

# UNI-TREND TECHNOLOGY (CHINA) CO.,LTD.

SCOPE OF WORK EMC TESTING–UTi640Q

**REPORT NUMBER** 231123071GZU-009

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**TEST REPORT** 

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Applicant Name &	:	UNI-TREND TECHNOLOGY (CHINA) CO.,LTD.		
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Manufacturing Site Intertek Report No: FCC ID:	:	Same as Applicant 231123071GZU-009 2APMK-6401213Q		

## Test standards

#### 47 CFR PART 15 Subpart C: 2023 section 15.247

#### Sample Description

Product	:	Professional Thermal Imager
Model No.	:	UTi640Q
Electrical Rating	:	Powered by battery pack: 3.7V, 5200mAh/19.24Wh
Serial No.	:	Not Labeled
Date Received	:	23 November 2023
Date Test	:	13 December 2023-14 December 2023
Conducted		

Prepared and Checked By

Approved By:

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**Richard Liu** 

Engineer

en, Lm

Dean Liu Sr. Project Engineer

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Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

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Guangdong, China

Version: 10 June 2019

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## **TEST REPORT**

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## **1.0 TEST RESULT SUMMARY**

Test Item	Test Requirement	Test Method	Result
Antenna Requirement	FCC PART 15 C section 15.247 (c) and Section 15.203	FCC PART 15 C section 15.247 (c) and Section 15.203	PASS
6 dB Bandwidth (DTS bandwidth)	FCC PART 15 C section 15.247 (a)(2)	ANSI C63.10: Clause 11.8	PASS
Duty Cycle	FCC KDB 558074 D01 15.247 Meas Guidance v05r02, Clause 6	ANSI C63.10: Clause 11.6 & RSS Gen 2.9	PASS
Maximum Average Conducted Output Power	FCC PART 15 C clause 5.247(b)(3) RSS-247 clause 5.4(4)	ANSI C63.10: Clause 11.9.2.3.1 & RSS-Gen clause 6.12	PASS
Peak Power Spectral Density	FCC PART 15 C section 15.247(e)	ANSI C63.10: Clause 11.10.2	PASS
Out of Band Conducted Emissions	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 11.11	PASS
Out of Band Radiated Emission	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 11.11, 6.4, 6.5 and 6.6	N/A
Radiated Emissions in Restricted Bands	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 11.12.1, 6.4, 6.5 and 6.6	PASS
Band Edges Measurement	FCC PART 15 C section 15.247 (d) &15.205	ANSI C63.10: Clause 11.11 and 11.13	PASS
Conducted Emissions at Mains Terminals	FCC PART 15 C section 15.207	ANSI C63.10: Clause 6.2	PASS

#### **Remark:**

N/A: not applicable. Refer to the relative section for the details.

EUT: In this whole report EUT means Equipment Under Test.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

ANSI C63.10: the detail version is ANSI C63.10:2013 in the whole report



## 2.0 General Description

## 2.1 Product Description

Operating Frequency:	2412 MHz to 2462 MHz for 802.11b/g/n(HT20) 2422 MHz to 2452 MHz for 802.11n(HT40)
Type of Modulation:	802.11b: DSSS(CCK/QPSK/BPSK)
	802.11g: OFDM(BPSK/QPSK/16QAM/64QAM)
	802.11n: OFDM (BPSK/QPSK/16QAM/64QAM)
Transmit Data Rate:	802.11b :1/2/5.5/11 Mbps
	802.11g :6/9/12/18/24/36/48/54 Mbps
	802.11n(HT20): 6.5/13/19.5/26/39/52/58.5/65 Mbps/72.2Mbps
	802.11n(HT40): 13.5/27/40.5/54/81/108/121.5/135/150 Mbps
Number of Channels	11 Channels for 802.11b/g/n(HT20)
	7 Channels for 802.11n(HT40)
Channel Separation:	5 MHz
Antenna Type	The wire antenna that uses a unique coupling to the intentional
	radiator
Function:	Professional Thermal Imager with 2.4 GHz WIFI
EUT Power Supply:	Powered by 3.7V rechargeable Li-ion battery

EUT channels and frequencies list:

For 802.11b/g/n(HT20): test frequencies are lowest channel 1: 2412 MHz, middle channel 6: 2437 MHz and highest channel 11: 2462 MHz.

For 802.11n(HT40): test frequencies are lowest channel 3: 2422 MHz, middle channel 6: 2437 MHz and highest channel 9: 2452 MHz.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	



## **TEST REPORT**

## 2.2 Related Submittal(s) Grants

This is an application for certification of: DTS- Part 15 Digital Transmission Systems (WIFI transmitter portion)

Remaining portions are subject to the following procedures: 1. Receiver portion of WIFI: exempt from technical requirement of this Part.

## 2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans and final tests were performed in the semi-anechoic chamber to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise.

#### 2.4 Test Facility

All tests were performed at: Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China Except Conducted Emissions was performed at: Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China

A2LA Certificate Number 0078.10

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch is accredited by A2LA and Listed in FCC website. FCC accredited test labs may perform both Certification testing under Parts 15 and 18 and Declaration of Conformity testing.

## **3.0** System Test Configuration

#### 3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, AC power line was manipulated to produce worst case emissions. It was powered by AC 120V/60Hz supply.



The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. The spurious emissions more than 20 dB below the permissible value are not reported.

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement	
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower	
At or above 10 GHz to below	5th harmonic of highest fundamental frequency or to	
30 GHz	100 GHz, whichever is lower	
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified	

#### Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device	Number of	Location in frequency
operates	frequencies	range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

#### 3.2 EUT Exercising Software

Description	Manufacturer	Model No.	SN/Version	Supplied by
For normal operation	HP	Compaq 6710b	SN:CNU8240LF9	Intertek
For fixing frequency	VanDyke Software	SecureCRT	Version: v9.4.1.3102	Client



## **3.3** Special Accessories

No special accessories used.

#### 3.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
	20 dB Bandwidth	
1	6dB Bandwidth	2.3%
	99% Bandwidth	
2	Carrier Frequencies Separated	2.3%
3	Dwell Time	1.2%
4	Maximum Peak Conducted Output Power	1.5dB
5	Peak Power Spectral Density	1.5dB
6	Out of Band Conducted Emissions	1.5dB
7	Band edges measurement	1.5dB
		4.26 dB (25 MHz-1 GHz)
		4.46 dB (1 GHz-6 GHz)
8	Radiated Emissions	4.96 dB (6 GHz-18 GHz)
0		5.15dB (18GZH-26GHz)
		5.15dB (26GZH-40GHz)
9	Conducted Emissions at Mains Terminals	2.58dB
10	Temperature	0.5 °C
11	Humidity	0.4 %
12	Time	1.2%

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty is calculated in accordance with ETSI TR 100 028-2001.

The measurement uncertainty is given with a confidence of 95%, k=2.

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance – Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value

## 3.5 Equipment Modification

Any modifications installed previous to testing by UNI-TREND TECHNOLOGY (CHINA) CO., LTD.



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will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

## 3.6 Support Equipment List and Description

This product was tested with corresponding support equipment as below:

## Support Equipment

Description	Manufacturer	Model No.	SN/Version	Supplied by
NoteBook	НР	Dell P137G	SN:CNU8241LF8	Intertek
Control board	WIK	CNMDIP34	Version:3434	WIK
Adapter	Huiwei	HW-200325CP0	Version:C973Y1JAP0 5052	Intertek

#### Cable

Description	Model No.	Connector type	Cable length/type	Supplied by
Antenna cable	RF-01	SMA	0.2 m(shielded)	Intertek
USB extension cord	USB-01	USB	1.0 m(shielded)	WIK



## **TEST REPORT**

## 4.0 Measurement Results

#### 4.1 Antenna Requirement

Standard requirement:

15.203 requirement:

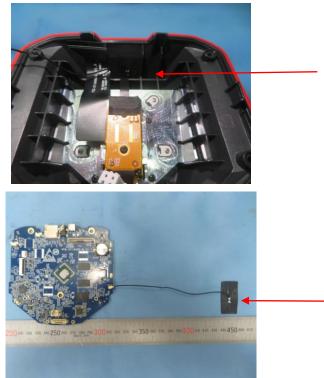
For intentional device. According to 15.203 an intentional radiator shall be designed to Ensure that no antenna other than that furnished by the responsible party shall be used with the device.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz bands that are used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna

The antenna is an integral antenna and no consideration of replacement. The best case gain of the antenna is 2.37 dBi as declared by applicant.

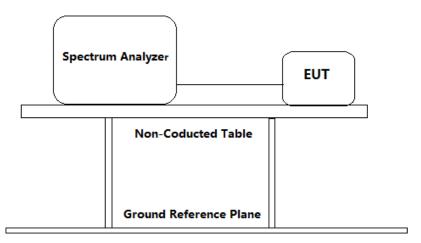




## 4.2 6 dB Bandwidth (DTS bandwidth)

Test Requirement:	FCC Part 15 C section 15.247 (a)(2)Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5MHz, and 5725- 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10: Clause 11.8
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

- 1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1dB, with a 10dB attenuator) from the antenna port to the spectrum.
- 2. Set the spectrum analyzer:
  - a) Set RBW = 100 kHz
  - b) Set the VBW  $\geq$  [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.
h) Span=2\*BW~5\*BW

3. Repeat until all the test status is investigated.



## **TEST REPORT**

## 4. Report the worst case.

## Used Test Equipment List

Spectrum Analyzer. Refer to Clause 5 Test Equipment List for details.

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured 6dB bandwidth (MHz)	Limit	Result
1	2412		1 Mbps	10.0		Pass
6	2437	802.11b	1 Mbps	12.0		Pass
11	2462		1 Mbps	10.1		Pass
1	2412		6 Mbps	16.3		Pass
6	2437	802.11g	6 Mbps	16.2		Pass
11	2462		6 Mbps	16.1		Pass
1	2412	802.11n	6.5Mbps	17.1	≥500KHz	Pass
6	2437	(HT20)	6.5Mbps	17.1		Pass
11	2462		6.5Mbps	17.0		Pass
3	2422	802.11n	13.5 Mbps	35.9		Pass
6	2437	(HT40)	13.5 Mbps	36.1		Pass
9	2452		13.5 Mbps	36.0		Pass

Test result: The unit does meet the FCC requirements.

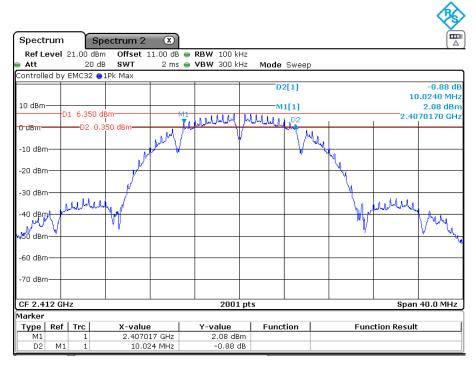


## **TEST REPORT**

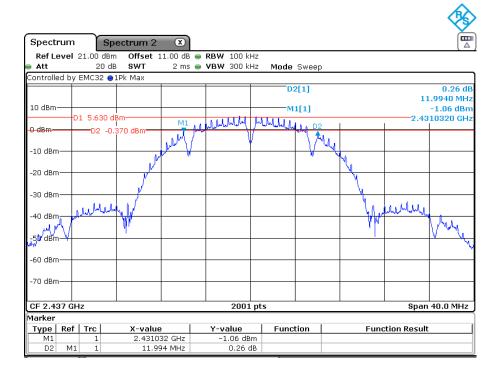
Result plot as follows:

802.11b mode with 1Mbps data rate

Channel 1: 2.412GHz



Channel 6: 2.437GHz:



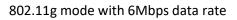


 $\mathbf{\Lambda}$ 

# **TEST REPORT**

Channel 11: 2.462GHz:

