

# NON-CATALOG

## Frequency Synthesizer

SSN-2362A+

50Ω    2232 to 2362 MHz

### The Big Deal

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



CASE STYLE: KJ1367

### Product Overview

The SSN-2362A+ is a Frequency Synthesizer, designed to operate from 2232 to 2362MHz for WiMAX application. The SSN-2362A+ 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: <ul style="list-style-type: none"><li>• Phase Noise: -99 dBc/Hz typ. @ 10 kHz offset</li><li>• Step Size Spurious: -86 dBc typ.</li><li>• Comparison Spurious: -98 dBc typ.</li><li>• Reference Spurious: -91 dBc typ.</li></ul>	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of SSN-2362A+, 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-2362A+ to be used in compact designs.

#### Notes

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[www.minicircuits.com](http://www.minicircuits.com) P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

Surface Mount

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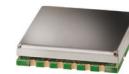
## Frequency Synthesizer

SSN-2362A+

50Ω 2232 to 2362 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**

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

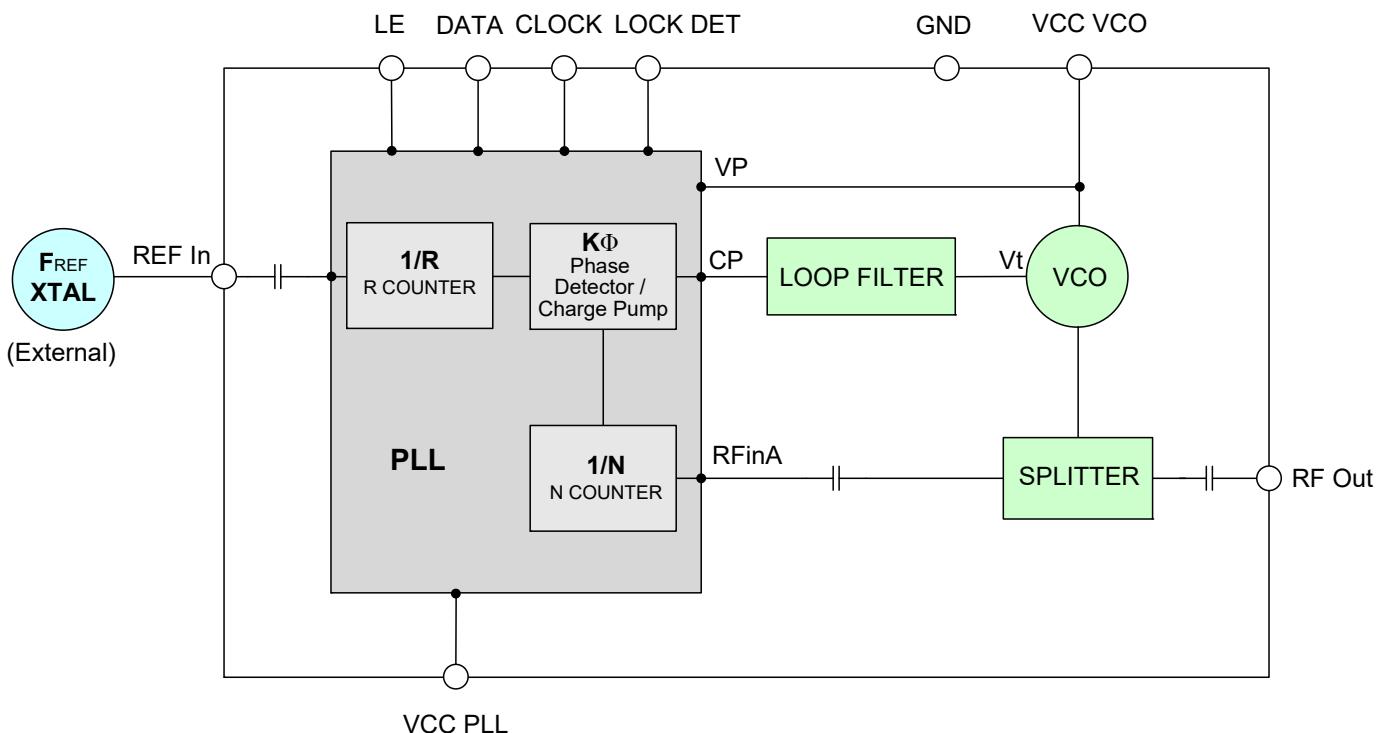
### Applications

- WiMAX

### General Description

The SSN-2362A+ is a Frequency Synthesizer, designed to operate from 2232 to 2362 MHz for WiMAX application. The SSN-2362A+ 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-2362A+, 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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## Frequency Synthesizer

**SSN-2362A+**

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

Parameters	Test Conditions	Min.	Typ.	Max.	Units
Frequency Range	-	2232	-	2362	MHz
Step Size	-	-	125	-	kHz
Comparison Frequency	-	-	13	-	MHz
Settling Time	Within $\pm 1$ kHz	-	27	-	mSec
Output Power	-	0	+3.5	+6.0	dBm
SSB Phase Noise	@ 100 Hz offset	-	-80	-	dBc/Hz
	@ 1 kHz offset	-	-89	-83	
	@ 10 kHz offset	-	-99	-94	
	@ 100 kHz offset	-	-124	-119	
	@ 1 MHz offset	-	-144	-139	
Integrated SSB Phase Noise	@ 1 kHz to 10MHz	-	-52	-	dBc
Step Size Spurious Suppression	Step Size 125 kHz	-	-86	-66	dBc
0.5 Step Size Spurious Suppression	0.5 Step Size 62.5 kHz	-	-84	-61	
Reference Spurious Suppression	Ref. Freq. 52 MHz	-	-91	-82	
Comparison Spurious Suppression	Comp. Freq. 13 MHz	-	-98	-84	
Non - Harmonic Spurious Suppression	-	-	-90	-	
Harmonic Suppression	-	-	-33	-24	
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	-	-	46	52	mA
PLL Supply Current	-	-	15	23	
Reference Input (External)	Frequency	52 (square wave)	-	52	-
	Amplitude	1	-	1	-
	Input impedance	-	-	100	-
	Phase Noise @ 1 kHz offset	-	-	-135	-
RF Output port Impedance	-	-	50	-	Ω
Input Logic Level	Input high voltage	-	2.65	-	-
	Input low voltage	-	-	-	0.60
Digital Lock Detect	Locked	-	2.70	-	3.70
	Unlocked	-	-	-	0.40
Frequency Synthesizer PLL	-	ADF4153			
PLL Programming	-	3-wire serial 3.2V CMOS			
Register Map @ 2362 MHz	R0_Register	-	(MSB) 1011010100000100100000 (LSB)		
	R1_Register	-	(MSB) 101010000000110100001 (LSB)		
	R2_Register	-	(MSB) 111100010 (LSB)		
	R3_Register	-	(MSB) 1111000111 (LSB)		

### Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	5.6V
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

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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	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2232	4.04	3.70	3.43	43.46	45.38	46.82	13.38	14.58	17.17
2236	4.05	3.70	3.43	43.48	45.40	46.83	12.23	13.39	15.93
2254	3.99	3.70	3.34	43.62	45.51	46.89	13.41	14.63	17.21
2272	3.80	3.54	3.05	43.64	45.54	46.89	13.36	14.58	17.15
2290	4.08	3.59	3.08	43.72	45.55	46.91	13.26	14.48	17.05
2308	4.07	3.54	3.09	43.63	45.47	46.86	13.46	14.69	17.27
2326	4.04	3.36	2.88	43.63	45.43	46.82	13.22	14.44	17.00
2344	3.91	3.33	2.69	43.44	45.36	46.74	13.36	14.59	17.16
2362	3.87	3.16	2.55	43.37	45.25	46.67	13.38	14.61	17.17

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2232	-31.86	-34.15	-36.04	-39.40	-37.88	-36.53
2236	-31.95	-34.02	-36.43	-35.54	-38.32	-37.68
2254	-29.23	-32.21	-34.27	-38.41	-38.37	-37.39
2272	-30.87	-32.86	-35.46	-45.57	-40.66	-38.84
2290	-29.90	-33.12	-34.64	-42.18	-41.36	-40.38
2308	-30.54	-32.93	-36.41	-43.02	-41.65	-42.89
2326	-30.44	-33.51	-33.48	-57.94	-44.37	-46.69
2344	-31.68	-32.36	-35.24	-46.23	-42.85	-42.65
2362	-30.03	-34.67	-36.23	-38.62	-41.49	-40.11

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**SSN-2362A+**

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
2232	-83.40	-90.01	-99.25	-124.09	-144.28
2236	-84.88	-91.62	-98.52	-123.93	-144.06
2254	-84.20	-90.78	-99.34	-124.54	-144.84
2272	-84.02	-90.34	-99.15	-124.25	-144.52
2290	-85.06	-89.21	-99.42	-124.46	-144.84
2308	-84.22	-89.15	-99.08	-124.08	-144.09
2326	-83.09	-88.12	-100.10	-124.57	-144.92
2344	-85.06	-89.22	-99.62	-124.35	-144.58
2362	-82.42	-89.44	-99.38	-124.09	-144.38

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS					FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-45°C						+85°C				
100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	
2232	-82.58	-90.62	-98.82	-124.15	-145.59	2232	-90.96	-90.73	-97.64	-122.57	-142.77
2236	-83.91	-90.50	-98.71	-125.32	-145.66	2236	-85.14	-90.24	-97.91	-122.57	-142.78
2254	-82.14	-91.38	-99.54	-125.84	-146.09	2254	-86.34	-91.41	-98.28	-122.94	-143.12
2272	-83.81	-90.98	-99.01	-125.49	-145.93	2272	-86.35	-90.32	-98.29	-122.52	-142.75
2290	-83.42	-88.91	-99.91	-126.24	-146.73	2290	-87.12	-88.51	-98.51	-123.12	-143.29
2308	-82.07	-91.07	-99.45	-125.58	-145.99	2308	-85.34	-88.69	-98.12	-122.68	-142.87
2326	-84.21	-89.01	-100.38	-126.47	-146.84	2326	-86.83	-87.81	-98.50	-122.55	-142.38
2344	-82.91	-90.11	-100.23	-125.73	-146.22	2344	-83.88	-87.18	-98.28	-122.41	-142.62
2362	-82.79	-89.37	-100.55	-126.07	-146.74	2362	-86.96	-86.14	-98.25	-122.38	-142.60

