NON-CATALOG

Frequency Synthesizer KSN-900A-119+

50Ω 840 to 900 MHz

The Big Deal

- Low phase noise and spurious
- Robust design and construction
- Small size 0.800" x 0.584" x 0.154"

CASE STYLE: DK1042

Product Overview

The KSN-900A-119+ is a Frequency Synthesizer, designed to operate from 840 to 900 MHz for WCDMA base station applications. The KSN-900A-119+ is packaged in a metal case (size of 0.800" x 0.584" x 0.154") to shield against unwanted signals and noise.

Key Features

Feature	Advantages
Low phase noise and spurious: • Phase Noise: -90 dBc/Hz typ. @ 10 kHz offset • Comparison Spurious: -90 dBc typ. • Reference Spurious: -105 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-900A-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, 0.800" x 0.584" x 0.154"	The small size enables the KSN-900A-119+ to be used in compact designs.

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

Surface Mount

NON-CATALOG

Frequency Synthesizer

KSN-900A-119+

50Ω 840 to 900 MHz

CASE STYLE: DK1042

+ 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 0.800" x 0.584" x 0.154"

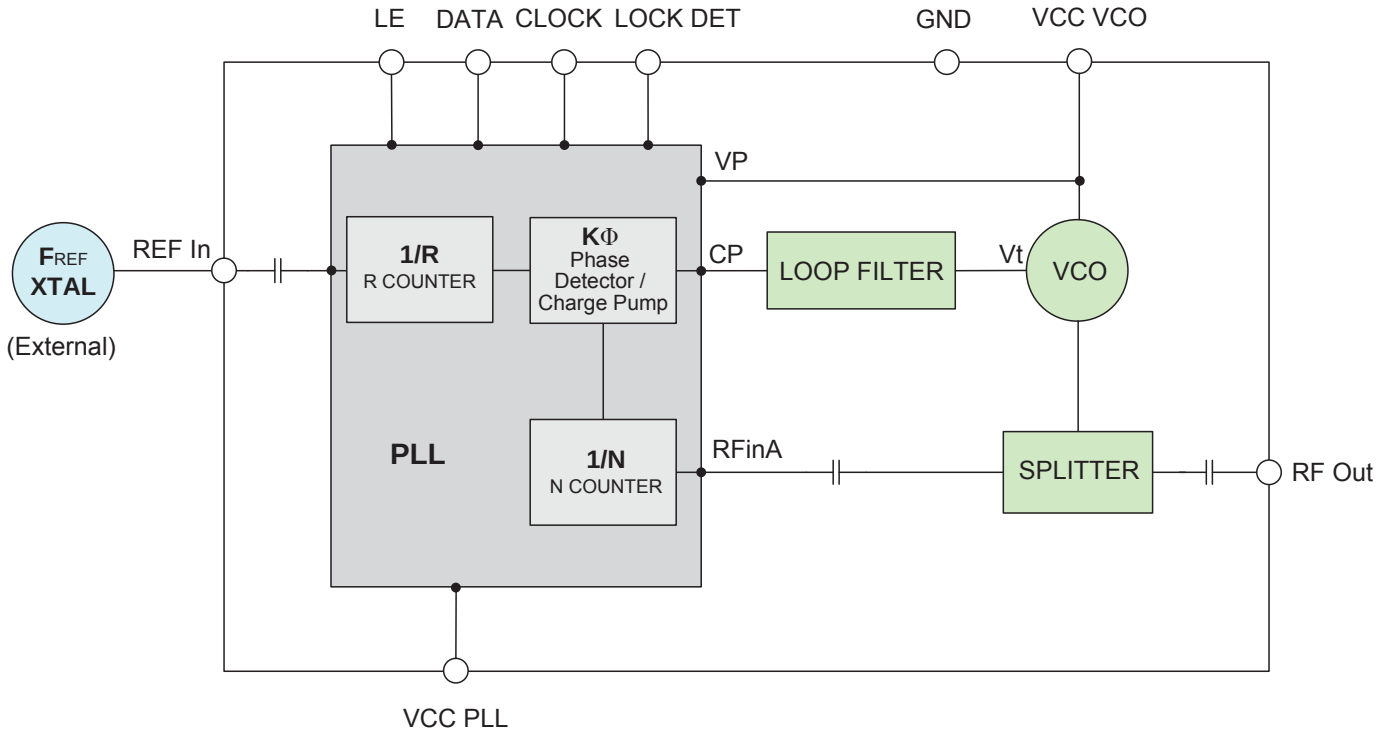
Applications

- WCDMA base station

General Description

The KSN-900A-119+ is a Frequency Synthesizer, designed to operate from 840 to 900 MHz for WCDMA base station application. The KSN-900A-119+ is packaged in a metal case (size of 0.800" x 0.584" x 0.154") to shield against unwanted signals and noise. To enhance the robustness of KSN-900A-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



