

# Frequency Synthesizer

KSN-3700A+

50Ω     3700 MHz (fixed)

## The Big Deal

- Low phase noise and spurious
- Robust design and construction
- Small size 0.800" x 0.584" x 0.240"



CASE STYLE: DK1171

## Product Overview

The KSN-3700A+ is a Frequency Synthesizer, designed to operate 3700 MHz for Military & Avionics application. The KSN-3700A+ is packaged in a metal case (size of 0.800" x 0.584" x 0.240") 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: -97 dBc/Hz typ. @ 10 kHz offset</li><li>• Comparison Spurious: -90 dBc typ.</li><li>• Reference Spurious: -90 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-3700A+, 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, 0.800" x 0.584" x 0.240"	The small size enables the KSN-3700A+ to be used in compact designs.



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp).

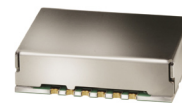
# Frequency Synthesizer

KSN-3700A+

50Ω 3700 MHz (fixed)

## Features

- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+3.3V)
- Small size 0.800" x 0.584" x 0.240"



CASE STYLE: DK1171

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.

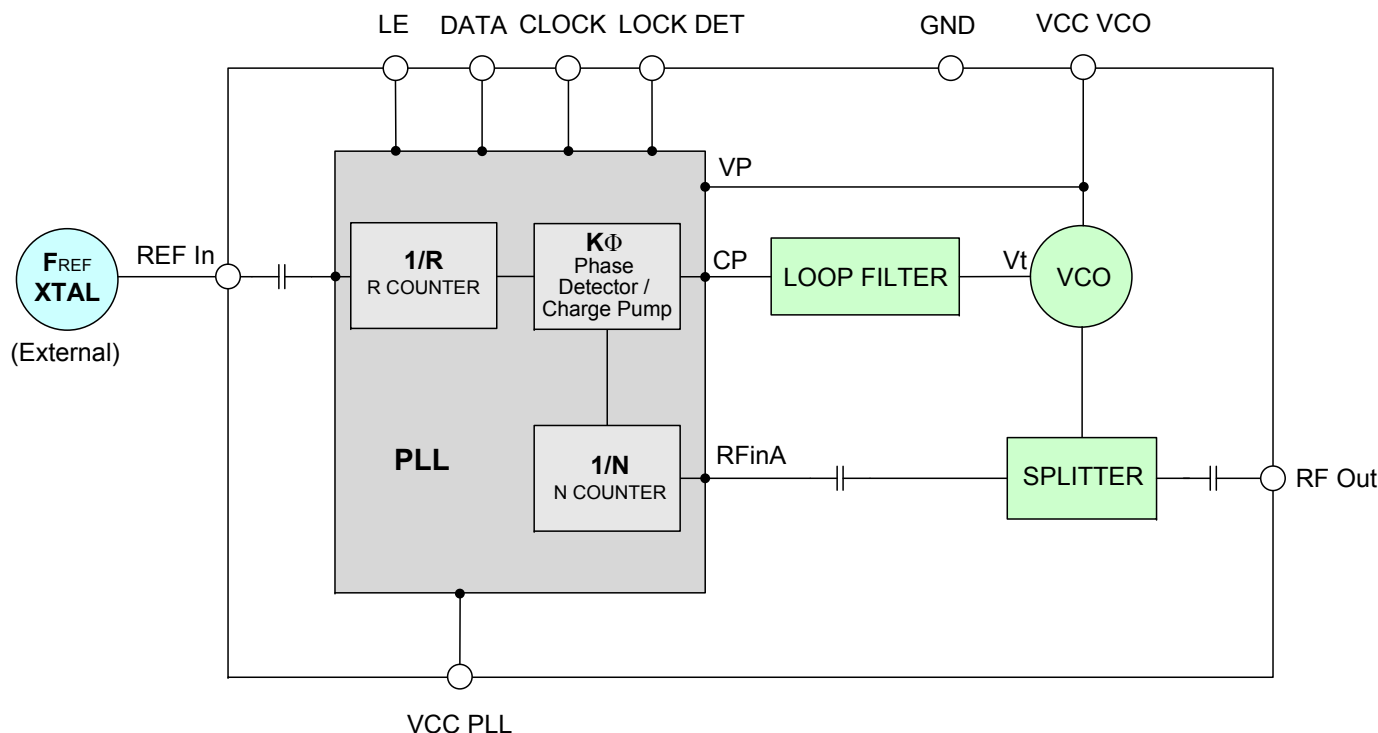
## Applications

- Military & Avionics

## General Description

The KSN-3700A+ is a Frequency Synthesizer, designed to operate 3700 MHz for Military & Avionics application. The KSN-3700A+ is packaged in a metal case (size of 0.800" x 0.584" x 0.240") to shield against unwanted signals and noise. To enhance the robustness of KSN-3700A+, 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



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCStore/terms.jsp](http://www.minicircuits.com/MCStore/terms.jsp).

REV. OR  
M128272  
EDR-9948/3MPF1  
KSN-3700A+  
Category-A3  
RAV  
101005  
Page 2 of 8

**Electrical Specifications** (over operating temperature -20°C to +85°C)

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	3700	-	3700	MHz
Step Size		-	-	20	-	MHz
Settling Time		Within $\pm 1$ kHz	-	0.3	0.6	mSec
Output Power		-	+1	+6	+9	dBm
SSB Phase Noise	@ 100 Hz offset		-	-82	-	dBc/Hz
	@ 1 kHz offset		-	-96	-88	
