

Frequency Synthesizer

KSN-2400A-219+

50Ω 2300 to 2400 MHz

The Big Deal

- Fractional N synthesizer
- 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-2400A-219+ is a Frequency Synthesizer, designed to operate from 2300 to 2400 MHz for TD-SCDMA application. The KSN-2400A-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: -97 dBc/Hz typ. @ 10 kHz offset• Step Size Spurious: -72 dBc typ.• Comparison Spurious: -100 dBc typ.• Reference Spurious: -102 dBc typ. | Low phase noise and spurious improve system EVM (Error Vector Magnitude). |
| Robust design and construction | To enhance the robustness of KSN-2400A-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-2400A-219+ to be used in compact designs. |



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

50Ω 2300 to 2400 MHz

Features

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

Applications

- TD-SCDMA

General Description

The KSN-2400A-219+ is a Frequency Synthesizer, designed to operate from 2300 to 2400 MHz for TD-SCDMA application. The KSN-2400A-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-2400A-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.

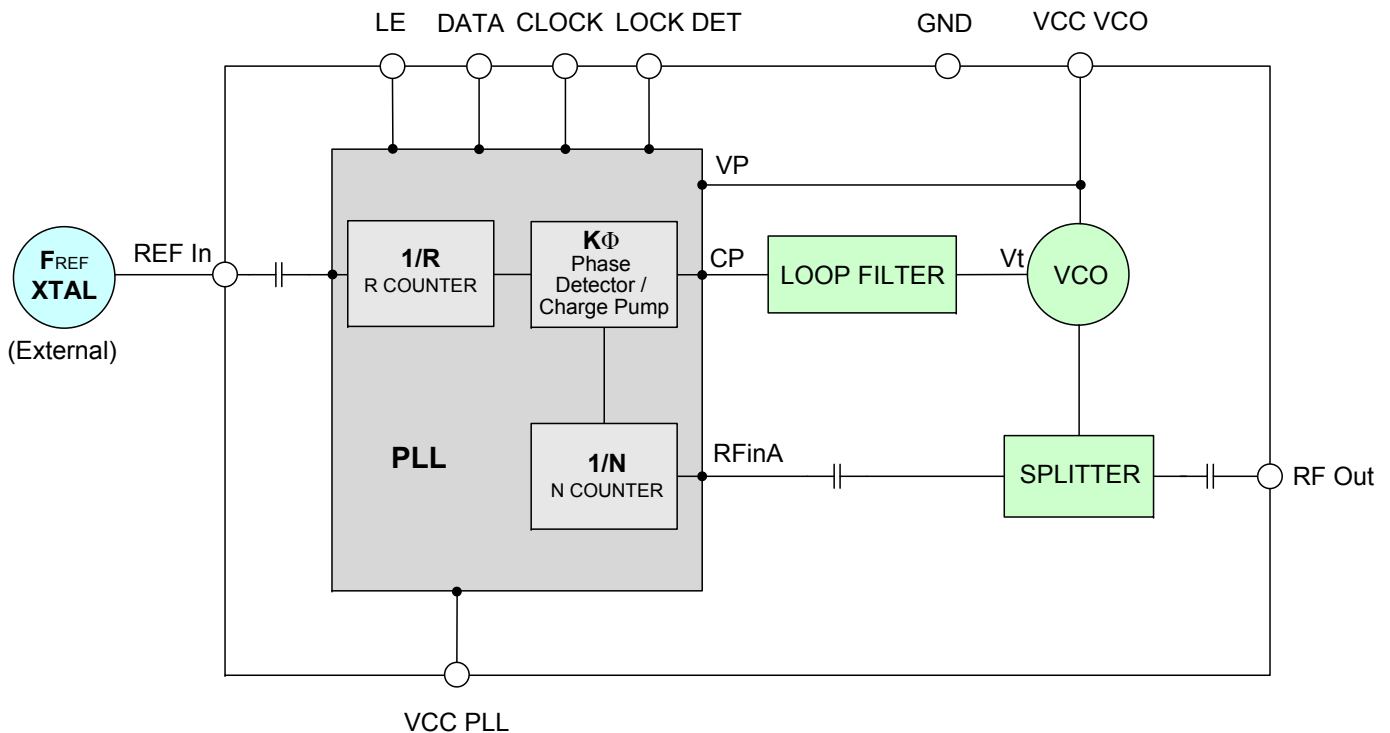


CASE STYLE: DK1042
PRICE: \$29.95 ea. QTY (1-9)

+ 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



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.



