NON-CATALOG

Frequency Synthesizer SSN-3600A-119+

50Ω 3400 to 3600 MHz

The Big Deal

- Fractional N synthesizer
- Low phase noise and spurious
- Robust design and construction
- Very small size 0.60" x 0.60" x 0.138"

CASE STYLE: KJ1367

Product Overview

The SSN-3600A-119+ is a Frequency Synthesizer, designed to operate from 3400 to 3600 MHz for WiMAX application. The SSN-3600A-119+ is packaged in a metal case (size of 0.60" x 0.60" x 0.138") to shield against unwanted signals and noise.

Key Features

Feature	Advantages
Low phase noise and spurious: • Phase Noise: -93 dBc/Hz typ. @ 10 kHz offset • Step Size Spurious: -83 dBc typ. • Comparison Spurious: -98 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 SSN-3600A-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, 0.60" x 0.60" x 0.138"	The small size enables the SSN-3600A-119+ to be used in compact designs.

Surface Mount

NON-CATALOG

Frequency Synthesizer

SSN-3600A-119+

50Ω 3400 to 3600 MHz

Features

- Fractional N synthesizer
- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+4.85V, VCC PLL=+3.2V)
- Small size 0.60" x 0.60" x 0.138"

CASE STYLE: KJ1367

+ 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.

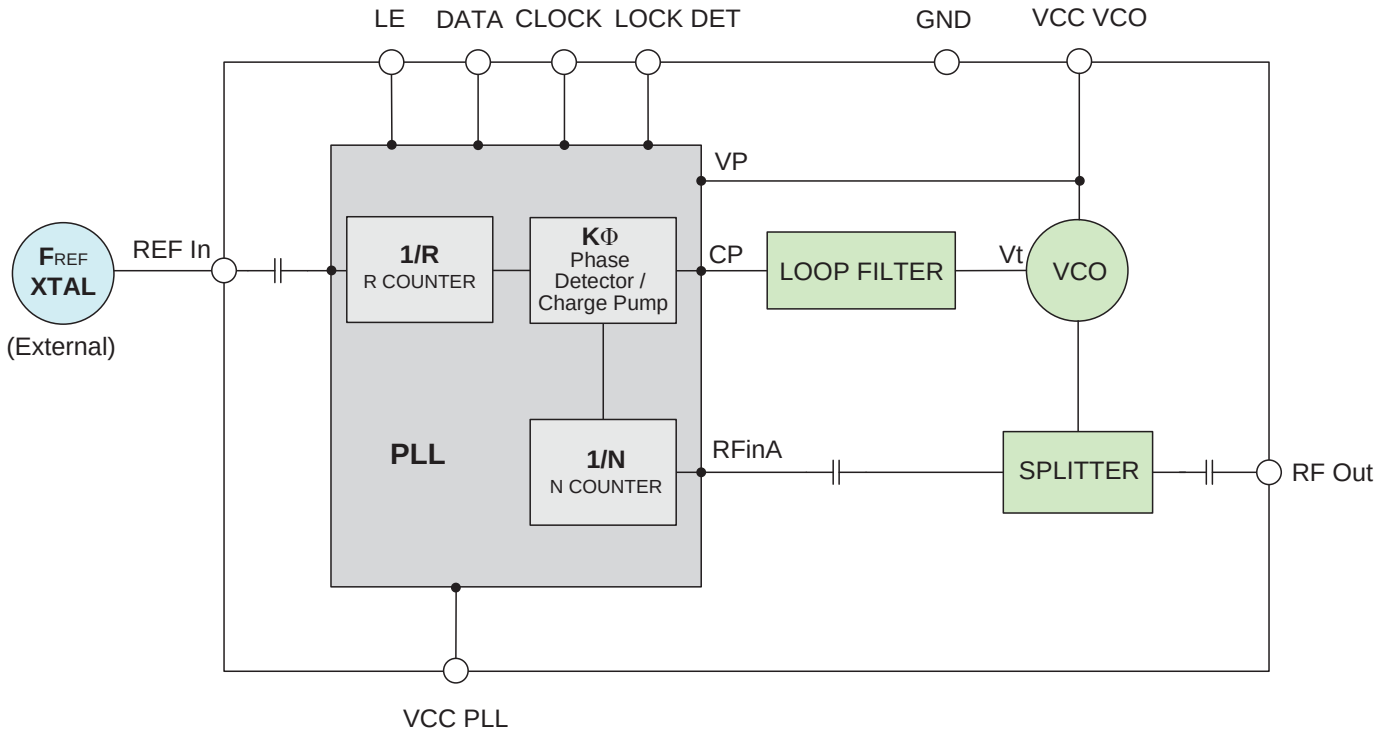
Applications

- WiMAX

General Description

The SSN-3600A-119+ is a Frequency Synthesizer, designed to operate from 3400 to 3600 MHz for WiMAX application. The SSN-3600A-119+ is packaged in a metal case (size of 0.60" x 0.60" x 0.138") to shield against unwanted signals and noise. To enhance the robustness of SSN-3600A-119+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tomb-stoning during subsequent solder reflow operations by the customer.

Simplified Schematic



REV. B
M149087
EDR-8969/8F1
SSN-3600A-119+
Category-A1
RAV
150301

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

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	3400	-	3600	MHz
Step Size		-	-	125	-	kHz
Comparison Frequency		-	-	26	-	MHz
Settling Time		Within ± 1 kHz	-	30	50	mSec
Output Power		-	+1.0	+4.6	+7.0	dBm
SSB Phase Noise		@ 100 Hz offset	-	-78	-	dBc/Hz
		@ 1 kHz offset	-	-91	-84	
		@ 10 kHz offset	-	-93	-88	
		@ 100 kHz offset	-	-116	-112	
		@ 1 MHz offset	-	-137	-133	
Integrated SSB Phase Noise		@ 1kHz to 10MHz	-	-49	-45	dBc
Step Size Spurious Suppression		Step Size 125 kHz	-	-77	-62	dBc
0.5 Step Size Spurious Suppression		0.5 Step Size 62.5 kHz	-	-69	-54	
Reference Spurious Suppression		Ref. Freq. 52 MHz	-	-85	-77	
Comparison Spurious Suppression		Comp. Freq. 26 MHz	-	-85	-77	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-32	-20	
VCO Supply Voltage		+4.85	+4.75	+4.85	+5.25	V
PLL Supply Voltage		+3.20	+3.10	+3.20	+3.30	
VCO Supply Current		-	-	41	47	mA
PLL Supply Current		-	-	16	22	
Reference Input (External)	Frequency	52 (square wave)	-	52	-	MHz
	Amplitude	1	-	1	-	V_{P-P}
	Input impedance	-	-	100	-	KΩ
	Phase Noise @ 1 kHz offset	-	-	-135	-	dBc/Hz
RF Output port Impedance		-	-	50	-	Ω
Input Logic Level	Input high voltage	-	2.65	-	-	V
	Input low voltage	-	-	-	0.60	V
Digital Lock Detect	Locked	-	2.70	-	3.30	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4153			
PLL Programming		-	3-wire serial 3.2V CMOS			
Register Map @ 3600 MHz	R0_Register	-	(MSB) 10001010000001100000000 (LSB)			
	R1_Register	-	(MSB) 10100100000011010000001 (LSB)			
	R2_Register	-	(MSB) 1111100010 (LSB)			
	R3_Register	-	(MSB) 1111000111 (LSB)			

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	5.8V
PLL Supply Voltage	4.0V
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

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
3400	4.63	4.55	4.29	39.70	41.76	43.24	15.09	15.76	18.00
3404	4.62	4.53	4.27	39.69	41.77	43.24	14.84	15.53	17.73
3428	4.70	4.62	4.34	39.65	41.79	43.24	14.97	15.68	17.87
3452	4.66	4.55	4.28	39.67	41.77	43.24	15.10	15.82	18.01
3476	4.60	4.48	4.20	39.70	41.77	43.24	15.12	15.86	18.04
3500	4.57	4.46	4.16	39.67	41.78	43.31	15.18	15.93	18.11
3524	4.57	4.41	4.10	39.68	41.78	43.32	15.26	16.01	18.19
3548	4.64	4.48	4.16	39.68	41.76	43.21	15.27	16.04	18.21
3572	4.52	4.37	4.09	39.67	41.77	43.23	15.18	15.94	18.11
3596	4.50	4.33	4.02	39.68	41.76	43.22	15.10	15.85	18.02
3600	4.50	4.34	4.03	39.68	41.76	43.22	15.28	16.05	18.21

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
3400	-37.87	-29.31	-31.25	-39.59	-37.05	-39.20
3404	-40.54	-30.46	-30.68	-40.32	-37.40	-40.71
3428	-39.97	-30.03	-33.24	-40.10	-35.88	-37.52
3452	-38.74	-31.85	-37.56	-37.65	-35.50	-36.88
3476	-38.54	-34.40	-37.09	-35.79	-33.40	-37.63
3500	-35.55	-35.09	-37.40	-34.68	-32.86	-37.51
3524	-33.94	-37.99	-38.85	-36.21	-33.76	-37.34
3548	-29.98	-46.13	-45.32	-35.77	-32.44	-37.59
3572	-29.77	-48.31	-47.28	-35.78	-32.54	-39.56
3596	-26.98	-47.78	-42.30	-38.67	-33.04	-39.29
3600	-27.32	-47.00	-43.49	-39.59	-33.13	-41.60

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
3400	-82.26	-93.24	-93.91	-115.93	-136.89
3404	-80.31	-91.87	-94.65	-116.03	-136.93
3428	-80.46	-91.94	-94.25	-116.24	-137.08
3452	-80.83	-92.76	-93.63	-116.31	-137.05
3476	-81.05	-92.92	-94.17	-116.35	-137.13
3500	-81.09	-93.52	-93.59	-116.38	-137.19
3524	-80.32	-93.53	-93.73	-116.46	-137.15
3548	-81.43	-93.32	-93.50	-116.57	-137.31
3572	-81.67	-92.29	-93.31	-116.54	-137.25
3596	-78.86	-93.19	-92.96	-116.56	-137.20
3600	-80.37	-92.30	-93.06	-116.54	-137.19

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS -45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
3400	-80.54	-92.01	-94.48	-115.92	-137.15
3404	-78.40	-90.77	-94.37	-115.88	-137.13
3428	-76.34	-91.04	-94.06	-116.25	-137.41
3452	-77.97	-91.54	-93.36	-116.28	-137.46
3476	-77.09	-90.52	-92.60	-116.39	-137.60
3500	-79.53	-90.65	-93.41	-116.60	-137.66
3524	-77.96	-91.45	-93.59	-116.70	-137.63
3548	-77.62	-90.64	-93.29	-116.81	-137.85
3572	-78.57	-89.13	-92.54	-116.72	-137.90
3596	-76.57	-90.96	-92.62	-116.78	-137.79
3600	-76.15	-90.17	-92.77	-116.73	-137.56

