

Frequency Synthesizer

KSN-1145A-119+

50Ω 1052 to 1145 MHz

The Big Deal

- Low phase noise and spurious
- Robust design and construction
- Small size 0.80" x 0.58" x 0.15"



CASE STYLE: DK1042

Product Overview

The KSN-1145A-119+ is a Frequency Synthesizer, designed to operate from 1052 to 1145 MHz for W-CDMA application. The KSN-1145A-119+ is packaged in a metal case (size of 0.80" x 0.58" x 0.15") to shield against unwanted signals and noise.

Key Features

| Feature | Advantages |
|---|--|
| Low phase noise and spurious: <ul style="list-style-type: none">• Phase Noise: -103 dBc/Hz typ. @ 10 kHz offset• Comparison Spurious: -90 dBc typ.• Reference Spurious: -101 dBc typ. | Low phase noise and spurious improve system EVM (Error Vector Magnitude). |
| Robust design and construction | To enhance the robustness of KSN-1145A-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, 0.80" x 0.58" x 0.15" | The small size enables the KSN-1145A-119+ to be used in compact designs. |



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50Ω 1052 to 1145 MHz

Features

- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+3.3V)
- Small size 0.80" x 0.58" x 0.15"

Applications

- W-CDMA

General Description

The KSN-1145A-119+ is a Frequency Synthesizer, designed to operate from 1052 to 1145 MHz for W-CDMA application. The KSN-1145A-119+ is packaged in a metal case (size of 0.80" x 0.58" x 0.15") to shield against unwanted signals and noise. To enhance the robustness of KSN-1145A-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.



CASE STYLE: DK1042
PRICE: \$29.95 ea. QTY (1-9)

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.

Simplified Schematic



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

| Parameters | Test Conditions | Min. | Typ. | Max. | Units |
|-------------------------------------|----------------------------|-------------------------|-----------------------------------|------|------------------|
| Frequency Range | - | 1052 | - | 1145 | MHz |
| Step Size | - | - | 200 | - | kHz |
| Settling Time | Within \pm 500 Hz | - | 10 | - | mSec |
| Output Power | - | 0 | +4 | +6 | dBm |
| SSB Phase Noise | @ 100 Hz offset | - | -81 | - | dBc/Hz |
| | @ 1 kHz offset | - | -81 | -72 | |
| | @ 10 kHz offset | - | -103 | -94 | |
| | @ 100 kHz offset | - | -130 | -117 | |
| | @ 1 MHz offset | - | -150 | -137 | |
| Reference Spurious Suppression | Ref. Freq. 10 MHz | - | -101 | -82 | dBc |
| Comparison Spurious Suppression | Step Size 200 kHz | - | -90 | -70 | |
| Non - Harmonic Spurious Suppression | - | - | -90 | - | |
| Harmonic Suppression | - | - | -35 | -30 | |
| VCO Supply Voltage | 5.00 | 4.75 | 5.00 | 5.25 | |
| PLL Supply Voltage | 3.30 | 3.15 | 3.30 | 3.45 | mA |
| VCO Supply Current | - | - | 35 | 42 | |
| PLL Supply Current | - | - | 7 | 14 | |
| Reference Input (External) | Frequency | 10 (sine wave) | - | 10 | MHz |
| | Amplitude | 1 | - | 1 | V _{P-P} |
| | Input impedance | - | - | 100 | K Ω |
| | Phase Noise @ 1 kHz offset | - | - | -135 | dBc/Hz |
| RF Output port Impedance | - | - | 50 | - | Ω |
| Input Logic Level | Input high voltage | - | 2.80 | - | V |
| | Input low voltage | - | - | 0.60 | V |
| Digital Lock Detect | Locked | - | 2.70 | 3.45 | V |
| | Unlocked | - | - | 0.40 | V |
| Frequency Synthesizer PLL | - | ADF4118 | | | |
| PLL Programming | - | 3-wire serial 3.3V CMOS | | | |
| Register Map @ 1145 MHz | F_Register | - | (MSB) X0XXX00000X0010010010 (LSB) | | |
| | N_Register | - | (MSB) 10000101001000110001 (LSB) | | |
| | R_Register | - | (MSB) 0XXXX0000000011001000 (LSB) | | |

