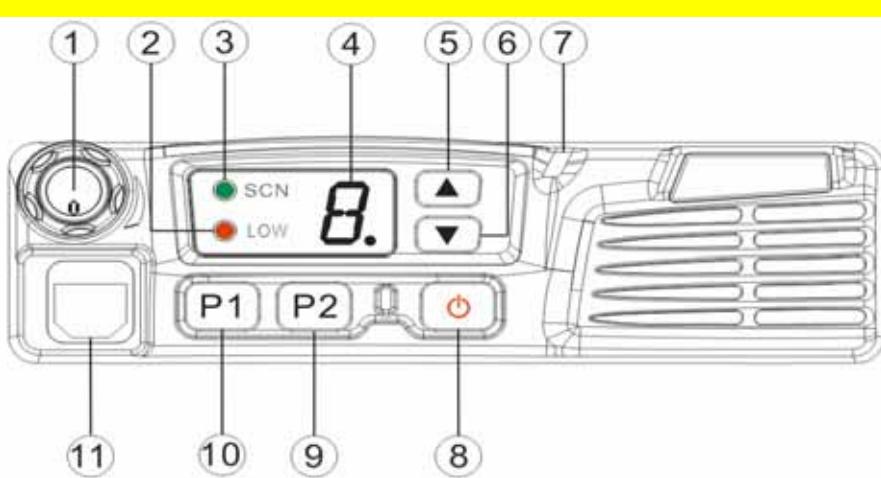


## Adjustment Description

### I. Key Functions

#### 1-1 Front Panel



Volume Knob

Low Power Indicator

Scan Indicator

Channel Display Numeric LED

Channel Up Key

Channel Down Key

Rx/Tx Indicator

On/Off Key

P2 Key

P1 Key

⑪ Mic Jack

#### 1-2 Panel Test Mode

When the function is off

Controls	Functions	Description
Up	Channel Up	
Down	Channel Down	
PF1	Squelch On/Off	
PF2	Channel scan	
Selector Knob	Volume tuning	

### 1-3 Panel Tuning Mode

Controls	Function	Description
Up	Tuning value up	
Down	Tuning value down	
PF1	Test/Tuning mode toggle	
PF2	Save tuning value, then move to the next item.	
Selector Knob	No function.	

### II. Panel Test Mode

Measure the transceiver's Tx output, Rx sensitivity and other items. CTCSS, CDCSS, 2-Tone, MSK and DTMF signalling are decoded in this mode.

#### 2-1 To Enter the Test Mode

Press [P1] key to power on and enter test mode.

#### 2-2 Test Frequency Channel (MHz)

In this mode, the test channel frequency (Center (C), Low (L), High (H) frequency) can be modified via the programming software.

Model	RX/TX	1 (C)	2 (L)	3 (H)	4	5	6	7	8
0	RX(MHz)	155.15	136.15	173.85	145.55	164.50	155.00	155.20	155.40
(V)	TX(MHz)	155.00	136.00	174.00	145.50	164.50	155.00	155.20	155.40

### III. Panel Tuning Mode

The transceiver is adjusted in this mode.

#### 3-1 To Enter the Panel Tuning Mode

Press the [P2] key in the panel test mode.

Within the adjustment items, all the frequency and signalling, other than the maximum deviation and sensitivity, return to the values valid for the test frequency channel and test signalling channel before entering the panel tuning mode.

No.	Dealer Mode	LED Display
1	Tx high power	0
2	Tx low power	1
3	Max. frequency deviation	2
4	CDCSS balance	3
5	CTCSS frequency deviation (67.0Hz)	4

6	CTCSS frequency deviation (151.4Hz)	5
7	CTCSS frequency deviation (254.1Hz)	6
6	CDCSS frequency deviation	7
7	DTMF frequency deviation	8
8	MSK frequency deviation	9
9	Single tone frequency deviation	A
10	Rx sensitivity	B
11	Squelch on level (Level 9)	C
12	Squelch on level (Level 3)	D
13	Squelch off level (Level 9)	E
14	Squelch off level (Level 3)	F

