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# Report On

FCC Testing of the  
Crane Electronics Ltd Wrenchstar Multi  
In accordance with FCC 47 CFR Part 15C

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA6WSM01

Document 75931034 Report 03 Issue 2

December 2015



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COMMERCIAL-IN-CONFIDENCE

**REPORT ON**

FCC Testing of the  
Crane Electronics Ltd Wrenchstar Multi  
In accordance with FCC 47 CFR Part 15C

Document 75931034 Report 03 Issue 2

December 2015

**PREPARED FOR**

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**PREPARED BY**

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**APPROVED BY**

**Mark Jenkins**  
Authorised Signatory

**DATED**

18 December 2015

**This report has been up-issued to Issue 2 to amend the FCC ID.**

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**ENGINEERING STATEMENT**

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler



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## **SECTION 1**

### **REPORT SUMMARY**

FCC Testing of the  
Crane Electronics Ltd Wrenchstar Multi  
In accordance with FCC 47 CFR Part 15C



## 1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC Testing of the Crane Electronics Ltd Wrenchstar Multi to the requirements of FCC 47 CFR Part 15C.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Crane Electronics Ltd
Model Number(s)	Wrenchstar Multi
Serial Number(s)	Not serialised (75931034_TSR0001)
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C (2014)
Incoming Release Date	Application Form 09 July 2015
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	046910 25 June 2015
Start of Test	11 August 2015
Finish of Test	12 August 2015
Name of Engineer(s)	G Lawler
Related Document(s)	ANSI C63.10: 2009



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
2.4 GHz Short Range Device				
2.1	15.205	Restricted Band Edges	Pass	
2.2	15.249 (a)	Authorised Band Edges	Pass	
2.3	15.249 (a) and 15.35 (b)	Field Strength of Fundamental	Pass	
2.4	15.249 (a)(d)	Field Strength of Emissions	Pass	



### 1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	Wrenchstar Multi
Part Number	WS1KX-XXXX-C2DARX
Hardware Version	101471 iss.B 101472 + 101473 iss.A
Software Version	Test version supplied
FCC ID (if applicable)	TA6WSM01
Industry Canada ID (if applicable)	Not Applicable
Technical Description (Please provide a brief description of the intended use of the equipment)	A digital torque wrench which collects torque and angle readings and transmits them to a data collector via RF

POWER SOURCE	
<input type="checkbox"/> AC mains	State voltage
AC supply frequency (Hz)	
VAC	
Max Current	
Hz	
<input type="checkbox"/> Single phase	<input type="checkbox"/> Three phase
And / Or	
<input type="checkbox"/> External DC supply	
Nominal voltage	V Max Current A
Extreme upper voltage	V
Extreme lower voltage	V
Battery	
<input type="checkbox"/> Nickel Cadmium	<input type="checkbox"/> Lead acid (Vehicle regulated)
<input type="checkbox"/> Alkaline	<input type="checkbox"/> Leclanche
<input checked="" type="checkbox"/> Lithium	<input type="checkbox"/> Other Details :
3.7	Volts nominal.
End point voltage as quoted by equipment manufacturer	3.3 V

FREQUENCY INFORMATION					
Frequency Range	2400 to2480	MHz			
Channel Spacing (where applicable)	1MHz				
Receiver Frequency Range (if different)	2400 to2480	MHz			
Channel Spacing (if different)					
Test Frequencies*	Bottom	2400	MHz	Channel Number (if applicable)	0
	Middle	2440	MHz	Channel Number (if applicable)	40
	Top	2480	MHz	Channel Number (if applicable)	80
Intermediate Frequencies		MHz			
Highest Internally Generated Frequency :		16 MHz			



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POWER CHARACTERISTICS			
Maximum TX power	0.001	W	
Minimum TX power		W (if variable)	
Is transmitter intended for :			
Continuous duty			<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Intermittent duty			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If intermittent state DUTY CYCLE			
Transmitter ON	4 milli seconds		
Transmitter OFF	40 milli seconds		

ANTENNA CHARACTERISTICS			
<input type="checkbox"/>	Antenna connector		State impedance Ohm
<input type="checkbox"/>	Temporary antenna connector		State impedance Ohm
<input checked="" type="checkbox"/>	Integral antenna	Type Ant3216A 063R 2400A	State impedance 1.69 dBi
<input type="checkbox"/>	External antenna	Type	State impedance dBi

MODULATION CHARACTERISTICS	
<input type="checkbox"/> Amplitude	<input checked="" type="checkbox"/> Frequency
<input type="checkbox"/> Phase	<input type="checkbox"/> Other (please provide details):
Can the transmitter operate un-modulated? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

CLASS OF EMISSION USED
ITU designation or Class of Emission:
1 1M00F1D
(if applicable) 2
(if applicable) 3
If more than three classes of emission, list separately:

BATTERY POWER SUPPLY			
Model name/number		Identification/Part number	1/LIC 18650-22 L
Manufacturer	Varta	Country of Origin	China

ANCILLARIES (If applicable)	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

EXTREME CONDITIONS					
Extreme test voltages (Max)	5.5	V	Extreme test voltages (Mix)	3.3	V
Nominal DC Voltage	3.7	V	DC Maximum Current	0.500	A
Maximum temperature	55	°C	Minimum temperature	-20	°C





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I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Name: Marcus

Position held: Assistant to Technical Director

Date: 9/7/15



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## **1.4 PRODUCT INFORMATION**

### **1.4.1 Technical Description**

The Equipment Under Test (EUT) was a Crane Electronics Ltd Wrenchstar Multi. A full technical description can be found in the manufacturer's documentation.

## **1.5 TEST CONDITIONS**

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 3.7 V DC supply.

FCC Measurement Facility Registration Number  
90987 Octagon House, Fareham Test Laboratory

## **1.6 DEVIATIONS FROM THE STANDARD**

No deviations from the applicable test standard were made during testing.

## **1.7 MODIFICATION RECORD**

Modification 0 - No modifications were made to the test sample during testing.



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## **SECTION 2**

### **TEST DETAILS**

FCC Testing of the  
Crane Electronics Ltd Wrenchstar Multi  
In accordance with FCC 47 CFR Part 15C



Product Service

## **2.1 RESTRICTED BAND EDGES**

### **2.1.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.205

### **2.1.2 Equipment Under Test and Modification State**

WrenchStar Multi S/N: Not serialised (75931034\_TSR0001) - Modification State 0

### **2.1.3 Date of Test**

11 August 2015 & 12 August 2015

### **2.1.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.1.5 Test Procedure**

The test was performed in accordance with ANSI C63.10, clause and 6.6, 6.9.2 and 7.5.

The transmissions from this EUT are considered to be pulsed and therefore peak only measurements have been performed. In order to determine the average values, a duty cycle correction factor has been determined by the following equation:

$$\text{duty (dB)} = 20 \log((\text{On Time} + \text{Off Time}) / \text{On Time}).$$

This correction factor has been subtracted from the peak measurements to determine the average values.

