



# BIPOLAR ANALOG INTEGRATED CIRCUIT UPC2710TB

## 5V, SUPER MINIMOLD MEDIUM POWER SI MMIC AMPLIFIER

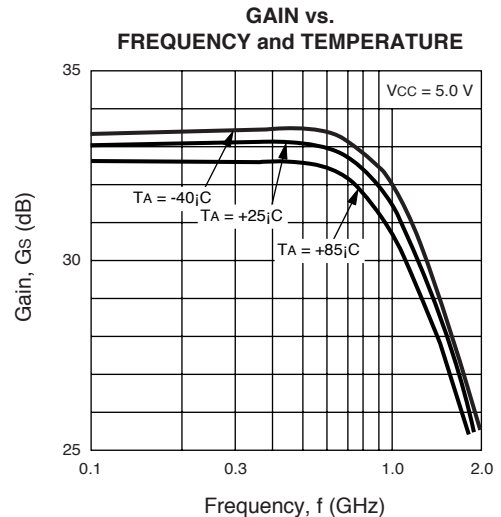
### FEATURES

- **HIGH DENSITY SURFACE MOUNTING:**  
6 Pin Super Minimold or SOT-363 package
- **HIGH GAIN:**  
33 dB TYP
- **SATURATED OUTPUT POWER:**  
+13.5 dBm
- **SUPPLY VOLTAGE:**  
 $V_{CC} = 4.5$  to  $5.5$  V

### DESCRIPTION

The UPC2710TB is a Silicon RFIC manufactured using the NESAT III process. This device is suitable as a PA driver amplifier for cellular radio and other communication receivers. The UPC2710TB is pin compatible and has comparable performance to the larger UPC2710T, 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.

Stringent quality assurance and test procedures ensure the highest reliability and performance.



### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , $V_{CC} = 5$ V, $f = 0.5$ GHz)

PART NUMBER PACKAGE OUTLINE			UPC2710TB S06		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
$I_{CC}$	Circuit Current (no signal)	mA	16	22	29
$G_S$	Small Signal Gain	dB	30	33	36.5
$f_u$	Upper Limit Operating Frequency (The gain at $f_u$ is 3 dB down from the gain at 0.1 GHz)	GHz	0.7	1.0	
$\Delta G_S$	Gain Flatness, $f = 0.1 \sim 0.6$ GHz $f = 0.1 \sim 0.8$ GHz	dB		$\pm 0.8$	
$P_{SAT}$	Saturated Output Power	dBm	+11	+13.5	
$P_{1dB}$	Output Power at 1dB Compression Point	dBm		+7.5	
NF	Noise Figure	dB		3.5	5
$RL_{IN}$	Input Return Loss	dB	3	6	
$RL_{OUT}$	Output Return Loss	dB	9	12	
ISOL	Isolation	dB	34	39	
$\Delta G_T$	Gain -Temperature Coefficient	dB/ $^\circ\text{C}$		-0.006	
$R_{TH}$	Thermal Resistance (Junction to Ambient)	$^\circ\text{C}/\text{W}$			325

# UPC2710TB

## ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CC</sub>	Supply Voltage	V	6
P <sub>IN</sub>	Input Power	dBm	+10
P <sub>T</sub>	Power Dissipation <sup>2</sup>	mW	200
T <sub>OP</sub>	Operating Temperature	°C	-40 to +85
T <sub>STG</sub>	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 50 x 50 x 1.6 mm epoxy glass PWB (T<sub>A</sub> = +85°C).