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## Frequency Synthesizer

**SSN-2362A+**

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 2232MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 2297MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 2362MHz+(n*Fcomparison) (dBc) note 1		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5	-100.03	-97.43	-98.90	-98.85	-102.42	-98.16	-98.10	-98.91	-99.86
-4	-105.79	-97.52	-97.07	-101.33	-99.85	-98.36	-100.26	-99.44	-97.95
-3	-99.26	-109.03	-99.48	-105.99	-99.77	-105.04	-105.99	-101.62	-102.24
-2	-99.40	-99.79	-101.45	-101.61	-101.56	-99.92	-103.72	-102.85	-106.24
-1	-113.29	-93.13	-103.50	-99.40	-108.71	-95.23	-101.59	-111.72	-106.92
0 <sup>note 2</sup>	-	-	-	-	-	-	-	-	-
+1	-110.57	-95.46	-113.68	-103.97	-105.63	-100.07	-104.68	-110.71	-110.62
+2	-103.28	-106.48	-108.26	-111.29	-107.10	-110.54	-110.80	-109.54	-116.55
+3	-107.68	-111.95	-106.04	-115.13	-119.12	-117.68	-120.18	-109.62	-111.54
+4	-102.31	-100.54	-103.06	-102.32	-103.18	-101.92	-106.50	-106.81	-103.72
+5	-101.31	-102.12	-104.42	-102.11	-103.72	-105.25	-105.43	-105.90	-107.47

Note 1: Comparison frequency 13 MHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 2232MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 2297MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 2362MHz+(n*Freference) (dBc) note 3		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5	-103.68	-100.69	-106.86	-102.85	-99.08	-99.28	-100.90	-102.75	-104.53
-4	-98.37	-108.73	-100.94	-99.96	-104.08	-104.27	-95.84	-100.11	-100.60
-3	-92.12	-92.60	-98.79	-91.53	-93.33	-96.25	-90.02	-91.24	-95.53
-2	-92.84	-93.37	-94.67	-93.66	-92.69	-94.01	-92.97	-92.77	-93.36
-1	-106.30	-97.50	-96.82	-100.97	-100.35	-98.67	-100.42	-99.80	-98.19
0 <sup>note 4</sup>	-	-	-	-	-	-	-	-	-
+1	-102.62	-100.78	-103.25	-103.02	-102.95	-102.43	-106.75	-106.74	-104.85
+2	-92.65	-94.79	-99.48	-94.36	-96.75	-99.16	-96.63	-97.93	-99.99
+3	-86.87	-92.32	-101.86	-87.95	-93.11	-100.43	-90.19	-95.06	-101.98
+4	-90.35	-99.46	-105.51	-91.44	-97.24	-105.72	-92.24	-98.98	-106.74
+5	-98.29	-108.55	-114.24	-97.72	-103.91	-108.43	-98.31	-105.13	-117.80

Note 3: Reference frequency 52 MHz

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

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STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2232MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2297MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2362MHz+(n*Fstep size) (dBc) note 5		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5.0	-113.90	-112.47	-112.93	-109.36	-111.89	-110.65	-111.08	-113.35	-108.84
-4.5	-110.82	-108.98	-109.00	-110.64	-113.35	-111.65	-107.03	-112.50	-109.43
-4.0	-111.28	-110.09	-110.03	-111.02	-109.72	-110.75	-109.25	-109.01	-112.19
-3.5	-107.65	-111.38	-106.44	-102.41	-109.29	-107.85	-103.26	-105.26	-105.75
-3.0	-105.71	-106.30	-107.21	-106.04	-105.07	-102.49	-105.24	-105.30	-102.29
-2.5	-101.41	-101.79	-105.66	-104.60	-100.54	-100.72	-98.95	-101.27	-104.63
-2.0	-97.01	-97.79	-97.46	-101.35	-98.38	-95.99	-100.29	-96.87	-99.08
-1.5	-92.27	-91.83	-90.03	-95.32	-94.32	-88.54	-88.75	-94.16	-95.82
-1.0	-87.47	-88.07	-85.47	-88.32	-84.72	-86.41	-87.98	-89.74	-89.80
-0.5	-79.85	-86.75	-84.82	-77.22	-85.94	-86.24	-84.23	-82.14	-83.50
0 <sup>note 6</sup>	-	-	-	-	-	-	-	-	-
+0.5	-79.91	-86.07	-85.25	-78.43	-87.13	-79.15	-83.77	-83.51	-81.99
+1.0	-87.07	-87.82	-88.69	-86.26	-85.66	-87.22	-86.67	-85.81	-90.00
+1.5	-93.19	-93.12	-94.16	-93.23	-93.90	-94.49	-91.92	-94.10	-94.52
+2.0	-101.40	-99.37	-100.52	-97.85	-97.35	-96.10	-101.43	-102.35	-96.56
+2.5	-104.22	-101.17	-102.44	-102.22	-98.82	-104.75	-97.77	-103.34	-104.24
+3.0	-104.92	-106.21	-103.61	-105.87	-109.05	-107.16	-103.10	-104.63	-107.86
+3.5	-105.79	-106.40	-108.78	-102.51	-108.72	-108.57	-100.64	-105.03	-105.61
+4.0	-109.98	-108.78	-110.07	-110.04	-111.39	-108.65	-106.84	-110.28	-108.95
+4.5	-109.78	-111.83	-110.59	-108.67	-106.55	-110.03	-109.15	-110.79	-109.46
+5.0	-113.88	-108.97	-110.50	-111.13	-108.21	-111.02	-112.44	-115.14	-111.95

Note 5: Step size 125 kHz

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

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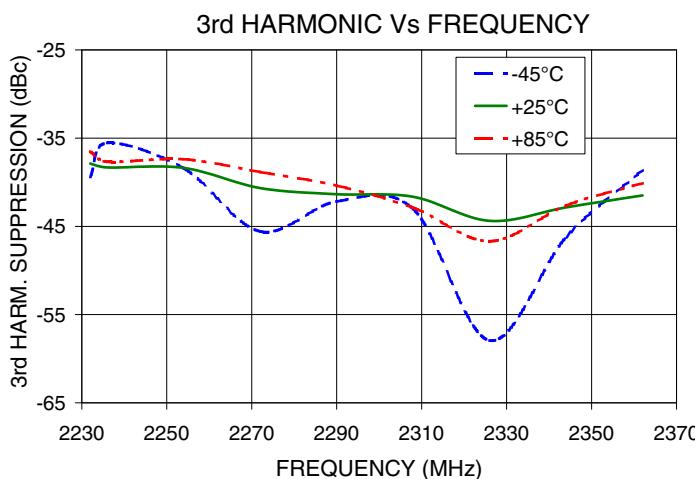
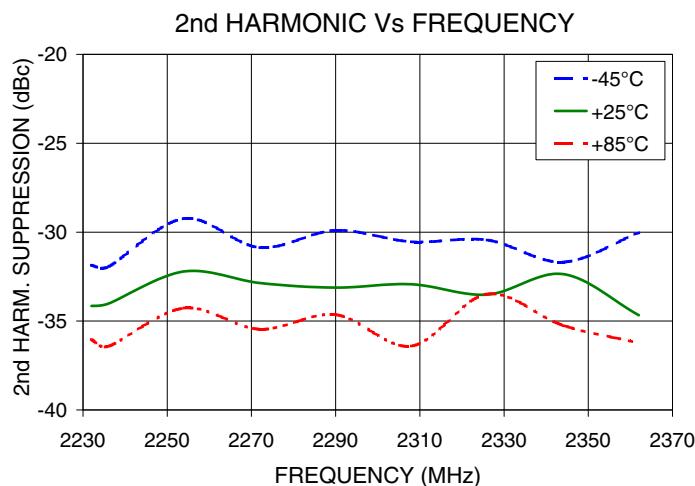
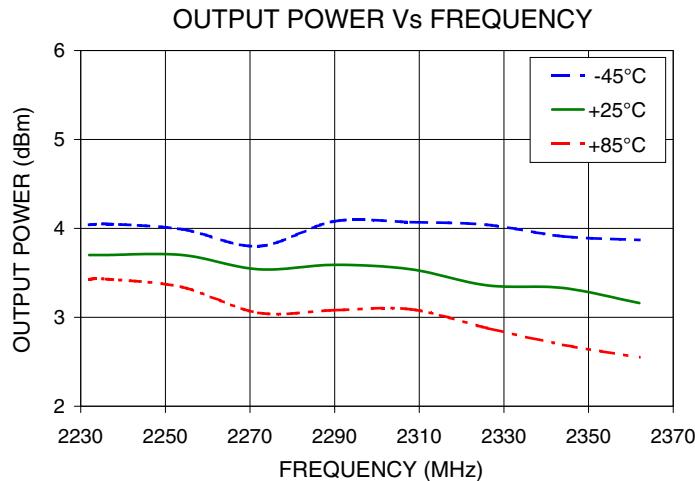