### **2.1.6 Environmental Conditions**

Ambient Temperature	18.7 - 18.8°C
Relative Humidity	66.0 - 69.0%



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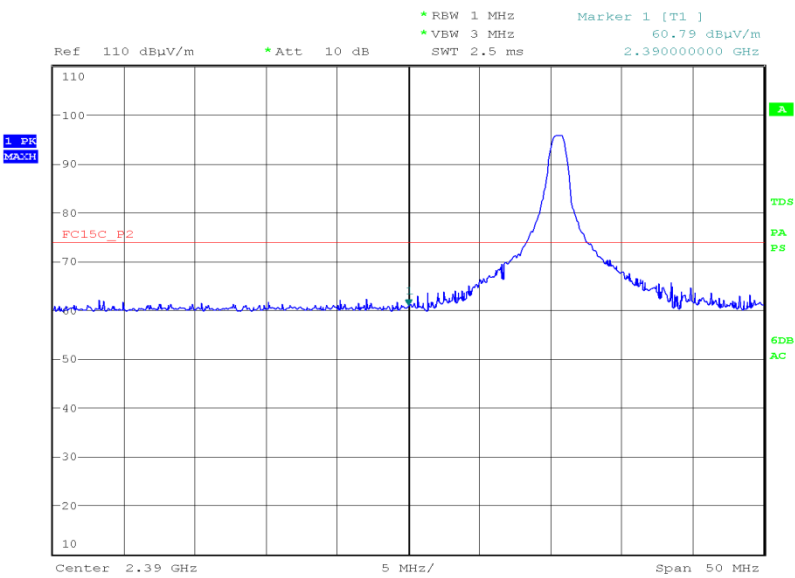
2.1.7 Test Results

3.7 V DC Supply

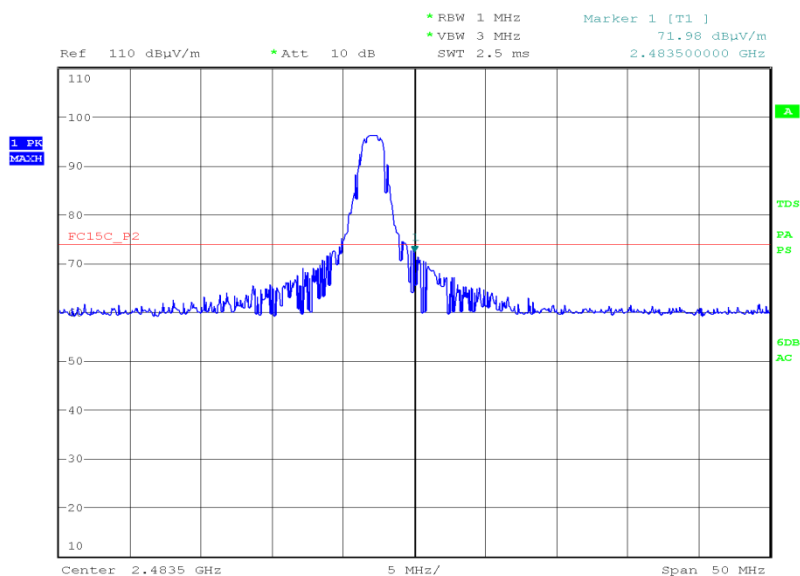
2.4 GHz Short Range Device, Restricted Band Edges Results

2400.5 MHz		2480.0 MHz	
Measured Frequency 2390 MHz		Measured Frequency 2483.5 MHz	
dBμV/m		dBμV/m	
Final Peak	Final Average	Final Peak	Final Average
60.79	24.82	71.98	36.01

2.4 GHz Short Range Device, 2400.5 MHz, Measured Frequency 2390 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 11.AUG.2015 19:31:12

Remarks

Final average values have been calculated by subtracting duty cycle correction factor from peak value.

For a 40 ms transmission cycle the total on time was measured as 636  $\mu$ s and the total off time as 39.364 ms.

FCC 47 CFR Part 15, Limit Clause 15.209

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54



Product Service

## **2.2 AUTHORISED BAND EDGES**

### **2.2.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.249 (a)

### **2.2.2 Equipment Under Test and Modification State**

WrenchStar Multi S/N: Not serialised (75931034\_TSR0001) - Modification State 0

### **2.2.3 Date of Test**

11 August 2015

### **2.2.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.2.5 Test Procedure**

The test was performed in accordance with ANSI C63.10, clause 6.10, 7.5 and 7.7.9

The transmissions from this EUT are considered to be pulsed and therefore peak only measurements have been performed. In order to determine the average values, a duty cycle correction factor has been determined by the following equation:

$$\text{duty (dB)} = 20 \log((\text{On Time} + \text{Off Time}) / \text{On Time}).$$

This correction factor has been subtracted from the peak measurements to determine the average values.

### **2.2.6 Environmental Conditions**

Ambient Temperature	18.7°C
Relative Humidity	69.0%



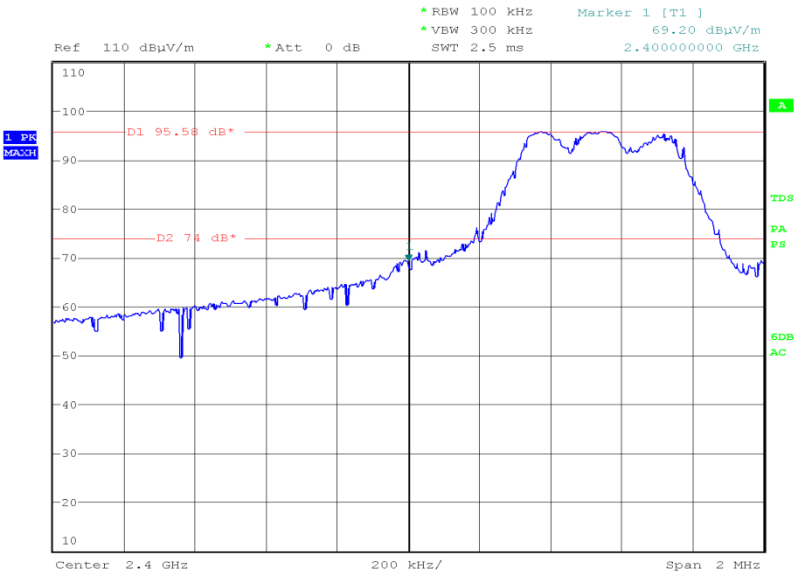
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2.2.7 Test Results

