

Shenzhen Toby Technology Co., Ltd.

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Radio Test Report FCC ID: 2A2GJ-HTIT

Report No.	:	TBR-C-202202-0173-14
Applicant	13	Heltec Automation Technology Co., Ltd
Equipment Under T	'est (E	UT)
EUT Name	<u>a: (</u>	Heltec WiFI Kit LoRa Node
Model No.		HTIT-WS
Series Model No.	1.5	Please see page 5
Brand Name	:	
Sample ID		RW-C-202202-0173-1-1# & RW-C-202202-0173-1-2#
Receipt Date	650	2022-02-24
Test Date		2022-02-24 to 2022-03-30
Issue Date	0.61	2022-04-01
Standards	:	FCC Part 15 Subpart C 15.247
Test Method	33	ANSI C63.10: 2013 KDB 558074 D01 15.247 Meas Guidance v05r02
Conclusions	1	PASS
		In the configuration tested, the EUT complied with the standards specified above.
Witness Engineer		: Wade W Ster

Engineer Supervisor

Engineer Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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Revision History

Report No.	Version	Description	Issued Date
TBR-C-202202-0173-14	Rev.01	Initial issue of report	2022-04-01
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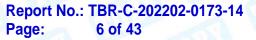
1. General Information about EUT

1.1 Client Information

Applicant	: Heltec Automation Technology Co., Ltd	
Address	Address 1st floor, No. 54, 56, 58 zirui North Street, High-tech Zone, Chengdu city, China	
Manufacturer	-	Heltec Automation Technology Co., Ltd
Address	:	1st floor, No. 54, 56, 58 zirui North Street, High-tech Zone, Chengdu city, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Heltec WiFl Kit LoRa N	lode			
Models No.		HTIT-WS, HTIT-WB32LAF, HTIT-WB32, HTIT-WS, HTIT-WSL, HTIT-WSH, HTIT-TB, HTIT-LN151, HTIT-LK151, HITI-WB32LABR, HTIT-W8266, HTIT-WB32G, HT-M00, HT-M01S, HTCC-AB01, HTCC-AB01-S, HTCC-AB02, HTCC-AB02-S, HTCC-AB03, HTCC-AB03-S, HTCC-AC01, HTCC-AC01-S, HTCC-AC02, HTCC-AC02-S, HTCC-AC03, HTCC-AC03-S, HTCC-AM01, HTCC-AM01-S, HTCC-AM02, HTCC-AM02-S, HTCC-AM03, HTCC-AM03-S, HTIT-DIY0051N, HTIT-DIY0031				
Model Different	· · ·	All these models are identical in the same PCB, layout and electrical circuit, the only difference is appearance and color.				
COPPOR	3	Operation Frequency: 802.11b/g/n(HT20): 2412MHz~2462N 802.11n(HT40): 2422MHz-2452MHz 802.11b/g/n(HT20):11 channels				
TOBY	5	Number of Channel: Antenna Gain:	802.11n(HT40): 7 channels 3.0dBi Internal Antenna			
Product Description		Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n:OFDM(BPSK,QPSK,16QAM,64 QAM)			
		Bit Rate of Transmitter:	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6 Mbps 802.11n: up to 150Mbps			
Power Rating	·	USB Input: DC 5V	The mail			
Software Version	••	V1.0				
Hardware Version	:	V2	/2			



TOBY

Remark:

- (1) The antenna gain and adapter provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.
- (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (3) Antenna information provided by the applicant.



(4) Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)		
01	2412	05	2432	09	2452		
02	2417	06	2437	10	2457		
03	2422	07	2442	11	2462		
04	2427	08	2447				
Note: CH 01~CH 11 for 802.11b/g/n(HT20)							
CH 03~CH 0	9 for 802.11n(HT40)						

1.3 Block Diagram Showing the Configuration of System Tested

Conducted Test

		EUT		APTER		
					-	
						GIU
diated Test	OBI U	n D	AL L	BE	TO	B
diated Test	OBY C	B	BY NOT	B	TO	

1.4 Description of Support Units

		Equipment Information								
	Name	Model	FCC ID/SDOC	Manufacturer	Used "√"					
2	<u>nB</u>	The second se								
		Cable Information								
	Number	Shielded Type	Ferrite Core	Length	Note					
	Cable 1	Yes	NO	1.0M	Accessory					

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Conducted Emission Test					
Final Test Mode Description					
Mode 1	TX b Mode Channel 01				
For Radiated and RF Conducted Test					
Final Test Mode Description					
Mode 2	TX Mode b Mode Channel 01/06/11				
Mode 3	TX Mode g Mode Channel 01/06/11				
Mode 4	TX Mode n(HT20) Mode Channel 01/06/11				
Mode 5	TX Mode n(HT40) Mode Channel 03/06/09				

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

802.11b Mode: CCK

802.11g Mode: OFDM

802.11n (HT20) Mode: MCS 0

802.11n (HT40) Mode: MCS 0

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a Mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

- ARI	Test Software	: EspRFTestTool_v	2.8			
Test Mode: Continuously transmitting						
Mode	Data Rate	Channel	Parameters			
	CCK/ 1Mbps	01	DEF			
802.11b	CCK/ 1Mbps	06	DEF			
MBL I	CCK/ 1Mbps	11	DEF			
	OFDM/ 6Mbps	01	DEF			
802.11g	OFDM/ 6Mbps	06	DEF			
BL	OFDM/ 6Mbps	11	DEF			
(III)	MCS 0	01	DEF			
802.11n(HT20)	MCS 0	06	DEF			
	MCS 0	11	DEF			
	MCS 0	03	DEF			
802.11n(HT40)	MCS 0	06	DEF			
	MCS 0	09	DEF			

1.7 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U_3$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U _{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	±3.50 dB ±3.10 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.50 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB



1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1/F.,Building 6, Rundongsheng Industrial Zone, Longzhu, Xixiang, Bao'an District, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.FCC Accredited Test Site Number: 854351. Designation Number: CN1223.

IC Registration No.: (11950A)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A. CAB identifier: CN0056.

2. Test Summary

Standard Section	Test litera	Test Comple(s)	lu dament	Domori
FCC	Test Item	Test Sample(s)	Judgment	Remark
FCC 15.207(a)	Conducted Emission	RW-C-202202-0173-1-1#	PASS	N/A
FCC 15.209 & 15.247(d)	Radiated Unwanted Emissions	RW-C-202202-0173-1-1#	PASS	N/A
FCC 15.203	Antenna Requirement	RW-C-202202-0173-1-2#	PASS	N/A
FCC 15.247(a)(2)	6dB Bandwidth	RW-C-202202-0173-1-2#	PASS	N/A
	99% Occupied bandwidth	RW-C-202202-0173-1-2#	PASS	N/A
FCC 15.247(b)(3)	Peak Output Power and E.I.R.P	RW-C-202202-0173-1-2#	PASS	N/A
FCC 15.247(e)	Power Spectral Density	RW-C-202202-0173-1-2#	PASS	N/A
FCC 15.247(d)	Band Edge Measurements	RW-C-202202-0173-1-2#	PASS	N/A
FCC 15.207	Conducted Unwanted Emissions	RW-C-202202-0173-1-2#	PASS	N/A
FCC 15.247(d)	Emissions in Restricted Bands	RW-C-202202-0173-1-2#	PASS	N/A
	On Time and Duty Cycle	RW-C-202202-0173-1-2#		N/A

3. Test Software

Test Item	Test Software	Manufacturer	Version No.
Conducted Emission	EZ-EMC	EZ	CDI-03A2
Radiation Emission	EZ-EMC	EZ	FA-03A2RE
RF Conducted Measurement	MTS-8310	MWRFtest	V2.0.0.0
RF Test System	JS1120	Tonscend	V2.6.88.0336

4. Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 02, 2021	Jul. 01, 2022
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 02, 2021	Jul. 01, 2022
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 02, 2021	Jul. 01, 2022
LISN	Rohde & Schwarz	ENV216	101131	Jul. 02, 2021	Jul. 01, 2022
Radiation Emission	on Test (A Site)				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 02, 2021	Jul. 01, 2022
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 02, 2021	Jul. 01, 2022
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Feb.27, 2022	Feb.26, 2023
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 02, 2022	Mar. 01, 2023
Horn Antenna	SCHWARZBECK	BBHA 9170	1118	May. 20, 2021	May. 19, 2022
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 06, 2021	Jul. 05, 2022
Pre-amplifier	SONOMA	310N	185903	Feb. 26, 2022	Feb.25, 2023
Pre-amplifier	HP	8449B	3008A00849	Feb. 26, 2022	Feb.25, 2023
HF Amplifier	Tonscend	TAP0184050	AP21C806129	Sep. 03, 2021	Sep. 02, 2022
Radiation Emis	sion Test (B Site)		· ·		
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	KEYSIGT	N9020B	MY60110172	Sep. 03, 2021	Sep. 02, 2022
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 02, 2021	Jul. 01, 2022
Bilog Antenna	SCHWARZBECK	VULB 9168	1225	Dec. 05, 2021	Dec. 04, 2023
Horn Antenna	SCHWARZBECK	BBHA 9120 D	2463	May 20, 2021	May 19, 2022
Horn Antenna	SCHWARZBECK	BBHA 9170	1118	May 20, 2021	May 19, 2022
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 06, 2021	Jul. 05, 2022
HF Amplifier	Tonscend	TAP9E6343	AP21C806117	Sep. 03, 2021	Sep. 02, 2022
HF Amplifier	Tonscend	TAP051845	AP21C806141	Sep. 03, 2021	Sep. 02, 2022
HF Amplifier	Tonscend	TAP0184050	AP21C806129	Sep. 03, 2021	Sep. 02, 2022



Antenna Conducted Emission					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 02, 2021	Jul. 01, 2022
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 02, 2021	Jul. 01, 2022
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Sep. 03, 2021	Sep. 02, 2022
MXA Signal Analyzer	Agilent	N9020A	MY47380425	Sep. 03, 2021	Sep. 02, 2022
Vector Signal Generator	Agilent	N5182A	MY50141294	Sep. 03, 2021	Sep. 02, 2022
Analog Signal Generator	Agilent	N5181A	MY50141953	Sep. 03, 2021	Sep. 02, 2022
Vector Signal Generator	Agilent	5182B	MY59101429	Sep. 03, 2021	Sep. 02, 2022
Analog Signal Generator	Agilent	5181A	MY48180463	Sep. 03, 2021	Sep. 02, 2022
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO26	Sep. 03, 2021	Sep. 02, 2022
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO29	Sep. 03, 2021	Sep. 02, 2022
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO31	Sep. 03, 2021	Sep. 02, 2022
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO33	Sep. 03, 2021	Sep. 02, 2022
RF Control Unit	Tonsced	JS0806-1	21C8060380	N/A	N/A
RF Control Unit	Tonsced	JS0806-2	21F8060439	Sep. 03, 2021	Sep. 02, 2022
Band Reject Filter Group	Tonsced	JS0806-F	21D8060414	Jul. 02, 2021	Jul. 01, 2022
Power Control Box	Tonsced	JS0806-4ADC	21C8060387	N/A	N/A
Wideband Radio Comunication Tester	Rohde & Schwarz	CMW500	144382	Sep. 03, 2021	Sep. 02, 2022



5. Conducted Emission Test

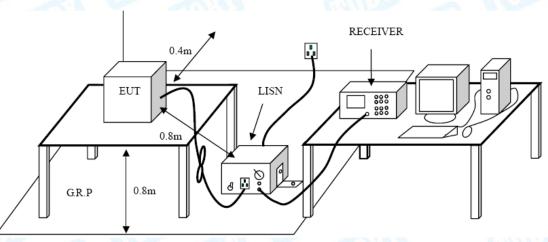
- 5.1 Test Standard and Limit
 - 5.1.1 Test Standard
 - FCC Part 15.207
 - 5.1.2 Test Limit

Fromuenou	Maximum RF Line	Voltage (dBµV)
Frequency	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.2 Test Setup



5.3 Test Procedure

● The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50 uH of coupling impedance for the measuring instrument.

●Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

●I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

●LISN at least 80 cm from nearest part of EUT chassis.

●The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.



5.4 Deviation From Test Standard

No deviation

5.5 EUT Operating Mode

Please refer to the description of test mode.

5.6 Test Data

Please refer to the Attachment A inside test report.



6. Radiated and Conducted Unwanted Emissions

- 6.1 Test Standard and Limit
 - 6.1.1 Test Standard

FCC Part 15.209 & FCC Part 15.247(d)

6.1.2 Test Limit

General field strength limits at frequencies Below 30MHz			
Frequency	Field Strength	Field Strength	Measurement
(MHz)	(µA/m)*	(microvolt/meter)**	Distance (meters)
0.009~0.490	6.37/F (F in kHz)	2400/F(KHz)	300
0.490~1.705	63.7/F (F in kHz)	24000/F(KHz)	30
1.705~30.0	0.08	30	30

Note: 1, The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

2, *is for RSS Standard, **is for FCC Standard.

General field strength limits at frequencies above 30 MHz			
Frequency (MHz)	Field strength (µV/m at 3 m)	Measurement Distance (meters)	
30~88	100	3	
88~216	150	3	
216~960	200	3	
Above 960	500	3	

General field strength limits at frequencies Above 1000MHz		
Distance of 3r	n (dBuV/m)	
Peak	Average	
74	54	
	Distance of 3r Peak	

Note:

(1) The tighter limit applies at the band edges.

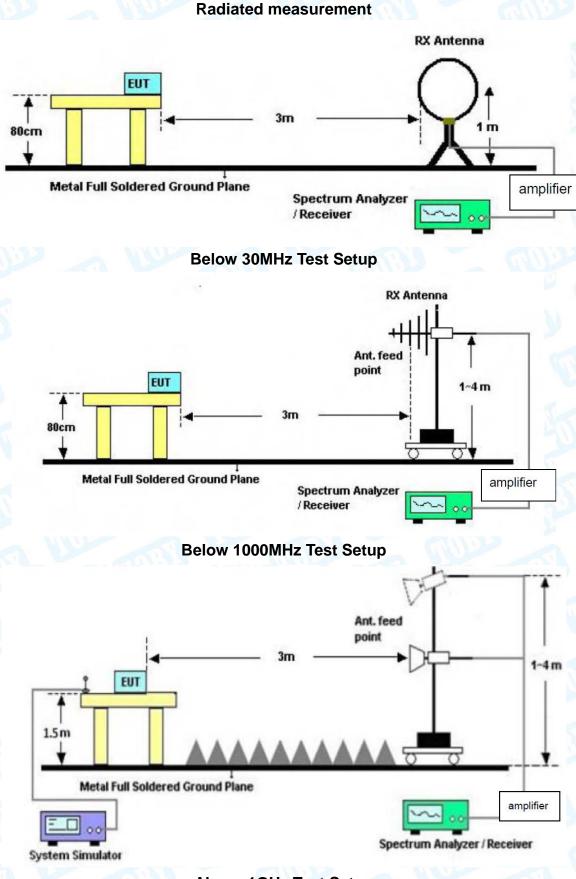
(2) Emission Level(dBuV/m)=20log Emission Level(uV/m)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.



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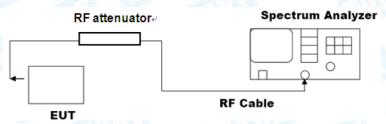
6.2 Test Setup



Above 1GHz Test Setup



Conducted measurement



6.3 Test Procedure

---Radiated measurement

● The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.

• Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.

• The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.

• The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

● If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Below 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.

● Testing frequency range 30MHz-1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection. Testing frequency range 9KHz-150Hz the measuring instrument use VBW=200Hz with Quasi-peak detection. Testing frequency range 9KHz-30MHz the measuring instrument use VBW=9kHz with Quasi-peak detection.

● Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

• For the actual test configuration, please see the test setup photo.

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--- Conducted measurement

Reference level measurement

Establish a reference level by using the following procedure:

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

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

• Emission level measurement

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW≥[3*RBW].
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.

h) Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

6.4 Deviation From Test Standard

No deviation

6.5 EUT Operating Mode

Please refer to the description of test mode.

6.6 Test Data

Radiated measurement please refer to the Attachment B inside test report. Conducted measurement please refer to the Appendix C.



7. Restricted Bands Requirement

- 7.1 Test Standard and Limit
 - 7.1.1 Test Standard

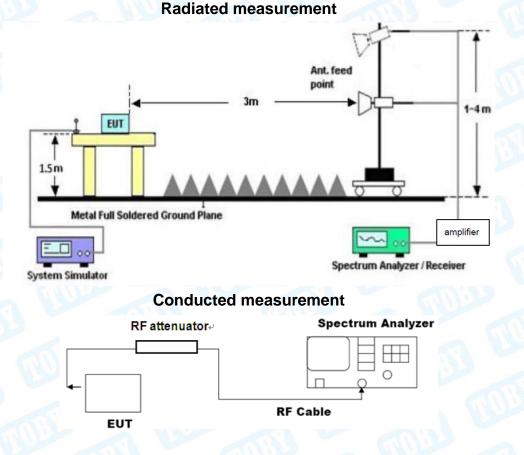
FCC Part 15.205 & FCC Part 15.247(d)

7.1.2 Test Limit

Restricted Frequency	Distance N	leters(at 3m)
Band (MHz)	Peak (dBuV/m)	Average (dBuV/m)
2310 ~2390	74	54
2483.5 ~2500	74	54
	Peak (dBm)see 7.3 e)	Average (dBm) see 7.3 e)
2310 ~2390	-21.20	-41.20
2310 ~2390 2483.5 ~2500	-21.20 -21.20	-41.20 -41.20

alternative to radiated measurements for determining compliance in the restricted frequency bands requirements. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test forcabinet/case emissions is required.

7.2 Test Setup





7.3 Test Procedure

---Radiated measurement

• Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.

• The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.

● The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

●The Peak Value and average value both need to comply with applicable limit above 1 GHz.

● Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

• For the actual test configuration, please see the test setup photo.

--- Conducted measurement

a) Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 11.12.2.3 through 11.12.2.5 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).

b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP (see 11.12.2.6 for guidance on determining the applicable antenna gain).

c) Add the appropriate maximum ground reflection factor to the EIRP (6 dB for frequencies \leq 30 MHz; 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive; and 0 dB for frequencies > 1000 MHz).

d) For MIMO devices, measure the power of each chain and sum the EIRP of all chains in linear terms (i.e., watts and mW).

e) Convert the resultant EIRP to an equivalent electric field strength using the following relationship:

$E = EIRP-20 \log d + 104.8$

where

E is the electric field strength in dBuV/m

EIRP is the equivalent isotropically radiated power in dBm

d is the specified measurement distance in m

f) Compare the resultant electric field strength level with the applicable regulatory limit.

g) Perform the radiated spurious emission test.



7.4 Deviation From Test Standard

No deviation

7.5 EUT Operating Mode

Please refer to the description of test mode.

7.6 Test Data

Remark: The test uses antenna-port conducted measurements as an alternative to radiated measurements for determining compliance in the restricted frequency bands requirements.



8. Bandwidth Test

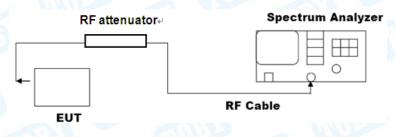
- 8.1 Test Standard and Limit
 - 8.1.1 Test Standard

FCC Part 15.205 & FCC Part 15.247(d)

8.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
-6dB bandwidth (DTS bandwidth)	>=500 KHz	2400~2483.5
99% occupied bandwidth		2400~2483.5

8.2 Test Setup



8.3 Test Procedure

---DTS bandwidth

- The steps for the first option are as follows:
- a) Set RBW = 100 kHz.
- b) Set the VBW≥[3*RBW].
- c) Detector = peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

---occupied bandwidth

• The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding



the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Step a) through step c) might require iteration to adjust within the specified range.

e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequence between these two frequencies.

 h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled.
 Tabular data may be reported in addition to the plot(s).

8.4 Deviation From Test Standard

No deviation

8.5 EUT Operating Mode

Please refer to the description of test mode.

8.6 Test Data

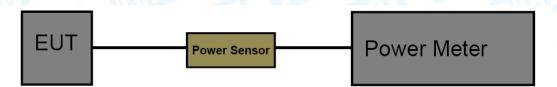


9. Peak Output Power

- 9.1 Test Standard and Limit
 - 9.1.1 Test Standard
 - FCC Part 15.247(b)(3)
 - 9.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)	
Peak Output Power	not exceed 1 W or 30dBm	2400 2482 5	
E.I.R.P	not exceed 4 W or 36dBm	- 2400~2483.5	

9.2 Test Setup



9.3 Test Procedure

● The EUT was connected to RF power meter via a broadband power sensor as show the block above. The power sensor video bandwidth is greater than or equal to the DTS bandwidth of the equipment.

9.4 Deviation From Test Standard

No deviation

9.5 EUT Operating Mode

Please refer to the description of test mode.

9.6 Test Data



10. Power Spectral Density

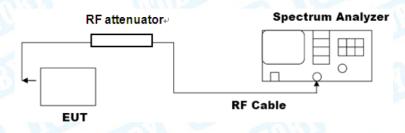
10.1 Test Standard and Limit

- 10.1.1 Test Standard
- FCC Part 15.247(e)

10.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

10.2 Test Setup



10.3 Test Procedure

• The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

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

j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

10.4 Deviation From Test Standard

No deviation

10.5 Antenna Connected Construction

Please refer to the description of test mode.

10.6 Test Data



11. Antenna Requirement

11.1 Test Standard and Limit

- 11.1.1 Test Standard RSS 247 6.8 FCC Part 15.203
- 11.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

11.2 Deviation From Test Standard

No deviation

11.3 Antenna Connected Construction

The gains of the antenna used for transmitting is 3.0dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

11.4 Test Data

The EUT antenna is a Internal Antenna. It complies with the standard requirement.

	Antenna Type					
00	Permanent attached antenna					
N C	Unique connector antenna					
COB)	Professional installation antenna					

Attachment A-- Conducted Emission Test Data

-	rature:	24.5℃		Re	lative Humi	dity: 4	-5%	alle
	oltage:)V/60Hz					
ermin est Mo		Line Mode 1		QUY	2			
est Mo Remar			orse case is	reported	600			
	n. IBuV	Only	JISE 0400	Teponou.				-
30 V	mm	×~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	MANDON MANADON	**************************************	Margan James Aland	www.www.	QP: AVG:	pe
-20 0.150		0.5	Reading	(MHz) Correct	5 Measure-			30.000
No.	Mk.	Freq.	Level	Factor	ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detecto
1	0.	.1700	30.65	11.63	42.28	64.96	-22.68	QP
2	0.	.1700	11.92	11.63	23.55	54.96	-31.41	AVC
3	0.	.3379	22.27	11.53	33.80	59.25	-25.45	QP
4	0.	.3379	4.99	11.53	16.52	49.25	-32.73	AVC
5	* 0	.4860	22.87	11.48	34.35	56.24	-21.89	QP
6	0	.4860	8.18	11.48	19.66	46.24	-26.58	AVC
7	1	.3300	14.99	10.98	25.97	56.00	-30.03	QP
8	1	.3300	0.74	10.98	11.72	46.00	-34.28	AVC
9	4	.8340	14.09	10.09	24.18	56.00	-31.82	QP
10	4	.8340	0.64	10.09	10.73	46.00	-35.27	AVG
11	10	.6580	7.51	10.25	17.76	60.00	-42.24	QP

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)

2. Margin (dB) =QuasiPeak/Average (dBuV)-Limit (dBuV)

TOBY

Temperature:	24.5 ℃	Rel	ative Humidity:	45%
Test Voltage:	AC 120V/60Hz		COLIN .	AUL:
Ferminal:	Neutral	-	199	
Fest Mode:	Mode 1	anu		
Remark:	Only worse case is	s reported.		GILLE
	MMM Marine Marin	444hrun 444hrun 44hrun		QP:
-20 0.150	0.5	(MHz)	5	30.000

	_	Reading	Correct	Measure-	1.1	0	
No. Mł	k. Freq.	Level	Factor	ment	Limit	Over	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.1740	29.19	11.63	40.82	64.76	-23.94	QP
2	0.1740	10.43	11.63	22.06	54.76	-32.70	AVG
3 *	0.4860	23.69	11.50	35.19	56.24	-21.05	QP
4	0.4860	9.91	11.50	21.41	46.24	-24.83	AVG
5	0.7660	16.62	11.39	28.01	56.00	-27.99	QP
6	0.7660	1.77	11.39	13.16	46.00	-32.84	AVG
7	1.4580	17.03	10.86	27.89	56.00	-28.11	QP
8	1.4580	2.42	10.86	13.28	46.00	-32.72	AVG
9	3.1500	10.73	10.17	20.90	56.00	-35.10	QP
10	3.1500	-1.32	10.17	8.85	46.00	-37.15	AVG
11	7.8500	13.47	10.06	23.53	60.00	-36.47	QP
12	7.8500	0.52	10.06	10.58	50.00	-39.42	AVG

Remark: 1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)

2. Margin (dB) =QuasiPeak/Average (dBuV)-Limit (dBuV)

Attachment B--Unwanted Emissions Data

---Radiated Unwanted Emissions

9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB Below the permissible value has no need to be reported.

30MHz~1GHz

Temperature:	24.3 ℃		Relative Hum	nidity:	45%				
Test Voltage:	AC 120V/6	OHz	GUUS		NY2				
Ant. Pol.	Horizontal	orizontal							
Test Mode:	Mode 2(TX	Mode b Mode (Channel 01)		(Frank				
Remark:	Only worse	Only worse case is reported.							
80.0 dBu∀/m									
70									
60									
50				(RF)FCC 1 Margin -6	5C 3M Radiation dB				
40									
30			4 5		amutantitations	IL A ALL DE			
20		2	Martin Martin		a shake a where we will be a friend	Vertun Anna			
10 Mahamanan Maraylanada	ermannaler here werden here here here here here here here he	2 Marshar March							
0									
-10									
-20						1000.0			

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	93.7685	40.03	-25.97	14.06	43.50	-29.44	peak
2	159.7844	42.16	-21.42	20.74	43.50	-22.76	peak
3	192.4186	45.81	-23.73	22.08	43.50	-21.42	peak
4 *	268.4853	49.80	-21.71	28.09	46.00	-17.91	peak
5	346.8092	46.04	-19.69	26.35	46.00	-19.65	peak
6	752.7432	38.23	-10.74	27.49	46.00	-18.51	peak

*:Maximum data x:Over limit !:over margin

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = QuasiPeak (dB μ V/m)-Limit QPK(dB μ V/m)

TOBY

Temperature:	24.3	۶°C			Re	elative Hu	umidit	y:	45%	, D	
Test Voltage:	AC	120V	//60ŀ	Ηz	63	C	63	3		5	100
Ant. Pol.	Verti	ical	1	NUP		AV	320		5		5
Test Mode:	Mod	le 2(TX N	/lode b Mo	de Cha	annel 01)	-	CI I	J.P		-
Remark:	Only	Only worse case is reported.						GIL	(D)		
80.0 dBuV/m											
70											
60								GENELC -	150.3M	Radiation	
50								(REJECC Margin-6		Kaulation	
40			┍╼┢═								
30	+	+						6			
20 highlyhad with any hard with	Marghlynn	- X /	2 mary	Managhand	WWW A	Manual Marialan		AND MARKAR	nd with land and	al for the section of	when an an
10 Mentow Willie worth	<u>المعامر من</u>	MAY -		and an and a second sec		т [.]					+
0											
-10											
-20											
30.000	60.00	1			(MHz)	3	300.00				1000.0

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	76.2442	44.38	-25.83	18.55	40.00	-21.45	peak
2 *	82.6482	49.51	-26.65	22.86	40.00	-17.14	peak
3	100.5806	49.47	-25.24	24.23	43.50	-19.27	peak
4	189.7385	47.55	-23.58	23.97	43.50	-19.53	peak
5	344.3855	42.24	-19.76	22.48	46.00	-23.52	peak
6	480.5276	42.01	-16.09	25.92	46.00	-20.08	peak

*:Maximum data x:Over limit !:over margin

Remark:

- Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
 QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = QuasiPeak (dBµV/m)-Limit QPK(dBµV/m)

Above 1GHz

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		6032
Test Mode:	TX B Mode 2412MHz		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4824.105	40.82	1.42	42.24	54.00	-11.76	AVG
2	4824.156	52.27	1.42	53.69	74.00	-20.31	peak

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX B Mode 2412MHz	MUDD -	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4824.058	51.58	1.42	53.00	74.00	-21.00	peak
2 *	4824.078	40.67	1.42	42.09	54.00	-11.91	AVG

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV) 3. Margin (dB) = Peak/AVG (dBμV/m)-Limit PK/AVG(dBμV/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.



Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		and a
Ant. Pol.	Horizontal	200	
Test Mode:	TX B Mode 2437MHz		No.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4874.236	40.45	1.53	41.98	54.00	-12.02	AVG
2	4874.260	52.06	1.53	53.59	74.00	-20.41	peak

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26° C	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz	anus -	
Ant. Pol.	Vertical	COB.	- mup
Test Mode:	TX B Mode 2437MHz		No.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4874.206	52.56	1.53	54.09	74.00	-19.91	peak
2 *	4874.251	41.50	1.53	43.03	54.00	-10.97	AVG

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.



Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		AU2
Ant. Pol.	Horizontal	1	
Test Mode:	TX B Mode 2462MHz		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4924.291	51.63	1.67	53.30	74.00	-20.70	peak
2 *	4924.362	41.31	1.67	42.98	54.00	-11.02	AVG

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical	THUS S	
Test Mode:	TX B Mode 2462MHz	COB	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4924.184	50.04	1.67	51.71	74.00	-22.29	peak
2 *	4924.425	40.88	1.67	42.55	54.00	-11.45	AVG

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

TOBY

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		AU2
Ant. Pol.	Horizontal	1	
Test Mode:	TX G Mode 2412MHz		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4824.188	51.44	1.42	52.86	74.00	-21.14	peak
2 *	4824.188	40.56	1.42	41.98	54.00	-12.02	AVG

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical	alles	
Test Mode:	TX G Mode 2412MHz	anB!	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4824.135	40.22	1.42	41.64	54.00	-12.36	AVG
2	4824.200	51.23	1.42	52.65	74.00	-21.35	peak

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.



Temperature:	26 °C	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		and a
Ant. Pol.	Horizontal	201	
Test Mode:	TX G Mode 2437MHz		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4874.147	41.30	1.53	42.83	54.00	-11.17	AVG
2	4874.215	53.02	1.53	54.55	74.00	-19.45	peak

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 °C	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical	MUDD -	
Test Mode:	TX G Mode 2437MHz	and b	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4874.176	41.39	1.53	42.92	54.00	-11.08	AVG
2	4874.253	51.42	1.53	<mark>52.95</mark>	74.00	-21.05	peak

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.



Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		MU2
Ant. Pol.	Horizontal	1	
Test Mode:	TX G Mode 2462MHz		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4924.226	41.33	1.67	43.00	54.00	-11.00	AVG
2	4924.260	51.37	1.67	53.04	74.00	-20.96	peak

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 °C	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz	and a	NUL S
Ant. Pol.	Vertical	COB.	and the
Test Mode:	TX G Mode 2462MHz		No.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1 *	4924.171	40.99	1.67	42.66	54.00	-11.34
2	4924.279	51.31	1.67	52.98	74.00	-21.02

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.



Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		anu?
Ant. Pol.	Horizontal	2 4	
Test Mode:	TX n(HT20) Mode 2412M	IHz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4824.070	51.18	1.42	52.60	74.00	-21.40	peak
2 *	4824.142	39.99	1.42	41.41	54.00	-12.59	AVG

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical	ALL A	NUC S
Test Mode:	TX n(HT20) Mode	2412MHz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4824.124	50.09	1.42	51.51	74.00	-22.49	peak
2 *	4824.190	40.64	1.42	42.06	54.00	-11.94	AVG

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.



26 ℃	Relative Humidity:	54%
AC 120V/60Hz		MU2
Horizontal	200	
TX n(HT20) Mode 2437N	ЛНz	
	AC 120V/60Hz Horizontal	AC 120V/60Hz

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4874.126	53.29	1.53	54.82	74.00	-19.18	peak
2 *	4874.218	41.39	1.53	42.92	54.00	-11.08	AVG

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical	CODD -	
Test Mode:	TX n(HT20) Mode 243	7MHz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4874.148	41.33	1.53	42.86	54.00	-11.14	AVG
2	4874.237	52.75	1.53	54.28	74.00	-19.72	peak

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

TOBY

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		AUD -
Ant. Pol.	Horizontal	1	
Test Mode:	TX n(HT20) Mode 2462M	ИНz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4924.123	41.32	1.67	42.99	54.00	-11.01	AVG
2	4924.222	50.57	1.67	52.24	74.00	-21.76	peak

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical	GUUD A	NUL S
Test Mode:	TX n(HT20) Mode 2462N	ЛНz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4924.322	40.91	1.67	42.58	54.00	-11.42	AVG
2	4924.386	54.54	1.67	56.21	74.00	-17.79	peak

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.



Temperature:	26 °C	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		anu?
Ant. Pol.	Horizontal	201	
Test Mode:	TX n(HT40) Mode 2422M	ИНz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4844.287	46.55	1.47	48.02	54.00	-5.98	AVG
2	4844.359	52.72	1.47	54.19	74.00	-19.81	peak

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 °C	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX n(HT40) Mode	2422MHz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4844.253	50.11	1.47	51.58	74.00	-22.42	peak
2 *	4844.313	41.68	1.47	43.15	54.00	-10.85	AVG

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.



Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		and a
Ant. Pol.	Horizontal	200	
Test Mode:	TX n(HT40) Mode 2437	MHz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4874.210	51.85	1.53	53.38	74.00	-20.62	peak
2 *	4874.254	41.45	1.53	42.98	54.00	-11.02	AVG

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz	1	
Ant. Pol.	Vertical	all's	
Test Mode:	TX n(HT40) Mode 2437	MHz	

No.	Frequency (MHz)	Reading (dBuV)		Level (dBuV/m)		Margin (dB)	Detector
1 *	4874.175	41.17	1.53	42.70	54.00	-11.30	AVG
2	4874.224	53.83	1.53	55.36	74.00	-18.64	peak

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

TOBY

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz		and the
Ant. Pol.	Horizontal	1	
Test Mode:	TX n(HT40) Mode 2452N	ИНz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4904.150	41.52	1.60	43.12	54.00	-10.88	AVG
2	4904.278	50.59	1.60	52.19	74.00	-21.81	peak

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz	20	
Ant. Pol.	Vertical		
Test Mode:	TX n(HT40) Mode 2452M	Hz	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4904.120	53.18	1.60	54.78	74.00	-19.22	peak
2 *	4904.204	41.48	1.60	43.08	54.00	-10.92	AVG

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)

4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

----END OF REPORT-----