



Nemko

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CERTIFICATION TEST REPORT

Report Number: 2009 12139961 FCC

Project Number: 40809-1

Nex Number: 139961

Applicant: HOLATRON SYSTEMS LLC
833 ILANIWAI ST., STE. 2
HONOLULU, HI 96813 USA

Equipment Under Test (EUT): ENCODED REMOTE CONTROL TRANSMITTER

Model: XMTR1M

FCC ID: OI4XMTR1M

In Accordance With: FCC Part 15 Subpart C, 15.231

Tested By: Nemko USA Inc.
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Authorized By:

Alan Laudani, EMC/RF Test Engineer

Date: December 9, 2009

Total Number of Pages: 20



Section1: Summary of Test Results

General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed: Encoded Remote Control Transmitter

Model: XMTR1M

Specification: FCC Part 15 Subpart C, 15.231

Date Received in Laboratory: December 9, 2009

Compliance Status: Complies

Exclusions: None

Non-compliances: None



1.1 Report Release History

REVISION	DATE	COMMENTS	
-	December 9, 2009	Prepared By:	Ferdinand Custodio
-	December 9, 2009	Initial Release:	Alan Laudani

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TESTED BY:


Ferdinand Custodio, EMC Test Engineer

Date: December 9, 2009



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Section 2: Equipment Under Test

2.1 Product Identification

The Equipment Under Test was identified as follows:

Holatron Systems LLC Model # XMTR1M Encoded Remote Control Transmitter



2.2 Samples Submitted for Assessment

The following sample of the apparatus has been submitted for type assessment:

Sample No.	Description	Serial No.
139961-1	XMTR1M Encoded Remote Control Transmitter	10001



2.3 Theory of Operation

The XMTR1M is an Encoded Remote Control Transmitter. Its function is to command a single pulse output in a similarly decoded receiver for the purpose of actuating a simulated explosive device during a military training session. The EUT was exercised in a test mode-providing a continuously modulated transmission. The EUT is powered by a 3 volt lithium coin type battery.

2.4 Technical Specifications of the EUT

Manufacturer:	Holatron Systems LLC
Operating Frequency:	418 MHz
Number of Operating Frequencies:	1
Rated Power:	78.8 dB μ V/m @ 3 m
Modulation:	ASK /OOK
Antenna Type:	2" Monopole with RP-SMA connector. Typical gain as per manufacturer is -5.9dBi with a 4" ground plane.
Power Source:	3VDC Lithium coin cell battery (CR2032)
Dimensions:	55mm x 140mm x 30mm (without antenna and trigger safety cover closed)



Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.231

Radio Frequency Devices – Intentional Radiators – Radiated Emission Limits:
Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

3.2 Deviations from Laboratory Test Procedures

No deviations from Laboratory Test Procedure

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	10.4-20.0 °C
Humidity range	:	36-38 %
Pressure range	:	100.9 - 101.8 kPa
Power source range	:	3VDC (in each start of any test, a new fresh battery is installed)

3.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
897	Spectrum Analyzer	Rohde & Schwarz	FSP7	837620/009	10/14/2009	10/14/2010
114	Antenna, Bicon	EMCO	3104	2997	2/10/2009	2/10/2010
110	Antenna, LPA	Electrometrics	LPA-25	1217	1/10/2009	2/10/2011
877	Antenna, DRG Horn, .7-18GHz	AH Systems	SAS-571	688	7/28/2008	7/28/2010
902	pre amp	Sonoma	310 N	185803	8/4/2009	8/4/2010
317	Preamplifier	HP	8449A	2749A00167	4/16/2009	4/16/2010

Registration of the OATS are on file with the Federal Communications Commission, under Registration Number 90579, the VCCI under registration number R-3027, and are also registered with Industry Canada under Site Numbers 2040B-1 and 2040B-2.



Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

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4.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Test Deleted

No Tests were deleted from this assessment.

4.5 Additional Observations

There were no additional observations made during this assessment.



Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C: Test Results

§ 15.231 Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

The column headed “Required” indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No: not applicable / not relevant

Y Yes: Mandatory i.e. the apparatus shall conform to these test.

N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

5.1 Test Results

Part 15C	Test Description	Required	Result
15.231 (a)(1)	Transmitter deactivation within 5 seconds	Y	Pass
15.231 (a)(3)	Transmission Time	N*	
15.231 (b)	Field strength of emissions	Y	Pass
15.231 (c)	20 dB Bandwidth	Y	Pass
15.231 (e)	Field strength of emissions (if 15.231 (a) is not met)	N**	

*EUT does not transmit at predetermined intervals or polling (supervision transmissions)

**EUT satisfies 15.231 (a)



Appendix A: Test Results

Section 15.231(a)(1) – Transmitter deactivation within 5 seconds

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Test Conditions:

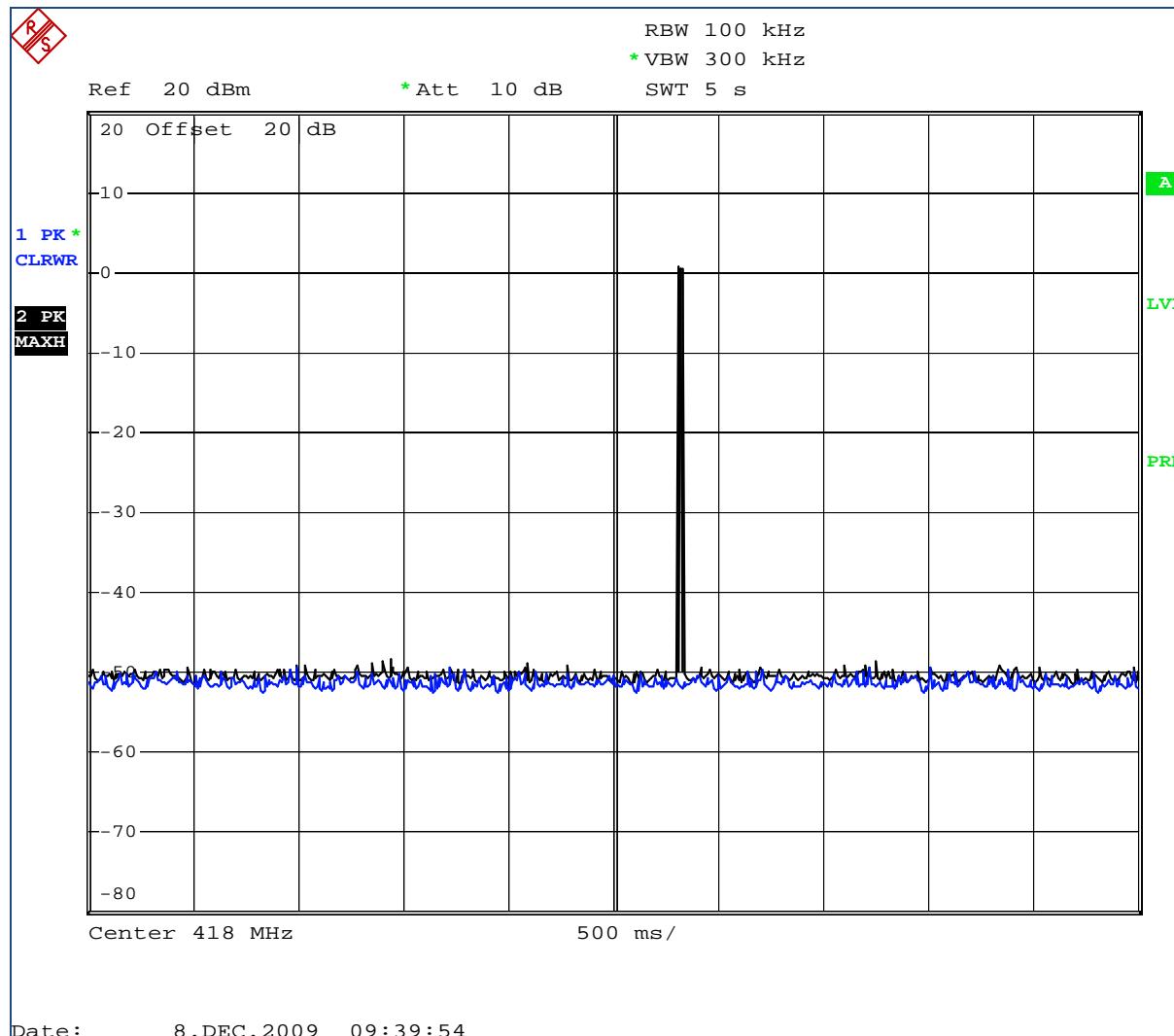
Sample Number:	XMTR1M	Temperature:	20.0°C
Date:	December 8, 2009	Humidity:	36%
Modification State:	Transmit @ max power	Tester:	FSCustodio
		Laboratory:	Nemko

