Frequency Synthesizer KSN-1885A-319+

50Ω 1869.76 to 1885.76 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: DK1042

Product Overview

The KSN-1885A-319+ is a Frequency Synthesizer, designed to operate from 1869.76 to 1885.76 MHz for TD-SCDMA application. The KSN-1885A-319+ 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: -100 dBc/Hz typ. @ 10 kHz offset • Step Size Spurious: -104 dBc typ. • Comparison Spurious: -102 dBc typ. • Reference Spurious: -86 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-1885A-319+, 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-1885A-319+ to be used in compact designs.

Surface Mount

Frequency Synthesizer

KSN-1885A-319+

50Ω 1869.76 to 1885.76 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=+3V)
- Small size 0.80" x 0.58" x 0.15"

CASE STYLE: DK1042

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

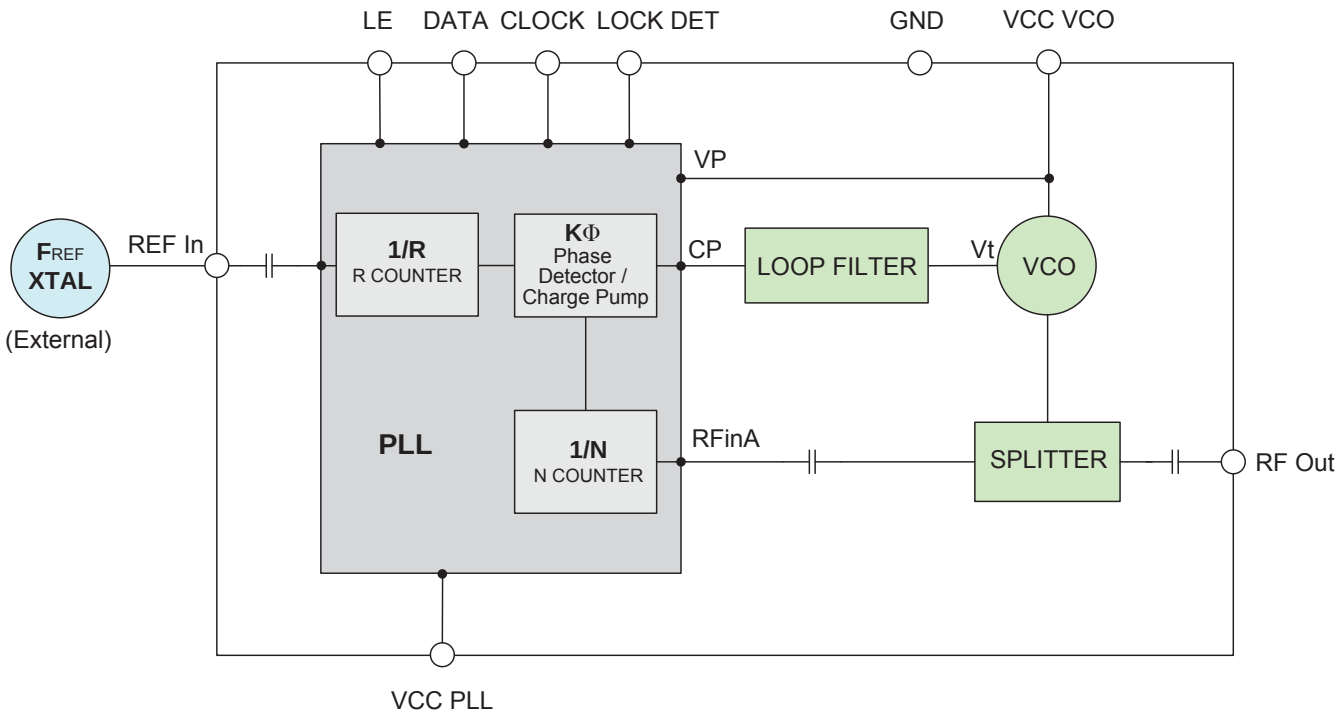
Applications

- TD-SCDMA

General Description

The KSN-1885A-319+ is a Frequency Synthesizer, designed to operate from 1869.76 to 1885.76 MHz for TD-SCDMA application. The KSN-1885A-319+ 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-1885A-319+, 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



