TEST REPORT # EMCC-150524BD, 2015-11-25

This report replaces Test Report # EMCC-150524BB, 2015-09-09

EQUIPMENT UNDER TEST:

Device:	MCT&RH-TX and W-TX
Serial Number:	14037, 50138
FCC-ID:	2AE3OTXKILN-I
Application:	Telemetry Data Transmitter
Manufacturer:	Fidemco, LLC
Address:	PO Box 20702 Portland, OR 97294 USA
Phone:	+1 (503) 830-5517
Fax:	+1 (503) 255-1430

RELEVANT STANDARD(S): 47 CFR § 15.249

MEASUREMENT PROCEDURE:

☒ ANSI C63.10-2013 ☐ RSS-Gen Issue 4 ☐ Other

TEST REPORT PREPARED BY:

Patrick Reusch
EMCCons DR. RAŠEK GmbH & Co. KG
Moggast, Boelwiese 8
91320 Ebermannstadt
Germany
Phone: +49 9194 9016
Fax: +49 9194 8125
E-Mail: p.reusch@emcc.de

TEST PERSONNEL:

i.A. M. Zeck
Patrick Reusch

HEAD OF COMMERCIAL EMC AND RADIO DEPT.:

Wolfgang Döring

CONTENTS

1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance with the 47 CFR §15.249 requirements for the certification of licence-exempt 15C Intentional Radiator.

1.2 Limits and Reservations

The test results in this report apply only to the particular equipment under test (EUT) as declared in this report. This test report shall not be reproduced except in full without the written permission of EMCCons DR. RAŠEK GmbH & Co. KG.

1.3 Test Location

Test Laboratory:	EMCCons DR. RAŠEK GmbH & Co. KG
Accreditation No.:	D-PL-12067-01-00
Address of Labs I, II, III and Head Office:	EMCCons DR. RAŠEK GmbH & Co. KG Moggast, Boelwiese 8 91320 Ebermannstadt GERMANY
Address of Labs IV and V:	EMCCons DR. RAŠEK GmbH & Co. KG Stoernhofer Berg 15 91364 Unterleinleiter GERMANY
Laboratory:	Test Laboratory IV The 3 m & 10 m semi-anechoic chamber site has been fully described in a report submitted to the FCC and accepted in the letter dated December 24, 2013, Registration Number 878769.
Phone:	+49 9194 9016
Fax:	+49 9194 8125
E-Mail:	emc.cons@emcc.de
Web:	www.emcc.de

1.4 Manufacturer

Company Name:	Fidemco, LLC
Street:	PO Box 20702
City:	Portland, OR 97294
Country:	USA
Name for contact purposes:	Mr Martin Glaeser
Phone:	+1 (503) 830-5517
Fax:	+1 (503) 255-1430
E-Mail:	martin@fidemco.com

1.5 Dates and Test Location

Date of receipt of EUT: 2015-08-27
Test Date: CW 35-36/2015
Test Location: Lab IV

1.6 Ordering Information

Purchase Order: PO 080715
Date: 2015-07-08
Vendor Number: none

1.7 Climatic Conditions

Date	Temperature [°C]	Relative Humidity [%]	Air Pressure [hPa]	Lab	Customer attended tests
2015-08-27	24	47	974	IV	yes, Mr Glaeser
2015-08-28	25	57	977	IV	yes, Mr Glaeser
2015-08-31	26	56	974	IV	yes, Mr Glaeser
2015-09-01	26	54	968	IV	yes, Mr Glaeser

2 PRODUCT DESCRIPTION

2.1 Equipment Under Test (EUT)

Trade Name:	MCT&RH-TX and W-TX
Serial Number:	14037, 50138
No. of Variants:	2
Variant #1	MCT&RH-TX, S/N: 14037
Variant #2	W-TX, S/N: 50138
FCC ID:	2AE3OTXKILN-I
Application:	Telemetry Data Transmitter
Transmit Frequency:	916.5 MHz
Modulation:	OOK
Power Supply:	3.6 VDC from internal Battery
Ports:	none
Antenna:	internal
Variants:	None
Remarks:	None

The following information was delivered by the customer:

Description of circuitry:
The device is powered by one or two Lithium batteries. A voltage detector chip monitors the voltage level of the battery.
Normally the microcontroller is in "Sleep"-mode (oscillator off) and doesn't do anything.
An internal wake-up feature of the microcontroller activates the device in constant time intervals.
Approximately every 40sec the microcontroller controls the measuring circuitry and interprets the measuring signals to determine new readings.
Approximately every 20sec the microcontroller sends the digital values serially to the hybrid transmitter chip at 2400Bd (6 bytes total).
Every byte consists of 14 bits: Start and Stop bit, 8 data bits and 4 balance bits. Individually for every byte, the balance bits are determined by the microcontroller to achieve a duty cycle of 50%.
In the worst case, when all data bits of all bytes are high, the duty cycle of the transmitter chip operated in on-off keyed modulation (OOK) will be less than 67%.
Operating frequency of the transmitter chip is 916.5MHz at a typical peak output power of 0.54mW.
A permanently attached ¼-wave length stub is used as antenna.

Available models:
a. Sensors #1 and #2 and transducer #3: Model MCT&RH-TX
b. Sensors #1 and #2 only (sensor #2 installed internally or externally): Model MCT-TX
c. Sensor #2 only (sensor #2 installed externally): Model WT-TX
d. Transducer #4 only: Model W-TX

Sensors:
#1. Wood or other natural materials:
The device measures the electrical resistance between two electrodes connected to wood or other natural materials.
#2. Thermistor:
The device measures the electrical resistance of a thermistor. This sensor can either be installed internally or externally of the device.
#3. Transducer for air temperature (T) and humidity (RH):
The device reads digital data from an external transducer. This transducer is powered by the device and converts the signals generated by an integrated humidity and temperature sensor into serially transmitted digital data.
#4. Load cell:
The device measures the midpoint voltage of the Wheatstone Bridge contained in a load cell.

2.2 Intended Use

The following information was delivered by the customer:

The Kiln Data Transmitter determines physical properties present in dry kilns for wood.
Several models are available of the device. They differ in the type and configuration of external sensors/transducers that are connected to it via short cables.

2.3 EUT Peripherals/Simulators

The EUTs were equipped with the maximum number of sensors. For details refer to chapter 2.1 of this report.

MCT&RH-TX: Sensors #1, #2, Transducer #3
W-TX: Transducer #4

2.4 Mode of operation during testing and test set-up

The equipment under test (EUT) was operated during the tests under the following conditions:

Normal Operation:
The EUT was operated with a shortened sleep time of approx. 2 seconds (instead of approx. 20 seconds) between two data transmissions. The principle operation is: measuring, transmitting the data and entering sleep mode.

Continuous Transmit:
The EUT was continuously transmitting modulated data without a measuring/sleep-phase.

Note: No unmodulated operation possible acc. to customer's information.

2.5 Modifications required for compliance

All measurements performed with this modification are marked accordingly.

The following information was delivered by the customer:

Purpose: Reducing the peak RF output power
According to the transmitter module's data sheet the peak RF output power is calculated as

$P_o = 7*(I_{TXM})^2$, where P_o is in mW, and the peak modulation current I_{TXM} is in mA.

The modulation current I_{TXM} is a function of the series resistor R_{TXM}.

The initial resistor value of 4.7k was increased to 8.2k.

This permanent change was done to all models:

MCT&RH-TX: R26
MCT-TX: R26
WT-TX: R26
W-TX: R221

As a result, the calculated peak RF output power was reduced from 1.36mW (U_{bat}=3.6V, R=4.7k) to 0.54mW (U_{bat}=3.6V, R=8.2k).

2.6 Duty-Cycle Correction

The following calculation is based on customer's information.

The measured readings of the EUT are transmitted automatically in regular time intervals of approx. 20 seconds. Each package consists of 6 Bytes with 14 Bits (1 Start, 1 Stop, 8 Data, 4 balance bits). With a data rate of 2400 baud, one pulse package length is equal to 35 ms.

The maximum duty cycle of the EUT referred to one pulse package is 67 % as declared by the manufacturer. It follows that the worst case ON-time in any 100 ms time window is
67% x 35 ms = 23.5 ms.

For average correction purposes, a correction factor of (23.5 ms / 100 ms) * 100 = 23.5 % have to be used. Expressed in logarithmic terms, the correction factor is 20 x log (23.5 %) = -12.6 dB.

3 TEST RESULTS SUMMARY

Summary of test results for the following EUT:

Manufacturer: Fidemco, LLC
Device: MCT&RH-TX and W-TX
Serial No: 14037, 50138

Requirement	47 CFR Section	Report Section	EUT condition	Result
Antenna Requirement	15.203	4	w/ & w/o modification	Passed
Occupied Bandwidth	15.215	5	w/ modification	Passed
Field Strength of Fundamental	15.249	6	w/ modification	Passed
Band Edge Compliance	15.209	7	w/ modification	Passed
Radiated Emissions 9 kHz – 30 MHz	15.209	8	w/o modification	Passed
Radiated Emissions 30 MHz – 1000 MHz	15.209	9	w/ & w/o modification	Passed
Radiated Emissions 1 GHz – 10 GHz	15.209	10	w/ modification	Passed

N.A. – not applicable; N.T. – Not tested acc. to applicant's order.

The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units and meet the requirements of the specifications referenced herein.
Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the "Correction Factor" documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.
The measurements contained in this report were made in accordance with the procedures described in ANSI C63.10-2013. All requirements were found to be within the limits outlined in this report.
The test results in this report apply only to the particular equipment under test (EUT) as declared in this report.

Test Personnel: Patrick Reusch
Issuance Date: 2015-11-25

4 ANTENNA REQUIREMENT

Test Requirement: FCC 47 CFR, § 15.203
Test Procedure: none

4.1 Regulation

§15.203 Antenna requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

4.2 Test Equipment

None.

4.3 Test Procedures

None.

4.4 Test Result

The EUT with the antenna plug is permanently moulded in epoxy resin.

Manufacturer:	Fidemco, LLC
Device:	MCT&RH-TX and W-TX
Serial No:	14037, 50138
Test date:	2015-09-01

The EUT meets the requirements of this section.

5 OCCUPIED BANDWIDTH

Test Requirement: FCC 47 CFR, § 15.215
Test Procedure: ANSI C63.10-2013

5.1 Regulation

§15.215 Additional provisions to the general radiated emission limitations

(a) The regulations in §§15.217 through 15.257 provide alternatives to the general radiated emission limits for intentional radiators operating in specified frequency bands. Unless otherwise stated, there are no restrictions as to the types of operation permitted under these sections.

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

5.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
EMI/RFI Test Receiver	R&S / ESS	303	2015-03	2016-03
Log Per. Antenna	Schwarzb. / VUSLP 9111B	3203	2015-05	2017-05

5.3 Test Procedures

ANSI C63.10-2013, 6.9.2 Occupied bandwidth—relative measurement procedure

The occupied bandwidth is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). Typical ratios, expressed in dB, are −6 dB, −20 dB, and −26 dB, corresponding to 6 dB BW, 20 dB BW, and 26 dB BW, respectively. In this subclause, the ratio is designated by “−xx dB.” The reference value is either the level of the unmodulated carrier or the highest level of the spectral envelope of the modulated signal, as stated by the applicable requirement. Some requirements might specify a specific maximum or minimum value for the “−xx dB” bandwidth; other requirements might specify that the “−xx dB” bandwidth be entirely contained within the authorized or designated frequency band.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Steps a) through c) might require iteration to adjust within the specified tolerances.

e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit an unmodulated carrier [comment: not applicable] or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "−xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

5.4 Test Result

Operating Mode: Continuous Transmit

EUT: MCT&RH-TX, modified

Nom. TX-Frequency [MHz]	Lower Edge [MHz]	Upper Edge [MHz]	20 dB Bandwidth [kHz]
916.5	916.4828	916.4902	7.37

EUT: W-TX, modified

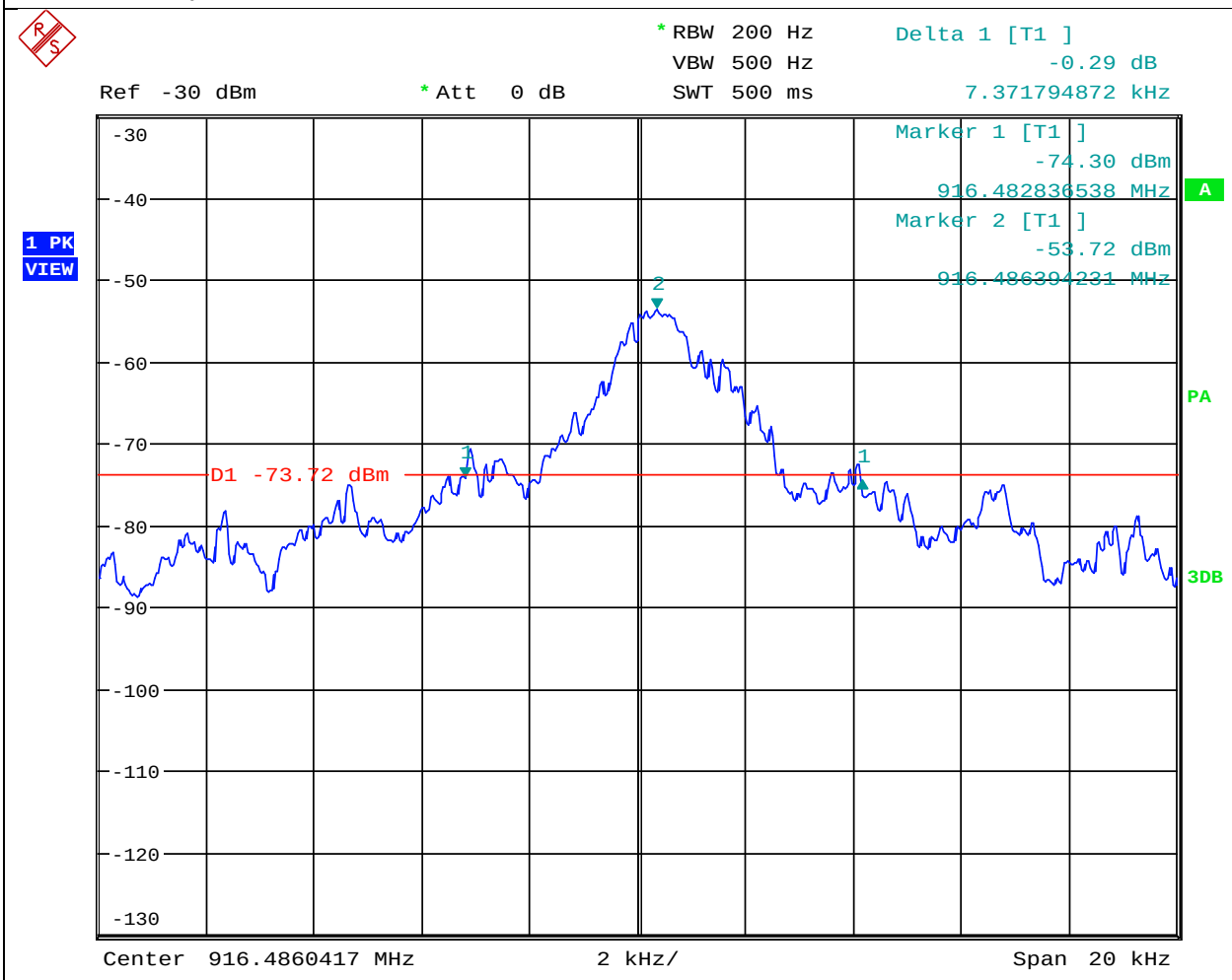
Nom. TX-Frequency [MHz]	Lower Edge [MHz]	Upper Edge [MHz]	20 dB Bandwidth [kHz]
916.5	916.5512	916.5554	4.17

Manufacturer: Fidemco, LLC
Device: MCT&RH-TX and W-TX
Serial No: 14037, 50138
Test date: 2015-09-01

The EUT meets the requirements of this section.

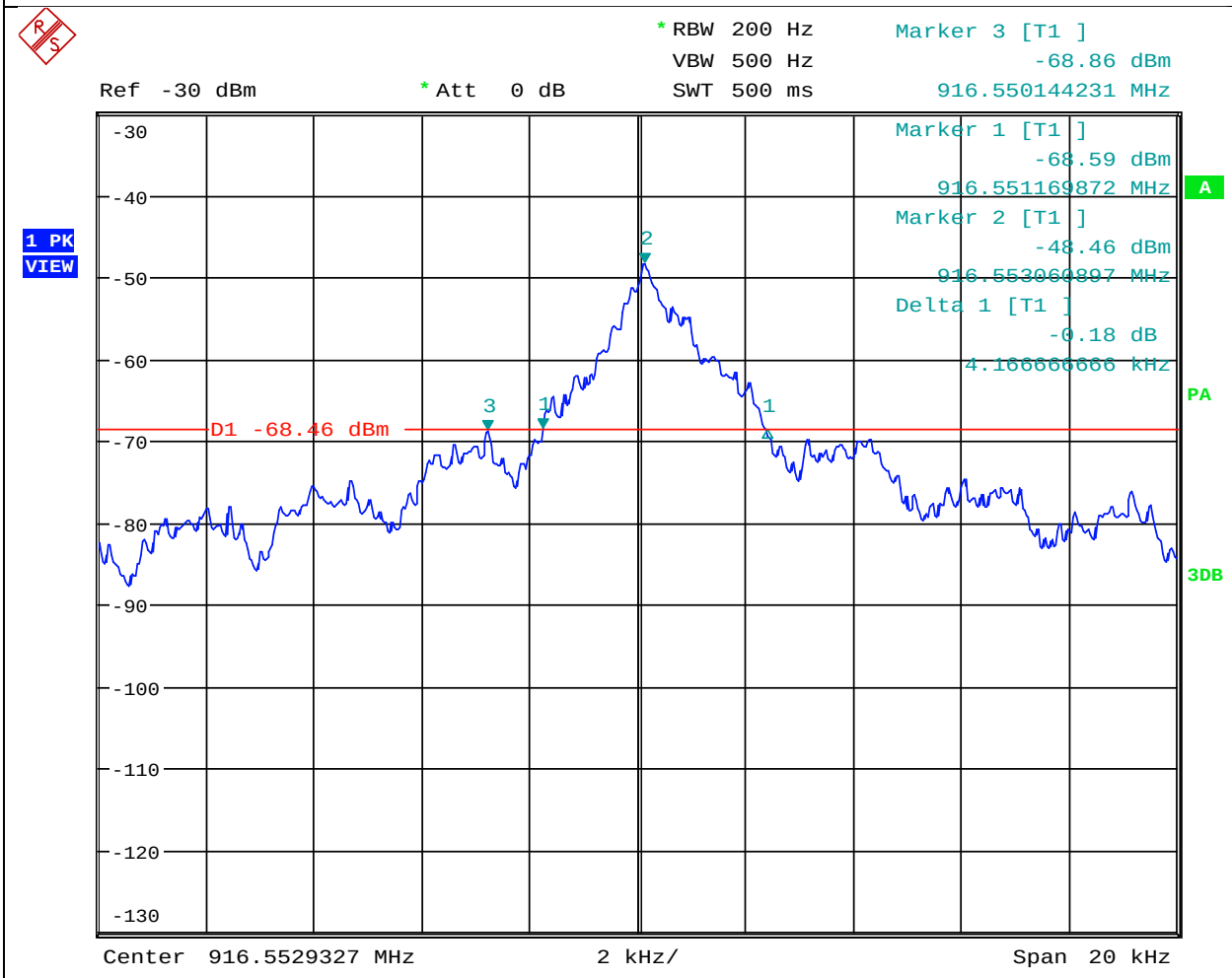
5.5 Measurement Prescan-Plots

EUT: MCT&RH-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: hor. & ver.
Modification: yes, refer to chapter 2.5



EUT: MCT&RH-TX; Mode: Continuous TX
Date: 01.SEP.2015

EUT: W-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: hor. & ver.
Modification: yes, refer to chapter 2.5



EUT: W-TX; Mode: Continuous TX
Date: 01.SEP.2015

6 FIELD STRENGTH OF FUNDAMENTAL

Test Requirement: FCC 47 CFR, § 15.249
Test Procedure: ANSI C63.10-2013

6.1 Regulation

§15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz.
(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(c) Field strength limits are specified at a distance of 3 meters.
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

6.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
EMI/RFI Test Receiver	R&S / ESS	303	2015-03	2016-03
Log Per. Antenna	Schwarzb. / VUSLP 9111B	3203	2015-05	2017-05

6.3 Test Procedures

ANSI C63.10-2013, 6.5.4 Final radiated emission tests

Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported.

Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.

6.4 Test Result

All tests are performed with modified EUTs (see chapter 2.5). All measurements based on CISPR-quasi-peak detector.

Operating Mode: Normal Operation

EUT: MCT&RH-TX, modified

Frequency [MHz]	QP-Reading [dBµV]	CF [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]
916.5	64.1	28.4	92.5	94	1.5

EUT: W-TX, modified

Frequency [MHz]	QP-Reading [dBµV]	CF [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]
916.5	64.0	28.4	92.4	94	1.6

Manufacturer: Fidemco, LLC
Device: MCT&RH-TX and W-TX
Serial No: 14037, 50138
Test date: 2015-08-31

The EUT meets the requirements of this section.

7 BAND EDGE COMPLIANCE

Test Requirement: FCC 47 CFR, § 15.249
Test Procedure: ANSI C63.10-2013

7.1 Regulation

§15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz and 24.0-24.25 GHz.
(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(c) Field strength limits are specified at a distance of 3 meters.
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

7.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
EMI/RFI Test Receiver	R&S / ESS	303	2015-03	2016-03
Log Per. Antenna	Schwarzb. / VUSLP 9111B	3203	2015-05	2017-05

7.3 Test Procedures

ANSI C63.10-2013, 6.5.4 Final radiated emission tests

Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported.

Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.

