

# Frequency Synthesizer

KSN-745A-119+

50Ω 739.4 to 744.6 MHz

## The Big Deal

- 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-745A-119+ is a Frequency Synthesizer, designed to operate from 739.4 to 744.6 MHz for block converter application. The KSN-745A-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: <ul style="list-style-type: none"><li>• Phase Noise: -105 dBc/Hz typ. @ 10 kHz offset</li><li>• Comparison Spurious: -88 dBc typ.</li><li>• Reference Spurious: -102 dBc typ.</li></ul>	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-745A-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-745A-119+ to be used in compact designs.

### Notes

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Surface Mount

# Frequency Synthesizer

KSN-745A-119+

50Ω 739.4 to 744.6 MHz

## Features

- 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"



CASE STYLE: DK1042

**+RoHS Compliant**

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

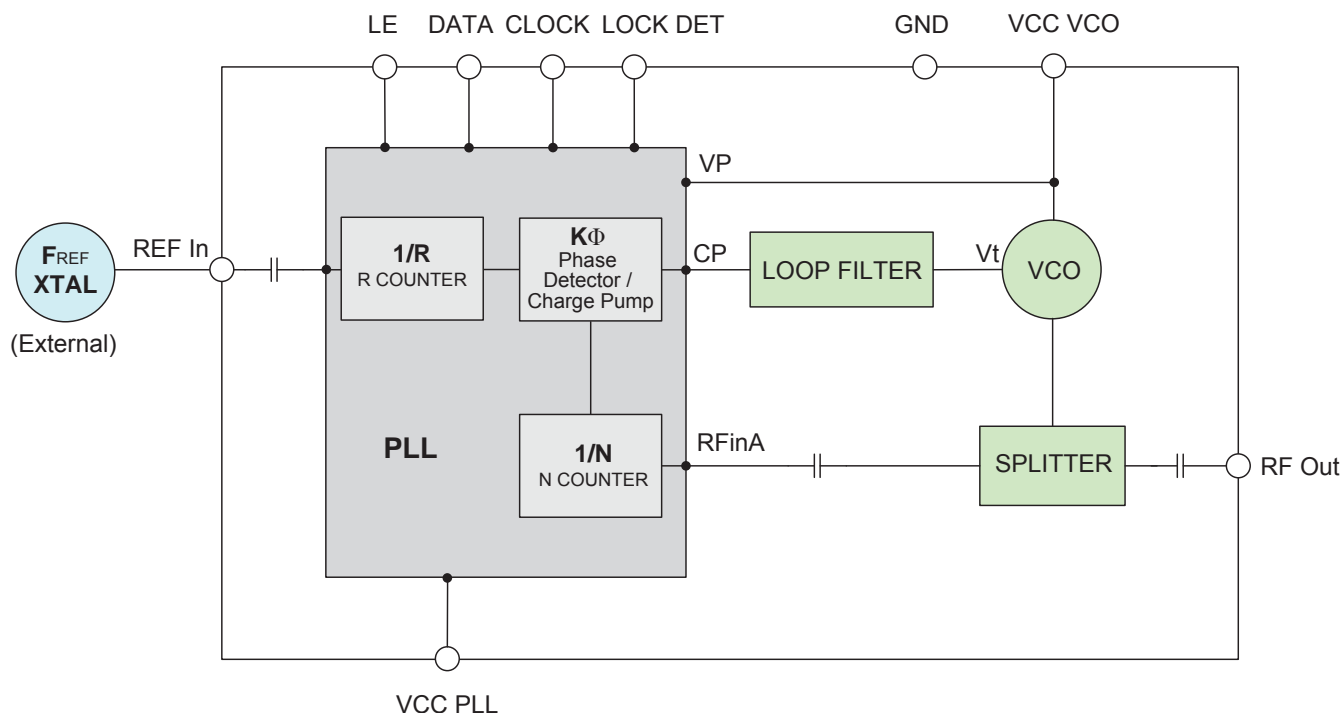
## Applications

- Block converter

## General Description

The KSN-745A-119+ is a Frequency Synthesizer, designed to operate from 739.4 to 744.6 MHz for block converter application. The KSN-745A-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-745A-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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REV. A  
M151108  
EDR-9042F1  
KSN-745A-119+  
Category-A1  
RAV  
151006  
Page 2 of 10