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

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	1869.76	-	1885.76	MHz
Step Size		-	-	320	-	kHz
Comparison Frequency		-	-	11.52	-	MHz
Settling Time		Within ± 1 kHz	-	3	-	mSec
Output Power		-	+4.0	+6.5	+8.0	dBm
SSB Phase Noise		@ 100 Hz offset	-	-83	-	dBc/Hz
		@ 1 kHz offset	-	-90	-85	
		@ 10 kHz offset	-	-100	-96	
		@ 100 kHz offset	-	-128	-122	
		@ 1 MHz offset	-	-148	-143	
Step Size Spurious Suppression		Step Size 320 kHz	-	-104	-73	dBc
0.5 Step Size Spurious Suppression		0.5 Step Size 160 kHz	-	-91	-70	
Reference Spurious Suppression		Ref. Freq. 92.16 MHz	-	-86	-70	
Comparison Spurious Suppression		Comp Freq. 11.52 MHz	-	-102	-75	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-25	-17	
VCO Supply Voltage		+5.00	4.75	+5.00	5.25	V
PLL Supply Voltage		+3.00	2.85	+3.00	3.15	
VCO Supply Current		-	-	68	75	mA
PLL Supply Current		-	-	14	22	
Reference Input (External)	Frequency	92.16 (square wave)	-	92.16	-	MHz
	Amplitude	1	-	1	-	V_{P-P}
	Input impedance	-	-	100	-	KΩ
	Phase Noise @ 1 kHz offset	-	-	-130	-	dBc/Hz
RF Output port Impedance		-	-	50	-	Ω
Input Logic Level	Input high voltage	-	2.45	-	-	V
	Input low voltage	-	-	-	0.50	V
Digital Lock Detect	Locked	-	2.30	-	3.00	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4153			
PLL Programming		-	3-wire serial 3V CMOS			
Register Map @1885.76MHz	R0_Register	-	(MSB) 10100011000000001100100 (LSB)			
	R1_Register	-	(MSB) 10110000000010010001 (LSB)			
	R2_Register	-	(MSB) 1111100010 (LSB)			
	R3_Register	-	(MSB) 1111000111 (LSB)			

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	5.4V
PLL Supply Voltage	4.0V
VCO Supply Voltage to PLL Supply Voltage	-0.3V to +5.8V
Reference Frequency Voltage	-0.3Vmin, +3.05Vmax
Data, Clock, LE Levels	-0.3Vmin, +3.05Vmax
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

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
1869.76	6.49	6.75	6.73	66.48	68.86	70.39	13.25	14.60	16.73
1870.40	6.53	6.75	6.72	66.84	68.86	70.39	13.27	14.64	16.77
1873.92	6.52	6.73	6.71	66.87	68.88	70.40	13.26	14.61	16.77
1877.44	6.48	6.73	6.70	66.52	68.88	70.41	13.07	14.42	16.58
1880.96	6.48	6.73	6.70	66.53	68.90	70.41	13.25	14.61	16.78
1884.48	6.49	6.73	6.69	66.53	68.91	70.41	13.30	14.66	16.84
1885.76	6.49	6.73	6.69	66.54	68.90	70.42	13.26	14.61	16.80

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1869.76	-28.80	-32.37	-36.06	-21.16	-24.54	-27.32
1870.40	-28.80	-32.38	-36.21	-21.17	-24.46	-27.43
1873.92	-28.81	-32.40	-36.12	-21.16	-24.61	-27.44
1877.44	-28.92	-32.51	-36.04	-21.30	-24.78	-27.68
1880.96	-29.05	-32.55	-36.02	-21.55	-25.03	-28.07
1884.48	-29.08	-32.51	-35.99	-21.73	-25.33	-28.32
1885.76	-29.08	-32.46	-35.90	-21.74	-25.31	-28.37

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1869.76	-84.28	-91.40	-100.48	-127.61	-147.88
1870.40	-86.48	-89.86	-100.24	-127.71	-147.95
1873.92	-87.16	-90.80	-100.55	-127.61	-148.11
1877.44	-85.11	-90.17	-100.73	-127.65	-148.11
1880.96	-84.47	-90.48	-100.31	-127.59	-147.87
1884.48	-84.22	-90.65	-100.56	-127.70	-147.94
1885.76	-86.69	-90.74	-100.27	-127.60	-147.93

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS -45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1869.76	-83.23	-90.16	-99.91	-129.23	-149.84
1870.40	-81.99	-91.35	-101.09	-129.01	-149.09
1873.92	-81.22	-89.68	-100.61	-128.89	-149.50
1877.44	-81.27	-89.51	-100.45	-129.43	-149.90
1880.96	-81.47	-89.85	-99.93	-129.04	-149.62
1884.48	-82.14	-90.63	-100.59	-129.15	-149.78
1885.76	-81.04	-90.17	-99.83	-129.17	-149.75

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1869.76	-87.34	-89.01	-99.64	-125.90	-146.06
1870.40	-88.83	-91.95	-99.32	-125.84	-146.11
1873.92	-91.69	-90.72	-99.47	-125.67	-146.15
1877.44	-85.76	-89.37	-99.36	-125.75	-145.99
1880.96	-88.10	-91.16	-99.18	-125.84	-146.00
1884.48	-87.08	-89.30	-99.70	-125.67	-146.04
1885.76	-88.65	-88.71	-99.53	-125.63	-145.92

