FCC PART 90
TEST REPORT

For

QUANZHOU CITY NEW CENTURY COMMUNICATION ELECTRONICS CO., LTD.

NO.1 FENGSHOU RD., ZHAOFENG IND. ZONE,FENGZE DISTRICT, QUANZHOU, FUJIAN, CHINA.

FCC ID: VO6DM-6R

Report Type:	**Product Type:**
Original Report	DMR TWO WAY RADIO

Test Engineer:	Dean Liu
Report Number:	RXM160509050-00
Report Date:	2016-05-30
Reviewed By:	Jerry Zhang EMC Manager
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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 *QUANZHOU CITY NEW CENTURY COMMUNICATION ELECTRONICS CO., LTD.* 's product, model: *DM-6R* (*FCC ID: VO6DM-6R)* (the "EUT") in this report is a *DMR TWO WAY RADIO*, which was measured approximately: 10 cm (L) x 5.1cm (W) x 2.8 cm (H), rated input voltage: DC3.7 V from battery and DC6 V from adapter.

Adapter information:
MODEL:AC06250VDC
INPUT: AC100-250V /50Hz
OUTPUT: DC6V ,800mA

Note: The series product, models DM-6R, DM-7R,DM-8R,DM-9R are electrically identical, the differences between them are model name, we selected DM-6R for fully testing, the details was explained in the declaration letter.

** All measurement and test data in this report was gathered from production sample serial number: 160509050. (Assigned by BACL.Xiamen). The EUT was received on 2016-05-10.*

Objective

This test report is prepared on behalf of *QUANZHOU CITY NEW CENTURY COMMUNICATION ELECTRONICS CO., LTD.* in accordance with Part 2, 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 90 – Private Land DMR TWO WAY 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 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.

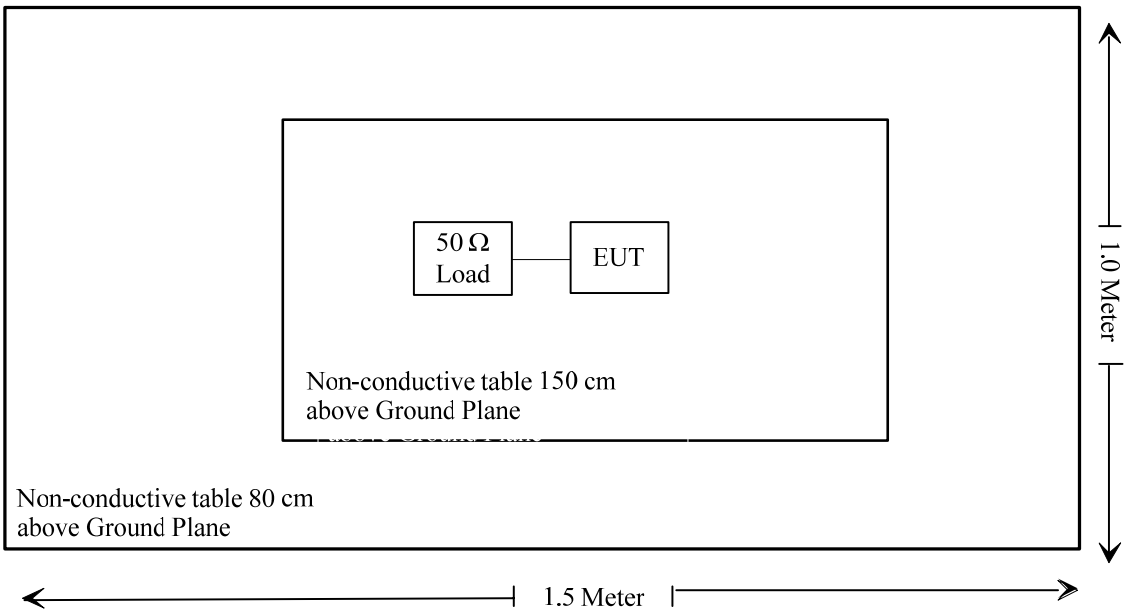
EUT Specification:

Frequency Band	400-480MHz
Modulation Mode	FM/4FSK
Channel Spacing	12.5kHz
Output Power	High: 2W, Low: 1W

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	50 Load Teminal	100W	/
HP	RF Communications Test Set	8920A	00 235

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

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

FCC §1.1310 & §2.1093 - RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RXM160509050-20

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

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	2016-05-09	2017-05-09
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2016-05-08	2017-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06

*** 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:	25.1°C
Relative Humidity:	54 %
ATM Pressure:	100.6 kPa

The testing was performed by Dean Liu on 2016-05-16.

Test Result: Compliant. Please refer to following tables.

Modulation Mode	Channel Separation	f_c	Reading (w)		Note
		MHz	High Power Level	Low Power Level	
FM	12.5kHz	400.0125	2.03	1.05	Not for FCC Review
		440	2.04	1.08	/
		479.9875	2.02	1.06	/
4FSK	12.5kHz	400.0125	2.03	1.03	Not for FCC Review
		440	2.05	1.06	/
		479.9875	2.04	1.04	/

Note: The rated power is 2W for high power level, 1W for low Power level.

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-603D 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	2016-05-09	2017-05-09
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2016-05-08	2017-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06

