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9. Restricted Band of Operation

9.1 Measurement procedure
[FCC 15.247(d), 15,205, 15.209, KDB 558074 D01 v04, Section 12.0]

Test was applied by following conditions.

Test method	:	ANSI C63.10
Test place	:	3m Semi-anechoic chamber
EUT was placed on	:	Styrofoam table / (W)1.0m × (D)1.0m × (H)0.8m (below 1GHz) Styrofoam table / (W)0.6m × (D)0.6m ×(H)1.5m (above 1GHz)
Antenna distance	:	3m
Spectrum analyzer setting		
- Peak	:	RBW=1MHz, VBW=3MHz, Span=Arbitrary setting, Sweep=auto
- Average	:	RBW=1MHz, VBW=10Hz, Span=Arbitrary setting, Sweep=auto Display mode=Linear

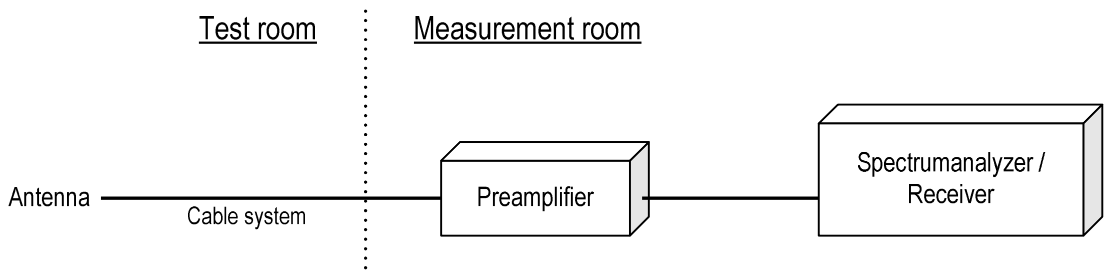
Average Measurement Setting [VBW]

Mode	Duty Cycle (%)	T_{on} (us)	T_{off} (us)	Determined VBW Setting
IEEE802.11b	99.03	1022	10	10Hz (Duty Cycle ≧ 98%)
IEEE802.11g	99.13	1360	12	10Hz (Duty Cycle ≧ 98%)
IEEE802.11n(HT20)	99.38	1276	8	10Hz (Duty Cycle ≧ 98%)

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

Radiated emission measurements are performed at 3m distance with the broadband antenna (Double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1m to 4m and stopped at height producing the maximum emission.
The EUT is Placed on a turntable, which is 0.8m/1.5m above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. The test results represent the worst case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation. Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

- Test configuration



9.2 Limit

Emission at the boundary of the restricted band provided by 15.205 shall be lower than 15.209 limit.

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9.3 Measurement Result

[IEEE802.11b、IEEE802.11g、IEEE802.11n (HT20)]

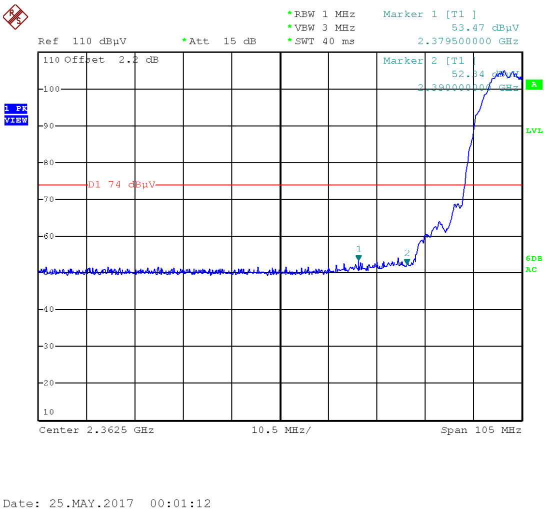
Channel	Frequency [MHz]	Results Chart	Result
Low	2412	See the Trace Data	Pass
High	2462	See the Trace Data	Pass

9.4 Test data

Date	:	May 25, 2017			
Temperature	:	22.9 [˚C]			
Humidity	:	49.8 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Tadahiro Seino

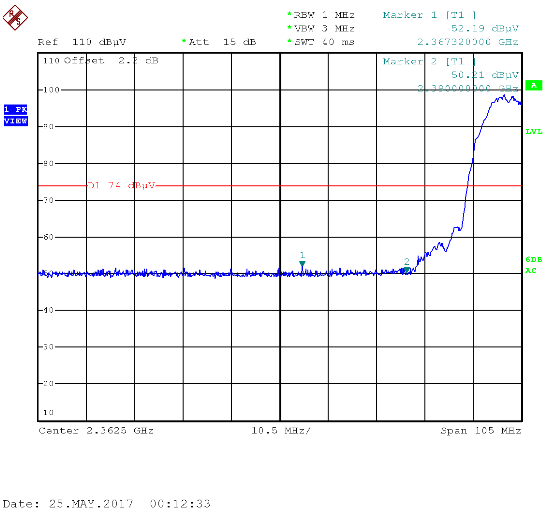
[IEEE802.11b]

Channel Low
Horizontal
Peak



Average

Vertical
Peak



Average

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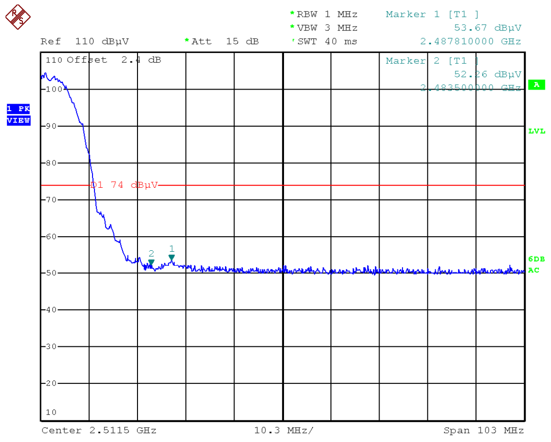
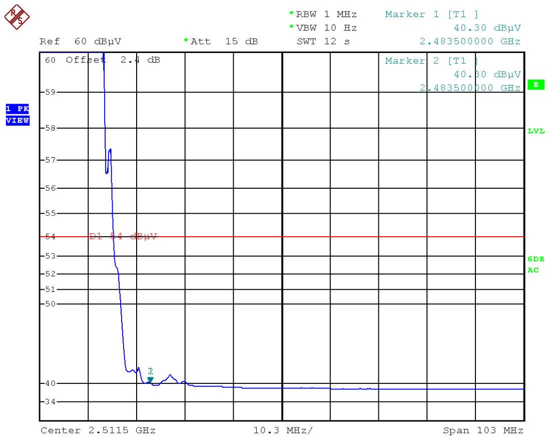
Channel High
Horizontal
Peak



