

Frequency Synthesizer

KSN-1840A-219+

50Ω 1780 to 1840 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-1840A-219+ is a Frequency Synthesizer, designed to operate from 1780 to 1840 MHz for W-CDMA application. The KSN-1840A-219+ 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: -96 dBc/Hz typ. @ 10 kHz offset• Comparison Spurious: -92 dBc typ.• Reference Spurious: -111 dBc typ. | Low phase noise and spurious improve system EVM (Error Vector Magnitude). |
| Robust design and construction | To enhance the robustness of KSN-1840A-219+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tombstoning during subsequent solder reflow operations by the customer. |
| Small size, 0.80" x 0.58" x 0.15" | The small size enables the KSN-1840A-219+ to be used in compact designs. |



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50Ω 1780 to 1840 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-1840A-219+ is a Frequency Synthesizer, designed to operate from 1780 to 1840 MHz for W-CDMA application. The KSN-1840A-219+ 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-1840A-219+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tombstoning during subsequent solder reflow operations by the customer.

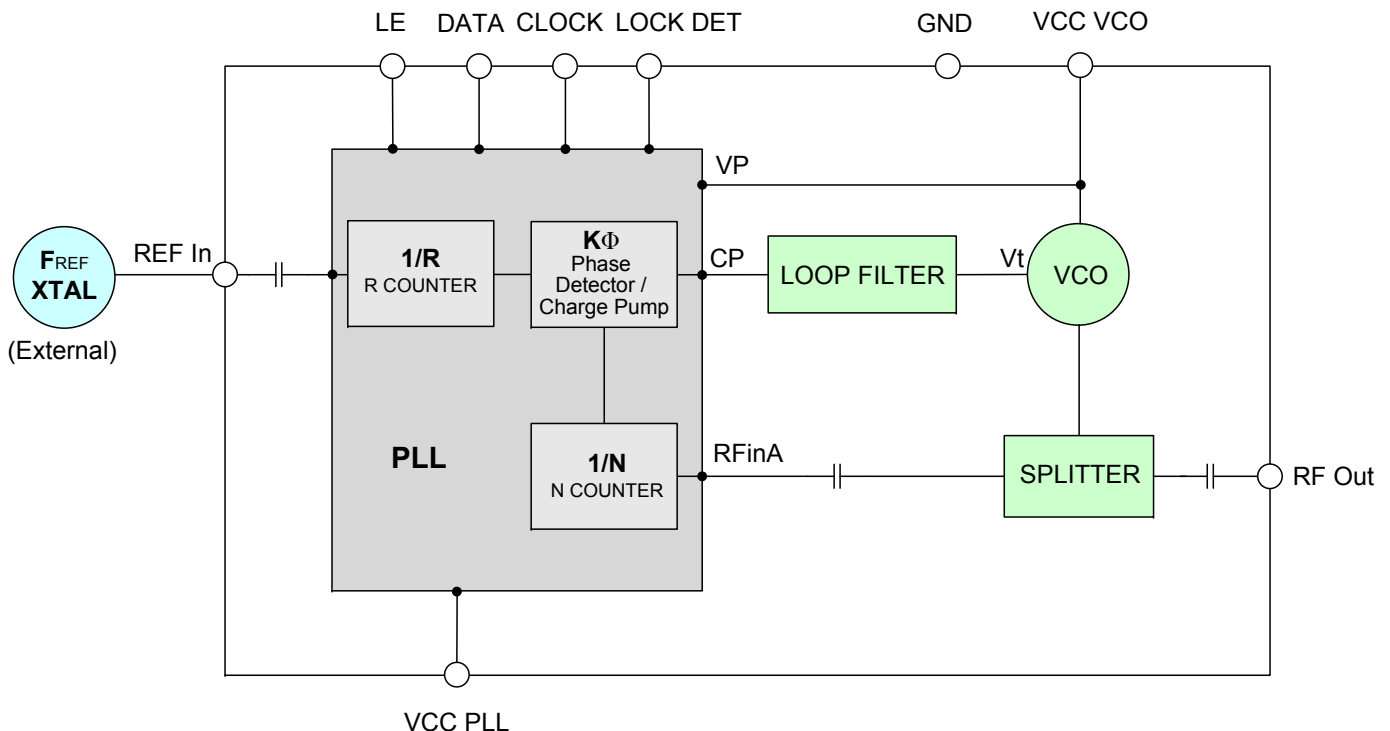


CASE STYLE: DK1042
PRICE: \$29.95 ea. QTY (1-9)

