



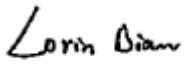

FCC PART 22 AND PART 90 TEST REPORT

For

Kirisun Communications Co.,Ltd

3-6Flrs, ROBETA Building, No. 1, QiMin Road, Song Ping Shan Area, Science & Industry
Park,Nanshan District Shenzhen 518057 P.R. China

FCC ID: Q5EDR600

Report Type: Original Report	Product Name: DMR Repeater(DR600), Transceiver(DR600T)
Test Engineer: <u>Lorin Bian</u>	
Report Number: <u>RDG170511009-A1</u>	
Report Date: <u>2017-06-09</u>	
Reviewed By: <u>Henry Ding</u> EMC Leader	
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: 028-65525123, Fax: 028-65525125 www.baclcorp.com

Note: This test report was prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Chengdu). Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. This report was valid only with a valid digital signature.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **Kirisun Communications Co.,Ltd.** 's product, model: **DR600 , DR600T** (**FCC ID: Q5EDR600**) which was measured approximately:48.3 cm (H) x 45 cm (W) x 4.4 cm (H), rated input voltage: DC13.6V or AC 120V.

Note: The series product, model DR600, DR600T are electrically identical, the difference between them is just the model name, we selected DR600 for fully testing, the details were explained in the declaration letter.

**All measurement and test data in this report was gathered from final production sample, serial number: 170511009 (assigned by the BAEL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-05-11, and EUT conformed to test requirement.*

Objective

This test report is prepared on behalf of **Kirisun Communications Co.,Ltd.** in accordance with Part 2, Part 22 and Part 90 of the Federal Communications Commission rules.

The model: **DR600, DR600T** use identical RF boards(Main Board, Transmitter Board, Receiver Board, AMP Board) with TR850G(FCC ID: Q5ETR850), only the interface board,power board and Enclosure are difference.

The change made to the device affected Radiated Spurious Emissions recorded in the report.

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 SERVICES

Applicable Standards: TIA-603-D.

The uncertainty of any RF tests which use conducted method measurement is ± 3.17 dB, the uncertainty of any radiation on emissions measurement is:

30M~200MHz: ± 4.7 dB;
200M~1GHz: ± 6.0 dB;
1G-6GHz: ± 5.13 dB;
6G~25GHz: ± 5.47 dB;

And the uncertainty will not be taken into consideration for all test data recorded in the report.

Test Facility

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Test site at BACL 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 April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1307 & §2.1091	Maximum Permissible Exposure (MPE)	Compliant
§2.1046; § 22.727;§90.205	RF Output Power	Compliant*
§2.1047;§90.207	Modulation Characteristic	Compliant*
§2.1049;§22.357;§ 2 2.731;§90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliant*
§2.1051; §22.861;§90.210	Spurious Emission at Antenna Terminal	Compliant*
§2.1053; §22.861;§90.210	Spurious Radiated Emissions	Compliant
§2.1055; § 22.355;§90.213	Frequency Stability	Compliant*
§90.214	Transient Frequency Behavior	Compliant*

Note: Compliant*- please refer to the original report: RDG140721007-00 which was issued by Bay Area Compliance Laboratories Corp.(Dongguan) on 2014-08-15.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode.

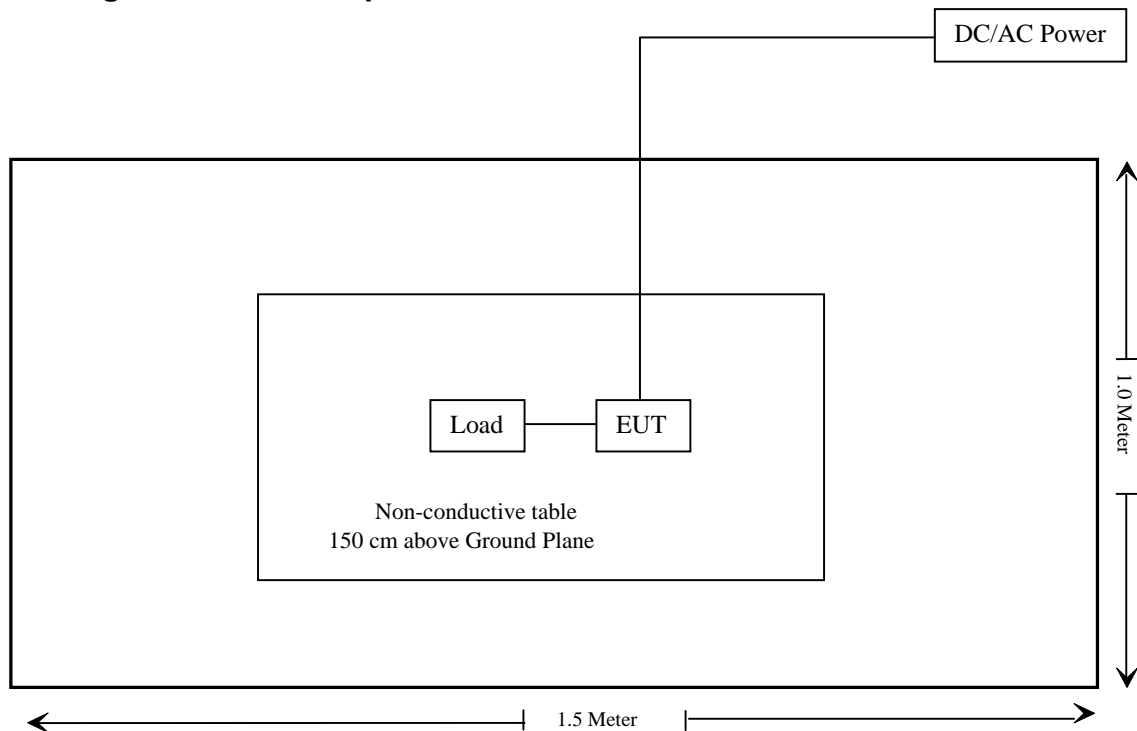
EUT Specification:

Operating Frequency Band	400-470MHz
Modulation Mode	FM, 4FSK
Channel Separation	12.5 kHz
Transmitter Power	40W

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
N/A	Terminal Load (50 Ω)	N/A	N/A

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1307 & §2.1091	Maximum Permissible Exposure (MPE)	Compliant
§2.1046; § 22.727;§90.205	RF Output Power	Compliant*
§2.1047;§90.207	Modulation Characteristic	Compliant*
§2.1049;§22.357;§ 2 2.731;§90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliant*
§2.1051; §22.861;§90.210	Spurious Emission at Antenna Terminal	Compliant*
§2.1053; §22.861;§90.210	Spurious Radiated Emissions	Compliant
§2.1055; § 22.355;§90.213	Frequency Stability	Compliant*
§90.214	Transient Frequency Behavior	Compliant*

Compliant*: Please refer to the report RDG140721007-00 with FCC ID: Q5ETR850 for the model TR850G, which was issued on 2014-08-15 by Bay Area Compliance Laboratories Corp. (Dongguan).

FCC §1.1307 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to 1.1307, systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm²)	Averaging Time E , H or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6

f = frequency in MHz

* = Plane-wave equivalent power density

MPE Calculation

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Frequency	Output Power	Typical Antenna		Distance	Power Density	Power Density
MHz	mW	dBi	numeric	cm	mW/cm ²	mW/cm ²
400-470	43000	0	1	100	0.34	1.33

Note: the target power is 43 W.

Result: The device meet FCC MPE at 100 cm distance

FCC §2.1053 & §22.861 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053 and §22.861 and §90.210

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde &Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde &Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	6751	2014-06-16	2017-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2017-5-23	2018-5-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2017-5-23	2018-5-22
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2017-05-20	2018-05-19
EMCT	Semi-Anechoic Chamber	966	966-1	2015-04-24	2018-04-23
Unknown	RF Cable (below 1GHz)	Unknown	NO.1	2016-11-10	2017-11-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.4	2016-11-10	2017-11-09
Unknown	RF Cable (above 1GHz)	Unknown	NO.2	2016-11-10	2017-11-09

* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

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.

For part 90:

Spurious emissions in dB =10 1g (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB =50+10 Log₁₀ (power out in Watts) for EUT with a 12.5 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

Temperature:	26.9 °C
Relative Humidity:	45 %
ATM Pressure:	100.7 kPa

The testing was performed by Lorin Bian on 2017-06-04.

Test Mode: Transmitting (AC 120V was the worst mode)

FM mode, high power level

Frequency	Polar	S.A. Reading	S.G. Level	Antenna Gain	Cable Loss	Absolute Level	Limit	Margin
MHz	H/V	dB μ V	dBm	dBd/dBi	dB	dBm	dBm	dB
435.000MHz, for FCC part 90								
870.000	H	29.41	-45.3	0.0	1	-46.3	-20.0	26.3
870.000	V	30.11	-41.3	0.0	1	-42.3	-20.0	22.3
103.720	H	30.76	-56.9	0.0	0.3	-57.2	-20.0	37.2
216.240	V	32.49	-50.2	0.0	0.5	-50.7	-20.0	30.7
1305.000	H	41.05	-58.8	8.3	1.3	-51.8	-20.0	31.8
1305.000	V	43.26	-57.1	8.3	1.3	-50.1	-20.0	30.1
1740.000	H	50.69	-50	10.9	1.4	-40.5	-20.0	20.5
1740.000	V	53.37	-47.6	10.9	1.4	-38.1	-20.0	18.1
2175.000	H	48.13	-47.6	10.9	1.9	-38.6	-20.0	18.6
2175.000	V	49.48	-45.9	10.9	1.9	-36.9	-20.0	16.9
454.500MHz, for FCC part 22								
909.000	H	30.68	-43.5	0.0	1	-44.5	-13.0	31.5
909.000	V	30.76	-40.1	0.0	1	-41.1	-13.0	28.1
103.720	H	31.79	-55.9	0.0	0.3	-56.2	-13.0	43.2
216.240	V	34.15	-48.5	0.0	0.5	-49.0	-13.0	36.0
1363.500	H	36.59	-63.8	8.7	1.4	-56.5	-13.0	43.5
1363.500	V	40.10	-60.2	8.7	1.4	-52.9	-13.0	39.9
1818.000	H	46.26	-53.7	11.2	1.3	-43.8	-13.0	30.8
1818.000	V	49.61	-50.6	11.2	1.3	-40.7	-13.0	27.7
2272.500	H	44.18	-51.9	11.1	2.2	-43.0	-13.0	30.0
2272.500	V	47.18	-48.6	11.1	2.2	-39.7	-13.0	26.7
458.000MHz, for FCC part 22								
916.000	H	31.33	-42.6	0.0	1	-43.6	-13.0	30.6
916.000	V	30.85	-39.8	0.0	1	-40.8	-13.0	27.8
103.720	H	31.97	-55.7	0.0	0.3	-56.0	-13.0	43.0
216.240	V	34.53	-48.1	0.0	0.5	-48.6	-13.0	35.6
1374.000	H	37.36	-63.1	8.8	1.4	-55.7	-13.0	42.7
1374.000	V	40.67	-59.7	8.8	1.4	-52.3	-13.0	39.3
1832.000	H	46.29	-53.6	11.3	1.3	-43.6	-13.0	30.6
1832.000	V	48.74	-51.2	11.3	1.3	-41.2	-13.0	28.2
2290.000	H	46.55	-49.6	11.2	2.3	-40.7	-13.0	27.7
2290.000	V	50.24	-45.6	11.2	2.3	-36.7	-13.0	23.7