2.4 GHz Short Range Device, GFSK, Authorised Band Edge Results

2400.5 MHz	2480.0 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Average	Final Average
69.20	51.19

2.4 GHz Short Range Device, 2400.5 MHz, Measured Frequency 2400.00 MHz, GFSK, Final Average, Authorised Band Edge Plot



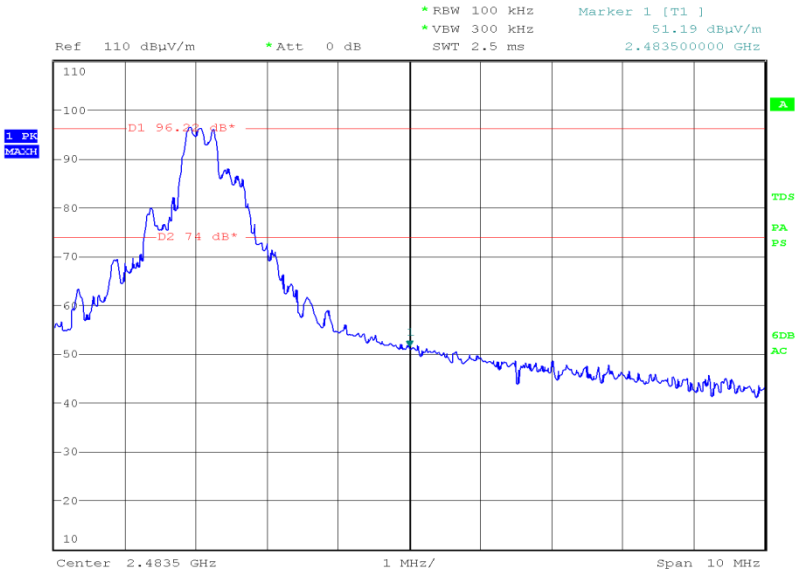
Date: 11.AUG.2015 19:26:36





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2.4 GHz Short Range Device, 2480.0 MHz, Measured Frequency 2483.50 MHz, GFSK, Final Average, Authorised Band Edge Plot



Date: 11.AUG.2015 20:10:37

FCC 47 CFR Part 15, Limit Clause 15.209

	Peak (dBμV/m)	Average (dBμV/m)
Restricted Bands of Operation	74	54



Product Service

## **2.3 FIELD STRENGTH OF FUNDAMENTAL**

### **2.3.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.249 (a) and 15.35 (b)

### **2.3.2 Equipment Under Test and Modification State**

WrenchStar Multi S/N: Not serialised (75931034\_TSR0001) - Modification State 0

### **2.3.3 Date of Test**

11 August 2015

### **2.3.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.3.5 Test Procedure**

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.6 and 7.5

The transmissions from this EUT are considered to be pulsed and therefore peak only measurements have been performed. In order to determine the average values, a duty cycle correction factor has been determined by the following equation:

$$\text{duty (dB)} = 20 \log((\text{On Time} + \text{Off Time}) / \text{On Time}).$$

This correction factor has been subtracted from the peak measurements to determine the average values.

### **2.3.6 Environmental Conditions**

Ambient Temperature	18.7°C
Relative Humidity	69.0%



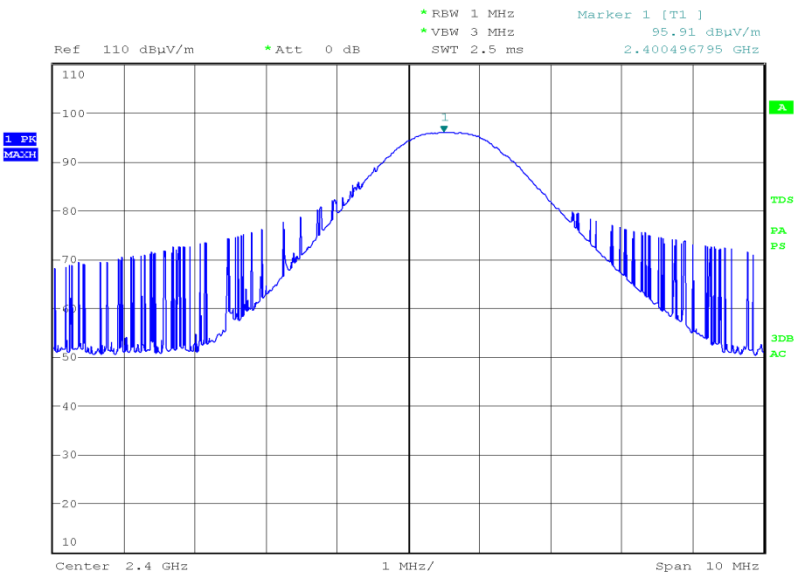
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2.3.7 Test Results

2.4 GHz Short Range Device, 2400.5 MHz, Field Strength of Fundamental Results

Frequency (MHz)	Peak Result (dBµV/m)	Average Result (dBµV/m)
2400.497	95.91	80.35

2.4 GHz Short Range Device, 2400.5 MHz, Field Strength of Fundamental Plot



Date: 11.AUG.2015 19:21:03

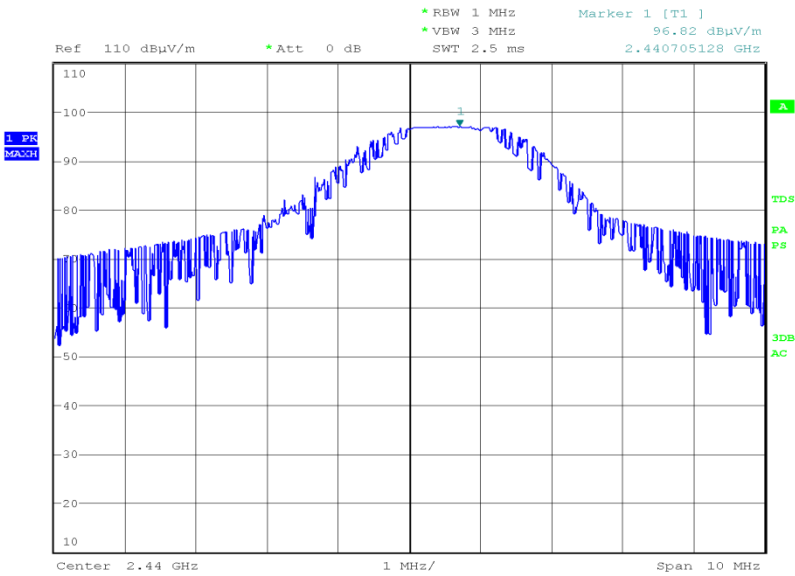


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2.4 GHz Short Range Device, 2440.0 MHz, Field Strength of Fundamental Results

Frequency (MHz)	Peak Result (dBµV/m)	Average Result (dBµV/m)
2440.705	96.82	81.26

2.4 GHz Short Range Device, 2440.0 MHz, Field Strength of Fundamental Plot



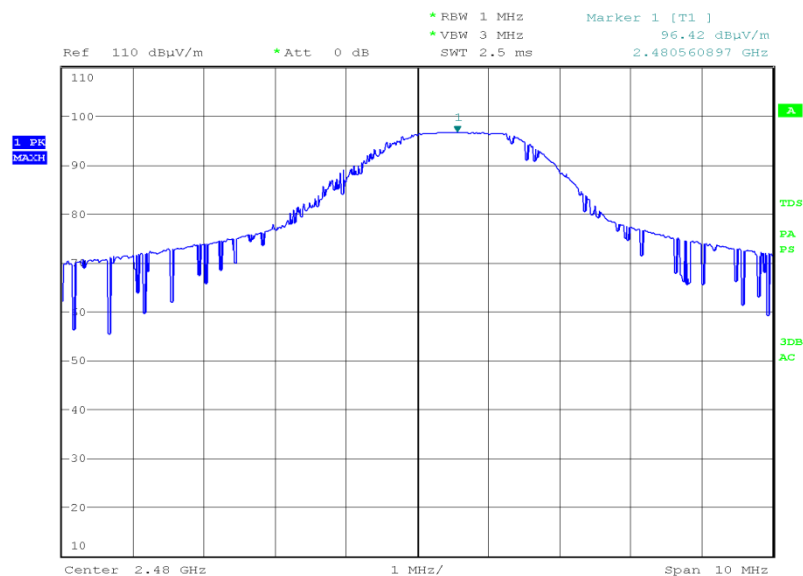
Date: 11.AUG.2015 20:25:15



### 2.4 GHz Short Range Device, 2480.0 MHz, Field Strength of Fundamental Results

Frequency (MHz)	Peak Result (dBμV/m)	Average Result (dBμV/m)
2480.561	96.42	80.86

### 2.4 GHz Short Range Device, 2400.5 MHz, Field Strength of Fundamental Plot



Date: 11.AUG.2015 20:04:19

### Remarks

Final average values have been calculated by subtracting duty cycle correction factor from peak value.