+ 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 | - | 1780 | - | 1840 | MHz |
| Step Size | - | - | 200 | - | kHz |
| Settling Time | Within ± 500 Hz | - | 5 | - | mSec |
| Output Power | - | +1 | +3 | +5 | dBm |
| SSB Phase Noise | @ 100 Hz offset | - | -76 | - | dBc/Hz |
| | @ 1 kHz offset | - | -77 | -73 | |
| | @ 10 kHz offset | - | -96 | -91 | |
| | @ 100 kHz offset | - | -122 | -118 | |
| | @ 1 MHz offset | - | -142 | -137 | |
| Reference Spurious Suppression | Ref. Freq. 26 MHz | - | -111 | -86 | dBc |
| Comparison Spurious Suppression | Step Size 200 kHz | - | -92 | -75 | |
| Non - Harmonic Spurious Suppression | - | - | -90 | - | |
| Harmonic Suppression | - | - | -46 | -32 | |
| VCO Supply Voltage | 5.00 | +4.75 | +5.00 | +5.25 | |
| PLL Supply Voltage | 3.30 | +3.15 | +3.30 | +3.45 | V |
| VCO Supply Current | - | - | 26 | 33 | mA |
| PLL Supply Current | - | - | 7 | 13 | |
| Reference Input (External) | Frequency | 26 (square wave) | - | 26 | 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 | - | 2.60 | 3.30 | V |
| | Unlocked | - | - | 0.40 | V |
| Frequency Synthesizer PLL | - | ADF4118 | | | |
| PLL Programming | - | 3-wire serial 3.15V CMOS | | | |
| Register Map @ 1840 MHz | F_Register | - | (MSB) X0XXX00000X0010010010 (LSB) | | |
| | N_Register | - | (MSB) 100001000111111000001 (LSB) | | |
| | R_Register | - | (MSB) 1XXXX0000001000001000 (LSB) | | |

Absolute Maximum Ratings

| Parameters | Ratings |
|--|-------------------------------|
| VCO Supply Voltage | 6.3V |
| PLL Supply Voltage | 6.3V |
| VCO Supply Voltage to PLL Supply Voltage | -0.3V to +5.5V |
| Reference Frequency Voltage | -0.3V/min, VCC PLL +0.15V/max |
| Data, Clock, LE Levels | -0.3V/min, VCC PLL +0.15V/max |
| 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 |
| | 1780 | 3.16 | 3.24 | 3.02 | 24.94 | 26.19 | 26.97 | 5.63 | 7.46 |
| 1786 | 3.18 | 3.26 | 3.05 | 24.97 | 26.21 | 26.99 | 5.64 | 7.46 | 8.47 |
| 1792 | 3.19 | 3.28 | 3.08 | 25.01 | 26.24 | 27.01 | 5.65 | 7.46 | 8.48 |
| 1798 | 3.19 | 3.30 | 3.11 | 25.04 | 26.26 | 27.03 | 5.65 | 7.46 | 8.48 |
| 1804 | 3.20 | 3.32 | 3.13 | 25.06 | 26.29 | 27.05 | 5.66 | 7.47 | 8.48 |
| 1810 | 3.20 | 3.33 | 3.16 | 25.09 | 26.31 | 27.07 | 5.66 | 7.48 | 8.48 |
| 1816 | 3.21 | 3.35 | 3.17 | 25.11 | 26.34 | 27.09 | 5.66 | 7.49 | 8.48 |
| 1822 | 3.21 | 3.35 | 3.19 | 25.13 | 26.36 | 27.10 | 5.66 | 7.49 | 8.47 |
| 1828 | 3.22 | 3.34 | 3.20 | 25.15 | 26.37 | 27.11 | 5.66 | 7.48 | 8.47 |
| 1834 | 3.22 | 3.34 | 3.19 | 25.16 | 26.39 | 27.12 | 5.66 | 7.48 | 8.48 |
| 1840 | 3.23 | 3.34 | 3.19 | 25.18 | 26.40 | 27.13 | 5.66 | 7.47 | 8.49 |

| FREQUENCY (MHz) | HARMONICS (dBc) | | | | | |
|--------------------|-----------------|--------|--------|--------|--------|--------|
| | F2 | | | F3 | | |
| | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C |
| 1780 | -38.94 | -42.24 | -47.90 | -67.29 | -73.23 | -77.94 |
| 1786 | -39.45 | -42.69 | -48.53 | -68.59 | -70.72 | -73.55 |
| 1792 | -39.87 | -43.14 | -48.90 | -69.24 | -68.20 | -69.88 |
| 1798 | -40.03 | -43.52 | -48.75 | -68.08 | -65.81 | -67.65 |
| 1804 | -40.19 | -43.54 | -48.59 | -66.92 | -63.98 | -65.41 |
| 1810 | -40.37 | -43.55 | -48.55 | -65.66 | -62.16 | -63.64 |
| 1816 | -40.79 | -43.57 | -48.72 | -63.16 | -60.33 | -62.79 |
| 1822 | -41.22 | -44.12 | -48.89 | -60.65 | -59.70 | -61.94 |
| 1828 | -41.64 | -44.67 | -49.28 | -58.14 | -59.07 | -61.46 |
| 1834 | -42.09 | -45.22 | -50.07 | -57.89 | -58.44 | -61.74 |
| 1840 | -42.54 | -45.72 | -50.87 | -57.98 | -58.60 | -62.01 |



