

### FEATURES

- WIDE BAND OPERATION UP TO 2.5 GHz
- INTERNAL BALANCED AMPLIFIER FOR VCO
- SINGLE ENDED PUSH-PULL IF AMPLIFIER
- 5 V SINGLE SUPPLY VOLTAGE:  
I<sub>CC</sub> = 30 to 35 mA
- LOW CURRENT DISSIPATION
- TAPE AND REEL PACKAGING OPTION AVAILABLE

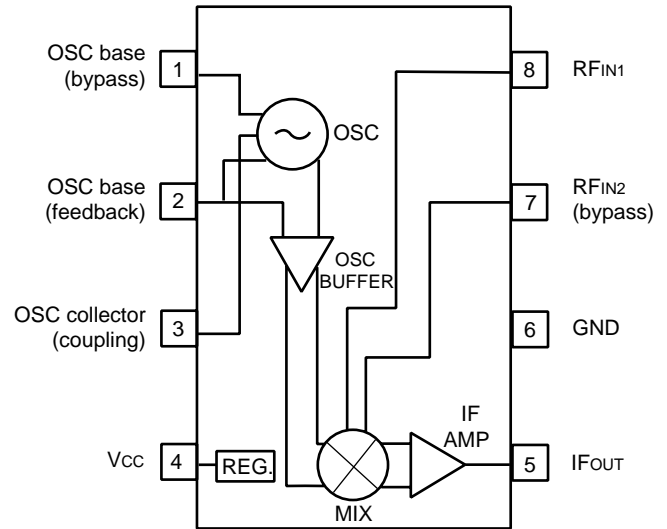
### DESCRIPTION

The UPC2721 and UPC2722 are L-Band frequency converters manufactured using the NESAT III MMIC process. These products consist of a double balanced mixer, local oscillator, IF preamplifier, and constant voltage generator. These devices are designed for low cost cellular radios, GPS receivers, PCS, and UHF TV tuner applications.

The UPC2721 output amplifier is a single-end push-pull amplifier designed for operation into a 50 Ω load. The UPC2722 output amplifier is the collector of one side of a balanced amplifier pair and operates best into a high impedance load. The absence of capacitive coupling in the UPC2722 permits better performance at IF frequencies below 25 MHz.

NEC's stringent quality assurance and test procedures ensure the highest reliability and performance.

### INTERNAL BLOCK DIAGRAM



### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, V<sub>CC</sub> = 5 V, P<sub>LO</sub> = -10 dBm)

PART NUMBER PACKAGE OUTLINE			UPC2721GR G08			UPC2722GR G08		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
I <sub>CC</sub>	Circuit Current	mA	29	38	45.5	19	28	37
f <sub>RF</sub>	RF Frequency Range	GHz	0.9		2.0	0.9		2.0
f <sub>IF</sub>	IF Frequency Range	MHz	50		600	DC		600
CG	Conversion Gain <sup>2</sup> f <sub>RF</sub> = 900 to 2000MHz, f <sub>IF</sub> = 50 to 400 MHz f <sub>IF</sub> = 400 to 400 MHz	dB dB dB	18	21 22 19.5	24	15	18 19 17	21
PSAT	Saturated Output Power <sup>2</sup> f <sub>RF</sub> = 800 to 2000 MHz, f <sub>IF</sub> = 400 MHz	dBm dBm	2	7 7		2	6 6	
NF	Noise Figure f <sub>RF</sub> = 900 MHz, f <sub>IF</sub> = 400 MHz, f <sub>RF</sub> = 2.0 GHz, f <sub>IF</sub> = 400 MHz	dB dB		9 11	13 15		9 11	13 15
IP <sub>3</sub>	SSB Third Order Intercept Point, f <sub>1</sub> = 900 MHz, f <sub>2</sub> = 938 MHz f <sub>1</sub> = 2.0 GHz, f <sub>2</sub> = 2.038 GHz	dBm dBm		+10 +8.5			+9 +8	

Notes:

1. Mounted on a 50 x 50 x 1.6 mm thick glass epoxy board with double sided copper.
2. Minimum and maximum specifications for CG and PSAT are measured at f<sub>RF</sub> = 900 MHz and 2.0 GHz and at f<sub>IF</sub> = 402.8 MHz.

