Report on the FCC and IC Testing of the Baltech AG
Shark Mico LA. Model: 10117-810
In accordance with FCC 47 CFR Part 15C and Industry Canada RSS-247 and Industry Canada RSS-GEN

Product Service

Choose certainty.
Add value.

Prepared for: Baltech AG
Lilienthalstr. 27
85399 Hallbergmoos

FCC ID: OKY10117810A01A
ICES: 7657A-10117810

COMMERCIAL-IN-CONFIDENCE

Date: 2019-04-04
Document Number: TR-69583-56910-01 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Matthias Stumpe	2019-04-04	
Authorised Signatory	Markus Biberger	2019-04-04	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

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 and Industry Canada RSS-247 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Matthias Stumpe	2019-04-04	

Laboratory Accreditation	Laboratory recognition	Industry Canada test site registration
DAkkS Reg. No. D-PL-11321-11-02	Registration No. BNetzA-CAB-16/21-15	3050A-2

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C, Industry Canada RSS-247 and Industry Canada RSS-GEN:2016 and Issue 2 (2017-02) and Issue 4 (2014-11).

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Product Service

Contents

Product Service

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2019-04-04

Table 1

1.2 Introduction

Applicant	Baltech AG
Manufacturer	Baltech AG
Model Number(s)	10117-810
Serial Number(s)	18032413
Hardware Version(s)	N/A
Software Version(s)	N/A
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C, Industry Canada RSS-247 and Industry Canada RSS-GEN:2016 and Issue 2 (2017-02) and Issue 4 (2014-11)
Test Plan/Issue/Date	N/A
Order Number Date	2019-03-29
Date of Receipt of EUT	2019-04-02
Start of Test	2019-04-02
Finish of Test	2019-04-03
Name of Engineer(s)	Martin Steindl, Matthias Stumpe
Related Document(s)	ANSI C63.10 (2013)

Product Service

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C and Industry Canada RSS-247 and Industry Canada RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: External USB Device of laptop PC Transmitting continuosuly				
2.1	15.247 (d), 15.205, 5.5 and 6.13	Spurious Radiated Emissions	Pass	ANSI C63.10 (2013)

Table 2

Product Service

1.4 Application Form

Supplied by applicant ====>

Test sample basic information

Please enter the information below in english language, since it is directly copied to the reports, thank you!

General information (for report)	
Ordernumber (your PO number)	Per E-Mail
Applicant (incl. address and contact person)	BALTECH AG Lilienthalstr.27, 85399, Hallbergmoos, Germany Contact person : Iftekhar Alam
Manufacturer (when different to applicant)	
Name and address of factory(ies)	

Table 3

Equipment characteristics:	
Type of equipment:	RFID Reader
Type designation*:	10117-810
***Please consider:**	If the type designation has to be changed in the report the whole test of the product has to be repeated! More Info: Only available in german language: http://www.dakks.de/sites/default/files/dokumente/71_sd_0_019_beschluesse_horizontal_20160914_v1.0.pdf
Parts of the system:	
Commercial value:	
Version of EUT: In case of already tested products please describe the differences to the original sample	
Serial number:	

Power supply:	☐ AC Nominal: V Minimum: V Maximum: V Nominal frequency: Hz	☒ DC Nominal: 5 V Minimum: 4.65 V Maximum: 5.35 V	☐ Battery Nominal: V
Necessary Pre-Fuse / RCCB (FI) in installation: (Please specify type and value)			
Terminal connection (AC and/or DC)	☐ Schuko Plug 16 A ☐ CEE 16 A ☐ CEE 32 A ☐ CEE 63 A ☐ Terminal Block, specify maximum Voltage/Current/Power per connection Point:		
highest frequency generated or used within the EUT	MHz ☐ < 108 MHz		

Table 4

Marking plate (may only be a draft)


Table 5

Product Service

Operating mode(s) // Methods of Observation	
Operating mode(s) for emission tests:	
Operating mode(s) for immunity tests:	
Methods of observation during immunity tests	

Table 6

List of ports and cables					
No.	*Description*	*Classification*[1]	*Cable type*	*Cable length used*	*Cable length maximum*[2]
A1		ac power	Unshielded	. m	. m
D1		dc power	Unshielded	. m	. m
S1		signal/control port	Shielded	. m	. m
S2		signal/control port	Unshielded	. m	. m
S3		signal/control port	Unshielded	. m	. m

Table 7

List of devices connected to EUT				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*
1				
2				
3				

Table 8

List of support devices				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*
1				
2				
3				

Table 9

<====

[1] Ports shall be classified as ac power, dc power or signal/control port.
[2] As specified by applicant

Product Service

1.5 Product Information

1.5.1 Technical Description

The EUT is a RFID Reader with BLE interface

1.6 Deviations from the Standard

Since the RFID reader was deactivated, the test was performed in the frequency range 30 MHz to 25 GHz, only.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	Not Applicable	Not Applicable

Table 10

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing Test Laboratory.