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| FREQUENCY (MHz) | PHASE NOISE (dBc/Hz) @ OFFSETS | | | | |
|--------------------|--------------------------------|--------|--------|---------|---------|
| | +25°C | | | | |
| | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 1780 | -81.73 | -77.58 | -95.71 | -121.65 | -141.40 |
| 1786 | -80.12 | -77.78 | -95.78 | -121.67 | -141.38 |
| 1792 | -78.51 | -77.98 | -95.84 | -121.69 | -141.35 |
| 1798 | -77.14 | -78.07 | -95.95 | -121.75 | -141.33 |
| 1804 | -76.96 | -77.59 | -96.27 | -121.96 | -141.30 |
| 1810 | -76.79 | -77.11 | -96.59 | -122.18 | -141.28 |
| 1816 | -76.61 | -76.63 | -96.91 | -122.40 | -141.25 |
| 1822 | -74.78 | -77.01 | -96.79 | -122.29 | -141.66 |
| 1828 | -72.94 | -77.39 | -96.67 | -122.19 | -142.07 |
| 1834 | -71.11 | -77.78 | -96.55 | -122.08 | -142.48 |
| 1840 | -77.90 | -77.18 | -96.68 | -122.24 | -141.54 |

| FREQUENCY (MHz) | PHASE NOISE (dBc/Hz) @ OFFSETS | | | | |
|--------------------|--------------------------------|--------|--------|---------|---------|
| | -45°C | | | | |
| | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 1780 | -78.80 | -77.37 | -95.26 | -123.54 | -144.80 |
| 1786 | -78.32 | -77.20 | -95.67 | -123.72 | -144.67 |
| 1792 | -77.99 | -77.02 | -96.01 | -123.89 | -144.61 |
| 1798 | -78.11 | -76.79 | -96.16 | -124.02 | -144.75 |
| 1804 | -78.24 | -76.56 | -96.32 | -124.14 | -144.89 |
| 1810 | -78.31 | -76.35 | -96.46 | -124.26 | -145.02 |
| 1816 | -77.75 | -76.39 | -96.48 | -124.29 | -145.06 |
| 1822 | -77.19 | -76.42 | -96.49 | -124.32 | -145.10 |
| 1828 | -76.63 | -76.46 | -96.51 | -124.36 | -145.14 |
| 1834 | -76.45 | -76.97 | -96.25 | -124.36 | -145.20 |
| 1840 | -76.32 | -77.55 | -95.95 | -124.35 | -145.26 |

| FREQUENCY (MHz) | PHASE NOISE (dBc/Hz) @ OFFSETS | | | | |
|--------------------|--------------------------------|--------|--------|---------|---------|
| | +85°C | | | | |
| | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 1780 | -77.55 | -76.78 | -94.70 | -119.21 | -139.77 |
| 1786 | -77.48 | -76.21 | -94.96 | -119.32 | -139.82 |
| 1792 | -77.39 | -75.92 | -95.10 | -119.45 | -139.70 |
| 1798 | -77.27 | -76.17 | -95.01 | -119.61 | -139.26 |
| 1804 | -77.15 | -76.43 | -94.93 | -119.77 | -138.82 |
| 1810 | -77.13 | -76.66 | -94.90 | -119.87 | -138.70 |
| 1816 | -77.30 | -76.84 | -95.00 | -119.88 | -139.26 |
| 1822 | -77.47 | -77.03 | -95.10 | -119.89 | -139.81 |
| 1828 | -77.53 | -77.06 | -95.18 | -119.87 | -140.11 |
| 1834 | -77.39 | -76.80 | -95.20 | -119.80 | -139.92 |
| 1840 | -77.24 | -76.53 | -95.22 | -119.74 | -139.72 |



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| COMPARISON SPURIOUS ORDER | COMPARISON SPURIOUS @Fcarrier 1780MHz+(n*Fcomparison) (dBc) note 1 | | | COMPARISON SPURIOUS @Fcarrier 1810MHz+(n*Fcomparison) (dBc) note 1 | | | COMPARISON SPURIOUS @Fcarrier 1840MHz+(n*Fcomparison) (dBc) note 1 | | |
|---------------------------|--|---------|---------|--|---------|---------|--|---------|---------|
| | | | | | | | | | |
| | n | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C | -45°C | +25°C |
| -5 | -95.88 | -97.35 | -99.04 | -109.00 | -103.01 | -112.78 | -112.12 | -103.08 | -110.72 |
| -4 | -113.73 | -106.11 | -106.61 | -114.52 | -104.38 | -107.13 | -112.29 | -100.13 | -110.74 |
| -3 | -108.14 | -105.90 | -101.24 | -111.17 | -98.15 | -108.33 | -104.67 | -95.95 | -103.27 |
| -2 | -113.66 | -99.85 | -99.45 | -112.69 | -94.23 | -102.80 | -101.29 | -98.53 | -100.43 |
| -1 | -97.23 | -92.39 | -89.68 | -90.96 | -89.01 | -93.05 | -91.48 | -90.66 | -89.24 |
| 0 note 2 | - | - | - | - | - | - | - | - | - |
| +1 | -95.32 | -91.81 | -88.67 | -89.54 | -88.58 | -92.57 | -90.09 | -91.09 | -89.17 |
| +2 | -112.21 | -100.66 | -98.02 | -112.66 | -94.49 | -104.91 | -101.20 | -98.32 | -99.60 |
| +3 | -106.67 | -107.34 | -100.21 | -113.72 | -98.75 | -108.11 | -105.06 | -96.70 | -103.33 |
| +4 | -112.37 | -105.50 | -107.71 | -113.59 | -104.41 | -107.08 | -108.63 | -100.94 | -110.54 |
| +5 | -96.95 | -97.31 | -98.94 | -111.69 | -103.50 | -110.19 | -112.50 | -103.75 | -112.39 |

