Frequency Synthesizer DSN-3019A-119+

50Ω 1788 to 3019 MHz

The Big Deal

- Low phase noise and spurious
- Robust design and construction

CASE STYLE: KL942

Product Overview

The DSN-3019A-119+ is a Frequency Synthesizer, designed to operate from 1788 to 3019 MHz for receiver application. The DSN-3019A-119+ is packaged in a metal case (size of 1.25" x 1.00" x 0.20") to shield against unwanted signals and noise.

Key Features

Feature	Advantages
Low phase noise and spurious: • Phase Noise: -83 dBc/Hz typ. @ 10 kHz offset • Comparison Spurious: -88 dBc typ. • Reference Spurious: -99 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of DSN-3019A-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.

Surface Mount

Frequency Synthesizer

DSN-3019A-119+

50Ω 1788 to 3019 MHz

CASE STYLE: KL942

Features

- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Operating voltage (VCC VCO=+5V, VCC PLL=+15V)

+RoHS Compliant

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

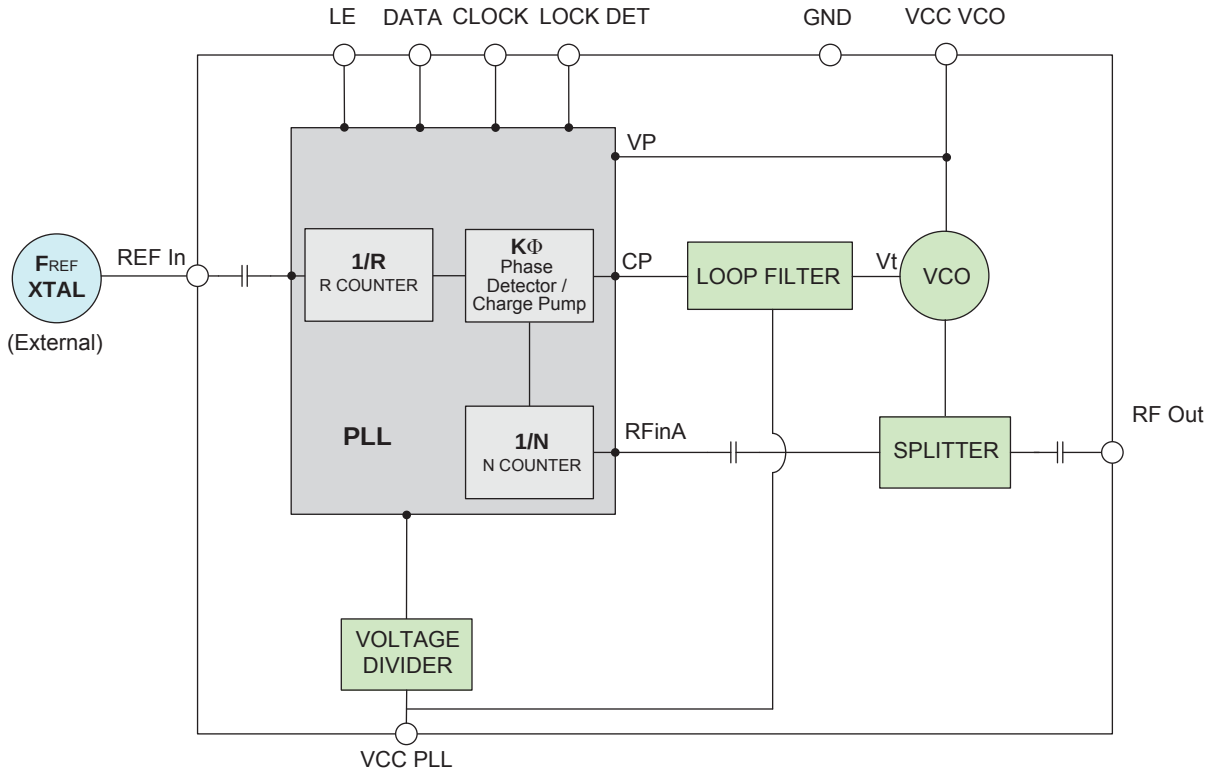
Applications

- Receiver

General Description

The DSN-3019A-119+ is a Frequency Synthesizer, designed to operate from 1788 to 3019 MHz for receiver application. The DSN-3019A-119+ is packaged in a metal case (size of 1.25" x 1.00" x 0.20") to shield against unwanted signals and noise. To enhance the robustness of DSN-3019A-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

