

6.7. Radiated Spurious Emission Measurement 6.7.1. Test Specification

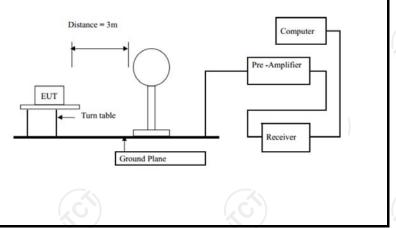
Test Method:

Limit:

Test setup:

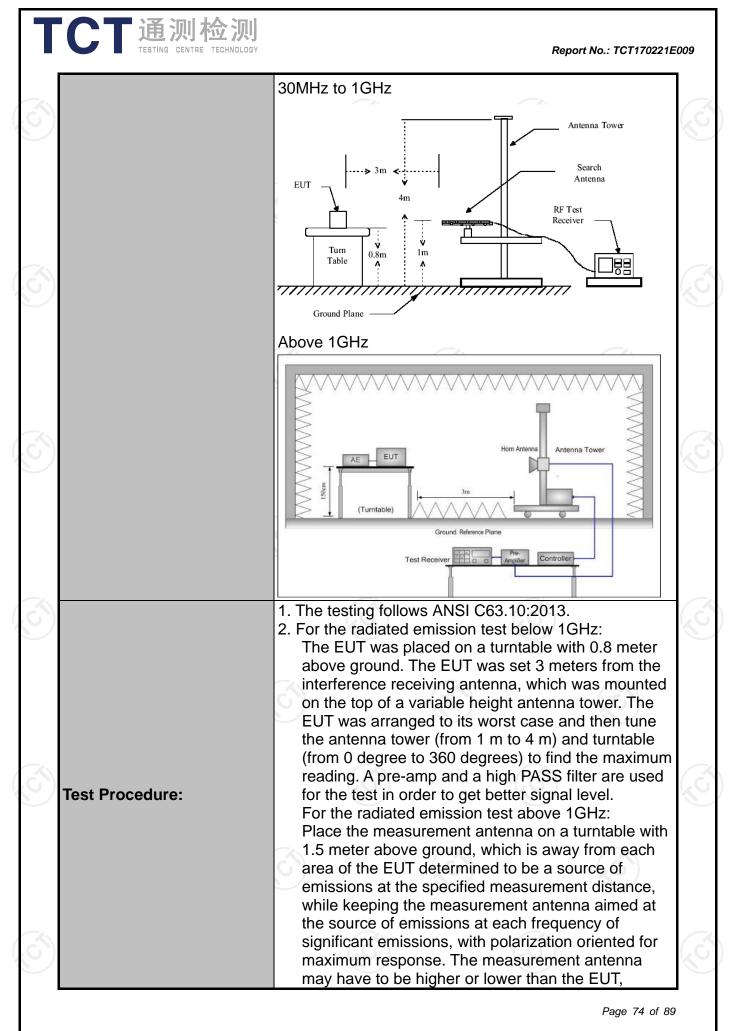
FCC Part15 C Section 15.209/RSS 247, 5.5 **Test Requirement:** ANSI C63.10:2013 9 kHz to 25 GHz Frequency Range: 3 m Measurement Distance: Antenna Polarization: Horizontal & Vertical **Operation mode:** Transmitting mode with modulation Detector RBW VBW Remark Frequency 9kHz- 150kHz Quasi-peak 200Hz 1kHz Quasi-peak Value 150kHz-Quasi-peak 9kHz 30kHz Quasi-peak Value **Receiver Setup:** 30MHz 30MHz-1GHz 100KHz Quasi-peak 300KHz Quasi-peak Value Peak Value Peak 1MHz 3MHz Above 1GHz Peak 1MHz 10Hz Average Value **Field Strength** Measurement Frequency (microvolts/meter) Distance (meters) 0.009-0.490 2400/F(KHz) 300 0.490-1.705 24000/F(KHz) 30 1.705-30 30 30 100 3 30-88 88-216 150 3 216-960 200 3 500 Above 960 3 Measurement Field Strength Frequency Distance Detector (microvolts/meter) (meters) 500 3 Average Above 1GHz 5000 3 Peak

