NON-CATALOG

Frequency Synthesizer KSN-1060A-119+

50Ω 969.99 to 1072.98 MHz

The Big Deal

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

CASE STYLE: DK801

Product Overview

The KSN-1060A-119++ is a Frequency Synthesizer, designed to operate from 969.99 to 1072.98 MHz for CDMA base station application. The KSN-1060A-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: • Phase Noise: -93 dBc/Hz typ. @ 10 kHz offset • Step Size Spurious: -79 dBc typ. • Comparison Spurious: -101 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 KSN-1060A-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-1060A-119+ to be used in compact designs.

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Surface Mount

NON-CATALOG

Frequency Synthesizer

KSN-1060A-119+

50Ω 969.99 to 1072.98 MHz

Features

- Fractional N synthesizer
- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+3.3V)
- Small size 0.80" x 0.58" x 0.15"

CASE STYLE:DK801

+ 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.

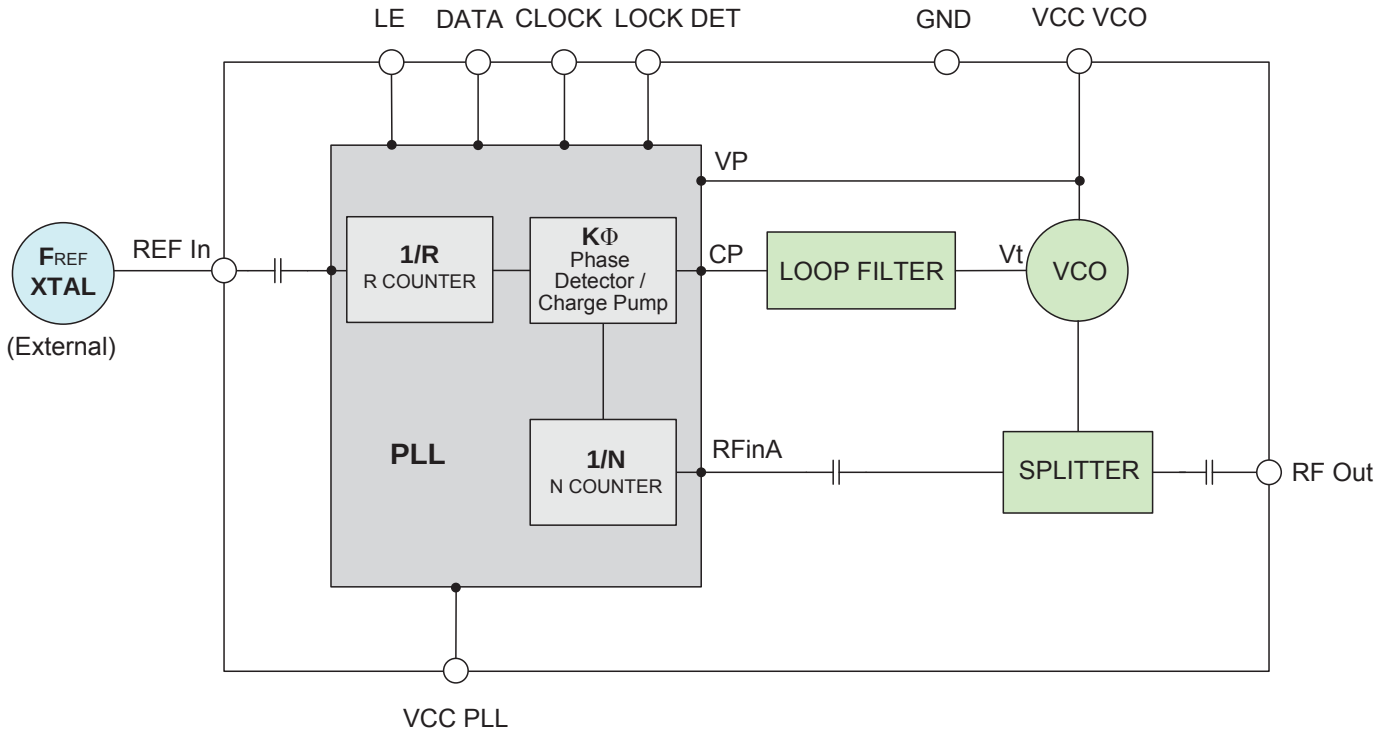
Applications

- CDMA base station

General Description

The KSN-1060A-119+ is a Frequency Synthesizer, designed to operate from 969.99 to 1072.98 MHz for CDMA base station application. The KSN-1060A-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-1060A-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
M149087
EDR-8057/11F1
KSN-1060A-119+
Category-A1
RAV
150104