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

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

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	840	-	900	MHz
Step Size		-	-	100	-	kHz
Settling Time		Within ± 1 kHz	-	1.1	-	mSec
Output Power		-	-1.0	+2.2	+4.5	dBm
SSB Phase Noise		@ 100 Hz offset	-	-83	-	dBc/Hz
		@ 1 kHz offset	-	-84	-77	
		@ 10 kHz offset	-	-90	-85	
		@ 100 kHz offset	-	-124	-117	
		@ 1 MHz offset	-	-148	-142	
Integrated SSB Phase Noise		@ 50Hz - 5MHz	-	-41	-	dBc
Reference Spurious Suppression		Ref. Freq. 10 MHz	-	-105	-85	dBc
Comparison Spurious Suppression		Step Size 100 kHz	-	-90	-70	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-30	-20	
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		-	-	16	23	mA
PLL Supply Current		-	-	8	14	
Reference Input (External)	Frequency	10 (square wave)	-	10	-	MHz
	Amplitude	1.0	0.8	1.0	1.2	V_{P-P}
	Input impedance	-	-	100	-	KΩ
	Phase Noise @ 1 kHz offset	-	-	-145	-	dBc/Hz
RF Output port Impedance		-	-	50	-	Ω
Input Logic Level	Input high voltage	-	4.10	-	-	V
	Input low voltage	-	-	-	0.95	V
Digital Lock Detect	Locked	-	4.35	-	5.10	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4118			
PLL Programming		-	3-wire serial 4.9V CMOS			

Register Map NOTE 1	F_Register NOTE 2	*Reserved*	*Power-Down 2*	*Reserved*	*Timer Counter Control*	*Fastlock Mode*	*Reserved*	*Fastlock Enable*	*CP 3-State*	*PD Polarity*	*Muxout Control*	*Power-Down 1*	*Counter Reset*	*Control Bits*
		0	0	000	0000	0	0	0	0	1	001	0	0	10
	N_Register @ 900 MHz	*CP Gain*	*13-Bit B Counter*								*5-Bit A Counter*			*Control Bits*
		1	0000100011001								01000			01
	R_Register	*Lock Detect Precision*	*Test Mode Bits*		*14-BIT Reference Counter, R*									*Control Bits*
		1	0000		00000001100100									00

Note 1: Registers Load Sequence: Initialization Register, F Register, R Register , N Register.
Note 2: For the Initialization Register use Register F with Control Bits 11.

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	6V
PLL Supply Voltage	6V
VCO Supply Voltage to PLL Supply Voltage	N.A.
Reference Frequency Voltage	-0.3Vmin, +5.05Vmax
Data, Clock, LE Levels	-0.3Vmin, +5.05Vmax
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

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURRENT (mA)		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
840	2.36	2.40	2.31	15.28	16.19	16.83	6.71	7.86	9.04
846	2.14	2.27	2.24	15.29	16.22	16.87	6.72	7.86	9.04
854	1.94	2.14	2.17	15.33	16.27	16.94	6.75	7.88	9.07
862	1.82	2.08	2.15	15.39	16.34	17.01	6.73	7.87	9.06
870	1.79	2.07	2.18	15.46	16.41	17.09	6.75	7.89	9.08
878	1.83	2.11	2.26	15.53	16.49	17.14	6.75	7.88	9.07
886	1.91	2.19	2.38	15.60	16.55	17.18	6.76	7.90	9.09
894	1.99	2.32	2.49	15.64	16.57	17.18	6.75	7.89	9.08
900	2.06	2.37	2.51	15.65	16.54	17.17	6.75	7.89	9.08

