

# Frequency Synthesizer

DSN-1500A-1119+

50Ω 1100 to 1500 MHz

## The Big Deal

- Low phase noise and spurious
- Robust design and construction



CASE STYLE: KL942

## Product Overview

The DSN-1500A-1119+ is a Frequency Synthesizer, designed to operate from 1100 to 1500 MHz for Point-to-Point application. The DSN-1500A-1119+ 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: <ul style="list-style-type: none"><li>• Phase Noise: -93 dBc/Hz typ. @ 10 kHz offset</li><li>• Comparison Spurious: -93 dBc typ.</li><li>• Reference Spurious: -112 dBc typ.</li></ul>	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of DSN-1500A-1119+, 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.



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50Ω 1100 to 1500 MHz

## Features

- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+12.5V)



CASE STYLE: KL942

PRICE: \$37.95 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.

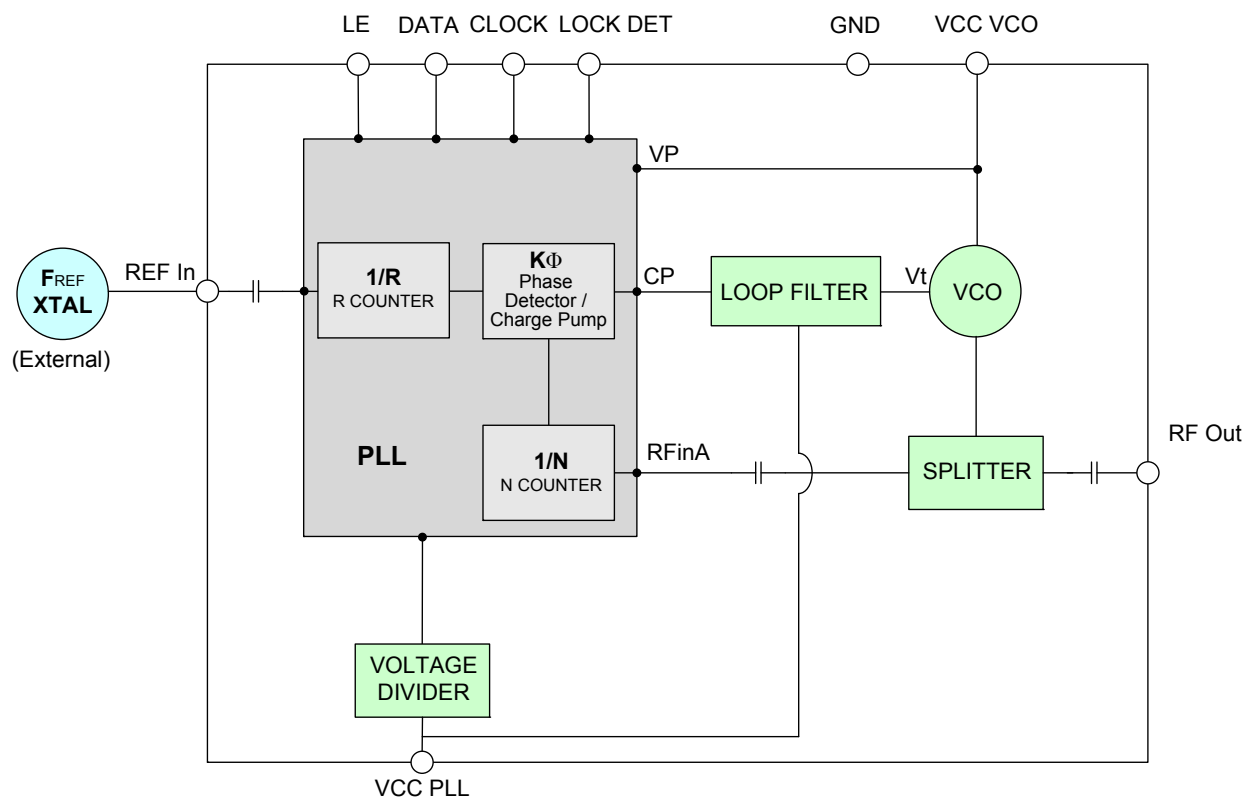
## Applications

- Point-to-Point

## General Description

The DSN-1500A-1119+ is a Frequency Synthesizer, designed to operate from 1100 to 1500 MHz for Point-to-Point application. The DSN-1500A-1119+ 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-1500A-1119+, 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  
M127257  
EDR-7028/8F1  
DSN-1500A-1119+  
Category-D6  
RAV  
100615  
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**Electrical Specifications** (over operating temperature -33°C to +80°C)

