Frequency Synthesizer KSN-2026A-219+

50Ω 2011.5 to 2026.5 MHz

The Big Deal

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

CASE STYLE: DK1171

Product Overview

The KSN-2026A-219+ is a Frequency Synthesizer, designed to operate from 2011.5 to 2026.5 MHz for CDMA cellular basestation application. The KSN-2026A-219+ 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: • Phase Noise: -109 dBc/Hz typ. @ 10 kHz offset • Step Size Spurious: -91 dBc typ. • Comparison Spurious: -90 dBc typ. • Reference Spurious: -88 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-2026A-219+, 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-2026A-219+ to be used in compact designs.

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Surface Mount

Frequency Synthesizer

KSN-2026A-219+

50Ω 2011.5 to 2026.5 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 0.24"

CASE STYLE: DK1171
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.

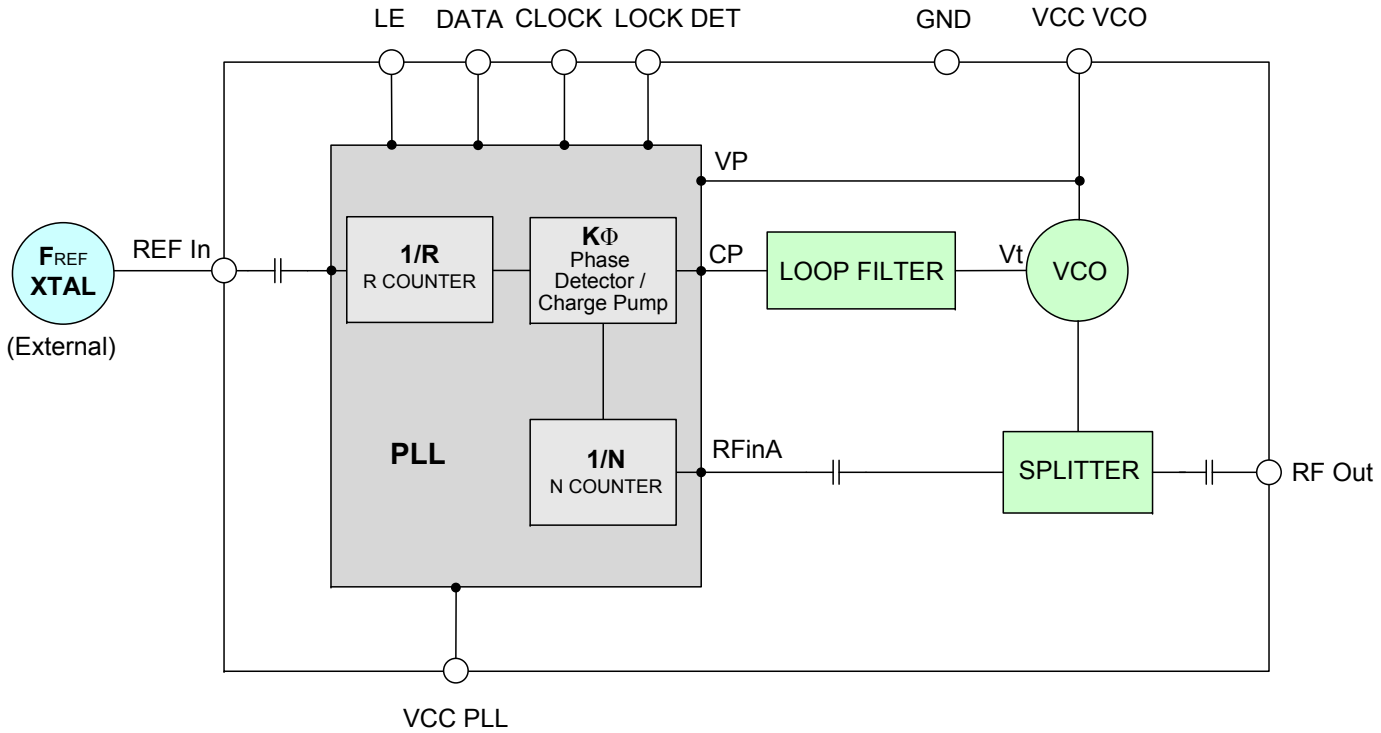
Applications

- CDMA cellular basestation

General Description

The KSN-2026A-219+ is a Frequency Synthesizer, designed to operate from 2011.5 to 2026.5 MHz for CDMA cellular basestation application. The KSN-2026A-219+ 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-2026A-219+, 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		-	2011.5	-	2026.5	MHz
Step Size		-	-	250	-	kHz
Comparison Frequency		-	-	20	-	MHz
Settling Time		Within ± 1 kHz	-	5	-	mSec
Output Power		-	-3	-1	+3	dBm
SSB Phase Noise		@ 100 Hz offset	-	-84	-	dBc/Hz
		@ 1 kHz offset	-	-94	-89	
		@ 10 kHz offset	-	-109	-105	
		@ 100 kHz offset	-	-134	-130	
		@ 1 MHz offset	-	-154	-149	
Step Size Spurious Suppression		Step Size 250 kHz	-	-91	-70	dBc
0.5 Step Size Spurious Suppression		0.5 Step Size 125 kHz	-	-87	-70	
Reference Spurious Suppression		Ref. Freq. 60 MHz	-	-88	-75	
Comparison Spurious Suppression		Step Size 20 MHz	-	-90	-70	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-28	-20	
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		-	-	46	55	mA
PLL Supply Current		-	-	15	25	
Reference Input (External)	Frequency	60 (square wave)	-	60	-	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	-	2.65	-	-	V
	Input low voltage	-	-	-	0.60	V
Digital Lock Detect	Locked	-	2.60	-	3.30	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4153			
PLL Programming		-	3-wire serial 3V CMOS			
Register Map @ 2026.5 MHz	R0_Register	-	(MSB) 11001010000000101000 (LSB)			
	R1_Register	-	(MSB) 10100110000010100000 1 (LSB)			
	R2_Register	-	(MSB) 1111100010 (LSB)			
	R3_Register	-	(MSB) 1111000111 (LSB)			

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	5.5V
PLL Supply Voltage	4.0V
