

Test report

according to ISO/IEC 17025:2017

FCC (Federal Communications Commission) Test Firm Registration Number: 768032 Designation Number DE0022

ISED (Inovation, Science and Economic Development) CAB identifier: DE0012 ISED#: 6155A

Electromagnetic compatibility

Intentional Radiators



DakkS Deutsche Akkreditierungsstelle D-PL-17379-01-00 D-PL-17379-01-02 D-PL-17379-01-03



BNetzA-CAB-18/21-19



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Test report no.:

20/01-0031

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Location of test facility:



STC Germany GmbH Ohmstrasse 1 84160 Frontenhausen Germany

1. Client information

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2. Equipment under test (EUT)

2.1 Identification of the EUT

Equipment:	WIFI+BT Combo Module
Model:	17WFM25
Brand name:	-/-
Serial no.:	-/-
Manufacturer:	Vestel Elektronik San ve Tic. A.S., Organize Sanayi Bölgesi, Vestel City, High-End, 45030 MANISA, TURKEY
Country of origin:	TURKEY
Power rating:	4.75 V – 5.25 V nominal 5 V = via USB
Highest frequency generated or used in the device or on which the device operates or tunes (MHz):	5.825
Date Sample Received:	16.01.2020
Tests were performed:	03.03.2020 - 18.06.2020

2.2 Additional information about the EUT:

The EUT can also operate simultaneously as 2.4 GHz or 5 GHz Wifi module. The 2.4 GHz / 5 GHz is not documented in this Report.

To duplicate parts of this test report needs the written confirmation of the test laboratory.

The test results relate only to the above mentioned test sample(s).

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3. Description of the Equipment under test and test conditions

FCC-ID:	241/08 17W/EM25		
	2AVQS-17WFM25 25888-17WFM25		
HVIN:			
Firmware version:	080419R4		
	V0.5.0.0, Wi-Fi Component: V1.1.0 Media Tek BT Tool (Version: W1746)		
Software to control EUT:	4.75 V – 5.25 V nominal		
Power:		5 V = VIA USB	
Cables:	USB cable 100 cm		
	Cable to test adaptor 30	CIII	
Approx. Size (I x w x h):	(70 x 25 x 4.5) mm		
Test conditions:	The "WIFI+BT Combo Module – 17WFM25" (= equipment under test – EUT) had been tested, where applicable with test software Media Tek BT Tool and with maximal RF-output in the following modes:		
	(1) Bluetooth 5.0: Tx mode GFSK 2402.0 MHz (2) Bluetooth 5.0: Tx mode GFSK 2441.0 MHz (3) Bluetooth 5.0: Tx mode GFSK 2480.0 MHz (4) Bluetooth 5.0: Tx mode π /4-DQPSK 2402.0 MHz (5) Bluetooth 5.0: Tx mode π /4-DQPSK 2441.0 MHz (6) Bluetooth 5.0: Tx mode π /4-DQPSK 2480.0 MHz (7) Bluetooth 5.0: Tx mode 8DPSK 2402.0 MHz (8) Bluetooth 5.0: Tx mode 8DPSK 2441.0 MHz		
	 (9) Bluetooth 5.0: Tx mode 8DPSK 2480.0 MHz (10) Bluetooth 5.0: Tx mode 8DPSK Hopping Mode The tested configuration represents (based on the product specification) with the tested operation modes the worst case. 		
RF Module Model Number:	17WFM25		
Frequency range:	2.400 GHz – 2.483,5 GH	17	
Operating frequencies:	2.402 GHz – 2.480 GHz		
Module Tranmission Type:	Bluetooth 5.0 (FHSS)		
Modulation:	GFSK	π/4-DQPSK	8DPSK
Data Rates:	1 MBit/s	2 MBit/s	3 MBit/s
Channel separation:	1 MHz	1 MHz	1 MHz
Number of channels:	79	79	79
Spurious Emissions:	50.68 dBµV/m @ 3 m	50.68 dBµV/m @ 3 m	50.68 dBµV/m @ 3 m
radiated lowest margin to limit Environmental conditions during tests:	Ambient temperature: Relative humitity Atmospheric pressure	20 °C 40 % 965 mbar	
Antenna specification:	Model: Printed PCB Antenna Gain: max. 0.29 dBi Type: External (with accessible antenna socket) Internal (integrated, PCB antenna)		
Test standard:	 e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz 		
	 RSS-247 issue 02 February 2017 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices 		

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Channel List

Unan		
Frequency (MHz)	Channel	Frequency (MHz)
2402	42	2444
2403	43	2445
2404	44	2446
2405	45	2447
2406	46	2448
2407	47	2449
2408	48	2450
2409		
2410	70	2472
2411	71	2473
	72	2474
2438	73	2475
2439	74	2476
2440	75	2477
2441	76	2478
2442	77	2479
2443	78	2480
	Frequency (MHz) 2402 2403 2404 2405 2406 2407 2408 2409 2410 2410 2410 2411 2438 2439 2441 2442	Frequency (MHz) Channel 2402 42 2403 43 2404 44 2405 45 2406 46 2407 47 2408 48 2409 ··· 2410 70 2411 71 ··· 72 2438 73 2439 74 2440 75 2441 76 2442 77

4. Performed measurements and results

The complete list of measurements required in e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 is given below.

Standard:	Standard:	Test Method:		Tes	t requi	remen	ts:	
otandara.	otandara.	rest method.			applicable:		fulfilled:	
				yes	no	yes	no	
§ 15.207	RSS-Gen issue 5	ANSI 63.10 Section 6.2	AC Mains Conducted Emissions	\boxtimes		\boxtimes		
§ 15.209	RSS-Gen issue 5	ANSI 63.10 Section 6.3 - 6.6	Radiated Emissions	\boxtimes		\boxtimes		
§15.247	RSS-247 issue 2	ANSI 63.10 Section 7.8.7	20 dB Bandwidth					
§15.247	RSS-247 issue 2	ANSI 63.10 Section 7.8.5	Output Power of Fundamental Emissions					
§15.247	RSS-247 issue 2	ANSI 63.10 Section 7.8.3	Number of Operating Channel	\boxtimes				
§15.247	RSS-247 issue 2	ANSI 63.10 Section 7.8.2	Carrier Frequency Separation	\boxtimes		\boxtimes		
§15.247	RSS-247 issue 2	ANSI 63.10 Section 7.8.6	Band Edges Measurement	\boxtimes		\boxtimes		
§15.247	RSS-247 issue 2	ANSI 63.10 Section 7.8.4	Occupancy Time (Dwell time)	\boxtimes		\boxtimes		
	RSS-Gen issue 5	ANSI 63.10 Section 6.9.3	99% Power Bandwidth	\square		\boxtimes		

All required / applicable tests according to the following standards were performed under Ref-No. 20/01-0031.

- e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 with test Method according to ANSI C63.10-2013

-RSS-247 issue 02 February 2017 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

- e-CFR data is current as of June 23, 2020

Remark: -/-



5. Antenna requirement

Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart B, § 15.203 Conducted limits

Test conditions and configuration of EUT

The EUT was configured and operated with conditions as mentioned under "Test conditions" in clause 3 above.

Module has on board printed antennas with the given gain values below.

Onboard PCB Antennas Ant 0 + Ant 1

Oboard Antennas:

Antenna	Туре	Gain (2.4 GHz) (dBi)
PCB Onboard	Ant 0	3.4
PCB Onboard	Ant 1	2.12

Requirements:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Usage with PCB antennas There is no external antenna, the antenna gain max =3.4dBi User is unable to remove or change the Antenna



6. AC Mains conducted emissions

Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.207 Conducted limits -RSS-Gen issue 05 section 8.8

Test site

Measurements of conducted emission from EUT was made in the shielded chamber (DC - 10GHz) located in the test facility.

Test equipment and test set up

Test equipment used for conducted measurements on Mains as given in clause Test equipment of this report. Test setup used for conducted measurements on Mains as given in clause Test setups of this report.

Detector function selection and bandwidth

In conducted emissions measurement CISPR quasi-peak- and average-detector were used. The bandwidth of the detector of instrument is 10 kHz over the frequency range of 150 kHz to 30 MHz.

Frequency range to be scanned

For conducted emission measurements, the spectrum in the range of 150 kHz to 30 MHz was investigated.

Test conditions and configuration of EUT

The EUT was configured and operated with conditions as mentioned und "Test conditions" in clause 3 of this report.

All modes are investigated by operating the EUT in a range of typical modes of operation, with typical cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation and for each ac power current-carrying conductor, cable manipulation are performed within the range of likely configurations. The highest values measured are shown in the table below. The corresponding configuration is shown in the "Photo(s) of test setup".

The EUT was placed on a 80 cm high non metallic table. Measurements were performed on the AC terminals of the Host AC-Adaptor (Laptop), on neutral (N)- and live (L1)-wire had been performed.

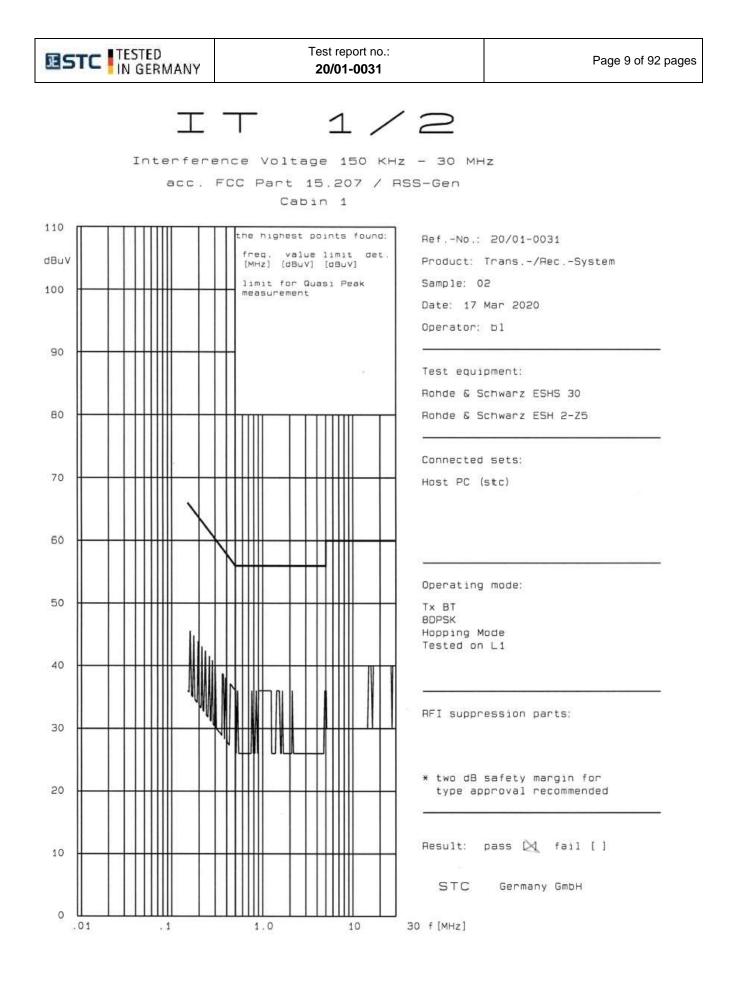
Requirements

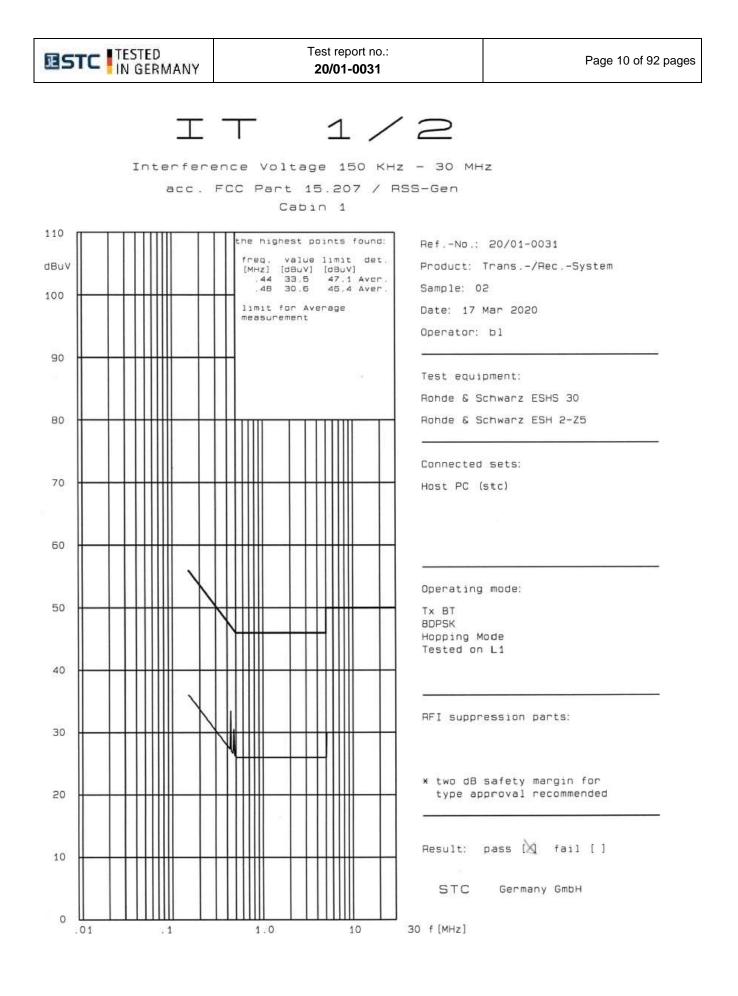
Frequency Range	Quasi-Peak Limits	Average Limits	
[MHz]	[dBµV]	[dBµV]	
0.15 - 0.5	66 to 56 ^{Note 1}	56 to 46 Note 1	
0.5 - 5.0	56	46	
5.0 - 30.0	60	50	
Note 1: The level decreases linearly with the logarithm of the frequency			

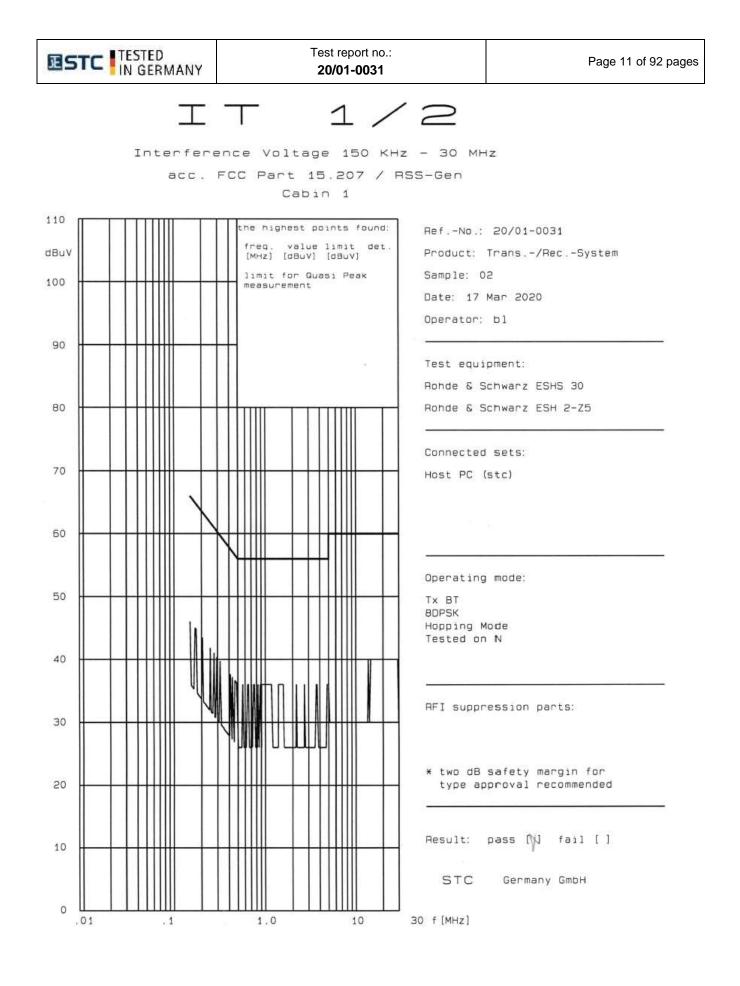
Measurement

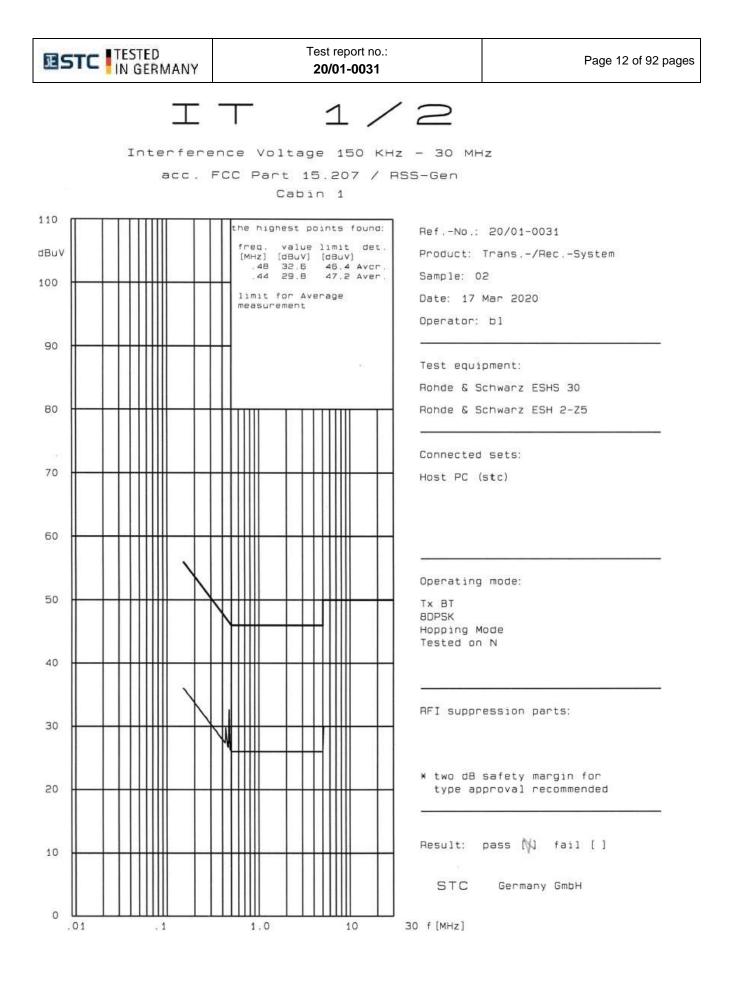
Measruement performed on 17.03.2020

As worst cases the mode No.: 10 with Transmitting 8DPSK in hopping mode was found and documented in this report.