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	1100	-	1500	MHz
Step Size		-	-	500	-	kHz
Settling Time		Within $\pm 1$ kHz	-	30	-	mSec
Output Power		-	+2.5	+5.5	+7.5	dBm
SSB Phase Noise		@ 100 Hz offset	-	-71	-	dBc/Hz
		@ 1 kHz offset	-	-75	-65	
		@ 10 kHz offset	-	-93	-87	
		@ 100 kHz offset	-	-116	-110	
		@ 1 MHz offset	-	-140	-135	
Reference Spurious Suppression		Ref. Freq. 10 MHz	-	-112	-95	dBc
Comparison Spurious Suppression		Step Size 500 kHz	-	-93	-78	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-28	-10	
VCO Supply Voltage		+5.00	+4.75	+5.00	+5.25	V
PLL Supply Voltage		+12.50	+12.25	+12.50	+12.75	
VCO Supply Current		-	-	36	43	mA
PLL Supply Current		-	-	14	21	
Reference Input (External)	Frequency	10 (square wave) ensure slew rate (SR) > 50 V/ $\mu$ s	-	10	-	MHz
	Amplitude	1	-	1	-	V <sub>P-P</sub>
	Input impedance	-	-	100	-	K $\Omega$
	Phase Noise @ 1 kHz offset	-	-	-140	-	dBc/Hz
RF Output port Impedance		-	-	50	-	$\Omega$
Input Logic Level	Input high voltage	-	2.65	-	-	V
	Input low voltage	-	-	-	0.65	V
Digital Lock Detect	Locked	-	2.85	-	3.70	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4106			
PLL Programming		-	3-wire serial 3.3V CMOS			
Register Map @ 1500 MHz	F_Register	-	(MSB) 100111111000000000010010 (LSB)			
	N_Register	-	(MSB) 1000000101110101100001 (LSB)			
	R_Register	-	(MSB) 100000000000001010000 (LSB)			

**Absolute Maximum Ratings**

Parameters	Ratings
VCO Supply Voltage	5.8V
PLL Supply Voltage	14.0V
VCO Supply Voltage to PLL Supply Voltage	N.A.
Reference Frequency Voltage	0Vmin, +3.55Vmax
Data, Clock, LE Levels	0Vmin, +3.55Vmax
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			VCO CURRENT			PLL CURENT		
	(dBm)			(mA)			(mA)		
	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C
1100	5.19	5.70	5.54	33.58	36.30	37.90	11.84	13.53	15.34
1124	5.20	5.65	5.45	33.68	36.37	37.95	11.81	13.52	15.32
1168	5.40	5.77	5.45	33.85	36.47	38.01	11.80	13.51	15.32
1212	5.72	5.97	5.57	33.98	36.55	38.06	11.85	13.56	15.37
1256	5.57	5.75	5.30	34.14	36.65	38.11	11.84	13.55	15.36
1300	5.96	6.07	5.53	34.18	36.65	38.08	11.83	13.55	15.35
1344	5.73	5.74	5.15	34.25	36.67	38.05	11.82	13.53	15.33
1388	5.97	5.88	5.21	34.17	36.57	37.96	11.87	13.58	15.38
1432	5.66	5.48	4.75	34.14	36.50	37.89	11.85	13.56	15.37
1476	5.52	5.24	4.50	34.00	36.37	37.80	11.84	13.55	15.35
1500	5.34	5.07	4.30	33.93	36.30	37.75	11.86	13.57	15.37

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C
1100	-15.62	-19.89	-27.30	-20.31	-23.41	-28.92
1124	-16.71	-20.94	-28.50	-21.64	-25.15	-31.60
1168	-17.95	-23.05	-31.58	-24.48	-29.05	-35.98
1212	-19.42	-25.18	-34.34	-27.45	-32.92	-38.92
1256	-21.75	-28.70	-35.79	-31.51	-38.12	-41.29
1300	-25.15	-33.14	-35.79	-35.66	-42.52	-44.16
1344	-27.34	-33.39	-33.80	-37.53	-45.80	-47.97
1388	-31.61	-34.05	-33.83	-40.48	-49.08	-49.17
1432	-31.31	-33.36	-33.99	-44.97	-55.54	-50.83
1476	-31.34	-32.76	-33.76	-55.38	-56.35	-51.75
1500	-29.85	-31.55	-32.99	-48.67	-65.20	-55.54



