

LABORATORY TESTING PROCEDURES

X32X

UNIT TEST - (UNIT ASSEMBLED)

TEST PREPARATION

- 1) Install Lithium Ion (observe polarity markings).
- 2) Turn on unit by pressing the power button.

SYSTEM TEST

- 1) Radiated Transmit and Receive performance may be observed.
- 2) Audio out & Audio in are available at the Headset jack.

LABORATORY TEST - (UNIT UN-ASSEMBLED)

TEST PREPARATION

- 1) Disassemble unit (4 screws – 2 behind batteries). Remove the PCB from the cabinet.
- 2) Remove the antenna with soldering iron and install a 50 ohm coax cable in its place.
- 3) Either clip alligator leads or solder test leads to the power supply connections. The negative terminal is the lower right PCB area below the VCO shield can. The positive terminal is the lower left PCB area.
- 4) Connect 3.7VDC power source to the terminals, observing correct polarity.
- 5) Connect an 16-ohm load through the Headset jack
- 6) Connect a audio generator with 10uF coupling capacitor through the Headset jack
- 7) Select desired channel 1-22 using CH up/down keypad switch. The rubber keypad may be removed from the front cabinet and used directly on the PCB.

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SPECIFIC TEST METHODS AND GUIDANCE

Modulation Characteristics – (*paragraph 2.1047(a) of the Rules*)

FOR TX AUDIO FILTER RESPONSE

1. Connect audio generator with 10uF coupling capacitor to microphone input jack. Press PTT button.
2. Connect RF output with modulation meter. (Filters of modulation meter should be set to a 25Hz to 15KHz.)
3. Adjust audio generator 6-7mVrms of 1KHz audio (approx. 0.75KHz modulation).
4. While transmitting, sweep generator and note measurement.
5. Please compensate the back-ground noise level.

Modulation Characteristics – (*paragraph 2.1047(b) of the Rules*)

FOR TX AUDIO LOW PASS FILTER RESPONSE.

1. Connect audio generator with 10uF coupling capacitor to microphone input jack. Press PTT button.
2. Connect AC voltmeter or other test equipment via jumper wire with junction of C53,R82.
3. Adjust audio generator for 200mV.
4. While transmitting, sweep generator and note measurement.

Occupied Bandwidth – (*paragraph 2.1049(c) of the Rules*)

1. Connect an audio frequency sweep generator with 10uF coupling capacitor to microphone input jack.
2. Adjust audio generator to a frequency of 2500Hz and a level of 51mV rms (+16dB above 8mV per FCC).
3. With a spectrum analyzer, transmit the radio and monitor the transmitter through an antenna.
4. Note required measurements per FCC.

TRANSMITTER ALIGNMENT METHOD

X32X

1. Frequency Setting

- A. Connect a frequency counter or communications service monitor capable of at least five watt RF.
- B. Press the PTT switch.
- C. Adjust CT201 trimmer capacitor such that the output frequency is equal to the channel frequency with a maximum error of +/- 200 Hz. CT201 is located the right side of X202 X-tal .

2. Output Power Alignment

- A. Connect a communications service monitor or a wattmeter and dummy load to the antenna connector.
- B. Press the PTT switch.
- C. Adjust air coil (L6) by spreading or de-spreading, to achieve maximum power, not to exceed 0.1W.