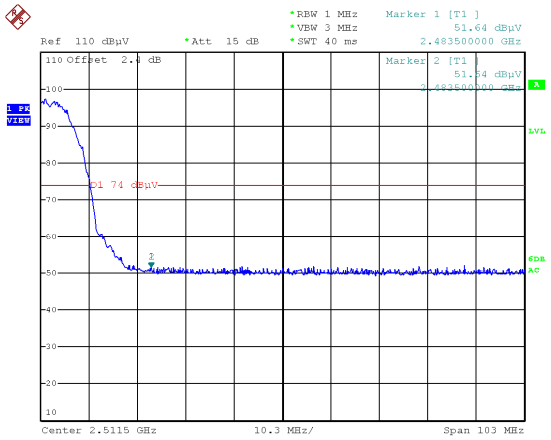
Date: 25.MAY.2017 00:33:36

Average



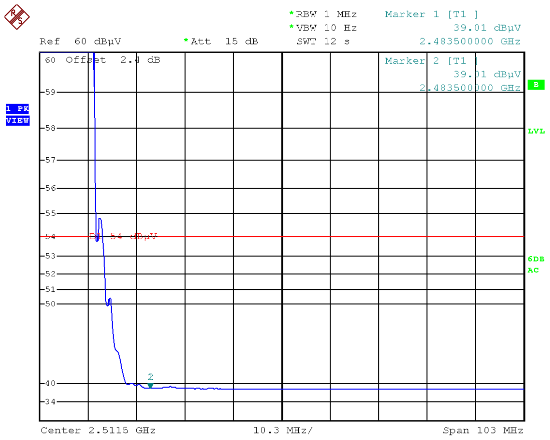
Date: 25.MAY.2017 00:34:17

Vertical
Peak



Date: 25.MAY.2017 00:37:50

Average



Date: 25.MAY.2017 00:38:30

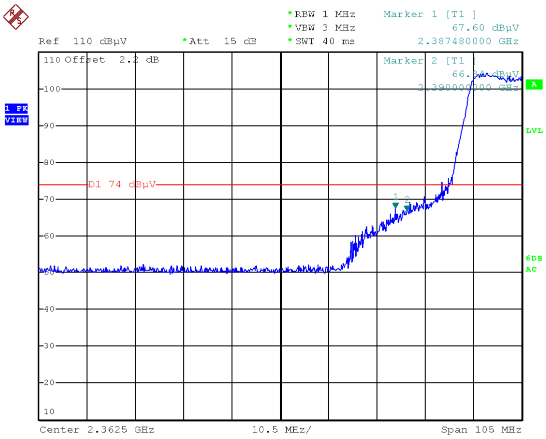
TÜV SÜD Zacta

[IEEE802.11g]

