HPMX-5002
Demonstration Circuit Board

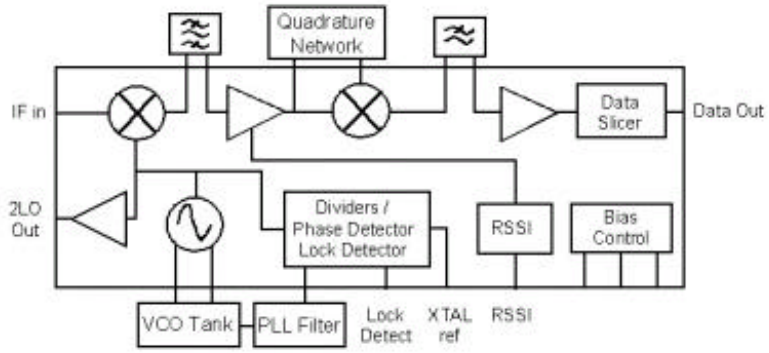
Applications Information

[12-17-98 Rev 1.01 DML]]

Introduction

The circuit board described is designed for use with HPMX-5002 DECT IF Demodulator / Modulator RFIC. It allows testing the IF RFIC for phaselock characteristics as well as 2LO mixer, limiting amplifier chain, discriminator / data slicer, Received Signal Strength Indicator (RSSI) and V2LO.

Plastic TQFP-48 Package



Functional Block Diagram

Assembly Notes

Table 1 lists the parts you will need to assemble the circuit board for many of the system component blocks. Note that several elements labeled as inductors or capacitors are actually replaced by resistors or shorts. For example elements L8, C20, C25, and C45 are actually 0 ohm shorting resistors. However, the board has been intentionally designed with flexibility to allow reactive elements in other testing modes. Refer to the full schematic for alternative test configurations. It must be cautioned that the full schematic is a superset of most testing requirement and therefore the user will need to carefully choose which subset of components and routing paths to utilize. Table 2 provides a complete parts list for the full schematic. Given board complexity, the components are grouped by component value and size for assembly ease, rather than sequential order.

If you are not familiar with surface mount PC board assembly, please read the HP Applications Bulletin titled 'Assembly Instructions for Communications Components Demonstration Circuit Boards', which details a recommended assembly technique.

Figures A and B show parts placement on the top and bottom sides of the board. Figure C provides the schematic diagram.

1. Always use bypass capacitors on the Vcc lines. Vcc can be set anywhere from 2.7 to 5.5 Volts. It is strongly recommended that you do not exceed the maximum IC voltage ratings shown on the IC data sheet.

2. Since there are components on both sides of the board, it is recommended that the top side components be installed first. The bottom side components will probably have to be soldered down by hand.

3. The circular board shape and regular placement of DC and RF connectors along the edge of the board are due to an HP internal generic PC convention. Thus, only some of the DC and RF connector positions are used specifically for the HPMX-5002 while many are not utilized.

4. The user may omit or modify several board components depending on characterization and performance requirements. In particular the loop filter components may be utilized and modified depending on specific system characteristics .

5. The tuning elements for mixer output port IF1 are optimized for 10 MHz. This is to allow direct noise figure measurements with an HP8970B which has a 10 MHz low range. Therefore with a 110.592 MHz mixer input signal at IP1, it is necessary to set the LO frequency at port VCOB to 100.592 MHz instead of the nominal 103.68 MHz. For actual noise figure measurement with an HP8970B, set IP1 to 110 MHz and VCOB to 100 MHz to obtain a 10 MHz IF1.

Using the Board

The board can be used to test performance of phaselock characteristics as well as the 2LO mixer, limiting amplifier chain, discriminator / data slicer, lock detector and Received Signal Strength Indicator (RSSI).

Figure 1 identifies major signal ports on the board. Figure 2 shows DC lines and recommended jumpers. Figures 3-6 show different test equipment set-ups for measuring performance of some of the sections of the IC. Because the HPMX-5002 has many functions, testing possibilities are quite large and only the tests for a few important parameters are outlined in this note as a starting point. The set-ups are for reference only. Fell free to use alternative equipment and set-ups that you may be more familiar with. For additional assistance please contact the HP Wireless Semiconductor Applications Group.