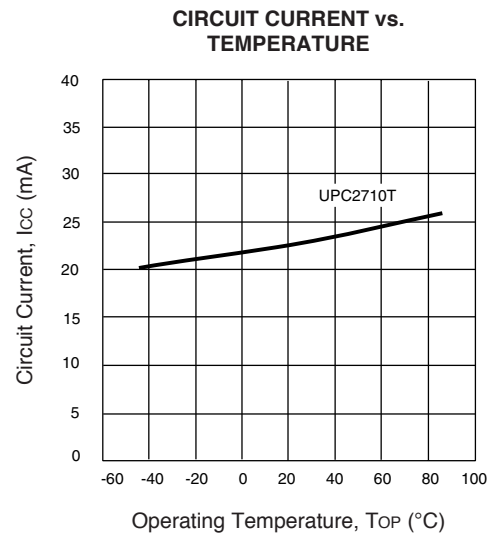
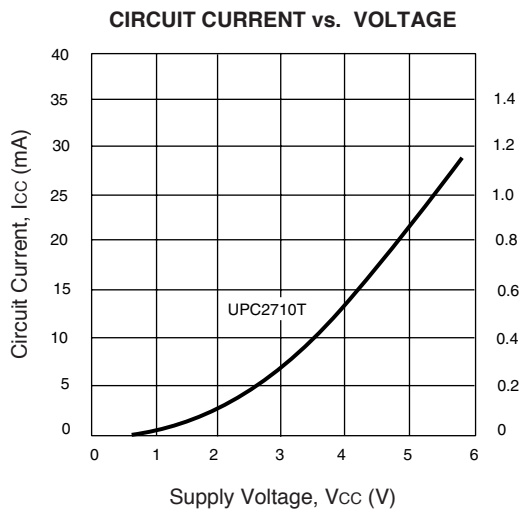
## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	UNITS	MIN	TYP	MAX
V <sub>CC</sub>	Supply Voltage	V	4.5	5.0	5.5

## PIN DESCRIPTIONS

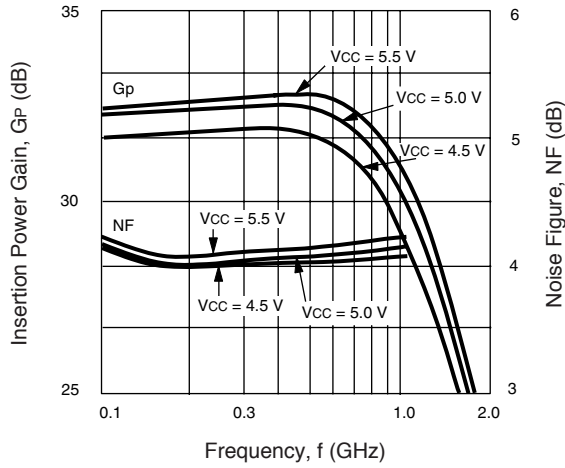
Pin No.	Symbol	Applied Voltage (V)	Pin Voltage (V)	Description	Internal Equivalent Circuit
1	Input	–	0.9	Signal input pin. An internal matching circuit, configured with resistors, enables 50 Ω connection over a wide bandwidth. A multi-feedback circuit is designed to cancel the deviations of h <sub>FE</sub> and resistance. This pin must be coupled to the signal source with a blocking capacitor.	
4	Output	–	–	Signal output pin. Connect an inductor between this pin and V <sub>CC</sub> to supply current to the internal output transistors.	
6	V <sub>CC</sub>	4.5 to 5.5	–	Power supply pin. This pin should be externally equipped with a bypass capacitor to minimize ground impedance.	
2 3 5	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.	

## TYPICAL PERFORMANCE CURVES (T<sub>A</sub> = 25°C)

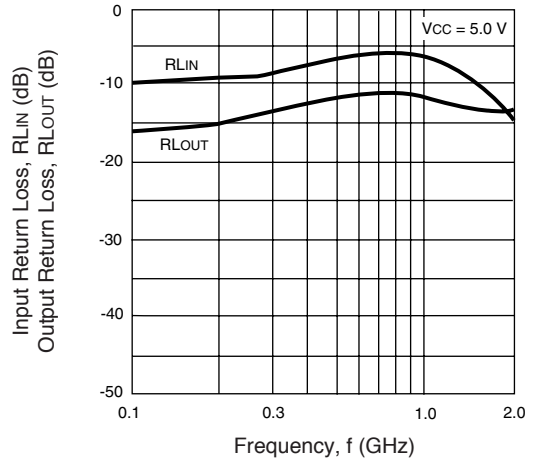


TYPICAL PERFORMANCE CURVES (TA = 25° C)