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

| Parameters | Test Conditions | Min. | Typ. | Max. | Units | |
|-------------------------------------|----------------------------|--------------------------|------------------------------------|-------|------------------|---|
| Frequency Range | - | 2300 | - | 2400 | MHz | |
| Step Size | - | - | 20 | - | kHz | |
| Comparison Frequency | - | - | 15.36 | - | MHz | |
| Settling Time | Within ± 1 kHz | - | 25 | - | mSec | |
| Output Power | - | +2 | +5 | +7 | dBm | |
| SSB Phase Noise | @ 100 Hz offset | - | -76 | - | dBc/Hz | |
| | @ 1 kHz offset | - | -82 | -76 | | |
| | @ 10 kHz offset | - | -97 | -88 | | |
| | @ 100 kHz offset | - | -127 | -122 | | |
| | @ 1 MHz offset | - | -148 | -142 | | |
| Integrated SSB Phase Noise | @ 1kHz to 5MHz | - | -47 | -44 | dBc | |
| Step Size Spurious Suppression | Step Size 20 kHz | - | -72 | -42 | dBc | |
| 0.5 Step Size Spurious Suppression | 0.5 Step Size 10 kHz | - | -70 | -51 | | |
| Reference Spurious Suppression | Ref. Freq. 30.72 MHz | - | -102 | -76 | | |
| Comparison Spurious Suppression | Comp. Freq. 15.36 MHz | - | -100 | -75 | | |
| Non - Harmonic Spurious Suppression | - | - | -90 | - | | |
| Harmonic Suppression | - | - | -31 | -21 | | |
| VCO Supply Voltage | 5.00 | +4.75 | +5.00 | +5.25 | V | |
| PLL Supply Voltage | 5.00 | +4.75 | +5.00 | +5.25 | | |
| VCO Supply Current | - | - | 45 | 52 | mA | |
| PLL Supply Current | - | - | 38 | 46 | | |
| Reference Input (External) | Frequency | 30.72 (square wave) | - | 30.72 | 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 | - | - | 0.55 | V | |
| Digital Lock Detect | Locked | - | 2.55 | - | 3.30 | V |
| | Unlocked | - | - | - | 0.40 | V |
| Frequency Synthesizer PLL | - | ADF4153 | | | | |
| PLL Programming | - | 3-wire serial 3.15V CMOS | | | | |
| Register Map @ 2400 MHz | R0_Register | - | (MSB) 1001110000001100000000 (LSB) | | | |
| | R1_Register | - | (MSB) 101001000110000000001 (LSB) | | | |
| | R2_Register | - | (MSB) 111100010 (LSB) | | | |
| | R3_Register | - | (MSB) 11 (LSB) | | | |

Absolute Maximum Ratings

| Parameters | Ratings |
|--|---------------------|
| VCO Supply Voltage | 5.8V |
| PLL Supply Voltage | 6.2V |
| VCO Supply Voltage to PLL Supply Voltage | -0.3V to +5.8V |
| Reference Frequency Voltage | -0.3Vmin,+ 3.25Vmax |
| Data, Clock, LE Levels | -0.3Vmin,+ 3.25Vmax |
| 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



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

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 |
| | 2300 | 5.31 | 5.17 | 4.93 | 43.23 | 44.39 | 45.73 | 37.60 | 38.21 |
| 2310 | 5.31 | 5.17 | 4.94 | 43.30 | 44.44 | 45.76 | 37.67 | 38.29 | 39.87 |
| 2330 | 5.25 | 5.12 | 4.89 | 43.42 | 44.52 | 45.82 | 37.63 | 38.25 | 39.84 |
| 2350 | 5.10 | 4.96 | 4.72 | 43.47 | 44.61 | 45.89 | 37.45 | 38.07 | 39.66 |
| 2370 | 5.16 | 4.96 | 4.70 | 43.59 | 44.68 | 45.96 | 37.62 | 38.24 | 39.84 |
| 2390 | 5.35 | 5.14 | 4.86 | 43.68 | 44.77 | 46.04 | 37.66 | 38.29 | 39.89 |
| 2400 | 5.40 | 5.21 | 4.93 | 43.74 | 44.82 | 46.08 | 37.50 | 38.13 | 39.73 |

| FREQUENCY (MHz) | HARMONICS (dBc) | | | | | |
|--------------------|-----------------|--------|--------|--------|--------|--------|
| | F2 | | | F3 | | |
| | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C |
| 2300 | -28.83 | -30.70 | -37.26 | -37.57 | -35.82 | -39.86 |
| 2310 | -29.38 | -32.51 | -36.58 | -38.23 | -37.41 | -42.12 |
| 2330 | -26.16 | -32.76 | -37.08 | -34.93 | -37.74 | -39.12 |
| 2350 | -27.06 | -27.43 | -35.75 | -35.77 | -34.23 | -39.72 |
| 2370 | -28.87 | -30.66 | -34.30 | -42.29 | -38.33 | -42.66 |
| 2390 | -27.99 | -31.02 | -35.28 | -38.64 | -40.27 | -42.68 |
| 2400 | -28.15 | -29.72 | -36.03 | -38.53 | -38.82 | -41.11 |

| FREQUENCY (MHz) | PHASE NOISE (dBc/Hz) @ OFFSETS | | | | |
|--------------------|--------------------------------|--------|--------|---------|---------|
| | +25°C | | | | |
| | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 2300 | -74.88 | -79.48 | -97.99 | -127.56 | -147.98 |
| 2310 | -74.08 | -79.56 | -97.94 | -127.61 | -148.12 |
| 2330 | -76.72 | -81.38 | -95.81 | -127.68 | -147.95 |
| 2350 | -75.15 | -80.74 | -95.91 | -127.56 | -148.26 |
| 2370 | -74.14 | -79.80 | -97.68 | -127.22 | -147.86 |
| 2390 | -75.20 | -79.54 | -96.40 | -127.51 | -147.88 |
| 2400 | -74.08 | -79.86 | -97.26 | -127.40 | -147.84 |

| FREQUENCY (MHz) | PHASE NOISE (dBc/Hz) @ OFFSETS | | | | |
|--------------------|--------------------------------|--------|--------|---------|---------|
| | -45°C | | | | |
| | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 2300 | -75.27 | -79.97 | -95.45 | -128.61 | -149.27 |
| 2310 | -74.13 | -79.51 | -95.35 | -128.72 | -149.48 |
| 2330 | -70.62 | -80.10 | -94.84 | -128.61 | -149.76 |
| 2350 | -72.79 | -79.52 | -93.17 | -128.37 | -148.92 |
| 2370 | -76.56 | -79.88 | -93.81 | -128.65 | -149.82 |
| 2390 | -73.03 | -79.84 | -92.91 | -128.70 | -149.54 |
| 2400 | -74.59 | -80.25 | -94.39 | -128.41 | -149.27 |