Remarks:

Composition of the measurement value:

$M_{Value} = M_{Rec} + C_{Loss} + LISN_{cor}$

 $\begin{array}{ll} M_{Value} &= Measurement \, Value \\ M_{Rec} &= Reading \, value \, of \, test \, receiver \\ C_{Loss} &= Cable \, loss \, between \, Receiver \, and \, LISN \\ LISN_{cor} &= LISN \, correction \, factor. \end{array}$

Sample calculation:

 $40.8 \text{ dB}\mu\text{V} = 40.1 \text{ dB}\mu\text{V} + 0.3 \text{ dB} + 0.4 \text{ dB}$

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Conducted Emission**.



7. Radiated emission measurements

Test site

Measurement of radiated emissions from EUT was made in the semi-anechoic chamber SAC3 (DC to 40 GHz) located in the test facility.

Test equipment and test set up

Test equipment used for radiated measurements as given in clause Test equipment of this report. Test setup used for radiated measurements as given in clause Test setups of this report.

Detector function selection and bandwidth

In radiated emissions measurement, an EMI test receiver that have CISPR detectors was used.

Frequency range	Resolution Bandwidth
9KHz – 150kHz (Quasi Peak & Average* Detector)	200Hz
150KHz – 30MHz (Quasi Peak & Average* Detector)	9kHz
30MHz – 1GHz (Quasi Peak Detector)	120kHz
Above 1GHz (Peak & Average Detector)	1MHz

*Average Detector only in specify frequency range.

Antennas

Measurements were made using a calibrated loop antenna in the range 9 kHz – 30 MHz, as well as a calibrated bilog antenna in the range of 30 to 1000 MHz to determine the emission characteristics of the EUT. Measurements were also made for both horizontal and vertical polarization.

The horizontal distance between the receiving antenna and the EUT was 3 meters.

In the range of 1 GHz to 40 GHz measurements were made using a calibrated horn antenna to determine the emission characteristics of the EUT. Measurements were also made for both horizontal and vertical polarization. The horizontal distance between the receiving antenna and the EUT was 3 meters.

Frequency range to be scanned

For radiated emissions measurements, the spectrum in the range of 9 kHz to 40 GHz was investigated as the highest frequency generated in the EUT is 5.825 GHz.

Test conditions and configuration of EUT

The EUT was configured and operated with conditions as mentioned under "Test conditions" in clause 3 above.

During test the EUT was operated as specified in the user manual of the EUT. For frequencies below 1000 MHz the EUT was placed on a 80 cm and for frequencies above 1000 MHz the RF Transmitter modul was placed on a 150 cm high non metallic table placed on the turntable. The EUT was rotated and the antenna height was varied between 1 m to 4 m to find the maximum RF energy generated from EUT. The procedure according to ANSI C63.10:2013 is used and all modes are investigated by operating the EUT in a range of typical modes of operation, with typical cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation, cable manipulation are performed within the range of likely configurations. The highest values measured are shown in the table below.

As worst cases the mode No.: 10 Transmitting 8DPSK in hopping mode was found and documented in this report.

Remarks:

-Correction factor included antenna factor and cable attenuation.

-In the frequency range 1 GHz – 7 GHz the Band Reject Filter 2,4 GHz (ID11243) was used to attenuate the fundamental emission.

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Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits -RSS-Gen issue 05 section 8.9

Requirements

acc. e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits

Frequency MHz	Limits [µV/m] Quasi-peak	Limits [dBµV/m] Quasi-peak	Limits [µV/m] Average	Limits [dBµV/m] Average	Test distance [m]
0.009 - 0.090	-/-	-/-	2400/F (kHz)	48.5 – 28.5	300
0.090 - 0.110	2400/F (kHz)	28.5 – 26.8	-/-	-/-	300
0.110 - 0.490	-/-	-/-	2400/F (kHz)	26.8 – 13.8	300
0.490 - 1.705	24000/F (kHz)	33.8 – 23.0	-/-	-/-	30
1.705 - 30.0	30	29.5	-/-	-/-	30

acc. RSS-Gen issue 05 section 8.9

Frequency MHz	Limits [µA/m] Quasi-peak	m] [dBμA/m] [μA/m] [dBμA/m] peak Quasi-peak Average Average		Test distance [m]	
0.009 - 0.090	-/-	-/-	6.37/F (kHz)	-3 – -23.0	300
0.090 - 0.110	6.37/F (kHz)	-23.0 – -24.7	-/-	-/-	300
0.110 – 0.490	-/-	-/-	6.37/F (kHz)	-24.7 – -37.7	300
0.490 - 1.705	63.7/F (kHz)	-17.7 – -28.5	-/-	-/-	30
1.705 - 30.0	0.08	-22	-/-	-/-	30

acc. e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits and RSS-Gen issue 05 section 8.9

Frequency MHz	Limits [µV/m] Quasi-peak	Limits [dBµV/m] Quasi-peak	Limits [µV/m] Average	Limits [dBµV/m] Average	Test distance [m]
30 - 88	100	40	-/-	-/-	3
88 - 216	150	43.5	-/-	-/-	3
216 - 960	200	46	-/-	-/-	3
960 - 1000	500	54	-/-	-/-	3
Above 1000	-/-	-/-	500	54	3

Measurements

The Measurement was performed on: 12.03.2020 and 16.06.2020

Result 9 kHz – 30 MHz

In the frequency range 9 kHz – 30 MHz the EUT had been scanned in a distance of 3 m and the Limit were corrected to the test distance of 3 m using a factor with 40 dB/decade acc. to § 15.31 (f)(2).

Only the worst case of the X,Y and Z axis measurement is documented in this report.



Result 9 kHz – 30 MHz

Operation Mode No.: 10. Transmitting 8DPSK in Hopping Mode



IT 3/4 Interference radiation (9kHz – 30MHz) acc.FCC Subpart C § 15.209



Ref.-No.: 20/01-0031

Operation mode: Tx BT; 8DPSK; Hopping Mode

Position X (9kHz - 150kHz)

Receiver		
RBW (QPK) 200 Hz	2 MT 15	EMCO-6502-E-Feld. TDF
InputIDC Att 10 da	Preamp OFF	Step TD Scan
Scan 😑 1QP Max		
10 KHenit Check Line FCC-9KHZ - 30MHz 3	PASS Bm PASS	
130 dBµV/m		
FCC-9KHZ - 30MHz_3m.LIN		
120 dBµV/m		
110 dBµV/m		
100 dBµV/m		
90 dBµV/m		
80 dBµV/m		
 70 dBµV/m		
60 dBµV/m		
oo dogayim		
59-d8µV/m		
	man man	TF
Start 9.0 kHz		Stop 150.0 kHz

	Position: X								
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
9kHz - 150kHz	-/-	>20	-/-	pass					

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Interference radiation (9kHz – 30MHz) acc.FCC Subpart C § 15.209

Ref.-No.: 20/01-0031

Operation mode: Tx BT; 8DPSK; Hopping Mode

Position X (150kHz - 30MHz)

RBW (QPK) 9 kHz MT 1 s EMCO-6502-E-Feld.TDF
Input 1 DC Att 10 dB Preamp OFF Step TD Scan
Scan 🕒 1QP Max
Limit Check 1 MHPASS 10 MHz
FCC-9KHZ - 30MHz 3m PASS
TUU OBHVYM
90 dBµV/m
80 dBµV/m
70 dBµV/m
60 dBµV/m
50 dBµV/m
40 dBµV/m
30 dвµV/m
20 dBµV/m
here here
Start 150.0 kHz Stop 30.0 MHz

Position: X								
		Detector QP						
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result				
150kHz- 30MHz	-/-	>20	-/-	pass				

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Summery result for frequency range 9 kHz - 30 MHz to show combliance with RSS-Gen limits:

Function	Freq.	Measured Value @ 3m		rsion to c field ^{Note 1}	Lin @:		Margin	Result
	[MHz]	[dBµV/m]	[dBµA/m]	[µA/m]	[dBµA/m]	[µA/m]	[dB]	
	0.009 – 0.490	< 50.0	<- 1.5	-/-	77 - 42.3	-/-	>20	Pass
Transmitting	0.490 – 1.705	< 47.0	< -4.5	-/-	22.3 - 11.5	-/-	>20	Pass
	1.705 - 30	< 38.0	< -13.5	-/-	18	-/-	>20	Pass

Note 1: Converstion E-field to H-Field: $x [dB\mu V/m] - 51.5 = y [dB\mu A/m]$

> Converstion [dB μ A/m] in [μ A/m] 10 ^ (y [dB μ A/m] / 20) = z [μ A/m]

Remarks: Composition of the measurement value (Freq.-range < 30 MHz):

$M_{Value} = M_{Rec} + C_{Loss} + AF_{Rec}$

M _{Value}	= Measurement Value
M_{Rec}	= Reading value of test receiver
C_{Loss}	= Cable loss between Receiver and Antenna
AF_{Rec}	= Antenna factor.

Sample calculation:

 $38.2 \text{ dB}\mu\text{V} = 18.3 \text{ dB}\mu\text{V} + 0.1 \text{ dB} + 19.8 \text{ dB}$

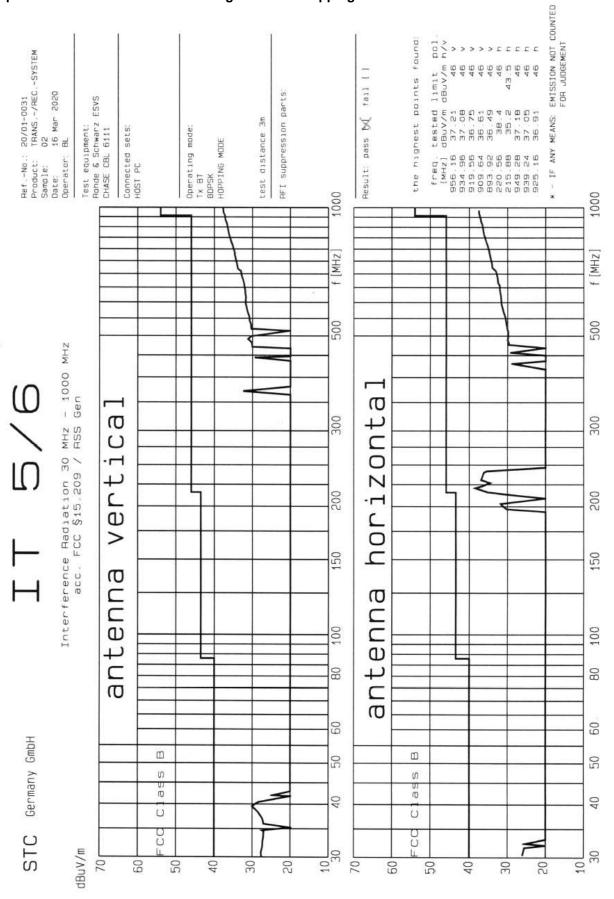
All emissions in the frequency range 9 kHz – 30 MHz are at least 20 dB below the relevant limit.



Result 30 MHz – 1000 MHz

,

Operation Mode No.: 10. Transmitting 8DPSK in Hopping Mode





Remarks:

Composition of the measurement value (Freq.-range 30 MHz - 1000 MHz):

$M_{Value} = M_{Rec} + C_{Loss} + AF_{Rec}$

- M_{Value} = Measurement Value
- M_{Rec} = Reading value of test receiver
- C_{Loss} = Cable loss between Receiver and Antenna
- AF_{Rec} = Antenna factor.

Sample calculation:

 $38.7 \text{ dB}\mu\text{V} = 18.3 \text{ dB}\mu\text{V} + 0.6 \text{ dB} + 19.8 \text{ dB}$

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Result 1 GHz – 7 GHz

Operation Mode No.: 10. Transmitting 8DPSK in Hopping Mode

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Product:	Transmitting/Receiving System	
Sample:	02	

pass

 \times

Result:

fail

Date: 12.03.2020

BI

Operator:

Remarks:

Operation mode: Tx BT / 8DPSK / Hopping Mode

Receiver	Spectrum	×					
	RBW (EMI) 1 MHz	MT	1 s		IT56-1-6GHz.	TDF	
Input 1 AC	Att 0 dB	Preamp	OFF St	ep TD Scan			
Scan 🔵1Av	Max o 2Pk Max						
Limit Ch	ieck		PASS				
	6-1-7GHZ-PEAK-		PASS				
90 dBjrv¢rã ⊺5	6-1-7CHZ-AV-FG	C-BT	PASS	-11-			
				10			
80 dBuV/m-							
IT56-1-7GHZ-P	PEAK-ECC-BT						
70 ивру/ш	2111100001						
60 dBµV/m—							
IT56-1-7GHZ-A	V-FCC-BT						4
SU UBUV/III							the way
				111		when when	1
40 dBµV/m—			م اطبيبا هي بالا	Marine	the same the party of the same		
	- endership	Winner with	listra dha ak			man	Munter the second
30 dBµV/m—	(Allender Contraction				mandam	same	
	h		marker	a have	V		
mon	mumment						
20 dBµV/m—							
10 dBµV/m—							
						Τ̈́F	
Start 1.0 GF	łz						Stop 7.0 GHz

	Polarisation: V								
Detector Average							Detector Peak		
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
4,8800	50,68	-3,32	54,00	pass	1-7	-/-	>20	74	pass
4,9060	50,66	-3,34	54,00	pass					
4,8600	49,46	-4,54	54,00	pass					
4,8680	48,21	-5,79	54,00	pass					
4,9500	45,63	-8,37	54,00	pass					
6,9988	39,40	-14,60	54,00	pass					



TESTED

IT 5/6



Interference radiation acc. to FCC § 15.209 / RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: Tx BT / 8DPSK / Hopping Mode

Receiver Spectrum X	
RBW (EMI) 1 MHz MT 1 s IT56-1-6GHz.TDF	<u> </u>
Input 1 AC Att 0 dB Preamp OFF Step TD Scan	
Scan 🔵 1Av Max 😋 2Pk Max	
Limit Check PASS	
Line IT56-1-7GHZ-PEAK-FCC-BT PASS	
90 dBjrwmT56-1-7CHZ-AV-FGG-8T PA88	
80 dBµV/m	
IT56-1-7GHZ-PEAK-FCC-BT	
70 uBpv/m	
60 dBµV/m	
IT56-1-7GHZ-AV-FCC-BT	
40 dBµV/m 30 dBµV/m 30 dBµV/m	(A. 16)
man hundre the second sec	
40 dBµV/m	- m
her and the function with the second and the	
30 dBµV/m	
30 dBpv/m	
manument	
20 dBµV/m-	
10 dBµV/m	
н <mark>т</mark>	
Start 1.0 GHz Stop 7.0 G	Hz

	Polarisation: H								
Detector Average							Detector Peak		
Frequ . [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
4,8560	43,90	-10,10	54,00	pass	1-7	-/-	>20	74	pass
6,9238	39,52	-14,48	54,00	pass					
6,9923	39,44	-14,56	54,00	pass					
5,7373	38,22	-15,78	54,00	pass					
6,5233	38,22	-15,78	54,00	pass					
6,1430	38,08	-15,92	54,00	pass					

No further significant emission found above 7GHz



Remarks:

Composition of the measurement value (Freq.-range 1 GHz – 7 GHz):

$M_{Value} = M_{Rec} + C_{Loss} + AF_{Rec} - G_{Amp}$

M_{Value}	= Measurement Value
M_{Rec}	= Reading value of test receiver
C_{Loss}	= Cable loss between Receiver and Antenna
AF_{Rec}	= Antenna factor.
CLoss	= Cable loss between Receiver and Antenna

 G_{Amp} = Gain Amplifier

Sample calculation:

39.7 dBµV = 53.01 dBµV + 0.9 dB + 24.19 dB -38.4 dB

Result 7GHz – 40GHz

All emissions in the frequency range 7 GHz – 40 GHz are at least 20 dB below the relevant limit

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Radiated Emissions**.



