TEST REPORT

KCTL Inc.

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-390, Korea TEL: 82 70 5008 1021 FAX: 82 505 299 8311 Report No.: KCTL16-SFR0070

Page (1) / (54) Pages



1. Applicant

Name:	IRIVER LIMITED.
Address:	Iriverhouse, 5, Bangbae-ro 18-gil, Seocho-gu, Seoul, Korea
2. Sample Description:	
FCC ID:	QDMPPE12
Type of equipment:	Portable Music Player
Basic Model:	PPE12
3. Date of Test:	June 20 ~ June 24, 2016
4. Test method used:	FCC Part 15 Subpart C 15.247
5. Test Results	
Test Item:	Refer to page 7
Result:	Complied (Refer to page $8 \sim \text{page 53}$)
Measurement Uncertainty:	Refer to page 7

This result shown in this report refer only to the sample(s) tested unless otherwise stated.

		2016. 07. 13 KCTL Inc.
	Name: DO WON, AHN	Name. MIN GI, SON
Affirmation		Name



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1. Client information

Applicant:	IRIVER LIMITED.
Address:	Iriverhouse, 5, Bangbae-ro 18-gil, Seocho-gu, Seoul, Korea
Telephone number:	+82-2-3019-7514
Facsimile number:	+82-2-3019-7575
Contact person:	Dabin Wang / dabin.wang@iriver.com

Manufacturer:	IRIVER LIMITED.
Address:	Iriverhouse, 5, Bangbae-ro 18-gil, Seocho-gu, Seoul, Korea



2. Laboratory information

Address

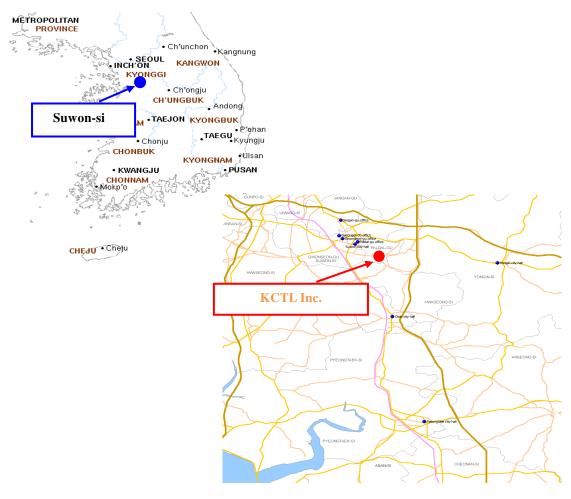
KCTL Inc.

480-5, Sin-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea Telephone Number: +82-70-5008-1016 Facsimile Number: +82-505-299-8311

Certificate

KOLAS No.: KT231 FCC Site Designation No.: KR0040 FCC Site Registration No.: 687132 VCCI Site Registration No.: R-3327, G-198, C-3706, T-1849 IC Site Registration No.:8035A-2

SITE MAP



KCTL-TIR001-003/0

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3. Description of E.U.T.

3.1 Basic description

Applicant	IRIVER LIMITED.	
Address of Applicant	Iriverhouse, 5, Bangbae-ro 18-gil, Seocho-gu, Seoul, Korea	
Manufacturer	IRIVER LIMITED.	
Address of Manufacturer	Iriverhouse, 5, Bangbae-ro 18-gil, Seocho-gu, Seoul, Korea	
Type of equipment	Portable Music Player	
Basic Model	PPE12	
Serial number	N/A	

3.2 General description

Frequency Range	2 412 Młz ~ 2 462 Młz (802.11b/g/n_HT20) 2 402 Młz ~ 2 480 Młz (Bluetooth)	
Type of Modulation	802.11b: DSSS, 802.11g/n: OFDM Bluetooth: GFSK, π/4DQPSK, 8DPSK	
The number of channels	11 ch (802.11b/g/n_HT20), 79 ch (Bluetooth)	
Type of Antenna	FPCB Antenna	
Antenna Gain	2.2 dBi	
Transmit Power	21.68 dBm	
Power supply	DC 3.7 V	
Product SW/HW version	V1.0 / V1.0	
Radio SW/HW version	V1.0 / V1.0	
Test SW Version	RF Tool	
RF power setting in TEST SW	b-15, g,n20-13	

Note : The above EUT information was declared by the manufacturer.



3.3 Test frequency

	Frequency
Lowest frequency	2 412 Mz
Middle frequency	2 437 Młz
Highest frequency	2 462 Mz

3.4 Test Voltage

Mode	Voltage
Nominal Voltage	DC 3.7 V



4. Summary of test results

4.1 Standards & results

FCC Rule Reference	IC Rule Reference	Parameter	Report Section	Test Result
15.203, 15.247(b)(4)	-	Antenna Requirement	5.1	С
15.247(b)(3)	RSS-247, 5.4(4)	Maximum Peak Output Power	5.2	С
15.247(e)	RSS-247, 5.2	Peak Power Spectral Density	5.3	С
15.247(a)(2)	RSS-247, 5.2	6 dB Channel Bandwidth	5.4	С
-	RSS-247, 5.2	Occupied Bandwidth	5.4	С
15.247(d), 15.205(a), 15.209(a)	RSS-247, 5.5 RSS-GEN, 8.9, 10	Spurious Emission, Band Edge and Restricted bands	5.5	С
15.207(a)	RSS-GEN, 8.8	Conducted Emissions	5.6	С
Note: C = complies NC = Not complies NT = Not tested NA = Not Applicable				

- The general test methods used to test this device is ANSI C63.10:2013

4.2 Uncertainty

Measurement Item	Expanded Uncertainty U = kUc (k = 2)		
Conducted RF power	1	.44 dB	
Conducted Spurious Emissions	1.52 dB		
	30 MHz ~ 300 MHz:	+ 4.94 dB, - 5.06 dB	
		+ 4.93 dB, - 5.05 dB	
Radiated Spurious Emissions	300 MHz ~ 1 000 MHz:	+ 4.97 dB, - 5.08 dB	
		+ 4.84 dB, - 4.96 dB	
	1 GHz ~ 25 GHz:	+ 6.03 dB, - 6.05 dB	
Conducted Emissions	9 kHz ~ 150 kHz:	3.75 dB	
Conducted Emissions	150 kHz ~ 30 MHz:	3.36 dB	



5. Test results

5.1 Antenna Requirement

5.1.1 Regulation

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. 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.

And according to \$15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. 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.

5.1.2 Result

-Complied

The transmitter has permanently attached FPCB antenna(internal antenna) on board.



5.2 Maximum Peak Output Power

5.2.1 Regulation

According to §15.247(b)(3), For systems using digital modulation in the 902-928 MŁ, 2 400-2 483.5 MŁ, and 5 725-5 850 MŁ bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to §15.247(b)(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. 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.

5.2.2 Measurement Procedure

These test measurement settings are specified in section 9.0 of 558074 D01 DTS Meas Guidance.

5.2.2.1 PKPM1 Peak power meter method

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.



5.2.3 Test Result

- Complied

- 802.11b

Channel	Frequency [Mtz]	Result [dBm]	Limit [dBm]	Margin [dB]	Avarage Power [dBm]
Lowest	2 412	17.47	30.00	12.53	13.93
Middle	2 437	17.07	30.00	12.93	13.58
Highest	2 462	16.77	30.00	13.23	13.31

- 802.11g

Channel	Frequency [Mt]	Result [dBm]	Limit [dBm]	Margin [dB]	Avarage Power [dBm]
Lowest	2 412	21.68	30.00	8.32	10.98
Middle	2 437	21.58	30.00	8.42	10.80
Highest	2 462	21.18	30.00	8.82	10.53

- 802. 11n HT20

Channel	Frequency [Mtz]	Result [dBm]	Limit [dBm]	Margin [dB]	Avarage Power [dBm]
Lowest	2 412	21.58	30.00	8.42	10.95
Middle	2 437	21.28	30.00	8.72	10.75
Highest	2 462	21.08	30.00	8.92	10.54

NOTE:

1. We took the insertion loss of the cable loss into consideration within the measuring instrument.

5.3 Peak Power Spectral Density

5.3.1 Regulation

According to §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 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.

5.3.2 Measurement Procedure

These test measurement settings are specified in section 10.0 of 558074 D01 DTS Meas Guidance.

5.3.2.1 Method PKPSD (peak PSD)

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Set the span to 1.5 times the DTS bandwidth.
- 3) Set the RBW to: 3 kHz \leq RBW \leq 100 kHz.
- 4) Set the VBW \geq 3 x RBW.
- 5) Detector = peak.
- 6) Sweep time = auto couple.
- 7) Trace mode = max hold.
- 8) Allow trace to fully stabilize.
- 9) Use the peak marker function to determine the maximum amplitude level within the RBW.
- 10) If measured value exceeds limit, reduce RBW (no less than 3 ${\rm kHz}$) and repeat.



