

Frequency Synthesizer

DSN-3500A-119+

50Ω 2700 to 3500 MHz

The Big Deal

- Low phase noise and spurious
- Robust design and construction



CASE STYLE: KL1294

Product Overview

The DSN-3500A-119+ is a Frequency Synthesizer, designed to operate from 2700 to 3500 MHz for VSAT application. The DSN-3500A-119+ 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: -85 dBc/Hz typ. @ 10 kHz offset • Comparison Spurious: -85 dBc typ. • Reference Spurious: -95 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of DSN-3500A-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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For detailed performance specs
& shopping online see web site

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.

50Ω 2700 to 3500 MHz

Features

- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+16V)



CASE STYLE: KL1294

PRICE: \$45.95 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.

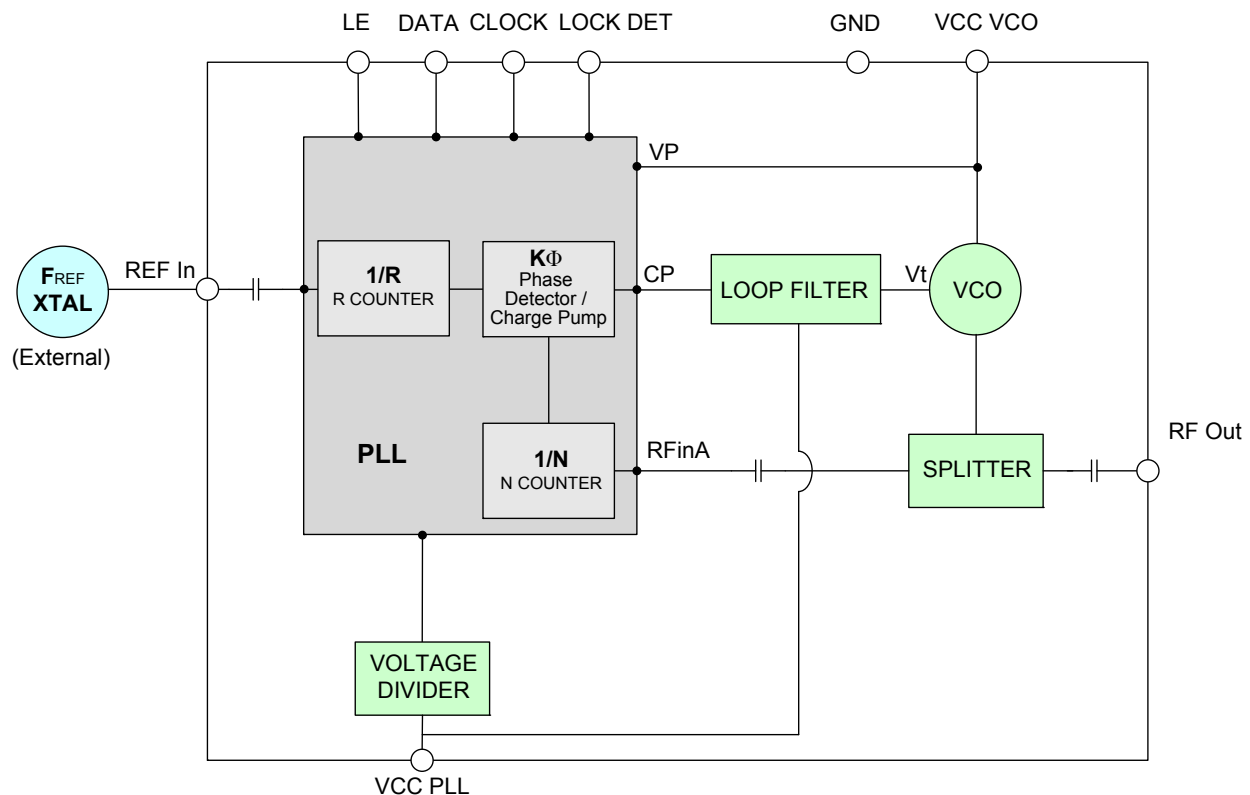
Applications

- VSAT

General Description

The DSN-3500A-119+ is a Frequency Synthesizer, designed to operate from 2700 to 3500 MHz for VSAT application. The DSN-3500A-119+ 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-3500A-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



