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Limited Test report

356174-4TRFWL

Date of issue: July 31, 2018

Applicant:
KIC Thermal

Product:
Smart Reflow Analyzer

Model:
SRA

Variants:
N/A

FCC ID: MWNSRA001

IC Registration number: N/A

Specifications:

- FCC 47 CFR Part 15 Subpart C, §15.247 – partial (§15.247(d) requirements only)

  Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5850 MHz

Nemko USA Inc., a testing laboratory, is accredited by NVLAP. The tests included in this report are within the scope of this accreditation

NVLAP Code 200116-0

Test location

Company name	Nemko USA, Inc.
Address	2210 Faraday Ave, Suite 150
City	Carlsbad
Province	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
FCC Site Number	Test Firm Registration Number: 392943 Designation Number: US5058
ISED Test Site	2040B-3

Tested by	Nikolay Shtin, Senior Wireless Engineer
Reviewed by	Chip Fleury, Wireless and Certification Supervisor
Review date	August 2, 2018
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name	KIC Thermal
Address	16120 W Bernardo Drive
City	San Diego
Province/State	California
Postal/Zip code	92127
Country	USA

1.2 Test specifications

FCC 47 CFR Part 15, Subpart C, Clause 15.247	Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5850 MHz

1.3 Test methods

ANSI C64.3-2014	American National Standard for Methods of Measurement of Radio- Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing is this report was performed to demonstrate the relocation of the antenna for WLAN operation had no impact on the regulatory compliance of the EUT. Testing was completed for a limited subset of requirements to demonstrate continued compliance. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.5 Exclusions

None

1.6 Test report revision history

Revision #	Details of changes made to test report
1	Original report issued

Section 2. Summary of test results

2.1 FCC Part 15 Subpart C, general requirements test results

Part	Test description	Verdict
§15.207(a)[1]	Conducted limits	Not tested
§15.31(e)[1]	Variation of power source	Not tested
§15.203[2]	Antenna requirement	Pass
§15.205	Restricted bands of operation	Pass

Notes: [1] Results from previous testing of the EUT apply. See test report: 323702 FCC 15.247 DTS Test Report for KIC Smart Profiler issued on 05-23-2017 by Nemko USA Inc.
[2] The EUT uses chip antennas.

2.2 FCC Part 15 Subpart C, intentional radiators test results

Part	Test description	Verdict
§15.247(a)(1)	20 dB bandwidth of the hopping channel	Not applicable
§15.247(a)(1)(i)	Frequency hopping systems operating in the 902–928 MHz band	Not applicable
§15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725–5850 MHz band	Not applicable
§15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
§15.247(a)(2)[1]	Minimum 6 dB bandwidth for systems using digital modulation techniques	Not tested
§15.247(b)(1)	Maximum peak output power of frequency hopping systems operating in the 2400–2483.5 MHz band and 5725–5850 MHz band	Not applicable
§15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902–928 MHz band	Not applicable
§15.247(b)(3)[1]	Maximum peak output power of systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands	Not tested
§15.247(c)(1)	Fixed point-to-point operation with directional antenna gains greater than 6 dBi	Not applicable
§15.247(c)(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	Not applicable
§15.247(d)	Spurious emissions	Pass
§15.247(e)[1]	Power spectral density for digitally modulated devices	Not tested
§15.247(f)	Time of occupancy for hybrid systems	Not applicable

Notes: [1] Results from previous testing of the EUT apply. See test report: 323702 FCC 15.247 DTS Test Report for KIC Smart Profiler issued on 05-23-2017 by Nemko USA Inc.

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	December 28, 2017
Nemko sample ID number	N/A

3.2 EUT information

Product name	Smart Reflow Analyzer
Model	SPS Profiler
Model variant	N/A
Serial number	N/A
FCC ID	MWNSRA001
IC Registration Number	N/A

3.3 Technical information

Applicant IC company number	N/A
IC UPN number	N/A
All used IC test site(s) Reg. number	2040B-3
RSS number and Issue number	N/A
Frequency band	2400-2483.5 MHz
Frequency Min (MHz)	2412
Frequency Max (MHz)	2462
RF power Min (W), Conducted/ERP/EIRP	N/A
RF power Max (W), Conducted/ERP/EIRP	0.0708 (Conducted)
Field strength, Units @ distance	N/A
Measured BW (kHz) (6 dB)	17720
Measured BW (kHz) (99%)	N/A
Calculated BW (kHz), as per TRC-43	N/A
Type of modulation	DSSS/(BPSK, QPSK, CCK), OFDM/(BPSK, QPSK, 16-QAM, 64-QAM)
Emission classification (F1D, G1D, D1D)	F1D
Transmitter spurious, Units @ distance	71.31 dBµV/m @ 3m Peak / 52.79 dBµV/m @ 3m Average
Power requirements	2.4 VDC from rechargeable battery
Antenna information	PCB Antenna, peak gain is 1.6 dBi. The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.

3.4 Product description and theory of operation

The Equipment Under Test (EUT) was an KIC Thermal Smart Reflow Analyzer (Model: SPS Profiler). The EUT is smart profiler to send sensor data using 2.4 GHz WLAN radio. EUT supports 802.11b, 11g and 11n modes.

3.5 EUT exercise details

A test software was used that allows the change of different RF modes/channels. EUT is set to fixed channel test mode with modulation.

For this evaluation the following RF power settings were used:

11b mode: PWR 0
11g mode: PWR 3
11n mode: PWR 2

RF conducted test was performed on unit with a temporary RF output port (50Ω SMA before antennas).

3.6 EUT setup diagram

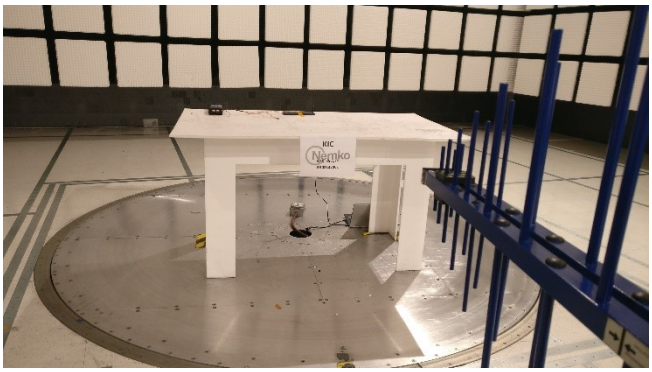


Figure 3.6-1: **Radiated Emissions Test Setup – below 1GHz**

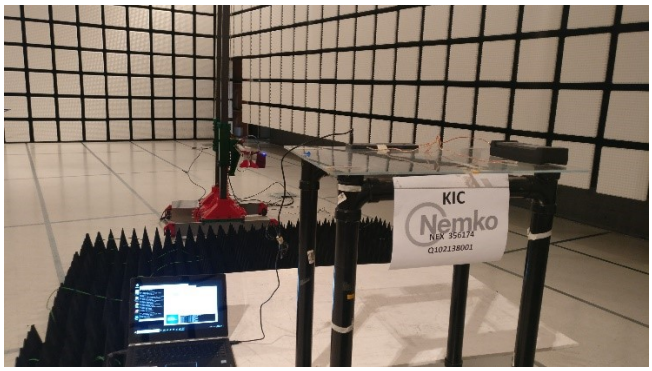


Figure 3.6-2: Radiated Emissions Test Setup – above 1GHz

3.7 EUT sub assemblies and support equipment

Table 3.7-1: EUT sub assemblies

Description	Brand name	Model/Part number	FCC ID / Serial
EUT – RF Conducted Unit	KIC		MWNSRA001

Table 3.7-2: Table 3.7-3: Support equipment

Description	Brand name	Model/Part number	FCC ID / Serial
Micro USB Cable	N/A	N/A	N/A
Laptop Computer	Lenovo	Yoga 900-13ISK 80MK	PF0DTWQT
Laptop Computer	Dell	Inspiron 15-5548	

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None.