VCO Supply Voltage to PLL Supply Voltage	-0.3V to +5.8V
Reference Frequency Voltage	-0.3V min, +3.4V max
Data, Clock, LE Levels	-0.3V min, +3.4V max
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
2011.5	-1.21	-1.18	-1.28	44.86	46.15	47.12	14.91	15.93	17.90
2013.0	-1.19	-1.16	-1.26	44.88	46.17	47.13	14.84	15.85	17.67
2014.5	-1.18	-1.13	-1.23	44.89	46.18	47.14	14.78	15.64	17.07
2016.0	-1.16	-1.12	-1.22	44.90	46.19	47.15	14.72	15.19	18.06
2017.5	-1.14	-1.10	-1.20	44.92	46.20	47.16	14.65	14.75	18.51
2019.0	-1.13	-1.08	-1.18	44.93	46.21	47.17	14.51	14.30	18.04
2020.5	-1.12	-1.07	-1.17	44.94	46.23	47.19	14.35	14.15	15.93
2022.0	-1.11	-1.06	-1.15	44.96	46.24	47.20	14.52	14.59	15.93
2023.5	-1.10	-1.05	-1.14	44.97	46.26	47.22	14.67	15.03	15.93
2025.0	-1.09	-1.04	-1.12	44.98	46.27	47.23	14.72	15.48	15.93
2026.5	-1.07	-1.02	-1.11	44.99	46.29	47.24	14.83	15.87	17.84

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2011.5	-33.05	-34.77	-36.30	-26.36	-26.93	-28.07
2013.0	-32.85	-34.87	-36.33	-26.40	-26.98	-28.14
2014.5	-32.61	-34.90	-36.33	-26.29	-27.00	-28.17
2016.0	-32.38	-34.80	-36.25	-26.24	-26.98	-28.14
2017.5	-32.16	-34.70	-36.18	-26.21	-26.96	-28.12
2019.0	-32.14	-34.60	-36.10	-26.17	-26.94	-28.09
2020.5	-32.17	-34.56	-36.06	-26.13	-26.92	-28.03
2022.0	-32.35	-34.63	-36.09	-26.07	-26.90	-27.89
2023.5	-32.52	-34.71	-36.12	-26.00	-26.88	-27.76
2025.0	-32.67	-34.78	-36.15	-25.89	-26.86	-27.63
2026.5	-32.71	-34.93	-35.75	-25.84	-26.36	-27.50

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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2011.5	-89.93	-94.16	-109.35	-135.36	-153.48
2013.0	-86.60	-95.77	-109.48	-135.20	-154.04
2014.5	-84.45	-96.55	-109.59	-135.10	-154.48
2016.0	-84.67	-95.67	-109.68	-135.11	-154.64
2017.5	-84.88	-94.78	-109.78	-135.13	-154.81
2019.0	-85.10	-93.89	-109.87	-135.15	-154.98
2020.5	-85.36	-93.39	-109.89	-135.10	-155.01
2022.0	-85.72	-93.66	-109.77	-134.94	-154.78
2023.5	-86.08	-93.93	-109.66	-134.77	-154.55
2025.0	-86.44	-94.20	-109.54	-134.60	-154.32
2026.5	-84.02	-95.15	-109.39	-135.56	-153.09

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS -45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2011.5	-84.47	-95.71	-109.03	-135.25	-154.48
2013.0	-83.93	-95.86	-108.90	-135.08	-155.20
2014.5	-84.80	-95.09	-109.04	-135.11	-155.09
2016.0	-84.81	-94.57	-108.98	-135.35	-154.66
2017.5	-84.38	-94.18	-108.83	-135.69	-154.07
2019.0	-84.46	-94.32	-108.85	-135.55	-153.91
2020.5	-84.65	-94.58	-108.91	-135.31	-153.84
2022.0	-84.99	-94.38	-109.03	-135.42	-154.40
2023.5	-85.22	-94.20	-109.10	-135.52	-154.82
2025.0	-84.83	-94.05	-108.94	-135.58	-154.56
2026.5	-84.57	-93.59	-109.51	-135.18	-153.96