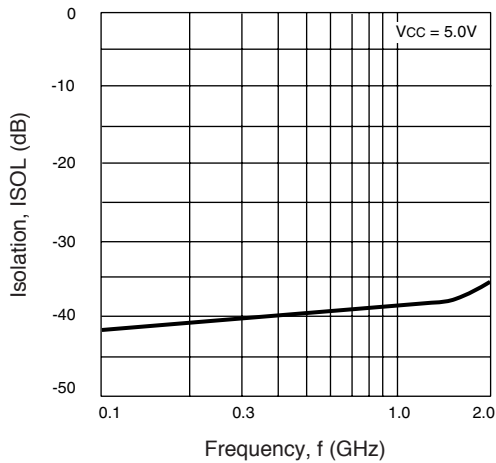
NOISE FIGURE AND INSERTION GAIN vs. FREQUENCY



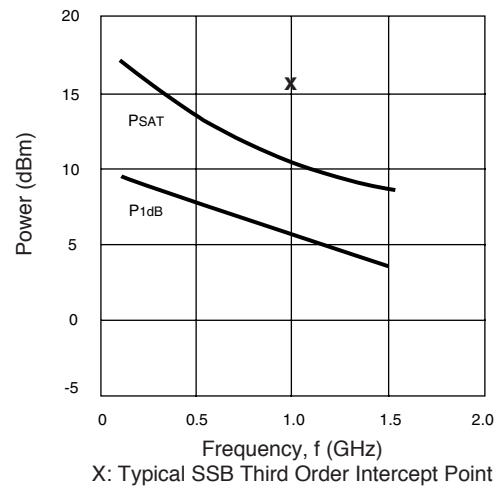
RETURN LOSS vs. FREQUENCY



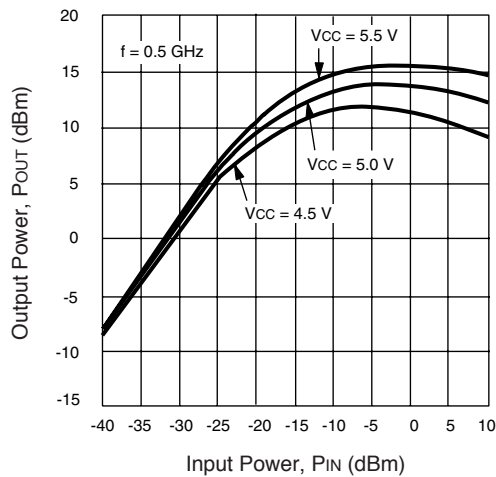
ISOLATION vs. FREQUENCY



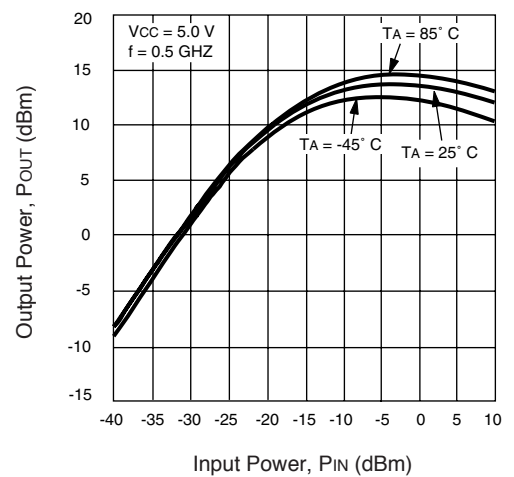