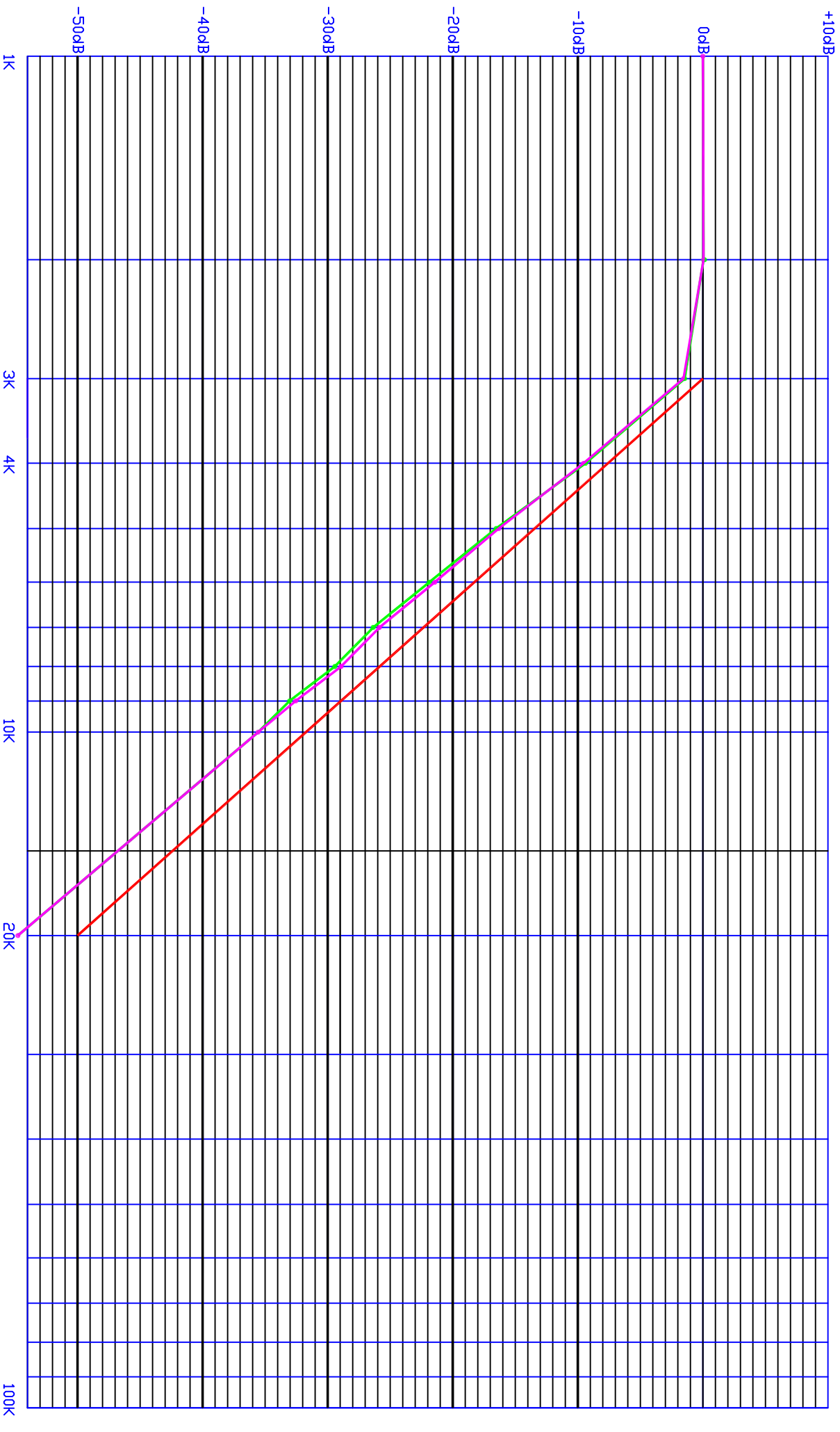
Note: Normally, it is not necessary.

3. Deviation Adjustment

- A. Connect an audio generator with 10uF coupling capacitor to the microphone jack. The audio frequency should be set at 1KHz with a level of 200mV.
- B. Connect an FM deviation meter or communications service monitor to the antenna connector. Set the monitor to read peak deviation.
- C. Press the PTT switch.
- D. Adjust RV2 for +/- 2.1KHz deviation. RV2 is located the bottom center side of PCB.

Frequency Response of the Audio Low Pass Filter

X32X #1
X32X #2



X32X

Audio Test Result

1. Frequency Response of Audio Low Pass Filter (150mV input)

	2K	3K	4K	5K	6K	7K	8K	9K	10K	15K	20K
#1	0.23	-1.45	-9.52	-16.5	-21.3	-25.8	-28.9	-32.3	-35.1	-46.8	-55.6
#2	-0.17	-1.52	-9.58	-16.6	-21.5	-26.5	-29.5	-33.1	-35.3	-46.5	-55.1

X32X Production Specification

1. GENERAL SPECIFICATION

	Items	Specifications
1	Tx Frequency range	462.5500MHz ~ 467.7125MHz
2	Tx VCO Frequency range	Same as item 1
3	RX Frequency range	Same as item1
4	RX VCO Frequency range	441.150MHz ~ 446.3125MHz (Lower Heterodyne)
5	Channel Number Channel Spacing	22CH 25KHz
6	Frequency Control	PLL Synthesizer with Temperature Compensated Crystal Reference
7	IF frequencies	21.4 MHz for 1'st IF 450KHz for 2'nd IF
8	Modulation	FM (F3E emissions)
9	Standard Test Modulation signal	Modulated audio Frequency : 1KHz Test modulation : +/-1.5KHz
10	TX Frequency stability	Max. +/-2.5ppm (-20℃ to +50℃)
11	Nominal test temperature Range	25℃ +/- 5℃
	Extreme operating temperature Range	-20℃ to +50℃
12	Antenna Impedance	50 ohm +/- 25 ohm
13	Power source	1 cell Lithium Ion battery
14	Test Power Supply Voltage	3.7Vdc. +/-0.1Vdc
	Extreme Supply Voltage Range	3.1Vdc to 4.2Vdc
15	Battery life time (Typ. 5/5/90 duty)	Min. 45 Hours
8	Microphone	Self contained Electret
17	Speaker	Self contained 16 ohm

