



<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>18052302.r01</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	89213653	Seite 1 von 17 <i>Page 1 of 17</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	4603457	<b>Auftragsdatum:</b> <i>Order date:</i>	30.05.2018	
<b>Auftraggeber:</b> <i>Client:</i>	MYLAPS BV, Zuiderhoutlaan 4 2012PJ Haarlem , Netherlands			
<b>Prüfgegenstand:</b> <i>Test item:</i>	ProChip Timer			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	ProChip Timer			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	Compliance with regulatory requirements			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	47 CFR PART 15 (10-1-17 EDITION), Subpart 15C			
	-			
	-			

<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>	31.05.2018	
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	GF-56582	
<b>Prüfzeitraum:</b> <i>Testing period:</i>	10.07.2018 – 31.07.2018	
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	Leek	
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TÜV Rheinland Nederland B.V. Leek Laboratory	
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass	

<b>geprüft von / tested by:</b> 			<b>Kontrolliert von / reviewed by:</b> 		
16.10.2018	R. van der Meer/Test Eng.		16.10.2018	E. van der Wal/Senior Eng.	
<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>
<b>Sonstiges / Other:</b> --					
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
<p>* Legende: 1 = sehr gut      2 = gut      3 = befriedigend      4 = ausreichend      5 = mangelhaft  P(ass) = entspricht o.g. Prüfgrundlage(n)      F(ail) = entspricht nicht o.g. Prüfgrundlage(n)      N/A = nicht anwendbar      N/T = nicht getestet</p> <p>Legend: 1 = very good      2 = good      3 = satisfactory      4 = sufficient      5 = poor  P(ass) = passed a.m.      Test specification(s)      F(ail) a.m. test specification(s)      N/A = not applicable      N/T = not tested</p>					
<p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b>  <i>This test report only relates to the above mentioned testsample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This report does not entitle to carry any test mark</i></p>					

v04

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**Liste der verwendeten Prüfmittel**  
*List of used test equipment*

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025:2005 has been confirmed before testing.  
NA= Not Applicable

<b>Prüfmittel</b> Kind of Equipment	<b>Hersteller /</b> Manufacturer	<b>Bezeichnung /</b> Model Name	<b>Prüfmittel- Nr. / ID-Nr.</b> <i>Equipment No. / ID-No.</i>	<b>Kalibrierung</b> <i>Calibration</i> <b>(mm/yyyy)</b>	<b>Nächste Kalibrierung</b> <i>Next calibration</i> <b>(mm/yyyy)</b>
<b>For Radiated Emissions</b>					
Measurement Receiver	Rohde & Schwarz	ESCI	A00314	03/2018	03/2019
RF Cable S-AR	Gigalink	APG0500	A00447	01/2018	01/2019
Controller	Maturo	SCU/088/ 8090811	A00450	N/A	N/A
Controller	EMCS	DOC202	A00257	N/A	N/A
Test facility	Comtest	FCC listed: 786213 IC: 2932G-2	A00235	10/2017	10/2020
Spectrum Analyzer	Rohde & Schwarz	FSV	A00337	06/2018	06/2019
Antenna mast	EMCS	AP-4702C	A00258	N/A	N/A
Temperature- Humiditymeter	Extech	SD500	A00444	06/2018	06/2019
Magnetic Loop Antenna 60cm	Chase	HLA6120	A01491	12/2017	12/2020
Magnetic loop antenna 6 cm	EMCO	7405-901	A00309	02/2018	02/2019
Biconilog Testantenna	Teseq	CBL 6111D	A00466	10/2017	10/2018

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**Produktbeschreibung**  
*Product description*

