

FEATURES

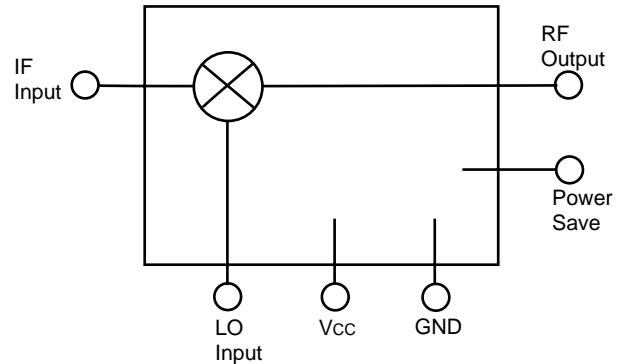
- **WIDE BAND OPERATION:**
IF Input: 3 dB BW: 50 ~ 400 MHz Typical
RF Output: 3 dB BW: 0.1~2 GHz Typical
- **LOW VOLTAGE OPERATION:** 2.7 V Minimum
- **POWER SAVE FUNCTION**
- **SUPER SMALL PACKAGE**
- **TAPE AND REEL PACKAGING OPTION AVAILABLE**

DESCRIPTION

The UPC8106T is an L-Band Frequency Up-Converter manufactured using the NESAT III MMIC process. The UPC8106T was designed for low distortion. Operation from a 3 volt supply voltage makes this device ideal for handheld cellular, PCN and wireless LAN applications.

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

INTERNAL BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS (TA = 25°C, VCC = 3 V, fIF = 240 MHz, PLO = -5 dBm, VPS ≥ 2.5V)

| PART NUMBER PACKAGE OUTLINE | | | UPC8106T T06 | | |
|--------------------------------|---|--------------|-----------------|--------------|------------|
| SYMBOLS | PARAMETERS AND CONDITIONS | UNITS | MIN | TYP | MAX |
| I _{CC} | Circuit Current, V _{PS} ≥ 2.5 V V _{PS} = 0 V | mA μA | 4.5 | 9 | 13.5 10 |
| CG | Conversion Gain ¹ , f _{RF} = 900 MHz f _{RF} = 1.9 GHz | dB dB | 7 4 | 10 7 | 13 10 |
| NF | SSB Noise Figure, f _{RF} = 900 MHz | dB | | 8.5 | |
| P _{SAT} | Saturated Output Power ² , f _{RF} = 900 MHz f _{RF} = 1.9 GHz | dBm dBm | -4 -6.5 | -2 -4 | |
| OIP ₃ | Output 3rd Order Intercept Point ³ , f _{RF} = 900, 900.4 MHz f _{RF} = 1.9, 1.9004 GHz | dBm dBm | | +5.5 +2.0 | |
| T _{PS} | Power Save Response Time, V _{P/S} : GND → V _{CC} V _{P/S} : V _{CC} → GND | μs μs | | 2.0 2.0 | |
| R _{TH} (J-A) | Thermal Resistance (Junction to Ambient) Free Air Mounted on a 50 x 50 x 1.6 mm epoxy glass PWB | °C/W °C/W | | | 620 230 |

Notes:

1. P_{IF} = -30 dBm.
2. P_{IF} = -10 dBm.
3. f_{IF1} = 240.0 MHz, f_{IF2} = 240.4 MHz

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

| SYMBOLS | PARAMETERS | UNITS | RATINGS |
|------------------|--------------------------------------|-------|-------------|
| V _{CC} | Supply Voltage | V | 6.0 |
| V _{PS} | Power Save Voltage | V | 6.0 |
| P _T | Total Power Dissipation ² | mW | 280 |
| T _{OP} | Operating Temperature | °C | -40 to +85 |
| T _{STG} | Storage Temperature | °C | -55 to +150 |

