

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.

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.
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Surface Mount

Frequency Synthesizer

KSN-2346A+

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

+RoHS Compliant

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

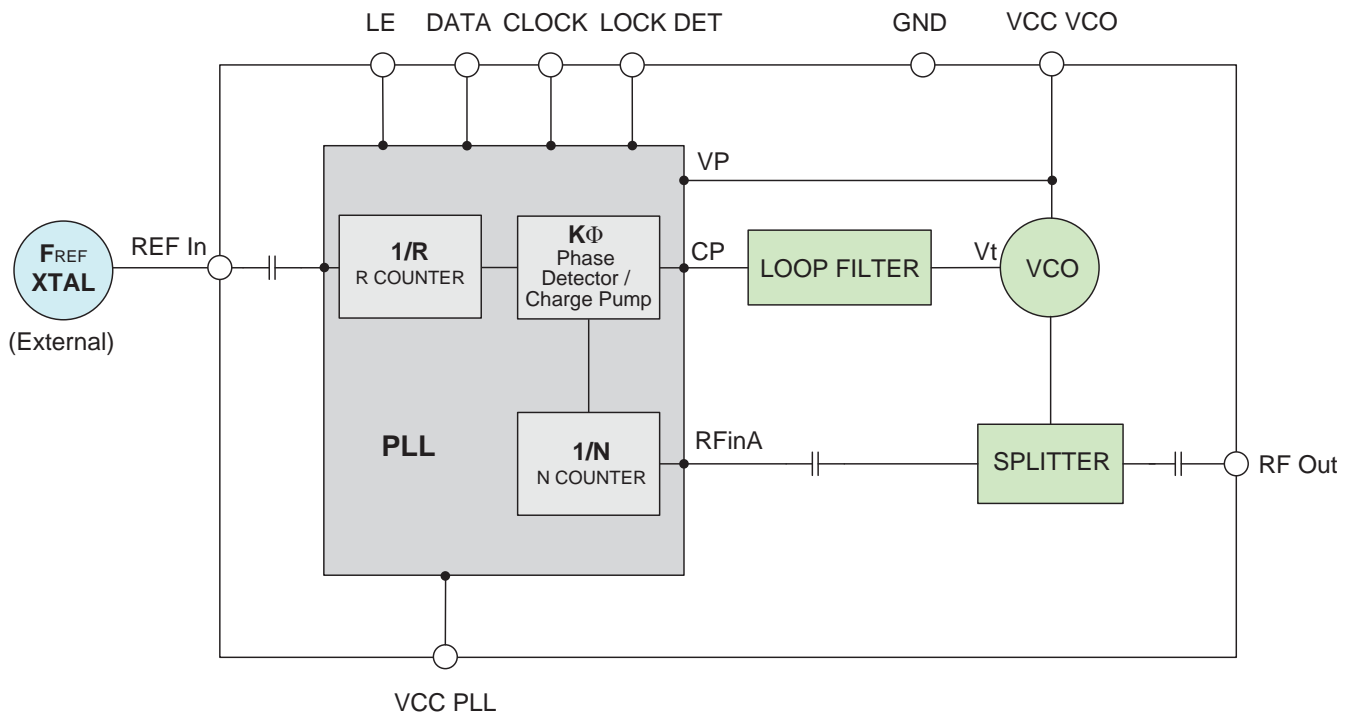
Applications

- 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



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M151108
EDR-9640/2F1
KSN-2346A+
Category-A1
RAV
151007
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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	0000000001111							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

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.