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
840	-26.19	-27.73	-29.60	-35.37	-37.88	-40.97
846	-27.34	-28.67	-30.41	-36.22	-38.94	-42.03
854	-28.23	-29.40	-31.01	-37.31	-39.75	-42.79
862	-29.04	-30.04	-31.51	-38.37	-41.22	-44.34
870	-29.91	-30.80	-32.23	-40.36	-42.37	-45.77
878	-30.51	-31.37	-32.78	-41.12	-43.71	-47.57
886	-31.26	-32.08	-33.32	-42.94	-46.22	-51.20
894	-31.92	-32.52	-33.61	-45.21	-49.38	-52.96
900	-32.18	-32.72	-33.87	-48.73	-52.55	-53.24

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
840	-85.10	-82.82	-90.99	-124.63	-149.30
846	-85.08	-83.81	-90.98	-123.74	-150.54
854	-83.76	-83.42	-90.94	-125.28	-149.08
862	-84.30	-82.44	-90.72	-124.14	-150.54
870	-82.86	-83.20	-89.92	-124.46	-149.52
878	-83.39	-82.14	-90.47	-124.40	-150.04
886	-84.42	-83.75	-91.20	-123.54	-147.94
894	-83.18	-82.07	-91.16	-122.54	-146.92
900	-83.44	-83.46	-90.94	-123.51	-147.21

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS -45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
840	-81.77	-82.79	-90.40	-124.95	-150.35
846	-84.11	-83.34	-90.47	-125.40	-151.33
854	-83.42	-82.16	-90.28	-125.60	-152.10
862	-83.16	-82.11	-90.84	-125.99	-152.95
870	-82.85	-84.28	-89.32	-126.28	-152.96
878	-84.06	-81.60	-90.46	-125.14	-152.74
886	-83.48	-82.80	-91.04	-125.28	-151.96
894	-82.84	-82.76	-90.79	-124.98	-151.17
900	-82.22	-81.69	-91.35	-125.28	-150.42

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
840	-81.27	-83.17	-90.63	-123.85	-149.03
846	-83.87	-82.65	-91.32	-123.94	-148.44
854	-86.23	-80.88	-90.42	-123.01	-148.45
862	-82.27	-82.78	-88.91	-122.64	-148.19
870	-85.14	-82.16	-89.41	-123.42	-147.58
878	-83.06	-81.00	-90.37	-123.17	-147.23
886	-82.18	-82.98	-90.72	-120.62	-146.23
894	-82.24	-80.19	-90.72	-122.37	-145.42
900	-81.88	-80.27	-90.24	-122.18	-144.88

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 840MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 870MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 900MHz+(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	-102.65	-104.64	-112.57	-108.04	-103.89	-104.36	-111.18	-110.02	-100.99
-4	-102.27	-103.18	-110.00	-106.00	-100.28	-102.01	-108.00	-108.01	-98.51
-3	-100.18	-102.02	-109.87	-102.25	-95.48	-98.40	-104.11	-106.18	-95.34
-2	-94.20	-98.54	-110.10	-98.30	-91.10	-95.22	-95.92	-102.35	-91.54
-1	-86.09	-91.12	-95.65	-83.17	-84.56	-87.12	-79.60	-96.19	-81.84
0 note 2	-	-	-	-	-	-	-	-	-
+1	-85.22	-90.71	-96.43	-83.12	-85.46	-87.28	-79.93	-97.65	-81.67
+2	-93.38	-98.58	-110.02	-98.24	-91.07	-94.52	-95.96	-103.91	-90.85
+3	-99.63	-103.31	-110.67	-104.23	-95.91	-97.15	-103.07	-106.82	-95.88
+4	-101.49	-103.08	-114.12	-105.69	-98.93	-100.83	-107.94	-108.10	-99.45
+5	-101.22	-104.82	-111.93	-111.35	-101.75	-103.55	-109.16	-113.28	-100.63

