



## FCC PART 90 TEST REPORT

For

**QUANZHOU BAOJIE ELECTRONICS CO., LTD.**

Dongmen Industrial area, Fengzhou Town, West door outside, Quanzhou, Fujian, China

**FCC ID: OBJ-1299**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Handheld two way radio
<b>Test Engineer:</b> <u>Ares Liu</u> <i>Ares Liu</i>	
<b>Report Number:</b> <u>R1XM120531052-00</u>	
<b>Report Date:</b> <u>2013-08-08</u>	
Ivan Cao <i>Ivan Cao</i>	
<b>Reviewed By:</b> <u>RF Leader</u> <i>RF Leader</i>	
<b>Test Laboratory:</b> Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxihu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>4</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	4
OBJECTIVE .....	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY .....	4
TEST FACILITY.....	5
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>6</b>
DESCRIPTION OF TEST CONFIGURATION .....	6
EQUIPMENT MODIFICATIONS .....	6
BLOCK DIAGRAM OF TEST SETUP .....	6
<b>SUMMARY OF TEST RESULTS .....</b>	<b>7</b>
<b>FCC §1.1310 &amp; §2.1093 - RF EXPOSURE.....</b>	<b>8</b>
APPLICABLE STANDARD .....	8
<b>FCC §2.1046 &amp; §90.205- RF OUTPUT POWER.....</b>	<b>9</b>
APPLICABLE STANDARD .....	9
TEST PROCEDURE .....	9
TEST EQUIPMENT LIST AND DETAILS.....	9
TEST DATA .....	9
<b>FCC §2.1047 &amp; §90.207 - MODULATION CHARACTERISTIC.....</b>	<b>11</b>
APPLICABLE STANDARD .....	11
TEST PROCEDURE .....	11
TEST EQUIPMENT LIST AND DETAILS.....	11
TEST DATA .....	11
<b>FCC §2.1049, §90.209 &amp; §90.210 – OCCUPIED BANDWIDTH &amp; EMISSION MASK .....</b>	<b>20</b>
APPLICABLE STANDARD .....	20
TEST EQUIPMENT LIST AND DETAILS.....	20
TEST PROCEDURE .....	20
TEST DATA .....	20
<b>FCC §2.1051 &amp; §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS .....</b>	<b>25</b>
APPLICABLE STANDARD .....	25
TEST EQUIPMENT LIST AND DETAILS.....	25
TEST PROCEDURE .....	25
TEST DATA .....	25
<b>FCC §2.1053 &amp; §90.210 - RADIATED SPURIOUS EMISSIONS .....</b>	<b>28</b>
APPLICABLE STANDARD .....	28
TEST EQUIPMENT LIST AND DETAILS.....	28
TEST PROCEDURE .....	28
TEST DATA .....	29
<b>FCC §2.1055 &amp; §90.213- FREQUENCY STABILITY.....</b>	<b>30</b>
APPLICABLE STANDARD .....	30
TEST EQUIPMENT LIST AND DETAILS.....	30
TEST PROCEDURE .....	30

TEST DATA .....	30
<b>FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR.....</b>	<b>32</b>
APPLICABLE STANDARD .....	32
TEST EQUIPMENT LIST AND DETAILS.....	32
TEST PROCEDURE .....	32
TEST DATA .....	33

## GENERAL INFORMATION

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

The *QUANZHOU BAOJIE ELECTRONICS CO.,LTD.* 's product, model number: *BJ-UV99 (FCC ID: OJB-1299)* (the "EUT") in this report is a *Handheld two way radio*, which was measured approximately 33.0cm(H) x 5.8 cm(W) x 3.4 cm(D), rated input voltage: DC 7.4V from lithium battery or DC 8.4V from battery charger.

#### Adapter Information:

INPUT: 220V-240V, 50Hz

OUTPUT: 12.5VDC

#### Battery Charger Information:

INPUT: 12VDC

OUTPUT: 8.4VDC, 400-450mA

#### Frequency range:

VHF:136MHz-174MHz

UHF:400MHz-470MHz

#### Output power:

High power: VHF 5W/UHF 4W

Low power: VHF 1W/UHF 1W

Channel separation:12.5kHz

\* All measurement and test data in this report was gathered from production sample serial number: 120515BJ9901 (Assigned by applicant). The EUT was received on 2012-06-11.

### Objective

This test report is prepared on behalf of *QUANZHOU BAOJIE ELECTRONICS CO.,LTD.* 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: TIA 603-D and ANSI 63.4-2009.

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

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) 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 February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

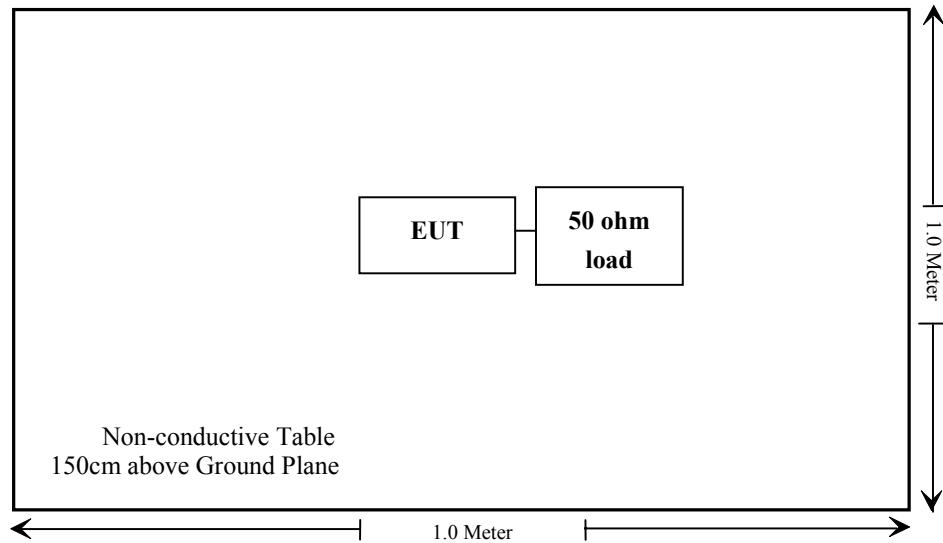
### Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

### Equipment Modifications

No modifications were made to the unit tested.

### Block Diagram of Test Setup



## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1310; §2.1093	RF Exposure	Compliance
§2.1046; §90.205	RF Output Power	Compliance
§2.1047; §90.207	Modulation Characteristic	Compliance
§2.1049; §90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliance
§2.1051; §90.210	Spurious Emission at Antenna Terminal	Compliance
§2.1053; §90.210	Spurious Radiated Emissions	Compliance
§2.1055; §90.213	Frequency Stability	Compliance
§90.214	Transient Frequency Behavior	Compliance

Note: The uncertainty of any RF tests which use conducted method measurement is  $\pm 0.96$  dB.  
The uncertainty of any radiation emissions measurement is  $\pm 4.0$  dB.

## **FCC §1.1310 & §2.1093 - RF EXPOSURE**

### **Applicable Standard**

According to FCC §1.1310 and §2.1093, protable device operates Part 90 should be subjected to rountine environmental evaluation for RF exposure prior or equipment authorization or use.

**Result:** Compliance.

Please refer to SAR Report Number: R1XM120531053-20, R1306279-SAR.

## FCC §2.1046 & §90.205- RF OUTPUT POWER

### Applicable Standard

FCC §2.1046 and §90.205.

### Test Procedure

Conducted RF Output Power:

TIA-603-D section 2.2.1

Radiated method:

TIA 603-D section 2.2.17

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

Spectrum Analyzer setting:

<b>RBW</b>	<b>Video B/W</b>
100 kHz	300 kHz

### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM	DE31388	2012-3-15	2013-3-14

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	26.2 °C
<b>Relative Humidity:</b>	51%
<b>ATM Pressure:</b>	101kPa

*The testing was performed by Ares Liu on 2012-10-17.*

*Test Mode: Transmitting*

**Test Result:** Compliance.

Please refer to following table.

