

# Frequency Synthesizer

KSN-1620A-119+

50Ω 1520 to 1620 MHz

## The Big Deal

- Low phase noise and spurious
- Robust design and construction
- Small size 0.80" x 0.58" x 0.15"



CASE STYLE: DK1042

## Product Overview

The KSN-1620A-119+ is a Frequency Synthesizer, designed to operate from 1520 to 1620 MHz for WCDMA base station application. The KSN-1620A-119+ is packaged in a metal case (size of 0.80" x 0.58" x 0.15") to shield against unwanted signals and noise.

## Key Features

Feature	Advantages
Low phase noise and spurious: <ul style="list-style-type: none"><li>• Phase Noise: -95 dBc/Hz typ. @ 10 kHz offset</li><li>• Comparison Spurious: -85 dBc typ.</li><li>• Reference Spurious: -100 dBc typ.</li></ul>	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-1620A-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.
Small size, 0.80" x 0.58" x 0.15"	The small size enables the KSN-1620A-119+ to be used in compact designs.



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50Ω 1520 to 1620 MHz



CASE STYLE: DK1042  
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.*

### Features

- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+5V)
- Small size 0.80" x 0.58" x 0.15"

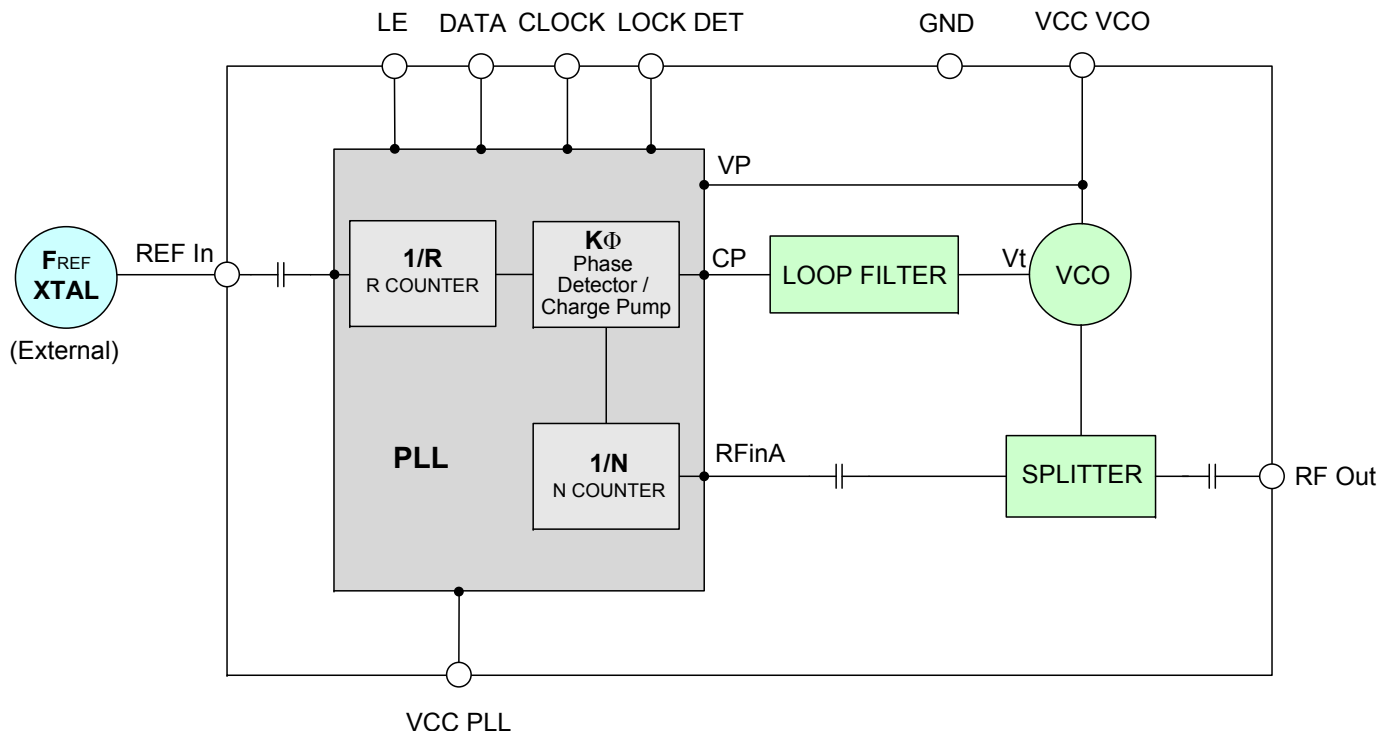
### Applications

- WCDMA base station

### General Description

The KSN-1620A-119+ is a Frequency Synthesizer, designed to operate from 1520 to 1620 MHz for WCDMA base station application. The KSN-1620A-119+ is packaged in a metal case (size of 0.80" x 0.58" x 0.15") to shield against unwanted signals and noise. To enhance the robustness of KSN-1620A-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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**Electrical Specifications** (over operating temperature -40°C to +85°C)

