

3.5 Test Conditions and Results - Band-edge compliance

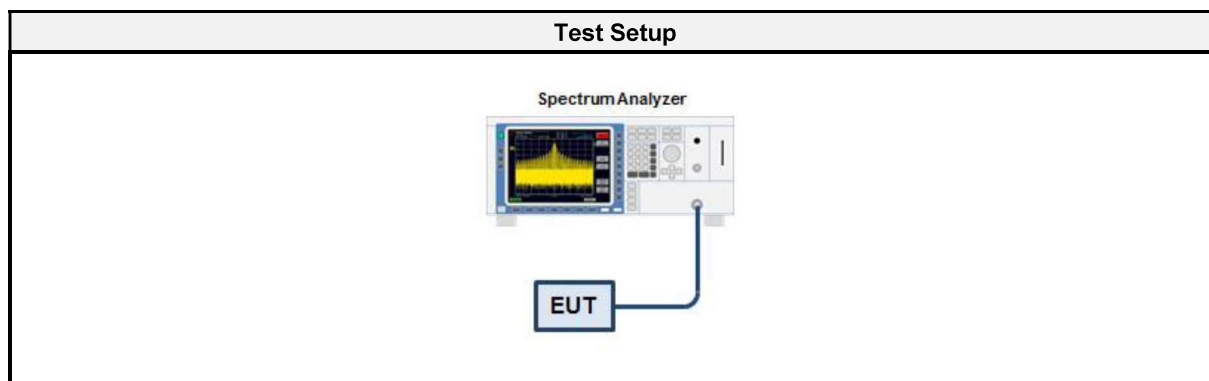
3.5.1 Information

Test Information	
Reference	FCC § 15.247(d)
Measurement Uncertainty	± 3.64 dB
Measurement Method	ANSI C63.10 11.13
Operator	Azamat Ibraimov
Date	2024-06-18

3.5.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.5.3 Setup



3.5.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSP 30	EF00312	2023-08	2024-08
Cable	Gigalane	1730	EF00779 (CAABE)	2024-04	2025-04

3.5.5 Procedure

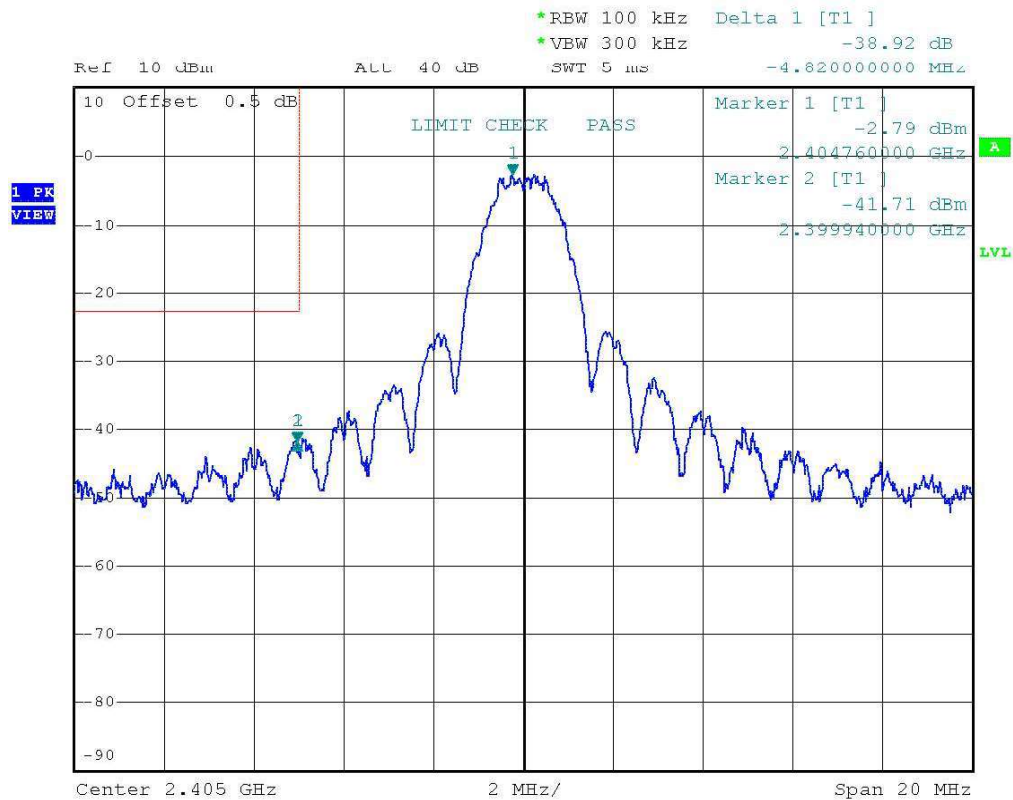
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge attenuation is determined from level difference