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2011.5	-85.29	-94.62	-108.90	-134.05	-152.17
2013.0	-85.30	-93.62	-109.04	-134.01	-152.10
2014.5	-85.32	-92.94	-109.16	-133.99	-152.26
2016.0	-85.34	-92.88	-109.20	-134.00	-152.85
2017.5	-85.37	-92.81	-109.25	-134.02	-153.44
2019.0	-85.39	-92.75	-109.30	-134.03	-154.04
2020.5	-85.45	-92.89	-109.26	-134.05	-154.37
2022.0	-85.55	-93.42	-109.05	-134.06	-154.20
2023.5	-85.66	-93.96	-108.83	-134.08	-154.03
2025.0	-85.76	-94.49	-108.62	-134.09	-153.86
2026.5	-86.72	-93.81	-108.87	-134.54	-153.82

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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 2011.5MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 2019MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 2026.5MHz+(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	-98.14	-100.39	-99.86	-91.60	-101.96	-100.16	-93.07	-107.71	-97.90
-4	-97.85	-101.59	-90.49	-87.45	-89.86	-88.18	-83.18	-85.15	-96.47
-3	-85.83	-82.18	-89.45	-90.36	-82.92	-90.20	-89.05	-83.30	-91.63
-2	-86.53	-87.28	-91.44	-99.21	-87.55	-92.11	-108.70	-87.39	-91.79
-1	-89.75	-89.74	-101.44	-97.13	-89.72	-103.36	-95.37	-91.57	-103.32
0 note 2	-	-	-	-	-	-	-	-	-
+1	-90.76	-90.09	-90.61	-91.97	-90.28	-91.94	-91.38	-90.70	-92.15
+2	-91.01	-91.09	-98.69	-93.40	-91.54	-96.44	-93.27	-92.36	-98.20
+3	-84.89	-87.51	-90.48	-90.61	-90.08	-92.12	-92.96	-90.60	-93.55
+4	-88.66	-88.11	-84.99	-80.22	-83.36	-81.07	-79.69	-85.50	-86.67
+5	-90.80	-89.69	-97.33	-87.50	-89.96	-97.33	-87.82	-89.36	-97.09

Note 1: Comparison frequency 20 MHz
Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 2011.5MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 2019MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 2026.5MHz+(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	-95.56	-85.95	-85.63	-94.78	-85.63	-85.81	-92.28	-92.99	-87.69
-4	-102.04	-88.42	-92.17	-97.05	-90.38	-90.90	-92.81	-90.34	-90.04
-3	-89.07	-90.76	-94.70	-89.65	-92.43	-92.37	-89.73	-92.72	-92.31
-2	-95.64	-86.64	-92.58	-92.95	-88.79	-94.69	-92.45	-88.33	-95.60
-1	-89.05	-85.40	-89.31	-90.47	-86.24	-90.51	-89.11	-87.73	-91.63
0 note 4	-	-	-	-	-		-	-	
+1	-89.26	-91.17	-90.39	-90.74	-90.40	-92.34	-93.21	-92.34	-93.29
+2	-87.34	-92.90	-90.84	-88.85	-93.50	-90.64	-90.79	-96.68	-89.64
+3	-99.23	-93.82	-88.65	-99.26	-92.80	-88.49	-98.00	-92.44	-88.81
+4	-90.40	-95.93	-86.74	-91.27	-95.74	-86.27	-89.68	-94.58	-85.92
+5	-89.44	-91.17	-108.86	-89.86	-96.62	-114.49	-88.77	-98.73	-101.41

Note 3: Reference frequency 60 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 2011.5MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2019MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2026.5MHz+(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	-112.96	-109.21	-114.83	-111.86	-111.67	-111.48	-106.97	-115.64	-116.20
-4.5	-105.30	-118.05	-112.98	-114.57	-116.06	-118.84	-118.13	-116.64	-112.98
-4.0	-99.76	-107.69	-110.45	-94.59	-90.64	-91.40	-109.29	-107.48	-118.26
-3.5	-100.51	-115.43	-114.10	-110.93	-106.21	-116.24	-108.57	-106.70	-112.91
-3.0	-112.75	-114.50	-111.23	-107.68	-113.50	-111.66	-107.31	-107.80	-110.13
-2.5	-98.96	-108.89	-111.34	-108.98	-109.98	-105.97	-101.66	-110.89	-102.01
-2.0	-101.67	-109.46	-107.64	-107.33	-109.14	-108.73	-96.33	-110.87	-96.17
-1.5	-107.60	-101.54	-102.37	-107.35	-105.48	-105.33	-101.94	-103.37	-108.67
-1.0	-100.66	-98.51	-97.15	-99.47	-97.10	-99.14	-83.59	-78.87	-81.07
-0.5	-86.69	-87.08	-90.09	-86.96	-87.99	-89.04	-89.33	-88.49	-89.56
0 note 6	-	-	-	-	-	-	-	-	-
+0.5	-89.81	-85.50	-89.00	-88.15	-85.83	-83.76	-90.07	-89.67	-88.24
+1.0	-99.88	-102.06	-97.51	-98.61	-98.93	-102.19	-84.65	-81.71	-81.73
+1.5	-106.38	-104.46	-102.44	-102.44	-106.43	-106.68	-103.65	-106.49	-105.37
+2.0	-105.12	-102.85	-109.02	-108.99	-111.22	-111.17	-97.80	-108.00	-95.45
+2.5	-101.98	-112.02	-109.52	-110.03	-109.15	-105.01	-106.54	-111.39	-107.02
+3.0	-113.43	-110.63	-117.14	-107.95	-110.45	-111.47	-107.34	-108.12	-108.13
+3.5	-106.63	-115.79	-112.37	-116.20	-106.52	-116.87	-114.44	-110.45	-113.52
+4.0	-105.64	-109.71	-110.64	-95.69	-98.34	-94.44	-114.19	-109.56	-118.69
+4.5	-114.86	-118.32	-113.12	-117.11	-116.83	-116.73	-119.10	-115.94	-109.67
+5.0	-115.26	-117.43	-115.18	-118.41	-116.43	-116.28	-112.12	-113.12	-115.70