Test Results:

See attached plots.

Additional Observations:

- This is a conducted test. A 20dB attenuator was used to protect the measuring instrument.
- Using a 5 seconds sweep, the EUT was activated and the transmit button released. The transmission was observed to verify that the unit ceases transmitting within 5 seconds.
- RBW was set to 100kHz; VBW was set at 3 times RBW.
- Span is set to zero.
- Detector function is peak with a secondary trace set at Max Hold.



Data packet captured in a 5 seconds sweep, please refer to Duty Cycle Calculation for more details on the data packet.

**Section 15.231(c) – 20 dB Bandwidth**

(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier

Test Conditions:

Sample Number:	XMTR1M	Temperature:	19.7°C
Date:	December 7, 2009	Humidity:	38%
Modification State:	Transmit @ max power	Tester:	FSCustodio
		Laboratory:	Nemko

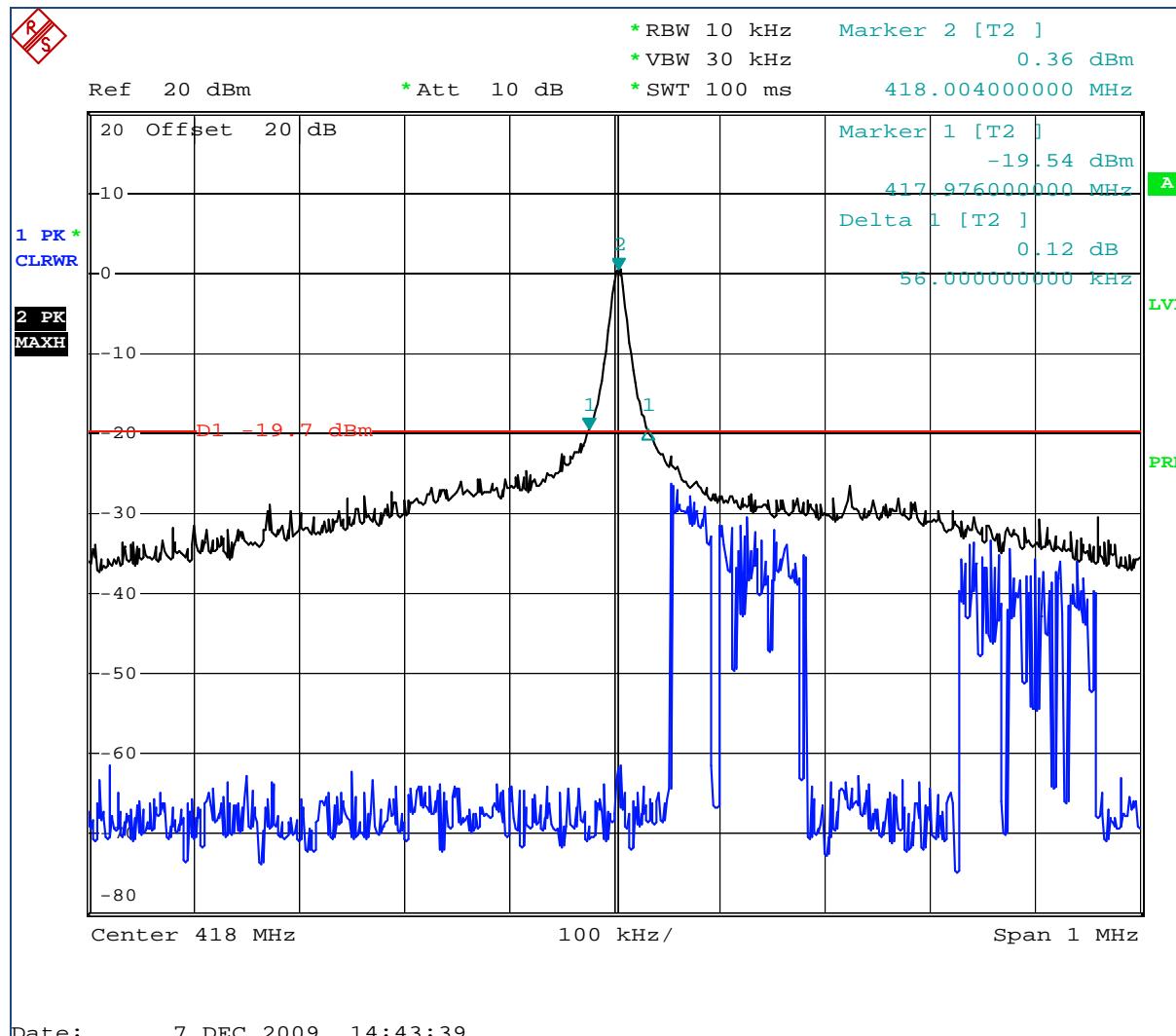
Test Results:

See attached plots.

Additional Observations:

- RBW was set to 1% of the span while VBW was set at 3 times RBW.
- Detector function is peak with a secondary trace set at Max Hold.
- This is a conducted test. A 20dB attenuator was used to protect the measuring instrument.
- The spectrum analyzer center frequency was set to the channel carrier. After a PEAK max hold output reading was taken, a line was drawn 20 dB lower than PEAK level. The bandwidth was determined from where the channel output spectrum intersected the display line.
- Limit is 1.045MHz base from a center frequency of 418.0MHz (worst case 0.25% of carrier frequency).

Model	20 dB BW	Results (<1.045MHz)
XMTR1M	56 kHz	Pass

**Measured 20dB Bandwidth is 56kHz**

**Section 15.231(b) – Field Strength of Emissions**

(b) In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66–40.70	2,250	225
70–130	1,250	125
130–174	¹ 1,250 to 3,750	¹ 125 to 375
174–260	3,750	375
260–470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

¹Linear interpolations.

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

Test Conditions:

Sample Number:	XMTR1M	Temperature:	10.4°C
Date:	December 8, 2009	Humidity:	38%
Modification State:	Transmit @ max power	Tester:	FSCustodio
		Laboratory:	SOATS

Test Results:

See attached plots.

Additional Observations:

- Emissions were searched over a range of 30 MHz to 5000 MHz while in transmit mode. No other emissions found above 1GHz..
- Investigations were made at 3 meters. The EUT was investigated and maximized on the OATS.



