

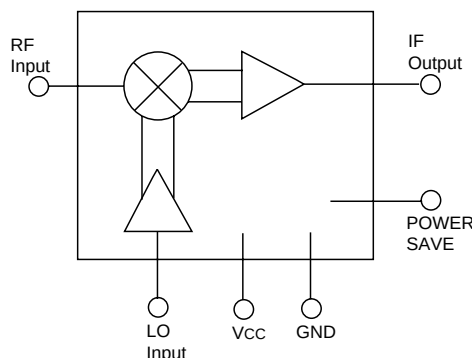
FEATURES

- **BROADBAND OPERATION:**
RF Input: 800 - 2000 MHz
IF Output: 100 - 300 MHz
- **INPUT IP₃:** -7 dBm
- **LOW VOLTAGE OPERATION:** 2.7~3.3 V
- **LOW CURRENT CONSUMPTION:** 8.5 mA
- **POWER SAVE FUNCTION**
- **SUPER SMALL T06 PACKAGE**
- **TAPE AND REEL PACKAGING OPTION AVAILABLE**

DESCRIPTION

The UPC8112T is a silicon Monolithic Microwave Integrated Circuit which is manufactured using the NESAT III process. The NESAT III process produces transistors with f_T approaching 20 GHz. This device consists of a double balance mixer, an IF amplifier, and a LO buffer amplifier. The device was designed to be used as the first down converter for GPS and

INTERNAL BLOCK DIAGRAM



wireless communications such as cellular, PCS, and 900 MHz cordless phones. Operating on a 3 volt supply, this IC is ideally suited for hand held portable designs.

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

ELECTRICAL CHARACTERISTICS (T_A = 25 °C, V_{CC} = V_{PS} = 3.0 V, P_{LOin} = -10 dBm, Z_L = Z_S = 50 Ω unless otherwise specified)

PART NUMBER PACKAGE OUTLINE			UPC8112T T06		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I _{CC}	Circuit Current (no input signal)	mA	4.9	8.5	11.7
I _{CC} (PS)	Circuit Current at Power Save Mode, V _{CC} = 3.0 V, V _{PS} = 0.5 V	μA			0.1
f _{RFIn}	RF Frequency Response	GHz	0.8	1.9	2.0
f _{IFout}	IF Frequency Response ¹	MHz	100	250	300
CG	Conversion Gain f _{RFIn} = 900 MHz, f _{LOin} = 1000 MHz f _{RFIn} = 1.5 GHz, f _{LOin} = 1.6 GHz f _{RFIn} = 1.9 GHz, f _{LOin} = 1.66 GHz	dB	11.5	15	17.5
		dB		13	
		dB	9.5	13	15.5
NF	Single Side Band Noise Figure (SSB) f _{RFIn} = 900 MHz, f _{LOin} = 1000 MHz f _{RFIn} = 1.5 GHz, f _{LOin} = 1.6 GHz f _{RFIn} = 1.9 GHz, f _{LOin} = 1.66 GHz	dB		9.0	11
		dB		11	
		dB		11.2	13.2
P _{1dB}	Output Power at 1 dB gain compression, f _{RFIn} = 1.9 GHz f _{LOin} = 1.66 GHz	dBm		-5	
P _{SAT}	Saturated Output Power f _{RFIn} = 900 MHz, f _{LOin} = 1000 MHz f _{RFIn} = 1.9 GHz, f _{LOin} = 1.66 GHz (P _{RFIn} = -10 dBm)	dBm	-6.5	-2.5	
		dBm	-7	-3	
IIP ₃	Input 3rd Order Intercept Point, f _{RFIn} = 900 MHz, f _{LOin} = 1000 MHz f _{RFIn} = 1.5 GHz, f _{LOin} = 1.6 GHz f _{RFIn} = 1.9 GHz, f _{LOin} = 1.66 GHz	dBm		-10	
		dBm		-9	
		dBm		-7	
LORF	LO Leakage at RF pin, f _{RFIn} = 900 MHz, f _{LOin} = 1000 MHz f _{RFIn} = 1.5 GHz, f _{LOin} = 1.6 GHz f _{RFIn} = 1.9 GHz, f _{LOin} = 1.66 GHz	dBm		-45	
		dBm		-46	
		dBm		-45	
LOIF	LO Leakage at IF pin, f _{RFIn} = 900 MHz, f _{LOin} = 1000 MHz f _{RFIn} = 1.5 GHz, f _{LOin} = 1.6 GHz f _{RFIn} = 1.9 GHz, f _{LOin} = 1.66 GHz	dBm		-32	
		dBm		-33	
		dBm		-30	
RFLO	RF Leakage at LO Pin f _{RFIn} = 900 MHz, f _{LOin} = 1000 MHz ² f _{RFIn} = 1.5 GHz, f _{LOin} = 1.6 GHz ² f _{RFIn} = 1.9 GHz, f _{LOin} = 1.66 GHz ²	dBm		-80	
		dBm		-57	
		dBm		-55	

