

## FCC PART 22 AND 90 TEST REPORT

For

### SHENZHEN COVALUE COMMUNICATIONS CO., LTD.

2/F., Bldg. 24, XiLi Industrial Park, No.119 Xinguang Rd, Xili, Nanshan, Shenzhen, China

**FCC ID: Y4GCU460-2**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Two way radio
<b>Test Engineer:</b> <u>Dean Liu</u>	<i>Dean Liu</i>
<b>Report Number:</b> <u>RDG151103002-00</u>	
<b>Report Date:</b> <u>2016-01-07</u>	
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**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 Compliant Laboratories Corp.

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## GENERAL INFORMATION

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

The SHENZHEN COVALUE COMMUNICATIONS CO., LTD.'s product, model: CU460-2 (FCC ID: Y4GCU460-2) (the "EUT") in this report is a *Two way radio*, which was measured approximately: 9.8 cm (L) x 5.4 cm (W) x 3.1 cm (H), rated input voltage: DC7.4V from rechargeable lithium battery.

*Note: The series product, model CU460-2, CU450-2 are electrically identical, the difference between them just is the appearance which can found in the attachment, we selected CU460-2 for fully testing, the details was explained in the attached declaration letter.*

*\* All measurement and test data in this report was gathered from production sample serial number: 151103002. The EUT was received on 2015-11-24.*

### Objective

This test report is prepared on behalf of SHENZHEN COVALUE COMMUNICATIONS CO., LTD. in accordance with Part 2, Part 22 and Part 90 of the Federal Communications Commission 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 22 – Public Mobile Service

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA-603-D.

All emissions measurement was performed and Bay Area Compliant 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 Compliant 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 Compliant 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 Compliant with the requirements of Section 2.948 of the FCC Rules on February 06, 2015. 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.

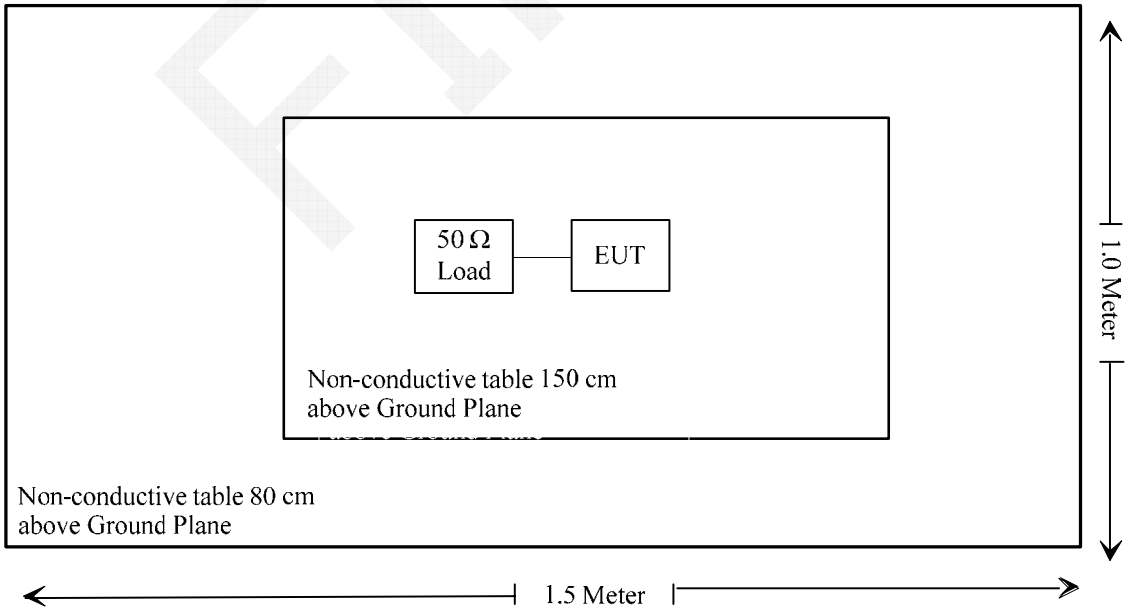
EUT Specification:

Frequency Band	400-470 MHz
Modulation Mode	FM
Channel Spacing	6.25 kHz
Rated Output Power	High: 2 W Low: 1 W
Channel Spacing	12.5 kHz
Rated Output Power	High: 4 W Low: 1 W

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Results
§1.1310; §2.1093	RF Exposure	Compliant
§2.1046; § 22.727; §90.205	RF Output Power	Compliant
§2.1047; §90.207	Modulation Characteristic	Compliant
§2.1049; §22.357; § 22.731; §90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliant
§2.1051; §22.359; §90.210	Spurious Emission at Antenna Terminal	Compliant
§2.1053; §22.359; §90.210	Spurious Radiated Emissions	Compliant
§2.1055; § 22.355; §90.213	Frequency Stability	Compliant
§90.214	Transient Frequency Behavior	Compliant

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

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### **Applicable Standard**

FCC§1.1310 and §2.1093.

### **Test Result**

Compliant, please refer to the SAR report: RDG151103002-20A.

FINAL

**FCC §2.1046 & § 22.727 & §90.205- RF OUTPUT POWER****Applicable Standard**

FCC §2.1046, § 22.727 and §90.205.

**Test Procedure**

Conducted RF Output Power:

TIA-603-D section 2.2.1

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

Spectrum Analyzer setting:

RBW	VBW
100 kHz	300 kHz

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2015-05-09	2016-05-09
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2015-05-08	2016-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

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

Temperature:	24.8 °C
Relative Humidity:	59 %
ATM Pressure:	101.7 kPa

*The testing was performed by Dean Liu on 2015-11-28.*



Test Result: Compliant. Please refer to following tables.

FCC Part 90:

Modulation mode	Channel Spacing	$f_c$	Conducted Output Power		Note
		MHz	High	Low	
			W	W	
FM	6.25 kHz	400.0125	2.01	1.02	Not for FCC Review
		435	2.05	1.06	/
		469.9875	2.03	1.03	/
	12.5 kHz	400.0125	4.03	1.01	Not for FCC Review
		435	4.03	1.02	/
		469.9875	4.02	1.03	/

FCC Part 22:

Modulation mode	Channel Spacing	$f_c$	Conducted Output Power	
		MHz	High	Low
			W	W
FM	6.25 kHz	454.0125	2.06	1.06
	12.5 kHz	454.0125	4.03	1.02

**FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC****Applicable Standard**

FCC§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 Procedure**

Test Method: TIA/EIA-603 2.2.3

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	RF Communications Test Set	8920A	00 235	2015-05-09	2016-05-09
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2015-05-08	2016-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

\* **Statement of Traceability:** Bay Area Compliant Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

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

Temperature:	24.3°C
Relative Humidity:	59 %
ATM Pressure:	101.5 kPa

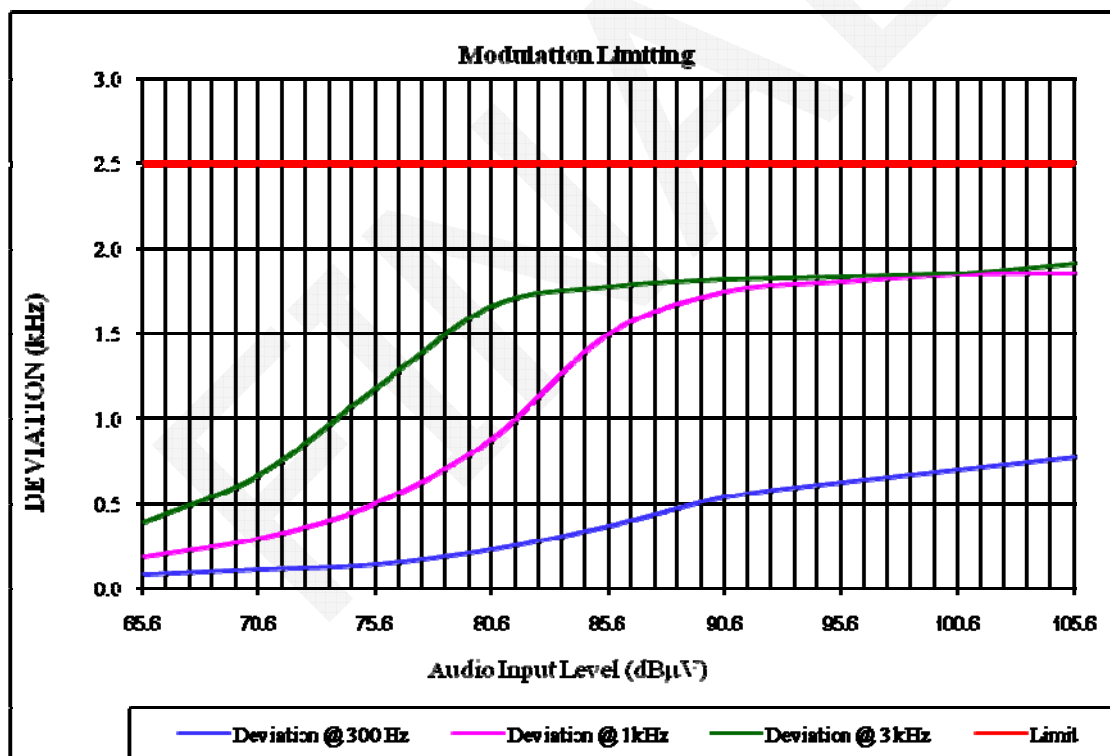
*The testing was performed by Dean Liu on 2015-11-30.*

*Test Result: Compliant. Please refer to following table and plots.*

**MODULATION LIMITING**

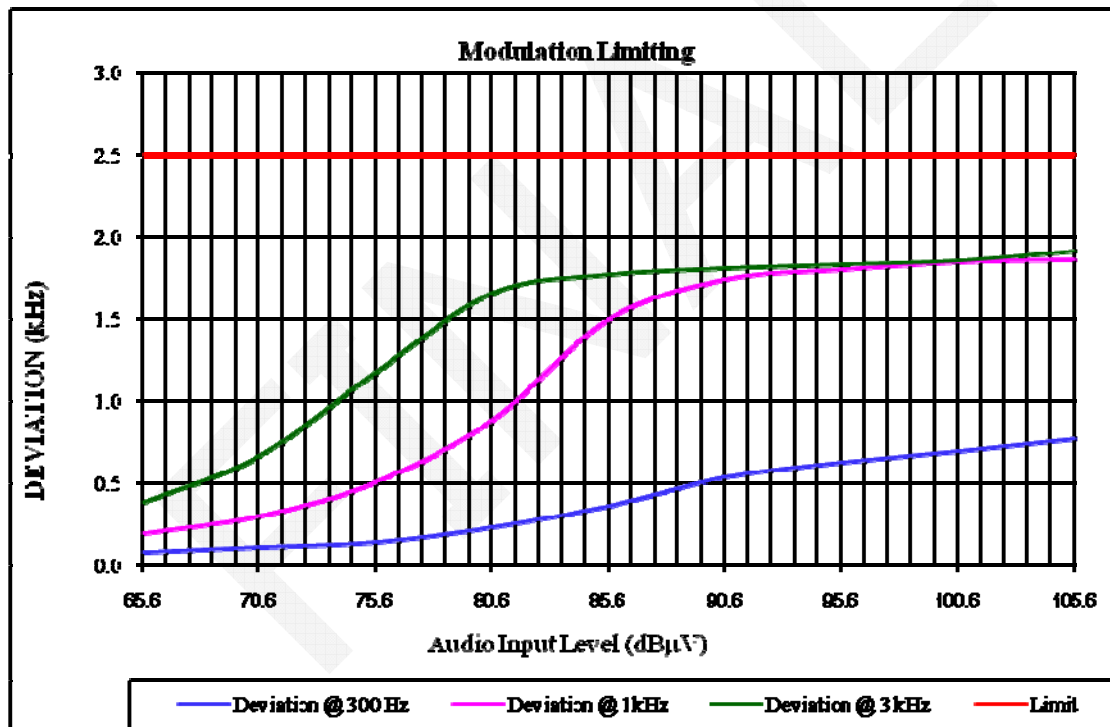
Carrier Frequency: 435 MHz, Channel Spacing = 12.5 kHz, high power level

Audio Input Level [dB $\mu$ V]	Frequency Deviation (kHz)			Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
105.6	0.775	1.858	1.916	2.5
100.6	0.701	1.847	1.859	2.5
95.6	0.628	1.802	1.837	2.5
90.6	0.542	1.744	1.816	2.5
85.6	0.368	1.500	1.774	2.5
80.6	0.235	0.886	1.664	2.5
75.6	0.143	0.501	1.176	2.5
70.6	0.115	0.302	0.670	2.5
65.6	0.084	0.192	0.391	2.5



