

Frequency Synthesizer

KSN-2346A+

50Ω 2286 to 2346 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: DK801

Product Overview

The KSN-2346A+ is a Frequency Synthesizer, designed to operate from 2286 to 2346 MHz for LTE base station application. The KSN-2346A+ 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: <ul style="list-style-type: none">• Phase Noise: -88 dBc/Hz typ. @ 10 kHz offset• Comparison Spurious: -92 dBc typ.• Reference Spurious: -106 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-2346A+, 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-2346A+ to be used in compact designs.



For detailed performance specs
& shopping online see web site

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IF/RF MICROWAVE COMPONENTS

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50Ω 2286 to 2346 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 0.800" x 0.584" x 0.154"



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

- LTE base station

General Description

The KSN-2346A+ is a Frequency Synthesizer, designed to operate from 2286 to 2346 MHz for LTE base station application. The KSN-2346A+ 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-2346A+, 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



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

Parameters				Test Conditions				Min.	Typ.	Max.	Units				
Frequency Range				-				2286	-	2346	MHz				
Step Size				-				-	1000	-	kHz				
Settling Time				Within ± 1 kHz				-	1.1	-	mSec				
Output Power				-				-2.5	-0.3	+2.5	dBm				
SSB Phase Noise				@ 100 Hz offset				-	-83	-	dBc/Hz				
				@ 1 kHz offset				-	-86	-80					
				@ 10 kHz offset				-	-88	-83					
				@ 100 kHz offset				-	-122	-116					
				@ 1 MHz offset				-	-143	-137					
Integrated SSB Phase Noise				@100 Hz to 1MHz				-	-45	-	dBc				
Reference Spurious Suppression				Ref. Freq. 15 MHz				-	-106	-80	dBc				
Comparison Spurious Suppression				Step Size 1000 kHz				-	-92	-70					
Non - Harmonic Spurious Suppression				-				-	-90	-					
Harmonic Suppression				-				-	-30	-20					
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				-				-	24	30	mA				
PLL Supply Current				-				-	13	20					
Reference Input (External)		Frequency		15 (square wave)				-	15	-	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		-				4.20	-	-	V				
		Input low voltage		-				-	-	0.95	V				
Digital Lock Detect		Locked		-				4.35	-	5.25	V				
		Unlocked		-				-	-	0.40	V				
Frequency Synthesizer PLL				-				ADF4113							
PLL Programming				-				3-wire serial 5V CMOS							
Register Map ^{NOTE 1}	F_Register ^{NOTE 2}	Prescaler Value	Power-Down 2	Current Setting 2		Current Setting 1	Timer Counter Control	Fastlock Mode	Fastlock Enable	CP Three-State	PD Polarity	Muxout Control	Power-Down 1	Counter Reset	Control Bits
		01	0	111		111	0000	0	0	0	1	001	0	0	10
	N_Register @ 2346MHz	Reserved	CP Gain	13-Bit B Counter							6-Bit A Counter			Control Bits	
		00	1	0000010010010							001010			01	
	R_Register	Reserved	DLY	SYNC	Lock Detect Precision	Test Mode Bits	Anti-Backlash Width		14-BIT Reference Counter, R						Control Bits
	0	0	0	1	00	00		00000000001111						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 ^{NOTE 3}	6V
PLL Supply Voltage ^{NOTE 3}	6V
VCO Supply Voltage to PLL Supply Voltage ^{NOTE 3}	-0.3V to +5.5V
Reference Frequency Voltage	-0.3Vmin, VCC PLL +0.3Vmax
Data, Clock, LE Levels	-0.3Vmin, VCC PLL +0.3Vmax
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

Note 3: Power on/off Sequence:
Power on: VCO Supply Voltage, followed by PLL Supply Voltage.
Power off: PLL Supply Voltage, followed by VCO Supply Voltage.