Note 1: Comparison frequency 200 kHz

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

| REFERENCE SPURIOUS ORDER | REFERENCE SPURIOUS @Fcarrier 1780MHz+(n*Freference) (dBc) note 3 | | | REFERENCE SPURIOUS @Fcarrier 1810MHz+(n*Freference) (dBc) note 3 | | | REFERENCE SPURIOUS @Fcarrier 1840MHz+(n*Freference) (dBc) note 3 | | |
|--------------------------|--|---------|---------|--|---------|---------|--|---------|---------|
| | | | | | | | | | |
| | n | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C | -45°C | +25°C |
| -5 | -130.42 | -122.44 | -117.26 | -132.83 | -119.46 | -115.61 | -122.51 | -119.28 | -114.27 |
| -4 | -118.46 | -115.81 | -117.07 | -116.54 | -117.19 | -117.79 | -116.37 | -116.76 | -116.15 |
| -3 | -109.54 | -111.17 | -109.47 | -108.32 | -109.94 | -109.49 | -109.27 | -110.63 | -109.62 |
| -2 | -131.25 | -121.99 | -122.44 | -123.75 | -121.51 | -130.60 | -127.63 | -125.61 | -126.22 |
| -1 | -120.41 | -112.98 | -112.10 | -109.53 | -115.75 | -117.89 | -115.19 | -114.05 | -116.55 |
| 0 note 4 | - | - | - | - | - | - | - | - | - |
| +1 | -108.64 | -114.01 | -110.83 | -108.82 | -107.10 | -102.74 | -107.80 | -108.14 | -105.48 |
| +2 | -119.63 | -132.32 | -120.77 | -126.92 | -123.50 | -123.01 | -123.66 | -125.75 | -119.26 |
| +3 | -121.01 | -130.80 | -103.55 | -104.05 | -104.93 | -103.89 | -105.37 | -106.02 | -105.65 |
| +4 | -132.30 | -130.43 | -114.66 | -114.52 | -112.62 | -114.58 | -114.37 | -112.71 | -113.51 |
| +5 | -132.64 | -132.22 | -107.10 | -108.46 | -107.81 | -107.77 | -108.82 | -107.99 | -107.96 |

Note 3: Reference frequency 26 MHz

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



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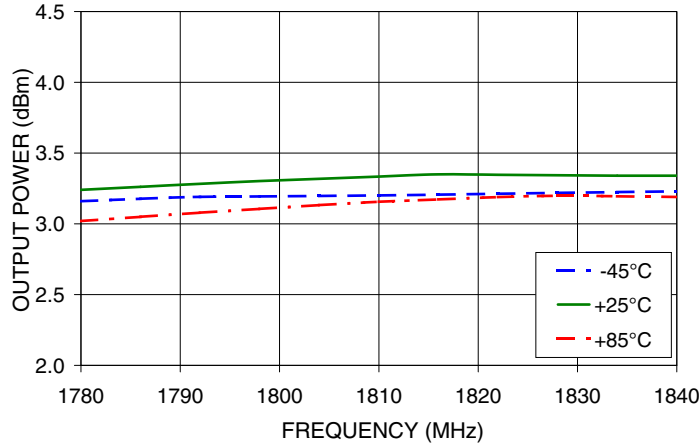
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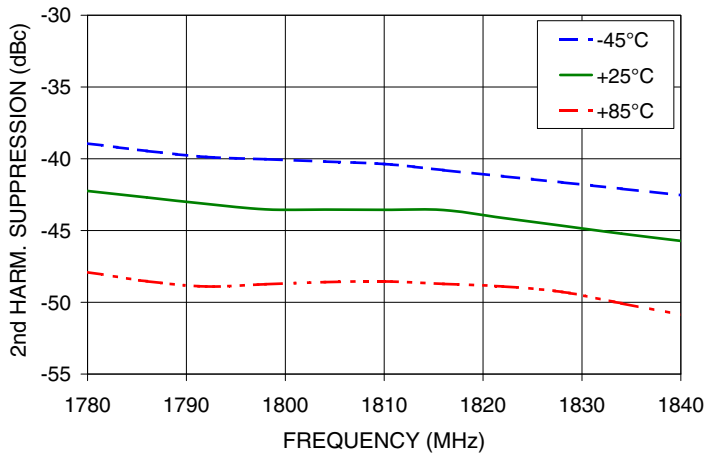
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Typical Performance Curves

