MAXIM

45MHz to 650MHz, Integrated IF VCOs with Differential Output

MAX2605–MAX2609

General Description

The MAX2605–MAX2609 are compact, high-performance intermediate-frequency (IF) voltage-controlled oscillators (VCOs) designed specifically for demanding portable wireless communication systems. They combine monolithic construction with low-noise, low-power operation in a tiny 6-pin SOT23 package.

These low-noise VCOs feature an on-chip varactor and feedback capacitors that eliminate the need for external tuning elements, making the MAX2605–MAX2609 ideal for portable systems. Only an external inductor is required to set the oscillation frequency. In addition, an integrated differential output buffer is provided for driving a mixer or prescaler. The buffer output is capable of supplying up to -8dBm (differential) with a simple power match. It also provides isolation from load impedance variations.

The MAX2605–MAX2609 operate from a single +2.7V to +5.5V supply and offer low current consumption. These IF oscillators can cover the 45MHz to 650MHz frequency range.

Applications

Cellular and PCS Mobile Phones

2.4GHz ISM Band

902MHz to 928MHz ISM Band

Land Mobile Radio

GPS Receivers

General-Purpose IF Oscillators

Features

♦ **Small Size**

♦ **Integrated Varactor for Tuning**

♦ **Low Phase Noise**

♦ **Wide Application Frequency Range**

♦ **Differential or Single-Ended Outputs**

♦ **Single +2.7V to +5.5V Supply**

♦ **Ultra-Small SOT23-6 Package**

♦ **On-Chip Temperature-Stable Bias**

♦ **Low-Current Operation**

Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE	TOP MARK
MAX2605EUT-T	-40°C to +85°C	6 SOT23-6	AABB
MAX2606EUT-T	-40°C to +85°C	6 SOT23-6	AABC
MAX2607EUT-T	-40°C to +85°C	6 SOT23-6	AABD
MAX2608EUT-T	-40°C to +85°C	6 SOT23-6	AABE
MAX2609EUT-T	-40°C to +85°C	6 SOT23-6	AABF

Selector Guide

PART	FREQUENCY RANGE (MHz)	SUPPLY CURRENT (mA)	PHASE NOISE (dBc/Hz)
MAX2605	45 to 70	1.9	-117
MAX2606	70 to 150	2.1	-112
MAX2607	150 to 300	2.1	-107
MAX2608	300 to 500	2.7	-100
MAX2609	500 to 650	3.6	-93

Pin Configuration/Functional Diagram

SOT23-6

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_____ *Maxim Integrated Products* **1**

MAX2605–MAX2609
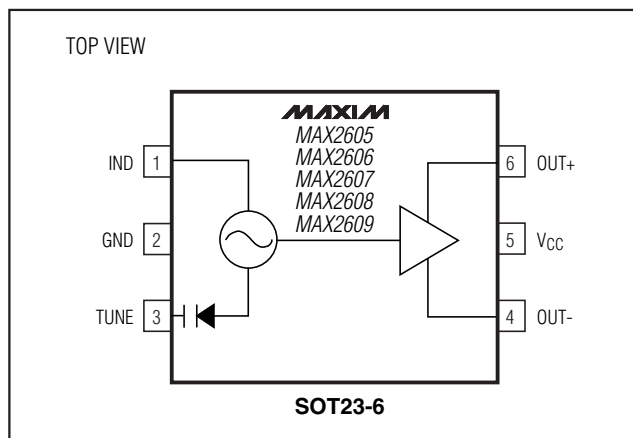
ABSOLUTE MAXIMUM RATINGS

V_{CC} to GND ....-0.3V to +6V
IND to GND ....-0.6V to (V_{CC} + 0.3V)
TUNE to GND ....-0.3V to (V_{CC} + 0.3V)
OUT+, OUT- to GND ....-0.3V to (V_{CC} + 0.6V)
Continuous Power Dissipation (T_A = +85°C)
  6-Pin SOT23 (derate 8.7mW/°C above +70°C) 696mW

Operating Temperature Range ....-40°C to +85°C
Junction Temperature ....+150°C
Storage Temperature Range ....-65°C to +150°C
Lead Temperature (soldering, 10s) ....+300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

(V_{CC} = +2.7V to +5.5V, V_{TUNE} = 0.4V to 2.4V, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at V_{CC} = +2.75V, V_{TUNE} = 1.5V, and T_A = +25°C.) (Note1)

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Supply Voltage			2.7		5.5	V
Supply Current (Note 2)	MAX2605	T_A = +25°C		1.9	2.6	
		T_A = -40°C to +85°C			2.8	
	MAX2606	T_A = +25°C		2.1	2.7	
		T_A = -40°C to +85°C			3.0	
	MAX2607	T_A = +25°C		2.1	3.2	
		T_A = -40°C to +85°C			3.5	mA
	MAX2608	T_A = +25°C		2.7	4.4	
		T_A = -40°C to +85°C			5.5	
	MAX2609	T_A = +25°C		3.6	6.8	
		T_A = -40°C to +85°C			7.5	
DC Output Current (Note 3)	OUT+ plus OUT-		0.5	1.0	1.5	mA
TUNE Input Current				0.03		nA

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AC ELECTRICAL CHARACTERISTICS