Notes:

1. External matching required.

2. P_{RFIn} = -30 dBm

ABSOLUTE MAXIMUM RATINGS¹ ($T_A = 25^\circ\text{C}$)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CC}	Supply Voltage	V	3.6
I _{CC}	Circuit Current	mA	77.7
P _D	Power Dissipation ²	mW	280
T _{OP}	Operating Temperature	°C	-40 to +85
T _{STG}	Storage Temperature	°C	-55 to +150

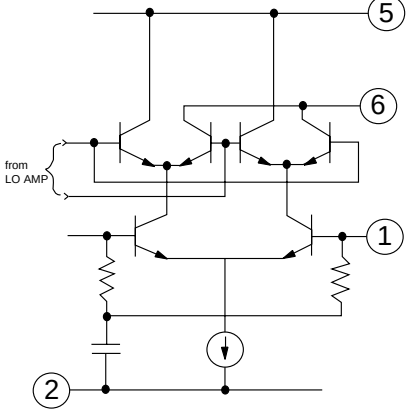
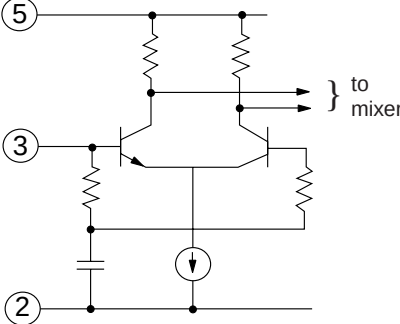
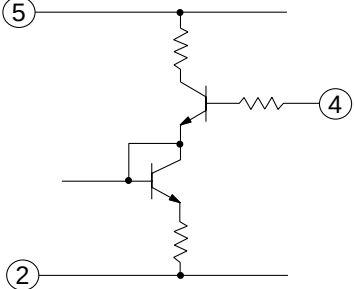
Notes:

- Operation in excess of any one of these parameters may result in permanent damage.
- Mounted on a 50 x 50 x 1.6 mm epoxy glass PWB ($T_A = +85^\circ\text{C}$).

**RECOMMENDED
OPERATING CONDITIONS**

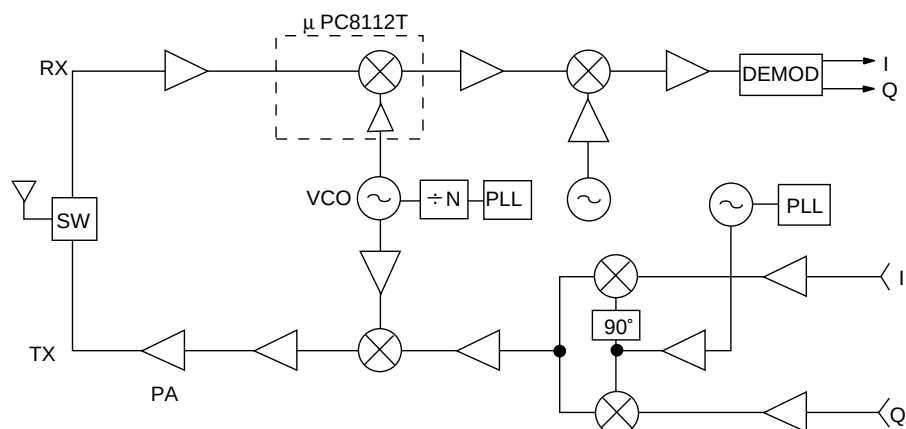
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V _{CC}	Supply Voltage	V	2.7	3.0	3.3
T _{OP}	Operating Temperature	°C	-40	+25	+85
P _{LOin}	LO Input Level	dBm	-15	-10	0
f _{RFin}	RF Input Frequency	GHz	0.8	1.9	2.0
f _{IFout}	IF Output Frequency	MHz	100	250	300