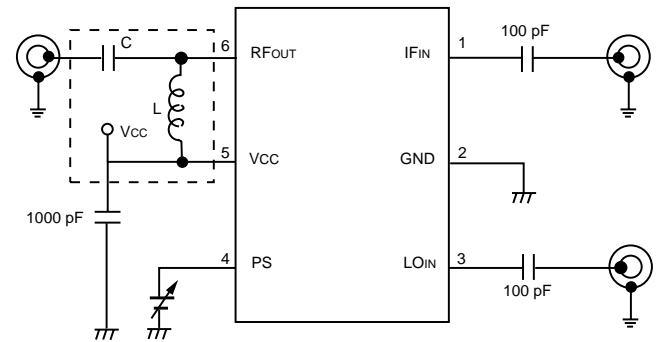
Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. Mounted on a 50 x 50 x 1.6 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 | 5.5 |
| T _{OP} | Operating Temperature | °C | -40 | +25 | +85 |
| P _{LO} | LO Input Level | dBm | -10 | -5 | 0 |

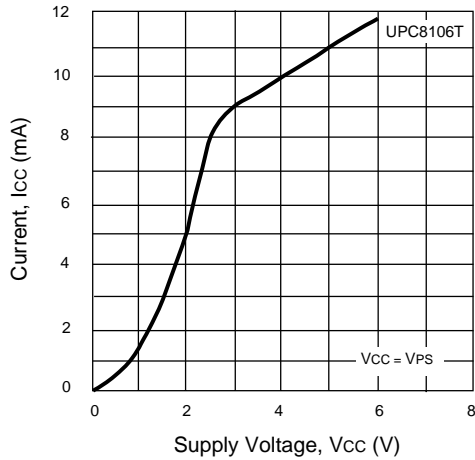
TEST CIRCUIT



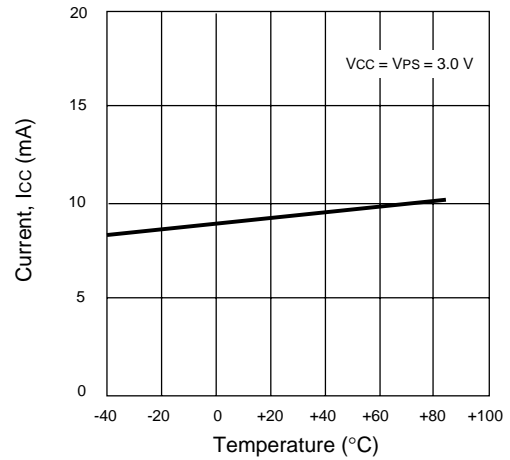
| Recommended Values | 900 MHz | 1.9 GHz |
|--------------------|---------|---------|
| C | 1.0 pF | 1.8 pF |
| L | 8.2 nH | 18 nH |

TYPICAL PERFORMANCE CURVES (T_A = 25°C unless otherwise specified)

