Prüfbericht-Nr.: *Test Report No.:*	60264954-003	**Auftrags-Nr.:** *Order No.:*	23870168
Kunden Referenz-Nr.: Client Reference No.:	-	**Auftragsdatum** *Order date:*	2019-03-08
Auftraggeber: *Client:*	IKEA of Sweden AB Box 702 343 81 Älmhult Sweden	Torbjörn Samuelsson torbjorn.samuelsson@ikea.com 0705-353183	
Prüfgegenstand: *Test item:*	TRÅDFRI Shortcut button		
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	FCC ID: FHO-E1812		
Auftrags-Inhalt: *Order content:*	Partial FCC Certification testing – Zigbee radio		
Prüfgrundlage: *Test specification:*	FCC Part 15 Subpart C 15.205 & 15.209 FCC Part 15 Subpart B 15.109 ANSI C63.10-2013		
Wareneingangsdatum: *Date of receipt:*	2019-03-08		
Prüfmuster-Nr.: *Test sample No.:*	A000228095-002		
Prüfzeitraum: *Testing period:*	2019-04-24 – 2019-09-10		
Ort der Prüfung: *Place of testing:*	Lund, Sweden		
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland Sweden		
Prüfergebnis: *Test results:*	Pass		

Geprüft von *Tested by:*	Stefan Olsson Test Engineer		**Kontrolliert von** *Reviewed by:*	Per Isacsson Lab Manager	
2019-10-17			2019-10-17		
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sontiges /*Other:*

Only Radiated Emissions, FCC Rule parts 15.109, 15.205, 15.209 are covered in this report.

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts.

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Revisions ***Revisions***			
Revision Revision	**Datum** Date	**Anmerkung** Remark	**Verfasser** Author
001	2019-08-12	First release	Stefan Olsson
002	2019-09-10	Various updates after TCB comments	Stefan Olsson
003	2019-10-17	Duty cycle info added	Stefan Olsson
Note: Latest revision report will replace all previous reports			

Summary of Test Results

FCC Rule Part	Test item	Result	Remarks
15.107 15.207	AC POWER CONDUCTED EMISSION	N/A	
15.205 15.109 15.209	RADIATED EMISSIONS	PASS	Meet the requirement of limit
15.247(a)(2)	6dB BANDWIDTH	n.p	
15.247(b)(3)	OUTPUT POWER	n.p	
15.247(d)	OUT OF BAND EMISSIONS	n.p	
15.247(d)	100 kHz Bandwidth of Frequency Band Edges	n.p	
15.247(e)	POWER SPECTRAL DENSITY	n.p	
15.203	ANTENNA REQUIREMENT	n.p	

Possible test case verdicts:

- test case does not apply to the test object ....: N/A
- test object does meet the requirement .....: PASS
- test object does not meet the requirement ....: FAIL
- test case not performed on the test object ....: n.p.

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1 TEST SITES

Testing facility

TÜV Rheinland Sweden AB
Mobilvägen 10
223 62 Lund
Sweden

FCC Test Firm Registration Number: 517458

2 PRODUCT INFORMATION

2.1 General description

Model name:	TRÅDFRI Shortcut button
Manufacturer:	IKEA of Sweden
Model number:	E1812
FCC ID:	FHO-E1812
Description:	It´s a programmable button, which give the user a quick and easy way to access certain functions in the TRÅDFRI System quickly without the need for opening the app. Possible use cases could be : All OFF, Scenes, Welcome home and timer
Supported Radio Technologies:	Zigbee 2405 MHz - 2480 MHz
Highest internal frequency	2480MHz
Supply Voltage to Product:	Battery powered, during testing the EUT was powered by a power supply with 3,3V due to test mode drained the battery too fast.
Ancillary Equipment:	None

2.2 Radio specific details

2.2.1 Zigbee radio

Operating Frequency Range	2405 MHz – 2480 MHz
Radio Protocol	Zigbee
Channel Spacing	5 MHz
Number of channels	16
Modulation	OQPSK
Number of antennas	1
Antenna type	Printed Inverted-F Antenna
Antenna gain	1,94dBi

2.3 Equipment Under Test (EUT) identification

TÜV Rheinland ID	Model	S/N	HW	SW
A000228095-002	E1812	-	P2.0	2.0.019

3 TEST METHODS AND OPERATION MODES

3.1 Test Methods

The following standards/references has been considered for the testing

Reference Standards	
Standard	**Description**
FCC Part 15 (Subpart C)	15.205 Restricted bands of operation
FCC Part 15 (Subpart B)	15.109 Radiated emission limits; general requirements, unintentional radiators
FCC Part 15 (Subpart C)	15.209 Radiated emission limits; general requirements, intentional radiators
ANSI C63.4:2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system and hybrid system devices operating under §15.247 of the FCC rules

3.2 Operation modes

Testing was performed at the lowest operating frequency, at the operating frequency in the middle of the specified frequency band and at the highest operating frequency of each supported technology as per below.
A special test software was used to enable a modulated transmission of each channel with maximum power, this was considered to be the worst cases.
The duty cycle used was 1%.

3.2.1 Tested channels/Frequencies

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
Zigbee (2.4 GHz)	11	2405
	19	2445
	26	2480

4 TEST METHODOLOGY

4.1 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the turntable on an 80cm high table for below 1 GHz & 1.5 m height for above 1 GHz measurement, for frequencies up to 18GHz the EUT is 3 meters far from the measuring antenna, above 18GHz the distance is 1 meter. The turntable was rotated 360˚ for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurements above 1000 MHz was performed by 3 different horn antennas, the measurement below 30 MHz was performed by loop antenna and measurement from 30 MHz to 1 GHz was performed by Log-Periodic Antenna.

