

NON-CATALOG

Frequency Synthesizer

KSN-2060A-119+

50Ω 2010 to 2060 MHz

The Big Deal

- Low phase noise and spurious
- Robust design and construction
- Small size 0.80" x 0.58" x 0.24"



CASE STYLE: DK1171

Product Overview

The KSN-2060A-119+ is a Frequency Synthesizer, designed to operate from 2010 to 2060 MHz for cellular infrastructure application. The KSN-2060A-119+ is packaged in a metal case (size of 0.80" x 0.58" x 0.24") to shield against unwanted signals and noise.

Key Features

Feature	Advantages
Low phase noise and spurious: <ul style="list-style-type: none">• Phase Noise: -110 dBc/Hz typ. @ 10 kHz offset• Comparison Spurious: -84 dBc typ.• Reference Spurious: -104 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-2060A-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 0.24"	The small size enables the KSN-2060A-119+ to be used in compact designs.



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50Ω 2010 to 2060 MHz

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 0.24"



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+ 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.

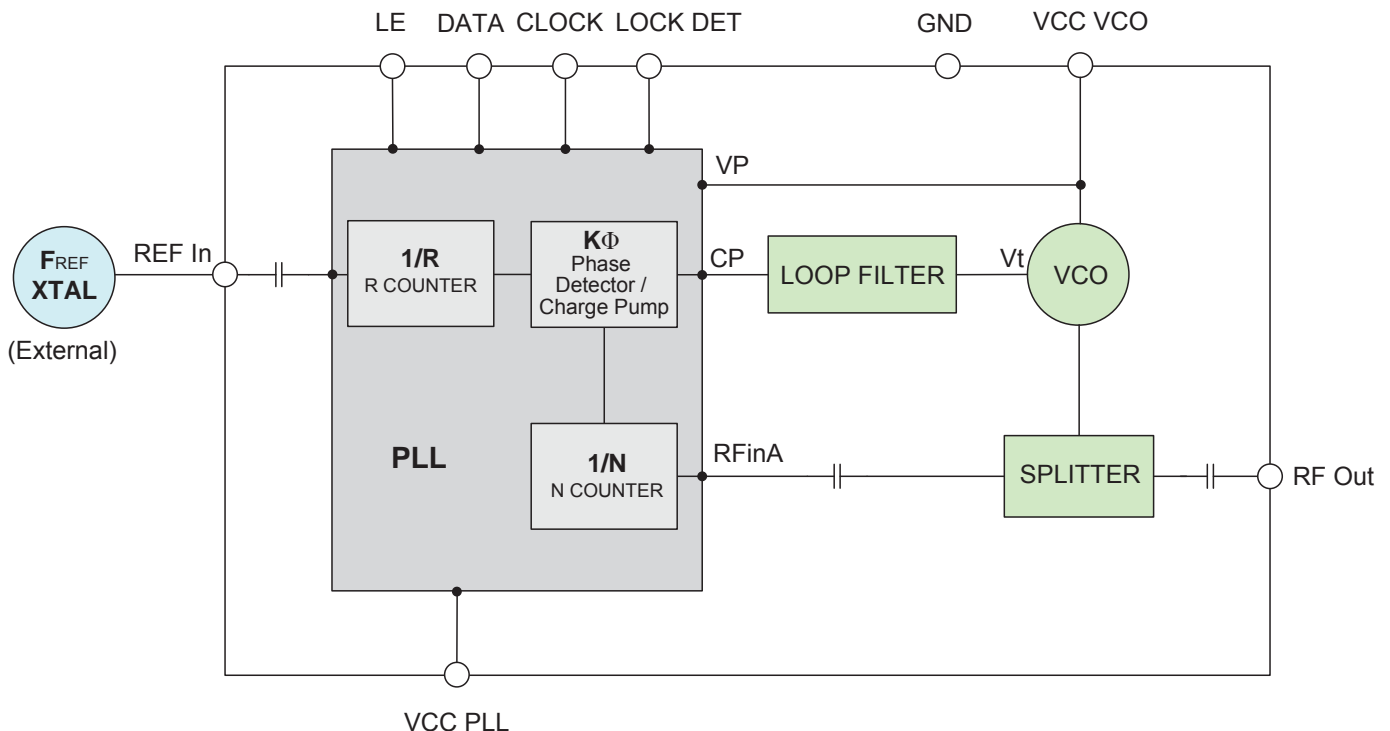
Applications

- Cellular infrastructure

General Description

The KSN-2060A-119+ is a Frequency Synthesizer, designed to operate from 2010 to 2060 MHz for cellular infrastructure application. The KSN-2060A-119+ is packaged in a metal case (size of 0.80" x 0.58" x 0.24") to shield against unwanted signals and noise. To enhance the robustness of KSN-2060A-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	-	2010	-	2060	MHz
Step Size	-	-	100	-	kHz
Settling Time	Within ± 1 kHz	-	10	-	mSec
Output Power	-	0	+3	+6	dBm
SSB Phase Noise	@ 100 Hz offset	-	-72	-	dBc/Hz
	@ 1 kHz offset	-	-79	-74	
	@ 10 kHz offset	-	-110	-104	
	@ 100 kHz offset	-	-133	-127	
	@ 1 MHz offset	-	-151	-145	
Reference Spurious Suppression	Ref. Freq. 60 MHz	-	-104	-80	dBc
Comparison Spurious Suppression	Step Size 100 kHz	-	-84	-65	