POWER vs. FREQUENCY



OUTPUT POWER vs. INPUT POWER AND VOLTAGE

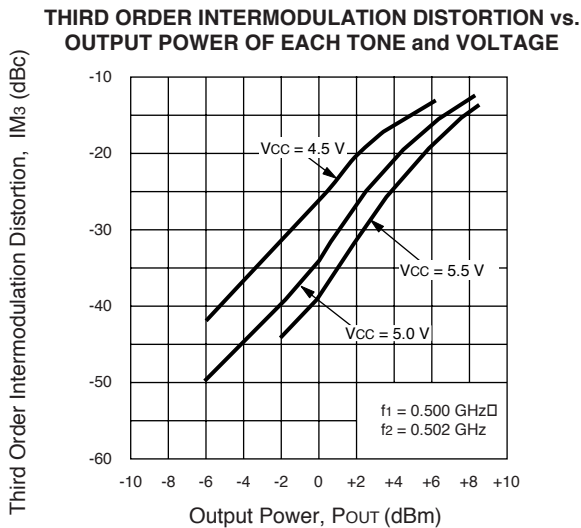
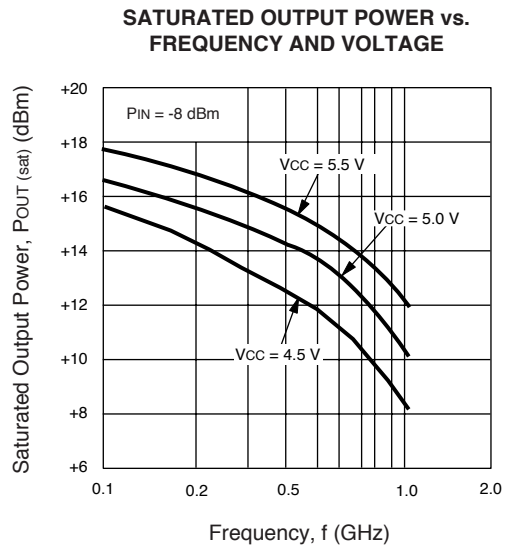
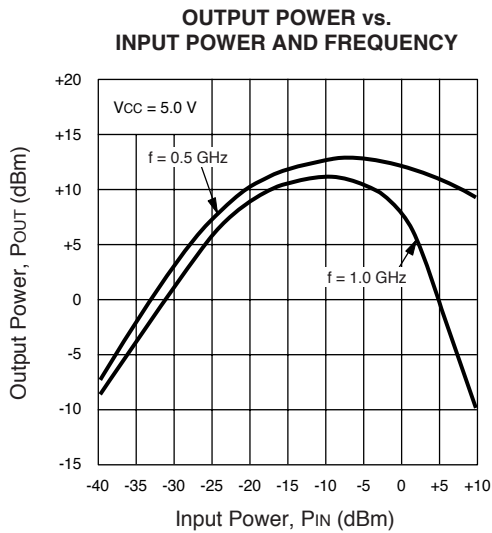
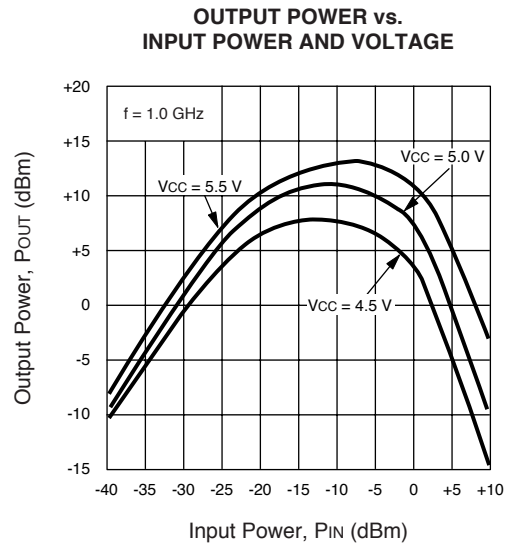
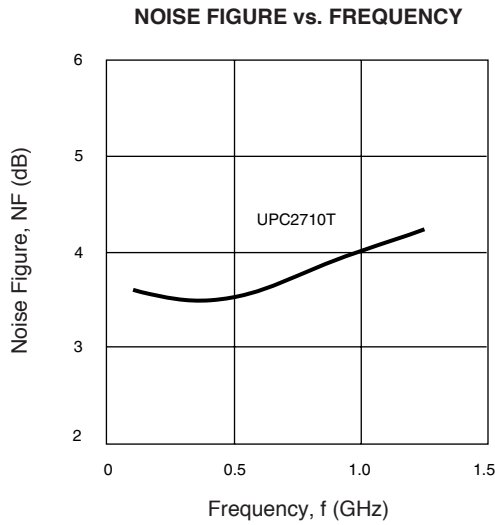