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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1869.76MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1877.76MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1885.76MHz+(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	-103.07	-102.19	-105.02	-98.27	-107.78	-104.92	-102.92	-100.82	-105.96
-4	-104.85	-100.71	-105.59	-98.60	-102.21	-107.93	-103.87	-101.13	-115.08
-3	-115.03	-103.19	-109.26	-86.15	-93.78	-97.08	-107.56	-102.82	-117.42
-2	-116.07	-109.83	-110.91	-101.13	-106.65	-103.32	-108.64	-113.56	-106.54
-1	-109.76	-114.03	-104.75	-101.89	-108.13	-103.88	-116.75	-110.71	-101.14
0 note 2	-	-	-	-	-	-	-	-	-
+1	-106.46	-98.25	-103.85	-100.69	-97.10	-121.37	-102.55	-96.11	-104.49
+2	-110.11	-101.85	-104.42	-106.70	-99.12	-112.36	-104.15	-100.88	-110.08
+3	-109.51	-105.69	-110.05	-98.66	-102.58	-115.78	-106.25	-105.49	-108.26
+4	-109.00	-106.18	-110.05	-118.10	-102.44	-110.03	-106.34	-105.42	-105.16
+5	-107.81	-104.67	-108.77	-89.64	-95.67	-96.84	-106.46	-103.28	-103.72

Note 1: Comparison frequency 11.52 MHz
Note 2: All spurs are referenced to carrier signal (n=0).

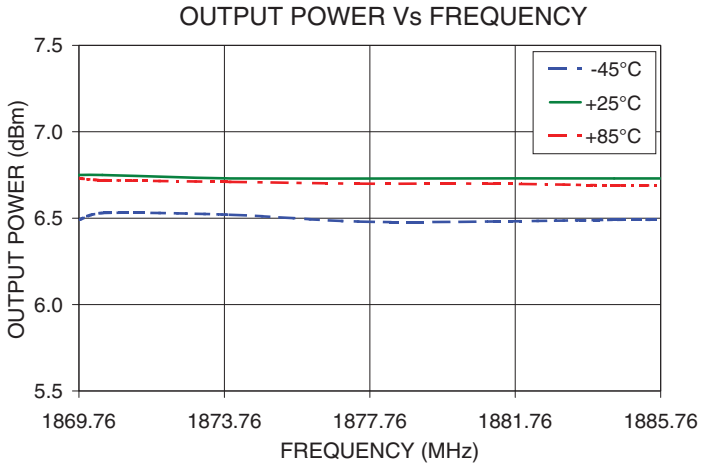
REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1869.76MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1877.76MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1885.76MHz+(n*Freference) (dBc) note 3		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-99.59	-91.91	-91.91	-98.31	-90.86	-91.23	-102.37	-91.47	-93.24
-4	-90.37	-107.24	-106.83	-88.45	-101.58	-101.55	-91.50	-114.56	-107.00
-3	-93.74	-90.59	-90.33	-100.59	-92.09	-89.28	-95.11	-91.76	-90.12
-2	-113.33	-95.30	-102.40	-102.39	-92.92	-103.16	-110.37	-94.66	-98.02
-1	-79.04	-81.73	-84.51	-81.93	-88.77	-89.93	-90.31	-93.59	-92.57
0 note 4	-	-	-	-	-	-	-	-	-
+1	-86.29	-83.27	-81.32	-77.66	-79.34	-80.89	-77.74	-80.45	-80.87
+2	-88.73	-91.37	-91.89	-89.79	-89.32	-90.62	-88.41	-90.99	-90.42
+3	-87.58	-92.47	-104.04	-88.91	-93.98	-101.64	-88.39	-94.49	-104.54
+4	-104.54	-99.15	-109.59	-115.09	-101.71	-108.24	-103.73	-99.39	-105.36
+5	-93.89	-96.03	-101.17	-95.08	-99.15	-101.96	-96.65	-97.00	-103.30

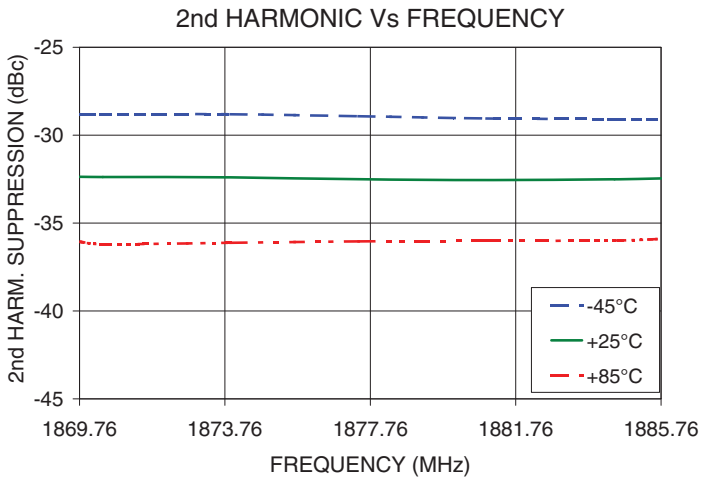
Note 3: Reference frequency 92.16 MHz
Note 4: All spurs are referenced to carrier signal (n=0).