For a 40 ms transmission cycle the total on time was measured as 636 μs and the total off time as 39.364 ms.

### FCC 47 CFR Part 15, Limit Clause 15.249 (a)

Fundamental Frequency (MHz)	Average Field Strength of Fundamental (millivolts/meter)
902 to 928	50
2400 to 2483.5	50
5725 to 5875	50
24000 to 24250	250

### FCC 47 CFR Part 15, Limit Clause 15.35 (b)

The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.



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## **2.4 FIELD STRENGTH OF EMISSIONS**

### **2.4.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.249 (a)(d)

### **2.4.2 Equipment Under Test and Modification State**

WrenchStar Multi S/N: Not serialised (75931034\_TSR0001) - Modification State 0

### **2.4.3 Date of Test**

11 August 2015 & 12 August 2015

### **2.4.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.4.5 Test Procedure**

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.4, 6.5, 6.6 and 7.5.

All final measurements were assessed against the emission limits specified in 15.209(a).

### **2.4.6 Environmental Conditions**

Ambient Temperature	18.7 - 21.1°C
Relative Humidity	40.0 - 69.0%

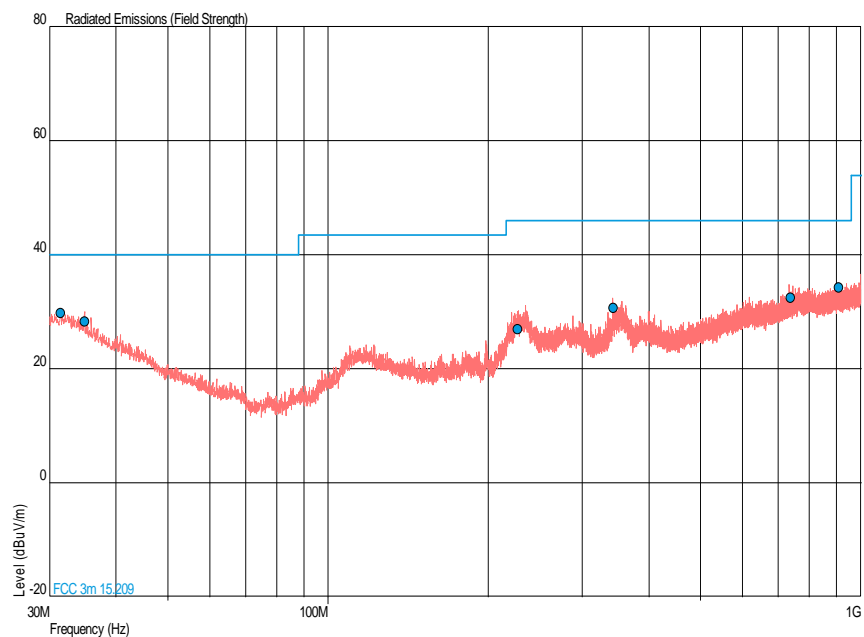


## 2.4.7 Test Results

### 2.4 GHz Short Range Device, 2400.5 MHz, 30 MHz to 1 GHz, Field Strength of Emissions Results

Frequency (MHz)	Quasi-Peak Level (dB $\mu$ V/m)	Quasi-Peak Level ( $\mu$ V/m)	Quasi-Peak Margin (d $\mu$ V/m)	Quasi-Peak Margin ( $\mu$ V/m)	Angle (°)	Height (m)	Polarisation
31.453	29.7	30.5	-10.3	-69.5	146	1.00	Horizontal
34.921	28.3	26.0	-11.7	-74.0	244	1.00	Horizontal
226.693	26.9	22.1	-19.1	-177.9	2	1.00	Horizontal
342.756	30.6	33.9	-15.4	-166.1	37	1.00	Horizontal
737.218	32.4	41.7	-13.6	-158.3	92	1.00	Horizontal
908.896	34.2	51.3	-11.8	-148.7	360	1.00	Horizontal

### 2.4 GHz Short Range Device, 2400.5 MHz, 30 MHz to 1 GHz, Field Strength of Emissions Plot



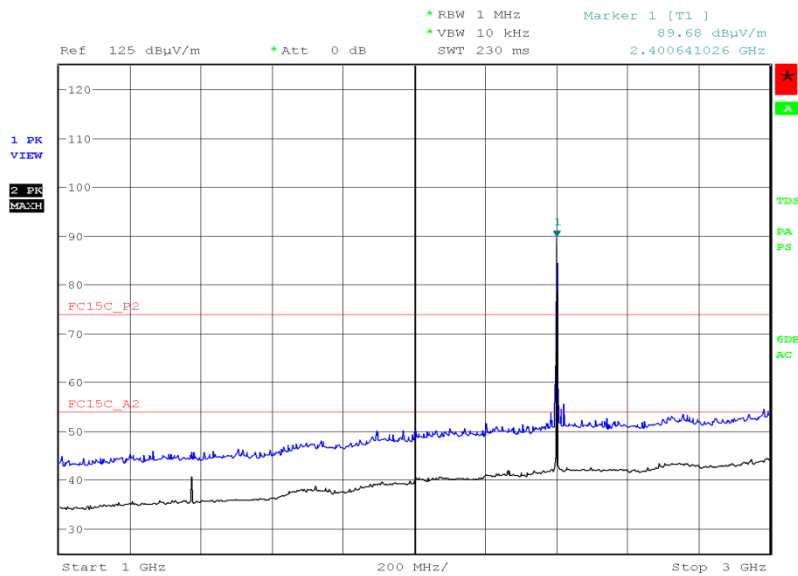


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### 2.4 GHz Short Range Device, 2400.5 MHz, 1 GHz to 25 GHz, Field Strength of Emissions Results

Frequency (MHz)	Final Peak (dB $\mu$ V/m)	Final Average (dB $\mu$ V/m)	Final Peak ( $\mu$ V/m)	Final Average ( $\mu$ V/m)	Angle (°)	Height (m)	Polarisation
4881.238	64.56	49.00	1690.44	281.84	77	100	Horizontal
7321.755	62.92	47.36	1399.59	233.35	0	3.33	Vertical