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

Parameters					Test Conditions	Min.	Typ.	Max.	Units						
Frequency Range					-	2700	-	3500	MHz						
Step Size					-	-	1000	-	kHz						
Settling Time					Within $\pm$ 1 kHz	-	15	-	mSec						
Output Power					-	0	+3.2	+6.0	dBm						
SSB Phase Noise					@ 100 Hz offset	-	-74	-	dBc/Hz						
					@ 1 kHz offset	-	-88	-82							
					@ 10 kHz offset	-	-85	-79							
					@ 100 kHz offset	-	-105	-100							
					@ 1 MHz offset	-	-137	-133							
Reference Spurious Suppression					Ref. Freq. 10 MHz	-	-95	-75	dBc						
Comparison Spurious Suppression					Step Size 1000 kHz	-	-85	-65							
Non - Harmonic Spurious Suppression					-	-	-90	-							
Harmonic Suppression					-	-	-25	-15							
VCO Supply Voltage					+5.00	+4.75	+5.00	+5.25	V						
PLL Supply Voltage					+16.00	+15.75	+16.00	+16.25							
VCO Supply Current					-	-	50	55	mA						
PLL Supply Current					-	-	16	23							
Reference Input (External)		Frequency			10 (square wave)	-	10	-	MHz						
		Amplitude			1	-	1	-	V _{P-P}						
		Input impedance			-	-	100	-	K Ω						
		Phase Noise @ 1 kHz offset			-	-	-145	-	dBc/Hz						
RF Output port Impedance					-	-	50	-	Ω						
Input Logic Level		Input high voltage			-	2.65	-	-	V						
		Input low voltage			-	-	-	0.65	V						
Digital Lock Detect		Locked			-	2.15	-	2.90	V						
		Unlocked			-	-	-	0.40	V						
Frequency Synthesizer PLL					-	ADF4106									
PLL Programming					-	3-wire serial 3.3V CMOS									
Register Map ^{NOTE 1}	F_Register ^{NOTE 2}	Prescaler Value	Power-Down 2	Current Setting 2		Current Setting 1	Timer Counter Control	Fastlock Mode	Fastlock Enable	CP Three-State	PD Polarity	Muxout Control	Power-Down 1	Counter Reset	Control Bits
		01	0	111		111	0000	0	0	0	0	001	0	0	10
	N_Register @ 3500 MHz	Reserved	CP Gain	13-Bit B Counter								6-Bit A Counter			Control Bits
		00	1	0000011011010								001100			01
	R_Register	Reserved		Lock Detect Precision	Test Mode Bits	Anti-Backlash Width	14-BIT Reference Counter, R								Control Bits
	000		1	00	00	00000000001010								00	

Note 1: Registers Load Sequence: Initialization Register, F Register, R Register, N Register.**Note 2:** For the Initialization Register use Register F with Control Bits 11.**Absolute Maximum Ratings**

Parameters	Ratings
VCO Supply Voltage ^{NOTE 3}	5.8V
PLL Supply Voltage ^{NOTE 3}	18.0V
VCO Supply Voltage to PLL Supply Voltage	Note 3
Reference Frequency Voltage	-0.3Vmin, +3.6Vmax
Data, Clock, LE Levels	-0.3Vmin, +3.6Vmax
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

Note 3: Power on/off Sequence:
Power on: VCO Supply Voltage,
followed by PLL Supply Voltage.
Power off: PLL Supply Voltage,
followed by VCO Supply Voltage.

Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURRENT (mA)		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2700	4.32	3.78	3.33	49.87	50.14	50.23	14.27	16.02	17.79
2790	4.07	3.55	2.96	49.77	50.12	50.24	14.29	16.05	17.85
2885	3.74	3.20	2.67	49.68	50.07	50.25	14.33	16.09	17.89
2980	3.74	3.19	2.73	49.63	50.06	50.26	14.37	16.13	17.93
3075	3.79	3.24	2.80	49.55	50.01	50.24	14.41	16.17	17.98
3170	3.85	3.28	2.81	49.41	49.94	50.22	14.44	16.20	18.02
3265	4.01	3.49	3.04	49.33	49.90	50.22	14.47	16.24	18.05
3360	4.09	3.53	2.99	49.24	49.88	50.22	14.50	16.28	18.09
3455	3.60	3.23	2.62	49.27	49.83	50.22	14.59	16.36	18.19
3500	3.28	2.67	2.06	49.16	49.87	50.26	14.60	16.38	18.21