<b>1</b>	<b>Produktdetails</b> <i>Product details</i>	MYLAPS Sports Timing – ProChip Timer Transponder operating on 6.78 MHz Modulation: DBPSK
<b>2</b>	<b>Maße / Gewicht</b> <i>Dimensions / Weight</i>	16g
<b>3</b>	<b>Bedienelemente</b> <i>Operating elements</i>	None
<b>4</b>	<b>Ausstattung / Zubehör</b> <i>Equipment / Accessories</i>	Ankle strap, shoe lace or bike holder
<b>5</b>	<b>Verwendete Materialien</b> <i>Used materials</i>	--
<b>6</b>	<b>Sonstiges</b> <i>Other</i>	3 Vdc battery operated;

<b>Absatz</b>				
<b>Clause</b>	<b>Anforderungen – Prüfungen / Requirements - Tests</b>			
1	47 CFR Part 15 (10-1-17 Edition) - 15.207(a)	AC Power Line Conducted Emissions	P	<input type="checkbox"/>
			F	<input type="checkbox"/>
			N/A	<input checked="" type="checkbox"/>
			N/T	<input type="checkbox"/>
2	47 CFR Part 15 (10-1-17 Edition) - 15.209, 15.223	Radiated unwanted emissions	P	<input checked="" type="checkbox"/>
			F	<input type="checkbox"/>
			N/A	<input type="checkbox"/>
			N/T	<input type="checkbox"/>

Testmethods: ANSI C63.10-2013.

<b>Revisions</b> <i>Revisions</i>			
<b>Revision</b> Revision	<b>Datum</b> Date	<b>Anmerkung</b> Remark	<b>Verfasser</b> Author
-	31.07.2018	First release	R. van der Meer
01	16-10-2018	Corrected section 1.1 15.233 to 15.223	R. van der Meer
Note: Latest revision report will replace all previous reports			

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## 1 General information.

### 1.1 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-17 Edition), sections 15.31, 15.209 and 15.223. The test methods, which have been used, are based on ANSI C63.10-2013.

Radiated emission tests were performed at a measurement distance of 3 meters and measurement results were extrapolated to the applicable distance.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

### 1.2 Test facility.

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at TÜV Rheinland Nederland B.V., located at Eiberkamp 10, 9351 VT Leek, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 786213. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

### 1.3 Test conditions.

Normal test conditions:

Temperature (\*) : +15°C to +35°C  
Relative humidity(\*) : 20 % to 75 %  
Supply voltage : EUT is battery operated only, tested with fully loaded battery.

*\*When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.*

## **2 System test configuration.**

### **2.1 Justification.**

The test sample was configured by the applicant to enable continuous transmit.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.10-2013.

### **2.2 EUT mode of operation.**

The tests have been performed with a complete functioning EUT.

### **2.3 Special accessories.**

No special accessories are used and/or needed to achieve compliance.

### **2.4 Equipment modifications.**

None.

### 3 Radiated emission data.

#### 3.1 Radiated emission data, H-field

**RESULT: Pass**

Date of testing: 2018-07-10

Frequency range: 9kHz - 30 MHz

Requirements:

FCC 15.209, FCC 15.223 and 15.35.

(a) The field strength of any emission within the band 1.705-10.0 MHz shall not exceed 100 microvolts/meter (40 dB $\mu$ V/m) at a distance of 30 meters. However, if the bandwidth of the emission is less than 10% of the center frequency, the field strength shall not exceed 15 microvolts/meter (23.5 dB $\mu$ V/m) or (the bandwidth of the device in kHz) divided by (the center frequency of the device in MHz) microvolts/meter at a distance of 30 meters, whichever is the higher level. For the purposes of this section, bandwidth is determined at the points 6 dB down from the modulated carrier. The emission limits in this paragraph are based on measurement instrumentation employing an average detector. The provisions in §15.35(b) for limiting peak emissions apply.

(b) The field strength of emissions outside of the band 1.705-10.0 MHz shall not exceed the general radiated emission limits in §15.209.

15.209 (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 (MHz)	Field strength (microvolts/meter)	Field strength (dB $\mu$ V/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	43.5-13.8	300
0.490-1.705	24000/F(kHz)	33.8-22.9	30
1.705-30.0	30	29.5	30

Table 2. Field strength limits

Test procedure:

ANSI C63.10-2013.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling and the EUT orientation (X, Y, Z) were varied in order to ensure that maximum emission amplitudes were attained.