### 3-2. Tuning Items and Display

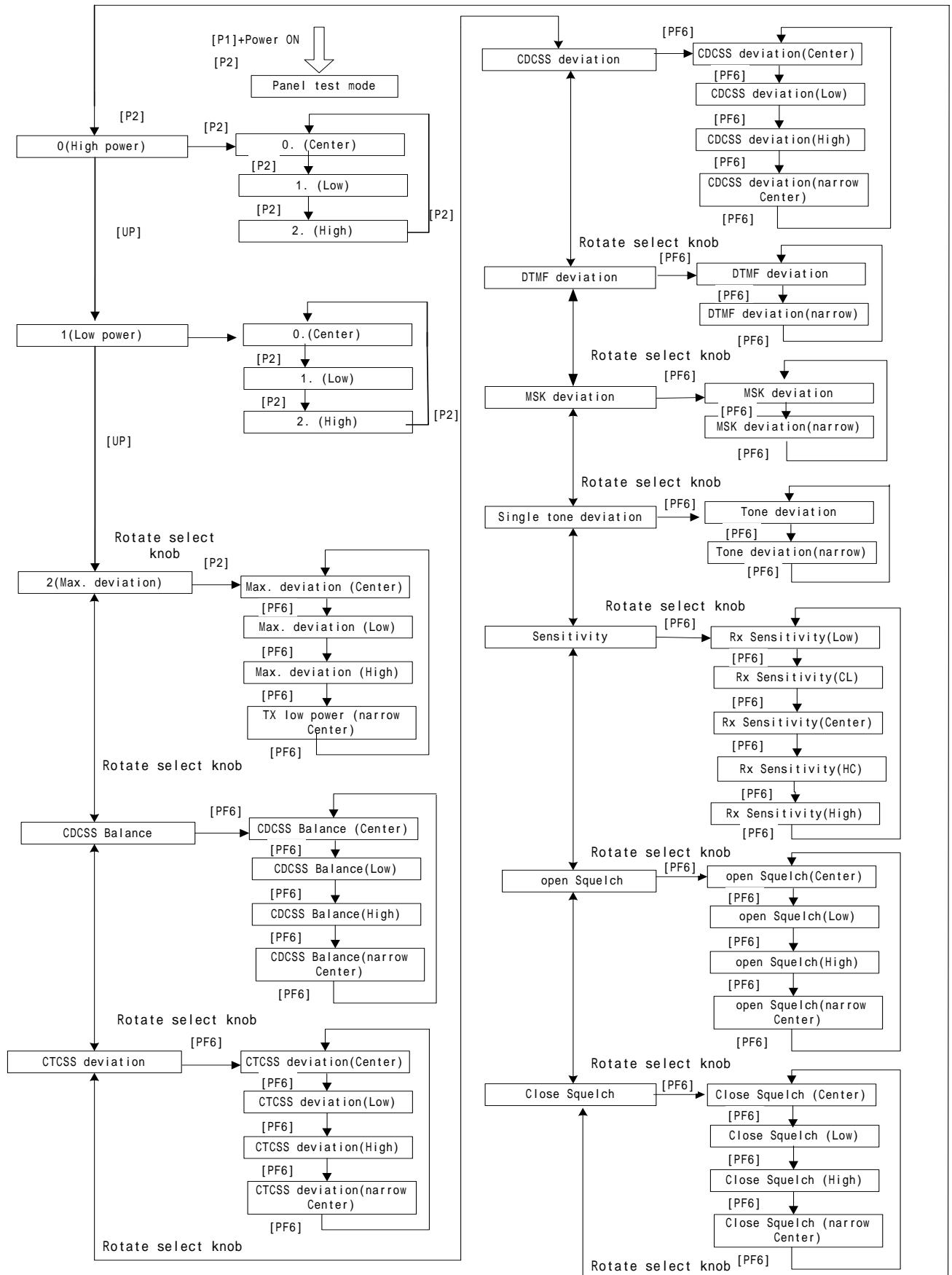
Items	Wide/Narrow Band	Frequency	LED Display	Signalling
Tx Frequency	High Power Wide Band	Center	0.	No signalling
		Low	1.	No signalling
		High	2.	No signalling
	Medium Power Wide Band	Center	0.	No signalling
		Low	1.	No signalling
		High	2.	No signalling
Max Frequency Deviation	Wide Band	Center	0.	No signalling
		Low	1.	No signalling
		High	2.	No signalling
	Medium Band	Center	3.	No signalling
	Narrow Band	Center	4.	No signalling
CDCSS Balance	Wide Band	Center	0.	Square wave 100Hz
		Low	1.	Square wave 100Hz
		High	2.	Square wave 100Hz
	Medium Band	Center	3.	Square wave 100Hz
	Narrow Band	Center	4.	Square wave 100Hz
CTCSS Frequency Deviation	Wide Band	Center	0.	CTCSS: 67.0Hz
		Low	1.	CTCSS: 67.0Hz
		High	2.	CTCSS: 67.0Hz
	Medium Band	Center	3.	CTCSS: 67.0Hz
	Narrow Band	Center	4.	CTCSS: 67.0Hz
	Wide Band	Center	0.	CTCSS: 151.4Hz
		Low	1.	CTCSS: 151.4Hz

