

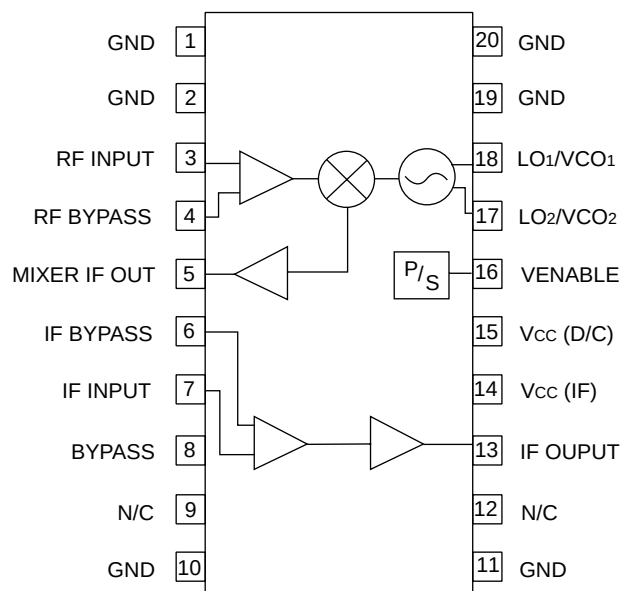
FEATURES

- **LOW POWER DISSIPATION**
 $V_{CC} = 3\text{ V}$, $I_{CC} = 7\text{ mA}$
- **HIGH CONVERSION GAIN**
80 dB
- **ON CHIP OSCILLATOR OR LO BUFFER:**
DC - 450 MHz
- **OUTPUT LIMITING**
450 mVp-p
- **BROADBAND OPERATION**
DC - 450 MHz
- **POWER SAVE FUNCTION**
 $I_{CC}(\text{ps}) = <100\text{ }\mu\text{A}$

DESCRIPTION

The UPC2768GR is a frequency converter manufactured with the NESAT III process. This product consists of an RF input amplifier, Gilbert cell mixer, Local Oscillator or LO buffer, IF amplifier, external filter port, and IF output limiting amplifier. The on-chip local oscillator only requires an external tank circuit. The power save feature enables users to minimize overall current consumption when dormant. This device was specifically designed for low-cost second IF receivers, key-less entry applications, security systems, GPS, and other low power Part 15 mobile radios.

INTERNAL BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS ($V_{CC} = 3.0\text{ V}$, $T_A = 25^\circ\text{C}$, $Z_L = Z_S = 50\text{ }\Omega$, $V_{ENABLE} \oplus 2.5\text{ V}$ unless otherwise specified)

PART NUMBER PACKAGE OUTLINE			UPC2768GR S20 (SSOP 20)			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	
I_{CC}	Circuit Current ($V_{ENABLE} \geq 2.5\text{ V}$) ⁴ ($V_{ENABLE} \leq 0.5\text{ V}$)	mA μA		7	100	
f_{RF}, f_{LO}	RF and LO Input Frequency Range (3 dB BW) ¹ , $f_{IF} = 10\text{ MHz}$	MHz	DC		450	
CG	Conversion Gain ² , $f_{RF} = 433\text{ MHz}$, $f_{IF} = 25\text{ MHz}$	dB	33	36	40	
NF	Noise Figure ² , $f_{RF} = 450\text{ MHz}$, $f_{IF} = 10\text{ MHz}$	dB		12		
Leak LO-RF	LO to RF Leakage ³ , $f_{LO} = 1\text{ to }450\text{ MHz}$	dBm		-62		
Leak LO-IF	LO to IF Leakage ³ , $f_{LO} = 1\text{ to }450\text{ MHz}$	dBm		-25		
G_S	IF Amplifier Small Signal Gain $f_{IF} = 10.7\text{ MHz}$ $f_{IF} = 25.0\text{ MHz}$	dB dB	40 38	44 42	47 45	
V_{OUT}	Limiting Output Voltage, $Z_L = 2\text{ K}\Omega$, $f_{IF} = 10\text{ MHz}$	mVp-p		450		
P_{SAT}	Saturated Output Power	dBm		-20		

Notes:

1. Max freq. range is -3 dB from conversion gain for $R_F = 50\text{ MHz}$
2. Down converter only (R_{FIN} to mixer I_{FOUT}).
3. $P_{LO} = -10\text{ dBm}$ external, or using internal LO.

