CONFORMANCE TEST REPORT

FOR

Subpart C Part 15.247

Report No. : JNDL-NU-15R-0006

Client:	**JVM CO., Ltd.**
Product:	**Automated medication management system**
Model:	**JV-EH10**
Manufacture/supplier:	**JVM CO., Ltd.**
Date test item received:	**July 07, 2015**
Date test campaign completed:	**July 23 , 2015**
Date of issue:	**July 29 , 2015**

ATTESTATION STAEMENT

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards.

All **JNDL Laboratory. CO., LTD** instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements**.**

Total number of pages of this test report : 52 pages

Test engineer	Report reviewed by
	
Byoung-Su, Shim	**Gye-Woog, Lee**

REPORT SUMMARY

Purpose of Test :	To demonstrate the EUT in compliance with FCC Part 15 Subpart C for DTS (Part 15 Digital Transmission System)
Disclaimer :	The test results relate only to the items tested.
Applicable Standards :	Pt 15.247, ANSI C63.4-2009

TEST ENVIRONMENT AND TEST SETUP

Test Facilities :	Test Firm Registration # : 748649 3m & 10m Open Site : 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 3m semi-Anechoic chamber : B 114~115, 810 Kwanyang-Dong, dongan-Gu, Anyang-Si, Kyunggi-Do, 431-060, Korea
Laboratory Test Conditions :	Open Site : Temperature 30 ºC, Humidity : 45 % 3m anechoic chamber : Temperature 24 ºC, Humidity : 46 %
Test Exercise :	The EUT was set in continuous transmit mode of operation unless stated otherwise.
Modification to the EUT :	No modification was made.
Supporting Accessories :	None

REVISION HISTORY

Revison	Date	Desriptions
0	July 29, 2015	Original release

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1. General Remarks

The test results in this report apply to the particular Equipment Under Test (EUT) as declared in this report.
The test results presented in this report relate only to the item tested.

2. Test Site

2.1 Location

JNDL Laboratory. CO., LTD. .(Test Firm Registration # : 748649)
3m anechoic chamber : B 114~115, 810 Kwanyang-Dong, dongan-Gu, Anyang-Si, Kyunggi-Do, Korea
3m & 10m Open site : 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea

2.2 List of Test equipment used for tests

No.	Instrument	Model No.	Due to Calibration	Manufactor	Serial No.
☒	PSA SPECTRUM ANALYZER (3 Hz ~ 26.5 GHz)	E4440A	2016-01-06	Agilent Technologies	MY46185375
☒	SPECTRUM ANALYZER (9 KHz ~ 40 GHz)	FSP40	2015-10-13	Rohde & Schwarz	100308
☒	SIGNAL GENERATOR (10 MHz ~ 40 GHz)	MG3694B	2015-10-15	Anritsu Corp	062513
☒	POWER METER (DC ~ 67 GHz)	NRP2	2015-10-14	Rohde & Schwarz	100973
☒	POWER SENSOR (50 MHz ~ 40 GHz)	NRP-Z85	2015-10-14	Rohde & Schwarz	101121
☒	POWER SENSOR (9 KHz ~ 6 GHz)	NRP-Z92	2015-10-14	Rohde & Schwarz	100093
☒	EMI TEST RECEIVER (9 KHz ~ 7 GHz)	ESCI7	2015-07-30	Rohde & Schwarz	100933
☒	EMI TEST RECEIVER (20 MHz ~ 1000 MHz)	ESVS30	2015-10-14	Rohde & Schwarz	828525/005
☒	AUTORAING POWER SUPPLY	E3630A	2015-10-13	Agilent Technologies	MY40005094
☒	Active Loop Antenna	6502	2016-11-06	ETS-LINDGREN	00148046
☒	BILOG ANTENNA (30 MHz ~ 1000 MHz)	VULB 9168	2017-03-15	Schwarzbeck	9168-505
☒	HORN ANTENNA (1 GHz ~ 18 GHz)	BBHA 9120D	2016-10-14	Schwarzbeck	568
☒	HORN ANTENNA (18 GHz ~ 40 GHz)	BBHA 9170	2015-09-06	Schwarzbeck	BBHA9170440
☐	HORN ANTENNA (18 GHz ~ 40 GHz)	BBHA 9170	2015-09-06	Schwarzbeck	BBHA9170444
☒	Low Nosie Amplifier (100 MHz ~ 26.5 GHz)	TTA2650-HG	2016-05-06	MITEQ	1881352
☐	Low Nosie Amplifier (18 GHz ~ 40 GHz)	AMF-6F-18004000-37-8P	2015-10-14	MITEQ	1814914
☒	High Pass Filter (2.3 GHz ~ 18 GHz)	WT-A1706-HS	2016-07-06	Chengdu Micorwave Communication Technology Co., Ltd	WT140626102
☒	EMI RECEIVER (10 KHz ~ 30MHz)	PMM 9010	2015.09.07	Narda S.T.S/PMM	697WW40306

➔ All equipment is calibrated with traceable calibrations.
Each calibration is traceable to the national or international standards.

2.3 Test Date

Date of Application: July 10, 2015
Date of Test: July 14, 2015 ~ July 23, 2015

3. Product Information

3.1 Manufacturers declarations

Manufacturer :	JVM Co., Ltd.
Product Description :	Supporing 7 days/15 days/30days replaceable medicine contrainers Automatic medicine recognition installation function Automatic cut off Medicine dose pre-discharge funcion Communication function Supporting convenient touch-screen UI
FCC ID :	2AF6G-JVEH10
Model Name :	JV-EH10
Multiple Model Name :	
Operationg Frequency :	2 402 MHz to 2 480 MHz and Channel Spacing 1 MHz (79 Ch)
Type of Modulation :	FHSS (GFSK (BDR), 8DPSK (EDR))
Air Date Rate :	BDR (1 Mbps), EDR (2 Mbps, 3 Mbps)
Antenna Type :	Chip Antenna
Antenna Gain :	2.5 dBi max
RF Power :	1.47 mW
EUT Power Source :	Primary power – Direct plug type adapter
	Secondary Power – N/A

➔All the testing were performed according to the procedures in FCC Parts 15.247
The EUT was operation in special test mode.