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2700	-22.98	-25.63	-27.98	-24.42	-26.45	-28.31
2790	-22.43	-24.82	-27.09	-29.50	-31.63	-32.60
2885	-21.18	-22.53	-25.17	-32.98	-36.00	-35.78
2980	-20.38	-22.15	-25.10	-57.25	-46.12	-50.33
3075	-21.35	-22.03	-25.33	-42.08	-39.36	-41.96
3170	-21.76	-24.98	-28.00	-33.41	-37.90	-39.09
3265	-34.67	-31.57	-33.95	-41.11	-39.88	-42.99
3360	-26.60	-31.06	-35.59	-38.21	-51.45	-41.74
3455	-36.80	-44.42	-48.33	-42.30	-48.75	-43.79
3500	-43.54	-52.54	-40.91	-41.00	-42.58	-42.04



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2700	-87.00	-88.93	-87.14	-104.94	-137.63
2790	-89.29	-90.19	-86.83	-105.85	-137.99
2885	-87.96	-88.87	-86.56	-106.05	-138.08
2980	-84.65	-88.99	-86.03	-106.25	-138.18
3075	-86.44	-87.78	-85.92	-106.14	-137.96
3170	-83.73	-88.87	-85.23	-105.89	-137.97
3265	-83.19	-87.84	-84.94	-106.09	-138.24
3360	-84.24	-87.21	-83.97	-106.25	-138.61
3455	-83.87	-87.20	-83.53	-105.98	-138.38
3500	-82.32	-86.58	-82.86	-106.78	-138.65

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2700	-86.38	-90.52	-87.76	-105.16	-137.14
2790	-85.03	-88.99	-86.43	-106.39	-137.51
2885	-86.08	-88.67	-86.66	-106.61	-137.78
2980	-86.60	-88.46	-86.08	-106.49	-138.02
3075	-88.10	-88.10	-85.48	-106.53	-137.98
3170	-86.28	-87.53	-85.09	-106.42	-138.04
3265	-85.01	-87.72	-84.27	-106.70	-138.61
3360	-86.17	-88.09	-83.57	-107.01	-139.01
3455	-86.62	-86.03	-83.27	-106.15	-138.57
3500	-84.07	-87.02	-82.16	-107.78	-139.68

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2700	-91.41	-88.34	-86.74	-104.03	-136.87
2790	-85.01	-89.87	-86.57	-104.78	-137.01
2885	-88.60	-89.60	-86.12	-105.17	-137.16
2980	-83.85	-88.38	-85.88	-105.17	-136.96
3075	-85.27	-88.22	-85.74	-105.02	-136.85
3170	-86.02	-87.97	-84.70	-104.84	-136.82
3265	-87.50	-88.61	-84.51	-105.37	-137.42
3360	-85.03	-88.93	-83.90	-105.45	-136.24
3455	-89.06	-88.34	-82.93	-105.23	-137.53
3500	-87.34	-86.83	-82.20	-106.05	-138.05

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 2700MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 3100MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 3500MHz+(n*Fcomparison) (dBc) note 1		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5	-104.25	-113.16	-122.71	-106.11	-108.91	-109.87	-107.80	-112.00	-111.31
-4	-102.32	-105.50	-118.46	-105.67	-108.86	-115.49	-111.56	-104.89	-113.26
-3	-98.62	-102.20	-111.36	-101.76	-103.83	-112.78	-107.81	-103.17	-111.18
-2	-91.70	-94.85	-103.68	-94.21	-97.34	-102.77	-99.25	-97.34	-106.67
-1	-84.71	-85.89	-89.51	-83.28	-85.31	-88.29	-86.90	-91.46	-93.36
0 ^{note 2}	-	-	-	-	-	-	-	-	-
+1	-86.23	-87.04	-91.33	-84.57	-86.52	-89.97	-88.75	-94.52	-97.64
+2	-91.07	-94.07	-102.40	-94.52	-97.46	-109.71	-100.29	-96.86	-113.21
+3	-95.89	-98.85	-103.57	-100.06	-103.16	-109.39	-104.46	-101.16	-114.76
+4	-99.18	-100.72	-108.63	-103.51	-106.96	-121.49	-107.26	-105.04	-119.56
+5	-102.02	-108.34	-108.00	-110.60	-106.31	-113.81	-104.49	-108.50	-106.81