7.4 Test Result

Operating Mode: Normal Operation

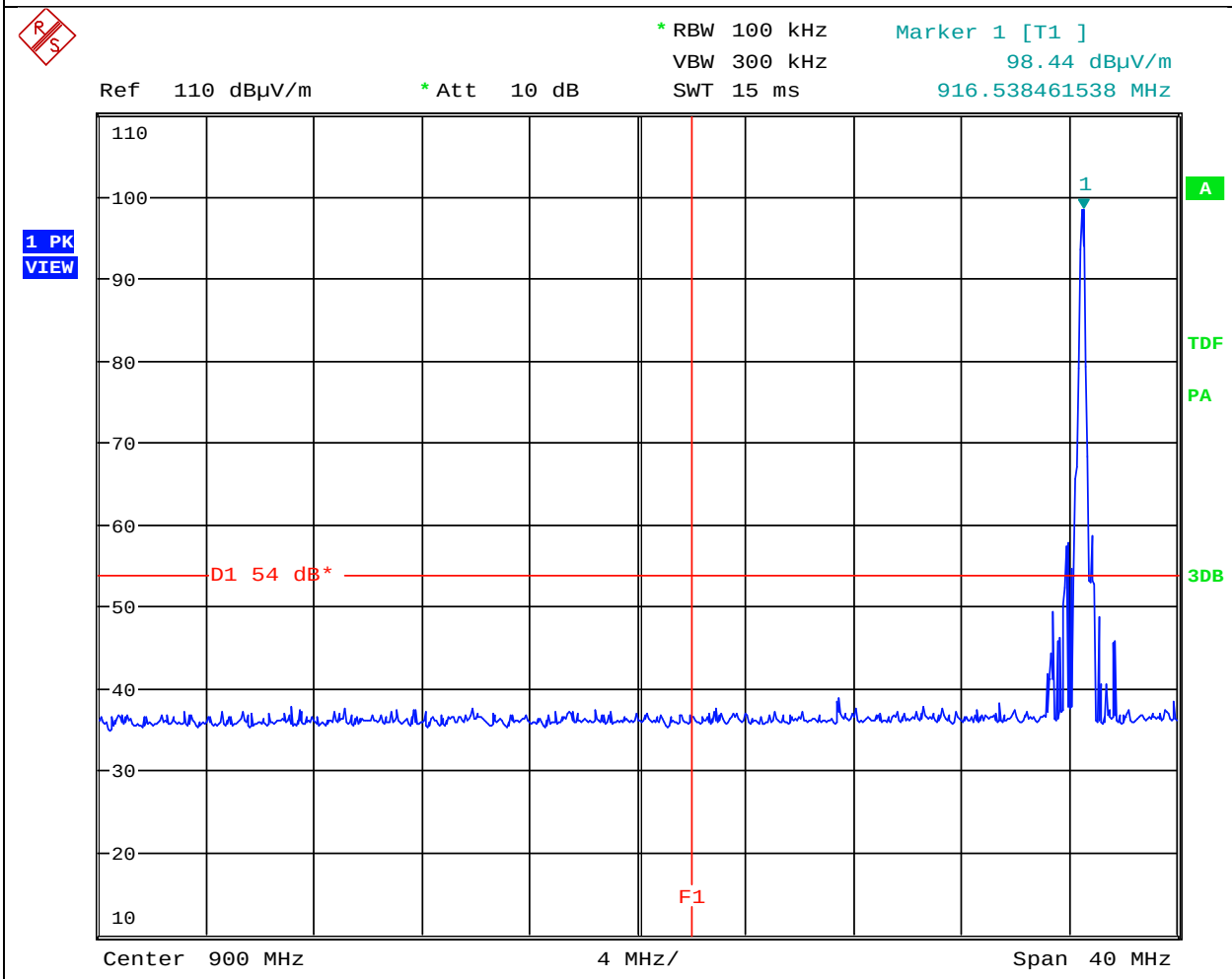
For further details, refer to measurement plots on the following pages.

Manufacturer:	Fidemco, LLC
Device:	MCT&RH-TX and W-TX
Serial No:	14037, 50138
Test date:	2015-09-01

The EUT meets the requirements of this section.

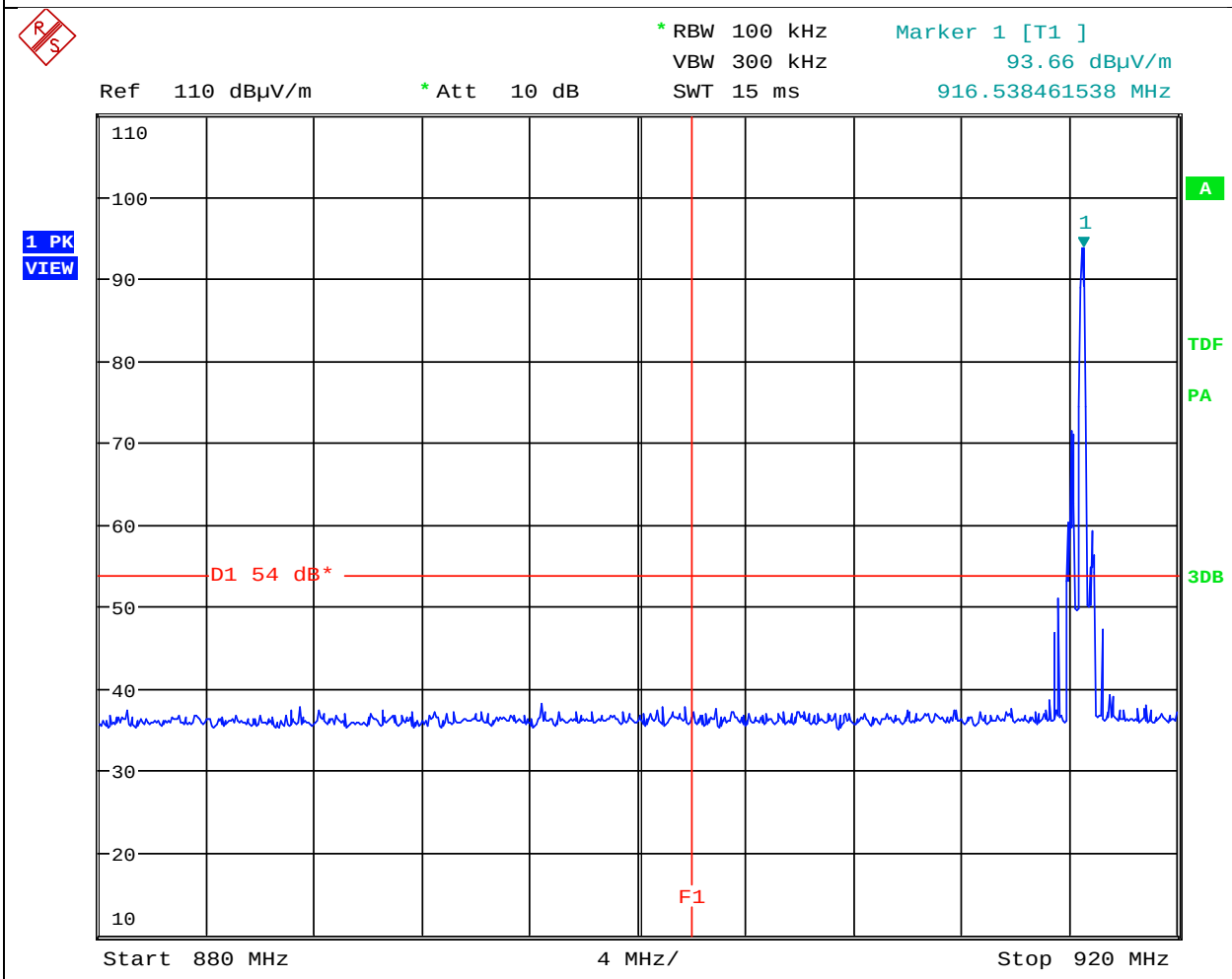
7.5 Measurement Prescan-Plots

EUT: MCT&RH-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: hor.
Modification: yes, refer to chapter 2.5



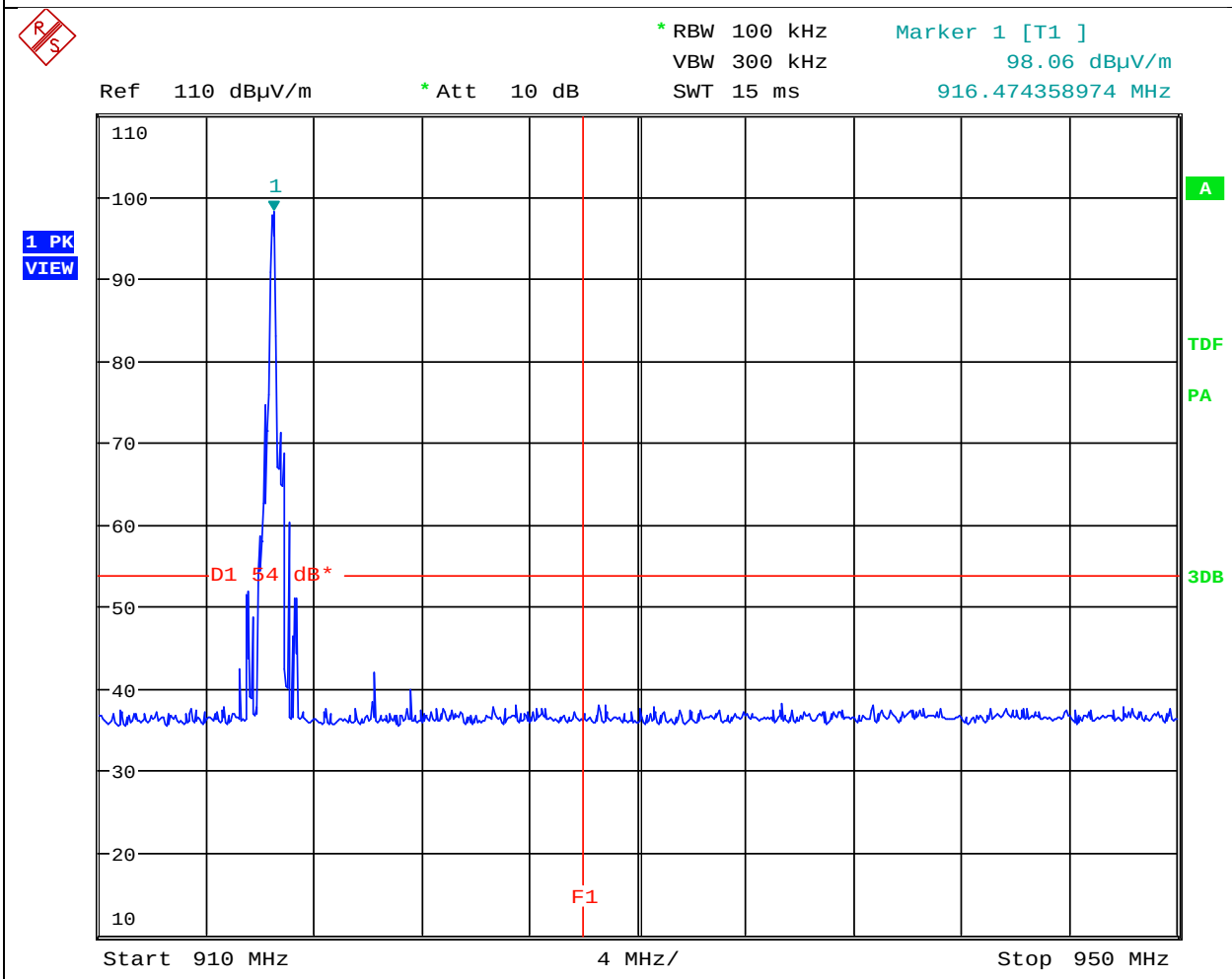
EUT: MCT&RH-TX; Mode: Normal Operation
Date: 1.SEP.2015

EUT: MCT&RH-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: ver.
Modification: yes, refer to chapter 2.5



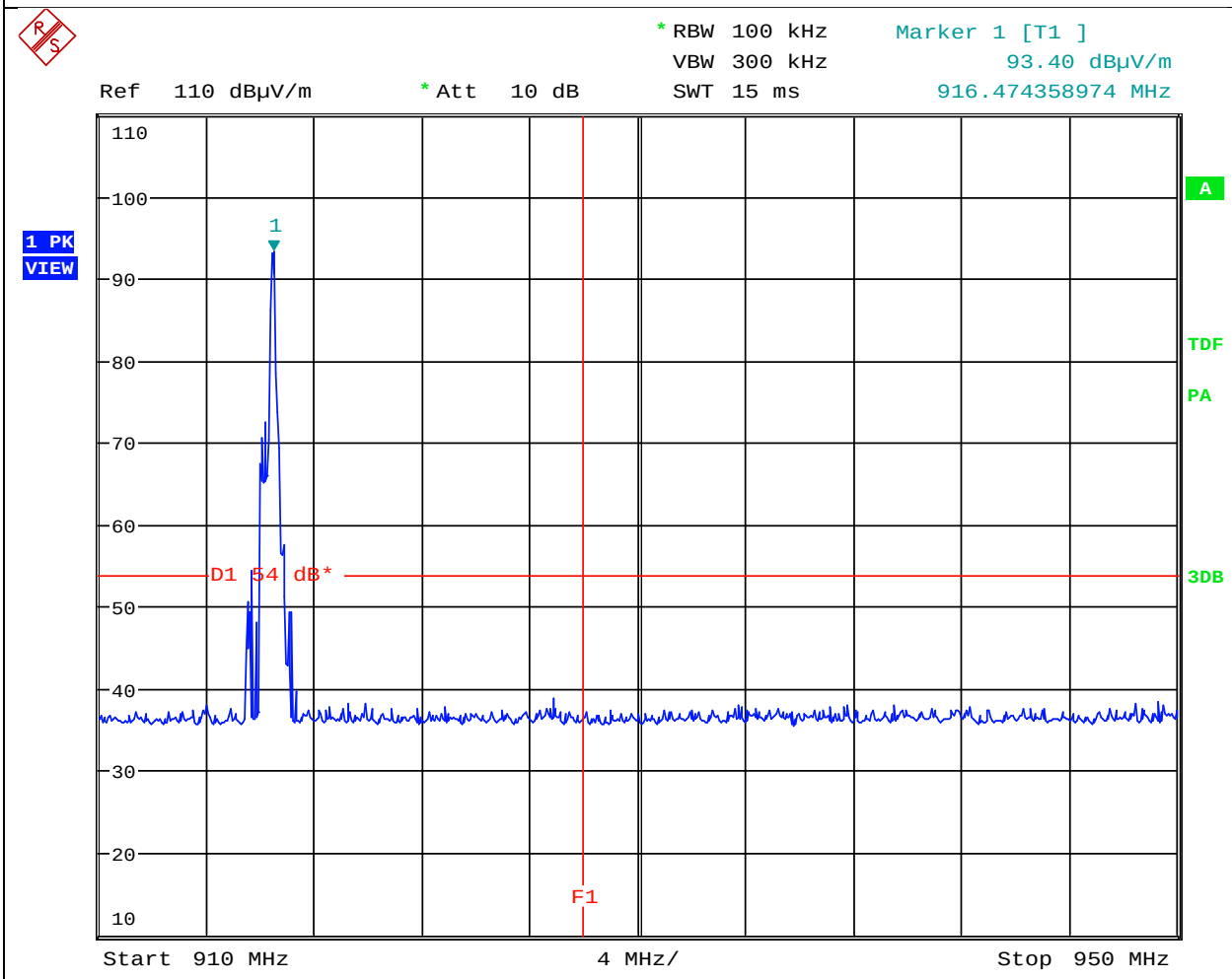
EUT: MCT&RH-TX; Mode: Normal Operation
Date: 1.SEP.2015

EUT: MCT&RH-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: hor.
Modification: yes, refer to chapter 2.5



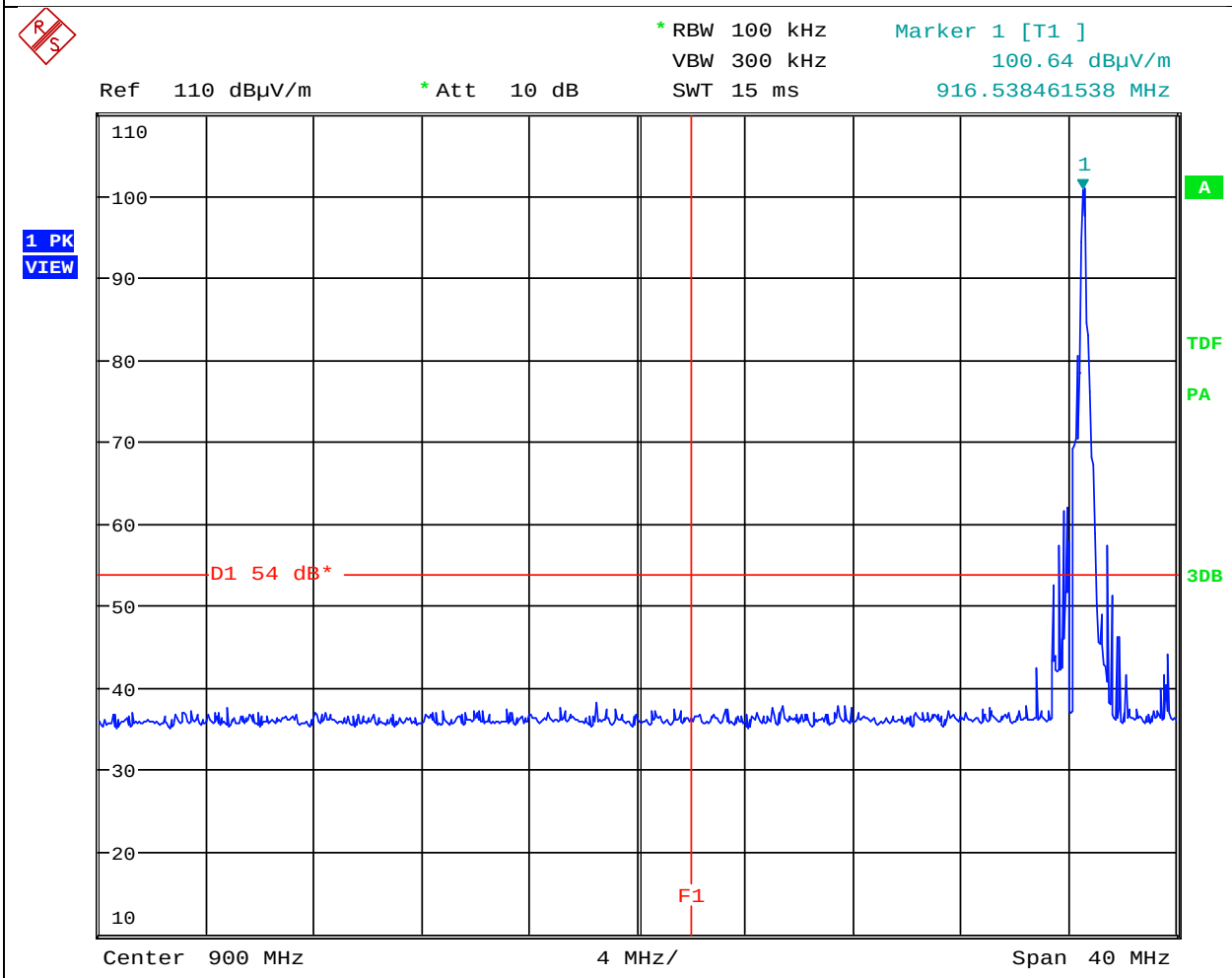
EUT: MCT&RH-TX; Mode: Normal Operation
Date: 1.SEP.2015

EUT: MCT&RH-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: ver.
Modification: yes, refer to chapter 2.5



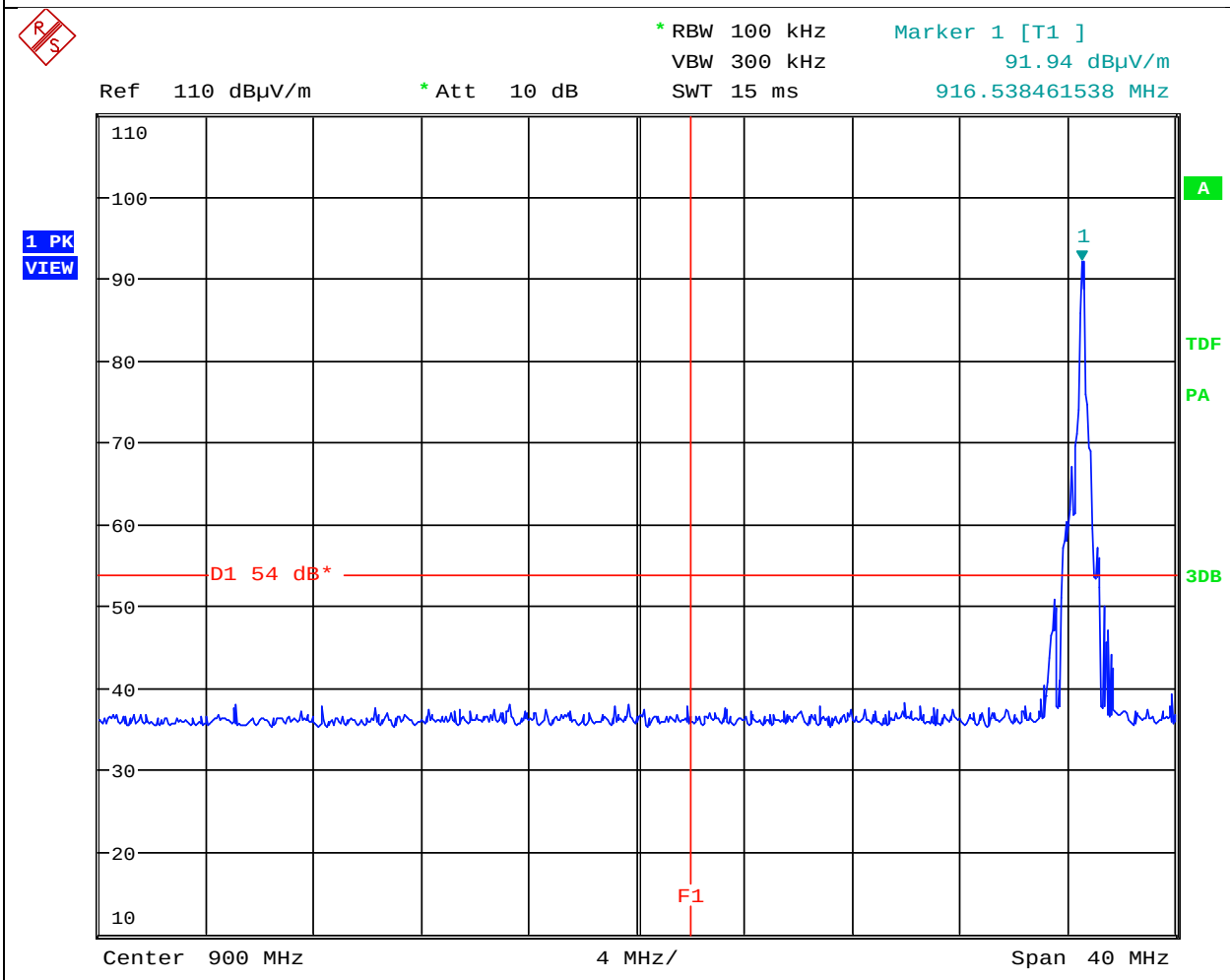
EUT: MCT&RH-TX; Mode: Normal Operation
Date: 1.SEP.2015

EUT: W-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: hor.
Modification: yes, refer to chapter 2.5



