

**FCC PART 90 TYPE APPROVAL**  
**EMI MEASUREMENT AND TEST REPORT**  
For  
**Quanzhou Licheng New Puxing Communication Equipment Factory**

Torch Industrial Area, Quanzhou, Fujian, China (Floor 5, Torch electronics Co LTD)

**FCC ID: UBYQZPUXING02**

July 17, 2006

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> VHF Portable Two-way Radio
<b>Test Engineer:</b> Charmi Peng <i>Charmi Peng</i> Deny Xiong <i>Deny Xiong</i>	
<b>Report No.:</b> RSZ06052903	
<b>Test Date:</b> June 2, 2006-July 12, 2006	
<b>Reviewed By:</b> Boni Baniqued <i>Boni Baniqued</i>	
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(ShenZhen). This report **must not** be used by the client to claim product certification,  
approval, or endorsement by NVLAP, NIST or any agency of the US Government.

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## GENERAL INFORMATION

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### Product Description for Equipment Under Test (EUT)

The *Quanzhou Licheng New Puxing Communication Equipment Factory's* product, model number: PX-777 or the "EUT" as referred to in this report is a VHF Portable Two-way Radio. The EUT is measured approximately 24.0 cm L x 6.0 cmW x 3.5 cmH, rated input voltage: DC 7.2 V battery.

*\* The test data gathered are from production sample, serial number: 0605034, provided by the manufacturer, we received the EUT on 2006-5-29.*

### Objective

This Type approval report is prepared on behalf of *Quanzhou Licheng New Puxing Communication Equipment Factory* in accordance with Part 2, and Part 90 of the Federal Communication Commissions rules.

### Related Submittal(s)/Grant(s)

No related submittal(s).

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA603-C and ANSI 63.4-2003, American National Standard for Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Lab Corp. (ShenZhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Test Facility

The Test site used by Bay Area Compliance Lab Corp. (ShenZhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China.

Test site at Bay Area Compliance Lab Corp. (ShenZhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179 and Industrial Canada registration test site No.: 5500A. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Lab Corp. (ShenZhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

### Equipment Modifications

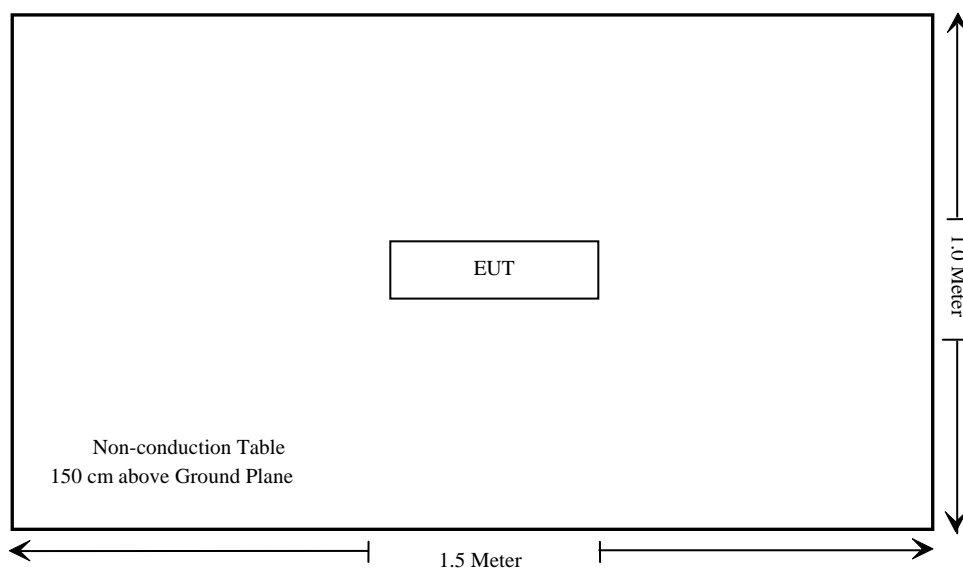
Bay Area Compliance Lab Corp. (ShenZhen) has not done any modification on the EUT.