Table 1: Board Parts List (Characterization)

Notes: D69 is jumpered to D7. D33 is connected to D13 via a 10 k resistor.
All resistors and capacitors are Garrett surface mount. Inductors are Johansson.

package name	device type	component value & tolerance	comp class	refdes	totl
BALUN_B7T	TOKO 456DB-1007	4 turns	Discrete	X1	1
CAP0603	CE100D1NO	10 pf ± 0.5 pf	Discrete	C26 C27-bottom	2
CAP0603		100 pf 10%	Discrete	C2	1
CAP0603	CE102K1NR	1000 pf 10%	Discrete	C23, C24, C42, C52	4
CAP0603	CE103K1NR	.01uf 10%	Discrete	C10, C11, C12, C13, C14, C16, C17, C18, C40-bottom, C46, C47, C51, C53, C54, C55	15
CAP0603	CE220J2NO	22pf 5%	Discrete	C7	
CAP0603		27pf 5%	Discrete	C8	1
CAP0603	CE332K1NR	3300pf 5%	Discrete	C3	1
CAP0603	CE8R2J2NO	8.2pf 5%	Discrete	C31	1
CAP0805	0805N104J101N	.1uf 5%	Discrete	C35, C38	
CAP0603	0603N104J101N	.1uf 5%	Discrete	C22, C15-bottom, C19-bottom	5
DIPSWITCH 3POLE	Grayhill 78B03		Discrete	SW2	1
DIPSWITCH 4POLE	Grayhill 78B04		Discrete	SW1	1
IND1008	1008CS-101-XKCB	100nH 10%	Discrete	L6	1
IND1008	1008CS-221-XKCB	220nH 10%	Discrete	L4	1
IND1008	1008CS-272-XKCB	2.7nH 10%	Discrete	L1	1
RES0603	RK731H1J0R0F	0 ohm 1%	Discrete	R21, R22, R26	
CAP0603	RK731H1J0R0F	0 ohm 1%	Discrete	C20-bottom, C25, C45	
IND1008	RK731H1J0R0F	0 ohm 1%	Discrete	L8	7
RES0603		100 ohm 1%	Discrete	R40	1
RES0603	RK731H1J1001F	1Kohm 1%	Discrete	R16	
RES0603	RK731H1J1401F	1.4Kohm 1%	Discrete	R17,R18	2
RES0603	RK731H1J10R0F	10ohm 1%	Discrete	R32, R33, R34, R35-bottom, R36-bottom	5
RES0603	RK731H1J6191F	6.2Kohm 1%	Discrete	R10-bottom, R11-bottom, R12-bottom, R13-bottom, R29-bottom, R30-bottom, R31	7
RES0603	RK731H1J2002F	20Kohm 1%	Discrete	R6	1
RES0603	RK731H1J49R9F	49.9ohm 1%	Discrete	R27	1
RES0603	RK731H1J51R1F	51.1ohm 1%	Discrete	R28, C28	2
SMA	Johnson either: 142-0701-201 (straight) 142-0701-301 (right angle)		Connector	RF2, RF4, RF8, RF16, RF18, RF20, RF22	7