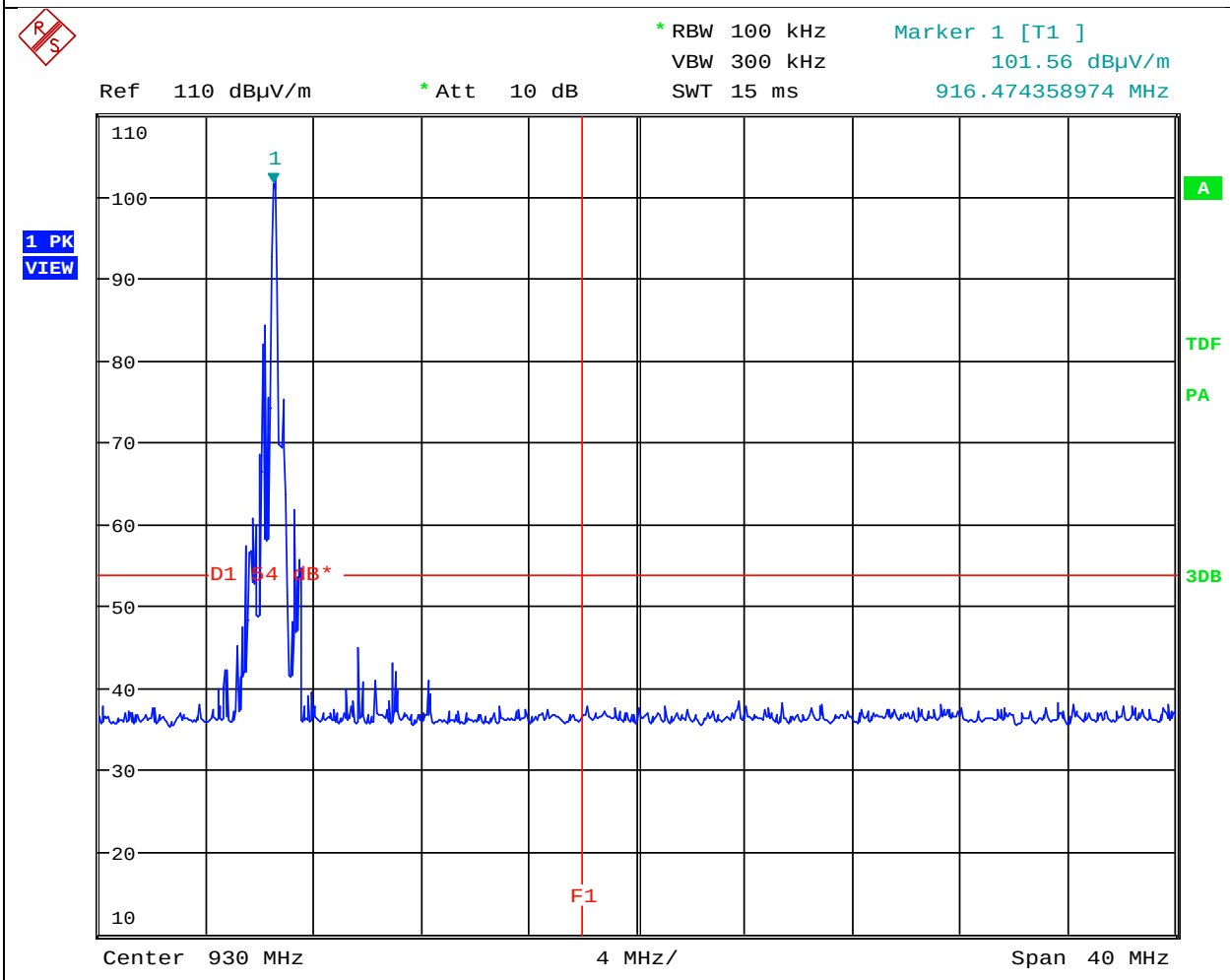
EUT: W-TX; Mode: Normal Operation
Date: 1.SEP.2015

EUT: W-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: ver.
Modification: yes, refer to chapter 2.5



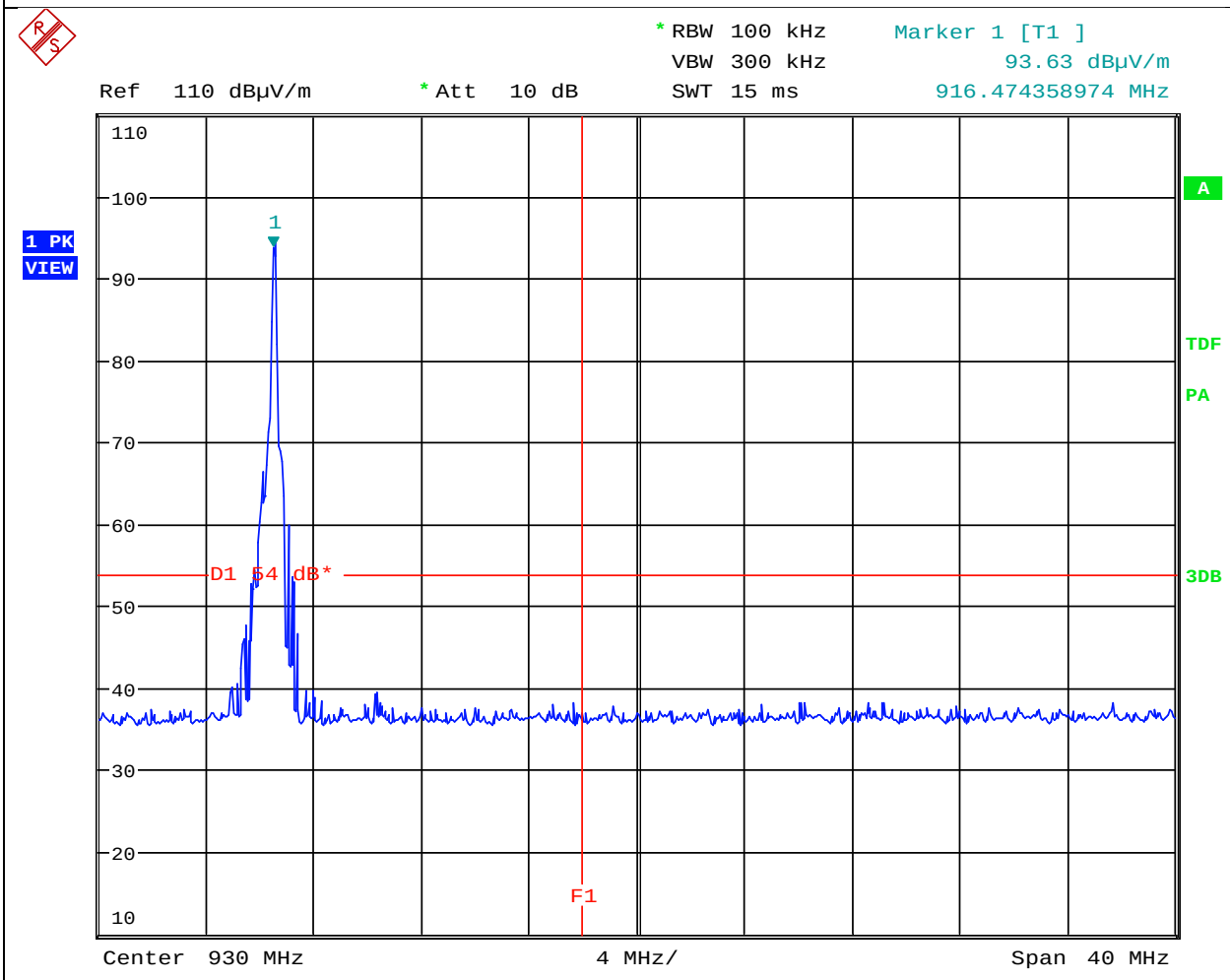
EUT: W-TX; Mode: Normal Operation
Date: 1.SEP.2015

EUT: W-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: hor.
Modification: yes, refer to chapter 2.5



EUT: W-TX; Mode: Normal Operation
Date: 1.SEP.2015

EUT: W-TX
Nom. TX-Frequency: 916.5 MHz
Ant.: .: hor. & ver.
EUT-Pos.: ver.
Modification: yes, refer to chapter 2.5



EUT: W-TX; Mode: Normal Operation
Date: 1.SEP.2015

8 RADIATED EMISSIONS 9 kHz – 30 MHz

Test requirement: FCC 47 CFR, §§ 15.249, 15.209
Test procedure: ANSI C63.10-2013

8.1 Regulation

§ 15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz and 24.0-24.25 GHz
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

§15.209 Radiated emission limits; general requirements
(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency	Field Strength		Measurement distance
[MHz]	[µV/m]	[dB(µV/m)]	[m]
0.009–0.490	2400/F[kHz]	67.6 – 20 logF[kHz]	300
0.490–1.705	24000/F[kHz]	87.6 – 20 logF[kHz]	30
1.705–30.0	30	29.5	30

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.
(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
(e) The provisions in §§ 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

§ 15.31 Measurement standards
(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle.
1 to 10 MHz	2	1 near top and 1 near bottom.
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom.

§ 15.33 Frequency range of radiated measurements
(a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:
(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

§ 15.35 Measurement detector functions and bandwidths
The conducted and radiated emission limits shown in this part are based on the following, unless otherwise specified elsewhere in this part:
(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.
Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.

8.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
EMI/RFI Test Receiver	R&S / ESS	303	2015-03	2016-03
Loop Antenna	R&S / HFH-Z2	374	2014-06	2016-06
AC Power Source	AEG / DAMK4/DAGK4	0001	n.a	n.a
Multimeter	Agilent / U1241B	3880	2014-04	2016-04

8.3 Test Procedures

ANSI C63.10-2013, 5.3.2 Test distance for frequencies below 30 MHz

Radiated emissions limits are usually defined at a specific distance from the EUT. Where possible, measurements shall be made at the distance specified in the limits. This might not be possible in all cases, however, due to the physical limitations of the test facility, physical access problems at the required distance (especially for measurements that must be made in situ or on-site), or levels of ambient noise or other radiated signals present at the time and location where measurements are made. See 6.4.3 for more information about antenna selection, location, and test distance. If measurements cannot practically be made at the EUT limit distance, then they may be made at a different distance (usually closer) and extrapolated to the limit distance using one of the procedures described in 6.4.4, 6.4.5, or 7.7, depending on the EUT source and size.31 The test report shall specify the extrapolation method used to determine compliance of the EUT.

ANSI C63.10-2013, 6.4.6 Exploratory radiated emission tests

The tests shall be performed in the frequency range specified in 5.5 and 5.6, using the procedures in Clause 5, applying the appropriate modulating signal to the EUT, to determine cable or wire positions of the EUT system that produce the emission with the highest amplitude relative to the limit.

Exploratory measurements below 30 MHz are useful in determining the maximum level of emissions while manipulating and rotating the EUT; however, exploratory and final measurements may be made concurrently, provided care is taken to determine the maximum level of emissions for all configurations and orientations.

The test arrangement, measuring antenna guidelines and operational configurations in 6.3.1 and 6.3.2, shall be followed. The measurement antenna shall be positioned with its plane perpendicular to the ground at the specified distance. When perpendicular to the ground plane, the lowest height of the magnetic antenna shall be 1 m above the ground and shall be positioned at the specified distance from the EUT.50 When the EUT contains a loop antenna that can only be placed in a vertical axis, normal measurements shall be made aligning the measurement antenna along the site axis, and then orthogonal to the axis. For each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable. When the EUT contains a loop antenna that can be placed in a horizontal or vertical axis, normal measurements shall be made aligning the measurement antenna along the site axis, orthogonal to the axis, and then with the measurement antenna horizontal. For each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable. The report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground-parallel) unless the margin is greater than 20 dB, then the following statement shall be made: “all emissions were greater than 20 dB below the limit.”

ANSI C63.10-2013, 6.4.7 Final radiated emission tests

Using the orientation and equipment arrangement of the EUT determined in 6.4.6, and applying the appropriate modulating signal to the EUT, perform final radiated emission measurements on the fundamental and highest spurious emissions.

Unless otherwise specified by the regulatory authority, the instrumentation, detector functions, and bandwidths specified in 4.1.4.2.1 shall be used. For pulsed emissions, the procedure in 4.1.4.2.4 shall be used.

Radiated Emissions Test Characteristics	
Frequency range	9 kHz - 30 MHz
Test distance	3 m*
Test instrumentation resolution bandwidth	200 Hz (9 kHz - 150 kHz)
	10 kHz (150 kHz - 30 MHz)
Receive antenna height	1 m
Receive antenna polarization	Vertical

* According to Section 15.31 (f)(2): At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The 40 dB/decade factor was used.

8.4 Calculation of Field Strength Limits

E.g. radiated spurious emissions field strength limits for the restricted band 1.705–30.0 MHz:

30 µV/m at 30 meters

Using the equation:

$E_{dB\mu V/m} = 20 * \log (E_{\mu V/m})$

where

$E_{dB\mu V/m}$ = Field Strength in logarithmic units (dBµV/m)

$E_{\mu V/m}$ = Field Strength in linear units (µV/m)

A field strength limit of 30 µV/m corresponds with 29.5 dBµV/m.

8.5 Field Strength Calculation

All emission measurements performed using the test receiver's transducer factor setting capability, i.e. the field strength value measured directly without the necessity of additional correction factors. For test distance other than what is specified, but fulfilling the requirements of Section 15.31 (f)(2) the field strength is calculated by adding additionally an extrapolation factor of 40 dB/decade (inverse linear-distance for field strength measurements). The basic equation with a sample calculation is as follows:

FS = FST + DF

where

FS = Field Strength in dBµV/m

FST = Field Strength at test distance in dBµV/m

DF = Distance Extrapolation Factor in dB,

where DF = 40 log (Dtest/Dspec) where Dtest = Test Distance and Dspec = Specified distance

Assume the tests performed at a reduced Test Distance of 3 m instead of the Specified Distance of 30 m giving a Distance Extrapolation Factor of DF = 40 log (3 m/30 m) = -40 dB.
Assuming a measured field strength level of 58.8 dBµV/m is obtained. The Distance Factor of -40 dB is added, giving a field strength of 18.8 dBµV/m. The 18.8 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

FS = 58.8 - 40 = 18.8 [dBµV/m]
Level in µV/m = Common Antilogarithm (18.8/20) = 8.7

8.6 Final Test Results

Operating Mode: Normal Operation

EUT: MCT&RH-TX

Frequency [MHz]	Meas. [PK / QPK]	Reading [dB(µV)]	Ant. factor [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]
All emissions are more than 20 dB below the specified limits.						

All prescan peak measurement values are more than 20 dB below the specified limits. Therefore, no final measurements performed.

EUT: W-TX

Frequency [MHz]	Meas. [PK / QPK]	Reading [dB(µV)]	Ant. factor [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]
All emissions are more than 20 dB below the specified limits.						

All prescan peak measurement values are more than 20 dB below the specified limits. Therefore, no final measurements performed.

Manufacturer:	Fidemco, LLC
Device:	MCT&RH-TX and W-TX
Serial No:	14037, 50138
Test date:	2015-08-27

All measured emissions in the range 9 kHz to 30 MHz are below the specified limits.

The EUT meets the requirements of this section.

8.7 Measurement Prescan-Plots

EUT: MCT&RH-TX
Frequency Range: 9 kHz – 30 MHz
Ant.: .: – & |
EUT-Pos.: hor.
Modification: none

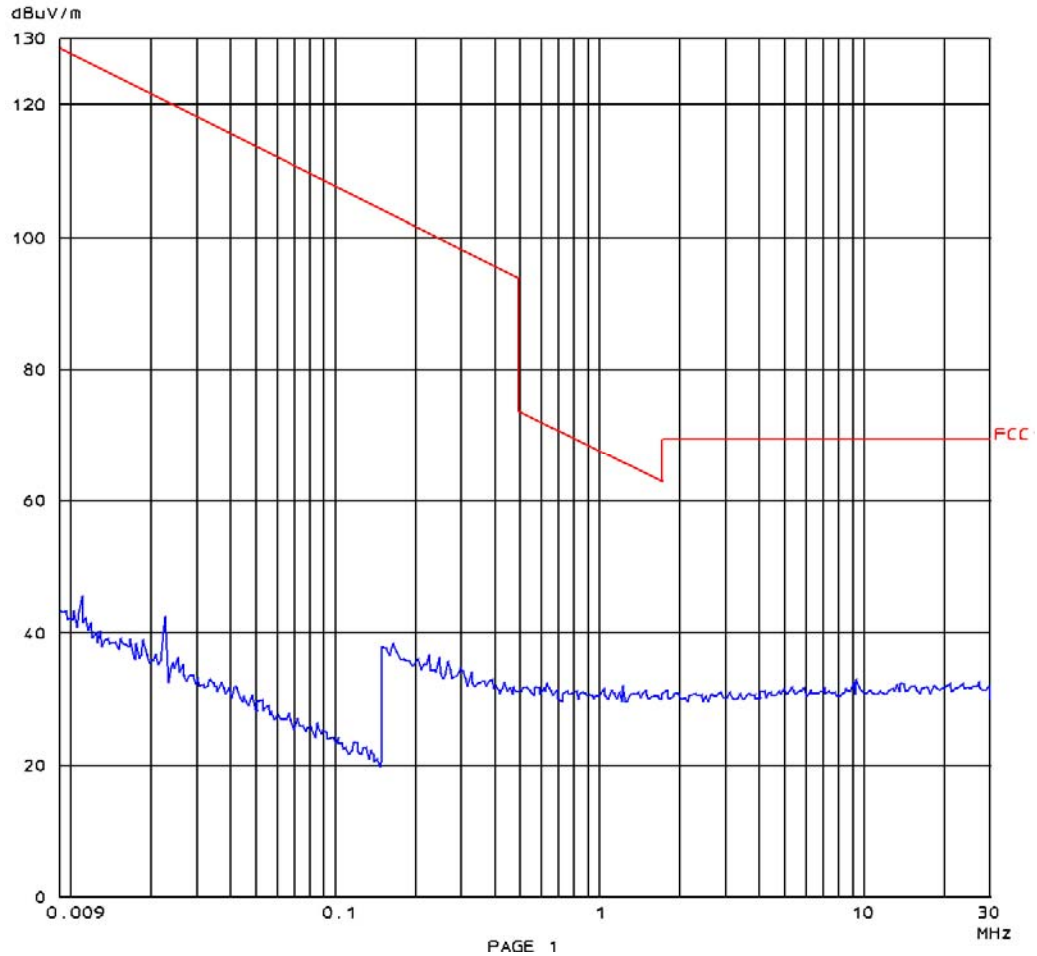
EMCCons DR. RASEK 27 Aug 15 08:04
Radiated Emissions H Field in SAR, d=3m

EUT: MCT RH TX
Manuf: Fidemco
Op Cond: Normal
Operator: Reusch
Test Spec: FCC 15.209
Comment: 4 sides, ant: l. _
EUT Hor

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
9k	150k	100Hz	200Hz	PK	10ms	AUTO LN	OFF	60dB
150k	30M	5k	10k	PK	5ms	AUTO LD	OFF	30dB

Final Measurement: x Hor-Max / + Vert-Max
Meas Time: 1 s
Subranges: 25
Acc Margin: 30dB



PAGE 1
EUT: MCT&RH-TX, Mode: Normal Operation, EUT-Pos.: hor
Date: 27.AUG.2015

EUT: MCT&RH-TX
Frequency Range: 9 kHz – 30 MHz
Ant.: .: – & |
EUT-Pos.: ver.
Modification: none

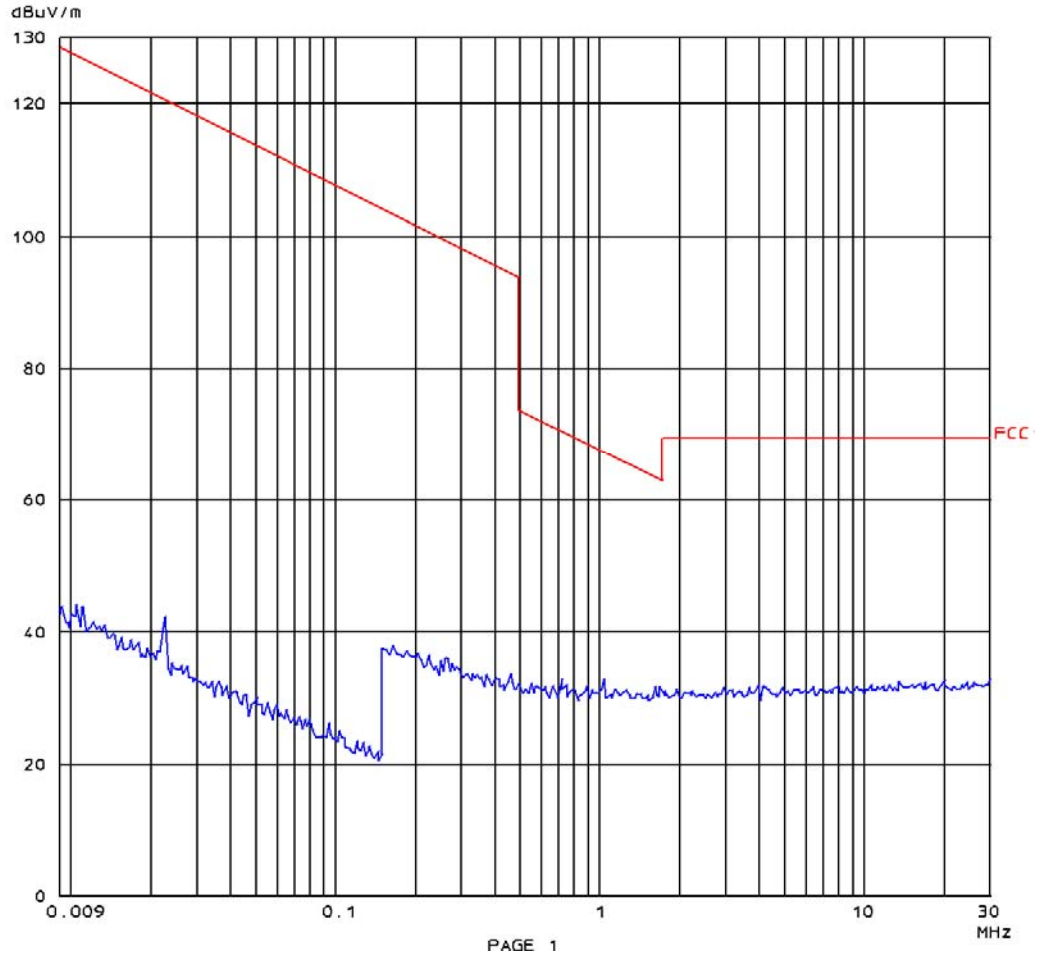
EMCCons DR. RASEK 27 Aug 15 09:09
Radiated Emissions H Field in SAR, d=3m

EUT: MCT RH TX
Manuf: Fidemco
Op Cond: Normal
Operator: Reusch
Test Spec: FCC 15.209
Comment: 4 sides, ant: l. _
EUT Ver

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
9k	150k	100Hz	200Hz	PK	10ms	AUTO LN	OFF	60dB
150k	30M	5k	10k	PK	5ms	AUTO LD	OFF	30dB

Final Measurement: x Hor-Max / + Vert-Max
Meas Time: 1 s
Subranges: 25
Acc Margin: 30dB



PAGE 1
EUT: MCT&RH-TX, Mode: Normal Operation, EUT-Pos.: ver
Date: 27.AUG.2015

EUT: W-TX
Frequency Range: 9 kHz – 30 MHz
Ant.: .: – & |
EUT-Pos.: hor.
Modification: none