### 2.4 GHz Short Range Device, 2400.5 MHz, 1 GHz to 3 GHz, Field Strength of Emissions Plot



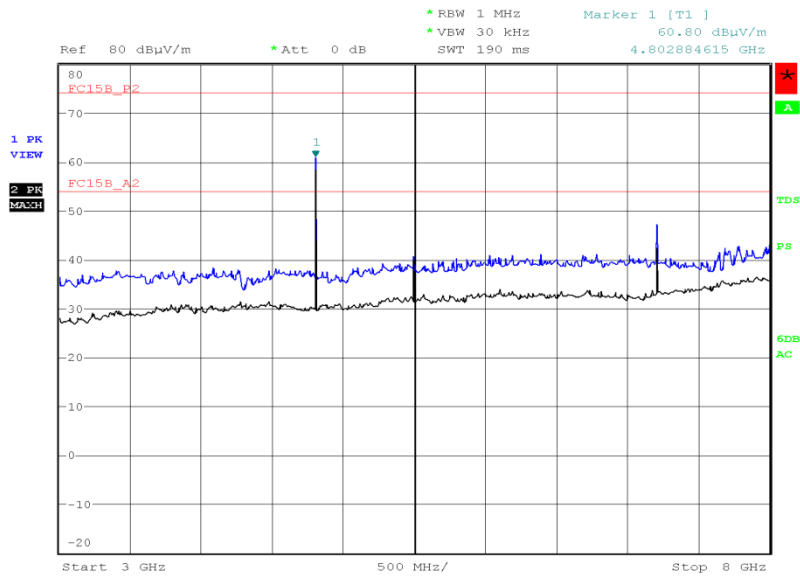
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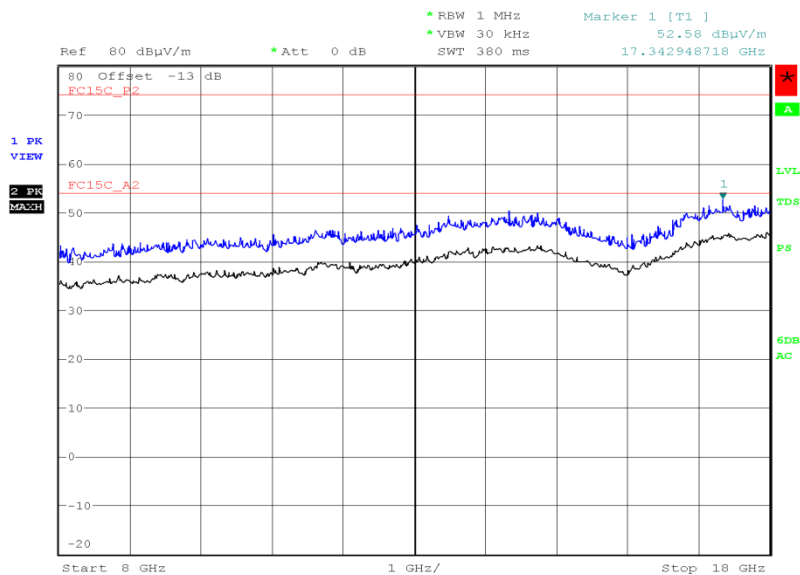
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### 2.4 GHz Short Range Device, 2400.5 MHz, 3 GHz to 8 GHz , Field Strength of Emissions Plot



Date: 11.AUG.2015 22:35:14

### 2.4 GHz Short Range Device, 2400.5 MHz, 8 GHz to 18 GHz, Field Strength of Emissions Plot

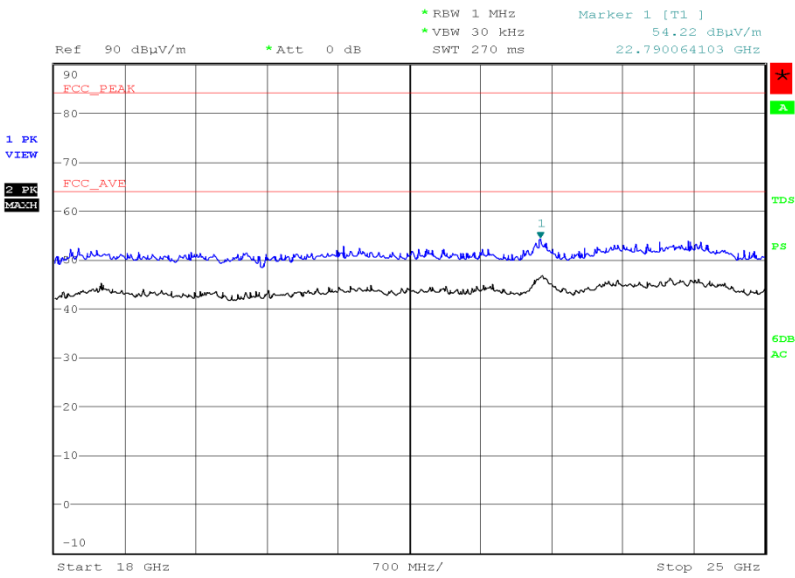


Date: 12.AUG.2015 20:36:58



Product Service

2.4 GHz Short Range Device, 2400.5 MHz, 18 GHz to 25 GHz, Field Strength of Emissions Plot



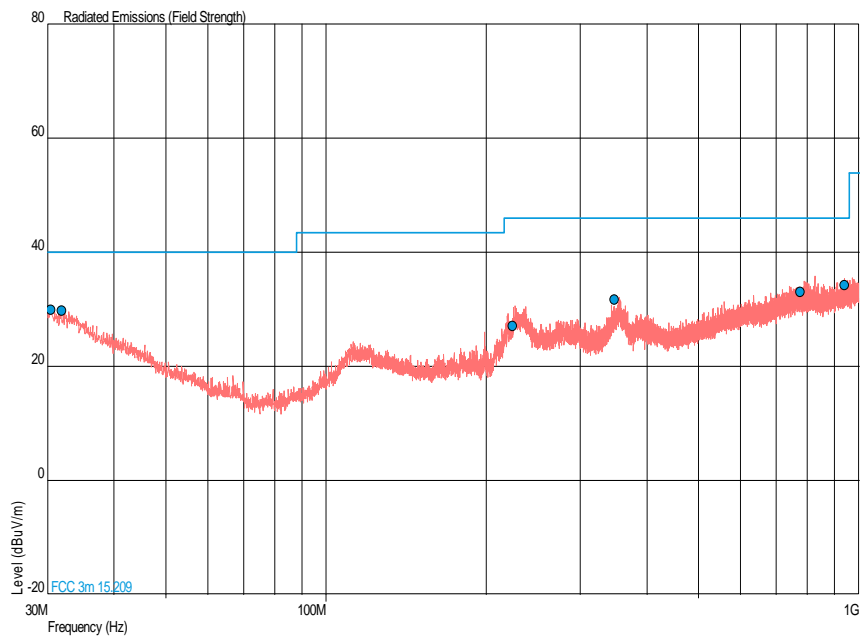
Date: 12.AUG.2015 21:33:17



### 2.4 GHz Short Range Device, 2440.0 MHz, 30 MHz to 1 GHz, Field Strength of Emissions Results

Frequency (MHz)	Quasi-Peak Level (dB $\mu$ V/m)	Quasi-Peak Level ( $\mu$ V/m)	Quasi-Peak Margin (d $\mu$ V/m)	Quasi-Peak Margin ( $\mu$ V/m)	Angle (°)	Height (m)	Polarisation
30.423	30.0	31.6	-10.0	-68.4	326	1.00	Horizontal
31.917	29.7	30.5	-10.3	-69.5	62	1.00	Horizontal
224.018	27.1	22.6	-18.9	-177.4	359	1.00	Horizontal
348.277	31.7	38.5	-14.3	-161.5	140	1.00	Horizontal
776.733	33.1	45.2	-12.9	-154.8	130	1.00	Horizontal
939.418	34.3	51.9	-11.7	-148.1	240	1.00	Horizontal