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

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	969.99	-	1072.98	MHz
Step Size		-	-	30	-	kHz
Comparison Frequency		-	-	15	-	MHz
Settling Time		Within ± 1 kHz	-	8	-	mSec
Output Power		-	-3	0	+3	dBm
SSB Phase Noise		@ 100 Hz offset	-	-82	-	dBc/Hz
		@ 1 kHz offset	-	-89	-81	
		@ 10 kHz offset	-	-93	-86	
		@ 100 kHz offset	-	-127	-118	
		@ 1 MHz offset	-	-149	-139	
Step Size Spurious Suppression		Step Size 30 kHz	-	-79	-60	dBc
0.5 Step Size Spurious Suppression		0.5 Step Size 15 kHz	-	-68	-50	
Reference Spurious Suppression		Ref. Freq. 30 MHz	-	-98	-79	
Comparison Spurious Suppression		Comp. Freq. 15 MHz	-	-101	-80	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-26	-18	
VCO Supply Voltage		5.00	+4.75	+5.00	+5.25	V
PLL Supply Voltage		3.30	+3.15	3.30	+3.45	
VCO Supply Current		-	-	37	45	mA
PLL Supply Current		-	-	15	23	
Reference Input (External)	Frequency	30 (square wave)	-	30	-	MHz
	Amplitude	1	-	1	-	V_{P-P}
	Input impedance	-	-	100	-	KΩ
	Phase Noise @ 1 kHz offset	-	-	-135	-	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	-	3.45	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4153			
PLL Programming		-	3-wire serial 3.3V CMOS			
Register Map @ 1072.98 MHz	R0_Register	-	(MSB) 10001110001000010100 0 (LSB)			
	R1_Register	-	(MSB) 10000100001111101000 1 (LSB)			
	R2_Register	-	(MSB) 1111100010 (LSB)			
	R3_Register	-	(MSB) 11 (LSB)			

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	5.8V
PLL Supply Voltage	4.0V
VCO 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)		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
969.99	-0.46	0.64	0.40	34.96	36.81	38.18	14.71	16.01	18.70
976.92	-0.44	0.62	0.39	34.98	36.85	38.22	14.46	15.78	18.43
988.86	-0.39	0.62	0.40	35.05	36.94	38.29	14.50	15.84	18.47
1000.80	-0.36	0.65	0.44	35.14	37.03	38.36	14.67	16.02	18.65
1012.74	-0.43	0.61	0.40	35.22	37.11	38.43	14.72	16.08	18.73
1024.68	-0.58	0.48	0.24	35.27	37.18	38.50	14.67	16.04	18.68
1036.62	-0.69	0.33	0.02	35.31	37.24	38.54	14.55	15.91	18.54
1048.56	-0.77	0.20	-0.24	35.34	37.27	38.57	14.47	15.83	18.46
1060.50	-0.79	0.10	-0.53	35.37	37.27	38.60	14.70	16.07	18.71
1072.44	-0.85	-0.05	-0.94	35.37	37.25	38.62	14.76	16.14	18.79
1072.98	-0.85	-0.06	-0.96	35.37	37.25	38.62	14.74	16.12	18.77

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
969.99	-22.72	-24.16	-24.50	-37.55	-40.13	-43.42
976.92	-23.08	-24.20	-24.48	-38.13	-41.28	-44.41
988.86	-23.96	-24.57	-24.76	-39.26	-42.90	-45.33
1000.80	-24.69	-25.23	-25.18	-40.76	-44.41	-46.39
1012.74	-25.25	-25.59	-25.44	-42.48	-46.18	-47.67
1024.68	-25.32	-25.57	-25.28	-43.97	-47.60	-48.66
1036.62	-26.14	-26.74	-25.56	-44.89	-47.83	-49.33
1048.56	-26.63	-27.51	-24.52	-46.67	-49.69	-51.65
1060.50	-27.67	-28.52	-23.24	-47.77	-50.91	-53.54
1072.44	-29.84	-28.05	-22.00	-48.96	-52.25	-55.29
1072.98	-29.99	-27.96	-21.96	-49.04	-52.43	-55.75

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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
969.99	-83.22	-90.53	-96.16	-128.14	-149.31
976.92	-85.32	-88.48	-95.06	-128.65	-150.16
988.86	-86.51	-88.87	-94.04	-128.54	-150.44
1000.80	-83.98	-90.58	-94.37	-128.68	-150.38
1012.74	-82.58	-88.98	-94.26	-128.34	-150.42
1024.68	-84.54	-88.25	-93.69	-128.21	-149.95
1036.62	-85.47	-89.72	-92.95	-127.55	-149.17
1048.56	-80.02	-87.55	-92.32	-126.46	-147.99
1060.50	-83.42	-88.19	-93.42	-125.29	-146.56
1072.44	-80.54	-88.73	-93.01	-124.86	-146.49
1072.98	-82.37	-87.74	-92.90	-124.67	-146.52

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS -45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
969.99	-83.07	-86.70	-94.48	-125.15	-146.45
976.92	-84.57	-87.51	-92.74	-126.45	-147.54
988.86	-83.03	-87.33	-92.27	-127.91	-150.20
1000.80	-81.69	-88.03	-92.57	-128.46	-151.22
1012.74	-82.84	-87.41	-91.95	-127.71	-151.28
1024.68	-85.37	-86.67	-91.95	-127.14	-150.91
1036.62	-82.60	-88.79	-91.67	-126.61	-150.75
1048.56	-83.35	-87.96	-90.76	-126.14	-150.02
1060.50	-85.19	-87.09	-90.93	-125.73	-148.96
1072.44	-80.80	-88.11	-91.55	-124.52	-146.57
1072.98	-84.13	-86.05	-90.61	-124.32	-146.46