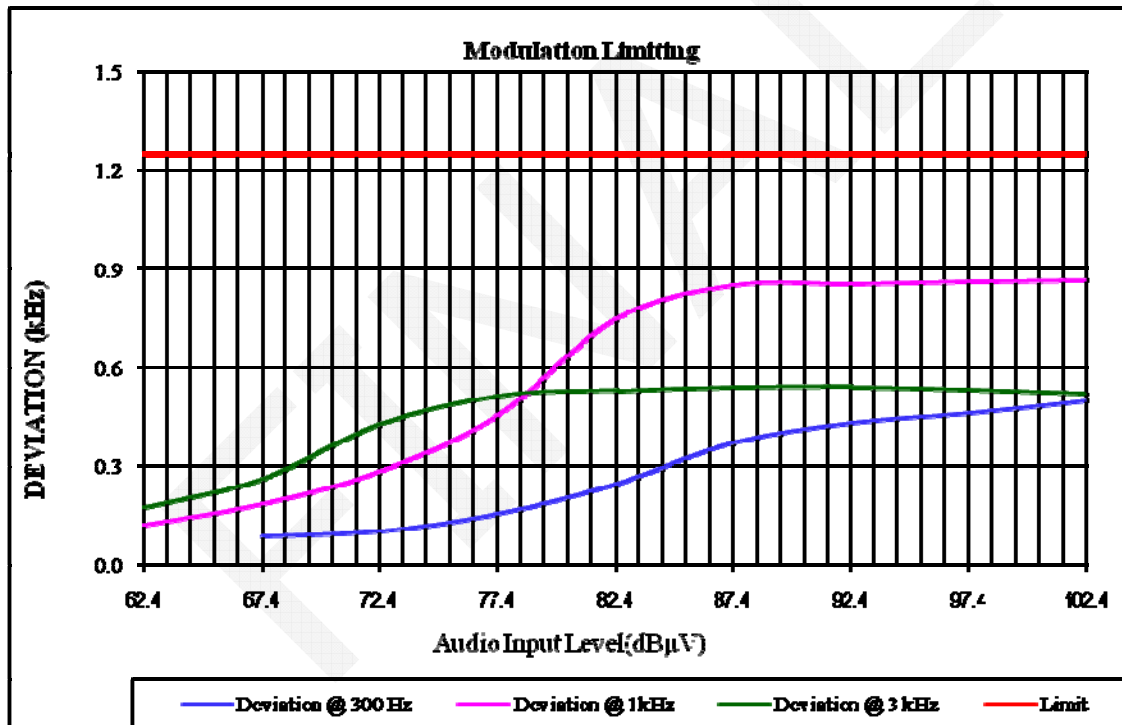
Carrier Frequency: 435 MHz, Channel Spacing = 12.5 kHz, low power level

Audio Input Level [dB $\mu$ V]	Frequency Deviation (kHz)			Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
105.6	0.772	1.858	1.911	2.5
100.6	0.698	1.847	1.854	2.5
95.6	0.624	1.803	1.831	2.5
90.6	0.539	1.743	1.811	2.5
85.6	0.365	1.500	1.769	2.5
80.6	0.232	0.886	1.658	2.5
75.6	0.142	0.505	1.172	2.5
70.6	0.112	0.301	0.665	2.5
65.6	0.081	0.192	0.383	2.5



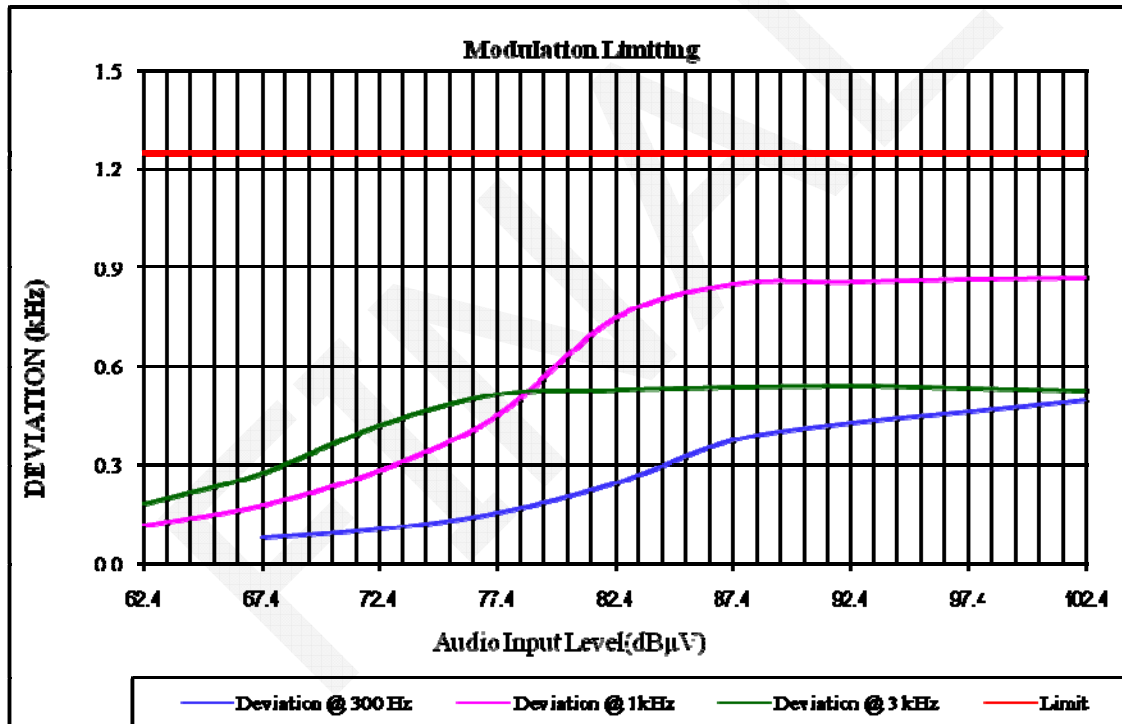
Carrier Frequency: 435 MHz, Channel Spacing = 6.25 kHz, high power level

Audio Input Level [dBμV]	Frequency Deviation (kHz)			Result
	@ 300 Hz	@ 1kHz	@ 3 kHz	
102.4	0.499	0.867	0.523	PASS
97.4	0.461	0.861	0.535	PASS
92.4	0.431	0.856	0.542	PASS
87.4	0.371	0.852	0.539	PASS
82.4	0.246	0.750	0.531	PASS
77.4	0.154	0.453	0.514	PASS
72.4	0.103	0.283	0.426	PASS
67.4	0.086	0.185	0.261	PASS
62.4	/	0.122	0.172	PASS



Carrier Frequency: 435 MHz, Channel Spacing = 6.25 kHz, low power level

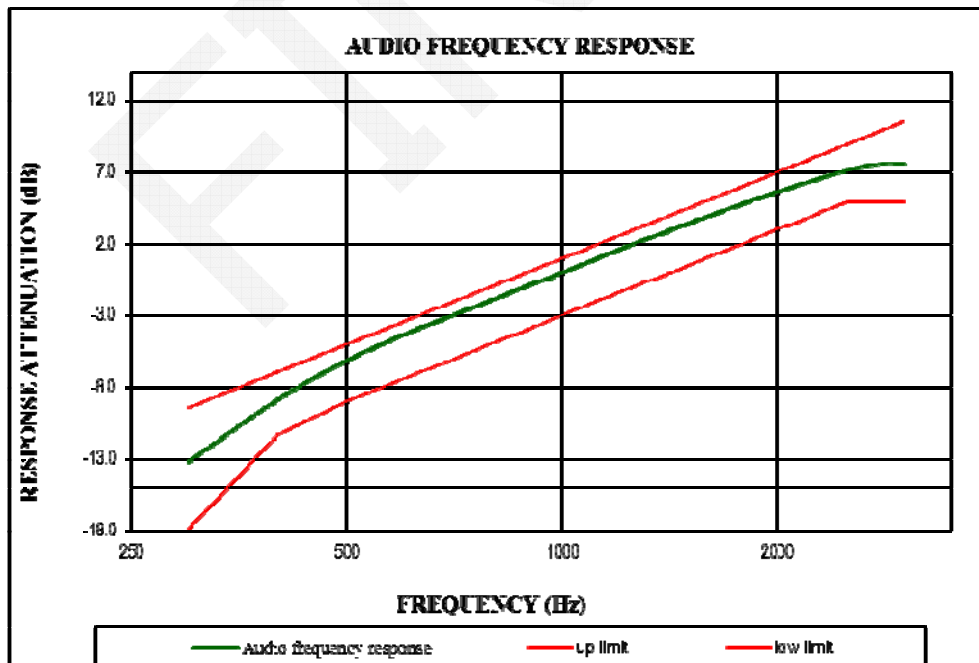
Audio Input Level [dBμV]	Frequency Deviation (kHz)			Result
	@ 300 Hz	@ 1kHz	@ 3 kHz	
102.4	0.497	0.872	0.524	PASS
97.4	0.463	0.865	0.533	PASS
92.4	0.427	0.857	0.541	PASS
87.4	0.374	0.851	0.536	PASS
82.4	0.245	0.750	0.528	PASS
77.4	0.155	0.451	0.516	PASS
72.4	0.105	0.284	0.421	PASS
67.4	0.079	0.176	0.274	PASS
62.4	/	0.116	0.181	PASS



**Audio Frequency Response**

Carrier Frequency: 435 MHz, Channel Spacing = 12.5 kHz, high power level

Audio Frequency (Hz)	Response Attenuation (dB)
300	-13.21
400	-8.86
500	-6.14
600	-4.33
700	-3.02
800	-1.89
900	-0.85
1000	0.00
1200	1.62
1400	2.87
1600	3.95
1800	4.87
2000	5.65
2200	6.31
2400	6.87
2600	7.31
2800	7.59
3000	7.58



Carrier Frequency: 435 MHz, Channel Spacing = 12.5 kHz, low power level

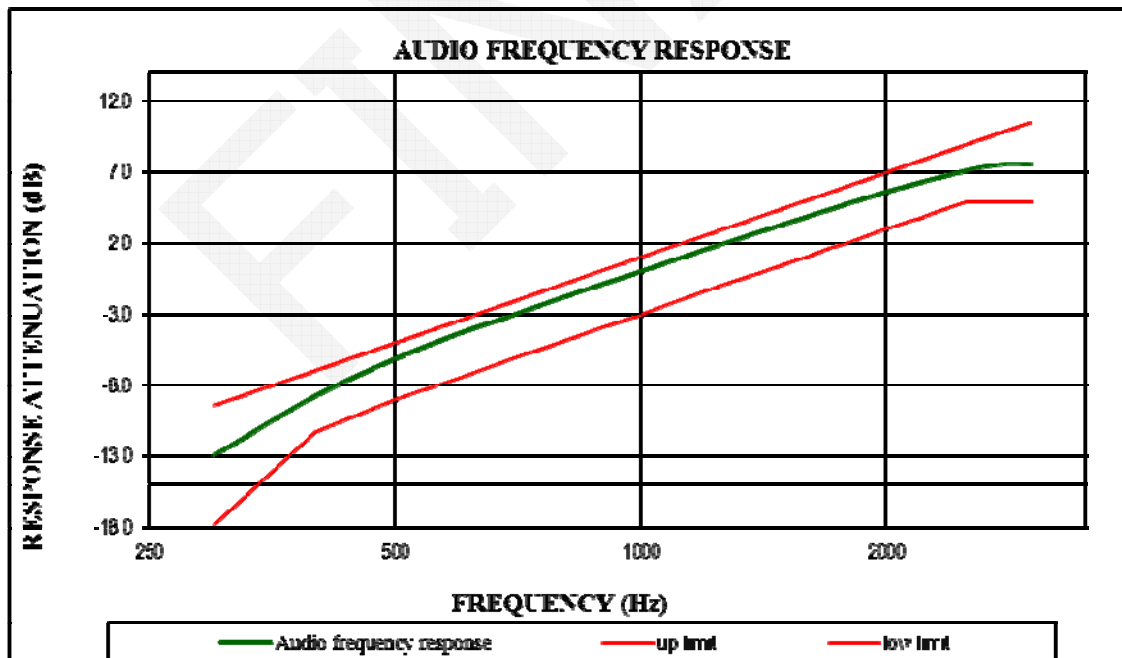
Audio Frequency (Hz)	Response Attenuation (dB)
300	-13.25
400	-8.91
500	-6.15
600	-4.35
700	-3.02
800	-1.94
900	-0.89
1000	0.00
1200	1.52
1400	2.83
1600	3.90
1800	4.81
2000	5.62
2200	6.27
2400	6.84
2600	7.23
2800	7.54
3000	7.51





