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TEST REPORT

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

Report Reference No.: **CTL1906244051-WR05**

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Product Name.....: Beaglebone AI

Model/Type reference: Beaglebone AI

List Model(s).....: N/A

Trade Mark.....: N/A

Applicant's name: **BeagleBoard.org Foundation**

Address of applicant: 4467 Ascot Court Oakland Township, Michigan, US 48306

Test Firm: **Shenzhen CTL Testing Technology Co., Ltd.**

Address of Test Firm: Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road,
Nanshan District, Shenzhen, China 518055

Test specification.....:

Standard.....: **ETSI EN 300 440 V2.2.1 (2018-07)**

TRF Originator: Shenzhen CTL Testing Technology Co., Ltd.

Master TRF: Dated 2011-01

Date of receipt of test item.....: Jun. 26, 2019

Date of sampling: Jun. 26, 2019

Date of Test Date.....: Jun. 26, 2019–Jul. 08, 2019

Data of Issue.....: Jul. 09, 2019

Result.....: **Pass**

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TEST REPORT

Test Report No. :	CTL1906244051-WR05	Jul. 09, 2019
		Date of issue

Equipment under Test : Beaglebone AI

Model /Type : Beaglebone AI

Listed Models : N/A

Applicant : **BeagleBoard.org Foundation**

Address : 4467 Ascot Court Oakland Township, Michigan, US
48306

Manufacturer : **Embest Technology Co., Ltd**

Address : Tower B 4/F, Shanghai Building, Nanshan Yungu
Innovation Industry Park, Liuxian Ave. No.1183,
Taoyuan St., Nanshan District, Shenzhen,Chinas.

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

**** Modified History ****

[illegible]

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1 SUMMARY

1.1 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

Description

ETSI EN 300 440 Requirements		
Equivalent isotropically radiated power (e.i.r.p.)	ETSI EN 300 440 V2.2.1 Sub-clause 4.2.2	Pass
Permitted range of operating frequencies	ETSI EN 300 440 V2.2.1 Sub-clause 4.2.3	Pass
Unwanted emissions in the spurious domain	ETSI EN 300 440 V2.2.1 Sub-clause 4.2.4	Pass
Duty cycle	ETSI EN 300 440 V2.2.1 Sub-clause 4.2.5	Pass
Additional requirements for FHSS equipment	ETSI EN 300 440 V2.2.1 Sub-clause 4.2.6	N/A ^{Note 1}
Adjacent channel selectivity	ETSI EN 300 440 V2.2.1 Sub-clause 4.3.3	N/A ^{Note 2}
Blocking or desensitization	ETSI EN 300 440 V2.2.1 Sub-clause 4.3.4	N/A ^{Note 2}
Spurious radiations	ETSI EN 300 440 V2.2.1 Sub-clause 4.3.5	Pass

Note 1: Which only applicable to FHSS system device.

Note 2: Which not applicable to receiver class 3 device

1.2 Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

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

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology 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: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9518B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9518B on Jan. 22, 2019.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

1.3 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 CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology 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 CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.53dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	2.66dB	(1)

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

2 GENERAL INFORMATION

2.1 Environmental conditions

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

Temperature	NT: Normal Temperature	25°C
	HT: High Temperature	60°C
	LV: Low Temperature	-20°C
Voltage	NV: Normal Voltage	5.00V
	HV: High Voltage	5.75V
	LV: Low Voltage	4.25V
Other	Relative Humidity	55 %
	Air Pressure	101 kPa

2.2 General Description of EUT

Product Name:	Beaglebone AI			
Model/Type reference:	Beaglebone AI			
Power supply:	DC 5.0V			
5G WIFI:				
Supported type:	20MHz system	40MHz system	80MHz system	160MHz system
	802.11a 802.11n 802.11ac	802.11n 802.11ac	802.11ac	N/A
Operation frequency:	5745MHz-5825MHz	5755MHz-5795MHz	5775MHz	N/A
Modulation:	OFDM	OFDM	OFDM	N/A
Channel number:	5	2	1	N/A
Channel separation:	20MHz	40MHz	80MHz	N/A
Antenna type:	Internal Antenna			
Antenna gain:	1.5dBi			

Receiver categorization

The product family of short range radio devices is divided into three receiver categories, see table 5, each having a set of relevant receiver requirements and minimum performance criteria. The set of receiver requirements depends on the equipment manufacturer.

The receiver categories are defined as below:

Receiver categories		Relevant receiver clauses	Risk assessment of receiver performance
<input type="checkbox"/>	1	4.3.3, 4.3.4 and 4.3.5	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person).
<input type="checkbox"/>	2	4.3.4 and 4.3.5	Medium reliable SRD communication media e.g. causing inconvenience to persons, which cannot simply be overcome by other means.
<input checked="" type="checkbox"/>	3	4.3.5	Standard reliability SRD communication media and radiodetermination devices. E.g.

		Inconvenience to persons, which can simply be overcome by other means (e.g. manual).
--	--	--

Remark: this device is belong to category 3 declared by the manufacturer.

2.3 Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The user can control the EUT for staying in continuous transmitting mode for testing.

2.4 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.1 2	2019/05/24	2020/05/23
LISN	R&S	ESH2-Z5	860014/010	2019/05/24	2020/05/23
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2019/05/24	2020/05/23
EMI Test Receiver	R&S	ESCI	1166.5950.03	2019/05/24	2020/05/23
Spectrum Analyzer	Agilent	E4407B	MY41440676	2019/05/24	2020/05/23
Spectrum Analyzer	Agilent	N9020	US46220290	2019/05/24	2020/05/23
Controller	EM Electronics	EM 1000	060859	2019/05/24	2020/05/23
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2019/05/24	2020/05/23
Active Loop Antenna	Da Ze	ZN30900A	/	2019/05/24	2020/05/23
Amplifier	Agilent	8449B	3008A02306	2019/05/24	2020/05/23
Amplifier	Agilent	8447D	2944A10176	2019/05/24	2020/05/23
Temperature/Humidity Meter	Gangxing	CTH-608	02	2019/05/24	2020/05/23
High-Pass Filter	micro-tranics	HPM50108	G174	2019/05/24	2020/05/23
High-Pass Filter	micro-tranics	HPM50111	G142	2019/05/24	2020/05/23
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	2019/05/24	2020/05/23
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2019/05/24	2020/05/23
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2019/05/24	2020/05/23
RF Cable	Megalon	RF-A303	N/A	2019/05/24	2020/05/23

The calibration interval was one year

2.5 Modifications

No modifications were implemented to meet testing criteria.