3.5.6 Results

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
O-QPSK	2405	-38.92	-20	PASS
O-QPSK	2475	-45.85	-20	PASS

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2403-2497
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System
 Model: 52445055, Person Tag
 Test Sample ID: 48861
 Reference Standards: FCC 15.247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: IEEE 802.15.4 (2000 kbps), Channel: 11, 2405 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Azamat Ibraimov
 Test Site: Eurofins Product Service GmbH
 Test Date: 2024-06-18
 Note: RFR2a
 Band-edge: Lower
 In-band Frequency [MHz]: 2404.76
 Max. in-band Level [dBm/100 kHz]: -2.789
 Out-of-band Frequency [MHz]: 2399.94
 Max. out-of-band Level [dBm/100 kHz]: -41.712
 Attenuation [dB]: -38.92



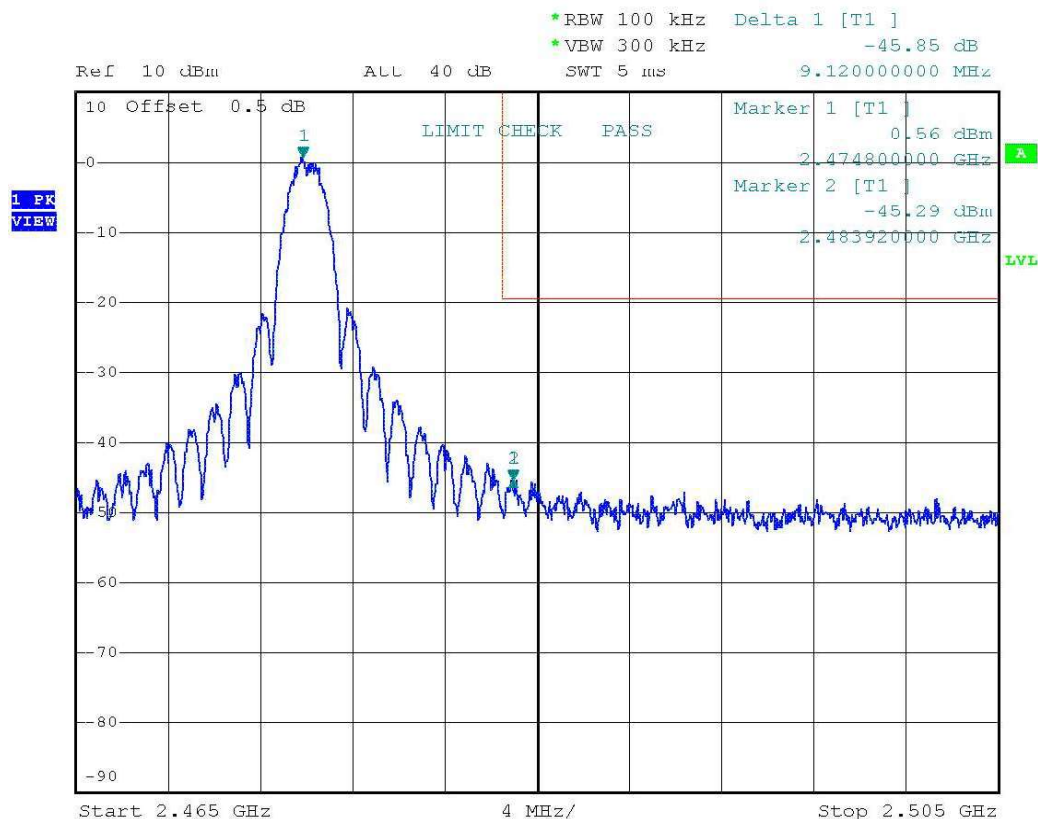
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Test Report No.: G0M-2403-2497-TFC247ZB-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2403-2497
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System
 Model: 52445055, Person Tag
 Test Sample ID: 48861
 Reference Standards: FCC 15.247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: IEEE 802.15.4 (2000 kbps), Channel: 25, 2475 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Azamat Ibraimov
 Test Site: Eurofins Product Service GmbH
 Test Date: 2024-06-18
 Note: RFR2a
 Band-edge: Upper
 In-band Frequency [MHz]: 2474.8
 Max. in-band Level [dBm/100 kHz]: 0.558
 Out-of-band Frequency [MHz]: 2483.92
 Max. out-of-band Level [dBm/100 kHz]: -45.289
 Attenuation [dB]: -45.85



