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FCC PART 90 TEST REPORT

APPLICANT	KENWOOD USA CORPORATION
	3970 JOHNS CREEK COURT, SUITE #100
	SUWANEE GA 30024 USA
FCC ID	ALH468800
MODEL NUMBER	TK-5410D-K2, TK-5410D-K3
PRODUCT DESCRIPTION	PORTABLE LMR RADIO
DATE SAMPLE RECEIVED	7/23/2013
DATE TESTED	8/9/2013
TESTED BY	NAM NGUYEN
APPROVED BY	NAM NGUYEN
TIMCO REPORT NO.	1264AUT13TestReport_rev1.docx
TEST RESULTS	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**



Certificate # 0955-01



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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.



Testing Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669



Authorized Signatory Name:

Nam Nguyen
Project Manager/Testing Technician

Date: 8/16/2013

GENERAL INFORMATION

DUT Specification

DUT Description	PORTABLE LMR RADIO
FCC ID	ALH468800
Model Number	TK-5410D-K2, TK-5410D-K3
Operating Frequency	769-775, 799-805, 806-824, and 851-869 MHz
No. of Channels	512 channels per Zone (100 Zone Max)
Type of Emission	16K0F3E, 14K0F3E, 11K0F3E 8K10F1E, 8K10F1D, 8K10F1W
Modulation	FM
DUT Power Source	<input type="checkbox"/> 110-120Vac/50- 60Hz
	<input type="checkbox"/> DC Power 12V
	<input checked="" type="checkbox"/> Battery Operated Exclusively
Test Item	<input type="checkbox"/> Prototype
	<input checked="" type="checkbox"/> Pre-Production
	<input type="checkbox"/> Production
Type of Equipment	<input type="checkbox"/> Fixed
	<input type="checkbox"/> Mobile
	<input checked="" type="checkbox"/> Portable
Test Conditions	The temperature was 26°C with a relative humidity of 50%.
Modification to the DUT	None
Test Exercise	The DUT was placed in continuous transmit mode.
Applicable Standards	ANSI/TIA 603-C:2004, FCC CFR 47 Part 90
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.

*1264AUT13TestReport_rev1: adding NPSPAC mutual aid channels.

EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	10/28/11	10/28/13
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	10/28/11	10/28/13
EMI Receiver	Rohde & Schwarz	ESIB40	100274	3/16/12	3/16/14
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	06/13/12	06/13/14
Antenna: Biconnical	Eaton	94455-1	1096	05/10/13	05/10/15
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	05/09/13	05/09/15
Frequency Counter	HP	5352B	2632A00165	06/26/13	06/26/15
Signal Generator	HP	8640B	2308A21464	02/23/12	02/23/14
Hygro-Thermometer	Extech	445703	0602	06/20/13	06/20/15
Digital Multimeter	Fluke	77	35053830	09/09/11	09/09/13
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	10/28/11	10/28/13
Antenna: Passive Loop	EMC Test Systems	EMCO 6512	9706-1211	06/14/12	06/14/14
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	10/28/11	10/28/13
Temperature Chamber	Tenney Engineering	TTRC	11717-7	07/03/12	07/03/14
Frequency Counter	HP	5385A	3242A07460	06/16/13	06/16/15
3/10-Meter OATS	TEI	N/A	N/A	12/31/11	12/31/13
3-Meter OATS	TEI	N/A	N/A	12/31/11	12/31/13
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/11	12/31/13

Applicant: KENWOOD USA CORPORATION

FCC ID: ALH468800

Report: K\KENWOOD_ALH\1264AUT13\1264AUT13TestReport_rev1.docx

TEST PROCEDURE

Power Line Conducted Interference: The procedure used was ANSI/TIA 603-C: 2004, using a 50uH LISN. Both lines were observed with the DUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

Bandwidth 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Power Output: The RF power output was measured at the antenna feed point using a peak power meter.

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

Radiation Interference: The test procedure used was ANSI/TIA 603-C: 2004, using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum ANSI/TIA 603-C: 2004, receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

RF POWER OUTPUT

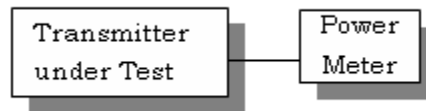
Rule Part No.: Part 2.1046(a), Part 90

Test Requirements:

Method of Measurement: RF power is measured by using a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage (if battery operated), or a properly adjusted power supply (if not battery operated), and the transmitter properly adjusted the RF output measures:

For the device with a fixed or integral antenna, the RF power is measured as ERP. The substitution method was used. The RF output measures:

Test Setup Diagram:



Test Data:

Tuned Frequency (MHz)	RF POWER (W)	
	HI	LOW
769.05	2.5	0.9
772.05	2.6	0.9
774.95	2.6	0.9
799.05	2.6	1.0
802.05	2.5	1.0
804.95	2.5	1.0
851.05	2.9	1.1
860.05	2.9	1.1
868.95	2.9	1.0
806.05	2.7	1.0
815.05	2.8	1.0
823.95	2.8	1.0

Part 2.1033 (C)(8) DC Input into the final amplifier

FOR LOW POWER SETTING INPUT POWER: (7.5V)(1.3A) = 9.75 Watts
 FOR HIGH POWER SETTING INPUT POWER: (7.5V)(1.9A) = 14.25Watts

MODULATION CHARACTERISTICS

Part 2.1033(c)

Part 2.1033(c) (4) Type of Emission: 11K2F1D , 11K2F2D, and 11K2F3E

FCC Part 90.209

FCC Part 90.207

DMR TDMA

Type of Emission: 11K2F3E

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 2100$$

$$K=1$$

$$B_n = 2(3000)+2(2100) = 10.2k$$

Type of Emission: 16K0F3E

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 4700$$

$$K=1$$

$$B_n = 2(3000)+2(4700) = 15.4k$$

And

APCO 25 modulation phase 1 and phase 2 as defined in ANSI/ TIA-102.BABA.

The transmitter meets the requirements.

MODULATION CHARACTERISTICS

Rule Part No.: Part 2.1047(a)(b)

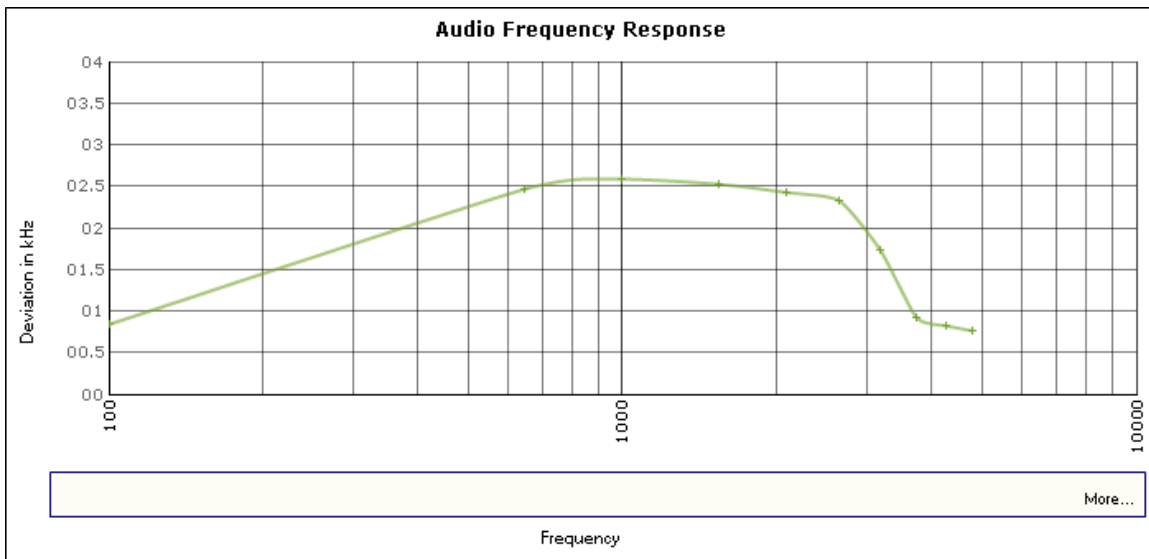
Test Requirements:

Method of Measurement:

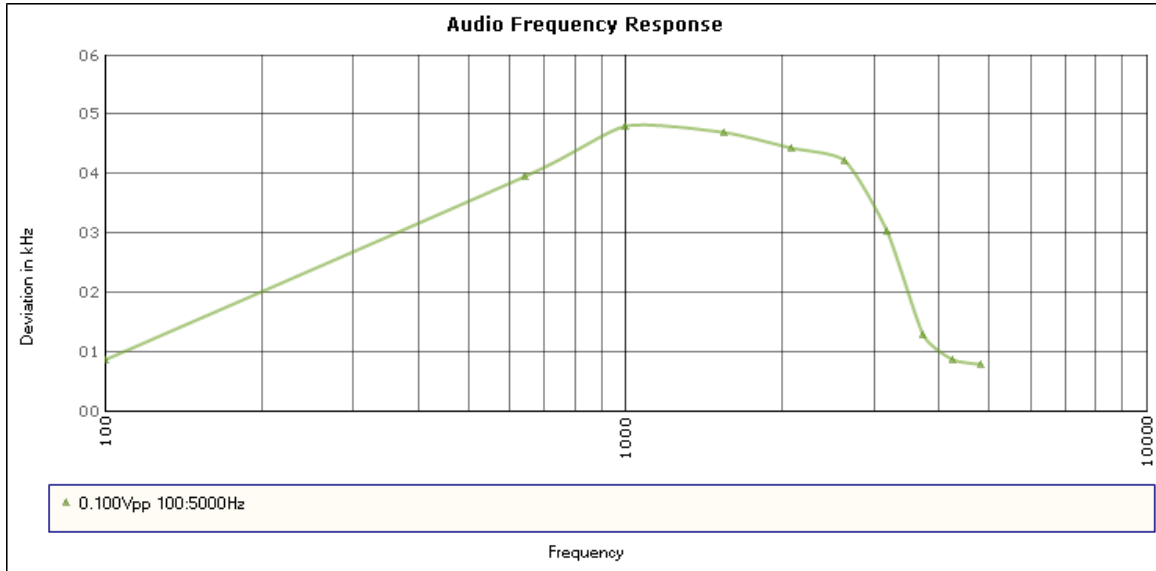
Audio frequency response

The audio frequency response was measured in accordance with ANSI/TIA 603-C: 2004. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted. The audio frequency response curve is shown below.

