

# EMC TEST REPORT

From **3C Test Limited**

On behalf of  
**McLaren Automotive Limited**  
 On the  
**McLaren MP4-12C Remote Key**  
**11M1313CP.01 (433MHz)**

To the requirements of the following standards:

FCC CFR 47: Part 15: C: 2010  
 Industry Canada RSS-Gen: Issue 3 2010 (RSS-210: Issue 8 2010)\*


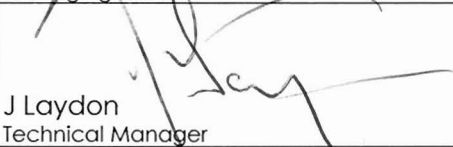
FULL COMPLIANCE

3C Test Report Number: 3C12/9210/1 Issue 2  
 This report replaces 3C12/9210/1 Issue 1 which is now withdrawn

Overall Test Result: COMPLIANT

Date of Test: 5<sup>th</sup> – 17<sup>th</sup> January 2012

Tested By: J Gordon-Colebrooke

Lead Test Engineer:	 J Gordon-Colebrooke Managing Director	Date: 17 <sup>th</sup> / Jan / 2012
Checked and Released by:	 J Laydon Technical Manager	Date: 17 <sup>th</sup> / Jan / 2012

\* Indicates standards that are not currently covered by the 3C Test Limited UKAS scope of accreditation

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The results contained in this report relate only to the product tested.

Please note that all opinions and interpretations expressed within this report are outside the scope of the UKAS accreditation of 3C Test Limited.



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Issue	Date	Reason	Pages revised	Author
1	06 Jan 2012	Initial Issue	All	JGC
2	17 Jan 2012	99% Bandwidth Measurement added	16, 35-36	JGC

## 1. INTRODUCTION

This report summarises the tests for electromagnetic interference compatibility made on the equipment listed in Section 2 with the standards listed in Section 3 on behalf of: -

Clients Name: McLaren Automotive Limited

Address: McLaren Technology Centre  
Chertsey Road  
Woking  
Surrey  
GU21 4YH

Contact Name: Martin Chambers

The Client named above is the manufacturer of the Equipment under Test (EUT).

## 2. EQUIPMENT UNDER TEST

### 2.1 IDENTIFICATION OF EUT

**Manufacturers Name:** Pektron Automotive  
**Model Name:** ASSY-KEY FOB-LOCK BARRELL-KIT-433MHz.  
**Model Number:** 11M1313CP.01  
**Serial Number:** NM137 (modified for mode 1 operation)  
NM119 (unmodified)  
**Hardware Version:** A-0739G01F  
**Software Revision:** P0739K01G  
**Voltage Rating:** 3V dc (Battery)  
**Highest internal frequency:** 433.9MHz  
**Country of Origin:** United Kingdom  
**Date of Receipt:** 4<sup>th</sup> January 2012  
**Description of EUT:** Remote Key for the McLaren MP4-12C  
**Intended Operating Environment:** Automotive

### 2.2 BUILD STATUS

The product was a standard unit, with no modifications prior to the start of the test.

### 2.3 OPERATING MODE

Mode 1: The key was programmed to transmit continuously on pressing the button. This test mode was used to support all the testing except that of the timing.

Mode 2: Normal operation, a key press was made and the resulting output used for the testing as appropriate.

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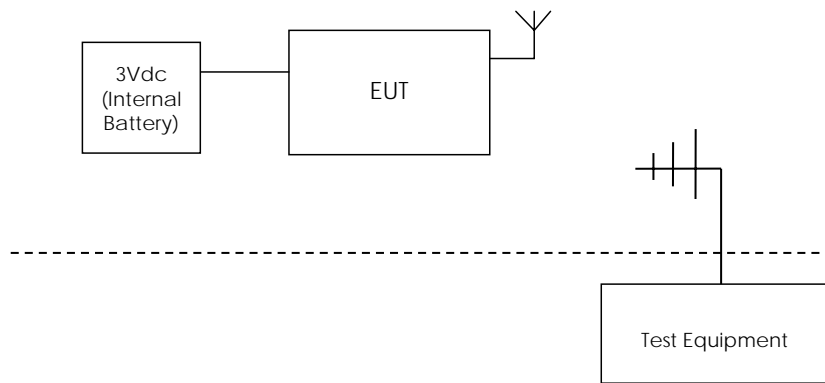
2.4 MODIFICATIONS MADE TO THE EUT DURING TESTING

Modification State 0: Unmodified

2.5 SUPPORT EQUIPMENT

No Support Equipment was required.

2.6 BLOCK DIAGRAM OF SET-UP



2.7 DETAILS OF ACCREDITATION STATUS

**Accredited testing laboratory**

UKAS registration number Laboratory 1204

**FCC filed test laboratory**

Reg. No. 806046

**Industry Canada filed test laboratory**

Reg. No. 8195A

2.8 TECHNICAL DESCRIPTION

The Equipment Under Test (EUT) was a McLaren MP4-12C Remote Key (Part Number 11M1313CP.01) as shown in the photograph below. A full technical description can be found in the manufacturer's documentation





2.9 PORTS TESTED

The EUT possessed the following ports that required testing:  
Enclosure Port Only (Integral Antenna).

### 3. TEST SPECIFICATIONS USED

The EUT was tested against the requirements of the following test specification(s):

**Test Specification:** Federal Communications Commission "Code of Federal Regulations", Title CFR 47, Part 15, Subpart C, dated 1 October 2010.

and

**Test Specification:** ANSI C63.4 2003

**Title:** Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

and

**Test Specification:** Industry Canada Radio Standards Specification, RSS-Gen, "General Requirements and Information for the Certification of Radio Apparatus", Issue 3, December 2010.\*

and

**Test Specification:** Industry Canada Radio Standards Specification, RSS-210, "License-exempt Apparatus (All Frequency Bands): Category I Equipment", Issue 8, December 2010.\*

**Purpose of test:** Obtain Compliance to FCC CFR 47: Part 15.C: 2010 and Industry Canada RSS-Gen requirements.

#### 3.1 ADDITIONS, DEVIATIONS AND / OR EXCLUSIONS FROM SPECIFICATIONS

\* Indicates standards that are not currently covered by the 3C Test Limited UKAS scope of accreditation

#### 3.2 NOTES RELATING TO TESTING PERFORMED

The product utilised an on board antenna with no external connection.

#### 3.3 UNCERTAINTY

It is a requirement of ISO 17025 to account for uncertainties when making all measurements. All results in this test report are reported against the limits only. Details of the 3C Test Limited measurement uncertainties for any given test can be given on request.

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3.4 TYPE OF EQUIPMENT

- Stand-alone (Equipment with or without its own control provision)
- Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
- Plug-in card (An inserted card, connected via a standardised interface)
- Other (module intended for integration into host without standard protocol for connection)

3.5 ANTENNA

- Integral
- External (Fixed) – BNC Connector
- External (Retractable)

Number of Antenna submitted – N/A

3.6 TRANSMITTER CHARACTERISTICS

- Can the transmitter operate unmodulated:  Yes  
 No
- Is the transmitter intended for:  Continuous duty cycle  
 Intermittent duty cycle only
- Declared Frequency: 433.93 MHz
- Actual Measured Frequency: 433.93 MHz
- Declared Channel separation: N/A
- Equipment Type:  Base Station  
 Mobile or hand-portable station
- Is continuous operation possible for test  Yes(A sample of the key is configured for this test)  
 No
- Transmitter power source:  AC Mains  
 DC Supply  
 Battery  
  
Vnom=3VDC  
Vmin=2.7VDC  
Vmax=3.2VDC

Extreme temperature range: -20°C to +60°C (automotive usage)



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#### 4. SUMMARY OF TESTS AND RESULTS

Testing for emissions and timing was carried out in accordance with the standards listed in Section 3 of this report. The test methods employed were as required by these standards and the technical procedures of 3C Test Limited.

##### 4.1 TEST PROCEDURES

###### 4.1.1 GENERAL CONDITIONS

<b>Test Location:</b>	Radiated Emissions - Anechoic Chamber 4 Timing Measurements – Screened Room 1
<b>Temperature Range:</b> (Range 15°C to 35°C):	18°C to 19°C
<b>Humidity Range:</b> (Range 30% to 60%):	36% to 38%
<b>Date Tested:</b>	5 <sup>th</sup> – 6 <sup>th</sup> January 2012
<b>Test Engineer:</b>	JGC

###### 4.1.2 TEST REQUIREMENTS - POWER LINE CONDUCTED EMISSIONS

Since the EUT was battery powered and no external power connection is made, no conducted emissions measurements were made.

###### 4.1.3 TEST REQUIREMENTS - PERIODIC OPERATION MEASUREMENTS

A manually operated transmitter must employ a switch that automatically deactivates the transmitter within not more than 5 seconds of being released. In addition, a transmitter activated automatically shall cease transmission within 5 seconds after activation.

Measurements were made using the timing set-up shown in section 4.1.5 below. The transmitter was set to transmit normally and the resulting waveform was captured and analysed.

###### 4.1.4 TEST REQUIREMENTS - DUTY CYCLE FACTOR MEASUREMENTS

The duty cycle correction factor is used to convert the peak measurements made in the radiated emissions measurements to an average value that can be compared directly to the limits.

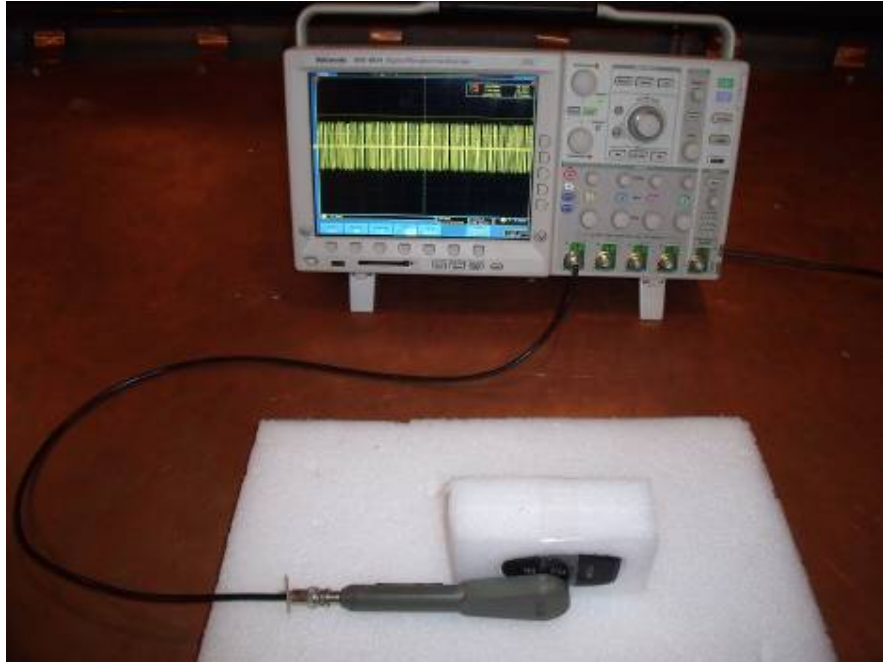
Measurements were made using the timing set-up shown in section 4.1.5 below. The transmitter was set to transmit normally and the resulting waveform was captured and analysed.

The On time and Off times were measured over the whole 100ms period. The results were then used to compute the duty cycle correction factor.

---

#### 4.1.5 TEST SET-UP – TIMING MEASUREMENTS

The following Photograph shows the generic layout for the timing test



The oscilloscope was set to give the appropriate timing and voltage settings to allow the waveform to be captured and analysed. These are displayed on the screen captures given in this report.

The full 500MHz bandwidth setting was used for all measurements.

#### 4.1.6 TEST REQUIREMENTS – RADIATED EMISSIONS MEASUREMENTS

The EUT must comply with the requirements of FCC part 15B Subpart C Section 15.231 (b) and Industry Canada RSS-210, Annex 1.

The following radiated emission limits apply for both standards:

Fundamental Frequency (MHz)	Field Intensity ( $\mu\text{V}/\text{m}$ @ 3 meters)	Field Strength Harmonics and Spurious ( $\mu\text{V}/\text{m}$ @ 3 meters)
40.66 – 40.70	2,250	225
70 – 130	1,250	125
130 – 174	1,250 – 3,750 <sup>1</sup>	125 – 375 <sup>1</sup>
174 – 260	3,750	375
260 – 470	3,750 – 12,500 <sup>1</sup>	375 – 1250 <sup>1</sup>
Above 470	12,500	1250

<sup>1</sup> Linear interpolation.