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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
2286	-0.15	-0.13	-0.15	23.07	24.25	25.03	9.95	12.41	14.51
2295	-0.20	-0.23	-0.19	23.05	24.23	25.01	9.91	12.36	14.46
2310	-0.21	-0.17	-0.22	23.03	24.22	24.99	9.92	12.37	14.46
2325	-0.22	-0.18	-0.29	22.98	24.19	24.95	9.92	12.38	14.48
2340	-0.30	-0.27	-0.34	22.90	24.12	24.89	9.93	12.39	14.49
2346	-0.31	-0.29	-0.36	22.88	24.10	24.85	9.99	12.44	14.55

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2286	-33.48	-31.72	-31.73	-45.15	-48.70	-48.58
2295	-34.25	-31.16	-31.52	-46.84	-48.67	-49.75
2310	-31.85	-30.05	-29.50	-49.01	-52.38	-52.30
2325	-29.78	-28.86	-29.48	-54.42	-53.66	-52.29
2340	-26.90	-26.61	-27.98	-55.95	-56.06	-52.78
2346	-26.09	-25.72	-27.63	-58.88	-57.31	-53.86

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2286	-84.86	-87.03	-89.47	-122.84	-144.68
2295	-86.32	-87.87	-88.79	-122.63	-144.35
2310	-85.86	-86.30	-89.14	-122.68	-144.49
2325	-85.16	-85.90	-87.49	-122.08	-144.19
2340	-83.48	-86.43	-86.47	-121.51	-143.89
2346	-85.59	-85.28	-87.00	-121.55	-143.72

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS				
	-45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2286	-83.57	-84.00	-88.50	-124.23	-146.82
2295	-84.94	-86.57	-89.33	-123.73	-146.44
2310	-81.73	-86.14	-88.41	-123.26	-146.28
2325	-82.31	-86.59	-88.51	-123.14	-145.80
2340	-84.14	-86.28	-88.06	-122.40	-145.12
2346	-83.06	-85.24	-86.87	-122.34	-145.13

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2286	-82.95	-88.05	-88.16	-121.17	-142.81
2295	-81.91	-85.95	-87.68	-120.91	-142.72
2310	-81.37	-85.13	-87.07	-120.76	-142.80
2325	-85.12	-84.89	-86.39	-120.39	-142.07
2340	-81.99	-86.33	-86.65	-120.18	-142.08
2346	-83.98	-86.34	-86.72	-119.99	-141.32

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @ Fcarrier 2286MHz+(n*Freference) (dBc) note 1			COMPARISON SPURIOUS @ Fcarrier 2316MHz+(n*Freference) (dBc) note 1			COMPARISON SPURIOUS @ Fcarrier 2346MHz+(n*Freference) (dBc) note 1		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-123.87	-110.95	-102.84	-103.40	-114.80	-114.22	-101.62	-109.45	-103.02
-4	-107.19	-103.79	-102.93	-108.95	-115.60	-103.42	-104.85	-111.60	-102.05
-3	-104.94	-101.32	-100.61	-106.71	-118.82	-102.27	-103.17	-107.74	-101.18
-2	-96.60	-98.32	-95.78	-107.04	-111.53	-96.02	-106.72	-108.16	-94.86
-1	-90.49	-92.26	-91.26	-100.77	-104.97	-89.76	-99.00	-102.58	-89.41
0 note 2	-	-	-	-	-	-	-	-	-
+1	-88.83	-92.62	-90.66	-96.43	-99.88	-89.54	-94.43	-98.82	-88.76
+2	-95.34	-97.79	-95.01	-100.90	-104.68	-94.78	-104.13	-109.22	-93.51
+3	-99.87	-101.07	-100.85	-102.12	-116.50	-100.96	-107.67	-107.94	-99.74
+4	-105.26	-104.65	-104.33	-106.85	-117.19	-102.66	-107.22	-112.01	-100.31
+5	-107.88	-105.48	-103.18	-104.68	-106.32	-108.57	-101.22	-113.46	-104.21

Note 1: Comparison frequency 1000 kHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @ Fcarrier 2286MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @ Fcarrier 2316MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @ Fcarrier 2346MHz+(n*Freference) (dBc) note 3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-115.10	-126.60	-116.04	-117.31	-114.85	-119.26	-116.91	-117.03	-119.52
-4	-116.83	-123.42	-117.54	-120.37	-118.83	-116.87	-120.32	-116.24	-124.91
-3	-115.57	-122.81	-115.09	-119.28	-117.07	-115.10	-115.94	-114.59	-117.35
-2	-111.77	-113.45	-113.50	-112.72	-112.98	-118.55	-110.09	-113.67	-118.43
-1	-109.04	-108.01	-113.27	-109.38	-117.43	-117.04	-98.95	-106.22	-112.71
0 note 4	-	-	-	-	-	-	-	-	-
+1	-106.52	-106.39	-114.45	-112.11	-120.00	-122.20	-106.69	-112.16	-116.50
+2	-110.48	-111.83	-117.44	-112.53	-119.86	-116.72	-109.84	-112.19	-117.96
+3	-116.78	-117.87	-116.02	-116.56	-116.24	-117.86	-113.59	-113.02	-113.79
+4	-117.88	-123.24	-121.64	-122.15	-123.29	-116.84	-118.74	-116.43	-118.53
+5	-117.56	-123.72	-118.34	-116.34	-117.79	-117.49	-115.40	-114.86	-117.56