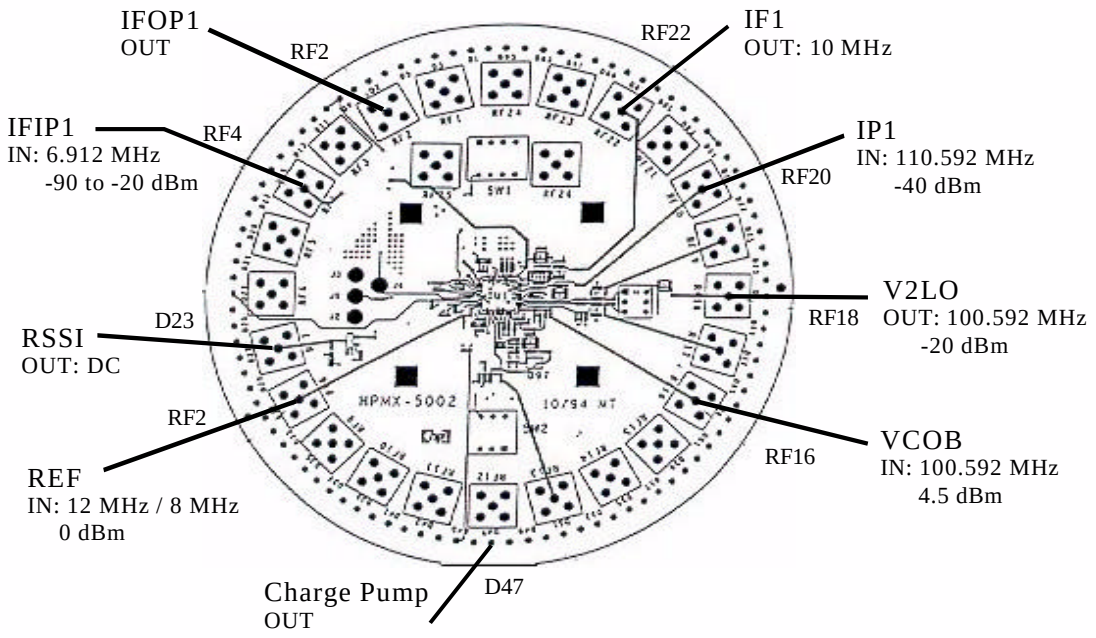
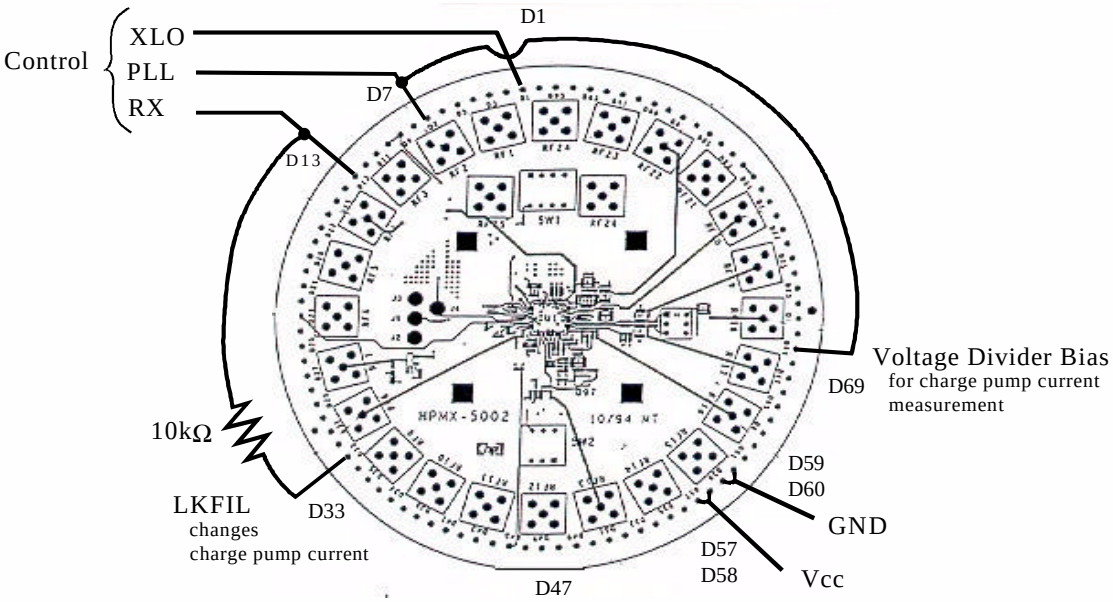


Figure 1: **Signal Ports**



Note: User may prefer SW1 instead of external control lines D1, D7, and D13 In that case D1, D7, and D13 should be connected to Vcc. Also SW2 lines should be closed, i.e. shorted to ground.