Channel Low

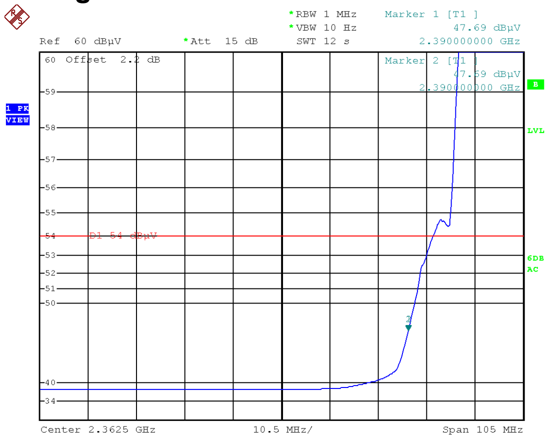
Horizontal

Peak



Date: 25.MAY.2017 01:25:32

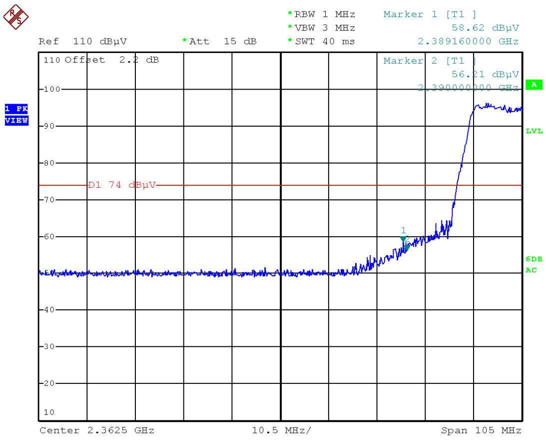
Average



Date: 25.MAY.2017 01:26:07

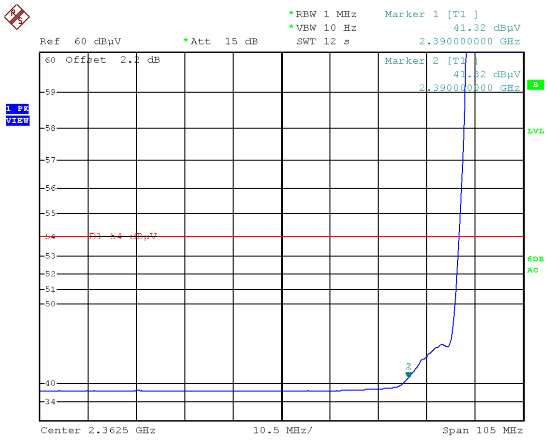
Vertical

Peak



Date: 25.MAY.2017 01:29:53

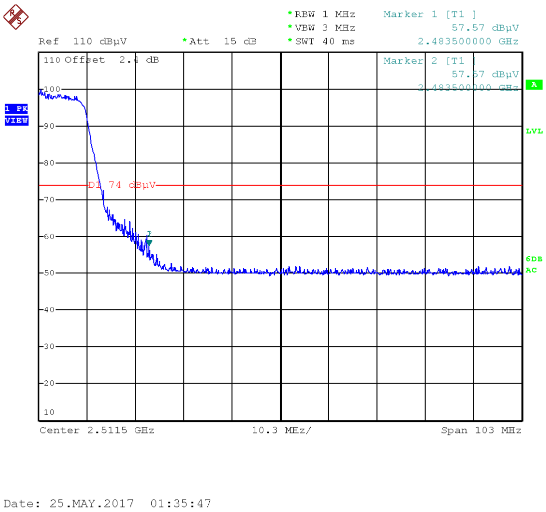
Average



Date: 25.MAY.2017 01:30:30

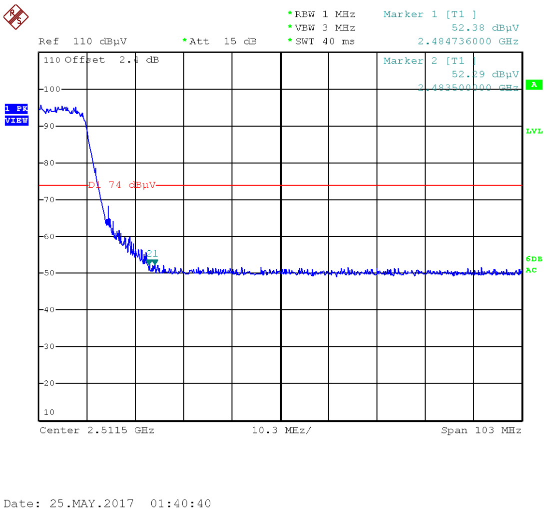
Zacta

Channel High
Horizontal
Peak



Average

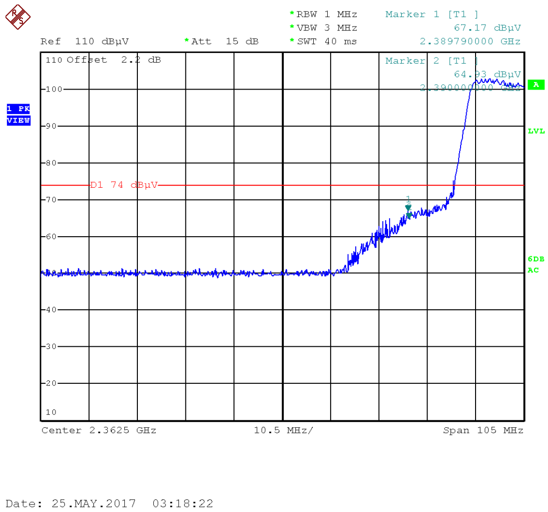
Vertical
Peak



Average

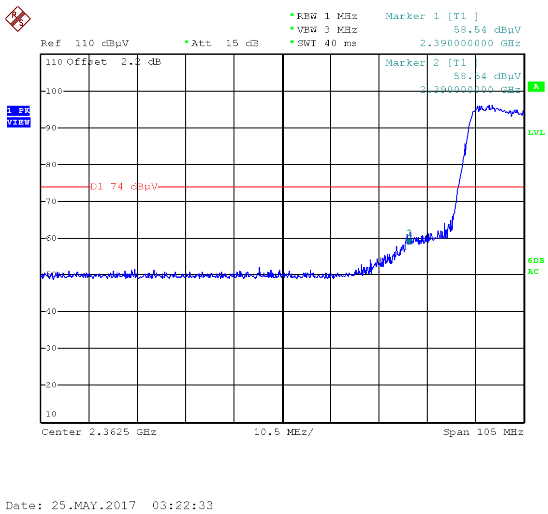
[IEEE802.11n (HT20)]

