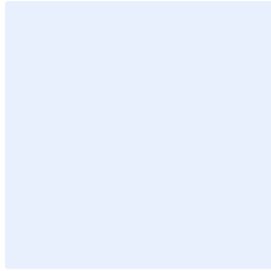


Prüfbericht-Nr.: <i>Test report no.:</i>	IN24FO3U 001	Auftrags-Nr.: <i>Order no.:</i>	146912000 010	Seite 1 von 47 Page 1 of 47
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	2133653	Auftragsdatum: <i>Order date:</i>	03-05-2024	
Auftraggeber: <i>Client:</i>	Halsa Baby Inc 2626 Cole Avenue, Suite 429, Dallas, TX 75204 USA			
Prüfgegenstand: <i>Test item:</i>	Hälsa Baby All-In-One Wellness Monitor			
Bezeichnung <i>Identification</i>	HB2.0	Serien -Nr.: <i>Serial no.:</i>	Engineering Sample	
Auftrags-Inhalt: <i>Order content:</i>	Testing and issue of Test report with Grant Certificate			
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15 Subpart C 15.247,15.205, 15.207 & 15.209 RSS 247 Issue 3 & RSS Gen Issue 5			
Wareneingangsdatum: <i>Date of sample receipt:</i>	03-05-2024			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003710897-001 & A003710897-002			
Prüfzeitraum: <i>Testing period:</i>	03-05-2024 - 01-06-2024			
Ort der Prüfung: <i>Place of testing:</i>	Wireless laboratory, Bangalore			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (India) Pvt. Ltd. 27/B,2nd cross road, Electronic city Phase1, Bangalore-560100, India FCC Test Site Registration No: 496599 IC Test Site Registration No: 27711			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i>	Ausstellatum: <i>Issue date:</i>			
Stellung / Position:	M.V.Naveen Kumar Senior Engineer	Stellung / Position:	Madhu K.N Assistant Manager	
Sonstiges / Other:	FCC ID: 2BCMF-HALSAV02 IC : 32365-HALSAV02 HVIN: HBV10			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

- | | |
|---|---|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</p> <p>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p> |
| 2 | <p>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben.</p> <p><i>As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.</i></p> |
| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</p> <p>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i></p> <p><i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p> |
| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird.</p> <p><i>The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report.</i></p> |

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TEST SUMMARY

For Wi-Fi:

Test Item	FCC Clause	ISED Clause	Result
Maximum conducted output power	15.247 (b)(3)	RSS 247 Issue 3, Section 5.4 (d)	Pass
Maximum Power Spectral Density	15.247(e)	RSS 247 Issue 3, Section 5.2 (b)	Pass
DTS Bandwidth & Occupied Channel Bandwidth	15.247(a)(2)	RSS 247 Issue 3, Section 5.2 (a)	Pass
Emissions in non-restricted frequency bands	15.247 (d)	RSS 247 Issue 3, Section 5.5	Pass
Spurious Radiated Emissions and Restricted Bands of Operation	15.209 / 15.205	RSS-Gen Issue 3, Section 8.9 /8.10	Pass
AC Power lines Conducted emission	15.207	RSS-Gen Issue 5, Section 8.8	Pass

For BLE:

Test Item	FCC Clause	ISED Clause	Result
Maximum conducted output power	15.247 (b)(3)	RSS 247 Issue 3, Section 5.4 (d)	Pass
Maximum Power Spectral Density	15.247(e)	RSS 247 Issue 3, Section 5.2 (b)	N/T
DTS Bandwidth & Occupied Channel Bandwidth	15.247(a)(2)	RSS 247 Issue 3, Section 5.2 (a)	N/T
Emissions in non-restricted frequency bands	15.247 (d)	RSS 247 Issue 3, Section 5.5	N/T
Spurious Radiated Emissions and Restricted Bands of Operation	15.209 / 15.205	RSS-Gen Issue 3, Section 8.9 /8.10	Pass
AC Power lines Conducted emission	15.207	RSS-Gen Issue 5, Section 8.8	Pass

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Note:

The product uses certified RF modules with **FCC ID: SH6MDBT50Q & IC: 8017A-MDBT50Q** , Hence the above mentioned test cases are excluded and which can be found in the module test report of respective FCC ID & IC

Product	Applicant	FCC ID	IC	Report No	Issued By	Grant Date
Bluetooth Low Energy & IEEE 802.15.4 Combo Module	Raytac Corporation	SH6MDBT50Q	8017A- MDBT50Q	E2/2018/50091	SGS Taiwan Ltd	26/07/2018

Product Category: Electronics Testing

Test Discipline: EMC Test Facility

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REVISION HISTORY OF THIS REPORT

Report Number	Version	Description	Issue date
IN24FO3U 001	01	Initial Issue of Test Report	19-07-2024

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1 GENERAL REMARKS

1.1 Attachments

All attachments are part of this test report and are issued in separate document

1. Test Setup photos
2. EUT External Photos
3. EUT Internal Photos
4. FCC Label and Label Location
5. Block Diagram
6. Specification of EUT
7. Schematic Diagrams
8. Bill of Material
9. User Manual
10. Maximum Permissible Exposure Information

2 TEST SITES

2.1 Testing Facilities

- | | |
|---|--|
| <p>1. TÜV Rheinland (India) Pvt.Ltd.,
27/B, 2nd Cross,
ElectronicCityPhase1
Bangalore – 560 100,
India
Radiated Measurement site type :
Fully anechoic chamber (used for above
1GHz measurements)</p> | <p>2. TUV Rheinland (India) Pvt.Ltd.,
108, Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.
India
Radiated Measurement site type :
Semi anechoic chamber (used for below
1GHz measurements)</p> |
|---|--|

2.2 List of Test and Measurement Instruments

Table 1: List of test and measurement instruments

Equipment	Manufacturer	Model Name	Serial Number	Firmware Versions	Calibration Due Date	Periodicity	Test Facility
EMI Receiver	Rohde & Schwarz	ESW 44	101732	4.73 SP5	30.07.2024	Yearly	Radiated Spurious Emission
Active loop antenna	Frankonia	LAX-10	LAX-10-800	-	23-03-2025	Yearly	
Balun & Biconical Antenna	Schwarzbeck mess-elektronik	VHBB-9124 / BBA-9106	01028	-	08.02.2025	Yearly	
Log-Periodic Antenna	Schwarzbeck mess-elektronik	VUSLP-9111B	9111B-111	-	08.02.2025	Yearly	
Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-01944	-	28.10.2024	Yearly	
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-0904	-	15-01-2025	Yearly	
EMI Test Receiver	Rohde & Schwarz	ESW44	101773	1.72.SP1	26.01.2025	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	-	
Fully Anechoic Chamber	Albatross	-	-	-	-	-	
Signal Analyzer	Rohde & Schwarz	FSV7	101644	3.40	09.02.2025	Yearly	Conducted Test Parameters
Open Switch & Control Unit	Rohde & Schwarz	OSP120 Incl. B157	OSP120-101323 & B157-100894	1.27.0.0	05.01.2025	Yearly	
Vector Signal Generator	Rohde & Schwarz	SMBV 100A	260789	4.15.125.49	09.02.2025	Yearly	
RF and microwave Signal Generator	Rohde & Schwarz	SMB 100A	108788	3.01.203.32	09.02.2025	Yearly	
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	1201.0002K 50	3.7	28.10.2024	Yearly	
MicroWave Switch System	KITHELEY	S46	1012004	-	-	-	
Vector Signal Generator	Rohde & Schwarz	SMU200A	100994	-	02.05.2025	Yearly	
Fading Simulator	Rohde & Schwarz	ABFS	100179	-	19.09.2024	Yearly	
Spectrum Analyzer	Rohde & Schwarz	FSU26	200767	-	19.09.2024	Yearly	

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Equipment	Manufacturer	Model Name	Serial Number	Firmware Versions	Calibration Due Date	Periodicity	Test Facility
EMI Receiver	Rohde & Schwarz	ESR7	101133	3.48 SP3	29.07.2024	Yearly	Conducted AC Power line Test
Two Line V- Network (LISN)	Rohde & Schwarz	ENV 216	100022	-	05.10.2024	Yearly	
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100811	-	12.07.2024	Yearly	

Table 2: Instrument application Software versions

SL. No.	Test Type	Application software	Version
1	Radiated spurious emission measurement in FAC	EMC 32	10.60.20
2	Radiated spurious emission measurement in 10mtr SAC	BAT EMC	3.20.0.17

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

The Hälsa Baby is an All-In-One Wellness Monitor that uses a smart sensor to track your baby's readings.

The product package contains two main devices, Hälsa Hub and Hälsa SmartSensor, accompanied with Ankle Bands, Power adapter and Power cable.

The Hälsa Smart Sensor will estimate your baby's skin temperature and SPO2 to measure any variations from your baby's personal baseline. The Hälsa Smart Sensor is inbuilt with sensors, which is the data acquisition point. The Smart Sensor directly communicates via BLE with the Hälsa Hub. The Hälsa Smart Sensor has the capability to measure the following parameters.