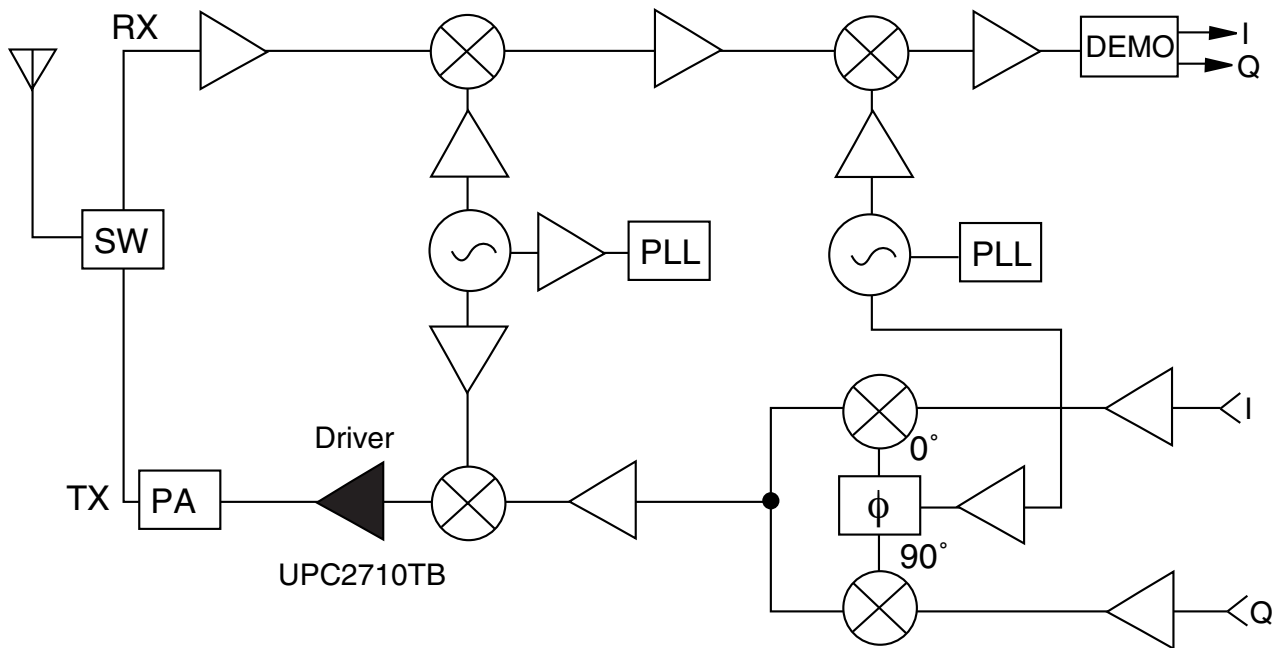
OUTPUT POWER vs. INPUT POWER AND TEMPERATURE



# UPC2710TB

## TYPICAL PERFORMANCE CURVES (T<sub>A</sub> = 25°C)

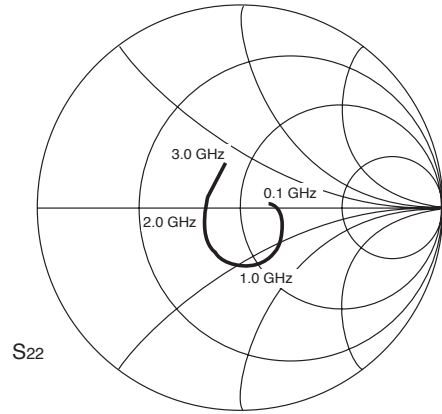
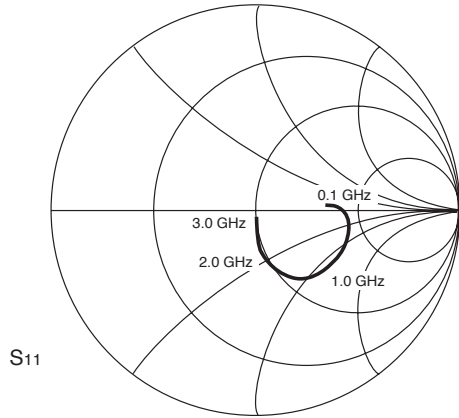


