Report on the FCC and IC Testing of the Siemens AG SIMATIC RTLS PCB OEM AC In accordance with FCC 47 CFR Part 15C and ISED Canada RSS-247 and ISED Canada RSS-GEN

Product Service

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Prepared for: Siemens AG
Gleiwitzer Str. 555
DE-90475 Nürnberg
Germany

FCC ID: NXWOEMAC
IC: 267X-OEMAC

COMMERCIAL-IN-CONFIDENCE

Date: 2020-02-14
Document Number: TR-72654-64463-02 | Issue: 04

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Alex Fink	2020-02-14	SIGN-ID 338195
Authorised Signatory	Matthias Stumpe	2020-02-14	SIGN-ID 338237

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

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Alex Fink	2020-02-14	SIGN-ID 338195

Laboratory Accreditation	Laboratory recognition	ISED 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, ISED Canada RSS-247 and ISED Canada RSS-GEN:2016 and Issue 2 (2017-02) and Issue 5 (2019-03).

Trade Register Munich
HRB 85742
VAT ID No. DE129484267
Information pursuant to Section 2(1)
DL-InfoV (Germany) at
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Product Service

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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	2019-10-28
2	Page 2 and 4: MLFB added	2019-11-11
3	Section 1.4: Frequency range corrected. Section 2.6: conducted power added. Section 2.9: separation distance changed to 20 mm.	2020-02-14
4	Section 2.9: separation distance corrected to 20 mm.	2020-03-12

Table 1

1.2 Introduction

Applicant	Siemens AG
Manufacturer	Siemens AG
Model Number(s)	SIMATIC RTLS PCB OEM AC
MLFB	6GT2700-8DF00-0AX1 6GT2700-8DF10-0AX1 6GT2700-8DF20-0AX1 6GT2700-8DF30-0AX1
Serial Number(s)	A55882 (radiated), A55717 (conducted)
Hardware Version(s)	0606
Software Version(s)	2.1.0
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN:2016 and Issue 2 (2017-02) and Issue 5 (2019-03)
Test Plan/Issue/Date	---
Order Number Date	5121883 2018-07-30
Date of Receipt of EUT	2018-11-19
Start of Test	2019-08-21
Finish of Test	2019-09-20
Name of Engineer(s)	Alex Fink, Patrick Müller
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 ISED Canada RSS-247 and ISED Canada RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Continuously Transmitting				
2.1	15.247 (d), 15.205, 5.5 and 6.13	Spurious Radiated Emissions	Pass	ANSI C63.10 (2013)
2.2	15.205 N/A and 8.10	Restricted Band Edges	Pass	ANSI C63.10 (2013)
2.3	15.247 (d), 5.5 and N/A	Authorised Band Edges	Pass	ANSI C63.10 (2013)
2.4	15.247 (a)(2), 5.2 and 6.6	Emission Bandwidth	Pass	ANSI C63.10 (2013)
2.5	15.247 (e), 5.2 and 6.12	Power Spectral Density	Pass	ANSI C63.10 (2013) KDB 662911 D01 v02r02
2.6	15.247 (b), 5.4 and 6.12	Maximum Conducted Output Power	Pass	ANSI C63.10 (2013) KDB 662911 D01 v02r02
2.7	15.207, N/A and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10 (2013)
2.8	RSS-Gen, Issue 5	Transmitter frequency stability	Pass	RSS-Gen, Issue 5, April 2018, chapter 6.11
2.9		Exposure of Humans to RF Fields	Pass	

Table 2

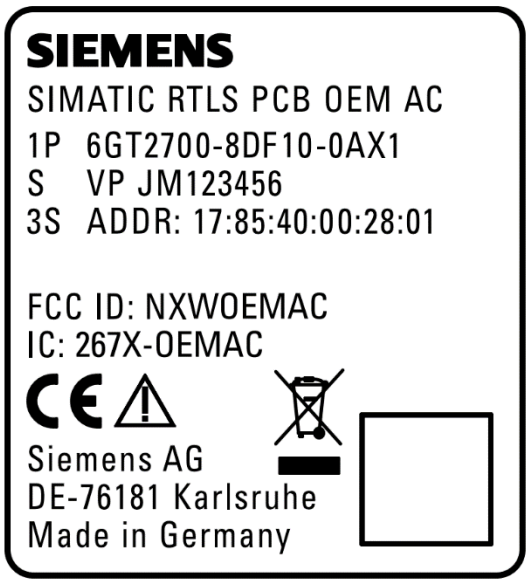
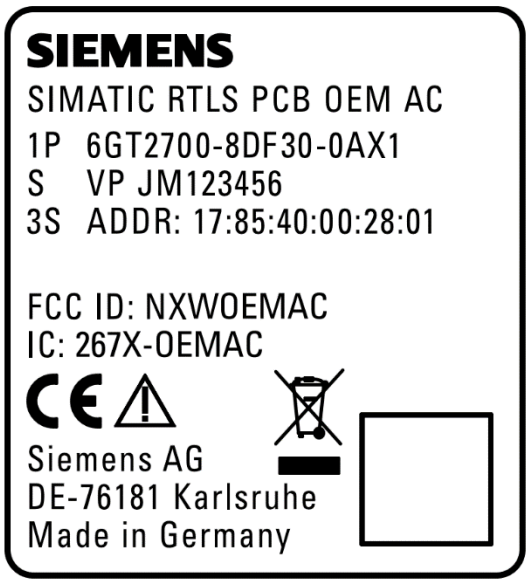
2.9 Exposure of Humans to RF Fields
2.9.1 Specification Reference
IC RSS-GEN Issue 5, section 3.2 and
IC RSS-102, Issue 5, section 2.5
KDB 447498 D01 General RF Exposure Guidance v06, chapter 4.3.1

Product Service

1.4 Application Form

Eigenschaften des Prüflings: ***Equipment characteristics:***				
Type of equipment:	Communication and Real Time Location System in 2.4 GHz ISM Band and UWB			
Type designation:	SIMATIC RTLS PCB OEM AC			
MLFB	6GT2700-8DF00-0AX1 6GT2700-8DF10-0AX1 6GT2700-8DF20-0AX1 6GT2700-8DF30-0AX1			
Parts of the system:	Tag			
Intended use	Communication and Real Time Location System			
Hardware Version:	0606			
Software Version:	2.1.0			
Intended area of use	☐ residential environment (home) ☒ industrial environment	☐ vehicle (automotive)		
Power supply:	☐ AC Nominal: Minimum: Maximum: Nominal frequency: Hz	☒ DC Nominal: 3.3 V Minimum:3.1 V Maximum: 3.4 V	☐ Batterie Nominal: Max.	
Dimensions (in cm)	2.5 x 2.5 x 1.8 cm			
General requirements according to RED:	☒ Funk / *Radio*	☒ Sicherheit / *Safety*	☒ EMV / *EMC*	☒ EMF
Application:	Short Range Devices			
Kind of equipment:	Transceiver			
Frequency band:	Phase: 2400 – 2483.5 MHz; UWB: 3100 – 4800 MHz (EU, USA), UWB: 6000 - 7000 MHz (EU, USA), UWB: 6240 – 6739.2 MHz (Canada and China)			
Number of RF-channels:	Phase: 14 (2410 MHz – 2480 MHz) UWB: 2 (Channel 2, without DAA, Center 3993.6 MHz) (Channel 5, without DAA, Center 6489.6 MHz)			
Channel spacing	Phase: 5 MHz UWB: 499.2 MHz			
Rated Carrier Power:	Phase: 4 dBm UWB: -14.31 dBm			
Type(s) of Modulation (e.g. BPSK, FSK, ASK, …)	Phase: OQPSK in ISM 2.4 GHz UWB: BPSK with BPM			

Product Service

Type of radio transmission / Use of frequency spectrum (e.g. DSSS, OFDM,.)	Phase: 4QAM UWB: BPM-BPSK
Number / Type of Antenna(s)	2 PCB antennas (both internal)
Antenna Gain	2 dBi
Minimum Distance of the Antenna to the human body	> 20 cm
Nominal Temperature & Temperature Range:	20°C / 0 °C to +50 °C
Marking plate	FCC:  ISED: 

Product Service

1.5 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 (S/N: A55882)	Not Applicable	Not Applicable

Table 3

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer (S/N: A55717) - antennas replaced with SMA connector	Not Applicable	Not Applicable

Table 4

1.6 Test Location

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

Test Name	Name of Engineer(s)
Configuration and Mode: Continuously Transmitting	
Spurious Radiated Emissions	Alex Fink
Restricted Band Edges	Alex Fink
Authorised Band Edges	Alex Fink
Emission Bandwidth	Alex Fink
Power Spectral Density	Alex Fink
Maximum Conducted Output Power	Alex Fink
AC Power Line Conducted Emissions	Alex Fink
Transmitter frequency stability	Alex Fink
Exposure of Humans to RF Fields	Alex Fink

Table 5

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

2 Test Details

2.1 Spurious Emissions

2.1.1 Specification Reference

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

2.1.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55882 - Modification State 0

2.1.3 Date of Test

2019-08-21 to 2019-09-03

2.1.4 Test Method

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).

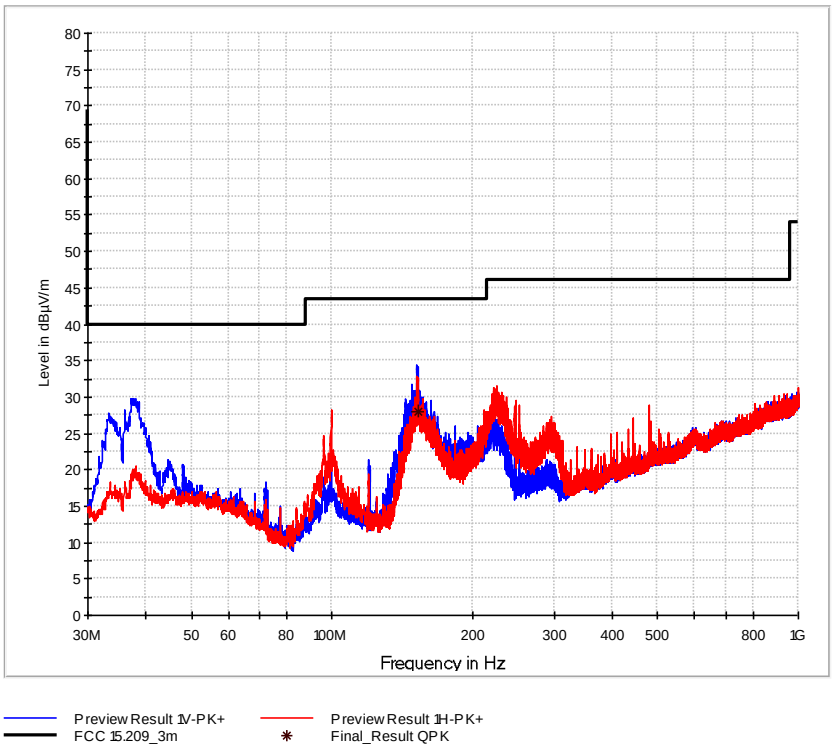
2.1.5 Environmental Conditions

Ambient Temperature	25.0 °C
Relative Humidity	56.0 %

2.1.6 Test Results

Product Service

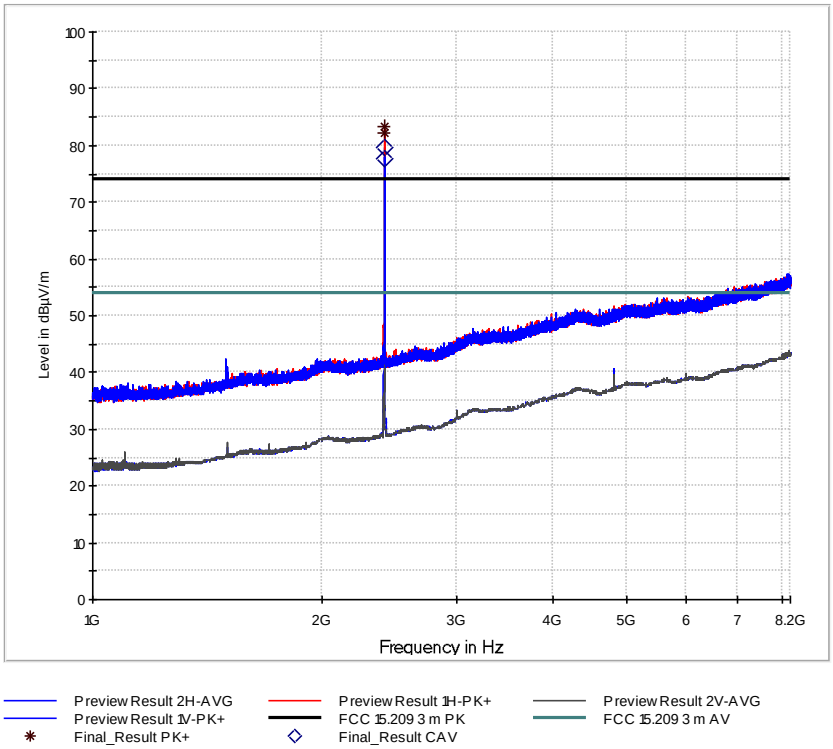
1.orthogonal axis, xz plane - channel 12



Final Results:

Frequency MHz	*QuasiPeak dBµV/m*	*Limit dBµV/m*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azimuth deg*	*Corr. dB*
152.660000	28.08	43.50	15.42	1000.0	120.000	100.0	V	-123.0	9.5

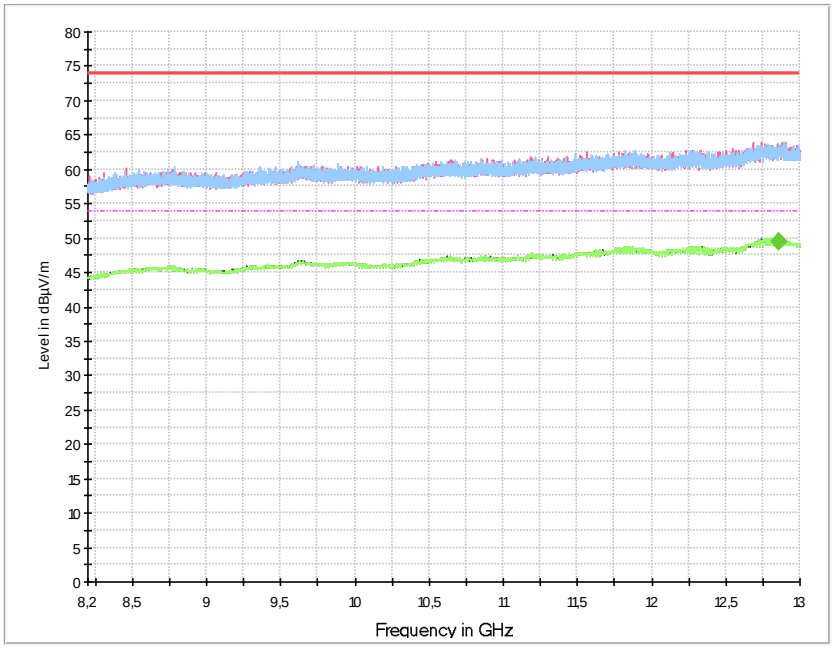
Product Service



Final Results:

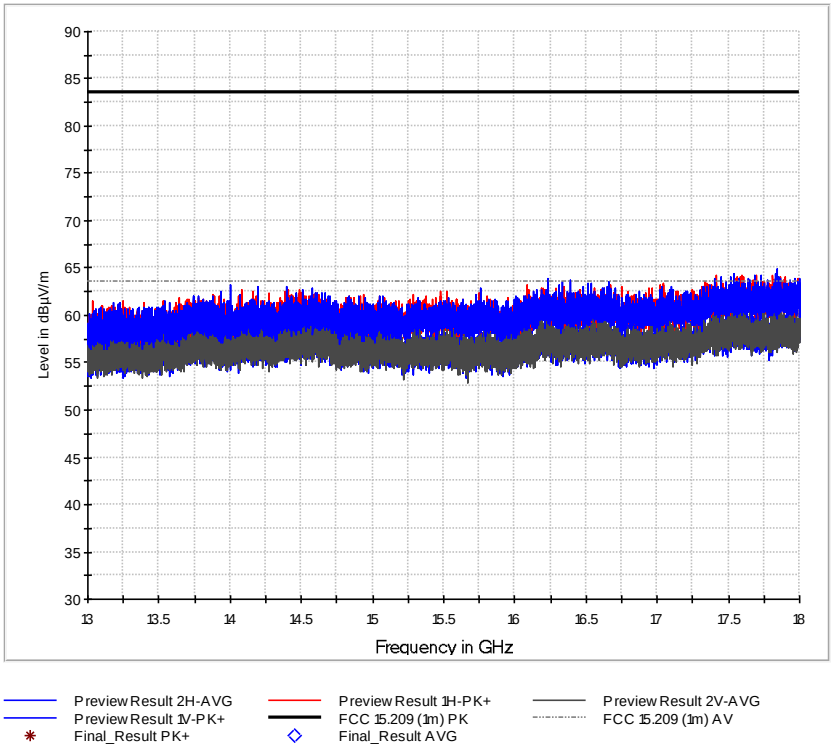
Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2410.000000	---	79.77	#1	#1	1000.0	1000.000	149.0	H	-33.0	32.8
2410.000000	82.26	---	#1	#1	1000.0	1000.000	149.0	H	-33.0	32.8
2410.500000	---	77.62	#1	#1	1000.0	1000.000	153.0	H	-35.0	32.8
2410.500000	83.25	---	#1	#1	1000.0	1000.000	153.0	H	-35.0	32.8

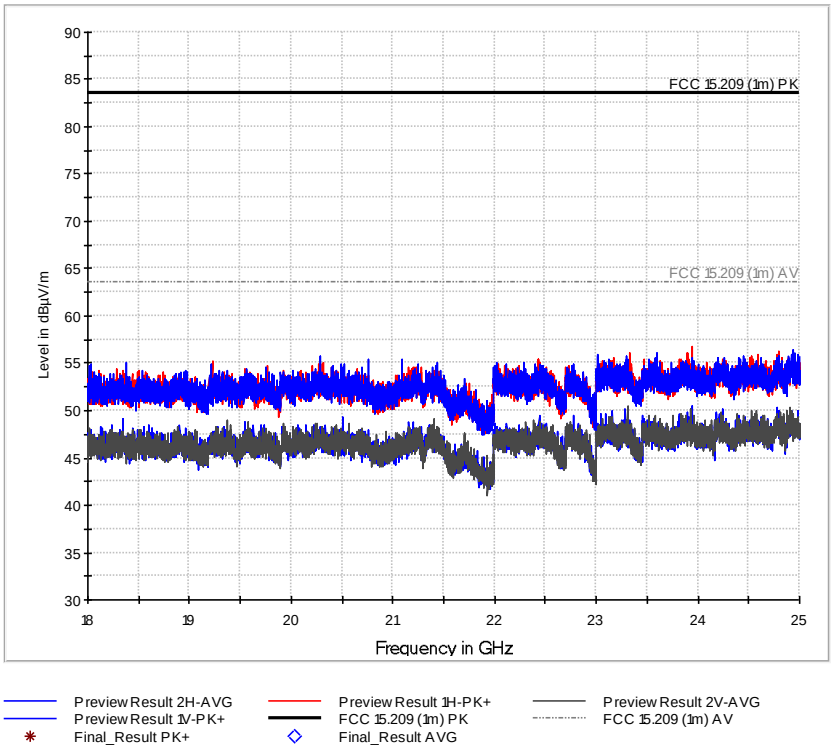
Note: #1: Emission within the frequency band