VHF:

Frequency (MHz)	Output Power (dBm)	Output Power (Watt)	Power Level setting
136.025	30.57	1.140	Low
136.025	36.22	4.188	High
154.025	30.26	1.062	Low
154.025	36.24	4.207	High
173.975	30.57	1.140	Low
173.975	36.55	4.518	High

UHF:

Frequency (MHz)	Output Power (dBm)	Output Power (Watt)	Power Level setting
400.025	30.14	1.033	Low
400.025	36.27	4.236	High
435	30.11	1.026	Low
435	36.25	4.217	High
469.975	30.15	1.035	Low
469.975	36.47	4.436	High

## **FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC**

### **Applicable Standard**

FCC§2.1047 & §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 Procedure**

Test Method: TIA/EIA-603 2.2.3

### **Test Equipment List and Details**

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
HP	RF Communications Test Set	HP8920A	3438A05201	2012-06-14	2013-06-13

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	26.2 °C
<b>Relative Humidity:</b>	51%
<b>ATM Pressure:</b>	101 kPa

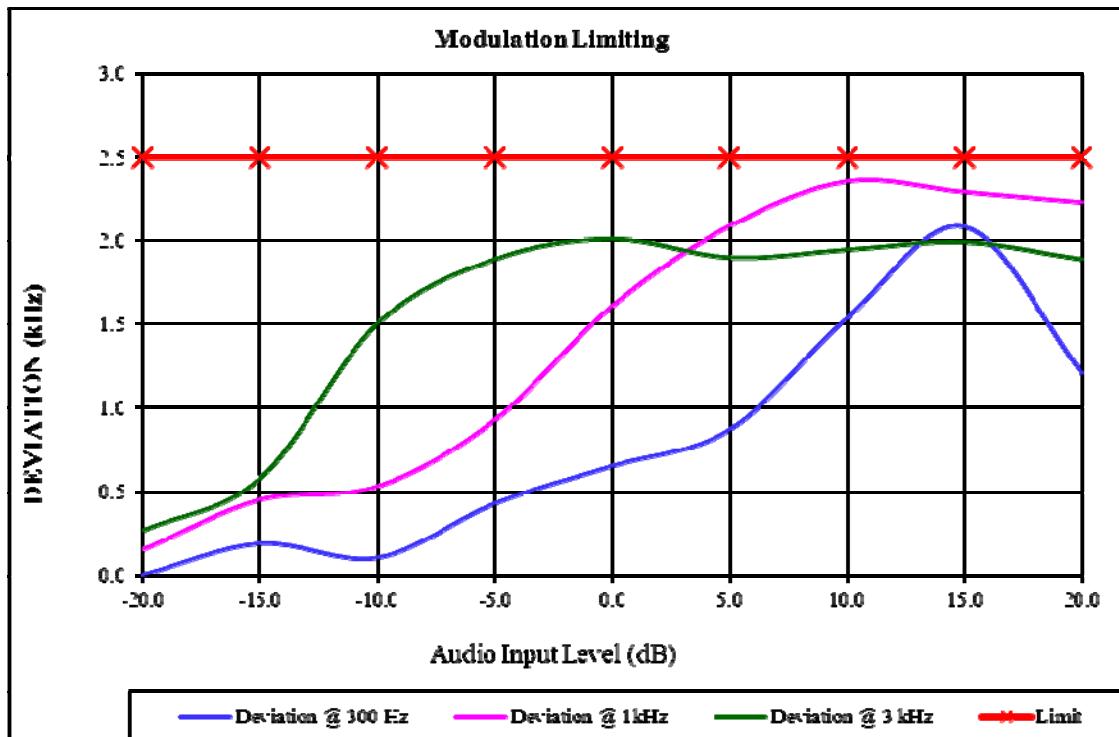
*The testing was performed by Ares Liu on 2012-10-17.*

*Test Mode: Transmitting*

## MODULATION LIMITING

Carrier Frequency: 435 MHz-Low Power, Channel Separation = 12.5 kHz

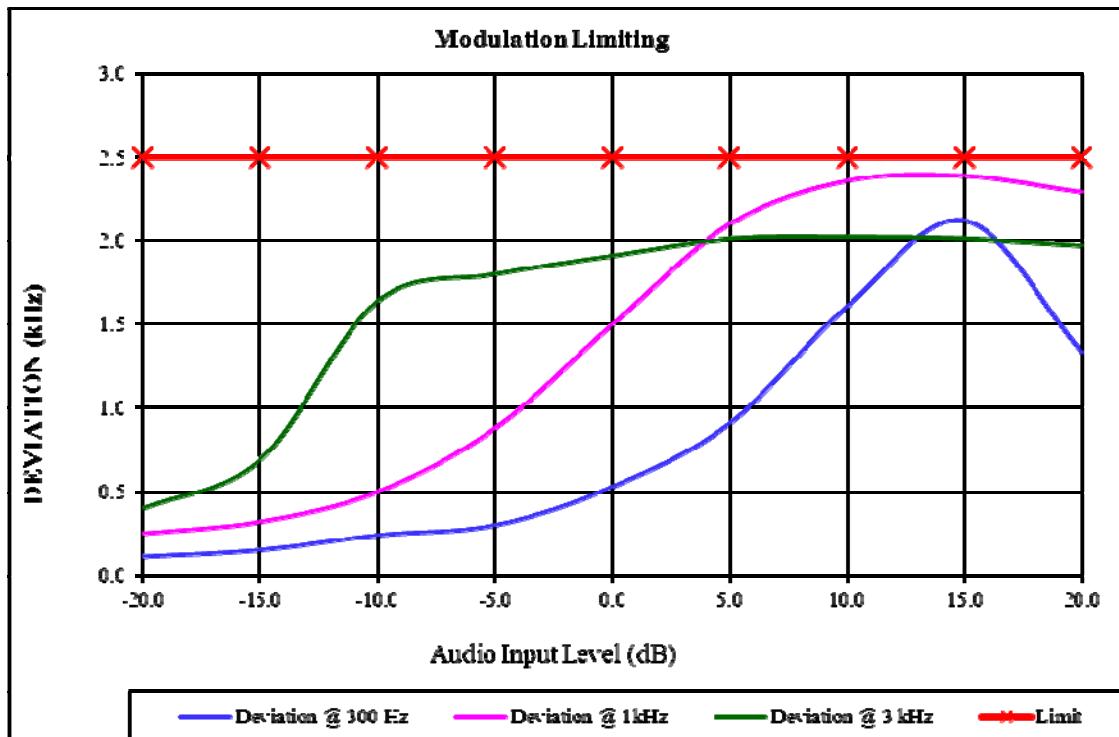
Audio Input Level [dBm]	Frequency Deviation (kHz)			FCC Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	1.205	2.229	1.889	2.5
15.0	2.082	2.291	1.990	2.5
10.0	1.540	2.356	1.946	2.5
5.0	0.872	2.088	1.900	2.5
0.0	0.654	1.613	2.010	2.5
-5.0	0.431	0.930	1.890	2.5
-10.0	0.104	0.531	1.506	2.5
-15.0	0.190	0.454	0.580	2.5
-20.0	0.002	0.152	0.268	2.5



## MODULATION LIMITING

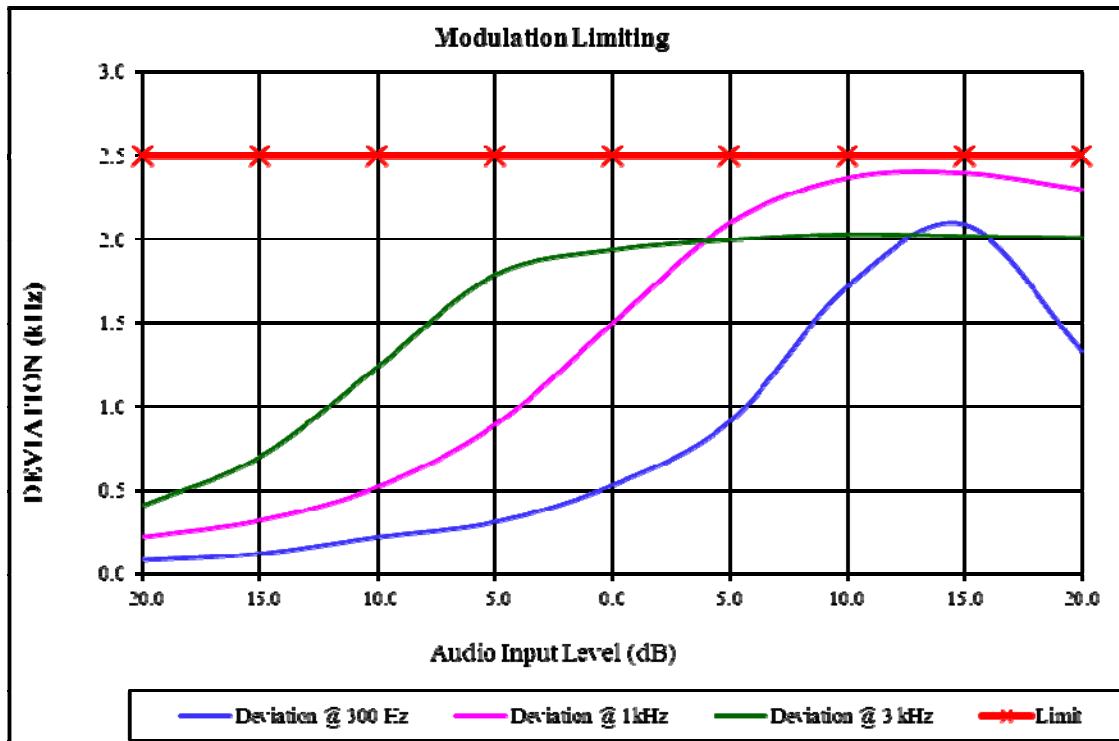
Carrier Frequency: 435 MHz-High Power, Channel Separation = 12.5 kHz