The limit at 433.93MHz is calculated to be 10,997.1  $\mu\text{V}/\text{m}$  and 1099.7  $\mu\text{V}/\text{m}$  for the harmonics at 3 meters.

In addition, emissions appearing in the Restricted Bands of Operation listed in Paragraph 15.205(a) shall not exceed the general requirements shown in Paragraph 15.209.

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The equipment was set up in accordance with the chosen standard for a Table Top configuration. The receiver characteristics, bandwidths and test set-up were all in accordance with the conditions laid out in the standard. The following variable test conditions were used:

**Frequency Range 30 - 1000MHz**

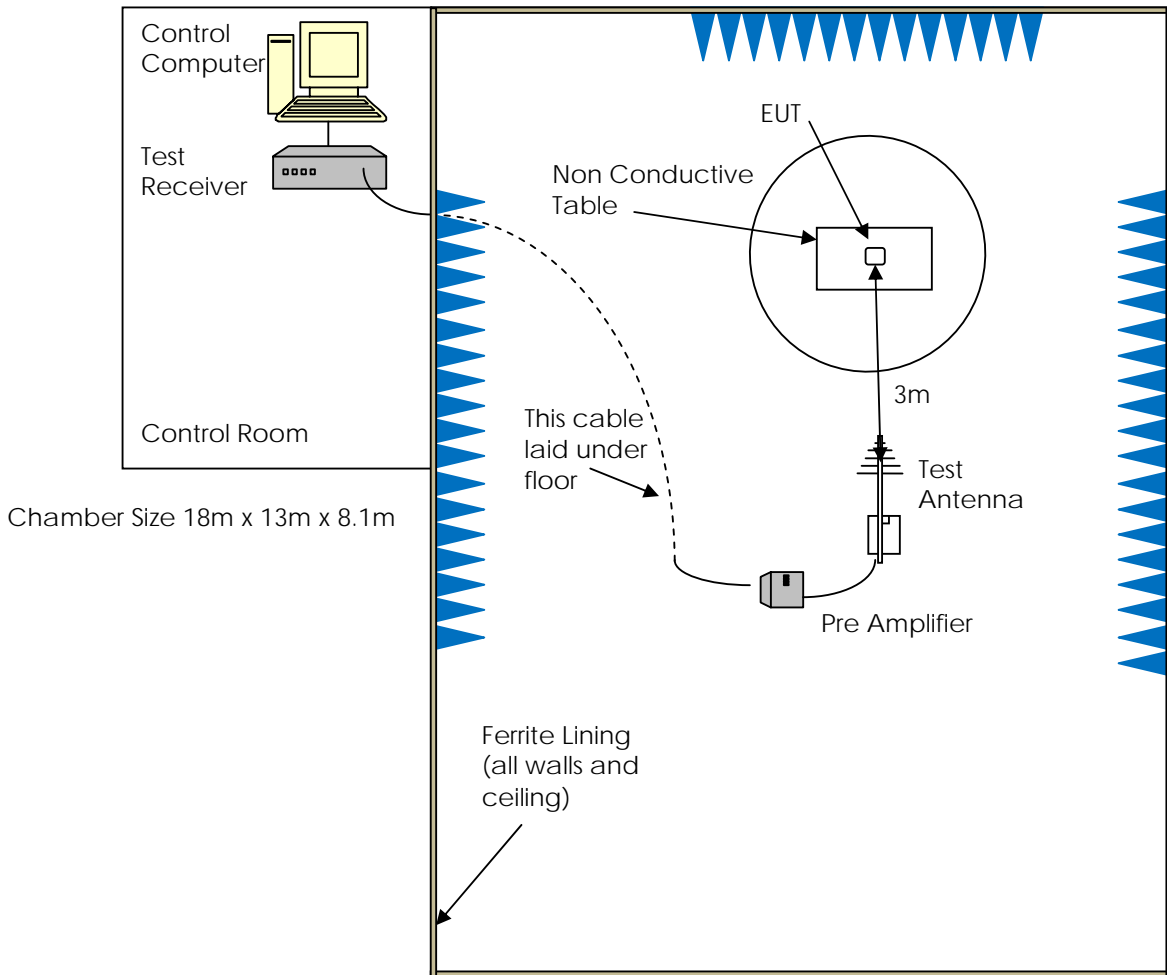
**Height above Ground Plane:** 0.8 metres  
**Distance from Antenna to EUT; Pre-Scans:** 3 metres  
**Antenna Height; Pre-Scans:** 1 - 4m (Vertical and Horizontal)  
**EUT Face Measured for Pre-Scans:** 0° - 360° rotation  
**Pre-Scans Detector:** Peak  
**Pre-Scans Measurement Bandwidth:** 120kHz  
**Pre-Scans Dwell Time:** 100ms  
**Distance from Antenna to EUT; Final:** 3 metres  
**Final Measurements Detector:** Peak  
**Final Measurements Bandwidth:** 120kHz  
**Antenna Height; Final Measurements:** 1 - 4 m scan at each frequency  
**Final Measurement Dwell Time:** 2 sec  
**EUT Supply Voltage:** 3Vdc (Battery)

**Frequency Range 1 - 4.5GHz**

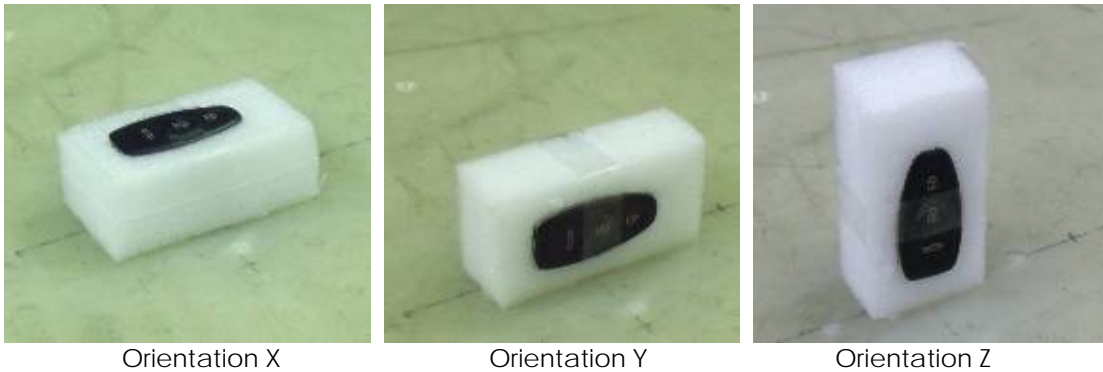
**Height above Ground Plane:** 0.8 metres  
**Distance from Antenna to EUT; Pre-Scans:** 3 metres  
**Antenna Height; Pre-Scans:** 1 - 4m (Vertical and Horizontal)  
**EUT Face Measured for Pre-Scans:** 0° - 360° rotation  
**Pre-Scans Detector:** Peak  
**Pre-Scans Measurement Bandwidth:** 1MHz  
**Pre-Scans Dwell Time:** 100ms  
**Distance from Antenna to EUT; Final:** 3 metres  
**Final Measurements Detector:** Peak  
**Final Measurements Bandwidth:** 1MHz  
**Antenna Height; Final Measurements:** 1 - 4 m scan at each frequency  
**Final Measurement Dwell Time:** 2 sec  
**EUT Supply Voltage:** 3Vdc (Battery)

---

The test was made according to the requirements of the standard. The following diagram shows the generic layout for the test and a photograph of the actual test is shown on the following page.



The key fob was assessed in three orthogonal planes for both horizontal and vertical antenna polarisations as below.



Using the above test set-up, an initial set of measurements were made. The antenna height was varied between 1-4m and the turntable rotated 0-360 during these preliminary measurements. In addition, for hand held devices, the equipment was rotated through three orthogonal planes.

The data recorded was then verified manually and these manual measurements are used as the test result. The measurements recorded were converted to average measurements using the duty cycle correction factor and losses associated with the measurement system. The test result recorded was then converted to a field strength for direct comparison to the test limits.

The following formula was used to convert the manually recorded set reading to the value used:

Recorded Field Strength (Peak Detector)(PX) is a summation of the dB values for the receiver reading (SR), less the gain of the pre-amplifier (PA) and allows for the factors associated with antenna factor (AF) and Cable losses (CF). No correction for distance was required.

$$PX \text{ (dB}\mu\text{V/m)} = SR \text{ (dB}\mu\text{V)} - PA \text{ (dB)} + AF \text{ (dB)} + CF \text{ (dB)}$$

This value is then corrected for the duty cycle factor (DCF) to convert to an Average value (AX) as required by the standard.

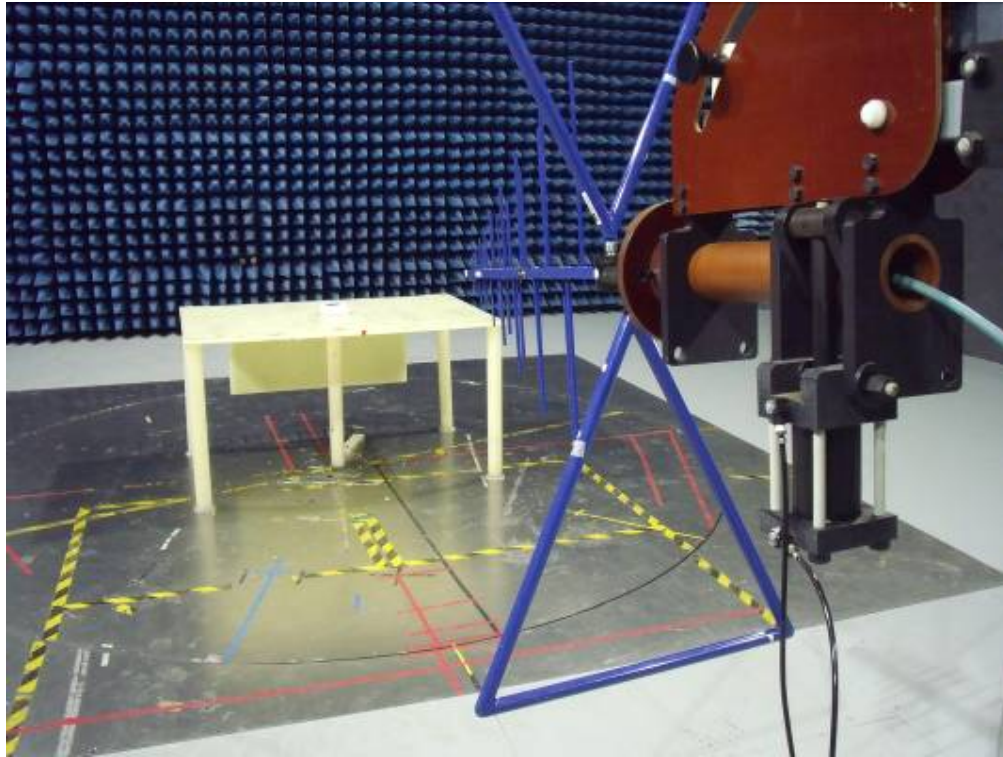
$$AX \text{ (dB}\mu\text{V/m)} = PX \text{ (dB}\mu\text{V/m)} + DCF$$

This value is then converted to a  $\mu\text{V}$  value (X) to allow for direct comparison with the limits specified in the standard:-

