



QUADBAND MMIC VCO 8.3 - 15.2 GHz

Typical Applications

Low noise QUADBAND MMIC VCO for:

- Test Equipment & Industrial Controls
- VSAT Radio
- Point to Point/Multi-Point Radio
- Military End-Use

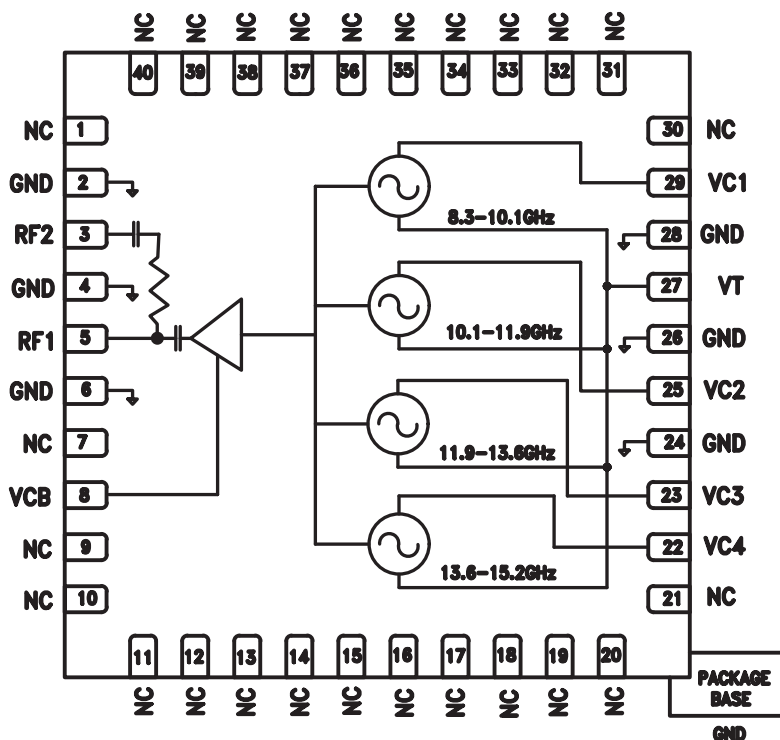
Features

- Dual Output: RF1 = -5 to +6 dBm
RF2 = -15 to -4 dBm
- Four Independent VCO's with common RF & Tuning ports
- No External Resonator Needed
- 40 Lead 6x6mm SMT Package: 36mm²

General Description

The HMC8074LP6GE is a QUADBAND MMIC VCO that integrates the resonators, negative resistance devices, varactor diodes, and features two RF output pins. The VCO's phase noise performance is excellent over temperature, shock, and process due to the oscillator's monolithic structure. With a +4.75V supply, the output power is typically -5 to +6 dBm for each RF output, respectively. The voltage controlled oscillator is packaged in a leadless QFN 6x6 mm surface mount package, and requires no external matching components.

Functional Diagram





QUADBAND MMIC VCO 8.3 - 15.2 GHz

Electrical Specifications, $T_A = -40\text{ }^\circ\text{C}$ to $+85\text{ }^\circ\text{C}$, $V_{CC} = +4.75\text{V}$