5.3.3 Test Result

- Complied

- 802.11b

Channel	Result (RBW=100 kHz) [dBm]	Result (RBW=3 kHz) [dB m]	Limit	Margin [dBm]
Lowest	5.24	-8.10	8 dBm/3 kHz	16.10
Middle	5.22	-8.21	8 dBm/3 kHz	16.21
Highest	5.05	-8.29	8 dBm/3 kHz	16.29

- 802.11g

Channel	Result (RBW=100 klz) [dBm]	Result (RBW=3 klz) [dB m]	Limit	Margin [dBm]
Lowest	-1.42	-13.73	8 dBm/3 kHz	21.73
Middle	-0.63	-13.99	8 dBm/3 kHz	21.99
Highest	-0.98	-14.52	8 dBm/3 kHz	22.52

- 802.11n HT20

Channel	Result (RBW=100 kllz) [dBm]	Result (RBW=3 klz) [dB m]	Limit	Margin [dBm]
Lowest	-0.35	-12.26	8 dBm/3 kHz	20.26
Middle	-1.09	-13.23	8 dBm/3 kHz	21.23
Highest	-0.87	-15.03	8 dBm/3 kHz	23.03

NOTE:

1. We took the insertion loss of the cable loss into consideration within the measuring instrument.



5.3.4 Test Plot

Figure 1. Plot of the Power Density

- 802.11b

Lowest Channel(2 412 Mz)

Ref Level 1 Att	30 dB	SWT	0.50 dB 👄 R 1.9 ms 👄 V		Mode Au	to FET			
TDF					induo ina				
1Pk Max									
					M	1[1]			-8.10 dB
0 dBm						1	1	2.41	26870 GF
o ubiii					M1				
-10 dBm			when when	mouther	Jutun	man			
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-30 dBm									~
-40 dBm									
-50 dBm									
-60 dBm									
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-70 dBm									
-80 dBm									
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Middle Channel (2 437 Mz)

Ref Level 10.	DO dBm	Offset	0.50 dB 😑 RB	3W 3 kHz					
Att TDF	30 dB	SWT	2.5 ms 👄 ۷	3W 10 kHz	Mode Au	to FFT			
1DF 1Pk Max									
					м	1[1]			-8.21 dBr
0 dBm								2.43	76840 GH
					M1				
-10 dBm	numeral	www.www	www.www.www.	would		and the hand we	when would	Chambaral	
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-30 dBm									
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
-80 dBm									
00 0011									

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Highest Channel (2 462 M₺)

Att	30 dB 🛛 SV	VT 2.5	ms 👄 VB	3W 10 kHz	Mode Au	to FFT			
TDF									
1Pk Max					М	1[1]		2.46	-8.29 dBn 29410 GH
D dBm					M1			<u> </u>	
-10 dBm	mulmel	Un allantita	warman	water	parthen	white	Munnun	Junitar	
would be for				1				the second se	Junio
-30 dBm 🖤									4
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
-80 dBm									

- 802.11g

Lowest Channel(2 412 Mz)

Spectrum	- P.	ectrum			ectrum 4	× s	Spectrum (2 🗙		
Ref Level			0.50 dB 🥌							
Att TDF	20 dB	SWT	3.8 ms 🧉	ABA	V 1U KHZ	Mode Aut	O FFT			
10F										
UPK Max				- 1						13.73 dBn
						IM	1[1]			.81880 GH
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-50 dBm				-						
-60 dBm			_							
-70 dBm			_							
-80 dBm			_							
-90 dBm										
20 abiii]
]
CF 2.412 G	Hz				691	pts			Span 2	24.86 MHz



Middle Channel (2 437 Mz)

Att TDF	20 dB	SWT 3.	8 ms 👄 VB	₩ 10 kHz	Mode Aut	D FFT			
1DF 1Pk Max									
					M	1[1]			13.99 dBr
-10 dBm					M1			2.43	88240 GH
	Jus	AA. AAAAA	num	λαδαλά	ADDABL.	Авдакла	LAND AN	Mn	
-20 dBm	~ ~ ~ ~ ~	- WAAAA	VVVVVVV	NERVON		URANAMAN	0000000	10	
-30 dBm	0			U U				A A	
-30 UBIII	www.							My.	
40 dBm	1 ⁹⁶							- May	hun.
when									hat we wanted
-50 dBm									
-60 dBm									
00 00									
-70 dBm									
-80 dBm									
.90 dBm									

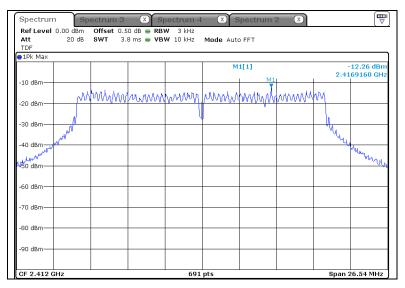
Highest Channel (2 462 ₩z)

TDF	20 dB	SWT 3.	8 ms 👄 VB1	N 10 KHZ	Mode Auto				
1Pk Max									
					м	1[1]			14.52 dBn 37950 GH:
10 dBm					MI				
	w	M.MAN	6A. 58540	. AAAAAA	1.600.040	mm	WAN PAAN	M	
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-50 dBm									
-60 dBm									
-70 dBm									
-80 dBm									
ou uBIII									
.90 dBm									



- 802.11n HT20

Lowest Channel(2 412 Mz)

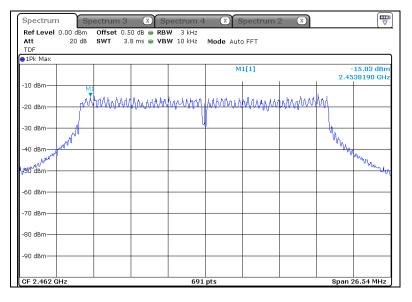


Middle Channel (2 437 Mz)

Ref Level Att	20 dB		0 dB 👄 RB1 3 ms 👄 VB1		Mode Auto	1 FFT			
TDF					nous nat				
∋1Pk Max									
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-40 dBm 	l.							Mun	Mar.
Marth									- Webliehe
930 UBIII-									
-60 dBm									
-00 ubiii									
-70 dBm									
-70 ubiii									
-80 dBm									
00 00111									
-90 dBm									
-90 abiii-									



Highest Channel (2 462 M₂)





5.4 6 dB Bandwidth(DTS Channel Bandwidth)

5.4.1 Regulation

According to §15.247(a)(2) Systems using digital modulation techniques may operate in the 902–928 Mz, 2 400–2 483.5 Mz, and 5 725–5 850 Mz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.4.2 Measurement Procedure

These test measurement settings are specified in section 8.0 of 558074 D01 DTS Meas Guidance.

5.4.2.1 DTS Channel Bandwidth-Option 1

- 1) Set RBW = 100 kHz.
- 2) Set the video bandwidth (VBW) \geq 3 x RBW.
- 3) Detector = Peak.
- 4) Trace mode = max hold.
- 5) Sweep = auto couple.
- 6) Allow the trace to stabilize.
- 7) 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.

5.4.2.2 DTS Channel Bandwidth Measurement Procedure-Option 2

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW \ge 3 x RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \ge 6 dB.



5.4.3 Test Result

- Complied

- 802.11b

Channel	Frequency [Mtz]	6 dB Bandwidth [Mtz]	Min. Limit [Mtz]	Occupied Bandwidth (99 % BW) [Mb]
Lowest	2 412	8.55	0.50	12.39
Middle	2 437	9.01	0.50	12.50
Highest	2 462	9.03	0.50	12.45

- 802.11g

Channel	Frequency [Mtz]	6 dB Bandwidth [₩z]	Min. Limit [Mt/2]	Occupied Bandwidth (99 % BW) [Mb]
Lowest	2 412	16.57	0.50	16.67
Middle	2 437	16.48	0.50	16.67
Highest	2 462	16.54	0.50	16.73

- 802.11n HT20

Channel	Frequency [Mtz]	6 dB Bandwidth [Mtz]	Min. Limit [Mtz]	Occupied Bandwidth (99 % BW) [雕]
Lowest	2 412	17.69	0.50	17.83
Middle	2 437	17.76	0.50	17.83
Highest	2 462	17.69	0.50	17.77

NOTE:

1. We took the insertion loss of the cable loss into consideration within the measuring instrument.

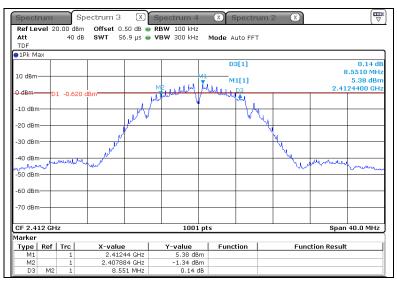


5.4.4 Test Plot

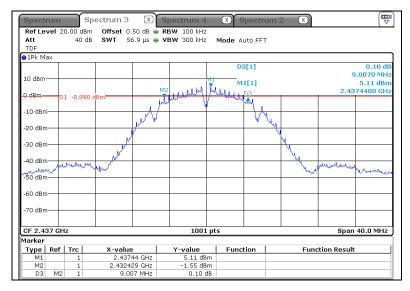
Figure 2. Plot of the 6 dB Bandwidth & Occupied Bandwidth

- 802.11b_6 dB Bandwidth

Lowest Channel(2 412 Mz)



Middle Channel (2 437 Mz)

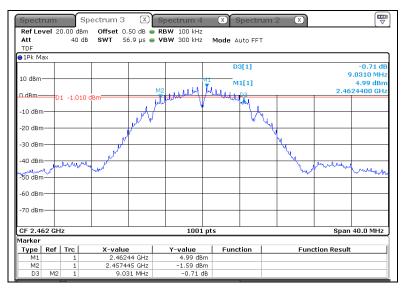


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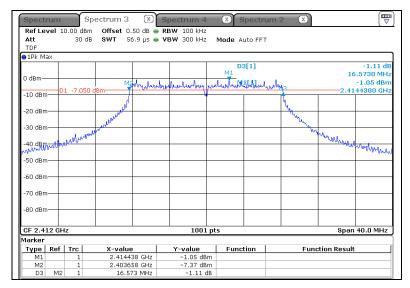


Highest Channel (2 462 ₩z)



- 802.11g_6 dB Bandwidth

Lowest Channel(2 412 Mz)





Middle Channel (2 437 Mz)

Spectr			trum 3	×		trum 4	0) s	pectru	um 2	X			
Ref Lev Att	el 10.00		Offset 0 SWT 56			100 kHz 300 kHz	Mo	do Ai	to FFT					
TDF														
∋1Pk Ma	х													
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-80 dBm														
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M1		1	2.44443			-0.73 dB		ance			1 41	iccion r	<u>us sun</u>	
M2		1	2.42867			-6.95 dB								
D3	M2	1	16.47	9 MHz		-0.15 c	B							

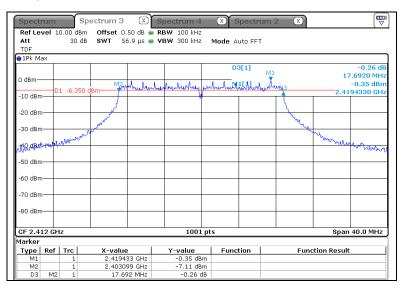
Highest Channel (2 462 ₩z)

Spect			ectrum 3 🛛 🛛	opour		Spectru	ım 2 🛛 🗶		
Ref Le Att TDF	vel 10	0.00 dBm 30 dB		 RBW 10 VBW 30 		ode Auto FFT			
01Pk M	ах								
0 dBm-						D3[1]	M1	10	-1.25 dE 5.5430 MH;
		1 -7.310 d	m Mahul	unhundersola	Mary prato	when the fillent	July 3		-1.31 dBn 94330 GH:
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-40 dBn	waa ba	MMM						www.wa	
-50 dBm									
-60 dBrr							_		
-70 dBrr	ı—						_		
-80 dBm							_		
CF 2.4		_			1001 pts				40.0 MHz
Marker		۷			1001 pts			əhan	
Type	Ref	Trc	X-value	Y-va	lue	Function	Fun	ction Result	
M1		1	2.469433 GH	-1.	31 dBm				
M2		1	2.453688 GH		43 dBm				
D3	M2	1	16.543 MH:	2	1.25 dB				

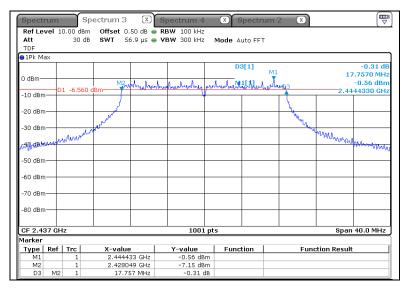


- 802.11n HT20_6 dB Bandwidth

Lowest Channel(2 412 Mz)



Middle Channel (2 437 Mz)





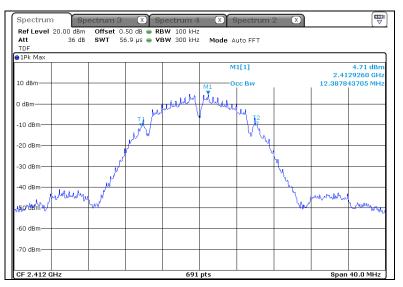
Highest Channel (2 462 Mz)

Spect	rum	S	pectrum 3 🛛 🕅	Spectrum 4	× Spectr	um 2 🛛 🔊	
Ref Le Att TDF	vel 1	0.00 dBn 30 dB		 RBW 100 kHz VBW 300 kHz 	Mode Auto FF	т	
⊖1Pk M	ах						
0 dBm—					D3[1]	M1	-0.17 dE 17.6920 MH
		1 -6.750	dBm M2mmulu	alawstranticentury or	Mulastiller	hundrugs	-0.75 dBm 2.4694330 GH
-10 dBm	<u>ا</u>	1 -0.730					2.1091330 (112
-20 dBm	1		March Qu			- June	
-30 dBm	1	wern	Nord			w	hurbarton warden war
n <mark>HQ/dB</mark> h	And	havena					. On Mary Contraction of the
-50 dBm	۱ <u> </u>						
-60 dBm	1						
-70 dBm							
-80 dBm	n						
CF 2.4	52 GH	z		1001 p	ots		Span 40.0 MHz
Marker							
Type	Ref		X-value	Y-value	Function	Fun	ction Result
M1		1	2.469433 GHz	-0.75 dBm			
M2 D3	M2	1	2.453049 GHz 17.692 MHz	-7.02 dBm -0.17 dB			
03	1912	1	17.692 MHZ	-0.17 dB		1	

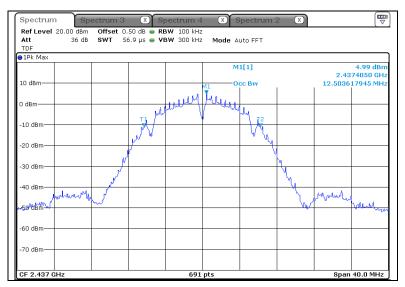


- 802.11b_Occupied Bandwidth

Lowest Channel(2 412 Mz)

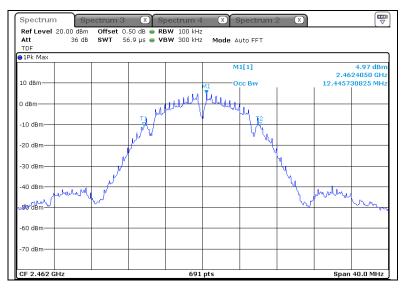


Middle Channel (2 437 Mz)





Highest Channel (2 462 Mz)



- 802.11g_Occupied Bandwidth

Lowest Channel (2 412 Mz)

Spectrum	Spectrum	3 🗴 S	pectrum 4	× s	pectrum 2	×		
Ref Level 10.00		0.50 dB 😐 R						
Att 2 TDF	26 dB SWT	56.9 µs 👄 V	BW 300 KHZ	Mode A	uto FFT			
●1Pk Max								
				M	1[1]		0.41	-0.39 dBr 94100 GH
0 dBm					CC BW			90593 MH
		- physladia	harmentry	parlandent	whenhall			
-10 dBm		4				2		
		1				ն		
-20 dBm		r				- Yu		
						u _n		
-30 dBm	Nar	_				- Why		
a south	m ^r						Muna.	
-40 dentifican							Muun	W Mars.
-50 dBm								
-60 dBm								
00 0011								
-70 dBm								
-80 dBm								
CF 2.412 GHz			691	nte				40.0 MHz



Middle Channel (2 437 Mz)

Ref Level 10				3W 100 kHz					
Att	26 dB	SWT 5	5.9 µs 🖷 VI	3W 300 kHz	Mode A	uto FFT			
TDF 1Pk Max									
JIFK MAA					м	1[1]			44.18 dBr
						1(1)			70000 GH
0 dBm					0	cc Bw		16.6714	90593 MH
		т	Mugherlin	minuhay	monter	and when a poly			
-10 dBm		-	•			•	2		
		d and a second					{		
-20 dBm		کړ							
		ALL					No.		
-30 dBm		J.					- The		
oo abiii	1 all	and the second s					M	When	
40 dem v M	WWW.							moury	
-30 dBm -40 dBm								~	- Marine
-50 dBm									- 0
-50 UBIII									
60 ID									
-60 dBm									
-70 dBm									
-80 dBm									