Absolute Maximum Ratings

| Parameters | Ratings |
|--|----------------------------|
| VCO Supply Voltage | 6V |
| PLL Supply Voltage | 6V |
| VCO Supply Voltage to PLL Supply Voltage | -0.3V to +5.5V |
| 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 |
| | 1052 | 3.94 | 3.80 | 3.19 | 33.53 | 35.29 | 36.45 | 5.23 | 6.64 |
| 1060 | 3.96 | 3.80 | 3.16 | 33.56 | 35.32 | 36.45 | 5.25 | 6.66 | 7.91 |
| 1068 | 3.97 | 3.79 | 3.12 | 33.58 | 35.31 | 36.44 | 5.24 | 6.66 | 7.92 |
| 1076 | 3.97 | 3.79 | 3.07 | 33.59 | 35.31 | 36.44 | 5.23 | 6.66 | 7.92 |
| 1084 | 3.98 | 3.78 | 3.00 | 33.60 | 35.30 | 36.44 | 5.23 | 6.66 | 7.92 |
| 1092 | 3.98 | 3.76 | 2.90 | 33.60 | 35.29 | 36.62 | 5.24 | 6.66 | 7.92 |
| 1100 | 3.97 | 3.73 | 2.79 | 33.60 | 35.28 | 36.75 | 5.26 | 6.66 | 7.92 |
| 1108 | 3.95 | 3.68 | 2.66 | 33.59 | 35.27 | 36.76 | 5.25 | 6.65 | 7.92 |
| 1116 | 3.94 | 3.59 | 2.50 | 33.57 | 35.27 | 36.78 | 5.25 | 6.65 | 7.92 |
| 1124 | 3.92 | 3.48 | 2.32 | 33.55 | 35.28 | 36.80 | 5.26 | 6.66 | 7.93 |
| 1132 | 3.88 | 3.34 | 2.14 | 33.52 | 35.30 | 36.82 | 5.27 | 6.69 | 7.96 |
| 1143 | 3.79 | 3.07 | 1.85 | 33.48 | 35.34 | 36.86 | 5.26 | 6.69 | 7.95 |
| 1145 | 3.77 | 3.05 | 1.83 | 33.47 | 35.34 | 36.56 | 5.28 | 6.69 | 7.97 |

| FREQUENCY (MHz) | HARMONICS (dBc) | | | | | |
|--------------------|-----------------|--------|--------|--------|--------|--------|
| | F2 | | | F3 | | |
| | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C |
| 1052 | -40.32 | -43.34 | -45.52 | -55.26 | -59.86 | -70.10 |
| 1060 | -40.90 | -43.54 | -44.63 | -54.64 | -59.07 | -65.26 |
| 1068 | -41.26 | -43.32 | -44.03 | -52.33 | -56.47 | -61.40 |
| 1076 | -40.89 | -42.95 | -43.43 | -50.68 | -53.90 | -57.89 |
| 1084 | -40.57 | -42.49 | -42.69 | -49.45 | -52.32 | -54.59 |
| 1092 | -39.79 | -40.88 | -41.40 | -50.09 | -53.40 | -54.43 |
| 1100 | -38.63 | -39.48 | -40.06 | -51.87 | -53.33 | -53.65 |
| 1108 | -38.05 | -38.78 | -38.82 | -49.04 | -50.54 | -50.93 |
| 1116 | -38.07 | -38.84 | -39.05 | -49.04 | -51.16 | -50.12 |
| 1124 | -37.89 | -38.54 | -38.91 | -49.02 | -50.81 | -49.35 |
| 1132 | -37.08 | -37.64 | -38.02 | -47.39 | -48.61 | -48.37 |
| 1143 | -36.68 | -37.00 | -37.61 | -49.59 | -48.92 | -48.29 |
| 1145 | -36.58 | -37.02 | -37.54 | -48.01 | -48.14 | -47.99 |



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| FREQUENCY (MHz) | PHASE NOISE (dBc/Hz) @ OFFSETS | | | | |
|--------------------|--------------------------------|--------|---------|---------|---------|
| | +25°C | | | | |
| | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 1052 | -84.39 | -80.12 | -103.35 | -130.37 | -150.34 |
| 1060 | -81.59 | -80.89 | -103.49 | -130.31 | -150.45 |
| 1068 | -82.04 | -81.16 | -103.40 | -130.15 | -150.30 |
| 1076 | -82.57 | -81.71 | -103.17 | -129.94 | -150.07 |
| 1084 | -81.60 | -83.07 | -102.81 | -129.71 | -149.81 |
| 1092 | -82.65 | -82.81 | -102.19 | -129.45 | -149.57 |
| 1100 | -83.51 | -82.01 | -101.98 | -129.25 | -149.40 |
| 1108 | -83.46 | -80.80 | -102.53 | -129.16 | -149.31 |
| 1116 | -80.40 | -79.92 | -102.57 | -129.27 | -149.48 |
| 1124 | -78.21 | -79.56 | -102.55 | -129.35 | -149.62 |
| 1132 | -77.66 | -79.84 | -102.51 | -129.34 | -149.69 |
| 1143 | -75.16 | -80.12 | -102.48 | -129.11 | -148.08 |
| 1145 | -74.81 | -80.11 | -102.35 | -128.95 | -148.61 |