Non - Harmonic Spurious Suppression	-	-	-90	-	
Harmonic Suppression	-	-	-24	-18	
VCO Supply Voltage	+5.00	+4.75	+5.00	+5.25	V
PLL Supply Voltage	+5.00	+4.75	+5.00	+5.25	
VCO Supply Current	-	-	32	38	mA
PLL Supply Current	-	-	15	22	
Reference Input (External)	Frequency	60 (square wave)	-	60	MHz
	Amplitude	1	-	1	V _{P-P}
	Input impedance	-	-	100	K Ω
	Phase Noise @ 1 kHz offset	-	-	-130	dBc/Hz
RF Output port Impedance	-	-	50	-	Ω
Input Logic Level	Input high voltage	-	2.60	-	V
	Input low voltage	-	-	0.55	V
Digital Lock Detect	Locked	-	2.45	3.25	V
	Unlocked	-	-	0.40	V
Frequency Synthesizer PLL	-	ADF4113			
PLL Programming	-	3-wire serial 3V CMOS			
Register Map @ 2060 MHz	F_Register	-	(MSB) 10011111100000010010011 (LSB)		
	N_Register	-	(MSB) 001000101000001101100001 (LSB)		
	R_Register	-	(MSB) 000100000000100101100000 (LSB)		

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	5.7V
PLL Supply Voltage	6.3V
VCO Supply Voltage to PLL Supply Voltage	-0.3V to +5.5V
Reference Frequency Voltage	-0.3Vmin, +3.2Vmax
Data, Clock, LE Levels	-0.3Vmin, +3.2Vmax
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
	2010	2.42	2.40	2.33	31.15	32.06	32.44	13.59	15.28
2016	2.54	2.51	2.43	31.22	32.13	32.50	13.60	15.29	16.68
2024	2.74	2.71	2.64	31.28	32.20	32.56	13.61	15.30	16.70
2032	2.92	2.90	2.83	31.31	32.22	32.59	13.61	15.30	16.70
2040	3.08	3.07	2.99	31.32	32.23	32.59	13.62	15.31	16.71
2048	3.20	3.19	3.11	31.33	32.23	32.59	13.62	15.31	16.71
2056	3.32	3.32	3.21	31.34	32.23	32.59	13.62	15.32	16.72
2060	3.37	3.37	3.26	31.34	32.23	32.59	13.63	15.32	16.73

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2010	-23.71	-24.46	-25.43	-35.02	-34.73	-34.74
2016	-23.36	-23.87	-24.63	-34.03	-33.92	-34.88
2024	-24.40	-24.40	-24.55	-35.68	-34.74	-34.13
2032	-25.50	-25.64	-25.65	-35.11	-33.09	-32.01
2040	-25.35	-25.83	-26.33	-36.77	-35.27	-34.28
2048	-24.33	-25.03	-25.95	-37.72	-37.16	-36.09
2056	-23.46	-24.08	-24.92	-32.61	-32.53	-33.43
2060	-23.56	-23.91	-24.60	-32.89	-31.33	-31.89