Final Results:

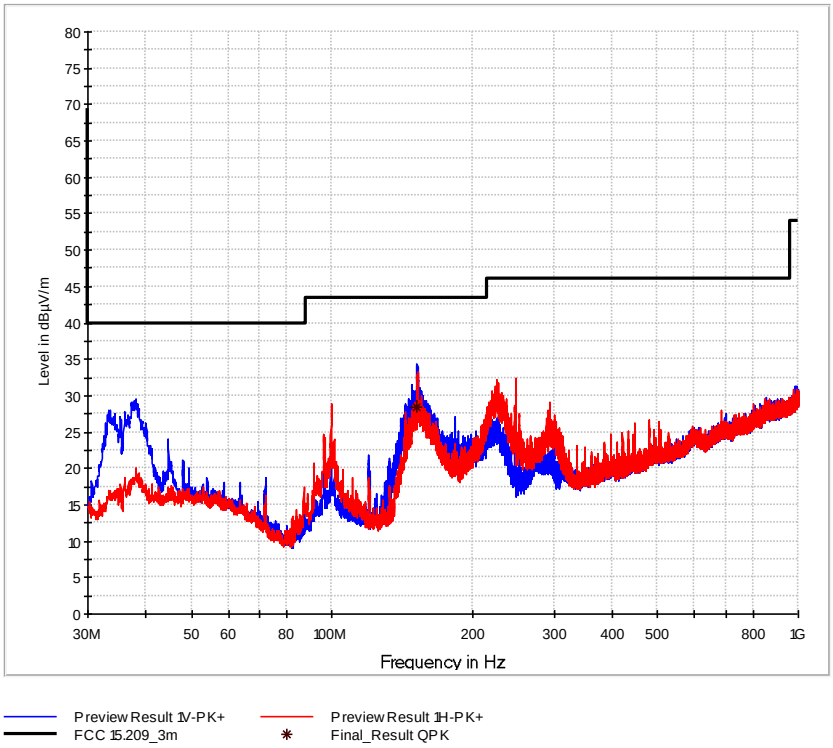
Frequency MHz	MaxPeak dBµV/m	CAverage dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
12857.750000	---	49.42	53.98	4.56	1000.0	1000.000	350.0	V	180.0	47.6




90
85
80
75
70
65
60
55
50
45
40
35
30
Level in dBµV/m
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
18
19
20
21
22
23
24
25
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

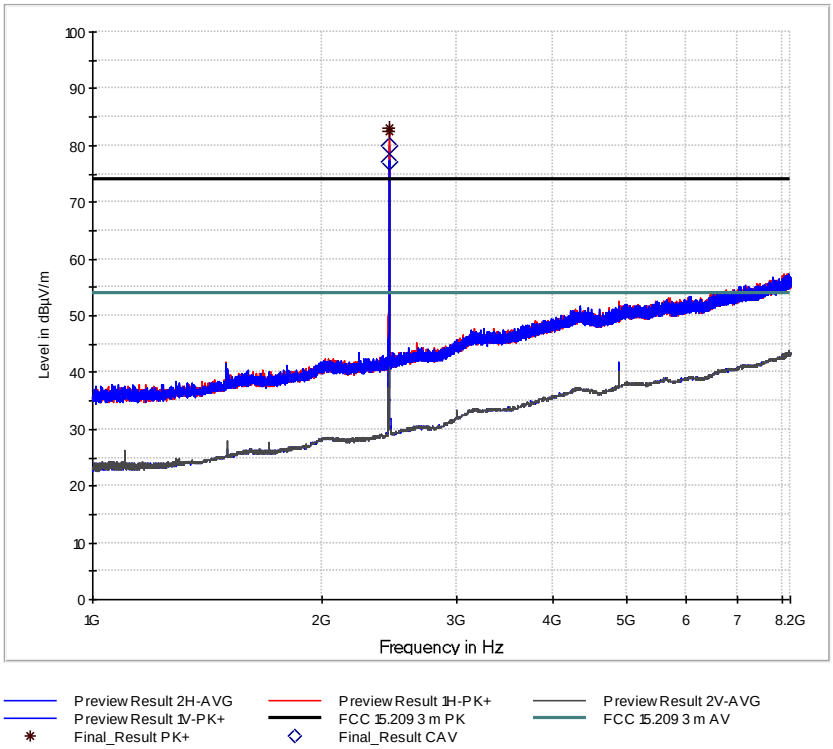
1.orthogonal axis, xz plane - channel 19



Final Results:

Frequency MHz	*QuasiPeak dBµV/m*	*Limit dBµV/m*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azimuth deg*	*Corr. dB*
152.550000	28.39	43.50	15.11	1000.0	120.000	104.0	V	-107.0	9.5

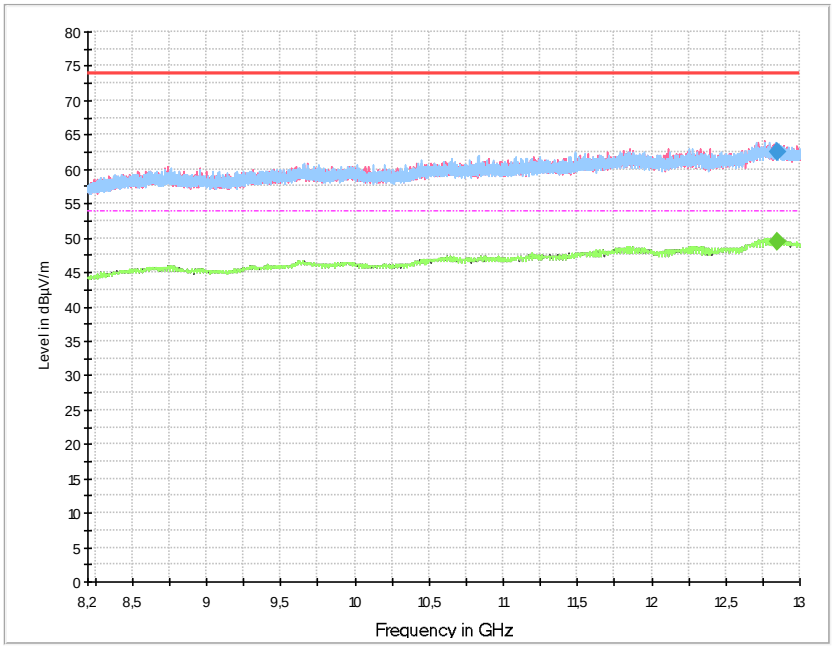
Product Service



Final Results:

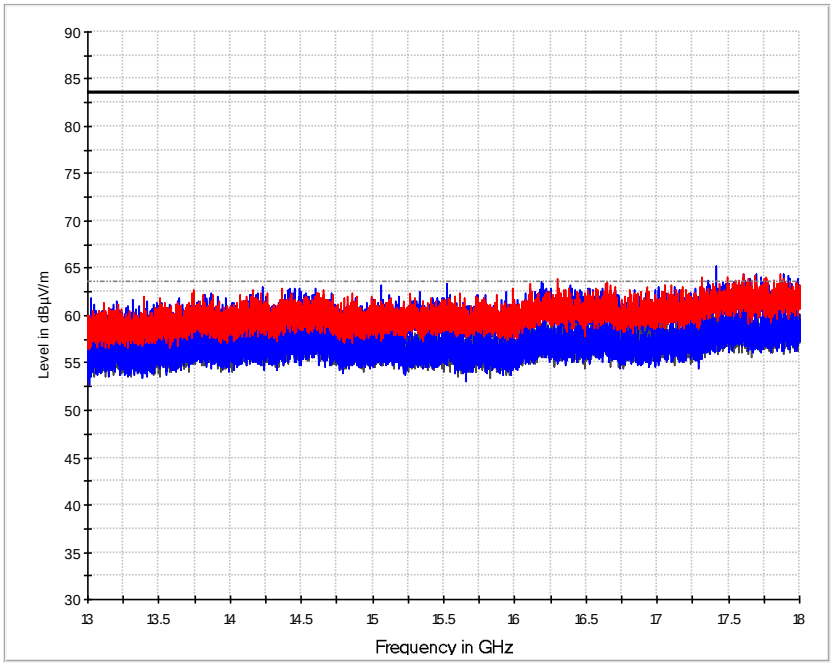
Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2444.500000	---	77.19	#1	#1	1000.0	1000.000	199.0	H	-19.0	33.0
2444.500000	83.10	---	#1	#1	1000.0	1000.000	199.0	H	-19.0	33.0
2445.000000	---	79.89	#1	#1	1000.0	1000.000	199.0	H	-19.0	33.0
2445.000000	82.39	---	#1	#1	1000.0	1000.000	199.0	H	-19.0	33.0

Note: #1: Emission within the frequency band

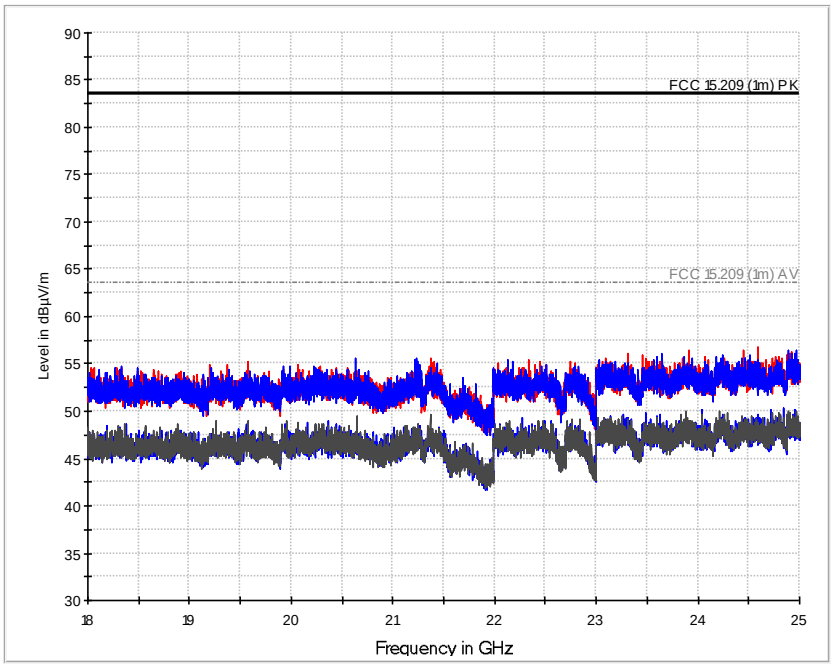


Final Results:

Frequency MHz	MaxPeak dBµV/m	CAverage dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
12852.000000	---	49.45	53.98	4.53	1000.0	1000.000	387.0	H	113.0	47.6
12852.000000	62.48	---	73.98	11.50	1000.0	1000.000	387.0	H	113.0	47.6



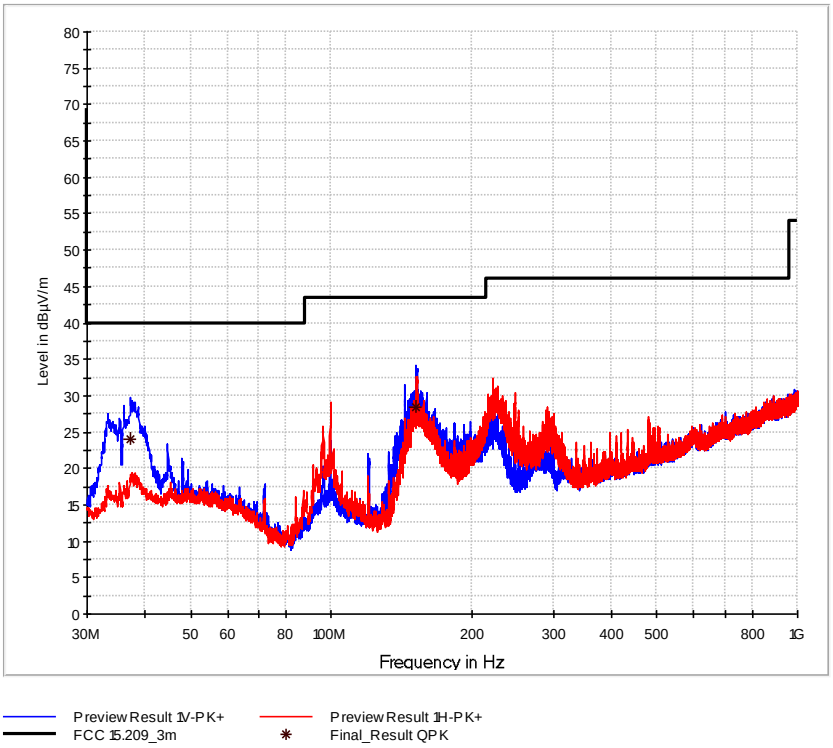
Preview Result 2V-AVG
Preview Result 1V-PK+
Preview Result 2H-AVG
Preview Result 1H-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG



Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG

Product Service

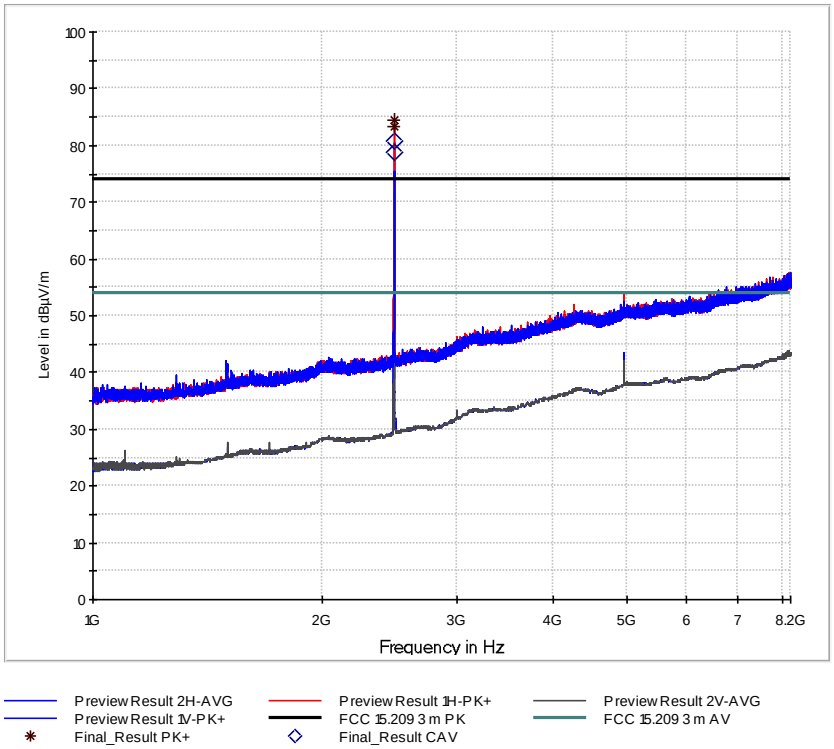
1.orthogonal axis, xz plane - channel 26



Final Results:

Frequency MHz	*QuasiPeak dBµV/m*	*Limit dBµV/m*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azimuth deg*	*Corr. dB*
37.245000	23.99	40.00	16.01	1000.0	120.000	103.0	V	-142.0	12.1
152.565000	28.37	43.50	15.13	1000.0	120.000	103.0	V	-114.0	9.5

Product Service

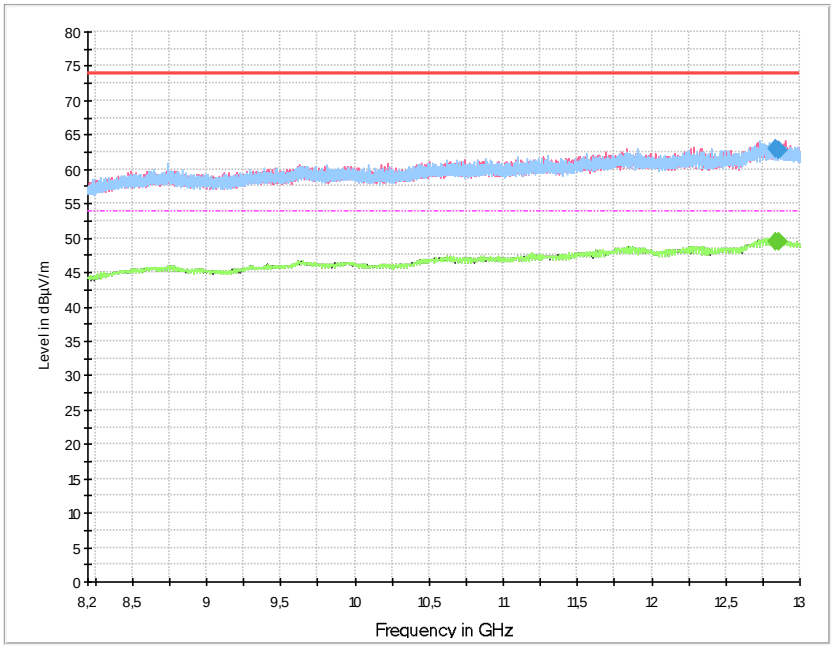


Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2480.000000	---	80.88	#1	#1	1000.0	1000.000	211.0	H	-34.0	33.3
2480.000000	83.38	---	#1	#1	1000.0	1000.000	211.0	H	-34.0	33.3
2480.500000	---	78.76	#1	#1	1000.0	1000.000	214.0	H	-36.0	33.3
2480.500000	84.39	---	#1	#1	1000.0	1000.000	214.0	H	-36.0	33.3