**SYSTEM APPLICATION EXAMPLE****Example of 900 MHz Band Digital Cellular Telephone**

UPC2710TB

# UPC2710TB

## TYPICAL SCATTERING PARAMETERS (TA = 25°C)

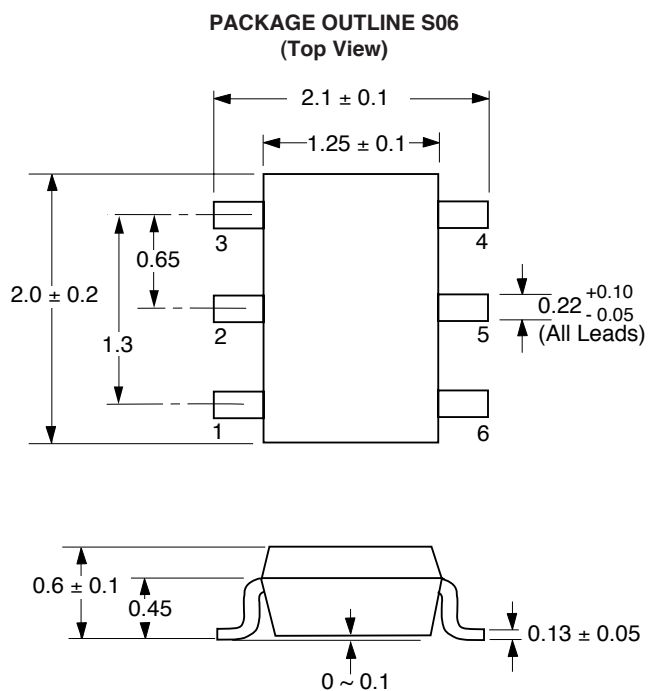


### UPC2710TB

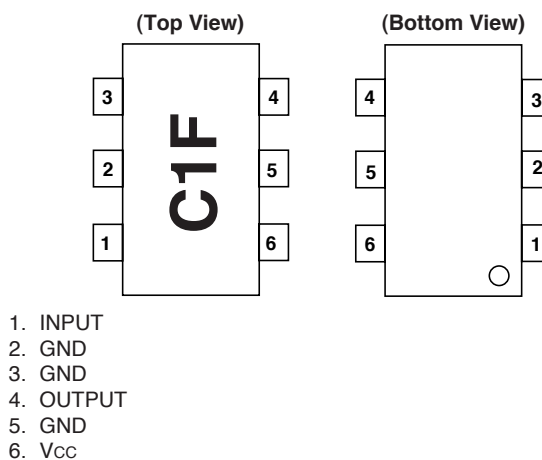
Vcc = Vout = 5 V, Icc = 22 mA

FREQUENCY GHz	S11		S21		S12		S22		K
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
0.1	0.306	2.5	43.072	-8.4	0.012	15.2	0.156	2.7	1.08
0.2	0.324	5.2	43.517	-17.1	0.010	10.7	0.164	2.1	1.17
0.3	0.356	5.3	44.432	-26.5	0.010	20.2	0.185	0.3	1.10
0.4	0.400	2.5	45.513	-36.9	0.012	26.9	0.225	-5.5	0.92
0.5	0.439	-3.3	45.679	-48.1	0.012	27.0	0.255	-15.4	0.85
0.6	0.469	-10.2	45.670	-59.7	0.013	31.3	0.283	-27.6	0.77
0.7	0.481	-17.9	44.793	-71.8	0.014	27.9	0.312	-54.9	0.74
0.8	0.488	-26.7	43.016	-84.3	0.014	34.9	0.301	-40.2	0.74
0.9	0.479	-34.5	40.519	-96.0	0.013	26.6	0.307	-92.2	0.85
1.0	0.465	-41.2	37.946	-107.3	0.016	30.8	0.311	-79.5	0.79
1.1	0.448	-49.3	35.122	-117.9	0.016	26.6	0.307	-92.2	0.85
1.2	0.417	-54.9	32.108	-128.0	0.015	39.5	0.282	-104.6	0.99
1.3	0.387	-61.2	29.221	-137.0	0.015	39.7	0.270	-115.5	1.12
1.4	0.350	-65.2	26.656	-145.8	0.015	50.2	0.248	-127.0	1.27
1.5	0.316	-70.8	23.895	-153.9	0.013	50.8	0.236	-136.2	1.56
1.6	0.292	-74.0	21.576	-161.6	0.016	56.6	0.215	-145.3	1.49