3 TEST CONDITIONS AND RESULTS

3.1 Transmitter requirements

3.1.1 6dB Bandwidth

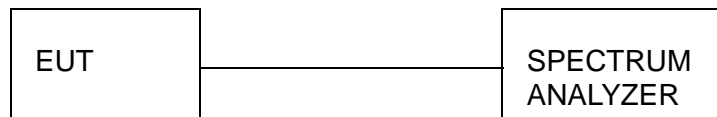
Limit

N/A

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration

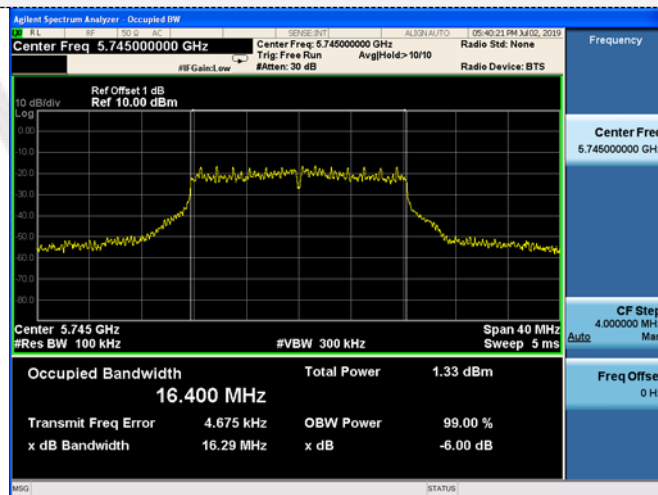


Test Results

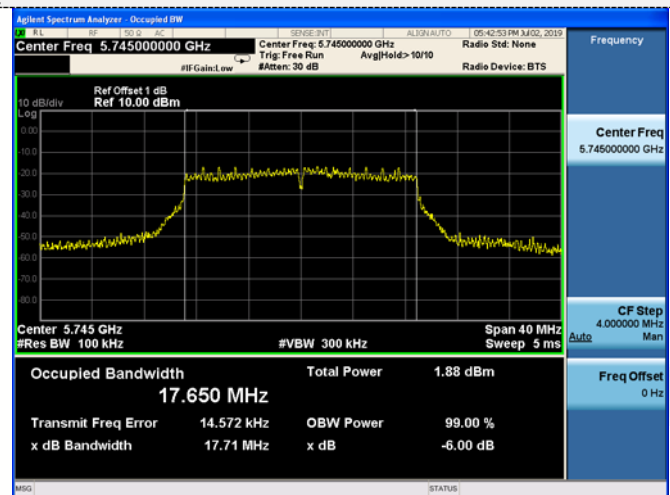
Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	149	16.29	N/A	N/A
	157	16.30		
	165	16.30		
802.11n20MHz	149	17.71	N/A	N/A
	157	17.59		
	165	17.65		
802.11n40MHz	151	36.39	N/A	N/A
	159	36.26		
802.11ac20MHz	149	17.65	N/A	N/A
	157	17.32		
	165	17.58		
802.11ac40MHz	151	36.32	N/A	N/A
	159	36.39		
802.11ac80MHz	155	74.94	N/A	N/A

Test plot as follows:

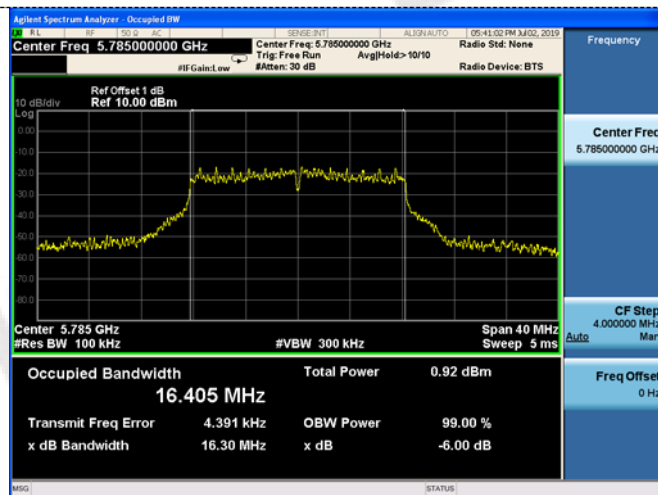
802.11a



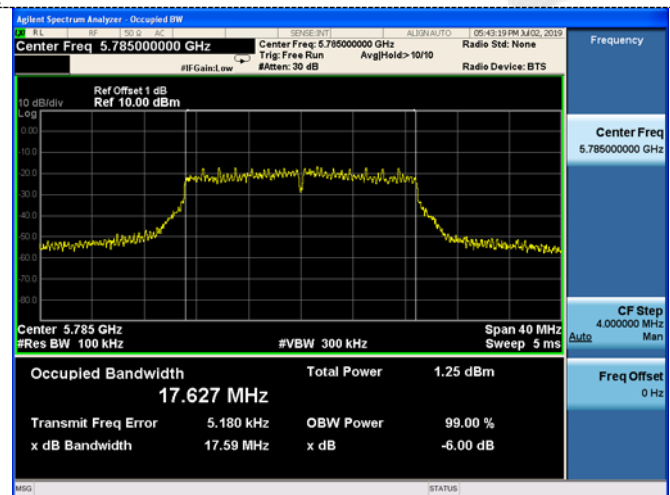
802.11n20Mhz



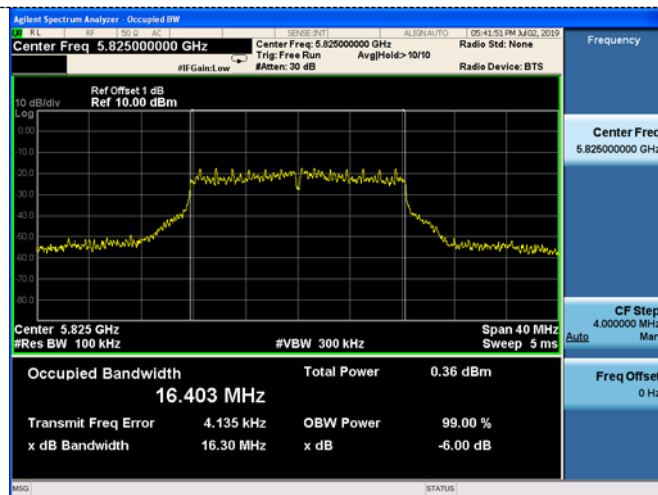
CH149



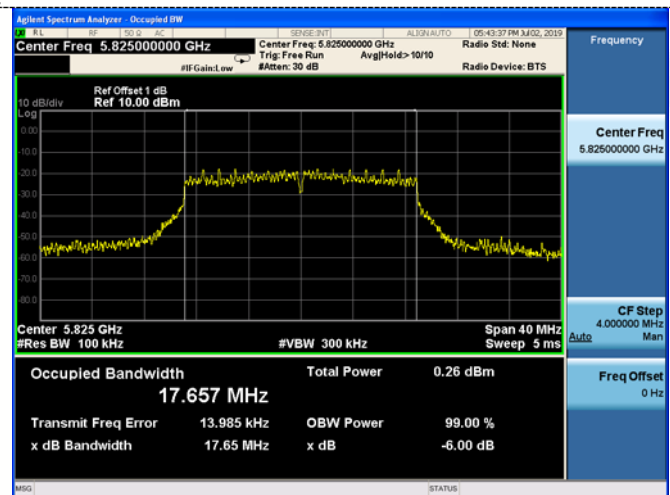
CH149



CH157



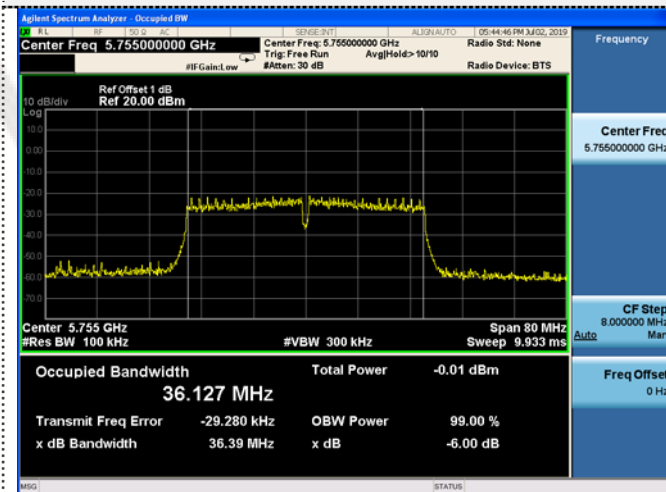
CH157



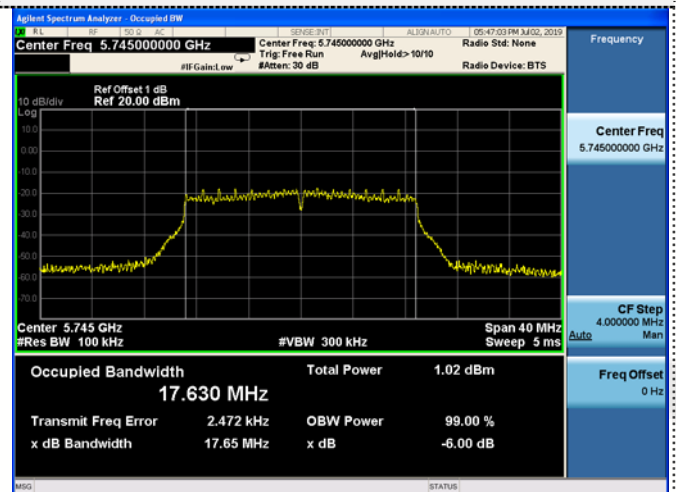
CH165

CH165

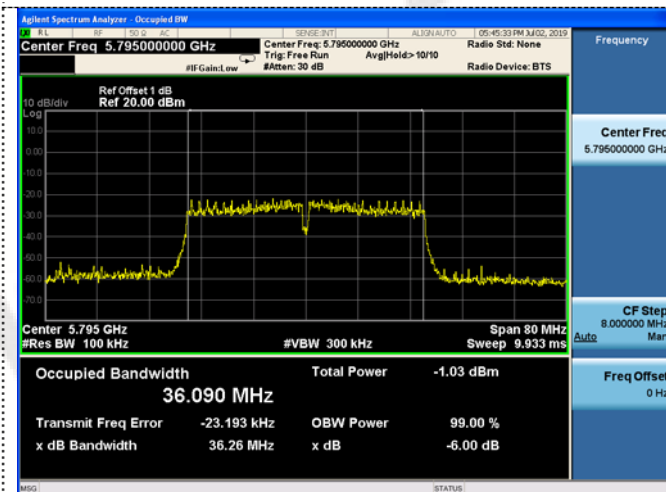
802.11n40Mhz



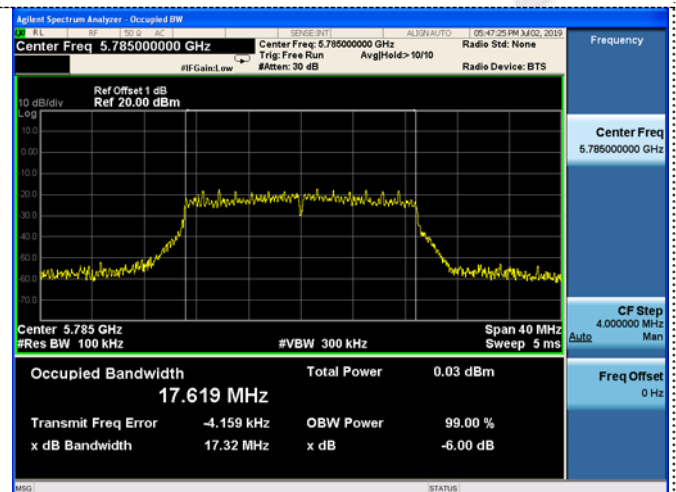
802.11ac20Mhz



CH151



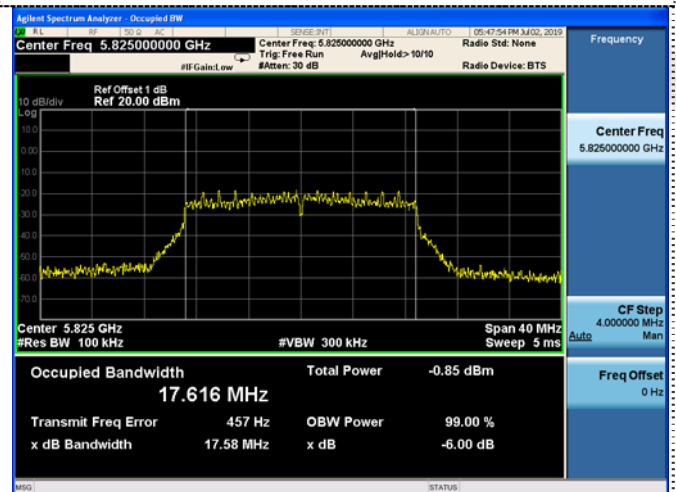
CH149



CH159

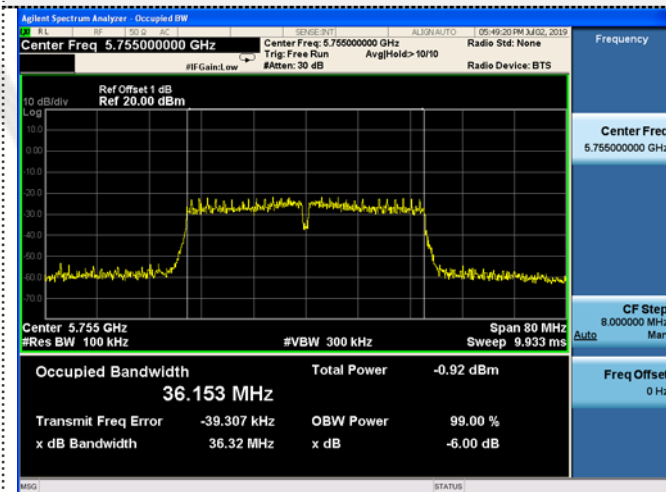


CH157

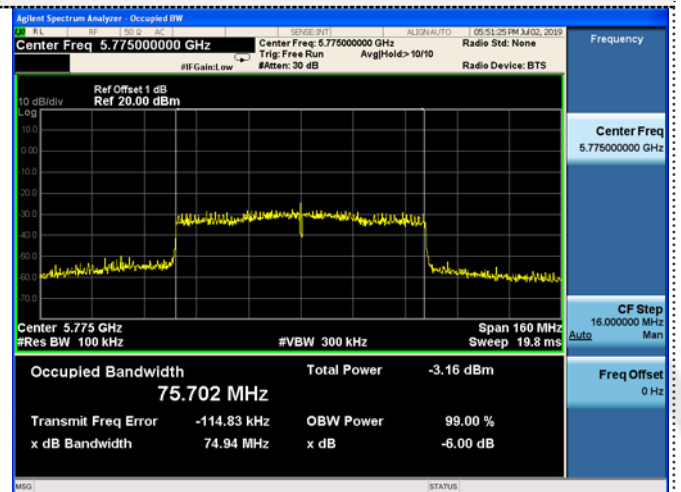


CH165

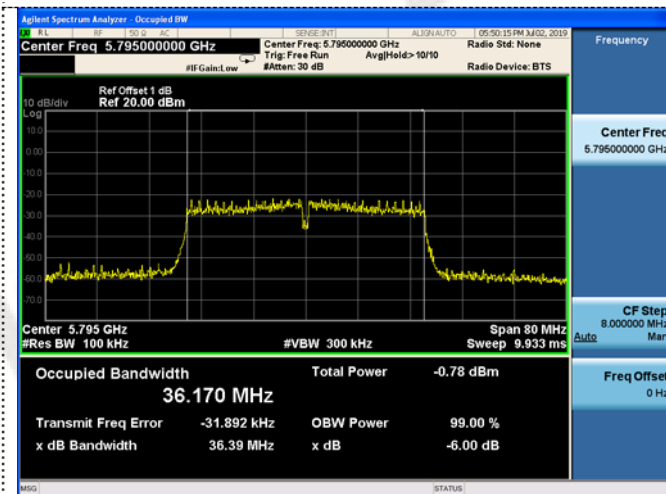
802.11ac40Mhz



802.11ac80Mhz



CH151



CH159

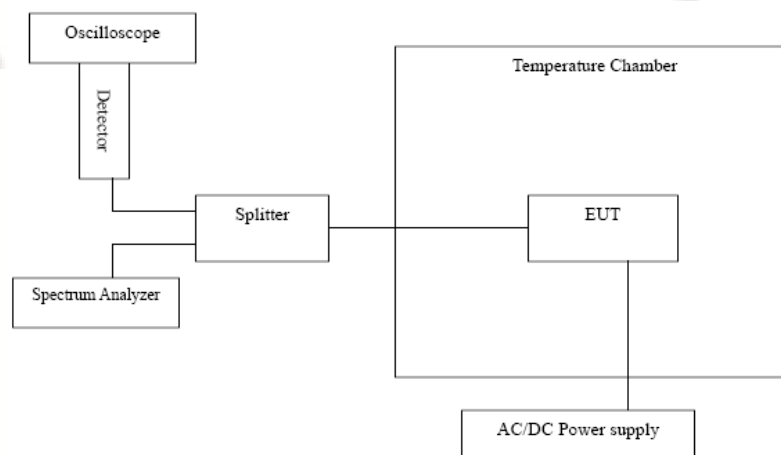
3.1.2 Equivalent Isotropically Radiated Power (e.i.r.p)

LIMIT

The transmitter maximum e.i.r.p. under normal and extreme test conditions is provided in table below:

Frequency Bands	Power	Application	Notes
2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Non-specific short range devices	
2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Radio determination devices	
(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 D
(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 D
5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Non-specific short range devices	
9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radio determination devices	
9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radio determination devices	
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radio determination devices	
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radio determination devices	
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radio determination devices	See annex F
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and Radio determination devices	