Test Setup Configuration

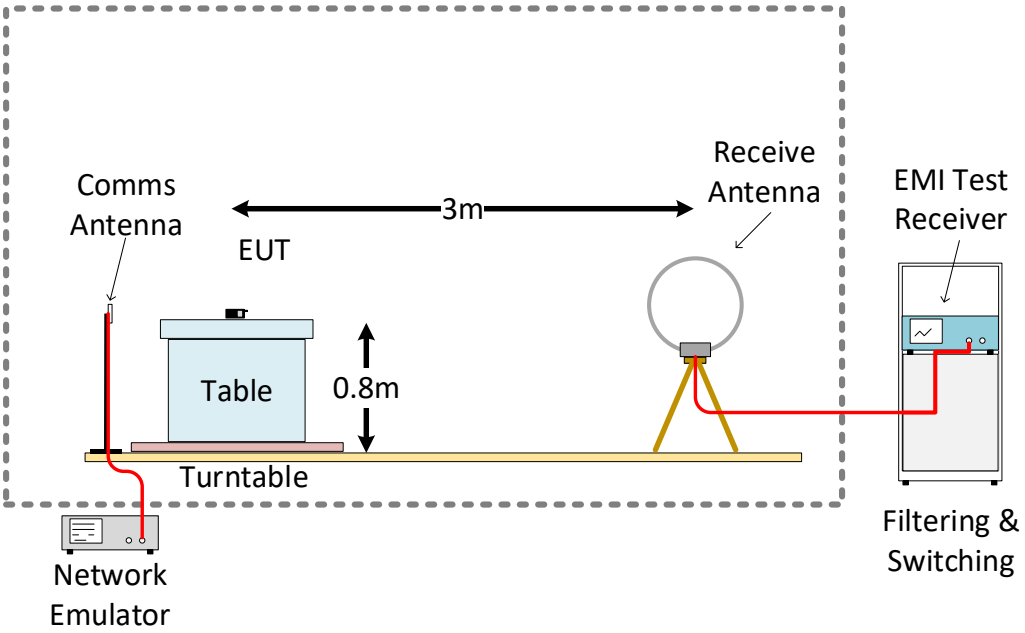


Figure 1: Frequency range 9 KHz – 30 MHz

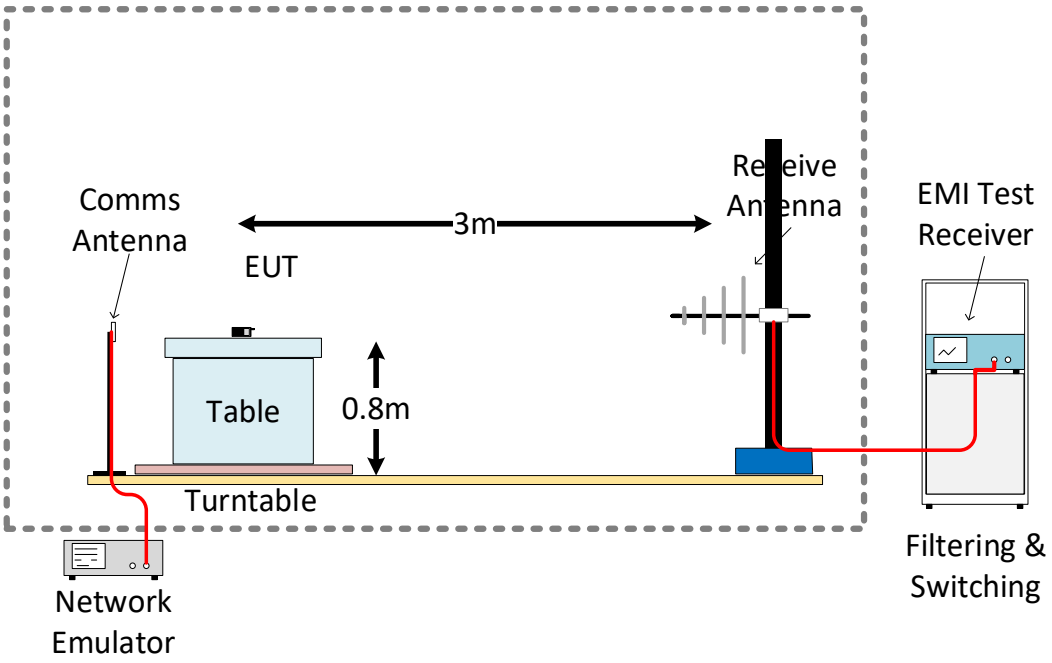


Figure 2: Frequency range 30 MHz – 1 GHz

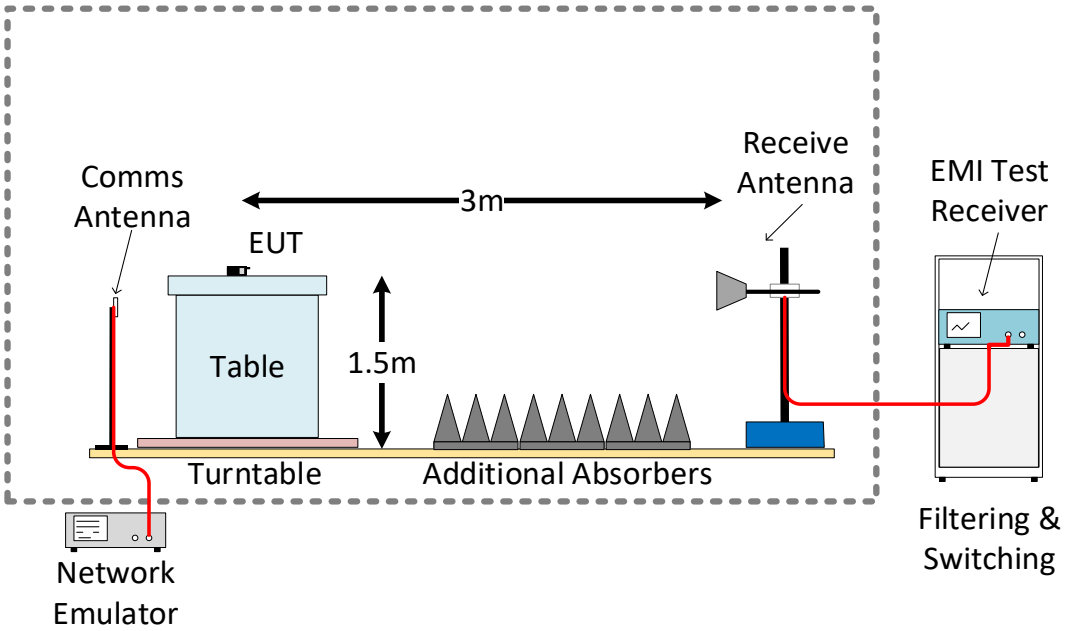


Figure 3: Frequency range 1 GHz – 18 GHz

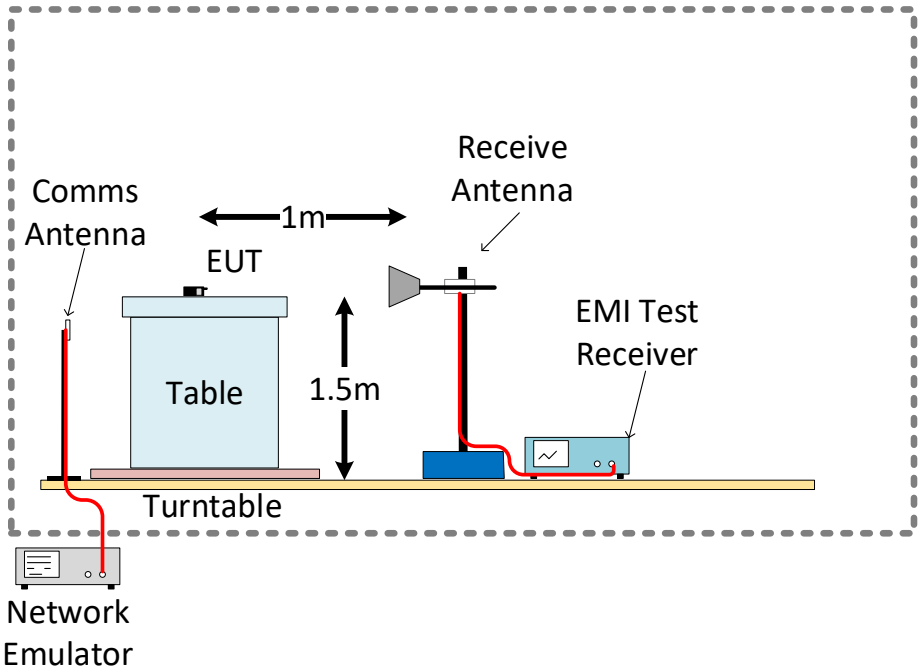


Figure 4: Frequency range 18 GHz – 40 GHz

5 TEST RESULTS

5.1 Radiated emissions

Result	Pass
Test period	2019-04-24 – 2019-09-10
Test Engineer	Stefan Olsson and Niall Forrester
Test Specification	FCC part 15 Subpart C Section 15.209 & 15.205 FCC Part 15 Subpart B Section 15.109
Test Method	ANSI C63.10 – 2013 ANSI C63.4 - 2014
Measurement Location	Semi Anechoic Chamber
Measuring Distance	3 m for 9 KHz to 18 GHz 1 m for 18 GHz to 40 GHz
Detector	Quasi-peak, except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz where an Average detector is used.
Requirement	As per the limits mentioned in the below table
Environmental conditions	Temperature: + 18 - 20 °C Relative Humidity: 20 - 40 %

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 3 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54 dBµV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

For measurements above 18GHz the measurement was performed at 1m distance, the limit line has been adjusted for this using the following formula: Extrapolation (dB) = 40log (3meter / 1meter) = +19,08db

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

5.2 Test setups

Test	Constellation (see also notes below)	EUT Radio	Result
1	EUT standalone	Zigbee	Pass
2	EUT standalone	Idle	Pass