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.
2.4VDC

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of K = 2 with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	3.55

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: **Equipment list**

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMC Test Receiver	Rohde & Schwarz	ESU 40	E1131	1 yr.	8/18/2018
Antenna, Bilog	Schaffner-Chase	CBL6111B	1763	1 yr.	11/28/2018
Antenna, Horn (1-18 GHz)	ETS Lindgren	3117	1139	1 yr.	1/26/2019
Antenna, Horn (18-26 GHz)	SAGE Millimeter	SAR-2309-42-S2	E1143	2 yr.	3/13/2020
Spectrum Analyzer	Rohde & Schwarz	FSV40	E1120	1 yr.	7/27/2018
Signal Generator	Rohde & Schwarz	SMW200A	E1156	2 yr.	4/10/2020
Band-reject filter	Micro-Tronics	BRM50702-02	E1142	N/A	Verified with FSV40

Section 8. Test Data

8.1 FCC 15.247(d) Spurious (out-of-band) emissions

8.1.1 Definitions and limits

FCC:
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)).

Table 8.1-1: **FCC §15.209 – Radiated emission limits**

Frequency, MHz	Field strength of emissions µV/m	dBµV/m	Measurement distance, m
0.009–0.490	2400/F	$67.6 - 20 \times \log_{10}(F)$	300
0.490–1.705	24000/F	$87.6 - 20 \times \log_{10}(F)$	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.
For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

Table 8.1-2: **FCC restricted frequency bands**

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

8.1.2 Test summary

Test date	July 2-3, July 20 and July 23, 2018	Temperature	20 °C
Test engineer	Nikolay Shtin	Air pressure	1007 mbar
Verdict	Pass	Relative humidity	51 %

8.1.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to the 10th harmonic.
EUT was set to transmit with worst-case data rate/duty cycle in 11b, 11g and 11n modes.
Final results for valid average emissions were calculated taking into account the EUT duty cycle and are given in the Final Average Results Tables.

Spectrum analyzer settings for conducted spurious emissions measurements:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyzer settings for radiated measurements within restricted bands below 1 GHz:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

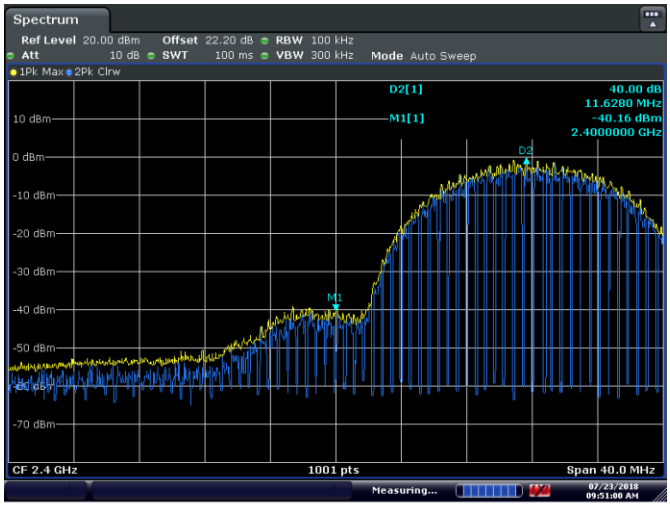
Spectrum analyzer settings for peak radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyzer settings for average radiated measurements within restricted bands above 1 GHz:

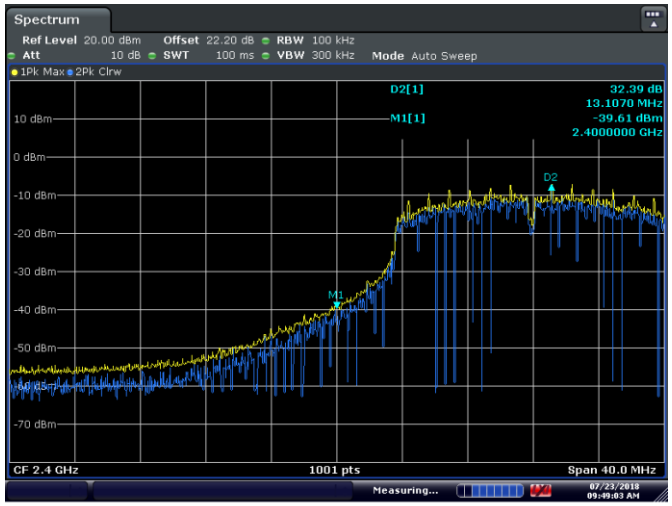
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	AVG
Trace mode:	Max Hold