X33X DETAILED SPECIFICATION

A. RECEIVER SECTIONS

* Normal test condition *

	TYP.	LIMIT				
1. MAXIMUM USABLE SENSITIVITY * 1KHz +/-1.5KHz DEV. * REF. CHANNEL 1 & 8	-121dBm	<-118dBm				
2. 20dB QUIETING SENSITIVITY * 1KHz +/-1.5KHz DEV. * REF. CHANNEL 1 & 8, 12dB SINADDER	-114dBm	<-110dBm				
3. 6dB BANDWIDTH * REF. 1KHz +/-1.5KHz DEV.	+/-3.0KHz	+/-1.0KHz				
4. MODULATION ACCEPTANCE BANDWIDTH * REF. 1KHz +/-1.5KHz DEV.		<+/-4.5KHz				
5. ADJACENT CHANNEL TWO SIGNAL SELECTIVITY & SENSITIZATION * +/- 1 CHANNEL SPACING		>50dB				
6. SPURIOUS RESPONSE ATTENUATION * FROM 100KHz TO 1GHz		>50dB				
7. INTER-MODULATION SPURIOUS RESPONSE ATTENUATION		>50dB				
8. SPURIOUS EMISSIONS * CONDUCTIVE CONNECTION		<-53dBm				
9. RECEIVE FREQUENCY RESPONSE * REF. 1KHz +/-1.5KHz DEV. 500Hz 3KHz	+3.0dB -17.0dB	+/-2.0dB +/-3.0dB				
10. AUDIO OUTPUT LEVEL * REF. 1KHz +/-1.5KHz DEV. * (No LOAD) * Volume INITIAL	1.3V	+/-150mV				
11. MAXIMUM AUDIO OUTPUT LEVEL * REF. 1KHz +/-1.5KHz DEV. * 16 ohm LOAD * VOLUME MAX.	200mW	+/-40mW				
12. AUDIO OUTPUT DISTORTION * REF. 1KHz +/-1.5KHz DEV. * (8 ohm LOAD)		<5%				
13. MAX. S/N RATIO * REF. 1KHz +/-1.5KHz DEV. * (8 ohm LOAD)	30 dB	>25dB				
14. RX VCO REF. VOLTAGE * REF. CHANNEL 1 * REF. CHANNEL 8	0.8V 1.5V	+/-0.3V +/-0.5V				
15. SQUELCH THRESHOLD * REF. 1KHz +/-1.5KHz DEV.*	9dBsinadder	-3dB - +7dB				
8. CURRENT CONSUMPTION * Un-squelched Volume Max. * Power Off	70mA 400uA	+/-20mA <400uA				

B. TRANSMITTER SECTIONS

	TYP	LIMIT	#1	#2
1. TRANSMITTER FREQUENCY TOL. * REF. CHANNEL 1		<+/-500Hz		
2. TRANSMITTER RF POWER * REQUIRED CONDUCTIVE CONNECTION * CHANNEL 1	0.1W	-0.03W		
3. TRANSMITTER OCCUPIED BANDWIDTH * REQUIRED CONDUCTIVE CONNECTION * REF. CHANNEL 1 @12.5KHz		<-50dBC		
4. TRANSMITTER SPURIOUS * REQUIRED CONDUCTIVE CONNECTION * REF. CHANNEL 8		<-50dBC		
5. MODULATION SENSITIVITY * REF. 1KHz AUDIO * CHANNEL 1 , @+/-1.5KHz	10mV	+/-3mV		
6. MODULATION LIMITING * REF. 1KHz AUDIO, CHANNEL 1 * (INPUT AUDIO ; 200mVrms)	+/-2.2KHz	+/-0.2KHz		
7. MODULATION AUDIO DISTORTION * REF. 1KHz AUDIO +/-1.5KHz	3%	<5%		
8.TX AUDIO FREQUENCY RESPONSE * REF. 1KHz AUDIO, CHANNEL 1 * (INPUT AUDIO ; 4mVrms) 500Hz 3KHz	-3.0dB +4.0dB	+/-2.0dB +/-2.0dB		
9. TX MODUALTION S/N * REF. 1KHz AUDIO, CHANNEL 1 * (REF. INPUT AUDIO ; 8mVrms)	30dB	>25dB		
10. CTCSS CODE MODULATION CODE 1 CODE 38	+/-0.5KHz +/-0.5KHz	+/-0.2KHz +/-0.2KHz		
11. TX VCO REF. VOLTAGE * CHANNEL 1 * CHANNEL 8	0.8V 1.5V	+/-0.2V +/-0.2V		
12. CURRENT CONSUMPTION	220mA	+/-50mA		