

10.4 Test Results

<Chip Antenna (FR05-S1-N-0-102) with 1.8V_{dc}>

Mode	CH	Freq. (MHz)	Peak Output Power		Ant Gain (dBi)	EIRP Peak Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
IEEE 802.11b	Low	2412	14.59	0.0288	1.70	16.29	0.0426	30	36
	Middle	2437	16.48	0.0445	1.70	18.18	0.0658	30	36
	High	2462	15.13	0.0326	1.70	16.83	0.0482	30	36
IEEE 802.11g	Low	2412	10.96	0.0125	1.70	12.66	0.0185	30	36
	Middle	2437	16.88	0.0488	1.70	18.58	0.0721	30	36
	High	2462	12.62	0.0183	1.70	14.32	0.0270	30	36
IEEE 802.11n HT20	Low	2412	9.86	0.0097	1.70	11.56	0.0143	30	36
	Middle	2437	16.91	0.0491	1.70	18.61	0.0726	30	36
	High	2462	11.35	0.0136	1.70	13.05	0.0202	30	36
IEEE 802.11n HT40	Low	2422	6.96	0.0050	1.70	8.66	0.0073	30	36
	Middle	2437	10.97	0.0125	1.70	12.67	0.0185	30	36
	High	2452	10.03	0.0101	1.70	11.73	0.0149	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm

Mode	CH	Freq. (MHz)	Average Output Power		Ant Gain (dBi)	EIRP Average Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
IEEE 802.11b	Low	2412	13.06	0.0202	1.70	14.76	0.0299	30	36
	Middle	2437	15.26	0.0336	1.70	16.96	0.0497	30	36
	High	2462	13.77	0.0238	1.70	15.47	0.0352	30	36
IEEE 802.11g	Low	2412	8.01	0.0063	1.70	9.71	0.0094	30	36
	Middle	2437	15.18	0.0330	1.70	16.88	0.0488	30	36
	High	2462	9.73	0.0094	1.70	11.43	0.0139	30	36
IEEE 802.11n HT20	Low	2412	6.67	0.0046	1.70	8.37	0.0069	30	36
	Middle	2437	15.21	0.0332	1.70	16.91	0.0491	30	36
	High	2462	8.46	0.0070	1.70	10.16	0.0104	30	36
IEEE 802.11n HT40	Low	2422	3.67	0.0023	1.70	5.37	0.0034	30	36
	Middle	2437	8.01	0.0063	1.70	9.71	0.0094	30	36
	High	2452	7.11	0.0051	1.70	8.81	0.0076	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm; Note2: Duty Cycle is 100% and Duty Factor is 0 dB.

<Chip Antenna (FR05-S1-N-0-102) with 3.3V_{dc}>

Mode	CH	Freq. (MHz)	Peak Output Power		Ant Gain (dBi)	EIRP Peak Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
IEEE 802.11b	Low	2412	18.55	0.0716	1.70	20.25	0.1059	30	36
	Middle	2437	18.56	0.0718	1.70	20.26	0.1062	30	36
	High	2462	18.13	0.0650	1.70	19.83	0.0962	30	36
IEEE 802.11g	Low	2412	15.64	0.0366	1.70	17.34	0.0542	30	36
	Middle	2437	21.75	0.1496	1.70	23.45	0.2213	30	36
	High	2462	17.31	0.0538	1.70	19.01	0.0796	30	36
IEEE 802.11n HT20	Low	2412	13.69	0.0234	1.70	15.39	0.0346	30	36
	Middle	2437	21.93	0.1560	1.70	23.63	0.2307	30	36
	High	2462	16.97	0.0498	1.70	18.67	0.0736	30	36
IEEE 802.11n HT40	Low	2422	10.61	0.0115	1.70	12.31	0.0170	30	36
	Middle	2437	15.18	0.0330	1.70	16.88	0.0488	30	36
	High	2452	14.75	0.0299	1.70	16.45	0.0442	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm

Mode	CH	Freq. (MHz)	Average Output Power		Ant Gain (dBi)	EIRP Average Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
IEEE 802.11b	Low	2412	16.98	0.0499	1.70	18.68	0.0738	30	36
	Middle	2437	17.02	0.0504	1.70	18.72	0.0745	30	36
	High	2462	16.58	0.0455	1.70	18.28	0.0673	30	36
IEEE 802.11g	Low	2412	12.23	0.0167	1.70	13.93	0.0247	30	36
	Middle	2437	19.38	0.0867	1.70	21.08	0.1282	30	36
	High	2462	14.09	0.0256	1.70	15.79	0.0379	30	36
IEEE 802.11n HT20	Low	2412	10.36	0.0109	1.70	12.06	0.0161	30	36
	Middle	2437	19.53	0.0897	1.70	21.23	0.1327	30	36
	High	2462	13.57	0.0228	1.70	15.27	0.0337	30	36
IEEE 802.11n HT40	Low	2422	7.18	0.0052	1.70	8.88	0.0077	30	36
	Middle	2437	11.35	0.0136	1.70	13.05	0.0202	30	36
	High	2452	11.49	0.0141	1.70	13.19	0.0208	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm; Note2: Duty Cycle is 100% and Duty Factor is 0 dB.

< Dipole Antenna (GW.34.5153) with 1.8V_{dc}>

Mode	CH	Freq. (MHz)	Peak Output Power		Ant Gain (dBi)	EIRP Peak Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
IEEE 802.11b	Low	2412	15.98	0.0396	5.89	21.87	0.1538	30	36
	Middle	2437	16.85	0.0484	5.89	22.74	0.1879	30	36
	High	2462	14.95	0.0313	5.89	20.84	0.1213	30	36
IEEE 802.11g	Low	2412	14.94	0.0312	5.89	20.83	0.1211	30	36
	Middle	2437	17.74	0.0594	5.89	23.63	0.2307	30	36
	High	2462	14.85	0.0305	5.89	20.74	0.1186	30	36
IEEE 802.11n HT20	Low	2412	12.64	0.0184	5.89	18.53	0.0713	30	36
	Middle	2437	17.79	0.0601	5.89	23.68	0.2333	30	36
	High	2462	13.83	0.0242	5.89	19.72	0.0938	30	36
IEEE 802.11n HT40	Low	2422	10.16	0.0104	5.89	16.05	0.0403	30	36
	Middle	2437	13.93	0.0247	5.89	19.82	0.0959	30	36
	High	2452	12.93	0.0196	5.89	18.82	0.0762	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm

Mode	CH	Freq. (MHz)	Average Output Power		Ant Gain (dBi)	EIRP Average Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
IEEE 802.11b	Low	2412	14.34	0.0272	5.89	20.23	0.1054	30	36
	Middle	2437	15.49	0.0354	5.89	21.38	0.1374	30	36
	High	2462	13.25	0.0211	5.89	19.14	0.0820	30	36
IEEE 802.11g	Low	2412	9.88	0.0097	5.89	15.77	0.0378	30	36
	Middle	2437	15.31	0.0340	5.89	21.20	0.1318	30	36
	High	2462	10.01	0.0100	5.89	15.90	0.0389	30	36
IEEE 802.11n HT20	Low	2412	7.19	0.0052	5.89	13.08	0.0203	30	36
	Middle	2437	15.42	0.0348	5.89	21.31	0.1352	30	36
	High	2462	8.87	0.0077	5.89	14.76	0.0299	30	36
IEEE 802.11n HT40	Low	2422	4.16	0.0026	5.89	10.05	0.0101	30	36
	Middle	2437	8.45	0.0070	5.89	14.34	0.0272	30	36
	High	2452	7.55	0.0057	5.89	13.44	0.0221	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm; Note2: Duty Cycle is 100% and Duty Factor is 0 dB.

< Dipole Antenna (GW.34.5153) with 3.3V_{dc}>

Mode	CH	Freq. (MHz)	Peak Output Power		Ant Gain (dBi)	EIRP Peak Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
IEEE 802.11b	Low	2412	18.55	0.0716	5.89	24.44	0.2780	30	36
	Middle	2437	18.56	0.0718	5.89	24.45	0.2786	30	36
	High	2462	18.13	0.0650	5.89	24.02	0.2523	30	36
IEEE 802.11g	Low	2412	15.64	0.0366	5.89	21.53	0.1422	30	36
	Middle	2437	21.75	0.1496	5.89	27.64	0.5808	30	36
	High	2462	19.26	0.0843	5.89	25.15	0.3273	30	36
IEEE 802.11n HT20	Low	2412	18.86	0.0769	5.89	24.75	0.2985	30	36
	Middle	2437	22.98	0.1986	5.89	28.87	0.7709	30	36
	High	2462	16.97	0.0498	5.89	22.86	0.1932	30	36
IEEE 802.11n HT40	Low	2422	14.77	0.0300	5.89	20.66	0.1164	30	36
	Middle	2437	18.42	0.0695	5.89	24.31	0.2698	30	36
	High	2452	14.75	0.0299	5.89	20.64	0.1159	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm

Mode	CH	Freq. (MHz)	Average Output Power		Ant Gain (dBi)	EIRP Average Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
IEEE 802.11b	Low	2412	16.98	0.0499	5.89	22.87	0.1936	30	36
	Middle	2437	17.02	0.0504	5.89	22.91	0.1954	30	36
	High	2462	16.58	0.0455	5.89	22.47	0.1766	30	36
IEEE 802.11g	Low	2412	12.23	0.0167	5.89	18.12	0.0649	30	36
	Middle	2437	19.38	0.0867	5.89	25.27	0.3365	30	36
	High	2462	13.75	0.0237	5.89	19.64	0.0920	30	36
IEEE 802.11n HT20	Low	2412	12.76	0.0189	5.89	18.65	0.0733	30	36
	Middle	2437	19.55	0.0902	5.89	25.44	0.3499	30	36
	High	2462	13.57	0.0228	5.89	19.46	0.0883	30	36
IEEE 802.11n HT40	Low	2422	8.27	0.0067	5.89	14.16	0.0261	30	36
	Middle	2437	12.25	0.0168	5.89	18.14	0.0652	30	36
	High	2452	11.49	0.0141	5.89	17.38	0.0547	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm; Note2: Duty Cycle is 100% and Duty Factor is 0 dB.

11 FCC §15.247(d) and RSS-247 §5.5 – 100 kHz Bandwidth of Frequency Band Edge

11.1 Applicable Standard

According to FCC §15.247(d),

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to RSS-247 §5.5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

11.2 Test Procedure

- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- (3) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- (4) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

11.3 Test Equipment List and Details

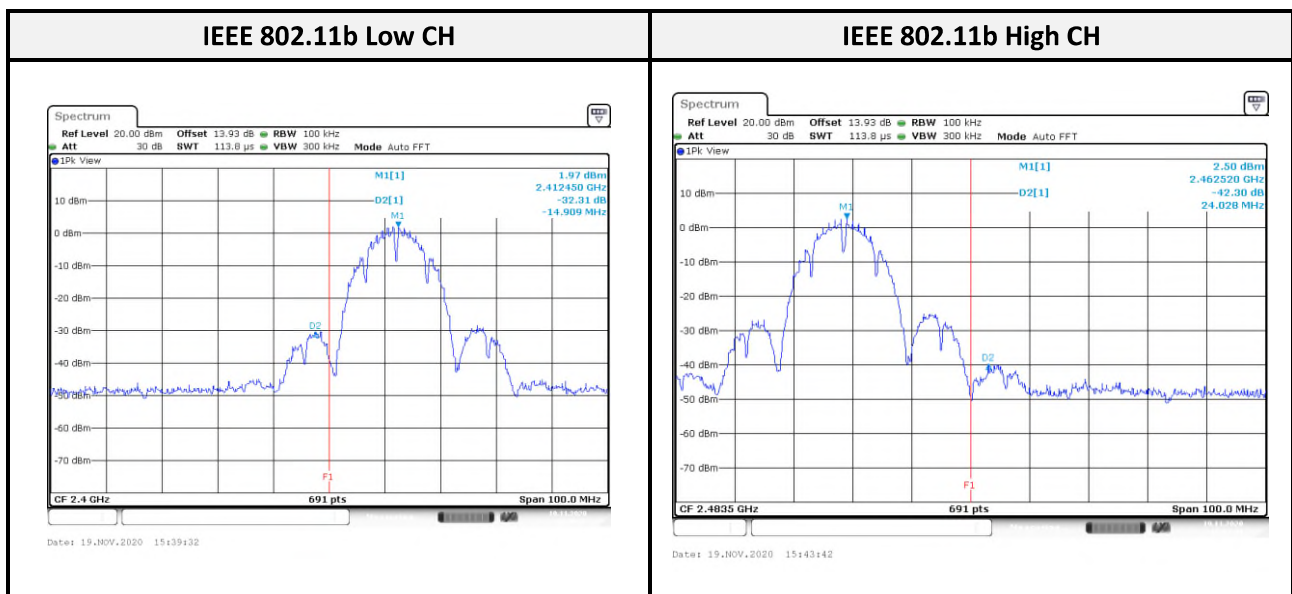
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Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

