

Frequency Synthesizer

KSN-1990A-119+

50Ω 1790 to 1990 MHz

The Big Deal

- 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-1990A-119+ is a Frequency Synthesizer, designed to operate from 1790 to 1990 MHz for UMTS application. The KSN-1990A-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: <ul style="list-style-type: none">• Phase noise: -95 dBc/Hz typ. @ 10 kHz offset• Comparison spurious: -75 dBc typ.• Reference spurious: -100 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-1990A-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-1990A-119+ to be used in compact designs.



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Frequency Synthesizer

KSN-1990A-119+

50Ω 1790 to 1990 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 0.15"



CASE STYLE: DK801
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.

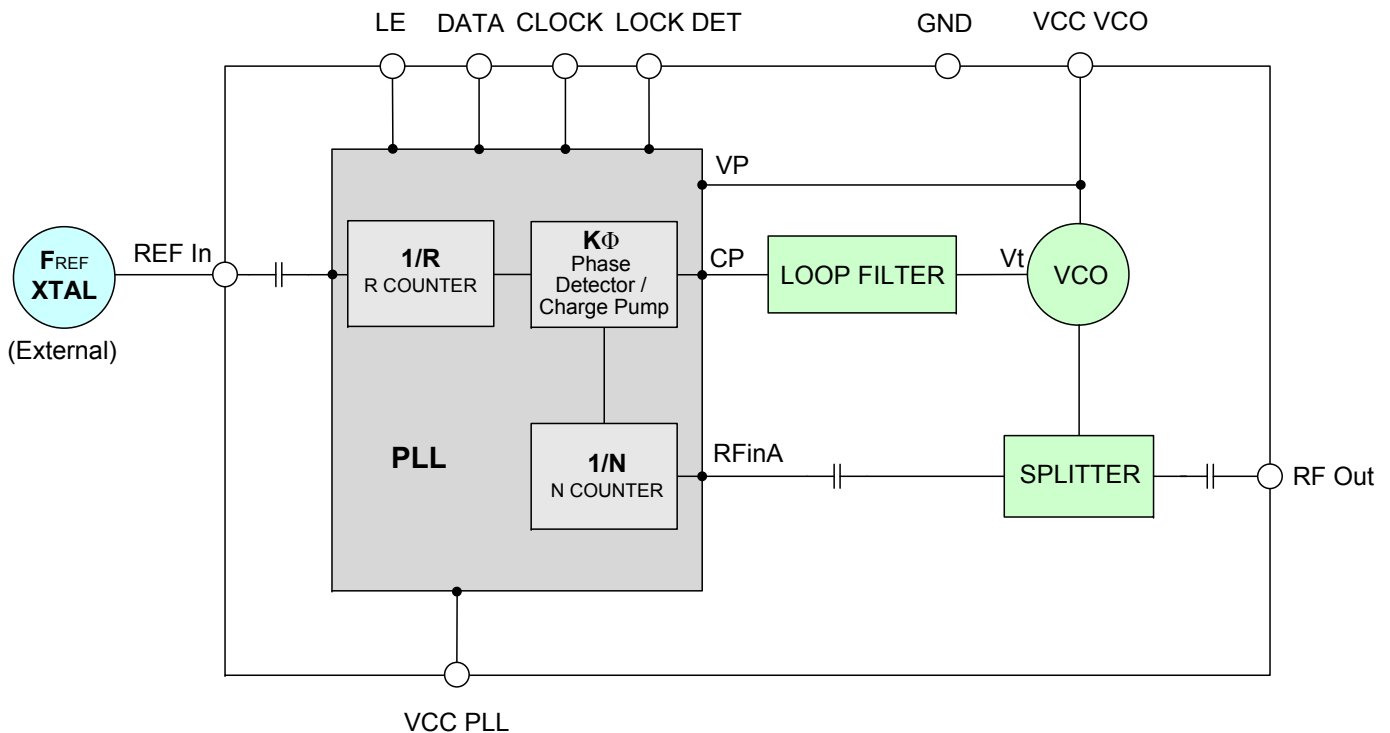
Applications

- UMTS

General Description

The KSN-1990A-119+ is a Frequency Synthesizer, designed to operate from 1790 to 1990MHz for UMTS application. The KSN-1990A-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-1990A-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. OR
M126018
EDR-8108F1
KSN-1990A-119+
Category-A1
RAV
100322
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Electrical Specifications (over operating temperature -40°C to +85°C)