| FREQUENCY (MHz) | PHASE NOISE (dBc/Hz) @ OFFSETS | | | | |
|--------------------|--------------------------------|--------|--------|---------|---------|
| | +85°C | | | | |
| | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 2300 | -76.36 | -83.19 | -97.73 | -125.82 | -146.12 |
| 2310 | -77.23 | -81.43 | -98.34 | -125.86 | -146.19 |
| 2330 | -78.05 | -83.04 | -95.63 | -125.71 | -146.06 |
| 2350 | -77.28 | -82.58 | -96.18 | -125.55 | -145.88 |
| 2370 | -75.88 | -81.43 | -96.52 | -125.63 | -145.98 |
| 2390 | -76.15 | -81.32 | -95.95 | -125.47 | -145.82 |
| 2400 | -74.83 | -82.39 | -96.72 | -125.38 | -145.98 |



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
 P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

| COMPARISON SPURIOUS ORDER | COMPARISON SPURIOUS @ Fcarrier 2300MHz+(n*Fcomparison) (dBc) note 1 | | | COMPARISON SPURIOUS @ Fcarrier 2350MHz+(n*Fcomparison) (dBc) note 1 | | | COMPARISON SPURIOUS @ Fcarrier 2400MHz+(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 | -107.09 | -112.50 | -115.62 | -106.91 | -106.61 | -114.58 | -103.37 | -116.11 | -120.21 |
| -4 | -101.11 | -103.72 | -103.89 | -97.99 | -102.81 | -100.23 | -108.68 | -99.86 | -100.70 | |
| -3 | -101.78 | -113.21 | -108.15 | -102.54 | -106.30 | -103.58 | -107.34 | -101.05 | -102.46 | |
| -2 | -99.73 | -105.65 | -96.36 | -101.24 | -100.50 | -94.26 | -102.94 | -97.54 | -98.78 | |
| -1 | -99.41 | -106.71 | -100.77 | -101.38 | -102.50 | -100.75 | -100.38 | -98.53 | -100.01 | |
| 0 note 2 | - | - | - | - | - | - | - | - | - | |
| +1 | -108.92 | -100.68 | -97.96 | -96.37 | -97.38 | -106.76 | -99.71 | -100.19 | -98.15 | |
| +2 | -104.41 | -97.03 | -90.64 | -97.42 | -107.18 | -104.35 | -102.82 | -104.70 | -101.56 | |
| +3 | -129.42 | -105.25 | -102.46 | -102.32 | -115.68 | -111.92 | -99.65 | -113.33 | -115.15 | |
| +4 | -103.72 | -101.03 | -101.44 | -100.57 | -105.55 | -105.27 | -103.11 | -102.29 | -103.38 | |
| +5 | -104.61 | -109.74 | -106.67 | -104.59 | -117.33 | -106.27 | -106.33 | -103.61 | -107.99 | |

Note 1: Comparison frequency 15.36 MHz

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

| REFERENCE SPURIOUS ORDER | REFERENCE SPURIOUS @ Fcarrier 2300MHz+(n*Freference) (dBc) note 3 | | | REFERENCE SPURIOUS @ Fcarrier 2350MHz+(n*Freference) (dBc) note 3 | | | REFERENCE SPURIOUS @ Fcarrier 2400MHz+(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 | -92.10 | -95.75 | -99.34 | -94.02 | -95.28 | -96.88 | -95.75 | -97.87 | -97.16 |
| -4 | -92.92 | -94.78 | -95.08 | -92.19 | -94.65 | -95.22 | -93.55 | -92.18 | -95.40 | |
| -3 | -100.51 | -109.54 | -104.89 | -109.46 | -106.27 | -110.01 | -100.28 | -110.92 | -105.97 | |
| -2 | -101.18 | -103.90 | -103.66 | -97.75 | -102.31 | -100.01 | -107.39 | -99.97 | -100.61 | |
| -1 | -99.62 | -106.54 | -97.16 | -101.36 | -100.66 | -94.37 | -102.54 | -97.34 | -98.65 | |
| 0 note 4 | - | - | - | - | - | - | - | - | - | |
| +1 | -104.72 | -97.19 | -91.02 | -97.35 | -108.35 | -104.80 | -103.88 | -105.80 | -101.15 | |
| +2 | -103.30 | -100.91 | -101.46 | -100.37 | -104.95 | -104.68 | -104.45 | -101.94 | -103.12 | |
| +3 | -107.10 | -111.70 | -107.02 | -117.46 | -111.94 | -104.46 | -106.25 | -106.89 | -118.80 | |
| +4 | -100.60 | -100.95 | -99.43 | -96.33 | -100.47 | -101.32 | -97.92 | -99.11 | -101.10 | |
| +5 | -100.79 | -99.52 | -103.36 | -98.57 | -100.09 | -105.77 | -99.44 | -101.76 | -114.42 | |

