

# Frequency Synthesizer

KSN-395A-1C19+

50Ω     395 MHz (fixed)

## The Big Deal

- Low phase noise and spurious
- Fixed frequency without external programming
- Integrated microcontroller
- Robust design and construction
- Small size 0.80" x 0.58" x 0.15"



CASE STYLE: DK1042

## Product Overview

The KSN-395A-1C19+ is a Frequency Synthesizer, designed to operate 395MHz for military and avionics application. The KSN-395A-1C19+ 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: -107 dBc/Hz typ. @ 10 kHz offset</li><li>• Comparison spurious: -85 dBc typ.</li><li>• Reference spurious: -85 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-395A-1C19+, 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-395A-1C19+ to be used in compact designs.



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# Frequency Synthesizer

**KSN-395A-1C19+**

50Ω 395 MHz (fixed)

## Features

- Fixed frequency without external programming
- Integrated microcontroller
- High reliability over temperature changes
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+5V)
- Small size 0.80" x 0.58" x 0.15"

## Applications

- Military & avionics



CASE STYLE: DK1042  
PRICE: \$29.95 ea. QTY (1-9)

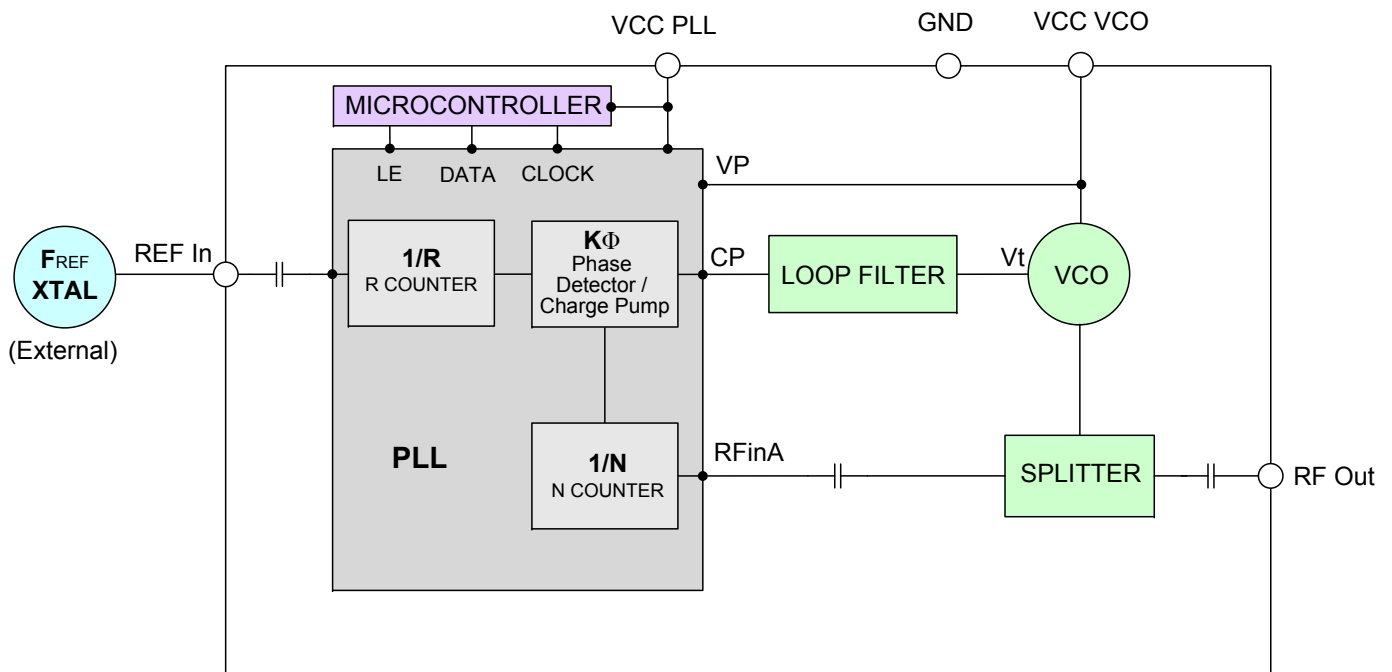
**+ RoHS compliant in accordance with EU Directive (2002/95/EC)**

