

Frequency Synthesizer

KSN-2534A-119+

50Ω 2354 to 2556 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-2534A-119+ is a Frequency Synthesizer, designed to operate from 2354 to 2556 MHz for WiMAX application. The KSN-2534A-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: • Phase Noise: -100 dBc/Hz typ. @ 10 kHz offset • Step Size Spurious: -98 dBc typ. • Comparison Spurious: -95 dBc typ. • Reference Spurious: -95 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-2534A-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-2534A-119+ to be used in compact designs.



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50Ω 2354 to 2556 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"

Applications

- WiMAX

General Description

The KSN-2534A-119+ is a Frequency Synthesizer, designed to operate from 2354 to 2556 MHz for WiMAX application. The KSN-2534A-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-2534A-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.



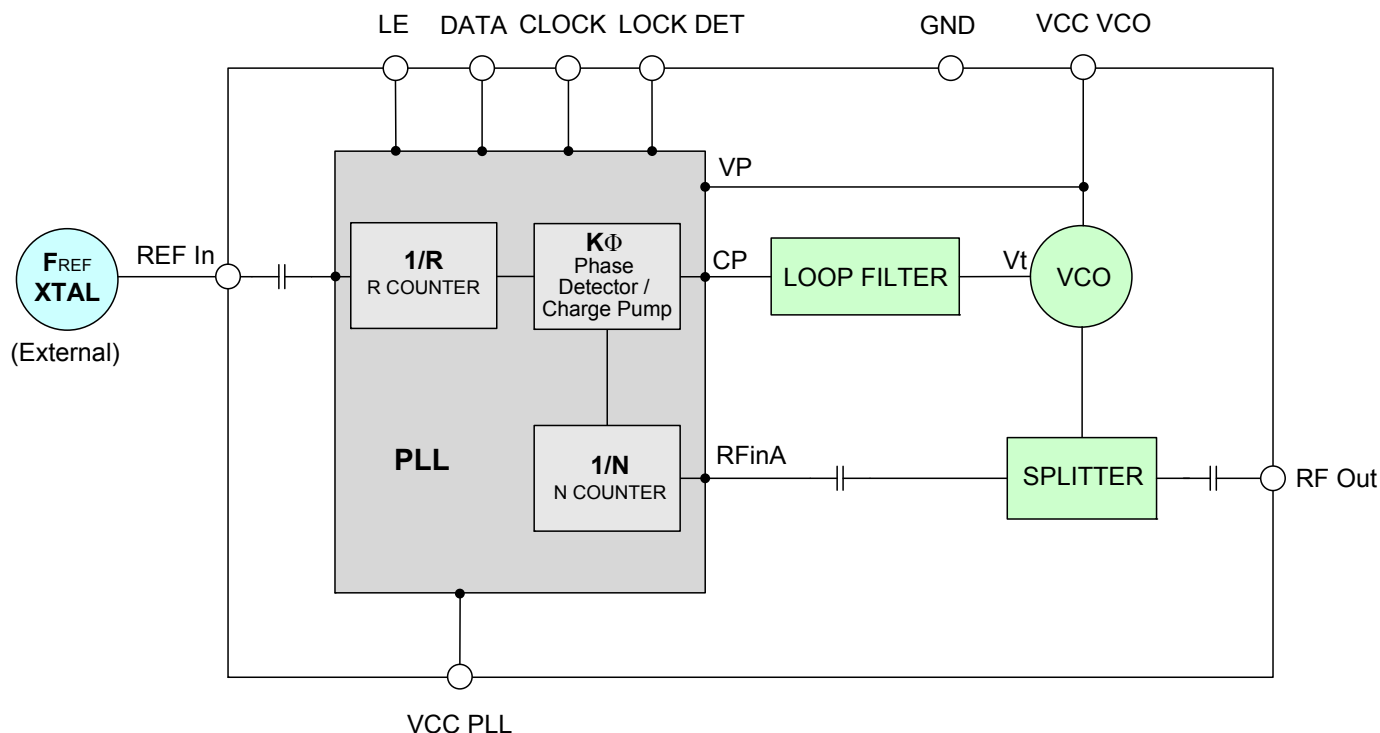
CASE STYLE: DK1042

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.