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

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	739.4	-	744.6	MHz
Step Size		-	-	200	-	kHz
Settling Time		Within $\pm 1$ kHz	-	1.5	-	mSec
Output Power		-	0	+3	+6	dBm
SSB Phase Noise	@ 100 Hz offset	-	-	-91	-	dBc/Hz
	@ 1 kHz offset	-	-	-90	-78	
	@ 10 kHz offset	-	-	-105	-100	
	@ 100 kHz offset	-	-	-138	-133	
	@ 1 MHz offset	-	-	-159	-152	
Reference Spurious Suppression		Ref. Freq. 104 MHz	-	-102	-80	dBc
Comparison Spurious Suppression		Step Size 200 kHz	-	-88	-73	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-29	-23	
VCO Supply Voltage		+5.00	+4.75	+5.00	+5.25	V
PLL Supply Voltage		+3.00	+2.85	+3.00	+3.15	
VCO Supply Current		-	-	42	50	mA
PLL Supply Current		-	-	10	16	
Reference Input (External)	Frequency	104 (square wave)	-	104	-	MHz
	Amplitude	1.0	0.5	1.0	1.5	V <sub>P-P</sub>
	Input impedance	-	-	100	-	K $\Omega$
	Phase Noise @ 1 kHz offset	-	-	-130	-	dBc/Hz
RF Output port Impedance		-	-	50	-	$\Omega$
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		-	ADF4106			
PLL Programming		-	3-wire serial 3V CMOS			
Register Map @ 744.6 MHz	F_Register	-	(MSB) 010111111000000010010011(LSB)			
	N_Register	-	(MSB) 000000001110100000101101 (LSB)			
	R_Register	-	(MSB) 000000000000100000100000 (LSB)			

**Absolute Maximum Ratings**

Parameters	Ratings
VCO Supply Voltage	5.5V
PLL Supply Voltage	3.6V
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

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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
739.4	3.38	3.49	3.43	40.00	42.20	43.68	8.38	9.57	11.06
739.6	3.38	3.49	3.43	40.00	42.20	43.67	8.38	9.57	11.06
740.8	3.36	3.47	3.41	40.00	42.19	43.66	8.38	9.58	11.07
742.0	3.35	3.45	3.39	40.00	42.17	43.65	8.39	9.59	11.08
743.2	3.33	3.43	3.37	39.99	42.16	43.64	8.38	9.59	11.07
744.4	3.32	3.41	3.34	39.99	42.14	43.62	8.39	9.59	11.08
744.6	3.31	3.41	3.34	39.99	42.14	43.62	8.39	9.60	11.08

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
739.40	-28.18	-29.23	-31.14	-39.76	-44.19	-47.90
739.60	-28.17	-29.23	-31.16	-39.66	-44.17	-47.84
740.80	-28.17	-29.24	-31.18	-39.42	-43.86	-47.54
742.00	-28.20	-29.26	-31.25	-39.08	-43.60	-47.15
743.20	-28.26	-29.33	-31.33	-38.80	-43.27	-46.89
744.40	-28.34	-29.42	-31.46	-38.44	-42.89	-46.55
744.60	-28.35	-29.47	-31.50	-38.46	-42.90	-46.36

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
739.4	-91.11	-89.77	-106.27	-138.40	-156.79
739.6	-93.89	-90.80	-106.02	-138.32	-157.20
740.8	-91.81	-90.28	-106.27	-138.32	-159.09
742.0	-90.11	-90.93	-106.21	-138.43	-159.32
743.2	-91.45	-91.73	-106.46	-138.58	-159.44
744.4	-91.53	-91.93	-106.46	-138.75	-157.14
744.6	-89.58	-91.00	-106.30	-138.54	-156.98