AUDIO FREQUENCY RESPONSE PLOT – 12.5 kHz



AUDIO FREQUENCY RESPONSE PLOT – 25 kHz



Applicant: KENWOOD USA CORPORATION

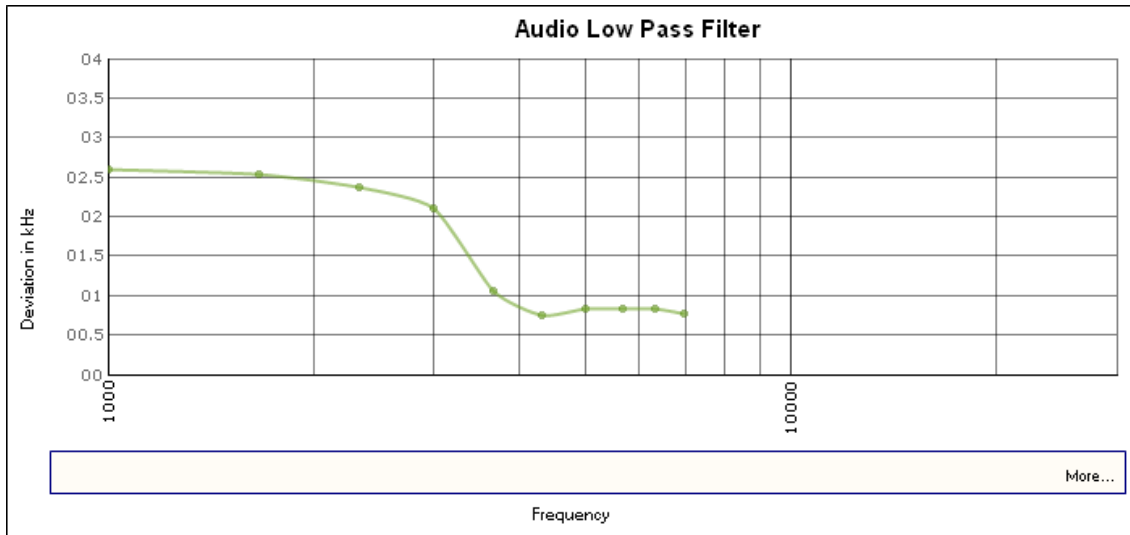
FCC ID: ALH468800

Report: K\KENWOOD_ALH\1264AUT13\1264AUT13TestReport_rev1.docx

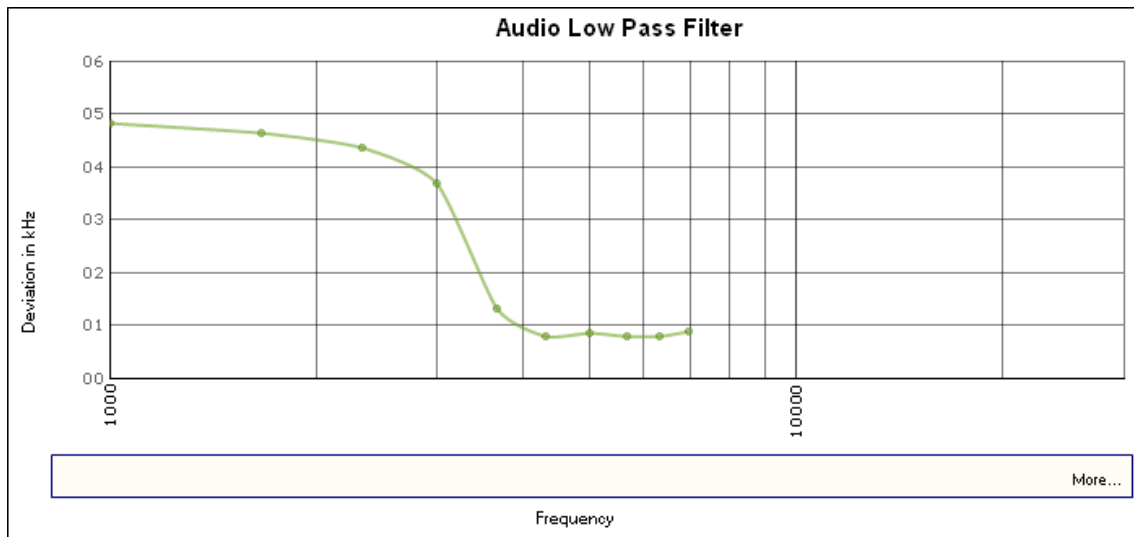
VOICE MODULATED COMMUNICATION EQUIPMENT

Part 2.1047(a): For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all the circuitry installed between the modulation limiter and the modulated stage shall be submitted.

AUDIO LOW PASS FILTER 12.5 kHz



AUDIO LOW PASS FILTER 25 kHz



AUDIO INPUT VERSUS MODULATION

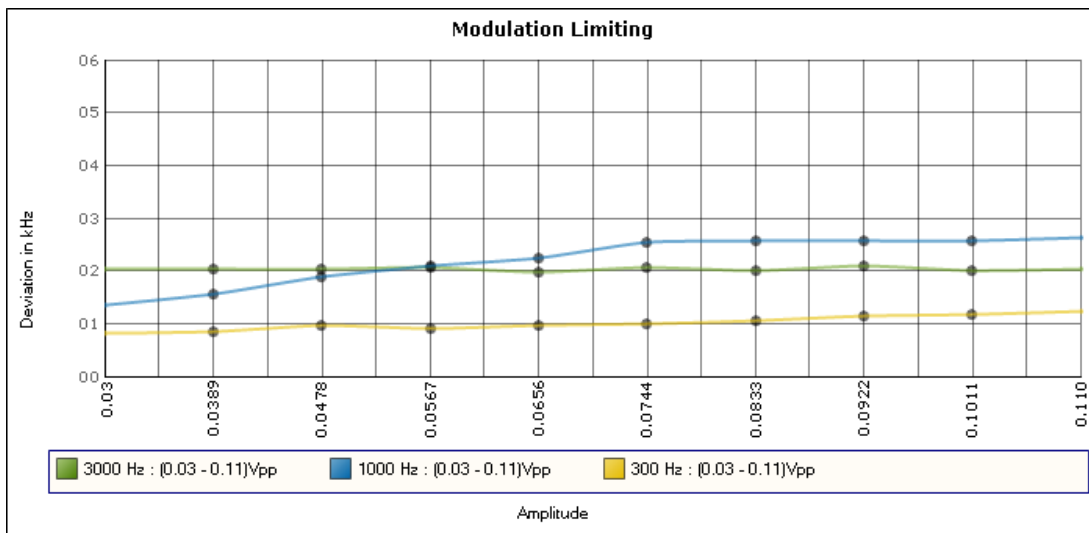
Rule Part No.: Part 2.1047(b) & 90

Test Requirements:

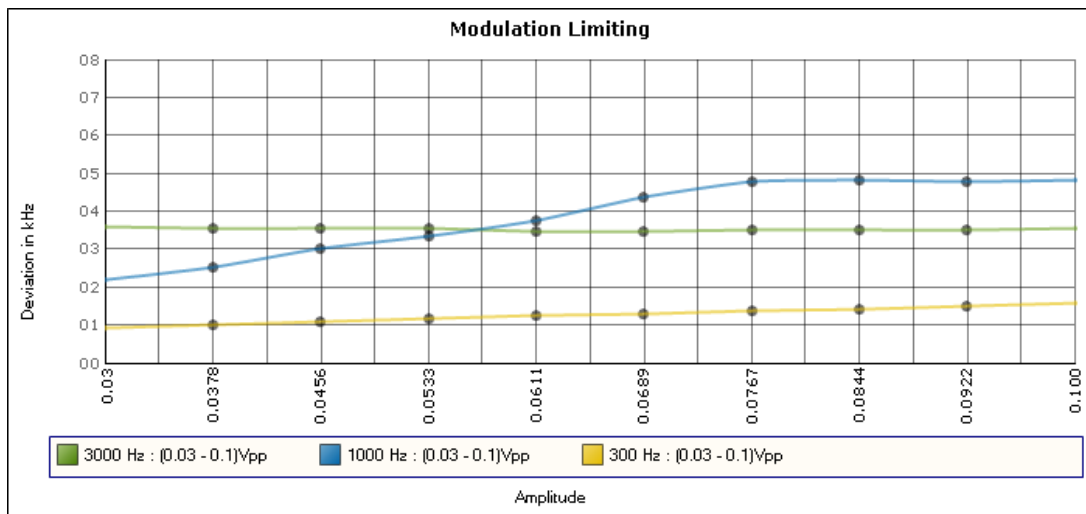
Method of Measurement: Modulation cannot exceed 100%, The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

Test data:

MODULATION LIMITING PLOT 12.5 kHz



MODULATION LIMITING PLOT 25 kHz



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OCCUPIED BANDWIDTH

Part 2.1049(c) EMISSION BANDWIDTH:
Part 90.210(b) 25 kHz Channel Spacing

Data in the plots show that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35 dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least $43 + 10\log(P)$ dB.

Part 90.210(c) 25 kHz Channel Spacing Not Equipped with a Low Pass Filter

For transmitters that are not equipped with an audio low pass filter pursuant to S90.211 (b), the power of any emission must be attenuated below the un-modulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz but not more than 10 kHz: At least $83 \log(f_d/5)$ dB; (2) ON any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250% of the authorized bandwidth: At least $29 \log(f_d^2/11)$ dB or 50 dB, whichever is the lesser attenuation; (3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: At least $43+10 \log(P_o)$ dB.

Part 90.210(d) Emission Mask D - 12.5 kHz channel BW 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 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.

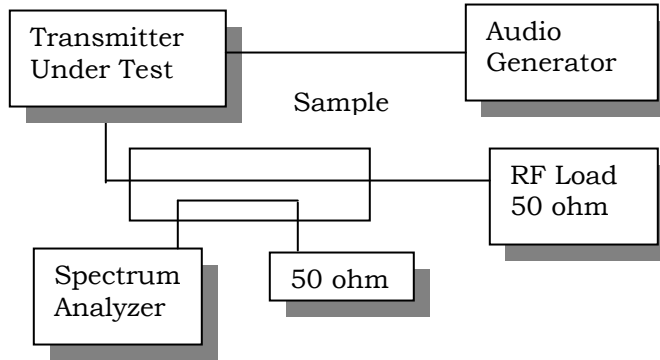
Part 90.210(e) Emission Mask E - 6.25 kHz channel BW equipment.

For transmitters designed to operate with a 6.25 kHz bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth f_0 to 3.0 kHz removed from f_0 : Zero dB.
- (2) On any frequency from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least $30 + 16.67(f_d - 3.0 \text{ kHz})$ or $55 + 10 \log(P)$ or 65, whichever us the lesser attenuation.
- (3) On any frequency removed from the center of the authorized bandwidth by more than 4.6kHz: At least $55 + 10\log(P)$ dB or 65 dB, whichever is the lesser attenuation.

Method of Measurement: ANSI/TIA 603-C: 2004

Test Setup Diagram:



Test Data: See the plots below

OCCUPIED BANDWIDTH PLOTS

Part 90.210(d) Emission Mask D - 12.5 kHz channel

Part 90.210(b) Emission Mask B - 25 kHz channel

769 - 775 MHz BAND

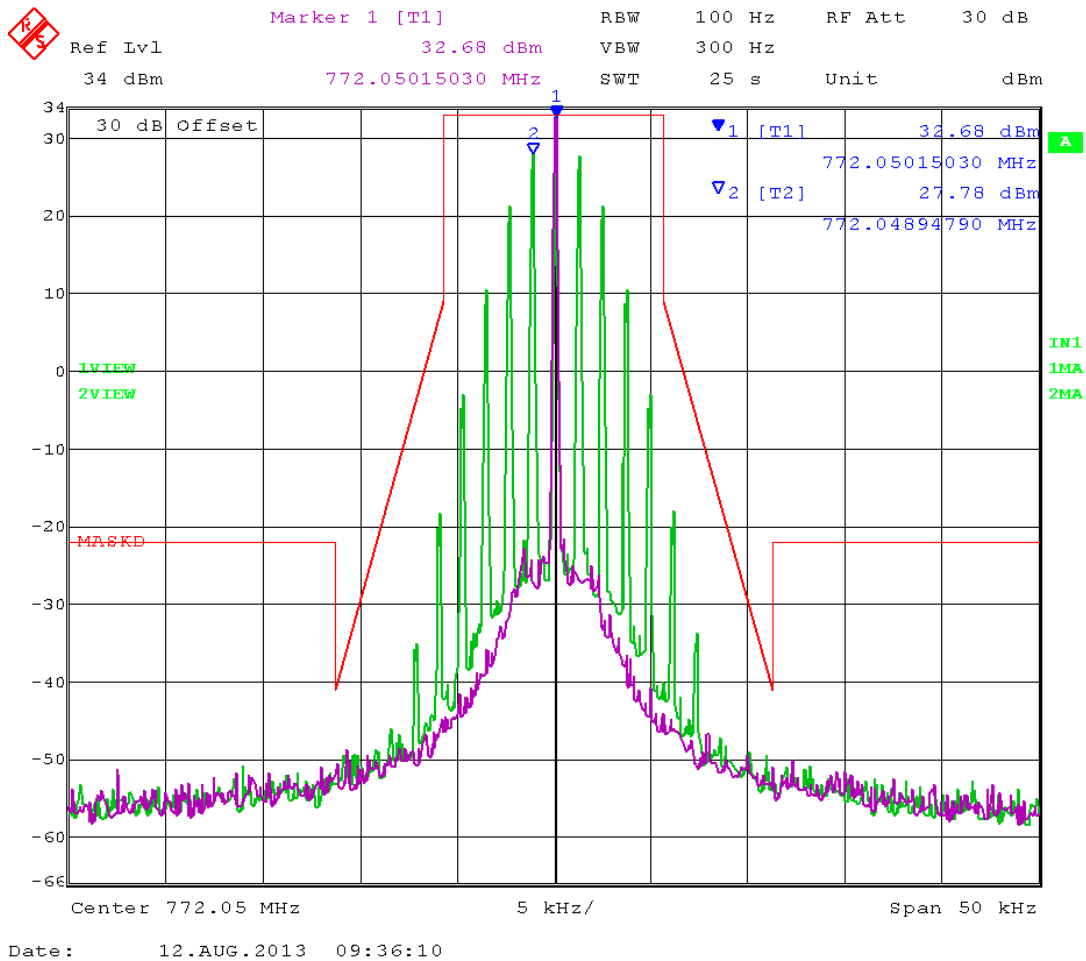


Figure 1: Occupied bandwidth 772.05MHz - 12.5 kHz ANALOG

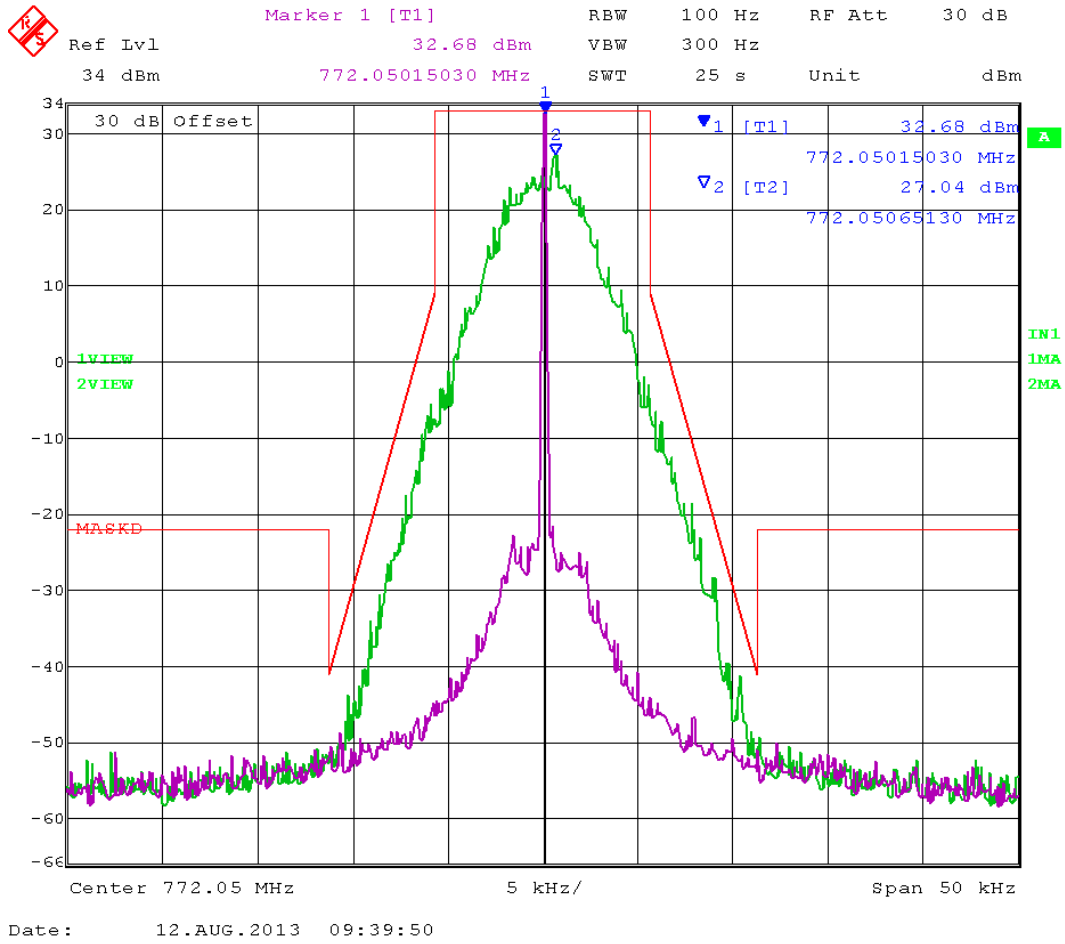
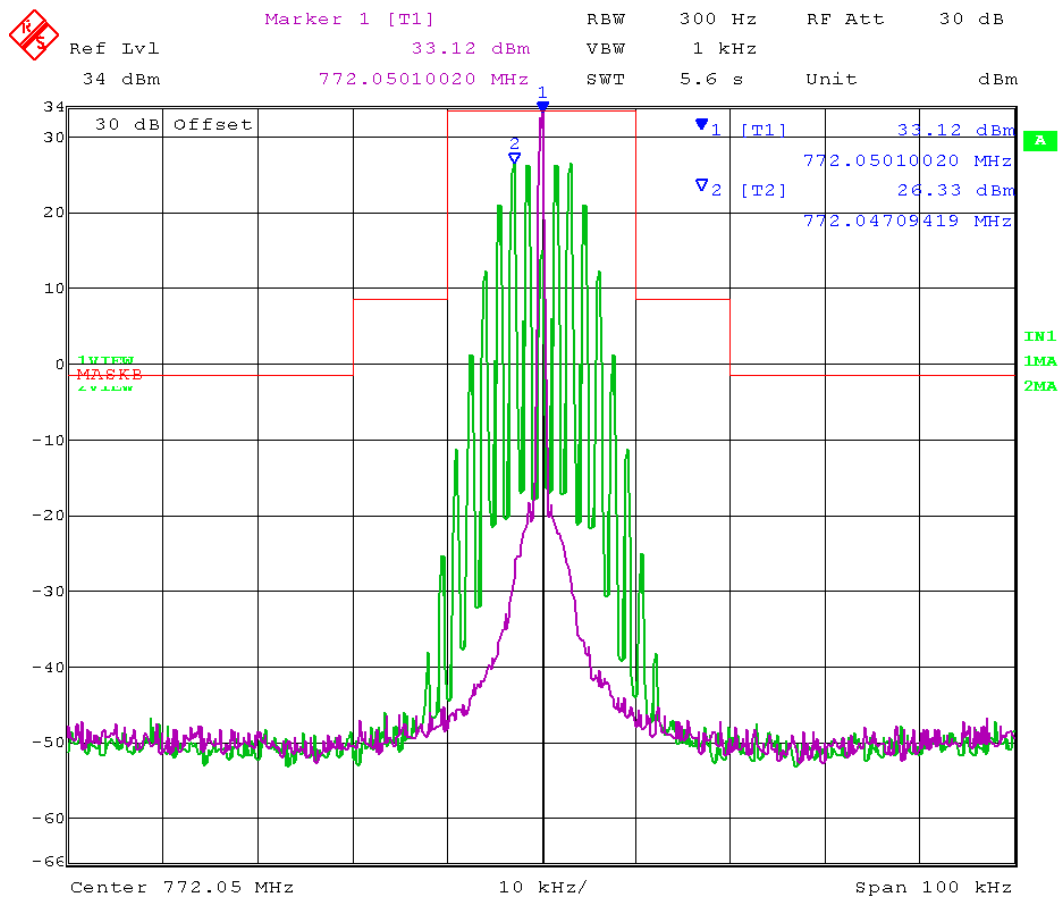