| FREQUENCY (MHz) | PHASE NOISE (dBc/Hz) @ OFFSETS | | | | |
|--------------------|--------------------------------|--------|---------|---------|---------|
| | -45°C | | | | |
| | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 1052 | -77.94 | -80.57 | -102.67 | -128.87 | -147.32 |
| 1060 | -79.28 | -80.97 | -102.65 | -128.70 | -148.45 |
| 1068 | -79.21 | -80.62 | -102.64 | -128.46 | -148.73 |
| 1076 | -82.96 | -82.08 | -101.86 | -127.94 | -148.23 |
| 1084 | -83.94 | -81.11 | -101.75 | -127.36 | -146.85 |
| 1092 | -84.06 | -81.19 | -101.12 | -126.66 | -146.26 |
| 1100 | -83.42 | -82.15 | -100.05 | -125.83 | -146.43 |
| 1108 | -80.69 | -79.54 | -100.19 | -125.01 | -145.43 |
| 1116 | -77.28 | -77.77 | -99.94 | -124.16 | -144.62 |
| 1124 | -74.49 | -76.97 | -99.51 | -123.39 | -143.84 |
| 1132 | -73.12 | -77.33 | -99.00 | -122.75 | -143.01 |
| 1143 | -71.00 | -79.06 | -98.12 | -122.02 | -140.73 |
| 1145 | -70.56 | -78.37 | -98.28 | -122.07 | -141.14 |

| FREQUENCY (MHz) | PHASE NOISE (dBc/Hz) @ OFFSETS | | | | |
|--------------------|--------------------------------|--------|---------|---------|---------|
| | +85°C | | | | |
| | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 1052 | -83.45 | -80.62 | -102.57 | -130.06 | -148.17 |
| 1060 | -84.53 | -80.52 | -102.83 | -130.23 | -148.79 |
| 1068 | -84.27 | -80.83 | -102.84 | -130.58 | -149.42 |
| 1076 | -83.72 | -81.28 | -102.63 | -130.94 | -149.73 |
| 1084 | -83.26 | -81.82 | -102.12 | -131.21 | -149.36 |
| 1092 | -83.41 | -80.53 | -101.86 | -130.88 | -150.11 |
| 1100 | -82.71 | -79.16 | -101.69 | -130.41 | -150.54 |
| 1108 | -80.38 | -78.17 | -101.62 | -129.87 | -150.11 |
| 1116 | -80.31 | -78.45 | -101.22 | -129.28 | -149.48 |
| 1124 | -81.14 | -78.39 | -100.95 | -128.75 | -148.96 |
| 1132 | -82.85 | -77.68 | -100.91 | -128.30 | -148.60 |
| 1143 | -80.81 | -77.89 | -100.53 | -127.86 | -148.21 |
| 1145 | -78.95 | -78.64 | -101.51 | -128.60 | -148.41 |



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| COMPARISON SPURIOUS ORDER | COMPARISON SPURIOUS @Fcarrier 1052MHz+(n*Fcomparison) (dBc) note 1 | | | COMPARISON SPURIOUS @Fcarrier 1098MHz+(n*Fcomparison) (dBc) note 1 | | | COMPARISON SPURIOUS @Fcarrier 1145MHz+(n*Fcomparison) (dBc) note 1 | | |
|---------------------------|--|---------|---------|--|---------|---------|--|---------|---------|
| | n | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C | -45°C | +25°C |
| -5 | -102.39 | -105.02 | -105.59 | -105.10 | -103.08 | -114.62 | -105.23 | -111.22 | -105.73 |
| -4 | -99.84 | -104.67 | -100.43 | -100.13 | -99.51 | -113.93 | -98.91 | -113.41 | -107.67 |
| -3 | -97.60 | -99.79 | -96.77 | -100.44 | -96.14 | -113.02 | -95.67 | -109.28 | -102.95 |
| -2 | -94.22 | -95.63 | -92.75 | -92.35 | -90.68 | -106.26 | -88.43 | -104.05 | -98.49 |
| -1 | -92.51 | -87.47 | -84.83 | -82.37 | -82.36 | -97.39 | -78.24 | -93.44 | -90.34 |
| 0 note 2 | - | - | - | - | - | - | - | - | - |
| +1 | -93.51 | -87.59 | -84.77 | -83.08 | -82.72 | -97.17 | -78.54 | -92.84 | -91.42 |
| +2 | -94.62 | -96.59 | -92.50 | -93.32 | -90.89 | -106.88 | -88.42 | -104.05 | -101.73 |
| +3 | -97.58 | -102.47 | -96.10 | -101.99 | -95.71 | -110.91 | -95.59 | -110.89 | -105.02 |
| +4 | -99.85 | -105.65 | -99.70 | -102.03 | -97.67 | -114.40 | -98.04 | -113.99 | -106.87 |
| +5 | -102.36 | -107.72 | -102.27 | -106.62 | -102.17 | -115.16 | -104.96 | -113.14 | -115.08 |

