Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

TEST REPORT
ETSI EN 300 440 V2.2.1 (2018-07)

Report Reference No. ..... :	**GTS20240426022-1-19**
Compiled by (position+printed name+signature) . :	File administrators Peter Xiao
Supervised by (position+printed name+signature) . :	Test Engineer Evan Ouyang
Approved by (position+printed name+signature) . :	Manager Jason Hu
Date of issue ..... :	Jun.21, 2024

Representative Laboratory Name . :	**Shenzhen Global Test Service Co.,Ltd.**
Address ..... :	No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Stre Longgang District, Shenzhen, Guangdong

Applicant's name ..... :	**Shenzhen Techtion Smart Electronics Co., Ltd**
Address ..... :	Room 902, 8th Floor, Unit 1, Building No. 2, Xintianxia Chengyun Factory District, Vanke City Community, Bantian Street, Longgang District, Shenzhen, China

Test specification ..... **:**	
Standard ..... :	**ETSI EN 300 440 V2.2.1 (2018-07)**
TRF Originator ..... :	Shenzhen Global Test Service Co.,Ltd.
Master TRF ..... :	Dated 2014-12

Test item description ..... :	**Outdoor Reflective Display Terminal**
Trade Mark ..... :	N/A
Manufacturer ..... :	Shenzhen Techtion Smart Electronics Co., Ltd
Model/Type reference ..... :	TS-156PHD
List Model ..... :	TS-780PHD, TS-101PHD, TS-105PHD, TS-133PHD, TS-215PHD, TS-286THD, TS-298THD, TS-280THD, TS-320PHD, TS-362THD, TS-401THD, TS-430PHD, TS-434THD, TS-500THD, TS-550PHD, TS-650THD, TS-750THD, TS-850THD, TS-860THD, TS-980THD, TS-XXXPHD, TS-XXXTHD(X=0-9,X=A-Z)
Operation Frequency ..... :	From 5745MHz to 5825MHz
Ratings ..... :	DC 12.0V/4.0A by Adapter
Result ..... :	**PASS**

T E S T R E P O R T

Test Report No. :	**GTS20240426022-1-19**	Jun. 21, 2024 Date of issue

Equipment under Test	:	Outdoor Reflective Display Terminal
Model /Type	:	TS-156PHD
Listed model	:	TS-780PHD, TS-101PHD, TS-105PHD, TS-133PHD, TS-215PHD, TS-286THD, TS-298THD, TS-280THD, TS-320PHD, TS-362THD, TS-401THD, TS-430PHD, TS-434THD, TS-500THD, TS-550PHD, TS-650THD, TS-750THD, TS-850THD, TS-860THD, TS-980THD, TS-XXXPHD, TS-XXXTHD(X=0-9,X=A-Z)
Applicant	:	**Shenzhen Techtion Smart Electronics Co., Ltd**
Address	:	Room 902, 8th Floor, Unit 1, Building No. 2, Xintianxia Chengyun Factory District, Vanke City Community, Bantian Street, Longgang District, Shenzhen, China
Manufacturer	:	**Shenzhen Techtion Smart Electronics Co., Ltd**
Address	:	Room 902, 8th Floor, Unit 1, Building No. 2, Xintianxia Chengyun Factory District, Vanke City Community, Bantian Street, Longgang District, Shenzhen, China

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

ETSI EN 300 440 V2.2.1 (2018-07) : Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	May. 10, 2024
Testing commenced on	:	May. 10, 2024
Testing concluded on	:	Jun. 20, 2024

2.2. Product Description

Product Name:	Outdoor Reflective Display Terminal
Trade Mark:	N/A
Model/Type reference:	TS-156PHD
List Model:	TS-780PHD, TS-101PHD, TS-105PHD, TS-133PHD, TS-215PHD, TS-286THD, TS-298THD, TS-280THD, TS-320PHD, TS-362THD, TS-401THD, TS-430PHD, TS-434THD, TS-500THD, TS-550PHD, TS-650THD, TS-750THD, TS-850THD, TS-860THD, TS-980THD, TS-XXXPHD, TS-XXXTHD(X=0-9,X=A-Z)
Model Declaration	PCB board, structure and internal of these model(s) are the same, Only the model name different , So no additional models were tested.
Power supply:	DC 12.0V/4.0A by Adapter
Hardware Version	N/A
Software Version	N/A
Bluetooth	
Frequency Range	2402MHz ~ 2480MHz
Channel Number	79 channels for Bluetooth (DSS) 40 channels for Bluetooth (DTS)
Channel Spacing	1MHz for Bluetooth (DSS) 2MHz for Bluetooth (DTS)
Modulation Type	GFSK, π/4-DQPSK, 8-DPSK for Bluetooth (DSS) GFSK for Bluetooth (DTS)
2.4GWLAN	
WLAN CE Operation frequency	IEEE 802.11b:2412-2472MHz IEEE 802.11g:2412-2472MHz IEEE 802.11n HT20:2412-2472MHz IEEE 802.11n HT40:2422-2462MHz
WLAN CE Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
Channel number:	13 Channel for IEEE 802.11b/g/n (HT20) 9 Channel for IEEE 802.11n (HT40)
Channel separation:	5MHz
WIFI (5G Band)	
WLAN CE Operation frequency	5180-5240MHz
WLAN CE Modulation Type	802.11a/n/ac: OFDM
Channel number:	4 Channels for 20MHz bandwidth(5180-5240MHz) 2 channels for 40MHz bandwidth(5190~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)

SRD (5.8G Band)	
WLAN CE Operation frequency	5745-5825MHz
WLAN CE Modulation Type	802.11a/n/ac: OFDM
Channel Number	5 channels for 20MHz bandwidth(5745-5825MHz) 2 channels for 40MHz bandwidth(5755~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Antenna Description	Two External antenna respectively. WLAN not support 2*2MIMO technology. ANT0 used for WIFI TX/RX, 2.0 dBi(Max.) for 2.4GWLAN; ANT1 used for BT&WIFI TX/RX, 2.0 dBi(Max.) for BT and 2.0dBi (Max.) for 5GWLAN;

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V/ 50 Hz	○	120V/60Hz
		●	12 V DC	○	24 V DC
		○	Other (specified in blank below)		

DC 12.0V

2.4. Equipment Under Test

Description of the test mode

mode	Test channel		
802.11a	5745	5785	5825
802.11 n20	5745	5785	5825
802.11 n40	5755	5795	
802.11 ac20	5745	5785	5825
802.11 ac40	5755	5795	
802.11 ac80	5775		

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer
○ - supplied by the lab

●	Adapter	M/N:	ADP-48D12
		Manufacturer:	Hunan Dajing Technology Co., Ltd
○	PC	M/N:	DESKYOP-EUIVCNR
		Manufacturer:	LENOVO
○	Display	M/N:	LE23CW-D
		Manufacturer:	THTF
○	Keyboard	M/N:	T460S
		Manufacturer:	LENOVO
○	Mouse	M/N:	Howard
		Manufacturer:	LENOVO
○	Earphone	M/N:	MDR-XB550AP
		Manufacturer:	SONY
○	USB flash disk	M/N:	U330
		Manufacturer:	aigo

2.6. Test summary

ETSI EN 300 440 Requirements		
Equivalent isotropic radiated power(Radiated)	ETSI EN 300 440 Sub-clause 4.2.2	Pass
Permitted range of operating frequencies	ETSI EN 300 440 Sub-clause 4.2.3	Pass
Spurious emissions	ETSI EN 300 440 Sub-clause 4.2.4	Pass
Duty cycle	ETSI EN 300 440 Sub-clause 4.2.5	Pass
Additional requirements for FHSS equipment	ETSI EN 300 440 Sub-clause 4.2.6	N/A[Note1]
Adjacent channel selectivity	ETSI EN 300 440 Sub-clause 4.3.3	Pass
Blocking or desensitization	ETSI EN 300 440 Sub-clause 4.3.4	Pass
Receiver Spurious emissions	ETSI EN 300 440 Sub-clause 4.3.5	N/A[Note 2]

Note 1: This is not a FHSS device;
Note 2: Not applicable as the equipment support duty cycle restriction for media access;
Remark: The measurement uncertainty is not included in the test result.