Note 3: Reference frequency 15 MHz

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

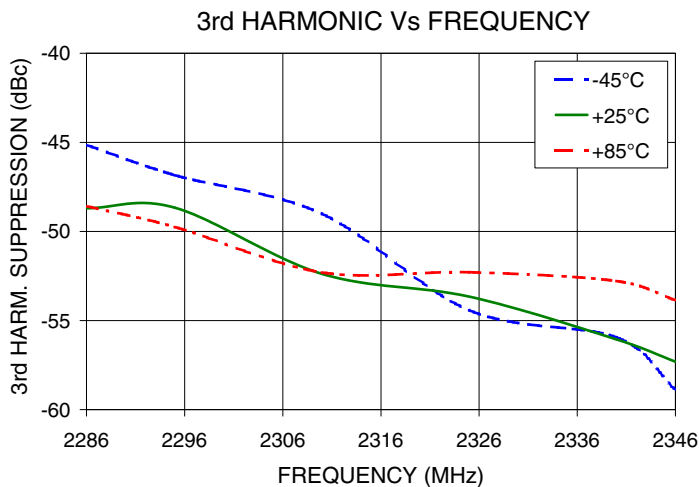
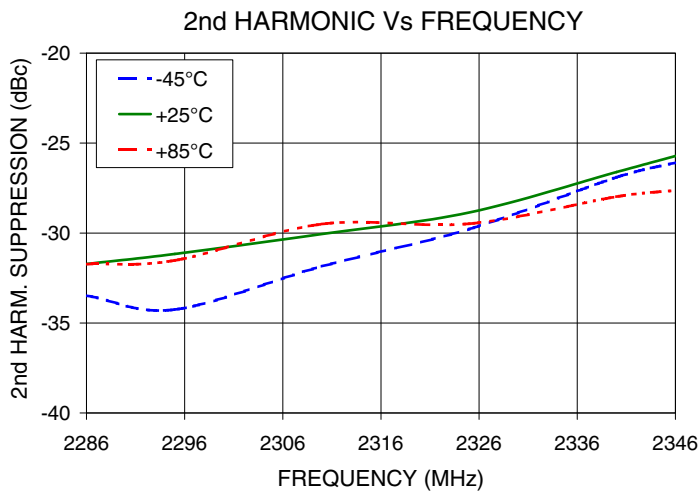
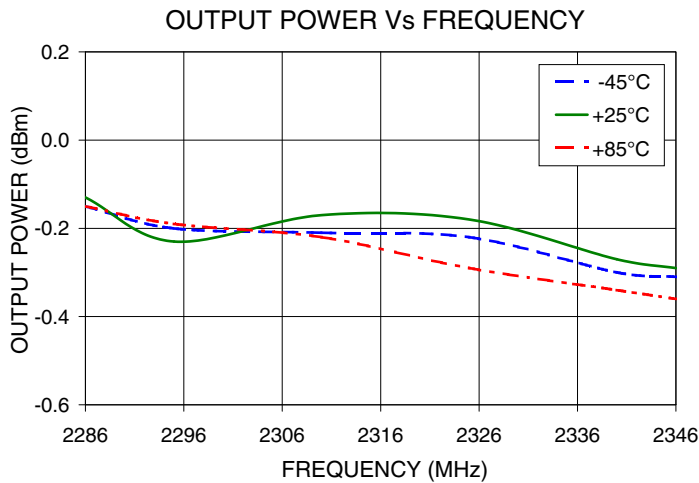
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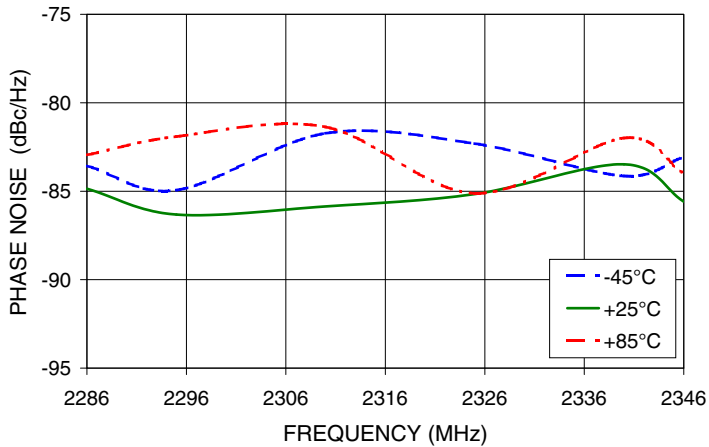
IF/RF MICROWAVE COMPONENTS