### Configuration of Test Setup



EUT

### Block Diagram of Test Setup



## SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§1.1310 §2.1093	RF Exposure	Compliant, refer to SAR Report
§2.1046	Conducted Output Power	Compliant
§2.1046, §90.205	Radiated Output Power	Compliant
§2.1047 §90.207	Modulation Characteristic	Compliant
§2.1049, §90.209	Occupied Bandwidth	Compliant
§2.1051 §90.210	Spurious Emission at Antenna Terminal	Compliant
§ 2.1053 § 90.210	Spurious Radiated Emissions	Compliant
§ 2.1055 § 90.213	Frequency stability	Compliant
§ 90.214	Transient Frequency Behavior	Compliant

## §2.1046 - CONDUCTED OUTPUT POWER

### Applicable Standard

According to FCC §2.1046, and §90.205, maximum ERP is dependent upon the station's antenna HAAT and required service area.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde&Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17

\* **Statement of Tractability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

R B/W	Video B/W
100 kHz	300 kHz



## Test Data

### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	1005mbar

The testing was performed by Charmi Peng on 2006-6-2.

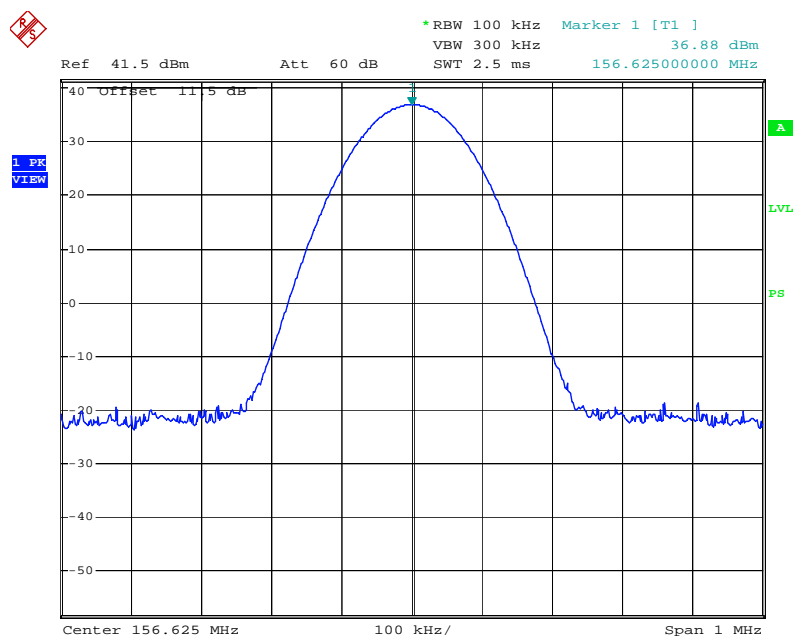
Test Result: Pass

Test Mode: Transmitting

Frequency Spacing (kHz)	Frequency (MHz)	Output Power in dBm	Output Power in W
Narrow12.5	156.6250	36.88	4.875

For Narrow 12.5kHz

Middle channel:



Puxing Two-way radio M/N:PX-777(V) RF Output power Mid ch

Date: 2.JUN.2006 16:46:46

## §2.1046, and §90.205 – RADIATED OUTPUT POWER

### Applicable Standard

According to FCC §2.1046, and §90.205, maximum ERP is dependent upon the station's antenna HAAT and required service area.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
SUNOL SCIENCES	Horn Antenna	DRH-118	A052604	2005-7-20	2006-7-20
SUNOL SCIENCES	Broadband Antenna	JB1	A040904-1	2006-4-28	2007-4-28
SUNOL SCIENCES	Broadband Antenna	JB1	A040904-2	2006-4-28	2007-4-28
Agilent	Spectrum Analyzer	8564E	3943A01781	2005-12-08	2006-12-08
HP	Signal Generator	HP8657A	2849U00982	2006-2-28	2007-2-28
Giga-tronics	Signal Generator	1026	270801	2006-2-28	2007-2-28
A.H. System	Horn Antenna	SAS-200/571	135	2006-4-28	2007-4-28

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the ERP were measured by the substitution.