*The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.*

## General Description

The KSN-395A-1C19+ is a Frequency Synthesizer, designed to operate 395MHz for military and avionics application. The KSN-395A-1C19+ 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-395A-1C19+, 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 (fixed)	-	395	-	395	MHz	
Step size	-	-	5000	-	kHz	
Settling Time (Power on to lock)	Within ± 1 kHz	-	20	-	mSec	
Output Power	-	-3	0	+3	dBm	
SSB Phase Noise	@ 100 Hz offset	-	-93	-	dBc/Hz	
	@ 1 kHz offset	-	-107	-103		
	@ 10 kHz offset	-	-107	-103		
	@ 100 kHz offset	-	-135	-131		
	@ 1 MHz offset	-	-158	-153		
Reference Spurious Suppression	Ref. Freq. 10 MHz	-	-85	-70	dBc	
Comparison Spurious Suppression	Step Size 5000 kHz	-	-85	-70		
Non - Harmonic Spurious Suppression	-	-	-90	-		
Harmonic Suppression	-	-	-30	-20	dBc	
VCO Supply Voltage	+5.00	+4.75	+5.00	+5.25	V	
PLL Supply Voltage	+5.00	+4.75	+5.00	+5.25		
VCO Supply Current	-	-	45	55	mA	
PLL Supply Current	-	-	12	20		
Reference Input (External)	Frequency	10 (square wave)	-	10	-	MHz
	Amplitude	1	-	1	-	V <sub>p-p</sub>
	Input impedance	-	-	100	-	KΩ
	Phase Noise @ 1 kHz offset	-	-	-145	-	dBc/Hz
RF Output port Impedance	-	-	50	-	Ω	
Digital Lock Detect	Locked	-	4.35	-	5.15	V
	Unlocked	-	-	-	0.40	V

**Absolute Maximum Ratings**

Parameters	Ratings
VCO Supply Voltage	5.9V
PLL Supply Voltage	5.9V
VCO Supply Voltage to PLL Supply Voltage	-0.3V to +5.5V
Reference Frequency Voltage	-0.3Vmin, VCC PLL +0.2Vmax
Data, Clock, LE Levels	-0.3Vmin, VCC PLL +0.2Vmax
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
	395	1.01	0.83	0.12	41.08	44.18	45.93	9.88	11.58

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
395	-26.77	-30.01	-33.42	-26.66	-29.85	-30.38

FREQUENCY	@TEMP.	PHASE NOISE (dBc/Hz)				
		@OFFSETS				
		100Hz	1kHz	10kHz	100kHz	1MHz
395	-45°C	-94.42	-107.60	-107.91	-136.67	-159.59
	+25°C	-99.56	-107.33	-107.67	-136.44	-159.13
	+85°C	-99.65	-108.80	-107.79	-134.73	-156.61

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 395MHz+(n*Fcomparison) (dBc) note 1		
	-45°C	+25°C	+85°C
n			
-5	-83.88	-91.85	-89.31
-4	-93.26	-87.51	-89.28
-3	-86.65	-92.75	-106.42
-2	-89.54	-91.32	-95.26
-1	-76.14	-84.59	-91.18
0 <sup>note 2</sup>	-	-	-
+1	-80.64	-84.59	-90.53
+2	-86.45	-92.79	-90.88
+3	-79.41	-86.16	-91.47
+4	-86.14	-91.12	-88.15
+5	-89.53	-96.34	-92.13

Note 1: Comparison frequency 5000 kHz  
 Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 395MHz+(n*Freference) (dBc) note 3		
	-45°C	+25°C	+85°C
n			
-5	-88.29	-98.04	-100.78
-4	-85.96	-93.49	-90.90
-3	-91.52	-97.18	-93.28
-2	-93.19	-87.46	-89.37
-1	-89.67	-91.31	-94.97
0 <sup>note 4</sup>	-	-	-
+1	-86.38	-92.89	-90.75
+2	-86.09	-91.16	-88.35
+3	-87.49	-86.73	-86.12
+4	-85.98	-94.45	-90.25
+5	-106.85	-90.97	-86.48