(MAX2605–MAX2609 EV kits, V_{CC} = +2.7V to +5.5V, V_{TUNE} = 0.4V to 2.4V, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at V_{CC} = +2.75V, V_{TUNE} = 1.5V, and T_A = +25°C.) (Note 1)

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Oscillator Nominal Frequency Range (Note 4)	MAX2605		45		70	MHz
	MAX2606		70		150	
	MAX2607		150		300	
	MAX2608		300		500	
	MAX2609		500		650	
Guaranteed Frequency Limits (relative to nominal) (Note 5)	MAX2605	T_A = +25°C	-4.1		+3.2	%
		T_A = -40°C to +85°C	-2.25		+2.25	
	MAX2606	T_A = +25°C	-4.4		+3.4	
		T_A = -40°C to +85°C	-2.5		+2.5	
	MAX2607	T_A = +25°C	-4.6		+3.6	
		T_A = -40°C to +85°C	-2.75		+2.75	
	MAX2608	T_A = +25°C	-4.7		+3.6	
		T_A = -40°C to +85°C	-2.8		+2.8	
	MAX2609	T_A = +25°C	-5.0		+3.8	
		T_A = -40°C to +85°C	-3.0		+3.0	
Peak Tuning Gain	V_{TUNE} = 0.4V to 0.6V step (Note 6)			14.5		%/V
Single-Ended Output Power (Note 7)				-10		dBm
Phase Noise (Note 8)	f_{OFFSET} = 100kHz	MAX2605, $Q_L \geq 35$		-117		dBc/Hz
		MAX2606, $Q_L \geq 35$		-112		
		MAX2607, $Q_L \geq 35$		-107		
		MAX2608, $Q_L \geq 40$		-100		
		MAX2609, $Q_L \geq 40$		-93		

MAX2605–MAX2609

AC ELECTRICAL CHARACTERISTICS (continued)

(MAX2605–MAX2609 EV kits, V_{CC} = +2.7V to +5.5V, V_{TUNE} = 0.4V to 2.4V, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at V_{CC} = +2.75V, V_{TUNE} = 1.5V, and T_A = +25°C.) (Note 1)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Even-Order Harmonics	Differential, R_L = 50Ω each side		-30		dBc
Supply Pushing (Note 9)	MAX2605		60		kHz/V
	MAX2606		120		
	MAX2607		220		
	MAX2608		480		
	MAX2609		720		

Note 1: Production tested at T_A = +25°C. Maximum and minimum over temperature limits are guaranteed by design and characterization.

Note 2: Supply current is measured while the part is oscillating and inductor Q ≥ Q_{MIN}. For MAX2605/MAX2606/MAX2607, Q_{MIN} = 35; for MAX2608/MAX2609, Q_{MIN} = 40.

Note 3: The DC output current is the total available output signal current.

Note 4: Application range of the part is achieved using external inductance as specified in Figures 1-5 and shown in Figure 6. The internal varactors support center frequencies of 45MHz to 650MHz. The center frequency is defined by the value of the external inductor element, L_F. The application frequency limits are guaranteed by design and characterization.

Note 5: The guaranteed (tested) limits f_{MIN} and f_{MAX} are measured at V_{TUNE} = 0.4V and V_{TUNE} = 2.4V, respectively. Passing requirements are: $f ≤ f_{MIN}$ at V_{TUNE} = 0.4 and $f ≥ f_{MAX}$ at V_{TUNE} = 2.4V. The nominal frequency of oscillation is defined by the inductor.

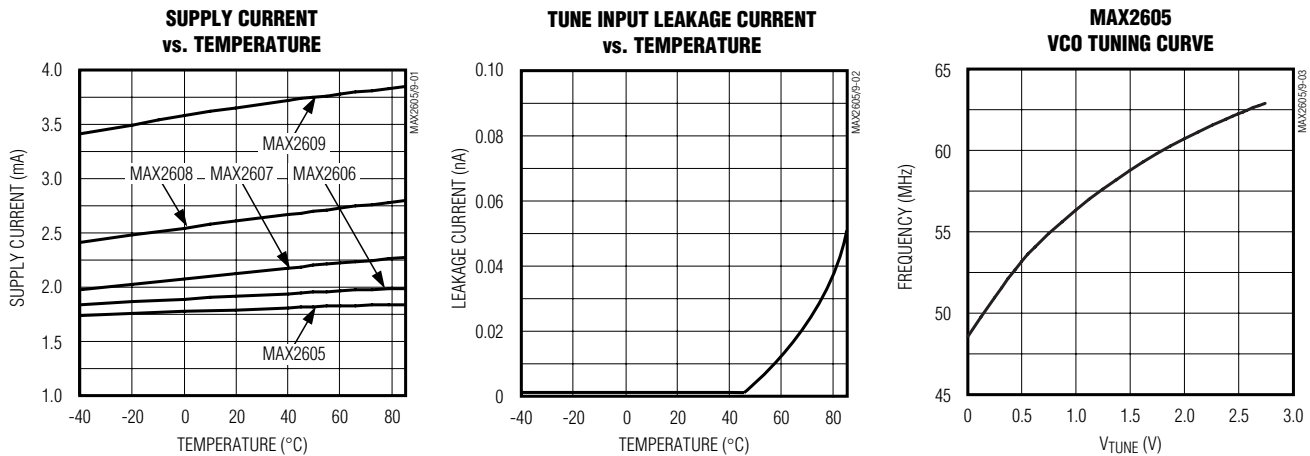**Note 6:** Describes peak tuning gain, which occurs at V_{TUNE} = 0.4V.