2.7. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

3.2. Test Facility

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

CNAS (No. CNAS L8169)
Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.
A2LA (Certificate No. 4758.01)
Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.
Industry Canada Registration Number. is 24189.
FCC Designation Number is CN1234.
FCC Registered Test Site Number is165725.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature: 25 °C
High Temperature: 45 °C
Low Temperature: -20 °C
Normal Voltage : DC 12.0V
High Voltage: DC 13.2V
Low Voltage: DC10.8V
Relative Humidity: 55 %
Air Pressure: 989 hPa

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 2 " and is documented in the Shenzhen Global Test Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Conducted spurious emission	1.60 dB	(1)
Radiated spurious emission	2.20 dB	(1)

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Equipments Used during the Test

RF output power&PSD&OOB&OBW &Hoping &Duty Cycle, Tx-sequence, Tx-gap&Adaptively& ReceiverBlocking& Centre frequencies & TPC						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Spectrum Analyzer	Agilent	N9020A	MY48010425	2023/09/08	2024/09/07
2	Vector Signal generator	Agilent	N5181A	MY49060502	2023/07/13	2024/07/12
3	Signal generator	Agilent	E4421B	3610AO1069	2023/09/08	2024/09/07
4	4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW53323507	2023/09/08	2024/09/07
5	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY5365004	2023/09/08	2024/09/07
6	Climate Chamber	ESPEC	EL-10KA	A20120523	2023/09/08	2024/09/07
7	Spectrum Analyzer	R&S	FSV40	100019	2023/07/13	2024/07/12
8	Universal Radio Communication	Rohde&Schwarz	CMU200	114353	2023/09/08	2024/09/07
9	Wireless Commnunication Tester	Rohde&Schwarz	CMW500	125408	2023/07/13	2024/07/12
10	Test Control Unit	Tonscend	JS0806-1	178060067	2023/07/13	2024/07/12
11	Automated filter bank	Tonscend	JS0806-F	19F8060177	2023/07/13	2024/07/12
12	EMI Test software	Tonscend	JS1120-1	Ver 2.6.8.0518	/	/
13	EMI Test software	Tonscend	JS1120-3	Ver 2.5.77.0418	/	/

Transmitter spurious emissions & Receiver spurious emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI 7	101102	2023/09/08	2024/09/07
2	Spectrum Analyzer	Agilent	N9020A	MY480 10425	2023/09/08	2024/09/07
3	Spectrum Analyzer	R&S	FSV40	100019	2023/07/13	2024/07/12
4	By-log Antenna	SCHWARZBECK	VULB9163	000976	2023/07/13	2024/07/12
5	Double Ridged Horn Antenna (1~18GHz)	SCHWARZBECK	BBHA 9120D	01622	2023/09/08	2024/09/07
6	Horn Antenna (18GHz~40GHz)	Schwarzbeck	BBHA9170	791	2023/09/08	2024/09/07
7	Amplifier (30MHz~1GHz)	Schwarzbeck	BBV 9743	#202	2023/07/13	2024/07/12
8	Amplifier (1GHz~18GHz)	Taiwan Chengyi	EMC051845 B	980355	2023/07/13	2024/07/12
9	Amplifier (26.5GHz~40GHz)	Schwarzbeck	BBV9179	9719-025	2023/07/13	2024/07/12
10	High-Pass Filter	K&L	9SH10-2700/X1275 0-O/O	KL1420 31	2023/07/13	2024/07/12
11	High-Pass Filter	K&L	41H10-1375/U1275 0-O/O	KL1420 32	2023/07/13	2024/07/12
12	High pass filter	Compliance Direction systems	BSU-6	34202	2023/07/13	2024/07/12
13	RF Cable	HUBER+SUHNE R	RG214	N/A	2023/07/13	2024/07/12
14	EMI Test software	Tonscend	JS32-RE	Ver 2.5.1.8	/	/

The calibration interval is 1 year.

4. TEST CONDITIONS AND RESULTS

4.1. Equivalent Isotropically Radiated Power (e.i.r.p)

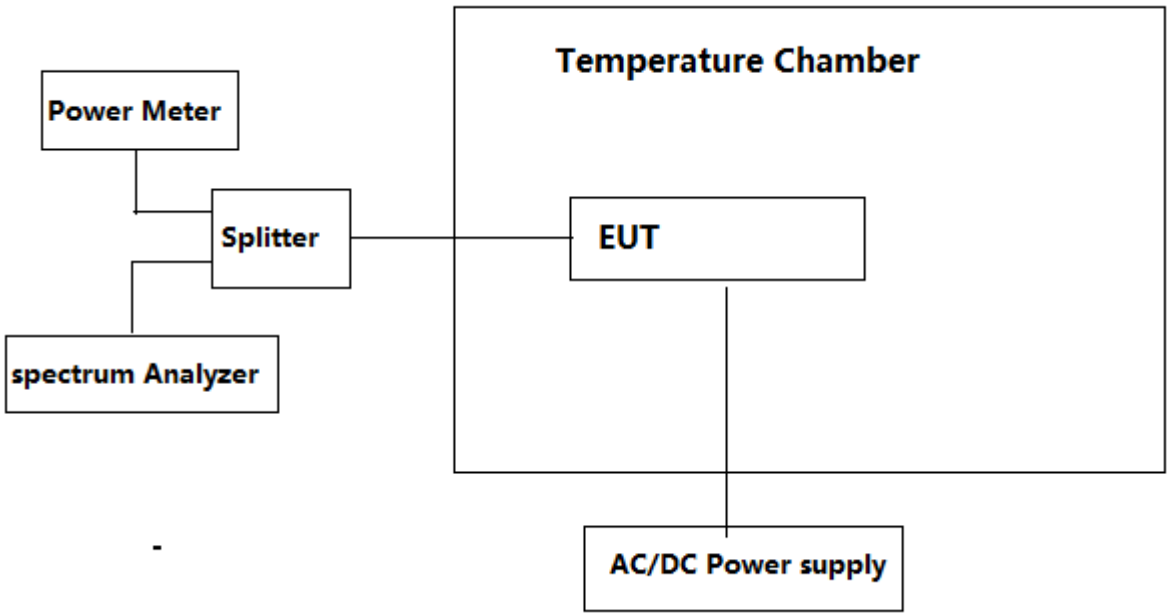
LIMIT

The e.i.r.p. is defined as the maximum radiated power of the transmitter and its antenna .

The transmitter maximum e.i.r.p. under normal and extreme test conditions shall not exceed the values given in following table.

Entry	Frequency Bands	Power	Application	Notes
1	2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Non-specific short range devices	
2	2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Radiodetermination devices	
3	(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and Annex G
4	(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and Annex G
5	5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Non-specific short range devices	
6	9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radiodetermination devices	
7	9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radiodetermination devices	
8	10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radiodetermination devices	
9	13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radiodetermination devices	
10	17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radiodetermination devices	See Annex H
11	24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and radiodetermination devices	
NOTE: The spectrum ranges in some entries are not harmonised throughout all EU territory, specifically entries 4, 9, and 11 have been identified as such. Implementers are cautioned to refer to CEPT/ERC Recommendation 70-03 [i.2] as well as current National Radio plans to verify acceptance within intended regions of use.				

TEST CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 300 440 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.2.2.3 for the measurement method.

TEST RESULTS

802.11a							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)						
TNor(+25℃)	DC12.0	5745	5.31	2.00	7.31	14.00	PASS
Tmin(-20℃)	DC 13.2		5.59	2.00	7.59		
	DC 10.8		5.79	2.00	7.79		
TMax(+45℃)	DC 13.2		5.50	2.00	7.50		
	DC 10.8		5.41	2.00	7.41		
TNor(+25℃)	DC12.0	5785	6.12	2.00	8.12		
Tmin(-20℃)	DC 13.2		6.58	2.00	8.58		
	DC 10.8		6.78	2.00	8.78		
TMax(+45℃)	DC 13.2		6.40	2.00	8.40		
	DC 10.8		6.73	2.00	8.73		
TNor(+25℃)	DC12.0	5825	7.57	2.00	9.57		
Tmin(-20℃)	DC 13.2		7.52	2.00	9.52		
	DC 10.8		7.08	2.00	9.08		
TMax(+45℃)	DC 13.2		7.14	2.00	9.14		
	DC 10.8		7.25	2.00	9.25		

802.11n20							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)						
TNor(+25℃)	DC12.0	5745	6.02	2.00	8.02	14.00	PASS
Tmin(-20℃)	DC 13.2		6.91	2.00	8.91		
	DC 10.8		6.37	2.00	8.37		
TMax(+45℃)	DC 13.2		6.23	2.00	8.23		
	DC 10.8		6.67	2.00	8.67		
TNor(+25℃)	DC12.0	5785	7.05	2.00	9.05		
Tmin(-20℃)	DC 13.2		7.62	2.00	9.62		
	DC 10.8		7.45	2.00	9.45		
TMax(+45℃)	DC 13.2		7.39	2.00	9.39		
	DC 10.8		7.14	2.00	9.14		
TNor(+25℃)	DC12.0	5825	7.75	2.00	9.75		
Tmin(-20℃)	DC 13.2		7.49	2.00	9.49		
	DC 10.8		7.13	2.00	9.13		
TMax(+45℃)	DC 13.2		7.33	2.00	9.33		
	DC 10.8		7.70	2.00	9.70		