	@ 10 kHz offset		-	-97	-90	
	@ 100 kHz offset		-	-120	-115	
	@ 1 MHz offset		-	-143	-138	
Reference & Comparison Spurious Suppression		Ref. & Comp. Freq. 20 MHz	-	-90	-70	dBc
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-33	-20	
VCO Supply Voltage		+5.00	+4.75	+5.00	+5.25	V
PLL Supply Voltage		+3.30	+3.15	+3.30	+3.45	
VCO Supply Current		-	-	56	62	mA
PLL Supply Current		-	-	13	20	
Reference Input (External)	Frequency	20 (square wave)	-	20	-	MHz
	Amplitude	1	-	1	-	V <sub>P-P</sub>
	Input impedance	-	-	100	-	K $\Omega$
	Phase Noise @ 1 kHz offset	-	-	-145	-	dBc/Hz
RF Output port Impedance		-	-	50	-	$\Omega$
Input Logic Level	Input high voltage	-	2.80	-	-	V
	Input low voltage	-	-	-	0.60	V
Digital Lock Detect	Locked	-	2.75	-	3.85	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4106			
PLL Programming		-	3-wire serial 3.3V CMOS			
Register Map @ 3700 MHz	F_Register	-	(MSB) 010111111000000010010011 (LSB)			
	N_Register	-	(MSB) 000000000000101100100101 (LSB)			
	R_Register	-	(MSB) 00010000000000000000100 (LSB)			

**Absolute Maximum Ratings**

Parameters	Ratings
VCO Supply Voltage	5.8V
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



**IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED** RoHS compliant  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661  
**The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see** [minicircuits.com](http://minicircuits.com)  
Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCStore/terms.jsp](http://www.minicircuits.com/MCStore/terms.jsp).

## Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT			VCO CURRENT			PLL CURENT		
	(dBm)			(mA)			(mA)		
	-25°C	+25°C	+85°C	-25°C	+25°C	+85°C	-25°C	+25°C	+85°C
3700	6.96	6.14	3.31	54.57	55.65	57.05	11.60	12.72	14.16

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-25°C	+25°C	+85°C	-25°C	+25°C	+85°C
3700	-33.32	-33.76	-31.70	-36.40	-36.96	-48.74

FREQUENCY	@TEMP.	PHASE NOISE (dBc/Hz)				
		@ OFFSETS				
		100Hz	1kHz	10kHz	100kHz	1MHz
3700	-25°C	-84.73	-96.02	-96.25	-120.01	-142.50
	+25°C	-82.41	-97.10	-97.10	-120.39	-143.16
	+85°C	-81.39	-97.22	-98.37	-119.57	-142.26