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 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
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

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COMPARISON SPURIOUS ORDER n	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 n	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

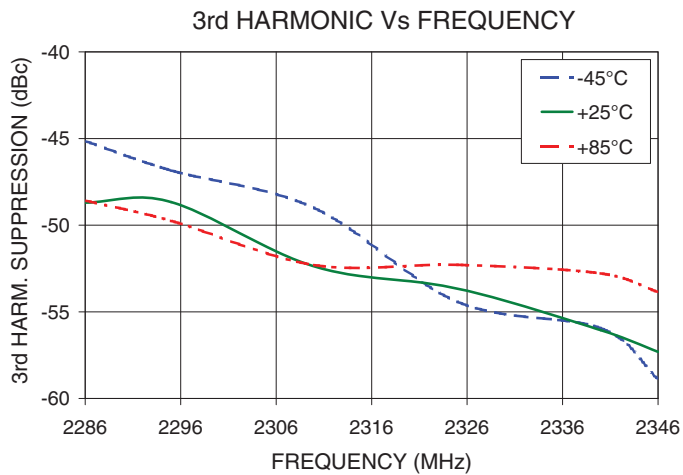
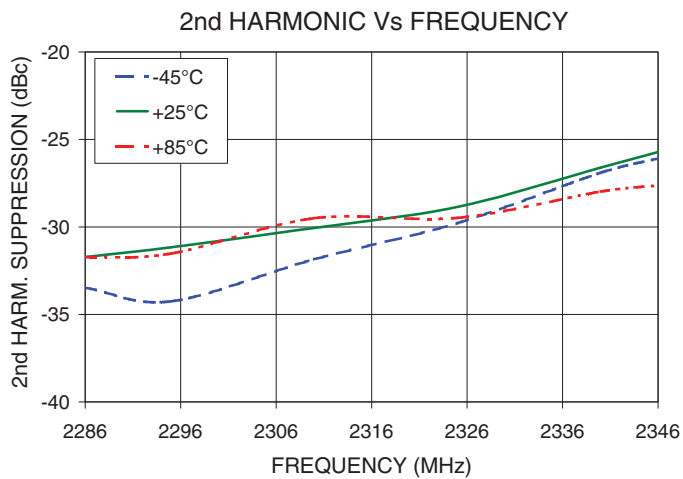
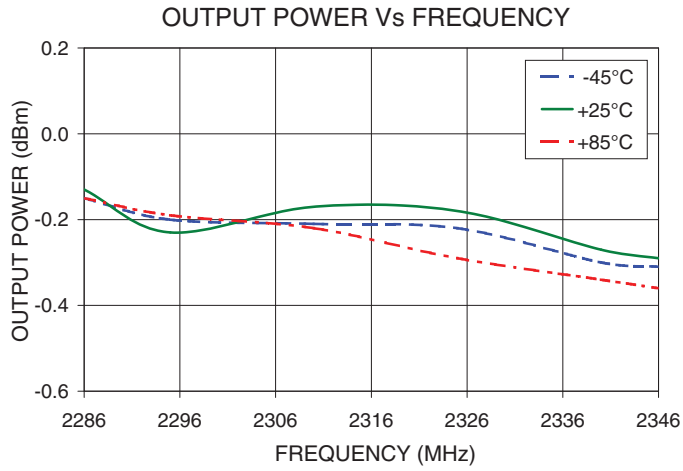
Note 4: All spurs are referenced to carrier signal (n=0).