- PPG Signal from the optical sensor.
- Track the baby's body temperature.
- Track the baby's motion.
- Status of the Battery

3.2 Ratings and System Details of Equipment under Test

Table 3: Ratings and System Details as declared by Supplier*

Radio Protocol	Bluetooth Low Energy	Wi-Fi
Operating Frequency Range	2402MHz-2480MHz	2412MHz to 2462MHz
No. of Channels	40	11 (Refer Table 5)
Channel Spacing	2MHz	5MHz
Transmitting Power level	8dBm	Refer the clause 12
Measured e.i.r.p (dBm)	7.89dBm@2442MHz(1Mbps)	19.12dBm@2462MHz (G-mode 54Mbps)
Modulation	GFSK	802.11b: DQPSK, DBPSK, CCK (20MHz Channels) 802.11g: OFDM/64-QAM, 16-QAM, QPSK, BPSK (20MHz Channels), 802.11n: OFDM/64-QAM, 16-QAM, QPSK, BPSK (20MHz Channels)
Number of antennas	1	1
Antenna Gain	0.41dBi	2.2dBi for 2.4GHz & 5.2dBi for 5GHz
Antenna Type	PCB Antenna	Chip Antenna P/N: W3006
Supply Voltage to Product	5VDC, 3A through AC/DC Adapter	
Environmental conditions	Storage Temp: -10°C to +45°C	
	Operating Temp: 0°C to +40°C	
EUT Dimension(L x W x H)	152.4 x 76.2 x 50.8 (mm) (L x W x H)	

***Disclaimer:** The information/data is supplied by the client and the same is considered to arrive at the final value. Any changes made apart from the specified specification, can directly impact on the tests results. Refer the products user manual for more details.

3.3 Measurement Uncertainty:

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k = 2$

Table 4: Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 5 \%$
RF output power, conducted	$\pm 1.5 \text{ dB}$
Power Spectral Density, conducted	$\pm 3 \text{ dB}$
Unwanted Emissions, conducted	$\pm 3 \text{ dB}$
All emissions, radiated	$\pm 6 \text{ dB}$
Temperature	$\pm 3 \text{ }^{\circ}\text{C}$
Supply Voltages	$\pm 3 \%$
Time	$\pm 5 \%$

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle transmission on low, mid and high channel.

4.2 Test Operation and Test Software

Hardware Version: HBV10

Hardware Name: Halsa Hub

Software Version: Release 2(0.0.43)

4.3 Special Accessories and Auxiliary Equipment

Model Number	Power Adapter Ratings
XY-0049	Input: 100-240V ~ 50/60Hz 0.5A Max Output: 5V = 3A, 9V = 2A, 12V = 1.5A

4.4 Countermeasures to achieve EMC Compliance

- None

4.5 Simultaneous Operation

Device supports Simultaneous Operation of BLE & Wi-Fi 2.4GHz

4.6 List of frequencies

Frequency Band (GHz)	Channel No.	Frequency (MHz)
BLE (2.4-2.4835)	0	2402
	1	2404
	2	2406
	3	2408
	:	:
	:	:
	18	2438
	19	2440
	20	2442
	:	:
	:	:
	36	2474
	37	2476
	38	2478
	39	2480

Table 5: List of BLE centre frequencies

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Channel used for BLE testing

Channel low: 2402MHz

Channel mid: 2442MHz

Channel high: 2480MHz

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2412 – 2462	1	2412
	2	2417
	3	2422
	4	2427
	5	2432
	6	2437
	7	2442
	8	2447
	9	2452
	10	2457
	11	2462

Table 6: List of Wi-Fi center Frequencies

Channel used for Wi-Fi 2.4GHz testing

Protocol: WLAN 802.11b

Channel Low : 2412 MHz

Channel Mid : 2437 MHz

Channel High : 2462 MHz

Protocol: WLAN 802.11g

Channel Low : 2412 MHz

Channel Mid : 2437 MHz

Channel High : 2462 MHz

Protocol: WLAN 802.11n_20MHz

Channel Low : 2412 MHz

Channel Mid : 2437 MHz

Channel High : 2462 MHz

4.7 TUV Sample Identification

1. TUV Sample Identification number: A003710897-001– Radiated test Sample
A003710897-002– Conducted test Sample

4.8 Report Reference

Note: Product **Hälsa All-In-One Baby Wellness Monitor** has multiple protocols. All the supported wireless protocols and their respective test results are issued in separate test reports, following table lists the report numbers.

Radio Protocol	Report Number
RF Test report for BLE (2.4GHz) & WI-FI(2.4GHz) – (This report)	IN24FO3U 001
RF Test report for Wi-Fi 5GHz	IN24WR8Y 001

5 OPERATIONAL DESCRIPTION

The Hälsa SmartSensor device contains a FCC-certified Bluetooth Low Energy (BLE) module - ISP1807 (on module antenna). Contains FCC ID: 2AAQS-ISP1807.

The Hälsa Hub manages the nursery environment and maintains the connection between the Hälsa Smart Sensor device via BLE and with a router via Wi-Fi. Furthermore, it makes the local alerts based on the processed data.

Hälsa Hub needs to be powered by connected power through a USB wall adapter. This also acts as the charging dock for the Hälsa Smart Sensor device.

Hälsa Hub contains the following features.

- Customizable Night Light
- Customizable and Intelligent Sound Machines and Music
- Touch sensor
- Touch-sensitive Quick Control for Presets
- Audio Monitor
- Two-way communication from the App
- Alexa/Google Home integration
- Environmental sensor for humidity and temperature
- Easy snap on charging for the wearable
- Vitals out of range Alarms/Alerts
- Bluetooth low energy, Wi-Fi 2.4GHz and 5GHz
- Connected power through USB wall adapter

The Hälsa Hub device contains MDBT50Q-P1MV2 BLE module which contains the FCC ID: SH6MDBT50Q and AP6256 Dual Band 2.4GHz. 5GHz WiFi module.

The BLE and Wi-Fi modules are 80mm apart from each other on the same PC board and on the same layer, i.e., the top side. The SmartSensor contains a small lithium polymer battery pack, which will be charged via the Hälsa Hub. The Hälsa Hub is powered by FCC certified USB power adaptor.

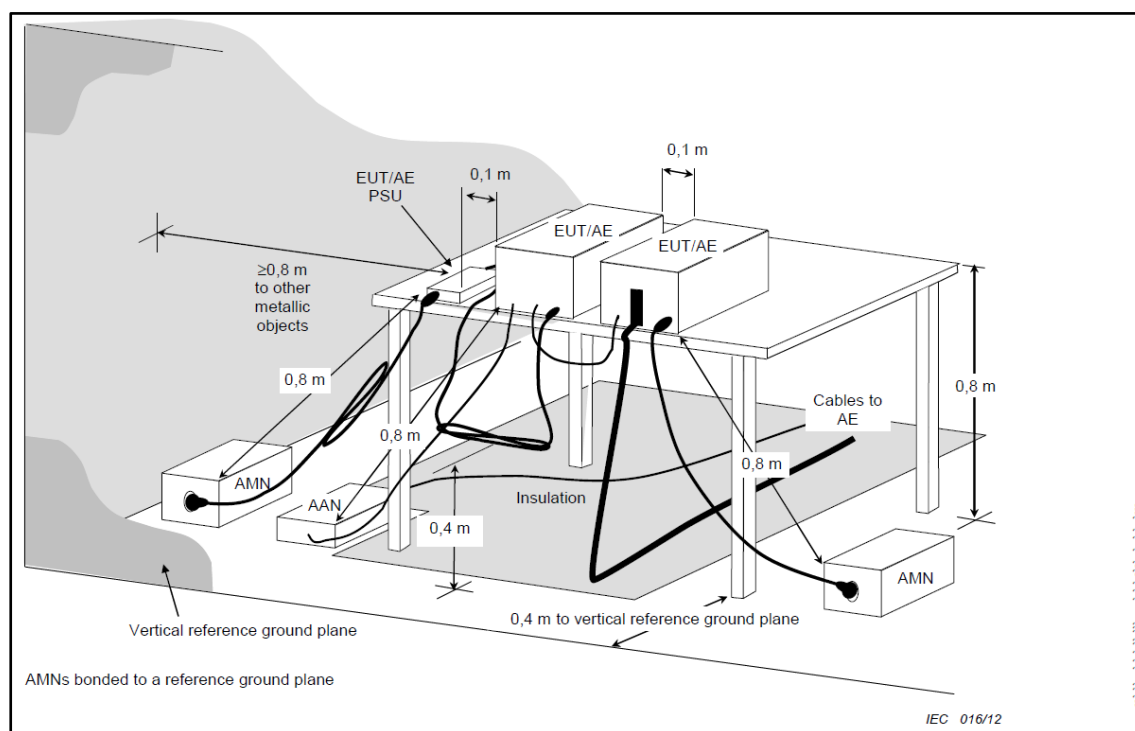
6 TEST METHODOLOGY

6.1 AC Powerlines Conducted Emission

Measured levels of ac power-line conducted emission across the 50Ω LISN port (to which the EUT is connected). All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer.