Note 1: Comparison frequency 200 kHz

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

| REFERENCE SPURIOUS ORDER | REFERENCE SPURIOUS @Fcarrier 1052MHz+(n*Freference) (dBc) note 3 | | | REFERENCE SPURIOUS @Fcarrier 1098MHz+(n*Freference) (dBc) note 3 | | | REFERENCE SPURIOUS @Fcarrier 1145MHz+(n*Freference) (dBc) note 3 | | |
|--------------------------|--|---------|---------|--|---------|---------|--|---------|---------|
| | n | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C | -45°C | +25°C |
| -5 | -114.63 | -112.82 | -115.08 | -116.20 | -115.21 | -111.23 | -113.82 | -112.46 | -111.44 |
| -4 | -102.83 | -102.04 | -99.39 | -103.77 | -100.90 | -98.23 | -104.00 | -100.39 | -98.06 |
| -3 | -117.96 | -124.31 | -116.15 | -124.23 | -118.47 | -114.10 | -117.29 | -122.49 | -116.64 |
| -2 | -109.62 | -112.34 | -107.03 | -117.05 | -110.21 | -108.29 | -113.96 | -110.45 | -106.84 |
| -1 | -99.60 | -102.91 | -100.73 | -103.66 | -104.15 | -102.81 | -100.97 | -105.64 | -102.40 |
| 0 note 4 | - | - | - | - | - | - | - | - | - |
| +1 | -99.47 | -98.38 | -98.78 | -101.93 | -99.44 | -99.94 | -100.61 | -100.67 | -99.74 |
| +2 | -105.03 | -101.20 | -101.42 | -103.78 | -101.69 | -101.09 | -105.48 | -100.57 | -99.51 |
| +3 | -119.62 | -115.58 | -117.65 | -117.94 | -118.15 | -113.94 | -116.64 | -116.08 | -113.42 |
| +4 | -102.50 | -100.55 | -98.74 | -102.49 | -99.66 | -97.86 | -103.49 | -99.05 | -97.83 |
| +5 | -118.88 | -118.72 | -115.52 | -120.77 | -117.07 | -114.57 | -115.65 | -114.87 | -118.09 |

Note 3: Reference frequency 10 MHz

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



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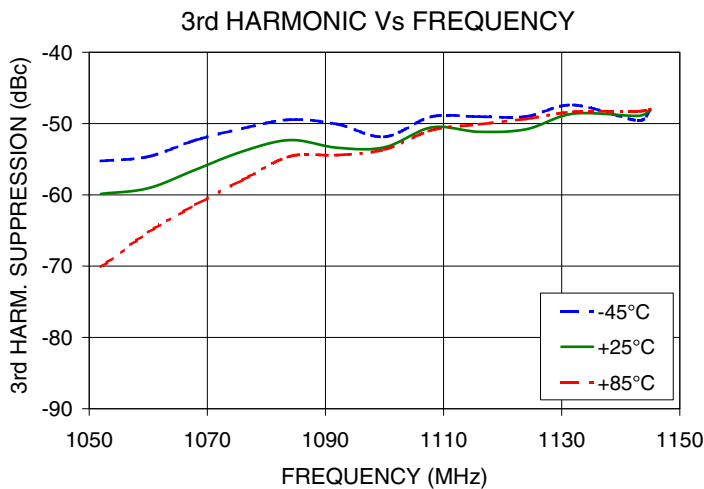
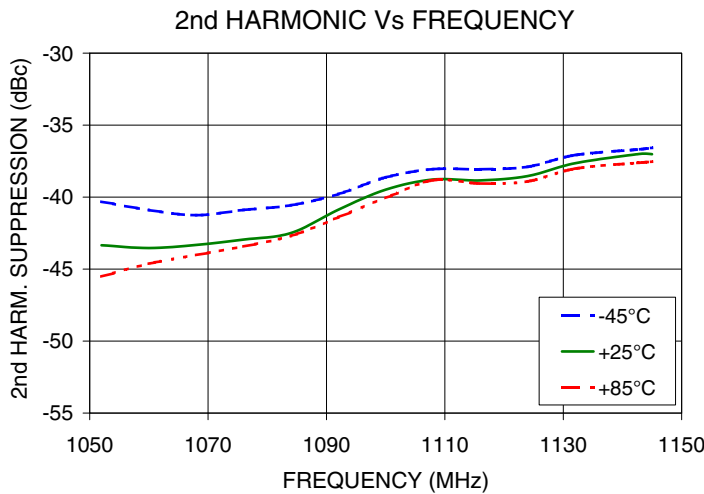
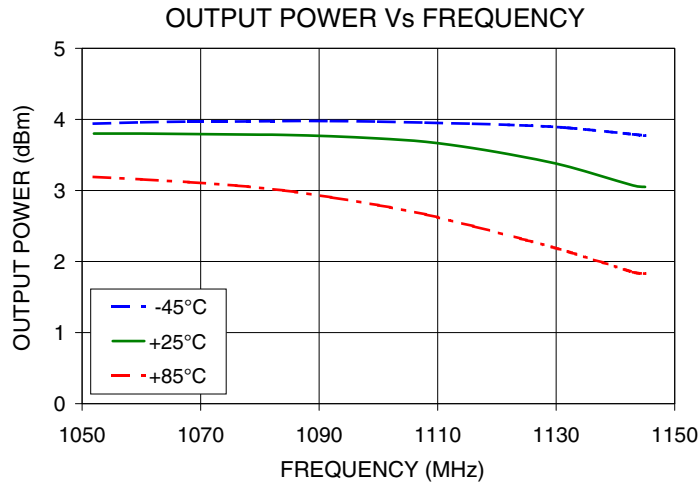