	High	2.	CTCSS: 151.4Hz	
Medium Band	Center	3.	CTCSS: 151.4Hz	
Narrow Band	Center	4.	CTCSS: 151.4Hz	
Wide Band	Center	0.	CTCSS: 254.1Hz	
	Low	1.	CTCSS: 254.1Hz	
	High	2.	CTCSS: 254.1Hz	
Medium Band	Center	3.	CTCSS: 151.4Hz	
Narrow Band	Center	4.	CTCSS: 254.1Hz	
CDCSS Frequency Deviation	Wide Band	Center	0.	CTCSS: 023N
		Low	1.	CTCSS: 023N
		High	2.	CTCSS: 023N
Medium Band	Center	3.	CTCSS: 151.4Hz	
Narrow Band	Center	4.	CTCSS: 023N	
DTMF Frequency Deviation	Wide Band	Center	1.	DTMF: 9
	Medium Band	Center	3.	DTMF: 9
	Narrow Band	Center	4.	DTMF: 9
MSK Frequency Deviation	Wide Band	Center	1.	0XAAA...
	Medium Band	Center	3.	0XAAA...
	Narrow Band	Center	4.	0XAAA...
Single Tone Frequency Deviation	Wide Band	Center	1.	1KHz
	Medium Band	Center	3.	1KHz
	Narrow Band	Center	4.	1KHz
Rx Sensitivity	-	Low	1.	No signalling; SQ deactivated
	-	Low-medium	5.	No signalling; SQ deactivated
	-	Center	0.	No signalling; SQ deactivated
	-	Medium-high	6.	No signalling; SQ deactivated
	-	High	2.	No signalling; SQ deactivated
Squelch On/Off	Level 9 Wide Band	Center	0.	No signalling
		Low	1.	No signalling
		High	2.	No signalling
	Level 9 Medium Band	Center	3.	No signalling
	Level 9 Narrow Band	Center	4.	No signalling
	Level 3 Wide Band	Center	0.	No signalling
		Low	1.	No signalling

	High	2.	No signalling
Level 3 Medium Band	Center	3.	No signalling
Level 3 Narrow Band	Center	4.	No signalling
Level 9 Wide Band	Center	0.	No signalling
	Low	1.	No signalling
	High	2.	No signalling
Level 9 Medium Band	Center	3.	No signalling
Level 9 Narrow Band	Center	4.	No signalling
Level 3 Wide Band	Center	0.	No signalling
	Low	1.	No signalling
	High	2.	No signalling
Level 3 Medium Band	Center	3.	No signalling
Level 3 Narrow Band	Center	4.	No signalling

### 3-3. Flow Chart

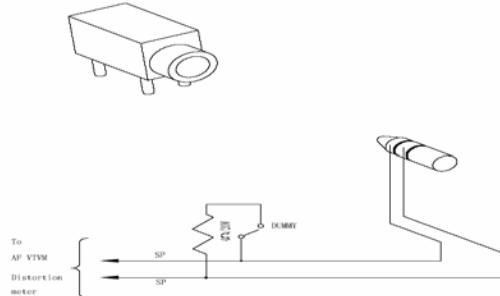
1. Use “UP”, “DN” keys to adjust the value (1 to 256).
2. Press [P2] key to move to the next item.