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS +85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
3400	-79.69	-94.18	-94.62	-115.68	-136.51
3404	-76.75	-93.81	-94.36	-115.67	-136.46
3428	-80.89	-93.73	-94.09	-115.70	-136.61
3452	-80.59	-93.18	-94.21	-115.67	-136.54
3476	-79.51	-93.32	-93.52	-115.70	-136.61
3500	-78.78	-92.32	-93.49	-115.89	-136.59
3524	-78.37	-92.23	-93.35	-115.74	-136.45
3548	-79.21	-92.93	-93.59	-116.09	-136.86
3572	-79.50	-92.84	-93.31	-115.98	-136.76
3596	-80.07	-92.07	-92.80	-116.18	-136.71
3600	-79.61	-93.17	-92.73	-116.11	-136.69

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 3400MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 350MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 3600MHz+(n*Fcomparison) (dBc) note 1		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-106.01	-107.05	-108.60	-108.93	-105.63	-112.68	-112.21	-103.99	-109.13
-4	-94.66	-95.09	-93.24	-96.76	-96.78	-95.26	-98.27	-96.84	-97.31
-3	-103.97	-102.12	-107.41	-105.35	-105.02	-105.49	-107.54	-110.41	-108.17
-2	-85.64	-84.90	-83.54	-88.32	-86.38	-85.66	-88.42	-87.14	-88.33
-1	-102.85	-97.64	-103.37	-100.26	-98.70	-100.50	-103.10	-104.15	-102.83
0 note 2	-	-	-	-	-	-	-	-	-
+1	-101.69	-95.77	-98.54	-99.05	-96.10	-98.36	-97.94	-97.62	-99.92
+2	-87.02	-87.23	-85.10	-89.57	-88.89	-85.12	-92.57	-89.63	-89.87
+3	-107.28	-107.67	-107.69	-104.33	-107.36	-104.84	-109.08	-118.36	-108.02
+4	-94.89	-94.68	-94.24	-95.72	-94.63	-93.51	-95.56	-94.08	-93.79
+5	-110.15	-112.69	-105.36	-115.76	-104.54	-107.57	-107.80	-104.51	-103.31

Note 1: Comparison frequency 26 MHz
Note 2: All spurs are referenced to carrier signal (n=0).

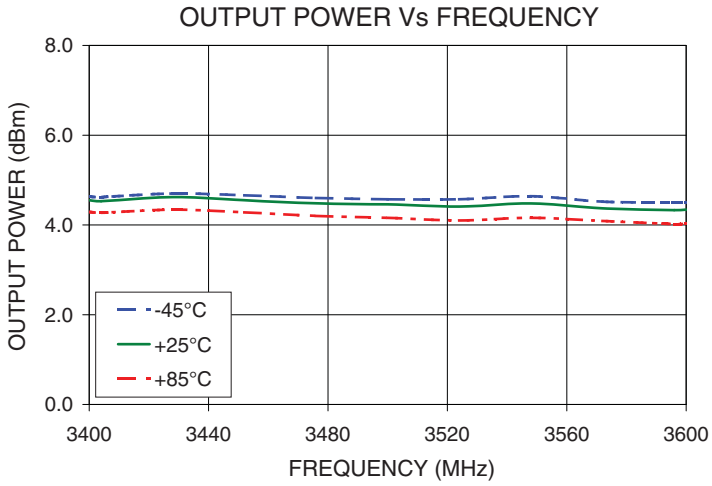
REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 3400MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 3500MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 3600MHz+(n*Freference) (dBc) note 3		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-85.46	-88.22	-90.30	-89.16	-91.87	-95.63	-91.29	-94.61	-97.51
-4	-91.26	-90.78	-90.58	-93.94	-93.27	-92.65	-95.46	-96.18	-94.77
-3	-100.31	-100.10	-96.51	-101.62	-106.05	-97.93	-102.93	-107.82	-100.60
-2	-94.64	-95.09	-92.95	-96.70	-96.69	-95.12	-98.17	-96.77	-97.14
-1	-85.43	-84.91	-83.66	-88.26	-86.30	-85.78	-88.40	-87.11	-88.44
0 note 4	-	-	-	-	-	-	-	-	-
+1	-87.08	-87.36	-85.16	-89.61	-88.90	-85.19	-92.59	-89.59	-90.08
+2	-94.57	-94.53	-94.49	-95.71	-94.76	-93.64	-95.48	-94.15	-94.11
+3	-104.96	-103.68	-102.49	-105.50	-109.92	-102.74	-104.69	-111.13	-103.89
+4	-92.27	-92.83	-93.79	-95.14	-97.06	-95.82	-96.63	-98.12	-98.74
+5	-87.88	-91.24	-93.90	-91.90	-95.04	-97.63	-93.36	-95.79	-98.97

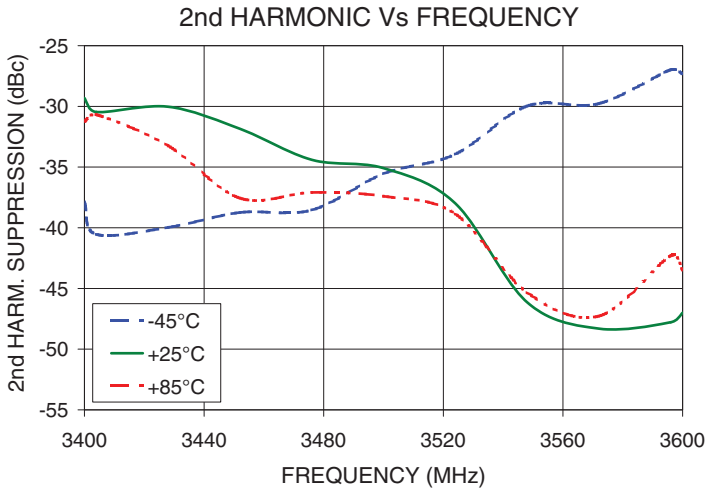
Note 3: Reference frequency 52 MHz
Note 4: All spurs are referenced to carrier signal (n=0).

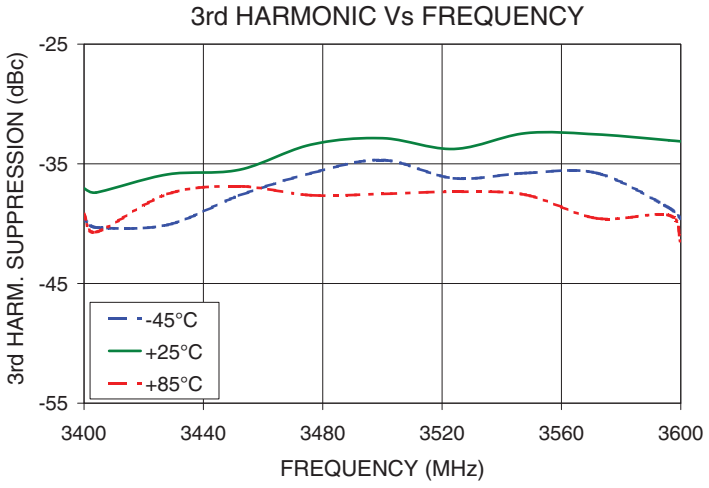
STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 3400MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 3500MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 3600MHz+(n*Fstep size) (dBc) note 5		
n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5.0	-109.06	-107.76	-111.71	-113.06	-111.89	-112.16	-112.21	-111.14	-108.24
-4.5	-111.94	-107.81	-109.94	-108.57	-111.02	-106.18	-107.98	-110.64	-100.31
-4.0	-109.47	-106.29	-106.94	-107.64	-106.39	-107.02	-107.54	-107.99	-104.60
-3.5	-106.84	-104.88	-105.17	-106.99	-105.76	-107.78	-107.63	-105.89	-105.29
-3.0	-102.79	-106.56	-104.86	-107.89	-106.33	-104.96	-106.15	-102.79	-105.81
-2.5	-97.58	-100.97	-102.63	-101.58	-102.89	-102.86	-101.46	-103.44	-100.60
-2.0	-87.50	-88.36	-93.26	-95.60	-95.89	-99.11	-100.63	-100.10	-99.03
-1.5	-88.80	-94.46	-92.97	-92.59	-91.71	-95.57	-91.66	-90.64	-94.93
-1.0	-82.52	-79.33	-78.53	-84.73	-85.02	-86.24	-87.68	-88.25	-86.67
-0.5	-64.84	-70.04	-78.46	-73.06	-75.99	-80.47	-74.83	-79.73	-84.52
0 note 6	-	-	-	-	-	-	-	-	-
+0.5	-66.26	-69.51	-78.46	-71.67	-75.06	-80.21	-72.88	-87.01	-82.73
+1.0	-83.37	-78.66	-77.99	-86.60	-82.35	-85.98	-87.59	-88.00	-82.75
+1.5	-89.25	-93.67	-90.19	-91.89	-95.64	-90.78	-95.76	-94.02	-98.68
+2.0	-87.68	-89.64	-96.63	-100.40	-98.78	-94.10	-103.10	-102.14	-103.00
+2.5	-96.57	-96.78	-103.24	-99.80	-103.42	-100.01	-103.91	-104.82	-100.37
+3.0	-104.65	-105.19	-104.37	-107.84	-105.07	-105.46	-108.87	-108.65	-104.79
+3.5	-104.55	-104.85	-103.13	-107.43	-109.08	-107.34	-109.22	-109.91	-105.47
+4.0	-106.81	-107.15	-109.25	-110.97	-105.89	-110.82	-109.65	-109.27	-107.19
+4.5	-109.70	-104.78	-111.35	-108.63	-109.79	-107.34	-105.46	-111.31	-102.44
+5.0	-108.66	-106.69	-113.23	-107.42	-112.64	-113.07	-114.55	-114.96	-109.89

Note 5: Step size 125 kHz
Note 6: All spurs are referenced to carrier signal (n=0).