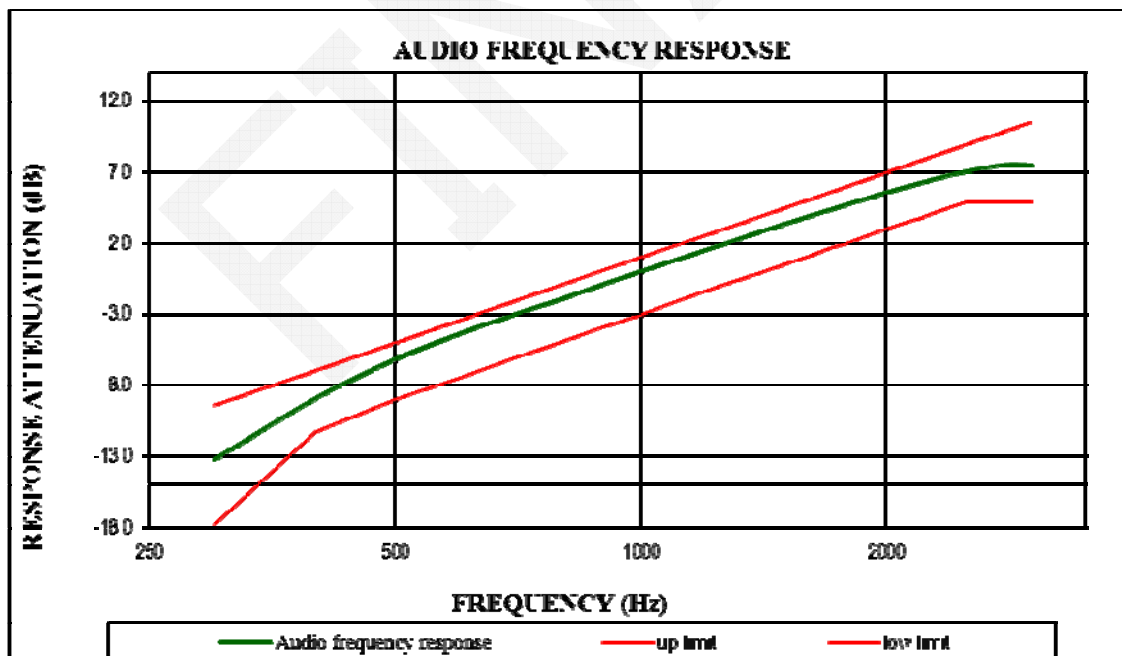
Carrier Frequency: 435 MHz, Channel Spacing = 6.25 kHz, high power level

Audio Frequency (Hz)	Response Attenuation (dB)
300	-12.96
400	-8.72
500	-6.12
600	-4.31
700	-3.02
800	-1.86
900	-0.86
1000	0.00
1200	1.56
1400	2.84
1600	3.91
1800	4.85
2000	5.66
2200	6.31
2400	6.87
2600	7.32
2800	7.59
3000	7.56



Carrier Frequency: 435 MHz, Channel Spacing = 6.25 kHz, low power level

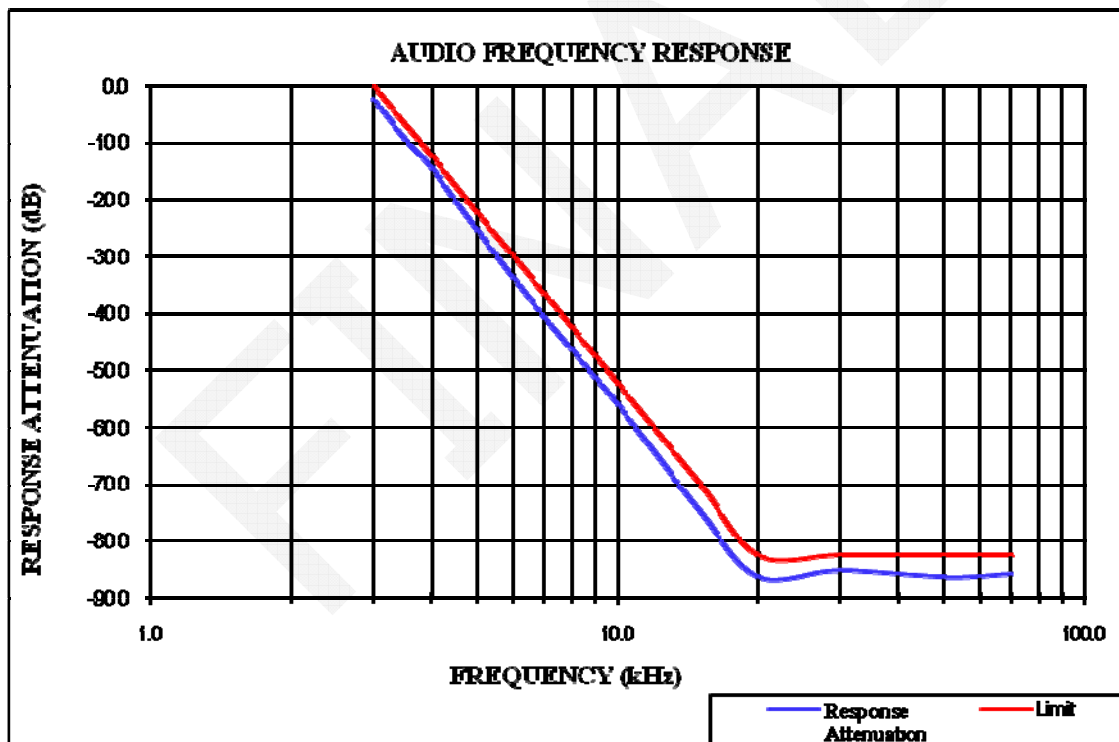
Audio Frequency (Hz)	Response Attenuation (dB)
300	-12.94
400	-8.72
500	-6.15
600	-4.33
700	-3.02
800	-1.87
900	-0.84
1000	0.00
1200	1.52
1400	2.81
1600	3.91
1800	4.83
2000	5.64
2200	6.29
2400	6.87
2600	7.33
2800	7.58
3000	7.55



**Audio Frequency Low Pass Filter Response**

Carrier Frequency: 435 MHz, Channel Spacing = 12.5 kHz, high power level

Audio Frequency	Response Attenuation	Limit
kHz	dB	dB
3.0	-2.4	0.0
3.5	-9.3	-6.7
4.0	-14.6	-12.5
5.0	-25.4	-22.2
7.0	-40.8	-36.8
10.0	-55.9	-52.3
15.0	-74.9	-69.9
20.0	-86.2	-82.5
30.0	-85.1	-82.5
50.0	-86.3	-82.5
70.0	-85.7	-82.5



## FCC §2.1049 & §22.357 & § 22.731 & §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

### Applicable Standard

FCC §2.1049, §22.357, § 22.731, §90.209 and §90.210

Applicable Emission Masks

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25	A or B	A or C
25-50	B	C
72-76	B	C
150-174	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854	B	H
809-824/854-869	B	G
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-5925		
All other bands	B	C

**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) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27(f_d - 2.88 \text{ kHz})$  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  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation.
- (4) The reference level for showing Compliant with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show Compliant with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

## §22.357 Emission types.

Any authorized station in the Public Mobile Services may transmit emissions of any type(s) that comply with the applicable emission rule, i.e. §22.359 or §22.917

## §22.731 Emission limitations.

Upon application for multichannel operation, the FCC may authorize emission bandwidths wider than those specified in §22.357, provided that spectrum utilization is equal to or better than that achieved by single channel operation.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2015-05-09	2016-05-09
HP	RF Communications Test Set	8920A	00 235	2015-05-09	2016-05-09
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2015-05-08	2016-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

**\* Statement of Traceability:** Bay Area Compliant Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Procedure**

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

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

<b>Temperature:</b>	24.6~25.5 °C
<b>Relative Humidity:</b>	46~50 %
<b>ATM Pressure:</b>	101.3~101.5 kPa

*The testing was performed by Dean Liu on 2015-11-28 & 2015-12-01.*

*Test Result: Compliant. Please refer to the following tables and plots.*

*FCC Part 90:*

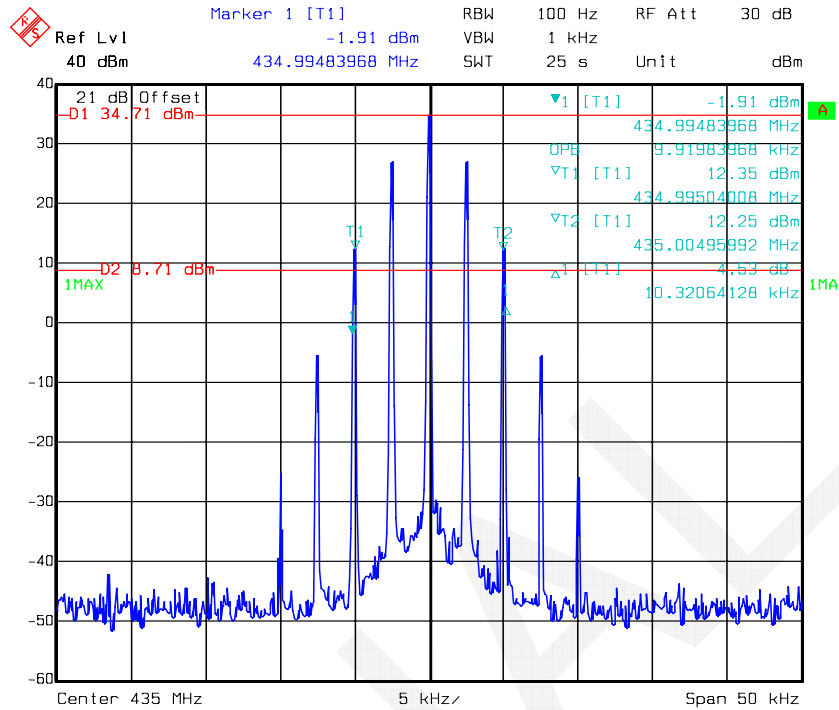
Modulation Mode	Channel Spacing	$f_c$	26 dB Bandwidth	99% Bandwidth	Power Level
	kHz	MHz	kHz	kHz	
FM	12.5	435	10.321	9.92	High
			10.321	9.92	Low
	6.25	435	5.311	5.11	High
			5.311	5.11	Low

*FCC Part 22:*

Modulation Mode	Channel Spacing	$f_c$	26 dB Bandwidth	99% Bandwidth	Power Level
	kHz	MHz	kHz	kHz	
FM	12.5	454.0125	10.321	9.92	High
			10.321	9.92	Low
	6.25	454.0125	5.311	5.11	High
			5.311	5.11	Low