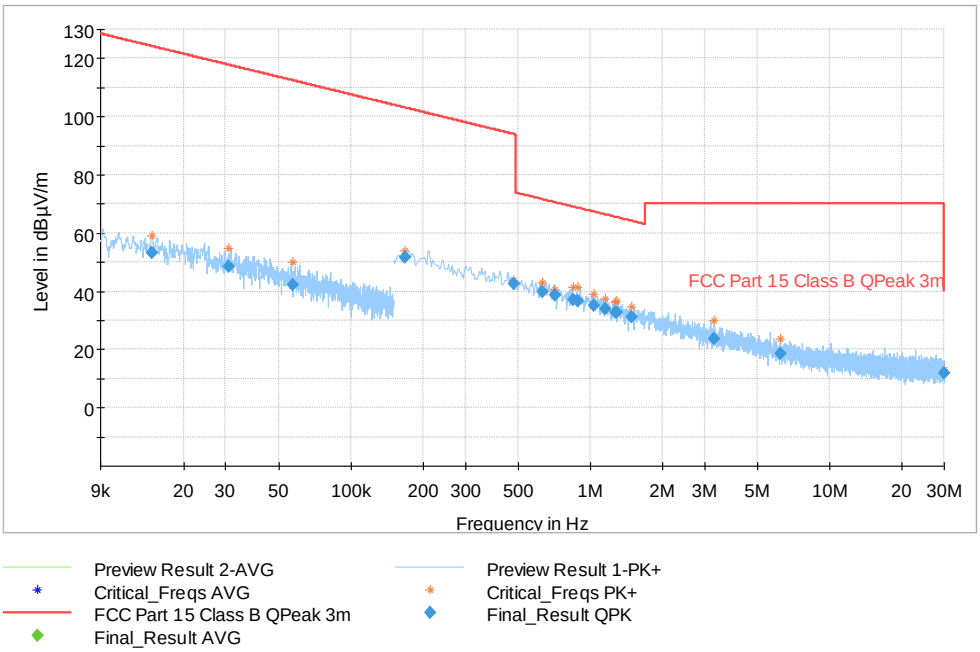
5.3 Test results, Test 1

5.3.1 Zigbee channel 11

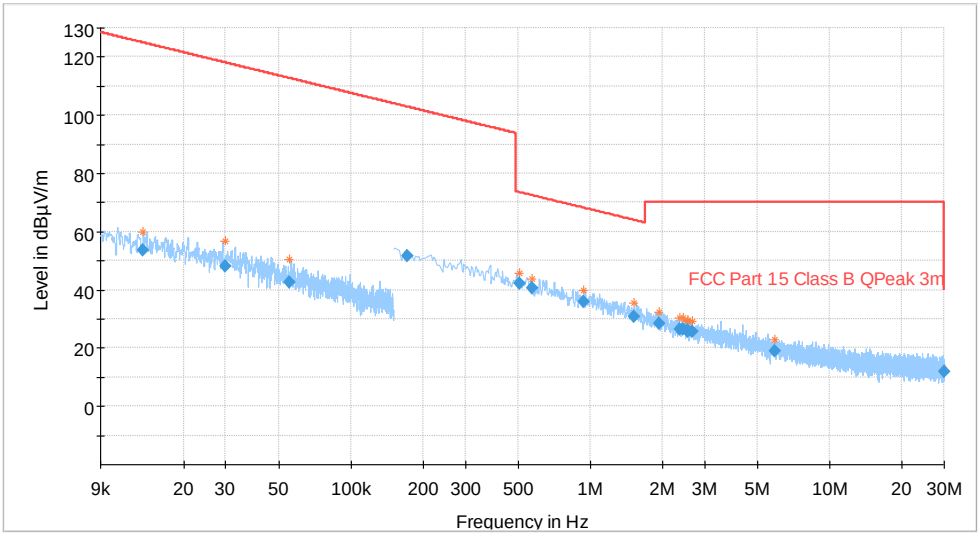
Radiated Emissions - Test results for frequencies in the range 9 KHz - 30 MHz

All emissions were greater than 20dB below the limit for all 9kHz to 30MHz tests.

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Perpendicular	2405	9kHz-30MHz

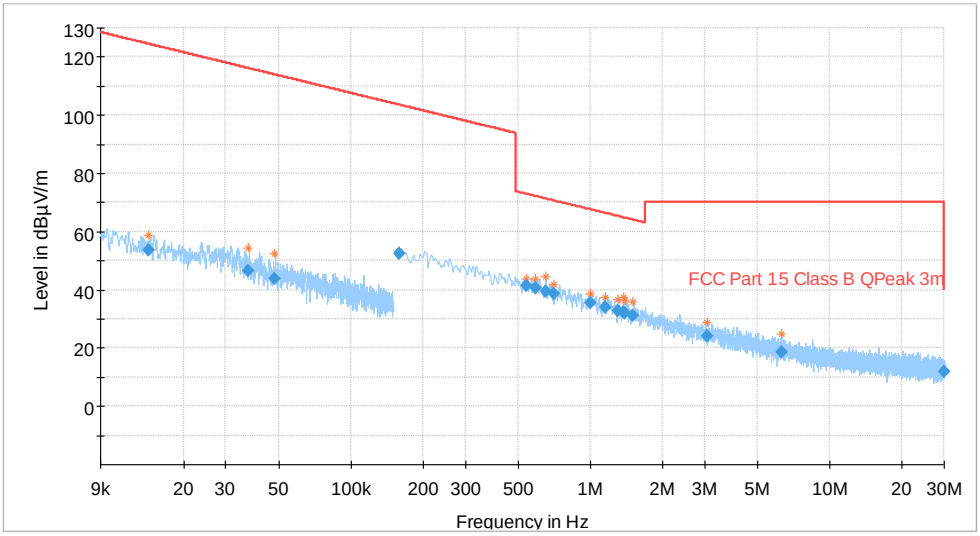


Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Ground-parallel	2405	9kHz-30MHz



Preview Result 2-AVG
Critical_Freqs AVG
FCC Part 15 Class B QPeak 3m
Final_Result AVG
Preview Result 1-PK+
Critical_Freqs PK+
Final_Result QPK

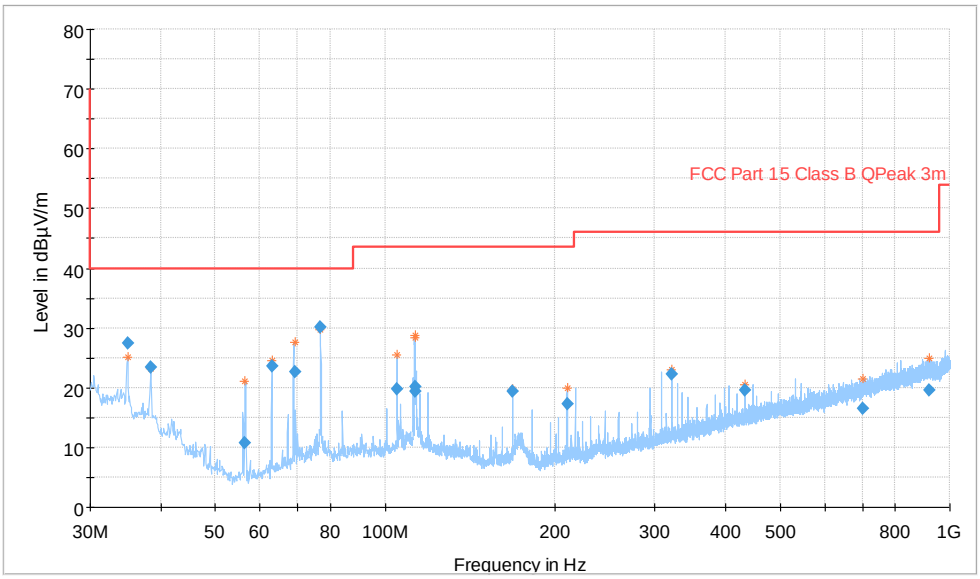
Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	parallel	2405	9kHz-30MHz



Preview Result 2-AVG
Critical_Freqs AVG
FCC Part 15 Class B QPeak 3m
Final_Result AVG
Preview Result 1-PK+
Critical_Freqs PK+
Final_Result QPK

Radiated Emissions - Test results for frequencies in the range 30 MHz – 1 GHz

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2405	30 MHz – 1 GHz

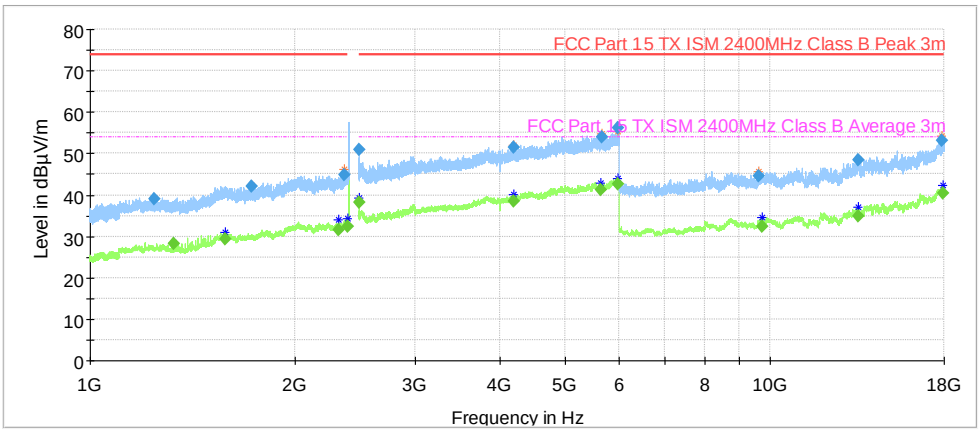


Preview Result 1-PK+
FCC Part 15 Class B QPeak 3m
Critical_Freqs PK+
Final_Result QPK

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
34.970880	27.45	40.00	12.55	120.000	100.0	V	112.0
38.410160	23.49	40.00	16.51	120.000	100.0	V	157.0
62.958960	23.63	40.00	16.37	120.000	175.0	V	157.0
69.049120	22.64	40.00	17.36	120.000	103.0	V	179.0
76.796360	30.22	40.00	9.78	120.000	128.0	V	199.0
113.039520	20.08	43.50	23.42	120.000	275.0	V	247.0