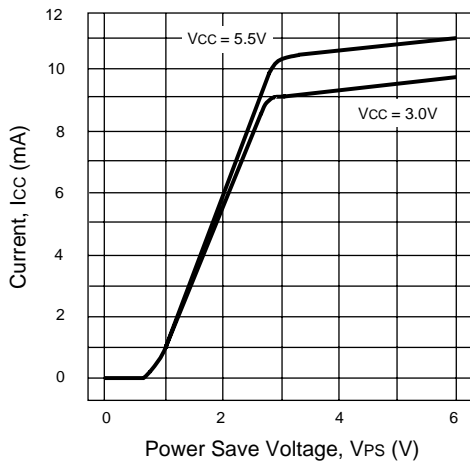
CURRENT vs. VOLTAGE



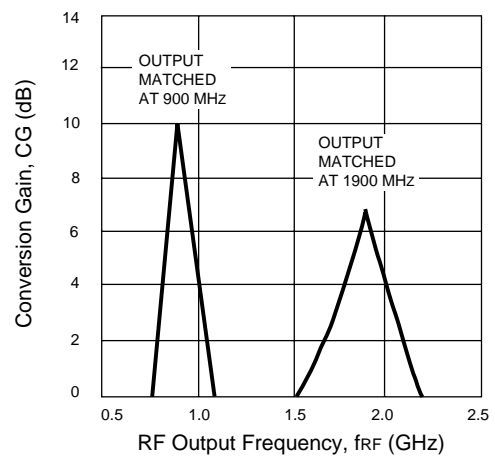
CURRENT vs. TEMPERATURE



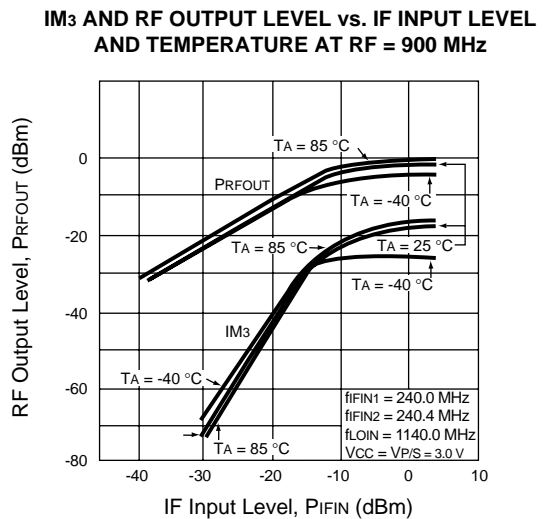
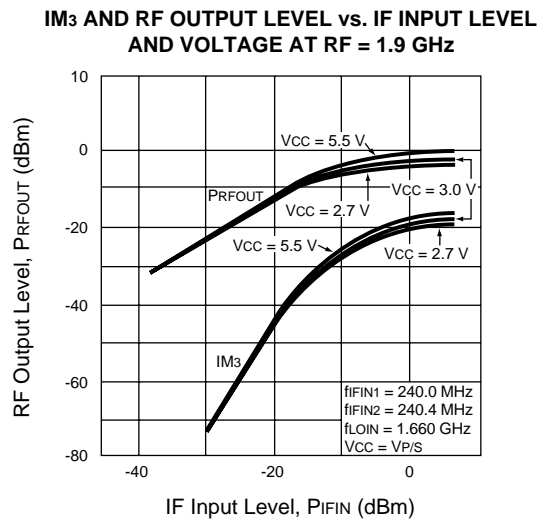
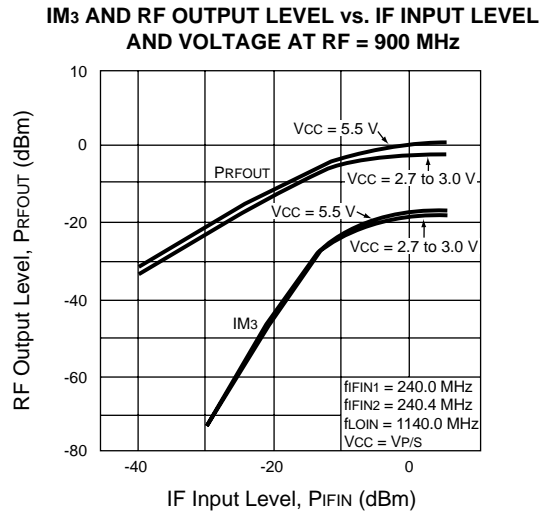
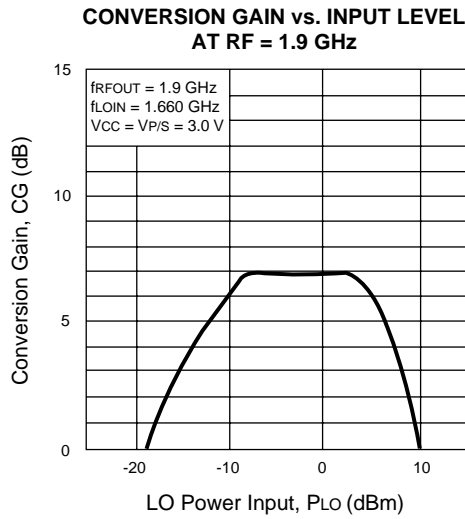
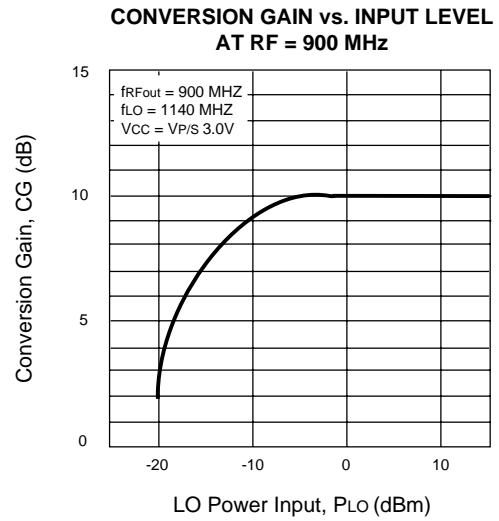
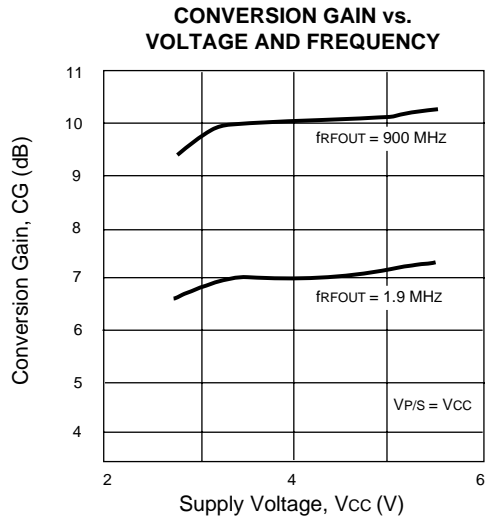
CURRENT vs. POWER SAVE PIN INPUT VOLTAGE



