## FEATURES

- HIGH OUTPUT POWER: PSAT = + 11 dBm at 900 MHz
- LOW VOLTAGE: 3.0 V TYP, 2.7 V MIN
- WIDE BANDWIDTH: 2.7 GHz at -3 dB
- HIGH GAIN: 20 dB at 1.9 GHz
- SUPER SMALL PACKAGE: SOT-363 package
- TAPE AND REEL PACKAGING OPTION AVAILABLE DESCRIPTION

NEC's UPC2763TB is a Silicon Monolithic integrated circuit which is manufactured using the NESAT ${ }^{\text {TM }}$ III process. The NESAT ${ }^{\text {TM }}$ III process produces transistors with fT approaching 20 GHz . The UPC2763TB is pin compatible and has comparable performance to the larger UPC2763T, 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 handheld, portable designs.

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


TEMPERATURE

ELECTRICAL CHARACTERISTICS $\left(\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}, \mathrm{ZL}=\mathrm{Zs}=50 \Omega, \mathrm{~V} \mathrm{CC}=3.0 \mathrm{~V}\right)$

| PART NUMBER PACKAGE OUTLINE |  |  |  | $\begin{aligned} & \text { UPC2763TB } \\ & \text { S06 } \end{aligned}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| SYMBOLS | PARAMETERS AND CONDITIONS |  | UNITS | MIN | TYP | MAX |
| Icc | Circuit Current (no signal) |  | mA |  | 27 | 35 |
| Gs | Small Signal Gain, $\quad \begin{array}{r}f=900 \mathrm{MHz} \\ f=1900 \mathrm{MHz}\end{array}$ |  | $\begin{aligned} & \hline \mathrm{dB} \\ & \mathrm{~dB} \end{aligned}$ | $\begin{aligned} & \hline 18 \\ & 18 \end{aligned}$ | $\begin{aligned} & \hline 20 \\ & 21 \end{aligned}$ | $\begin{aligned} & 23 \\ & 24 \end{aligned}$ |
| fu | Upper Limit Operating Frequency <br> (The gain at fu is 3 dB down from the gain at 0.1 GHz ) |  | GHz | 2.3 | 2.7 |  |
| P1dB | Output Power at $\begin{aligned} \mathrm{dB} \text { Compression Point, } \mathrm{f} & =900 \mathrm{MHz} \\ \mathrm{f} & =1900 \mathrm{MHz}\end{aligned}$ |  | $\begin{aligned} & \mathrm{dBm} \\ & \mathrm{dBm} \end{aligned}$ | $\begin{aligned} & +7 \\ & +4 \end{aligned}$ | $\begin{aligned} & \hline+9.5 \\ & +6.5 \end{aligned}$ |  |
| Psat | Saturated Output Power, $\begin{aligned} & \mathrm{f}=900 \mathrm{MHz} \\ & \mathrm{f}=1900 \mathrm{MHz}\end{aligned}$ |  | $\begin{aligned} & \mathrm{dBm} \\ & \mathrm{dBm} \end{aligned}$ |  | $\begin{gathered} 11 \\ 8 \end{gathered}$ |  |
| NF | Noise Figure, | $\begin{aligned} & f=900 \mathrm{MHz} \\ & f=1900 \mathrm{MHz} \end{aligned}$ | $\begin{aligned} & \mathrm{dB} \\ & \mathrm{~dB} \end{aligned}$ |  | $\begin{aligned} & 5.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 7.0 \\ & 7.5 \end{aligned}$ |
| RLIN | Input Return Loss, | $\begin{aligned} & f=900 \mathrm{MHz} \\ & \mathrm{f}=1900 \mathrm{MHz} \end{aligned}$ | $\begin{aligned} & \mathrm{dB} \\ & \mathrm{~dB} \end{aligned}$ | $\begin{aligned} & 8 \\ & 8 \end{aligned}$ | $\begin{aligned} & 11 \\ & 11 \end{aligned}$ |  |
| RLout | Output Return Loss, | $\begin{aligned} & f=900 \mathrm{MHz} \\ & f=1900 \mathrm{MHz} \end{aligned}$ | $\begin{aligned} & \mathrm{dB} \\ & \mathrm{~dB} \end{aligned}$ | $\begin{aligned} & 5 \\ & 6 \end{aligned}$ | $\begin{aligned} & 7 \\ & 9 \end{aligned}$ |  |
| ISOL | Isolation, | $\begin{aligned} & f=900 \mathrm{MHz} \\ & \mathrm{f}=1900 \mathrm{MHz} \end{aligned}$ | $\begin{aligned} & \mathrm{dB} \\ & \mathrm{~dB} \end{aligned}$ | $\begin{aligned} & 25 \\ & 24 \\ & \hline \end{aligned}$ | $\begin{aligned} & 30 \\ & 29 \end{aligned}$ |  |
| OIP3 | SSB Output Third Order Intercept Point $f=900,902 \mathrm{MHz}$ <br> Pout $=+4 \mathrm{dBm}$ <br> $f=1900,1902 \mathrm{MHz}$  |  | $\mathrm{dBm}$ $\mathrm{dBm}$ |  | $\begin{aligned} & +17 \\ & +11 \end{aligned}$ |  |
| PAdJ | Adjacent Channel Power, $\mathrm{f}=900 \mathrm{MHz}, \pi / 4$ QPSK wave ${ }^{1}$, $\mathrm{Po}=+4 \mathrm{dBm}$ | $\begin{aligned} & \Delta \mathrm{f}= \pm 50 \mathrm{KHz} \\ & \Delta \mathrm{f}= \pm 100 \mathrm{KHz} \end{aligned}$ | $\begin{aligned} & \mathrm{dBc} \\ & \mathrm{dBc} \end{aligned}$ |  | $\begin{aligned} & -61 \\ & -62 \end{aligned}$ |  |