### 2.4 GHz Short Range Device, 2440.0 MHz, 30 MHz to 1 GHz, Field Strength of Emissions Plot



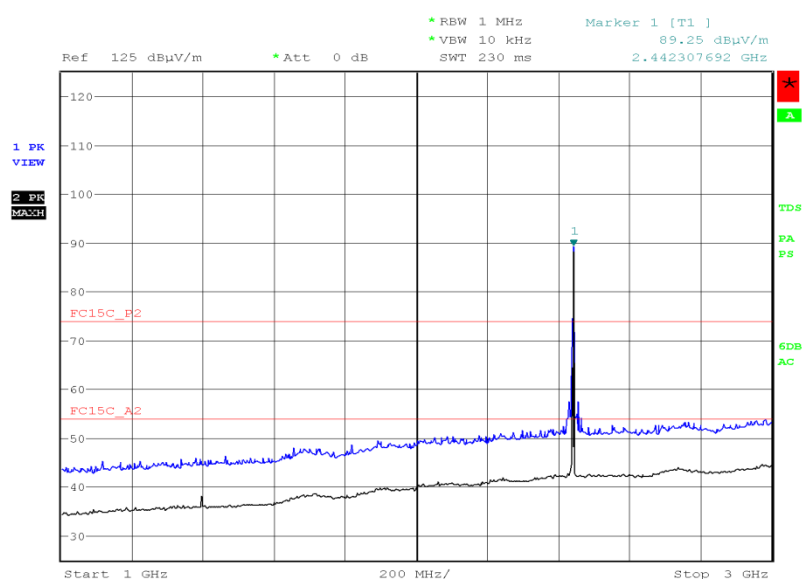


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### 2.4 GHz Short Range Device, 2440.0 MHz, 1 GHz to 25 GHz, Field Strength of Emissions Results

Frequency (MHz)	Final Peak (dB $\mu$ V/m)	Final Average (dB $\mu$ V/m)	Final Peak ( $\mu$ V/m)	Final Average ( $\mu$ V/m)	Angle (°)	Height (m)	Polarisation
4961.426	68.36	52.80	2618.18	436.52	192	1.60	Horizontal
7441.524	64.64	49.08	1706.08	284.45	237	112	Horizontal

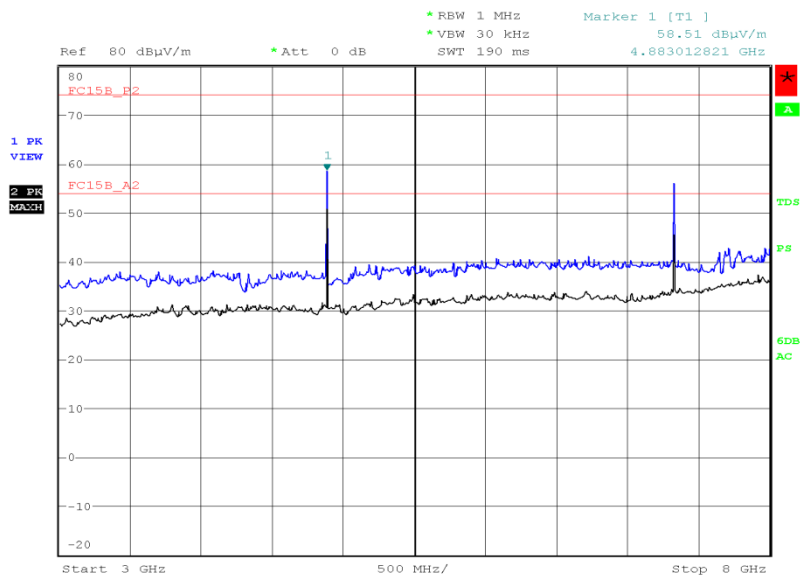
### 2.4 GHz Short Range Device, 2440.0 MHz, 1 GHz to 3 GHz, Field Strength of Emissions Plot



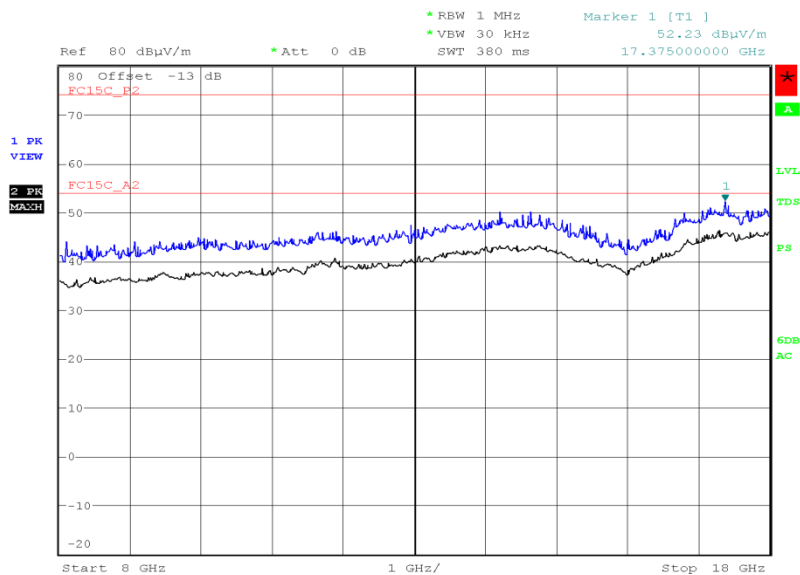
Date: 11.AUG.2015 19:52:53



Product Service

2.4 GHz Short Range Device, 2440.0 MHz, 3 GHz to 8 GHz , Field Strength of Emissions Plot

Date: 11.AUG.2015 21:46:54

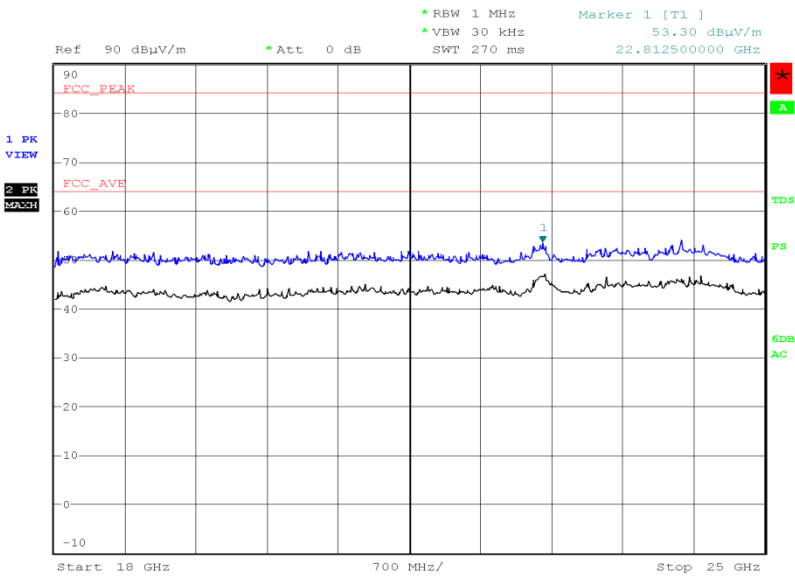
2.4 GHz Short Range Device, 2440.0 MHz, 8 GHz to 18 GHz, Field Strength of Emissions Plot