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
969.99	-83.83	-89.76	-96.89	-127.13	-148.38
976.92	-84.43	-89.75	-95.18	-127.64	-148.69
988.86	-83.09	-89.38	-95.04	-127.99	-149.01
1000.80	-83.07	-90.02	-95.47	-127.81	-149.18
1012.74	-86.19	-90.75	-94.80	-127.67	-149.18
1024.68	-82.24	-89.11	-94.87	-127.07	-148.80
1036.62	-82.95	-89.32	-93.73	-126.76	-148.26
1048.56	-85.07	-89.66	-93.57	-126.18	-147.67
1060.50	-81.73	-87.55	-92.70	-124.25	-145.35
1072.44	-83.48	-86.87	-91.76	-122.04	-142.89
1072.98	-83.75	-88.46	-91.97	-122.01	-142.95

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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 969.99MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1021.5MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1072.98MHz+(n*Fcomparison) (dBc) note 1		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-96.42	-97.97	-102.99	-98.95	-103.80	-103.49	-103.54	-100.89	-96.34
-4	-94.64	-103.84	-106.68	-105.16	-100.46	-101.02	-102.15	-103.69	-98.73
-3	-95.13	-107.14	-105.60	-103.74	-100.78	-98.54	-100.89	-103.40	-102.36
-2	-96.88	-107.50	-101.38	-102.29	-98.78	-99.28	-99.12	-104.41	-111.17
-1	-97.74	-106.41	-96.01	-102.50	-95.60	-100.38	-95.31	-111.96	-100.57
0 note 2	-	-	-	-	-	-	-	-	-
+1	-99.61	-101.75	-96.26	-98.93	-97.06	-104.20	-95.44	-104.84	-94.94
+2	-100.24	-100.67	-97.38	-99.41	-97.99	-104.30	-100.01	-99.42	-100.49
+3	-99.61	-100.12	-101.26	-99.64	-100.64	-100.62	-101.01	-96.86	-100.56
+4	-103.32	-104.50	-104.84	-100.74	-106.28	-101.32	-102.45	-100.25	-103.66
+5	-105.98	-99.79	-105.88	-98.59	-98.89	-101.32	-96.87	-102.19	-101.42

Note 1: Comparison frequency 15 MHz
Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 969.99MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1021.5MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1072.98MHz+(n*Freference) (dBc) note 3		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-95.92	-95.39	-99.85	-90.22	-100.27	-91.87	-92.70	-89.28	-96.46
-4	-87.92	-86.82	-94.62	-85.35	-88.52	-89.46	-91.08	-91.49	-100.13
-3	-96.68	-96.93	-100.62	-95.40	-105.35	-103.26	-100.06	-100.54	-96.01
-2	-94.83	-105.24	-103.61	-104.84	-100.61	-101.94	-103.86	-102.74	-97.01
-1	-97.32	-108.14	-100.69	-103.62	-98.06	-99.11	-100.50	-107.49	-114.57
0 note 4	-	-	-	-	-	-	-	-	-
+1	-100.72	-101.45	-97.77	-98.52	-101.89	-101.29	-99.13	-101.57	-99.37
+2	-103.76	-103.15	-105.36	-100.08	-108.45	-100.42	-102.43	-98.41	-103.50
+3	-106.62	-98.80	-100.59	-99.89	-95.03	-101.70	-93.70	-103.66	-99.45
+4	-87.22	-90.47	-89.66	-94.04	-88.59	-96.15	-88.40	-89.75	-94.40
+5	-94.85	-101.21	-94.80	-96.75	-91.20	-96.31	-87.58	-91.29	-97.18