| Parameter | | Min. | Typ. | Max. | Units |
|---|--------|-------------|------|------|-----------------------|
| Frequency Range | Band 1 | 8.3 - 10.1 | | | GHz |
| | Band 2 | 10.1 - 11.9 | | | |
| | Band 3 | 11.9 - 13.6 | | | |
| | Band 4 | 13.6 - 15.2 | | | |
| Tuning Sensitivity | Band 1 | 75 | 200 | 850 | MHz/V |
| | Band 2 | 75 | 225 | 950 | |
| | Band 3 | 100 | 250 | 1050 | |
| | Band 4 | 120 | 275 | 1150 | |
| Power Output | RF1 | -5 | 0 | +6 | dBm |
| | RF2 | -15 | -10 | -4 | |
| SSB Phase Noise | Band 1 | 10kHz | -76 | -71 | dBc/Hz |
| | | 100kHz | -104 | -100 | |
| | | 1MHz | -130 | -127 | |
| | Band 2 | 10kHz | -74 | -69 | |
| | | 100kHz | -102 | -98 | |
| | | 1MHz | -129 | -126 | |
| | Band 3 | 10kHz | -71 | -66 | |
| | | 100kHz | -100 | -96 | |
| | | 1MHz | -128 | -125 | |
| | Band 4 | 10kHz | -68 | -63 | |
| | | 100kHz | -98 | -94 | |
| | | 1MHz | -127 | -124 | |
| Supply Voltage | | 4.50 | 4.75 | 5.00 | V |
| Total Supply Current (ICB + ICx) (VCB = VCx = +4.75V) [1] | | | 60 | 90 | mA |
| Tune Voltage (VTUNE) | | 0.5 | | 13.0 | V |
| Tune Port Leakage Current (VTUNE = 13V) | | | | 40 | μA |
| Output Return Loss (RF1) | | | 13 | | dB |
| Output Return Loss (RF2) | | | 7.5 | | dB |
| Harmonics (RF1 & RF2) | | 2nd | 15 | | dBc |
| | | 3rd | 24 | | dBc |
| Pulling (into a 2.0:1 VSWR) | | | .25 | | MHz pp |
| Pushing (VTUNE = 5V) | | | 20 | | MHz/V |
| Frequency Drift Rate | Band 1 | | 1.0 | | MHz/ $^\circ\text{C}$ |
| | Band 2 | | 1.2 | | |
| | Band 3 | | 1.4 | | |
| | Band 4 | | 1.4 | | |

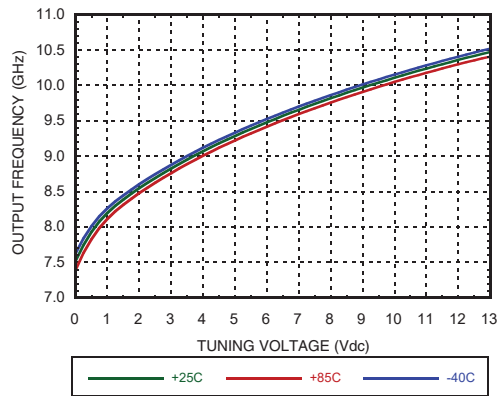
[1] Total supply current is for the output buffer and one VCO band.
Only one VCO band must be powered at a time.