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Frequency Synthesizer

SSN-2362A+

## Typical Performance Curves



### Notes

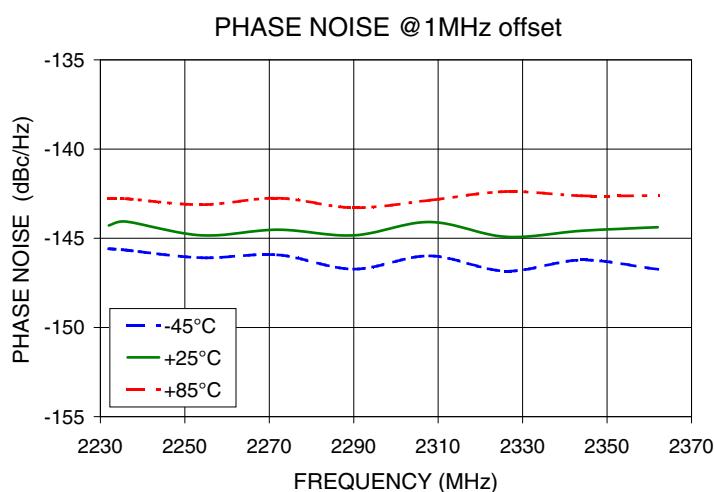
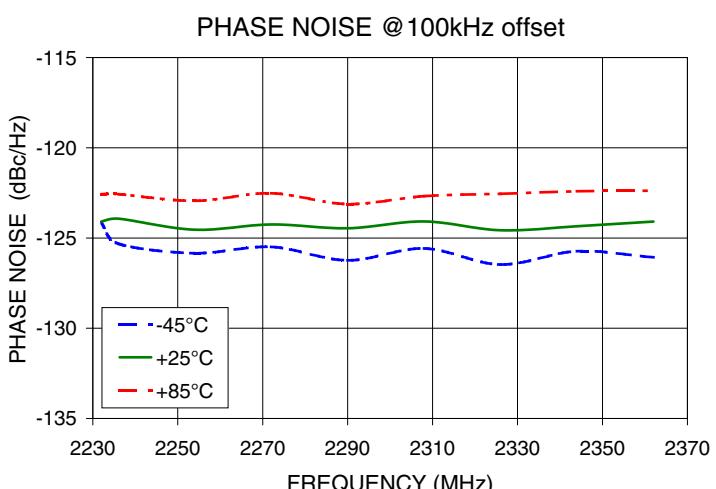
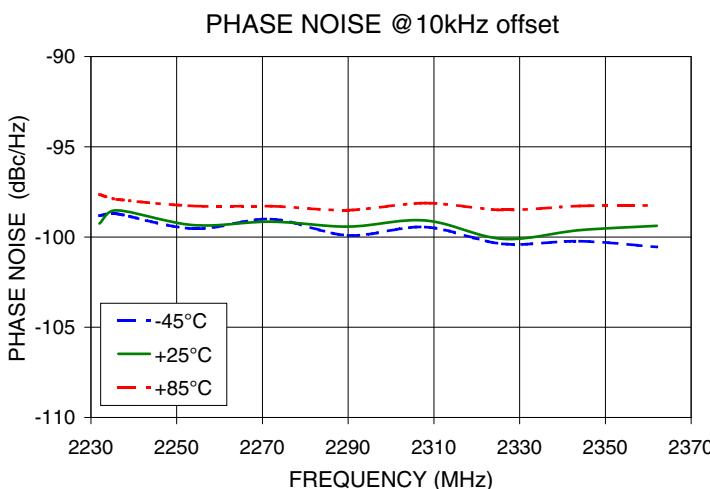
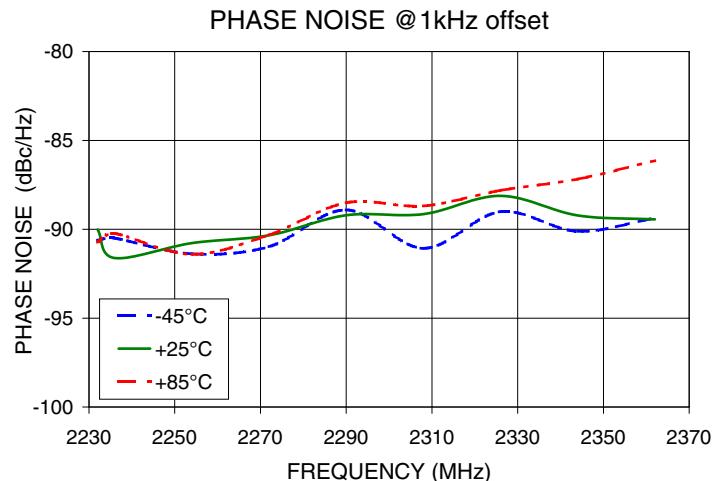
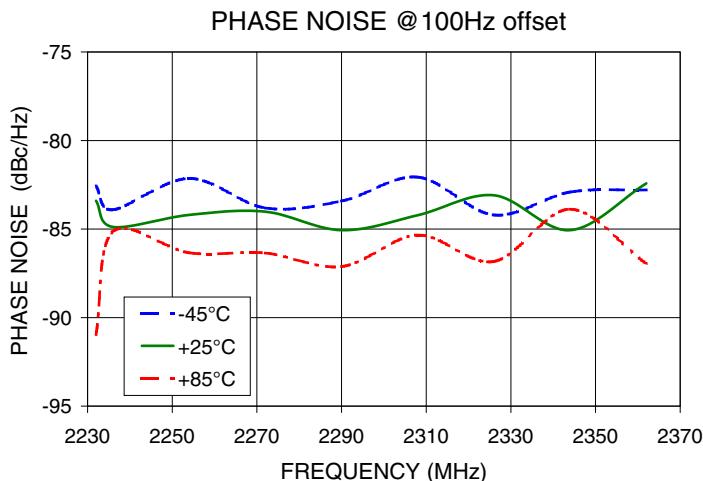
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## Frequency Synthesizer

**SSN-2362A+**



### Notes

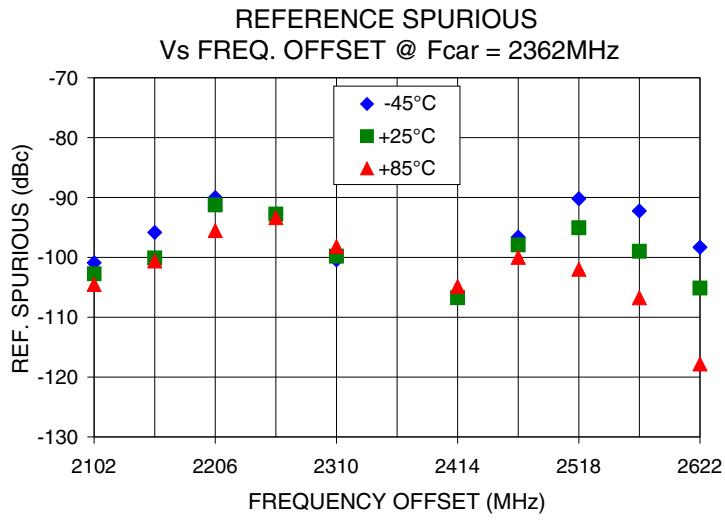
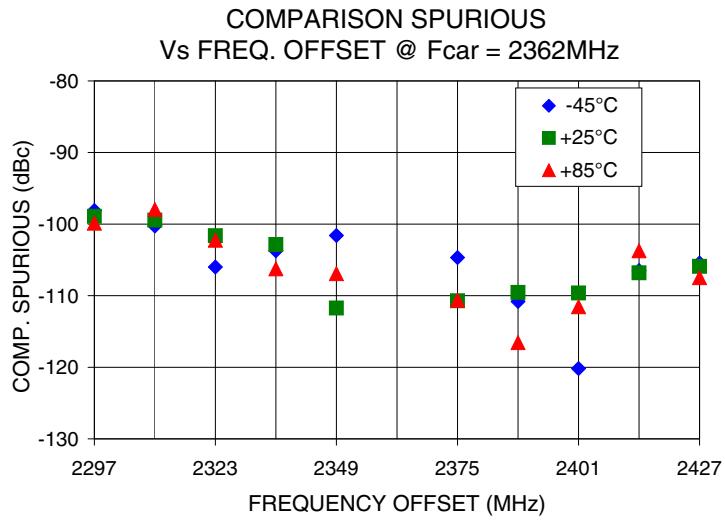
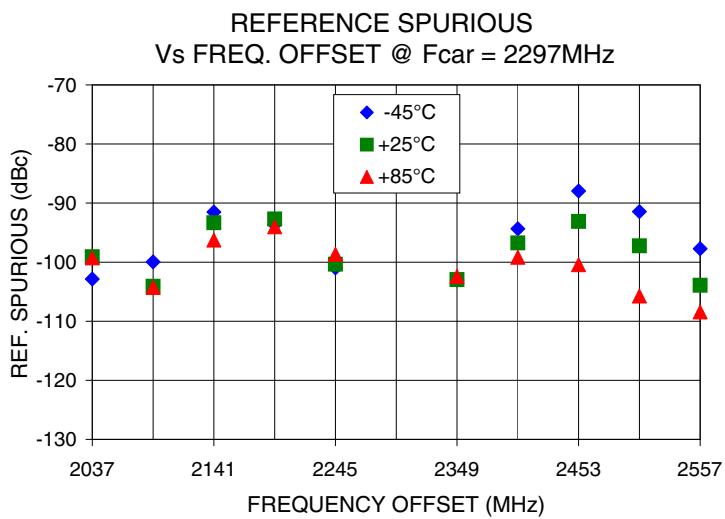
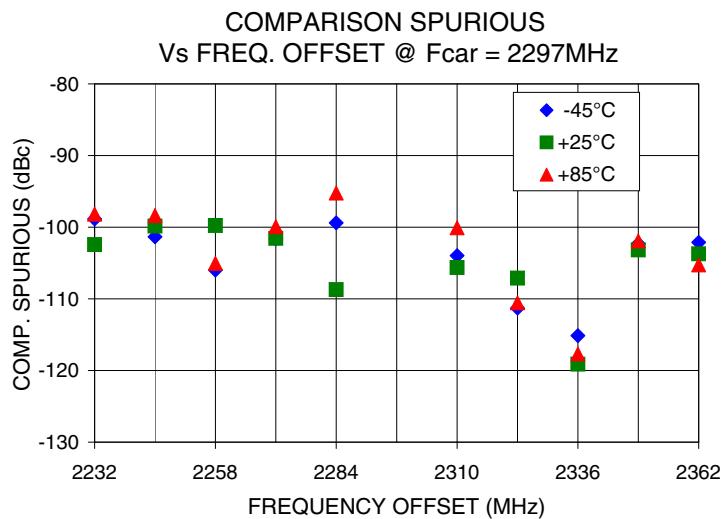
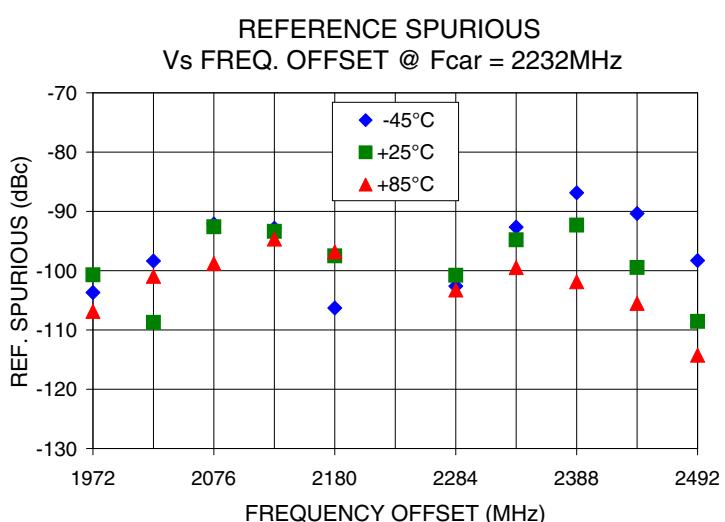
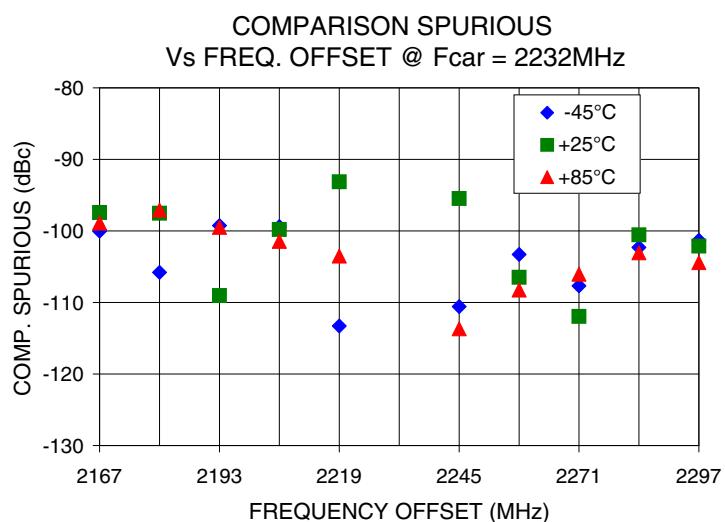
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## Frequency Synthesizer