*** 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:	25.1°C
Relative Humidity:	54 %
ATM Pressure:	100.6 kPa

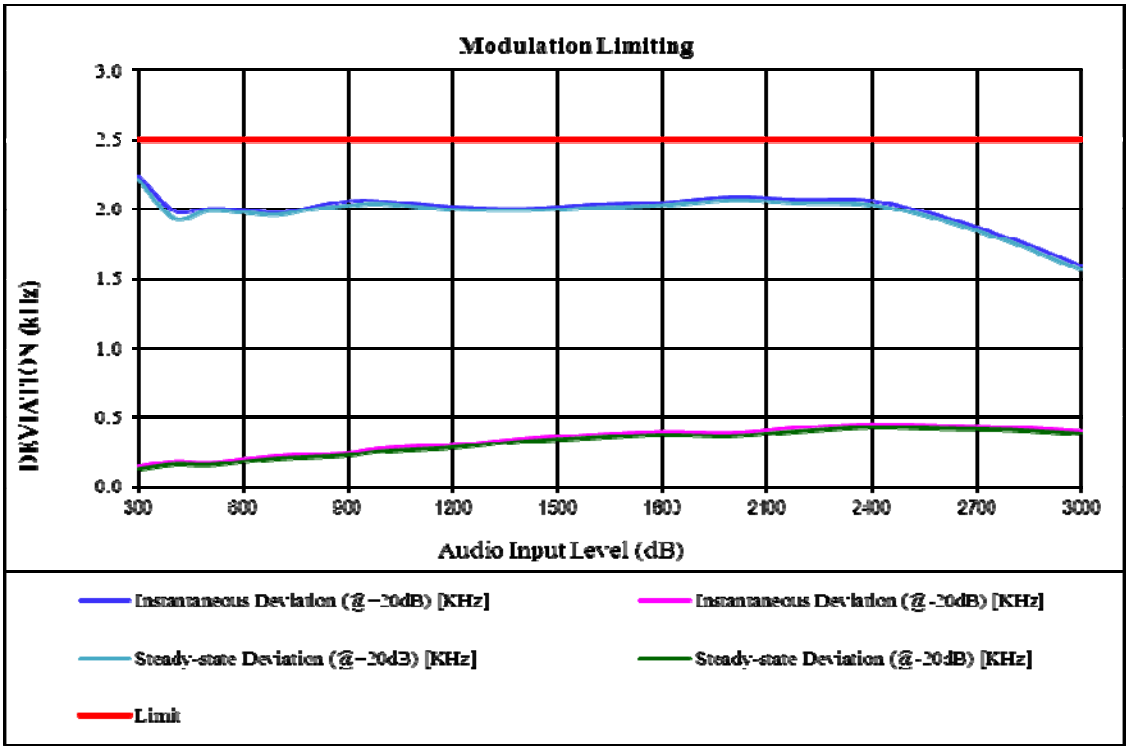
The testing was performed by Dean Liu on 2016-05-16.

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

MODULATION LIMITING

Carrier Frequency: 440 MHz, Channel Spacing = 12.5 kHz

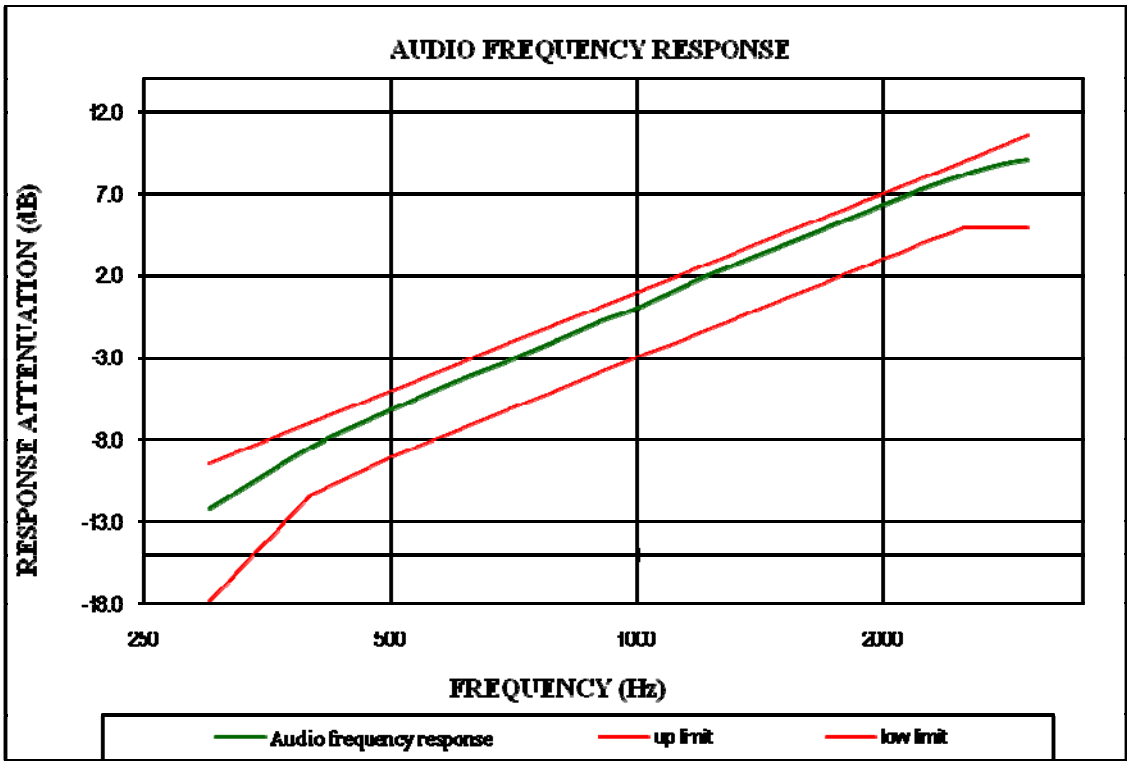
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit [kHz]
	Deviation (@+20dB) [kHz]	Deviation (@-20dB) [kHz]	Deviation (@+20dB) [kHz]	Deviation (@-20dB) [kHz]	
300	2.235	0.149	2.212	0.132	2.5
400	1.987	0.185	1.932	0.163	2.5
500	2.003	0.177	1.985	0.160	2.5
600	1.996	0.200	1.972	0.183	2.5
700	1.974	0.222	1.956	0.205	2.5
800	2.015	0.235	2.000	0.215	2.5
900	2.056	0.245	2.023	0.227	2.5
1000	2.055	0.277	2.035	0.256	2.5
1200	2.016	0.303	1.996	0.282	2.5
1400	2.003	0.347	1.987	0.328	2.5
1600	2.030	0.377	2.009	0.354	2.5
1800	2.047	0.396	2.025	0.376	2.5
2000	2.085	0.390	2.063	0.369	2.5
2200	2.066	0.427	2.043	0.402	2.5
2400	2.060	0.448	2.028	0.428	2.5
2600	1.942	0.440	1.919	0.419	2.5
2800	1.783	0.429	1.758	0.410	2.5
3000	1.590	0.403	1.560	0.384	2.5