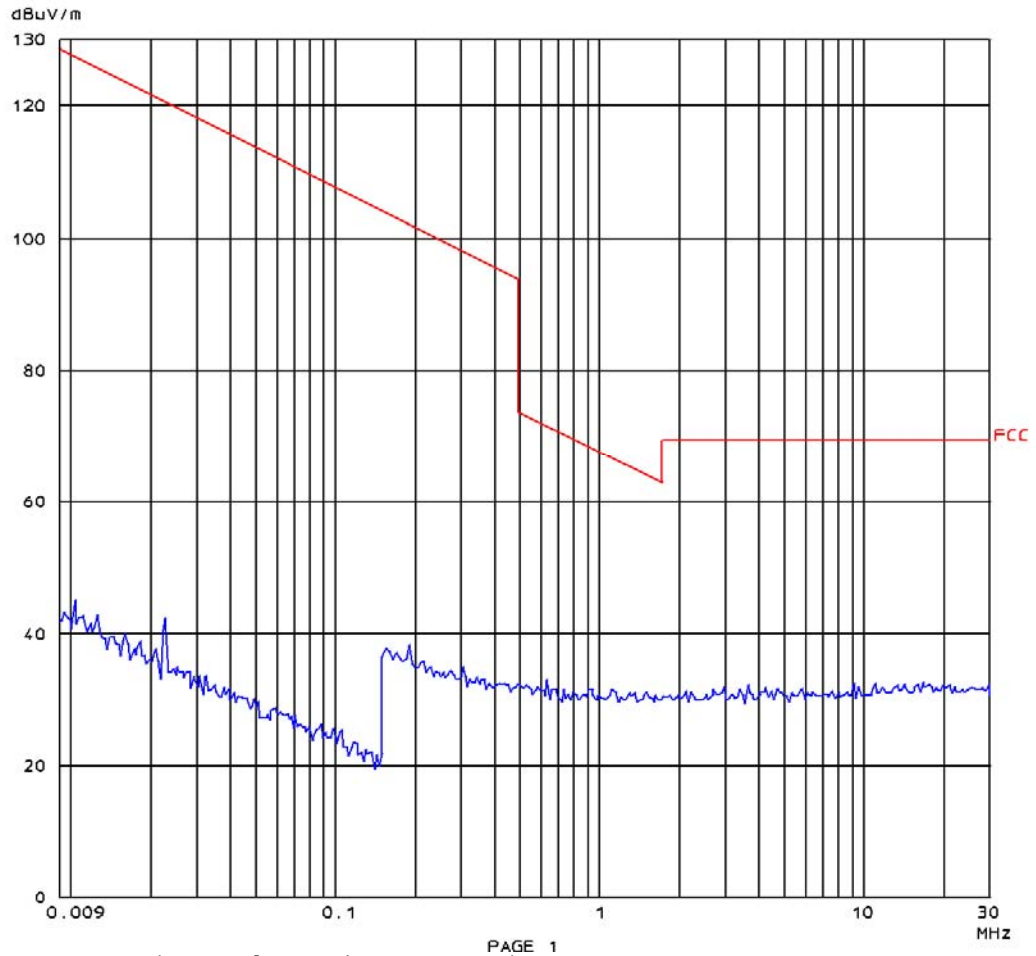
EMCCons DR. RASEK 27 Aug 15 10:15
Radiated Emissions H Field in SAR, d=3m

EUT:	W TX
Manuf:	Fidemco
Op Cond:	Normal
Operator:	Reusch
Test Spec:	FCC 15.209
Comment:	4 sides, ant: l. _
	EUT Hor

Scan Settings (2 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
9k	150k	100Hz	200Hz	PK	10ms	AUTO LN	OFF	60dB
150k	30M	5k	10k	PK	5ms	AUTO LD	OFF	30dB

Final Measurement: x Hor-Max / + Vert-Max
Meas Time: 1 s
Subranges: 25
Acc Margin: 30dB



PAGE 1
EUT: W-TX, Mode: Normal Operation, EUT-Pos.: hor
Date: 27.AUG.2015

EUT: W-TX
Frequency Range: 9 kHz – 30 MHz
Ant.: .: – & |
EUT-Pos.: ver.
Modification: none

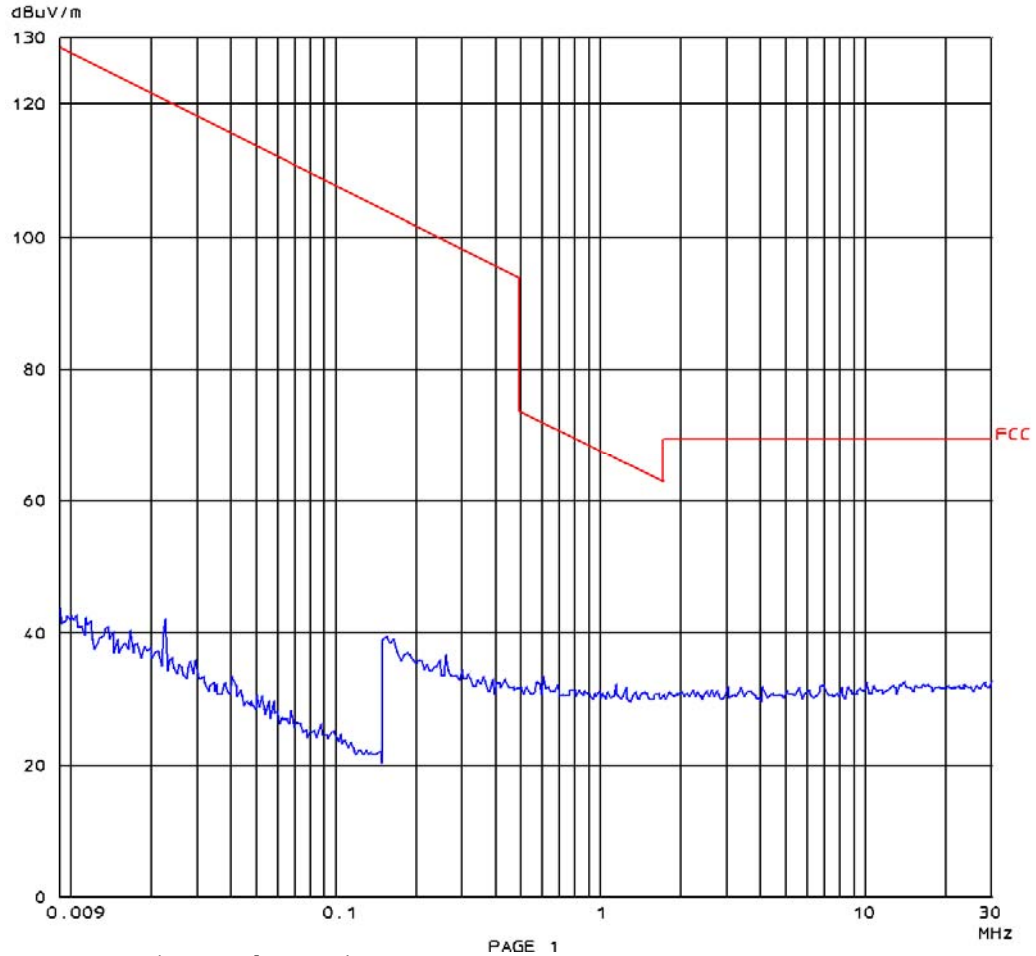
EMCCons DR. RASEK 27 Aug 15 09:47
Radiated Emissions H Field in SAR, d=3m

EUT: W TX
Manuf: Fidemco
Op Cond: Normal
Operator: Reusch
Test Spec: FCC 15.209
Comment: 4 sides, ant: l. _
EUT Ver

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
9k	150k	100Hz	200Hz	PK	10ms	AUTO LN	OFF	60dB
150k	30M	5k	10k	PK	5ms	AUTO LD	OFF	30dB

Final Measurement: x Hor-Max / + Vert-Max
Meas Time: 1 s
Subranges: 25
Acc Margin: 30dB



EUT: W-TX, Mode: Normal Operation, EUT-Pos.: ver
Date: 27.AUG.2015

9 RADIATED EMISSIONS 30 MHz – 1000 MHz

Test Requirement: FCC 47 CFR, §§ 15.249, 15.209
Test Procedure: ANSI C63.10-2013

9.1 Regulation

§ 15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz and 24.0-24.25 GHz
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

§15.209 Radiated emission limits; general requirements
(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency	Field Strength		Measurement distance
[MHz]	[µV/m]	[dB(µV/m)]	[m]
30–88	100**	40	3
88–216	150**	43.5	3
216–960	200**	46	3
Above 960	500	54	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.
(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
(e) The provisions in §§ 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

§ 15.31 Measurement standards
(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle.
1 to 10 MHz	2	1 near top and 1 near bottom.
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom.

§ 15.33 Frequency range of radiated measurements
(a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:
(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

§ 15.35 Measurement detector functions and bandwidths
The conducted and radiated emission limits shown in this part are based on the following, unless otherwise specified elsewhere in this part:
(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.
Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.

9.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
EMI/RFI Test Receiver	R&S / ESS	303	2015-03	2016-03
VHF Test Dipole RX	Schwarzb. / VHA 9103	1983	2015-05	2017-05
VHF Double-Cone Ant. bars	Schwarzb. / BBA 9106	1984	n.a.	n.a.
Log Per. Antenna	Schwarzb. / VUSLP 9111B	3203	2015-05	2017-05

9.3 Test Procedures

ANSI C63.10-2013, 6.3.1 Test arrangement

Figure 4 shows the typical arrangement of an unlicensed wireless device on a tabletop on a test site. Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m (see 6.6.3.1). A method for evaluating the effects of the table on EUT radiated emissions is given in 5.5 of CISPR 16-1-4:2010 for frequencies up to 18 GHz. The EUT shall be set up in its typical configuration and arrangement and operated in its various modes as described in 5.10. An antenna shall be connected to the EUT in accordance with 5.8 and 5.10.4. The EUT and transmitting antenna shall be centered on the turntable. For devices with multiple antennas that are active simultaneously, the EUT shall be positioned, to the extent possible, with the antennas equally distributed around the center of the device. The exact setup shall be documented in the test report.

Any controlling device (e.g., notebook, laptop, or desktop computer) shall be positioned such that it shall not significantly influence the measurement results. No other peripherals are required to be connected to the controlling device for this test unless the radio is being tested as part of the notebook or PDA qualifications.

ANSI C63.10-2013, 6.5.2 Antenna selection, location, and test distance

Measurements shall be made with the antenna positioned in both horizontal and vertical of polarizations. The measurement antenna shall be varied in height above the reference ground plane to obtain the maximum signal strength. The measurement antenna height shall be varied from 1 m to 4 m. These height scans apply for both horizontal and vertical polarizations, except that for vertical polarization, the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the lowest antenna element clears the site reference ground plane by at least 25 cm. […]

ANSI C63.10-2013, 6.5.3 Exploratory radiated emission tests

Exploratory measurements are used to identify the frequencies and amplitudes of the emissions while manipulating and rotating the EUT.

Exploratory radiated measurements shall be performed at the measurement distance or at a closer distance than that specified for compliance to determine the emission characteristics of the EUT. At near distances, for EUTs of comparably small size, it is relatively easy to determine the spectrum signature of the EUT and, if applicable, the EUT configuration that produces the maximum level of emissions. Exploratory measurements shall be made on a test site per 5.2. Shielded rooms, not treated with RF absorption material, shall not be used for exploratory measurements.

For each mode of operation required to be tested, the frequency spectrum shall be monitored. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.

ANSI C63.10-2013, 6.5.4 Final radiated emission tests

Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported.

Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.

Radiated Emissions Test Characteristics	
Frequency range	30 MHz – 1000 MHz
Test distance	3 m
Test instrumentation resolution bandwidth	120 kHz
Receive antenna height	1 m - 4 m
Receive antenna polarization	Vertical/Horizontal

9.4 Calculation of Field Strength Limits

E.g. radiated spurious emissions field strength limits for the restricted band 108-121.94 MHz:

150 µV/m at 3 meters

Using the equation:

$E_{dB\mu V/m} = 20 * \log (E_{\mu V/m})$

where

$E_{dB\mu V/m}$ = Field Strength in logarithmic units (dBµV/m)

$E_{\mu V/m}$ = Field Strength in linear units (µV/m)

A field strength limit of 150 µV/m corresponds with 43.5 dBµV/m.

9.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF
where
FS = Field Strength in dBµV/m
RA = Receiver Amplitude in dBµV
AF = Antenna Factor in dB(1/m)
CF = Cable Attenuation Factor in dB

Assume a receiver reading of 23.5 dBµV is obtained. The Antenna Factor of 7.4 dB(1/m) and a Cable Factor of 1.1 dB are added, giving a field strength of 32 dBµV/m. The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

FS = 23.5 + 7.4 + 1.1 = 32 [dBµV/m]

Level in µV/m = Common Antilogarithm (32/20) = 39.8

9.6 Final Test Results

Operating Mode: Continuous Transmit

EUT: MCT&RH-TX:

Frequency [MHz]	Detector	RA [dB(µV)]	AF + CF [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Pol. h / v
297.1	QP	-1.5	22.4	20.9	46	25.1	h
949.5	QP	-1.5	28.7	27.2	46	18.8	h

EUT: W-TX:

Frequency [MHz]	Detector	RA [dB(µV)]	AF + CF [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Pol. h / v
297.7	QP	-1.3	22.4	21.1	46	24.9	v
949.1	QP	-1.2	28.7	27.5	46	18.5	v

All tests performed at 3 m distance. The table above contains worst-case emissions, only. For further details refer to the pre-scan test plots.

Note: The measurement results shown in the table above are recorded with unmodified samples. The measured quasi-peak values are noise, only.

The measurement 300 – 1000 MHz repeated with modified EUTs in worst case position as figured out during measurements with non-modified EUTs. No deviations of measurement results were observed. Refer to the following prescan plots.

Manufacturer:	Fidemco, LLC
Device:	MCT&RH-TX and W-TX
Serial No:	14037, 50138
Test date:	2015-08-31 / 2015-09-01

All measured emissions in the range 30 MHz to 1000 MHz are below the specified limits.

The EUT meets the requirements of this section.

9.7 Measurement Prescan-Plots

EUT: MCT&RH-TX
Frequency Range: 30 MHz – 300 MHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: none

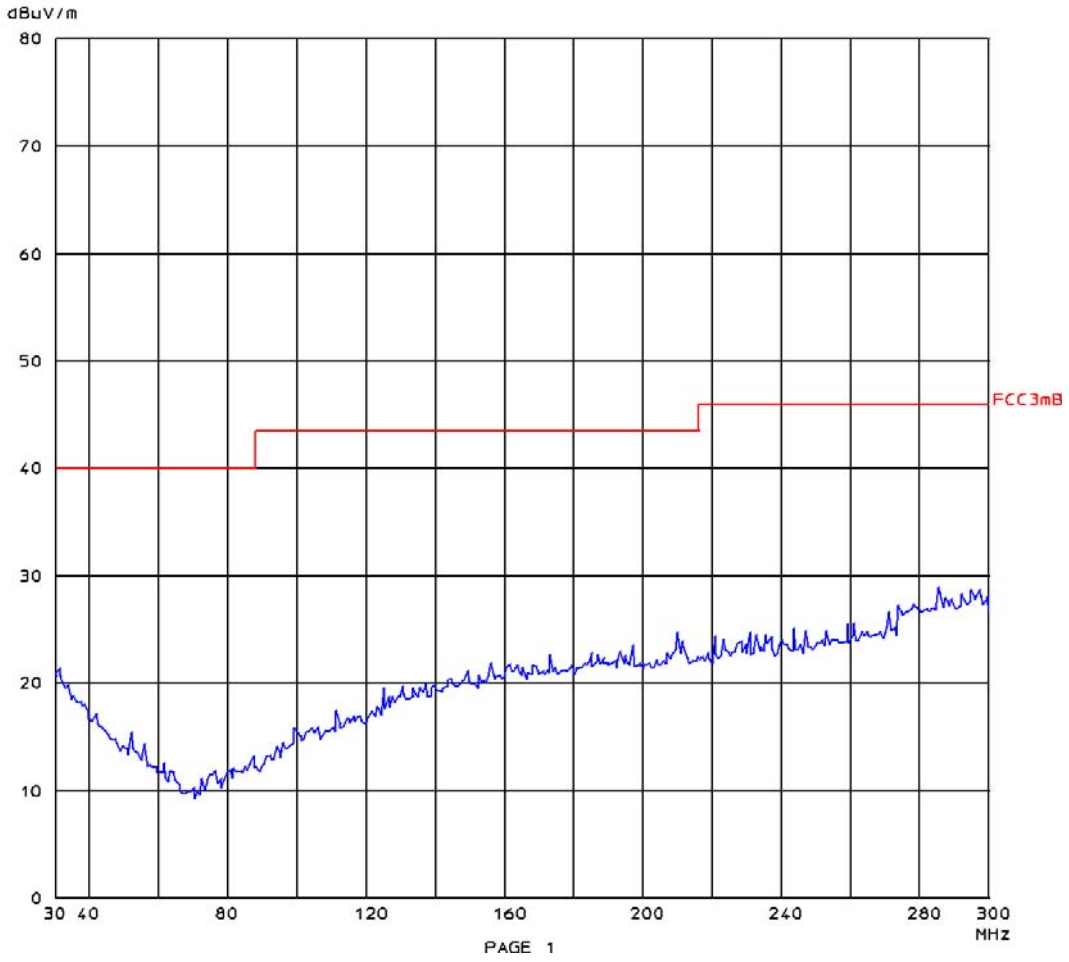
EMCC DR. RASEK 31. Aug 15 07:23
Radiated Emissions Prescan in SAR, d=3m

EUT: MCT RH TX
Manuf: Fidemco
Op Cond: Cont. TX
Operator: Reusch
Test Spec: FCC 15.209
Comment: 4 Sides, 4 Heigth, Ver & Hor
EUT Hor

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	300M	40k	120k	PK	0.10ms	0dBLN	ON	60dB

Transducer No.	Start	Stop	Name
21	30M	350M	899K26



Mode: Continuous Transmit, EUT hor
Date: 28.AUG.2015

EUT: MCT&RH-TX
Frequency Range: 300 MHz – 1000 MHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: none

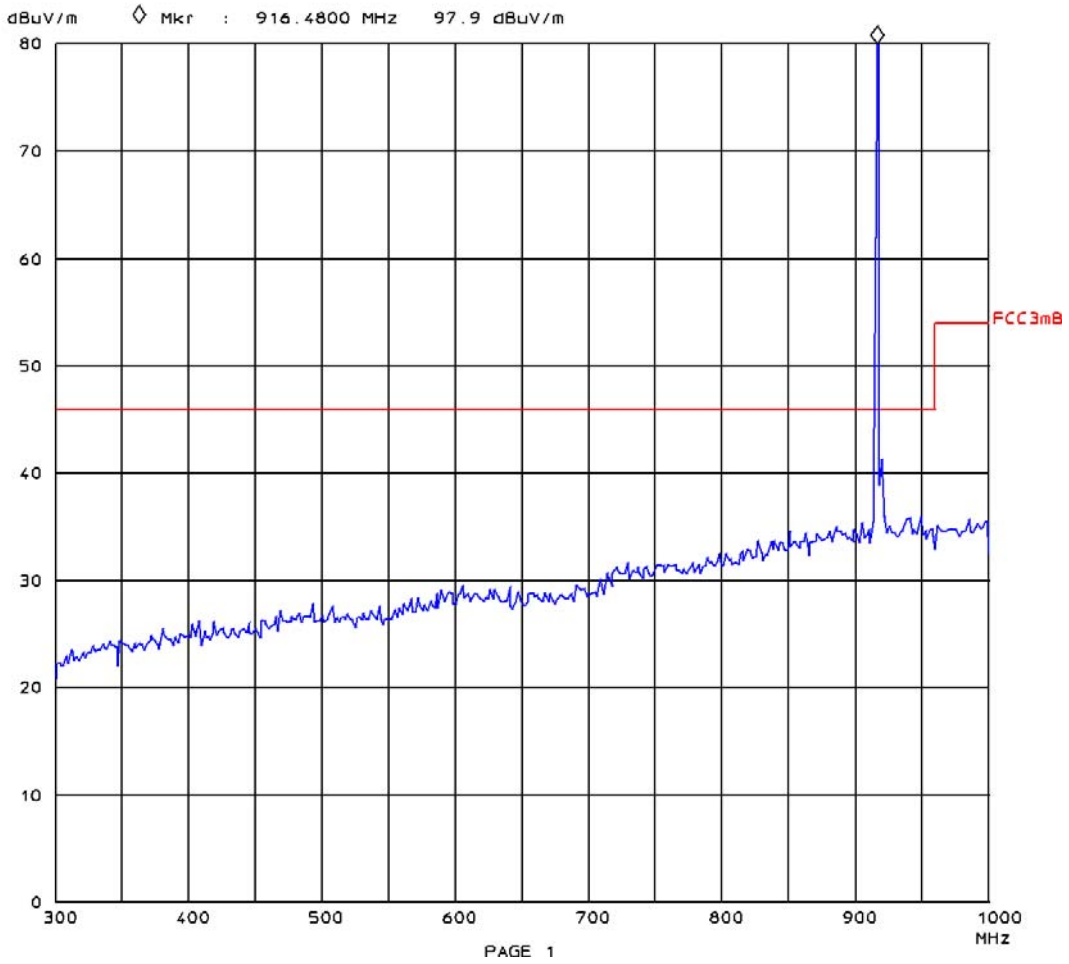
EMCC DR. RASEK 31. Aug 15 11:18
Radiated Emissions Prescan in SAR, d=3m

EUT:	MCT RH TX
Manuf:	Fidemco
Op Cond:	Cont. TX
Operator:	Reusch
Test Spec:	FCC 15.209
Comment:	4 Sides, 4 Heigth, Ver & Hor
	EUT Hor

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	40k	120k	PK	0.10ms	0dBLN	ON	60dB

Transducer No.	Start	Stop	Name
22	150M	1000M	3203K26



Mode: Continuous Transmit, EUT hor
Date: 28.AUG.2015

Note: TX-Frequency at 916.5 MHz, refer to chapters 5 to 7.