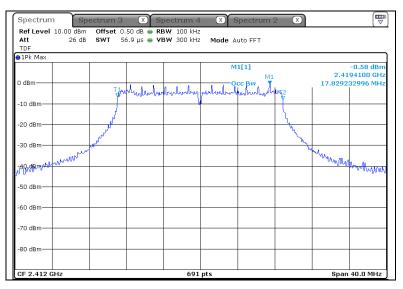
Highest Channel (2 462 ₩z)

Spectrum Ref Level 10.	-	trum 3		pectrum 4 3W 100 kHz		pectrum 2	X		
Att TDF				BW 300 kHz		to FFT			
●1Pk Max					M1	.[1]			-5.60 dBn
0 dBm			hard	n i an an fhorean	M1 Multururururururururururururururururururu	C BW			24050 GH: 77713 MH:
-10 dBm							2 I		
-20 dBm		- John Star					L.		
-30 dBm	maren	M					Mer 4	WWW.L.	
-30 dBm								wind how has	and www.
-50 dBm									
-60 dBm									
-70 dBm									
-80 dBm									
CF 2.462 GHz				691	nts			Snan	40.0 MHz

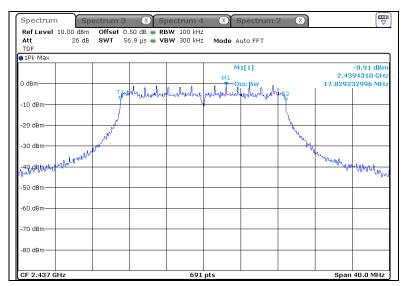


- 802.11n HT20_Occupied Bandwidth

Lowest Channel(2 412 MHz)



Middle Channel (2 437 Mz)





Highest Channel (2 462 Mz)

Att TDF	26 dB SW	Т 56.9 µ	s 👄 VBV	/ 300 kHz	Mode A	uto FFT			
1Pk Max									
					м	1[1]		2 45	-0.97 dBr 44170 GH
0 dBm		M1				cc Bw			45876 MH
		- Thurnham	humber	entreating	parlander	cc Bw whenly he	M2		
-10 dBm				ł					
-20 dBm		1					Υ.		
-20 UBIII		<i>y</i> ~					Z		
-30 dBm	J.M.						Je Je		
	hours						٩	why	
-30 dBm	0.							whim	Monthy
-50 dBm									
-50 ubiii									
-60 dBm									
-70 dBm									
-80 dBm									
-oo ubiii					-		-	-	



5.5 Spurious Emission, Band Edge, and Restricted bands

5.5.1 Regulation

According to §15.247(d), in any 100 kt 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 kt 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. 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 15.205(c)).

radiator shall notexceed the field strength levels specified in the following table: Frequency (Mz) Field strength (µV/m) Measurement distance (m)

According to §15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional

Frequency (Mb)	Field strength ($\mu N/m$)	Measurement distance (m)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 Mb, 76–88 Mb, 174–216 Mb or 470–806 Mb. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.



MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 - 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 - 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 - 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 – 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 - 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 - 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	$2\ 483.5 - 2\ 500$	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 - 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 - 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 - 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 - 4 400	Above 38.6
13.36 - 13.41			

According to § 15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1 000 Mb, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 Mb, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.



5.5.2 Measurement Procedure

5.5.2.1 Band-edge Compliance of RF Conducted Emissions

5.5.2.1.1 Reference Level Measurement

Establish a reference level by using the following procedure:

1) Set instrument center frequency to DTS channel center frequency.

- 2) Set the span to ≥ 1.5 times the DTS bandwidth.
- 3) Set the RBW = 100 kHz.
- 4) Set the VBW \geq 3 x RBW.
- 5) Detector = peak.
- 6) Sweep time = auto couple.
- 7) Trace mode = max hold.
- 8) Allow trace to fully stabilize.
- 9) Use the peak marker function to determine the maximum PSD level.

5.5.2.1.2 Emissions Level Measurement

- 1) Set the center frequency and span to encompass frequency range to be measured.
- 2) Set the RBW = 100 kHz.
- 3) Set the VBW \geq 3 x RBW.
- 4) Detector = peak.
- 5) Ensure that the number of measurement points \geq span/RBW
- 6) Sweep time = auto couple.
- 7) Trace mode = max hold.
- 8) Allow trace to fully stabilize.
- 9) 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) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.



5.5.2.2 Conducted Spurious Emissions

Set the spectrum analyzer as follows:

- Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.
 - Typically, several plots are required to cover this entire span.
- 2) RBW = 100 kHz
- 3) VBW \ge RBW
- 4) Sweep = auto
- 5) Detector function = peak
- 6) Trace = max hold
- 7) Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
- 8) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified
 - bandwidth.

5.5.2.3 Radiated Spurious Emissions

- 1) The preliminary and final rdiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m semi-anechoic chamber. The EUT was tested at a distance 3 meters.
- 2) The EUT was placed on the top of the 0.8-meter height, 1×1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.
- 3) The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1 000 MHz using the Bi-Log antenna, and from 1 000 MHz to 26 500 MHz using the horn antenna.
- 4) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.
- 5) The 0.8m height is for below 1 G testing, and 1.5m is for above 1G testing.

Note

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kl/z for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 Gl/z.
- 2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz($\geq 1/T$) for Average detection (AV) at frequency above 1 GHz. (where T = pulse width)



5.5.3 Test Result

- Complied

- 1. Band edge & Conducted Spurious Emissions was shown in figure 3 & 4. Note: We took the insertion loss of the cable into consideration within the measuring instrument.
- 2. Measured value of the Field strength of spurious Emissions (Radiated)
- 3. It tested x,y and z 3 axis each, mentioned only worst case data at this report.

- Below 1 (Hz data (worst-case: 802.11g)

Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result	Limit	Margin	
[M±z]	[kHz]	[V/H]	$[dB(\mu N)]$	[dB]	$[dB(\mu N/m)]$	$[dB(\mu V/m)]$	[dB]	
Quasi-Peak DATA. Emissions below 30 Mz								
Below 30.00	Not Detected	-	-	-	-	-	-	
Quasi-Peak DATA. Emissions below 1 🛱								
79.96	120	V	35.70	-15.30	20.40	40.00	19.60	
99.60	120	V	31.60	-15.60	16.00	43.50	27.50	
600.24	120	V	29.80	-1.00	28.80	46.00	17.20	
800.18	120	Н	33.50	2.50	36.00	46.00	10.00	
840.19	120	Н	31.50	3.30	34.80	46.00	11.20	
880.21	120	Н	28.80	4.00	32.80	46.00	13.20	
Above 900.00	Not Detected	-	-	-	-	-	-	

Lowest channel (2 412 Mz)



- Above 1 🕀 data

802.11b_Lowest channel (2 412 Mz)

Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result	Limit	Margin			
[MHz]	[kHz]	[V/H]	$[dB(\mu N)]$	[dB]	$[dB(\mu N/m)]$	$[dB(\mu N/m)]$	[dB]			
Peak DATA. Emissions above 1										
1 800.00	1 000	Н	52.50	-0.10	52.40	74.00	21.60			
2 371.50 ¹⁾	1 000	V	41.80	3.50	45.30	74.00	28.70			
7 235.63	1 000	Н	46.60	14.30	60.90	74.00	13.10			
10 666.87	1 000	Н	38.30	19.10	57.40	74.00	16.60			
12 553.12	1 000	Н	29.70	22.40	52.10	74.00	21.90			
14 062.50	1 000	Н	31.30	24.40	55.70	74.00	18.30			
Above 15 000.00	Not Detected	-	-	-	-	-	-			
Average DATA. Emissions above 1 Gz										
1 800.00	1 000	Н	43.50	-0.10	43.40	54.00	10.60			
2 371.50 ¹⁾	1 000	V	33.80	3.50	37.30	54.00	16.70			
7 235.63	1 000	Н	30.80	14.30	45.10	54.00	8.90			
10 666.87	1 000	Н	27.00	19.10	46.10	54.00	7.90			
12 553.12	1 000	Н	23.20	22.40	45.60	54.00	8.40			
14 062.50	1 000	Н	22.80	24.40	47.20	54.00	6.80			
Above 15 000.00	Not Detected	-	-	-	-	-	-			

¹⁾ Restricted band.