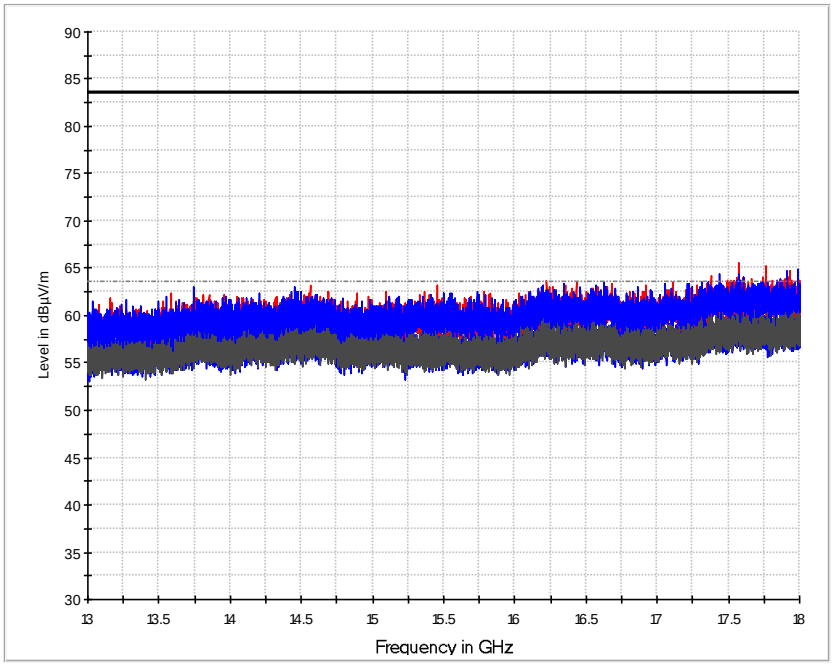
Note: #1: Emission within the frequency band

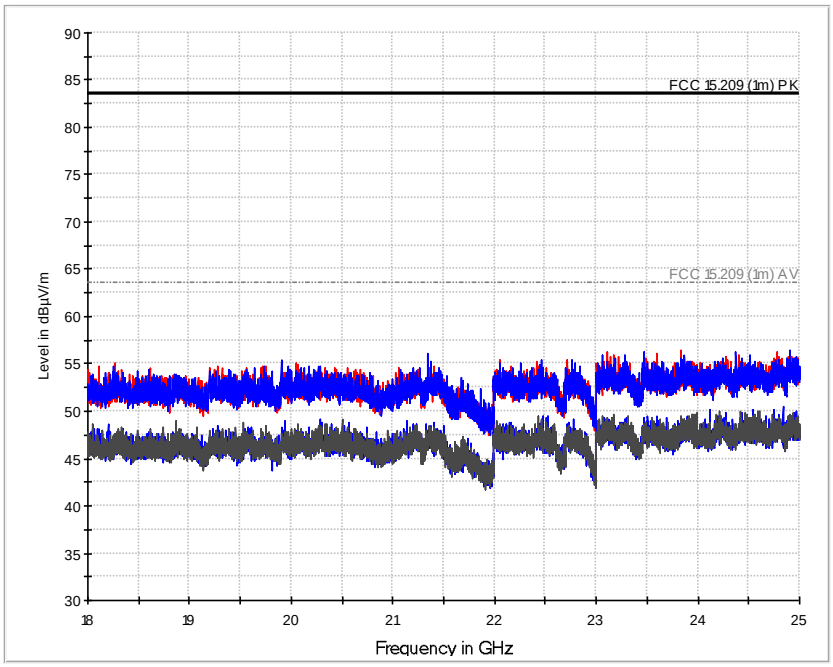
Product Service



Final Results:

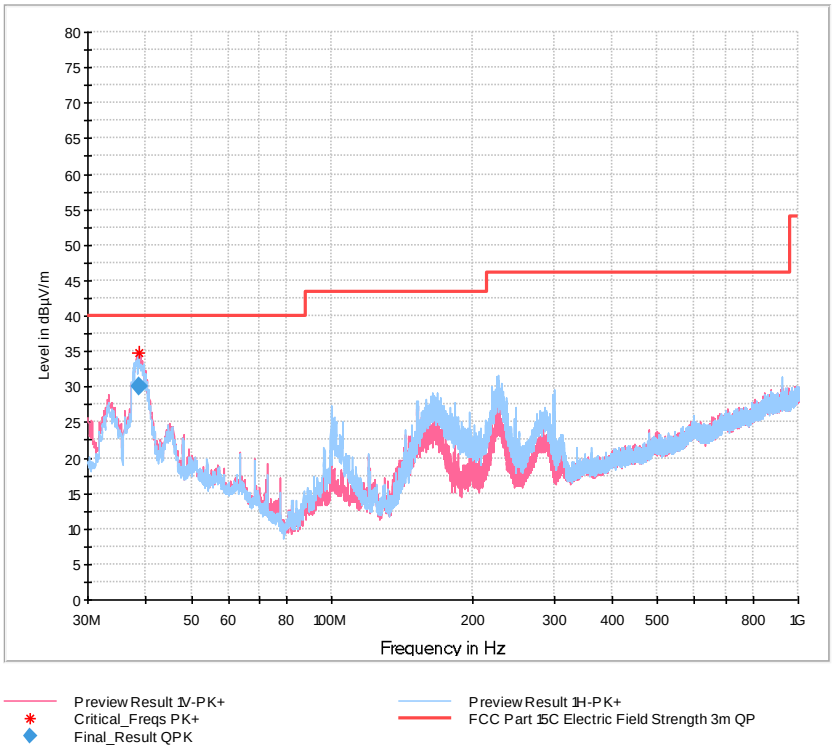
Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
12842.250000	63.05	---	73.98	10.93	1000.0	1000.000	325.0	H	132.0	47.6
12842.250000	---	49.47	53.98	4.51	1000.0	1000.000	325.0	H	132.0	47.6
12857.000000	62.78	---	73.98	11.20	1000.0	1000.000	325.0	H	-104.0	47.6
12857.000000	---	49.41	53.98	4.57	1000.0	1000.000	325.0	H	-104.0	47.6


Level in dBµV/m
Frequency in GHz
Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG


FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Level in dBµV/m
Frequency in GHz
Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG

Product Service

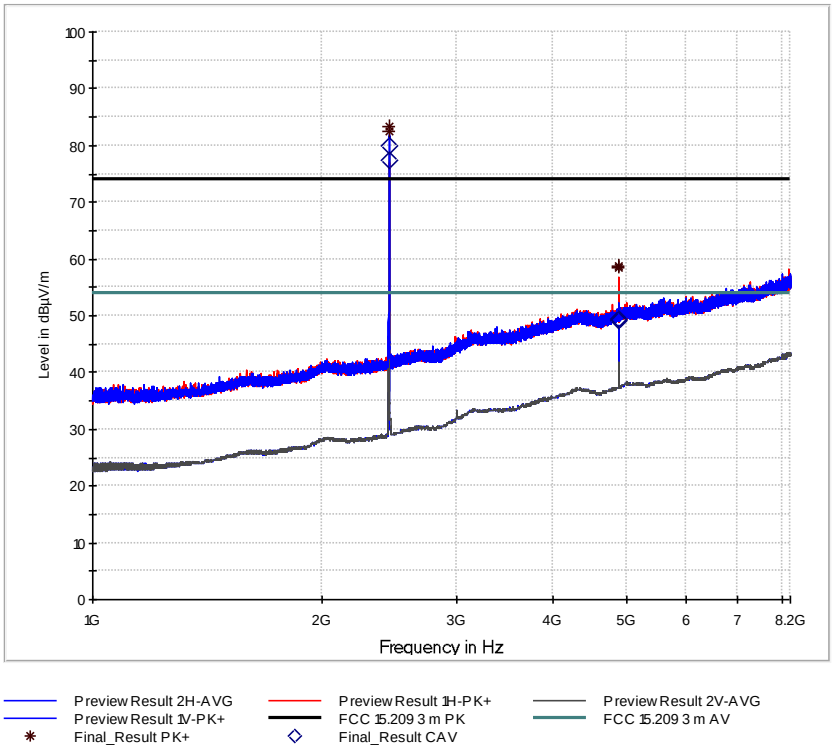
2.orthogonal axis, xy plane - channel 12



Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
38.550000	30.10	40.00	9.90	1000.0	120.000	115.0	V	116.0	12.4

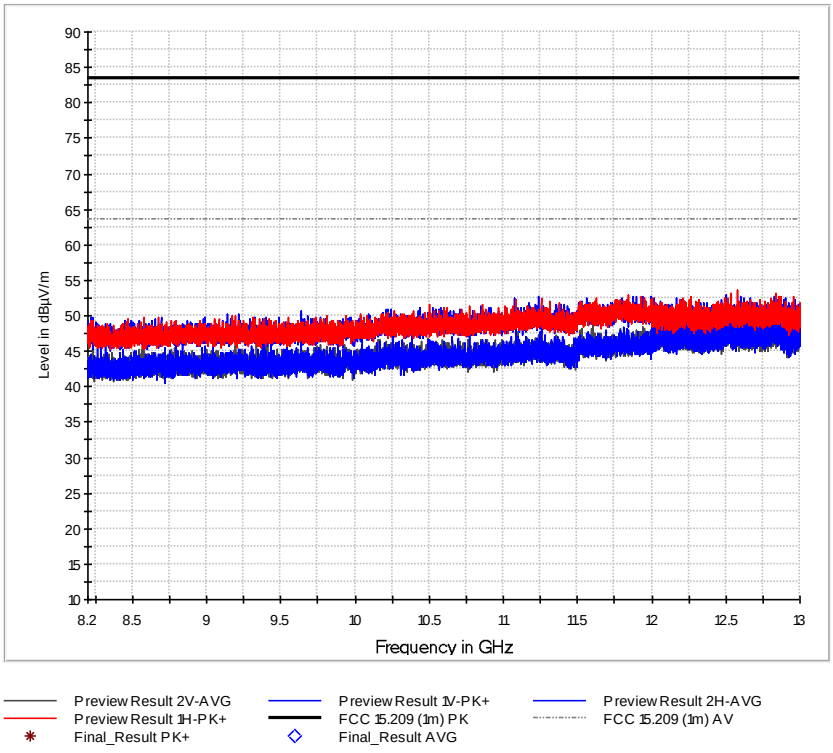
Product Service

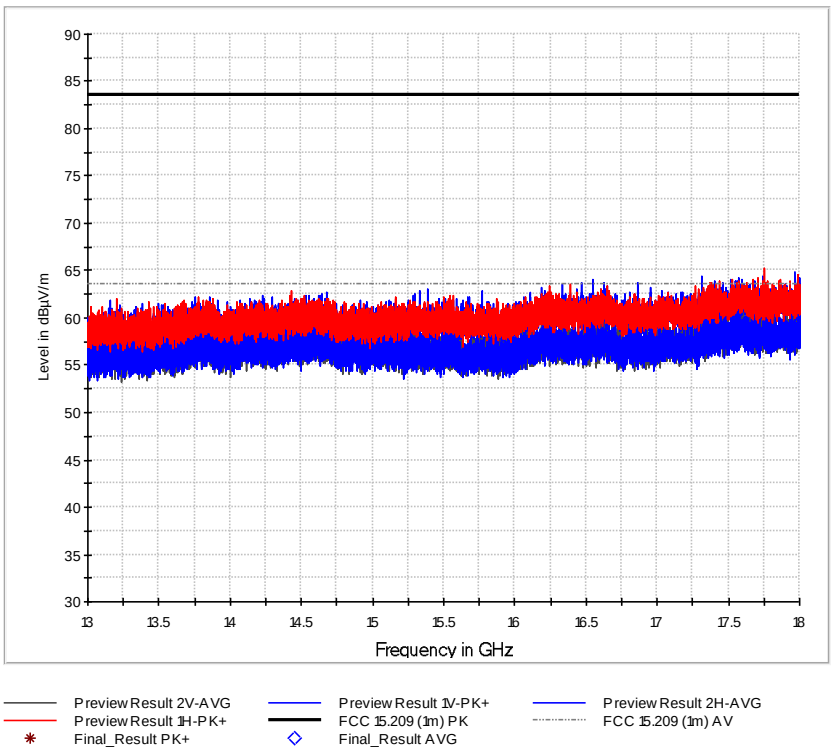


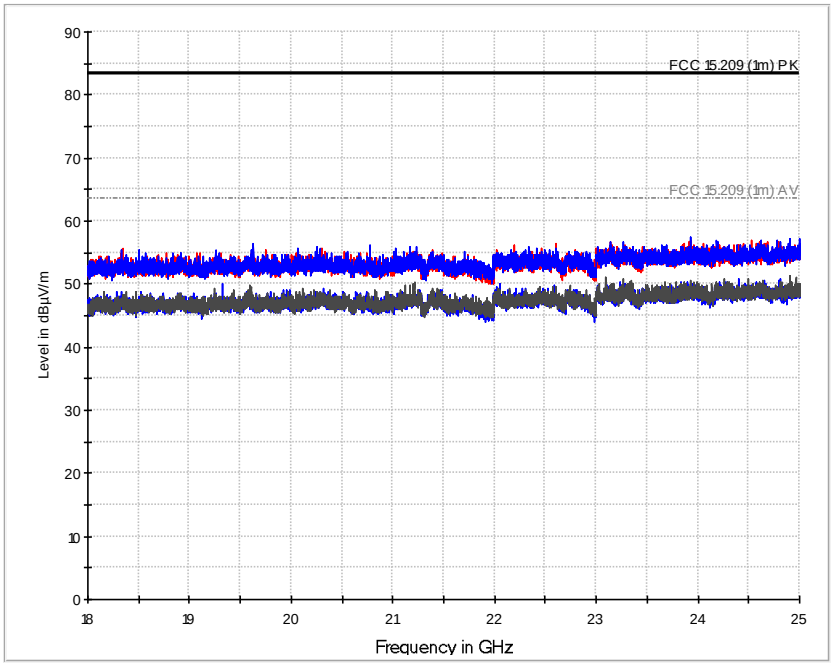
Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2444.500000	83.44	---	#1	#1	1000.0	1000.000	303.0	V	141.0	33.0
2444.500000	---	77.49	#1	#1	1000.0	1000.000	303.0	V	141.0	33.0
2445.000000	82.58	---	#1	#1	1000.0	1000.000	303.0	V	144.0	33.0
2445.000000	---	80.06	#1	#1	1000.0	1000.000	303.0	V	144.0	33.0
4889.000000	58.55	---	73.97	15.42	1000.0	1000.000	198.0	H	-1.0	40.9
4889.000000	---	49.12	53.98	4.86	1000.0	1000.000	198.0	H	-1.0	40.9
4891.000000	58.64	---	73.97	15.33	1000.0	1000.000	198.0	H	5.0	40.9
4891.000000	---	49.51	53.98	4.47	1000.0	1000.000	198.0	H	5.0	40.9

Note: #1: Emission within the frequency band

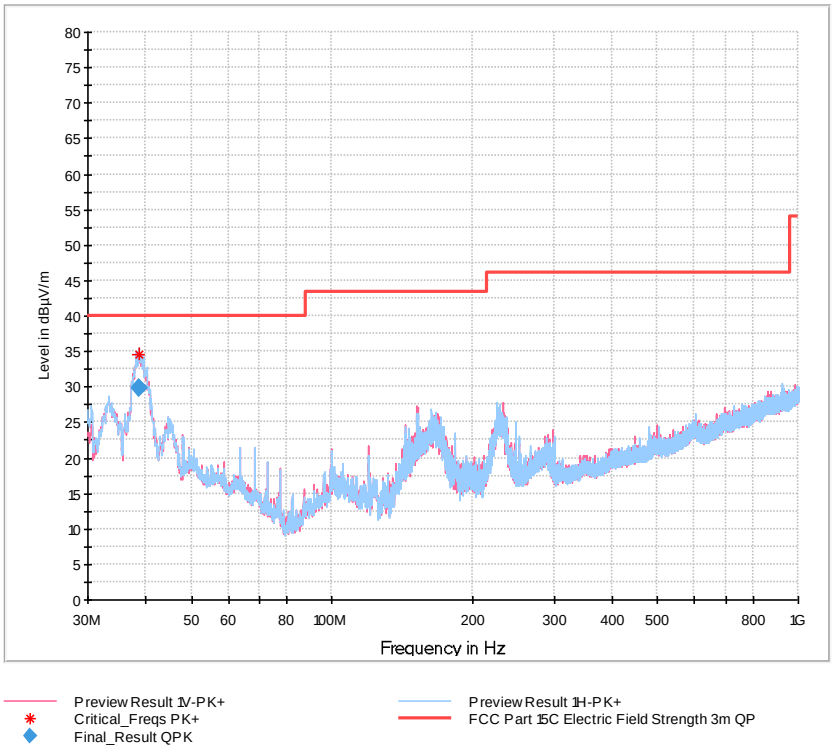

Level in dBµV/m
Frequency in GHz
Preview Result 2V-AVG
Preview Result 1H-PK+
Final_Result PK+
Preview Result 1V-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2H-AVG
FCC 15.209 (1m) AV


Level in dBµV/m
Frequency in GHz
Preview Result 2V-AVG
Preview Result 1H-PK+
Final_Result PK+
Preview Result 1V-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2H-AVG
FCC 15.209 (1m) AV


FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Level in dBµV/m
Frequency in GHz
90
80
70
60
50
40
30
20
10
0
18
19
20
21
22
23
24
25
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

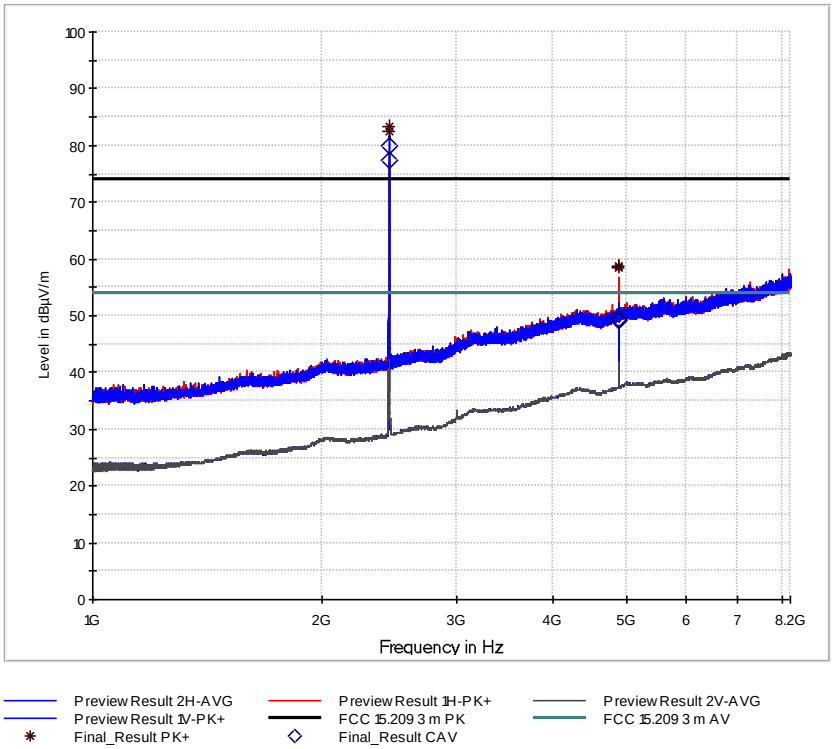
2.orthogonal axis, xy plane - channel 19



Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
38.550000	29.91	40.00	10.09	1000.0	120.000	144.0	H	-115.0	12.4

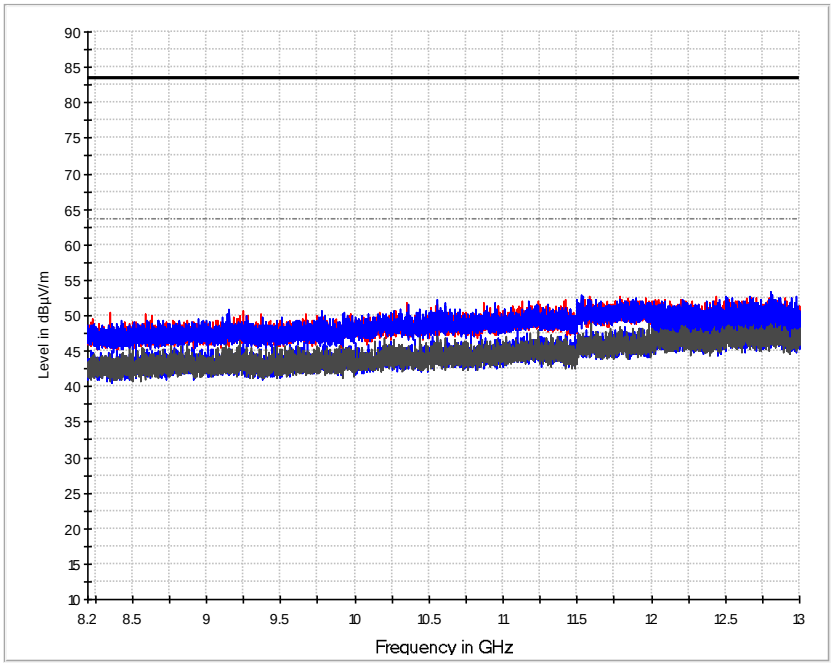
Product Service

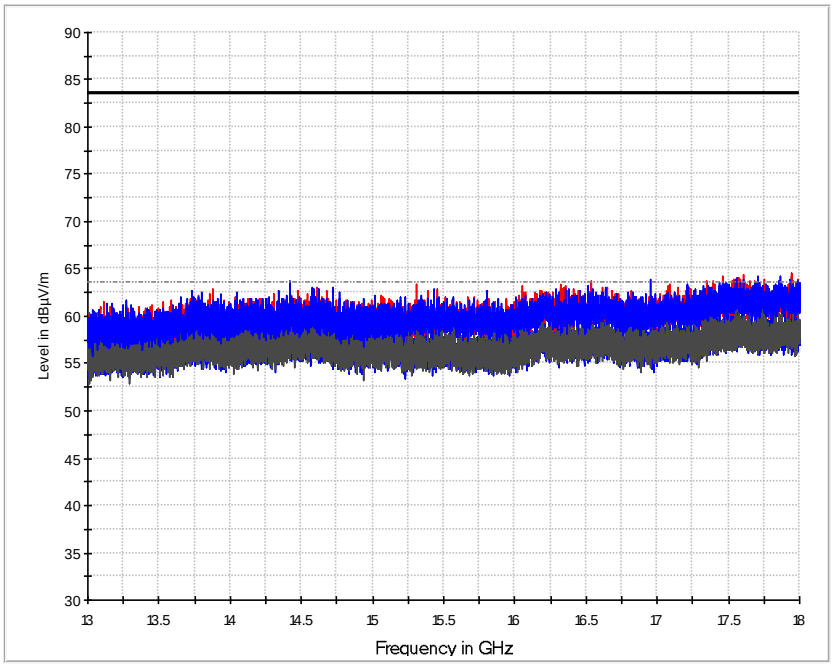


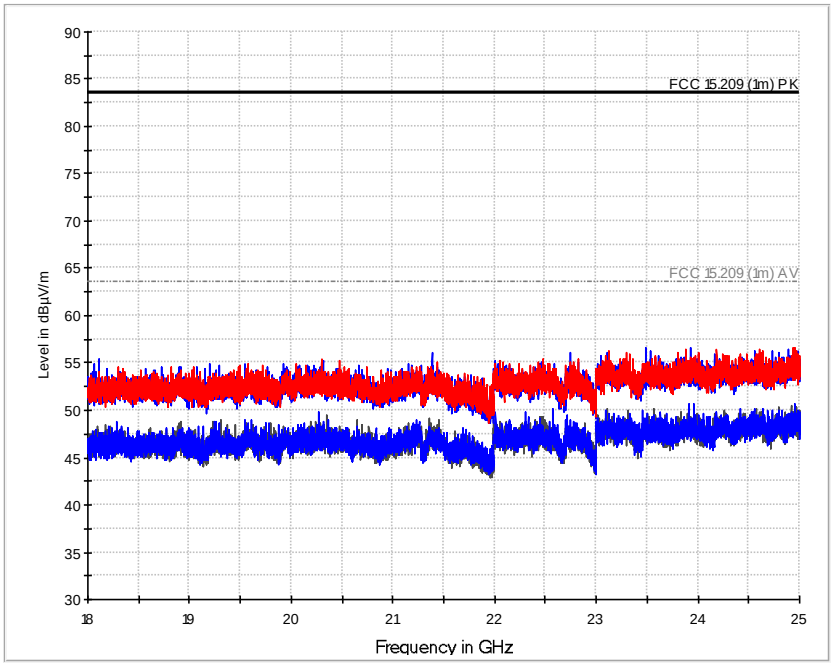
Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2444.500000	83.44	---	#1	#1	1000.0	1000.000	303.0	V	141.0	33.0
2444.500000	---	77.49	#1	#1	1000.0	1000.000	303.0	V	141.0	33.0
2445.000000	82.58	---	#1	#1	1000.0	1000.000	303.0	V	144.0	33.0
2445.000000	---	80.06	#1	#1	1000.0	1000.000	303.0	V	144.0	33.0
4889.000000	58.55	---	73.97	15.42	1000.0	1000.000	198.0	H	-1.0	40.9
4889.000000	---	49.12	53.98	4.86	1000.0	1000.000	198.0	H	-1.0	40.9
4891.000000	58.64	---	73.97	15.33	1000.0	1000.000	198.0	H	5.0	40.9
4891.000000	---	49.51	53.98	4.47	1000.0	1000.000	198.0	H	5.0	40.9

Note: #1: Emission within the frequency band

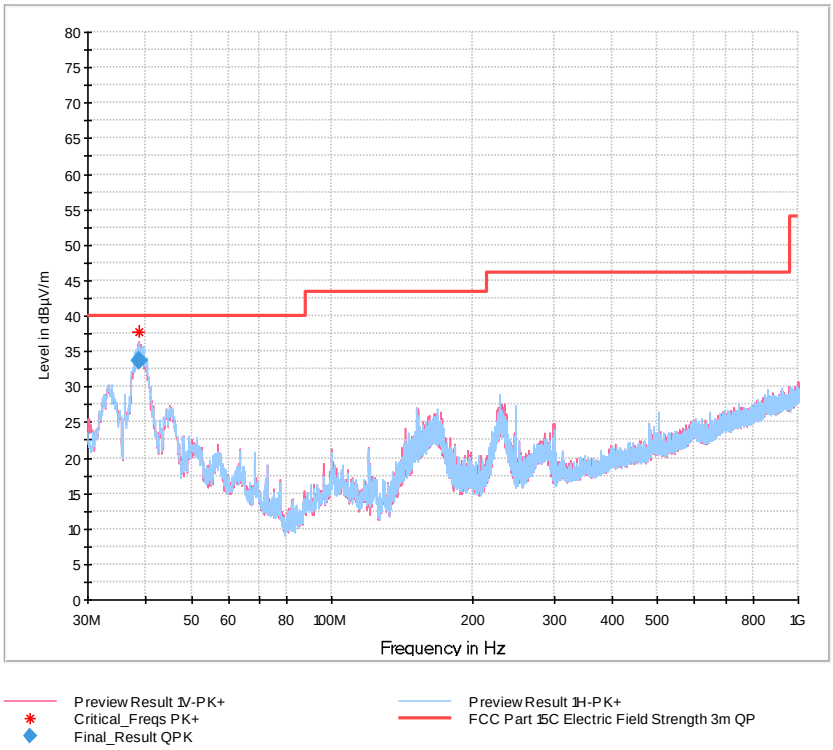

Level in dBµV/m
Frequency in GHz
Preview Result 2H-AVG
Preview Result 1V-PK+
Final_Result PK+
Preview Result 1H-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2V-AVG
FCC 15.209 (1m) AV


Level in dBµV/m
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


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

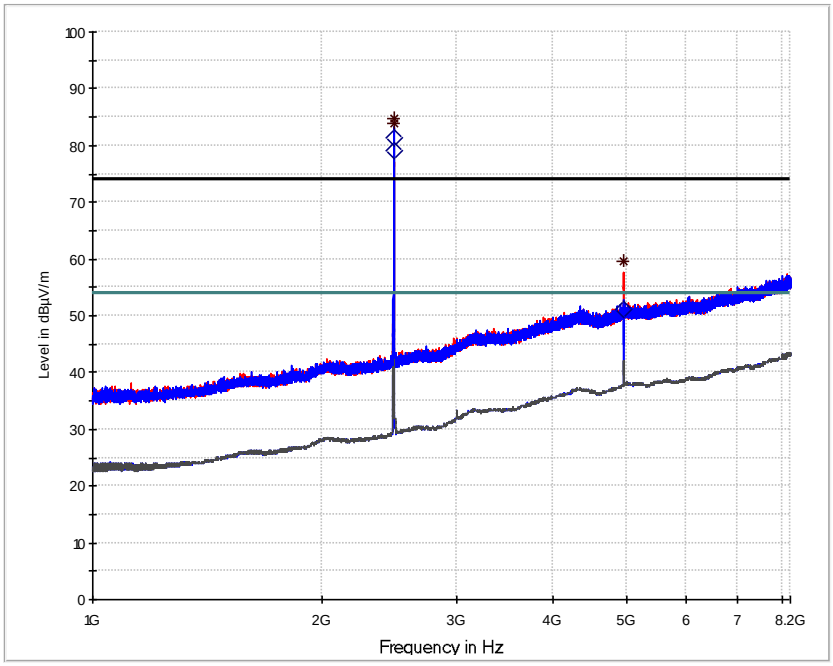
Product Service

2.orthogonal axis, xy plane - channel 26



Final Results:

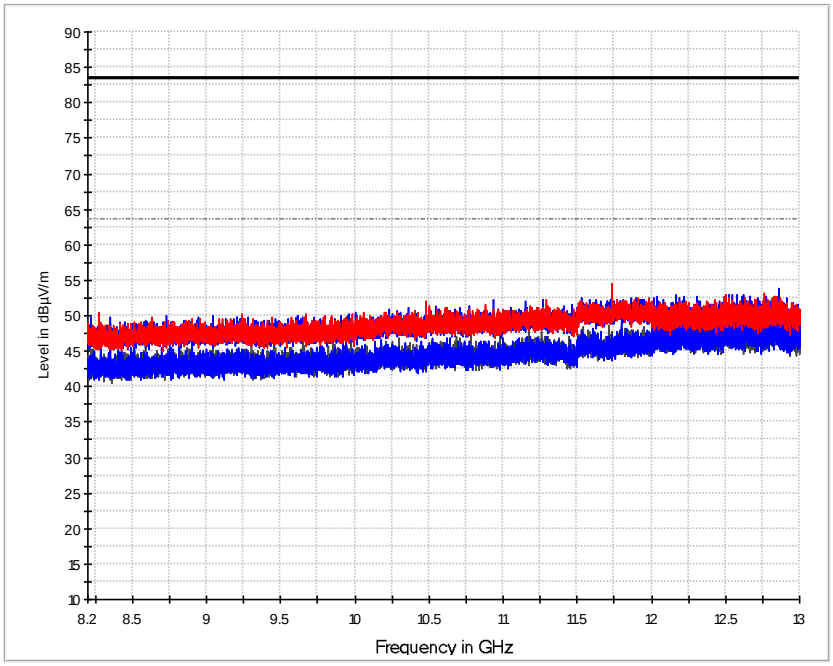
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
38.610000	33.76	40.00	6.24	1000.0	120.000	100.0	V	186.0	12.4

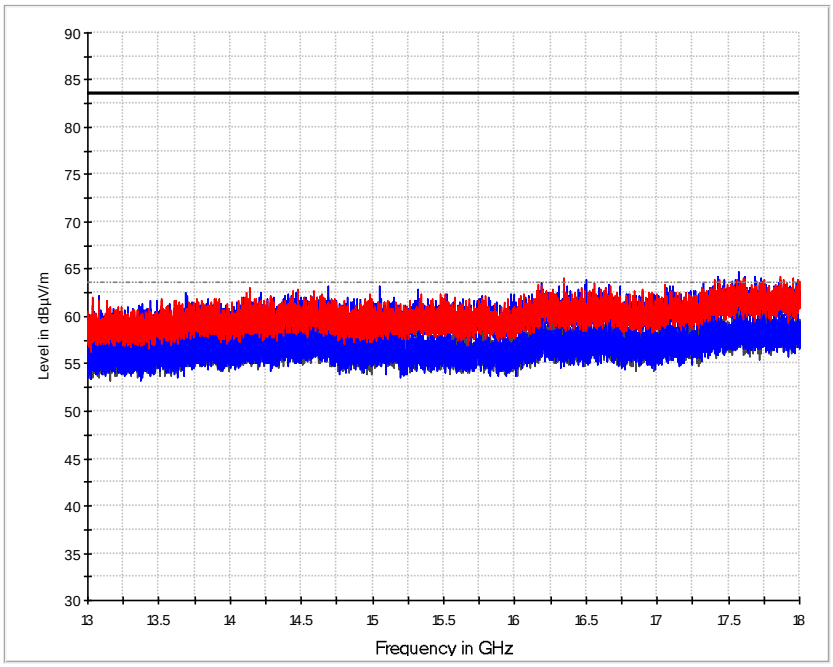


Final Results:

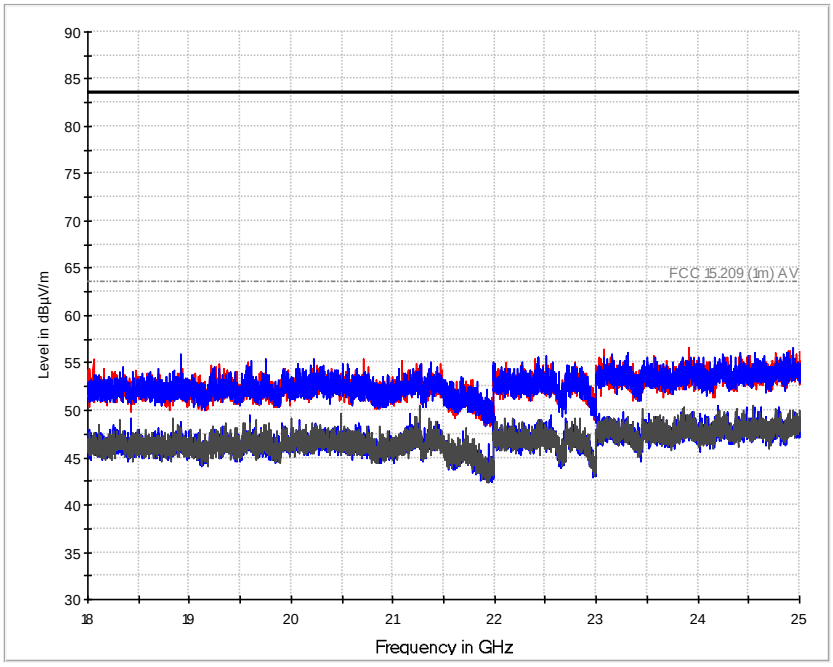
Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2480.000000	83.78	---	#1	#1	1000.0	1000.000	306.0	V	141.0	33.3
2480.000000	---	81.30	#1	#1	1000.0	1000.000	306.0	V	141.0	33.3
2480.500000	84.70	---	#1	#1	1000.0	1000.000	304.0	V	142.0	33.3
2480.500000	---	79.09	#1	#1	1000.0	1000.000	304.0	V	142.0	33.3
4961.000000	---	51.23	53.98	2.75	1000.0	1000.000	192.0	H	4.0	41.0
4961.000000	59.73	---	73.97	14.24	1000.0	1000.000	192.0	H	4.0	41.0

Note: #1: Emission within the frequency band


Level in dBµV/m
Frequency in GHz
Preview Result 2V-AVG
Preview Result 1V-PK+
Preview Result 2H-AVG
Preview Result 1H-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG

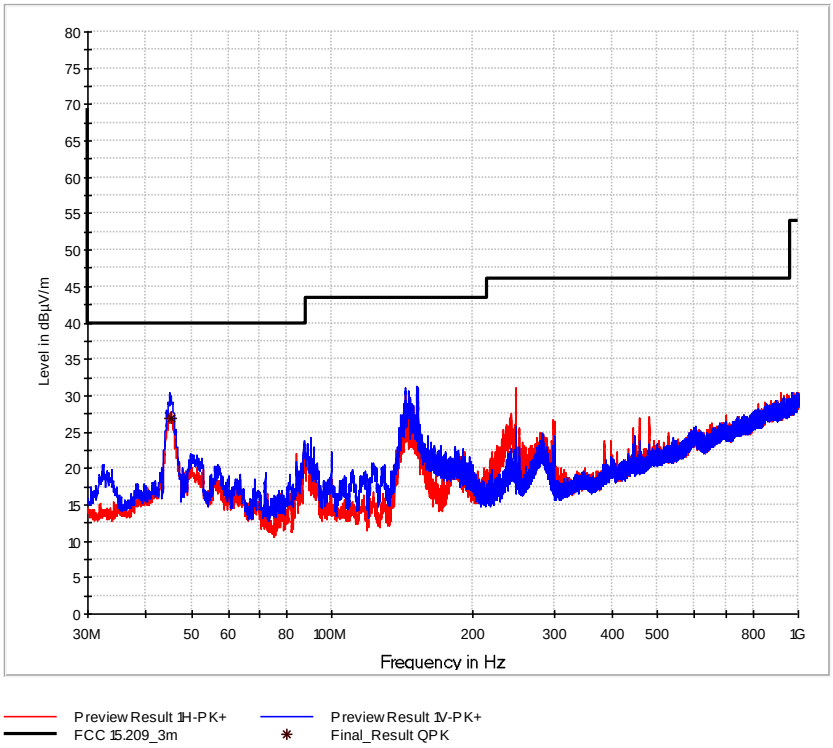

Level in dBµV/m
Frequency in GHz
Preview Result 2V-AVG
Preview Result 1V-PK+
Preview Result 2H-AVG
Preview Result 1H-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG

Product Service



Product Service

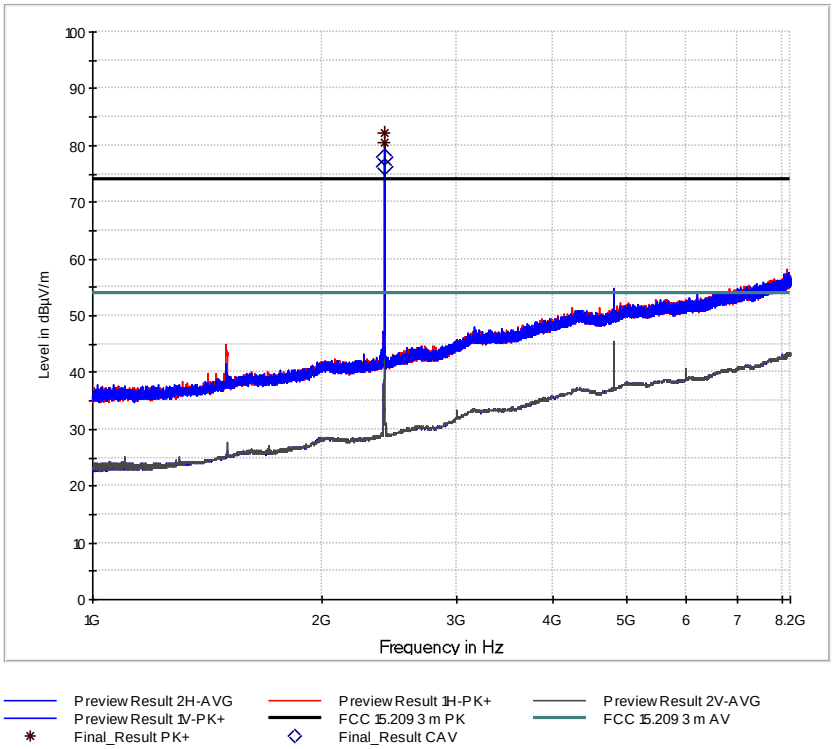
3.orthogonal axis, yz plane - channel 12



Final Results:

Frequency MHz	*QuasiPeak dBµV/m*	*Limit dBµV/m*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azimuth deg*	*Corr. dB*
45.150000	26.96	40.00	13.04	1000.0	120.000	100.0	V	8.0	14.3

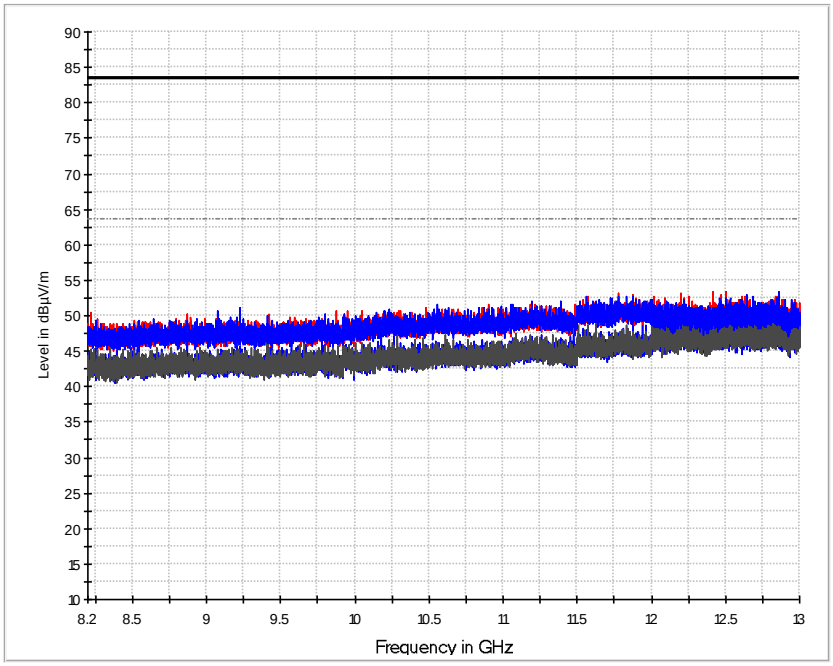
Product Service

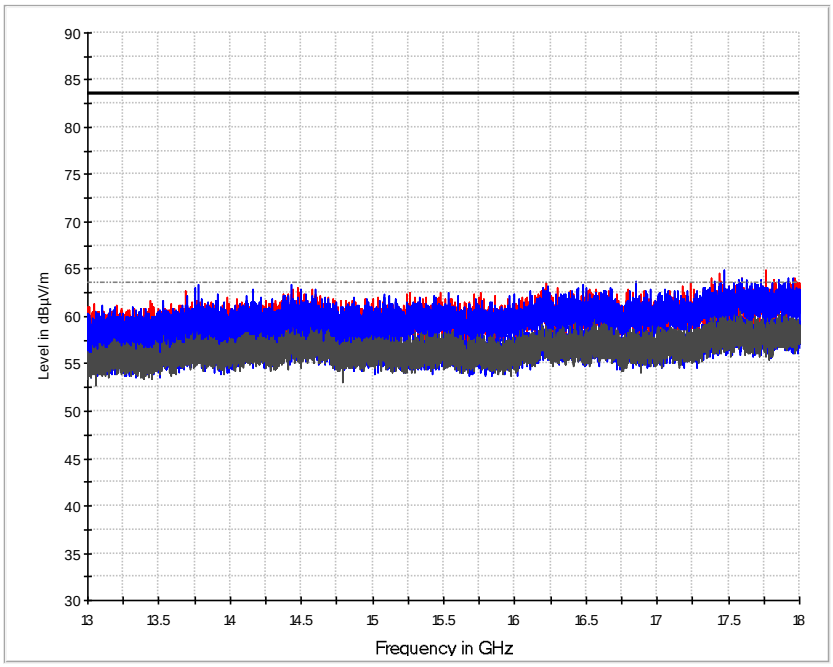


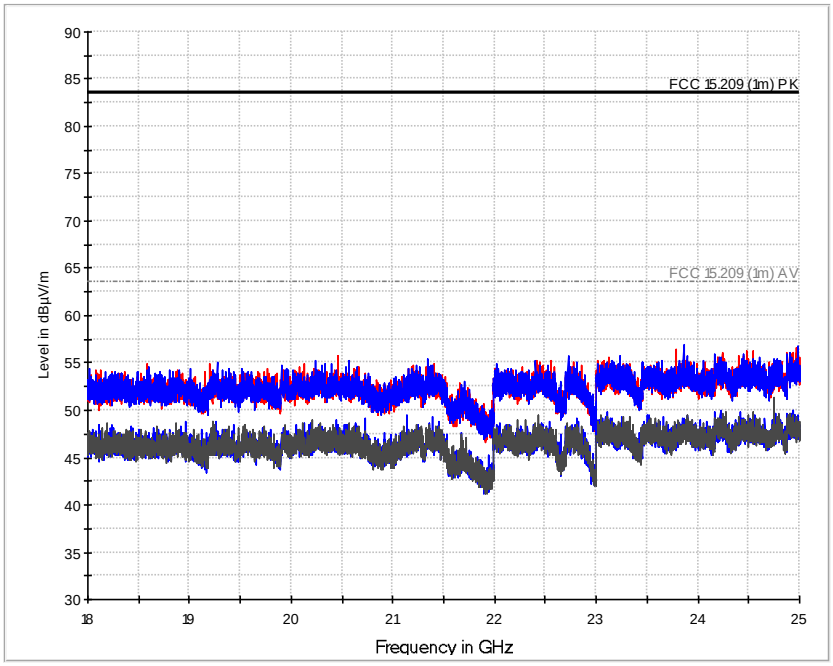
Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2409.500000	82.12	---	#1	#1	1000.0	1000.000	311.0	H	-163.0	32.8
2409.500000	---	76.17	#1	#1	1000.0	1000.000	311.0	H	-163.0	32.8
2410.000000	80.61	---	#1	#1	1000.0	1000.000	254.0	H	-165.0	32.8
2410.000000	---	78.09	#1	#1	1000.0	1000.000	254.0	H	-165.0	32.8

Note: #1: Emission within the frequency band

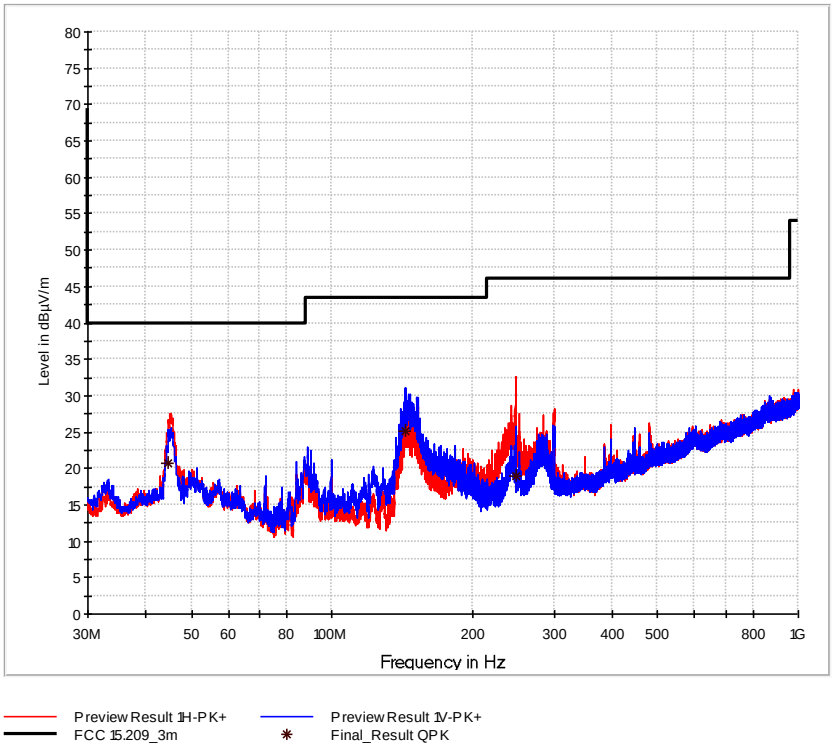

Level in dBµV/m
Frequency in GHz
Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG


Level in dBµV/m
Frequency in GHz
Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG


90
85
80
75
70
65
60
55
50
45
40
35
30
Level in dBµV/m
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
18
19
20
21
22
23
24
25
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

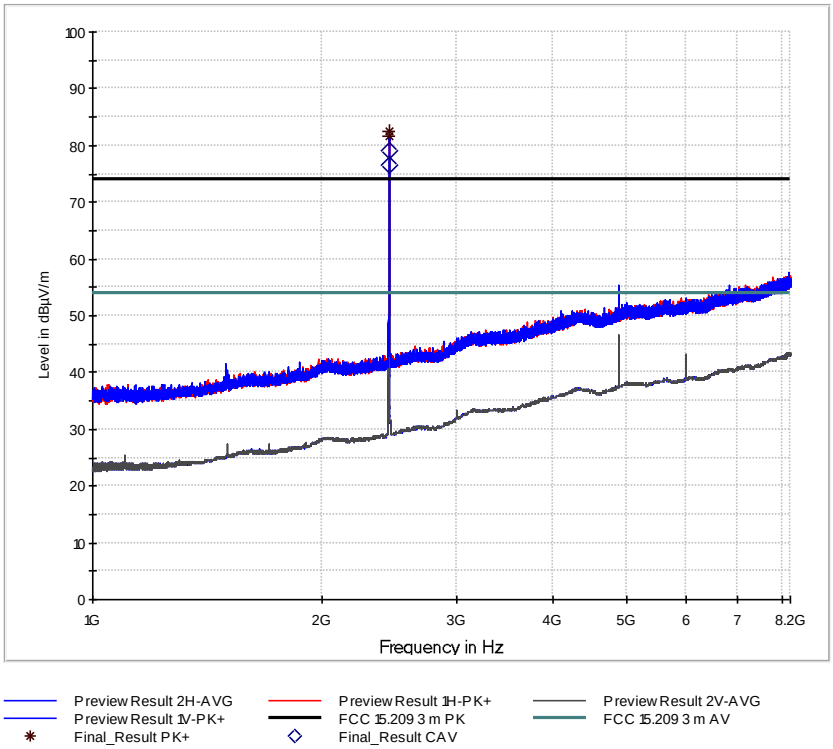
3.orthogonal axis, yz plane - channel 19



Final Results:

Frequency MHz	*QuasiPeak dBµV/m*	*Limit dBµV/m*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azimuth deg*	*Corr. dB*
44.695000	20.66	40.00	19.34	1000.0	120.000	140.0	H	51.0	14.3
143.980000	25.13	43.50	18.37	1000.0	120.000	106.0	V	82.0	9.3
247.980000	19.02	46.00	26.98	1000.0	120.000	104.0	H	175.0	14.2

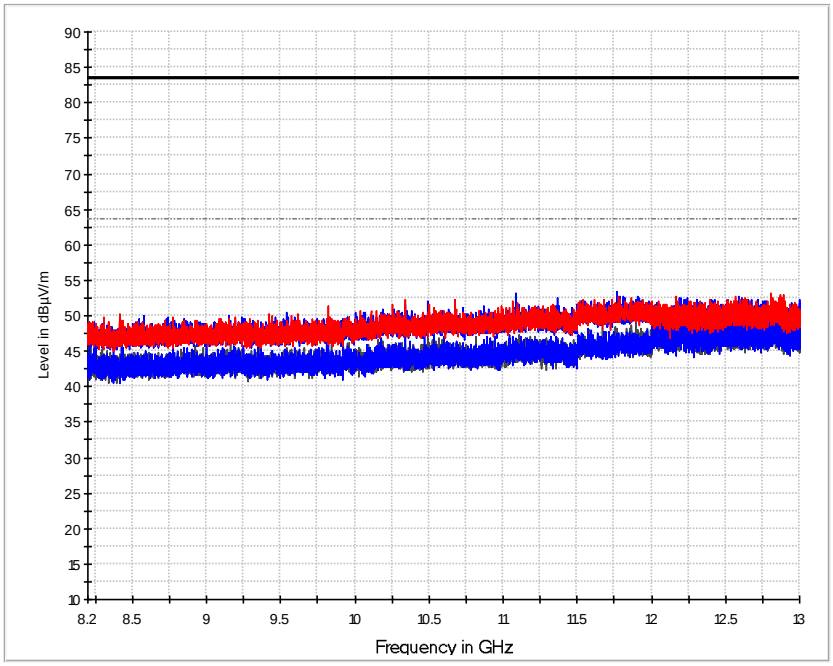
Product Service

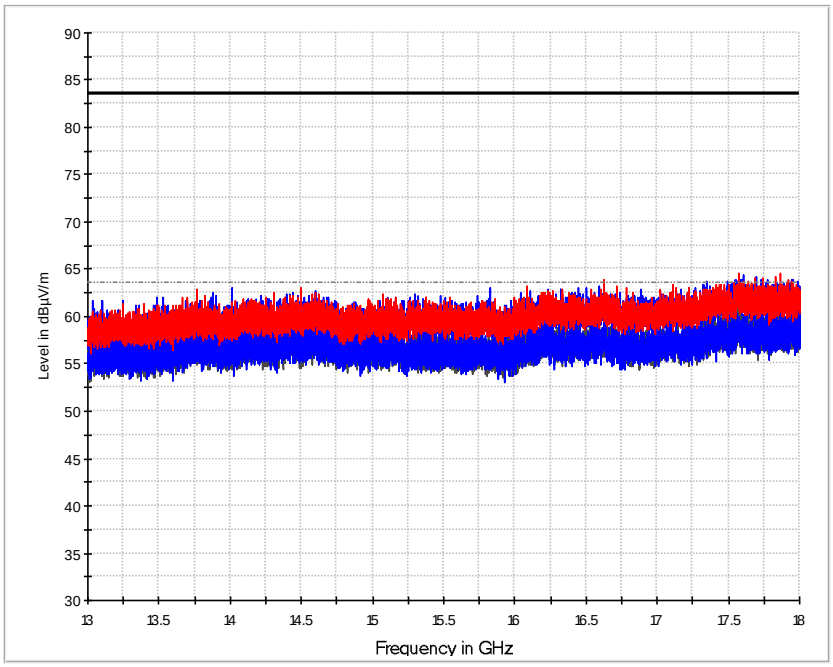


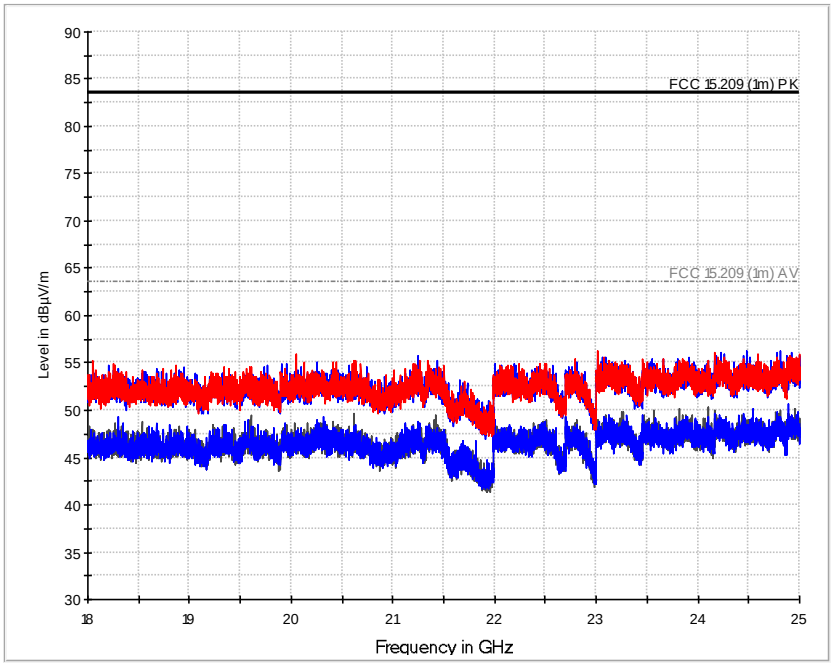
Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2444.500000	---	76.46	#1	#1	1000.0	1000.000	279.0	V	-90.0	33.0
2444.500000	82.39	---	#1	#1	1000.0	1000.000	279.0	V	-90.0	33.0
2445.000000	---	79.19	#1	#1	1000.0	1000.000	279.0	V	-91.0	33.0
2445.000000	81.70	---	#1	#1	1000.0	1000.000	279.0	V	-91.0	33.0