Radiated emission testing was performed at a distance of 3 meters in a 5 meter semi-anechoic chamber. The measured values were corrected to the applicable distance using the extrapolation factor of 40dB/decade or 80dB/decade as per FCC Part 15.31(f)(2).

At each frequency where a spurious emission was found, the EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations.

The six highest emission amplitudes relative to the appropriate limit were recorded in this report. Field strength values of radiated emissions at frequencies not listed in the tables are more than 20 dB below the applicable limit.



### 3.2 Radiated field strength measurements H-field, frequency range of 0.009-30 MHz.

Frequency (MHz)	(a) Measurement results (dBµV)	(b) Antenna factor	(c) Cable loss	(d) Distance extrapolation factor 3m to 30m	Detector	Measurement results (calculated = a+b+c-d)	Limits
	3 m	dB	dB	dB			
6.78 fundamental	24.7	19.4	1	40	Pk	5.1	43.5 Pk/ 23.5 Av
15.847 (Harmonic)	4.6	20.1	1	40	Qp	-14.3	23.5
16.205	4.5	20.2	1	40	Qp	-14.3	29.5
18.264	4.0	20.4	1	40	Qp	-14.6	29.5
26.080	3.0	21.4	1	40	Qp	-14.6	29.5

Table 3 Radiated emissions of the EUT

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209 and 15.223 with the EUT operating in continuous transmit mode, are depicted in Tables 3.

The measured 6 dB bandwidth is 0.438 MHz (see section 6) which is less than 0.678 MHz (10% of the 6.78 MHz of center frequency), hence the limit for the field strength is 15 microvolts/meter (23.5 dBµV/m) at a distance of 30 meters.

**Notes:**

1. Calculated measurement results are obtained by using the 40 dB/decade extrapolation factor and the antenna factor and cable loss is included. For instance the corrected value for 6.78 MHz fundamental frequency is calculated as:  
 Measurement result + Antenna Factor + Cable loss – Extrapolation Factor =>  
 24.6 dBµV + 19.4 dB + 1 dB – 40 dB = 5.0 dBµV/m.
2. In the frequency range 1705 kHz – 10 MHz a Peak detector was used during measurements with a resolution bandwidth of 9kHz. For the frequency range 10 MHz – 30 MHz a Quasi peak detector used during measurements with a resolution bandwidth of 9kHz was used.
3. Field strength values of radiated emissions at frequencies in the frequency range 0.009 – 30 MHz not listed in Tables 3 are more than 20 dB below the applicable limit. The reported value is the worst case found at the reported frequency. Worst case values proved to be of EUT in vertical position.
4. The measurement distance was 3m and measured values were corrected to the applicable limit distance.
5. Measured Peak (Pk) values were already within Average (Av) limits, therefor Av not tested.
6. Measurement uncertainty is ±5.0dB.
7. See plot 6 on page 15 for the 6 dB bandwidth, which determines the applicable limit for the fundamental.
8. Tested as a stand-alone item.

Test equipment used (for reference see test equipment listing:

A01491	A00235	A00141	A00314		

### 3.3 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

**RESULT: PASS**

Date of testing: 2018-07-30

Frequency range: 30MHz - 1000MHz

Requirements:

FCC 15.209(a)

Except for Class A digital devices, the field strength of radiated emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (µV/meter)	Field strength (dBµV/m)	Measurement distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0 (Av), 74 (Pk)	3

Table of applicable limits

Test procedure:

Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile.

The spectrum was examined from 30MHz to 1 GHz. Final radiated emission measurements were made at 3m distance.

At each frequency where a spurious emission was found, the EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Field strength values of radiated emissions at frequencies not listed in the tables are more than 20 dB below the applicable limit. Where Peak (Pk) values were at least 6 dB under the Average (Av) limits, Av value was not tested. Where Average values were tested, Average values were measured using a reduced Video Bandwidth.