Simplified Schematic



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REV. OR
M126018
EDR-8853/2F1
KSN-2534A-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		-	2354	-	2556	MHz
Step Size		-	-	250	-	kHz
Comparison Frequency		-	-	10	-	MHz
Settling Time		Within ± 1 kHz	-	25	-	mSec
Output Power		-	-1	+2	+5	dBm
SSB Phase Noise	@ 100 Hz offset	-	-	-85	-	dBc/Hz
	@ 1 kHz offset	-	-	-85	-79	
	@ 10 kHz offset	-	-	-100	-97	
	@ 100 kHz offset	-	-	-125	-120	
	@ 1 MHz offset	-	-	-145	-140	
Step Size Spurious Suppression		Step Size 250 kHz	-	-98	-80	dBc
0.5 Step Size Spurious Suppression		0.5 Step Size 125 kHz	-	-85	-77	
Reference Spurious Suppression		Ref. Freq. 10 MHz	-	-95	-80	
Comparison Spurious Suppression		Comp. Freq. 10 MHz	-	-95	-80	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-35	-20	V
VCO Supply Voltage		+5.00	+4.75	+5.00	+5.25	
PLL Supply Voltage		+3.00	+2.85	+3.00	+3.15	mA
VCO Supply Current		-	-	45	50	
PLL Supply Current		-	-	14	22	
Reference Input (External)	Frequency	10 (square wave)	-	10	-	MHz
	Amplitude	1	-	1	-	V _{P-P}
	Input impedance	-	-	100	-	K Ω
	Phase Noise @ 1 kHz offset	-	-	-140	-	dBc/Hz
RF Output port Impedance		-	-	50	-	Ω
Input Logic Level	Input high voltage	-	2.55	-	-	V
	Input low voltage	-	-	-	0.55	V
Digital Lock Detect	Locked	-	2.45	-	3.15	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4153			
PLL Programming		-	3-wire serial 3V CMOS			
Register Map @ 2556 MHz	R0_Register	-	(MSB) 1111111100000001100000 (LSB)			
	R1_Register	-	(MSB) 101000100000010100001 (LSB)			
	R2_Register	-	(MSB) 111100010 (LSB)			
	R3_Register	-	(MSB) 1111000111 (LSB)			

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	+5.8V
PLL Supply Voltage	+4.0V
VCO Supply Voltage to PLL Supply Voltage	-0.3V to +5.8V
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



Patent Pending

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Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT			VCO CURRENT			PLL CURENT		
	(dBm)			(mA)			(mA)		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2354.00	2.00	1.82	1.29	42.12	44.30	45.66	12.87	14.06	16.40
2367.50	2.04	1.85	1.32	42.20	44.37	45.71	12.87	14.06	16.43
2390.00	2.01	1.83	1.34	42.26	44.43	45.77	12.02	13.18	15.53
2412.50	2.03	1.88	1.43	42.31	44.50	45.84	12.81	14.00	16.39
2435.00	2.05	1.93	1.53	42.38	44.58	45.93	12.89	14.08	16.49
2457.50	2.02	1.92	1.53	42.45	44.65	45.98	12.87	14.06	16.48
2480.00	1.95	1.87	1.50	42.49	44.69	46.04	12.03	13.18	15.57
2502.50	1.98	1.90	1.52	42.57	44.76	46.10	12.81	14.00	16.43
2525.00	2.03	1.95	1.57	42.63	44.83	46.16	12.89	14.08	16.52
2547.50	2.03	1.94	1.58	42.69	44.88	46.21	12.87	14.06	16.51
2556.00	2.03	1.94	1.57	42.70	44.90	46.23	12.86	14.05	16.50

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2354.00	-31.63	-36.33	-32.00	-35.31	-34.80	-39.46
2367.50	-30.78	-34.29	-31.56	-35.80	-35.69	-40.28
2390.00	-31.58	-33.75	-30.48	-35.99	-36.97	-41.86
2412.50	-32.16	-36.21	-32.29	-36.09	-36.90	-41.06
2435.00	-31.22	-34.79	-31.25	-34.95	-36.65	-41.29
2457.50	-29.55	-34.22	-32.53	-35.08	-37.00	-41.66
2480.00	-30.51	-34.42	-32.53	-36.30	-37.49	-42.38
2502.50	-29.89	-33.68	-31.77	-35.40	-37.92	-43.91
2525.00	-30.31	-34.82	-33.74	-35.84	-38.10	-43.85
2547.50	-28.43	-33.45	-33.00	-35.85	-38.35	-45.78
2556.00	-28.60	-33.53	-33.60	-36.75	-38.29	-46.00