802.11ac20							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)						
TNor(+25℃)	DC12.0	5745	6.03	2.00	8.03	14.00	PASS
Tmin(-20℃)	DC 13.2		6.55	2.00	8.55		
	DC 10.8		6.60	2.00	8.60		
TMax(+45℃)	DC 13.2		6.51	2.00	8.51		
	DC 10.8		6.09	2.00	8.09		
TNor(+25℃)	DC12.0	5785	7.10	2.00	9.10		
Tmin(-20℃)	DC 13.2		7.26	2.00	9.26		
	DC 10.8		7.01	2.00	9.01		
TMax(+45℃)	DC 13.2		7.34	2.00	9.34		
	DC 10.8		7.98	2.00	9.98		
TNor(+25℃)	DC12.0	5825	7.07	2.00	9.07		
Tmin(-20℃)	DC 13.2		7.67	2.00	9.67		
	DC 10.8		7.12	2.00	9.12		
TMax(+45℃)	DC 13.2		7.74	2.00	9.74		
	DC 10.8		7.73	2.00	9.73		

802.11n40							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)						
TNor(+25℃)	DC12.0	5755	5.57	2.00	7.57	14.00	PASS
Tmin(-20℃)	DC 13.2		5.37	2.00	7.37		
	DC 10.8		5.03	2.00	7.03		
TMax(+45℃)	DC 13.2		5.15	2.00	7.15		
	DC 10.8		5.93	2.00	7.93		
TNor(+25℃)	DC12.0	5795	6.84	2.00	8.84		
Tmin(-20℃)	DC 13.2		6.29	2.00	8.29		
	DC 10.8		6.91	2.00	8.91		
TMax(+45℃)	DC 13.2		6.35	2.00	8.35		
	DC 10.8		6.90	2.00	8.90		

802.11ac40							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)						
TNor(+25℃)	DC12.0	5755	5.82	2.00	7.82	14.00	PASS
Tmin(-20℃)	DC 13.2		5.97	2.00	7.97		
	DC 10.8		5.01	2.00	7.01		
TMax(+45℃)	DC 13.2		5.57	2.00	7.57		
	DC 10.8		5.31	2.00	7.31		
TNor(+25℃)	DC12.0	5795	6.61	2.00	8.61		
Tmin(-20℃)	DC 13.2		6.71	2.00	8.71		
	DC 10.8		6.55	2.00	8.55		
TMax(+45℃)	DC 13.2		6.45	2.00	8.45		
	DC 10.8		6.05	2.00	8.05		

802.11ac80							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)						
TNor(+25℃)	DC12.0	5775	4.61	2.00	6.61	14.00	PASS
Tmin(-20℃)	DC 13.2		4.08	2.00	6.08		
	DC 10.8		4.34	2.00	6.34		
TMax(+45℃)	DC 13.2		4.32	2.00	6.32		
	DC 10.8		4.06	2.00	6.06		

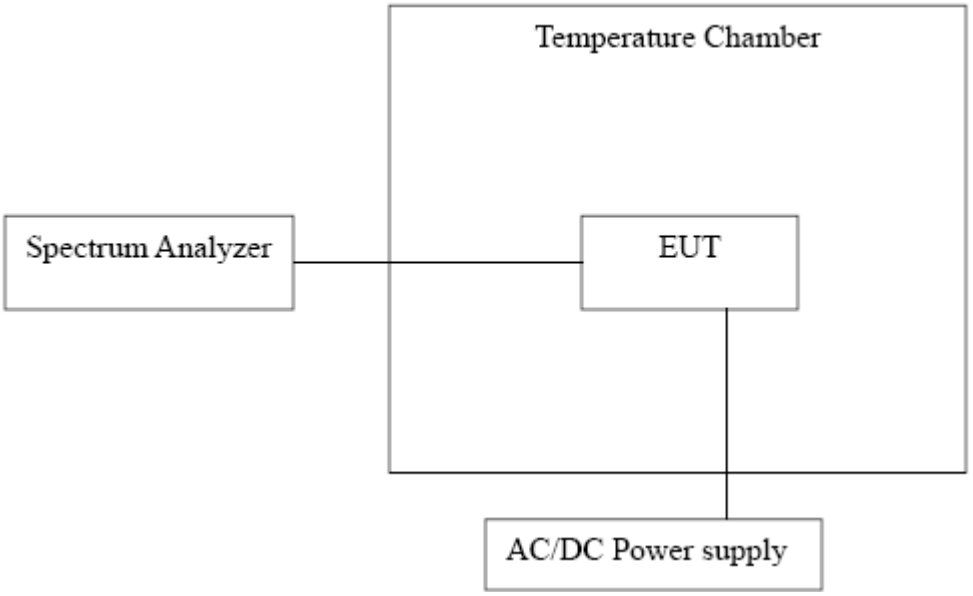
4.2. Permitted Range of Operating Frequencies

LIMIT

According to ETSI EN 300 440 clause 4.2.3.5

Frequency range Limit	
$F_{Low >}$ 5725.0MHz	$F_{High <}$ 5875.0MHz

TEST CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 300 440 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.2.3.3 for the measurement method.

TEST RESULTS

802.11a			
Antenna Gain: 2.0 dBi Test Condition Test environmental		Test Method: Conducted	
Temperature (℃)	Voltage (V)	fL Low	fH High
T Nor (25℃)	DC12.0	5738.824546	5832.144928
T min (-20℃)	DC 13.2	5738.890295	5832.138075
T min (-20℃)	DC 10.8	5738.894153	5832.104953
T Max (+45℃)	DC 13.2	5738.855829	5832.126300
T Max (+45℃)	DC 10.8	5738.800768	5832.158830
Limits		＞5725MHz	＜5875M
Result		Pass	

802.11n20			
Antenna Gain: 2.0 dBi Test Condition Test environmental		Test Method: Conducted	
Temperature (℃)	Voltage (V)	fL Low	fH High
T Nor (25℃)	DC12.0	5738.825667	5832.162197
T min (-20℃)	DC 13.2	5738.855668	5832.164865
T min (-20℃)	DC 10.8	5738.884655	5832.195078
T Max (+45℃)	DC 13.2	5738.843848	5832.177371
T Max (+45℃)	DC 10.8	5738.892321	5832.162459
Limits		＞5725MHz	＜5875M
Result		Pass	

802.11ac20			
Antenna Gain: 2.0 dBi Test Condition Test environmental		Test Method: Conducted	
Temperature (℃)	Voltage (V)	fL Low	fH High
T Nor (25℃)	DC12.0	5738.884513	5832.172933
T min (-20℃)	DC 13.2	5738.861853	5832.103132
T min (-20℃)	DC 10.8	5738.801692	5832.197567
T Max (+45℃)	DC 13.2	5738.833465	5832.182087
T Max (+45℃)	DC 10.8	5738.842934	5832.162604
Limits		＞5725MHz	＜5875M
Result		Pass	

802.11n40			
Antenna Gain: 2.0 dBi Test Condition Test environmental		Test Method: Conducted	
Temperature (℃)	Voltage (V)	fL Low	fH High
T Nor (25℃)	DC12.0	5738.897972	5817.813764
T min (-20℃)	DC 13.2	5738.897658	5817.805844
T min (-20℃)	DC 10.8	5738.809065	5817.850582
T Max (+45℃)	DC 13.2	5738.859485	5817.828617
T Max (+45℃)	DC 10.8	5738.851834	5817.811801
Limits		＞5725MHz	＜5875M
Result		Pass	

802.11ac40			
Antenna Gain: 2.0 dBi Test Condition Test environmental		Test Method: Conducted	
Temperature (℃)	Voltage (V)	fL Low	fH High
T Nor (25℃)	DC12.0	5738.809523	5817.843799
T min (-20℃)	DC 13.2	5738.857107	5817.803792
T min (-20℃)	DC 10.8	5738.871047	5817.811094
T Max (+45℃)	DC 13.2	5738.862638	5817.890283
T Max (+45℃)	DC 10.8	5738.821344	5817.898260
Limits		＞5725MHz	＜5875M
Result		Pass	