Note 1: Comparison frequency 1 MHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 2700MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 3100MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 3500MHz+(n*Freference) (dBc) note 3		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-109.93	-113.57	-117.84	-111.12	-113.31	-111.47	-109.12	-110.29	-112.49
-4	-110.79	-116.51	-114.50	-114.27	-112.95	-113.08	-109.63	-111.55	-110.33
-3	-114.43	-111.88	-117.29	-115.05	-117.78	-112.22	-111.28	-116.99	-112.99
-2	-111.49	-119.46	-118.02	-124.32	-122.20	-115.89	-107.17	-110.20	-107.96
-1	-105.75	-109.27	-109.24	-98.40	-97.27	-105.29	-98.50	-99.30	-95.21
0 ^{note 4}	-	-	-	-	-	-	-	-	-
+1	-104.80	-113.14	-109.72	-90.43	-89.18	-97.80	-118.61	-101.69	-101.80
+2	-108.92	-110.02	-116.57	-108.67	-111.06	-114.25	-120.06	-116.18	-111.87
+3	-118.89	-117.29	-118.54	-115.65	-119.10	-110.46	-118.21	-122.43	-126.07
+4	-116.95	-116.75	-127.81	-115.74	-116.11	-115.80	-121.94	-123.50	-119.42
+5	-119.64	-115.45	-111.66	-115.58	-114.87	-112.85	-118.07	-118.34	-119.93

Note 3: Reference frequency 10 MHz

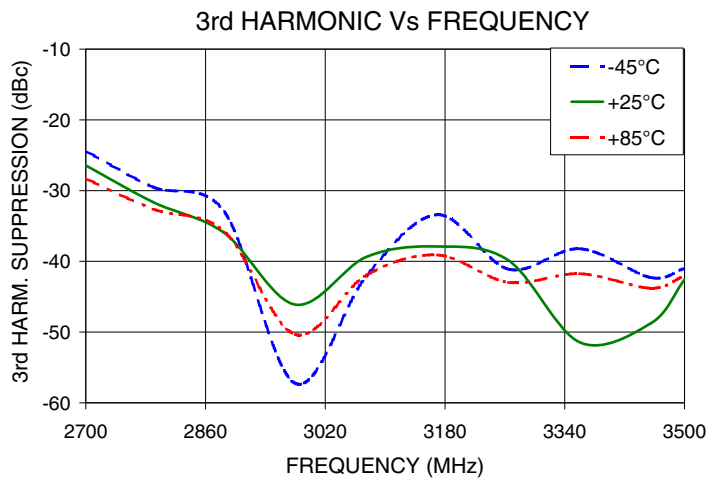
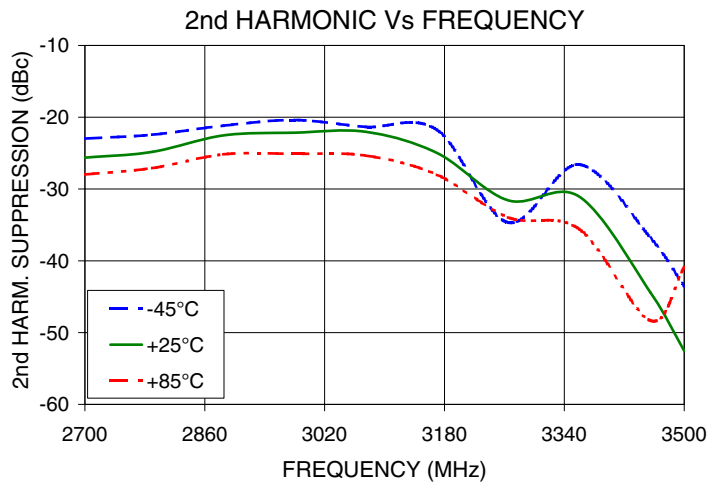
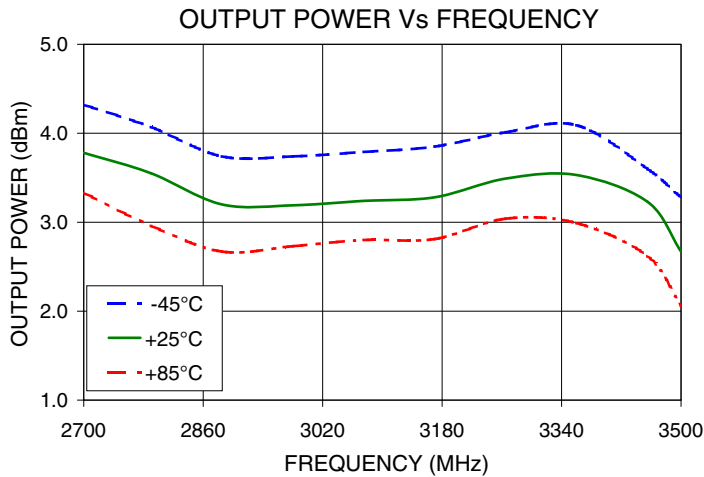
Note 4: All spurs are referenced to carrier signal (n=0).