TEST CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 300 440 V2.2.1 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 V2.2.1 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 (°C)	Voltage (V)						
T _{Nor} (25°C)	5.00V	149/5745	3.01	1.50	4.51	13.98	PASS
T _{min} (-20°C)	5.75V		2.88	1.50	4.38		
	4.25V		2.76	1.50	4.26		
T _{Max} (+60°C)	5.75V		2.89	1.50	4.39		
	4.25V		2.71	1.50	4.21		
T _{Nor} (25°C)	5.00V	157/5785	2.59	1.50	4.09		
T _{min} (-20°C)	5.75V		2.41	1.50	3.91		
	4.25V		2.49	1.50	3.99		
T _{Max} (+60°C)	5.75V		2.53	1.50	4.03		
	4.25V		2.47	1.50	3.97		
T _{Nor} (25°C)	5.00V	165/5825	2.19	1.50	3.69		
T _{min} (-20°C)	5.75V		2.08	1.50	3.58		
	4.25V		2.03	1.50	3.53		
T _{Max} (+60°C)	5.75V		2.11	1.50	3.61		
	4.25V		2.14	1.50	3.64		

802.11n20Mhz							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (°C)	Voltage (V)						
T _{Nor} (25°C)	5.00V	149/5745	-3.66	1.50	-2.16	13.98	PASS
T _{min} (-20°C)	5.75V		-3.45	1.50	-1.95		
	4.25V		-3.61	1.50	-2.11		
T _{Max} (+60°C)	5.75V		-3.52	1.50	-2.02		
	4.25V		-3.48	1.50	-1.98		
T _{Nor} (25°C)	5.00V	157/5785	-3.92	1.50	-2.42		
T _{min} (-20°C)	5.75V		-3.87	1.50	-2.37		
	4.25V		-3.81	1.50	-2.31		
T _{Max} (+60°C)	5.75V		-3.76	1.50	-2.26		
	4.25V		-3.89	1.50	-2.39		
T _{Nor} (25°C)	5.00V	165/5825	-4.38	1.50	-2.88		
T _{min} (-20°C)	5.75V		-4.46	1.50	-2.96		
	4.25V		-4.51	1.50	-3.01		
T _{Max} (+60°C)	5.75V		-4.49	1.50	-2.99		
	4.25V		-4.58	1.50	-3.08		

802.11n40Mhz							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (°C)	Voltage (V)						
T _{Nor} (25°C)	5.00V	151/5755	-5.40	1.50	-3.90	13.98	PASS
T _{min} (-20°C)	5.75V		-5.51	1.50	-3.61		
	4.25V		-5.62	1.50	-4.12		
T _{Max} (+60°C)	5.75V		-5.47	1.50	-3.97		
	4.25V		-5.53	1.50	-4.03		
T _{Nor} (25°C)	5.00V	159/5795	-5.86	1.50	-4.36		
T _{min} (-20°C)	5.75V		-6.01	1.50	-4.51		
	4.25V		-6.14	1.50	-4.64		
T _{Max} (+60°C)	5.75V		-6.18	1.50	-4.68		
	4.25V		-6.22	1.50	-4.72		