Channel Low
Horizontal
Peak



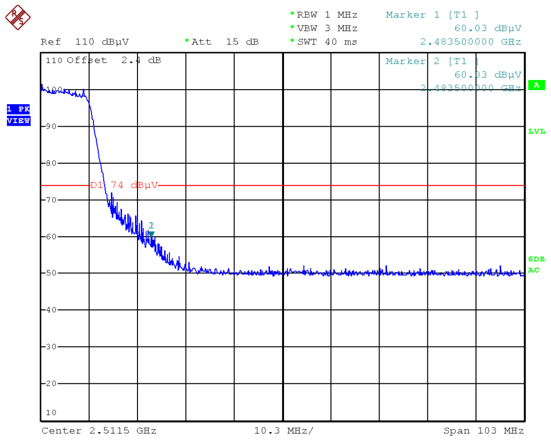
Average

Vertical
Peak



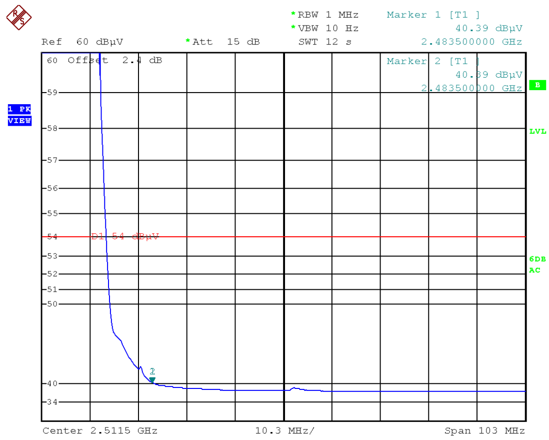
Average

Channel High
Horizontal
Peak



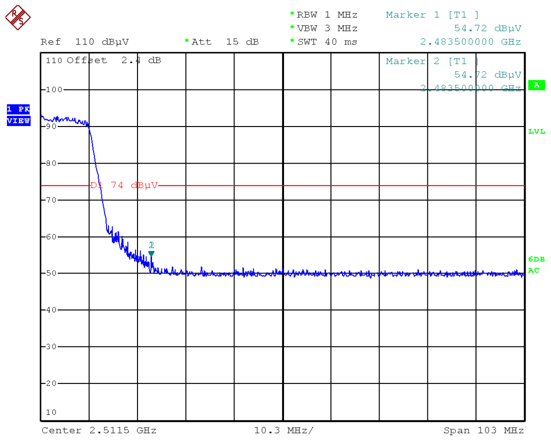
Date: 25.MAY.2017 03:29:35

Average



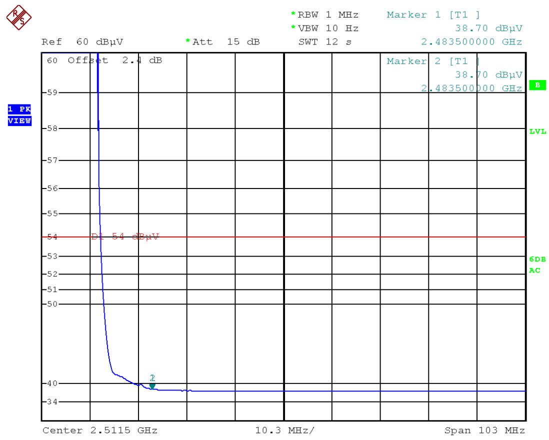
Date: 25.MAY.2017 03:51:36

Vertical
Peak



Date: 25.MAY.2017 03:54:35

Average



Date: 25.MAY.2017 03:55:05

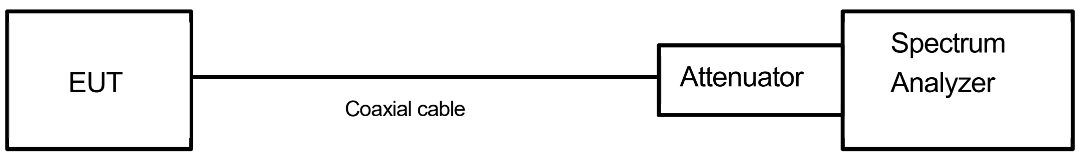
10. Transmitter Power Spectral Density

10.1 Measurement procedure
[FCC 15.247(e), KDB 558074 D01 v04, Section 10.2]

The peak power is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;
a) Span = 1.5 times the 6 dB bandwidth.
b) RBW = 3kHz - 100kHz.
c) VBW ≥ 3 x RBW.
d) Sweep time = auto-couple.
e) Detector = peak.
f) Trace mode = max hold.

- Test configuration



10.2 Limit

The peak power spectral density shall not be greater than 8dBm in any 3kHz band.

10.3 Measurement result

Date	:	June 8, 2017			
Temperature	:	23.5 [˚C]			
Humidity	:	53.6 [%]	Test engineer	:	
Test place	:	Shielded room No.4			Tadahiro Seino

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[IEEE802.11b]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dBm)	Result
Low	2412	-17.43	10.52	-6.91	8.00	14.91	PASS
Middle	2437	-16.67	10.52	-6.15	8.00	14.15	PASS
High	2462	-16.91	10.52	-6.39	8.00	14.39	PASS

Calculation;
Transmitter Power Spectral Density Level (Margin) = Limit – (Reading + Factor)

[IEEE802.11g]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dBm)	Result
Low	2412	-23.16	10.52	-12.64	8.00	20.64	PASS
Middle	2437	-23.36	10.52	-12.84	8.00	20.84	PASS
High	2462	-22.70	10.52	-12.18	8.00	20.18	PASS

Calculation;
Transmitter Power Spectral Density Level (Margin) = Limit – (Reading + Factor)

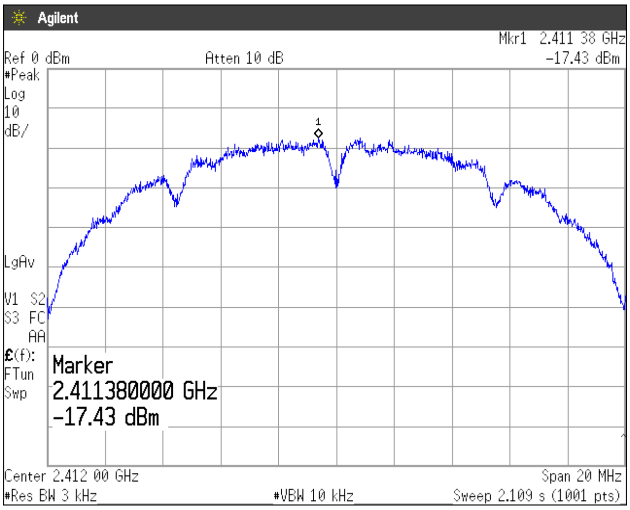
[IEEE802.11n (HT20)]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dBm)	Result
Low	2412	-23.55	10.52	-13.03	8.00	21.03	PASS
Middle	2437	-22.78	10.52	-12.26	8.00	20.26	PASS
High	2462	-22.59	10.52	-12.07	8.00	20.07	PASS

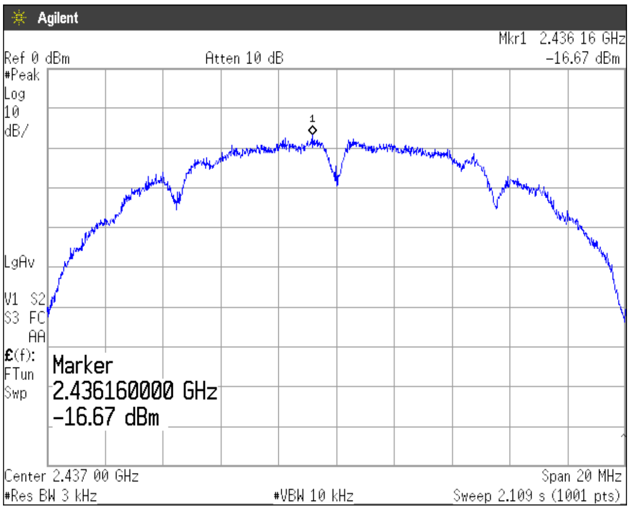
Calculation;
Transmitter Power Spectral Density Level (Margin) = Limit – (Reading + Factor)