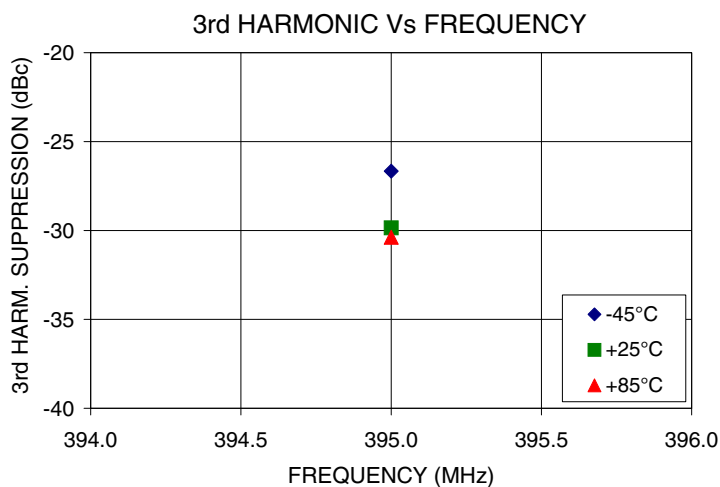
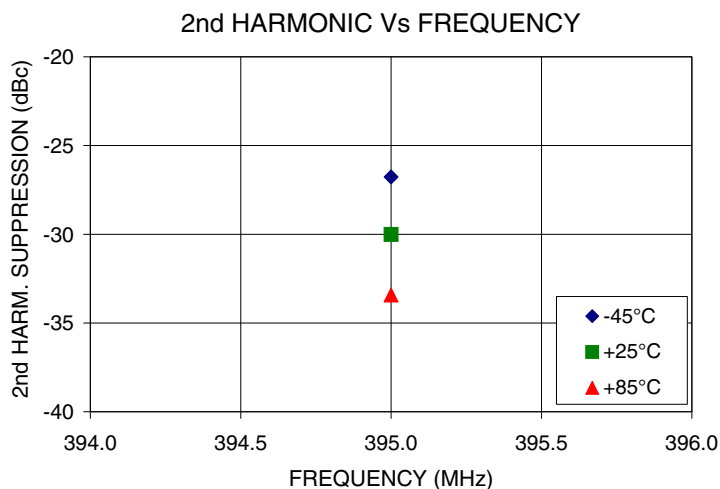
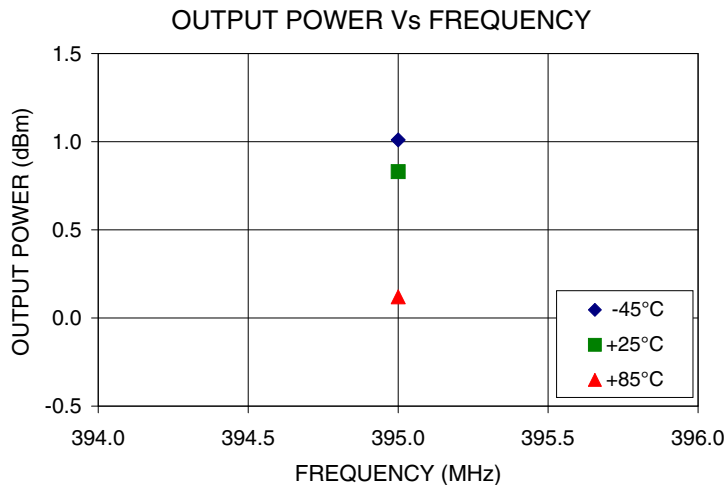
Note 3: Reference frequency 10 MHz  
 Note 4: All spurs are referenced to carrier signal (n=0).