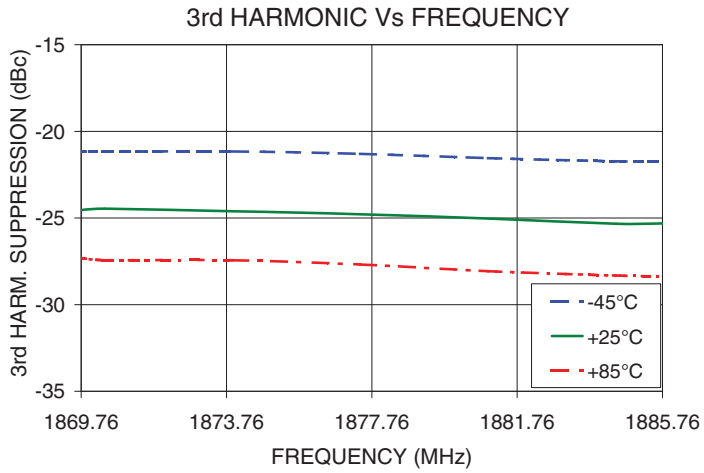
STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1869.76MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1877.76MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1885.76MHz+(n*Fstep size) (dBc) note 5		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5.0	-120.58	-115.27	-115.86	-118.09	-114.93	-117.31	-116.70	-118.84	-119.02
-4.5	-114.52	-117.68	-117.60	-116.58	-117.36	-117.50	-117.28	-113.81	-115.67
-4.0	-118.33	-117.32	-118.03	-117.98	-119.64	-118.41	-117.57	-113.72	-115.61
-3.5	-119.16	-113.61	-114.08	-114.21	-117.93	-116.88	-116.76	-118.14	-114.14
-3.0	-113.35	-114.46	-114.64	-114.55	-114.45	-115.86	-116.19	-117.18	-116.27
-2.5	-116.13	-112.54	-114.35	-112.23	-116.76	-113.36	-114.05	-107.21	-113.54
-2.0	-113.16	-115.29	-112.00	-114.53	-114.47	-112.89	-113.16	-111.90	-108.26
-1.5	-108.65	-107.18	-108.74	-106.99	-106.55	-106.73	-105.79	-113.39	-107.97
-1.0	-101.92	-105.37	-103.42	-106.46	-106.57	-104.45	-106.01	-104.90	-103.67
-0.5	-91.72	-89.52	-91.67	-91.96	-89.23	-94.66	-88.31	-89.45	-92.02
0 note 6	-	-	-	-	-	-	-	-	-
+0.5	-88.56	-90.23	-92.02	-89.86	-92.03	-92.59	-93.93	-94.12	-92.06
+1.0	-105.61	-100.11	-104.43	-106.27	-104.23	-100.58	-103.35	-105.69	-105.50
+1.5	-109.15	-108.57	-104.28	-108.37	-112.66	-111.28	-107.90	-109.24	-110.82
+2.0	-114.46	-115.21	-109.38	-108.55	-113.34	-111.76	-113.07	-114.57	-108.99
+2.5	-117.08	-115.01	-115.88	-111.73	-111.45	-114.63	-112.69	-113.43	-114.25
+3.0	-114.52	-116.40	-117.09	-117.41	-113.62	-116.22	-112.03	-116.13	-115.46
+3.5	-119.08	-113.04	-118.75	-117.33	-116.97	-119.19	-117.89	-116.88	-116.15
+4.0	-115.06	-119.28	-113.79	-117.48	-114.96	-115.29	-115.35	-117.43	-119.63
+4.5	-114.28	-117.71	-117.98	-116.48	-117.27	-116.60	-116.83	-114.72	-119.83
+5.0	-120.81	-114.31	-117.47	-118.34	-119.12	-116.70	-119.89	-120.30	-119.11

Note 5: Step size 320 kHz
Note 6: All spurs are referenced to carrier signal (n=0).