Note 3: Reference frequency 30.72 MHz

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



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

| STEP SIZE SPURIOUS ORDER n | 0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2300MHz+(n*Fstep size) (dBc) note 5 | | | 0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2350MHz+(n*Fstep size) (dBc) note 5 | | | 0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 2400MHz+(n*Fstep size) (dBc) note 5 | | |
|---|---|--------|--------|---|--------|--------|---|--------|--------|
| | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C |
| -5.0 | -84.13 | -86.10 | -87.69 | -86.37 | -85.10 | -83.44 | -86.16 | -84.32 | -84.44 |
| -4.5 | -81.58 | -85.72 | -86.89 | -86.49 | -85.63 | -83.31 | -86.24 | -84.38 | -85.52 |
| -4.0 | -83.35 | -82.42 | -85.43 | -71.39 | -70.27 | -79.92 | -87.24 | -83.27 | -82.85 |
| -3.5 | -86.02 | -83.98 | -85.95 | -82.15 | -84.14 | -83.60 | -86.50 | -85.86 | -85.56 |
| -3.0 | -84.49 | -81.12 | -86.78 | -86.26 | -87.53 | -82.67 | -81.29 | -86.83 | -86.69 |
| -2.5 | -85.13 | -87.18 | -86.98 | -86.06 | -84.08 | -82.13 | -82.87 | -87.54 | -86.31 |
| -2.0 | -85.33 | -88.00 | -83.81 | -88.54 | -85.39 | -85.92 | -84.13 | -84.47 | -83.30 |
| -1.5 | -83.52 | -83.68 | -84.43 | -76.79 | -81.12 | -84.10 | -88.37 | -87.41 | -82.96 |
| -1.0 | -66.43 | -71.04 | -72.37 | -77.58 | -83.24 | -84.06 | -60.97 | -64.09 | -64.51 |
| -0.5 | -69.92 | -72.08 | -68.66 | -68.49 | -70.46 | -65.74 | -68.92 | -70.98 | -70.50 |
| 0 note 6 | - | - | - | - | - | - | - | - | - |
| +0.5 | -69.16 | -71.64 | -68.61 | -66.43 | -66.14 | -67.46 | -67.59 | -72.58 | -68.36 |
| +1.0 | -67.85 | -71.19 | -72.32 | -79.99 | -83.35 | -80.06 | -61.14 | -65.39 | -64.39 |
| +1.5 | -85.15 | -86.67 | -85.66 | -77.95 | -83.13 | -80.92 | -83.42 | -86.67 | -84.28 |
| +2.0 | -83.51 | -86.31 | -86.22 | -87.35 | -86.65 | -87.70 | -83.04 | -87.51 | -82.74 |
| +2.5 | -85.67 | -87.60 | -82.74 | -82.60 | -82.31 | -82.53 | -81.51 | -86.04 | -87.05 |
| +3.0 | -84.48 | -85.53 | -87.07 | -87.74 | -85.78 | -80.96 | -86.71 | -85.97 | -84.34 |
| +3.5 | -83.67 | -85.21 | -84.25 | -86.03 | -85.30 | -84.01 | -84.24 | -86.89 | -82.29 |
| +4.0 | -86.20 | -85.64 | -86.19 | -70.28 | -70.55 | -81.52 | -84.72 | -85.01 | -82.51 |
| +4.5 | -85.28 | -85.53 | -86.41 | -87.78 | -84.72 | -87.47 | -87.11 | -83.18 | -87.67 |
| +5.0 | -86.61 | -88.17 | -87.67 | -85.93 | -85.55 | -86.03 | -86.58 | -88.12 | -86.79 |

Note 5: Step size 20 kHz

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



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
 P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



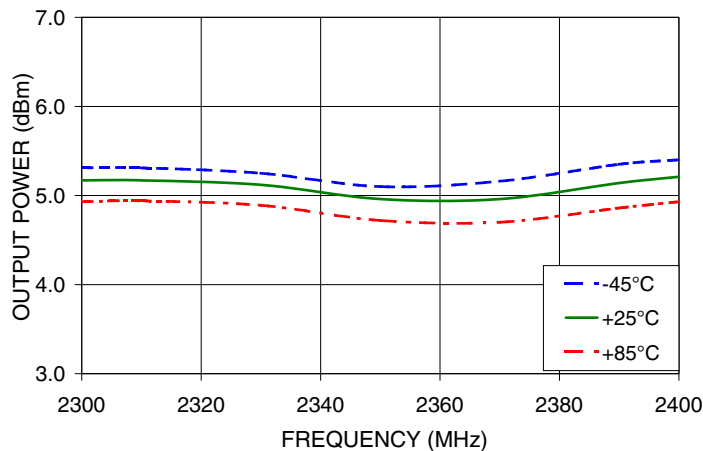
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



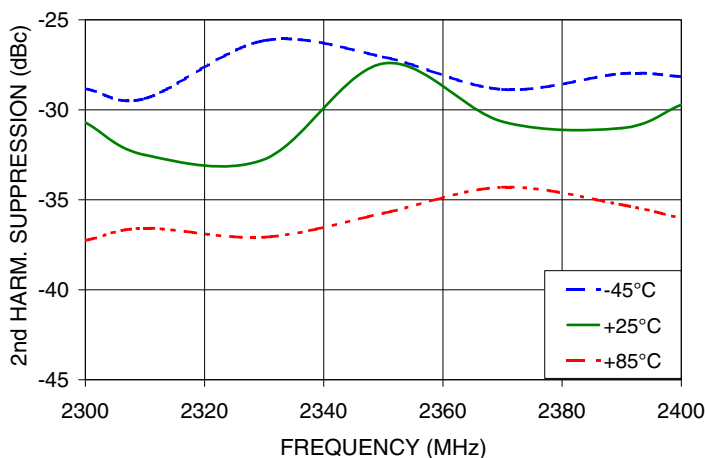
Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