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
739.4	-88.48	-86.03	-107.33	-139.58	-159.74
739.6	-86.68	-85.96	-107.47	-139.42	-160.01
740.8	-90.62	-85.83	-106.99	-139.47	-160.29
742.0	-93.41	-85.92	-106.91	-139.64	-160.22
743.2	-89.33	-81.26	-107.07	-140.10	-159.92
744.4	-88.22	-81.83	-106.94	-139.46	-158.00
744.6	-93.39	-82.83	-106.90	-139.83	-157.53

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
739.4	-89.58	-91.14	-105.21	-137.24	-158.25
739.6	-90.92	-91.02	-105.00	-137.14	-156.00
740.8	-90.43	-91.30	-104.99	-137.22	-155.36
742.0	-91.19	-92.03	-104.97	-137.23	-155.12
743.2	-89.80	-91.32	-105.08	-137.51	-155.68
744.4	-90.95	-92.54	-104.97	-137.30	-155.44
744.6	-89.81	-89.52	-104.95	-137.04	-155.49

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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 739.4MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 742MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 744.6MHz+(n*Fcomparison) (dBc) note 1		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-107.04	-104.19	-102.21	-98.83	-99.77	-95.66	-103.38	-103.38	-98.42
-4	-101.74	-102.08	-100.09	-98.81	-101.80	-95.85	-99.56	-100.78	-95.63
-3	-99.35	-99.17	-96.85	-96.03	-97.65	-92.36	-97.26	-98.69	-92.68
-2	-92.05	-96.56	-91.53	-89.11	-93.31	-88.16	-89.78	-93.37	-87.76
-1	-83.78	-90.86	-83.87	-80.57	-85.71	-80.50	-81.41	-89.30	-80.55
0 note 2	-	-	-	-	-	-	-	-	-
+1	-86.03	-95.89	-83.87	-82.13	-90.69	-81.29	-81.94	-90.58	-81.34
+2	-95.42	-97.74	-92.55	-91.85	-95.73	-87.67	-92.27	-95.25	-88.12
+3	-101.92	-100.76	-96.47	-97.84	-99.62	-91.71	-98.71	-101.25	-92.39
+4	-103.71	-104.22	-99.35	-101.40	-102.15	-95.73	-102.91	-102.83	-95.61
+5	-107.13	-105.24	-101.80	-99.66	-101.21	-95.13	-105.18	-104.74	-97.28

Note 1: Comparison frequency 200 kHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 739.4MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 742MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 744.6MHz+(n*Freference) (dBc) note 3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-125.27	-122.90	-124.13	-115.59	-112.31	-110.53	-113.01	-111.50	-109.93
-4	-114.79	-116.31	-112.30	-108.85	-108.74	-107.45	-108.52	-108.88	-107.96
-3	-94.86	-99.47	-102.08	-95.16	-99.46	-102.79	-95.24	-99.53	-102.56
-2	-102.18	-102.55	-103.54	-102.51	-103.31	-104.68	-102.49	-102.56	-104.12
-1	-110.34	-106.37	-107.13	-111.70	-107.16	-107.08	-112.45	-107.61	-107.79
0 note 4	-	-	-	-	-	-	-	-	-
+1	-102.08	-103.46	-104.25	-101.57	-102.37	-103.74	-101.63	-102.48	-103.88
+2	-107.44	-107.16	-106.84	-109.76	-110.00	-108.82	-110.55	-111.04	-110.01
+3	-102.69	-107.43	-110.57	-104.04	-108.29	-110.30	-103.79	-107.67	-110.72
+4	-110.38	-114.12	-119.21	-123.83	-120.54	-124.85	-124.26	-122.55	-126.58
+5	-118.62	-118.79	-122.70	-116.42	-118.63	-127.57	-116.44	-120.13	-124.28