8. Operation within the band 902-928 MHz, 2400-2483,5 MHz and 5725-5850 MHz

Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 -RSS-247 issue 2

8.1. 20 dB Spectrum Bandwidth Measurement

Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (a) (1) -RSS-247 issue 2 Section 5.1 (a)

Limit

The minimum 20 dB bandwidth shall be at least 25 kHz.

Test equipment and test set up

Test equipment used for conducted measurements as given in clause Test equipment of this report. Test setup used for conducted measurements as given in clause Test setups of this report.

Description

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

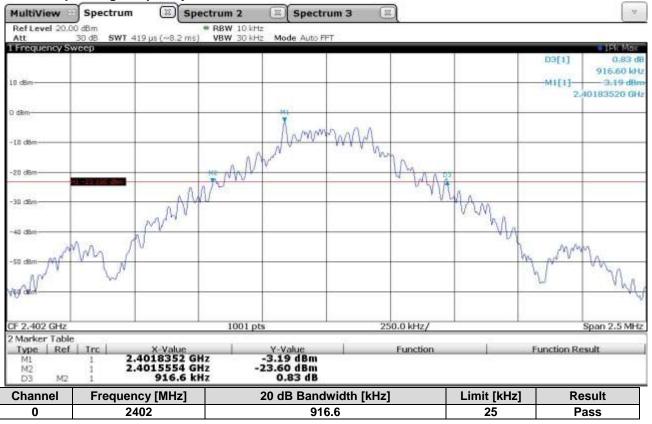
Measurement

The Measurement was performed on: 03.03.2020

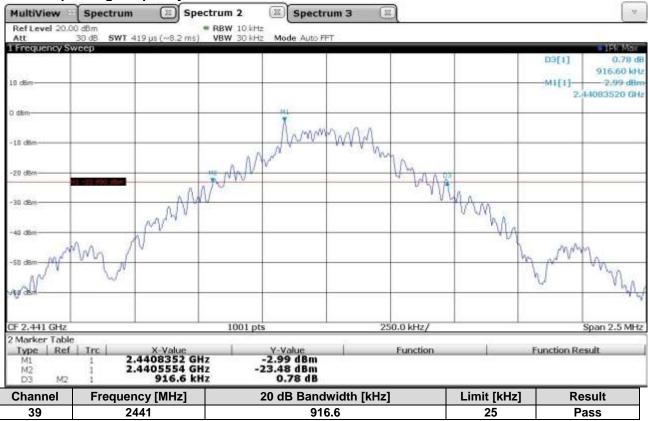
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Lowest Operating Frequency - GFSK

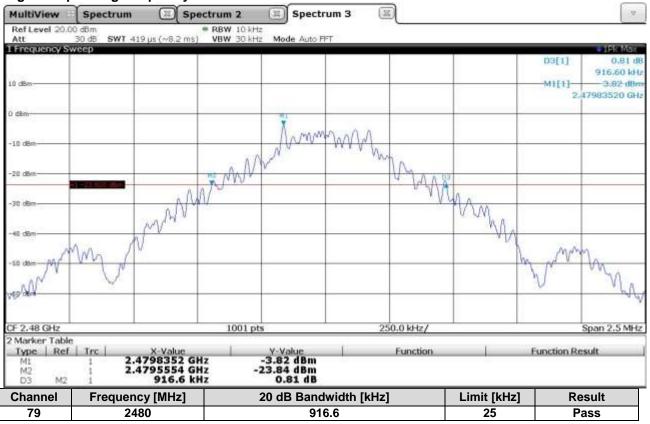


Middle Operating Frequency - GFSK

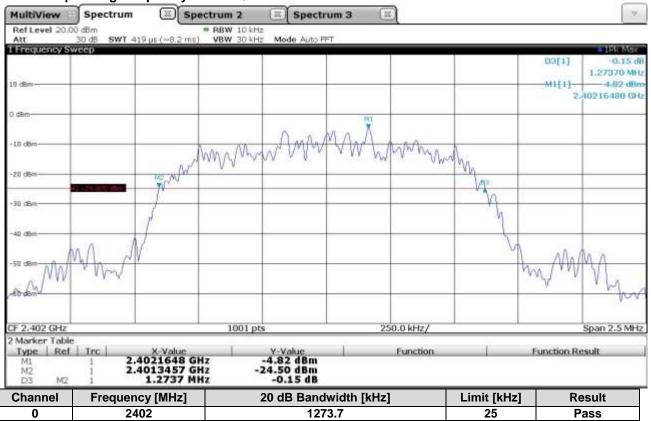


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Highest Operating Frequency - GFSK



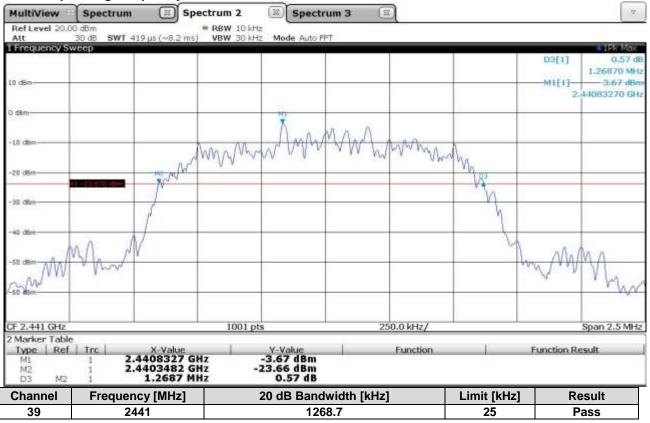
Lowest Operating Frequency - π/4 DQPSK



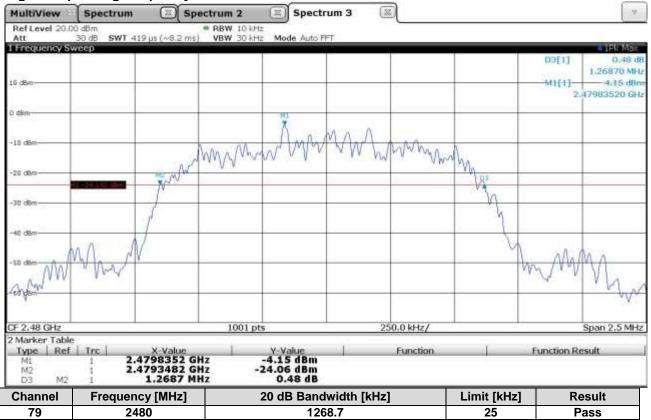
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Middle Operating Frequency - π/4 DQPSK



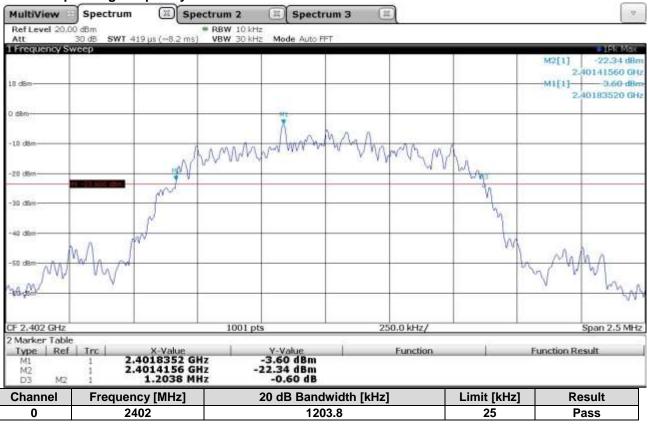
Highest Operating Frequency - π/4 DQPSK



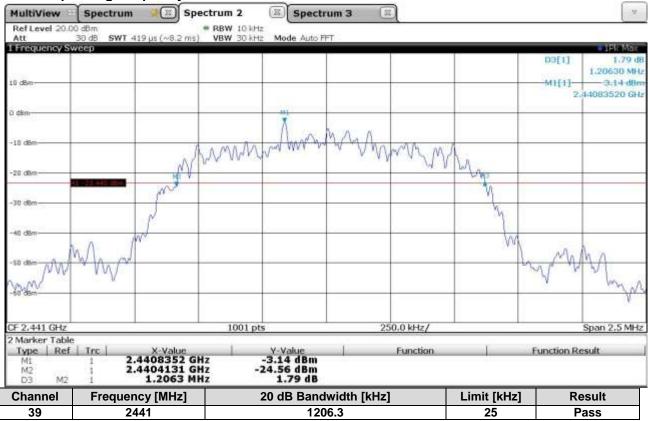
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Lowest Operating Frequency - 8DPSK

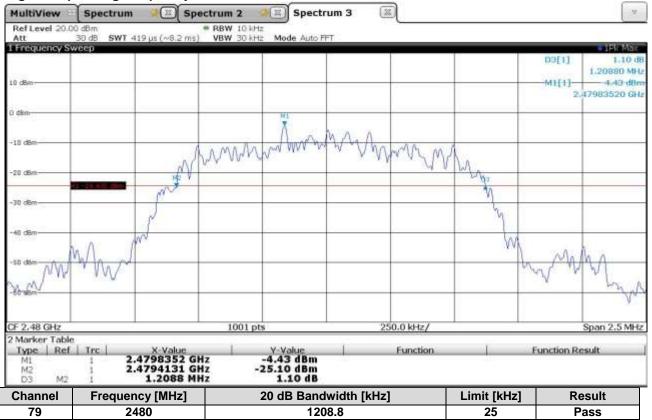


Middle Operating Frequency - 8DPSK



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Highest Operating Frequency - 8DPSK



Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **20 dB Bandwidth**.



8.2. Output Power of Fundamental Emissions Maximum Peak Output Power

Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (b) (1) -RSS-247 Issue 2 section 5.4 (b)

Limits for Peak Output Power of Fundamental (EIRP)

For FHSS in the 2400 – 2483.5 MHz Band the maximum peak output power shall not exceeded the following limits:

For frequency hopping systems employing at least 75 hopping channels: 1 Watt For frequency hopping systems employing less then 75 hopping channels: 0.125 Watt The e.i.r.p shall not exceed 4 Watt.

Test equipment and test set up

Test equipment used for conducted measurements as given in clause Test equipment of this report. Test setup used for conducted measurements as given in clause Test setups of this report.

Description

For the conducted measurement, the RF output of the EUT was connected to the Analyzer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in Watt.

Measurement

The Measurement was performed on: 03.03.2020

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Lowest operating frequency – GFSK

MultiView	Spectrum	E) s	pectrum 2	E Spectr	um 3 [D			V
Ref Level 20.00) dBm		W 2 MHz W 5 MHz Mode	Auto Sweep					_
1 Frequency Sw	eep							M1[1]	1FK M98 3.59 dBm .40190410 GHz
10 dBm				Mi					
O dBm		_					~		
-10 dBm	\square					-			
#20 d8m									
-30 dbm									
-40 d8m									
-50 d8m-									
-60 d8m									
CF 2.402 GHz			1001 p	ts.	60	00.0 kHz/			Span 6.0 MHz

Middle Operating Frequency – GFSK

MultiView	Spectrum	Spectrum 2	🗷 Spectru	m 3 🔳				· 2
Ref Level 20.0	0 dBm	RBW 2 MHz						_
Att Frequency Sv	30 dB SWT 1.01 ms	VBW 5 MHz Mode	Auto Sweep					LEK Mais
La concrete a							M1[1]	3.76 dBm H4082620 GHz
LD. clBm							-	
541250 N.			MI					
0 dBm						_		
							<hr/>	
-10 d8m								<
/								
<20 dBm								
-30 d8m	·							
-40 dBm								
-50 d8m								
-60 d8m								
CF 2.441 GHz		1001 pt	s	600.	0 kHz/			Span 6.0 MHz

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Highest Operating Frequency – GFSK

MultiView	Spectrum	Spectrum 2	Spectrum 3	36	
Ref Level 20.0 Att	30 dBm 30 dB SWT 1.01	# RBW 2 MHz ms VBW 5 MHz Mode	Auto Sweep		
1 Frequency Sv	weep				IFR ME
					M1[1] 3.39 d 2.47980820 d
10 dBm					
			M1.		
O dBm					
-10 dBm					
-20 d8m					
-30 dbm					
-48 d8m					
-					
-50 d8m-					
-60 d8m					
CF 2.48 GHz		1001 pt	is in the second s	600.0 kHz/	Span 6.0 M

Maximum output power conducted measurement - GFSK								
Channel	Frequency Reading of Analyzer				Output Power		Limit	
	[MHz]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[mW]	
0	2402	3.59	1.2	4.79	3.01	21	125	Pass
39	2441	3.76	1.2	4.96	3.13	21	125	Pass
78	2480	3.39	1.2	4.59	2.88	21	125	Pass

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Lowest operating frequency – $\pi/4$ -DQPSK

MultiView	Spectrum	(II) (II)	pectrum 2	E Spe	ctrum 3	E			v .
Ref Level 20.0 Att	TO ID CHAT & OF		/2MHz 5MHz Mode	Auto Sweep					-
1 Frequency Sv	weep								IPk Mas
	1000000							MI[1]	6.14 dBm .40212590 GHz
10. dBm					H1				
0 dBm		~							
0 dBm	/								
-10 dBm			-		_				
-10 d8m									
-20 dBm									
-30 d8m							_		
-40 dBm									
-50 d8m							_		
-60 d8m	· · · · ·								
CF 2.402 GHz			1001 p	ts		600.0 kHz/			Span 6.0 MHz

Middle Operating Frequency – $\pi/4$ -DQPSK

MultiView	Spectrum 🖾	Spectrum 2 📧 S	pectrum 3 🔳	4
Ref Level 20.0	0 dBm 🐡	XBW 2 MHz		
Att Frequency Sv	30 dB SWT 1.01 ms	/BW 5 MHz Mode Auto Swee	9p	IPk Max
I Frequency Sv				M1[1] 6.26 dBn 2.44111390 GH
10 dBm-			541	
0 dBm				
-10 dBm				
-20 dBm				
-30 d8m				
-40 dBm				
-50 dbm				
-60 d8m				
2F 2.441 GHz		1001 pts	600.0 kHz/	Span 6.0 MHz

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Highest Operating Frequency – $\pi/4$ -DQPSK

MultiView	Spectrum	Spectrum 2	Spectrum 3		V
Ref Level 20.0	0 dBm	# RBW 2 MHz			
Att EFrequency Sv	30 dB SWT 1.0	tms VBW 5 MHz Mod	e Auto Sweep		Pk Max
ETTEQUEICY S					M1[1] 5.88 dBn 2.48012590 GH
10 dBm-					
9988.000.00		12.2	H1		
0 dBm					
	-				
-10 d8m					
-20 dBm					
-30 dbm					
-48 d8m					
-50 dBm					
100000					
-60 d8m					
CF 2.48 GHz		1001		600.0 kHz/	Span 6.0 MHz

Maximum output power conducted measurement - π /4-DQPSK								
Channel	Frequency	requency Reading of Analyzer		Output	Power	Lir	nit	Result
Channel	[MHz]	[dBm]	Loss [dB]	[dBm]	[mW]	[dBm]	[mW]	Robuit
0	2402	6.14	1.2	7.34	5.42	21	125	Pass
39	2441	6.26	1.2	7.46	5.57	21	125	Pass
78	2480	5.88	1.2	7.08	5.11	21	125	Pass

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Lowest operating frequency – 8DPSK

Ref Level 20.00 dBm # RBW 2 Mitz Att 30 dB SWT 1.01 ms VBW 5 MHz Mode Auto Sweep	
1 Frequency Sweep	IFK Max
	M1[1] 6.47 dBm 2.40200600 GHz
10 dBm // 1	
O dBm	
-10 dan	
-10 dem	
-20 dBm	
-30 d8m-	
-40 dBm	
-50 dbm	
-60 d8m	
CF 2.402 GHz 1001 pts 600.0 kHz/	Span 6.0 MHz

Middle Operating Frequency – 8DPSK

MultiView	Spectrum	Spectrum 2	Spectrum 3		v
Ref Level 20.0 Att	30 dBm	* RBW 2 MHz VBW 5 MHz Mode A			
1 Frequency Sy	weep				IPK Max
					M1[1] 6.59 dBm 2.44100600 GHz
10 dBm			141		
0 dBm					
-10 d8m					
-20 dBm					
-30 d8m					
-40 dBm					
-50 dilm					
-60 d8m				-	
CF 2.441 GHz		1001 pts	51	00.0 kHz/	Span 6.0 MHz

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Highest Operating Frequency – 8DPSK

MultiView	Spectrum 🗵	Spectrum 2 🗐 Spectr	um 3 🔟	- V
Ref Level 20.00 Att		RBW 2 MHz VBW 5 MHz Mode Auto Sweep		
1 Frequency Sw	veep	Noti other mode hats sheep		1Pk Max
				M1[1] 6.19 dBm 2.48000600 GHz
10 dBm		1		
0 dBm				
-10 dBm				
-20 d8m				
-30 d8m				
-40 dBm				
-50 d8m				
-60 dBm				
CF 2.48 GHz		1001 pts	600.0 kHz/	Span 6.0 MHz

Maximum output power conducted measurement - 8DPSK								
Channel Frequency		J .	Cable Loss	Output Power		Limit		Result
Channer	[MHz]	-	[dB]	[dBm]	[mW]	[dBm]	[mW]	Result
0	2402	6.47	1.2	7.67	5.85	21	125	Pass
39	2441	6.59	1.2	7.79	6.01	21	125	Pass
78	2480	6.19	1.2	7.39	5.48	21	125	Pass

Calculated EIRP:						
Channel Frequence [MHz]	Frequency	Output co	onducted	Output Power EIRP		
	[INIHZ]	[dBm]	[mW]	[dBm]	[mW]	
0	2402	7.67	5.85	7.96	6.25	
39	2441	7.79	6.01	8.08	6.42	
78	2480	7.39	5.48	7.68	5.86	
	Conducted R ain: max. 0.29	F power] + [Antenna ga 9 dBi	ain] = [EIRP]			

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements of **Output Power of Fundamental Emissions**.



