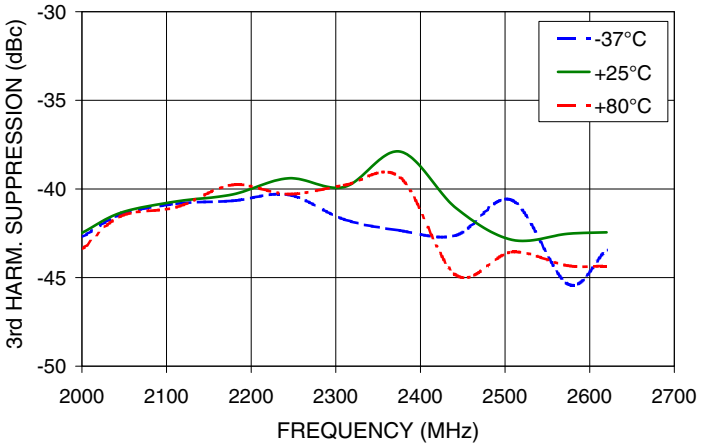
OUTPUT POWER Vs FREQUENCY



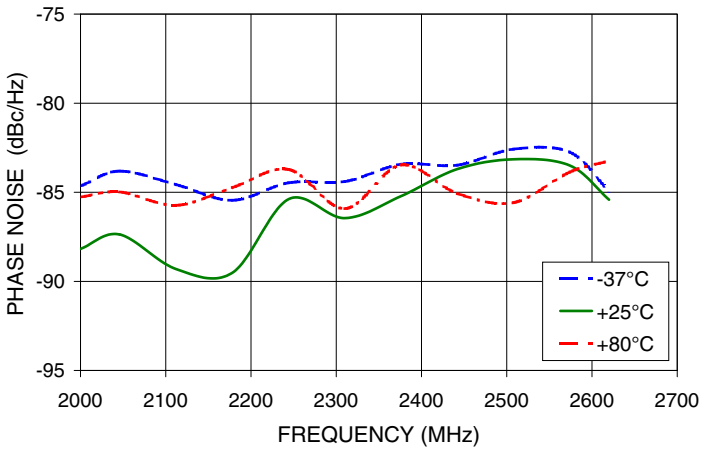
2nd HARMONIC Vs FREQUENCY



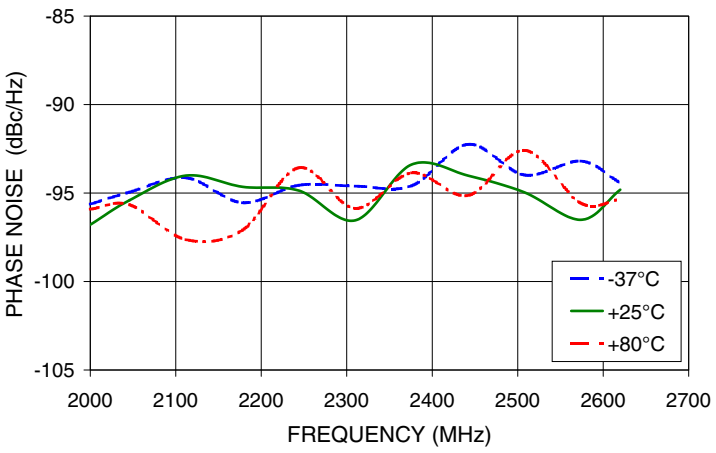
3rd HARMONIC Vs FREQUENCY



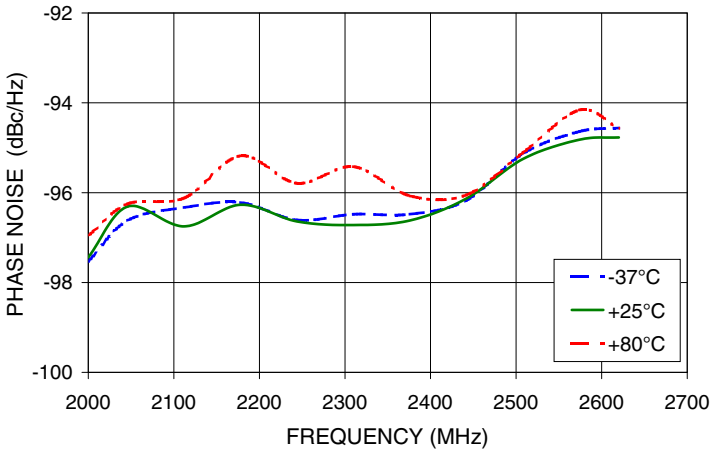
PHASE NOISE @100Hz offset



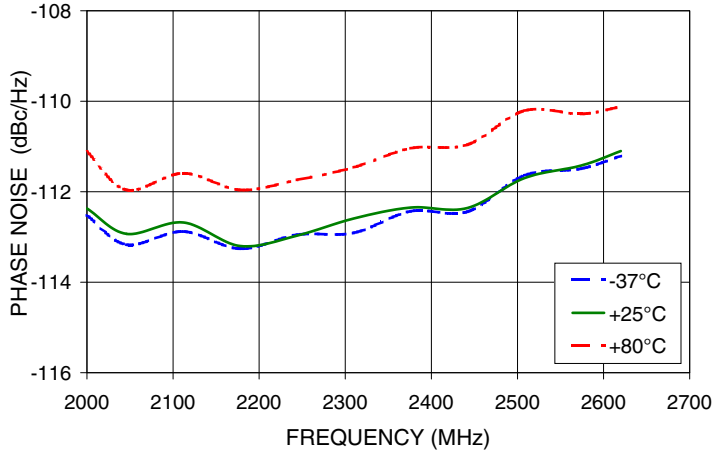
PHASE NOISE @1kHz offset