# UPC2721GR, UPC2722GR,

## ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CC</sub>	Supply Voltage <sup>2</sup>	V	6
P <sub>T</sub>	Power Dissipation <sup>3</sup>	mW	250
T <sub>OP</sub>	Operating Temperature	°C	-40 to +85
T <sub>STG</sub>	Storage Temperature	°C	-65 to +150

### Notes:

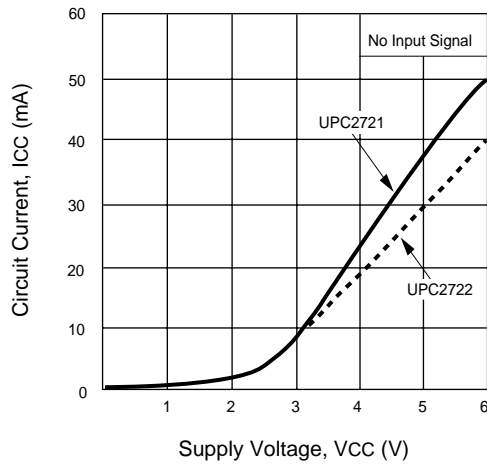
1. Operation in excess of any one of these parameters may result in permanent damage.
2. Recommended operating V<sub>CC</sub> range is 4.5 to 5.5 V max.
3. T<sub>A</sub> = +85°C mounted on a 50 x 50 x 1.6 mm thick glass epoxy board with double sided copper.

## PIN DESCRIPTIONS

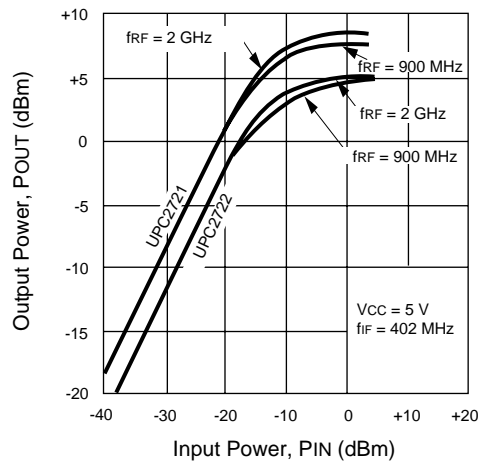
PIN NO.	SYMBOL	PIN VOLT TYP (V)	DESCRIPTION	EQUIVALENT CIRCUIT
1	OSC base (bypass)	2.9	Internal oscillator consists of a balance amplifier. Pin 2 and pin 3 should be externally equipped with a tank resonator circuit in order to oscillate with feedback loop.  Pin 1 should be grounded through coupling capacitor ~0.5 pF.  Pin 3 is an open collector. This pin should be coupled through resistor or choke coil in order to adjust Q and connect the supply voltage.	
2	OSC base (feedback)	2.9		
3	OSC collector (coupling)	5.0		
4	V <sub>CC</sub>	5.0	Supply voltage pin for the IC.	
5	IF Output	UPC2721 2.9	In the UPC2721 the amplifier is designed as single-ended push-pull amplifier. This pin is an emitter follower output with a wideband 50 Ω impedance.	UPC2721 
		UPC2722 5.0	In the UPC2722 the IF amplifier is designed as a balanced amplifier. This pin is an open collector output with high impedance dependent on external inductance.	UPC2722 
6	GND	0.0	GND pin for the IC.	
7	RF input2 (bypass)	2.4	Pin 7 and pin 8 are inputs to a double-balanced mixer. Either pin can be assigned for input or ground.	
8	RF input1	2.4		

TYPICAL PERFORMANCE CURVES (TA = 25°C)