Ref Level         21.00         dBm         Offset         11.00         dBm         RBW         100         Hz           Att         20         dB         SWT         2 ms         VBW         300 kHz         Mode         Sweep           Controlled by EMC32         1Pk Max         D2[1]         4.14 dB         10.1399 MHz           10         dBm         D1         5.560 dBm         MI[1]         -3.37 dBm           0         dBm         D2         -0.440 dBm         MI[1]         -3.37 dBm           -10         dBm         D2         -0.440 dBm         MI[1]         -4.569011 GHz           -20 dBm         MI         MI         MI         MI         MI         MI           -30 dBm         MI         MI         MI         MI         MI         MI           -50 dBm         MI         MI         MI         MI         MI         MI           -70 dBm         MI         MI         MI         MI         MI         MI         MI           -70 dBm         MI									
Att         20 dB         SWT         2 ms         VBW 300 kHz         Mode Sweep           Controlled by EMC32         1Pk Max         D2[1]         4.14 dB           10 dBm         D1         5.560 dBm         MI[1]         -3.37 dBm           -10 dBm         D2         -0.440 dBm         MI         MI         -2.4569011 GHz           -20 dBm         -02         -0.440 dBm         MI         -04         -04         -04           -30 dBm         -04         -04         -04         -04         -04         -04           -50 dBm         -04         -04         -04         -04         -04         -04           -00 dBm         -02         -0.440 dBm         -04         -04         -04         -04           -20 dBm         -04         -04         -04         -04         -04         -04           -30 dBm         -04	Spectrum	Spectrum 2	× Sp	ectrum 3	X Spe	ectrum 4	×		
Controlled by EMC32 • 1Pk Max         D2[1]         4.14 dB           10 dBm         D1 5.560 dBm         -3.37 dBm           0 dBm         D2 -0.440 dBm         M1[1]         -3.37 dBm           -10 dBm         D2 -0.440 dBm         M1[1]         -3.37 dBm           -20 dBm         D2 -0.440 dBm         M1[1]         -4569011 GHz           -30 dBm         -40 dBm         -40 dBm         -40 dBm         -40 dBm           -50 dBm         -60 dBm         -70 dBm         -70 dBm         -70 dBm         -70 dBm           -70 dBm         -70 dBm         -70 dBm         -70 dBm         -70 dBm         -70 dBm         -70 dBm           -70 dBm         -70 dBm         -70 dBm         -70 dBm         -70 dBm         -70 dBm									
D2[1]         4.14 dB           10 dBm         D1 5.560 dBm         -3.37 dBm           0 dBm         D2 -0.440 dBm         M1[1]         -3.37 dBm           -10 dBm         D2 -0.440 dBm         M1[1]         2.4569011 GHz           -20 dBm         -3.37 dBm         -40 dBm         -40 dBm         -40 dBm           -40 dBm         -40 dBm         -40 dBm         -40 dBm         -40 dBm         -40 dBm           -70 dBm			2 ms 😑 🕻	<b>VBW</b> 300 kHz	Mode Sv	weep			
10 dBm     01 5.560 dBm     02 -0.440 dBm     01 0.1399 MHz       0 dBm     02 -0.440 dBm     01 0.1399 MHz     -3.37 dBm       -10 dBm     02 -0.440 dBm     01 0.100 mm     01 0.100 mm       -20 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -20 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -20 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -30 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -30 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -30 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -30 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -30 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -30 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -50 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -50 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -70 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -70 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -70 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       -70 dBm     01 0.100 mm     01 0.100 mm     01 0.100 mm       Type     Ref <td>Controlled by EMC</td> <td>.32 OIPK Max</td> <td></td> <td></td> <td>Dala</td> <td>. 1</td> <td></td> <td></td> <td>4.14.40</td>	Controlled by EMC	.32 OIPK Max			Dala	. 1			4.14.40
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0 dBm     D2     -0.440 dBm     0 dBm     0 dBm       -10 dBm     -10 dBm     -10 dBm     -10 dBm       -20 dBm     -10 dBm     -10 dBm     -10 dBm       -30 dBm     -10 dBm     -10 dBm     -10 dBm       -30 dBm     -10 dBm     -10 dBm     -10 dBm       -30 dBm     -10 dBm     -10 dBm     -10 dBm       -40 dBm     -10 dBm     -10 dBm     -10 dBm       -50 dBm     -10 dBm     -10 dBm     -10 dBm       -60 dBm     -10 dBm     -10 dBm     -10 dBm       -70 dBm     -10 dBm	D1 5	.560 dBm				-			
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-70 dBm70 dB	-Strubin V								e M
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Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4569011 GHz         -3.37 dBm	-70 dBm								
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4569011 GHz         -3.37 dBm									
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4569011 GHz         -3.37 dBm	CF 2.462 GHz			2001 p	ts			Span	40.0 MHz
M1 1 2.4569011 GHz -3.37 dBm	Marker								
	Type   Ref   Tr	c X-value	.	Y-value	Functio	n	Func	tion Result	1
D2 M1 1 10.1399 MHz 4.14 dB									
	D2 M1	1 10.13	99 MHz	4.14 dB					



Channel 1: 2.412GHz:

													- VY
Spectru	ım	$\neg$	Spe	ctrum 2	X	Spect	um 3	X	Spectr	um 4	X		
Ref Lev Att	/el :		dBm I dB	Offset SWT		● RBW ● VBW		Mode	sweep				
Controllec	l by	EMC32	●1F	k Max									
								D	2[1]			16	1.11 dB 5.2817 MHz
10 dBm—			+					N	11[1]			2.40	-3.46 dBm 38302 GHz
0 dBm—		1 3.42 		n	1 Jongoo Int	ah salitant	nvelmen per	Jugalium	handmind	MAR 2			
-10 dBm-	_		-		∦		¥			-			
-20 dBm-				W						- \ <u>\</u>	M		
-20 dBm- -30 dBm- (\\\\) (\\\\) (\\\\) (\\) (\\) (\\\) ((\\\) (\\\) (\\\) ((\\\) (\\\) ((\\) ((\\) ((\\\) ((\\\) ((\\) ((\\) ((\\) ((\\) (	rmhl	MAAM	M	w/# ``							W	Mahny	MMMMM
-40 dBm-													
-50 dBm-													
-60 dBm-													
-70 dBm-													
CF 2.412	2 GH	z					2001 pt	s	·			Span	40.0 MHz
Marker													
	Ref	Trc		X-valu			alue	Fund	ction		Fun	ction Result	:
M1 D2	М1	1			302 GHz 317 MHz	-3	3.46 dBm 1.11 dB						



# **TEST REPORT**

Channel 6: 2.437GHz:

													×,
Spectr	um	Υ	Spec	trum 2	×	Spect	rum 3	X	Spec	trum 4	. X		
Ref Le	vel 3	21.00	dBm	Offset	11.00 dB	😑 RBV	/ 100 kl	Ηz					(
Att 🗧		20	) dB	SWT	2 ms	e VBV	/ 300 ki	Hz Mi	ode Swe	зер			
Controlle	d by I	EMC32	2 🔵 1 Pk	< Max									
									D2[1]				1.49 dB
												1	6.1658 MHz
10 dBm-									-M1[1]				-3.69 dBm
		1 1 0 9	IO dBm							1 10		2.4	289461 GHz
0 dBm—					Hunner	ntundan	Multing	maltin	ليهما ويعاده	<u>দলন্দ্রনার্দ্রি</u>	2		
			-4.020	J aBm	ſ			1		ľ			
-10 dBm-					/								
				1							<b>L</b>		
-20 dBm-				M							~~		
				Start							Martin		MMMM
-30 dBm-		W.A.M.	MAN W	·								MY WARA	10 all 1
~nN/^///~~	Maria A	ALKIN										I THE WI	"YYUWWWW.
-40 dBm-													
-50 dBm-													
-60 dBm-													
-70 dBm-					1							+	-
CF 2.43	7 GH	z					2001	pts				Spa	n 40.0 MHz
Marker													
Type	Ref	Trc		X-valı	ie	Y-1	value	F	unction		Fun	ction Resu	lt
M1		1			461 GHz	-	3.69 dB						
D2	Μ1	1		16.10	558 MHz		1.49 c	IB					

Channel 11: 2.462GHz:

					<b></b>
Spectrum	Spectrum 2	Spectrum 3	Spectru	um 4 🛛 🕱	
Ref Level 21.00 Att		0 dB <b>e RBW</b> 100 kHz 2 ms <b>e VBW</b> 300 kHz			(-)
Controlled by EMC3	32 😑 1Pk Max				
			D2[1]		-0.56 dB
					16.1079 MHz
10 dBm			M1[1]		-4.15 dBm
D1 2.6	50 dBm				2.4539461 GHz
0 dBm	2 -3.350 dBm	Allow marked marker and marker and	al and any all and a solution of the	MWA a	
	2 -5.550 dbm			f f	
-10 dBm					
	8			4	
-20 dBm	Marken			Mary Mary	
-30 dBm	Lister and the second sec				(Lalla d
-30 dBm	Anna				a man way and a man
-50 dBm					
-60 dBm					
-70 dBm					
CF 2.462 GHz		2001 p	ts		Span 40.0 MHz
Marker	1	1	· - · · ·		
Type Ref Trc		Y-value	Function	Fund	ction Result
M1 1 D2 M1 1					

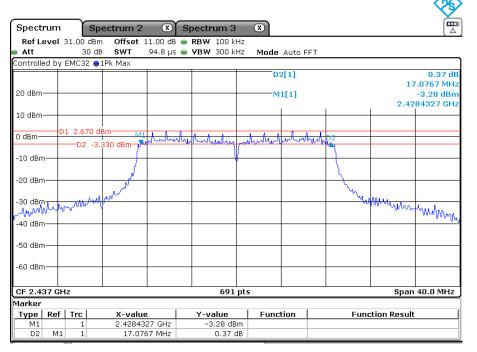
802.11n(HT20) mode with 6.5Mbps data rate Channel 1: 2.412GHz:



# **TEST REPORT**

									- A
Spectrun									
Ref Leve Att	31.00 dBm 30 dE			• RBW 100 kH • VBW 300 kH		Auto FFT			
-	y EMC32 🔵		94.0 h2 🖷	YOW SUUKE	12 Mode	AULO FFI			
	,			1 1	D2	[1]			2.05 dB
								17	1346 MHz
20 dBm——				+ +	M1	[1]			-4.17 dBm
					1		1	2.40	33748 GHz
10 dBm									
0 dBm	D1 2.820 d	Bm		A 6 A		1.0	1.02		
o ubiii	D2 -3.	180 dBm 📅	n marthall	mutuating	mallandanth	Mhuthu	VUL -		
-10 dBm				V					
							$ \lambda $		
-20 dBm							<u> </u>		
	www.www	n MAN					Nr.		
-30 dBm	1 Mart and Mart	pro-						ph May	www.
	Č.								monor
-40 dBm									
-50 dBm									
-30 ubiii									
-60 dBm									
CF 2.412 (	GHz	I	1	691	ots			Span	40.0 MHz
Marker									
Type   Re	f Trc	X-value		Y-value	Funct	ion	Func	tion Result	
M1	1	2.40337		-4.17 dBr					
D2 M	11 1	17.134	16 MHz	2.05 d	в				

Channel 6: 2.437GHz:



Channel 11: 2.462GHz:



# **TEST REPORT**

Spect	rum	s	pectrum 2	×	Spectr	um 3	×	Spectru	m 4	×		
	evel :	31.00 dB			RBW							`
Att		30 0		94.8 µs	VBW	300 kHz	Mod	e Auto FF	Т			
controlle	ару	EMC32 (	1Pk Max					D2[1]				0.27 d
								J2[1]			13	0.27 u 7.0188 MH
20 dBm·								M1[1]			-	-3.84 dBr
											2.45	34327 GH
10 dBm·												
	n	1 2.470	dBm									
0 dBm—			aum M 3.330 dBm 7	how	Instructor	wilco pr	Inolu	Junutratio	MAR2			
-10 dBm						¥						
-10 000	'		1 1			ľ						
-20 dBm									4			
			and the							h		
-30 dBm	·	n A	W WW					-		- 44	munuly	
www	wp	nan	۳								and a constrained of the	MUM
-40 dBm												v)- ~
-50 dBm												
-50 UBII	·											
-60 dBm												
CF 2.40	52 GH	z		1		691 pts	;				Span	40.0 MHz
/larker												
Туре	Ref	Trc	X-valu		Y-Va		Fun	ction		Fund	tion Result	t
M1		1	2.45343			.84 dBm						
D2	M1	1	17.01	.88 MHz		0.27 dB						

## 802.11n(HT40) mode with 13.5Mbps data rate

#### Channel 3: 2.422GHz:

Spectrum		Spect	trum 2	2 🗴	Sp	ectrun	n 3	X	Spectr	um 4 🛛 🗶		
Ref Level Att	3	0 dB	SWT	11.00 dE 1.1 m		BW 10 BW 30			e Auto S	Gweep		
Controlled by	/ EMC32	2 😑 1 Pk	Max									
									D2[1]			-0.40 dB
0 dBm												85.890 MHz
o abiii									M1[1]			15.94 dBm 03939 GHz
-10 dBm	D1 -9.9	50 dBm									2.9	03939 GHZ
		15.05		applied	with	Why	MA V	while	Automat	hhh de		
-20 dBm	02	-13.93	U UBII		U P		<u> </u>	.00	10000	*	_	
							Ψ					
-30 dBm			-+	_			_				_	
			J.									
-40 dBm			J.	_			-			- \_		
		-	, n'							and a second	mondan	
50 abm	mon	- and			-							and the second s
-60 dBm												
-70 dBm												
-80 dBm												
-ou ubiii												
CF 2.422 G	Hz					6	91 pt	ts			Span	80.0 MHz
Marker												
Type Ref			X-valu			Y-valu		Fur	nction	Fui	nction Result	
M1 D2 M	1 1 1			939 GHz .89 MHz		-15.94	+ dBm 40 dB					
		1	33			0.5	io ub	<u> </u>				

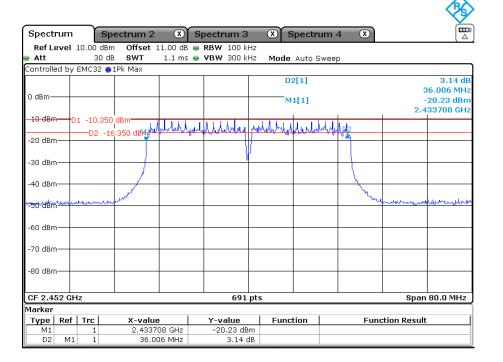
Channel 6: 2.437GHz:



# **TEST REPORT**

Spectr	um												
Ref Le	evel	10.00 (	dBm	Offset	11.00 dE	e RE	<b>W</b> 100 k	Hz					
🛛 Att		30	) dB	SWT	1.1 ms	5 👄 VE	<b>3W</b> 300 k	Hz Mode	a Auto S	Sweep			
Controlle	d by	EMC32	●1P	k Max									
									02[1]				-2.57 dB
0 dBm—													36.122 MHz
U UBIII-								ſ	41[1]				-15.89 dBm
-10 dBm		1 -9.89	an der									;	2.418939 GHz
-10 ubm		1 -5.0.		'' M:	1 Mar ul Mar	ne Ul	L.L.MARK	pathlet	Allen Ast	hrlu	1.		
-20 dBm			-15.8	90 aBm	0. 0. v.	0.0.0		p	Joseph A. an				
20 0011				[				l					
-30 dBm													
00 00				1							1		
-40 dBm				کلیس .							<u> </u>		
				فللمس							No.		
-50 dBm	- Margarette	- Maria	$\sim 10$						_		~	mand	www.www.w
-60 dBm													
-70 dBm			_						_				
-80 dBm	_		_		_								
CF 2.43	37 GH	lz					691	pts				Sp	an 80.0 MHz
Marker													
	Ref	Trc		X-val			'-value		ction		Fun	ction Res	ult
M1		1			3939 GHz		-15.89 dE						
D2	M1	1		36	122 MHz		-2.57	38					

Channel 9: 2.452GHz:





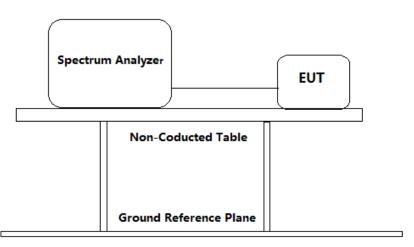
## **TEST REPORT**

## 4.3 Duty Cycle

Test Requirement:	FCC KDB 558074 D01 15.247 Meas Guidance v05r02, Clause 6
Test Method:	ANSI C63.10: Clause 11.6
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was

(were) selected for the final test as listed below.

Test Configuration:



#### Test Procedure:

- 1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1dB, with a 10dB attenuator) from the antenna port to the spectrum.
- 2. Set the spectrum analyser:
  - a) Set the center frequency of the instrument to the center frequency of the transmission. Set the VBW  $\geqslant$  [3 x RBW]
  - b) Set RBW ≥OBW if possible; otherwise, set RBW to the largest available value. Span = Zero span
  - c) Set VBW  $\geq$  RBW. Set detector = peak or average. Trace mode = Free run
- 3. Report the worst case.

Used Test Equipment List

Spectrum Analyzer. Refer to Clause 5 Test Equipment List for details.



# **TEST REPORT**

## Test result:

Channel No.	Frequency (MHz)	Mode	On time (ms)	Period (ms)	Duty Cycle (%)
6	2437	802.11b	12.464	12.638	98.62
6	2437	802.11g	2.058	2.217	92.83
6	2437	802.11n (HT20)	1.917	2.049	93.56
6	2437	802.11n (HT40)	0.945	1.055	89.57

# Result plot as follows:

802.11b mode

Channel 6: 2437 MHz:

2437		12.													×
Spectru	ım	Υ	Spectru	ım 2	X	Spe	ctrum 3	X	) s	pectri	um 4	x x			
Ref Lev	/el 🗧	31.00	dBm C	ffset	11.00 d	B 😑 R	BW 10 M	1Hz							
Att 🗧			D dB 😑 S	WT	40 m	s V	<b>BW</b> 10 №	1Hz							
SGL TRG															
Controllec	by I	EMC32	2 😑 1 A P C	lrw											
									D	3[1]					-0.10 dB
20 dBm—			Ne	<u>þ</u>						1[1]					2.6377 ms 16.72 dBm
					1				Γ. IΥ	+1+1					9.7391 ms
	TF	RG 8.1	.00 dBm												
ethan.			. Laster			. 66.		a ista				ah.		a.,	11
lu i dBm	له . ه	in produced in the	and the fill	. , W	l II	10.00	ىلار <u>ئىلى بى مى</u>	الألمع	<u>ь</u> , ,	1127.0	_1, l <sup>i</sup>	The second second	(Hilliamed)	14	a
	1		1.00	11	Aldah	[1]	P		1	1 N		a dia a			11111
L20 dBm-					10.4	- I'			-		<u>- 1</u>			- '	
-30 dBm-															
-40 dBm-															
-40 0011															
-50 dBm-															
-60 dBm-															
				1											
CF 2.43	7 GH	z					691	pts							4.0 ms/
Marker															
	Ref	Trc	X	-value		Y	-value 16.72 dB		unc	tion		Fun	ction Res	ult	
M1 D2	М1	1			391 ms_ 73.9 μs		0.85 (								
D2	M1	1			377 ms		-0.10 (								
50		-					2,10			_				_	



# **TEST REPORT**

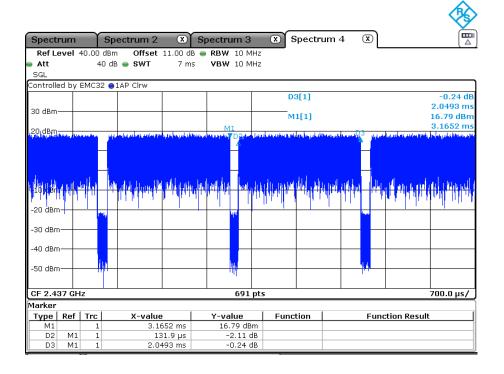
802.11g mode

Channel 6: 2437 MHz:

Spect	rum	Υ	Spe	ectrum 2	X	s	pectrum 3	X	ſ	Spectri	um 4	1	×			
Ref Le	evel :	31.00	dBm	Offset	11.00 d	В 🧉	<b>RBW</b> 10 M	Hz								
👄 Att		3	0 dB	👄 SWT	10 m	s	<b>VBW</b> 10 M	Hz								
SGL TR																
Controlle	ed by	ЕМС3:	2 🛛 1	AP Clrw	_											
									D	3[1]						1.57 dB
20 d8m-		M1	L	and the party of the local sector		D3	ووالدورافة أنواسه والتار									2.2174 ms
a na stan stan		T. M. M. C	DEMIN	and the second secon	a - 44 Julio 140 Aug		a la futura des constants ant	969392)369636	1970	Think		and the state	1. Shurk (Shu	·" `	and a short build as	1.5652 ms
	T	RG 8.1	100 d	Bm						t						
Hadilder			4	<mark>h ndri frantifi</mark> t		4 <u>1</u>	<mark>n ke her fer kunnen ble</mark>		44		u <sup>l</sup> ulu (			₩	k e b Hilense	, a <mark>Devel de l</mark> a second
-20 dBm	1 <sup></sup>				<u> </u>			11.1	_			- 1	_	╢		· · ·
-30 dBm										di <mark></mark>				T		
-40 dBm																
10 421																
-50 dBm						_			_					+		
														П		
-60 dBm						1								H		
CF 2.43	37 GH	z					691	pts								1.0 ms/
Marker	Def	Tur	1	V urbs	-		V=lu.c	1 -		tion			Enve	-+?	on Resul	•
Type M1	Ref	Trc 1		X-valu	e 652 ms		<u>Y-value</u> 17.84 dB		unc	auun			Fun	CO	on kesur	<u> </u>
D2	M1	1			59.4 µs		-2.69 0									
D3	M1	1			174 ms		1.57 c									

#### 802.11n(HT 20) mode

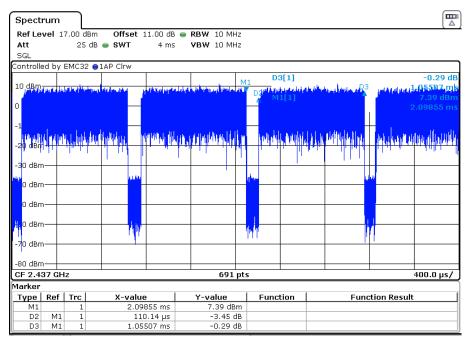
Channel 6: 2437 MHz:





#### 802.11n(HT 40) mode

#### Channel 6: 2437 MHz:



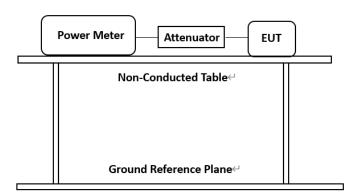


# **TEST REPORT**

#### 4.4 Maximum Average Conducted Output Power

Test Requirement:	FCC Part 15 C section 15.247 (b)(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b) (1), (b) (2), and (b) (3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
Test Method: Test Status:	ANSI C63.10: Clause 11.9.2.3.1 Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



#### Test Procedure:

- 1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1 dB, with a 10dB attenuator) from the antenna port to the power meter. Add compensation value 11dB on the software.
- 2. The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- 3. If the EUT is transmitting at all times, it must be transmitting at its maximum power control level.
- 4. If the EUT does not transmit continuously, measure the duty cycle and adjust the measurement in dBm by adding 10log(1/x) where x is the duty cycle of transmitter output signal. This measurement is an average over both the ON and OFF periods of the transmitter.
- 5. Report the worst case.



Used Test Equipment List

Power meter. Refer to Clause 5 Test Equipment List for details.

Test result:						
Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Power (dBm)	Limit	Result
1	2412		1 Mbps	11.02		Pass
6	2437	802.11b	1 Mbps	11.17		Pass
11	2462		1 Mbps	10.93		Pass
1	2412		6 Mbps	5.01		Pass
6	2437	802.11g	6 Mbps	4.67	1	Pass
11	2462		6 Mbps	4.47	1W	Pass
1	2412	802.11n	6.5 Mbps	5.06	(30dBm)	Pass
6	2437	(HT20)	6.5 Mbps	4.85	-	Pass
11	2462	(	6.5 Mbps	4.55		Pass
3	2422	802.11n	13.5 Mbps	4.81	]	Pass
6	2437	(HT40)	13.5 Mbps	4.75	]	Pass
9	2452	(	13.5 Mbps	4.56		Pass

Remark: The measured power in the table has considered the compensation of duty cycle, cable loss and attenuator.

The unit does meet the FCC requirements.

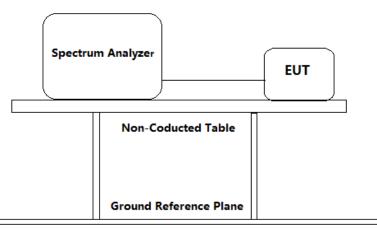


# TEST REPORT

## 4.4 Peak Power Spectral Density

Test Requirement:	FCC Part 15 C section 15.247 (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with
Test Method:	the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density. ANSI C63.10: Clause 11.10.2
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test Couffermentions	

Test Configuration:



Test Procedure:

- 1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable(cable loss =1 dB, with a 10dB attenuator) from the antenna port to the spectrum analyzer or power meter.
- 2. Set the spectrum analyzer:
  - a) Set analyzer center frequency to DTS channel center frequency.
  - b) Set the span= 1.5 × DTS bandwidth.
  - c) Set the RBW to 3 kHz  $\leq$  RBW  $\leq$  100 kHz.
  - d) Set the VBW  $\geq$  [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



# **TEST REPORT**

the RBW.

- j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.
- 3. Measure the Power Spectral Density of the test frequency with special test status.
- 4. Repeat until all the test status is investigated.
- 5. Report the worst case.

#### **Used Test Equipment List**

Spectrum Analyzer. Refer to Clause 5 Test Equipment List for details.

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Peak Power Spectral Density (dBm/3kHz)	Limit	Result
1	2412		1 Mbps	-10.69		Pass
6	2437	802.11b	1 Mbps	-13.79		Pass
11	2462		1 Mbps	-14.16		Pass
1	2412		6 Mbps	-21.96		Pass
6	2437	802.11g	6 Mbps	-22.03		Pass
11	2462		6 Mbps	-23.70	8dBm/	Pass
1	2412	802.11n	6.5 Mbps	-22.60	3 KHz	Pass
6	2437	(HT20)	6.5 Mbps	-22.19		Pass
11	2462	(1120)	6.5 Mbps	-22.92		Pass
3	2422	802.11n	13.5 Mbps	-25.56		Pass
6	2437	(HT40)	13.5 Mbps	-24.59		Pass
9	2452		13.5 Mbps	-26.40		Pass



## **TEST REPORT**

Result plot as follows:

802.11b mode with 1Mbps data rate Channel 1: 2.412GHz:

									<b>I</b>
Spectrum	Spe	ctrum 2	× Sp	ectrum 3	× s	pectrum -	4 🗶		
Ref Level 10 Att	0.00 dBm 15 dB			BW 3 kHz BW 10 kHz					
Controlled by B			2.5 1115 👿 🖣		MOUE A				
					М	1[1]			10.69 dBm 22390 GHz
0 dBm									
-10 dBm					M1				
-10 dBm	welland	withur	-yewenter	relleventeret	philippian	whentit	How where	white presenting	Hurobloshover
									"When the she
-30 dBm									
-40 dBm									
-50 dBm									
-60 dBm									
oo abiii									
-70 dBm									
-80 dBm									
CF 2.412 GH	z			691	pts			Span	15.0 MHz

Channel 6: 2.437GHz:

				<b>\$</b>
Spectrum	Spectrum 2 🛛 🕱 Sp	ectrum 3 🛛 🗵	Spectrum 4	x 🕅
Ref Level         10.00 dB           Att         15 d	dB SWT 3.2 ms 🖷 V		de Auto FFT	
Controlled by EMC32	1Pk Max		M1[1]	-13.79 dBm
0 dBm				2.4362450 GHz
-10 dBm		M1		
-20 dBm	repallenderverderentendet	unanaphany daries	hurrannon	dud any man man and man man and
-30 dBah				
-40 dBm				
-50 dBm				
-60 dBm				
-70 dBm				
-80 dBm				
CF 2.437 GHz		691 pts		Span 18.0 MHz



# **TEST REPORT**

Channel 11: 2.462GHz:

Spectrum	2 🗶 Spe	ctrum 3 🛛 🗵	Spectrum 4	X	
C32 O1Pk Max	2.5 ms 🖶 VB	W IUKHZ MOO	Ie Auto FFI		
			M1[1]		-14.16 dBn 2.4637380 GH
to be a to the	ulequere descharge	manymeter	webraman	MANU MANUE	
pt.pat. Mc.apar. a.d.		1			willing with the
					· · · · · · · · · · · · · · · · · · ·
	0 dBm Offset 15 dB SWT C32 1Pk Max	0 dBm Offset 11.00 dB R 15 dB SWT 2.5 ms VB C32 O1Pk Max	0 dBm Offset 11.00 dB      RBW 3 kHz 15 dB SWT 2.5 ms      VBW 10 kHz Mod C32      1Pk Max	0 dBm Offset 11.00 dB      RBW 3 kHz 15 dB SWT 2.5 ms      VBW 10 kHz Mode Auto FFT C32      IPk Max      M1[1]	0 dBm Offset 11.00 dB • RBW 3 kHz 15 dB SWT 2.5 ms • VBW 10 kHz Mode Auto FFT C32 • 1Pk Max M1[1]

802.11g mode with 6Mbps data rate Channel 1: 2.412GHz:

									<b>(</b>
Spectrum	Sp	ectrum 2	x Sp	ectrum 3	× s	Spectrum -	4 🗴		
Ref Level 1			1.00 dB 😐 R						
Att Controlled by	15 dB	SWT	3.8 ms 👄 🖌	' <b>BW</b> 10 kHz	Mode A	uto FFT			
					М	1[1]			21.96 dBm 85720 GHz
0 dBm									
-10 dBm									
-20 dBm			M1						
-30 dBm		Mablan	phtppp	whither	HANAMAN	entry ha	htertyry	<b>М</b>	
-40 dBm	N							Nug.	
-50 dBm								՝ "Իր	Munu
4444									WWW
-70 dBm									
-80 dBm									
CF 2.412 G	Hz			691	pts			Span 2	24.42 MHz

Version: 10 June 2019

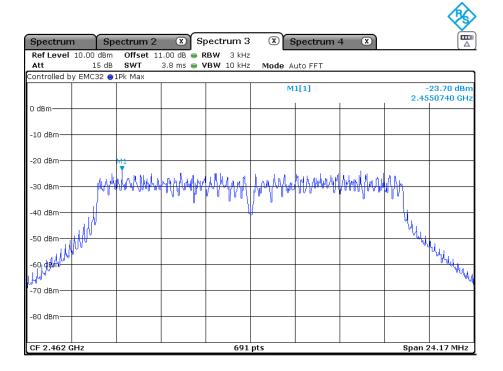


# **TEST REPORT**

Channel 6: 2.437GHz:

					R
Spectrum	Spectrum 2	Spectrum	3 🗴 Spectrum	4 X	
Ref Level 10.00 Att 1	dBm Offset 1: 5 dB SWT	1.00 dB 👄 <b>RBW</b> 3 kł 3.8 ms 👄 <b>VBW</b> 10 kł			(
Controlled by EMC3	32 🔵 1 Pk Max				
			M1[1]		-22.03 dBr 2.4432510 GH
0 dBm					
-10 dBm					
-20 dBm				M1	
-30 dBm	hermont	handhan	y prompositionally	hterefresht	N .
-40 dBm	r		V		- hu
-50 dBm					Werkhow War
-60 dent					W WWW WWW
-70 dBm					
-80 dBm					
CF 2.437 GHz	1	69	1 pts	· ·	Span 25.26 MHz

Channel 11: 2.462GHz:





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# **TEST REPORT**

802.11n(HT20) mode with 6.5Mbps data rate Channel 1: 2.412GHz:

									~ <b>%</b>
Spectrun	n Sp	ectrum 2	xs	pectrum 3	× :	Spectrum 4	4 X		
Ref Level Att	10.00 dBm 15 dB		.00 dB 😐 I 3.8 ms 👄 Y	RBW 3 kHz VBW 10 kHz		uto FET			
Controlled b	y EMC32 😑	LPk Max							
					M	1[1]			22.60 dBm 48590 GHz
0 dBm									
-10 dBm									
-20 dBm—						M1			
-30 dBm	ph	MMMM	NANAN	Multing	MANN	httin	www	hij	
-40 dBm					[				
	. AND							My.	
—-50 dBm	NN <sup>644</sup>							. Nr	Λ <u>μ.</u>
-60 dBr/									- Oran Maria
∯0 dBm—									~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-80 dBm									
CF 2.412 (	GHz			691	pts	•		Span	26.7 MHz

#### Channel 6: 2.437GHz:

Spectrum	Spe	ectrum 2	🗶 St	ectrum 3	× s	pectrum -	4 🕱		
Ref Level 10 Att	15 dB	SWT	00 dB 🕳 R 3.8 ms 🕳 V	BW 3 kHz BW 10 kHz	Mode A	uto FFT			
Controlled by E	EMC32 🔵 1	Pk Max			м	1[1]		-	22.19 dBm
0 dBm									17350 GHz
-10 dBm									
-20 dBm		M	L. 1. k				tisk als		
-30 dBm		YAWAAN	THINK	man	MARAN	ANAM	MMMM	rnu	
-40 dBm	N			l	J				
-50 dBm	/*							<u>์ ๆ</u> น <sub>ับ</sub>	W.
-60 <b>d</b> 8m									- When the boltown
-70 dBm									`
-80 dBm									
CF 2.437 GH	z			691	pts	I		Span 2	25.62 MHz



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# **TEST REPORT**

Channel 11: 2.462GHz:

									~ <b>?</b> \$
Spectrum	n Spe	ectrum 2	× Sp	ectrum 3	X E	Spectrum	4 🕱		
Ref Level Att	10.00 dBm 15 dB		00 dB 👄 R 3.8 ms 👄 V	<b>BW</b> 3 kHz <b>BW</b> 10 kHz	Mode A	uto FFT			
Controlled by	y EMC32 🔵 1	.Pk Max							
					м	1[1]			22.92 dBm 82440 GHz
0 dBm									
-10 dBm									
-20 dBm							M1		
-30 dBm	mM	month	mANIA	WILLIAM	humu	Whythe	Walshar	MAA	
-40 dBm									
-50 dBm	N							- <sup>V</sup> h	
مى	٣								huhhanan an
-60 dBfn									""White
-70 dBm									
-80 dBm									
CF 2.462 G	Hz			691	pts			Span 2	5.53 MHz

## 802.11n(HT40) mode with 6.5Mbps data rate

Channel 3: 2.422GHz:

Spectrum	Spectrum 2	X Spect	rum 3 🛛 🗵	Spectrum	4 🕱		
Ref Level 10.00 Att 1		00 dB 👄 RBW 8.2 ms 👄 VBW		e Auto FFT			
Controlled by EMC	32 🔵 1 Pk Max						
				M1[1]			25.56 dBm 01240 GHz
0 dBm							
-10 dBm							
-20 dBm			M1				
-30 dBm	Jun Jon Source	hand flaghten flaghte	<b>•</b>	un un alle alle and an	ann fallan faar	www	
-40 dBm	V						
-50 dBm	/					- h	
-60 dBm						- N	Ju.
-70 dBm							"though yes
-80 dBm							
CF 2.422 GHz			691 pts			Span	54.0 MHz

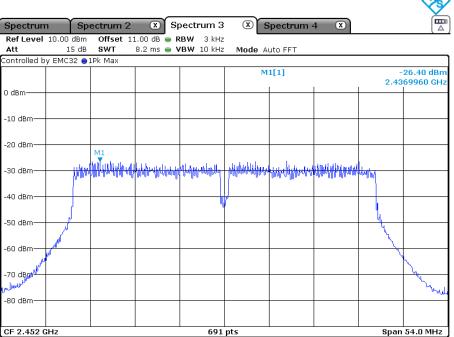


# **TEST REPORT**

Channel 6: 2.437GHz:

						<b>I</b>
Spectrum	Spectrum 2	Spectrum 3	Spectrum	4 🕱		
	15 dB SWT	1.00 dB 👄 RBW 3 kH; 8.2 ms 👄 VBW 10 kH;				
Controlled by EMC	32 😑 1Pk Max		M1[1]		-2	4.59 dBm
			milil			7500 GHz
0 dBm						
-10 dBm						
-20 dBm		M1				
-30 dBm	hand the second	<b>T</b>	hand the second second second second	Hillerichterendet	thy -	
-40 dBm	J					
لم -50 dBm	N				- <u>4</u> 4.	
-60 dBm					<u> </u>	
-70 dBpg						1 W WWW WWW
-80 dBm						~~~~
CF 2.437 GHz		<u>691</u>	pts		Span 5	4.0 MHz

## Channel 9: 2.452GHz:







## **TEST REPORT**

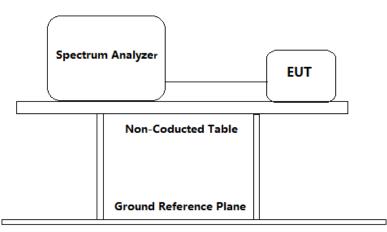
#### 4.5 Out of Band Conducted Emissions

Test Requirement:	FCC Part 15 C section 15.247
rest negan ement.	

(d) In any 100 kHz 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 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 the transmitter demonstrates compliance with the peak conducted power limits.

- Test Method: ANSI C63.10: Clause 11.11
- Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



#### Test Procedure:

- Remove the antenna from the EUT and then connect a low RF cable (cable loss =1 dB, with a 10dB attenuator) from the antenna port to the spectrum analyzer or power meter.
- 2. Establish a reference level by using the following procedure:
  - a) Set instrument center frequency to DTS channel center frequency.
  - b) Set the span to  $\geq$  1.5 imes DTS bandwidth.
  - c) Set the RBW = 100 kHz.
  - d) Set the VBW  $\geq$  [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



# **TEST REPORT**

establish the reference level

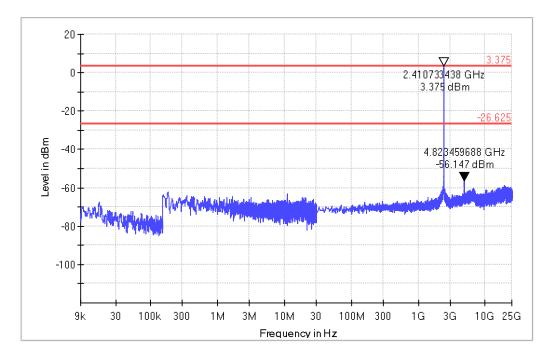
- 3. Emission level measurement
  - a) Set the center frequency and span to encompass frequency range to be measured.
  - b) Set the RBW = 100 kHz.
  - c) Set the VBW  $\geq$  [3 × RBW].
  - d) Detector = peak.
  - e) Sweep time = auto couple.
  - f) Trace mode = max hold.
  - g) Allow trace to fully stabilize.
  - h) Use the peak marker function to determine the maximum amplitude level.
- 4. Measure the Conducted unwanted Emissions of the test frequency with special test status.
- 5. Repeat until all the test status is investigated.
- 6. Report the worst case.

#### Used Test Equipment List

Spectrum Analyzer. Refer to Clause 5 Test Equipment List for details.