Note 3: Reference frequency 104 MHz

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

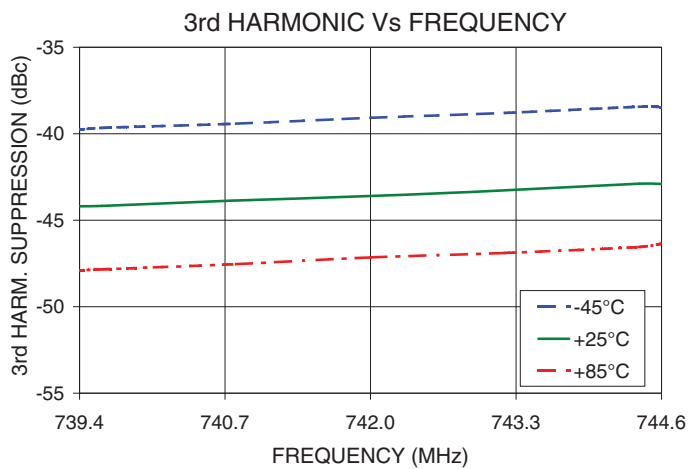
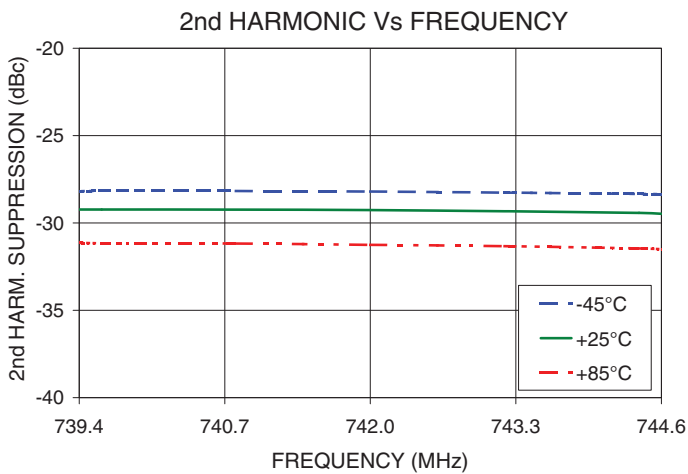
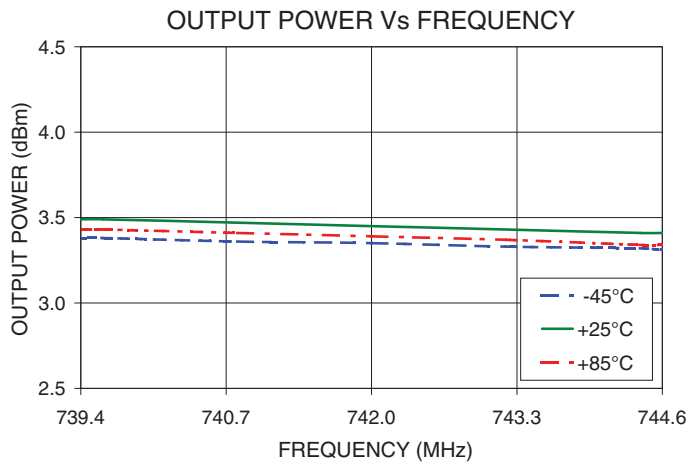
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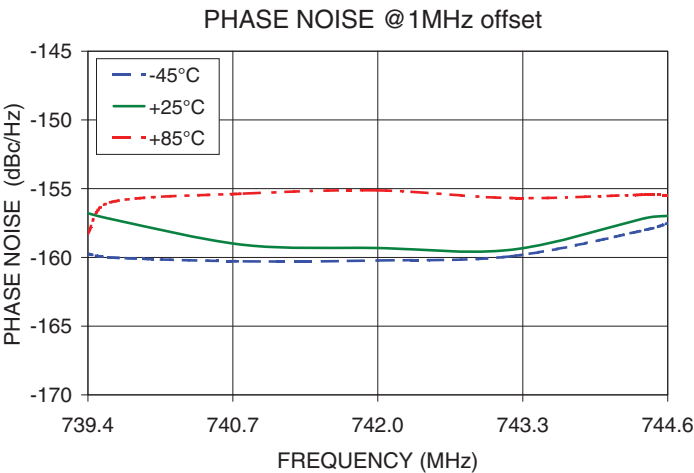
