NEC

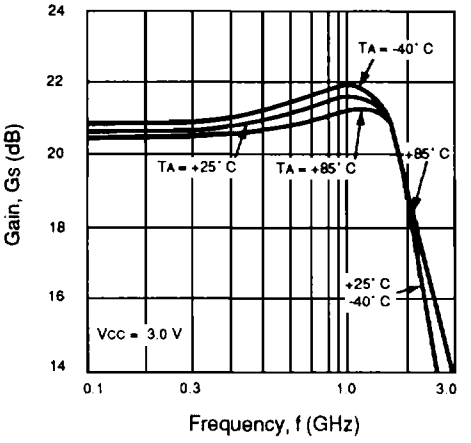
# 3V, 2400 MHz MEDIUM POWER SI MMIC AMPLIFIER

# UPC2771T

## FEATURES

- **HIGH GAIN:** 20 dB at 900 to 1500 MHz Typical
- **HIGH OUTPUT POWER:** $P_{1dB}$ = +12.5 dBm at 900 MHz
  +11 dBm at 1500 MHz
- **LOW BIAS VOLTAGE:** 3.0 V Typical, 2.7 V Minimum
- **SUPER SMALL PACKAGE**
- **TAPE AND REEL PACKAGING OPTION AVAILABLE**

**GAIN vs. FREQUENCY AND TEMPERATURE**




## DESCRIPTION

The UPC2771T is a Silicon Monolithic integrated circuit which is manufactured using the NESAT III process. The NESAT III process produces transistors with $f_T$ approaching 20 GHz. This amplifier was designed as a driver amplifier for digital cellular applications. Operating on a 3 volt supply, this IC is ideally suited for hand-held, portable designs.

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

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## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C, $Z_L$ = $Z_S$ = 50 Ω, $V_{CC}$ = 3.0 V)

| PART NUMBER / PACKAGE OUTLINE | | | | UPC2771T T06 | | |
|---|---|---|---|---|---|---|
| SYMBOLS | PARAMETERS AND CONDITIONS | | UNITS | MIN | TYP | MAX |
| $I_{CC}$ | Circuit Current (no signal) | | mA | | 36 | 45 |
| $G_S$ | Small Signal Gain, | f = 900 MHz<br>f = 1500 MHz | dB<br>dB | 19<br>17 | 21<br>20 | 24<br>23 |
| $f_U$ | Upper Limit Operating Frequency (The gain at $f_U$ is 3 dB down from the gain at 100 MHz) | | GHz | 1.7 | 2.1 | |
| $P_{1dB}$ | 1 dB Compressed Output Power, | f = 900 MHz<br>f = 1500 MHz | dBm<br>dBm | +9<br>+7 | +11.5<br>+9.5 | |
| $P_{SAT}$ | Saturated Output Power, | f = 900 MHz<br>f = 1500 MHz | dBm<br>dBm | | +12.5<br>+11 | |
| NF | Noise Figure, | f = 900 MHz<br>f = 1500 MHz | dB<br>dB | | 6<br>6 | 7.5<br>7.5 |
| $RL_{IN}$ | Input Return Loss, | f = 900 MHz<br>f = 1500 MHz | dB<br>dB | 10<br>10 | 14<br>14 | |
| $RL_{OUT}$ | Output Return Loss, | f = 900 MHz<br>f = 1500 MHz | dB<br>dB | 6.5<br>5.5 | 9.5<br>8.5 | |
| ISOL | Isolation, | f = 900 MHz<br>f = 1500 MHz | dB<br>dB | 25<br>25 | 30<br>30 | |
| IP3 | SSB Third Order Intercept Point | f = 900, 902 MHz<br>f = 1500, 1502 MHz | dBm<br>dBm | | +16<br>+13 | |