Test Name	Name of Engineer(s)
Configuration and Mode: External USB Device of laptop PC Transmitting continuously	
Spurious Radiated Emissions	Matthias Stumpe, Martin Steindl

Table 11

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

2 Test Details

2.1 Spurious Radiated Emissions

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Industry Canada RSS-247 and Industry Canada RSS-GEN, Clause 15.247 (d), 15.205, 5.5 and 6.13

2.1.2 Equipment Under Test and Modification State

10117-810, S/N: 18032413 - Modification State 0

2.1.3 Date of Test

2019-04-02 to 2019-04-03

2.1.4 Test Method

Testing was performed in accordance with ANSI C63.10-2013 clause 6.3, 6.5 and 6.6.

Plots for average measurements were taken in accordance with ANSI C63.10-2013 clause 4.1.4.2.3 to characterize the EUT. Where emissions were detected, final average measurements were taken in accordance with ANSI C63.10-2013 clause 4.1.4.2.2.

The plots shown are the characterization of the EUT. The limits on the plots represent the most stringent case for restricted bands, (54/74 dBuV/m) when compared to 20 dBc outside restricted bands. The limits shown have been used as a threshold to determine where further measurements are necessary. Where results are within 10 dB of the limits shown on the plots, further investigation was carried out and reported in results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

2.1.5 Environmental Conditions

Ambient Temperature	24.0 °C
Relative Humidity	34.0 %

Product Service

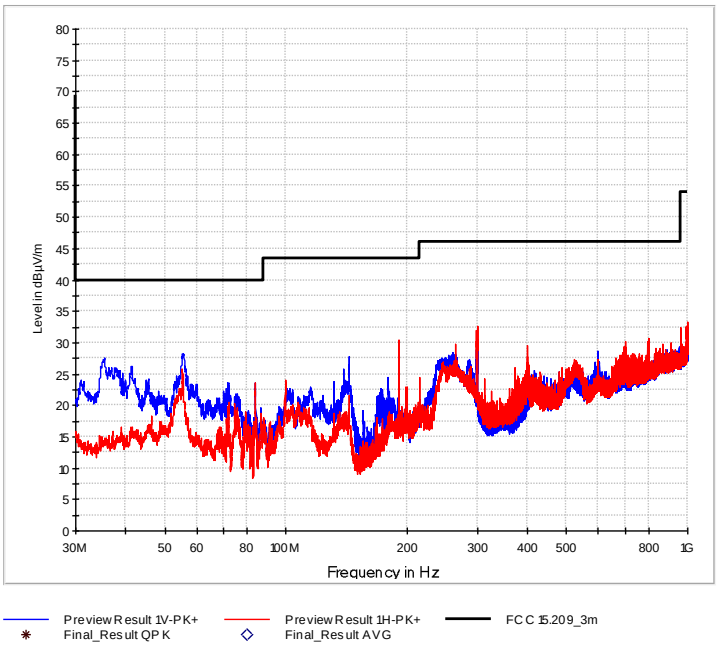
2.1.6 Test Results

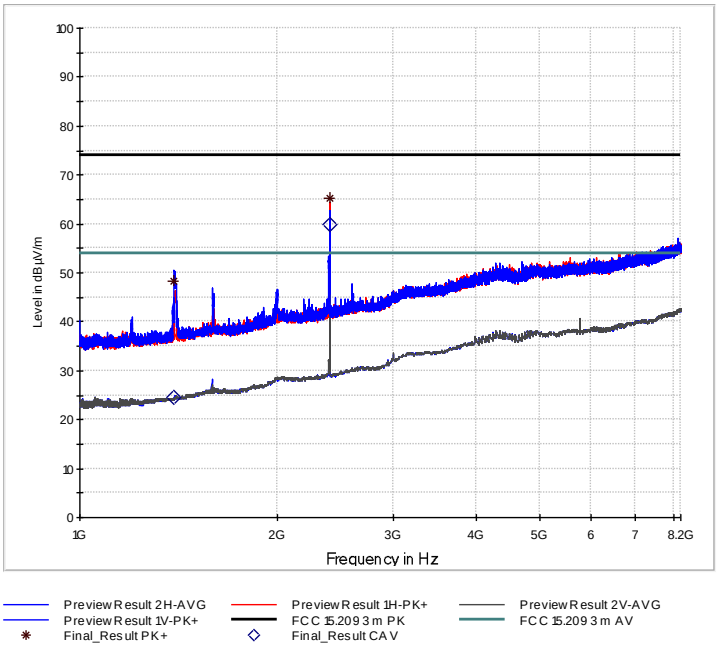
External USB Device of laptop PC Transmitting continuously on lowest channel 00