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

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	1788	-	3019	MHz
Step Size		-	-	100	-	kHz
Settling Time		Within ± 1 kHz	-	20	-	mSec
Output Power		-	-4.0	+1.5	+4.0	dBm
SSB Phase Noise		@ 100 Hz offset	-	-70	-	dBc/Hz
		@ 1 kHz offset	-	-65	-56	
		@ 10 kHz offset	-	-83	-78	
		@ 100 kHz offset	-	-108	-102	
		@ 1 MHz offset	-	-130	-123	
Reference Spurious Suppression		Ref. Freq. 10 MHz	-	-99	-78	dBc
Comparison Spurious Suppression		Step Size 100 kHz	-	-88	-69	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-18	-8	
VCO Supply Voltage		+5.00	+4.75	+5.00	+5.25	V
PLL Supply Voltage		+15.00	+14.75	+15.00	+15.25	
VCO Supply Current		-	-	35	41	mA
PLL Supply Current		-	-	13	21	
Reference Input (External)	Frequency	10 (square wave)	-	10	-	MHz
	Amplitude	1	-	1	-	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	-	2.65	-	-	V
	Input low voltage	-	-	-	0.65	V
Digital Lock Detect	Locked	-	2.90	-	3.40	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4113			
PLL Programming		-	3-wire serial 3.3V CMOS			
Register Map @ 3019 MHz	F_Register	-	(MSB) 10011111100000000010010 (LSB)			
	N_Register	-	(MSB) 00100011101011100111001 (LSB)			
	R_Register	-	(MSB) 00010000000000110010000 (LSB)			

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	6V
PLL Supply Voltage	16V
VCO Supply Voltage to PLL Supply Voltage	N.A
Reference Frequency Voltage	-0.3Vmin, +3.6Vmax
Data, Clock, LE Levels	-0.3Vmin, +3.6Vmax
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

Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURENT (mA)		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1788	1.00	1.47	0.84	35.48	36.11	36.25	10.44	13.11	14.95
1888	1.60	1.98	1.32	35.59	36.11	36.26	10.45	13.13	14.96
2016	1.78	2.20	1.47	35.43	36.06	36.29	10.48	13.17	15.00
2144	2.15	2.31	1.62	35.27	36.05	36.34	10.52	13.20	15.03
2272	2.54	2.57	1.92	34.94	35.91	36.35	10.55	13.24	15.06
2400	2.63	2.65	2.01	34.61	35.77	36.33	10.58	13.27	15.09
2528	2.59	2.55	1.84	34.26	35.64	36.33	10.62	13.31	15.12
2656	1.90	1.96	1.09	33.92	35.47	36.29	10.64	13.33	15.14
2784	0.83	1.15	0.46	33.63	35.29	36.21	10.68	13.37	15.17
2912	-0.53	0.20	-0.61	33.36	35.11	36.13	10.70	13.39	15.19
3019	-1.46	-1.03	-1.81	33.10	34.95	36.05	10.73	13.41	15.22

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1788	-22.92	-22.74	-22.78	-21.68	-24.24	-26.04
1888	-23.59	-24.76	-25.97	-22.37	-24.29	-27.68
2016	-21.37	-23.39	-24.31	-24.74	-27.95	-29.20
2144	-19.08	-22.08	-24.08	-26.80	-31.93	-33.95
2272	-17.23	-20.53	-23.11	-29.37	-34.94	-32.95
2400	-16.83	-18.90	-20.79	-29.22	-28.64	-30.22
2528	-15.01	-16.79	-18.11	-21.20	-23.58	-25.23
2656	-12.77	-14.17	-15.18	-30.28	-32.75	-33.19
2784	-11.36	-13.28	-14.55	-27.43	-29.28	-31.78
2912	-13.59	-14.53	-16.73	-33.77	-33.77	-34.55
3019	-14.95	-16.88	-18.67	-32.21	-32.85	-33.75