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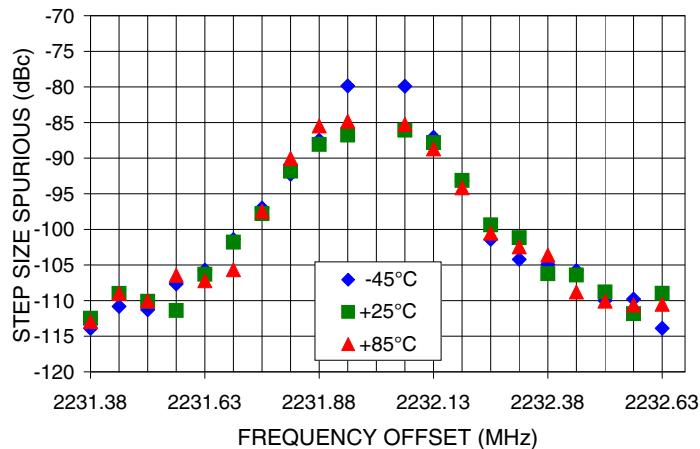


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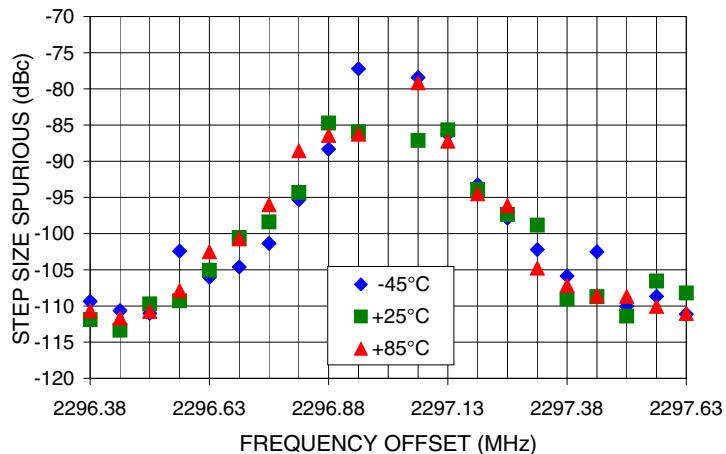
## Frequency Synthesizer

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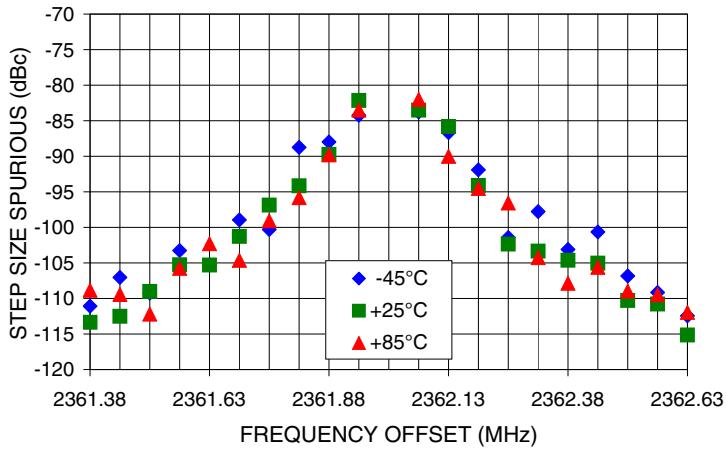
0.5 STEP SIZE & STEP SIZE SPURIOUS  
Vs FREQ. OFFSET @ Fcar = 2232MHz



0.5 STEP SIZE & STEP SIZE SPURIOUS  
Vs FREQ. OFFSET @ Fcar = 2297MHz



0.5 STEP SIZE & STEP SIZE SPURIOUS  
Vs FREQ. OFFSET @ Fcar = 2362MHz



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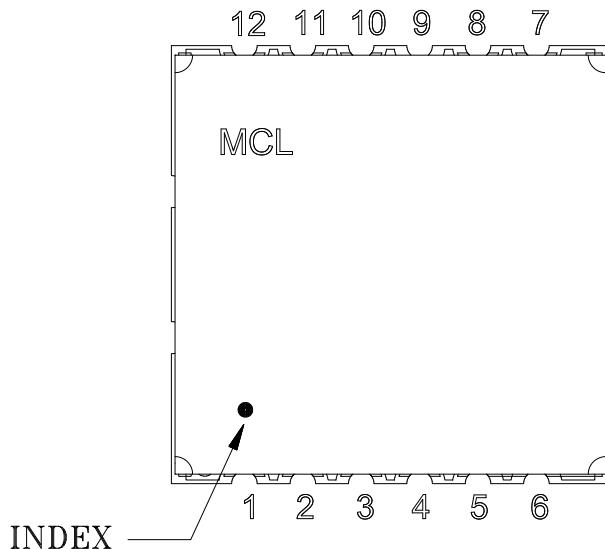


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Frequency Synthesizer

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## Pin Configuration

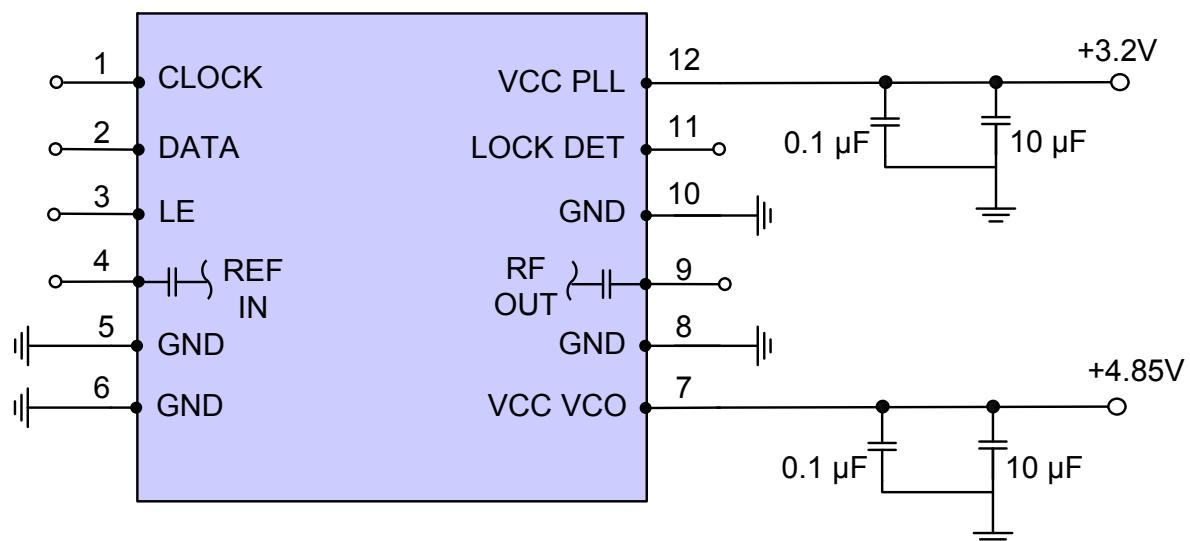


## Pin Connection

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.



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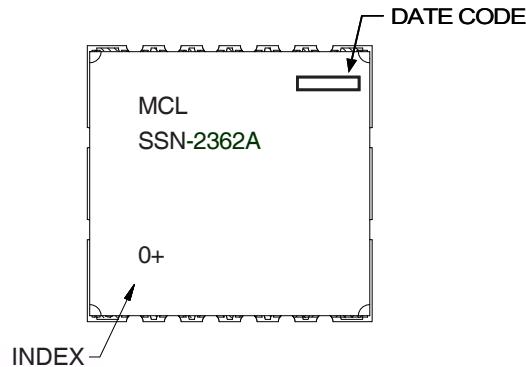


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Frequency Synthesizer

**SSN-2362A+**

## 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:** ENV65T2

#### Notes

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# Frequency Synthesizer

**SSN-2362A+**

## Typical Performance Data

FREQ. (MHz)	POWER OUTPUT (dBm)			HARMONICS (dBc)						VCO CURRENT (mA)			PLL CURENT (mA)		
				F2			F3								
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
2232.00	4.04	3.70	3.43	-31.86	-34.15	-36.04	-39.40	-37.88	-36.53	43.46	45.38	46.82	13.38	14.58	17.17
2236.00	4.05	3.70	3.43	-31.95	-34.02	-36.43	-35.54	-38.32	-37.68	43.48	45.40	46.83	12.23	13.39	15.93
2254.00	3.99	3.70	3.34	-29.23	-32.21	-34.27	-38.41	-38.37	-37.39	43.62	45.51	46.89	13.41	14.63	17.21
2272.00	3.80	3.54	3.05	-30.87	-32.86	-35.46	-45.57	-40.66	-38.84	43.64	45.54	46.89	13.36	14.58	17.15
2290.00	4.08	3.59	3.08	-29.90	-33.12	-34.64	-42.18	-41.36	-40.38	43.72	45.55	46.91	13.26	14.48	17.05
2308.00	4.07	3.54	3.09	-30.54	-32.93	-36.41	-43.02	-41.65	-42.89	43.63	45.47	46.86	13.46	14.69	17.27
2326.00	4.04	3.36	2.88	-30.44	-33.51	-33.48	-57.94	-44.37	-46.69	43.63	45.43	46.82	13.22	14.44	17.00
2344.00	3.91	3.33	2.69	-31.68	-32.36	-35.24	-46.23	-42.85	-42.65	43.44	45.36	46.74	13.36	14.59	17.16
2362.00	3.87	3.16	2.55	-30.03	-34.67	-36.23	-38.62	-41.49	-40.11	43.37	45.25	46.67	13.38	14.61	17.17