Figure 2: Occupied bandwidth 772.05MHz - 12.5 kHz DIGITAL



Date: 12.AUG.2013 12:59:23

Figure 3: Occupied bandwidth 772.05MHz - 25 kHz ANALOG

799 – 805 MHz BAND

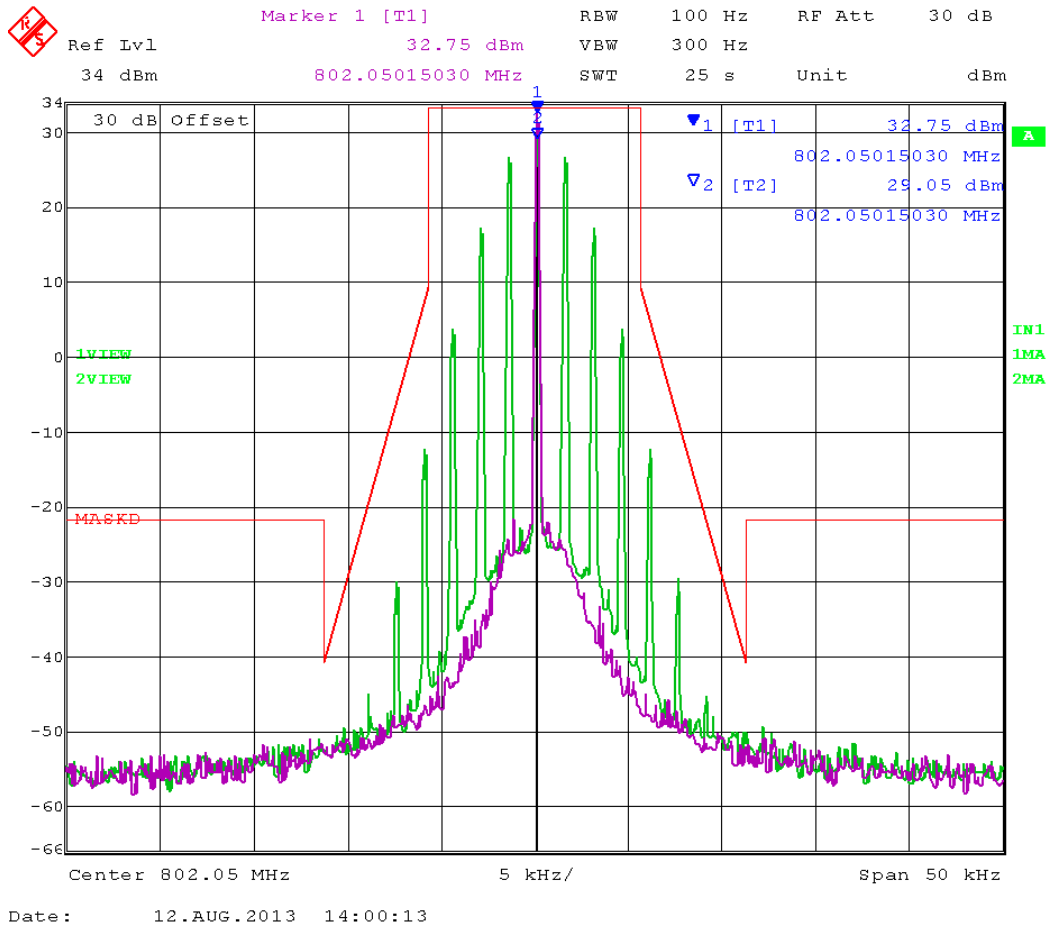
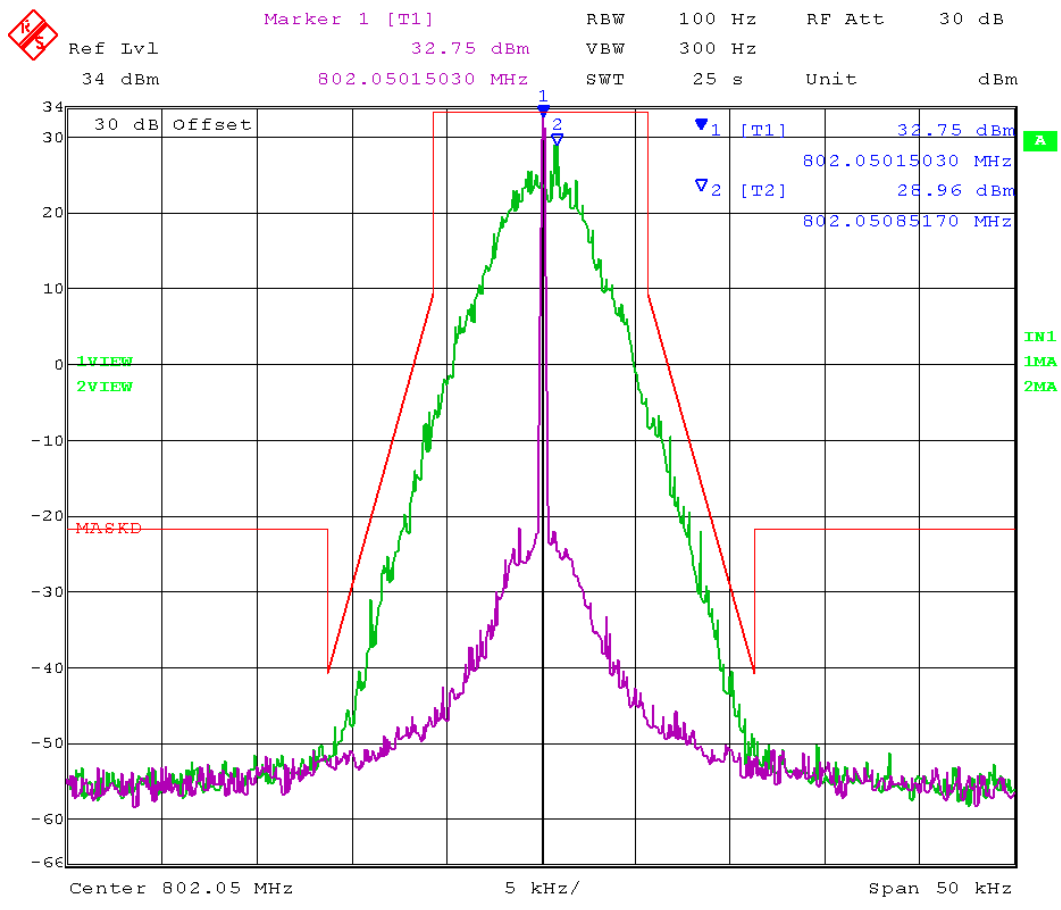
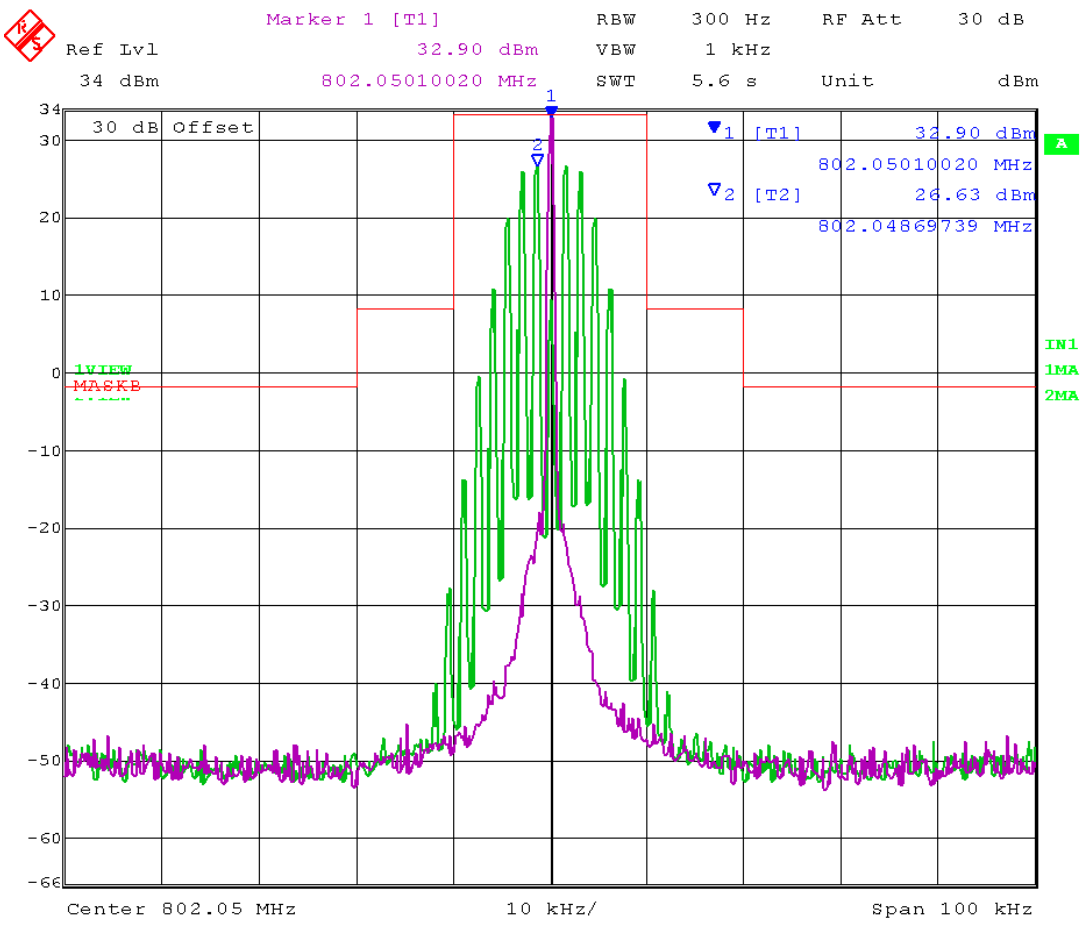


Figure 4: Occupied bandwidth 802.05MHz – 12.5 kHz ANALOG



Date: 12.AUG.2013 14:04:32

Figure 5: Occupied bandwidth 802.05MHz – 12.5 kHz DIGITAL



Date: 12.AUG.2013 13:14:55

Figure 6: Occupied bandwidth 802.05MHz – 25 kHz ANALOG

806 – 824 MHz BAND

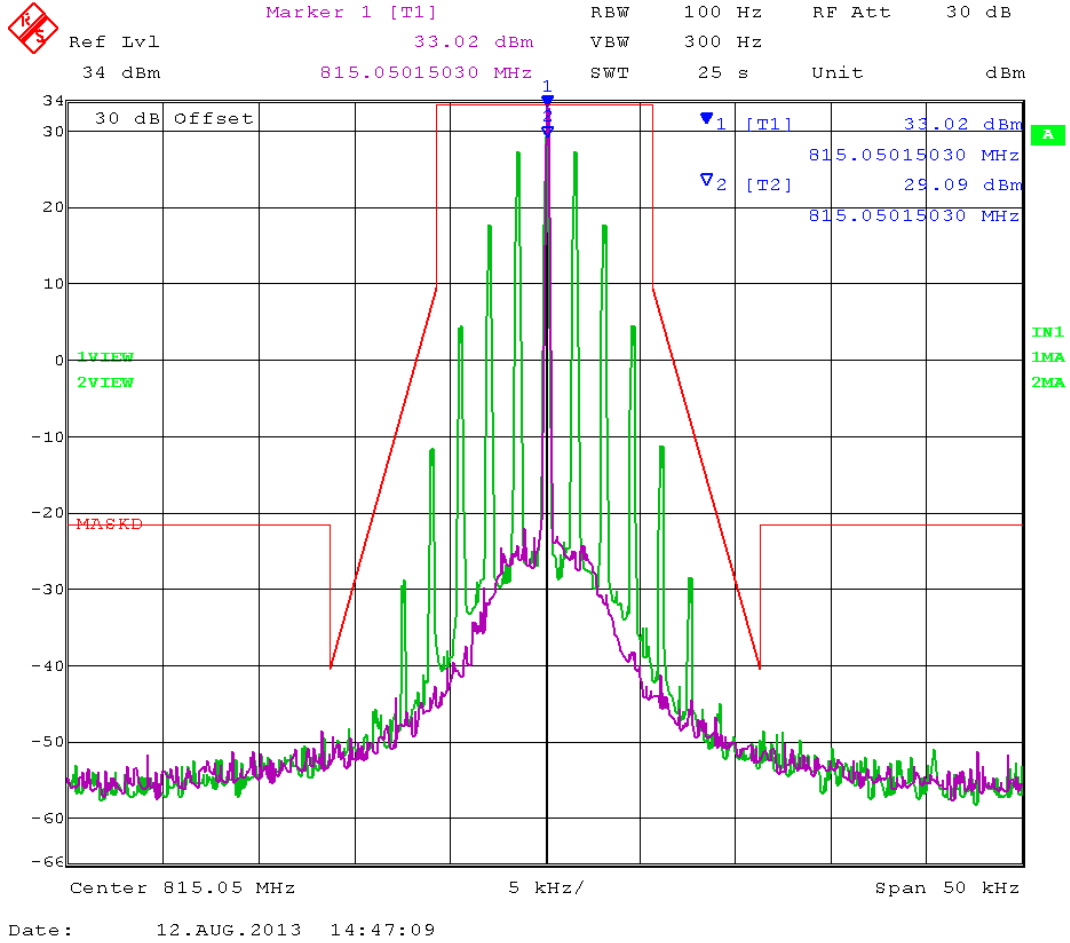
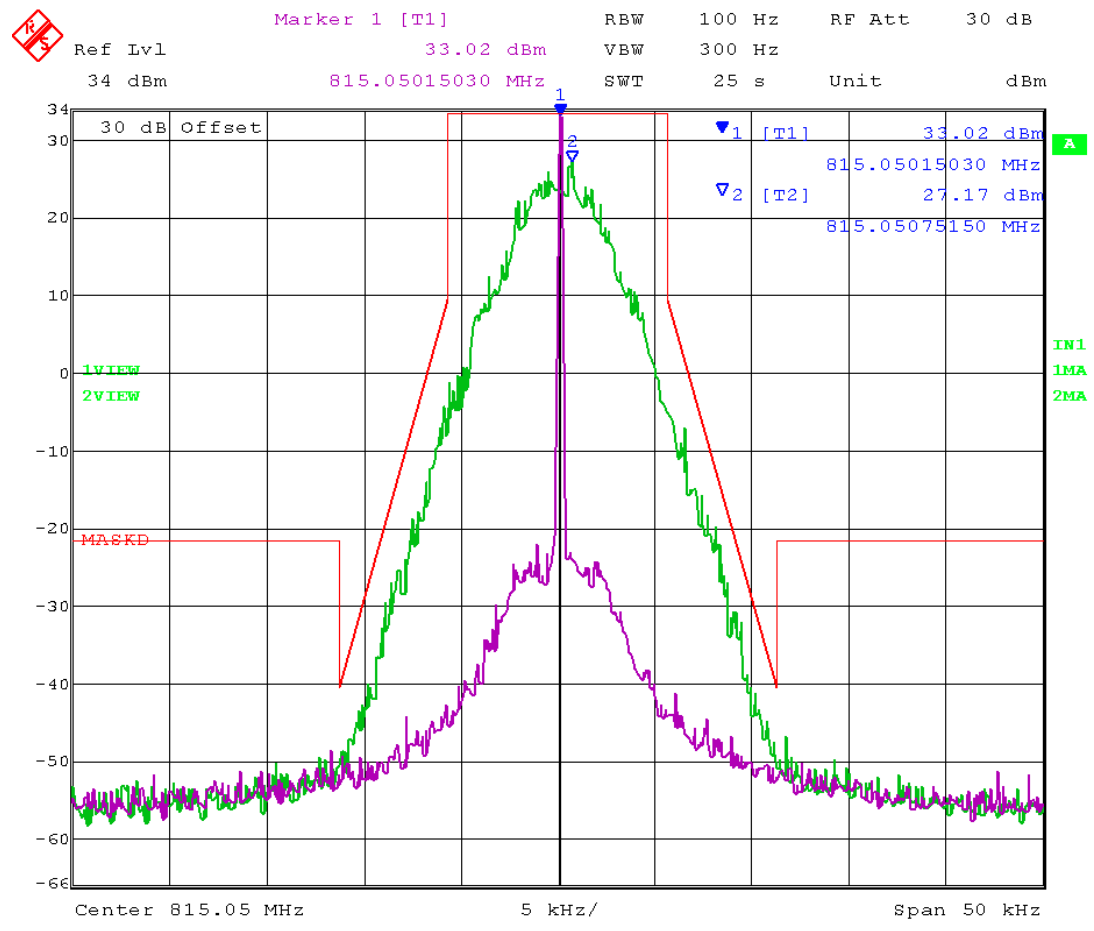