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1788	-75.49	-66.97	-84.59	-109.05	-130.73
1888	-72.26	-65.08	-84.03	-108.13	-129.60
2016	-73.03	-65.55	-83.05	-107.29	-128.82
2144	-74.20	-64.80	-82.03	-106.81	-128.40
2272	-71.08	-65.16	-81.93	-106.93	-128.67
2400	-72.11	-65.17	-82.83	-107.53	-129.29
2528	-74.14	-65.64	-83.73	-108.31	-130.07
2656	-72.31	-65.81	-83.71	-108.84	-130.50
2784	-70.56	-63.92	-85.26	-110.22	-131.71
2912	-69.64	-63.78	-85.80	-110.82	-132.18
3019	-71.09	-63.67	-86.45	-111.28	-132.46

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS -45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1788	-73.16	-66.05	-85.67	-107.97	-131.57
1888	-69.66	-61.63	-83.75	-107.12	-128.93
2016	-65.82	-59.81	-82.10	-105.77	-127.24
2144	-66.08	-60.53	-81.28	-105.30	-126.79
2272	-67.07	-61.19	-81.52	-105.81	-127.18
2400	-67.27	-59.99	-81.86	-106.02	-127.57
2528	-66.11	-61.10	-83.31	-107.11	-128.86
2656	-68.29	-60.96	-83.85	-107.73	-129.55
2784	-67.53	-60.58	-85.26	-109.58	-131.28
2912	-66.85	-61.31	-86.08	-110.08	-131.87
3019	-67.57	-61.32	-86.58	-111.12	-132.42

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1788	-74.19	-68.50	-84.09	-108.44	-130.57
1888	-73.10	-66.26	-84.41	-108.86	-130.26
2016	-71.20	-66.10	-82.81	-108.01	-129.73
2144	-71.66	-66.03	-82.08	-107.55	-129.52
2272	-72.54	-67.06	-82.09	-107.42	-129.60
2400	-71.87	-65.86	-82.60	-107.85	-129.99
2528	-70.51	-65.94	-83.27	-108.55	-130.66
2656	-71.32	-64.43	-83.31	-108.37	-130.57
2784	-70.31	-64.80	-85.00	-109.31	-131.65
2912	-70.19	-64.50	-85.42	-109.60	-131.95
3019	-66.86	-61.87	-85.98	-109.65	-131.81

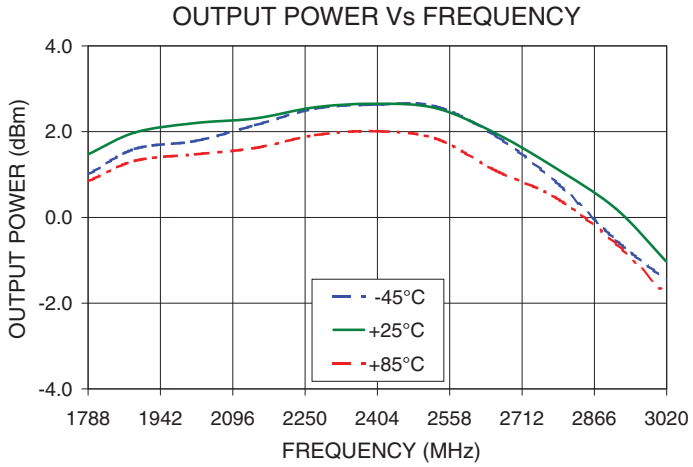
COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1788MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 2403MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 3019MHz+(n*Fcomparison) (dBc) note 1		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-90.48	-101.76	-105.72	-89.89	-99.46	-100.58	-93.89	-101.19	-106.36
-4	-87.70	-99.86	-104.66	-90.65	-98.34	-100.76	-93.47	-100.83	-105.14
-3	-83.46	-98.78	-98.24	-93.10	-97.06	-98.34	-93.40	-98.78	-103.74
-2	-77.59	-95.14	-96.74	-95.35	-96.68	-99.83	-89.71	-98.41	-99.73
-1	-75.88	-85.84	-82.53	-84.57	-86.35	-83.88	-86.60	-92.51	-89.32
0 note 2	-	-	-	-	-	-	-	-	-
+1	-76.07	-84.34	-82.77	-83.76	-87.04	-84.14	-85.67	-91.26	-88.88
+2	-76.88	-92.12	-94.16	-91.66	-96.28	-98.51	-89.65	-99.16	-98.43
+3	-83.21	-96.75	-97.67	-94.10	-98.87	-97.79	-92.06	-97.27	-102.27
+4	-87.19	-99.68	-103.56	-90.82	-97.93	-99.61	-93.79	-101.44	-103.94
+5	-89.92	-100.42	-106.06	-89.35	-100.02	-102.14	-93.96	-101.11	-106.88