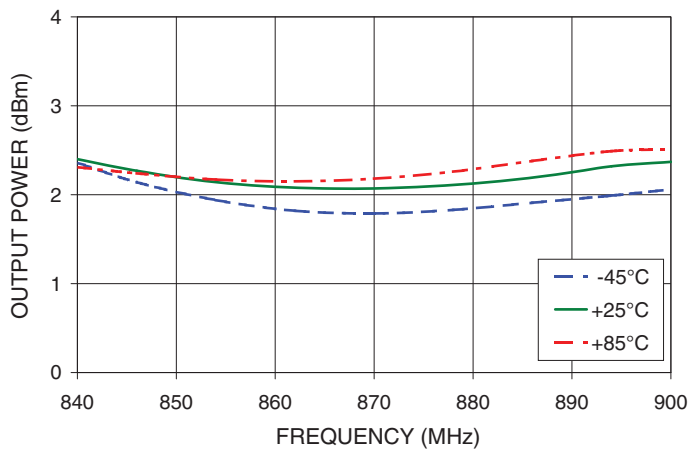
Note 1: Comparison frequency 100 kHz
Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 840MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 870MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 900MHz+(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	-116.06	-113.65	-112.37	-120.32	-124.84	-122.25	-109.41	-114.24	-117.40
-4	-116.25	-125.85	-119.60	-122.43	-115.81	-120.67	-126.35	-131.05	-122.97
-3	-109.21	-112.97	-114.76	-110.59	-115.49	-114.17	-108.07	-109.75	-110.58
-2	-111.62	-125.72	-120.56	-110.87	-113.71	-119.07	-127.77	-129.05	-118.23
-1	-103.41	-107.04	-113.94	-115.02	-114.78	-113.28	-101.95	-108.49	-110.26
0 note 4	-	-	-	-	-	-	-	-	-
+1	-99.95	-102.55	-104.63	-101.45	-104.50	-105.79	-100.01	-101.67	-103.16
+2	-124.19	-128.32	-122.38	-110.76	-111.70	-110.30	-119.09	-123.02	-121.34
+3	-106.79	-108.52	-109.92	-116.14	-116.57	-118.16	-117.39	-115.00	-115.71
+4	-122.71	-128.26	-118.34	-114.14	-115.48	-113.75	-120.77	-123.38	-122.61
+5	-110.50	-111.94	-111.45	-125.92	-120.91	-120.44	-115.79	-115.04	-115.60

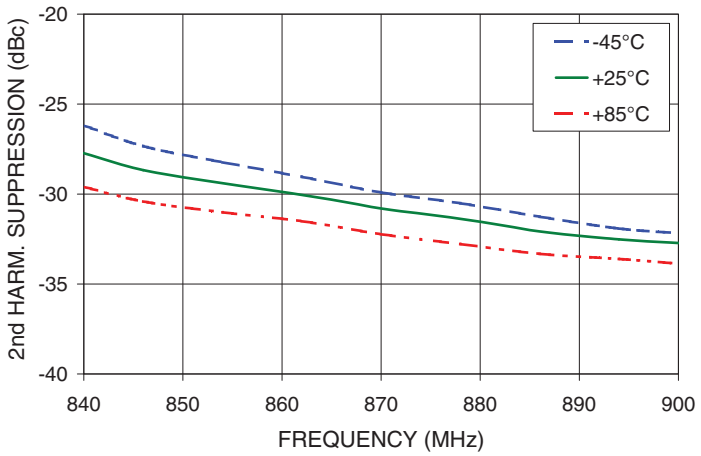
Note 3: Reference frequency 10 MHz
Note 4: All spurs are referenced to carrier signal (n=0).