Note: #1: Emission within the frequency band

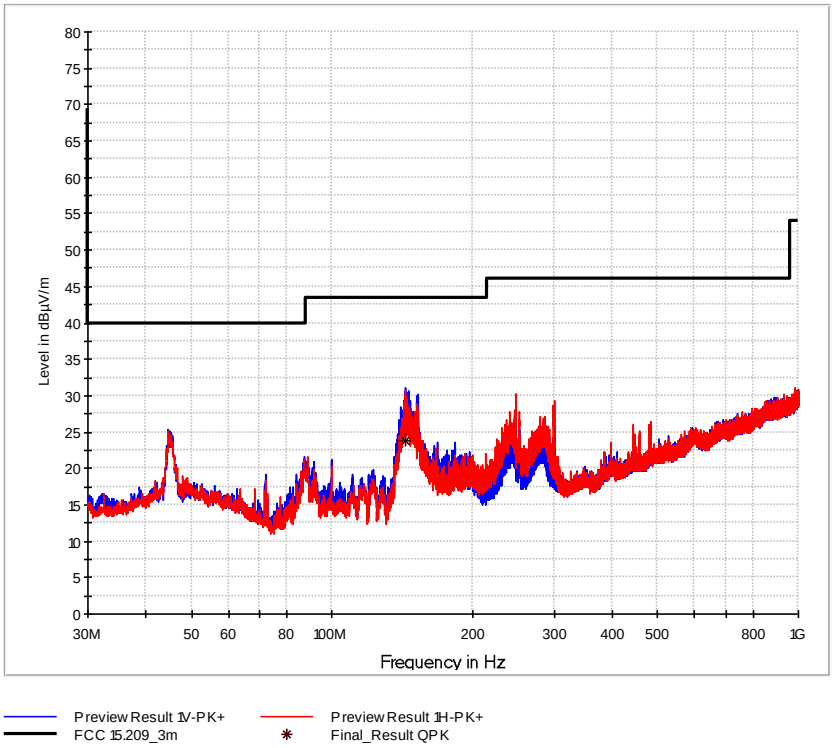

Level in dBµV/m
Frequency in GHz
Preview Result 2V-AVG
Preview Result 1H-PK+
Final_Result PK+
Preview Result 1V-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2H-AVG
FCC 15.209 (1m) AV


Level in dBµV/m
Frequency in GHz
Preview Result 2V-AVG
Preview Result 1H-PK+
Final_Result PK+
Preview Result 1V-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2H-AVG
FCC 15.209 (1m) AV


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

Product Service

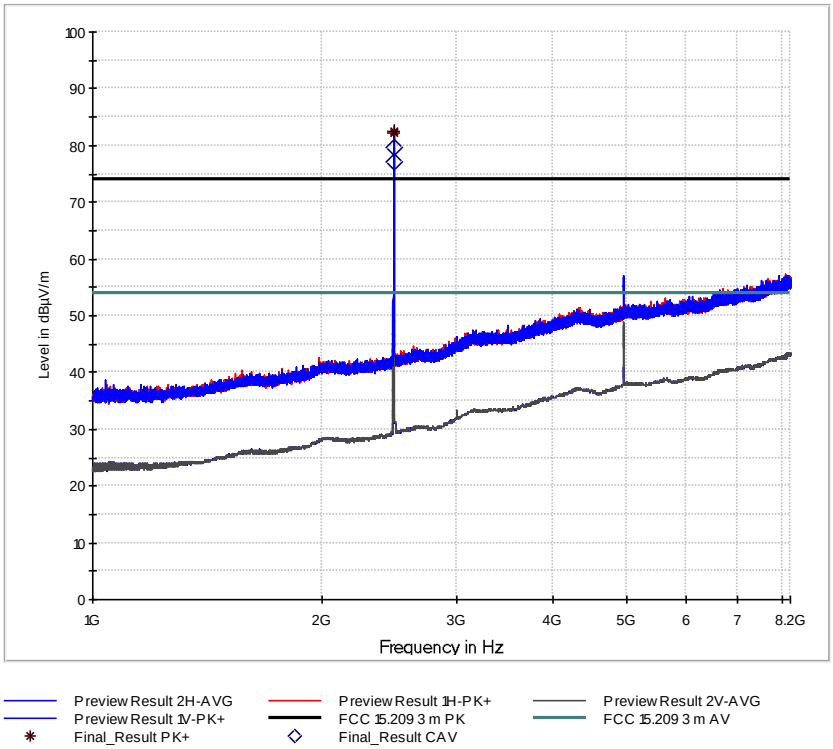
3.orthogonal axis, yz plane - channel 26



Final Results:

Frequency MHz	*QuasiPeak dBµV/m*	*Limit dBµV/m*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azimuth deg*	*Corr. dB*
143.750000	23.89	43.50	19.61	1000.0	120.000	111.0	V	-18.0	9.3

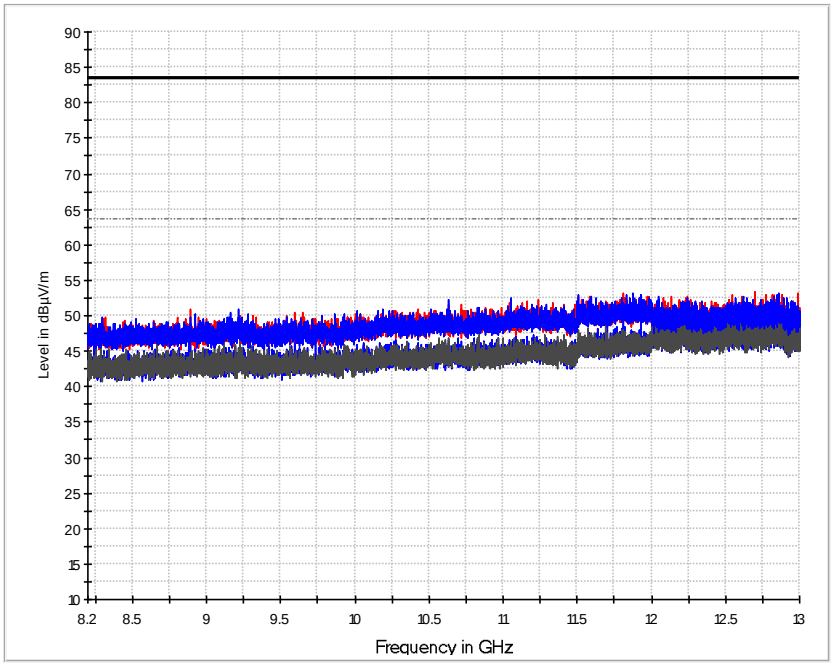
Product Service

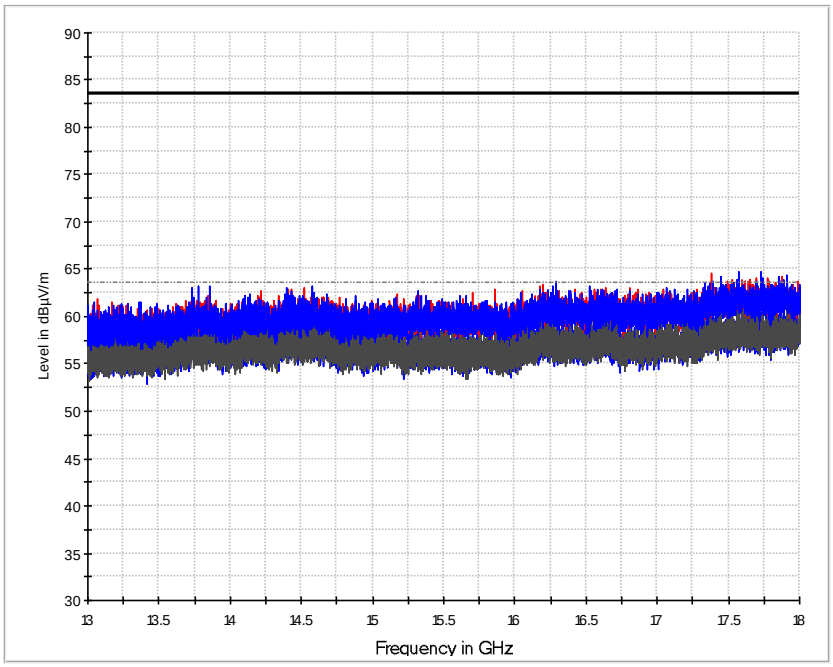


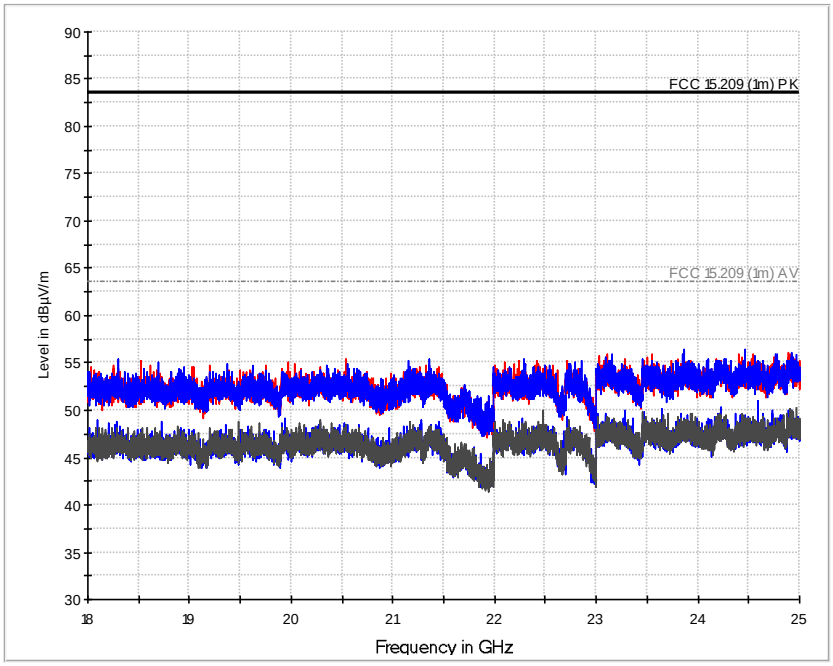
Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2480.000000	---	79.68	#1	#1	1000.0	1000.000	375.0	V	-89.0	33.3
2480.000000	82.17	---	#1	#1	1000.0	1000.000	375.0	V	-89.0	33.3
2480.500000	---	76.99	#1	#1	1000.0	1000.000	378.0	V	-88.0	33.3
2480.500000	82.61	---	#1	#1	1000.0	1000.000	378.0	V	-88.0	33.3

Note: #1: Emission within the frequency band


Level in dBµV/m
Frequency in GHz
Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG


Level in dBµV/m
Frequency in GHz
Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Final_Result PK+
Final_Result AVG


90
85
80
75
70
65
60
55
50
45
40
35
30
Level in dBµV/m
18
19
20
21
22
23
24
25
Frequency in GHz
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
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)

ISED 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

Radiated Tests were carried out in FAR No.8

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	202020-02-29
TRILOG Antenna	Schwarzbeck	VULB 9163	19691	24	2020-12-31
Horn Antenna	Rohde&Schwarz	HF907	19933	24	2021-07-31
Semi Anechoic Room	Albatross	Cabin No. 8	19917	36	2020-09-30
Horn antenna	EMCO	3160-09	19125	---	---
EMC measurement softwareEMC measurement software	Rohde&Schwarz	EMC32-MEBEMC32-MEB	19927	------	------

Table 6

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

Product Service

2.2 Restricted Band Edges

2.2.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.205 N/A and 8.10

2.2.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55882 - Modification State 0

2.2.3 Date of Test

2019-08-21 to 2019-09-03

2.2.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.10.5.

Plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3. These are shown for information purposes and were used to determine the worst case measurement point. Final average measurements were then taken in accordance with ANSI C63.10 clause 4.1.4.2.2. to obtain the measurement result recorded in the test results tables.

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

2.2.5 Environmental Conditions

Ambient Temperature	25.0 °C
Relative Humidity	56.0 %

2.2.6 Test Results

Results are shown in chapter 2.1

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (µV/m at 3 m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 7

ISED Canada RSS-GEN, Limit Clause 8.9

Frequency (MHz)	Field Strength (µV/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

Table 8

*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Product Service

2.2.7 Test Location and Test Equipment Used

Radiated Tests were carried out in FAR No.8

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	202020-02-29
TRILOG Antenna	Schwarzbeck	VULB 9163	19691	24	2020-12-31
Horn Antenna	Rohde&Schwarz	HF907	19933	24	2021-07-31
Semi Anechoic Room	Albatross	Cabin No. 8	19917	36	2020-09-30
Horn antenna	EMCO	3160-09	19125	---	---
EMC measurement softwareEMC measurement software	Rohde&Schwarz	EMC32-MEBEMC32-MEB	19927	------	------

Table 9

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

Product Service

2.3 Authorised Band Edges

2.3.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.247 (d), 5.5 and N/A

2.3.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55717 - Modification State 0

2.3.3 Date of Test

2019-09-20

2.3.4 Test Method

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 8.7 and ANSI C63.10-2013

2.3.5 Environmental Conditions

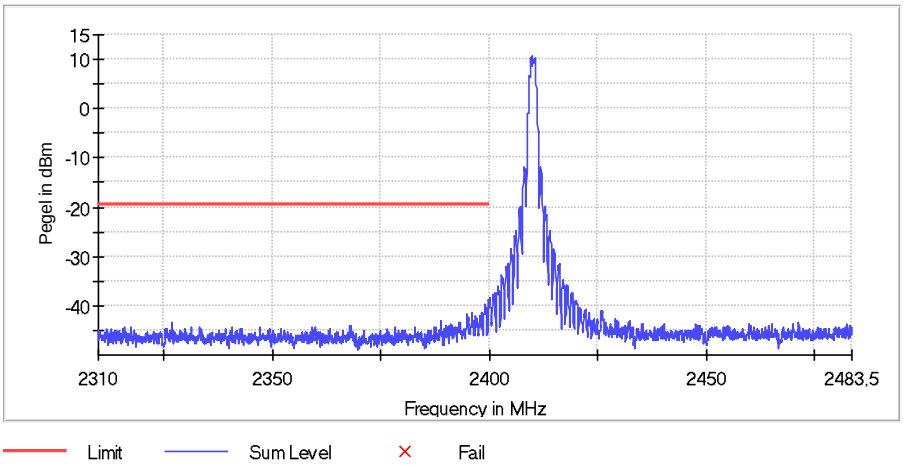
Ambient Temperature	23.0 °C
Relative Humidity	41.0 %