## ABSOLUTE MAXIMUM RATINGS[1] ($T_A$ = 25°C)

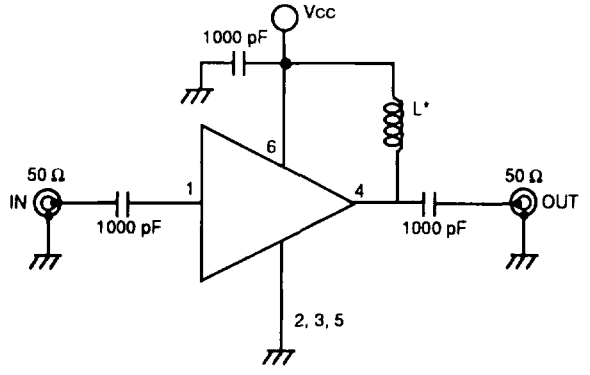
| SYMBOLS | PARAMETERS | UNITS | RATINGS |
|---|---|---|---|
| $V_{CC}$ | Supply Voltage | V | 3.6 |
| $I_{CC}$ | Total Supply Current | mA | 77.7 |
| $P_{IN}$ | Input Power | dBm | +13 |
| $P_T$ | Total Power Dissipation[2] | mW | 280 |
| $T_{OP}$ | Operating Temperature | °C | -40 to +85 |
| $T_{STG}$ | 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 | 3.3 |
| $T_{OP}$ | Operating Temperature | °C | -40 | +25 | +85 |

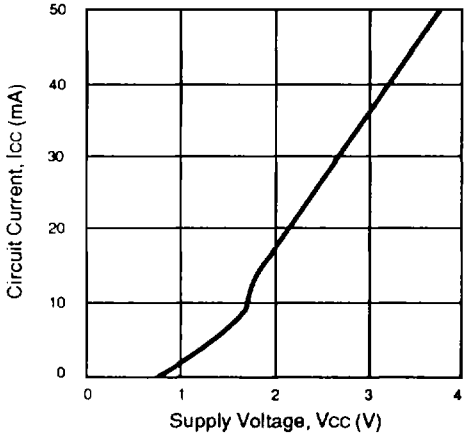
## TEST CIRCUIT



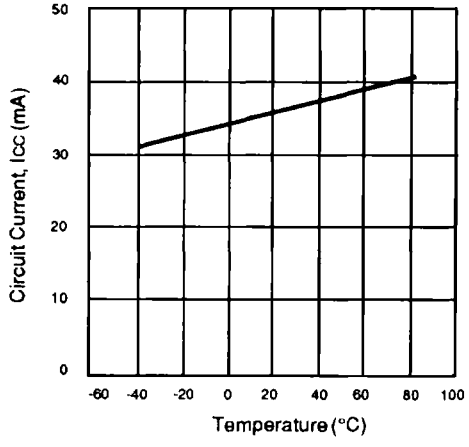

* This device is tested using a bias tee with typical series inductance, L = 1000 nH. In circuit applications, L = 50 nH is satisfactory at 900 MHz, and L = 10 nH is satisfactory at 1500 MHz.