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

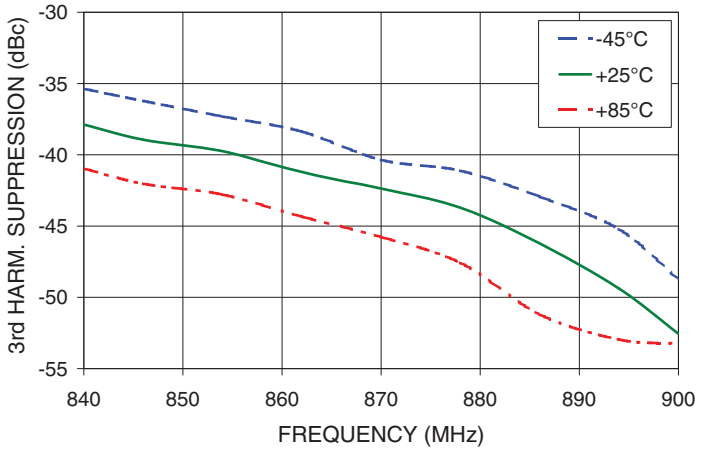
OUTPUT POWER Vs FREQUENCY



2nd HARMONIC Vs FREQUENCY

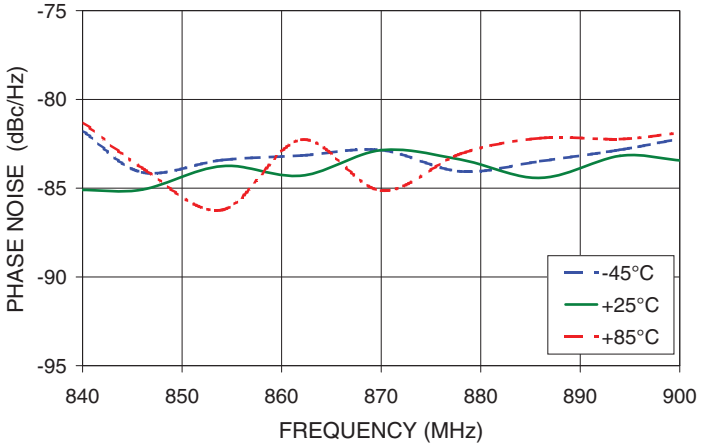


3rd HARMONIC Vs FREQUENCY

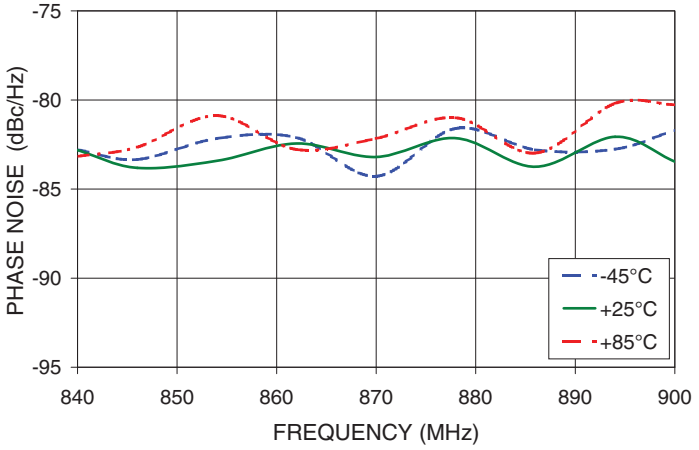


Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

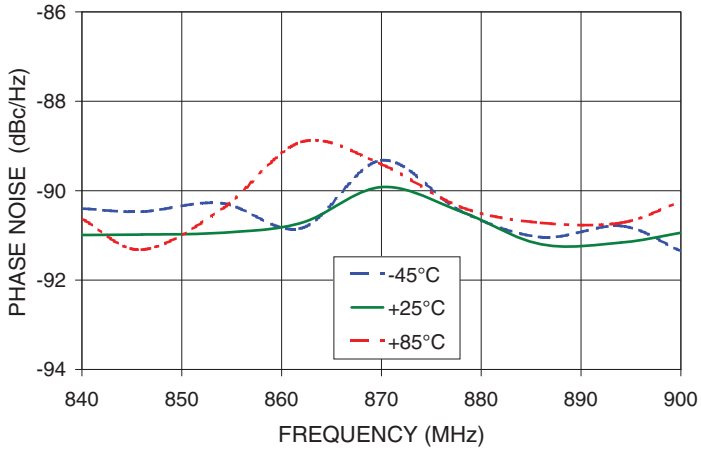
PHASE NOISE @100Hz offset