Parameters	Test Conditions	Min.	Typ.	Max.	Units	
Frequency Range	-	1790	-	1990	MHz	
Step size	-	-	40	-	kHz	
Settling Time	Within ± 1 kHz	-	10	-	mSec	
Output Power	-	0	+2.5	+5	dBm	
SSB Phase Noise	@ 100 Hz offset	-	-72	-	dBc/Hz	
	@ 1 kHz offset	-	-73	-66		
	@ 10 kHz offset	-	-95	-90		
	@ 100 kHz offset	-	-122	-116		
	@ 1 MHz offset	-	-143	-136		
Integrated SSB Phase Noise	@ 50 Hz to 5MHz	-	-38	-34	dBc	
Reference Spurious Suppression	Ref. Freq. 15.84 MHz	-	-100	-80		
Comparison Spurious Suppression	Step size 40 kHz	-	-75	-50		
Non - Harmonic Spurious Suppression	-	-	-90	-		
Harmonic Suppression	-	-	-25	-17		
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	-	-	35	40	mA	
PLL Supply Current	-	-	17	22		
Reference Input (External)	Frequency	15.84 (square wave)	-	15.84	-	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	-	2.8	-	-	V
	Input low voltage	-	-	-	0.6	V
Digital Lock Detect	Locked	-	2.7	-	3.5	V
	Unlocked	-	-	-	0.4	V
Frequency Synthesizer PLL	-	ADF4113				
PLL Programming	-	3-wire serial 3V CMOS				
Register Map @ 1990 MHz	F_Register	-	(MSB) 100111111000000000010011 (LSB)			
	N_Register	-	(MSB) 001001100001001001011001 (LSB)			
	R_Register	-	(MSB) 000000000000011000110000 (LSB)			

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	6.3V
PLL Supply Voltage	6.3V
VCO Supply Voltage to PLL Supply Voltage	-0.3V to +5.5V
Reference Frequency Voltage	-0.3Vmin, +3.5Vmax
Data, Clock, LE Levels	-0.3Vmin, +3.5Vmax
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)		
	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C
	1790	2.62	2.98	2.94	34.00	35.87	37.29	15.93	17.42
1794	2.53	2.93	2.90	34.02	35.88	37.29	15.94	17.43	19.11
1818	2.68	2.91	2.85	34.01	35.88	37.29	15.95	17.44	19.12
1842	2.59	3.04	2.96	33.77	35.86	37.27	15.95	17.45	19.13
1866	2.51	2.84	2.76	33.95	35.83	37.25	15.96	17.47	19.13
1890	2.51	2.82	2.71	33.91	35.80	37.22	15.97	17.47	19.14
1914	2.51	2.77	2.62	33.86	35.76	37.20	15.97	17.48	19.14
1938	2.58	2.93	2.74	33.58	35.71	37.16	15.98	17.48	19.15
1962	2.36	2.69	2.50	33.76	35.67	37.12	15.99	17.49	19.16
1986	2.25	2.50	2.26	33.69	35.61	37.08	15.99	17.49	19.16
1990	2.27	2.51	2.27	33.68	35.60	37.07	15.99	17.50	19.17

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C
1790	-21.17	-24.39	-27.99	-30.42	-31.11	-33.42
1794	-20.58	-24.02	-27.47	-33.85	-32.16	-34.25
1818	-22.14	-24.34	-27.92	-39.14	-40.12	-40.70
1842	-23.41	-27.49	-31.50	-30.81	-34.05	-36.95
1866	-21.54	-24.77	-28.09	-37.48	-34.02	-36.13
1890	-22.75	-25.53	-28.83	-40.29	-51.07	-48.35
1914	-23.97	-28.25	-31.96	-33.12	-34.44	-37.58
1938	-22.54	-25.54	-28.91	-43.24	-38.84	-40.65
1962	-23.82	-26.70	-30.18	-40.45	-54.32	-60.30
1986	-23.10	-26.05	-29.95	-36.20	-36.41	-40.29
1990	-22.70	-25.32	-29.16	-36.74	-36.26	-39.71