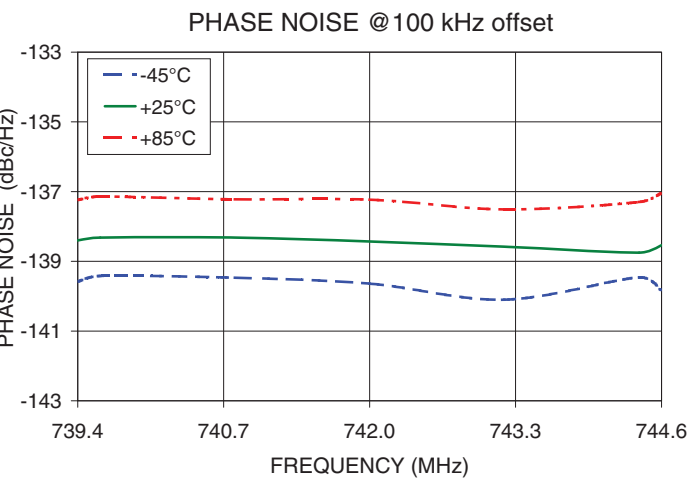
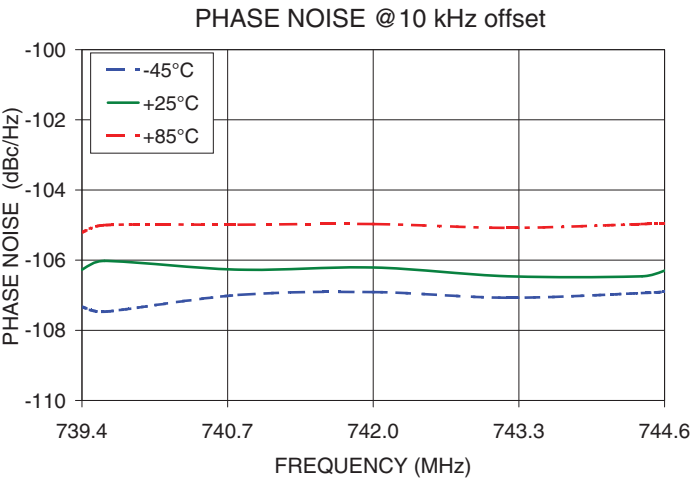
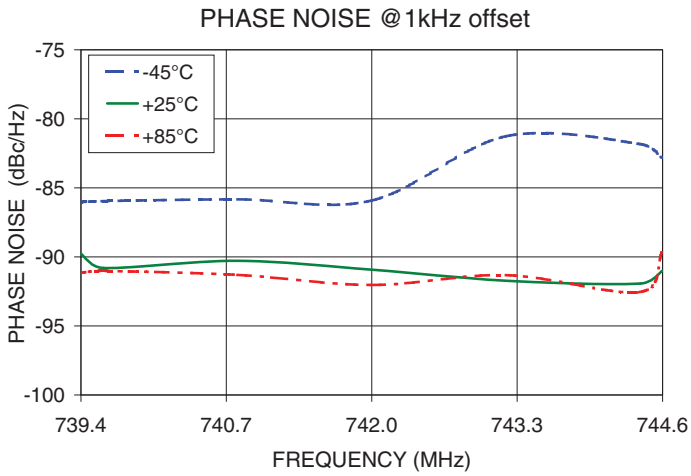
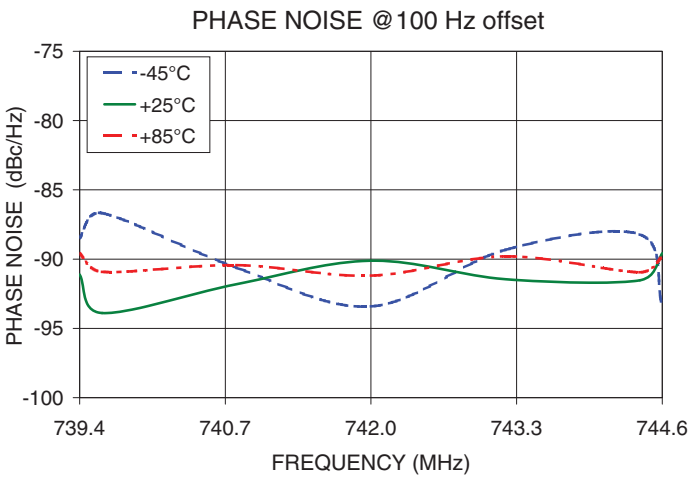
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Typical Performance Curves