8.3. Number of Operating Channel

Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (a) (1) (iii) -RSS-247 issue 2 Section 5.1 (d)

Limit

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

Test equipment and test set up

Test equipment used for conducted measurements as given in clause Test equipment of this report. Test setup used for conducted measurements as given in clause Test setups of this report.

Description

Frequency range	Bandwidth	
2.4 GHz – 2.4835 GHz (Peak Detector)	RBW:	100 kHz
	VBW:	≥ RBW

Measurement

The Measurement was performed on: 03.03.2020

GFSK: 79 of 79 Channel

MultiView	Spectrum								2
Ref Level 20.0			100 kHz						
Att Frequency Sv	30 dB SWT :	1.02 ms VBW	300 kHz Mode	a Auto Sweep					IEK MG
	20120							M2[1]	2.16 dB
									2.4900000 GI
dBm									.4020000 Gi
	A A A A A A A		AAAAAAAAA	0.00.00.00.00	A A B A A A A A A	AkaAsada	0.0.0.0.0.0.0.0.0	100000000	Sann.
	MANAM	17174944	KIANAN (A)	BERNELLA	1112211411	a nfattaat	HARY BAY	HUARAMAA (A	
LUI NY	Rinnen	PAN PADA	IN REPORT	01414614	1121331131	n an an th	11/10/04/01	1111111111	
TIVITV	1111111	11111111	1111111	1111111	11111111	1.1.1.1.1.1.1	1.1.1.1.1.1	11111111	AAAA
d8m-		21.23	1.4.5. 5.	<u>.</u>				. <u>.</u>	1. N.
0.000									5
d8m-									
1									
d8m-									- 1
d8m-									1
d8m									-
I GHz			1001 pt		8.	35 MHz/			2.4835 G
Aarker Table									
M1 Ref	Trc	X-Value 2.402 GHz		V-Value 2.46 dBm		Function		Function Re	sult
M2	i	2.48 GHz		2.16 dBm					

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π /4-DQPSK: 79 of 79 Channel

MultiView	Spectrum								[ę.
RefLevel 20 Att	0.00 dBm 30 dB SWT 1		100 kHz 300 kHz Mod	le Auto Sweep						
Frequency			-						IPk Ma	
								M2[1]	2.66 df 2.4800000 G	
0. d8m								M1[1]	a searche a	
M	and the second s					Contraction of the			2,4020000 G	Ĥ
AMAMANA .	MANAMAN	hanana	KAMAAAAA	MARAAAAA	MAAAAAAA	MANAN	AAAAAAAA	MAMMAN	MAAAA	_
4444.4		1				1.0.0.0.0	1.1.1.1.			
10 dBm										
1										
20 d8m	-		-		-					_
10.000										
30 d8m	-			-						_
40 dBm									1	_
S0 d8m										÷
										ł.
60 d8m	-								-	4
2.4 GHz			1001 p	ts	8	.35 MHz/			2.4835 G	÷1,
Marker Tal			contra la							-
	d Trc	X-Value 2.402 GHz		Y-Value 1.57 dBm		Function		Function Re	esult.	-
M1 M2	1	2.402 GHZ		2.66 dBm						

8DPSK: 79 of 79 Channel

MultiView	Spectrum								v .
Ref Level 20.0	0.dBm 30.dB SWT 1		100 kHz 300 kHz Mod	e Auto Sween					
1 Frequency Sv				- Hato officep				110713	IFk Max
								M2[1]	2.67 dBm 2.4800000 GHz
10 d8m								M1[1]	2.40 dBm 2.4020000 GHz
· ANNNY	WWWWW	WANNAM	WWWW	MAMAN	MANYAM	MMMM	MANNA	www	
-10 dBm	and the set		Contraction of the Population						
-20 d8m					-				
-30 d8m									
-40 d8m									
SB dBm									1
-60 d8m		-					-		by
2,4 GHz 2 Marker Table		Ô.	1001 pt	s	8.	.35 MHz/			2.4835 GHz
Type Ref M1 M2		X-Value 2.402 GHz 2.48 GHz		Y-Value 2.40 dBm 2.67 dBm		Function		Function Re	esult

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Number of Hopping Frequencies**.



8.4. Channel Center Frequency

Test Requirements

Frequency hopping system in the 2400-2483.5MHz band shall use at least 79 (Channel 0 to 78) non-overlapping channels.

The EUT operates in according with the Bluetooth system specification within the 2400 - 2483.5 MHz frequency band. RF channels for Bluetooth systems are spaced 1 MHz and are ordered in channel number k. In order to comply with out-of-band regulations, a lower frequency guard band of 2.0 MHz and a higher frequency guard band of 3.5 MHz is used.

The operating frequencies of each channel are as follows:

First RF channel start from 2400MHz + 2MHz guard band = 2402MHz Frequency of RF Channel = 2402+(k+1) MHz, k = 0,...,78 (Channel separation = 1MHz)

8.5. Carrier Frequency Separation

Test Requirements

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (a) (1) -RSS-247 issue 2 Section 5.1 (b)

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test equipment and test set up

Test equipment used for conducted measurements as given in clause Test equipment of this report. Test setup used for conducted measurements as given in clause Test setups of this report.

Description

Frequency range wide enough to capture the peaks of two adjacent channels. (Peak Detector)

Limits

GFSK: The measured maximum bandwidth* 2/3 = 916.6 kHz * 2/3 = 611.1 kHz

 π /4 DQPSK: The measured maximum bandwidth * 2/3 =1273.7 kHz * 2/3 = 849.1 kHz

8DPSK: The measured maximum bandwidth * 2/3 =1208.8 kHz * 2/3 = 805.9 kHz

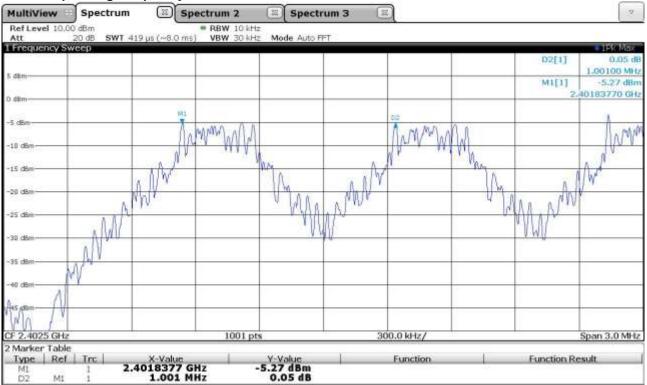
Measurement

The Measurement was performed on: 03.03.2020

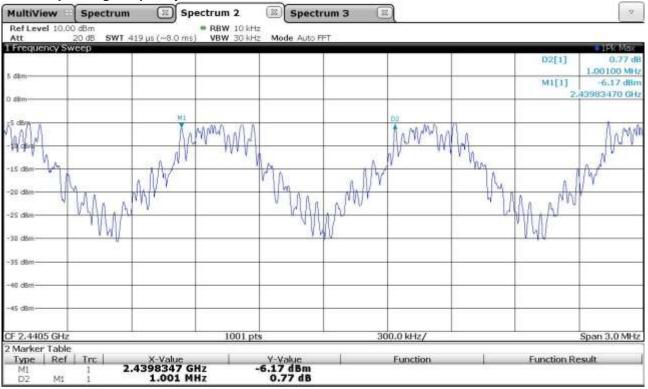
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Lowest Operating Frequency – GFSK

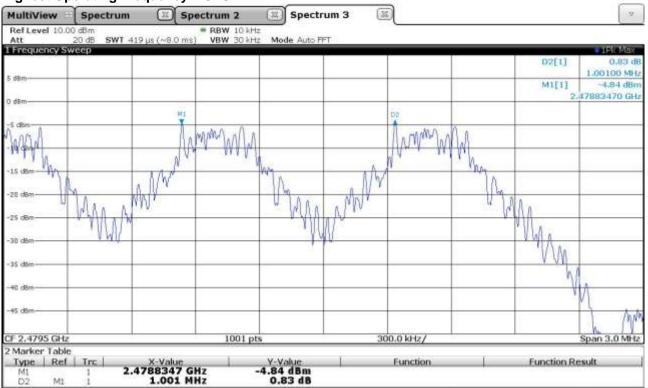


Middle Operating Frequency – GFSK



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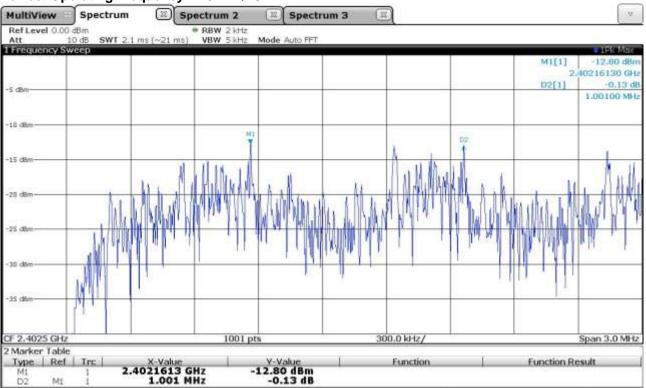
Highest Operating Frequency – GFSK



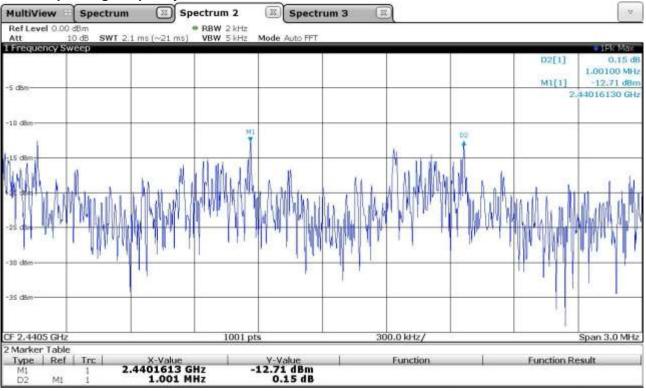
Summary of Channel seperation measurements – GFSK				
Tested Channel	Channel seperation [kHz]	Limit = 2/3 BW [kHz]	Result	
Lowest	1001	> 611.1	Pass	
Middle	1001	> 611.1	Pass	
Highest	1001	> 611.1	Pass	

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Lowest Operating Frequency – π/4 DQPSK

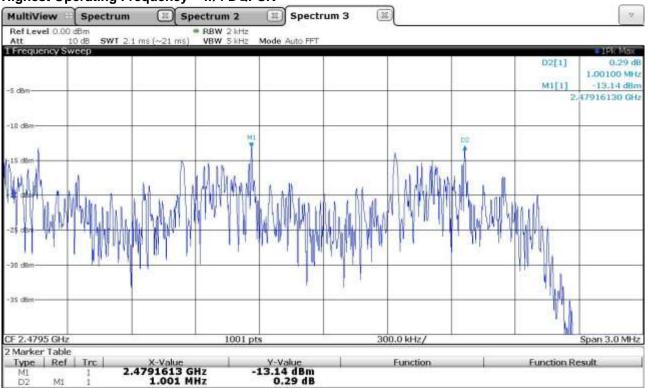


Middle Operating Frequency – π/4 DQPSK





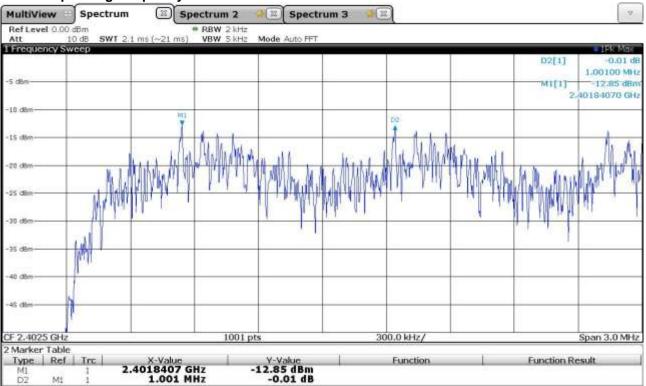
Highest Operating Frequency – π/4 DQPSK



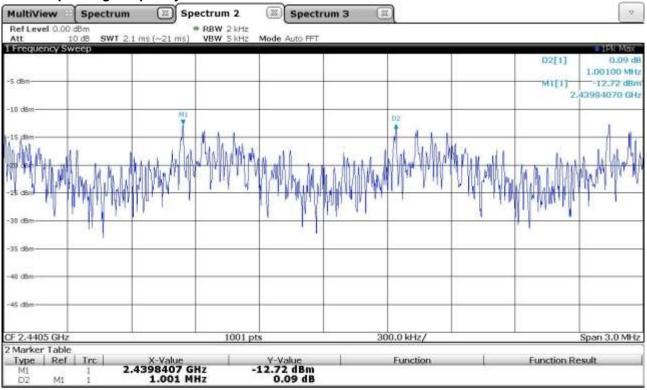
Summary of Channel seperation measurements – $\pi/4$ DQPSK				
Tested Channel Channel seperation [kHz] Limit = 2/3 BW [kHz] Result				
Lowest	1001	> 849.1	Pass	
Middle	1001	> 849.1	Pass	
Highest	1001	> 849.1	Pass	

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Lowest Operating Frequency – 8DPSK

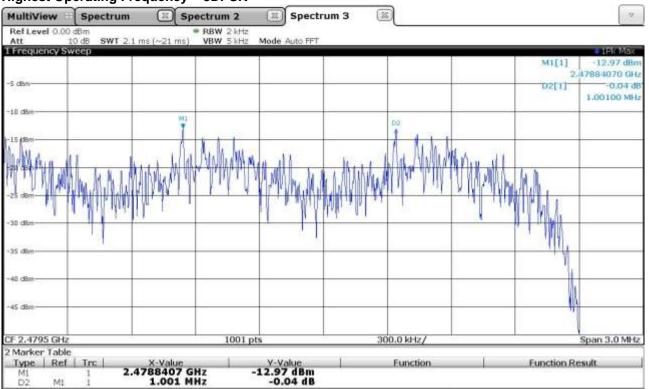


Middle Operating Frequency – 8DPSK





Highest Operating Frequency – 8DPSK



Summary of Channel seperation measurements – 8DPSK				
Tested Channel	Channel seperation [kHz]	Limit = 2/3 BW [kHz]	Result	
Lowest	1001	> 805.9	Pass	
Middle	1001	> 805.9	Pass	
Highest	1001	> 805.9	Pass	

8.6. Band-Edges Measurement / Out of Band Emissions

Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (d) -RSS-247 issue 2 Section 5.5

Limit

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 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Emissions which fall in the restricted bands, as defined in §15.205 Restricted Bands of operation as well as in restricted bands of the RSS-Gen Issue 5 (see Section 8.10 Restricted Frequency Bands) and must also comply with the radiated emission limits specified in §15.209 Radiated emission limits as well as the limits specified in RSS-Gen Table 5.

Test equipment and test set up

Test equipment used for Band Edge measurements as given in clause Test equipment of this report. Test setup used for Band Edge measurements as given in clause Test setups of this report.

Description

For restricted Bands: The Emission must comply with the radiated emission limits. Measured with Average and Peak detector.

For non restricted Bands:

The band edge is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

The measurements are initially carried out according to the requirements for restricted bands, as these requirements are more stringent. If the limit value is exceeded in a non-restricted band according to the restricted band specifications, the measurement is repeated again with requirments for non restricted bands in order to prove the conformity.

Note: It was not necessary to carry out a re-test for non restricted band requirments for the tested EUT.

Detector function selection and bandwidth

For the measurement, an EMI test receiver that have CISPR peak detector as well as average detector were used.