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Typical Performance Curves



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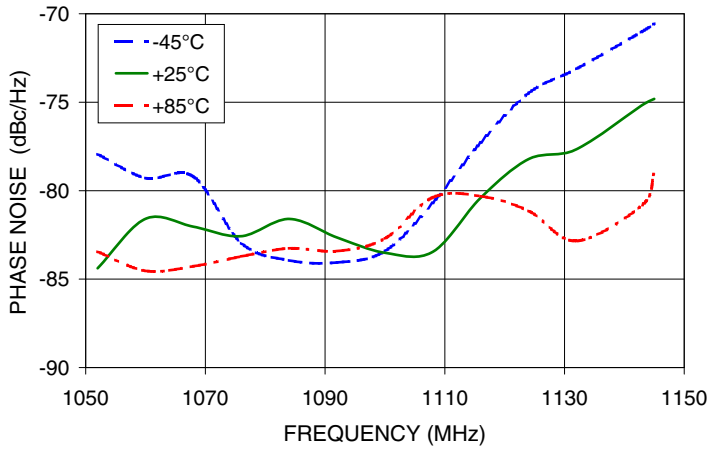


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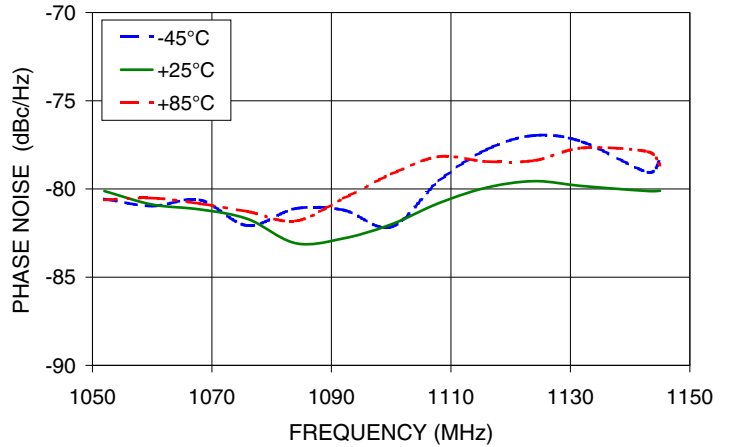


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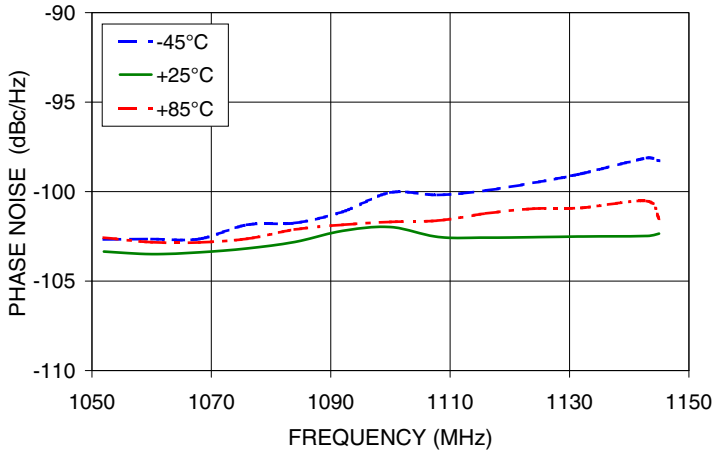
PHASE NOISE @100Hz offset