Typical Performance Curves

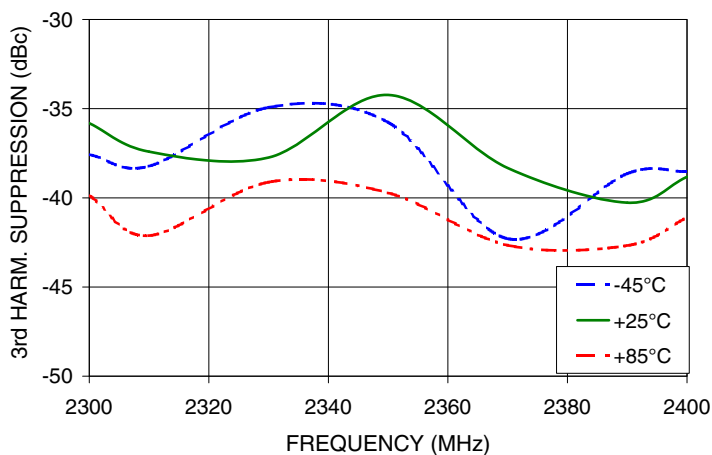
OUTPUT POWER Vs FREQUENCY



2nd HARMONIC Vs FREQUENCY



3rd HARMONIC Vs FREQUENCY



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
 P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