3.2 General Specification

Item	Spec
Model No.	JV-EH10
Container Volume	7, 15, 30 days
Dimensions(WxDxHmm)	176x374(D1)x261(H1),176x458(D2)x282.5(H2), 176x508(D3)x307.5(H3)
Weight(kg)	About 6.5
Pouch Size(mm)	70 x 75
Max. Number of pouch canbe installed (on the basis of 20 pills)	28 , 60, 120 pouches
Max. Number of the skipped pouch	3 pouches
Display	4.3“ TFT LCD
Power Consumption	12V DC, 30W
Power Supply	110-240V~, 50/60Hz
Operation Temperature	10 °C ~ 40 °C

4. Description of Tests

The tests documented in this report were performed in accordance with ANSI C63.4-2009 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

4.1 Radiated Emission Measurement

Radiated emission measurements were made in accordance with § 13 in ANSI C63.4-2009 "Measurement of Intentional radiators" The measurements were performed over the frequency range of 30 MHz to 40 GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak, Quasi-peak, Average" within a bandwidth of 120 kHz and above 1 GHz is 1 MHz.

Preliminary measurements were made at 3 m using broadband antennas, and spectrum analyzer to determine the frequency producing the maximum emission in shielded room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 MHz to 1 000 MHz using Log-Bicon antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site or SVSWR chamber at 3 m. The test equipment was placed on a styrofoam table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8 m high nonmetallic 1.0 m x 1.5 m table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 m to 4 m and stopped at the azimuth or height producing the maximum emission.

Varying the mode of operating frequencies of the EUT maximized each emission. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst-case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per section 15.31(f).

Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

4.2 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section § 13 in ANSI C63.4-2009 "measurement of intentional radiators" The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to a Spectrum Analyzer or a Test Receiver. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 9 kHz or for "quasi-peak" within a bandwidth of 9 kHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1 m x 1.5 m x 0.8 m wooden table which is placed 0.4 m away from the vertical wall and 1.5 m away from the side wall of the chamber room. Two LISN are bonded to the shielded room. The EUT is powered from the LISN and the support equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the LISN. Non-inductive bundling to a 1 m length shortened all interconnecting cables more than 1 m. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the EMI Test Receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.15 MHz to 30 MHz. The bandwidth of the spectrum analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

4.3 FCC Part 15.205 Restricted Bands of Operations

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]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	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490 MHz - 0.510 MHz.
[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

5. TEST CONDITION

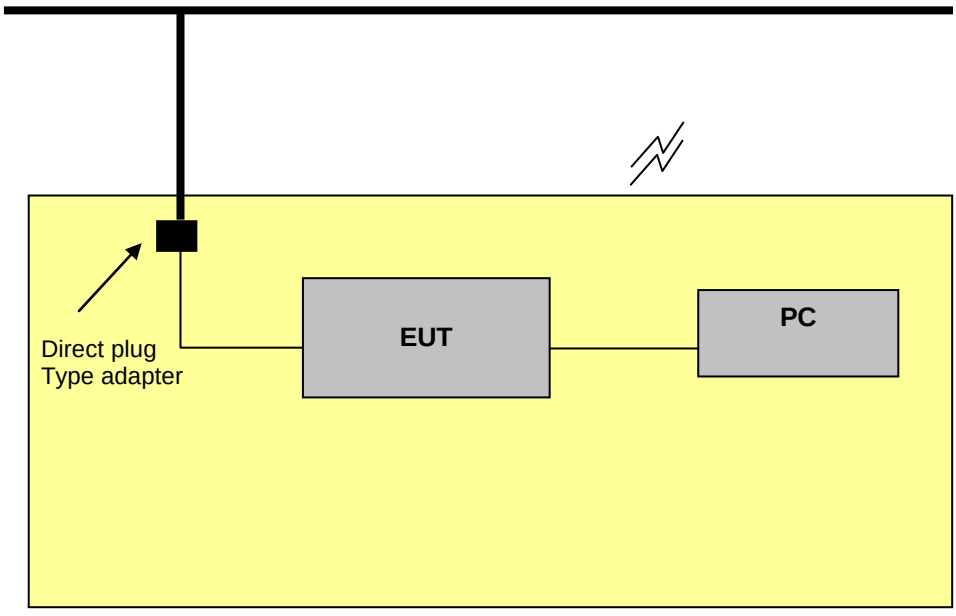
5.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following conditions and configurations were used.

5.2 Description of Test modes

Automated medication management system that has the control software.

5.3 The setup drawing(s)



: Signal line

: Power line

: Direct plug type adapter

6. TEST RESULTS

6.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

47 CFR Part 15, Subpart C	Measurement Required	Result
15.247(a)(1)	Channel Bandwidth, Frequency Separation	**Pass**
15.247(b)(3)	Maximum Peak Output Power	**Pass**
15.247(d)	Bandwidth of Frequency Band Edges	**Pass**
15.247(a)(1)(iii)	Number of Hopping Channels	**Pass**
15.247(a)(1)(iii)	Time of Occupancy (Dwell time)	**Pass**
15.209(a)	Spurious Emissions	**Pass**
15.207	Conducted Emissions	**Pass**
15.247(i) 1.1307(b)(1)	RF Exposure	**Pass**

The data collected shows that the **JVM Co., Ltd / Automated medication management system / JV-EH10** complied with technical requirements of above rules part 15.207, 209 and 15.247 Limits.