Audio Frequency Response

Carrier Frequency: 440 MHz, Channel Spacing = 12.5 kHz

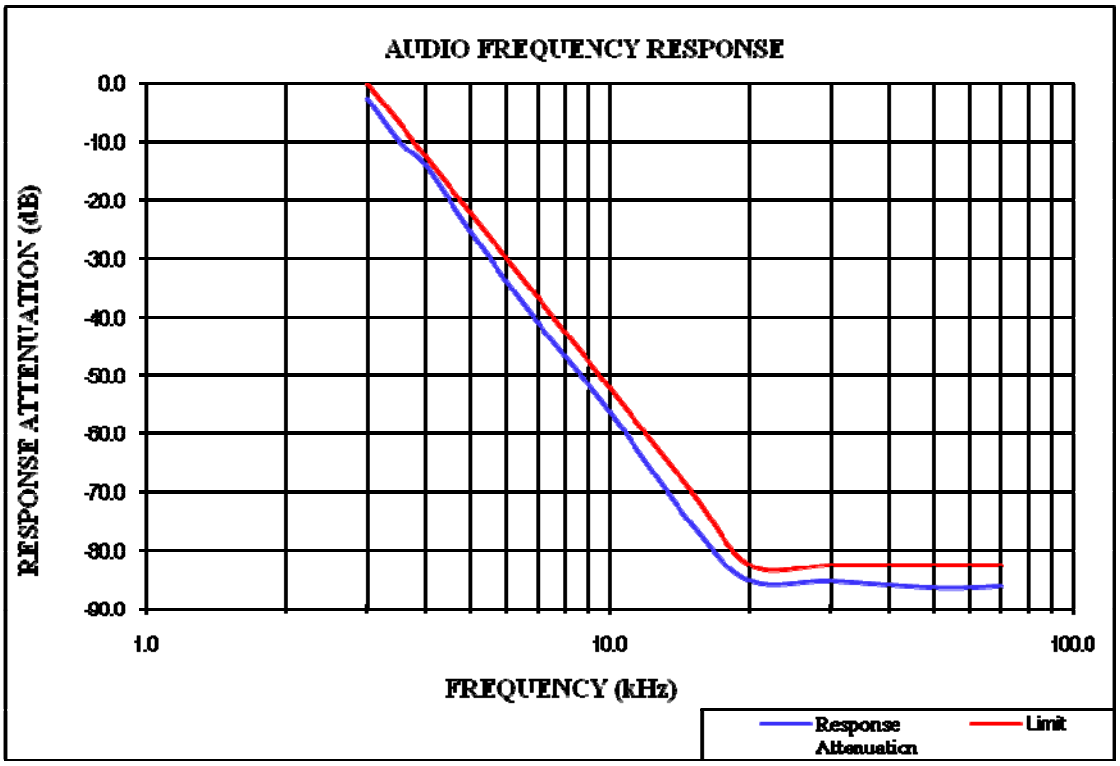
Audio Frequency (Hz)	Response Attenuation (dB)
300	-12.15
400	-8.41
500	-6.17
600	-4.45
700	-3.12
800	-1.97
900	-0.84
1000	0.00
1200	1.82
1400	3.21
1600	4.37
1800	5.41
2000	6.31
2200	7.13
2400	7.81
2600	8.39
2800	8.84
3000	9.06



Audio Frequency Low Pass Filter Response

Carrier Frequency: 440 MHz, Channel Spacing = 12.5 kHz

Audio Frequency	Response Attenuation	Limit
kHz	dB	dB
3.0	-2.6	0.0
3.5	-9.9	-6.7
4.0	-14.2	-12.5
5.0	-25.5	-22.2
7.0	-41.1	-36.8
10.0	-56.3	-52.3
15.0	-75.3	-69.9
20.0	-85.1	-82.5
30.0	-85.2	-82.5
50.0	-86.3	-82.5
70.0	-86.1	-82.5



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

Applicable Standard

FCC §2.1049, §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 f0 to 5.625 kHz removed from f0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd−2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2016-05-09	2017-05-09
HP	RF Communications Test Set	8920A	00 235	2016-05-09	2017-05-09
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2016-05-08	2017-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06

*** 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 Procedure

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

Test Data

Environmental Conditions

Temperature:	25.1 °C
Relative Humidity:	54 %
ATM Pressure:	100.6Pa

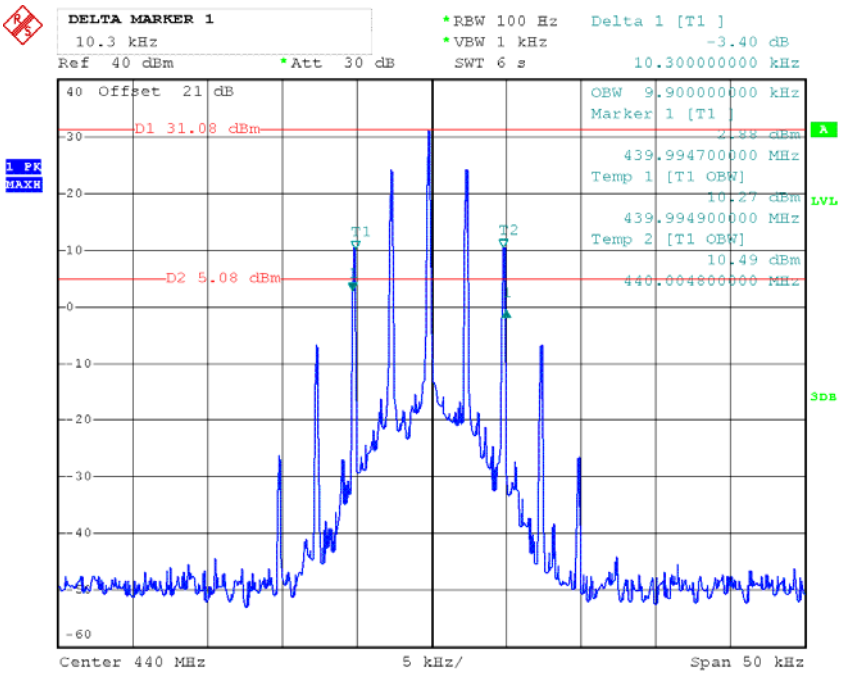
The testing was performed by Dean Liu on 2016-05-16.

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

Modulation Mode	Channel Separation	f_c	99% Occupied Bandwidth	26 dB Bandwidth	Emission Power
		MHz	kHz	kHz	
FM	12.5kHz	440	9.9	10.3	High power level
			9.9	10.3	LowPower Level
4FSK	12.5kHz	440	7.6	9.9	High power level
			7.4	9.7	LowPower Level