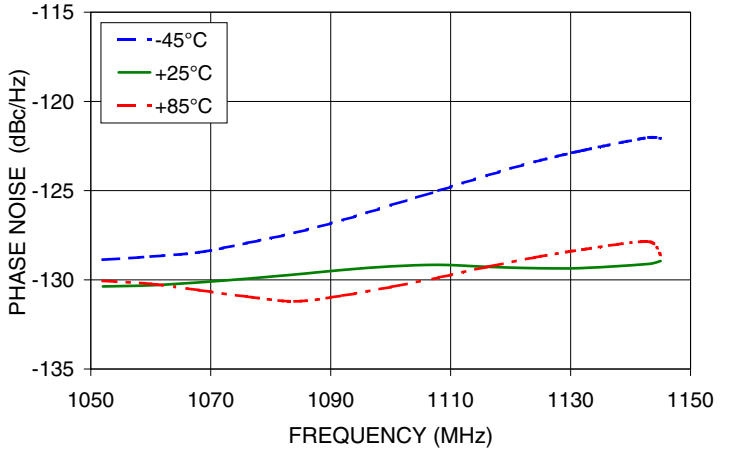
PHASE NOISE @1kHz offset



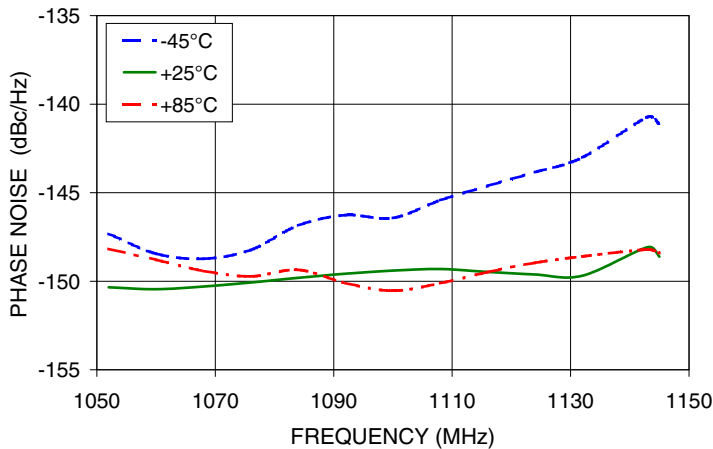
PHASE NOISE @10 kHz offset



PHASE NOISE @100 kHz offset



PHASE NOISE @1MHz offset



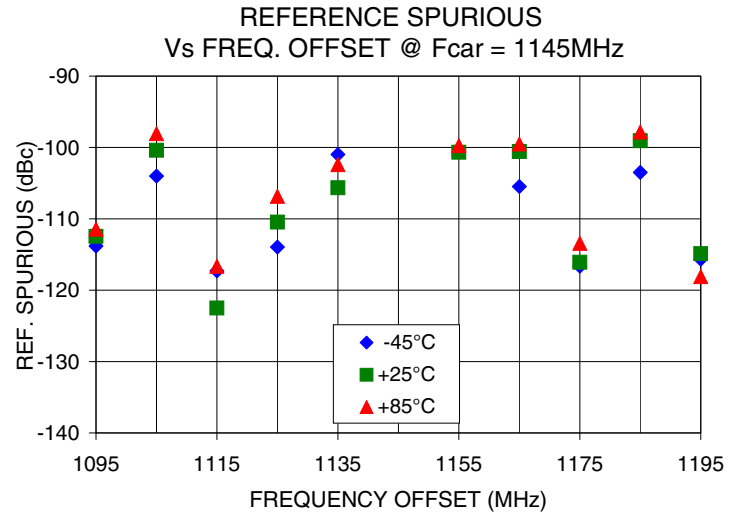
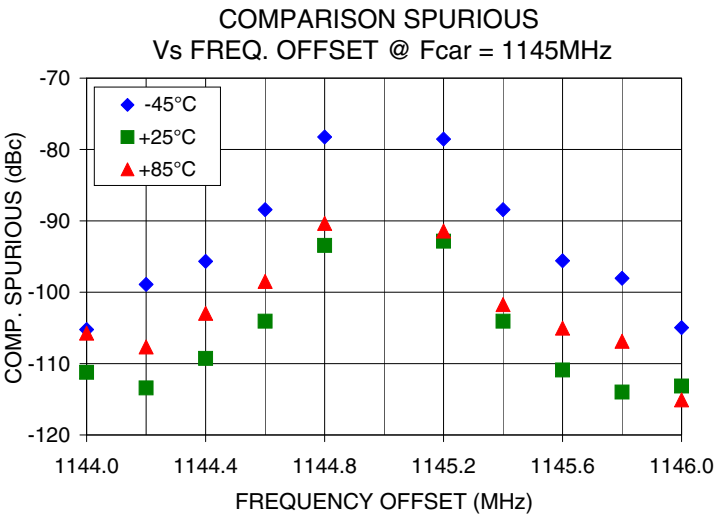