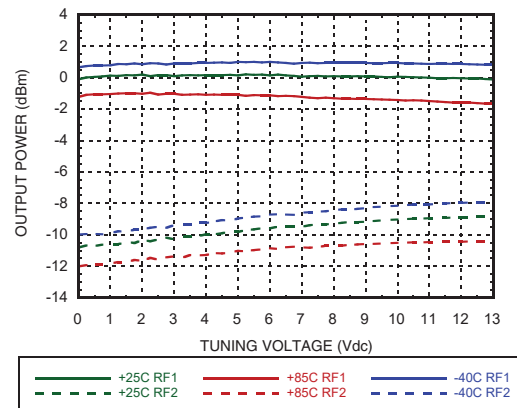
QUADBAND MMIC VCO
8.3 - 15.2 GHz

TYPICAL DATA, VCC=4.75V, BAND 1

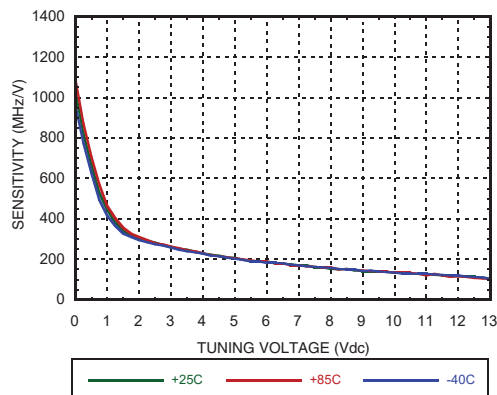
Frequency vs. Tuning Voltage



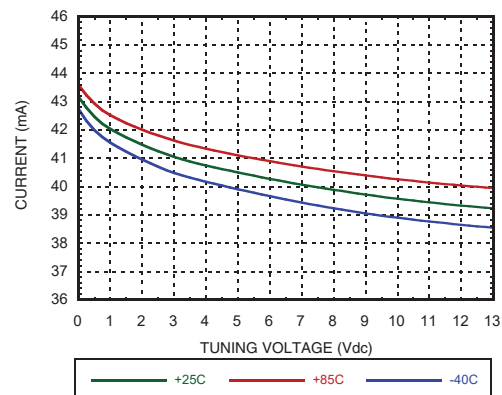
Output Power vs. Tuning Voltage



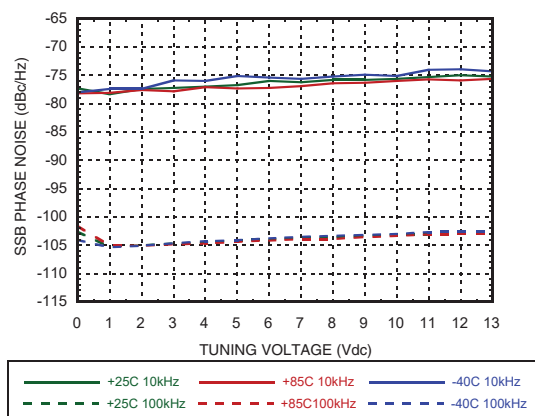
Sensitivity vs. Tuning Voltage



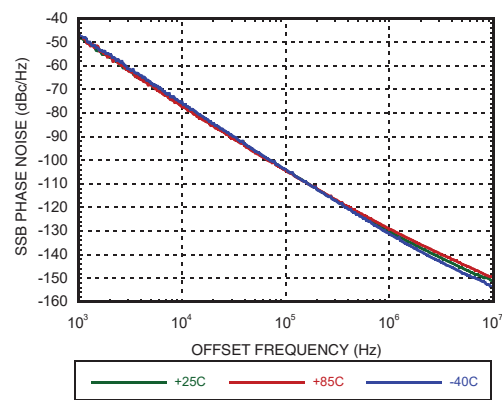
Supply Current vs. Tuning Voltage



SSB Phase Noise vs. Tuning Voltage



SSB Phase Noise @ Vtune = +5V

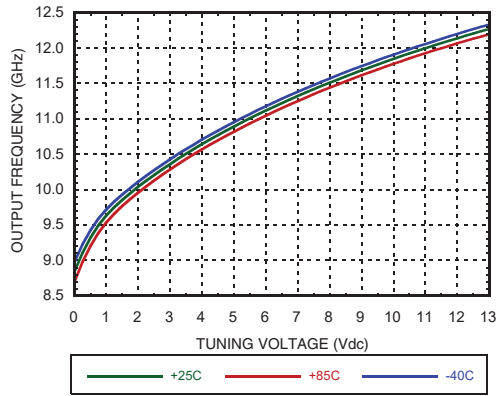




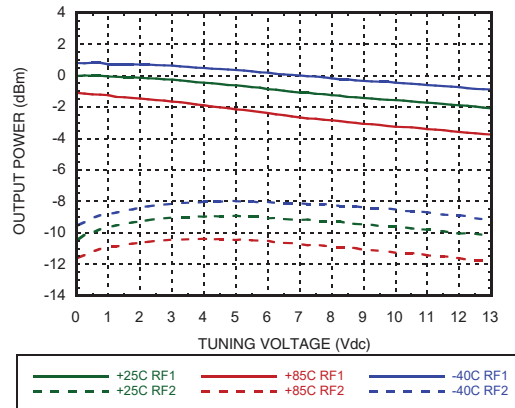
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TYPICAL DATA, VCC=4.75V, BAND 2