Date: 12.AUG.2015 20:49:30



Product Service

2.4 GHz Short Range Device, 2440.0 MHz, 18 GHz to 25 GHz, Field Strength of Emissions Plot



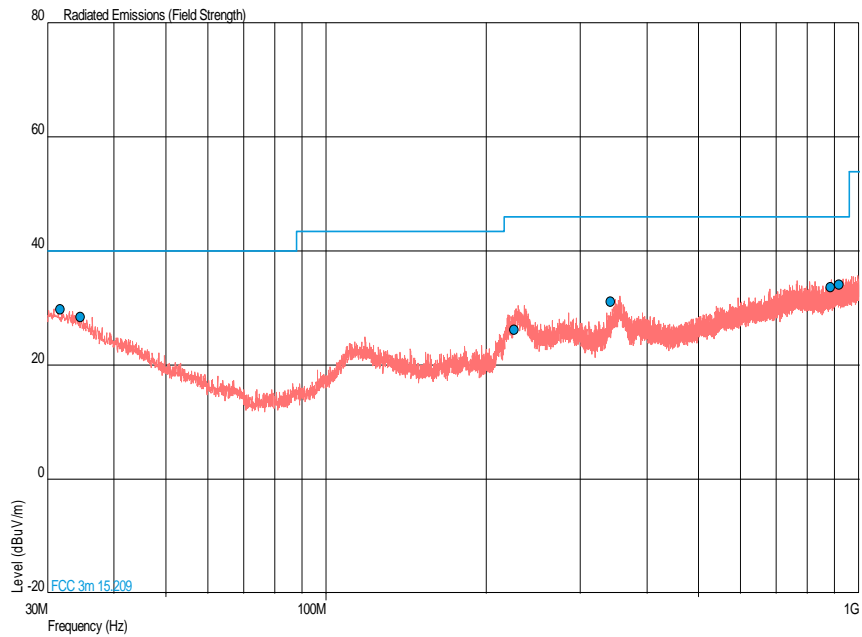
Date: 12.AUG.2015 21:39:00



### 2.4 GHz Short Range Device, 2480.0 MHz, 30 MHz to 1 GHz, Field Strength of Emissions Results

Frequency (MHz)	Quasi-Peak Level (dBμV/m)	Quasi-Peak Level (μV/m)	Quasi-Peak Margin (dμV/m)	Quasi-Peak Margin (μV/m)	Angle (°)	Height (m)	Polarisation
31.729	29.8	30.9	-10.2	-69.1	293	1.00	Horizontal
34.624	28.5	26.6	-11.5	-73.4	293	1.00	Horizontal
225.279	26.2	20.4	-19.8	-179.6	194	1.00	Horizontal
342.003	31.1	35.9	-14.9	-164.1	27	1.00	Horizontal
883.740	33.7	48.4	-12.3	-151.6	136	1.00	Horizontal
916.490	34.0	50.1	-12.0	-149.9	253	1.00	Horizontal

### 2.4 GHz Short Range Device, 2480.0 MHz, 30 MHz to 1 GHz, Field Strength of Emissions Plot

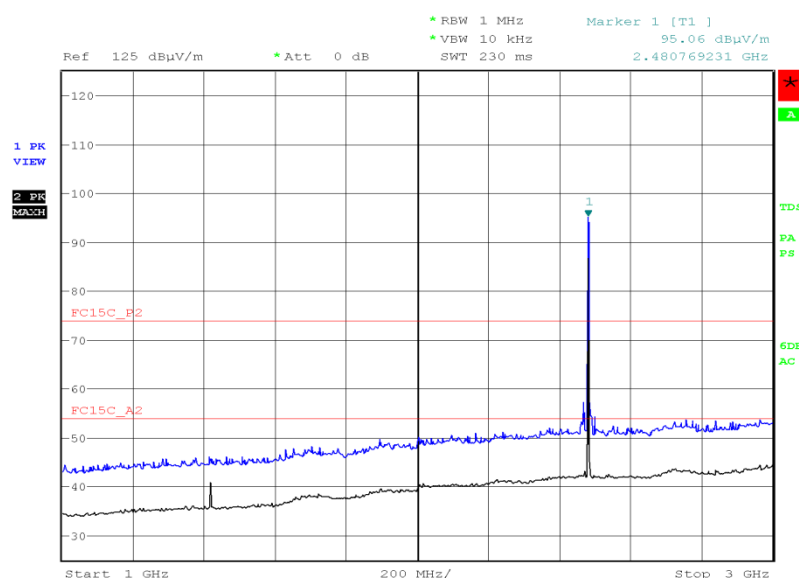




### 2.4 GHz Short Range Device, 2480.0 MHz, 1 GHz to 25 GHz, Field Strength of Emissions Results

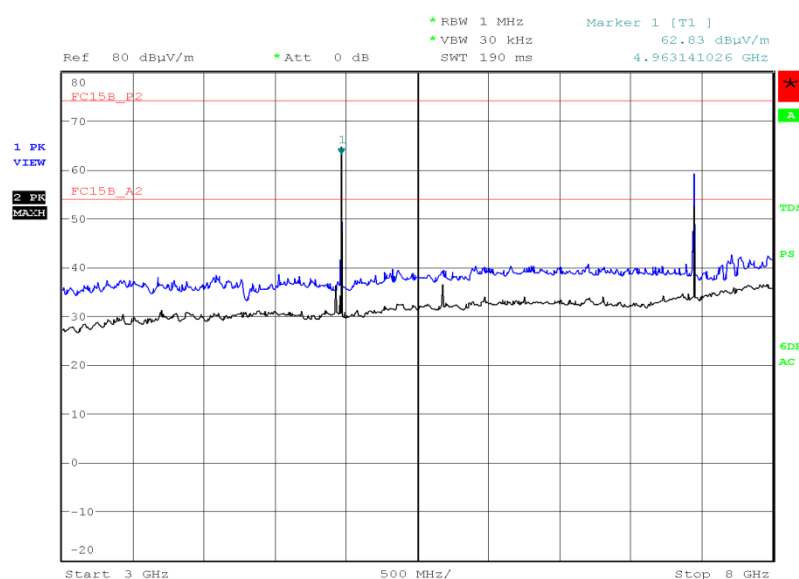
Frequency (MHz)	Final Peak (dBμV/m)	Final Average (dBμV/m)	Final Peak (μV/m)	Final Average (μV/m)	Angle (°)	Height (m)	Polarisation
4800.377	66.69	51.13	2160.23	360.16	333	173	Vertical