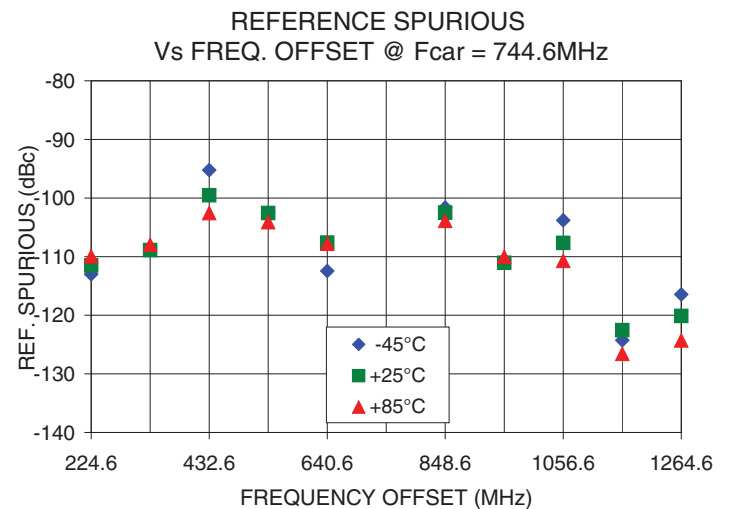
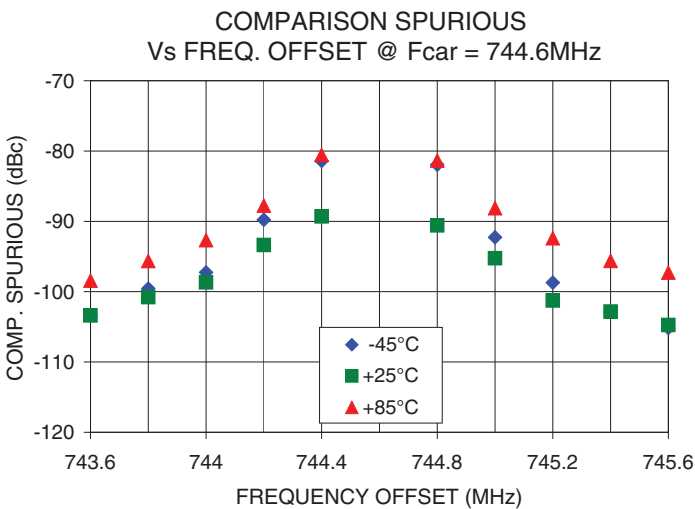
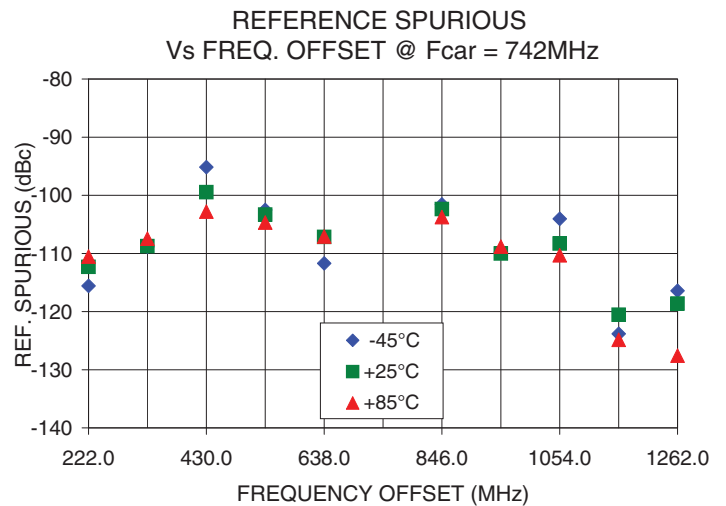
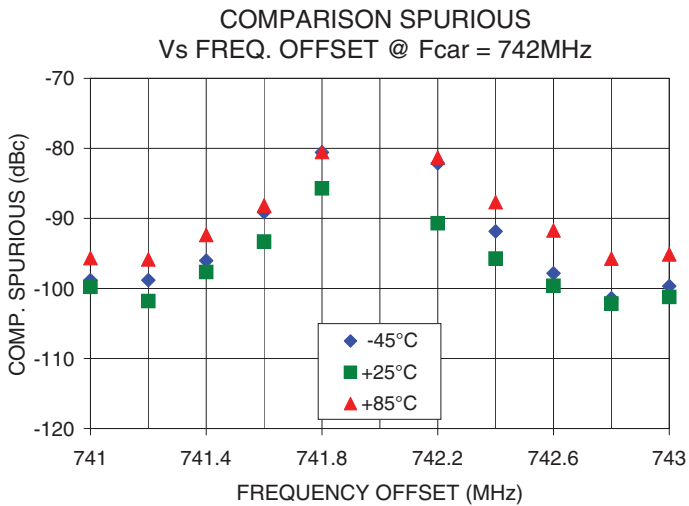
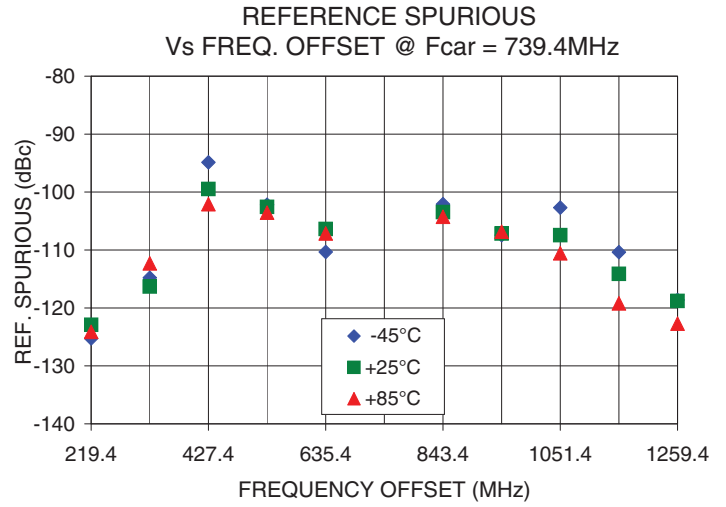
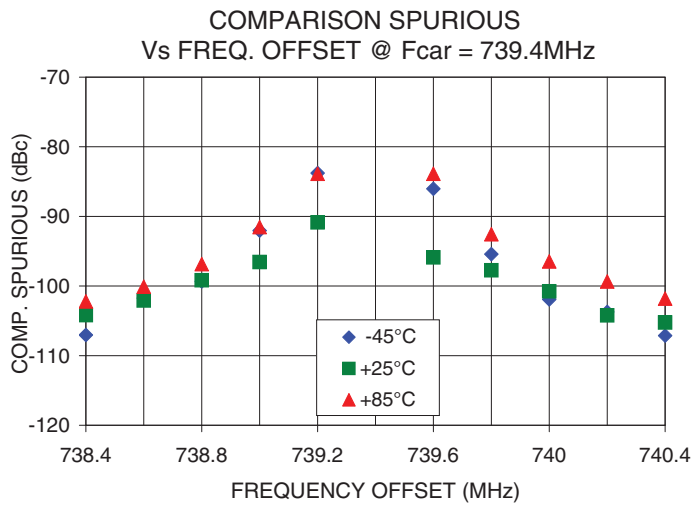