Parameters	Test Conditions	Min.	Typ.	Max.	Units	
Frequency Range	-	1520	-	1620	MHz	
Step Size	-	-	100	-	kHz	
Settling Time	Within ± 50 Hz	-	5	10	mSec	
Output Power	-	-1.0	+2.5	+4.5	dBm	
SSB Phase Noise	@ 100 Hz offset	-	-80	-	dBc/Hz	
	@ 1 kHz offset	-	-77	-72		
	@ 10 kHz offset	-	-95	-87		
	@ 100 kHz offset	-	-124	-112		
	@ 1 MHz offset	-	-147	-141		
Integrated SSB Phase Noise	@ 50 Hz to 5 MHz	-	-38	-	dBc	
Reference Spurious Suppression	Ref. Freq. 10 MHz	-	-100	-85		
Comparison Spurious Suppression	Step Size 100 kHz	-	-85	-60		
Non - Harmonic Spurious Suppression	-	-	-90	-		
Harmonic Suppression	-	-	-56	-40		
VCO Supply Voltage	5.00	4.85	5.00	5.15	V	
PLL Supply Voltage	5.00	4.85	5.00	5.15		
VCO Supply Current	-	-	25	31	mA	
PLL Supply Current	-	-	8	15		
Reference Input (External)	Frequency	10 (square wave)	-	10	-	MHz
	Amplitude	1.0	0.8	1.0	1.2	V <sub>P-P</sub>
	Input impedance	-	-	100	-	KΩ
	Phase Noise @ 1 kHz offset	-	-	-140	-	dBc/Hz
RF Output port Impedance	-	-	50	-	Ω	
Input Logic Level	Input high voltage	-	4.15	-	-	V
	Input low voltage	-	-	-	0.95	
Digital Lock Detect	Locked	-	4.45	-	5.55	
	Unlocked	-	-	-	0.40	
Frequency Synthesizer PLL	-	ADF4118				
PLL Programming	-	3-wire serial 5V CMOS				
Register Map @ 1620 MHz	F_Register	-	(MSB) X0XXX00000X0010010010 (LSB)			
	N_Register	-	(MSB) 100001111110100100001 (LSB)			
	R_Register	-	(MSB) 1XXXX0000000110010000 (LSB)			

**Absolute Maximum Ratings**

Parameters	Ratings
VCO Supply Voltage	6.3V
PLL Supply Voltage	6.3V
VCO Supply Voltage to PLL Supply Voltage	N.A.
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)		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
	1520.0	2.69	2.75	2.60	24.03	24.99	25.52	6.69	8.22
1530.0	2.70	2.74	2.60	24.03	24.98	25.52	6.73	8.25	9.61
1540.0	2.67	2.72	2.58	24.02	24.97	25.51	6.72	8.24	9.61
1550.0	2.63	2.66	2.54	24.02	24.98	25.52	6.72	8.25	9.62
1560.0	2.57	2.62	2.51	24.02	24.98	25.53	6.74	8.26	9.62
1570.0	2.53	2.60	2.48	24.02	25.00	25.55	6.74	8.27	9.63
1580.0	2.50	2.59	2.48	24.03	25.00	25.56	6.75	8.27	9.64
1590.0	2.53	2.60	2.49	24.02	25.01	25.57	6.74	8.28	9.65
1600.0	2.55	2.60	2.50	24.00	25.00	25.56	6.74	8.29	9.66
1610.0	2.55	2.59	2.49	23.99	24.99	25.56	6.76	8.30	9.67
1620.0	2.52	2.56	2.48	23.97	24.98	25.55	6.76	8.29	9.66