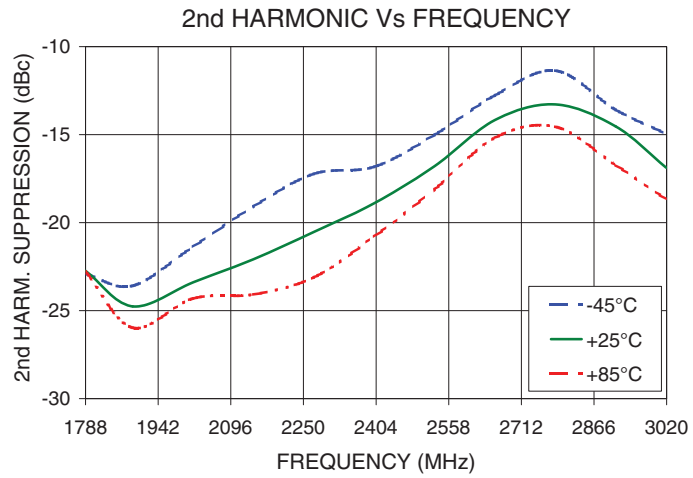
Note 1: Comparison frequency 100 kHz
Note 2: All spurs are referenced to carrier signal (n=0).

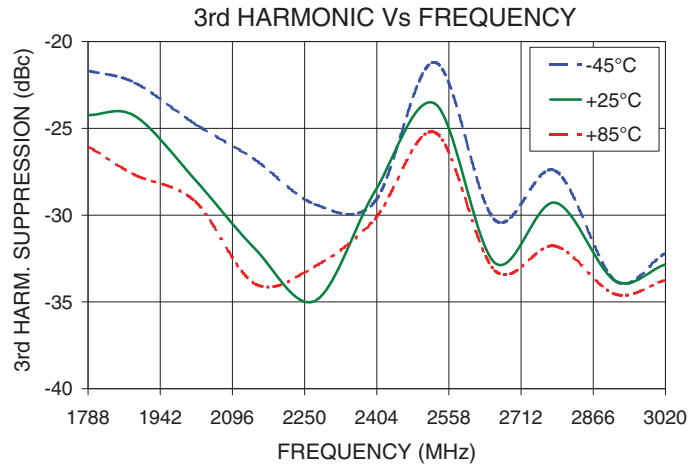
REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1788MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 2403MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 3019MHz+(n*Freference) (dBc) note 3		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-128.10	-127.82	-119.32	-128.45	-129.08	-126.32	-124.29	-121.83	-123.33
-4	-128.72	-129.16	-120.58	-126.16	-130.62	-124.66	-120.85	-118.80	-120.32
-3	-129.02	-129.10	-120.89	-125.37	-129.99	-125.62	-124.73	-123.41	-117.99
-2	-116.53	-115.96	-116.66	-118.91	-115.81	-115.26	-111.85	-105.63	-113.97
-1	-104.04	-102.93	-106.24	-103.19	-104.76	-95.61	-96.38	-87.69	-108.96
0 note 4	-	-	-	-	-	-	-	-	-
+1	-101.37	-100.09	-102.24	-103.16	-103.35	-102.72	-98.13	-94.99	-115.09
+2	-118.08	-117.35	-116.97	-111.56	-113.70	-113.53	-117.21	-110.89	-119.80
+3	-128.34	-128.25	-118.80	-123.18	-125.51	-123.88	-119.35	-118.71	-119.83
+4	-126.66	-128.35	-118.88	-128.44	-129.39	-124.68	-119.56	-117.95	-120.84
+5	-128.50	-129.69	-119.14	-127.89	-128.88	-124.40	-122.84	-121.46	-120.03