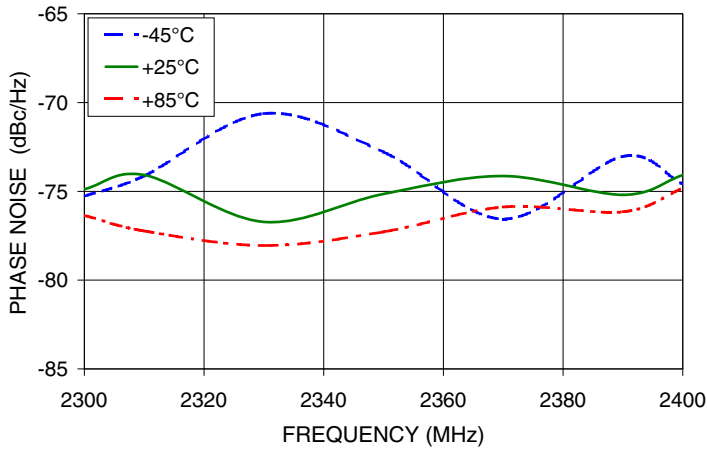


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

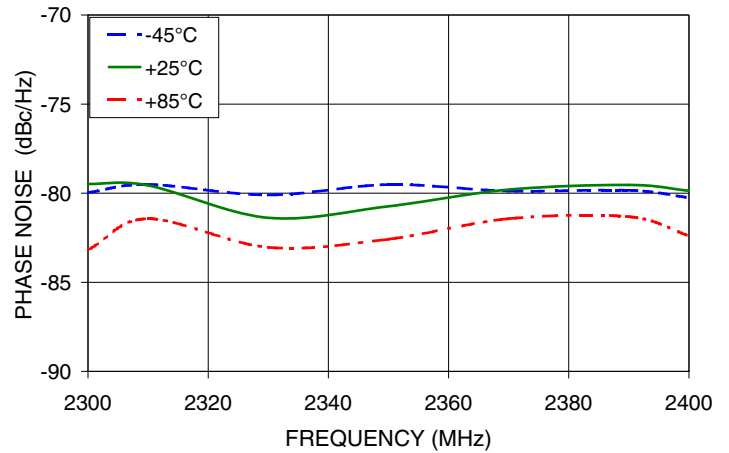


Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

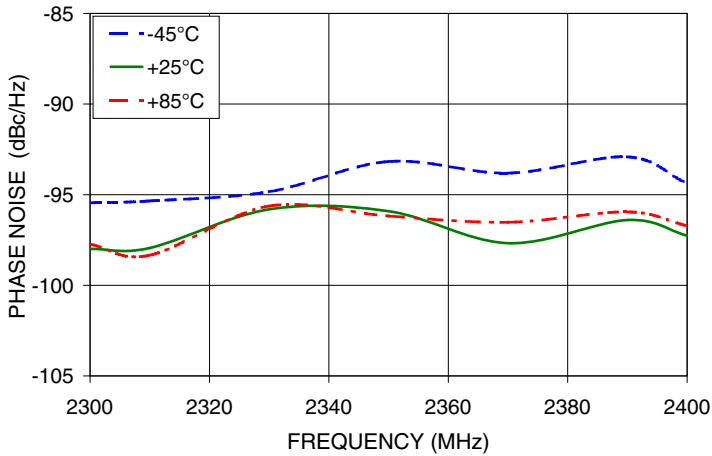
PHASE NOISE @100Hz offset



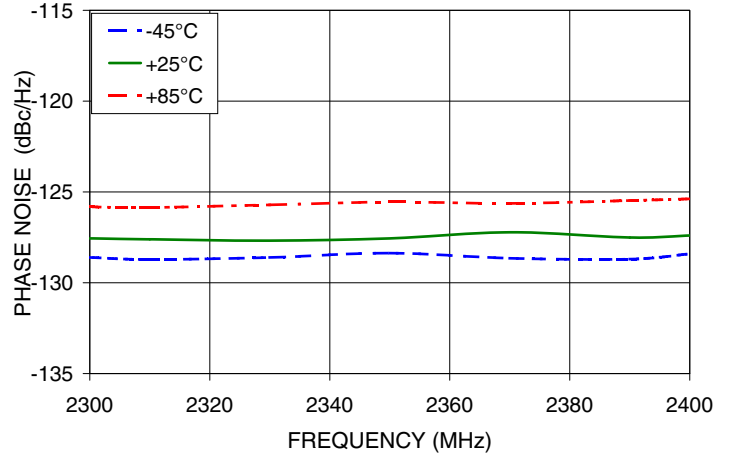
PHASE NOISE @1kHz offset



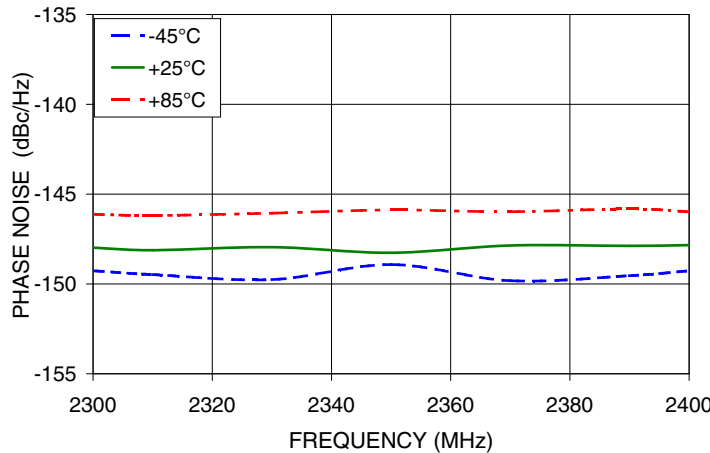
PHASE NOISE @10kHz offset



PHASE NOISE @100kHz offset



PHASE NOISE @1MHz offset



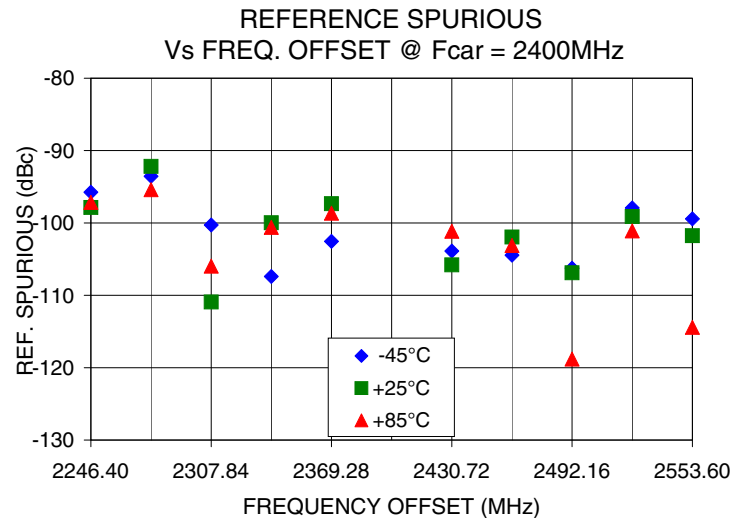
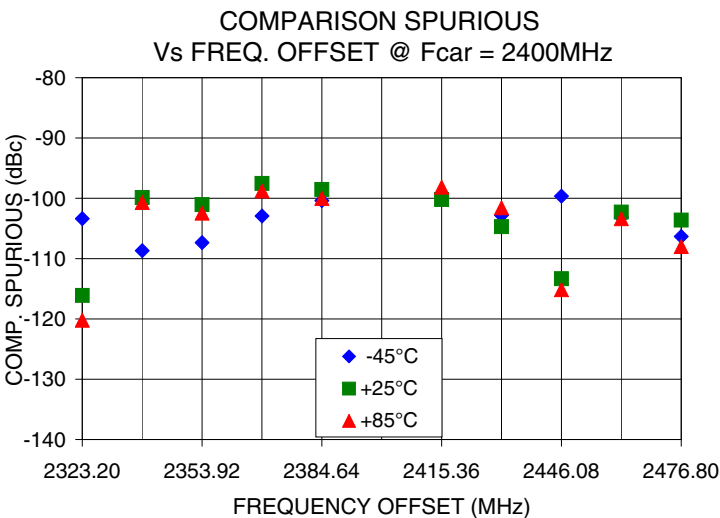
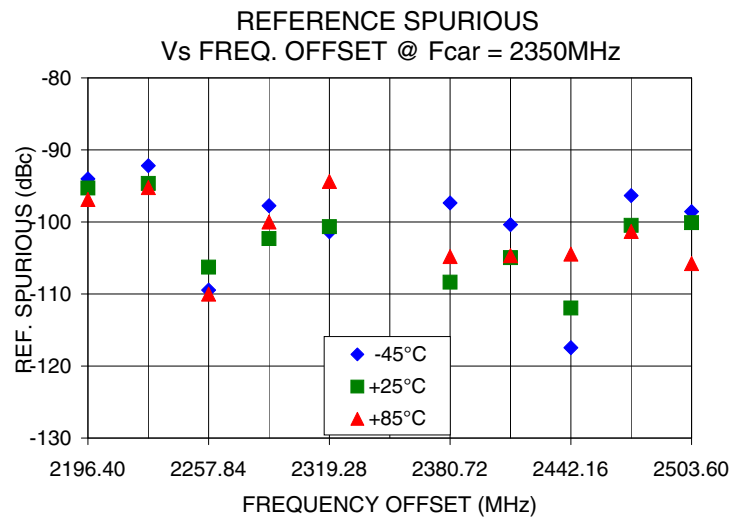
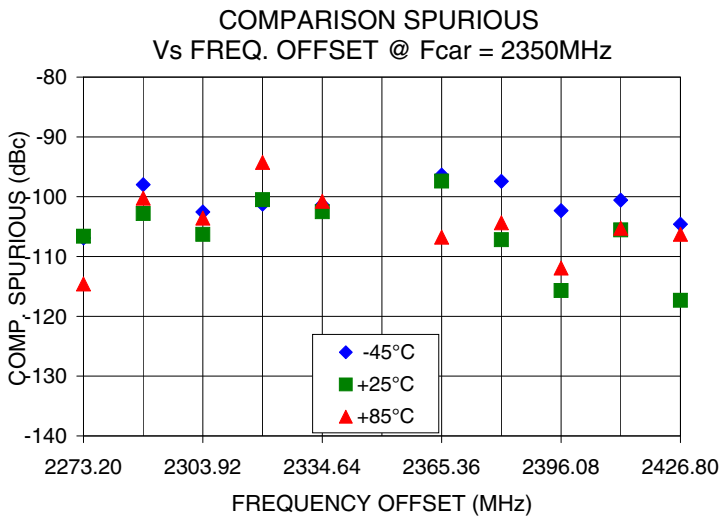
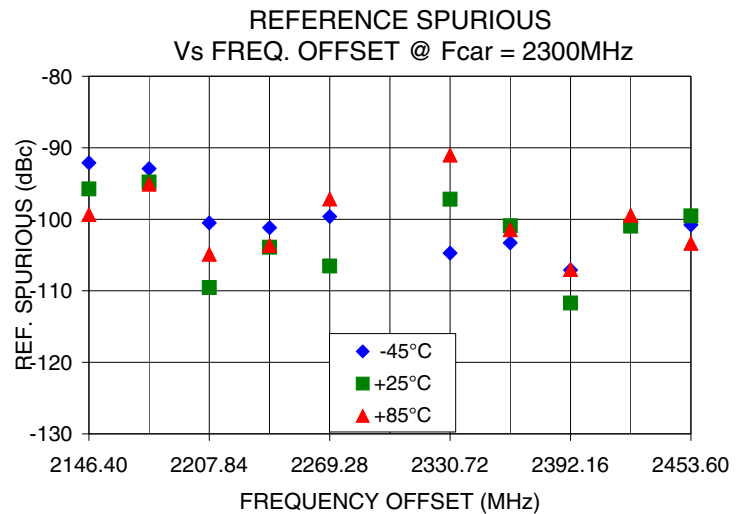
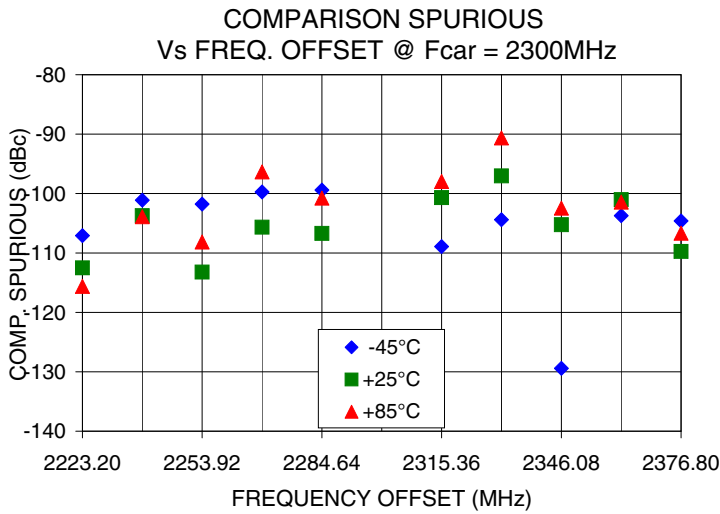
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
 P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.