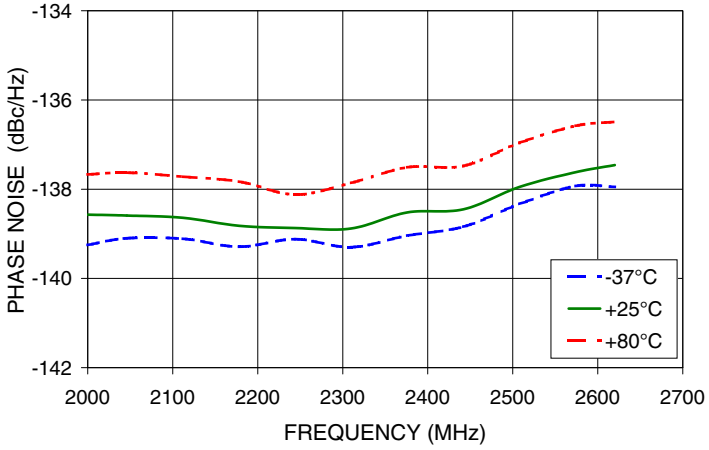
PHASE NOISE @10kHz offset



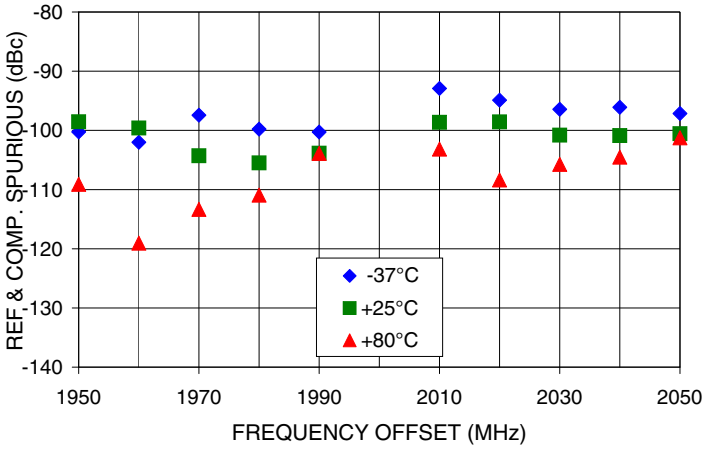
PHASE NOISE @100kHz offset



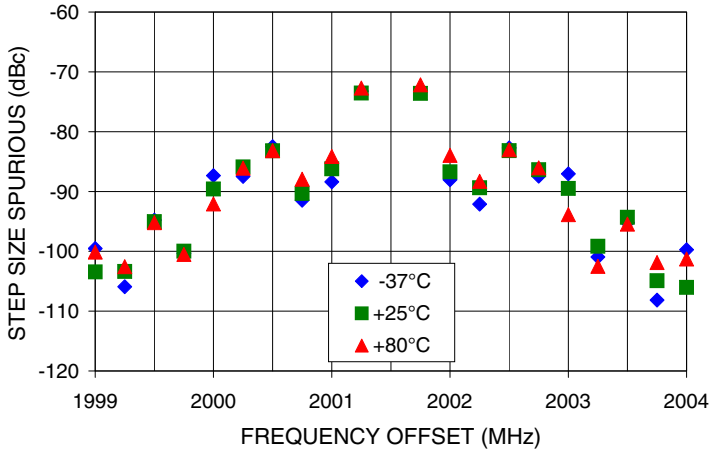
PHASE NOISE @1MHz offset



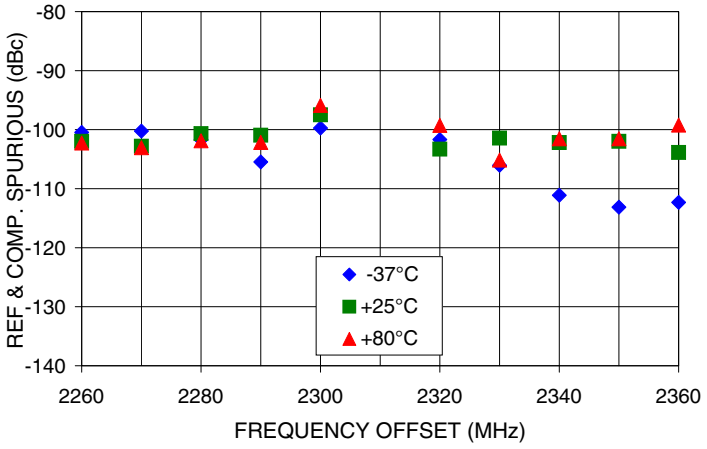
REFERENCE & COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2000MHz