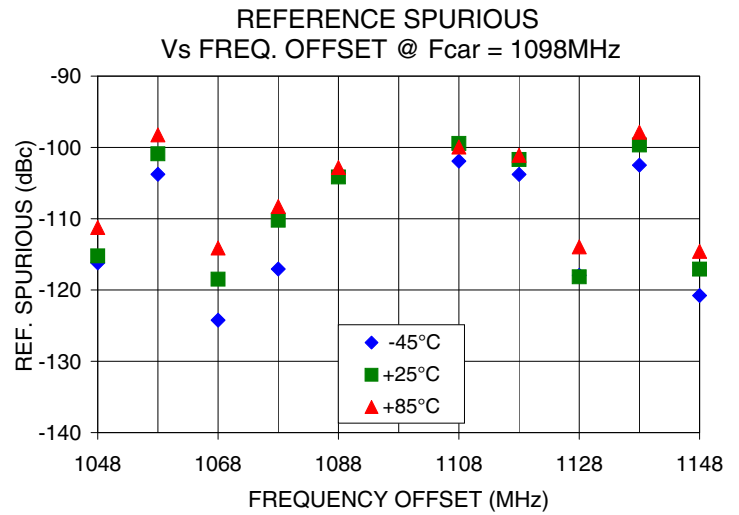
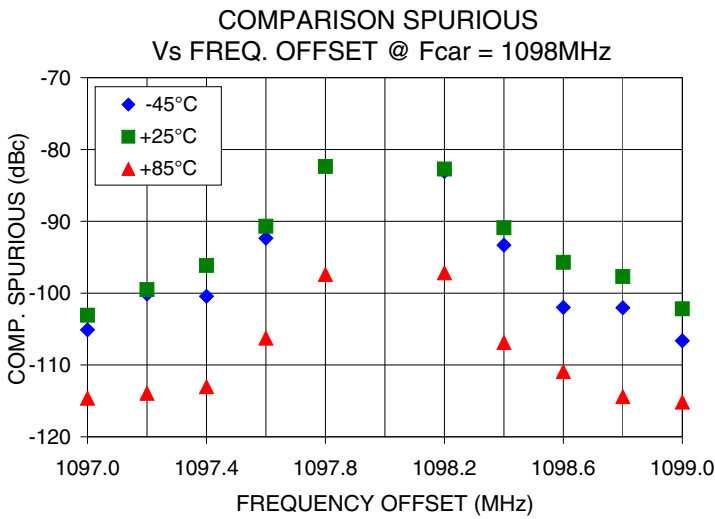
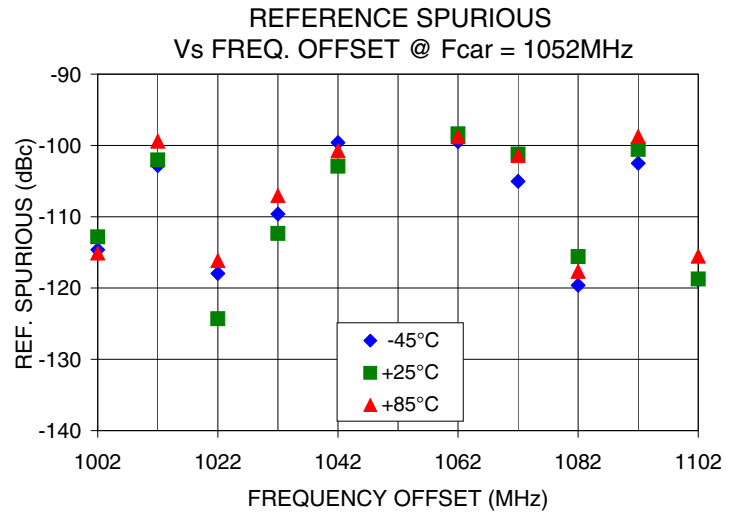
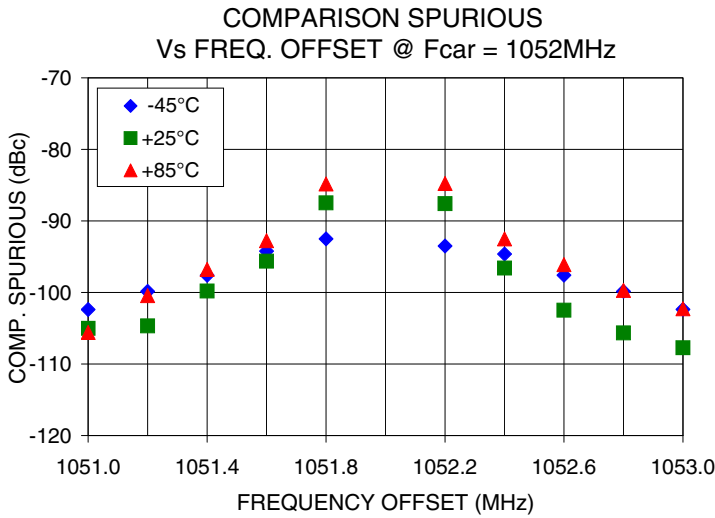
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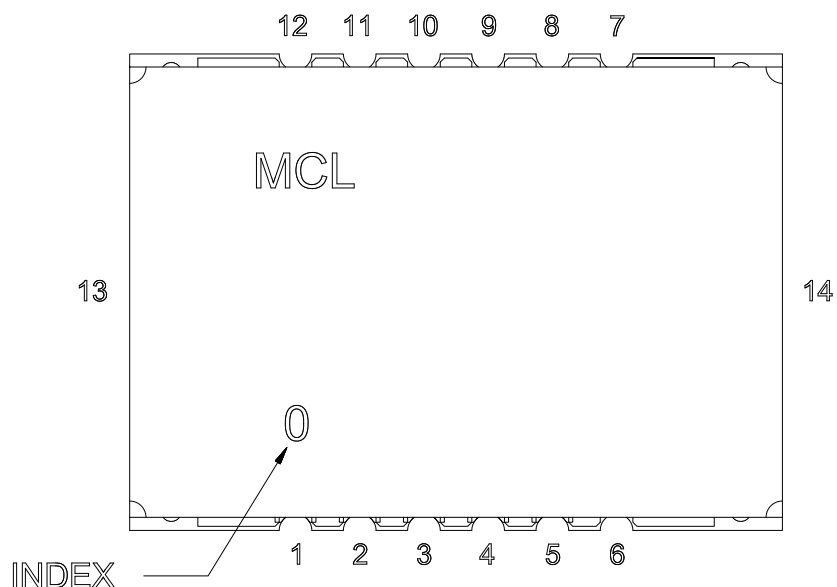