10.4 Trace data
[IEEE802.11b]

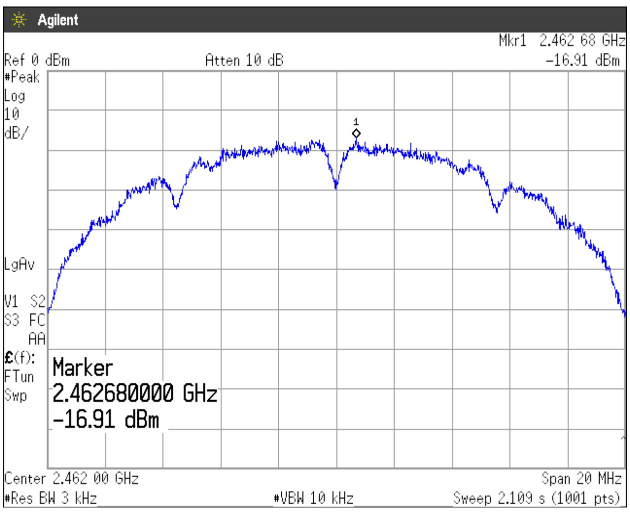
Channel Low



Channel Middle



Channel High



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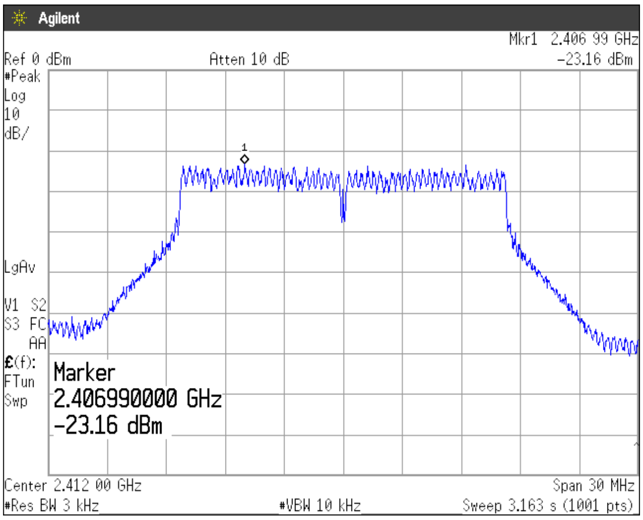
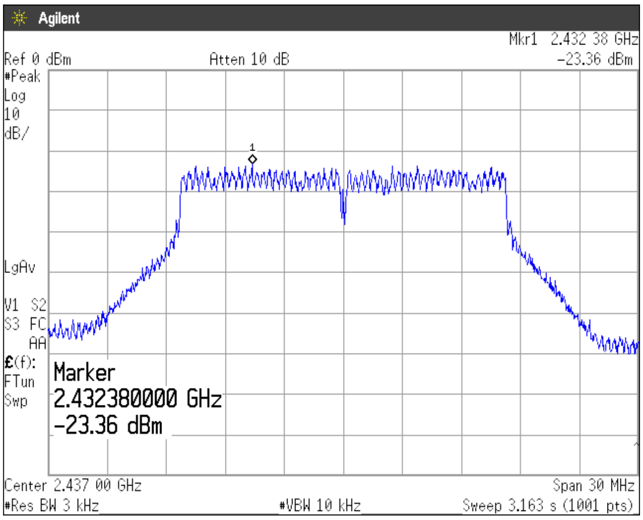
[IEEE802.11g]

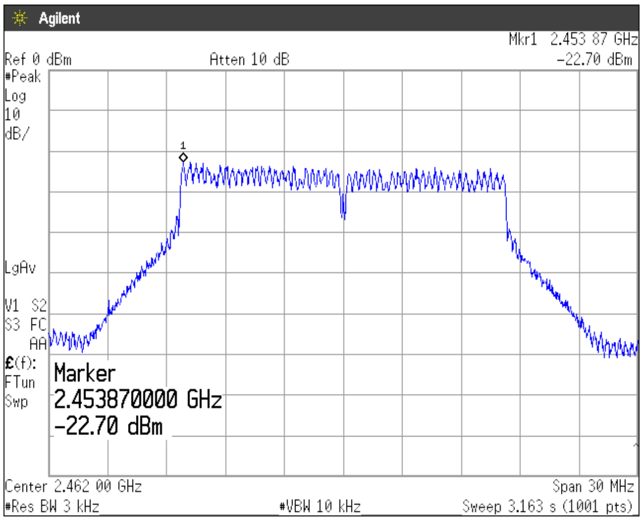
Channel Low



Channel Middle



Channel High



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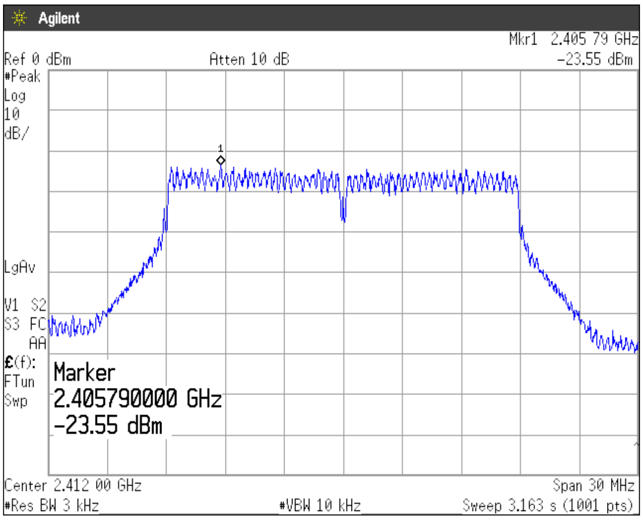
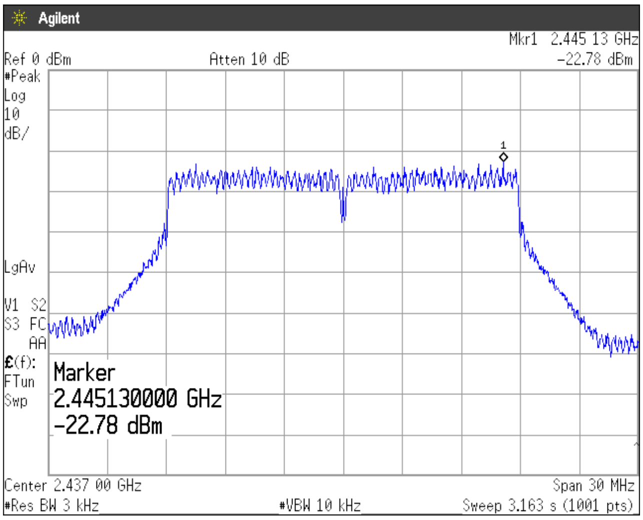
[IEEE802.11n (HT20)]