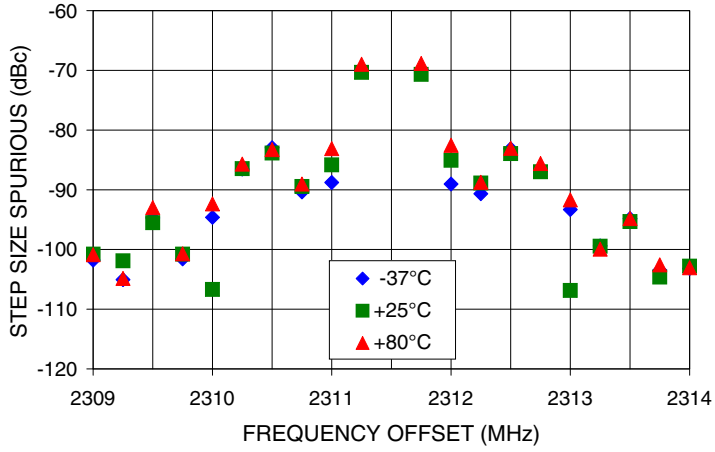
0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2001.5MHz



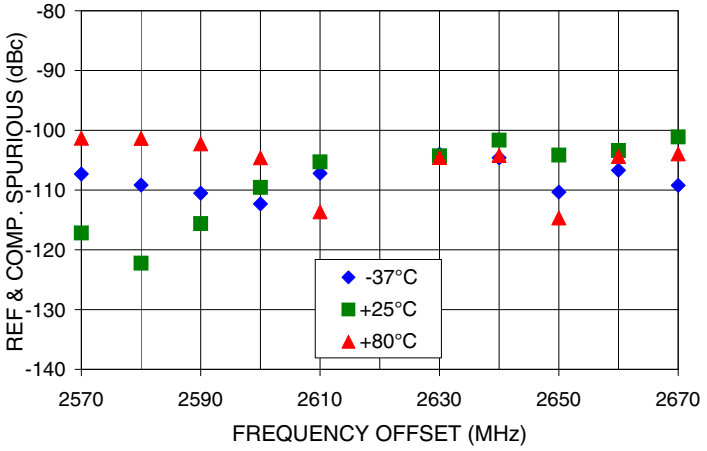
REFERENCE & COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2310MHz



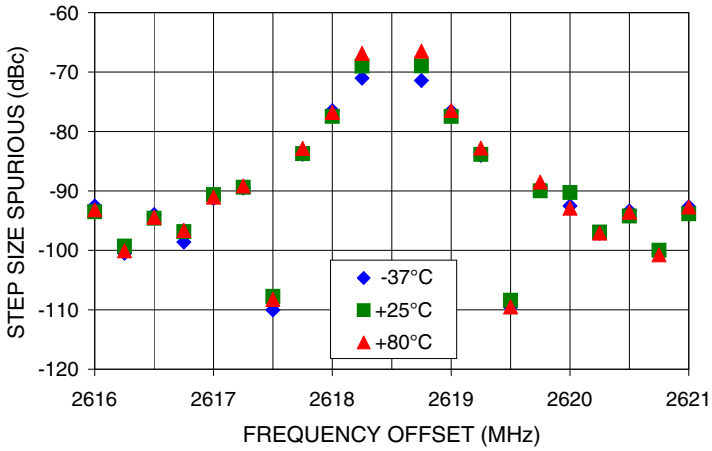
0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2311.5MHz