802.11ac80			
Antenna Gain: 2.0 dBi Test Condition Test environmental		Test Method: Conducted	
Temperature (℃)	Voltage (V)	fL Low	fH High
T Nor (25℃)	DC12.0	5738.883098	5817.825492
T min (-20℃)	DC 13.2	5738.837535	5817.891376
T min (-20℃)	DC 10.8	5738.800344	5817.841180
T Max (+45℃)	DC 13.2	5738.848332	5817.888402
T Max (+45℃)	DC 10.8	5738.895810	5817.869309
Limits		＞5725MHz	＜5875M
Result		Pass	

4.3. Spurious emissions and cabinet

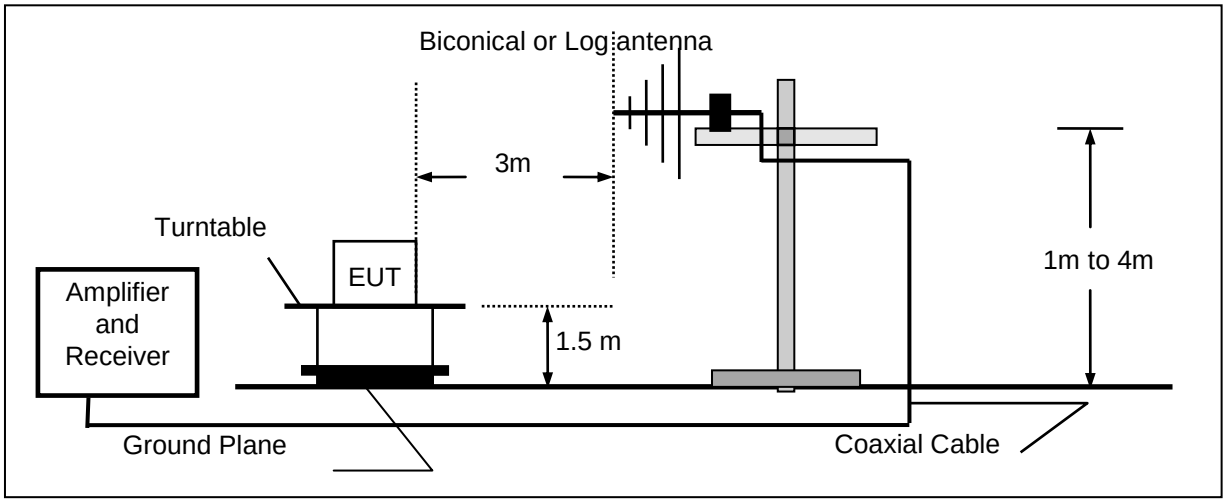
LIMIT

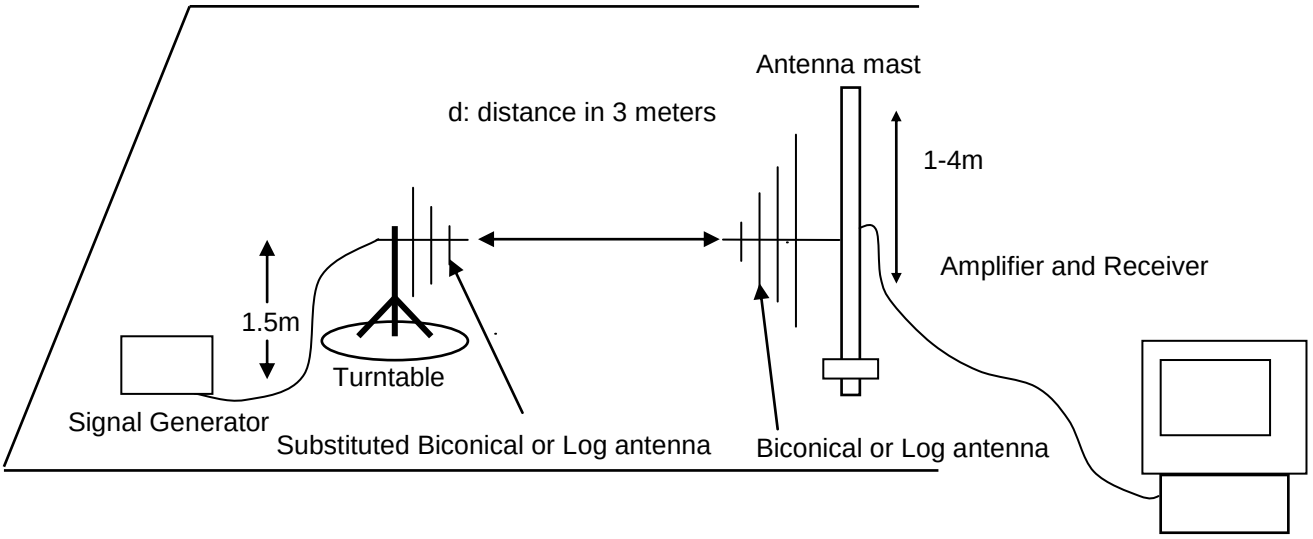
The power of the spurious emissions shall not exceed the limits of table

State	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies ≤1 000 MHz	Frequencies > 1 000 MHz
Operating	4 nW /-54dBm	250 nW/-36dBm	1 μW /-30dBm
Standby	2 nW /-57dBm	2 nW /-57dBm	20 nW /-47dBm

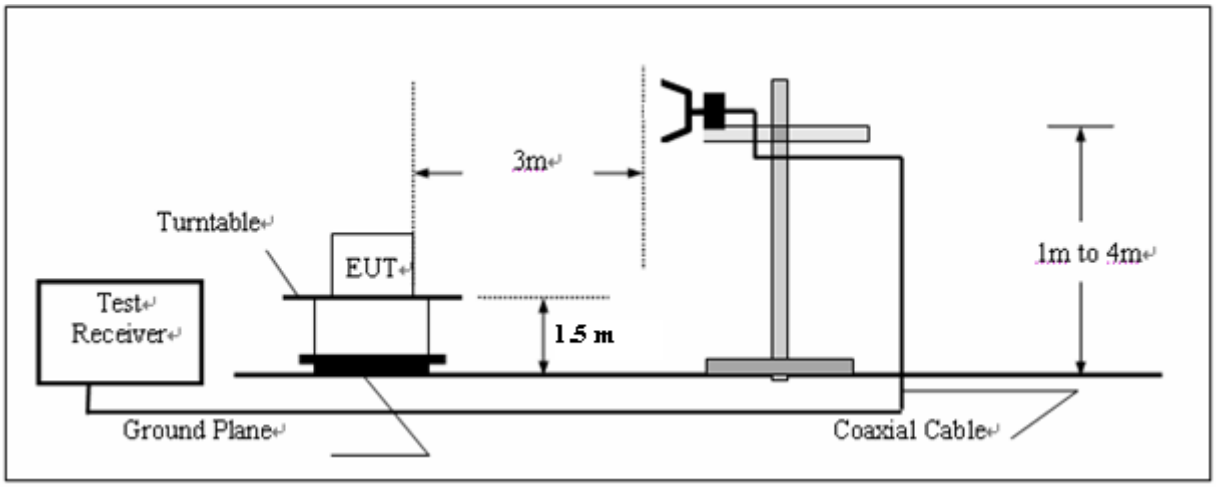
TEST CONFIGURATION

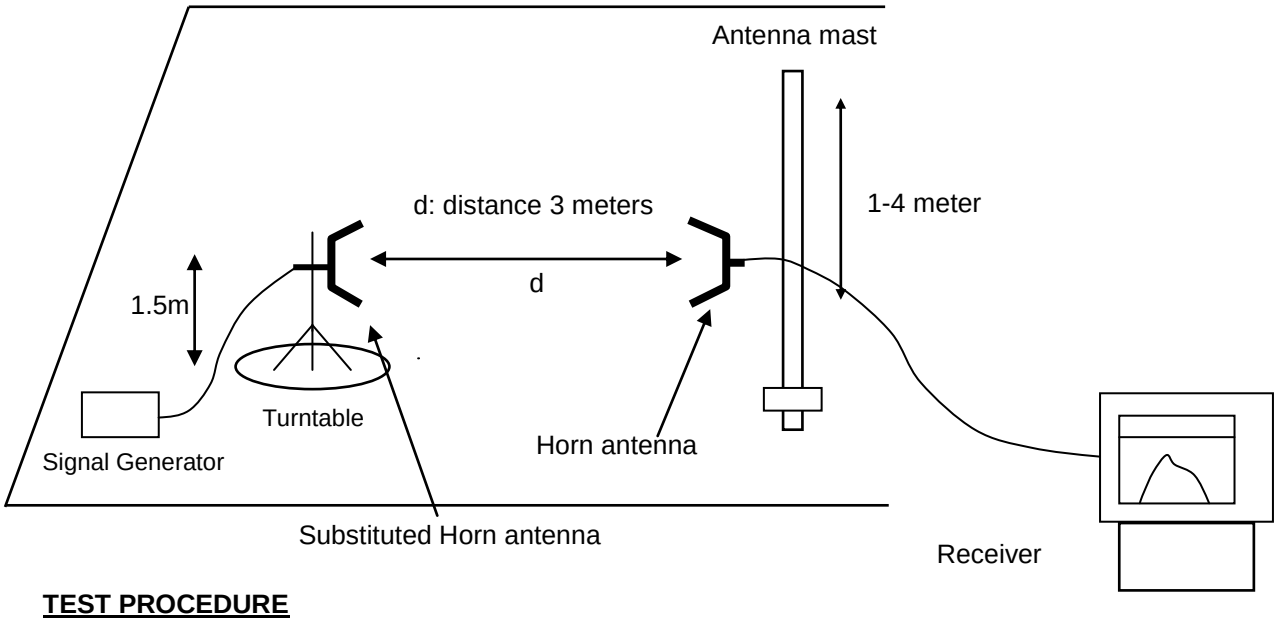
Below 1GHz





Above 1GHz





TEST PROCEDURE

1. Please refer to ETSI EN 300 440 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.2.4.3 for the measurement method.