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Typical Performance Curves



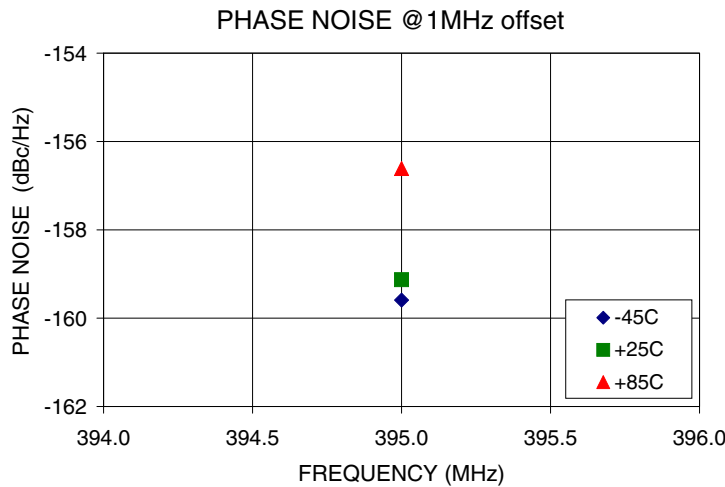
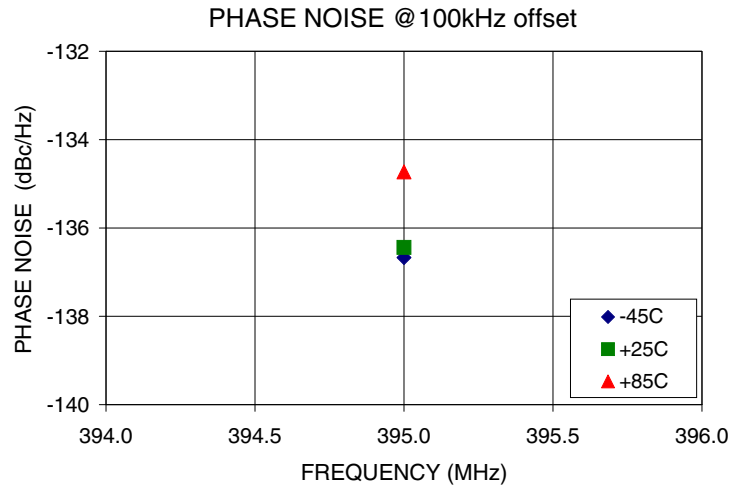
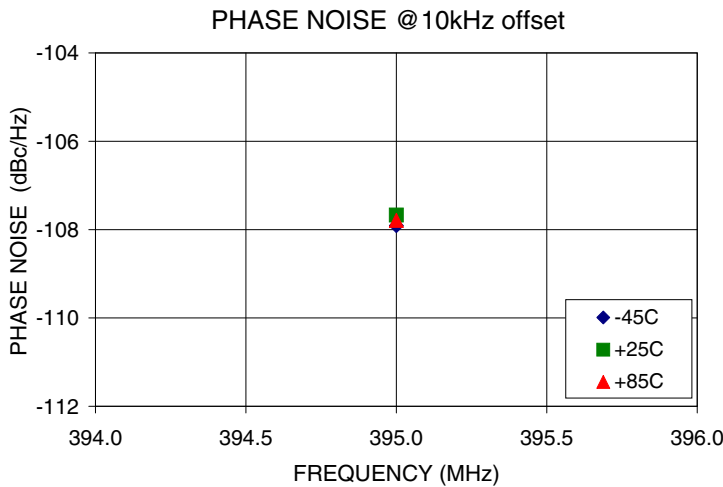
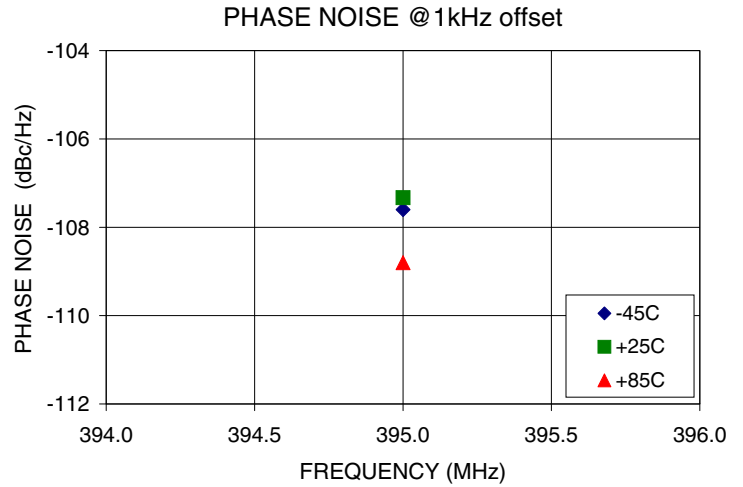