### 3.4 Results radiated field strength measurements (30 MHz – 1 GHz, E-field)

Frequency [MHz]	EUT Orientation	Antenna Orientation	Detector / Bandwidth	Level [dB $\mu$ V/m]	Limit QP [dB $\mu$ V/m]	Result Pass/Fail
47.47	Horizontal	Vertical	Qp / 120 kHz	23.8	40.0	Pass
61.02	Horizontal	Vertical	Qp / 120 kHz	19.4	40.0	Pass
74.70	Horizontal	Vertical	Qp / 120 kHz	17.4	43.5	Pass
88.14	Vertical	Vertical	Qp / 120 kHz	17.3	43.5	Pass
142.39	Vertical	Vertical	Qp / 120 kHz	18.4	46.0	Pass
728.5 & 845.5 noise	-	Vertical	Qp / 120 kHz	22.0	46.0	Pass

Table 4 Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.205, 15.209 are depicted in Table 4.

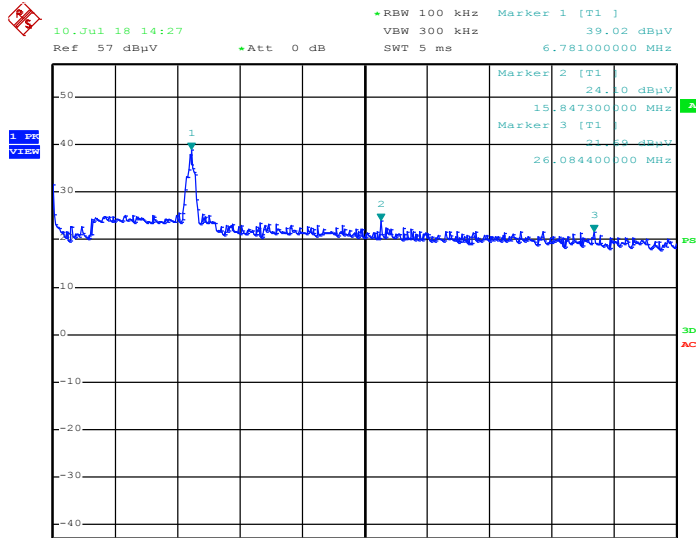
**Notes:**

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is 5.22 dB.
3. The reported value is the worst case found at the reported frequency.
4. a selection of plots is provided on the next pages.

#### 3.4.1 Test equipment used (for reference see test equipment listing).

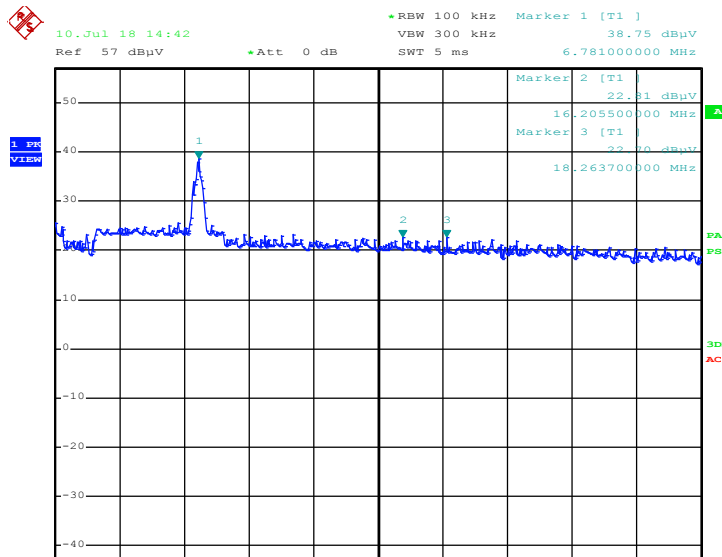
A00257	A00258	A00314	A00447	A00235	A00466	
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3.4.2 Plot of the emissions below 30 MHz