Note 3: Reference frequency 30 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 969.99MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1021.5MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1072.98MHz+(n*Fstep size) (dBc) note 5		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5.0	-89.07	-90.04	-90.74	-90.48	-87.89	-88.55	-89.93	-88.81	-88.79
-4.5	-89.33	-88.83	-85.97	-84.53	-84.56	-90.74	-88.49	-84.14	-87.20
-4.0	-84.02	-86.73	-87.70	-83.90	-87.25	-88.96	-87.61	-87.48	-87.35
-3.5	-85.23	-85.76	-87.29	-82.77	-86.54	-85.46	-87.57	-88.24	-85.31
-3.0	-86.17	-82.92	-84.86	-85.96	-88.06	-81.83	-84.75	-82.48	-85.29
-2.5	-87.75	-84.91	-80.88	-82.89	-82.11	-85.17	-85.63	-87.58	-85.98
-2.0	-87.19	-85.19	-86.47	-86.48	-88.53	-84.79	-86.76	-82.72	-86.20
-1.5	-83.37	-85.66	-86.47	-86.12	-82.53	-88.69	-78.01	-79.63	-79.49
-1.0	-74.92	-79.71	-81.70	-73.47	-75.12	-73.68	-82.50	-83.01	-84.81
-0.5	-63.11	-66.18	-68.34	-80.38	-78.28	-81.94	-57.90	-59.12	-59.61
0 note 6	-	-	-	-	-	-	-	-	-
+0.5	-64.14	-66.91	-68.06	-79.32	-81.31	-79.33	-57.38	-59.62	-60.16
+1.0	-72.65	-79.93	-80.73	-72.22	-73.33	-72.61	-81.56	-83.32	-84.79
+1.5	-84.49	-84.29	-84.78	-82.60	-88.57	-86.77	-78.01	-76.50	-78.75
+2.0	-84.63	-84.30	-86.26	-87.85	-85.57	-82.94	-84.89	-83.61	-84.51
+2.5	-84.62	-86.55	-82.91	-88.64	-85.52	-85.00	-82.78	-87.19	-84.93
+3.0	-85.07	-87.62	-82.24	-85.81	-87.31	-87.14	-84.91	-84.48	-86.61
+3.5	-80.75	-84.02	-85.64	-86.56	-82.33	-87.54	-87.92	-85.84	-84.52
+4.0	-86.75	-84.35	-87.09	-87.71	-87.74	-83.14	-89.10	-88.80	-86.13
+4.5	-89.53	-85.48	-89.12	-88.32	-89.35	-89.76	-84.88	-90.38	-89.66
+5.0	-88.60	-90.23	-86.83	-87.90	-89.97	-86.60	-87.95	-88.05	-89.73

Note 5: Step size 30 kHz
Note 6: All spurs are referenced to carrier signal (n=0).

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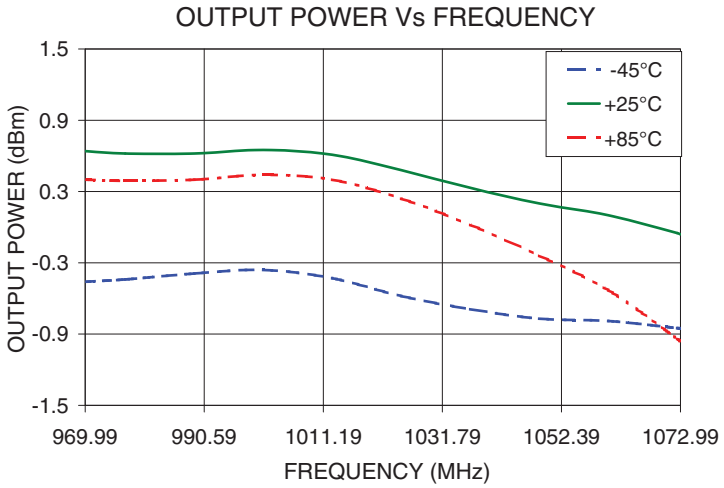
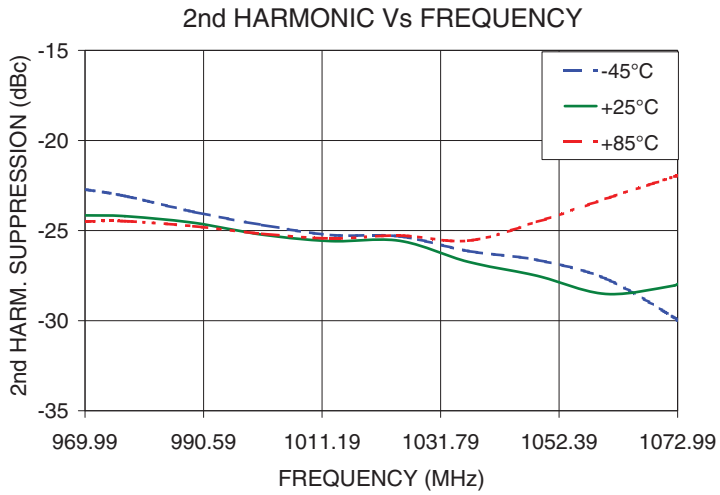
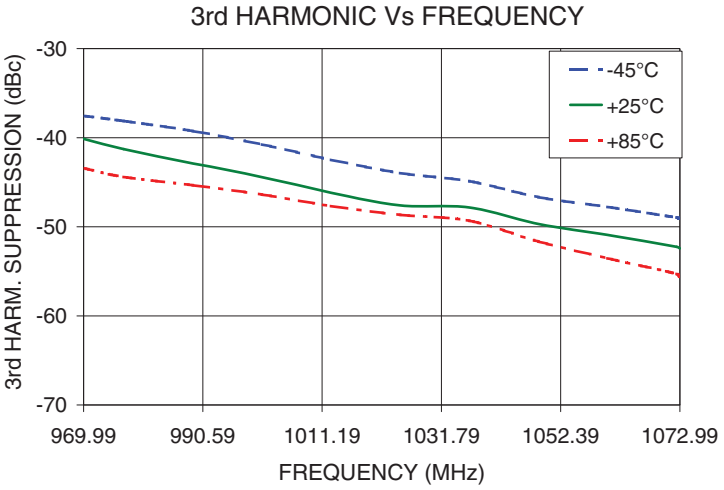
Typical Performance Curves