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Test Report No.: G0M-2403-2497-TFC247ZB-V01

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3.6 Test Conditions and Results - Conducted spurious emissions

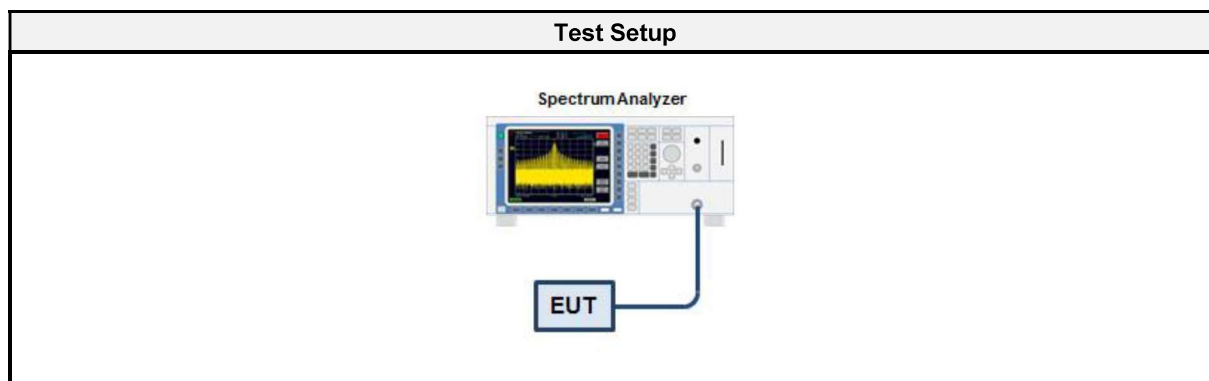
3.6.1 Information

Test Information	
Reference	FCC § 15.247(d)
Measurement Uncertainty	± 4.25 dB
Measurement Method	ANSI C63.10 11.11
Operator	Azamat Ibraimov
Date	2024-06-18

3.6.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.6.3 Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSP 30	EF00312	2023-08	2024-08
Cable	Huber+Suhner	Sucoflex 102EA	EF00779 (CAABR)	2024-04	2025-04