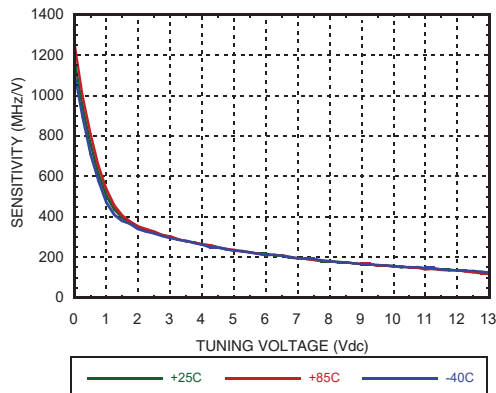
Frequency vs. Tuning Voltage



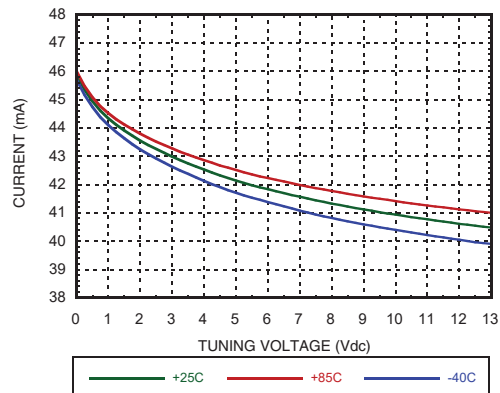
Output Power vs. Tuning Voltage



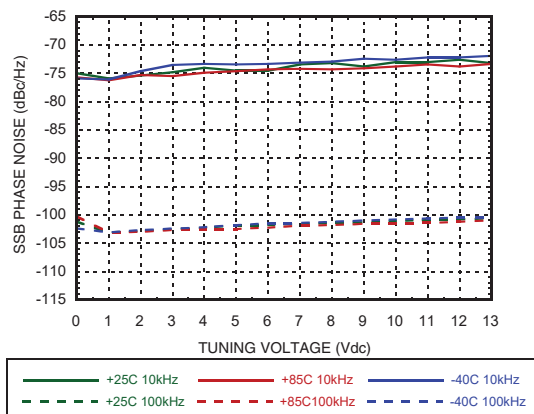
Sensitivity vs. Tuning Voltage



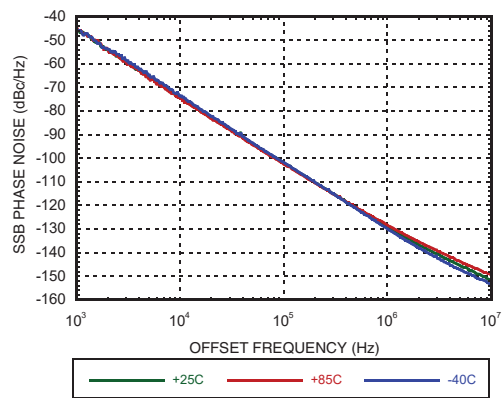
Supply Current vs. Tuning Voltage



SSB Phase Noise vs. Tuning Voltage



SSB Phase Noise @ Vtune = +5V

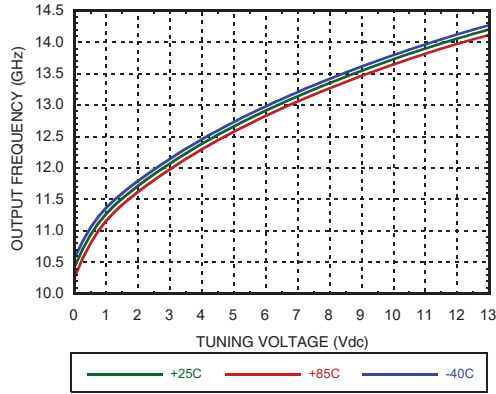




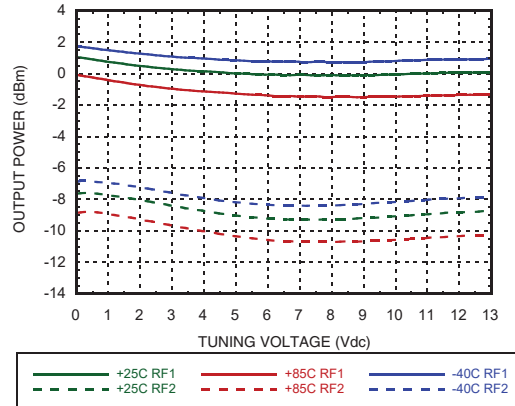
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TYPICAL DATA, VCC=4.75V, BAND 3