Margin

[dB]

Limit

 $[dB(\mu N/m)]$

Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result				
[MHz]	[kHz]	[V/H]	$[dB(\mu V)]$	[dB]	$[dB(\mu N/m)]$				
Peak DATA. En	Peak DATA. Emissions above 1 🛱								
1 800.00	1 000	V	53.70	-0.10	53.60				
4 873.13	1 000	V	43.10	9.20	52.30				
7 310 63	1 000	V	50.40	14 40	64 80				

802.11b_Middle channel (2 437 Mz)

Peak DATA. Emissions above 1 Gz									
1 800.00	1 000	V	53.70	-0.10	53.60	74.00	20.40		
4 873.13	1 000	V	43.10	9.20	52.30	74.00	21.70		
7 310.63	1 000	V	50.40	14.40	64.80	74.00	9.20		
10 665.00	1 000	Н	36.90	19.00	55.90	74.00	18.10		
12 320.62	1 000	V	30.80	22.30	53.10	74.00	20.90		
13 595.62	1 000	Н	32.60	23.30	55.90	74.00	18.10		
Above 14 000.00	Not Detected	-	-	-	-	-	-		
Average DATA.	Average DATA. Emissions above 1 🗄								
1 800.00	1 000	V	40.50	-0.10	40.40	54.00	13.60		
4 873.13	1 000	V	26.20	9.20	35.40	54.00	18.60		
7 310.63	1 000	V	32.20	14.40	46.60	54.00	7.40		
10 665.00	1 000	Н	24.10	19.00	43.10	54.00	10.90		
12 320.62	1 000	V	24.50	22.30	46.80	54.00	7.20		
13 595.62	1 000	Н	21.30	23.30	44.60	54.00	9.40		
Above	Not								
14 000.00	Detected	-	-	-	-	-	-		

802.11b_Highest channel (2 462 Mz)

Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result	Limit	Margin		
[MHz]	[kHz]	[V/H]	$[dB(\mu N)]$	[dB]	$[dB(\mu N/m)]$	$[dB(\mu N/m)]$	[dB]		
Peak DATA. Emissions above 1 🖧									
1 800.25	1 000	V	51.40	-0.10	51.30	74.00	22.70		
2 488.251)	1 000	V	41.00	3.60	44.60	74.00	29.40		
4 923.75	1 000	V	47.30	9.20	56.50	74.00	17.50		
7 383.75	1 000	V	52.20	14.50	66.70	74.00	7.30		
10 670.62	1 000	V	37.50	19.10	56.60	74.00	17.40		
13 595.62	1 000	Н	33.10	23.30	56.40	74.00	17.60		
Above	Not		_			-			
14 000.00	Detected	-	-	-	-	-	-		
Average DATA.	Average DATA. Emissions above 1 🗄								
1 800.25	1 000	V	41.90	-0.10	41.80	54.00	12.20		
2 488.251)	1 000	V	37.50	3.60	41.10	54.00	12.90		
4 923.75	1 000	V	29.60	9.20	38.80	54.00	15.20		
7 383.75	1 000	V	35.70	14.50	50.20	54.00	3.80		
10 670.62	1 000	V	23.00	19.10	42.10	54.00	11.90		
13 595.62	1 000	Н	21.30	23.30	44.60	54.00	9.40		
Above	Not								
14 000.00	Detected		-				-		

¹⁾ Restricted band.

KCTL-TIR001-003/0



Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result	Limit	Margin
[MHz]	[kHz]	[V/H]	$[dB(\mu N)]$	[dB]	$[dB(\mu N/m)]$	$[dB(\mu N/m)]$	[dB]
Peak DATA. En	nissions above	1 GHz					
1 800.00	1 000	V	53.70	-0.10	53.60	74.00	20.40
2 390.00 ¹⁾	1 000	V	43.40	3.50	46.90	74.00	27.10
4 835.63	1 000	V	35.20	9.30	44.50	74.00	29.50
7 241.25	1 000	V	48.50	14.30	62.80	74.00	11.20
10 666.87	1 000	Н	37.40	19.10	56.50	74.00	17.50
13 876.87	1 000	V	32.10	24.30	56.40	74.00	17.60
Above	Not			_			
11 000.00	Detected	-			-	-	
Average DATA.	Emissions abo	ove 1 GHz					
1 800.00	1 000	V	40.30	-0.10	40.20	54.00	13.80
2 390.001)	1 000	V	36.10	3.50	39.60	54.00	14.40
4 835.63	1 000	V	30.80	9.30	40.10	54.00	13.90
7 241.25	1 000	V	29.20	14.30	43.50	54.00	10.50
10 666.87	1 000	Н	27.50	19.10	46.60	54.00	7.40
13 876.87	1 000	V	19.70	24.30	44.00	54.00	10.00
Above	Not						
11 000.00	Detected	-	-	-	-	-	-

802.11g_Lowest channel (2 412 Mz)

¹⁾ Restricted band.

802.11g_Middle channel (2 437 Mz)

Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result	Limit	Margin
[MHz]	[kHz]	[V/H]	$[dB(\mu N)]$	[dB]	$[dB(\mu N/m)]$	$[dB(\mu N/m)]$	[dB]
Peak DATA. En	nissions above	1 GHz					
1 800.50	1 000	Н	53.30	-0.10	53.20	74.00	20.80
4 880.63	1 000	V	40.90	9.10	50.00	74.00	24.00
7 301.25	1 000	V	49.00	14.40	63.40	74.00	10.60
10 655.62	1 000	V	33.70	19.00	52.70	74.00	21.30
12 740.62	1 000	Н	32.80	22.40	55.20	74.00	18.80
14 062.50	1 000	V	32.90	24.40	57.30	74.00	16.70
Above 15 000.00	Not Detected	-	-	-	-	-	-
Average DATA.	Emissions abo	ove 1 GHz					
1 800.50	1 000	Н	39.30	-0.10	39.20	54.00	14.80
4 880.63	1 000	V	24.70	9.10	33.80	54.00	20.20
7 301.25	1 000	V	28.50	14.40	42.90	54.00	11.10
10 655.62	1 000	V	23.50	19.00	42.50	54.00	11.50
12 740.62	1 000	Н	19.90	22.40	42.30	54.00	11.70
14 062.50	1 000	V	21.00	24.40	45.40	54.00	8.60
Above 15 000.00	Not Detected	_	-	-	-	-	-

KCTL-TIR001-003/0



802.11g_Highest channel (2 462 Mz)

Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result	Limit	Margin
[MHz]	[kHz]	[V/H]	$[dB(\mu N)]$	[dB]	$[dB(\mu N/m)]$	$[dB(\mu N/m)]$	[dB]
Peak DATA. En	nissions above	1 GHz					
1 799.75	1 000	V	51.20	-0.10	51.10	74.00	22.90
2 483.751)	1 000	V	47.40	3.60	51.00	74.00	23.00
4 929.38	1 000	V	43.70	9.20	52.90	74.00	21.10
7 385.63	1 000	V	50.50	14.50	65.00	74.00	9.00
10 666.87	1 000	V	37.30	19.10	56.40	74.00	17.60
14 188.12	1 000	V	32.30	24.30	56.60	74.00	17.40
Above	Not		-			-	
15 000.00	Detected	-	-	-	-	-	-
Average DATA.	Emissions abo	ove 1 GHz					
1 799.75	1 000	V	40.50	-0.10	40.40	54.00	13.60
2 483.751)	1 000	V	36.20	3.60	39.80	54.00	14.20
4 929.38	1 000	V	26.50	9.20	35.70	54.00	18.30
7 385.63	1 000	V	31.70	14.50	46.20	54.00	7.80
10 666.87	1 000	V	28.10	19.10	47.20	54.00	6.80
14 188.12	1 000	V	18.00	24.30	42.30	54.00	11.70
Above	Not						
15 000.00	Detected	-	-	-	-	-	-

¹⁾ Restricted band.

802.11n HT20_Lowest channel (2 412 Mz)

Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result	Limit	Margin
[MHz]	[kHz]	[V/H]	$[dB(\mu N)]$	[dB]	$[dB(\mu N/m)]$	$[dB(\mu N/m)]$	[dB]
Peak DATA. En	nissions above	1 GHz					
1 800.00	1 000	Н	53.40	-0.10	53.30	74.00	20.70
2 389.001)	1 000	V	46.10	3.50	49.60	74.00	24.40
4 830.00	1 000	V	37.70	9.40	47.10	74.00	26.90
7 235.63	1 000	V	50.20	14.30	64.50	74.00	9.50
9 161.25	1 000	V	33.70	16.70	50.40	74.00	23.60
11 263.12	1 000	Н	32.90	20.50	53.40	74.00	20.60
14 265.00	1 000	Н	32.60	24.20	56.80	74.00	17.20
Above	Not						
15 000.00	Detected	-	-	-	-	-	-
Average DATA.	Emissions abo	ove 1 GHz					
1 800.00	1 000	Н	41.30	-0.10	41.20	54.00	12.80
2 389.001)	1 000	V	36.70	3.50	40.20	54.00	13.80
4 830.00	1 000	V	31.00	9.40	40.40	54.00	13.60
7 235.63	1 000	V	29.40	14.30	43.70	54.00	10.30
9 161.25	1 000	V	23.00	16.70	39.70	54.00	14.30
11 263.12	1 000	Н	21.20	20.50	41.70	54.00	12.30
14 265.00	1 000	Н	20.00	24.20	44.20	54.00	9.80
Above	Not						
15 000.00	Detected	-	-	-	-	-	-
1) Restricted band	1.						