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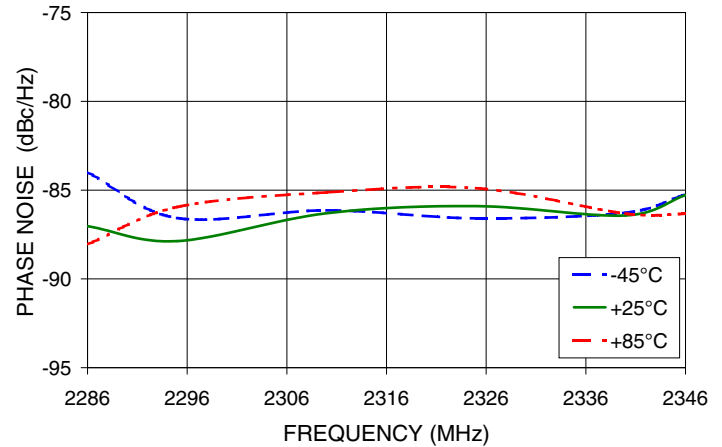
Typical Performance Curves



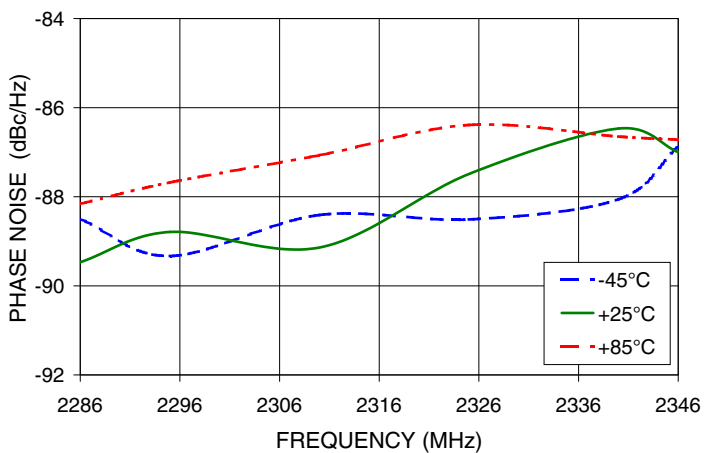
PHASE NOISE @ 100Hz offset