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1790	-77.06	-76.38	-97.76	-124.15	-144.29
1794	-73.29	-74.83	-97.39	-124.16	-144.26
1818	-75.06	-73.81	-96.92	-124.09	-144.49
1842	-76.50	-74.58	-96.31	-123.93	-144.36
1866	-74.19	-76.38	-96.12	-123.65	-144.05
1890	-74.12	-75.01	-95.68	-123.37	-143.65
1914	-72.33	-74.62	-95.85	-122.84	-143.12
1938	-72.60	-73.59	-95.60	-122.27	-142.56
1962	-71.52	-71.57	-95.90	-121.65	-141.88
1986	-70.72	-71.40	-95.60	-120.93	-141.08
1990	-71.54	-71.85	-95.75	-120.86	-140.89

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-40°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1790	-73.19	-74.97	-96.86	-124.74	-145.22
1794	-71.76	-74.92	-96.27	-124.68	-145.28
1818	-71.72	-74.74	-95.51	-124.61	-144.33
1842	-70.22	-73.69	-95.61	-124.29	-145.06
1866	-72.14	-73.87	-94.28	-123.74	-144.89
1890	-71.55	-73.70	-94.11	-123.29	-144.36
1914	-72.36	-72.96	-94.23	-122.61	-143.60
1938	-71.76	-72.42	-94.75	-122.14	-142.87
1962	-70.85	-73.19	-94.31	-121.29	-142.06
1986	-70.45	-70.53	-94.37	-120.36	-141.01
1990	-70.33	-71.30	-94.21	-120.33	-140.84

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1790	-77.65	-73.47	-96.54	-123.22	-143.36
1794	-74.24	-74.47	-96.43	-123.20	-143.37
1818	-72.48	-73.65	-95.74	-123.15	-143.33
1842	-75.25	-73.41	-95.51	-123.05	-143.31
1866	-74.18	-73.21	-94.87	-122.82	-142.96
1890	-72.64	-72.47	-94.95	-122.63	-142.81
1914	-71.79	-72.17	-94.82	-122.16	-142.28
1938	-71.81	-73.14	-95.11	-121.81	-141.98
1962	-71.81	-71.42	-95.11	-121.61	-141.65
1986	-70.43	-71.49	-95.36	-121.73	-141.54
1990	-71.89	-72.43	-95.45	-121.74	-141.71



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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1790MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1890MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1990MHz+(n*Fcomparison) (dBc) note 1		
	n	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C	-40°C	+25°C
-5	-91.12	-96.64	-110.84	-108.61	-105.49	-88.69	-83.68	-86.00	-81.86
-4	-86.34	-90.40	-98.53	-108.79	-104.24	-85.94	-80.20	-80.96	-77.91
-3	-90.96	-98.63	-92.55	-104.39	-99.95	-80.19	-86.28	-90.20	-77.10
-2	-85.39	-92.75	-88.14	-96.69	-91.83	-73.50	-80.90	-81.05	-68.98
-1	-75.47	-78.21	-77.65	-89.55	-81.21	-61.19	-67.50	-67.20	-56.57
0 note 2	-	-	-	-	-	-	-	-	-
+1	-75.63	-77.93	-78.53	-88.32	-80.75	-61.00	-67.66	-67.78	-56.51
+2	-85.82	-88.81	-88.97	-96.78	-93.24	-73.40	-81.80	-81.37	-69.07
+3	-90.76	-96.99	-93.85	-102.32	-96.42	-80.33	-87.44	-91.49	-76.91
+4	-85.22	-89.28	-95.96	-102.79	-107.27	-86.11	-81.28	-81.93	-77.69
+5	-89.89	-94.67	-102.73	-111.01	-107.01	-88.82	-83.88	-87.04	-82.24

Note 1: Comparison frequency 40 kHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1790MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1890MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1990MHz+(n*Freference) (dBc) note 3		
	n	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C	-40°C	+25°C
-5	-99.63	-100.16	-102.27	-98.24	-100.50	-102.32	-99.33	-100.57	-102.52
-4	-91.56	-98.34	-95.06	-90.90	-97.90	-94.94	-92.31	-94.28	-95.66
-3	-104.07	-106.01	-107.43	-104.02	-108.16	-108.49	-105.82	-106.62	-108.74
-2	-99.50	-106.39	-102.36	-99.86	-105.83	-102.07	-101.62	-102.16	-105.40
-1	-107.05	-109.06	-110.18	-107.37	-102.85	-111.91	-100.41	-101.02	-109.01
0 note 4	-	-	-	-	-	-	-	-	-
+1	-105.41	-109.90	-112.47	-107.87	-103.56	-116.10	-119.86	-114.31	-118.82
+2	-103.46	-108.10	-110.96	-103.23	-109.33	-110.99	-104.74	-109.17	-110.22
+3	-106.38	-111.11	-111.47	-106.70	-110.58	-111.32	-108.17	-110.15	-112.01
+4	-93.97	-101.45	-98.92	-95.17	-103.23	-100.29	-95.33	-97.59	-100.72
+5	-101.52	-102.56	-105.40	-101.58	-104.12	-106.78	-103.15	-103.97	-106.01