REFERENCE & COMPARISON SPURIOUS ORDER n	REFERENCE & COMPARISON SPURIOUS @Fcarrier 3700MHz+(n*Freference) (dBc) note 1		
	-25°C	+25°C	+85°C
-5	-102.39	-99.16	-98.82
-4	-102.35	-100.10	-98.06
-3	-104.48	-101.26	-102.22
-2	-101.71	-103.35	-100.62
-1	-95.39	-89.11	-86.96
0 <sup>note 2</sup>	-	-	-
+1	-96.15	-88.74	-90.22
+2	-100.34	-97.75	-100.32
+3	-101.83	-98.78	-100.41
+4	-103.48	-100.10	-101.05
+5	-105.39	-113.23	-98.82

Note 1: Reference frequency = Comparison frequency = 20 MHz

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



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

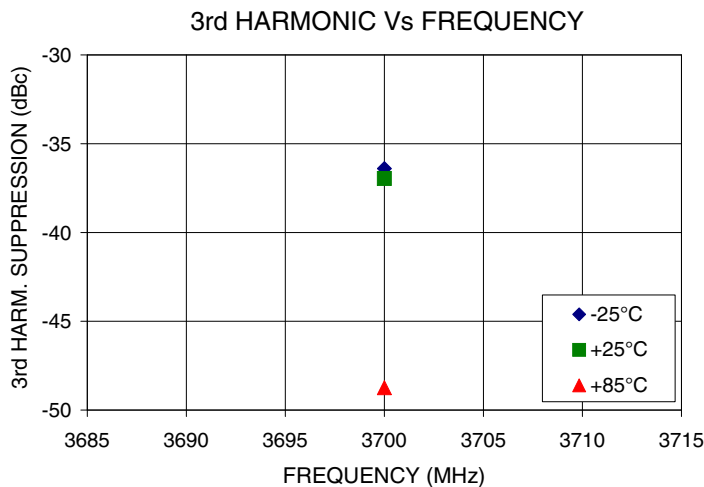
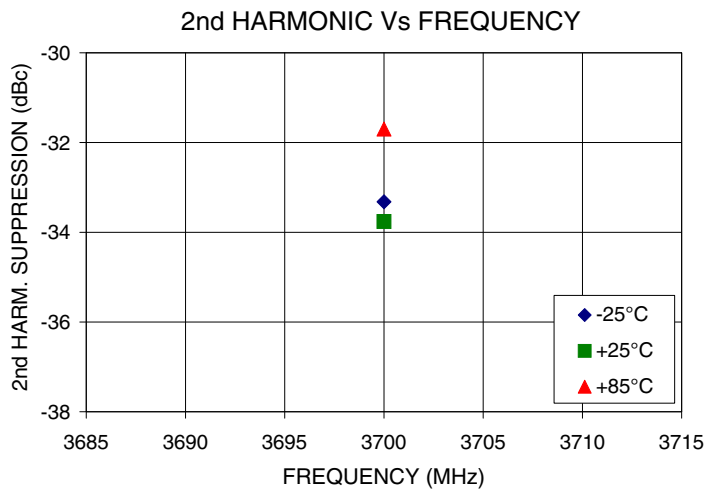
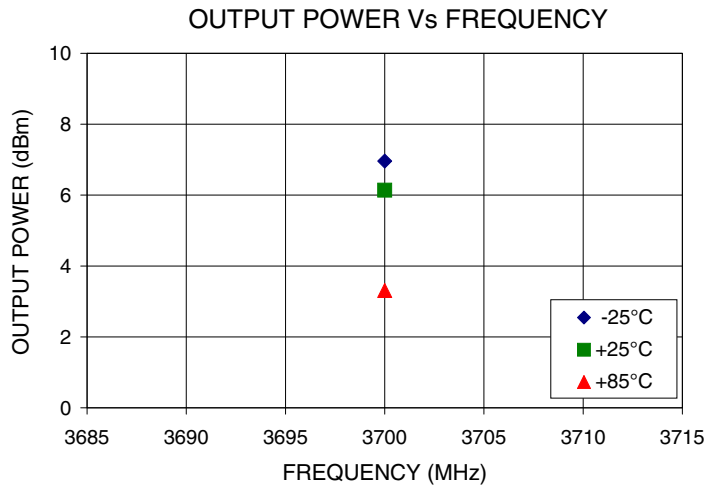


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp).