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

Typical Performance Curves







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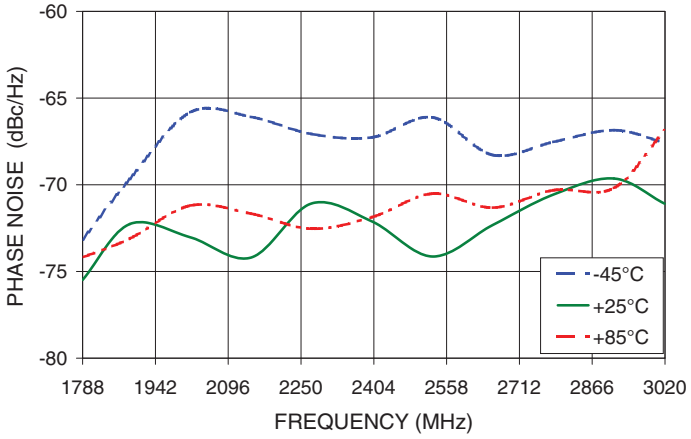
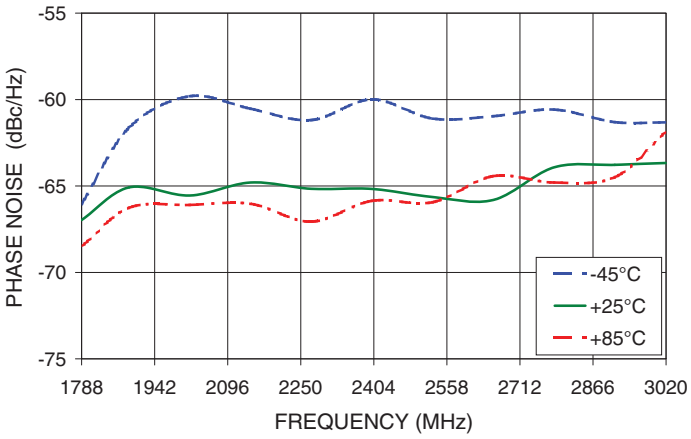
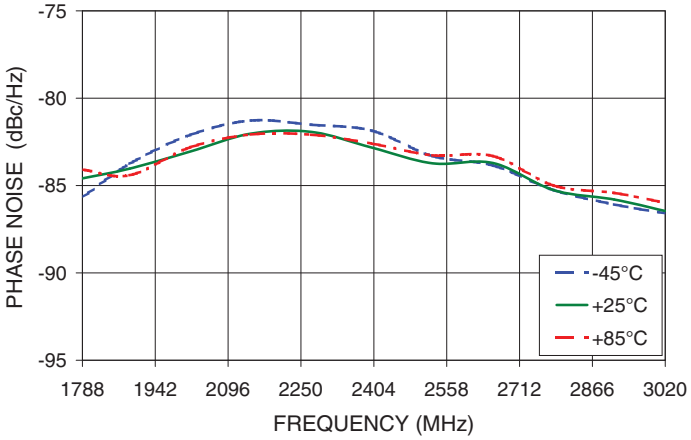
PHASE NOISE @100Hz offset