3.6.5 Procedure

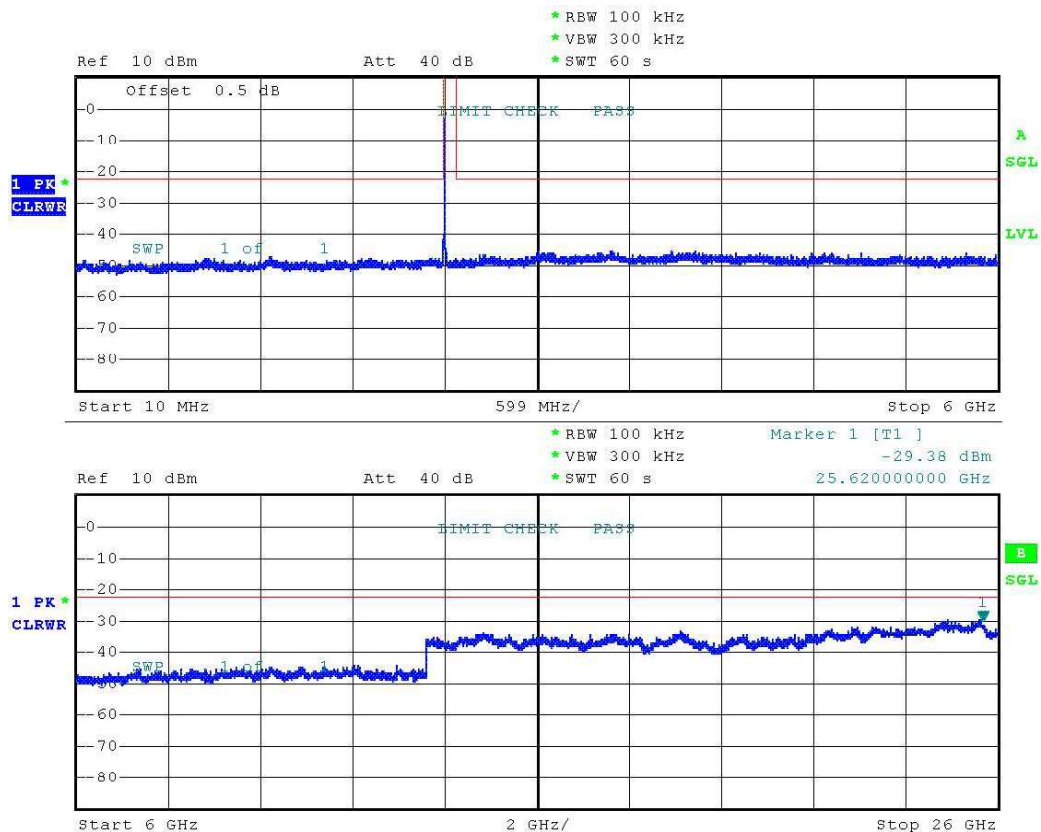
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels outside frequency band

3.6.6 Results

Test Results		
Mode	Channel [MHz]	Verdict
O-QPSK	2405	PASS
O-QPSK	2440	PASS
O-QPSK	2475	PASS

Conducted Spurious Emissions

Project Number: G0M-2403-2497
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System
 Model: 52445055, Person Tag
 Test Sample ID: 48861
 Reference Standards: FCC 15.247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: IEEE 802.15.4 (2000 kbps), Channel: 11, 2405 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Azamat Ibraimov
 Test Site: Eurofins Product Service GmbH
 Test Date: 2024-06-18
 Note: RFR2a
 Max. in-band Frequency [MHz]: 2405.3
 Max. in-band Level [dBm/100 kHz]: -2.4
 Out-of-band Limit [dBm/100 kHz]: -22.4