Typical Performance Curves



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

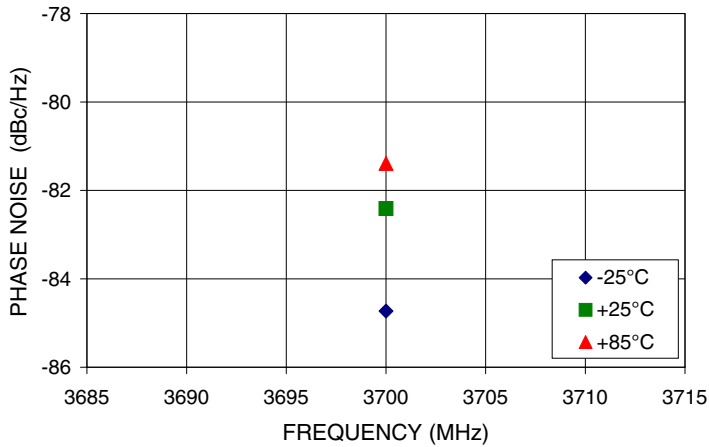


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

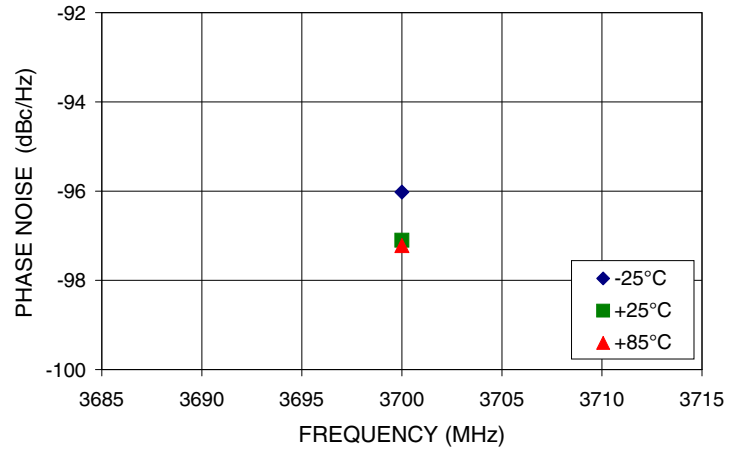


Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCStore/terms.jsp](http://www.minicircuits.com/MCStore/terms.jsp).