Typical Performance Curves







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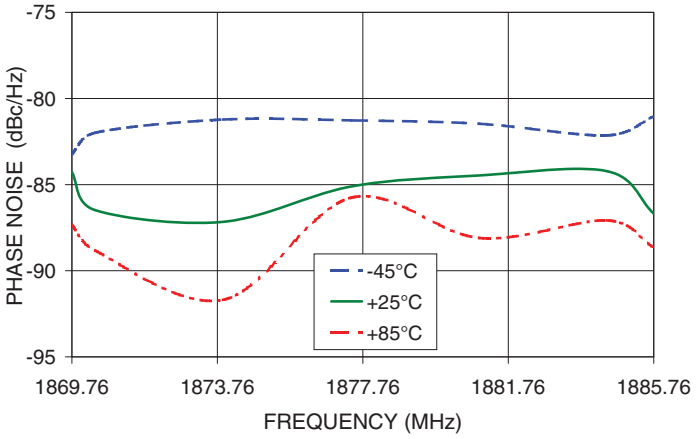
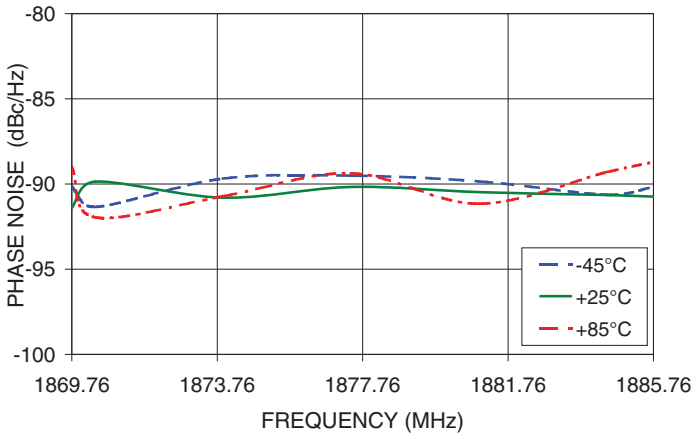
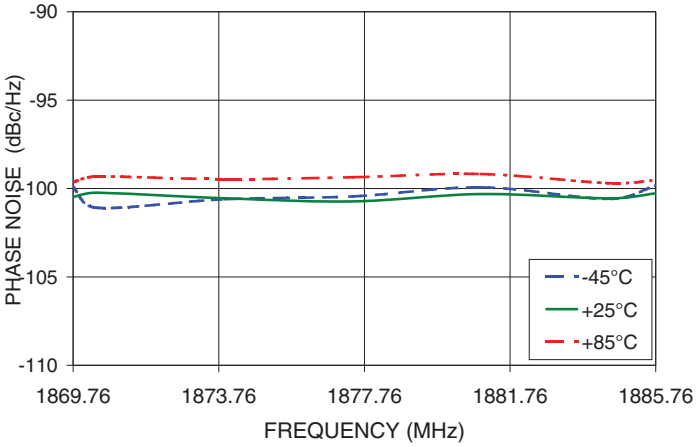
PHASE NOISE @100Hz offset