Audio Input Level [dBm]	Frequency Deviation (kHz)			FCC Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	1.33	2.29	1.97	2.5
15.0	2.12	2.39	2.01	2.5
10.0	1.61	2.36	2.02	2.5
5.0	0.91	2.10	2.01	2.5
0.0	0.53	1.50	1.91	2.5
-5.0	0.30	0.88	1.80	2.5
-10.0	0.24	0.50	1.64	2.5
-15.0	0.15	0.32	0.69	2.5
-20.0	0.11	0.25	0.40	2.5



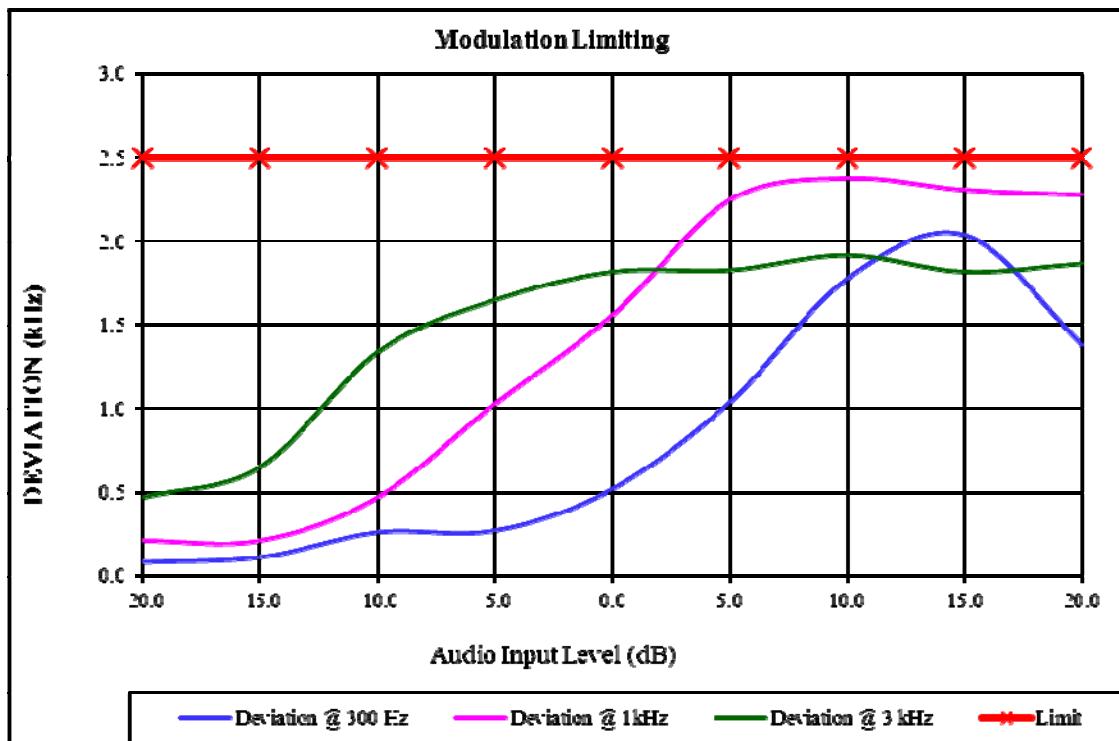
Carrier Frequency: 155.5 MHz-Low Power, Channel Separation = 12.5 kHz

Audio Input Level [dBm]	Frequency Deviation (kHz)			FCC Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	1.33	2.30	2.01	2.5
15.0	2.09	2.40	2.02	2.5
10.0	1.72	2.37	2.03	2.5
5.0	0.91	2.10	2.00	2.5
0.0	0.53	1.50	1.94	2.5
-5.0	0.31	0.89	1.79	2.5
-10.0	0.22	0.52	1.24	2.5
-15.0	0.12	0.32	0.70	2.5
-20.0	0.08	0.22	0.41	2.5



Carrier Frequency: 155.5 MHz-High Power, Channel Separation = 12.5 kHz

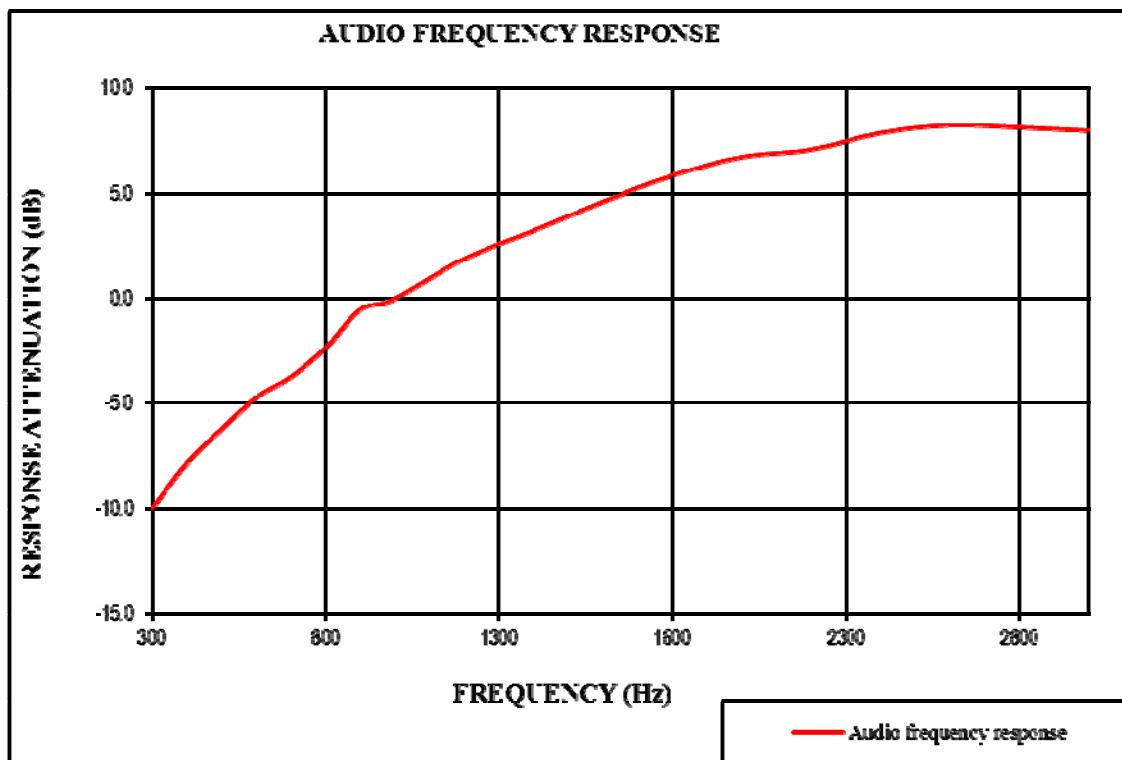
Audio Input Level [dBm]	Frequency Deviation (kHz)			FCC Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	1.38	2.28	1.87	2.5
15.0	2.04	2.31	1.82	2.5
10.0	1.78	2.38	1.92	2.5
5.0	1.04	2.25	1.83	2.5
0.0	0.52	1.56	1.82	2.5
-5.0	0.27	1.03	1.65	2.5
-10.0	0.26	0.47	1.34	2.5
-15.0	0.11	0.21	0.65	2.5
-20.0	0.08	0.21	0.47	2.5



