

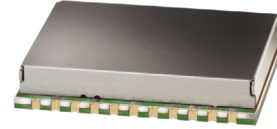
# Frequency Synthesizer

DSN-2050A-119+

50Ω 1130 to 2100 MHz

## The Big Deal

- Low phase noise and spurious
- Robust design and construction



CASE STYLE: KL942

## Product Overview

The DSN-2050A-119+ is a Frequency Synthesizer, designed to operate from 1130 to 2100 MHz for digital TV application. The DSN-2050A-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: <ul style="list-style-type: none"><li>• Phase Noise: -100 dBc/Hz typ. @ 10 kHz offset</li><li>• Comparison Spurious: -60 dBc typ.</li><li>• Reference Spurious: -98 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-2050A-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.



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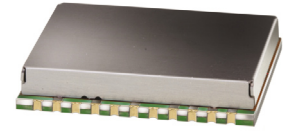


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50Ω 1130 to 2100 MHz

### Features

- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+24V)



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.

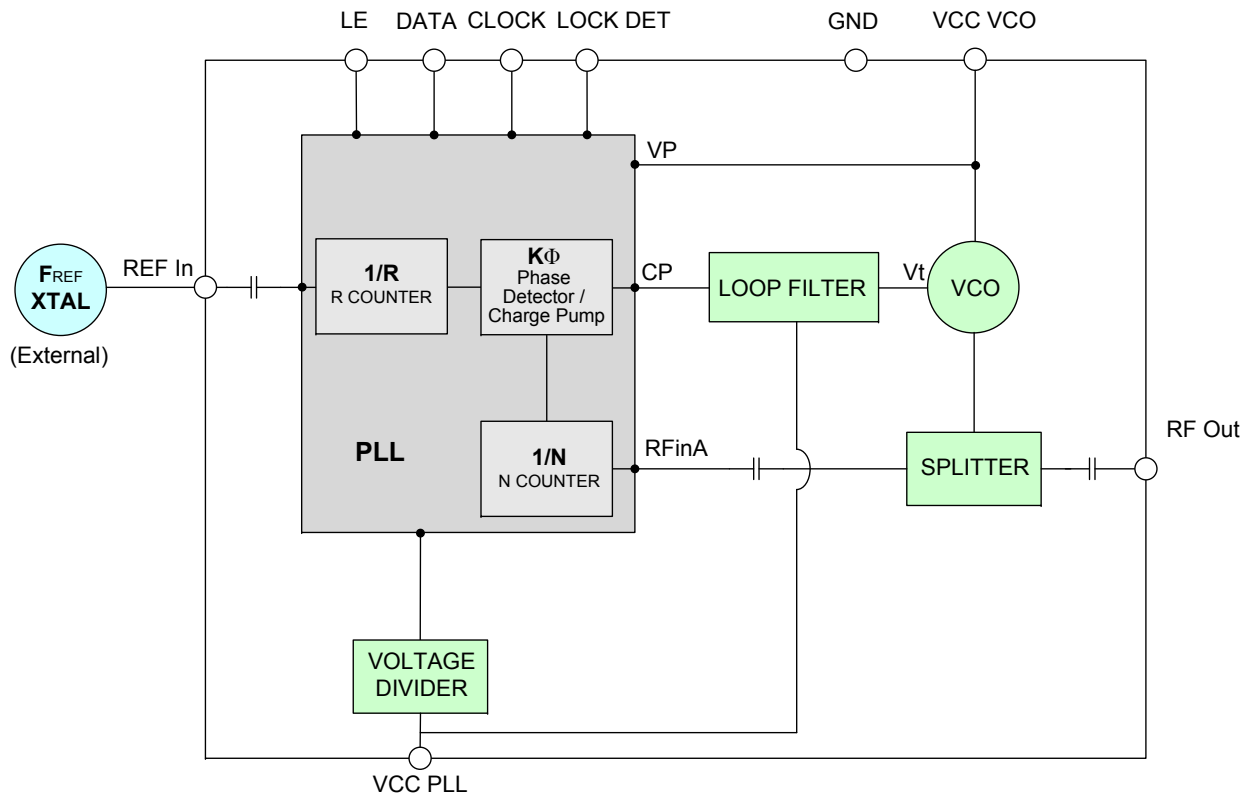
### Applications

- Digital TV

### General Description

The DSN-2050A-119+ is a Frequency Synthesizer, designed to operate from 1130 to 2100 MHz for digital TV application. The DSN-2050A-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-2050A-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