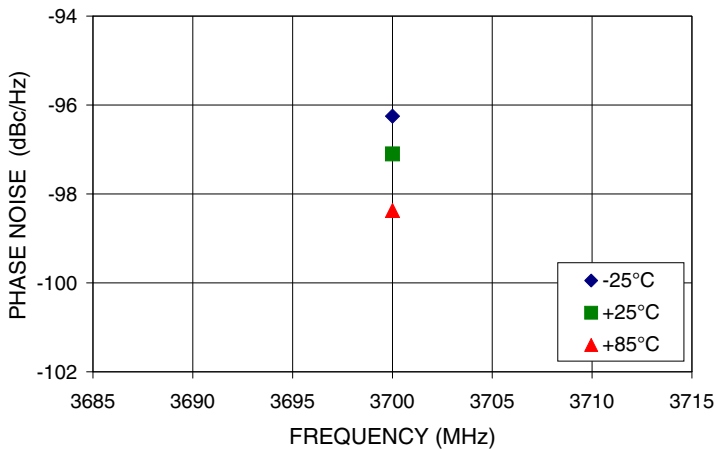
PHASE NOISE @ 100Hz offset



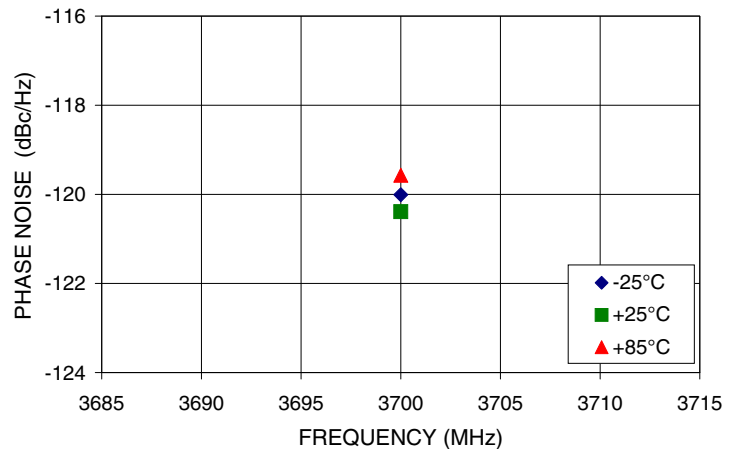
PHASE NOISE @ 1kHz offset



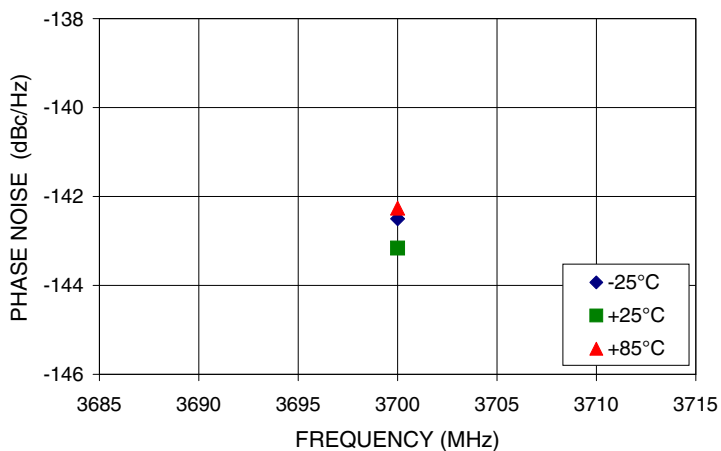
PHASE NOISE @ 10kHz offset



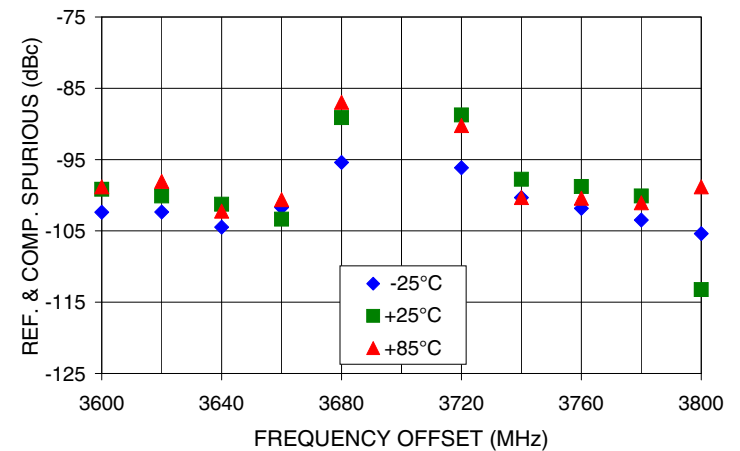
PHASE NOISE @ 100kHz offset



PHASE NOISE @ 1MHz offset



REFERENCE & COMPARISON SPURIOUS  
Vs FREQ. OFFSET @ Fcar = 3700MHz



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

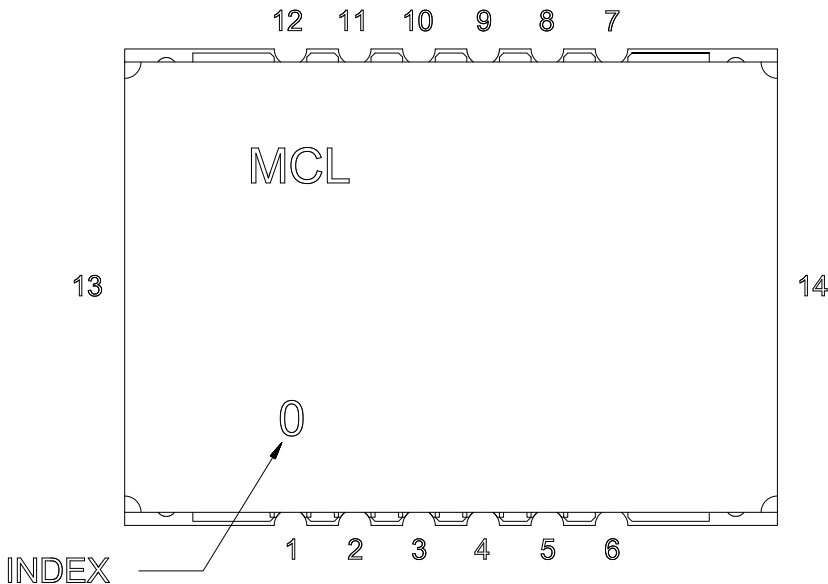


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp).

Pin Configuration