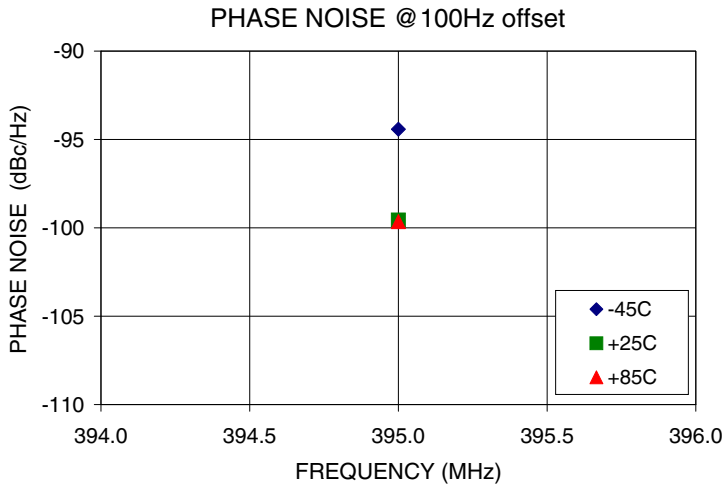
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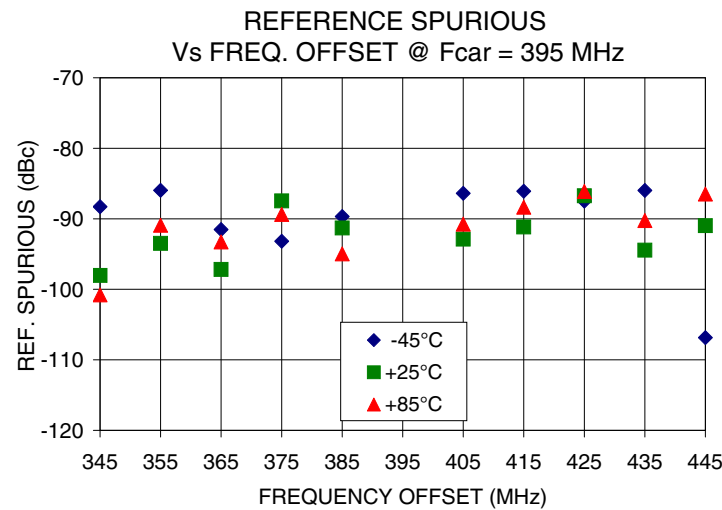
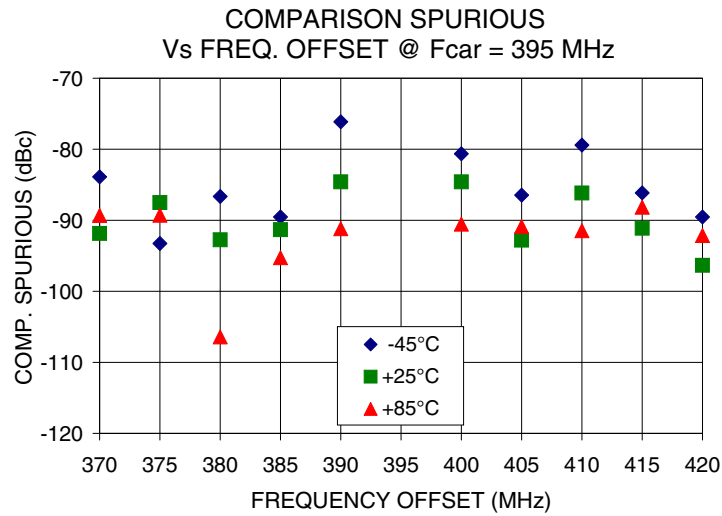
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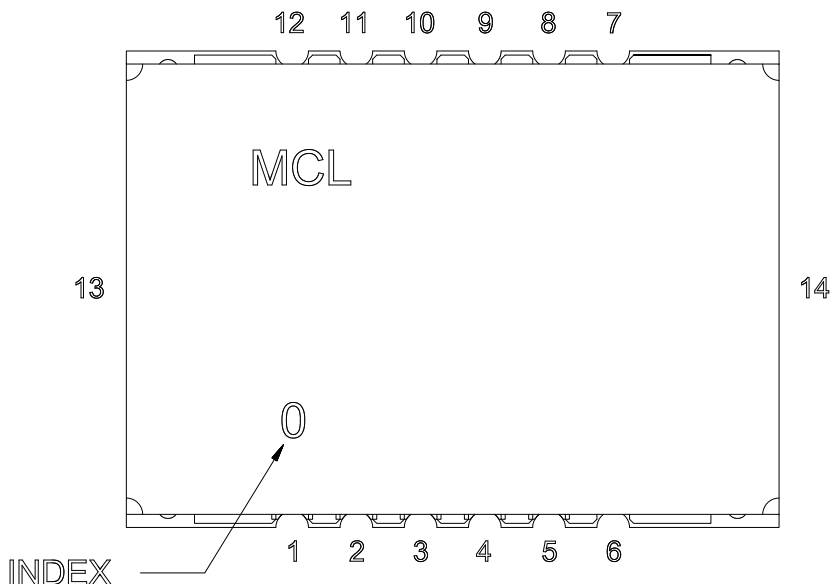