Note 5: Step size 250 kHz
Note 6: All spurs are referenced to carrier signal (n=0).

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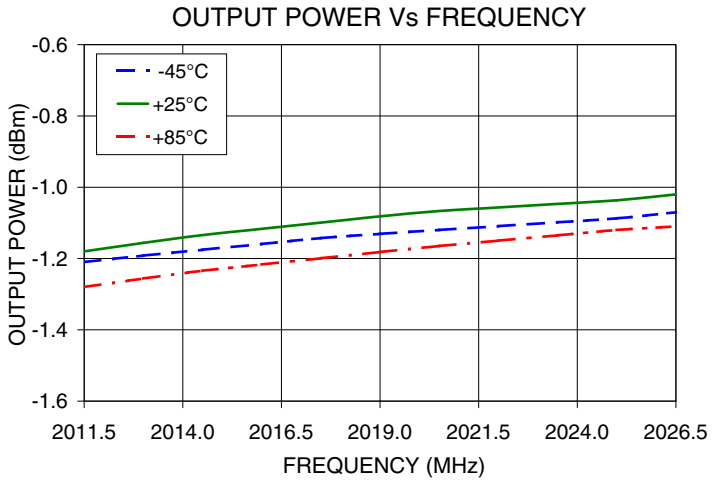
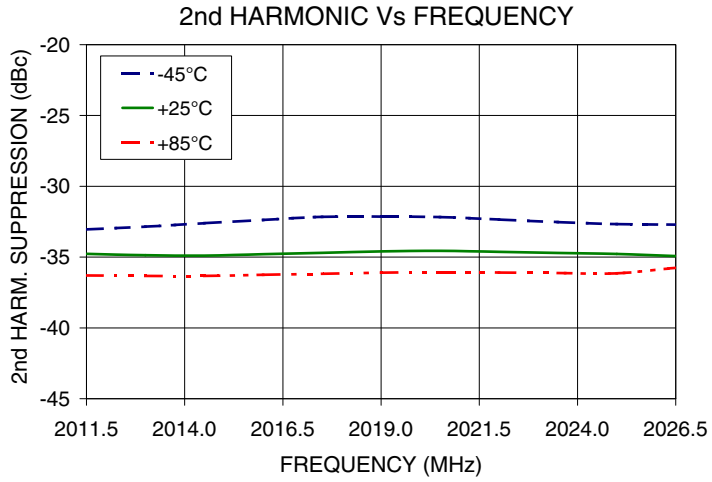
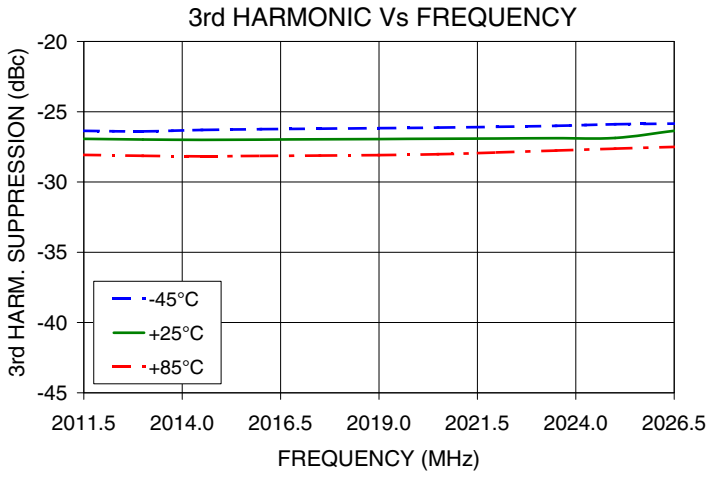
Typical Performance Curves