8.1.4 Test data



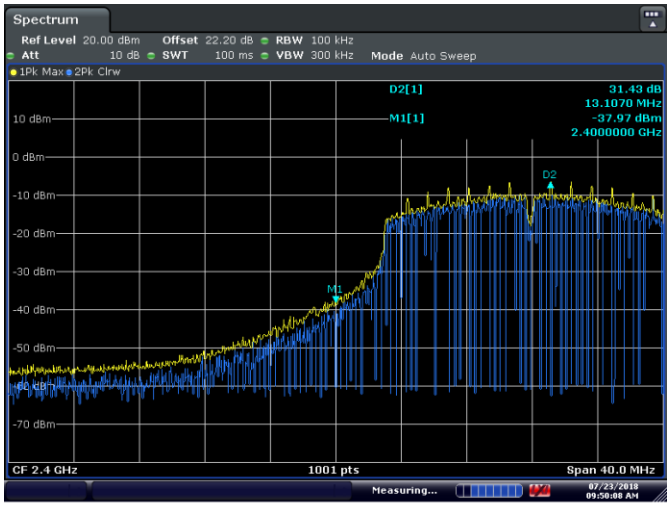
Date: 23.JUL.2018 09:51:00

Figure 8.1.1: Band-edge Measurement, low channel, 11b/11Mbps



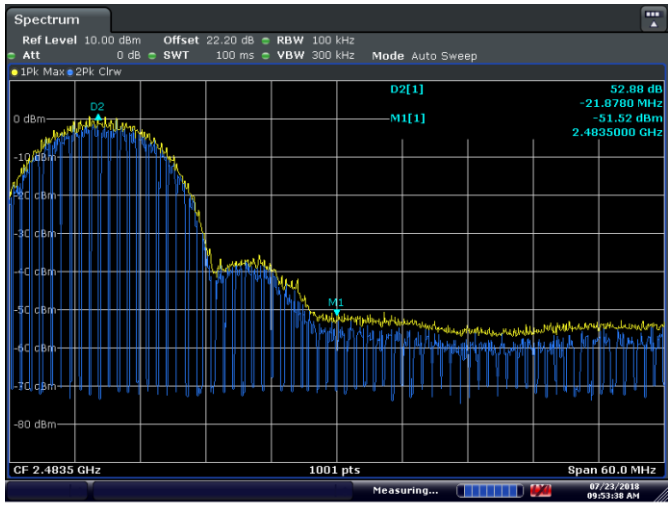
Date: 23.JUL.2018 09:49:04

Figure 8.1.2: Band-edge Measurement, low channel, 11g/9Mbps



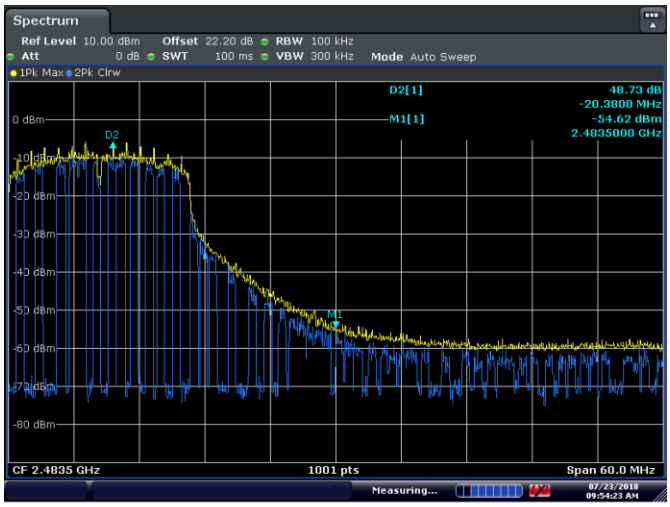
Date: 23.JUL.2018 09:50:09

Figure 8.1.3: Band-edge Measurement, low channel, 11n/MCS2



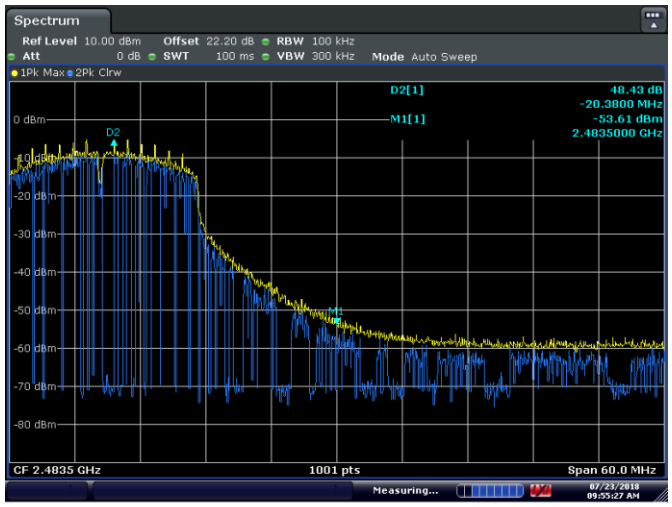
Date: 23.JUL.2018 09:53:39

Figure 8.1.4: Band-edge Measurement, high channel, 11b/11Mbps



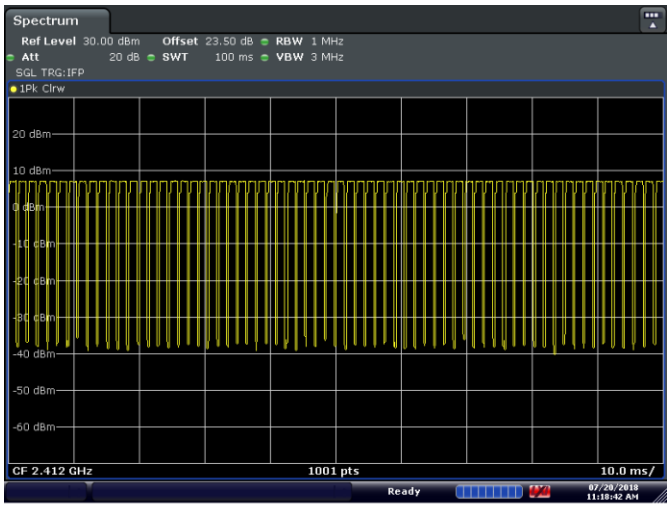
Date: 23.JUL.2018 09:54:23

Figure 8.1.5: Band-edge Measurement, high channel, 11g/9Mbps



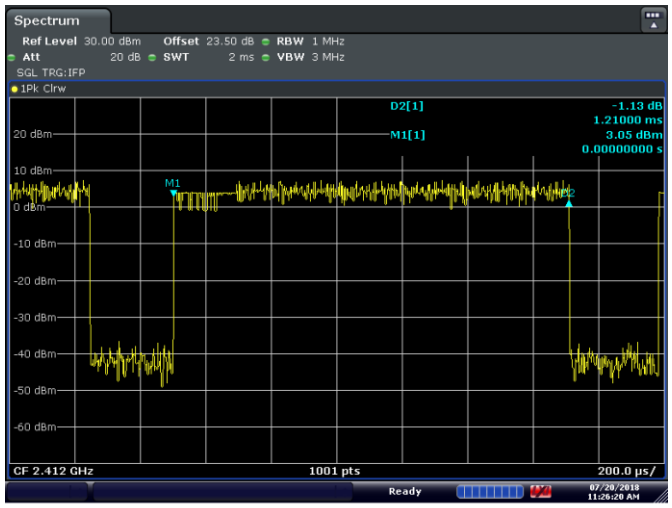
Date: 23.JUL.2018 09:55:27

Figure 8.1.6: Band-edge Measurement, high channel, 11n/MCS2



Date: 20.JUL.2018 11:18:42

Figure 8.1.7: *100ms sweep (representative channel, 11b)*



Date: 20.JUL.2018 11:26:20

Figure 8.1.8: *2ms sweep (representative channel, 11b)*

Duty Cycle Calculation: = 1.21 ms x 66 / 100 ms
Duty Cycle Correction Factor = 20 log (1/0.7986) = **1.95 dB**

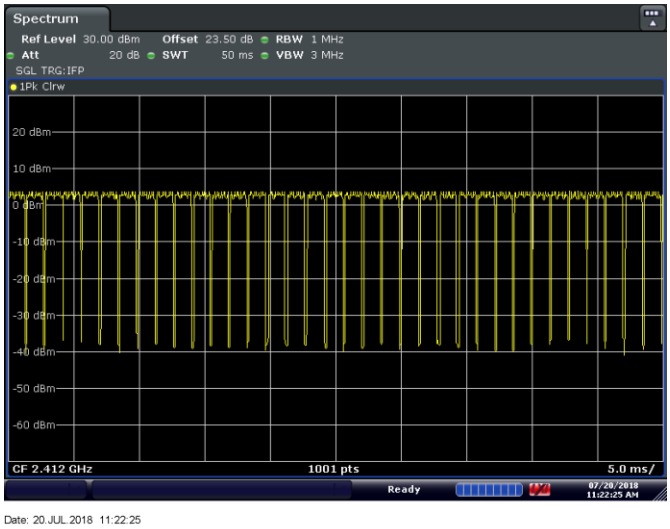


Figure 8.1.9: *100ms sweep (representative channel, 11g)*

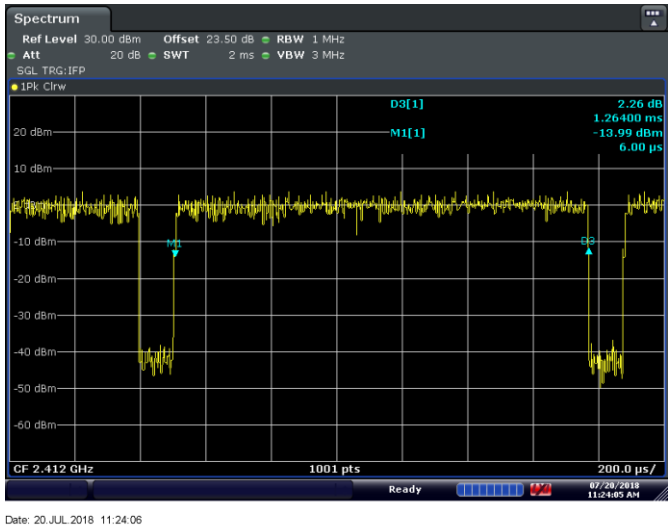


Figure 8.1.10: *2ms sweep (representative channel, 11g)*

Duty Cycle Calculation: = 1.264 ms x 70 / 100 ms
Duty Cycle Correction Factor = 20 log (1/0.8848) = **1.06 dB**

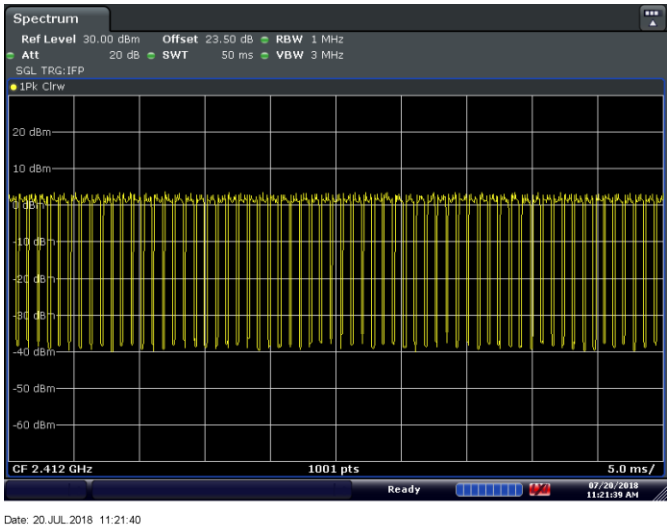


Figure 8.1.11: *100ms sweep (representative channel, 11n)*

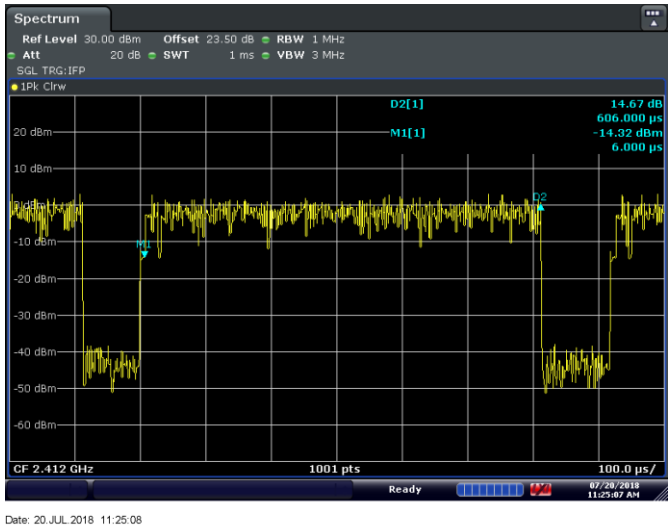


Figure 8.1.12: *2ms sweep (representative channel, 11n)*

Duty Cycle Calculation: = 0.606 ms x 126 / 100 ms
Duty Cycle Correction Factor = 20 log (1/0.7636) = **2.34 dB**