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1520.0	-51.36	-54.74	-58.47	-59.35	-61.70	-62.16
1530.0	-52.08	-54.93	-58.57	-60.18	-61.10	-61.92
1540.0	-50.64	-54.22	-57.91	-60.21	-60.15	-60.83
1550.0	-49.97	-53.18	-56.55	-59.39	-59.67	-59.74
1560.0	-50.43	-52.97	-56.44	-57.33	-58.78	-58.97
1570.0	-51.48	-54.03	-57.15	-56.41	-57.27	-58.41
1580.0	-52.78	-55.16	-58.80	-55.99	-56.96	-58.58
1590.0	-52.92	-56.05	-59.30	-56.14	-56.94	-58.33
1600.0	-52.50	-54.49	-58.07	-55.87	-55.81	-57.45
1610.0	-50.77	-53.11	-56.40	-54.63	-55.08	-56.25
1620.0	-50.31	-51.96	-55.08	-54.05	-54.82	-55.57



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1520.0	-80.50	-77.32	-95.67	-125.47	-146.64
1530.0	-79.02	-77.02	-95.52	-123.39	-146.77
1540.0	-79.26	-77.38	-95.37	-126.45	-146.76
1550.0	-80.30	-78.02	-94.47	-125.76	-146.86
1560.0	-80.60	-78.31	-93.99	-124.93	-146.92
1570.0	-79.76	-78.08	-94.13	-123.87	-146.96
1580.0	-80.28	-78.37	-94.44	-123.36	-146.98
1590.0	-81.11	-78.65	-94.73	-123.20	-146.99
1600.0	-80.74	-77.26	-94.41	-124.50	-146.87
1610.0	-80.59	-77.05	-94.23	-125.20	-146.76
1620.0	-80.73	-78.29	-94.22	-125.16	-146.66

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1520.0	-78.03	-76.19	-94.64	-126.04	-147.85
1530.0	-76.74	-77.12	-94.76	-123.45	-147.94
1540.0	-77.91	-76.11	-94.70	-125.54	-147.89
1550.0	-78.14	-75.64	-94.34	-126.69	-147.94
1560.0	-76.97	-76.00	-93.54	-126.45	-148.14
1570.0	-77.11	-76.39	-92.85	-125.34	-148.22
1580.0	-77.82	-76.78	-92.21	-123.86	-148.26
1590.0	-77.71	-77.84	-92.61	-123.90	-147.97
1600.0	-77.56	-78.22	-92.82	-123.36	-147.75
1610.0	-77.35	-77.01	-92.60	-121.49	-147.69
1620.0	-78.52	-76.37	-92.51	-125.12	-147.47

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1520.0	-79.20	-76.61	-94.12	-123.41	-145.70
1530.0	-79.06	-76.47	-93.63	-123.26	-145.58
1540.0	-79.09	-76.89	-93.29	-122.69	-145.48
1550.0	-80.42	-77.16	-92.49	-121.58	-145.62
1560.0	-80.23	-76.94	-92.20	-121.49	-145.73
1570.0	-79.04	-76.39	-92.24	-122.09	-145.84
1580.0	-78.63	-76.34	-92.83	-122.29	-145.87
1590.0	-78.15	-76.43	-93.03	-122.48	-145.85
1600.0	-77.58	-76.73	-92.63	-122.65	-145.75
1610.0	-77.22	-76.41	-92.69	-121.26	-145.57
1620.0	-79.03	-75.83	-92.53	-118.96	-145.32



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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1520MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1570MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1620MHz+(n*Fcomparison) (dBc) note 1		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5	-109.12	-104.61	-100.63	-109.58	-109.16	-103.40	-112.06	-102.21	-100.91
-4	-105.57	-103.23	-100.21	-106.14	-107.23	-101.05	-107.11	-98.56	-100.03
-3	-98.65	-99.96	-96.79	-102.93	-102.20	-100.62	-102.95	-97.92	-95.05
-2	-93.58	-93.30	-90.71	-93.86	-94.46	-94.93	-95.22	-93.28	-90.05
-1	-88.33	-85.93	-82.64	-82.34	-83.21	-83.73	-85.51	-84.99	-82.04
0 note 2	-	-	-	-	-	-	-	-	-
+1	-85.20	-84.74	-76.95	-84.83	-85.29	-83.92	-88.49	-86.07	-83.59
+2	-97.88	-92.88	-90.47	-97.11	-93.79	-93.47	-97.19	-93.93	-92.88
+3	-101.43	-99.84	-96.59	-103.24	-104.03	-97.77	-104.21	-95.84	-97.43
+4	-103.66	-102.12	-99.49	-107.86	-108.83	-101.38	-108.29	-97.54	-102.10
+5	-107.90	-104.40	-104.50	-108.27	-107.28	-103.38	-109.72	-101.01	-103.04