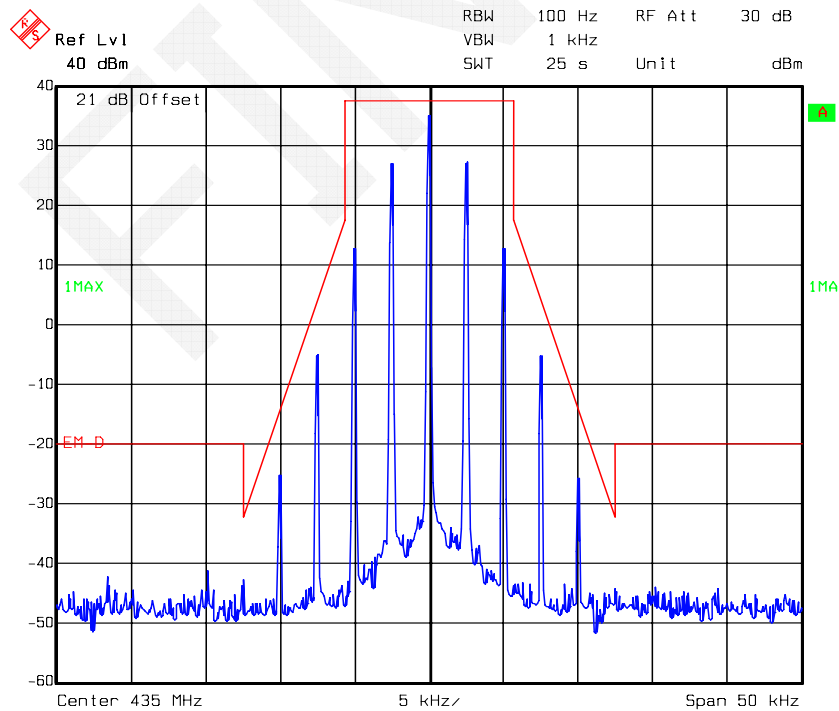
## FCC PART 90

## Occupied Bandwidth –12.5kHz, 435 MHz, High Power Level

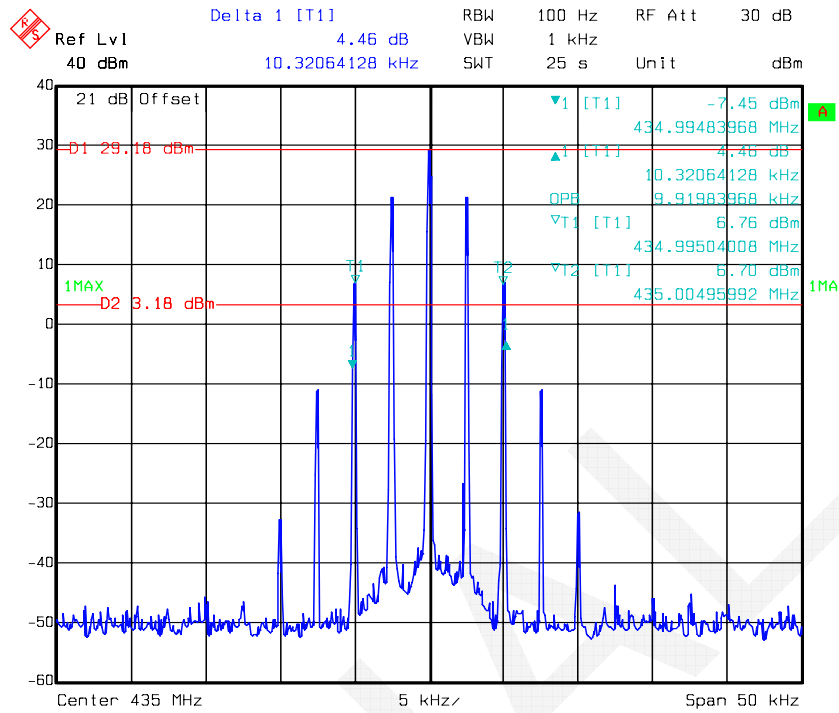
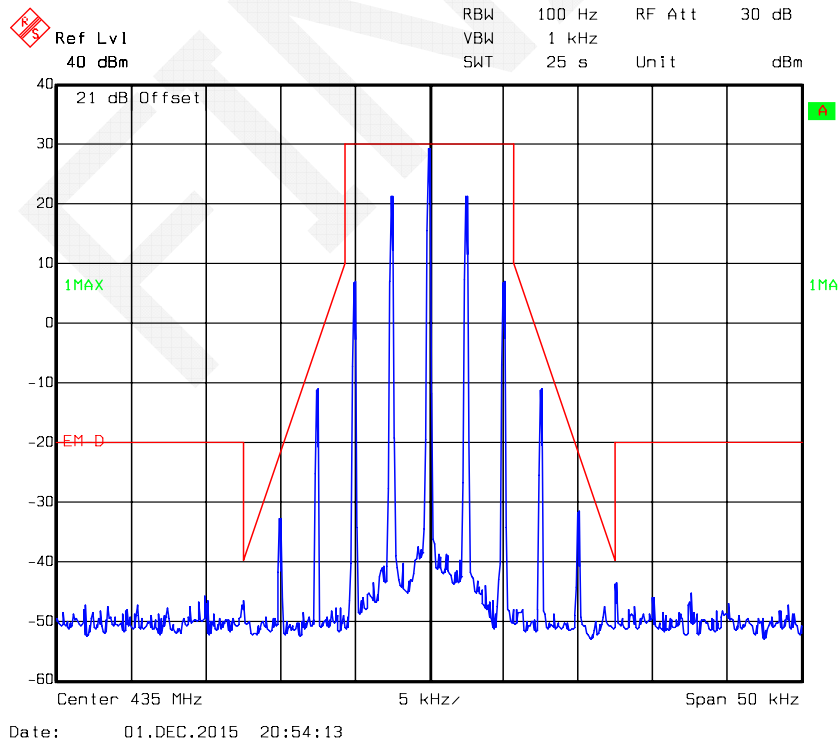


Date: 01.DEC.2015 00:05:25

## Emission Mask - Type D



Date: 30.NOV.2015 23:50:55

**Occupied Bandwidth – 12.5kHz, 435 MHz, Low Power Level****Emission Mask - Type D**



Delta 1 [T1]

Ref Lvl 40 dBm

RBW 100 Hz

RF Att 30 dB

VBW 1 kHz

SWT 25 s

Unit dBm

21 dB Offset

-01.32.1 dBm

1MA02 5.1 dBm

Start 434.975 MHz

5 kHz/

Stop 435.025 MHz

434.99744 MHz

434.99754 MHz

435.00265 MHz

-4.02 dBm

-3.27 dBm

5.31062124 kHz

5.11022044 kHz

6.41 dBm

6.35 dBm

Date: 28.DEC.2015 22:04:43

Marker 1 [T1]