Figure 2: **DC Connections**

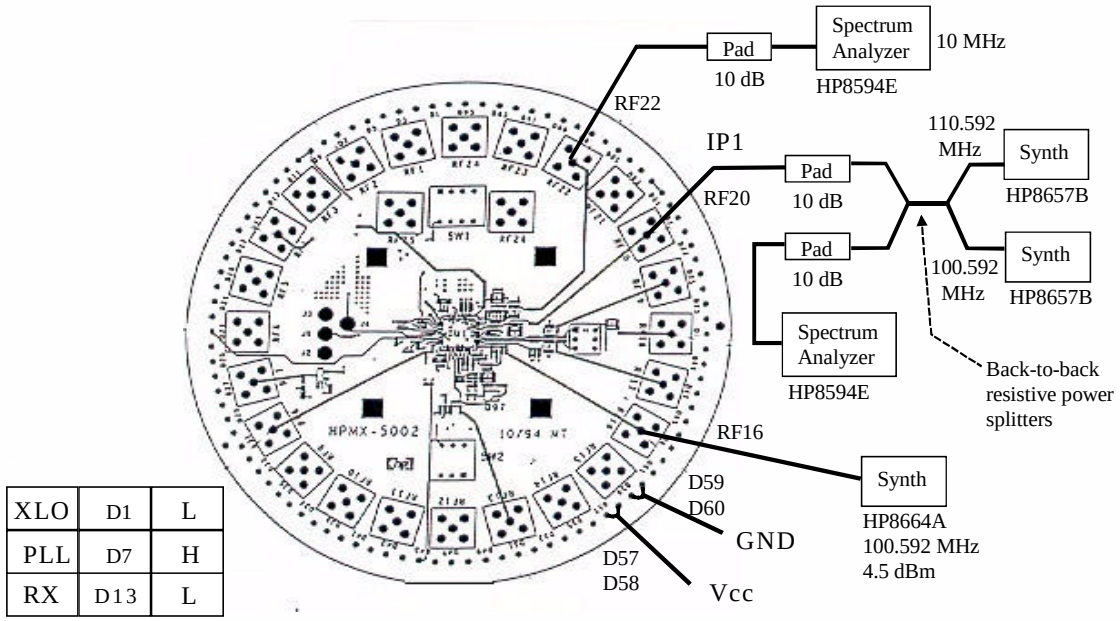


Figure3: **Mixer IP3 Test**

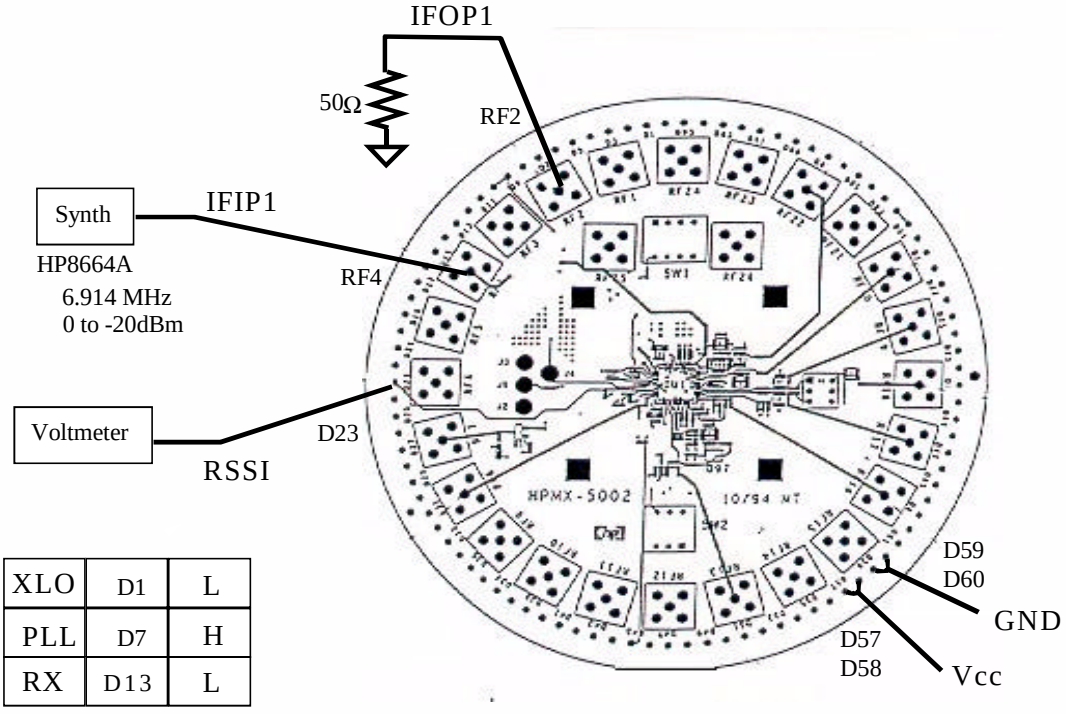


Figure4: RSSI Test