EUT: MCT&RH-TX
Frequency Range: 30 MHz – 300 MHz
Ant.: hor. & ver.
EUT-Pos.: ver.
Modification: none

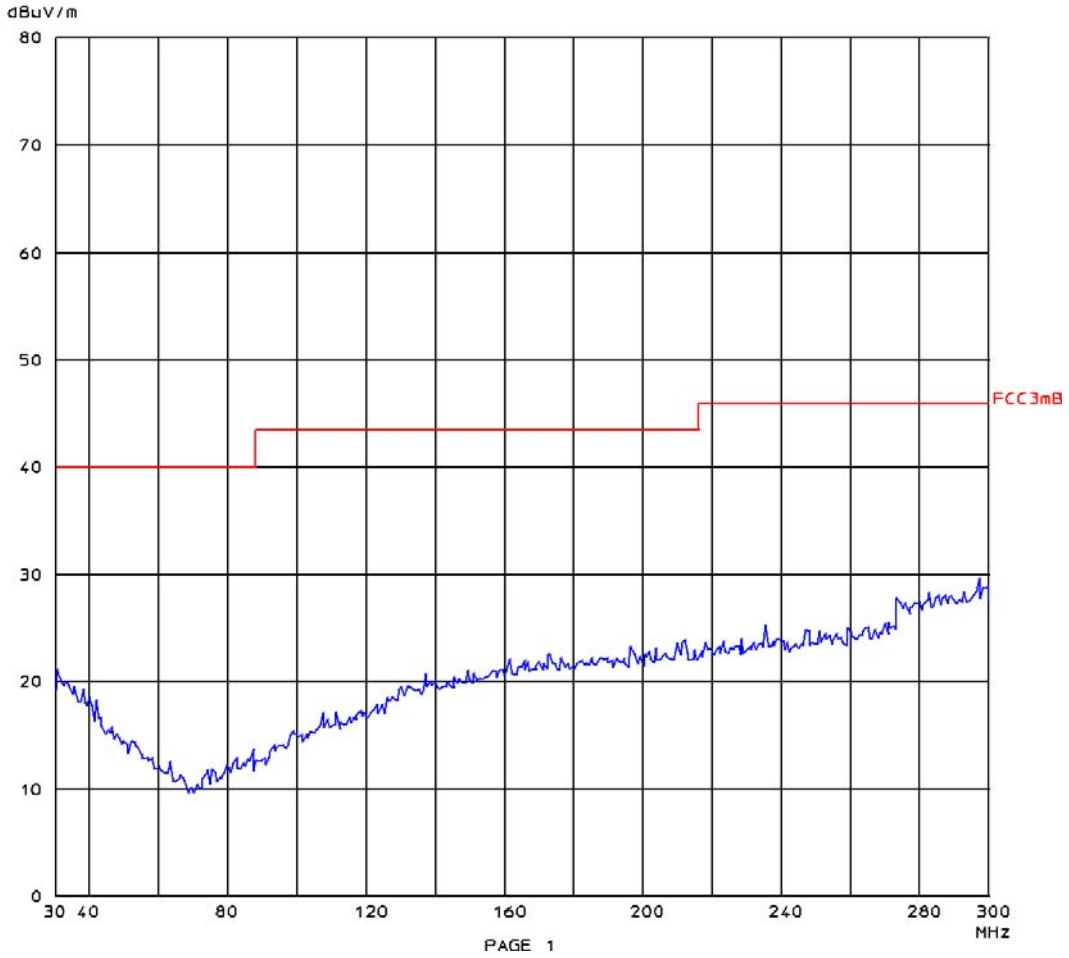
EMCC DR. RASEK 31. Aug 15 07:52
Radiated Emissions Prescan in SAR, d=3m

EUT: MCT RH TX
Manuf: Fidemco
Op Cond: Cont. TX
Operator: Reusch
Test Spec: FCC 15.209
Comment: 4 Sides, 4 Heigth, Ver & Hor
EUT Ver

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	300M	40k	120k	PK	0.10ms	0dBLN	ON	60dB

Transducer No.	Start	Stop	Name
21	30M	350M	899K26



Mode: Continuous Transmit, EUT ver
Date: 28.AUG.2015

EUT: MCT&RH-TX
Frequency Range: 300 MHz – 1000 MHz
Ant.: hor. & ver.
EUT-Pos.: ver.
Modification: none

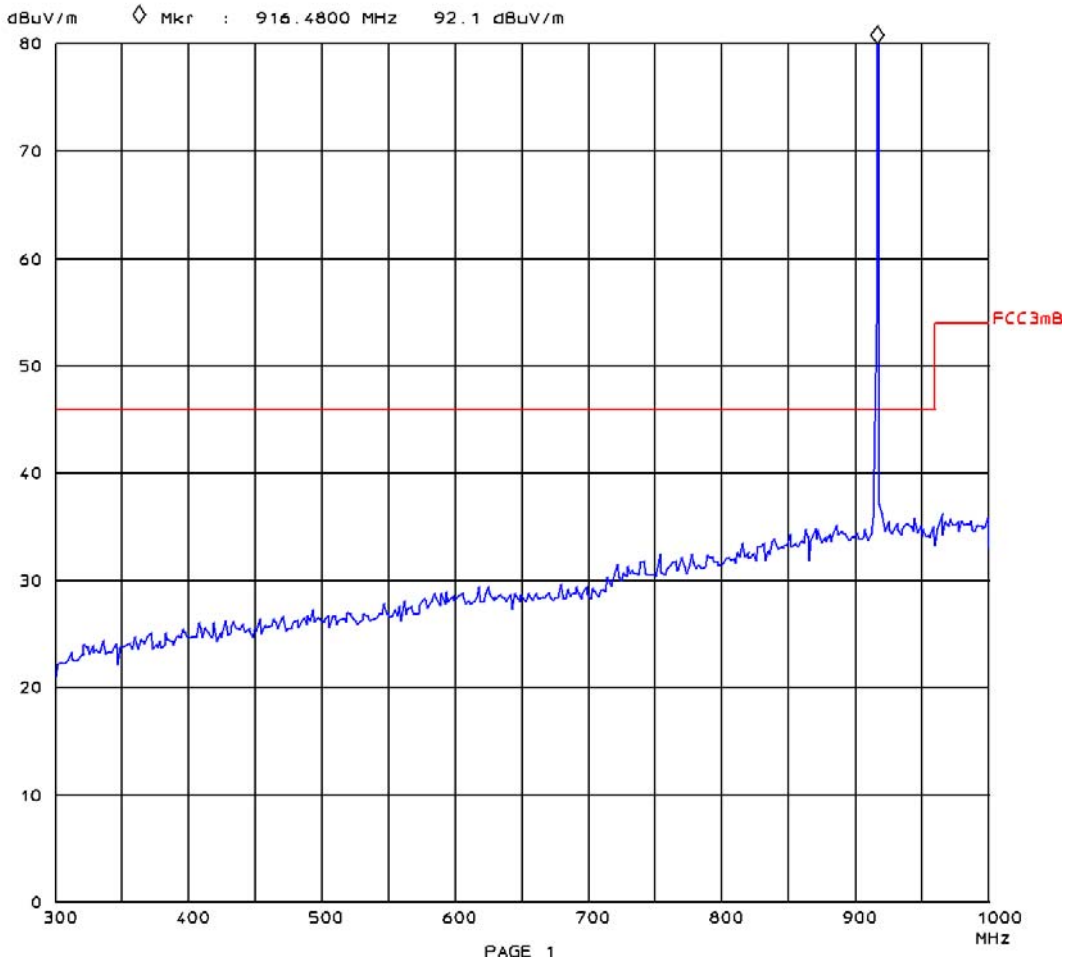
EMCC DR. RASEK 31. Aug 15 10:47
Radiated Emissions Prescan in SAR, d=3m

EUT:	MCT RH TX
Manuf:	Fidemco
Op Cond:	Cont. TX
Operator:	Reusch
Test Spec:	FCC 15.209
Comment:	4 Sides, 4 Heigth, Ver & Hor
	EUT Ver

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	40k	120k	PK	0.10ms	0dBLN	ON	60dB

Transducer No.	Start	Stop	Name
22	150M	1000M	3203K26



Mode: Continuous Transmit, EUT ver
Date: 28.AUG.2015

Note: TX-Frequency at 916.5 MHz, refer to chapters 5 to 7.

EUT: MCT&RH-TX
Frequency Range: 300 MHz – 1000 MHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5

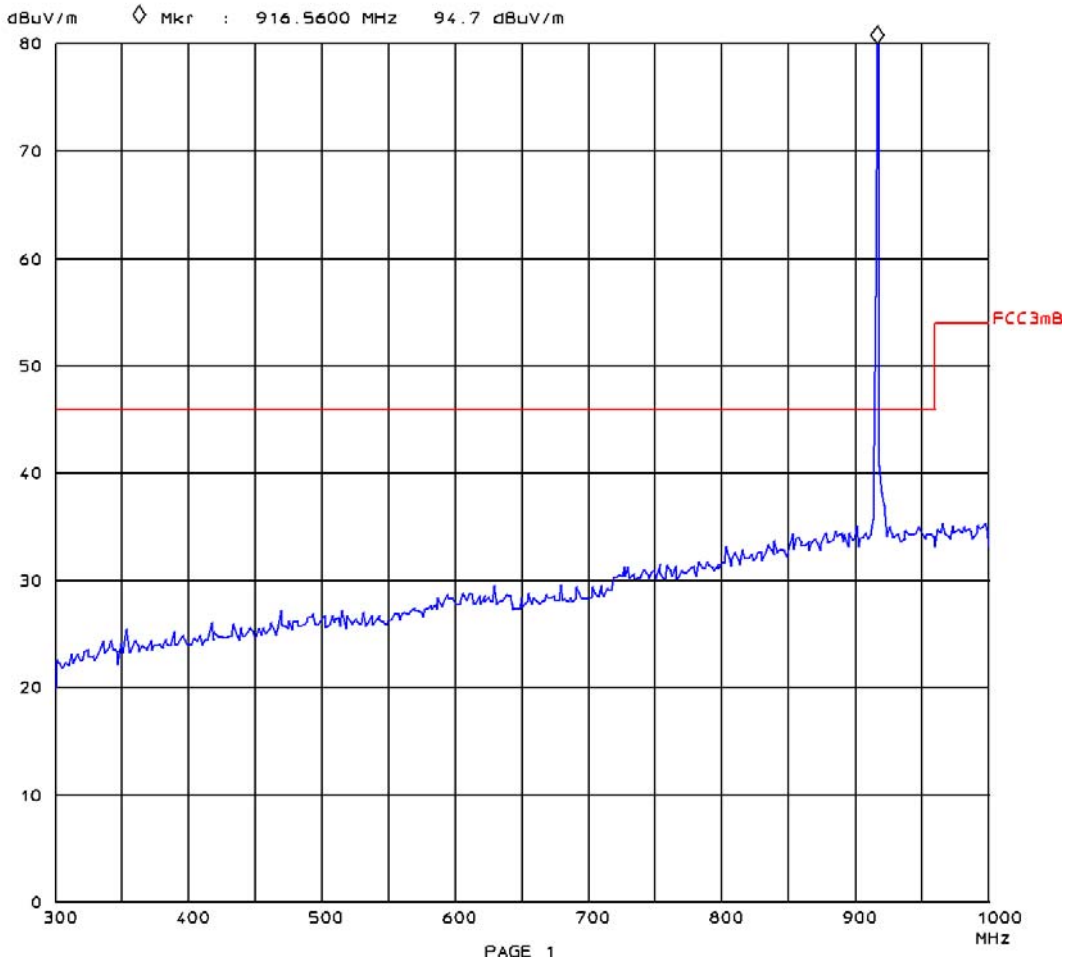
EMCC DR. RASEK 01 Sep 15 09:49
Radiated Emissions Prescan in SAR, d=3m

EUT: MCT RH TX
Manuf: Fidemco
Op Cond: Cont. TX
Operator: Reusch
Test Spec: FCC 15.209
Comment: 4 Sides, 4 Heigth, Ver & Hor
EUT Hor, Modified

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	40k	120k	PK	0.10ms	0dB	LN ON	60dB

Transducer	No.	Start	Stop	Name
	22	150M	1000M	3203K26



Mode: Continuous Transmit, EUT hor
Date: 28.AUG.2015

Note: TX-Frequency at 916.5 MHz, refer to chapters 5 to 7.

EUT: W-TX
Frequency Range: 30 MHz – 300 MHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: none

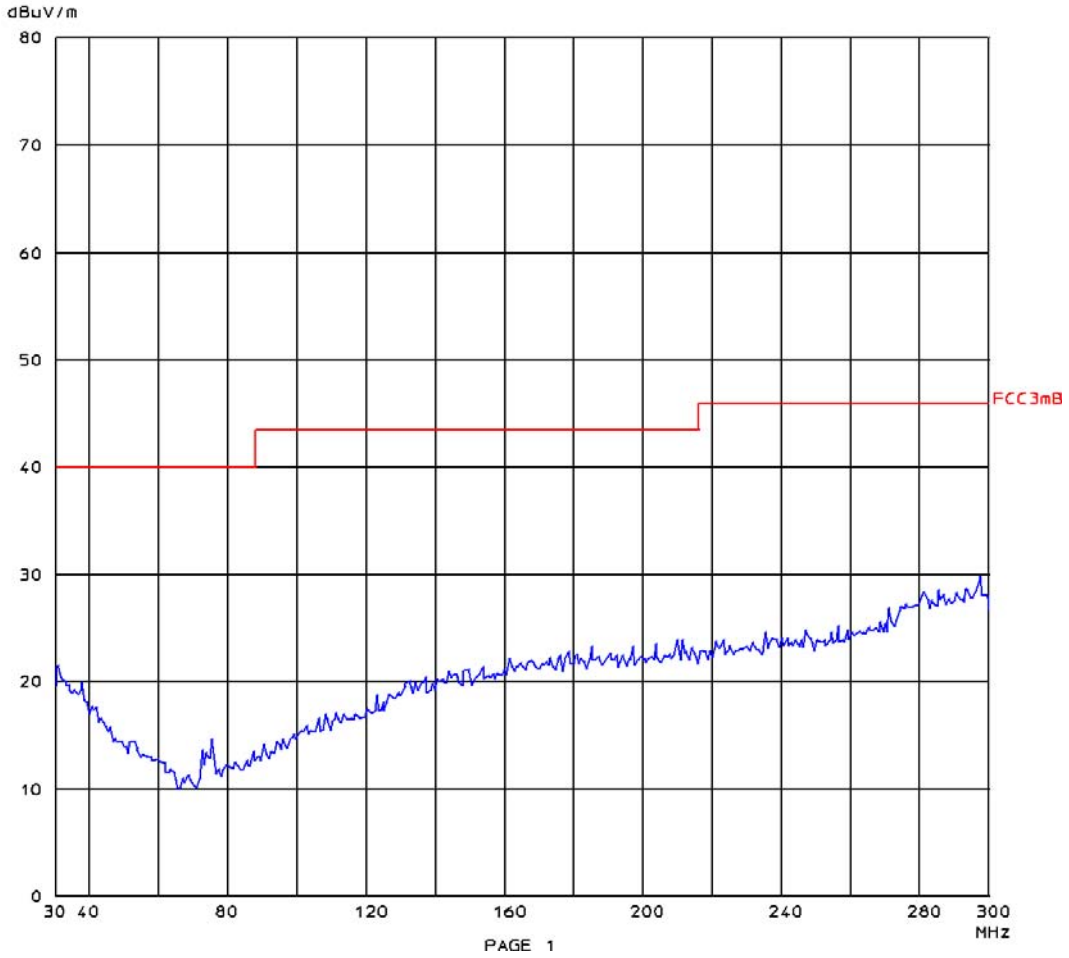
EMCC DR. RASEK 31. Aug 15 08:50
Radiated Emissions Prescan in SAR, d=3m

EUT: W TX
Manuf: Fidemco
Op Cond: Cont. TX
Operator: Reusch
Test Spec: FCC 15.209
Comment: 4 Sides, 4 Heigth, Ver & Hor
EUT Hor

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	300M	40k	120k	PK	0.10ms	0dBLN	ON	60dB

Transducer No.	Start	Stop	Name
21	30M	350M	899K26



Mode: Continuous Transmit, EUT hor
Date: 28.AUG.2015

EUT: W-TX
Frequency Range: 300 MHz – 1000 MHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: none

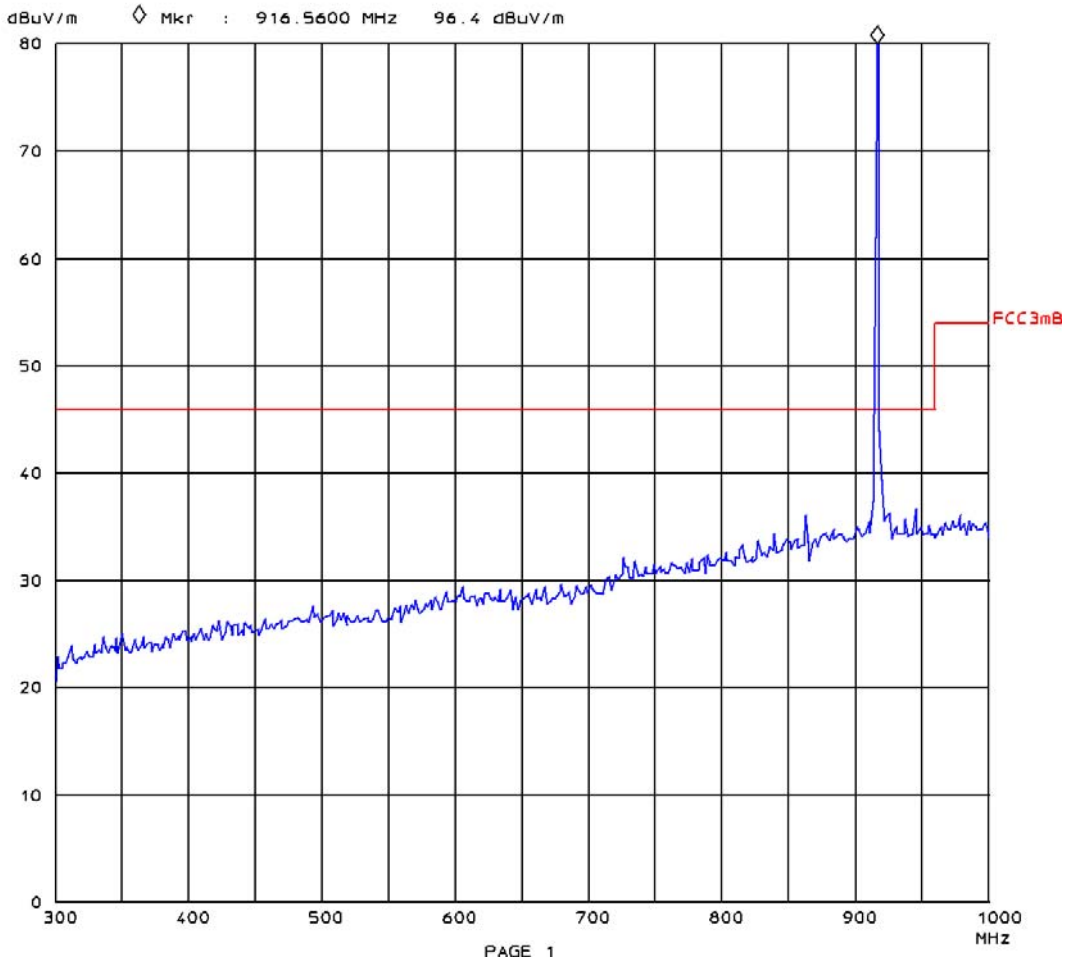
EMCC DR. RASEK 31. Aug 15 09:29
Radiated Emissions Prescan in SAR, d=3m

EUT: W TX
Manuf: Fidemco
Op Cond: Cont. TX
Operator: Reusch
Test Spec: FCC 15.209
Comment: 4 Sides, 4 Heigth, Ver & Hor
EUT Hor

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	40k	120k	PK	0.10ms	0dBLN	ON	60dB

Transducer No.	Start	Stop	Name
22	150M	1000M	3201K26



Mode: Continuous Transmit, EUT hor
Date: 28.AUG.2015

Note: TX-Frequency at 916.5 MHz, refer to chapters 5 to 7.

EUT: W-TX
Frequency Range: 30 MHz – 300 MHz
Ant.: hor. & ver.
EUT-Pos.: ver.
Modification: none

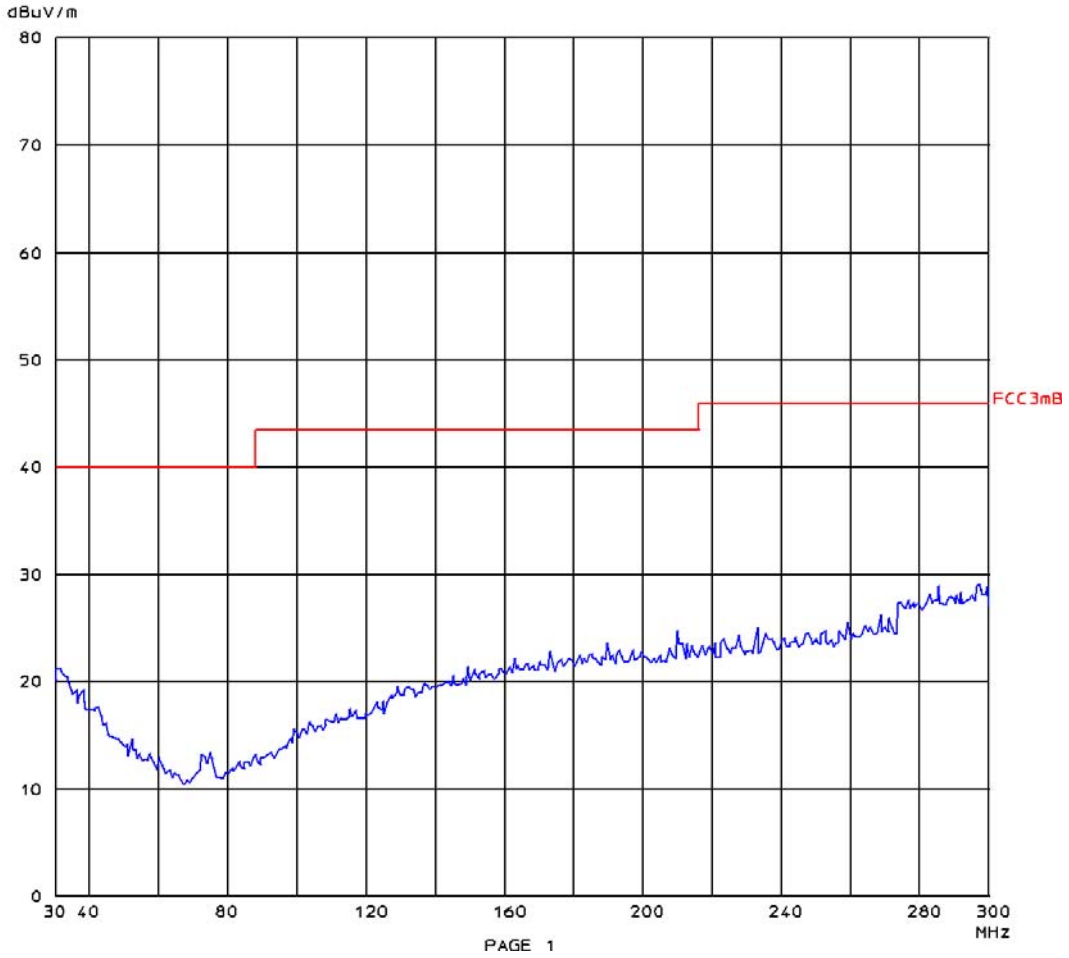
EMCC DR. RASEK 31. Aug 15 08:28
Radiated Emissions Prescan in SAR, d=3m

EUT:	W TX
Manuf:	Fidemco
Op Cond:	Cont. TX
Operator:	Reusch
Test Spec:	FCC 15.209
Comment:	4 Sides, 4 Heigth, Ver & Hor
	EUT Ver

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	300M	40k	120k	PK	0.10ms	0dBLN	ON	60dB

Transducer	No.	Start	Stop	Name
	21	30M	350M	899K26



Mode: Continuous Transmit, EUT ver
Date: 28.AUG.2015

EUT: W-TX
Frequency Range: 300 MHz – 1000 MHz
Ant.: hor. & ver.
EUT-Pos.: ver.
Modification: none

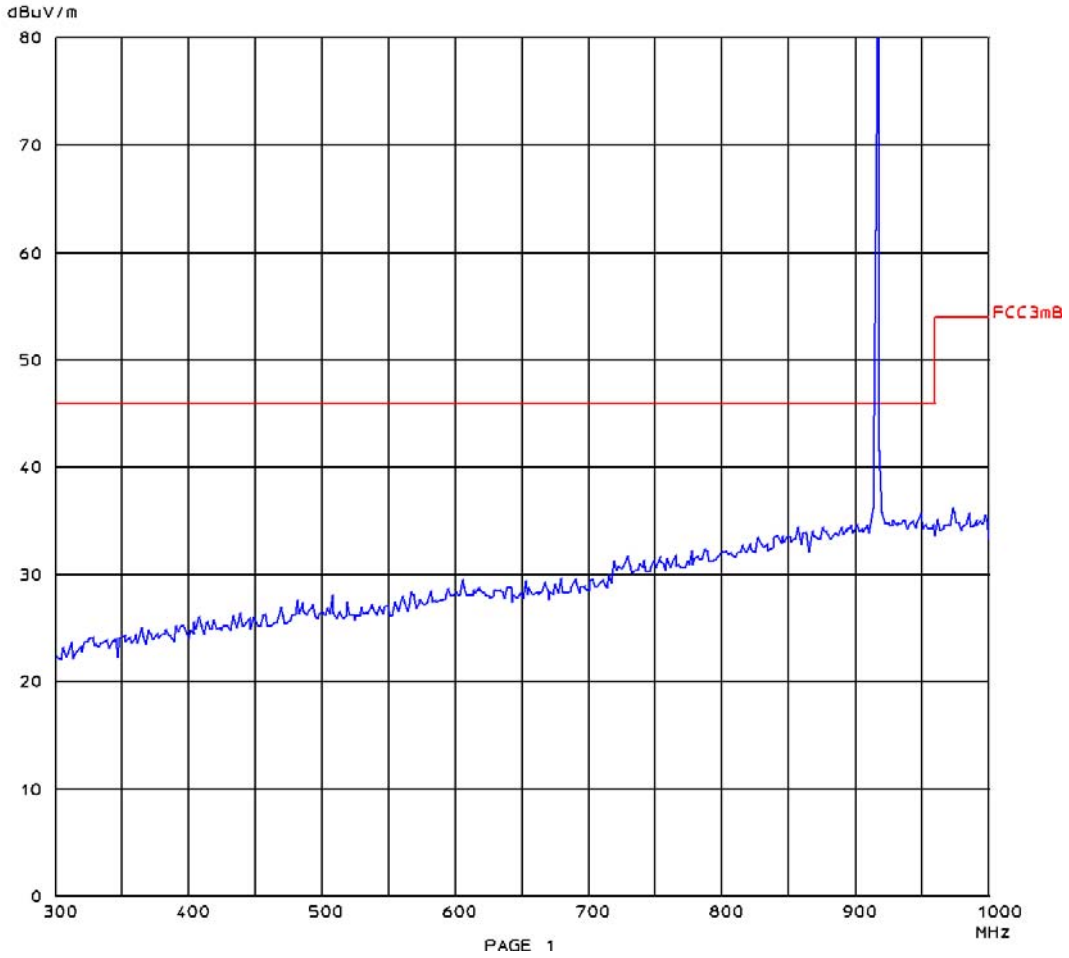
EMCC DR. RASEK 31. Aug 15 10:15
Radiated Emissions Prescan in SAR, d=3m

EUT:	W TX
Manuf:	Fidemco
Op Cond:	Cont. TX
Operator:	Reusch
Test Spec:	FCC 15.209
Comment:	4 Sides, 4 Heigth, Ver & Hor
	EUT Ver

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	40k	120k	PK	0.10ms	0dBLN	ON	60dB

Transducer No.	Start	Stop	Name
22	150M	1000M	3203K26



Mode: Continuous Transmit, EUT ver
Date: 28.AUG.2015

Note: TX-Frequency at 916.5 MHz, refer to chapters 5 to 7.