Note 1: Comparison frequency 100 kHz  
 Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1520MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1570MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1620MHz+(n*Freference) (dBc) note 3		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5	-130.36	-125.28	-120.00	-128.52	-125.03	-128.55	-122.80	-124.03	-126.57
-4	-111.43	-116.93	-115.26	-117.06	-120.35	-117.39	-119.82	-120.60	-114.22
-3	-120.91	-116.05	-116.45	-113.32	-119.09	-117.76	-118.54	-119.19	-128.61
-2	-108.46	-113.26	-113.68	-114.22	-116.75	-114.50	-114.75	-116.74	-113.44
-1	-112.80	-101.57	-107.16	-109.22	-101.82	-111.06	-101.31	-103.12	-105.01
0 note 4	-	-	-	-	-	-	-	-	-
+1	-103.76	-104.82	-103.40	-101.71	-105.64	-106.67	-100.75	-104.56	-104.85
+2	-111.37	-112.44	-118.24	-119.08	-116.97	-121.23	-116.47	-118.60	-114.95
+3	-117.06	-116.09	-120.57	-113.86	-114.75	-114.57	-114.43	-114.43	-115.68
+4	-114.20	-115.92	-116.05	-123.33	-121.96	-122.09	-121.25	-120.13	-116.58
+5	-113.50	-116.90	-118.63	-116.36	-106.83	-118.19	-117.09	-118.17	-118.85

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



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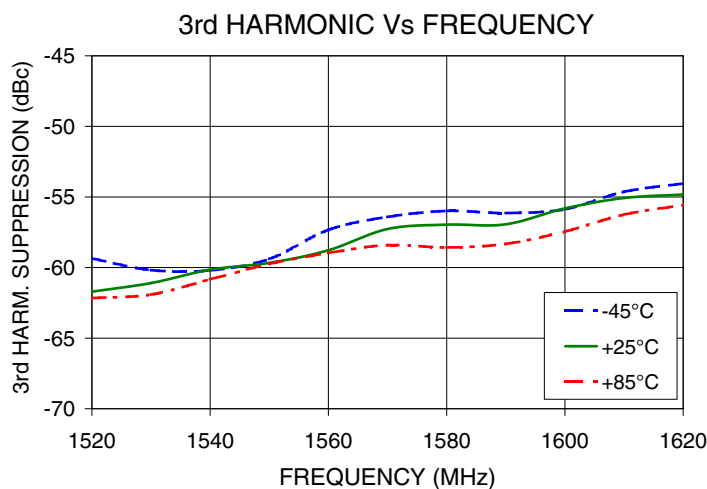
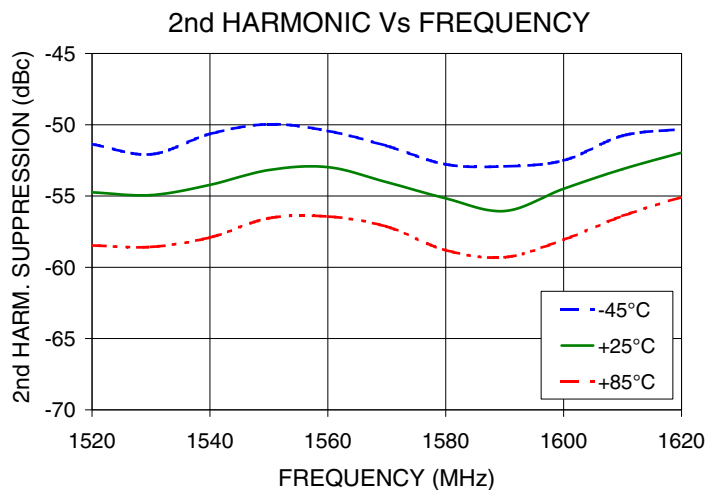
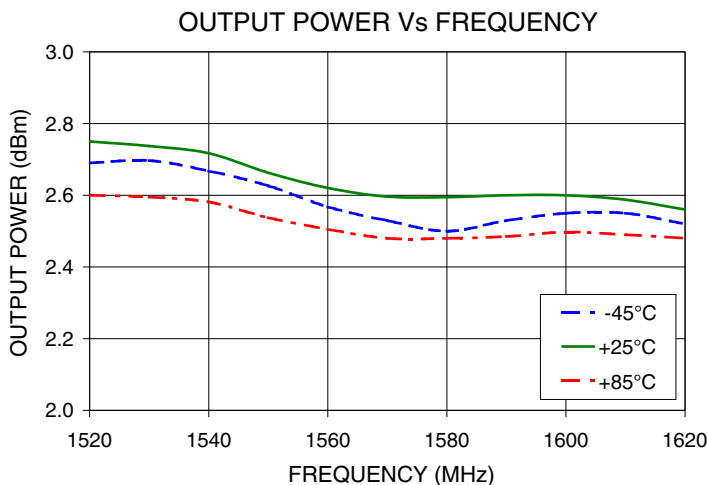