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

6.2 Channel Bandwidth and Frequency Separation

6.2.1 Channel Bandwidth

Type of Modulation	Frequency [MHz]	20 dB Bandwidth [MHz]	Limit
BDR	2 402	0.858.	2/3 of the 20 dB Bandwidth < Carrier frequency separation
	2 441	0.868	
	2 480	0.861	
EDR	2 402	1.184	
	2 441	1.176	
	2 480	1.174	

NOTES:

1. Measure frequency separation of relevant channel using spectrum analyzer.
2. Please see the measured plot in next page.

6.2.2 Frequency Separation

Frequency hopping systems operating in the 2 400.0 MHz - 2 483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

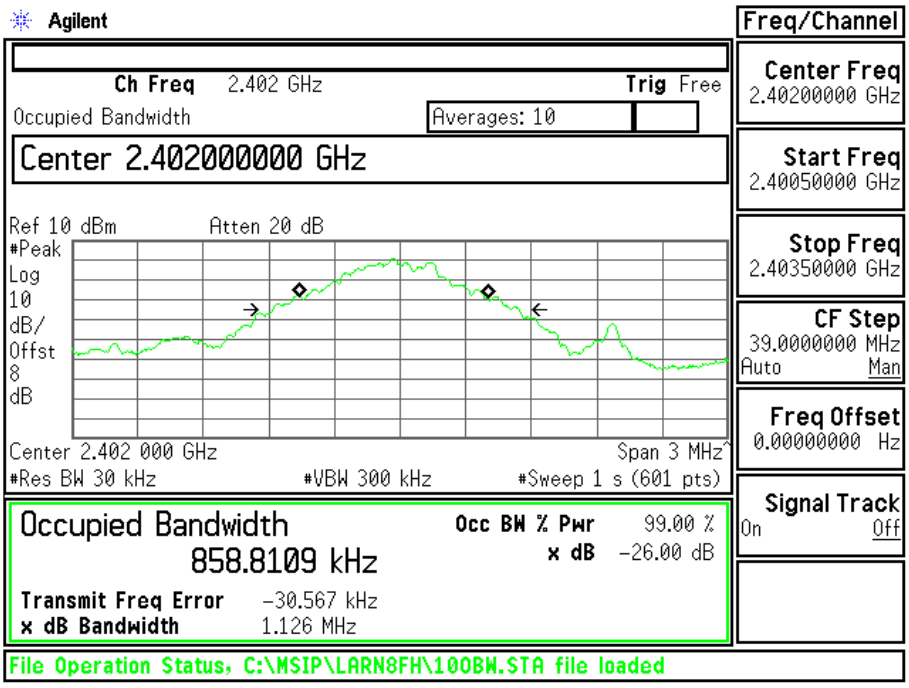
Type of Modulation	EUT Channel Separation [MHz]	20 dB bandwidth [MHz]	Limit
BDR	1.000 (Worst)	0.985 (Worst)	> 25 kHz or > 2/3 of the 20 dB Bandwidth
EDR	1.000 (Worst)	0.999 (Worst)	

NOTES:

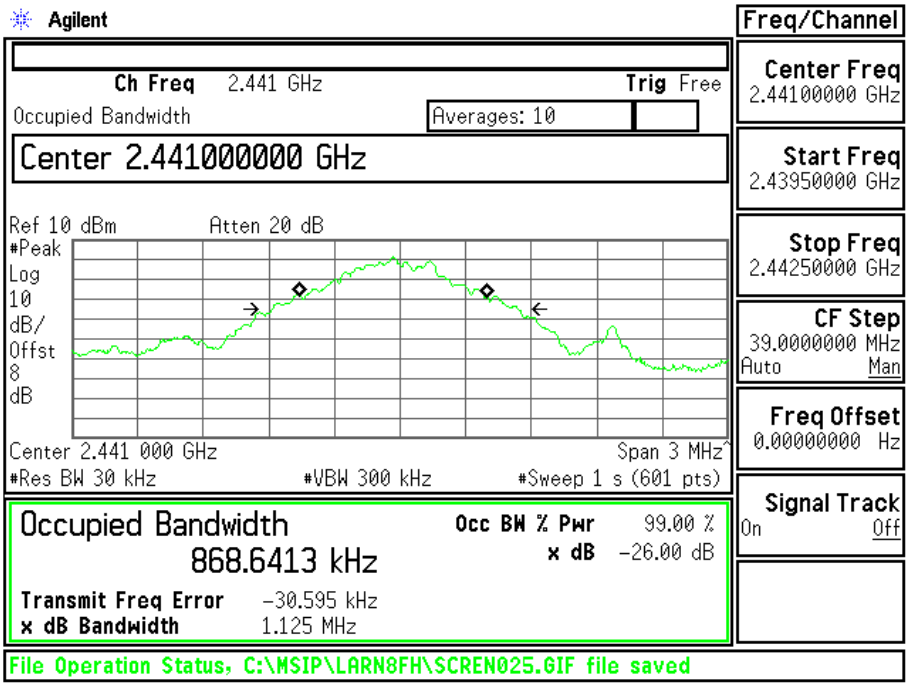
1. Measure frequency separation of relevant channel using spectrum analyzer.
2. Please see the measured plot in next page.

Plots of 20 dB Bandwidth (BDR)