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2354.00	-82.64	-89.00	-101.84	-125.00	-145.36
2367.50	-81.67	-87.20	-102.14	-125.55	-145.70
2390.00	-81.71	-88.00	-101.99	-125.38	-145.52
2412.50	-81.88	-87.28	-101.73	-125.36	-145.67
2435.00	-83.03	-86.38	-101.73	-125.63	-145.56
2457.50	-82.26	-87.43	-101.51	-125.75	-146.21
2480.00	-83.65	-87.13	-101.33	-125.58	-146.21
2502.50	-82.96	-88.18	-101.99	-126.01	-146.65
2525.00	-82.18	-87.08	-101.97	-125.90	-146.70
2547.50	-83.20	-86.67	-101.72	-125.79	-145.90
2556.00	-82.60	-85.73	-101.84	-125.77	-146.40

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2354.00	-78.47	-88.94	-102.71	-126.41	-146.72
2367.50	-78.46	-90.17	-103.12	-126.79	-147.12
2390.00	-80.80	-89.43	-102.75	-126.63	-147.01
2412.50	-79.14	-88.47	-102.40	-126.29	-146.35
2435.00	-79.98	-88.01	-102.21	-126.10	-146.92
2457.50	-79.25	-87.50	-102.39	-126.60	-146.57
2480.00	-80.62	-87.13	-101.94	-126.40	-147.05
2502.50	-81.93	-87.00	-102.25	-126.91	-147.53
2525.00	-83.04	-88.51	-102.24	-126.89	-147.24
2547.50	-82.37	-87.33	-102.45	-126.85	-147.32
2556.00	-80.00	-87.11	-102.01	-126.57	-147.52

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2354.00	-76.75	-86.97	-100.59	-123.11	-143.37
2367.50	-74.30	-87.15	-100.84	-123.52	-143.69
2390.00	-80.98	-87.09	-100.62	-123.66	-143.93
2412.50	-77.51	-86.65	-100.44	-123.92	-144.08
2435.00	-78.45	-85.92	-100.71	-123.99	-144.15
2457.50	-76.48	-85.78	-100.65	-124.20	-144.53
2480.00	-77.82	-87.14	-100.58	-124.13	-144.53
2502.50	-77.49	-86.73	-100.62	-124.67	-144.99
2525.00	-77.72	-86.20	-100.65	-124.45	-144.88
2547.50	-81.03	-84.30	-100.37	-124.44	-144.91
2556.00	-76.85	-84.53	-100.60	-124.24	-144.68



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REFERENCE & COMPARISON SPURIOUS ORDER	REFERENCE & COMPARISON SPURIOUS @Fcarrier 2354MHz+(n*Fcomp or Fref) (dBc) note 1			REFERENCE & COMPARISON SPURIOUS @Fcarrier 2455MHz+(n*Fcomp or Fref) (dBc) note 1			REFERENCE & COMPARISON SPURIOUS @Fcarrier 2556MHz+(n*Fcomp or Fref) (dBc) note 1		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-105.42	-104.52	-105.98	-104.74	-102.17	-102.84	-103.61	-103.05	-105.59
-4	-104.99	-106.19	-102.73	-104.24	-102.14	-101.14	-102.09	-102.40	-103.72
-3	-104.03	-107.28	-101.25	-102.06	-100.79	-98.90	-99.78	-102.74	-103.39
-2	-105.02	-109.58	-100.80	-100.99	-99.18	-96.56	-97.39	-100.00	-100.19
-1	-90.83	-91.89	-87.80	-102.37	-100.44	-94.57	-94.61	-93.68	-92.23
0 note 2	-	-	-	-	-	-	-	-	-
+1	-90.25	-89.42	-87.54	-98.14	-100.79	-101.69	-104.25	-110.80	-101.51
+2	-103.47	-105.92	-102.35	-102.44	-101.22	-100.04	-100.57	-100.73	-102.66
+3	-102.90	-106.71	-102.49	-103.56	-101.75	-102.11	-102.30	-102.96	-104.10
+4	-105.32	-107.99	-104.06	-104.76	-103.39	-104.62	-104.11	-104.69	-104.78
+5	-107.30	-109.51	-106.33	-106.53	-104.25	-107.88	-105.29	-106.36	-106.45