Figure 7: Occupied bandwidth 815.05MHz – 12.5 kHz ANALOG



Date: 12.AUG.2013 14:51:05

Figure 8: Occupied bandwidth 815.05MHz – 12.5 kHz DIGITAL

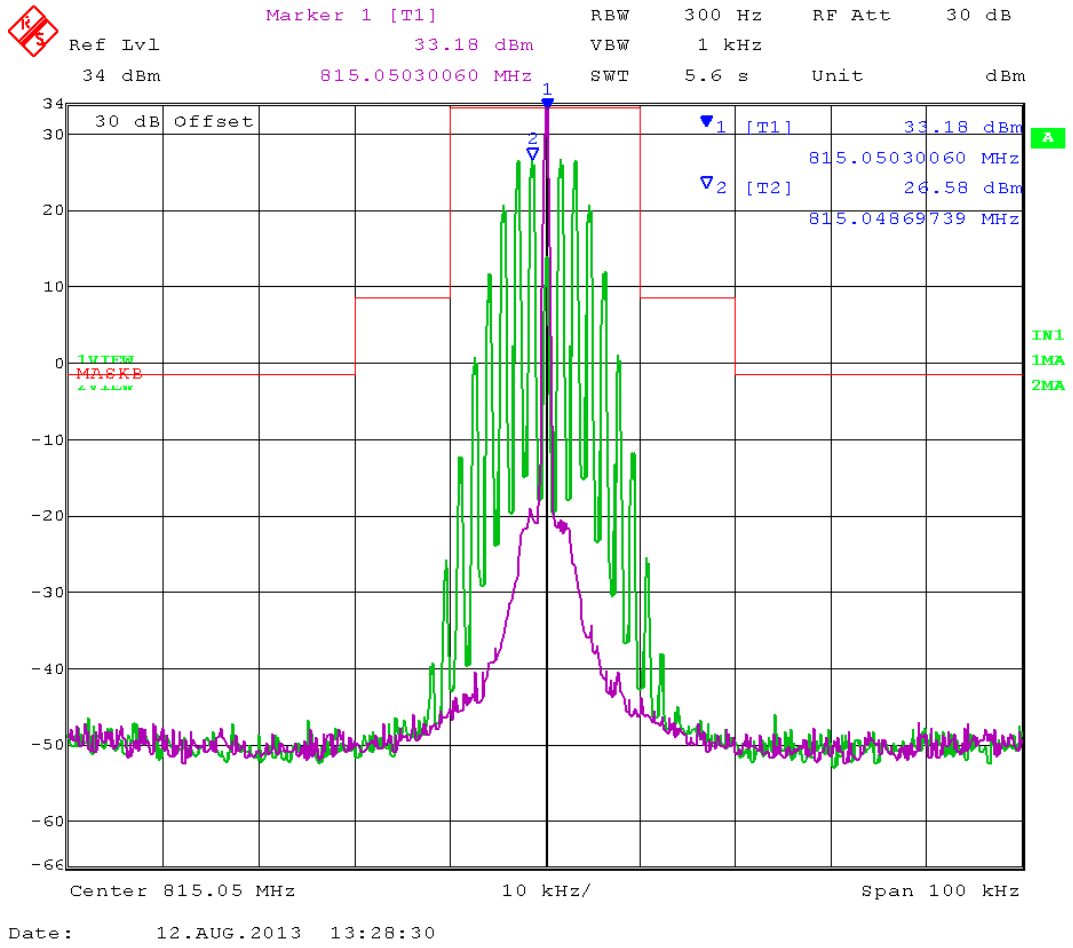


Figure 9: Occupied bandwidth 815.05MHz – 25 kHz ANALOG

851 – 869 MHz BAND

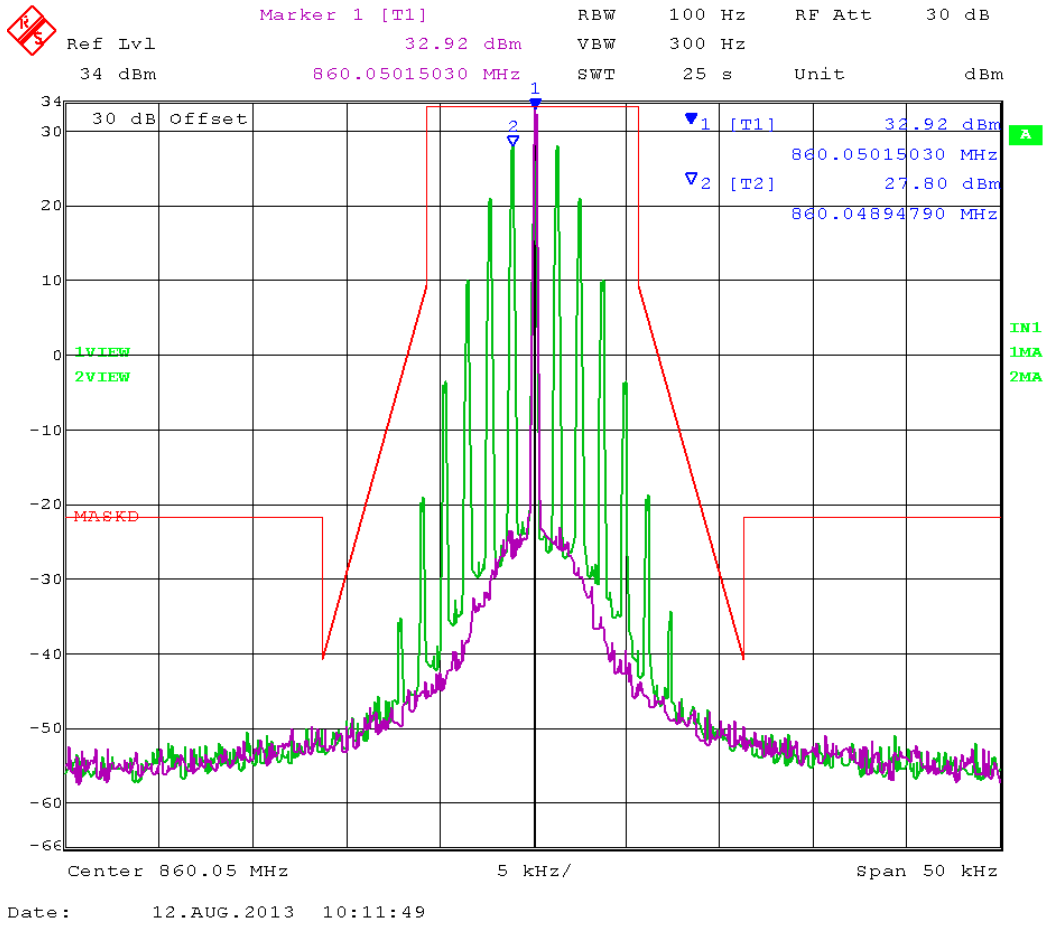


Figure 10: Occupied bandwidth 860.05MHz – 12.5 kHz ANALOG

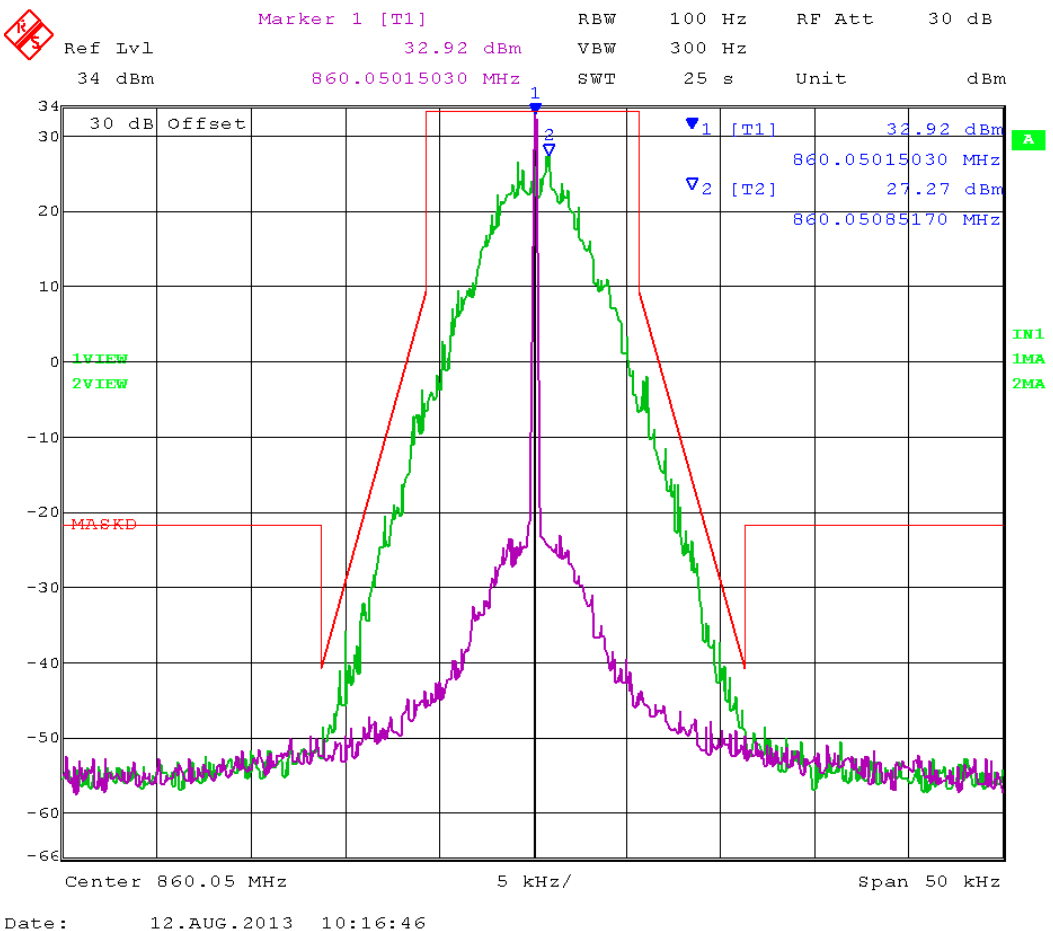
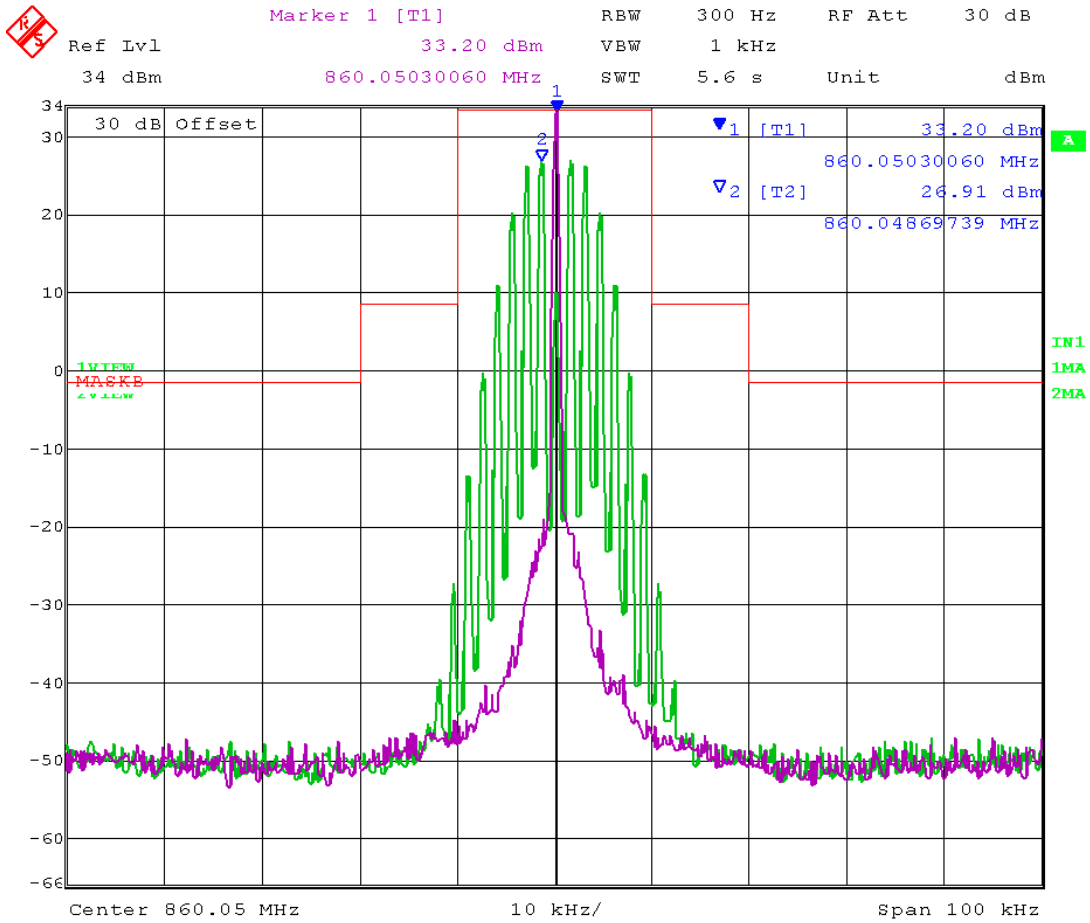


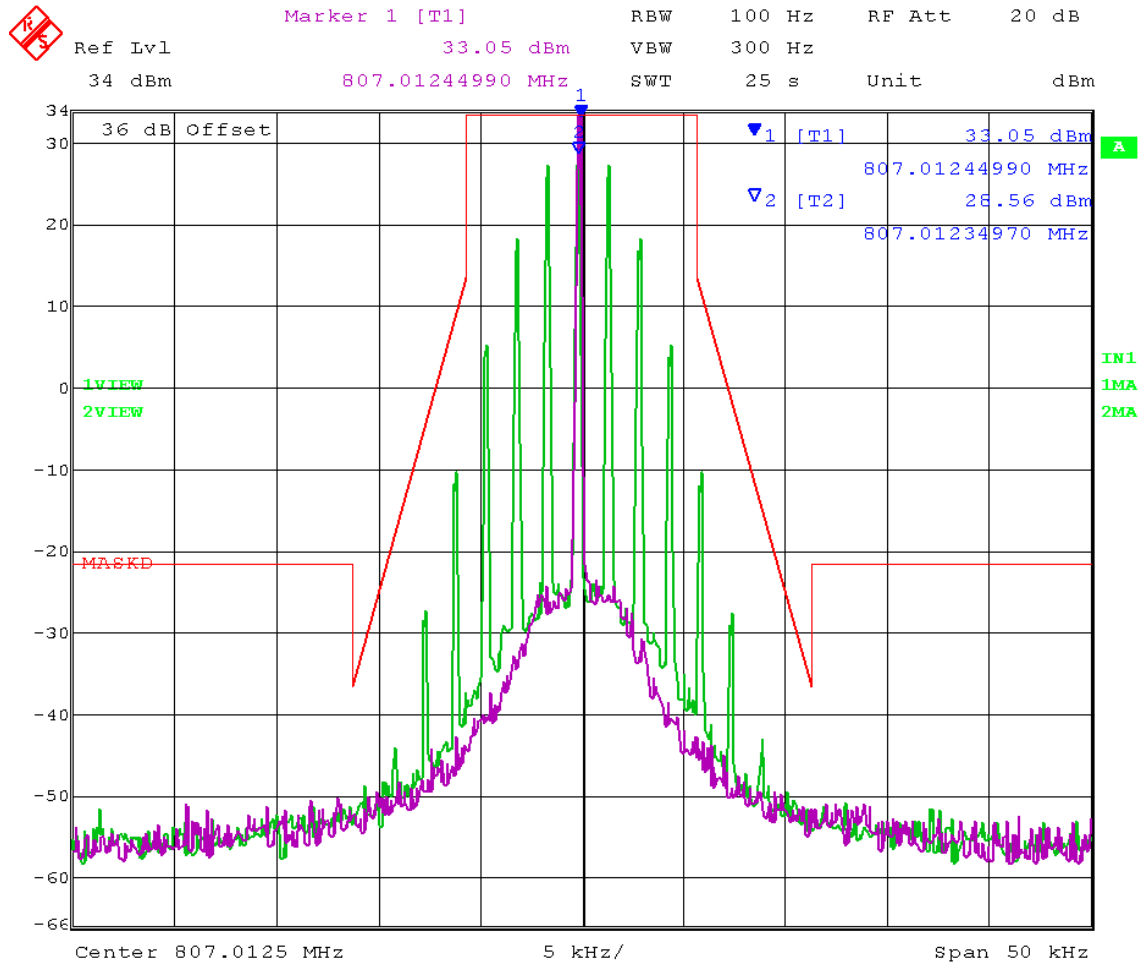
Figure 11: Occupied bandwidth 860.05MHz – 12.5 kHz DIGITAL



Date: 12.AUG.2013 11:15:06

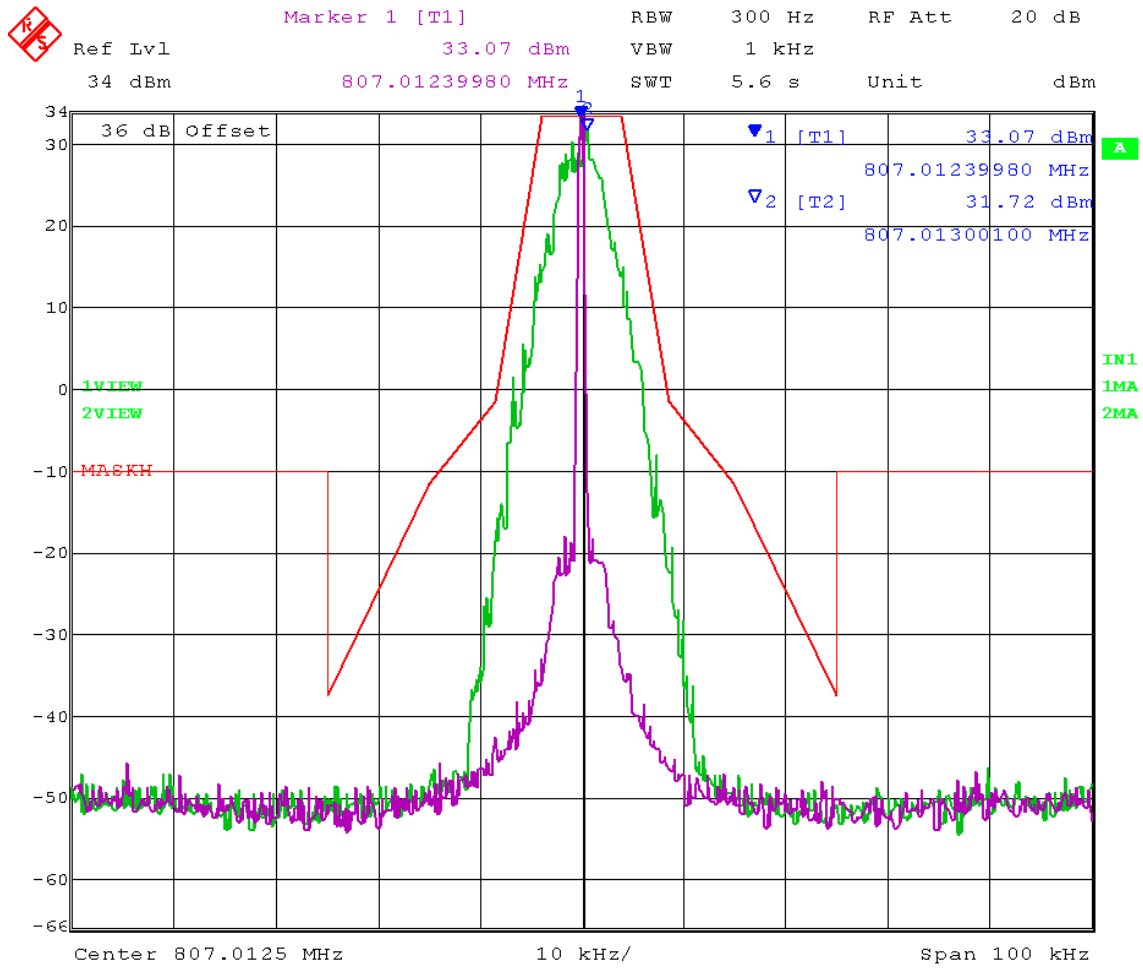
Figure 12: Occupied bandwidth 860.05MHz – 25 kHz ANALOG

OCCUPIED BANDWIDTH PLOTS (NPSPAC mutual aid channels)
Part 90.210(d) Emission Mask D - 12.5 kHz channel
Part 90.210(h) Emission Mask H



Date: 2.OCT.2013 11:21:36

Figure 13: Occupied bandwidth 807.0125MHz – 12.5 kHz ANALOG



Date: 2.OCT.2013 13:29:10

Figure 14: Occupied bandwidth 807.0125MHz – DIGITAL

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a)

Requirements:

12.5kHz Channel Spacing = $50+10\log(3.0) = 54.8\text{dBc}$
 12.5kHz Channel Spacing = $50+10\log(1.0) = 50.0\text{dBc}$

Method of Measurement: The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard ANSI/TIA 603-C: 2004.