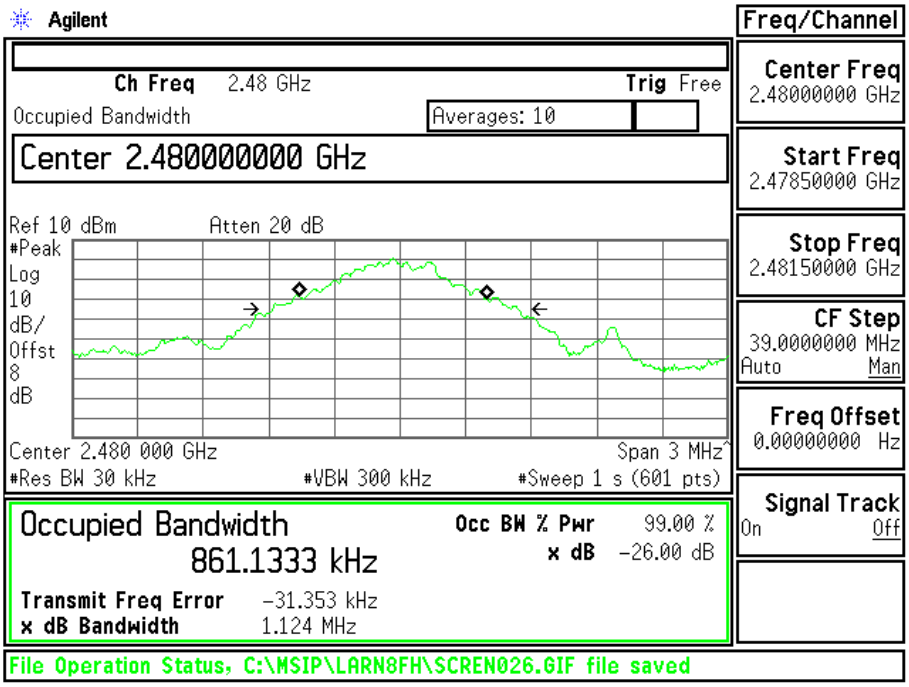
[2 402 MHz]



[2 441 MHz]

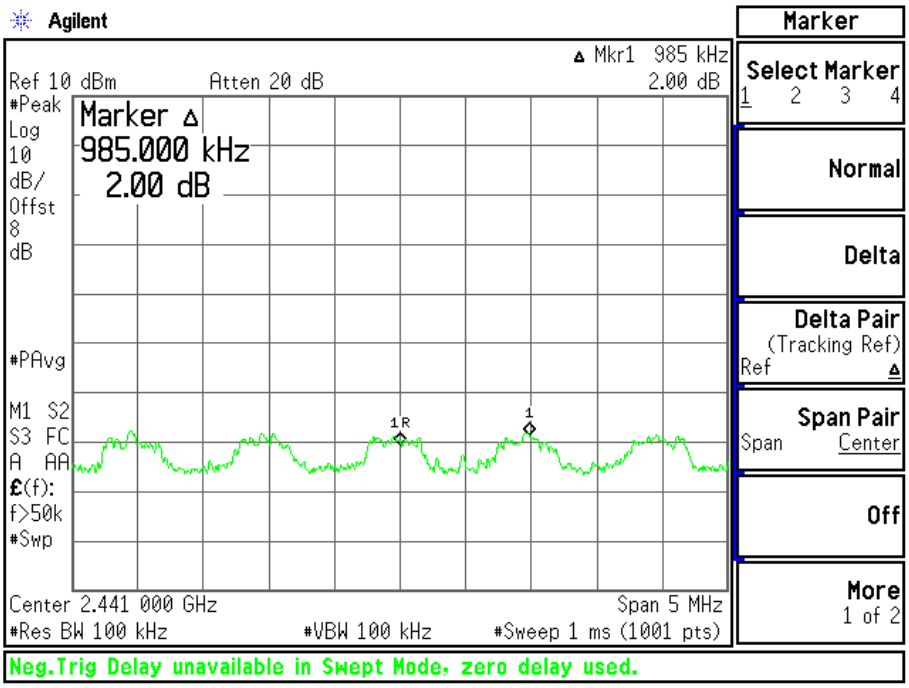


[2 480 MHz]



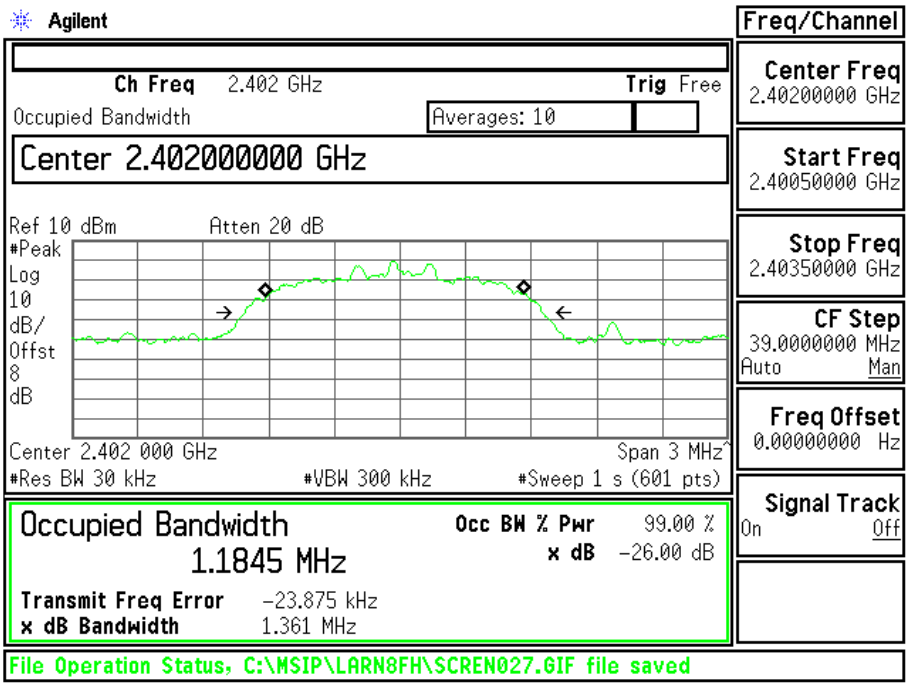
Plots of Frequency Separation (BDR)

[Channel Separation]