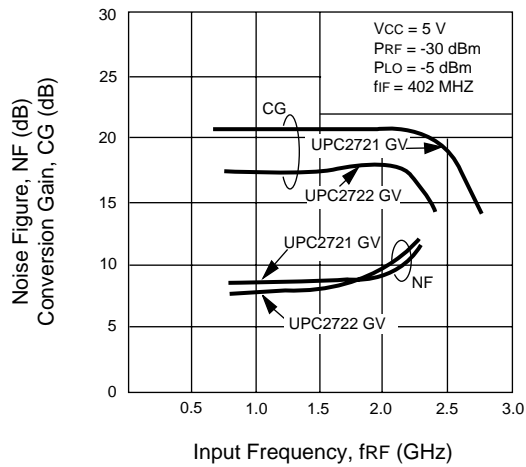
CIRCUIT CURRENT VS. SUPPLY VOLTAGE



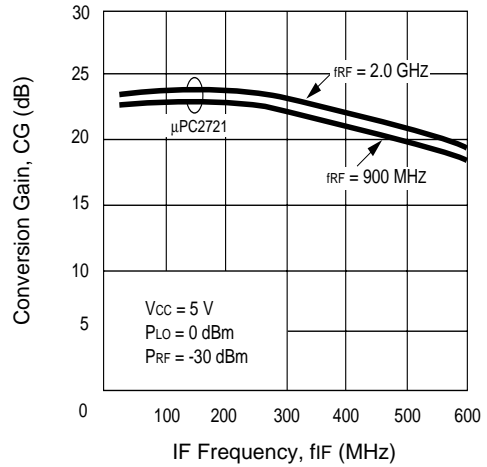
OUTPUT POWER VS. INPUT POWER



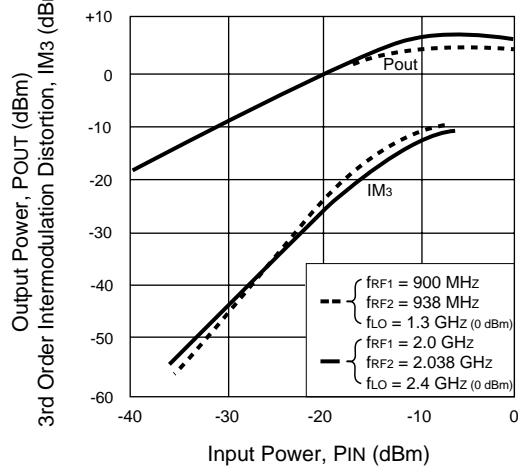
CONVERSION GAIN AND NOISE FIGURE vs. RF FREQUENCY



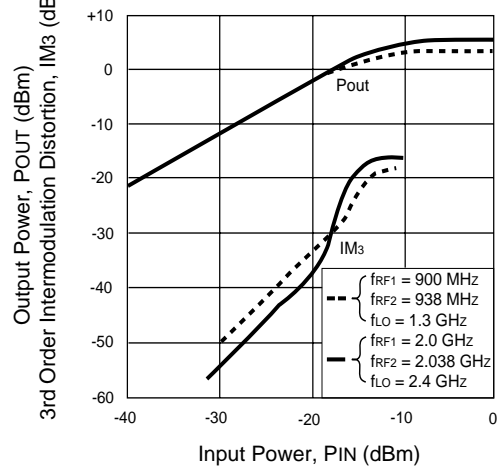
UPC2721 CONVERSION GAIN vs. IF FREQUENCY



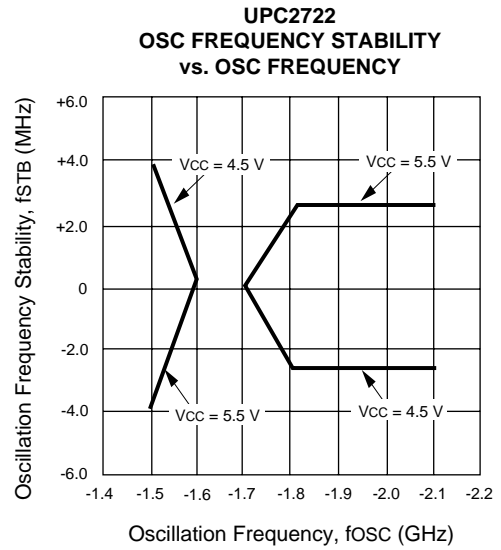
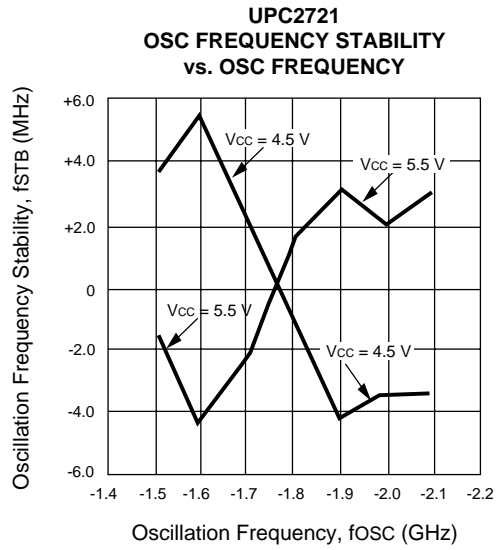
UPC2721 IM3 AND OUTPUT POWER vs. INPUT POWER