Note 7: Measurement at OUT+ or OUT- matched for optimum power transfer into 50Ω load near the center of the operating frequency range.

Note 8: The phase-noise specifications listed apply to the typical operating circuit shown in Figure 6. Apply over the entire operating frequency range of the MAX2605–MAX2609.

Note 9: Supply pushing is measured with V_{CC} stepped from +2.7V to +3.2V.
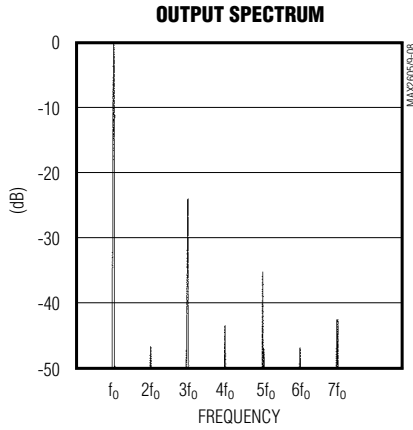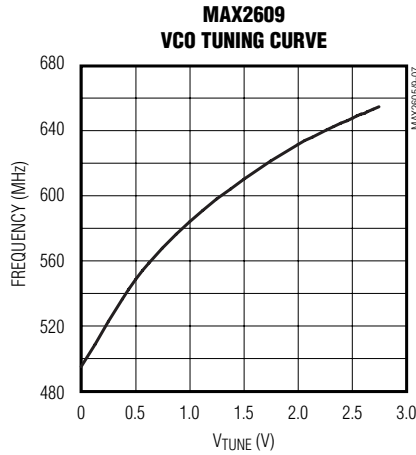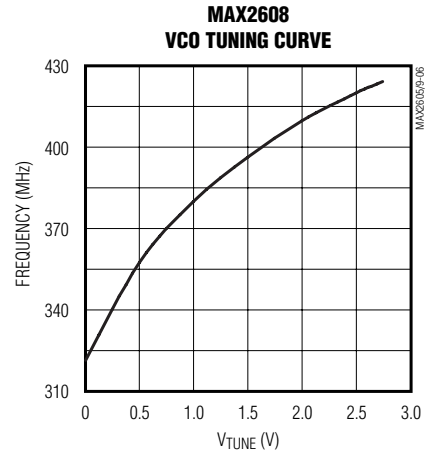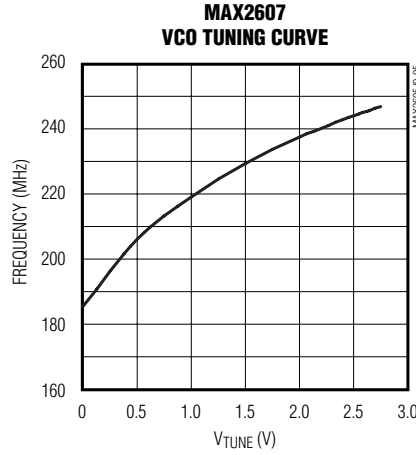
_____**Typical Operating Characteristics**

(MAX260_ EV kit, V_{CC} = +2.75V, V_{TUNE} = 1.4V, T_A = +25°C, unless otherwise noted.)

SUPPLY CURRENT vs. TEMPERATURE

TUNE INPUT LEAKAGE CURRENT vs. TEMPERATURE

MAX2605 VCO TUNING CURVE

MAXIM

MAX2605–MAX2609

(MAX260_ EV kit, V_{CC} = +2.75V, V_{TUNE} = 1.4V, T_A = +25°C, unless otherwise noted.)

MAX2606 VCO TUNING CURVE

MAX2607 VCO TUNING CURVE

MAX2608 VCO TUNING CURVE

MAX2609 VCO TUNING CURVE

OUTPUT SPECTRUM
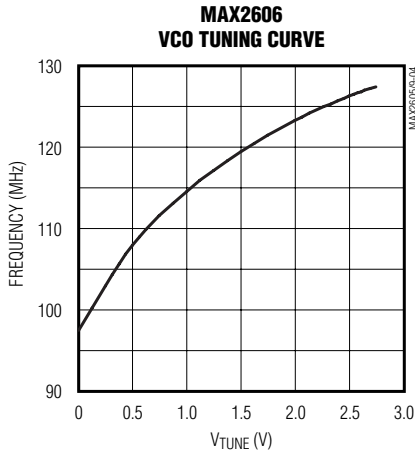
Pin Description

PIN	NAME	FUNCTION
1	IND	Tuning Inductor Port. Connect an inductor from IND to GND to set VCO center frequency (see *Oscillation Frequency*).
2	GND	Ground. Connect to the ground plane with a low-inductance path.
3	TUNE	Voltage-Control Input for Frequency Tuning. Input voltage range from +0.4V to +2.4V.
4	OUT-	High-Impedance Open-Collector Output. An external pull-up resistor or inductor to V_{CC} is required. Output power is dependent on external load impedance. OUT- is complementary to OUT+.
5	V_{CC}	Supply Voltage Connection. Connect an external bypass capacitor to ground for low noise and low spurious-output content. See *Layout Issues* for more details.
6	OUT+	High-Impedance Open-Collector Output. An external pull-up resistor or inductor to V_{CC} is required. Output power is dependent on external load impedance. OUT+ is complementary to OUT-.

