



## FCC PART 90

### TEST REPORT

For

**3M Svenska AB**

Malmstensgatan 19, SE331 02 Varnamo, Sweden

**FCC ID: COZMT4610NA**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Programmable 2-way transceiver headset
<b>Test Engineer:</b> <u>Rocky Kang</u>	
<b>Report Number:</b> <u>R1DG120919007-00B</u>	
<b>Report Date:</b> <u>2013-09-11</u>	
Alvin Huang 	
<b>Reviewed By:</b> RF Leader	
<b>Prepared By:</b> Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 <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 equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

## **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 §2.1093 - RF EXPOSURE INFORMATION</b> .....	<b>8</b>
APPLICABLE STANDARD .....	8
RESULT .....	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>12</b>
APPLICABLE STANDARD .....	12
TEST EQUIPMENT LIST AND DETAILS.....	12
TEST PROCEDURE .....	12
TEST DATA .....	12
<b>FCC §2.1049, §90.209 &amp; §90.210 – OCCUPIED BANDWIDTH &amp; EMISSION MASK</b> .....	<b>18</b>
APPLICABLE STANDARD .....	18
TEST EQUIPMENT LIST AND DETAILS.....	18
TEST PROCEDURE .....	18
TEST DATA .....	18
<b>FCC §2.1051 &amp; §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS</b> .....	<b>22</b>
APPLICABLE STANDARD .....	22
TEST EQUIPMENT LIST AND DETAILS.....	22
TEST PROCEDURE .....	22
TEST DATA .....	22
<b>FCC §2.1053 &amp; §90.210 - RADIATED SPURIOUS EMISSIONS</b> .....	<b>24</b>
APPLICABLE STANDARD .....	24
TEST EQUIPMENT LIST AND DETAILS.....	24
TEST PROCEDURE .....	24
TEST DATA .....	25
<b>FCC §2.1055 &amp; §90.213- FREQUENCY STABILITY</b> .....	<b>26</b>
APPLICABLE STANDARD .....	26
TEST EQUIPMENT LIST AND DETAILS.....	26
TEST PROCEDURE .....	26

TEST DATA .....	26
<b>FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR.....</b>	<b>28</b>
APPLICABLE STANDARD .....	28
TEST EQUIPMENT LIST AND DETAILS.....	28
TEST PROCEDURE .....	28
TEST DATA .....	29
<b>PRODUCT SIMILARITY DECLARATION LETTER.....</b>	<b>31</b>

## GENERAL INFORMATION

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

The 3M Svenska AB's product, model number: *MT7H7A4610-NA* (FCC ID: *COZMT4610NA*) or the "EUT" as referred to in this report is a *Programmable 2-way transceiver headset*, named as *LiteCom Plus* by applicant. The EUT is measured approximately: 25.0 cm (L) x 16.0 cm (W) x 11.0 cm (H), rated input voltage: DC 3.7V Li-Ion battery.

*Note: The serial products model MT7H7B4610-NA and MT7H7P3E4610-NA are electrically identical with the model MT7H7A4610-NA which was selected for full testing, the difference among them is just the model number, which was explained for details in the attached declaration letter.*

*\*All measurement and test data in this report was gathered from production sample serial number: 120919007 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2012-09-19.*

### Objective

This test report is prepared on behalf of 3M Svenska AB in accordance with Part 2, and Part 90 of the Federal Communication Commissions rules.

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

FCC Part 95 FRE submission with FCC ID: COZMT4610NA.

### 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. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz. And 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

## Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories 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 December 06, 2010. 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.: 382179. 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.

Transmit Frequency:

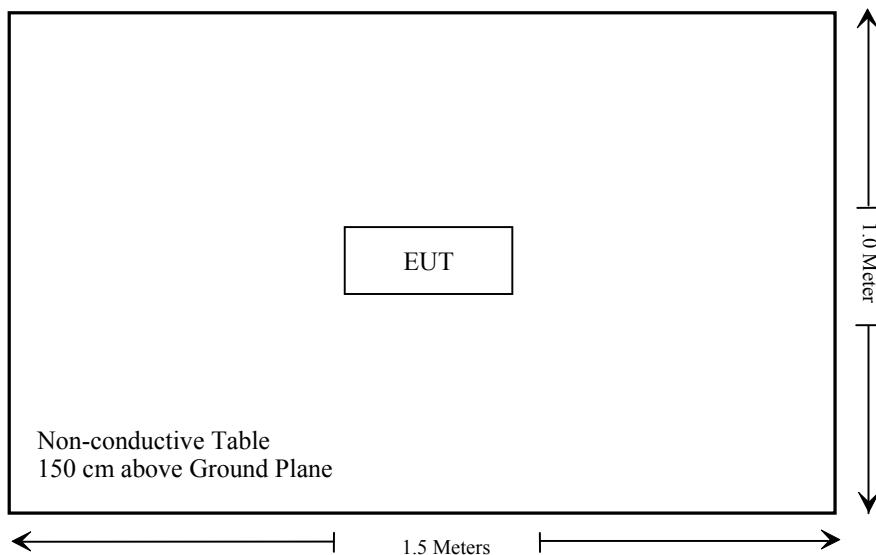
464.5000 MHz, 464.5500 MHz, 467.7625 MHz, 467.8125 MHz  
467.8500 MHz, 467.8750 MHz, 467.9000 MHz, 467.9250 MHz

Frequency 467.8125 MHz was selected to test.

### Equipment Modifications

No modification was made to the EUT tested.

### Block Diagram of Test Setup



## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1307 (b); §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

## FCC §2.1093 - RF EXPOSURE INFORMATION

### Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to FCC OET, KDB 447498 D01 General RF Exposure Guidance v05 section 4.3.1 & 6.1 Push-to-talk (PTT) devices:

RF exposure is evaluated with a duty factor of 50% when the actual operating duty factor is  $\leq 50\%$ . Devices supporting higher duty factors shall be evaluated at the maximum duty factor; for example, devices supporting operator-assisted PSTN calls. Contact the FCC Laboratory when unable to test a device at the required duty factor due to hardware limitations or other reasons.

### Result

According to FCC KDB 447498 D01 General RF Exposure Guidance v05 generic portable criteria

The distance between antenna and head is 40mm

The Maximum tune-up output power: 24.5dBm (282 mW), for PTT device the duty factor is 50%

The time-averaged output power is:  $282 \times 0.5 = 141$  mW

The exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR, where:

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

So, the exclusion thresholds is 175.4mW @ 467.925MHz (worst case)

### Conclusion:

The time-averaged output power is 141 mW < the exclusion thresholds is 175.4 mW

Stand-alone SAR evaluation is not required.