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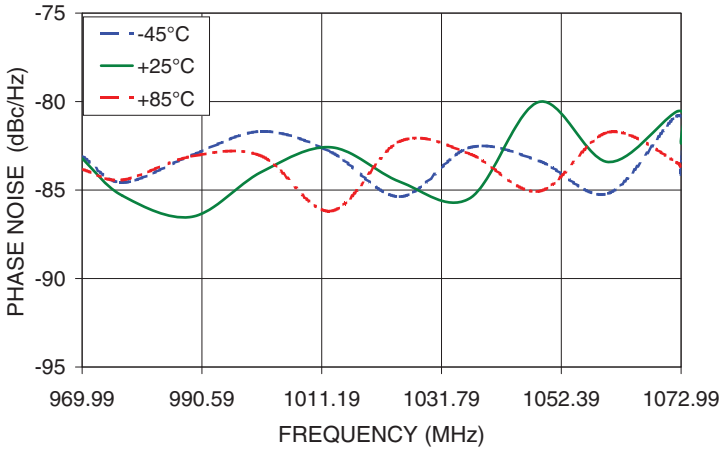
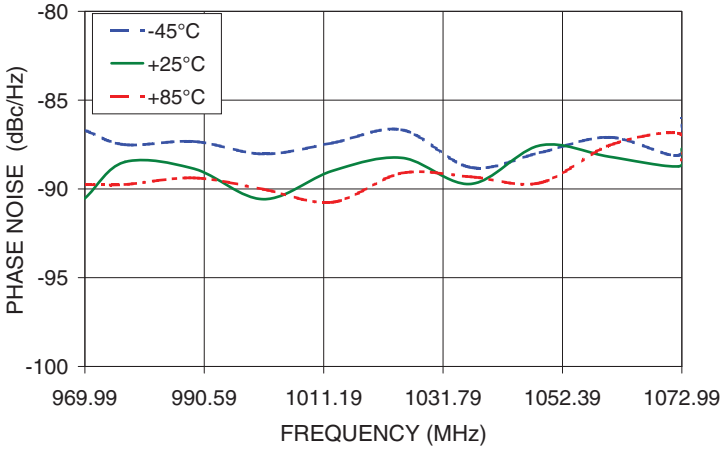
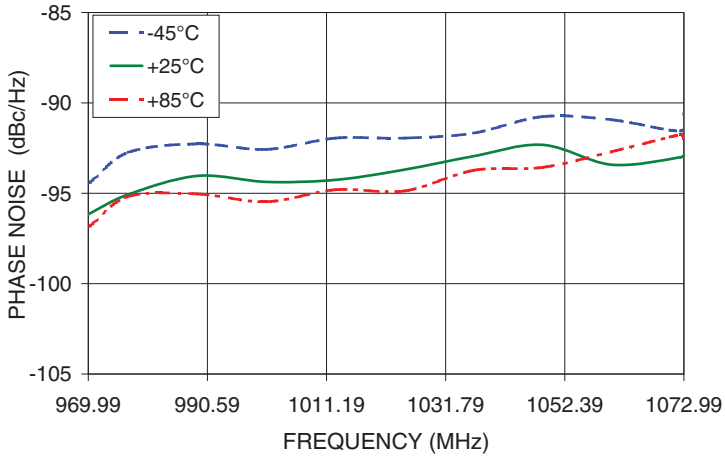
PHASE NOISE @100Hz offset