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1100	-78.02	-80.25	-96.34	-118.99	-139.04
1124	-76.67	-80.75	-95.79	-118.86	-140.84
1168	-74.44	-77.25	-94.77	-117.78	-141.53
1212	-69.93	-74.66	-93.64	-116.68	-141.18
1256	-70.04	-73.75	-92.89	-115.65	-140.52
1300	-69.62	-72.83	-92.27	-114.77	-139.84
1344	-68.88	-71.72	-91.84	-114.46	-139.66
1388	-66.44	-71.67	-91.55	-114.32	-139.20
1432	-62.96	-70.49	-91.60	-114.62	-139.55
1476	-66.69	-70.37	-92.25	-114.99	-139.88
1500	-69.84	-70.98	-92.57	-115.23	-140.24

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-38°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1100	-80.54	-83.12	-99.67	-121.55	-138.88
1124	-79.43	-83.28	-99.75	-121.99	-138.86
1168	-77.12	-82.90	-99.73	-122.20	-140.10
1212	-76.17	-80.88	-99.36	-122.12	-141.87
1256	-76.01	-79.37	-98.00	-120.91	-143.27
1300	-73.38	-76.30	-96.25	-119.34	-143.37
1344	-73.54	-74.22	-95.16	-118.14	-143.06
1388	-72.44	-74.96	-94.26	-117.16	-142.15
1432	-69.94	-72.85	-94.31	-116.85	-142.04
1476	-70.41	-73.12	-94.23	-117.11	-142.17
1500	-70.38	-73.29	-94.54	-117.19	-142.39

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1100	-69.36	-75.68	-91.86	-115.23	-138.94
1124	-69.03	-74.85	-91.79	-115.17	-139.01
1168	-68.81	-73.60	-91.06	-114.80	-139.00
1212	-68.25	-73.30	-90.67	-114.31	-138.73
1256	-67.67	-71.02	-90.44	-114.00	-138.69
1300	-65.29	-71.98	-90.52	-113.78	-138.43
1344	-68.28	-70.21	-90.58	-114.11	-138.41
1388	-67.14	-69.96	-90.34	-114.17	-138.68
1432	-66.96	-70.88	-90.73	-114.63	-139.05
1476	-68.83	-71.68	-91.42	-115.12	-139.40
1500	-67.43	-71.76	-91.79	-115.31	-139.57



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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1100MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1300MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1500MHz+(n*Fcomparison) (dBc) note 1		
	n	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C	-38°C	+25°C
-5	-106.29	-108.47	-130.80	-115.42	-130.62	-115.91	-128.08	-126.91	-128.73
-4	-104.20	-106.75	-125.39	-115.44	-127.83	-114.60	-126.15	-125.60	-125.75
-3	-101.33	-104.51	-122.77	-114.12	-125.79	-113.39	-124.96	-123.55	-123.62
-2	-99.18	-99.65	-108.02	-113.33	-114.21	-109.27	-115.38	-121.75	-119.58
-1	-92.75	-93.59	-95.28	-99.84	-102.83	-102.02	-100.00	-109.46	-113.84
0 <sup>note 2</sup>	-	-	-	-	-	-	-	-	-
+1	-92.78	-93.21	-95.48	-99.65	-102.61	-102.44	-99.36	-108.67	-113.82
+2	-99.23	-99.56	-108.71	-114.23	-113.84	-111.83	-114.37	-122.87	-115.50
+3	-101.75	-104.55	-122.19	-114.55	-120.56	-114.64	-123.60	-126.86	-119.42
+4	-103.84	-106.11	-121.70	-114.56	-125.45	-119.27	-130.38	-128.60	-121.25
+5	-105.86	-108.79	-129.11	-115.34	-125.04	-118.99	-130.82	-130.12	-126.82