2.3.6 Test Results

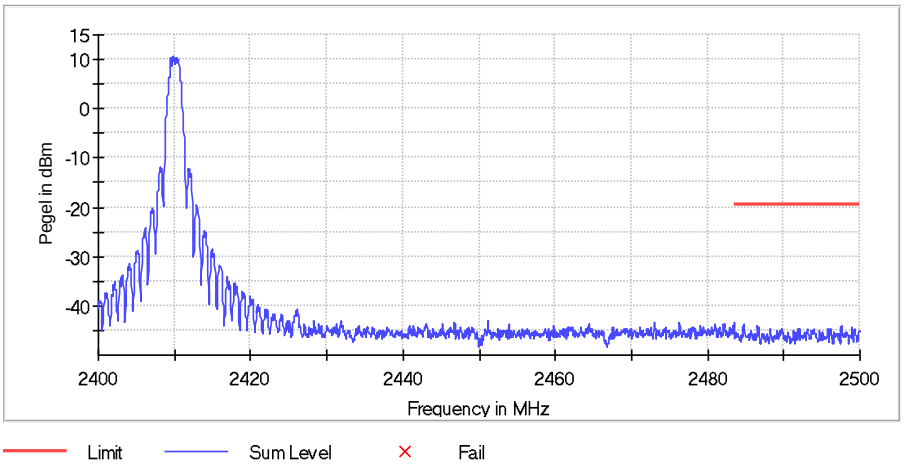
Product Service

Transmission on Channel 12

Band Edge Low



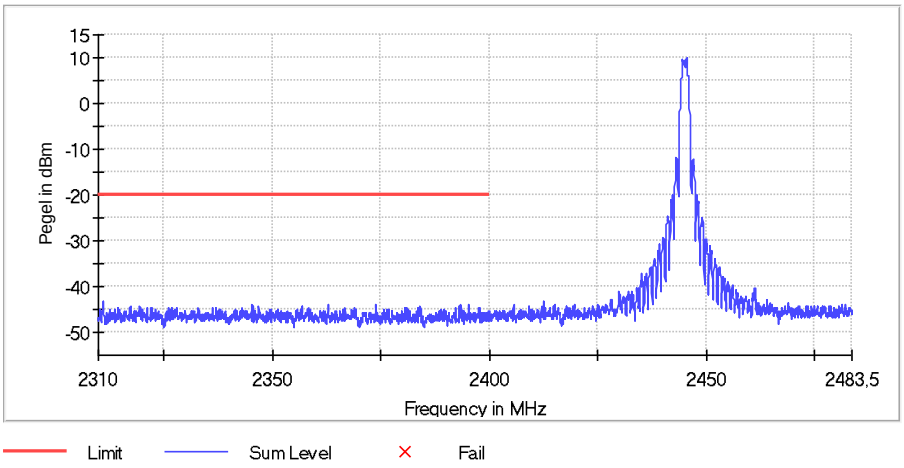
Band Edge High



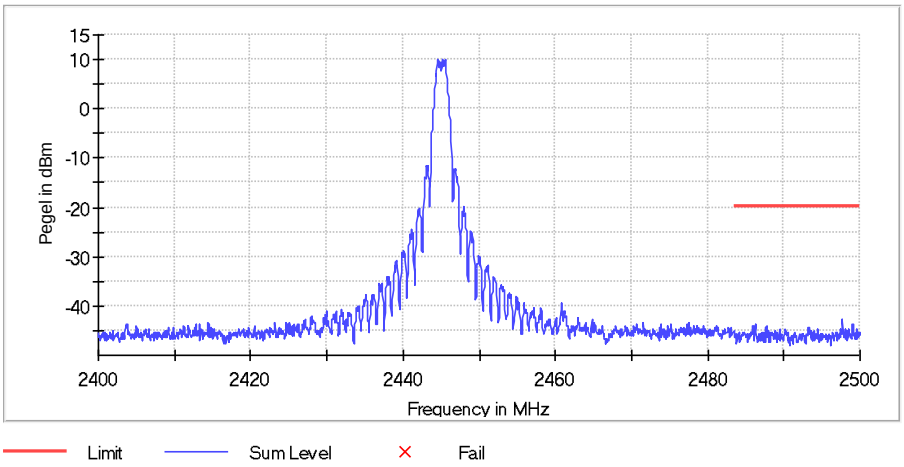
Product Service

Transmission on Channel 19

Band Edge Low



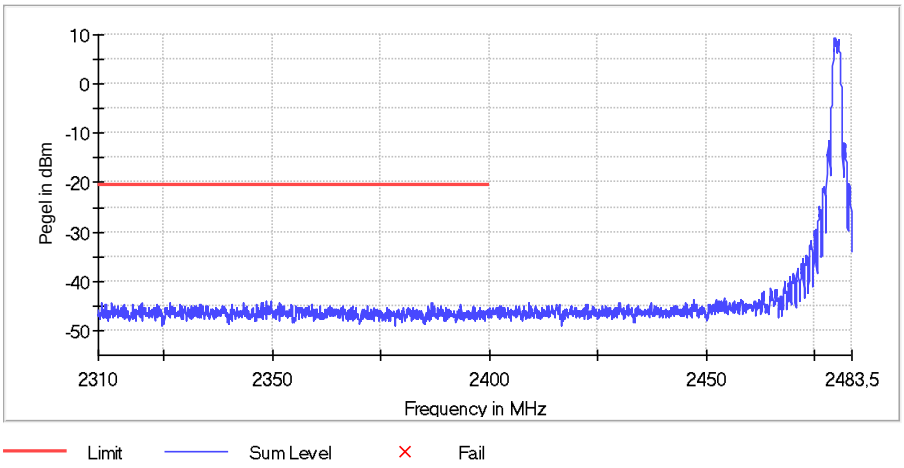
Band Edge High



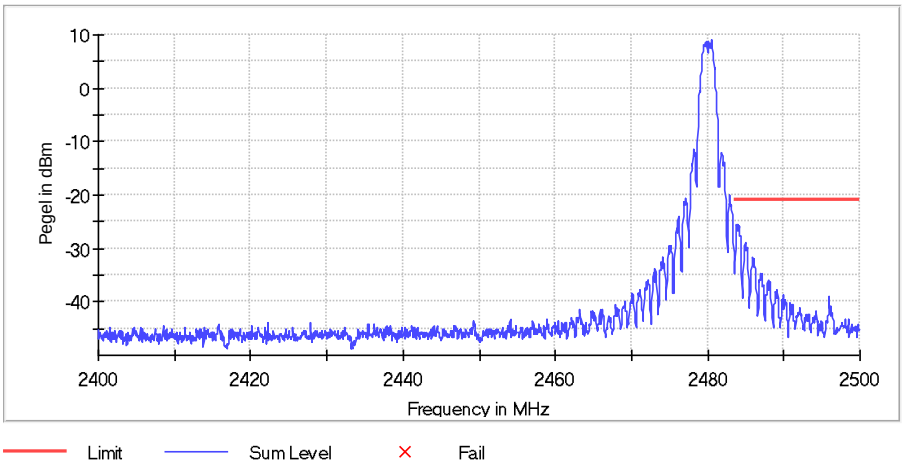
Product Service

Transmission on Channel 26

Band Edge Low



Band Edge High



Product Service

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

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

ISED 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.

2.3.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde&Schwarz	FSV40	20219	12	2020-01-31
Vector Signal Generator	Rohde&Schwarz	SMBV100A	20238	24	2019-10-31
Signal Generator	Rohde&Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde&Schwarz	OSP120 I	20248	24	2020-01-31
Switching Device	Rohde&Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde&Schwarz	EMC32	19719	---	---

Table 10

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

Product Service

2.4 Emission Bandwidth

2.4.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.247 (a)(2), 5.2 and 6.6

2.4.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55717 - Modification State 0

2.4.3 Date of Test

2019-09-20

2.4.4 Test Method

Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 11.8.1

2.4.5 Environmental Conditions

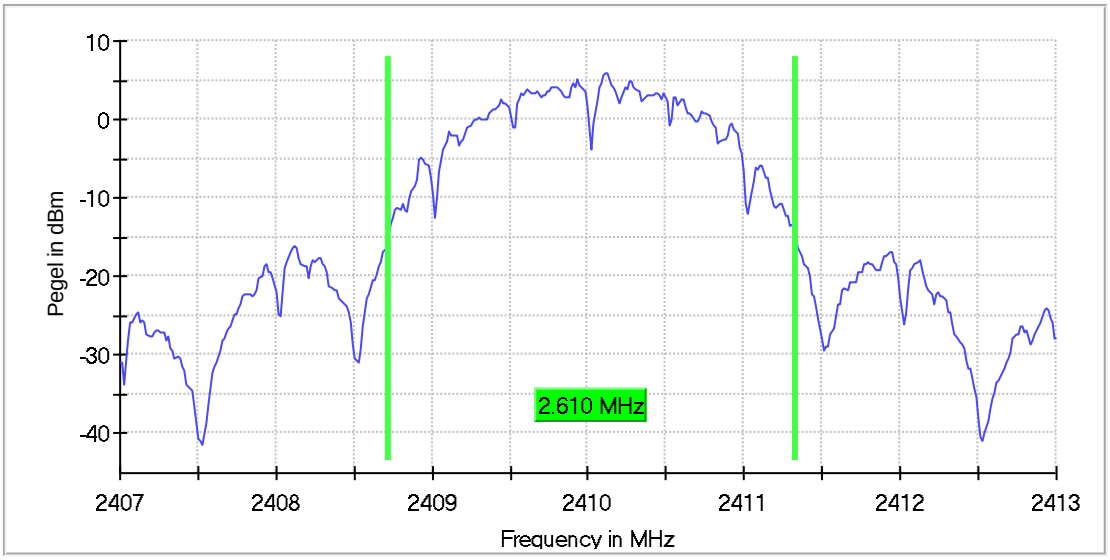
Ambient Temperature	23.0 °C
Relative Humidity	41.0 %

2.4.6 Test Results

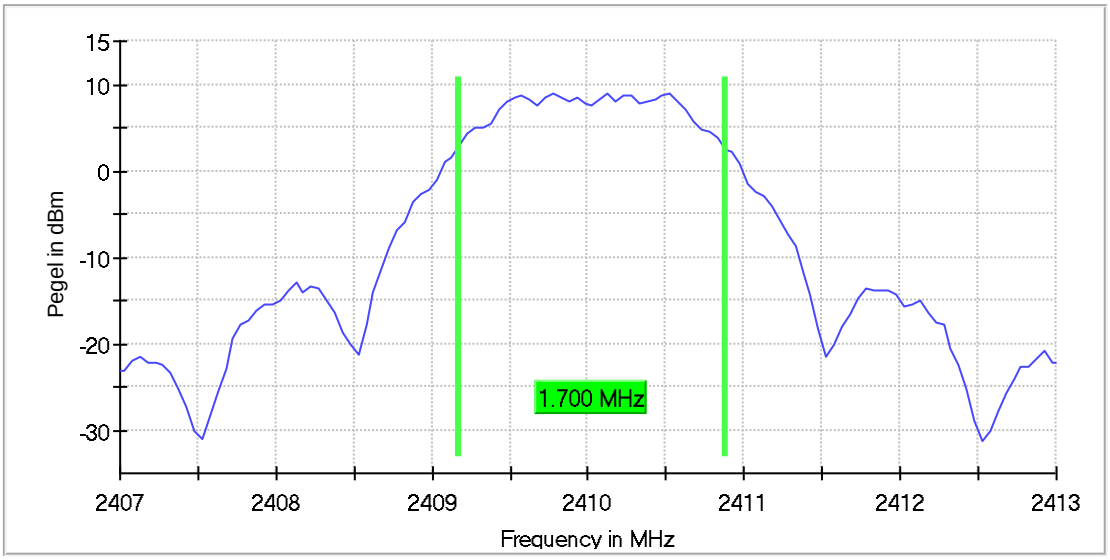
Operating Mode	Frequency (MHz)	20 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
ZigBee	2410	2.610	1.700	2.415
ZigBee	2445	2.625	1.700	2.460
ZigBee	2480	2.645	1.900	2.505