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2010	-71.31	-78.86	-110.54	-132.96	-151.73
2016	-70.43	-79.88	-110.10	-132.97	-150.48
2024	-72.46	-78.34	-109.91	-132.85	-151.77
2032	-71.89	-78.23	-109.68	-132.77	-150.98
2040	-71.22	-77.02	-109.61	-132.57	-150.70
2048	-75.69	-78.10	-109.33	-132.53	-150.17
2056	-71.89	-77.32	-109.54	-132.18	-150.60
2060	-74.23	-80.10	-109.17	-132.23	-150.40

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS				
	-45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2010	-72.53	-77.53	-110.16	-133.62	-151.06
2016	-71.60	-78.99	-109.93	-133.36	-148.69
2024	-70.66	-78.35	-109.68	-133.31	-151.04
2032	-70.97	-78.51	-109.54	-133.08	-150.67
2040	-70.16	-78.38	-109.27	-133.02	-149.77
2048	-73.20	-79.36	-109.61	-132.89	-149.54
2056	-70.97	-78.80	-109.22	-132.88	-148.89
2060	-70.23	-78.79	-109.36	-133.00	-149.48

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2010	-71.37	-77.10	-108.82	-131.59	-151.05
2016	-72.85	-77.63	-108.93	-131.49	-149.19
2024	-73.86	-78.44	-108.77	-131.60	-149.57
2032	-70.37	-77.34	-108.48	-131.15	-151.04
2040	-71.58	-79.17	-108.69	-131.25	-149.65
2048	-72.64	-77.77	-108.05	-130.84	-149.96
2056	-69.71	-78.70	-108.28	-130.85	-150.94
2060	-68.83	-77.12	-107.93	-130.69	-150.92



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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 2010MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 2035MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 2060MHz+(n*Fcomparison) (dBc) note 1		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5	-99.13	-101.49	-103.90	-96.27	-99.00	-101.73	-96.62	-98.79	-103.63
-4	-95.09	-98.01	-100.29	-92.20	-94.72	-98.26	-92.50	-95.45	-99.49
-3	-88.01	-90.40	-93.90	-85.48	-88.20	-91.62	-85.32	-89.05	-92.81
-2	-77.32	-78.78	-81.53	-74.19	-76.25	-79.72	-74.30	-76.67	-81.00
-1	-89.99	-89.63	-90.57	-86.51	-86.79	-89.07	-86.39	-87.39	-91.93
0 note 2	-	-	-	-	-	-	-	-	-
+1	-90.16	-88.55	-91.22	-86.20	-86.42	-88.65	-85.94	-86.94	-91.15
+2	-76.55	-78.03	-80.77	-73.70	-75.65	-78.82	-73.79	-76.29	-80.07
+3	-87.49	-90.30	-92.48	-84.05	-86.64	-90.53	-84.53	-88.58	-91.81
+4	-93.48	-95.74	-99.22	-91.30	-93.33	-95.68	-91.64	-94.24	-97.32
+5	-98.38	-100.31	-104.08	-95.86	-97.93	-100.85	-96.08	-98.42	-101.76

Note 1: Comparison frequency 100 kHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 2010MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 2035MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 2060MHz+(n*Freference) (dBc) note 3		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5	-123.21	-122.65	-126.87	-124.04	-126.00	-126.05	-123.87	-126.93	-125.88
-4	-110.65	-113.40	-113.66	-107.06	-109.43	-109.72	-103.20	-105.19	-106.67
-3	-93.63	-94.51	-95.26	-93.71	-96.12	-98.66	-100.76	-102.89	-104.69
-2	-101.61	-102.43	-104.11	-103.04	-103.79	-106.39	-104.04	-105.79	-107.51
-1	-113.12	-111.54	-113.30	-113.58	-113.47	-113.29	-115.87	-115.65	-114.68
0 note 4	-	-	-	-	-	-	-	-	-
+1	-119.73	-116.61	-114.05	-117.49	-114.47	-112.90	-117.81	-116.64	-114.45
+2	-97.91	-99.53	-100.37	-98.80	-100.54	-102.21	-100.19	-102.06	-103.23
+3	-88.71	-89.57	-90.94	-88.92	-91.18	-93.95	-94.97	-97.05	-99.22
+4	-104.53	-106.52	-109.09	-101.12	-102.94	-105.08	-96.80	-99.01	-101.22
+5	-129.34	-131.05	-130.89	-126.75	-129.60	-131.02	-122.22	-124.16	-126.87