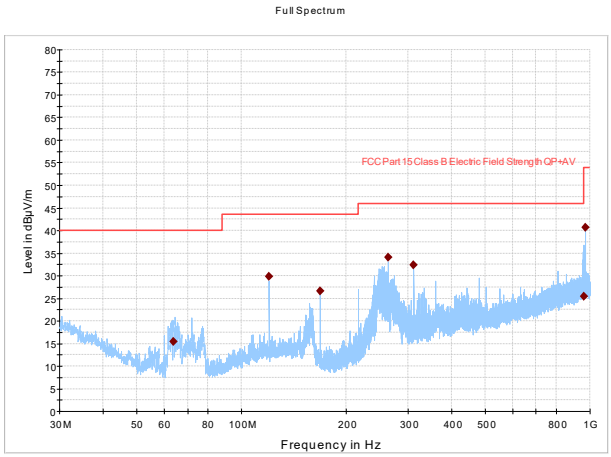


Figure 8.1.13: Radiated spurious emissions, Low channel, 30-1000MHz

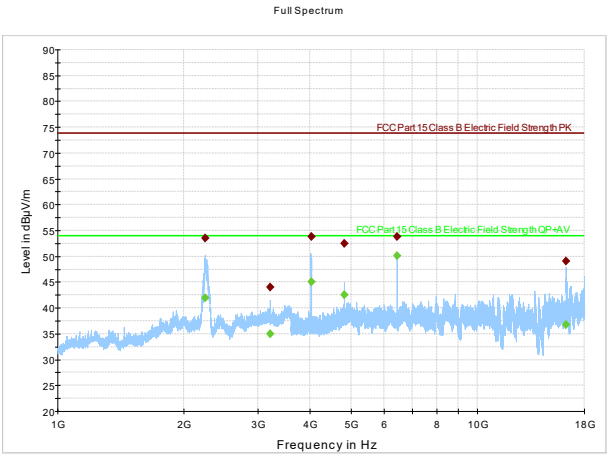


Figure 8.1.14: Radiated spurious emissions, Low channel, 1-3GHz

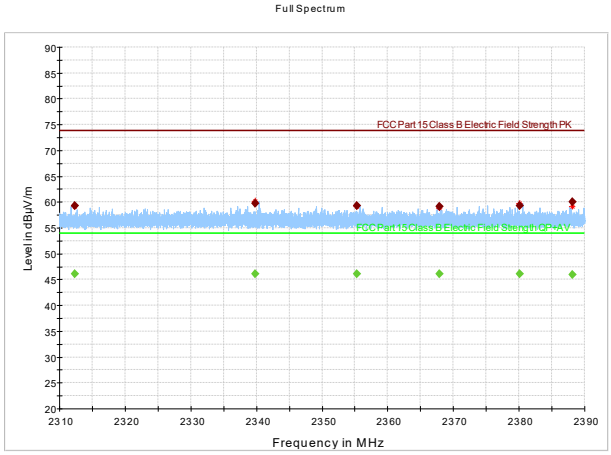


Figure 8.1.15: Radiated spurious emissions in the 2.31-2.39GHz Restricted Band, Low channel, 11b/11Mbps

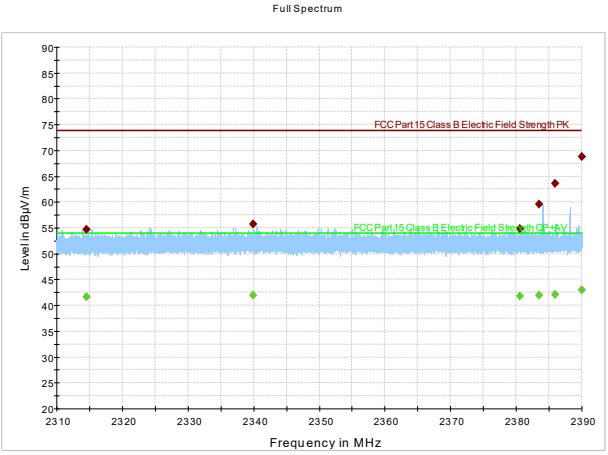


Figure 8.1.16: Radiated spurious emissions in the 2.31-2.39GHz Restricted Band, Low channel, 11g/9Mbps

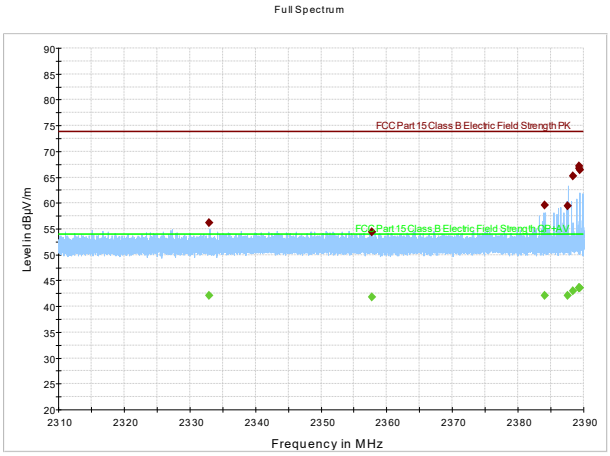


Figure 8.1.17: Radiated spurious emissions in the 2.31-2.39GHz Restricted Band, Low channel, 11n/MCS2

Table 8.1-3: Radiated field strength measurement results for Low channel 2412MHz (30 MHz -18 GHz, 11b/11Mbps)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
63.603500	15.47	40.00	24.53	5000.0	120.000	182.4	V	352.0
120.007500	29.76	43.50	13.74	5000.0	120.000	112.5	V	55.0
167.982500	26.69	43.50	16.81	5000.0	120.000	100.0	V	274.0
264.012500	34.11	46.00	11.89	5000.0	120.000	100.0	V	34.0
311.979000	32.38	46.00	13.62	5000.0	120.000	118.2	V	0.0
959.956000	25.40	46.00	20.60	5000.0	120.000	343.5	V	146.0
968.717500	40.75	53.90	13.15	5000.0	120.000	100.0	V	171.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2245.83333	53.50	---	73.90	20.40	5000.0	1000.000	113.2	H	254.0
2245.83333	---	41.95	53.90	11.95	5000.0	1000.000	113.2	H	254.0
3215.66666	---	34.98	53.90	18.92	5000.0	1000.000	128.0	H	147.0
3215.66666	44.03	---	73.90	29.87	5000.0	1000.000	128.0	H	147.0
4020.36666	53.76	---	73.90	20.14	5000.0	1000.000	100.0	V	176.0
4020.36666	---	45.10	53.90	8.80	5000.0	1000.000	100.0	V	176.0
4823.70000	---	42.54	53.90	11.37	5000.0	1000.000	133.1	V	146.0
4823.70000	52.46	---	73.90	21.44	5000.0	1000.000	133.1	V	146.0
6431.50000	53.80	---	73.90	20.10	5000.0	1000.000	118.2	V	276.0
6431.50000	---	50.08	53.90	3.82	5000.0	1000.000	118.2	V	276.0
16307.7666	49.00	---	73.90	24.90	5000.0	1000.000	112.7	H	356.0
16307.7666	---	36.79	53.90	17.11	5000.0	1000.000	112.7	H	356.0

Note: No considerable EUT emissions above 18 GHz were observed.