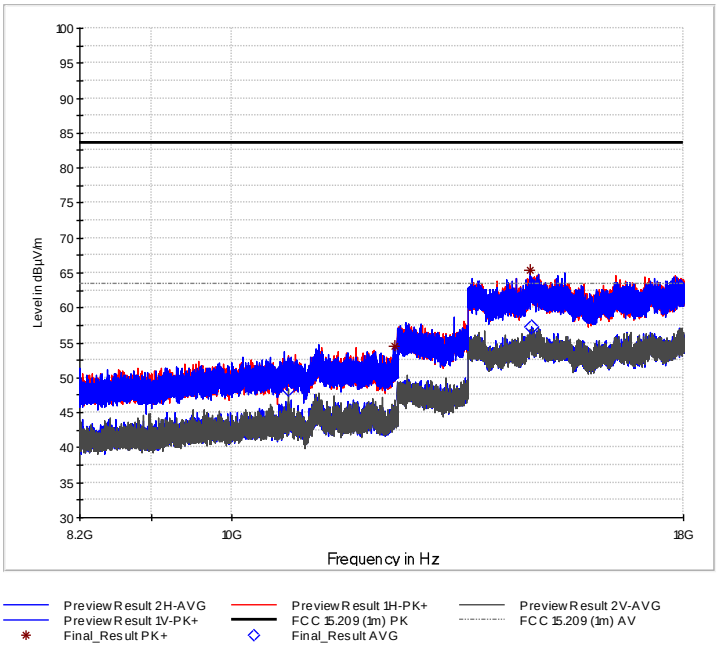
Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
190.425	horizontal	Quasi-Peak	-2.9	12.1		9.2	43.5	34.3
1397.750	vertical	Average	-3.6	28.4		24.8	54.0	29.2
1397.750	vertical	Peak	22.7	28.4		51.1	74.0	22.9
2402.000	horizontal	Average	22.8	33.3		56.1		
2402.000	horizontal	Peak	29.3	33.3		62.6		
5760.000	vertical	Peak	13.2	41.8		55.0	74.0	19.0
5760.000	vertical	Average	2.4	41.8		44.2	54.0	9.8
11182.788	horizontal	Average	34.6	13.1		47.7	64.5	16.9
11201.950	horizontal	Peak	41.6	13.1		54.6	83.5	28.9
14710.000	horizontal	Peak	47.1	18.0		65.1	83.5	18.4
14863.300	vertical	Average	39.5	18.0		57.5	63.5	**6.0**
19775.438	vertical	Peak	16.3	39.9		56.2	83.5	27.3
25487.438	horizontal	Average	10.1	39.9		50.0	63.5	13.5

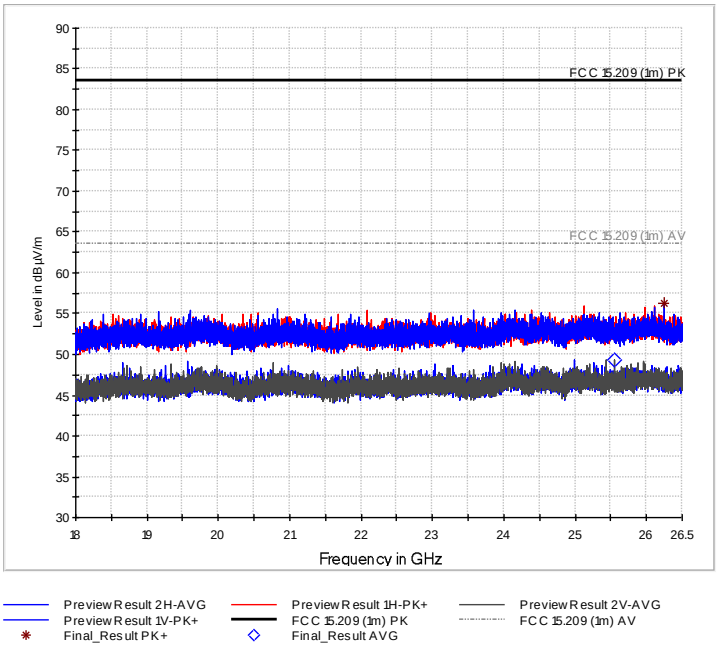
Sample calculation of final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m) + Pulse Train Correction (dB)




Level in dBµV/m
Frequency in Hz
1G
2G
3G
4G
5G
6
7
8.2G
Preview Result 2H-AVG
Preview Result 1V-PK+
Final_Result PK+
Preview Result 1H-PK+
FCC 15.209 3 m PK
Final_Result CAV
Preview Result 2V-AVG
FCC 15.209 3 m AV


Level in dBµV/m
Frequency in Hz
8.2G
10G
18G
Preview Result 2H-AVG
Preview Result 1V-PK+
Final_Result PK+
Preview Result 1H-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2V-AVG
FCC 15.209 (1m) AV


90
85
80
75
70
65
60
55
50
45
40
35
30
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Level in dBµV/m
18
19
20
21
22
23
24
25
26
26.5
Frequency in GHz
Preview Result 2H-AVG
Preview Result 1V-PK+
Final_Result PK+
Preview Result 1H-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2V-AVG
FCC 15.209 (1m) AV