Note 3: Reference frequency 15.84 MHz

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



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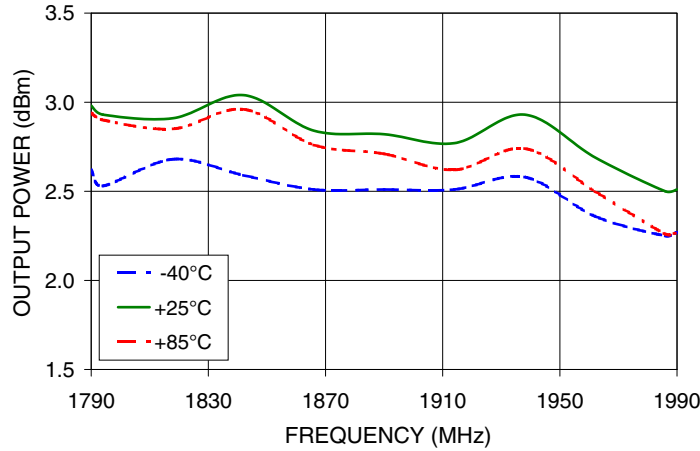
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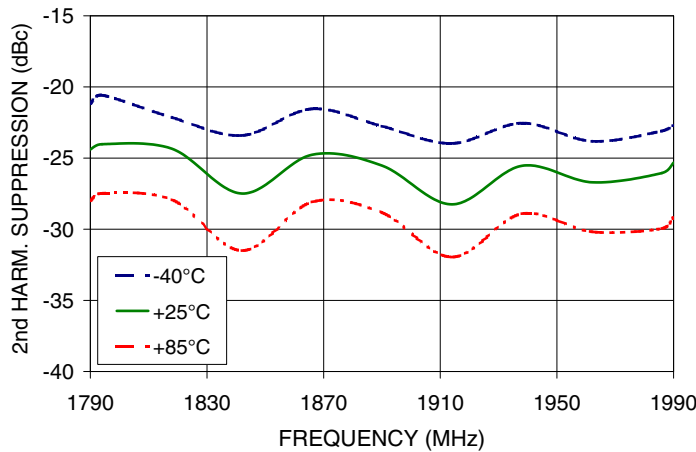
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Typical Performance Curves