The device is placed on the test table, raised 80cm above the reference ground plane. The vertical conducting plane is located 40cm to the rear of the device. AC Conducted emission measurement is made over frequency range from 150 kHz to 30 MHz, this measurement was performed an AC adaptor 110V AC 60Hz supply

6.1.1 Test Setup Configuration



6.2 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Balloon and Biconical Antenna, and measurement from 200 MHz to 1 GHz was performed by Log-Periodic Antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded

6.2.1 Test Setup Configuration

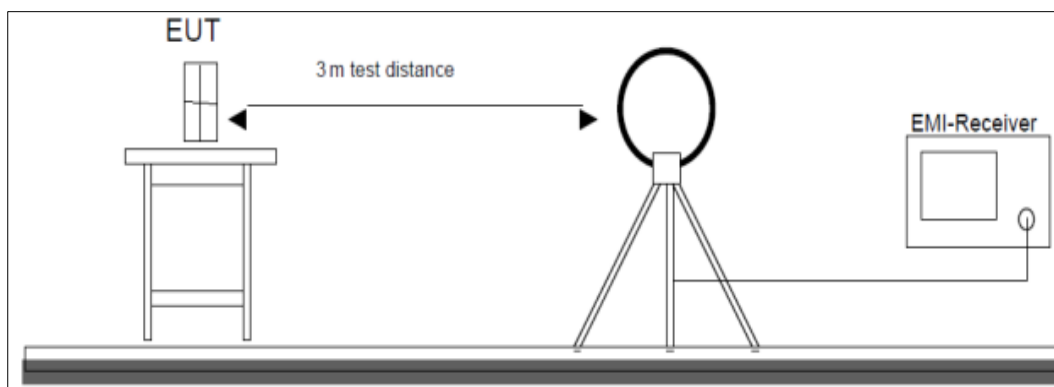


Figure 1: Frequency Range 9 kHz- 30 MHz

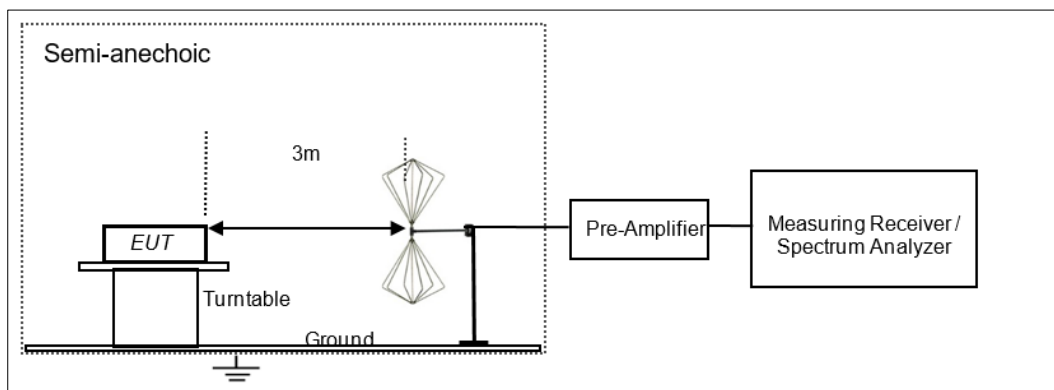


Figure 2: Frequency Range 30 MHz – 200 MHz

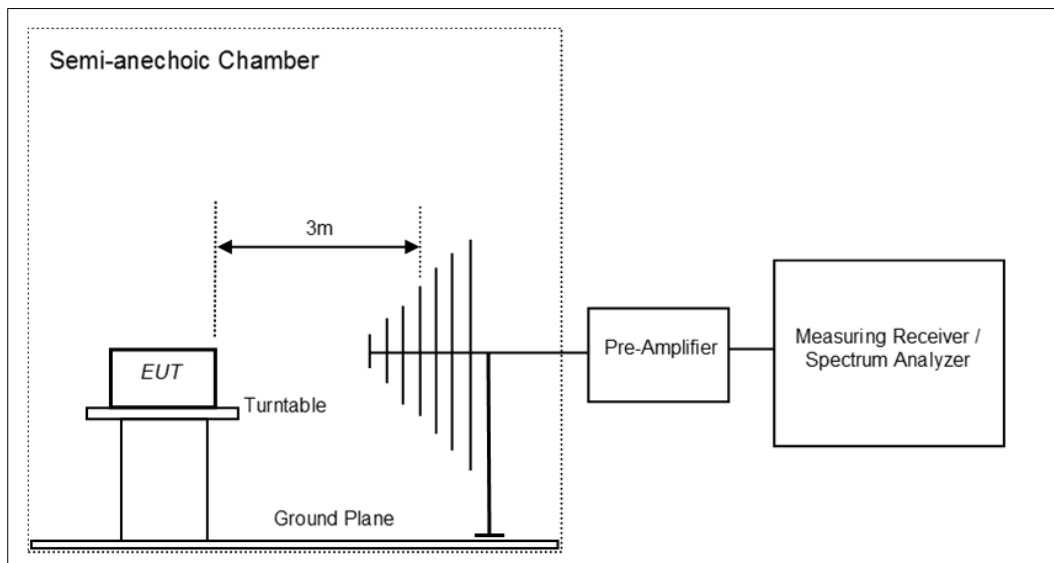


Figure 3: Frequency Range 200 MHz - 1GHz

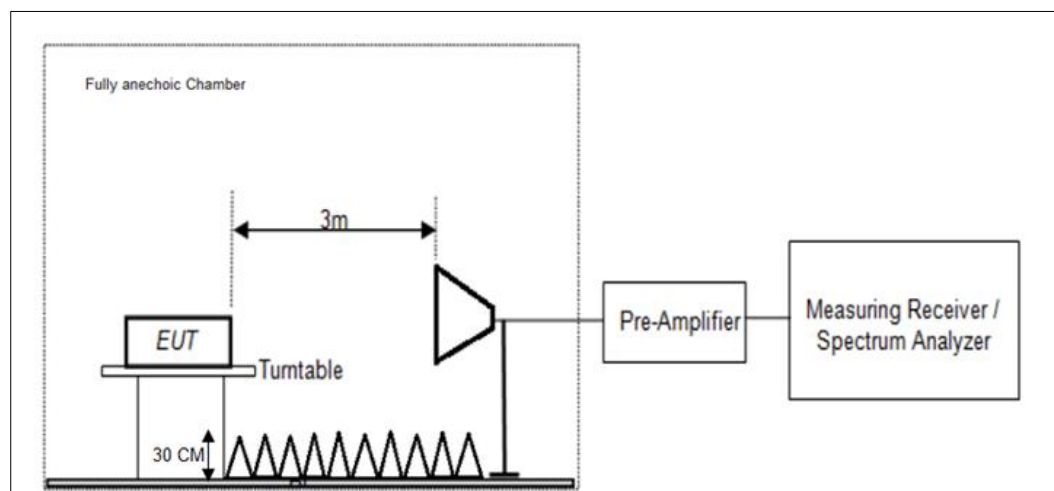


Figure 4: Frequency Range above 1 GHz

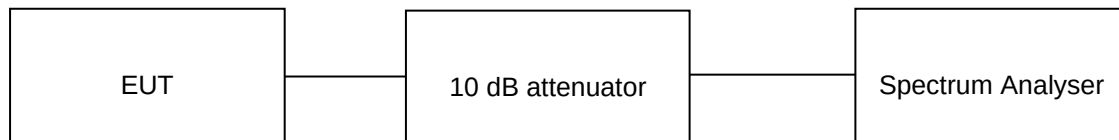
7 TEST RESULTS FOR BLE

7.1 Maximum Peak Conducted Output Power

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (b)(3) RSS 247 Issue 3, Section 5.4(d)
Test Method	Subclause 11.9.1.1 of ANSI C63.10
Measurement Bandwidth	1MHz for 1Mbps 3MHz for 2Mbps
Detector	Peak
Port of testing	Antenna port
Requirement	Power ≤ 1 W (30 dBm) & e.i.r.p ≤ 4 W (36 dBm)



Test Condition

Normal Test Condition:

Temperature (Norm) = + 22.1 °C Voltage = 5VDC through AC/DC Adapter Relative humidity: 65%

KDB Guidelines applied:

Measurements were made as per section 8.3.1.1 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

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Test results:

Note:

1. All the losses are included during measurement and final values are mentioned in the test report
2. Total Peak Output power (dBm) = Measured Peak power (dBm) + Attenuator factor (10dB) + Cable loss (0.6dB)
3. This product do not support additional beamforming gain / directional gain, it uses single antenna and hence Directional gain of the single antenna is 0.41 dBi

Data Rate	Channel Frequency (MHz)	Measured Peak Power (dBm)	Measured e.i.r.p (dBm)	FCC Limit (dBm)	IC Limit e.i.r.p (dBm)
1Mbps	2402	7.41	7.82	30.00	36.00
	2442	7.48	7.89	30.00	36.00
	2480	7.48	7.89	30.00	36.00
2Mbps	2402	6.19	6.60	30.00	36.00
	2442	6.24	6.65	30.00	36.00
	2480	6.43	6.84	30.00	36.00

***Note:** For test plots please refer the **Appendix-Test plots**

7.2 Spurious Radiated Emissions & Restricted Bands of Operation

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (d) / (15.209 & 15.205) RSS Gen Issue 5, Section 8.9 & 8.10
Test Method	ANSI C63.10
Measurement Location	Semi Anechoic Chamber 9kHz - 1 GHz Fully Anechoic Chamber 1 GHz - 40GHz
Measurement Bandwidth	100 kHz for frequency range < 1GHz 1 MHz for Frequency range >1GHz
Detector	Refer remarks below
Measuring Distance	3 m
Requirement	As per the limits mentioned in the below table
Test setup	Refer 6.2 TEST METHODOLOGY

Table 7: Transmitter limits for Radiated emission

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54 dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Conditions:

Temperature (Norm) = + 21.5 °C

Voltage = 5VDC through AC/DC Adapter

Relative humidity: 63%

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Test results:

Note: All the losses are included during measurement and final values are mentioned in the test report. Refer TEST METHODOLOGY for more details