MAXIM

45MHz to 650MHz, Integrated IF VCOs with Differential Output

_____Detailed Description

The MAX2605–MAX2609 are low-noise VCOs designed for fixed/single-frequency IF applications. The core oscillator circuit is based on the well-known Colpitts topology. The varactor and feedback capacitors are integrated on-chip so that only an external inductor is required to establish the frequency of oscillation and produce a properly operating VCO. The tuning range, biasing, startup, etc., are all managed within the IC. This highly integrated design dramatically simplifies the parts' application.

The tuning range is wide enough so that, with the use of ±2% tolerance inductors, no board-level adjustments to the oscillation frequency are necessary. Once the correct inductor value is chosen, the VCO is guaranteed always to tune to the desired operating frequency. In addition, with the use of inductors of moderate Q (35 to 40), the VCO achieves excellent phase-noise performance.

_____Applications Information

Desired Oscillation Frequency

The desired VCO operating frequency is set by the value of the external inductance, L_F. Figures 1–5 show the inductance value L_F required to achieve the desired oscillation frequency. The inductor value can be taken directly from these figures. Inductance must be selected accurately to ensure proper operation over all conditions.

Inductor Implementation

The inductance value required for the desired operating frequency may not necessarily coincide with a standard-value SMT inductor, which typically increases size in ~1.2x steps. In such cases, the inductance must be constructed from two inductors, L_{F1} and L_{F2}, in order to achieve the desired inductance value. Choose L_{F1} to be a standard-value inductor with a value just less than

that required for L_F. Choose L_{F2} to be a standard-value inductor with a value just less than (L_F - L_{F1}). L_{F1} should adhere to the minimum Q requirements, but L_{F2} may be implemented as a lower-cost, lower-Q, thin-film SMT inductor. Its lower Q has only a small impact on the overall Q of the total inductance because it is <20% of the total inductance. However, the overall Q of L_{F1} and L_{F2} must be greater than the minimum inductor Q (Table 1).

It is also permissible to use PC board traces to provide a small amount of inductance, thereby adjusting the total inductance value. On the MAX2608/MAX2609, the inductance values for L_{F2} are sometimes more exactly implemented as a PC board trace (shorted to GND), rather than an SMT inductor. When designing L_F with two inductors, use the simple model in Figure 7 to calculate X_L and L_{EQ}.

The L_F in Figures 1–5 represents an equivalent inductance as seen by pin 1 (IND). The equivalent inductance corresponds to the inductive reactance connected to IND at the desired oscillation frequency ($f_{NOMINAL}$).

$$L_{EQ} = X_L / (2\pi f_{NOMINAL}) \text{ as seen in Figure 8}$$

Design $L_{EQ} = L_F$ at the desired $f_{NOMINAL}$. The MAX2605–MAX2609 are designed to tolerate approximately 0.5pF of external parasitic capacitance at IND. This parasitic capacitance arises from the pad capacitance at the device pin and pads for the inductor. Additional shunt capacitance is not recommended because it degrades the tuning range.

Bypass Capacitor on TUNE

The MAX2605–MAX2609's oscillator design uses a variant of the Colpitts topology, where DC bias for the varactor is applied via a DC voltage on TUNE and a ground connection through the external inductor L_F. TUNE must also have a high-frequency AC ground for

Table 1. External Inductor L_F Range

PART	FREQUENCY RANGE (MHz)	INDUCTANCE RANGE (nH)	MIN INDUCTOR Q
MAX2605	45 to 70	680 ≤ L_F ≤ 2200	35
MAX2606	70 to 150	150 ≤ L_F ≤ 820	35
MAX2607	150 to 300	39 ≤ L_F ≤ 180	35
MAX2608	300 to 500	10 ≤ L_F ≤ 47	40
MAX2609	500 to 650	3.9 ≤ L_F ≤ 15	40

Table 2. C_{BYPASS} Values

DEVICE	C_{BYPASS}
MAX2605	≥ 820 pF
MAX2606	≥ 680 pF
MAX2607	≥ 330 pF
MAX2608	≥ 100 pF
MAX2609	≥ 39 pF

MAXIM

MAX2605–MAX2609

MAX2605
REQUIRED INDUCTANCE vs. DESIRED VCO FIXED FREQUENCY

MEASUREMENT CONDITIONS
V_{CC} = 2.75V, T_A = 25°C,
R_{LOAD} = 100Ω||50Ω (100Ω RESISTIVE PULL-UP PARALLELED WITH 50Ω
VNA IMPEDANCE), UNUSED OUTPUT TERMINATED IN 50Ω,
PCB PARASITIC SHUNT CAPACITANCE (IND TO GND) = 0.45pF

THE INDUCTANCE LISTED IS THE PRECISE NOMINAL INDUCTANCE VALUE
REQUIRED FROM IND TO GND IN ORDER TO GUARANTEE THE VCO
CAN TUNE TO THE DESIRED FIXED FREQUENCY, OVER ALL OPERATING
CONDITIONS AND WORST-CASE COMPONENT
VALUES (±2% INDUCTOR AND IC PROCESS VARIATION).