**Audio Frequency Response**

Carrier Frequency: 435 MHz-Low Power, Channel Separation = 12.5 kHz

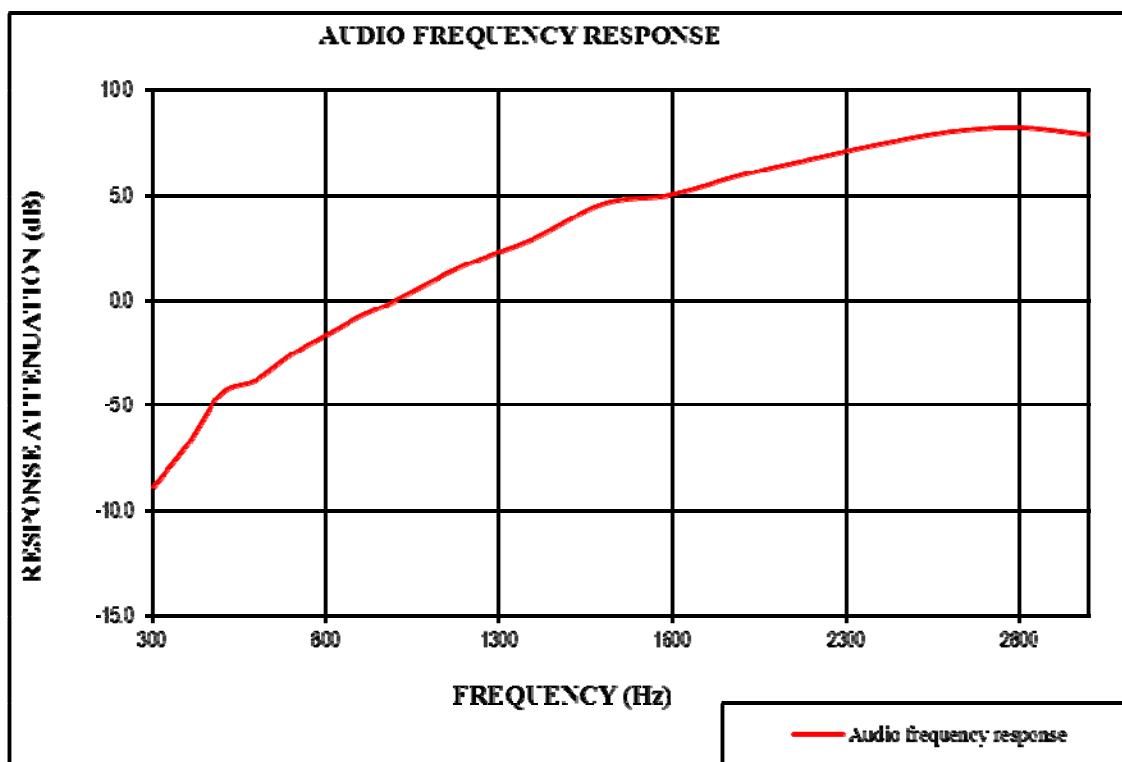
Audio Frequency (Hz)	Response Attenuation (dB)
300	-10.01
400	-7.83
500	-6.20
600	-4.70
700	-3.72
800	-2.34
900	-0.52
1000	0.00
1200	1.90
1400	3.24
1600	4.63
1800	5.86
2000	6.75
2200	7.10
2400	7.90
2600	8.27
2800	8.16
3000	8.00



**Audio Frequency Response**

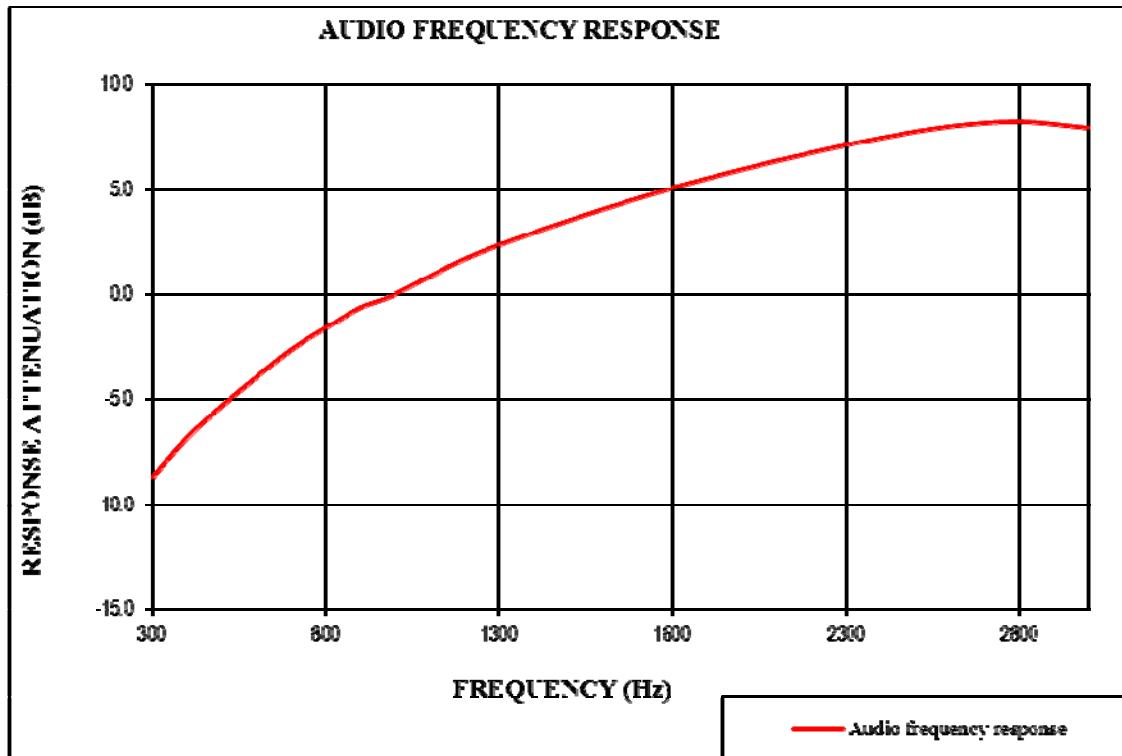
Carrier Frequency: 435 MHz-High Power, Channel Separation = 12.5 kHz

Audio Frequency (Hz)	Response Attenuation (dB)
300	-8.92
400	-6.90
500	-4.41
600	-3.77
700	-2.57
800	-1.66
900	-0.74
1000	0.00
1200	1.68
1400	2.95
1600	4.63
1800	5.05
2000	5.99
2200	6.75
2400	7.46
2600	8.03
2800	8.23
3000	7.89



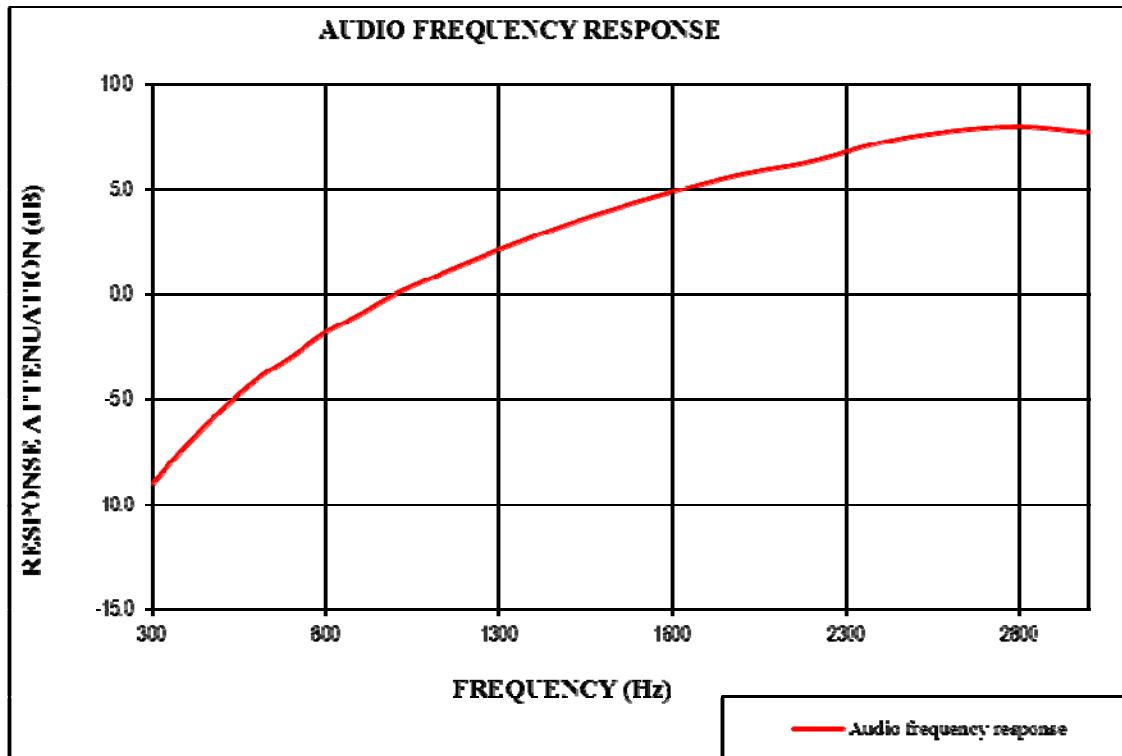
Carrier Frequency: 155.5 MHz-Low Power, Channel Separation = 12.5 kHz

Audio Frequency (Hz)	Response Attenuation (dB)
300	-8.73
400	-6.82
500	-5.32
600	-3.96
700	-2.64
800	-1.60
900	-0.63
1000	0.00
1200	1.68
1400	2.95
1600	4.06
1800	5.07
2000	5.95
2200	6.74
2400	7.45
2600	8.00
2800	8.23
3000	7.93