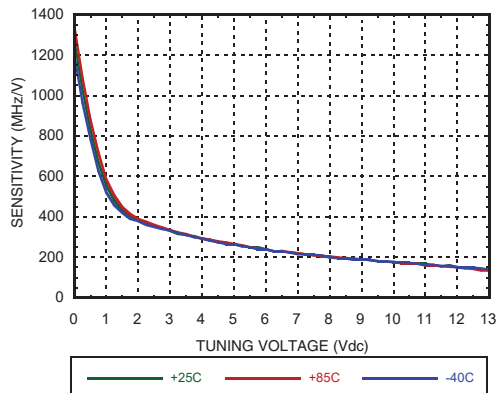
Frequency vs. Tuning Voltage



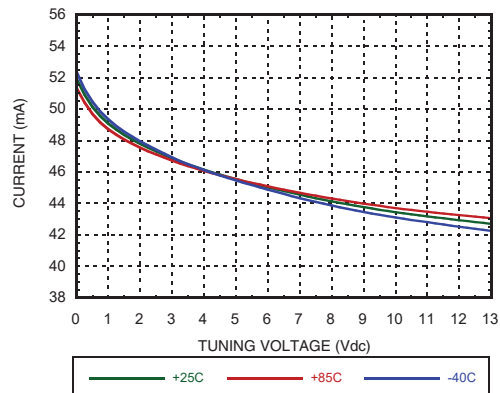
Output Power vs. Tuning Voltage



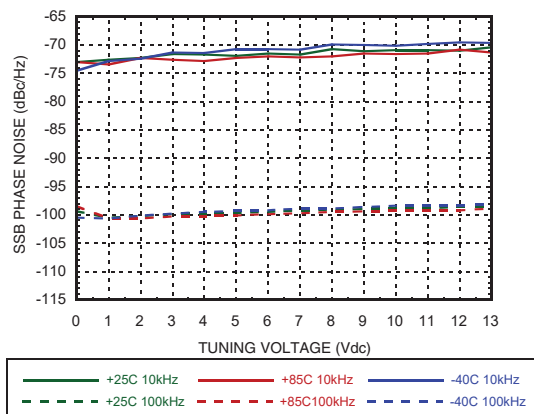
Sensitivity vs. Tuning Voltage



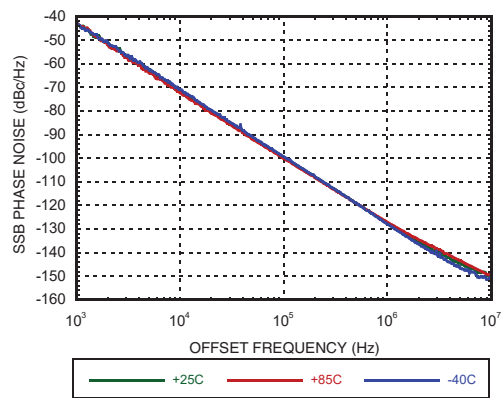
Supply Current vs. Tuning Voltage



SSB Phase Noise vs. Tuning Voltage



SSB Phase Noise @ Vtune = +5V

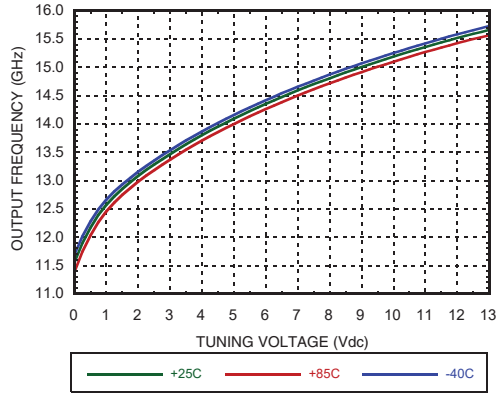




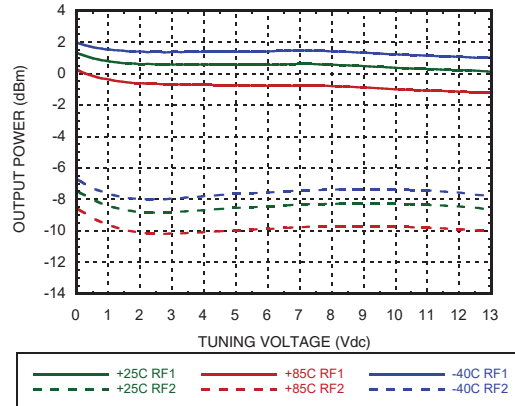
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TYPICAL DATA, VCC=4.75V, BAND 4