Radiated Emissions - Test results for frequencies in the range 1 GHz – 18 GHz

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2405	1GHz – 18 GHz



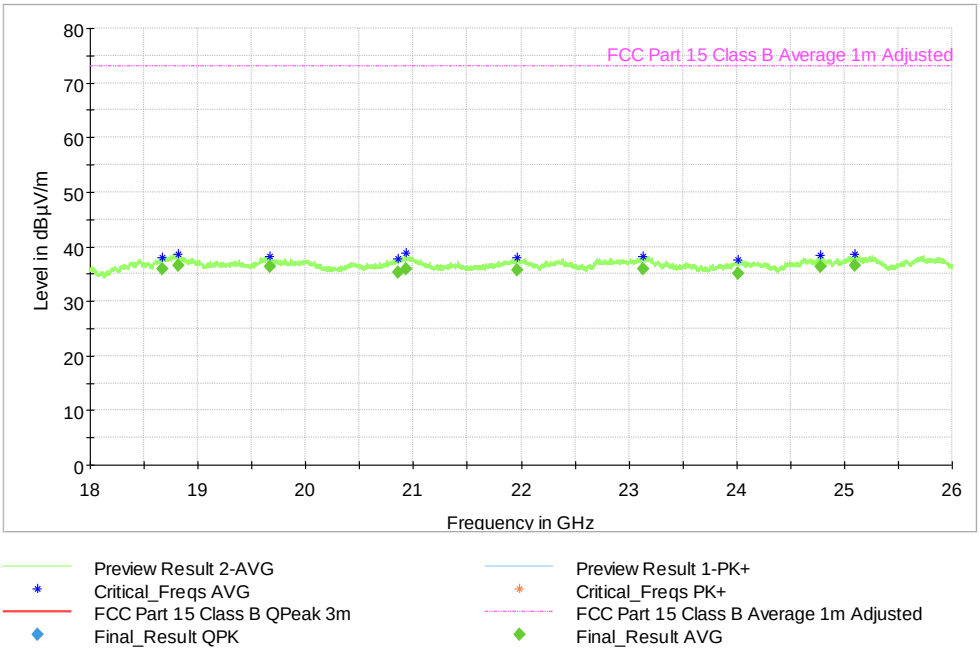
Preview Result 2-AVG
Preview Result 1-PK+
Critical_Freqs AVG
Critical_Freqs PK+
FCC Part 15 TX ISM 2400MHz Class B Peak 3m
FCC Part 15 TX ISM 2400MHz Class B Average 3m
Final_Result QPK
Final_Result AVG
Final_Result PK+

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2483.510000	38.31	---	54.00	15,69	1000.000	165.0	V	98.0
4187.526000	38.43	---	54.00	15,57	1000.000	158.0	V	142.0
5632.441000	41.35	---	54.00	12,65	1000.000	138.0	H	53.0
5973.133000	42.65	---	54.00	11,35	1000.000	109.0	V	40.0
5975.606000	---	56.08	74.00	17,92	1000.000	150.0	V	45.0
17938.23700	40.42	---	54.00	13,58	1000.000	100.0	H	217.0

Radiated Emissions - Test results for frequencies in the range 18 GHz – 26 GHz

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2405	18GHz – 26 GHz

No tables of measured emissions are present since all emissions are more than 20dB lower than the limit.

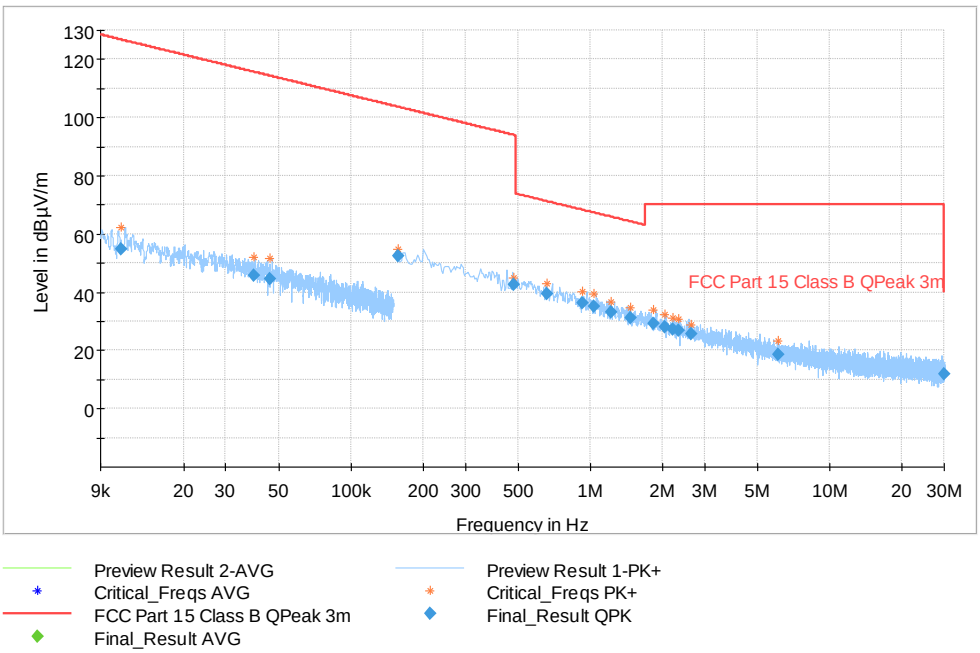


5.3.2 Zigbee channel 19

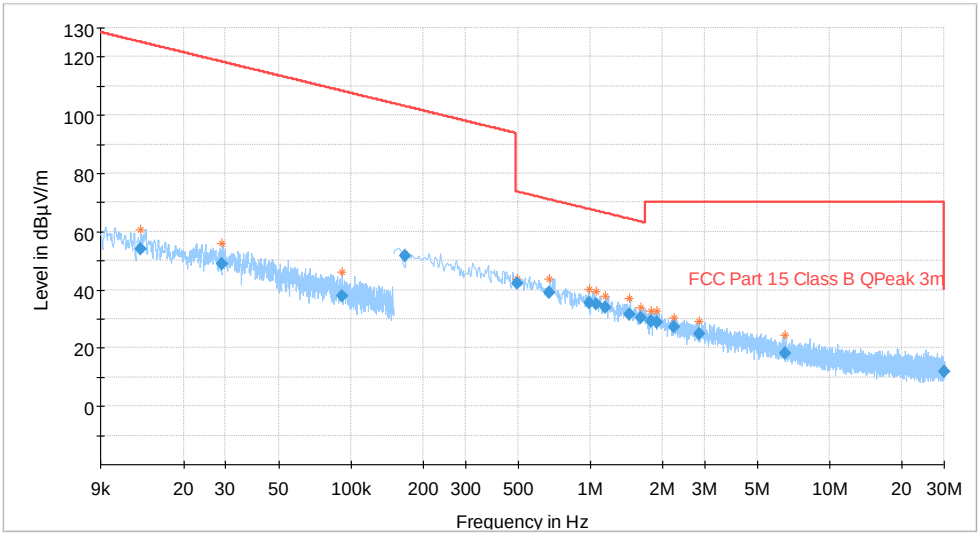
Radiated Emissions - Test results for frequencies in the range 9 KHz - 30 MHz

All emissions were greater than 20dB below the limit for all 9kHz to 30MHz tests.

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Perpendicular	2445	9kHz-30MHz

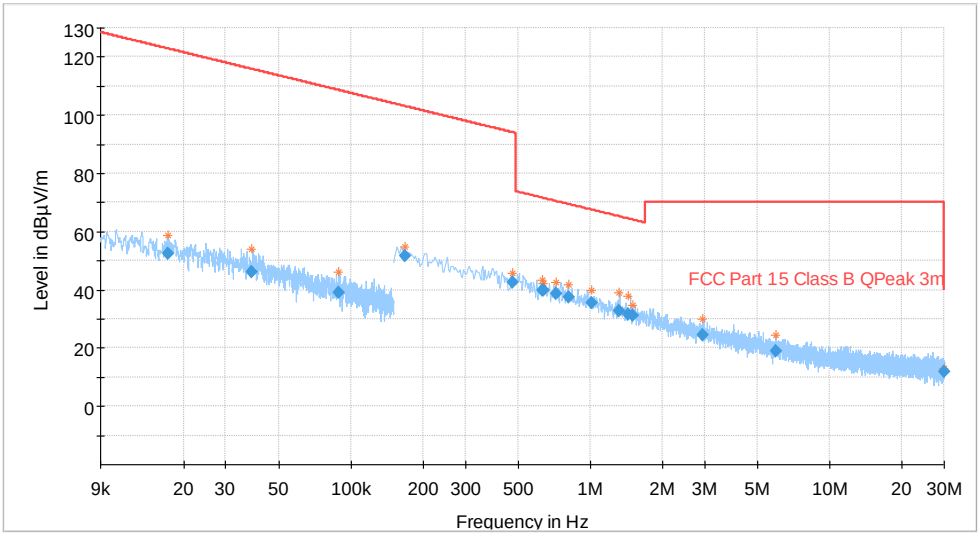


Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Ground-parallel	2445	9kHz-30MHz



Preview Result 2-AVG
Critical_Freqs AVG
FCC Part 15 Class B QPeak 3m
Final_Result AVG
Preview Result 1-PK+
Critical_Freqs PK+
Final_Result QPK