Note 1: Comparison frequency 500 kHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1100MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1300MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1500MHz+(n*Freference) (dBc) note 3		
	n	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C	-38°C	+25°C
-5	-124.36	-125.18	-122.57	-126.29	-127.25	-125.52	-127.43	-126.88	-128.38
-4	-122.57	-131.25	-123.52	-132.35	-126.89	-129.88	-131.48	-121.79	-126.31
-3	-127.74	-117.89	-118.37	-119.62	-117.86	-119.14	-120.22	-120.25	-119.62
-2	-120.50	-129.18	-131.26	-129.81	-125.39	-129.13	-129.72	-120.56	-129.00
-1	-111.96	-110.79	-112.45	-112.16	-112.18	-110.14	-113.54	-112.96	-112.75
0 <sup>note 4</sup>	-	-	-	-	-	-	-	-	-
+1	-112.93	-114.52	-112.88	-117.36	-117.96	-112.72	-116.40	-116.64	-116.95
+2	-123.95	-125.59	-129.51	-134.63	-130.08	-119.57	-123.88	-122.35	-121.49
+3	-131.10	-117.83	-121.74	-127.73	-119.11	-119.92	-130.45	-123.54	-128.25
+4	-132.27	-128.68	-132.05	-124.46	-126.65	-131.59	-124.59	-129.80	-122.25
+5	-124.90	-124.61	-124.43	-122.73	-123.54	-133.84	-123.23	-124.90	-133.36

Note 3: Reference frequency 10 MHz

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



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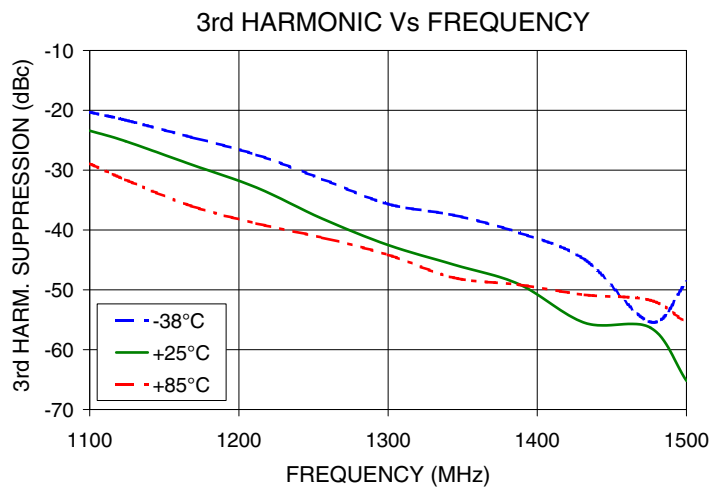
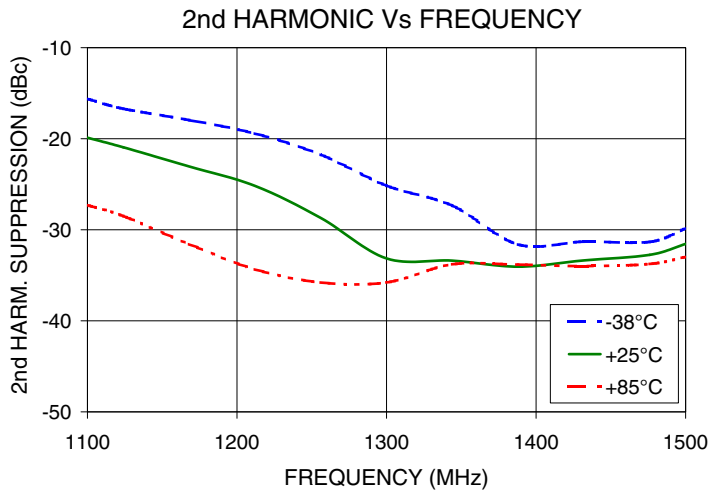
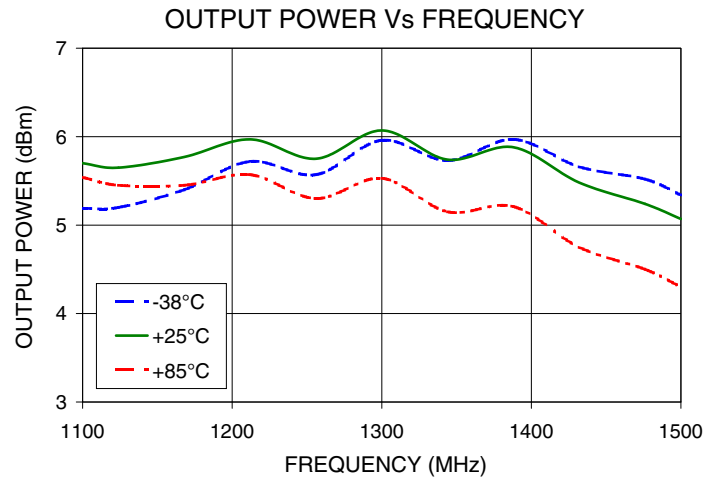