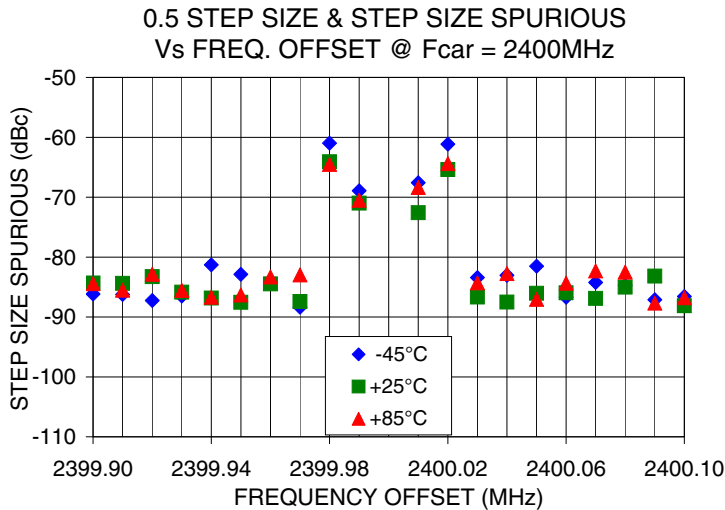
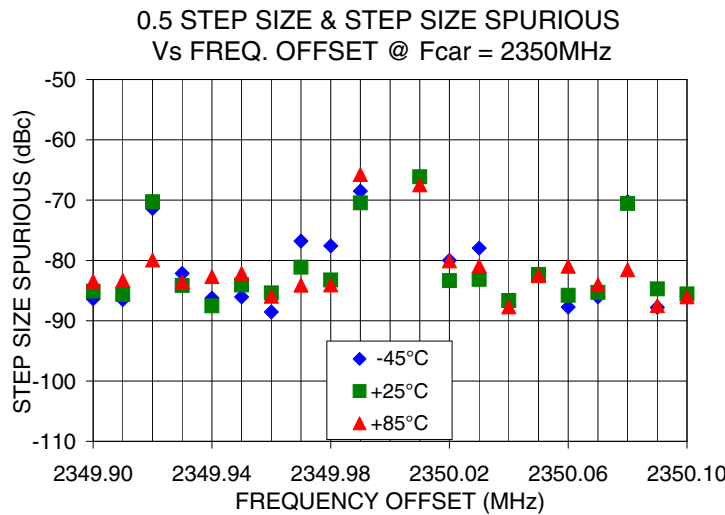
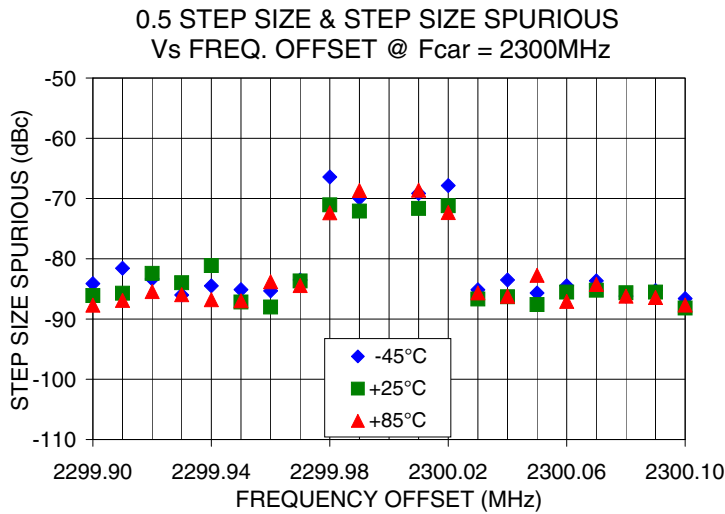
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