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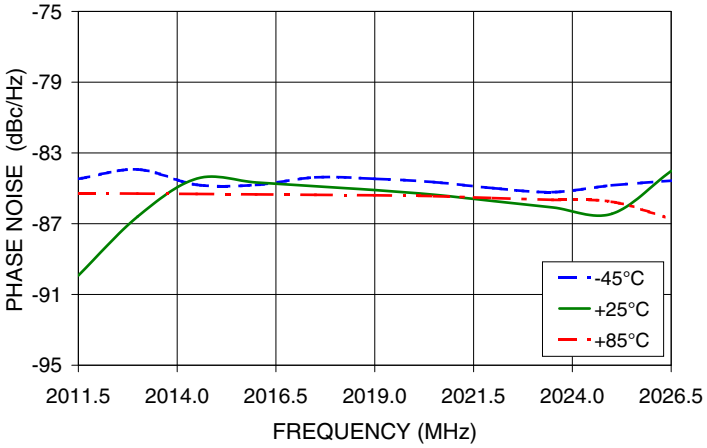
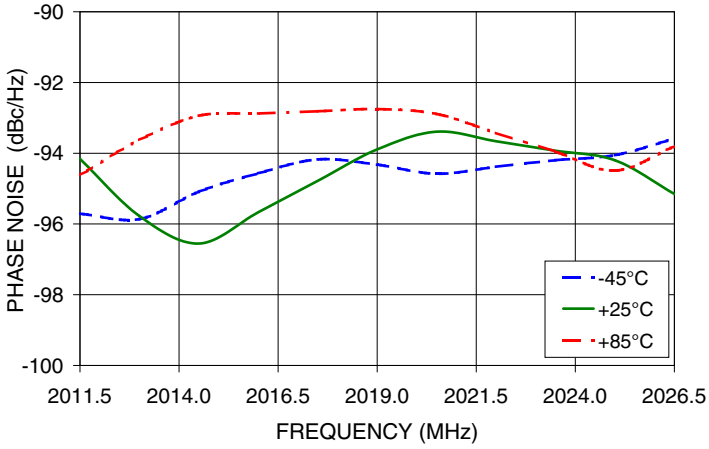
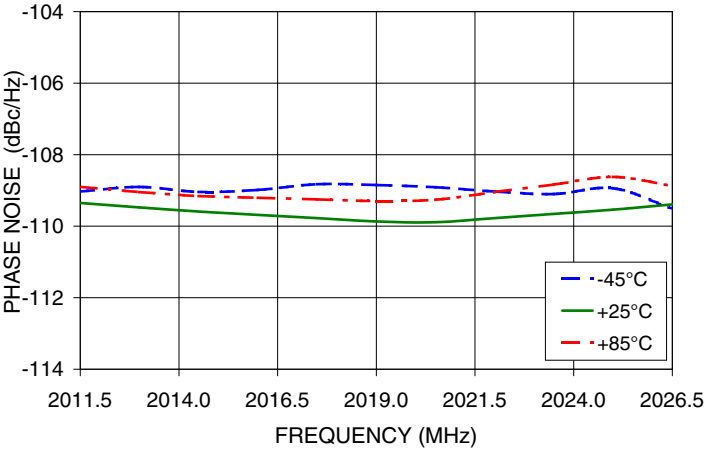
PHASE NOISE @100Hz offset