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

### Applicable Standard

FCC §2.1046 and §90.205.

### Test Procedure

Conducted RF Output Power:

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

Radiated Power:

Please refer to TIA/EIA-603

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
HP	Synthesized Sweeper	8341B	2624A00116	2013-05-09	2014-05-09
COM POWER	Dipole Antenna	AD-100	041000	2013-06-06	2014-06-05

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

### Test Data

#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.1 kPa

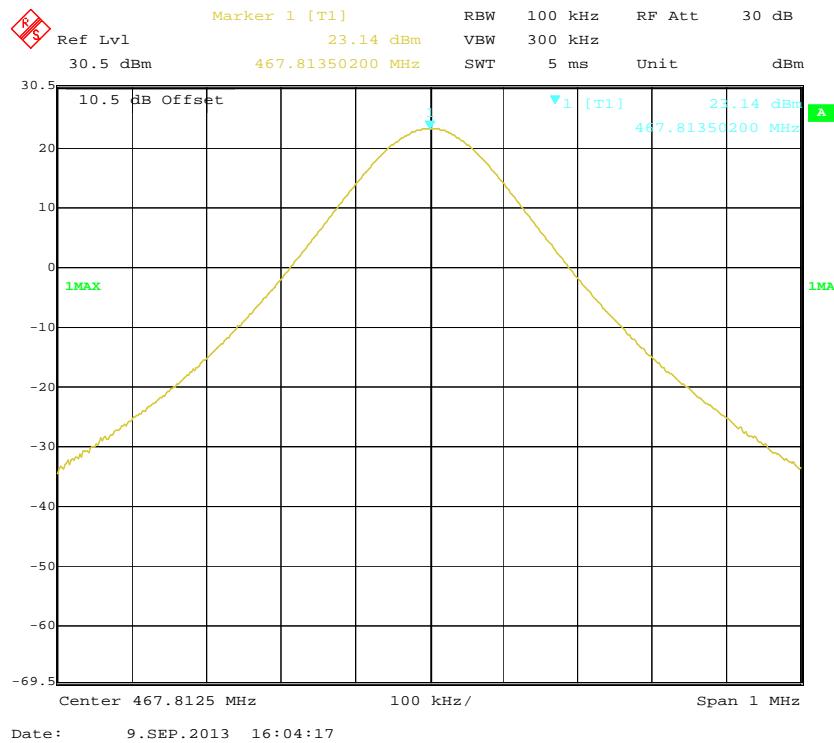
The testing was performed by Rocky Kang on 2013-09-09.

Test Mode: Transmitting

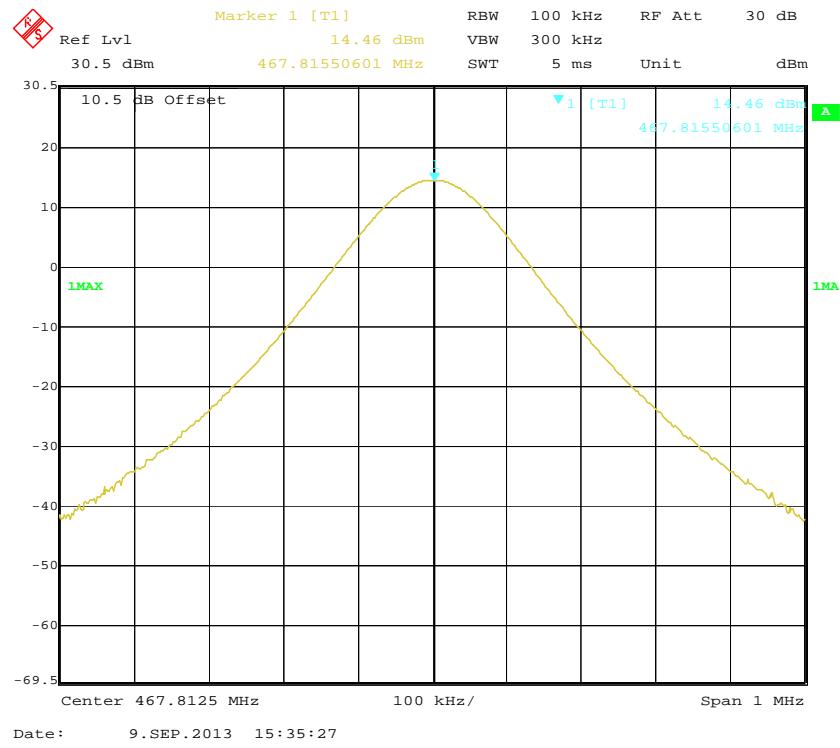
Conducted power:

Modulation	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (W)	Power level
Analog Modulation (FM)	467.8125	23.140	0.206	High Power
		14.460	0.028	Low Power

### High Power (467.8125 MHz)



## Low Power (467.8125 MHz)



Radiated power at high power level:

Indicated		Table Angle Degree	Test Ant.		Substituted			Absolute Level (dBm)	Part 90
Frequency (MHz)	S.A. Reading (dB $\mu$ V)		Height (m)	Polar (H/V)	S.G. Level (dBm)	Ant. Gain (dB)	Cable Loss (dB)		
467.8125	96.85	201	1.5	V	21.8	0	0.5	21.3	0.135
467.8125	87.32	351	1.5	H	12.1	0	0.5	11.6	0.014

## **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 Equipment List and Details**

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
HP	RF Communication Test Set	8920A	3325U00859	2013-05-07	2014-05-07
LEADER	MILLIVOLTMETER	LMV-181A	6041126	2013-05-13	2014-05-13