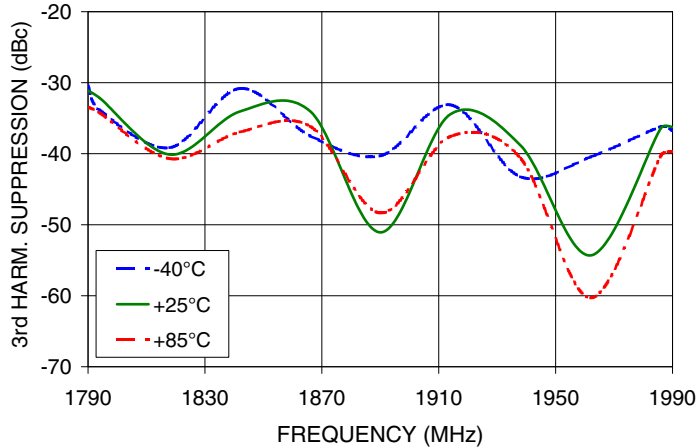
OUTPUT POWER Vs FREQUENCY



2nd HARMONIC Vs FREQUENCY



3rd HARMONIC Vs FREQUENCY



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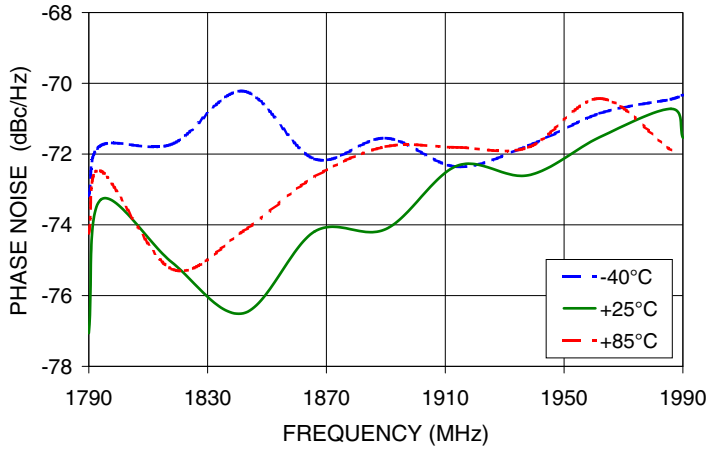


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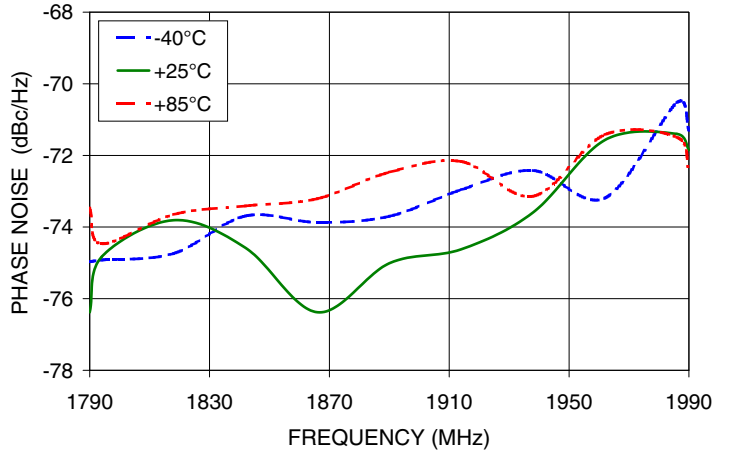


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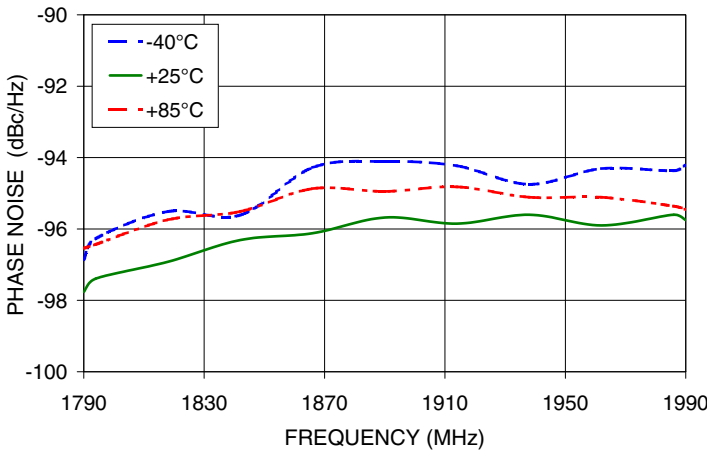
PHASE NOISE @ 100Hz offset