#### IV. Test Instrument for Alignment

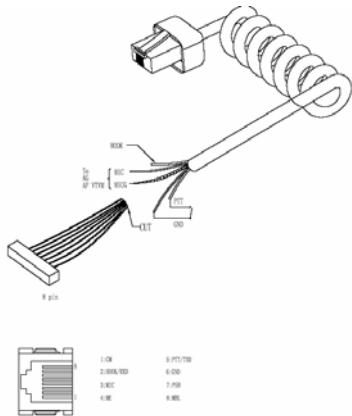
Instrument	Method	Major Specifications
Standard Signal Generator (SSG)	Frequency Modulation Output power	136 to 174 MHz Frequency modulation and external modulation 0.1uV to 1mV above
Power Meter	Input Impedance Operation Frequency Measurement Capability	50Ω 136 to 174 MHz or above About 50W
Digital Voltmeter (DVM)	Measuring Range Accuracy	1 to 20V DC High input impedance for minimum circuit loading
Oscilloscope		DC to 30MHz AC
High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 600MHz 0.2ppm or below
Ammeter		13A or above
AF Voltmeter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz 3mV to 3V
Audio Generator (AG)	Frequency Range Output Power	50Hz to 5kHz 0 to 1V
Distortion Meter	Measurement Capability Input Level	1kHz above 3% or less 50mV to 10Vrms
Voltmeter	Frequency Range Input Impedance	10 to 1.5V DC or less 50kΩ/V or more
4Ω Dummy Load		About 4Ω, 20W
Regulated Power		13.6V, about 20A (adjustable from 9 to 20V) Applicable if antenna required

##### 4-1 Test Cable for Speaker Output



##### 4-2 Test Cable for Microphone Input

The following test cable is recommended.



## V. Cautions When Removing or Attaching the Shield Cover

1. When handling with the shield cover, do not damage the components on the TX-RX unit.
2. When installing the shield cover, insert the cover from the rear side.
3. When removing the shield cover, squeeze the hole marked with an arrow as shown in the diagram and pull it straight up.

This mobile radio can only be adjusted via programming software or manually. Manual adjustment is described as follows. (Refer to ‘Test Mode’ and ‘Adjustment Mode’ in the section Radio Modes.)

### Instrument:

Radio Communication Test Set	1 set
Spectrum Analyzer	1 set
20A/30V Power Supply	1 set
Digital Voltmeter	1 set
Power Meter	1 set
Signal Line (with dummy load)	1 set

### Adjustment:

#### 1. Download

Connect the radio with PC by programming cable; turn the radio on.

Click “Download” on software interface.

Select the desired program and click “Open”, download starts.

Click “End” when download is completed.

Turn the radio off and remove the programming cable.

#### 2. Initialization

It is necessary to set the frequency and initialize the radio before adjustment because there

is no needed information in EEPROM when the radio is manufactured.

Turn on the power while holding down [P2], and re-press it after the **LED** displays “0”.

The LED on the control panel finishes flashing, indicating that the initialization is over.

### 3. Adjustment

Some items can be adjusted in conventional mode and the others in manual adjust mode.

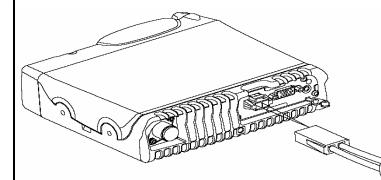
Turn on the power to enter conventional mode.

Switch off the power. And then turn on the power while holding down [P1]. The radio enter manual adjustment mode. The CH number is displayed on LED.