Band Edge for restriced Band

Frequency range:	Bandwidth	
See measurement graph	RBW:	1 MHz
	VBW:	3 MHz

Band Edge for non resticted Band

Frequency range:	Bandwidth	
See measurement graph	RBW:	100 kHz
	VBW:	300 kHz

Measurement

The Measurement was performed on: 18.06.2020

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TESTED IN GERMANY	Band ed	CC 3 ge emission ording to 17, FCC §15.209 I		STC
RefNo.: 20/01-0031				
Product: Transmitting/	Receiving System			
Sample: 02				
Date: 18.06.2020				
Operator: Bl				pass fail
Remarks:			Result:	\boxtimes \square
Operation mode: BT (CH.78; 8DPSK; Hig	h Edge		
Spectrum Receiver RBW (EMI) 1 MHz Input 1 AC Att 0 dB Scan 1Av Max 2Pk Max		IT56-1-7 TD Scan	GHz ohne AmpTDF	
IT56-LIGGHCREAK-WLAN-2-4GHZ	FCC.LIN PASS	M1[1]		96.64 dBµ¥/m
120 出版水/而 56-1-66HZ-AV-WI Line IT56-1-66HZ-PEAK-		0.000	s 	2.48000000 GHz
110 dBµV/m				
100 dBµV/m				
90 dBµV/m				
80 dBµV/m				
70 dBµV/m				
60 dBµV/m				
minimum	man	1 Umment	······································	
50 dBµV/m				
40 dBµV/m		1 Jan to Anna	+	*~_ * ~~*~~*
30 dBµV/m		TF		
Start 2.433 GHz	•			Stop 2.533 GHz

	Polarisation: V								
Detector Average									
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
2,4843	42,80	-11,20	54,00	pass	2,4840	54,94	-19,06	74,00	pass
2,5100	42,43	-11,57	54,00	pass	2,4933	54,45	-19,55	74,00	pass
2,5095	42,40	-11,60	54,00	pass	2,5095	54,23	-19,77	74,00	pass
2,4873	42,36	-11,64	54,00	pass	2,5113	54,01	-19,99	74,00	pass
2,4900	41,90	-12,10	54,00	pass					
2,5158	41,81	-12,19	54,00	pass					

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FCC 3



Band edge emission according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT CH.78; 8DPSK; High Edge

Spectrum Receiver 🗷	D		
RBW (EMI) 1 MHz MT	1 s	IT56-1-7GHz ohne Amp	TDF
_InputIAC Att 0 dB Pre	eamp OFF Step TD S	can	
Scan 😑 1Av Max 🕒 2Pk Max			
IT56-LingHCREAK-WLAN-2-4GHZ_FCC.	LIN PASS	M1[1]	97.63 dBµV/m
120 HBp//m56-1-66HZ-AV-WLAN-2			2.480000000 GHz
Line IT56-1-66HZ-PEAK-WLAN	V-2-4 PASS		
110 dBµV/m			
100 dBµV/m	M1		
	A		
90 dBµV/m			
80 dBµV/m			
	(1)		
70 dBµV/m			
60 dBµV/m			
50 dBµV/m	man l	and more thanks	
	man la		++-+
40 dBµV/m			
20 dBµV/m			
Start 2.433 GHz		1	Stop 2.533 GHz

	Polarisation: H									
Detector Average										
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	
2,4840	42,45	-11,55	54,00	pass	2,5103	54,20	-19,80	74,00	pass	
2,5100	42,24	-11,76	54,00	pass						
2,5095	42,22	-11,78	54,00	pass						
2,4865	41,89	-12,11	54,00	pass						
2,5058	41,70	-12,30	54,00	pass						
2,5140	41,68	-12,32	54,00	pass						

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FCC 3 Band edge emission



according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT CH.0; 8DPSK; Low Edge

Spectrum Receiver 🔆 🖲							
RBW (EMI) 1 MHz MT	1 s	II	[56-1-7GHz	ohne Amp	TDF		
Input 1 AC Att 0 dB Preamp	OFF Step	TD Scan		-			
Scan 🕤 1Av Max 🎯 2Pk Max							
Limit Check	PASS		D2[2]			-38.48 (dB
120 HBUW/M56-1-6CHZ-AV-WLAN-2-4CH			-0.000 s			9.500000 MI	
Line IT56-1-6GHZ-PEAK-WLAN-2-4	PASS		M1[2]			94.45 dBµV∕	
110 dBµV/m			0.000 s		2.40	02000000 GI	Hz
100 dBµV/m			M1				
			Å				
90 dBµV/m			A				—
			\square				
80 dBµV/m			11				
IT56-1-6GHZ-PEAK-WLAN-2-4GHZ_FCC.LIN							
70 dBµV/m							
			1				
60 dBµV/m		D2					
IT56-1-6GHZ-AV-WLAN-2-4GHZ_FCC.LIN		Ann		\sim			
50 dBµV/m	m		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	- A	~~~~~	
				$ \vee \setminus $			
40 dBpV/m			V^{\vee}			~~~~··································	\sim
		F	1				
30 dBµV/m		r	ŕ	Т	F		\neg
Start 2.343 GHz		·	•		St	op 2.443 GH	Iz

				Polarisat	ion: V					
Detector Average					Detector Peak					
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	
al	l emissions are	10dB below	limit	pass	all emissions are 10dB below limit					
					_					

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FCC 3



Band edge emission according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT CH.0; 8DPSK; Low Edge

Spectrum Receiver 🔆 🛞						
RBW (EMI) 1 MHz MT	1 s	IT	56-1-7GHz	ohne Amp	TDF	· · · · ·
Input 1 AC Att 0 dB Preamp	OFF Step 1	'D Scan				
Scan 🕒1Av Max <mark>@</mark> 2Pk Max						
Limit Check	PASS		D2[2]			-44.51 dE
120 HB1/W/M56-1-6CHZ-AV-WLAN-2-1CH			-0.000 s			7.000000 MH;
Line IT56-1-66HZ-PEAK-WLAN-2-4	PASS		M1[2]			97.99 dBµV/n
110 dBµV/m			0.000 s		2.40	02000000 GH:
110 0000,000						
			M1			
100 dBµV/m			X			
			A			
90 dBµV/m			<u>A</u>			
			11			
IT56-1-6GHZ-PEAK-WLAN-2-4GHZ_FCC.LIN			11			
70 dBµV/m						
60 dBµV/m						
IT56-1-6GHZ-AV-WLAN-2-4GHZ_FCC.LIN		D2	11			
many ran have shown	hanne	man	hun	hanne	mon	mann
50 dBµV/m						
					Λ	
40 dBpv/m	+	<u> </u>	~~~~		\sim	
30 dBµV/m		F	1			
		TF				
Start 2.343 GHz					St	op 2.443 GHz

Polarisation: H Detector Detector Average Peak Margin Frequ. [GHz] Level Limit Result Frequ. Level Margin Limit Result [GHz] [dBµV/m] [dBµV/m] [dBµV/m] [dBµV/m] to Limit to Limit [dB] [dB] pass pass all emissions are 10dB below limit all emissions are 10dB below limit

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FCC 3 Band edge emission



according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT; Hopping 8DPSK; High Edge

Spectrum Receiver 🗷						
RBW (EMI) 1 MHz MT	1 5	IT	56-1-7GHz	ohne ∧mp`	TDF	
Input 1 AC Att 0 dB Preamp	OFF Step	TD Scan				
Scan 🕒 1Av Max 🕒 2Pk Max						
IT56-LIANHCREAK-WLAN-2-4GHZ_FCC.LIN	PASS					
120 HBLW/M56-1-6CHZ-AV-WLAN-2-1CH						
Ling IT56-1-6GHZ-PEAK-WLAN-2-4	PASS					
110 dBµV/m						
100 dBµV/m						
	مممممم					
	WWWWW	N I				
ABD ABDAAW AAAAAAAAAAAAAAAAAAAAAAAAAAAAA						
80 dBµV/m						
70 dBµV/m						
Í		1				
co do Alim						
60 dBµV/m						
		hour	mar	m		mon
50 dBµV/m						
40 dBµV/m				++7	****	<u>_+-++</u> +
30 dBuV/m						
				T		
Start 2.433 GHz					St	op 2.533 GHz

Polarisation:	V
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				Detector Peak					
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
2,5098	42,34	-11,66	54,00	pass	all	emissions are	e 10dB belov	w limit	pass
2,5095	42,23	-11,77	54,00	pass					
2,4843	42,18	-11,82	54,00	pass					
2,4865	42,11	-11,89	54,00	pass					
2,5143	41,69	-12,31	54,00	pass					
2,5308	41,61	-12,39	54,00	pass					

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FCC 3 Band edge emission



according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT; Hopping 8DPSK; High Edge

Spectrum	Receiver	×							(
	RBW (EMI) 1 MHz	MT	1 s		IT	56-1-7GHz	ohne Amp	TDF		
Input 1 AC	Att 0 dB	Preamp	OFF Step	TD Sc	an					
-	v Maxo2Pk Max									
IT56- <mark>Lគេ</mark> ធិមិស	REAK-WLAN-2-4GHZ	FCC.LIN	PASS							
	56-1-6CHZ-AV-WI									
Line IT3	56-1-6GHZ-PEAK-	WLAN-2-4	PASS							
110 dBµV/m-										
100 40-04/20										
100 dBµV/m-		AAAAAAAAA	mm							
MANAMAA		nnninn	NWWW	N						
agvashAvyy+										\vdash
80 dBµV/m—										
Í										
70 dBµV/m—										
60 dBµV/m—										
						mm	m	·····		
50 dBµÝ/m—										
40 dBuV/m—				1	+	ttt		++	**	++
30 dBµV/m—							Т	F		
Start 2.433	3 GHz							St	op 2.533 G	Hz

	Polarisation: H									
Detector Average							Detector Peak			
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	
2,4840	42,38	-11,62	54,00	pass	2,4843	54,11	-19,89	74,00	pass	
2,5098	42,25	-11,75	54,00	pass						
2,5095	42,17	-11,83	54,00	pass						
2,4903	41,69	-12,31	54,00	pass						
2,4895	41,66	-12,34	54,00	pass						
2,5150	41,65	-12,35	54,00	pass						

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FCC 3 Band edge emission



according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT; Hopping 8DPSK; Low Edge

Spectrum Receiver 🔆 🕱						(
RBW (EMI) 1 MHz MT	1 s	IT	56-1-7GHz	ohne Amp	TDF		
Input 1 AC Att 0 dB Preamp	OFF Step	TD Scan					
Scan 🔵 1Av Max 😡 2Pk Max							
Limit Check	PASS		D2[2]			-45.83	
120 出的水/而 56-1-6℃HZ-AV-WLAN-2-1CH			-0.000 s			2.250000 N	
Line IT56-1-6GHZ-PEAK-WLAN-2-4	PASS		M1[2] 0.000 s			98.78 dBµV 42000000 (-
110 dBµV/m							
100 dBµV/m							M1
			ΜΛΛΛΛΝ	mmm	MMM	******	
90 dBµV/m			Minin	mmm	WWWWW	WWWWWWW	NAC
			1				
80 dBµV/m			1				
IT56-1-6GHZ-PEAK-WLAN-2-4GHZ_FCC.LIN							
70 dBµV/m							
60 dBµV/m							
IT56-1-6GHZ-AV-WLAN-2-4GHZ_FCC.LIN		D1					
50 dBµV/m	mm	m					
50 dBµV/m-							
40 dBµV/m							
30 dBµV/m		F	1				
Start 2.343 GHz		TF			e+	 op 2.443 GI	
					5ເ	up 2.443 G	ΠZ

Polarisation:	٧
---------------	---

Detector Average					Detector Peak					
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	
all	all emissions are 10dB below limit			pass	all emissions are 10dB below limit pas					

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TESTE IN GE	D RMANY	FCC §	Ba §15.247, F	nd edg acco	rding	to		9 RSS	S-Gen		Ξ	5	ТС	-
RefNo.:	20/01		,		,									
Operation	mode:	BT; Ho	pping 8DF	PSK; Lo	w Ed	lge								
Spectrun	n Rec	eiver 🤺	×										(
	•)1MHz N					56-1	-7GHz	ohne Amp	TDF			````	_
Input 1 AC	C Att Av Maxo2Pk		reamp OFF	Step	TD SC	an								_
Limit (Check			88			D2[2]					-45.83	
	Г 56-1-6€НZ Г56-1-6GHZ						-0.00 M1[0000 N 8 dBµV	
110 dBµV/m				00			0.00	_					00000	
110 08µV/m	1													
100 dBµV/m	n									+				M
							M	MW		<u>an</u> av	nn	Ŵ	^^	W
90 dBµV/m-							m	4MM	****	VV VV	NUVW	4443	****	N T
80 dBµV/m-	-PEAK-WLAN-	2-46HZ EO	CLIN							+				
70 dBµV/m-			CILIN											
							}							
60 dBµV/m-										+				
IT56-1-6GHZ	-AV-WLAN-2-	4GHZ_FCC.L	IN			D								
50 dBµV/m-							-			+				-
						~~~~								
40 dBµV/m-				-										
30 dBµV/m-						F	1			$\perp$				
Start 2.34					TF						St	00 2	.443 GI	Hz
				Pola	risatio	on: H								
		Detector Average								ector eak				
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Resi	ult	Freq [GHz		Level [dBµV/	Mar	gin .imit	Limit [dBµV/r	n]	Result	:
alle	emissions are		v limit	pa	ISS		all er	nissior	ns are 10dE		w limit		pass	

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	according to
	ECC \$15 247 RSS-247 ECC \$15 2



47, FCC §15.209 RSS-Gen

20/01-0031 Ref.-No.:

BT CH.78;  $\pi/4$  DQPSK; High Edge Operation mode:

Spectrum	eiver (	×							
RBW (EMI	)1MHz M	IT 15		II	56-1-7GHz	ohne Amp	rdf		
Input 1 AC Att			Step TD	Scan					
Scan 😑 1Av Maxo2Pk									
IT56-LIAGHCAREAK-WLAN-	2-4GHZ_FCC	C.LIN PAS	8						
120 HBUW/MT56-1-6CHZ									
Line IT56-1-6GHZ	-PEAK-WLA	N-2-4 PAS	S						
110 dBµV/m									
100 dBµV/m									
			4						
90 dBµV/m									
80 dBµV/m									
			- 111						
70 dBµV/m									
			- 711						
60 dBµV/m									
		mm							
50 dBµV/m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	- m	~	harren	m	m	man	······	~~~
		$\sim$							
	mah	$\sim 1$	~   \	the states		+-++			-+
40 dBµV/m									
30 dBµV/m				TE					
Start 2.433 GHz	I	I	í				St	op 2.533 Gl	Ηz

	Polarisation: V								
		Detector Average					Detector Peak		
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
2,5095	42,57	-11,43	54,00	pass	alle	all emissions are 10dB below limit			pass
2,5100	42,39	-11,61	54,00	pass					
2,4840	42,24	-11,76	54,00	pass					
2,5165	41,86	-12,14	54,00	pass					
2,5135	41,86	-12,14	54,00	pass					
2,4893	41,81	-12,19	54,00	pass					

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# FCC 3



Band edge emission according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT CH.78;  $\pi/4$  DQPSK; High Edge

Spectrum Receiver 🕱		
RBW (EMI) 1 MHz MT	1 s IT56-1-7GHz ohne AmpTDF	
Input 1 AC Att 0 dB Preamp	OFF Step TD Scan	
Scan 🔵 1Av Max 😡 2Pk Max		
IT56-LIGGHOREAK-WLAN-2-4GHZ_FCC.LIN	PASS	
120 HBUW/M56-1-6CHZ-AV-WLAN-2-1CH		+
Line IT56-1-6GHZ-PEAK-WLAN-2-4	I PASS	
110 dBµV/m		+
100 dBµV/m		<u> </u>
90 dBµV/m		
80 dBµV/m		
70 d0 0//m		
70 dBµV/m		
60 dBµV/m		
minimum	man have been and the second s	
50 dBµV/m		+
40 dBµV/m		Ħ
30 dBµV/m		+
Start 2.433 GHz	Stop 2.533 G	⊥ iHz

	Polarisation: H								
		Detector Average					Detector Peak		
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
2,5095	42,68	-11,32	54,00	pass	all	emissions are	e 10dB belov	w limit	pass
2,5098	42,40	-11,60	54,00	pass					
2,4853	42,23	-11,77	54,00	pass					
2,5300	41,84	-12,16	54,00	pass					
2,4870	41,75	-12,25	54,00	pass					
2,5048	41,69	-12,31	54,00	pass					

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TESTED IN GERMAN		<b>Ba</b> C §15.247, F		ES	тс			
			,					
RefNo.: 20/	/01-0031							
Operation mode:	BT C	H.0; π/4 D0	QPSK; Low	Edge				
•	Receiver	MT 19			-1-7GHz ohr	ne AmpTDF		
Input 1 AC Att Scan OlAv MaxO		Preamp OFF	Step TD S	can				
Limit Check			88		2[2]			-38.31 dB
120 비カル/雨 <del>56-1-60</del> Line IT56-1-60				м	.000 s 1[2] .000 s		95.5	00000 MHz 2 dBµV/m 50000 GHz
110 dBµV/m					.000 5		2.4017	
100 dBµV/m								
90 dBµV/m								
80 dBµV/m								
70 dBµV/m	AN-2-4GHZ	FCC.LIN						
60 dBµV/m	1-2-4GHZ_FC	C.LIN		m				
50 dBµV/m								
40 dBµV/m								
30 dBµV/m				F1				
Start 2.343 GHz				· ·			Stop 2	2.443 GHz
			Polarisat	ion: V				]
	Detecto					Detector Peak		
Frequ. Level	Margir	n Limit	Result	Frequ.	Level	Margin		Result

 Frequ.
 Level
 Margin
 Limit
 Kesuit
 Kesuit

 all emissions are 10dB below limit
 pass
 all emissions are 10dB below limit
 pass
 all emissions are 10dB below limit
 pass