802.11ac20Mhz							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (°C)	Voltage (V)						
T _{Nor} (25°C)	5.00V	149/5745	2.60	1.50	4.10	13.98	PASS
T _{min} (-20°C)	5.75V		2.54	1.50	4.04		
	4.25V		2.48	1.50	3.98		
T _{Max} (+60°C)	5.75V		2.51	1.50	4.01		
	4.25V		2.44	1.50	3.94		
T _{Nor} (25°C)	5.00V	157/5785	2.09	1.50	3.59		
T _{min} (-20°C)	5.75V		2.01	1.50	3.51		
	4.25V		1.94	1.50	3.44		
T _{Max} (+60°C)	5.75V		1.98	1.50	3.48		
	4.25V		1.83	1.50	3.33		
T _{Nor} (25°C)	5.00V	165/5825	1.68	1.50	3.18		
T _{min} (-20°C)	5.75V		1.53	1.50	3.03		
	4.25V		1.47	1.50	2.97		
T _{Max} (+60°C)	5.75V		1.56	1.50	3.06		
	4.25V		1.48	1.50	2.98		

802.11ac40Mhz							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (°C)	Voltage (V)						
T _{Nor} (25°C)	5.00V	151/5755	-6.30	1.50	-4.80	13.98	PASS
T _{min} (-20°C)	5.75V		-6.47	1.50	-4.97		
	4.25V		-6.58	1.50	-5.08		
T _{Max} (+60°C)	5.75V		-6.45	1.50	-4.98		
	4.25V		-6.51	1.50	-5.01		
T _{Nor} (25°C)	5.00V	159/5795	-6.25	1.50	-4.75		
T _{min} (-20°C)	5.75V		-6.37	1.50	-4.87		
	4.25V		-6.45	1.50	-4.95		
T _{Max} (+60°C)	5.75V		-6.34	1.50	-4.84		
	4.25V		-6.49	1.50	-4.99		

802.11ac80Mhz							
Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (°C)	Voltage (V)						
T _{Nor} (25°C)	5.00V	155/5775	-8.79	1.50	-7.29	13.98	PASS
T _{min} (-20°C)	5.75V		-8.87	1.50	-7.37		
	4.25V		-8.91	1.50	-7.41		
T _{Max} (+60°C)	5.75V		-8.84	1.50	-7.34		
	4.25V		-8.96	1.50	-7.46		

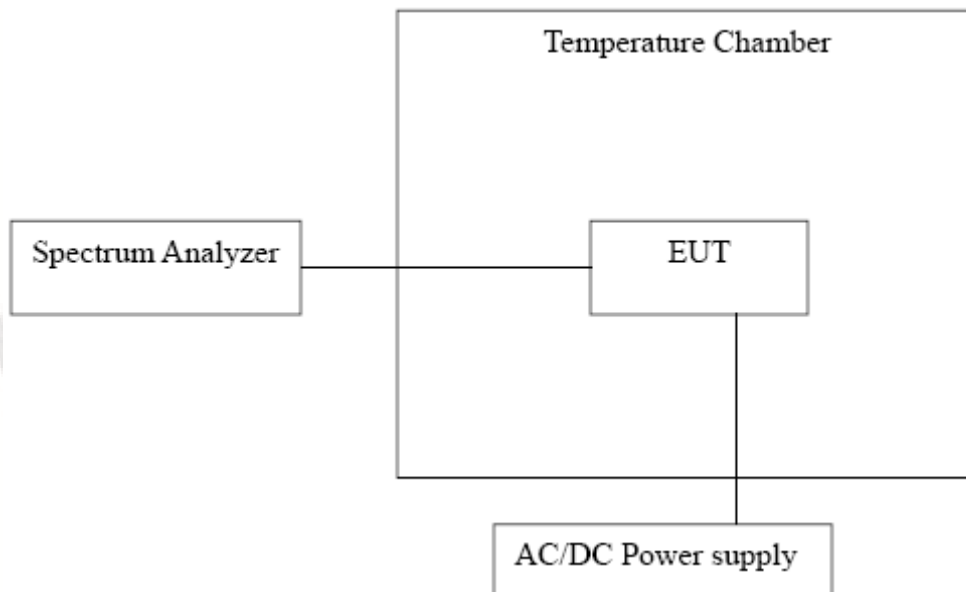
3.1.3 Permitted range of operating frequencies

LIMIT

For all equipment the frequency range shall lie within the assigned frequency band. For non-harmonized frequency bands the available frequency range may differ between national administrations.

Frequency range Limit	
$F_{Low} > 5725G$	$F_{High} < 5875GHz$

TEST CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 300 440 V2.2.1 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 V2.2.1 clause 4.2.3.3 for the measurement method.

TEST RESULTS

Remark: All test modes were test and recorded worst case at 802.11ac mode

802.11ac20MHz					
Test Condition		f_L (MHz)	f_H (MHz)	Limit	Result
Temperature (°C)	Voltage (V)				
T_{Nor} (25°C)	5.00	5736.215	5833.857	$f_L \geq 5725MHz$ and $f_H \leq 5875MHzGHz$	Pass
T_{min} (-20°C)	5.75	5736.221	5833.863		
	4.25	5736.245	5833.841		
T_{max} (+60°C)	5.75	5736.223	5833.829		
	4.25	5736.274	5833.837		

802.11ac40MHz					
Test Condition		f_L (MHz)	f_H (MHz)	Limit	Result
Temperature (°C)	Voltage (V)				
T_{Nor} (25°C)	5.00	5736.844	5813.015	$f_L \geq 5725\text{MHz}$ and $f_H \leq 5875\text{MHzGHz}$	Pass
T_{min} (-20°C)	5.75	5736.846	5813.022		
	4.25	5736.838	5813.017		
T_{max} (+60°C)	5.75	5736.854	5813.019		
	4.25	5736.863	5813.014		

802.11ac80MHz					
Test Condition		f_L (MHz)	f_H (MHz)	Limit	Result
Temperature (°C)	Voltage (V)				
T_{Nor} (25°C)	5.00	5737.721	5812.284	$f_L \geq 5725\text{MHz}$ and $f_H \leq 5875\text{MHzGHz}$	Pass
T_{min} (-20°C)	5.75	5737.724	5812.289		
	4.25	5737.711	5812.281		
T_{max} (+60°C)	5.75	5737.719	5812.283		
	4.25	5737.720	5812.288		