Note 1: Reference frequency = Comparison frequency = 10 MHz

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

STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2354MHz+(n*Fstep size) (dBc) note 3			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2455MHz+(n*Fstep size) (dBc) note 3			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2556MHz+(n*Fstep size) (dBc) note 3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5.0	-116.09	-116.62	-118.22	-125.86	-117.32	-109.41	-117.44	-114.19	-114.54
-4.5	-106.45	-120.32	-113.58	-111.94	-116.81	-118.46	-111.99	-115.97	-112.70
-4.0	-122.66	-118.07	-118.39	-113.04	-110.91	-116.51	-123.34	-115.48	-121.63
-3.5	-103.47	-110.32	-108.83	-113.51	-115.21	-114.69	-116.72	-114.84	-114.34
-3.0	-116.76	-115.81	-116.46	-113.41	-113.60	-116.43	-118.42	-115.24	-115.63
-2.5	-110.51	-112.48	-105.42	-109.62	-112.15	-106.09	-113.40	-110.02	-117.48
-2.0	-107.92	-109.60	-111.09	-116.01	-107.93	-108.78	-110.48	-107.47	-107.05
-1.5	-101.90	-108.31	-107.99	-113.12	-105.40	-102.56	-103.85	-106.51	-110.32
-1.0	-95.94	-96.07	-105.22	-105.16	-98.86	-98.43	-104.70	-98.22	-103.67
-0.5	-95.27	-87.42	-91.24	-82.37	-84.87	-89.07	-89.00	-86.62	-91.13
0 note 4	-	-	-	-	-	-	-	-	-
+0.5	-93.09	-84.76	-93.54	-84.20	-85.86	-88.90	-91.75	-83.35	-90.20
+1.0	-97.52	-98.75	-101.19	-106.36	-101.55	-100.33	-104.06	-99.49	-102.48
+1.5	-104.20	-107.31	-105.58	-113.85	-105.97	-102.97	-104.51	-100.16	-109.58
+2.0	-108.12	-109.42	-113.57	-115.72	-113.12	-110.80	-111.88	-108.96	-107.44
+2.5	-111.01	-111.98	-105.34	-109.62	-110.36	-106.39	-112.05	-111.92	-118.02
+3.0	-113.59	-114.82	-114.71	-113.41	-114.11	-114.62	-120.24	-111.27	-116.79
+3.5	-104.16	-109.10	-106.85	-113.60	-113.96	-113.33	-118.52	-115.93	-113.58
+4.0	-120.98	-115.83	-115.62	-113.75	-114.35	-116.04	-122.83	-114.35	-120.65
+4.5	-106.83	-116.28	-112.78	-111.43	-116.64	-113.21	-110.84	-117.72	-112.02
+5.0	-111.22	-110.13	-112.86	-121.39	-120.39	-110.35	-117.64	-111.32	-112.63

Note 3: Step size 250 kHz

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



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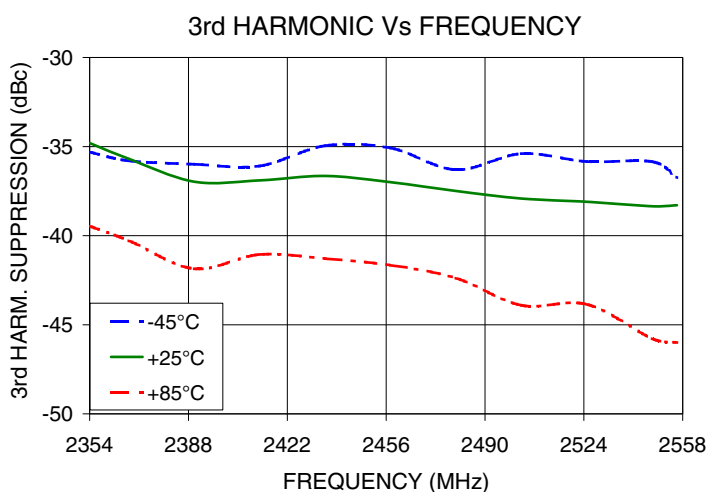
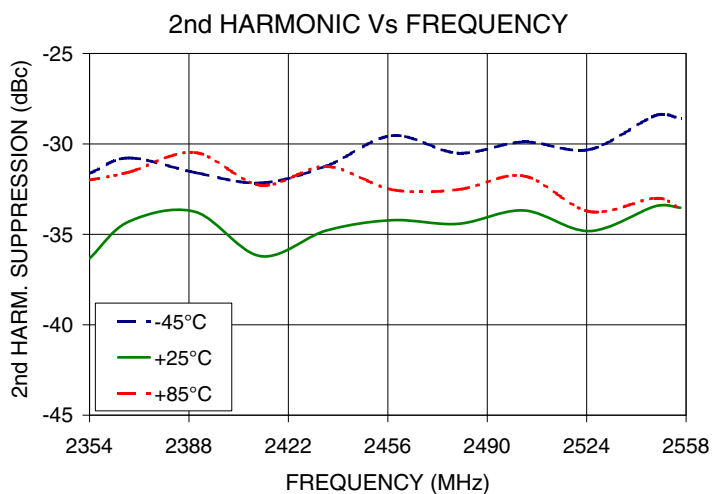
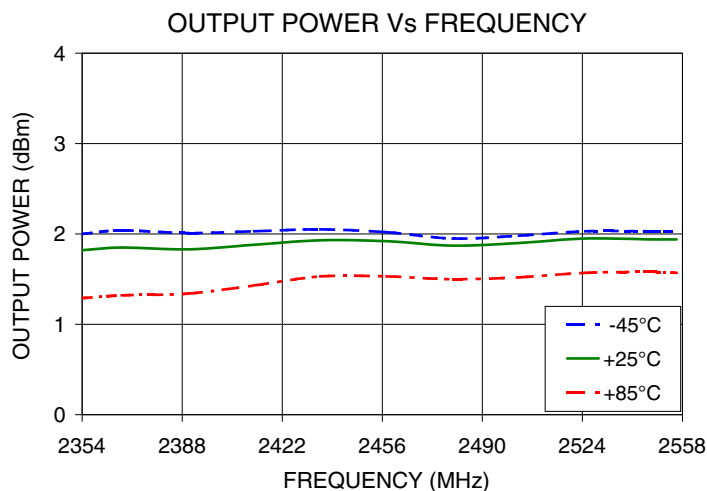