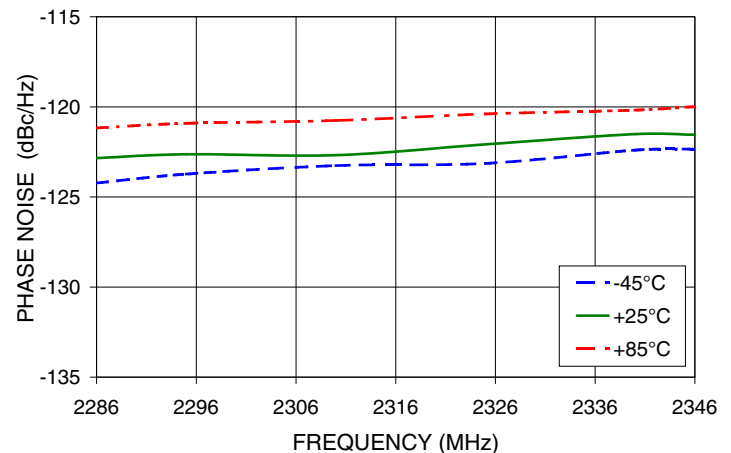
PHASE NOISE @ 1kHz offset



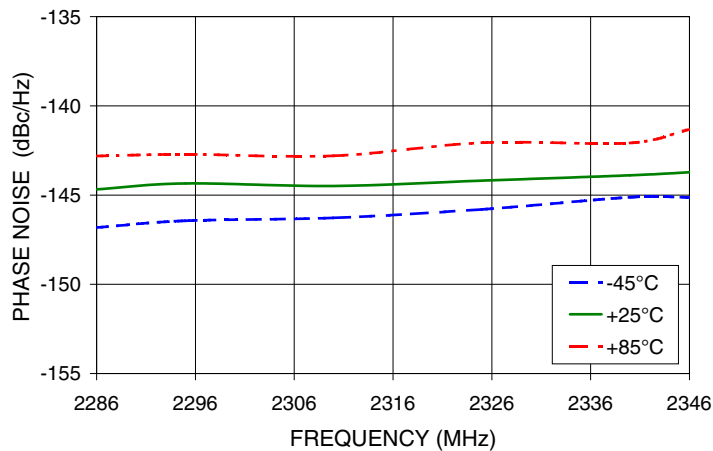
PHASE NOISE @ 10kHz offset

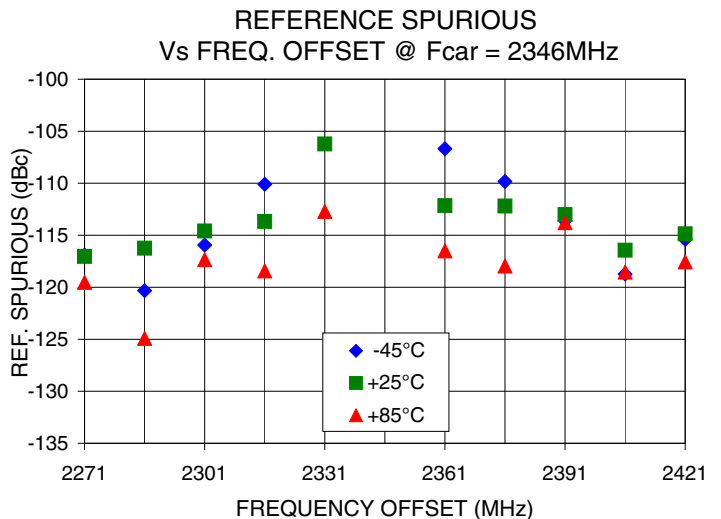