4. Down converter and IF amp may be operated separately.
Typical I_{CC} for down converter is 5.5 mA (pin 15). Typical I_{CC} for IF amp is 1.4 mA (pin 14).

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

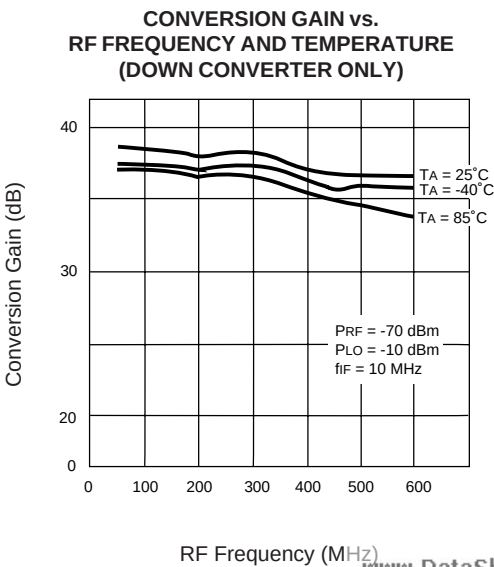
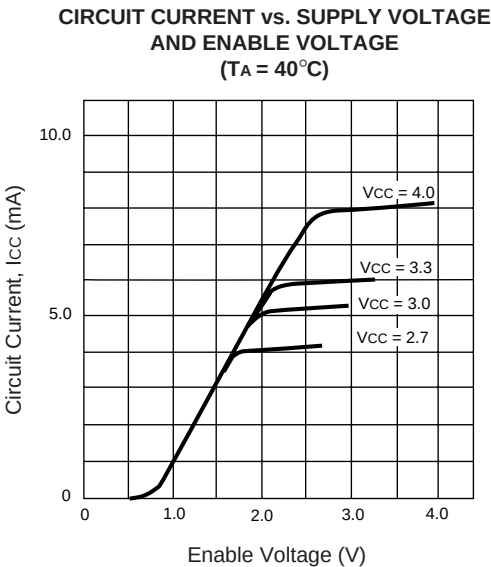
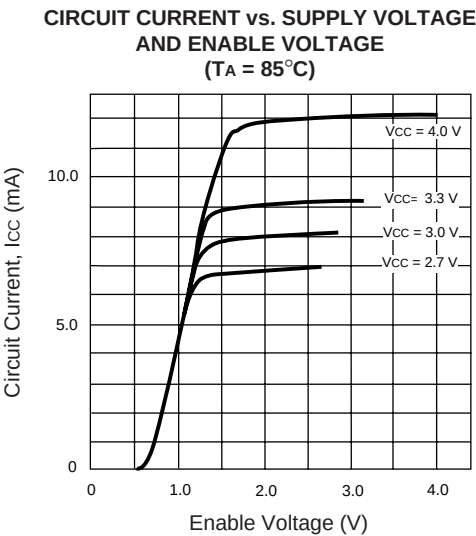
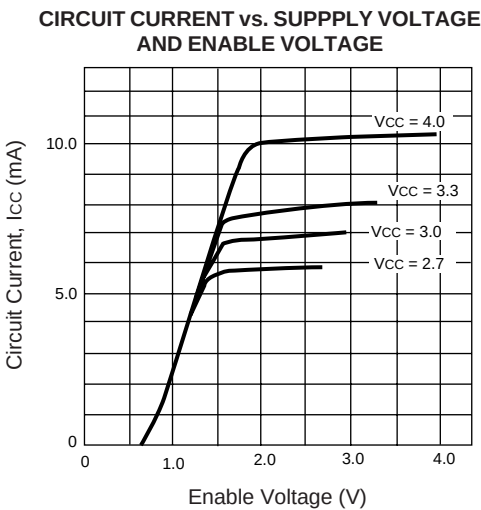
SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CC}	Supply Voltage	V	5
P _T	Power Dissipation ²	mW	433
T _{OP}	Operating Temperature	°C	-40 to +85
T _{STG}	Storage Temperature	°C	-55 to +150

- Note:
1. Operation in excess of any one of these parameters may result in permanent damage.
 2. Mounted on a 50x50x1.6 mm epoxy glass PWB (T_A = 85°C).