EFFECTIVE INDUCTANCE
FROM IND TO GND

INDUCTOR VALUE
MOUNTED ON EV KIT

REQUIRED INDUCTANCE (nH)

DESIRED VCO FIXED FREQUENCY (MHz)

Figure 1. MAX2605 Required Inductance vs. Desired VCO Fixed Frequency

/MAXIM _____ 7

MAX2605
REQUIRED INDUCTANCE vs. DESIRED VCO FIXED FREQUENCY

MEASUREMENT CONDITIONS
V_{CC} = 2.75V, T_A = 25°C,
R_{LOAD} = 100Ω∥50Ω (100Ω RESISTIVE PULL-UP PARALLELED WITH 50Ω
VNA IMPEDANCE), UNUSED OUTPUT TERMINATED IN 50Ω,
PCB PARASITIC SHUNT CAPACITANCE (IND TO GND) = 0.45pF

THE INDUCTANCE LISTED IS THE PRECISE NOMINAL INDUCTANCE VALUE
REQUIRED FROM IND TO GND IN ORDER TO GUARANTEE THE VCO
CAN TUNE TO THE DESIRED FIXED FREQUENCY, OVER ALL OPERATING
CONDITIONS AND WORST-CASE COMPONENT
VALUES (±2% INDUCTOR AND IC PROCESS VARIATION).

EFFECTIVE INDUCTANCE
FROM IND TO GND

INDUCTOR VALUE
MOUNTED ON EV KIT

REQUIRED INDUCTANCE (nH)

DESIRED VCO FIXED FREQUENCY (MHz)

Figure 2. MAX2606 Required Inductance vs. Desired VCO Fixed Frequency

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MAX2607
REQUIRED INDUCTANCE vs. DESIRED VCO FIXED FREQUENCY
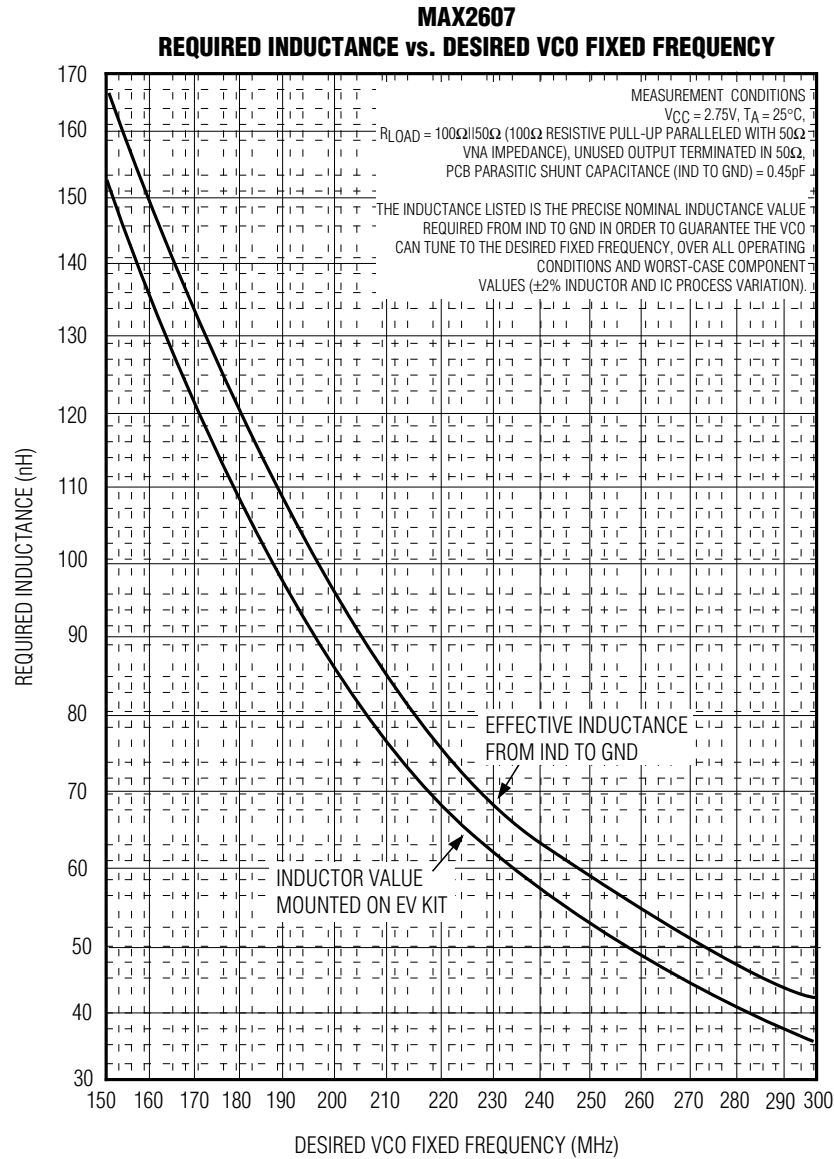
Figure 3. MAX2607 Required Inductance vs. Desired VCO Fixed Frequency

MAX2605–MAX2609

MAX2608
REQUIRED INDUCTANCE vs. DESIRED VCO FIXED FREQUENCY

MEASUREMENT CONDITIONS
V_{CC} = 2.75V, T_A = 25°C,
R_{LOAD} = 100Ω‖50Ω (100Ω RESISTIVE PULL-UP PARALLELED WITH 50Ω
VNA IMPEDANCE), UNUSED OUTPUT TERMINATED IN 50Ω,
PCB PARASITIC SHUNT CAPACITANCE (IND TO GND) = 0.45pF

THE INDUCTANCE LISTED IS THE PRECISE NOMINAL INDUCTANCE VALUE
REQUIRED FROM IND TO GND IN ORDER TO GUARANTEE THE VCO
CAN TUNE TO THE DESIRED FIXED FREQUENCY, OVER ALL OPERATING
CONDITIONS AND WORST-CASE COMPONENT
VALUES (±2% INDUCTOR AND IC PROCESS VARIATION).