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = SG Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

4FSK mode, high power level

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
435.000MHz, for FCC part 90								
870.000	H	30.78	-43.9	0.0	1	-44.9	-20.0	24.9
870.000	V	31.15	-40.3	0.0	1	-41.3	-20.0	21.3
103.720	H	31.44	-56.2	0.0	0.3	-56.5	-20.0	36.5
216.240	V	33.05	-49.6	0.0	0.5	-50.1	-20.0	30.1
1305.000	H	41.42	-58.4	8.3	1.3	-51.4	-20.0	31.4
1305.000	V	43.60	-56.7	8.3	1.3	-49.7	-20.0	29.7
1740.000	H	51.56	-49.1	10.9	1.4	-39.6	-20.0	19.6
1740.000	V	53.92	-47	10.9	1.4	-37.5	-20.0	17.5
2175.000	H	48.42	-47.3	10.9	1.9	-38.3	-20.0	18.3
2175.000	V	49.71	-45.7	10.9	1.9	-36.7	-20.0	16.7
454.500MHz, for FCC part 22								
909.000	H	30.74	-43.4	0.0	1	-44.4	-13.0	31.4
909.000	V	30.56	-40.3	0.0	1	-41.3	-13.0	28.3
103.720	H	31.64	-56	0.0	0.3	-56.3	-13.0	43.3
216.240	V	33.73	-48.9	0.0	0.5	-49.4	-13.0	36.4
1363.500	H	36.95	-63.4	8.7	1.4	-56.1	-13.0	43.1
1363.500	V	41.02	-59.3	8.7	1.4	-52.0	-13.0	39.0
1818.000	H	47.04	-53	11.2	1.3	-43.1	-13.0	30.1
1818.000	V	50.50	-49.7	11.2	1.3	-39.8	-13.0	26.8
2272.500	H	44.84	-51.2	11.1	2.2	-42.3	-13.0	29.3
2272.500	V	48.03	-47.8	11.1	2.2	-38.9	-13.0	25.9
458.000MHz, for FCC part 22								
916.000	H	35.41	-38.6	0.0	1	-39.6	-13.0	26.6
916.000	V	33.96	-36.7	0.0	1	-37.7	-13.0	24.7
103.720	H	35.88	-51.8	0.0	0.3	-52.1	-13.0	39.1
216.240	V	37.21	-45.5	0.0	0.5	-46.0	-13.0	33.0
1374.000	H	37.36	-63.1	8.8	1.4	-55.7	-13.0	42.7
1374.000	V	40.67	-59.7	8.8	1.4	-52.3	-13.0	39.3
1832.000	H	46.29	-53.6	11.3	1.3	-43.6	-13.0	30.6
1832.000	V	48.74	-51.2	11.3	1.3	-41.2	-13.0	28.2
2290.000	H	46.55	-49.6	11.2	2.3	-40.7	-13.0	27.7
2290.000	V	50.24	-45.6	11.2	2.3	-36.7	-13.0	23.7

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = SG Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

BELOW IS THE FIRST APPLICATION REPORT



FCC PART 22 and 90 TEST REPORT

For

Kirisun Communications Co., Ltd.

3-6Flrs, ROBETA Building, No. 1, QiMin Road, Song Ping Shan Area, Science & Industry Park, Nanshan District, Shenzhen 518057 P.R. China

FCC ID: Q5ETR850

Report Type: Original Report	Product Type: DMR Repeater
Test Engineer: Leon Chen	<i>leon chen</i>
Report Number: RDG140721007-00	
Report Date: 2014-08-15	
Reviewed By: Jerry Zhang EMC Manager	<i>Jerry Zhang</i>
Test Laboratory: Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP*, or any agency of the Federal Government.

* This report may contain data that are not covered by the NVLAP accreditation and shall be marked with an asterisk "★" (Rev.2)

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FEMVAL

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Kirisun Communications Co., Ltd.*'s product, model: *TR850G* (FCC ID: *Q5ETR850*) (the "EUT") in this report is a *DMR Repeater*, which was measured approximately: 48.5 cm (L) x 33.5 cm (H) x 13.0 cm (T), rated input voltage: 120 VAC, 13.6 VDC.

Note: The series product, model TR850, TR850G are electrically identical, the difference between them is just the model name, we selected TR850G for fully testing, and the details was explained in the attached declaration letter.

** All measurement and test data in this report was gathered from production sample serial number: 410014020000001 (Assigned by the Applicant). The EUT was received on 2014-07-21.*

Objective

This test report is prepared on behalf of *Kirisun Communications Co., Ltd.* in accordance with Part 2, and Part 90 of the Federal Communications Commission's 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 and ANSI 63.4-2003.

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

Test Facility

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

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

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.

Additionally, Bay Area Compliance Laboratories Corp. (Dongguan) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 500069-0).



The current scope of accreditations can be found at <http://ts.nist.gov/standards/scopes/5000690.htm>

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode.

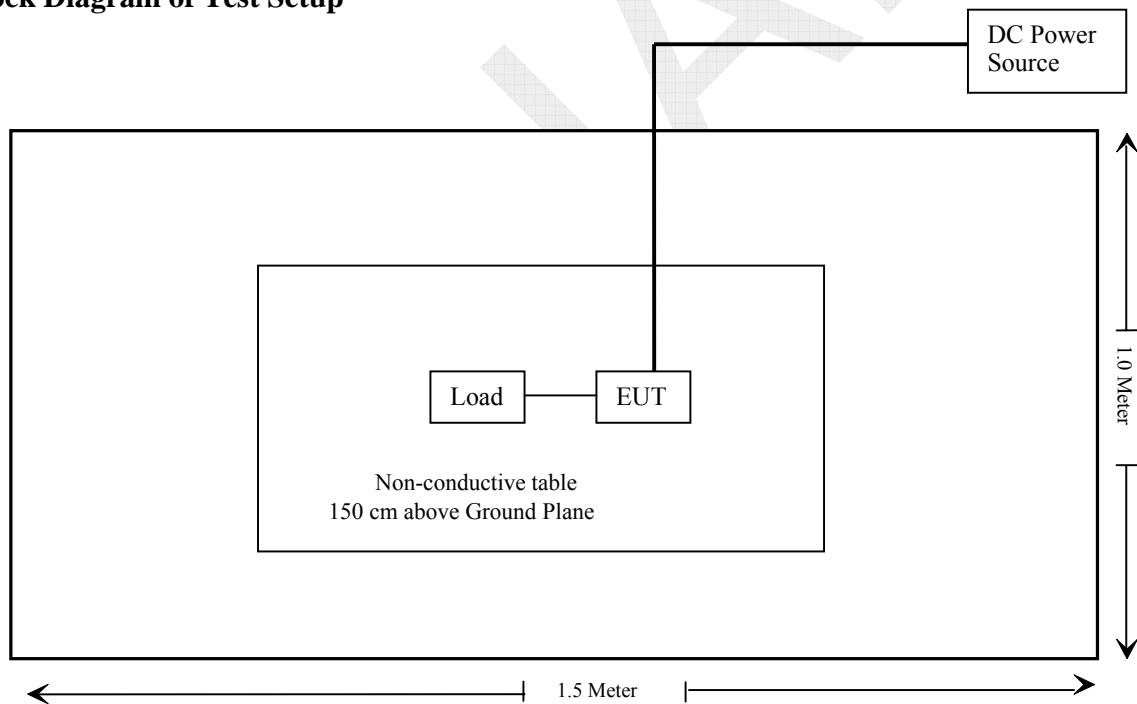
EUT Specification:

Operating Frequency Band	400-470MHz
Modulation Mode	FM, 4FSK
Channel Separation	12.5 kHz
Transmitter Power	40W

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Pro instrument	DC Power Supply	pps3300	N/A

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§2.1091	Maximum Permissible Exposure	Compliance
§2.1046; § 22.727;§90.205	RF Output Power	Compliance
§2.1047;§90.207	Modulation Characteristic	Compliance
§2.1049;§22.357;§ 22.731;§90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliance
§2.1051; §22.861;§90.210	Spurious Emission at Antenna Terminal	Compliance
§2.1053; §22.861;§90.210	Spurious Radiated Emissions	Compliance
§2.1055; § 22.355;§90.213	Frequency Stability	Compliance
§90.214	Transient Frequency Behavior	Compliance

FCC §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to 1.1307, systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E , H or S (minutes)
0.3- 3.0	614	1.63	(100)*	6
3.0 - 30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6

f = frequency in MHz

* = Plane-wave equivalent power density

MPE Calculation

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Frequency	Output Power	Typical Antenna		Distance	Power Density	Power Density
		dBi	numeric			
MHz	mW			cm	mW/cm ²	mW/cm ²
435	43000	0	1	100	0.34	1.45

Note: the target power is 43 W.

Result: The device meet FCC MPE at 100 cm distance

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:

According to TIA-603-D section 2.2.1

Spectrum Analyzer setting:

RBW	Video B/W
100 kHz	300 kHz

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09

* **Statement of Traceability:** Bay Area Compliance 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:	30.4 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa

The testing was performed by Leon Chen on 2014-07-31.

Test Mode: Transmitting

Test Result: Compliance.

Please refer to following table.