FM Mode

Occupied Bandwidth –12.5kHz, 440 MHz, High Power Level



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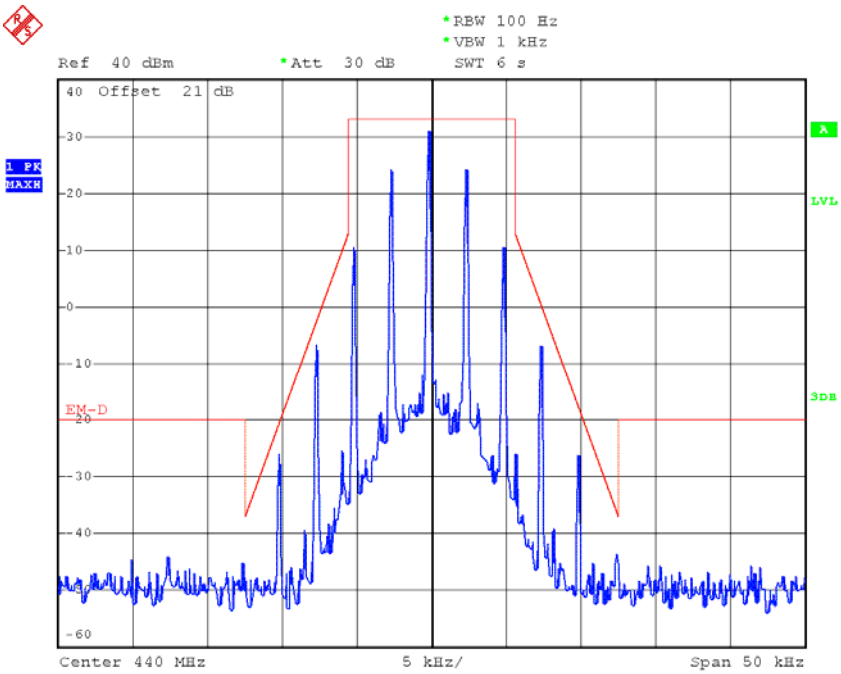
Emission Mask - Type D



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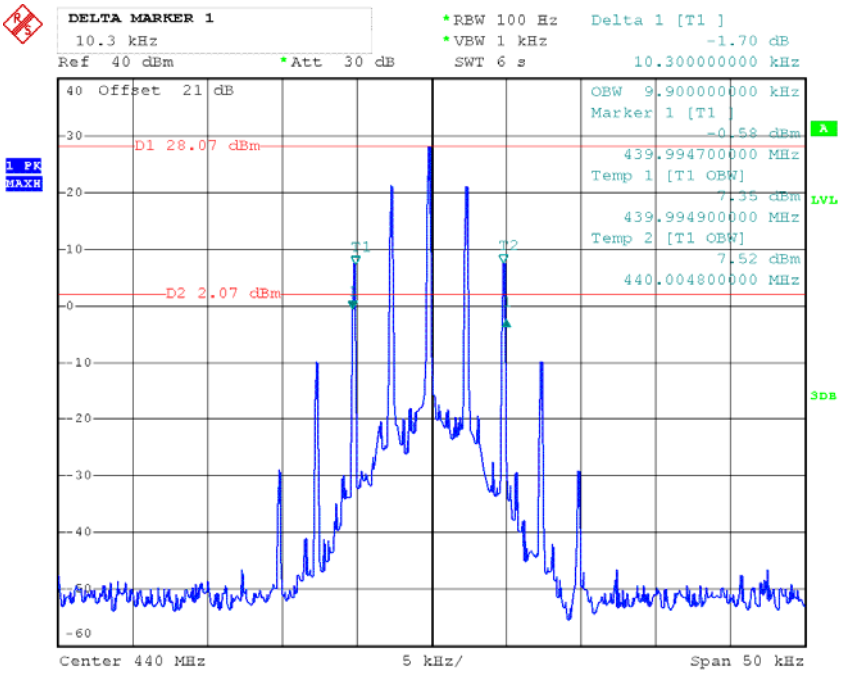
Occupied Bandwidth –12.5kHz, 440 MHz, Low Power Level



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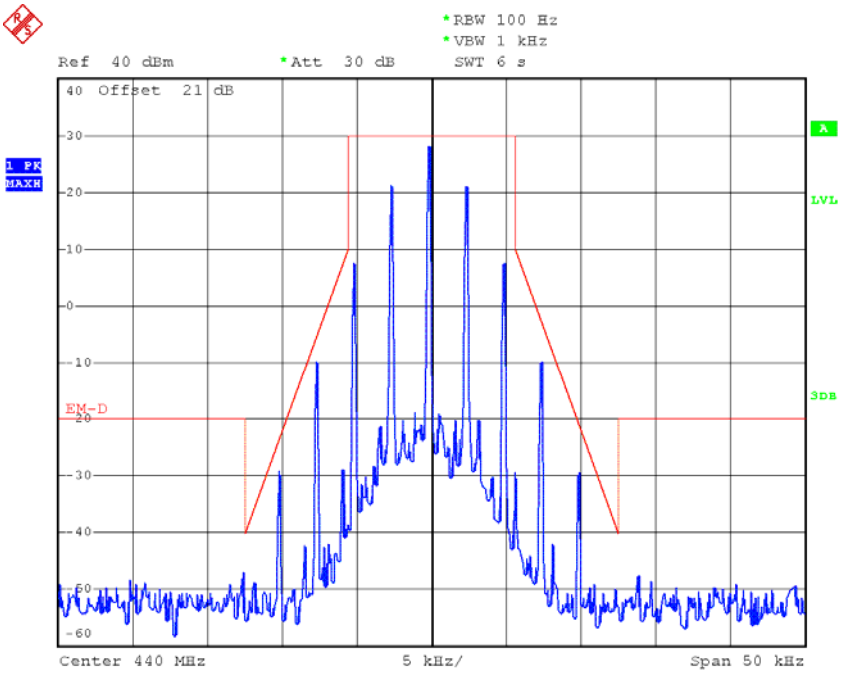

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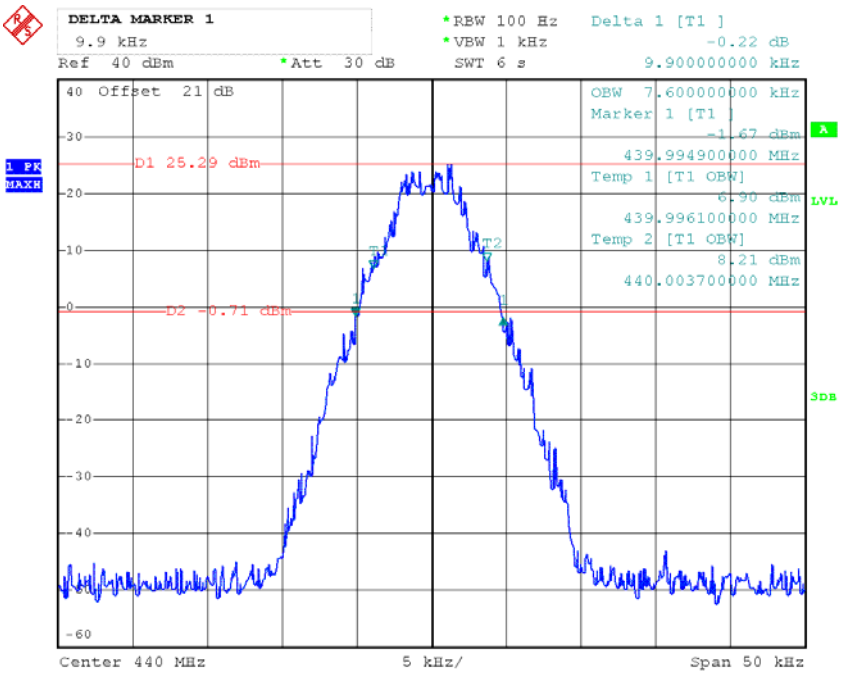
4FSK Mode