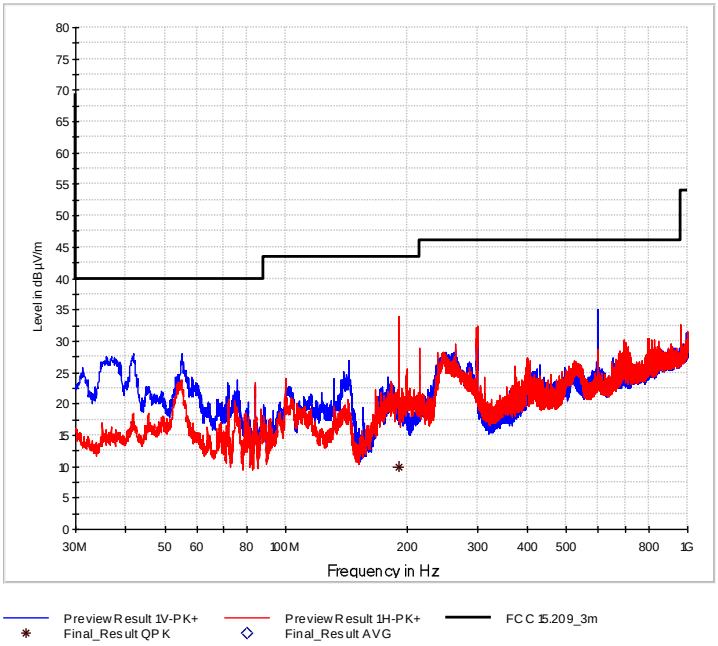
Product Service

External USB Device of laptop PC Transmitting continuously middle channel 19

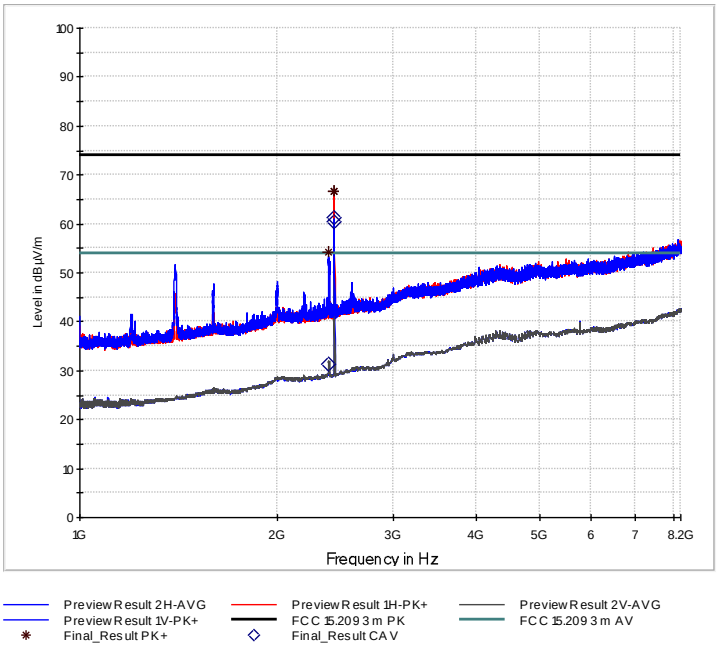
Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
190.950	horizontal	Quasi-Peak	21.5	12.1		33.6	43.5	9.9
1398.500	vertical	Average	-3.4	28.4		25.1	54.0	29.0
1398.500	vertical	Average	21.8	28.4		50.2	74.0	23.8
2388.750	horizontal	Average	-2.9	33.2		30.3	54.0	23.7
2388.750	vertical	Peak	20.3	33.2		53.5	74.0	20.5
2440.000	horizontal	Peak	29.2	33.5		62.7		
2440.000	vertical	Peak	21.9	33.5		55.4		
11143.150	horizontal	Peak	42.3	13.0		55.3	83.5	28.2
11151.550	vertical	Average	35.1	13.0		48.1	63.5	15.4
14894.800	horizontal	Average	39.4	18.0		57.4	63.5	**6.1**
17855.450	horizontal	Peak	47.7	18.0		65.7	83.5	17.8

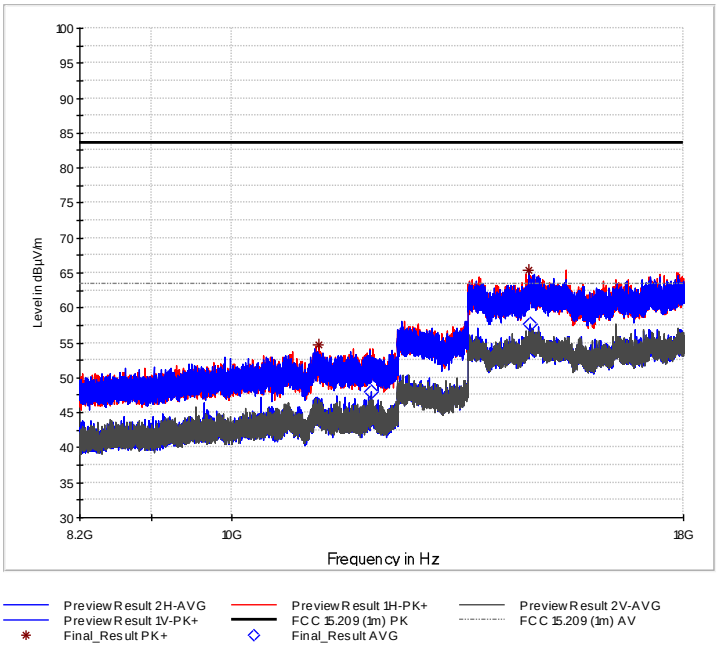
Sample calculation of final values:

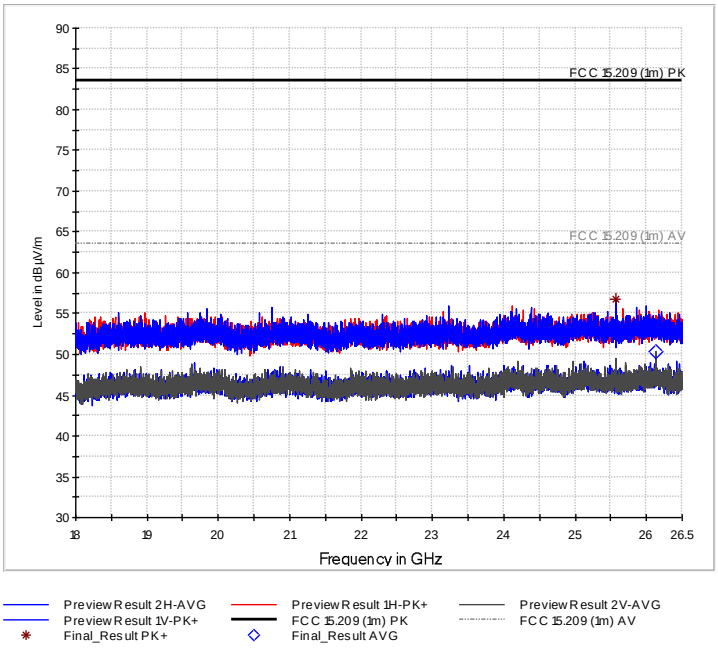
Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m) + Pulse Train Correction (dB)



Product Service






FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Level in dBµV/m
Frequency in GHz
90
85
80
75
70
65
60
55
50
45
40
35
30
18
19
20
21
22
23
24
25
26
26.5
Preview Result 2H-AVG
Preview Result 1V-PK+
Final_Result PK+
Preview Result 1H-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2V-AVG
FCC 15.209 (1m) AV

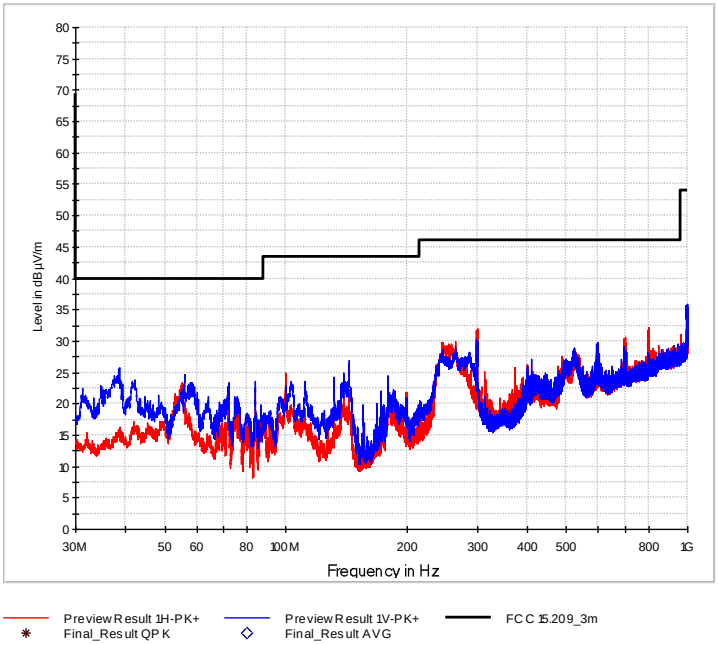
Product Service

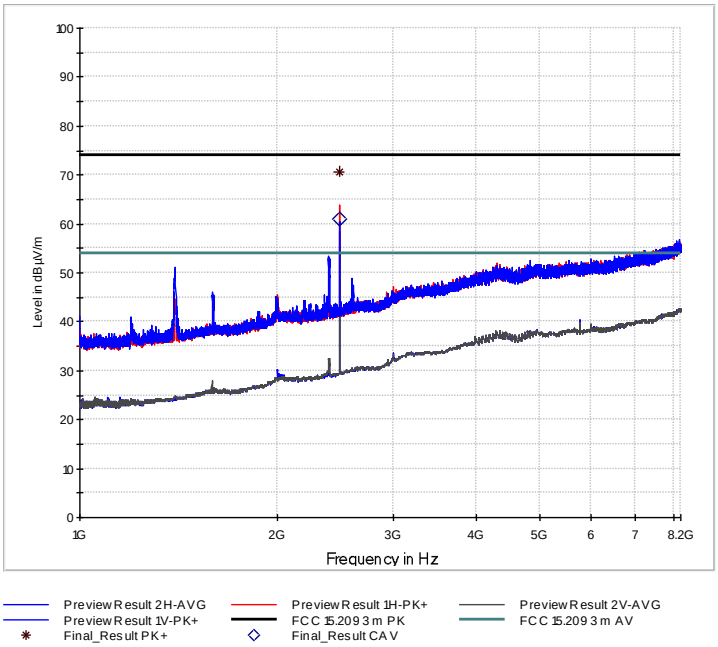
External USB Device of laptop PC Transmitting continuously highest channel 39