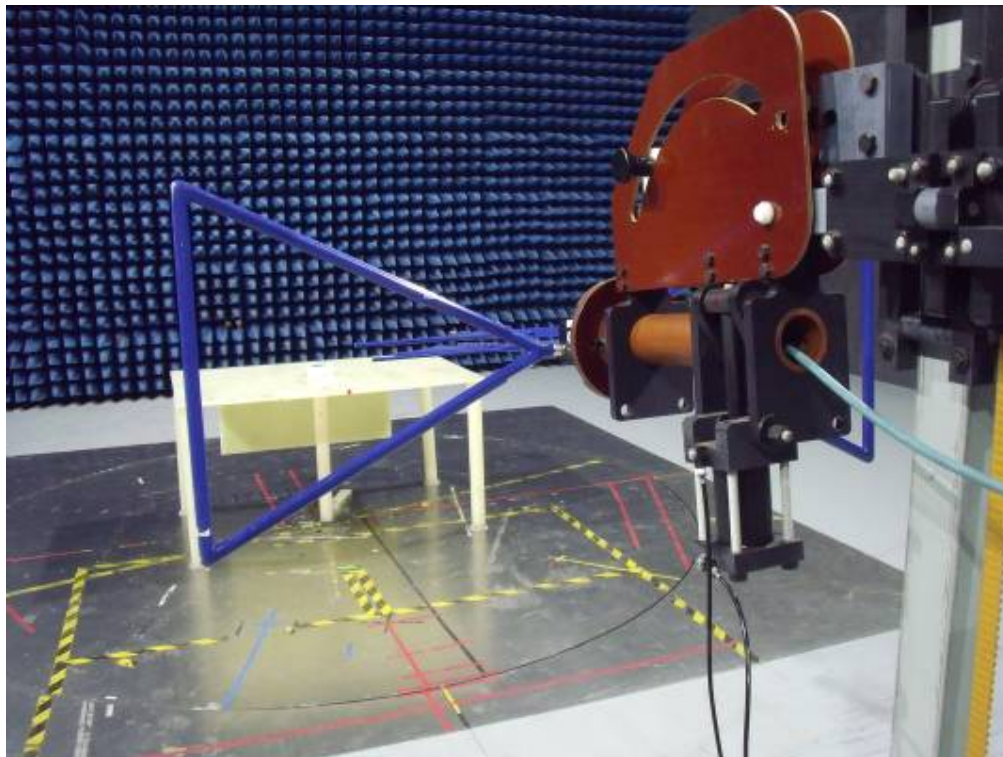
$$X \text{ (}\mu\text{V/m)} = \text{Antilog} [(AX \text{ (dB}\mu\text{V/m)})/20]$$

---

Photograph(s) of Test Set-up for Radiated Disturbance:

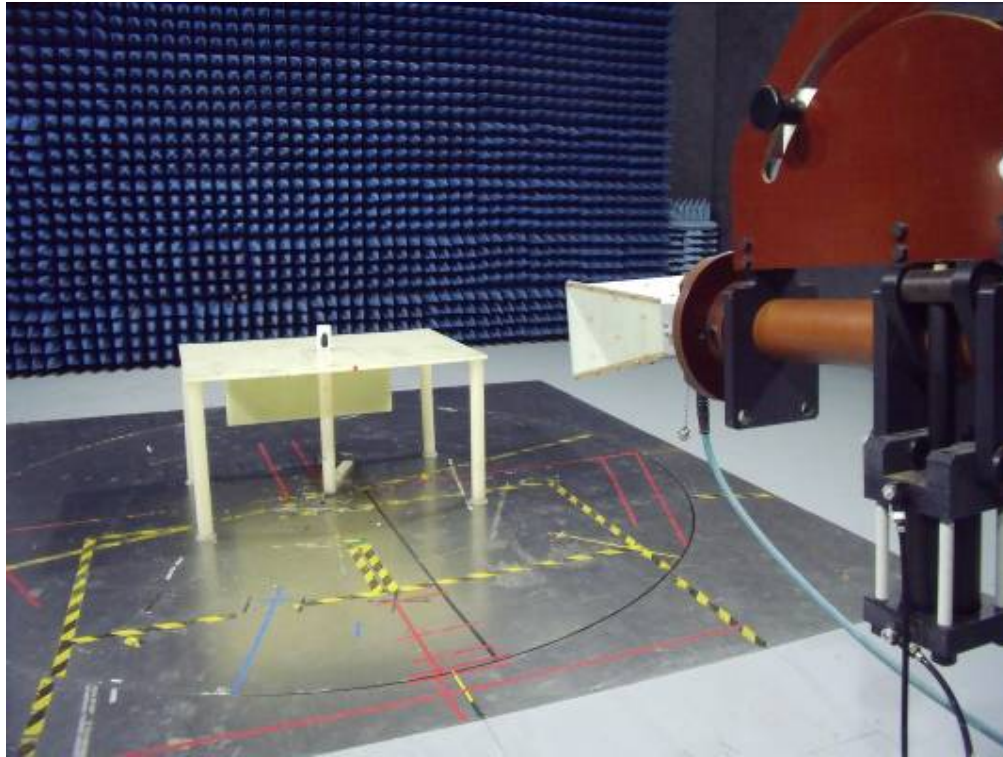


Vertical (30 - 1000MHz)

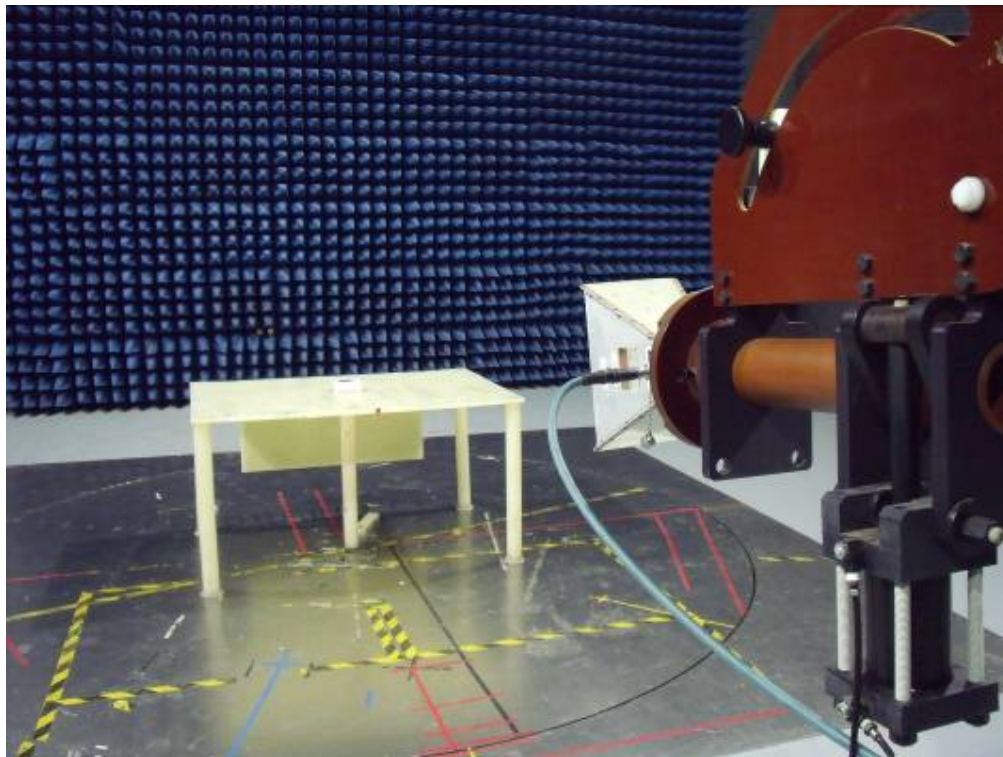


Horizontal (30 - 1000MHz)





Vertical (1 - 4.5GHz)



Horizontal (1 - 4.5GHz)

4.1.7 TEST REQUIREMENTS – OCCUPIED BANDWIDTH MEASUREMENTS – FCC PART 15B

In accordance with section 15.231 (c) of the standard, all emissions within 20dB of the peak amplitude of the centre frequency are required to be within a band less than 0.25% of the centre frequency.

Measurements were made using the radiated emissions set-up as described on the previous pages of this report. The result for the transmissions was captured using a 120kHz bandwidth and a peak detector on a 2MHz span.

A display line was introduced 20dB down from the peak value and the data analysed for comparison with the above requirement.

4.1.8 TEST REQUIREMENTS – OCCUPIED BANDWIDTH MEASUREMENTS – ICS RSS-210

In accordance with section A 1.1.3 of the standard, the measurement of the 99% bandwidth is made and the results shall be less than 0.25% of the centre frequency.

Measurements were made using the radiated emissions set-up as described on the previous pages of this report. The result for the transmissions was captured using a 30kHz bandwidth and a peak detector on a 1MHz span.

The measurement was made using the calibrated measurement function on the test receiver.

4.1.9 TEST EQUIPMENT USED – ALL TESTS.

All test equipment used was calibrated to the requirements of UKAS and checked prior to use. The following table details the equipment used.

Equipment Used	Description	Calibration Due Date
Oscilloscope	3C/1293 Tektronix DPO4054	19/12/12
Measurement Probe	Anritsu MA2061B	Class 2
Spectrum Analyser / Receiver	3C/0590 Rohde Schwarz ESI26	19/05/12
Pre Amp 1	3C/1286 HP 87405A	27/05/12
Pre Amp 2	3C/1065 Agilent 8449B	01/03/12
Antenna 1 – BiLog	3C/0777 Chase CBL6111C	30/04/12
Antenna 2 – Horn	3C/0411 EMCO 3115	27/05/12
Cable 1	3C/0891	29/07/12
Cable 2	3C/0896	11/01/12
Cable 3	3C/0963	28/07/12
Cable 4	3C/1025	18/02/12

The following Software was used to perform the measurements of radiated disturbance:

**Name:** Rohde + Schwarz EMC32

**Version:** v8.52



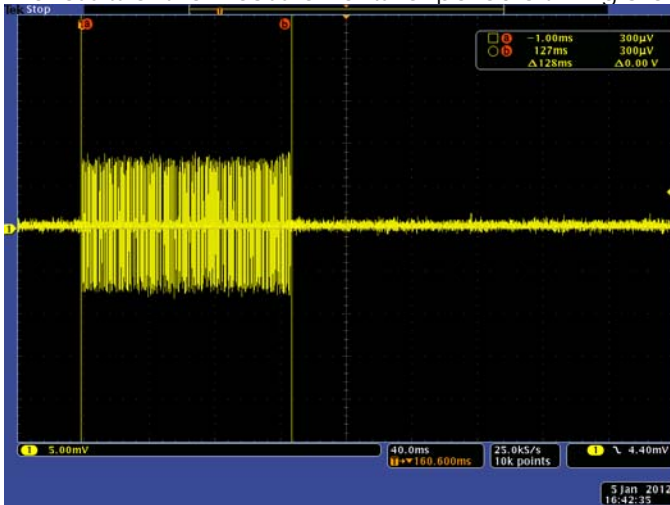
#### 4.2 TEST RESULTS

Measurements were made on the equipment under test as detailed below.

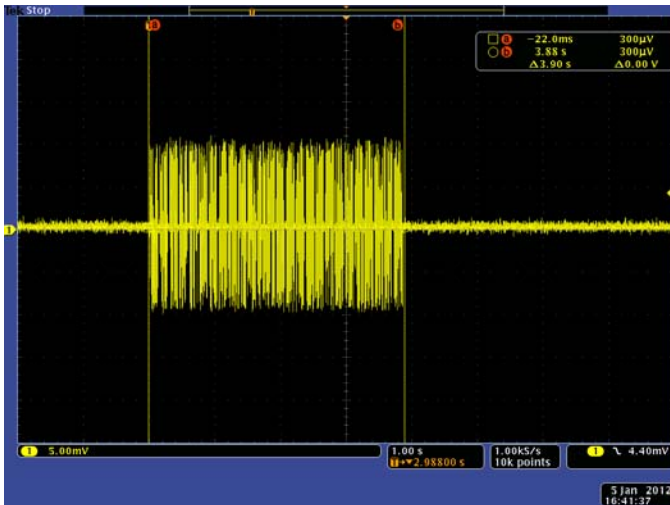
**Serial Number:** NM137  
**Modification State:** 0  
**Overall Test Result:** Pass  
**Test Class:** I

##### 4.2.1 TEST RESULTS – PERIODIC OPERATION MEASUREMENTS

The results of the measurements for periodic timing are shown below.



Single Press Transmission (128ms)



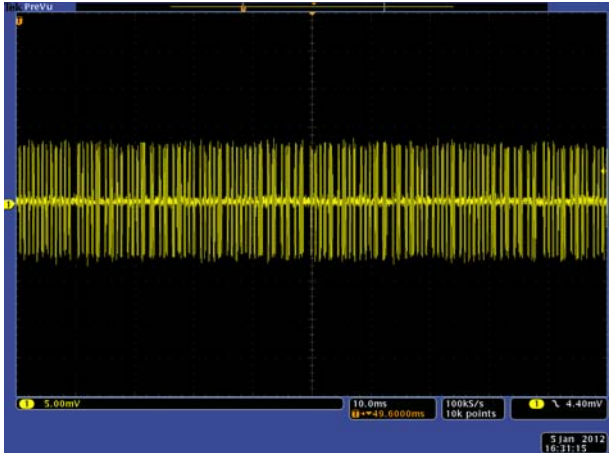
Continuous Press (Time Out 3.90seconds)

As can be seen, the transmitter ceases transmission within 128ms for a single press and within 4s for a continuous press.