RECOMMENDED
OPERATING CONDITIONS

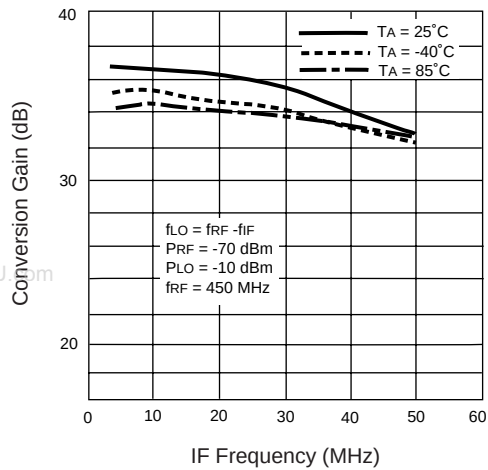
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V _{CC}	Supply Voltage	V	2.7	3.0	3.3
T _{OP}	Operating Temperature	°C	-40	25	85
f _{IF}	IF Frequency Range	MHz	DC		25

TYPICAL PERFORMANCE CURVES (T_A = 25°C, V_{CC} = 3.0 V, V_{ENABLE} ≥ 2.5 V unless otherwise specified)

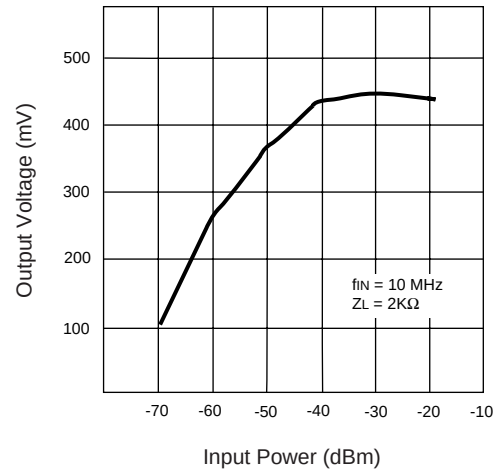


TYPICAL PERFORMANCE CURVES ($T_A = 25^\circ\text{C}$, $V_{CC} = 3.0\text{ V}$, $V_{\text{ENABLE}} \geq 2.5\text{ V}$ unless otherwise specified)

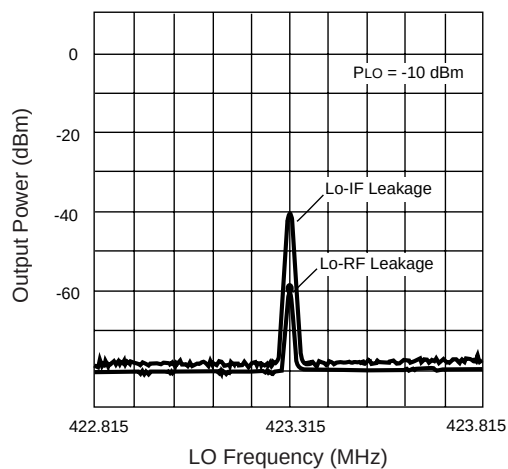
**CONVERSION GAIN VS.
IF FREQUENCY
(DOWNCONVERTER ONLY)**