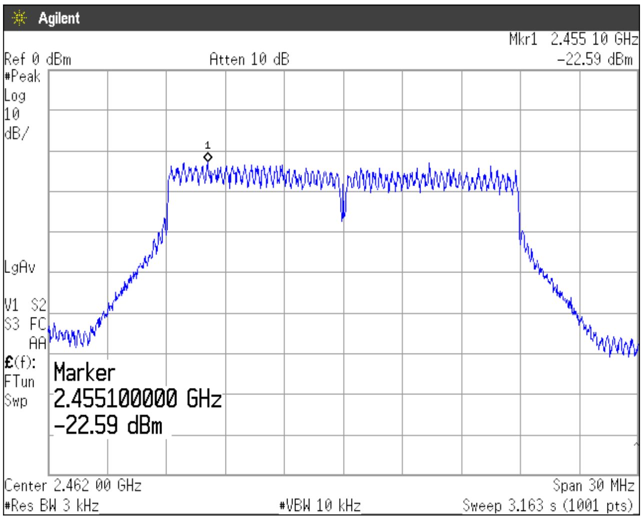
Channel Low



Channel Middle



Channel High



11. AC Power Line Conducted Emissions

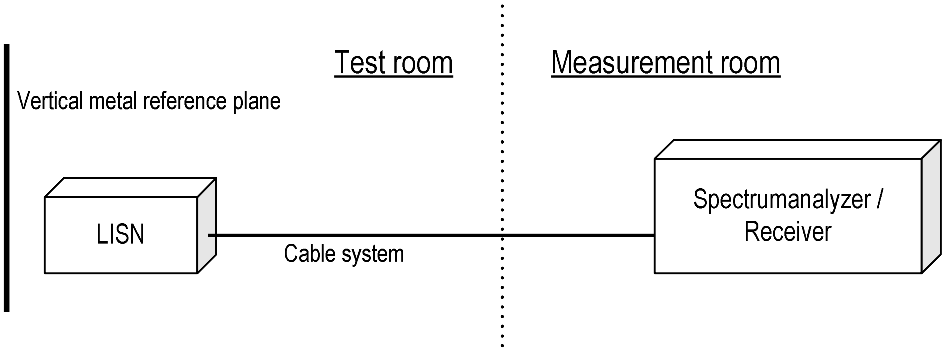
11.1 Measurement procedure
[FCC 15.207]

Test was applied by following conditions.

Test method	:	ANSI C63.10
Frequency range	:	0.15MHz to 30MHz
Test place	:	3m Semi-anechoic chamber
EUT was placed on	:	FRP table / (W)2.0m × (D)1.0m × (H)0.8m
Vertical Metal Reference Plane	:	(W)2.0m × (H)2.0m 0.4m away from EUT
Test receiver setting		
- Detector	:	Quasi-peak, Average
- Bandwidth	:	9kHz

EUT and peripherals are connected to 50Ω/50μH Line Impedance Stabilization Network (LISN) which are connected to reference ground plane, and are placed 80cm away from EUT. Excess of AC power cable is bundled in center.
LISN for peripheral is terminated in 50Ω.
EUT operating mode is selected to emit the maximum noise. Overall frequency range is investigated with spectrum analyzer using peak detector. Maximum emission configuration is determined by manipulating the EUT, peripherals, interconnecting cables. Then, emission measurements are performed with test receiver in above setting to each current-carrying conductor of the mains port. Sufficient time for EUT, peripherals and test equipment is provided in order for them to warm up to their normal operating condition. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits.

- Test configuration



11.2 Calculation method

Emission level = Reading + (LISN. factor + Cable system loss)
Margin = Limit – Emission level

Example:
Limit @ 0.403MHz : 57.8dBμV(Quasi-peak)
: 47.8dBμV(Average)
(Quasi peak) Reading = 22.7dBμV c.f = 10.4dB
Emission level = 22.7 + 10.4 = 33.1dBμV
Margin = 57.8 – 33.1 = 24.7dB
(Average) Reading = 6.5dBμV c.f = 10.4dB
Emission level = 6.5 + 10.4 = 16.9dBμV
Margin = 47.8 – 16.9 = 30.9dB

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11.3 Limit

Frequency [MHz]	Limit	
	QP [dBuV]	AV [dBuV]
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

*: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

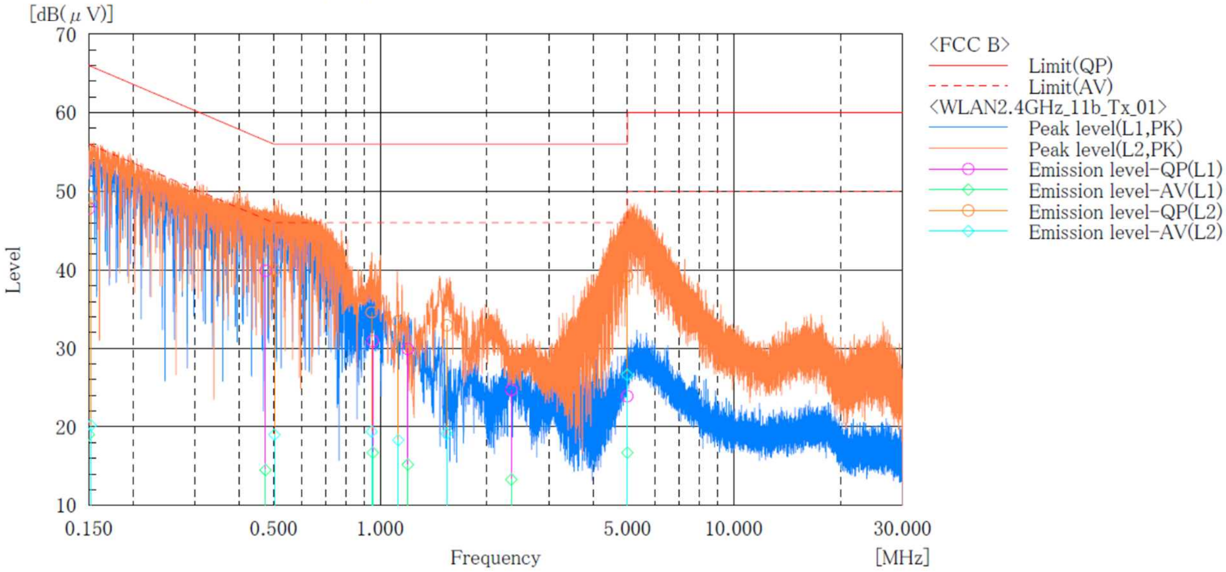
11.4 Test data

***** CONDUCTED EMISSION at MAINS PORT *****
[3m Semi-anechoic chamber]

TUV SUD Zacta Ltd. <<Data Sheet No.01>> 12 June,2017 10:55

Company Name : KTOCERA Corporation
EUT : Mobile Phone
Model No. : EA05
Serial No. : N/A
Test mode : 2.4GHz_WLAN_11b_Tx

Standard : FCC Part.15 Subpart C
Operator : H.Shibata
Temp,Hum,Atm : 19.5[℃] 50.4[%]
Note1 :
Note2 :