ORI  
 Date: 10.JUL.2018 14:27:31

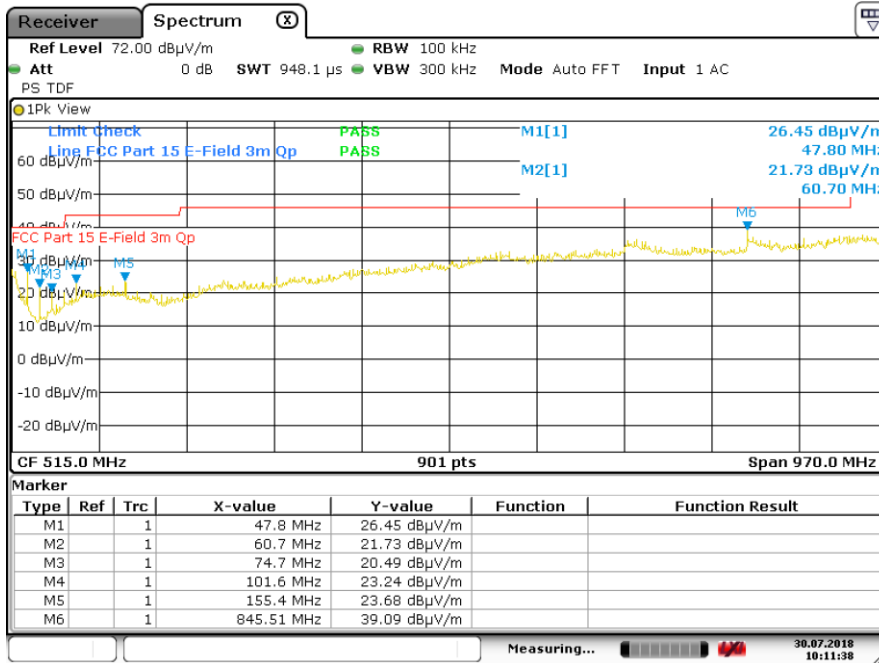
Plot 1: the emissions, EUT Vertical, Peak values shown



ORI  
 Date: 10.JUL.2018 14:42:47

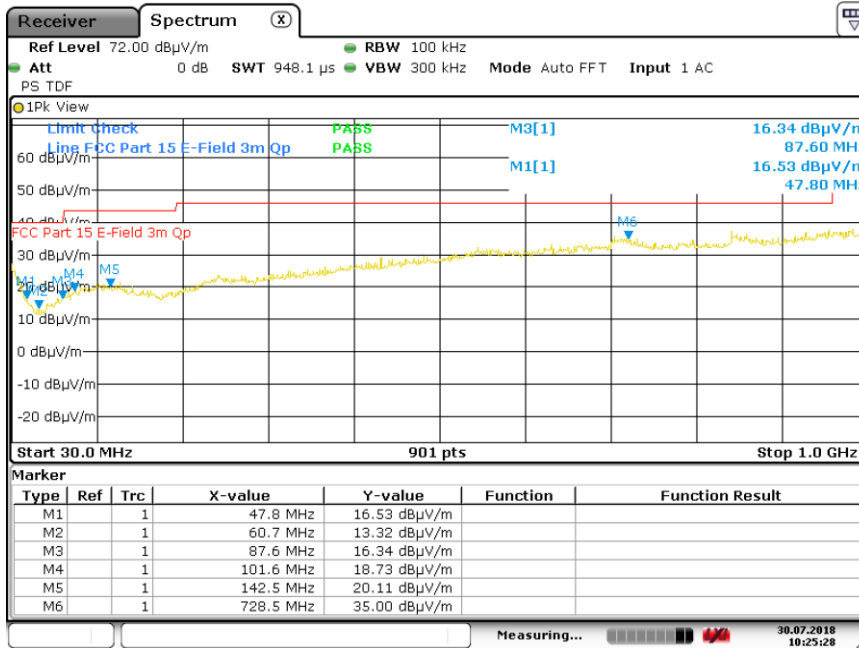
Plot2: of the emissions, EUT Horizontal, Peak values shown