Carrier Frequency: 155.5 MHz-High Power, Channel Separation = 12.5 kHz

Audio Frequency (Hz)	Response Attenuation (dB)
300	-9.02
400	-7.15
500	-5.50
600	-4.07
700	-2.99
800	-1.81
900	-0.95
1000	0.00
1200	1.45
1400	2.77
1600	3.90
1800	4.88
2000	5.73
2200	6.32
2400	7.23
2600	7.77
2800	7.99
3000	7.72



## FCC §2.1049, §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

### Applicable Standard

FCC §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 5.625 kHz 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 5.625 kHz but no more than 12.5 kHz, 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 12.5 kHz at least:  $50 + 10\log P$

### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM	DE31388	2012-3-15	2013-3-14

### 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  $\pm 35$  kHz from the carrier frequency.

### Test Data

#### Environmental Conditions

Temperature:	26.2 °C
Relative Humidity:	51%
ATM Pressure:	101kPa

*The testing was performed by Ares Liu from 2012-09-03 to 2012-10-17*

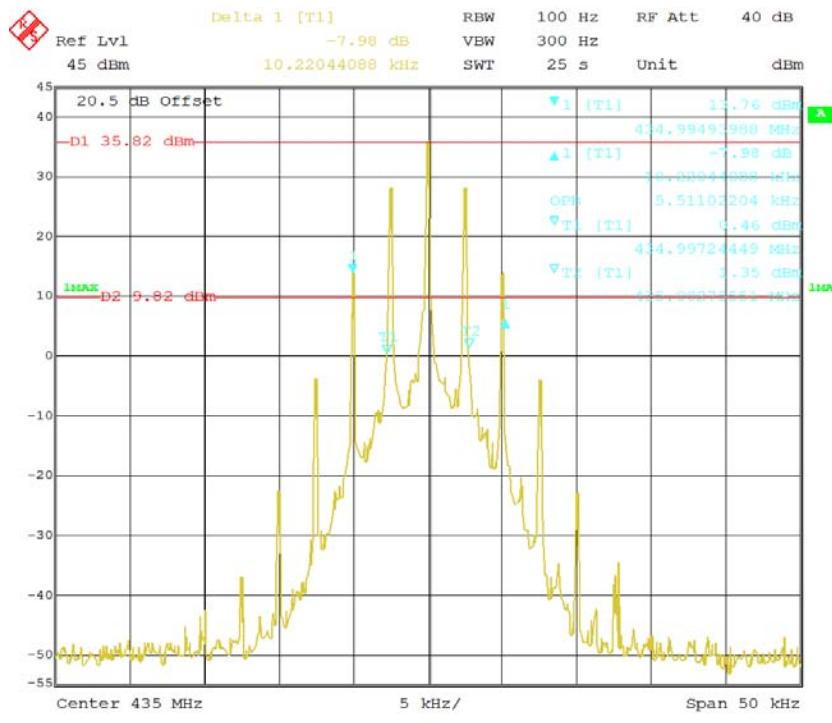
*UHF:*

<b>Frequency</b>	<b>99% Occupied Bandwidth</b>	<b>26 dB Bandwidth</b>
<b>MHz</b>	<b>kHz</b>	<b>kHz</b>
435	5.51	10.22

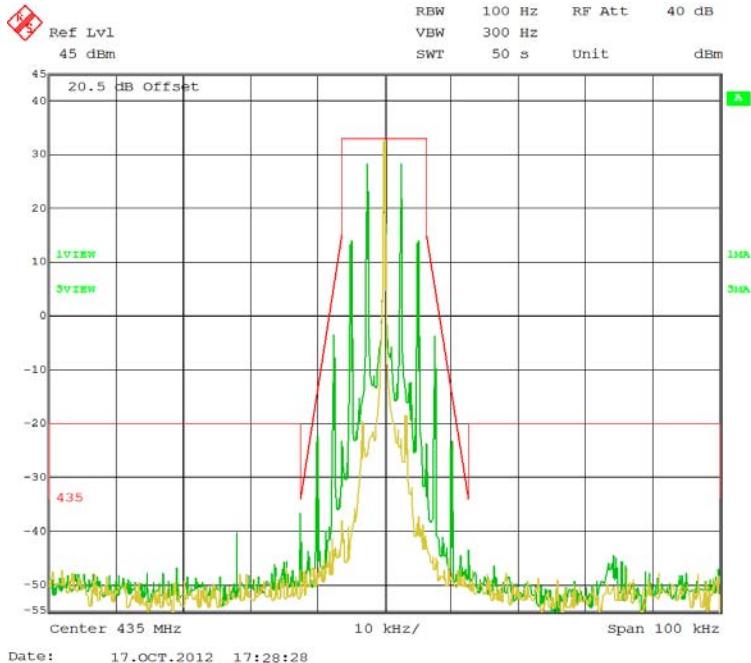
*VHF:*

<b>Frequency</b>	<b>99% Occupied Bandwidth</b>	<b>26 dB Bandwidth</b>
<b>MHz</b>	<b>kHz</b>	<b>kHz</b>
155.5	10.0	10.2

Please refer to the emission mask hereinafter plots.