Occupied Bandwidth – 12.5kHz, 440MHz, High Power Level



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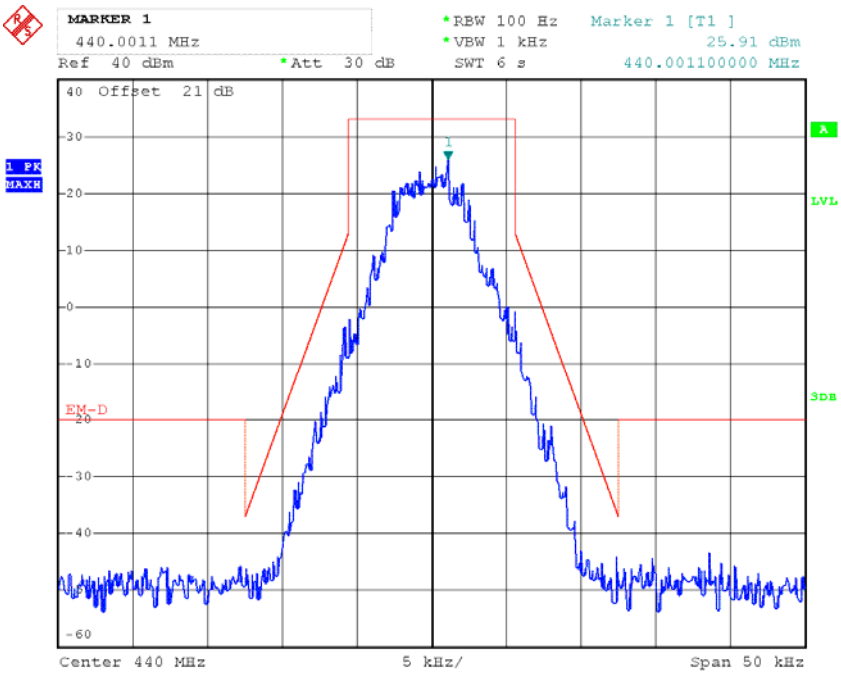
Emission Mask - Type D



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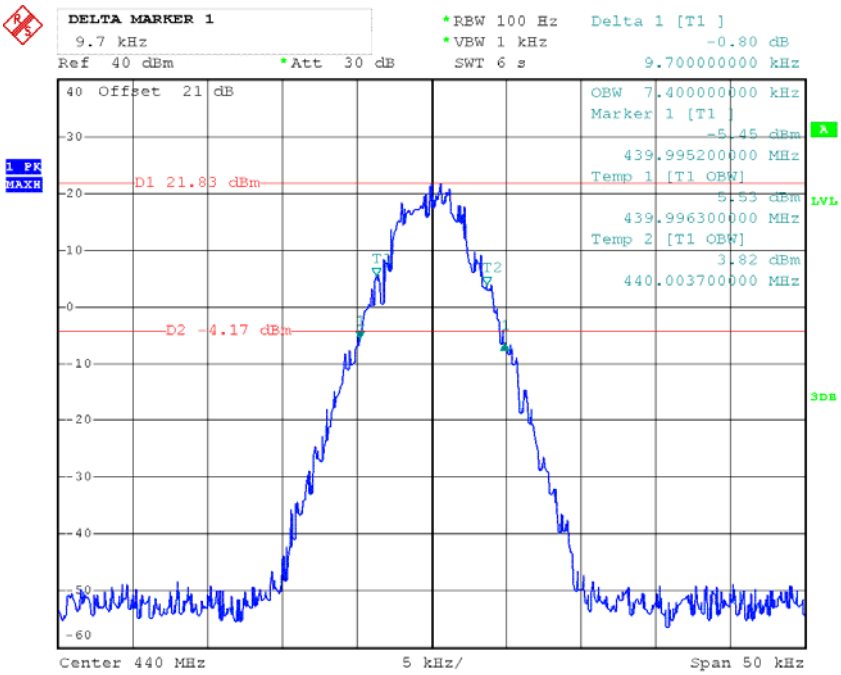
Occupied Bandwidth –12.5kHz, 440 MHz, Low Power Level



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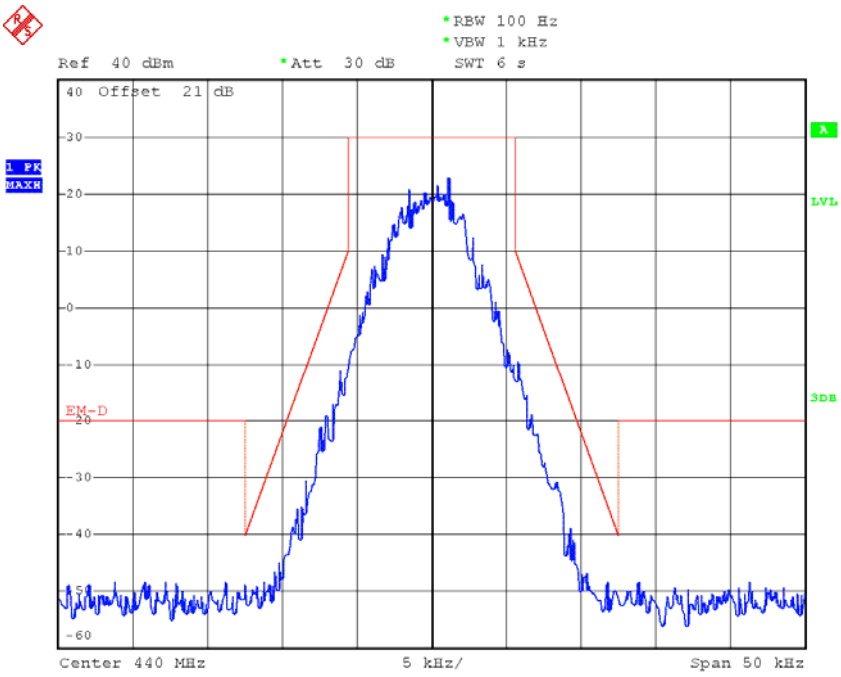