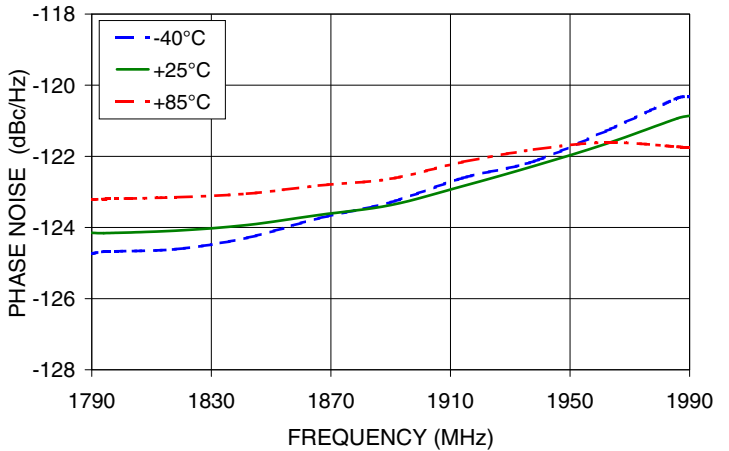
PHASE NOISE @ 1kHz offset



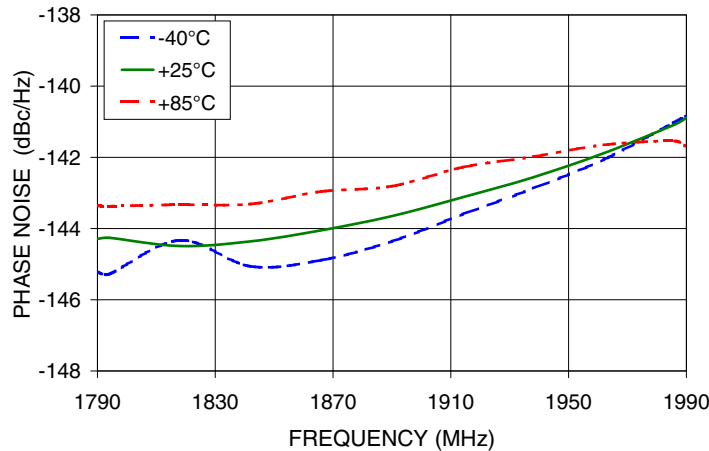
PHASE NOISE @ 10 kHz offset



PHASE NOISE @ 100 kHz offset



PHASE NOISE @ 1MHz offset



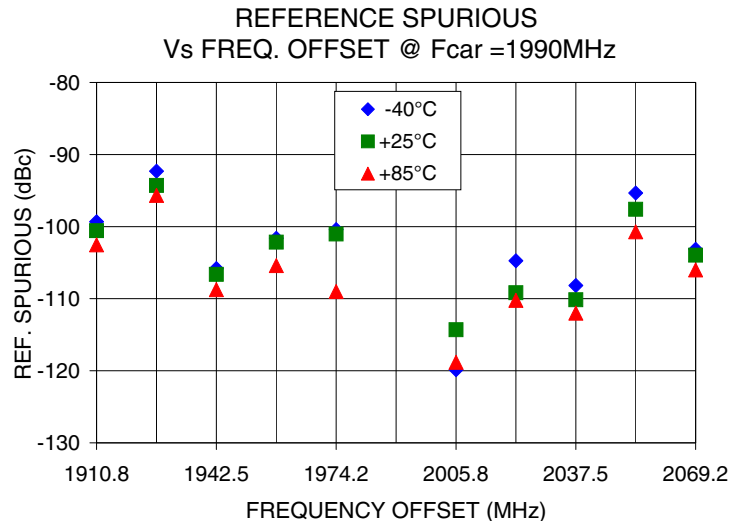
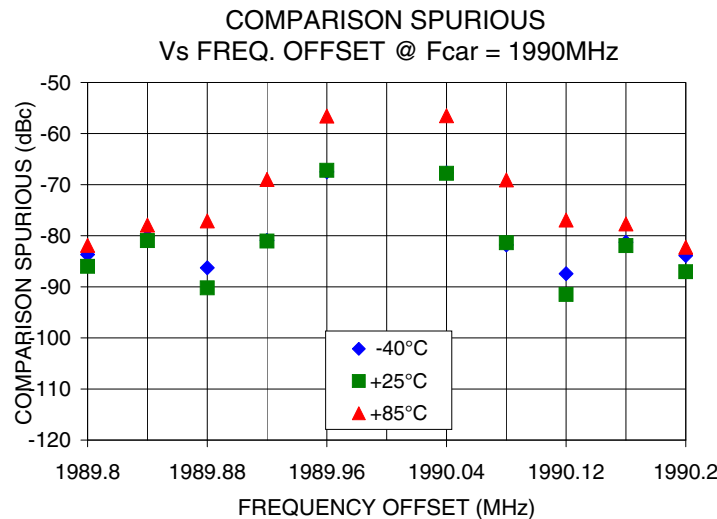