Final Result

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.150	37.3	8.5	10.5	47.8	19.0	66.0	56.0	18.2	37.0
2	0.474	29.5	4.1	10.4	39.9	14.5	56.4	46.4	16.5	31.9
3	0.953	20.5	6.3	10.4	30.9	16.7	56.0	46.0	25.1	29.3
4	1.197	19.5	4.8	10.4	29.9	15.2	56.0	46.0	26.1	30.8
5	2.348	14.2	2.8	10.5	24.7	13.3	56.0	46.0	31.3	32.7
6	4.996	13.2	6.0	10.7	23.9	16.7	56.0	46.0	32.1	29.3

--- L2 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.152	38.7	9.7	10.5	49.2	20.2	65.9	55.9	16.7	35.7
2	0.502	29.6	8.6	10.4	40.0	19.0	56.0	46.0	16.0	27.0
3	0.946	24.2	9.0	10.4	34.6	19.4	56.0	46.0	21.4	26.6
4	1.124	23.0	7.9	10.4	33.4	18.3	56.0	46.0	22.6	27.7
5	1.542	22.5	8.7	10.4	32.9	19.1	56.0	46.0	23.1	26.9
6	4.990	28.5	15.9	10.7	39.2	26.6	56.0	46.0	16.8	19.4

12. Antenna requirement

According to FCC section 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 antenna is a special antenna mounted inside of the EUT. Therefore, the EUT complies with the antenna requirement of FCC section 15.203.

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13. Uncertainty of measurement

Expanded uncertainties stated are calculated with a coverage Factor k=2.
Please note that these results are not taken into account when measurement uncertainty considerations contained in ETSI TR 100 028-0011 determining compliance or non-compliance with test result.

Test item	Measurement uncertainty
Conducted emission at mains port	±3.0dB
Radiated emission (9kHz – 30MHz)	±4.4dB
Radiated emission (30MHz – 1000MHz)	±4.5dB
Radiated emission (1000MHz – 26GHz)	±3.9dB

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14. Laboratory Information

1. Location

Name: Yonezawa Testing Center
Address: 5-4149-7, Hachimanpara, Yonezawa-shi, Yamagata, 992-1128 Japan
Phone: +81-238-28-2881
Fax: +81-238-28-2888

2. Accreditation and Registration

1) NVLAP
LAB CODE: 200306-0

2) VLAC
Accreditation No.: VLAC-013

3) BSMI
Laboratory Code: SL2-IN-E-6018, SL2-A1-E-6018

4) Industry Canada

Site number	Facility	Expiration date
4224A-4	3m Semi-anechoic chamber	2017-12-03
4224A-5	10m Semi-anechoic chamber No.1	2017-12-03
4224A-6	10m Semi-anechoic chamber No.2	2019-12-14

5) VCCI Council

Registration number	Expiration date
A-0166	2017-07-03

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Appendix A. Test equipment

Antenna port conducted test

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
Spectrum analyzer	Agilent Technologies	E4440A	US40420937	Jul. 31, 2017	Jul. 15, 2016
Microwave cable	RS	YH-13S5	N/A(S403)	May 31, 2018	May 24, 2017
Attenuator	Weinschel	56-10	J4993	Nov. 30, 2017	Nov. 1, 2016
Power meter	ROHDE&SCHWARZ	NRP2	103269	Jun. 30, 2017	Jun. 27, 2016
Power sensor	ROHDE&SCHWARZ	NRP-Z81	102467	Jun. 30, 2017	Jun. 27, 2016

Radiated emission

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ESCI	100764	Aug. 31, 2017	Aug. 19, 2016
Spectrum analyzer	Agilent Technologies	E4440A	US40420937	Jul. 31, 2017	Jul. 15, 2016
Preamplifier	ANRITSU	MH648A	M96057	Feb. 28, 2018	Feb. 1, 2017
Loop antenna	ROHDE&SCHWARZ	HFH2-Z2	892246/010	Feb. 28, 2018	Feb. 17, 2017
Attenuator	TDC	TAT-43B-06	N/A(S209)	May 31, 2018	May 23, 2017
Biconical antenna	Schwarzbeck	VHA9103/BBA9106	2155	Jun. 30, 2017	Jun. 2, 2016
Log periodic antenna	Schwarzbeck	UHALP9108A	0560	Jun. 30, 2017	Jun. 2, 2016
Attenuator	TME	CFA-01NPJ-6	N/A(S275)	Feb. 28, 2018	Feb. 3, 2017
Attenuator	TME	CFA-01NPJ-3	N/A(S272)	Feb. 28, 2018	Feb. 2, 2017
Preamplifier	TSJ	MLA-100M18-B02-40	1929118	Feb. 28, 2018	Feb. 3, 2017
Attenuator	AEROFLEX	26A-10	081217-08	May 31, 2018	May 24, 2017
Double ridged guide antenna	EMCO	3115	5205	Mar. 31, 2018	Mar. 15, 2017
Double ridged guide antenna	ETS LINDGREN	3117	00052315	Feb. 28, 2018	Feb. 23, 2017
Attenuator	Agilent Technologies	8491B	MY39268633	Feb. 28, 2018	Feb. 2, 2017
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170189	Jun. 30, 2017	Jun. 16, 2016
Preamplifier	TSJ	MLA-1840-B03-35	1240332	Jun. 30, 2017	Jun. 16, 2016
Notch filter	Micro-Tronics	BRM50702	045	Apr. 30, 2017	Apr. 8, 2016
Microwave cable	SUHNER	SUCOFLEX104/9m	MY30037/4	Feb. 28, 2018	Feb. 3, 2017
		SUCOFLEX104/1m	my24610/4	Feb. 28, 2018	Feb. 3, 2017
		SUCOFLEX104/8m	SN MY30031/4	Feb. 28, 2018	Feb. 2, 2017
		SUCOFLEX104	MY32976/4	Dec. 31, 2017	Dec. 2, 2016
		SUCOFLEX104/1.5m	SN MY19309/4	Feb. 28, 2018	Feb. 3, 2017
		SUCOFLEX104/7m	41625/6	Feb. 28, 2018	Feb. 3, 2017
PC	DELL	DIMENSION E521	75465BX	N/A	N/A
Software	TOYO Corporation	EP5/RE-AJ	0611193/V5.6.0	N/A	N/A
Absorber	RIKEN	PFP30	N/A	N/A	N/A
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-NSA)	May 31, 2017	May 11, 2016
				May 31, 2018	May 30, 2017
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-SVSWR)	May 31, 2017	May 12, 2016
				May 31, 2018	May 31, 2017