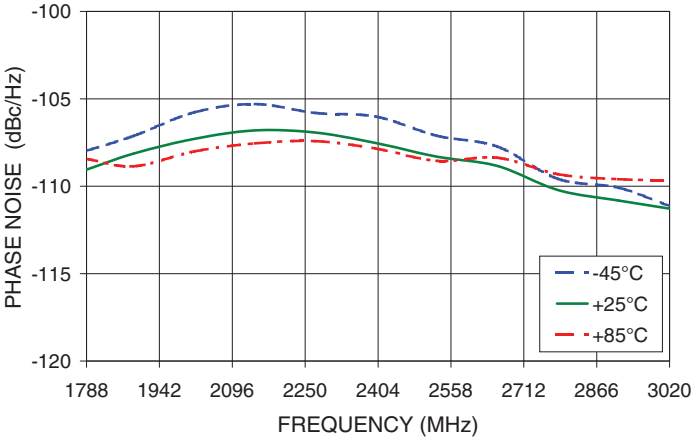
PHASE NOISE @1kHz offset



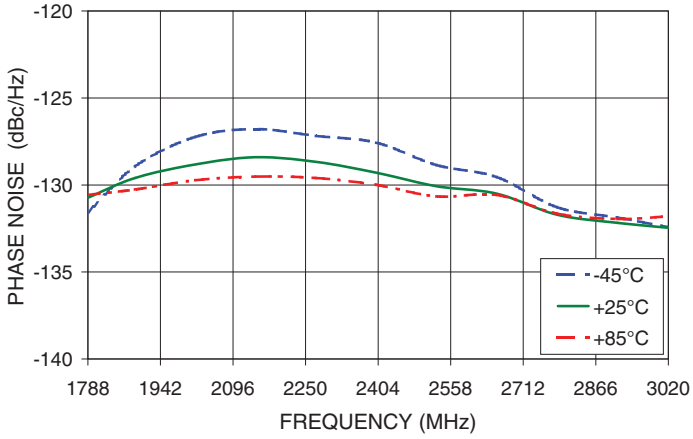
PHASE NOISE @10 kHz offset



PHASE NOISE @100 kHz offset



PHASE NOISE @1MHz offset



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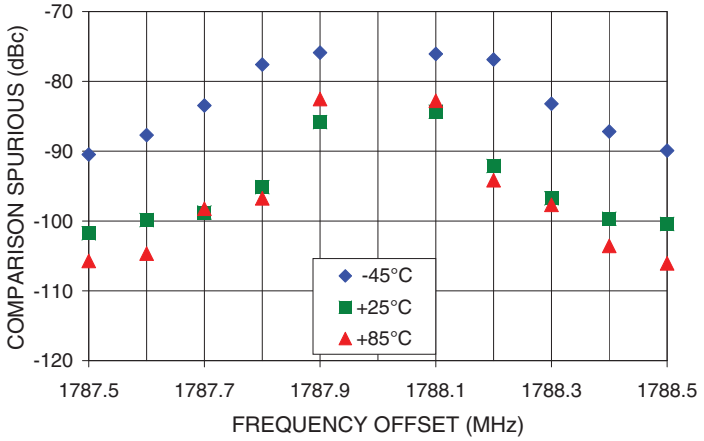
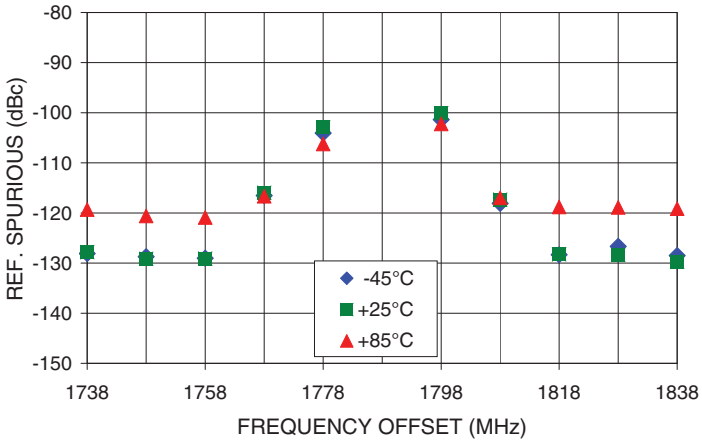
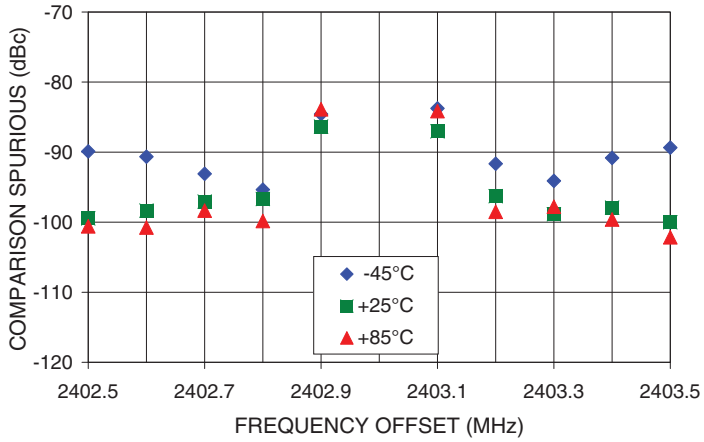
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1788MHz