Table 8.1-4: Final radiated average results for Low channel 2412MHz (1-18 GHz, 11b/11Mbps)

Frequency (MHz)	Measurement (dBµV/m)	DCCF (dB)	Final Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2245.833333	41.95	1.95	43.90	53.90	10	Pass
4020.366667	45.10	1.95	47.05	53.90	6.85	Pass
4823.700000	42.54	1.95	44.49	53.90	9.41	Pass
6431.500000	***50.08***	***1.95***	***52.03***	***53.90***	***1.87***	Pass

Table 8.1-5: Radiated field strength measurement results for Low channel 2412 MHz (2.31-2.39 GHz Restricted band, 11b/11 Mbps)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2312.29200	59.37	---	73.90	14.53	5000.0	1000.000	116.1	H	231.0
2312.29200	---	46.10	53.90	7.80	5000.0	1000.000	116.1	H	231.0
2339.86800	59.79	---	73.90	14.11	5000.0	1000.000	179.3	H	142.0
2339.86800	---	46.13	53.90	7.77	5000.0	1000.000	179.3	H	142.0
2355.27600	---	46.05	53.90	7.85	5000.0	1000.000	154.0	H	215.0
2355.27600	59.29	---	73.90	14.61	5000.0	1000.000	154.0	H	215.0
2367.88400	---	46.06	53.90	7.84	5000.0	1000.000	410.0	H	300.0
2367.88400	59.17	---	73.90	14.73	5000.0	1000.000	410.0	H	300.0
2380.07600	---	46.08	53.90	7.82	5000.0	1000.000	241.1	H	240.0
2380.07600	59.32	---	73.90	14.58	5000.0	1000.000	241.1	H	240.0
2388.13200	---	45.96	53.90	7.94	5000.0	1000.000	210.5	V	162.0
2388.13200	60.11	---	73.90	13.79	5000.0	1000.000	210.5	V	162.0

Table 8.1-6: Final radiated average results for Low channel 2412 MHz (2.31-2.39 GHz Restricted band, 11b/11 Mbps)

Frequency (MHz)	Measurement (dBµV/m)	DCCF (dB)	Final Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2312.292000	46.10	1.95	48.05	53.90	5.85	Pass
2339.868000	***46.13***	***1.95***	***48.08***	***53.90***	***5.82***	Pass

Table 8.1-7: Radiated field strength measurement results for Low channel 2412 MHz (2.31-2.39 GHz Restricted band, 11g/9 Mbps)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2314.50266	---	41.65	53.90	12.25	5000.0	1000.000	141.6	V	355.0
2314.50266	54.73	---	73.90	19.17	5000.0	1000.000	141.6	V	355.0
2339.96400	55.80	---	73.90	18.10	5000.0	1000.000	292.8	V	42.0
2339.96400	---	41.88	53.90	12.02	5000.0	1000.000	292.8	V	42.0
2380.53466	54.81	---	73.90	19.09	5000.0	1000.000	325.4	V	352.0
2380.53466	---	41.86	53.90	12.04	5000.0	1000.000	325.4	V	352.0
2383.53200	59.58	---	73.90	14.32	5000.0	1000.000	333.5	H	355.0
2383.53200	---	41.96	53.90	11.94	5000.0	1000.000	333.5	H	355.0
2385.93200	63.56	---	73.90	10.34	5000.0	1000.000	116.4	H	124.0
2385.93200	---	42.06	53.90	11.84	5000.0	1000.000	116.4	H	124.0
2389.98800	---	43.00	53.90	10.90	5000.0	1000.000	248.3	H	244.0
2389.98800	68.81	---	73.90	5.09	5000.0	1000.000	248.3	H	244.0
2390.08133	***71.31***	---	73.90	2.59	5000.0	1000.000	98.0	H	252.0
2390.08133	---	43.81	53.90	10.09	5000.0	1000.000	98.0	H	252.0

Table 8.1-8: Final radiated average results for Low channel 2412 MHz (2.31-2.39 GHz Restricted band, 11g/9 Mbps)

Frequency (MHz)	Measurement (dBµV/m)	DCCF (dB)	Final Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2389.988000	43.00	1.06	44.06	53.90	9.84	Pass
2390.081333	***43.81***	***1.06***	***44.87***	***53.90***	***9.03***	Pass

Table 8.1-9: Radiated field strength measurement results for Low channel 2412 MHz (2.31-2.39 GHz Restricted band, 11n/MCS2)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2332.94266	---	42.13	53.90	11.77	5000.0	1000.000	158.3	H	253.0
2332.94266	56.13	---	73.90	17.77	5000.0	1000.000	158.3	H	253.0
2357.74800	---	41.79	53.90	12.11	5000.0	1000.000	254.2	H	0.0
2357.74800	54.44	---	73.90	19.46	5000.0	1000.000	254.2	H	0.0
2384.10533	59.62	---	73.90	14.28	5000.0	1000.000	141.0	H	265.0

2384.10533	---	42.06	53.90	11.84	5000.0	1000.000	141.0	H	265.0
2387.52400	---	42.08	53.90	11.82	5000.0	1000.000	136.0	H	85.0
2387.52400	59.48	---	73.90	14.42	5000.0	1000.000	136.0	H	85.0
2388.41466	65.30	---	73.90	8.60	5000.0	1000.000	179.0	H	243.0
2388.41466	---	43.04	53.90	10.86	5000.0	1000.000	179.0	H	243.0
2389.26800	---	43.64	53.90	10.26	5000.0	1000.000	122.1	H	251.0
2389.26800	67.19	---	73.90	6.71	5000.0	1000.000	122.1	H	251.0
2389.28133	66.75	---	73.90	7.15	5000.0	1000.000	159.2	H	243.0
2389.28133	---	43.53	53.90	10.37	5000.0	1000.000	159.2	H	243.0
2389.40400	66.47	---	73.90	7.43	5000.0	1000.000	163.9	H	243.0
2389.40400	---	43.55	53.90	10.36	5000.0	1000.000	163.9	H	243.0
2390.35866	---	43.38	53.90	10.52	5000.0	1000.000	100.0	H	184.0
2390.35866	65.40	---	73.90	8.50	5000.0	1000.000	100.0	H	184.0

Table 8.1-10: Final radiated average results for Low channel 2412MHz (2.31-2.39 GHz Restricted band, 11n/MCS2)

Frequency (MHz)	Measurement (dBµV/m)	DCCF (dB)	Final Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2389.268000	***43.64***	***2.34***	***45.98***	***53.90***	***7.92***	Pass
2389.281333	43.53	2.34	45.87	53.90	8.03	Pass
2389.404000	43.55	2.34	45.89	53.90	8.01	Pass
2390.358667	43.38	2.34	45.92	53.90	7.98	Pass