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FCC §2.1051& §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

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) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd−2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	831259/019	2016-05-09	2017-05-09
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2016-05-08	2017-05-08
Mini-Circuits	HIGH PASS FILTER	BHP-550+	YZU15801121	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06

*** 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 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

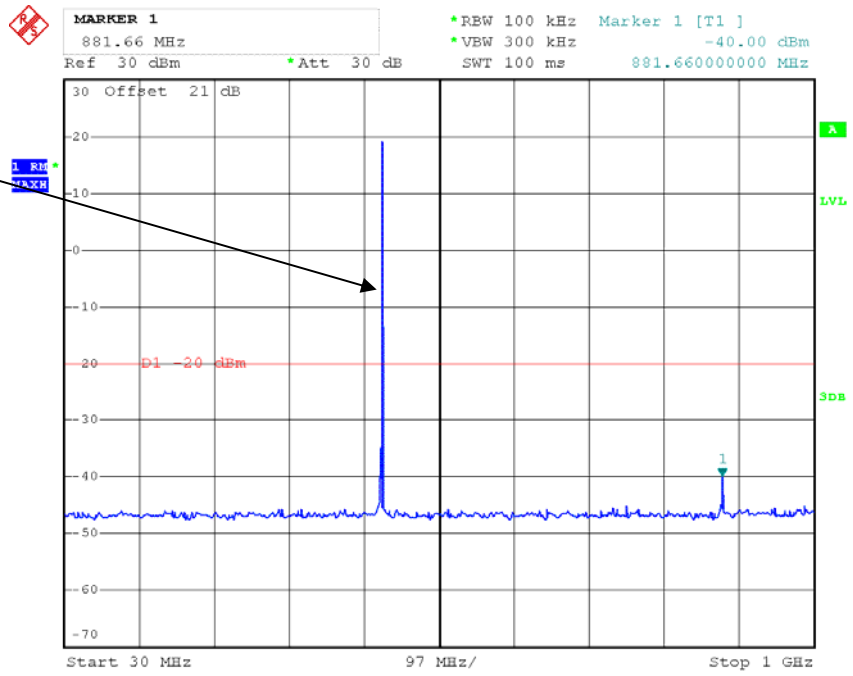
Temperature:	25.1°C
Relative Humidity:	54%
ATM Pressure:	100.6kPa

The testing was performed by Dean Liu on 2016-05-16.

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

440MHz – FM Mode, 12.5 kHz

Fundamental



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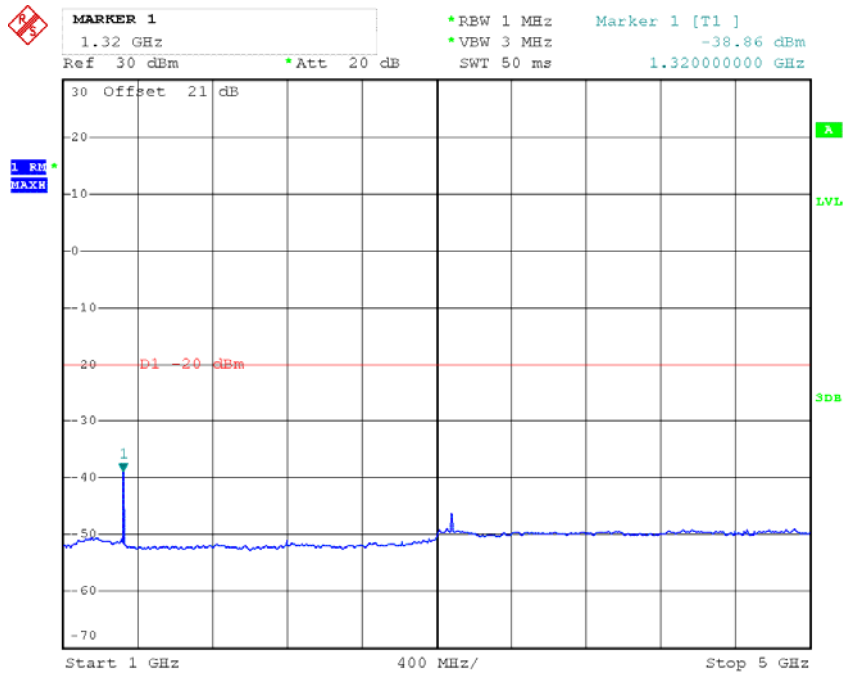