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Pin Configuration

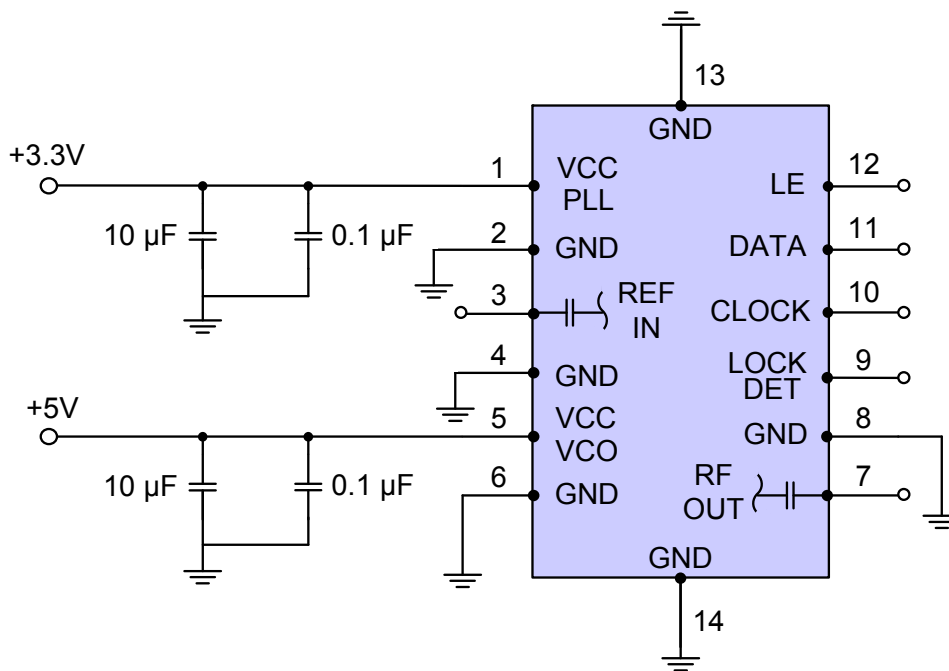


Pin Connection

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

Recommended Application Circuit

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



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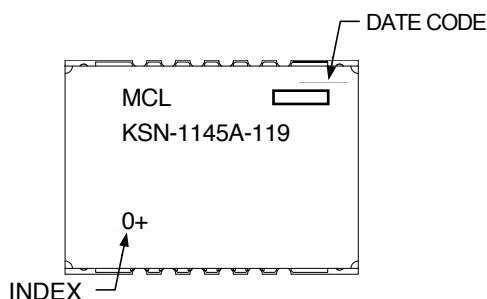


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Device Marking



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: DK1042

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567-1+

Environment Ratings: ENV03T2



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