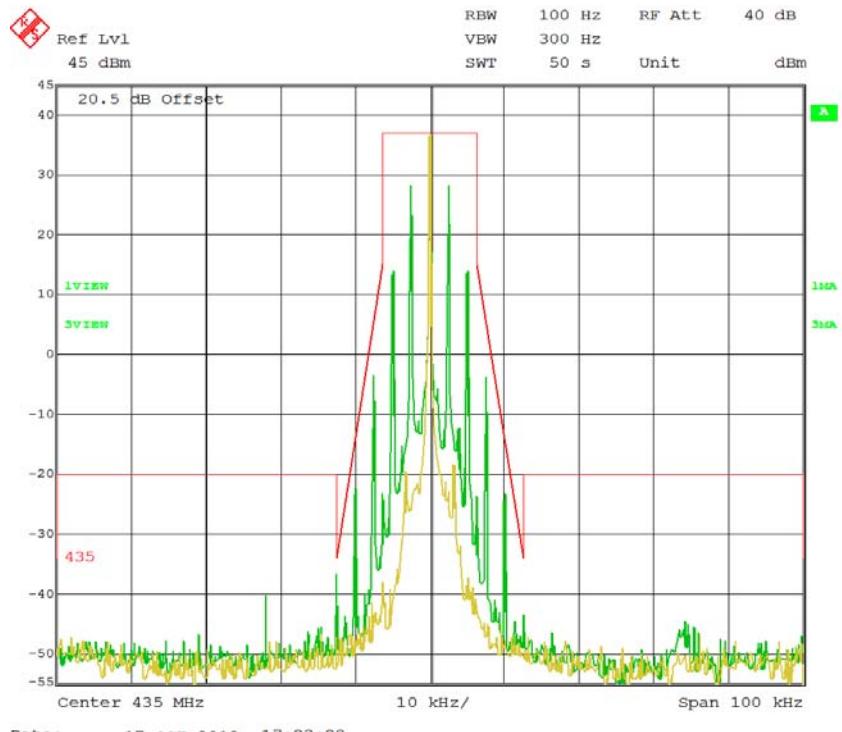
**UHF:****Occupied Bandwidth**

Date: 17.OCT.2012 17:39:28

**Emission Mask -Low Power- Type D**

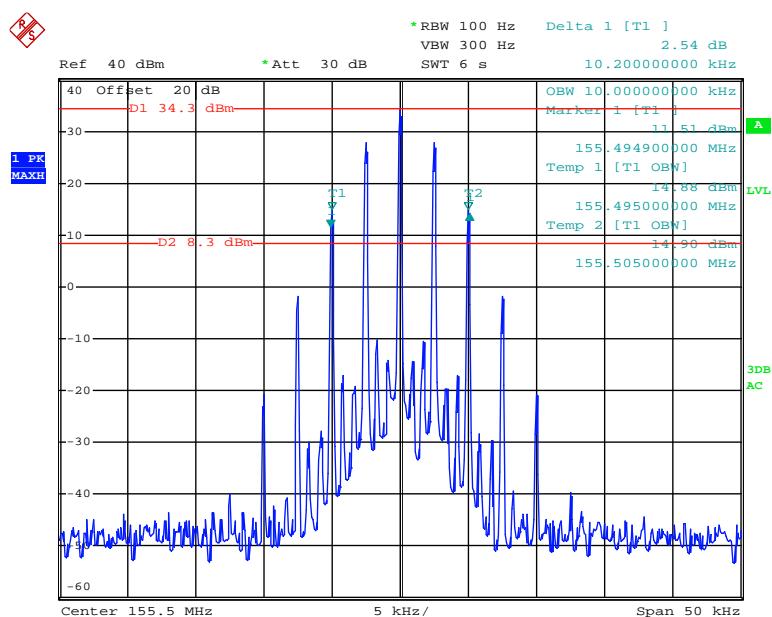
Date: 17.OCT.2012 17:28:28

## Emission Mask-High Power- Type D

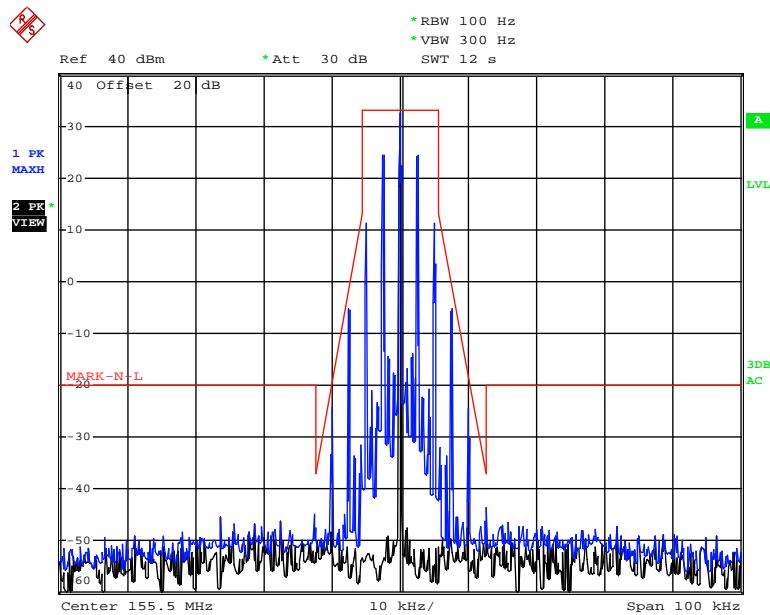


VHF:

## Occupied Bandwidth-High Power

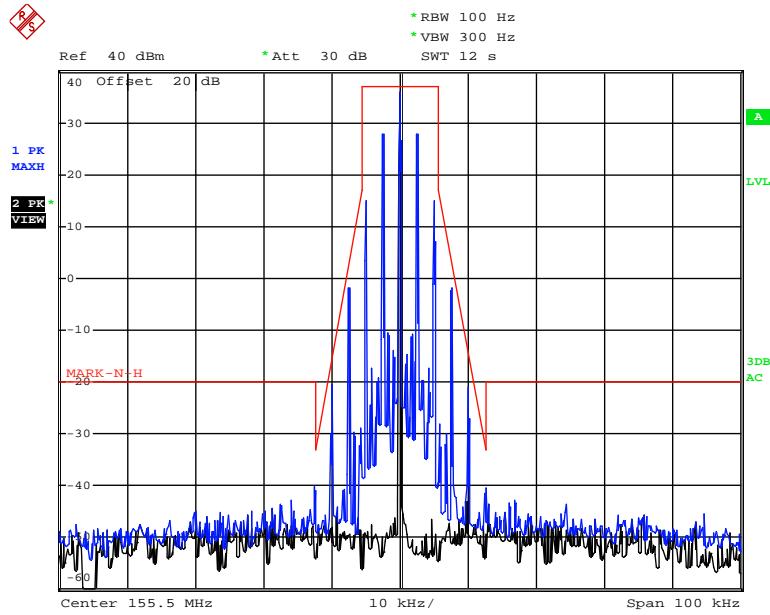


## Emission Mask-Low Power – Type D



Date: 3.SEP.2012 08:57:57

## Emission Mask-High Power-Type D



Date: 3.SEP.2012 08:55:41

## FCC §2.1051 & §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### Applicable Standard

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

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

### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM	DE31388	2012-3-15	2013-3-14

### Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### Test Data

#### Environmental Conditions

Temperature:	26.2°C
Relative Humidity:	51%
ATM Pressure:	101 kPa

*The testing was performed by Ares Liu from 2012-08-19 to 2012-10-17.*

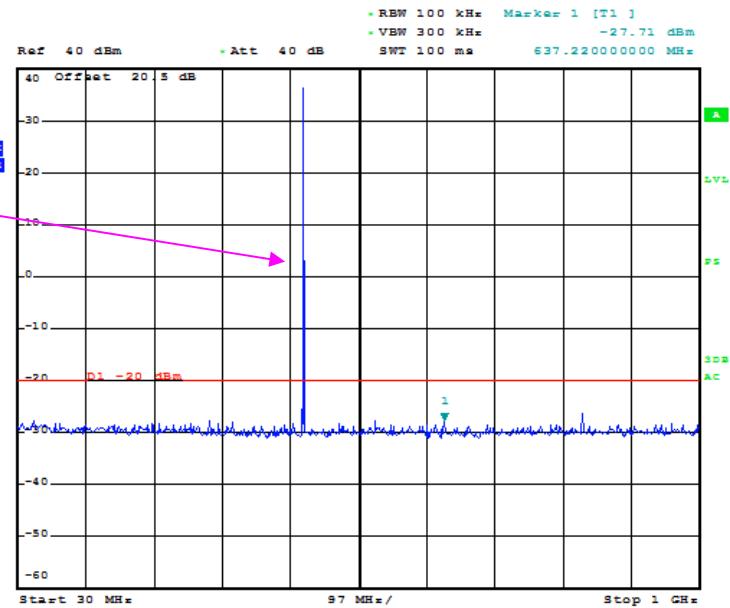
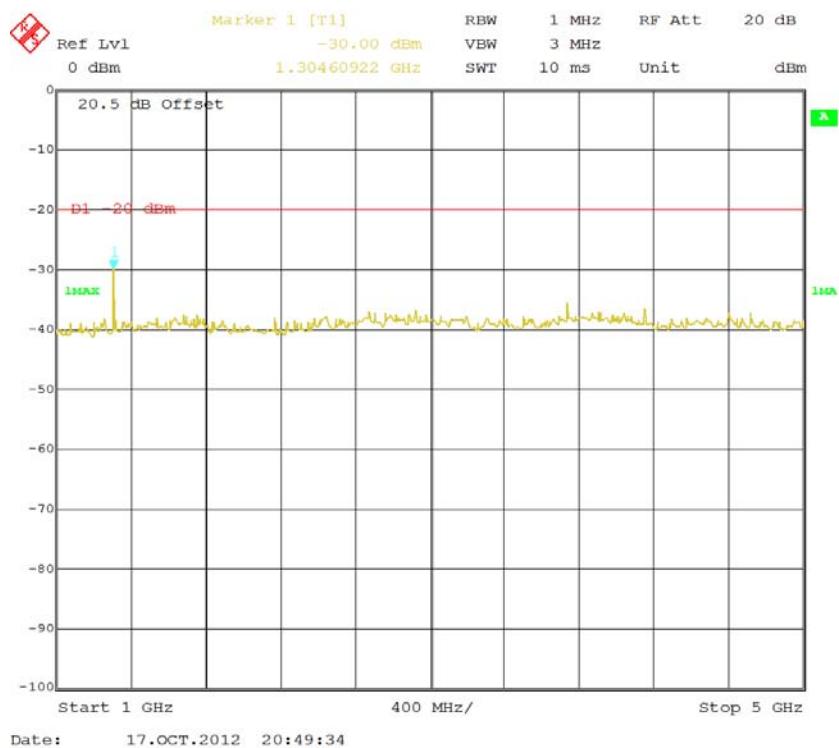
*Test Mode: Transmitting*

Please refer to the following plots.

UHF (Middle Channel,High Power):

**30 MHz - 1 GHz**

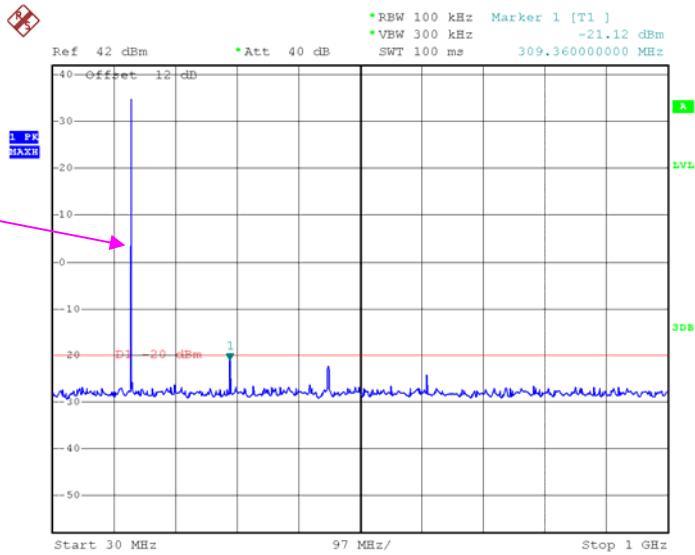
Fundamental

**1GHz - 5 GHz**

VHF (Middle Channel,High Power):