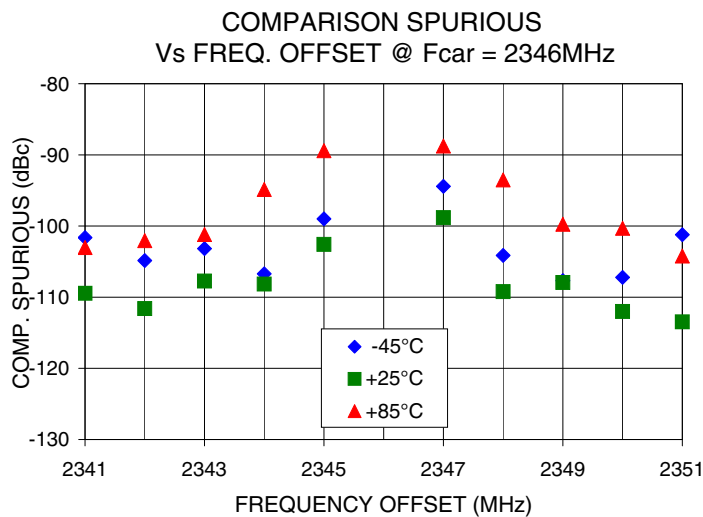
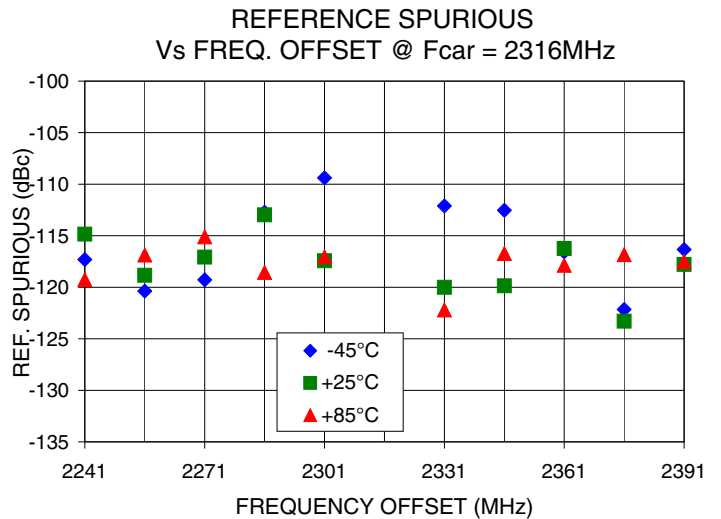
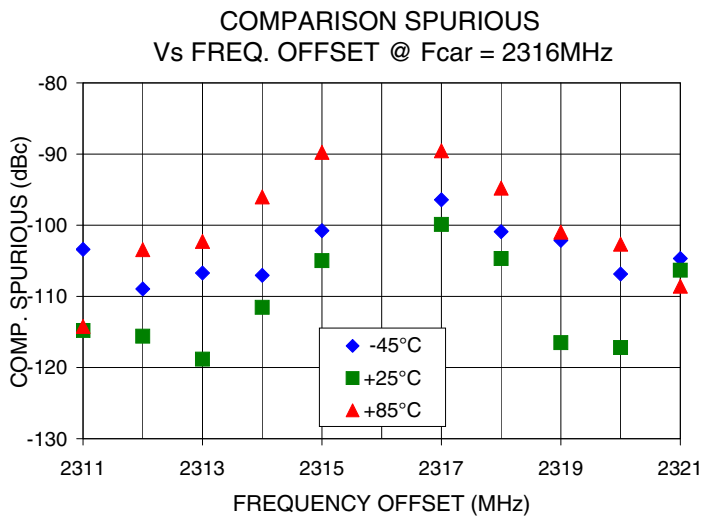
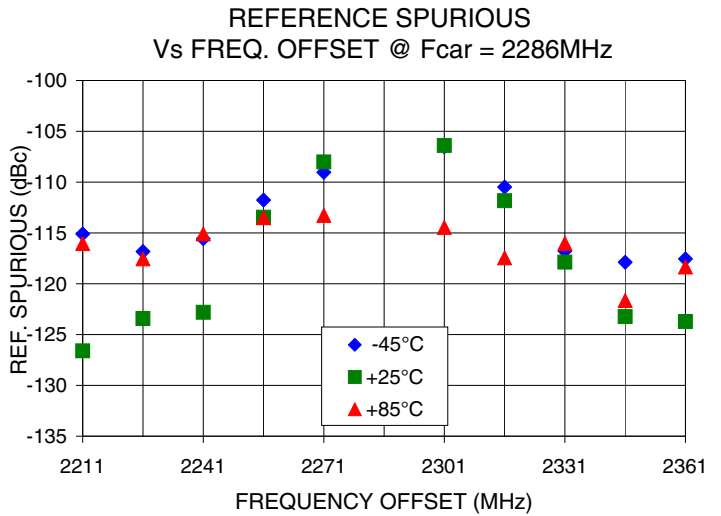
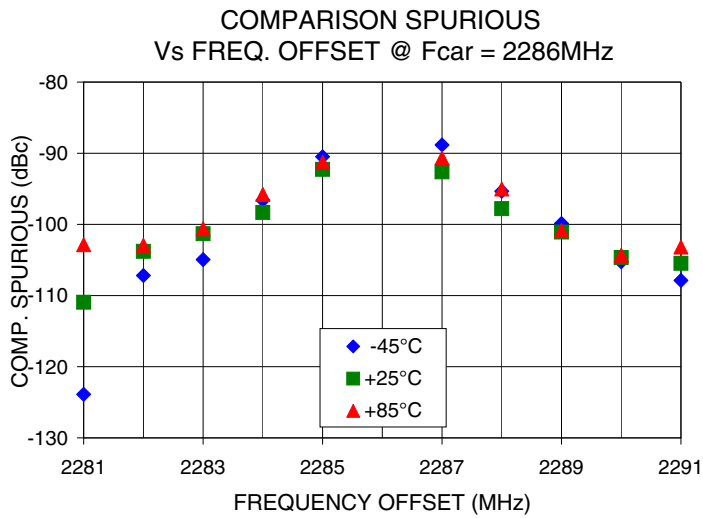