- Detector used for fundamental measurement is peak using a RBW greater than the measured occupied bandwidth. The EUT was investigated in three orthogonal axes.
- The Average measurements were calculated from peak measurements less the duty cycle correction factor.
Average = Peak – DCCF (Duty Cycle Correction Factor)
- A correction factor was added to compensate for the antenna factor and cable loss at the fundamental frequencies, example below.
- There were no other emissions observed other than the fundamental and the second harmonic.
- Sample Computation:

$$\begin{aligned}\text{Correction factor @ 418.00MHz} &= \text{Antenna factor} + \text{Cable loss} - \text{Preamp gain} \\ &= 15.9 + 3.3 - 0 = 19.2\end{aligned}$$

$$\begin{aligned}\text{Corrected reading} &= \text{Max. reading} + \text{Correction factor} \\ &= 79.48 + 19.2 = 98.7 \text{ dB}\mu\text{V/m}\end{aligned}$$



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www.nemko.com**Radiated Emissions Data**

Job # : 40809-1 Date : 12/8/2009
NEX #: 139961 Time : 8AM
Staff : FSC

Client Name : Holatron Systems LLC
EUT Name : Encoded Remote Control Transmitter
EUT Model # : XMTR1M
EUT Serial # : 10001
EUT Config. : Transmitting continuously @ max. power

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EUT Voltage : 3VDC
EUT Frequency :
Phase:
NOATS
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Specification : FCC Part 15 Subpart C §15.231(b)

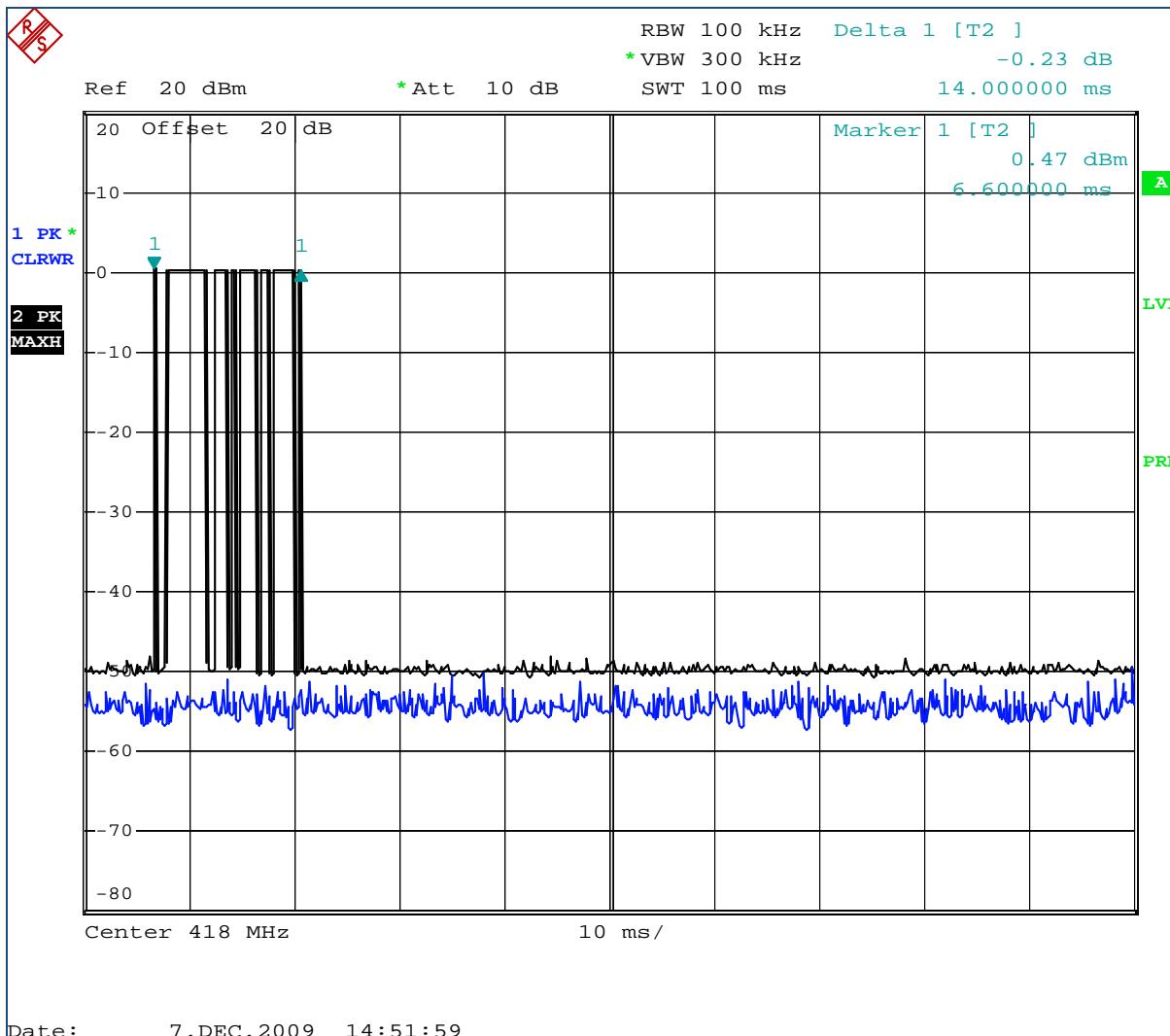
Loop Ant. #:	<u>NA</u>		
Bicon Ant.#:	<u>114_3m</u>	Temp. (°C) :	<u>10.4</u>
Log Ant.#:	<u>110_3m</u>	Humidity (%) :	<u>38</u>
DRG Ant. #	<u>877</u>	Spec An. #:	<u>897</u>
Cable LF#:	<u>SOATS</u>	Spec An. Display #:	<u>NA</u>
Cable HF#:	<u>SOATS</u>	QP #:	<u>897</u>
Preamp LF#:	<u>902</u>	PreSelect#:	<u>NA</u>
Preamp HF#	<u>317</u>	DCCF:	<u>20</u>