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Typical Performance Curves



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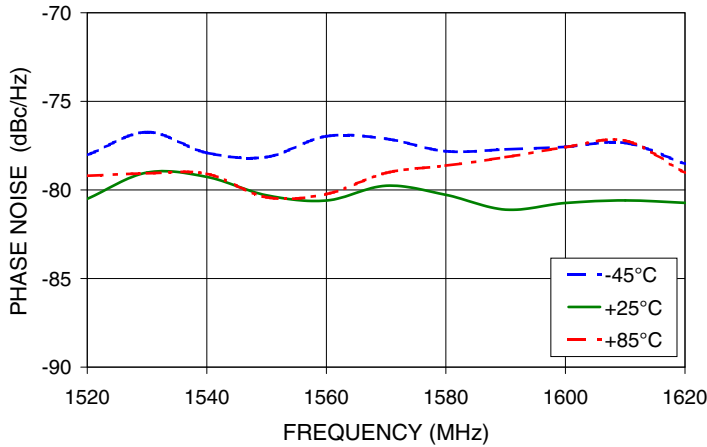


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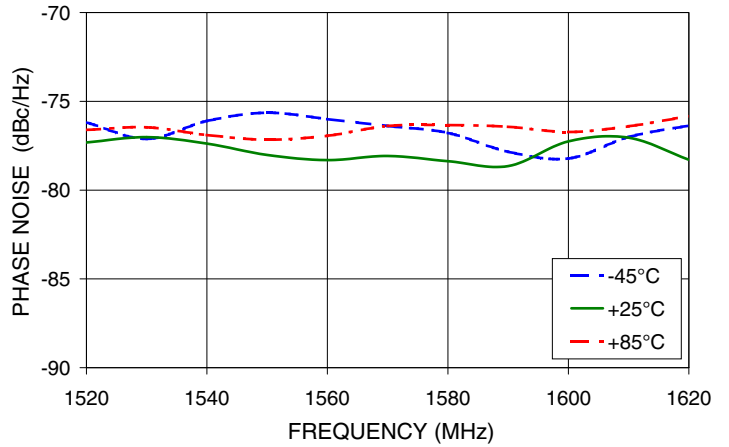


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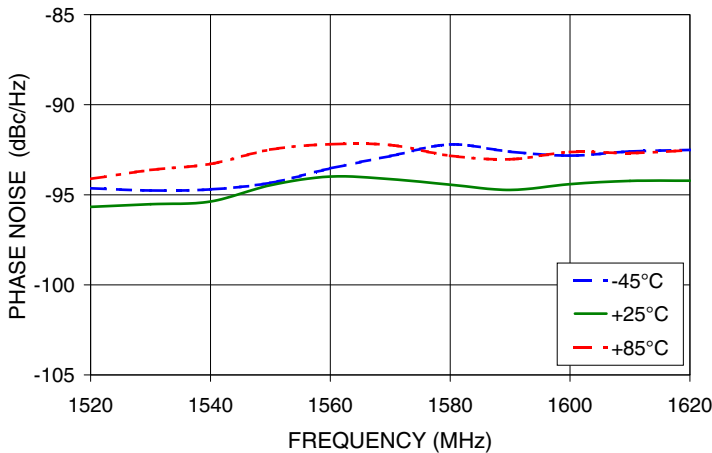
PHASE NOISE @ 100Hz offset