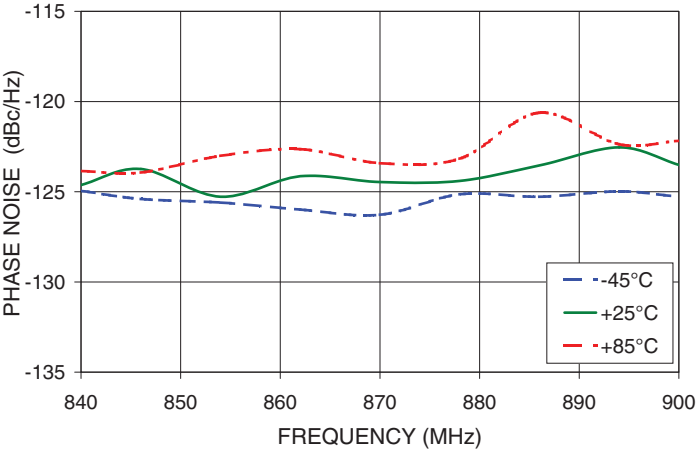
PHASE NOISE @1kHz offset



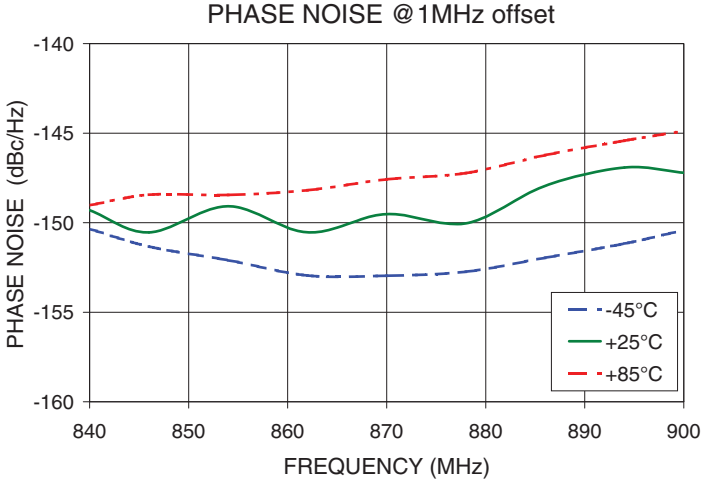
PHASE NOISE @10 kHz offset



PHASE NOISE @100 kHz offset

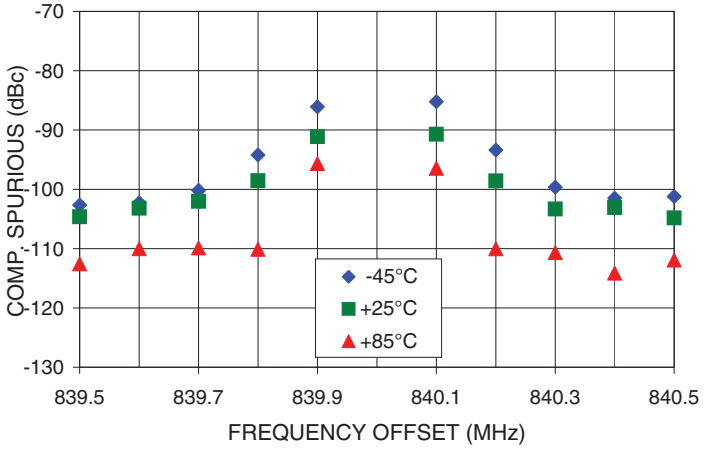


PHASE NOISE @1MHz offset

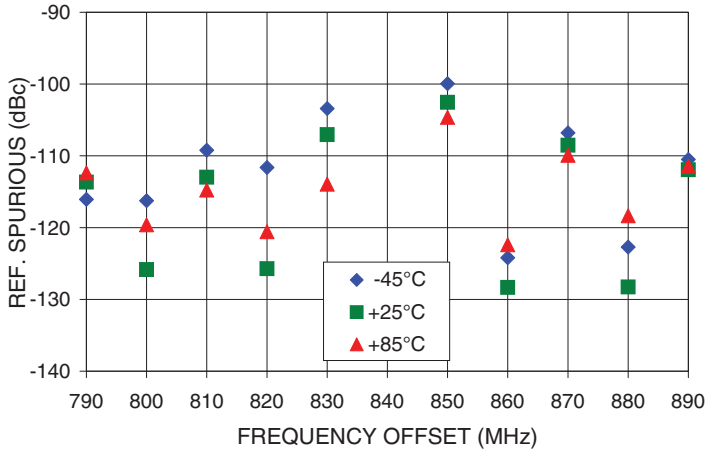


Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

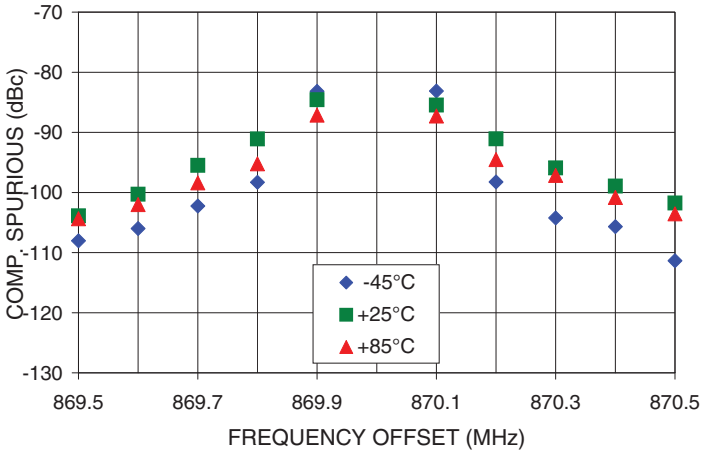