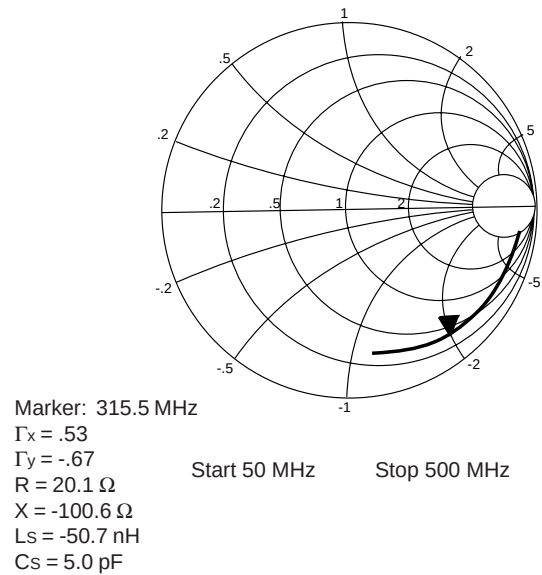
**OUTPUT VOLTAGE vs.
INPUT POWER**



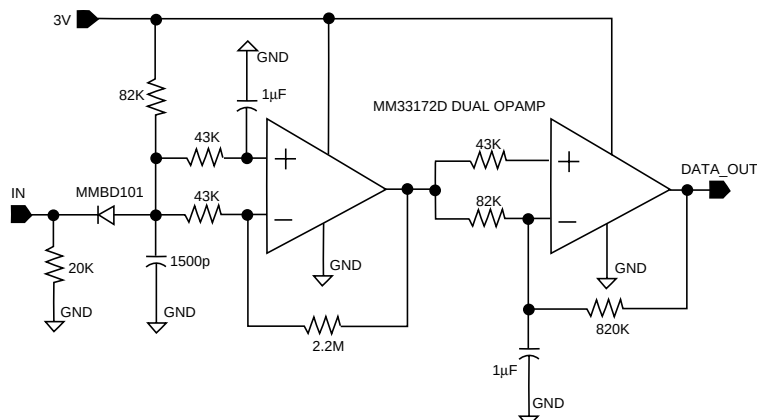
LO LEAKAGE vs. FREQUENCY

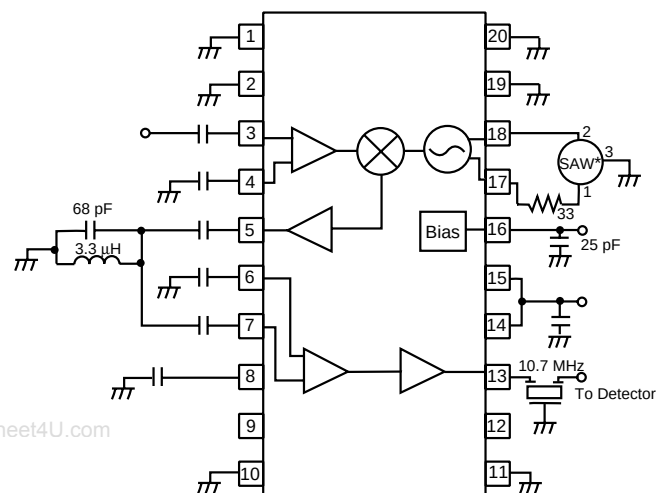


RF INPUT MATCH (S_{11})



TYPICAL DETECTOR CIRCUIT

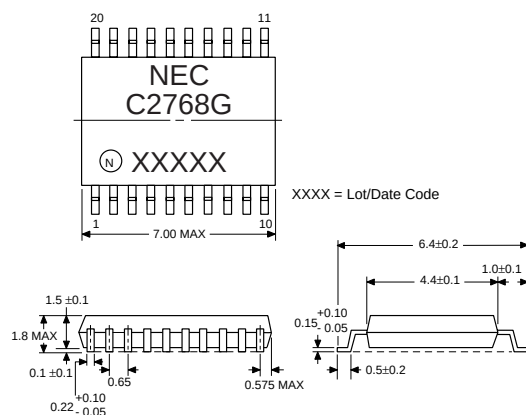




1. GND	20. GND
2. GND	19. GND
3. RF Input	18. L ₀₁ /VCO ₁
4. RF Bypass	17. L ₀₂ /VCO ₂
5. Mixer IF	16. VENABLE
6. IF Bypass	15. VCC (D/C)
7. IF Input	14. VCC (IF)
8. Bypass	13. IF OUTPUT
9. N/C	12. N/C
10. GND	11. GND

RF Monolithics RO2125A for 304 MHz
RF Monolithics RO2102A for 423 MHz
or equivalent

PACKAGE OUTLINE SSOP 20



LEAD CONNECTIONS:

- | | |
|--------------|---------------|
| 1. GND | 11. GND |
| 2. GND | 12. N/C |
| 3. RF INPUT | 13. IF OUTPUT |
| 4. RF BYPASS | 14. VCC (IF) |
| 5. MIXER IF | 15. VCC (D/C) |
| 6. IF BYPASS | 16. V ENABLE |
| 7. IF INPUT | 17. Lo2/VCO2 |
| 8. BYPASS | 18. Lo1/VCO1 |
| 9. N/C | 19. GND |
| 10. GND | 20. GND |

TYPICAL INPUT MATCHING CIRCUIT

The schematic diagram shows a differential amplifier circuit. An RF input is connected to a 5.6 pF capacitor, which is in series with a 27 nH inductor connected to ground. This is followed by an 82 pF capacitor in series with a 200 ohm resistor. A 36 pF capacitor is connected from the node between the 200 ohm resistor and the 82 pF capacitor to ground. The output of the 82 pF capacitor is connected to the gates of a differential pair of MOSFETs. The MOSFETs are connected in a differential configuration, with their sources tied together and connected to ground. The differential output is taken from the drains of the MOSFETs and connected to a load, represented by a circle with an 'X' inside.

ORDERING INFORMATION

PART NUMBER	QUANTITY
UPC2768GR-E1	2500/Reel