Test results for frequency range 9 kHz – 30 MHz

No emissions found in frequency range 9 kHz to 30 MHz, and measured levels are below 20dB from the limit line, hence not reported

Table 8: Test results for frequency range 30MHz – 200MHz

Antenna Polarization	Measured Frequency (MHz)	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	46.35(PK)	25.01	40.00	-14.99
	76.95(PK)	33.32	40.00	-6.68
	92.82(PK)	32.50	43.50	-11.00
	99.99(PK)	32.17	43.50	-11.33
	147.30(PK)	29.51	43.50	-13.99
Horizontal	77.52(PK)	25.79	40.00	-14.21
	85.05(PK)	30.67	40.00	-9.33
	94.59(PK)	35.32	43.50	-8.18
	117.36(PK)	21.39	43.50	-22.11
	174.75(PK)	27.32	43.50	-16.18

Table 9: Test results for frequency range 200MHz – 1GHz

Antenna Polarization	Measured Frequency (MHz)	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	449.99	36.75	46.00	-9.25
	531.68	36.84	46.00	-9.16
	550.00	36.15	46.00	-9.85
	575.67	27.81	46.00	-18.19
	599.99	27.63	46.00	-18.37
	725.18	33.15	46.00	-12.85
	814.01	39.08	46.00	-6.92
Horizontal	400.20	28.36	46.00	-17.64
	429.11	37.13	46.00	-8.87
	550.01	37.99	46.00	-8.01
	573.05	38.41	46.00	-7.59

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Table 10: Test results for the frequencies above 1GHz:

Data Rate: 1Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Emission level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2402	2402(Pk)	Vertical	95.98	-	-
	2402(Av)		94.98	-	-
	2338(Pk)		43.16	74.00*	-30.84
	2338(Av)		36.52	54.00*	-17.48
	4804(Pk)		41.22	74.00	-32.78
	4804(Av)		29.88	54.00	-24.12
	7206(Pk)		48.08	74.00	-25.92
	7206(Av)		35.29	54.00	-18.71
	2402(Pk)	Horizontal	92.40	-	-
	2402(Av)		91.42	-	-
	2338(Pk)		42.02	74.00*	-31.98
	2338(Av)		33.54	54.00*	-20.46
	4804(Pk)		42.40	74.00	-31.60
	4804(Av)		29.39	54.00	-24.61
	7206(Pk)		47.28	74.00	-26.72
	7206(Av)		35.62	54.00	-18.38
2442	2442(Pk)	Vertical	95.19	-	-
	2442(Av)		94.18	-	-
	4884(Pk)		41.89	74.00	-32.11
	4884(Av)		29.12	54.00	-24.88
	7326(Pk)		47.26	74.00	-26.74
	7326(Av)		35.30	54.00	-18.70
	2442(Pk)	Horizontal	90.25	-	-
	2442(Av)		89.24	-	-
	4884(Pk)		41.46	74.00	-32.54
	4884(Av)		29.29	54.00	-24.71
	7326(Pk)		47.56	74.00	-26.44
	7326(Av)		35.69	54.00	-18.31
2480	2480(Pk)	Vertical	94.52	-	-
	2480(Av)		93.48	-	-
	2483.5(Pk)		45.84	74.00*	-28.16
	2483.5(Av)		32.98	54.00*	-21.02
	4960(Pk)		41.45	74.00	-32.55
	4960(Av)		29.69	54.00	-24.31
	7440(Pk)		48.51	74.00	-25.49
	7440(Av)		36.11	54.00	-17.89
	2480(Pk)	Horizontal	89.77	-	-
	2480(Av)		88.75	-	-
	2483.5(Pk)		42.22	74.00*	-31.78
	2483.5(Av)		29.37	54.00*	-24.63
	4960(Pk)		42.17	74.00	-31.83
	4960(Av)		29.69	54.00	-24.31
	7440(Pk)		48.22	74.00	-25.78
	7440(Av)		36.04	54.00	-17.96

_ → Fundamental Frequency

*→ Restricted Band edges

Pk: Peak Detector; Av: Average Detector

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Data Rate: 2Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Emission level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2402	2402(Pk)	Vertical	94.59	-	-
	2402(Av)		91.91	-	-
	2338(Pk)		43.25	74.00*	-30.75
	2338(Av)		34.46	54.00*	-19.54
	4804(Pk)		41.40	74.00	-32.60
	4804(Av)		29.67	54.00	-24.33
	7206(Pk)		47.97	74.00	-26.03
	7206(Av)		35.26	54.00	-18.74
	2402(Pk)	Horizontal	91.67	-	-
	2402(Av)		89.05	-	-
	2338(Pk)		40.64	74.00*	-33.36
	2338(Av)		30.62	54.00*	-23.38
	4804(Pk)		40.82	74.00	-33.18
	4804(Av)		29.06	54.00	-24.94
	7206(Pk)		47.10	74.00	-26.90
	7206(Av)		35.23	54.00	-18.77
2442	2442(Pk)	Vertical	95.67	-	-
	2442(Av)		93.17	-	-
	4884(Pk)		41.00	74.00	-33.00
	4884(Av)		29.15	54.00	-24.85
	7326(Pk)		47.88	74.00	-26.12
	7326(Av)		35.74	54.00	-18.26
	2442(Pk)	Horizontal	90.77	-	-
	2442(Av)		88.29	-	-
	4884(Pk)		41.61	74.00	-32.39
	4884(Av)		29.09	54.00	-24.91
	7326(Pk)		47.04	74.00	-26.96
	7326(Av)		35.33	54.00	-18.67
2480	2480(Pk)	Vertical	94.53	-	-
	2480(Av)		91.95	-	-
	2483.5(Pk)		49.53	74.00*	-24.47
	2483.5(Av)		37.20	54.00*	-16.80
	4960(Pk)		41.69	74.00	-32.31
	4960(Av)		29.71	54.00	-24.29
	7440(Pk)		47.73	74.00	-26.27
	7440(Av)		35.83	54.00	-18.17
	2480(Pk)	Horizontal	89.65	-	-
	2480(Av)		87.11	-	-
	2483.5(Pk)		45.23	74.00*	-28.77
	2483.5(Av)		32.88	54.00*	-21.12
	4960(Pk)		42.27	74.00	-31.73
	4960(Av)		29.58	54.00	-24.42
	7440(Pk)		48.42	74.00	-25.58
	7440(Av)		35.90	54.00	-18.10

_ → Fundamental Frequency

*→ Restricted Band edges

Pk: Peak Detector; Av: Average Detector

***Note:** For test plots please refer the **Appendix-Test plots**

8 TEST RESULTS FOR Wi-Fi

8.1 Duty Cycle

Test Method	Subclause 11.6 of ANSI C63.10 for duty cycle
Measurement Duty Cycle	Refer Test Method below
Detector	Peak/Average
Port of testing	Antenna port

Test Method



Test Condition:

Normal Test Condition:

Temperature (Norm) = + 22.3 °C Voltage = 5VDC, 3A via Power adapter Relative humidity: 62 %

KDB Guidelines applied:

Measurements were made as per section 6 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

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Note:

1. All the losses are included during measurement and final values are mentioned in the test report.

Test Results:

Modulation	Data rate	Channel Frequency (MHz)	Duty Cycle (%)	Duty cycle correction factor (dB)
802.11b	1Mbps	2412	99.77	0.01
		2437	99.77	0.01
		2462	99.77	0.01
	11Mbps	2412	98.17	0.08
		2437	98.17	0.08
		2462	98.17	0.08
802.11g	6Mbps	2412	99.08	0.04
		2437	99.08	0.04
		2462	99.08	0.04
	54Mbps	2412	92.46	0.34
		2437	92.46	0.34
		2462	92.46	0.34
802.11n HT20	MCS0	2412	99.08	0.04
		2437	99.08	0.04
		2462	99.08	0.04
	MCS7	2412	91.62	0.38
		2437	91.62	0.38
		2462	91.62	0.38

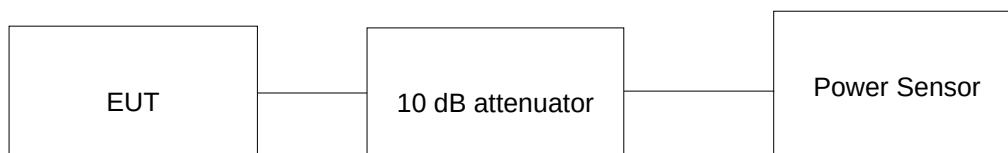
8.2 Maximum Average Conducted Output Power

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (b)(3) RSS 247 Issue 3, Section 5.4 (d)
Test Method	Subclause 11.9.2.2.4 of ANSI C63.10
Detector	Average
Port of testing	Antenna port
Requirement	Power ≤ 1 W (30 dBm) & e.i.r.p ≤ 4 W (36 dBm)

Test Method



Test Condition

Normal Test Condition:

Temperature (Norm) = + 22.3 °C Voltage = 5VDC Through AC/DC Adapter Relative humidity: 62%

KDB Guidelines applied:

Measurements were made as per section 8.3.2.2 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

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Test results:

Note:

1. All the losses are included during measurement and final values are mentioned in the test report.
2. This product do not support additional beamforming gain / directional gain, it uses signal antenna and hence directional gain of the single antenna is 2.20 dBi