Conducted emission at mains port

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ESCI	100764	Aug. 31, 2017	Aug. 19, 2016
Attenuator	HUBER+SUHNER	6810.01.A	N/A (S411)	Feb. 28, 2018	Feb. 2, 2017
Line impedance stabilization network for EUT	Kyoritsu Electrical Works, Ltd.	KNW-407F2	12-17-110-2	Apr. 30, 2018	Apr. 25, 2017
Coaxial cable	FUJIKURA	5D-2W/4m	N/A (S350)	Feb. 28, 2018	Feb. 2, 2017
Coaxial cable	FUJIKURA	5D-2W/1m	N/A (S193)	Feb. 28, 2018	Feb. 3, 2017
Coaxial cable	SUHNER	RG214/U/10m	N/A (S194)	Feb. 28, 2018	Feb. 3, 2017
PC	DELL	DIMENSION	75465BX	N/A	N/A
Software	TOYO Corporation	EP5/CE-AJ	0611193/V5.4.11	N/A	N/A

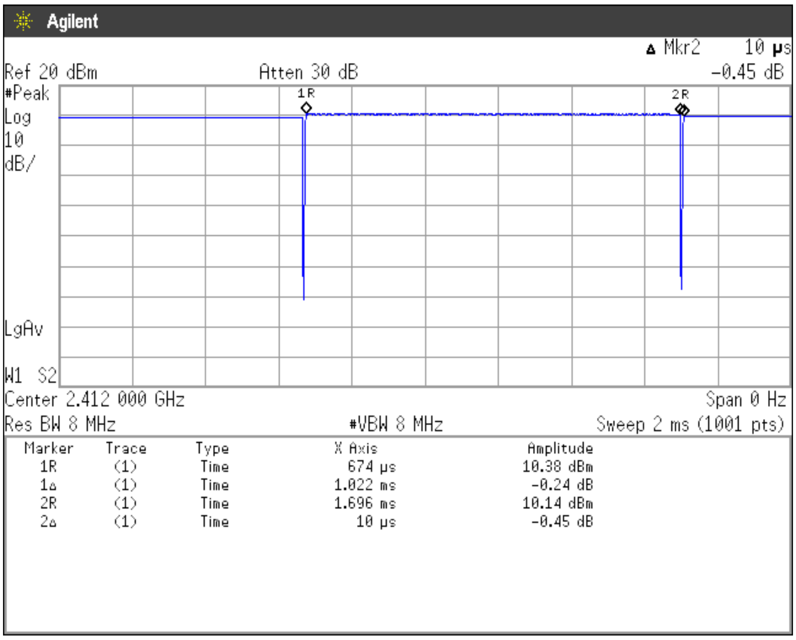
*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.

Zacta

Appendix B. Duty Cycle

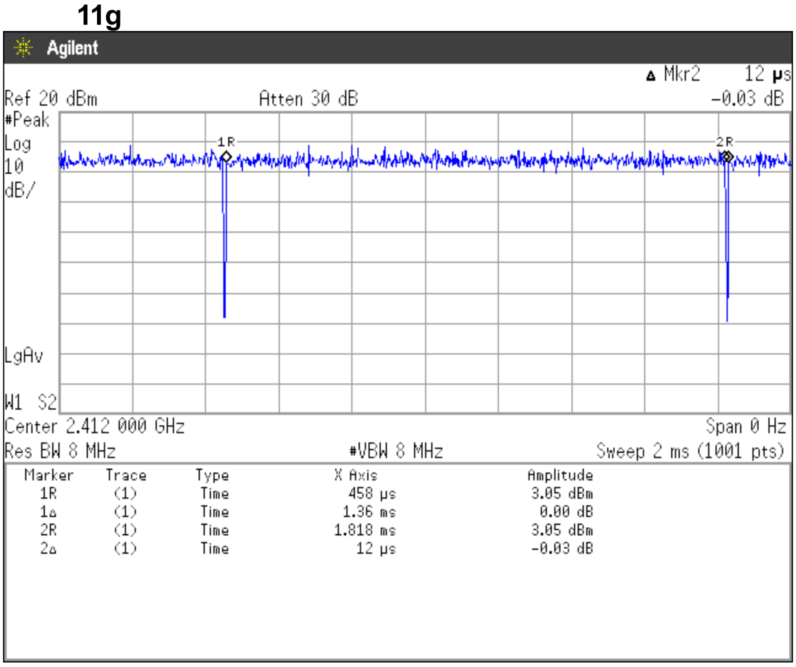
[Plot & Calculation]

11b



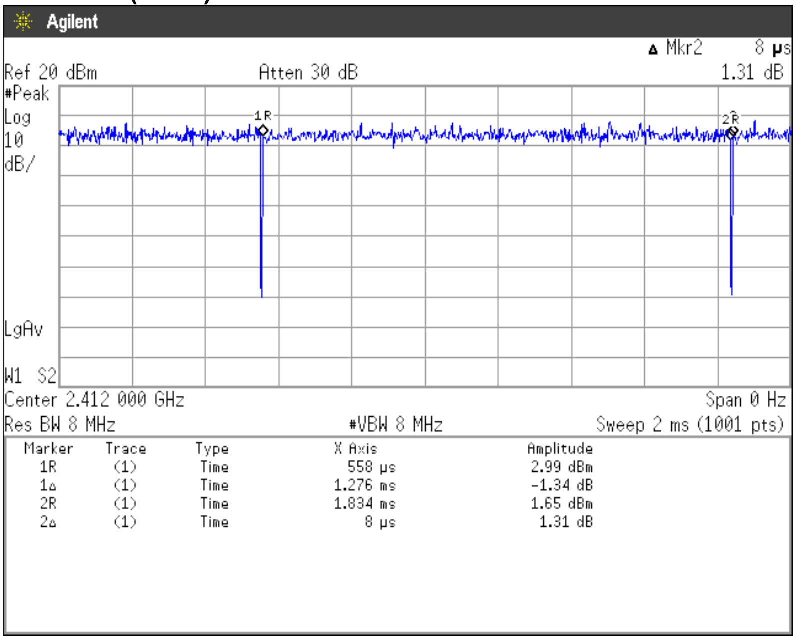
Duty Cycle = Ton / (Ton + Toff) = 1022[μs] / (1022[μs] + 10[μs]) =99.03[%]

11g



Duty Cycle = Ton / (Ton + Toff) = 1360[μs] / (1360[μs] + 12[μs]) =99.13[%]

11n (HT20)



Duty Cycle = Ton / (Ton + Toff) = 1276[μs] / (1276[μs] + 8[μs]) =99.38[%]