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

### **Test Procedure**

Test Method: TIA/EIA-603 2.2.3

### **Test Data**

#### **Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.1 kPa

*The testing was performed by Rocky Kang on 2013-09-09.*

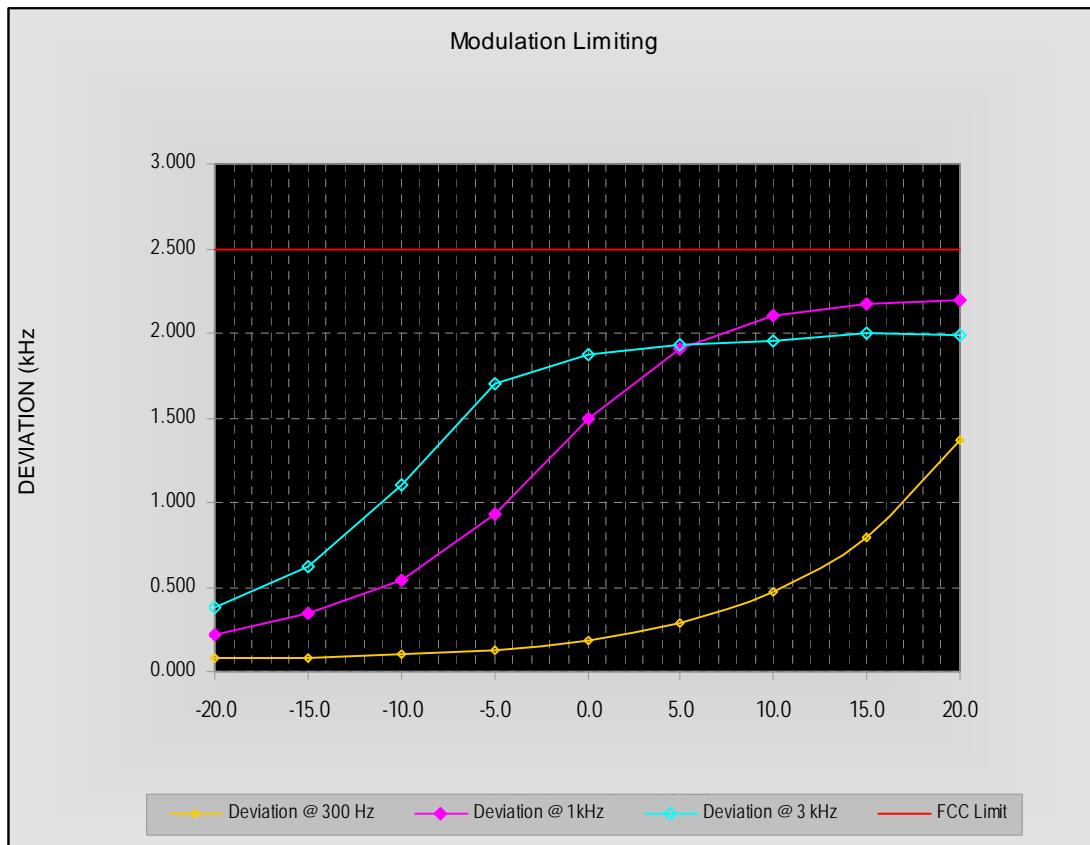
*Test Mode: Transmitting*

**Result:** Compliance.

**Analog Modulation:****MODULATION LIMITING**

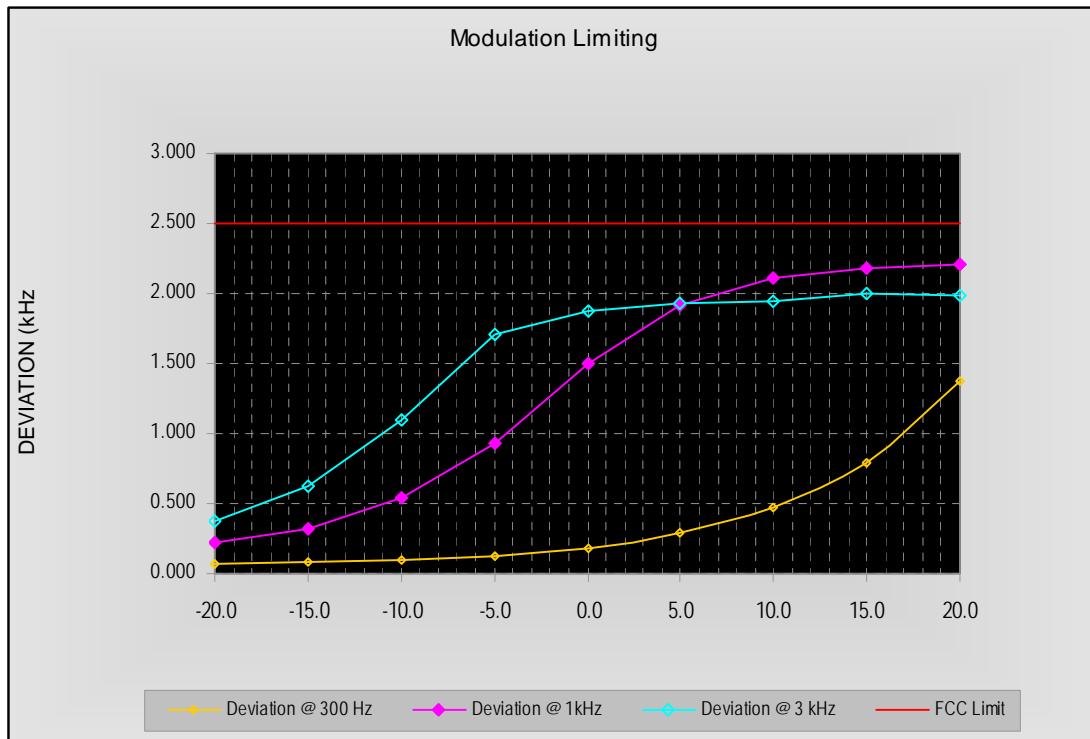
Carrier Frequency: 467.8125 MHz, Channel Separation=12.5 kHz, High Power

Audio Input Level [dB]	Frequency Deviation (kHz)			Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	1.373	2.194	1.987	2.5
15.0	0.798	2.174	1.996	2.5
10.0	0.472	2.104	1.956	2.5
5.0	0.282	1.906	1.935	2.5
0.0	0.181	1.500	1.877	2.5
-5.0	0.132	0.936	1.705	2.5
-10.0	0.101	0.542	1.098	2.5
-15.0	0.084	0.340	0.619	2.5
-20.0	0.075	0.216	0.381	2.5