EUT: W-TX
Frequency Range: 300 MHz – 1000 MHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5

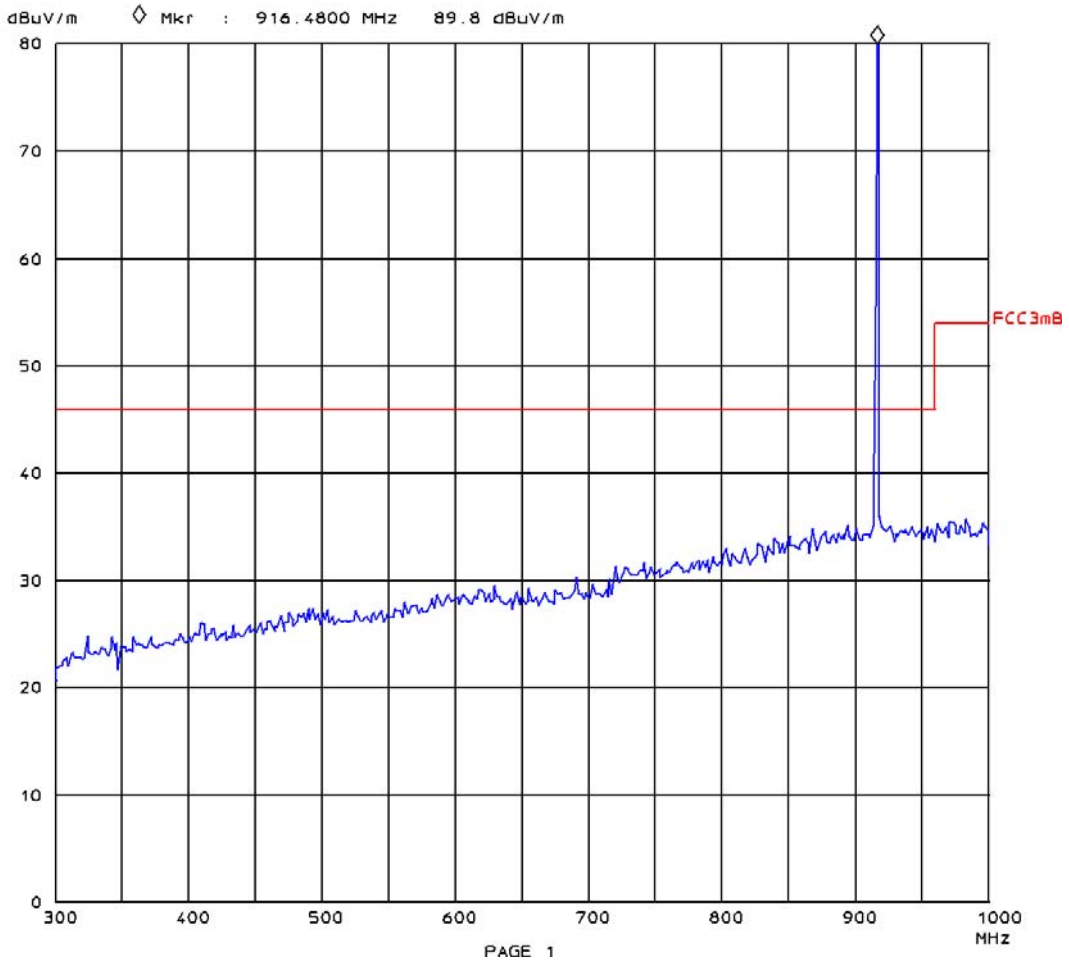
EMCC DR. RASEK 01. Sep 15 10.11
Radiated Emissions Prescan in SAR, d=3m

EUT: W TX
Manuf: Fidemco
Op Cond: Cont. TX
Operator: Reusch
Test Spec: FCC 15.209
Comment: 4 Sides, 4 Heigth, Ver & Hor
EUT Hor, Modified

Fast Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	40k	120k	PK	0.10ms	0dBLN	ON	60dB

Transducer	No.	Start	Stop	Name
	22	150M	1000M	3203K26



Mode: Continuous Transmit, EUT hor
Date: 28.AUG.2015

Note: TX-Frequency at 916.5 MHz, refer to chapters 5 to 7.

10 RADIATED EMISSIONS 1 GHz – 10 GHz

Test Requirement: FCC 47 CFR, § 15.109
Test Procedure: ANSI C63.10-2013

10.1 Regulation

§ 15.109 Radiated emission limits:

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission	Field strength
[MHz]	[microvolts/meter]
30-88	100
88-216	150
216-960	200
Above 960	500

(c) In the emission tables above, the tighter limit applies at the band edges. Sections 15.33 and 15.35 which specify the frequency range over which radiated emissions are to be measured and the detector functions and other measurement standards apply

§ 15.33 Frequency range of radiated measurements:
(b) For unintentional radiators:
(1) Except as otherwise indicated in paragraphs (b)(2) or (b)(3) of this section, for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

§ 15.35 Measurement detector functions and bandwidths
The conducted and radiated emission limits shown in this part are based on the following, unless otherwise specified elsewhere in this part:
(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector

function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.
Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.

10.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
AC Power Source	AEG / DAMK4/DAGK4	0001	n.a	n.a
EMI/RFI Test Receiver	R&S / FSU50	3831	2015-07	2016-07
Double Ridged Guide Ant.	Schwarzb. / BBHA 9120D	3236	2015-06	2017-06
Multimeter	Agilent / U1241B	3880	2014-04	2016-04
HF-Cable	IW / NPS-2801AN-2756	4393	2014-10	2015-10

10.3 Test Procedures

ANSI C63.10-2013, 6.3.1 Test arrangement
Figure 4 shows the typical arrangement of an unlicensed wireless device on a tabletop on a test site. Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m (see 6.6.3.1). A method for evaluating the effects of the table on EUT radiated emissions is given in 5.5 of CISPR 16-1-4:2010 for frequencies up to 18 GHz. The EUT shall be set up in its typical configuration and arrangement and operated in its various modes as described in 5.10. An antenna shall be connected to the EUT in accordance with 5.8 and 5.10.4. The EUT and transmitting antenna shall be centered on the turntable. For devices with multiple antennas that are active simultaneously, the EUT shall be positioned, to the extent possible, with the antennas equally distributed around the center of the device. The exact setup shall be documented in the test report.
Any controlling device (e.g., notebook, laptop, or desktop computer) shall be positioned such that it shall not significantly influence the measurement results. No other peripherals are required to be connected to the controlling device for this test unless the radio is being tested as part of the notebook or PDA qualifications.

ANSI C63.10-2013, 6.6.2 Antenna selection, location, and test distance:
Radiated emission measurements in the frequency range above 1 GHz shall be made on a test site meeting the requirements in 5.2 particularly for measurements above 1 GHz, and at a measurement distance specified in 5.3 (typically 3 m) using antenna(s) specified in 4.3.4. Because some EUTs can have an electrical size larger than the 3 dB beamwidth of the antenna at the specified measurement distance, and because the source of emissions is generally limited to relatively small-angle cones of radiation, the measurement antenna beamwidth shall be known so that when emissions from EUTs are measured, the area of coverage across the EUT can be determined.

ANSI C63.10-2013, 6.6.3.1 Tabletop equipment

For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the floor on a support that is RF transparent for the frequencies of interest. The 1.5 m height EUT support shall be constructed using a low permittivity and low loss tangent (tanδ) material with a height of 1.5 m, or a low permittivity and low loss tangent (tanδ) material may be placed on top of a typical table with a height of 0.8 m or 1 m. One typical low-permittivity and low-loss tangent material is styrene. Due to its dielectric properties for frequencies above 1 GHz, the use of styrene or building insulation foam is recommended, rather than, for example, wood. Support equipment shall be placed far enough away from the EUT, such that changes in relative position of the EUT and support equipment do not cause changes in measured values. Final measurements for the EUT require a measurement antenna height scan of 1 m to 4 m.

Where possible, the methods for portable, handheld, or body-worn equipment detailed in 6.6.3.3 may be employed for smaller tabletop equipment to allow the use of shorter cabling between measurement antennas and measuring receiver/spectrum analyzer by restricting the upper height of the measurement antenna.

Radiated Emissions Test Characteristics	
Frequency range	1 GHz – 10 GHz
Test distance	3 m*
Test instrumentation resolution bandwidth	1 MHz
Receive antenna height	1 m – 4 m
Receive antenna polarization	Vertical/Horizontal

* decreased test distance at frequencies above 6 GHz.

10.4 Calculation of Field Strength Limits

E.g. radiated spurious emissions field strength limits for the band above 960 MHz:

500 µV/m at 3 meters

Using the equation:

$E_{dB\mu V/m} = 20 * \log (E_{\mu V/m})$

where

$E_{dB\mu V/m}$ = Field Strength in logarithmic units (dBµV/m)

$E_{\mu V/m}$ = Field Strength in linear units (µV/m)

A field strength limit of 500 µV/m corresponds with 46 dBµV/m.

10.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF
where
FS = Field Strength in dBµV/m

RA = Receiver Amplitude in dBµV
AF = Antenna Factor in dB(1/m)
CF = Cable Attenuation Factor in dB

Assume a receiver reading of 23.5 dBµV is obtained. The Antenna Factor of 7.4 dB(1/m) and a Cable Factor of 1.1 dB are added, giving a field strength of 32 dBµV/m. The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

FS = 23.5 + 7.4 + 1.1 = 32 [dBµV/m]
Level in µV/m = Common Antilogarithm (32/20) = 39.8

For average measurements, the measured peak field strength is corrected by an AV correction factor. Please refer to chapter 2.6 for details.

FS_{AV} = FS + CF
where
FS_{AV} = Average Field Strength in dBµV/m
FS = Peak Field Strength in dBµV/m
CF = Correction Factor in dB

Assuming a peak field strength of 50 dBµV/m, the value for the average field strength with a AV correction factor of -12dB corresponds with 38 dBµV/m.

10.6 Final Test Results

Operating Mode: Continuous Transmit

EUT: MCT&RH-TX, modified

Frequency [MHz]	Field Strength [dBµV/m]	AV Correction Factor [dB]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]
1833	45.4	0	45.4	74	28.6
1833	45.4	-12.6	32.8	54	21.2
2749	58.6	0	58.6	74	15.4
2749	58.6	-12.6	46.0	54	8.0
3666	54.6	0	54.6	74	19.4
3666	54.6	-12.6	42.0	54	12.0

EUT: W-TX, modified

Frequency [MHz]	Field Strength [dBµV/m]	AV Correction Factor [dB]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]
1833	49.2	0	49.2	74	24.8
1833	49.2	-12.6	36.6	54	17.4
2750	54.9	0	54.9	74	19.1
2750	54.9	-12.6	42.2	54	11.8
3666	48.6	0	48.6	74	25.4
3666	48.6	-12.6	36.0	54	18.0

Note: average correction factor is based on the transmission time ratio of the EUT. For further details refer to chapter 2.1 of the report.

All tests below 6 GHz are performed at 3 m distance. Prescan measurements above 6 GHz performed at 1.5 m distance. The table above contains worst-case emissions, only. For further details refer to the pre-scan test plots.

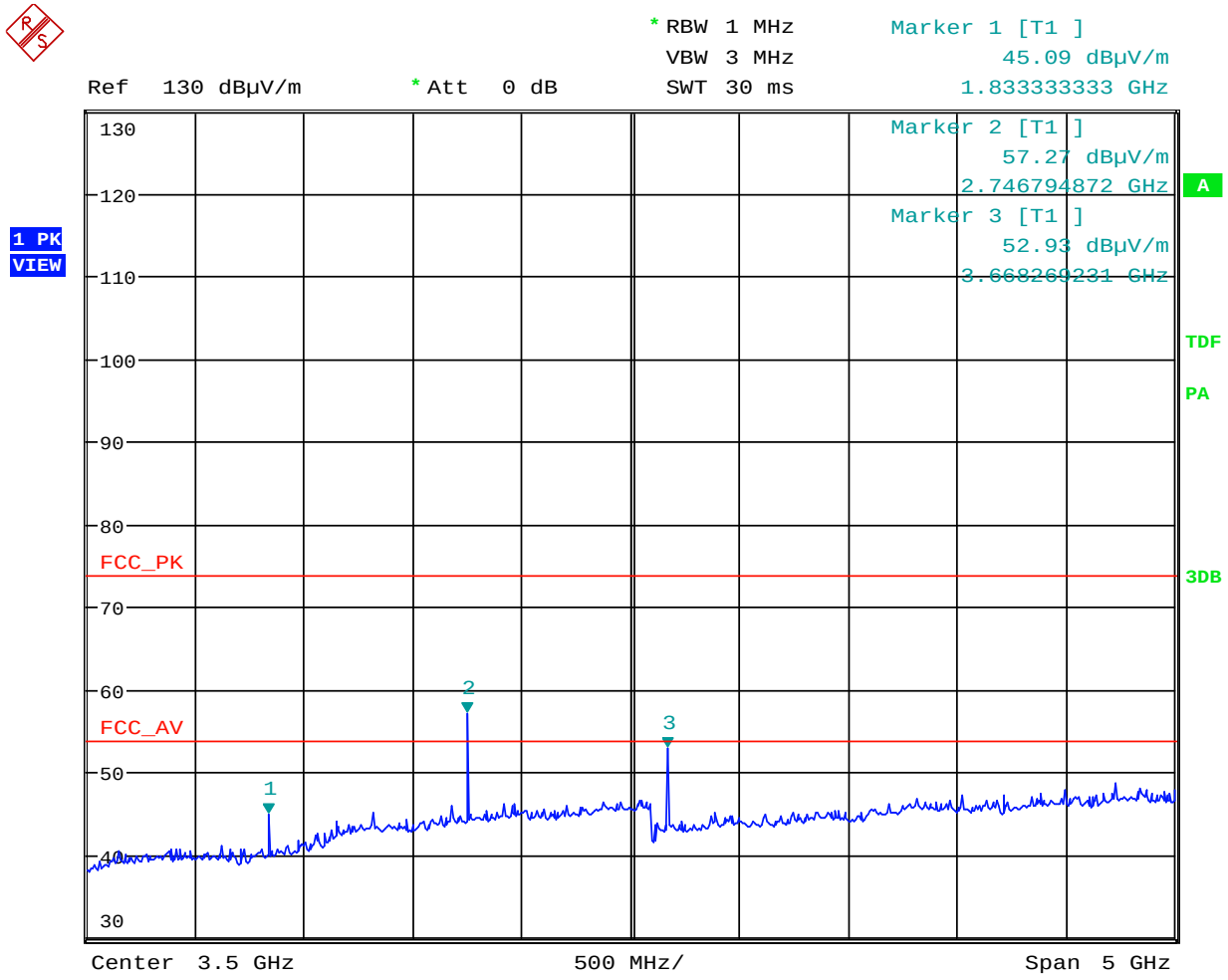
Manufacturer: Fidemco, LLC
Device: MCT&RH-TX and W-TX
Serial No: 14037, 50138
Test date: 2015-09-01

All measured emissions in the range 1 GHz to 10 GHz are below the specified limits.

The EUT meets the requirements of this section.

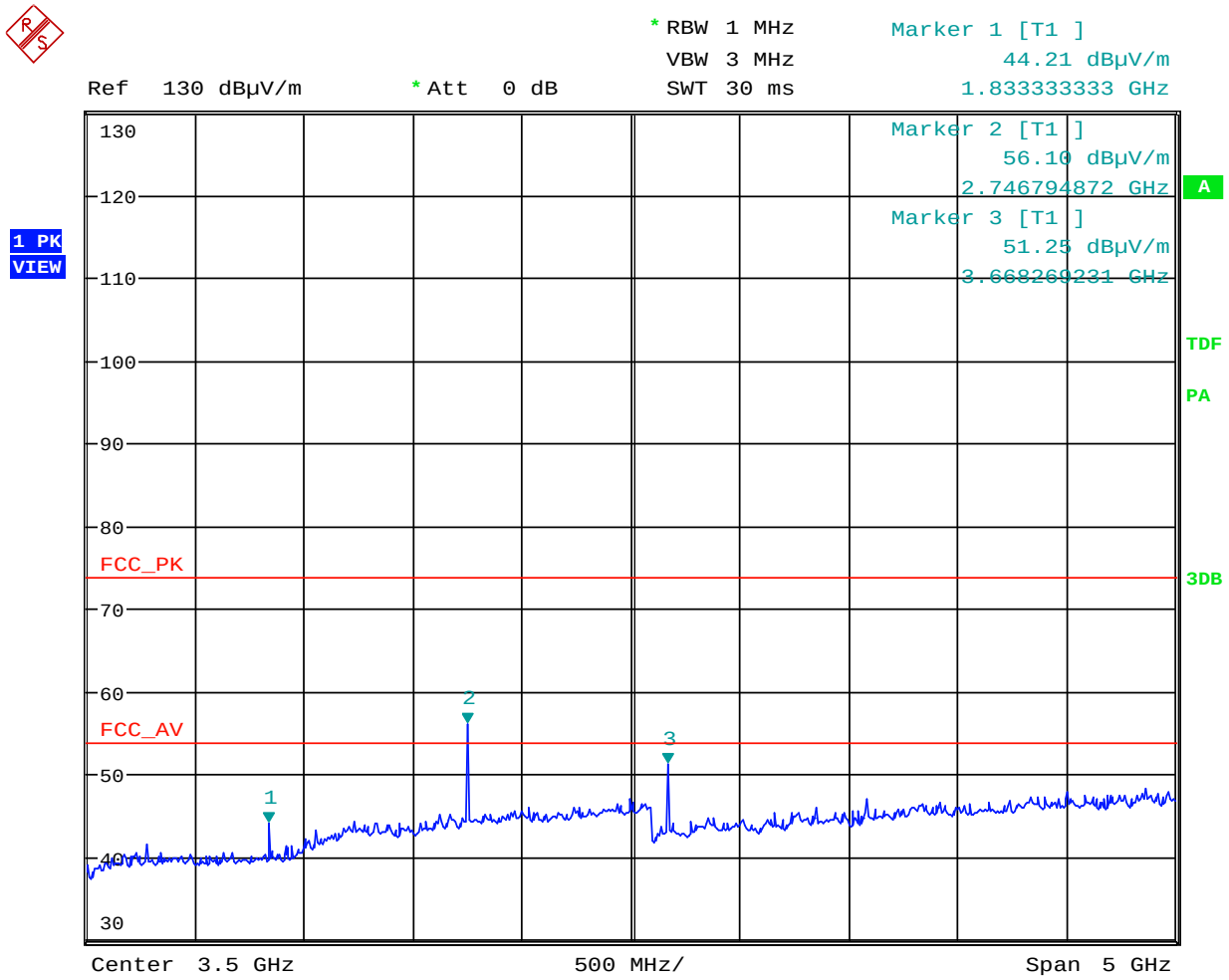
10.7 Measurement Prescan-Plots

EUT: MCT&RH-TX
Frequency Range: 1 GHz – 6 GHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5



