NEC

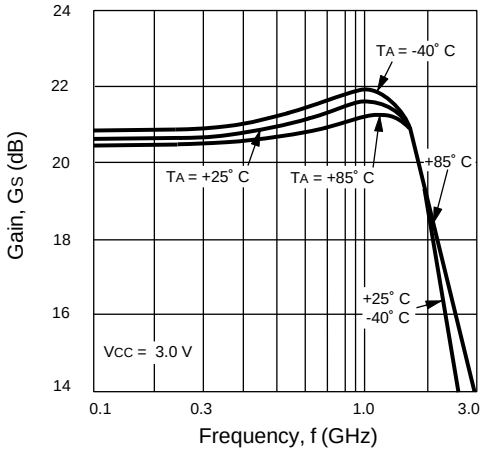
# 3V, SUPER MINIMOLD MEDIUM POWER SI MMIC AMPLIFIER

# UPC2771TB

## FEATURES

- **HIGH GAIN:** 21 dB at 900 to 1500 MHz Typical
- **HIGH OUTPUT POWER:** $P_{SAT}$ = +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:** SOT-363
- **TAPE AND REEL PACKAGING OPTION AVAILABLE**

**GAIN vs. FREQUENCY AND TEMPERATURE**




## DESCRIPTION

The UPC2771TB 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. The UPC2771TB is pin compatible and has comparable performance as the larger UPC2771T, so it is suitable for use as a replacement to help reduce system size. The IC is housed in a 6 pin super minimold or SOT-363 package. 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.

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

| PART NUMBER<br>PACKAGE OUTLINE | | | | UPC2771TB<br>S06 | | |
|---|---|---|---|---|---|---|
| **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>18 | 21<br>21 | 24<br>24 |
| $f_U$ | Upper Limit Operating Frequency (The gain at $f_U$ is 3 dB down from the gain at 100 MHz) | | GHz | 1.8 | 2.2 | |
| $P_{1dB}$ | 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 | 9.0<br>8.5 | |
| ISOL | Isolation, | f = 900 MHz<br>f = 1500 MHz | dB<br>dB | 25<br>25 | 30<br>30 | |
| OIP3 | SSB OutputThird Order Intercept Point | f = 900, 902 MHz, $P_{OUT}$ = +4 dBm<br>f = 1500, 1502 MHz, $P_{OUT}$ = +4 dBm | dBm<br>dBm | | +13<br>+10 | |
| $P_{ADJ1}$ | Adjacent Channel Power 1, | f = 900 mHz, π/4 QPSK wave[1], $P_{OUT}$ = +7 dBm<br>Δf = ± 50 kHz<br>Δf = ± 100 kHz | <br>dBc<br>dBc | | <br>-61<br>-72 | |
| $P_{ADJ2}$ | Adjacent Channel Power 2, | f = 1.5 GHz, π/4 QPSK wave[1], $P_{OUT}$ = +7 dBm<br>Δf = ± 50 kHz<br>Δf = ± 100 kHz | <br>dBc<br>dBc | | <br>-59<br>-72 | |

Note:
1. π/4 QPSK modulated wave input, data rate 42 kbps, Filter roll off α = 0.5

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

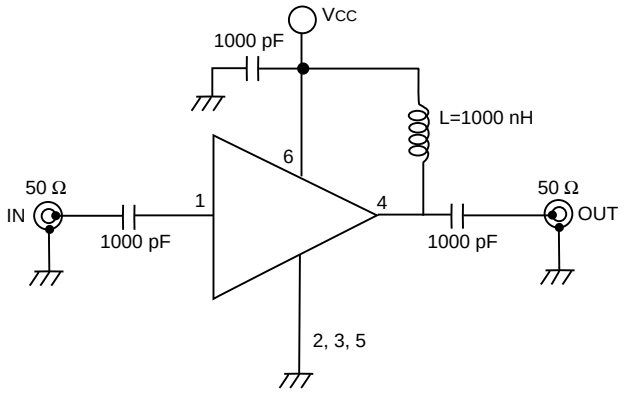
| SYMBOLS | PARAMETERS | UNITS | RATINGS |
|---|---|---|---|
| $V_{CC}$ | Supply Voltage | V | 3.6 |
| $I_{CC}$ | Total Supply Current | mA | 77.7 |
| $P_{IN}$ | Input Power | dBm | +13 |
| $P_T$ | Total Power Dissipation[2] | mW | 200 |
| $T_{OP}$ | Operating Temperature | °C | -40 to +85 |
| $T_{STG}$ | 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

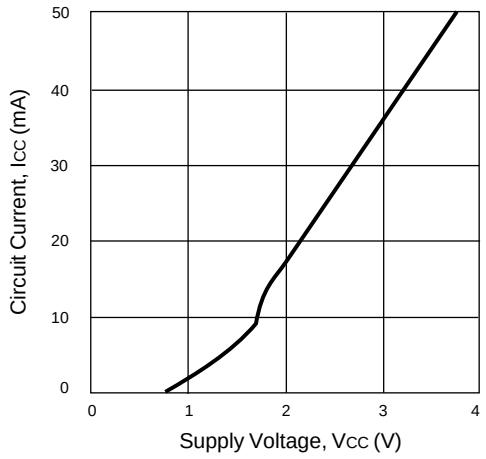
| SYMBOLS | PARAMETERS | UNITS | MIN | TYP | MAX |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply Voltage | V | 2.7 | 3 | 3.3 |
| $T_{OP}$ | Operating Temperature | °C | -40 | +25 | +85 |