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Pin Configuration

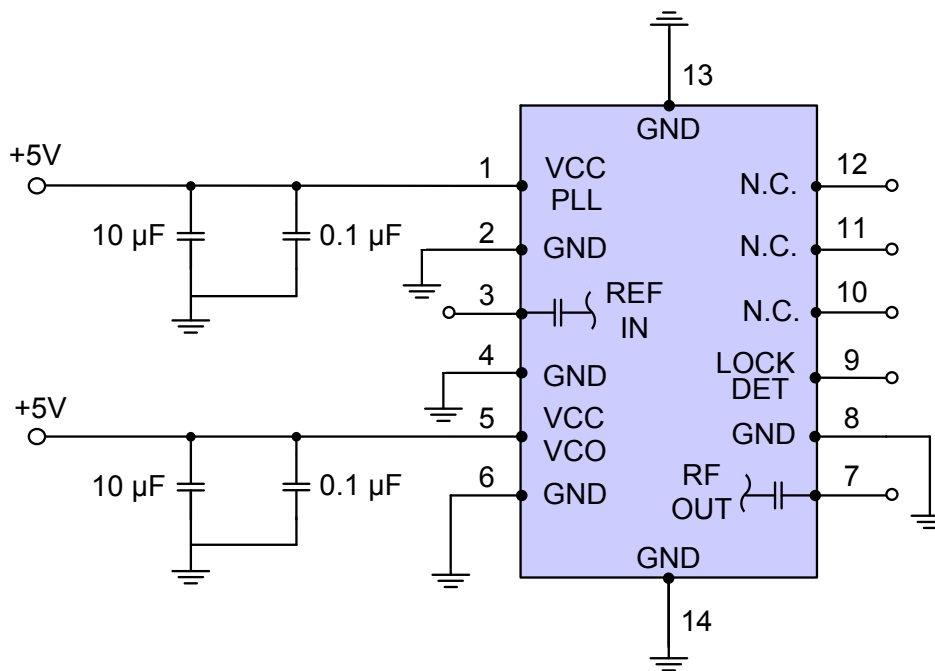


Pin Connection

Pin Number	Function
1	VCC PLL
2	GND
3	REF IN
4	GND
5	VCC VCO
6	GND
7	RF OUT
8	GND
9	LOCK DET
10	NOT CONNECTED
11	NOT CONNECTED
12	NOT CONNECTED
13	GND
14	GND

Recommended Application Circuit

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



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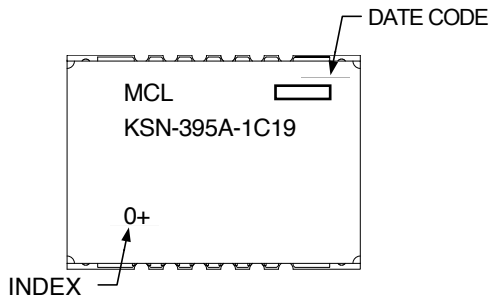
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**Device Marking**



**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+F

**Environment Ratings:** ENV03T2



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