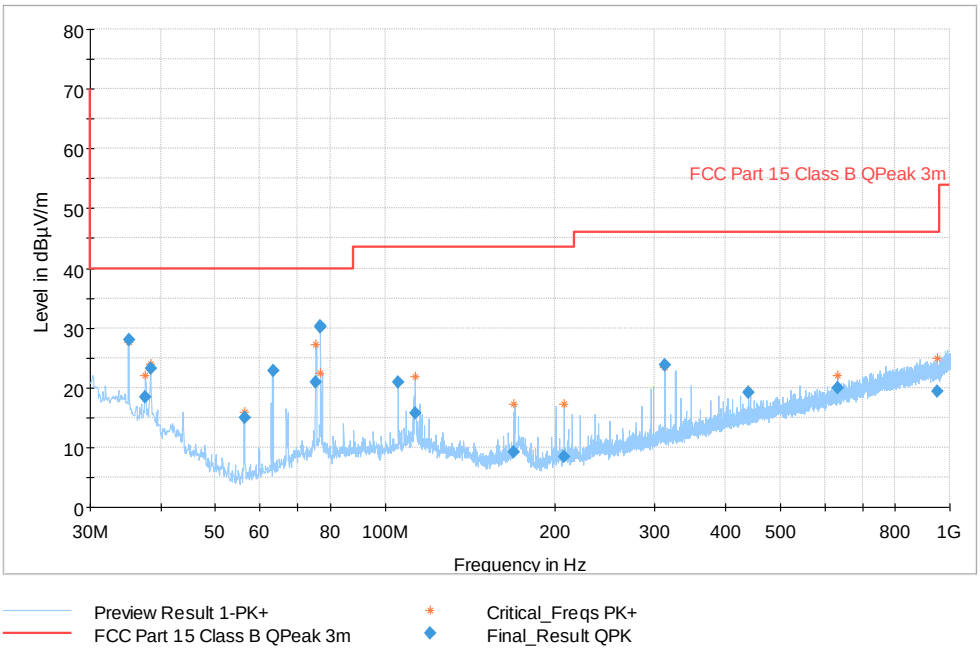
Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	parallel	2445	9kHz-30MHz



Preview Result 2-AVG
Critical_Freqs AVG
FCC Part 15 Class B QPeak 3m
Final_Result AVG
Preview Result 1-PK+
Critical_Freqs PK+
Final_Result QPK

Radiated Emissions - Test results for frequencies in the range 30 MHz – 1 GHz

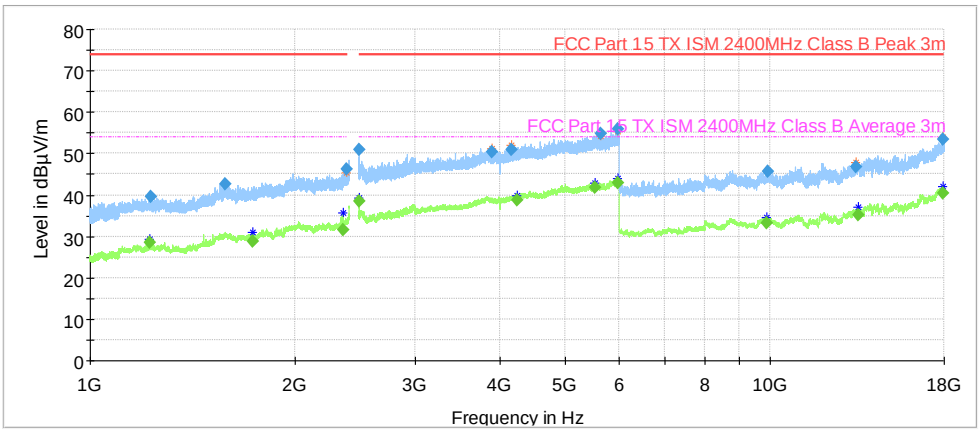
Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2445	30 MHz – 1 GHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
35.150240	28.07	40.00	11,93	120.000	100.0	V	22.0
38.388200	23.28	40.00	16,72	120.000	100.0	V	248.0
63.264840	22.90	40.00	17,1	120.000	179.0	V	161.0
75.357080	20.85	40.00	19,15	120.000	100.0	V	162.0
76.786720	30.17	40.00	9,83	120.000	157.0	V	202.0
76.796000	30.38	40.00	9,62	120.000	158.0	V	202.0

Radiated Emissions - Test results for frequencies in the range 1 GHz – 18 GHz

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2445	1GHz – 18 GHz



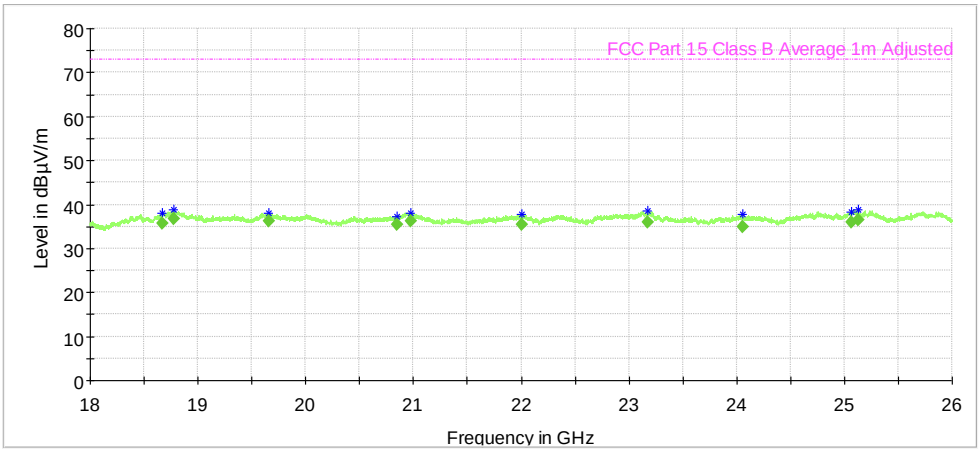
Preview Result 2-AVG
Preview Result 1-PK+
Critical_Freqs AVG
Critical_Freqs PK+
FCC Part 15 TX ISM 2400MHz Class B Peak 3m
FCC Part 15 TX ISM 2400MHz Class B Average 3m
Final_Result QPK
Final_Result AVG
Final_Result PK+

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2483.535362	38.37	---	54.00	15,63	1000.000	149.0	H	-5.0
4246.934000	38.80	---	54.00	15,2	1000.000	185.0	V	173.0
5531.278000	41.68	---	54.00	12,32	1000.000	149.0	V	262.0
5973.428000	42.80	---	54.00	11,2	1000.000	115.0	V	217.0
5977.234000	---	55.88	74.00	18,12	1000.000	200.0	H	90.0
17922.12100	40.38	---	54.00	13,62	1000.000	100.0	H	307.0

Radiated Emissions - Test results for frequencies in the range 18 GHz – 26 GHz

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2445	18GHz – 26 GHz

No tables of measured emissions are present since all emissions are more than 20dB lower than the limit.



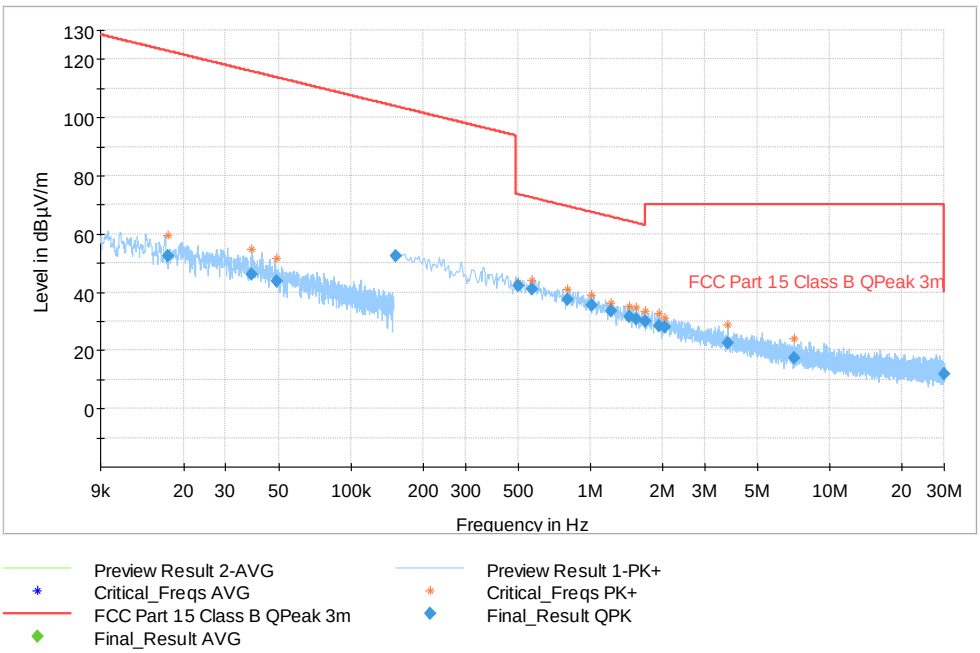
Preview Result 2-AVG [Preview Result 2.Result:2]
Preview Result 1-PK+ [Preview Result 1.Result:1]
Critical_Freqs AVG [Critical_Freqs.Result:5]
Critical_Freqs PK+ [Critical_Freqs.Result:4]
FCC Part 15 Class B QPeak 3m [..\]
FCC Part 15 Class B Average 1m Adjusted [..\]
Final_Result QPK [Final_Result.Result:4]
Final_Result AVG [Final_Result.Result:5]