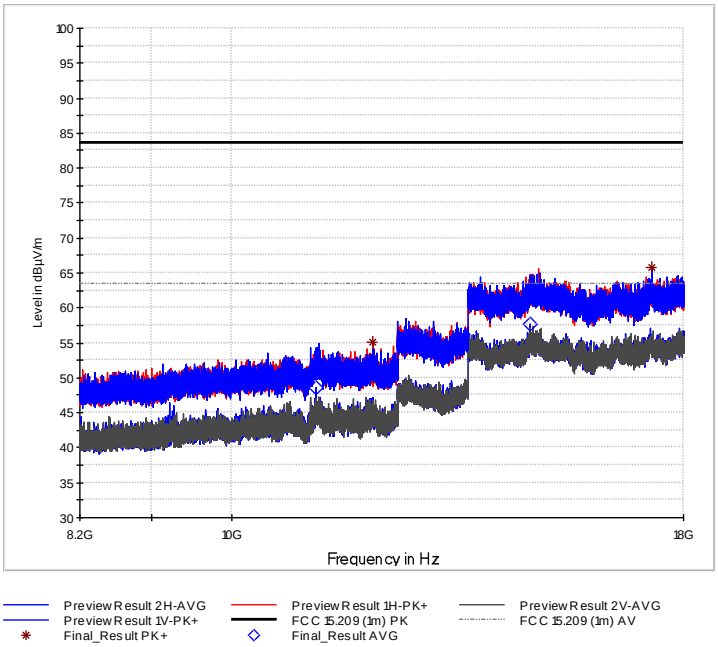
Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
190.950	horizontal	Quasi-Peak	21.0	12.1		33.1	43.8	**10.7**
1394.750	vertical	Average	-3.7	28.4		24.7	54.0	29.3
1394.750	vertical	Peak	21.7	28.4		50.1	74.0	23.9
2394.750	vertical	Average	-2.2	33.2		31.0	54.0	23.0
2394.750	vertical	Peak	20.9	33.2		54.1	74.0	19.9
2480.000	horizontal	Average	22.8	33.8		56.6		
2480.000	horizontal	Peak	30.0	33.8		63.8		
11107.975	vertical	Peak	-35.5	47.5		12.0	63.5	51.5
12045.625	vertical	Average	-42.5	55.5		13.0	83.5	70.5
13719.800	horizontal	Average	-46.0	65.0		19.0	83.5	64.5
14756.550	horizontal	Peak	-38.9	57.9		19.0	63.5	44.5
24158.250	horizontal	Average	-9.8	49.8		40.0	63.5	23.5
25829.563	horizontal	Peak	-15.2	56.2		41.0	83.5	42.5

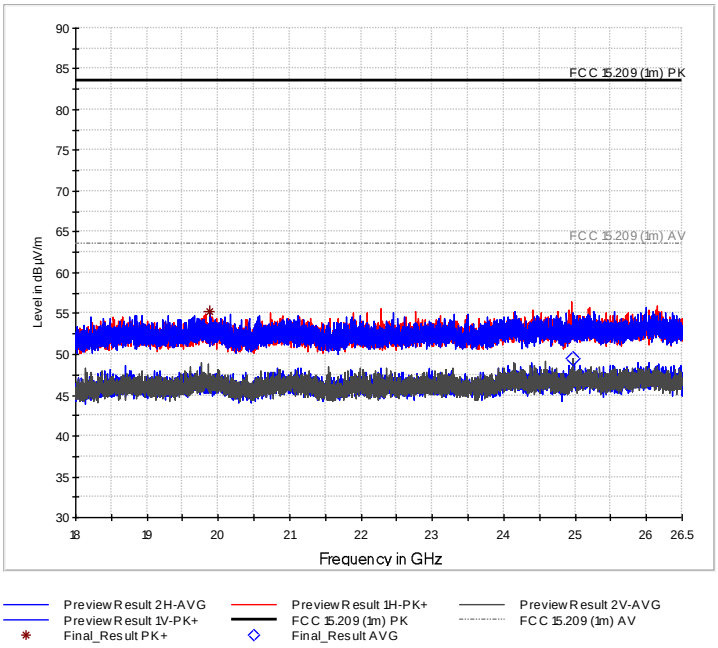
Sample calculation of final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m) + Pulse Train Correction (dB)




Level in dBµV/m
Frequency in Hz
1G
2G
3G
4G
5G
6
7
8.2G
Preview Result 2H-AVG
Preview Result 1V-PK+
Final_Result PK+
Preview Result 1H-PK+
FCC 15.209 3 m PK
Final_Result CAV
Preview Result 2V-AVG
FCC 15.209 3 m AV


Level in dBµV/m
Frequency in Hz
8.2G
10G
18G
Preview Result 2H-AVG
Preview Result 1V-PK+
Final_Result PK+
Preview Result 1H-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2V-AVG
FCC 15.209 (1m) AV


FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Level in dBµV/m
Frequency in GHz
90
85
80
75
70
65
60
55
50
45
40
35
30
18
19
20
21
22
23
24
25
26
26.5
Preview Result 2H-AVG
Preview Result 1V-PK+
Final_Result PK+
Preview Result 1H-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2V-AVG
FCC 15.209 (1m) AV

Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in 15.209(a)

Industry Canada RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Product Service

2.1.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 8.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
ESW26	Rohde & Schwarz	101315	28268	12	2019-05
ESW44	Rohde & Schwarz	101814	39897	12	2020-02
VULB9162	Schwarzbeck	9162-048	20116	36	2022-01
HF907	Rohde & Schwarz	100154	19933	24	2019-06
3160-07	EMCO	9112-1008	18874	O/P Mon	
3160-08	EMCO	9112-1002	18875	O/P Mon	
3160-09	EMCO	9403-1025	19125	O/P Mon	