ModulationMode	Channel Separation	f_c	Reading	Note
		MHz	W	
FM	12.5kHz	400.0125	39.23	Not for FCC review
		435	40.08	FCC part 90
		469.9875	39.97	
4FSK		400.0125	39.16	Not for FCC review
		435	40.04	FCC part 90
		469.9875	40.01	
FM		454.5	40.11	FCC part 22
		458	39.97	
4FSK		454.5	40.06	
	458	39.92		

FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC

Applicable Standard

FCC§2.1047 & §90.207:

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

Test Procedure

Test Method: TIA/EIA-603 2.2.3

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
HP	RF Communications Test Set	8920A	00 235	2014-05-09	2015-05-09

* **Statement of Traceability:** Bay Area Compliance 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

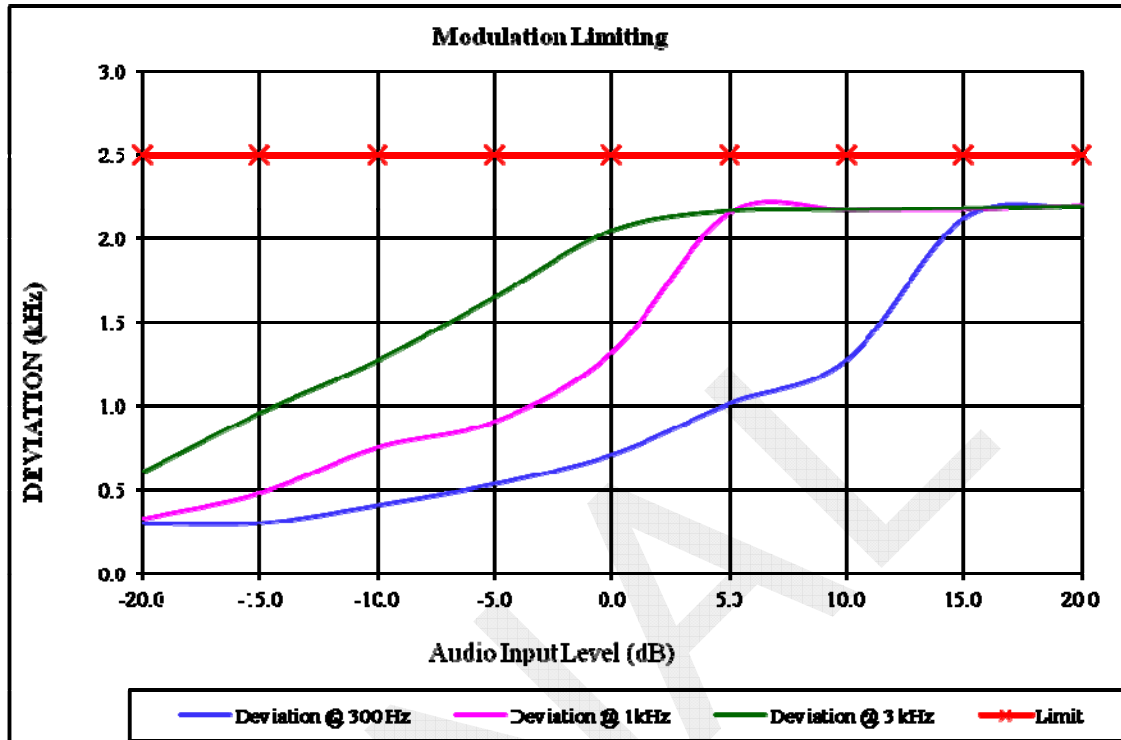
Environmental Conditions

Temperature:	30.4 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa

The testing was performed by Leon Chen on 2014-07-31.

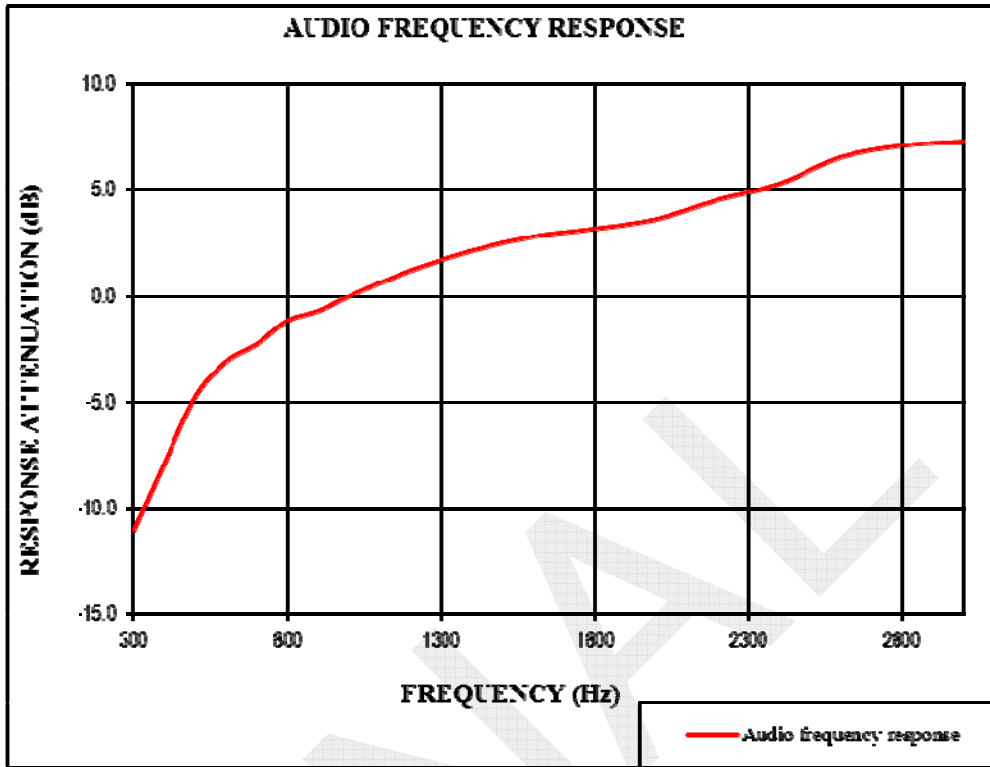
MODULATION LIMITING

Carrier Frequency: 435 MHz, Channel Separation = 12.5 kHz

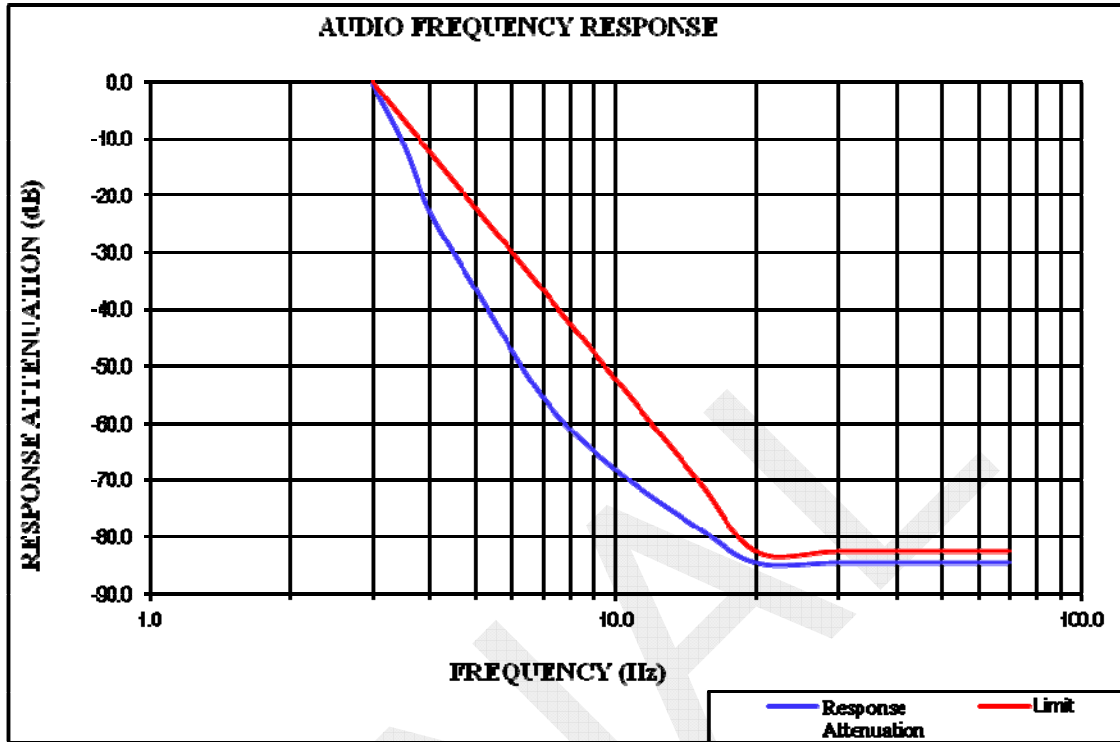


MODULATION LIMITING

Carrier Frequency: 435 MHz, Channel Separation = 12.5 kHz



Audio Frequency Low Pass Filter Response



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 (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27(fd - 2.88 \text{ kHz})$ 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 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.

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
HP	RF Communications Test Set	8920A	00 235	2014-05-09	2015-05-09
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09

* **Statement of Traceability:** Bay Area Compliance 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:	30.4 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa

The testing was performed by Leon Chen on 2014-07-31.

Test Mode: Transmitting

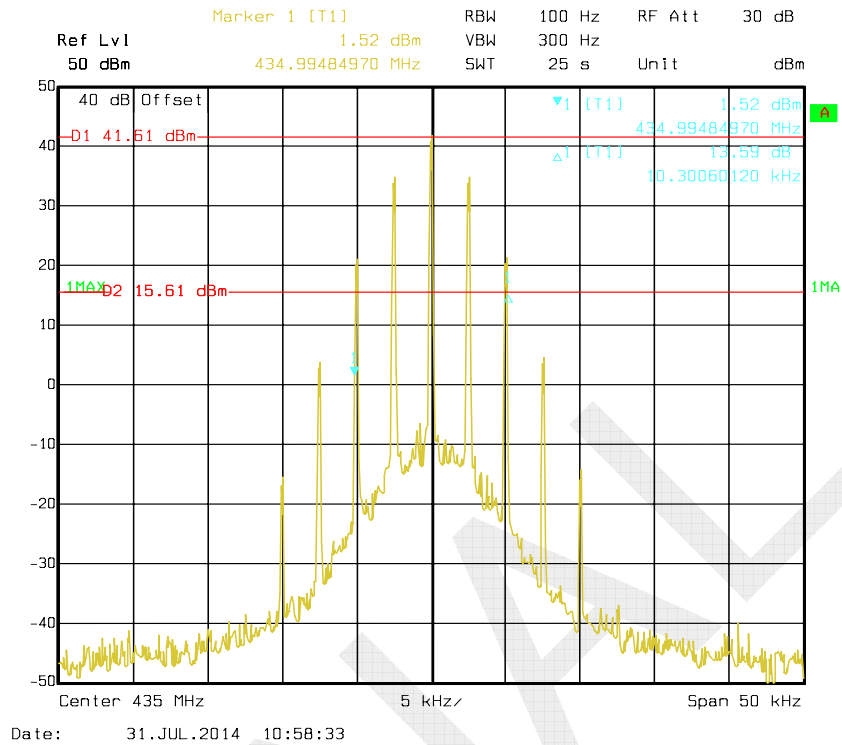
Test Result: Compliance.

Please refer to following tables.