## TEST CIRCUIT

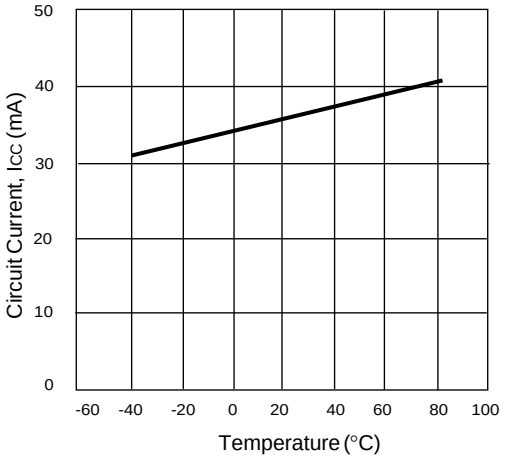



## TYPICAL PERFORMANCE CURVES ($T_A$ = 25°C)

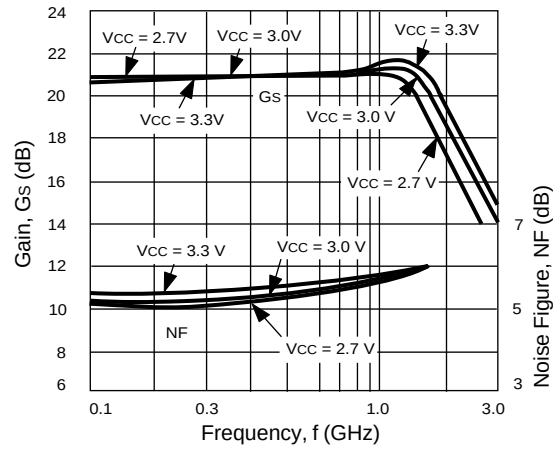
**CIRCUIT CURRENT vs. VOLTAGE**



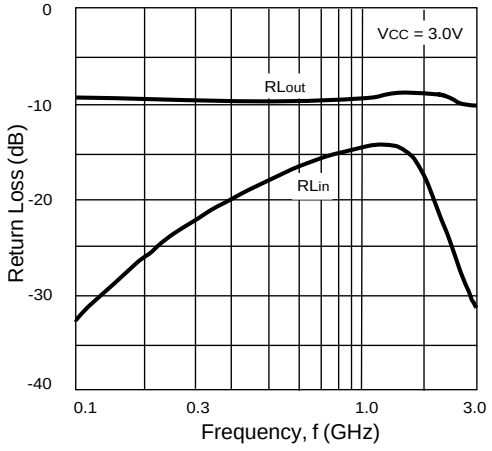

**CIRCUIT CURRENT vs. TEMPERATURE**




**GAIN AND NOISE FIGURE vs. FREQUENCY AND VOLTAGE**

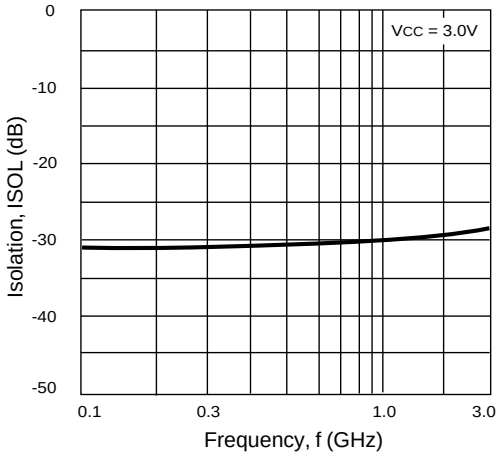



**INPUT RETURN LOSS AND OUTPUT RETURN LOSS vs. FREQUENCY**

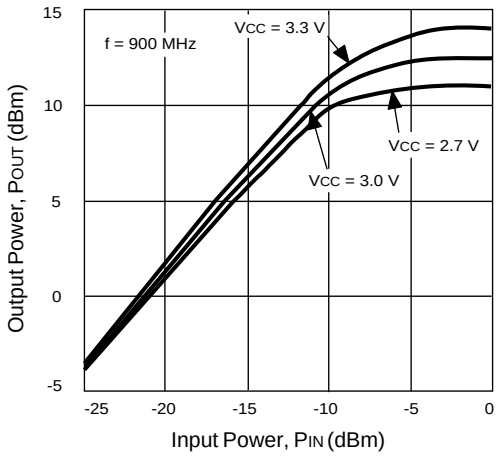


## TYPICAL PERFORMANCE CURVES ($T_A$ = 25°)

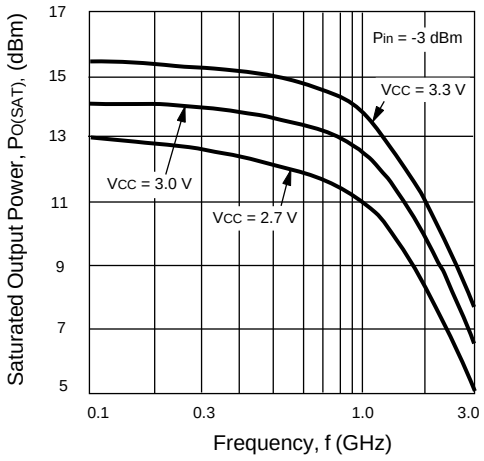
**ISOLATION vs. FREQUENCY**



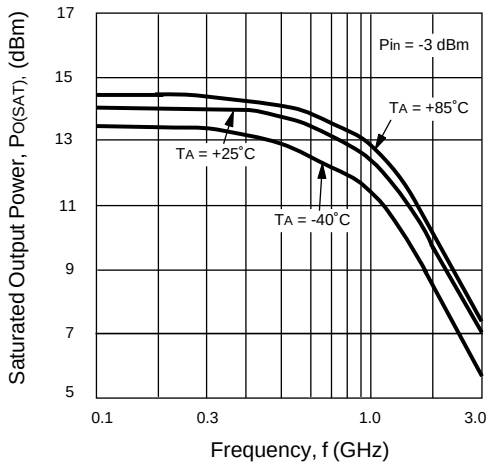

**OUTPUT POWER vs. INPUT POWER AND VOLTAGE**




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

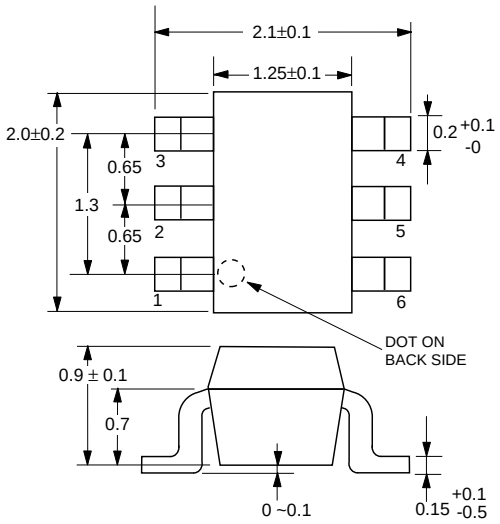



**SATURATED OUTPUT POWER vs. FREQUENCY AND TEMPERATURE**

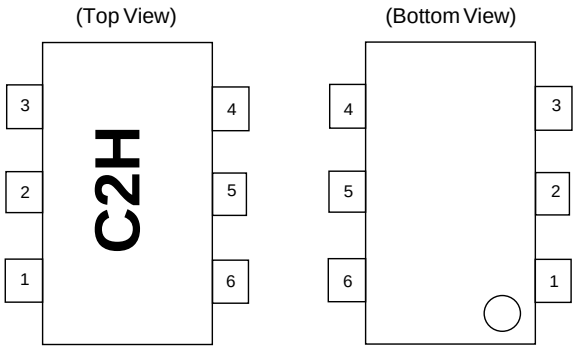


## OUTLINE DIMENSIONS (Units in mm)

**UPC2771TB**
**PACKAGE OUTLINE S06**

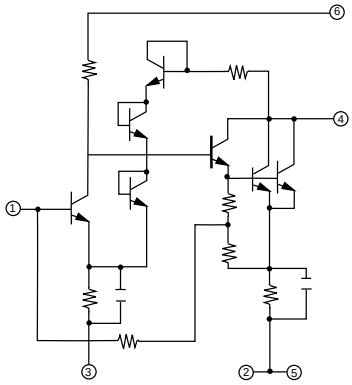



## LEAD CONNECTIONS




1. INPUT
2. GND
3. GND
4. OUTPUT
5. GND
6. $V_{CC}$

## PIN DESCRIPTION

| Pin No. | Pin Name (V) | Applied Voltage | Description | Internal Equivalent Circuit |
|---|---|---|---|---|
| 1 | Input | — | Signal input pin. An internal matching circuit, configured with resistors, enables 50 Ω connection over a wide bandwidth. A multi-feedback circuit is designed to cancel the deviations of $h_{FE}$ and resistance. This pin must be coupled to the signal source with a blocking capacitor. |  |
| 4 | Output | 2.7 to 3.3 | Signal output pin. Connect an inductor between this pin and VCC to supply current to the internal output transistors. | |
| 6 | VCC | | Power supply pin. This pin should be externally equipped with a bypass capacitor to minimize ground impedance. | |
| 2 | GND | 0 | Ground pins. These pins should be connected to system ground with minimum inductance. Ground pattern on the board should be formed as wide as possible. All the ground pins must be connected together with wide ground pattern to minimize impedance difference. | |

## ORDERING INFORMATION

| PART NUMBER | QTY |
|---|---|
| UPC2771TB-E3 | 3K/Reel |

Note: Embossed Tape, 8 mm wide. Pins 1, 2 and 3 face perforated side of tape.