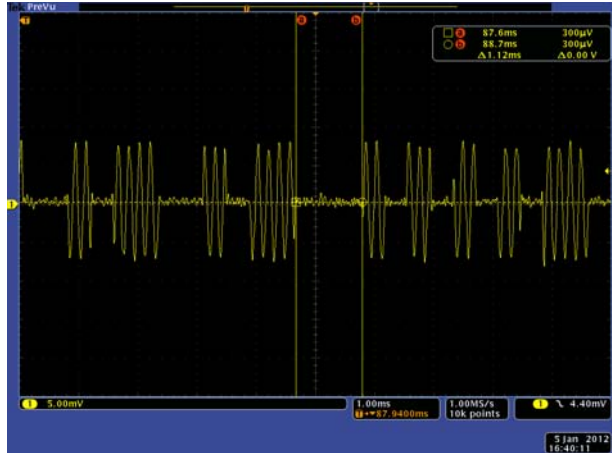
#### 4.2.2 TEST RESULTS – DUTY CYCLE FACTOR MEASUREMENTS

Measurements of the Pulse timing where made using an oscilloscope with a bandwidth of 500MHz. The transmitter was operated and the resulting waveform captured. The waveform was seen to be 128ms in length. The analysis was therefore made over a period of 100ms. The on and off times were measured and the duty cycle computed. The following measurements where used to determine the duty cycle correction.

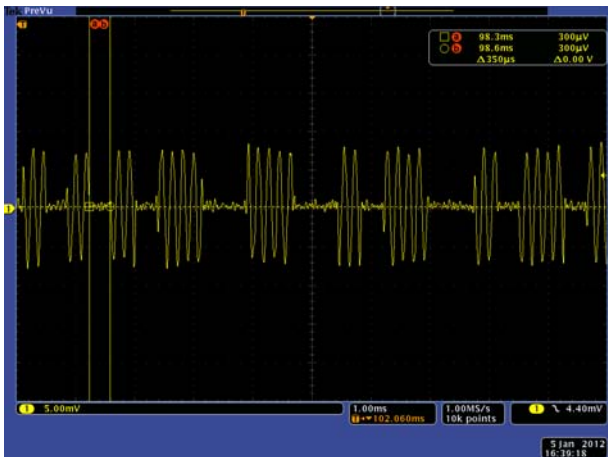
The duty cycle factor measurement is used to convert the peak reading to average readings in accordance with section 15.35 of the FCC Rules Part 15B.



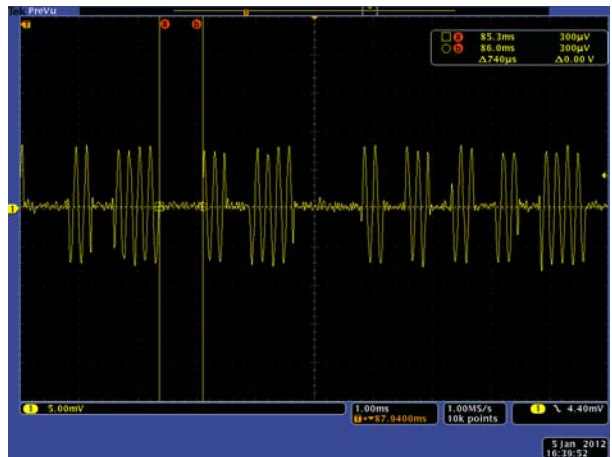
100ms Pulse Train



1.12ms OFF period (4 off per 100ms recorded)



0.35 OFF period (80 of per 100ms recorded)



0.74ms OFF period (20 of per 100ms recorded)

Using the Plot taken, the ON period was 52.72ms and OFF was 47.28ms.

The Duty Cycle is calculated as  $20 \times \log(\text{on time}/100\text{msec}) = 20 \times \log(52.72/100) = -5.56\text{dB}$ .

A -5.56dB correction factor was therefore applied to the results for all radiated emissions measurements as given in the following sections.

4.2.3 TEST RESULTS – RADIATED MEASUREMENTS

Measurements of radiated disturbance were made on the equipment under test as detailed below.

**Serial Number:** NM137  
**Modification State:** 0  
**Overall Test Result:** Pass

The results of the measurements of radiated disturbance between the frequencies of 30MHz - 4500MHz are shown in the following pages. The following table indicates the measurements that were made:

Frequency MHz	Limit	Antenna Polarisation	EUT Orthogonal Plane	Test Mode	Plot #	Observation (refer 4.2.4)
30MHz - 1GHz	Section 15.231(C)	Vertical	X	1	9120-1	Note 1
30MHz - 1GHz	Section 15.231(C)	Horizontal	X	1	9120-6	Note 1
30MHz - 1GHz	Section 15.231(C)	Vertical	Y	1	9120-2	Note 1
30MHz - 1GHz	Section 15.231(C)	Horizontal	Y	1	9120-5	Note 1
30MHz - 1GHz	Section 15.231(C)	Vertical	Z	1	9120-3	Note 1
30MHz - 1GHz	Section 15.231(C)	Horizontal	Z	1	9120-4	Note 1
1GHz – 4.5GHz	Section 15.231(C)	Vertical	X	1	9120-11	Note 1
1GHz – 4.5GHz	Section 15.231(C)	Horizontal	X	1	9120-14	Note 1
1GHz – 4.5GHz	Section 15.231(C)	Vertical	Y	1	9120-10	Note 1
1GHz – 4.5GHz	Section 15.231(C)	Horizontal	Y	1	9120-13	Note 1
1GHz – 4.5GHz	Section 15.231(C)	Vertical	Z	1	9120-12	Note 1
1GHz – 4.5GHz	Section 15.231(C)	Horizontal	Z	1	9120-15	Note 1

The graphs shown are for reference only and should not be used to determine compliance. The final measurements were made manually and are recorded in the table below.

4.2.4 OBSERVATIONS AND RECOMMENDATIONS

Note 1: None

The maximum recorded levels of disturbance within the frequency range demonstrating the minimum margin of compliance when final measurements were made were:

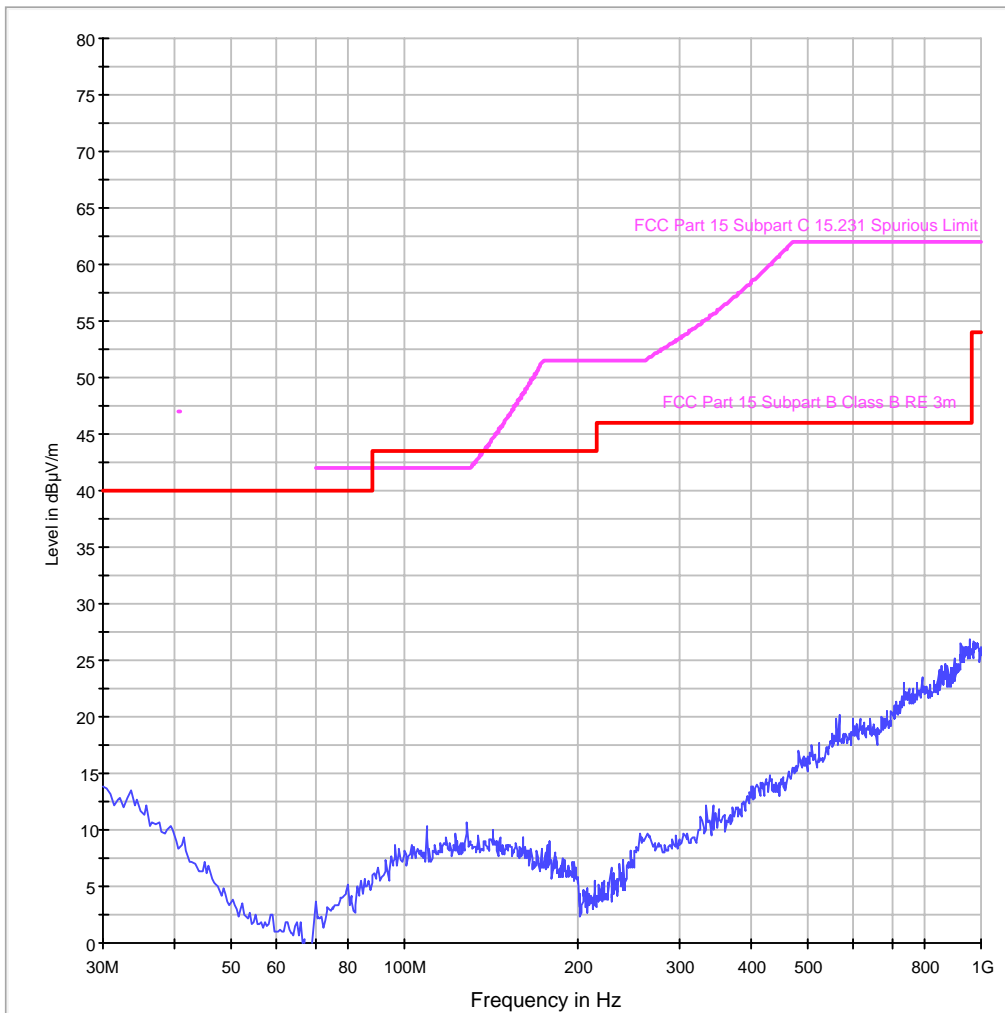
Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Antenna Pol (H/V)	EUT Orthogonal Plane	EUT Angle ( $^{\circ}$ )	Antenna Height (m)	Combined Correction (dB)	Duty Cycle Correction (dB)	Level ( $\mu$ V/m)	Limit ( $\mu$ V/m)	Margin dB	Result (Pass / Fail)
433.9	66.8	V	Y	280	1.48	-6.3	-5.56	<b>558.47</b>	10997.0	10438.5	Pass
433.9	65.4	H	X	0	2.57	-6.3	-5.56	<b>475.34</b>	10997.0	10521.7	Pass
867.8	33.5	V	X	10	1.10	1.5	-5.56	<b>29.65</b>	1099.7	1070.1	Pass
867.8	38.4	H	Y	175	2.40	1.5	-5.56	<b>52.12</b>	1099.7	1047.6	Pass
1301.8	58.5	V	Z	210	1.53	-10.3	-5.56	<b>135.52</b>	500.0	364.5	Pass
1301.8	57.8	H	Y	30	1.30	-10.3	-5.56	<b>125.03</b>	500.0	375.0	Pass
1735.8	51.7	V	Z	35	1.00	-7.7	-5.56	<b>83.56</b>	1099.7	1016.1	Pass
1735.8	50.7	H	Y	0	1.00	-7.7	-5.56	<b>74.47</b>	1099.7	1025.2	Pass
2169.7	53.8	V	Z	195	1.51	-5.3	-5.56	<b>140.28</b>	1099.7	959.4	Pass
2169.7	55.2	H	X	0	1.80	-5.3	-5.56	<b>164.82</b>	1099.7	934.9	Pass
2603.5	62.7	V	Z	215	1.86	-3.8	-5.56	<b>464.52</b>	1099.7	635.2	Pass
2603.5	59.9	H	Y	200	1.74	-3.8	-5.56	<b>336.51</b>	1099.7	763.2	Pass
3037.4	55.4	V	Y	340	1.20	-1.8	-5.56	<b>252.35</b>	1099.7	847.4	Pass
3037.4	56.6	H	Z	20	2.26	-1.8	-5.56	<b>289.73</b>	1099.7	810.0	Pass
3471.5	56.1	V	Z	213	1.48	-0.3	-5.56	<b>325.09</b>	1099.7	774.6	Pass
3471.5	55.2	H	Y	216	1.87	-0.3	-5.56	<b>293.09</b>	1099.7	806.6	Pass
3905.4	42.8	V	Z	0	1.00	0.2	-5.56	<b>74.47</b>	500.0	425.5	Pass
3905.4	41.8	H	Z	0	2.00	0.2	-5.56	<b>66.37</b>	500.0	433.6	Pass
4339.2	41.1	V	Y	0	1.00	1.8	-5.56	<b>73.62</b>	500.0	426.4	Pass
4339.2	44.6	H	Z	0	1.00	1.8	-5.56	<b>110.15</b>	500.0	389.8	Pass

No signals were recorded above the test specification limit.

# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-Amb  
Operating Mode: Receive Mode  
Antenna: Vertical/ 1.0m Height / 3m Distance  
Notes: -  
FCC Part 15 Subpart C 15.231 30-1000MHz

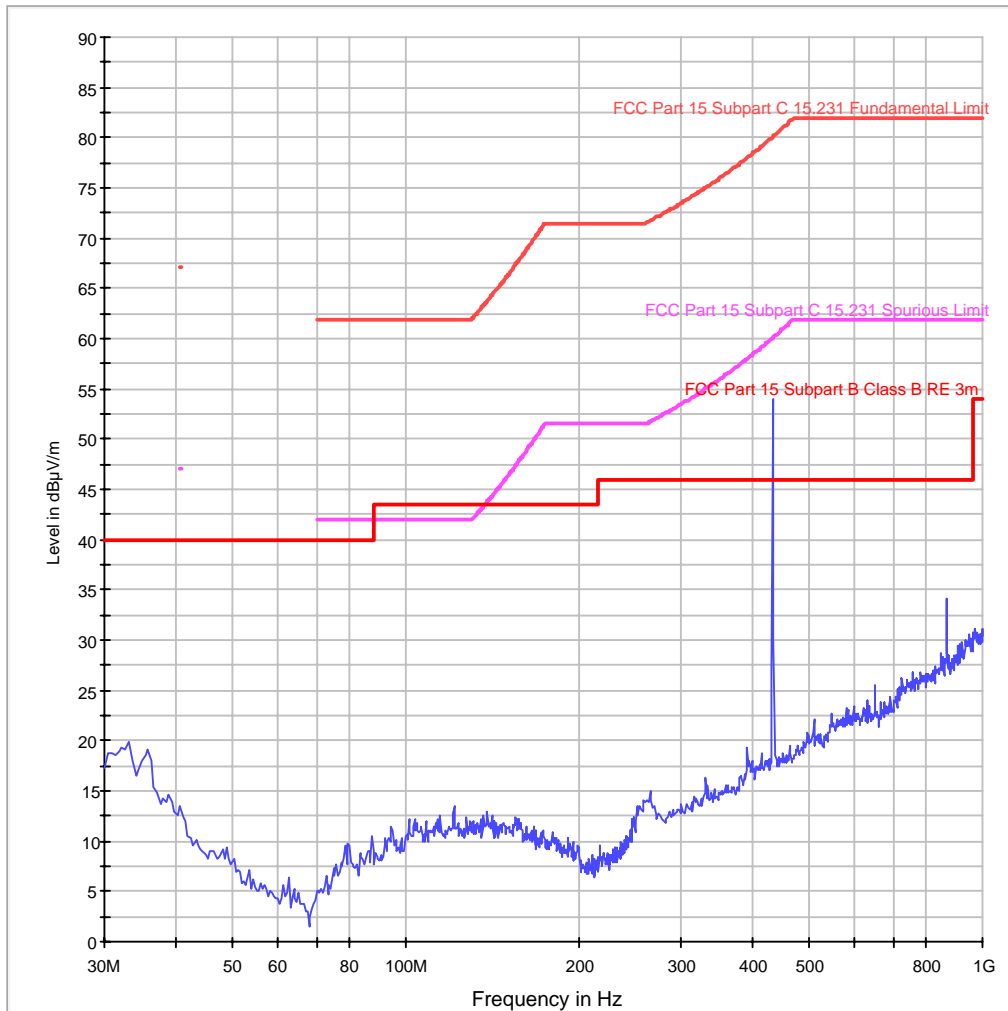


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-1  
Operating Mode: Transmit Mode  
Antenna: Vertical/ 1.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation X

FCC Part 15 Subpart C 15.231 30-1000MHz

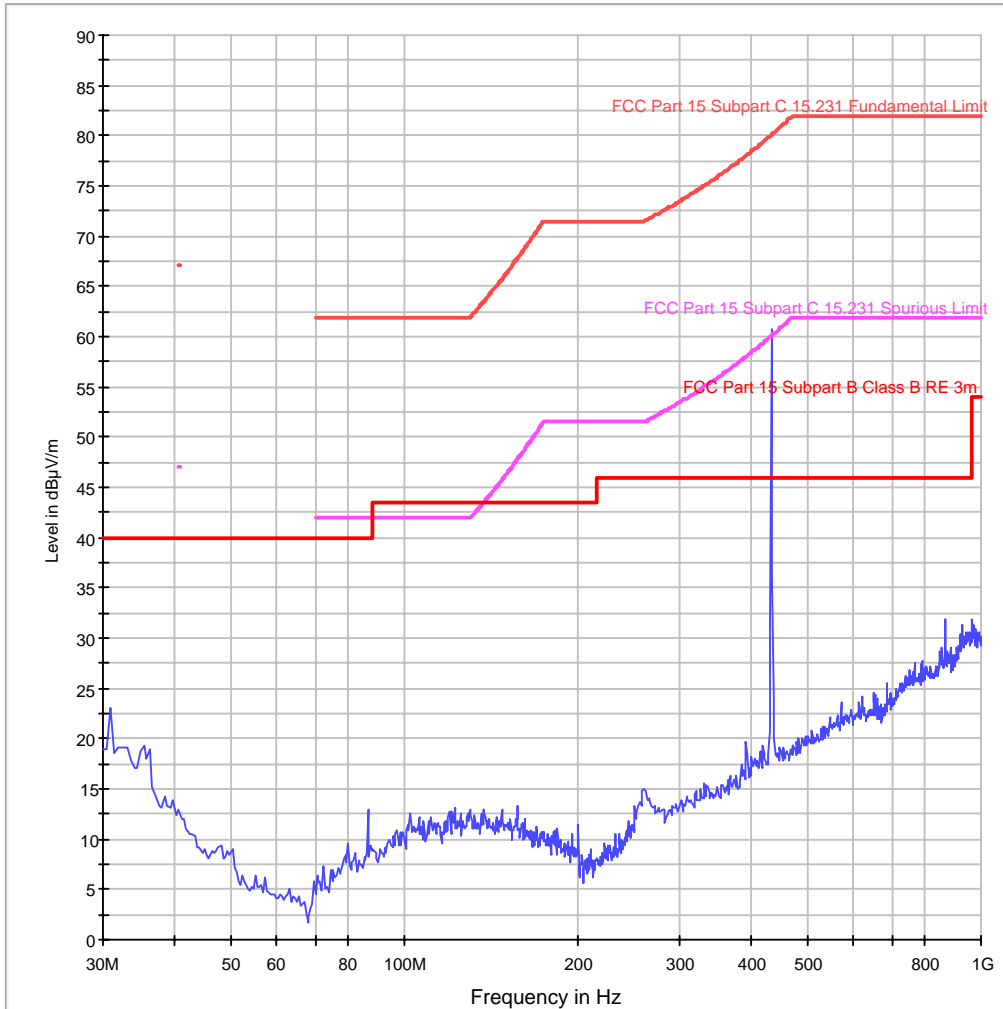


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-2  
Operating Mode: Transmit Mode  
Antenna: Vertical/ 1.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation Y

FCC Part 15 Subpart C 15.231 30-1000MHz

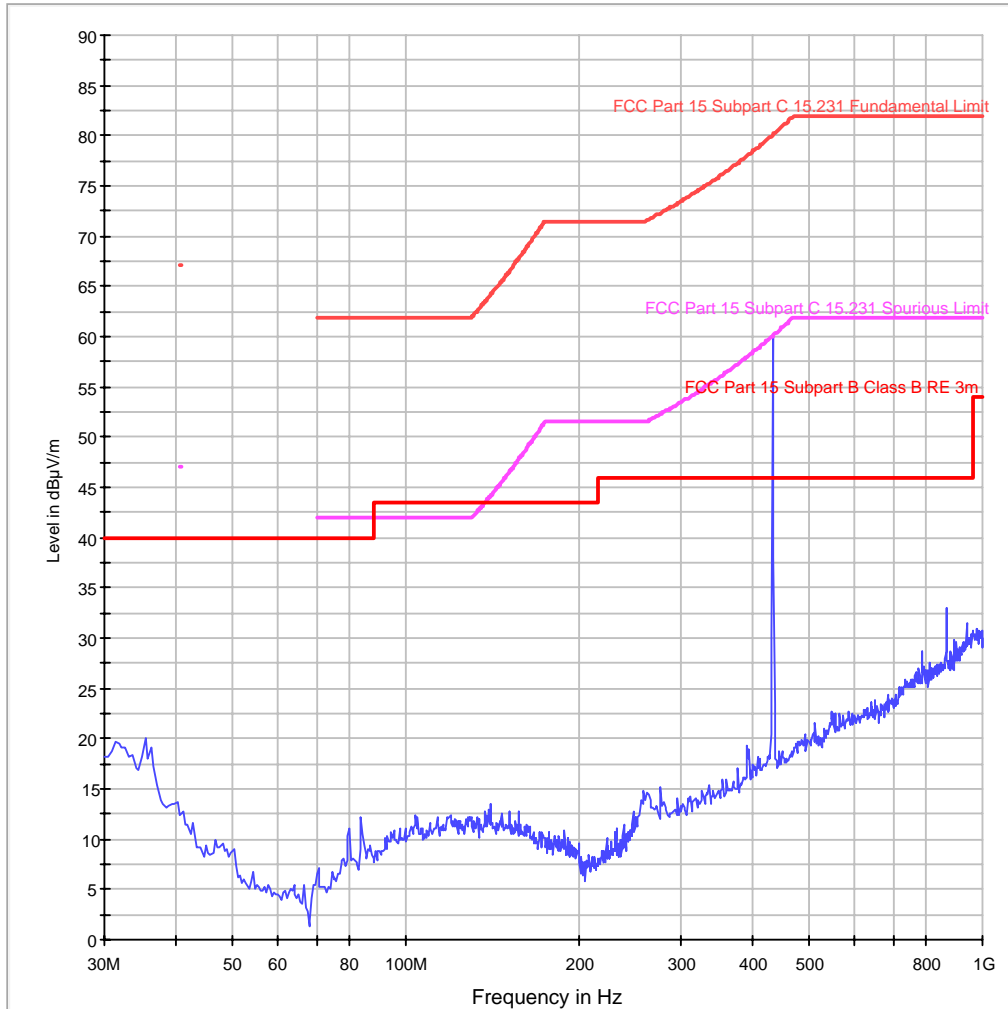


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-3  
Operating Mode: Transmit Mode  
Antenna: Vertical/ 1.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation Z