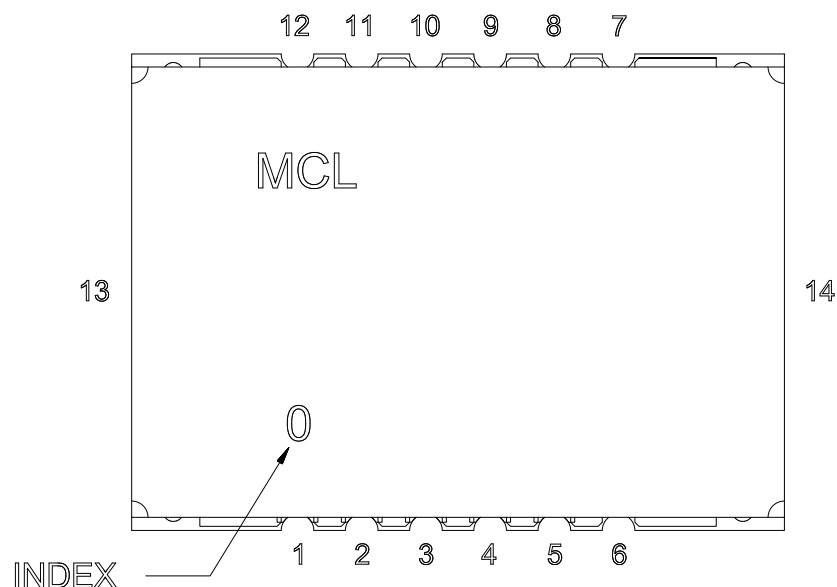


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

Pin Configuration

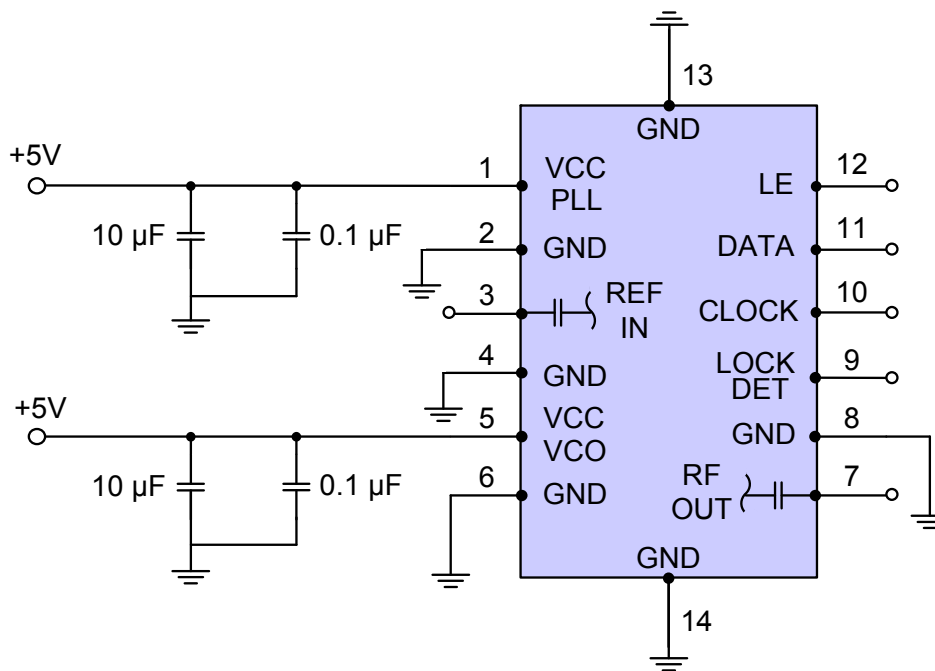


Pin Connection

| 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.



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
 P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

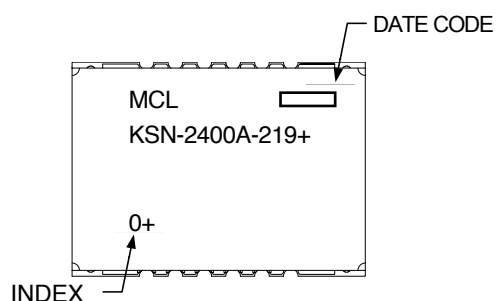


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

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+

Environment Ratings: ENV03T2



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.