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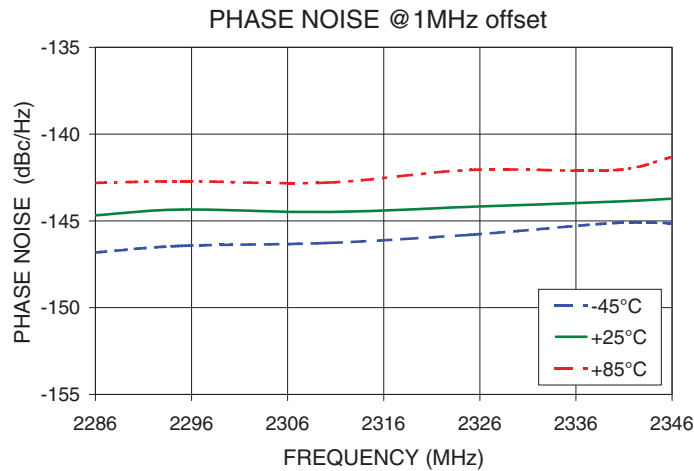
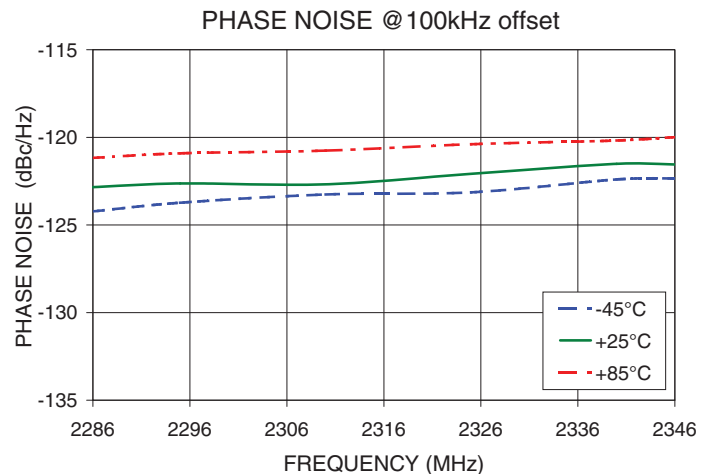
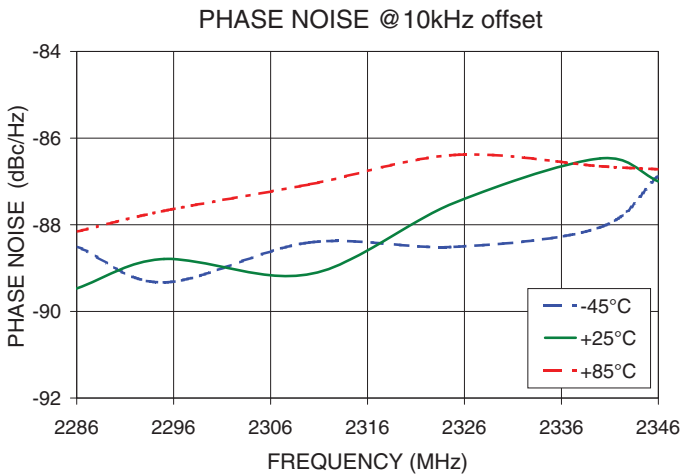
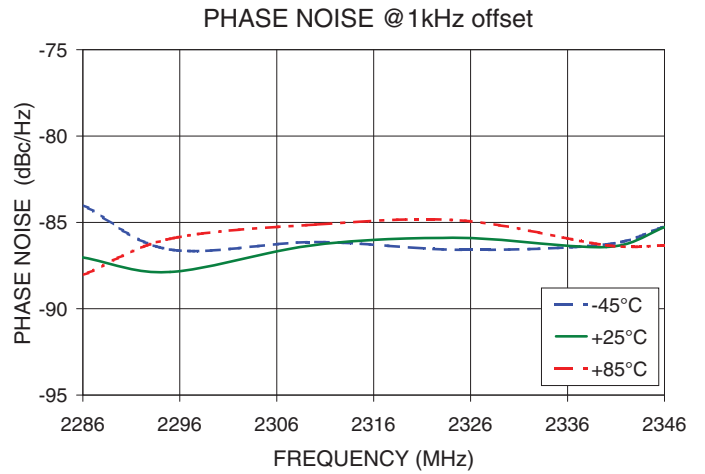
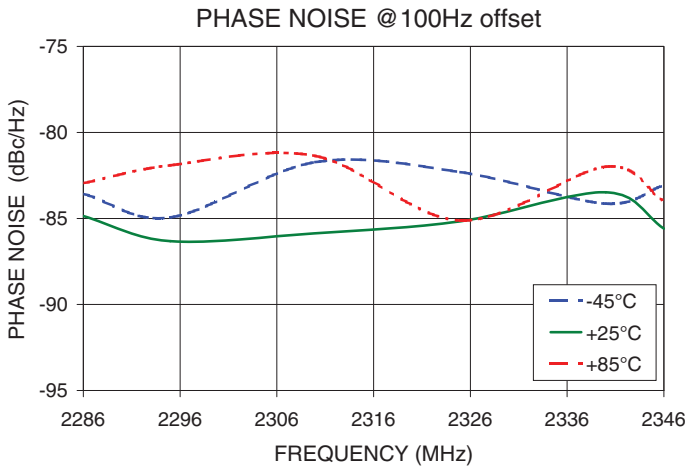
Typical Performance Curves