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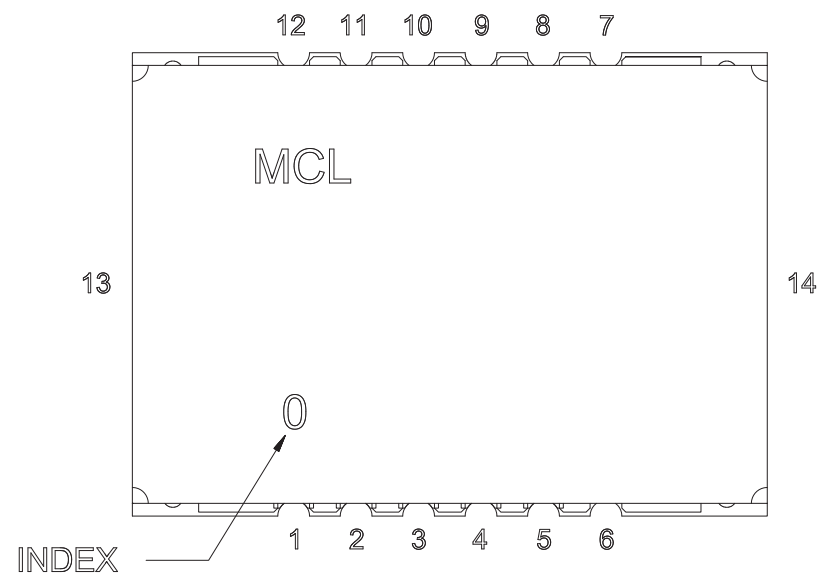
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Pin Configuration