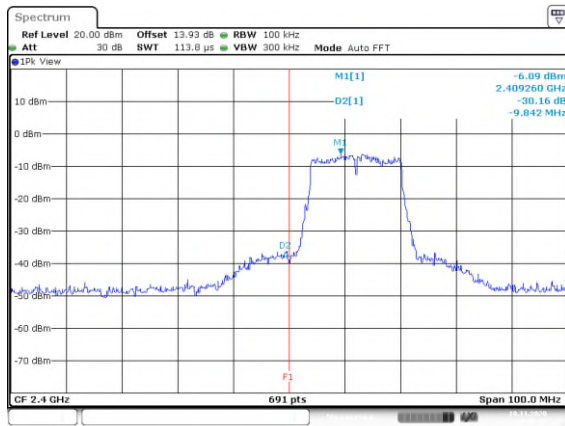
11.4 Test Results

<Chip Antenna (FR05-S1-N-0-102) with 1.8V_{dc}>

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
IEEE 802.11b	Low	2412	32.31	≥ 20	Compliance
	High	2462	42.30	≥ 20	Compliance
BLE-2M IEEE 802.11g	Low	2412	30.16	≥ 20	Compliance
	High	2462	36.08	≥ 20	Compliance
IEEE 802.11n HT20	Low	2412	29.31	≥ 20	Compliance
	High	2462	35.99	≥ 20	Compliance
IEEE 802.11n HT40	Low	2422	27.18	≥ 20	Compliance
	High	2452	27.37	≥ 20	Compliance

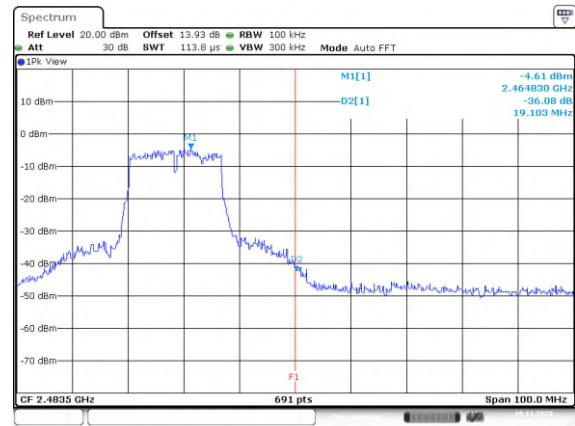


IEEE 802.11g Low CH



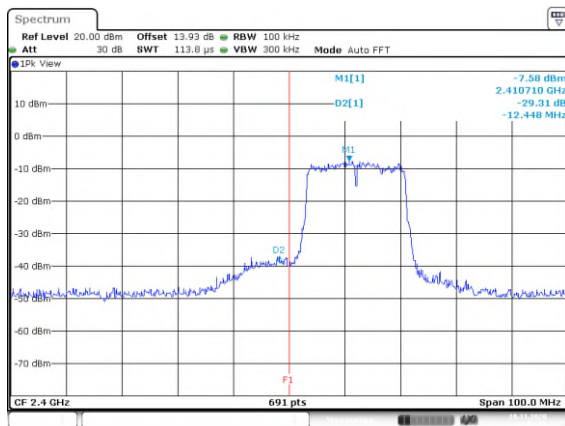
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IEEE 802.11g High CH



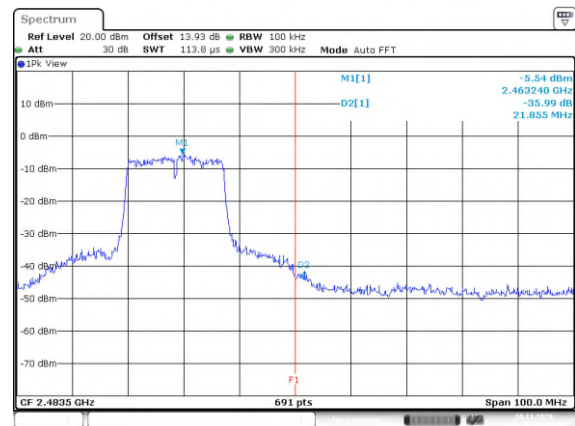
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IEEE 802.11n HT20 Low CH



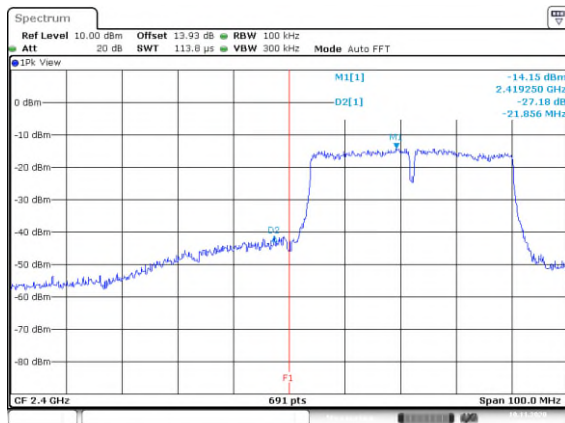
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IEEE 802.11n HT20 High CH