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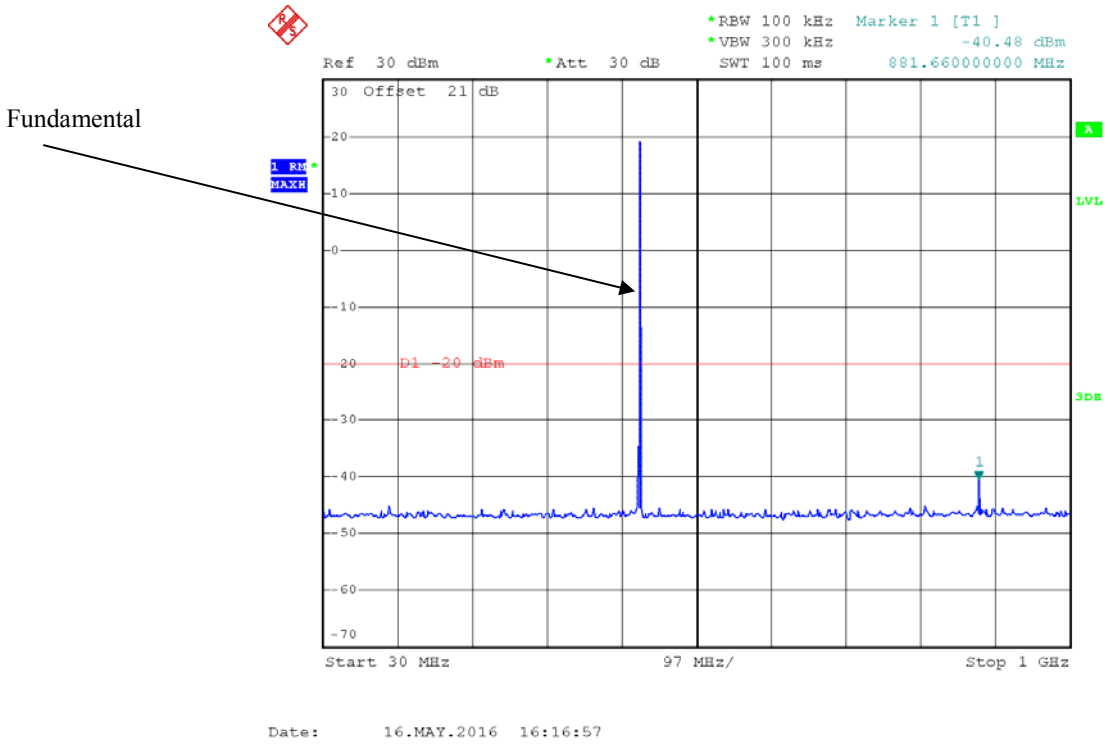
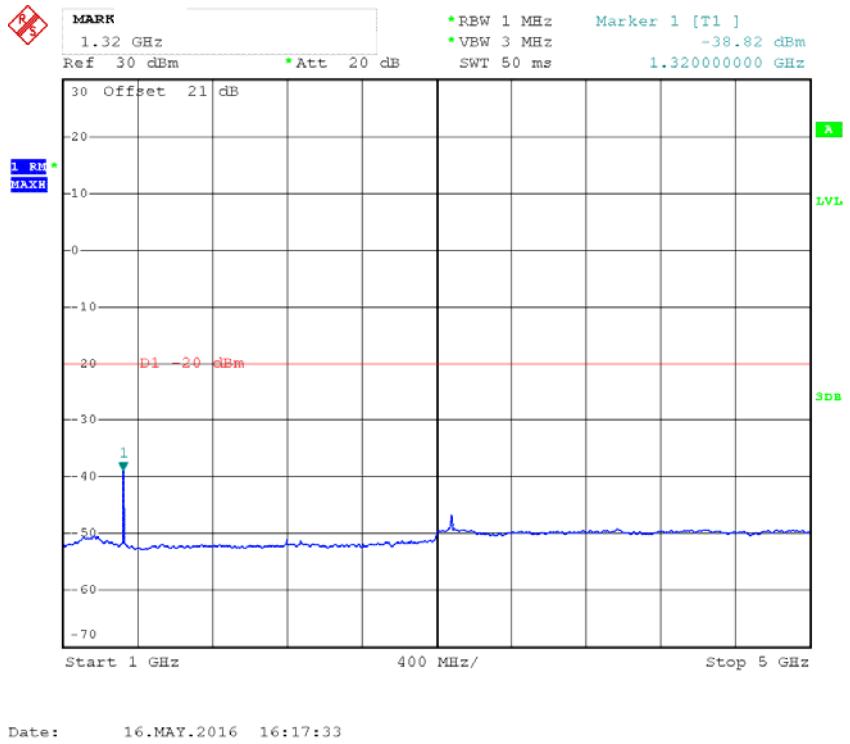
440 MHz – 4FSK Mode, 12.5 kHz





FCC §2.1053 & §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
HP	Signal Generator	1026	320408	2015-11-23	2016-11-22
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	2016-02-19	2017-02-19
Ducommun Technolagies	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	2016-05-06	2017-05-06
N/A	Coaxial Cable	8m	N/A	2016-05-06	2017-05-06
Mini-Circuits	HIGH PASS FILTER	BHP-550+	YZU15801121	2016-05-06	2017-05-06
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 $1og_{10}$ (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

Temperature:	26.3°C
Relative Humidity:	74 %
ATM Pressure:	100.4kPa

The testing was performed by Dean Liu on 2016-05-24.

Test Mode: Transmitting-High power level is the worst case.

FM Mode:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
frequency: 440.000 **MHz**								
880.000	H	39.68	-34.9	0.0	1.0	-35.9	-20.0	15.9
880.000	V	38.27	-33.1	0.0	1.0	-34.1	-20.0	14.1
1320.000	H	44.08	-55.9	8.4	1.4	-48.9	-20.0	28.9
1320.000	V	44.65	-55.7	8.4	1.4	-48.7	-20.0	28.7
1760.000	H	46.56	-54	10.9	1.4	-44.5	-20.0	24.5
1760.000	V	46.25	-54.6	10.9	1.4	-45.1	-20.0	25.1
2200.000	H	56.27	-39.4	10.8	2.0	-30.6	-20.0	10.6
2200.000	V	44.84	-50.9	10.8	2.0	-42.1	-20.0	22.1
2640.000	H	53.74	-41.5	13.2	2.5	-30.8	-20.0	10.8
2640.000	V	53.50	-44.1	13.2	2.5	-33.4	-20.0	13.4
3080.000	H	56.87	-41	13.4	2.4	-30.0	-20.0	10.0
3080.000	V	62.23	-35.4	13.4	2.4	-24.4	-20.0	4.4
3520.000	H	54.44	-42	13.9	2.1	-30.2	-20.0	10.2
3520.000	V	46.25	-49.2	13.9	2.1	-37.4	-20.0	17.4
3960.000	H	42.96	-50.5	13.8	3.3	-40.0	-20.0	20.0
3960.000	V	36.69	-56	13.8	3.3	-45.5	-20.0	25.5

4FSK Mode:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
frequency: 440.000 **MHz**								
880.000	H	41.86	-32.7	0.0	1.0	-33.7	-20.0	13.7
880.000	V	40.59	-30.8	0.0	1.0	-31.8	-20.0	11.8
1320.000	H	42.66	-57.3	8.4	1.4	-50.3	-20.0	30.3
1320.000	V	43.76	-56.6	8.4	1.4	-49.6	-20.0	29.6
1760.000	H	46.81	-53.7	10.9	1.4	-44.2	-20.0	24.2
1760.000	V	45.63	-55.2	10.9	1.4	-45.7	-20.0	25.7
2200.000	H	52.13	-43.5	10.8	2.0	-34.7	-20.0	14.7
2200.000	V	47.11	-48.6	10.8	2.0	-39.8	-20.0	19.8
2640.000	H	54.32	-40.9	13.2	2.5	-30.2	-20.0	10.2
2640.000	V	56.49	-41.1	13.2	2.5	-30.4	-20.0	10.4
3080.000	H	60.21	-37.7	13.4	2.4	-26.7	-20.0	6.7
3080.000	V	62.62	-35	13.4	2.4	-24.0	-20.0	4.0
3520.000	H	54.16	-42.3	13.9	2.1	-30.5	-20.0	10.5
3520.000	V	46.59	-48.9	13.9	2.1	-37.1	-20.0	17.1
3960.000	H	43.19	-50.3	13.8	3.3	-39.8	-20.0	19.8
3960.000	V	36.46	-56.2	13.8	3.3	-45.7	-20.0	25.7

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 & §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
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	2016-04-10	2017-04-10
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2016-05-08	2017-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06

*** 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

Temperature:	28.7°C
Relative Humidity:	52 %
ATM Pressure:	100.6kPa

The testing was performed by Dean Liu on 2016-05-13.