FREQ. (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS														
	-45°C					+25°C					+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	1kHz	10kHz	100kHz	1MHz
2232.00	-82.58	-90.62	-98.82	-124.15	-145.59	-83.40	-90.01	-99.25	-124.09	-144.28	-90.96	-90.73	-97.64	-122.57	-142.77
2236.00	-83.91	-90.50	-98.71	-125.32	-145.66	-84.88	-91.62	-98.52	-123.93	-144.06	-85.14	-90.24	-97.91	-122.57	-142.78
2254.00	-82.14	-91.38	-99.54	-125.84	-146.09	-84.20	-90.78	-99.34	-124.54	-144.84	-86.34	-91.41	-98.28	-122.94	-143.12
2272.00	-83.81	-90.98	-99.01	-125.49	-145.93	-84.02	-90.34	-99.15	-124.25	-144.52	-86.35	-90.32	-98.29	-122.52	-142.75
2290.00	-83.42	-88.91	-99.91	-126.24	-146.73	-85.06	-89.21	-99.42	-124.46	-144.84	-87.12	-88.51	-98.51	-123.12	-143.29
2308.00	-82.07	-91.07	-99.45	-125.58	-145.99	-84.22	-89.15	-99.08	-124.08	-144.09	-85.34	-88.69	-98.12	-122.68	-142.87
2326.00	-84.21	-89.01	-100.38	-126.47	-146.84	-83.09	-88.12	-100.10	-124.57	-144.92	-86.83	-87.81	-98.50	-122.55	-142.38
2344.00	-82.91	-90.11	-100.23	-125.73	-146.22	-85.06	-89.22	-99.62	-124.35	-144.58	-83.88	-87.18	-98.28	-122.41	-142.62
2362.00	-82.79	-89.37	-100.55	-126.07	-146.74	-82.42	-89.44	-99.38	-124.09	-144.38	-86.96	-86.14	-98.25	-122.38	-142.60



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10067  
Page 1 of 3



# Frequency Synthesizer

**SSN-2362A+**

## Typical Performance Data

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 2232MHz± (n*Fcomparison) (dBc) NOTE 1			COMPARISON SPURIOUS @Fcarrier 2297MHz± (n*Fcomparison) (dBc) NOTE 1			COMPARISON SPURIOUS @Fcarrier 2362MHz± (n*Fcomparison) (dBc) NOTE 1		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5	-100.03	-97.43	-98.90	-98.85	-102.42	-98.16	-98.10	-98.91	-99.86
-4	-105.79	-97.52	-97.07	-101.33	-99.85	-98.36	-100.26	-99.44	-97.95
-3	-99.26	-109.03	-99.48	-105.99	-99.77	-105.04	-105.99	-101.62	-102.24
-2	-99.40	-99.79	-101.45	-101.61	-101.56	-99.92	-103.72	-102.85	-106.24
-1	-113.29	-93.13	-103.50	-99.40	-108.71	-95.23	-101.59	-111.72	-106.92
0 <sup>note 2</sup>	-	-	-	-	-	-	-	-	-
+1	-110.57	-95.46	-113.68	-103.97	-105.63	-100.07	-104.68	-110.71	-110.62
+2	-103.28	-106.48	-108.26	-111.29	-107.10	-110.54	-110.80	-109.54	-116.55
+3	-107.68	-111.95	-106.04	-115.13	-119.12	-117.68	-120.18	-109.62	-111.54
+4	-102.31	-100.54	-103.06	-102.32	-103.18	-101.92	-106.50	-106.81	-103.72
+5	-101.31	-102.12	-104.42	-102.11	-103.72	-105.25	-105.43	-105.90	-107.47

Note 1: Comparison frequency 13 MHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 2232MHz± (n*Reference) (dBc) NOTE 3			REFERENCE SPURIOUS @Fcarrier 2297MHz± (n*Reference) (dBc) NOTE 3			REFERENCE SPURIOUS @Fcarrier 2362MHz± (n*Reference) (dBc) NOTE 3		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5	-103.68	-100.69	-106.86	-102.85	-99.08	-99.28	-100.90	-102.75	-104.53
-4	-98.37	-108.73	-100.94	-99.96	-104.08	-104.27	-95.84	-100.11	-100.60
-3	-92.12	-92.60	-98.79	-91.53	-93.33	-96.25	-90.02	-91.24	-95.53
-2	-92.84	-93.37	-94.67	-93.66	-92.69	-94.01	-92.97	-92.77	-93.36
-1	-106.30	-97.50	-96.82	-100.97	-100.35	-98.67	-100.42	-99.80	-98.19
0 <sup>note 4</sup>	-	-	-	-	-	-	-	-	-
+1	-102.62	-100.78	-103.25	-103.02	-102.95	-102.43	-106.75	-106.74	-104.85
+2	-92.65	-94.79	-99.48	-94.36	-96.75	-99.16	-96.63	-97.93	-99.99
+3	-86.87	-92.32	-101.86	-87.95	-93.11	-100.43	-90.19	-95.06	-101.98
+4	-90.35	-99.46	-105.51	-91.44	-97.24	-105.72	-92.24	-98.98	-106.74
+5	-98.29	-108.55	-114.24	-97.72	-103.91	-108.43	-98.31	-105.13	-117.80

Note 3: Reference frequency 52 MHz

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

REV. X1

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100607

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# Frequency Synthesizer

**SSN-2362A+**

## Typical Performance Data

STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @ Fcarrier 2232 MHz± (n*Fstep size) (dBc) NOTE 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @ Fcarrier 2297 MHz± (n*Fstep size) (dBc) NOTE 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @ Fcarrier 2362 MHz± (n*Fstep size) (dBc) NOTE 5		
	n	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C
-5.0	-113.90	-112.47	-112.93	-109.36	-111.89	-110.65	-111.08	-113.35	-108.84
-4.5	-110.82	-108.98	-109.00	-110.64	-113.35	-111.65	-107.03	-112.50	-109.43
-4.0	-111.28	-110.09	-110.03	-111.02	-109.72	-110.75	-109.25	-109.01	-112.19
-3.5	-107.65	-111.38	-106.44	-102.41	-109.29	-107.85	-103.26	-105.26	-105.75
-3.0	-105.71	-106.30	-107.21	-106.04	-105.07	-102.49	-105.24	-105.30	-102.29
-2.5	-101.41	-101.79	-105.66	-104.60	-100.54	-100.72	-98.95	-101.27	-104.63
-2.0	-97.01	-97.79	-97.46	-101.35	-98.38	-95.99	-100.29	-96.87	-99.08
-1.5	-92.27	-91.83	-90.03	-95.32	-94.32	-88.54	-88.75	-94.16	-95.82
-1.0	-87.47	-88.07	-85.47	-88.32	-84.72	-86.41	-87.98	-89.74	-89.80
-0.5	-79.85	-86.75	-84.82	-77.22	-85.94	-86.24	-84.23	-82.14	-83.50
0 <sup>note 6</sup>	-	-	-	-	-	-	-	-	-
+0.5	-79.91	-86.07	-85.25	-78.43	-87.13	-79.15	-83.77	-83.51	-81.99
+1.0	-87.07	-87.82	-88.69	-86.26	-85.66	-87.22	-86.67	-85.81	-90.00
+1.5	-93.19	-93.12	-94.16	-93.23	-93.90	-94.49	-91.92	-94.10	-94.52
+2.0	-101.40	-99.37	-100.52	-97.85	-97.35	-96.10	-101.43	-102.35	-96.56
+2.5	-104.22	-101.17	-102.44	-102.22	-98.82	-104.75	-97.77	-103.34	-104.24
+3.0	-104.92	-106.21	-103.61	-105.87	-109.05	-107.16	-103.10	-104.63	-107.86
+3.5	-105.79	-106.40	-108.78	-102.51	-108.72	-108.57	-100.64	-105.03	-105.61
+4.0	-109.98	-108.78	-110.07	-110.04	-111.39	-108.65	-106.84	-110.28	-108.95
+4.5	-109.78	-111.83	-110.59	-108.67	-106.55	-110.03	-109.15	-110.79	-109.46
+5.0	-113.88	-108.97	-110.50	-111.13	-108.21	-111.02	-112.44	-115.14	-111.95

Note 5: Step size 125 kHz

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

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Page 3 of 3



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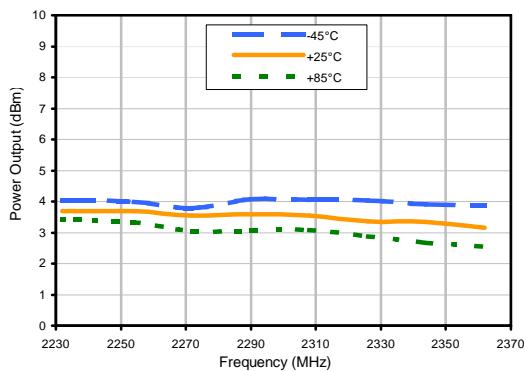
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# Frequency Synthesizer

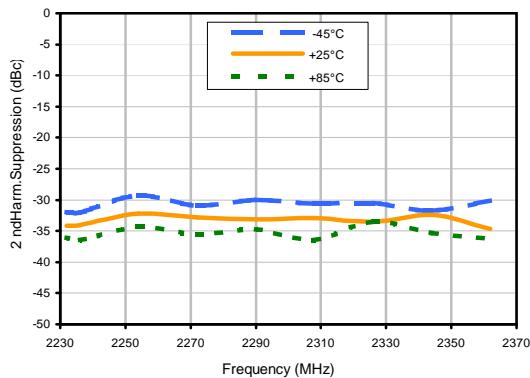
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## Typical Performance Data