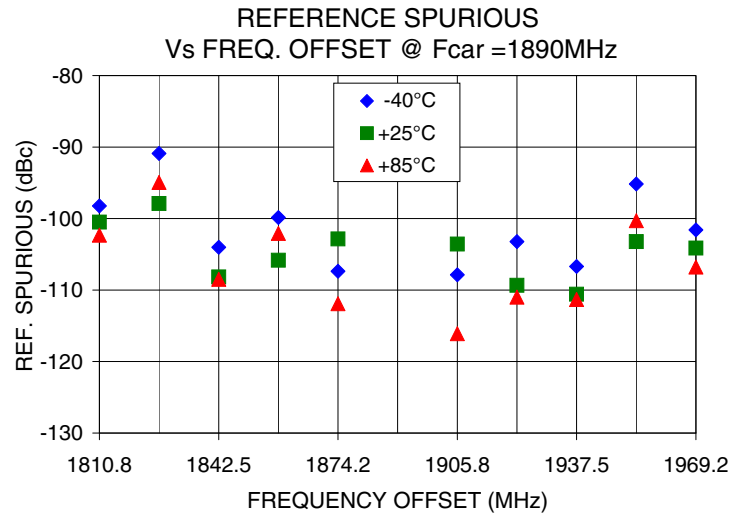
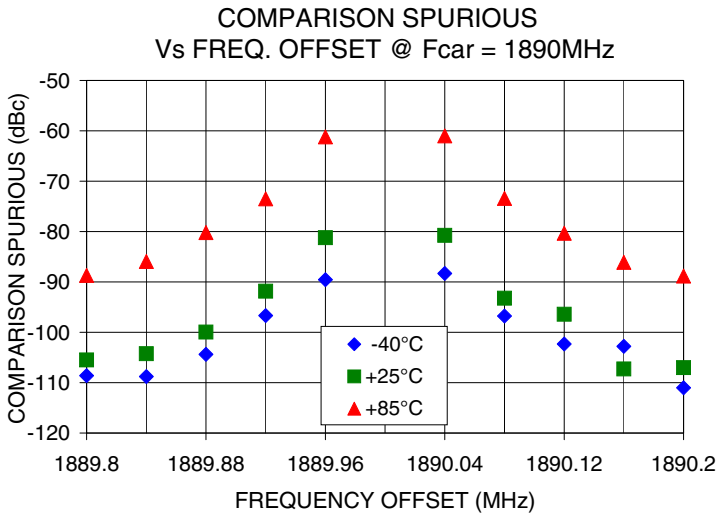
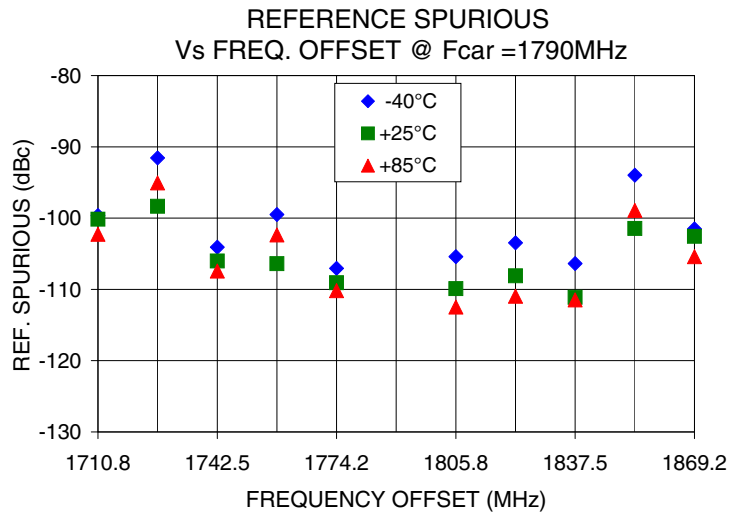
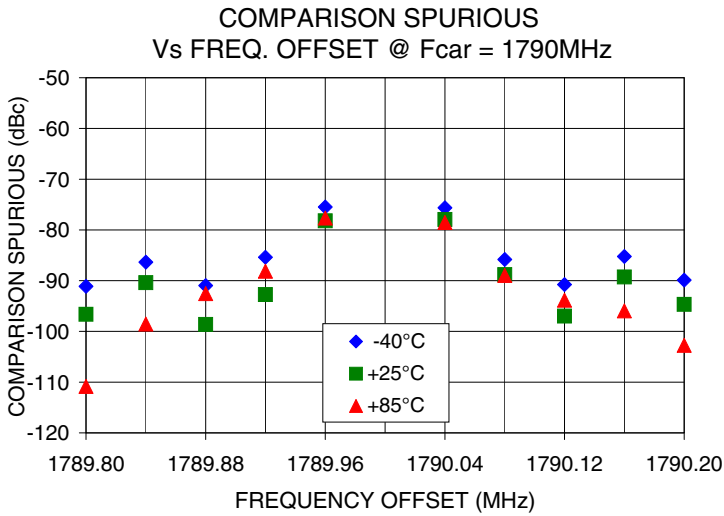
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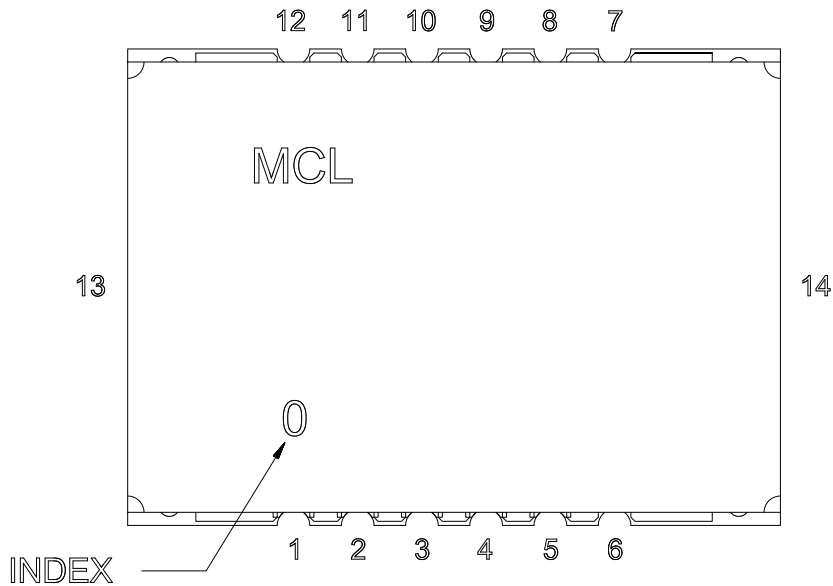