Note 3: Reference frequency 60 MHz

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



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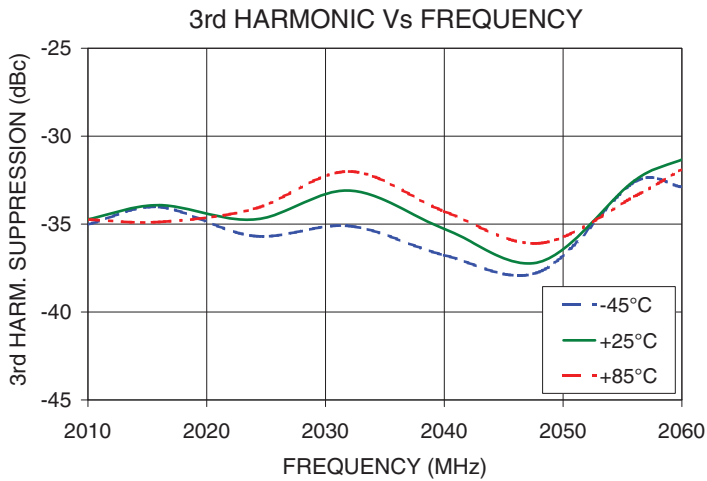
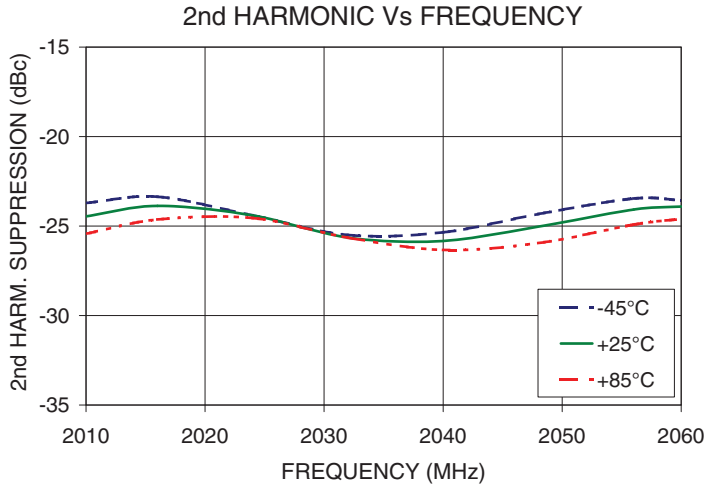
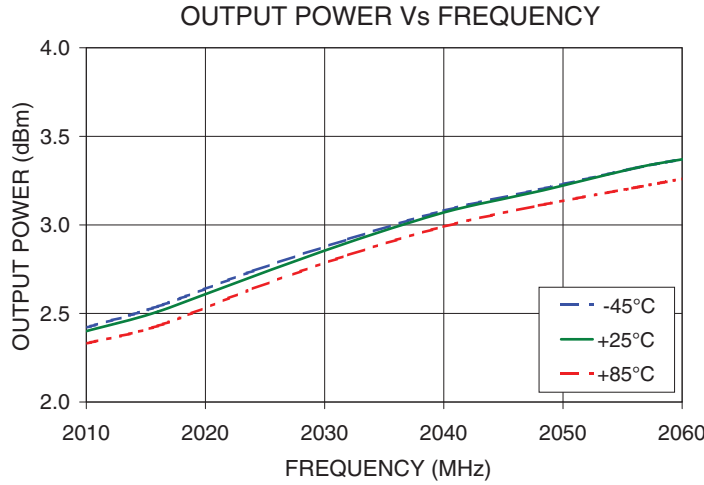