Carrier Frequency: 467.8125 MHz, Channel Separation=12.5 kHz, Low Power

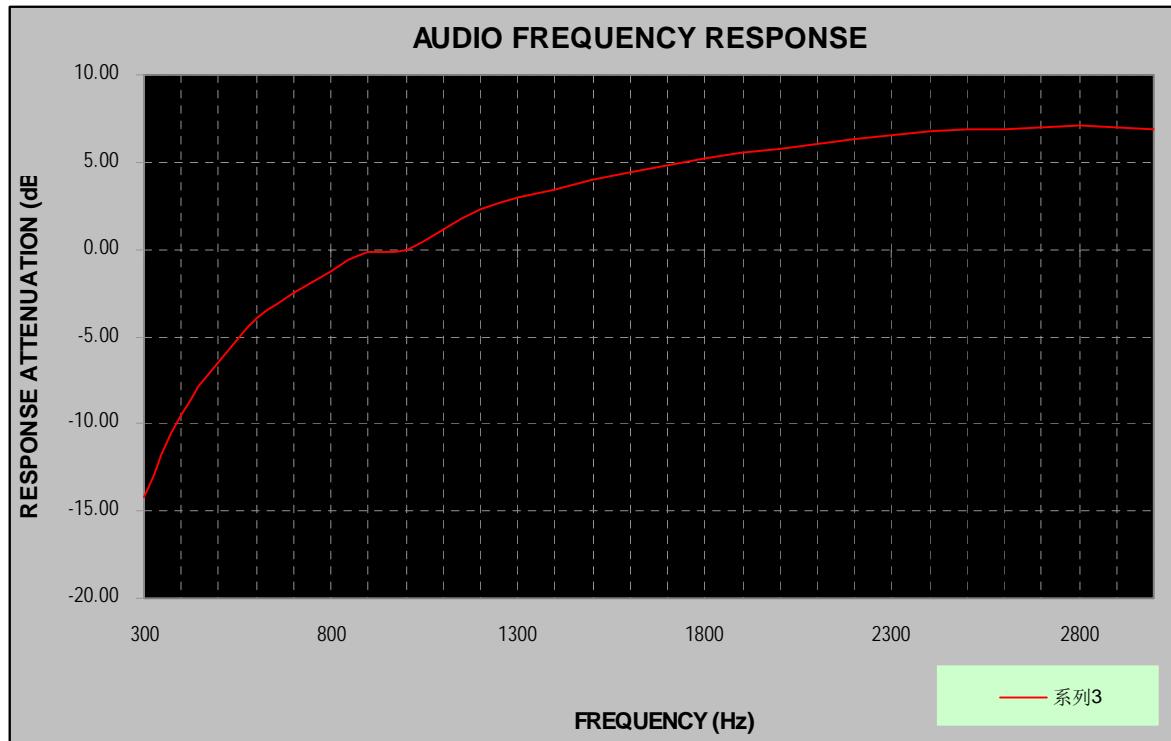
Audio Input Level [dB]	Frequency Deviation (kHz)			Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	1.378	2.206	1.986	2.5
15.0	0.797	2.187	1.996	2.5
10.0	0.468	2.108	1.948	2.5
5.0	0.286	1.916	1.932	2.5
0.0	0.185	1.500	1.873	2.5
-5.0	0.125	0.935	1.706	2.5
-10.0	0.103	0.546	1.095	2.5
-15.0	0.081	0.325	0.628	2.5
-20.0	0.074	0.216	0.375	2.5



**Audio Frequency Response**

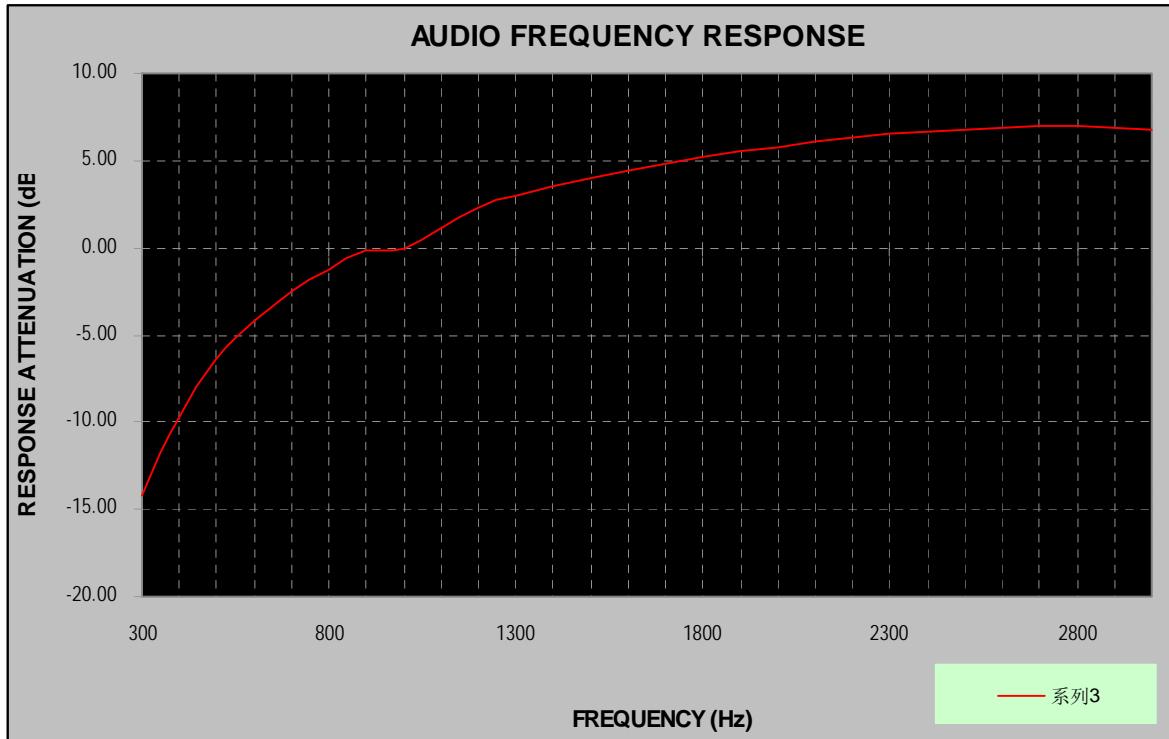
Carrier Frequency: 467.8125 MHz, Channel Separation=12.5 kHz, High Power

Audio Frequency (Hz)	Response Attenuation (dB)
300	-14.15
400	-9.47
500	-6.56
600	-3.99
700	-2.50
800	-1.27
900	-0.14
1000	0.00
1200	2.25
1400	3.48
1600	4.45
1800	5.15
2000	5.79
2200	6.29
2400	6.75
2600	6.89
2800	7.13
3000	6.84