UPC2722 IM3 AND OUTPUT POWER vs. INPUT POWER

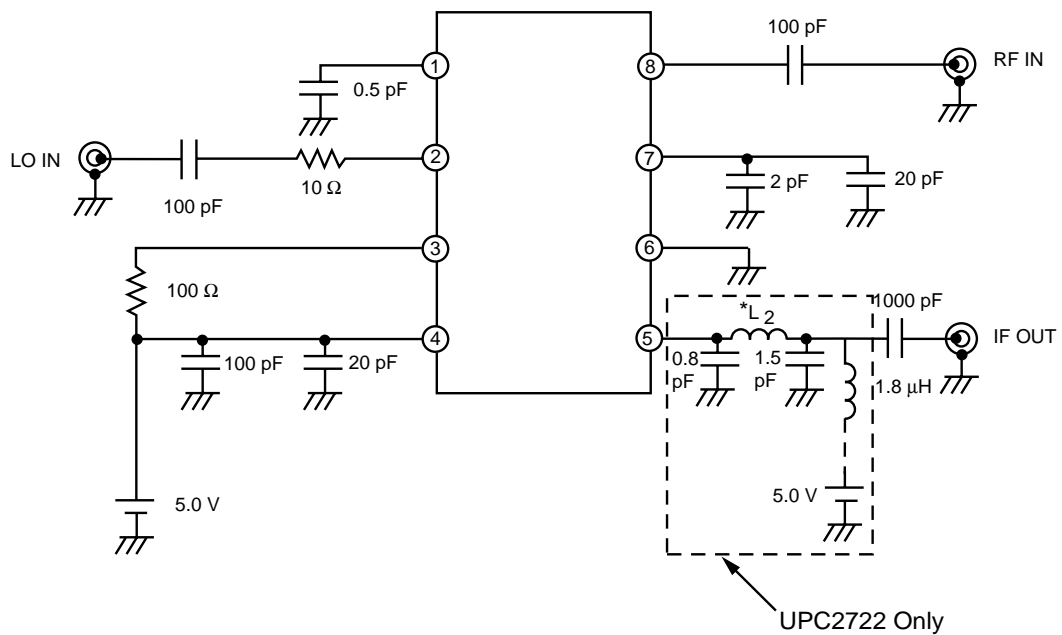


TYPICAL PERFORMANCE CURVES (TA = 25°C)