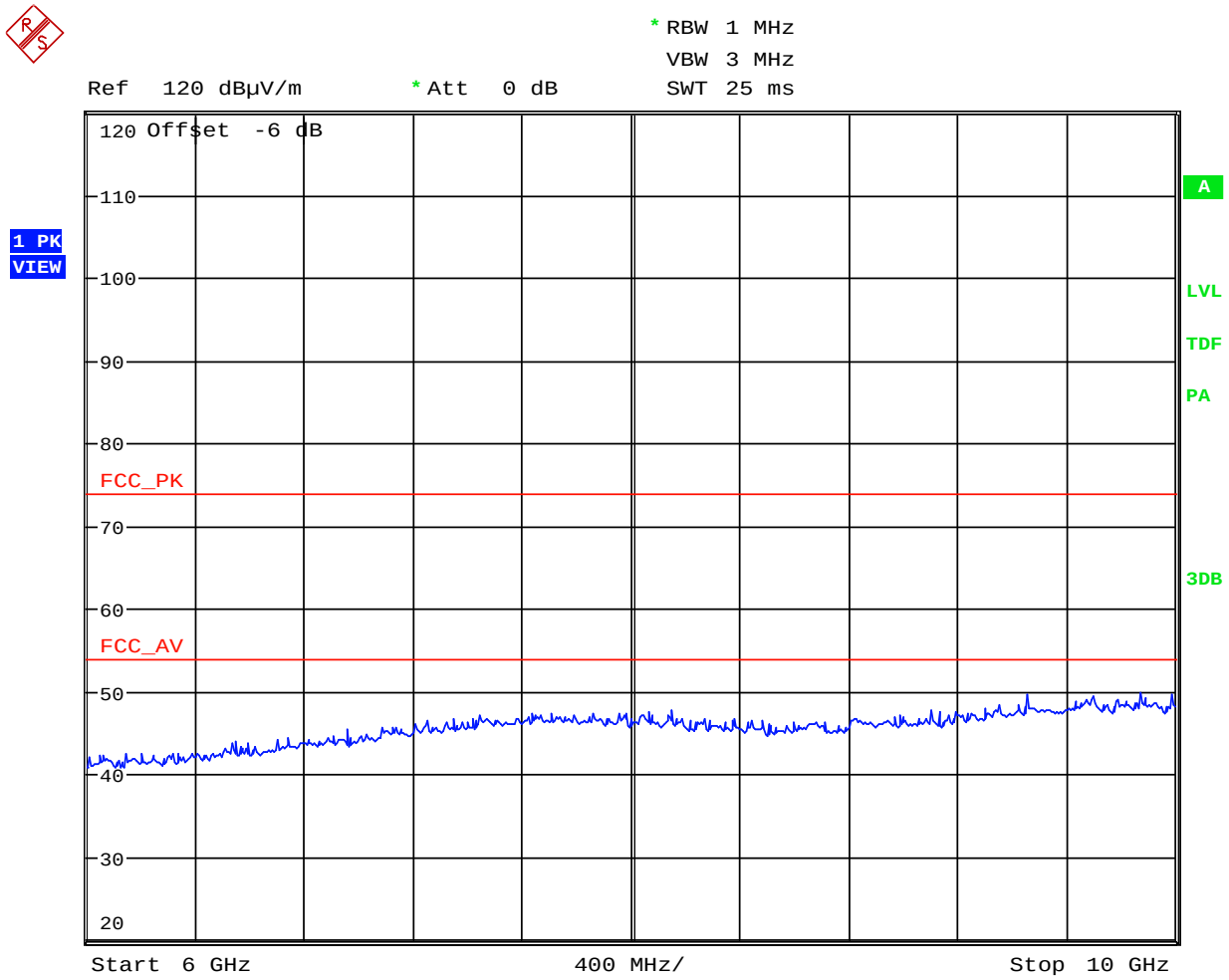
Mode: Continuous Transmit, EUT hor
Date: 1.SEP.2015

EUT: MCT&RH-TX
Frequency Range: 1 GHz – 6 GHz
Ant.: hor. & ver.
EUT-Pos.: ver.
Modification: yes; refer to chapter 2.5



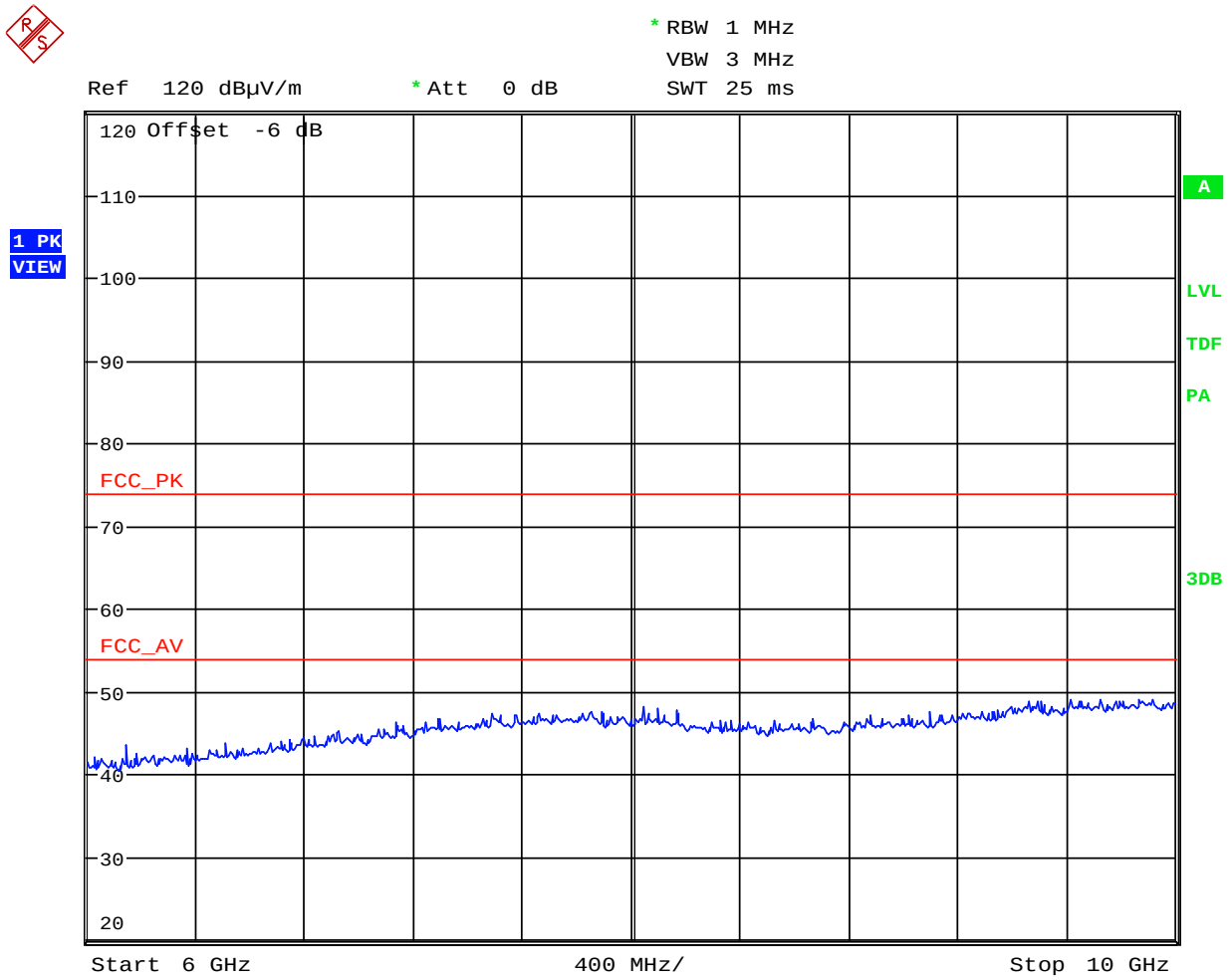
Mode: Continuous Transmit, EUT ver
Date: 1.SEP.2015

EUT: MCT&RH-TX
Frequency Range: 6 GHz – 10 GHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5



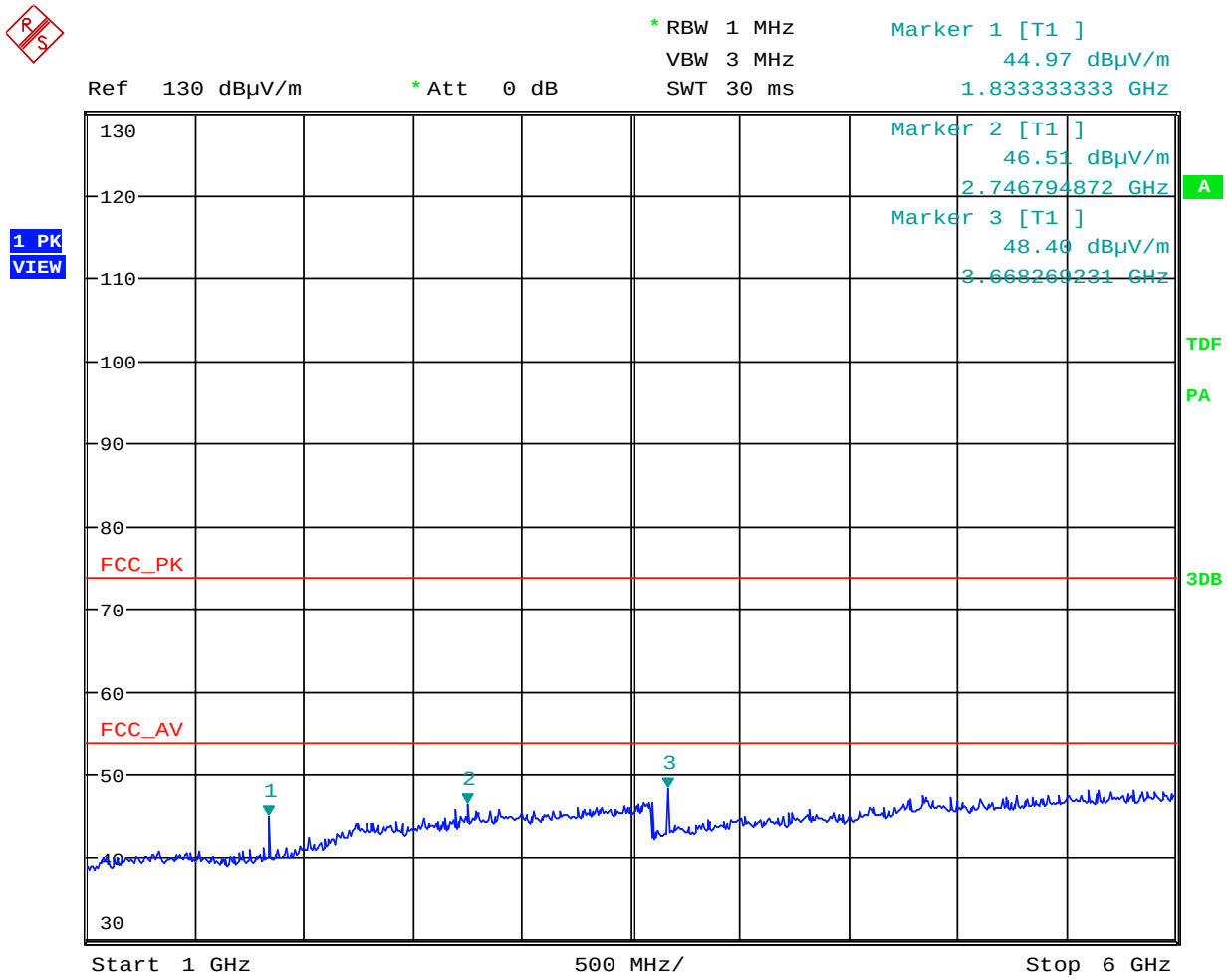
Mode: Continuous Transmit, EUT hor
Date: 1.SEP.2015

EUT: MCT&RH-TX
Frequency Range: 6 GHz – 10 GHz
Ant.: hor. & ver.
EUT-Pos.: ver.
Modification: yes; refer to chapter 2.5



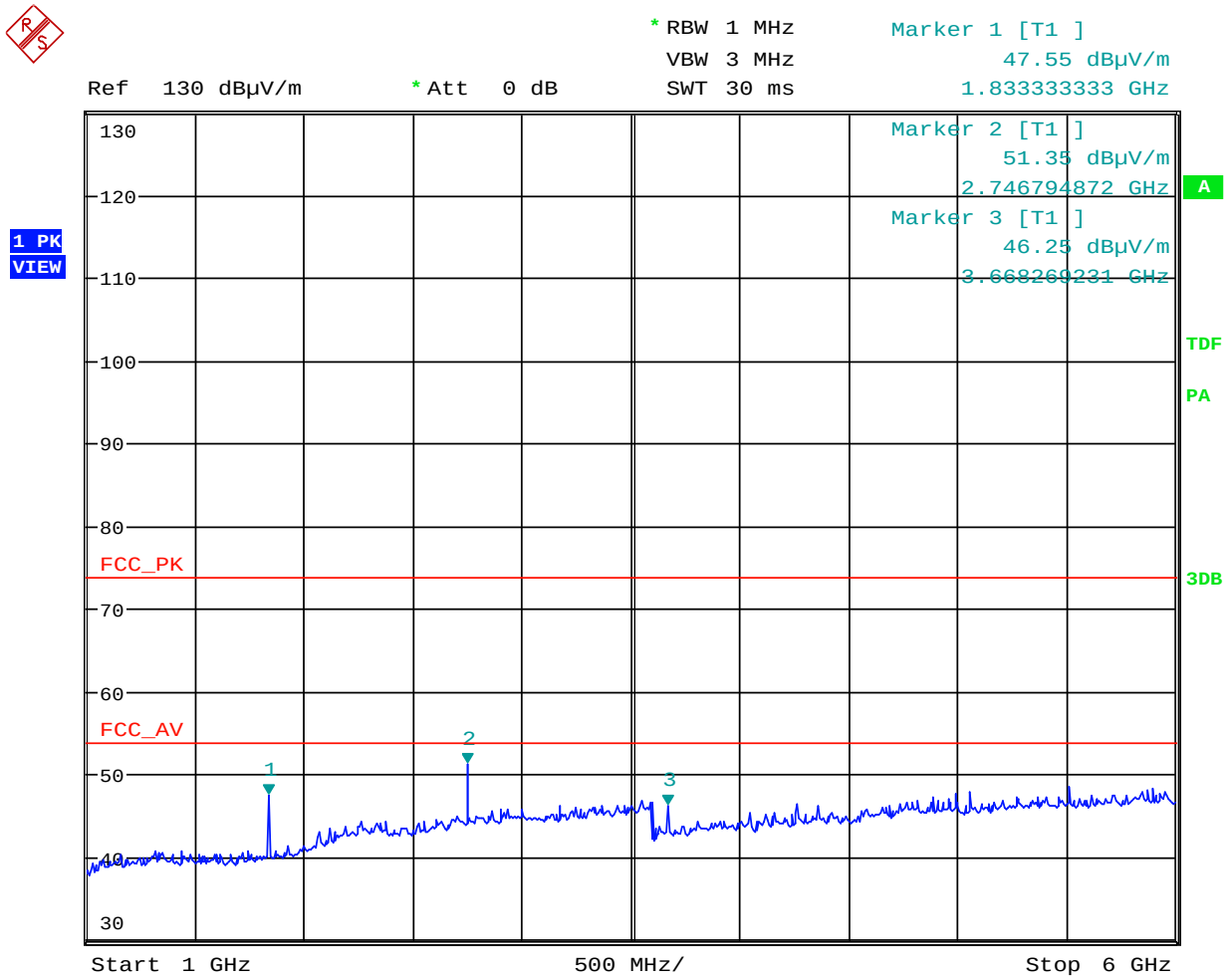
Mode: Continuous Transmit, EUT ver
Date: 1.SEP.2015

EUT: W-TX
Frequency Range: 1 GHz – 6 GHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5



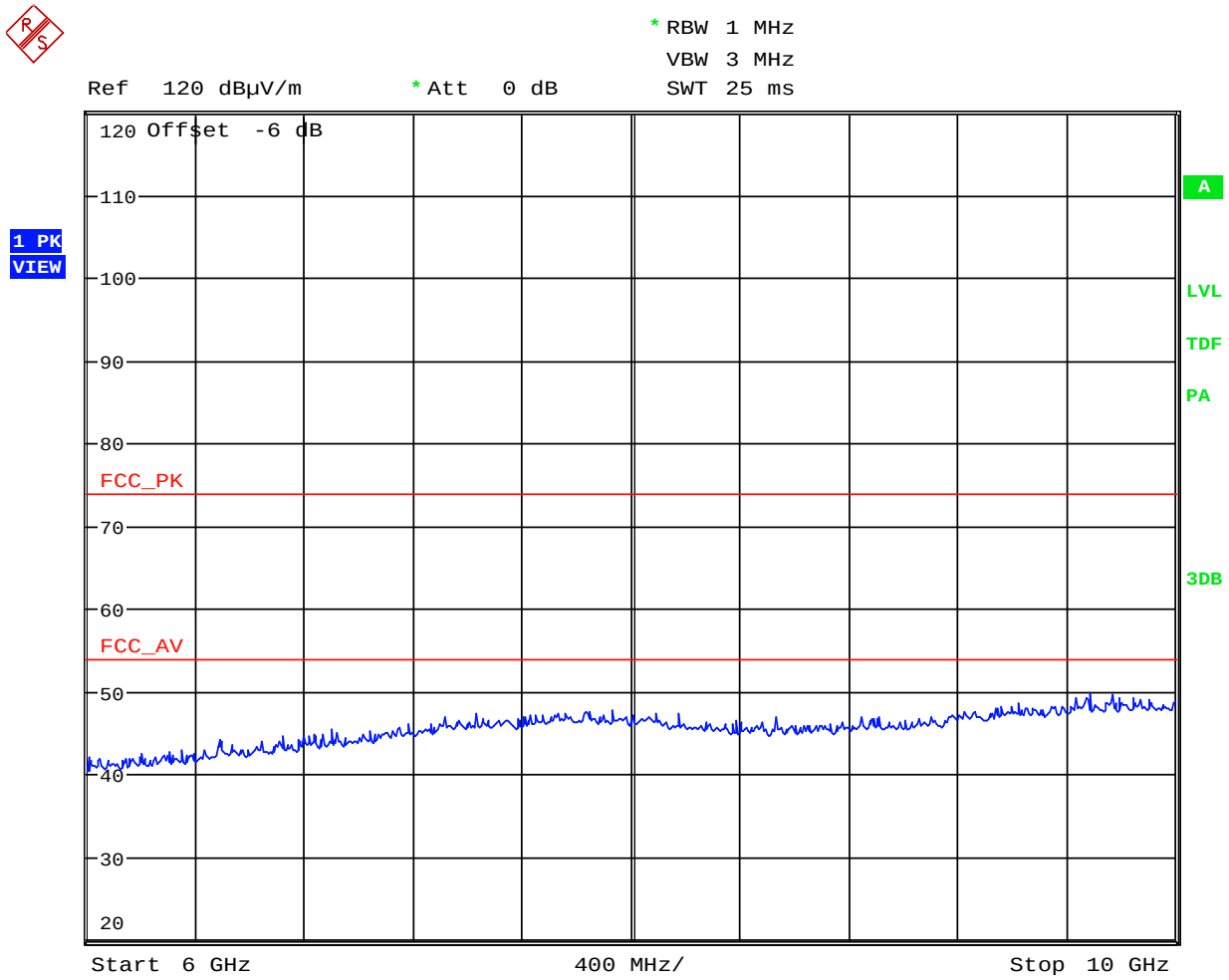
Mode: Continuous Transmit, EUT hor
Date: 1.SEP.2015

EUT: W-TX
Frequency Range: 1 GHz – 6 GHz
Ant.: hor. & ver.
EUT-Pos.: ver.
Modification: yes; refer to chapter 2.5



Mode: Continuous Transmit, EUT ver
Date: 1.SEP.2015

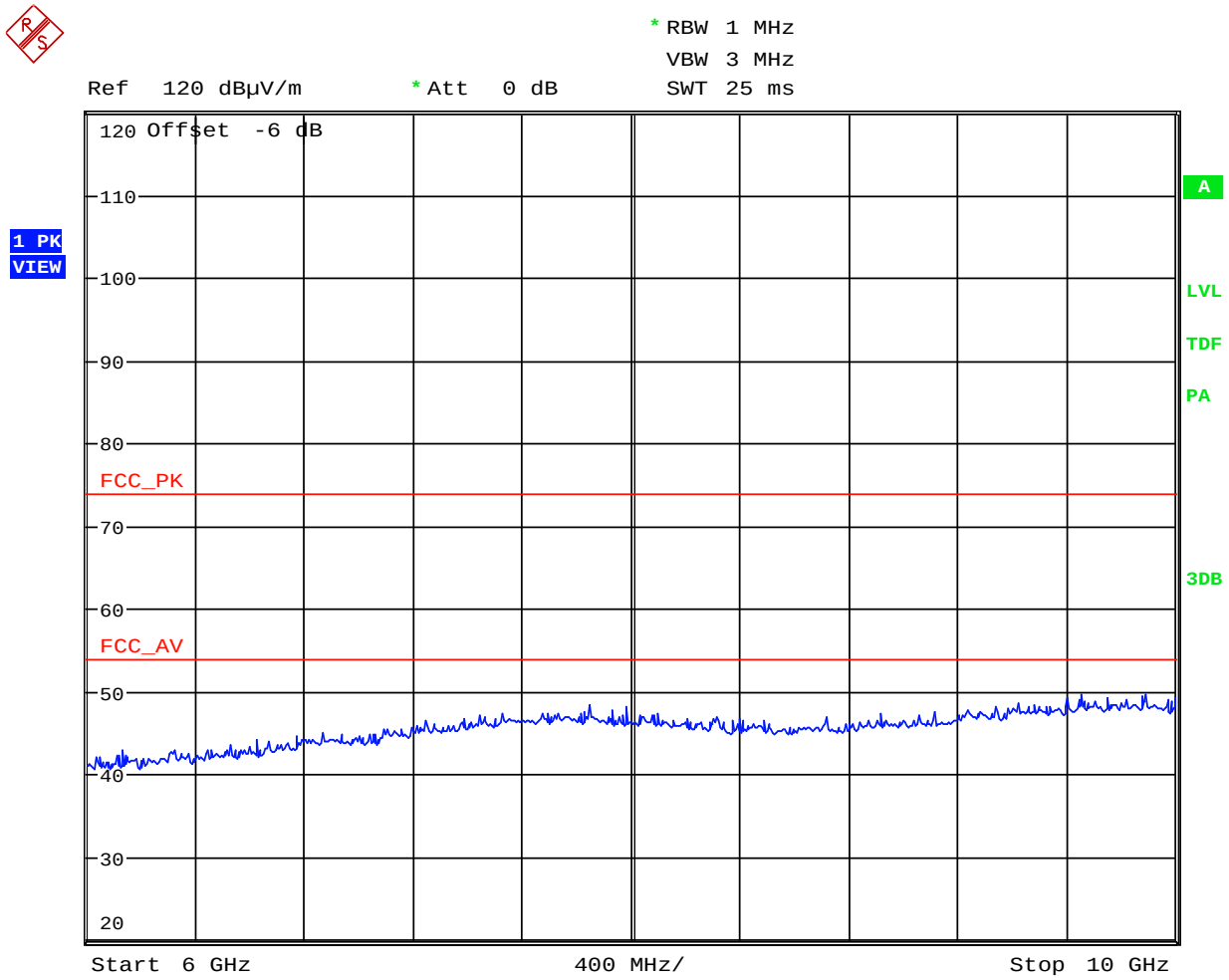
EUT: W-TX
Frequency Range: 6 GHz – 10 GHz
Ant.: hor. & ver.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5