Absolute level = substituted level + Antenna gain – Cable Loss

**Test Data****Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1005mbar

*The testing was performed by Deny Xiong on 2006-6-23.*

*Test Mode: Transmitting*

Indicated		Table	Test Antenna		Substituted			Antenna Gain Correction	Cable Loss dB	FCC Part 90
Frequency MHz	Meter Reading dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Polar H/V			Absolute Level dBm
Transmitting in Middle Channel										
156.62	112.01	100	1.2	V	156.62	30.7	V	0	2.5	28.2
156.62	113.9	156	1.3	H	156.62	29.5	H	0	2.5	27.0

**§2.1047, and §90.207 - MODULATION CHARACTERISTIC****Applicable Standard**

§2.1047 &amp; §90.207:

- (a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.
- (b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Modulation Analyzer	8901B	3438A05208	2006-2-28	2007-2-28
NANYAN	Audio Generator	NY2201	019829	2005-12-23	2006-12-23

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

**Test Procedure**

Test Method: TIA/EIA-603 2.2.3

**Test Data****Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1005mbar

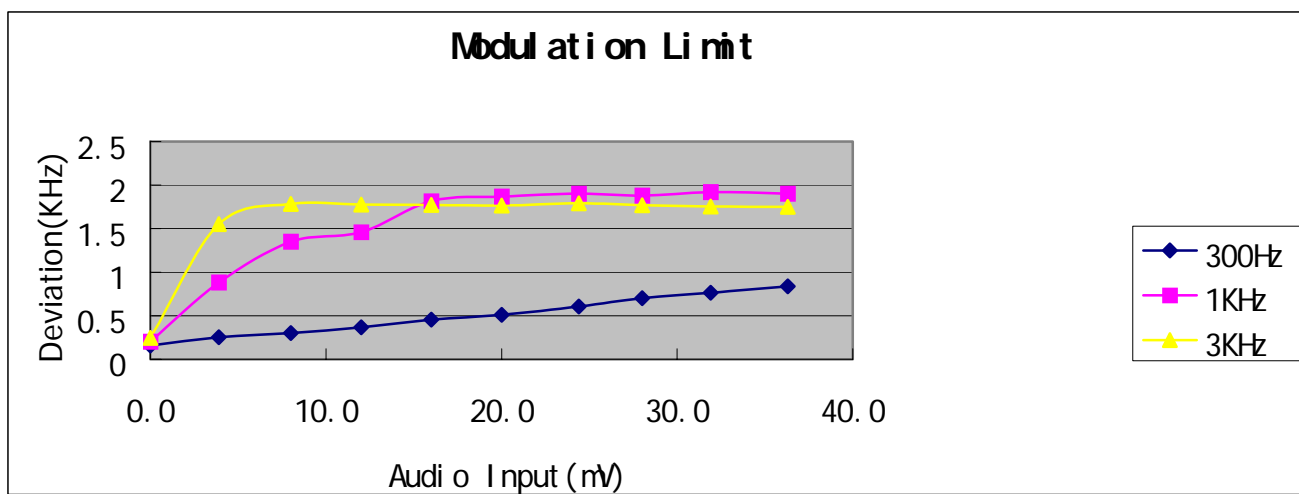
*The testing was performed by Charmi Peng on 2006-6-23.*

Test Result: Pass

*Test Mode: Transmitting*

For 12.5 kHz Channel Bandwidth:

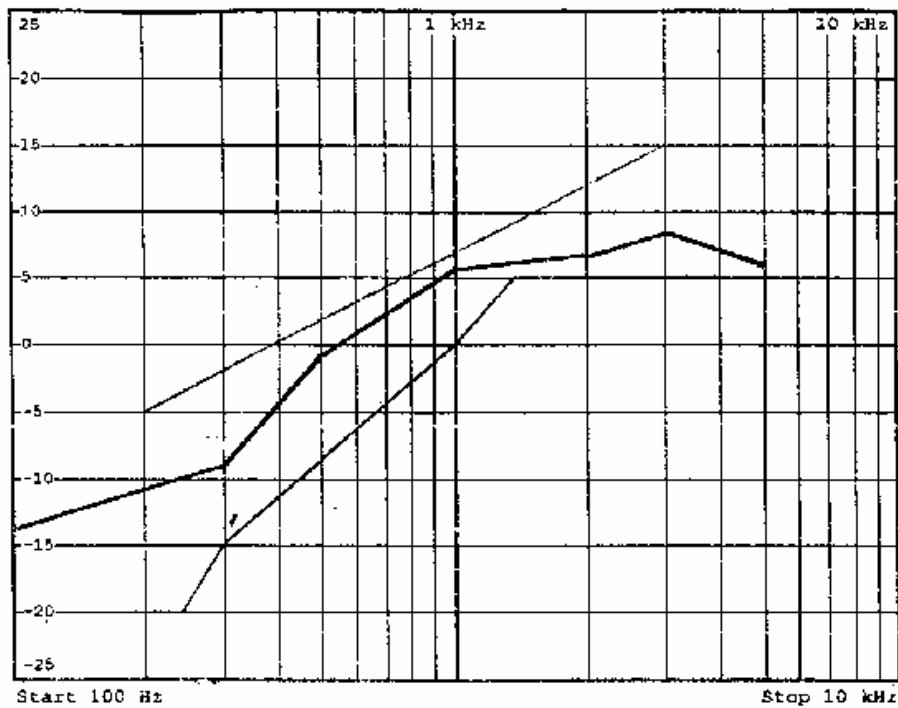
Audio Input (mV)	300Hz Deviation (kHz)	1kHz Deviation (kHz)	3kHz Deviation (kHz)
0.0	0.157	0.201	0.247
4.0	0.255	0.882	1.552
8.0	0.303	1.351	1.782
12.0	0.368	1.460	1.776
16.0	0.456	1.816	1.771
20.0	0.512	1.866	1.765
24.0	0.605	1.902	1.792
28.0	0.702	1.877	1.768
32.0	0.766	1.918	1.755
36.0	0.837	1.902	1.751



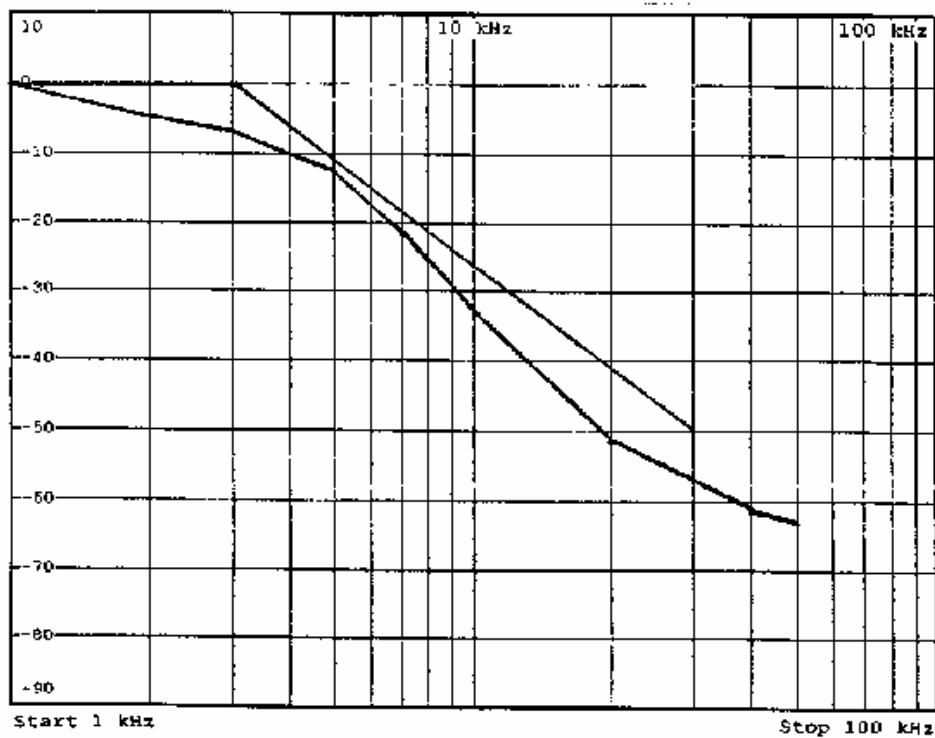
## Audio Low Filter Characteristic:



Ref. 25 dB



Ref. 10 dB



## §2.1049, and § 90.209 – OCCUPIED BANDWIDTH

### Applicable Standard

§2.1049, §90.209 and §90.210

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- 1) For any frequency removed from the center of the authorized bandwidth  $f_0$  to 5.625kHz removed from  $f_0$ , 0dB.
- 2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.626kHz but no more than 12.5kHz, at least 7.27 ( $f_d - 2.88$ kHz) dB.
- 3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5kHz at least:

$$50 + 10 \log P = 50 + 10 \log(4.875) = 56.88 \text{ dB}$$

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde&Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17
HP	Modulation Analyzer	8901B	3438A05208	2006-2-28	2007-2-28
NANYAN	Audio Generator	NY2201	019829	2005-12-23	2006-12-23

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the frequency band  $\pm 50$  KHz from the carrier frequency.

**Test Data****Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1005mbar

*The testing was performed by Charmi Peng on 2006-6-9.*

Test Result: Pass.

*Test Mode: Transmitting*

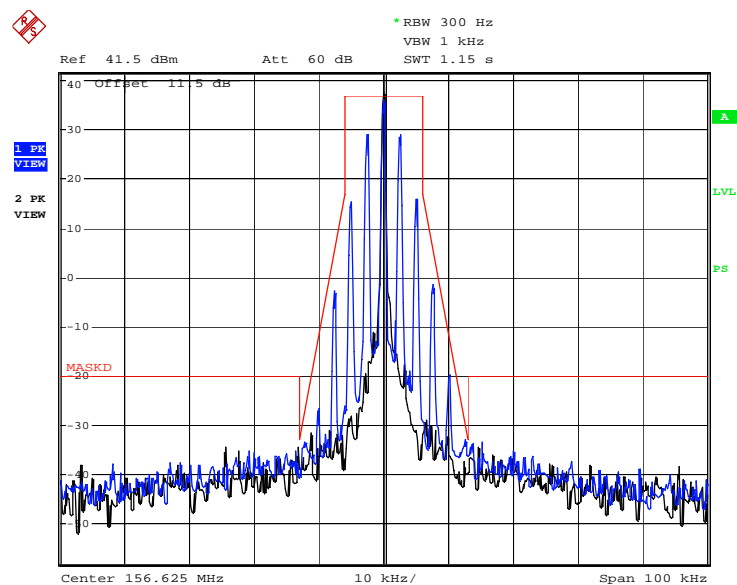
Please refer to the hereinafter plots.

Emission Designator:

For 12.5KHz Channel Spacing:  $2M+2D = 2x3+2x2.5 = 11K0F3E$



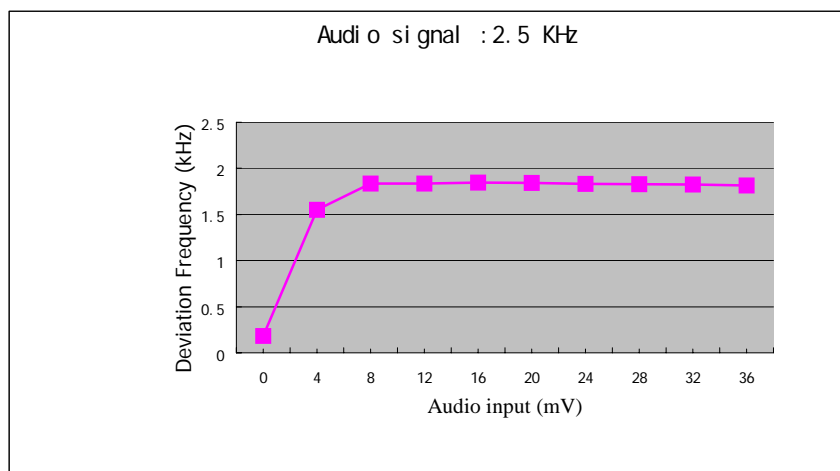
## Emission Mask D For 12.5 KHz Channel Bandwidth:



Puxing Two-way radio M/N:PX-777V Mask emission narrow

Date: 9.JUN.2006 10:58:36

Audio input (mV)	Frequency Deviation (kHz)
0	0.182
4	1.551
8	1.834
12	1.836
16	1.845
20	1.842
24	1.833
28	1.827
32	1.824
36	1.813



**§2.1051 and §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS****Applicable Standard**

§90.210 (12.5kHz bandwidth only)

On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5kHz at least:

$$50+10\log P=50+10\log(4.875)=56.88\text{dB}$$

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde&Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

**Test Procedure**

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

**Test Data****Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1005mbar

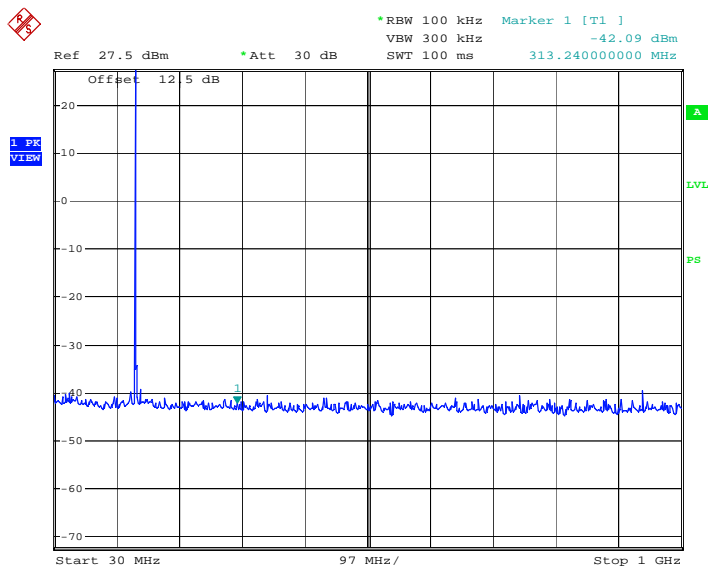
*The testing was performed by Charmi Peng on 2006-6-9, 2006-7-12.*

Test Result: Pass

*Test Mode: Transmitting*

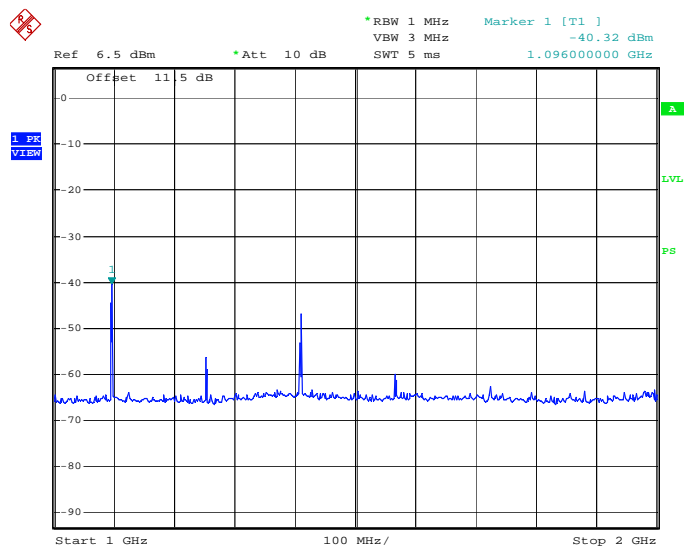
For 12.5KHz Channel bandwidth:

Middle channel:  
(30MHz-1GHz)



Huayi Two-way radio M/N:PX-777V Spurious emission at antenna  
terminal Mid channel (30MHz-1GHz)  
Date: 12.JUL.2006 15:15:44

(1GHz-2GHz)



Puxing Two-way radio M/N:PX-777V Spurious emission at antenn  
a terminal Mid ch (1GHz-2GHz)  
Date: 9.JUN.2006 11:44:22

Standby Mode:

Frequency channel	Frequency tuned (MHz)	Frequency emission (MHz)	Level dBm	Limit dBm	Margin dBm
Middle channel	156.6250	194.90	-69.62	-57	-12.62

## §2.1053 and §90.210 - RADIATED SPURIOUS EMISSION

### Applicable Standard

§2.1053 and §90.210

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
SUNOL SCIENCES	Horn Antenna	DRH-118	A052604	2005-7-20	2006-7-20
SUNOL SCIENCES	Broadband Antenna	JB1	A040904-1	2006-4-28	2007-4-28
SUNOL SCIENCES	Broadband Antenna	JB1	A040904-2	2006-4-28	2007-4-28
Agilent	Spectrum Analyzer	8564E	3943A01781	2005-12-8	2006-12-8
HP	Signal Generator	HP8657A	2849U00982	2006-2-28	2007-2-28
Giga-tronics	Signal Generator	1026	270801	2006-2-28	2007-2-28
A.H. System	Horn Antenna	SAS-200/571	135	2006-4-28	2007-4-28

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = 43 + 10 Log<sub>10</sub> (power out in Watts)

Spurious attenuation limit in dB = 50 + 10 Log<sub>10</sub> (power out in Watts) for EUT with a 12.5KHz channel bandwidth.

### Test Results Summary

30-1000MHz:

Transmitting in Middle Channel: **-18.02 dB** at **939.76 MHz** in the **Vertical** polarization

Above 1GHz:

Transmitting in Middle Channel: **-10.09 dB** at **1044.13 MHz** in the **Horizontal** polarization

**Test Data****Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1005mbar

The testing was performed by Charmi Peng on 2006-6-9, 2006-7-12.

Test Mode: Transmitting

30-1000 MHz:

Indicated		Table	Test Antenna		Substituted			Antenna Gain Correction	Cable Loss dB	Absolute Level	FCC Part 90	
Frequency MHz	Meter Reading dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Polar H/V			dBm	Limit dBm	Margin
Transmitting in Middle Channel												
939.76	36.67	305	1.4	V	939.76	-30.1	V	0	7.92	-38.02	-20	-18.02
939.76	36.17	127	1.5	H	939.76	-30.3	H	0	7.92	-38.22	-20	-18.22
313.24	43.83	158	1.5	H	313.24	-41.8	H	0	3.79	-45.59	-20	-25.59
783.13	33.83	54	1.2	H	783.13	-39.8	H	0	7.08	-46.88	-20	-26.88
626.50	31.83	263	1.8	H	626.50	-46.5	H	0	4.89	-51.39	-20	-31.39
626.50	33.0	26	1.4	V	626.50	-48.8	V	0	4.89	-53.69	-20	-33.69
469.87	30.83	168	1.5	H	469.87	-49.6	H	0	5.07	-54.67	-20	-34.67
783.13	33.5	248	1.0	V	783.13	-48.8	V	0	7.08	-55.88	-20	-35.88
313.24	37.33	62	1.6	V	313.24	-44.1	V	0	3.79	-47.89	-20	-37.89
469.87	37.5	138	1.5	V	469.87	-44.2	V	0	5.07	-49.27	-20	-39.27

Above 1GHz:

Indicated		Table	Test Antenna		Substituted			Antenna Gain Correction	Cable Loss dB	Absolute Level	FCC Part 90	
Frequency MHz	Meter Reading dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Polar H/V			dBm	Limit dBm	Margin
Transmitting in Middle Channel												
1044.13	42.05	248	1.0	H	1044.13	-35.6	H	5.7	0.19	-30.09	-20	-10.09
1044.13	41.01	100	1.2	V	1044.13	-38.5	V	5.7	0.19	-32.99	-20	-12.99
1392.13	38.4	138	1.5	V	1392.13	-45.0	V	6.5	0.33	-38.83	-20	-18.83
1392.13	36.28	156	1.3	H	1392.13	-46.1	H	6.5	0.33	-39.93	-20	-19.93
1218.07	35.91	305	1.4	H	1218.07	-46.3	H	6.2	0.49	-40.59	-20	-20.59
1566.07	33.21	26	1.4	V	1566.07	-47.3	V	6.1	0.39	-41.59	-20	-21.59
1218.07	35.25	62	1.6	V	1218.07	-49.0	V	6.2	0.49	-43.29	-20	-23.29
1566.07	33.13	127	1.5	H	1566.07	-49.3	H	6.1	0.39	-43.59	-20	-23.59