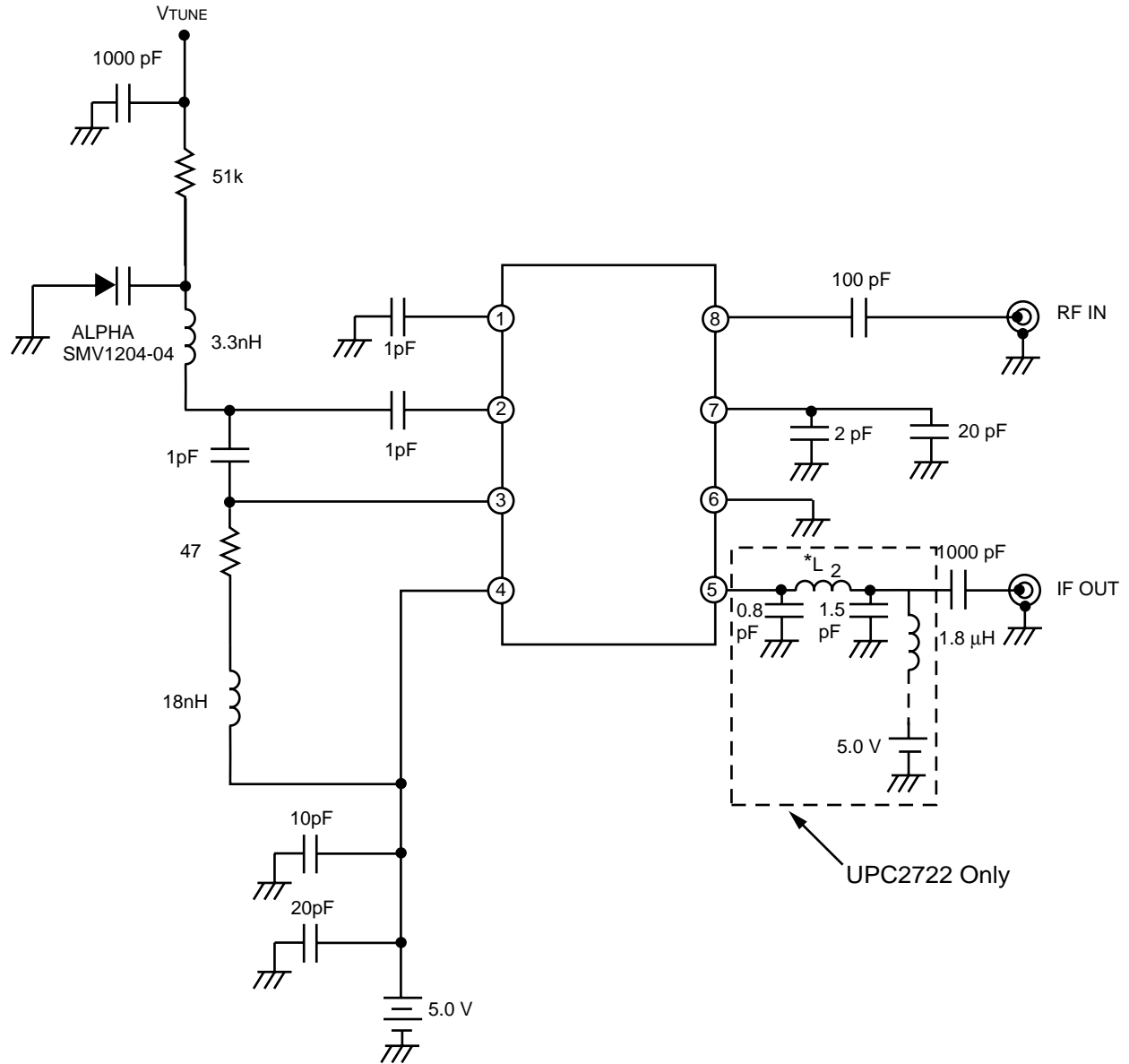
TEST CIRCUITS

External LO Test Circuit



\*L2 = 3 turn, 0.4 diameter wire; 4.0 mm coil inside diameter. (Approximately 37 nH)

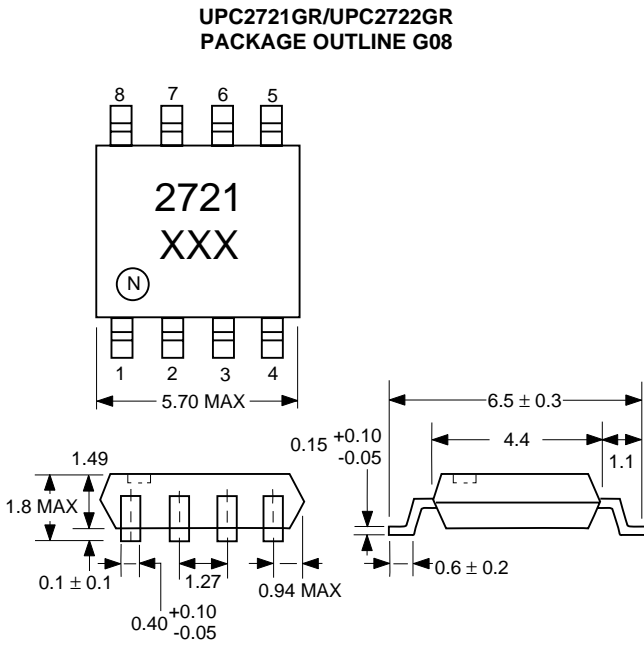
APPLICATION CIRCUIT



\*L2 = 3 turn, 0.4 diameter wire; 4.0 mm coil inside diameter. (Approximately 37 nH)

# UPC2721GR, GV, UPC2722GR, GV

## OUTLINE DIMENSIONS (Units in mm)



## ORDERING INFORMATION

PART NUMBER	QTY
UPC2721GR - E1	2500/Reel
UPC2722GR - E1	2500/Reel

### LEAD CONNECTIONS

1. OSC-Base (Bypass)
2. OSC-Base (Feed back)
3. OSC-Collector (Coupling)
4. Vcc
5. IF OUT
6. GND
7. RFIN2
8. RFIN1

Notes: Package will be marked as 2721 or 2722 as shown.  
All dimensions are typical unless otherwise specified.

**Lead Material: Alloy 42**  
**Lead Plating: Lead tin alloy**