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Typical Performance Curves



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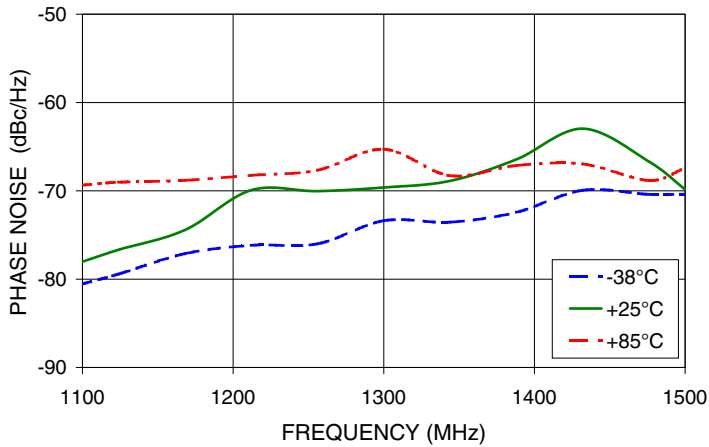


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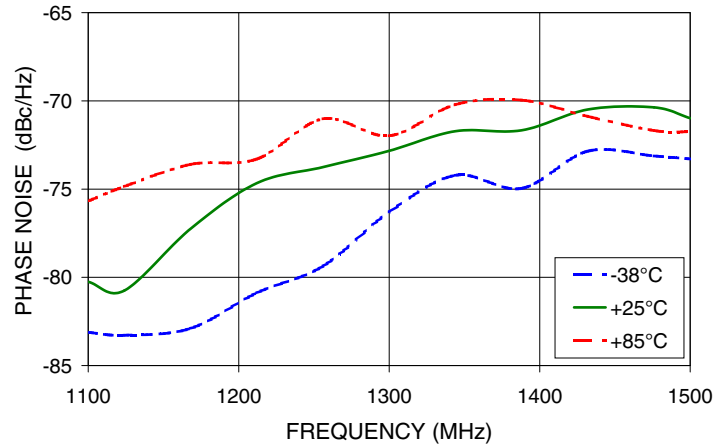


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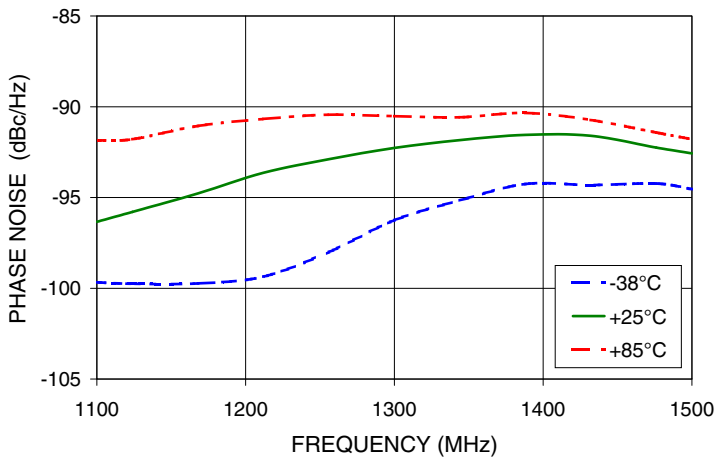
PHASE NOISE @ 100Hz offset



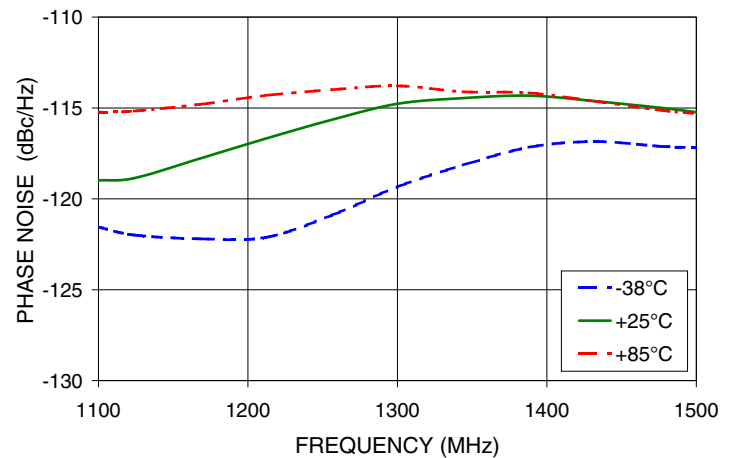
PHASE NOISE @ 1kHz offset



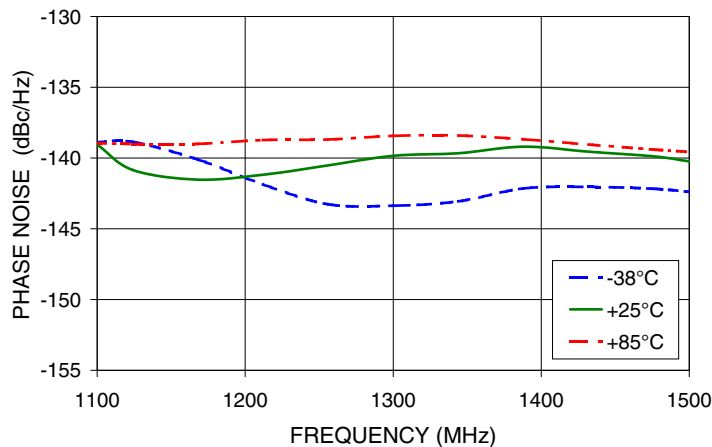
PHASE NOISE @ 10kHz offset



PHASE NOISE @ 100kHz offset



PHASE NOISE @ 1MHz offset



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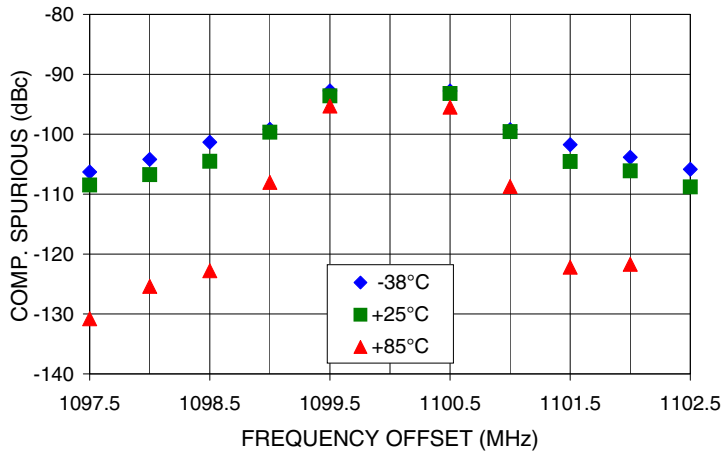
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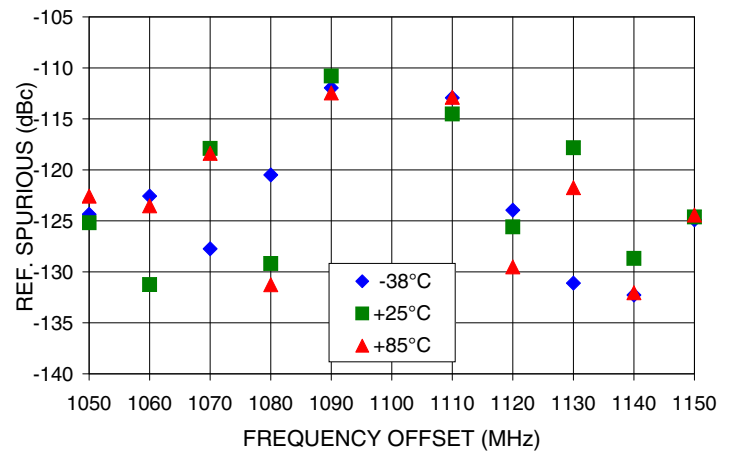
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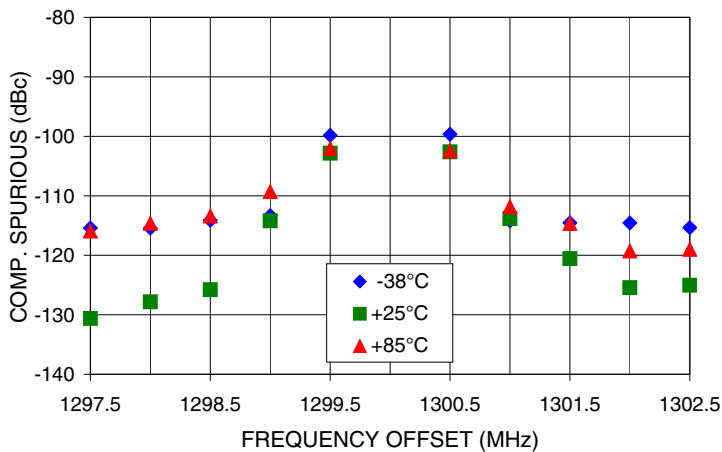
COMPARISON SPURIOUS  
Vs FREQ. OFFSET @ Fcar = 1100MHz