Test Data: 769-775 MHz

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
769.05	1538.10	88.3		769.05	1538.10	90.3
	2307.15	70.4			2307.15	75.7
	3076.20	84.6			3076.20	91.5
	3845.25	78.7			3845.25	78.5
	4614.30	92.5			4614.30	91.6
	5383.35	88.6			5383.35	94.8
	6152.40	81.9			6152.40	94.6
	6921.45	95.3			6921.45	95.3
	7690.50	96.4			7690.50	92.5

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
774.95	1549.90	84.4		774.95	1549.90	85.6
	2324.85	71.3			2324.85	75.5
	3099.80	95.3			3099.80	92.8
	3874.75	82.6			3874.75	85.5
	4649.70	95.2			4649.70	92.2
	5424.65	98.5			5424.65	96.2
	6199.60	98.0			6199.60	93.0
	6974.55	97.4			6974.55	93.7
	7749.50	98.4			7749.50	94.2

Test Data: 799-805 MHz

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
799.05	1598.10	84.3		799.05	1598.10	86.0
	2397.15	70.2			2397.15	73.0
	3196.20	97.5			3196.20	94.2
	3995.25	84.4			3995.25	86.0
	4794.30	98.0			4794.30	94.7
	5593.35	99.7			5593.35	96.0
	6392.40	96.4			6392.40	94.9
	7191.45	92.1			7191.45	91.9
	7990.50	99.2			7990.50	93.8

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
804.95	1609.90	87.6		804.95	1609.90	87.2
	2414.85	71.0			2414.85	73.6
	3219.80	97.0			3219.80	93.8
	4024.75	84.7			4024.75	86.5
	4829.70	96.7			4829.70	93.4
	5634.65	100.2			5634.65	96.1
	6439.60	97.0			6439.60	94.7
	7244.55	89.4			7244.55	88.9
	8049.50	97.3			8049.50	94.5

Test Data: 806-824 MHz

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
806.05	1612.10	86.9		806.05	1612.10	86.7
	2418.15	70.7			2418.15	73.6
	3224.20	96.9			3224.20	93.3
	4030.25	84.8			4030.25	88.1
	4836.30	98.2			4836.30	94.7
	5642.35	99.9			5642.35	96.7
	6448.40	99.2			6448.40	93.8
	7254.45	88.7			7254.45	87.3
	8060.50	98.3			8060.50	93.7

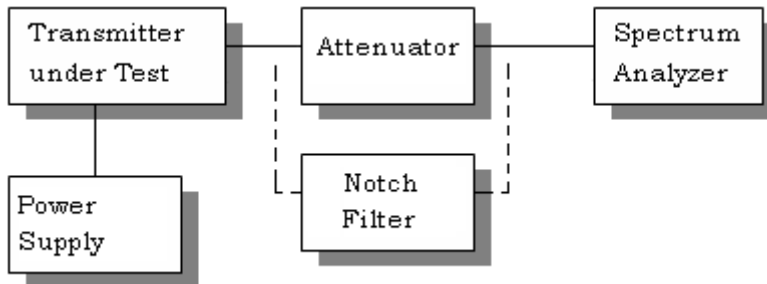
TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
823.95	1647.90	85.9		823.95	1647.90	88.0
	2471.85	65.3			2471.85	67.6
	3295.80	96.1			3295.80	95.7
	4119.75	82.5			4119.75	87.2
	4943.70	99.2			4943.70	94.7
	5767.65	93.9			5767.65	91.1
	6591.60	92.0			6591.60	92.2
	7415.55	86.0			7415.55	86.8
	8239.50	97.9			8239.50	93.3

Test Data: 851-869 MHz

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
851.05	1702.10	87.1		851.05	1702.10	87.6
	2553.15	65.4			2553.15	69.7
	3404.20	92.2			3404.20	94.7
	4255.25	85.2			4255.25	90.3
	5106.30	95.8			5106.30	94.9
	5957.35	90.7			5957.35	88.7
	6808.40	95.2			6808.40	94.1
	7659.45	94.8			7659.45	91.8
	8510.50	97.3			8510.50	93.2

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
868.95	1737.90	84.0		868.95	1737.90	87.3
	2606.85	64.8			2606.85	69.0
	3475.80	90.1			3475.80	94.2
	4344.75	83.5			4344.75	79.6
	5213.70	100.3			5213.70	96.4
	6082.65	90.0			6082.65	93.8
	6951.60	98.9			6951.60	94.5
	7820.55	96.8			7820.55	93.5
	8689.50	98.2			8689.50	93.0

Method of Measuring Conducted Spurious Emissions



FIELD STRENGTH OF SPURIOUS EMISSIONS

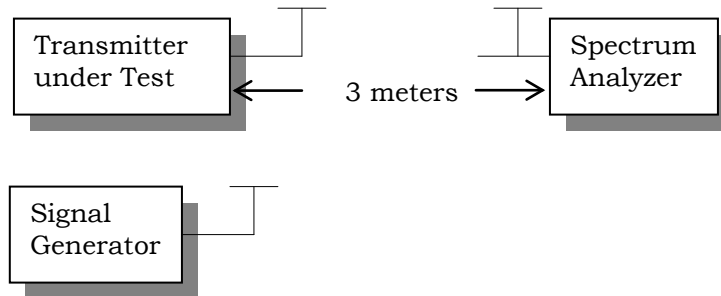
Rule Parts. No.: Part 2.1053

Requirements:

12.5kHz Channel Spacing = $50+10\log(3.0) = 54.8\text{dBc}$
 12.5kHz Channel Spacing = $50+10\log(1.0) = 50.0\text{dBc}$

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-C: 2004 using the substitution method. Measurements were made at the test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

Test Setup Diagram:



Test Data: 769 – 775 MHz

High Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
769.05	0	0
1538.10	H	86.8
2307.15	H	92.1
3076.20	H	85.6
3845.25	H	81.3
4614.30	H	87.6
5383.35	H	86.6
6152.40	H	82.6
6921.45	H	83.4
7690.50	H	94.6

Low Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
769.05	0	0
1538.10	H	83.7
2307.15	V	86.7
3076.20	H	83.0
3845.25	H	83.1
4614.30	H	82.0
5383.35	H	82.7
6152.40	H	77.9
6921.45	H	80.9
7690.50	H	89.8

High Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
774.95	0	0
1549.90	H	87.2
2324.85	H	93.0
3099.80	H	86.5
3874.75	H	83.0
4649.70	H	87.0
5424.65	H	87.5
6199.60	H	82.3
6974.55	H	85.7
7749.50	H	95.3

Low Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
774.95	0	0
1549.90	H	81.7
2324.85	H	87.7
3099.80	H	82.9
3874.75	H	84.4
4649.70	H	83.7
5424.65	H	82.9
6199.60	H	78.1
6974.55	H	81.4
7749.50	H	91.5

Test Data: 799 – 805 MHz

High Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
799.05	0	0
1598.10	H	89.4
2397.15	H	89.4
3196.20	H	83.6
3995.25	H	81.9
4794.30	H	83.0
5593.35	H	79.9
6392.40	H	83.2
7191.45	H	80.0
7990.50	H	84.5

Low Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
799.05	0	0
1598.10	H	85.8
2397.15	H	85.0
3196.20	H	80.0
3995.25	H	80.7
4794.30	H	77.6
5593.35	H	77.4
6392.40	H	78.1
7191.45	H	78.3
7990.50	H	80.8

High Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
804.95	0	0
1609.90	H	88.7
2414.85	H	90.5
3219.80	H	84.7
4024.75	H	82.9
4829.70	H	81.8
5634.65	V	79.8
6439.60	H	83.0
7244.55	H	78.4
8049.50	H	85.1

Low Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
804.95	0	0
1609.90	H	85.3
2414.85	V	83.0
3219.80	H	79.2
4024.75	H	82.4
4829.70	H	79.0
5634.65	H	76.9
6439.60	H	79.9
7244.55	H	77.4
8049.50	H	80.1

Test Data: 806 – 824 MHz

High Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
806.05	0	0
1612.10	H	87.4
2418.15	H	88.0
3224.20	H	84.9
4030.25	H	82.8
4836.30	H	82.4
5642.35	V	80.2
6448.40	H	83.8
7254.45	H	79.0
8060.50	H	84.6

Low Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
806.05	0	0
1612.10	H	86.0
2418.15	V	81.7
3224.20	H	79.2
4030.25	V	80.8
4836.30	H	79.6
5642.35	H	77.3
6448.40	H	78.2
7254.45	H	77.1
8060.50	H	79.7

High Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
823.95	0	0
1647.90	H	80.3
2471.85	H	82.0
3295.80	H	80.6
4119.75	H	80.2
4943.70	H	83.0
5767.65	V	72.7
6591.60	H	83.1
7415.55	H	74.5
8239.50	H	83.1

Low Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
823.95	0	0
1647.90	H	78.5
2471.85	H	77.8
3295.80	H	81.3
4119.75	H	78.0
4943.70	H	76.7
5767.65	H	70.6
6591.60	H	79.1
7415.55	H	73.9
8239.50	H	78.4

Test Data: 851 –869 MHz

High Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
851.05	0	0
1702.10	H	83.5
2553.15	V	76.3
3404.20	H	81.1
4255.25	V	79.5
5106.30	H	78.4
5957.35	H	69.4
6808.40	H	79.2
7659.45	H	77.0
8510.50	H	81.2

Low Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
851.05	0	0
1702.10	H	80.3
2553.15	V	74.5
3404.20	H	78.2
4255.25	H	76.0
5106.30	H	74.5
5957.35	H	70.1
6808.40	H	75.2
7659.45	V	77.8
8510.50	H	76.4

High Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
868.95	0	0
1737.90	H	79.4
2606.85	V	73.8
3475.80	H	78.0
4344.75	H	76.8
5213.70	H	74.4
6082.65	H	67.4
6951.60	H	79.1
7820.55	H	74.6
8689.50	H	78.4

Low Power

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
868.95	0	0
1737.90	H	76.2
2606.85	V	75.1
3475.80	H	76.2
4344.75	H	75.1
5213.70	H	73.2
6082.65	V	68.8
6951.60	H	74.7
7820.55	H	74.2
8689.50	H	73.1

FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 90.213

Requirements: Temperature range requirements: -30 to +50° C.
Voltage Variation +, -15%
±2.5 PPM

Method of Measurements: ANSI/TIA 603-C: 2004.

Test Data: 769-805 MHz Band

Assigned Frequency (Ref. Frequency) (MHz)		772.049842
Temperature (°C)	Frequency (MHz)	Frequency Stability (PPM)
-30	772.049725	-0.15
-20	772.049771	-0.09
-10	772.049958	0.15
0	772.049931	0.12
+10	772.049937	0.12
+20	772.049906	0.08
+30	772.049801	-0.05
+40	772.049830	-0.02
+50	772.049877	0.05

Assigned Frequency (Ref. Frequency) (MHz)		
Battery %	Frequency (MHz)	Frequency Stability (PPM)
-15%	772.049848	0.01
0	772.049842	0.00
+15%	772.049832	-0.01

Test Data: 806-869 MHz Band

Assigned Frequency (Ref. Frequency) (MHz)		860.049867
Temperature (°C)	Frequency (MHz)	Frequency Stability (PPM)
-30	860.049737	-0.15
-20	860.049791	-0.09
-10	860.049991	0.14
0	860.049957	0.10
+10	860.049972	0.12
+20	860.049935	0.08
+30	860.049816	-0.06
+40	860.049859	-0.01
+50	860.049950	0.10

Assigned Frequency (Ref. Frequency) (MHz)		
% Battery	Frequency (MHz)	Frequency Stability (PPM)
-15%	860.1049874	0.01
0	860.1049867	0.00
+15%	860.1049859	-0.01



ADJACENT CHANNEL POWER (ACP)

Rule Parts. No.: 90.543 Emission limitations.