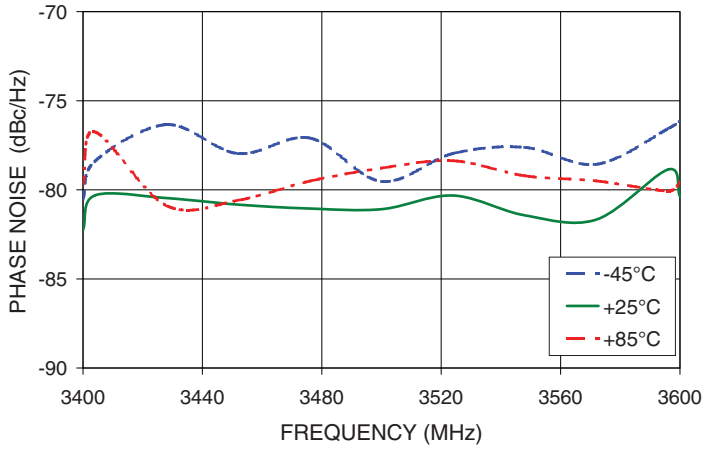
Typical Performance Curves



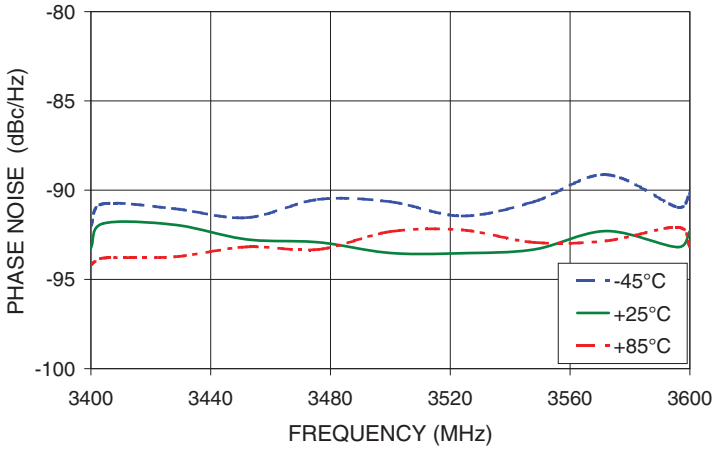




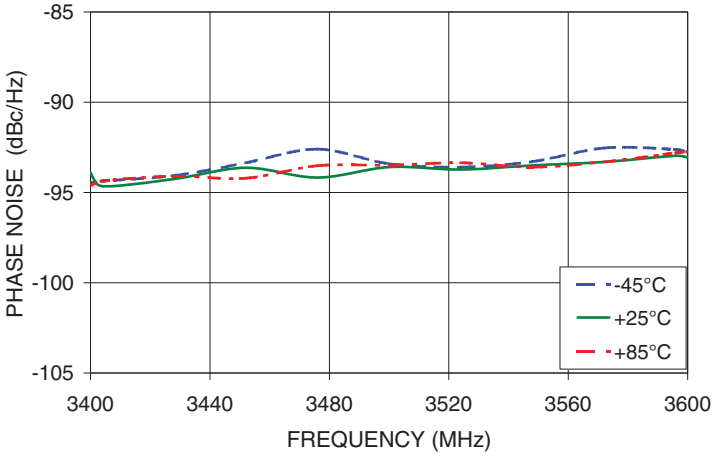
PHASE NOISE @100Hz offset



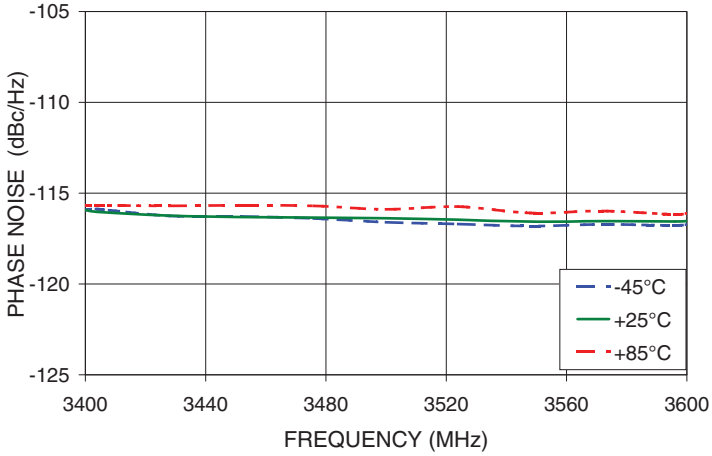
PHASE NOISE @1kHz offset



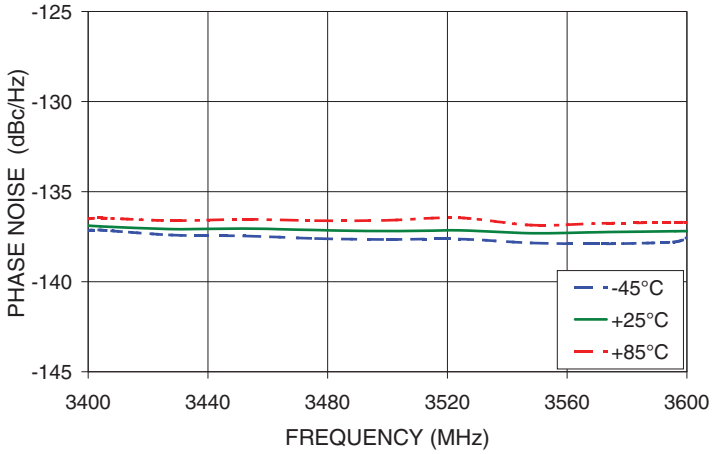
PHASE NOISE @10kHz offset



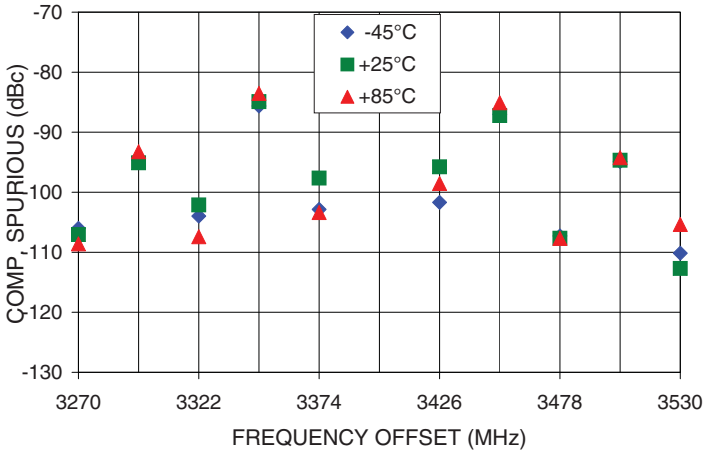
PHASE NOISE @100kHz offset



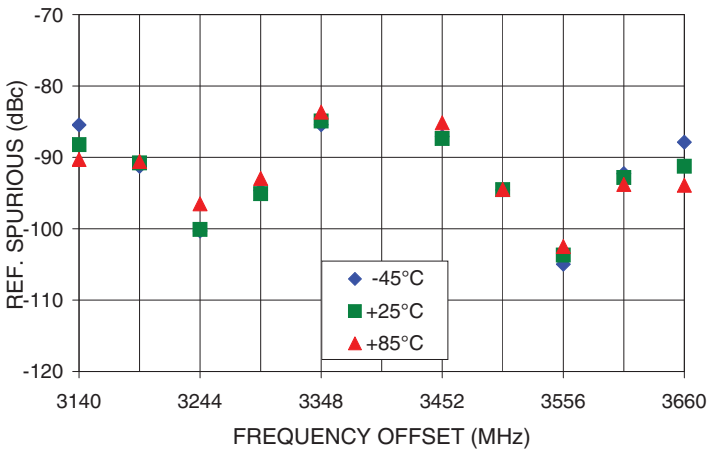
PHASE NOISE @1MHz offset



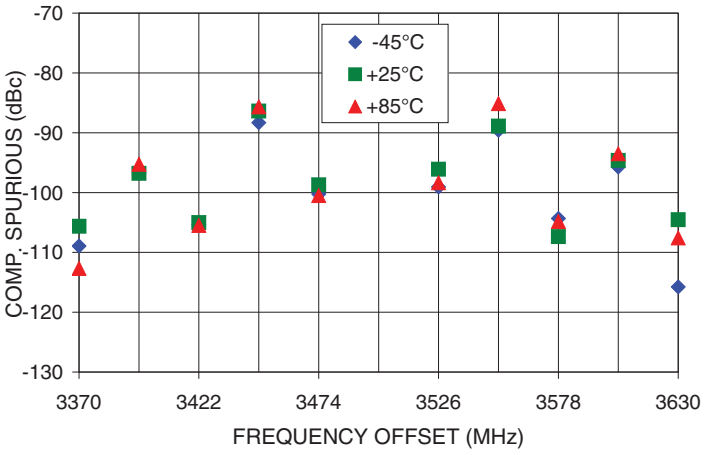
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3400MHz



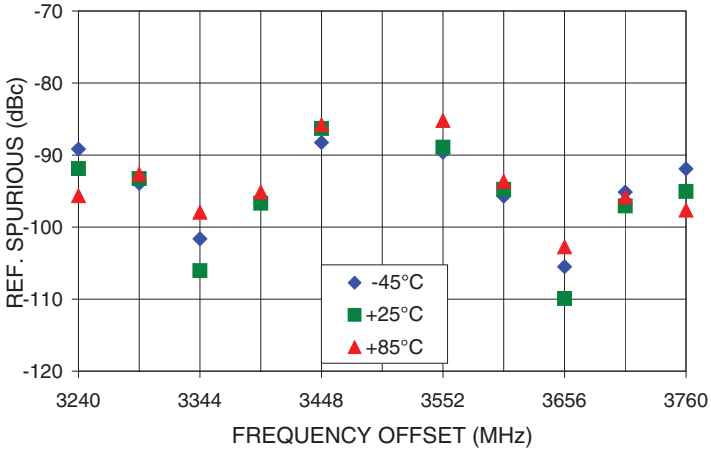
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3400MHz



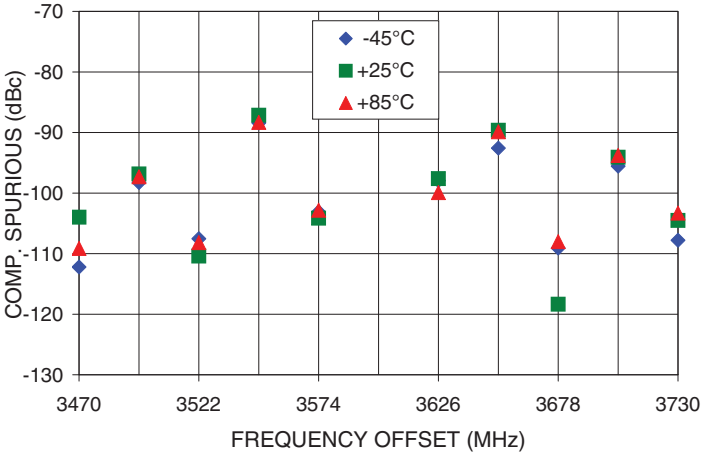
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3500MHz