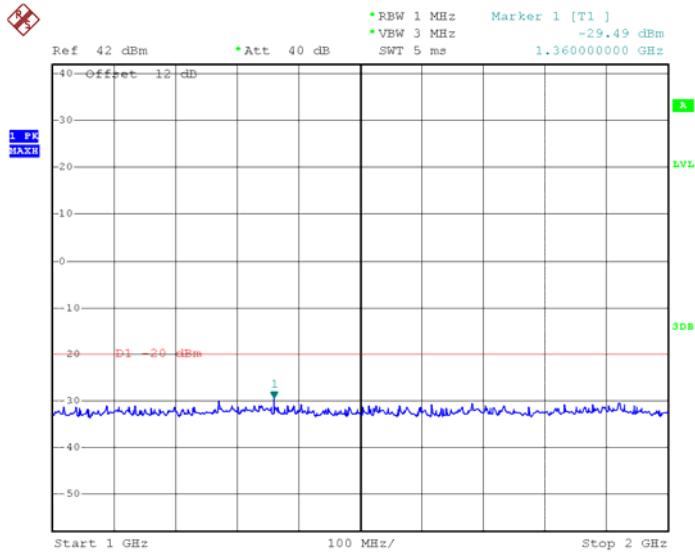
**30 MHz - 1 GHz**

Fundamental



Date: 31.OCT.2012 10:54:56

**1 GHz - 2 GHz**



Date: 31.OCT.2012 10:55:40

## FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

FCC §2.1053 and §90.210

### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	1079 8500	2012-10-09	2013-10-08
Sunol Sciences	Hybrid Antennas	JB3	A060611-3	2012-03-16	2013-03-15
Dayang	Horn Antenna	OMCDH101 80	10279001A	2008-08-22	2013-08-21
EMCO	Adjustable Dipole Antenna System	3121C	9109-753	2012-04-24	2013-04-23
Dayang	Horn Antenna	OMCDH101 80	10279001B	2010-07-30	2015-07-29
HP	Signal Generator	8648A	3426A00831	2012-10-09	2013-10-08
HP	Pre-amplifier	8447E	2434A02181	2012-10-08	2013-10-07
Mini-Circuits	Wideband Amplifier	ZVA-183-S+	96901149	2012-04-24	2013-04-23
Giga	Signal Generator	1026	320408	2012-03-15	2013-03-14

### 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 1g (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = $43+10 \log_{10}$  (power out in Watts)

Spurious attenuation limit in dB = $50+10 \log_{10}$  (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

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

<b>Temperature:</b>	26.2 °C
<b>Relative Humidity:</b>	51%
<b>ATM Pressure:</b>	101 kPa

The testing was performed by Ares Liu on 2012-10-17.

Frequency (MHz)	Receiver Reading (dB $\mu$ V/m)	TurnTable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 90	
			Height (m)	Polar (H / V)	SG Level (dBm)	Cable loss(dB)	Antenna Gain(dB)		Limit (dBm)	Margin (dB)
Frequency:435 MHz-High Power, Channel spacing:12.5 kHz										
870	41.12	13	1.6	H	-55.9	0.68	0.00	-56.58	-20	36.58
870	40.08	135	1.5	V	-56.9	0.68	0.00	-57.58	-20	37.58
1305	46.99	154	1.6	H	-51.5	0.84	7.00	-45.34	-20	25.34
1305	52.02	13	1.8	V	-47.6	0.84	7.00	-41.44	-20	21.44
2175	48.37	86	1.9	H	-54.2	1.06	9.90	-45.36	-20	25.36
2175	49.06	221	1.6	V	-47.3	1.06	9.90	-38.46	-20	18.46
3480	53.41	214	2.1	H	-43.9	2.23	12.00	-34.13	-20	14.13
3480	64.31	334	1.4	V	-33.8	2.23	12.00	-24.03	-20	4.03
Frequency:155.5MHz-High Power, Channel spacing: 12.5 kHz										
311	26.99	169	1.9	V	-70.0	0.37	0.0	-70.37	-20	50.37
311	23.19	59	1.6	H	-73.8	0.37	0.0	-74.17	-20	54.17
466.5	49.25	168	1.6	V	-47.8	0.48	0.0	-48.28	-20	28.28
466.5	30.55	287	1.8	H	-66.5	0.48	0.0	-66.98	-20	46.98
622	52.65	48	1.7	V	-44.4	0.58	0.0	-44.98	-20	24.98
622	40.88	26	1.8	H	-56.1	0.58	0.0	-56.68	-20	36.68
777.5	45.72	136	1.6	V	-51.3	0.66	0.0	-51.96	-20	31.96
777.5	35.43	147	1.5	H	-61.6	0.66	0.0	-62.26	-20	42.26

## FCC §2.1055 & §90.213- FREQUENCY STABILITY

### Applicable Standard

FCC §2.1055 & §90.213

### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM	DE31388	2012-3-15	2013-3-14
ESPEC	Humidity tester	ESX-4CA	018 463	2012-3-2	2013-3-1

### Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The AC 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 counter.

The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value.

### Test Data

#### Environmental Conditions

Temperature:	26.2 °C
Relative Humidity:	51%
ATM Pressure:	101 kPa

*The testing was performed by Ares Liu on 2012-10-17.*

*Test Mode: Transmitting*

UHF:

Reference Frequency: 435MHz, Limit:2.5 ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MCF (MHz)	PPM Error
50	7.4	435.0000121	0.028
40	7.4	435.0000038	0.009
30	7.4	435.0000157	0.036
20	7.4	435.0000063	0.014
10	7.4	435.0000139	0.031
0	7.4	435.0000354	0.081
-10	7.4	435.0000092	0.021
-20	7.4	435.0000067	0.015
-30	7.4	435.0000038	0.008

Frequency Stability versus Input Voltage

Reference Frequency: 435MHz, Limit: 2.5 ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		Frequency (MHz)	PPM Error
25	7.14	435.0000028	0.006
	8.51	435.0000137	0.031

VHF:

Reference Frequency: 155MHz, Limit:5 ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MCF (MHz)	PPM Error
50	7.4	155.5000136	0.087
40	7.4	155.5000071	0.046
30	7.4	155.5000102	0.066
20	7.4	155.5000080	0.051
10	7.4	155.5000120	0.077
0	7.4	155.5000054	0.035
-10	7.4	155.5000103	0.066
-20	7.4	155.5000059	0.038
-30	7.4	155.5000088	0.057

Frequency Stability versus Input Voltage

Reference Frequency: 155MHz, Limit: 5 ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		Frequency (MHz)	PPM Error
25	7.14	155.5000112	0.072
	8.51	155.5000094	0.060

## FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

### Applicable Standard

Regulations: FCC §90.214

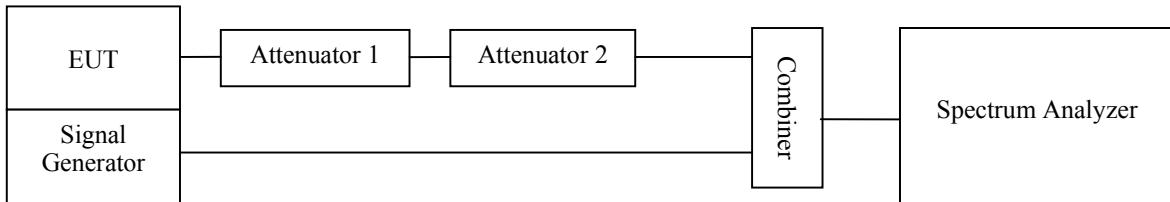
Test method: ANSI/TIA-603-D 2010, section 2.2.19.3

### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM	DE31388	2012-3-15	2013-3-14
HP	Signal Generator	8648A	3426A00831	2012-10-9	2013-10-8

### Test Procedure

- a) Connect the EUT and test equipment as shown on the following block diagram.
- b) Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
- c) Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at  $\pm 12.5$  kHz deviation and set its output level to -100dBm.
- d) Turn on the transmitter.
- e) Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as  $P_0$ .
- f) Turn off the transmitter.
- g) Adjust the RF level of the signal generator to provide RF power equal to  $P_0$ . This signal generator RF level shall be maintained throughout the rest of the measurement.
- h) Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
- i) Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at  $\pm 4$  divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "tiger offset" to -10ms for turn on and -15ms for turn off.
- j) Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be  $t_{on}$ . The trace should be maintained within the allowed divisions during the period  $t_1$  and  $t_2$ .
- k) Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period  $t_3$ .