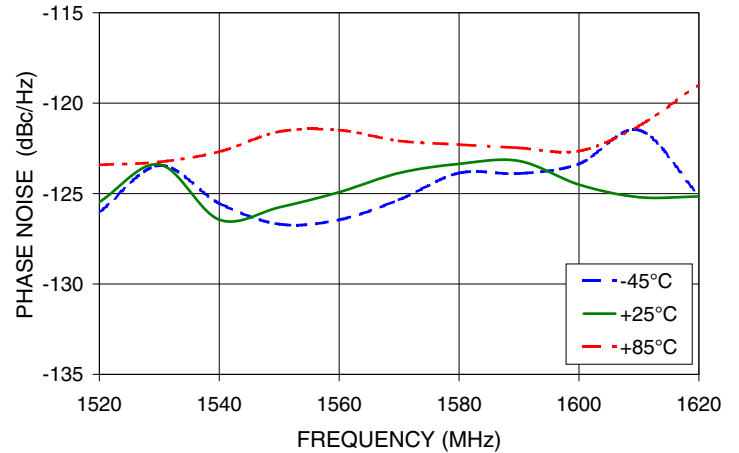
PHASE NOISE @ 1kHz offset



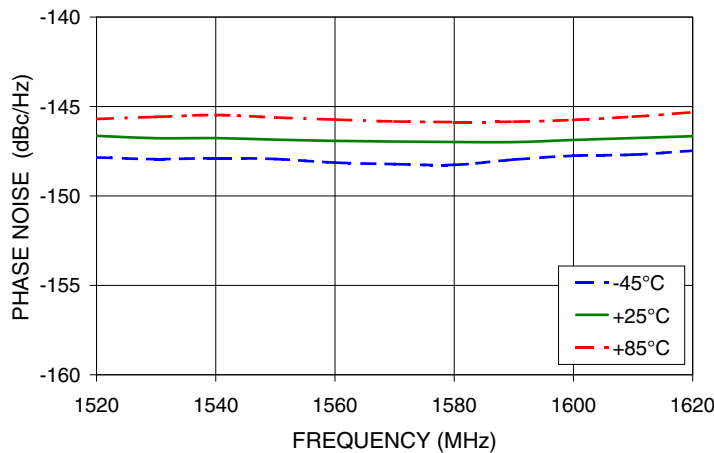
PHASE NOISE @ 10kHz offset



PHASE NOISE @ 100kHz offset



PHASE NOISE @ 1MHz offset



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