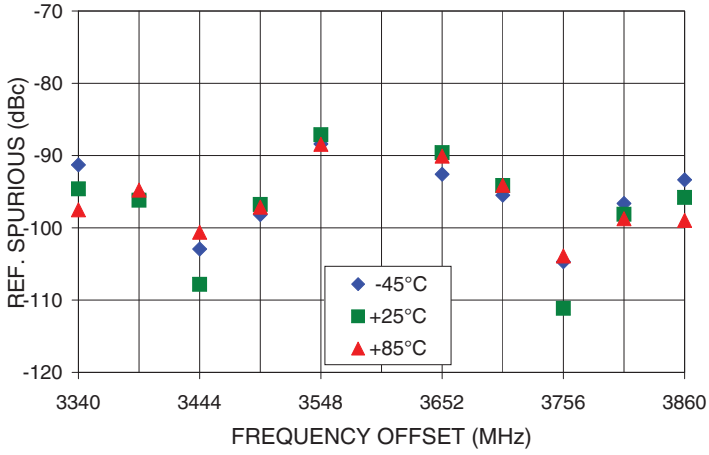
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3500MHz

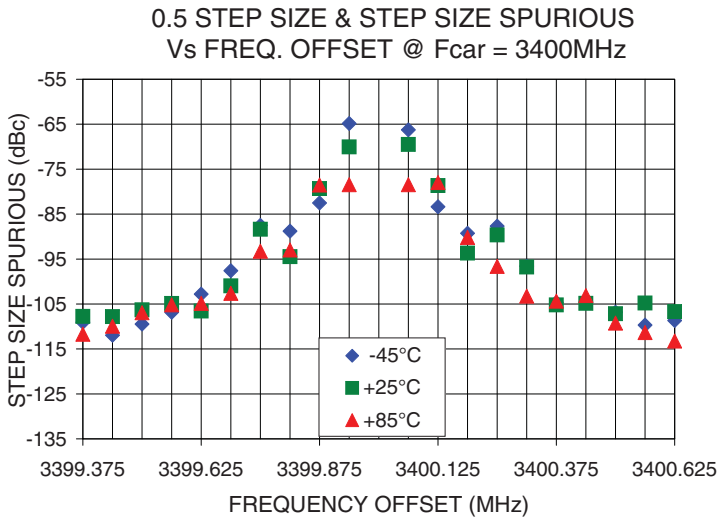


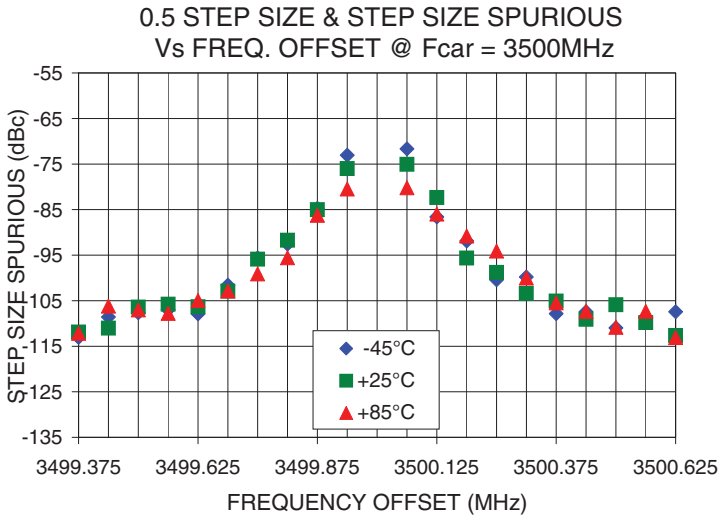
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3600MHz

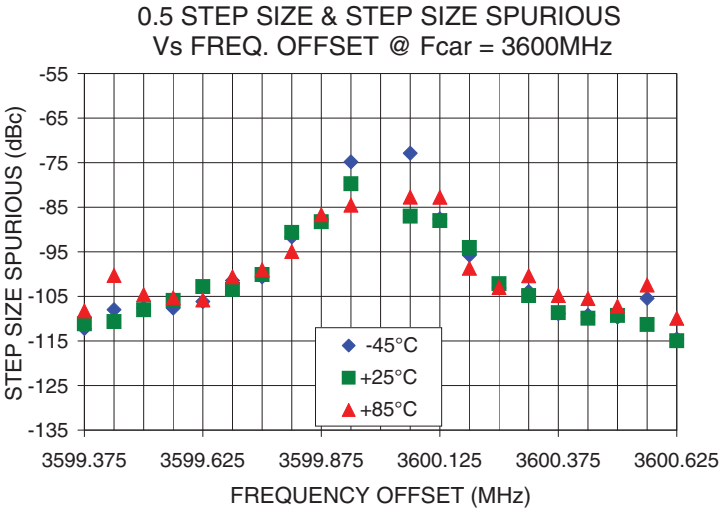


REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 3600MHz

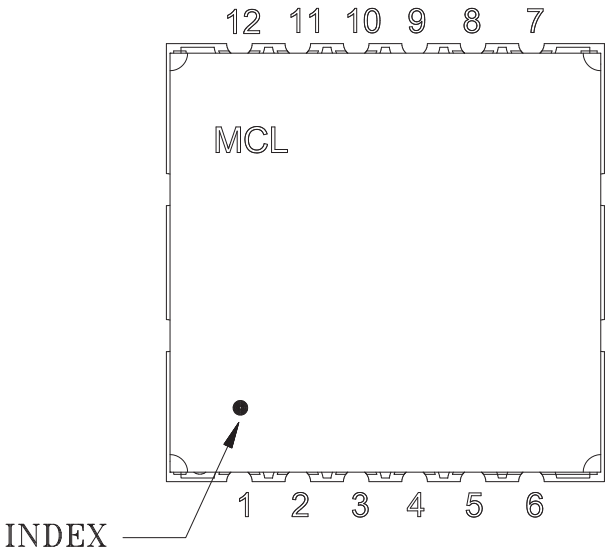








Pin Configuration

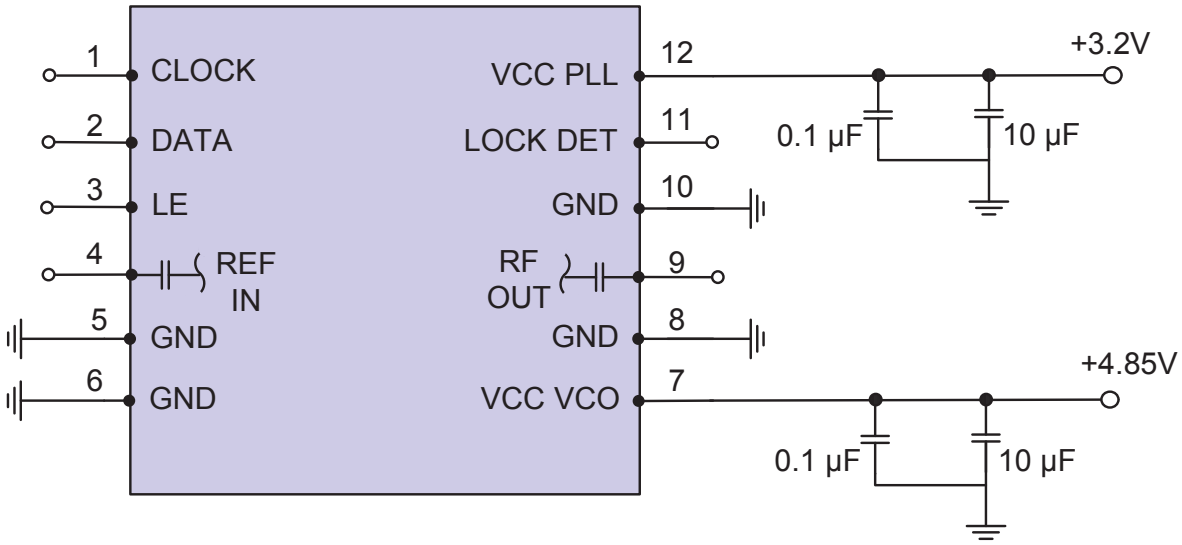


Pin Connection

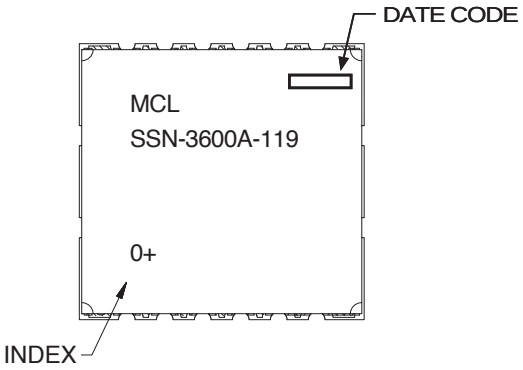
Pin Number	Function
1	CLOCK
2	DATA
3	ENABLED
4	REF IN
5	GND
6	GND
7	VCC VCO
8	GND
9	RF OUT
10	GND
11	LOCK DET
12	VCC PLL

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: KJ1367

Tape & Reel: TR-F95

Suggested Layout for PCB Design: PL-317

Evaluation Board: TB-552+

Environment Ratings: ENV03T2

Frequency Synthesizer SSN-3600A-119+

Typical Performance Data

FREQ. (MHz)	POWER OUTPUT (dBm)			HARMONICS (dBc)						VCO CURRENT (mA)			PLL CURENT (mA)		
				F2			F3								
	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC
3400	4.63	4.55	4.29	-37.87	-29.31	-31.25	-39.59	-37.05	-39.20	39.70	41.76	43.24	15.09	15.76	18.00
3404	4.62	4.53	4.27	-40.54	-30.46	-30.68	-40.32	-37.40	-40.71	39.69	41.77	43.24	14.84	15.53	17.73
3428	4.70	4.62	4.34	-39.97	-30.03	-33.24	-40.10	-35.88	-37.52	39.65	41.79	43.24	14.97	15.68	17.87
3452	4.66	4.55	4.28	-38.74	-31.85	-37.56	-37.65	-35.50	-36.88	39.67	41.77	43.24	15.10	15.82	18.01
3476	4.60	4.48	4.20	-38.54	-34.40	-37.09	-35.79	-33.40	-37.63	39.70	41.77	43.24	15.12	15.86	18.04
3500	4.57	4.46	4.16	-35.55	-35.09	-37.40	-34.68	-32.86	-37.51	39.67	41.78	43.31	15.18	15.93	18.11
3524	4.57	4.41	4.10	-33.94	-37.99	-38.85	-36.21	-33.76	-37.34	39.68	41.78	43.32	15.26	16.01	18.19
3548	4.64	4.48	4.16	-29.98	-46.13	-45.32	-35.77	-32.44	-37.59	39.68	41.76	43.21	15.27	16.04	18.21
3572	4.52	4.37	4.09	-29.77	-48.31	-47.28	-35.78	-32.54	-39.56	39.67	41.77	43.23	15.18	15.94	18.11
3596	4.50	4.33	4.02	-26.98	-47.78	-42.30	-38.67	-33.04	-39.29	39.68	41.76	43.22	15.10	15.85	18.02
3600	4.50	4.34	4.03	-27.32	-47.00	-43.49	-39.59	-33.13	-41.60	39.68	41.76	43.22	15.28	16.05	18.21