TEST RESULTS

Note :We tested the all modes,and recorded the worst case at the 802.11n 20 Mode.

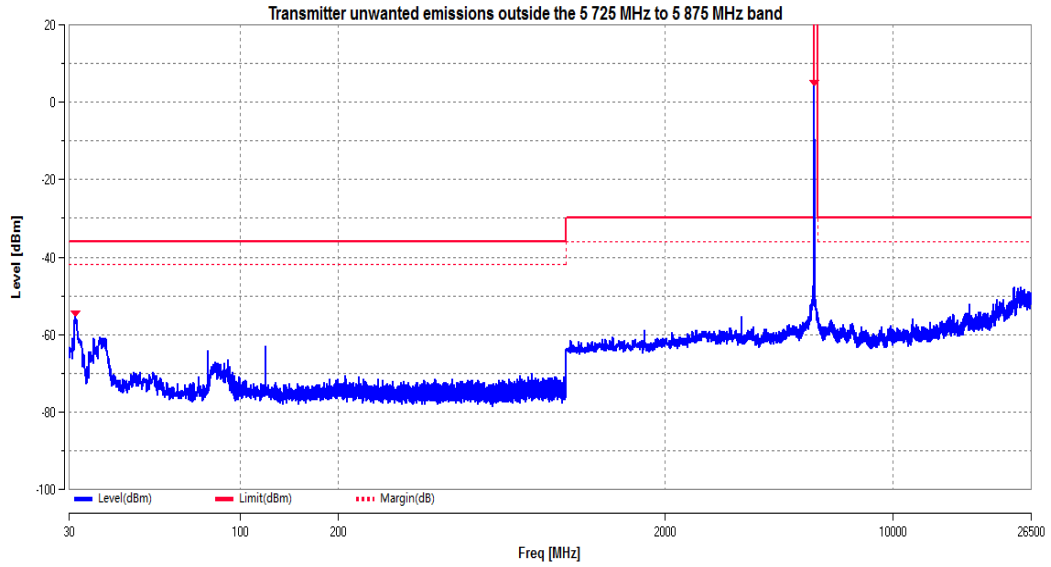
The Worst Test Mode 802.11n20				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
67.27	Vertical	-59.54	-36.00	Pass
916.68	V	-53.19	-36.00	
3985.76	V	-52.25	-30.00	
6138.58	V	-49.05	-30.00	
164.94	Horizontal	-65.17	-36.00	
925.89	H	-55.43	-36.00	
3985.45	H	-51.42	-30.00	
6642.33	H	-53.41	-30.00	
Middle Channel				
66.33	Vertical	-60.75	-36.00	Pass
914.32	V	-57.44	-36.00	
3986.32	V	-53.06	-30.00	
6135.22	V	-52.16	-30.00	
163.75	Horizontal	-59.05	-36.00	
924.11	H	-55.22	-36.00	
3984.04	H	-55.85	-30.00	
6646.54	H	-54.12	-30.00	
Highest Channel				
66.71	Vertical	-64.86	-36.00	Pass
911.55	V	-52.35	-36.00	
3987.50	V	-52.61	-30.00	
6138.00	V	-48.36	-30.00	
164.14	Horizontal	-62.47	-36.00	
920.43	H	-57.05	-36.00	
3985.22	H	-55.91	-30.00	
6646.77	H	-52.22	-30.00	

NOTE: All the modes have been tested and recorded worst mode in the report.

Conducted Spurious Emissions:

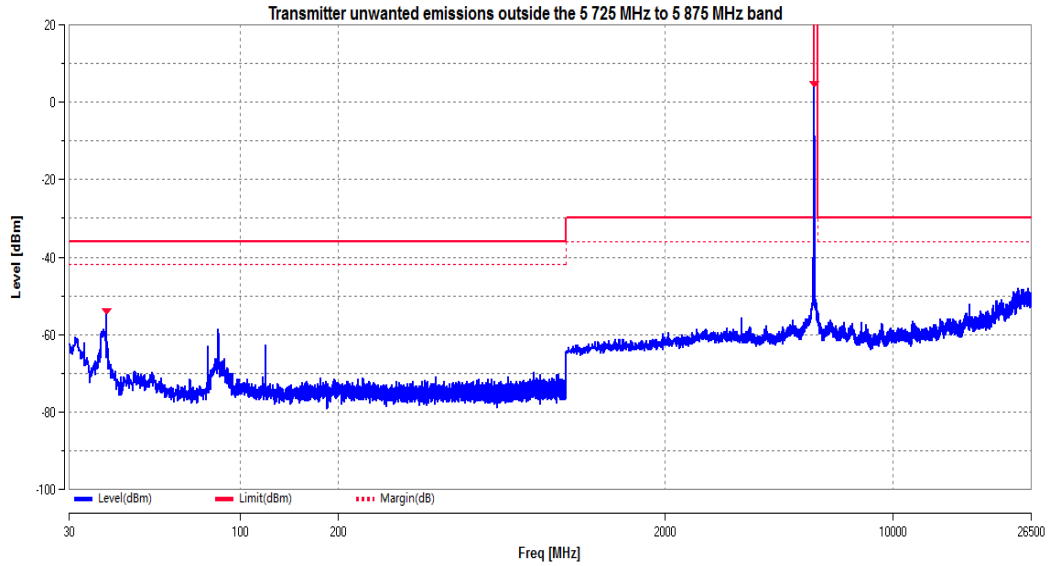
802.11 a

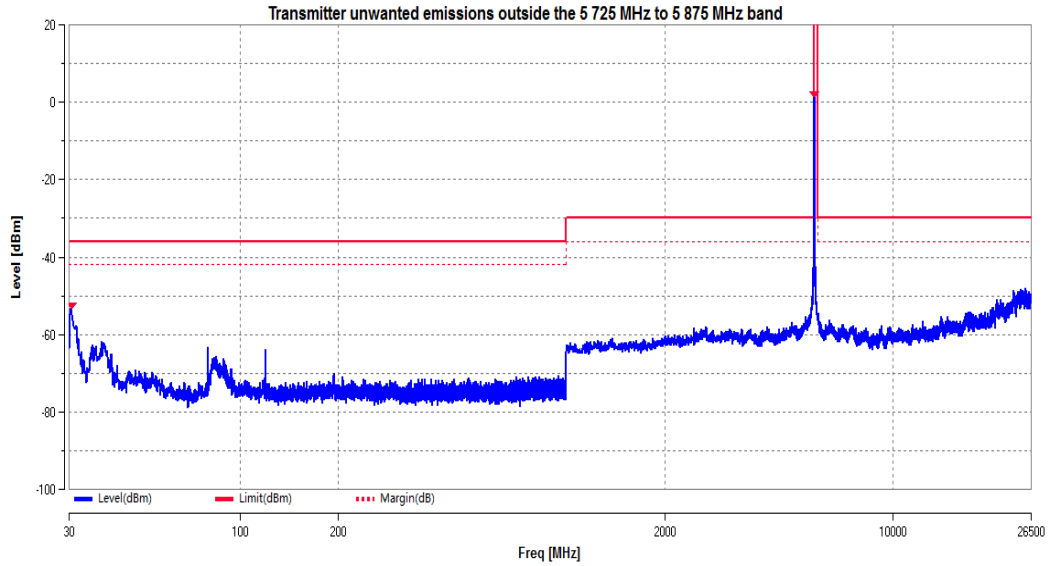
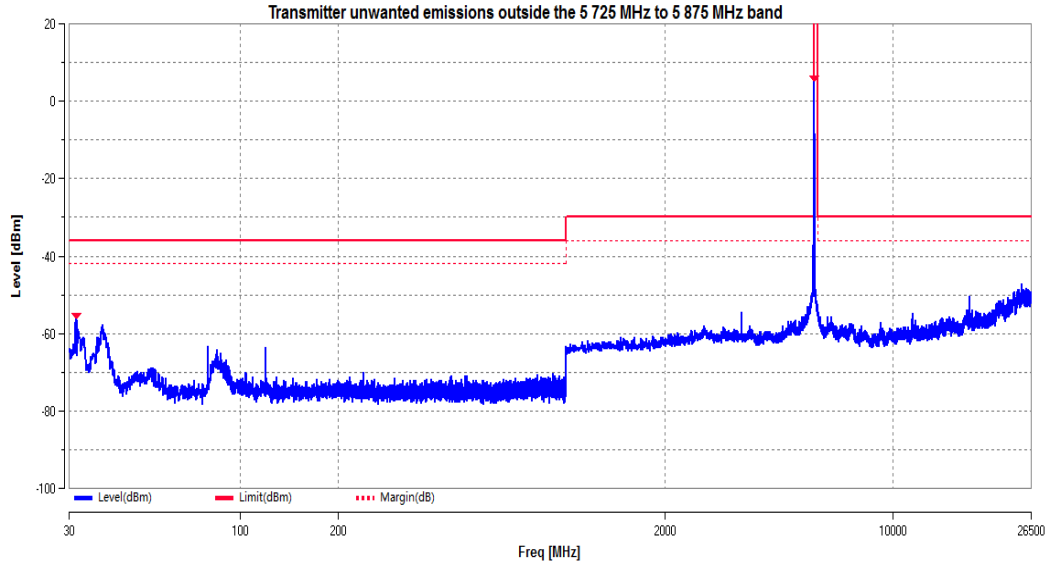
CH149