Frequency Table

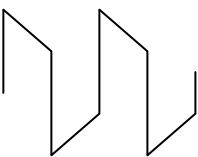
Model	RX/TX	1 (C)	2 (L)	3 (H)	4	5	6	7	8
0	RX(MHz)	155.15	136.15	173.85	145.55	164.50	155.00	155.20	155.40
(V)	TX(MHz)	155.00	136.00	174.00	145.50	164.50	155.00	155.20	155.40

## VCO

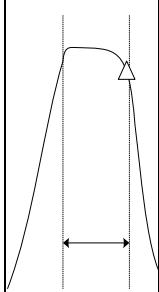
Item	Condition	Measurement		Adjustment		Specification/R emarks
		Test Instrument	Terminal	Part	Method	
1. Power Supply	1. Power supply voltage DC 13.6V		<p>Note: 1. This radio can only be installed in negative grounding electrical system. Reverse polarity will cause the cable fuse to blow. Check the vehicle ground polarity before the installation to avoid wasted time and effort.</p> <p>2. If DC power is to be controlled by the vehicle ignition switch, a switch relay should be used to switch the positive power lead. The vehicle ignition switch then controls DC to the relay coil.</p>			
2. VCO Lock Voltage (Tx)	1.CH: TX HI 2.CH: TX LO	Digital Voltmeter	CV	TC1	6.0V±0.1V Check	> 1.0V
3. VCO Lock Voltage (Rx)	1.CH: RX HI 2.CH: RX LO			TC2	6.0V±0.1V Check	> 1.3V

## Transmitter

Item	Condition	Measurement		Adjustment		Specification /Remarks
		Test Instrument	Terminal	Part	Method	
4. TX Frequency	Not enter adjustment item, but switch to 2CH	Radio Communication Test Set	ANT	Adjust VR801	Adjust channel frequency	Error<50Hz
5. TX Power	Each CH corresponds to a specific TX freq; enter the item "0", "1" in turn, to adjust High/Low power.	Radio Communication Test Set Ammeter	ANT	Adjust software setting & VR101; press [P2] to save the setting and move to the next item.	High Power: PO=23~25WW I≤8.0A	Check High Power
6. Max. Deviation	1. Each CH corresponds to a specific TX freq; enter the item "2" and adjust "0."、"1."、"2."、"3."、"4."	Radio Communication Test Set Filter: 0.05-15KHz AF : 1KHz 75mV	ANT MIC Jack	Adjust software setting; press [P2] to save the setting and move to the next item.	Low Power: PO=5±0.5W I≤5.0A	Check Low Power
					Check the deviation of Hi/Mid/Low channel: 4.0±0.1KHz(W)	
					Check the deviation of Hi/Mid/Low channel: 2.4±0.1KHz(W)	
					Check the deviation of Hi/Mid/Low channel: 1. 9±0.1KHz (N)	