Note:

1. $\pi / 4$ QPSK modulated wave input, data rate 42 kbps .

ABSOLUTE MAXIMUM RATINGS ${ }^{1}\left(\mathrm{~T}_{\mathrm{A}}=25^{\circ} \mathrm{C}\right)$

| SYMBOLS | PARAMETERS | UNITS | RATINGS |
| :---: | :--- | :---: | :---: |
| Vcc | Supply Voltage | V | 3.6 |
| Icc | Total Supply Current | mA | 70 |
| PIN | Input Power | dBm | +10 |
| PT | Total Power Dissipation ${ }^{2}$ | mW | 200 |
| Top | Operating Temperature | ${ }^{\circ} \mathrm{C}$ | -40 to +85 |
| TsTG | Storage Temperature | ${ }^{\circ} \mathrm{C}$ | -55 to +150 |

Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. Mounted on a $50 \times 50 \times 1.6 \mathrm{~mm}$ epoxy glass $\mathrm{PWB}\left(\mathrm{TA}_{\mathrm{A}}=85^{\circ} \mathrm{C}\right)$.

## TYPICAL PERFORMANCE CURVES $\left(\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}\right)$

RECOMMENDED OPERATING CONDITIONS

| SYMBOLS | PARAMETERS | UNITS | MIN | TYP | MAX |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Vcc | Supply Voltage | V | 2.7 | 3 | 3.3 |
| Top | Operating Temperature | ${ }^{\circ} \mathrm{C}$ | -40 | 25 | 85 |

## TEST CIRCUIT





## TYPICAL PERFORMANCE CURVES $\left(\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}\right)$



OUTPUT POWER vs. INPUT POWER AND TEMPERATURE


OUTPUT POWER vs. INPUT POWER AND TEMPERATURE


Input Power, Pin (dBm)

OUTPUT POWER vs.


OUTPUT POWER vs. INPUT POWER AND VOLTAGE


SATURATED OUTPUT POWER vs. FREQUENCY AND VOLTAGE


Frequency, f(GHz)