802.11 n20

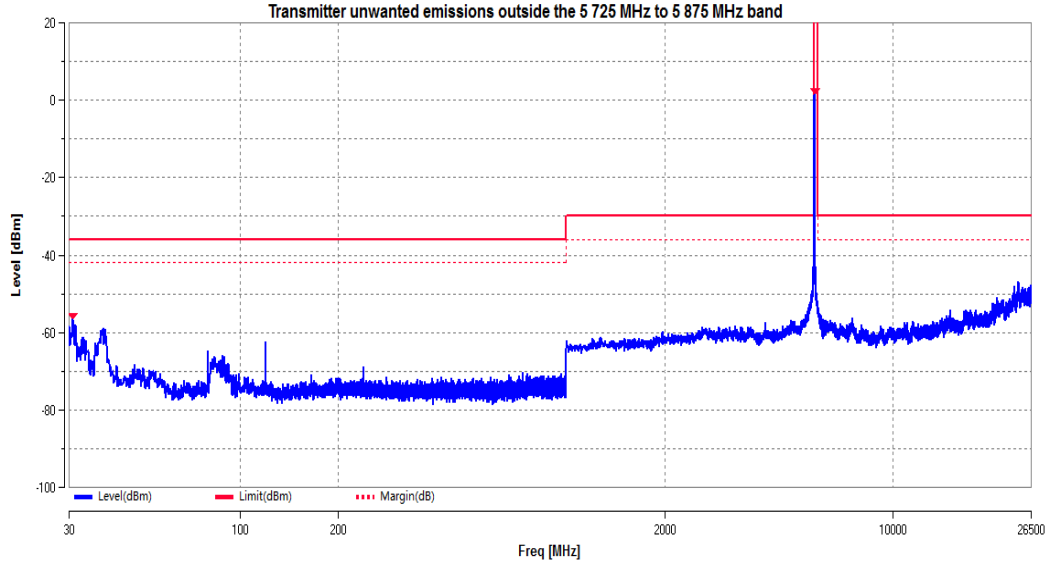
CH149



802.11 n40
CH151

802.11 ac20
CH149


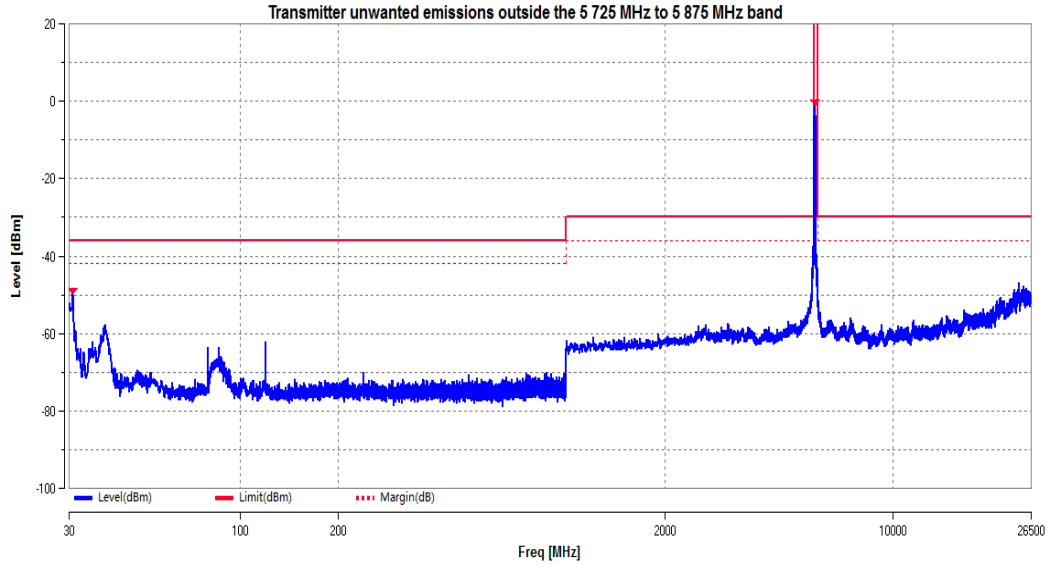
802.11 ac40

CH151



802.11 ac80

CH155



4.4. Duty cycle

According to ETSI EN 300 440 clause 4.2.5.4

Frequency Band	Duty cycle	Application	Notes
2 400 MHz to 2 483,5 MHz	No Restriction	Generic use	
2 400 MHz to 2 483,5 MHz	No Restriction	Radiodetermination	
(a) 2 446 MHz to 2 454 MHz	No Restriction	RFID	Limits shown in Annex G shall apply
(b) 2 446 MHz to 2 454 MHz	≤ 15 %	RFID	Limits shown in Annex G shall apply
5 725 MHz to 5 875 MHz	No Restriction	Generic use	
9 200 MHz to 9 500 MHz	No Restriction	Radiodetermination	
9 500 MHz to 9 975 MHz	No Restriction	Radiodetermination	
10,5 GHz to 10,6 GHz	No Restriction	Radiodetermination	
13,4 GHz to 14,0 GHz	No Restriction	Radiodetermination	
17,1 GHz to 17,3 GHz	DAA or equivalent techniques	Radiodetermination, limited to GBSAR detecting and movement and alert applications	Limits shown in Annex I shall apply
24,00 GHz to 24,25 GHz	No Restriction	Generic use and for radiodetermination	
NOTE: The spectrum ranges in some entries are not harmonised throughout all EU territory, specifically entries 4, 9, and 11 have been identified as such. Implementers are cautioned to refer to CEPT/ERC Recommendation 70-03 [i.2] as well as current National Radio plans to verify acceptance within intended regions of use.			

TEST RESULTS

this test item is not applicable for this EUT.

4.5. Receiver Emissions

LIMIT

The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.

TEST CONFIGURATION

The same as described in section 4.4

TEST PROCEDURE

1. Please refer to ETSI EN 300 440 Sub-clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 Sub-clause 4.2.4.3 for the measurement method.