PHASE NOISE @ 100kHz offset

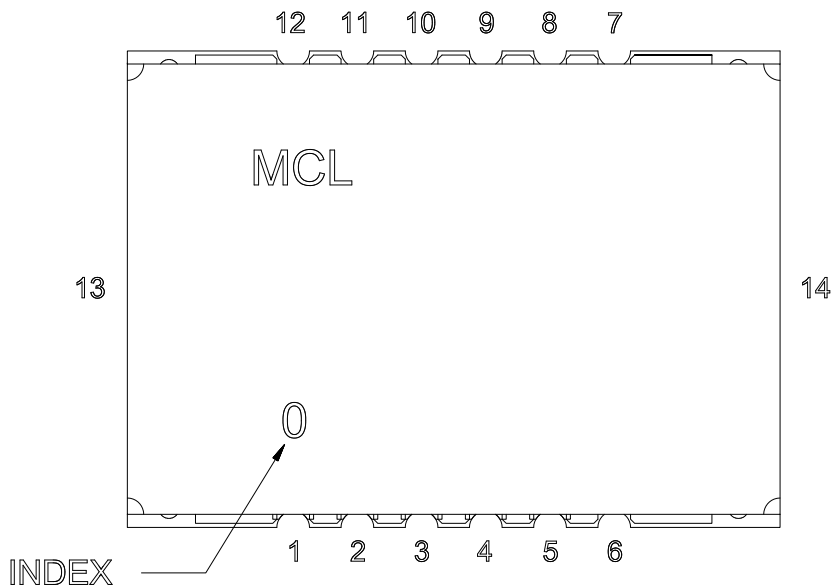


PHASE NOISE @ 1MHz offset





Pin Configuration

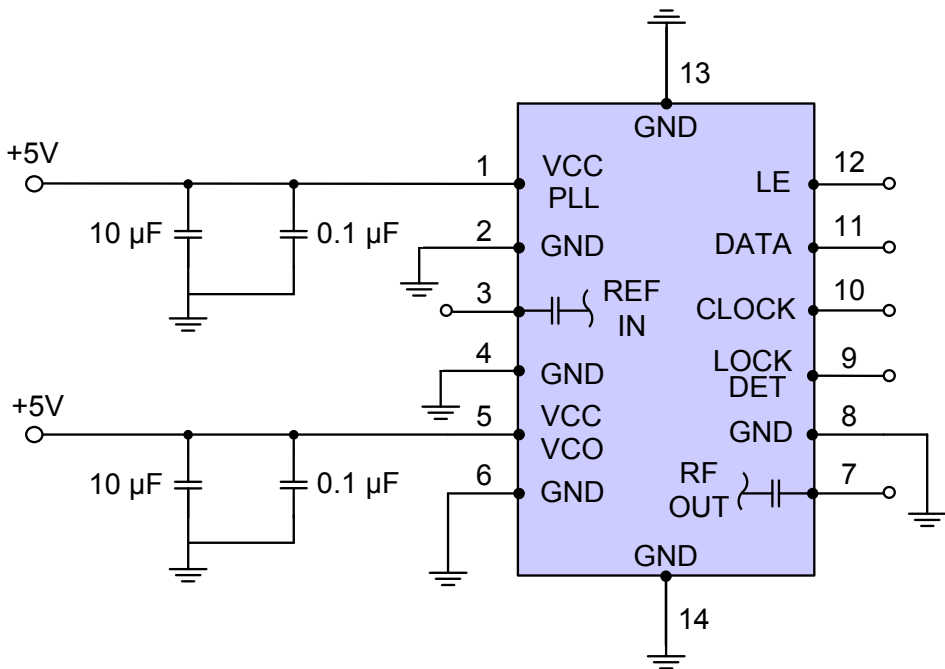


Pin Connection

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

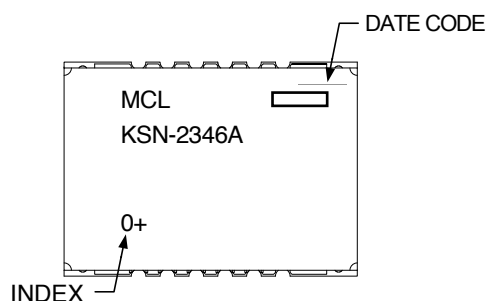
Recommended Application Circuit

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: DK801

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567+

Environment Ratings: ENV03T2