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	Test report <b>20/01-00</b>	Page 58 of 92 pa				
TESTED IN GERMANY	FCC 3 Band edge emission according to CC §15.247, RSS-247, FCC §15.209 RSS-Gen					
RefNo.: 20/01-0031 Operation mode: BT		Edge				
Scan 🔵 1Av Max 🎯 2Pk Max		IT56-1-7GHz oh Scan	ine AmpTDF			
Linit Check 120 Hbp://m <del>56-1-6CHZ-AV-WI</del> Line IT56-1-6CHZ-PEAK- 110 dBµV/m-		M1[2] 0.000 s D2[2] 0.000 s	95.42 dBµV/m 2.401750000 GHz −41.92 dB −7.000000 MHz			
100 dBµV/m		M1				
90 dBµV/m 80 dBµV/m IT56-1-6GHZ-PEAK-WLAN-2-4GHZ						
70 dBµV/m						
1156-1-6GHZ-AV-WLAN-2-4GHZ_F 50 dBµV/m	CC.LIN	P2				

40 dBµV/m 30 dBµV/m-TF Start 2.343 GHz Stop 2.443 GHz

				Polarisat	ion: H				
Detector Average							Detector Peak		
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
al	all emissions are 10dB below limit			pass	all emissions are 10dB below limit				pass

2,5213

41,59

-12,41

54,00

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ITESTE	D RMANY	FCC §		FCC and edge end according S-247, FC	to	09 RSS-Ge		ES	тс
RefNo.:	20/01-	-0031							
Operation	mode:	BT ; Ho	oping $\pi/4$ [	DQPSK; H	igh Edge	•			
Spectrun	n Rec	eiver (	×)						
	RBW (EMI)	)1 MHz MI				1–7GHz ohne	e AmpTDF		
Input 1 AC	2 Att Av Max <b>o</b> 2Pk I		eamp OFF	Step TD Sc	an				
IT56-LIAGHZ	REAK-WLAN-	2-4GHZ_FCC	LIN PASS		M	1[2]		94.2	20 dBµV/m
120 Hby//	1 <del>56-1-6</del> CHZ-	AV-WAN-	2-1GH PASE			000 s			00000 GHz
Line II	56-1-6GHZ-	PEAK-WLA	N-2-4 PASS			2[2] 000 s			0.00 dB 0 Hz
110 dBµV/m	ı <u> </u>				0.				
_100 dBµV/m									
		an m	a same	Ma n					
in viter opi	WAW	10000	Mathin	Ŵ					
80 dBµV/m-									
70 dBµV/m-									
60 dBµV/m-									
50 dBµV/m-					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
40 dBµV/m-				\v	-+	<u></u>	<u>++</u>	****	++
30 dBµV/m-		TF							
Start 2.43	3 GHz							Stop 2	2.533 GHz
				Polarisati	on: V				
		Detector Average					Detector Peak		
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit	Limit [dBµV/m]	Result
2,4840	42,35	[dB] -11,65	54,00	pass	2,5105	54,15	[dB] -19,85	74,00	pass
2,4040	42,33	-11,65	54,00	pass	2,0100	04,10	-13,00	14,00	· · · · · · · · · · · · · · · · · · ·
2,5095	42,34	-11,73	54,00	pass					
2,4870	41,88	-12,12	54,00	pass					
2,5140	41,68	-12,32	54,00	pass					

pass

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# FCC 3

Band edge emission



according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT ; Hopping  $\pi/4$  DQPSK; High Edge

Spectrum Receiver 🗵								
RBW (EMI) 1 MHz MT	1 s	I	F56-1-7GHz	ohne Amp	TDF			
Input 1 AC Att 0 dB Preamp OFF Step TD Scan								
Scan 🔵 1Av Max 😋 2Pk Max								
	PASS		M1[2]		ġ	96.47 dBµV/m		
120 HBuV/M56-1-6CHZ-AV-WLAN-2-1CF			-0.000 s		2.43	33000000 GHz		
Line IT56-1-66HZ-PEAK-WLAN-2-4	PASS		D2[2]			0.00 dB		
110 dBµV/m			0.000 s			0 Hz		
100 dBµV/m	anna 00 ma							
Sharping the second sharping	Mr. mark							
90 dBpv/m W/	· · · · · · · · · · · · ·							
80 dBµV/m								
70 dBµV/m								
60 dBµV/m								
50 dBµV/m		m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	hand		
		1+mm	+	L				
40 dBµV/m								
.30 dBµV/m								
IF Start 2.433 GHz					St	op 2.533 GHz		
Start Er 100 GHE					00	op 21000 GHz		

Polarisation: H									
Detector Average						Detector Peak			
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
2,5098	42,41	-11,59	54,00	pass	all	emissions are	e 10dB belov	w limit	pass
2,4845	42,38	-11,62	54,00	pass					
2,5095	42,22	-11,78	54,00	pass					
2,5148	42,02	-11,98	54,00	pass					
2,4893	41,82	-12,18	54,00	pass					
2,5043	41,71	-12,29	54,00	pass					

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# FCC 3 Band edge emission



according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT ; Hopping  $\pi/4$  DQPSK; Low Edge

Spectrum Receiver 🔆 🖲						(	
RBW (EMI) 1 MHz MT	1 s	IT	56-1-7GHz	ohne Amp	TDF	,	<u> </u>
Input 1 AC Att 0 dB Preamp	OFF Step	TD Scan					
Scan 😑 1Av Max 😔 2Pk Max							
Limit Check	PASS		D2[2]			-35.95	i dB
120 HBUV/M56-1-6CHZ-AV-WLAN-2-4CH			-0.000 s		-1	2.500000 M	4Hz
Line IT56-1-66HZ-PEAK-WLAN-2-4	PASS		M1[2] 0.000 s			93.80 dBµV 08250000 (	
110 dBµV/m			0.000 S		2.4	08230000	
100 dBµV/m							
			M1				
90 dBµV/m			- ROOMAN	wwww	Mann	Mart	5 AV
			1 MM/N	WWWW	$\mathcal{M}$	WHWW	ŴV
80 dBµV/m			1	· ·	· · ·	V ~	
IT56-1-6GHZ-PEAK-WLAN-2-4GHZ_FCC.LIN							
70 dBµV/m							$\vdash$
60 dBµV/m		D2					$\vdash$
IT56-1-6GHZ-AV-WLAN-2-4GHZ_FCC.LIN	· · · /	n Mar					
50 dBµV/m		V					$\vdash$
40 dBuV/m		$\cdots$					
20 db 4/m		F	1				
30 dBµV/m							
Start 2.343 GHz					St	op 2.443 G	Hz

Polarisation: V									
Detector Average					Detector Peak				
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
all	emissions are	10dB below	limit	pass	all e	missions are	10dB below	limit	pass

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FCC 3 Band edge emission



according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT ; Hopping  $\pi/4$  DQPSK; Low Edge

Spectrum Receiver 💥 🖲					(		
RBW (EMI) 1 MHz MT	1 s	IT56-1-7GHz	ohne Amp	TDF	,		
Input 1 AC Att 0 dB Preamp	OFF Step TD Scan						
Scan 🕒 1Av Max 🕒 2Pk Max							
Limit Check	PASS	M1[2]			98.34 dBµV		
120 HBUV/m56-1-6CHZ-AV-WLAN-2-1CH		-0.000 s		2.4	43000000 0		
Line IT56-1-6GHZ-PEAK-WLAN-2-4	PASS	D2[2] 0.000 s		-4	-45.17 3.750000 M		
110 dBµV/m							
100 dBµV/m						м	
		0	10 m A	- D.Dan	N 5 048	L. ]	
		Marchia		MANNA	MM. M	Ŵ	
90 dBµV/m		1	1 W W	WW Y	- www.	¥ Y	
80 dBµV/m							
IT56-1-6GHZ-PEAK-WLAN-2-4GHZ_FCC.LIN		1					
70 dBµV/m							
60 dBµV/m							
IT56-1-6GHZ-AV-WLAN-2-4GHZ_FCC.LIN		ba					
50 dBµV/m	man	x					
		_					
40 dBµV/m							
30 dBµV/m TE		.F1					
Start 2.343 GHz Stop 2.443 GHz							

Polarisation: H									
Detector Average					Detector Peak				
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
all	emissions are	10dB below I	imit	pass	all	emissions are	10dB belov	w limit	pass

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# FCC 3



Band edge emission according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT CH.78; GFSK; High Edge

Spectrum	Ĩ	Receiver	×								(	
	RBW	(EMI) 1 MH:	z MT	1 s			IT	F56-1-7GHz	ohne Amp	TDF	```````````````````````````````````````	
Input 1 AC			B Preamp	OFF S	tep 1	rd s	can					
Scan 🔵1Av												
IT56-LingHCh												
120 HBU//m5	6-1-6	CHZ-AV-W	AN-2-1GF	PASS		_						
		GHZ-PEAK-										
110 dBµV/m—						_						
 100 dBµV/m—						_						
90 dBµV/m—					_							
Í					- 11							
80 dBµV/m—												
					- ()							
70 dBµV/m—												
60 dBµV/m—												
			m		- []							
50 dBµV/m—	m	mont		have	~/	P	m	m	m	m h	~~~~~	~
		han	$\downarrow$		$J \mid$	Ŀ				h-++	++	+
40 dBµV/m—												
30 dBµV/m—						Т	F					
Start 2.433	GHz									St	op 2.533 Gl	Hz

	Polarisation: V								
		Detector Average					Detector Peak		
<b>Frequ</b> . [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
2,5098	42,34	-11,66	54,00	pass	2,5178	54,02	-19,98	74,00	pass
2,5095	42,29	-11,71	54,00	pass					
2,4840	42,24	-11,76	54,00	pass					
2,4865	41,72	-12,28	54,00	pass					
2,5153	41,70	-12,30	54,00	pass					
2,5315	41,66	-12,34	54,00	pass					

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RefNo.:	20/01-	-0031													
Operation r	node:	BT CH.	78; GFSK;	High E	Edge										
Spectrum	RBW (EMI)	)1 MHz MT	T 1s reamp OFF	Step 1	ID Sca		F56-1	1–7GHz o	hne	AmpT	DF				
	v Maxo2Pk I														
IT56- <b>Lif</b> ឡិងខ្ល	REAK-WLAN-	2-4GHZ_FCC	LIN PASS	3											
			2-161 PASE		-		<u> </u>								
Line IT	56-1-6GHZ-	PEAK-WLA	N-2-4 PAS	\$											
110 dBµV/m					-		<u> </u>								
100 dBµV/m															
100 0000/11															
90 dBµV/m-				- 1											
				- 11											
80 dBµV/m-					++		<u> </u>								
				- 11	I L										
70 dBµV/m-															
, o dopvym				- 11											
				- 11	N L										
60 dBµV/m-				- 11											
man	~~~~~	- Alina					-		10.0			mad .		0	
50 dBµV/m-				~~	Ť										
				- 11											
40 dBµV/m-	hhm	~~~	~~~	~	7	~+-+	+	+	-+-	+	~~~	- <b>t</b> t	+ +	<b></b>	<b>.</b>
30 dBµV/m-		TF													
Start 2.43	3 GHz		·									St	op 2	.533 G	Hz
	Polarisation: H														
		Detector								Detect	or				
		Average								Peak					
Frequ.	Level	Margin	Limit	Resu	lt	Freq	u.	Level		Margi		Limit		Resu	t
[GHz]	[dBµV/m]	to Limit	[dBµV/m]		-	[GHz		[dBµV/n	n]	to Lim		[dBµV/r	n]		
		[dB]								[dB]					
2,4840	42,32	-11,68	54,00	pas		2,50	095	54,	15	-19,8	85	74	,00	pass	
2,5098	42,22	-11,78	54,00	pas	SS	2,50	098	54,	04	-19,9	96	74	,00	pass	5
2,5095	42,05	-11,95	54,00	pas	55										

pass

pass

pass

54,00

54,00

54,00

41,86

41,80

41,69

2,5150

2,4870

2,5235

-12,14

-12,20

-12,31

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FCC 3





according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT CH.0; GFSK; Low Edge

Spectrum Receiver 🔆 🖲							
RBW (EMI) 1 MHz MT	1 s	I	F56-1-7GHz	ohne Amp	TDF		
Input 1 AC Att 0 dB Preamp	OFF Step	TD Scan					
Scan 🕤 1Av Max 🎯 2Pk Max							
Limit Check	PASS		D2[2]			-38.70 (	dB
120 ዘክሥ/ሽ <del>56-1-6ፍዙਟ-ልላ-₩ι.ልN-2-4GF</del>			-0.000 s			9.000000 MI	
Line IT56-1-6GHZ-PEAK-WLAN-2-4	PASS		M1[2]			95.88 dBµV∕	
110 dBµV/m			0.000 s		2.40	02000000 GI	Hz
100 dBµV/m-			M.T				
			Ā				
90 dBµV/m			H				
an dhuatta							
IT56-1-6GHZ-PEAK-WLAN-2-4GHZ_FCC.LIN							
70 dBµV/m							_
			11				
60 dBµV/m							
IT56-1-6GHZ-AV-WLAN-2-4GHZ_FCC.LIN		02					
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	~~~~	l hom	m	man	hannah	~~
50 dBµV/m							_
					\sim	\sim	
40 dBµV/m				~ `	Ň	·	\sim
		F	1				
30 dBµV/m				Т	F		
Start 2.343 GHz Stop 2.443 GHz							

Polarisation: V

Detector Average					Detector Peak				
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
alle	emissions are	10dB below	limit	pass	all e	missions are	issions are 10dB below limit		

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Test report no .:

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TESTE IN GE	D RMANY		Ban 15.247, RS	FCC d edge en according S-247, FC		ΞS	тс		
RefNo.:	20/01	-0031							
Operation	mode:	BT CH.	0; GFSK; L	ow Edge					
Spectrun	RBW (EM	ceiver ≱(I)1 MHz MI	T 1s			5-1-7GHz c	hne AmpTDP	-	
Input 1 A0	C Att Av Max o 2Pk		eamp OFF	Step TD So	an				
Limit (120 HBµ//ii Line II	Check 1 56-1-6CHZ 156-1-6GHZ	-AV-WLAN-	PAS: 2-461- PAS: N-2-4 PAS:	8		41[2] 1.000 s)2[2] 1.000 s		2.4020	56 dBµV/m 00000 GHz -43.78 dB 00000 MHz
110 dBµV/m	י <u></u> ו								
100 dBµV/m	۱ <u> </u>								
90 dBµV/m-									
80 dBuV/m- IT56-1-6GHZ	-PEAK-WLAN	-2-4GHZ_FCC	LIN						
70 dBµV/m-									
60 dBµV/m-									
50 dBµV/m-				m	~~ <u>P</u> 2	hun	m	m	
40 dBµV/m²									
					F1				
30 dBµV/m-					-î				
Start 2.34	3 GHz							Stop	2.443 GHz
				Polarisati	on: H				
		Detector Average					Detector Peak	,	
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/n	Margin	Limit [dBµV/m]	Result
	1			nass					nass

[GHz]	[dBµV/m]	to Limit [dB]	[dBµV/m]		[GHz]	[dBµV/m]	to Limit [dB]	[dBµV/m]	
all e	missions are	10dB below l	imit	pass	all e	emissions are	10dB below	v limit	pass

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Band edge emission according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT; Hopping GFSK; High Edge

Spectrum	Receiver	×							(
RI	BW (EMI) 1 MHz	мт	1 ⊆		IT	56-1-7GHz	ohne ∧mp*	TDF		
Input 1 AC A	tt OdB	Preamp	OFF Step	TD Sca	in					
Scan 😑 1Av M	axo2Pk Max									
IT56-LIAGHCREA	K-WLAN-2-4GHZ	FCC.LIN	PASS							
120 ដ២µ/w/m 56-										-
Line IT56-	1-6GHZ-PEAK-	VLAN-2-4	PASS							
100 dBμV/m										
880 a.	A. Mar Mh	<u>രംറംമറമ</u> ു	A A A A							
129 9 40 0/200 - 6110	haw water	NI MUN	1 1 M V V							
NWA . WAMAN	CANAL CAN LT	$r_{M} \sim 1$	BIY							
80 dBµV/m		V.	,							
70 dBµV/m										
60 dBµV/m										
								million .		
50 dBµV/m				~~~			m		~~~~~	\sim
				1			·····			+-+
40 dBµV/m										
30 dBµV/m	TE									
Start 2.433 GF								St	op 2.533 G	Hz

	Polarisation: V										
		Detector Average				Detector Peak					
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result		
2,5095	42,22	-11,78	54,00	pass	2,5135	54,26	-19,74	74,00	pass		
2,5098	42,11	-11,89	54,00	pass							
2,4840	42,09	-11,91	54,00	pass							
2,5148	41,92	-12,08	54,00	pass							
2,4893	41,79	-12,21	54,00	pass							
2,4900	41,71	-12,29	54,00	pass							

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FCC 3 Band edge emission



according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT; Hopping GFSK; High Edge

Spectrum	Receiver	×						ſ	
RBW	, (EMI) 1 MHz	MT	1 s	I	F56-1-7GHz	ohne Amp	TDF		
Input 1 AC Att	0 dB	Preamp	OFF Step	TD Scan		-			
Scan 🔵 1Av Max(
IT56-LIAGHCAREAK-\	NLAN-2-4GHZ	FCC.LIN	PASS						
120 ដែល/កា 56-1-(
Line IT56-1-6	5GHZ-PEAK-	WLAN-2-4	PASS						
110 dBμV/m									
100 10 1/1-									
100 dBµV/m	80 80 0080.	0.0.00	Manakasa						
Manhaman M	NAMANNI	WWWW	WWWW						
ab domontine 11		1.1							
80 dBµV/m									
70 dBµV/m									
60 dBµV/m									
					mon	mm	mm	m	m
50 dBµV/m									
							.		
40 dBµV/m								*	
30 dBµV/m									
TF 1								on 0 500 01	
Start 2.433 GHz							St	op 2.533 GF	ΗZ