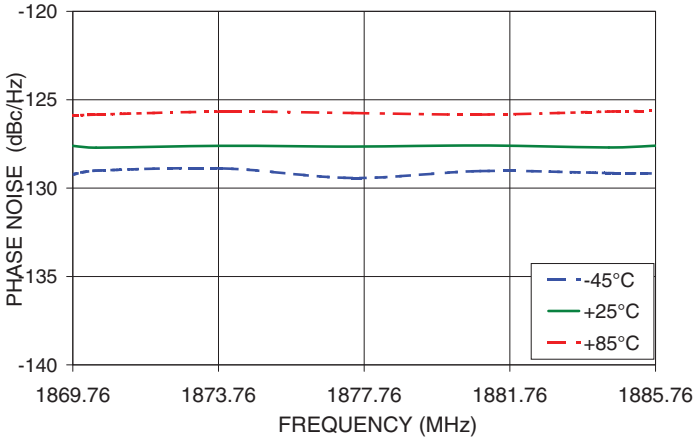
PHASE NOISE @1kHz offset



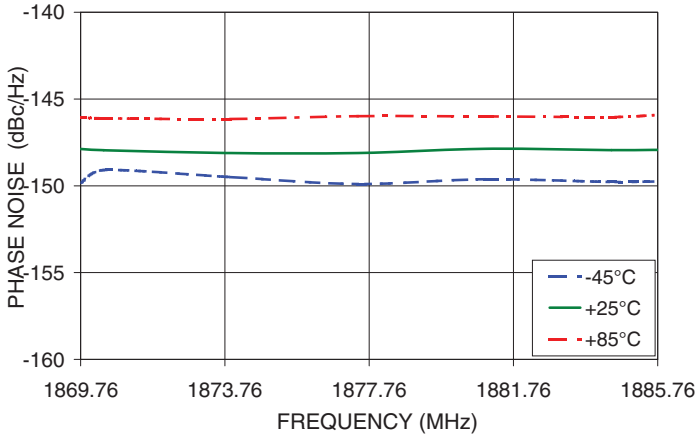
PHASE NOISE @10 kHz offset



PHASE NOISE @100 kHz offset



PHASE NOISE @1MHz offset



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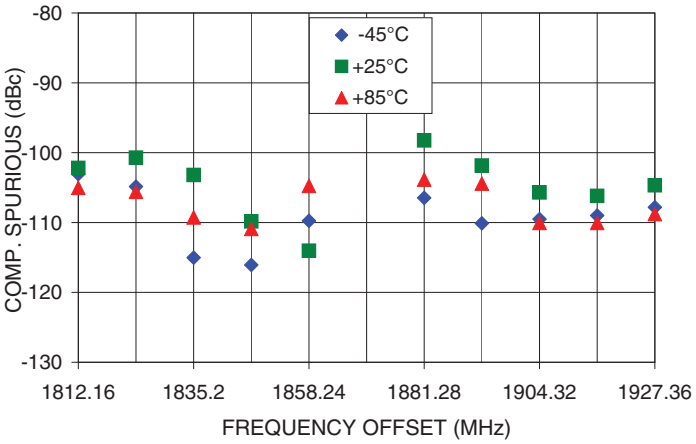
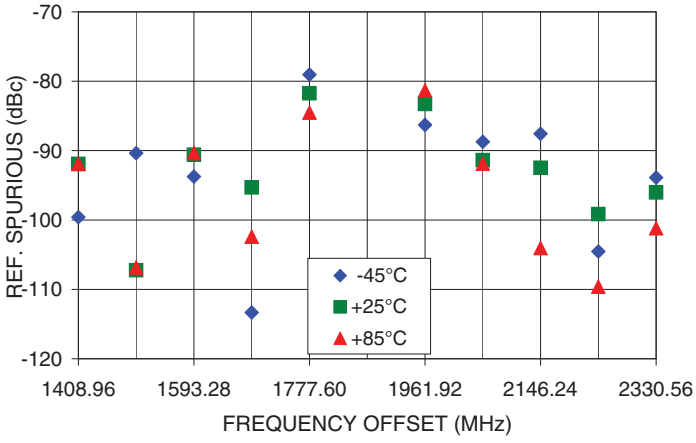
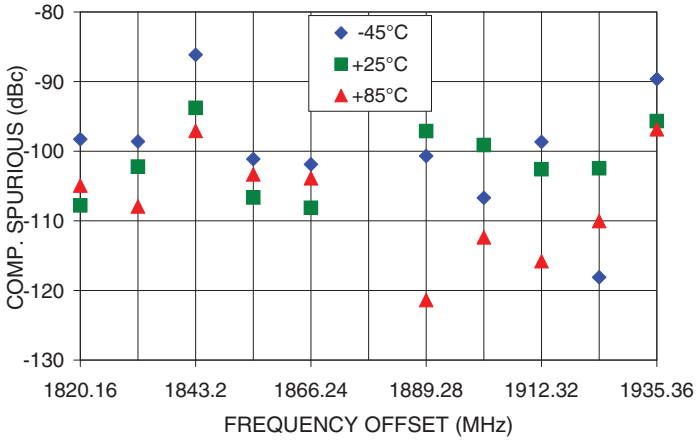
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1869.76MHz



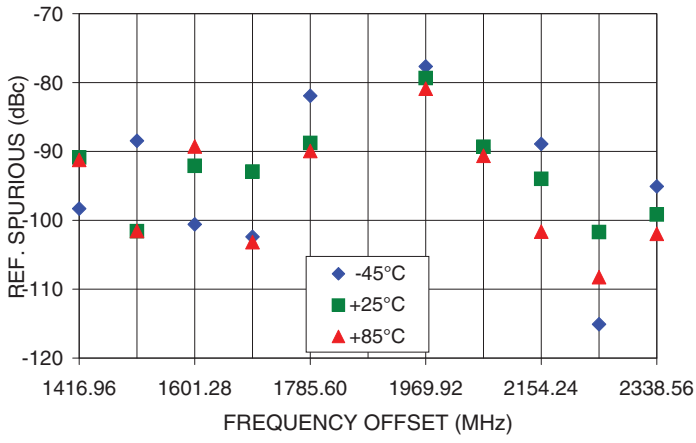
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1869.76MHz



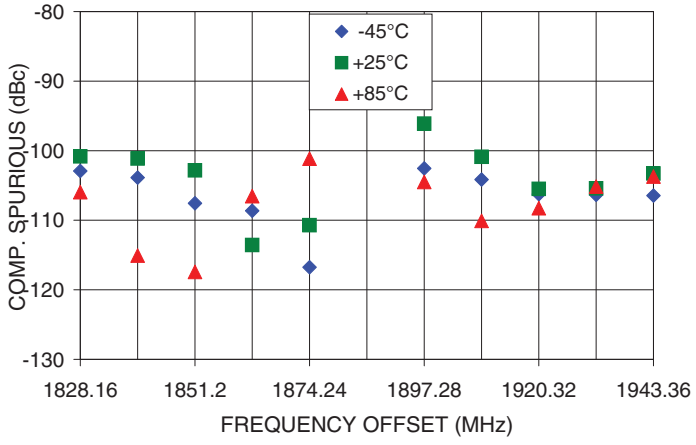
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1877.76MHz