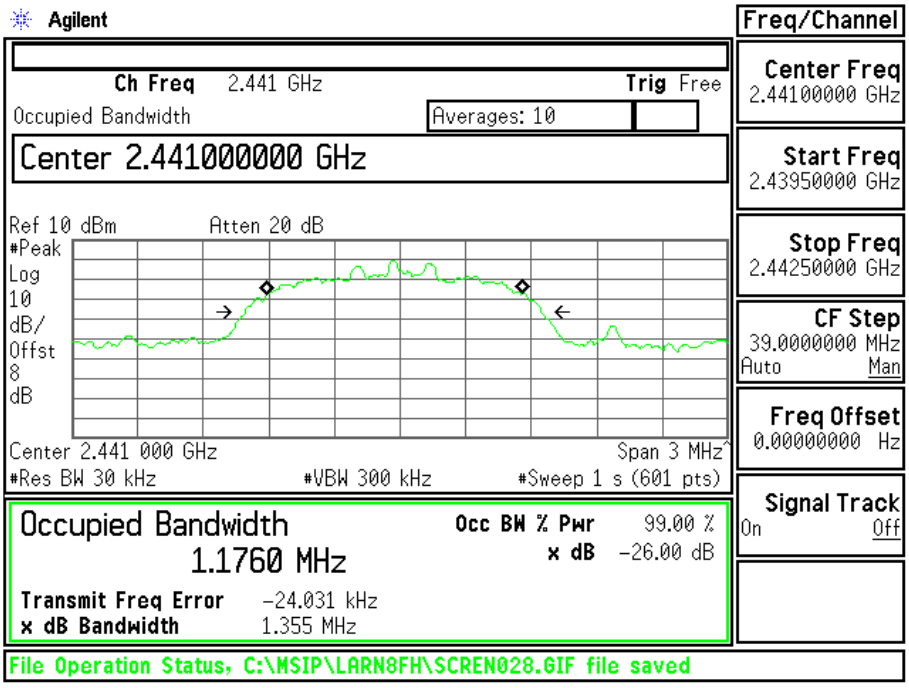


Plots of 20 dB Bandwidth (EDR)

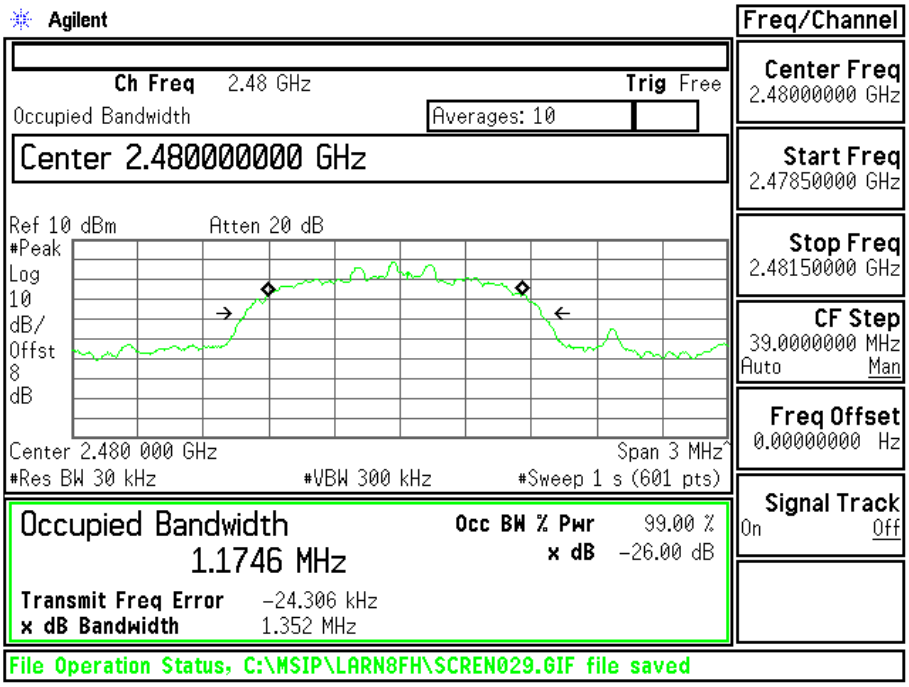
[2 402 MHz]



[2 441 MHz]

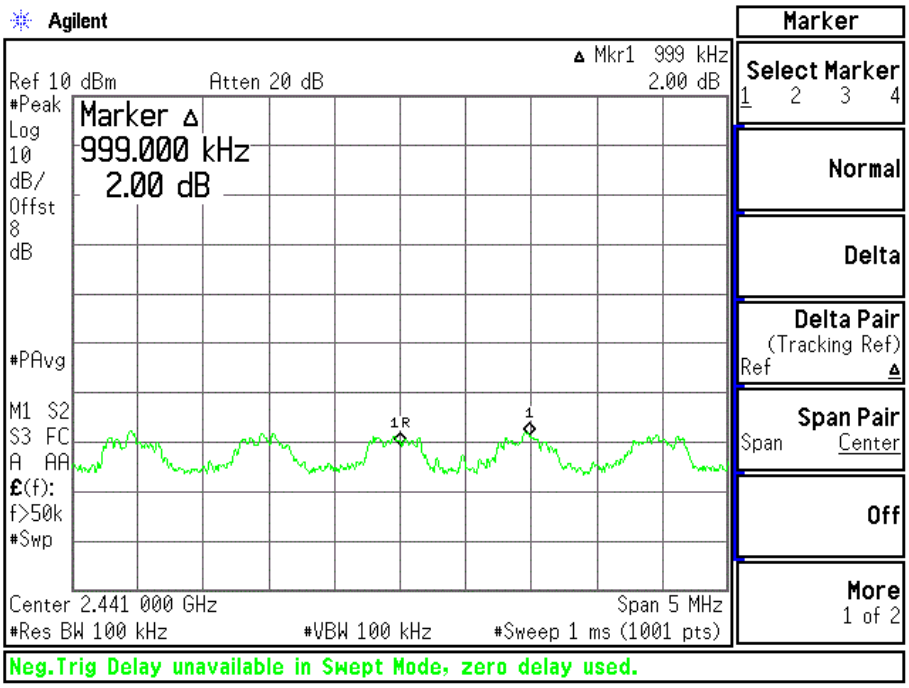


[2 480 MHz]



Plots of Frequency Separation (EDR)

[Channel Separation]