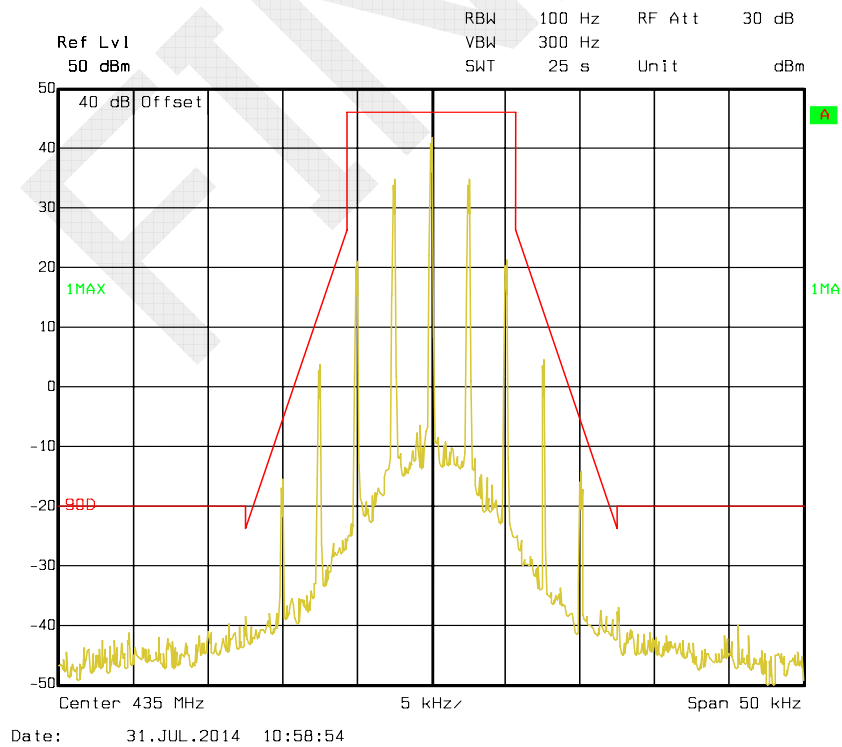
ModulationMode	Channel Separation	Frequency	26dB Bandwidth	Note
		MHz	kHz	
FM	12.5kHz	435	10.3	FCC Part 90
4FSK			9.9	
FM		454.5	10.3	FCC Part 22
		458	10.4	
4FSK		454.5	10.0	
		458	10.0	

Part 90:

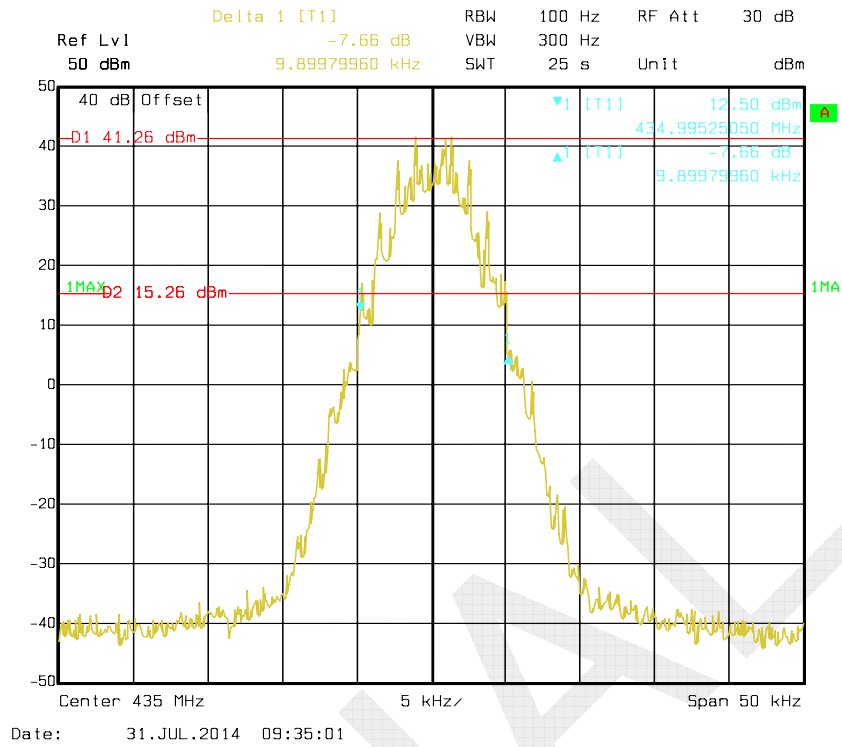
Occupied Bandwidth – FM



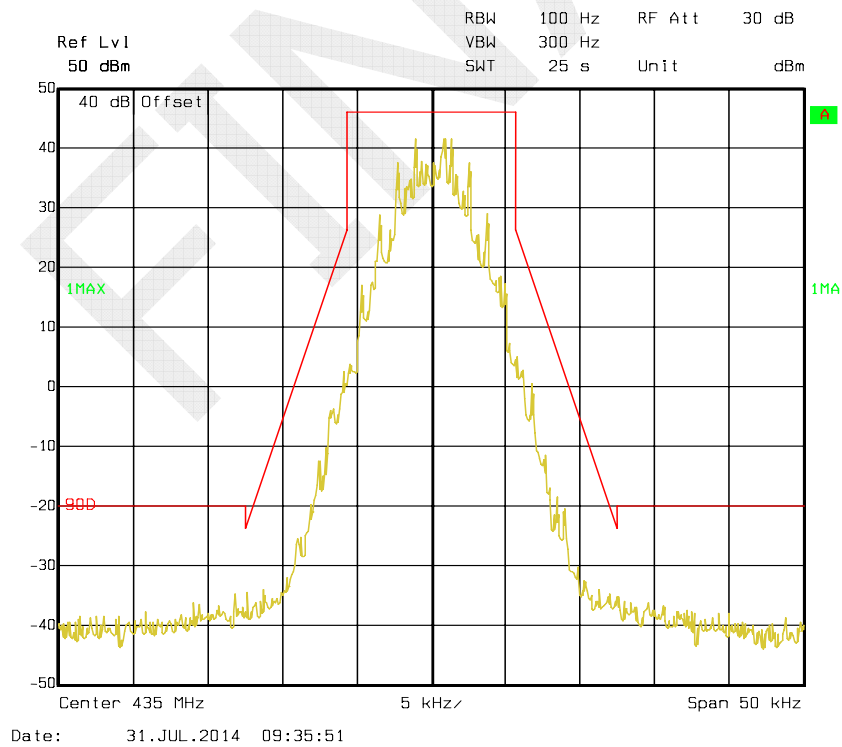
Emission Mask - Type D



Occupied Bandwidth – 4FSK

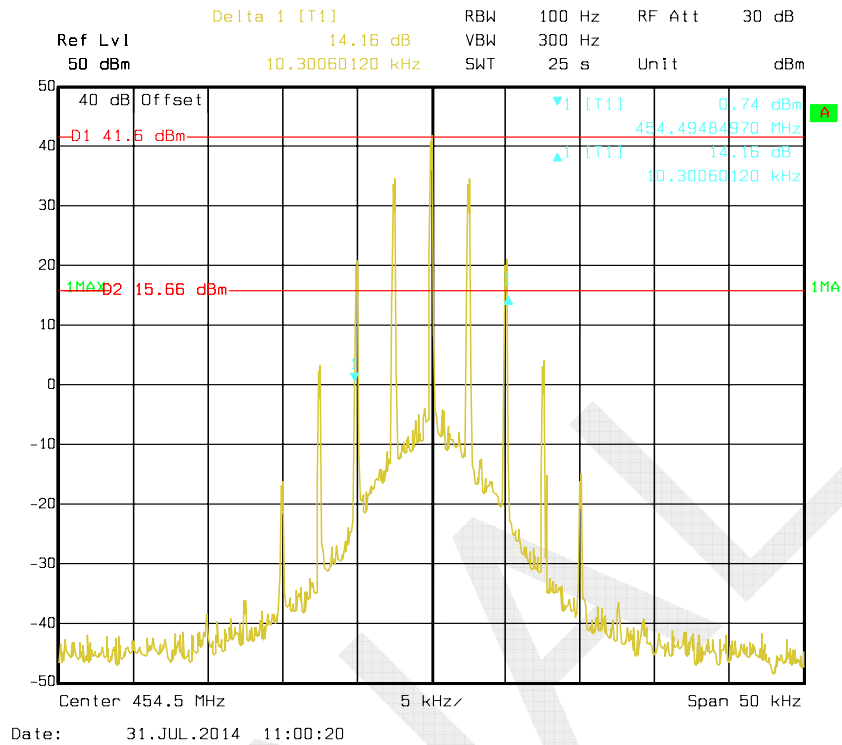


Emission Mask - Type D

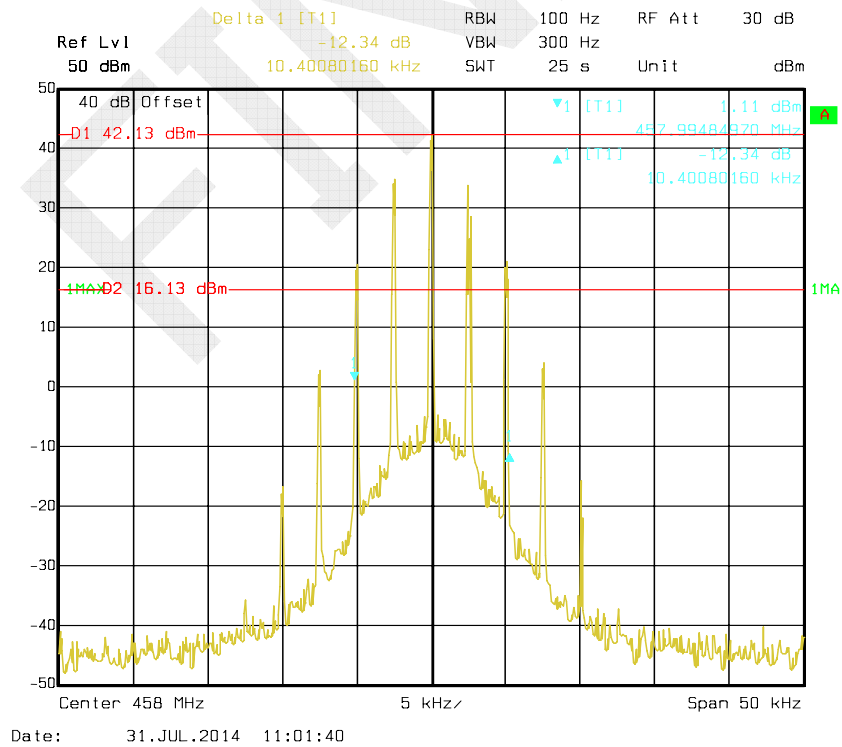


Part 22:

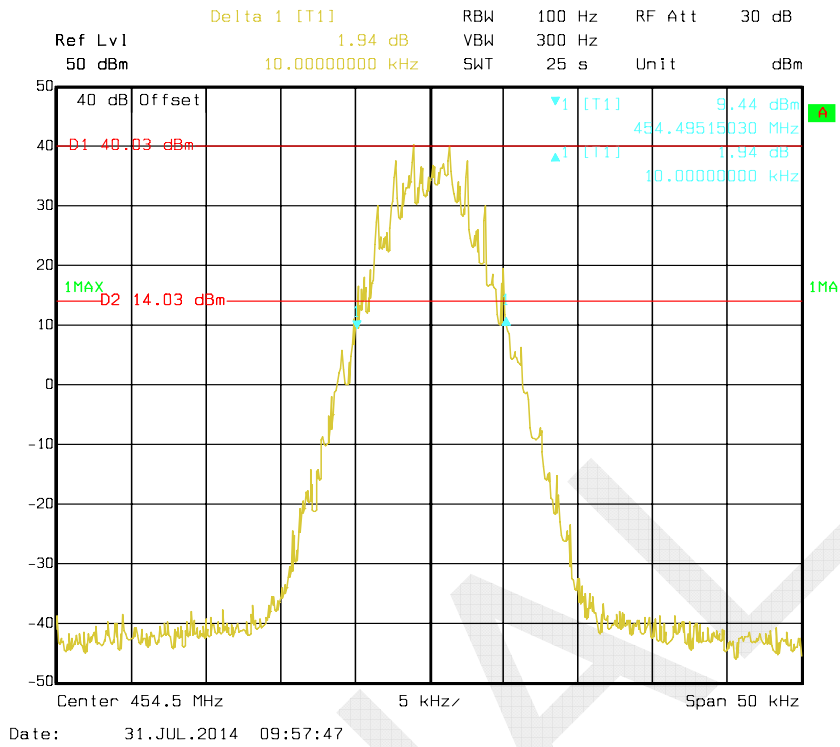
Occupied Bandwidth – FM, 454.5 MHz



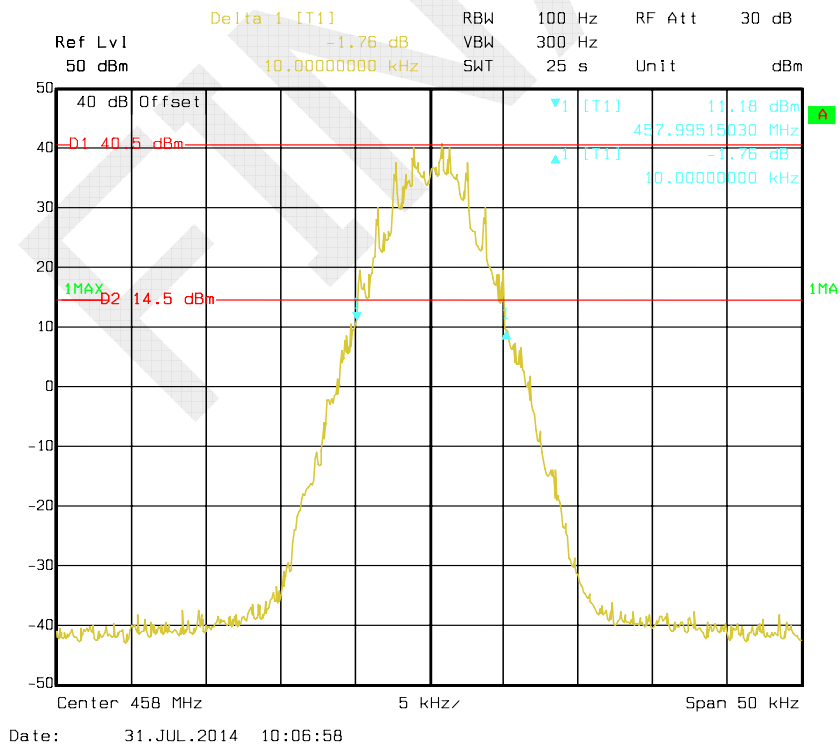
Occupied Bandwidth – FM, 458 MHz



Occupied Bandwidth – 4FSK, 454.5 MHz



Occupied Bandwidth – 4FSK, 458 MHz



FCC §2.1051& §22.861 & §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 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.

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
HP	RF Communications Test Set	8920A	00 235	2014-05-09	2015-05-09
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09

* **Statement of Traceability:** Bay Area Compliance 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

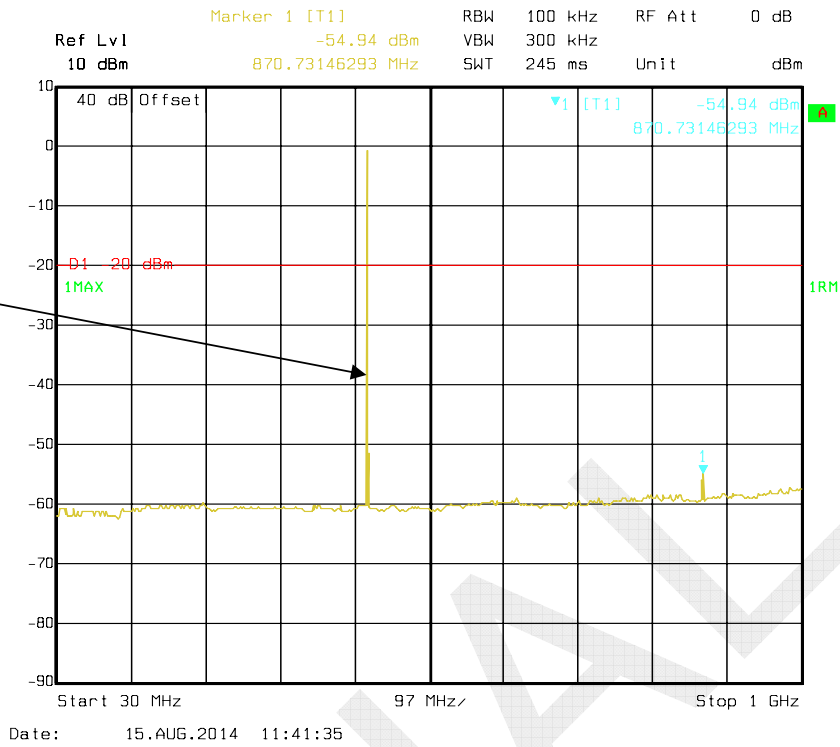
Environmental Conditions

Temperature:	30.4 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa

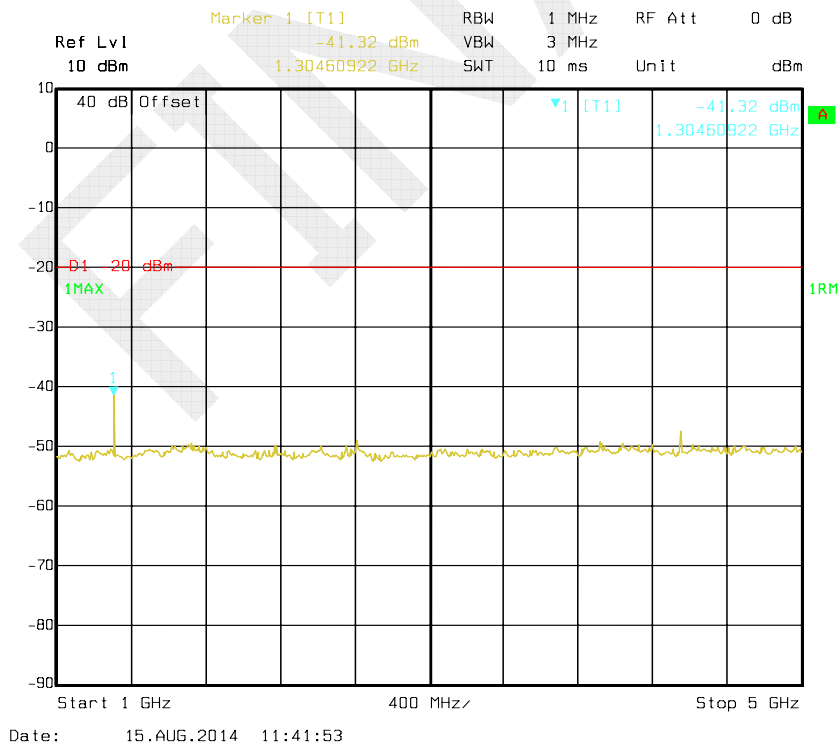
The testing was performed by Leon Chen on 2014-08-15.

FEMVA

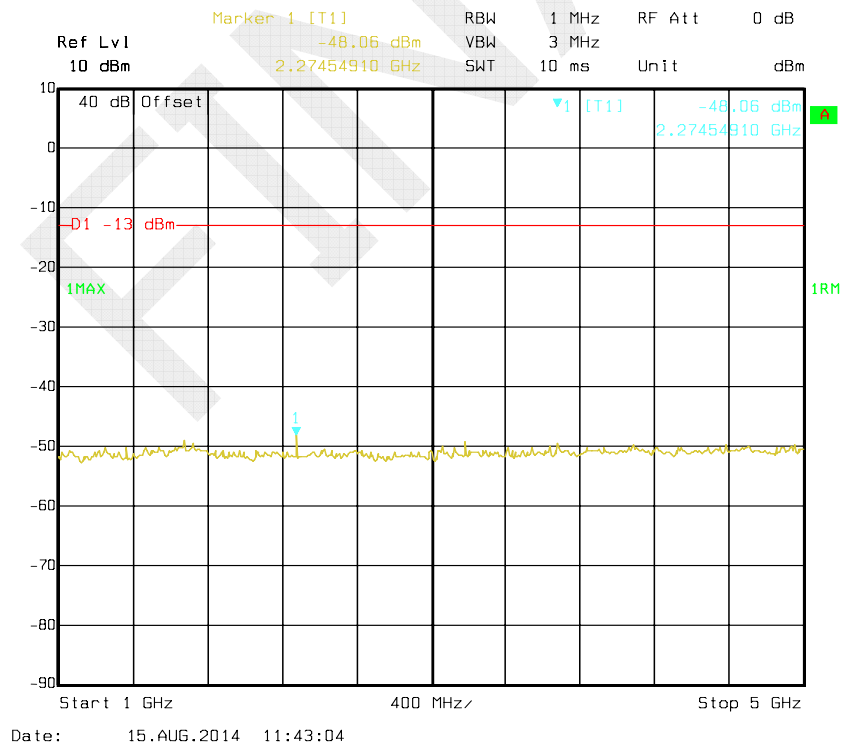
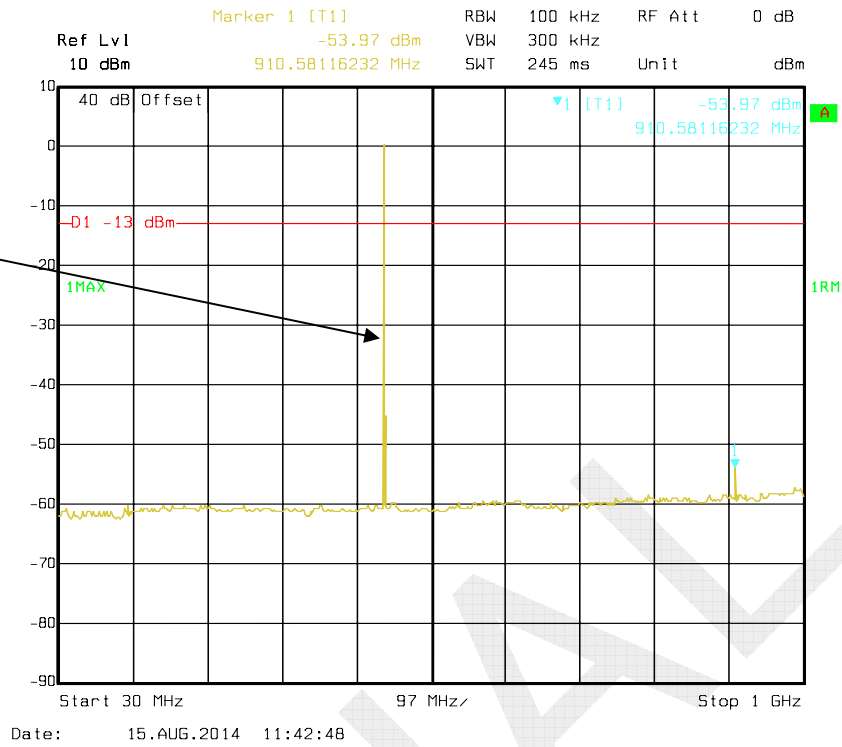
435 MHz – FM Mode