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

Parameters	Test Conditions	Min.	Typ.	Max.	Units
Frequency Range	-	1130	-	2100	MHz
Step Size	-	-	12.5	-	kHz
Settling Time	Within ± 1 kHz	-	600	-	mSec
Output Power	-	-2.5	+0.5	+3.5	dBm
SSB Phase Noise	@ 100 Hz offset	-	-44	-	dBc/Hz
	@ 1 kHz offset	-	-74	-67	
	@ 10 kHz offset	-	-100	-93	
	@ 100 kHz offset	-	-120	-114	
	@ 1 MHz offset	-	-140	-130	
Reference Spurious Suppression	Ref. Freq. 13 MHz	-	-98	-68	dBc
Comparison Spurious Suppression	Step Size 12.5 kHz	-	-60	-	
Non - Harmonic Spurious Suppression	-	-	-90	-	
Harmonic Suppression	-	-	-20	-8	
VCO Supply Voltage	+5.00	+4.75	+5.00	+5.25	
PLL Supply Voltage	+24.00	+23.75	+24.00	+24.25	
VCO Supply Current	-	-	31	40	mA
PLL Supply Current	-	-	27	35	
Reference Input (External)	Frequency	13 (square wave)	-	13	MHz
	Amplitude	1	-	1	V <sub>P-P</sub>
	Input impedance	-	-	100	KΩ
	Phase Noise @ 1 kHz offset	-	-	-130	-
RF Output port Impedance	-	-	50	-	Ω
Input Logic Level	Input high voltage	-	2.5	-	V
	Input low voltage	-	-	0.6	V
Digital Lock Detect	Locked	-	2.6	-	V
	Unlocked	-	-	0.4	V
Frequency Synthesizer PLL	-	ADF4113			
PLL Programming	-	3-wire serial 3V CMOS			
Register Map @ 2100 MHz	F_Register	-	(MSB) 100111111000000000010010 (LSB)		
	N_Register	-	(MSB) 001101001000001000000001 (LSB)		
	R_Register	-	(MSB) 0001000000100000100000 (LSB)		

**Absolute Maximum Ratings**

Parameters	Ratings
VCO Supply Voltage	5.5V
PLL Supply Voltage	25.0V
VCO Supply Voltage to PLL Supply Voltage	N.A.
Reference Frequency Voltage	0Vmin, +3.3Vmax
Data, Clock, LE Levels	0Vmin, +3.3Vmax
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



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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
	1130	1.59	1.65	1.40	30.00	32.11	33.10	23.20	25.88
1147	1.55	1.58	1.33	30.08	32.18	33.15	23.21	25.89	28.53
1264	1.14	1.19	0.92	30.71	32.73	33.62	23.25	25.95	28.62
1381	0.95	1.00	0.72	31.30	33.25	34.08	23.29	26.00	28.69
1498	0.70	0.74	0.49	31.75	33.66	34.45	23.32	26.04	28.74
1615	0.40	0.45	0.25	32.05	33.97	34.74	23.35	26.09	28.79
1732	0.25	0.37	0.18	32.18	34.17	34.96	23.38	26.12	28.83
1849	-0.04	0.13	-0.04	32.13	34.22	35.09	23.40	26.15	28.87
1966	-0.24	-0.05	-0.17	31.82	34.06	35.02	23.43	26.19	28.92
2083	-0.55	-0.34	-0.41	31.38	33.75	34.82	23.45	26.22	28.95
2100	-0.52	-0.28	-0.39	31.30	33.68	34.77	23.44	26.22	28.96

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1130	-17.67	-19.46	-20.57	-25.55	-27.64	-29.35
1147	-17.29	-19.11	-20.24	-28.84	-30.57	-32.23
1264	-14.10	-15.95	-16.99	-31.56	-33.97	-35.36
1381	-12.67	-14.51	-15.52	-36.28	-37.56	-38.35
1498	-12.54	-14.39	-15.50	-38.88	-39.78	-40.18
1615	-14.60	-16.46	-17.75	-39.48	-38.72	-38.42
1732	-19.03	-20.91	-21.78	-36.00	-37.30	-37.63
1849	-21.96	-24.26	-24.90	-40.29	-40.18	-39.42
1966	-24.40	-26.04	-26.93	-37.09	-37.44	-38.04
2083	-29.89	-30.97	-31.35	-36.85	-39.52	-38.63
2100	-30.02	-31.08	-31.31	-39.63	-40.62	-41.64