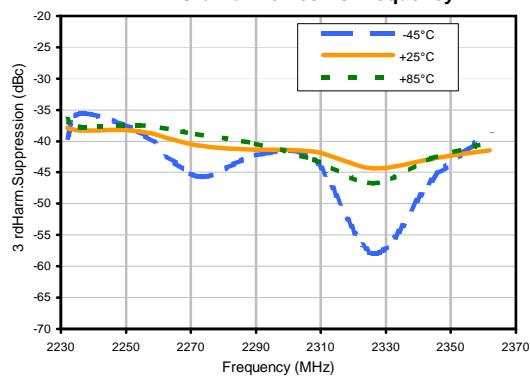
Power Output Vs Frequency



2nd Harmonics Vs Frequency



3rd Harmonics Vs Frequency



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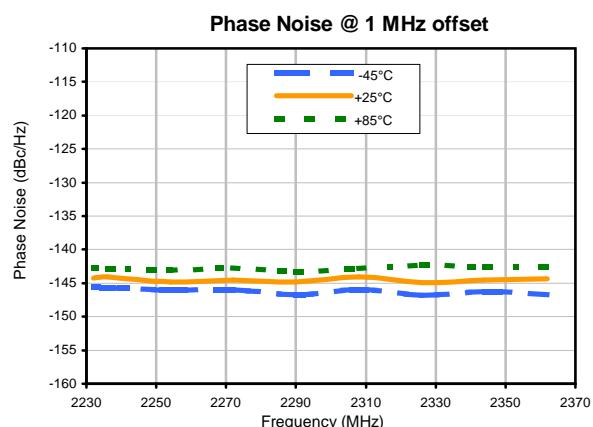
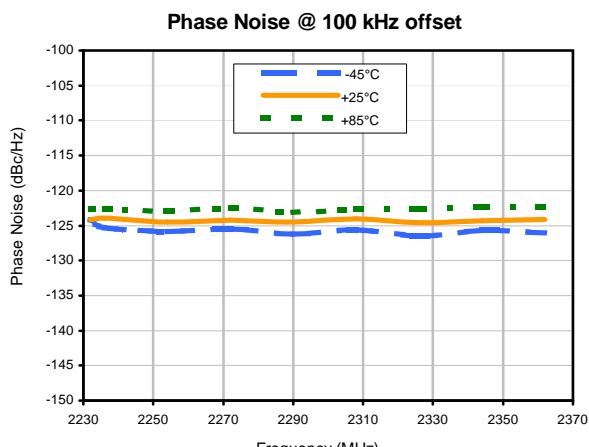
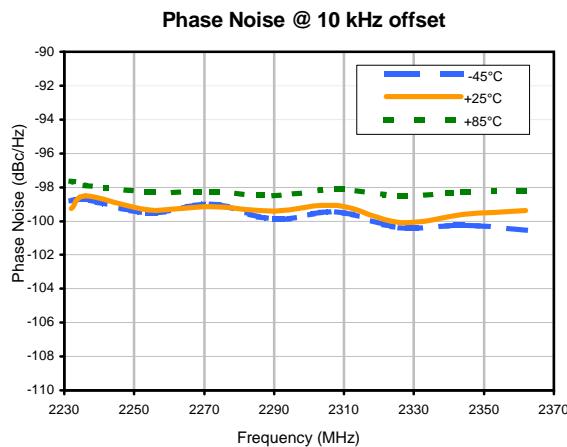
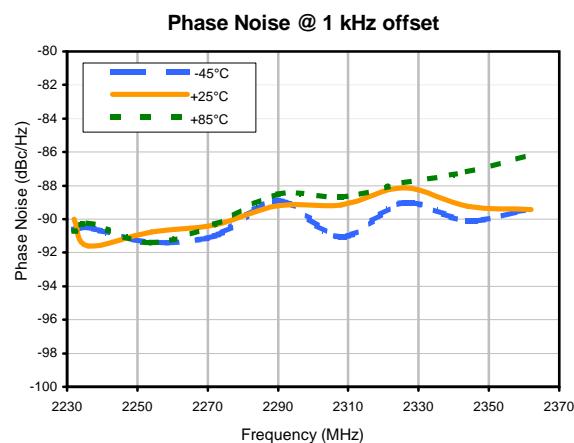
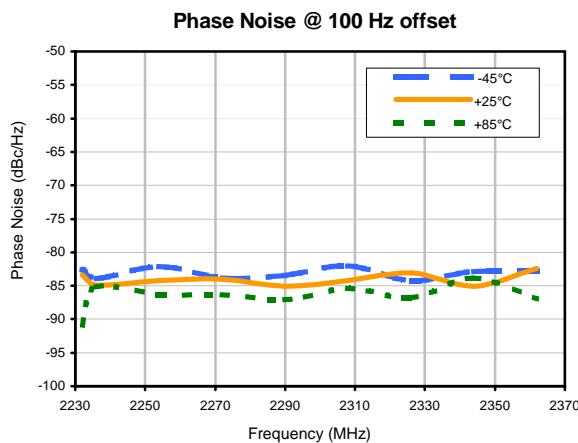
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# Frequency Synthesizer

SSN-2362A+

## Typical Performance Data



REV. X1  
SSN-2362A+  
100607  
Page 2 of 4



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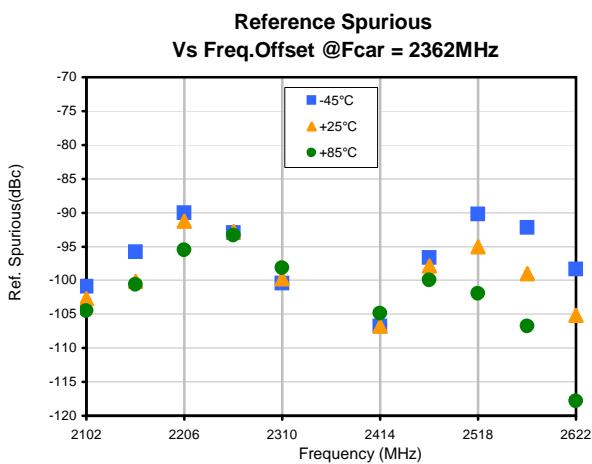
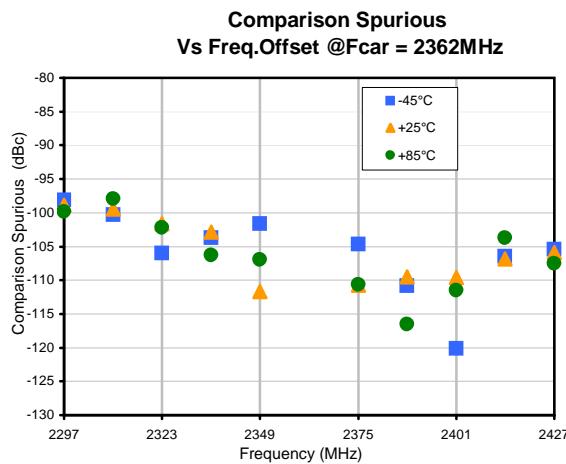
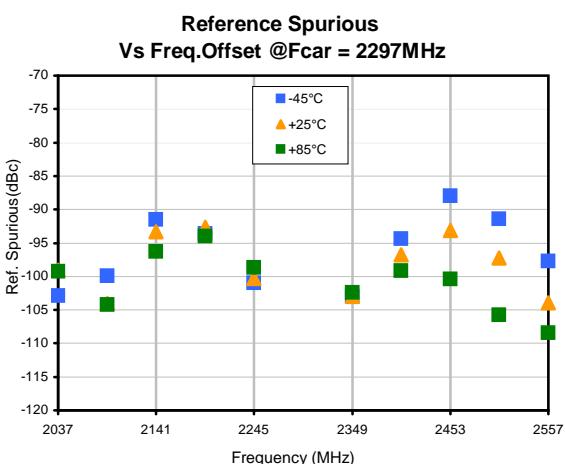
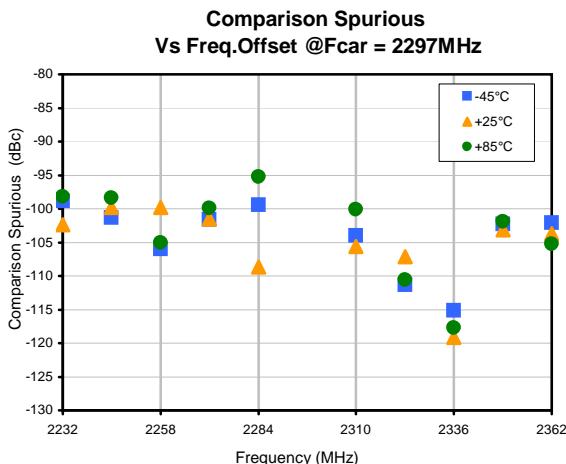
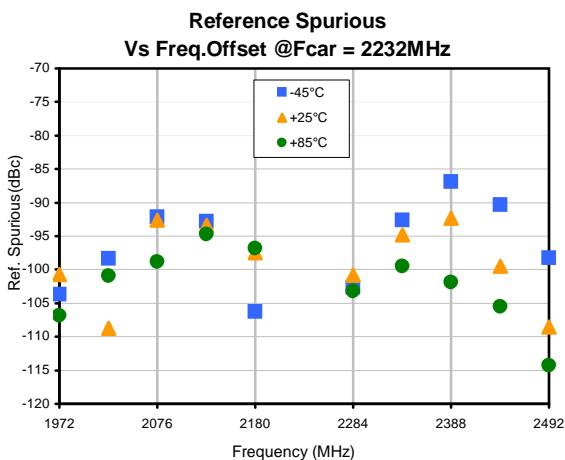
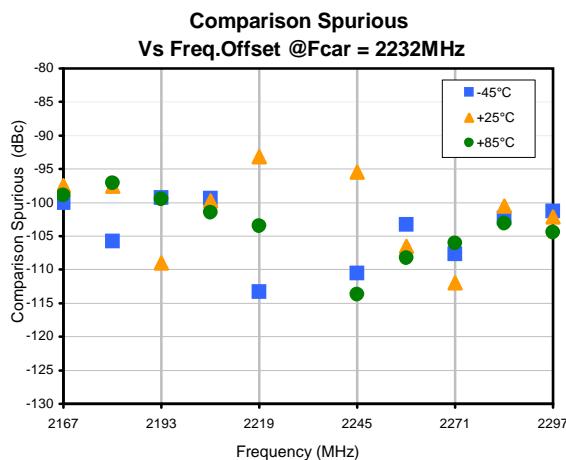
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# Frequency Synthesizer