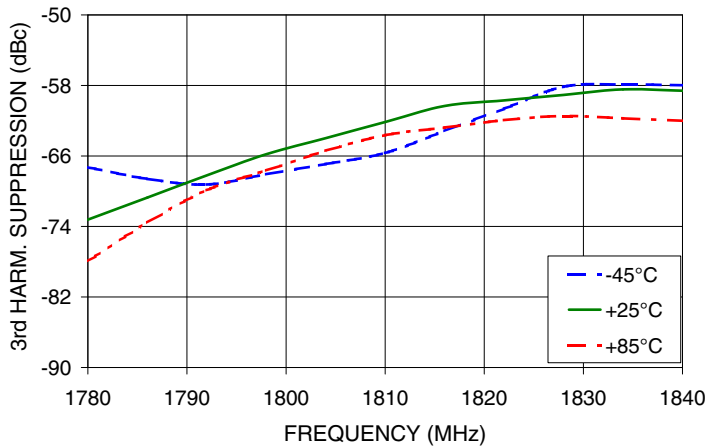
OUTPUT POWER Vs FREQUENCY



2nd HARMONIC Vs FREQUENCY



3rd HARMONIC Vs FREQUENCY



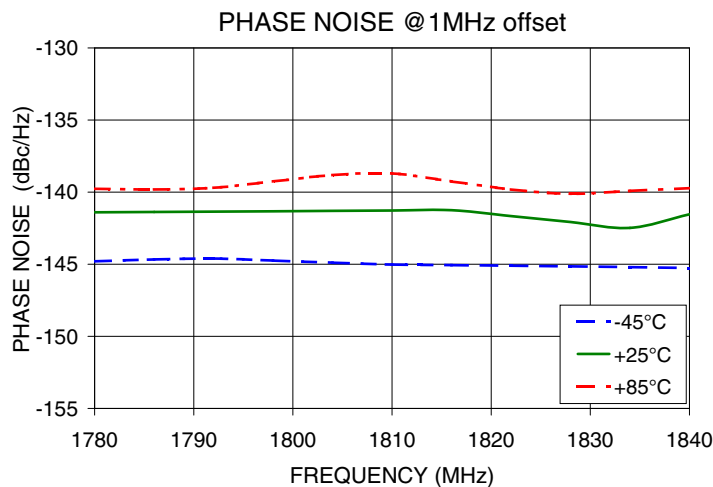
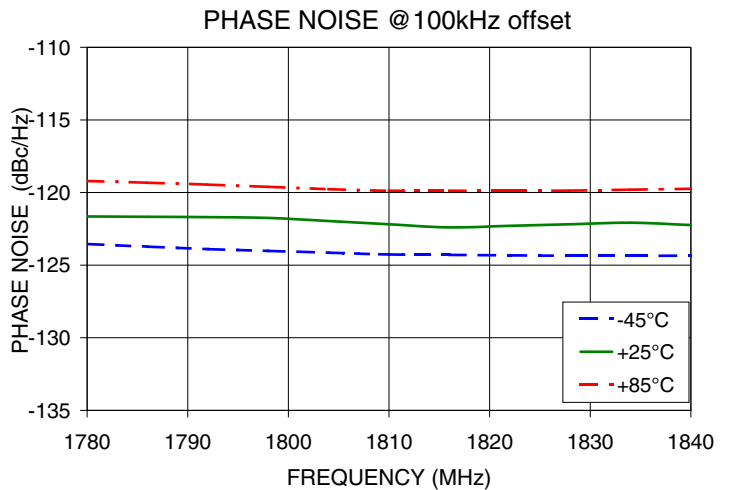
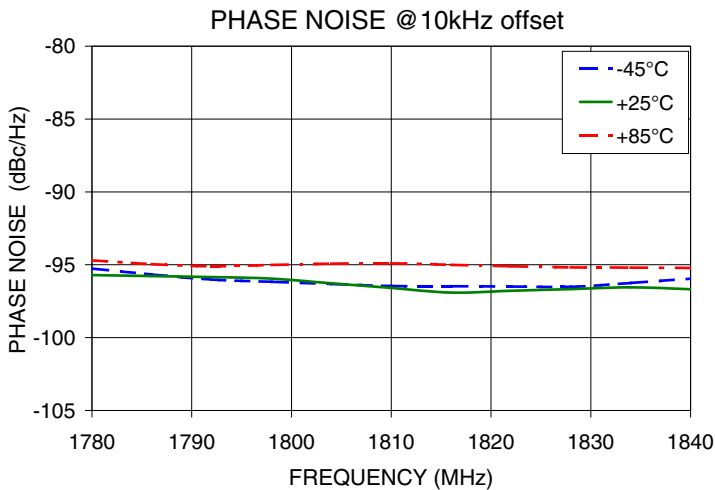