## TYPICAL PERFORMANCE CURVES ($T_A$ = 25°C)

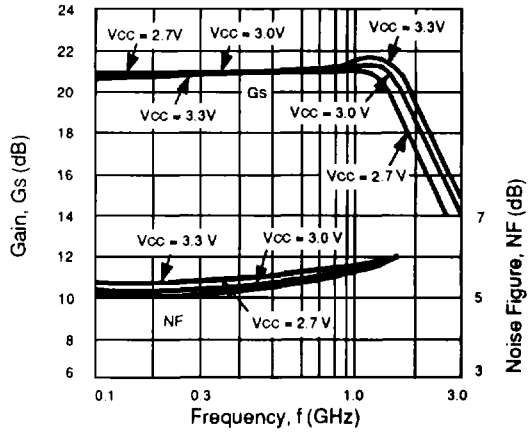
CIRCUIT CURRENT vs. VOLTAGE



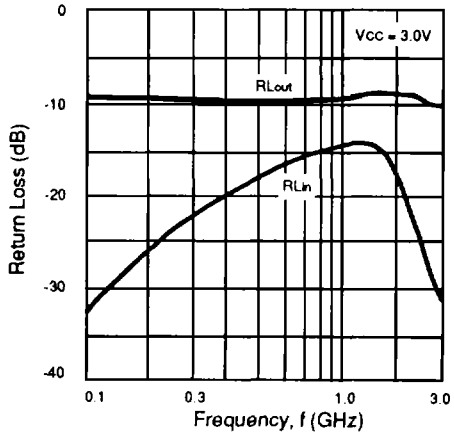

CIRCUIT CURRENT vs. TEMPERATURE




GAIN AND NOISE FIGURE vs. FREQUENCY AND VOLTAGE

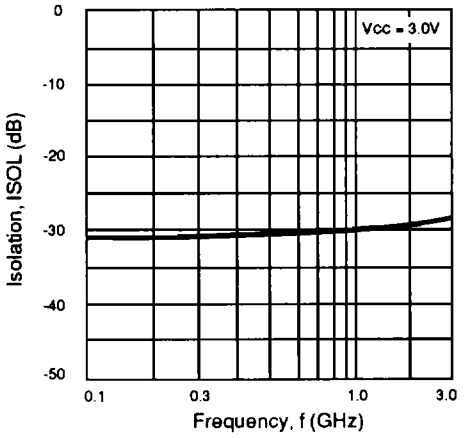



INPUT RETURN LOSS AND OUTPUT RETURN LOSS vs. FREQUENCY

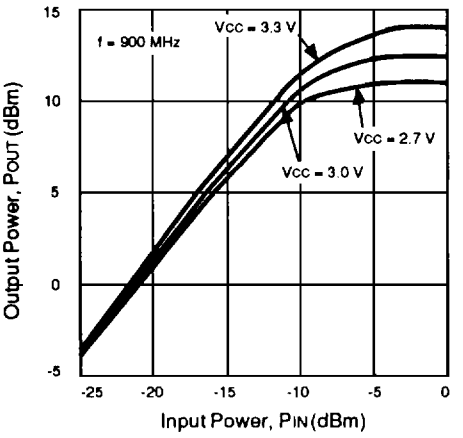


## TYPICAL PERFORMANCE CURVES ($T_A$ = 25°)

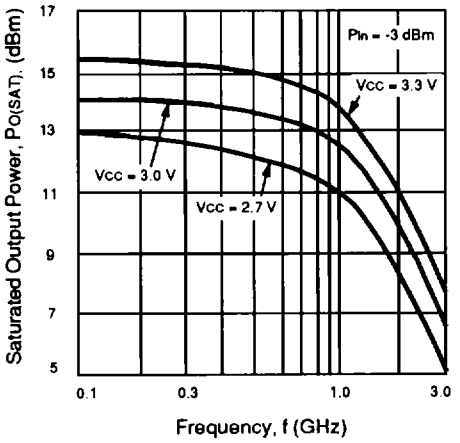
**ISOLATION vs. FREQUENCY**



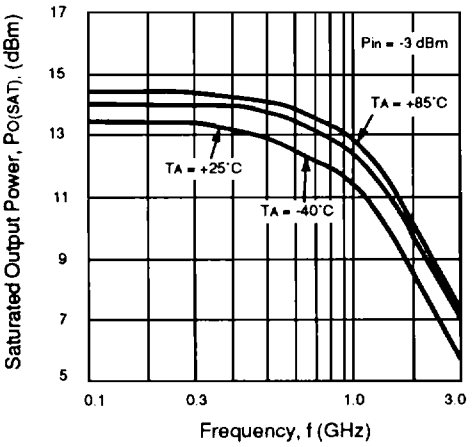

**OUTPUT POWER vs. INPUT POWER AND VOLTAGE**



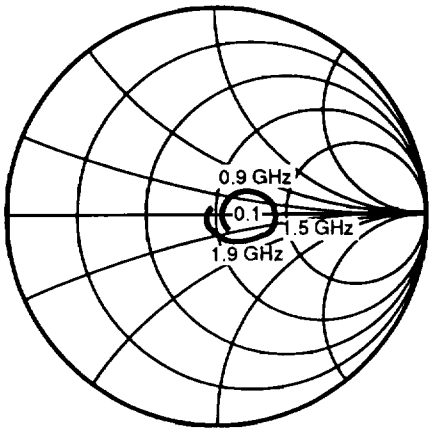

**SATURATED OUTPUT POWER vs. FREQUENCY AND VOLTAGE**



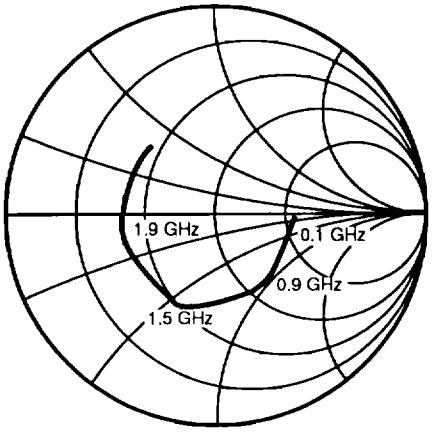