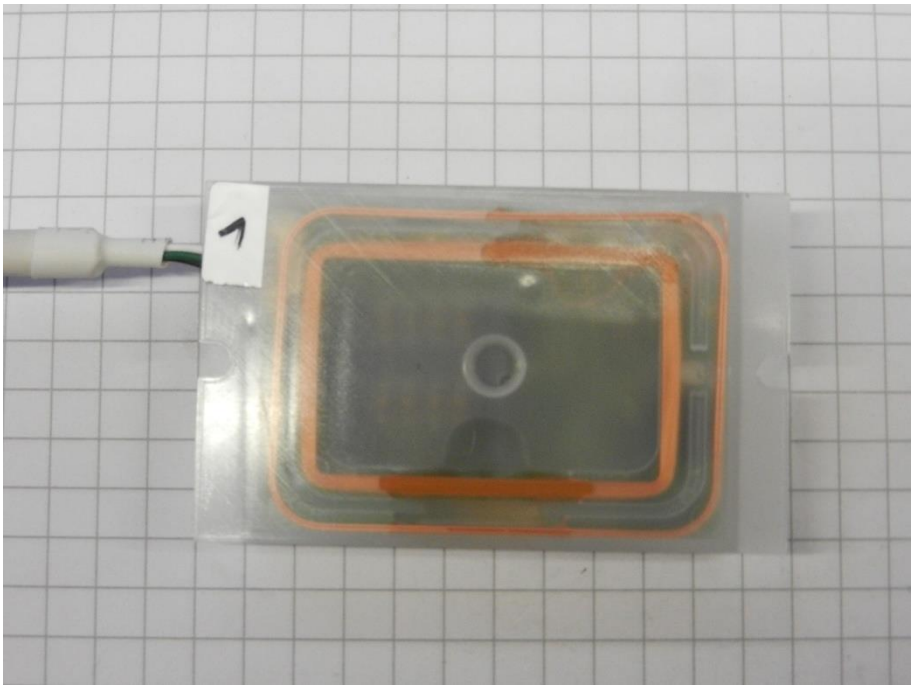
Table 12

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3 Photographs

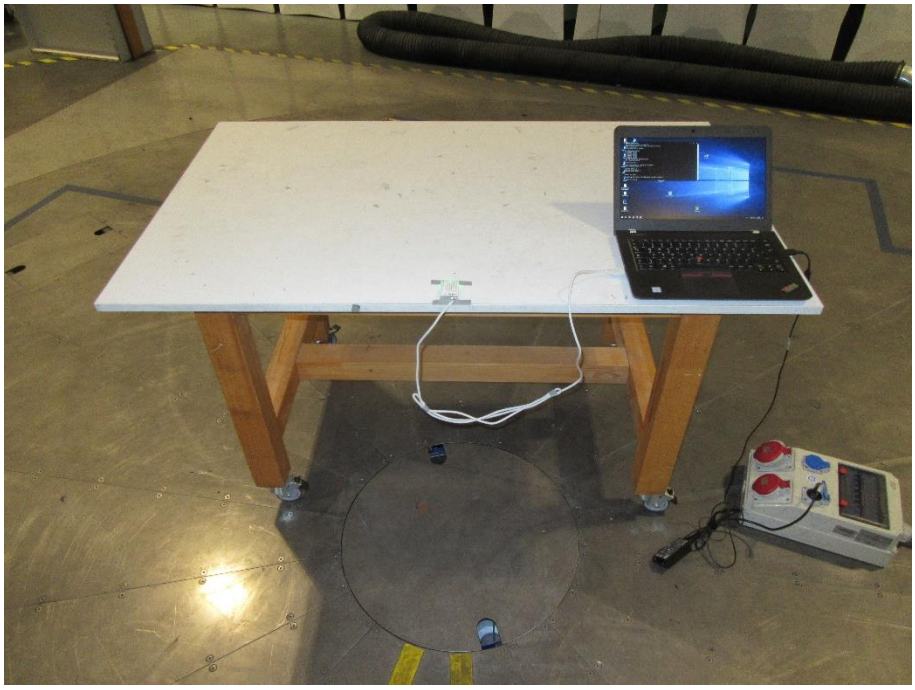
3.1 Equipment Under Test (EUT)