## TYPICAL PERFORMANCE CURVES $\left(\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}\right)$



THIRD ORDER INTERMODULATION DISTORTION vs.
OOUTPUT POWER OF EACH TONE AND VOLTAGE



## TYPICAL SCATTERING PARAMETERS $\left(T_{A}=+25^{\circ} \mathrm{C}, \mathrm{Vcc}=\mathrm{Vout}=3.0 \mathrm{~V}\right)$

S11

$\mathrm{Vcc}=\mathrm{VOUT}=3.0 \mathrm{~V}$, $\mathrm{Icc}=28 \mathrm{~mA}$

| FREQUENCY | S11 |  | S21 |  | S12 |  | S22 |  | K |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| GHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |  |
| 0.1 | 0.231 | -1.4 | 10.210 | -3.8 | 0.023 | 2.4 | 0.406 | -4.1 | 1.68 |
| 0.2 | 0.242 | -0.2 | 10.305 | -8.5 | 0.023 | 7.8 | 0.412 | -7.5 | 1.66 |
| 0.3 | 0.250 | 2.7 | 10.464 | -12.9 | 0.024 | 9.3 | 0.407 | -9.9 | 1.58 |
| 0.4 | 0.425 | 2.8 | 10.655 | -18.2 | 0.024 | 13.4 | 0.407 | -13.9 | 1.55 |
| 0.5 | 0.242 | 2.0 | 10.863 | -22.8 | 0.026 | 16.1 | 0.405 | -17.6 | 1.44 |
| 0.6 | 0.241 | -2.2 | 11.093 | -28.1 | 0.027 | 19.9 | 0.414 | -21.6 | 1.37 |
| 0.7 | 0.263 | -5.3 | 11.544 | -33.2 | 0.028 | 22.3 | 0.419 | -24.6 | 1.25 |
| 0.8 | 0.291 | -5.6 | 11.843 | -39.0 | 0.029 | 22.5 | 0.424 | -27.7 | 1.16 |
| 0.9 | 0.316 | -5.1 | 12.291 | -45.1 | 0.029 | 23.9 | 0.424 | -31.9 | 1.09 |
| 1.0 | 0.322 | -4.0 | 12.676 | -52.4 | 0.030 | 25.6 | 0.425 | -37.1 | 1.02 |
| 1.1 | 0.318 | -5.4 | 13.066 | -59.8 | 0.031 | 24.1 | 0.438 | -42.5 | 0.96 |
| 1.2 | 0.309 | -9.0 | 13.311 | -67.3 | 0.031 | 27.0 | 0.442 | -47.8 | 0.96 |
| 1.3 | 0.322 | -14.2 | 13.661 | -75.8 | 0.033 | 28.8 | 0.441 | -51.2 | 0.90 |
| 1.4 | 0.344 | -20.6 | 13.845 | -83.9 | 0.033 | 28.5 | 0.434 | -56.0 | 0.87 |
| 1.5 | 0.371 | -23.7 | 13.824 | -93.0 | 0.035 | 30.1 | 0.435 | -62.2 | 0.82 |
| 1.6 | 0.380 | -27.5 | 13.890 | -101.5 | 0.035 | 28.1 | 0.439 | -68.9 | 0.80 |
| 1.7 | 0.388 | -30.6 | 13.634 | -110.5 | 0.036 | 29.2 | 0.439 | -74.6 | 0.78 |
| 1.8 | 0.378 | -36.4 | 13.236 | -119.6 | 0.035 | 29.9 | 0.428 | -81.3 | 0.84 |
| 1.9 | 0.378 | -42.1 | 12.724 | -127.9 | 0.035 | 30.9 | 0.411 | -87.0 | 0.89 |
| 2.0 | 0.375 | -46.6 | 12.290 | -136.1 | 0.035 | 32.9 | 0.393 | -93.4 | 0.94 |
| 2.1 | 0.369 | -50.5 | 11.707 | -144.0 | 0.035 | 33.0 | 0.385 | -99.6 | 0.99 |
| 2.2 | 0.351 | -53.8 | 11.130 | -151.7 | 0.036 | 35.7 | 0.373 | -104.9 | 1.06 |
| 2.3 | 0.331 | -59.8 | 10.524 | -159.1 | 0.036 | 36.8 | 0.359 | -110.3 | 1.13 |
| 2.4 | 0.306 | -66.4 | 9.824 | -165.9 | 0.034 | 38.7 | 0.336 | -117.5 | 1.31 |
| 2.5 | 0.300 | -73.1 | 9.152 | -172.3 | 0.035 | 40.1 | 0.321 | -123.3 | 1.41 |
| 2.6 | 0.294 | -75.8 | 8.583 | -178.2 | 0.034 | 43.8 | 0.306 | -129.4 | 1.55 |
| 2.7 | 0.290 | -77.1 | 8.029 | 176.2 | 0.035 | 46.3 | 0.299 | -133.9 | 1.58 |
| 2.8 | 0.270 | -77.7 | 7.610 | 170.6 | 0.037 | 47.7 | 0.288 | -138.6 | 1.63 |
| 2.9 | 0.248 | -78.7 | 7.240 | 166.1 | 0.039 | 51.1 | 0.270 | -143.6 | 1.67 |
| 3.0 | 0.219 | -82.3 | 6.827 | 161.2 | 0.039 | 53.6 | 0.253 | -150.1 | 1.79 |
| 3.1 | 0.198 | -88.7 | 6.516 | 156.9 | 0.040 | 55.1 | 0.244 | -156.2 | 1.88 |

## OUTLINE DIMENSIONS (Units in mm)



## LEAD CONNECTIONS

(Top View)

(Bottom View)


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

PIN DESCRIPTIONS

| Pin No. | Pin Name | Applied Voltage (V) | Description | Internal Equivalent Circuit |
| :---: | :---: | :---: | :---: | :---: |
| 1 | Input | - | Signal input pin. An internal matching circuit, configured with resistors, enables $50 \Omega$ connection over a wide bandwidth. A multi-feedback circuit is designed to cancel the deviations of hFE 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. |  |
| $\begin{aligned} & 2 \\ & 3 \\ & 5 \end{aligned}$ | 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 |
| :---: | :---: |
| UPC2763TB-E3-A | 3K/Reel |

Note:
Embossed Tape, 8 mm wide. Pins 1, 2 and 3 face perforated side
of tape.
Life Support Applications
These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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## Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix -A indicates that the device is Pb -free. The -AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance <br> per RoHS | Concentration Limit per RoHS <br> (values are not yet fixed) | Concentration contained <br> in CEL devices |  |
| :--- | :---: | :---: | :---: |
| Lead (Pb) | $<1000$ PPM | - -A |  |
| Mercury | $<1000$ PPM | Not Detected |  |
| Cadmium | $<100$ PPM | Not Detected |  |
| Hexavalent Chromium | $<1000$ PPM | Not Detected |  |
| PBB | $<1000$ PPM | Not Detected |  |
| PBDE | $<1000$ PPM | Not Detected |  |

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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