1.7	0.256	-76.9	19.567	-168.1	0.015	69.0	0.200	-155.2	1.71
1.8	0.245	-80.5	17.743	-174.4	0.018	61.7	0.196	-162.5	1.59
1.9	0.215	-82.9	16.040	-179.6	0.017	70.0	0.180	-173.4	1.88
2.0	0.201	-85.6	14.717	-173.5	0.021	71.2	0.175	-178.1	1.71
2.1	0.177	-84.4	13.475	-168.8	0.020	83.0	0.166	-172.0	1.94
2.2	0.161	-88.8	12.327	-163.1	0.021	76.7	0.171	-167.7	1.99
2.3	0.145	-88.7	11.154	-158.7	0.022	87.9	0.159	-159.7	2.08
2.4	0.124	-90.3	10.262	-154.4	0.023	81.4	0.164	-154.0	2.15
2.5	0.113	-89.8	9.490	-150.4	0.025	91.9	0.158	-147.0	2.19
2.6	0.107	-91.9	8.793	-146.4	0.028	88.7	0.166	-141.8	2.06
2.7	0.091	-92.2	8.149	-142.4	0.030	93.4	0.175	-135.7	2.13
2.8	0.081	-94.9	7.652	-138.9	0.031	92.1	0.183	-131.6	2.13
2.9	0.067	-97.4	7.134	-135.1	0.031	93.0	0.191	-123.4	2.26
3.0	0.055	-103.8	6.726	-131.5	0.039	88.3	0.200	-118.9	1.97
3.1	0.039	-95.6	6.295	-128.4	0.039	89.6	0.203	-111.5	2.08

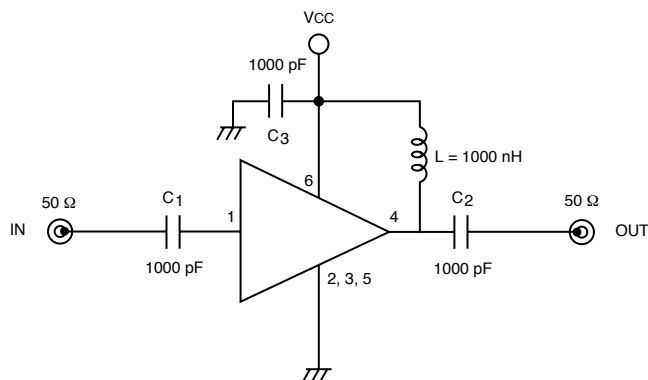
### OUTLINE DIMENSIONS (Units in mm)



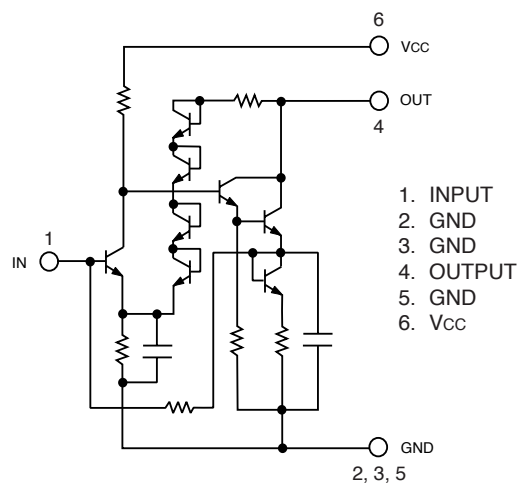
### PIN CONNECTIONS



### TEST CIRCUIT



### EQUIVALENT CIRCUIT



### ORDERING INFORMATION

PART NUMBER	MARKING	QTY
UPC2710TB-E3-A	C1F	3K/Reel

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

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