Result plot as follows:

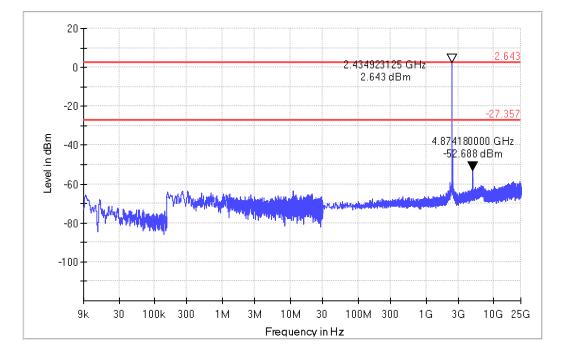
802.11b mode with 1Mbps data rate Channel 1: 2.412GHz:



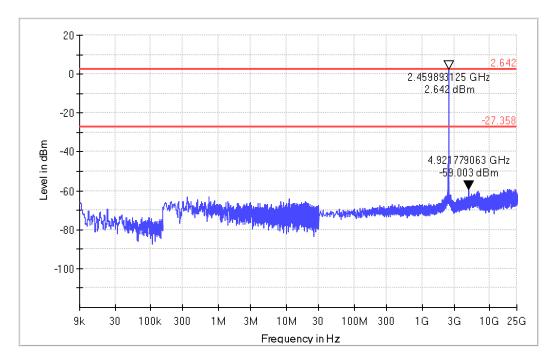
In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.



Channel 6: 2.437GHz:



In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.



Channel 11:2.462 GHz:

In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater

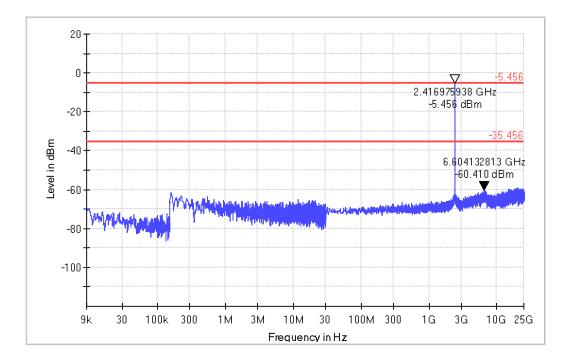


# **TEST REPORT**

than 30dB below the peak emission within the band that contains the highest level of the desired power.

#### 802.11g mode with 6Mbps data rate

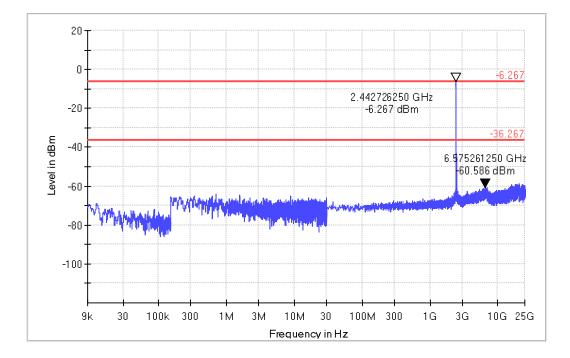
Channel 1: 2.412GHz:



In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.

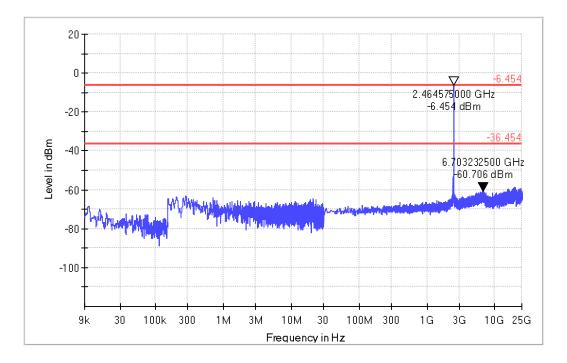
Channel 6: 2.437GHz:





In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.

Channel 11: 2.462 GHz:



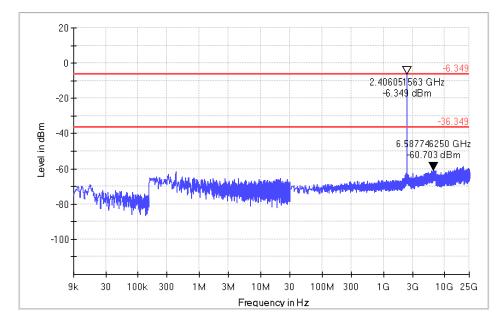
In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater



# **TEST REPORT**

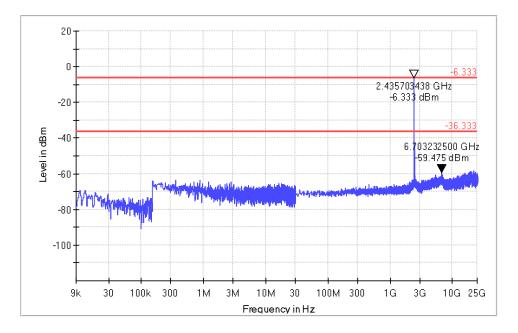
than 30dB below the peak emission within the band that contains the highest level of the desired power.

802.11n(HT20) mode with 6.5Mbps data rate Channel 1: 2.412GHz:



In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.

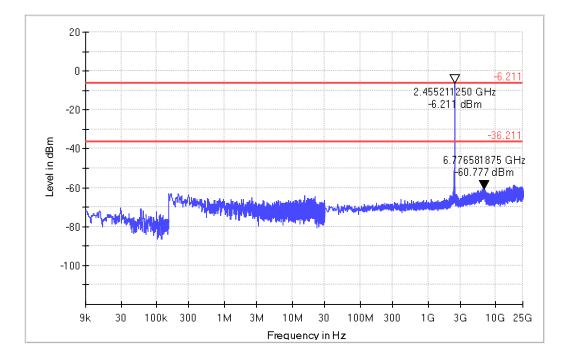
Channel 6: 2.437GHz:





In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.

Channel 11:2.462 GHz:

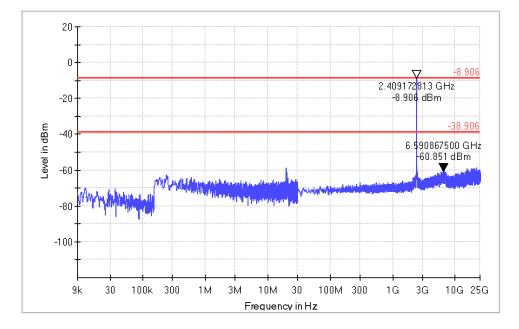


In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.

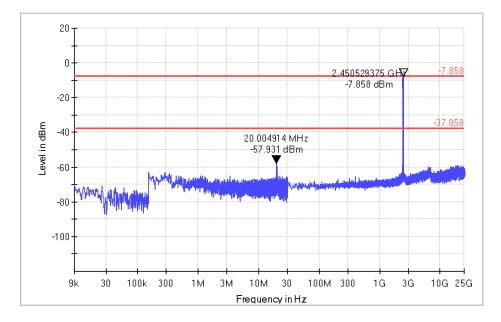


## **TEST REPORT**

802.11n(HT40) mode with 13.5Mbps data rate Channel 3: 2.422GHz:



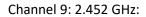
In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.

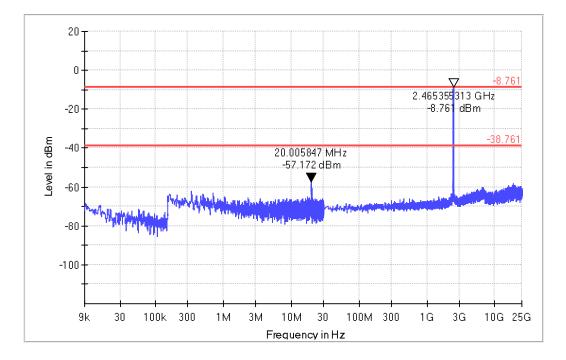


Channel 6: 2.437GHz:

In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.







In any 100kHz bandwidth, the Conducted Spurious Emissions from 9kHz to 25 GHz were greater than 30dB below the peak emission within the band that contains the highest level of the desired power.

### 4.6 Out of Band Radiated Emissions

For out of band radiated emissions into Non-Restricted Frequency Bands were performed at a 3m separation distance to determine whether these emissions complied with the 20dB attenuation requirement.

- [×] Not required, since all emissions are more than 20dB below fundamental
- [] See attached data sheet

### 4.7 Radiated Emissions in Restricted Bands

Test Requirement:	FCC Part 15 C section 15.247			
	bands, as defined in Section 15.205(a), mus	(d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).		
Test Method:	ANSI C63.10: Clause 11.12.1, 6.4, 6.5 and 6	.6		
Version: 10 June 2019	Page 41 of 73	FCC WIFI-d		



# **TEST REPORT**

Test Status: Test site:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below. Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	40.0 dBμV/m between 30MHz & 88MHz;
	43.5 dB $\mu$ V/m between 88MHz & 216MHz;
	46.0 dB $\mu$ V/m between 216MHz & 960MHz;
	54.0 dB $\mu$ V/m above 960MHz.
Detector:	For Peak and Quasi-Peak value: RBW =
	1 MHz for $f \ge 1$ GHz,
	200 Hz for 9 kHz to 150 kHz
	9 kHz for 150 kHz to 30 MHz 120 kHz for 30 MHz to 1GHz
	$VBW \ge RBW$
	Sweep = auto
	Detector function = peak for $f \ge 1$ GHz, QP for $f < 1$ GHz
	Trace = max hold
	For AV value:
	RBW = 1 MHz for $f \ge 1$ GHz, 100 kHz for $f < 1$ GHz
	VBW=10 Hz Sweep = auto
	Trace = max hold
Field Strength Calculation:	
	The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below: FS = RA + AF + CF - AG + PD + AV FS = RA + Correct Factor + AV
Where:	FS = Field Strength in dBμV/m
	RA = Receiver Amplitude (including preamplifier) in dBμV AF = Antenna Factor in dB
	CF = Cable Attenuation Factor in dB
	AG = Amplifier Gain in dB
	PD = Pulse Desensitization in dB
	AV = Average Factor in –dB Correct Factor = AF + CF – AG + PD
	In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:



## **TEST REPORT**

### FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB/m and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB $\mu$ V/m. RA = 62.0 dB $\mu$ V AF = 7.4 dB/m CF = 1.6 dB AG = 29.0 dB PD = 0 dB AV = -10 dB Correct Factor = 7.4 + 1.6 - 29.0 + 0 = -20 dB FS = 62 + (-20) + (-10) = 32 dB $\mu$ V/m

Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section. Only spurious emissions are permitted in any of the frequency bands listed below:

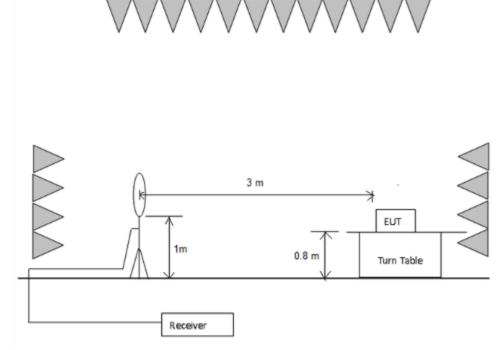
MHz	MHz	MHz	GHz
$\begin{array}{c} 0.090 - 0.110 \\ 10.495 - 0.505 \\ 2.1735 - 2.1905 \\ 4.125 - 4.128 \\ 4.17725 - 4.17775 \\ 4.20725 - 4.20775 \\ 6.215 - 6.218 \\ 6.26775 - 6.26825 \\ 6.31175 - 6.31225 \\ 8.291 - 8.294 \\ 8.362 - 8.366 \\ 8.37625 - 8.38675 \\ 8.41425 - 8.41475 \\ 12.29 - 12.293 \\ 12.51975 - 12.52025 \\ 12.57675 - 12.57725 \\ 13.36 - 13.41 \end{array}$	$\begin{array}{c} 16.42 - 16.423 \\ 16.69475 - 16.69525 \\ 16.80425 - 16.80475 \\ 25.5 - 25.67 \\ 37.5 - 38.25 \\ 73 - 74.6 \\ 74.8 - 75.2 \\ 108 - 121.94 \\ 123 - 138 \\ 149.9 - 150.05 \\ 156.52475 - \\ 156.52525 \\ 156.7 - 156.9 \\ 162.0125 - 167.17 \\ 167.72 - 173.2 \\ 240 - 285 \\ 322 - 335.4 \end{array}$	399.9 - 410 608 - 614 960 - 1240 1300 - 1427 1435 - 1626.5 1645.5 - 1646.5 1660 - 1710 1718.8 - 1722.2 2200 - 2300 2310 - 2390 2483.5 - 2500 2655 - 2900 3260 - 3267 3332 - 3339 3345.8 - 3358 3600 - 4400	$\begin{array}{r} 4.5 - 5.15\\ 5.35 - 5.46\\ 7.25 - 7.75\\ 8.025 - 8.5\\ 9.0 - 9.2\\ 9.3 - 9.5\\ 10.6 - 12.7\\ 13.25 - 13.4\\ 14.47 - 14.5\\ 15.35 - 16.2\\ 17.7 - 21.4\\ 22.01 - 23.12\\ 23.6 - 24.0\\ 31.2 - 31.8\\ 36.43 - 36.5\end{array}$



## **TEST REPORT**

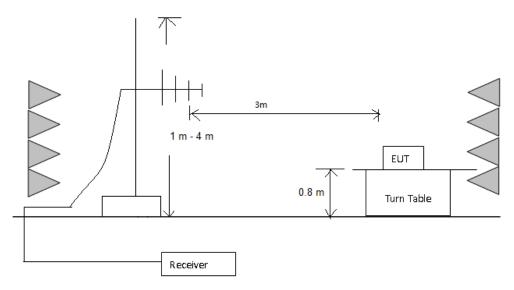
Test Configuration:

1) 9 kHz to 30 MHz emissions:



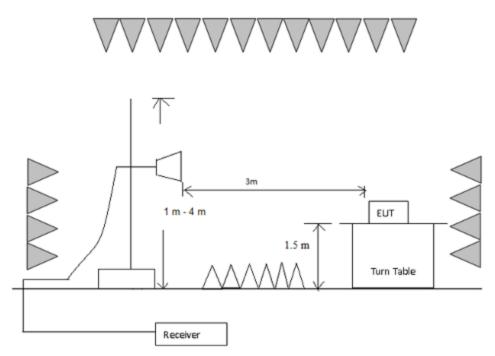
2) 30 MHz to 1 GHz emissions:





3) 1 GHz to 40 GHz emissions:





### Test Procedure:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2010 was used to perform radiated emission test above 1 GHz.

