



AA Electro Magnetic Test Laboratory Private Limited

Report No.: AAEMT/EMC/201119-01-02
ULR No.: TC85972000000413F



Radio Test Report-2.4G WIFI

Report Reference No. AAEMT/EMC/201119-01-02

Applicant's name..... Netradyne Inc.

Address 9191 Towne Centre Drive, Suite 200, San Diego, CA 92122

Manufacture's Name Netradyne Inc.

Address 9191 Towne Centre Drive, Suite 200, San Diego, CA 92122

Test item description:

Product name Driveri

Trademark Netradyne

Model and/or type reference D-210

Series Models..... D-210A, D-211

Standards ETSI EN 300 328 V2.2.2 (2019-07)

Testing Laboratory information:

Testing Laboratory Name AA Electro Magnetic Test Laboratory Private Limited

Address Plot No 174, Udyog Vihar-Phase4, Sector18, Gurgaon, Haryana, India

This device has been tested and found to comply with the stated standard(s), which is (are) required by the council directive of 2014/53/RED and indicated in the test report and are applicable only to the tested sample identified in the report.

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Testing..... :

Date of receipt of test item Nov. 19, 2020

Date (s) of performance of tests Nov. 19~ Dec. 07, 2020

Date of Issue Dec. 29, 2020

Test Result Pass

Declaration of Conformity: Declaration of conformity of the results is based as per the standard limits

Compiled by (+ signature) Abhinav Kumar: *Abhinav Kumar*

Authorized & Reviewed by (+ signature) Dr. Lenin Raja: *Dr. Lenin Raja*

Issued by (+ signature) Bittu Kumar: *Bittu Kumar*



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2 Test Summary

2.1 Compliance with ETSI EN 300 328 V2.2.2 (2019-07)

No.	Description of Test Item	Basic Standard	Results
Transmitter Parameters			
1	RF Output Power	EN 300 328 clause 4.3.2.2	Pass
2	Power Spectral Density	EN 300 328 clause 4.3.2.3	Pass
3	Duty cycle, Tx-Sequence, Tx-gap	EN 300 328 clause 4.3.2.4	N/A
4	Medium Utilization (MU) factor	EN 300 328 clause 4.3.2.5	N/A
5	Adaptivity	EN 300 328 clause 4.3.2.6	Pass
6	Occupied Channel Bandwidth	EN 300 328 clause 4.3.2.7	Pass
7	Transmitter unwanted emission in the OOB domain	EN 300 328 clause 4.3.2.8	Pass
8	Transmitter unwanted emissions in the spurious domain	EN 300 328 clause 4.3.2.9	Pass
9	Geo-location capability	EN 300 328 Clause 4.3.2.12	N/A
Receiver Parameters			
10	Receiver spurious emissions	EN 300 328 clause 4.3.2.10	Pass
11	Receiver Blocking	EN 300 328 clause 4.3.2.11	Pass



3 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

ILAC / NABL Accreditation No.: TC-8597

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by National Accreditation Board for Testing and Calibration Laboratories (NABL).

ILAC –A2LA Accreditation No.: 5593.01

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered American Association of Laboratory Accreditation (A2LA.)

FCC- Recognition No.: 137777

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by Federal Communications Commission (FCC).

ISED Recognition No.: 26046

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by Institute for Social and Economic Development.(ISED)

VCCI- Registration No: 4053

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by Voluntary Control Council for Interference.(VCCI)

TEC Designation No.: IND063

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by Telecommunication Engineering (TEC) Center.

BIS Recognition No: 816586

BIS recognized as per CRS scheme for IT electronics, LED control gears, Lamp, Inverter / UPS are recognized as per LRS 2020.

3.1 Deviation from Standard

None



3.2 Abnormalities from Standard Conditions

None

4 General Information

4.1 General Description of EUT

Manufacturer:	Netradyne Inc.
Manufacturer Address:	9191 Towne Centre Drive, Suite 200, San Diego, CA 92122
EUT Name:	Driveri
Model No:	D-210
Series Models:	D-210A, D-211
Brand Name:	Netradyne
Operation Frequency:	2412-2472MHz for 802.11b/g/n-20BW 2422-2462MHz for 802.11n-40BW
Modulation Type:	802.11b: CCK/QPSK/BPSK 802.11g/n: BPSK/QPSK/16QAM/64QAM
Adaptive/non-adaptive:	Adaptive equipment
Antenna Gain:	3 dBi
H/W No.:	501-1-00908_B1
F/W No.:	2.4.9.rc.2
Product Ratings:	Input : 12VDC, 3A
Battery	N /A
Note:	
1.	For a more detailed features description, please refer to the manufacturer's Specifications or the User's Manual.



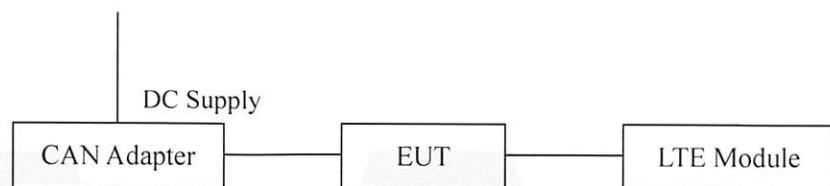
Description of Channel:					
802.11b/g/n(20MHz)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	06	2437	11	2462
02	2417	07	2442	12	2467
03	2422	08	2447	13	2472
04	2427	09	2452		
05	2432	10	2457		
802.11n(40MHz)					
03	2422	06	2437	09	2452
04	2427	07	2442	10	2457
05	2432	08	2447	11	2462



4.2 Description of Test setup

EUT was tested in normal configuration (Please See following Block diagrams)

1. Block diagram of EUT configuration (TX Mode)



4.3 EUT Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	Power cord	Signal cable
1	DC Power Supply	JUNKE	JK15040K	20181126-43	2m Unshielded Cable	N/A

4.4 TEST Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	Signal cable
1	DriverI/DCM LTE Module	Netradyne Inc.	N/A	DriverI/DCM	N/A	N/A	N/A
2	CAN Adaptor Board	Netradyne Inc.	N/A	A1 version : D-210-AD1 A2 version : D-210-AD2 A3 version : D-210-AD3	N/A	N/A	N/A



4.5 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal.Due Date
1	EMI TEST Receiver	Rohde and Schwarz	ESIB26	838786/010	2020/01/28	2021/01/27
2	Loop antenna	DAZE Beijing	ZN30900C	18052	2020/01/29	2021/01/28
3	Hi power horn antenna	DAZE Beijing	ZN30700	18012	2020/01/30	2021/01/29
4	Horn antenna	DAZE Beijing	ZN30702	18006	2020/01/30	2021/01/29
5	Horn antenna	DAZE Beijing	ZN30703	18005	2020/01/30	2021/01/29
6	Pre amplifier	KELIANDA	LNA-0009295	-	2020/01/28	2021/01/29
7	Pre amplifier	KELIANDA	CF-00218	-	2020/01/28	2021/01/27
8	Biconical Antenna	DAZE Beijing	ZN30505C	17038	2020/01/28	2021/01/29
9	EMI-RECEIVER	Schwarzbeck	FCKL	1528194	2020/01/28	2021/01/27
10	Spectrum Analyzer	ADVANTEST	R3361	-	2020/05/15	2021/05/14
11	LISN	Kyoritsu	KNW-407	8-1789-5	2020/01/28	2021/01/27
12	Network-LISN	SCHWAR ZBECK	NNBM8125	81251314	2020/01/28	2021/01/27
13	Network-LISN	SCHWAR ZBECK	NNBM8125	81251315	2020/01/28	2021/01/27
14	PULSELIMITER	Rohde and Schwarz	ESH3-Z2	100681	2020/05/13	2021/05/12
15	50ΩCoaxialSwitch	DAIWA	1565157	-	2020/05/13	2021/05/12
16	50ΩCoaxialSwitch	-	-	-	2020/05/13	2021/05/12
17	Wireless signal power	DARE!!	RPR3006W	RFSW190220	2020/01/29	2021/01/27
18	Signal Generator	KEYSIGHT	N5181A	512071	2020/01/29	2021/01/28



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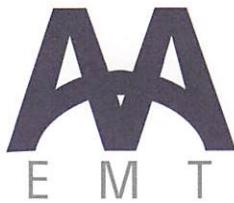
Report No.: AAEMT/EMC/201119-01-02
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TC-8597

19	RF Vector Signal Generator	Keysight	N5182B	512094	2020/01/29	2021/01/28
20	Spectrum analyzer	R&S	FSV-40N	101385	2020/01/29	2021/01/28
21	Radio Communication Tester	R&S	CMW 500	124589	2020/05/15	2021/05/14
22	Signal Generator	R&S	SMP02	837017/004 836593/005	2020/05/15	2021/05/14
23	DC Power Supply	Guanker	JK15040K	TNC/ET/C/0 01/15	2020/02/02	2021/02/01
24	Pro.Temp&Humi. chamber	MENTEK	MHP-150-1C	MAA081125 01	2020/02/02	2021/02/01
25	Attenuators	AGILENT	8494B	-	-	-
26	Attenuators	AGILENT	8495B	-	-	-





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4.6 Test conditions

4.6.1 Normal conditions

Ambient:	Temperature:	+15°C to +35°C
	Relative humidity:	20% to 75%
	Press:	1010 mbar
Power supply:	DC	12V

4.6.2 Extreme conditions

Ambient:	Temperature:	-20 °C to +40 °C (Which declared by manufacture)
Power supply:	DC	10.8Vto13.2V

4.7 Measurement Uncertainty

No.	Item	Uncertainty
1	Conducted Emission Test	2.78dB
2	Radiated Emission Test	2.82dB
3	RF power, conducted	2.62dB
4	RF power density, conducted	2.72dB
5	Spurious emissions, conducted	2.83dB
6	All emissions, radiated(<1G)	2.80dB
7	All emissions, radiated(>1G)	2.81dB



5 Transmitter Requirements

5.1 RF Output Power

5.1.1 Limit(ETSI EN 300 328, V2.2.2/2019-07 Clause 4.3.1.2.3)

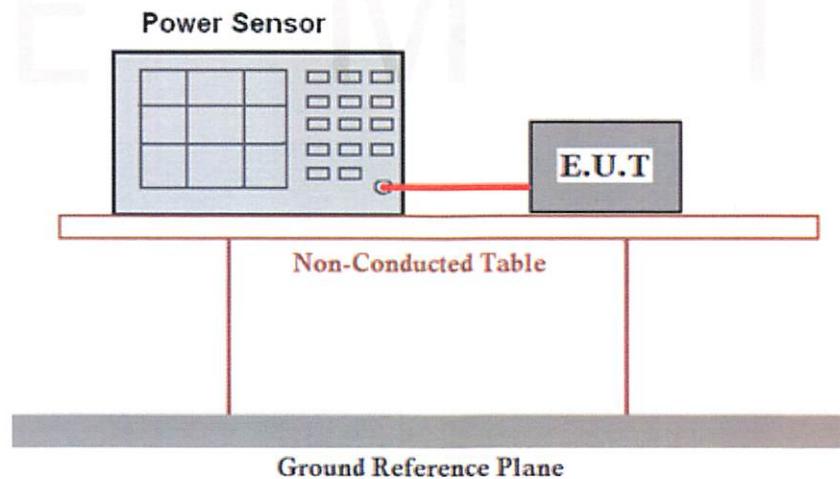
RF OUTPUT POWER	
Condition	Limit
<input type="checkbox"/> Non-adaptive wide band modulations systems	Equal to or less than the value declared by the supplier. This declared value shall be equal to or less than 20 dBm.
<input checked="" type="checkbox"/> Adaptive wide band modulations systems	$\leq 20\text{dBm}$

5.1.2 Test procedure

1. Refer to chapter 5.4.2.2 of ETSI EN 300 328 V2.2.2 (2019-07)
- 2.

Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input type="checkbox"/> Radiated measurement

5.1.3 Test Setup



5.1.4 Test result

802.11b

TEST CONDITIONS				Total e.i.r.p(dBm)			
T nom(°C)	25.00	V nom (V)	12.0	CH01	CH07	CH13	
T min (°C)	-20.00	V max(V)	13.2	16.26	16.19	16.52	
		V min(V)	10.8	16.39	16.33	16.62	
T max (°C)	40.00	V max(V)	13.2	15.99	16.41	16.57	
		V min(V)	10.8	15.84	16.47	16.49	
Max e.i.r.p Power				16.66			
Limits				20 dBm			
Result				Complies			

Note: 1.Power measurement actual measurement for 25 Burst power.