TEST RESULTS

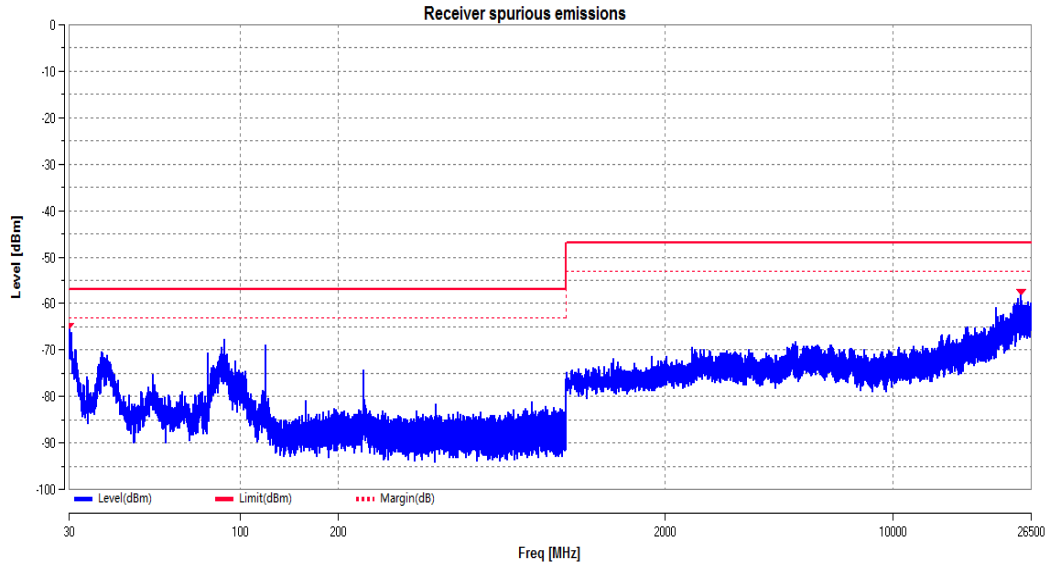
The Worst Test Mode 802.11n20				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
62.91	Vertical	-75.80	-57.00	Pass
921.51	V	-77.77	-57.00	
2791.85	V	-64.64	-47.00	
8766.91	V	-62.55	-47.00	
56.31	Horizontal	-84.66	-57.00	
806.50	H	-75.24	-57.00	
3124.30	H	-70.42	-47.00	
8894.92	H	-65.56	-47.00	
Middle Channel				
66.56	Vertical	-76.05	-57.00	Pass
924.87	V	-76.95	-57.00	
2789.37	V	-69.24	-47.00	
8761.97	V	-68.78	-47.00	
56.96	Horizontal	-82.77	-57.00	
809.65	H	-79.04	-57.00	
3129.92	H	-71.69	-47.00	
8897.58	H	-65.26	-47.00	
Highest Channel				
60.86	Vertical	-80.15	-57.00	Pass
919.73	V	-75.92	-57.00	
2788.51	V	-69.14	-47.00	
8761.83	V	-64.99	-47.00	
54.06	Horizontal	-84.58	-57.00	
805.75	H	-75.49	-57.00	
3125.24	H	-72.20	-47.00	
8897.01	H	-70.11	-47.00	

NOTE: All the modes have been tested and recorded worst mode in the report.

Conducted Spurious Emissions:

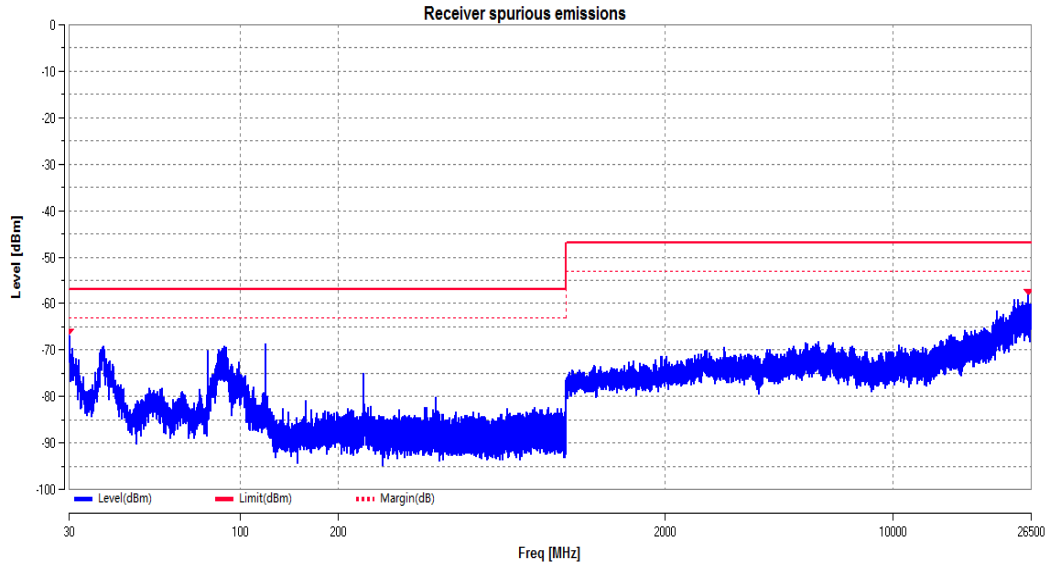
802.11 a

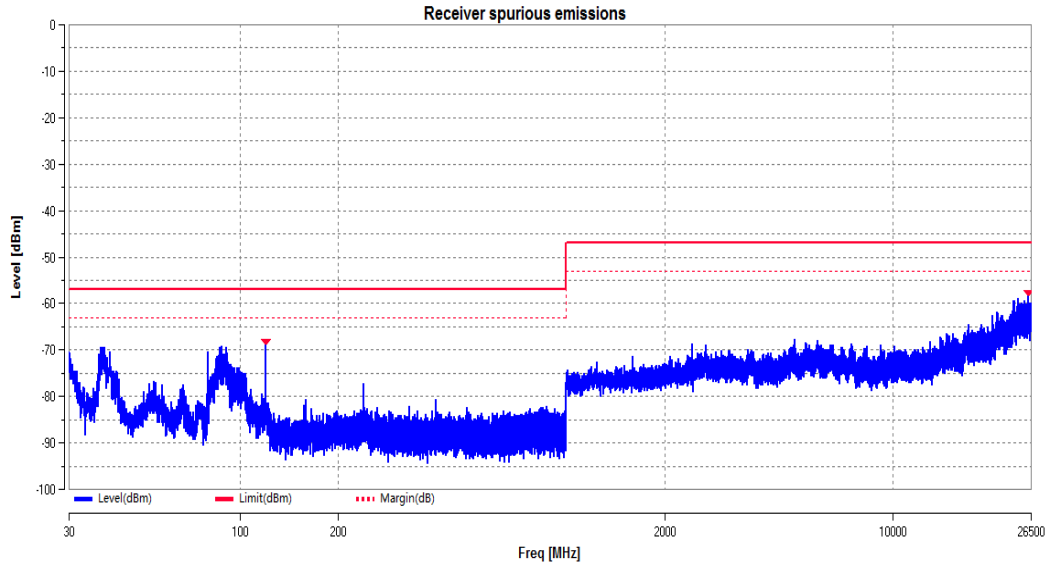
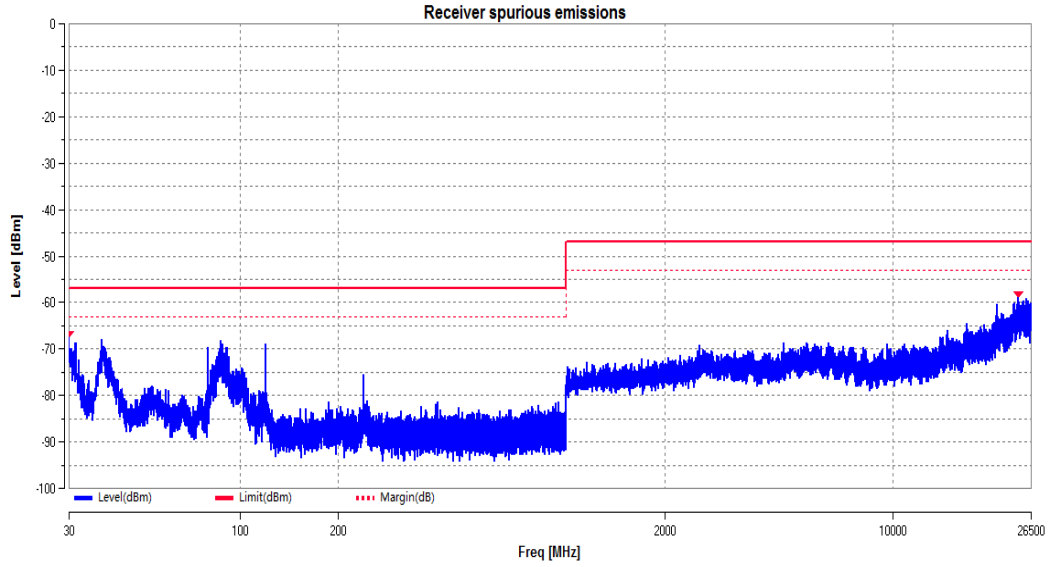
CH149