FREQ. (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS														
	-45ºC					+25ºC					+85ºC				
	100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	1kHz	10kHz	100kHz	1MHz
3400	-80.54	-92.01	-94.48	-115.92	-137.15	-82.26	-93.24	-93.91	-115.93	-136.89	-79.69	-94.18	-94.62	-115.68	-136.51
3404	-78.40	-90.77	-94.37	-115.88	-137.13	-80.31	-91.87	-94.65	-116.03	-136.93	-76.75	-93.81	-94.36	-115.67	-136.46
3428	-76.34	-91.04	-94.06	-116.25	-137.41	-80.46	-91.94	-94.25	-116.24	-137.08	-80.89	-93.73	-94.09	-115.70	-136.61
3452	-77.97	-91.54	-93.36	-116.28	-137.46	-80.83	-92.76	-93.63	-116.31	-137.05	-80.59	-93.18	-94.21	-115.67	-136.54
3476	-77.09	-90.52	-92.60	-116.39	-137.60	-81.05	-92.92	-94.17	-116.35	-137.13	-79.51	-93.32	-93.52	-115.70	-136.61
3500	-79.53	-90.65	-93.41	-116.60	-137.66	-81.09	-93.52	-93.59	-116.38	-137.19	-78.78	-92.32	-93.49	-115.89	-136.59
3524	-77.96	-91.45	-93.59	-116.70	-137.63	-80.32	-93.53	-93.73	-116.46	-137.15	-78.37	-92.23	-93.35	-115.74	-136.45
3548	-77.62	-90.64	-93.29	-116.81	-137.85	-81.43	-93.32	-93.50	-116.57	-137.31	-79.21	-92.93	-93.59	-116.09	-136.86
3572	-78.57	-89.13	-92.54	-116.72	-137.90	-81.67	-92.29	-93.31	-116.54	-137.25	-79.50	-92.84	-93.31	-115.98	-136.76
3596	-76.57	-90.96	-92.62	-116.78	-137.79	-78.86	-93.19	-92.96	-116.56	-137.20	-80.07	-92.07	-92.80	-116.18	-136.71
3600	-76.15	-90.17	-92.77	-116.73	-137.56	-80.37	-92.30	-93.06	-116.54	-137.19	-79.61	-93.17	-92.73	-116.11	-136.69

Typical Performance Data

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 3400MHz± (n*Fcomparison) (dBc) NOTE 1			COMPARISON SPURIOUS @Fcarrier 3500MHz± (n*Fcomparison) (dBc) NOTE 1			COMPARISON SPURIOUS @Fcarrier 3600MHz± (n*Fcomparison) (dBc) NOTE 1		
n	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC
-5	-106.01	-107.05	-108.60	-108.93	-105.63	-112.68	-112.21	-103.99	-109.13
-4	-94.66	-95.09	-93.24	-96.76	-96.78	-95.26	-98.27	-96.84	-97.31
-3	-103.97	-102.12	-107.41	-105.35	-105.02	-105.49	-107.54	-110.41	-108.17
-2	-85.64	-84.90	-83.54	-88.32	-86.38	-85.66	-88.42	-87.14	-88.33
-1	-102.85	-97.64	-103.37	-100.26	-98.70	-100.50	-103.10	-104.15	-102.83
0 note 2	-	-	-	-	-	-	-	-	-
+1	-101.69	-95.77	-98.54	-99.05	-96.10	-98.36	-97.94	-97.62	-99.92
+2	-87.02	-87.23	-85.10	-89.57	-88.89	-85.12	-92.57	-89.63	-89.87
+3	-107.28	-107.67	-107.69	-104.33	-107.36	-104.84	-109.08	-118.36	-108.02
+4	-94.89	-94.68	-94.24	-95.72	-94.63	-93.51	-95.56	-94.08	-93.79
+5	-110.15	-112.69	-105.36	-115.76	-104.54	-107.57	-107.80	-104.51	-103.31

Note 1: Comparison frequency 26 MHz
Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 3400MHz± (n*Freference) (dBc) NOTE 3			REFERENCE SPURIOUS @Fcarrier 3500MHz± (n*Freference) (dBc) NOTE 3			REFERENCE SPURIOUS @Fcarrier 3600MHz± (n*Freference) (dBc) NOTE 3		
n	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC
-5	-85.46	-88.22	-90.30	-89.16	-91.87	-95.63	-91.29	-94.61	-97.51
-4	-91.26	-90.78	-90.58	-93.94	-93.27	-92.65	-95.46	-96.18	-94.77
-3	-100.31	-100.10	-96.51	-101.62	-106.05	-97.93	-102.93	-107.82	-100.60
-2	-94.64	-95.09	-92.95	-96.70	-96.69	-95.12	-98.17	-96.77	-97.14
-1	-85.43	-84.91	-83.66	-88.26	-86.30	-85.78	-88.40	-87.11	-88.44
0 note 4	-	-	-	-	-	-	-	-	-
+1	-87.08	-87.36	-85.16	-89.61	-88.90	-85.19	-92.59	-89.59	-90.08
+2	-94.57	-94.53	-94.49	-95.71	-94.76	-93.64	-95.48	-94.15	-94.11
+3	-104.96	-103.68	-102.49	-105.50	-109.92	-102.74	-104.69	-111.13	-103.89
+4	-92.27	-92.83	-93.79	-95.14	-97.06	-95.82	-96.63	-98.12	-98.74
+5	-87.88	-91.24	-93.90	-91.90	-95.04	-97.63	-93.36	-95.79	-98.97

Note 3: Reference frequency 52 MHz
Note 4: All spurs are referenced to carrier signal (n=0).

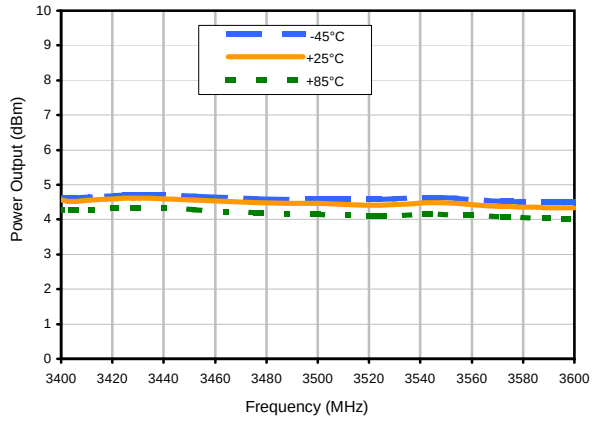
Typical Performance Data

STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @ Fcarrier 3400 MHz (n*Fstep size) (dBc) NOTE 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @ Fcarrier 3500 MHz (n*Fstep size) (dBc) NOTE 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @ Fcarrier 3600 MHz (n*Fstep size) (dBc) NOTE 5		
n	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC	-45ºC	+25ºC	+85ºC
-5.0	-109.06	-107.76	-111.71	-113.06	-111.89	-112.16	-112.21	-111.14	-108.24
-4.5	-111.94	-107.81	-109.94	-108.57	-111.02	-106.18	-107.98	-110.64	-100.31
-4.0	-109.47	-106.29	-106.94	-107.64	-106.39	-107.02	-107.54	-107.99	-104.60
-3.5	-106.84	-104.88	-105.17	-106.99	-105.76	-107.78	-107.63	-105.89	-105.29
-3.0	-102.79	-106.56	-104.86	-107.89	-106.33	-104.96	-106.15	-102.79	-105.81
-2.5	-97.58	-100.97	-102.63	-101.58	-102.89	-102.86	-101.46	-103.44	-100.60
-2.0	-87.50	-88.36	-93.26	-95.60	-95.89	-99.11	-100.63	-100.10	-99.03
-1.5	-88.80	-94.46	-92.97	-92.59	-91.71	-95.57	-91.66	-90.64	-94.93
-1.0	-82.52	-79.33	-78.53	-84.73	-85.02	-86.24	-87.68	-88.25	-86.67
-0.5	-64.84	-70.04	-78.46	-73.06	-75.99	-80.47	-74.83	-79.73	-84.52
0 NOTE 6	-	-	-	-	-	-	-	-	-
+0.5	-66.26	-69.51	-78.46	-71.67	-75.06	-80.21	-72.88	-87.01	-82.73
+1.0	-83.37	-78.66	-77.99	-86.60	-82.35	-85.98	-87.59	-88.00	-82.75
+1.5	-89.25	-93.67	-90.19	-91.89	-95.64	-90.78	-95.76	-94.02	-98.68
+2.0	-87.68	-89.64	-96.63	-100.40	-98.78	-94.10	-103.10	-102.14	-103.00
+2.5	-96.57	-96.78	-103.24	-99.80	-103.42	-100.01	-103.91	-104.82	-100.37
+3.0	-104.65	-105.19	-104.37	-107.84	-105.07	-105.46	-108.87	-108.65	-104.79
+3.5	-104.55	-104.85	-103.13	-107.43	-109.08	-107.34	-109.22	-109.91	-105.47
+4.0	-106.81	-107.15	-109.25	-110.97	-105.89	-110.82	-109.65	-109.27	-107.19
+4.5	-109.70	-104.78	-111.35	-108.63	-109.79	-107.34	-105.46	-111.31	-102.44
+5.0	-108.66	-106.69	-113.23	-107.42	-112.64	-113.07	-114.55	-114.96	-109.89

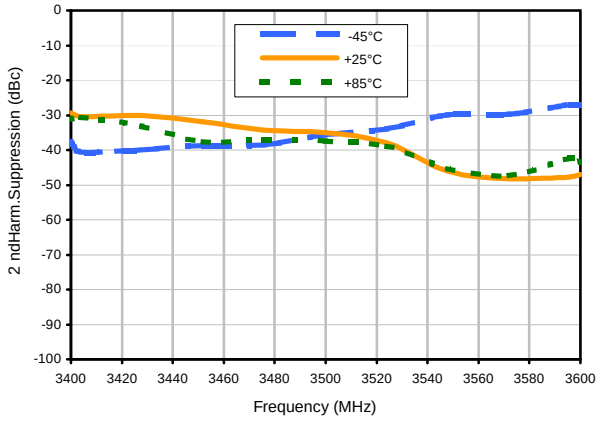
Note 5: Step size 125 kHz
Note 6: All spurs are referenced to carrier signal (n=0).