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1130	-47.49	-72.05	-99.02	-119.68	-136.85
1147	-45.08	-71.77	-98.78	-119.64	-139.76
1264	-48.94	-74.26	-100.05	-120.67	-140.80
1381	-45.91	-74.78	-100.68	-121.53	-141.74
1498	-46.18	-73.91	-100.89	-121.97	-142.18
1615	-43.95	-74.51	-100.97	-122.09	-142.44
1732	-42.79	-76.45	-100.78	-121.92	-142.55
1849	-42.82	-72.97	-100.43	-121.61	-142.36
1966	-44.05	-72.86	-100.28	-121.41	-142.24
2083	-39.05	-74.41	-100.22	-121.28	-141.96
2100	-40.45	-74.83	-100.26	-121.32	-141.97

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1130	-45.69	-73.61	-100.44	-121.39	-135.03
1147	-46.29	-73.50	-100.69	-121.54	-141.53
1264	-45.46	-74.01	-101.09	-122.32	-142.28
1381	-44.71	-74.48	-102.03	-122.77	-142.80
1498	-44.46	-75.15	-101.91	-123.24	-143.03
1615	-44.39	-76.16	-102.03	-123.08	-143.21
1732	-41.23	-75.81	-101.90	-122.87	-143.10
1849	-40.25	-73.99	-101.39	-122.70	-143.09
1966	-40.19	-75.22	-100.94	-122.32	-142.81
2083	-36.60	-76.31	-100.89	-122.01	-142.41
2100	-40.84	-76.57	-100.98	-122.02	-142.49

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1130	-39.82	-71.93	-97.60	-118.01	-137.18
1147	-43.93	-71.80	-97.67	-118.02	-138.16
1264	-41.88	-71.87	-98.57	-119.38	-139.49
1381	-41.22	-74.30	-99.67	-120.39	-140.53
1498	-38.99	-73.74	-100.12	-120.98	-141.20
1615	-37.98	-74.11	-100.05	-121.06	-141.56
1732	-40.95	-72.98	-99.84	-120.90	-141.74
1849	-39.87	-73.45	-99.33	-120.73	-141.85
1966	-38.06	-73.06	-99.09	-120.49	-141.68
2083	-39.92	-74.11	-98.95	-120.44	-141.50
2100	-36.33	-72.41	-99.08	-120.61	-141.42



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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1130MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1615MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 2100MHz+(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	-84.96	-85.61	-85.85	-85.35	-82.49	-86.27	-83.09	-87.03	-83.94
-4	-84.07	-85.49	-83.03	-84.90	-86.31	-86.75	-81.66	-87.38	-81.79	
-3	-85.30	-83.64	-76.28	-81.87	-85.10	-86.60	-83.29	-82.87	-82.46	
-2	-83.34	-84.92	-68.21	-86.66	-87.46	-83.54	-83.24	-81.15	-83.25	
-1	-83.51	-81.70	-61.66	-78.97	-81.11	-67.26	-68.83	-80.53	-67.46	
0 <sup>note 2</sup>	-	-	-	-	-	-	-	-	-	
+1	-75.09	-83.82	-61.46	-80.72	-82.04	-67.22	-70.55	-81.00	-66.53	
+2	-88.72	-84.73	-78.44	-77.16	-84.15	-85.46	-79.83	-86.30	-83.41	
+3	-86.97	-86.91	-85.68	-87.50	-86.50	-83.65	-87.42	-87.06	-87.47	
+4	-87.66	-82.48	-85.22	-86.21	-85.99	-85.22	-86.36	-86.87	-82.89	
+5	-86.86	-83.03	-87.31	-87.34	-82.52	-86.99	-86.88	-84.25	-85.51	