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 840MHz



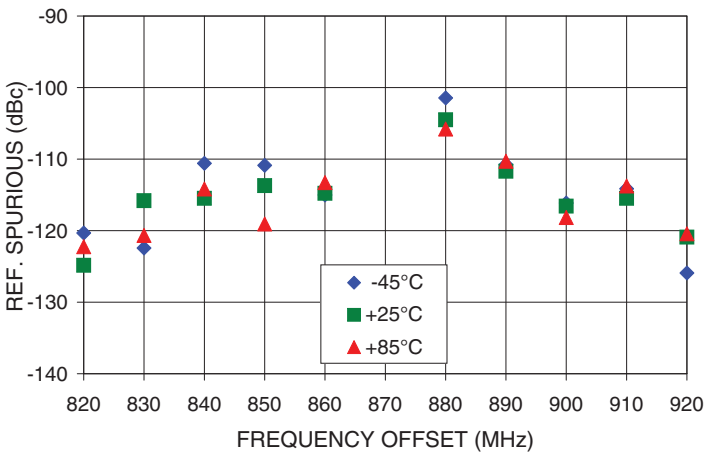
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 840MHz



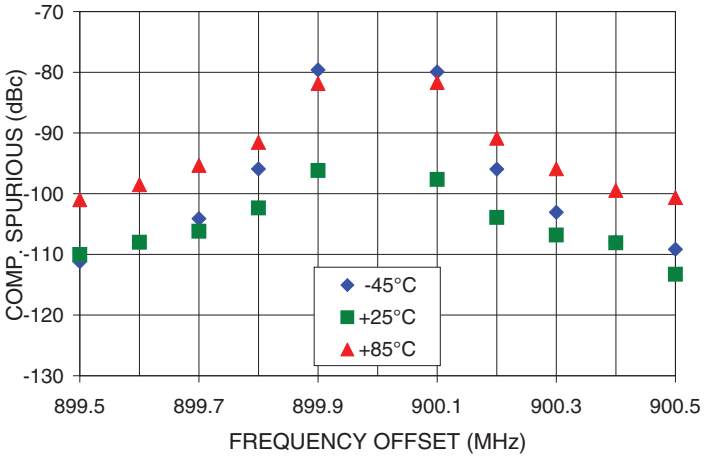
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 870MHz



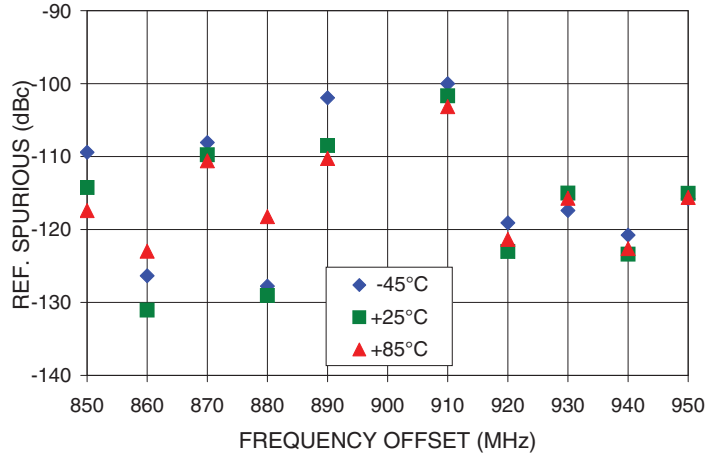
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 870MHz



COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 900MHz

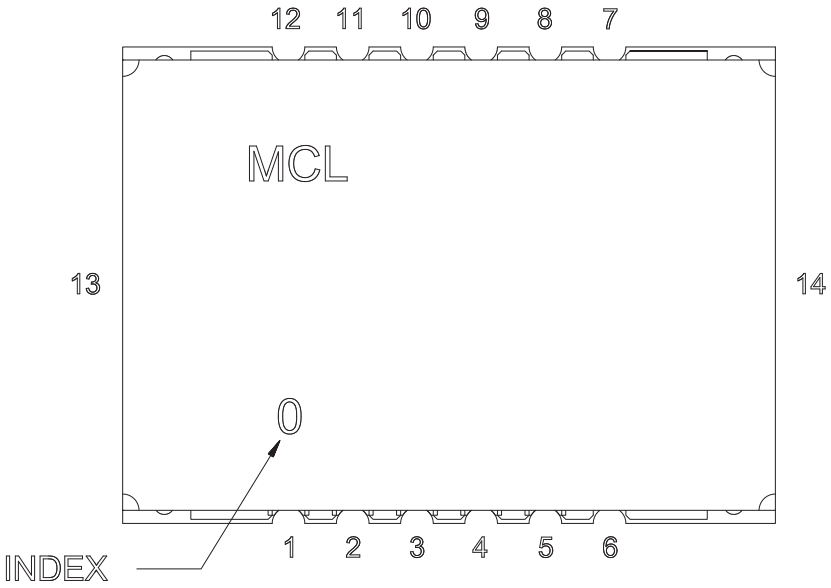


REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 900MHz



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

Pin Configuration

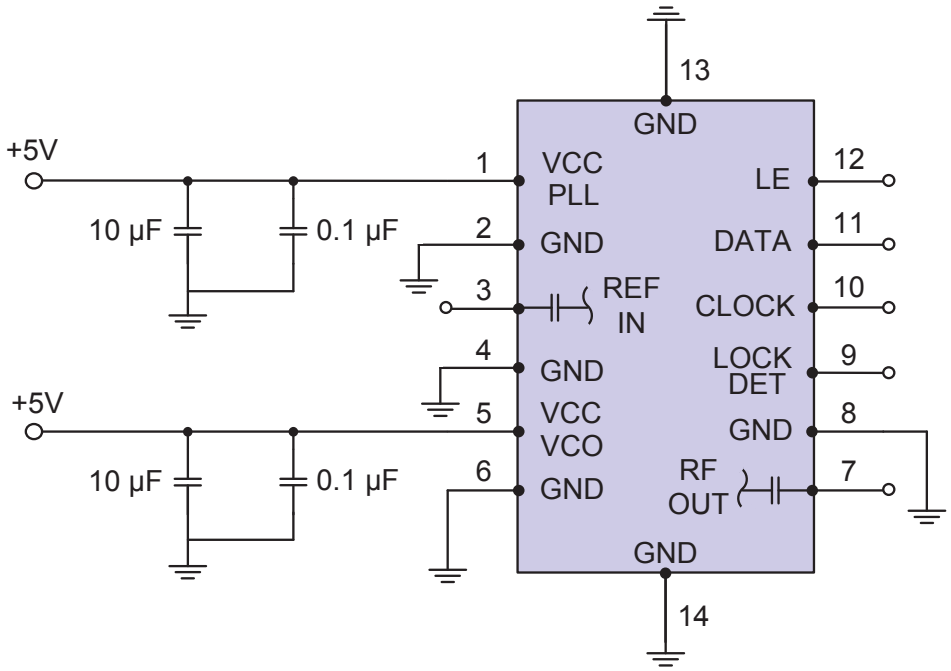


Pin Connection

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

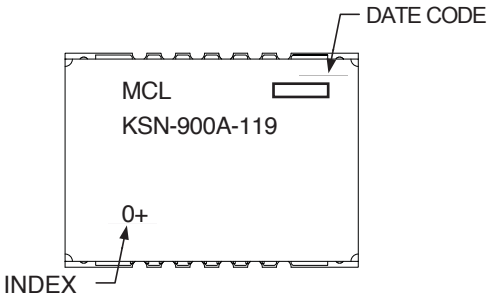
Recommended Application Circuit

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



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.

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

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. **2.** Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. **3.** The parts covered by this specification sheet 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.