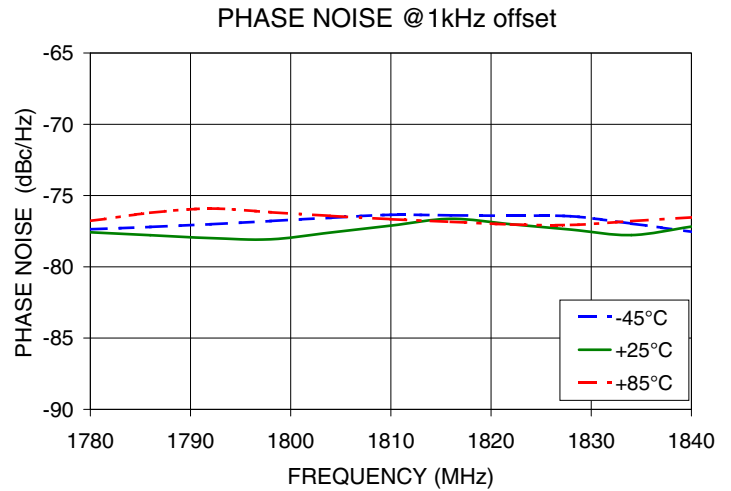
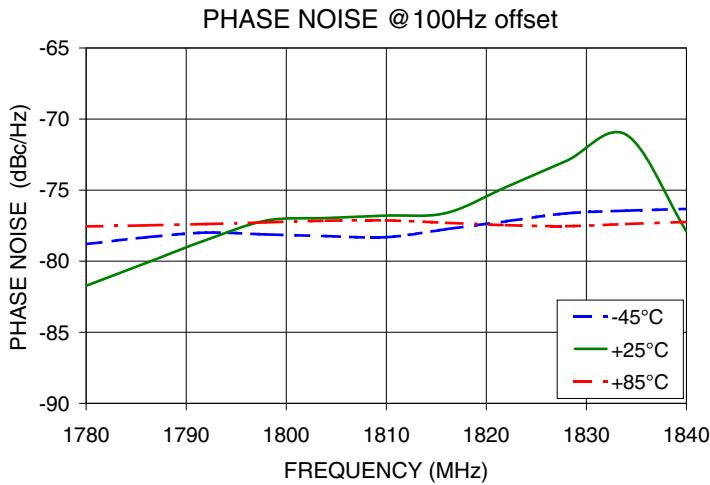
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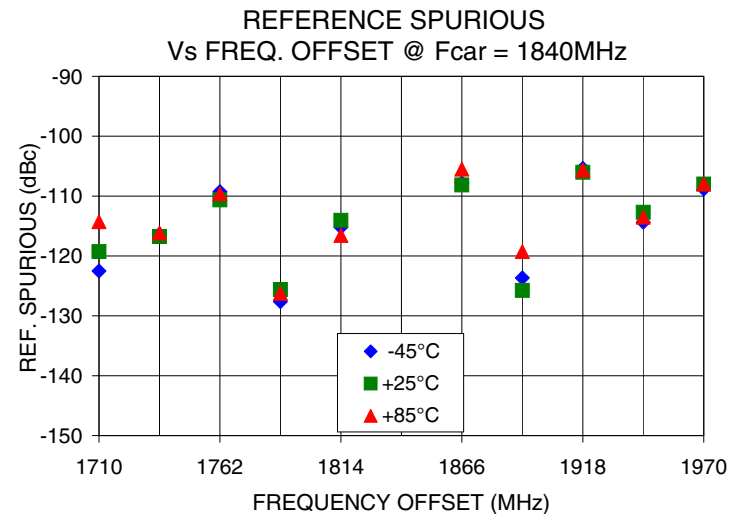
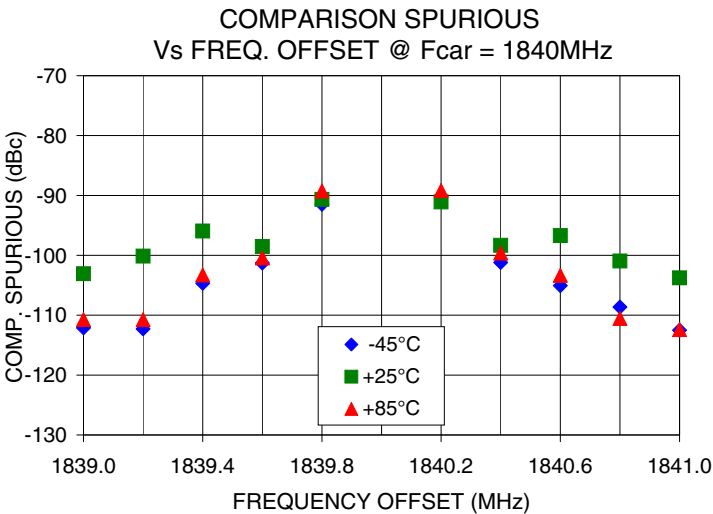