Note 1: Comparison frequency 12.5 kHz  
 Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1130MHz+(n*Frefernce) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1615MHz+(n*Frefernce) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 2100MHz+(n*Frefernce) (dBc) note 3			
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
	-5	-124.03	-125.92	-126.07	-110.36	-111.89	-112.20	-98.71	-102.14	-103.38
-4	-127.78	-126.40	-128.39	-128.34	-128.49	-126.80	-118.27	-120.22	-121.04	
-3	-118.37	-118.55	-119.04	-107.82	-109.31	-110.25	-96.45	-99.22	-100.02	
-2	-131.00	-129.52	-129.63	-129.13	-129.50	-128.10	-116.65	-121.85	-122.11	
-1	-108.26	-108.62	-109.49	-98.23	-99.45	-100.29	-86.79	-90.78	-91.74	
0 <sup>note 4</sup>	-	-	-	-	-	-	-	-	-	
+1	-107.11	-107.46	-108.88	-97.04	-99.27	-100.42	-84.64	-87.90	-88.77	
+2	-128.19	-130.18	-130.34	-128.03	-126.17	-127.57	-115.62	-117.62	-118.25	
+3	-116.91	-116.25	-118.77	-107.22	-109.06	-110.67	-94.52	-97.52	-99.60	
+4	-130.09	-129.39	-129.60	-127.30	-126.59	-127.36	-116.25	-118.50	-120.08	
+5	-123.02	-123.23	-124.23	-111.04	-112.92	-113.25	-98.63	-102.00	-104.02	

Note 3: Reference frequency 13 MHz  
 Note 4: All spurs are referenced to carrier signal (n=0).



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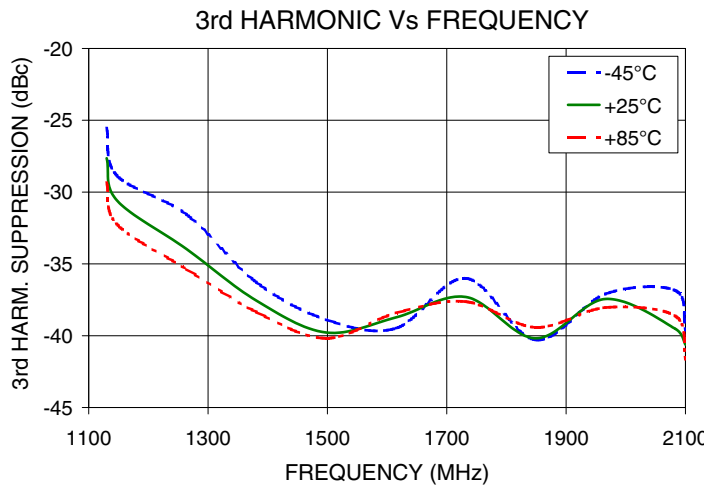
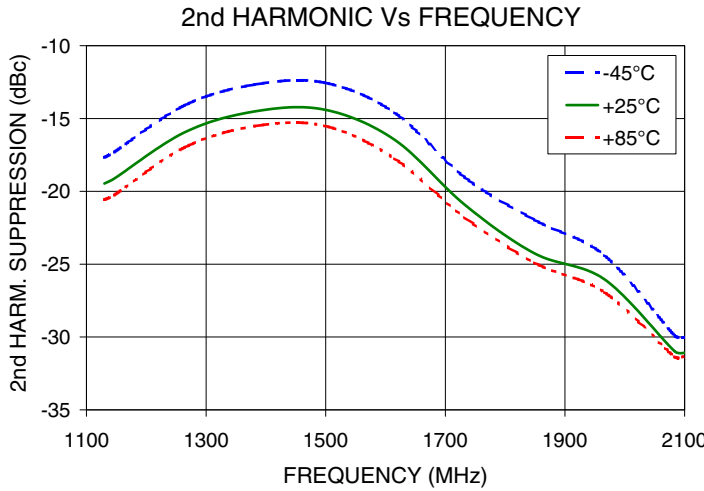
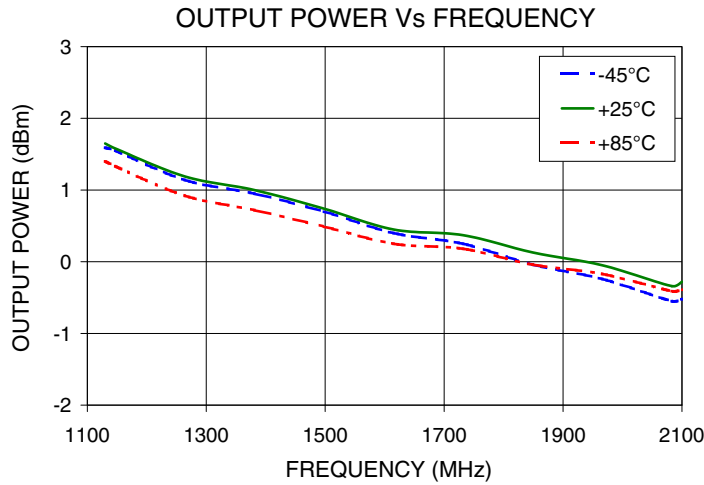