Typical Performance Data

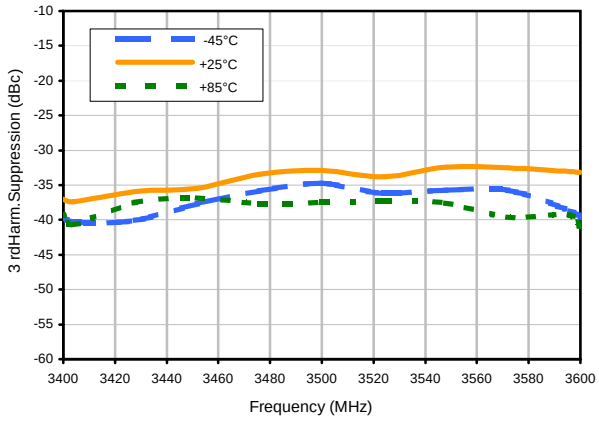
Power Output Vs Frequency



2nd Harmonics Vs Frequency

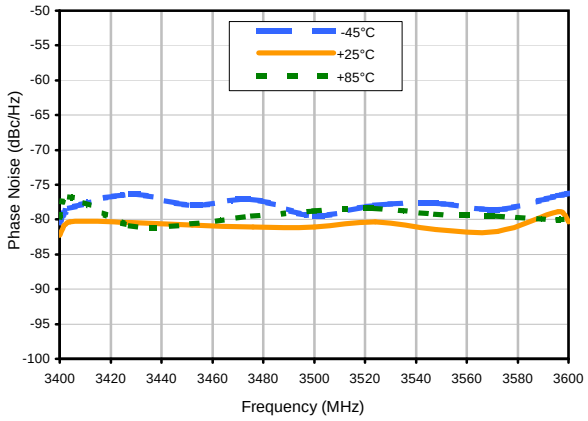


3rd Harmonics Vs Frequency

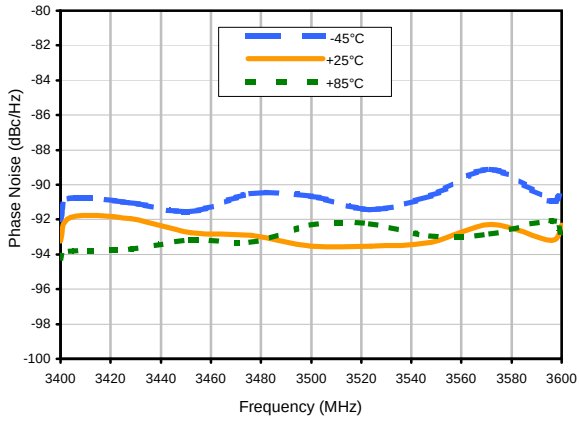


Typical Performance Data

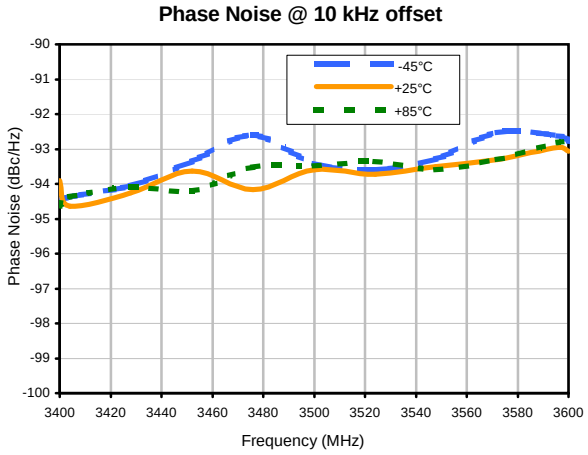
Phase Noise @ 100 Hz offset



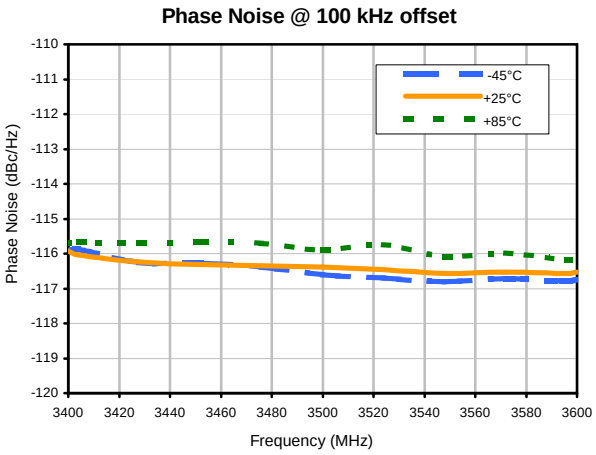
Phase Noise @ 1 kHz offset



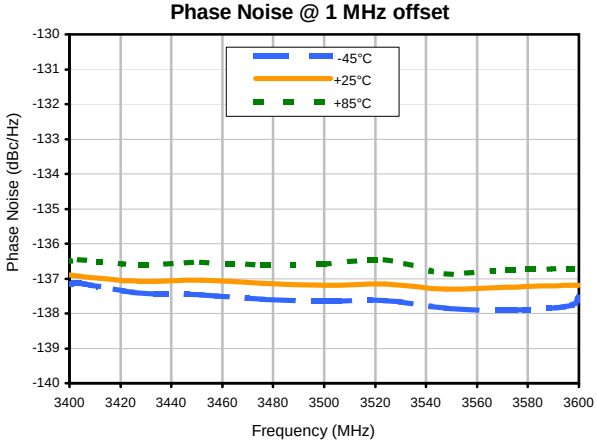
Phase Noise @ 10 kHz offset



Phase Noise @ 100 kHz offset

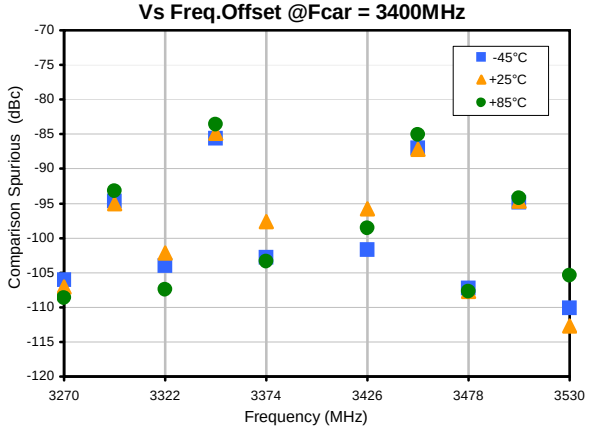


Phase Noise @ 1 MHz offset

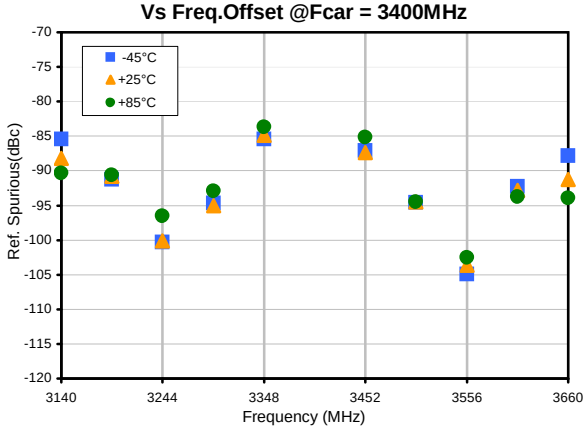


Typical Performance Data

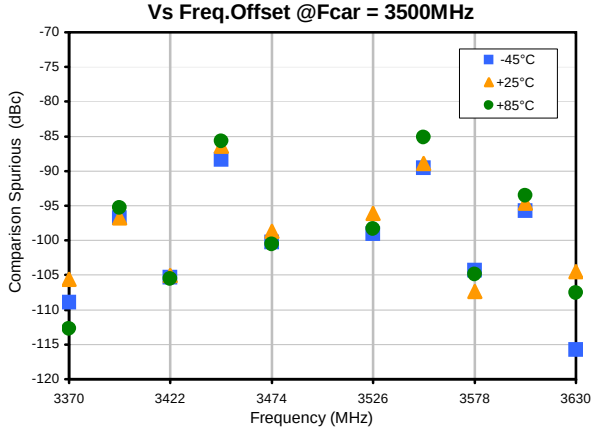
Comparison Spurious
Vs Freq.Offset @Fcar = 3400MHz



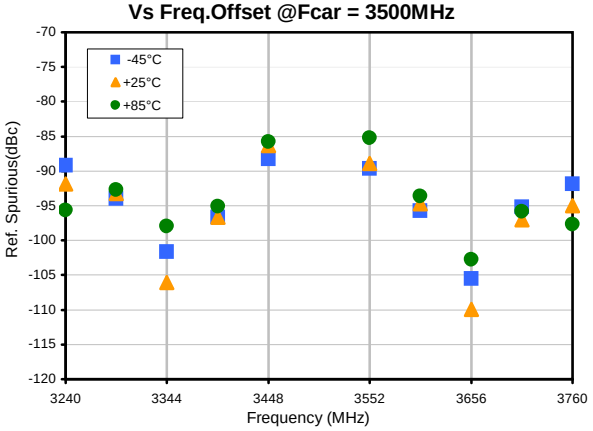
Reference Spurious
Vs Freq.Offset @Fcar = 3400MHz



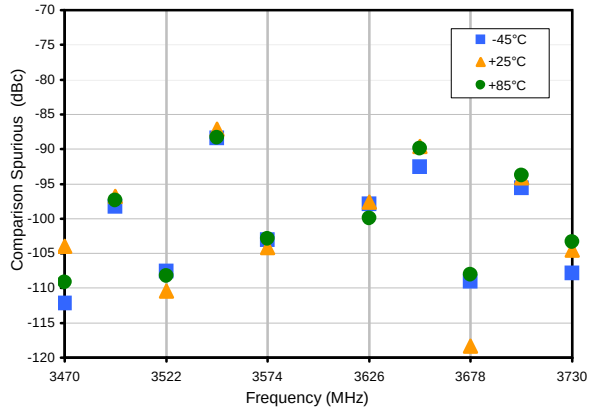
Comparison Spurious
Vs Freq.Offset @Fcar = 3500MHz



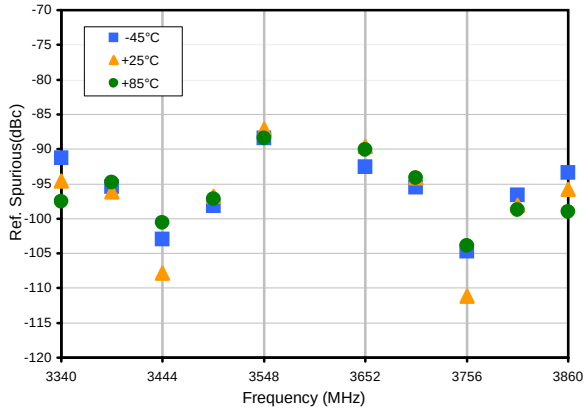
Reference Spurious
Vs Freq.Offset @Fcar = 3500MHz