6.3 Maximum Peak Conducted Output Power

Limit

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For frequency hopping systems operating in the 2 400.0 MHz - 2 483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 Watt

Test Data

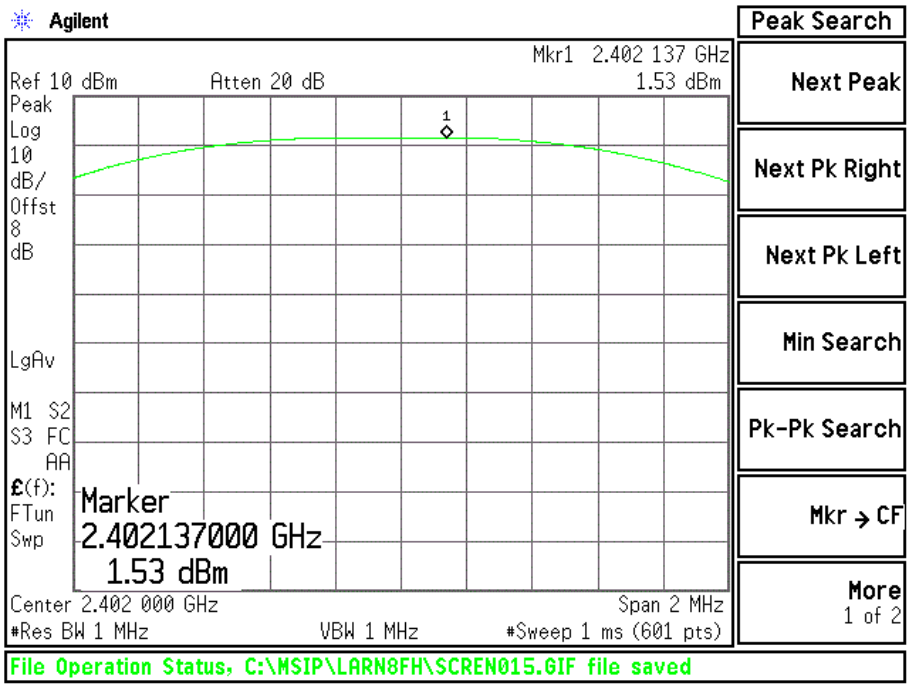
Type of Modulation	Channel	Frequency [MHz]	Output Power [dBm]	Limit
BDR	Low	2 402	1.53	< 30 dBm (1 W)
	Mid	2 441	1.68	
	High	2 480	1.52	
EDR	Low	2 402	0.75	
	Mid	2 441	0.82	
	High	2 480	0.33	

NOTES:

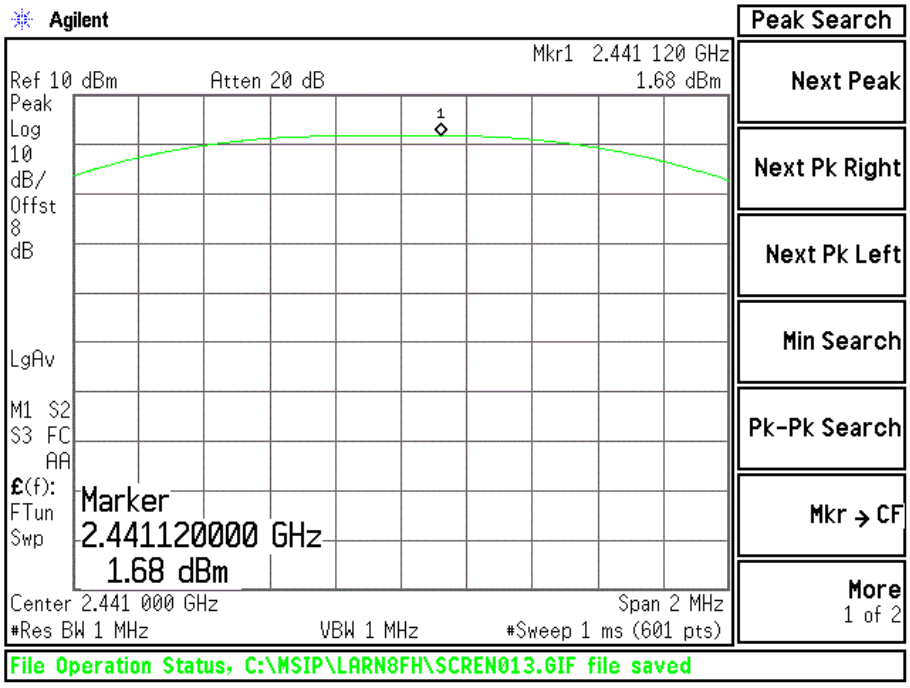
1. Measure conducted Channel power of relevant channel using Spectrum analyzer
2. RBW 1 MHz, VBW 1 MHz
3. Please see the measured plot in next page.

Plots of Maximum Peak Output Power (BDR)

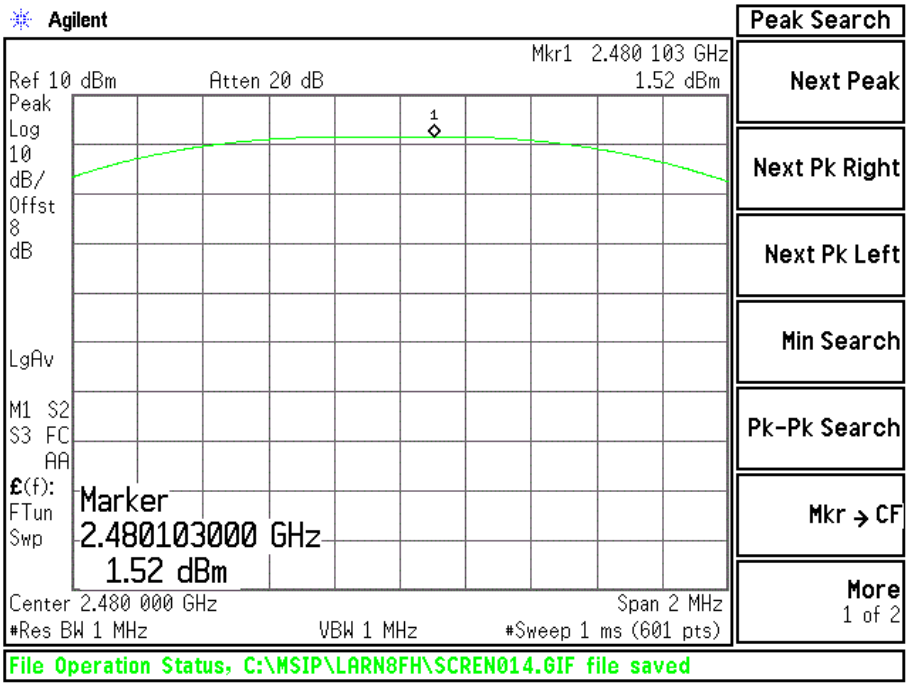
[2 402 MHz]