Test Mode: Transmitting

Reference Frequency: 440 MHz, 12.5 kHz, Limit: 2.5 ppm			
Temerature	**Voltage**	**Reading**	**Frequency Error**
℃	**V_{DC}**	**MHz**	**ppm**
-30	3.7	439.999912	-0.20
-20		439.999928	-0.16
-10		439.999909	-0.21
0		439.999971	-0.07
10		439.999962	-0.09
20		439.999937	-0.14
30		439.999918	-0.19
40		439.999919	-0.18
50		439.999921	-0.18
60		439.999948	-0.12
25	3.5	439.999937	-0.14

Note: Battery operating end point is declared by appliciant.

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

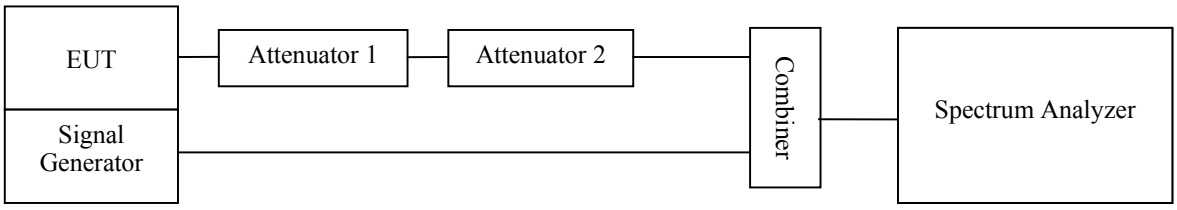
Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2016-05-09	2017-05-09
HP	Signal Generator	E4422B	MY41000355	2015-11-23	2016-11-22
Cheng Du Ou Li Tong	Two way power splitter	EMPD-T-2-10-1000	OE01201041	2016-05-06	2017-05-06
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2016-05-08	2017-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

* 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

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 ±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 ±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

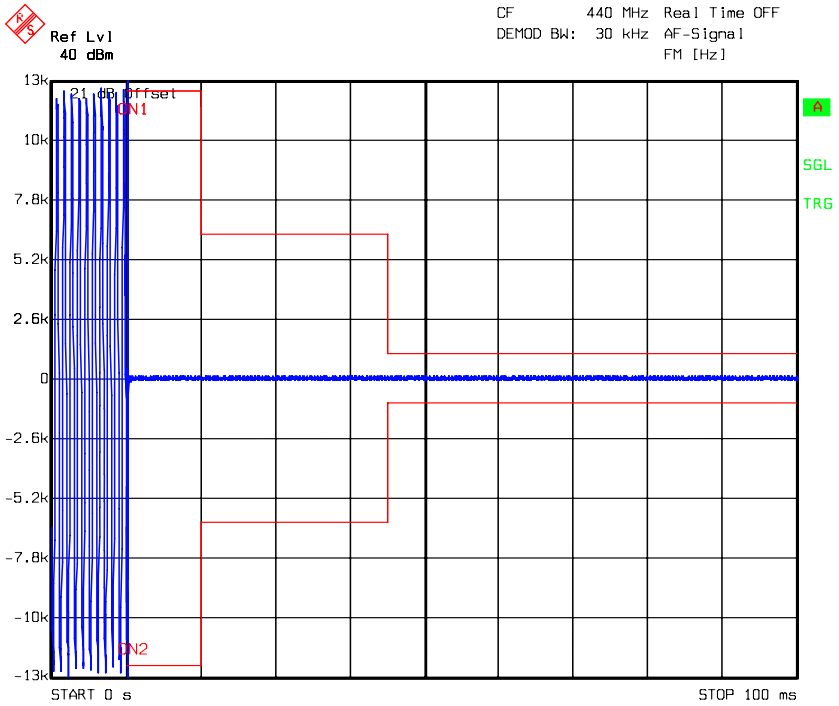
Temperature:	28.2°C
Relative Humidity:	51 %
ATM Pressure:	100.6kPa

The testing was performed by Dean Liu on 2016-05-17 .

Channel Spacing (kHz)	Transient Period (ms)	Maximum frequency difference	Result
12.5	10(t_1)	±12.5 kHz	Pass
	25(t_2)	±6.25 kHz	
	10(t_3)	±12.5 kHz	

Please refer to the following plots.

Turn on – 440 MHz, FM Mode 12.5 kHz



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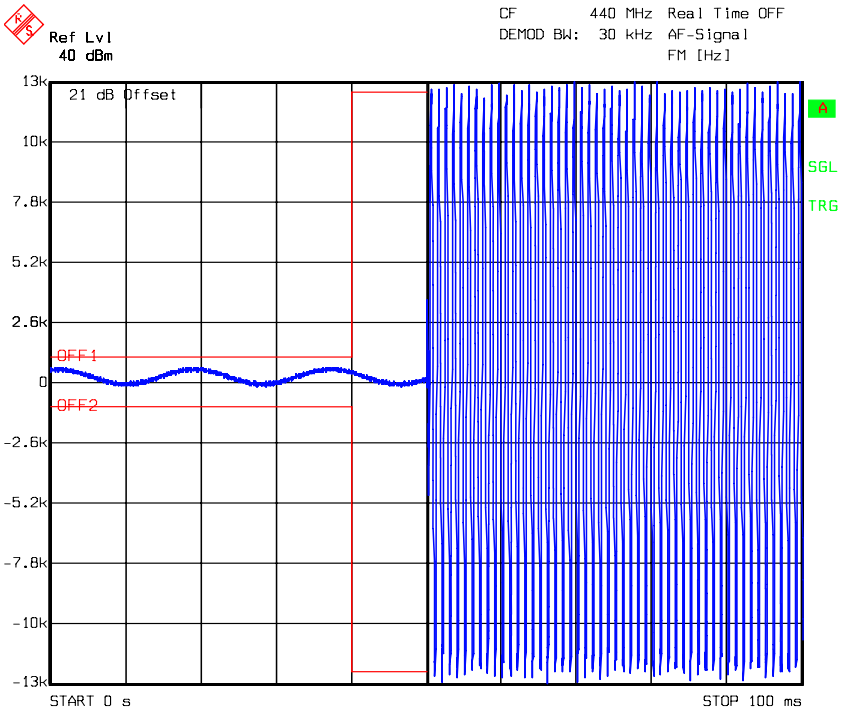
Turn off – 440 MHz, FM Mode 12.5 kHz



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