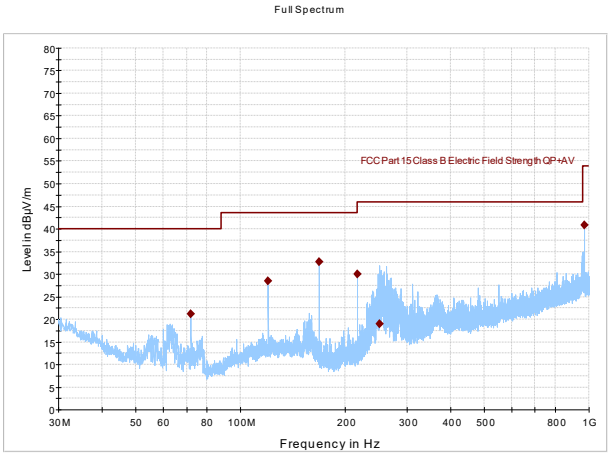


Figure 8.1.18: Radiated spurious emissions, Mid channel, 30-1000MHz

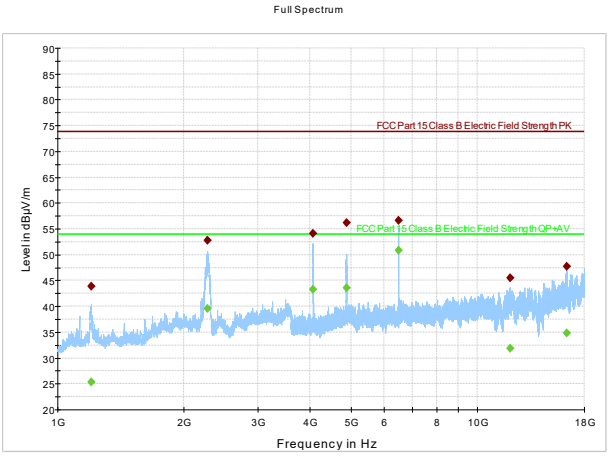


Figure 8.1.19: Radiated spurious emissions, Mid channel, 1-18GHz

Table 8.1-11: Radiated field strength measurement results for Mid channel 2437 MHz (30 MHz -18 GHz, 11b/11Mbps)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
71.992500	21.11	40.00	18.89	5000.0	120.000	147.6	V	64.0
119.976000	28.40	43.50	15.10	5000.0	120.000	120.0	V	64.0
167.982500	32.64	43.50	10.86	5000.0	120.000	100.0	V	274.0
216.007500	30.05	46.00	15.95	5000.0	120.000	124.2	V	42.0
250.437500	18.98	46.00	27.02	5000.0	120.000	111.3	V	-1.0
968.669000	40.80	53.90	13.10	5000.0	120.000	100.0	V	176.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1201.16666	43.93	---	73.90	29.97	5000.0	1000.000	111.0	V	131.0
1201.16666	---	25.37	53.90	28.53	5000.0	1000.000	111.0	V	131.0
2279.30000	52.84	---	73.90	21.06	5000.0	1000.000	111.0	H	253.0
2279.30000	---	39.57	53.90	14.33	5000.0	1000.000	111.0	H	253.0
4060.16666	---	43.27	53.90	10.63	5000.0	1000.000	123.9	V	162.0
4060.16666	54.10	---	73.90	19.80	5000.0	1000.000	123.9	V	162.0
4873.70000	---	43.51	53.90	10.39	5000.0	1000.000	130.0	H	267.0
4873.70000	56.14	---	73.90	17.76	5000.0	1000.000	130.0	H	267.0
6498.36666	56.60	---	73.90	17.30	5000.0	1000.000	112.7	V	266.0
6498.36666	---	50.84	53.90	3.06	5000.0	1000.000	112.7	V	266.0
11991.6333	45.52	---	73.90	28.38	5000.0	1000.000	312.4	V	0.0
11991.6333	---	31.83	53.90	22.07	5000.0	1000.000	312.4	V	0.0
16338.1000	47.79	---	73.90	26.11	5000.0	1000.000	131.7	H	138.0
16338.1000	---	34.84	53.90	19.06	5000.0	1000.000	131.7	H	138.0

Note: No considerable EUT emissions above 18 GHz were observed.

Table 8.1-12: Final radiated average results for Mid channel 2437MHz (1-18 GHz, 11b/11Mbps)

Frequency (MHz)	Measurement (dBµV/m)	DCCF (dB)	Final Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2279.300000	39.57	1.95	41.52	53.90	12.38	Pass
4060.166667	43.27	1.95	45.22	53.90	8.68	Pass
4873.700000	43.51	1.95	45.46	53.90	8.44	Pass
6498.366667	***50.84***	***1.95***	***52.79***	***53.90***	***1.11***	Pass

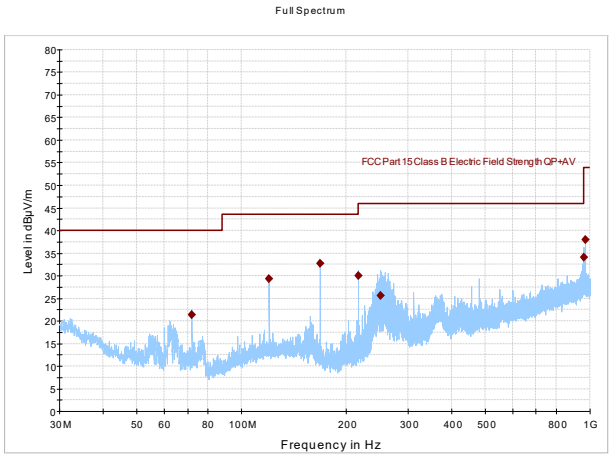


Figure 8.1.20: Radiated spurious emissions, High channel, 30-1000MHz

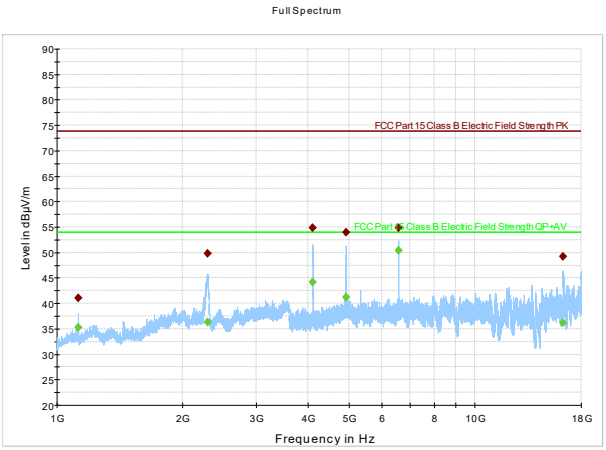


Figure 8.1.21: Radiated spurious emissions, High channel, 1-18GHz

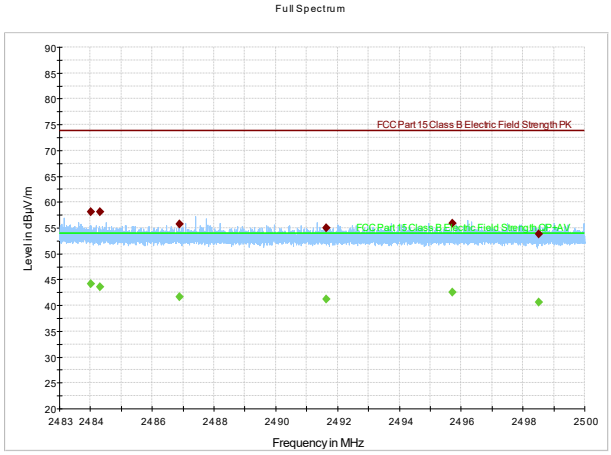


Figure 8.1.22: Radiated spurious emissions in the 2.31-2.39GHz Restricted Band, High channel, 11b/11Mbps

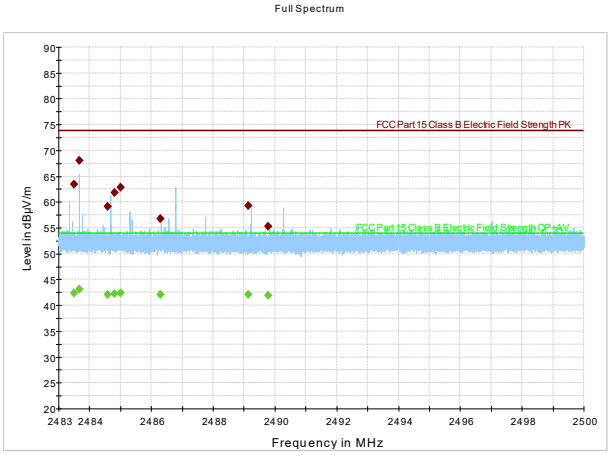


Figure 8.1.23: Radiated spurious emissions in the 2.31-2.39GHz Restricted Band, High channel, 11g/9Mbps

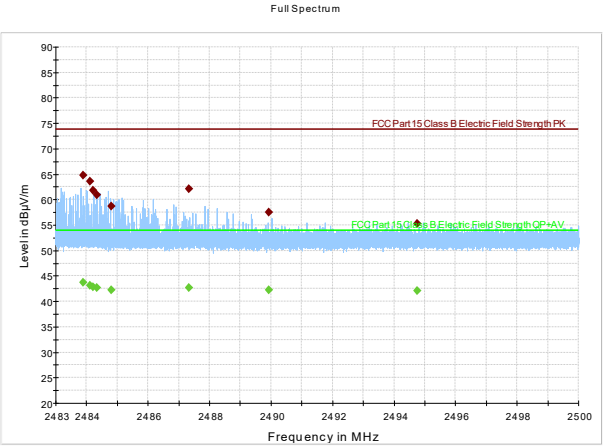


Figure 8.1.24: Radiated spurious emissions in the 2.31-2.39GHz Restricted Band, High channel, 11n/MCS2