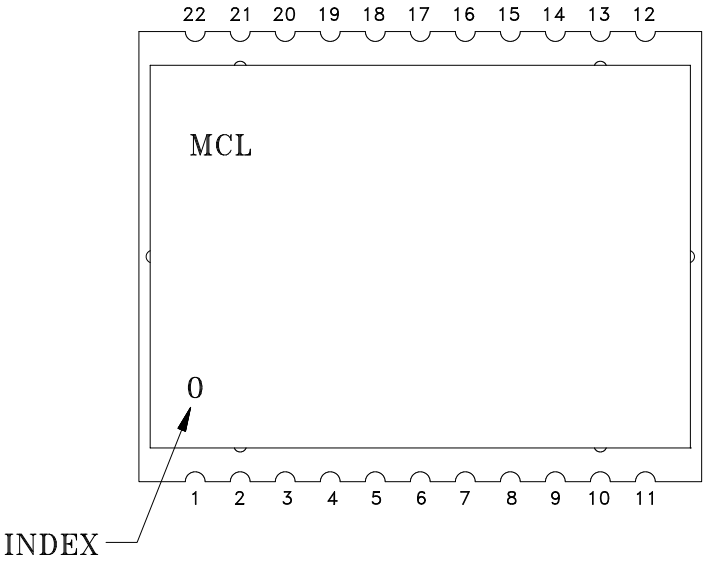
REFERENCE & COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2620MHz



0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2618.5MHz



Pin Configuration

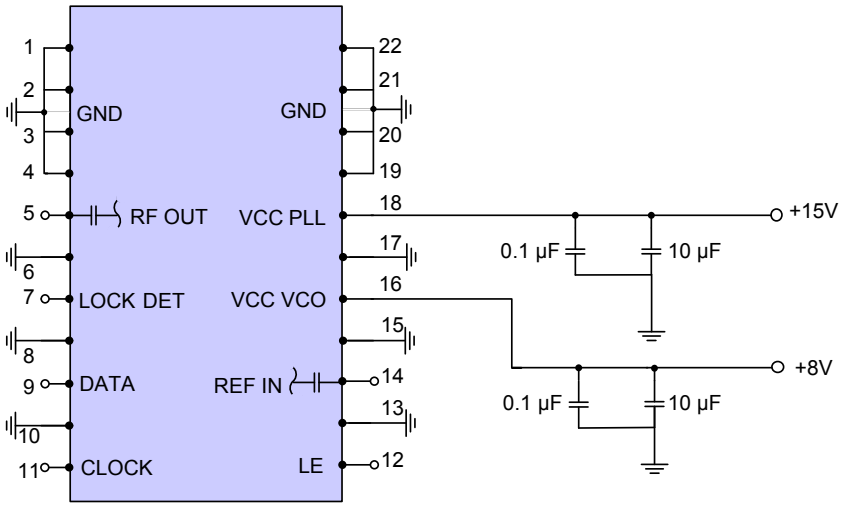


Pin Connection

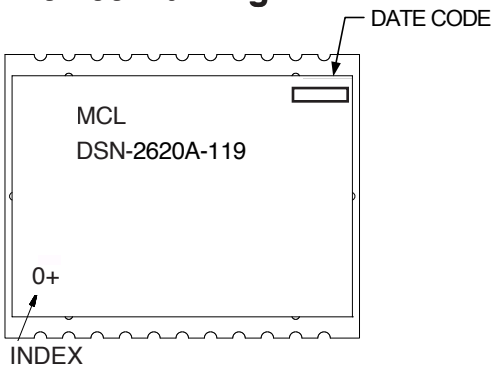
Pin Number	Function	Pin Number	Function
1	GND	12	LE
2	GND	13	GND
3	GND	14	REF IN
4	GND	15	GND
5	RF OUT	16	VCC VCO
6	GND	17	GND
7	LOCK DET	18	VCC PLL
8	GND	19	GND
9	DATA	20	GND
10	GND	21	GND
11	CLOCK	22	GND

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: KL1294

Tape & Reel: TR-F97

Suggested Layout for PCB Design: PL-318

Evaluation Board: TB-553+

Environment Ratings: ENV65T2

Synthesizer evaluation software to set PLL registers manually is available at http://www.minicircuits.com/support/software_download.html