The receiver was scanned from 9 kHz to 25 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

## **Used Test Equipment List:**

3m Semi-Anechoic Chamber, EMI Test Receiver (9 kHz~7 GHz), Signal and Spectrum Analyzer (10 Hz~40 GHz), Loop antenna (9 kHz-30 MHz). TRILOG Super Broadband test Antenna(30 MHz-3 GHz) (RX), Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)(RX) and High Frequency Antenna & preamplifier(18 GHz~26.5 GHz) (RX). Refer to Clause 5 Test Equipment List for details.

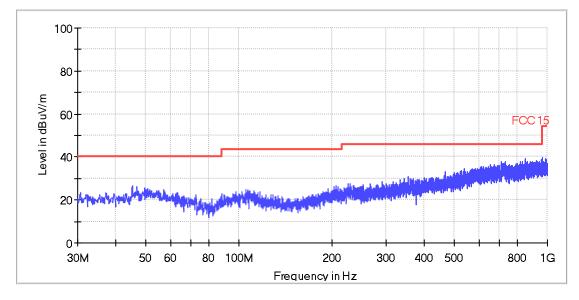
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report. 30 MHz~1 GHz Spurious Emissions. Quasi-Peak Measurement

The below data test on mode WIFI an (802.11b) channel 1: 2412MHz was the worst case of all test record.



## **TEST REPORT**

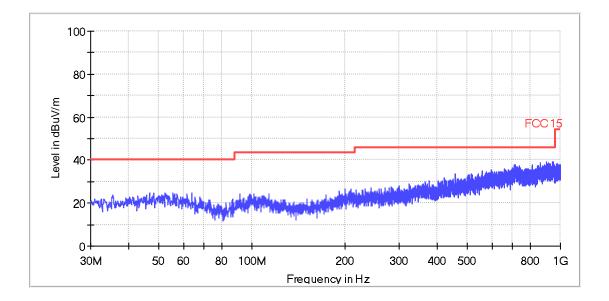
### Test at Channel 1 (2.412 GHz) in transmitting status



Vertical:

All emission levels are more than 6dB below the limit.

Horizontal:



All emission levels are more than 6dB below the limit.



### 1~25 GHz Radiated Emissions.

802.11b mode with 1Mbps data rate

Test at Channel 1 (2.412 GHz) in transmitting status

### PK Measurement:

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1571.5	65.4	-11.6	53.8	74	V
4679.5	45.9	-1.3	44.6	74	V
1432.0	63.4	-12.3	51.1	74	Н
5537.5	42.3	0.0	42.3	74	Н

### **AV Measurement:**

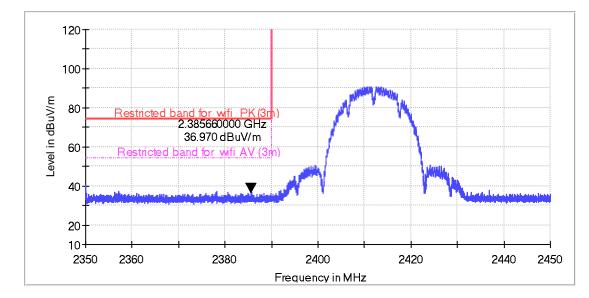
Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1571.5	-	-11.6	-	54	V
4679.5	-	-1.3	-	54	V
1432.0	-	-12.3	-	54	Н
5537.5	-	0.0	-	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

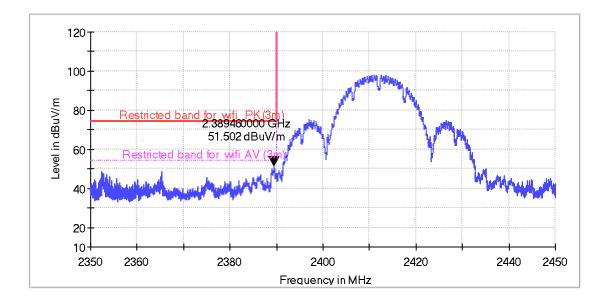
Restricted Bands Measurement

Horizontal





Vertical



#### **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2385.7	45.2	-8.2	37.0	74	Н
2389.5	59.7	-8.2	51.5	74	V

#### **AV Measurement:**

Frequency	AV Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2385.7	-	-8.2	-	54	Н



2389.5	-	-8.2	-	54	v
				<b>-</b> .	-

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 6 (2.437 GHz) in transmitting status

#### **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1432.0	63.1	-12.3	50.8	74	V
3119.5	46.6	-5.5	41.1	74	V
1603.0	62.1	-11.5	50.6	74	Н
3110.0	48.3	-5.5	42.8	74	Н

### AV Measurement:

Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1432.0	-	-12.3	-	54	V
3119.5	-	-5.5	-	54	V
1603.0	-	-11.5	-	54	Н
3110.0	-	-5.5	-	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded

## Test at Channel 11 (2.462 GHz) in transmitting status

#### PK Measurement:

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1568.5	62.8	-11.6	51.2	74	V
4924.0	43.7	-0.9	42.8	74	V
1394.5	65.0	-12.5	52.5	74	Н
4675.0	45.1	-1.3	43.8	74	Н

### **AV Measurement:**

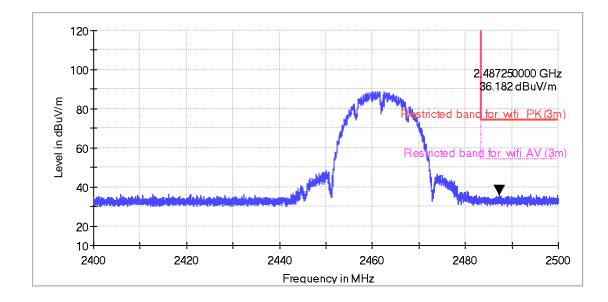
Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1568.5	-	-11.6	-	54	V
4924.0	-	-0.9	-	54	V
1394.5	-	-12.5	-	54	Н
4675.0	-	-1.3	-	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

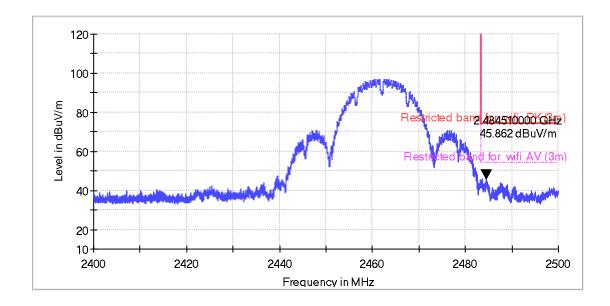
Restricted Bands Measurement

Horizontal





Vertical



### PK Measurement:

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2487.3	44.0	-7.8	36.2	74	Н
2484.5	53.7	-7.8	45.9	74	V
AV Measureme	nt:	_			
Frequency	AV Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization



(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2487.3	-	-7.8	-	54	Н
2484.5	-	-7.8	-	54	V

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

### 802.11g mode with 6Mbps data rate

Test at Channel 1 (2.412 GHz) in transmitting status **PK Measurement:** 

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1559.5	64.4	-11.7	52.7	74	V
3119.5	48.6	-5.5	43.1	74	V
1397.5	65.6	-12.5	53.1	74	Н
3119.5	47.6	-5.5	42.1	74	Н

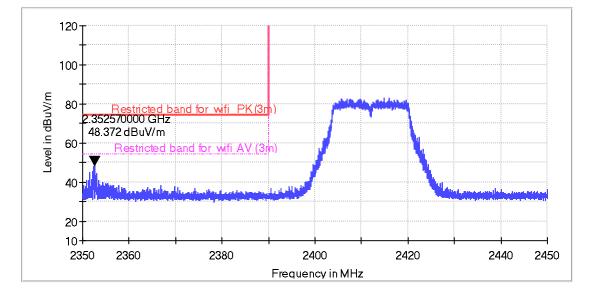
#### **AV Measurement:**

Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1559.5	-	-11.7	-	54	V
3119.5	-	-5.5	-	54	V
1397.5	-	-12.5	-	54	Н
3119.5	-	-5.5	-	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

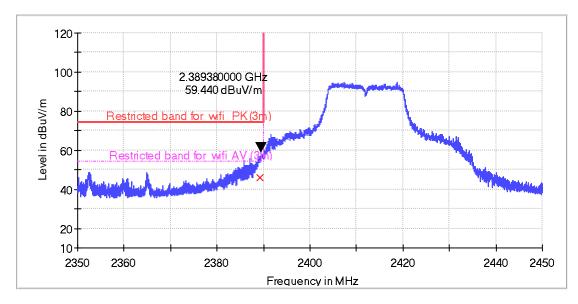
**Restricted Bands Measurement** 

Horizontal





## Vertical



#### **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2352.6	56.7	-8.3	48.4	74	Н
2389.4	67.6	-8.2	59.4	74	V

#### **AV Measurement:**

Frequency	AV Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2352.6	-	-8.3	-	54	Н
2389.4	54.1	-8.2	45.8	54	V

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 6 (2.437GHz) in transmitting status

### **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1558.0	64.9	-11.7	53.2	74	V
4874.5	53.2	-1.0	52.2	74	V
4873.0	57.2	-1.0	56.2	74	Н
7310.5	52.4	2.4	54.8	74	Н

**AV Measurement:** 



Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1558.0	-	-11.7	-	54	V
4874.5	-	-1.0	-	54	V
4873.0	39.6	-1.0	38.6	54	Н
7310.5	48.0	2.4	50.4	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 11 (2.462 GHz) in transmitting status

## **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	z) (dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1565.5	64.3	-11.7	52.6	74	V
4924.0	51.7	-0.9	50.8	74	V
1553.5	64.1	-11.7	52.4	74	Н
7385.5	51.5	2.5	54.0	74	Н

#### **AV Measurement:**

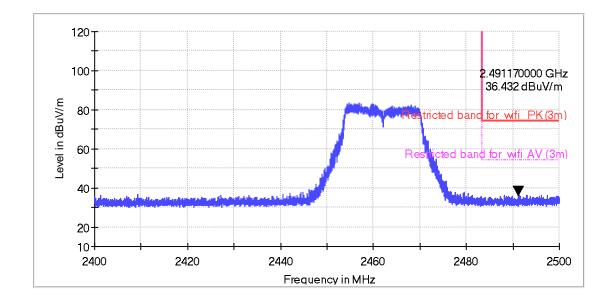
Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	Hz) (dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1565.5	-	-11.7	-	54	V
4924.0	-	-0.9	-	54	V
1553.5	-	-11.7	-	54	Н
7385.5	49.3	2.5	51.8	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

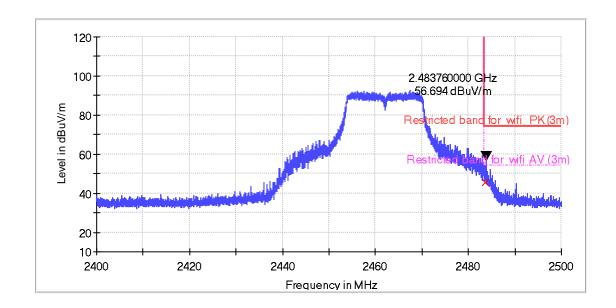
Restricted Bands Measurement

Horizontal





Vertical



### **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2491.1	44.2	-7.8	36.4	74	Н
2483.8	64.5	-7.8	56.7	74	V



#### Av Measurement:

Frequency	AV Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2491.1	-	-7.8	-	54	Н
2483.8	53.2	-7.8	45.4	54	V