Carrier Frequency: 467.8125 MHz, Channel Separation=12.5 kHz, Low Power

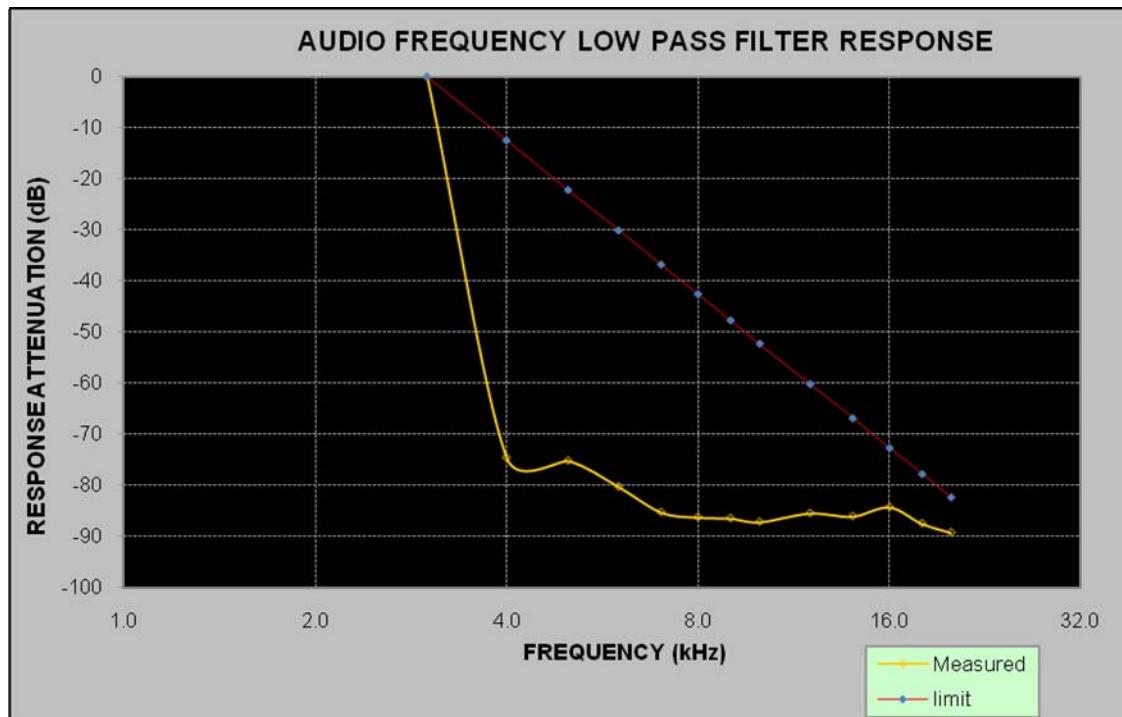
Audio Frequency (Hz)	Response Attenuation (dB)
300	-14.15
400	-9.79
500	-6.34
600	-4.12
700	-2.52
800	-1.27
900	-0.10
1000	0.00
1200	2.36
1400	3.53
1600	4.38
1800	5.18
2000	5.74
2200	6.34
2400	6.71
2600	6.86
2800	6.97
3000	6.79



**Audio Frequency Low Pass Filter Response****Analog Modulation:**

Carrier Frequency: 467.8125 MHz, Channel Separation=12.5 kHz

Audio Frequency (kHz)	Response Attenuation (dB)	FCC Limit (dB)
3.0	0	0.0
4.0	-74.6	-12.5
5.0	-75.2	-22.2
6.0	-80.3	-30.1
7.0	-85.3	-36.8
8.0	-86.3	-42.6
9.0	-86.5	-47.7
10.0	-87.2	-52.3
12.0	-85.5	-60.2
14.0	-86.1	-66.9
16.0	-84.3	-72.7
18.0	-87.5	-77.8
20.0	-89.3	-82.4



## 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 5.626 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  $50 + 10 \log (P)$  dB or 70 dB, whichever is the lesser attenuation.

### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
HP	RF Communication Test Set	8920A	3325U00859	2013-05-07	2014-05-07

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to 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.

The resolution bandwidth of the spectrum analyzer was set at 100 Hz and the spectrum was recorded in the frequency band  $\pm 50$  kHz from the carrier frequency.

### Test Data

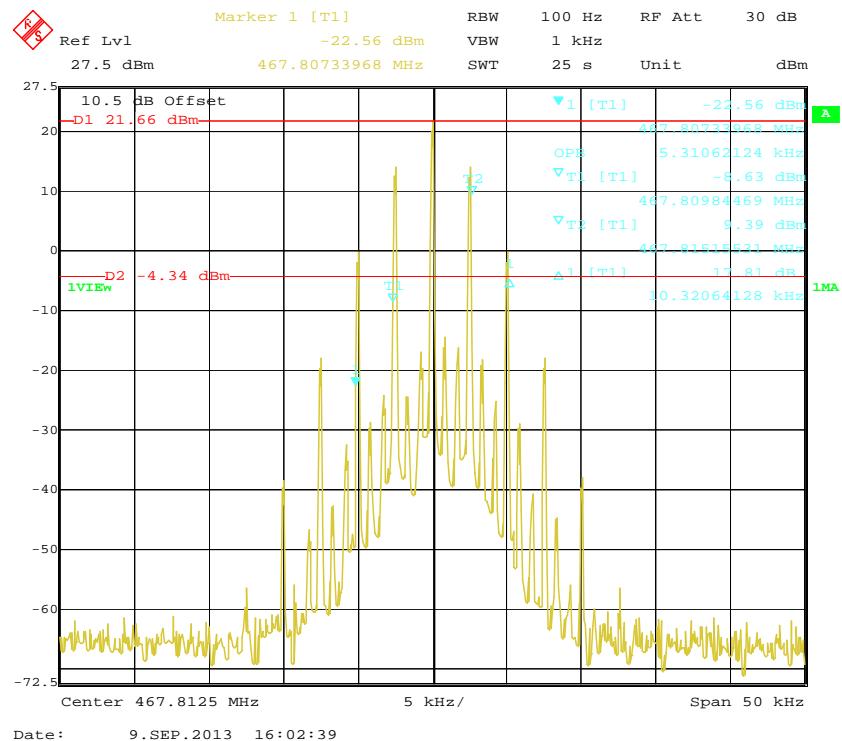
#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.1 kPa

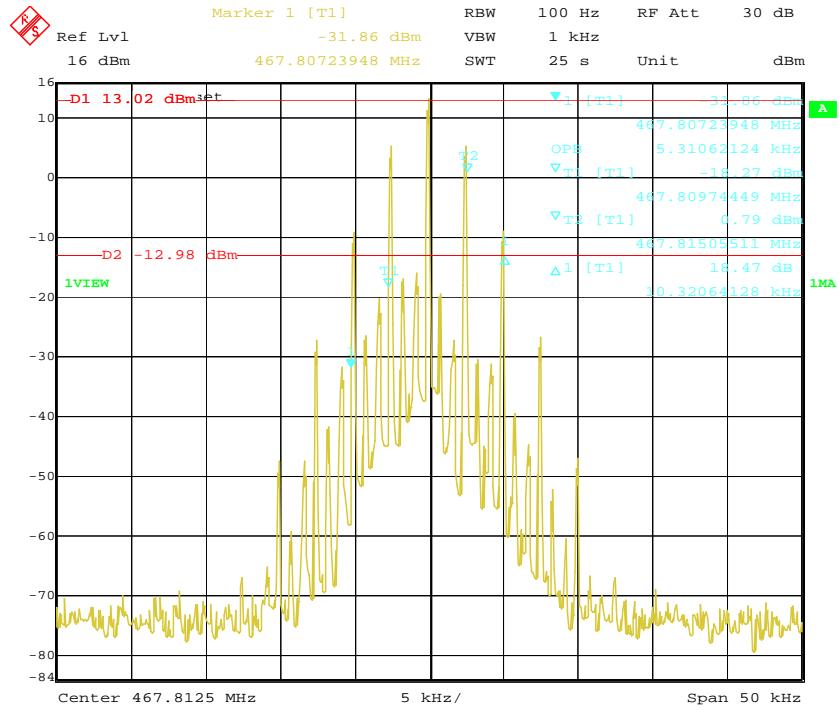
*The testing was performed by Rocky Kang on 2013-09-09 and 2013-09-10.*