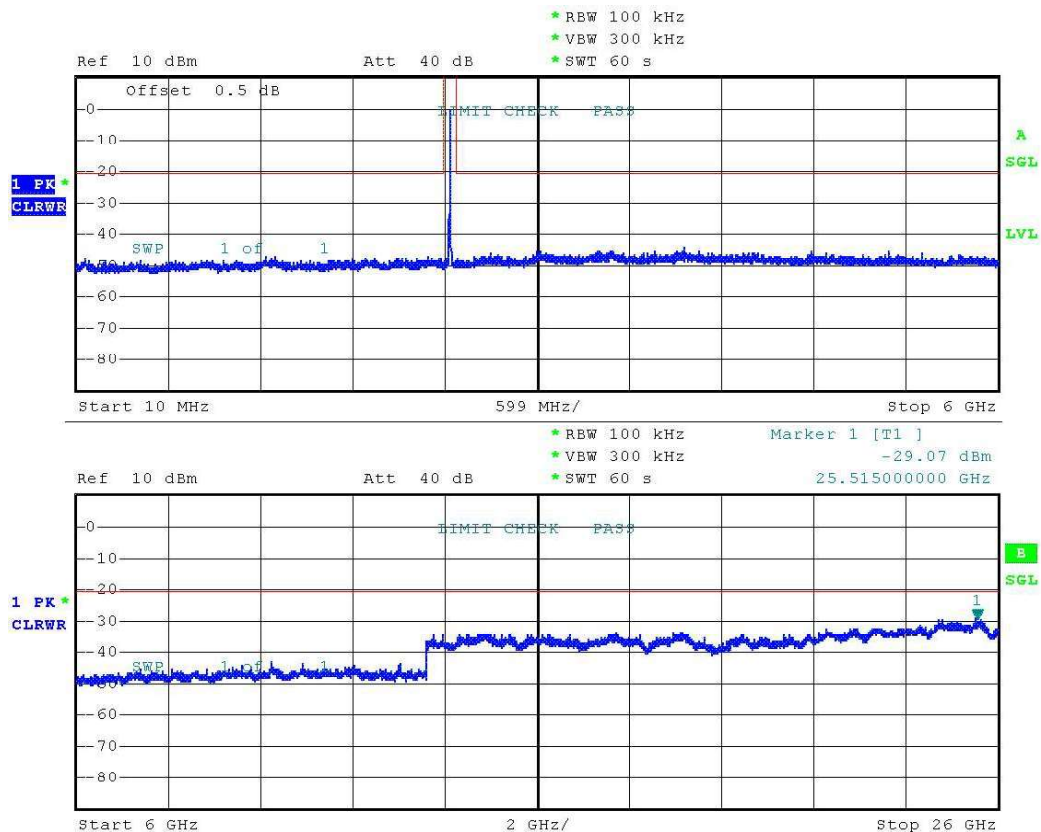
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Test Report No.: G0M-2403-2497-TFC247ZB-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted Spurious Emissions

Project Number: G0M-2403-2497
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System
 Model: 52445055, Person Tag
 Test Sample ID: 48861
 Reference Standards: FCC 15.247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: IEEE 802.15.4 (2000 kbps), Channel: 18, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Azamat Ibraimov
 Test Site: Eurofins Product Service GmbH
 Test Date: 2024-06-18
 Note: RFR2a
 Max. in-band Frequency [MHz]: 2440.1
 Max. in-band Level [dBm/100 kHz]: -0.6
 Out-of-band Limit [dBm/100 kHz]: -20.6



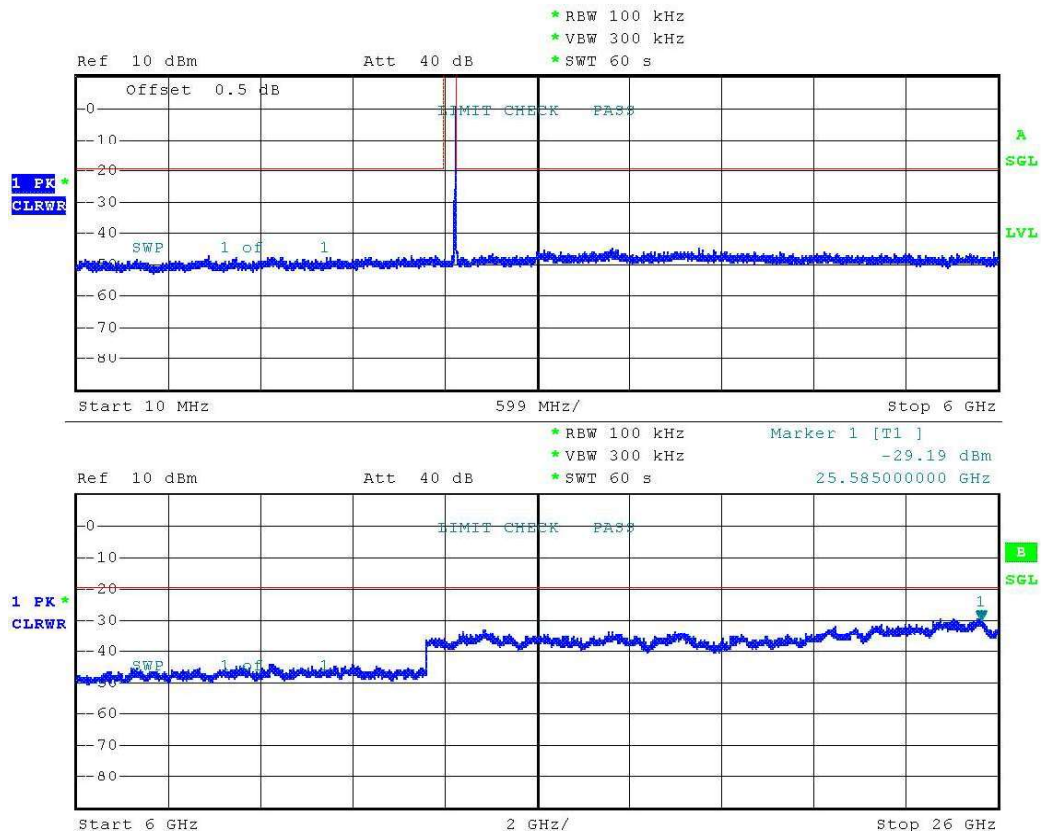
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Test Report No.: G0M-2403-2497-TFC247ZB-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted Spurious Emissions