Table 8.1-13: Radiated field strength measurement results for High channel 2462MHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
72.012500	21.36	40.00	18.64	5000.0	120.000	115.9	V	86.0
119.987500	29.26	43.50	14.24	5000.0	120.000	112.7	V	72.0
168.002500	32.79	43.50	10.71	5000.0	120.000	100.0	V	274.0
216.017500	30.05	46.00	15.95	5000.0	120.000	115.7	V	72.0
250.760500	25.63	46.00	20.37	5000.0	120.000	126.7	V	94.0
960.016000	34.12	53.90	19.78	5000.0	120.000	168.7	V	154.0
968.803000	37.98	53.90	15.92	5000.0	120.000	115.6	V	154.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1126.76666	41.03	---	73.90	32.87	5000.0	1000.000	100.0	V	64.0
1126.76666	---	35.24	53.90	18.66	5000.0	1000.000	100.0	V	64.0
2290.46666	---	36.37	53.90	17.53	5000.0	1000.000	136.6	H	266.0
2290.46666	49.75	---	73.90	24.15	5000.0	1000.000	136.6	H	266.0
4101.70000	54.88	---	73.90	19.02	5000.0	1000.000	112.9	V	173.0
4101.70000	---	44.16	53.90	9.74	5000.0	1000.000	112.9	V	173.0
4923.60000	---	41.24	53.90	12.66	5000.0	1000.000	128.3	V	116.0
4923.60000	53.89	---	73.90	20.01	5000.0	1000.000	128.3	V	116.0
6565.06666	54.81	---	73.90	19.09	5000.0	1000.000	132.7	V	0.0
6565.06666	---	50.37	53.90	3.53	5000.0	1000.000	132.7	V	0.0
16298.9000	49.27	---	73.90	24.63	5000.0	1000.000	111.0	H	172.0
16298.9000	---	36.10	53.90	17.80	5000.0	1000.000	111.0	H	172.0

Note: No considerable EUT emissions above 18 GHz were observed.

Table 8.1-14: Final radiated average results for High channel 2462MHz (1-18 GHz, 11b/11Mbps)

Frequency (MHz)	Measurement (dBµV/m)	DCCF (dB)	Final Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2290.466667	36.73	1.95	38.68	53.90	15.22	Pass
4101.700000	44.16	1.95	46.11	53.90	7.79	Pass
4923.600000	41.24	1.95	43.19	53.90	10.71	Pass
6565.066667	***50.37***	***1.95***	***52.32***	***53.90***	***1.58***	Pass

Table 8.1-15: Radiated field strength measurement results for High channel 2462MHz (2.4835-2.5 GHz Restricted band, 11b/11Mbps)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2484.01810	---	44.24	53.90	9.66	5000.0	1000.000	153.7	H	245.0
2484.01810	58.05	---	73.90	15.85	5000.0	1000.000	153.7	H	245.0
2484.30810	---	43.63	53.90	10.27	5000.0	1000.000	142.5	H	256.0
2484.30810	58.15	---	73.90	15.75	5000.0	1000.000	142.5	H	256.0
2486.89450	55.80	---	73.90	18.10	5000.0	1000.000	172.3	H	214.0
2486.89450	---	41.70	53.90	12.20	5000.0	1000.000	172.3	H	214.0
2491.63510	---	41.23	53.90	12.67	5000.0	1000.000	111.3	H	141.0
2491.63510	54.95	---	73.90	18.95	5000.0	1000.000	111.3	H	141.0
2495.72090	55.93	---	73.90	17.97	5000.0	1000.000	151.6	H	244.0
2495.72090	---	42.56	53.90	11.34	5000.0	1000.000	151.6	H	244.0
2498.50550	---	40.62	53.90	13.28	5000.0	1000.000	192.0	V	280.0
2498.50550	53.79	---	73.90	20.11	5000.0	1000.000	192.0	V	280.0

Table 8.1-16: Final radiated average results for high channel 2462MHz (2.4835-2.5 GHz Restricted band, 11b/11Mbps)

Frequency (MHz)	Measurement (dBµV/m)	DCCF (dB)	Final Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2484.018100	***44.24***	***1.95***	***46.19***	***53.90***	***7.71***	Pass
2484.308100	43.63	1.95	45.58	53.90	8.32	Pass

Table 8.1-17: Radiated field strength measurement results for High channel 2462MHz (2.4835-2.5 GHz Restricted band, 11g/9Mbps)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2483.67716	68.11	---	73.90	5.79	5000.0	1000.000	178.3	H	244.0
2483.67716	---	43.13	53.90	10.77	5000.0	1000.000	178.3	H	244.0
2483.50243	63.46	---	73.90	10.44	5000.0	1000.000	147.7	H	162.0
2483.50243	---	42.39	53.90	11.51	5000.0	1000.000	147.7	H	162.0
2484.58130	59.18	---	73.90	14.72	5000.0	1000.000	271.7	H	0.0
2484.58130	---	42.14	53.90	11.76	5000.0	1000.000	271.7	H	0.0
2484.81256	61.76	---	73.90	12.14	5000.0	1000.000	109.4	H	192.0
2484.81256	---	42.24	53.90	11.66	5000.0	1000.000	109.4	H	192.0
2485.00450	62.88	---	73.90	11.02	5000.0	1000.000	116.0	H	145.0
2485.00450	---	42.35	53.90	11.55	5000.0	1000.000	116.0	H	145.0
2486.28590	---	42.06	53.90	11.84	5000.0	1000.000	348.1	H	93.0
2486.28590	56.77	---	73.90	17.13	5000.0	1000.000	348.1	H	93.0
2489.12766	---	42.04	53.90	11.86	5000.0	1000.000	356.9	H	213.0
2489.12766	59.25	---	73.90	14.65	5000.0	1000.000	356.9	H	213.0
2489.77260	55.24	---	73.90	18.66	5000.0	1000.000	374.5	H	303.0
2489.77260	---	41.91	53.90	11.99	5000.0	1000.000	374.5	H	303.0

Table 8.1-18: Final radiated average results for High channel 2462MHz (2.4835-2.5 GHz Restricted band, 11g/9Mbps)

Frequency (MHz)	Measurement (dBµV/m)	DCCF (dB)	Final Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2483.677167	***43.13***	***1.06***	***44.19***	***53.90***	***9.71***	Pass
2483.502433	42.39	1.06	43.45	53.90	10.45	Pass

Table 8.1-19: Radiated field strength measurement results for High channel 2462MHz (2.4835-2.5 GHz Restricted band, 11n/MCS2)