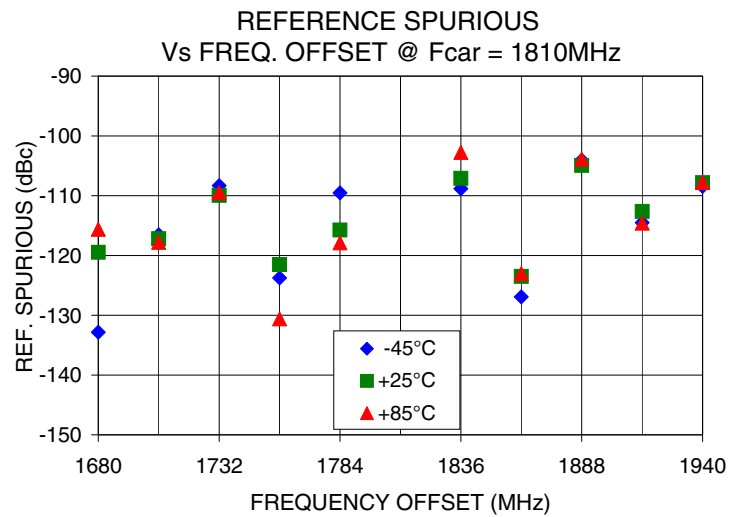
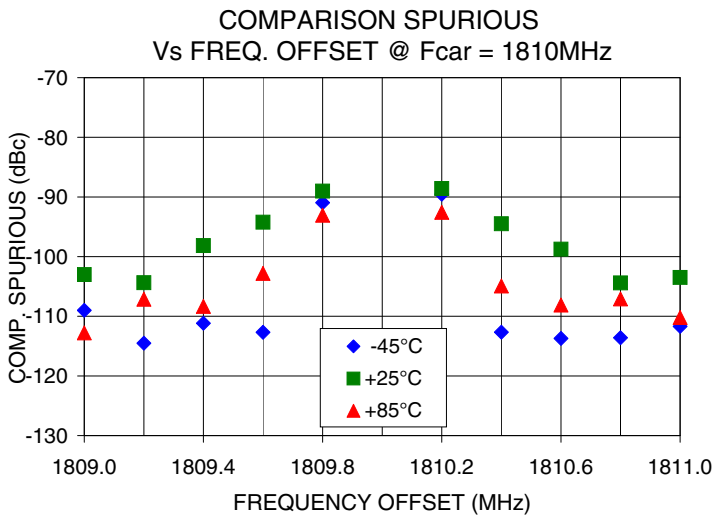
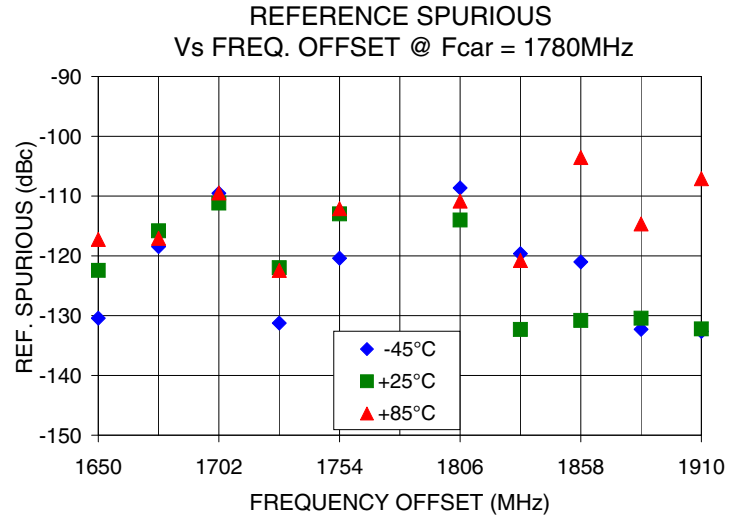
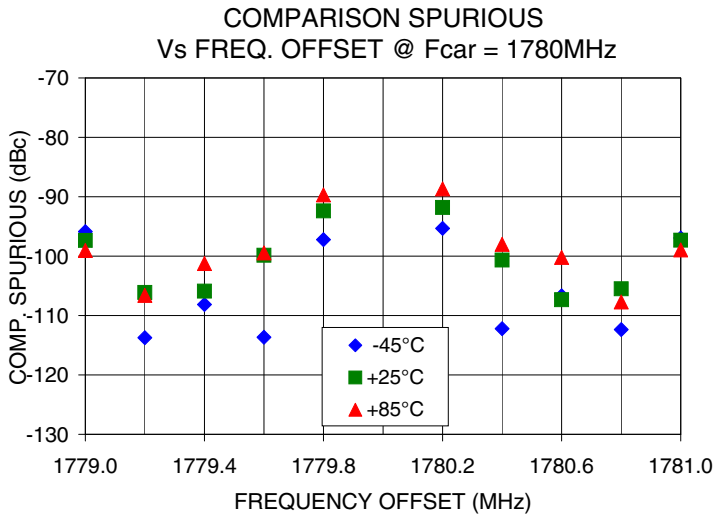
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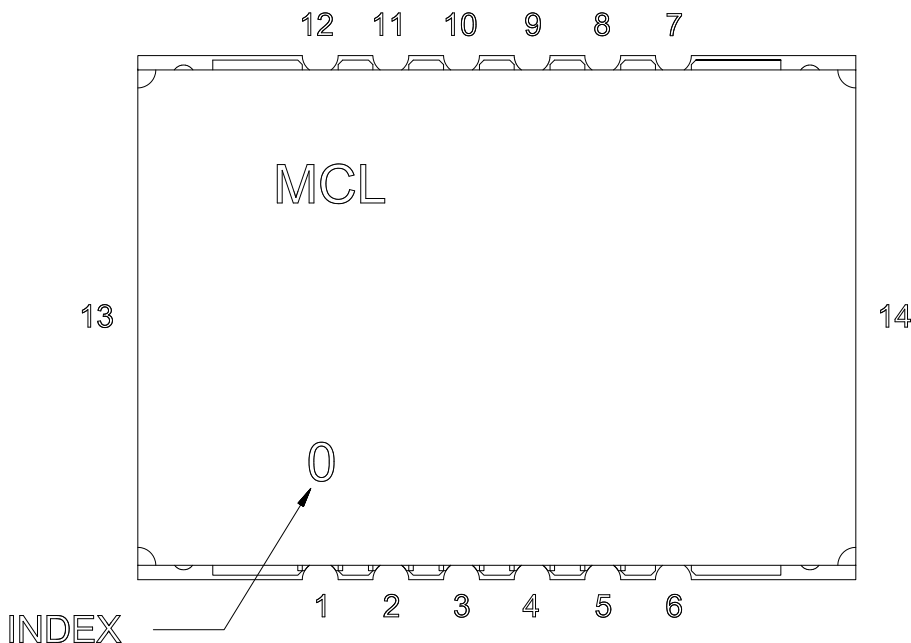