For radiated emissions below 30MHz



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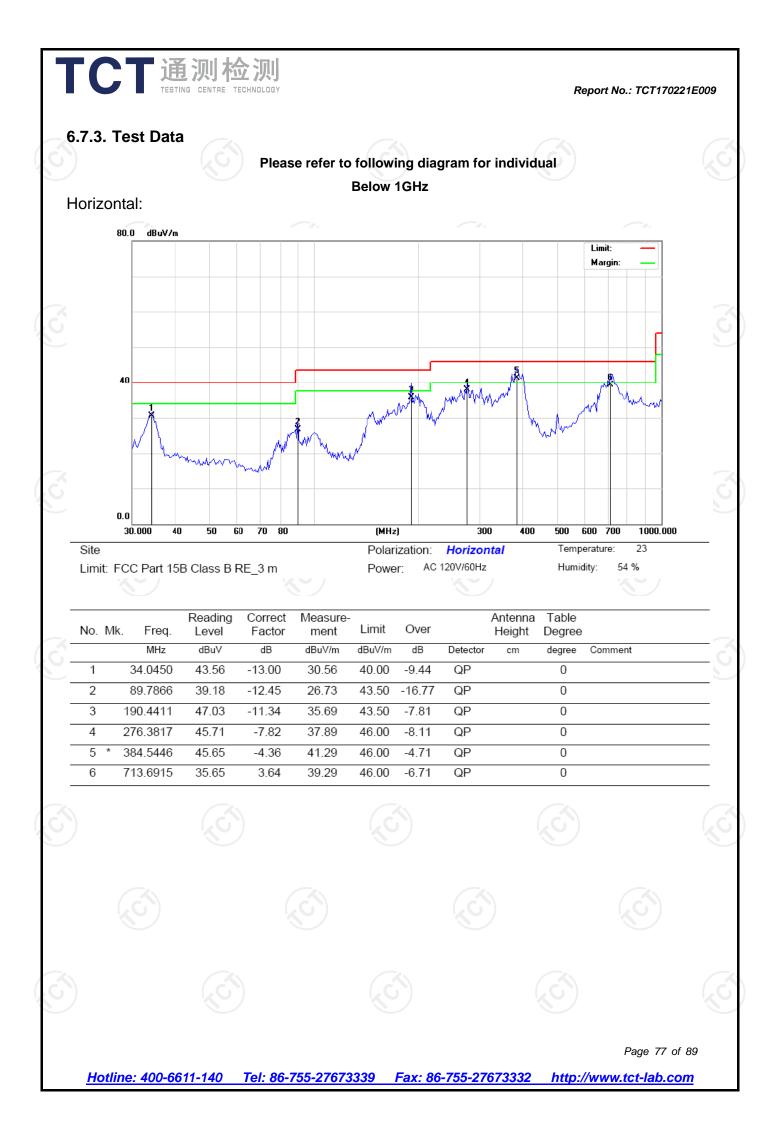


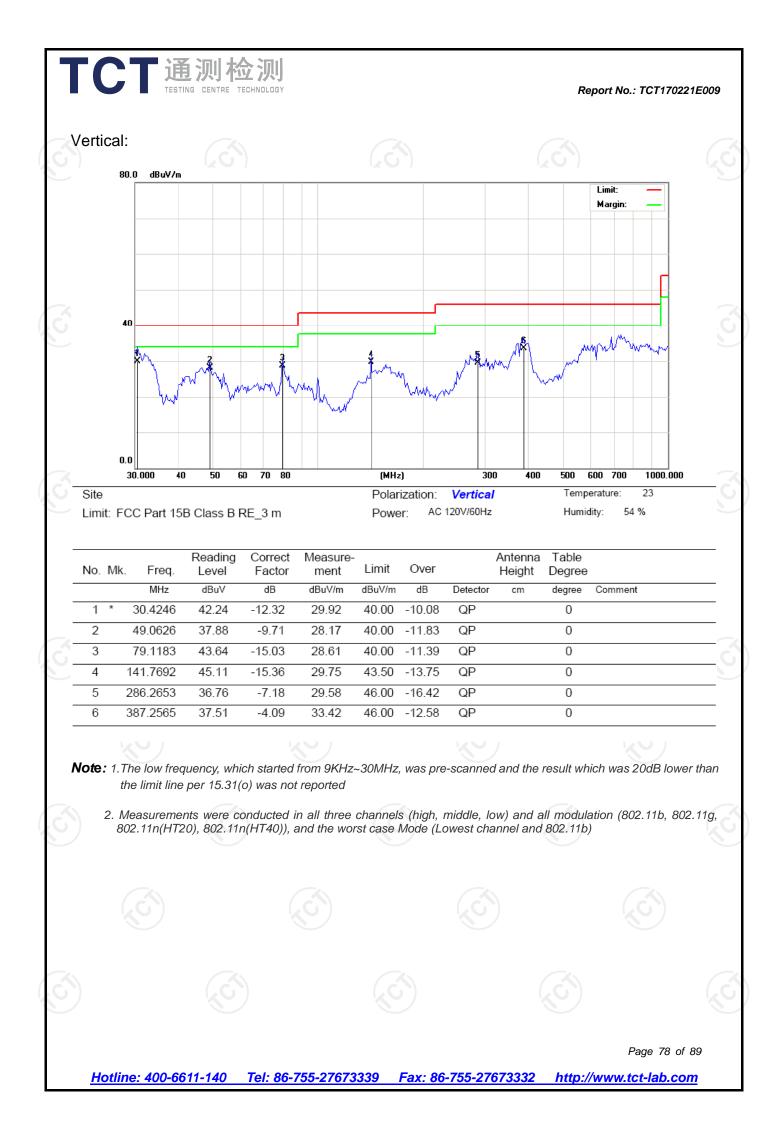
Report No.: TCT170221E009 depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. 3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level 4. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. 5. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for f < 1 GHz; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold: (3) Set RBW = 1 MHz, VBW= 3MHz for f 1 GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. PASS Test results:

6.7.2. Test Instruments

	Radiated Em	ission Test Si	te (966)	
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
ESPI Test Receiver	ROHDE&SCHW ARZ	ESVD	100008	Aug. 11, 2017
Spectrum Analyzer	ROHDE&SCHW ARZ	FSEM	848597/001	Aug. 11, 2017
Spectrum Analyzer	Agilent	N9020A	MY49100060	Aug. 12, 2017
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Aug. 11, 2017
Pre-amplifier	HP	8447D	2727A05017	Aug. 11, 2017
Loop antenna	ZHINAN	ZN30900A	12024	Aug. 13, 2017
Broadband Antenna	Schwarzbeck	VULB9163	340	Aug. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Aug. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9170	373	Aug. 13, 2017
Coax cable	тст	RE-low-01	N/A	Aug. 11, 2017
Coax cable	тст	RE-high-02	N/A	Aug. 11, 2017
Coax cable	тст	RE-low-03	N/A	Aug. 11, 2017
Coax cable	тст	RE-High-04	N/A	Aug. 11, 2017
Antenna Mast	CCS	CC-A-4M	N/A	Aug. 12, 2017
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A
Semi anechoic chamber	SAEMC	Chamber-#1	DQM0274	Aug. 12, 2017

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).





			lation Type: 80 channel: 2412			
requency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)
2310	Н	45.12	-4.20	40.92	74.00	54.00
2377.38	Н	46.19	-4.10	42.09	74.00	54.00
2390	Н	51.62	-3.94	47.68	74.00	54.00
2310	V	41.75	-4.20	37.55	74.00	54.00
2377.38	V	52.66	-4.10	48.56	74.00	54.00
2390	V	50.88	-3.94	46.94	74.00	54.00
	(\mathbf{G})		lation Type: 80		(G)	•
		High	channel: 2462	MHz		
requency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)
2483.5	Н	53.1	-3.60	49.5	74.00	54.00
2487.09	Н	44.18	-3.50	40.68	74.00	54.00
2500	Н	40.76	-3.34	37.42	74.00	54.00
2483.5	V	53.55	-3.60	49.95	74.00	54.00
2487.09	V	45.87	-3.50	42.37	74.00	54.00
2500	N	41.42	-3.34	38.08	74.00	54.00
	(\mathcal{O})		(\mathcal{G})		(\mathcal{G})	
		Modu	lation Type: 80	2.11g		
			channel: 2412			
requency	Ant. Pol.	Peak reading	Correction	Peak Final	Peak limit	AV limit
(MHz)	H/V	(dBµV)	Factor (dB/m)	Emission Level	(dBµV/m)	(dBµV/m)
2310	H	47.06	-4.20	42.86	74.00	54.00
2388.96	Н	50.84	-4.12	46.72	74.00	54.00
2390	Н	53.47	-3.94	49.53	74.00	54.00
2310	V	40.18	-4.20	35.98	74.00	54.00
2388.96	V	47.98	-4.12	43.86	74.00	54.00
2390	V	51.37	-3.94	47.43	74.00	54.00
			lation Type: 80			
		High	channel: 2462	MHz		
	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)
requency (MHz)	I I/ V			49.83	74.00	54.00
(MHz)		53.43	-3.60			
(MHz) 2483.5	Н	53.43 49.36	-3.60 -3.52	45.84	74.00	54.00
(MHz) 2483.5 2487.59		49.36			74.00 74.00	54.00 54.00
(MHz) 2483.5 2487.59 2500	H	49.36 46.68	-3.52 -3.34	45.84 43.34	74.00	54.00
2483.5 2487.59	H H H	49.36	-3.52	45.84		

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	<u></u>		n Type: 802.11 channel: 2412	1 /	<u></u>	
requency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)
2310	Н	45.55	-4.20	41.35	74.00	54.00
2388.01	Н	54.68	-4.10	50.58	74.00	54.00
2390	Н	52.79	-3.94	48.85	74.00	54.00
2310	V	46.38	-4.20	42.18	74.00	54.00
2388.01	V	54.19	-4.10	50.09	74.00	54.00
2390	V	50.84	-3.94	46.9	74.00	54.00
		Modulatio	n Type: 802.11	n(20MHz)		
			channel: 2462			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)
2483.5	Н	55.11	-3.60	51.51	74.00	54.00
2392.55	Н	52.61	-3.50	49.11	74.00	54.00
2500	Н	46.57	-3.34	43.23	74.00	54.00
2483.5	V	51.91	-3.60	48.31	74.00	54.00
2392.55	V	49.86	-3.50	46.36	74.00	54.00
2500	V	48.99	-3.34	45.65	74.00	54.00
-			channel: 2422 Correction	MHz Peak Final	De el l'acti	
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Factor (dB/m)	Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)
2310	Н	50.81	-4.20	46.61	74.00	54.00
2387.85	Н	55.02	-4.10	50.92	74.00	54.00
2390	Н	52.66	-3.94	48.72	74.00	54.00
2310	V	51.48	-4.20	47.28	74.00	54.00
2389.98	V	50.78	-4.10	46.68	74.00	54.00
2390	V	49.76	-3.94	45.82	74.00	54.00
	(2G')		n Type: 802.11			
			channel: 2452			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)
2483.5	Н	52.59	-3.60	48.39	74.00	54.00
2493.51	Н	54.38	-3.50	50.28	74.00	54.00
	Н	49.65	-3.34	45.71	74.00	54.00
2500	V	54.19	-3.60	49.99	74.00	54.00
2500 2493.51			-3.46	48.77	74.00	54.00
	V	52.87	-3.40			
2493.51	V V	52.87 50.9	-3.34	46.96	74.00	54.00

2.

Correction Factor= Antenna Factor + Cable loss - Pre-amplifier

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			М		9 1GHz ype: 802.11	lb			
			L	ow channe	el: 2412 MHz	z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emissio Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4824	Н	45.98		0.66	46.64	· · · ·	74	54	-7.36
7236	СH	39.52	<u> </u>	9.5	49.02		74	54	-4.98
	Ĥ								
4824	V	46.54		0.66	47.2		74	54	-6.8
7236	V	37.64		9.5	47.14		74	54	-6.86
5)	V	$(-\Theta)$		(, ()		(\mathbf{E})		(
9	· · · · ·		· · · · ·	<u> </u>	\mathcal{I}				<u> </u>

			Mi	ddle chanr	nel: 2437MF	Ηz			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)		Margin (dB)
4874	Ч	44.9	<u> </u>	0.99	45.89		74	54	-8.11
7311	H	40.67		9.85	50.52		74	54	-3.48
	Н								
4874	V	47.75		0.99	48.74		74	54	-5.26
7311	V	38.02		9.85	47.87		74	54	-6.13
_ <u></u>	V				_ <u></u>				

		·	F	ligh channe	el: 2462 MH	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4924	H	46.22		1.33	47.55		74	54	-6.45
7386	Н	39.25		10.22	49.47		74	54	-4.53
	Н								
									(6
4924	V	45.51		1.33	46.84		74	54	-7.16
7386	V	35.29		10.22	45.51		74	54	-8.49
	V								

Note:

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1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss - Pre-amplifier

2. Margin (dB) = Emission Level (Peak) (dB μ V/m)-Average limit (dB μ V/m)

3. The emission levels of other frequencies are very lower than the limit and not show in test report.

4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.