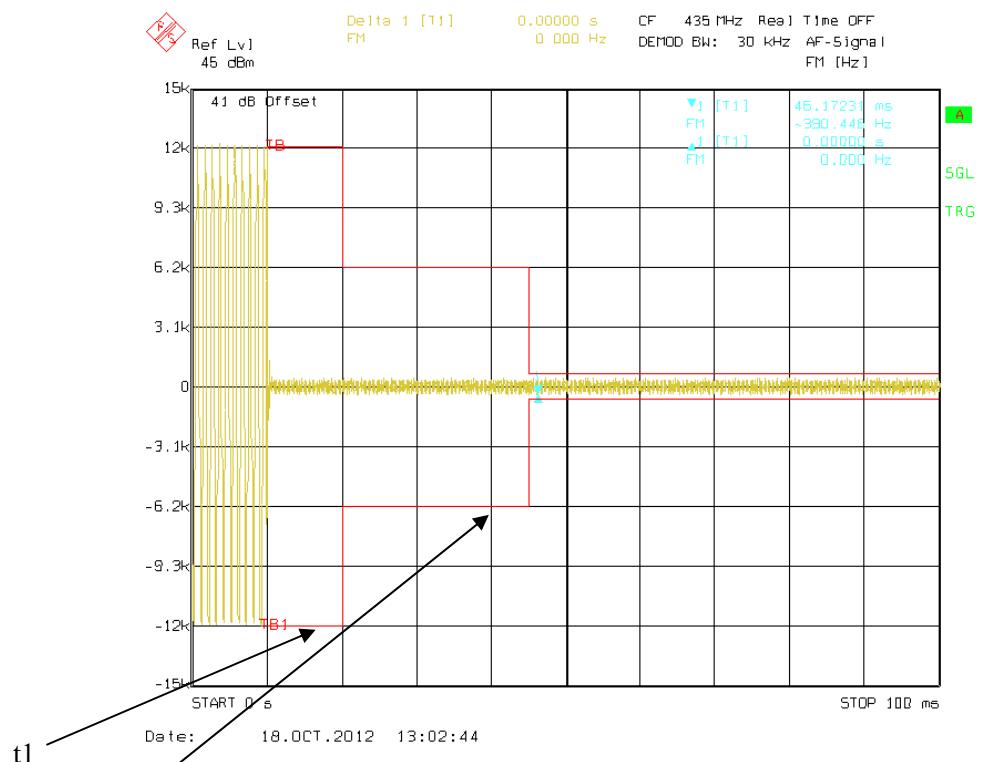
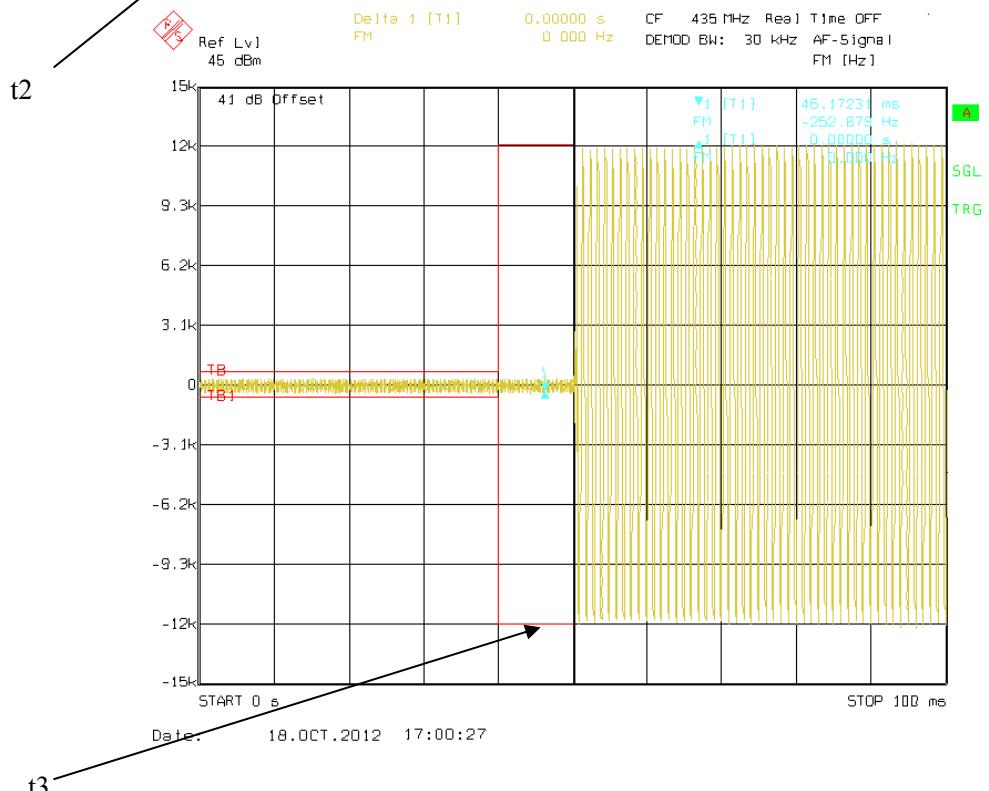
## Test Data

### Environmental Conditions

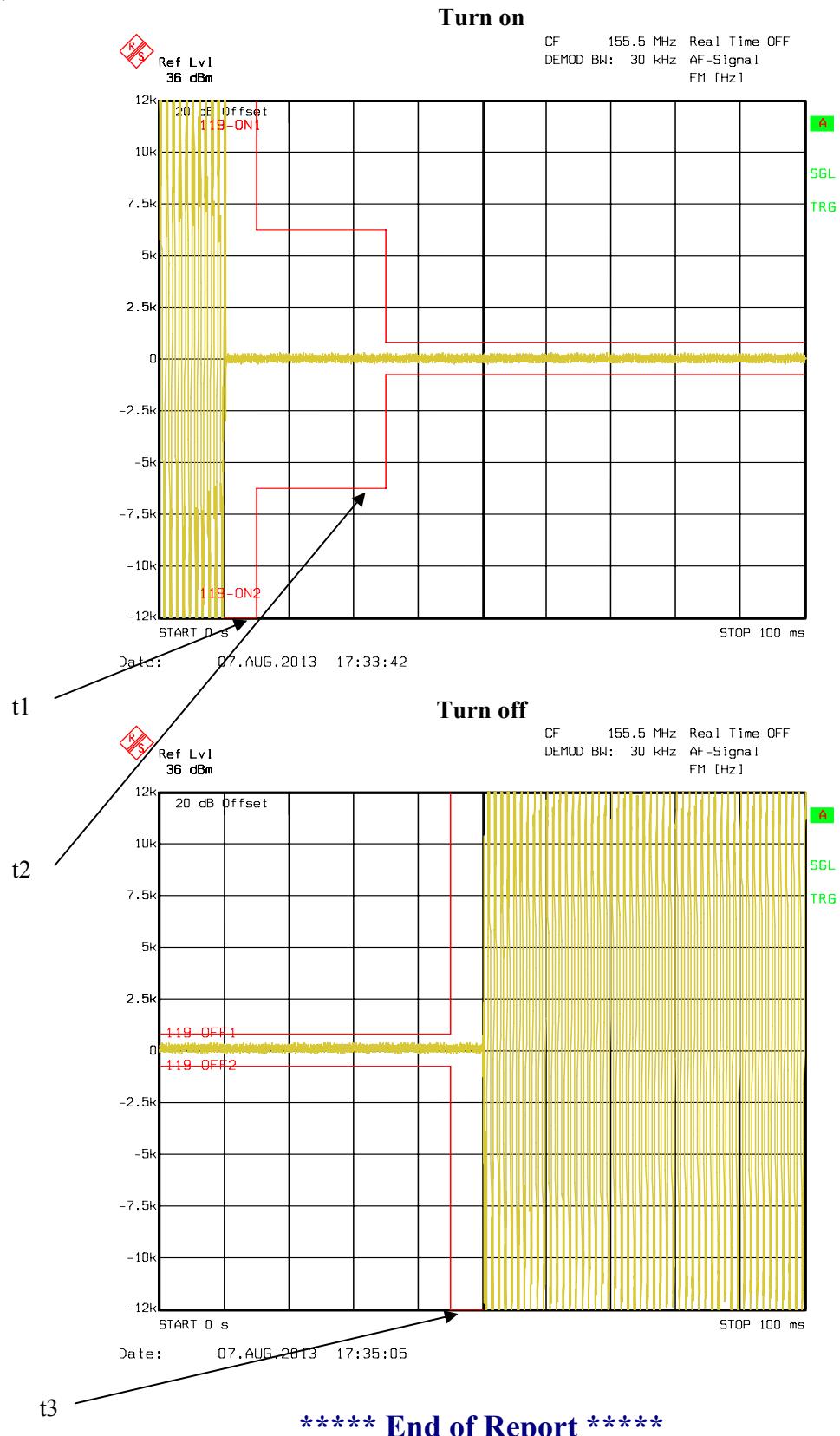
Temperature:	26.2 °C
Relative Humidity:	51%
ATM Pressure:	101 kPa

*The testing was performed by Ares Liu on 2012-10-17 to 2013-8-7.*

UHF:

**Turn on****Turn off**

VHF:

**\*\*\*\*\* End of Report \*\*\*\*\***