3.1.4 Unwanted emissions in the spurious domain

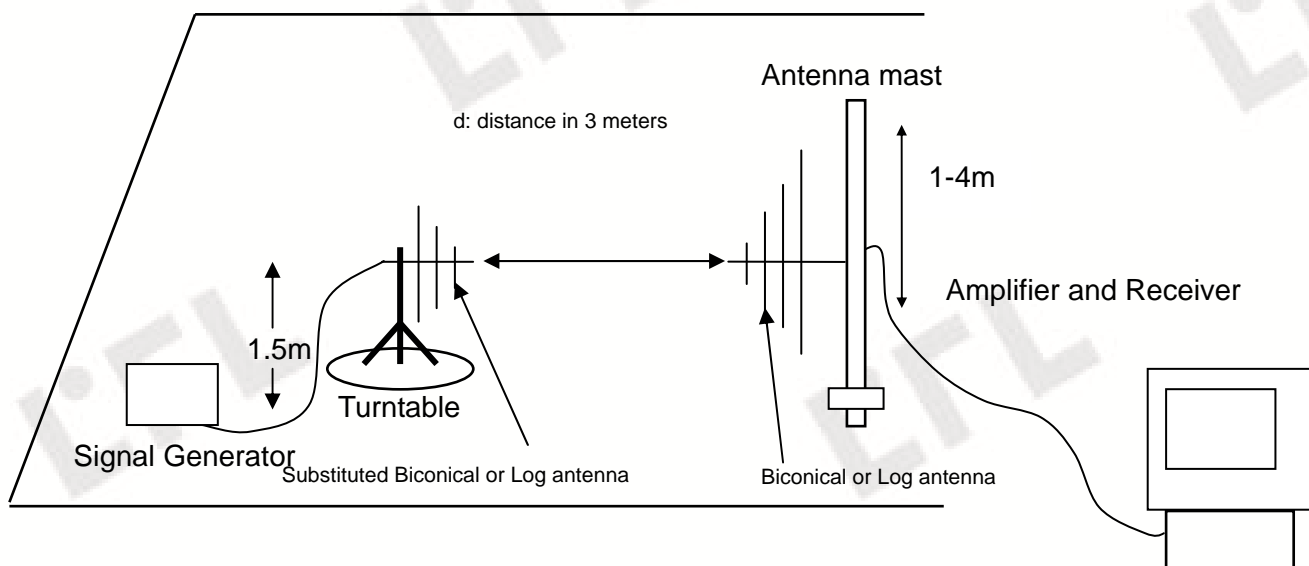
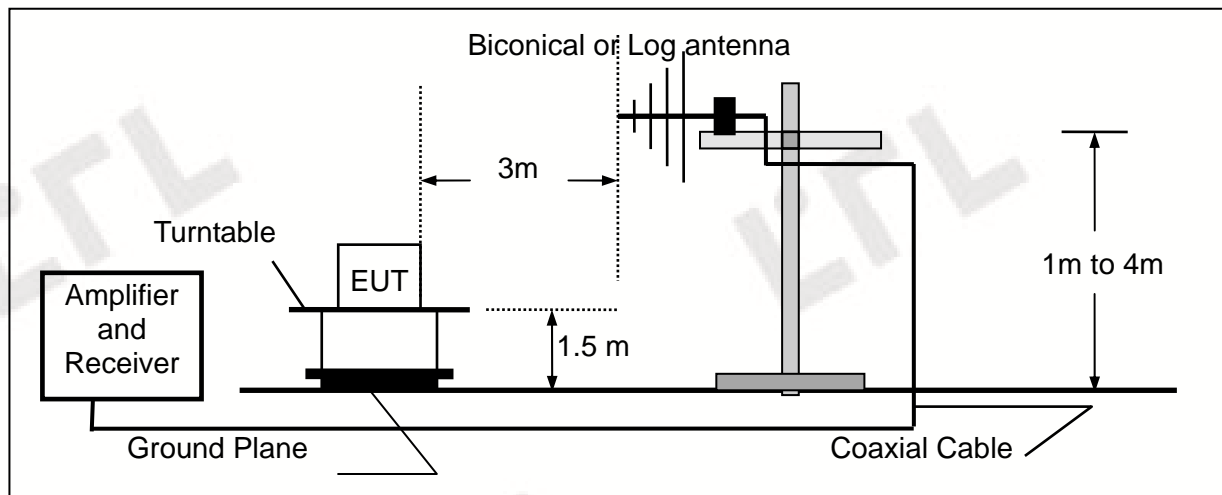
LIMIT

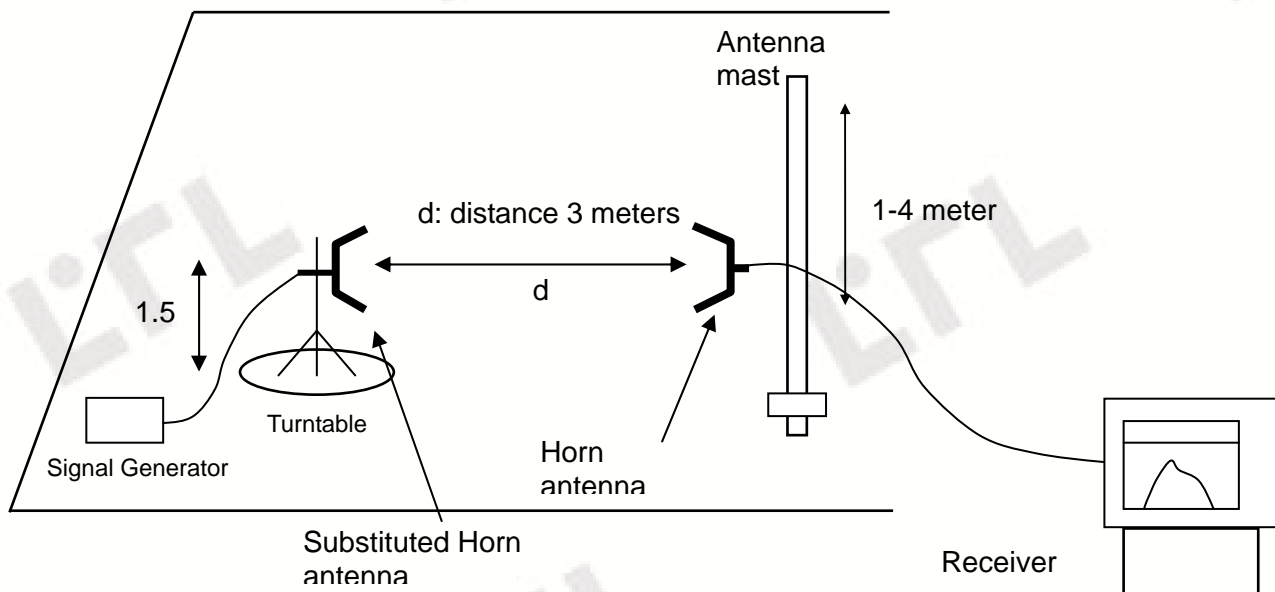
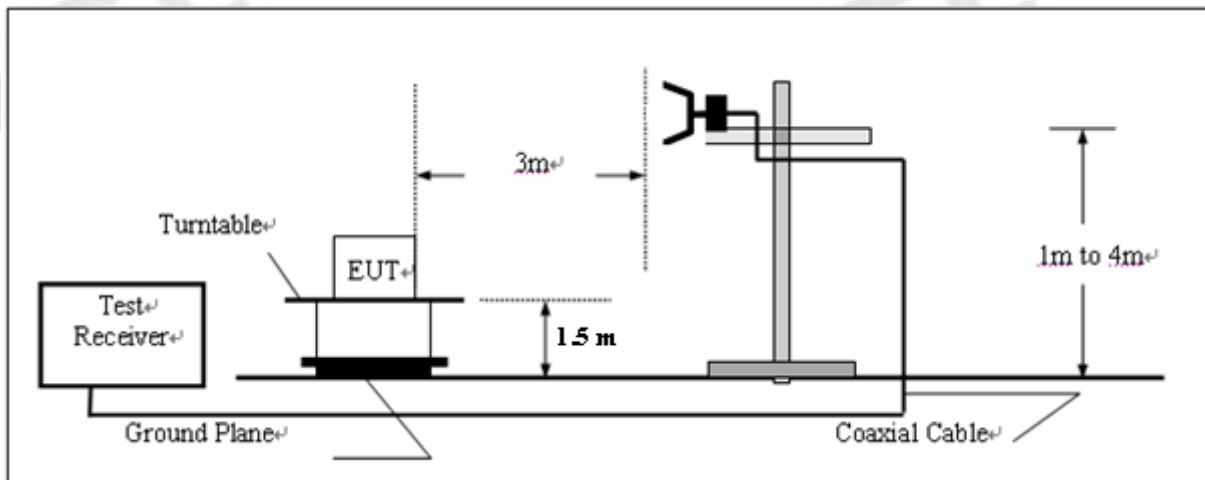
The maximum power limits of any unwanted emissions in the spurious domain are given in table below:

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

TEST CONFIGURATION

Below 1GHz

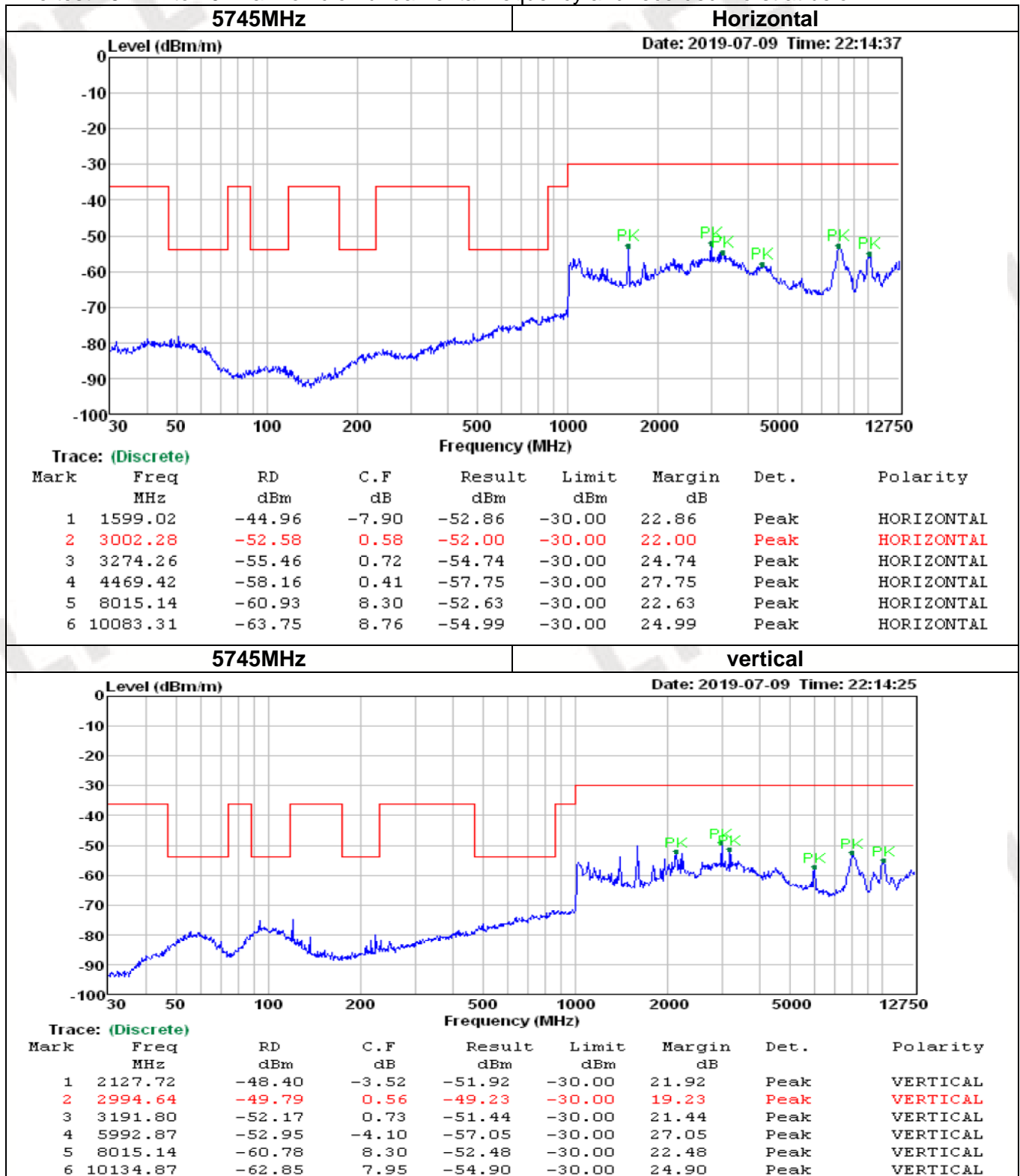


Above 1GHz**TEST PROCEDURE**

1. Please refer to ETSI EN 300 440 V2.2.1 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 V2.2.1 clause 4.2.4.3 for the measurement method.

TEST RESULTS

We test 25MHz to 10th harmonic of fundamental frequency and recorded worst at below:



Note: Note Above 12.75GHz have been tested and found no emission except floor noise.

3.1.5 Duty cycle

LIMIT

In a period of 1 hour the duty cycle shall not exceed the values give in table below for specified frequency band.

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	Detection, movement and alert applications	
(a) 2 446 MHz to 2 454 MHz	No Restriction	RFID	Limits shown in annex D shall apply
(b) 2 446 MHz to 2 454 MHz	≤ 15 %	RFID	Limits shown in annex D shall apply
5 725 MHz to 5 875 MHz	No Restriction	Generic use	
9 200 MHz to 9 500 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
9 500 MHz to 9 975 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
10,5 GHz to 10,6 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
13,4 GHz to 14,0 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
17,1 GHz to 17,3 GHz	DAA or equivalent techniques	Radiodetermination: GBSAR detecting and movement and alert applications	Limits shown in annex F shall apply
24,00 GHz to 24,25 GHz	No Restriction	Generic use and for Radiodetermination: radar, detection, movement and alert applications	

TEST RESULTS

For device working in frequency band 5725MHz to 5875MHz, no duty cycle restricted.

