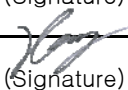


Test Report for FCC

FCC ID :2A2JFZENITHZ5

Report Number		ESTRFC2108-003		
Applicant	Company name	EZDS Co., LTD.		
	Address	Suite 1405,A Tower,11 Beobwon-ro 11-gil,Songpa-gu Seoul South Korea		
	Telephone	+82-31-8039-7789		
	Contact person	Choi Hanho		
Product	Product name	Automotive Diagnostic Scan tool		
	Factory address1	Suite 1405,A Tower,11 Beobwon-ro 11-gil,Songpa-gu Seoul South Korea		
	Model No.	ZENITH Z5	Manufacturer	EZDS Co., LTD.
	Serial No.	NONE	Country of origin	KOREA
Test date	19-Jul-21 ~ 23-Jul-21		Date of issue	27-Aug-21
Testing location	140-16, Eongmalli-ro, Majang-myeon, Icheon-si, Gyeonggi-do, Korea			
Standard	FCC PART 15 Subpart C (15.247) , ANSI C 63.10(2013) , KDB 558074 D01(2018)			
Measurement facility registration number		659627		
Tested by	Senior Engineer H.G. Lee		 (Signature)	
Reviewed by	Engineering Manager I.K. Hong		 (Signature)	
Abbreviation	OK, Pass = Passed, Fail = Failed, N/A = not applicable			
* Note - This test report is not permitted to copy partly without our permission - This test result is dependent on only equipment to be used - This test result based on a single evaluation of one sample of the above mentioned - This test report is not related to KOLAS accreditation				

Contents

1. Laboratory Information	3
2. Description of EUT	4
3. Test Standards	5
4. Measurement condition	6
5. DTS bandwidth	11
5.1 Test procedure	11
5.2 Test instruments and measurement setup	11
5.3 Measurement results	11
5.4 Trace data	13
6. Maximum Peak Output Power	19
6.1 Test procedure	19
6.2 Measurement results	19
7. Maximum conducted (average) output power	20
7.1 Test procedure	20
7.2 Measurement results	20
8. Maximum power spectral density level in the fundamental emission	21
8.1 Test procedure	21
8.2 Test instruments and measurement setup	21
8.3 Measurement results	21
8.4 Trace data	23
9. Emissions in non-restricted frequency bands	29
9.1 Test procedure	29
9.2 Test instruments and measurement setup	29
9.3 Measurement results	29
9.4 Trace data of band-edge & out of emissioin	30
10. Measurement of radiated emission	39
10.1 Measurement equipment	39
10.2 Environmental conditions	39
10.3 Measurement Instrument setting for Radiated Emission	40
10.4 Test Data.....	41
11. Measurement of conducted emission	77
11.1 Measurement equipment	77
11.2 Environmental conditions	77
11.3 Test Data.....	78

Appendix 1. Special diagram

Appendix 2. Antenna Information

1. Laboratory Information

1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report.

ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.

ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

1.2 Test Lab.

Corporation Name : ESTECH Co., Ltd.

Head Office : Suite 1015 World Meridian II, 123 Gasan Digital 2-ro, Geumcheon-gu, Seoul 153-759, R. O. Korea

EMC/Telecom/Safety Test Lab : 347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si,
Gyeonggi-do 467-811, R. O. Korea

1.3 Official Qualification(s)

MSIP : Granted Accreditation from Ministry of Information & Communication for EMC, Safety
and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC
requirements

FCC : Conformity Assessment Body(CAB) with registration number 659627 under
APEC TEL MRA between the RRA and the FCC

VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

2. Description of EUT

2.1 Summary of Equipment Under Test

Modulation Type	:	CCK, OFDM
Transfer Rate	:	11 Mbps , 54 Mbps, MCS7
Number of Channel	:	11 ch
Output Power	:	23.45 dBm (Peak), 14.17 dBm (Average)
Rating	:	DC 12V–24V The EUT is Tested by Cigar jack
Receipt Date	:	12-Jul-21
Testing Voltage	:	DC 3.8 V (Battery)
X-tal list(s) or Frequencies generated	:	The highest operating frequency is 2 462 MHz

2.2 General descriptions of EUT

Category	Specification
CPU	Octa Core Processor 2.0 GHz
Operating System	Andoroid 9
System Memory	3G / Internal 32G
External Memory	Micro SD Card
LCD	8.0 inch FHD (1920 x 1200)
Input Devices	Capacitive Touch Screen, 3 Hard Keys (Power, Volume +, Volume –)
Camera	8 megapixel auto-focus with LED flash
Sound	Loud Speackerl 1 microphone; 3.5 pi standard audio jack
Rechargeable Battery	Li-ion 3.8V 3200 mAh
Operating voltage	DC 9 ~ 30V
Sensors	Ambient Light, Proximity, Gyroscope, Accelerometer
Dimension	225 x 136 x 33 mm
Weight	800g
External port	USB 2.0 1ea, USB 3.0 2 ea
Network	RJ45 Ethernet, Wifi 802.11 a/b/g/n, Bluetooth 4.2

3. Test Standards

Test Standard : FCC PART 15 Subpart C (15.247)

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of

Test Method : ANSI C 63.10 (2013) & KDB558074 D01(2018)

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain devices that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment. These methods apply to the measurement of individual units or systems comprised

Summary of Test Results

Applied Standard : 47 CFR Part 15 Subpart C				remark
Standard	Test Type	Result	Remark	Limit
15.207	AC Power Conducted Emission	Pass		
15.205 & 15.209	Restricted band / Intentional Radiated Emission	Pass	Meet the requirement	
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement	Min. 500 kHz
	99 % Bandwidth			
15.247(b)(3)	Maximum Peak / Average output power	Pass	Meet the requirement	Max. 30 dBm
15.209	Transmitter Radiated Emission	Pass	Meet the requirement	Table 15.209
15.247(e)	Power Spectral Density	Pass	Meet the requirement	Max. 8 dBm
15.247(d)	Band Edge Measurement	Pass	Meet the requirement	20 dB less

4. Measurement Condition

4.1 EUT Operation

a. Channel

Ch.	Frequency	Ch.	Frequency
1	2 412 MHz	7	2 442 MHz
2	2 417 MHz	8	2 447 MHz
3	2 422 MHz	9	2 452 MHz
4	2 427 MHz	10	2 457 MHz
5	2 432 MHz	11	2 462 MHz
6	2 437 MHz		

b. Measurement Channel : WLAN : Low(2 412 MHz), Middle(2 437 MHz), High(2 462 MHz)

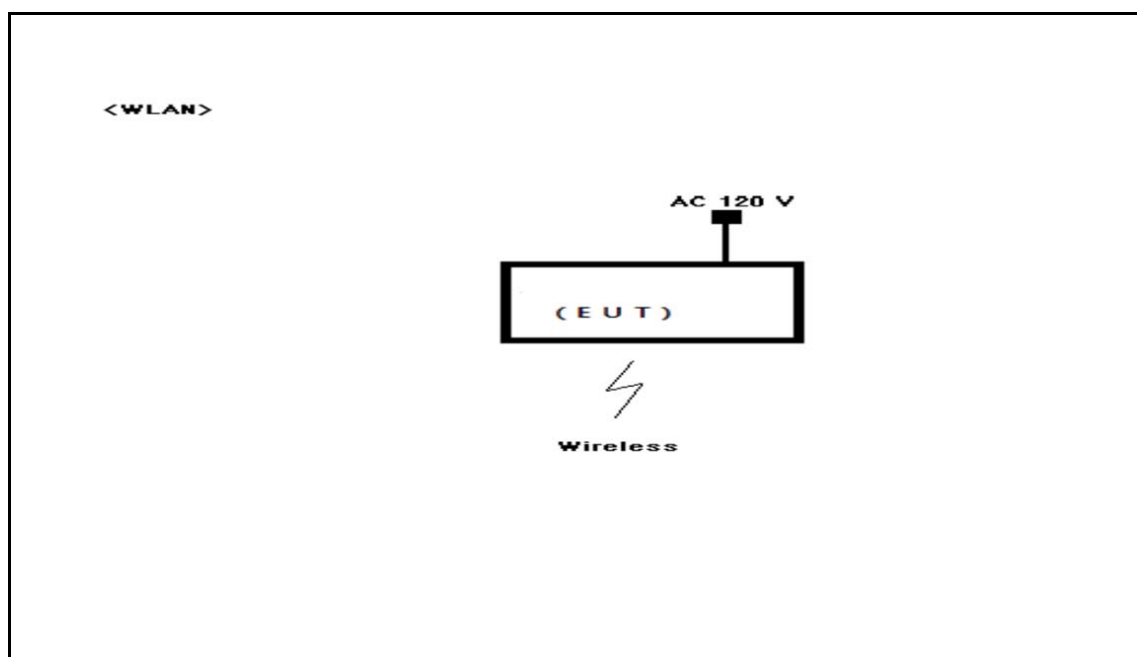
c. Test Mode : Continuous Output, CCK, OFDM

d. Test rate : 11 Mbps, 54 Mbps, Mcs7

4.2 EUT Operation

- The EUT was in the following operation mode during all testing
 - * Wireless LAN 2.4 GHz operation check
 - * Transmit mode were measured each channels(802.11b, 802.11g, 802.11n20)

4.3 Configuration and Peripherals



4.4 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
Automotive Diagnostic Scan tool	ZENITH Z5	NONE	EZDS Co., LTD.	EUT
Adapter	SK05T-1200320Z	21041901000022	Shenzhen Simsukian Electronics Technology Co., Ltd.	

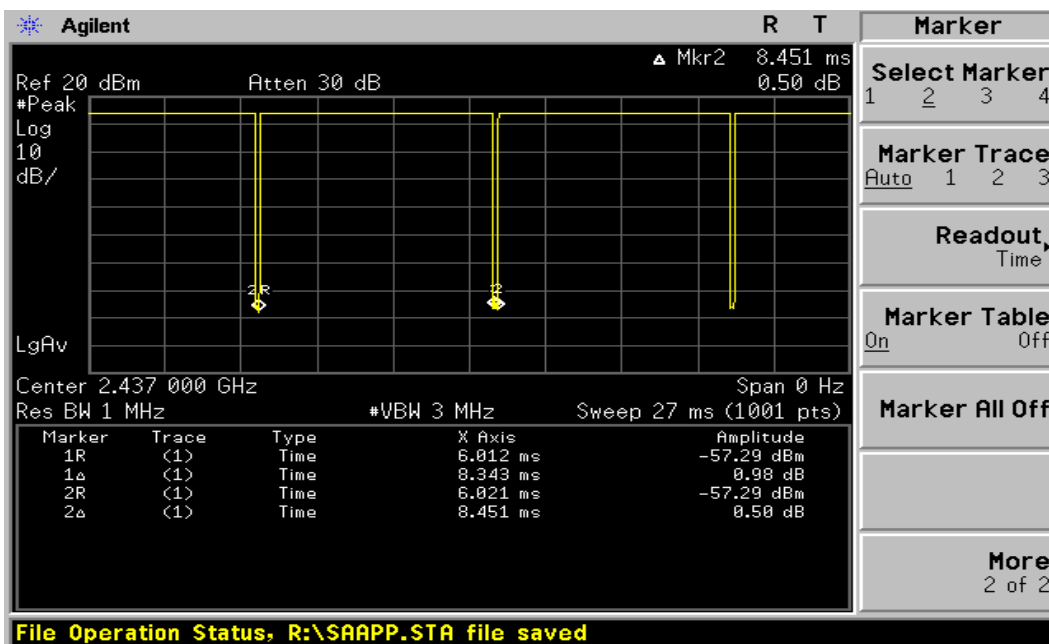
4.5 Cable Connecting

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
Automotive Diagnostic Scan tool	Power	Adapter	–	2.0	Unshielded	

4.6 DUTY CYCLE OF TEST SIGNAL

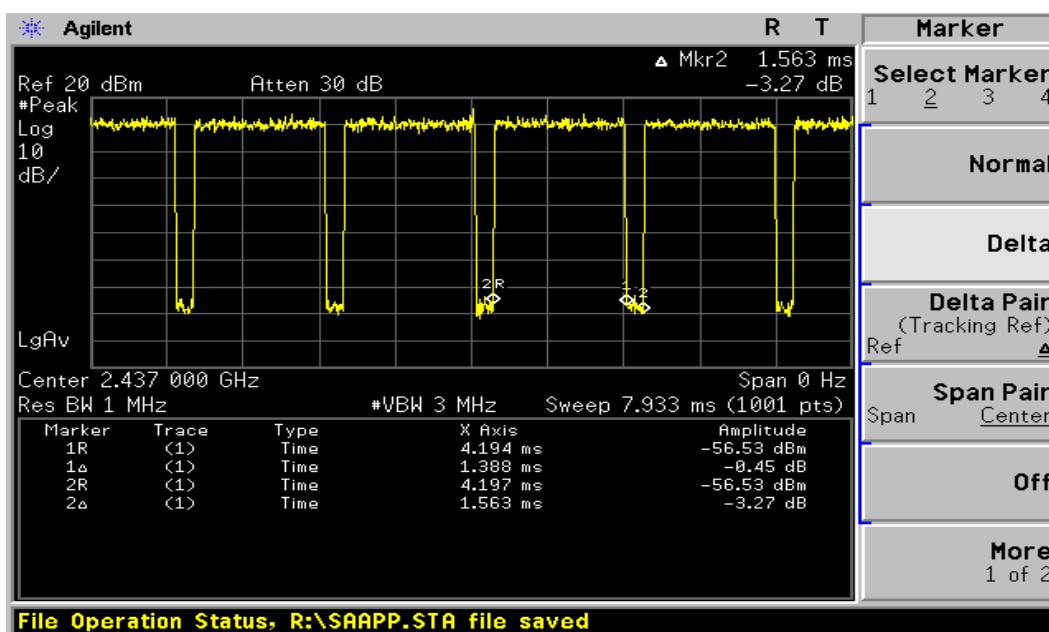
802.11b

duty cycle = 99 % , duty factor = 0



802.11g

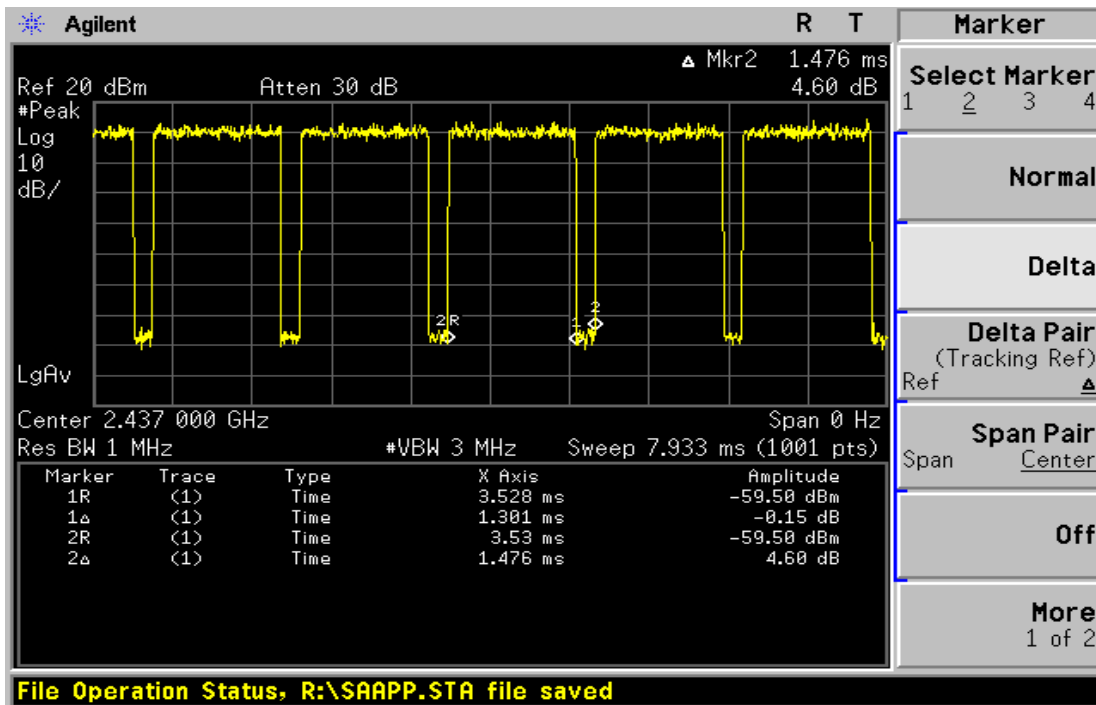
duty cycle = 0.888 % , duty factor = $10 \cdot \log(1/0.888) = 0.5156$



Duty cycle is > 98 %, duty factor shall be considered.

802.11n20

duty cycle = 88 % , duty factor = $10 \cdot \log(1/0.88) = 0.548$



5. DTS bandwidth

5.1 Test procedure

558074 D01 DTS Meas Guidance v05 8.2 Option 2 :The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW $\geq 3 \times$ RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

5.2 might be > 6 dB Test instruments and measurement setup

The spectrum analyzer is set to as following.

- . RBW= 100 KHz . VBW $\geq 3 \times$ RBW
 - . Span= 50 MHz . Sweep= suitable duration based on the EUT specification.
- Limits : FCC § 15.247(a)(2)

6dB Bandwidth Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US42041291	1-Dec-21
RF Cable	Length: 30 cm	–	
–Spectrum Analyzer $\Leftrightarrow$ EUT	Loss: 1.0 dB	–	

5.3 Measurement results

EUT	Automotive Diagnostic Scan tool	MODEL	ZENITH Z5
MODE	802.11b, g, n20	ENVIRONMENTAL CONDITION	23.0 °C, 47.0 % R.H.
INPUT POWER	DC 3.8 V		

MODE – 802.11b

Channel Frequency (MHz)	Emission bandwidth (MHz)	Bandwidth at 6dB below(MHz)	Minimum Limit (MHz)	PASS/FAIL
2 412	13.44	8.59	0.5	PASS
2 437	13.40	8.58	0.5	PASS
2 462	14.81	9.07	0.5	PASS

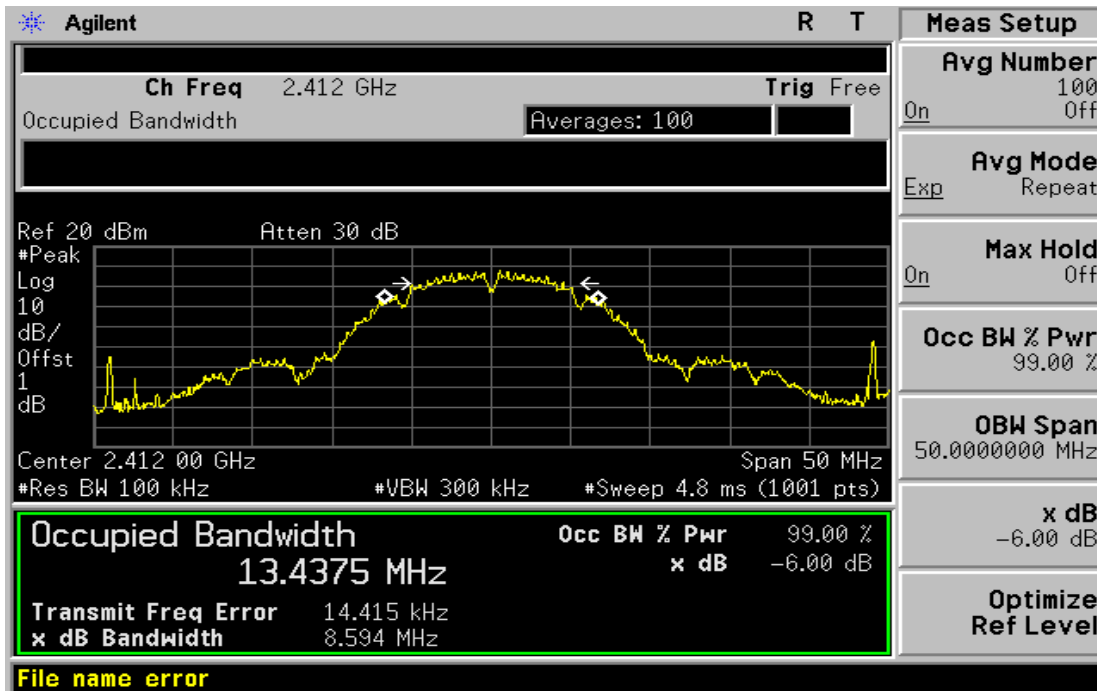
MODE – 802.11g

Channel Frequency (MHz)	Emission bandwidth (MHz)	Bandwidth at 6dB below(MHz)	Minimum Limit (MHz)	PASS/FAIL
2 412	16.56	16.44	0.5	PASS
2 437	16.58	16.42	0.5	PASS
2 462	16.57	16.42	0.5	PASS

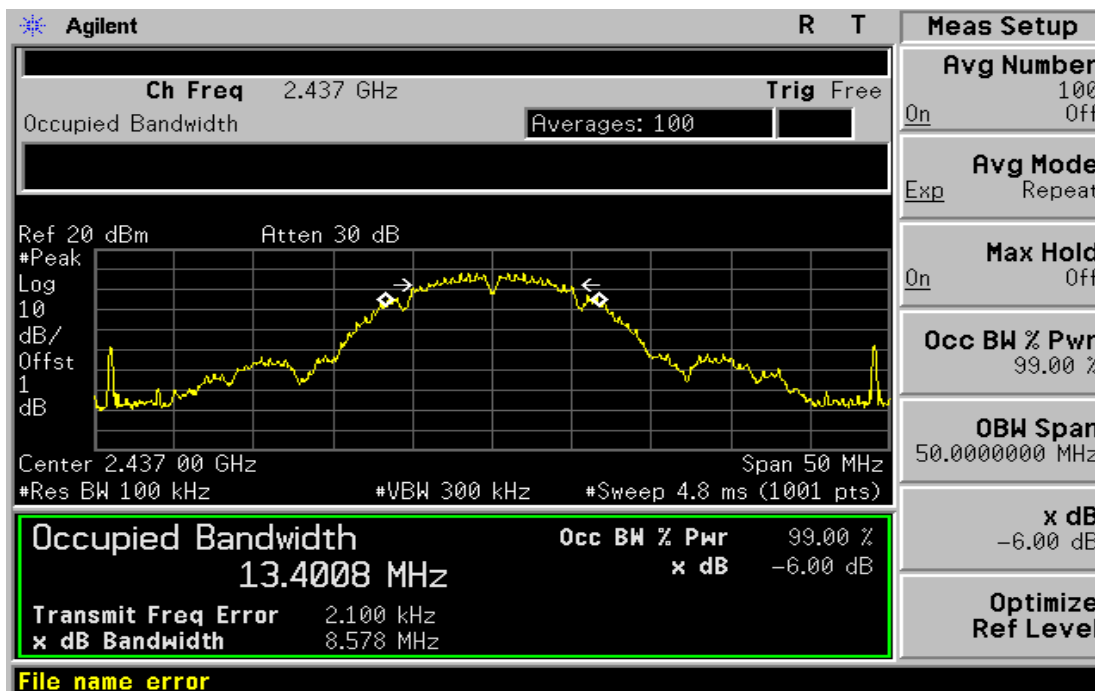
MODE – 802.11n20

Channel Frequency (MHz)	Emission bandwidth (MHz)	Bandwidth at 6dB below(MHz)	Minimum Limit (MHz)	PASS/FAIL
2 412	17.74	17.66	0.5	PASS
2 437	17.74	17.33	0.5	PASS
2 462	17.71	17.34	0.5	PASS

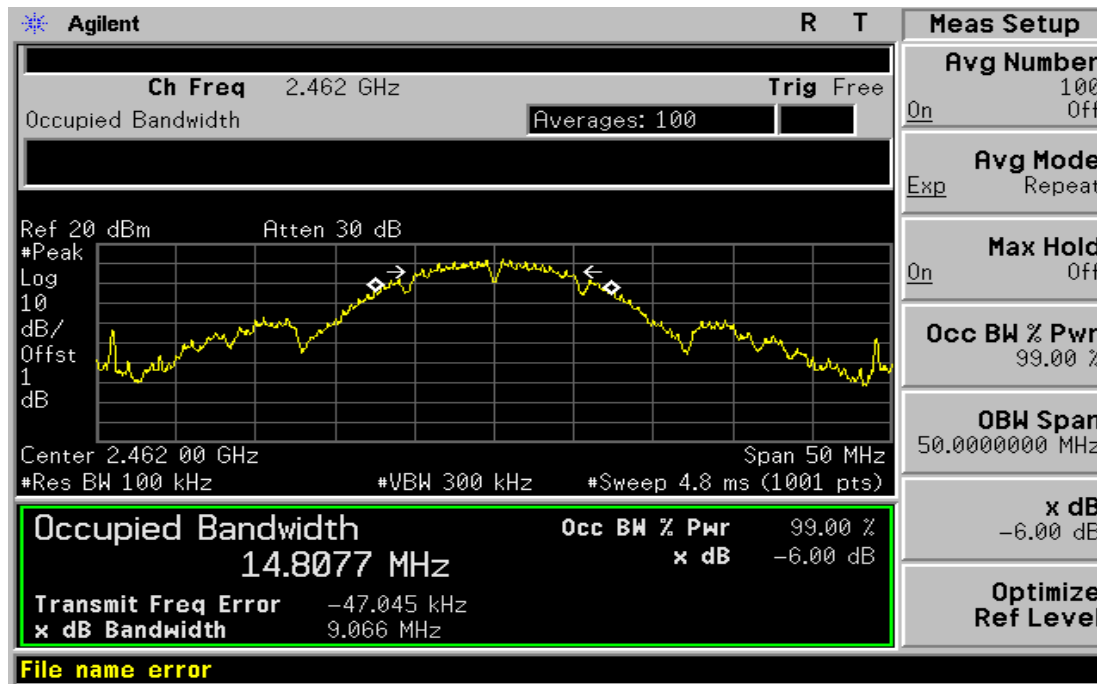
5.4 Trace data – 802.11b (ch_1)



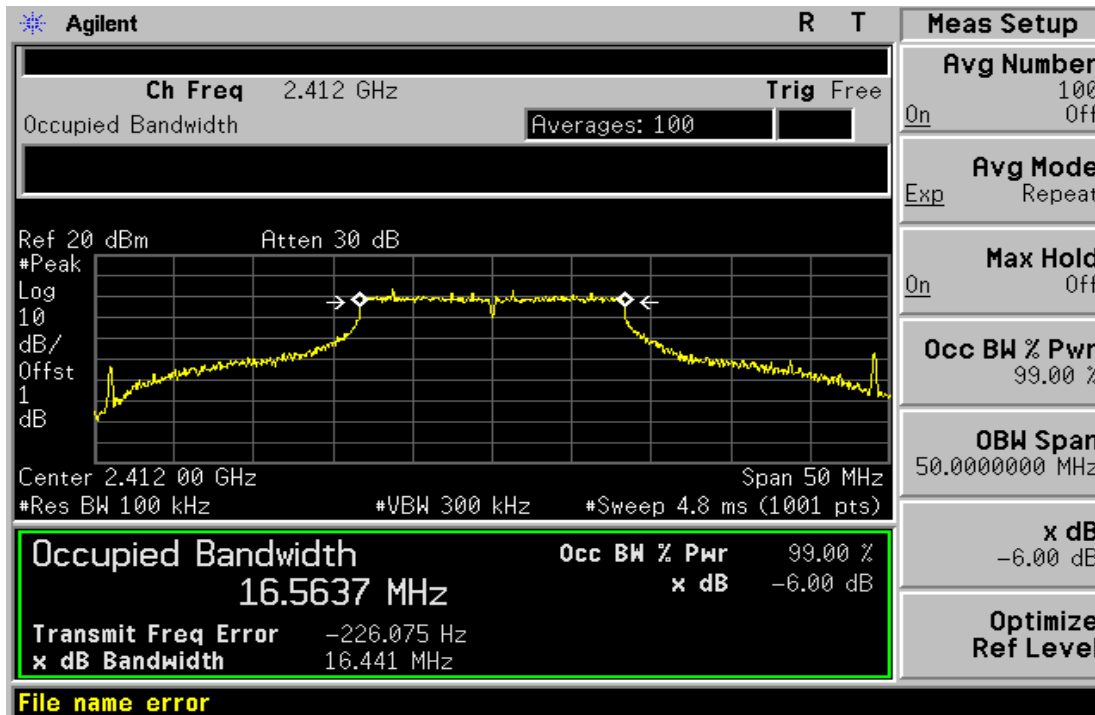
(ch_6)



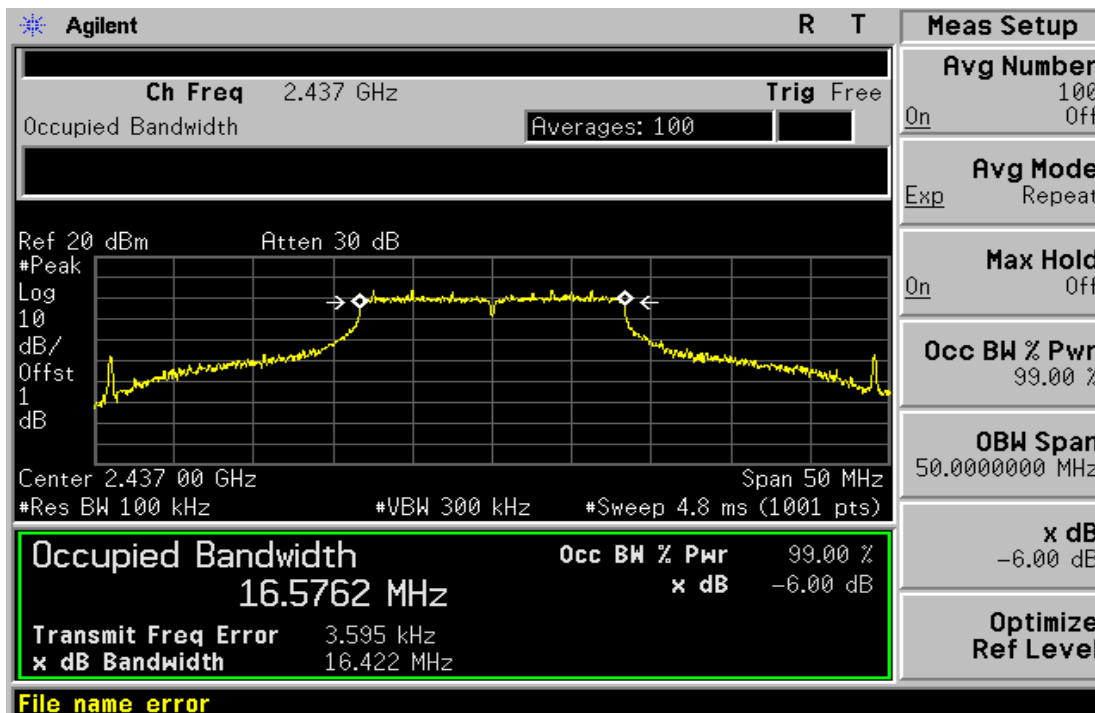
(ch_11)



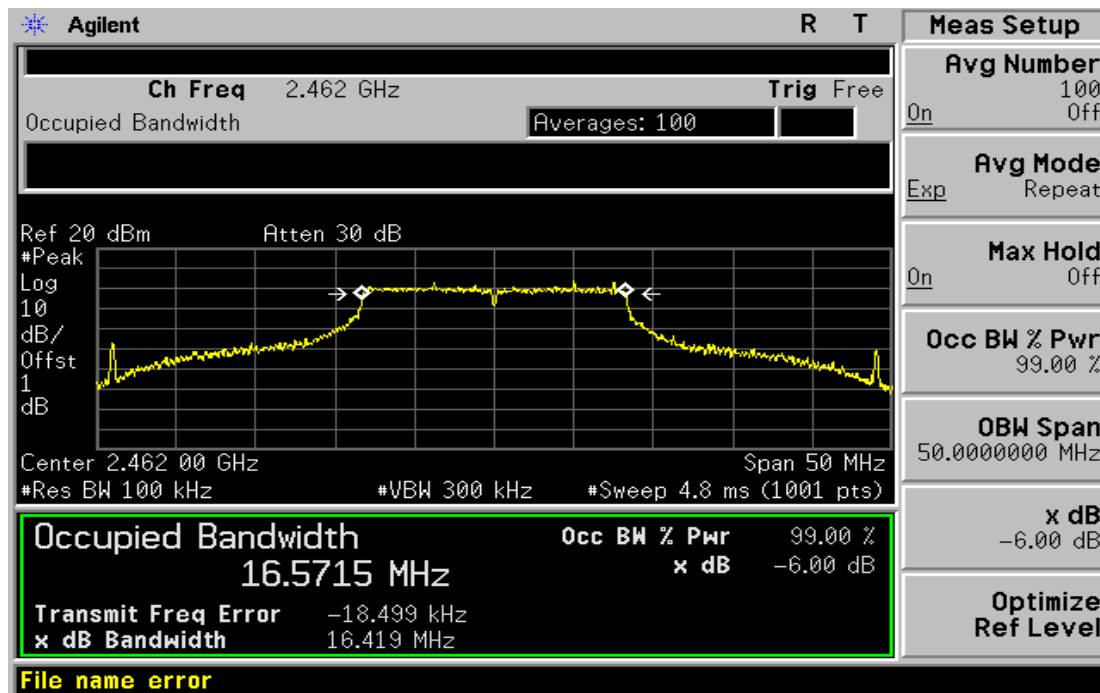
5.4 Trace data – 802.11g (ch_1)



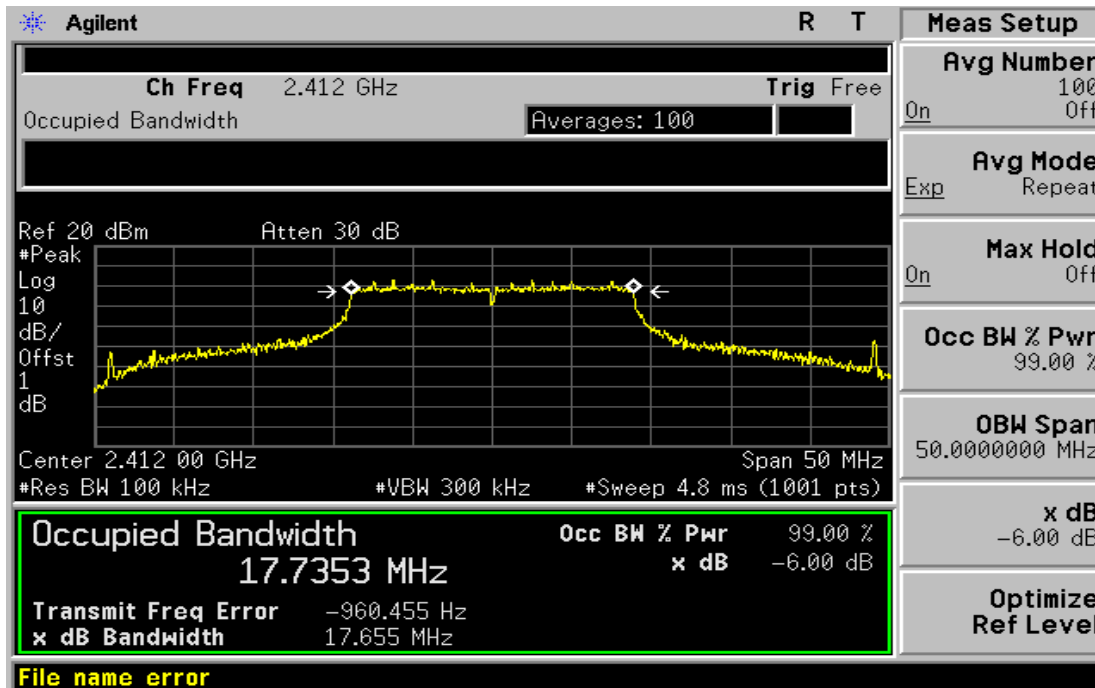
(ch_6)



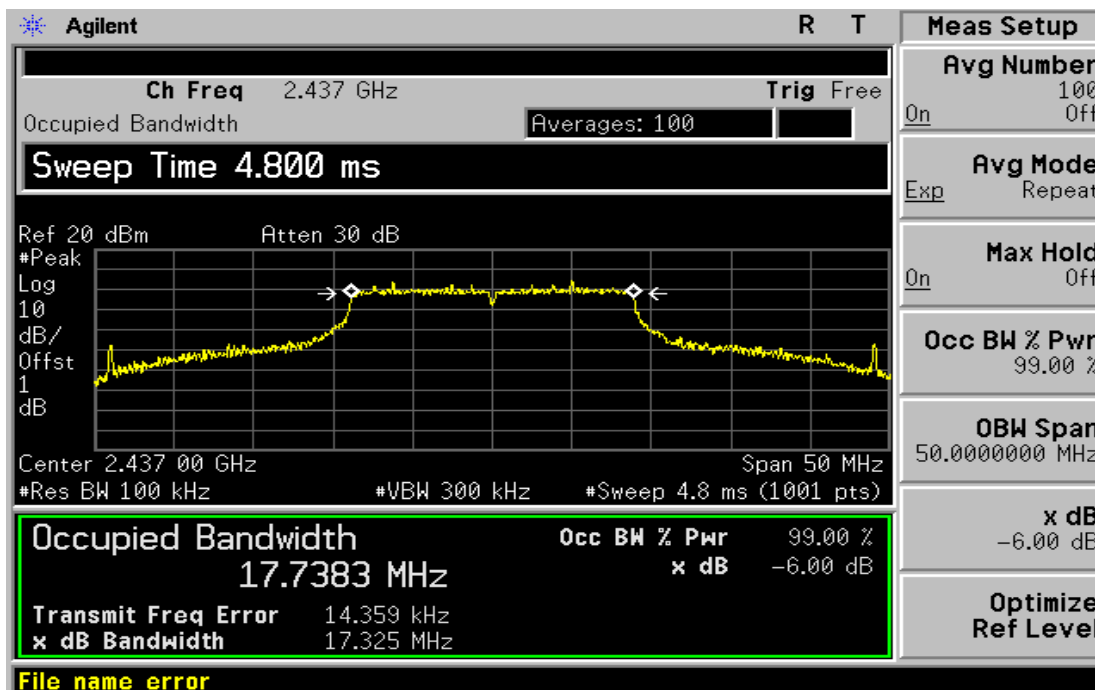
(ch_11)



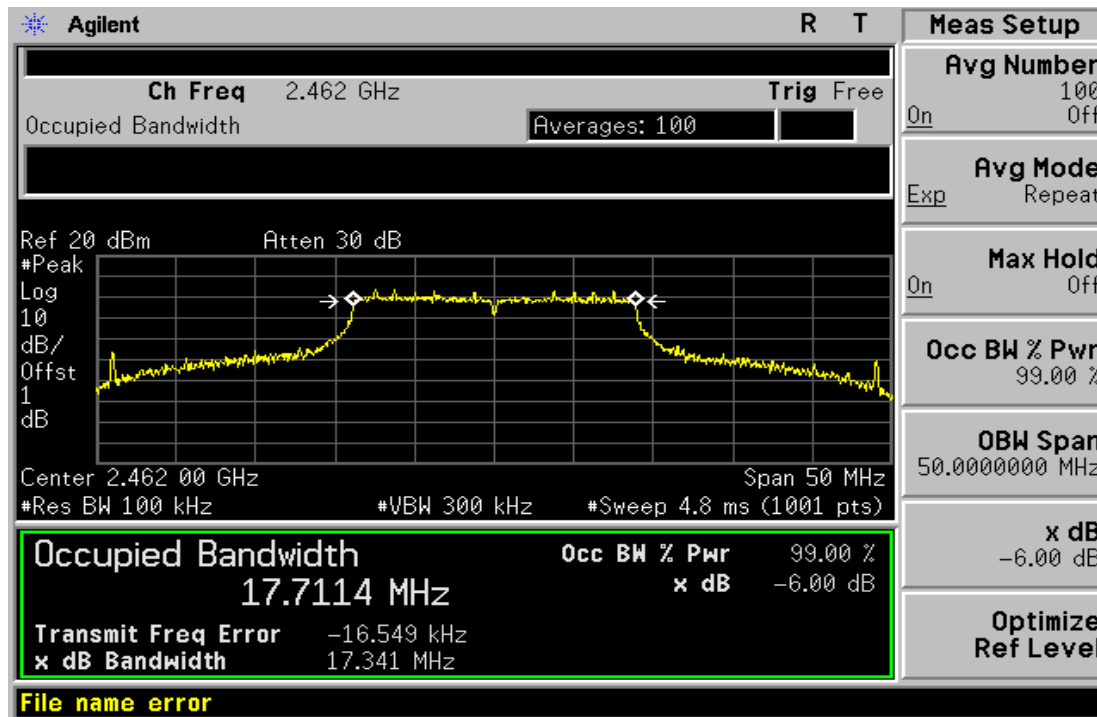
5.4 Trace data – 802.11n20 (ch_1)



(ch_6)



(ch_11)



6. Maximum peak conducted output power

6.1 Test procedure

The transmitter antenna terminal is connected to the input of a Power Sensor. Measurement is made while EUT is operating in transmission mode at the appropriate center frequency. The maximum peak output power measurement is 30 dBm.

Maximum Peak Output Power Test Instruments

Description	Model	Serial Number	Cal. Due Date
Power Meter	N1921A	MY45100570	1-Dec-21
Power Sensor	N1921A	MY45240427	1-Dec-21
Power Meter <=> EUT	Loss: 1 dB	–	

6.2 Measurement results

EUT	Automotive Diagnostic Scan tool	MODEL	ZENITH Z5
MODE	802.11b, g, n20	ENVIRONMENTAL CONDITION	23.0 °C, 47.0 % R.H.
INPUT POWER	DC 3.8 V		

MODE – 802.11b

CHANNEL	Channel frequency (MHz)	Conducted Power Output(dBm)			Limit[1W] (dBm)	PASS/FAIL
		Detector	(dBm)	(W)		
1	2 412	PEAK	17.44	0.0555	30.0	PASS
6	2 437	PEAK	17.37	0.0546	30.0	PASS
11	2 462	PEAK	17.24	0.0530	30.0	PASS

MODE – 802.11g

CHANNEL	Channel frequency (MHz)	Conducted Power Output(dBm)			Limit[1W] (dBm)	PASS/FAIL
		Detector	(dBm)	(W)		
1	2 412	PEAK	23.37	0.2173	30.0	PASS
6	2 437	PEAK	23.35	0.2163	30.0	PASS
11	2 462	PEAK	23.45	0.2213	30.0	PASS

MODE – 802.11n20

CHANNEL	Channel frequency (MHz)	Conducted Power Output(dBm)			Limit[1W] (dBm)	PASS/FAIL
		Detector	(dBm)	(W)		
1	2 412	PEAK	22.00	0.1585	30.0	PASS
6	2 437	PEAK	22.44	0.1754	30.0	PASS
11	2 462	PEAK	21.04	0.1271	30.0	PASS

7. Maximum conducted (average) output power

7.1 Test procedure

The transmitter antenna terminal is connected to the input of a Power Sensor. Measurement is made while EUT is operating in transmission mode at the appropriate center frequency. The maximum Average output power measurement is 30 dBm.

Maximum conducted (average) output power Test Instruments

Description	Model	Serial Number	Cal. Due Date
Power Meter	N1921A	MY45100570	1-Dec-21
Power Sensor	N1921A	MY45240427	1-Dec-21
Power Meter <=> EUT	Loss: 1 dB	—	

7.2 Measurement results

EUT	Automotive Diagnostic Scan tool	MODEL	ZENITH Z5
MODE	802.11b, g, n20	ENVIRONMENTAL CONDITION	23.0 °C, 47.0 % R.H.
INPUT POWER	DC 3.8 V		

MODE – 802.11b

CHANNEL	Channel frequency (MHz)	Conducted Power Output(dBm)			Measured + Duty Cycle(dBm)	Measured + Duty Cycle(W)
		Detector	(dBm)	Duty Cycle		
1	2 412	AVG	14.87	0.00	14.87	0.0307
6	2 437	AVG	14.91	0.00	14.91	0.0310
11	2 462	AVG	14.82	0.00	14.82	0.0303

MODE – 802.11g

CHANNEL	Channel frequency (MHz)	Conducted Power Output(dBm)			Measured + Duty Cycle(dBm)	Measured + Duty Cycle(W)
		Detector	(dBm)	Duty Cycle		
1	2 412	AVG	14.87	0.52	15.39	0.0346
6	2 437	AVG	14.90	0.52	15.42	0.0348
11	2 462	AVG	14.95	0.52	15.47	0.0352

MODE – 802.11n20

CHANNEL	Channel frequency (MHz)	Conducted Power Output(dBm)			Measured + Duty Cycle(dBm)	Measured + Duty Cycle(W)
		Detector	(dBm)	Duty Cycle		
1	2 412	AVG	12.89	0.55	13.44	0.0221
6	2 437	AVG	12.91	0.55	13.46	0.0222
11	2 462	AVG	12.81	0.55	13.36	0.0217

8. Maximum power spectral density level in the fundamental emission

8.1 Test procedure

KDB 558074 D01 DTS Meas Guidance V05 10.2 Method PKPSD (peak PSD)

8.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Limits FCC § 15.247

The peak power density Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	FSV40	100393	1-Dec-21
Spectrum Analyzer	E4440A	US42041291	1-Dec-21
RF Cable	Length: 30 cm	–	
Spectrum Analyzer <=> EUT	Loss: 1.0 dB	–	

8.3 Measurement results

EUT	Automotive Diagnostic Scan tool	MODEL	ZENITH Z5
MODE	802.11b, g, n20	ENVIRONMENTAL CONDITION	22.0 °C, 47.0 % R.H.
INPUT POWER	DC 3.8 V		

MODE – 802.11b

CHANNEL	Channel Frequency (MHz)	Measured Power Spectral Density (dBm)	Maximum Permissible Power Density (dBm/3kHz)	Margin
1	2 412	–6.20	8.00	14.20
6	2 437	–1.22	8.00	9.22
11	2 462	–6.45	8.00	14.45

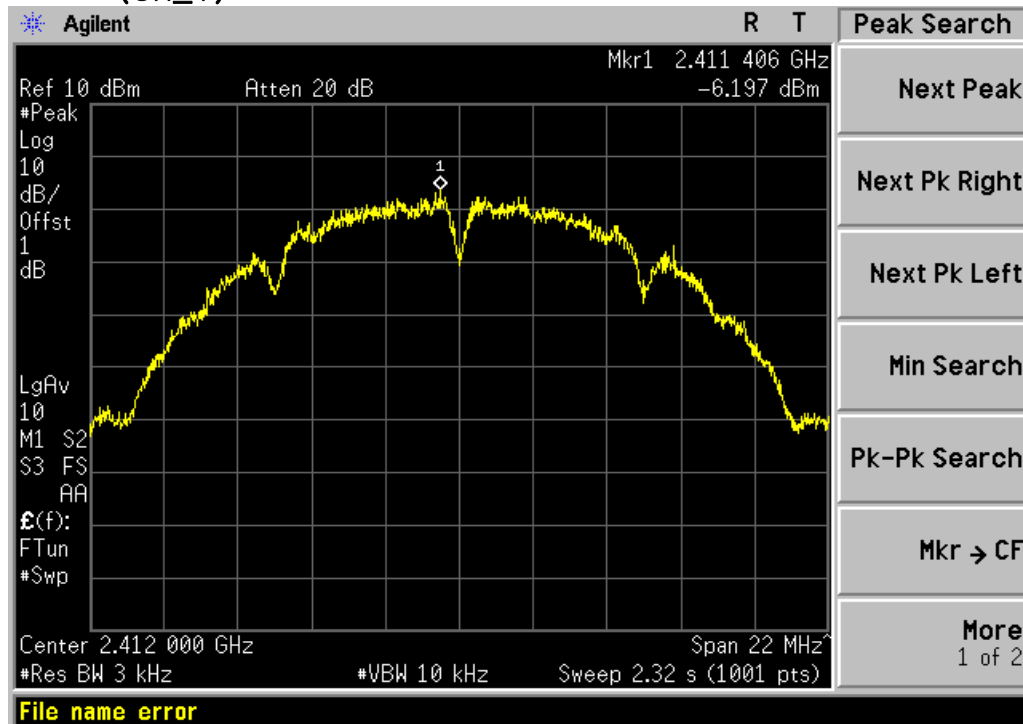
MODE – 802.11g

CHANNEL	Channel Frequency (MHz)	Measured Power Spectral Density (dBm)	Maximum Permissible Power Density (dBm/3kHz)	Margin
1	2 412	–11.33	8.00	19.33
6	2 437	–10.76	8.00	18.76
11	2 462	–9.79	8.00	17.79

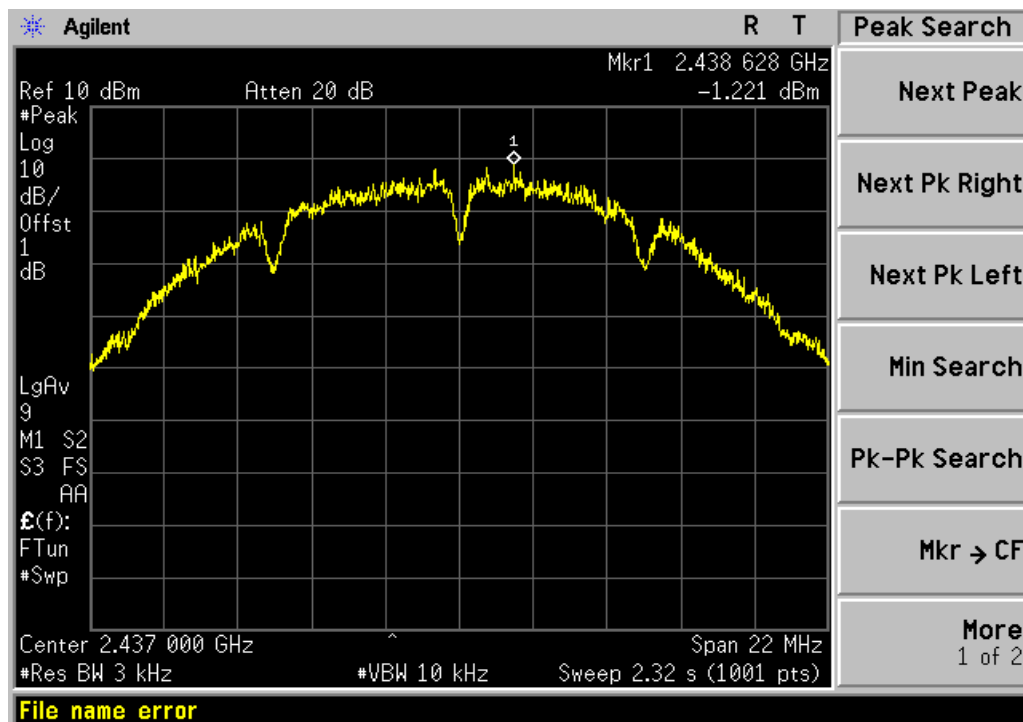
MODE – 802.11n20

CHANNEL	Channel Frequency (MHz)	Measured Power Spectral Density (dBm)	Maximum Permissible Power Density (dBm/3kHz)	Margin
1	2 412	–5.86	8.00	13.86
6	2 437	–10.00	8.00	18.00
11	2 462	–10.66	8.00	18.66

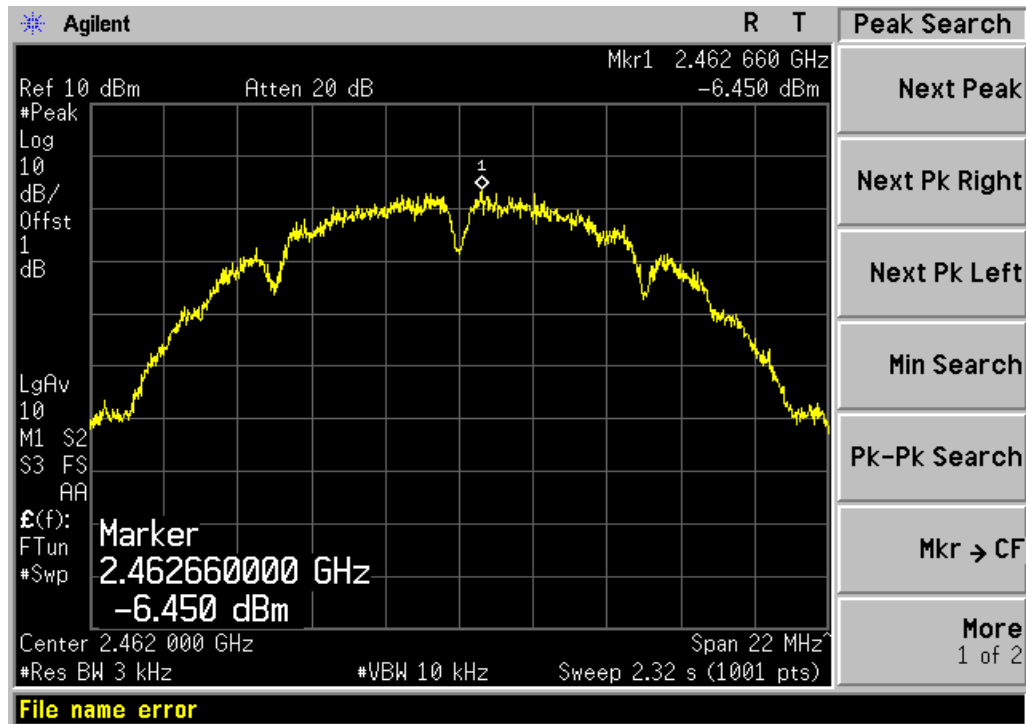
8.4 Trace data – 802.11b mode (ch_1)



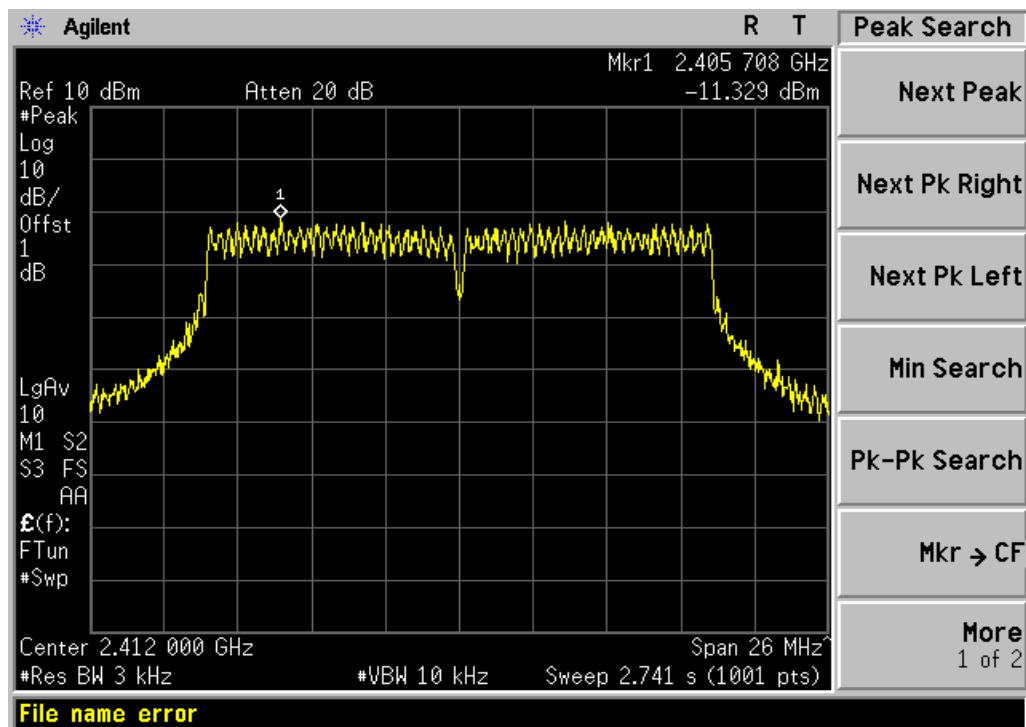
(ch_6)



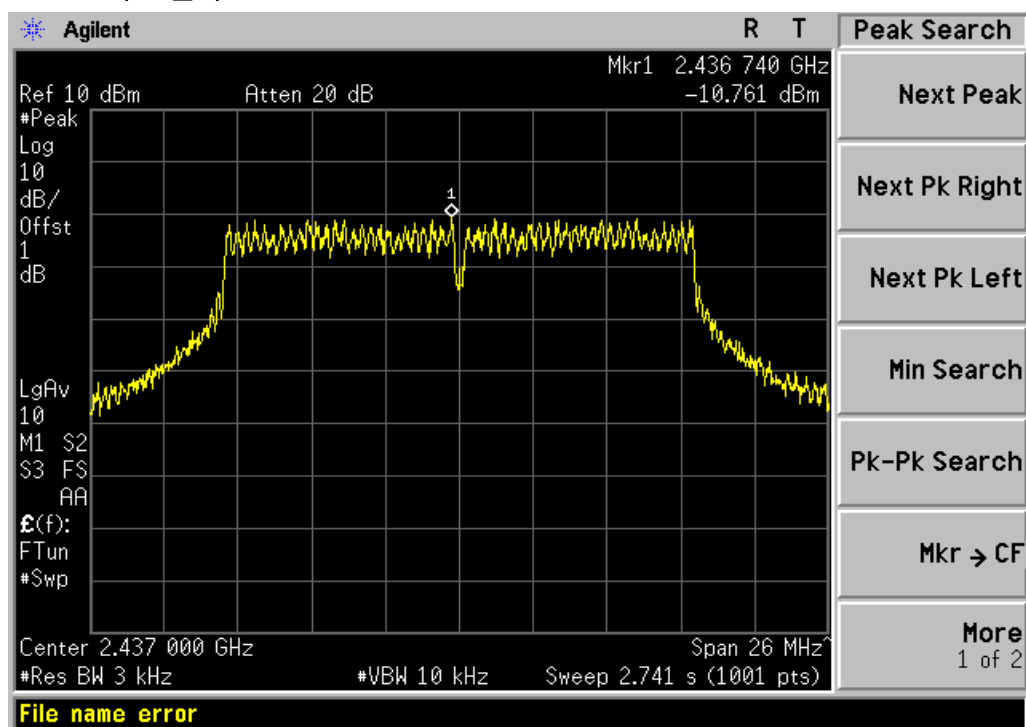
8.4 Trace data – 802.11b (ch_11)



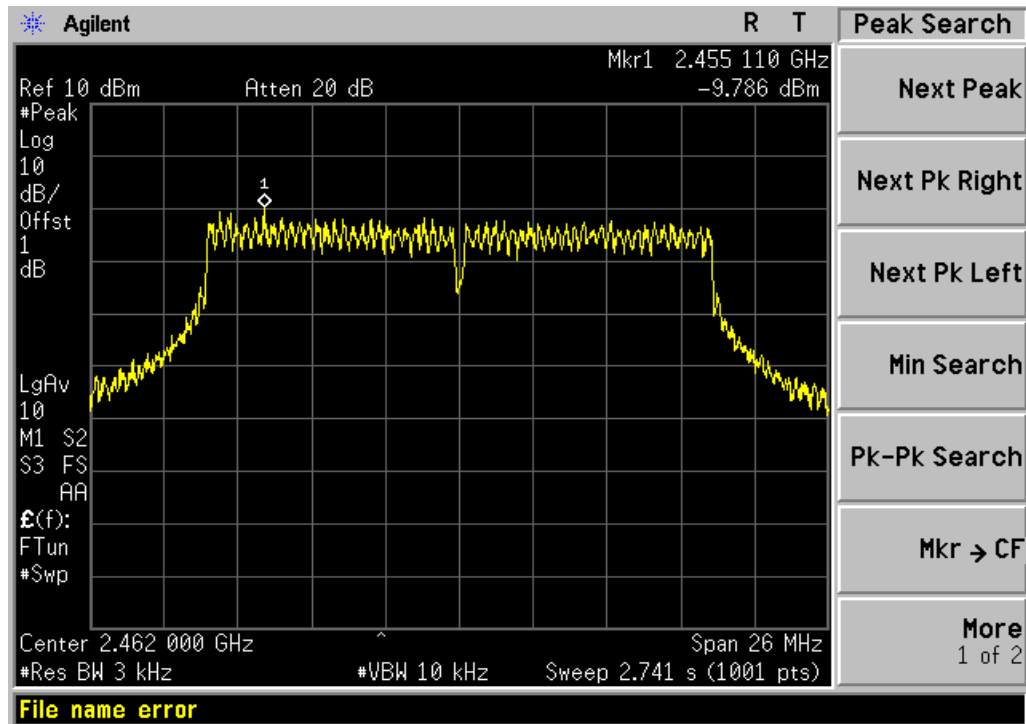
8.4 Trace data – 802.11g mode (ch_1)



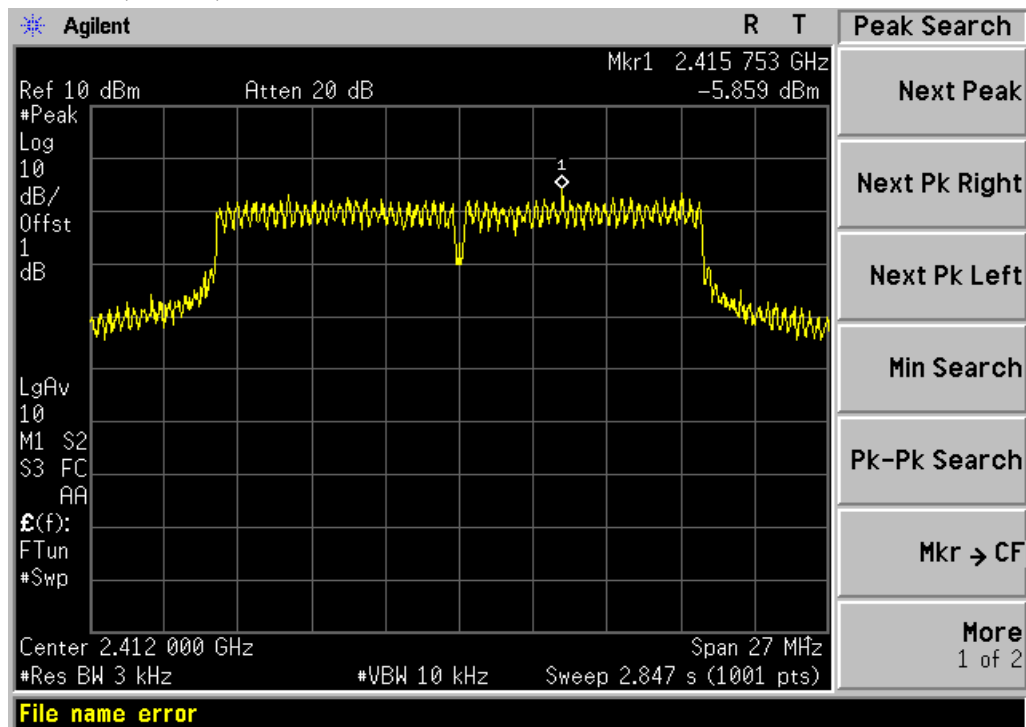
(ch_6)



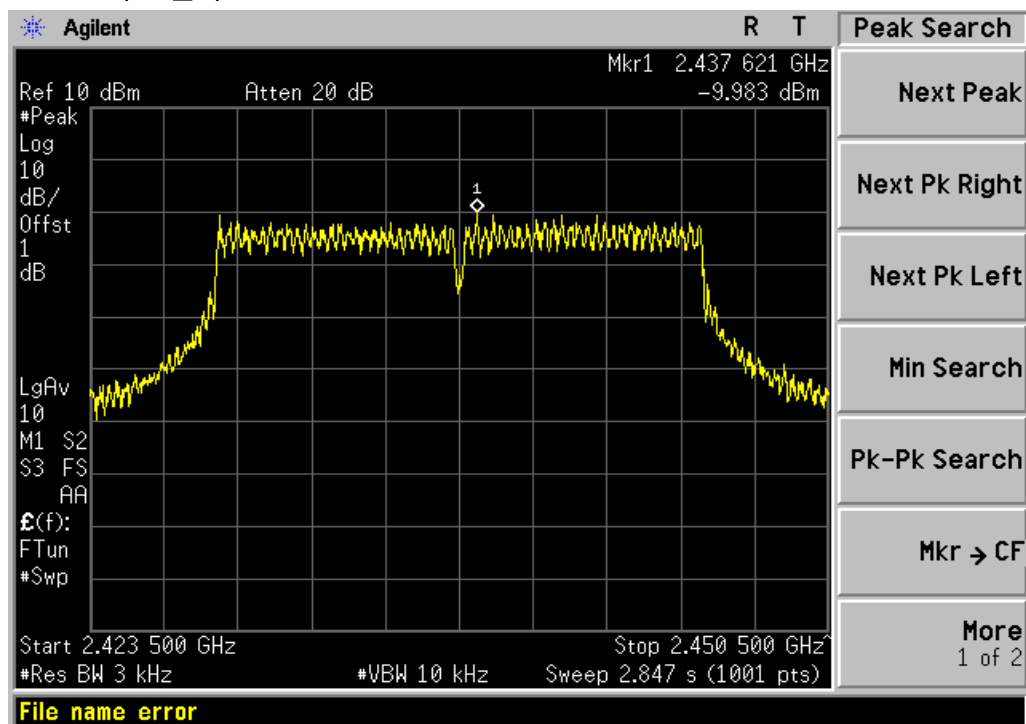
8.4 Trace data – 802.11g mode (ch_11)



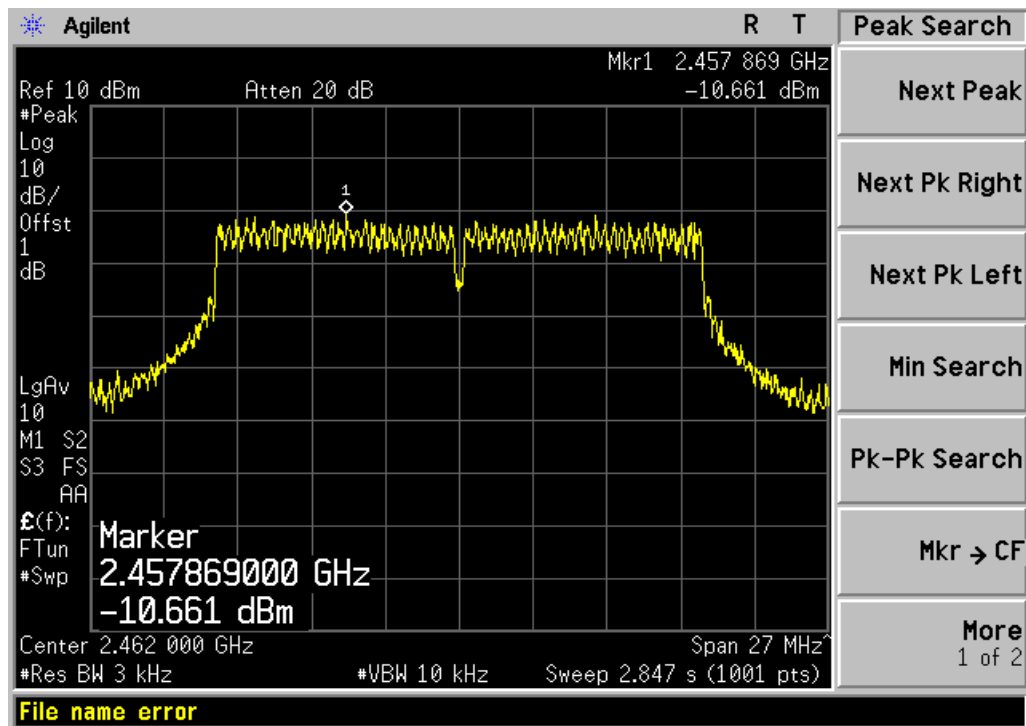
8.4 Trace data – 802.11n20 mode (ch_1)



(ch_6)



8.4 Trace data – 802.11n20 mode (ch_11)



9. Emissions in non-restricted frequency bands

9.1 Test procedure

KDB 558074 D01 DTS Meas Guidance V05

9.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to ≥ 1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW $\geq 3 \times$ RBW.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

Limits FCC § 15.247

Band Edge&Out of Emission Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US42041291	1-Dec-21
Spectrum Analyzer	FSV40	100939	1-Dec-21
RF Cable	Length: 30 cm		–
–Spectrum Analyzer <=> EUT	Loss: 1.0 dB		–

9.3 Measurement results of band-edge & out of emission – Adapter

EUT	Automotive Diagnostic Scan tool	MODEL	ZENITH Z5
MODE	802.11b, g, n20	ENVIRONMENTAL CONDITION	22.0 °C, 47.0 % R.H.
INPUT POWER	DC 3.8 V		

MODE –802.11b

CHANNEL	Channel Frequency (MHz)	limit	PASS/FAIL
1	2 412	20dBc	PASS
11	2 462	20dBc	PASS

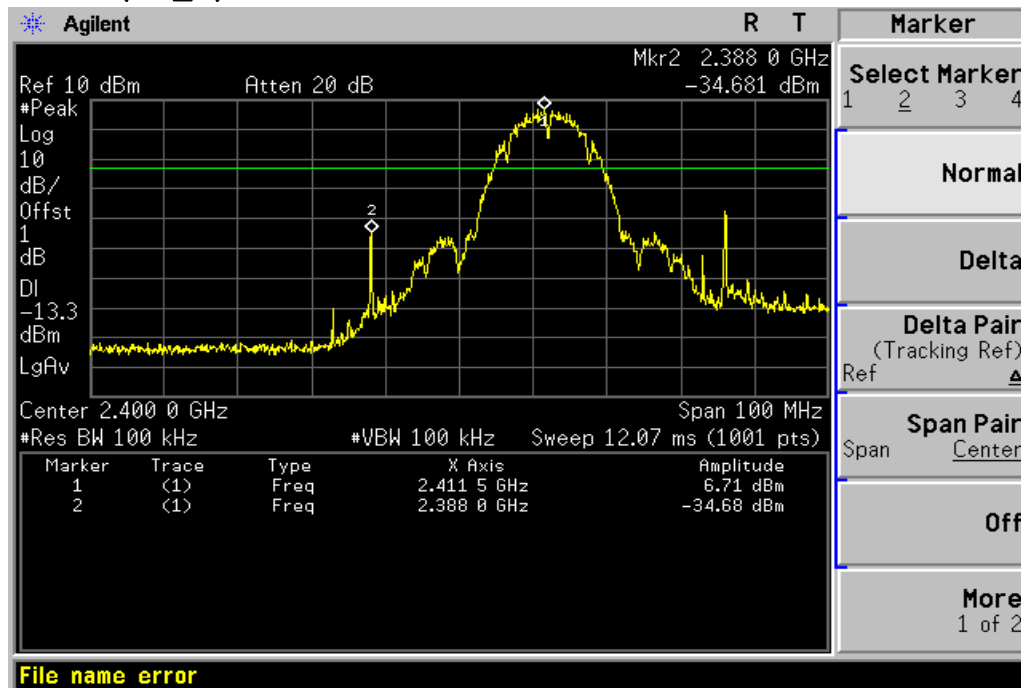
MODE –802.11g

CHANNEL	Channel Frequency (MHz)	limit	PASS/FAIL
1	2 412	20dBc	PASS
11	2 462	20dBc	PASS

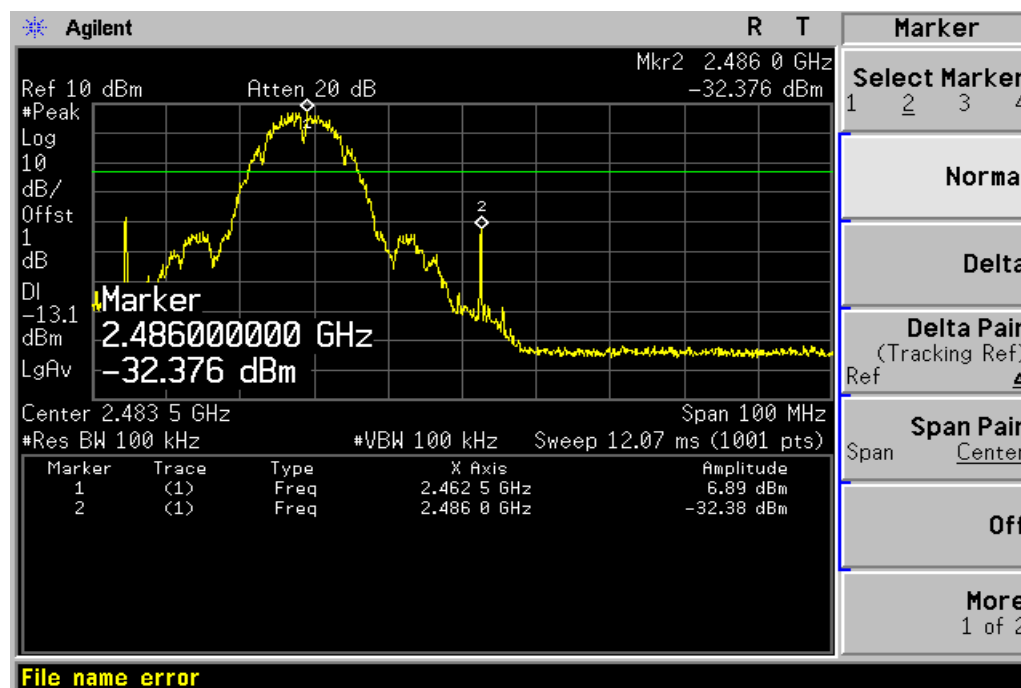
MODE –802.11n20

CHANNEL	Channel Frequency (MHz)	limit	PASS/FAIL
1	2 412	20dBc	PASS
11	2 462	20dBc	PASS

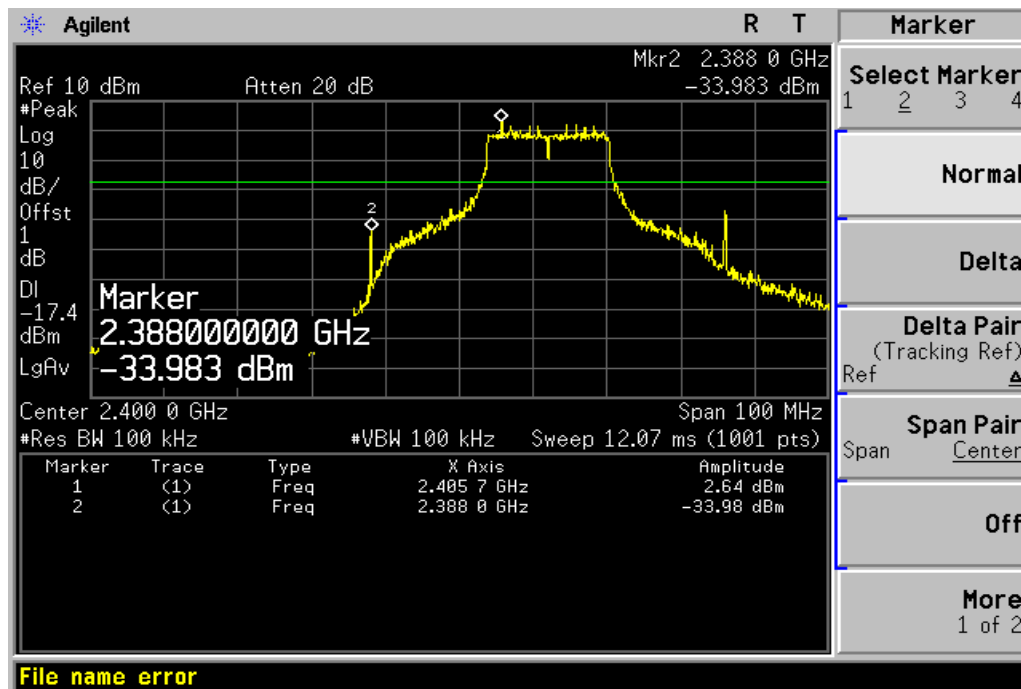
9.4 Trace data of band-edge & Out of Emission – 802.11b mode (ch_1)



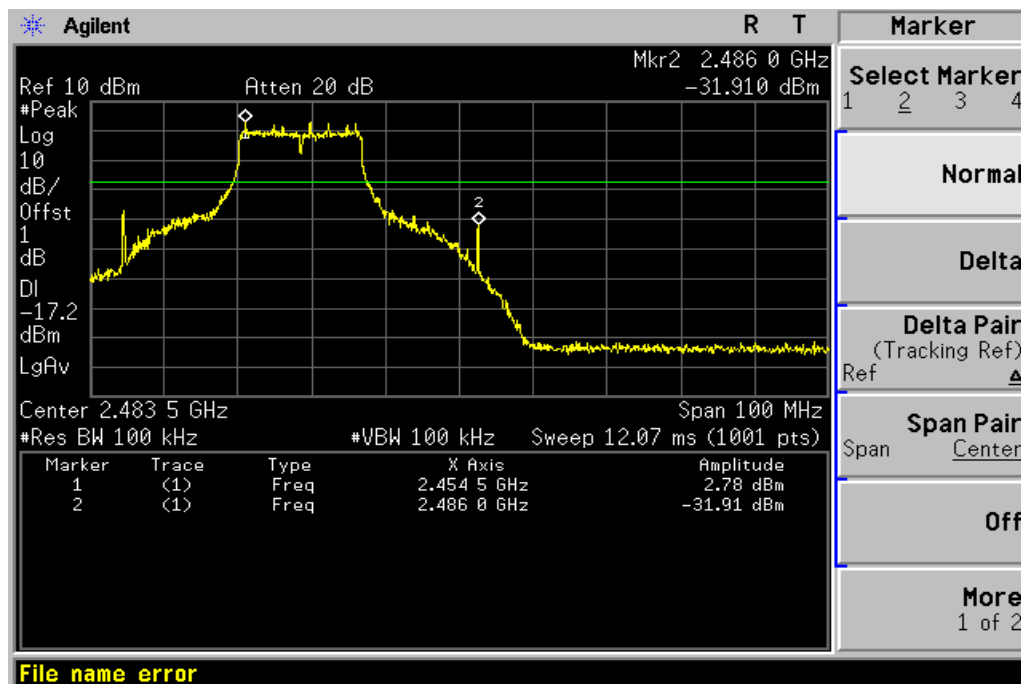
(ch_11)



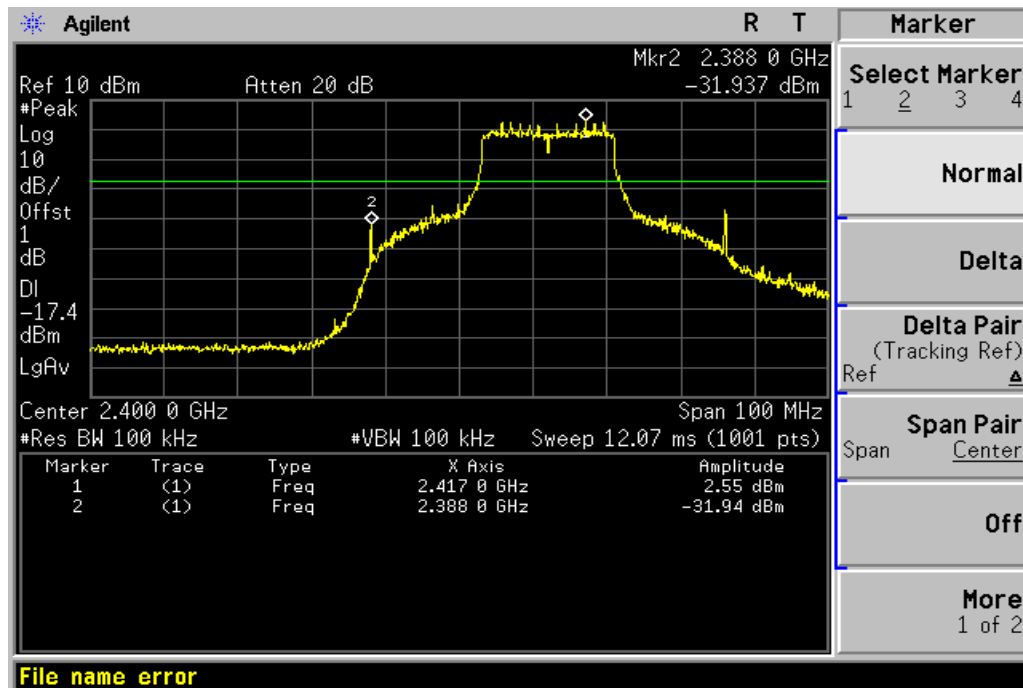
9.4 Trace data of band-edge & Out of Emission – 802.11g mode (ch₁)



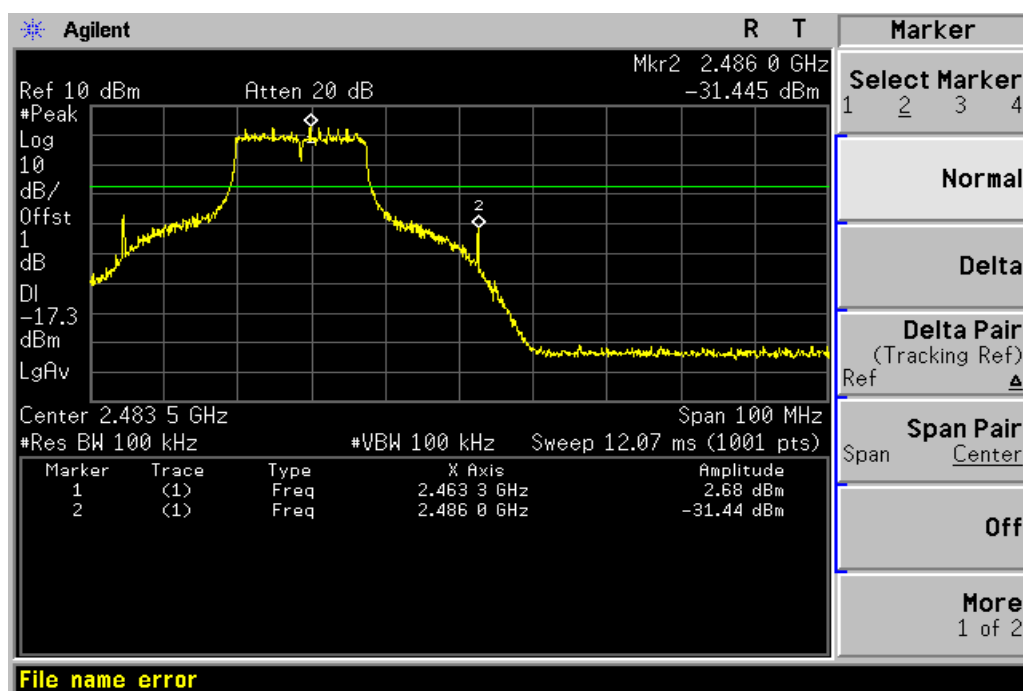
(ch₁₁)



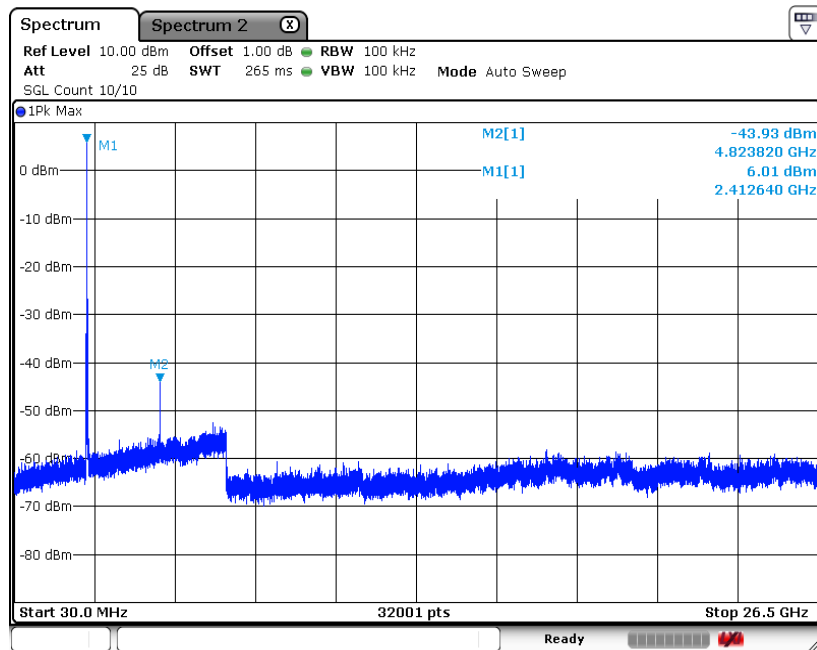
9.4 Trace data of band-edge & Out of Emission – 802.11n20 mode (ch₁)



(ch₁₁)

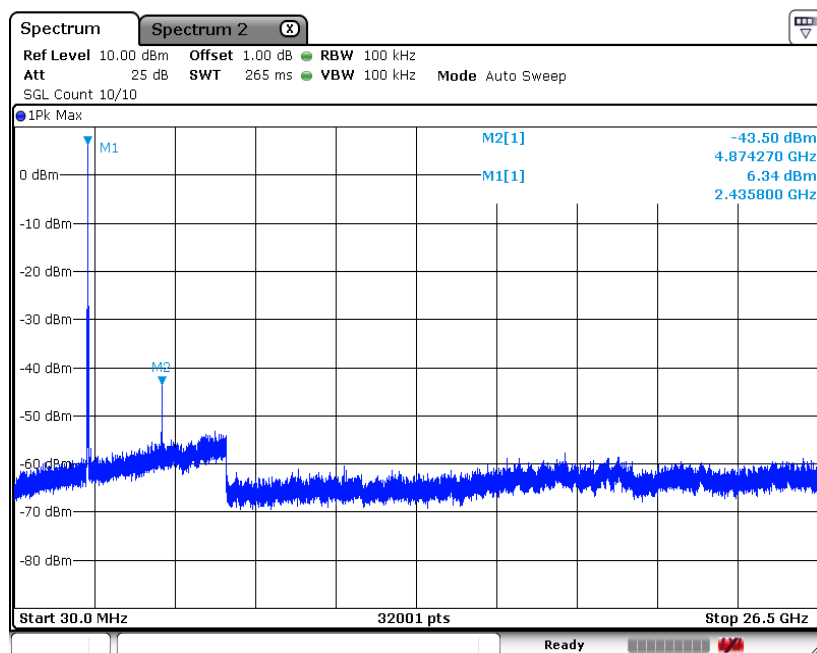


9.4 Trace data of Out of Emission – 802.11b mode (ch_1)



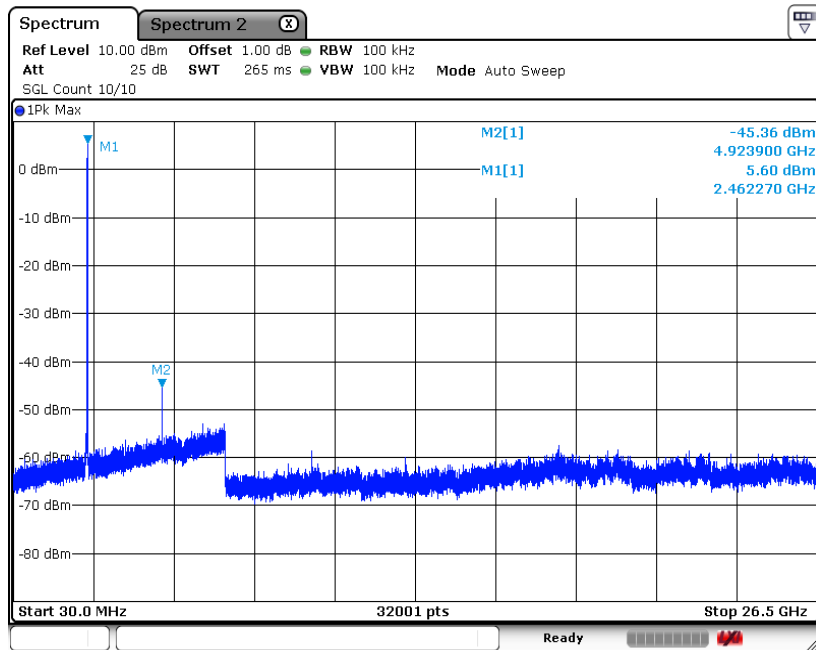
ESTR-21-00225

(ch_6)



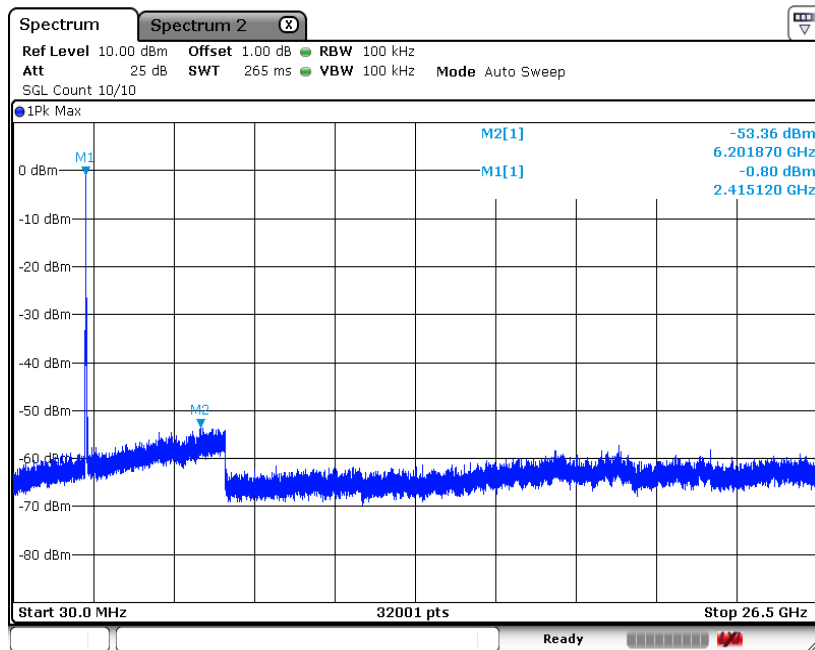
ESTR-21-00225

9.4 Trace data of Out of Emission – 802.11b mode (ch_11)



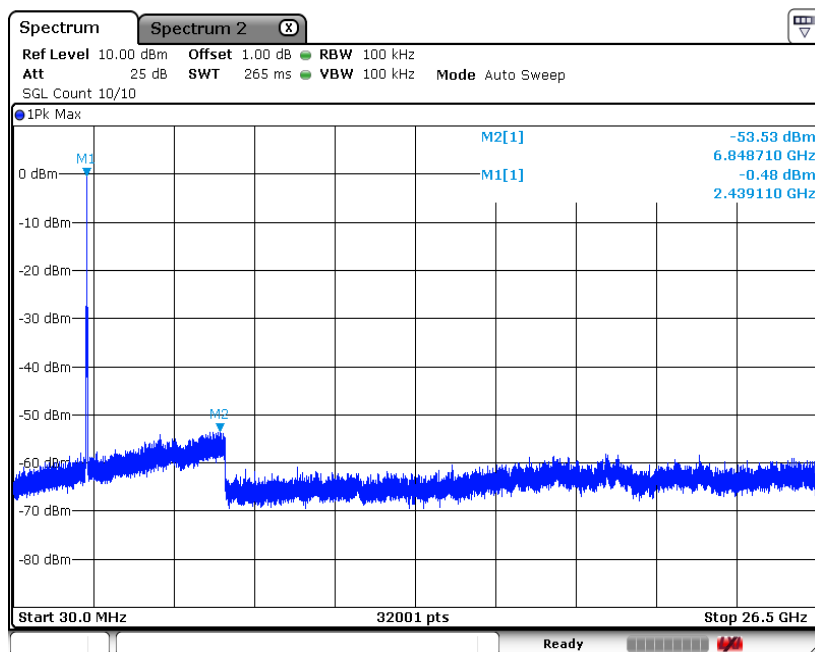
ESTR-21-00225

9.4 Trace data of Out of Emission – 802.11g mode (ch_1)



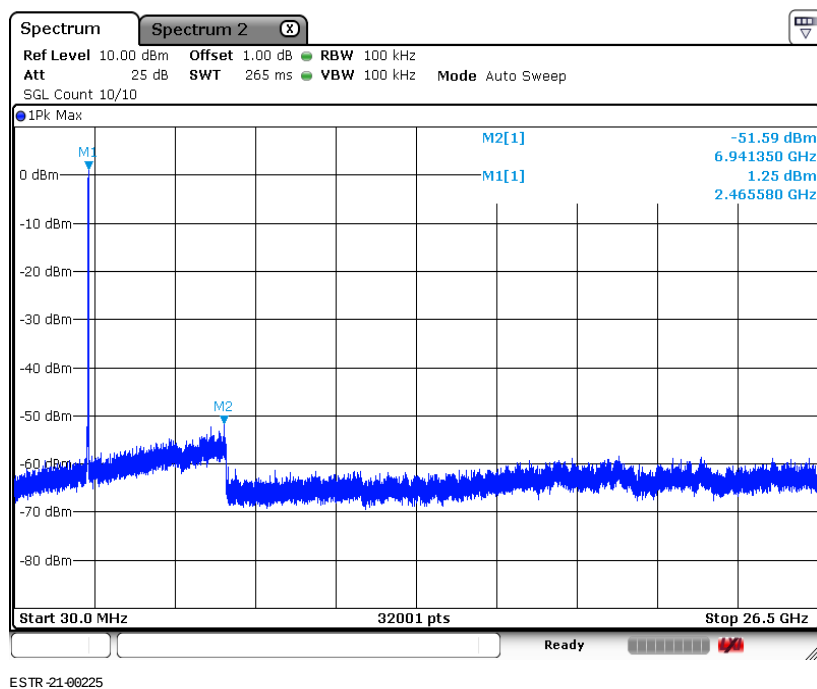
ESTR-21-00225

(ch_6)

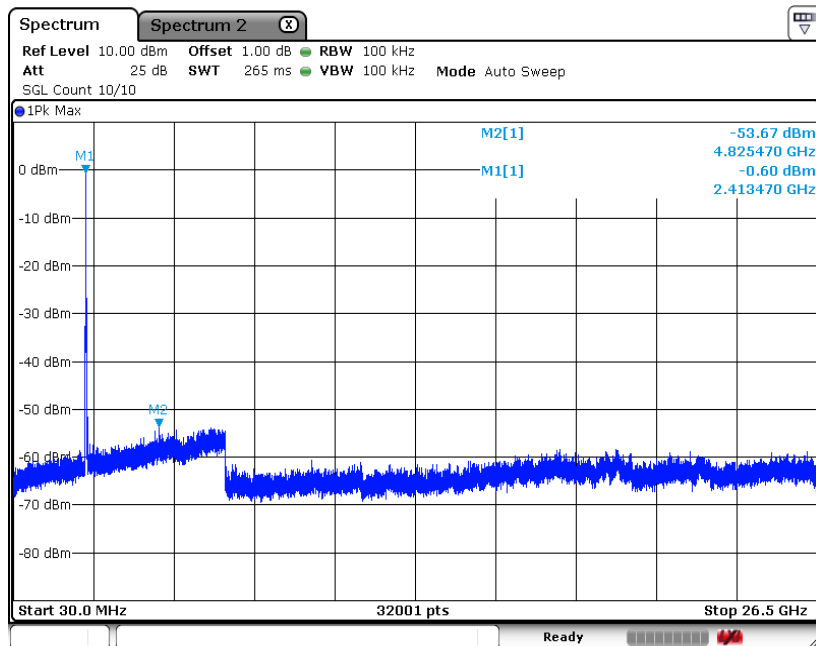


ESTR-21-00225

9.4 Trace data of Out of Emission – 802.11g mode (ch_11)

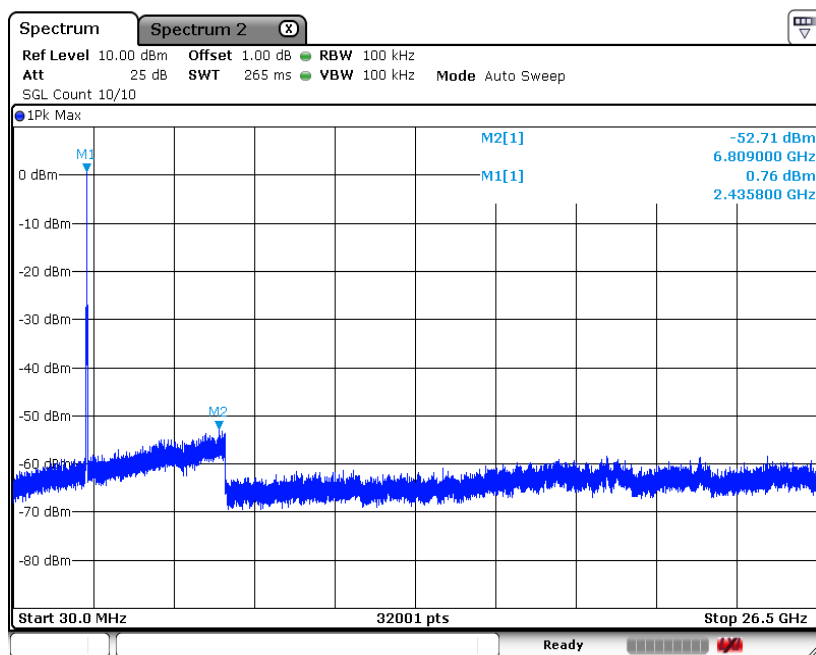


9.4 Trace data of Out of Emission – 802.11n20 mode (ch_1)



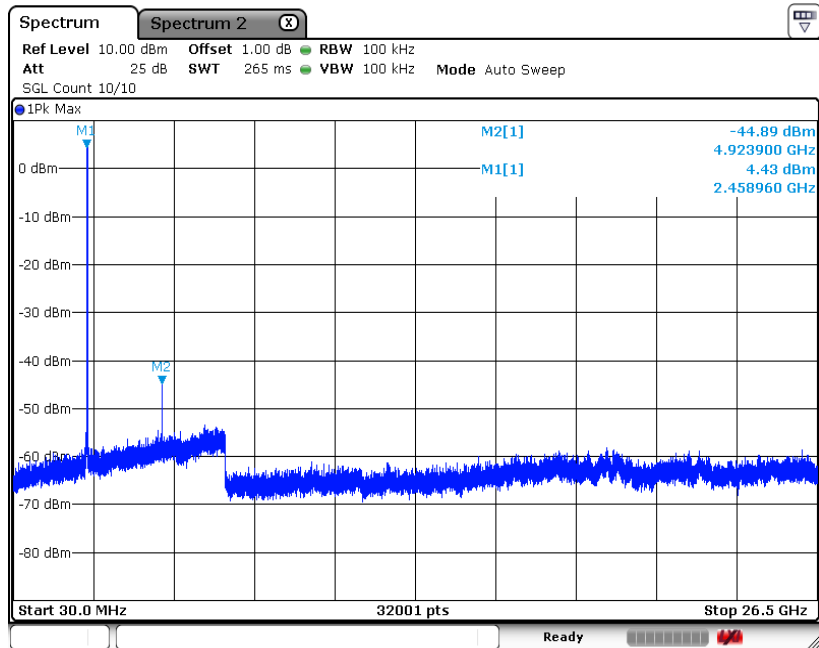
ESTR-21-00225

(ch_6)



ESTR-21-00225

9.4 Trace data of Out of Emission – 802.11n20 mode (ch_11)



ESTR-21-00225

10. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC PART 15.205, 15.209 .

The test setup was made according to ANSI C 63.10 (2013) & KDB 558074 D01 Semi-anechoic chamber, which allows a 3 m distance measurement. The EUT was placed in the center of styrofoam. turntable. The height of this table was 0.8 m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test setup.

10.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESCI7	ROHDE & SCHWARZ	100916	19-Jul-22
Logbicon Antenna	VULB 9168	SCHWARZBECK	193	14-Jan-22
Turn Table	DT3000-2t	Innco System GmbH	N/A	–
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	–
PREAMPLIFIER	8449B	AGILENT	3008A00581	20-Jul-22
Horn Antenna	BBHA9120D	SCHWARZBECK	469	24-Dec-21
Signal Analyzer	FSV40	ROHDE & SCHWARZ	100393	1-Dec-21
Turn Table	DT1500-S	Innco System GmbH	N/A	–
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	–
Horn Antenna	BBHA 9170	SCHWARZBECK	752	15-Oct-21
Antenna Master & Turn table controller	C02000-P	Innco System GmbH	CO2000/642 /28051111/L	–

10.2 Environmental Condition

Below 1 GHz –Test Place : 10 m Semi-anechoic chamber

WLAN 802.11 b,g,n20 Mode

Temperature (°C) : 22.5 °C

Humidity (% R.H.) : 50.7 % R.H.

Above 1 GHz–Test Place : 3 m Semi-anechoic chamber

WLAN 802.11 b,g,n20 Mode

Temperature (°C) : 24 °C

Humidity (% R.H.) : 49.6 % R.H.

10.3 Measurement Instrument setting for Radiated Emission

10.3.1 Frequency range below 1 GHz

Detector : Quasi-Peak

10.3.2 Frequency range above 1 GHz

Peak Power Measurement Procedure (KDB 558074 section 12.2.4)

- RBW : 1 MHz , VBW : 3 MHz
- Trace mode = max hold
- Detector : Peak
- Sweep time = auto

Average Power Measurement Procedures (KDB 558074 section 12.2.5.2)

- Set analyzer center frequency to the frequency associated with the emission
- RBW : 1 MHz , VBW : 3 MHz
- Detector : RMS
- Sweep time = auto

* Note

Band	Duty cycle(%)	Ton (ms)	Ton + Toff (ms)	DCF=10*log(1/Duty) (dB)
802.11b	98.7	8.343	8.451	0.055
802.11g	88.8	1.388	1.561	0.515
802.11n20	88.1	1.301	1.476	0.548

* This was not applied of duty cycle factor for average value because of measured with the EUT transmitting continuously more than 98 % duty cycle at its maximum power control level.

10.4-1 Test Data (802.11 b)

Test Date 19-Jul-21

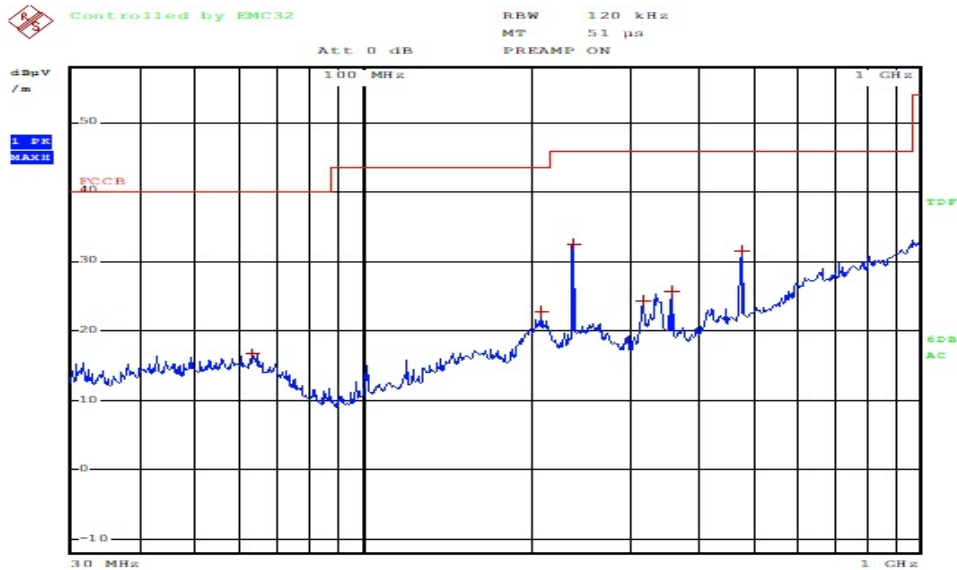
Measurement Distance : 3 m

Frequency y (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
42.10	7.81	V	1.0	12.93	0.95	40.00	21.69	18.31
193.60	13.31	V	1.2	10.57	2.16	43.50	26.04	17.46
239.00	19.35	H	1.6	10.78	2.43	46.00	32.56	13.44
318.10	7.78	H	1.4	13.84	2.83	46.00	24.44	21.56
358.30	9.77	H	1.3	14.34	3.01	46.00	27.12	18.88
478.00	10.81	H	1.2	17.32	3.50	46.00	31.63	14.37
Remark	H : Horizontal, V : Vertical *Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position) *CL = Cable Loss(In case of below 1 000 MHz) *Result Value = Reading + Ant Factor + Cable loss *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1 GHz.							

10.4-2 radiated Graph(30 MHz ~ 1 GHz)

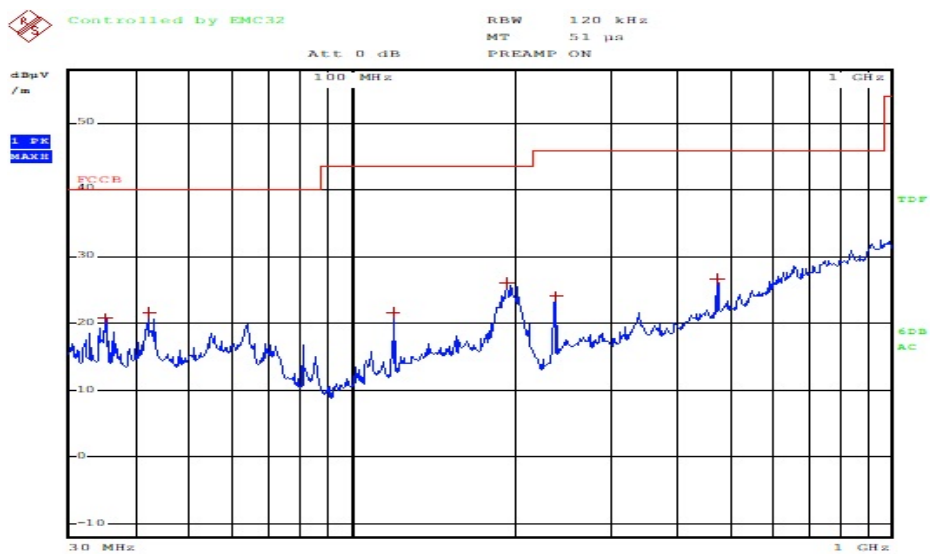
*802.11b Mode

Polarity:Horizontal



ESTR-21-00231

Polarity:Vertical



ESTR-21-00231

10.4-3 Test Data

Test Date : 20-Jul-21

Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2390.00	50.27	H	1.5	27.89	-29.82		74.00	48.34	25.66
2390.00	49.65	V	1.6	27.89	-29.82		74.00	47.72	26.28
2388.00	59.55	H	1.5	27.89	-29.82		74.00	57.62	16.38
2388.00	59.06	V	1.5	27.89	-29.82		74.00	57.13	16.87
4824.00	49.58	H	1.5	31.52	-27.27		74.00	53.83	20.17
4824.00	50.32	V	1.6	31.52	-27.27		74.00	54.57	19.43
AV(RBW: 1 MHz VBW: 3 MHz)									
2390.00	36.88	H	1.5	27.89	-29.82	0.05	54.00	35.00	19.00
2390.00	36.75	V	1.6	27.89	-29.82	0.05	54.00	34.87	19.13
2388.00	53.63	H	1.5	27.89	-29.82	0.05	54.00	51.75	2.25
2387.00	52.65	V	1.6	27.89	-29.82	0.05	54.00	50.77	3.23
4824.00	38.52	H	1.5	31.52	-27.27	0.05	54.00	42.82	11.18
4824.00	39.02	V	1.6	31.52	-27.27	0.05	54.00	43.32	10.68
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11 b – CH 1(2 412 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	*This test was radiated up to 26.5 GHz but no noise was measured.								

10.4-4 Test Data

Test Date : 20-Jul-21

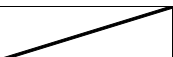
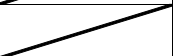
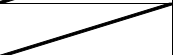
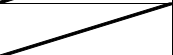
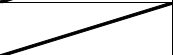
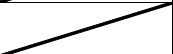
Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
4874.00	49.52	H	1.6	31.57	-27.24		74.00	53.85	20.15
4874.00	50.06	V	1.5	31.57	-27.24		74.00	54.39	19.61
AV(RBW: 1 MHz VBW: 3 MHz)									
4874.00	38.52	H	1.6	31.57	-27.24	0.05	54.00	42.90	11.10
4874.00	39.12	V	1.5	31.57	-27.24	0.05	54.00	43.50	10.50
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11 b – CH 6(2 437 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	*This test was radiated up to 26.5 GHz but no noise was measured.								

10.4-5 Test Data

Test Date : 20-Jul-21

Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2483.50	47.17	H	1.6	27.50	-30.92		74.00	43.75	30.25
2483.50	47.10	V	1.5	27.50	-30.92		74.00	43.68	30.32
2486.00	55.28	H	1.6	27.48	-29.75		74.00	53.01	20.99
2486.00	59.03	V	1.6	27.48	-29.75		74.00	56.76	17.24
4924.00	49.19	H	1.6	31.62	-27.21		74.00	53.60	20.40
4924.00	50.80	V	1.5	31.62	-27.21		74.00	55.21	18.79
AV(RBW: 1 MHz VBW: 3 MHz)									
2483.50	34.99	H	1.6	27.50	-30.92	0.05	54.00	31.62	22.38
2483.50	35.70	V	1.5	27.50	-30.92	0.05	54.00	32.33	21.67
2486.00	49.67	H	1.6	27.48	-29.75	0.05	54.00	47.45	6.55
2486.00	52.92	H	1.6	27.48	-29.75	0.05	54.00	50.70	3.30
4924.00	38.97	H	1.6	31.62	-27.21	0.05	54.00	43.43	10.57
4924.00	39.37	V	1.5	31.62	-27.21	0.05	54.00	43.83	10.17
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11 b – CH 11(2 462 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	*This test was radiated up to 26.5 GHz but no noise was measured.								

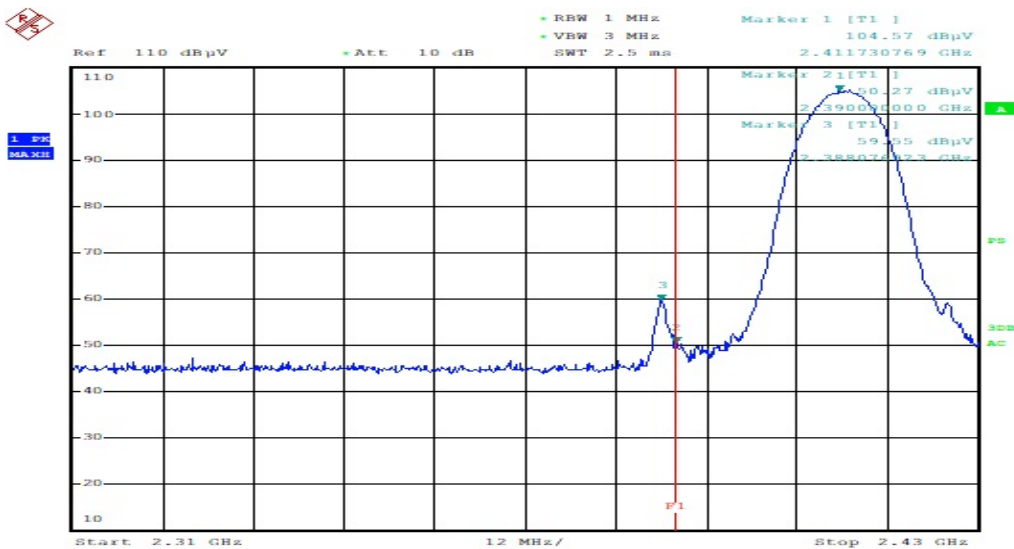
10.4-6 Restricted Band Edges

*802.11b Mode

Band Edges(CH Low)

Detector mode:Peak

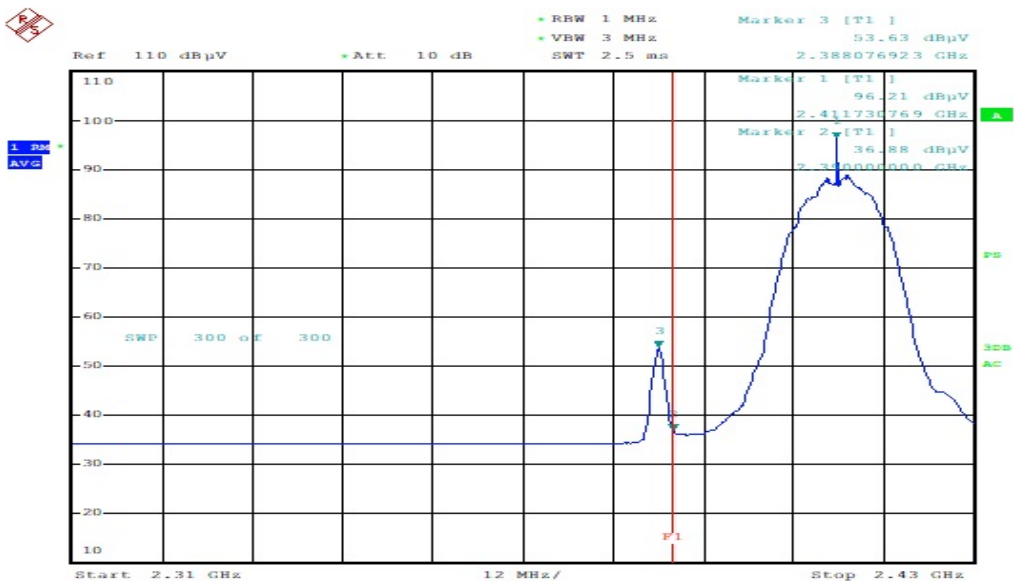
Polarity:Horizontal



ESTR-21-00231

Detector mode:Average

Polarity:Horizontal

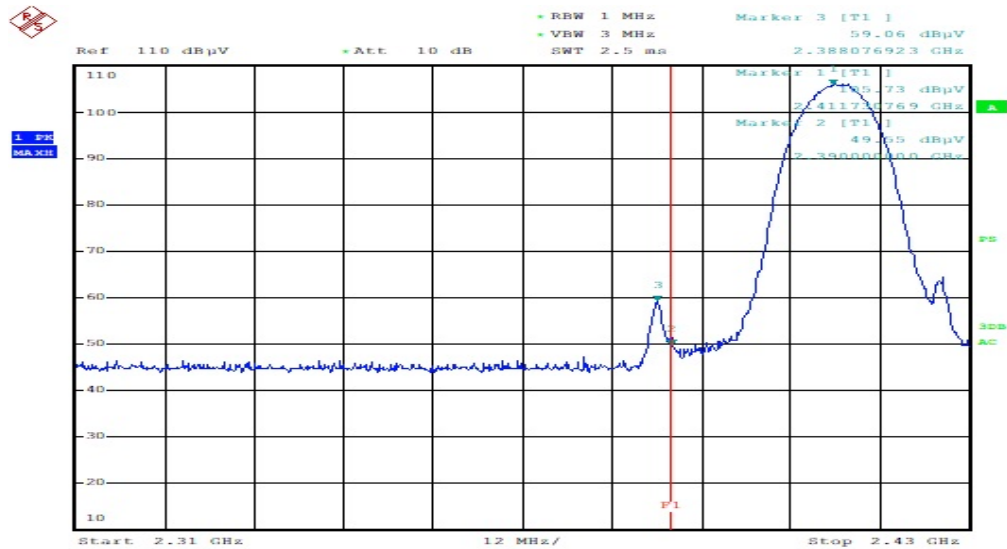


ESTR-21-00231

Band Edges(CH Low)

Detector mode:Peak

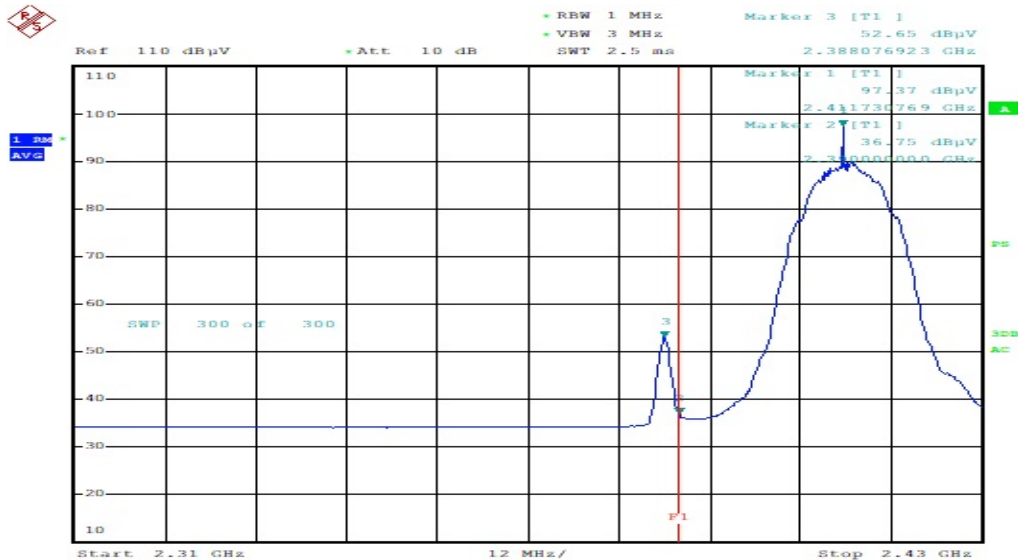
Polarity:Vertical



ESTR-21-00231

Detector mode:Average

Polarity:Vertical

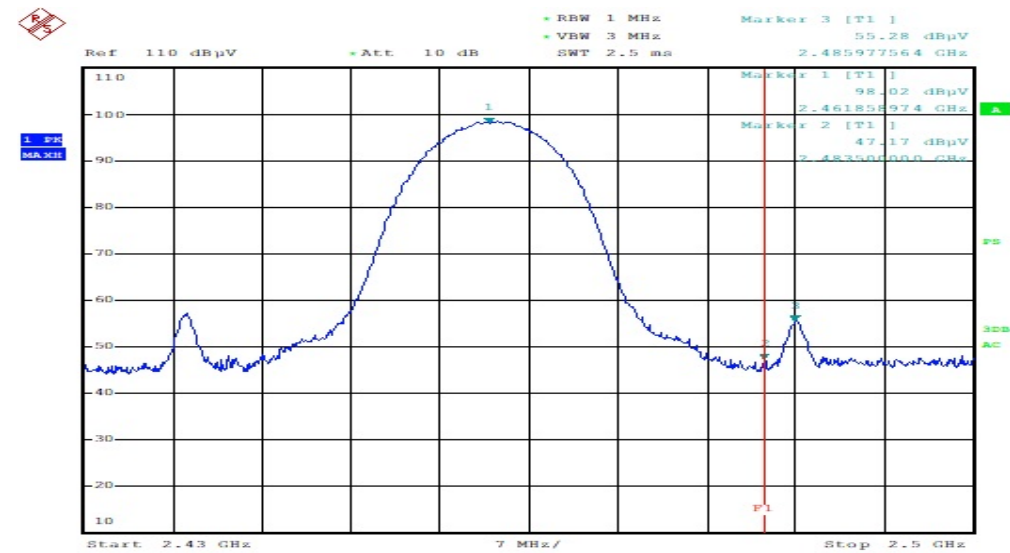


ESTR-21-00231

Band Edges(CH High)

Detector mode:Peak

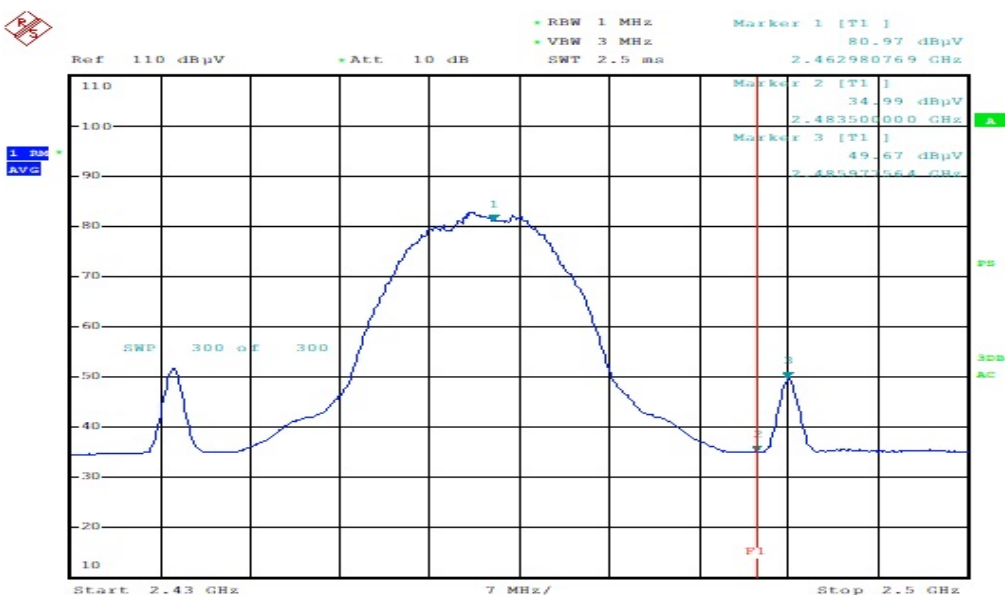
Polarity:Horizontal



ESTR-21-00231

Detector mode:Average

Polarity:Horizontal

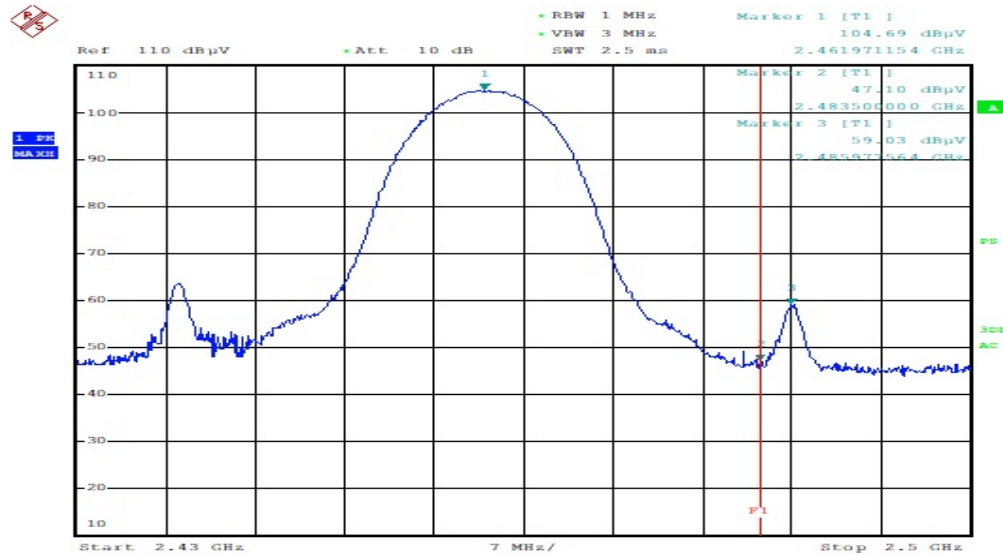


ESTR-21-00231

Band Edges(CH High)

Detector mode:Peak

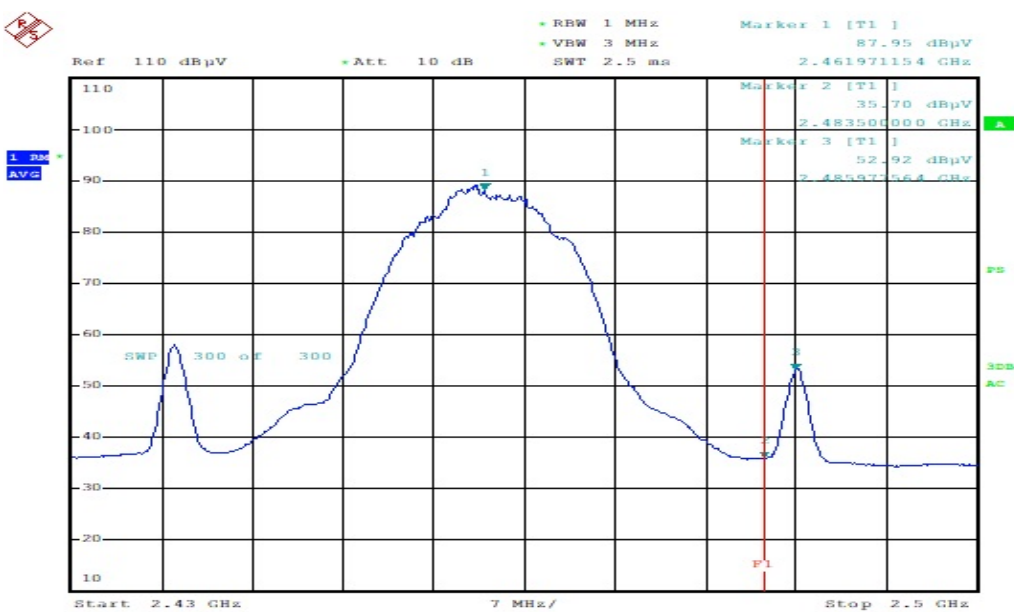
Polarity:Vertical



ESTR-21-00231

Detector mode:Average

Polarity:Vertical

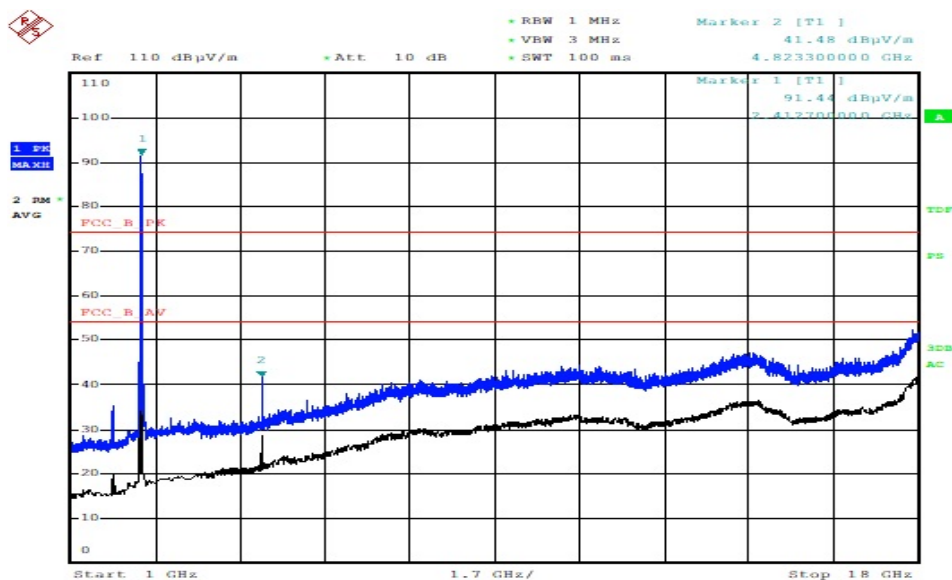


ESTR-21-00231

10.4-7 Restricted Band Edges

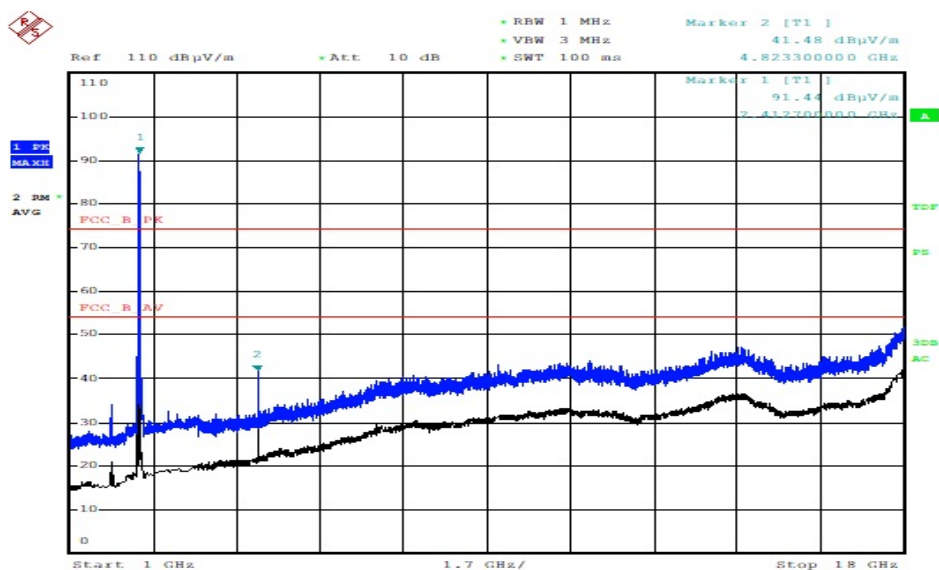
*802.11b Mode CH1

Polarity:Horizontal



ESTR-21-00231

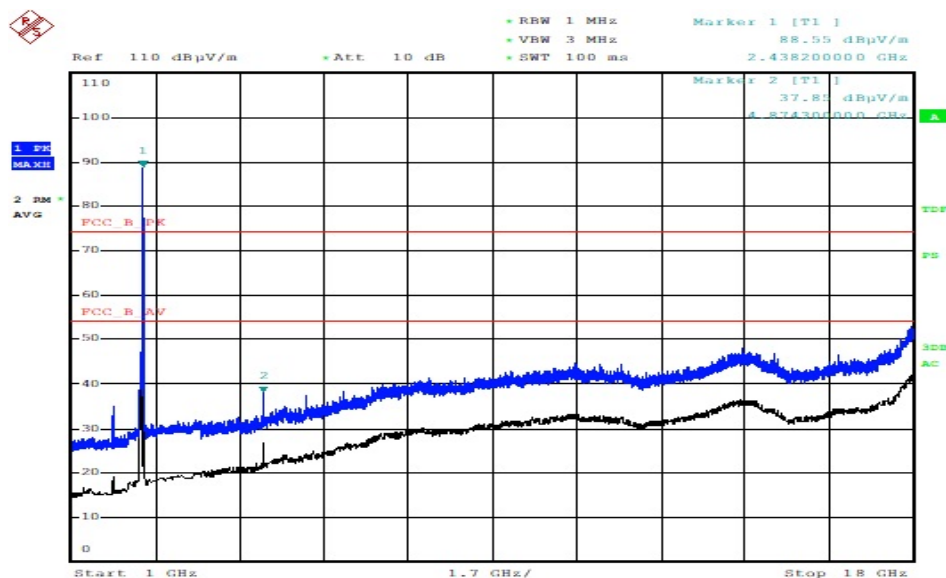
Polarity:Vertical



ESTR-21-00231

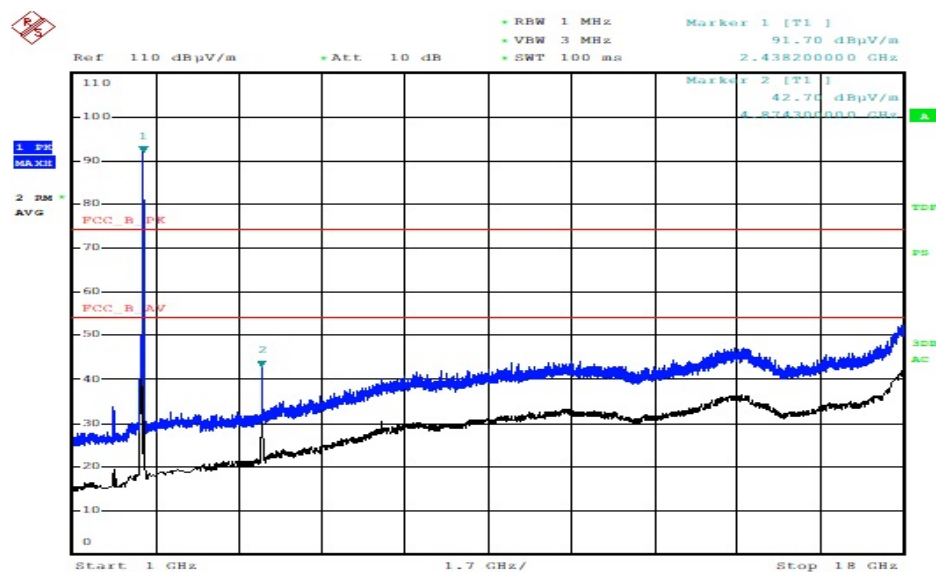
*802.11b Mode CH6

Polarity:Horizontal



ESTR-21-00231

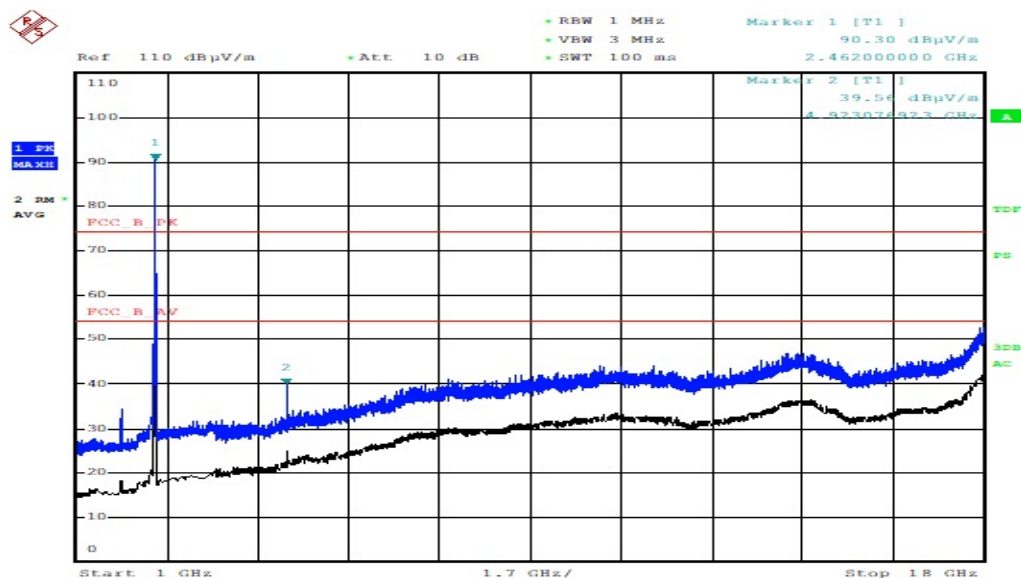
Polarity:Vertical



ESTR-21-00231

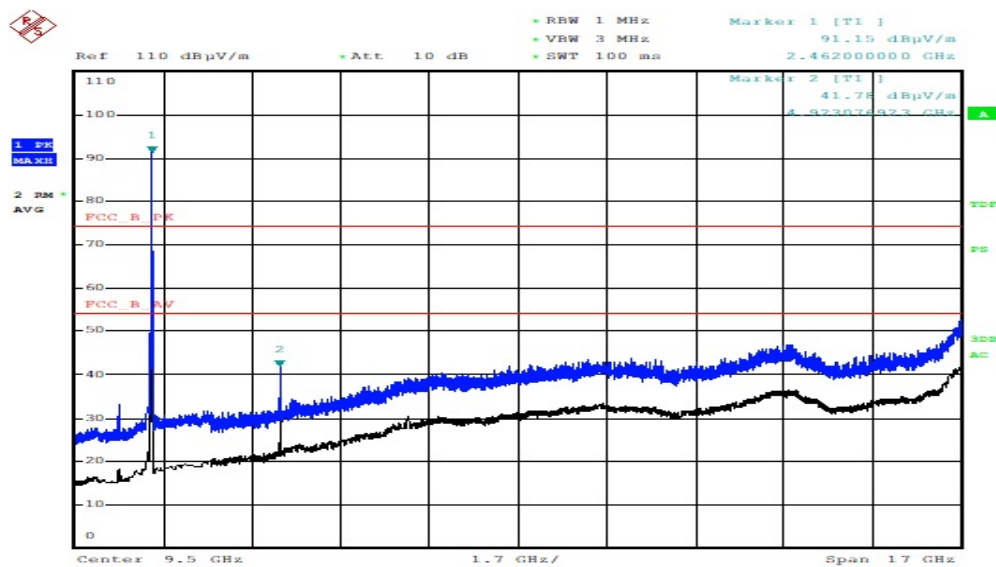
*802.11b Mode CH11

Polarity:Horizontal



ESTR-21-00231

Polarity:Vertical



ESTR-21-00231

10.4-8 Test Data (802.11 g)

Test Date : 19-Jul-21

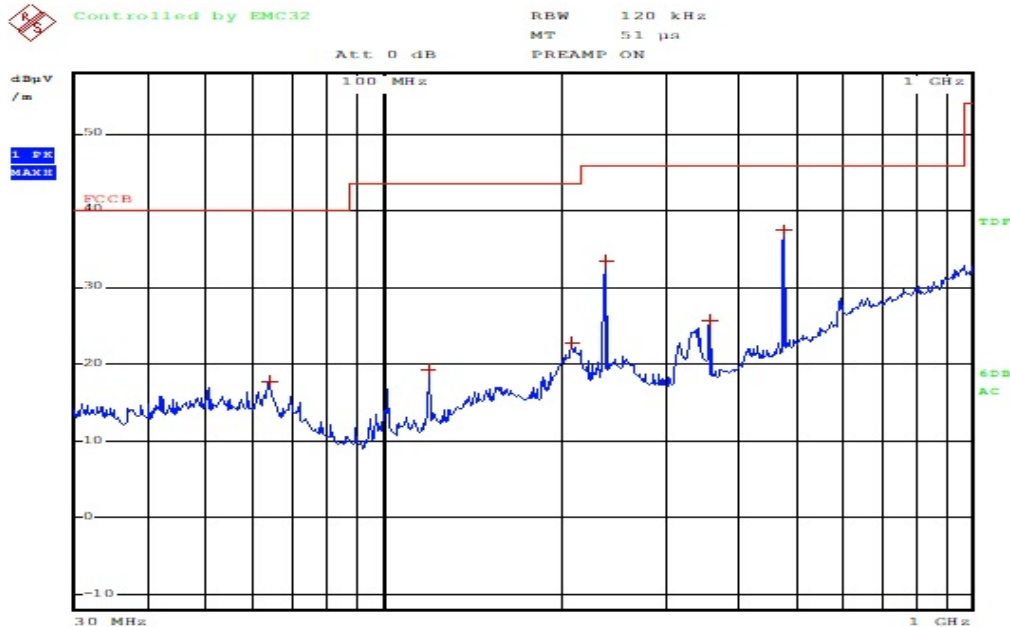
Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
198.90	14.81	V	1.1	10.28	2.19	43.50	27.28	16.22
208.50	10.61	H	1.6	9.87	2.25	43.50	22.73	20.77
239.00	20.27	H	1.5	10.78	2.43	46.00	33.48	12.52
358.60	8.12	V	1.4	14.35	3.01	46.00	25.48	20.52
476.00	6.94	V	1.6	17.29	3.50	46.00	27.72	18.28
478.00	16.63	H	1.2	17.32	3.50	46.00	37.45	8.55
Remark	H : Horizontal, V : Vertical *Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position) *CL = Cable Loss(In case of below 1 000 MHz) *Result Value = Reading + Ant Factor + Cable loss *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1 GHz.							

10.4-9 radiated Graph(30 MHz ~ 1 GHz)

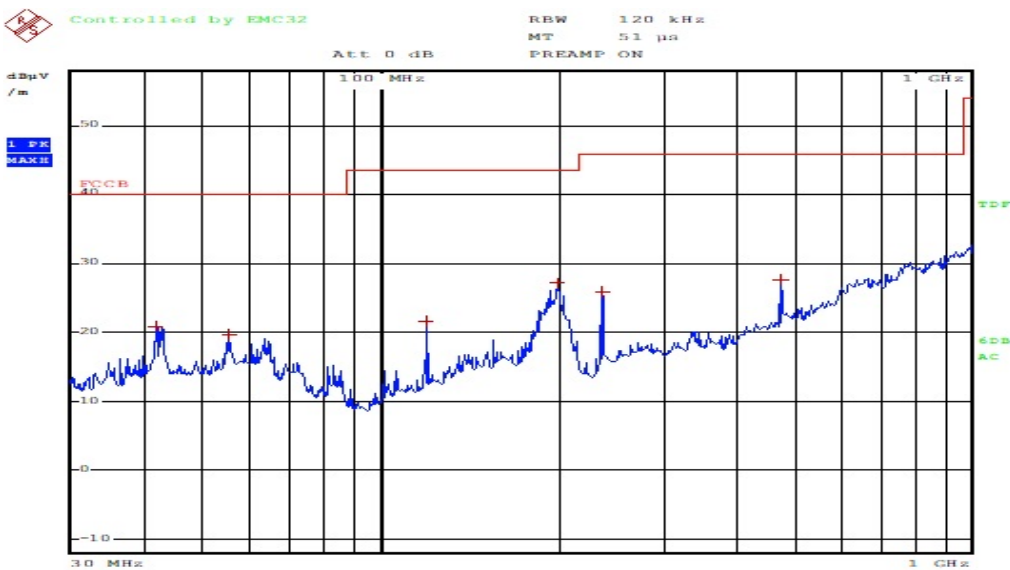
*802.11g Mode

Polarity:Horizontal



ESTR-21-00231

Polarity:Vertical

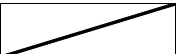
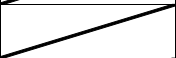
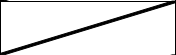
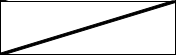


ESTR-21-00231

10.4-10 Test Data

Test Date : 20-Jul-21

Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2390.00	58.30	H	1.6	27.89	-29.82		74.00	56.37	17.63
2390.00	56.30	V	1.6	27.89	-29.82		74.00	54.37	19.63
2388.00	60.93	H	1.6	27.89	-29.82		74.00	59.00	15.00
2388.00	58.49	V	1.6	27.89	-29.82		74.00	56.56	17.44
4824.00	48.96	H	1.6	31.52	-27.27		74.00	53.21	20.79
4824.00	49.56	V	1.6	31.52	-27.27		74.00	53.81	20.19
AV(RBW: 1 MHz VBW: 3 MHz)									
2390.00	36.31	H	1.6	27.89	-29.82	0.52	54.00	34.90	19.11
2390.00	36.56	V	1.6	27.89	-29.82	0.52	54.00	35.15	18.86
2388.00	43.69	H	1.6	27.89	-29.82	0.52	54.00	42.28	11.73
2388.00	43.24	V	1.6	27.89	-29.82	0.52	54.00	41.83	12.18
4824.00	38.77	H	1.6	31.52	-27.27	0.52	54.00	43.54	10.47
4824.00	39.02	V	1.6	31.52	-27.27	0.52	54.00	43.79	10.22
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11 g – CH 1(2 412 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	*This test was radiated up to 26.5 GHz but no noise was measured.								

10.4-11 Test Data

Test Date : 20-Jul-21

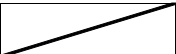
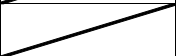
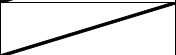
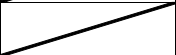
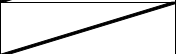
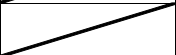
Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
4874.00	48.16	H	1.5	31.57	-27.24		74.00	52.49	21.51
4874.00	48.37	V	1.5	31.57	-27.24		74.00	52.70	21.30
AV(RBW: 1 MHz VBW: 3 MHz)									
4874.00	38.59	H	1.5	31.57	-27.24	0.52	54.00	43.44	10.57
4874.00	38.69	V	1.5	31.57	-27.24	0.52	54.00	43.54	10.47
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11 g – CH 6(2 437 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	*This test was radiated up to 26.5 GHz but no noise was measured.								

10.4-12 Test Data

Test Date : 20-Jul-21

Measurement Distance : 3 m

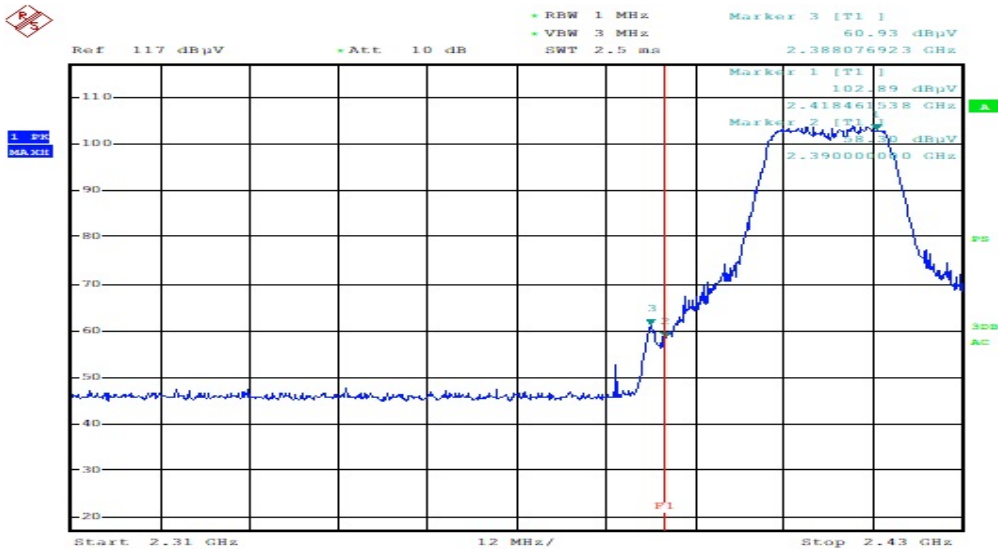
Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2483.50	60.96	H	1.6	27.50	-30.92		74.00	57.54	16.46
2483.50	59.19	V	1.5	27.50	-30.92		74.00	55.77	18.23
2486.00	59.43	H	1.6	27.48	-29.75		74.00	57.16	16.84
2486.00	60.78	V	1.5	27.48	-29.75		74.00	58.51	15.49
4924.00	49.69	H	1.6	31.62	-27.21		74.00	54.10	19.90
4924.00	50.36	V	1.5	31.62	-27.21		74.00	54.77	19.23
AV(RBW: 1 MHz VBW: 3 MHz)									
2483.50	39.31	H	1.6	27.50	-30.92	0.52	54.00	36.41	17.60
2483.50	39.41	V	1.5	27.50	-30.92	0.52	54.00	36.51	17.50
2486.00	45.27	H	1.6	27.48	-29.75	0.52	54.00	43.52	10.49
2486.00	46.52	V	1.5	27.48	-29.75	0.52	54.00	44.77	9.24
4924.00	39.67	H	1.6	31.62	-27.21	0.52	54.00	44.60	9.40
4924.00	40.10	V	1.5	31.62	-27.21	0.52	54.00	45.03	8.98
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11g – CH 11(2 462 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	*This test was radiated up to 26.5 GHz but no noise was measured.								

10.4–13 Restricted Band Edges *802.11g Mode

Band Edges(CH Low)

Detector mode:Peak

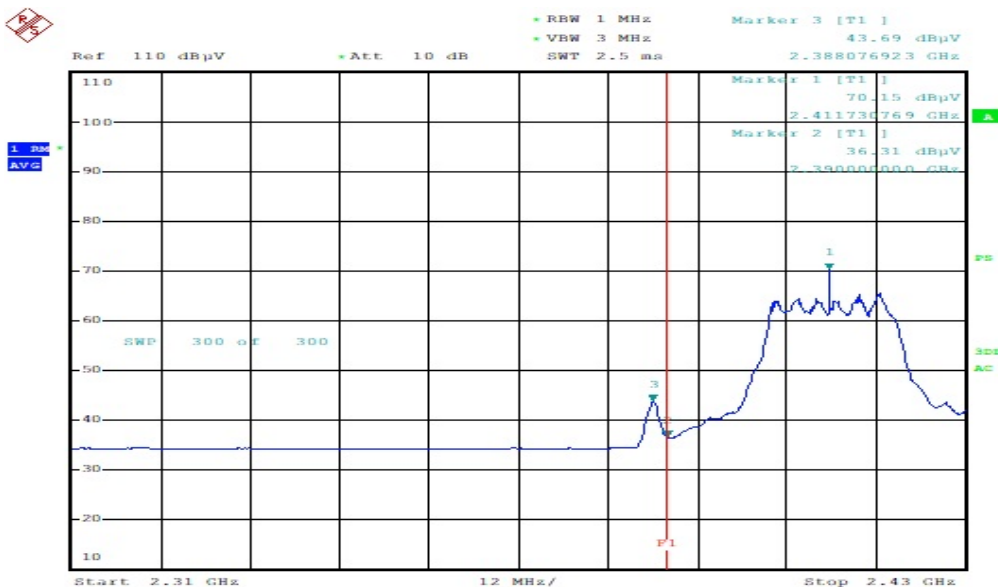
Polarity:Horizontal



ESTR-21-00231

Detector mode:Average

Polarity:Horizontal

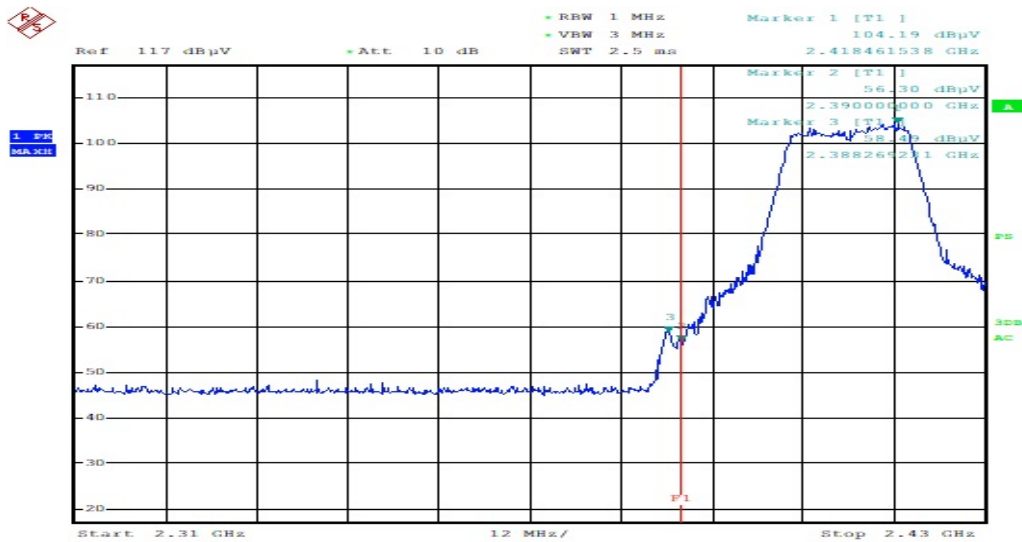


ESTR-21-00231

Band Edges(CH Low)

Detector mode:Peak

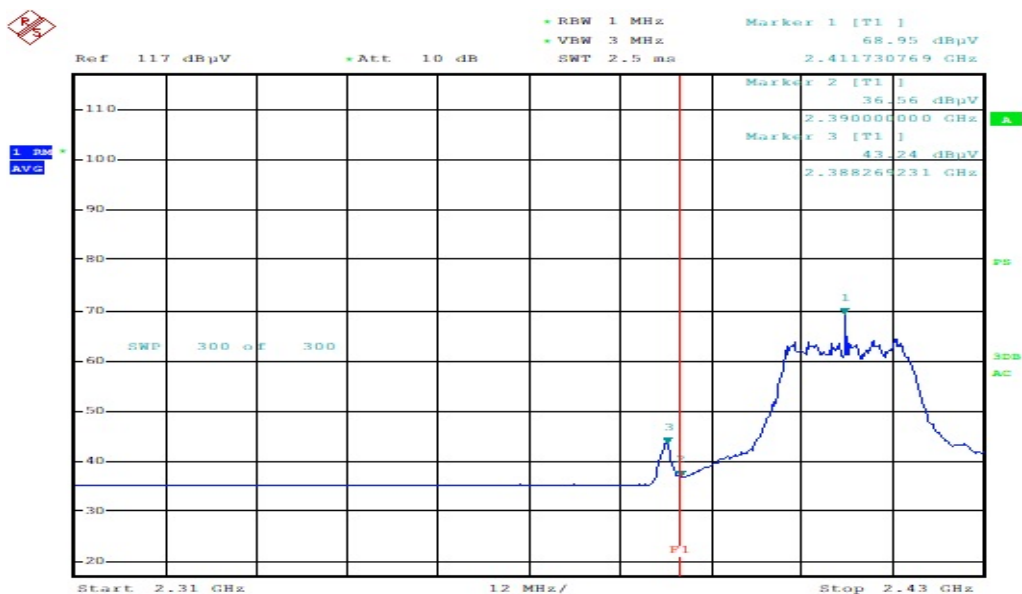
Polarity:Vertical



ESTR-21-00231

Detector mode:Average

Polarity:Vertical

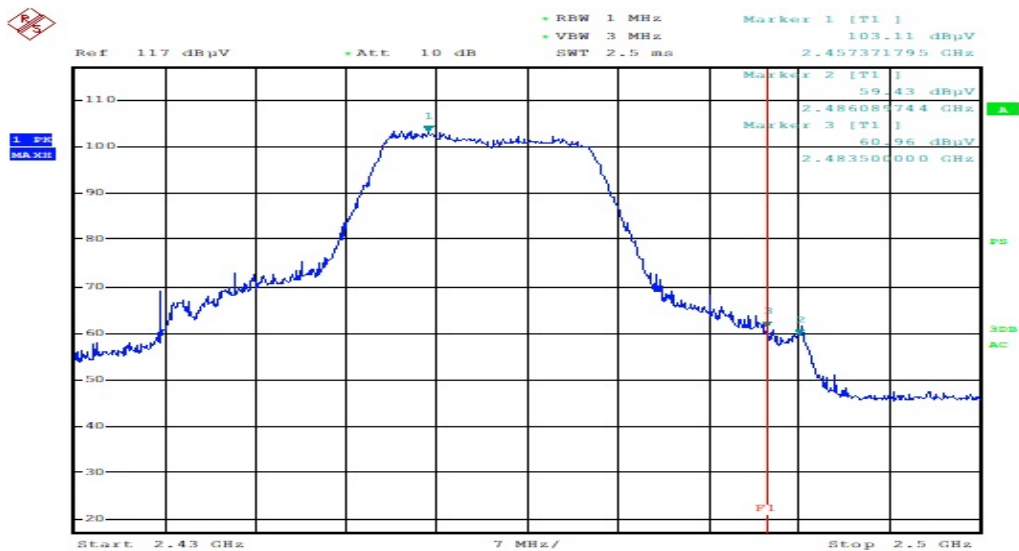


ESTR-21-00231

Band Edges(CH High)

Detector mode:Peak

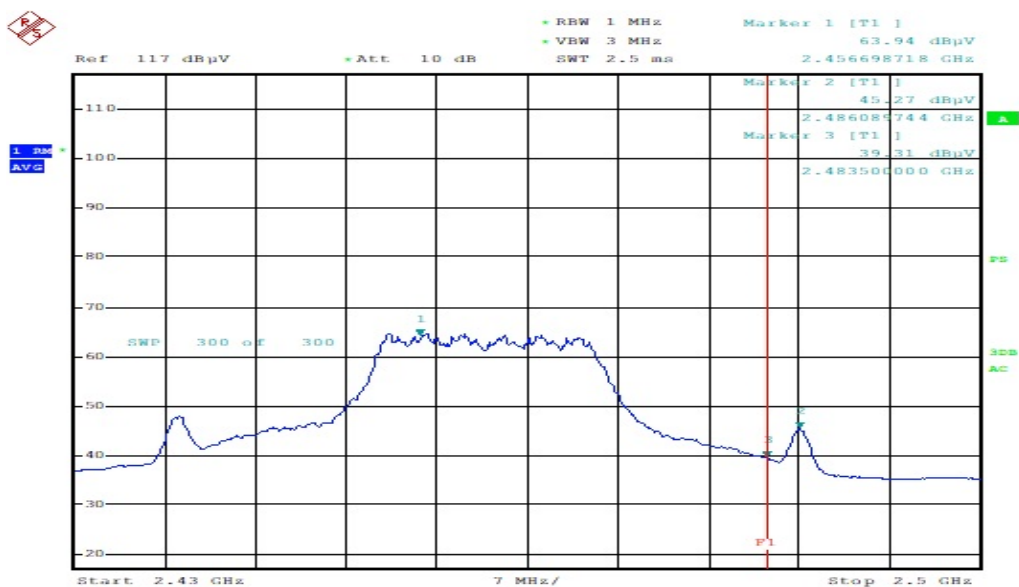
Polarity:Horizontal



ESTR-21-00231

Detector mode:Average

Polarity:Horizontal

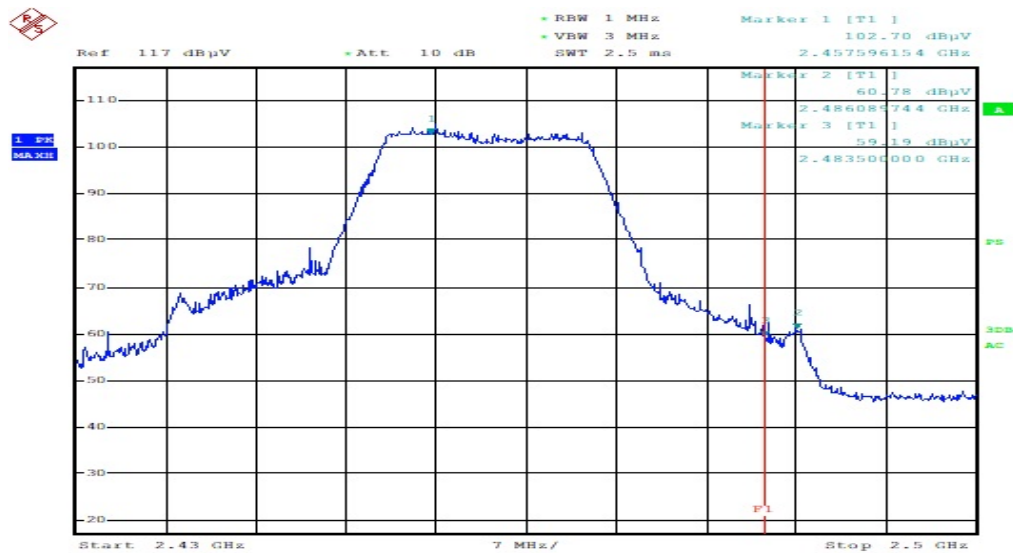


ESTR-21-00231

Band Edges(CH High)

Detector mode:Peak

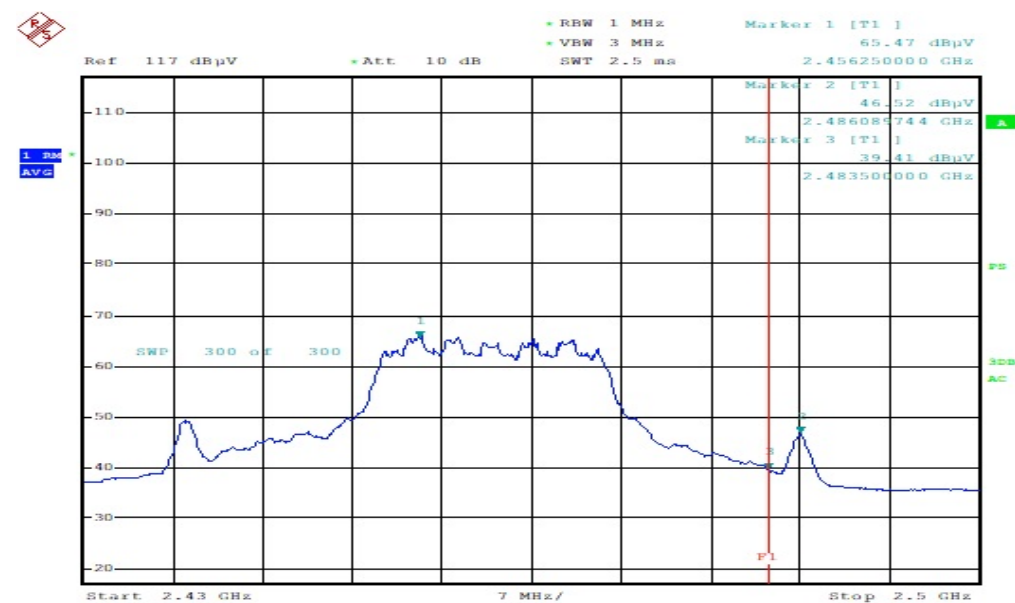
Polarity:Vertical



ESTR-21-00231

Detector mode:Average

Polarity:Vertical

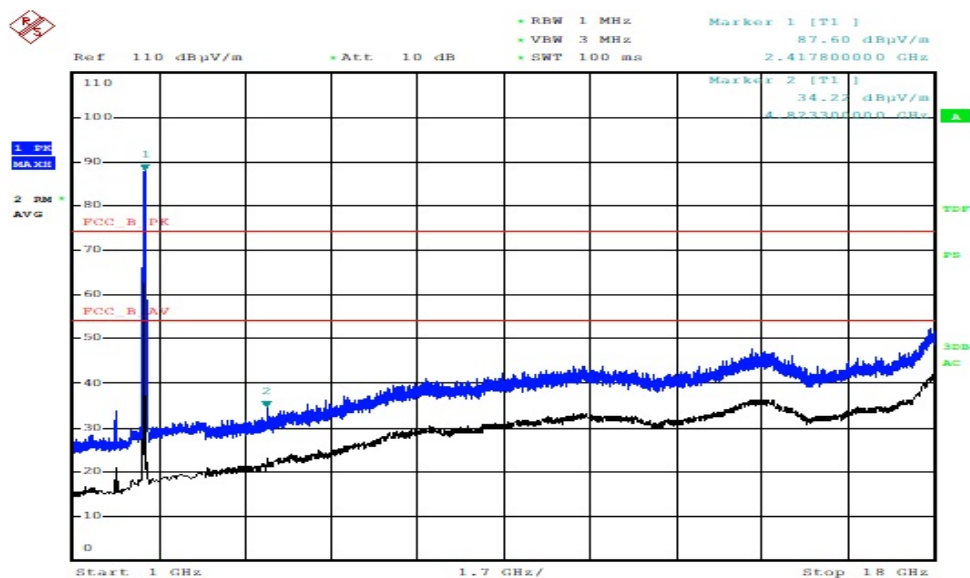


ESTR-21-00231

10.4–14 Restricted Band Edges

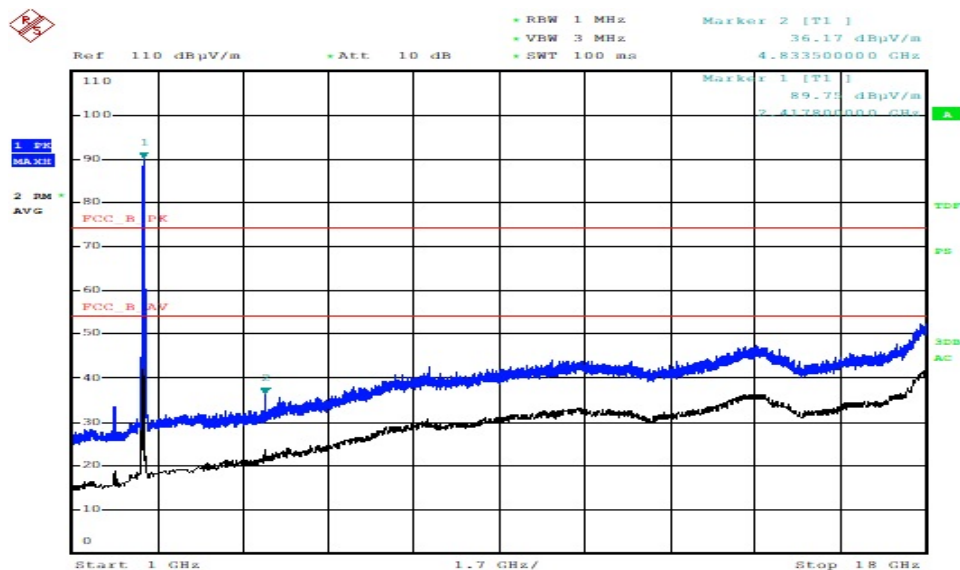
*802.11g Mode CH1

Polarity:Horizontal



ESTR-21-00231

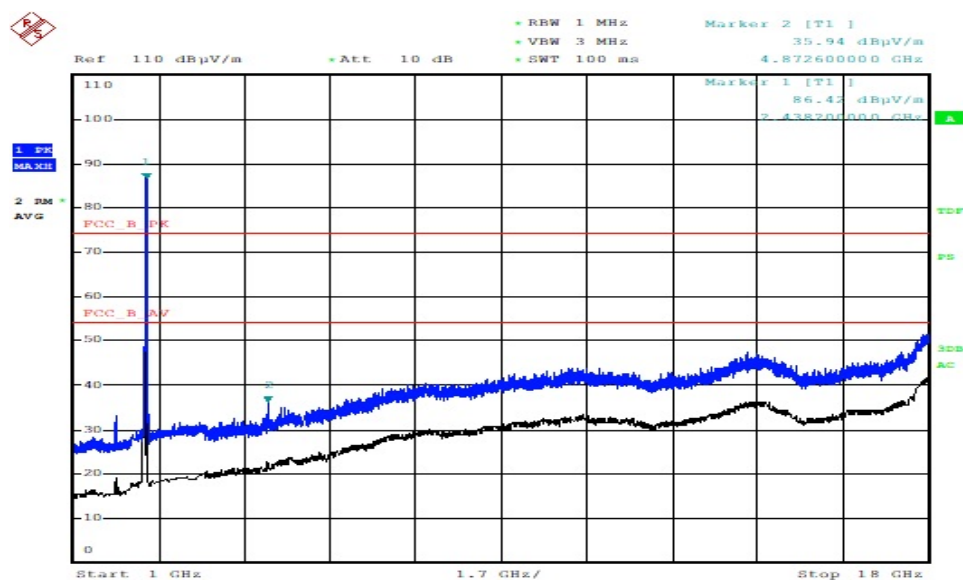
Polarity:Vertical



ESTR-21-00231

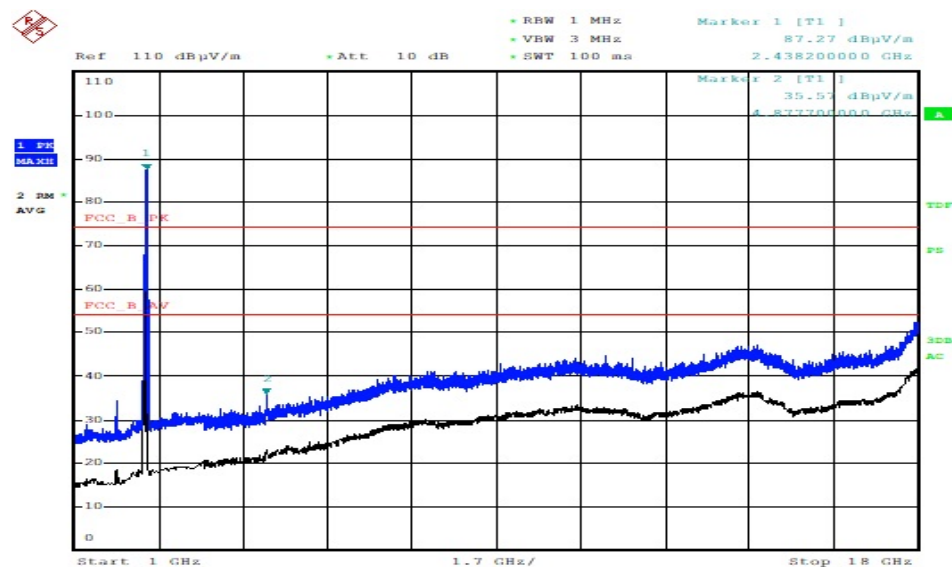
*802.11g Mode CH6

Polarity:Horizontal



ESTR-21-00231

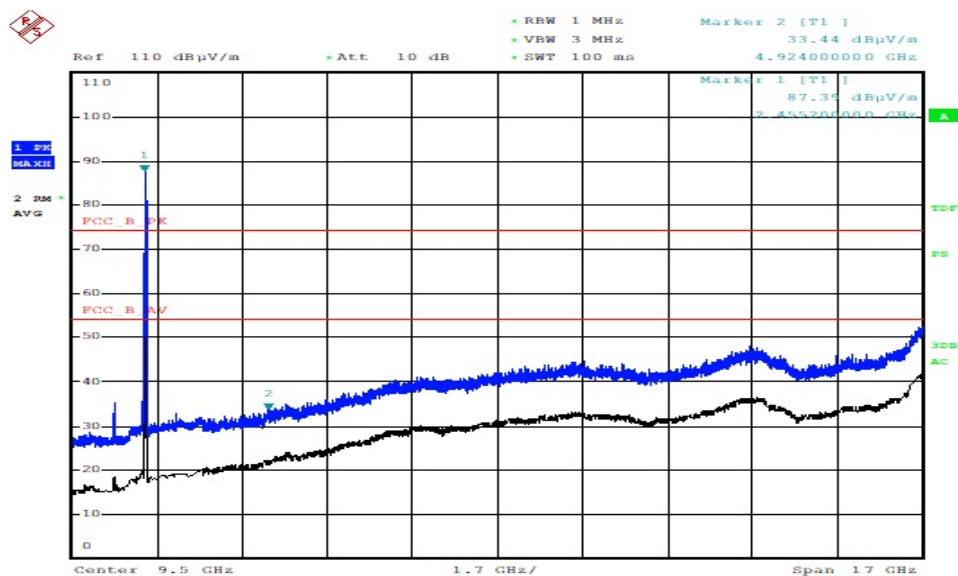
Polarity:Vertical



ESTR-21-00231

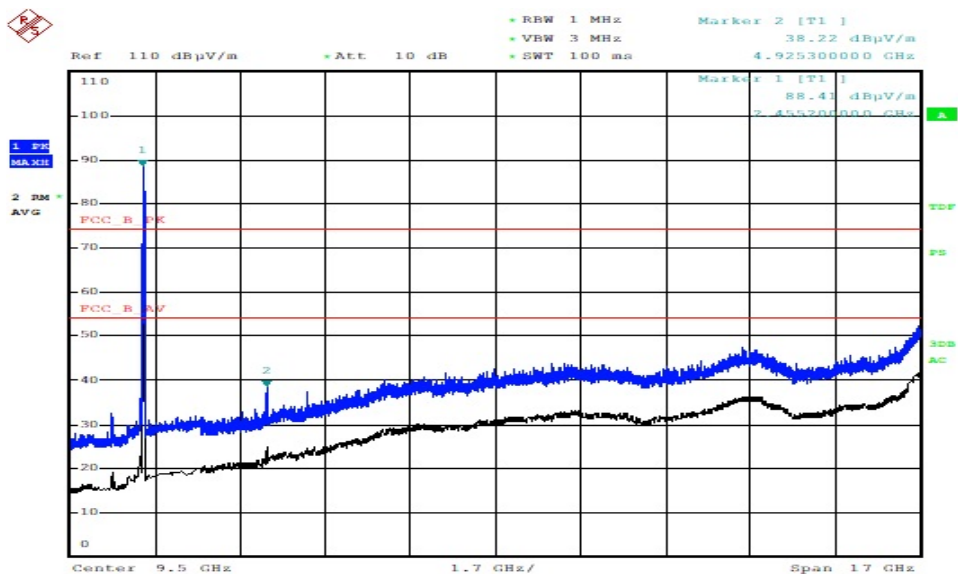
*802.11g Mode CH11

Polarity:Horizontal



ESTR-21-00231

Polarity:Vertical



ESTR-21-00231

10.4-15 Test Data (802.11 n20)

Test Date : 19-Jul-21

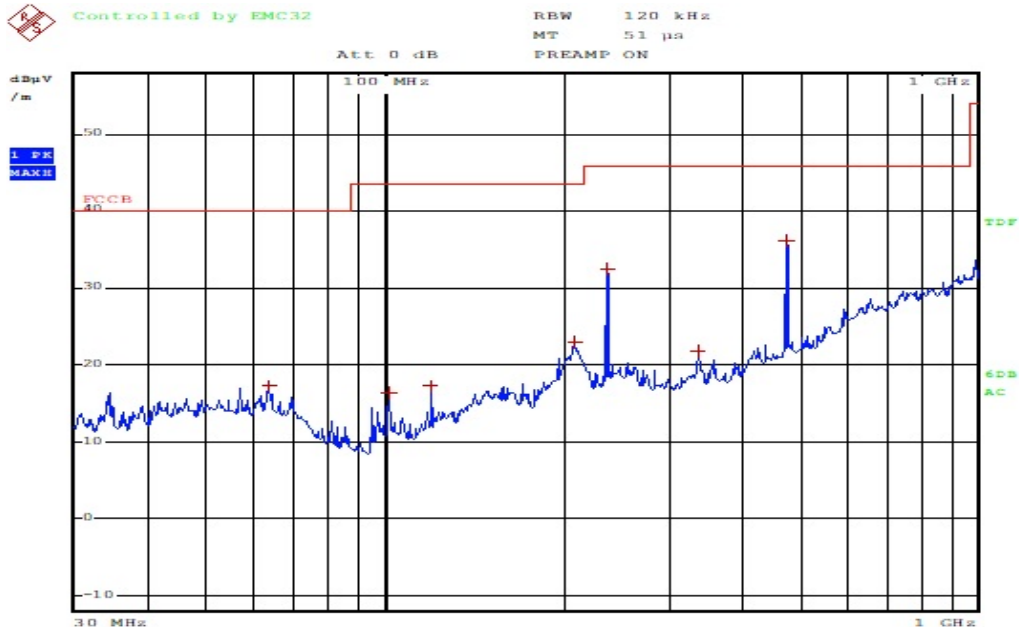
Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
119.00	10.28	V	1.0	9.87	1.66	43.50	21.81	21.69
197.90	13.66	V	1.2	10.26	2.19	43.50	26.11	17.39
209.60	10.86	H	1.8	9.89	2.26	43.50	23.01	20.49
238.00	19.29	H	1.4	10.76	2.42	46.00	32.47	13.53
336.20	4.84	H	1.6	14.20	2.91	46.00	21.95	24.05
475.90	15.45	H	1.5	17.29	3.50	46.00	36.23	9.77
Remark	H : Horizontal, V : Vertical *Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position) *CL = Cable Loss(In case of below 1 000 MHz) *Result Value = Reading + Ant Factor + Cable loss *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1 GHz.							

10.4–16 radiated Graph(30 MHz ~ 1 GHz)

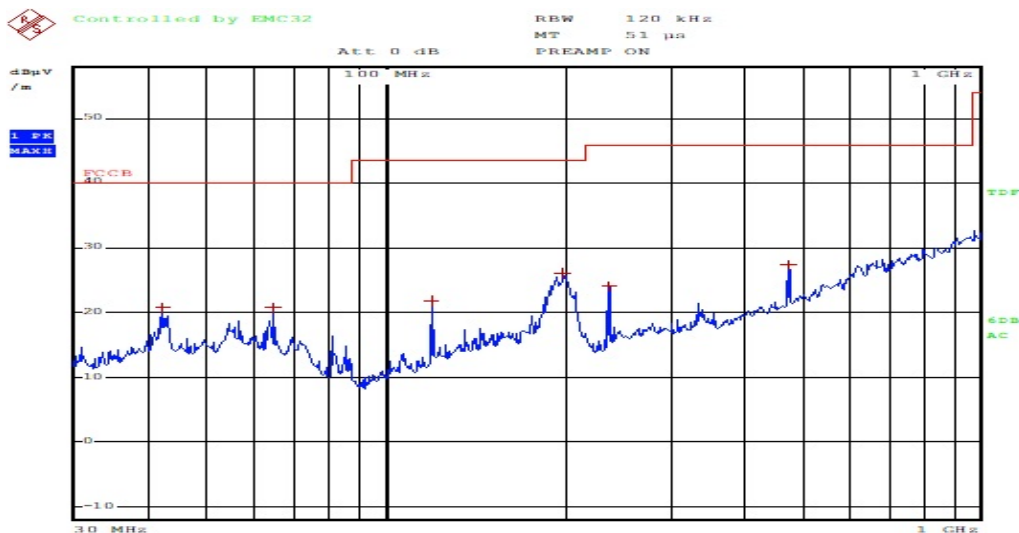
*802.11n20 Mode

Polarity:Horizontal



ESTR-21-00231

Polarity:Vertical

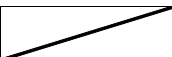
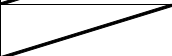
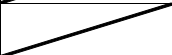
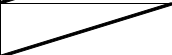
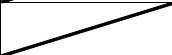
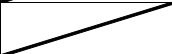


ESTR-21-00231

10.4-17 Test Data

Test Date : 22-Jul-21

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2390.00	55.54	H	1.5	27.89	-29.82		74.00	53.61	20.39
2390.00	54.39	V	1.6	27.89	-29.82		74.00	52.46	21.54
2388.00	59.36	H	1.5	27.89	-29.82		74.00	57.43	16.57
2388.00	57.59	V	1.6	27.89	-29.82		74.00	55.66	18.34
4824.00	48.56	H	1.5	31.52	-27.27		74.00	52.81	21.19
4824.00	49.10	V	1.6	31.52	-27.27		74.00	53.35	20.65
AV(RBW: 1 MHz VBW: 3 MHz)									
2390.00	37.28	H	1.5	27.89	-29.82	0.55	54.00	35.90	18.10
2390.00	37.02	V	1.6	27.89	-29.82	0.55	54.00	35.64	18.36
2388.00	45.73	H	1.5	27.89	-29.82	0.55	54.00	44.35	9.65
2388.00	44.03	V	1.6	27.89	-29.82	0.55	54.00	42.65	11.35
4824.00	37.98	H	1.5	31.52	-27.27	0.55	54.00	42.78	11.22
4824.00	38.64	V	1.6	31.52	-27.27	0.55	54.00	43.44	10.56
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11 n20 – CH 1(2 412 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	*This test was radiated up to 26.5 GHz but no noise was measured.								

10.4-18 Test Data

Test Date : 22-Jul-21

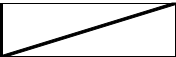
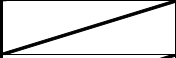
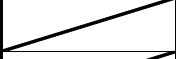
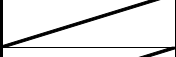
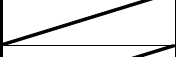
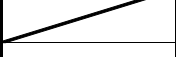
Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
4874.00	47.69	H	1.5	31.57	-27.24		74.00	52.02	21.98
4874.00	47.99	V	1.5	31.57	-27.24		74.00	52.32	21.68
AV(RBW: 1 MHz VBW: 3 MHz)									
4874.00	38.01	H	1.5	31.57	-27.24	0.55	54.00	42.89	11.11
4874.00	38.12	V	1.5	31.57	-27.24	0.55	54.00	43.00	11.00
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11 n20 – CH 6(2 437 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	*This test was radiated up to 26.5 GHz but no noise was measured.								

10.4-19 Test Data

Test Date : 22-Jul-21

Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2483.50	57.61	H	1.6	27.50	-30.92		74.00	54.19	19.81
2483.50	60.61	V	1.5	27.50	-30.92		74.00	57.19	16.81
2486.00	57.05	H	1.6	27.48	-29.75		74.00	54.78	19.22
2486.00	60.55	V	1.5	27.48	-29.75		74.00	58.28	15.72
4924.00	47.85	H	1.6	31.62	-27.21		74.00	52.26	21.74
4924.00	48.05	V	1.5	31.62	-27.21		74.00	52.46	21.54
AV(RBW: 1 MHz VBW: 3 MHz)									
2483.50	37.67	H	1.6	27.50	-30.92	0.55	54.00	34.80	19.20
2483.50	39.51	V	1.5	27.50	-30.92	0.55	54.00	36.64	17.36
2486.00	43.18	H	1.6	27.48	-29.75	0.55	54.00	41.46	12.54
2486.00	44.86	V	1.5	27.48	-29.75	0.55	54.00	43.14	10.86
4924.00	38.52	H	1.6	31.62	-27.21	0.55	54.00	43.48	10.52
4924.00	38.96	V	1.5	31.62	-27.21	0.55	54.00	43.92	10.08
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11n20 – CH 11(2 462 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.(Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	*This test was radiated up to 26.5 GHz but no noise was measured.								

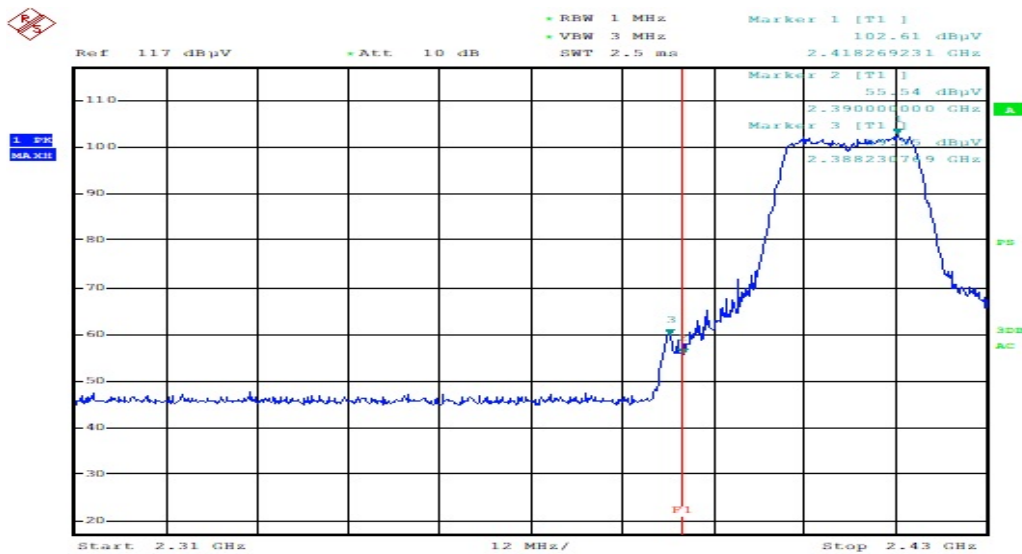
10.4–20 Restricted Band Edges

*802.11n20 Mode

Band Edges(CH Low)

Detector mode:Peak

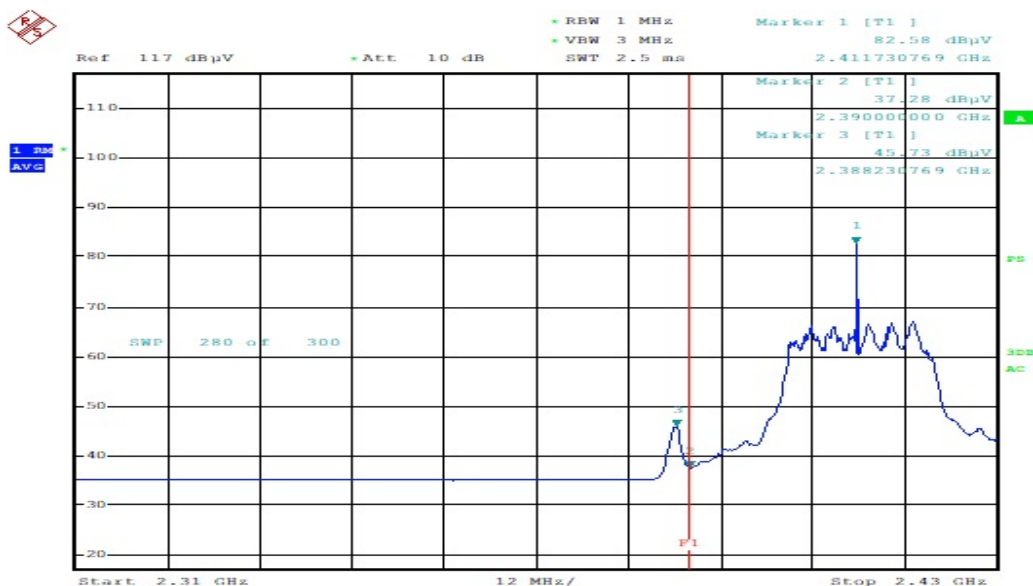
Polarity:Horizontal



ESTR-21-00231

Detector mode:Average

Polarity:Horizontal

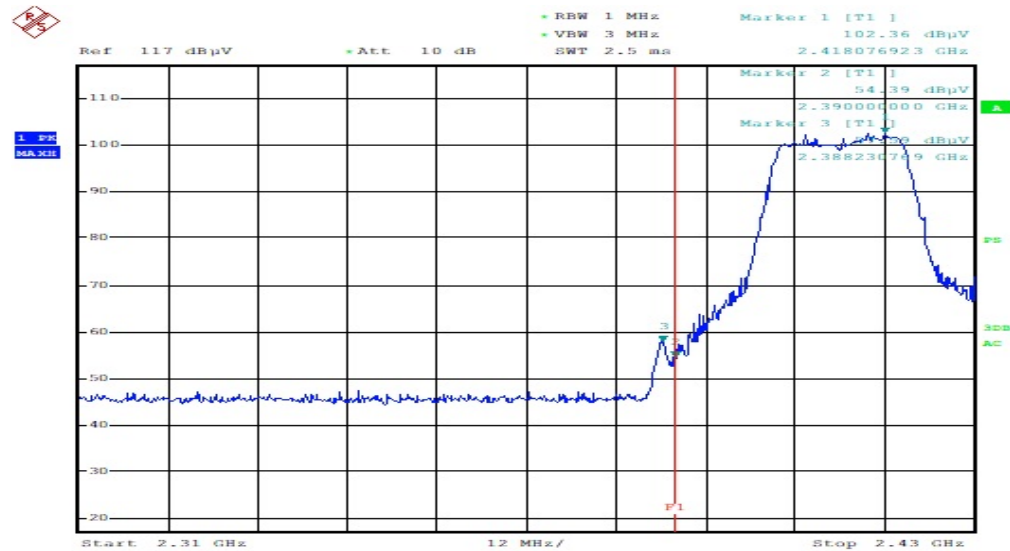


ESTR-21-00231

Band Edges(CH Low)

Detector mode:Peak

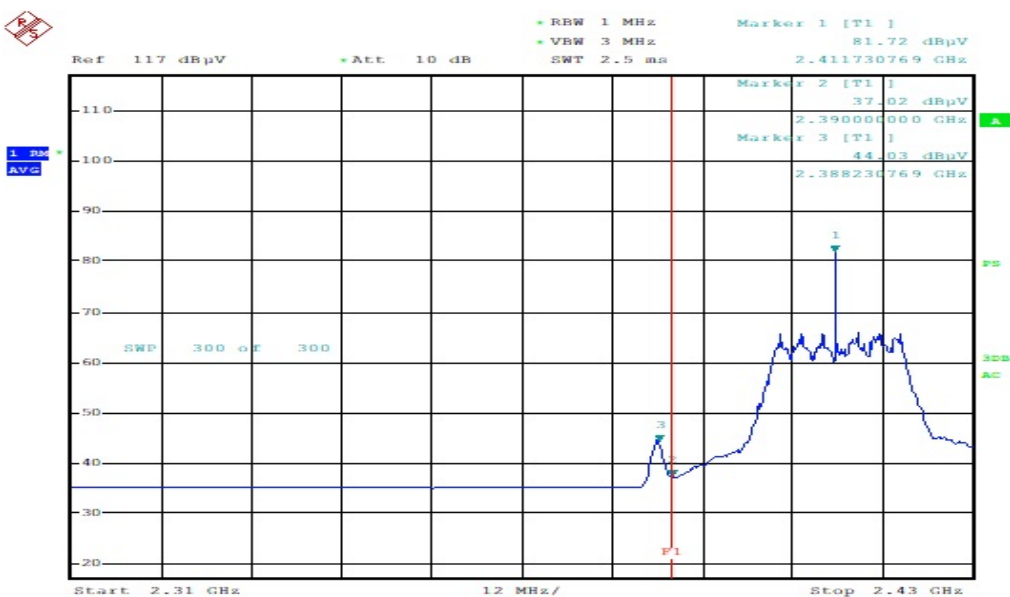
Polarity:Vertical



ESTR-21-00231

Detector mode:Average

Polarity:Vertical

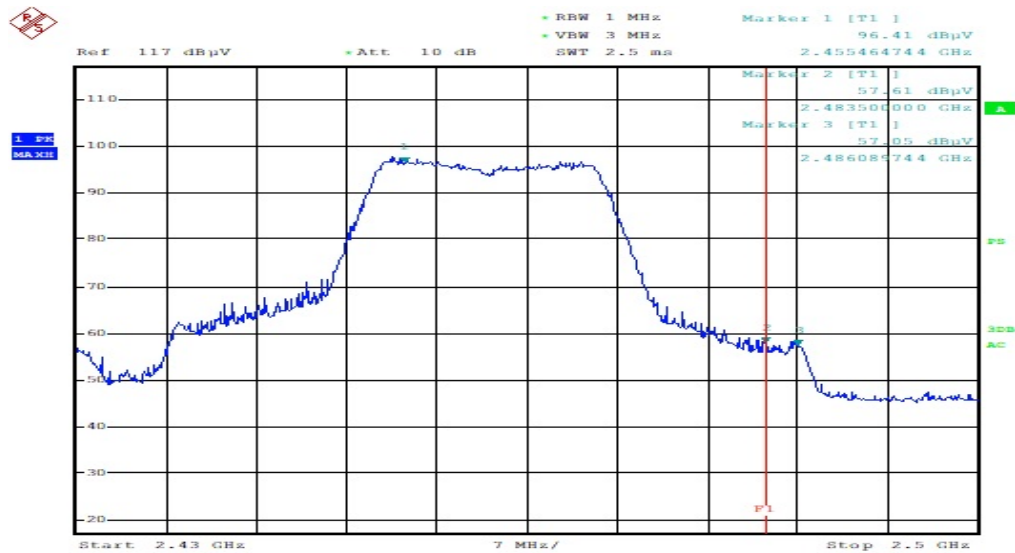


ESTR-21-00231

Band Edges(CH High)

Detector mode:Peak

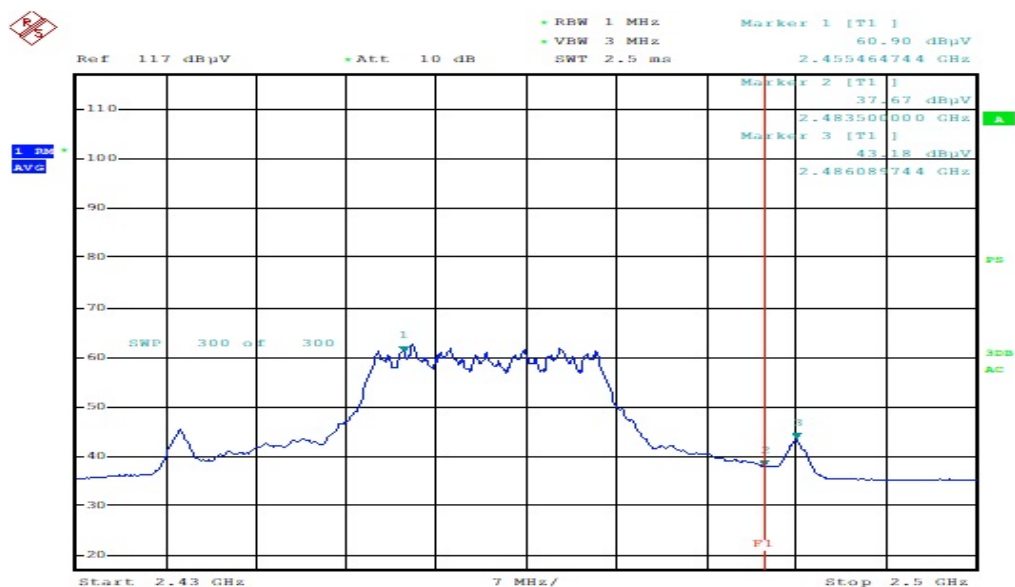
Polarity:Horizontal



ESTR-21-00231

Detector mode:Average

Polarity:Horizontal

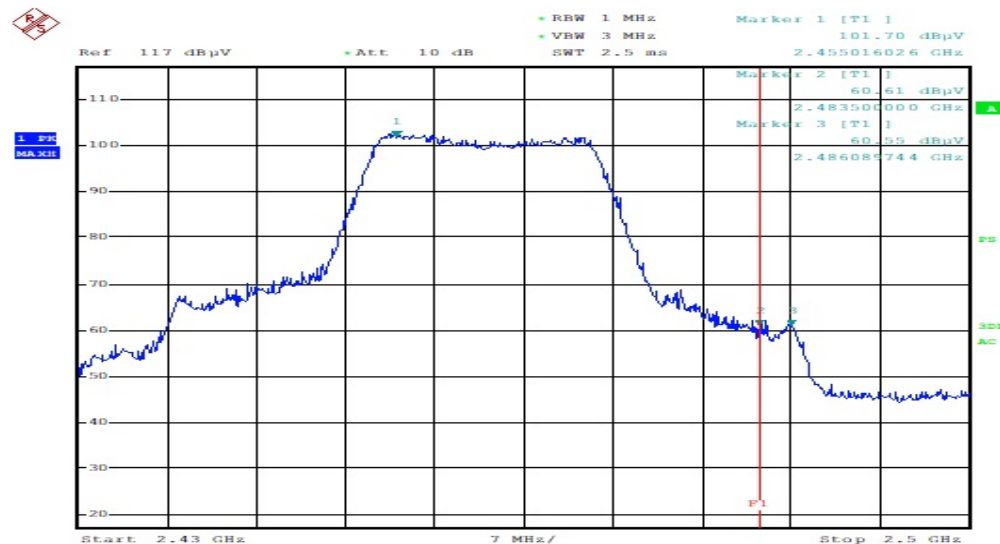


ESTR-21-00231

Band Edges(CH High)

Detector mode:Peak

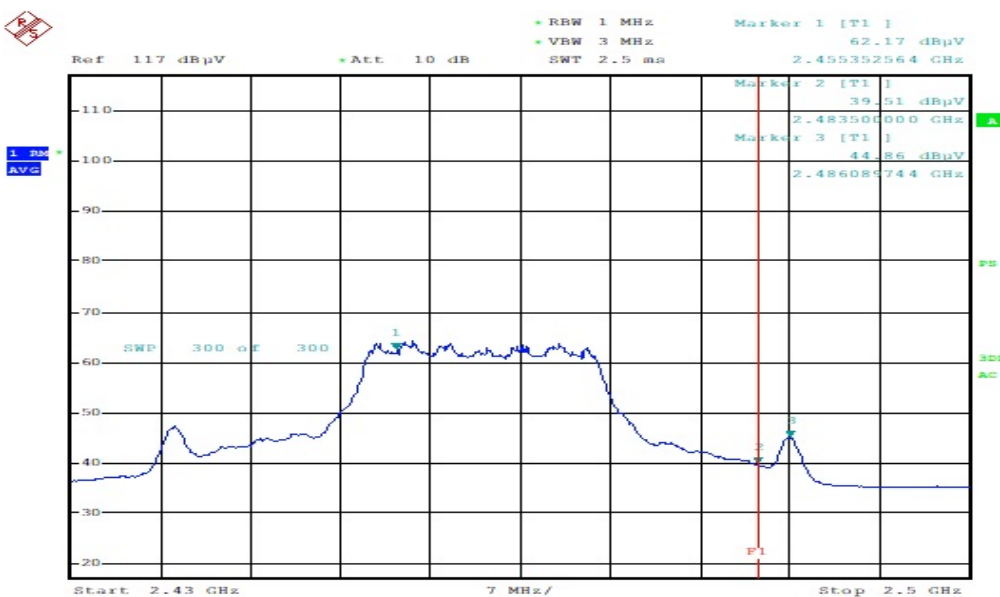
Polarity:Vertical



ESTR-21-00231

Detector mode:Average

Polarity:Vertical

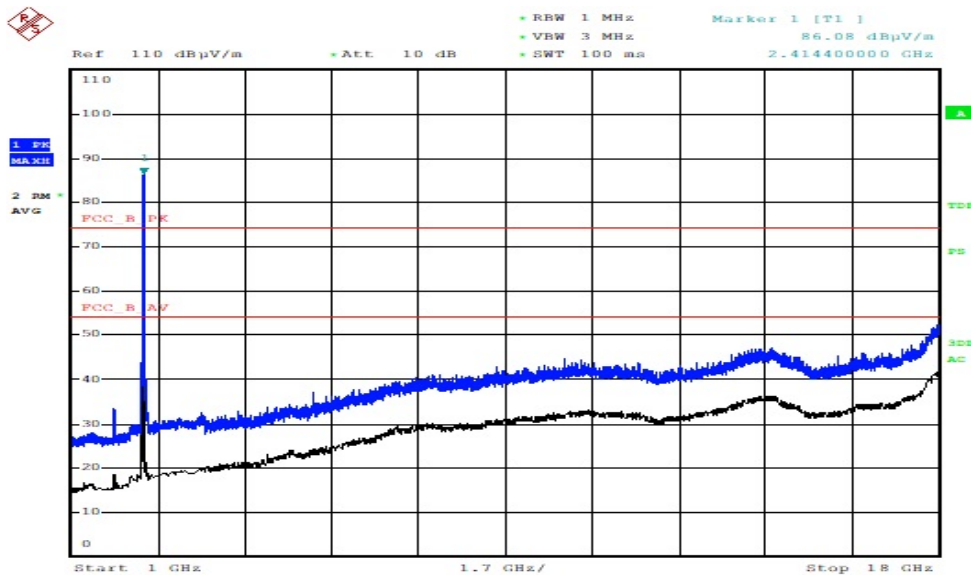


ESTR-21-00231

10.4–21 Restricted Band Edges

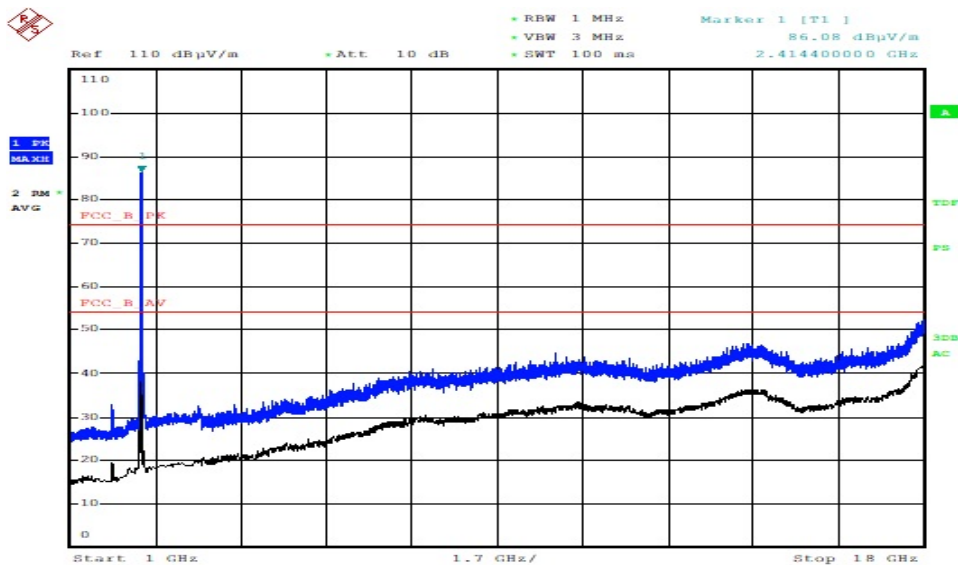
*802.11n20 Mode CH1

Polarity:Horizontal



ESTR-21-00231

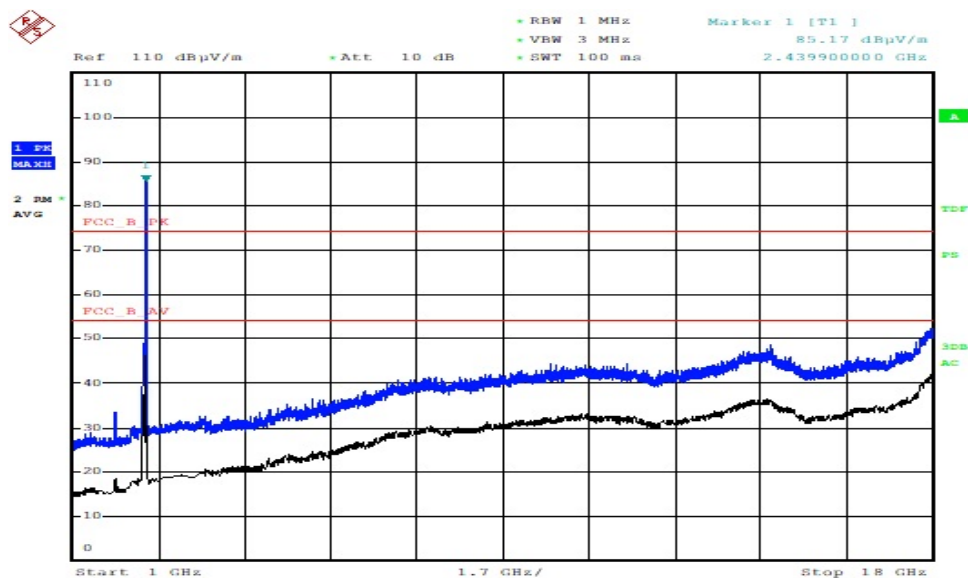
Polarity:Vertical



ESTR-21-00231

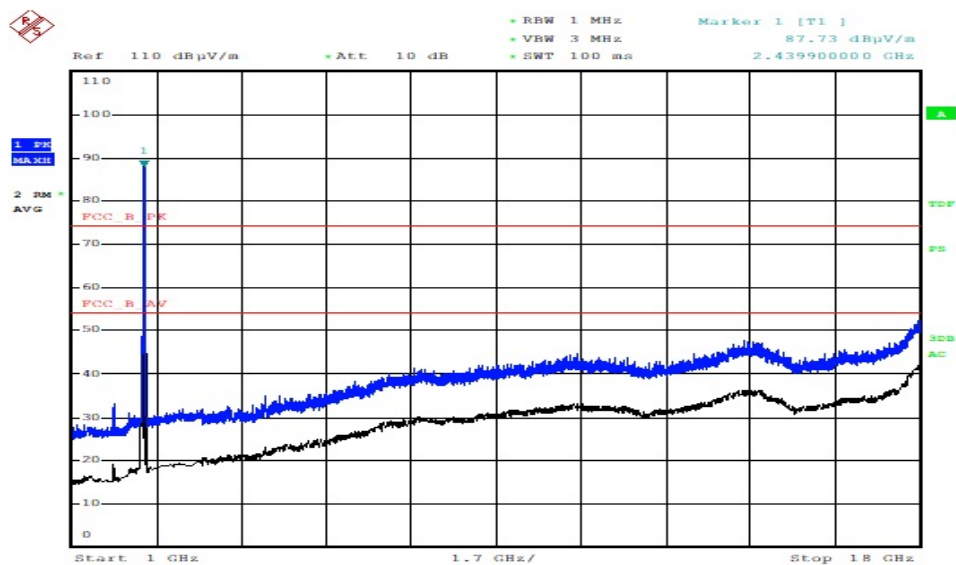
*802.11n20 Mode CH6

Polarity:Horizontal



ESTR-21-00231

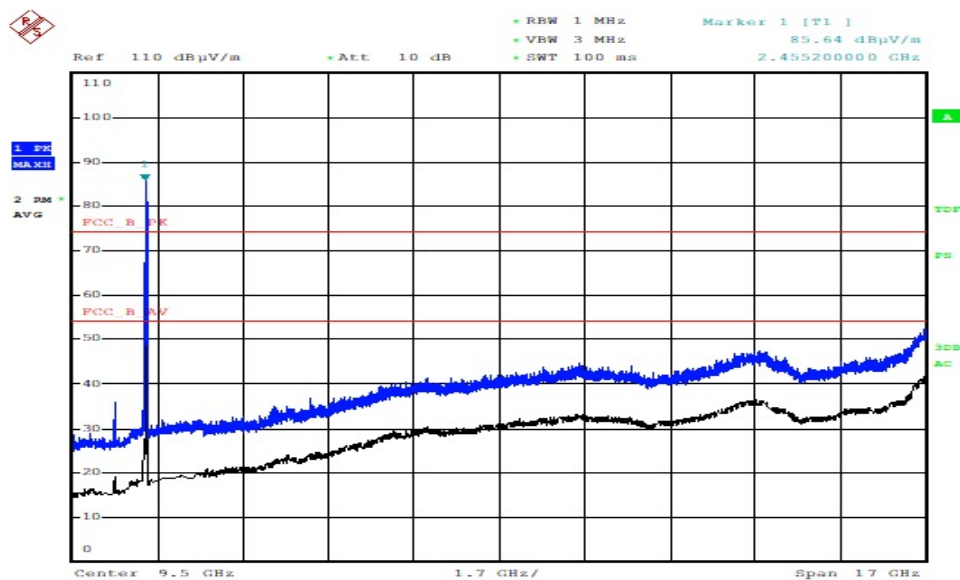
Polarity:Vertical



ESTR-21-00231

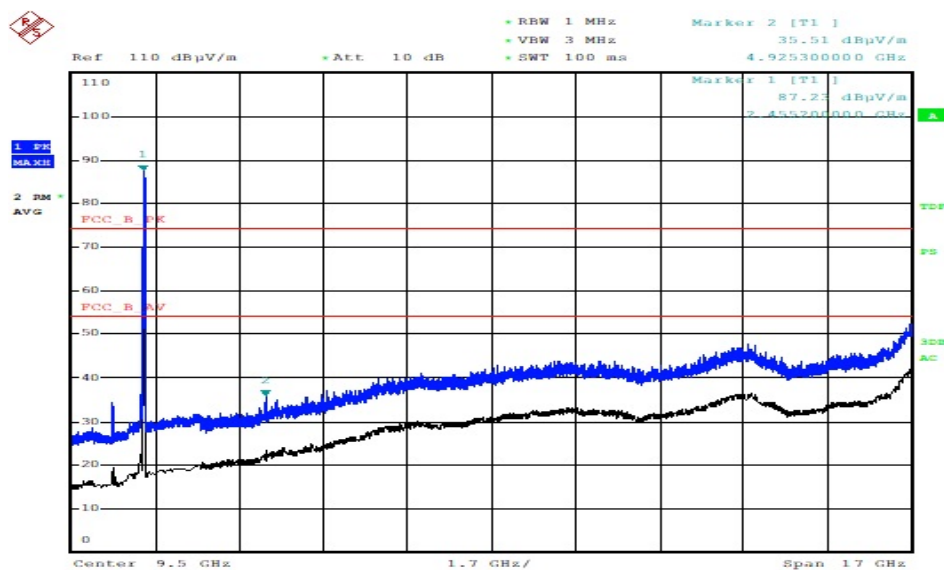
*802.11n20 Mode CH11

Polarity:Horizontal



ESTR-21-00231

Polarity:Vertical



ESTR-21-00231

11. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 MHz to 30 MHz was measured in accordance to FCC PART 15.207. The test setup was made according to ANSI C 63.10 (2009) in a shielded room. The EUT was placed on a non-conductive table at least 0.8 m above the ground plan. A grounded vertical reference plane was positioned in a distance of 0.4 m from the EUT. The distance from the EUT to other metal surfaces was at least 0.8 m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0 m. The test receiver with Quasi Peak detector complies with CISPR 16.

11.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST RECEIVER	ESPI	Rohde & Schwarz	100005	19-Jul-22
LISN	ESH3-Z5	Rohde & Schwarz	836679/025	19-Jul-22
LISN	ENV216	Rohde & Schwarz	101231	19-Jul-22
Pulse Limiter	ESH3Z2	Rohde & Schwarz	NONE	19-Jul-22

11.2 Environmental Condition

Test Place : Shielded Room

Temperature (°C) : 21.5 °C

Humidity (% R.H.) : 46.5 % R.H.

11.3-1 Test Data (802.11 b)

Test Date : 13-Aug-21

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dB μ V)	Reading (dB μ V)	Result (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Result (dB)
0.15	0.16	0.12	H	66.00	58.99	59.27	56.00	39.29	39.57
0.16	0.09	0.13	N	65.67	54.21	54.43	55.67	36.08	36.30
0.17	0.16	0.15	H	65.06	55.81	56.12	55.06	36.19	36.50
0.18	0.16	0.17	H	64.35	53.11	53.44	54.35	31.02	31.35
0.20	0.16	0.20	H	63.69	50.90	51.26	53.69	31.98	32.34
0.21	0.16	0.20	H	63.09	48.03	48.39	53.09	27.08	27.44
0.23	0.16	0.20	H	62.63	46.10	46.46	52.63	27.27	27.63
Remark	H : Hot Line, N : Neutral Line *Correction Factor = Lisn + Cable *Result = Correction Factor + Reading								

11.3-2 Test Data (802.11 g)

Test Date : 13-Aug-21

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dB μ V)	Reading (dB μ V)	Result (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Result (dB)
0.17	0.16	0.14	H	65.21	55.57	55.87	55.21	34.93	35.23
0.18	0.16	0.16	H	64.63	53.92	54.24	54.63	32.72	33.04
0.20	0.16	0.19	H	63.82	50.60	50.95	53.82	31.59	31.94
0.21	0.16	0.20	H	63.32	49.06	49.42	53.32	29.94	30.30
0.23	0.16	0.20	H	62.41	45.24	45.60	52.41	26.03	26.39
0.38	0.09	0.21	N	58.32	32.86	33.16	48.32	20.72	21.02
Remark	H : Hot Line, N : Neutral Line *Correction Factor = Lisn + Cable *Result = Correction Factor + Reading								

11.3-3 Test Data (802.11 n20)

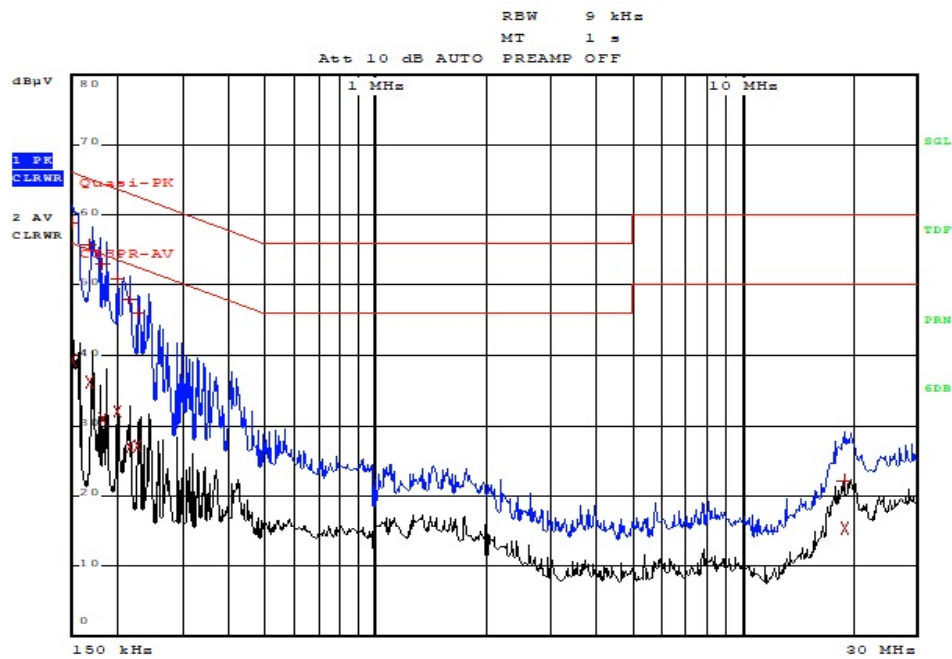
Test Date : 13-Aug-21

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dB μ V)	Reading (dB μ V)	Result (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Result (dB)
0.15	0.16	0.12	H	66.00	57.29	57.57	56.00	35.47	35.75
0.16	0.09	0.13	N	65.67	54.19	54.41	55.67	36.18	36.40
0.17	0.16	0.15	H	65.06	54.78	55.09	55.06	35.77	36.08
0.18	0.16	0.17	H	64.49	50.25	50.58	54.49	31.36	31.69
0.19	0.16	0.18	H	64.08	50.45	50.79	54.08	29.10	29.44
0.20	0.16	0.20	H	63.69	49.49	49.85	53.69	31.10	31.46
0.21	0.16	0.20	H	63.21	46.26	46.62	53.21	28.69	29.05
Remark	H : Hot Line, N : Neutral Line *Correction Factor = Lisn + Cable *Result = Correction Factor + Reading								

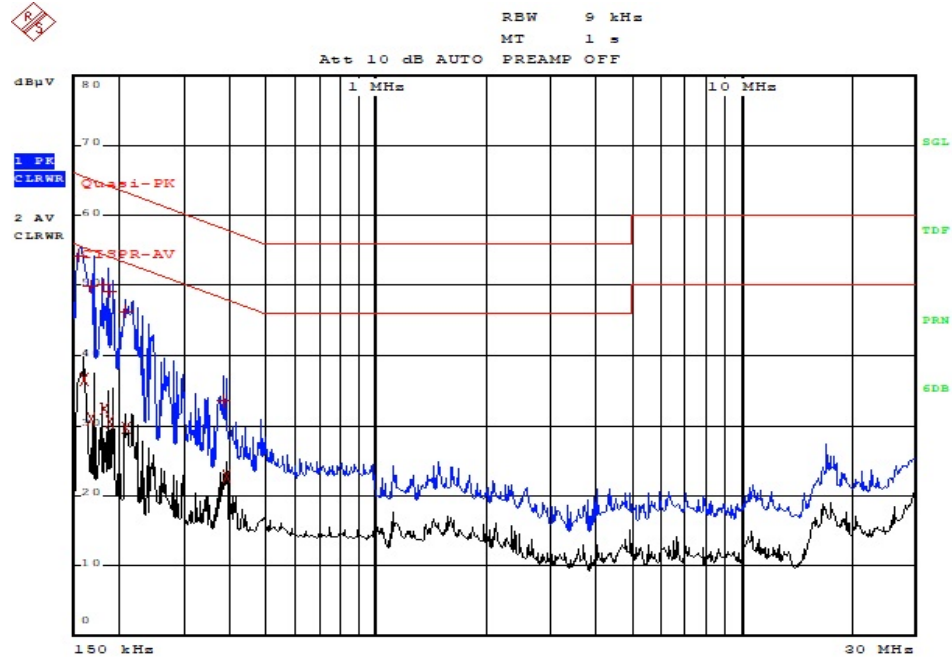
Appendix 1. Special diagram (802.11 b)

*CONDUCTED EMISSION-N/A

* HOT LINE



Comment: ESTR-21-00231

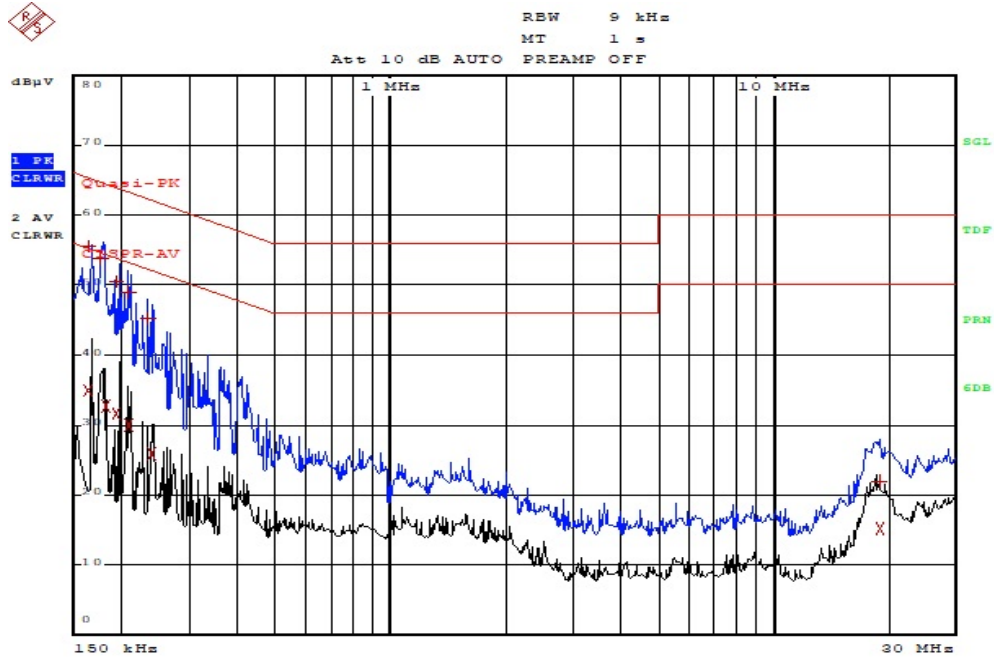


Comment: ESTR-21-00231

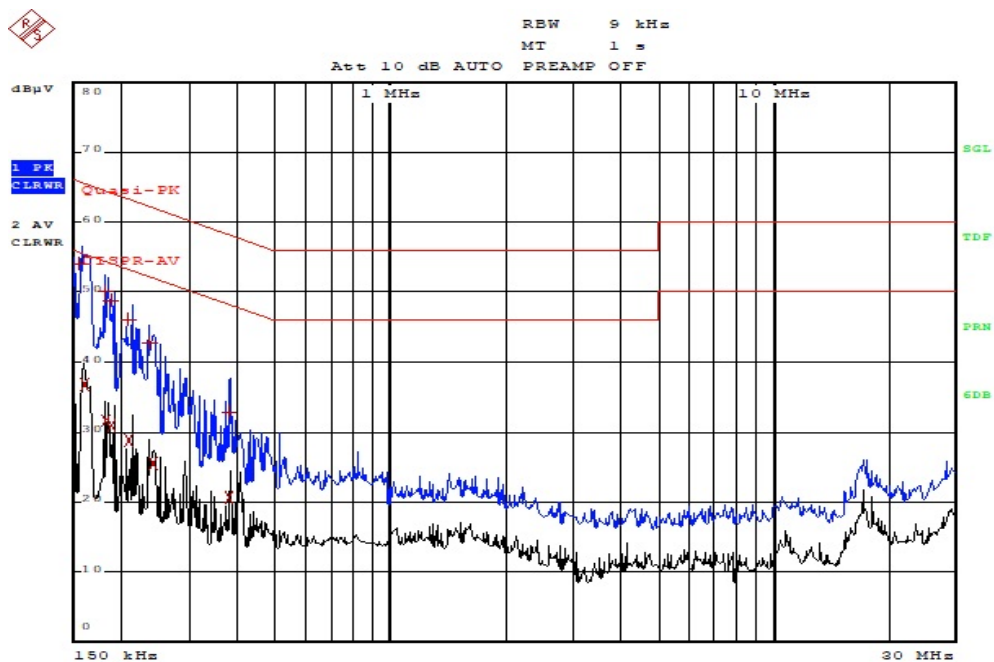
Appendix 1. Special diagram (802.11 g)

*CONDUCTED EMISSION-N/A

* HOT LINE



Comment: ESTR-21-00231

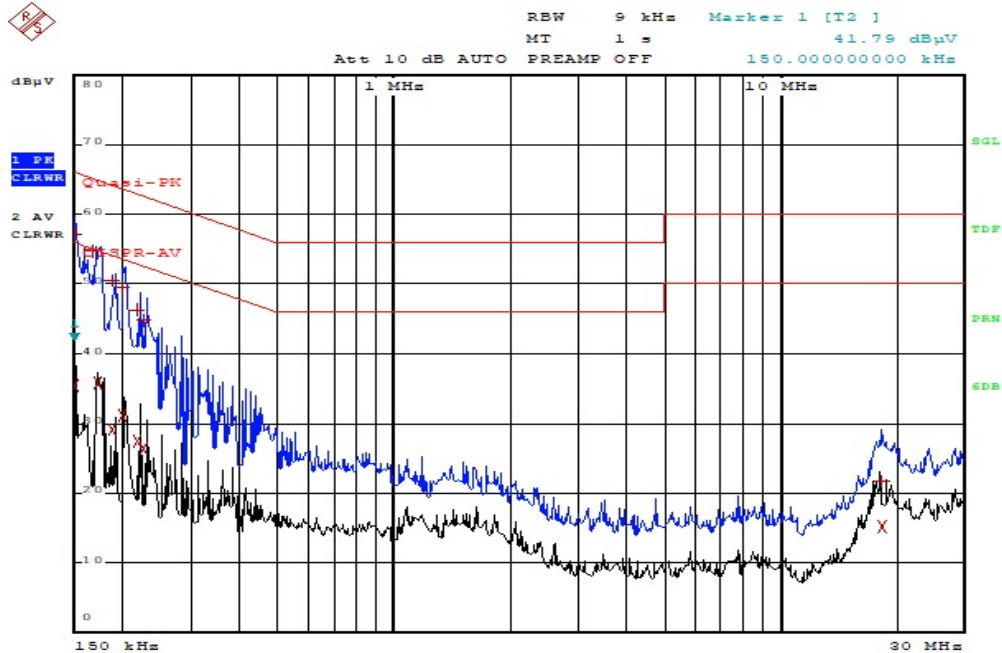


Comment: ESTR-21-00231

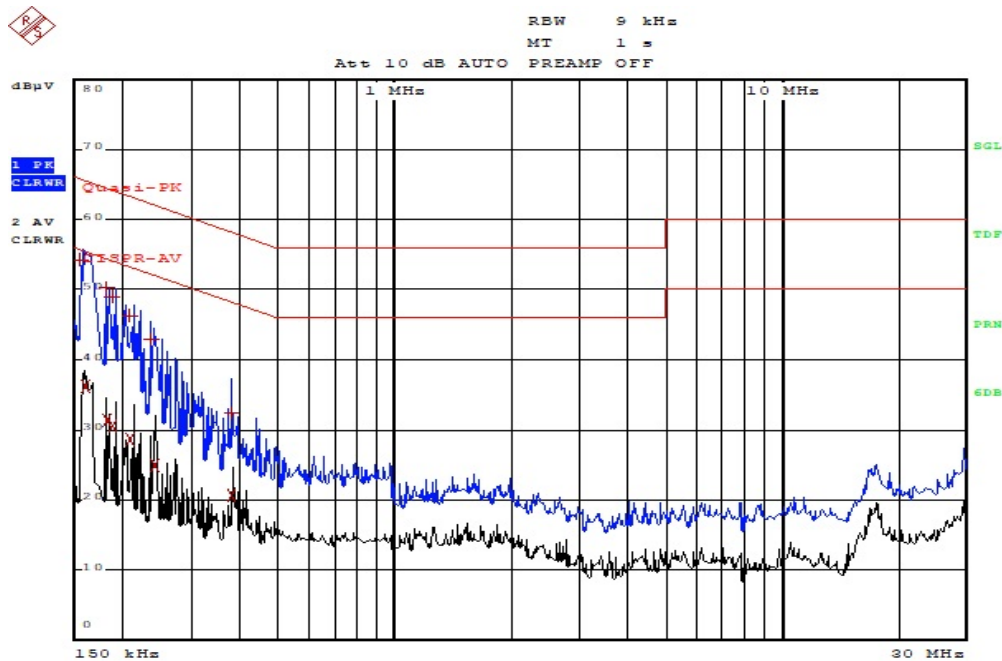
Appendix 1. Special diagram (802.11 n20)

*CONDUCTED EMISSION-N/A

* HOT LINE



Comment: ESTR-21-00231



Comment: ESTR-21-00231

Appendix 2. Antenna information

1. Antenna information

antenna type : Dielectric Chip Antenna.

antenna location : Integral

antenna gain : 3.183 dBi

No temporary RF connector provided