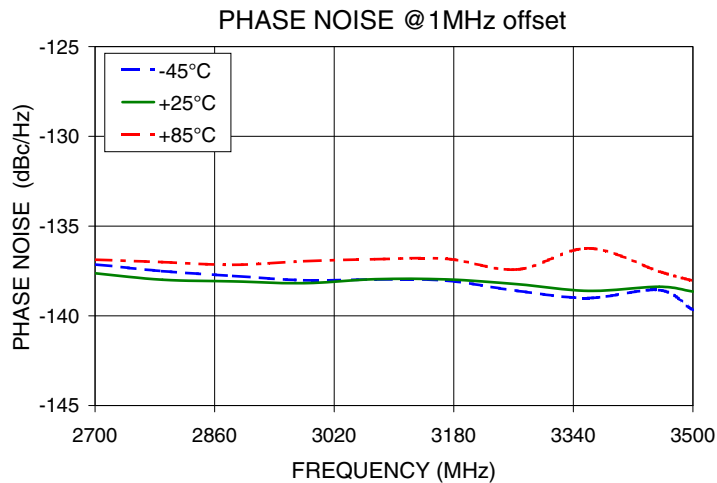
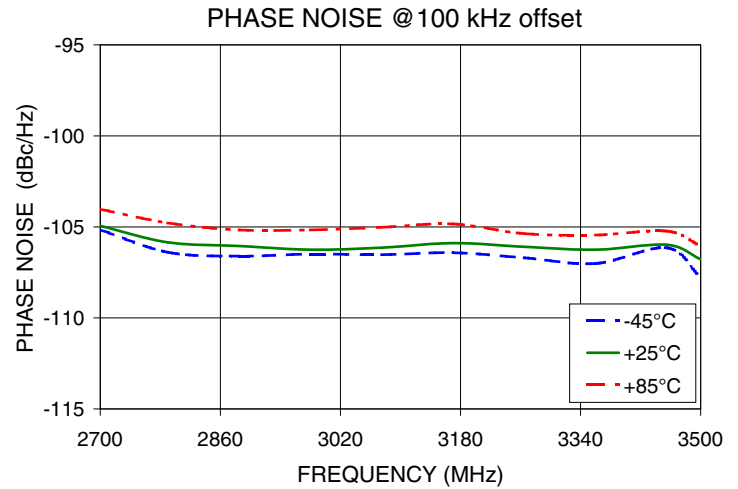
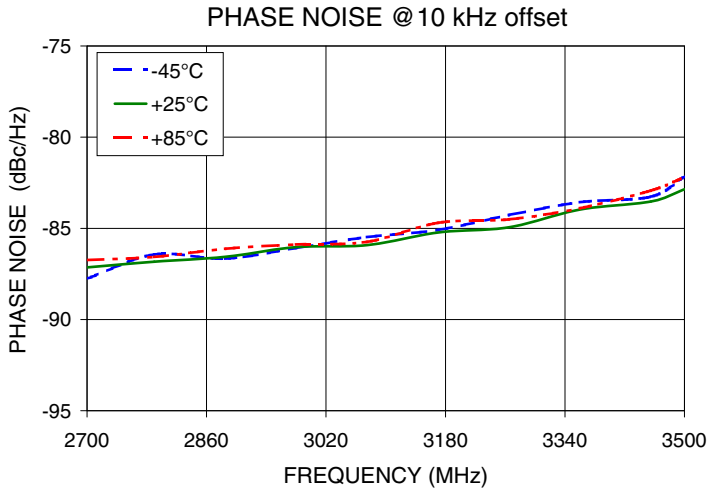
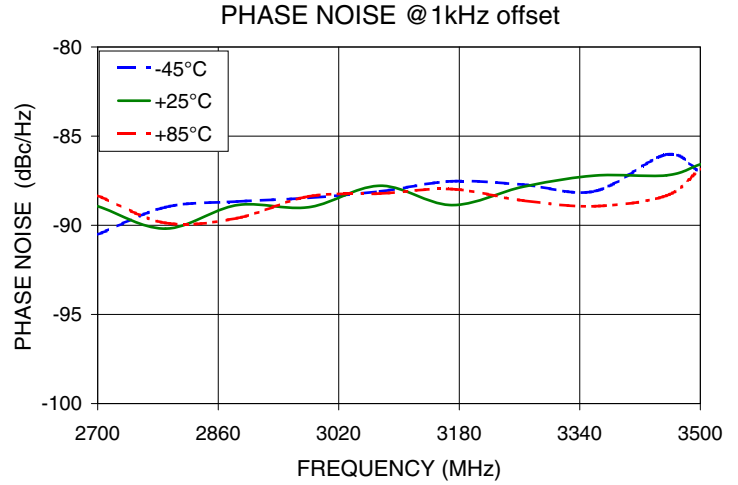
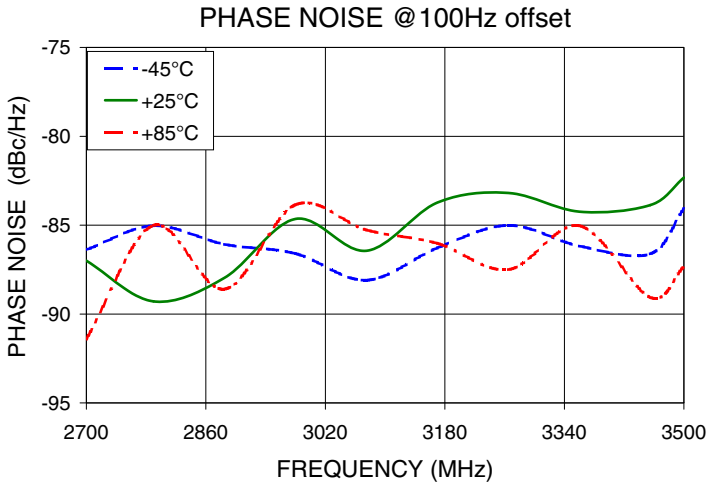
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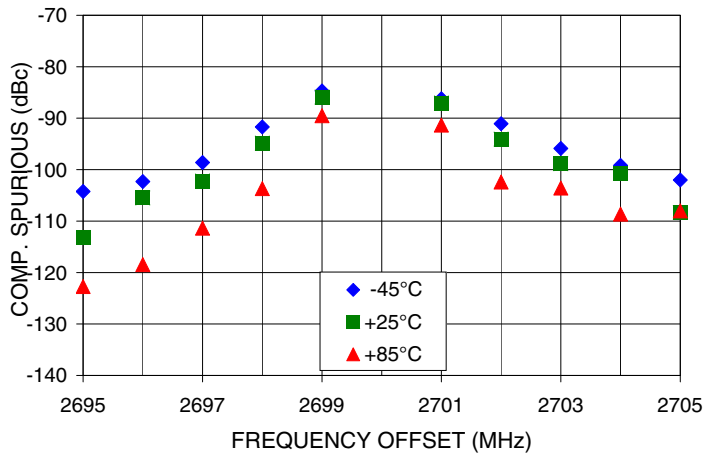
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Typical Performance Curves