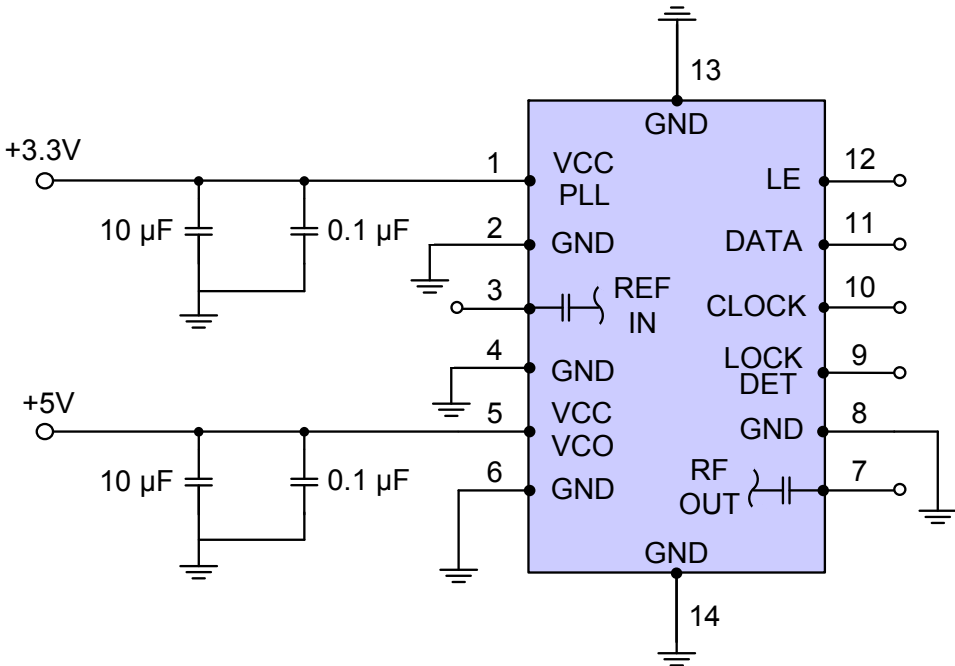


Pin Connection

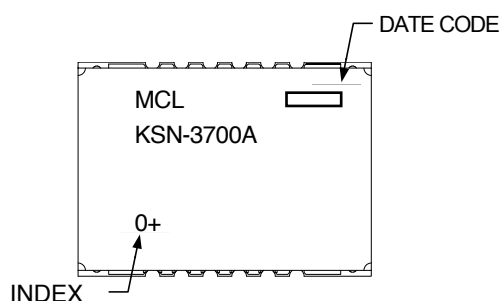
Pin Number	Function
1	VCC PLL
2	GND
3	REF IN
4	GND
5	VCC VCO
6	GND
7	RF OUT
8	GND
9	LOCK DET
10	CLOCK
11	DATA
12	LE
13	GND
14	GND

Recommended Application Circuit

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



## 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:** DK1171

**Tape & Reel:** TR-F28

**Suggested Layout for PCB Design:** PL-249

**Evaluation Board:** TB-567-1+

**Environment Ratings:** ENV03T2



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp).