NON-CATALOG

Frequency Synthesizer DSN-1750A-219+

50Ω 950 to 1750 MHz

The Big Deal

- Fractional N synthesizer
- Low phase noise and spurious
- Wide bandwidth

CASE STYLE: KL1294

Product Overview

The DSN-1750A-219+is a Frequency Synthesizer, designed to operate from 950 to 1750 MHz for Digial TV distribution application. The DSN-1750A-219+ is packaged in a metal case (size of 1.250" x 1.000" x 0.232") to shield against unwanted signals and noise.

Key Features

Feature	Advantages
Low phase noise and spurious: • Phase Noise: -100 dBc/Hz typ. @ 10 kHz offset • Step Size Spurious: -100 dBc typ. • Comparison Spurious: -90 dBc typ. • Reference Spurious: -90 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of DSN-1750A-219+, 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.

Surface Mount

NON-CATALOG

Frequency Synthesizer

DSN-1750A-219+

50Ω 950 to 1750 MHz

CASE STYLE: KL1294

+ 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.

Features

- Fractional N synthesizer
- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Operating voltage (VCC VCO=+8V, VCC PLL=+18V)
- Wide bandwidth

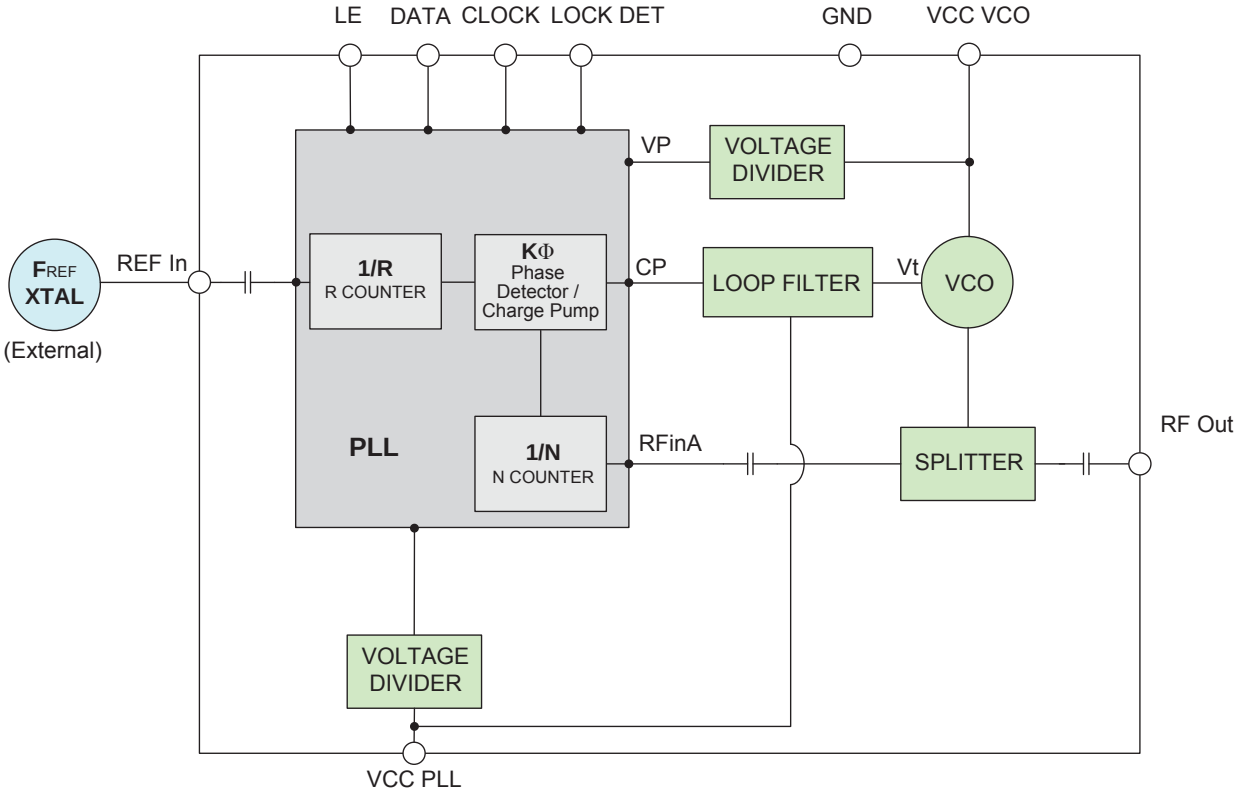
Applications

- Digital TV distribution

General Description

The DSN-1750A-219+ is a Frequency Synthesizer, designed to operate from 950 to 1750 MHz for Digital TV distribution application. The DSN-1750A-219+ is packaged in a metal case (size of 1.250" x 1.000" x 0.232") to shield against unwanted signals and noise. To enhance the robustness of DSN-1750A-219+, 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



REV. B
M149087
EDR-9820/1F1
DSN-1750A-219+
Category-F8
RAV
150101

Electrical Specifications *(over operating temperature -20°C to +70°C)*

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	950	-	1750	MHz
Step Size		-	-	2	-	MHz
Comparison Frequency		-	-	20	-	MHz
Settling Time		Within ± 1 kHz	-	2	-	mSec
Output Power		-	-1.0	+2.2	+5.0	dBm
SSB Phase Noise		@ 100 Hz offset	-	-88	-	dBc/Hz
		@ 1 kHz offset	-	-99	-93	
		@ 10 kHz offset	-	-100	-95	
		@ 100 kHz offset	-	-116	-110	
		@ 1 MHz offset	-	-140	-132	
Integrated SSB Phase Noise		@ 100 Hz to 1MHz	-	-50	-	dBc
Step Size Spurious Suppression		Step Size 2 MHz	-	-100	-85	dBc
0.5 Step Size Spurious Suppression		0.5 Step Size 1 MHz	-	-105	-85	
Reference Spurious Suppression		Ref. Freq. 10 MHz	-	-90	-75	
Comparison Spurious Suppression		Comp. Freq. 20 MHz	-	-90	-74	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-27	-15	
VCO Supply Voltage		+8.0	+7.6	+8.0	+8.4	V
PLL Supply Voltage		+18.0	+17.5	+18.0	+18.5	
VCO Supply Current		-	-	55	62	mA
PLL Supply Current		-	-	20	29	
Reference Input (External)	Frequency	10 (square wave)	-	10	-	MHz
	Amplitude	1	-	1	-	V_{P-P}
	Input impedance	-	-	100	-	KΩ
	Phase Noise @ 1 kHz offset	-	-	-145	-	dBc/Hz
RF Output port Impedance		-	-	50	-	Ω
Input Logic Level	Input high voltage	-	2.55	-	-	V
	Input low voltage	-	-	-	0.60	V
Digital Lock Detect	Locked	-	2.00	-	2.90	V
	Unlocked	-	-	-	0.4	V
Frequency Synthesizer PLL		-	ADF4153			
PLL Programming		-	3-wire serial 3V CMOS			
Register Map @ 1750 MHz	R0_Register	-	(MSB) 10101110000000010100 (LSB)			
	R1_Register	-	(MSB) 10000010000000101001 (LSB)			
	R2_Register *	-	(MSB) 10XYZ1100010 (LSB)			
	R3_Register	-	(MSB) 1111000111 (LSB)			

*** Refer to Charge Pump Settings**

FREQ.LOCK [MHz]	Charge Pump Settings		
	X	Y	Z
950 - 1098	0	0	1
1100 - 1448	1	0	0
1450 - 1548	1	0	1
1550 - 1698	1	1	0
1700 - 1750	1	1	1

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	9V
PLL Supply Voltage	19V
VCO Supply Voltage to PLL Supply Voltage	N.A
Reference Frequency Voltage	-0.3Vmin, +3.45Vmax
Data, Clock, LE Levels	-0.3Vmin, +3.45Vmax
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

Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURENT (mA)		
	-25°C	+25°C	+75°C	-25°C	+25°C	+75°C	-25°C	+25°C	+75°C
950	2.66	2.56	2.27	53.61	54.38	54.95	20.52	21.81	24.18
990	2.60	2.47	2.18	53.69	54.48	55.07	20.53	21.83	24.21
1080	2.37	2.25	1.98	53.89	54.70	55.26	18.67	19.95	22.31
1170	2.19	2.08	1.83	54.27	55.05	55.60	20.53	21.83	24.24
1260	2.11	2.02	1.79	54.52	55.32	55.86	18.67	19.95	22.33
1350	2.06	2.00	1.78	54.80	55.59	56.15	20.53	21.83	24.25
1440	2.07	2.02	1.83	55.08	55.89	56.42	18.66	19.94	22.34
1530	2.16	2.09	1.92	55.46	56.28	56.83	20.53	21.83	24.27
1620	2.18	2.10	1.94	55.82	56.63	57.15	18.66	19.94	22.34
1710	2.22	2.15	1.97	56.05	56.90	57.38	20.53	21.82	24.27
1750	2.24	2.16	1.96	56.07	56.91	57.43	20.51	21.81	24.27

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-25°C	+25°C	+75°C	-25°C	+25°C	+75°C
950	-20.40	-24.15	-30.38	-20.40	-21.64	-25.30
990	-21.63	-25.67	-33.88	-21.63	-22.19	-25.49
1080	-24.84	-28.85	-35.91	-24.84	-23.62	-26.48
1170	-25.64	-27.44	-29.25	-25.64	-28.87	-31.67
1260	-23.95	-24.89	-26.07	-23.95	-31.24	-32.84
1350	-23.45	-24.03	-24.97	-23.45	-33.22	-33.97
1440	-24.93	-25.39	-25.94	-24.93	-35.82	-35.87
1530	-29.75	-29.77	-29.50	-29.75	-37.53	-37.10
1620	-38.30	-35.00	-31.73	-38.30	-40.75	-41.10
1710	-33.88	-32.10	-29.70	-33.88	-47.13	-46.66
1750	-32.24	-30.85	-28.95	-32.24	-45.53	-45.96

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
950	-91.93	-101.39	-101.77	-115.16	-137.84
990	-92.49	-102.16	-101.76	-115.73	-138.61
1080	-91.88	-101.87	-101.03	-116.37	-139.75
1170	-90.18	-99.97	-101.80	-116.01	-139.57
1260	-90.94	-101.46	-101.11	-115.77	-140.27
1350	-87.03	-100.37	-100.52	-115.99	-140.17
1440	-89.96	-100.79	-99.23	-116.18	-140.29
1530	-87.59	-98.76	-99.71	-116.03	-140.61
1620	-87.45	-98.19	-99.38	-116.23	-140.90
1710	-89.98	-97.49	-99.48	-116.42	-140.94
1750	-85.48	-98.91	-98.52	-116.49	-141.33

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS -25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
950	-93.14	-100.58	-102.27	-116.10	-139.42
990	-87.99	-100.48	-102.72	-116.60	-139.97
1080	-88.73	-101.91	-101.45	-117.22	-140.75
1170	-89.15	-99.37	-102.12	-116.61	-140.24
1260	-89.85	-100.75	-101.71	-116.16	-140.79
1350	-86.60	-98.52	-101.11	-116.15	-140.49
1440	-87.54	-97.77	-99.55	-116.49	-140.51
1530	-86.50	-98.48	-99.58	-116.26	-140.30
1620	-88.08	-97.20	-99.84	-116.30	-141.03
1710	-89.18	-96.53	-99.14	-116.68	-141.17
1750	-87.43	-97.22	-98.83	-116.87	-141.37

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +75°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
950	-90.06	-105.66	-102.26	-113.36	-135.60
990	-90.07	-103.65	-100.81	-114.41	-136.76
1080	-89.19	-102.75	-101.17	-115.23	-138.28
1170	-87.48	-101.43	-101.74	-114.90	-138.80
1260	-87.55	-99.73	-101.52	-114.92	-139.32
1350	-86.48	-99.65	-100.15	-115.12	-139.50
1440	-85.34	-100.69	-99.31	-115.52	-140.01
1530	-84.00	-99.66	-100.00	-115.40	-140.26
1620	-88.38	-98.26	-99.99	-115.56	-140.65
1710	-86.07	-99.77	-98.79	-115.70	-140.60
1750	-83.52	-96.87	-98.93	-115.96	-140.81

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 950MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1350MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1750MHz+(n*Fcomparison) (dBc) note 1		
n	-25°C	+25°C	+75°C	-25°C	+25°C	+75°C	-25°C	+25°C	+75°C
-5	-99.27	-98.47	-103.14	-85.53	-88.63	-90.71	-93.20	-83.50	-88.64
-4	-92.46	-96.89	-91.08	-82.80	-88.73	-100.24	-90.96	-84.61	-88.20
-3	-91.02	-96.56	-91.60	-83.25	-90.67	-98.61	-90.74	-85.87	-92.82
-2	-92.42	-92.49	-106.82	-83.81	-93.92	-105.72	-94.21	-88.33	-104.65
-1	-98.43	-103.21	-94.61	-84.57	-88.61	-93.59	-90.26	-90.61	-96.06
0 note 2	-	-	-	-	-	-	-	-	-
+1	-91.57	-89.48	-83.46	-95.98	-86.85	-92.33	-93.16	-89.60	-95.36
+2	-94.20	-94.96	-84.17	-96.50	-85.92	-91.85	-97.38	-90.23	-96.81
+3	-93.31	-94.90	-87.71	-89.58	-85.11	-93.94	-107.52	-90.40	-91.80
+4	-91.51	-95.05	-94.99	-90.35	-85.93	-94.69	-96.34	-97.06	-90.29
+5	-95.95	-102.43	-100.24	-92.39	-89.10	-94.72	-94.25	-93.61	-95.07

Note 1: Comparison frequency 20 MHz
Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 950MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1350MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1750MHz+(n*Freference) (dBc) note 3		
n	-25°C	+25°C	+75°C	-25°C	+25°C	+75°C	-25°C	+25°C	+75°C
-5	-94.90	-99.85	-95.98	-102.77	-100.86	-105.89	-93.25	-93.52	-104.11
-4	-92.42	-92.49	-106.82	-83.81	-93.92	-105.72	-94.21	-88.33	-104.65
-3	-94.50	-105.82	-96.93	-95.62	-100.45	-111.01	-94.22	-97.37	-97.53
-2	-98.43	-103.21	-94.61	-84.57	-88.61	-93.59	-90.26	-90.61	-96.06
-1	-90.96	-93.79	-92.61	-92.52	-97.50	-102.43	-97.01	-117.26	-92.71
0 note 4	-	-	-	-	-	-	-	-	-
+1	-93.60	-91.88	-100.45	-94.42	-92.68	-97.29	-98.04	-101.83	-108.71
+2	-91.57	-89.48	-83.46	-95.98	-86.85	-92.33	-93.16	-89.60	-95.36
+3	-94.63	-102.22	-99.87	-99.81	-96.51	-106.36	-99.08	-102.73	-101.37
+4	-94.20	-94.96	-84.17	-96.50	-85.92	-91.85	-97.38	-90.23	-96.81
+5	-95.43	-100.83	-99.71	-107.66	-98.72	-109.75	-100.02	-106.59	-95.40

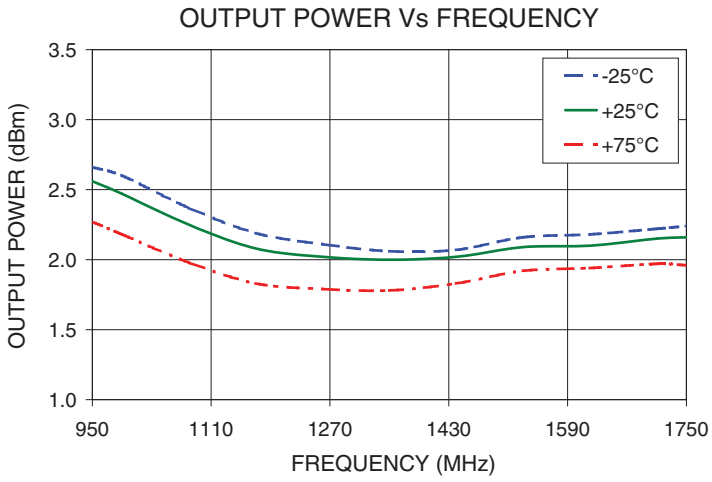
Note 3: Reference frequency 10 MHz
Note 4: All spurs are referenced to carrier signal (n=0).

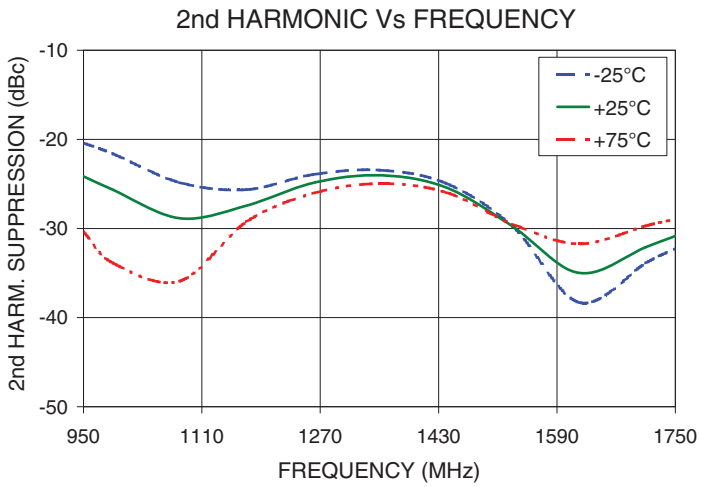
STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 950MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1350MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1750MHz+(n*Fstep size) (dBc) note 5		
n	-25°C	+25°C	+75°C	-25°C	+25°C	+75°C	-25°C	+25°C	+75°C
-4.0	-114.28	-117.11	-106.54	-106.79	-114.49	-106.07	-110.12	-114.12	-107.99
-3.5	-109.53	-111.48	-114.80	-112.59	-112.04	-117.18	-113.65	-121.10	-110.37
-3.0	-117.12	-121.90	-107.53	-117.80	-121.60	-116.63	-117.94	-118.53	-113.68
-2.5	-114.43	-105.48	-102.65	-107.77	-103.08	-100.65	-112.16	-114.45	-111.40
-2.0	-108.93	-107.78	-105.74	-104.67	-107.48	-100.53	-108.55	-110.32	-111.34
-1.5	-107.43	-107.41	-105.49	-115.89	-115.53	-117.14	-113.32	-116.47	-117.82
-1.0	-115.46	-102.53	-96.12	-103.32	-112.62	-102.15	-102.51	-107.28	-105.06
-0.5	-107.55	-107.29	-98.44	-114.32	-111.07	-107.02	-108.95	-111.19	-111.11
0 note 6	-	-	-	-	-	-	-	-	-
+0.5	-109.27	-105.43	-100.24	-115.72	-111.06	-106.98	-110.75	-113.91	-112.34
+1.0	-113.74	-102.96	-98.53	-102.41	-118.13	-106.33	-104.96	-107.14	-110.55
+1.5	-112.12	-109.89	-108.96	-114.02	-109.19	-114.20	-110.42	-109.66	-114.41
+2.0	-106.09	-110.50	-106.56	-105.75	-107.64	-102.45	-106.83	-108.25	-110.22
+2.5	-109.29	-107.01	-104.28	-108.37	-104.95	-102.63	-108.73	-111.56	-110.35
+3.0	-109.20	-112.59	-111.30	-115.50	-121.19	-117.89	-117.97	-116.71	-117.67
+3.5	-111.73	-114.56	-119.46	-116.87	-114.33	-117.62	-115.64	-117.04	-118.54
+4.0	-113.49	-121.48	-116.04	-107.54	-113.48	-109.29	-113.06	-118.78	-117.26

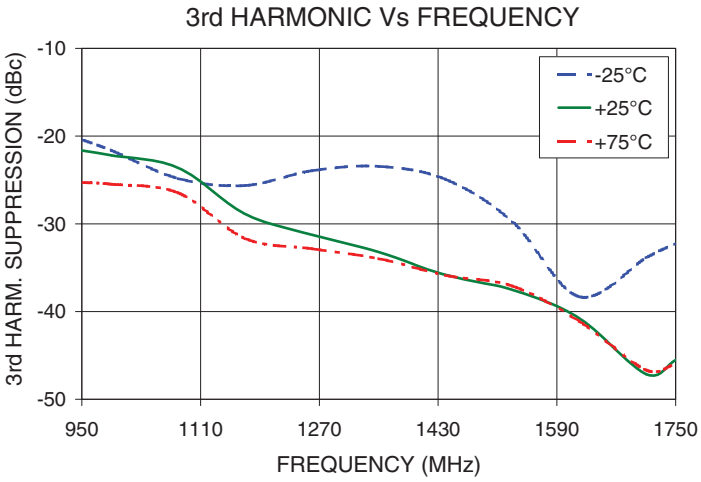
Note 5: Step size 2 MHz

Note 6: All spurs are referenced to carrier signal (n=0).

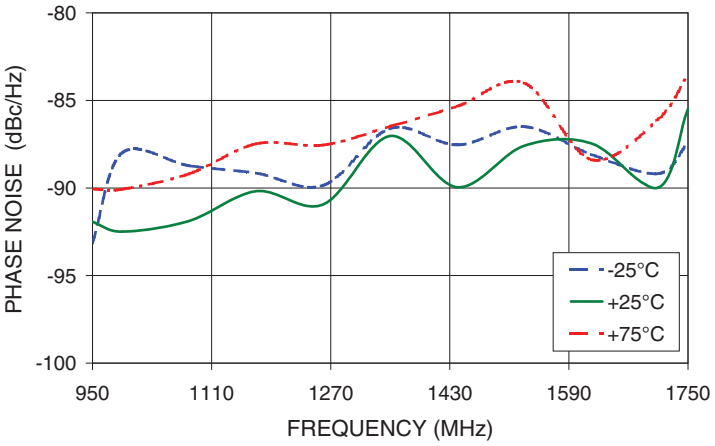
Typical Performance Curves



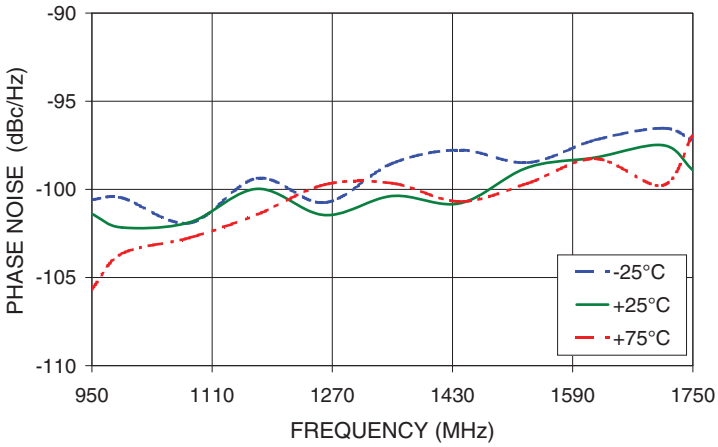




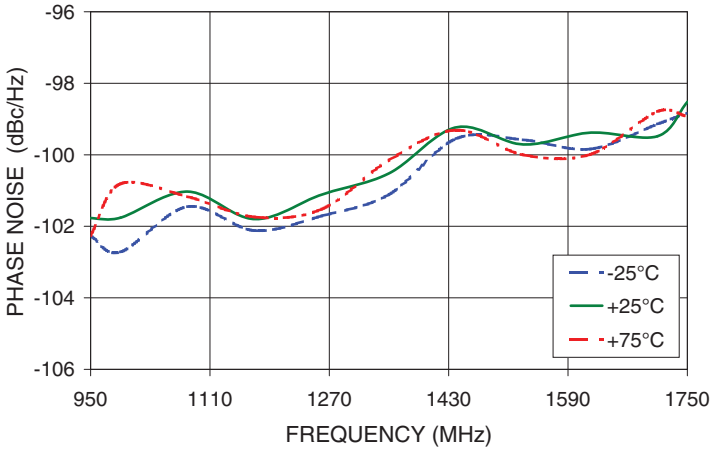
PHASE NOISE @100Hz offset



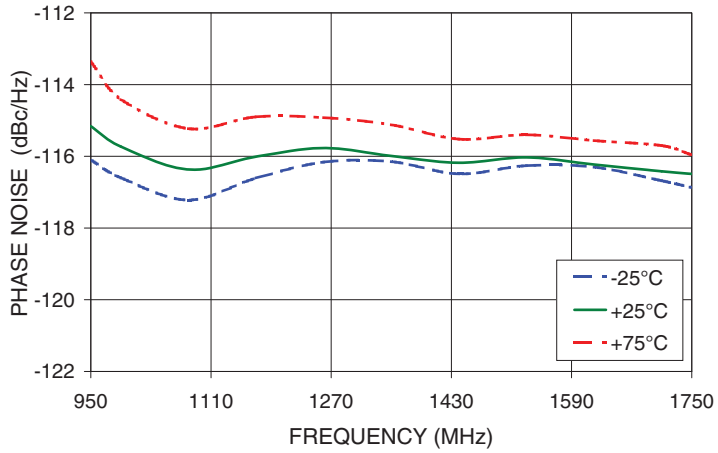
PHASE NOISE @1kHz offset



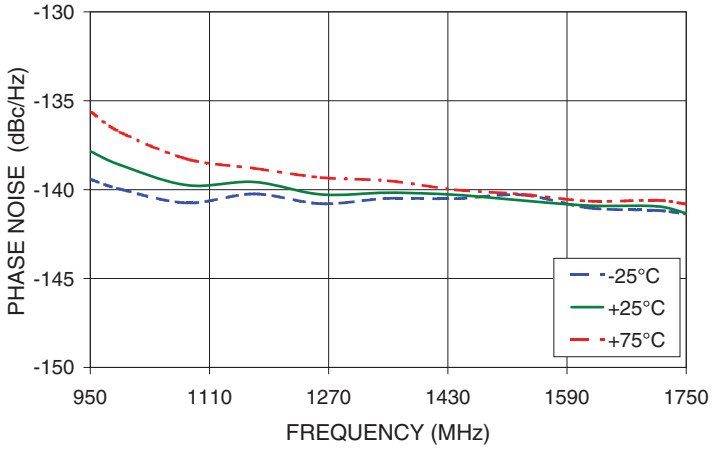
PHASE NOISE @10kHz offset



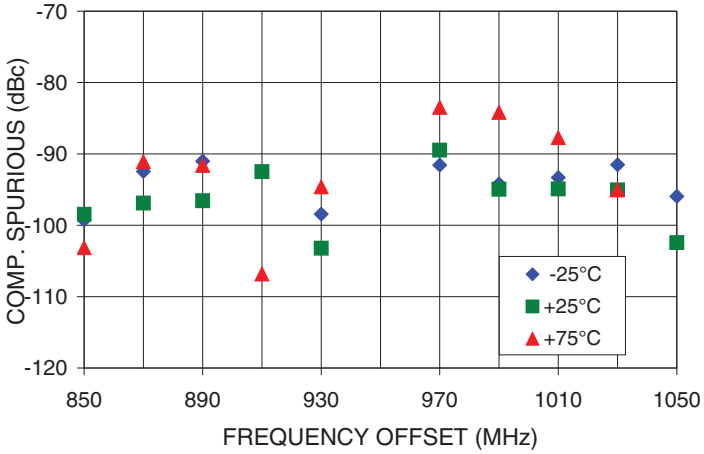
PHASE NOISE @100kHz offset



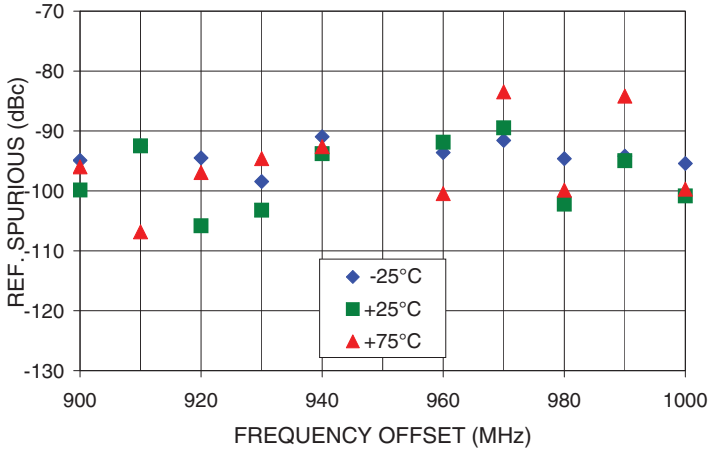
PHASE NOISE @1MHz offset



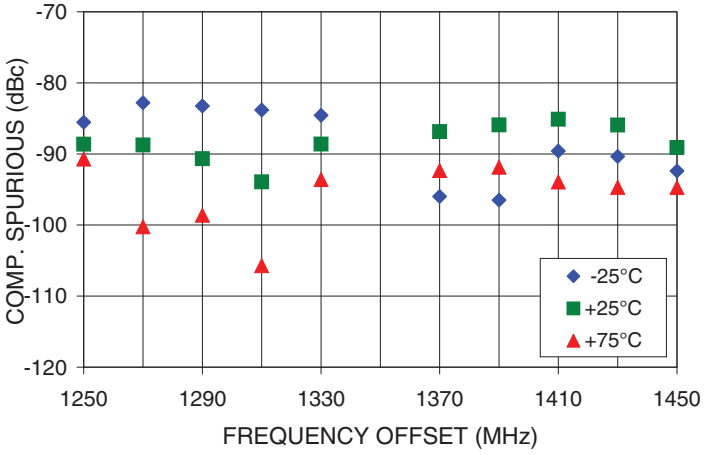
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 950MHz



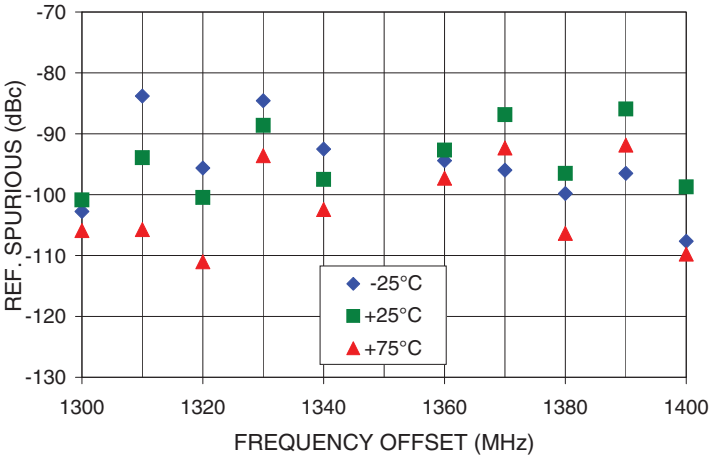
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 950MHz



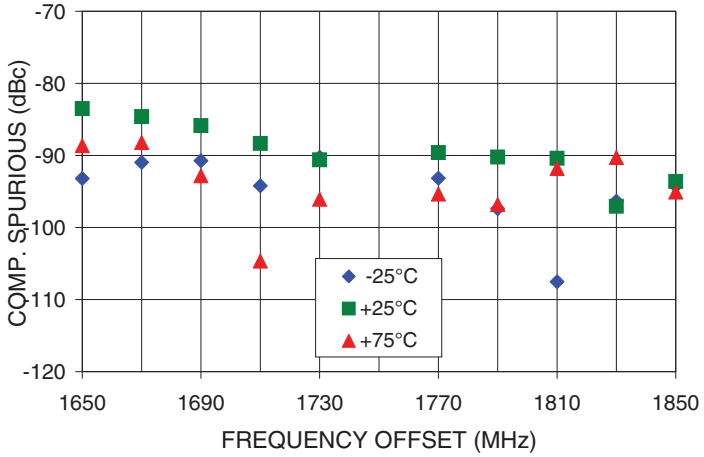
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1350MHz



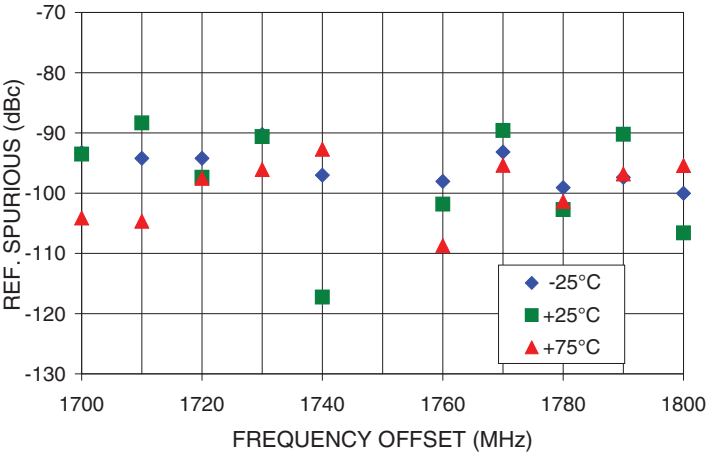
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1350MHz



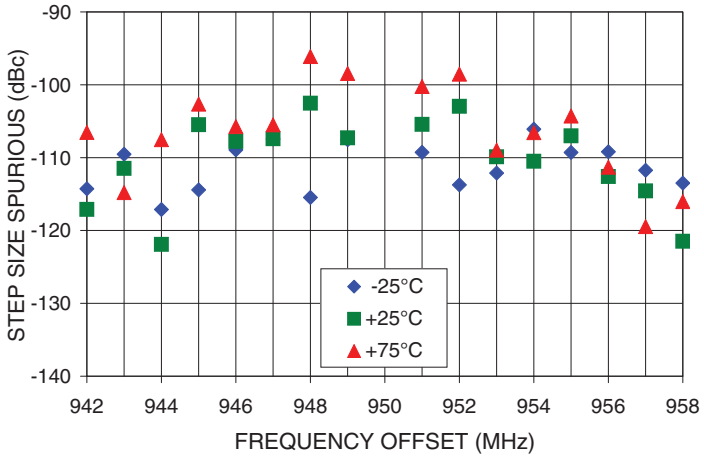
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1750MHz



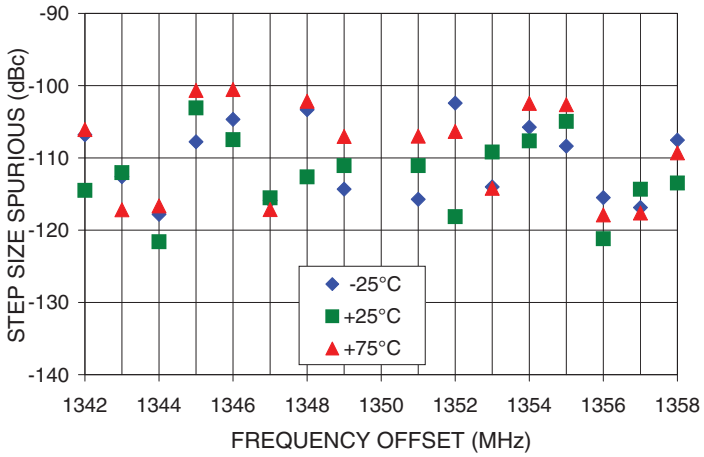
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1750MHz