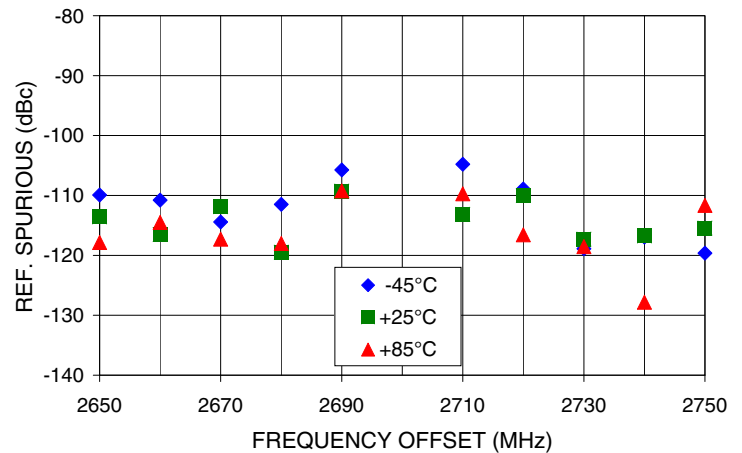




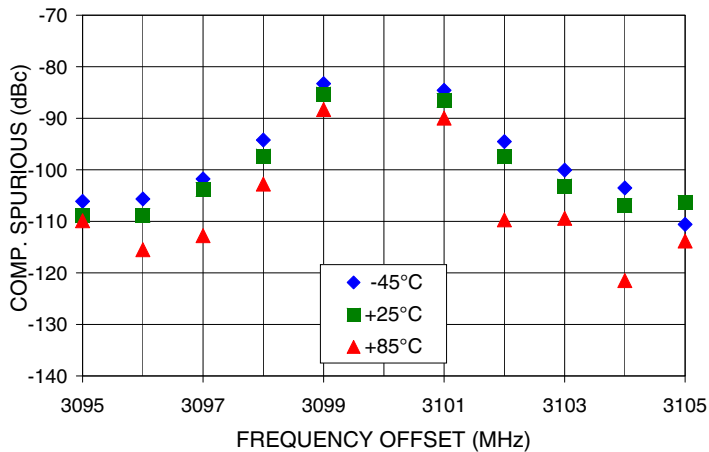
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 2700MHz



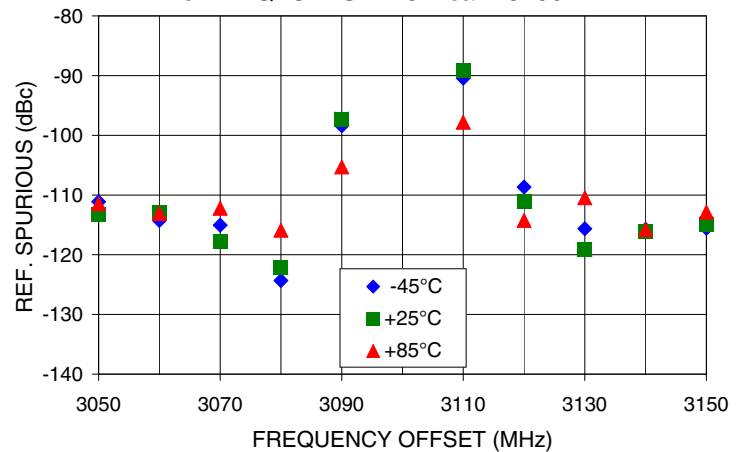
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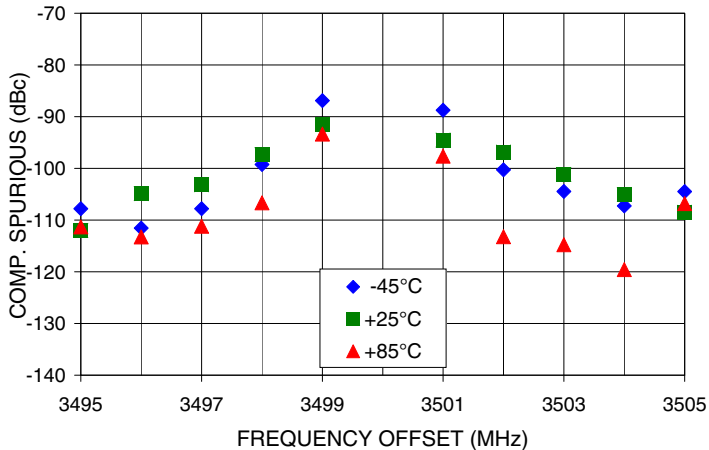
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3100MHz