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

802.11n (HT20) mode with 6.5Mbps data rate Test at Channel 1 (2.412 GHz) in transmitting status

#### **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1559.5	67.1	-11.7	55.4	74	V
4823.5	53.7	-1.1	52.6	74	V
1559.5	67.2	-11.7	55.5	74	Н
4823.5	57.0	-1.1	55.9	74	Н

**AV Measurement:** 

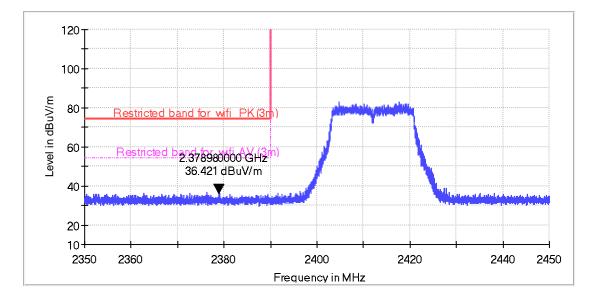
Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1559.5	42.6	-11.7	30.9	54	V
4823.5	-	-1.1	-	54	V
1559.5	54.2	-11.7	42.5	54	Н
4823.5	52.3	-1.1	51.2	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

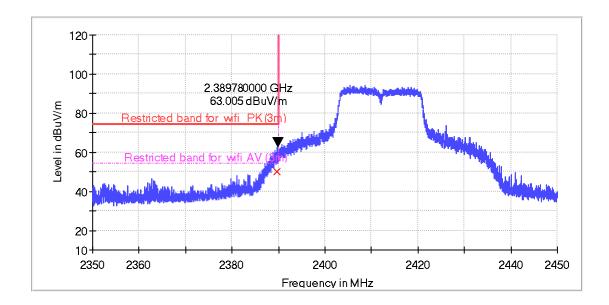
Restricted Bands Measurement

Horizontal





Vertical



### **PK Measurement:**

Frequency	PK Reading	Correction	PK Emission	PK Limit	Antenna
rrequency	Level	factors	Level		polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2379.0	44.6	-8.2	36.4	74	Н
2389.8	71.2	-8.2	63.0	74	V
AV Measureme	nt:				
Frequency	AV Reading	Correction	AV Emission	AV Limit	Antenna
Frequency	Level	factors	Level	AV LIIIII	polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
	•				



2379.0	-	-8.2	-	54	Н
2389.8	58.2	-8.2	50.0	54	V

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 6 (2.437 GHz) in transmitting status

### **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1556.5	64.3	-11.7	52.6	74	V
7310.5	50.4	2.4	52.8	74	V
1555.0	65.7	-11.7	54.0	74	н
4874.5	53.4	-1.0	52.4	74	Н

#### **AV Measurement:**

Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1556.5	-	-11.7	-	54	V
7310.5	-	2.4	-	54	V
1555.0	42.1	-11.7	30.4	54	Н
4874.5	-	-1.0	-	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be record.

Test at Channel 11 (2.462 GHz) in transmitting status

### PK Measurement:

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1561.0	66.7	-11.7	55.0	74	V
7387.0	52.5	2.5	55.0	74	V
1559.0	66.5	-11.7	54.8	74	Н
7385.5	50.6	2.5	53.1	74	Н

### **AV Measurement:**

Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1561.0	46.0	-11.7	34.3	54	V
7387.0	43.5	2.5	46.0	54	V
1559.0	54.0	-11.7	42.3	54	Н
7385.5	-	2.5	-	54	Н

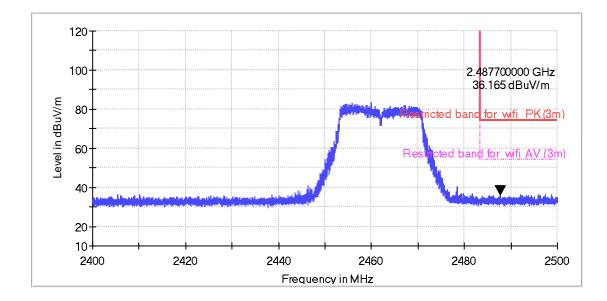
Remark: When Peak emission level was below AV limit, the AV emission level did not be record.



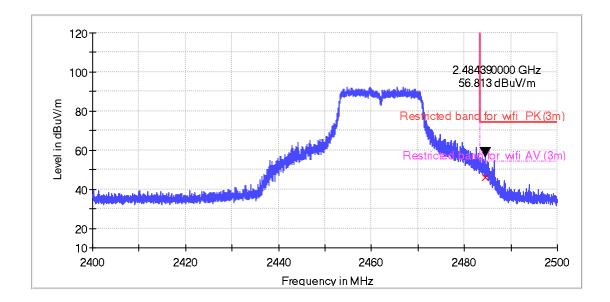
## **TEST REPORT**

#### **Restricted Bands Measurement**

#### Horizontal



Vertical





#### **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2487.7	44.0	-7.8	36.2	74	Н
2484.4	64.6	-7.8	56.8	74	V

#### **AV Measurement:**

Frequency	AV Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2487.7	-	-7.8	-	54	Н
2484.4	54.0	-7.8	46.2	54	V

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

### 802.11n (HT40) mode with 13.5 Mbps data rate

## Test at Channel 3 (2.422 GHz) in transmitting status

#### PK Measurement:

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1555.0	64.4	-11.7	52.7	74	V
4843.0	52.9	-1.1	51.8	74	V
1391.5	68.2	-12.5	55.7	74	Н
7265.5	50.1	2.4	52.5	74	Н

#### **AV Measurement:**

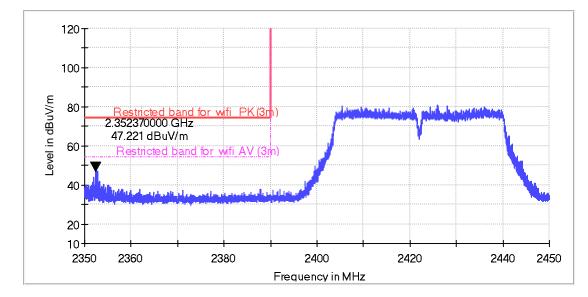
Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1555.0	-	-11.7	-	54	V
4843.0	-	-1.1	-	54	V
1391.5	47.5	-12.5	35.0	54	Н
7265.5	_	2.4	-	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

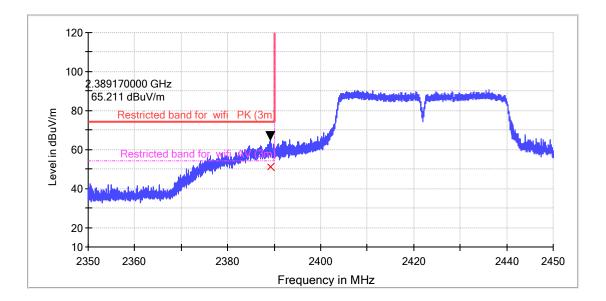
**Restricted Bands Measurement** 

Horizontal





Vertical



#### **PK Measurement:**

Frequency	PK Reading	Correction	PK Emission	PK Limit	Antenna					
	Level	factors	Level		polarization					
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)						
2352.4	55.4	-8.2	47.2	74	Н					
2389.2	73.4	-8.2	65.2	74	V					
AV Measureme	nt:									
Frequency	AV Reading	Correction	AV Emission	AV Limit	Antenna					
Frequency	Level	factors	Level		polarization					
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)						
2352.4	-	-8.2	-	54	Н					



2389.2	59.1	-8.2	50.9	54	V

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

# Test at Channel 6 (2.437 GHz) in transmitting status

#### PK Measurement:

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1561.0	66.6	-11.7	54.9	74	V
4874.5	52.8	-1.0	51.8	74	V
1559.5	68.4	-11.7	56.7	74	Н
7310.5	50.6	2.4	53.0	74	Н

### **AV Measurement:**

Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1561.0	45.9	-11.7	34.2	54	V
4874.5	-	-1.0	-	54	V
1559.5	53.8	-11.7	42.1	54	Н
7310.5	-	2.4	-	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be record.

Test at Channel 11 (2.452 GHz) in transmitting status

### PK Measurement:

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1568.5	64.6	-11.6	53.0	74	V
7387.0	51.8	2.5	54.3	74	V
1561.0	64.3	-11.7	52.6	74	Н
7385.5	52.3	2.5	54.8	74	Н

### AV Measurement:

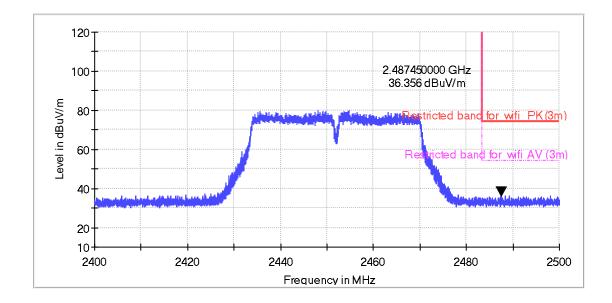
Frequency	Av Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBµV/m)	(dBµV/m)	
1568.5	-	-11.6	-	54	V
7387.0	43.5	2.5	46.0	54	V
1561.0	-	-11.7	-	54	Н
7385.5	43.6	2.5	46.1	54	Н

Remark: When Peak emission level was below AV limit, the AV emission level did not be record.

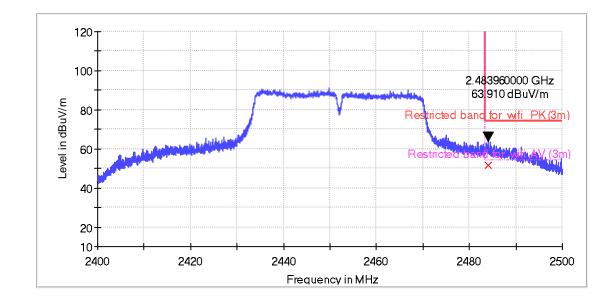
Restricted Bands Measurement

Horizontal





### Vertical



AV

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
2484.000000	51.4	1000.0	1000.000	150.0	V	1.0	-7.6	2.6	54.0

(continuation of the "AV" table from column 17 ...)

Frequency (MHz)	Comment
2484.000000	



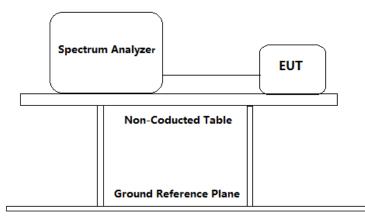
#### **PK Measurement:**

Frequency	PK Reading Level	Correction factors	PK Emission Level	PK Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2387.5	44.6	-8.2	36.4	74	Н
2384.0	72.1	-8.2	63.9	74	V
AV Measureme	nt:				
Frequency	AV Reading Level	Correction factors	AV Emission Level	AV Limit	Antenna polarization
(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	
2387.5	-	-8.2	-	54	Н
2384.0	59.6	-8.2	51.4	54	V

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

### 4.8 Band Edges Requirement

Test Requirement:	FCC Part 15 C section 15.247
	(d) In any 100 kHz 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 30 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 the transmitter demonstrates compliance with the peak conducted power limits.
Frequency Band:	2400 MHz to 2483.5 MHz
Test Method:	ANSI C63.10: Clause 11.11 and 11.13
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test Configuration:	For Band Edges Emission in Radiated mode, Please refer to clause 4.7



Test Procedure: For Band Edges Emission in Radiated mode, Please refer to clause 4.7

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.

a) Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge).

b) Set the center frequency and span to encompass frequency range to be measured.

- c) RBW = 100 kHz.
- d) VBW  $\geq$  [3 × RBW].
- e) Detector = peak.
- f) Sweep time = auto.
- g) Trace mode = max hold.

h) Allow sweep to continue until the trace stabilizes (required measurement time may increase for low-duty-cycle applications).

i) For radiated Band-edge emissions within a restricted band and within 2 MHz of an authorized band edge, integration method is considered.

- 2. Repeat until all the test status is investigated.
- 3. Report the worst case.

## Used Test Equipment List:

3m Semi-Anechoic Chamber, EMI Test Receiver (9 kHz~7 GHz), Signal and Spectrum Analyzer (10 Hz~40 GHz), Loop antenna (9 kHz-30 MHz). TRILOG Super Broadband test Antenna(30 MHz-3 GHz) (RX), Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)(RX) and High Frequency Antenna & preamplifier(18 GHz~26.5 GHz) (RX). Refer to Clause 5 Test Equipment List for details.

Test result with plots as follows: For conduct mode:

The band edges was measured and recorded Result:

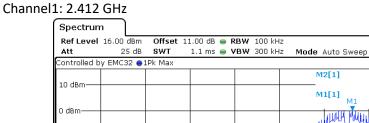
The Lower Edges attenuated more than 30dB.