Modulation	Data rate	Channel Frequency (MHz)	Measured Average Power (dBm)	Measured e.i.r.p (dBm)	FCC Limit (dBm)	ISED e.i.r.p Limit (dBm)
802.11b	1Mbps	2412	12.57	14.77	30.00	36.00
		2437	13.47	15.67	30.00	36.00
		2462	13.65	15.85	30.00	36.00
	11Mbps	2412	13.27	15.47	30.00	36.00
		2437	13.91	16.11	30.00	36.00
		2462	14.26	16.46	30.00	36.00
802.11g	6Mbps	2412	13.61	15.81	30.00	36.00
		2437	16.37	18.57	30.00	36.00
		2462	16.80	19.00	30.00	36.00
	54Mbps	2412	13.73	15.93	30.00	36.00
		2437	16.74	18.94	30.00	36.00
		2462	16.92	19.12	30.00	36.00
802.11n HT20	MCS0	2412	13.27	15.47	30.00	36.00
		2437	15.97	18.17	30.00	36.00
		2462	16.41	18.61	30.00	36.00
	MCS7	2412	13.34	15.54	30.00	36.00
		2437	15.88	18.08	30.00	36.00
		2462	16.58	18.78	30.00	36.00

***Note:** For test plots please refer the **Appendix-Test plots**

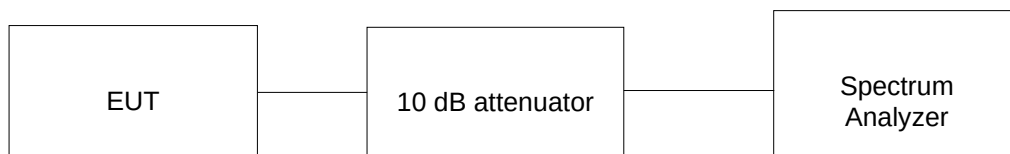
8.3 Maximum Power Spectral Density

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (e) RSS 247 Issue 3, Section 5.2 (b)
Test Method	Subclause 11.10.5 of ANSI C63.10
Measurement Bnadwidth	3kHz
Detector	Average sample detector mode
Port of testing	Antenna port
Requirement	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm

Test Method



Test Condition

Normal Test Condition:

Temperature (Norm) = + 22.3 °C Voltage = 5VDC Through AC/DC Adapter Relative humidity: 62%

KDB Guidelines applied:

Measurements were made as per section 8.4 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

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Note:

1. All the losses are included during measurement and final values are mentioned in the test report.

Test Results:

Modulation	Data rate	Channel Frequency (MHz)	Total PSD (dBm/3kHz)	Limit PSD (dBm/3kHz)
802.11b	1Mbps	2412	-17.86	8.00
		2437	-17.19	8.00
		2462	-16.41	8.00
	11Mbps	2412	-17.39	8.00
		2437	-16.88	8.00
		2462	-16.65	8.00
802.11g	6Mbps	2412	-16.41	8.00
		2437	-13.67	8.00
		2462	-13.02	8.00
	54Mbps	2412	-15.01	8.00
		2437	-13.00	8.00
		2462	-11.30	8.00
802.11n HT20	MCS0	2412	-18.27	8.00
		2437	-15.30	8.00
		2462	-14.78	8.00
	MCS7	2412	-17.14	8.00
		2437	-14.24	8.00
		2462	-13.45	8.00

***Note:** Duty Cycle Correction Factor Calculation

$10 \cdot \log(1/X)$ Where X is Duty Cycle is considered in above results

Duty cycle correction Factor is considered in Total PSD

For test plots please refer the **Appendix-Test plots**

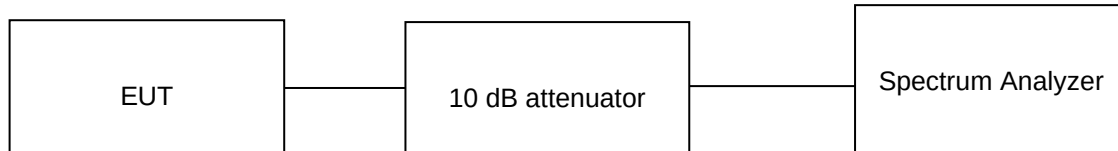
8.4 DTS Bandwidth & 99% Channel Bandwidth

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (a) (2) RSS 247 Issue 3, Section 5.2 (a)
Test Method	Subclause 11.8.1 & 6.9.3 of ANSI C63.10
Measurement Bandwidth	100kHz for x dB Bandwidth 1% to 5% of OCB for 99% bandwidth
Detector	Peak
Port of testing	Antenna port
Requirement	The minimum 6 dB bandwidth shall be at least 500 kHz

Test Method:



Test Condition

Normal Test Condition:

Temperature (Norm) = + 22.1 °C Voltage = 5VDC through AC/DC Adapter Relative humidity: 65%

KDB Guidelines applied:

Measurements were made as per section 8.2 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

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Note:

1. All the losses are included during measurement and final values are mentioned in the test report.

Test Results:

Modulation	Data rate	Channel Frequency (MHz)	6dB BW (MHz)	OBW 99% (MHz)	Minimum Limit (MHz)
802.11b	1Mbps	2412	7.04	11.28	0.5
		2437	7.08	11.14	
		2462	7.50	11.00	
	11Mbps	2412	7.36	11.14	
		2437	7.43	11.00	
		2462	7.25	11.14	
802.11g	6Mbps	2412	15.42	16.47	
		2437	15.49	16.47	
		2462	15.14	16.54	
	54Mbps	2412	15.17	16.35	
		2437	15.07	16.54	
		2462	15.10	16.35	
802.11n HT20	MCS0	2412	15.94	17.69	
		2437	15.49	17.76	
		2462	15.14	17.63	
	MCS7	2412	15.14	17.63	
		2437	15.14	17.63	
		2462	15.14	17.63	

***Note:** for Test plots refer the **Appendix-Test plots**

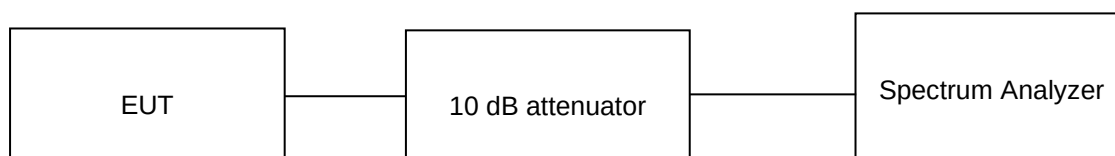
8.5 Emissions in non-restricted frequency bands & conducted spurious emission

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (d) RSS 247 Issue 3, Section 5.5
Test Method	Subclause 11.11.3 of ANSI C63.10
Measurement Bandwidth	100 kHz
Detector	Peak
Port of testing	Antenna port
Requirement	In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits

Test Method:



Test Condition

Normal Test Condition:

Temperature (Norm) = + 22.1 °C Voltage = 5VDC through AC/DC Adapter Relative humidity: 65%

KDB Guidelines applied:

Measurements were made as per section 8.5, 8.6 & 8.7 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

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Test Results:

Mode	Data Rate	Channel Frequency (MHz)	Band edge frequency (MHz)	Value at band edge (A) (dBm)	Reference value (B) (dBm)	A-B (dBc)	Minimum Limit (dBc)
b	1	2412	2390.00	-49.90	4.92	-54.82	-30.00
		2462	2483.50	-49.21	5.42	-54.63	-30.00
	11	2412	2390.00	-49.90	5.86	-55.76	-30.00
		2462	2483.50	-49.90	6.83	-56.73	-30.00
g	6	2412	2390.00	-45.22	2.13	-47.35	-30.00
		2462	2483.50	-40.09	5.57	-45.66	-30.00
	54	2412	2390.00	-40.12	3.44	-43.56	-30.00
		2462	2483.50	-37.90	6.75	-44.65	-30.00
n	MCS0	2412	2390.00	-43.32	1.80	-45.12	-30.00
		2462	2483.50	-38.60	5.07	-43.67	-30.00
	MCS7	2412	2390.00	-43.16	2.18	-45.34	-30.00
		2462	2483.50	-38.50	5.71	-44.21	-30.00

***Note:** for test Plots refer the **Appendix-Test plots**

8.6 Spurious Radiated Emissions & Restricted Bands of Operation

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (d) / (15.209 & 15.205) RSS Gen Issue 5, Section 8.9 & 8.10
Test Method	ANSI C63.10.2013
Measurement Location	Semi Anechoic Chamber 30MHz - 1 GHz Fully Anechoic Chamber 1 GHz - 40GHz
Measurement Bandwidth	100 kHz for frequency range < 1GHz 1 MHz for Frequency range >1GHz
Detector	Refer remarks below
Measuring Distance	3 m
Requirement	As per the limits mentioned in the below table
Test setup	Refer Clause 6.2 TEST METHODOLOGY

Table 11: Transmitter limits for Radiated emission

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.00	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54.00 dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Conditions:

Temperature (Norm) = + 22.5 °C

Voltage = 5VDC through AC/DC Adapter

Relative humidity = 62 %

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Test results:

Note: All the losses are included during measurement and final values are mentioned in the test report. Refer Clause 6.2 TEST METHODOLOGY for more details

Test results for frequency range 9kHz – 30MHz

No emissions found in frequency range 9 kHz to 30 MHz, and measured levels are below 20dB from the limit line, hence not reported.