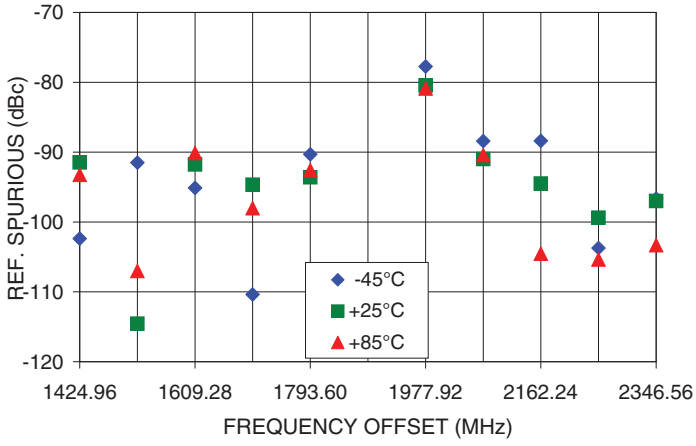
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1877.76MHz



COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1885.76MHz



REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1885.76MHz



Notes

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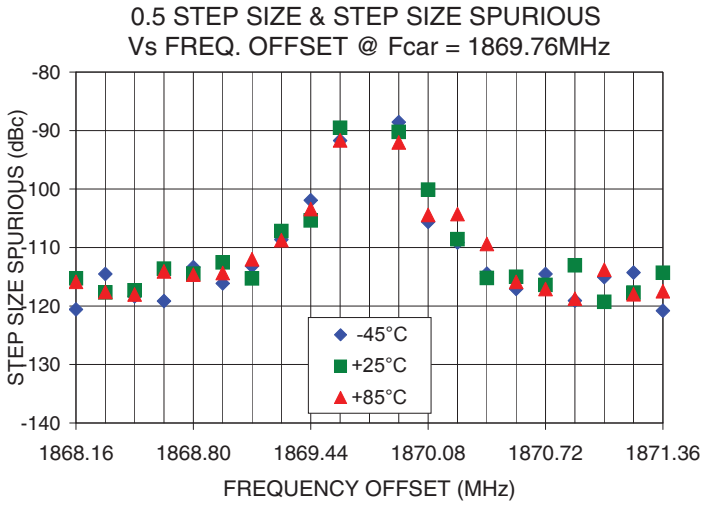
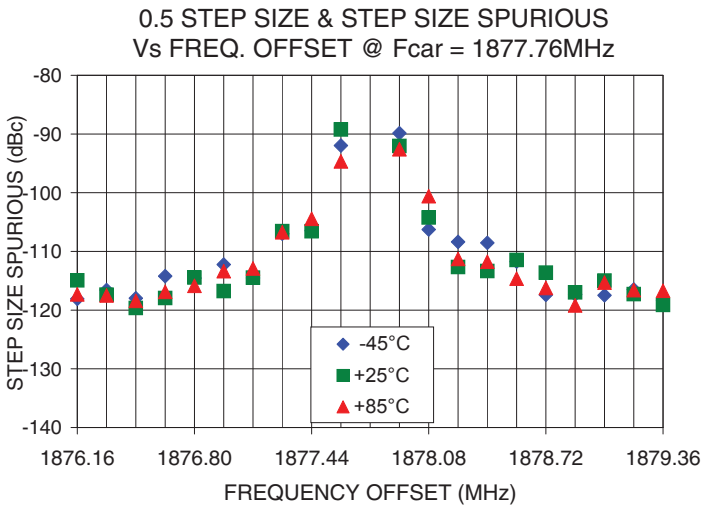
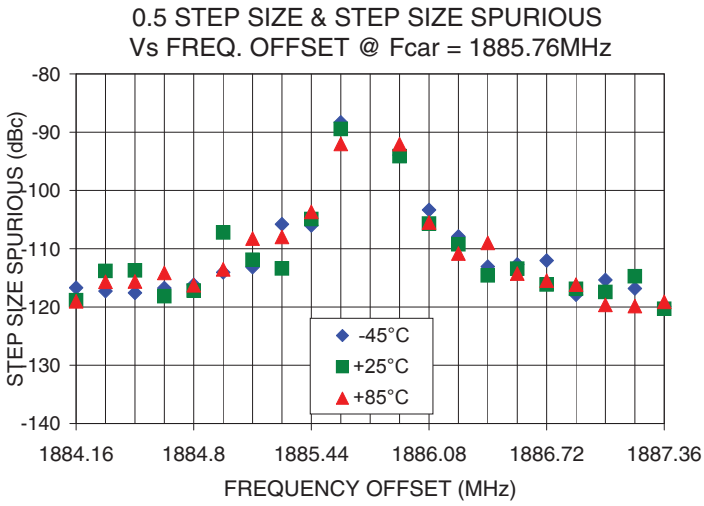
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp







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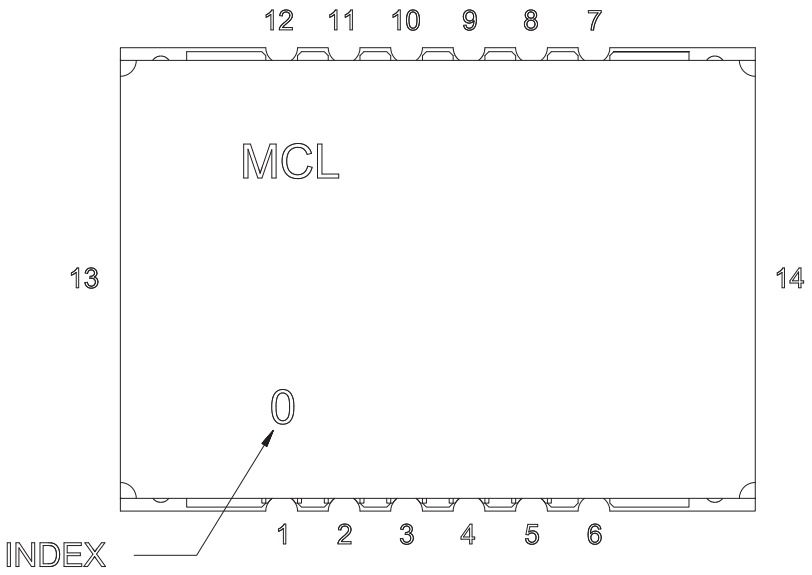
Pin Configuration

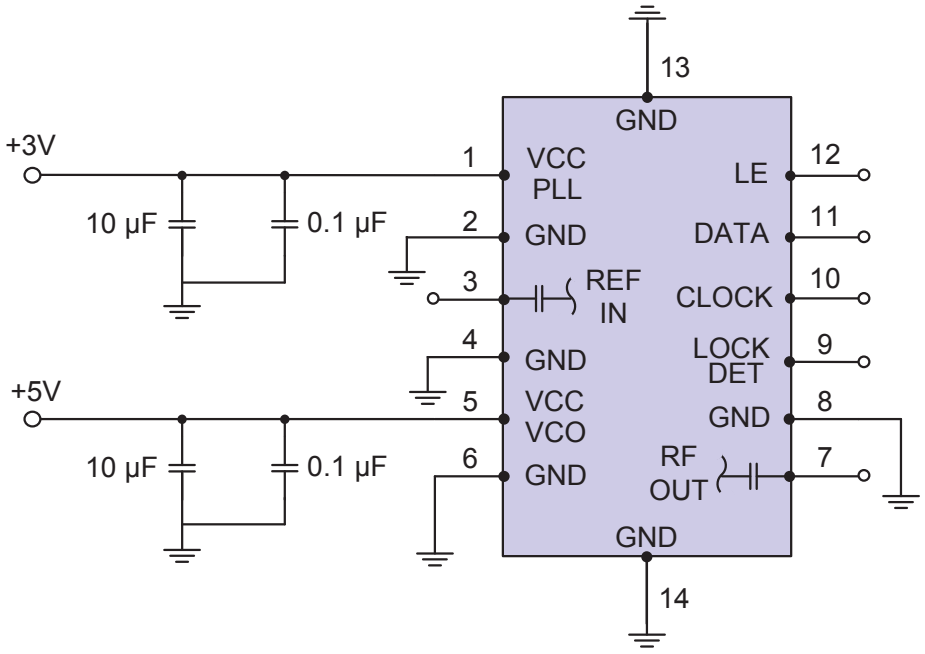


Pin Connection

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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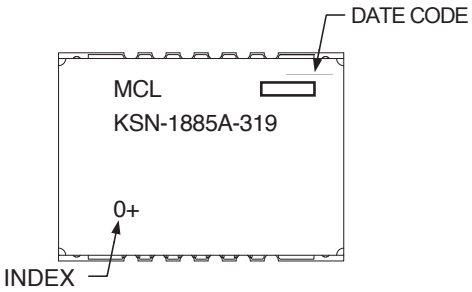
Device Marking



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: DK1042

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567-2+

Environment Ratings: ENV03T2