

## **Detail Test Item for Each Function**

**Model: XFR102**

*(Production reference document)*

Item	Test Function	Alignment Method	Equipment Requirement
<b>PCB</b>			
	Enter Test Mode	1. Push PTT and Power buttons together to enter Test-mode program.	Test Fixture: DC supply (0 ~ 15V)
1.	LCD display (open short test)	1. Press Power button to turn on the unit. 2. Use normal function to check icon and segment for LCD open short test.	Test Fixture: DC supply (0 ~ 15V)
2.	Current Consumption a. Stand by current b. RX Save ON current c. RX Save OFF current d. TX current	1. Set to test-mode, CH-1. 2. Check RX Current. (a) Press [LAMP] button one time to test-mode RX ON. (b) Check the RX Save ON current < 50mA. (c) Press [LAMP] button one more time to test-mode RX OFF. (d) Check the RX Save OFF current < 1.35mA. 3. Check TX current (a) Press PTT to TX mode. (b) Check TX talk ON current < 300mA.	Test Fixture: DC supply (0 ~ 15V)
3.	TX VCO RX VCO	1. Set to CH-14 and press PTT switch to TX mode. (a) Adjust L1 to get 2V DC at test point TP7. (b) Release PTT switch to check RX VCO DC on CH-14. 2. Set to CH-1 and press PTT switch. (a) Check CH-1 to DC voltage. (b) Release PTT switch and check RX VCO DC on CH-1.	Test Fixture: DC supply (0 ~ 15V) Digital Multi-meter (for DC voltage test)
4.	TX Part a. TX Power b. TX Frequency	1. Set to CH-7 and press PTT switch to TX mode. (a) Check transmit power within 17.5dBm (ERP). 2. Set to CH-1 and press PTT switch to TX mode. (a) Adjust VC1 to get 462.5625 MHz $\pm$ 300Hz on CH-1. 3. Set to CH-14 and press PTT switch to TX mode. (a) Check the frequency around 467.7125MHz $\pm$ 300Hz.	Test Fixture: DC supply (0 ~ 15V)  RF Power Meter - LODESTAR-340
5.	TX Modulation & Distortion	1. Maximum Deviation: (a) Output 80mV 1KHz audio signal to Mic input and press [PTT] switch. (b) Check maximum deviation is around 2.2KHz. 2. Normal Deviation: (a) Output 8mV 1KHz audio signal Mic input and press [PTT] switch. (b) Check normal deviation is around 1.5KHz. 3. Check TX audio distortion < 5%.	Test Fixture: DC supply (0 ~ 15V) Audio Signal Generator  Modulation Analyzer (1) (HP8901B) - test function as: - TX deviation - TX audio distortion

6.	RX Part a. RX Alignment b. RX Distortion c. RX Current d. RX Sensitivity	<ol style="list-style-type: none"> <li>Set to CH-4.</li> <li>Set RF signal generator to -50dBm with 1.5KHz modulation signal.</li> <li>Adjust T1 to get minimum distortion.</li> <li>Check audio distortion &lt; 5%.</li> <li>Check audio output &gt; 100mV at TP4.</li> <li>Check RX current &lt; 70mA.</li> <li>Set RF signal generator output level to -118dBm on TP9.</li> <li>Check SINAD sensitivity <math>\leq</math> -118dBm / 12dB SINAD on TP4.</li> <li>Repeat procedure 6.4 to 6.8 action on CH-11.</li> </ol>	<p>Test Fixture: DC supply (0 ~ 15V) Shield Room (1)</p> <p>RF Signal Generator (1) (HP8656B) test function as: - output RF signal - output modulating signal</p> <p>Audio Analyzer (1) (HP8903B) test function as: - SINAD reading</p> <p>Digital Multi-meter - for RX current test</p>
7.	RX Audio SQ Detection	<ol style="list-style-type: none"> <li>Set to CH-7.</li> <li>Set RF signal generator to -50dBm with 1.5KHz modulation signal.</li> <li>Adjust T1 to get minimum distortion.</li> <li>Check audio output &gt; 100mV at TP4.</li> <li>Audio Level: <ol style="list-style-type: none"> <li>Set RF SG level to -50dBm with 1.5KHz deviation at 1KHz audio frequency.</li> <li>Adjust volume button to the position, which give an output 200mV <math>\pm</math> 5mV at TP4.</li> </ol> </li> <li>Maximum and Minimum audio output power: <ol style="list-style-type: none"> <li>Set RF SG level to -50dBm with 1.5KHz deviation at 1KHz audio frequency.</li> <li>Adjust volume to the position, which give a maximum output with distortion 10%.</li> <li>Check the voltage at TP4 = 1V <math>\pm</math> 100mV.</li> <li>Set maximum audio output to 0 dB, adjust the volume to the position, which give a minimum output.</li> <li>Check the minimum voltage -35dB <math>\pm</math> 5dB at TP4.</li> </ol> </li> <li>Set to CH-4 <ol style="list-style-type: none"> <li>Set signal generator to -119dBm with 1.5KHz deviation, 1KHz tone.</li> <li>Adjust VR1 for 7 to 8dB SINAD.</li> <li>Check low sensitivity side 8 to 12dB SINAD.</li> <li>Check high sensitivity side 4 to 7dB SINAD.</li> </ol> </li> <li>Repeat 7.7 (a) on CH-11.</li> </ol>	<p>Test Fixture: DC supply (0 ~ 15V) Shield Room (2)</p> <p>RF Signal Generator (2) (HP8656B) test function as: - output RF signal - output modulating signal</p> <p>Audio Analyzer (2) (HP8903B, op 011 or 051) test function as: - audio level - distortion - audio bandwidth frequency and level measurement.</p> <p>Oscilloscope</p>
8.	Battery Detection	<ol style="list-style-type: none"> <li>Low battery 3.25V (speaker output beep tone and LCD flash).</li> <li>Dead battery 2.95V.</li> </ol>	<p>Text Fixture: DC supply (0 ~ 15V) Multi-voltage output equipment (self-made)</p>
<b>Casing</b>			
1.	Current Consumption	<ol style="list-style-type: none"> <li>Press POWER to turn on the unit.</li> <li>Press POWER to turn off the unit. <ol style="list-style-type: none"> <li>Check off mode current &lt; 550 uA.</li> </ol> </li> <li>Set Test-mode RX <ol style="list-style-type: none"> <li>Check the RX SCAN ON current &lt; 38 mA.</li> <li>Check the RX SCAN OFF current &lt; 1.35 mA.</li> </ol> </li> <li>TX current <ol style="list-style-type: none"> <li>Press PTT button and check TX current.</li> </ol> </li> </ol>	<p>Fix unit Fixture: DC supply (0 ~ 15V) Multi-Meter (for current test)</p>
2.	TX Frequency	<ol style="list-style-type: none"> <li>Set to CH-1 and press PTT switch to TX mode.</li> </ol>	Special Test Fixture:

	TX Power TX Audio	<ol style="list-style-type: none"> <li>(a) Check the frequency = <math>462.5625 \text{ MHz} \pm 300\text{Hz}</math>.</li> <li>2. Set to CH-14 and press PTT switch to TX mode.               <ol style="list-style-type: none"> <li>(a) Check the frequency = <math>467.7125 \text{ MHz} \pm 300\text{Hz}</math>.</li> </ol> </li> <li>3. Check the radiated power reference to Golden Sample.</li> <li>4. Standard TX deviation.               <ol style="list-style-type: none"> <li>(a) Set unit to CH-4.</li> <li>(b) Put checked unit on test fixture, make sure the unit mic is face to fixture speaker to get maximum pick up audio signal.</li> <li>(c) Press PTT switch to TX mode, unit can pick up the audio sound level from test fixture's speaker.</li> <li>(d) Check the normal TX deviation at a range of 1.5KHz that should compare to Golden sample.</li> <li>(e) Check the maximum TX deviation at a range of 2.2KHz.</li> </ol> </li> </ol>	DC supply (0 ~ 125V) Audio Signal Generator.  Frequency Country - HOODT CN-201A  Spectrum Analyzer (1 end) (HAMEG HM5010) - test function as - radiation output power - second harmonic - third harmonic  Modulation Analyzer (2 end) (HP8901B) - test function as - TX deviation - TX audio distortion
3.	Squelch Detection	<ol style="list-style-type: none"> <li>1. Set unit to CH-8.</li> <li>2. Set the distance of 0.3 meter between antenna of signal generator and checked unit.</li> <li>3. The antenna of signal generator and checked unit should be parallel to get max field strength power.</li> <li>4. Set RF signal generator to -90dBm with 1.5KHz deviation, 1KHz tone, make sure the unit still on squelch mute status (no voice can be heard)</li> <li>5. Adjust RF signal generator to -85dBm, it will change to squelch off status (voice can be heard)</li> <li>6. Repeat above action on CH-7.</li> </ol>	Fix unit Fixture: DC supply (0 ~ 15V) Shield Room (3)  RF Signal Generator (3) (HP8656B) - test function as - output RF signal  Telescope Antenna.
4.	Audio RX Path	<ol style="list-style-type: none"> <li>1. Set unit to CH-4.</li> <li>2. Plug the dummy speaker into audio jack.</li> <li>3. Check the radiated sensitivity reference to the Golden Sample.</li> <li>4. Audio Level:               <ol style="list-style-type: none"> <li>(a) Set RF SG level to -35dBm with 0.5KHz deviation at 1KHz audio frequency.</li> <li>(b) Select volume to the position, which give an output <math>100\text{mV} \pm 5\text{mV}</math>.</li> </ol> </li> <li>5. Maximum and Minimum audio output power.               <ol style="list-style-type: none"> <li>(a) Set RF SG level to -35dB with 1.5KHz deviation at 1KHz audio frequency.</li> <li>(b) Select volume to the position, which give a maximum output with distortion &lt; 5%.                   <ol style="list-style-type: none"> <li>(1) Check the voltage on dummy speaker &gt; 750mV.</li> <li>(2) Check the voltage pick up from speaker.</li> <li>(3) Compare the voltage difference between dummy speaker and speaker.</li> </ol> </li> <li>(c) Set maximum audio output to 0 dB, adjust volume to the position, which give a minimum output.                   <ol style="list-style-type: none"> <li>(1) Check the voltage on dummy speaker &gt; 350mV.</li> <li>(2) Check the voltage pick up from speaker.</li> <li>(3) Compare the voltage difference between dummy speaker and speaker.</li> </ol> </li> </ol> </li> </ol>	Special Test Fixture: DC supply (0 ~ 15V) Shield Room (4 end)  RF Signal Generator (4 end) (HP8656B) - test function as - output RF signal - output modulating signal - audio bandwidth frequency level output.  Audio Analyzer (3 end) (HP8903B) - test function as - audio level - distortion - audio bandwidth frequency and level measurement.  Audio Amplifier (to pick up speaker 1KHz signal)
5.	Battery Detection	<ol style="list-style-type: none"> <li>1. Low battery 3.25V (speaker output beep tone and LCD flash)</li> <li>2. Dead battery 2.95V.</li> </ol>	DC supply (0 ~ 15V) Multi-voltage output equipment (self-made).