802.11 n20

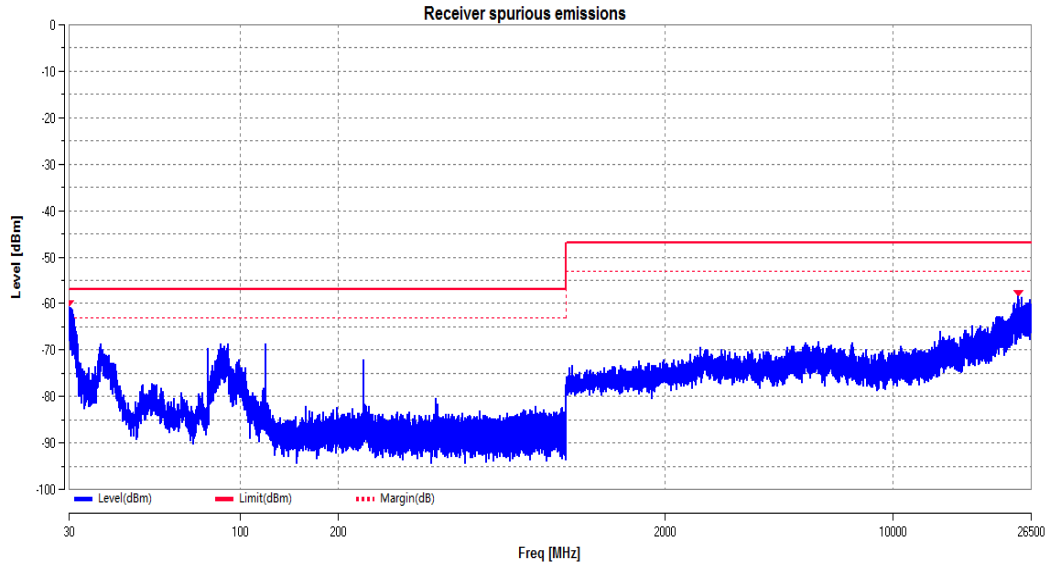
CH149



802.11 n40
CH151

802.11 ac20
CH149


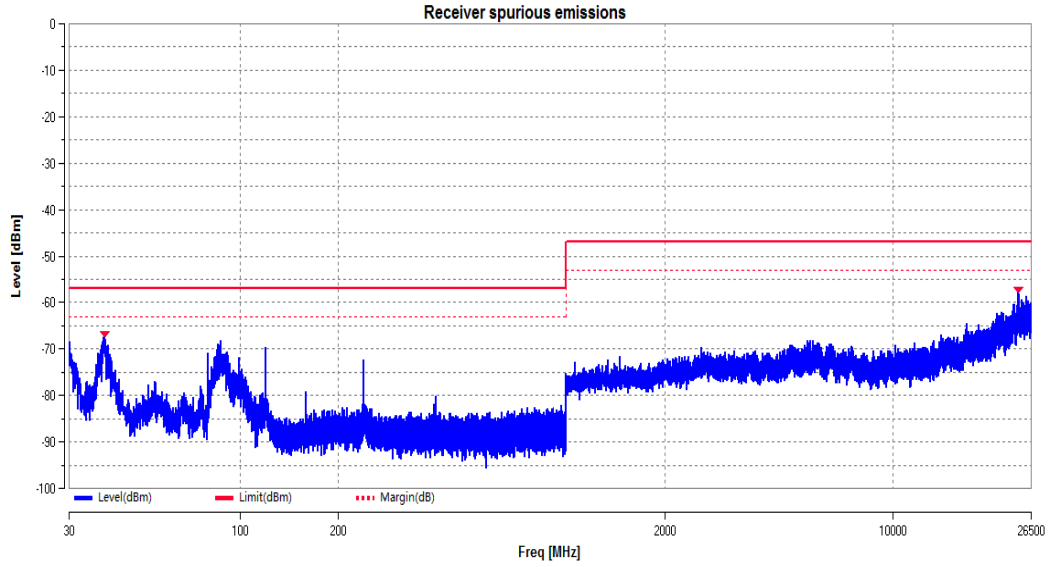
802.11 ac40

CH151



802.11 ac80

CH155



4.6. ADJACENT CHANNEL SELECTIVITY

Definition and Limit

The adjacent channel selectivity is a measure of the capability of the receiver to operate satisfactorily in the presence of an unwanted signal that differs in frequency from the wanted signal by an amount equal to the adjacent channel separation for which the equipment is intended.

The adjacent channel selectivity of the equipment under specified conditions shall not be less than -30 dBm + k. The correction factor, k, is as follows:

$$k = -20\log f - 10\log BW$$

Where:
- f is the frequency in GHz;
- BW is the channel bandwidth in MHz.

The factor k is limited within the following:
-40 dB < k < 0 dB.

Test Procedure

Please refer to ETSI EN 300 440 clause 4.3.3.3 for the measurement method.
Note: The signal is injected to the device via a temporary antenna connector(Test port).

Test Result

Pass.

Receiver category: 1 (The Worst Test Result for 802.11a)								
Test Channel (Worst Case)		The signal of adjacent channel(signal generator B)						
		Adjacent channel		BW (MHz)	K (dB)	Test Value (dBm)	Limit (dBm)	Verdict
157	5785MHz	153	5765MHz(lower)	20	-28.26	-46.33	≥-58.26	Pass
		161	5805MHz(upper)	20	-28.26	-45.28	≥-58.26	Pass
151	5755MHz	/	5715MHz(lower)	40	-31.22	-47.49	≥-61.22	Pass
		159	5805MHz(upper)	40	-31.22	-56.13	≥-61.22	Pass
155	5775MHz	/	5715MHz(lower)	80	-34.26	-54.86	≥-64.26	Pass
		/	5805MHz(upper)	80	-34.26	-53.22	≥-64.26	Pass

Note: The BW(channel bandwidth) is 20MHz&40MHz&80MHz which is declared by the manufacturer of the equipment.

4.7. BLOCKING OR DESENSITIZATION

Definition and Limit

Blocking is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the spurious responses or the adjacent channels or bands, see clauses 4.3.3 and 4.3.4.

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table 7, except at frequencies on which spurious responses are found.

Table 6: Limits for blocking or desensitization

Receiver category	Limit
1	-30 dBm + k
2	-45 dBm + k
3	-60 dBm + k

The correction factor, k, is as follows:
Where:
- f is the frequency in GHz;
- BW is the channel bandwidth in MHz.

The factor k is limited within the following:
- 40 < k < 0 dB

Test Procedure

Please refer to ETSI EN 300 440 clause 4.3.4.3 for the measurement method.

Test Result

Pass

Receiver category: 1 (The Worst Test Result for 802.11a)									
Test Channel (Worst Case)		Lower or upper	Spacing	Frequency (MHz)	BW (MHz)	K (dB)	Test Value (dBm)	Limit (dBm)	Verdict
157	5785MHz	Lower	10*BW	5575	20	-28.26	-19.11	≥-58.26	Pass
			20*BW	5375	20	-28.26	-16.52	≥-58.26	Pass
			50*BW	4775	20	-28.26	-13.50	≥-58.26	Pass
		Upper	10*BW	5995	20	-28.26	-15.84	≥-58.26	Pass
			20*BW	6195	20	-28.26	-14.21	≥-58.26	Pass
			50*BW	6795	20	-28.26	-9.67	≥-58.26	Pass
151	5755MHz	Lower	10*BW	5325	40	-31.22	-9.58	≥-61.22	Pass
			20*BW	4925	40	-31.22	-3.05	≥-61.22	Pass
			50*BW	3725	40	-31.22	1.58	≥-61.22	Pass
		Upper	10*BW	6175	40	-31.22	1.12	≥-61.22	Pass
			20*BW	6575	40	-31.22	4.54	≥-61.22	Pass
			50*BW	7775	40	-31.22	3.52	≥-61.22	Pass
155	5775MHz	Lower	10*BW	4935	80	-34.26	3.36	≥-64.26	Pass
			20*BW	4135	80	-34.26	7.36	≥-64.26	Pass
			50*BW	1735	80	-34.26	9.70	≥-64.26	Pass
		Upper	10*BW	6615	80	-34.26	11.03	≥-64.26	Pass
			20*BW	7415	80	-34.26	14.32	≥-64.26	Pass
			50*BW	9815	80	-34.26	15.10	≥-64.26	Pass

Note: The BW(channel bandwidth) is 20MHz&40MHz&80MHz which is declared by the manufacturer of the equipment.

5. TEST SETUP PHOTOS OF THE EUT

Reference to the test report No. **GTS20240426022-1-14.**

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Reference to the test report No. **GTS20240426022-1-14.**

.....End of Report.....