Comparison Spurious
Vs Freq.Offset @Fcar = 3600MHz

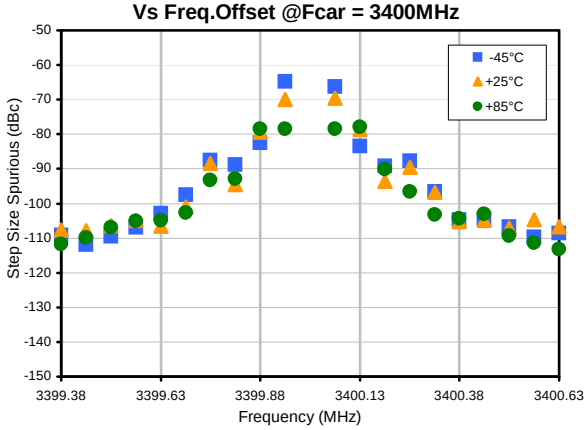


Reference Spurious
Vs Freq.Offset @Fcar = 3600MHz

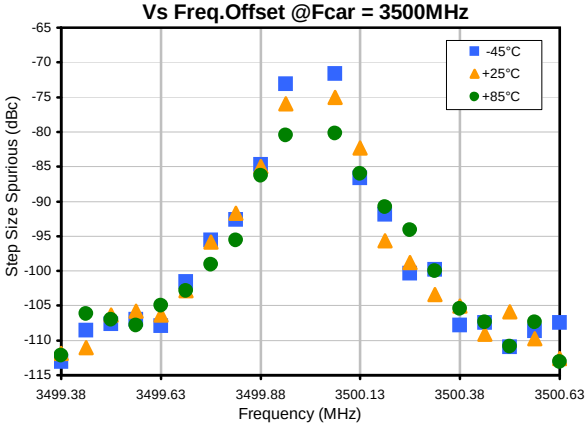


Typical Performance Data

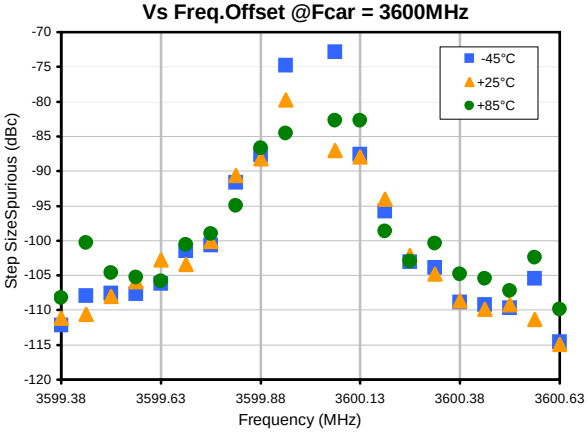
0.5 Step Size & Step Size Spurious Vs Freq.Offset @Fcar = 3400MHz



0.5 Step Size & Step Size Spurious Vs Freq.Offset @Fcar = 3500MHz



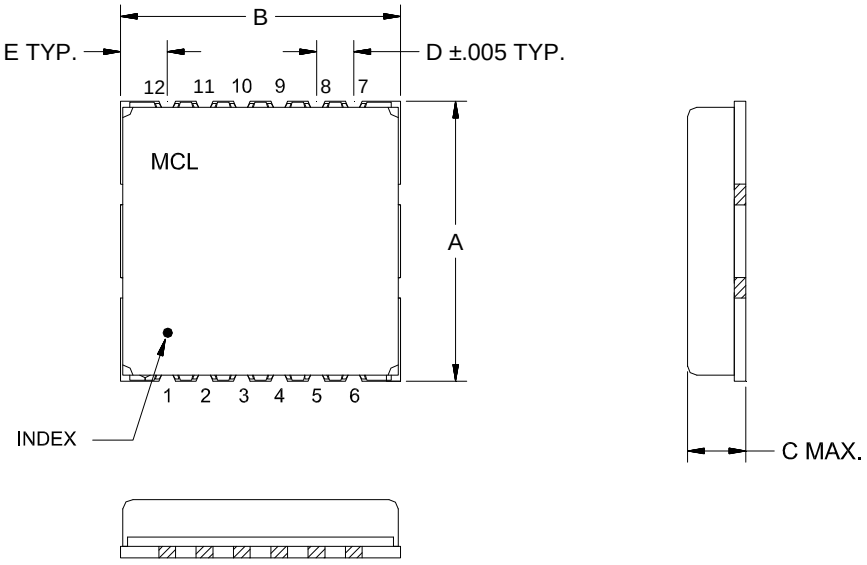
0.5 Step Size & Step Size Spurious Vs Freq.Offset @Fcar = 3600MHz



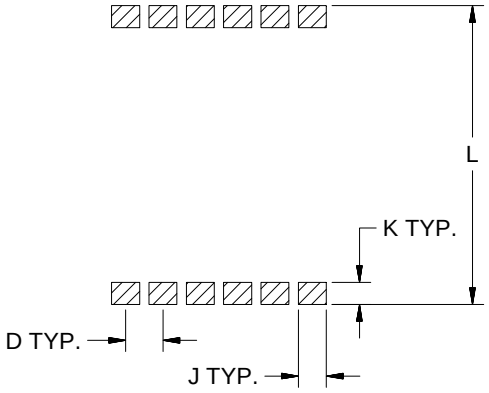
Case Style KJ

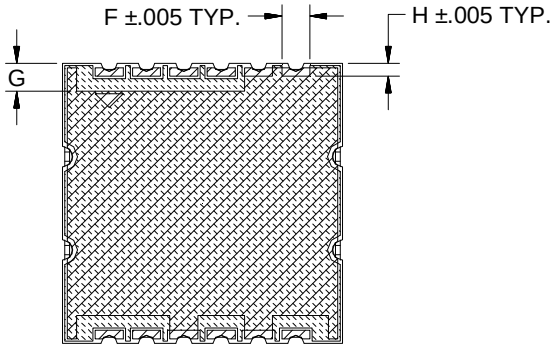
Outline Dimensions

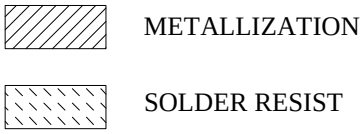
KJ1367



PCB Land Pattern







CASE#	A	B	C	D	E	F	G	H	J	K	L	WT.GRAM
KJ1367	.600 (15.24)	.600 (15.24)	.138 (3.51)	.080 (2.03)	.100 (2.54)	.060 (1.52)	.060 (1.52)	.028 (0.71)	.060 (1.52)	.047 (1.19)	.640 (16.26)	2.0

Dimensions are in inches (mm). Tolerances: 2PL. +/- .03; 3PL. +/- .015

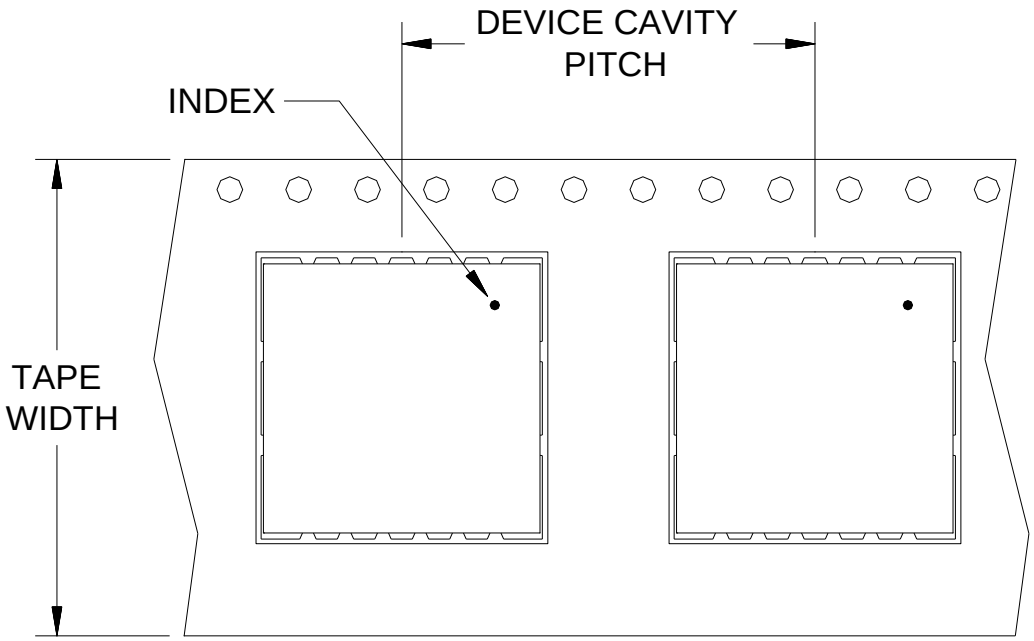
Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:

   For RoHS Case Styles: 2-5 µ inch (.05-.13 microns) Gold over 120-240 µ inch (3.05-6.10 microns) Nickel plate. All models, (+) suffix.

Tape & Reel Packaging TR-F95

DEVICE ORIENTATION IN T&R



DIRECTION OF FEED

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
24	24	13	Small quantity standards (see note)	20
				50
				100
				200
			Standard	500

Note: Please consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

Mini-Circuits®
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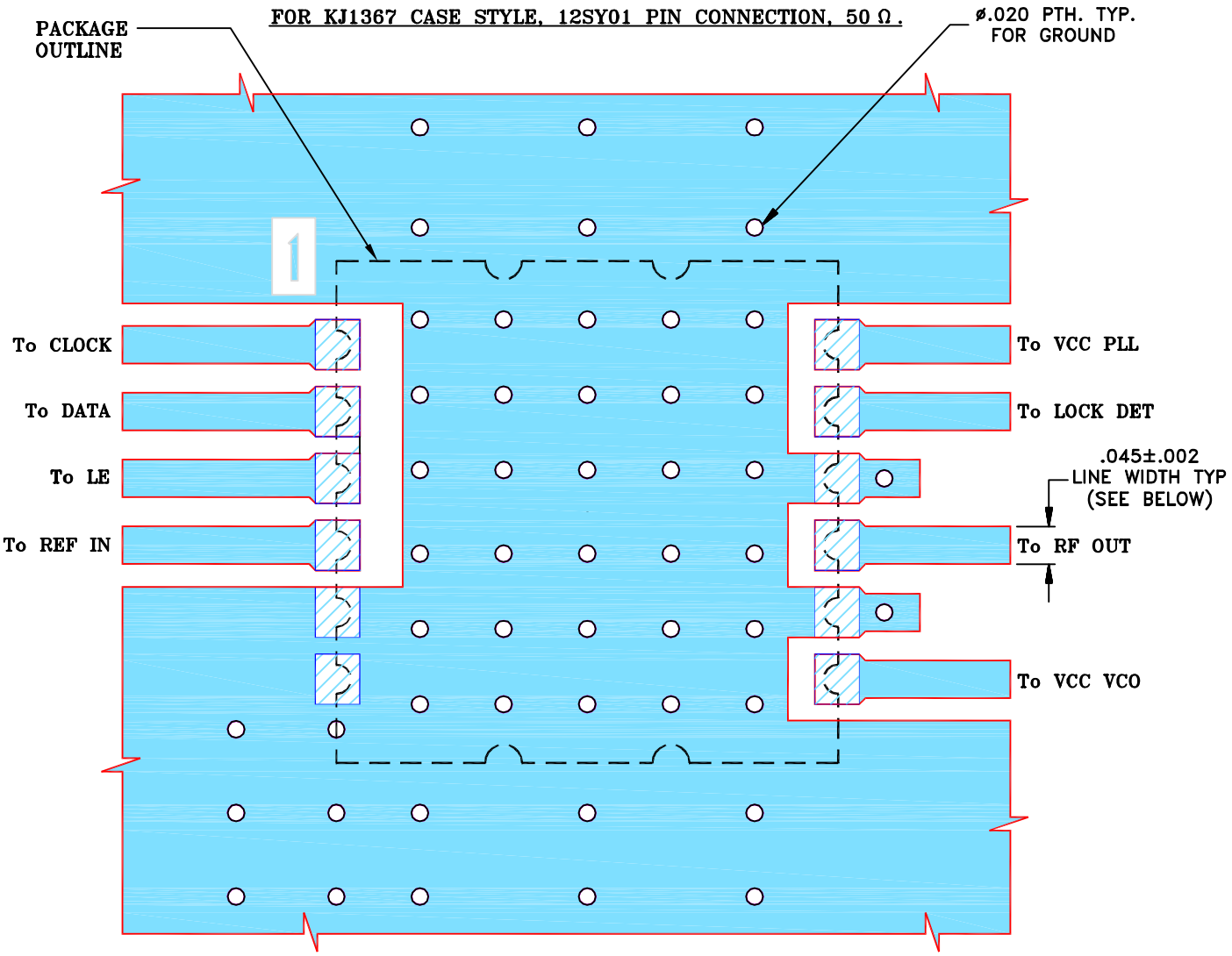
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M124738	NEW RELEASE	04/10	DK	HH
OR	R77823	NEW RELEASE	04/10	DK	HH