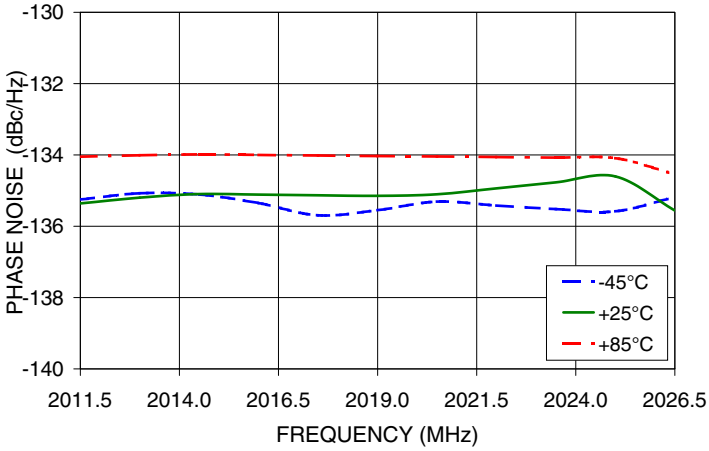
PHASE NOISE @1kHz offset



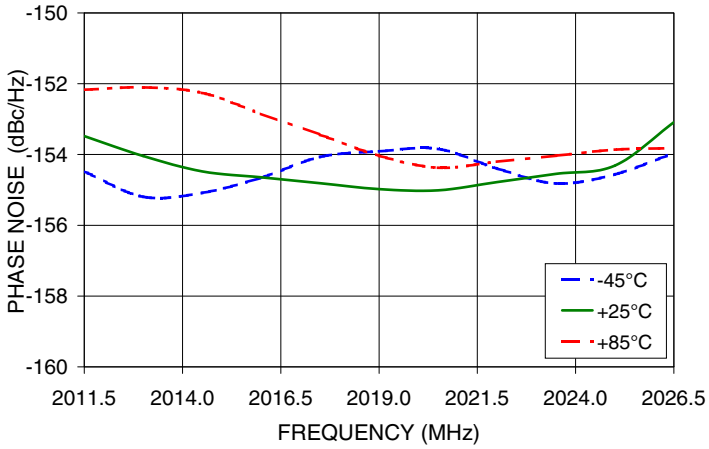
PHASE NOISE @10 kHz offset



PHASE NOISE @100 kHz offset



PHASE NOISE @1MHz offset



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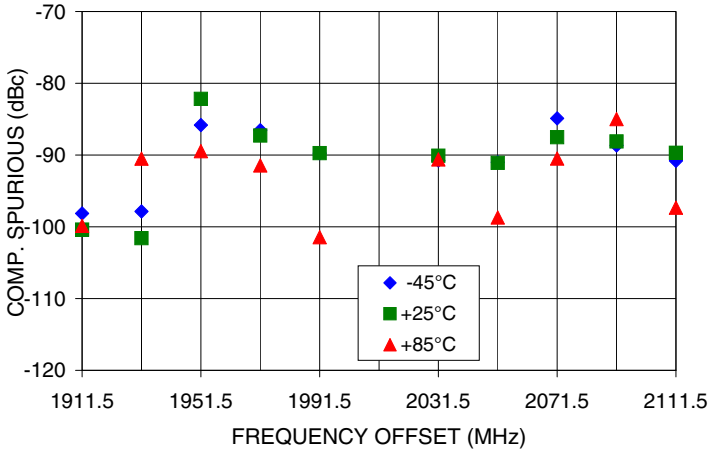
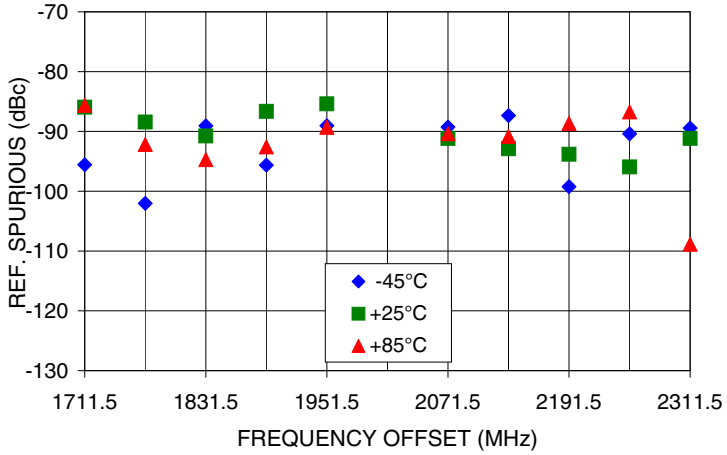
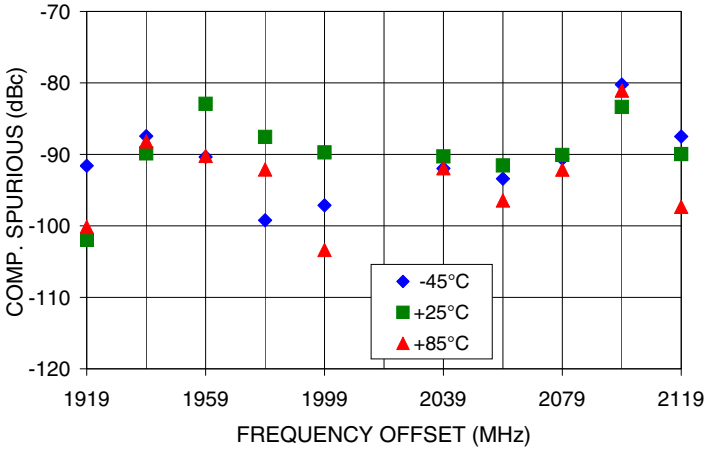
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2011.5MHz



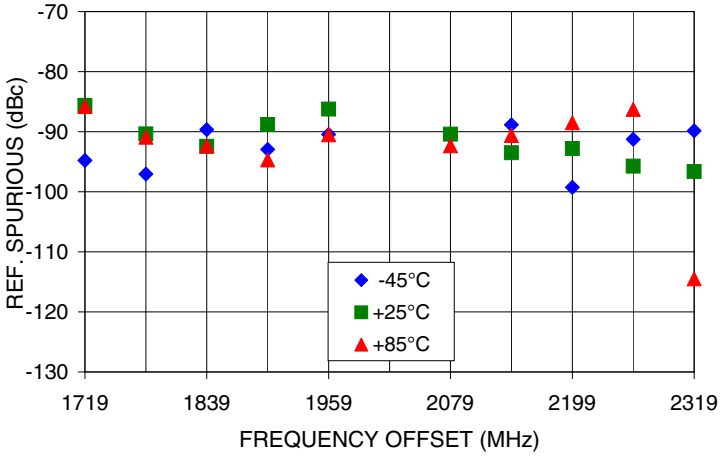
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2011.5MHz