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Pin Configuration

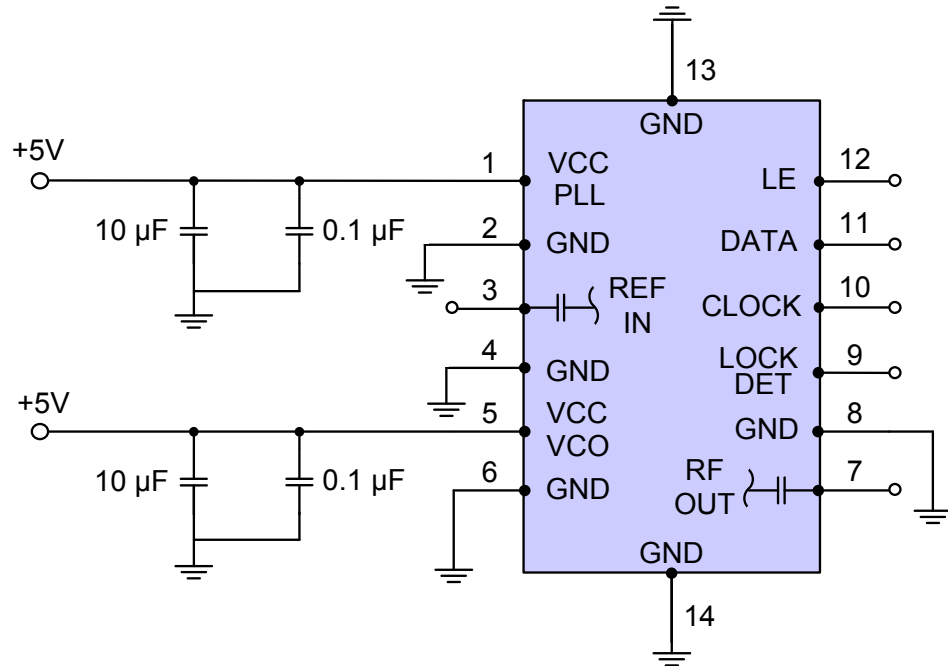


Pin Connection

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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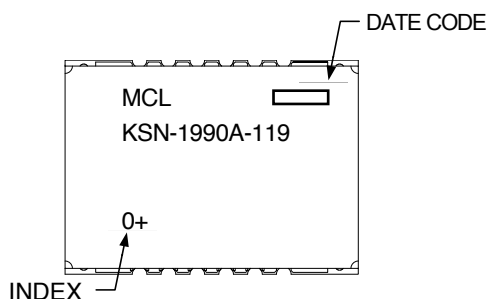


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Device Marking



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: DK801

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567+

Environment Ratings: ENV03T2



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