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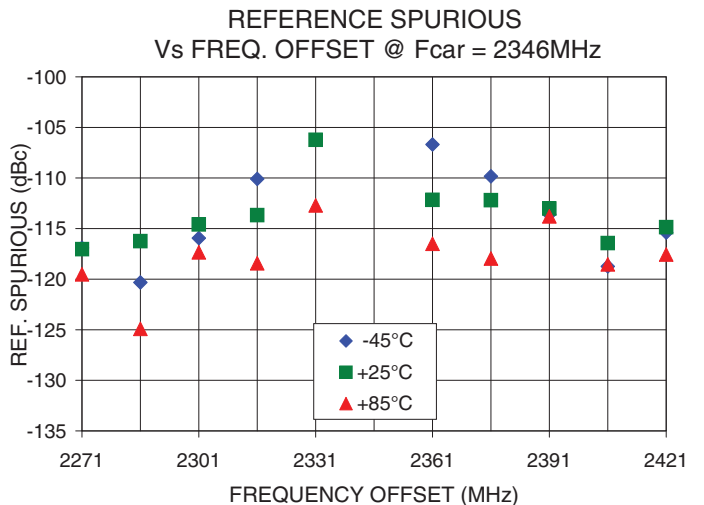
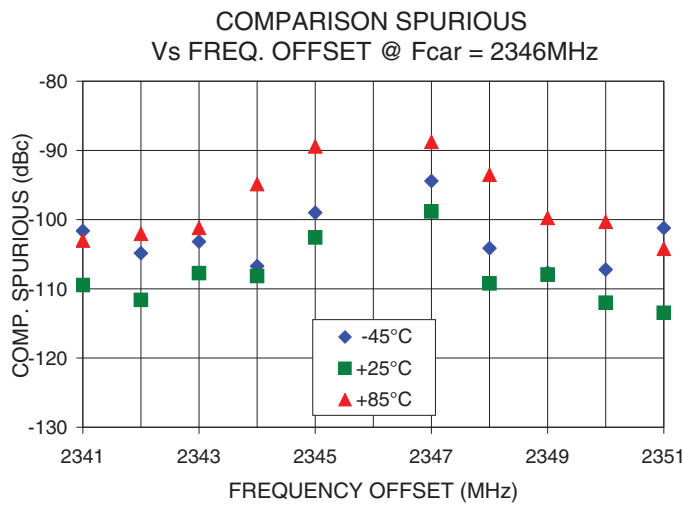
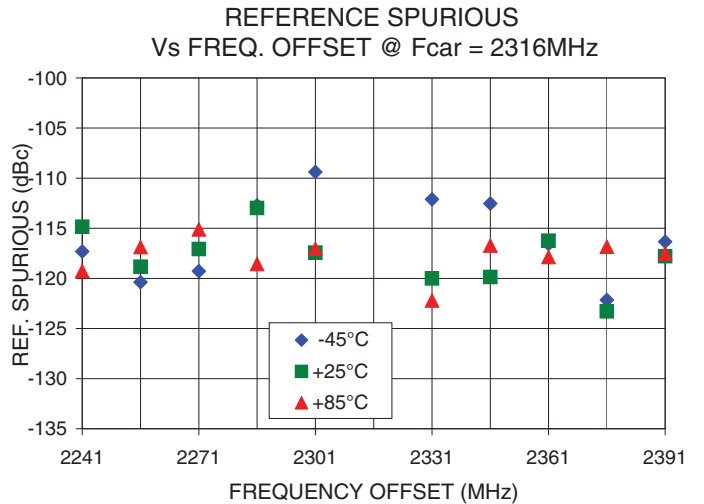
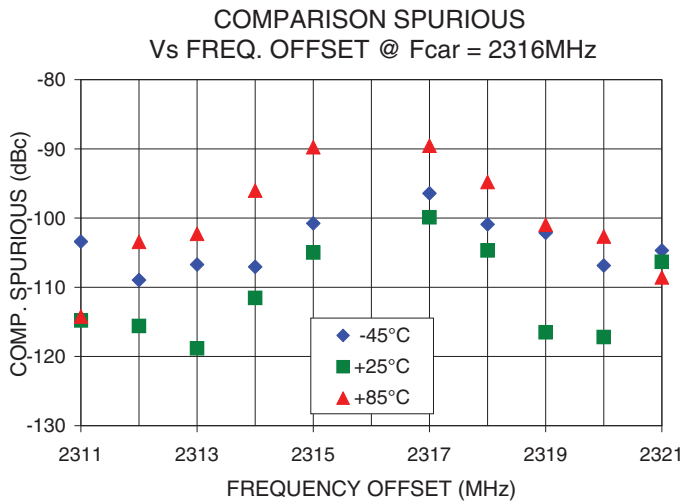
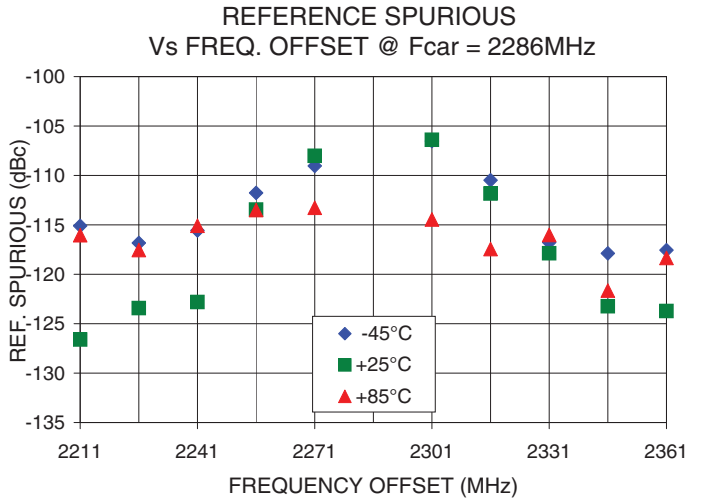
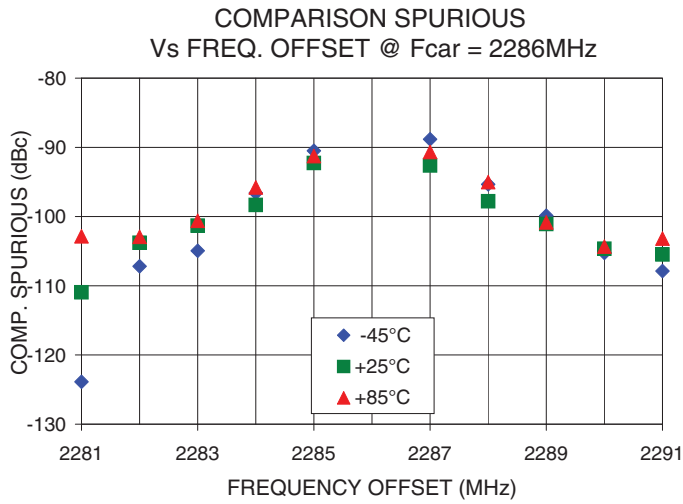