EFFECTIVE INDUCTANCE
FROM IND TO GND

INDUCTOR VALUE
MOUNTED ON EV KIT

REQUIRED INDUCTANCE (nH)

Figure 4. MAX2608 Required Inductance vs. Desired VCO Fixed Frequency

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MAX2605–MAX2609

MAX2609
REQUIRED INDUCTANCE vs. DESIRED VCO FIXED FREQUENCY

MEASUREMENT CONDITIONS
V_{CC} = 2.75V, T_A = 25°C,
R_{LOAD} = 100Ω||50Ω (100Ω RESISTIVE PULL-UP PARALLELED WITH 50Ω VNA IMPEDANCE), UNUSED OUTPUT TERMINATED IN 50Ω,
PCB PARASITIC SHUNT CAPACITANCE (IND TO GND) = 0.45pF

THE INDUCTANCE LISTED IS THE PRECISE NOMINAL INDUCTANCE VALUE REQUIRED FROM IND TO GND IN ORDER TO GUARANTEE THE VCO CAN TUNE TO THE DESIRED FIXED FREQUENCY, OVER ALL OPERATING CONDITIONS AND WORST-CASE COMPONENT VALUES (±2% INDUCTOR AND IC PROCESS VARIATION).

EFFECTIVE INDUCTANCE FROM IND TO GND

INDUCTOR VALUE MOUNTED ON EV KIT

REQUIRED INDUCTANCE (nH)

DESIRED VCO FIXED FREQUENCY (MHz)

Figure 5. MAX2609 Required Inductance vs. Desired VCO Fixed Frequency

MAXIM

MAX2605–MAX2609

the cathode of the varactor. This is accomplished through the use of a simple bypass capacitor connected from TUNE to ground. The value of this capacitor should be greater than or equal to the values listed in Table 2.

This capacitor provides an AC "short" to ground for the internal node of the varactor. It is acceptable to select the next-largest standard-value capacitor. Use a capacitor with a low-loss dielectric such as NPO; X7R-based capacitors are **not** suitable. Omitting this capacitor would affect the tuning characteristics of the MAX2605–MAX2609. Proper operation of the VCOs requires the use of this bypass capacitor.

The MAX2605–MAX2609 VCO is designed to tune over the full tuning range with a voltage range of 0.4V to 2.4V applied to TUNE. This voltage typically originates from the output of the phase-locked (PLL) loop filter.

Output Interface
The MAX2605–MAX2609 VCO includes a differential output amplifier after the oscillator core. The amplifier stage provides valuable isolation and offers a flexible interface to the IF stages, such as a mixer and PLL prescaler. The output can be taken single ended or differentially; however, the maximum output power and lowest harmonic output are achieved in the differential output mode.

Both outputs (OUT- and OUT+) are open-collector types and require a pull-up element to V_{CC}; this can be either resistive or inductive. A resistor pull-up is the most straightforward method of interfacing to the output, and works well in applications that operate at lower frequencies or only require a modest voltage swing.

In Figure 6, Z1 and Z2 are 1kΩ pull-up resistors that are connected from OUT+ and OUT- to V_{CC}, respectively. These resistors provide DC bias for the output amplifier and are the maximum value permitted with compliance to the output voltage swing limits. In addition, the 1kΩ resistors maximize the swing at the load. DC-blocking capacitors are connected from OUT- and OUT+ to the load. If the load driven is primarily resistive and the VCO operating frequency is below the -3dB bandwidth of the output network, then the peak-to-peak differential signal amplitude is approximately:

$$V_{OUTp-p}\left(diff\right) = 2 \times 1mA\left(\frac{1k\Omega \times R_{LOAD}}{1k\Omega + R_{LOAD}}\right)$$

To optimize the output voltage swing or the output power, use a reactive power match. The matching network is a simple shunt-inductor series-capacitor circuit, as shown in Figure 6. The inductors are connected from OUT- and OUT+ (in place of resistors) to V_{CC} to provide DC bias for the output stage. The series capacitors are connected from OUT- and OUT+ to the load. The values for L_{MATCH} (Z_1 and Z_2) and C_{MATCH} (C_1 and C_2) are chosen according to the operating frequency and load impedance. As the output stage is essentially a high-speed current switch, traditional linear impedance using techniques with [S] parameters do not apply. To achieve a reactive power match, start with the component values provided in the EV kit, and adjust values experimentally.

In general, the differential output may be applied in any manner, as would conventional differential outputs. The only constraints are the need for a pull-up element to V_{CC} and a voltage swing limit at the output pins OUT- and OUT+.