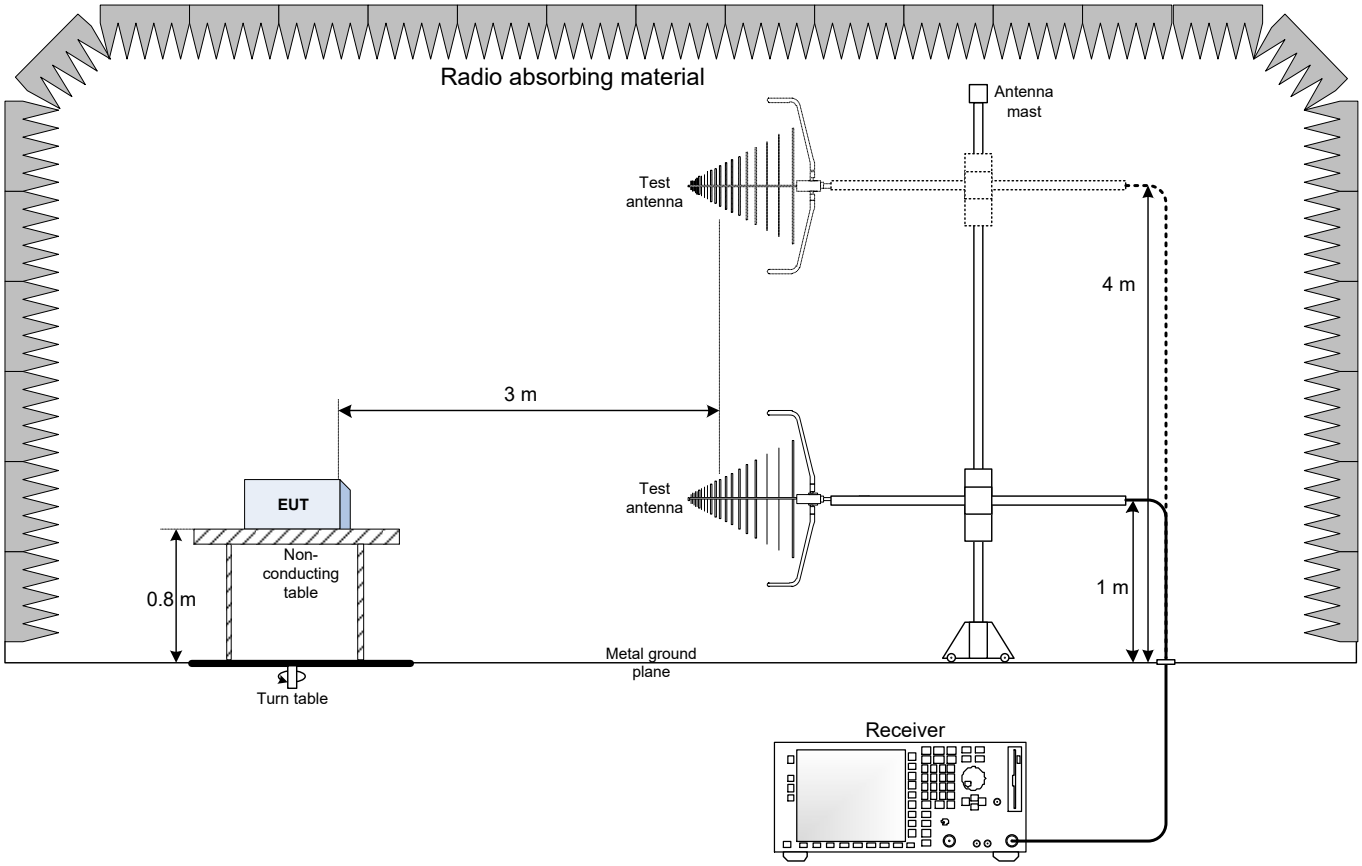
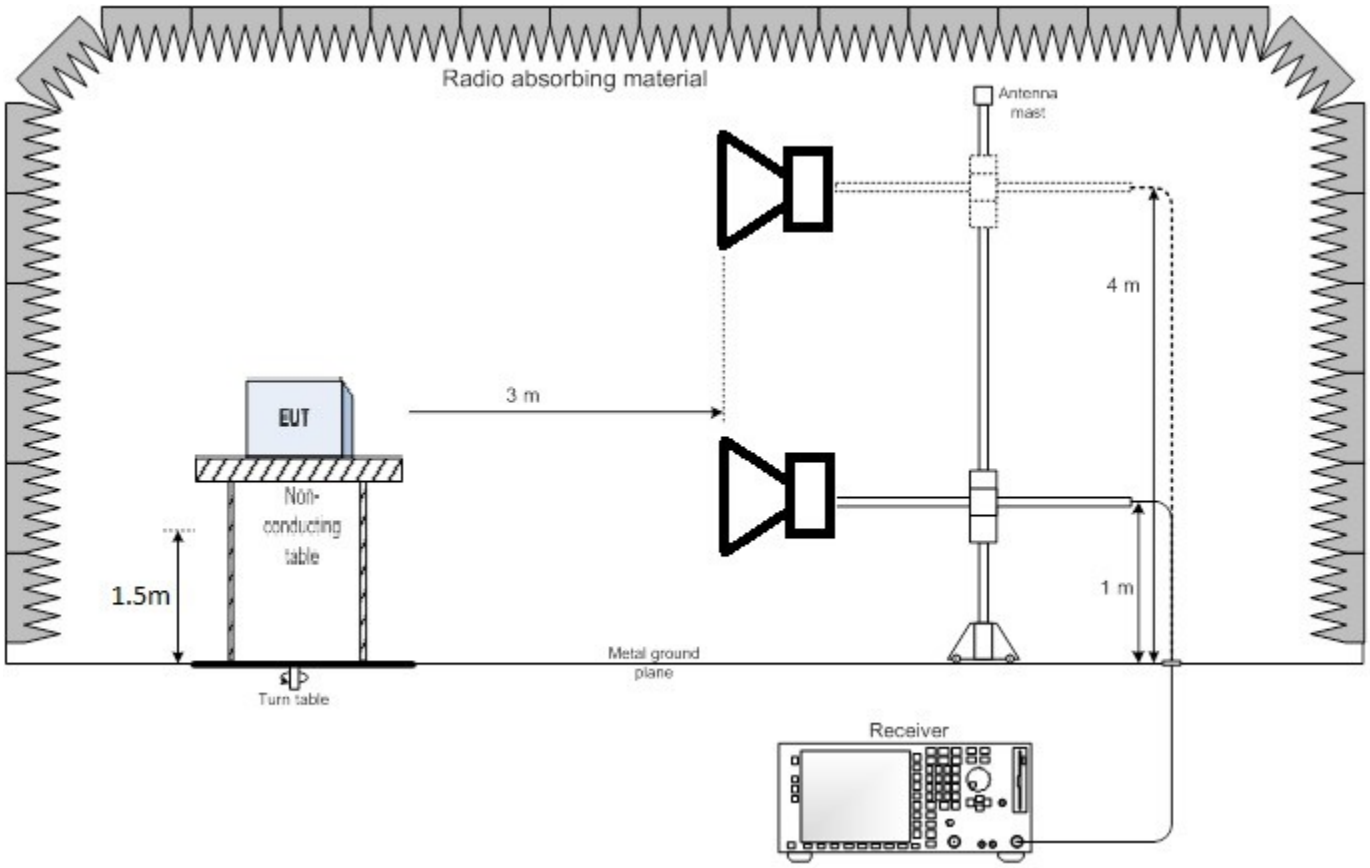
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2483.88486	64.81	---	73.90	9.09	5000.0	1000.000	137.4	H	252.0
2483.88486	---	43.70	53.90	10.20	5000.0	1000.000	137.4	H	252.0
2484.11656	---	43.20	53.90	10.70	5000.0	1000.000	149.9	H	176.0
2484.11656	63.65	---	73.90	10.25	5000.0	1000.000	149.9	H	176.0
2484.20850	---	42.79	53.90	11.11	5000.0	1000.000	125.4	H	147.0
2484.20850	61.83	---	73.90	12.07	5000.0	1000.000	125.4	H	147.0
2484.33253	---	42.63	53.90	11.27	5000.0	1000.000	179.9	H	146.0
2484.33253	60.89	---	73.90	13.01	5000.0	1000.000	179.9	H	146.0
2484.80563	---	42.31	53.90	11.59	5000.0	1000.000	98.0	V	283.0
2484.80563	58.77	---	73.90	15.13	5000.0	1000.000	98.0	V	283.0
2487.33990	---	42.70	53.90	11.20	5000.0	1000.000	131.1	H	245.0
2487.33990	62.11	---	73.90	11.79	5000.0	1000.000	131.1	H	245.0
2489.93800	---	42.18	53.90	11.72	5000.0	1000.000	253.4	H	245.0
2489.93800	57.47	---	73.90	16.43	5000.0	1000.000	253.4	H	245.0
2494.76253	55.36	---	73.90	18.54	5000.0	1000.000	257.4	H	184.0
2494.76253	---	42.04	53.90	11.86	5000.0	1000.000	257.4	H	184.0

Table 8.1-20: Final radiated average results for High channel 2462MHz (2.4835-2.5 GHz Restricted band, 11n/MCS2)

Frequency (MHz)	Measurement (dBµV/m)	DCCF (dB)	Final Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2483.884867	***43.70***	***2.34***	***46.04***	***53.90***	***7.86***	Pass
2484.116567	43.20	2.34	45.54	53.90	8.36	Pass

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up – Below 1GHz



9.2 Radiated emissions set-up – Above 1GHz