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Typical Performance Curves



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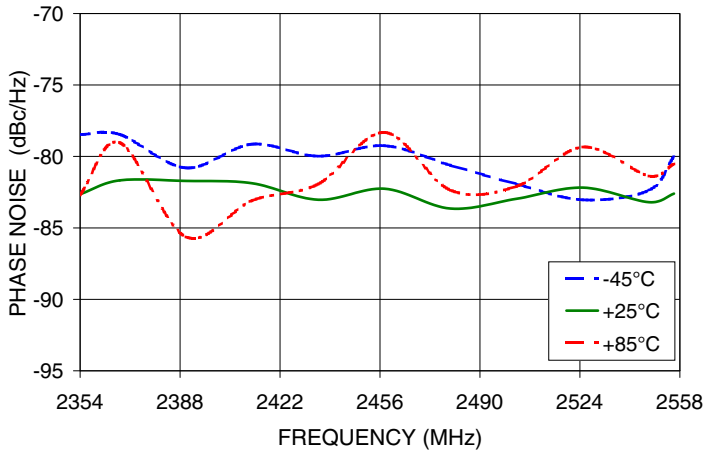


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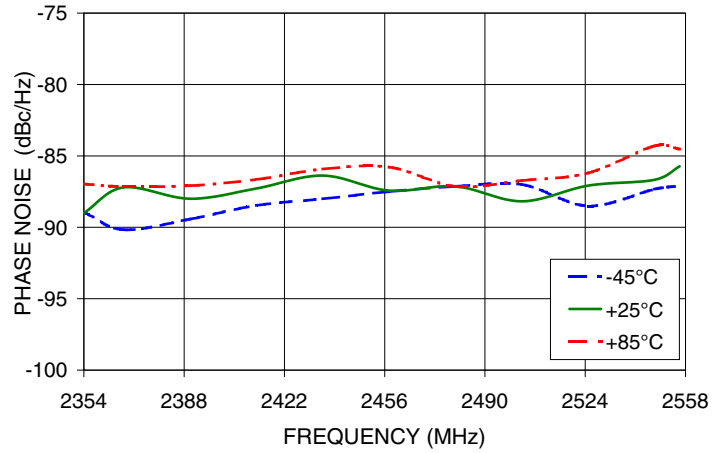


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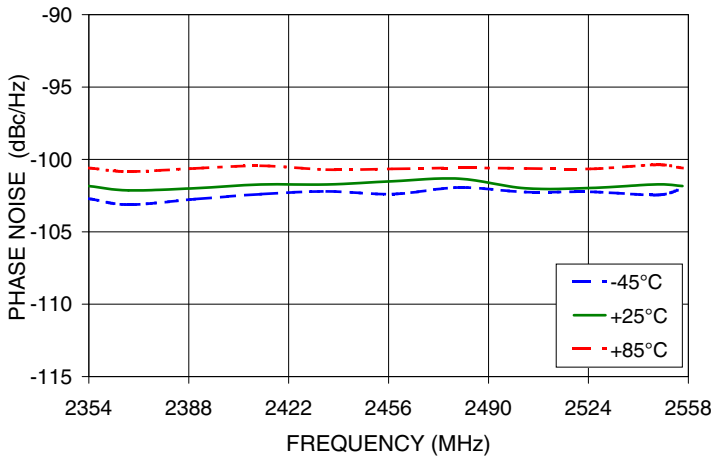
PHASE NOISE @ 100 Hz offset