Table 12: Test results for frequency range 30MHz – 200MHz

Antenna Polarization	Measured Frequency (MHz)	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	46.35(PK)	25.01	40.00	-14.99
	76.95(PK)	33.32	40.00	-6.68
	92.82(PK)	32.50	43.50	-11.00
	99.99(PK)	32.17	43.50	-11.33
	147.30(PK)	29.51	43.50	-13.99
Horizontal	77.52(PK)	25.79	40.00	-14.21
	85.05(PK)	30.67	40.00	-9.33
	94.59(PK)	35.32	43.50	-8.18
	117.36(PK)	21.39	43.50	-22.11
	174.75(PK)	27.32	43.50	-16.18

Table 13: Test results for frequency range 200MHz – 1GHz

Antenna Polarization	Measured Frequency (MHz)	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	449.99	36.75	46.00	-9.25
	531.68	36.84	46.00	-9.16
	550.00	36.15	46.00	-9.85
	575.67	27.81	46.00	-18.19
	599.99	27.63	46.00	-18.37
	725.18	33.15	46.00	-12.85
	814.01	39.08	46.00	-6.92
Horizontal	400.20	28.36	46.00	-17.64
	429.11	37.13	46.00	-8.87
	550.01	37.99	46.00	-8.01
	573.05	38.41	46.00	-7.59

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Table 14: Test results for the frequencies in the range 1 GHz to 26.5 GHz

Modulation: 802.11b

Data rate: 1Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2412	2390(Pk)	Vertical	39.97	74.00*	-34.03
	2390(Av)		27.45	54.00*	-26.55
	2412(Pk)		93.17	-	-
	2412(Av)		90.60	-	-
	4824(Pk)		42.04	74.00	-31.96
	4824(Av)		30.56	54.00	-23.44
	7236(Pk)		47.48	74.00	-26.52
	7236(Av)		35.10	54.00	-18.90
	2390(Pk)	Horizontal	41.64	74.00*	-32.36
	2390(Av)		28.41	54.00*	-25.59
	2412(Pk)		95.26	-	-
	2412(Av)		92.82	-	-
	4824(Pk)		43.55	74.00	-30.45
	4824(Av)		32.72	54.00	-21.28
	7236(Pk)		47.75	74.00	-26.25
	7236(Av)		35.18	54.00	-18.82
2437	2437(Pk)	Vertical	92.72	-	-
	2437(Av)		90.38	-	-
	4874(Pk)		42.06	74.00	-31.94
	4874(Av)		32.35	54.00	-21.65
	7311(Pk)		48.38	74.00	-25.62
	7311(Av)		35.14	54.00	-18.86
	2437(Pk)	Horizontal	95.31	-	-
	2437(Av)		93.02	-	-
	4874(Pk)		42.25	74.00	-31.75
	4874(Av)		31.48	54.00	-22.52
	7311(Pk)		47.60	74.00	-26.40
	7311(Av)		35.22	54.00	-18.78
2462	2462(Pk)	Vertical	92.67	-	-
	2462(Av)		90.13	-	-
	2483.5(Pk)		39.40	74.00*	-34.60
	2483.5(Av)		28.57	54.00*	-25.43
	4924(Pk)		42.07	74.00	-31.93
	4924(Av)		29.87	54.00	-24.13
	7386(Pk)		47.67	74.00	-26.33
	7386(Av)		35.24	54.00	-18.76
	2462(Pk)	Horizontal	94.61	-	-
	2462(Av)		92.12	-	-
	2483.5(Pk)		41.51	74.00*	-32.49
	2483.5(Av)		30.08	54.00*	-23.92
	4924(Pk)		42.38	74.00	-31.62
	4924(Av)		30.43	54.00	-23.57
	7386(Pk)		47.88	74.00	-26.12
	7386(Av)		35.25	54.00	-18.75

* : Indicate restricted band of operation §15.205

Pk: Peak Detector; Av: Average Detector

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Modulation: 802.11b

Data Rate: 11Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2412	2390(Pk)	Vertical	41.41	74.00*	-32.59
	2390(Av)		27.31	54.00*	-26.69
	2412(Pk)		97.93	-	-
	2412(Av)		89.98	-	-
	4824(Pk)		42.61	74.00	-31.39
	4824(Av)		30.39	54.00	-23.61
	7236(Pk)		47.46	74.00	-26.54
	7236(Av)		35.18	54.00	-18.82
	2390(Pk)	Horizontal	42.52	74.00*	-31.48
	2390(Av)		28.26	54.00*	-25.74
	2412(Pk)		100.13	-	-
	2412(Av)		92.16	-	-
	4824(Pk)		41.75	74.00	-32.25
	4824(Av)		29.84	54.00	-24.16
	7236(Pk)		47.77	74.00	-26.23
	7236(Av)		35.15	54.00	-18.85
2437	2437Pk)	Vertical	97.89	-	-
	2437(Av)		89.82	-	-
	4874(Pk)		41.43	74.00	-32.57
	4874(Av)		29.43	54.00	-24.57
	7311(Pk)		47.66	74.00	-26.34
	7311(Av)		35.23	54.00	-18.77
	2437Pk)	Horizontal	100.47	-	-
	2437(Av)		92.34	-	-
	4874(Pk)		41.73	74.00	-32.27
	4874(Av)		29.66	54.00	-24.34
	7311(Pk)		47.23	74.00	-26.77
	7311(Av)		35.25	54.00	-18.75
2462	2462(Pk)	Vertical	97.67	-	-
	2462(Av)		89.39	-	-
	2483.5(Pk)		39.47	74.00*	-34.53
	2483.5(Av)		27.45	54.00*	-26.55
	4924(Pk)		41.43	74.00	-32.57
	4924(Av)		29.53	54.00	-24.47
	7386(Pk)		48.09	74.00	-25.91
	7386(Av)		35.30	54.00	-18.70
	2462(Pk)	Horizontal	99.69	-	-
	2462(Av)		91.70	-	-
	2483.5(Pk)		41.81	74.00*	-32.19
	2483.5(Av)		28.87	54.00*	-25.13
	4924(Pk)		41.75	74.00	-32.25
	4924(Av)		29.74	54.00	-24.26
	7386(Pk)		47.61	74.00	-26.39
	7386(Av)		35.32	54.00	-18.68

* : Indicate restricted band of operation §15.205

Pk: Peak Detector; Av: Average Detector

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Test Report No.:

Modulation: 802.11g

Data Rate: 6Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2412	2390(Pk)	Vertical	57.72	74.00*	-16.28
	2390(Av)		38.43	54.00*	-15.57
	2412(Pk)		97.95	-	-
	2412(Av)		88.87	-	-
	4824(Pk)		41.97	74.00	-32.03
	4824(Av)		29.60	54.00	-24.40
	7236(Pk)		48.10	74.00	-25.90
	7236(Av)		35.41	54.00	-18.59
	2390(Pk)	Horizontal	60.01	74.00*	-13.99
	2390(Av)		41.17	54.00*	-12.83
	2412(Pk)		99.74	-	-
	2412(Av)		91.11	-	-
	4824(Pk)		41.82	74.00	-32.18
	4824(Av)		29.91	54.00	-24.09
	7236(Pk)		49.08	74.00	-24.92
	7236(Av)		35.58	54.00	-18.42
2437	2437(Pk)	Vertical	99.55	-	-
	2437(Av)		90.76	-	-
	4874(Pk)		42.58	74.00	-31.42
	4874(Av)		30.37	54.00	-23.63
	7311(Pk)		47.36	74.00	-26.64
	7311(Av)		35.49	54.00	-18.51
	2437(Pk)	Horizontal	102.08	-	-
	2437(Av)		93.05	-	-
	4874(Pk)		41.98	74.00	-32.02
	4874(Av)		30.31	54.00	-23.69
	7311(Pk)		47.19	74.00	-26.81
	7311(Av)		35.61	54.00	-18.39
2462	2462(Pk)	Vertical	99.33	-	-
	2462(Av)		90.68	-	-
	2483.5(Pk)		60.28	74.00*	-13.72
	2483.5(Av)		46.18	54.00*	-7.82
	4924(Pk)		41.98	74.00	-32.02
	4924(Av)		29.75	54.00	-24.25
	7386(Pk)		48.91	74.00	-25.09
	7386(Av)		35.69	54.00	-18.31
	2462(Pk)	Horizontal	101.45	-	-
	2462(Av)		92.78	-	-
	2483.5(Pk)		62.45	74.00*	-11.55
	2483.5(Av)		48.55	54.00*	-5.45
	4924(Pk)		41.88	74.00	-32.12
	4924(Av)		29.73	54.00	-24.27
	7386(Pk)		47.73	74.00	-26.27
	7386(Av)		35.62	54.00	-18.38

* : Indicate restricted band of operation §15.205

Pk: Peak Detector; Av: Average Detector

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Test Report No.:

Modulation: 802.11g

Data Rate: 54Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2412	2390(Pk)	Vertical	58.11	74.00*	-15.89
	2390(Av)		41.47	54.00*	-12.53
	2412(Pk)		98.70	-	-
	2412(Av)		88.42	-	-
	4824(Pk)		42.47	74.00	-31.53
	4824(Av)		30.01	54.00	-23.99
	7236(Pk)		48.48	74.00	-25.52
	7236(Av)		35.31	54.00	-18.69
	2390(Pk)	Horizontal	61.09	74.00*	-12.91
	2390(Av)		43.42	54.00*	-10.58
	2412(Pk)		100.63	-	-
	2412(Av)		90.41	-	-
	4824(Pk)		42.86	74.00	-31.14
	4824(Av)		29.69	54.00	-24.31
	7236(Pk)		47.38	74.00	-26.62
	7236(Av)		35.33	54.00	-18.67
2437	2437(Pk)	Vertical	99.52	-	-
	2437(Av)		90.74	-	-
	4874(Pk)		41.21	74.00	-32.79
	4874(Av)		29.54	54.00	-24.46
	7311(Pk)		48.25	74.00	-25.75
	7311(Av)		35.40	54.00	-18.60
	2437(Pk)	Horizontal	102.08	-	-
	2437(Av)		93.19	-	-
	4874(Pk)		42.23	74.00	-31.77
	4874(Av)		29.81	54.00	-24.19
	7311(Pk)		48.18	74.00	-25.82
	7311(Av)		35.56	54.00	-18.44
2462	2462(Pk)	Vertical	99.90	-	-
	2462(Av)		90.13	-	-
	2483.5(Pk)		60.28	74.00*	-13.72
	2483.5(Av)		47.57	54.00*	-6.43
	4924(Pk)		41.97	74.00	-32.03
	4924(Av)		29.75	54.00	-24.25
	7386(Pk)		47.53	74.00	-26.47
	7386(Av)		35.42	54.00	-18.58
	2462(Pk)	Horizontal	101.87	-	-
	2462(Av)		92.09	-	-
	2483.5(Pk)		63.06	74.00*	-10.94
	2483.5(Av)		50.14	54.00*	-3.86
	4924(Pk)		42.02	74.00	-31.98
	4924(Av)		30.34	54.00	-23.66
	7386(Pk)		47.87	74.00	-26.13
	7386(Av)		35.53	54.00	-18.47

* : Indicate restricted band of operation §15.205

Pk: Peak Detector; Av: Average Detector

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Test Report No.:

Modulation: 802.11n_HT20

Data Rate: MCS0

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2412	2390(Pk)	Vertical	57.96	74.00*	-16.04
	2390(Av)		38.78	54.00*	-15.22
	2412(Pk)		97.89	-	-
	2412(Av)		88.30	-	-
	4824(Pk)		41.73	74.00	-32.27
	4824(Av)		29.42	54.00	-24.58
	7236(Pk)		48.06	74.00	-25.94
	7236(Av)		35.28	54.00	-18.72
	2390(Pk)	Horizontal	61.15	74.00*	-12.85
	2390(Av)		40.83	54.00*	-13.17
	2412(Pk)		100.45	-	-
	2412(Av)		90.26	-	-
	4824(Pk)		41.48	74.00	-32.52
	4824(Av)		29.57	54.00	-24.43
	7236(Pk)		47.61	74.00	-26.39
	7236(Av)		35.28	54.00	-18.72
2437	2437(Pk)	Vertical	99.48	-	-
	2437(Av)		90.12	-	-
	4874(Pk)		42.44	74.00	-31.56
	4874(Av)		30.24	54.00	-23.76
	7311(Pk)		48.86	74.00	-25.14
	7311(Av)		35.35	54.00	-18.65
	2437(Pk)	Horizontal	102.03	-	-
	2437(Av)		92.74	-	-
	4874(Pk)		42.56	74.00	-31.44
	4874(Av)		30.19	54.00	-23.81
	7311(Pk)		47.26	74.00	-26.74
	7311(Av)		35.44	54.00	-18.56
2462	2462(Pk)	Vertical	99.16	-	-
	2462(Av)		90.12	-	-
	2483.5(Pk)		65.42	74.00*	-8.58
	2483.5(Av)		45.30	54.00*	-8.70
	4924(Pk)		40.99	74.00	-33.01
	4924(Av)		29.38	54.00	-24.62
	7386(Pk)		47.71	74.00	-26.29
	7386(Av)		35.41	54.00	-18.59
	2462(Pk)	Horizontal	101.25	-	-
	2462(Av)		92.06	-	-
	2483.5(Pk)		67.52	74.00*	-6.48
	2483.5(Av)		47.81	54.00*	-6.19
	4924(Pk)		41.40	74.00	-32.60
	4924(Av)		29.52	54.00	-24.48
	7386(Pk)		47.66	74.00	-26.34
	7386(Av)		35.55	54.00	-18.45

* : Indicate restricted band of operation §15.205

Pk: Peak Detector; Av: Average Detector

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Test Report No.:

Modulation: 802.11n HT20

Data Rate: MCS7

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2412	2390(Pk)	Vertical	58.82	74.00*	-15.18
	2390(Av)		41.36	54.00*	-12.64
	2412(Pk)		99.02	-	-
	2412(Av)		87.62	-	-
	4824(Pk)		41.71	74.00	-32.29
	4824(Av)		29.91	54.00	-24.09
	7236(Pk)		47.53	74.00	-26.47
	7236(Av)		35.30	54.00	-18.70
	2390(Pk)	Horizontal	60.51	74.00*	-13.49
	2390(Av)		43.26	54.00*	-10.74
	2412(Pk)		100.91	-	-
	2412(Av)		89.54	-	-
	4824(Pk)		42.38	74.00	-31.62
	4824(Av)		29.60	54.00	-24.40
	7236(Pk)		47.51	74.00	-26.49
	7236(Av)		35.30	54.00	-18.70
2437	2437(Pk)	Vertical	100.63	-	-
	2437(Av)		89.27	-	-
	4874(Pk)		41.42	74.00	-32.58
	4874(Av)		29.45	54.00	-24.55
	7311(Pk)		47.85	74.00	-26.15
	7311(Av)		35.34	54.00	-18.66
	2437(Pk)	Horizontal	103.09	-	-
	2437(Av)		91.77	-	-
	4874(Pk)		43.03	74.00	-30.97
	4874(Av)		31.02	54.00	-22.98
	7311(Pk)		47.23	74.00	-26.77
	7311(Av)		35.56	54.00	-18.44
2462	2462(Pk)	Vertical	100.39	-	-
	2462(Av)		89.38	-	-
	2483.5(Pk)		63.72	74.00*	-10.28
	2483.5(Av)		46.80	54.00*	-7.20
	4924(Pk)		42.33	74.00	-31.67
	4924(Av)		29.59	54.00	-24.41
	7386(Pk)		47.39	74.00	-26.61
	7386(Av)		35.42	54.00	-18.58
	2462(Pk)	Horizontal	102.39	-	-
	2462(Av)		91.35	-	-
	2483.5(Pk)		66.37	74.00*	-7.63
	2483.5(Av)		49.47	54.00*	-4.53
	4924(Pk)		41.76	74.00	-32.24
	4924(Av)		30.08	54.00	-23.92
	7386(Pk)		47.40	74.00	-26.60
	7386(Av)		35.50	54.00	-18.50

* : Indicate restricted band of operation §15.205

Pk: Peak Detector; Av: Average Detector

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Simultaneous Operation:

Combination of Wi-Fi 2.4GHz & BLE:

Antenna Polarization	Channel Frequency (MHz)	Measured Frequency (MHz)	Measured emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	2402	2390(Pk)	59.87	74.00*	-14.13
		2390(Av)	53.37	54.00*	-0.63
		2402(Pk)	99.17	-	-
		2402(Av)	96.58	-	-
		4804(Pk)	42.01	74.00	-31.99
		4804(Av)	29.22	54.00	-24.78
		7206(Pk)	46.78	74.00	-27.22
		7206(Av)	35.06	54.00	-18.94
	2412	2390(Pk)	59.87	74.00*	-14.13
		2390(Av)	53.37	54.00*	-0.63
		2412(Pk)	95.28	-	-
		2412(Av)	93.12	-	-
		4824(Pk)	42.54	74.00	-31.46
		4824(Av)	32.19	54.00	-21.81
		7236(Pk)	46.92	74.00	-27.08
		7236(Av)	34.98	54.00	-19.02
Horizontal	2402	2390(Pk)	58.96	74.00*	-15.04
		2390(Av)	52.58	54.00*	-1.42
		2402(Pk)	97.78	-	-
		2402(Av)	95.16	-	-
		4804(Pk)	41.76	74.00	-32.24
		4804(Av)	28.92	54.00	-25.08
		7206(Pk)	47.15	74.00	-26.85
		7206(Av)	35.07	54.00	-18.93
	2412	2390(Pk)	58.96	74.00*	-15.04
		2390(Av)	52.58	54.00*	-1.42
		2412(Pk)	100.41	-	-
		2412(Av)	97.96	-	-
		4824(Pk)	44.19	74.00	-29.81
		4824(Av)	36.06	54.00	-17.94
		7236(Pk)	47.46	74.00	-26.54
		7236(Av)	35.18	54.00	-18.82

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Antenna Polarization	Channel Frequency (MHz)	Measured Frequency (MHz)	Measured emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	2480	2498.5(Pk)	53.55	74.00*	-20.45
		2499.5(Av)	41.21	54.00*	-12.79
		2480(Pk)	98.30	-	-
		2480(Av)	95.73	-	-
		4960(Pk)	41.86	74.00	-32.14
		4960(Av)	29.88	54.00	-24.12
		7440(Pk)	48.19	74.00	-25.81
		7440(Av)	35.64	54.00	-18.36
	2462	2498.5(Pk)	53.55	74.00*	-20.45
		2499.5(Av)	41.21	54.00*	-12.79
		2462(Pk)	95.11	-	-
		2462(Av)	93.08	-	-
		4924(Pk)	42.80	74.00	-31.20
		4924(Av)	33.55	54.00	-20.45
		7386(Pk)	47.52	74.00	-26.48
		7386(Av)	35.09	54.00	-18.91
Horizontal	2480	2498.5(Pk)	54.84	74.00*	-19.16
		2499.5(Av)	46.69	54.00*	-7.31
		2480(Pk)	94.13	-	-
		2480(Av)	91.41	-	-
		4960(Pk)	41.28	74.00	-32.72
		4960(Av)	29.50	54.00	-24.50
		7440(Pk)	46.76	74.00	-27.24
		7440(Av)	35.60	54.00	-18.40
	2462	2498.5(Pk)	54.84	74.00*	-19.16
		2499.5(Av)	46.69	54.00*	-7.31
		2462(Pk)	99.72	-	-
		2462(Av)	97.26	-	-
		4924(Pk)	43.95	74.00	-30.05
		4924(Av)	36.07	54.00	-17.93
		7386(Pk)	46.84	74.00	-27.16
		7386(Av)	35.19	54.00	-18.81