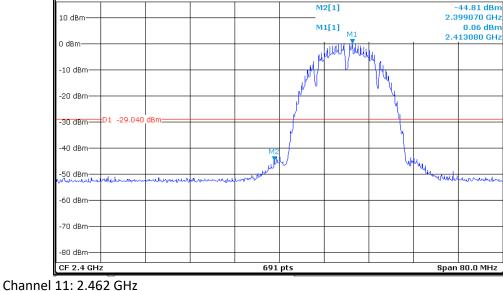
The Upper Edges attenuated more than 30dB.

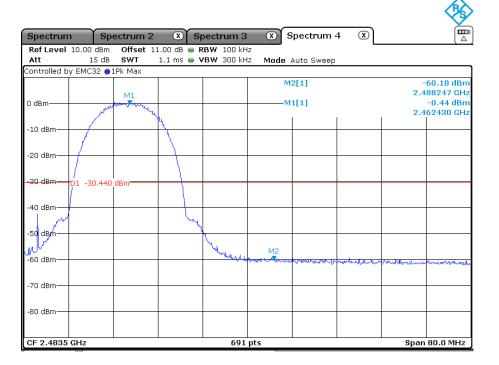
Result plots as follows: 802.11b mode with 1 Mbps data rate



# **TEST REPORT**





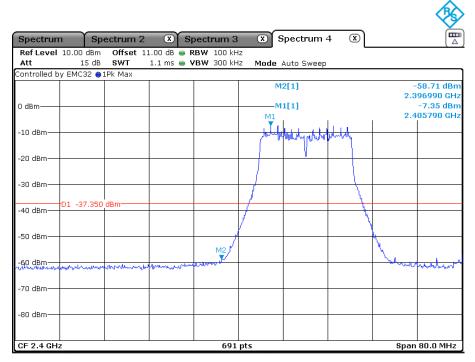


## 802.11g mode with 6 Mbps data rate

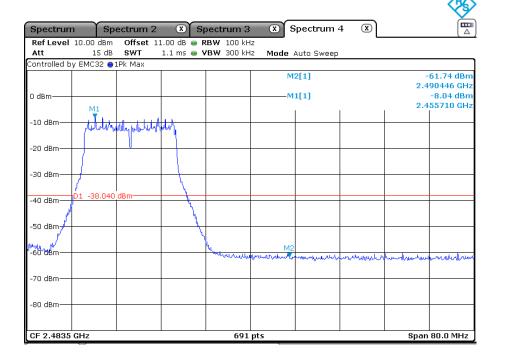
Channel1: 2.412 GHz



# **TEST REPORT**



Channel 11: 2.462 GHz

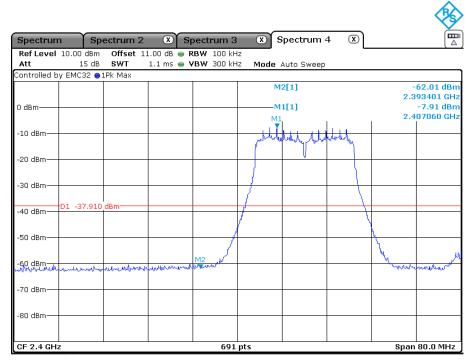


#### 802.11n(HT20) mode with 6.5Mbps data rate

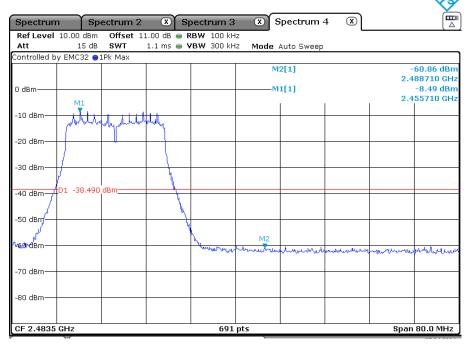
Channel 1: 2.412 GHz



# **TEST REPORT**



Channel 11: 2.462 GHz

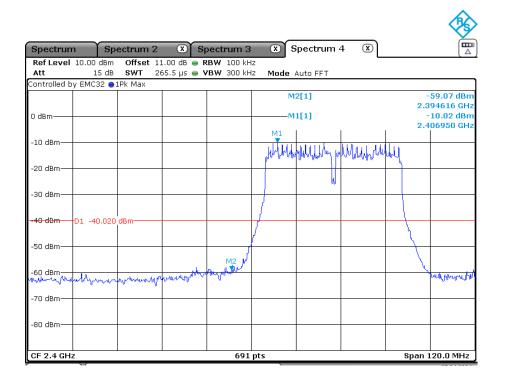


802.11n(HT40) mode with 13.5Mbps data rate

Channel 3: 2.422 GHz



# **TEST REPORT**



Channel 9: 2.452 GHz

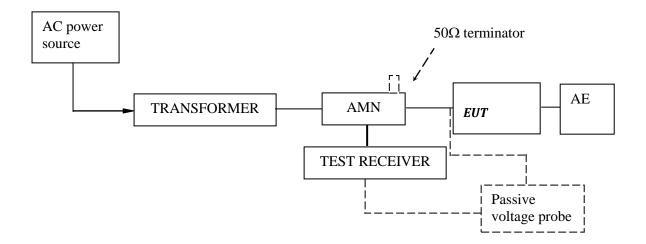
Spectrum	Spectrum 2	🗶 Sp	ectrum 3	× 5	pectrum 4	4 🕱		
Ref Level 10.00		.00 dB 🔵 RE						
		5.5 µs 👄 VE	3W 300 kH	z Mode	Auto FFT			
Controlled by EMC	32 🔵 1 Pk Max				0[4]			51 05 ID
				M	2[1]			61.26 dBm 97393 GHz
0 dBm				M	1[1]			10.49 dBm
							2.4	36960 GHz
-10 dBm								
Lille	William public	ARE LANDER						
-20 dBm		LONIO BALL						
-30 dBm	ľ							
SO UDIN								
-40 dBm 01 -4								
	0.490 dBm	l l						
-50 dBm								
-JU UBIII								
~60 dBm			4		M2			
~60 aBm			Wwithou	Mulantype	Murrerout	would what me	uhunder Juler	angether your
				•	· · ·	~ 1		* T
-70 dBm								
-80 dBm								
CF 2.4835 GHz	I		691	pts	1		Span 1	20.0 MHz



## **TEST REPORT**

### 4.9 Conducted Emission Test

Test Configuration:



Test Setup and Procedure:

Test was performed according to ANSI C63.10 Clause 6.2. The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a  $50\Omega$  linear impedance Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane (Ground Reference Plane). And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m

The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.



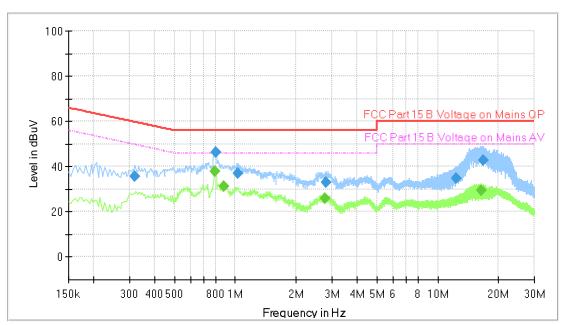
## **TEST REPORT**

Test Data and Curve

At main terminal: Pass

Tested Wire: Live

Operation Mode: transmitting mode



Full Spectrum

# **Final Result**

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.318000	35.72		59.76	24.04	1000.0	9.000	L1	ON	9.6
0.790000		38.06	46.00	7.94	1000.0	9.000	L1	ON	9.6
0.802000	46.54		56.00	9.46	1000.0	9.000	L1	ON	9.6
0.882000		31.32	46.00	14.68	1000.0	9.000	L1	ON	9.6
1.034000	37.06		56.00	18.94	1000.0	9.000	L1	ON	9.6
2.774000		26.04	46.00	19.96	1000.0	9.000	L1	ON	9.7
2.810000	33.14		56.00	22.86	1000.0	9.000	L1	ON	9.7
12.346000	34.61		60.00	25.39	1000.0	9.000	L1	ON	9.9
16.318000		29.43	50.00	20.57	1000.0	9.000	L1	ON	9.9
16.846000	42.71		60.00	17.29	1000.0	9.000	L1	ON	9.9

Remark:

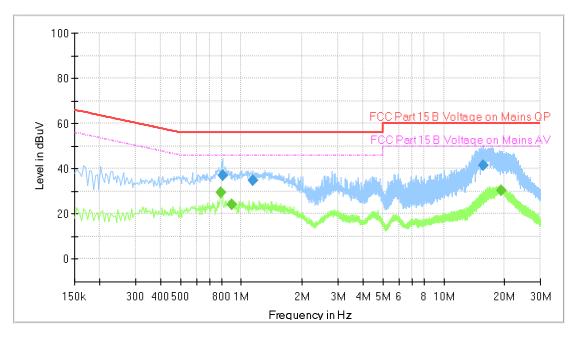
- 1. Corr. (dB) = LISN Factor (dB) + Cable Loss (dB)
- 2. Level (dB $\mu$ V) = Corr. (dB) + Read Level (dB $\mu$ V)
- 3. Delta Limit (dB) = Level (dB $\mu$ V)-Limit (dB $\mu$ V)



## **TEST REPORT**

Tested Wire: Neutral

Operation Mode: transmitting mode



Full Spectrum

# Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.794000		29.37	46.00	16.63	1000.0	9.000	Ν	ON	9.5
0.806000	37.03		56.00	18.97	1000.0	9.000	Ν	ON	9.5
0.894000		24.00	46.00	22.00	1000.0	9.000	Ν	ON	9.5
1.134000	34.59		56.00	21.41	1000.0	9.000	Ν	ON	9.5
15.722000	41.28		60.00	18.72	1000.0	9.000	Ν	ON	9.9
19.242000		30.16	50.00	19.84	1000.0	9.000	Ν	ON	10.0

Remark:

- 1. Corr. (dB) = LISN Factor (dB) + Cable Loss (dB)
- 2. Level  $(dB\mu V) = Corr. (dB) + Read Level (dB\mu V)$
- 3. Delta Limit (dB) = Level (dB $\mu$ V)-Limit (dB $\mu$ V)



# 5.0 Test Equipment List

#### **Radiated Emission/Radio**

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (YYYY-MM- DD)	Calibration Interval
EM030-04	3m Semi-Anechoic Chamber	9×6×6 m <sup>3</sup>	<b>ETS</b> •LINDGREN	2024-04-10	1Y
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	2024-11-15	1Y
EM031-03	Signal and Spectrum Analyzer (10 Hz~40 GHz)	R&S FSV40	R&S	2024-11-15	1Y
EM011-04	Loop antenna (9 kHz-30 MHz)	HFH2-Z2	R&S	2024-07-02	1Y
EM033-01	TRILOG Super Broadband test Antenna(30 MHz-3 GHz) (RX)	VULB 9163	SCHWARZBECK	2024-12-05	1Y
EM033-02	Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)(RX)	R&S HF907	R&S	2024-07-02	1 <b>Y</b>
EM033-03	High Frequency Antenna & preamplifier(18 GHz~26.5 GHz) (RX)	R&S SCU- 26	R&S	2024-04-22	1Y
EM033-04	High Frequency Antenna & preamplifier (26 GHz-40 GHz)	R&S SCU- 40	R&S	2024-04-22	1Y
EM031-02-01	Coaxial cable(9 kHz-1 GHz)	N/A	R&S	2024-04-10	1Y
EM033-02-02	Coaxial cable(1 GHz-18 GHz)	N/A	R&S	2024-04-10	1Y
EM033-04-02	Coaxial cable(18 GHz~40 GHz)	N/A	R&S	2024-04-22	1Y
EM031-01	Signal Generator (9 kHz~6 GHz)	SMB100A	R&S	2024-07-19	1Y
EM040-01	Band Reject/Notch Filter	WRHFV	Wainwright	N/A	1Y
EM040-02	Band Reject/Notch Filter	WRCGV	Wainwright	N/A	1Y
EM040-03	Band Reject/Notch Filter	WRCGV	Wainwright	N/A	1Y
EM022-03	2.45 GHz Filter	BRM50702	Micro-Tronics	2024-05-09	1Y
SA016-29	Climatic Test Chamber	MHU-80L	JIANQIAO	2024-01-03	1Y
EM046-05	Power meter	NPR6A	R&S	2024-04-19	1Y
EM046-06	Power meter	NPR6A	R&S	2024-04-19	1Y
EM045-01-01	EMC32 software (RE/RS)	V10.01.00	R&S	N/A	N/A

## Conducted Disturbance-Mains Terminal(2)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date	Calibration	
	Lquipment		Wanufacturer	(DD-MM- YYYY)	Interval	
EM031-04	EMI receiver	ESR3	R&S	06/01/2024	1Y	



EM006-06	LISN	ENV216	R&S	04/09/2024	1Y
SA047-111	Digital Temperature-Humidity Recorder	RS210	ҮІЛЕ	22/10/2024	1Y
EM004-03	EMC shield Room	8m×4m×3m	Zhongyu	03/01/2024	1Y
EM031-04-01	EMC32 software (CE)	V10.01.00	R&S	N/A	1Y