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Typical Performance Curves



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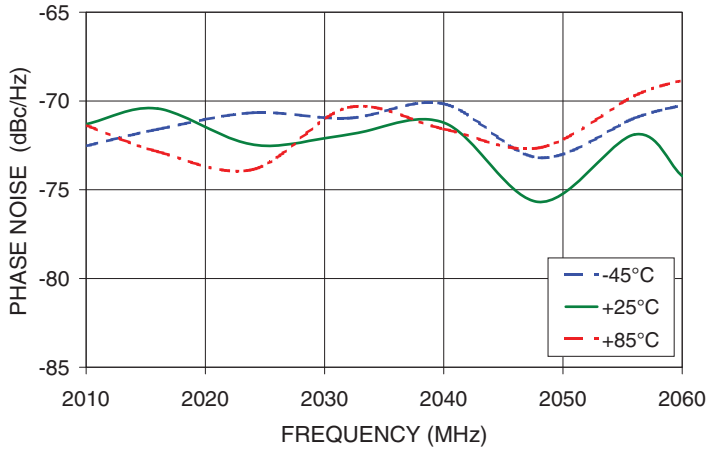
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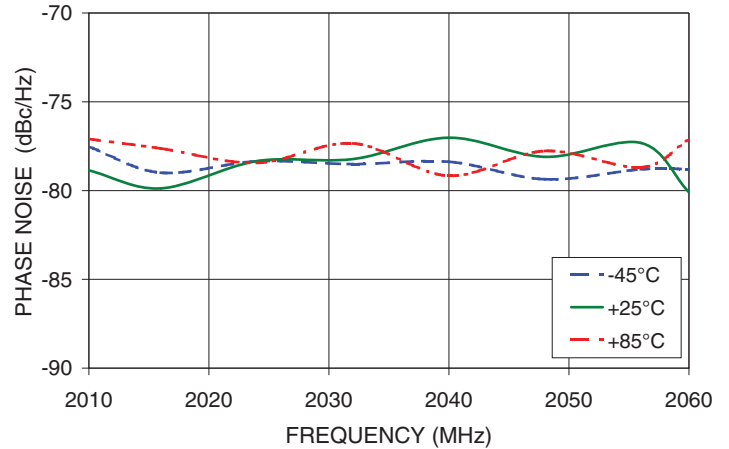
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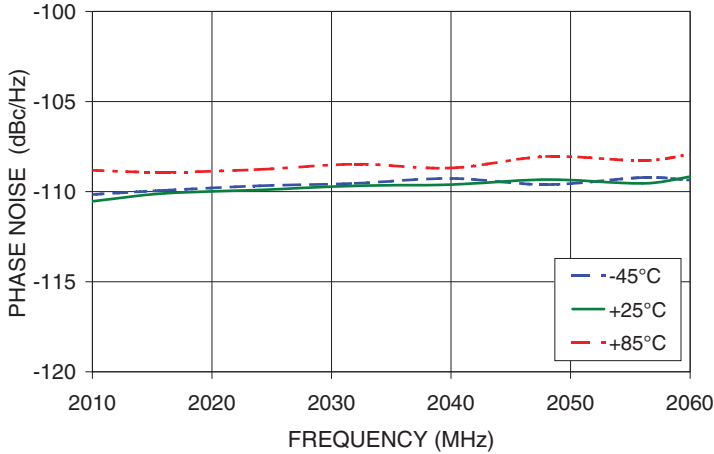
PHASE NOISE @100Hz offset