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Typical Performance Curves



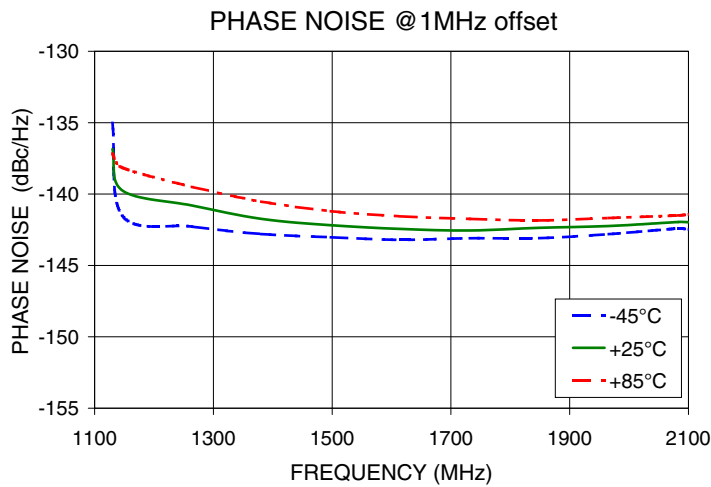
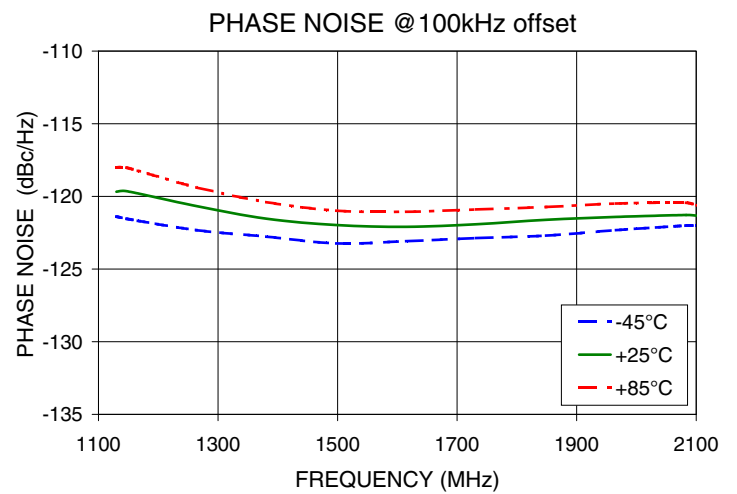
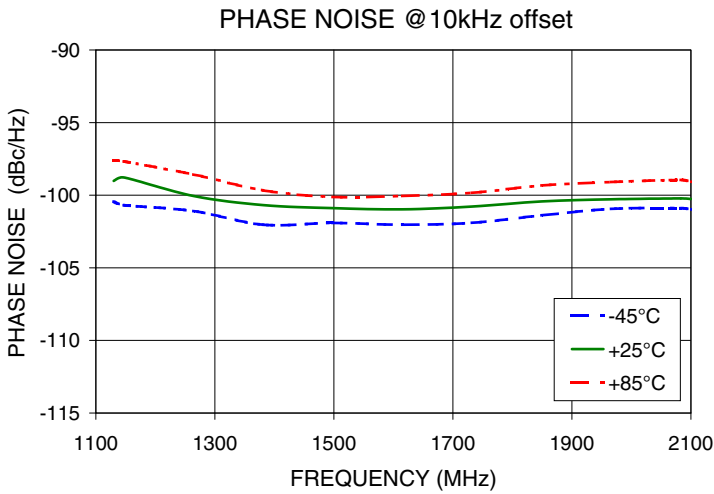
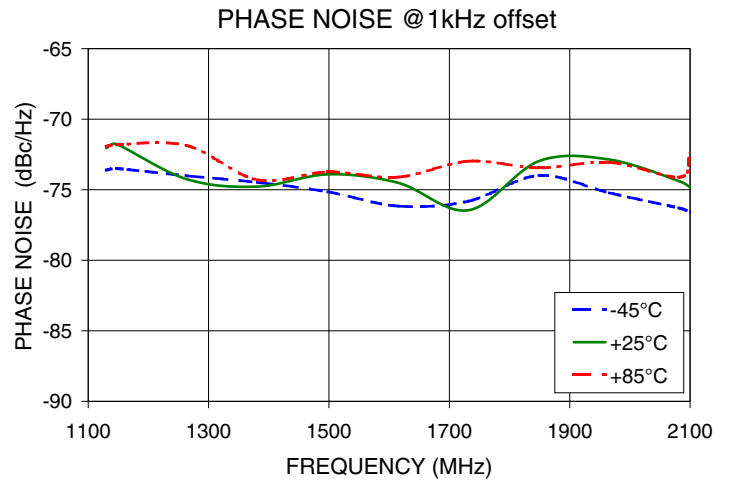