FCC Part 15 Subpart C 15.231 30-1000MHz



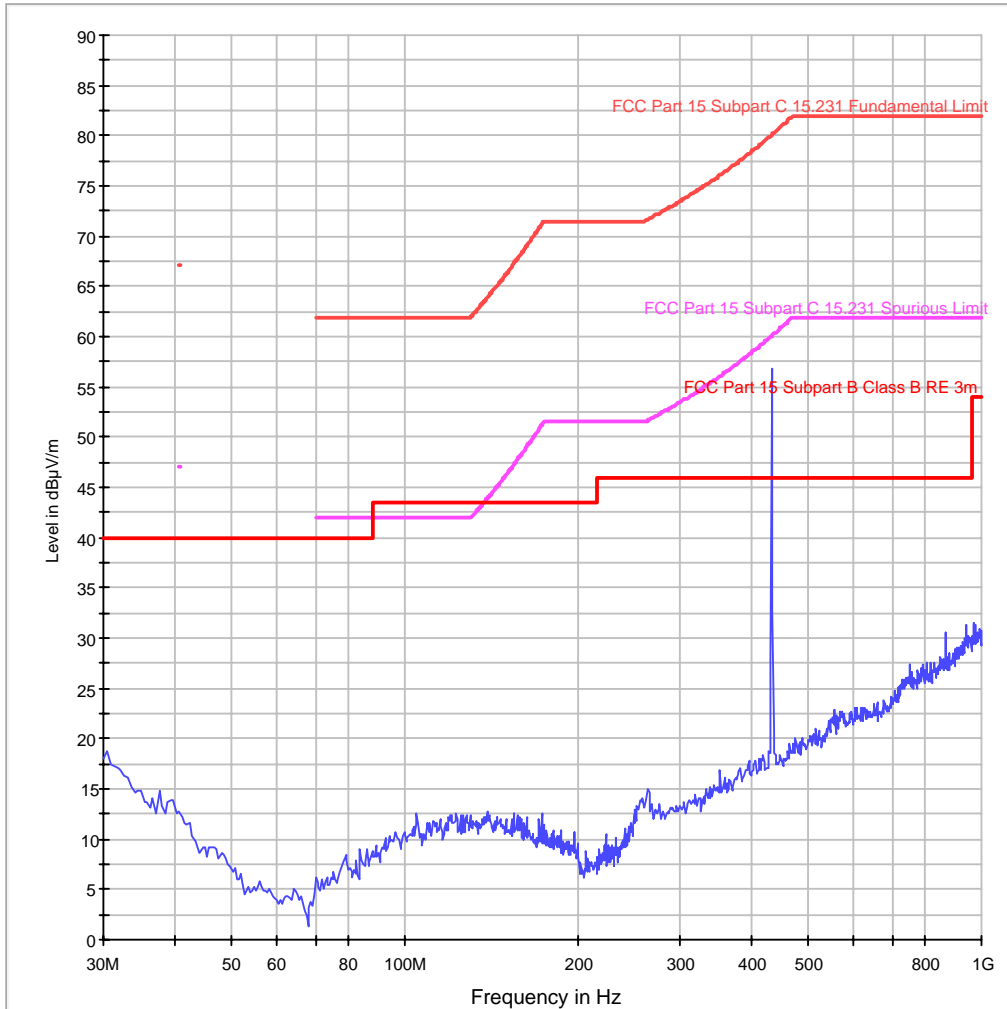


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-4  
Operating Mode: Transmit Mode  
Antenna: Horizontal/ 2.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation Z

FCC Part 15 Subpart C 15.231 30-1000MHz

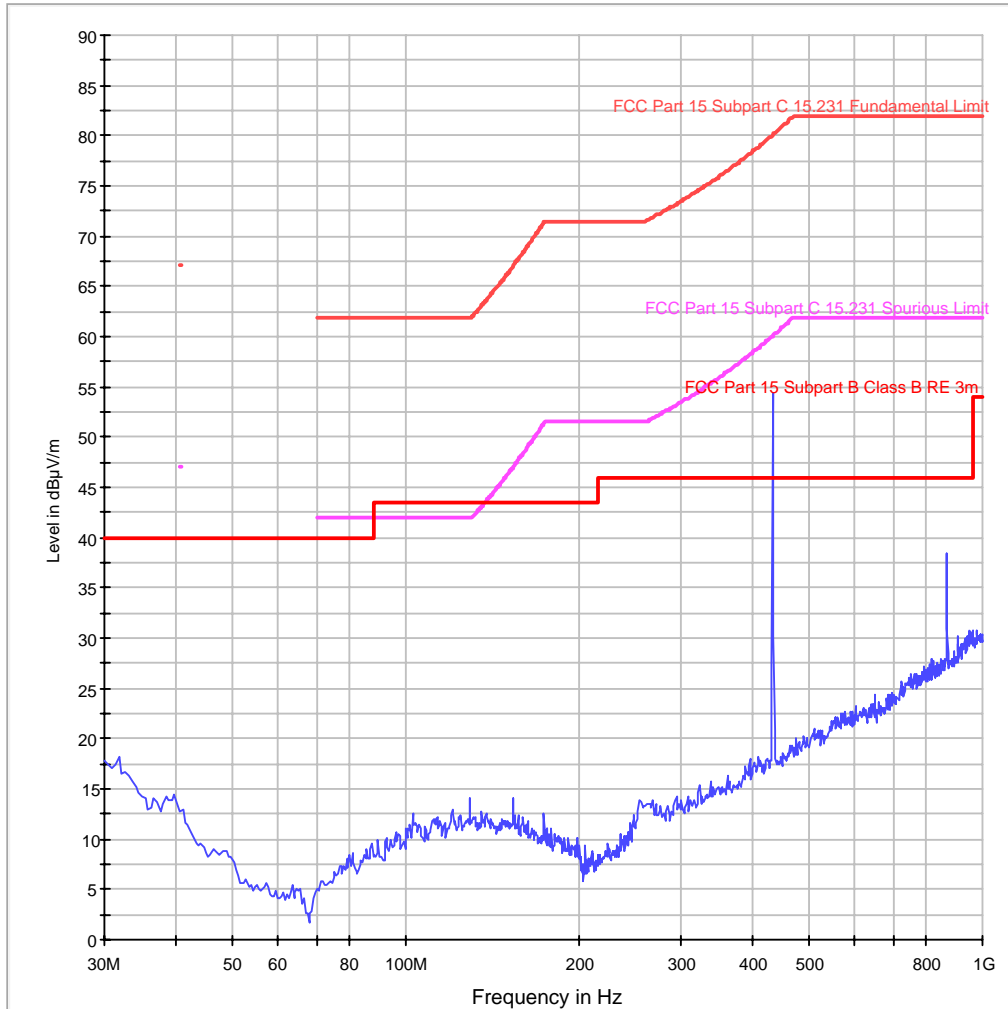


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-5  
Operating Mode: Transmit Mode  
Antenna: Horizontal/ 2.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation Y

FCC Part 15 Subpart C 15.231 30-1000MHz

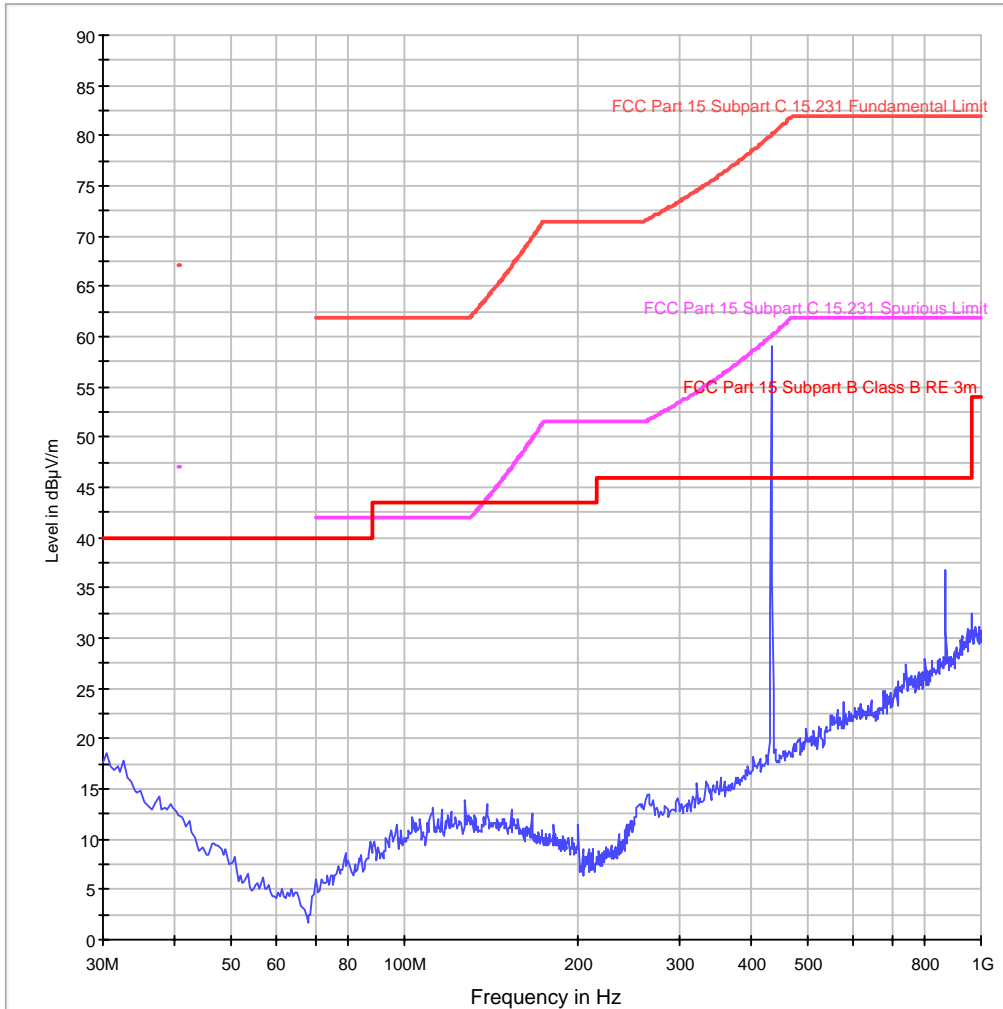


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-6  
Operating Mode: Transmit Mode  
Antenna: Horizontal/ 2.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation X

FCC Part 15 Subpart C 15.231 30-1000MHz

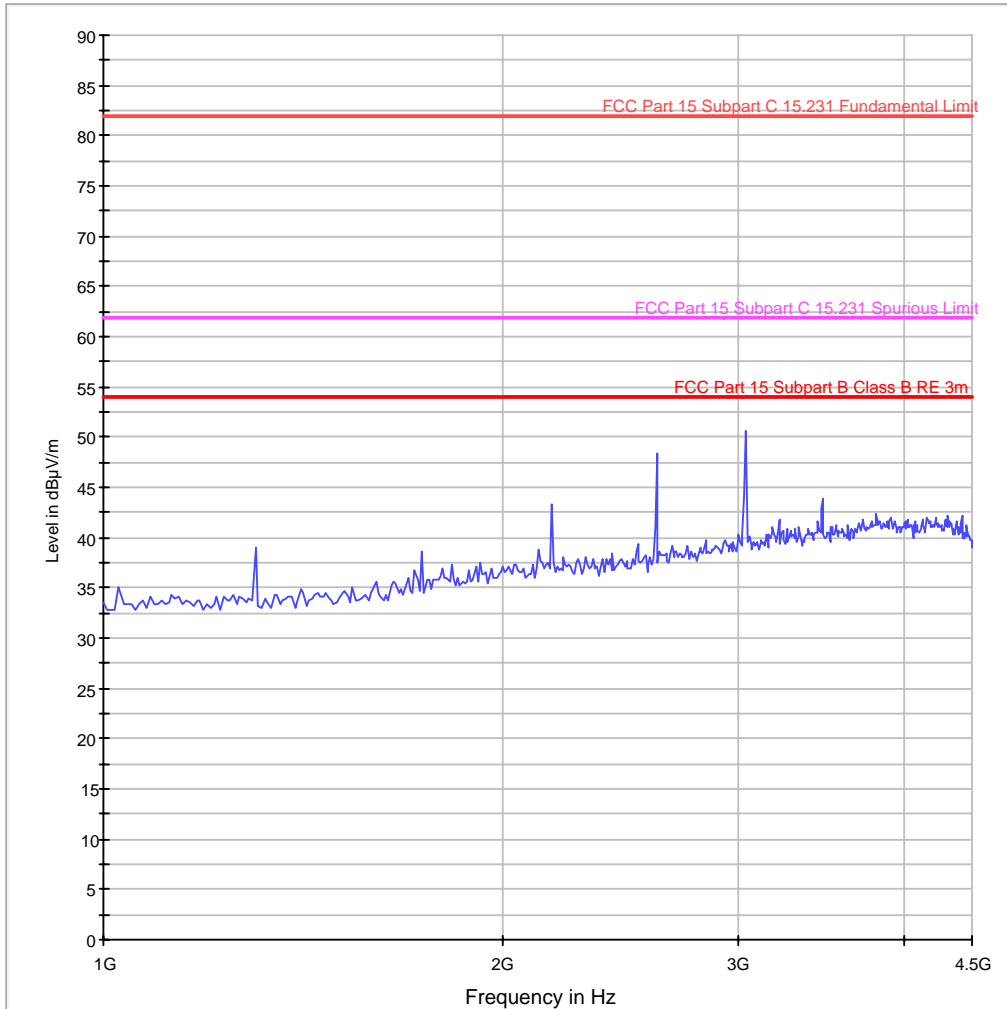


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-10  
Operating Mode: Transmit Mode  
Antenna: Vertical/ 1.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation Y