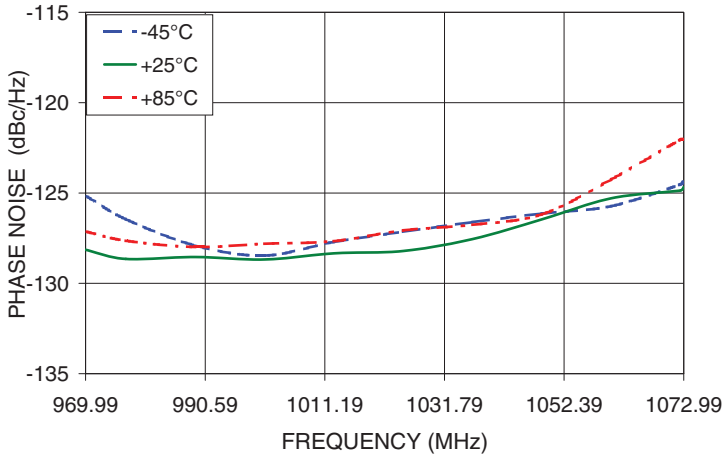
PHASE NOISE @1kHz offset



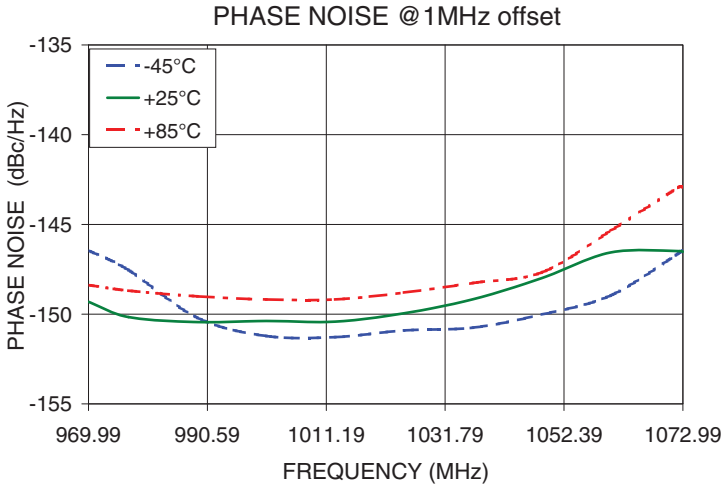
PHASE NOISE @10kHz offset



PHASE NOISE @100kHz offset



PHASE NOISE @1MHz offset



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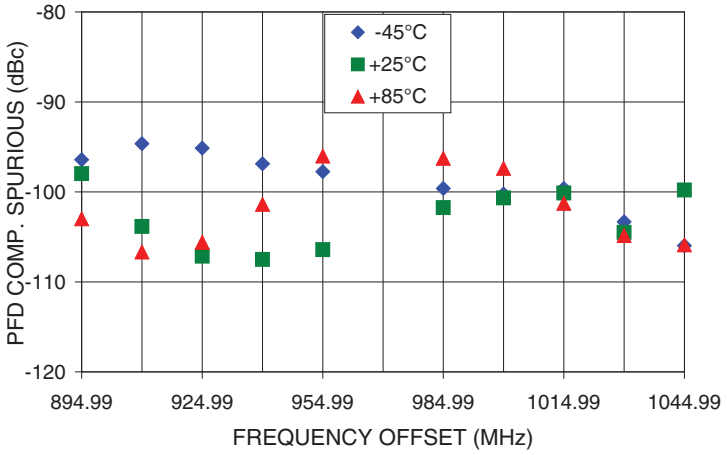
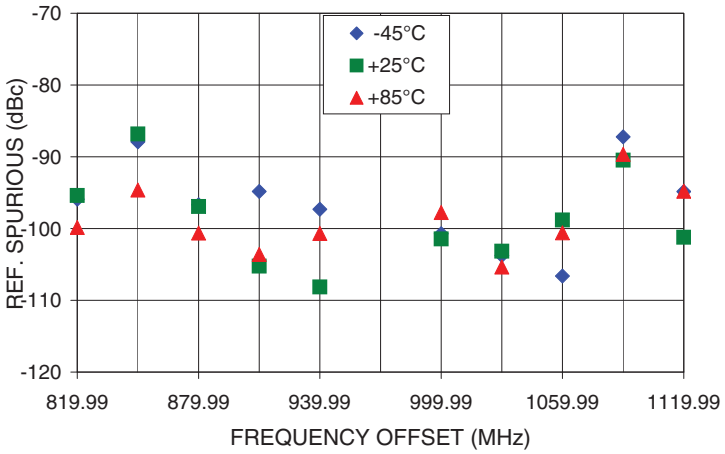
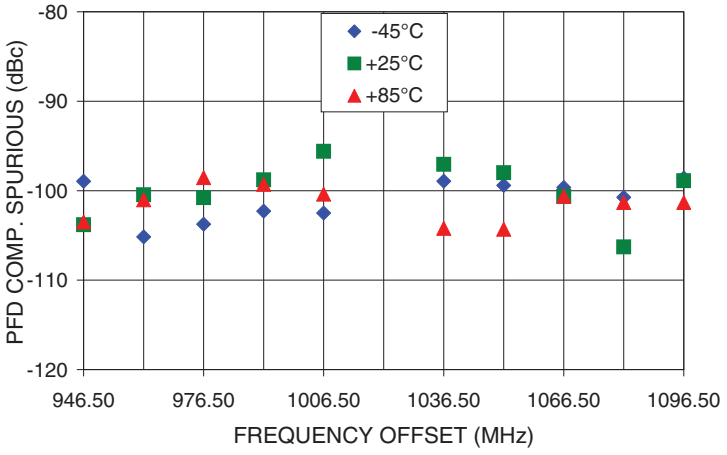
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 969.99MHz



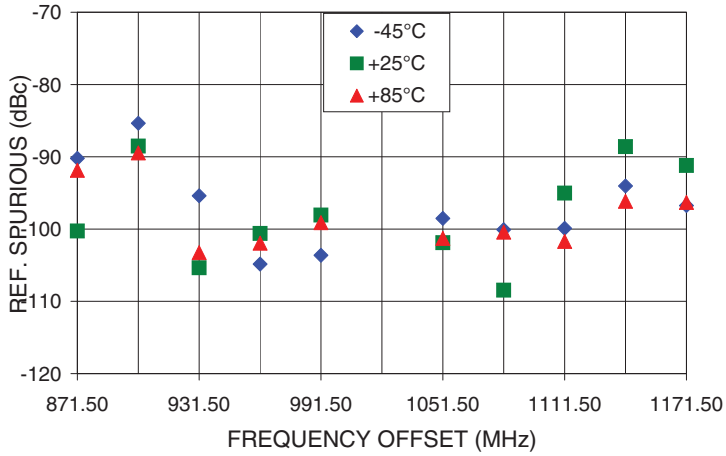
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 969.99MHz