**§2.1055 (d) and §90.213- FREQUENCY STABILITY****Applicable Standard**

§2.1055 (d)

§90.213

For output power &gt; 2 watts, the limit is 5.0ppm.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
WUHUAN	Temperature & Humidity Chamber	HTP205	20021115	2006-1-2	2007-1-2
Hewlett-Packard	Frequency Counter	5342A	2317A08289	2006-1-26	2007-1-26

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

**Test Procedure**

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a f Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

**Test Data****Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1005mbar

*The testing was performed by Charmi Peng on 2006-6-23.*

Test Result: Pass

*Test Mode: Transmitting*

Reference Frequency: 156.625MHz, Limit: 5 ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MCF (MHz)	PPM Error
50	7.2	156.625252	1.61
40	7.2	156.625246	1.57
30	7.2	156.625231	1.47
20	7.2	156.625226	1.44
10	7.2	156.625225	1.44
0	7.2	156.625225	1.44
-10	7.2	156.625224	1.43
-20	7.2	156.625221	1.41
-30	7.2	156.625218	1.39

*Frequency Stability Versus Input Voltage*

Reference Frequency: 156.625 MHz, Limit: 5 ppm		
Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
	Frequency (MHz)	PPM Error
6.4	156.625198	1.26



## §90.214 - TRANSIENT FREQUENCY BEHAVIOR

### Applicable Standard

§90.214

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
TEKTRONIX	Digital Phosphor Oscilloscope	TDS 7104	B020518	2006-1-24	2007-1-24
HP	Modulation Analyzer	8901B	3438A05208	2006-2-28	2007-2-28
HP	Signal Generator	HP8657A	2849U00982	2006-2-28	2007-2-28

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

TIA/EIA-603 2.2.19

### Test Data

#### Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1005mbar

*The testing was performed by Charmi Peng on 2006-6-2.*

Test Result: Pass

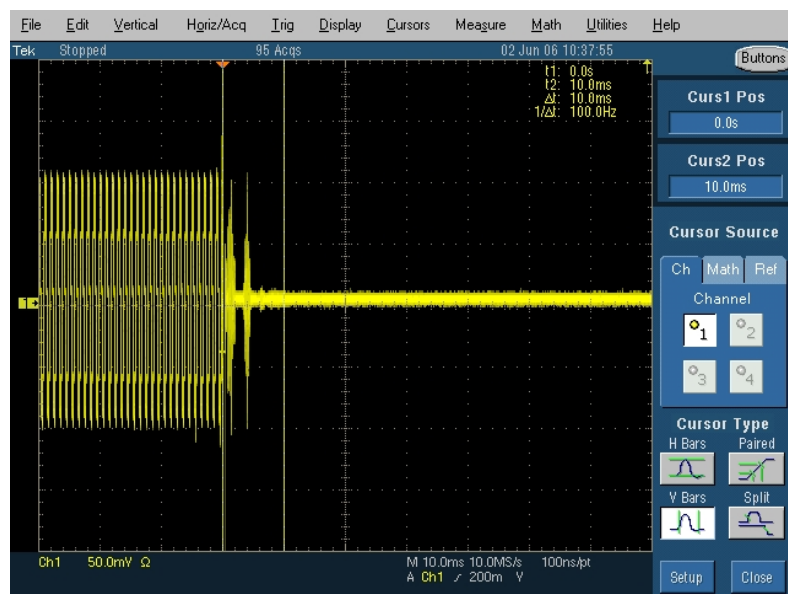
*Test Mode: Transmitting*

For Narrowband:

Operation Frequency (MHz)	Channel Separation (kHz)	Transient Period (ms)	Transient Frequency	Result
156.625	12.5	<5	+/-12.5 kHz	Pass
		<20	+/-6.25 kHz	
		<5	+/-12.5 kHz	

For Narrowband

Turn on



Turn off