Ref Lvl 40 dBm

32.22 dBm

435.0005010 MHz

RBW 100 Hz

VBW 1 kHz

SWT 25 s

Unit dBm

21 dB Offset

1MAX

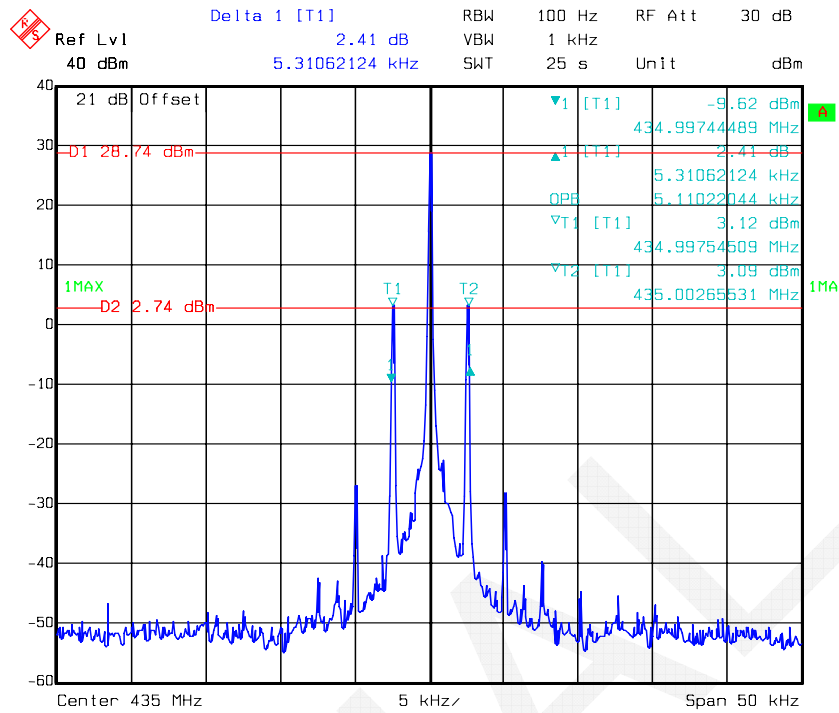
1MIN

Start 434.975 MHz

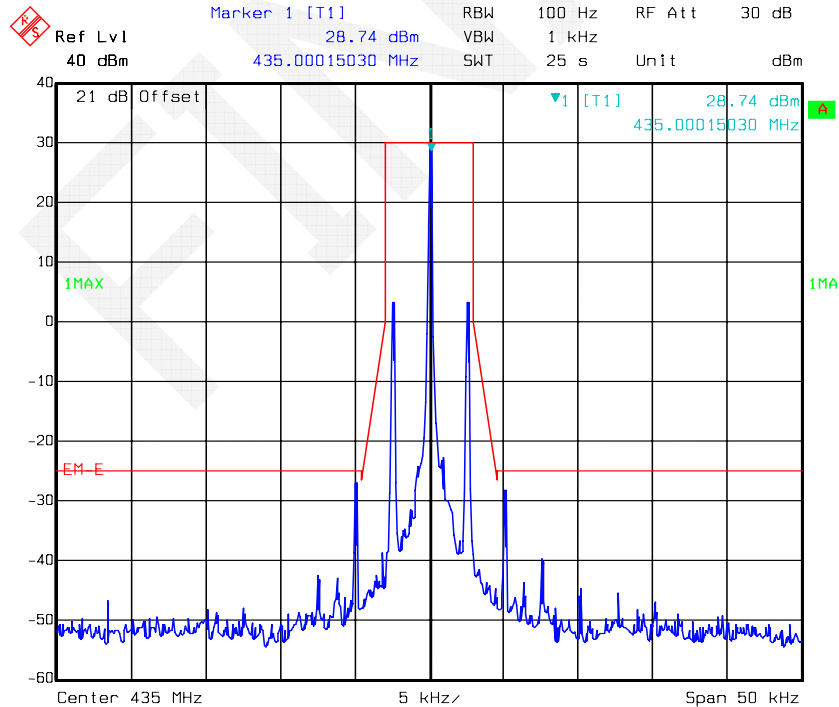
5 kHz

Stop 435.025 MHz

Date: 28.DEC.2015 21:59:10

**Occupied Bandwidth –6.25kHz, 435 MHz, Low Power Level**

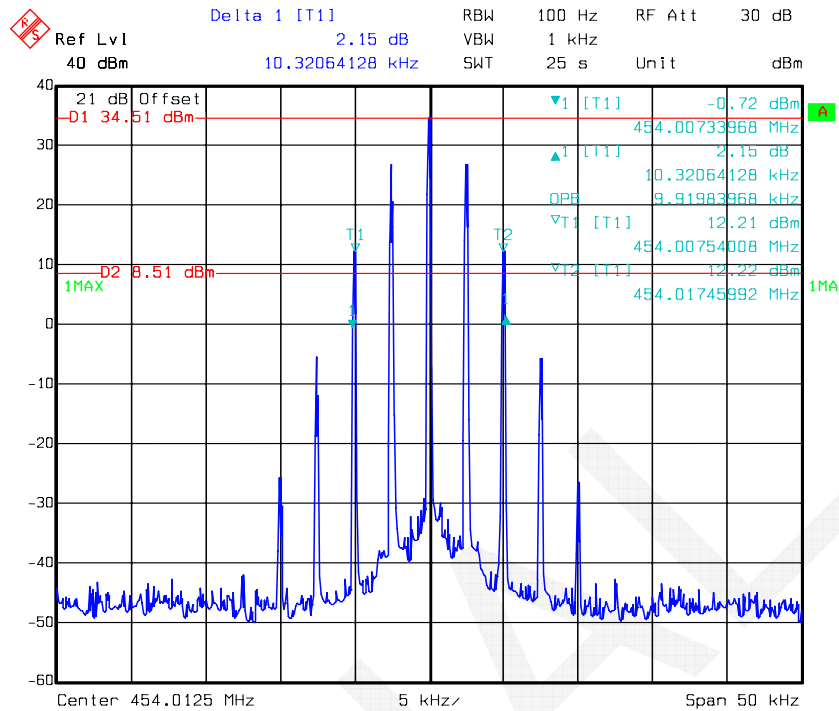
Date: 28.DEC.2015 22:34:28

**Emission Mask - Type D**

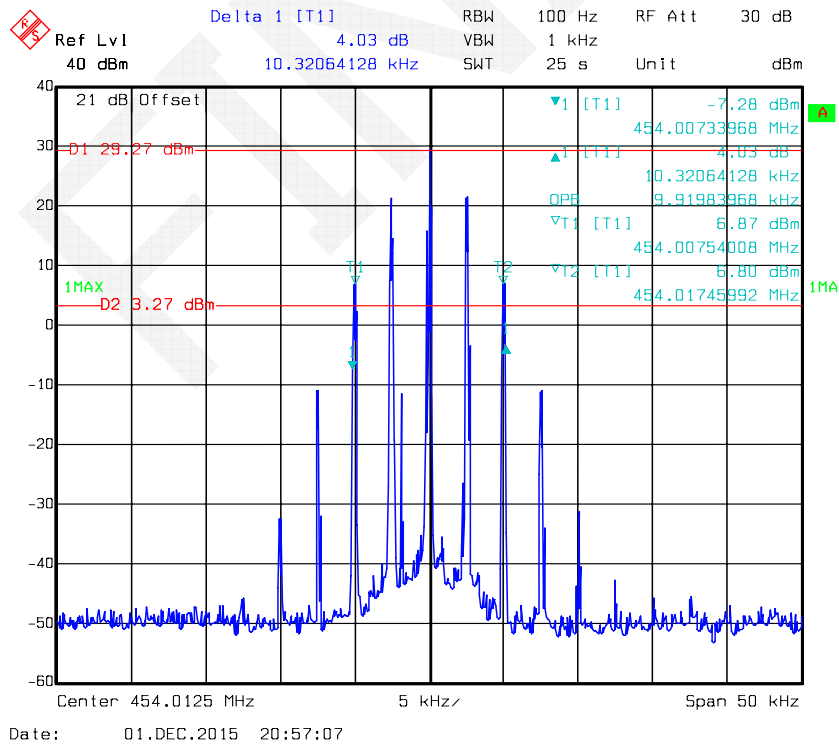
Date: 28.DEC.2015 22:34:55

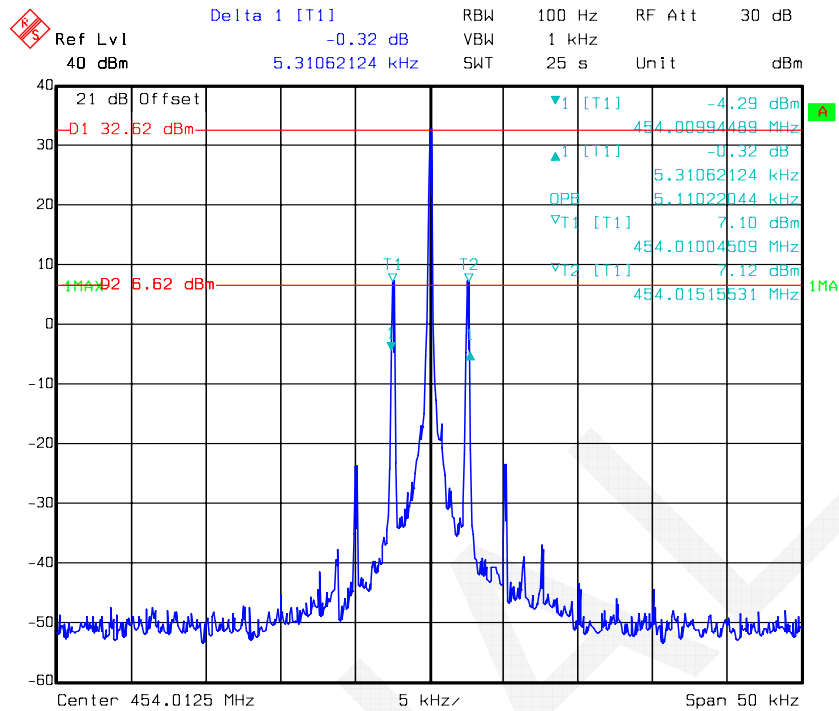
## FCC PART 22

## Occupied Bandwidth -12.5kHz, 454.0125 MHz, High Power Level

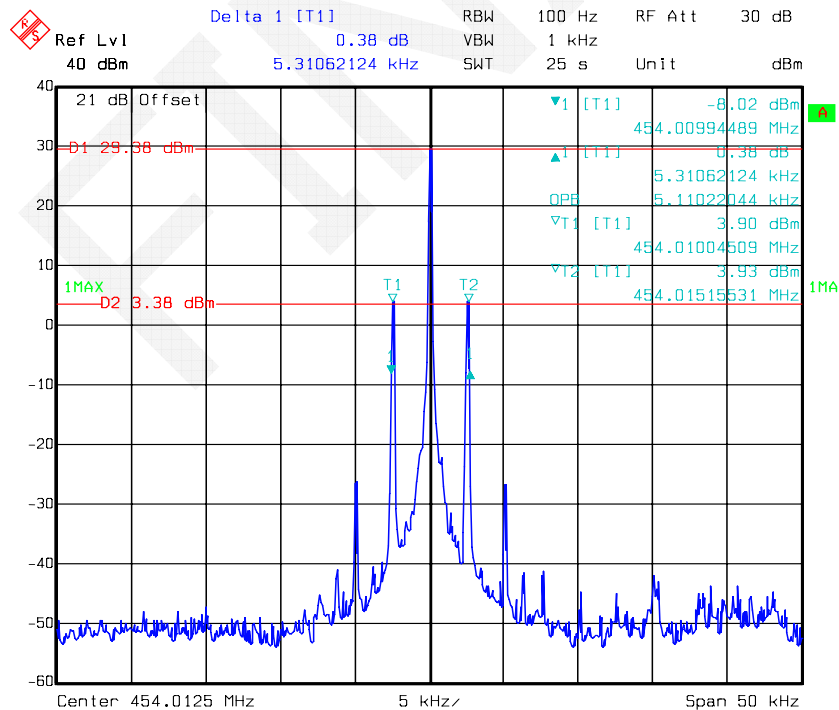


## Occupied Bandwidth -12.5kHz, 454.0125 MHz, Low Power Level



**Occupied Bandwidth –6.25kHz, 454.0125 MHz, High Power Level**

Date: 28.DEC.2015 22:06:52

**Occupied Bandwidth –6.25kHz, 454.0125 MHz, Low Power Level**

Date: 28.DEC.2015 22:32:45

## FCC §2.1051 & §22.359 & §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) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27(f_d - 2.88 \text{ kHz})$  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  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation.
- (4) The reference level for showing Compliant with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show Compliant with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

**Emission Mask E**—6.25 kHz or less channel bandwidth equipment. For transmitters designed to operate with a 6.25 kHz or less bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 3.0 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least  $30 + 16.67(f_d - 3 \text{ kHz})$  or  $55 + 10 \log(P)$  or 65 dB, whichever is the lesser attenuation.
- (3) On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least  $55 + 10 \log(P)$  or 65 dB, whichever is the lesser attenuation.
- (4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

#### §22.359 Emission limitations.

- (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	831259/019	2015-05-09	2016-05-09
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2015-05-08	2016-05-08
Mini-Circuits	HIGH PASS FILTER	BHP-550+	YZU15801121	2015-05-06	2016-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

\* **Statement of Traceability:** Bay Area Compliant Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

### Test Procedure

Adjust the spectrum analyzer for the following settings:

- 1) Resolution Bandwidth = 100 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.
- 2) Video Bandwidth = 3 times the resolution bandwidth.
- 3) Sweep Speed = 2000 Hz per second.
- 4) Detector Mode = mean or average power.

### Test Data

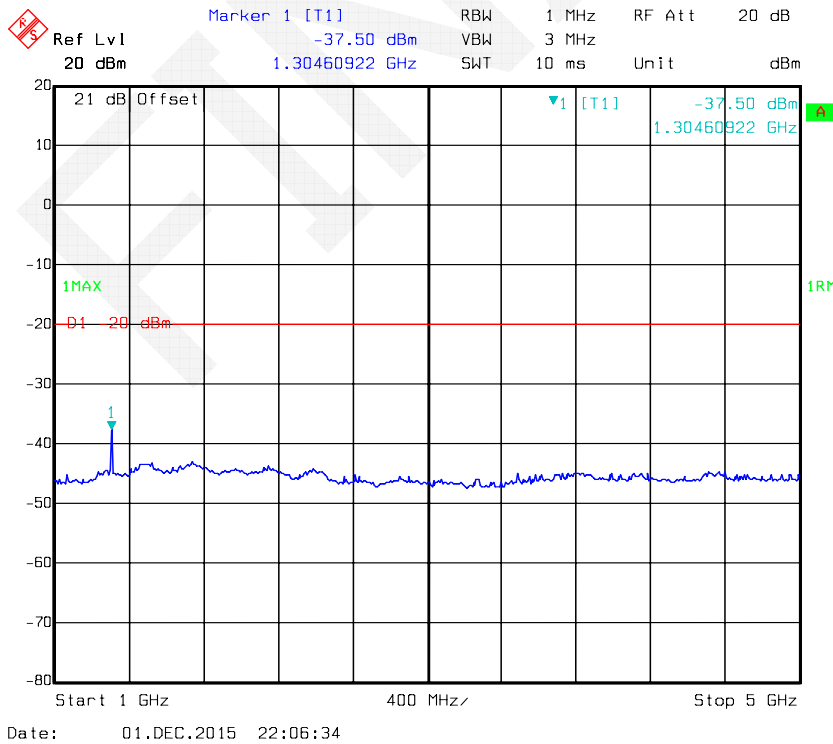
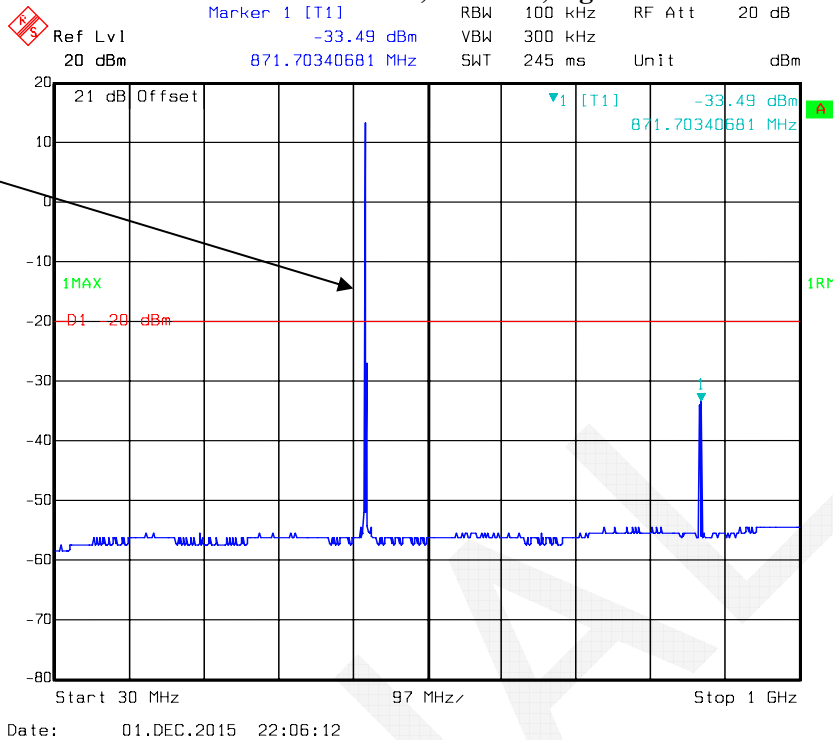
#### Environmental Conditions

<b>Temperature:</b>	24.5~25.1°C
<b>Relative Humidity:</b>	56~58 %
<b>ATM Pressure:</b>	101.1~101.3 kPa

*The testing was performed by Dean Liu on 2015-12-01 and 2015-12-22.*

Note: For conducted spurious emissions were tested at high rated power, which was the worst case. And there was a band reject filter between the EUT and test equipment when testing.

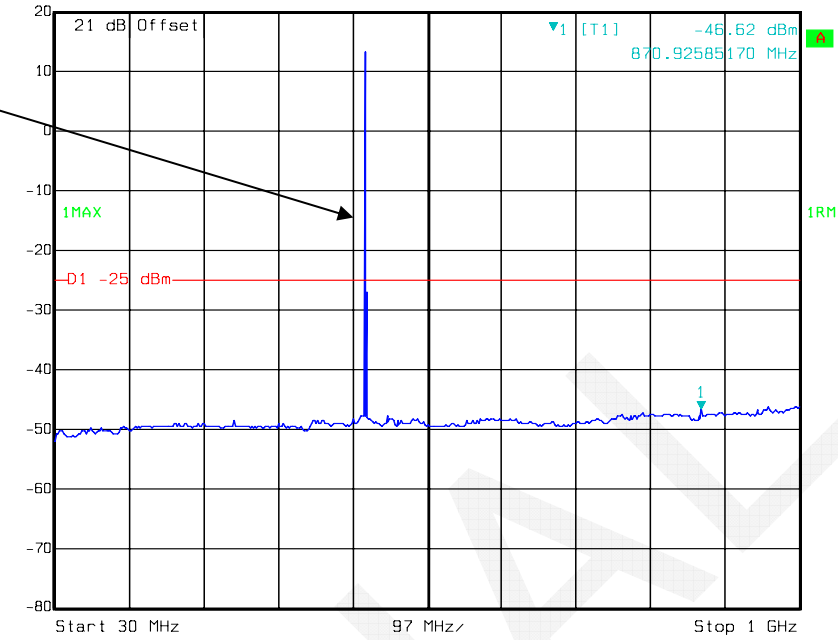
# FCC PART 90 435 MHz – FM Mode, 12.5 kHz, High Power



# FCC PART 90 435 MHz – FM Mode, 6.25 kHz, High Power

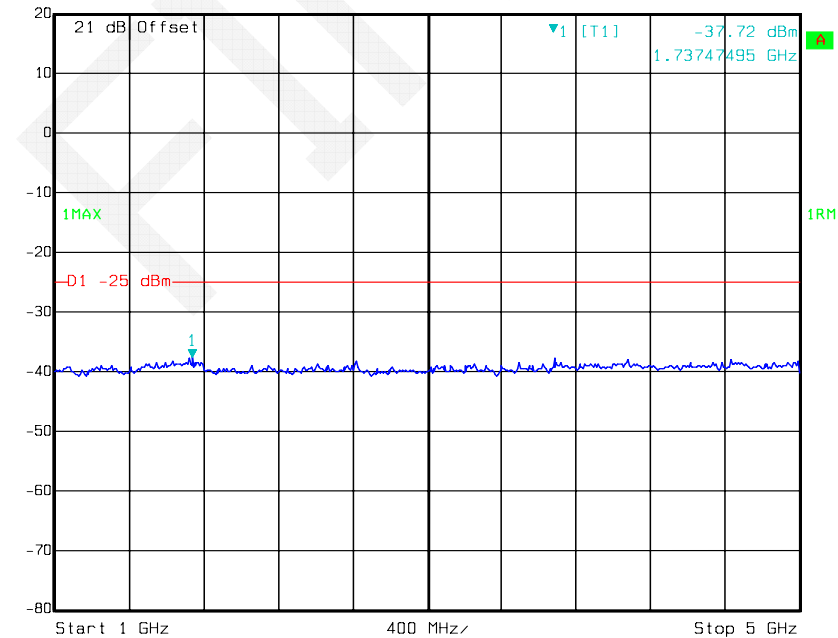
Marker 1 [T1] RBW 100 kHz RF Att 30 dB  
Ref Lvl -46.62 dBm VBW 300 kHz  
20 dBm 870.92585170 MHz SWT 245 ms Unit dBm