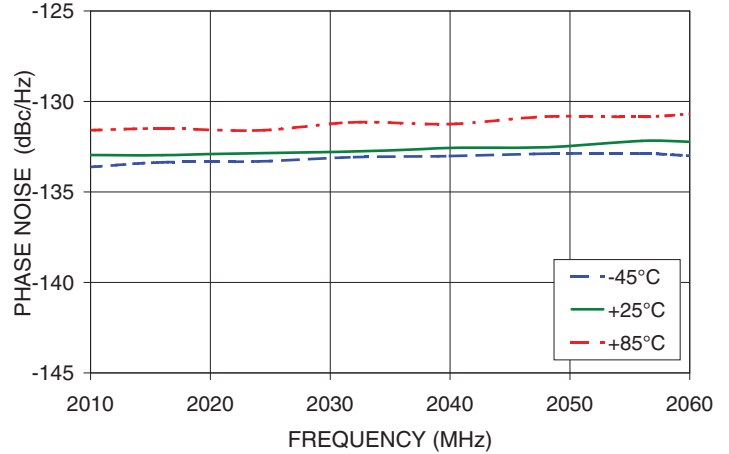
PHASE NOISE @1kHz offset



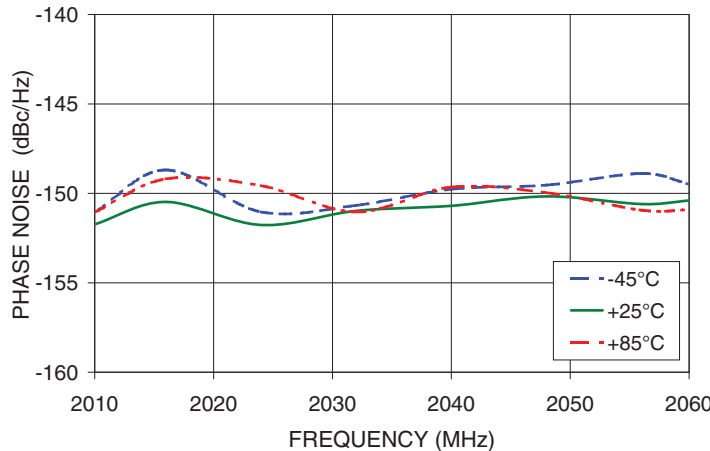
PHASE NOISE @10kHz offset



PHASE NOISE @100kHz offset



PHASE NOISE @1MHz offset



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