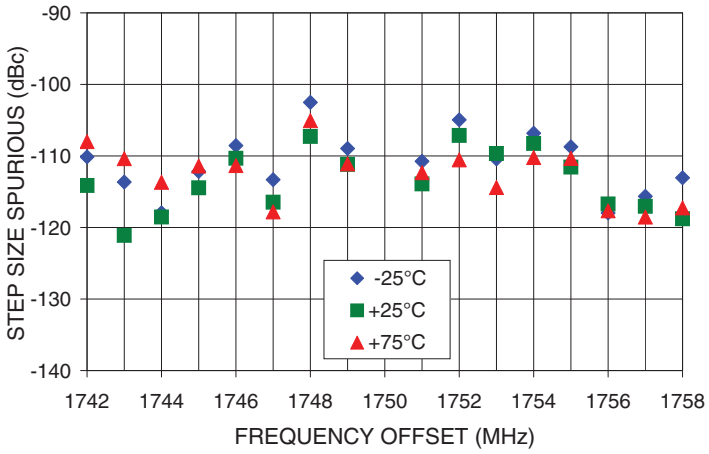
0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 950MHz



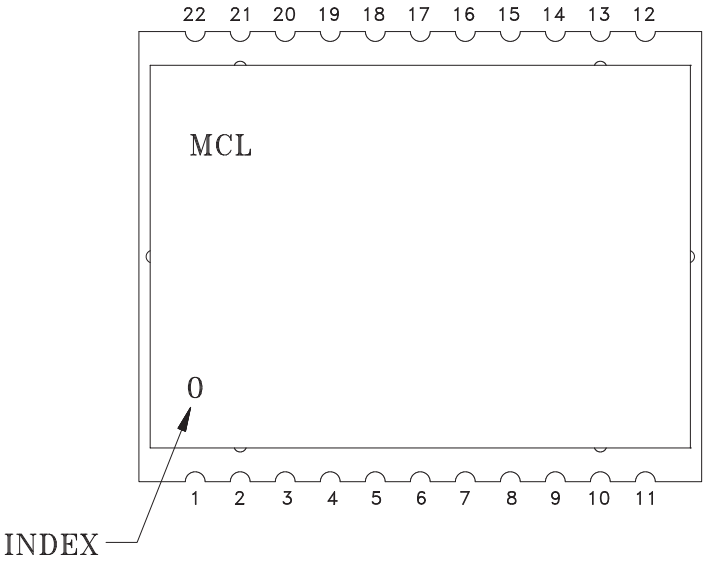
0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1350MHz



0.5 STEP SIZE & STEP SIZE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1750MHz



Pin Configuration

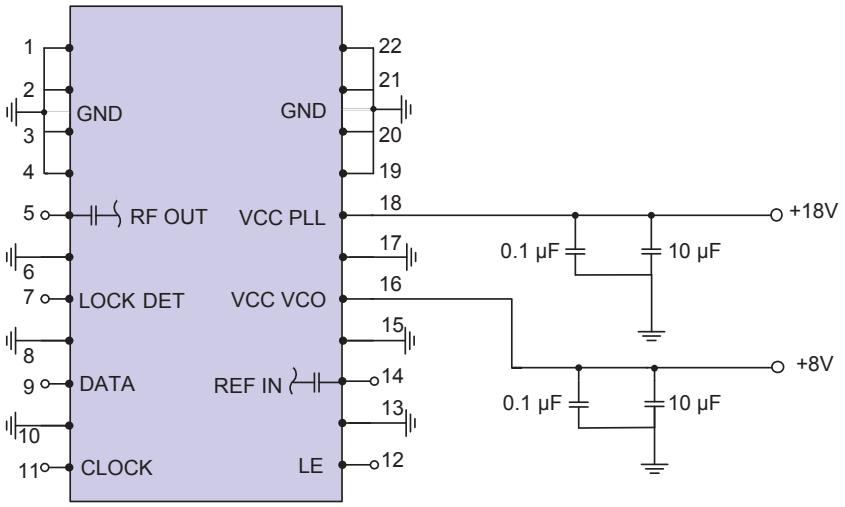


Pin Connection

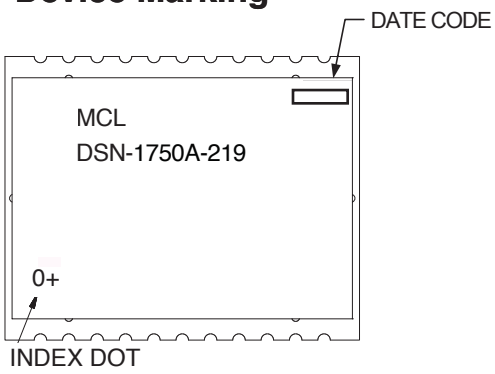
Pin Number	Function	Pin Number	Function
1	GND	12	LE
2	GND	13	GND
3	GND	14	REF IN
4	GND	15	GND
5	RF OUT	16	VCC VCO
6	GND	17	GND
7	LOCK DET	18	VCC PLL
8	GND	19	GND
9	DATA	20	GND
10	GND	21	GND
11	CLOCK	22	GND

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: KL1294

Tape & Reel: TR-F97

Suggested Layout for PCB Design: PL-318

Evaluation Board: TB-553+

Environment Ratings: ENV03T2