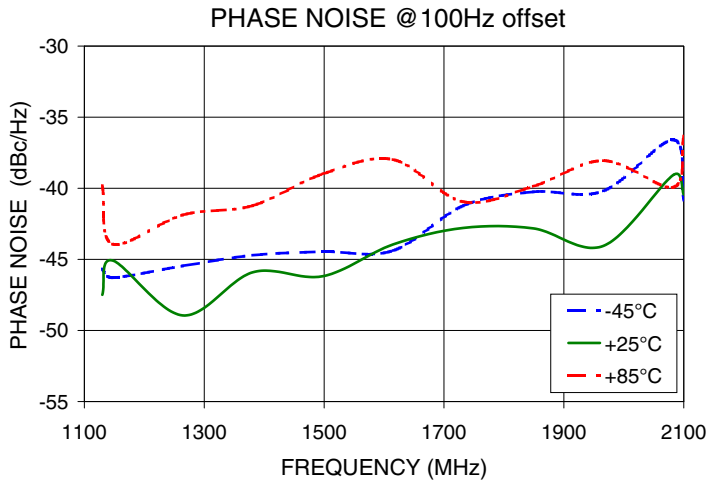
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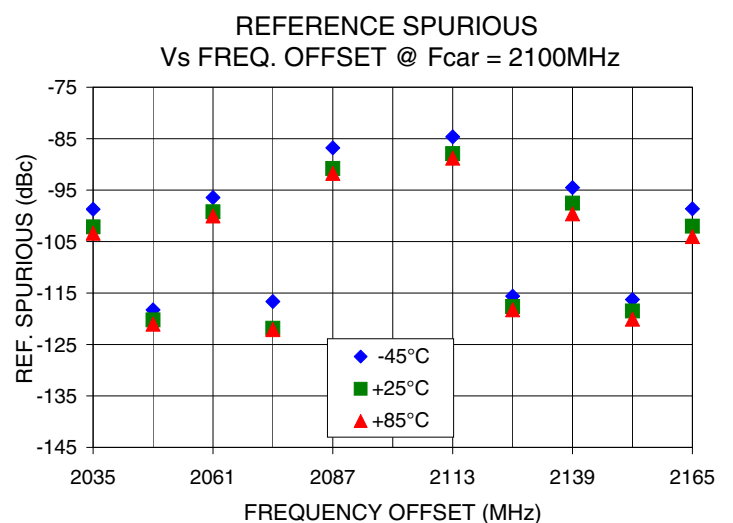
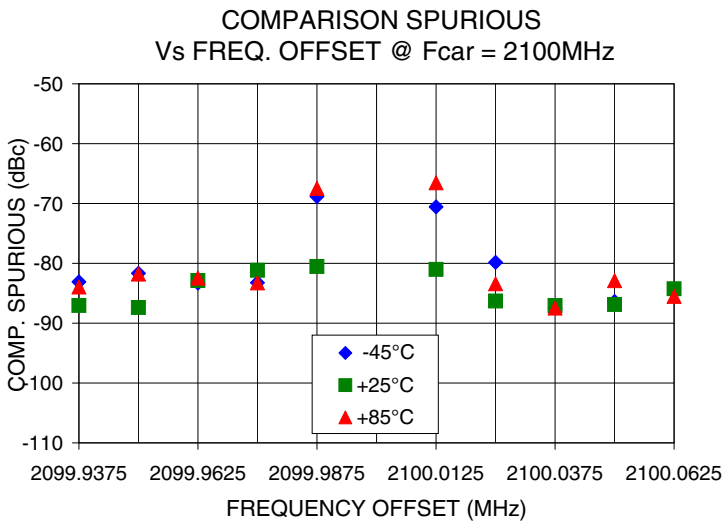
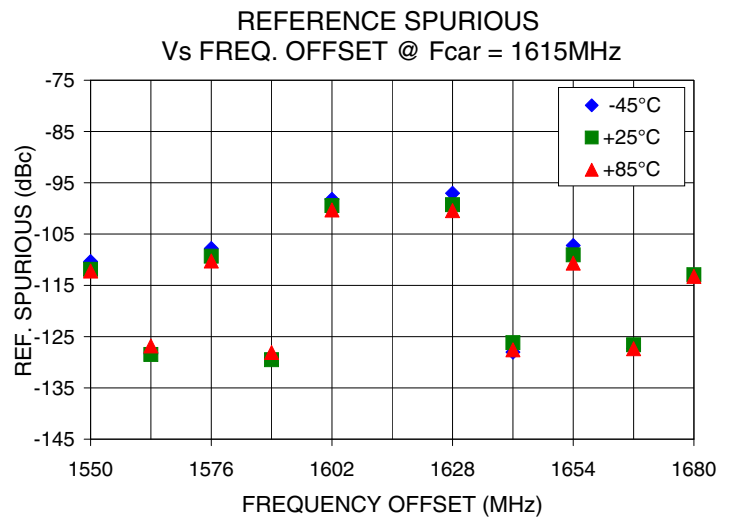
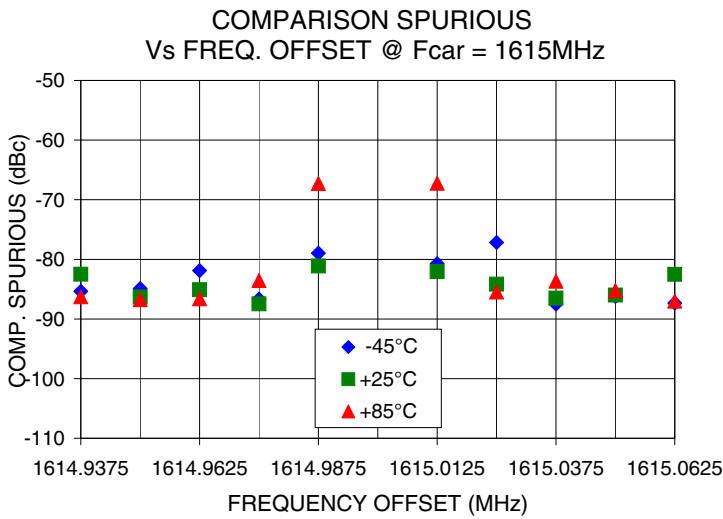
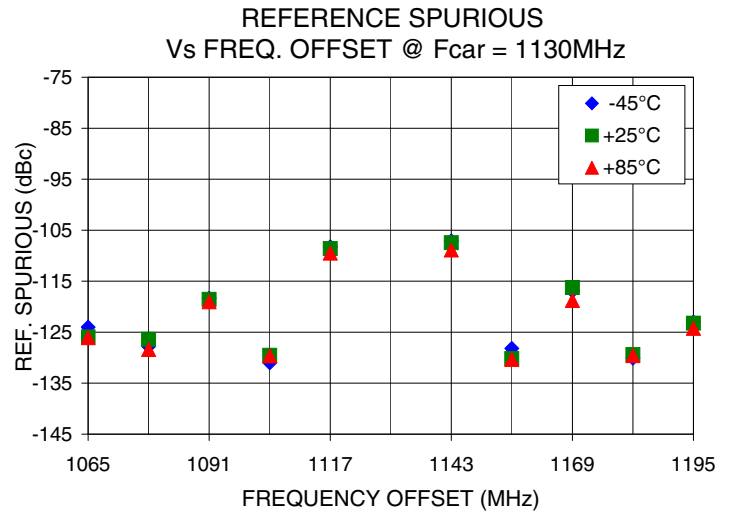
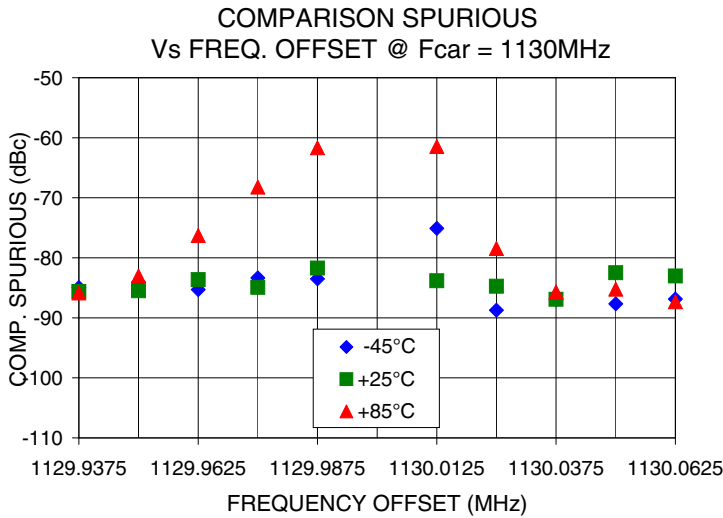
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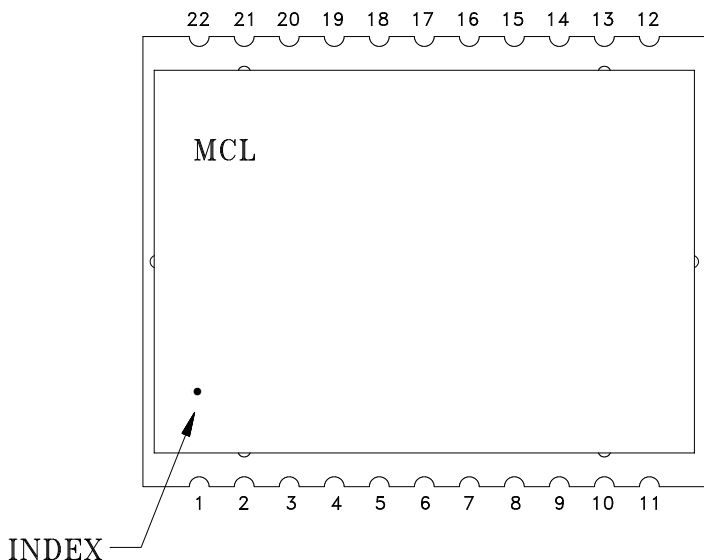


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Pin Configuration

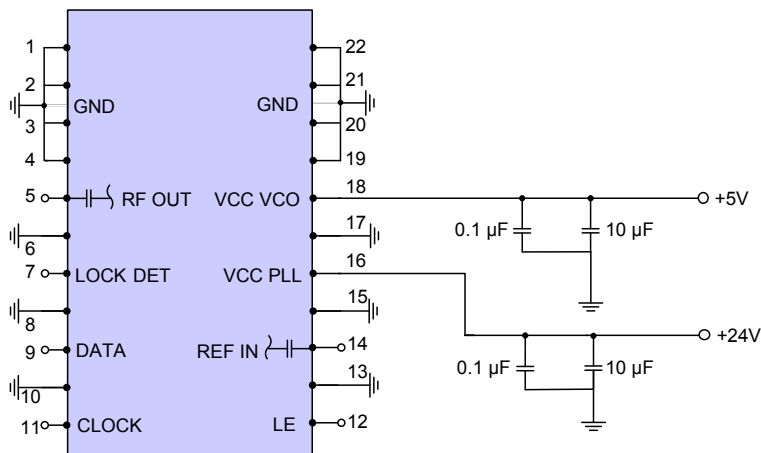


Pin Connection

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 PLL
6	GND	17	GND
7	LOCK DET	18	VCC VCO
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.



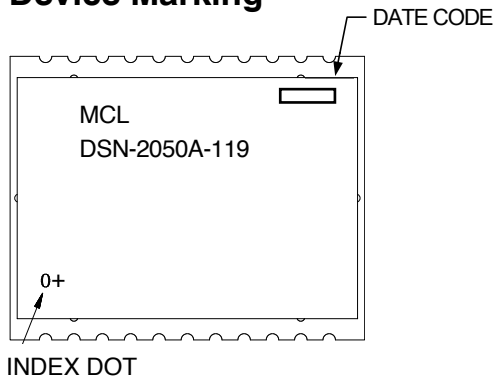
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**Device Marking****Additional Detailed Technical Information**

Additional information is available on our web site. To access this information enter the model number on our web site home page.

**Case Style:** KL942

**Tape & Reel:** TR-F97

**Suggested Layout for PCB Design:** PL-318

**Evaluation Board:** TB-553+

**Environment Ratings:** ENV03T2



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