Project Number: G0M-2403-2497
 Applicant: Jungheinrich AG
 Model Description: UWB-Location-System
 Model: 52445055, Person Tag
 Test Sample ID: 48861
 Reference Standards: FCC 15.247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: IEEE 802.15.4 (2000 kbps), Channel: 25, 2475 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Azamat Ibrahimov
 Test Site: Eurofins Product Service GmbH
 Test Date: 2024-06-18
 Note: RFR2a
 Max. in-band Frequency [MHz]: 2475.5
 Max. in-band Level [dBm/100 kHz]: 0.6
 Out-of-band Limit [dBm/100 kHz]: -19.4



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Test Report No.: G0M-2403-2497-TFC247ZB-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

3.7 Test Conditions and Results - Transmitter radiated emissions

3.7.1 Information

Test Information	
Reference	FCC § 15.247(d); FCC § 15.209
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Azamat Ibraimov
Date	2024-06-12 - 2024-06-14

3.7.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

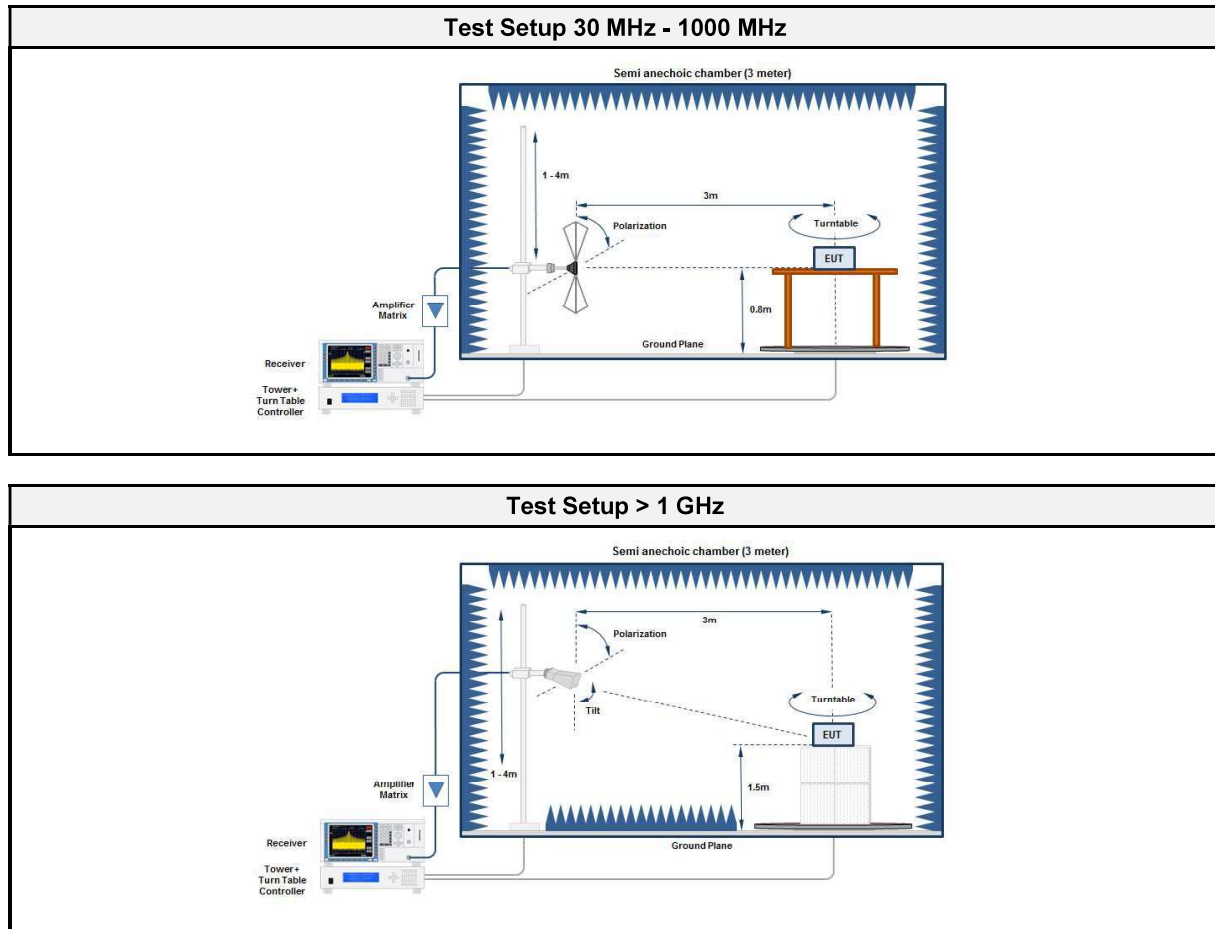
3.7.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8
EMC Software	DARE Instruments	RadiMation	2023.2.6

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2022-11	2025-11
Test Receiver	Rohde & Schwarz	ESW44	EF01856	2024-04	2025-04