Layout Considerations
In general, a properly designed PC board is essential to any RF/microwave circuit or system. Always use controlled impedance lines (microstrip, coplanar waveguide, etc.) on high-frequency signals. Always place decoupling capacitors as close to the V_{CC} pin as possible. For low phase noise and spurious content, use an appropriate size decoupling capacitor. For long V_{CC} lines, it may be necessary to add additional decoupling capacitors located further from the device. Always provide a low-inductance path to ground. Keep the GND vias as close to the device as possible. In addition, the VCO should be placed as far away from the noisy section of a larger system, such as a switching regulator or digital circuits. Use star topology to separate the ground returns.

The resonator tank circuit (L_F) is critical in determining the VCO's performance. For best performance, use high-Q components and choose values carefully. To minimize the effects of parasitic elements, which degrade circuit performance, place L_F and C_{BYP} close to their respective pins. Specifically, place C_{BYP} directly across pins 2 (GND) and 3 (TUNE).

For the higher frequency versions, consider the extra parasitic inductance and capacitance when determining the oscillation frequency. Be sure to account for the following: PC board pad capacitance at IND, PC board pad capacitance at the junction of two series inductors, series inductance of any PC board traces, and the inductance in the ground return path from the grounded side of the inductor and IC's GND pin. For best results, connect the "ground" side to the tuning inductor as close to pin 2 as possible. In addition, remove the ground plane around and under L_F and C_{BYP} to minimize the effects of parasitic capacitance.
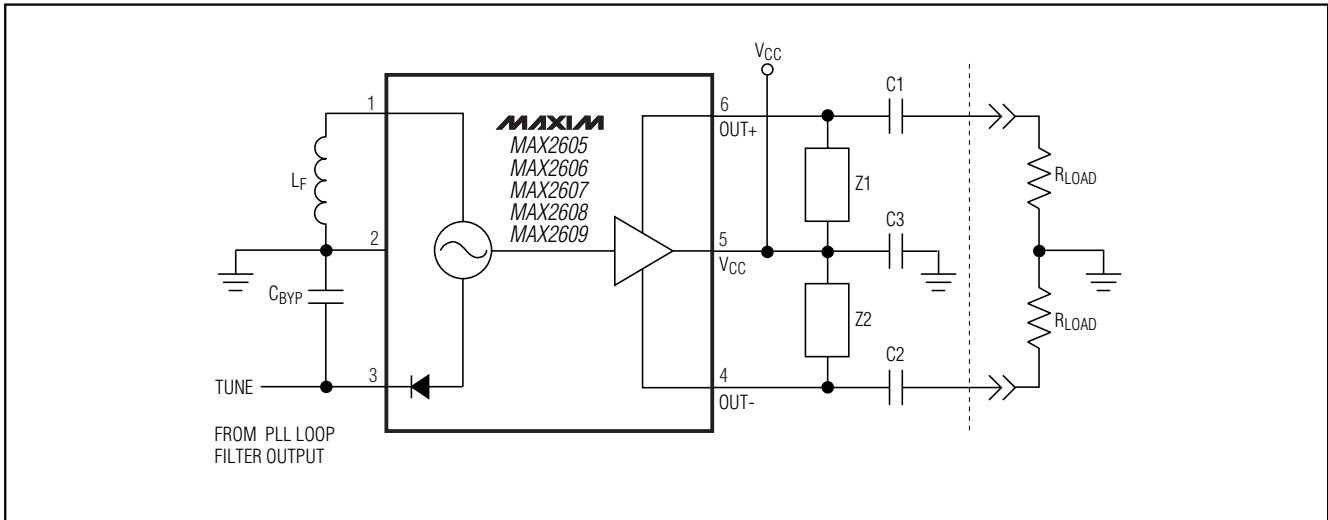
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Figure 6. Typical Operating Circuit

_____Chip Information

TRANSISTOR COUNT: 158

45MHz to 650MHz, Integrated IF
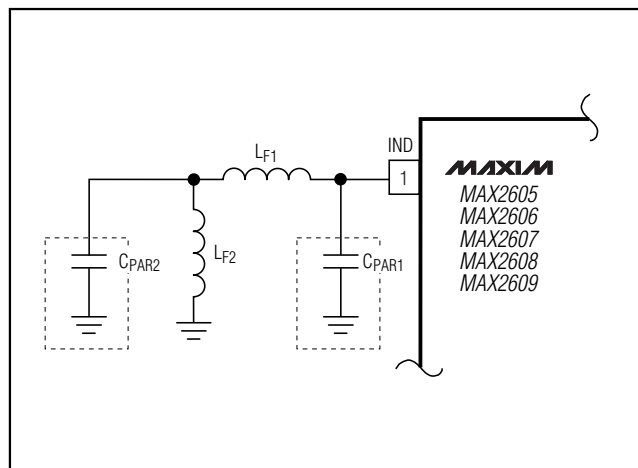# VCOs with Differential Output
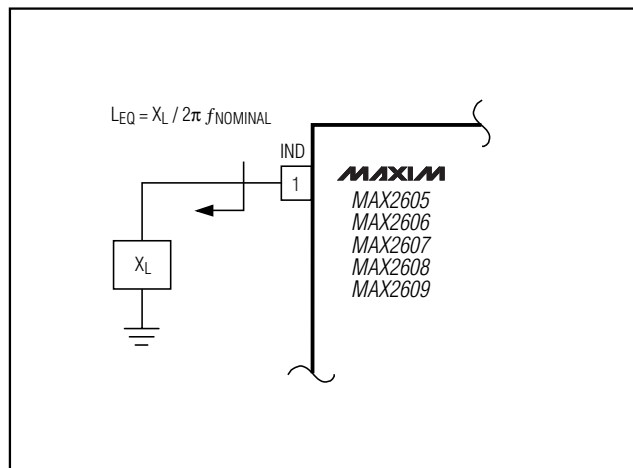