9 AC POWER LINES CONDUCTED EMISSION

Result

Pass

Test Specification: FCC Part 15 Section 15.207
RSS Gen Issue 5, Section 8.8

Test Method: ANSI C 63.10-2013

Testing Location: Screened room

Measurement Bandwidth: 9kHz

Frequency Range: 150kHz – 30MHz

Supply Voltage: 110VAC,60Hz

Test Method: Refer 6.1 TEST METHODOLOGY

Table 15: Limits for Conducted powerline emission

Frequency of emission (MHz)	QP Limit (dBμV)	AV Limit (dBμV)
0.15 – 0.5	66 – 56*	56 – 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency

Test Conditions:

Temperature (Norm) = + 23.8 °C

Voltage = 5VDC, 3A via AC Power adapter

Relative humidity: 57 %

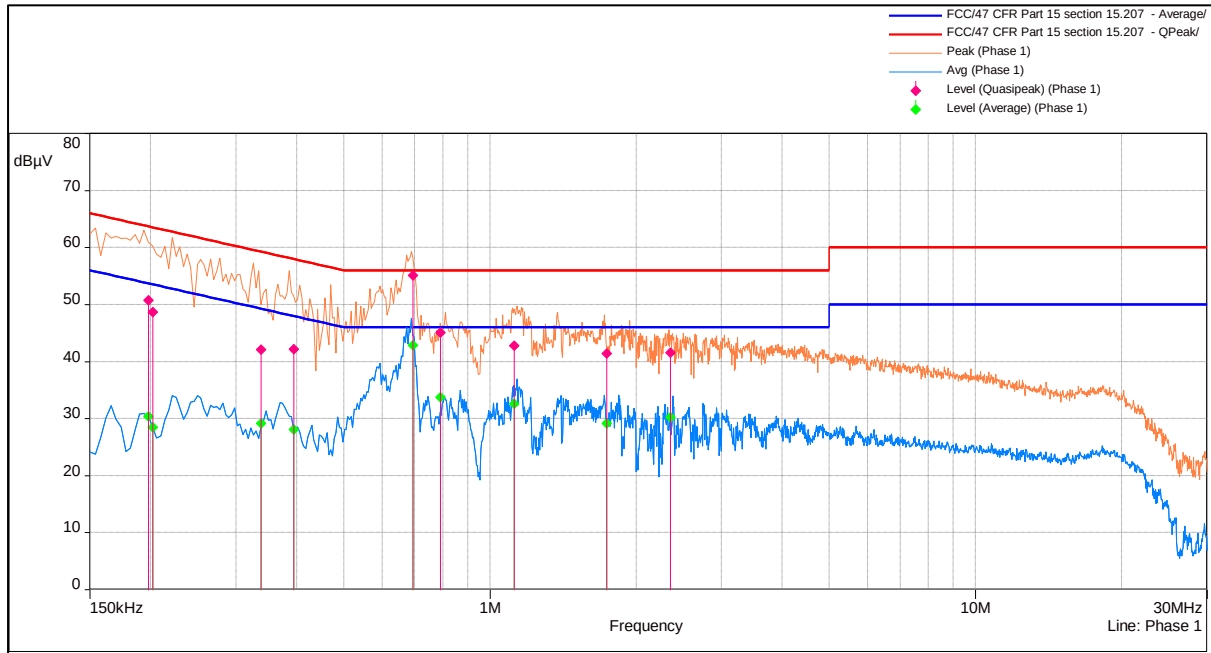
Prüfbericht - Nr.:
Test Report No.:

IN24FO3U 001

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Test results:

110VAC - 60Hz : Line



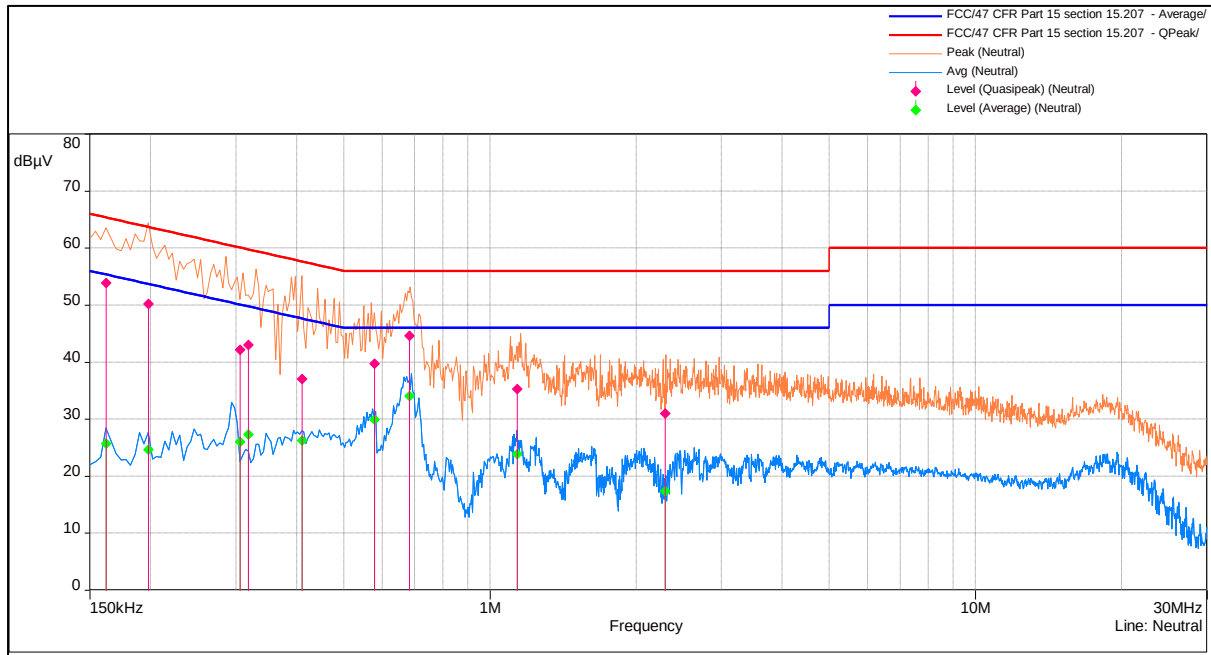
Quasi Peak:

Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
0.6927	55.10	56	-0.90	Pass
0.78885	45.08	56	-10.92	Pass
0.19715	50.76	63.69	-12.93	Pass
1.12135	42.81	56	-13.19	Pass
2.35465	41.54	56	-14.46	Pass
1.7373	41.42	56	-14.58	Pass
0.2004	48.72	63.53	-14.81	Pass
0.39455	42.21	57.98	-15.77	Pass
0.33635	42.11	59.25	-17.14	Pass

Average:

Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
0.6927	42.88	46	-3.12	Pass
0.78885	33.79	46	-12.21	Pass
1.12135	32.63	46	-13.37	Pass
2.35465	30.24	46	-15.76	Pass
1.7373	29.16	46	-16.84	Pass
0.39455	28.13	47.98	-19.85	Pass
0.33635	29.20	49.25	-20.05	Pass
0.19715	30.37	53.69	-23.33	Pass
0.2004	28.50	53.53	-25.02	Pass

110VAC - 60Hz: Neutral



Quasi Peak:

Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
0.6801	44.67	56	-11.33	Pass
0.1635	53.88	65.36	-11.48	Pass
0.1962	50.19	63.69	-13.50	Pass
0.5799	39.72	56	-16.28	Pass
0.31875	43.01	59.76	-16.74	Pass
0.30525	42.22	60.08	-17.86	Pass
0.41	37.06	57.65	-20.59	Pass
1.13685	35.29	56	-20.71	Pass
2.2952	30.98	56	-25.02	Pass

Average:

Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
0.6801	34.06	46	-11.94	Pass
0.5799	29.90	46	-16.10	Pass
0.41	26.25	47.65	-21.40	Pass
1.13685	23.93	46	-22.07	Pass
0.31875	27.33	49.76	-22.43	Pass
0.30525	26.03	50.08	-24.05	Pass
2.2952	17.40	46	-28.60	Pass
0.1962	24.63	53.69	-29.07	Pass
0.1635	25.76	55.36	-29.60	Pass

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12 POWER LEVELS

802.11b 1Mbps		802.11g 6Mbps		802.11n HT20 MCS0	
2412	13	2412	14	2412	14
2437	13	2437	16	2437	16
2462	13	2462	16	2462	16
802.11b 11Mbps		802.11g 54Mbps		802.11n HT20 MCS7	
2412	13	2412	14	2412	14
2437	13	2437	16	2437	16
2462	13	2462	16	2462	16

End of test report