Fundamental test  
with Band Reject  
Filter



Date: 22.DEC.2015 18:11:02

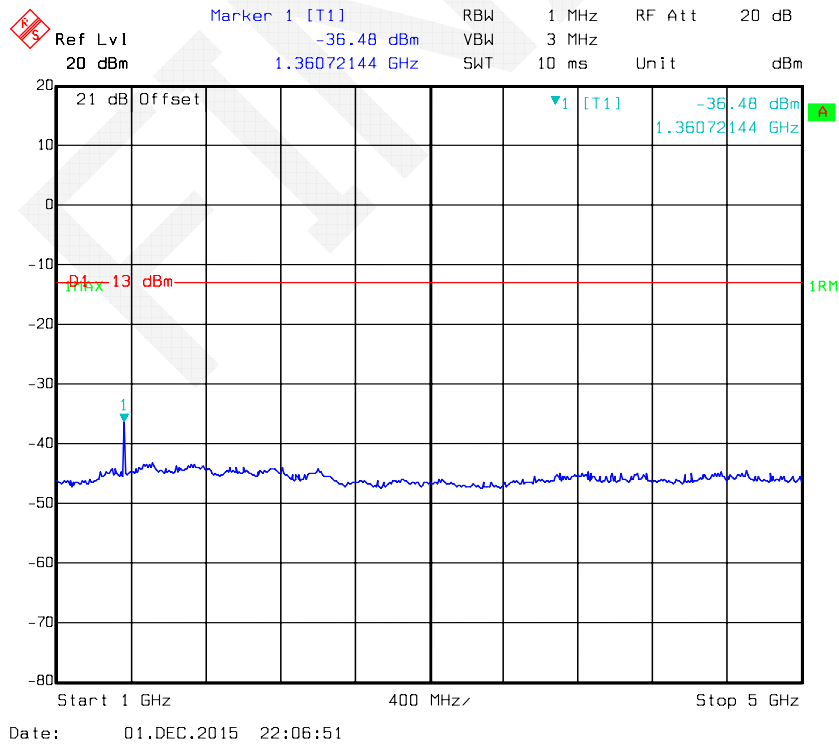
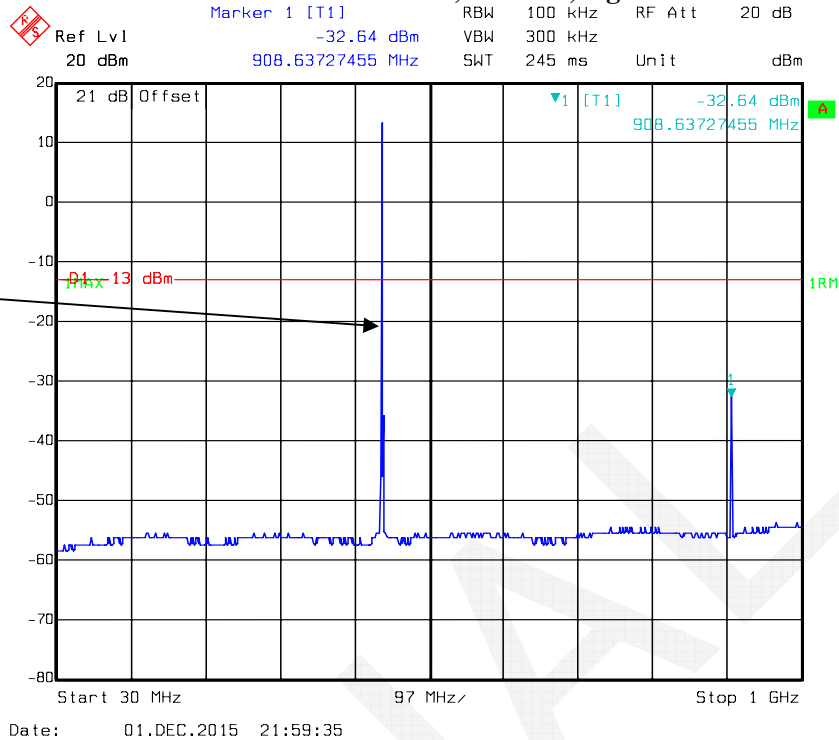
Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
Ref Lvl -37.72 dBm VBW 3 MHz  
20 dBm 1.73747495 GHz SWT 10 ms Unit dBm



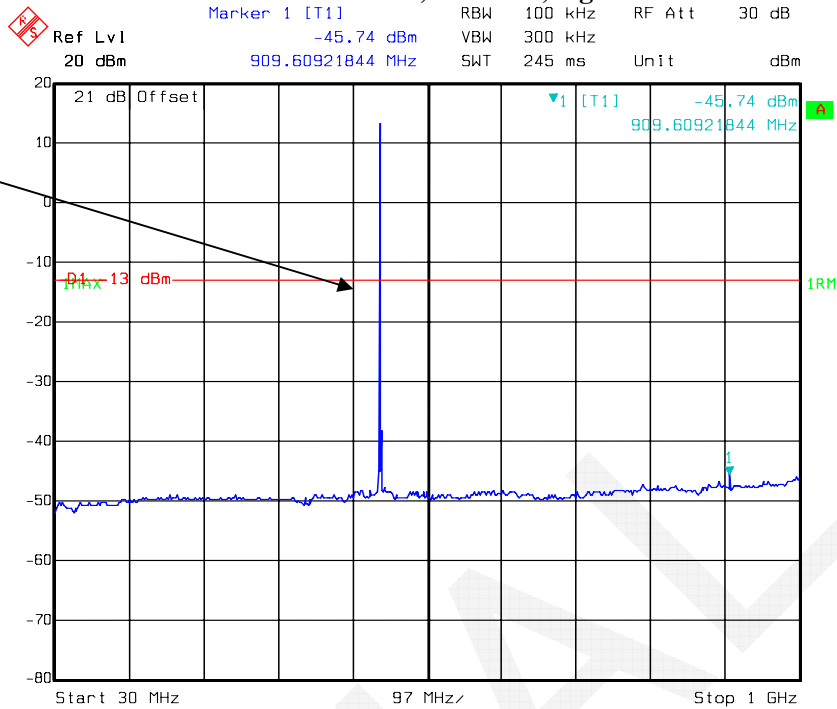
Date: 22.DEC.2015 18:19:45



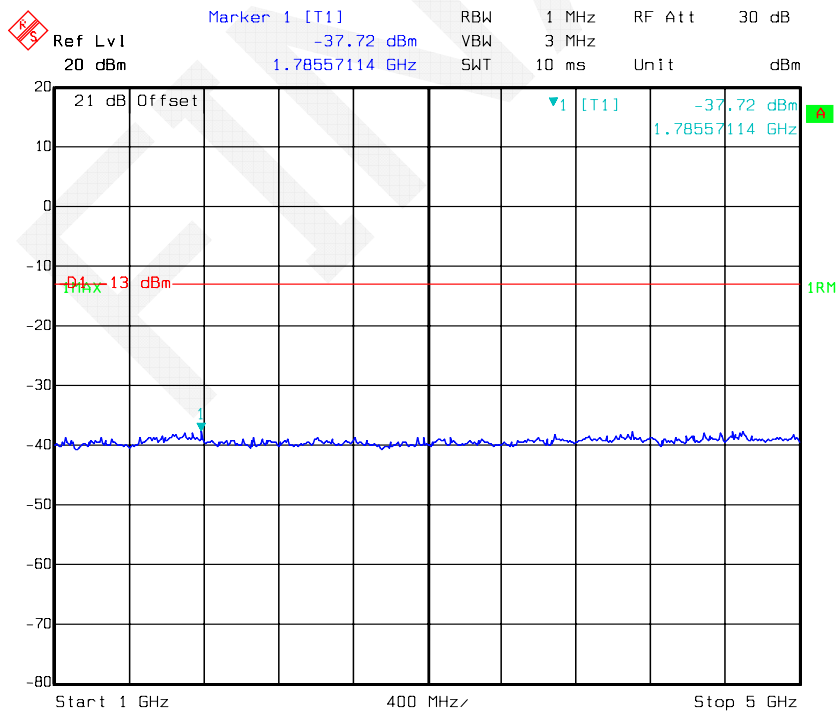
**FCC PART 22**  
**454.0125 MHz –FM Mode,12.5 kHz,High Power**



# FCC PART 22 435 MHz – FM Mode, 6.25 kHz, High Power



Date: 22.DEC.2015 18:11:59



Date: 22.DEC.2015 18:13:49

## FCC §2.1053 & §22.359 & §90.210 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

FCC §2.1053 and §22.359 and §90.210

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2015-02-19	2016-02-19
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
N/A	Coaxial Cable	14m	N/A	2015-05-06	2016-05-06
N/A	Coaxial Cable	8m	N/A	2015-05-06	2016-05-06
Mini-Circuits	HIGH PASS FILTER	BHP-550+	YZU15801121	2015-05-06	2016-05-06
Weinschel Corp	Terminal Load(100W)	1440-3	MD447	/	/

\* **Statement of Traceability:** Bay Area Compliant Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### 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 tenth 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.

For part 90:

Spurious emissions in dB =  $10 \log_{10} (\text{TXpwr in Watts}/0.001)$  - the absolute level

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

Spurious attenuation limit in dB =  $55 + 10 \log_{10}$  (power out in Watts) for EUT with a 6.25 kHz channel bandwidth.

For part 22:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

## Test Data

### Environmental Conditions

<b>Temperature:</b>	26.4 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.2 kPa

The testing was performed by Dean Liu on 2015-08-17.

Test Mode: Transmitting

Frequency	Polar	S.A. Reading	S.G. Level	Antenna Gain	Cable Loss	Absolute Level	Limit	Margin
MHz	H/V	dBμV	dBm	dBd/dBi	dB	dBm	dBm	dB
<b>Frequency: 435 MHz, for FCC PART 90, 12.5 kHz</b>								
1305.000	H	37.76	-62.1	8.3	1.3	-55.1	-20.0	35.1
1305.000	V	35.52	-64.8	8.3	1.3	-57.8	-20.0	37.8
1740.000	H	38.90	-61.8	10.9	1.4	-52.3	-20.0	32.3
1740.000	V	37.54	-63.4	10.9	1.4	-53.9	-20.0	33.9
2175.000	H	34.99	-60.8	10.9	1.9	-51.8	-20.0	31.8
2175.000	V	36.29	-59.1	10.9	1.9	-50.1	-20.0	30.1
2610.000	H	36.83	-57.8	13.2	2.5	-47.1	-20.0	27.1
2610.000	V	34.07	-63.1	13.2	2.5	-52.4	-20.0	32.4
3045.000	H	45.49	-52.2	13.6	2.4	-41.0	-20.0	21.0
3045.000	V	45.30	-52.4	13.6	2.4	-41.2	-20.0	21.2
870.000	H	47.37	-45.9	0.0	1	-46.9	-20.0	26.9
870.000	V	48.80	-47	0.0	1	-48.0	-20.0	28.0
<b>Frequency: 454.0125 MHz, for FCC PART 22, 12.5 kHz</b>								
1362.038	H	41.60	-58.8	8.7	1.4	-51.5	-13.0	38.5
1362.038	V	41.38	-59	8.7	1.4	-51.7	-13.0	38.7
1816.050	H	48.68	-51.3	11.2	1.3	-41.4	-13.0	28.4
1816.050	V	47.49	-52.8	11.2	1.3	-42.9	-13.0	29.9
2270.063	H	44.49	-51.6	11.1	2.2	-42.7	-13.0	29.7
2270.063	V	42.68	-53.1	11.1	2.2	-44.2	-13.0	31.2
2724.075	H	51.58	-45.3	13.1	2.3	-34.5	-13.0	21.5
2724.075	V	49.78	-48.6	13.1	2.3	-37.8	-13.0	24.8
3178.088	H	56.13	-41.5	13.5	2.3	-30.3	-13.0	17.3
3178.088	V	51.72	-45.1	13.5	2.3	-33.9	-13.0	20.9
3632.100	H	38.77	-56.7	14.1	2.2	-44.8	-13.0	31.8
3632.100	V	38.01	-57	14.1	2.2	-45.1	-13.0	32.1
908.025	H	44.59	-48	0.0	1	-49.0	-13.0	36.0
908.025	V	39.91	-54.7	0.0	1	-55.7	-13.0	42.7