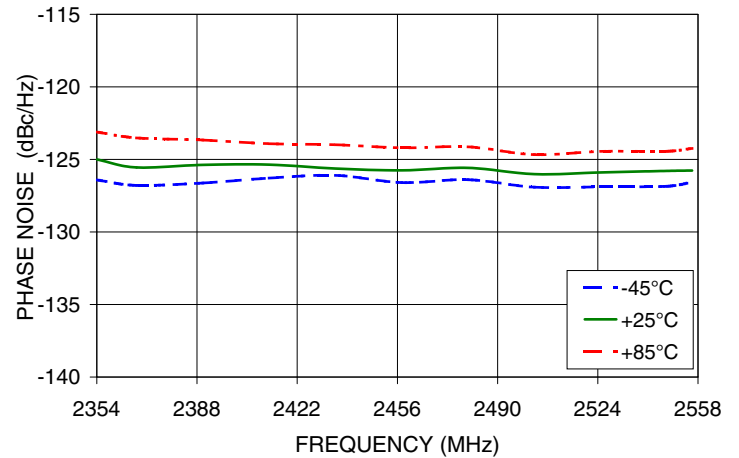
PHASE NOISE @ 1kHz offset



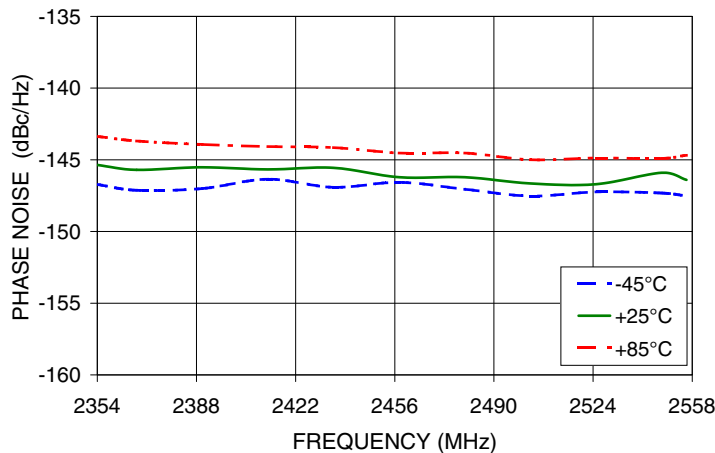
PHASE NOISE @ 10kHz offset



PHASE NOISE @ 100kHz offset



PHASE NOISE @ 1MHz offset



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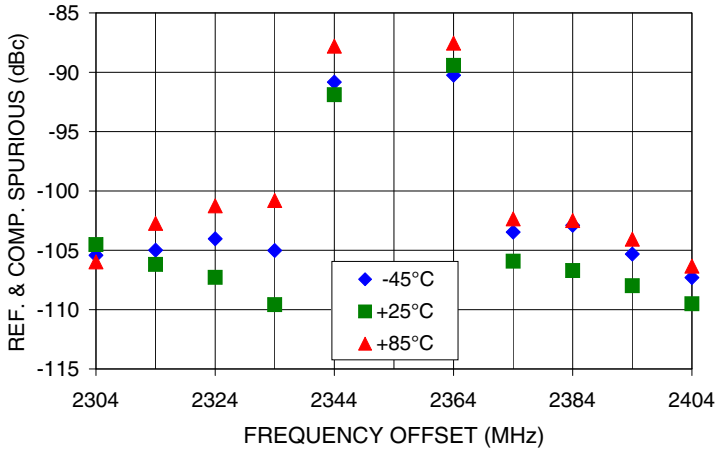


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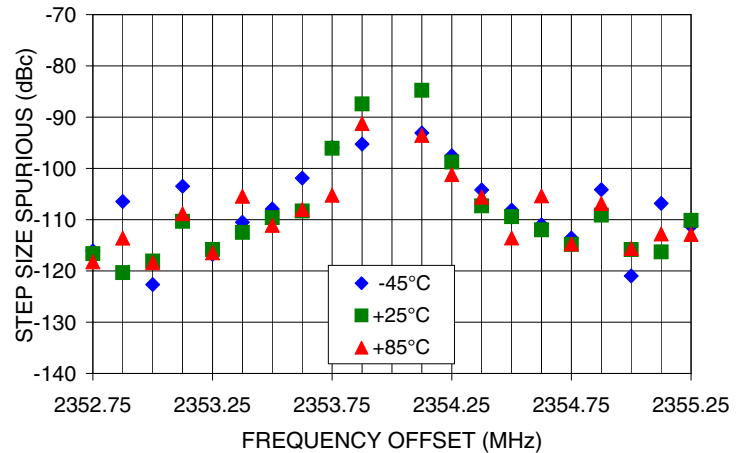


Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established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

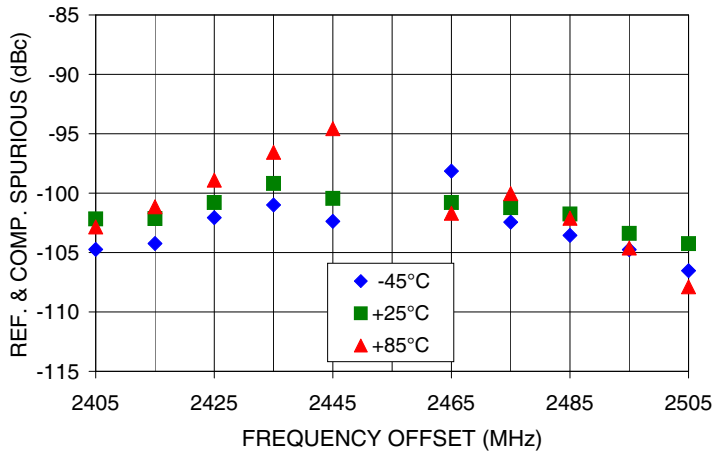
REFERENCE & COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2354MHz



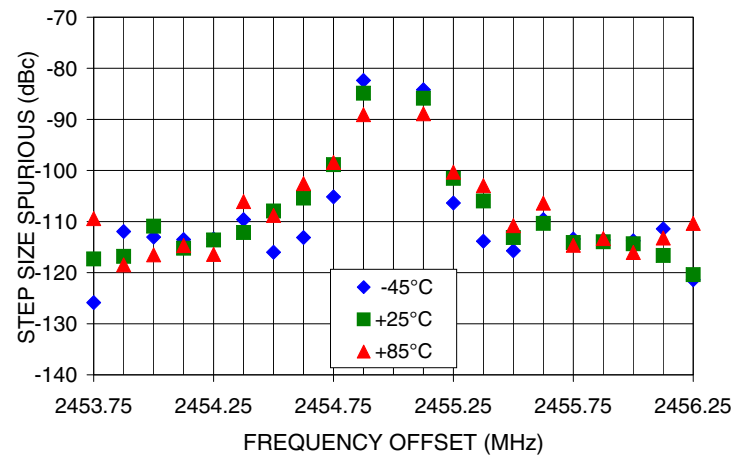
0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2354MHz



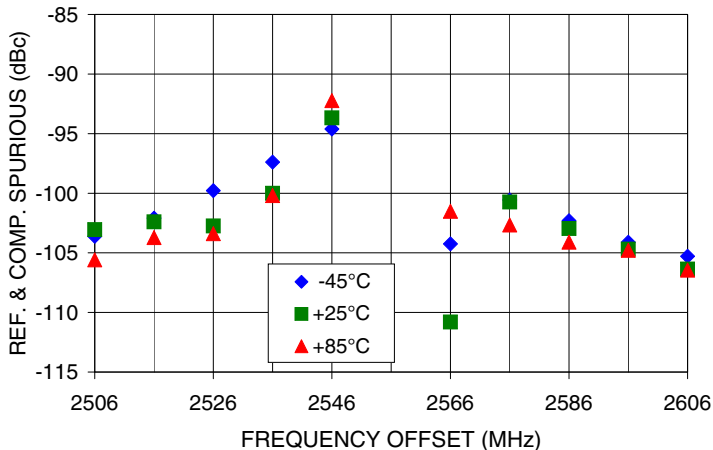
REFERENCE & COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2455MHz



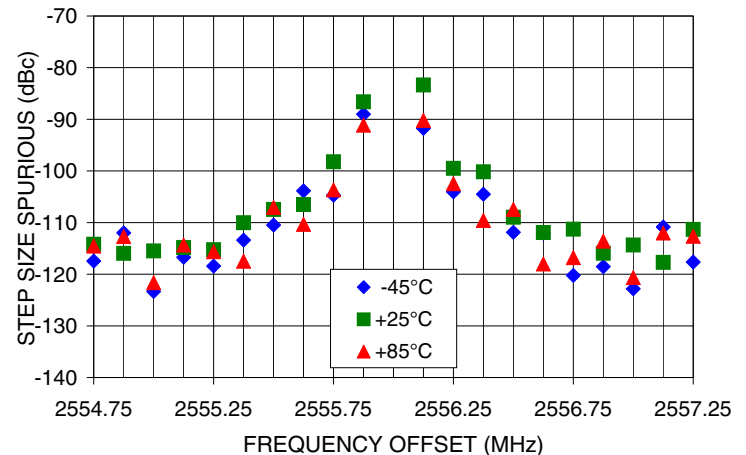
0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2455MHz