**SSN-2362A+**

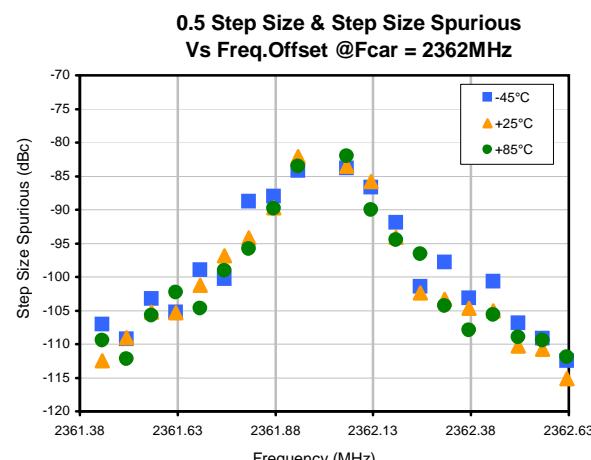
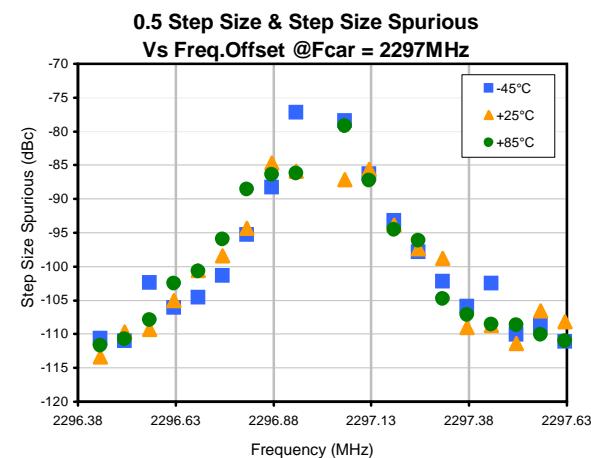
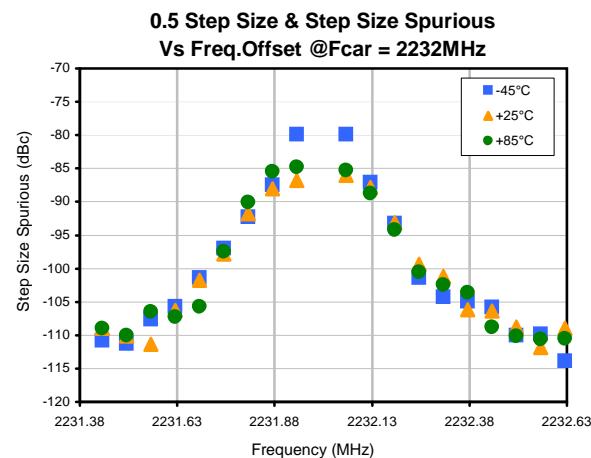
## Typical Performance Data



# Frequency Synthesizer

SSN-2362A+

## Typical Performance Data



REV. X1  
SSN-2362A+  
100607  
Page 4 of 4



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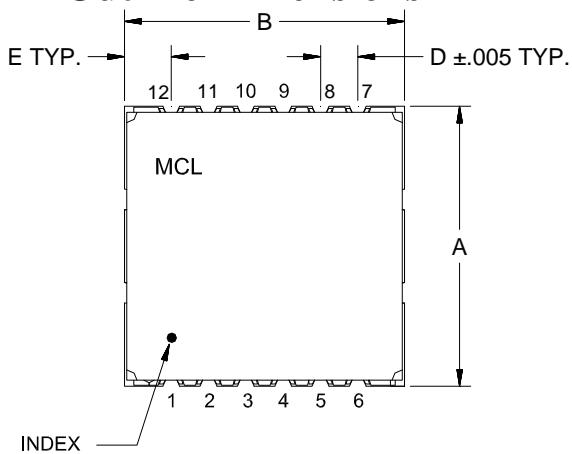
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# Case Style

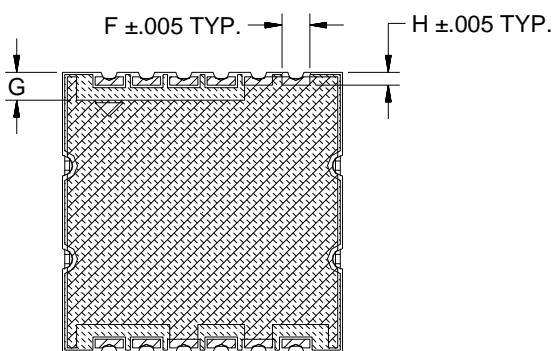
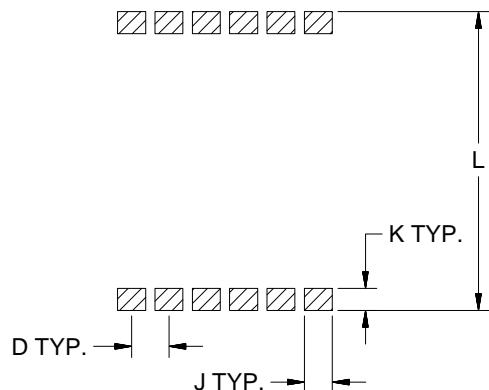
KJ

## 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  $\mu$  inch (.05-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.  
All models, (+) suffix.



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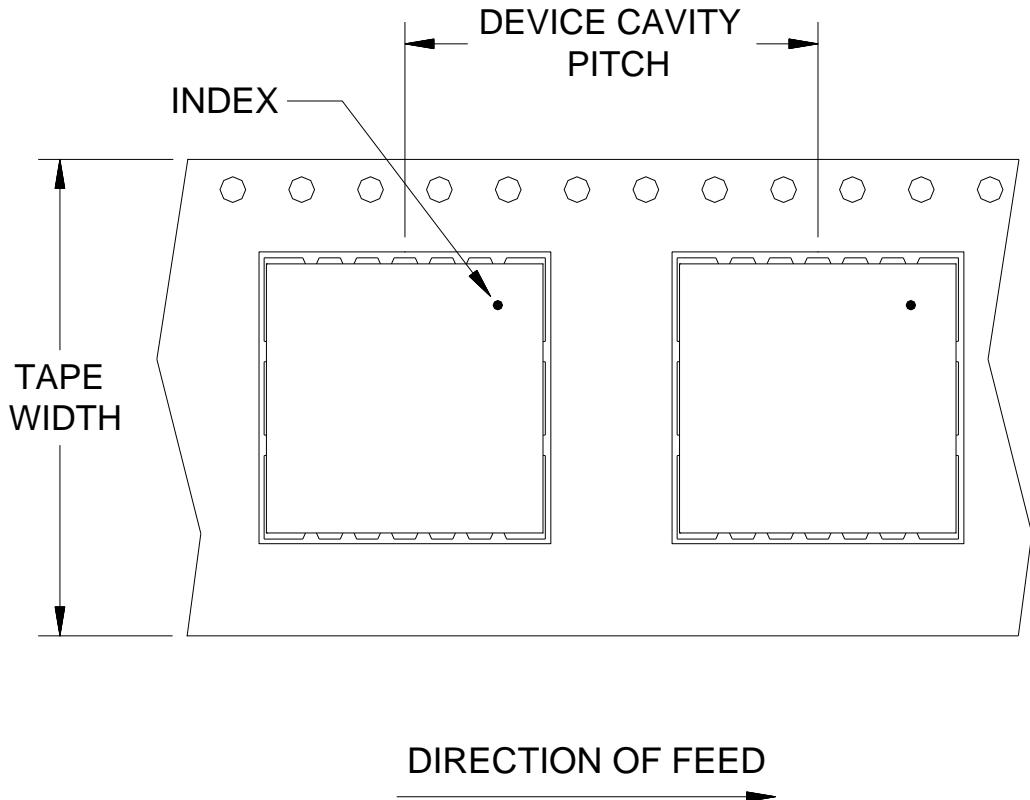


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RF/MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F95

## DEVICE ORIENTATION IN T&R



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

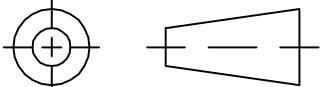
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## THIRD ANGLE PROJECTION