REQUIREMENTS: Transmitters designed to operate in the 769-775 MHz and 799-805 MHz frequency bands must meet the emission limitations.

12.5 kHz Transmitter ACP :

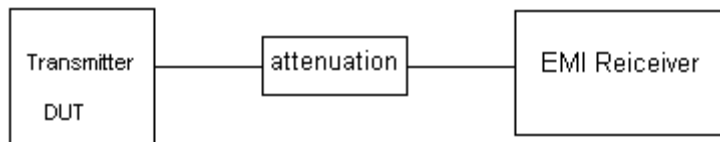
Offset from center frequency	Measurement bandwidth	Maximum ACP relative	UPPER	LOWER
(kHz)	(kHz)	(dBc)	(dB)	(dB)
9.375	6.25	-40	-43.0	-41.9
15.625	6.25	-60	-79.0	-79.1
21.875	6.25	-60	-79.1	-80.0
37.5	25	-60	-75.5	-75.2
62.5	25	-65	-72.6	-72.3
87.5	25	-65	-70.4	-69.9
150	100	-65	-66.8	-66.2
250	100	-65	-67.6	-67.3
350	100	-65	-68.3	-67.2
>400 to 12 MHz	30 (s)	-75	-88.5	-86.2
12 MHz to paired receive band	30 (s)	-75	-89.4	-87.6
In the paired receive band	30 (s)	-100	-107.2	NA

25 kHz Transmitter ACP :

Offset from center frequency	Measurement bandwidth	Maximum ACP relative	UPPER	LOWER
(kHz)	(kHz)	(dBc)	(dB)	(dB)
15.625	6.25	-40	-69.0	-68.9
21.875	6.25	-60	-70.1	-69.9
37.5	25	-60	-68.5	-68.9
62.5	25	-65	-67.7	-67.2
87.5	25	-65	-66.2	-66.2
150	100	-65	-66.5	-67.1
250	100	-65	-67.4	-67.5
350	100	-65	-67.2	-67.7
>400 kHz to 12 MHz	30 (s)	-75	-86.5	-85.3
12 MHz to paired receive band	30 (s)	-75	-89.2	-88.1
In the paired receive band	30 (s)	-100	-108	NA

TEST PROCEEDURE:

1. All the measurement are made at the transmitter’s output port.
2. The ACP was made with the EMI receiver which has a direct ACP function.
3. Reference level was set at 34 dBm.

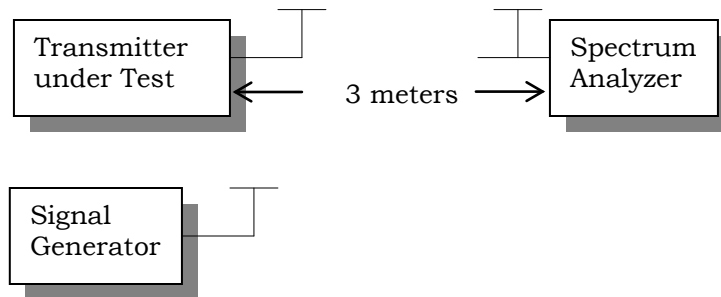


OUT OF BAND EMISSION

Rule Parts. No.: Part 90.543(f)

METHOD OF MEASUREMENT: The spurious emissions levels were measured, and calculated by a substitution method to achieve the EIRP level, then converted to dBW for 700 MHz band, and compare to the limit -80dBW

Test Setup Diagram:



Tuned Frequency MHz	Emission Frequency MHz	Ant. Polarity	EIRP Level (dBW)	Margin dB
799.05	1598.1	H	-80.4	0.4
802.05	1604.1	H	-82.6	2.6
804.95	1609.9	H	-81.8	1.8

EA EMISSION MASK

Part 90.691: Emission mask requirements for EA-based systems
(Under the Policies Governing The Licensing and Use of EA-Based SMR Systems in the 809–824/854–869 MHz Band rule part)

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

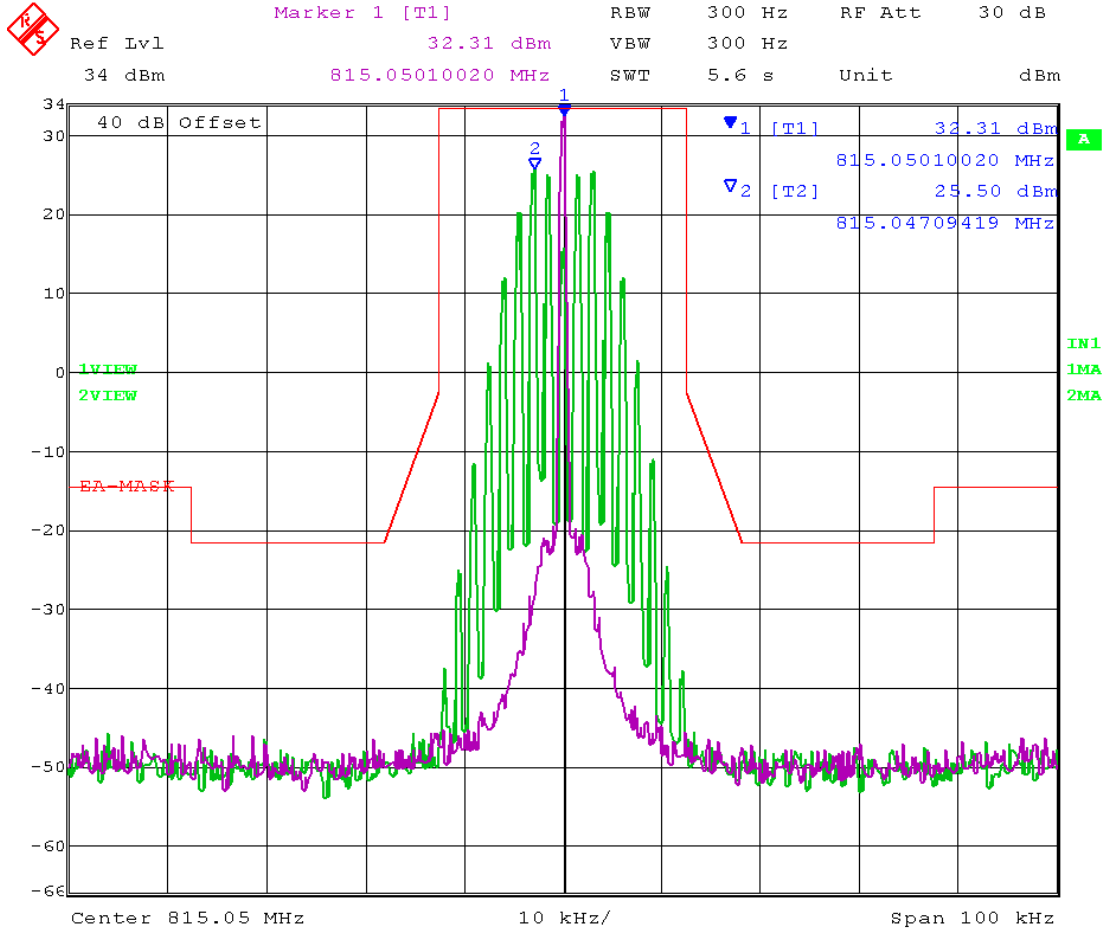
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \text{ Log}_{10} (f/6.1)$ decibels or $50 + 10 \text{ Log}_{10} (P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \text{ Log}_{10} (P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Test Data: See the plots below

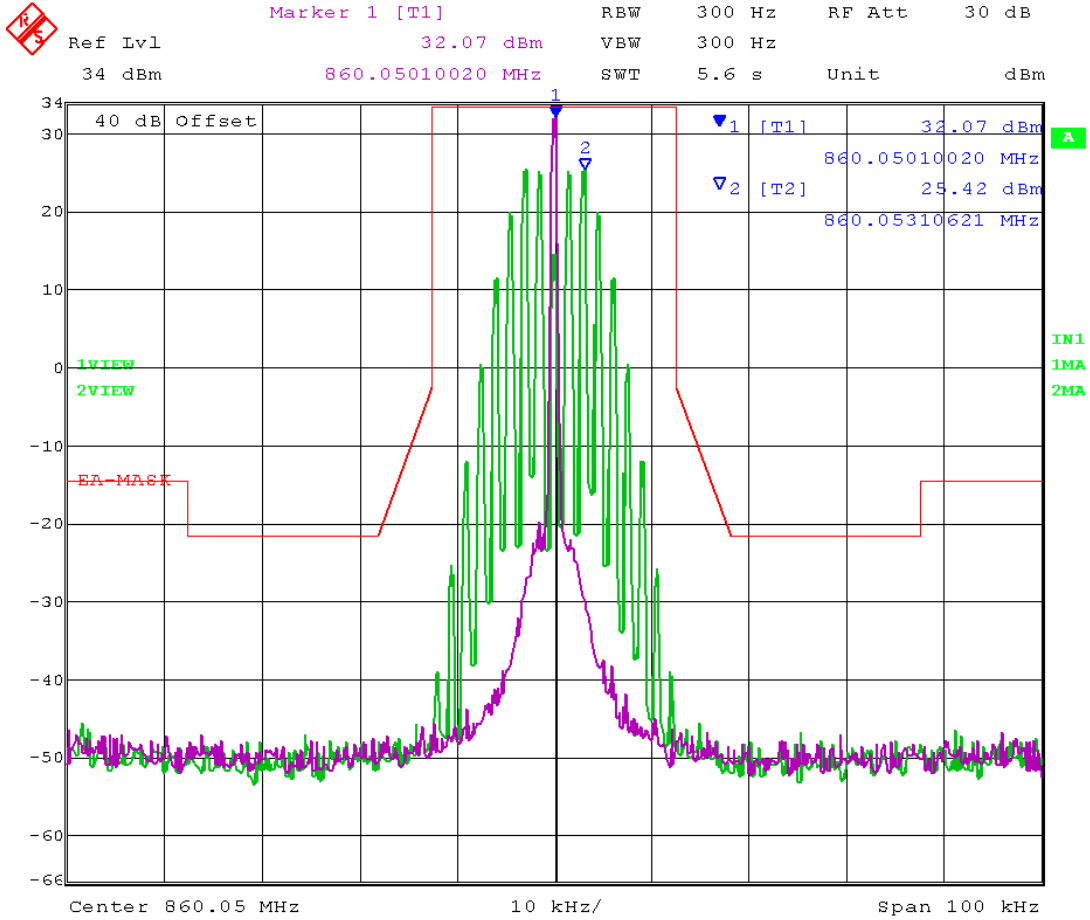
806 – 824 MHz BAND



Date: 27.AUG.2013 11:16:59

815.05 MHz OUT OF BAND EMISSION – EA MASK

851 – 869 MHz BAND



860.05 MHz OUT OF BAND EMISSION – EA MASK