Modulation	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)	Authorized Bandwidth Limit (kHz)	Power Level
Analog Modulation	5.31	10.32	11.25	High Power
	5.31	10.32	11.25	Low Power

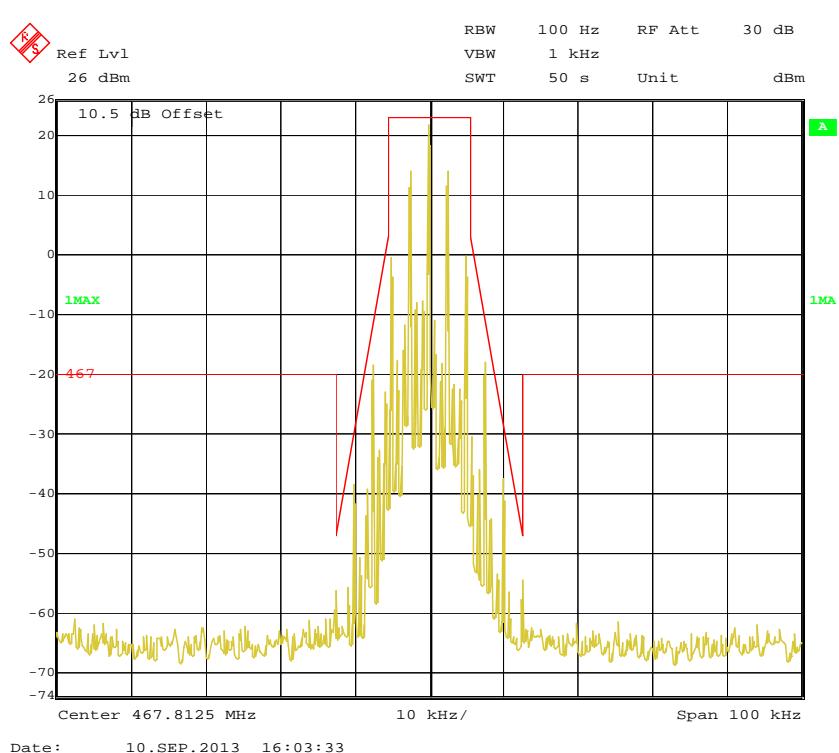
### Analog Modulation: 99% Occupied & 26 dB Bandwidth with High Power

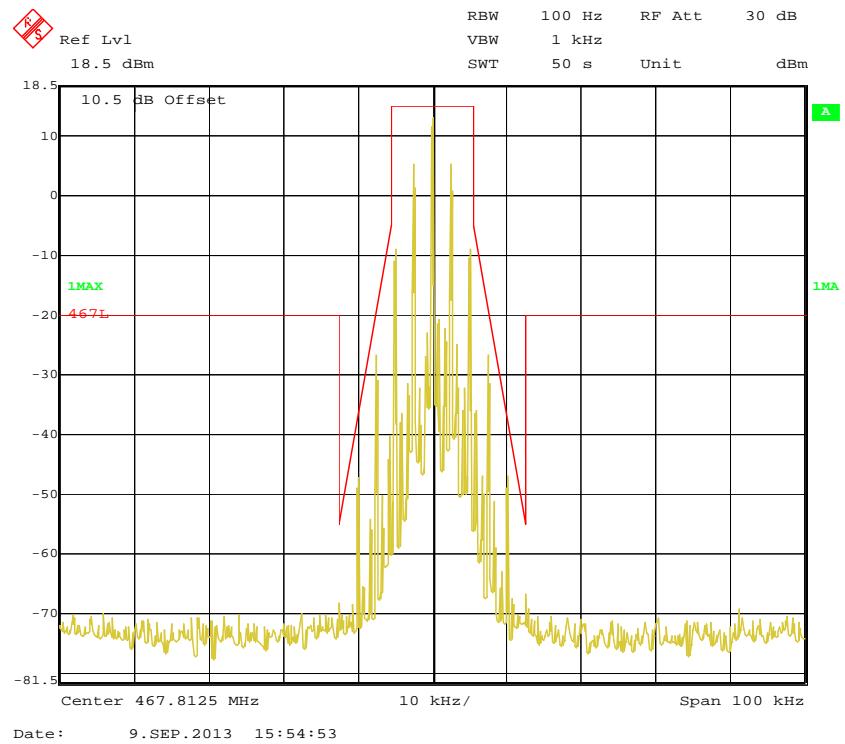


### Analog Modulation: 99% Occupied & 26 dB Bandwidth with Low Power



### Analog Modulation: Emission Mask with High Power



**Analog Modulation: Emission Mask with Low Power**

## 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  $50 + 10 \log (P)$  dB or 70 dB, whichever is the lesser attenuation.

### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

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

### 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

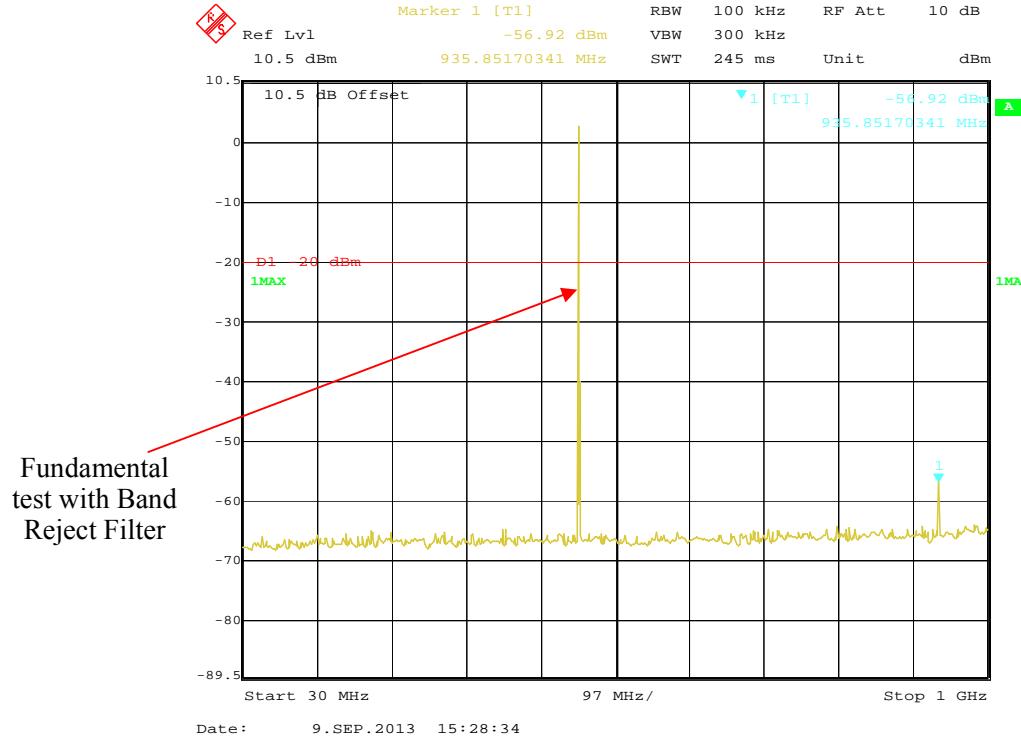
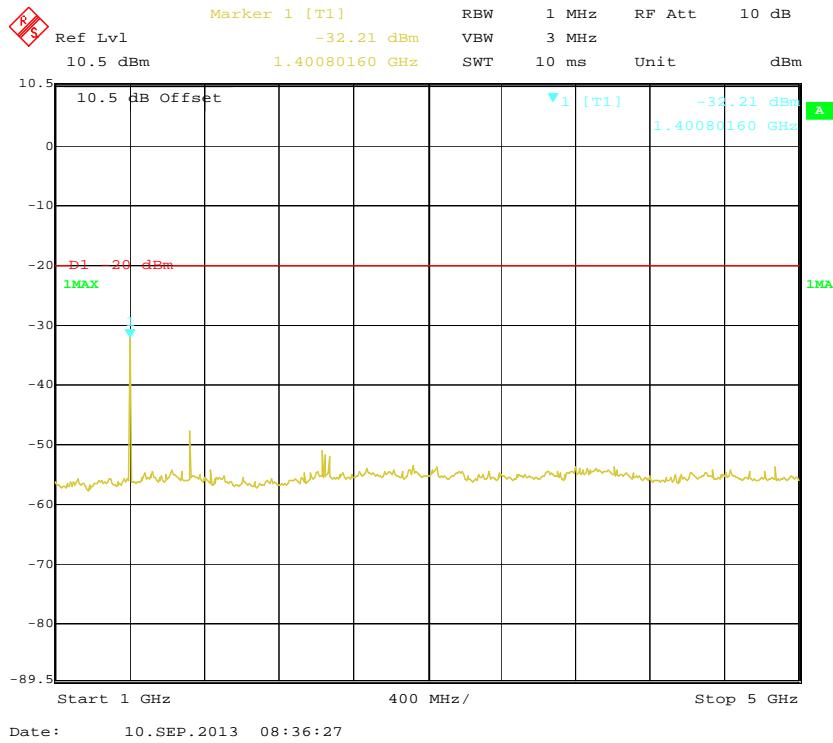
#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.1 kPa

*The testing was performed by Rocky Kang on 2013-09-09 and 2013-09-10.*

*Test Mode: Transmitting*

Please refer to the following plots.

**467.8125 MHz: 30 MHz – 1 GHz, High Power****467.8125 MHz: 1 GHz – 5 GHz, High Power**

**FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS****Applicable Standard**

FCC §2.1053 and §90.210

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09
HP	Amplifier	8447E	1937A01046	2013-08-09	2014-08-09
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30
HP	Synthesized Sweeper	8341B	2624A00116	2013-05-09	2014-05-09
Mini-Circuits	Amplifier	ZVA-213+	N/A	2012-11-24	2013-11-23
A.H. System	Horn Antenna	SAS-200/571	135	2012-02-11	2015-02-10
COM POWER	Dipole Antenna	AD-100	041000	2013-06-06	2014-06-05

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, 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 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  $\log_{10}$  (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.

## Test Data

### Environmental Conditions

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.1 kPa

The testing was performed by Rocky Kang on 2013-09-09.

Test Mode: Transmitting

### 30MHz-5GHz:

Frequency (MHz)	Receiver Reading (dB $\mu$ V)	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: 467.8125MHz, Channel Spacing 12.5 kHz										
935.62	63.48	99	1.4	V	-33.5	0.33	0	-33.83	-20	13.83
935.62	53.73	68	1.4	H	-43.3	0.33	0	-43.63	-20	23.63
3742.6	42.86	212	1.6	V	-53.7	2.59	10.40	-45.89	-20	25.89
3742.6	43.32	134	1.6	H	-53.9	2.59	10.40	-46.09	-20	26.09

Note:

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit - Absolute Level

## 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
Hewlett-Packard	Frequency Counter	5343A	2232A00827	2013-05-09	2014-05-09
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2012-11-02	2013-11-01
Long Wei	DC Power Supply	TPR-6420D	398363	N/A	N/A

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

### 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 frequency counter 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 counter.

### Test Data

#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.1 kPa

*The testing was performed by Rocky Kang on 2013-09-09.*

*Test Mode: Transmitting*

**For Analog Modulation (Channel Spacing 12.5 kHz)**

Reference Frequency: 467.8125 MHz, Limit: 2.5 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Measured Frequency error (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	3.7	467.812582	0.18
40	3.7	467.812588	0.19
30	3.7	467.812587	0.19
20	3.7	467.812590	0.19
10	3.7	467.812587	0.19
0	3.7	467.812583	0.18
-10	3.7	467.812583	0.18
-20	3.7	467.812587	0.19
-30	3.7	467.812586	0.18
Frequency Stability versus Input Voltage			
20	3.5	467.812592	0.19

## FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

### Applicable Standard

Regulations: FCC §90.214

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

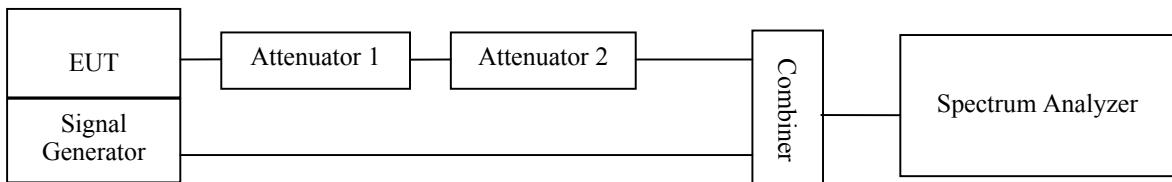
### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
HP	RF Communication Test Set	8920A	3325U00859	2013-05-07	2014-05-07