CONVERSION GAIN vs. OUTPUT FREQUENCY

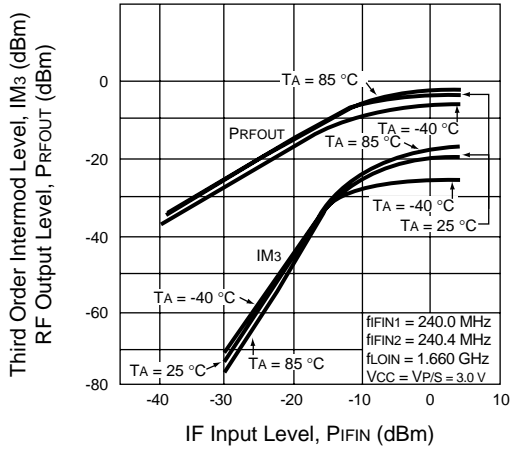


TYPICAL PERFORMANCE CURVES (TA = 25°C)

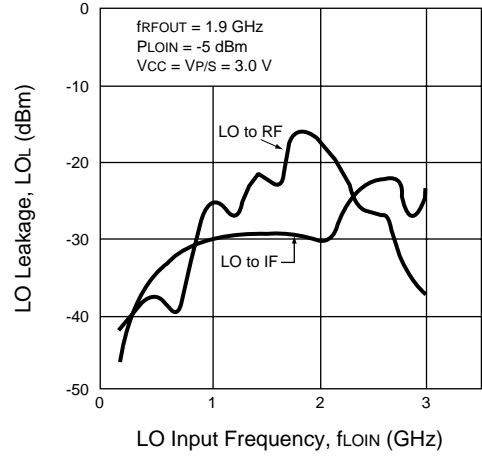


TYPICAL PERFORMANCE CURVES (TA = 25°C)

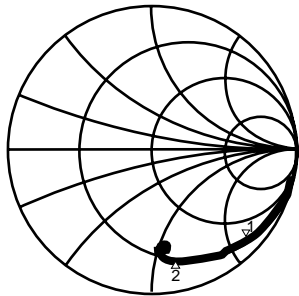
IM3 AND RF OUTPUT LEVEL vs. IF INPUT LEVEL AND TEMPERATURE AT RF = 1.9 GHz



LO LEAKAGE AT RF AND IF PINS vs. LO INPUT FREQUENCY AT RF = 1.9 GHz



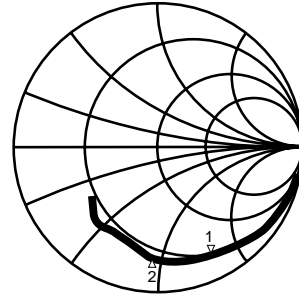
S11 - RF OUTPUT PORT



Start 500 MHz Stop 2300 MHz

2: 13.845 Ω -77.34 Ω 1.0850 pF
1: 20.633 Ω -144.74 Ω 1.2218 pF
Marker 1 - 900 MHz
Marker 2 - 1.9 GHz