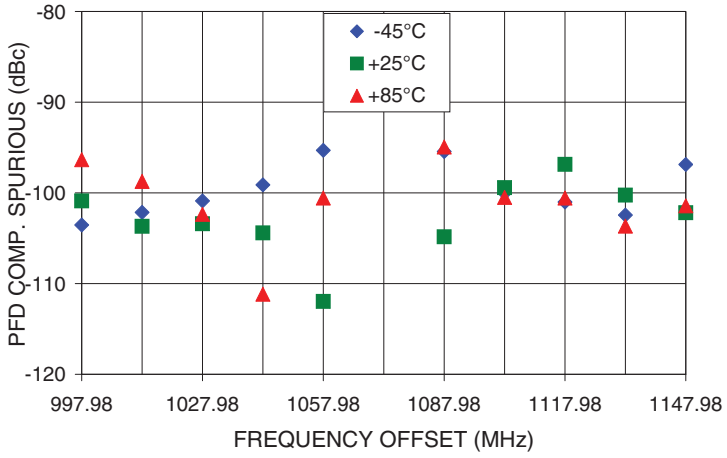
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1021.5MHz



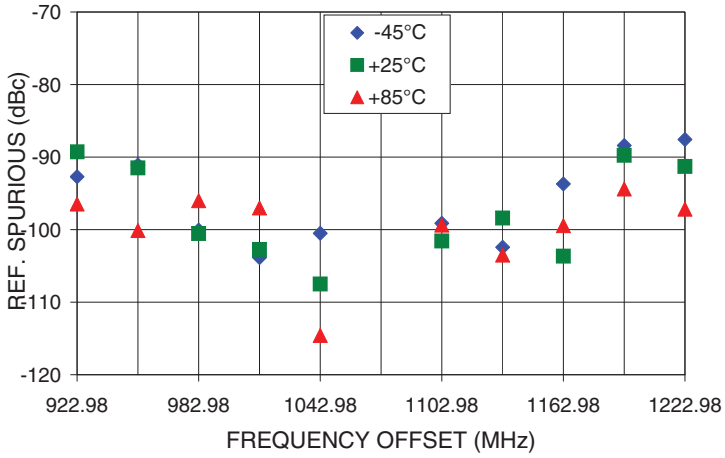
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar =1021.5MHz



PFD COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1072.98MHz



REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar =1072.98MHz



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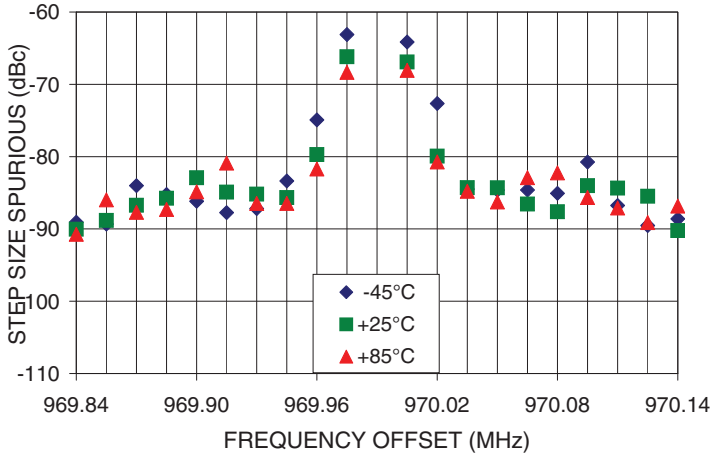
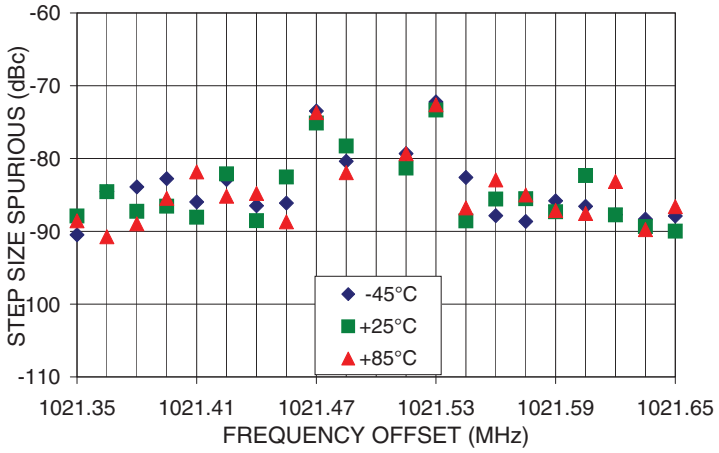
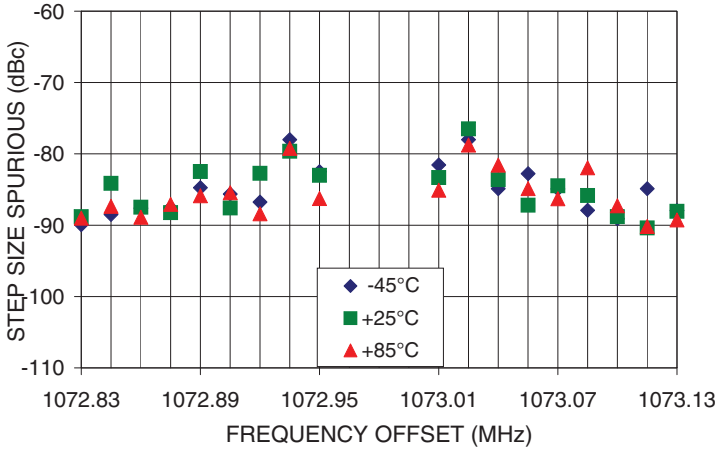
0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 969.99MHz