### 3.4.3 Plots of the emissions 30 MHz – 1000 MHz



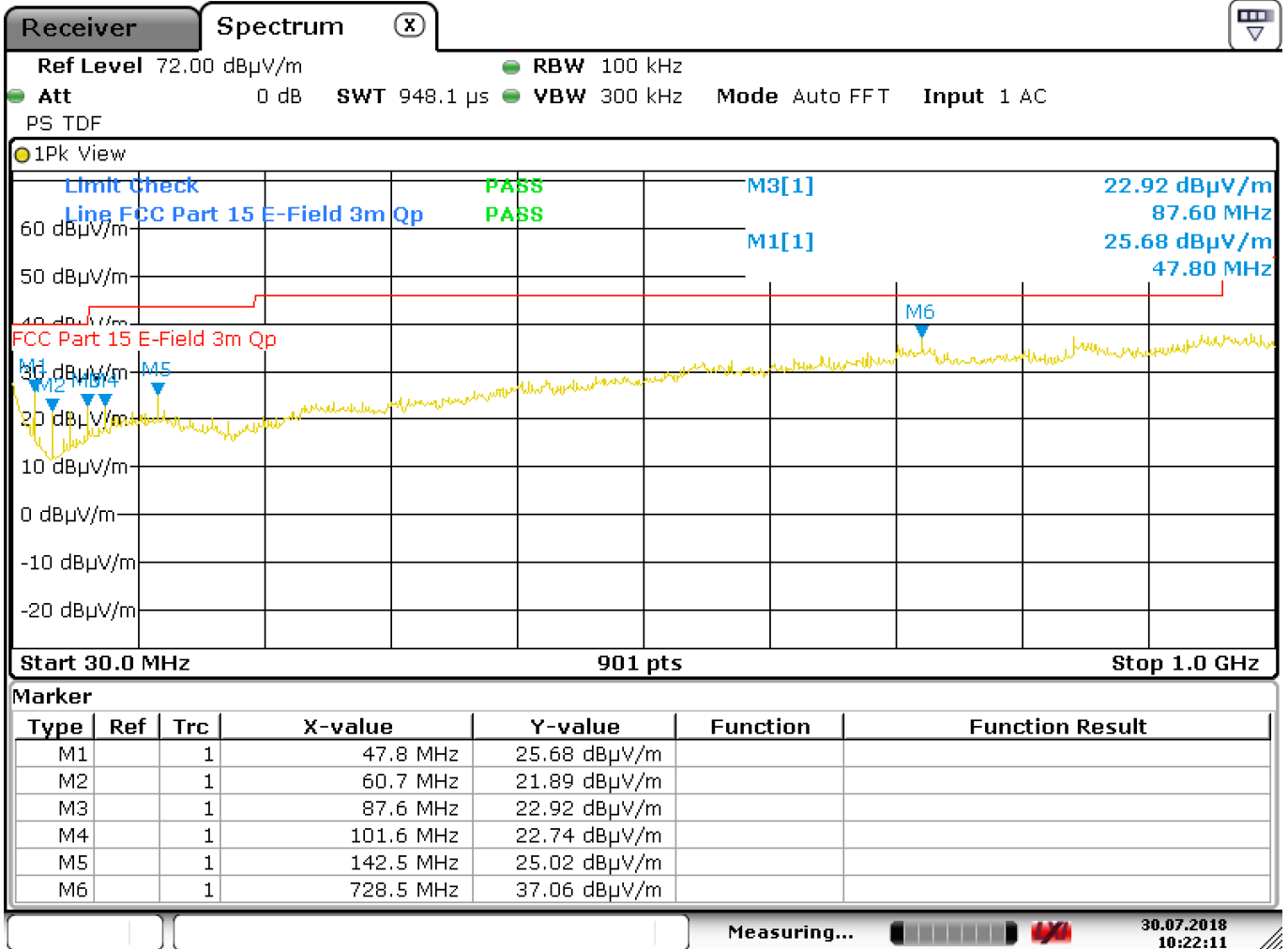
Date: 30.JUL.2018 10:11:38

Plot 3: radiated emissions of the EUT (Horizontal), (peak values shown), Antenna horizontal