[2 441 MHz]

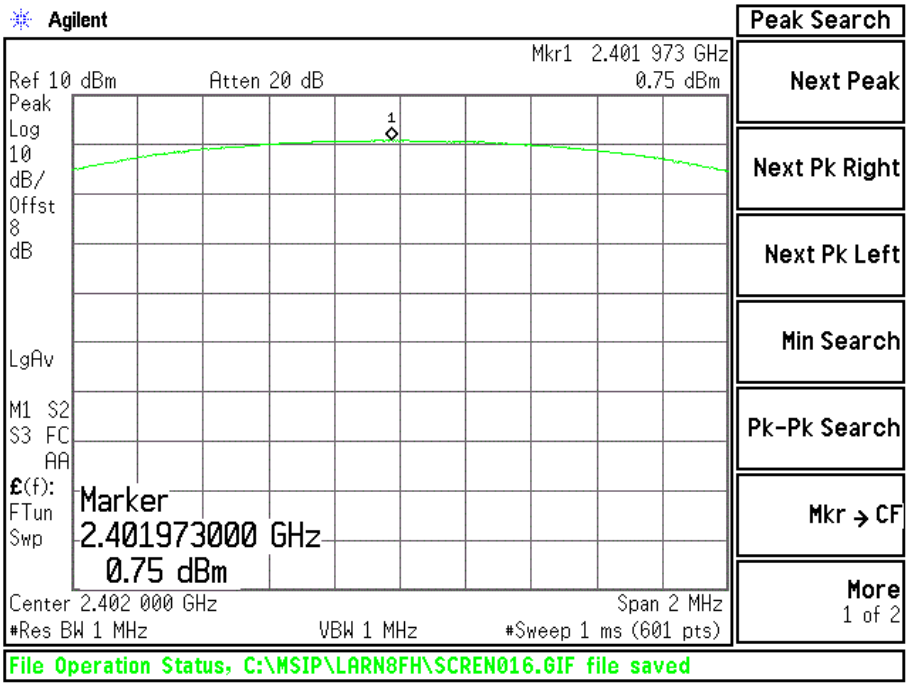


[2 480 MHz]

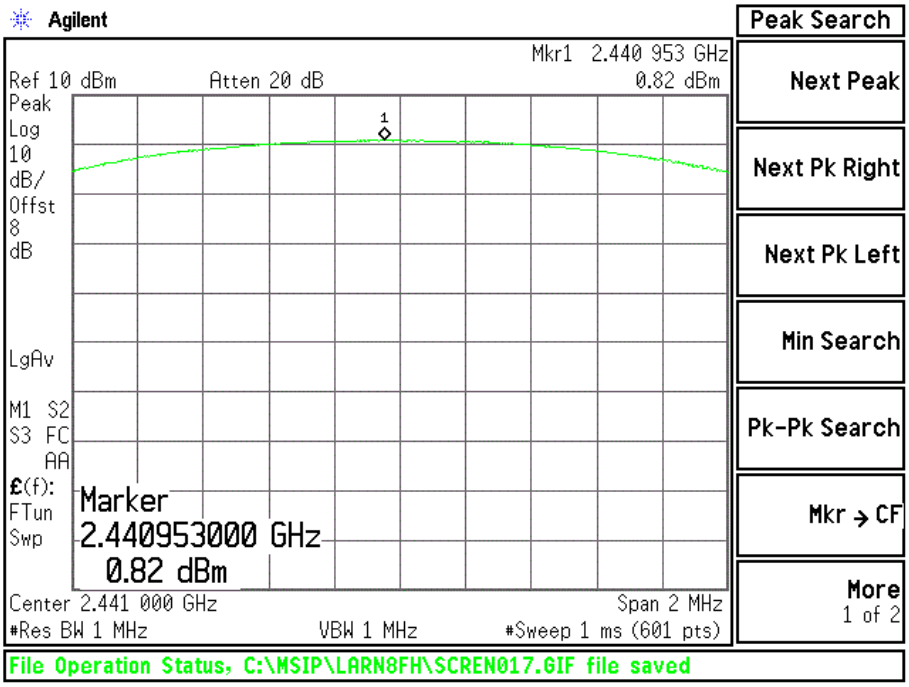


Plots of Maximum Peak Output Power (EDR)