3.2 Receiver requirements

3.2.1 Spurious radiations

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

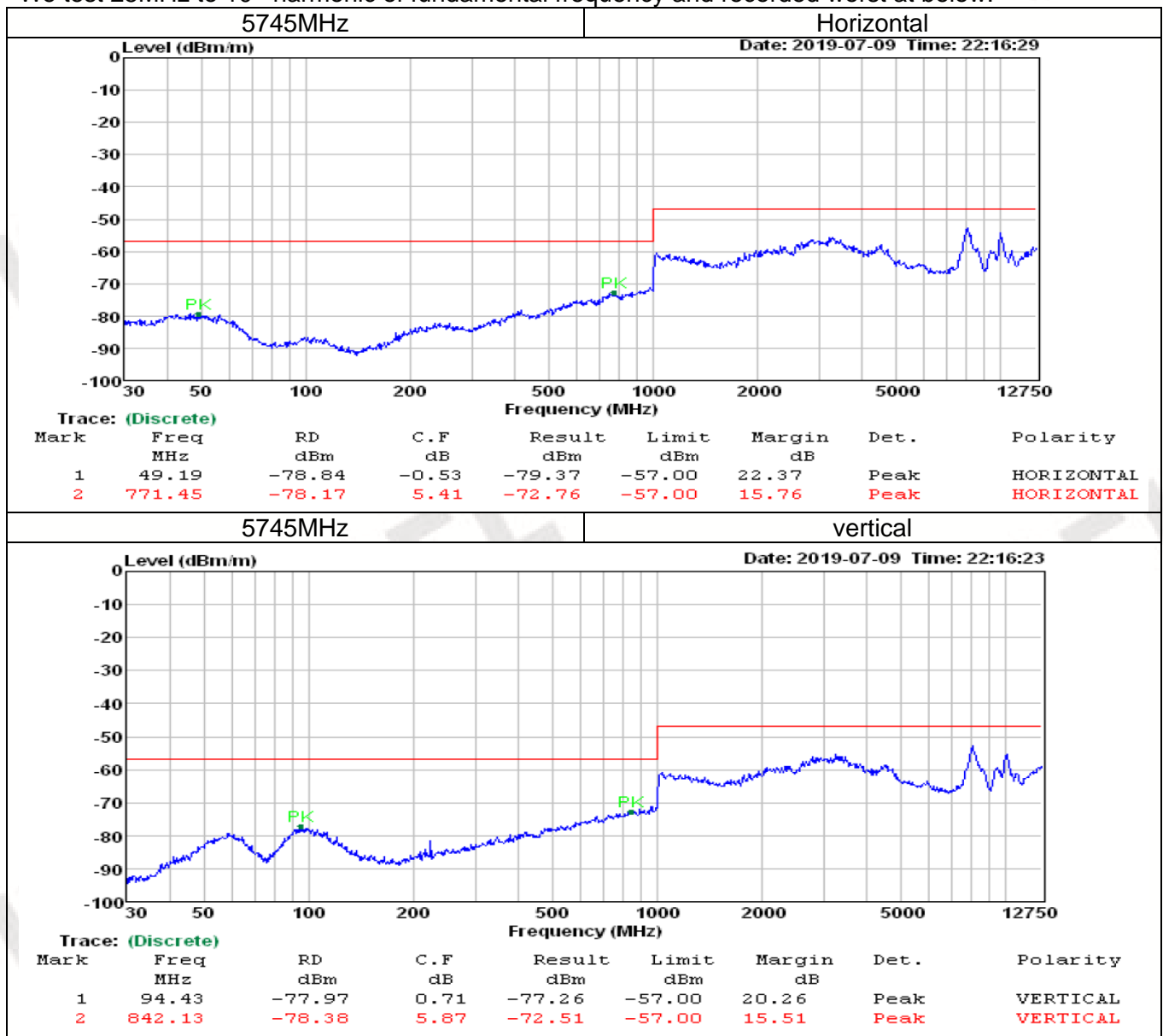
The same as described in section 3.1.4

TEST PROCEDURE

1. Please refer to ETSI EN 300 440 V2.2.1 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 V2.2.1 clause 4.3.5.3 for the measurement method.

TEST RESULTS

We test 25MHz to 10th harmonic of fundamental frequency and recorded worst at below:



Note: Note Above 12.75GHz have been tested and found no emission except floor noise

3.2.2 Blocking or desensitization

LIMIT

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table below, 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:

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

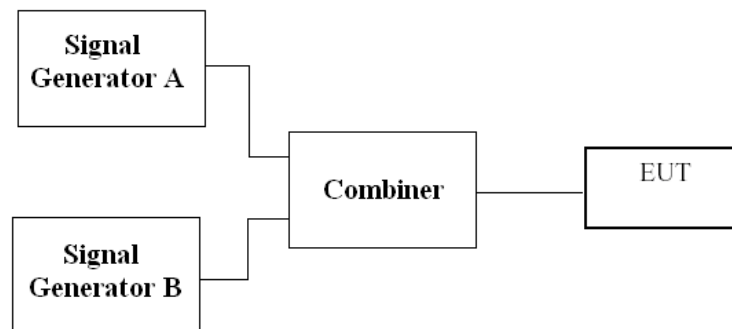
Where:

- f is the frequency in GHz;
- BW is the occupied bandwidth in MHz.

The factor k is limited within the following:

- $-40 \text{ dB} < k < 0 \text{ dB}$.

TEST CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 300 440 V2.2.1 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 V2.2.1 clause 4.3.4.3 for the measurement method.

TEST RESULTS

BW=20MHz (defined by the manufacturer)

Test Condition		Test frequency (MHz)	Measurement Position (MHz)	Result Measured (dbm)	Limit (dbm)	Result
Temperature (°C)	Voltage (V)					
T Nor(25°C)	5.0V	5745	4736.215	-40.36	-87.65	PASS
			5336.215	-42.58		PASS
			5536.215	-43.74		PASS
		5825	6033.857	-41.12	-87.75	PASS
			6233.857	-42.56		PASS
			6833.857	-43.56		PASS

BW=40MHz (defined by the manufacturer)

Test Condition		Test frequency (MHz)	Measurement Position (MHz)	Result Measured (dbm)	Limit (dbm)	Result
Temperature (°C)	Voltage (V)					
T Nor(25°C)	5.0V	5775	3736.844	-40.12	-90.44	PASS
			4936.844	-43.62		PASS
			5336.844	-42.25		PASS
		5795	6213.015	-40.28	-90.84	PASS
			6613.015	-38.04		PASS
			7813.015	-42.12		PASS

BW=80MHz (defined by the manufacturer)

Test Condition		Test frequency (MHz)	Measurement Position (MHz)	Result Measured (dbm)	Limit (dbm)	Result
Temperature (°C)	Voltage (V)					
T Nor(25°C)	5.0V	5775	1737.721	-41.27	-94.02	PASS
			4137.721	-42.16		PASS
			4937.721	-40.72		PASS
			6612.284	-42.52		PASS
			7412.284	-43.68		PASS
			9812.284	-41.28		PASS

4 Test Setup Photos of the EUT



5 External and Internal Photos of the EUT

Reference to the test report No. CTL1906244051-WE

***** End of Report *****