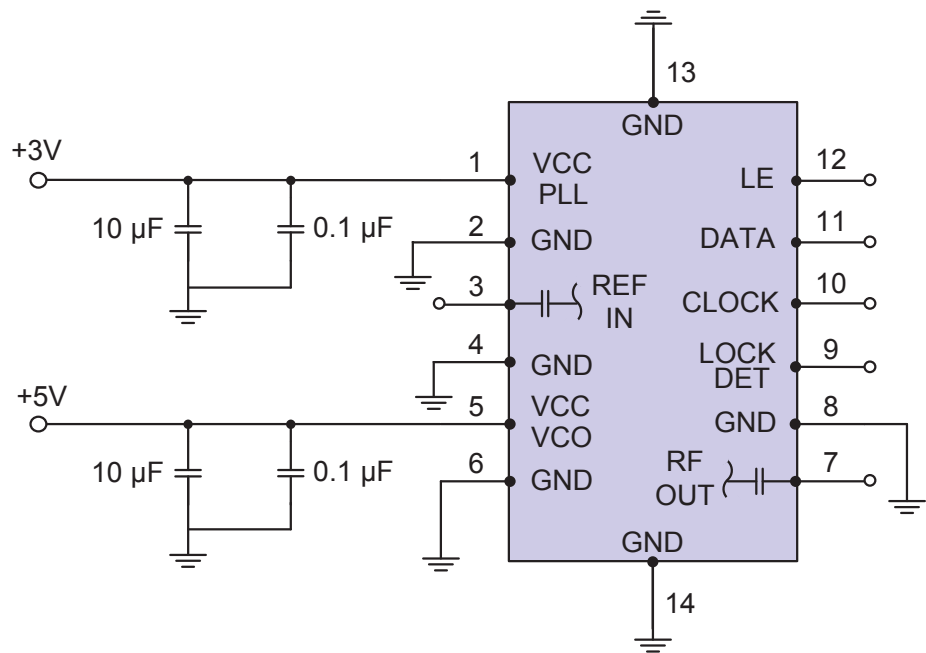


Pin Connection

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.



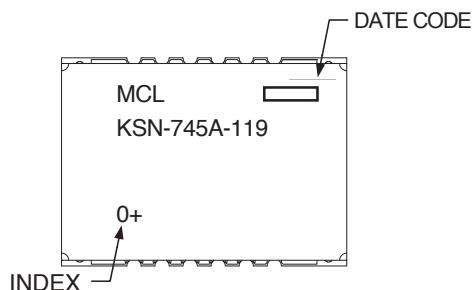
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## Device Marking

**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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