802.11g

TEST CONDITIONS				Total e.i.r.p(dBm)			
T nom(°C)	25.00	V nom (V)	12.0	CH01	CH07	CH13	
T min (°C)	-20.00	V max(V)	13.2	16.81	16.45	16.79	
		V min(V)	10.8	16.59	16.50	16.83	
T max (°C)	40.00	V max(V)	13.2	16.37	16.37	16.75	
		V min(V)	10.8	16.67	16.72	16.66	
Max e.i.r.p Power				16.90			
Limits				20 dBm			
Result				Complies			

Note: 1.Power measurement actual measurement for 25 Burst power.



802.11n20

TEST CONDITIONS				Total e.i.r.p(dBm)			
				CH01	CH07	CH13	
T nom(°C)	25.00	V nom (V)	12.0	17.15	16.76	16.85	
T min (°C)	-20.00	V max(V)	13.2	17.05	16.59	16.77	
		V min(V)	10.8	16.92	16.55	16.53	
T max (°C)	40.00	V max(V)	13.2	16.88	16.69	16.82	
		V min(V)	10.8	17.11	16.47	16.60	
Max e.i.r.p Power				17.15			
Limits				20 dBm			
Result				Complies			

Note: 1.Power measurement actual measurement for 25 Burst power.

802.11n40

TEST CONDITIONS				Total e.i.r.p(dBm)			
				CH03	CH07	CH11	
T nom(°C)	25.00	V nom (V)	12.0	17.99	17.52	18.02	
T min (°C)	-20.00	V max(V)	13.2	17.91	17.44	17.86	
		V min(V)	10.8	17.88	17.39	17.78	
T max (°C)	40.00	V max(V)	13.2	17.89	17.05	17.59	
		V min(V)	10.8	17.73	17.28	17.99	
Max e.i.r.p Power				18.02			
Limits				20 dBm			
Result				Complies			

Note: 1.Power measurement actual measurement for 25 Burst power.



5.2 Power Spectral Density

5.2.1 Limit(ETSI EN 300 328, V2.2.2/2019-07 Clause 4.3.2.3.3)

RF OUTPUT POWER	
Condition	Limit
For equipment using wide band modulations other than FHSS	$\leq 10 \text{ dBm/MHz}$

5.2.2 Test procedure

Refer to chapter 5.4.3.2 of ETSI EN 300 328 V2.2.2 (2019-07)

Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input type="checkbox"/> Radiated measurement

The setting of the Spectrum Analyzer

Start Frequency	2400MHz
Stop Frequency	2483.5MHz
Detector	RMS
Sweep Point	> 8 350; for spectrum analyzers not supporting this number of sweep points, the frequency band may be segmented
Sweep time	For non-continuous transmissions: $2 \times \text{Channel Occupancy Time} \times \text{number of sweep points}$ For continuous transmissions: 10 s; the sweep time may be increased further until a value where the sweep time has no further impact anymore on the RMS value of the signal.
RBW / VBW	10KHz / 30KHz

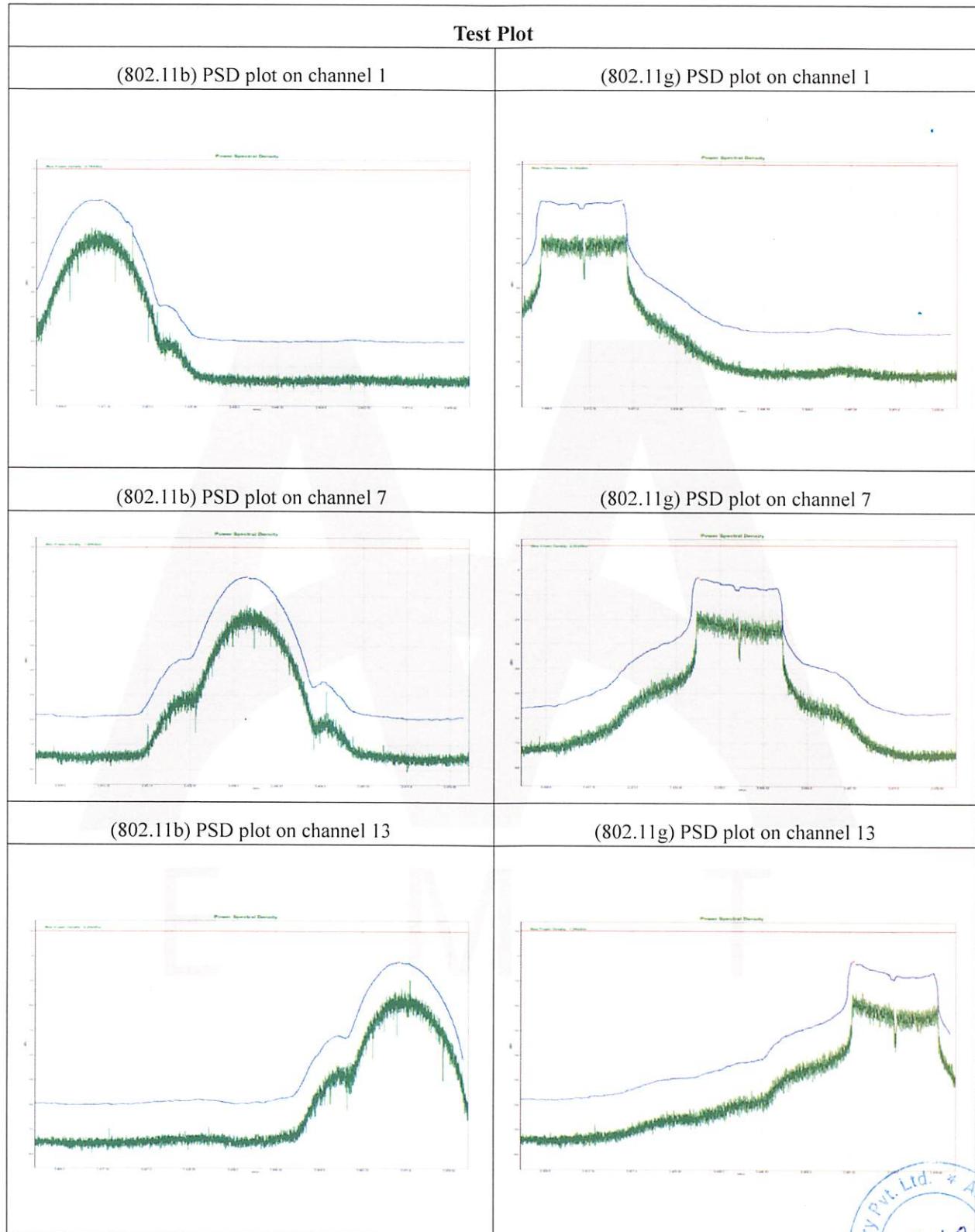
5.2.3 Test Setup

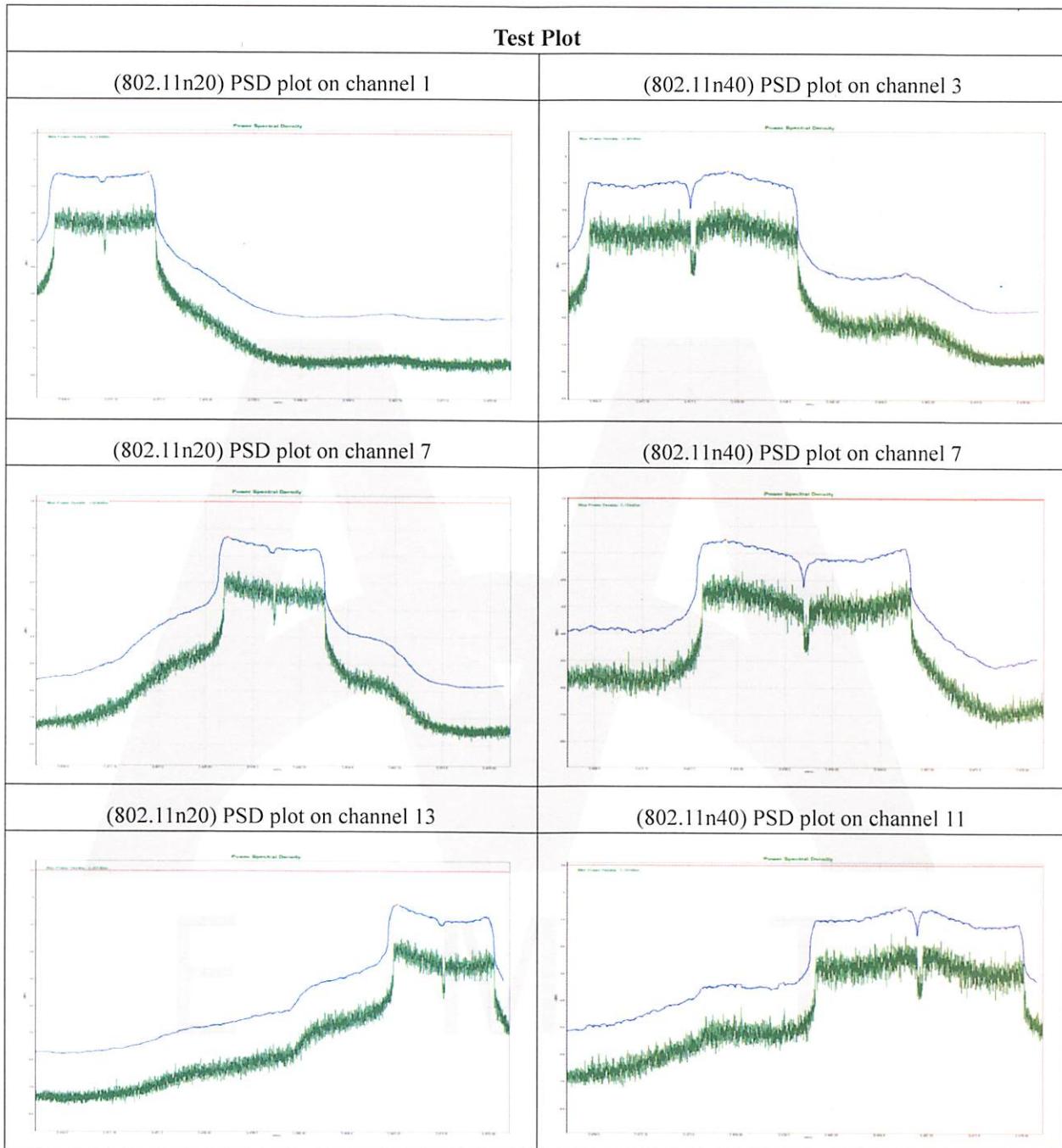


5.2.4 Test result

Mode	Channel Frequency (MHz)	Power Density (dBm/MHz)	Limit (dBm/1 MHz) (E.I.R.P)	PASS/FAIL
802.11b	2412	-2.720	10	PASS
	2442	-1.890	10	PASS
	2472	-2.206	10	PASS
802.11g	2412	-4.509	10	PASS
	2442	-2.923	10	PASS
	2472	-1.942	10	PASS
802.11n(HT20)	2412	-4.533	10	PASS
	2442	-3.032	10	PASS
	2472	-2.267	10	PASS
802.11n(HT40)	2422	-5.597	10	PASS
	2442	-5.158	10	PASS
	2462	-5.347	10	PASS







5.3 Occupied Channel Bandwidth

5.3.1 Limit (ETSI EN 300 328, V2.2.2/2019-07 Clause 4.3.2.7.3)

OCCUPIED CHANNEL BANDWIDTH		
	Condition	Limit
All types of equipment		Shall fall completely within the band 2400 to 2483.5 MHz
Additional requirement	For non-adaptive using wide band modulations other than FHSS system and E.I.R.P >10 dBm	Less than 20 MHz
	For non-adaptive frequency hopping system and E.I.R.P >10 dBm	Less than 5 MHz

5.3.2 Test procedure

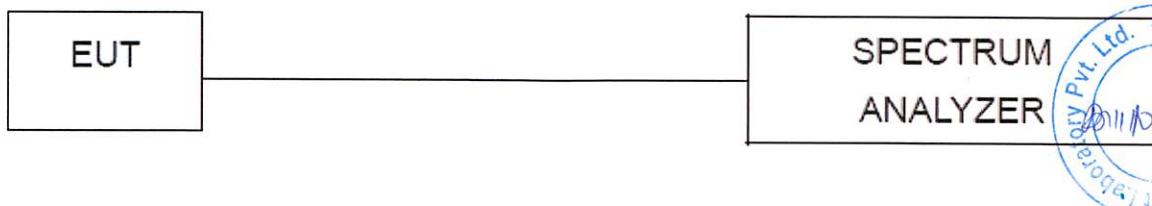
Refer to chapter 5.4.7.2 of ETSI EN 300 328 V2.2.2 (2019-07)

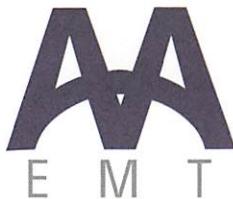
Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input type="checkbox"/> Radiated measurement

The setting of the Spectrum Analyzer

Center Frequency	The centre frequency of the channel under test
Frequency Span	2 × Nominal Channel Bandwidth
Detector	RMS
RBW	~ 1 % of the span without going below 1 %
VBW	3 × RBW
Trace	Max hold
Sweep time	1s

5.3.3 Test Setup





AA Electro Magnetic Test Laboratory Private Limited

Report No.: AAEMT/EMC/201119-01-02
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5.3.4 Test result

CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	FL/FH (MHz)	Limit	PASS /FAIL
802.11b					
01	2412	14.124	2404.938	FL>2400MHz, FH<2483.5 MHz	PASS
13	2472	14.993	2479.496		PASS
802.11g					
01	2412	16.845	2403.577	FL>2400MHz , FH<2483.5 MHz	PASS
13	2472	18.350	2481.175		PASS
802.11n20					
01	2412	18.003	2402.999	FL>2400MHz, FH<2483.5 MHz	PASS
13	2472	19.161	2481.580		PASS
802.11n40					
03	2422	36.208	2403.896	FL>2400MHz, FH<2483.5 MHz	PASS
11	2462	36.382	2480.191		PASS







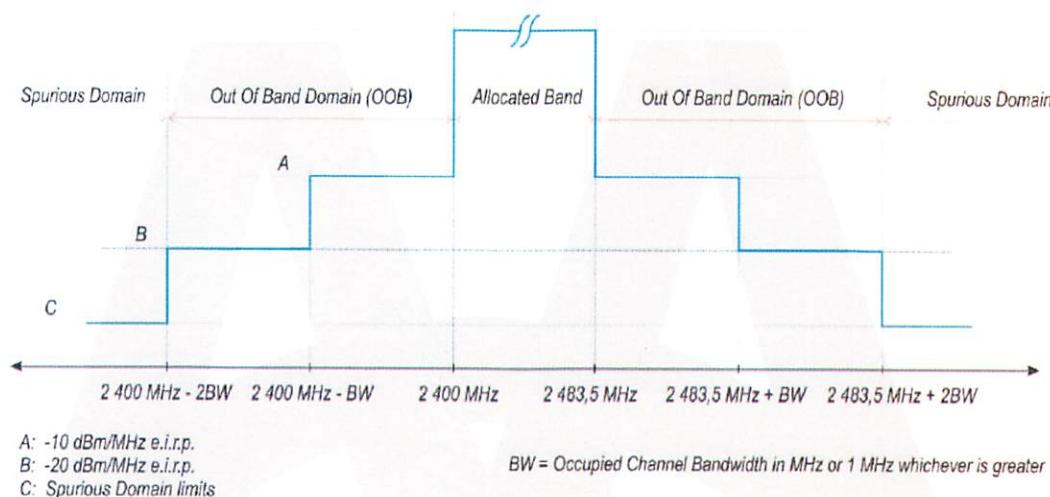




5.4 Transmitter unwanted emissions in the OOB domain

5.4.1 Limit(ETSI EN 300 328, V2.2.2/2019-07 Clause 4.3.2.8.3)

Transmitter unwanted emissions in the OOB domain	
Condition	Limit
Under all test conditions	The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in below figure.



5.4.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.8.2

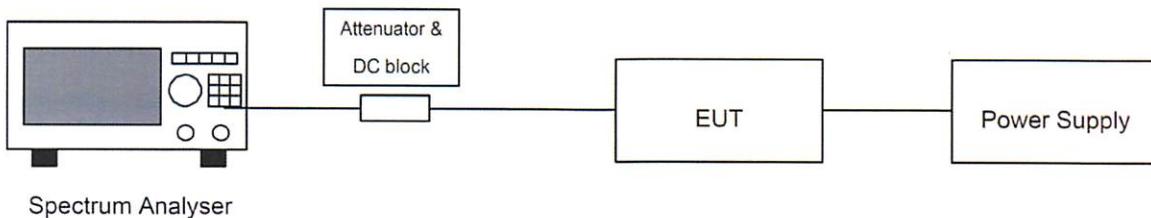
Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input type="checkbox"/> Radiated measurement

The setting of the Spectrum Analyzer

Span	0Hz
Filter Mode	Channel Filter
Trace Mode	Max Hold
Trigger Mode	Video trigger; in case video triggering is not possible, an external trigger source may be used
Detector	RMS
Sweep Point / Sweep Mode	Sweep Time [s] / (1 µs) or 5 000 whichever is greater/ Continuous
RBW / VBW	1MHz / 3MHz



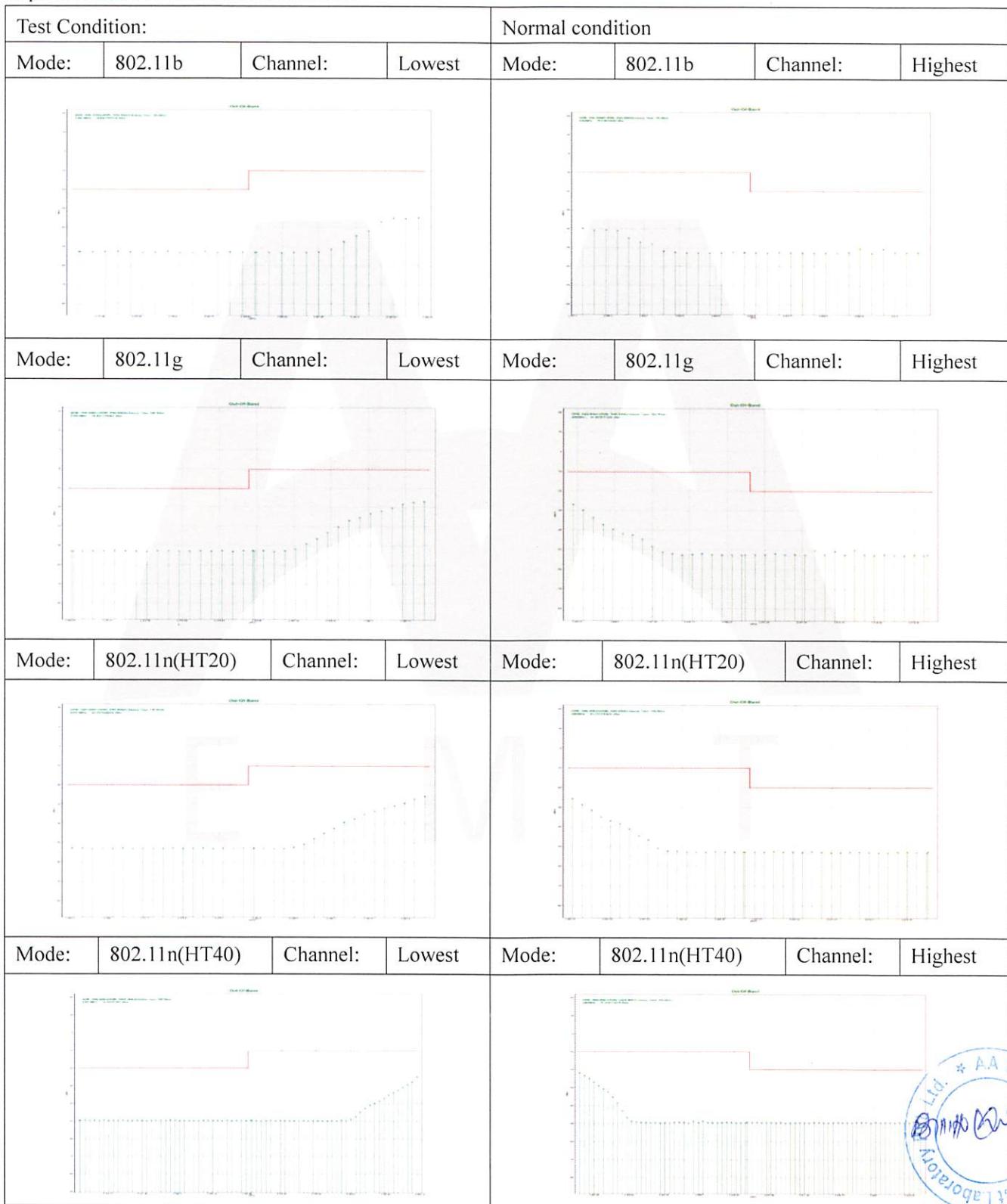
5.4.3 Test Setup



5.4.4 Test result

Measurement Data:

Test plots at normal condition are followed:



5.5 Adaptivity (Channel access mechanism)

5.5.1 Limit(ETSI EN 300 328, V2.2.2/2019-07 Clause 4.3.2.6)

Requirement	Operational Mode			
	<input type="checkbox"/> LBT based Detect and Avoid			
	<input type="checkbox"/> Non-LBT based Detect and Avoid	<input type="checkbox"/> Frame Based Equipment	<input type="checkbox"/> Load Based Equipment (CCA using 'energy detect')	<input type="checkbox"/> Load Based Equipment (CCA not using any of the mechanisms referenced as note 2)
Minimum Clear Channel Assessment (CCA) Time	NA	not less than 18 us (see note 1)	(see note 2)	not less than 18 us (see note 1)
Maximum Channel Occupancy (COT) Time	<40 ms	1ms to 10 ms	(see note 2)	(13/32)*q ms (see note 3)
Minimum Idle Period	5 % minimum of 100 µs	5% of COT	(see note 2)	NA
Extended CCA check	NA	NA	(see note 2)	R*CCA (see note 4)
Short Control Signalling Transmissions	Maximum duty cycle of 10% within an observation period of 50 ms (see note 5)			

Note 1: The CCA time used by the equipment shall be declared by the supplier.

Note 2: Load Based Equipment may implement an LBT based spectrum sharing mechanism based on the Clear Channel Assessment (CCA) mode using energy detect as described in IEEE 802.11™-2012 [i.3], clause 9, clause 10, clause 16, clause 17, clause 19 and clause 20, or in IEEE 802.15.4™-2011 [i.4], clause 4, clause 5 and clause 8 providing the equipment complies with the conformance requirements referred to in clause 4.3.2.6.3.4.

Note 3: q is selected by the manufacturer in the range [4...32]

Note 4: The value of R shall be randomly selected in the range [1...q]

Note 5: Adaptive equipment may or may not have Short Control Signaling Transmissions.

The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive)antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels less than 20 dBm e.i.r.p., the detection threshold level may be relaxed to:

$$TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / Pout) \quad (\text{Pout in mW e.i.r.p.})$$



Table 9: Unwanted Signal parameters

Wanted signal mean power from companion device (dBm)	Unwanted signal frequency (MHz)	Unwanted CW signal power (dBm)
-30/ sufficient to maintain the link(see note 2)	2395 or 2488,5 (see note 1)	-35 (see note 2)

NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.

NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.

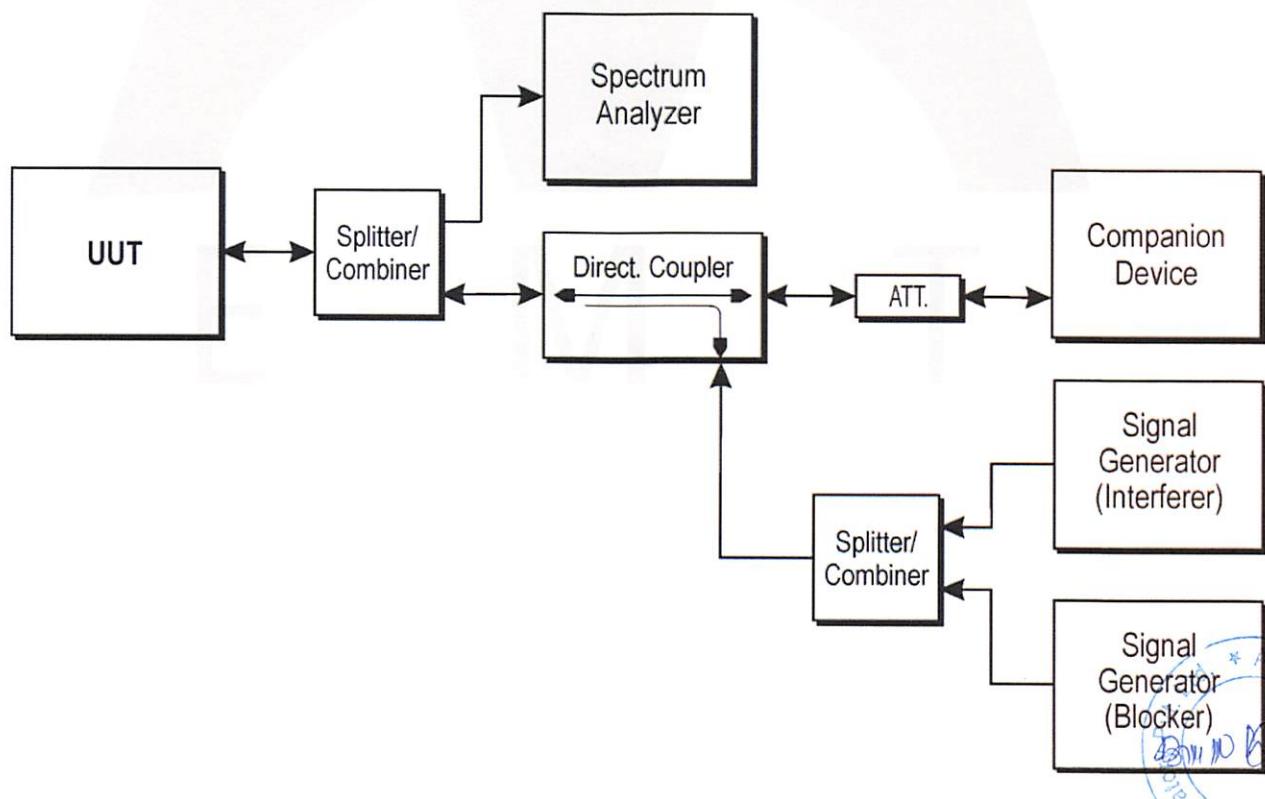
NOTE 3: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain.

5.5.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.6.2

Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input type="checkbox"/> Radiated measurement

5.5.3 TEST SETUP



5.5.4 List of Measurements

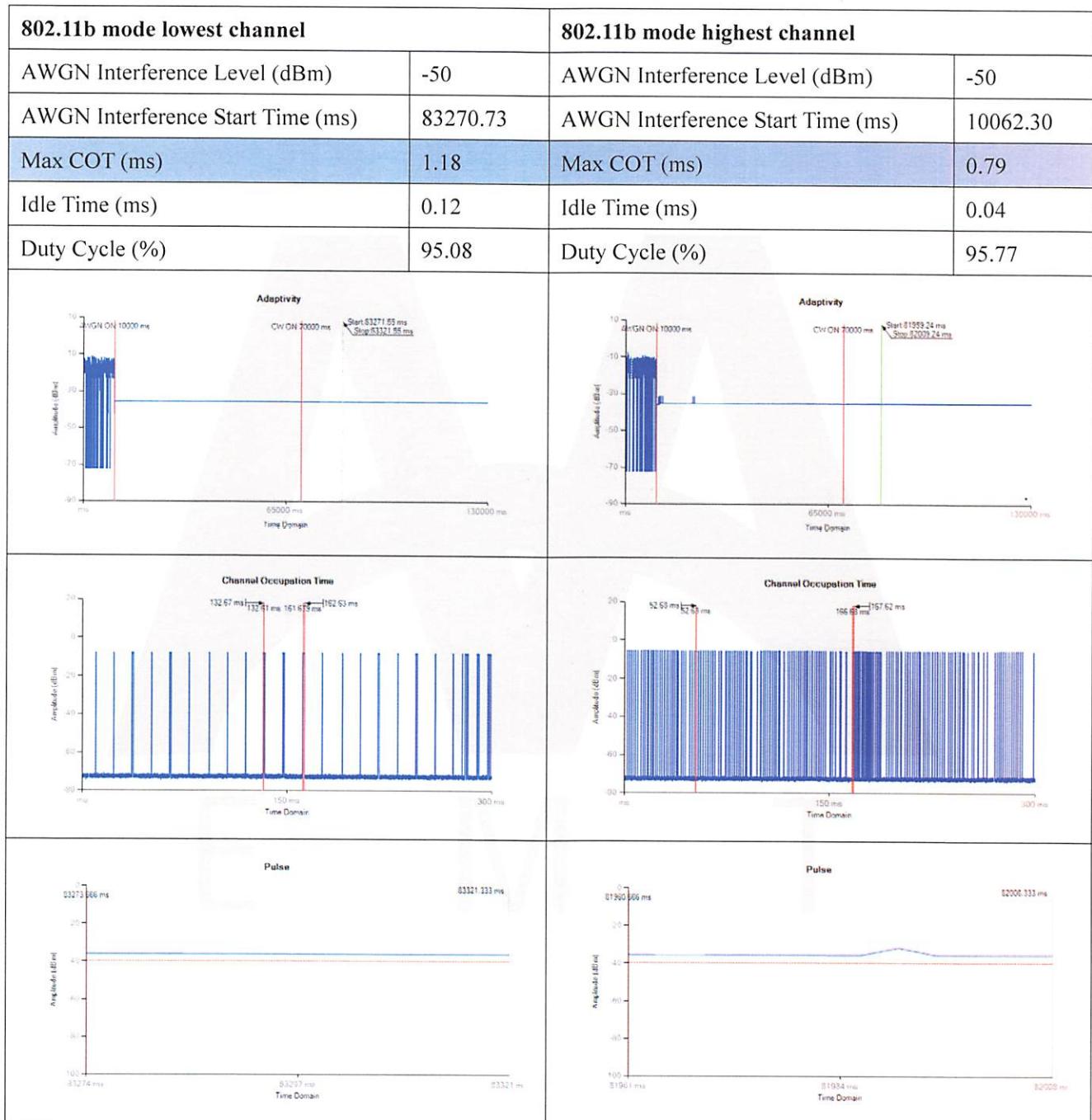
UUT operational Mode		
Frame Based Equipment	Load Based Equipment (CCA using 'energy detect')	Load Based Equipment (CCA not using any of the mechanisms referenced)
	V	

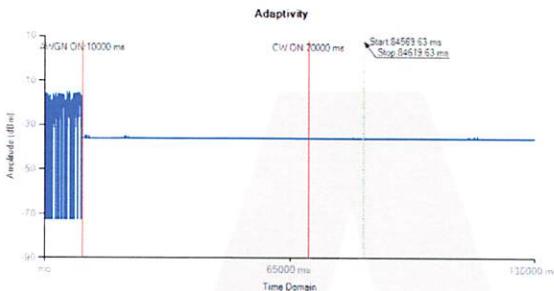
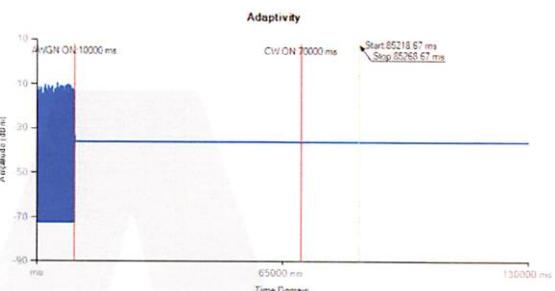
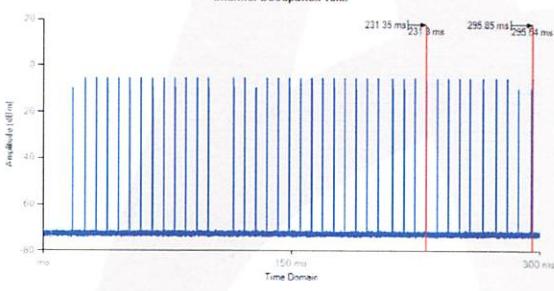
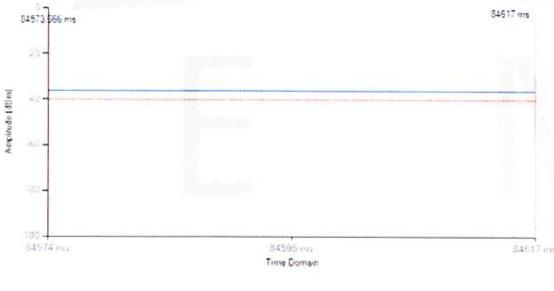
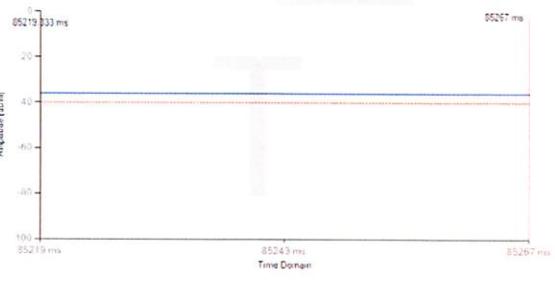
Clause	Test Parameter	Remarks	PASS/FAIL
4.3.2.5.2.2.1	Adaptive (Frame Based Equipment)	Not Applicable	N/A
4.3.2.5.2.2.2	Adaptive (Load Based Equipment)	Applicable	PASS
4.3.2.5.3	Short Control Signaling Transmissions	Applicable	PASS



5.5.5 Test result

Test plots are below:

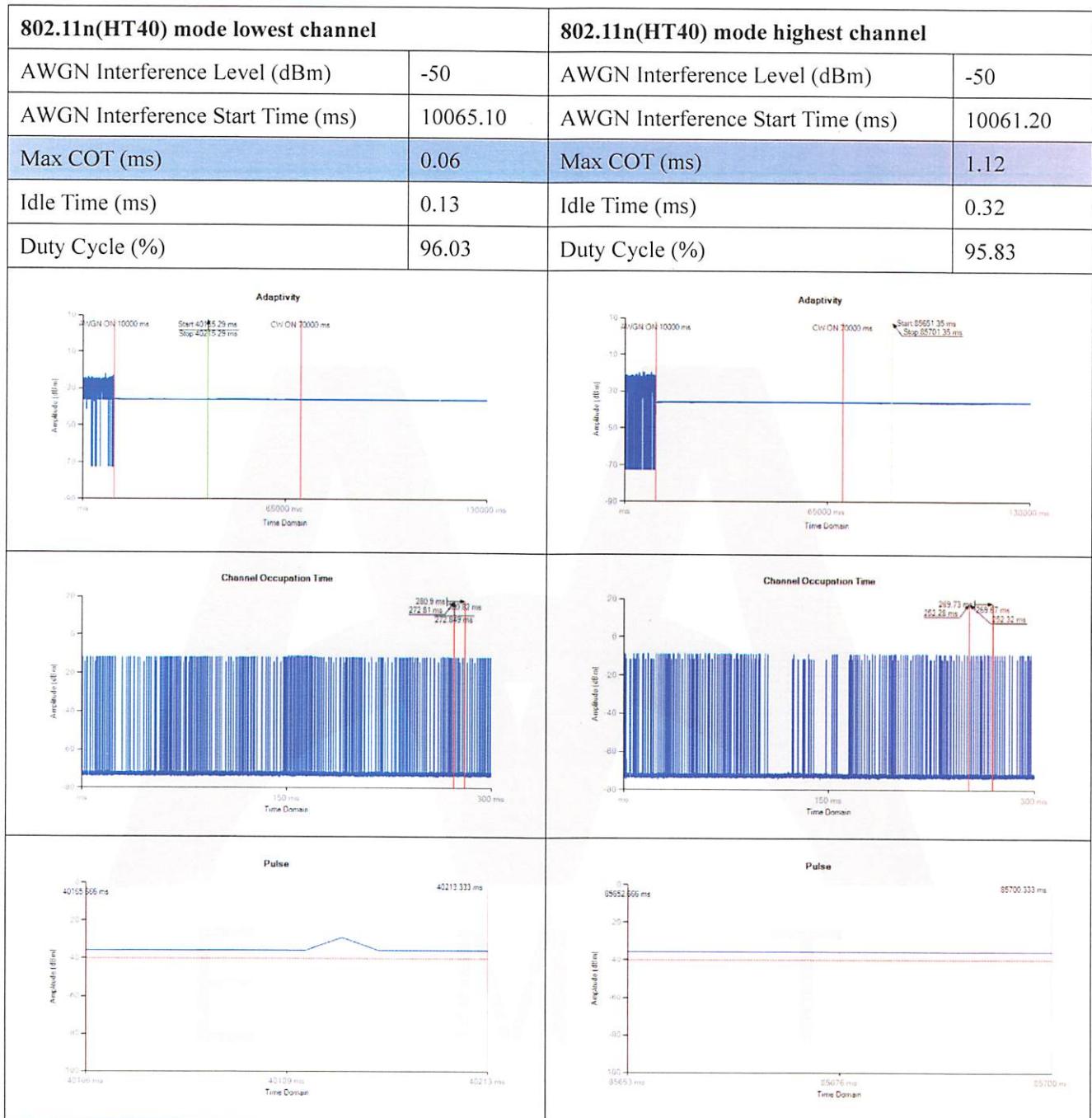


802.11g mode lowest channel		802.11g mode highest channel	
AWGN Interference Level (dBm)	-50	AWGN Interference Level (dBm)	-50
AWGN Interference Start Time (ms)	84570.16	AWGN Interference Start Time (ms)	85218.31
Max COT (ms)	0.26	Max COT (ms)	1.05
Idle Time (ms)	0.16	Idle Time (ms)	0.15
Duty Cycle (%)	90.93	Duty Cycle (%)	95.35
			
			
			



802.11n(HT20) mode lowest channel		802.11n(HT20) mode highest channel	
AWGN Interference Level (dBm)	-50	AWGN Interference Level (dBm)	-50
AWGN Interference Start Time (ms)	89978.75	AWGN Interference Start Time (ms)	74185.77
Max COT (ms)	0.73	Max COT (ms)	1.27
Idle Time (ms)	0.41	Idle Time (ms)	0.03
Duty Cycle (%)	92.54	Duty Cycle (%)	96.08





Note:

During the test, the signal observed on the channel being investigated is the Short Control Signalling Transmissions.



5.6 Transmitter unwanted emissions in the spurious domain

5.6.1 Limit(ETSI EN 300 328, V2.2.2/2019-07 Clause 4.3.2.9.3)

TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN		
Frequency Range	Maximum Power Limit (E.R.P.(≤1 GHz) E.I.R.P.(> 1 GHz))	Bandwidth
30 MHz to 47 MHz	-36dBm	100 kHz
47 MHz to 74 MHz	-54dBm	100 kHz
74 MHz to 87.5 MHz	-36dBm	100 kHz
87.5 MHz to 118 MHz	-54dBm	100 kHz
118 MHz to 174 MHz	-36dBm	100 kHz
174 MHz to 230 MHz	-54dBm	100 kHz
230 MHz to 470 MHz	-36dBm	100 kHz
470 MHz to 862 MHz	-54dBm	100 kHz
862 MHz to 1 GHz	-36dBm	100 kHz
1 GHz ~ 12.75 GHz	-30dBm	1 MHz

5.6.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.9

Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input checked="" type="checkbox"/> Radiated measurement

The setting of the Spectrum Analyzer

RBW	100K(<1GHz) / 1M(>1GHz)
VBW	300K(<1GHz) / 3M(>1GHz)



5.6.3 TEST SETUP

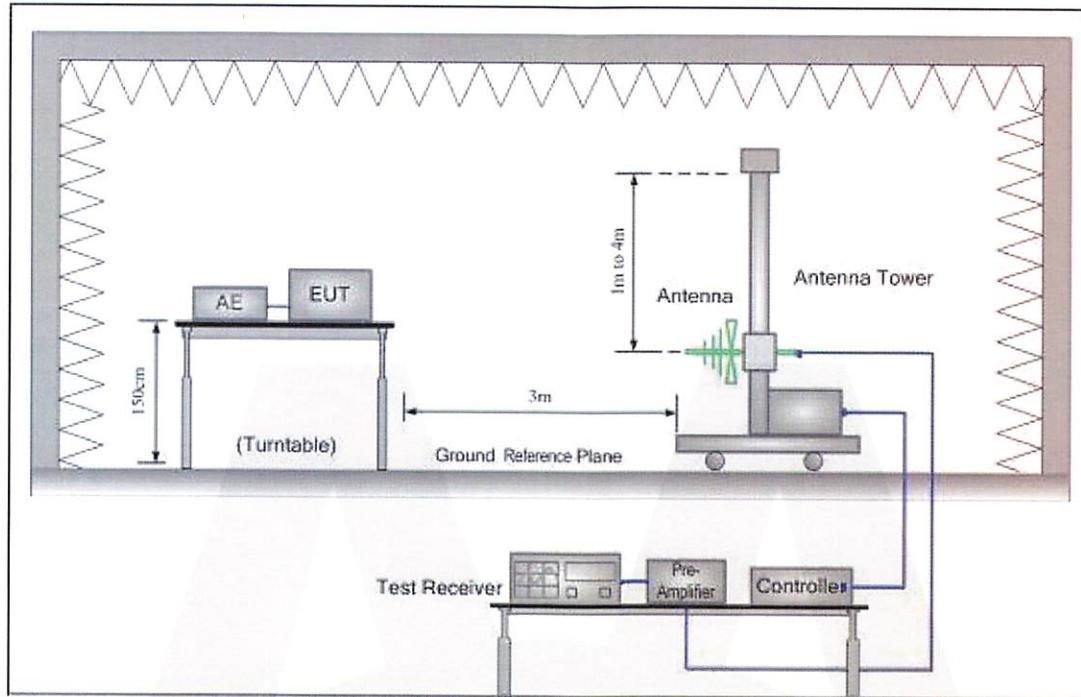


Figure 1. 30MHz to 1GHz

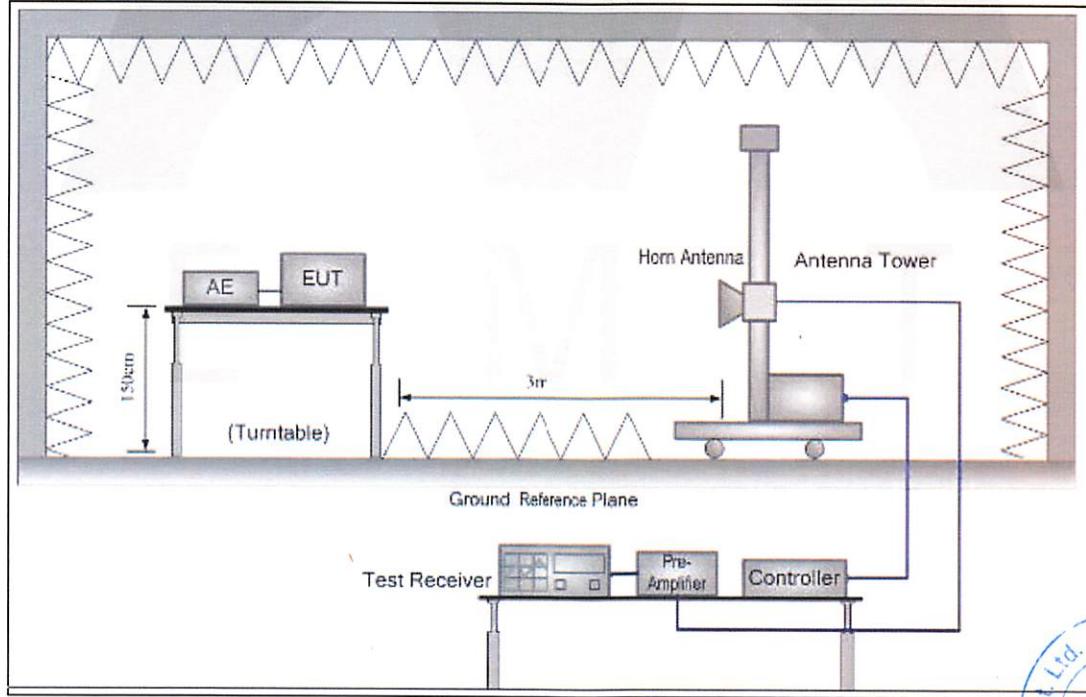


Figure 2. Above 1GHz



5.6.4 Radiated Test result

802.11b lowest (2412 MHz)

Below 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
64.69	Vertical	-62.84	-54	-8.84
236.71	Vertical	-69.10	-36	-33.10
400.38	Vertical	-66.59	-36	-30.59
117.61	Horizontal	-58.03	-54	-4.03
353.10	Horizontal	-63.12	-36	-27.12
456.23	Horizontal	-68.69	-36	-32.69

Above 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
4823.92	Vertical	-42.39	-30	-12.39
7236.24	Vertical	-42.71	-30	-12.71
9648.18	Vertical	-46.01	-30	-16.01
4943.34	Horizontal	-40.17	-30	-10.17
7416.19	Horizontal	-43.51	-30	-13.51
9888.59	Horizontal	-48.73	-30	-18.73





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ULR No.: TC859720000000413F



802.11b highest CH (2472 MHz)

below 1GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
110.53	Vertical	-57.58	-54	-3.58
394.97	Vertical	-63.20	-36	-27.20
514.17	Vertical	-63.72	-54	-9.72
93.06	Horizontal	-62.94	-54	-8.94
293.13	Horizontal	-65.26	-36	-29.26
638.33	Horizontal	-63.25	-54	-9.25

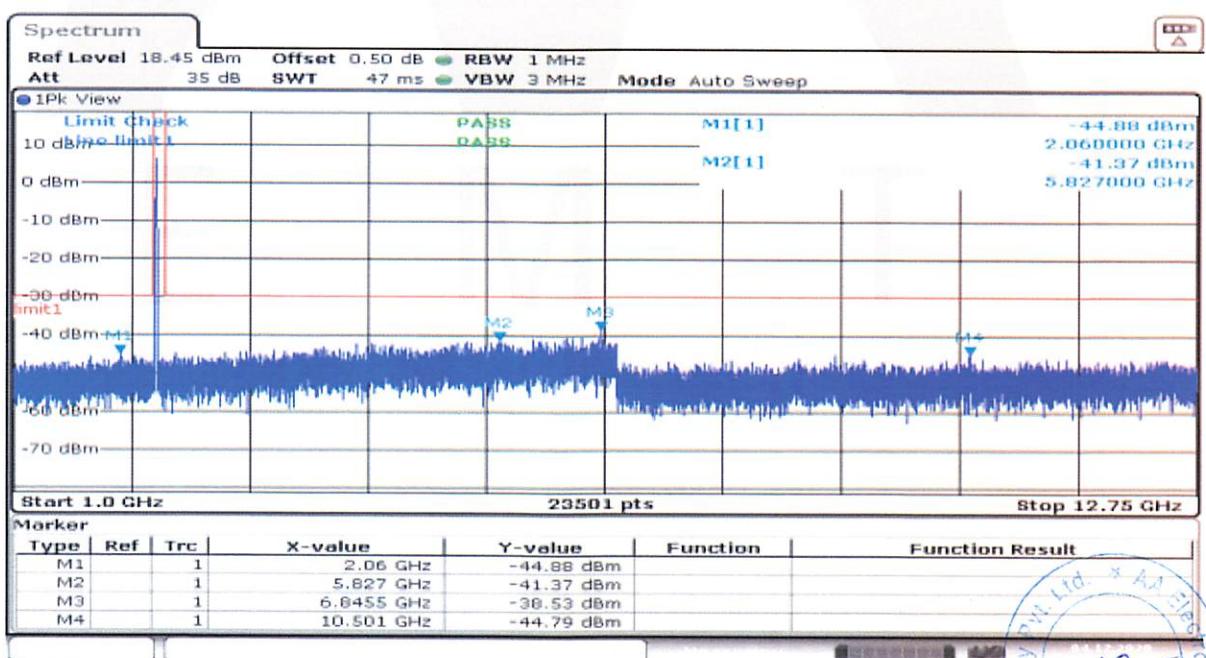
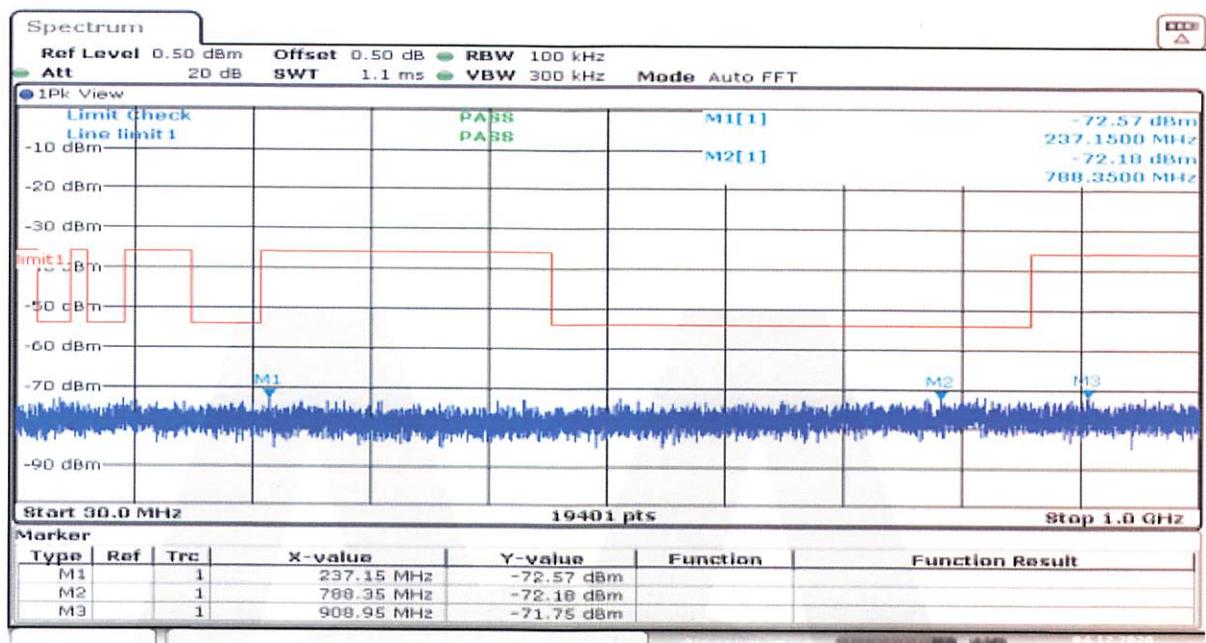
Above 1GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
4923.54	Vertical	-34.76	-30	-4.76
7385.92	Vertical	-41.56	-30	-11.56
9847.85	Vertical	-46.17	-30	-16.17
4923.88	Horizontal	-39.02	-30	-9.02
7386.42	Horizontal	-43.87	-30	-13.87
9848.71	Horizontal	-42.11	-30	-12.11

Note: All the modes had been tested, but only the worst data recorded in the report.

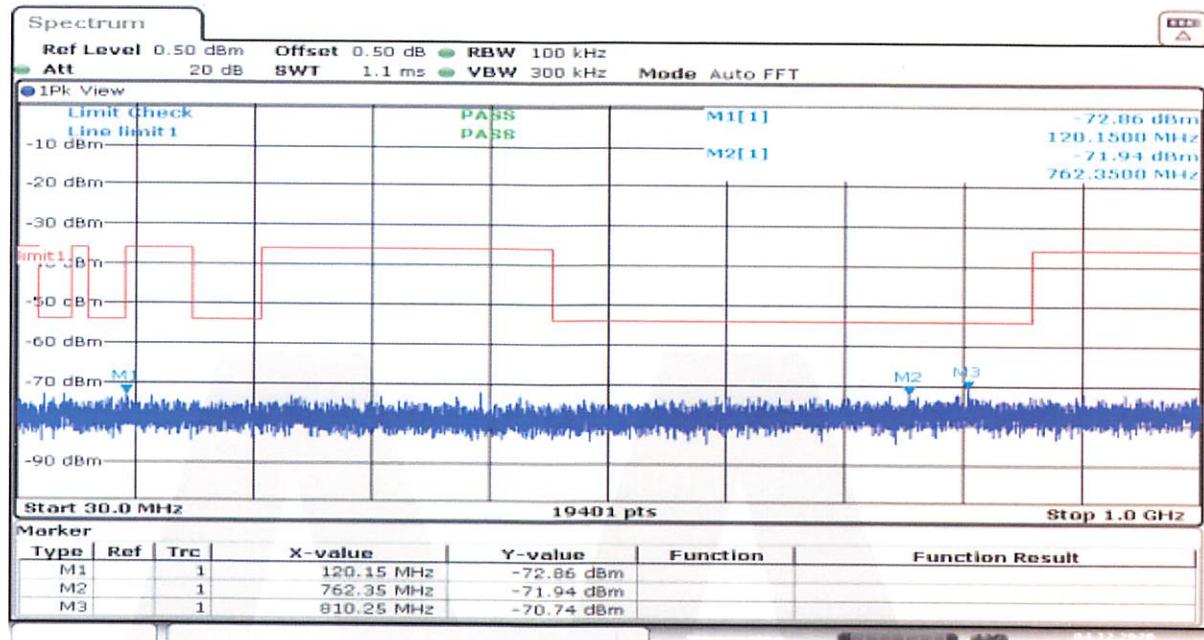


5.6.5 Conducted Test result

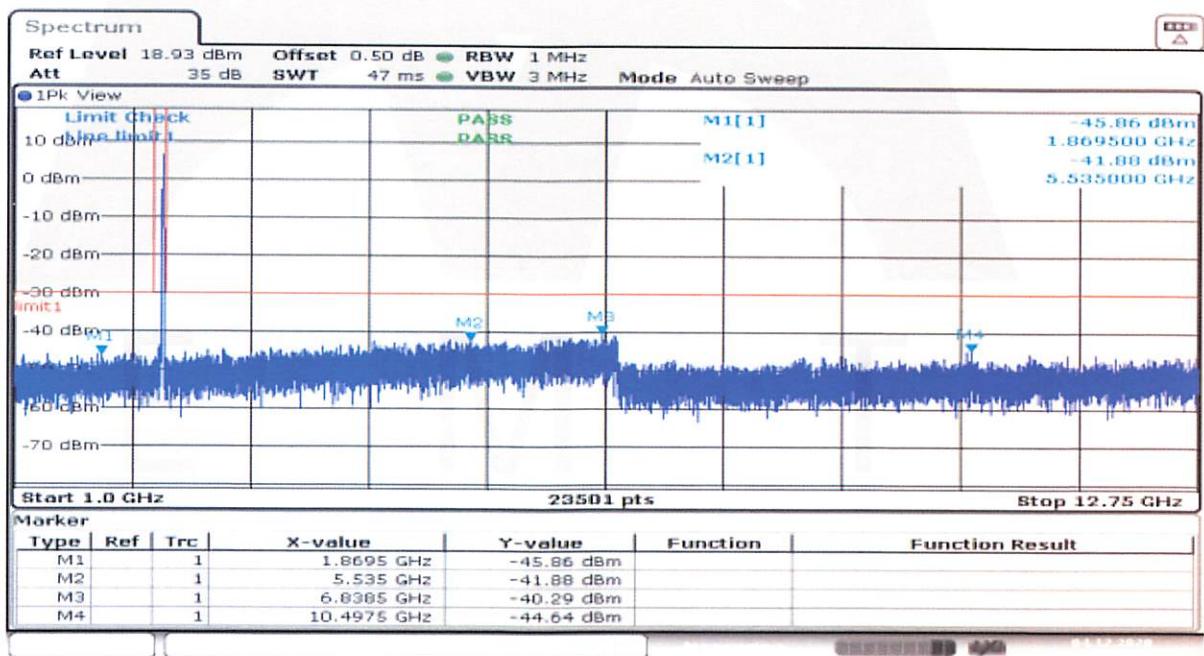
802.11b-Low CH



802.11b-High CH



Date: 4.DEC.2020 05:24:15



Date: 4.DEC.2020 05:24:45



5.7 Receiver spurious emissions

5.7.1 Limit(ETSI EN 300 328, V2.2.2/2019-07 Clause 4.3.2.10.3)

Spurious emission limits for receivers

Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 1 GHz	-57 dBm	100KHz
1 GHz to 12,75 GHz	-47 dBm	1MHz

5.7.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.10

Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input checked="" type="checkbox"/> Radiated measurement

The setting of the Spectrum Analyzer

RBW	100K(< 1 GHz) / 1M(> 1 GHz)
VBW	300K(< 1 GHz) / 3M(> 1 GHz)

5.7.3 Test Setup

Radiated measurement:

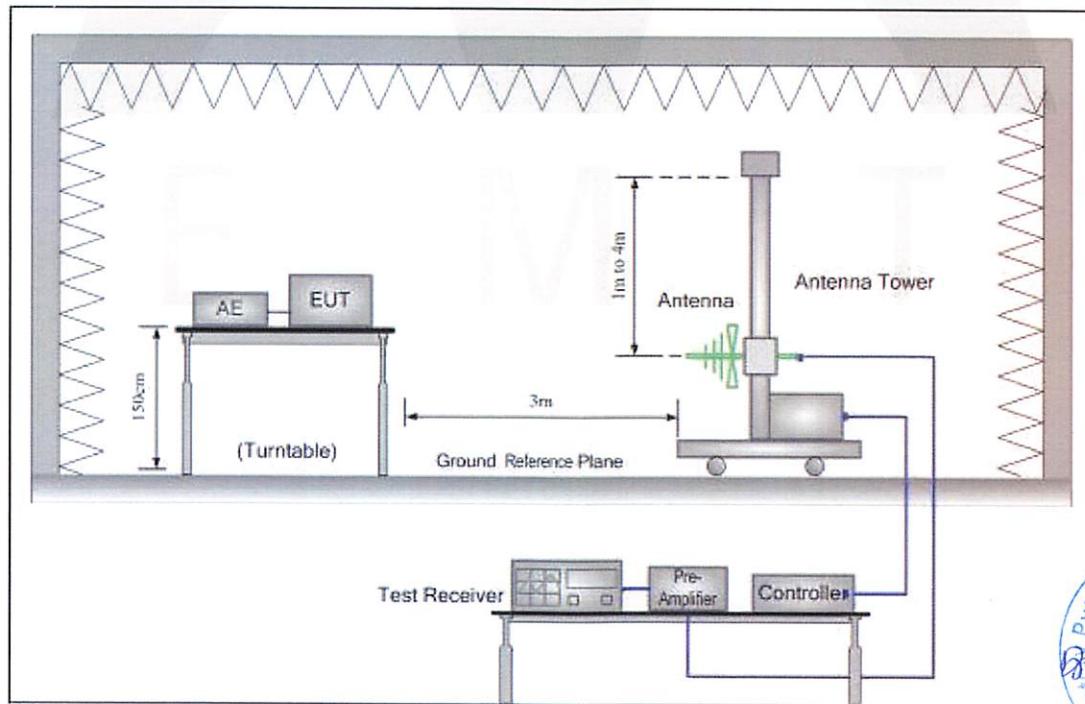


Figure 1. 30MHz to 1GHz



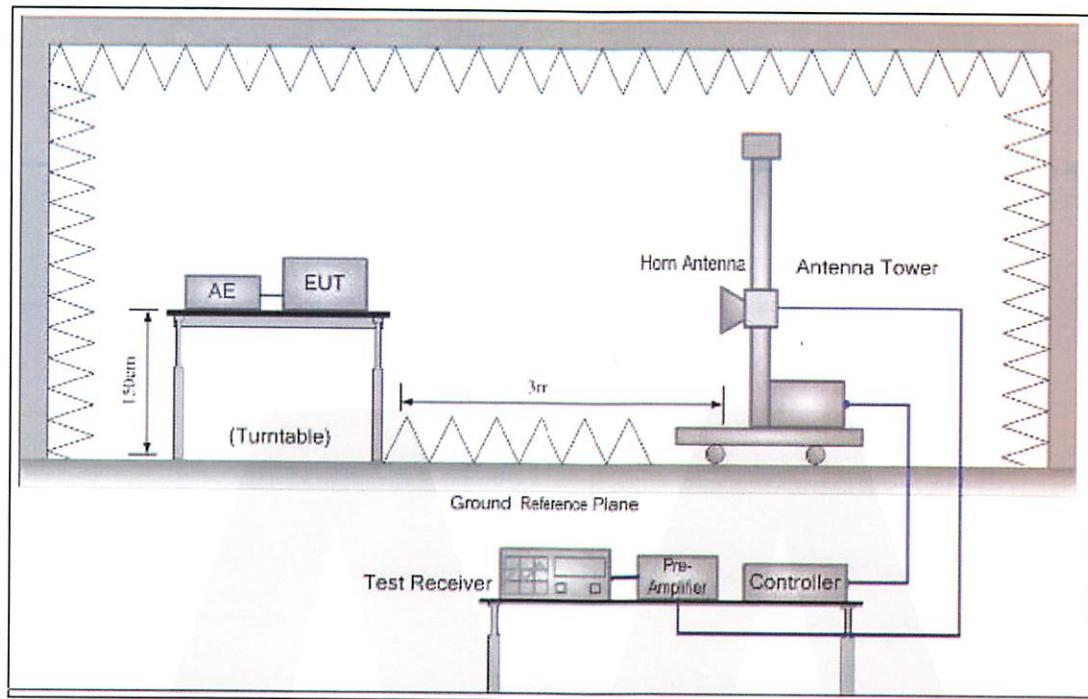
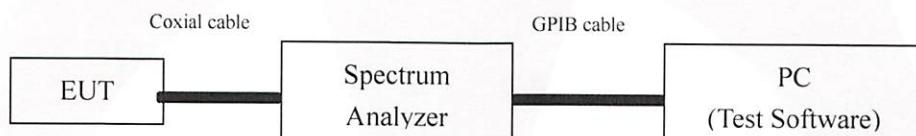


Figure 2. Above 1GHz

Conducted measurement:



1. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration).
2. Testing was performed when the equipment was in a receive-only mode.
3. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
4. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.



5.7.4 Test result(Radiated measurement)

802.11b low CH (2412 MHz)

below1GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
65.12	Vertical	-72.06	-57	-15.06
207.52	Vertical	-69.92	-57	-12.92
473.88	Vertical	-66.03	-57	-9.03
118.05	Horizontal	-69.60	-57	-12.60
252.93	Horizontal	-67.19	-57	-10.19
471.83	Horizontal	-65.55	-57	-8.55

Above1GHz

Above1GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
2054.08	Vertical	-55.61	-47	-8.61
2853.42	Vertical	-58.17	-47	-11.17
4899.00	Vertical	-57.55	-47	-10.55
2717.51	Horizontal	-51.76	-47	-4.76
3178.36	Horizontal	-53.91	-47	-6.91
4935.64	Horizontal	-56.83	-47	-9.83

802.11b High CH (2472 MHz)

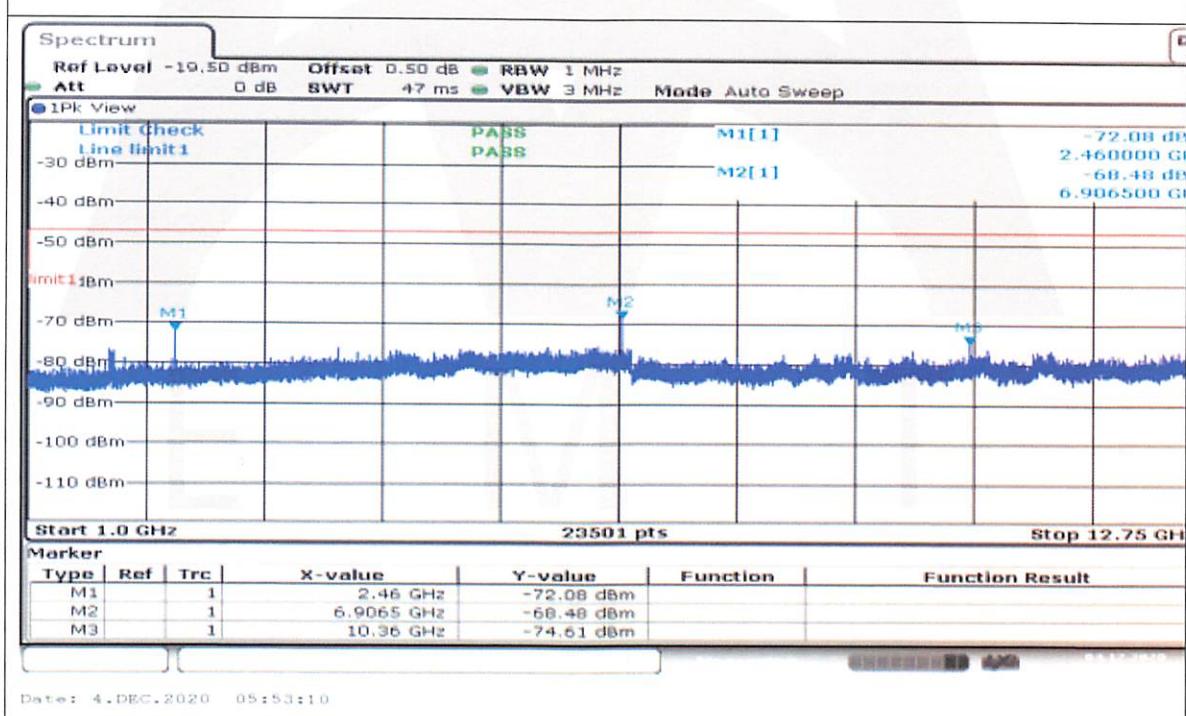
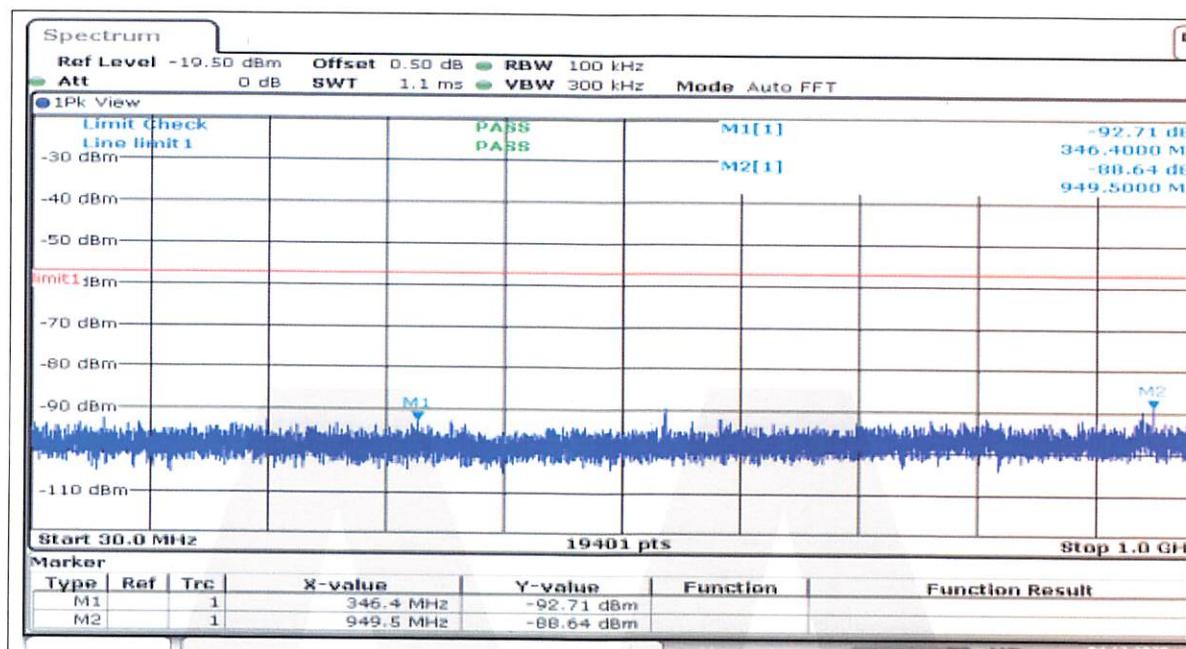
below1GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
57.50	Vertical	-72.92	-57	-15.92
477.09	Vertical	-71.50	-57	-14.50
415.31	Vertical	-63.07	-57	-6.07
98.82	Horizontal	-71.06	-57	-14.06
150.79	Horizontal	-68.21	-57	-11.21
618.24	Horizontal	-68.86	-57	-11.86

Above1GHz

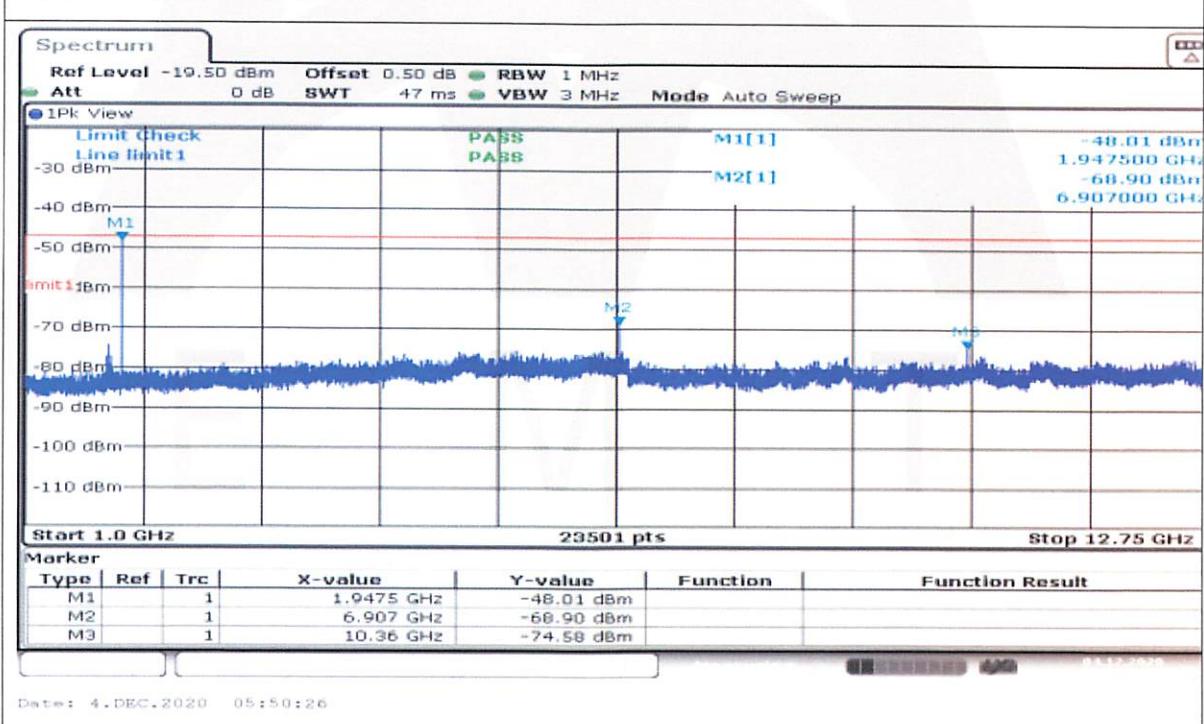
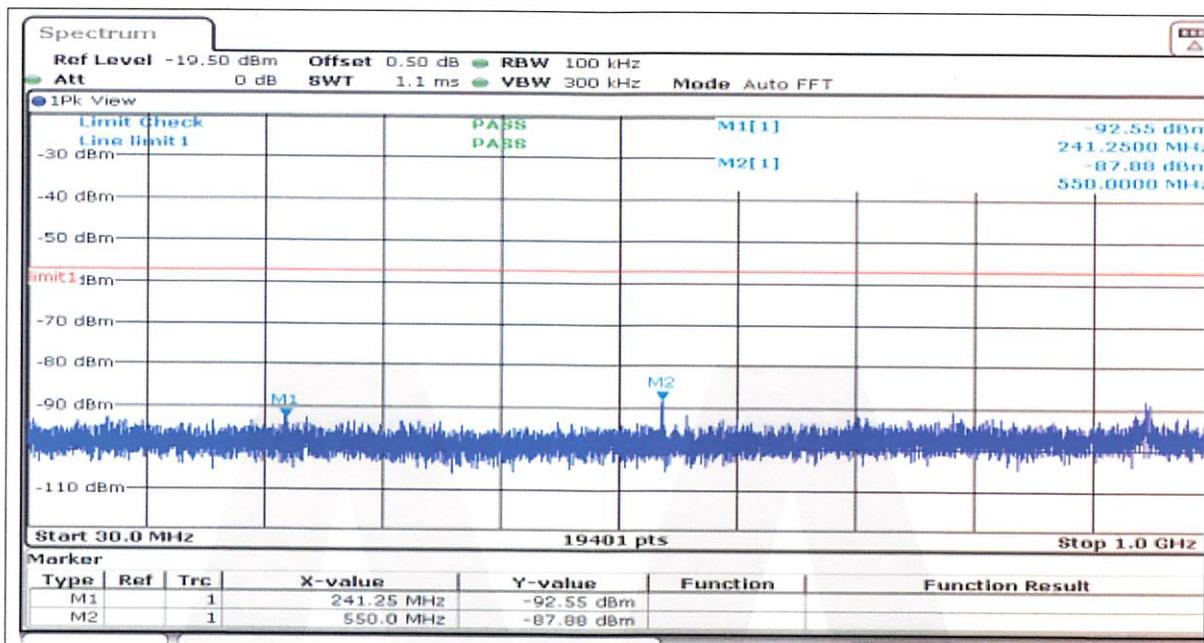
Above1GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
1882.35	Vertical	-56.61	-47	-9.61
2557.85	Vertical	-60.64	-47	-13.64
5268.91	Vertical	-49.96	-47	-2.96
2238.48	Horizontal	-53.35	-47	-6.35
3217.89	Horizontal	-54.33	-47	-7.33
4796.64	Horizontal	-59.95	-47	-12.95



Test result (Conducted measurement) - 802.11 b low CH (2412MHz)



Test result (Conducted measurement) - 802.11b High CH (2472MHz)



5.8 Receiver Blocking

5.8.1 Performance Criteria

The minimum performance criterion shall be a PER less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment (see clause 5.4.1.t)).

5.8.2 Limit(ETSI EN 300 328, V2.2.2/2019-07 (Clause 4.3.2.11.4)

While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15 or table 16.

Table 14: Receiver blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504		
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674	-34	CW

NOTE 1: OCBW is in Hz.
 NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
 NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
 NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.



Table 15: Receiver blocking parameters receiver category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log ₁₀ (OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Table 16: Receiver blocking parameters receiver category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log ₁₀ (OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

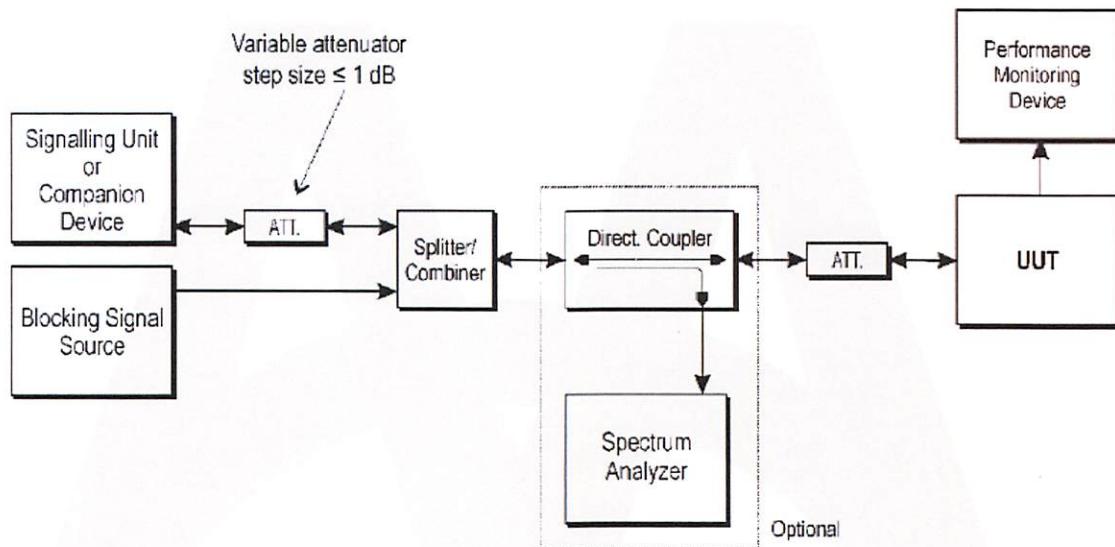


5.8.3 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.11.2

Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input type="checkbox"/> Radiated measurement

5.8.4 Test Setup



5.8.5 Test result

Receiver category 1

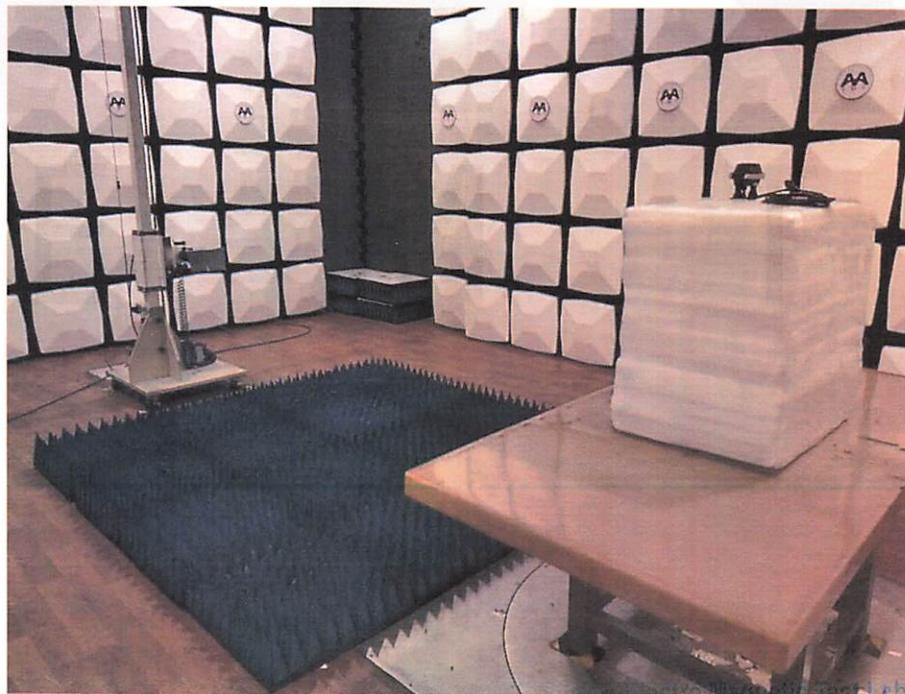
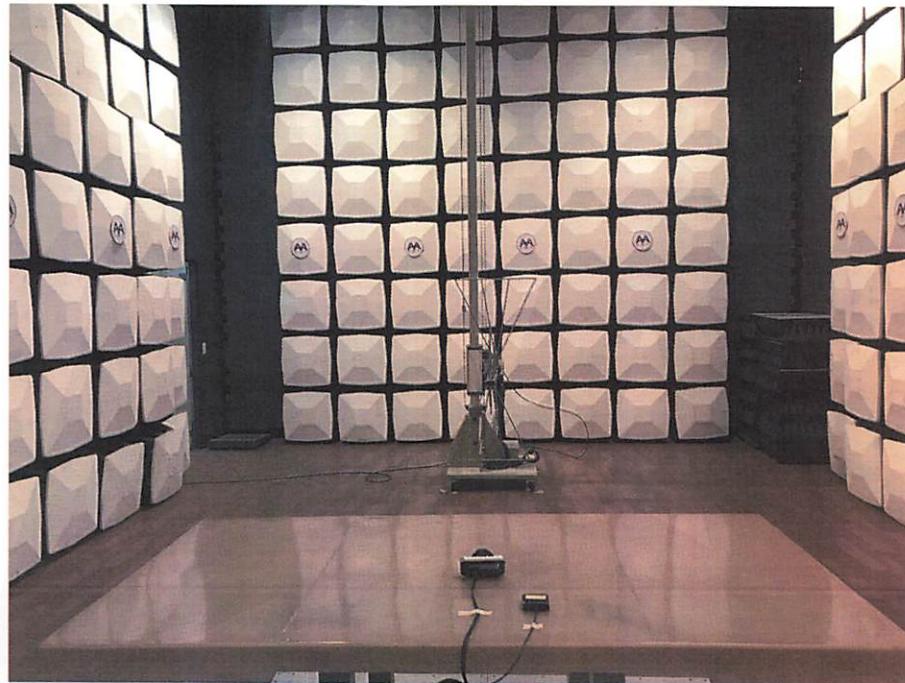
Wanted signal mean power from companion device	Blocking signal Frequency(MHz)	Blocking signal power(dBm)	PER% Note(2)	PER Limit %
802.11b low CH				
-68	2380	-34	0.137	$\leq 10\%$
	2504		0.892	
-74	2300	-34	0.498	$\leq 10\%$
	2330		0.285	
	2360		0.723	
	2524		1.252	
	2584		0.496	
	2674		0.905	
802.11b High CH				
-68	2380	-34	0.748	$\leq 10\%$
	2504		0.438	
-74	2300	-34	0.598	$\leq 10\%$
	2330		0.203	
	2360		0.615	
	2524		0.764	
	2584		0.576	
	2674		0.538	

Note: The above results were obtained from laboratory tests.



6 Test Setup photograph

Spurious Emission Test Setup



** End of report **


Authorised Signatory

Test Laboratory Pvt. Ltd. * AA Electro Magnetic