KCTL-TIR001-003/0



Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result	Limit	Margin
[MHz]	[kHz]	[V/H]	$[dB(\mu N)]$	[dB]	$[dB(\mu N/m)]$	$[dB(\mu N/m)]$	[dB]
Peak DATA. En	nissions above	1 GHz					
1 800.25	1 000	V	53.20	-0.10	53.10	74.00	20.90
4 876.88	1 000	V	36.80	9.10	45.90	74.00	28.10
7 306.88	1 000	V	46.10	14.40	60.50	74.00	13.50
11 821.87	1 000	Н	33.10	21.40	54.50	74.00	19.50
13 533.75	1 000	Н	33.20	23.10	56.30	74.00	17.70
14 810.62	1 000	V	34.00	24.30	58.30	74.00	15.70
Above	Not						
15 000.00	Detected	-	-	-	-	-	-
Average DATA.	Emissions abo	ove 1 GHz					
1 800.25	1 000	V	41.00	-0.10	40.90	54.00	13.10
4 876.88	1 000	V	30.00	9.10	39.10	54.00	14.90
7 306.88	1 000	V	27.80	14.40	42.20	54.00	11.80
11 821.87	1 000	Н	22.00	21.40	43.40	54.00	10.60
13 533.75	1 000	Н	19.80	23.10	42.90	54.00	11.10
14 810.62	1 000	V	19.20	24.30	43.50	54.00	10.50
Above	Not						
15 000.00	Detected	-	-	-		-	-

802. 11n HT20_Middle channel (2 437 Mz)

802.11n HT20_Highest channel (2 462 Mz)

Frequency	Receiver Bandwidth	Pol.	Reading	Factor	Result	Limit	Margin
[MHz]	[kHz]	[V/H]	$[dB(\mu N)]$	[dB]	[dB(µN/m)]	[dB(µN/m)]	[dB]
Peak DATA. En	nissions above	1 GHz					
1 789.50	1 000	Н	48.00	-0.20	47.80	74.00	26.20
1 800.00	1 000	V	48.30	-0.10	48.20	74.00	25.80
2 484.001)	1 000	V	49.30	3.60	52.90	74.00	21.10
4 933.13	1 000	V	40.90	9.20	50.10	74.00	23.90
7 383.75	1 000	V	48.30	14.50	62.80	74.00	11.20
11 340.00	1 000	V	32.30	20.60	52.90	74.00	21.10
Above 12 000.00	Not Detected	-	-	-	-	-	-
Average DATA.		ove 1 GHz					
1 789.50	1 000	Н	38.60	-0.20	38.40	54.00	15.60
1 800.00	1 000	V	40.10	-0.10	40.00	54.00	14.00
2 484.001)	1 000	V	36.90	3.60	40.50	54.00	13.50
4 933.13	1 000	V	27.60	9.20	36.80	54.00	17.20
7 383.75	1 000	V	31.50	14.50	46.00	54.00	8.00
11 340.00	1 000	V	21.00	20.60	41.60	54.00	12.40
Above 12 000.00	Not Detected	-	-	-	-	-	-

¹⁾ Restricted band.

KCTL-TIR001-003/0



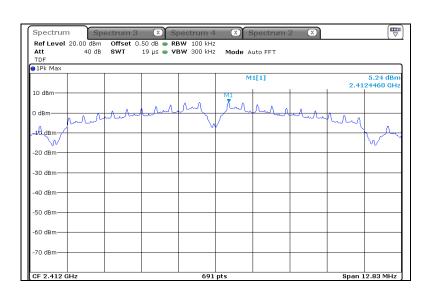
5.7.4 Test Plot

Figure 3. Plot of the Band-edge & Conducted Spurious Emissions

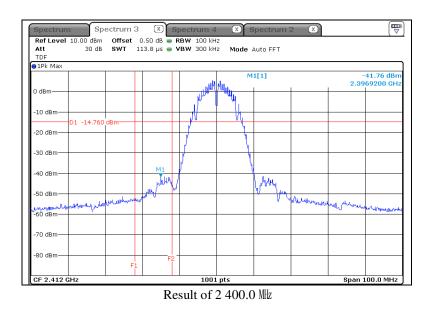
- 802.11b

Lowest Channel (2 412 Mz)

Reference



Band-edge



KCTL-TIR001-003/0



Ref Level Att	30 dB	Offset 0. SWT 2	60 ms 😑 🛛	3W 100 kHz 3W 300 kHz		uto Sweep			
TDF	00 45	0 2			mode A	ato Sweep			
∋1Pk Max									
					M	1[1]			49.32 dBr 2.0730 GH
0 dBm								2.	2.0730 GH
-10 dBm									
	D1 -14.760	dBm							
-20 dBm									
-30 dBm									
-40 dBm									
E0 d0m								M1	
-30 UBIII	Mann	outro att	murphiti	1 .	MULL AM	hundren	any the My	. Alast	happen
-ARHERNET	unuder	The lace	murphilin	unun	N WW		M	home a An	
-70 dBm									
-80 dBm									

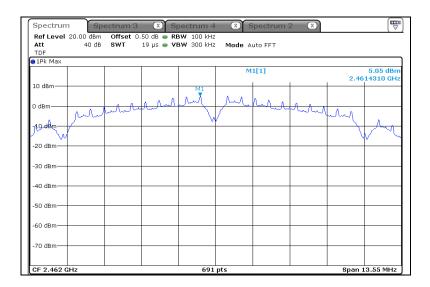
Middle Channel (2 437 Mz)

Spectrum	Sp	ectrum 3	× SI	bectrum 4	× 5	Spectrum 2	2 🛛 🗙		
Ref Level 3 Att TDF	20.00 dBm 40 dB			3W 100 kHz 3W 300 kHz	Mode A	uto FFT			
●1Pk Max									
					м	1[1]		2.43	5.22 dBn 64330 GH:
10 dBm				M1				2.10	
			مسمسم	M	M	0.0.0			
0 dBm	mn	what	Hunde	- \v	/	hard	Anta	My	٨
Jorgen M	,								~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-20 dBm									
-30 dBm									
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
CF 2.437 G	Hz			691	nts			Span 1	3.51 MHz



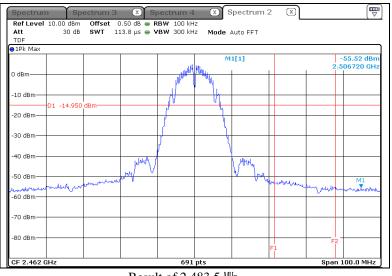
Att	10.00 dBm 30 dB	Offset 0 SWT 2	260 ms 🖷 🛛	3W 100 kHz 3W 300 kHz		uto Sweep			
TDF					noue n	ato oncop			
1Pk Max									
					M	1[1]			49.44 dBn
0 dBm								23	2.0350 GH:
-10 dBm									
	D1 -14.780	dBm							
-20 dBm									
-30 dBm-									
-40 dBm									
								M1	
-50 dBm-							. (k		
	1 A Land Marken and	Moural and	monder	hutown	www.	wwww	hurring	harthan	Monthly
-60°d8m	munterland	00.		- 10 Q VQ# 0 0			· ·		
-70 dBm									<u> </u>
-80 dBm									

Highest Channel (2 462 Mz)





Band-edge



Result of 2 483.5 Mz

Conducted Spurious Emissions

		<u> </u>			pood ann a			
30 dB				Mode A	uto Sweep			
				М	1[1]			49.55 dBr 2.0730 GH
				-				
D1 -14.950	dBm							
							M1	. Ind
allo Wallange	denterge tria Kanad	mannethe	Monorman	Mander	wwww	ar welling	addurw	rurur
	10.00 dBm 30 dB D1 -14.950	10.00 dBm Offset 0. 30 dB SWT 2	10.00 dBm Offset 0.50 dB Re 30 dB SWT 260 ms VE	10.00 dBm Offset 0.50 dB RBW 100 kHz 30 dB SWT 260 ms VBW 300 kHz D1 -14.950 dBm	10.00 dBm Offset 0.50 dB RBW 100 kHz 30 dB SWT 260 ms VBW 300 kHz Mode A Mode A 01 -14.950 dBm	10.00 dBm Offset 0.50 dB • RBW 100 kHz 30 dB SWT 260 ms • VBW 300 kHz Mode Auto Sweep M1[1] D1 -14.950 dBm	10.00 dBm Offset 0.50 dB RBW 100 kHz 30 dB SWT 260 ms VBW 300 kHz Mode Auto Sweep M1[1] D1 -14.950 dBm	10.00 dBm Offset 0.50 dB RBW 100 kHz 30 dB SWT 260 ms VBW 300 kHz Mode Auto Sweep M1[1] 22 D1 -14.950 dBm