### 2.4 GHz Short Range Device, 2480.0 MHz, 1 GHz to 3 GHz , Field Strength of Emissions Plot



Date: 11.AUG.2015 19:56:36

### 2.4 GHz Short Range Device, 2480.0 MHz, 3 GHz to 8 GHz , Field Strength of Emissions Plot



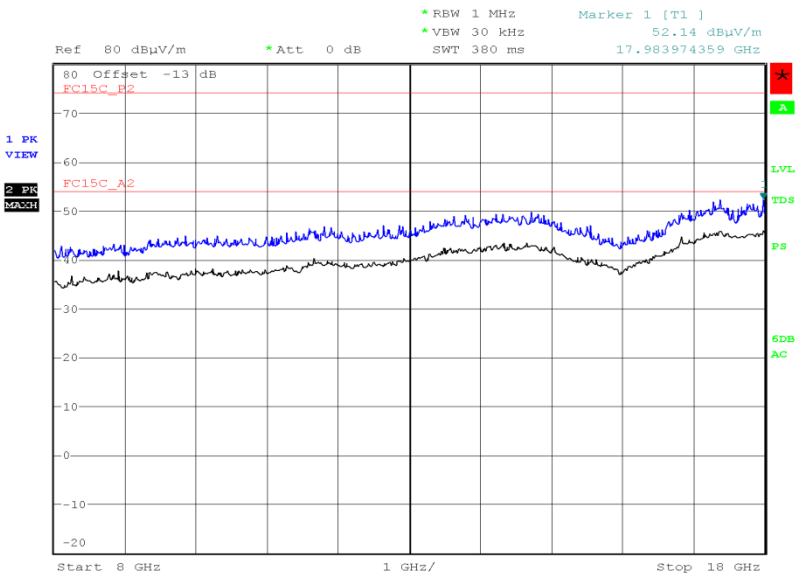
Date: 11.AUG.2015 22:39:18





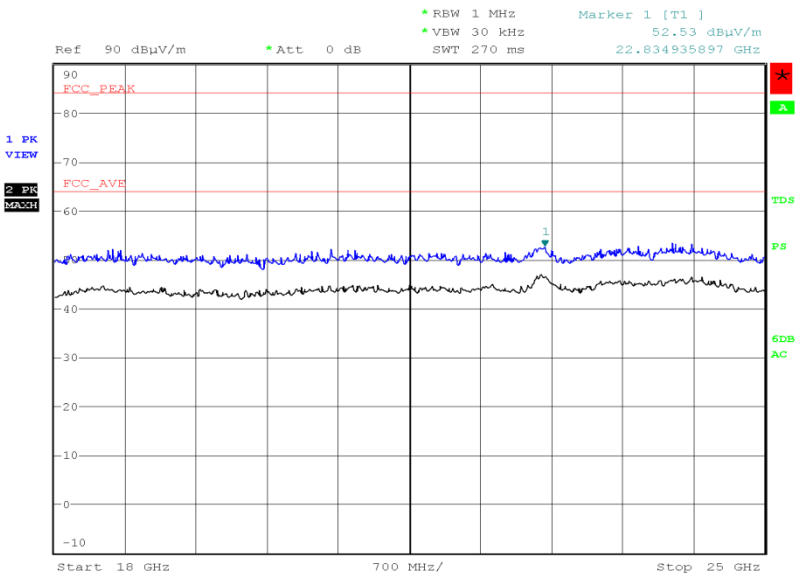
Product Service

2.4 GHz Short Range Device, 2480.0 MHz, 8 GHz to 18 GHz, Field Strength of Emissions Plot



Date: 12.AUG.2015 20:58:54

2.4 GHz Short Range Device, 2480.0 MHz, 18 GHz to 25 GHz, Field Strength of Emissions Plot



Date: 12.AUG.2015 21:44:12



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FCC 47 CFR Part 15. Limit Clause 15.249 (a)

Fundamental Frequency (MHz)	Field Strength of Harmonics (microvolts/meter)
902 to 928	500
2400 to 2483.5	500
5725 to 5875	500
24000 to 24250	2500

FCC 47 CFR Part 15. Limit Clause 15.249 (d) and 15.209

50 dB below the level of the fundamental.

or

Frequency (MHz)	Field Strength (microvolts/meter)
0.009 to 0.490	2400/F (kHz)
0.490 to 1.705	24000/F (kHz)
1.705 to 30.0	30
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500



Product Service

### **SECTION 3**

#### **TEST EQUIPMENT USED**



### 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
<b>Section 2.1 - Restricted Band Edges</b>					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Apr-2016
Screened Room (5)	Rainford	Rainford	1545	0	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	15-Apr-2016
2m K-Type Cable (Rx)	Scott Cables	KPS-1501-2000-KPS	4527	-	TU
<b>Section 2.2 - Authorised Band Edges</b>					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Apr-2016
Screened Room (5)	Rainford	Rainford	1545	0	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	15-Apr-2016
2m K-Type Cable (Rx)	Scott Cables	KPS-1501-2000-KPS	4527	-	TU
<b>Section 2.3- Field Strength of Fundamental</b>					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Apr-2016
Screened Room (5)	Rainford	Rainford	1545	0	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	15-Apr-2016
2m K-Type Cable (Rx)	Scott Cables	KPS-1501-2000-KPS	4527	-	TU



Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
<b>Section 2.4 - Field Strength of Emissions</b>					
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	26-Nov-2015
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Apr-2016
Antenna (Bilog)	Schaffner	CBL6143	287	24	3-Feb-2016
Pre-Amplifier	Phase One	PSO4-0087	1534	12	23-Dec-2015
Screened Room (5)	Rainford	Rainford	1545	0	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Amplifier (8 - 18GHz)	Phase One	PS06-0061	3176	12	11-Aug-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturo GmbH	NCD	3917	-	TU
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4100	12	9-Jun-2016
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	1-Oct-2015
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	15-Apr-2016
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4411	12	24-Mar-2016
2m K-Type Cable (Rx)	Scott Cables	KPS-1501-2000-KPS	4527	-	TU

TU – Traceability Unscheduled



### 3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Field Strength of Fundamental	30 MHz to 1 GHz: $\pm 5.1$ dB 1 GHz to 40 GHz: $\pm 6.3$ dB
Field Strength of Emissions	30 MHz to 1 GHz: $\pm 5.1$ dB 1 GHz to 40 GHz: $\pm 6.3$ dB
Restricted Band Edges	30 MHz to 1 GHz: $\pm 5.1$ dB 1 GHz to 40 GHz: $\pm 6.3$ dB
Authorised Band Edges	Conducted: $\pm 3.08$ dB Radiated: 30 MHz to 1 GHz: $\pm 5.1$ dB Radiated: 1 GHz to 40 GHz: $\pm 6.3$ dB



Product Service

## **SECTION 4**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**



Product Service

#### 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA  
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