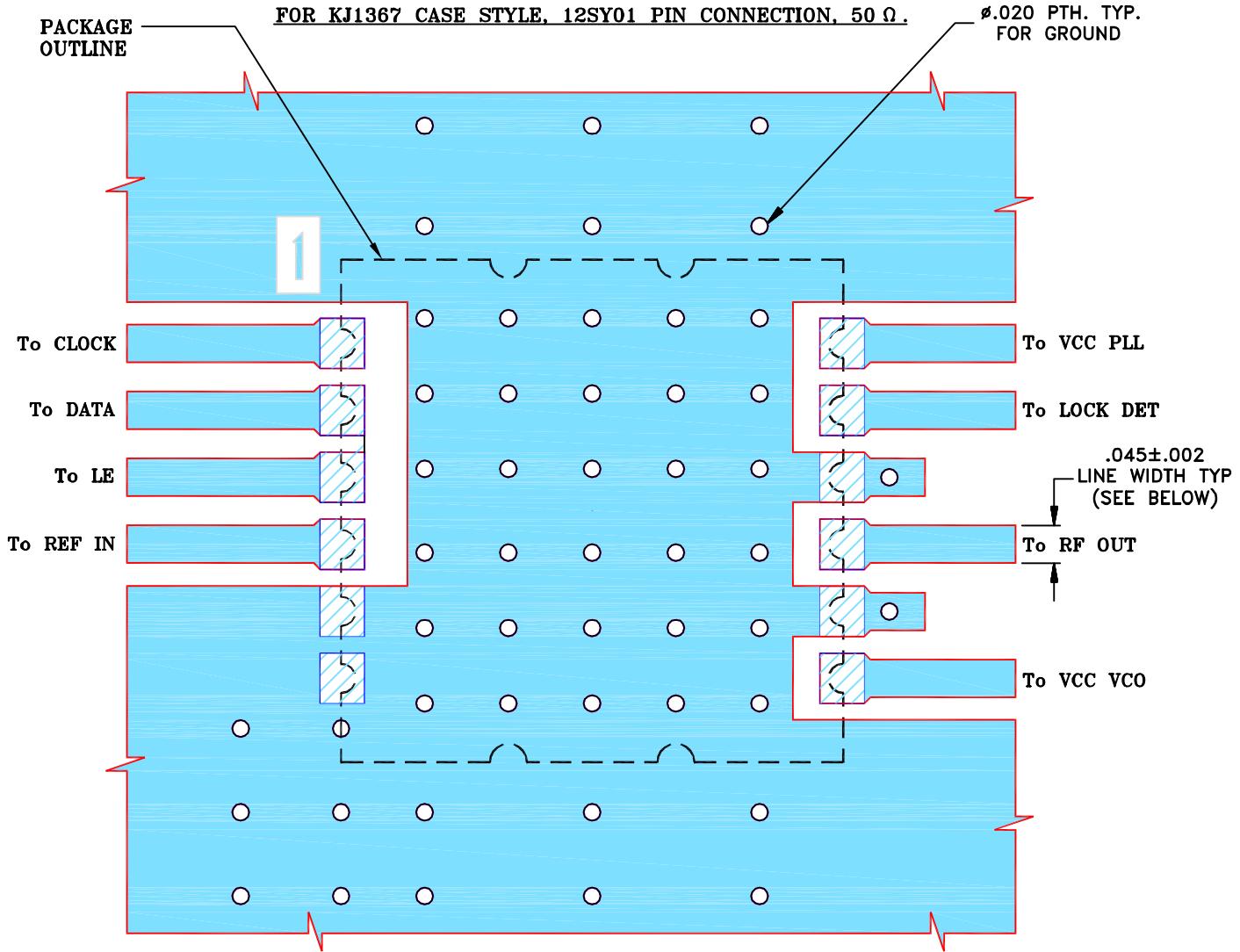


## REVISIONS

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 R04350B 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  
TOLERANCES ON:  
2 PL DECIMALS ±  
3 PL DECIMALS ± .005  
ANGLES ±  
FRACTIONS ±

DRAWN DK (RAVON) 06 APR 10  
CHECKED DH (RAVON) 07 APR 10  
APPROVED HH (RAVON) 07 APR 10

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

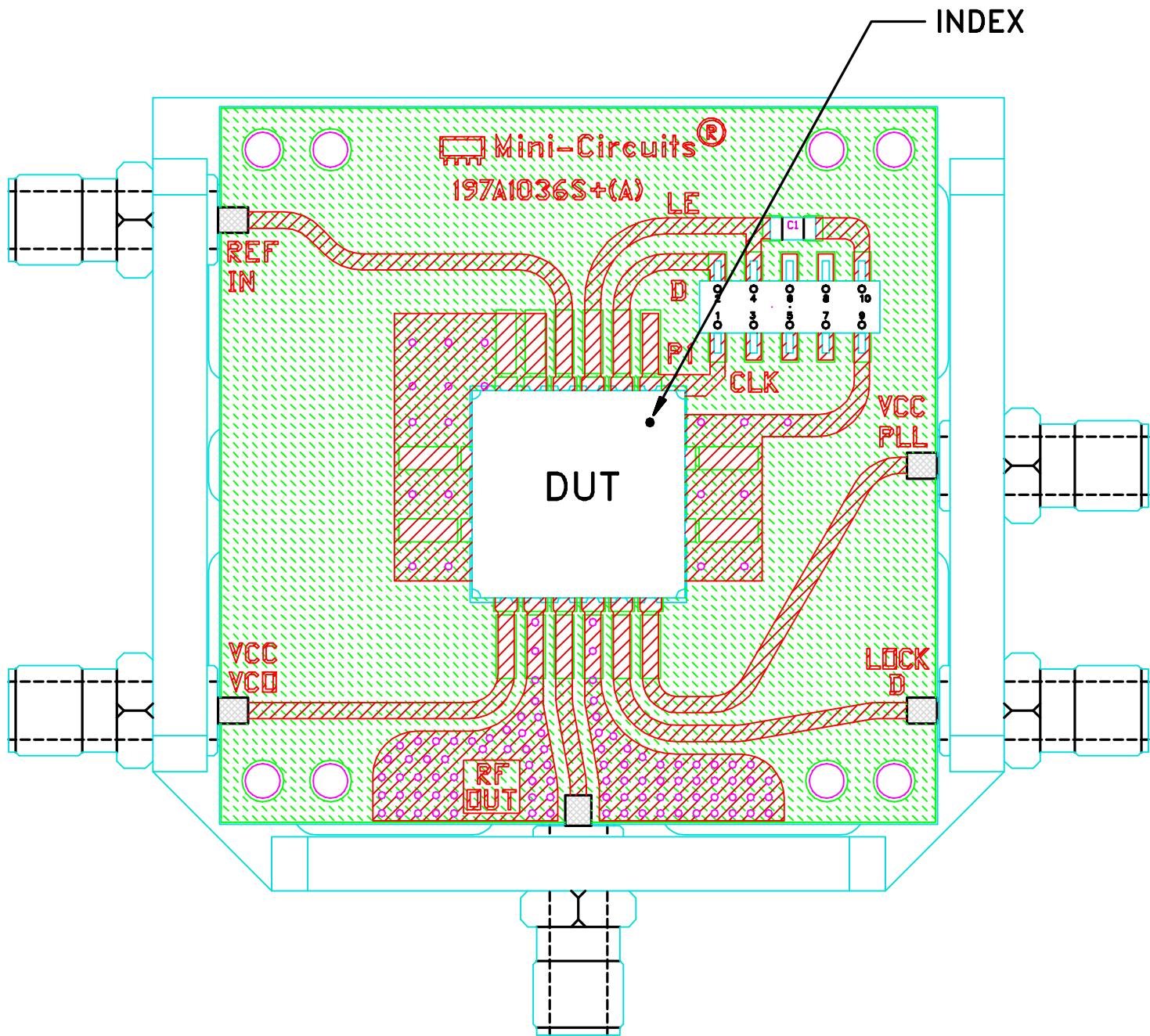


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13 Neptune Avenue  
Brooklyn NY 11235PL, 12SY01, KJ1367, SSN  
TB-552+ (50 Ω)

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-317	OR
FILE:	98PL317	SCALE: 5:1	SHEET: 1 OF 1

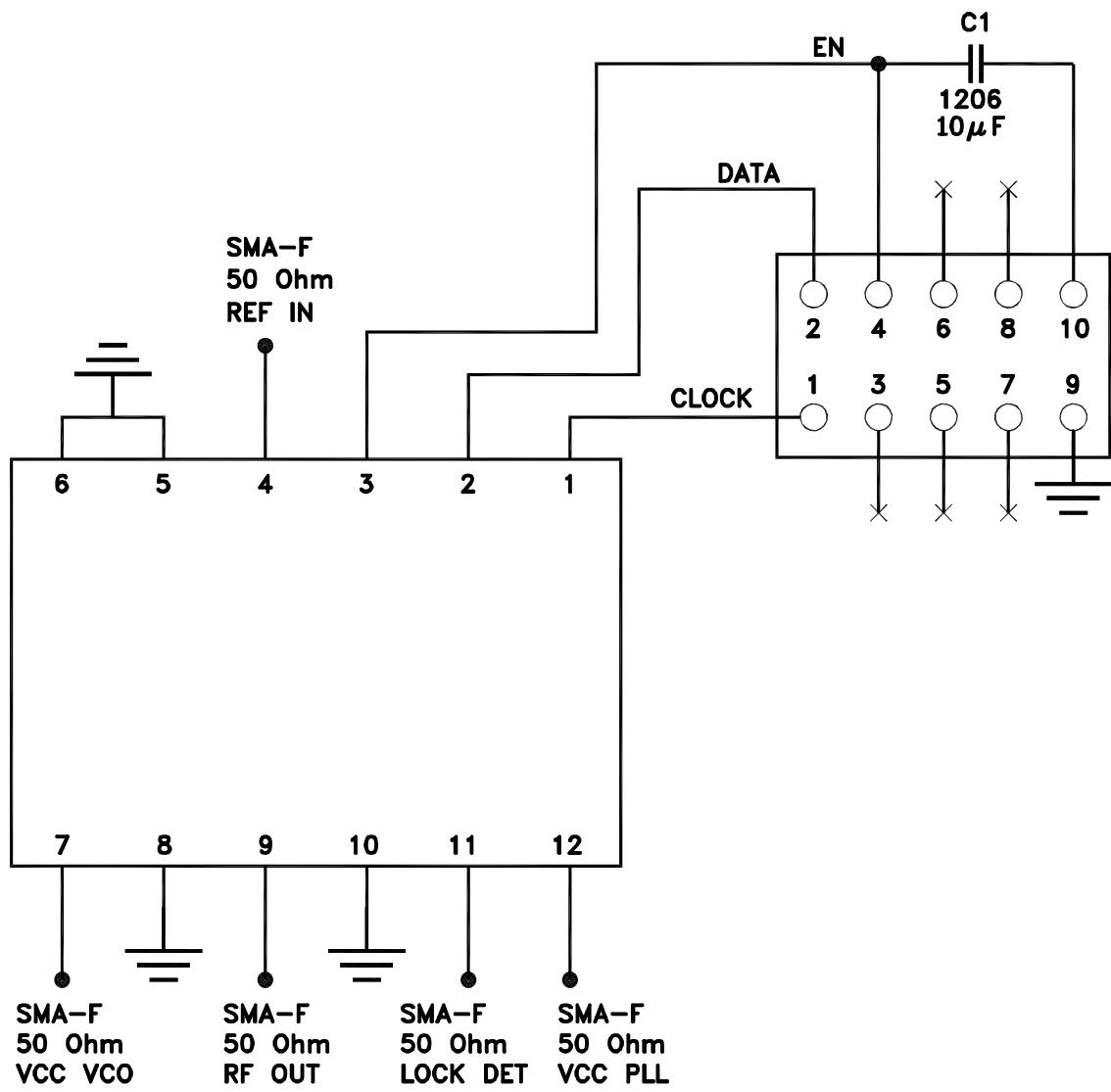
# Evaluation Board and Circuit



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**



## 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 + propylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215