**SATURATED OUTPUT POWER vs. FREQUENCY AND TEMPERATURE**




**$S_{11}$ vs. FREQUENCY (Vcc = 3.0 V)**




**$S_{22}$ vs. FREQUENCY (Vcc = 3.0 V)**

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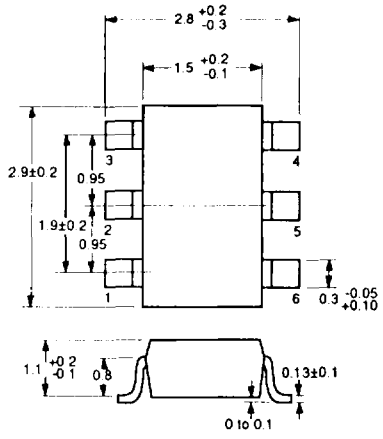
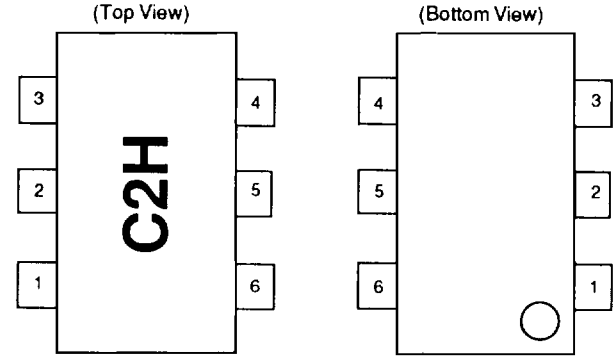
## OUTLINE DIMENSIONS (Units in mm)

UPC2771T
PACKAGE OUTLINE T06

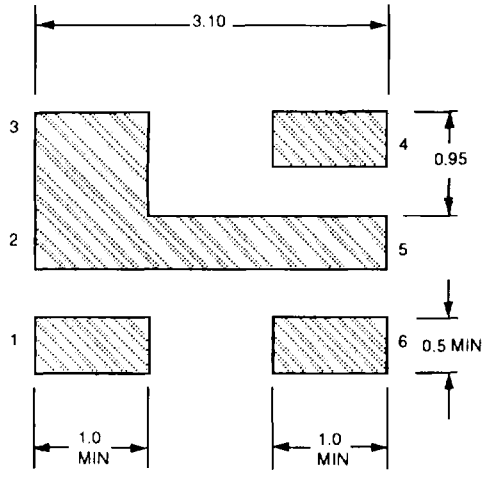



## LEAD CONNECTIONS



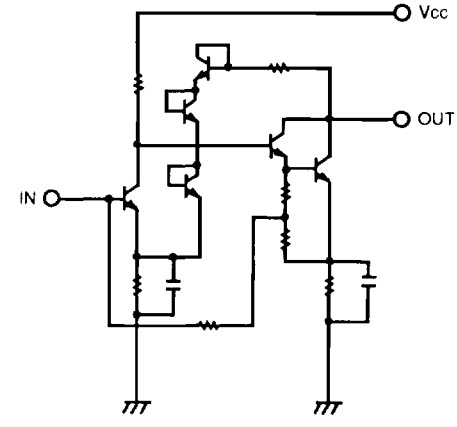

1. INPUT
2. GND
3. GND
4. OUTPUT
5. GND
6. Vcc

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




Note:
All dimensions are typical unless otherwise specified.

## EQUIVALENT CIRCUIT




## ORDERING INFORMATION

| PART NUMBER | QTY |
|---|---|
| UPC2771T-E3 | 3K/Reel |

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