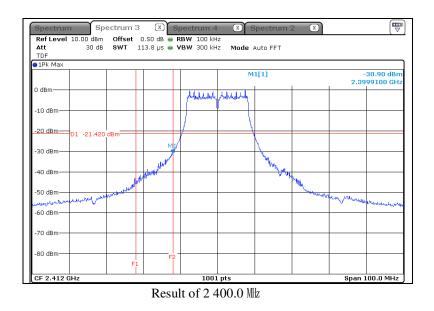
- 802.11g

Lowest Channel (2 412 Mz)

Reference

Spectrum	Spectrum	3 🗴 SI	bectrum 4	x s	pectrum 2	2 X		
RefLevel 10.00 Att 3 TDF	dBm Offset O dB SWT	0.50 dB 👄 RE 37.9 µs 👄 VE		Mode A	uto FFT			
1Pk Max								
				M	1[1]	M	.1 2.4 1	-1.42 dBr 194110 GH
0 dBm	monuto	Manawa	monthly	mutural	marker			
-10 dBm			- U				L.	
-20 dBm							No Willy	
-30, dBm								Mary Mary
-40 dBm								
-50 dBm								
-60 dBm								
-70 dBm								
-80 dBm								

Band-edge





Att	10.00 dBm 30 dB	Offset 0 SWT 2		3W 100 kHz 3W 300 kHz					
TDF	30 UB	5WI 2	.00 ms 🖶 VI	3 W 300 KH2	MODE A	uto Sweep			
1Pk Max									
					M	1[1]			50.24 dBr
0 dBm						I		17	.8630 GH
U UBIII									
10 40									
-10 dBm									
00 40									
-20 u8m	D1 -21.420	dBm							
-30 dBm									
-30 ubiii-									
-40 dBm									
-40 ubiii-									
-50 dBm-						M1			
-JU UBIII	untrangetustry	when	and	1	mu a ML	LANDRE	Mur M	. Alvent	North ARVIN
e dut the	monorman	lion	mallower	Norman		100 V V V V	- W	pulled to the	
oo pon									
-70 dBm									
, o abiii									
-80 dBm									
00 00111									

Middle Channel (2 437 Mz)

<u>Reference</u>

Att TDF	30 dB	SWT 3	7.9 µs 👄 VE	3W 300 kHz	Mode A	uto FFT			
10F 1Pk Max									
					М	1[1]			-0.63 dBr
0 dBm								-	144410 GH
	pro	mandham	montured	hendry	Junhan	mound	montener	ling	
-10 dBm				h 1	1				
-20 dBm								1 hours	
-								~	m
-39 dBm									mon
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
-80 dBm									



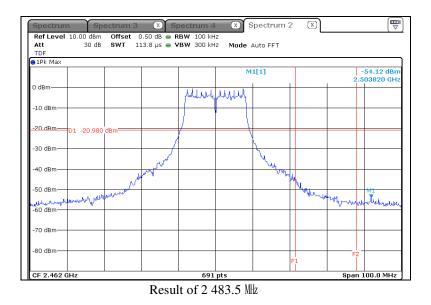
Ref Level Att	30 dB	Offset 0 SWT 2	260 ms 👄 ۷	3W 300 kHz	Mode A	uto Sweep			
TDF									
1Pk Max									
					м	1[1]			49.46 dBr 2.0730 GH
0 dBm						-		-	
1									
-10 dBm									
20 dBm	D1 -20.630	dBm							
-30 dBm									
-30 UBIII									
40 dBm									
								M1	
-50 dBm							1	V	
	namenette	mbriet	undertaking	dur rider of	Munn	worther	www.yy	mound	man
.60''08m	750	0.0~							
-70 dBm									
00 40									
-80 dBm									

Highest Channel (2 462 ₩z)

Ref Level 10				3W 100 kHz					
Att TDF	30 dB	SML 3	7.9 µs 👄 VE	3W 300 kHz	Mode A	uto FFT			
101 1Pk Max									
					м	1[1]			-0.98 dBr
0 dBm						1	м	1 2.4	594320 GH
	لمهر	handhard	mention	hundrey	pertrud	montern	Inntara	long	
-10 dBm				6				ų	
-20 dBm	₽ [№]							- Yoy	
-20 dBm									www
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
-80 dBm									



Band-edge



Conducted Spurious Emissions

Att	30 dB	SWT 2	60 ms 👄 ۷	3W 300 kHz	Mode A	uto Sweep			
TDF 1Pk Max									
					м	1[1]			49.83 dBn 2.0730 GH
D dBm									
-10 dBm									
:20 d8m-	D1 -20.980	dBm							
30 dBm									
-40 dBm									
-50 dBm	warman war	undreduced		1 .	Mary all	worknow	MUNTUM	MI	ann hAuse
elanderin	www.www.	but	manderbard	minun	W . VV		· · •	~~~ · · · ·	0 ~ 0
-70 dBm									
-80 dBm									



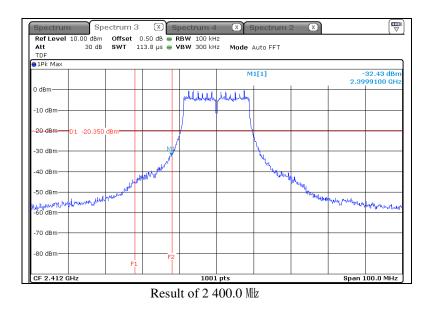
- 802.11n HT20

Lowest Channel (2 412 Mz)

Reference

Spectrum	Sp	ectrum (3 🗙 S	pectrum 4	× s	Spectrum (2 X		
Ref Level 1		Offset	0.50 dB 😑 R	BW 100 kHz					
Att	30 dB	SWT	37.9 µs 👄 🗸	BW 300 kHz	Mode A	uto FFT			
TDF									
∋1Pk Max									
					M	1[1]			-0.35 dBr
							M1	2.41	94510 GH
0 dBm		λ λ	1 A	ι λ	0 1	6 A	1 T		
	press	hhum	moundar	manhang	monthant	perspective	patropatr	ny	
-10 dBm									
	1			V V					
-20 dBm	1							<u>ل</u> ر	
-20 ubiii	P.							dr.	
and the second									14
-30 dB/m ²⁰			-						MANNY
Vum									
-40 dBm			_						
-50 dBm									
-30 ubiii									
-60 dBm									
									1
-70 dBm			+						
									1
-80 dBm									
-00 ubill									
									1
CF 2.412 GH	7		1	691	nte		1	enan f	26.54 MHz

Band-edge





Spectrum	Spee	trum 3	🗶 🕅 Sl	pectrum 4	× s	Spectrum 1	2 X		
Ref Level 10.7 Att TDF	00 dBm 30 dB	Offset 0. SWT 2		3W 100 kHz 3W 300 kHz	Mode A	uto Sweep			
1Pk Max					м	1[1]			50.31 dBn 2.0730 GH
0 dBm									
-10 dBm									
20 dBm-D1	-20.350 d	3m -							
-30 dBm									
-40 dBm									
-50 dBm								M1	
-50 dBm	wanter	montal	had the state of t	alanger wh	n he was here	would wh	when the ty	million	mound
-70 dBm									
-80 dBm									
Start 30.0 MH				691	nte			Pton	26.0 GHz

Middle Channel (2 437 Mz)