5.3.3 Zigbee channel 26

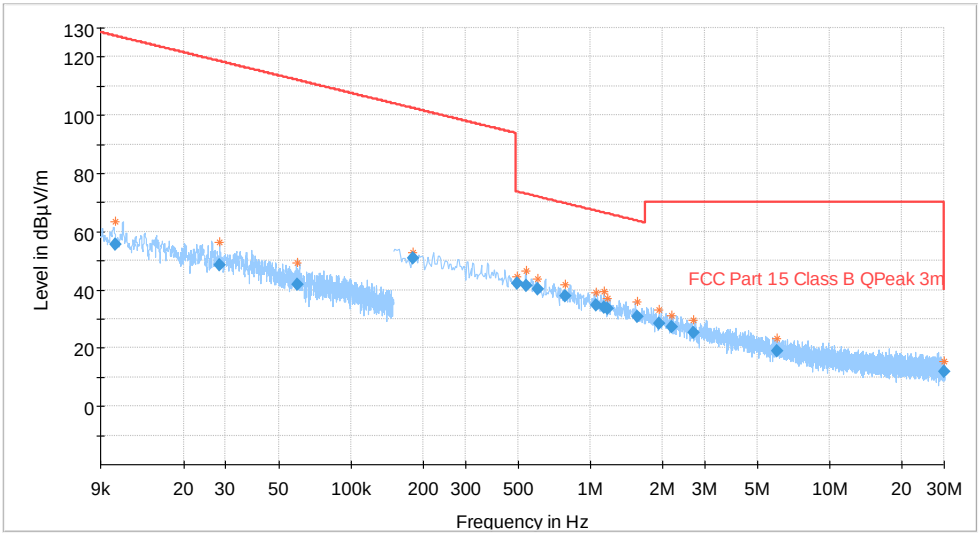
Radiated Emissions - Test results for frequencies in the range 9 KHz - 30 MHz

All emissions were greater than 20dB below the limit for all 9kHz to 30MHz tests.

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Perpendicular	2480	9kHz-30MHz

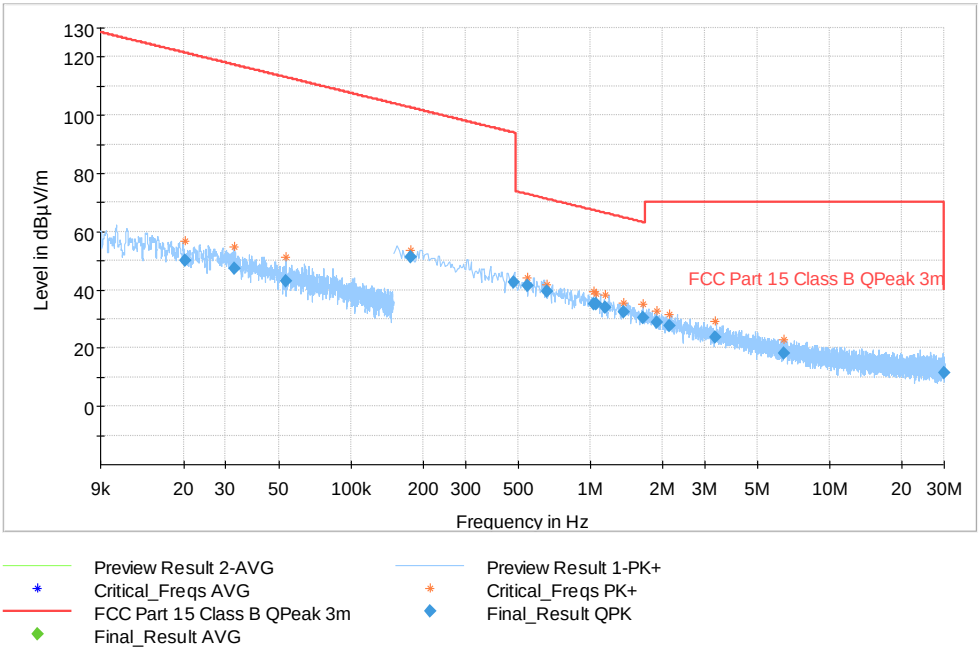


Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Ground-parallel	2480	9kHz-30MHz



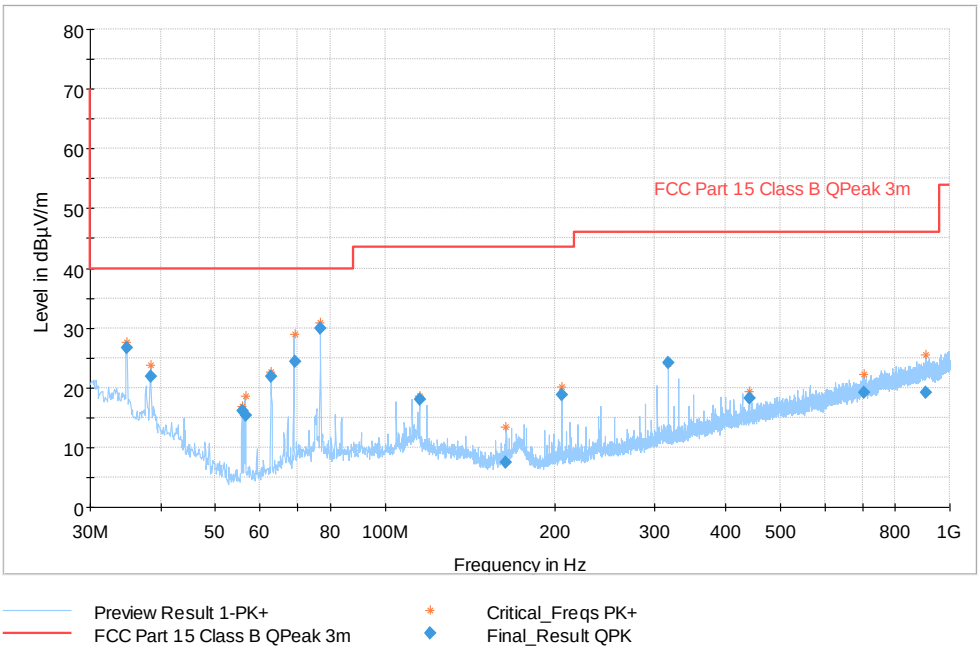
Preview Result 2-AVG
Critical_Freqs AVG
FCC Part 15 Class B QPeak 3m
Final_Result AVG
Preview Result 1-PK+
Critical_Freqs PK+
Final_Result QPK

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	parallel	2480	9kHz-30MHz



Radiated Emissions - Test results for frequencies in the range 30 MHz – 1 GHz

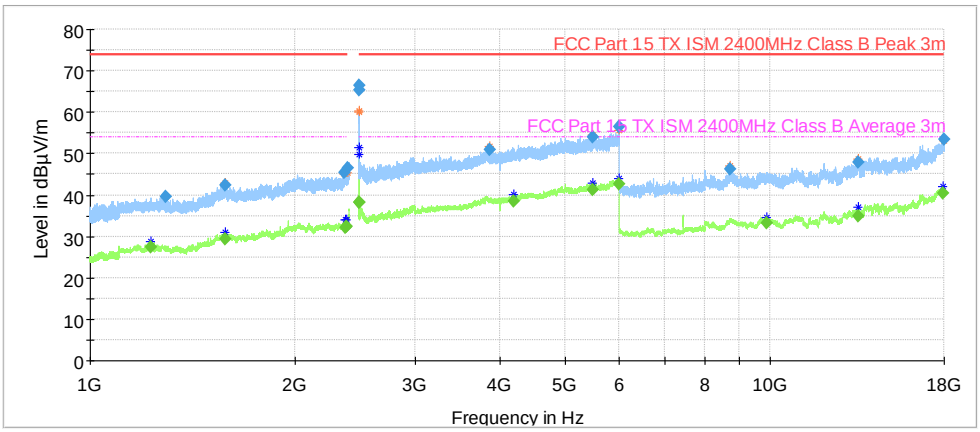
Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2480	30 MHz – 1 GHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
34.854560	26.74	40.00	13,26	120.000	100.0	V	247.0
38.387960	21.82	40.00	18,18	120.000	100.0	V	157.0
62.728720	21.95	40.00	18,05	120.000	175.0	V	179.0
69.076520	24.36	40.00	15,64	120.000	100.0	V	113.0
76.791440	30.01	40.00	9,99	120.000	128.0	V	202.0
317.128640	24.15	46.00	21,85	120.000	100.0	H	112.0