Date: 30.JUL.2018 10:25:28

Plot 4: radiated emissions (peak values shown) of the EUT (vertical), Antenna horizontal



Date: 30.JUL.2018 10:22:10

Plot 5: radiated emissions (peak values shown of the EUT (vertical), Antenna vertical)

## 4 Plot of the carrier bandwidth

### 4.1 Bandwidth of the emission

**RESULT: PASS**

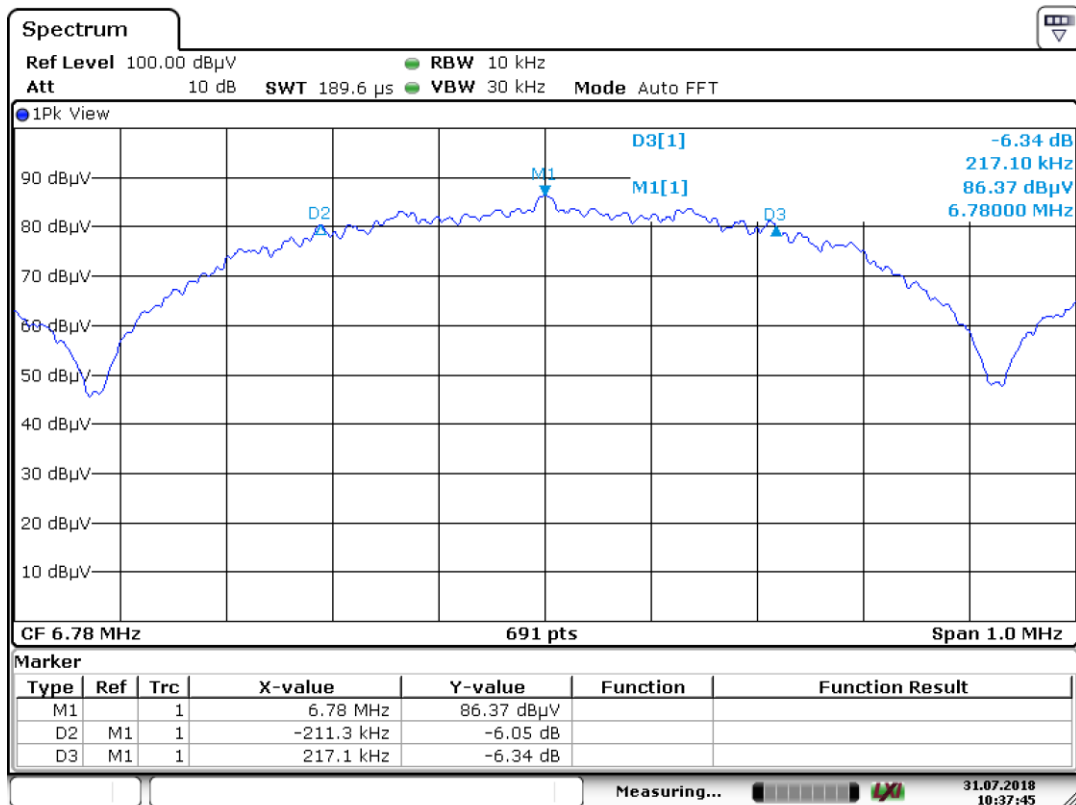
Date of testing: 2018-07-30 & 31

#### Requirements:

The 6 dB bandwidth of the fundamental emission shall be measured in order to find out the exact allowed limit of the field strength of any emission within the band 1.705-10.0 MHz.