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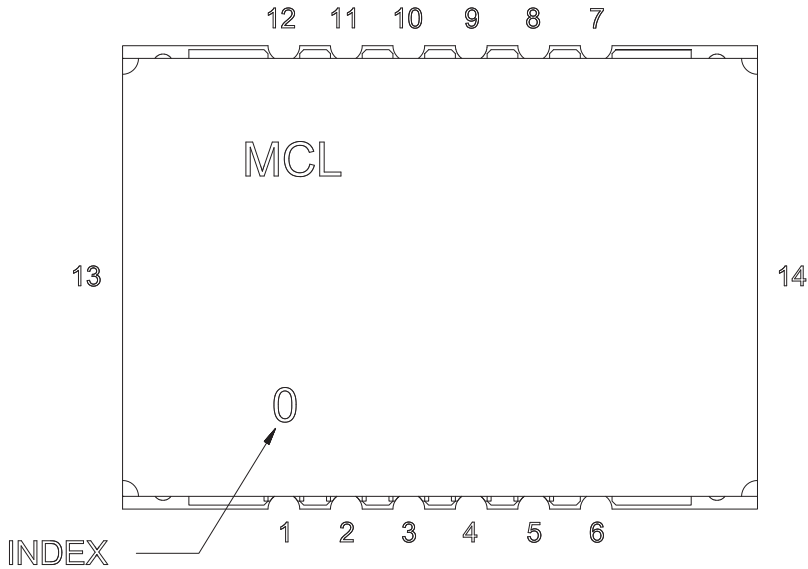