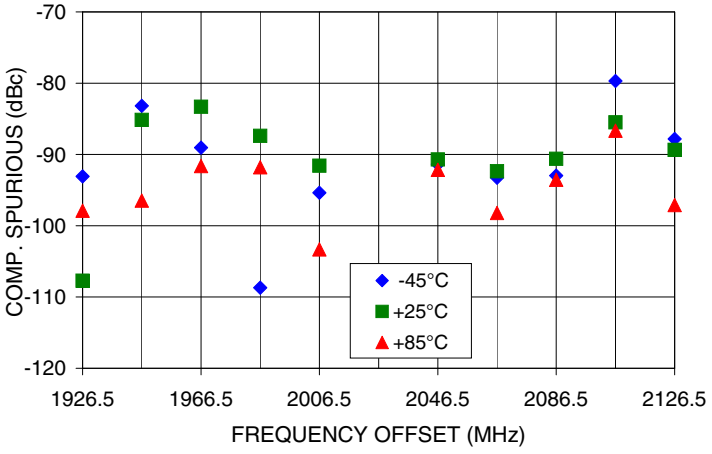
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2019MHz



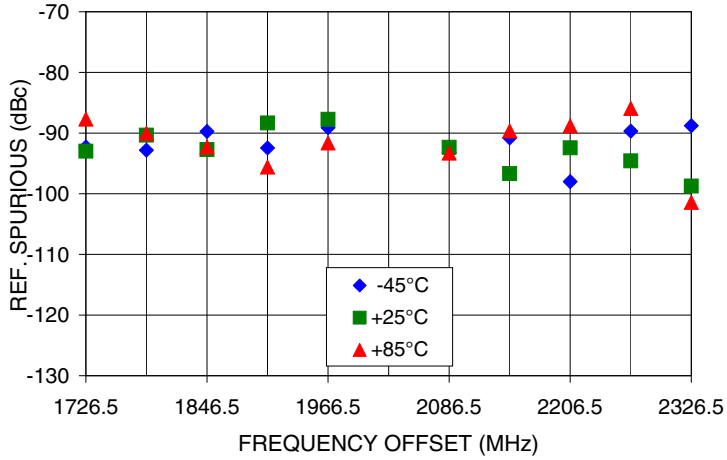
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2019MHz



COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2026.5MHz



REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2026.5MHz



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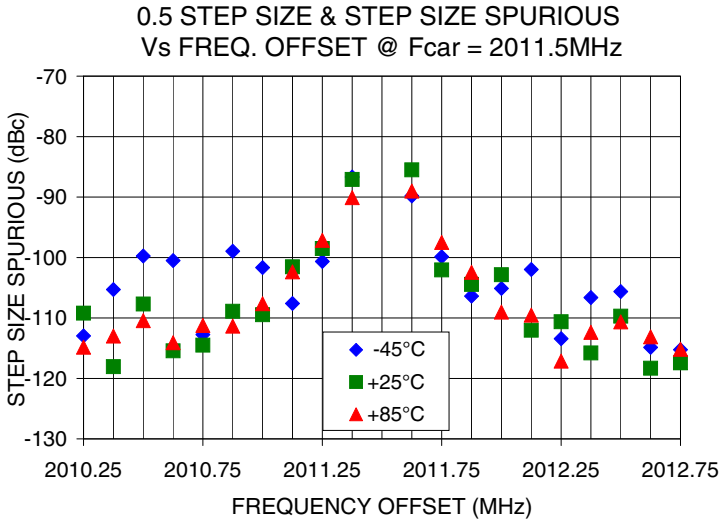