PIN FUNCTIONS

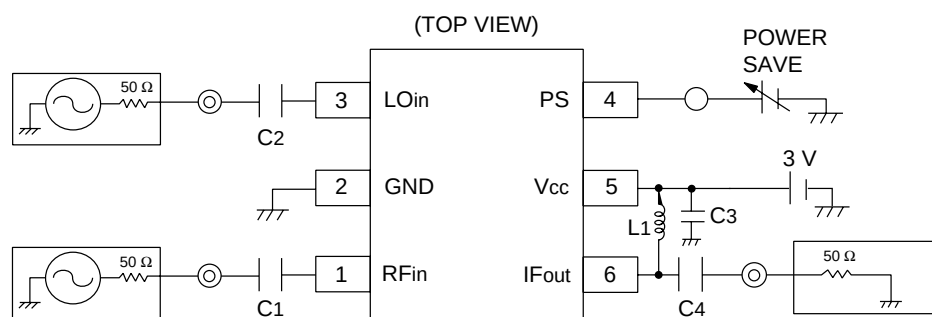
Pin No.	Symbol	Pin Voltage	Description	Internal Equivalent Circuit						
5	V _{CC}	2.7 ~ 3.3	Supply Voltage pin. Connect a bypass capacitor (e.g., 1000 pF) to minimize ground impedance.							
6	IF _{OUT}	Same as V _{CC} voltage through external inductor	IF output pin is an open collector with high impedance. External LC matching circuit is required.							
1	RF _{iiN}	1.2	RF input pin to mixer. Mixer is a double balanced Gilbert cell type. Input RF signal to the pin with a 50 Ω source impedance through a coupling capacitor.							
2	GND	0	Ground pin. Must be connected to the system ground with minimum inductance. Ground pattern on the board should be formed as wide as possible to minimize ground impedance.							
3	LO _{iN}	1.4	LO input pin to a differential buffer amplifier. Input LO signal through a coupling capacitor. Recommended input level: -15 to 0 dBm.							
4	PS	V _{CC} or GND	Power-save control pin. Voltage on this pin controls ON/OFF operation as follows: <table border="1" data-bbox="719 1629 950 1724"><thead><tr><th>Operation</th><th>V_{PS}</th></tr></thead><tbody><tr><td>ON</td><td>⊕2.5V</td></tr><tr><td>OFF</td><td>0-0.5 V</td></tr></tbody></table>	Operation	V _{PS}	ON	⊕2.5V	OFF	0-0.5 V	
Operation	V _{PS}									
ON	⊕2.5V									
OFF	0-0.5 V									

TYPICAL APPLICATION EXAMPLE

PCS or DIGITAL CELLULAR

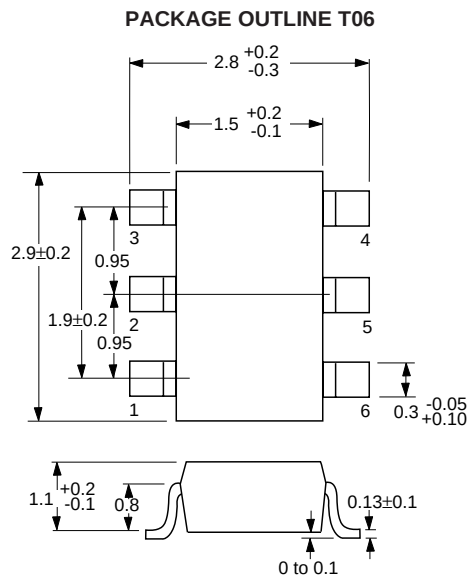


TEST CIRCUIT

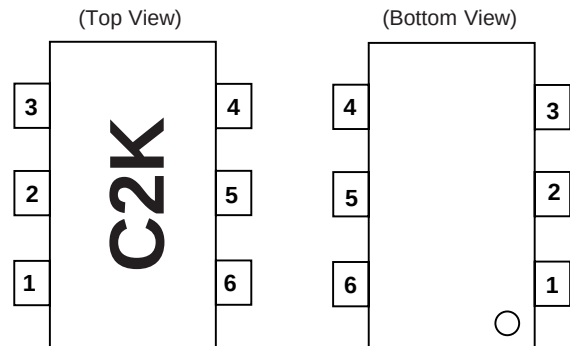


Note: 1. C1, C2, C3 are 1,000 pF capacitors.
 2. L1 and C4 are matching elements.
 L1 = 100nH and C4 = 2.7 pF for $f_{IF} = 240$ MHz

OUTLINE DIMENSIONS (Units in mm)



LEAD CONNECTIONS

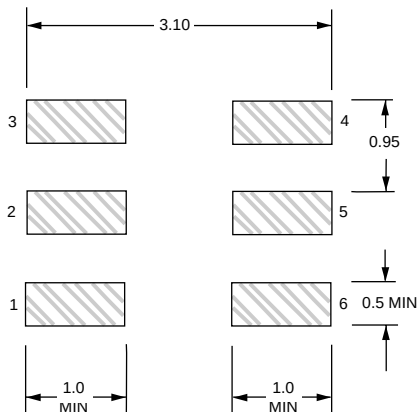


1. RF_{IN}
2. GND
3. LO_{IN}
4. PS
5. V_{CC}
6. IF_{OUT}

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

Note:

All dimensions are typical unless otherwise specified.



ORDERING INFORMATION

PART NUMBER	QTY
UPC8112T-E3	3K/Reel

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