Product Service

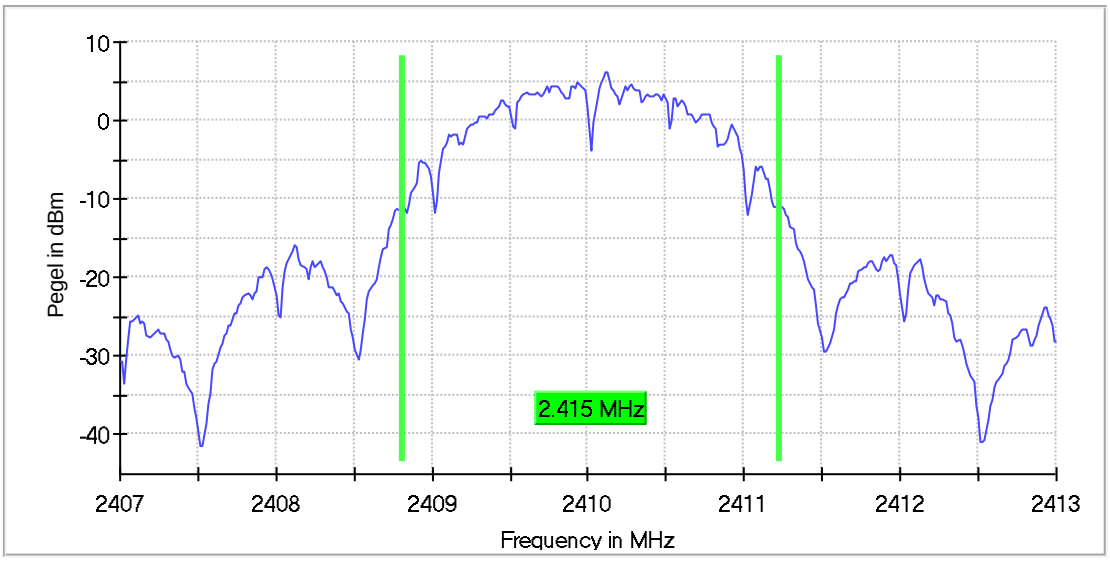
Transmission on Channel 12



20dB-BW, 2410 MHz, ZigBee



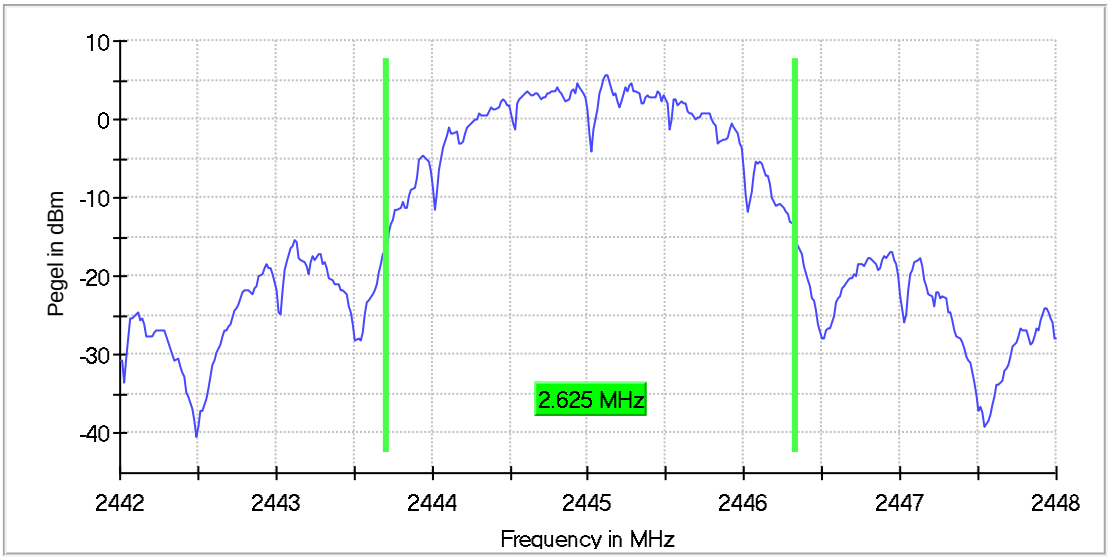
6dB-BW, 2410 MHz, ZigBee



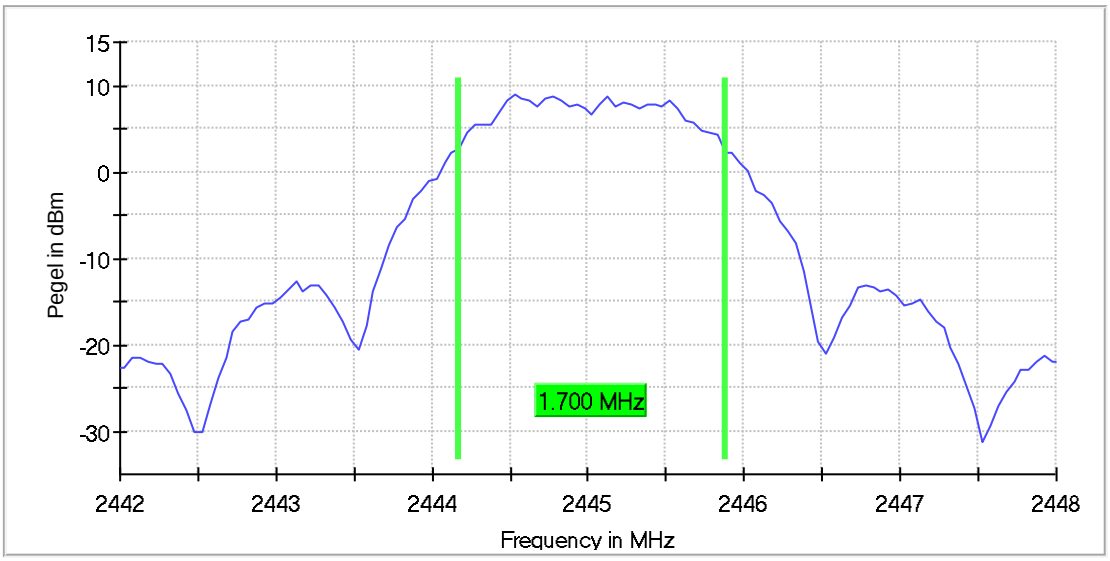
99%-BW, 2410 MHz, ZigBee

Product Service

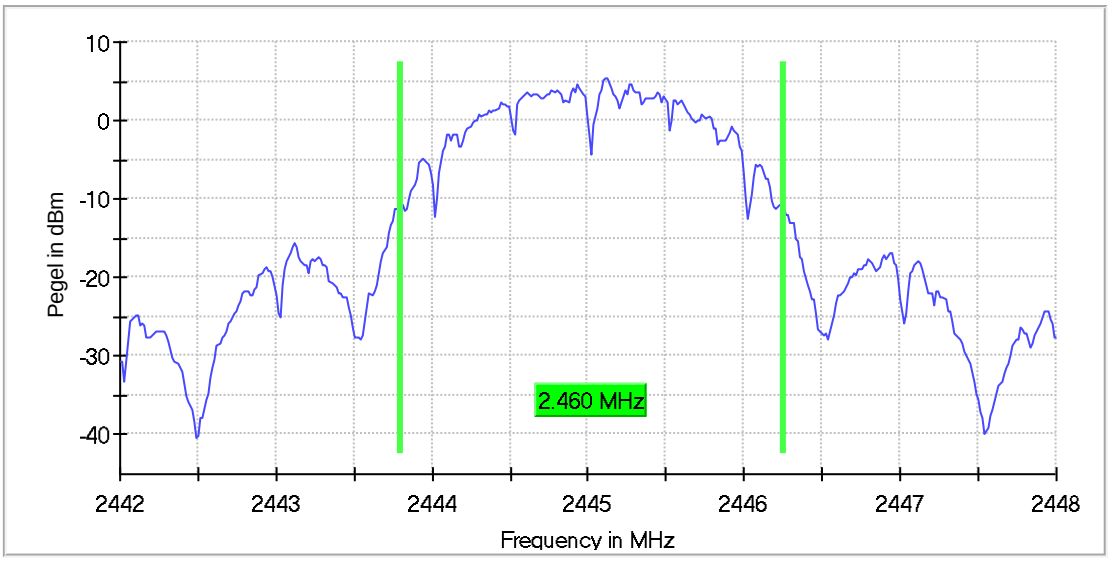
Transmission on Channel 19



20dB-BW, 2445 MHz, ZigBee



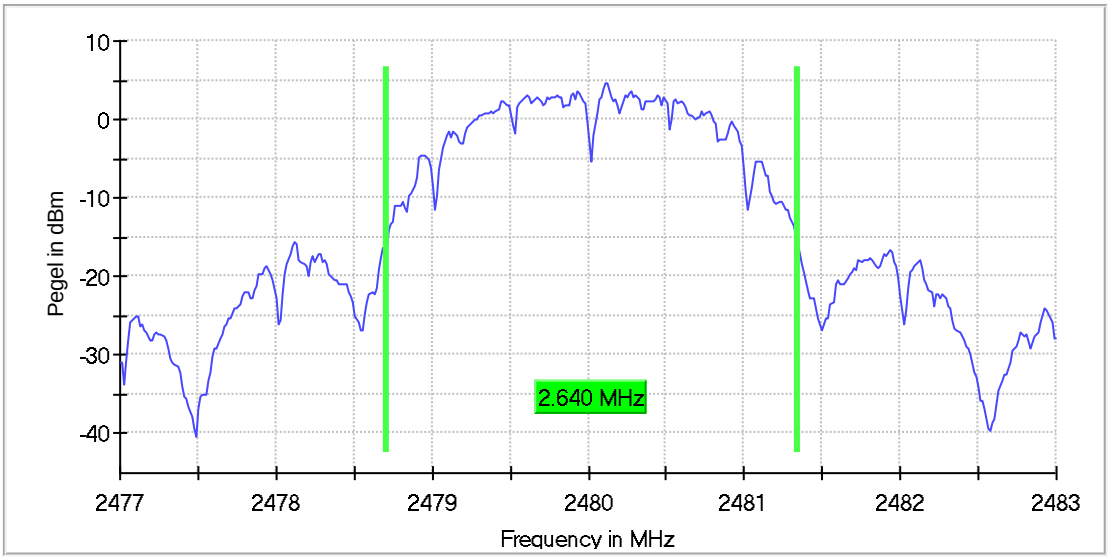
6dB-BW, 2445 MHz, ZigBee



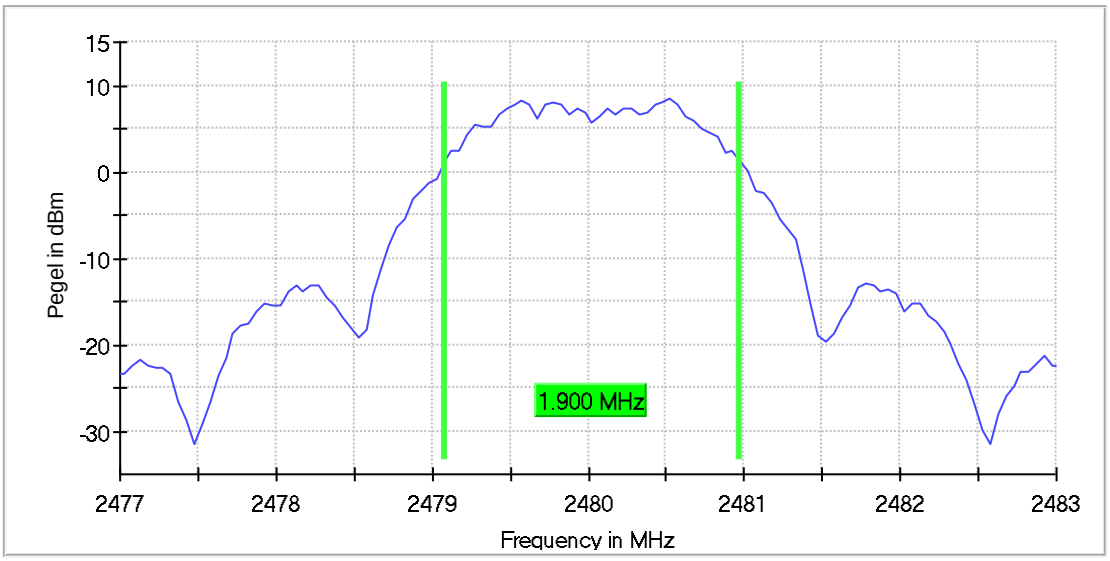
99%-BW, 2445 MHz, ZigBee

Product Service

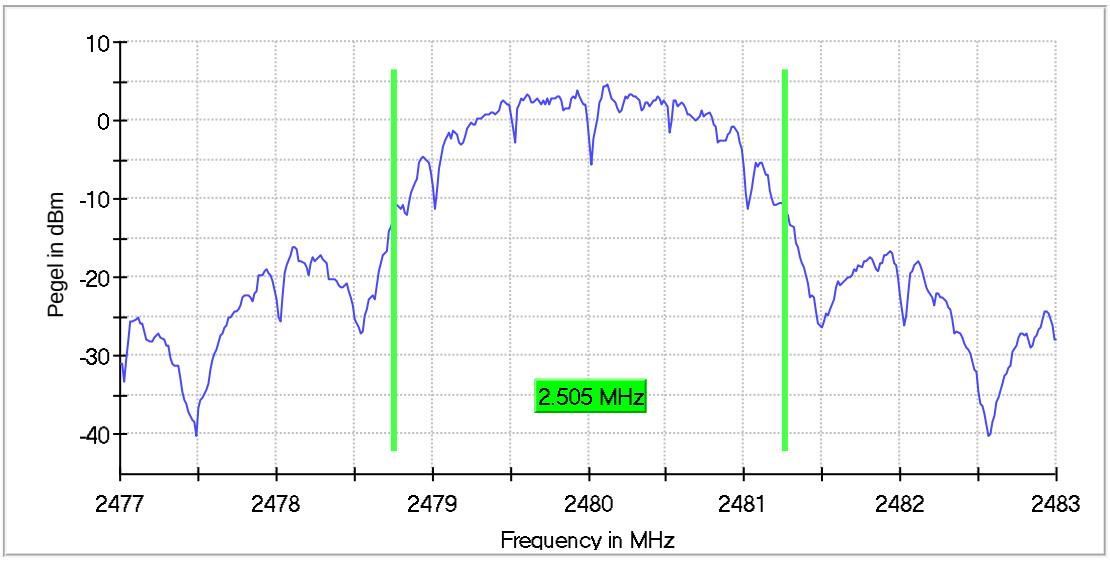
Transmission on Channel 26



20dB-BW, 2480 MHz, ZigBee



6dB-BW, 2480 MHz, ZigBee



99%-BW, 2480 MHz, ZigBee

Product Service

FCC 47 CFR Part 15, Limit Clause 15.247(a)(2) and ISED Canada RSS-247, Clause 5.2(a)

The minimum 6 dB Bandwidth shall be at least 500 kHz.

2.4.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde&Schwarz	FSV40	20219	12	2020-01-31
Vector Signal Generator	Rohde&Schwarz	SMBV100A	20238	24	2019-10-31
Signal Generator	Rohde&Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde&Schwarz	OSP120 I	20248	24	2020-01-31
Switching Device	Rohde&Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde&Schwarz	EMC32	19719	---	---

Table 11

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

Product Service

2.5 Power Spectral Density

2.5.1 Specification Reference

Test according to FCC title 47 part 15 §15.247(a), (e), KDB 558074 D01 DTS Meas Guidance v05 F and ANSI C63.10-2013

2.5.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55717 - Modification State 0

2.5.3 Date of Test

2019-09-20

2.5.4 Test Method

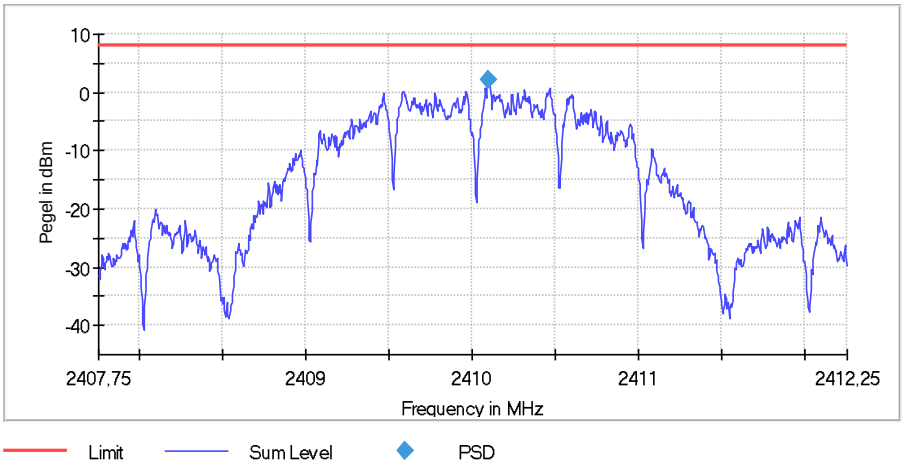
This test was performed in accordance with ANSI C63.10, clause 11.10.2.

2.5.5 Environmental Conditions

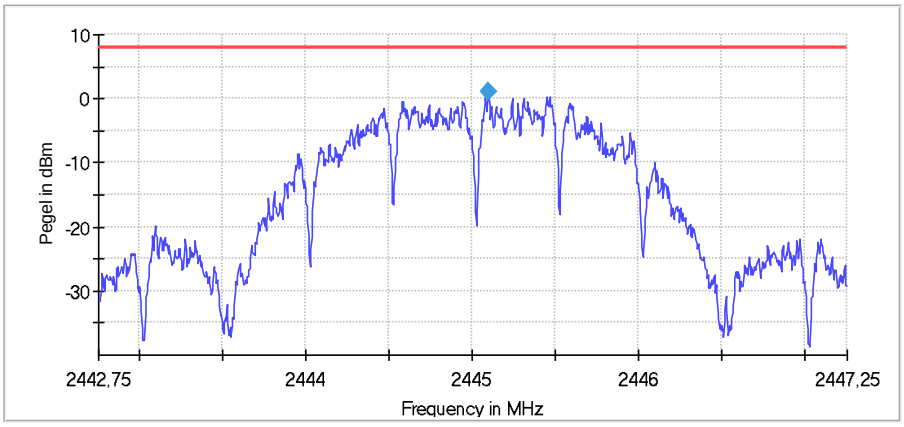
Ambient Temperature	23.0 °C
Relative Humidity	41.0 %

2.5.6 Test Results

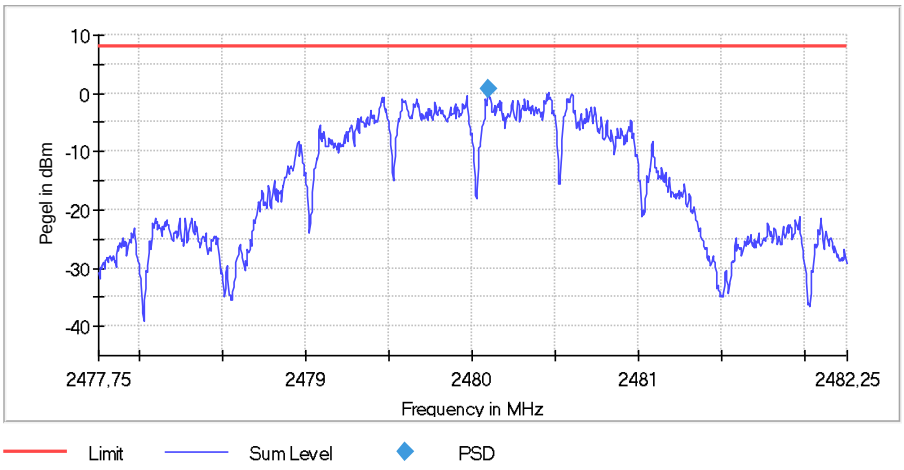
Operating Mode	Frequency (MHz)	PSD (dBm)	Limit (dBm)
ZigBee	2410	2.184	8.0
ZigBee	2445	1.192	8.0
ZigBee	2480	0.673	8.0



PSD, 2410 MHz, ZigBee



PSD, 2445 MHz, ZigBee



PSD, 2480 MHz, ZigBee

Product Service

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

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

ISED Canada RSS-247, Limit Clause 5.2(b)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

2.5.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde&Schwarz	FSV40	20219	12	2020-01-31
Vector Signal Generator	Rohde&Schwarz	SMBV100A	20238	24	2019-10-31
Signal Generator	Rohde&Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde&Schwarz	OSP120 I	20248	24	2020-01-31
Switching Device	Rohde&Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde&Schwarz	EMC32	19719	---	---

Table 12

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

Product Service

2.6 Maximum Conducted Output Power

2.6.1 Specification Reference

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 11.9.2.3.2

2.6.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55717 - Modification State 0

2.6.3 Date of Test

2019-09-20

2.6.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.9.1.1.

2.6.5 Environmental Conditions

Ambient Temperature	23.0 °C
Relative Humidity	41.0 %

Product Service

2.6.6 Test Results

Operating Mode	Frequency (MHz)	Conducted power	Gated EIRP (dBm)	DutyCycle (%)	Limit Max (dBm)
ZigBee	2410	11.7	13.7	100	30
ZigBee	2445	11.5	13.5	100	30
ZigBee	2480	11.0	13.0	100	30

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

ISED Canada RSS-247, Limit Clause 5.4 (b)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e) of the specification.

2.6.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde&Schwarz	FSV40	20219	12	2020-01-31
Vector Signal Generator	Rohde&Schwarz	SMBV100A	20238	24	2019-10-31
Signal Generator	Rohde&Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde&Schwarz	OSP120 I	20248	24	2020-01-31
Switching Device	Rohde&Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde&Schwarz	EMC32	19719	---	---

Table 13

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

Product Service

2.7 AC Power Line Conducted Emissions

2.7.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.207, N/A and 8.8

2.7.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55882 - Modification State 0

2.7.3 Date of Test

2019-09-20

2.7.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.2.

2.7.5 Environmental Conditions

Ambient Temperature	23.0 °C
Relative Humidity	41.0 %

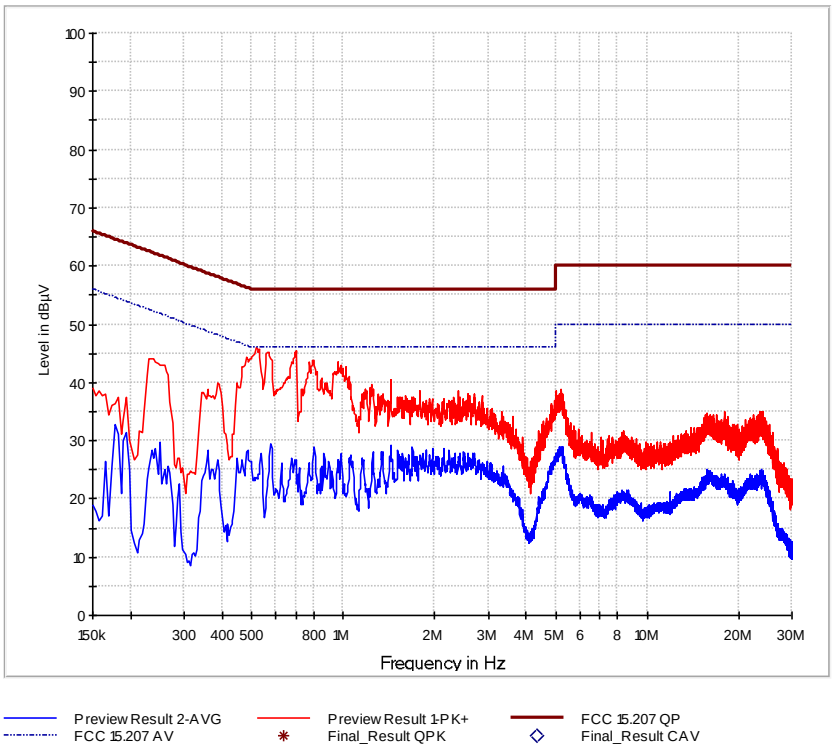
Product Service

2.7.6 Test Results

Results for Configuration and Mode: Normal operation mode - power supplied by computer port.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.
Line Under Test: AC mains Live and Neutral



FCC 47 CFR Part 15, Limit Clause 15.207 and ISED Canada RSS-GEN, Limit Clause 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

Table 14

*Decreases with the logarithm of the frequency.

2.7.7 Test Location and Test Equipment Used

This test was carried out in Shielded room - cabin no. 4.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESCI3	19730	18	2020-11-31
V-network	Rohde & Schwarz	ENV216	39911	12	2020-02-29
EMC measurement softwareEMC measurement software	Rohde & Schwarz	EMC32-MEBEMC32-MEB	20090--	------	------

Table 15

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

Product Service

2.8 Transmitter frequency stability

2.8.1 Specification Reference

RSS-Gen, Issue 5, April 2018 (General Requirements for Compliance of Radio Apparatus)

2.8.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55717- Modification State 0

2.8.3 Date of Test

2019-09-20

2.8.4 Test Method

RSS-Gen, Issue 5, April 2018, chapter 6.11

2.8.5 Environmental Conditions

Ambient Temperature	23.0 °C
Relative Humidity	41.0 %

Product Service

2.8.6 Test Results

Note: - Measured Frequency Error does not affect any band edge requirements.
- Measurement was performed with modulated transmitter signal

2.8.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde&Schwarz	FSV40	20219	12	2020-01-31
Vector Signal Generator	Rohde&Schwarz	SMBV100A	20238	24	2019-10-31
Signal Generator	Rohde&Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde&Schwarz	OSP120 I	20248	24	2020-01-31
Switching Device	Rohde&Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde&Schwarz	EMC32	19719	---	---

Table 16

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

Product Service

2.9 Exposure of Humans to RF Fields

2.9.1 Specification Reference

IC RSS-GEN Issue 5, section 3.2 and
IC RSS-102, Issue 5, section 2.5
KDB 447498 D01 General RF Exposure Guidance v06, chapter 4.3.1

2.9.2 Equipment Under Test and Modification State

SIMATIC RTLS PCB OEM AC, S/N: A55882 - Modification State 0

2.9.3 Date of Test

2019-09-20

Product Service

2.9.4 Test Results

acc. to KDB 447498 D01:

Maximum Radiated Power (EIRP) Pmax:	13.7 dBm = 23.4 mW	(Max. CP Test Result is 13.7 dBm including 2.0 dBi antenna gain. See chapter 2.6)
)		
Compliance Boundary d:	20 mm	
Frequency f:	2410 MHz = 2.410 GHz	
Numeric Threshold (Pmax / d) $(f)^{0.5}$	1.82	
Numeric Threshold Limit (1 g SAR):	3.0	

Product Service

IC RSS-GEN Issue 5, section 3.2 and IC RSS-102, Issue 5, section 2.5:

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
☒ detachable				
The conducted output power (CP in watts) is measured at the antenna connector: CP = 23.4 mW = 13.7 dBm (Max. CP Test Result is 13.7 dBm including 2.0 dBi antenna gain. See chapter 2.6)			☒	
The effective isotropic radiated power (EIRP in watts) is calculated using				
☒ the numerical antenna gain: G = 2.0 dBi $EIRP = G \cdot CP \Rightarrow EIRP$ = 23.4 mW		☒		
☐ the field strength[1] in V/m: FS = ... V/m $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = mW with: Distance between the antennas in m: D = mm		☒	☐	
☐ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by: $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = W with: Field strength in V/m: FS = dBµV/m = mV/m Distance between the two antennas in m: D = m			☒ ☒	
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): TP = 23.4 mW				

[1] The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.
If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

Product Service

Exposure of Humans to RF Fields (continued)		Applicable	Declared by applicant	Measured	Exemption
Separation distance between the user and the transmitting device is					
☒ less than or equal to 20 cm	☐ greater than 20 cm		☒		
Transmitting device is					
☐ in the vicinity of the human head	☐ body-worn		☐		

Product Service

SAR evaluation				
SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in the table. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in the table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required. For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.				

Frequency (MHz)	Exemption limits (mW)[2] at separation distance of									
	≤5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	≥50 mm
450	52	70	88	106	123	141	159	177	195	213
835	17	30	42	55	67	80	92	105	117	130
1900	7	10	18	34	60	99	153	225	316	431
2450	4	7	15	30	52	83	123	173	235	309
3500	2	6	16	32	55	86	124	170	225	290
5800	1	6	15	27	41	56	71	85	97	106

Carrier frequency:	f	=	2410 MHz	
Distance:	d	=	20 mm	☒
Transmitter output power:	TP	=	23.4 mW	
Limit:	TP_{limit}	=	30 mW	☒

[2] The excemption limit in the table are based on measurements and simulations on half-wave dipole antennas at separaton distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

Product Service

3 Photographs

3.1 Equipment Under Test (EUT)

See Annex A.

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 17

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 18

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		a	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 19

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:
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%