	Polarisation: H									
		Detector Average				Detector Peak				
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	
2,4840	42,69	-11,31	54,00	pass	2,4848	54,71	-19,29	74,00	pass	
2,5103	42,44	-11,56	54,00	pass	2,5125	54,68	-19,32	74,00	pass	
2,5095	42,21	-11,79	54,00	pass						
2,5145	42,08	-11,92	54,00	pass						
2,4875	42,00	-12,00	54,00	pass						
2,4915	41,72	-12,28	54,00	pass						

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FCC 3 Band edge emission



according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT; Hopping GFSK; Low Edge

Spectrum Receiver 💥 🖲							(
RBW (EMI) 1 MHz MT	1 s		IT	56-1-7GHz	ohne Amp	TDF		
Input 1 AC Att 0 dB Preamp	OFF Step	TD Sca	in					
Scan 🔵 1Av Max 😡 2Pk Max								
Limit Check	PASS		Ī	D2[2]			-38.80) dB
120 HBUN/M56-1-6CHZ-AV-WLAN-2-4CH				-0.000 s			3.000000 N	
Line IT56-1-6GHZ-PEAK-WLAN-2-4	PASS			M1[2] 0.000 s			95.89 dBµV 39000000 (
110 dBµV/m								\square
100 dBµV/m							MI	4
				AAAAAAAA	000000000000	111000000000000000000000000000000000000	ARRARA N	haat
90 dBµV/m				ppppy	<u>t titt ha ha ha ha ha h</u>	<u>, i kunikan</u>	<u> A A A A A A A A A A A</u>	₩₩₩
80 dBµV/m								
IT56-1-6GHZ-PEAK-WLAN-2-4GHZ_FCC.LIN								
70 dBμV/m								\vdash
60 dBµV/m			12					\vdash
IT56-1-6GHZ-AV-WLAN-2-4GHZ_FCC.LIN		h	A.m					
50 dBµV/m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<u>'</u>					
		h	~					
40 dBµV/m								
30 dBµV/m		TE		L				\vdash
Start 2.343 GHz Stop 2.443 GHz								

	Polarisation: V									
Detector Average					Detector Peak					
Frequ . [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	
all	all emissions are 10dB below limit		pass	alle	all emissions are 10dB below limit					

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FCC 3



Band edge emission according to

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0031

Operation mode: BT; Hopping GFSK; Low Edge

Spectrum Receiver 💥 🖲					(
RBW (EMI) 1 MHz MT	1 s	IT56-1-7GHz	ohne Amp'	TDF		
Input 1 AC Att 0 dB Preamp	OFF Step TD Scan					
Scan 🔵 1Av Max 🎯 2Pk Max						
Limit Check	PASS	D2[2]			-42.25	i dB
120 HBW/M56-1-6CHZ-AV-WLAN-2-1CH		-0.000 s			4.500000 N	
Line IT56-1-66HZ-PEAK-WLAN-2-4	PASS	M1[2]			96.98 dBµV	
110 dBµV/m		0.000 s		2.4	29000000	GHz
				MI		
100 dBµV/m						
		A Aga A	M askel	Martal 1	a Aarol Ma	
90 dBµV/m		10,4404-1	MAMAN	WAMM	Within	774
80 dBµV/m						
IT56-1-6GHZ-PEAK-WLAN-2-4GHZ_FCC.LIN						
70 dBµV/m		1				
60 dBµV/m						\vdash
IT56-1-6GHZ-AV-WLAN-2-4GHZ_FCC.LIN	D2					
50 dBµV/m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~				
		l l				
40 dBµV/m						
30 dBµý/m		_F1	Т			+
Start 2.343 GHz			1 1	-	l op 2.443 G	L Hz
				51		

Polarisation: H

Detector Average					Detector Peak				
Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result	Frequ. [GHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result
all emissions are 10dB below limit			pass	all emissions are 10dB below limit P					



8.7. Occupancy Time

Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (a) (1) (iii) -RSS-247 issue 2 Section 5.1 (d)

Test Requirements

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channel employed. No requirements for Digital Transmission System.

Discription

[Test time period] = [Limit] x [Channels] = 0.4 s x 79 = 31.6 s

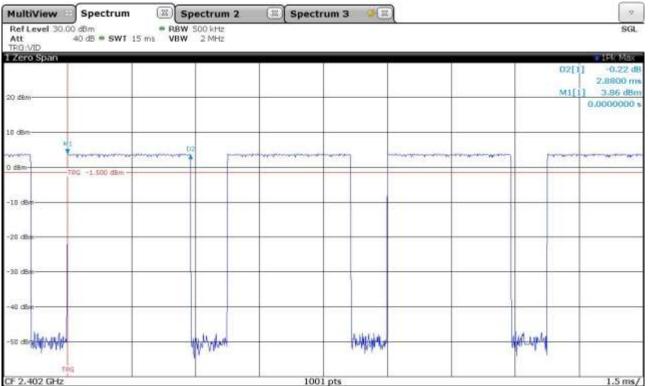
Measurement

The Measurement was performed on: 03.03.2020

DH5 / 3-DH5 Packet

DH5 Packet permit maximum 1600/79/6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times 3.37 hops/sec. x 31.6 sec. = 106.6 hops within 31.6 seconds

Pulse duration of Lowest Channel

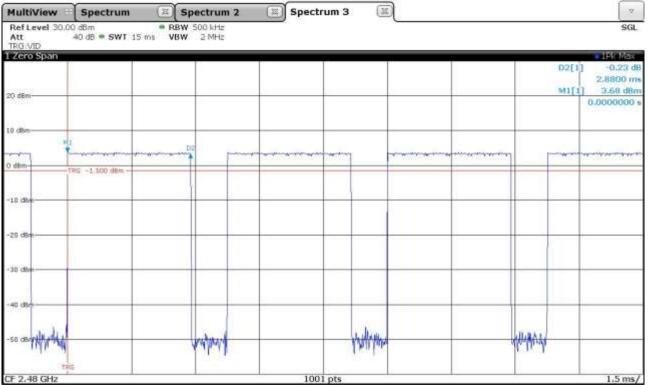


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Pulse duration of Middle Channel

MultiView	Spectrum	🗐 Sp	ectrum 2	Spect	rum 3 🛛 🤰 🗄	0			v .
Ref Level 30 Att TRG:VID	0.00 dBm 40 dB ● SWT	15 ms VBW							SGL
1 Zero Span								05[1	-0.22 dB 2.8800 ms
20 dBm				-				M1[1] 4.04 d8m 0.0000000 s
10 dBm	NL								
O dBm	-TRS -1.500 dBm -	·····					*********		
-10 dBm									-
-20 d8m						-			
- 30 dbn						-			
-40 d8m									
-so den thit	TRO		maturt		Hydrodyla	2		with the	
CF 2.441 GH	1.1			100	1 pts				1.5 ms/

Pulse duration of Highest Channel

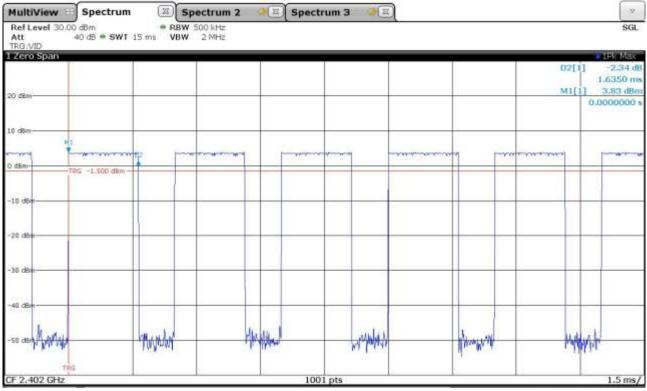


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DH3 / 3-DH3 Packet:

DH3 Packet permit maximum 1600/79/4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times 5.06 hops/sec. x 31.6 sec. = 160 hops within 31.6 seconds

Pulse duration of Lowest Channel

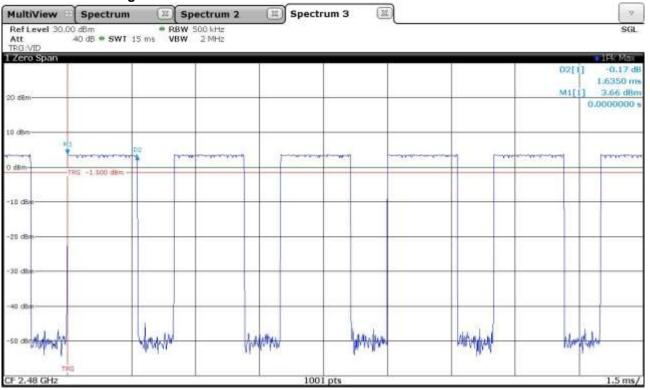


Pulse duration of Middle Channel

MultiView	Spectrum	(II)	Spectrum 2		(R	Spectru	JM 3 🔰 🗐	1					
Ref Level 30,00 Att TRG:VID	idBm 40 dB ● SWT i		₩ 500 kHz ₩ 2 MHz										SGL
Zero Span													1Pk Max
											0	22[1	0.00 dE
0 d8m			_		-			-			N	A1[1	4.06 dBm 0.0000000 s
0 dBm-													
Yerre T				a.					wh.				line a
dim	85 -1.500 dBm			-	_					1000			10,00-0
10 d8m			_	-			_		+	-			
20 d8m									-				_
30 dbm				-			_		-				_
40 d8m			_	_	_		_						_
SD CONTRACT		MAYAN	_	In	A.H		white		Antin			144	What
TRG F 2.441 GHz		1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 -		1		1001	1 - 1-					· · ·	1.5 ms/

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Pulse duration of Highest Channel

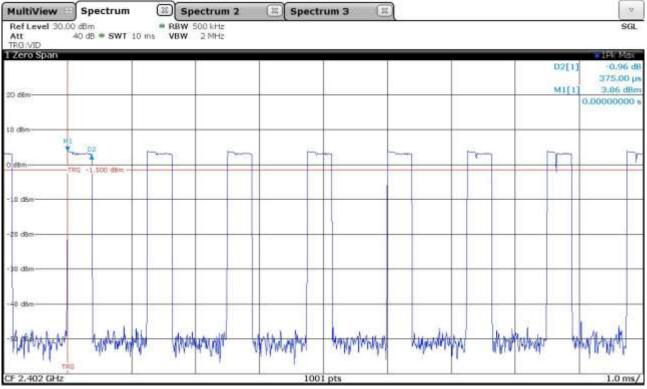


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DH1 / 2-DH1 Packet:

DH1 Packet permit maximum 1600/79/2 = 10.12 hops per second in each channel (1 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times 10.12 hops/sec. x 31.6 sec. = 320 hops within 31.6 seconds

Pulse duration of Lowest Channel



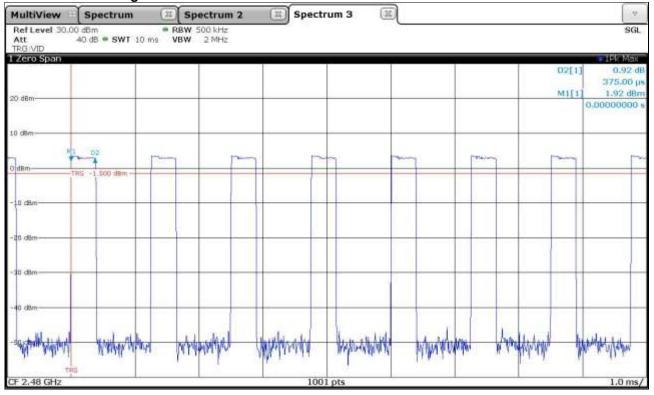
Pulse duration of Middle Channel

MultiView	Spectrum) S	pectrum 2	III Sp	ectrum 3 🛛 🤌 🔅				
Ref Level 30.00 Att TRG:VID	dBm 40 dB ● SWT		500 kHz 2 MHz	_					SGL
20 dBm								02[1] M1[1	375.00 µs
10 cBm	Da	لسعما						<u> </u>	
10 d8m 17	85 -1.500 dem								
20 d8m	-								
40 dBm									
MATTINI LAND	Antuite	AN MY	(Although	Al on the state	-	h when	hare Will	alanal why	handhaile
TRS F 2.441 GHz			<u>></u>		1001 pts				1.0 ms/

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Pulse duration of Highest Channel



Time of occup	oancy (Dwell Ti	me):				
Data Packet	Frequency [MHz]	Hops in Test time period	Pulse Duration [ms]	Dwell Time [s]	Limit [s]	Result
DH5/3-DH5	2402	106.6	2.88	0.307	0.400	PASS
DH5/3-DH5	2441	106.6	2.88	0.307	0.400	PASS
DH5/3-DH5	2480	106.6	2.88	0.307	0.400	PASS
DH3/3-DH3	2402	160	1.635	0.262	0.400	PASS
DH3/3-DH3	2441	160	1.620	0.259	0.400	PASS
DH3/3-DH3	2480	160	1.635	0.262	0.400	PASS
DH1/2-DH1	2402	320	0.375	0.120	0.400	PASS
DH1/2-DH1	2441	320	0.375	0.120	0.400	PASS
DH1/2-DH1	2480	320	0.375	0.120	0.400	PASS

Formula: [Dwell time] = [Hops in Test time period.] x [Pulse Duration]

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Time of occupancy (dwell time)**.



8.8. 99% Power Bandwidth

Applied standards

-RSS-Gen issue 5 Section 6.7

Test equipment and test set up

Test equipment used for conducted measurements as given in clause Test equipment of this report. Test setup used for conducted measurements as given in clause Test setups of this report.

Description

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The 99% power bandwidth function of the instrument was used for the measurement.

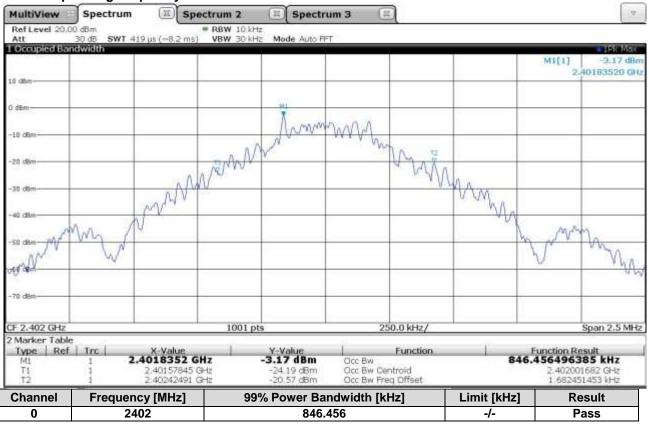
Measurement

The Measurement was performed on: 03.03.2020

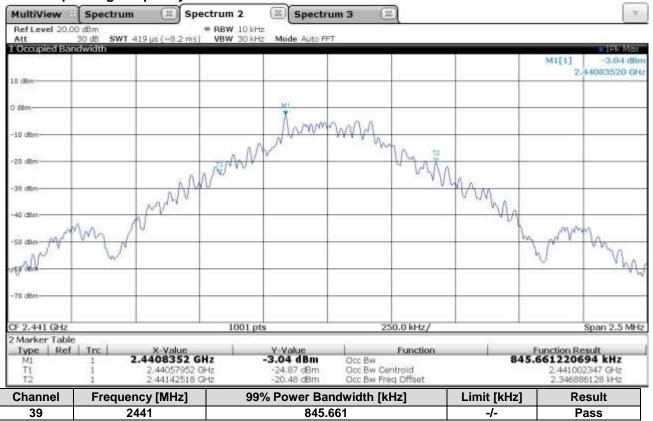
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Lowest operating frequency - GFSK



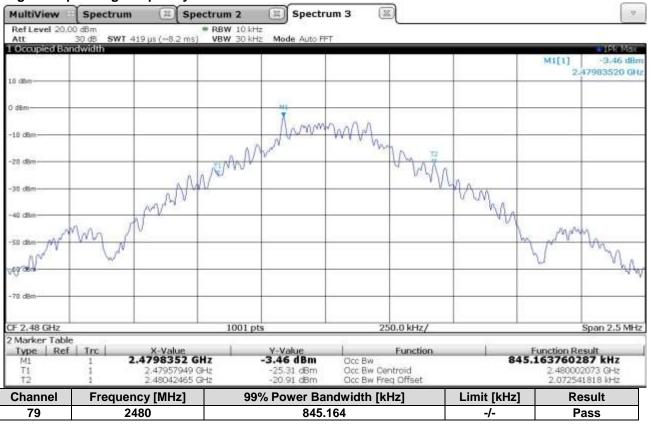
Middle Operating Frequency - GFSK



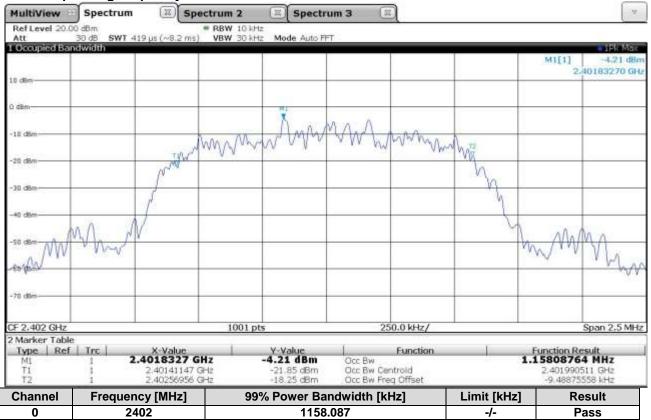
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Highest Operating Frequency - GFSK