Figure 7. Simple Model of External Inductance
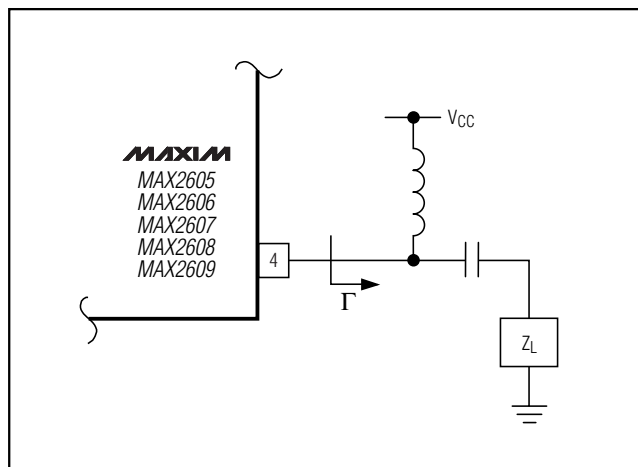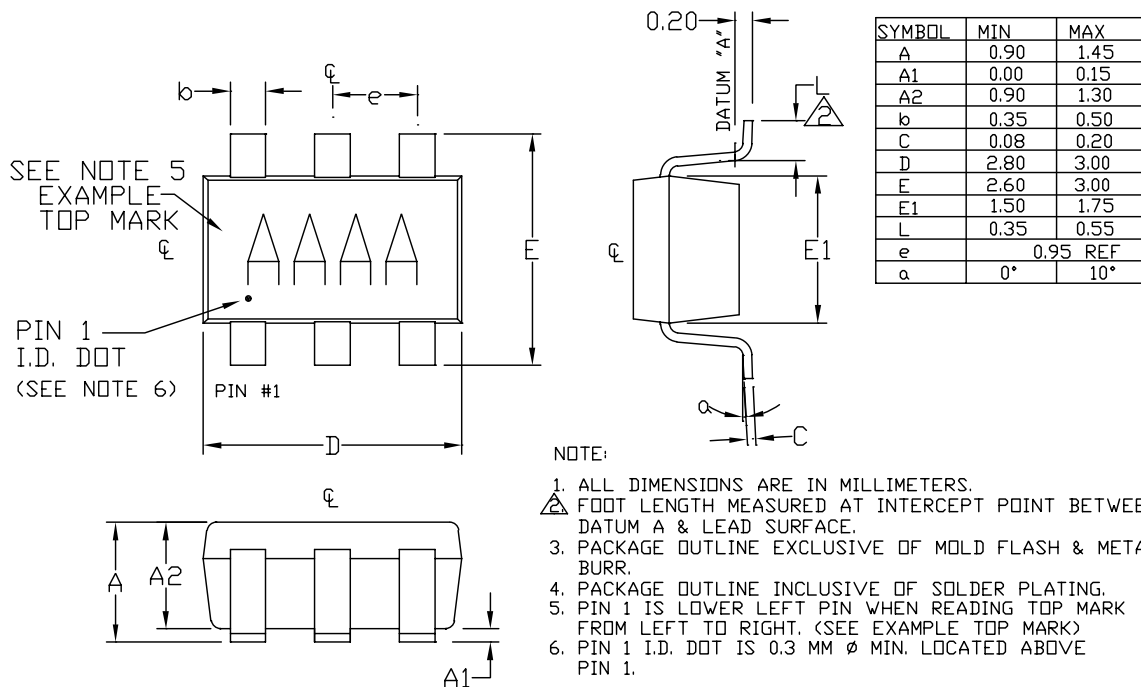

Figure 8. Inductive Reactance at Pin 1 (IND)

Figure 9. Output Matching Network

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Package Information

6LSOT.EPS

SYMBOL	MIN	MAX
A	0.90	1.45
A1	0.00	0.15
A2	0.90	1.30
b	0.35	0.50
C	0.08	0.20
D	2.80	3.00
E	2.60	3.00
E1	1.50	1.75
L	0.35	0.55
e	0.95 REF	
α	0°	10°

SEE NOTE 5
EXAMPLE
TOP MARK

PIN 1
I.D. DOT
(SEE NOTE 6)   PIN #1

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. FOOT LENGTH MEASURED AT INTERCEPT POINT BETWEEN DATUM A & LEAD SURFACE.
3. PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH & METAL BURR.
4. PACKAGE OUTLINE INCLUSIVE OF SOLDER PLATING.
5. PIN 1 IS LOWER LEFT PIN WHEN READING TOP MARK FROM LEFT TO RIGHT. (SEE EXAMPLE TOP MARK)
6. PIN 1 I.D. DOT IS 0.3 MM Ø MIN. LOCATED ABOVE PIN 1.

MAXIM
PROPRIETARY INFORMATION
TITLE:
PACKAGE OUTLINE, SOT23, 6L

APPROVAL	DOCUMENT CONTROL NO.	REV	
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