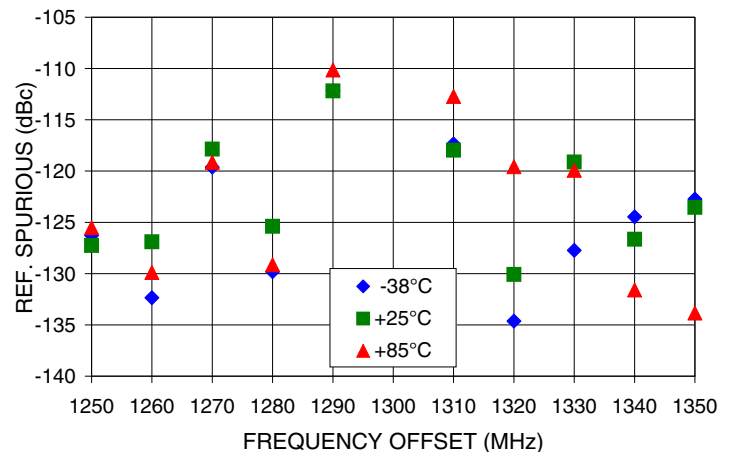
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Vs FREQ. OFFSET @ Fcar = 1100MHz



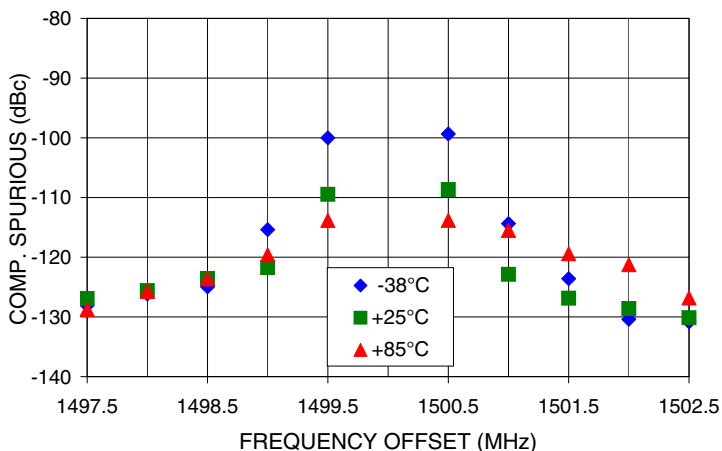
COMPARISON SPURIOUS  
Vs FREQ. OFFSET @ Fcar = 1300MHz