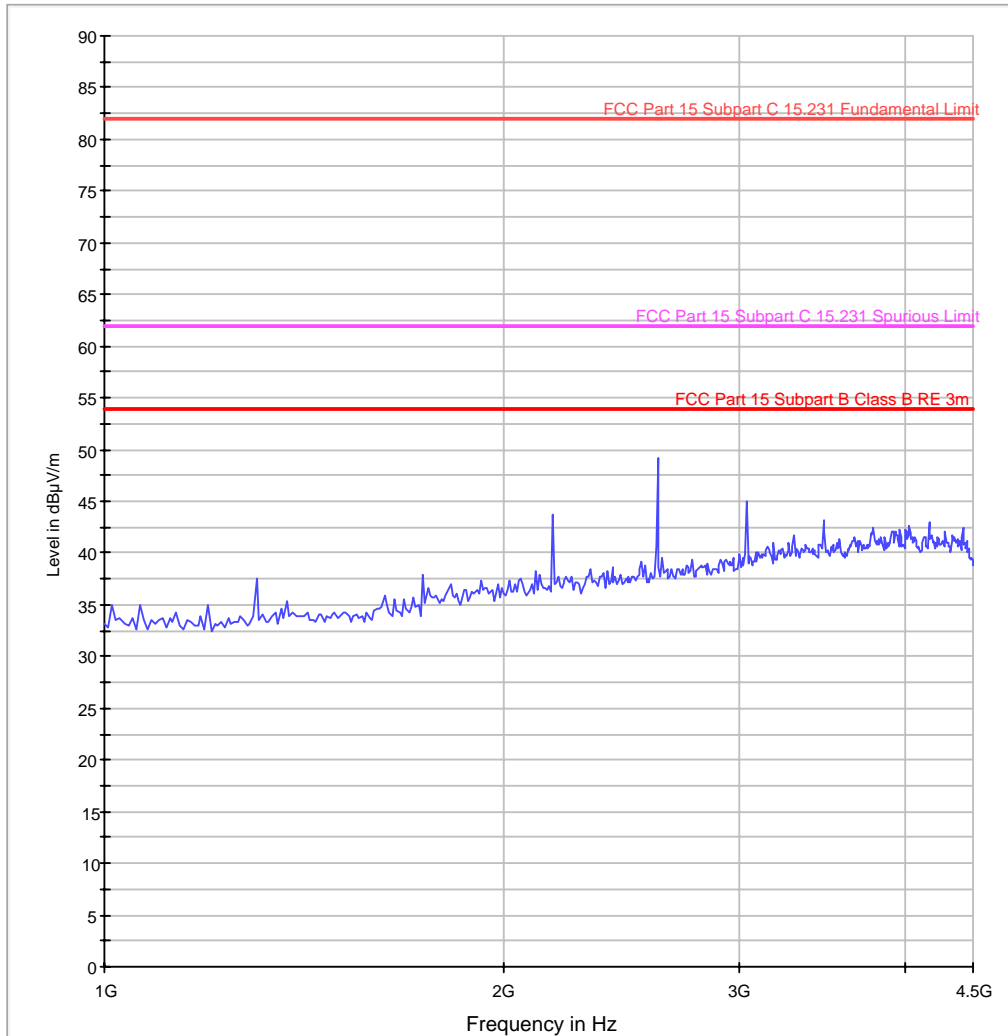
FCC Part 15 Subpart C 15.231 1-4.5GHz



# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-11  
Operating Mode: Transmit Mode  
Antenna: Vertical/ 1.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation X

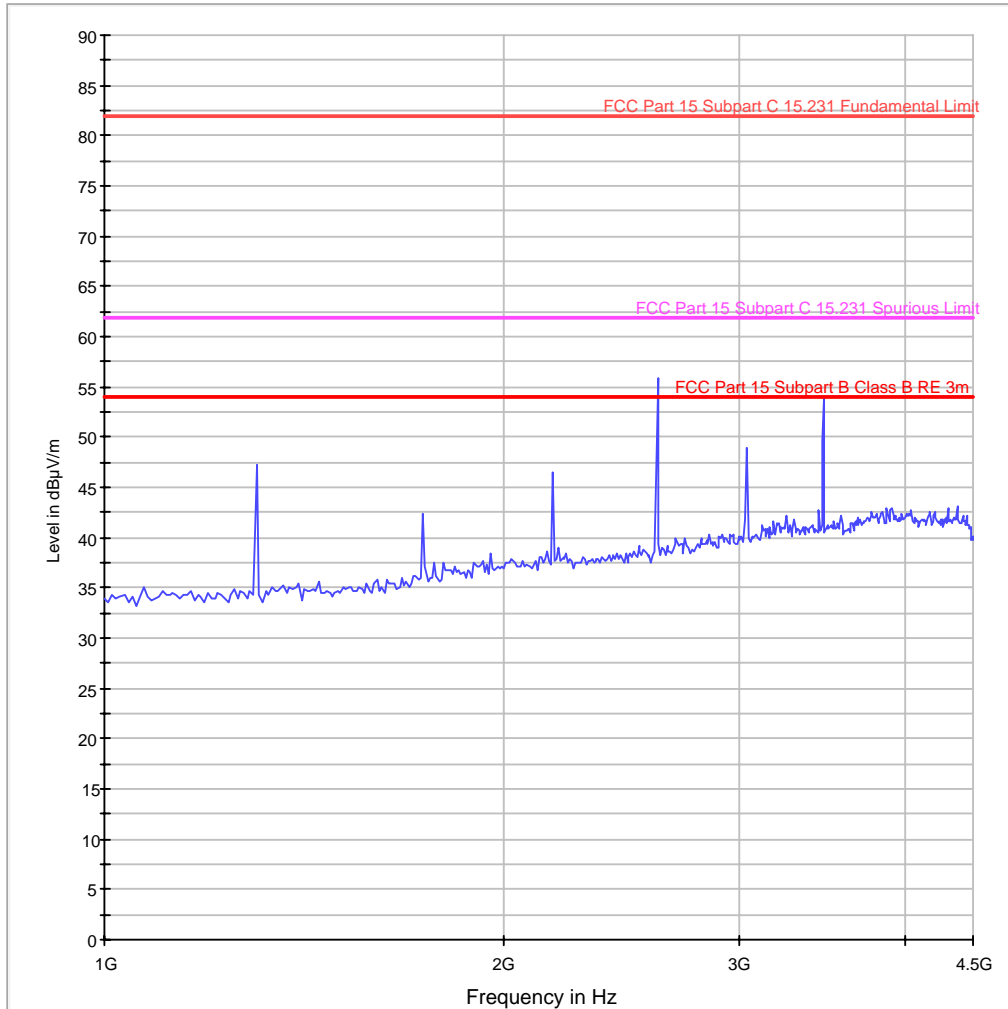


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-12  
Operating Mode: Transmit Mode  
Antenna: Vertical/ 1.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation Z

FCC Part 15 Subpart C 15.231 1-4.5GHz

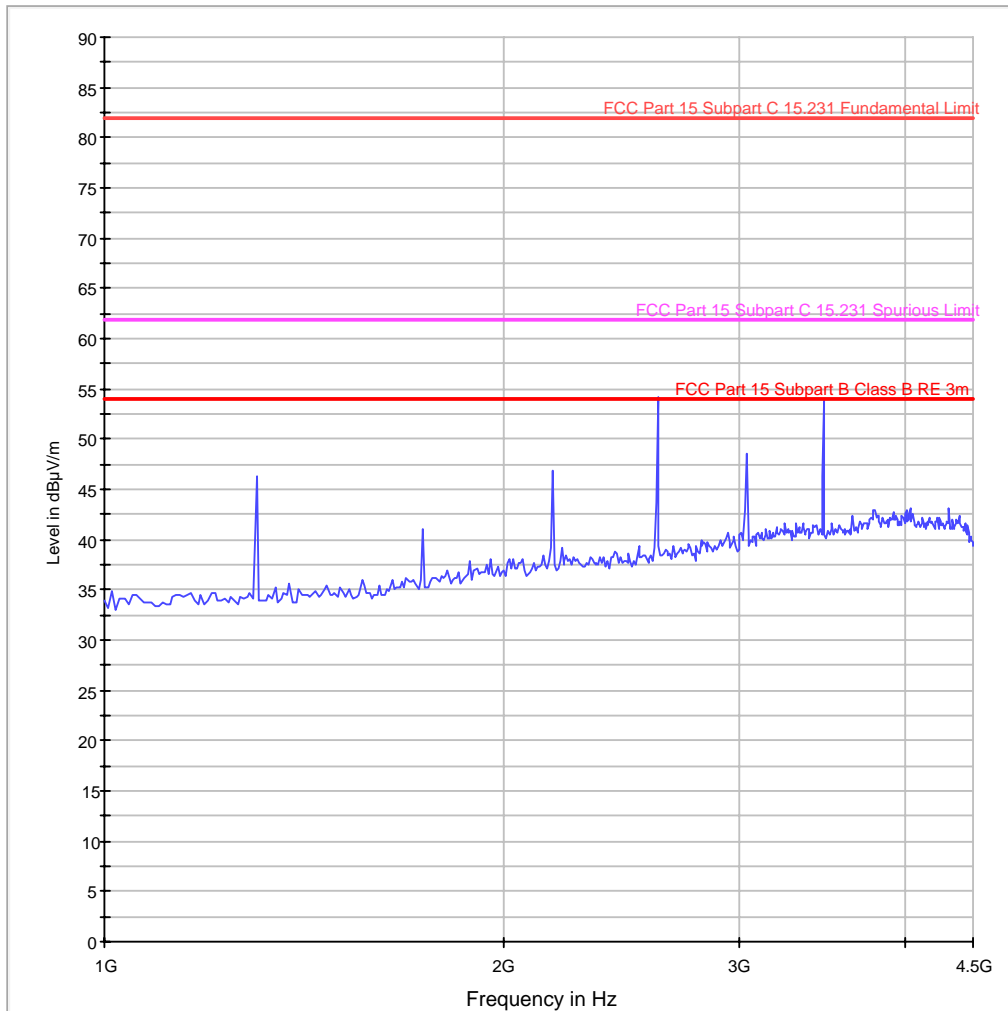


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-13  
Operating Mode: Transmit Mode  
Antenna: Horizontal/ 1-4.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation Y

FCC Part 15 Subpart C 15.231 1-4.5GHz

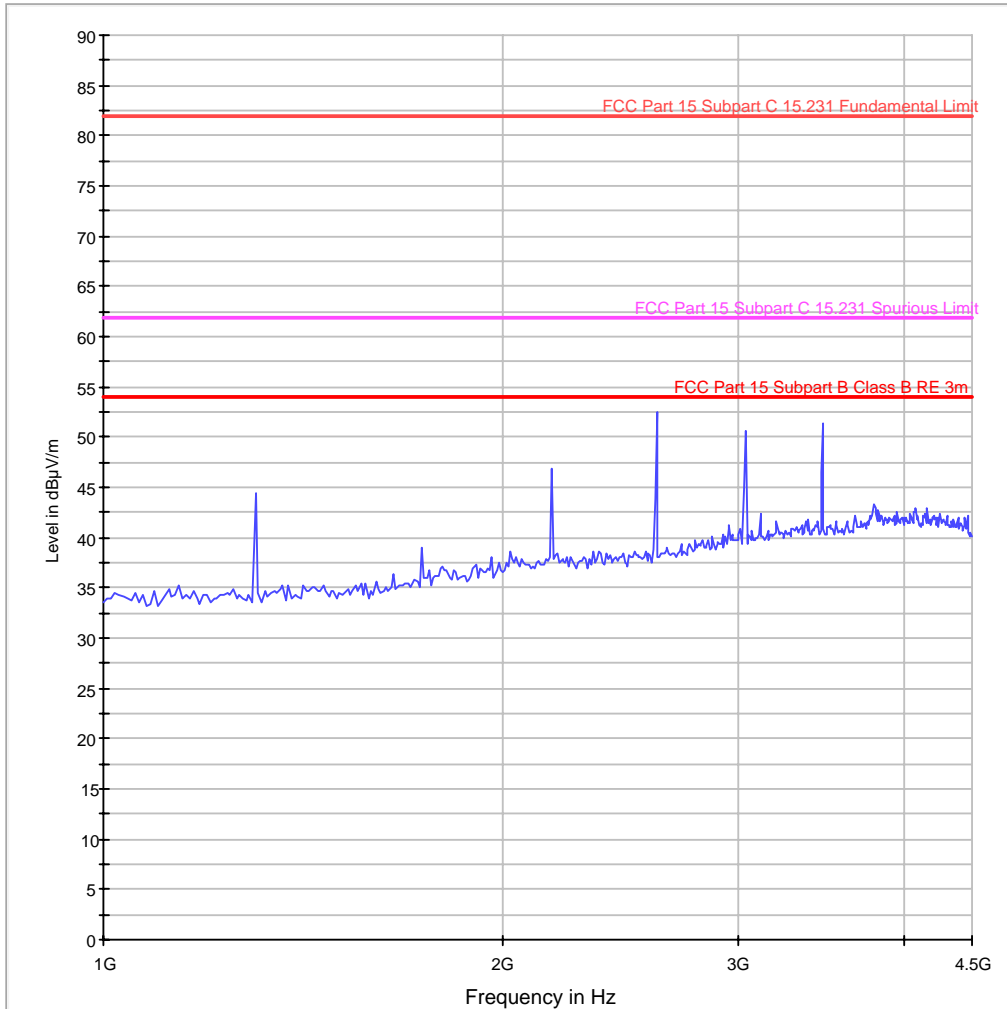


# AC4 - 3C Test EMC32E+ Report

## EUT Information

3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-14  
Operating Mode: Transmit Mode  
Antenna: Horizontal/ 1-4.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation X