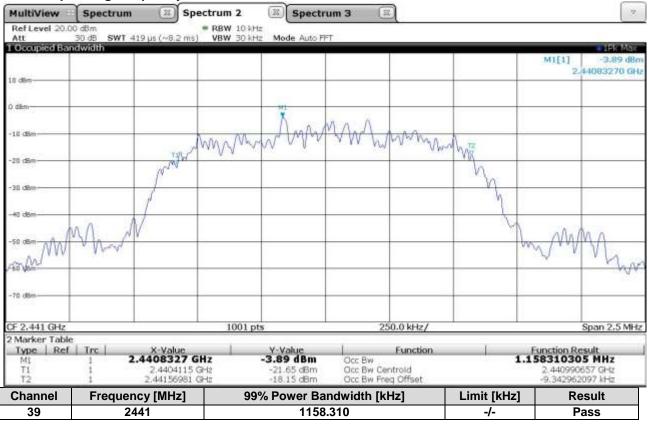
Lowest operating frequency – $\pi/4$ -DQPSK



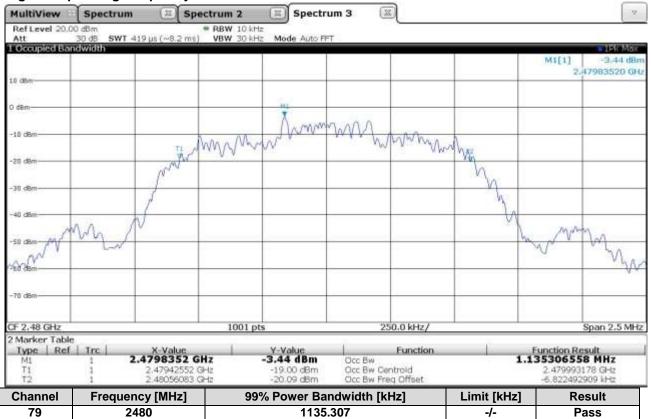
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Middle Operating Frequency – $\pi/4$ -DQPSK



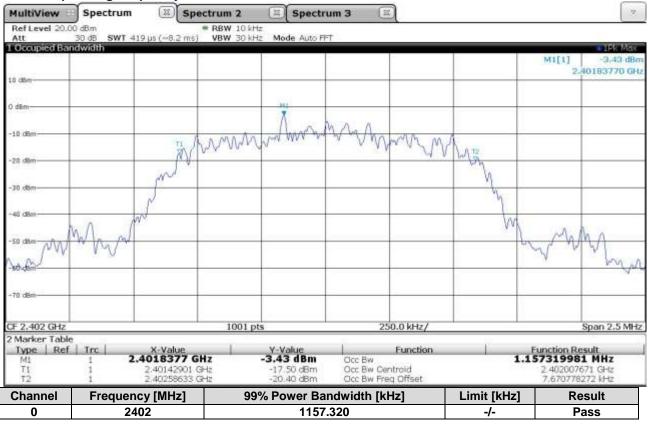
Highest Operating Frequency – π/4-DQPSK



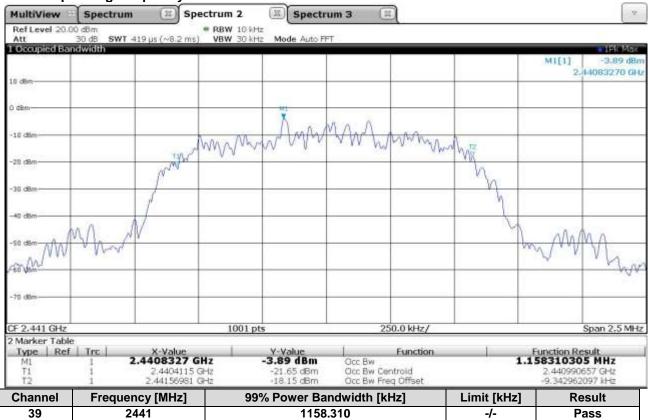
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Lowest operating frequency – 8DPSK

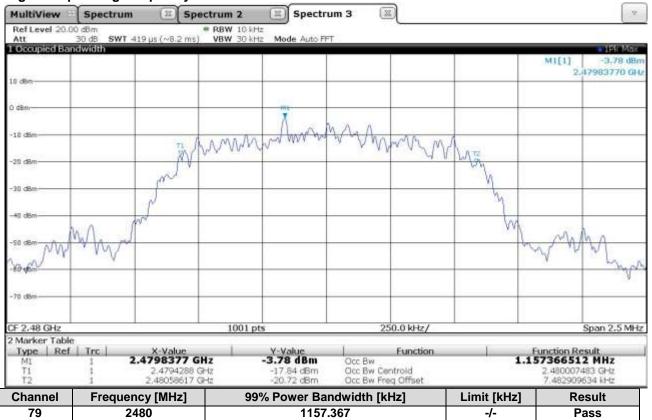


Middle Operating Frequency – 8DPSK



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Highest Operating Frequency – 8DPSK



Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **99% Power Bandwidth**.



9. Test equipment

Test equipment used for Conducted Mains emissions:

Kind of equipment	Manufacturer	Туре	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
Test-Receiver	Rohde & Schwarz	ESHS30	10571	842053/008	2019 – Mar.	3 years
Software	PKM	PKM U5/6	-/-	V1.01.03	-/-	-/-
Line impedance stabilisation network (LISN)	Rohde & Schwarz	ESH2-Z5	10139	879675/028	2019 – Jan.	3 years
Shielded room	Siemens	(6,2 x 4,7 x 3,3) m (l x w x h) DC – 10 GHz	10113	1	-/-	-/-

Test equipment used for radiated Measurements:

Kind of equipment	Manufacturer	Туре	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
Signal Spectrum Analyzer 2Hz – 26.5 GHz	Rohde & Schwarz	FSW 26 Instrument FW 2.60	11571	102047	2019-Jan.	3 years
ESR7 EMI Testreceiver 7GHz	Rohde & Schwarz	ESR7	11676	101694	2018-March	3 years
Test-Receiver	Rohde & Schwarz	ESVS30	10572	833825/010	2017-March 2020-April	3 years 3 years
Antenna 9 kHz – 30 MHz	EMCO	6502	10546	2018	2017-Nov.	3 years
Antenna 30 MHz – 1 GHz	Chase	CBL6111C	10022	1064	2019-Dec.	3 years
Antenna 1GHz – 18 GHz	Electro Metric	RGA50/60	10273	2753	2017-Nov.	3 years
Broadband- Hornantenne 15 - 26,5 (40) GHz	Schwarzbeck	BBHA 9170	11580	BBHA91706 21	2019-Dec.	3 years
Broadband- Preamplifier 1 - 18 GHz	Schwarzbeck	BBV9718	11231	9718-002	2017-Okt.	3 years
Preamplifier 18 - 40 GHz	CERNEX	CBM18403523	11679	29711	2019 - July	3 years
Cable	el-spec GmbH	FlexCore-SMA11- SMA11-8000-ARM	11625	-/-	2017-Dec.	3 years
Shielded room/Chamber	Frankonia	SAC3 "SEMI- ANECHOIC- CHAMBER"	11609	004/16	2019-March	3 years
Band Reject Filter	Telemeter	BRF-2450-150- 7-N (0441)	11243	-/-	-/-	-/-

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Test equipment used for Band Edge Measurements:

Kind of equipment	Manufacturer	Туре	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
ESR7 EMI Testreceiver 7GHz	Rohde & Schwarz	ESR7	11676	101694	2018-March	3 years
Antenna 1GHz – 18 GHz	Electro Metric	RGA50/60	10273	2753	2017-Nov.	3 years
Cable	el-spec GmbH	FlexCore-SMA11- SMA11-8000-ARM	11625	-/-	2017-Dec.	3 years
Shielded room/Chamber	Frankonia	SAC3 "SEMI- ANECHOIC- CHAMBER"	11609	004/16	2019-March	3 years

Test equipment used for conducted measurements:

Kind of equipment	Manufacturer	Туре	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
Signal Spectrum Analyzer 2Hz – 26.5 GHz	Rohde & Schwarz	FSW 26 Instrument FW 2.60	11571	102047	2019 - Jan.	3 years
EMI-Test-Receiver	Rohde & Schwarz	ESR7 Instrument FW 3.36	11505	101103	2017 - Nov.	3 years
Automatisation unit RF switch and power meter	Rohde & Schwarz	OSP120 and OSP B157	11573	101282	2017 - Dec.	3 years
Cable	el-spec GmbH	FlexCore-SMA11- SMA11-8000-ARM	11625	-/-	2017 - Dec.	3 years

All measurements were made with measuring instruments, including any accessories that may affect test results, calibrated according to the requests of ISO/IEC 17025 according to which the test site is accredited from DAkkS. Measurement of conducted mains emissions was made with instruments conforming to American National Standard Specification, ANSI C63.10-2013.

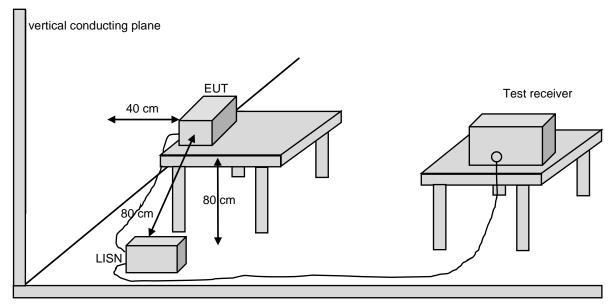
Test equipment to support EUT functions:

Kind of equipment	Manufacturer	Туре	Ident no.
Laptop	DELL	Inspiron	11488
AC-Adaptor [Laptop/EUT]	DELL	DA130PE1-00	Part of 11488
Test Adaptor Board	Vestel (Client)	17TEST02	Client
Software	Provided by Vestel (Client)	Media Tek BT Tool	-/-

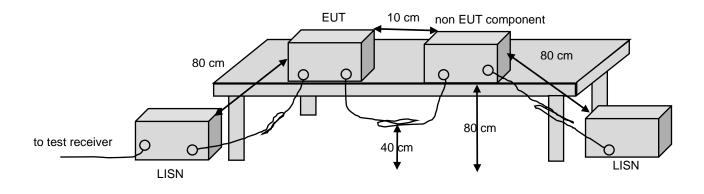
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10. Test Setups

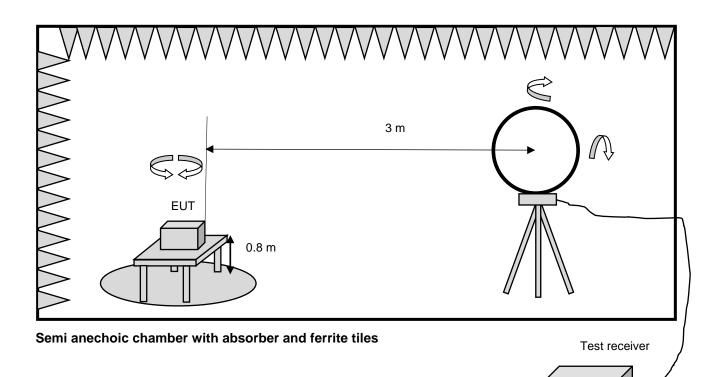
Block diagram Conducted Mains emissions



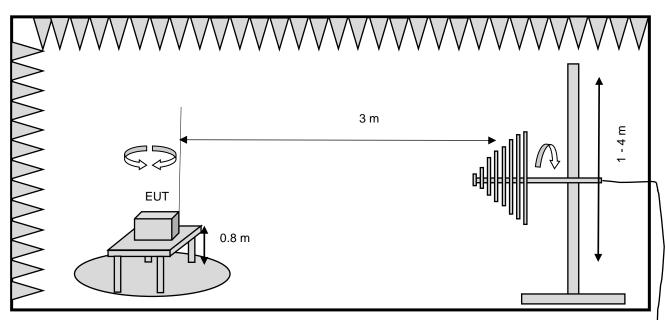
Groundplane



Block diagram Radiated emissions

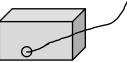


tested frequency range 9 kHz - 30 MHz

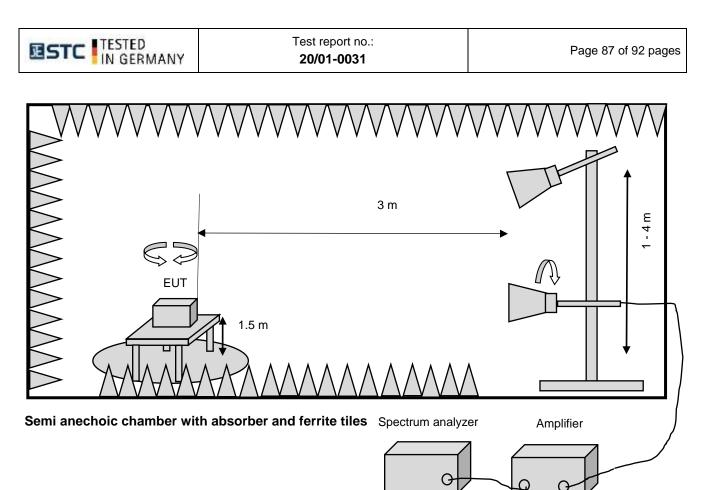


Semi anechoic chamber with absorber and ferrite tiles

Test receiver

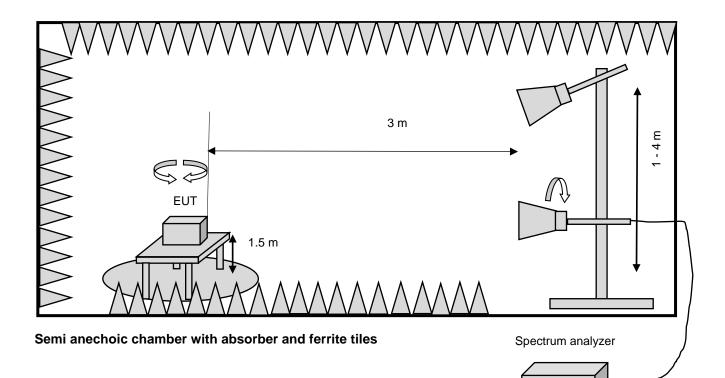


tested frequency range 30 MHz - 1000 MHz



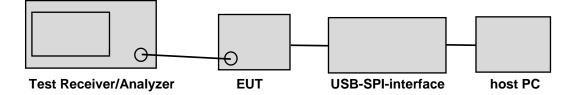
tested frequency range > 1000 MHz

Block diagram Band Edge emisions



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Block diagram for conducted measurements





11. Measurement uncertainty

according to CISPR 16-4-2 Edition 2.0 2011-06

Measurement	calculated uncertainty U _{lab}	Specified CISPR uncertainty according CISPR 16-4-2 Edition 2.0 2011-06, table 1 U _{CISPR}
Conducted disturbance at mains		
port using AMN	3.6 dB	3.8 dB
9 kHz – 150 kHz		
Conducted disturbance at mains		
port using AMN	3.2 dB	3.4 dB
150 kHz – 30 MHz		
Magn. fieldstrength	3.4 dB	-/-
9kHz - 30MHz	3.4 dB	-/-
Radiated disturbance (electric field		
strength in the SAC)	4.7 dB	6.3 dB
30 MHz to 1 000 MHz		
Radiated disturbance (electric field		
strength in the SAC)	4.1 dB	-/-
1 GHz to 26.5 GHz		

Measurement	calculated uncertainty U _{lab}	Maximum measurement uncertainty
Channel Bandwidth	±1.17 %	±5 %
RF output power, conducted	±1.36 dB	±1.5 dB
Power Spectral Density, conducted	±1.99 dB	±3 dB
Unwanted Emissions, conducted	±1.71 dB	±3 dB
All emissions, radiated	±4.8 dB	±6 dB
Temperature	±0.72 °C	±3 °C
Supply voltages	±0.76 % (DC up to 40V) ±1.74 % (AC 50Hz up to 400V)	±3 %
Time	±0.012 %	±5 %

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurements uncertainty was calculated in accordance with CISPR 16-4-2 Edition 2.0 2011-06.

The measurement uncertainty was given with a confidence of 95 % (k = 2).



12. Photos setup

Refer to "0031-fcc-ised-photos test setup.pdf" file

13. Conclusions

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the relevant §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the relevant RSS-247 issue 02 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

Following specific modifications and/or special attributes are necessary to pass the above mentioned requirements:

none

15.12.2020 Erstellt am/prepared on M. Beindl, Laboratory Engineer (Name/name / Stellung/position)

(Unterschrift/signature

(Unterschrift/signature)

15.12.2020

K. Simon, Deputy Head of Laboratory (Name/name / Stellung/position)

a

Freigabe am/released on

(Unterschrift/signature)



14. Photos of tested sample

Refer to "0031-fcc-ised-ext-photos.pdf" file

End of test report