Frequency	Polar	S.A. Reading	S.G. Level	Antenna Gain	Cable Loss	Absolute Level	Limit	Margin
MHz	H/V	dBuV	dBm	dBd/dBi	dB	dBm	dBm	dB
<b>Frequency:435 MHz, for FCC PART 90, 6.25 kHz</b>								
1305.000	H	37.23	-62.6	8.3	1.3	-55.6	-25.0	30.6
1305.000	V	34.51	-65.8	8.3	1.3	-58.8	-25.0	33.8
1740.000	H	36.22	-64.5	10.9	1.4	-55.0	-25.0	30.0
1740.000	V	40.27	-60.7	10.9	1.4	-51.2	-25.0	26.2
2175.000	H	41.12	-54.6	10.9	1.9	-45.6	-25.0	20.6
2175.000	V	45.19	-50.2	10.9	1.9	-41.2	-25.0	16.2
2610.000	H	48.12	-46.5	13.2	2.5	-35.8	-25.0	10.8
2610.000	V	45.21	-52	13.2	2.5	-41.3	-25.0	16.3
3045.000	H	57.14	-40.6	13.6	2.4	-29.4	-25.0	4.4
3045.000	V	58.03	-39.7	13.6	2.4	-28.5	-25.0	3.5
870.000	H	45.69	-47.6	0.0	1	-48.6	-25.0	23.6
870.000	V	44.32	-51.5	0.0	1	-52.5	-25.0	27.5
<b>Frequency:454.0125 MHz, for FCC PART 22, 6.25 kHz</b>								
1362.038	H	36.17	-64.2	8.7	1.4	-56.9	-13.0	43.9
1362.038	V	34.50	-65.8	8.7	1.4	-58.5	-13.0	45.5
1816.050	H	45.54	-54.5	11.2	1.3	-44.6	-13.0	31.6
1816.050	V	49.42	-50.9	11.2	1.3	-41.0	-13.0	28.0
2270.063	H	37.24	-58.8	11.1	2.2	-49.9	-13.0	36.9
2270.063	V	36.37	-59.4	11.1	2.2	-50.5	-13.0	37.5
2724.075	H	37.30	-59.6	13.1	2.3	-48.8	-13.0	35.8
2724.075	V	38.65	-59.7	13.1	2.3	-48.9	-13.0	35.9
3178.088	H	40.00	-57.6	13.5	2.3	-46.4	-13.0	33.4
3178.088	V	38.45	-58.4	13.5	2.3	-47.2	-13.0	34.2
908.025	H	35.90	-56.7	0.0	1	-57.7	-13.0	44.7
908.025	V	33.89	-60.7	0.0	1	-61.7	-13.0	48.7

Note1: For radiated spurious emissions were tested at high rated power, which was the worst case.

Note2: The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.

Note3: Absolute Level = SG Level - Cable loss + Antenna Gain  
Margin = Limit-Absolute Level

**FCC §2.1055 & § 22.355 & §90.213- FREQUENCY STABILITY****Applicable Standard**

FCC §2.1055, § 22.355, §90.213

**Test Equipment List and Details**

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2015-09-10	2016-09-09
UNI-T	Multimeter	UT39A	M130199938	2015-04-10	2016-04-10
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2015-05-08	2016-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

\* **Statement of Traceability:** Bay Area Compliant Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Procedure**

Frequency Stability vs. Temperature: The equipment under test was connected to DC 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 power 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) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

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

<b>Temperature:</b>	24.1 °C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	101.3 kPa

*The testing was performed by Dean Liu on 2015-12-01.*

*Test Mode: Transmitting*

FCC PART 90:

Reference Frequency: 435 MHz, 12.5 kHz, Limit: 2.5 ppm			
Temperature	Voltage	Reading	Frequency Error
	V <sub>DC</sub>	MHz	ppm
-30	7.4	435.000091	0.21
-20		435.000094	0.22
-10		435.000086	0.20
0		435.000093	0.21
10		435.000084	0.19
20		435.000095	0.22
30		435.000076	0.17
40		435.000087	0.20
50		435.000094	0.22
25	6.7	435.000092	0.21
25	7.4	435.000096	0.22

Reference Frequency: 435 MHz, 6.25 kHz, Limit: 1.0 ppm			
Temperature	Voltage	Reading	Frequency Error
	V <sub>DC</sub>	MHz	ppm
-30	7.4	435.000077	0.18
-20		435.000084	0.19
-10		435.000075	0.17
0		435.000081	0.19
10		435.000074	0.17
20		435.000081	0.19
30		435.000067	0.15
40		435.000077	0.18
50		435.000082	0.19
25	6.7	435.000072	0.17
25	7.4	435.000082	0.19

## FCC PART 22:

Reference Frequency: 454.0125 MHz, 12.5 kHz, Limit: 5 ppm			
Temperature	Voltage	Reading	Frequency Error
	V <sub>DC</sub>	MHz	ppm
-30	7.4	454.012476	-0.05
-20		454.012483	-0.04
-10		454.012493	-0.02
0		454.012482	-0.04
10		454.012484	-0.04
20		454.012478	-0.05
30		454.012486	-0.03
40		454.012481	-0.04
50		454.012471	-0.06
25	6.7	454.012483	-0.04
25	7.4	454.012486	-0.03

Reference Frequency: 454.0125 MHz, 6.25 kHz, Limit: 5 ppm			
Temperature	Voltage	Reading	Frequency Error
	V <sub>DC</sub>	MHz	ppm
-30	7.4	454.012467	-0.07
-20		454.012475	-0.06
-10		454.012481	-0.04
0		454.012472	-0.06
10		454.012475	-0.06
20		454.012464	-0.08
30		454.012477	-0.05
40		454.012473	-0.06
50		454.012463	-0.08
25	6.7	454.012472	-0.06
25	7.4	454.012474	-0.06

Note: The battery operating end point is 6.7V which specified by manufacturer.



## 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

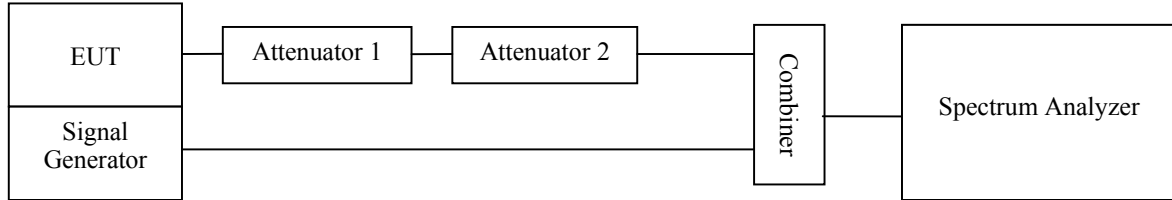
Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2015-05-09	2016-05-09
HP	Signal Generator	E4422B	MY41000355	2015-11-23	2016-11-22
Cheng Du Ou Li Tong	Two way power splitter	EMPD-T- 2-10-1000	OE01201041	2015-05-06	2016-05-06
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2015-05-08	2016-05-08
E-Microwave	DC Blocking	EMDCB- 00036	0E01201047	2015-05-06	2016-05-06

\* Statement of Traceability: Bay Area Compliant Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Procedure

- Connect the EUT and test equipment as shown on the following block diagram.
- Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
- 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.
- Turn on the transmitter.
- 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  $P_0$ .
- Turn off the transmitter.
- 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.
- Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
- 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 "trigger offset" to -10ms for turn on and -15ms for turn off.
- 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

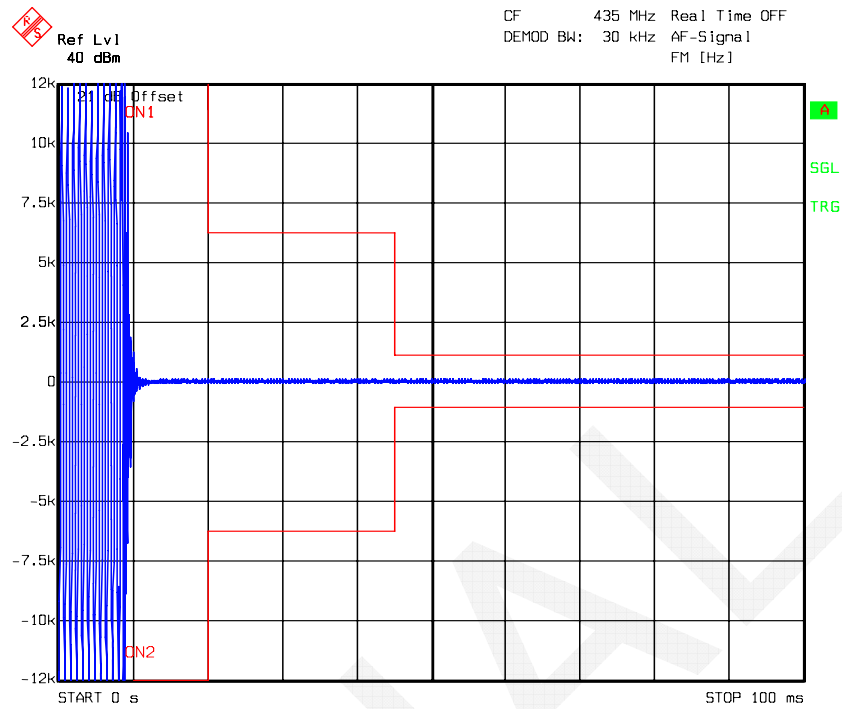
<b>Temperature:</b>	22.6~25.9 °C
<b>Relative Humidity:</b>	43~51 %
<b>ATM Pressure:</b>	101.1~101.9 kPa

The testing was performed by Dean Liu on 2015-12.01 and 2015-12-11.

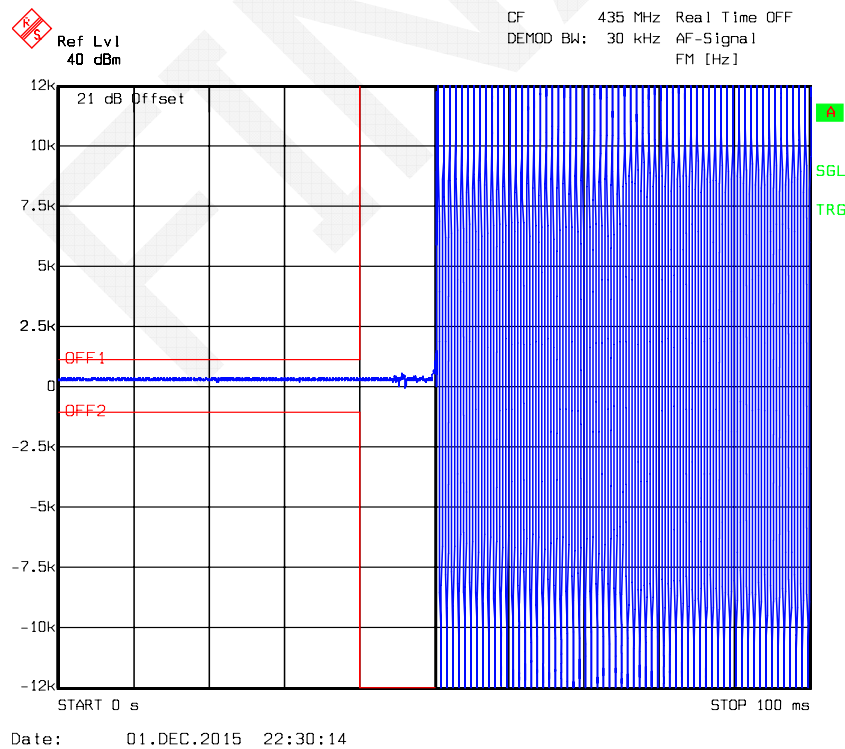
Channel Spacing (kHz)	Transient Period (ms)	Maximum frequency difference	Result
12.5	$< 10(t_1)$	$\pm 12.5$ kHz	Pass
	$< 25(t_2)$	$\pm 6.25$ kHz	
	$< 10(t_3)$	$\pm 12.5$ kHz	
6.25	$< 10(t_1)$	$\pm 6.25$ kHz	Pass
	$< 25(t_2)$	$\pm 3.125$ kHz	
	$< 10(t_3)$	$\pm 6.25$ kHz	

Please refer to the following plots.