7. Modulation Sensitivity	1. Each CH corresponds to a specific TX freq.	Radio Communication Test Set Filter: 0.05-15KHz AF: 1KHz 7.5mV	ANT MIC Jack		Check deviation: 2.6KHz-3.4KHz (W) 2.2KHz-2.7KHz (M) 1.3KHz-1.7KHz (N)	Check
8. Modulation Distortion					5%	
9. CDCSS Balance	Each CH corresponds to a specific TX freq; enter item "3"	Radio Communication Test Set Filter LPF: 300Hz	ANT	Use "UP", "DN" key to set CDCSS		Check waveform
10. CTCSS Deviation	Each CH corresponds to a specific TX freq; enter item "4", "5", "6"; adjust 67Hz/151.4Hz/254.1Hz CTCSS	Radio Communication Test Set Filter LPF: 300Hz	ANT	Use "UP", "DN" key to set CDCSS	Adjust deviation to 0.75KHz±0.10KHz (W) 0.60KHz±0.10KHz (M) 0.37KHz±0.05KHz (N)	
11. CDCSS Deviation	Each CH corresponds to a specific TX freq; enter item "7"	Radio Communication Test Set Filter LPF: 300Hz	ANT	Use "UP", "DN" key to set CDCSS	Adjust deviation to 0.75KHz±0.10KHz (W) 0.60KHz±0.10KHz (M) 0.37KHz±0.05KHz (N)	
12. DTMF Deviation	Each CH corresponds to a specific TX freq; enter item "8"	Radio Communication Test Set Filter LPF: 3KHz	ANT	Use "UP", "DN" key to set CDCSS	3.0KHz±0.1KHz (W) 2.4KHz±0.1KHz (M) 1.5KHz±0.1KHz (N)	
13. MSK	Each CH corresponds to a specific TX freq; enter item "9"	Radio Communication Test Set Filter LPF: 3KHz	ANT	Use "UP", "DN" key to set CDCSS	3.0KHz±0.1KHz (W) 2.4KHz±0.1KHz (M) 1.5KHz±0.1KHz (N)	
14. Single tone (2-/5-tone)	Each CH corresponds to a specific TX freq; enter item "A"	Radio Communication Test Set Filter LPF: 3KHz	ANT	Use "UP", "DN" key to set CDCSS	Adjust deviation to 3.0KHz±0.10KHz (W) 2.4KHz±0.10KHz (M) 1.5KHz±0.1KHz (N)	

## Receiver

Item	Condition	Measurement		Adjustment		Specification /Remarks
		Test Instrument	Terminal	Part	Method	
15. RF bandpass filter	Enter item "B"; Each CH corresponds to a specific TX freq.	Scanner	ANT . TP1	First manually adjust TC101, then the software setting	Set the gain value to the max; the corresponding freq is on the rightmost of the bandpass wave. Press [P2] key to save.	
16. Max. SINAD	Frequency: RX Center; adjust to CH1(C); corresponds to a specific freq.	Radio Communication Test Set SSG Output: -47dBm MOD: 1KHz DEV: ±3KHz(W) ±1.5KHz(N) Filter: 0.3-3.0KHz	ANT SP Jack	K301		Check Max. volume: 4.6V or above
17. Sensitivity	1. CH: RX Center, manually adjust to CH 1(C).  2. CH: RX LO, manually adjust to CH 2 (L).  3. CH: RX HI, manually adjust to CH3 (H).	Radio Communication Test Set SSG Output: -116dBm MOD: 1KHz DEV: ±3KHz(W) ±2.4KHz(M) ±1.5KHz(N) Filter: 0.3-3.0KHz	ANT SP Jack	Wide/narrow band switch (turn on the power while holding [P1] key to enter CH setting mode)	[P2] key for CH adjustment Check	SINAD: 12dB or above
19. SQ Open	Enter in turn the item "C" (Level 9 on), "D" (Level 3 on); adjust CH to "0.", "1.", "2.", "3.", "4."	Radio Communication Test Set SSG Output: -119dBm (Level 3)	ANT SP Jack	Adjust software setting	No need to adjust software setting at SQ Level 3/9; press [P2] twice to save.	Continuously press[P2] key twice for CPU reading and writing; SQ

		SSG Output: -112dBm (Level 9)				level
20. SQ Close	Enter in turn the item "C" (Level 9 off), "D" (Level 3 off); adjust CH to "0.", "1.", "2.", "3.", "4."	Radio Communication Test Set SSG Output: -123dBm (Level 3)			No need to adjust software setting at SQ Level 3/9; press [P2] twice to save.	Continuously press[P2] key twice for CPU reading and writing; SQ level
21. Distortion		Radio Communication Test Set SSG Output: -115dBm (Level 9)				DIS≤5%
22. S/N	1. Channel: RX Center	ANT SP Jack	Filter: 0.3-3.0KHz	Check		S/N≥47 (W) S/N≥42 (N)

Note: The radio must be covered with aluminum chassis during the adjustment of sensitivity, Tx power, signalling waveform, frequency deviation, Rx Squelch. Connect an RF power meter to the antenna connector during transmission. Connect the SINAD meter with 16ohm load to the external [SP] Jack.