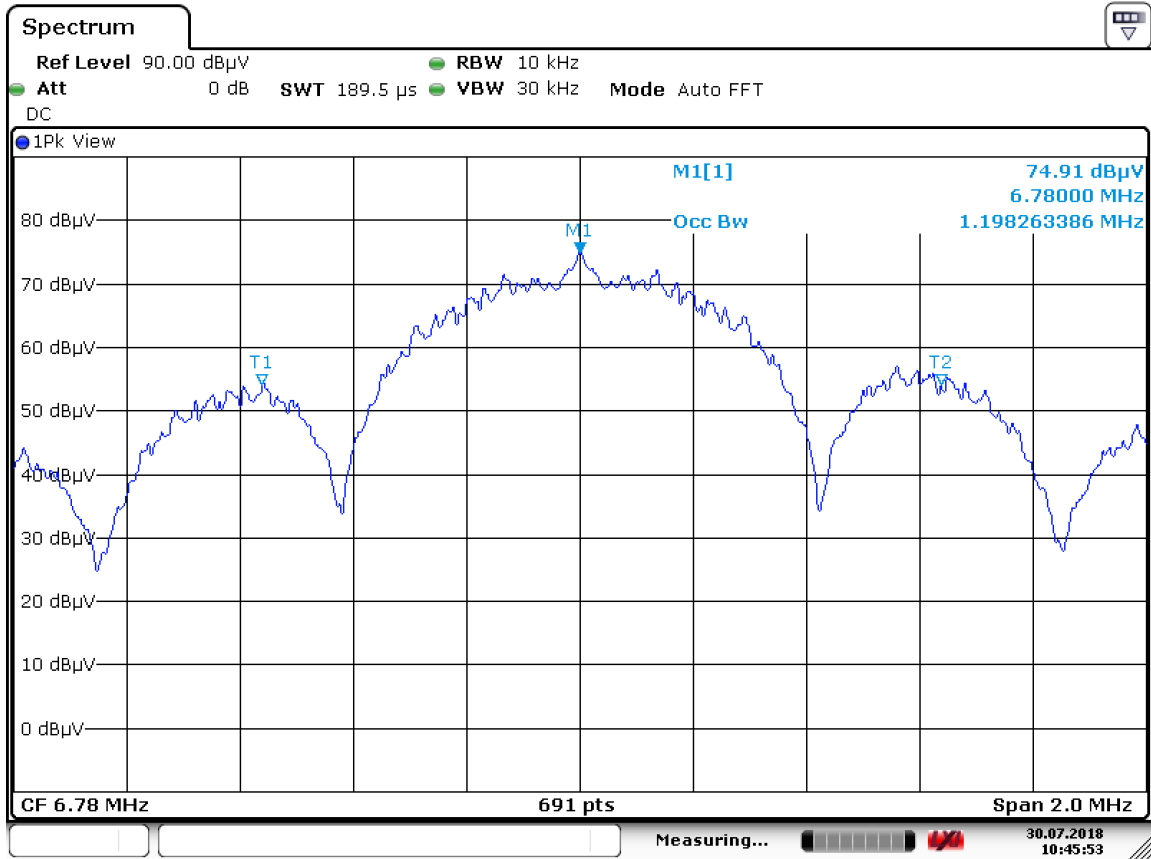
Testprocedure: ANSI C63.10-2013

Testresults: as measured on a spectrum analyzer.



Date: 31.JUL.2018 10:37:46

Plot 6: 6 dB bandwidth of the fundamental, actual bandwidth is 0.428 MHz, which is more less than 10% of the center frequency there for the 23.5 dBμV/m limit for radiated emissions is applicable according to 47 CFR Part 15.223.



Date: 30.JUL.2018 10:45:52

Plot 7: 20 dB bandwidth of the fundamental, actual bandwidth is kHz as measured on a spectrum analyzer

Test equipment used (for reference see test equipment listing):

A00309	A00314	A00444					



## 5 AC Power line Conducted emission data.

### 5.1 AC Power Line Conducted Emission data of the EUT

**RESULT: Not applicable, EUT is battery operated only (non chargeable)**

**<< End of report >>**