0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1021.5MHz



0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1072.98MHz



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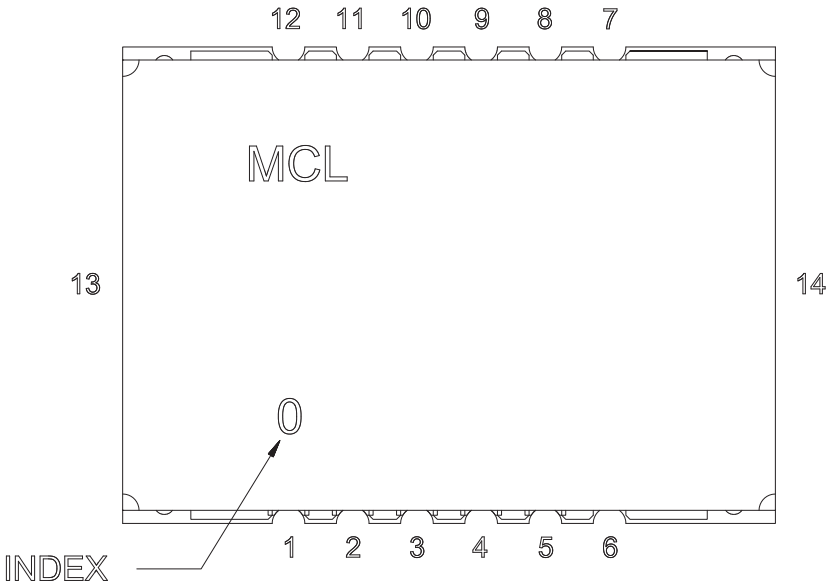
Pin Configuration

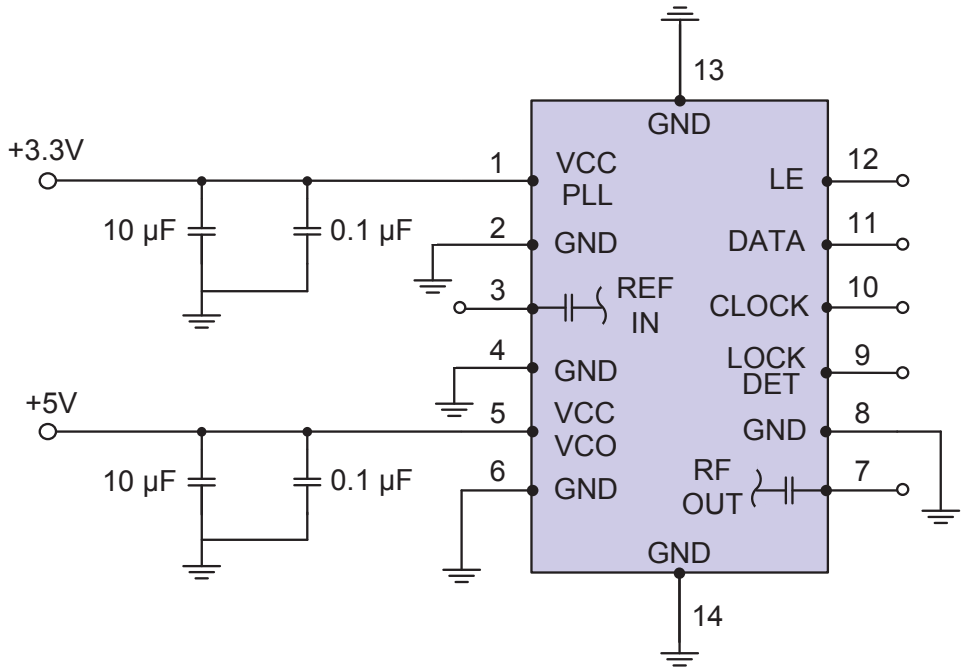


Pin Connection

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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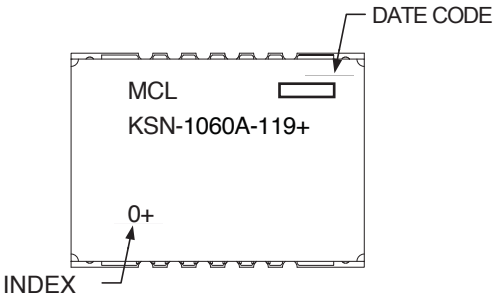
Device Marking



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:DK801

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567-1+

Environment Ratings: ENV03T2

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