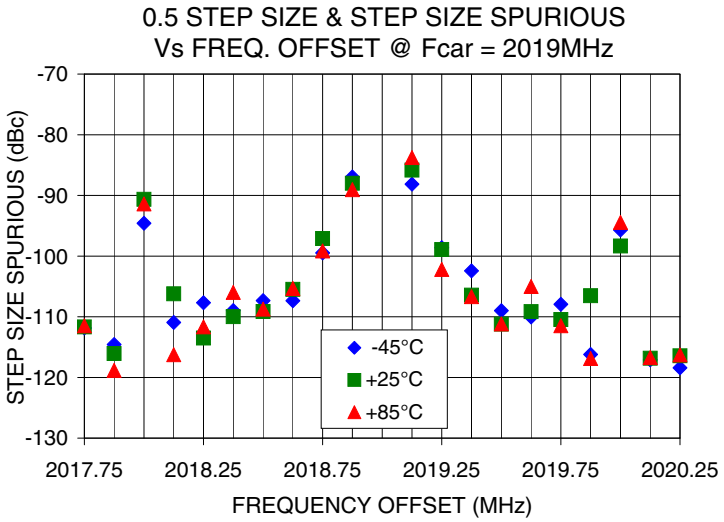

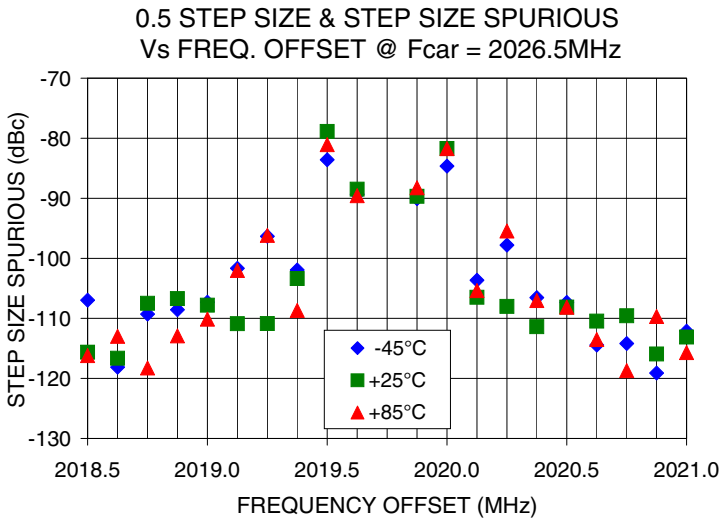

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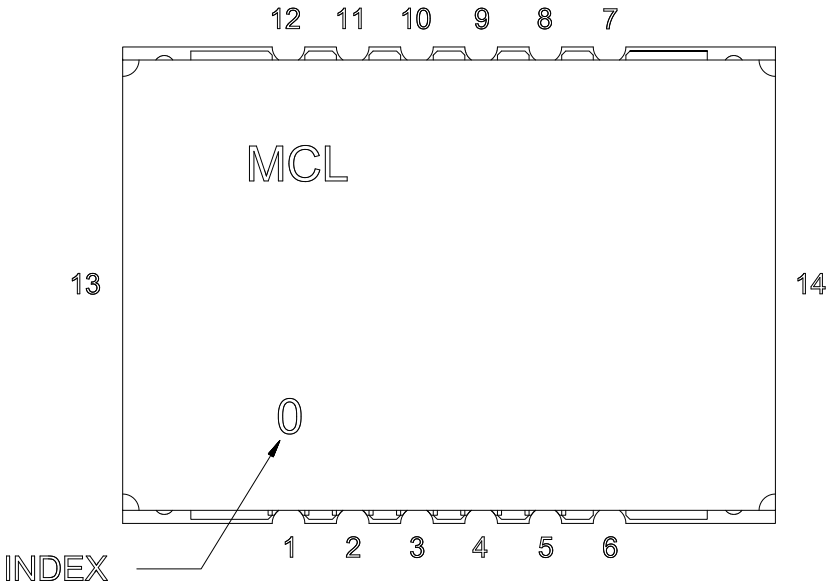
Pin Configuration

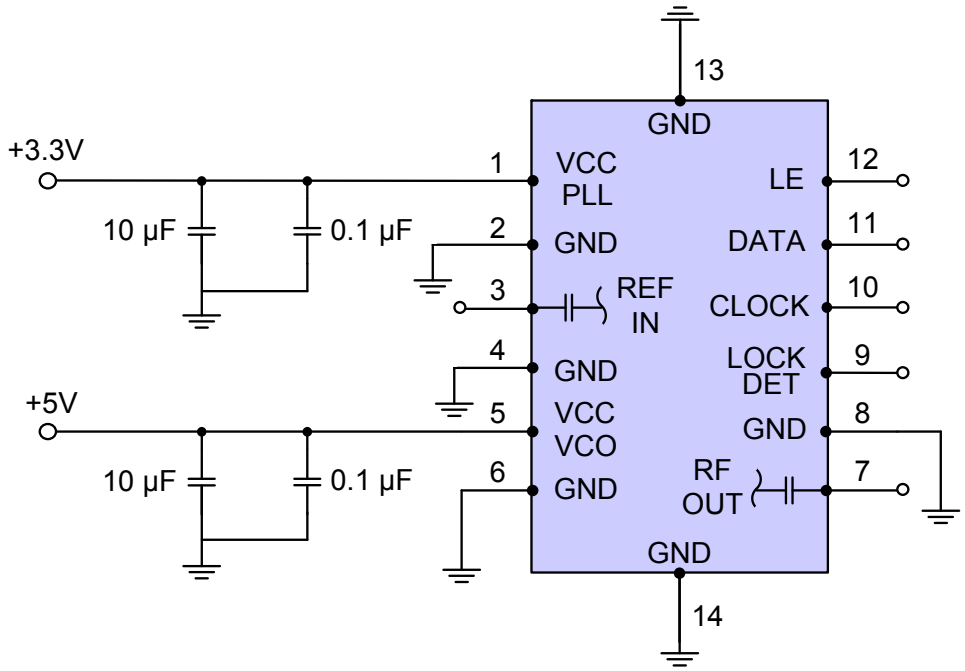


Pin Connection

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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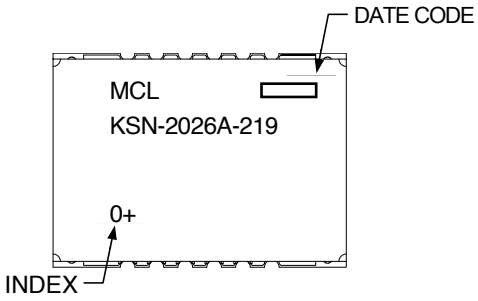
Device Marking



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-567-1+

Environment Ratings: ENV03T2

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