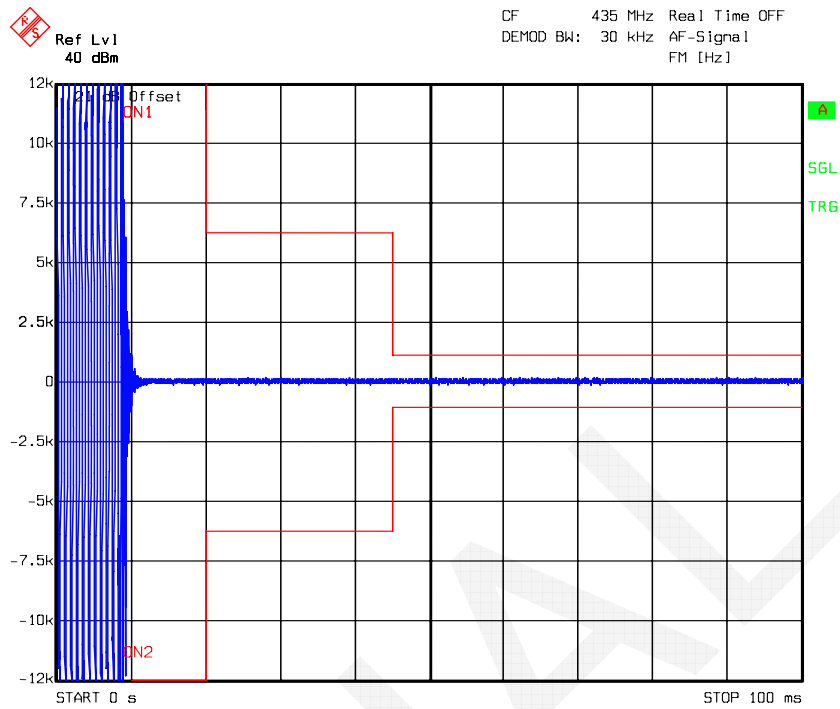
### Turn on – 435 MHz, 12.5 kHz, High power level



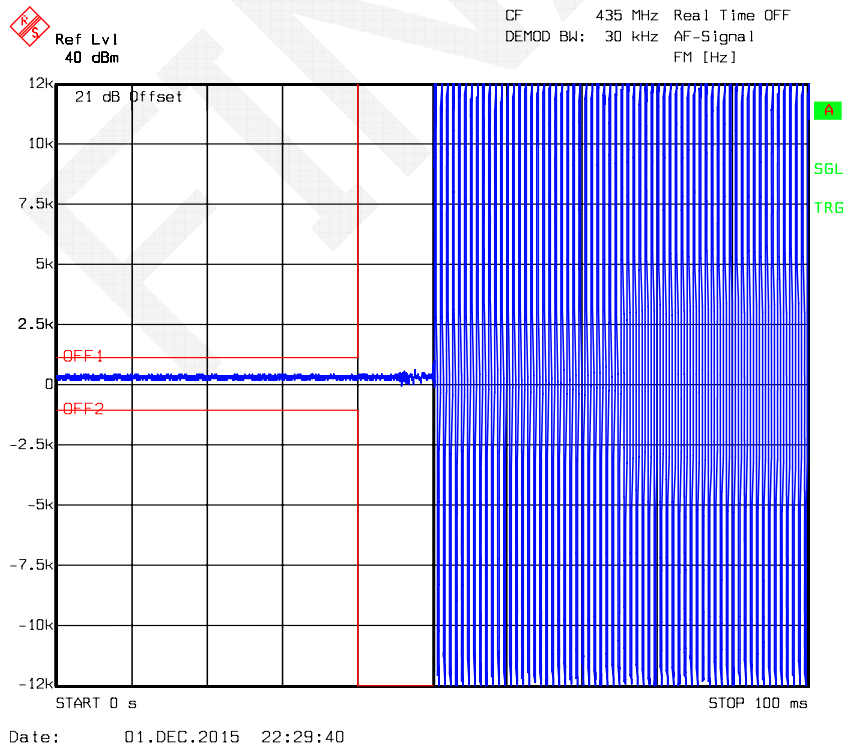
### Turn off – 435 MHz, 12.5 kHz, High power level



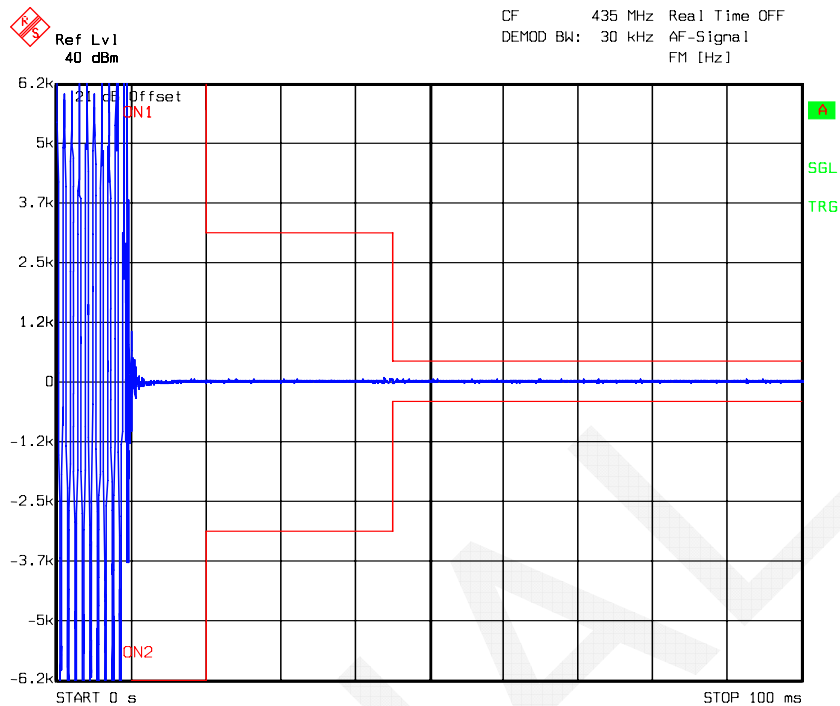
### Turn on – 435 MHz, 12.5 kHz, Low power level



### Turn off – 435MHz,12.5 kHz, Low power level

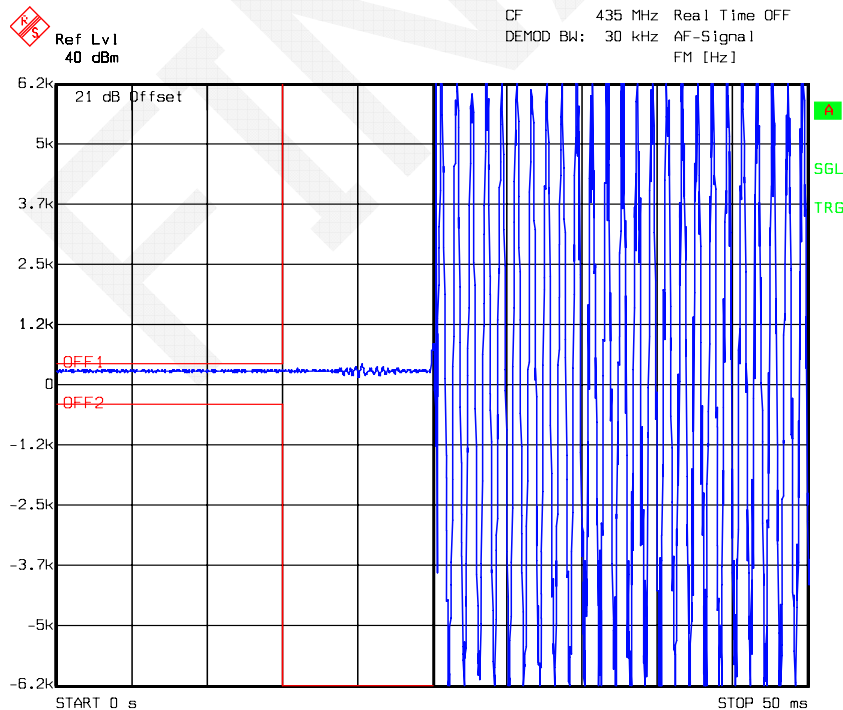


### Turn on – 435 MHz, 6.25 kHz, High power level



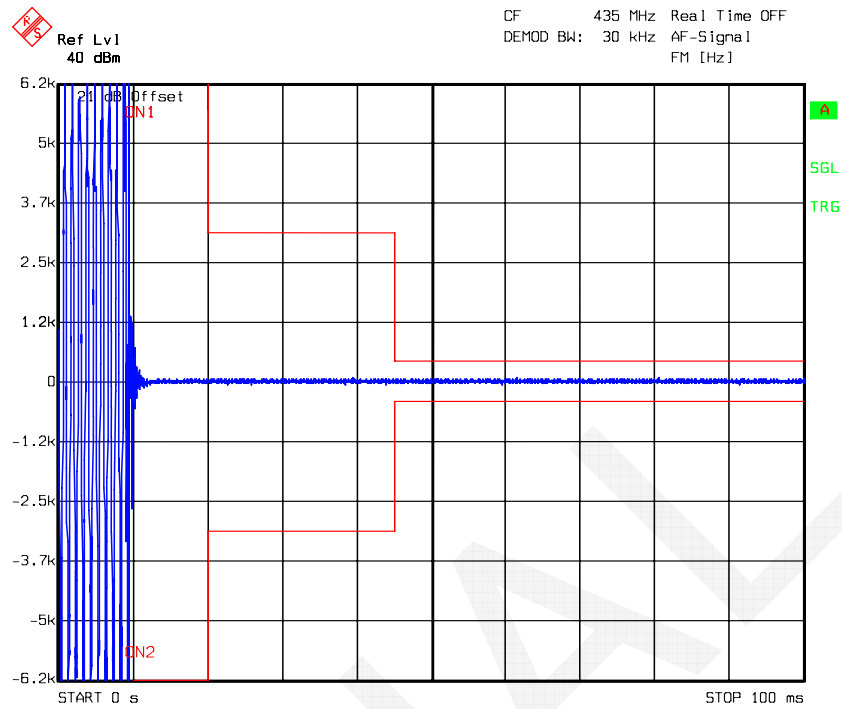
Date: 11.DEC.2015 22:14:01

### Turn off – 435 MHz, 6.25 kHz, High power level



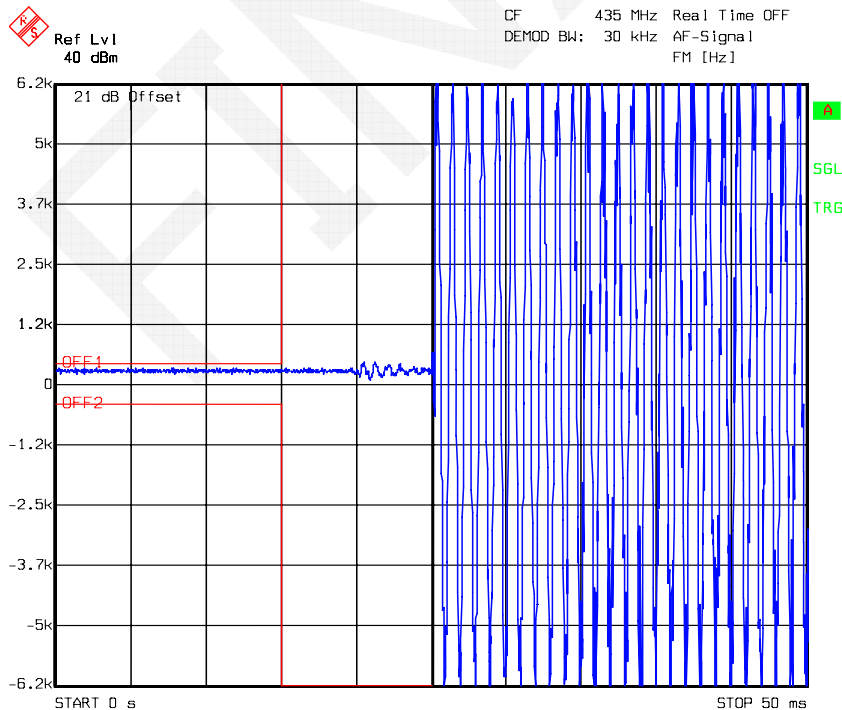
Date: 11.DEC.2015 22:11:08

### Turn on – 435 MHz, 6.25 kHz, Low power level



Date: 11.DEC.2015 22:13:26

### Turn off – 435 MHz, 6.25 kHz, Low power level



Date: 11.DEC.2015 22:11:33

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## DECLARATION LETTER

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SHENZHEN COVALUE COMMUNICATIONS CO., LTD.

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Shenzhen, China

Tel: 0755-86345789

Fax: 0755-86345790

### DECLARATION OF SIMILARITY

2015-12-08

To:

Dear Sir or Madam:

We, SHENZHEN COVALUE COMMUNICATIONS CO., LTD., hereby declare that product: Two way radio, Model numbers: CU450-2 and CU460-2 are electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics. Model Number CU450-2 is electrically identical with the Model Number: CU460-2 that was certified by BACL. Their difference is only the appearance which can found in the attachment.

Please contact me should there be need for any additional clarification or information.

Best Regards,

Shu, Chengtao  
Engineer

A handwritten signature in black ink that reads "Shu, Chengtao".

Attachment:



Picture 1:CU450-2



Picture 2:CU460-2

**\*\*\*\*\* END OF REPORT \*\*\*\*\***