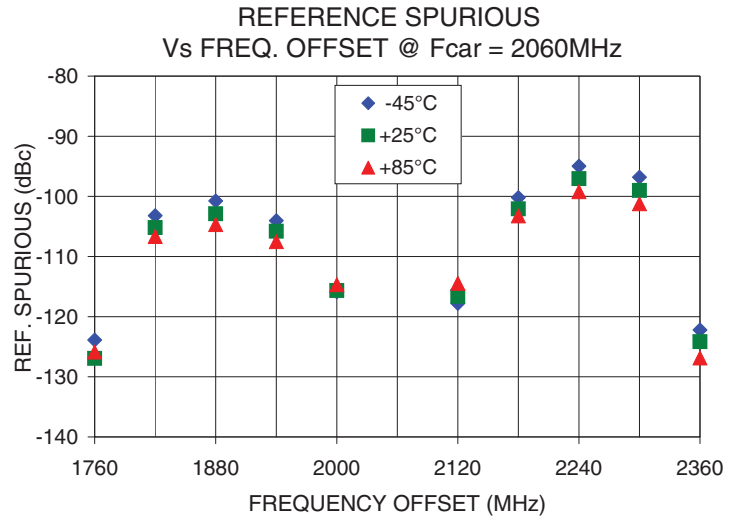
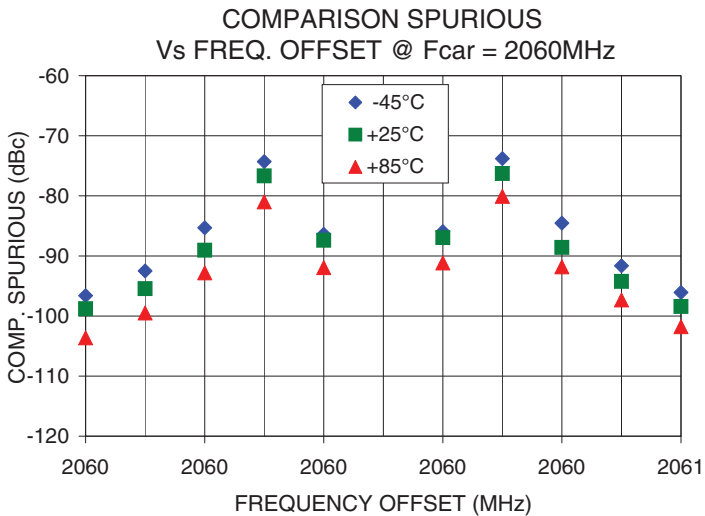
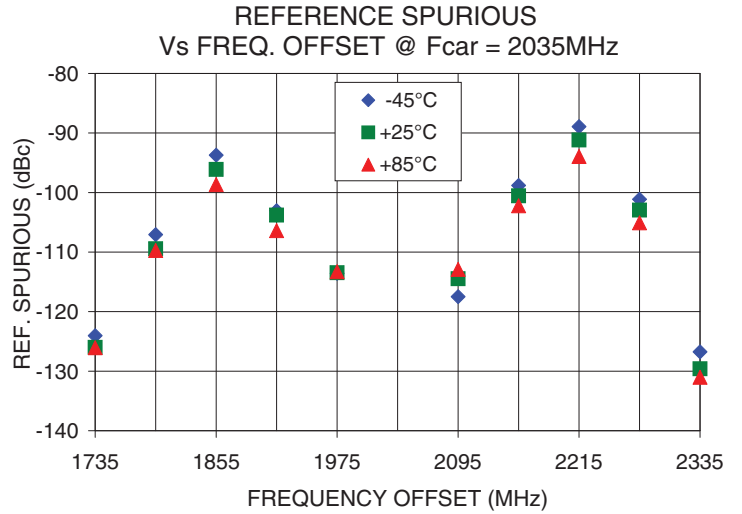
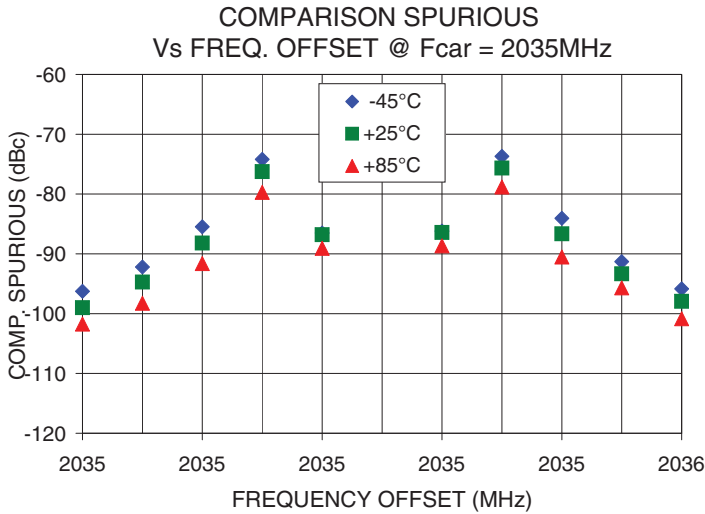
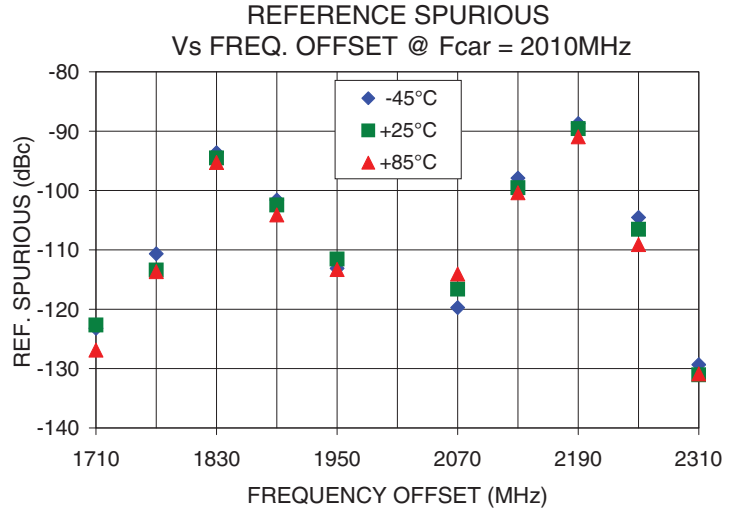
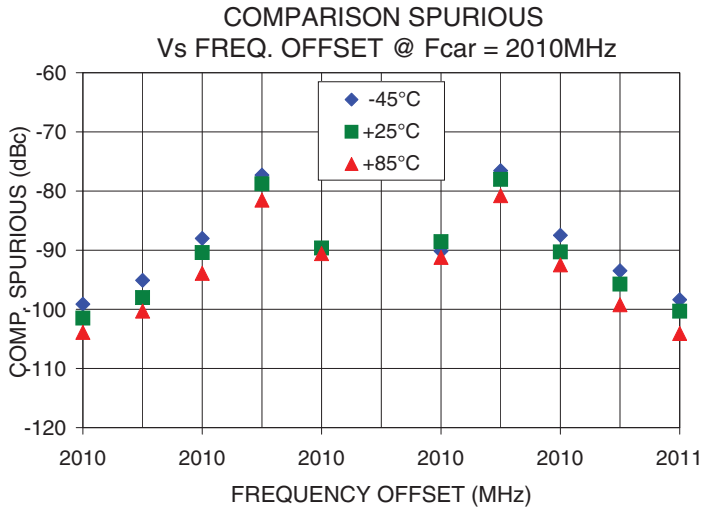


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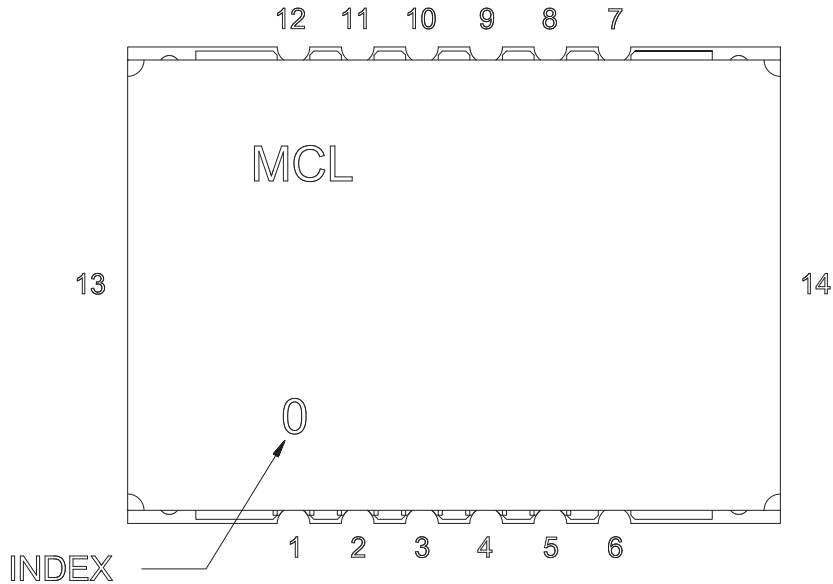
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Pin Configuration

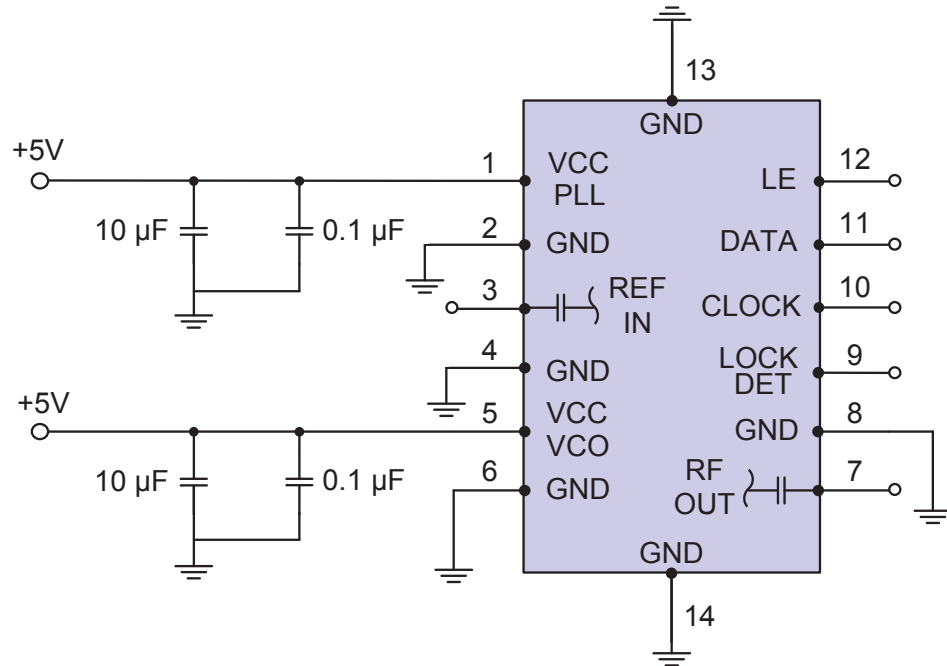


Pin Connection

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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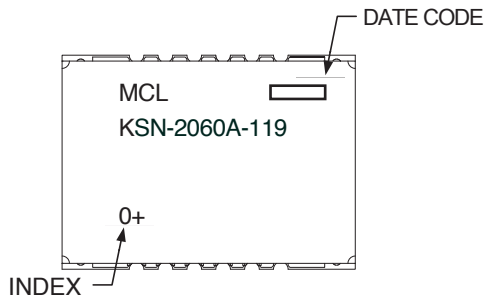


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Device Marking



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: DK1171

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567+

Environment Ratings: ENV03T2



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