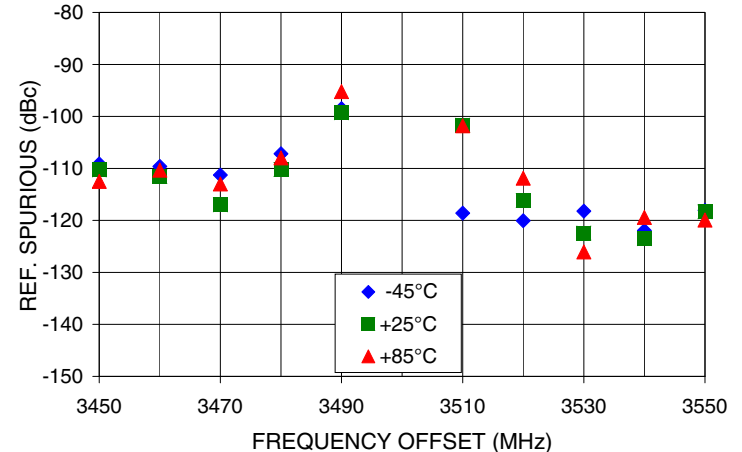
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3100MHz



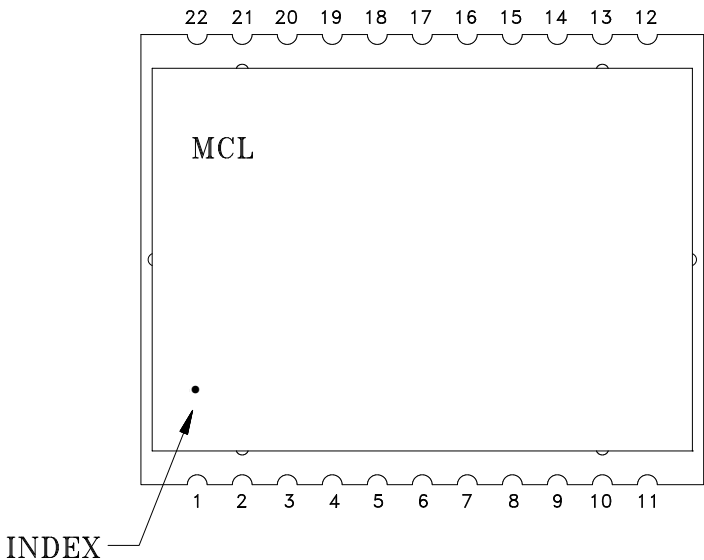
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3500MHz



REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3500MHz



Pin Configuration

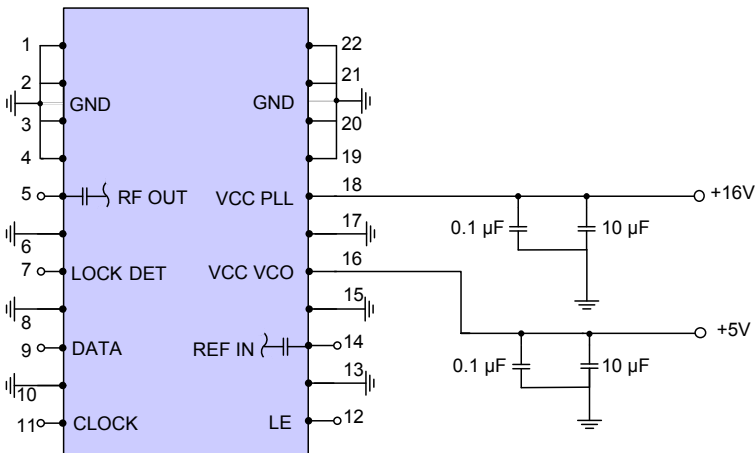


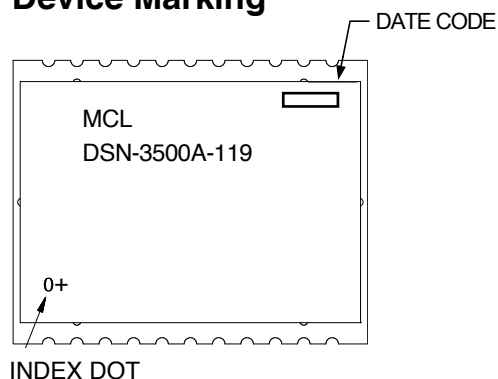
Pin Connection

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



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