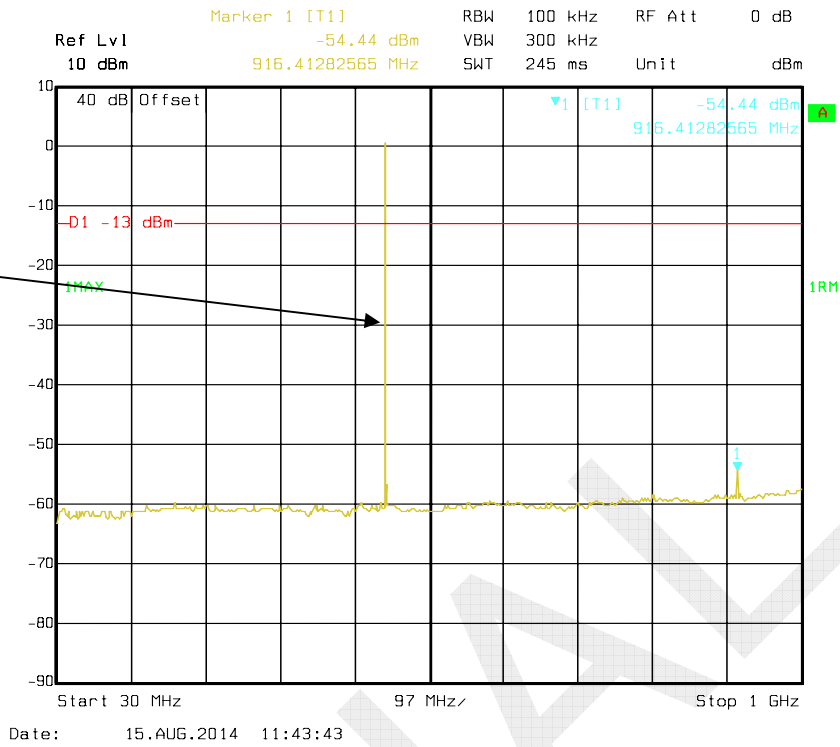
Fundamental test with Band Reject Filter



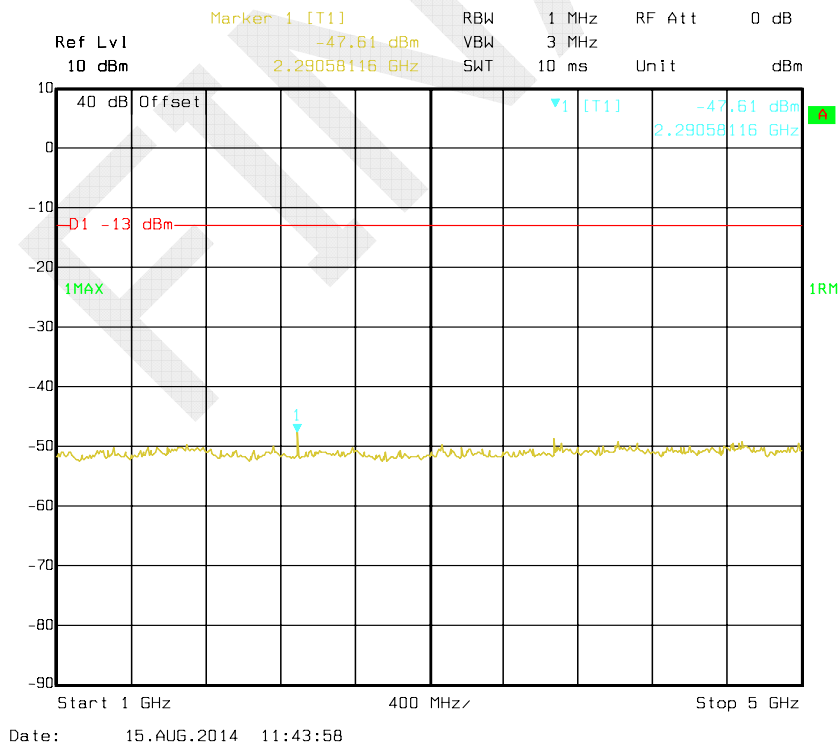
454.5 MHz – FM Mode



458 MHz – FM Mode

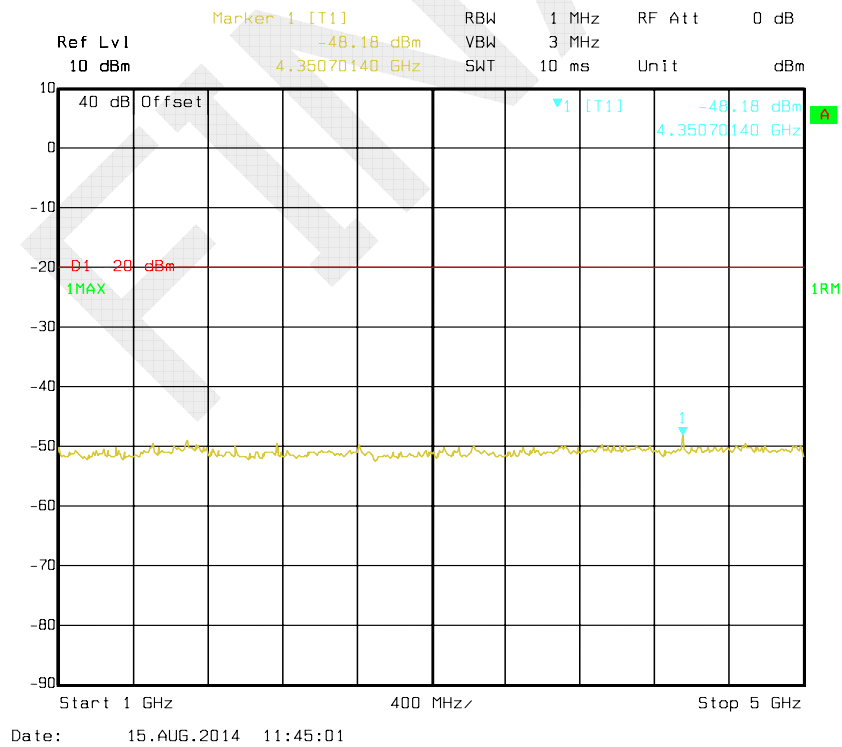
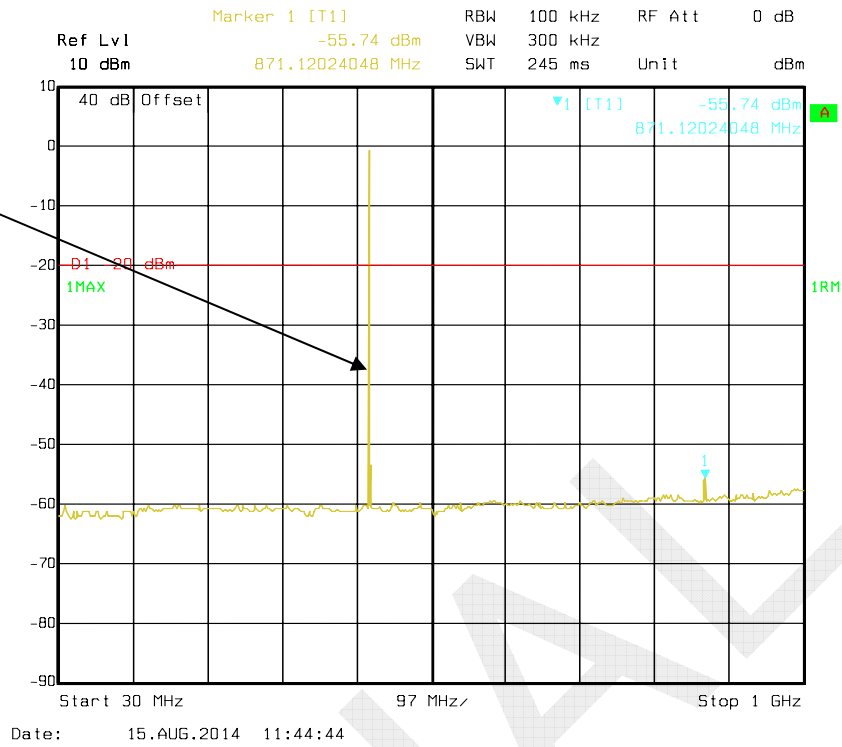