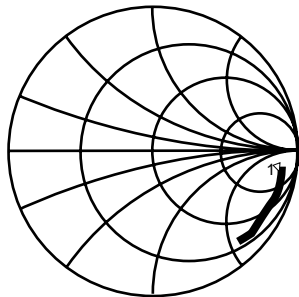
S11 - LO INPUT PORT



Start 0.3 MHz Stop 3000 MHz

2: 12.050 Ω -45.695 Ω 2.1780 pF
1: 13.961 Ω -76.158 Ω 1.8332 pF
Marker 1 - 1.14 GHz
Marker 2 - 1.66 GHz

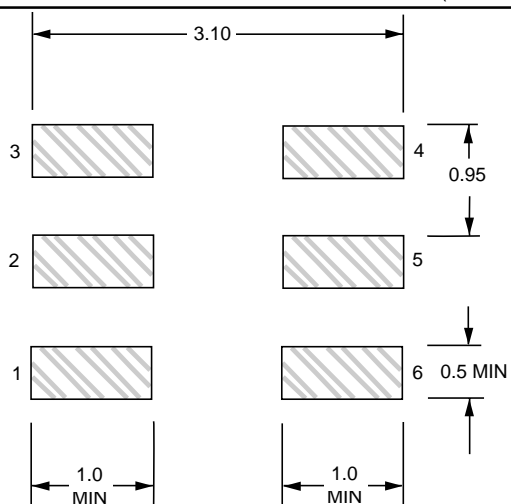
S11 - IF INPUT PORT



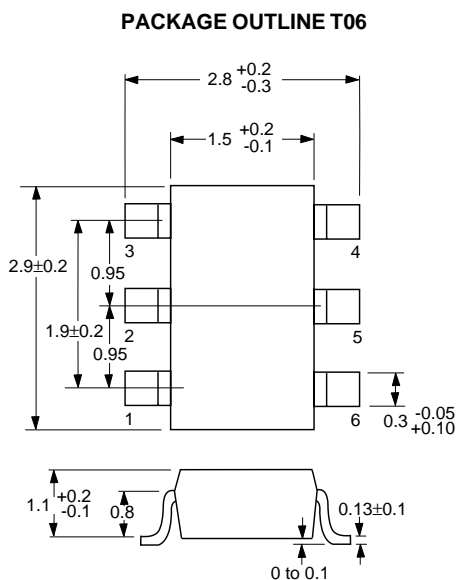
Start 50 MHz Stop 1000 MHz

1: 154.64 Ω -494.41 Ω 1.2876 pF
Marker 1 - 250 MHz

RECOMMENDED P.C.B. LAYOUT (Units in mm)

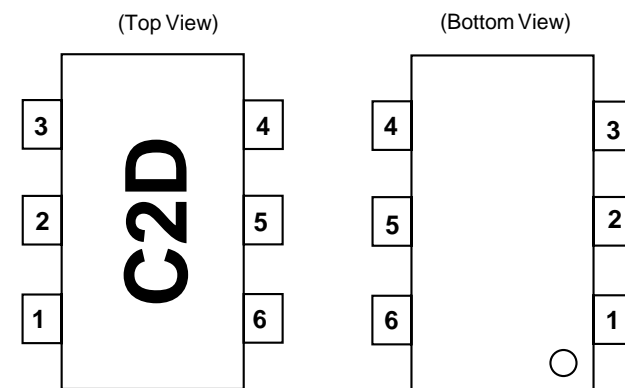


OUTLINE DIMENSIONS (Units in mm)



Note:
All dimensions are typical unless otherwise specified.

LEAD CONNECTIONS



- 1. IF INPUT
- 2. GND
- 3. LO INPUT
- 4. POWER SAVE
- 5. Vcc
- 6. RF OUTPUT

ORDERING INFORMATION

| PART NUMBER | QTY |
|-------------|---------|
| UPC8106T-E3 | 3K/Reel |

Note:
Embossed Tape, 8 mm wide,
Pins 1, 2, 3 are in tape pull-out direction.