Radiated Emissions - Test results for frequencies in the range 1 GHz – 18 GHz

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2480	1GHz – 18 GHz



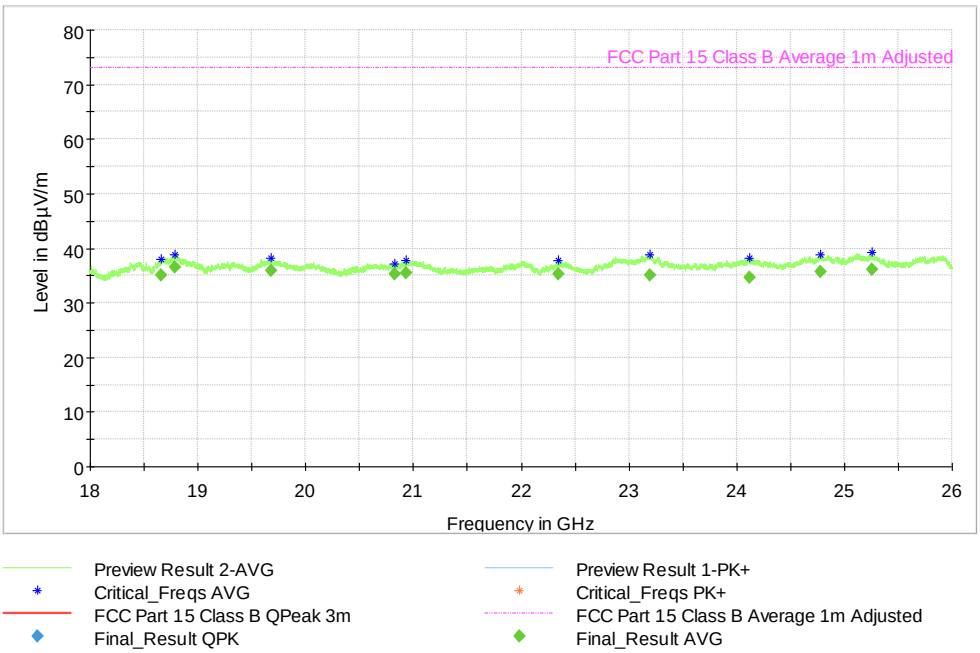
ExistingD2-AVG
ExistingD1-PK+
Average
MaxPeak
FCC Part 15 TX ISM 2400MHz Class B Peak 3m
FCC Part 15 TX ISM 2400MHz Class B Average 3m
Final_Result QPK
Final_Result AVG
Final_Result PK+

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2483.648839	---	66.36	74.00	7,64	1000.000	150.0	H	0.0
2483.667470	---	65.27	74.00	8,73	1000.000	100.0	H	0.0
2483.732660	38.19	---	54.00	15,81	1000.000	115.0	H	-8.0
4189.687000	38.47	---	54.00	15,53	1000.000	100.0	H	127.0
5474.597000	41.16	---	54.00	12,84	1000.000	100.0	H	232.0
5979.196000	42.59	---	54.00	11,41	1000.000	109.0	H	310.0

Radiated Emissions - Test results for frequencies in the range 18 GHz – 26 GHz

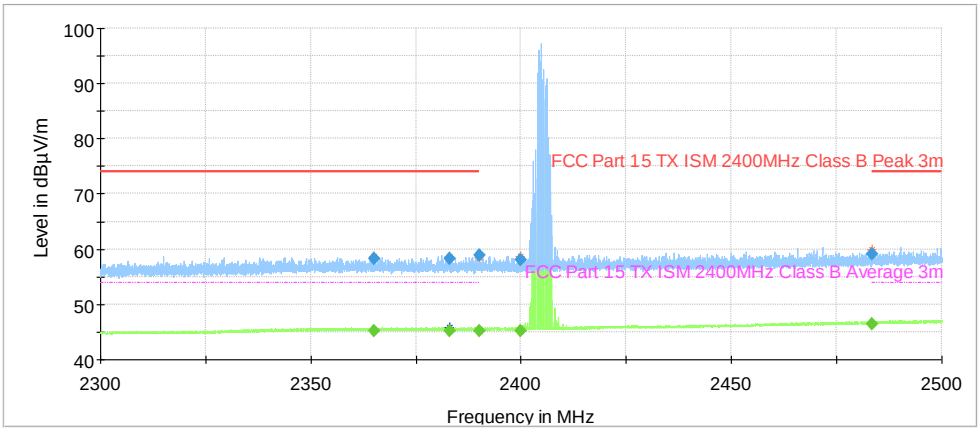
Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2480	18GHz – 26 GHz

No tables of measured emissions are present since all emissions are more than 20dB lower than the limit.



5.4 Test results, Band edge restricted band measurements

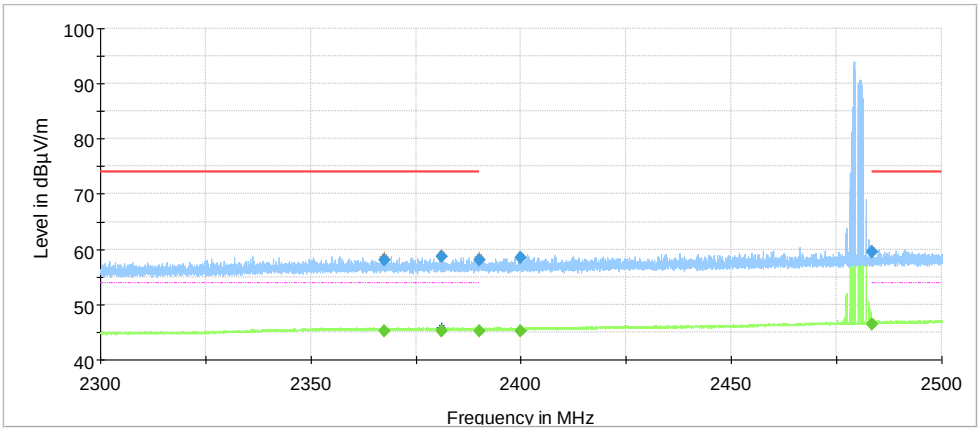
Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2405	2,3 GHz – 2,5 GHz



Preview Result 2-AVG
Preview Result 1-PK+
Critical_Freqs AVG
Critical_Freqs PK+
FCC Part 15 TX ISM 2400MHz Class B Peak 3m
FCC Part 15 TX ISM 2400MHz Class B Average 3m
Final_Result QPK
Final_Result AVG
Final_Result PK+

Frequency (MHz)	Average (dBµV/m	MaxPeak (dBµV/m	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
2390.000000	---	58.88	74.00	15.12	1000.0	1000.000	V	0.0
2390.000000	45.23	---	54.00	8.77	1000.0	1000.000	V	0.0

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Zigbee	Horizontal & Vertical	2480	2,3 GHz – 2,5 GHz



Preview Result 2-AVG
Preview Result 1-PK+
Critical_Freqs AVG
Critical_Freqs PK+
FCC Part 15 TX ISM 2400MHz Class B Peak 3m
FCC Part 15 TX ISM 2400MHz Class B Average 3m
Final_Result QPK
Final_Result AVG
Final_Result PK+

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
2483.500000	---	59.59	74.00	14.42	1000.0	1000.000	V	180.0
2483.500000	46.34	---	54.00	7.66	1000.0	1000.000	V	180.0

Note:
The duty cycle of this device is very low, according to 3.2 in this rapport it has been measured to be 1%. Due to this the normal average detector in the analyzer could not be used. Instead a peak detector has to be used. The sweep time has been adjusted to able to do an accurate peak measurement on the low duty cycle that the device is transmitting with. The peak value has to be adjusted with a correction factor due to the low duty cycle.

$$\delta = 20\log(\Delta)$$
$$\delta = is\ the\ duty\ cycle\ correction\ factor\ (dB)$$
$$\Delta = is\ the\ duty\ cycle\ (dimensionless)$$

(ANSI C63.10 chapter 7.6)

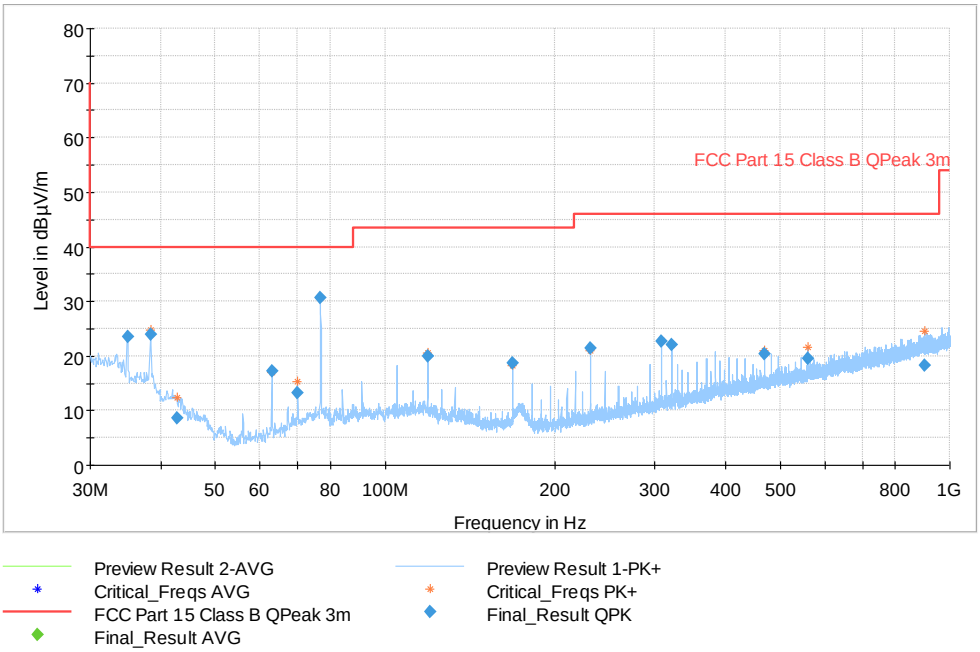
Correction factor for 1% is equal to -40dB.
The peak levels for both upper and lower band edges is already below limit and by lowering them with 40dB the margin will be even higher. So verdict is still PASS.