Mode: Continuous Transmit, EUT hor
Date: 1.SEP.2015

Test of MCT&RH-TX and W-TX (Fidemco, LLC) to 47 CFR § 15.249

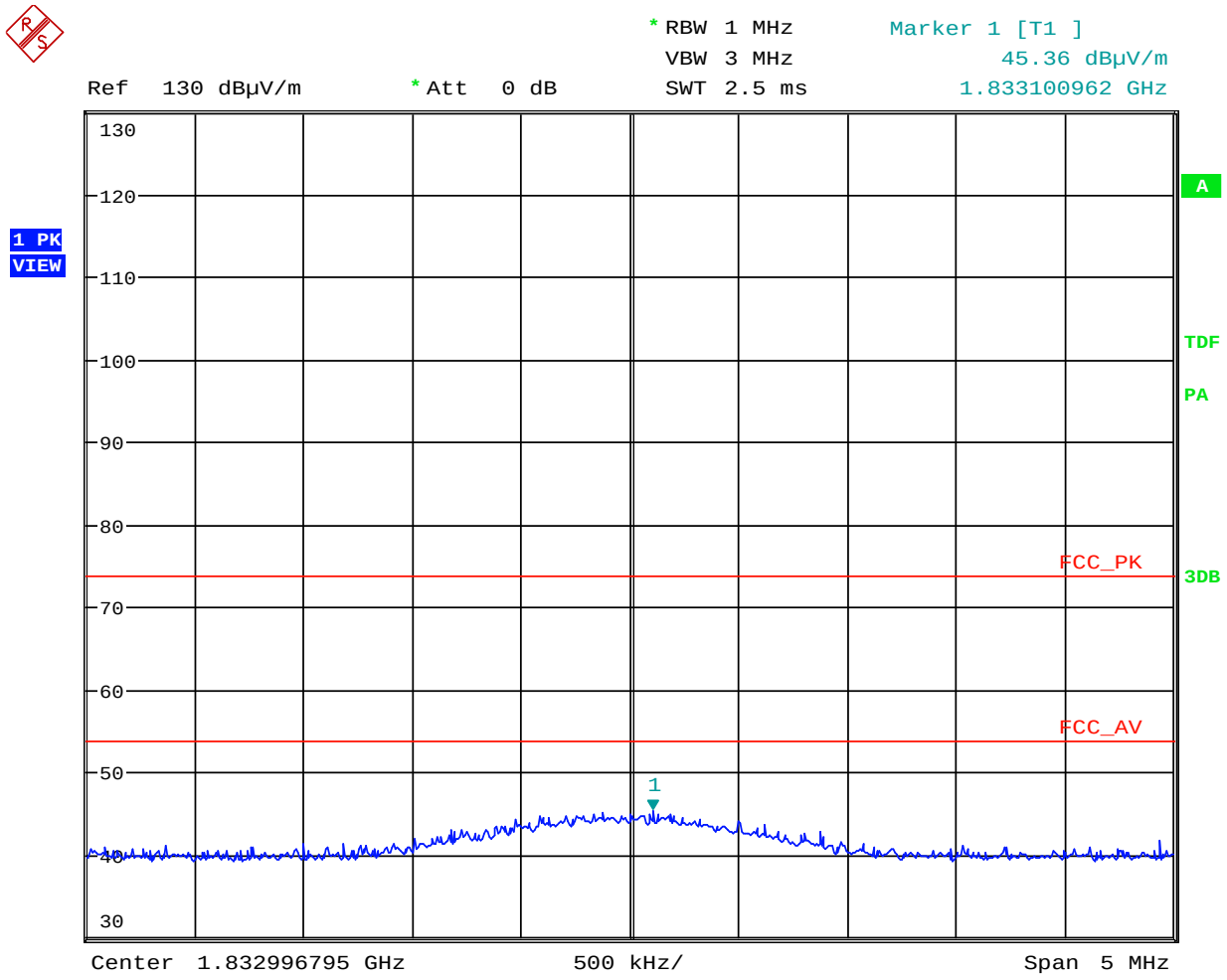
EUT: W-TX
Frequency Range: 6 GHz – 10 GHz
Ant.: hor. & ver.
EUT-Pos.: ver.
Modification: yes; refer to chapter 2.5



Mode: Continuous Transmit, EUT ver
Date: 1.SEP.2015

10.8 Measurement Final-Plots

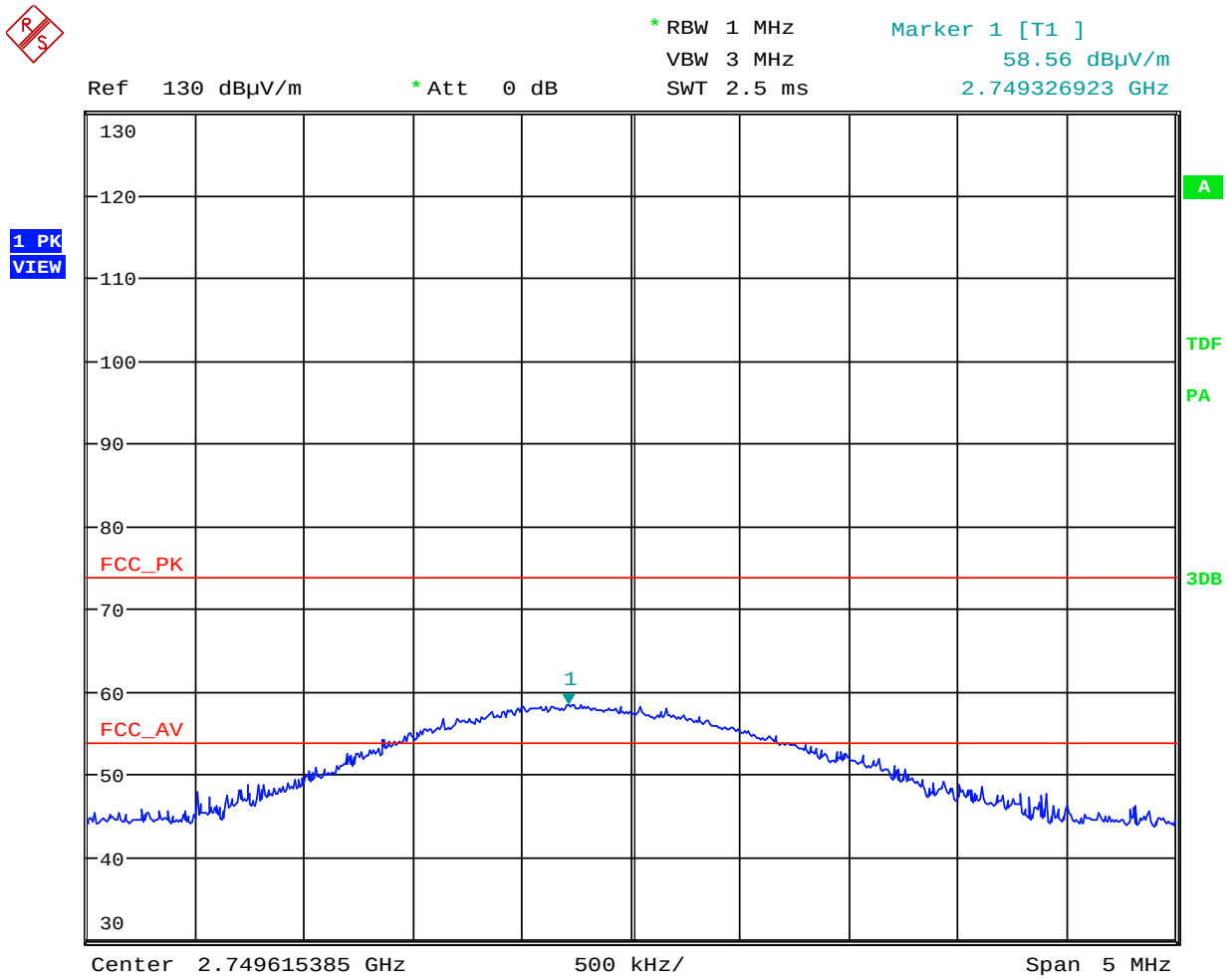
EUT: MCT&RH-TX
Frequency: 1833 MHz, 2nd harmonic
Ant.: hor.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5



Mode: Continuous Transmit, EUT hor
Date: 1.SEP.2015

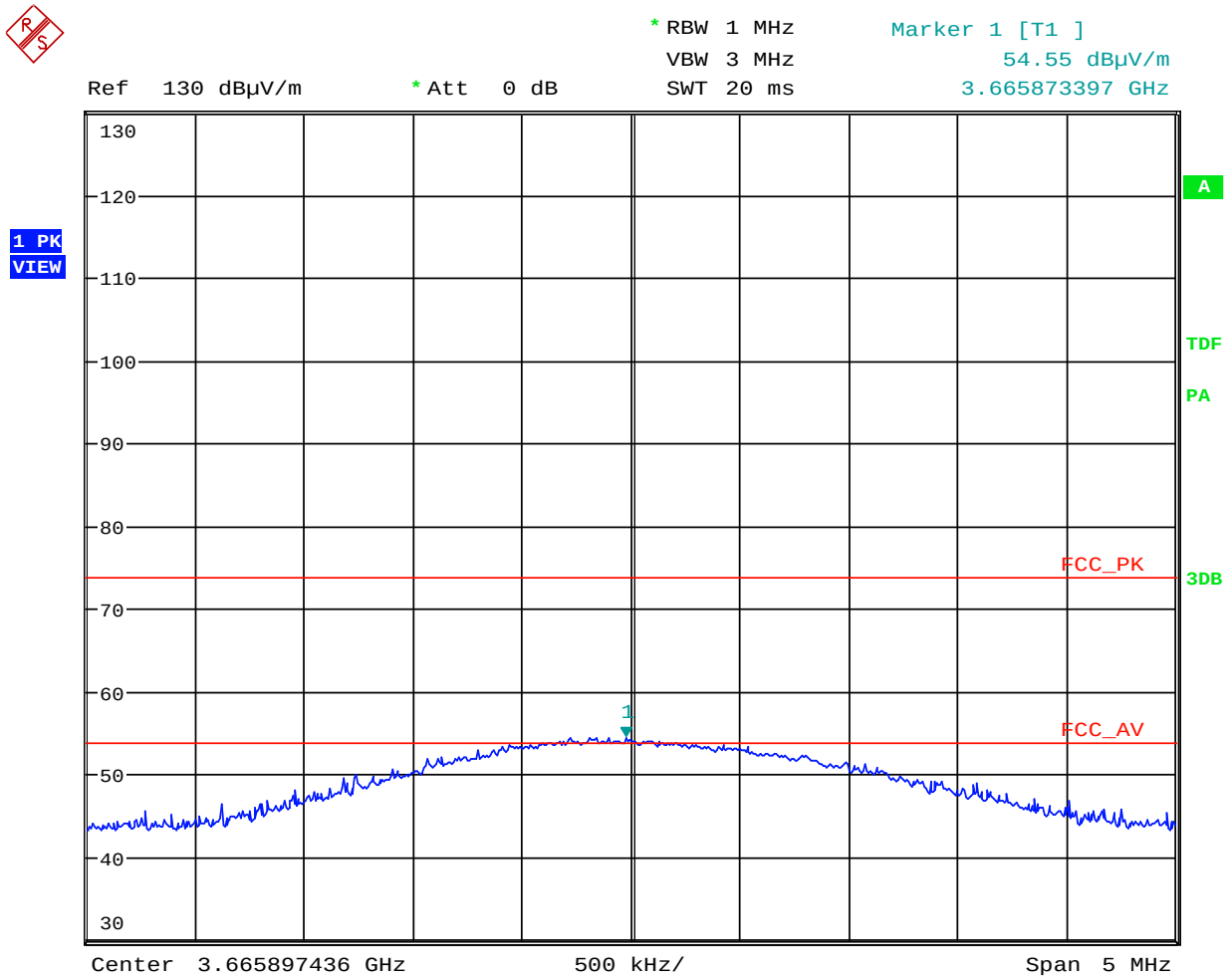
Test of MCT&RH-TX and W-TX (Fidemco, LLC) to 47 CFR § 15.249

EUT: MCT&RH-TX
Frequency: 2750 MHz, 3rd harmonic
Ant.: hor.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5



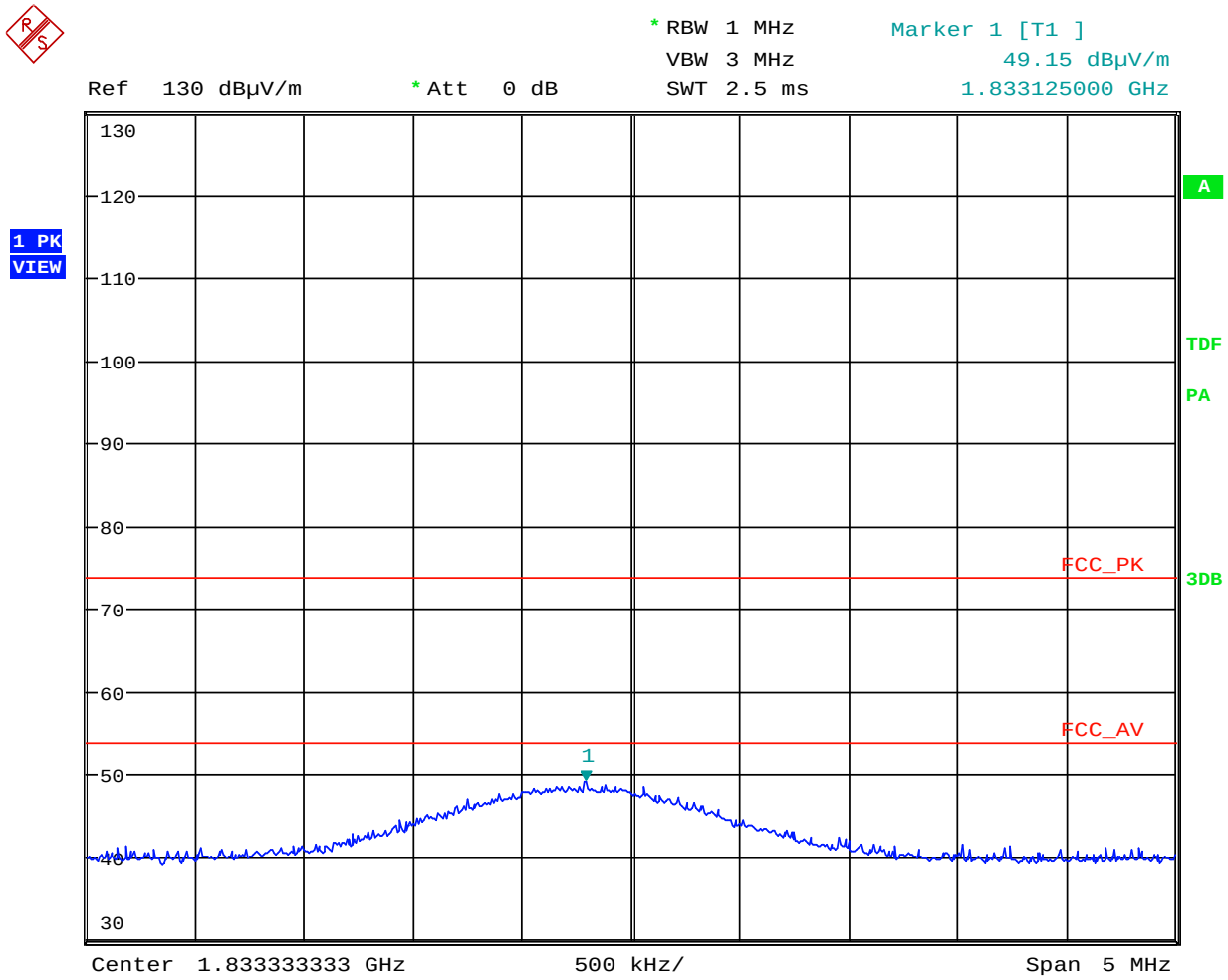
Mode: Continuous Transmit, EUT hor
Date: 1.SEP.2015

EUT: MCT&RH-TX
Frequency: 3666 MHz, 4th harmonic
Ant.: ver.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5



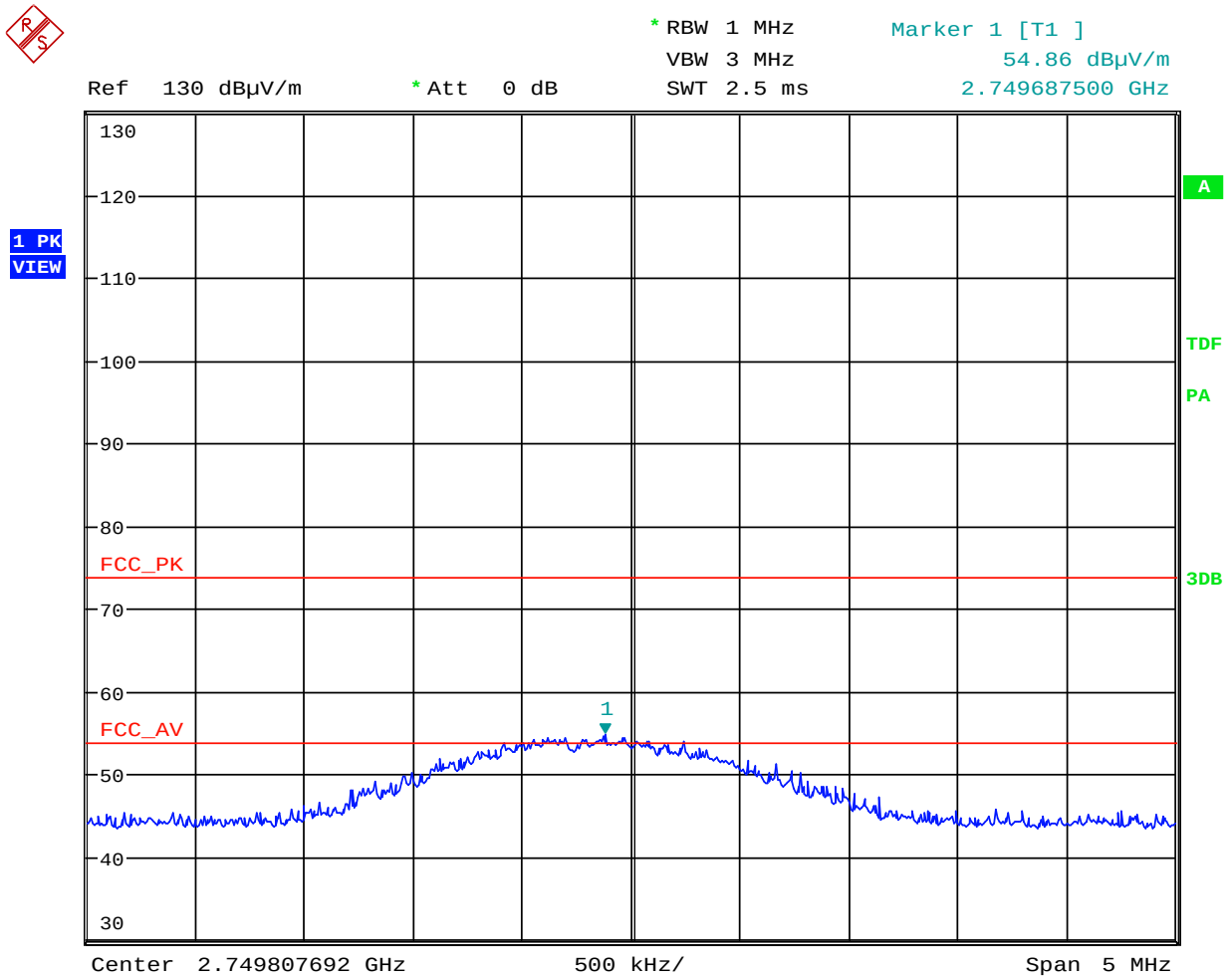
Mode: Continuous Transmit, EUT hor
Date: 1.SEP.2015

EUT: W-TX
Frequency: 1833 MHz, 2nd harmonic
Ant.: ver.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5



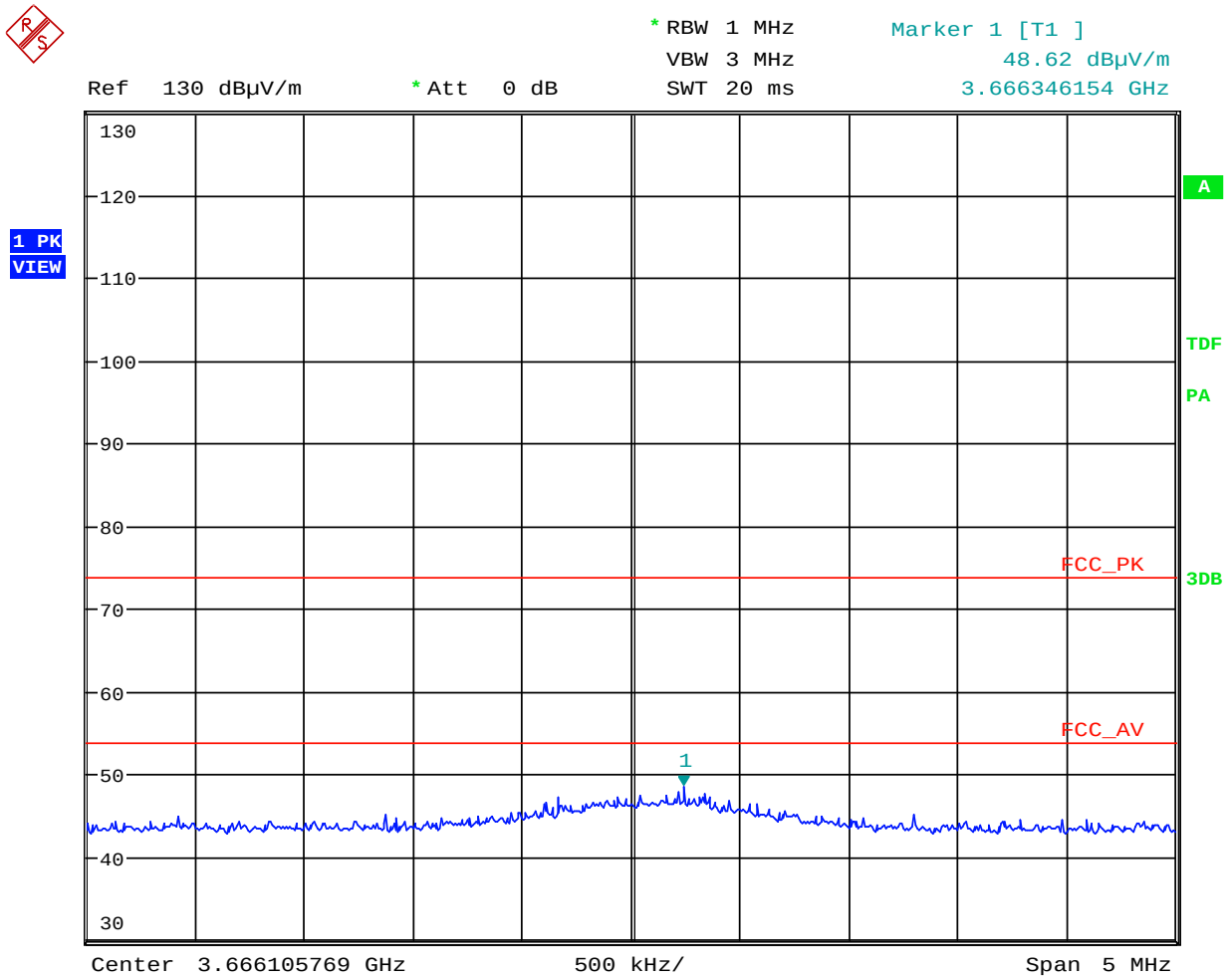
Mode: Continuous Transmit, EUT ver
Date: 1.SEP.2015

EUT: W-TX
Frequency: 2750 MHz, 3rd harmonic
Ant.: ver.
EUT-Pos.: ver.
Modification: yes; refer to chapter 2.5



Mode: Continuous Transmit, EUT ver
Date: 1.SEP.2015

EUT: W-TX
Frequency: 3666 MHz, 4th harmonic
Ant.: hor.
EUT-Pos.: hor.
Modification: yes; refer to chapter 2.5



Mode: Continuous Transmit, EUT hor
Date: 1.SEP.2015

11 LIST OF ANNEXES

Following annexes are separated parts from this test report.

Description	Pages
Annex 1: Photographs of test set-up	4
Annex 2: External photographs of equipment under test (EUTs)	3
Annex 3: Internal photographs of equipment under test (EUTs)	8