Fundamental test with Band Reject Filter

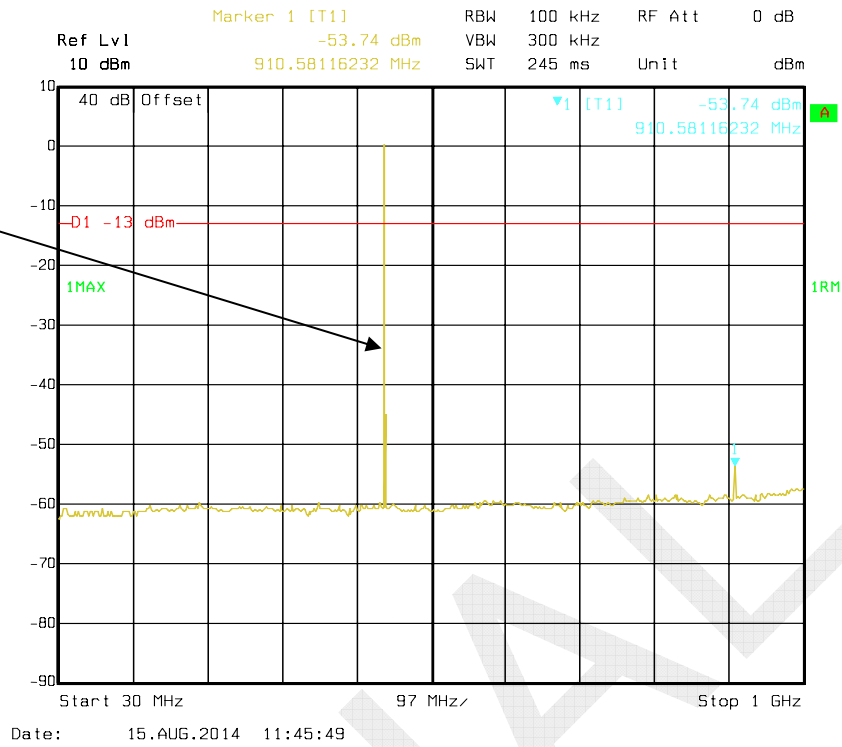


435 MHz – 4FSK Mode

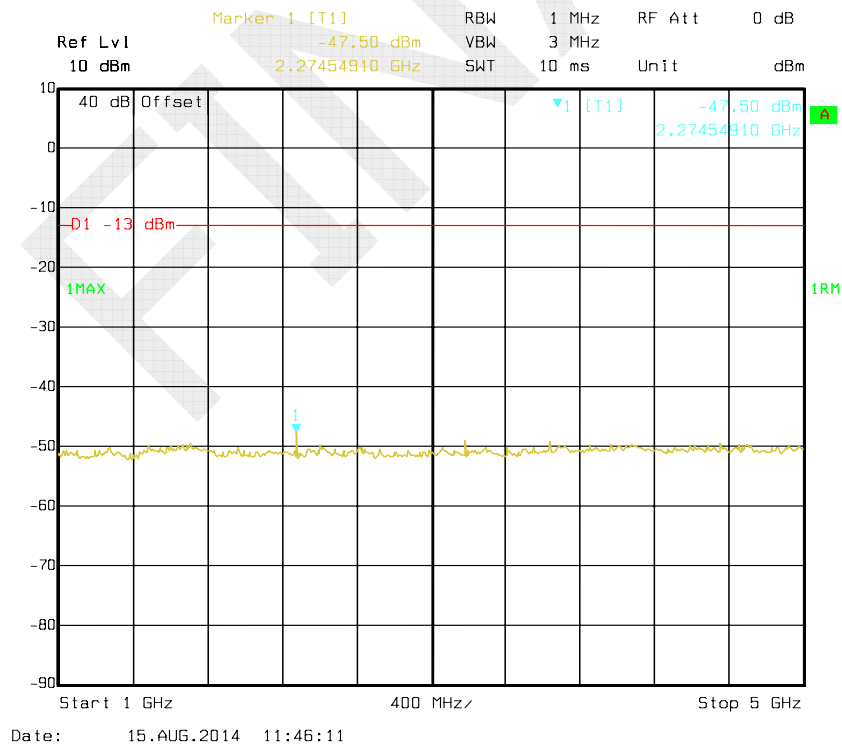
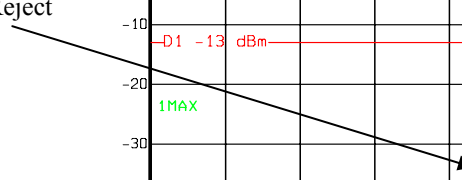
Fundamental test with Band Reject Filter



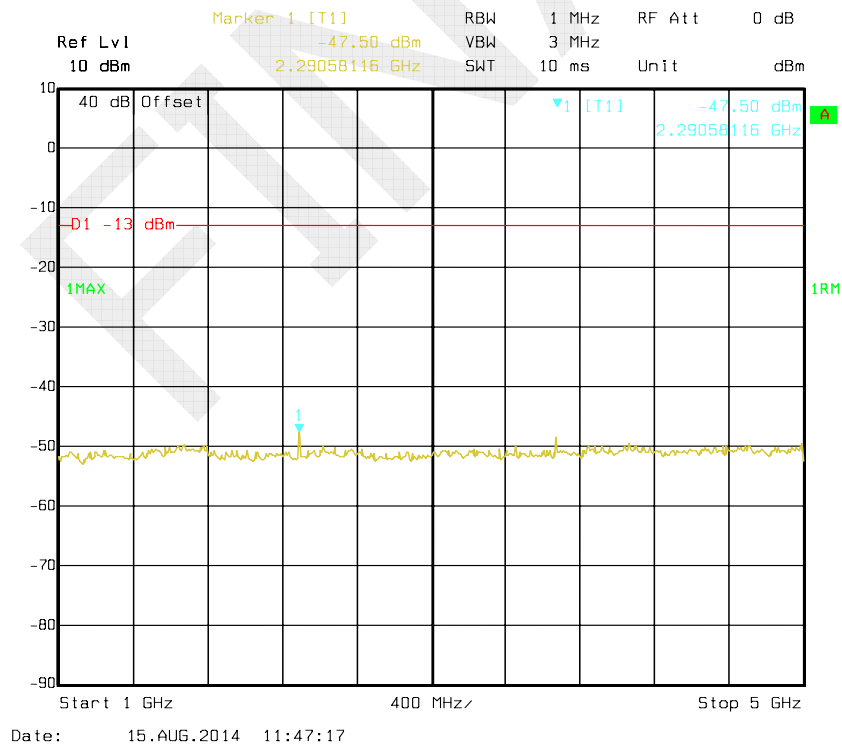
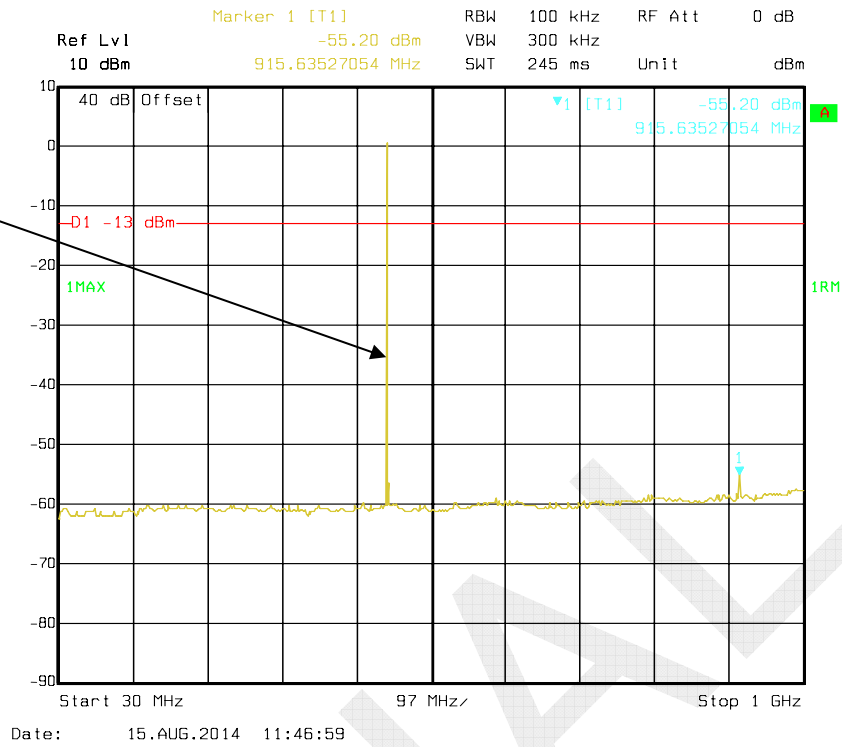
454.5 MHz – 4FSK Mode



Fundamental test with Band Reject Filter



458 MHz – 4FSK Mode



FCC §2.1053 & §22.861 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053, §22.861 and §90.210

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
HP	Signal Generator	8648A	3426A00831	2013-11-06	2014-11-06
Sunol Sciences	Antenna	JB3	A060611-1	2011-09-06	2014-09-05
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
HP	Amplifier	8447E	2434A02181	2013-09-06	2014-09-06
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Agilent	Signal Generator	E8247C	MY43321350	2012-10-15	2014-10-15
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19
TDK RF	Horn Antenna	HRN-0118	130 084	2012-09-06	2015-09-06
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09

* **Statement of Traceability:** Bay Area Compliance 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 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.

Test Data**Environmental Conditions**

Temperature:	26.8 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa

The testing was performed by Leon Chen on 2014-07-28.

Test Mode: Transmitting(FM modulation mode for worst case)

DC Power (DC13.6V)

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
f_c = 435.000MHz, for FCC part 90								
870.0000	H	41.78	-50.2	0.0	1	-51.2	-20.0	31.2
1305.0000	H	46.11	-53.7	8.3	1.1	-46.5	-20.0	26.5
1740.0000	H	44.12	-56.6	10.9	1.5	-47.2	-20.0	27.2
800.0250	H	46.96	-44.9	0.0	0.9	-45.8	-20.0	25.8
1200.0375	H	49.01	-51.7	7.3	1	-45.4	-20.0	25.4
1600.0500	H	47.04	-54.2	10.1	1.4	-45.5	-20.0	25.5
f_c = 454.500MHz, for FCC part 22								
909.0000	H	40.68	-50.5	0.0	1	-51.5	-13.0	38.5
1363.5000	H	46.25	-54.1	8.7	1.2	-46.6	-13.0	33.6
1818.0000	H	47.38	-52.6	11.2	1.4	-42.8	-13.0	29.8
870.0000	H	46.58	-45.4	0.0	1	-46.4	-13.0	33.4
1305.0000	H	47.43	-52.4	8.3	1.1	-45.2	-13.0	32.2
1740.0000	V	46.94	-54	10.9	1.5	-44.6	-13.0	31.6
f_c = 458.000MHz, for FCC part 22								
916.000	V	43.12	-44.1	0.0	1	-45.1	-13.0	32.1
1374.000	V	47.41	-52.9	8.8	1.2	-45.3	-13.0	32.3
1832.000	V	43.89	-56.1	11.3	1.4	-46.2	-13.0	33.2
916.000	V	48.48	-38.7	0.0	1	-39.7	-13.0	26.7
1374.000	V	49.74	-50.6	8.8	1.2	-43.0	-13.0	30.0
1832.000	V	47.90	-52.1	11.3	1.4	-42.2	-13.0	29.2

AC Power (AC 120V)

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
f_c = 435.000MHz, for FCC part 90								
870.0000	H	41.98	-50	0.0	1	-51.0	-20.0	31.0
1305.0000	H	46.74	-53.1	8.3	1.1	-45.9	-20.0	25.9
1740.0000	H	44.82	-55.9	10.9	1.5	-46.5	-20.0	26.5
800.0250	H	47.26	-44.6	0.0	0.9	-45.5	-20.0	25.5
1200.0375	H	49.88	-50.8	7.3	1	-44.5	-20.0	24.5
1600.0500	H	46.71	-54.5	10.1	1.4	-45.8	-20.0	25.8
f_c = 454.500MHz, for FCC part 22								
909.0000	H	40.73	-50.5	0.0	1	-51.5	-13.0	38.5
1363.5000	H	45.83	-54.5	8.7	1.2	-47.0	-13.0	34.0
1818.0000	H	46.65	-53.4	11.2	1.4	-43.6	-13.0	30.6
870.0000	H	45.59	-46.4	0.0	1	-47.4	-13.0	34.4
1305.0000	H	48.33	-51.5	8.3	1.1	-44.3	-13.0	31.3
1740.0000	V	47.07	-53.9	10.9	1.5	-44.5	-13.0	31.5
f_c = 458.000MHz, for FCC part 22								
916.000	V	42.64	-44.6	0.0	1	-45.6	-13.0	32.6
1374.000	V	48.17	-52.2	8.8	1.2	-44.6	-13.0	31.6
1832.000	V	43.18	-56.8	11.3	1.4	-46.9	-13.0	33.9
916.000	V	48.26	-39	0.0	1	-40.0	-13.0	27.0
1374.000	V	50.32	-50	8.8	1.2	-42.4	-13.0	29.4
1832.000	V	48.15	-51.8	11.3	1.4	-41.9	-13.0	28.9

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = SG Level - Cable loss + Antenna Gain
- 3) 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	FSEM	DE31388	2014-05-09	2015-05-09
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-3	2013-08-01	2014-08-01
Pro instrument	DC power supply	PPS3300	/	/	/
EXTECH INSTRUMENTS	AC power supply	380820	13180508	/	/

* **Statement of Traceability:** Bay Area Compliance 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

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

Frequency Stability vs. Voltage: An external variable AC/DC power supply was connected to the adaptor terminals of the equipment under test. For AC power supply, the voltage was set to 85% and 115% of the nominal value; For DC power supply, the voltage was set to the maximum and minimum input voltage allowed (according to the specification declared by manufacturer), the output frequency was recorded for each voltage.