5.5 Test results, Test 2

5.5.1 Idle mode

Radiated Emissions - Test results for frequencies in the range 30 MHz – 1 GHz

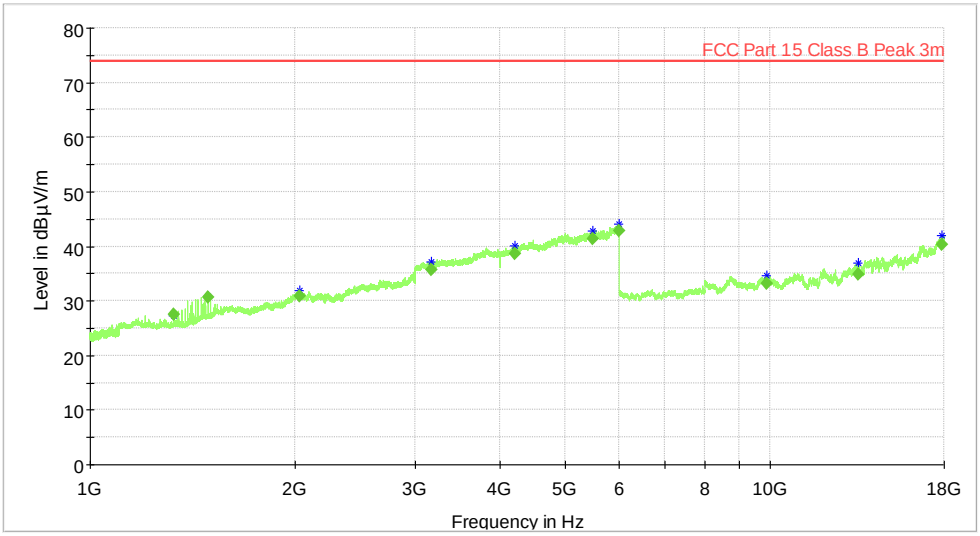
Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Idle	Horizontal & Vertical	-	30 MHz – 1 GHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
34.986600	23.62	40.00	16,38	120.000	103.0	V	68.0
38.386040	24.02	40.00	15,98	120.000	100.0	V	247.0
62.943720	17.23	40.00	22,77	120.000	175.0	V	247.0
76.801760	30.66	40.00	9,35	120.000	125.0	V	205.0
118.904800	19.99	43.50	23,51	120.000	100.0	V	287.0
307.770160	22.66	46.00	23,34	120.000	100.0	H	112.0

Radiated Emissions - Test results for frequencies in the range 1 GHz – 18 GHz

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Idle	Horizontal & Vertical	-	1GHz – 18 GHz



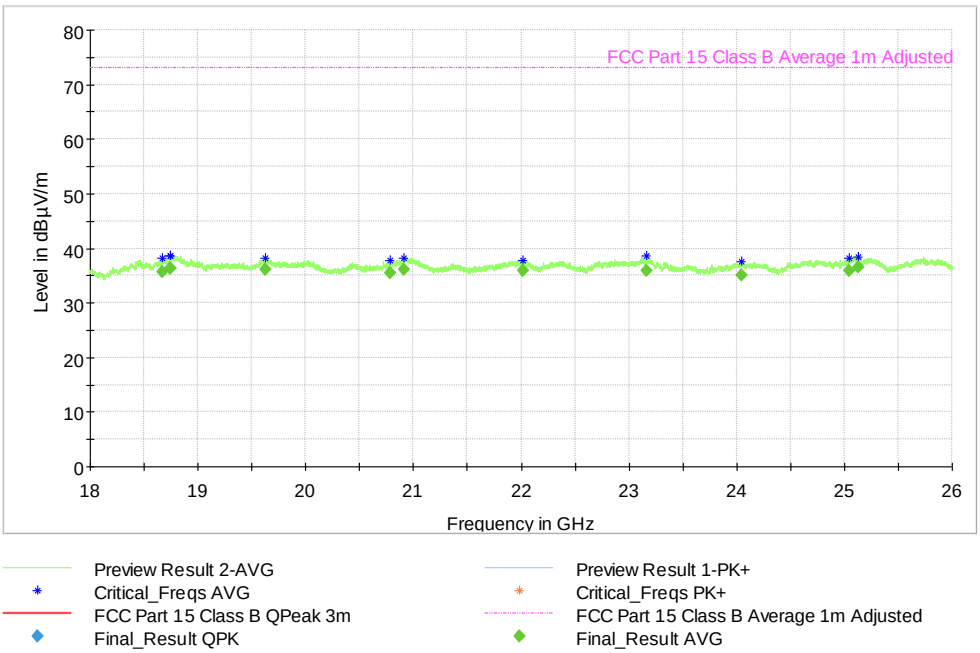
Preview Result 2-AVG
Critical_Freqs AVG
FCC Part 15 Class B Peak 3m
Final_Result AVG
Preview Result 1-PK+
Critical_Freqs PK+
Final_Result QPK

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
3178.515000	35.74	54.00	18,26	1000.000	197.0	H	232.0
4208.296000	38.54	54.00	15,46	1000.000	185.0	H	-8.0
5479.609000	41.34	54.00	12,66	1000.000	147.0	V	82.0
5978.610000	42.75	54.00	11,25	1000.000	110.0	H	130.0
13458.68600	34.90	54.00	19,1	1000.000	135.0	V	52.0
17885.94700	40.39	54.00	13,61	1000.000	100.0	V	172.0

Radiated Emissions - Test results for frequencies in the range 18 GHz – 26 GHz

Mode	Antenna orientation	Carrier Frequency (MHz)	Test Frequency
Idle	Horizontal & Vertical	-	18GHz – 26 GHz

No tables of measured emissions are present since all emissions are more than 20dB lower than the limit.



6 TEST EQUIPMENT LIST

SAC 5 – Radiated emissions						
Type:	**Manufacturer**	**Model**	**Serial Number**	**GTEM ID**	**Calibration date**	**Calibration Due:**
EMI Test Receiver	Rohde & Schwarz	ESW44	101760	2881044	27.07.2018	27.07.2019
Active Loop Antenna	EMCO	6502	9206-2775	2759035	31.10.2018	31.10.2019
Ultra Broadband Antenna	Rohde & Schwarz	HL562E	100988	2823181	08.03.2018	08.03.2020
Double Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF907	102678	2823164	13.02.2018	13.02.2020
Horn Antenna – 18 GHz – 26 GHz	ETS Lindgren	UG-596A/U	20898	2814839	10.08.2018	10.08.2019
Horn Antenna – 26 GHz - 40 GHz	ETS Lindgren	UG-600A/U	20623	2814834	10.08.2018	10.08.2019
Frequency Multiplier	Rohde & Schwarz	SMZ-90	101350	2886126	13.08.2018	13.08.2019
Control device	Maturo	NCD	NCD/393/2372.01	2884216	N/A	N/A
Open Switch & Control Unit	Rohde & Schwarz	OSP150	100081	2884198	09.09.2018	09.09.2019
Open Switch & Control Unit	Rohde & Schwarz	OSP120	100084	2761253	09.09.2018	09.09.2019
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 1	101333	2761265	09.09.2018	09.09.2019
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 2	101335	2761266	09.09.2018	09.09.2019
Shielded Filter Unit	Rohde & Schwarz	OSP-F Base Unit	101330	2761262	09.09.2018	09.09.2019
Humidity Temperature Probe	Rotronic	HF532-DG1XX21X	0061829280	2926379	14.08.2018	14.08.2020
EMI Test Receiver*	Rohde & Schwarz	ESR	101674	2704016	03.07.2019	03.07.2020

*Used for Band edge measurements only

7 MEASUREMENT UNCERTAINTY

Measurement Uncertainty for Radiated Emission (Coverage Factor k=2)	
Parameter	**Uncertainty**
Field Strength 10 Hz -9 kHz	3,38 dB
Field Strength 9 kHz -30 MHz	3,38 dB
Field Strength 30 MHz -1000 MHz	3,38 dB
Field Strength 1 GHz -18 GHz	4,88 dB
Field Strength 18 GHz - 40 GHz	5,14 dB

8 APPENDIX 1 – TEST SETUP PHOTOS

See report no. 60264954-003 Appendix 1