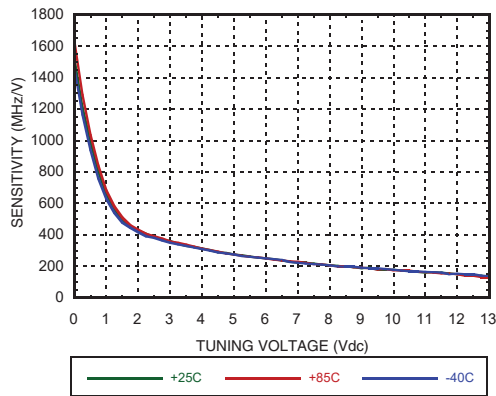
Frequency vs. Tuning Voltage



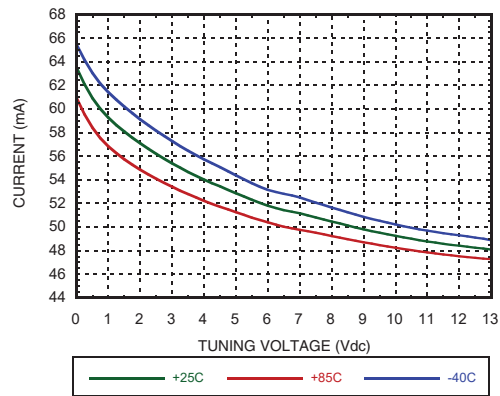
Output Power vs. Tuning Voltage



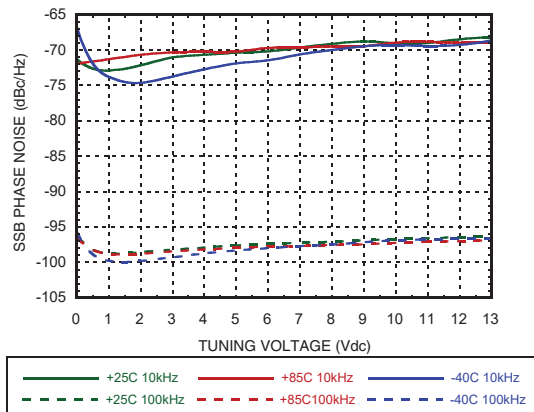
Sensitivity vs. Tuning Voltage



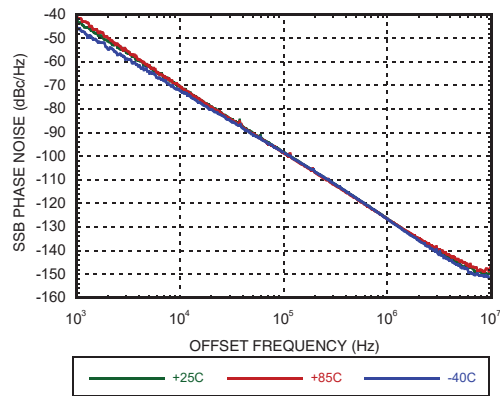
Supply Current vs. Tuning Voltage



SSB Phase Noise vs. Tuning Voltage



SSB Phase Noise @ Vtune = +5V





Absolute Maximum Ratings

| | |
|-----------------------|----------------|
| Vcc | +5.25 Vdc |
| Vtune | 0 to 15 |
| Storage Temperature | -65 to +150 °C |
| ESD Sensitivity (HBM) | CLASS 1A |
| ESD Sensitivity (CDM) | CLASS C1 |

Reliability Information

| | |
|--|---------------|
| Junction Temperature To Maintain 1 Million Hour MTTF | 135 °C |
| Nominal Junction Temperature (T = +85 °C) | 105 °C |
| Thermal Resistance (junction to ground paddle) | 70 °C/W |
| Operating Temperature | -40 to +85 °C |

Typical Supply Current vs. Vcc, +25C, Band 1

| Vcc (V) | Icc (mA) |
|---------|----------|
| 4.50 | 35 |
| 4.75 | 40 |
| 5.00 | 45 |

Typical Supply Current vs. Vcc, +25C, Band 2

| Vcc (V) | Icc (mA) |
|---------|----------|
| 4.50 | 36 |
| 4.75 | 42 |
| 5.00 | 46 |

Typical Supply Current vs. Vcc, +25C, Band 3

| Vcc (V) | Icc (mA) |
|---------|----------|
| 4.50 | 39 |
| 4.75 | 45 |
| 5.00 | 50 |