SUGGESTED MOUNTING CONFIGURATION
FOR KJ1367 CASE STYLE, 12SY01 PIN CONNECTION, 50 Ω.



NOTES:

1. TRACE WIDTH IS SHOWN FOR RO4350B WITH DIELECTRIC THICKNESS. .020"±.0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	DK (RAVON)	06 APR 10
TOLERANCES ON:	CHECKED	DH (RAVON)	07 APR 10
2 PL DECIMALS ±	APPROVED	HH (RAVON)	07 APR 10
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

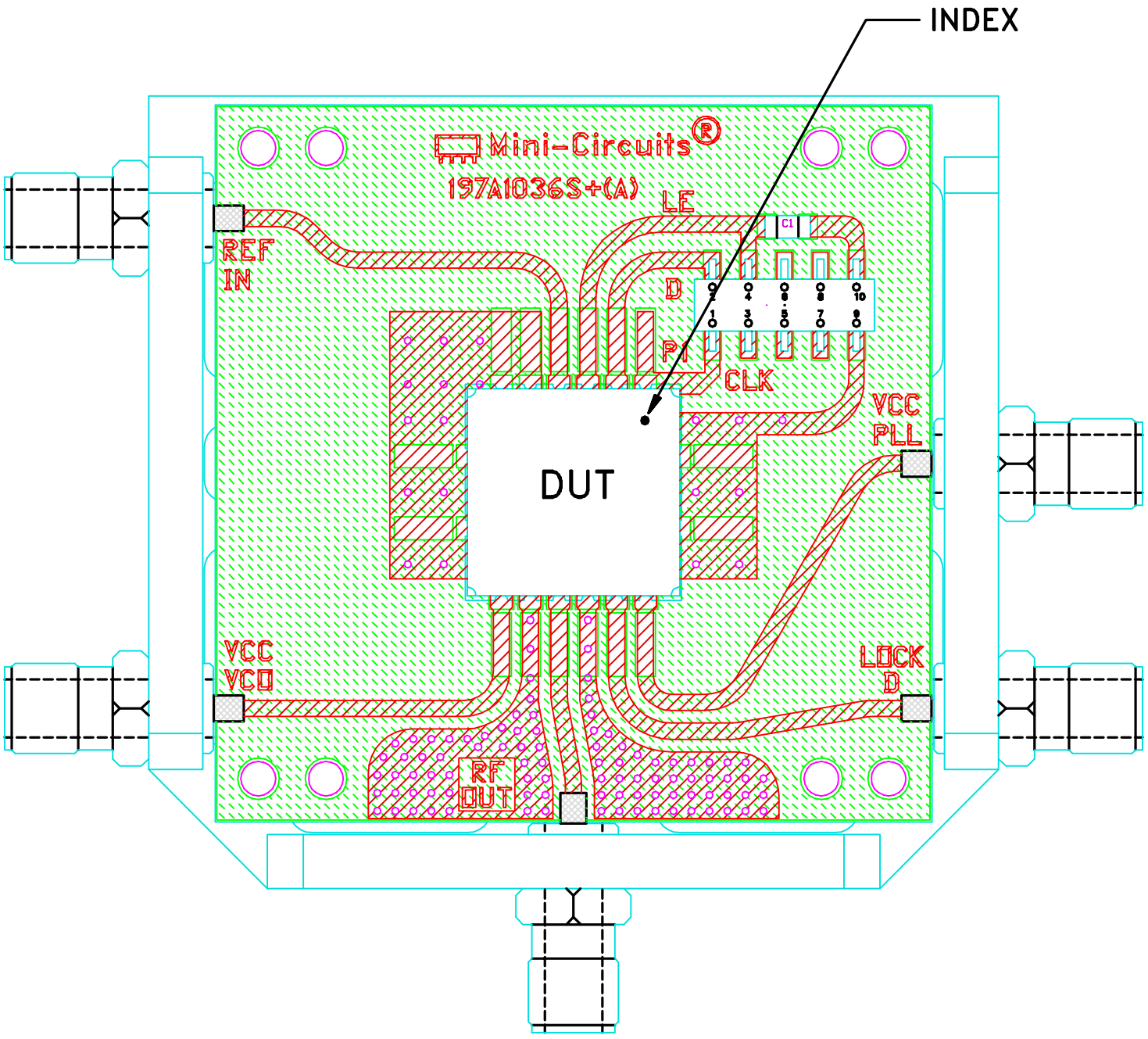
Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

PL, 12SY01, KJ1367, SSN
TB-552+ (50 Ω)

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-317	OR

FILE:	SCALE:	SHEET:
98PL317	5:1	1 OF 1

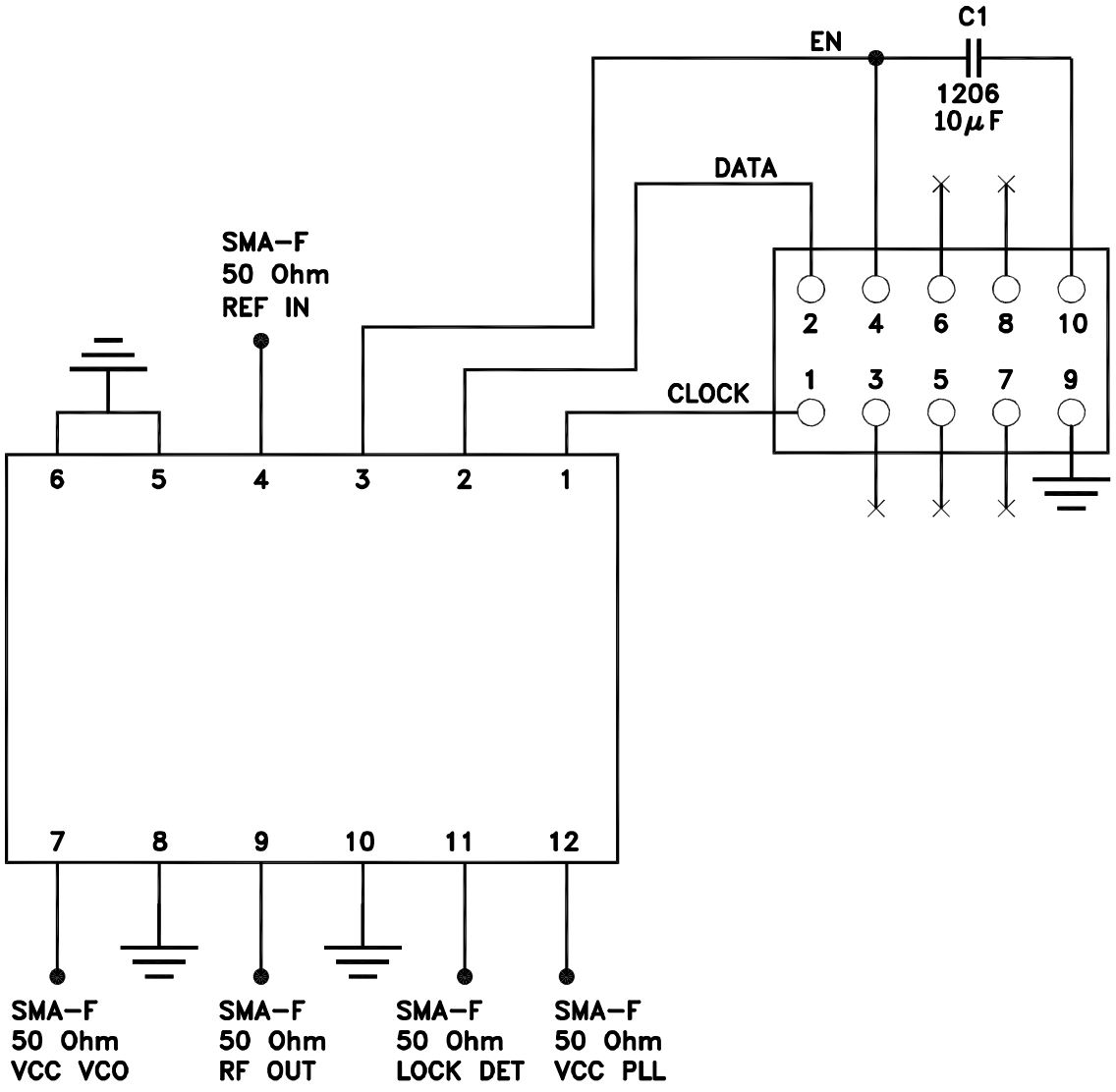
Evaluation Board and Circuit



TB-552+

NOTES:

1. SMA FEMALE CONNECTORS.
2. PCB MATERIAL: RO4350B OR EQUIVALENT, DIALECTRIC CONSTANT=3.5, DIALECTRIC THICKNESS=.020 INCH.



TB-552+

Schematic Diagram

Mini-Circuits

Environmental Specifications ENV65T2

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutectic Process: 225°C peak Pb-Free Process, 245°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Vibration (High Frequency)	20g peak, 20-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-883, Method 2007.3, Condition A
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215