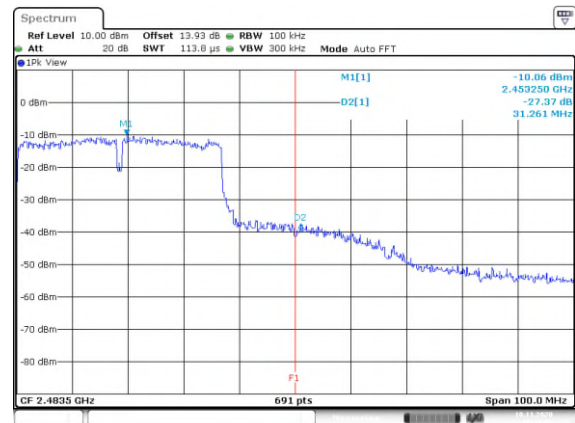
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IEEE 802.11n HT40 Low CH



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IEEE 802.11n HT40 High CH

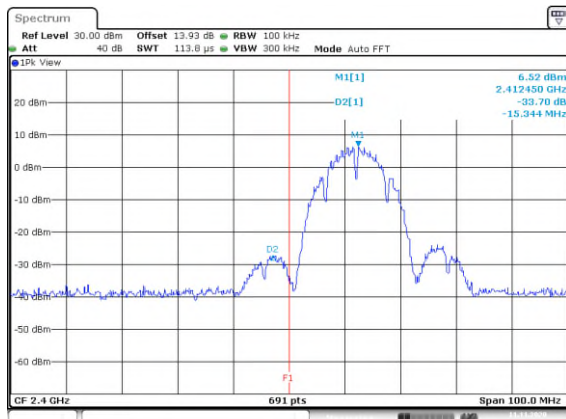


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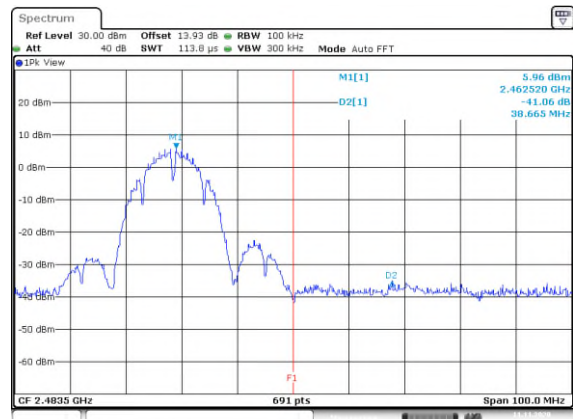
<Chip Antenna (FR05-S1-N-0-102) with 3.3V_{dc}>

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
IEEE 802.11b	Low	2412	33.70	≥ 20	Compliance
	High	2462	41.06	≥ 20	Compliance
BLE-2M IEEE 802.11g	Low	2412	34.81	≥ 20	Compliance
	High	2462	37.75	≥ 20	Compliance
IEEE 802.11n HT20	Low	2412	33.56	≥ 20	Compliance
	High	2462	36.64	≥ 20	Compliance
IEEE 802.11n HT40	Low	2422	30.34	≥ 20	Compliance
	High	2452	28.32	≥ 20	Compliance

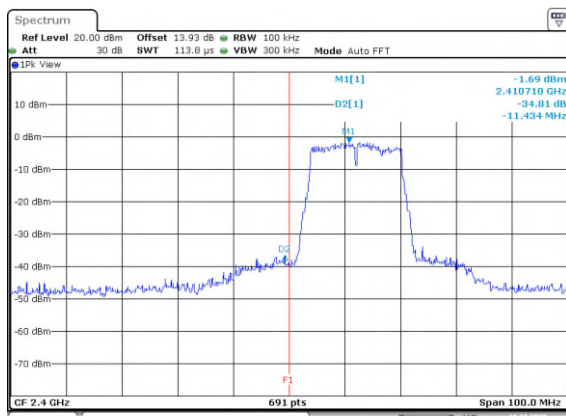
IEEE 802.11b Low CH



IEEE 802.11b High CH



IEEE 802.11g Low CH



IEEE 802.11g High CH