FCC Part 15 Subpart C 15.231 1-4.5GHz



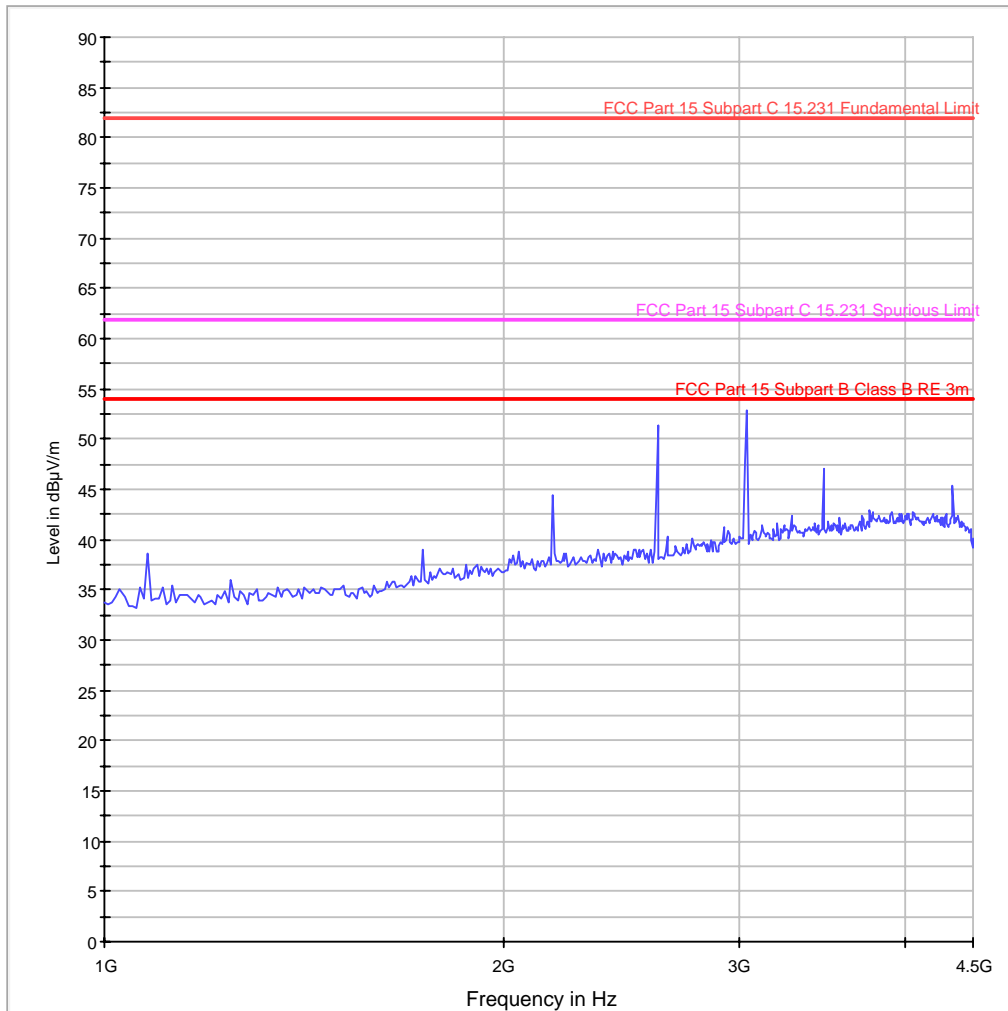


# AC4 - 3C Test EMC32E+ Report

## EUT Information

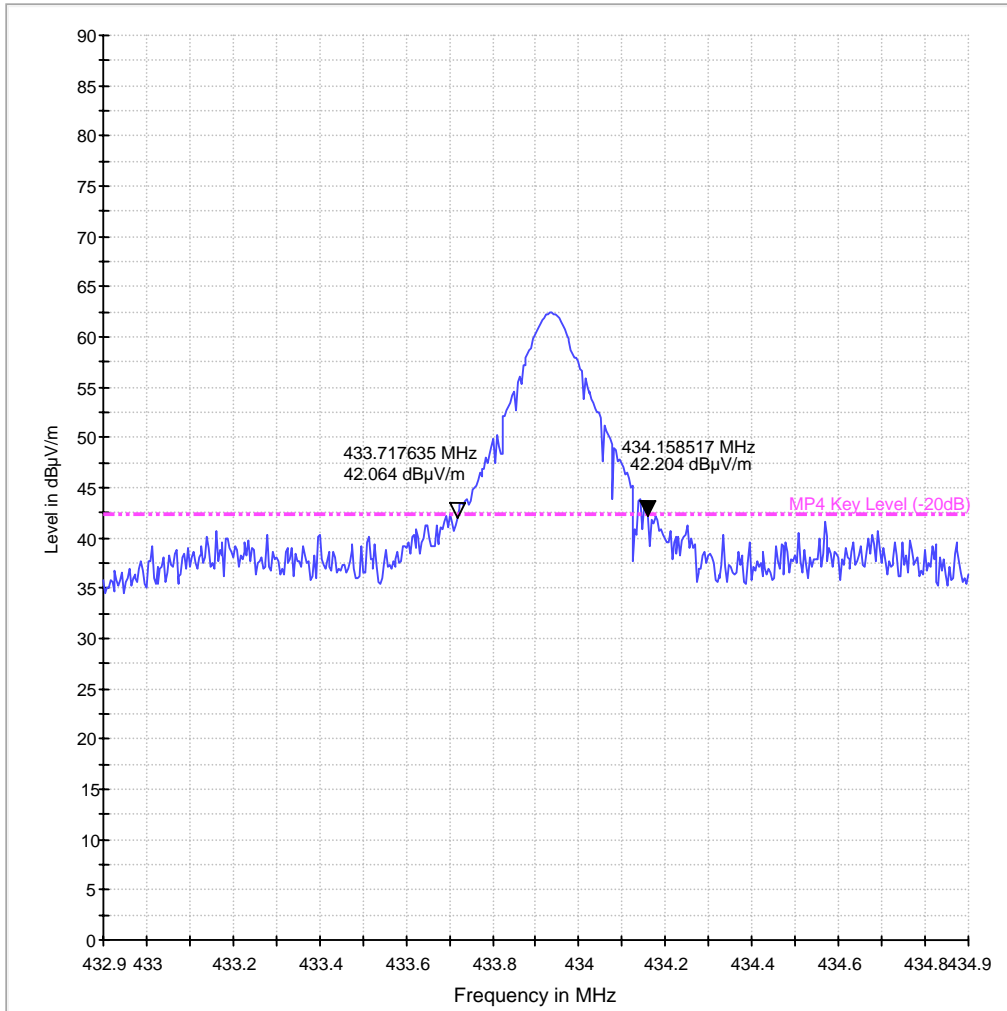
3C Test Task #: 3C12/9210  
Manufacturer: Pektron  
Model Name: McLaren MP4-12C Remote Key  
Model Number: -  
Serial Number: -  
Test Specification: FCC CFR 47 part 15C:2010  
Test Description: Radiated Emissions  
Test Site: AC4  
Engineer: JGC  
Plot #: 9210-15  
Operating Mode: Transmit Mode  
Antenna: Horizontal/ 1-4.0m Height / 3m Distance / 0-360 Degrees  
Notes: Orientation Z

FCC Part 15 Subpart C 15.231 1-4.5GHz



4.2.5 TEST RESULTS – OCCUPIED BANDWIDTH MEASUREMENTS – FCC PART 15B

The test result for occupied bandwidth is shown below; the bandwidth was measured at 441kHz with a limit of 1084.8 kHz.



**Peak Search**

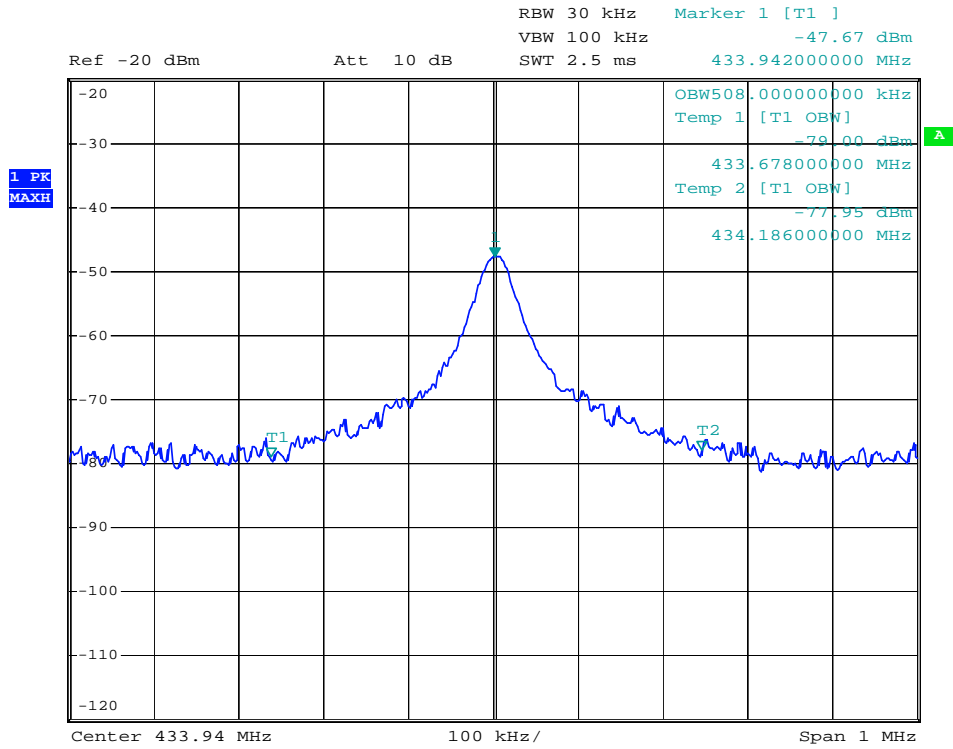
Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
433.717635	42.064	148.0	V	280.0	-6.3	
433.934068	62.4	148.0	V	280.0	-6.3	
434.158517	42.204	148.0	V	280.0	-6.3	

Bandwidth Limit = 1.0848MHz (Based on 0.25% of 433.934068MHz)

Occupied Bandwidth = 433.717635 – 434.158517 = 0.441MHz

4.2.6 TEST RESULTS – OCCUPIED BANDWIDTH MEASUREMENTS – ICS RSS-210

The test result for 99% occupied bandwidth is shown below; the bandwidth was measured at 441kHz with a limit of 1084.8 kHz.



Date: 17.JAN.2012 15:38:12

Bandwidth Limit = 1.0848MHz (Based on 0.25% of 433.932000MHz)

99% Bandwidth measured as 508.00kHz

#### 4.2.7 MEASUREMENT UNCERTAINTY

The 3C Test Limited measurement expanded uncertainty (95% confidence) for Radiated Disturbance testing is  $\pm 4.5$  dB.

The 3C Test Limited measurement expanded uncertainty (95% confidence) for Timing Measurements (allowing for EUT repeatability) is  $\pm 13.6\%$  ( $\pm 1.12$ dB).

#### 4.2.8 OBSERVATIONS AND RECOMMENDATIONS

The unit was found to comply with all requirements of the test program.

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