Data of measurement shown "----"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

<i>.</i>		<u> </u>			ype: 802.1	<u> </u>	<u> </u>		
			L	ow channe	el: 2412 MH	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4824	Н	49.36		0.75	50.11		74	54	-3.89
7236	H	40.61		9.87	50.48		74	54	-3.52
()	CH				()	G^{-}			
		•		-					
4824	V	47.57		0.75	48.32		74	54	-5.68
7236	V	40.68		9.87	50.55		74	54	-3.45
	V								
		(.G)	•			•	(.G)		
			Μ	iddle chanr	nel: 2437MF	Ηz			
Frequency (MHz)	Ant. Pol. H/V	Peak reading	AV reading (dBµV)	Facior	Peak	on Level AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
、 ,		(dBµV)	(ubµv)	(dB/m)	(dBµV/m)	(dBµV/m)	,		()
4874	Н	48.15		0.97	49.12		74	54	-4.88
7311	С H	40.17		9.83	50.00	2^{+}	74	54	-4.00
	Н								
4874	V	47.32		0.97	48.29		74	54	-5.71
7311	V	40.58		9.83	50.41		74	54	-3.59
	V								
		S	4		\supset	Į		ļļ	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
			F	ligh channe	el: 2462 MH	7			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction		n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4924	Н	47.76	K	1.18	48.94		74	54	-5.06

	H		 		 		
4924	V	46.57	 1.18	47.75	 74	54	-6.25
7386	V	40.20	 10.07	50.27	 74	54	-3.73
	V		 				

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-3.99

Note:

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1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss - Pre-amplifier

2. Margin (dB) = Emission Level (Peak) (dBµV/m)-Average limit (dBµV/m)

39.94

3. The emission levels of other frequencies are very lower than the limit and not show in test report.

10.07

4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.

5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

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			Modu	lation Type	: 802.11n (l	HT20)			
			L	ow channe	I: 2412 MH	Z			
Frequen (MHz)	cy Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4824	Н	47.45		1.33	48.78		74	54	-5.22
7236	Н	37.81		10.22	48.03		74	54	-5.97
	H		7- 4			×			
	(\mathcal{G})		60)	($\langle \mathbf{G} \rangle$			
4824	V	45.4		1.33	46.73		74	54	-7.27
7236	V	36.09		10.22	46.31		74	54	-7.69
	V								
74						-			(

		(G)	M	liddle chann	nel: 2437MF	Ηz	(G)		
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4874	Н	45.47		0.99	46.46		74	54	-7.54
7311	н	39.61		9.85	49.46		74	54	-4.54
/	Ч		<u>k</u>					<u>k</u>)
4874	V	45.13		0.99	46.12		74	54	-7.88
7311	V	37.74		9.85	47.59		74	54	-6.41
	V			((

			F	ligh channe	el: 2462 MH	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4924	H	40.17		1.33	41.5		74	54	-12.5
7386	Н	35.75	<u> </u>	10.22	45.97	-	74	54	-8.03
	H)			
4924	V	39.81		1.33	41.14		74	54	-12.86
7386	V	36.4		10.22	46.62		74	54	-7.38
/	V	KH.		X	//				'X'

Note:

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1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss - Pre-amplifier

2. Margin (dB) = Emission Level (Peak) (dBµV/m)-Average limit (dBµV/m)

3. The emission levels of other frequencies are very lower than the limit and not show in test report.

4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.

5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

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74			Modu	lation Type	: 802.11n (H	HT40)			
			L	.ow channe	l: 2422 MH	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4844	Н	45.97		0.66	46.63		74	54	-7.37
7266	Ŧ	38.52		9.5	48.02		74	54	-5.98
	C T		<u>K</u> O.					LO	
4824	V	44.56		0.66	45.22		74	54	-8.78
7236	V	35.6		9.5	45.1		74	54	-8.9
x	V								/
51)		$(2G^{*})$			5)		(2G)		
			Μ	iddle chanr	nel: 2437MF	lz			0
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4874	H	42.95		0.99	43.94		74	54	-10.06
7311	K H	34.61	× ·	9.85	44.46	C	74	54	-9.54
	Н					<u> </u>			
4874	V	43.7		0.99	44.69		74	54	-9.31

	-					1			
									1
High channel: 2452 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissio Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)		Margin (dB)
4904	н	45.18		1.33	46.51		74	54	-7.49
7356	Н	36.29		10.22	46.51		74	54	-7.49
	Н								
		<u></u>			-1.				
4904	V	43.5		1.33	44.83		74	54	-9.17
7356	V	36.81		10.22	47.03		74	54	-6.97
	V						<u> </u>		

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9.85

Note:

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1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss - Pre-amplifier

2. Margin (dB) = Emission Level (Peak) (dBµV/m)-Average limit (dBµV/m)

37.35

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3. The emission levels of other frequencies are very lower than the limit and not show in test report.

4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.

5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

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