REFERENCE & COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2556MHz



0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2556MHz



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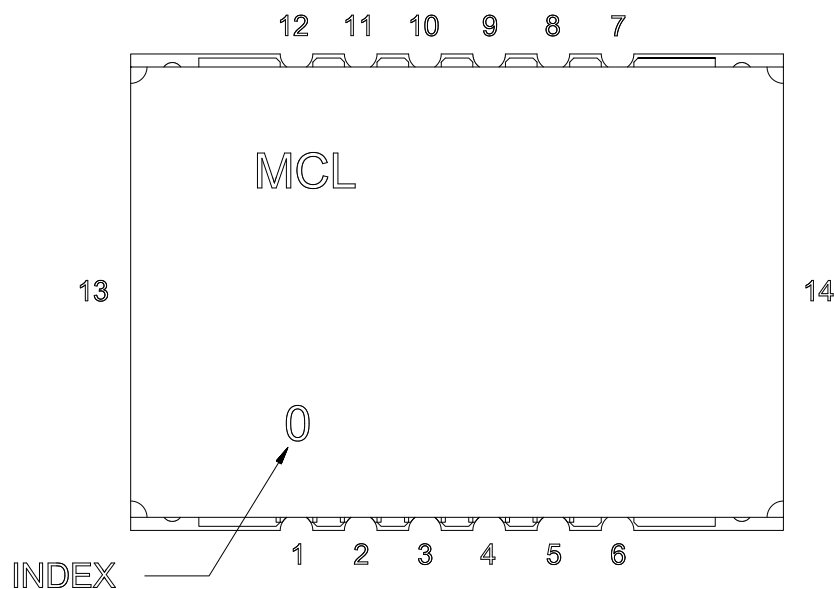


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Pin Configuration

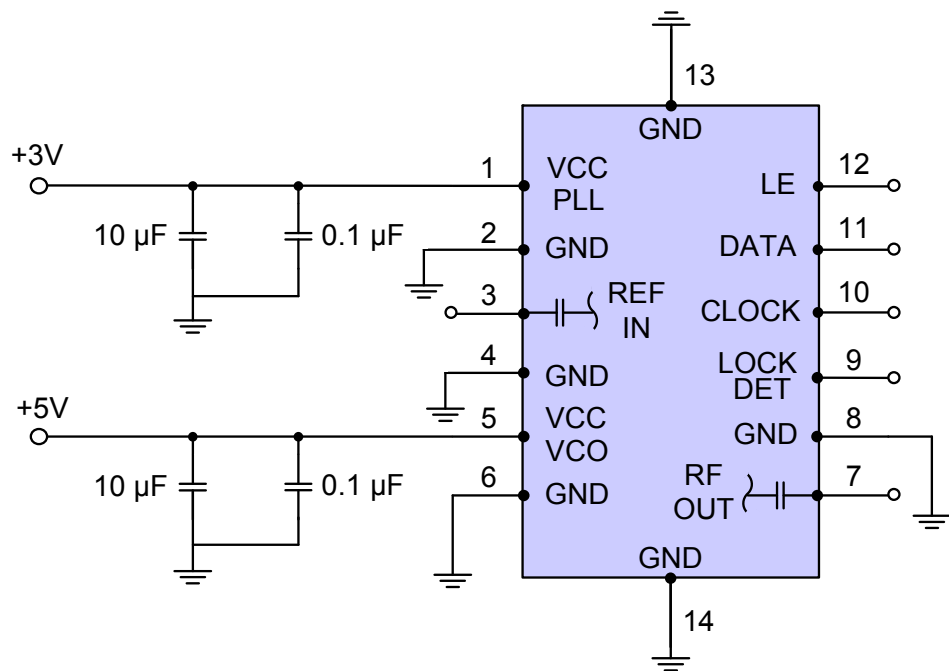


Pin Connection

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

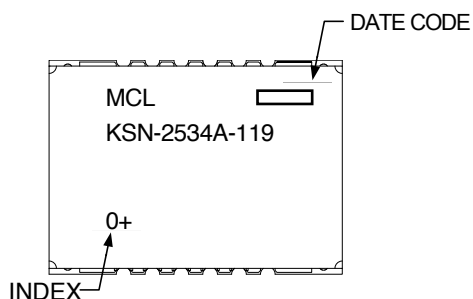
Note: REF IN and RF OUT ports are internally AC coupled.



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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: DK1042

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567-2+

Environment Ratings: ENV03T2



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