Antenna	Schwarzbeck	VULB 9168	EF01824	2022-10	2025-10

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC2	EF01616	2023-12	2024-12
Spectrum analyzer	Rohde & Schwarz	FSU26	EF01407	2023-08	2024-08
Antenna	Schwarzbeck	BBHA 9120B	EF01678	2024-05	2027-05
Antenna	Schwarzbeck	HWRD 650	EF01679	2024-05	2027-05
Antenna	Amplifier Research	AT4560	EF00302	2023-09	2025-09

3.7.4 Setup



3.7.5 Procedure

Test Procedure 30 MHz - 1000 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector
Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

3.7.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
2405	330.7	34.8	pk	hor	46	-11.25
2405	404.42	30.2	pk	hor	46	-15.79
2405	3993.7823	39.04	pk	hor	74	-34.96
2405	3993.7823	31.37	avg	hor	54	-22.63
2405	4810.9333	40.69	pk	hor	74	-33.31
2405	4810.9333	37.47	avg	hor	54	-16.53
2440	330.7	30.5	pk	hor	46	-15.48
2440	3993.6307	38.15	pk	hor	74	-35.85
2440	3993.6307	33.2	avg	hor	54	-20.8
2440	4880.9333	41.06	pk	ver	74	-32.94
2440	4880.9333	38.61	avg	ver	54	-15.39
2440	7321.6	40.69	pk	ver	74	-33.31
2440	7321.6	36.42	avg	ver	54	-17.58
2475	330.7	32	pk	hor	46	-14.04
2475	723.55	63.4	pk	ver	95	-31.64
2475	4950.9333	43.6	pk	hor	74	-30.4
2475	4950.9333	40.27	avg	hor	54	-13.73
2475	7426.6667	42.55	pk	ver	74	-31.45
2475	7426.6667	38.72	avg	ver	54	-15.28