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Pin Configuration

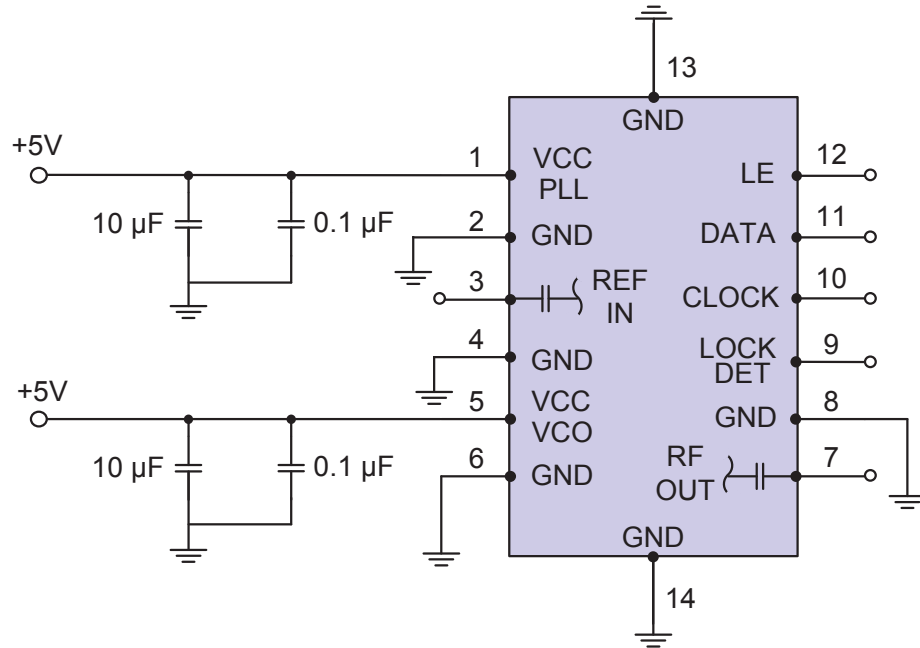


Pin Connection

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.

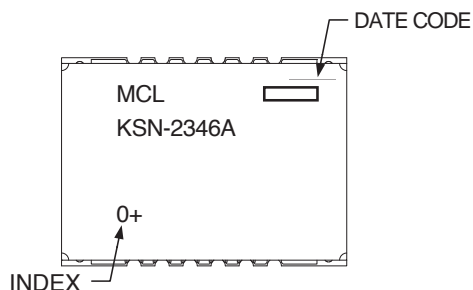


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Device Marking



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: DK801

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567+

Environment Ratings: ENV03T2

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