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

### 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

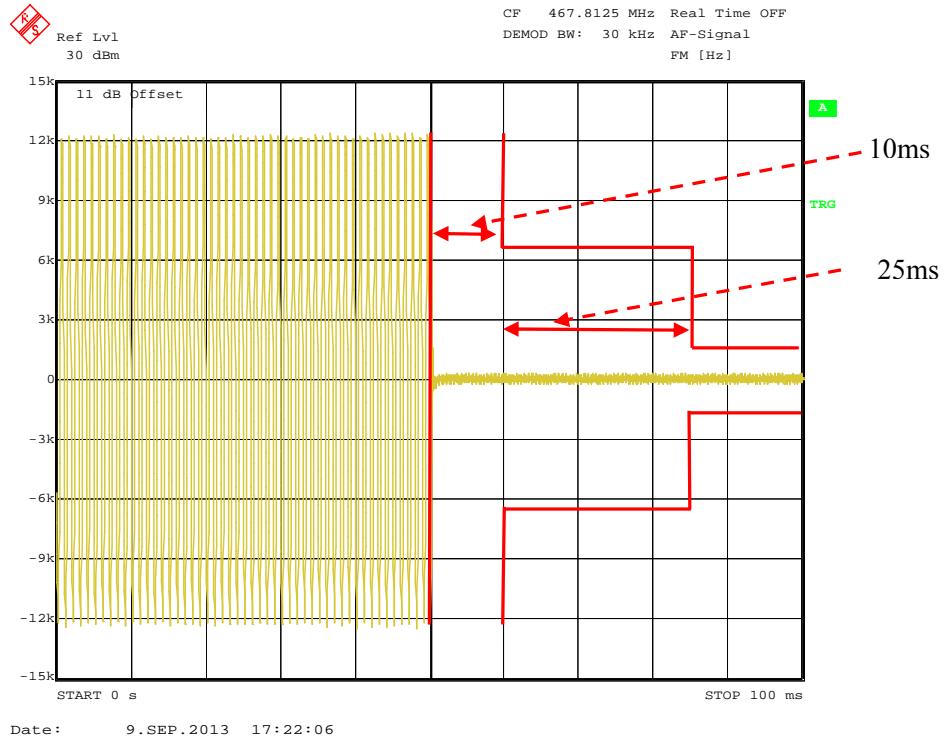
<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	100.1 kPa

The testing was performed by Rocky Kang on 2013-08-02.

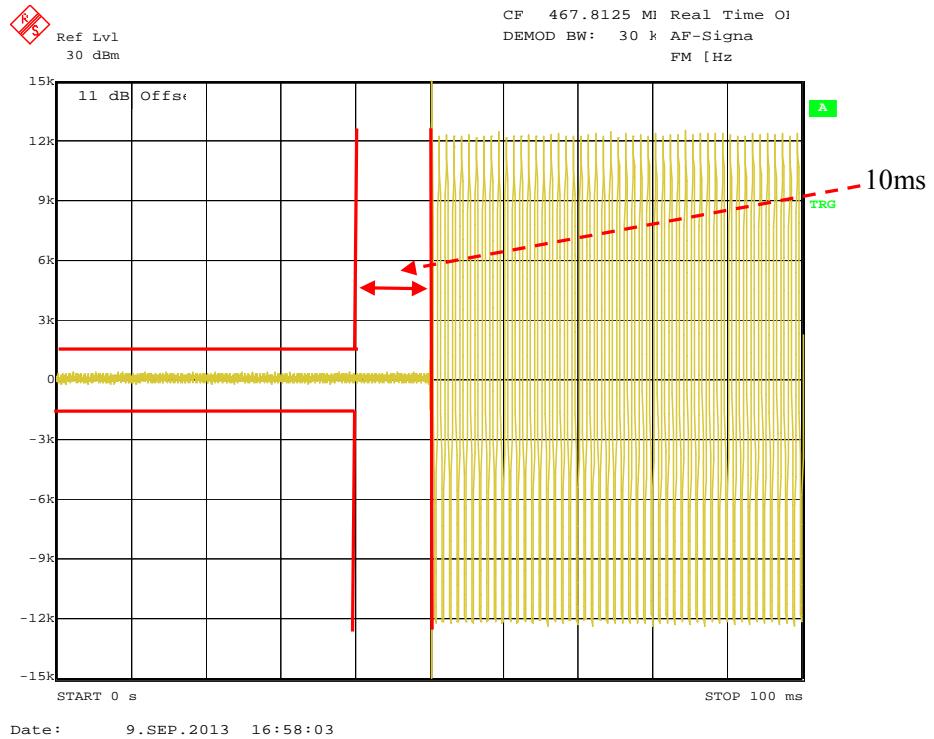
Channel Separation (kHz)	Transient Period (ms)	Transient Frequency	Result
12.5	<10 (t1)	+/-12.5 kHz	Pass
	<25 (t2)	+/-6.25 kHz	
	<10 (t3)	+/-12.5 kHz	

Please refer to the following plots.

### 467.8125 MHz, Turn on



## 467.8125 MHz, Turn off



## PRODUCT SIMILARITY DECLARATION LETTER



Sollentuna 2013-08-23

### Product Similarity Declaration

To Whom It May Concern,

We, 3M Svenska AB, hereby declare that our (LiteCom Plus), Model Number: MT7H7P3E4610-NA and MT7H7B4610-NA is electrically identical with the Model Number: MT7H7A4610-NA and that was certified by BACL. MT7H7A4610-NA, MT7H7P3E4610-NA and MT7H7B4610-NA are named differently due to marketing purposes.

Signature:

Two handwritten signatures are shown side-by-side. The signature on the left is for Lars Näslund and the signature on the right is for Mats Nilsson.

Print name:

Lars Näslund

Mats Nilsson

Title:

Country Manager

Finance Manager

Date:

August 23<sup>rd</sup> 2013

Postadress/Postal address  
SE-191 89 SOLLENTUNA  
www.3m.com/se

Besöksadress/Office address  
Bollstanäsvägen 3

Telefon/Telephone  
Nat 08-92 21 00  
Int +46 8 92 21 00

Telefax  
Nat 08-754 55 37  
Int+46 8 754 55 37

Orgainsationsnr  
556021-9684

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