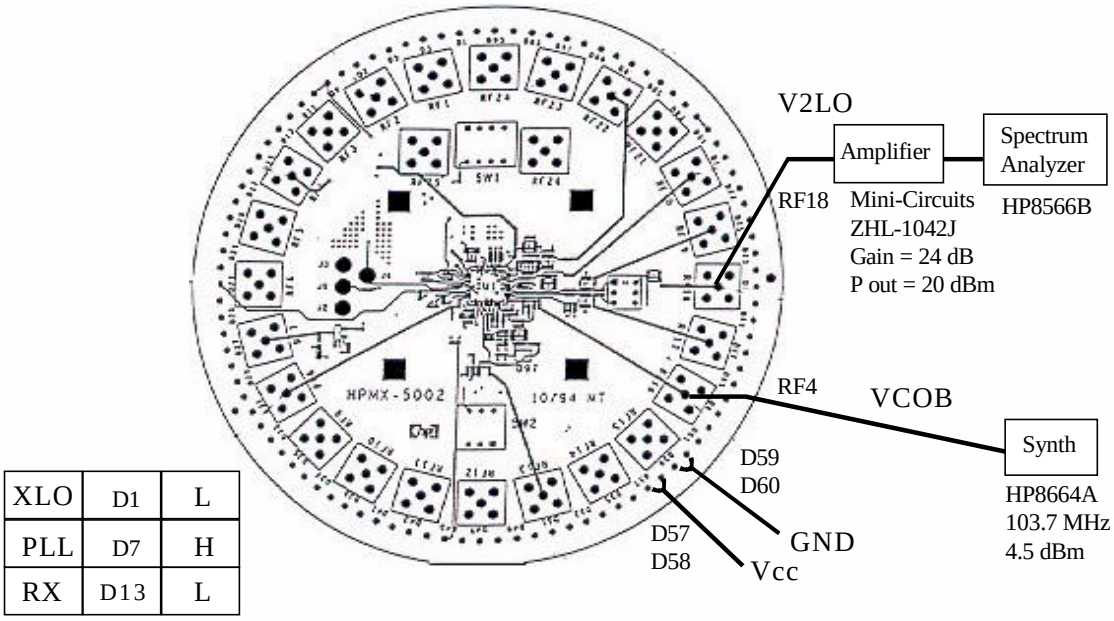


Figure 5: **V2LO Noise Floor Measurement**

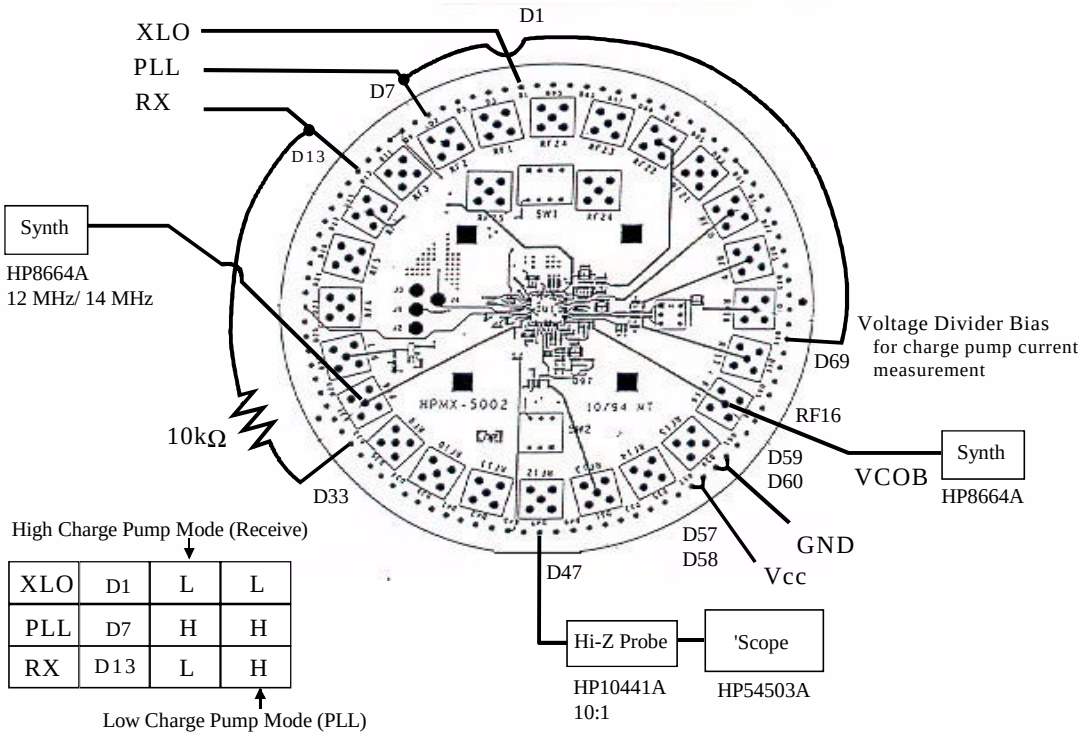


Figure 6: **Charge Pump Test**