Typical Supply Current vs. Vcc, +25C, Band 4


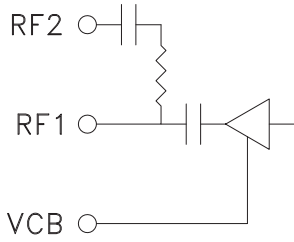
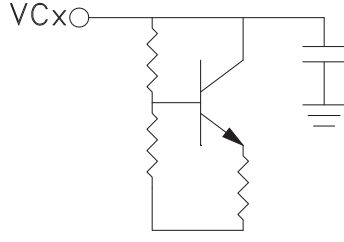
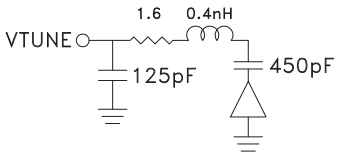
| Vcc (V) | Icc (mA) |
|---------|----------|
| 4.50 | 45 |
| 4.75 | 51 |
| 5.00 | 58 |



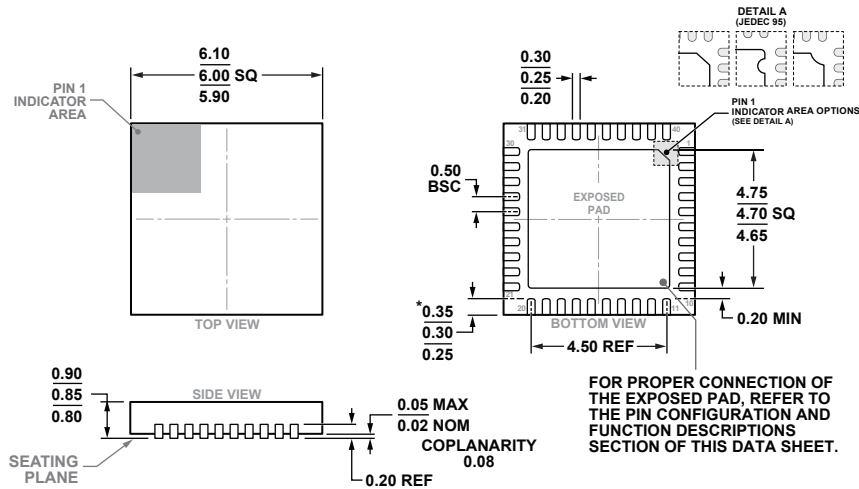
ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS



Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|-----------------------------------|----------|---|---|
| 1, 7, 9 - 21, 30 - 40 | N/C | No Connection. These pins may be connected to RF/DC ground. Performance will not be affected. | |
| 2, 4, 6, 24, 26, 28, Paddle | GND | Package bottom has an exposed metal paddle that must be connected to RF/DC ground. |  |
| 3 | RF2 | Coupled Low Power RF Output (AC coupled). |  |
| 5 | RF1 | Primary RF Output (AC coupled). | |
| 8 | VCB | Buffer Supply Voltage, +4.75V | |
| 22 | VC4 | Supply Voltage, BAND 4, +4.75V |  |
| 23 | VC3 | Supply Voltage, BAND 3, +4.75V | |
| 25 | VC2 | Supply Voltage, BAND 2, +4.75V | |
| 29 | VC1 | Supply Voltage, BAND 1, +4.75V | |
| 27 | VTUNE | Control Voltage Input. Modulation port bandwidth dependent on drive source impedance. |  |

Outline Drawing



FOR PROPER CONNECTION OF THE EXPOSED PAD, REFER TO THE PIN CONFIGURATION AND FUNCTION DESCRIPTIONS SECTION OF THIS DATA SHEET.

*COMPLIANT TO JEDEC STANDARDS MO-220-VJJD-5 WITH EXCEPTION TO LEAD LENGTH

40-Lead Lead Frame Chip Scale Package [LFCSP]
6 mm x 6 mm Body and 0.85 mm Package Height
(HCP-40-1)
Dimensions shown in millimeters

Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[2] |
|----------------|--|---------------|---------------------|--------------------------------|
| HMC8074LP6GE | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL3 ^[1] | H8074 XXXX |
| HMC8074LP6GETR | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL3 ^[1] | H8074 XXXX |

[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

**NOTES:**

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