Peak (<1GHz)	RBW: 120 kHz
Video Bandwidth	300 kHz
Peak (>1GHz)	RBW: 1 MHz
Video Bandwidth	3 MHz
Average=Peak-DCCF	

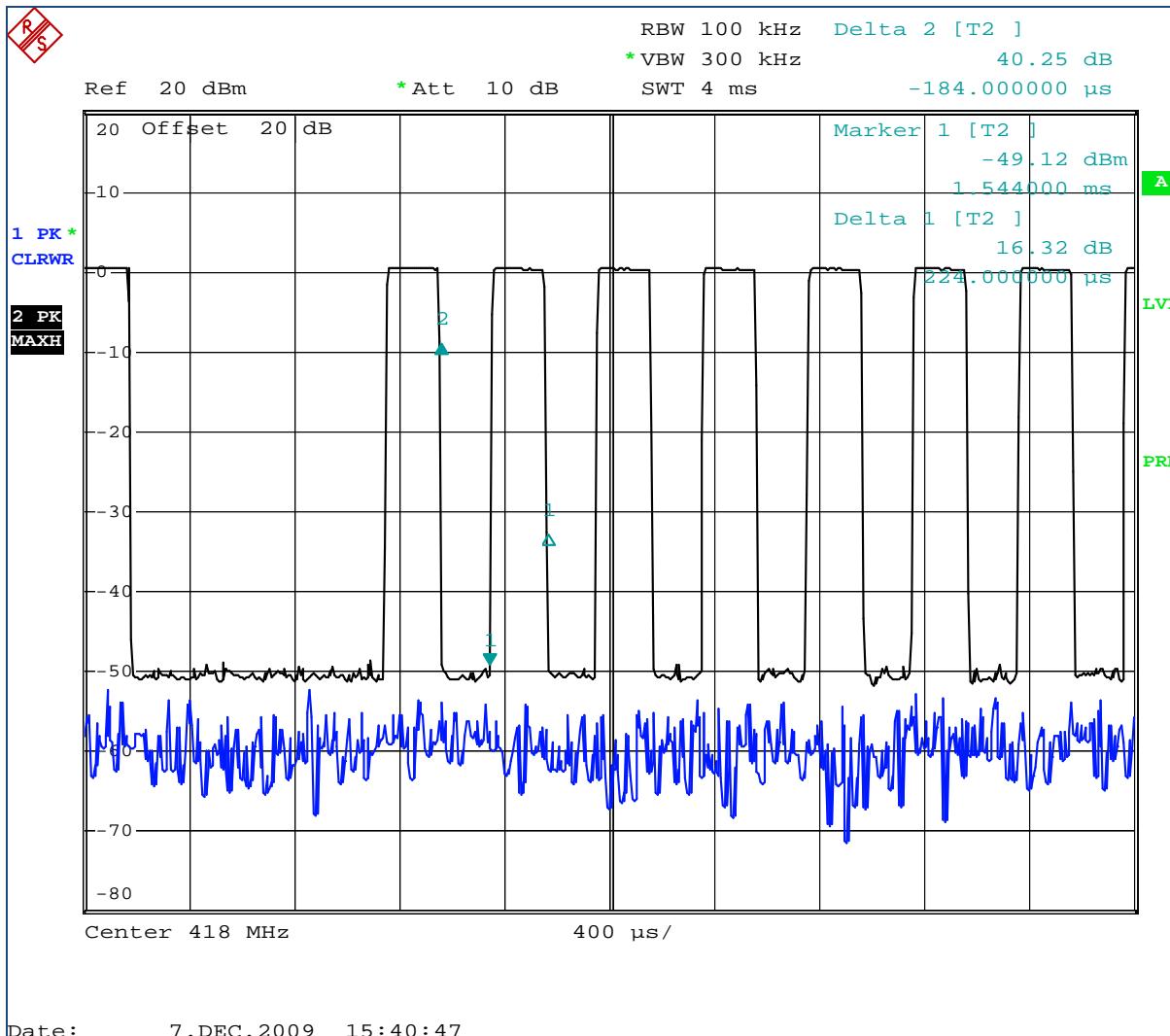
Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dB μ V)	Corrected Reading (dB μ V/m)	Spec. limit (dB μ V/m)	CR/SL Diff. (dB)	Pass Fail	Comment
418.0	79.5	67.6	P	FR	1.0	79.48	98.7	100.3	-1.6	Pass	"X" no preamp
418.0	59.5	47.6	A	FR	1.0	59.48	78.7	80.3	-1.6	Pass	"X" no preamp
418.0	70.4	79.5	P	B	1.0	79.52	98.8	100.3	-1.5	Pass	"Y" no preamp
418.0	50.4	59.5	A	B	1.0	59.52	78.8	80.3	-1.5	Pass	"Y" no preamp
418.0	71.7	79.1	P	R	2.2	79.06	98.3	100.3	-2.0	Pass	"Z" no preamp
418.0	51.7	59.1	A	R	2.2	59.06	78.3	80.3	-2.0	Pass	"Z" no preamp
836.0	24.3	26.1	P	B	2.1	26.13	53.2	81.9	-28.8	Pass	no preamp
836.0	4.3	6.1	A	B	2.1	6.13	33.2	61.9	-28.8	Pass	no preamp
1254.0	48.4	48.4	P	B	2.1	48.4	47.2	81.9	-34.7	Pass	Noise Floor
1254.0	28.4	28.4	A	B	2.1	28.4	27.2	61.9	-34.7	Pass	Noise Floor



Duty Cycle Calculations



Data packet measured at 14ms in a 100ms sweep



“On” time of 224μs (Delta 1) and “Off” time of 184μs (Delta 2)

Duty cycle correction factor computation:

- = 224μs + 184 μs (“on” time + “off” time)
- = 0.408 ms/cycle, therefore there are 34.3 cycles in a data packet (14 ms/0.408 ms)
- = 7.68 ms (total “on” time from 34.3 multiplied by 224 μs)
- = 7.68 % Duty Cycle
- = $20 \log (0.07686)$
- = **-22.28 DCCF** but limited to -20dB as per FCC rules.



Appendix B: Block Diagram of Test Setups

Test Site For Radiated Emissions