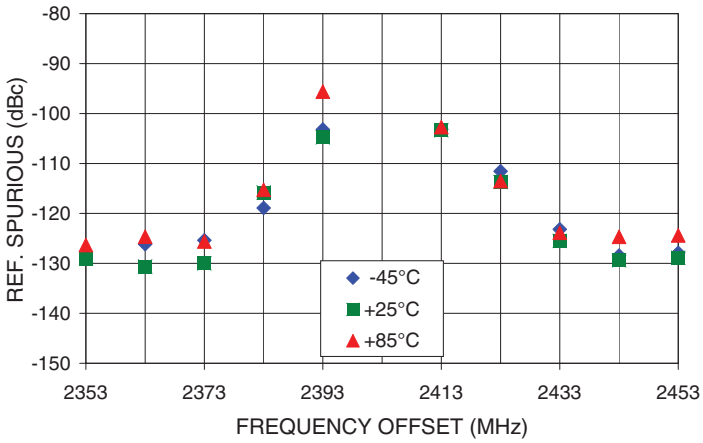
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar =1788MHz



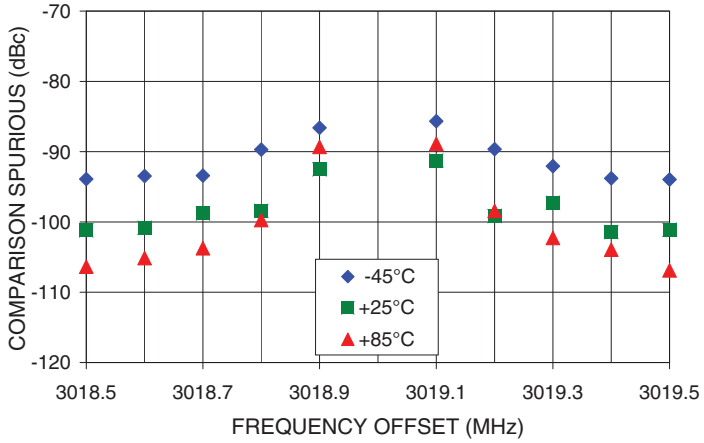
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2403MHz



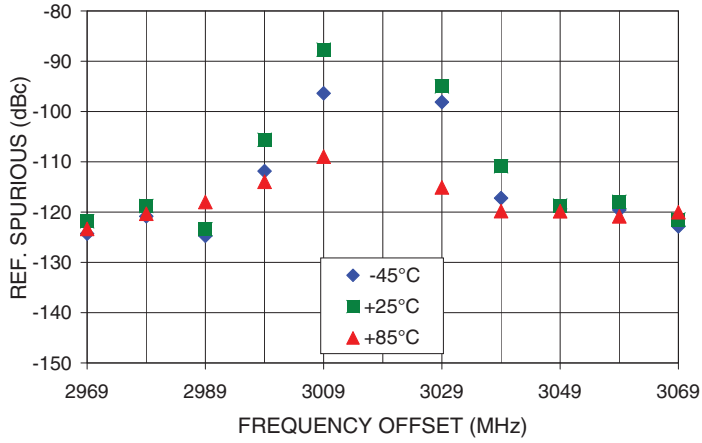
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar =2403MHz



COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3019MHz



REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar =3019MHz



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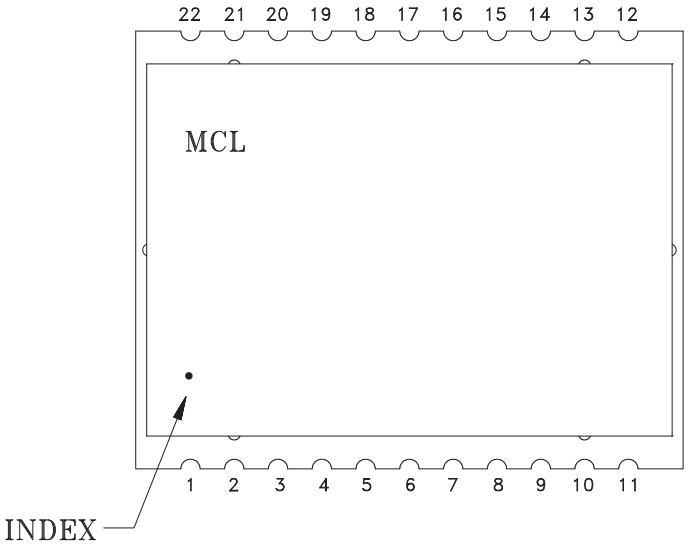
Pin Configuration

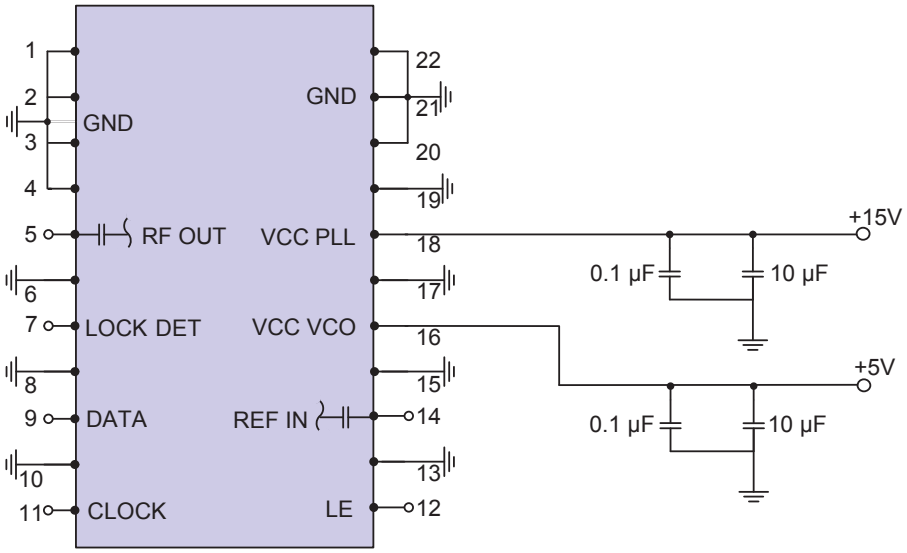


Pin Connection

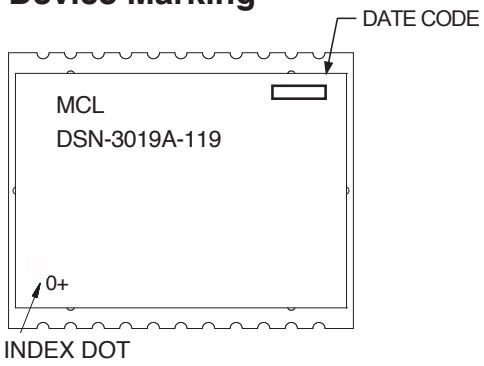
Pin Number	Function	Pin Number	Function
1	GND	12	LE
2	GND	13	GND
3	GND	14	REF IN
4	GND	15	GND
5	RF OUT	16	VCC VCO
6	GND	17	GND
7	LOCK DET	18	VCC PLL
8	GND	19	GND
9	DATA	20	GND
10	GND	21	GND
11	CLOCK	22	GND

Recommended Application Circuit

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



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: KL942

Tape & Reel: TR-F97

Suggested Layout for PCB Design: PL-318

Evaluation Board: TB-553+

Environment Ratings: ENV03T2