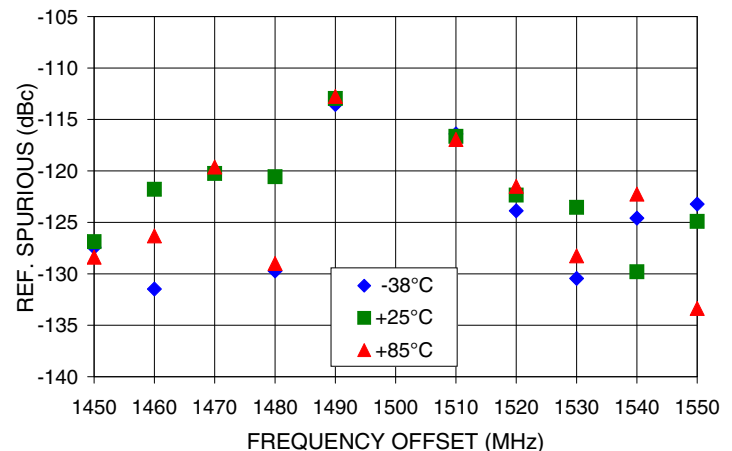
REFERENCE SPURIOUS  
Vs FREQ. OFFSET @ Fcar = 1300MHz



COMPARISON SPURIOUS  
Vs FREQ. OFFSET @ Fcar = 1500MHz



REFERENCE SPURIOUS  
Vs FREQ. OFFSET @ Fcar = 1500MHz



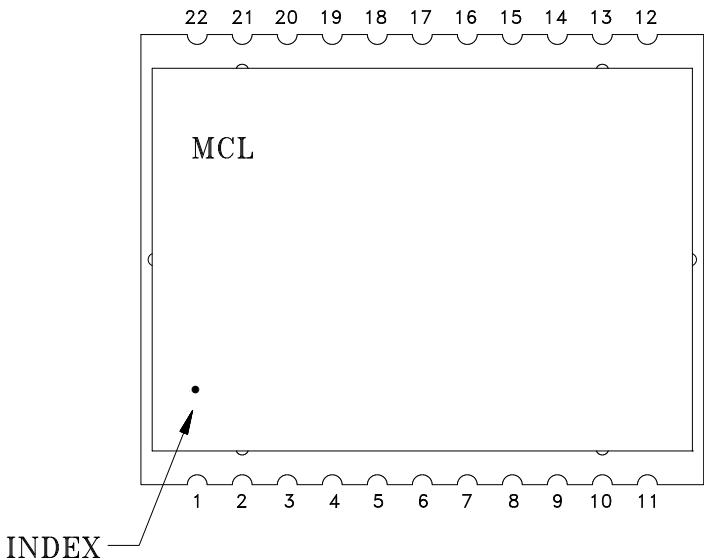
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Pin Configuration

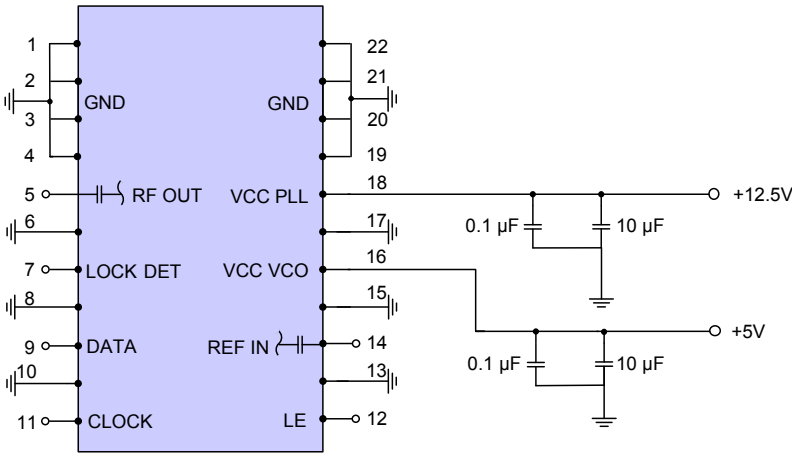


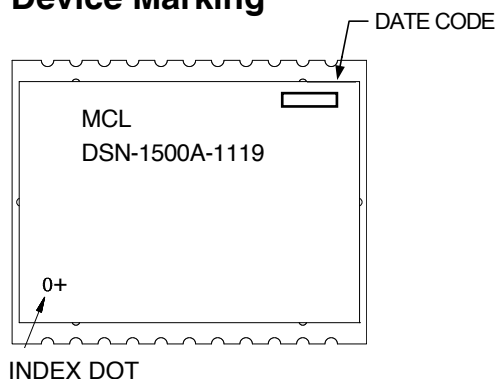
Pin Connection

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



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