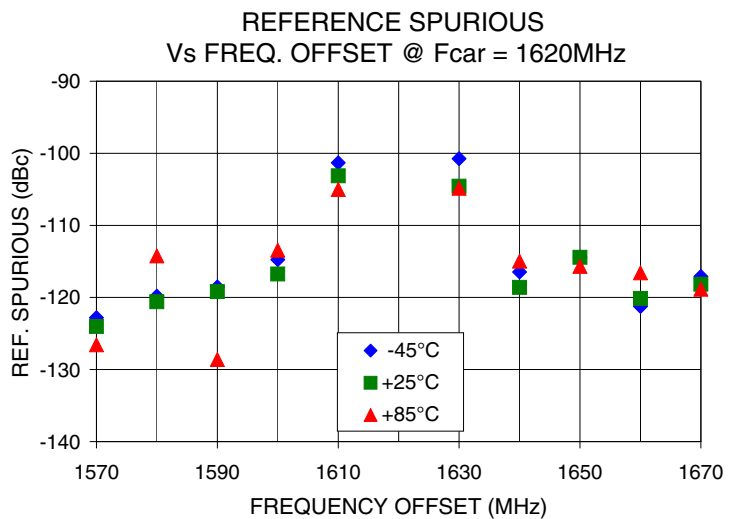
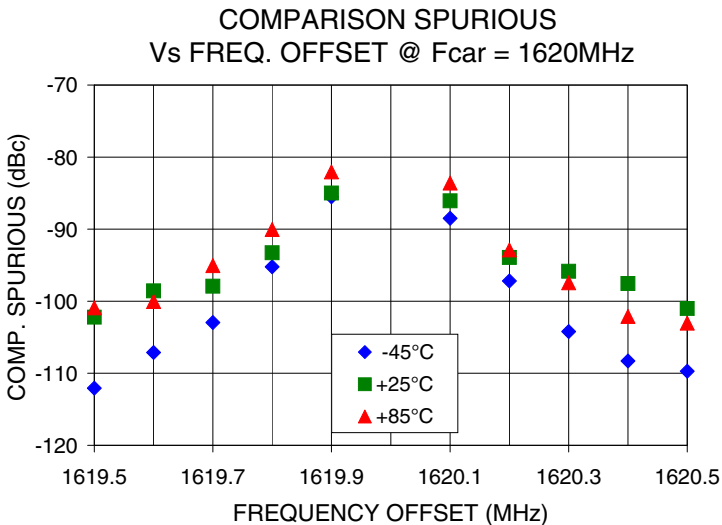
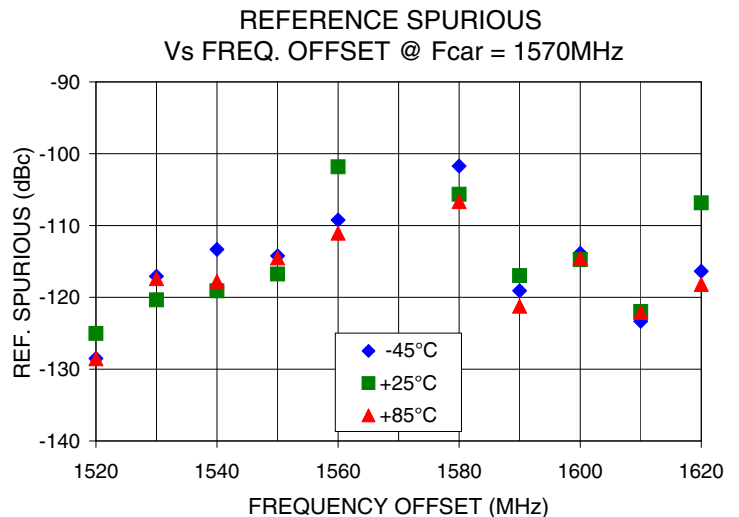
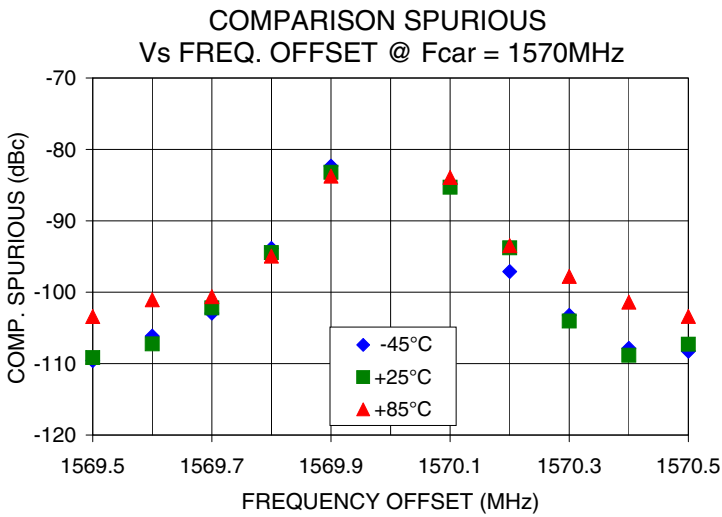
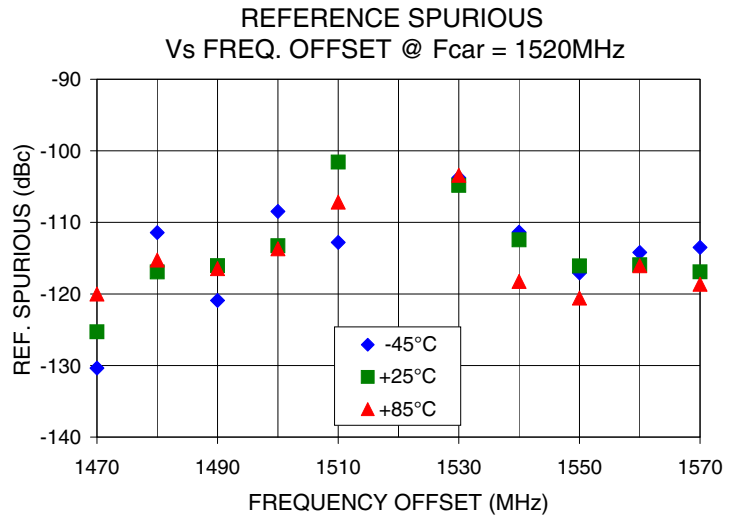
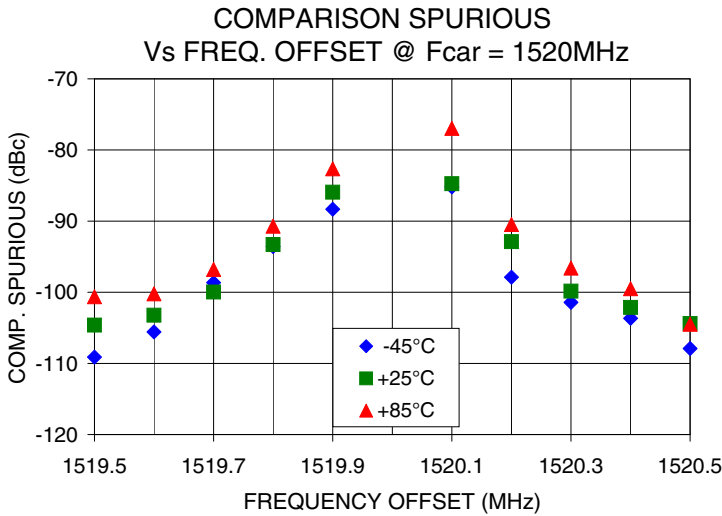