MI[1] -1.09 c 0 dBm M1 2.4444130 -10 dBm M1 2.4444130 -20 dBm	Spectrum	Sp	ectrum 3	3 🛛 🗶 S	pectrum 4	x s	Spectrum (2 🛛		
TDF M1[1] -1.09 c 0 dBm M1[1] -1.09 c -10 dBm M1 2.4444130 T -20 dBm -10 dBm -10 dBm -20 dBm -10 dBm -10 dBm -30 dBm -10 dBm -10 dBm -70 dBm -10 dBm -10 dBm	Ref Level									
1Pk Max M1[1] -1.09 c 0 dBm M1[1] M1 2.4444130 r -10 dBm -2.4444130 r -0.09 c -0.09 c -20 dBm -2.4444130 r -0.09 c -0.09 c -20 dBm -0.09 c -0.09 c -0.09 c -20 dBm -0.09 c -0.09 c -0.09 c -20 dBm -0.09 c -0.09 c -0.09 c -30 dBm -0.09 c -0.09 c -0.09 c -50 dBm -0.09 c -0.09 c -0.09 c -70 dBm -0.09 c -0.09 c -0.09 c	Att	30 dB	SWT	37.9 µs 👄 🖌	'BW 300 kHz	Mode A	uto FFT			
0 dBm										
0 dBm	🖯 1Pk Max									
0 dBm						M	1[1]			-1.09 dBr
0 dBm								M1	2.44	44130 GH
-10 dBm	0 dBm					A 4				
-20 dBm		pro	Www.m	menas	wwwwww	السمالينيم	mound	wwwww	nny	
-30 dBm	-10 dBm									
-30 dBm		1			1 1					
-30 dBm	-20 dBm	ß							4	
-40 dBm -50 dBm -60 dBm -70 dBm	20 0011	and the second s							ી બં	
-40 dBm -50 dBm -60 dBm -70 dBm									~	No.
-50 dBm	-30 dB/m									1 Jan
-50 dBm	N W									~(
-60 dBm	-40 dBm									
-60 dBm										
-60 dBm	-50 dBm									
-70 dBm										
-70 dBm	co dom									
	-60 aBm									
-80 dBm	-70 dBm			+						
-80 dBm										
	-80 dBm			+						
CF 2.437 GHz 691 pts Span 26.54 M										



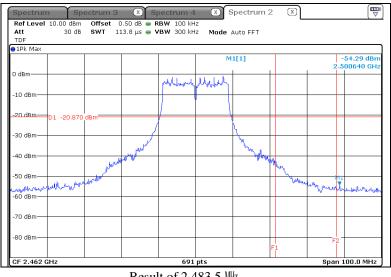
Ref Level Att	30 dB	Offset 0. SWT 2	50 dB 👄 RE 60 ms 👄 VE	3W 100 kHz	Modo A	uto Sweep			
TDF	30 GD	011 2	00 ms 🖕 🕫	500 KHZ	Mode A	uto Sweep			
1Pk Max									
					M	1[1]			50.72 dBr
0 dBm						1	1	24	1.9290 GH
J UDITI									
-10 dBm									
-10 00III									
20 dam_									
-20 dBm	D1 -21.090	dBm-							
-30 dBm									
-50 abiii									
-40 dBm									
10 abiii									
-50 dBm									M1
-50 dBm	نوامىيللى	ung re	manual		A. H. M. M.	mand	winholy.	. March	monto
BOMBH	n Marin	(Dul)	alle for and the	www			10	Martinora	
-70 dBm									
-80 dBm									

Highest Channel (2 462 Mz)

Spectrum		ectrum 3		ectrum 4		pectrum 2	2 🗶 🛛		
Ref Level Att TDF	10.00 dBm 30 dB		50 dB 👄 RE 7.9 µs 👄 VE			uto FFT			
⊖1Pk Max									
		M1			М	1[1]		2.45	-0.87 dBn 56630 GH
0 dBm	ju	aluralur	Inentuch	howherey	mahan	mahan	unnun	ary.	
-10 dBm				ł					
-20 dBm	~~~~~							- V	
-30 dBm	·								Mar horry
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
-80 dBm									



Band-edge



Result of 2 483.5 Mz

Conducted Spurious Emissions

Ref Level 1			0.50 dB 😑 RE						
Att TDF	30 dB	SWT	260 ms 👄 ۷	3W 300 kHz	Mode A	uto Sweep			
1DF 1Pk Max									
Par is main					M	1[1]			50.15 dBn
								2	2.0730 GH
0 dBm									
-10 dBm									
-20 dBm - D	1 -20.870	dBm							
-30 dBm									
-40 dBm									
								M1	
-50 dBm		h hand					a July	11 0	1. a. s. Jack
	workowid	un un	not observe all half	Udway.		Maria and .	- wan h	NWWW	WWWWWWWW
HOD BOM LANG									
-70 dBm									
-80 dBm									



5.6 Conducted Emission

5.6.1 Regulation

According to \$15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Erroquency of omission (Ma)	Conducted li	mit (dBµN)
Frequency of emission (Mb)	Qausi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

According to \$15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

5.6.2 Measurement Procedure

- 1) The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
- Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50µH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
- 3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
- 4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
- 5) The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 ^{kHz} or to QUASI-PEAK and AVERAGE within a bandwidth of 9 ^{kHz}. The EUT was in transmitting mode during the measurements.

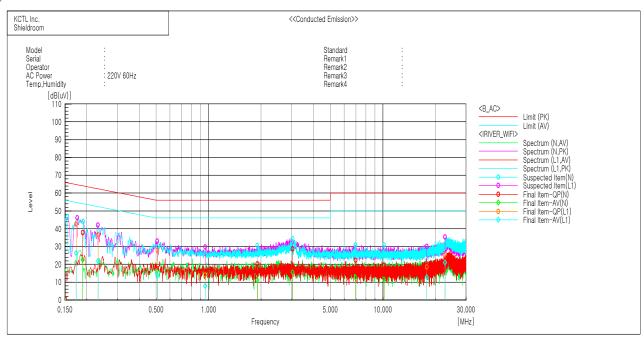


5.6.3 Test Result

- Complied

Figure 6. plot of Conducted Emission

- Conducted worst-case data : 802.11g_Lowest channel (2 412 Mz)



Final Result

	N Phase									
No.	Frequency	Reading	Reading	c.f	Result	Result	Limit	Limit	Margin	Margin
		QP	ÇAV		QP	ÇAV	QP	AV	QP	ÇAV
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]
1	0.14989	0.7	-0.9	0.0	0.7	-0.9	0.0	0.0	-0.7	0.9
2	0.18965	27.8	12.6	10.0	37.8	22.6	64.1	54.1	26.3	31.5
3	1.9049	10.5	1.4	9.8	20.3	11.2	56.0	46.0	35.7	34.8
4	3.02906	19.0	5.8	9.7	28.7	15.5	56.0	46.0	27.3	30.5
5	6.96657	12.6	2.9	9.7	22.3	12.6	60.0	50.0	37.7	37.4
6	10.15069	9.6	1.7	9.9	19.5	11.6	60.0	50.0	40.5	38.4
	L1 Phase	-								
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]
1	0.17341	32.7	16.3	9.9	42.6	26.2	64.8	54.8	22.2	28.6
2	0.23181	26.8	12.0	9.8	36.6	21.8	62.4	52.4	25.8	30.6
3	0.50785	17.9	3.7	10.0	27.9	13.7	56.0	46.0	28.1	32.3
U	0.00/00	17.5	0.7	10.0	L1.0		00.0		20.1	02.0
4	0.95534	4.1	-2.1	9.9	14.0	7.8	56.0	46.0	42.0	38.2



6. Test equipment used for test

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Test Receiver	R & S	ESCI	100710	17.02.26
Bi-Log Antenna	SCHWARZBECK	VULB 9168	583	18.06.10
Amplifier	SONOMA INSTRUMENT	310N	186280	17.04.07
3 dB Attenuator	HP	8491B	22981	16.09.01
Turn Table	MATURO	CO2000-SOFT	-	-
Antenna Mast	MATURO	AM4.0	079/3440509	-
Horn antenna	ETS.lindgren	3116	86635	17.05.03
Horn antenna	ETS.lindgren	3117	155787	16.11.25
Broadband Preamplifier	SCHWARZBECK	BBV9721	2	17.05.03
Broadband Preamplifier	SCHWARZBECK	BBV9718	216	16.11.11
Highpass Filter	Wainwright Instruments GmbH	WHKX3.0/ 18G-12SS	44	17.02.01
Spectrum Analyzer	R & S	FSV30	100810	16.09.02
Spectrum Analyzer	R & S	FSV30	100806	16.09.02
Wideband Power Sensor	R & S	NRP-Z81	102398	17.02.11
Attenuator	R & S	DNFDämpfungsglied 10 dB inN-50 Ohm	31209	16.07.15
Vector Signal Generator	R & S	SMBV100A	257566	17.01.07
Signal Generator	R & S	SMB100A	176206	17.03.14
LOOP Antenna	R & S	HFH2-Z2	100355	18.03.03
DC Power Supply	AGILENT	E3632A	KR73001026	17.01.07
Antenna Mast	Innco Systems	MA4000-EP	303	-
Turn Table	Innco Systems	DT2000S-1t	79	-
Amplifier	SONOMA INSTRUMENT	310N	344922	16.09.02