Test Data**Environmental Conditions**

Temperature:	30.4 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa

The testing was performed by Leon Chen on 2014-07-31

Test Mode: Transmitting

Reference Frequency: 435 MHz				
Temperature	Voltage	Reading	Frequency Error	Limit
°C	V _{AC}	MHz	ppm	ppm
-30	120	435.000196	0.45	1.5
-20	120	435.000194	0.45	
-10	120	435.000194	0.45	
0	120	435.000193	0.44	
10	120	435.000205	0.47	
20	120	435.000192	0.44	
30	120	435.000184	0.42	
40	120	435.000188	0.43	
50	120	435.000190	0.44	
60	120	435.000194	0.45	
25	102	435.000193	0.44	
25	108	435.000191	0.44	

Reference Frequency: 435 MHz				
Temperature	Voltage	Reading	Frequency Error	Limit
°C	V _{DC}	MHz	ppm	ppm
-30	13.6	435.000277	0.64	1.5
-20	13.6	435.000285	0.66	
-10	13.6	435.000276	0.63	
0	13.6	435.000271	0.62	
10	13.6	435.000274	0.63	
20	13.6	435.000276	0.63	
30	13.6	435.000271	0.62	
40	13.6	435.000277	0.64	
50	13.6	435.000286	0.66	
60	13.6	435.000267	0.61	
25	10.8	435.000278	0.64	
25	15.6	435.000272	0.63	

Reference Frequency: 454.5 MHz				
Temperature	Voltage	Reading	Frequency Error	Limit
°C	V _{AC}	MHz	ppm	ppm
-30	120	454.500159	0.35	2.5
-20	120	454.500158	0.35	
-10	120	454.500147	0.32	
0	120	454.500156	0.34	
10	120	454.500153	0.34	
20	120	454.500157	0.35	
30	120	454.500161	0.35	
40	120	454.500159	0.35	
50	120	454.500166	0.37	
60	120	454.500163	0.36	
25	102	454.500165	0.36	
25	108	454.500163	0.36	

Reference Frequency: 454.5 MHz				
Temperature	Voltage	Reading	Frequency Error	Limit
°C	V _{DC}	MHz	ppm	ppm
-30	13.6	454.500192	0.42	2.5
-20	13.6	454.500189	0.42	
-10	13.6	454.500211	0.46	
0	13.6	454.500216	0.48	
10	13.6	454.500221	0.49	
20	13.6	454.500193	0.42	
30	13.6	454.500195	0.43	
40	13.6	454.500198	0.44	
50	13.6	454.500194	0.43	
60	13.6	454.500192	0.42	
25	10.8	454.500196	0.43	
25	15.6	454.500199	0.44	

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

Applicable Standard

Regulations: FCC §90.214

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

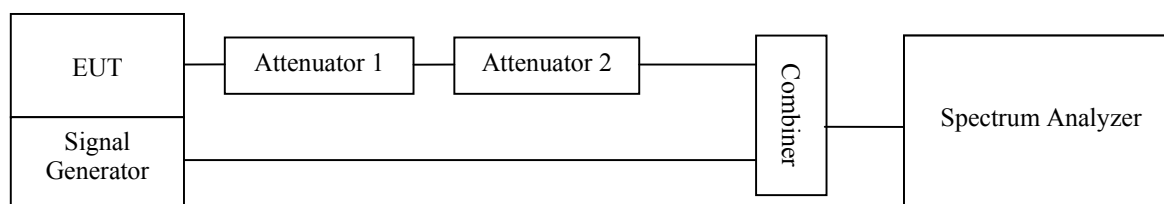
Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
R&S	Spectrum analyzer	FSEM	DE31388	2014-05-07	2015-05-07
HP	Signal Generator	8648A	3426A00831	2013-11-06	2014-11-06

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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 ± 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 ± 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 .
- 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

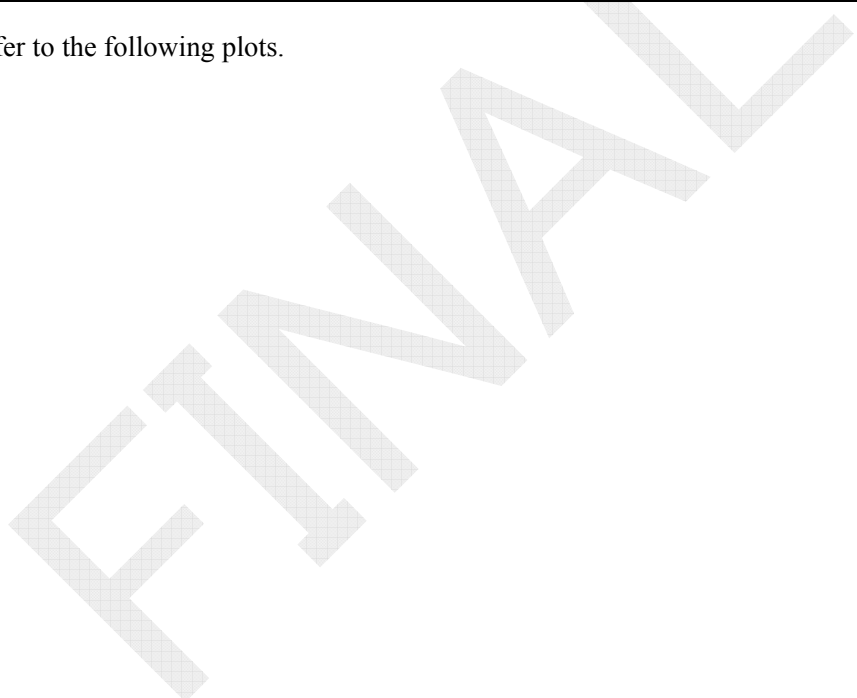
Environmental Conditions

Temperature:	30.4 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa

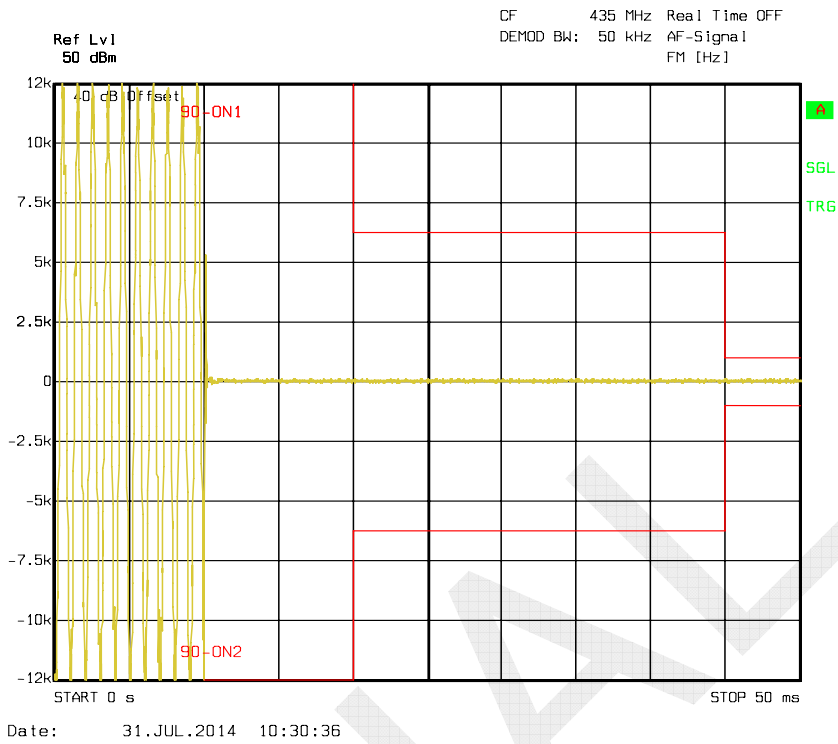
The testing was performed by Leon Chen on 2014-07-31

Channel Separation (kHz)	Period (ms)	Maximum frequency difference	Result
12.5	<10 (t1)	± 12.5 kHz	Pass
	<25 (t2)	± 6.25 kHz	
	<10 (t3)	± 12.5 kHz	

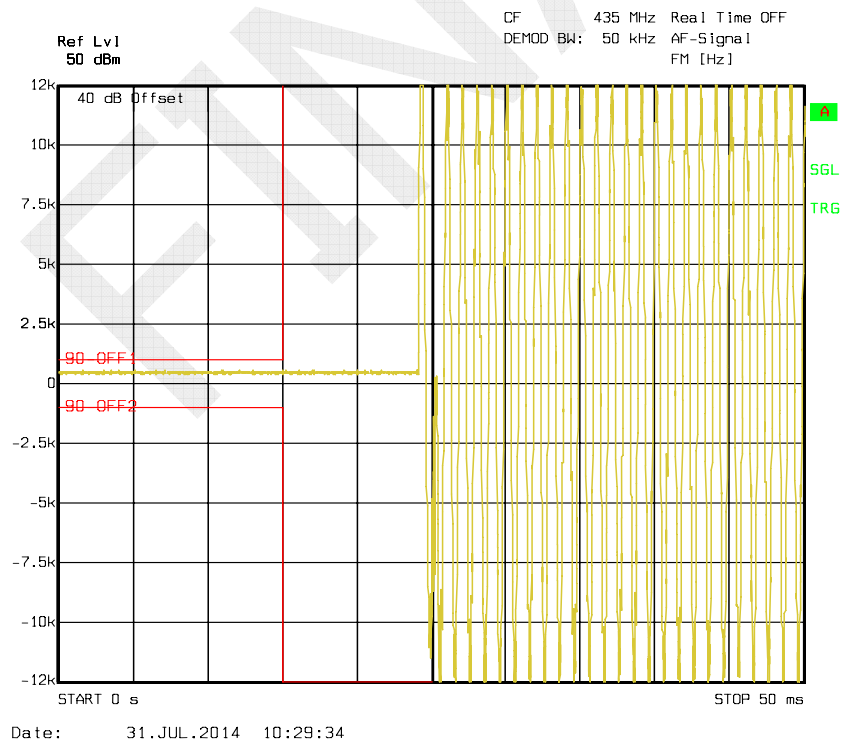
Please refer to the following plots.



435MHz, Turn On



435MHz, Turn Off



DECLARATION OF SIMILARITY



Kirisun Communications Co.,Ltd.

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Tel: 0755-86095979 0755-86096018

DECLARATION OF SIMILARITY

2014-04-10

Dear Sir or Madam:

We, Kirisun Communications Co.,Ltd., hereby declare that our product: DMR Repeater, model: TR850, TR850G are electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics as model: TR850G that was test by BACL, the results of which are featured in BACL project.

A description of the differences between the tested model and those that are declared similar areas follows:

Models: TR850, TR850G. The only difference is the model name.

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

Best Regards,

Signature: *Jessica . Wang*

Print Name: Jessica.Wang

Title: Product Manager

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