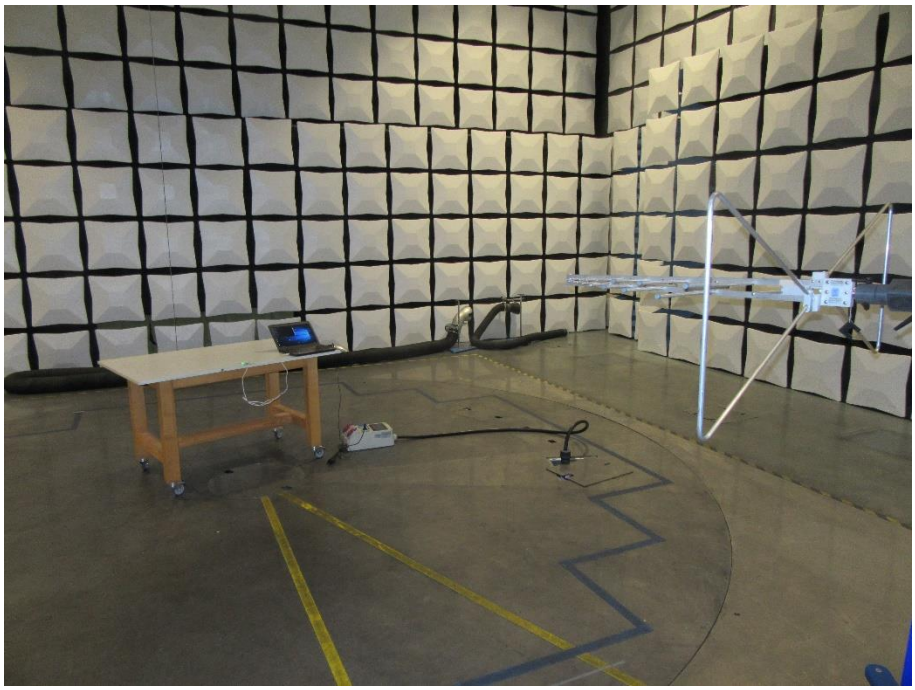
Top view of EUT

Rear view of EUT with marking plate

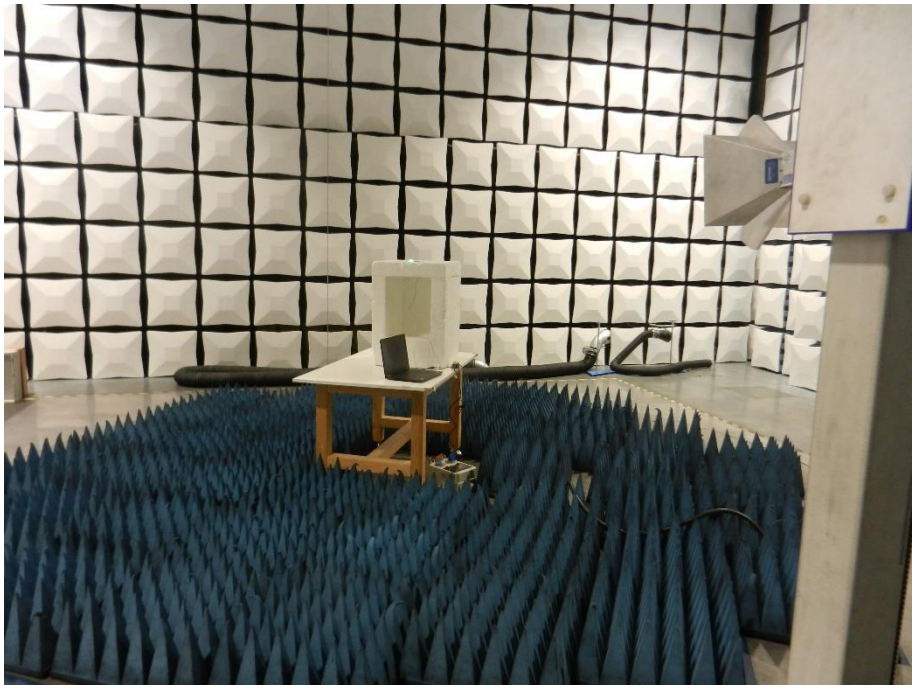
3.2 Test Setup



Frequency range ≤ 1 GHz



Frequency range ≤ 1 GHz



Frequency range > 1 GHz

Product Service

4 Measurement Uncertainty

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

Radio Testing			
Test Name	kp	Expanded Uncertainty	Note
Occupied Bandwidth	2.0	±1.14 %	2
RF-Frequency error	1.96	±1 · 10-7	7
RF-Power, conducted carrier	2	±0.079 dB	2
RF-Power uncertainty for given BER	1.96	+0.94 dB / -1.05	7
RF power, conducted, spurious emissions	1.96	+1.4 dB / -1.6 dB	7
RF power, radiated			
25 MHz – 4 GHz	1.96	+3.6 dB / -5.2 dB	8
1 GHz – 18 GHz	1.96	+3.8 dB / -5.6 dB	8
18 GHz – 26.5 GHz	1.96	+3.4 dB / -4.5 dB	8
40 GHz – 170 GHz	1.96	+4.2 dB / -7.1 dB	8
Spectral Power Density, conducted	2.0	±0.53 dB	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	±2,89 %	2
6 kHz – 25 kHz	2	±0.2 dB	2
Maximum frequency deviation for FM	2	±2,89 %	2
Adjacent channel power 25 MHz – 1 GHz	2	±2.31 %	2
Temperature	2	±0.39 K	4
(Relative) Humidity	2	±2.28 %	2
DC- and low frequency AC voltage			
DC voltage	2	±0.01 %	2
AC voltage up to 1 kHz	2	±1.2 %	2
Time	2	±0.6 %	2

Table 13

Radio Interference Emission Testing			
Test Name	kp	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Table 14

Immunity Testing			
Test Name	kp	Expanded Uncertainty	Note
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Table 15

Note 1:
The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 2:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 3:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05, providing a level of confidence of p = 95.45%
Note 4:
It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.
Note 5:
The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 6:
The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 7:
The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%
Note 8:

Product Service

The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%