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Pin Configuration

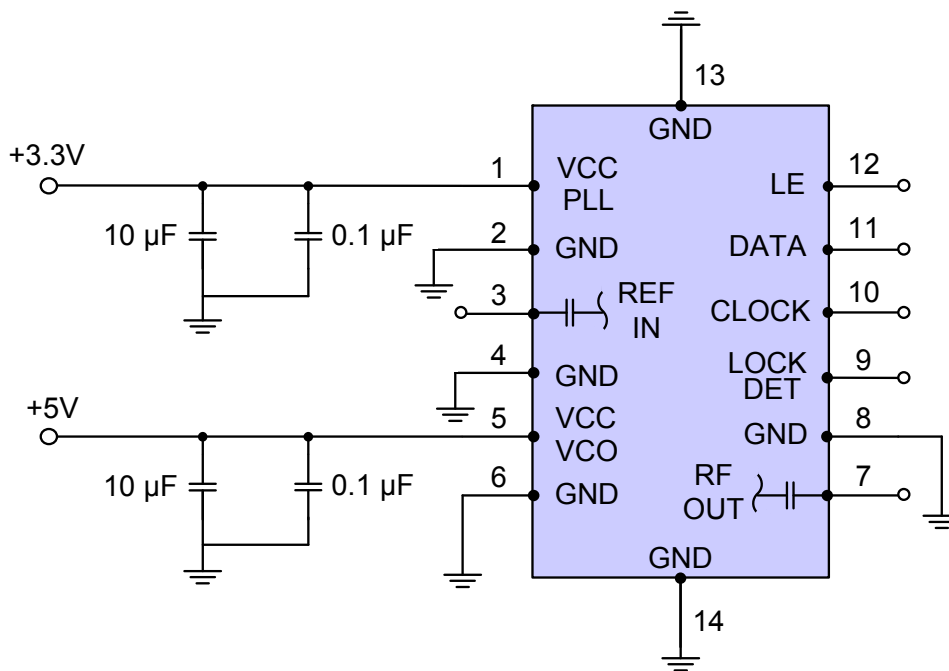


Pin Connection

| 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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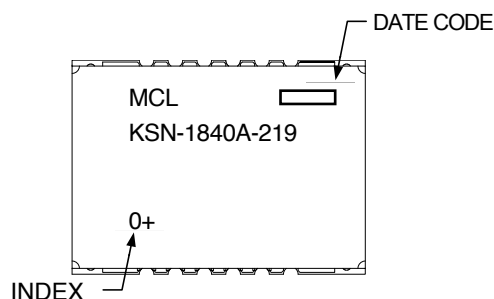


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Device Marking



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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