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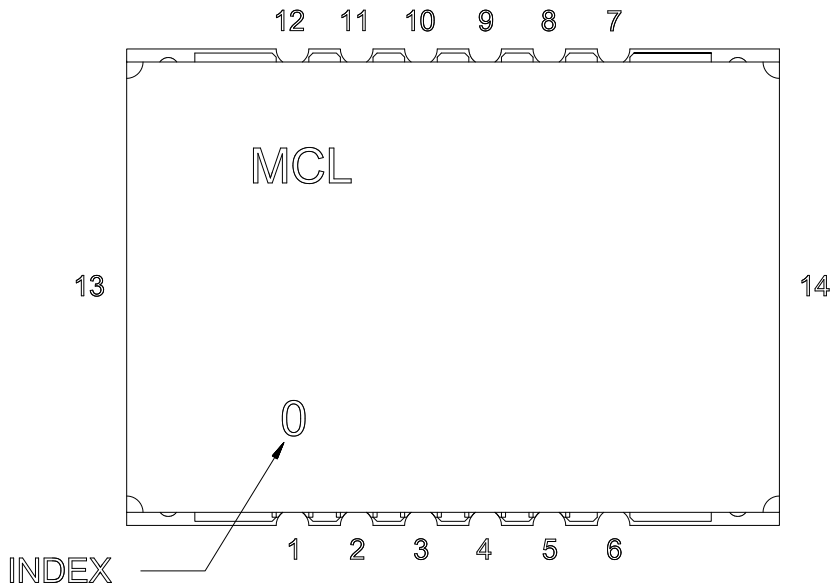


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Pin Configuration

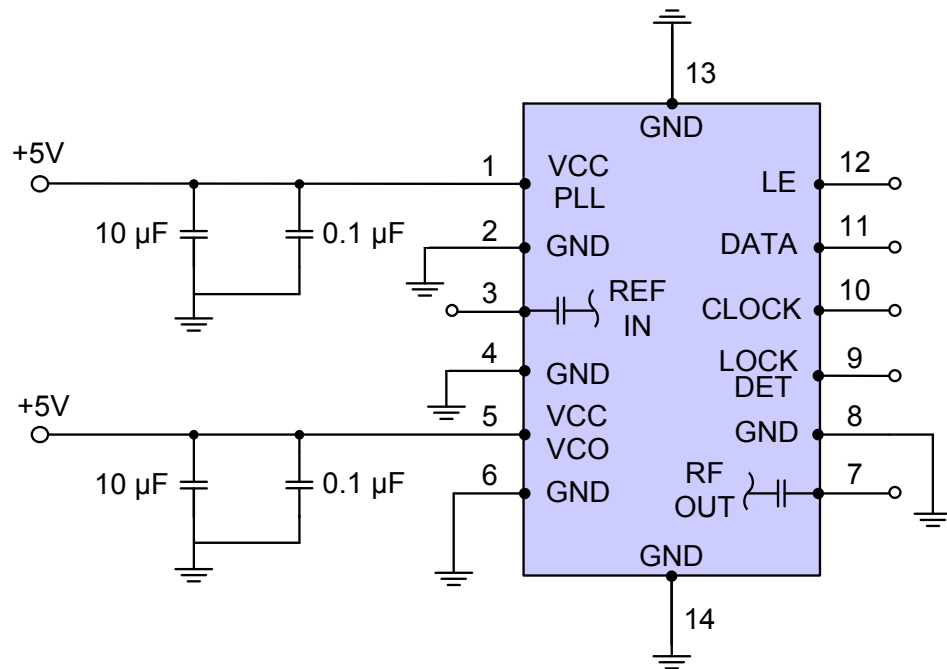


Pin Connection

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

Recommended Application Circuit

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



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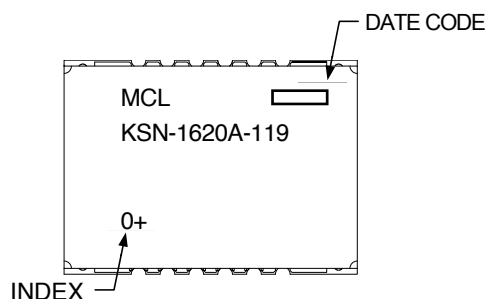


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## Device Marking



### 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:** DK1042

**Tape & Reel:** TR-F28

**Suggested Layout for PCB Design:** PL-249

**Evaluation Board:** TB-567+

**Environment Ratings:** ENV03T2



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Patent Pending

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