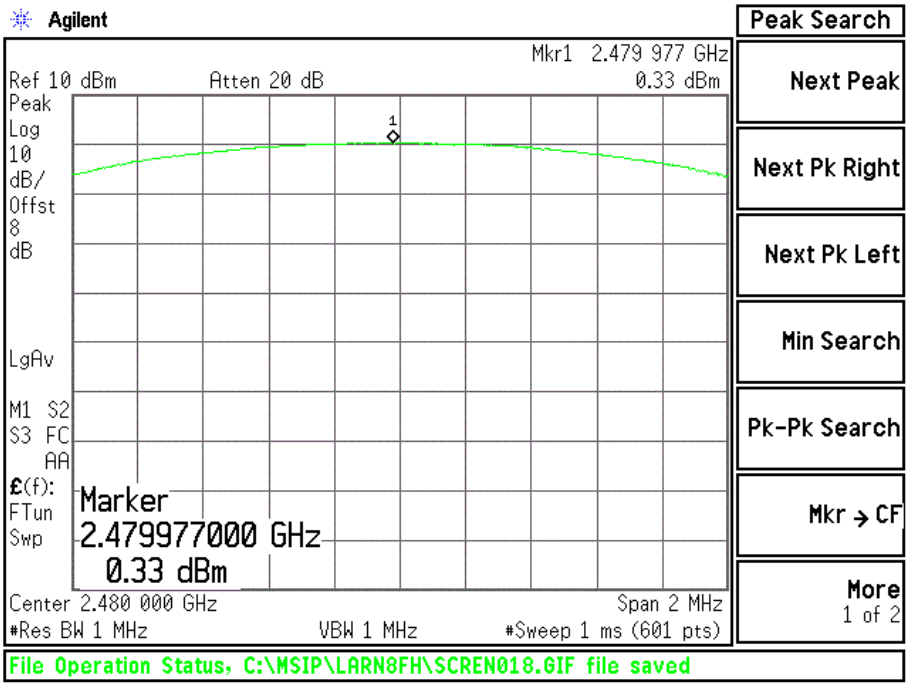
[2 402 MHz]



[2 441 MHz]



[2 480 MHz]



6.4 Bandwidth of Frequency Band Edges

Limit

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 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 15.209(a) (see Section 15.205(c)).

Test Results

- Refer to see the measured plot in next page.

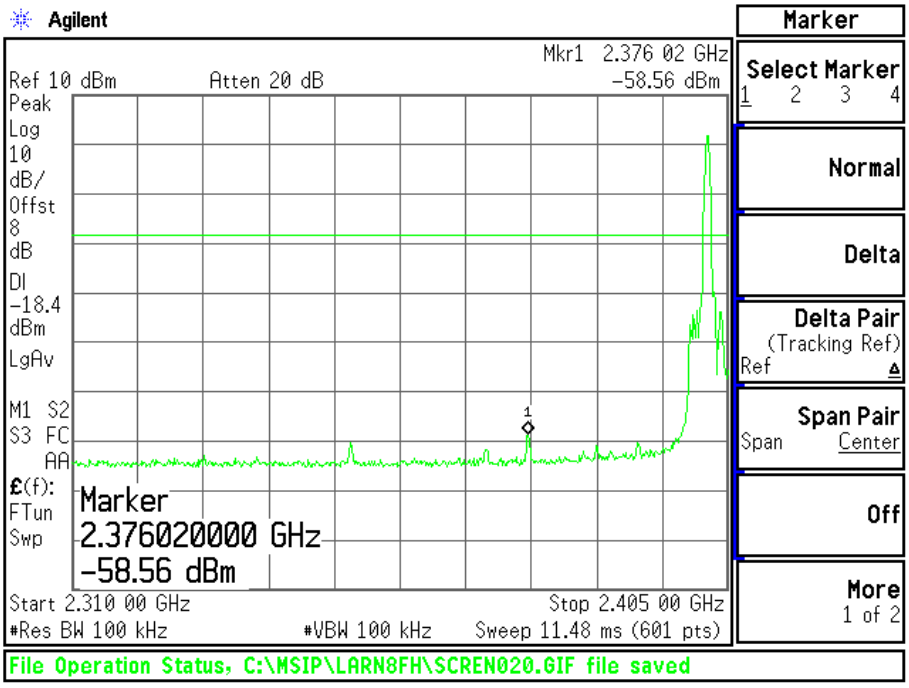
NOTES:

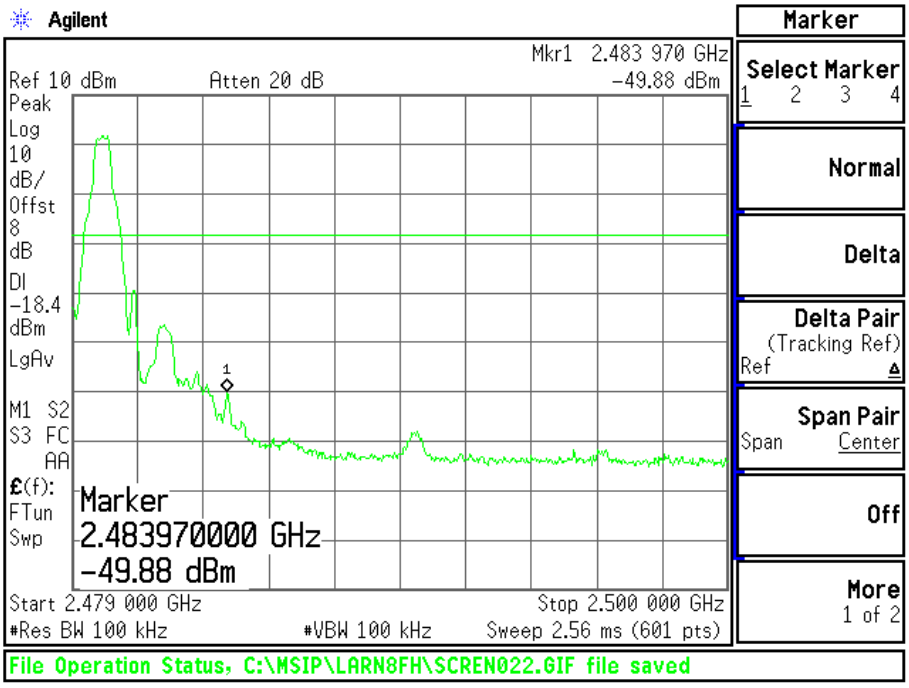
1. The test was performed to make a direct field strength measurement at the band edge frequencies.

Plots of Bandwidth of Frequency Band Edges (BDR)

[Non-hopping mode]

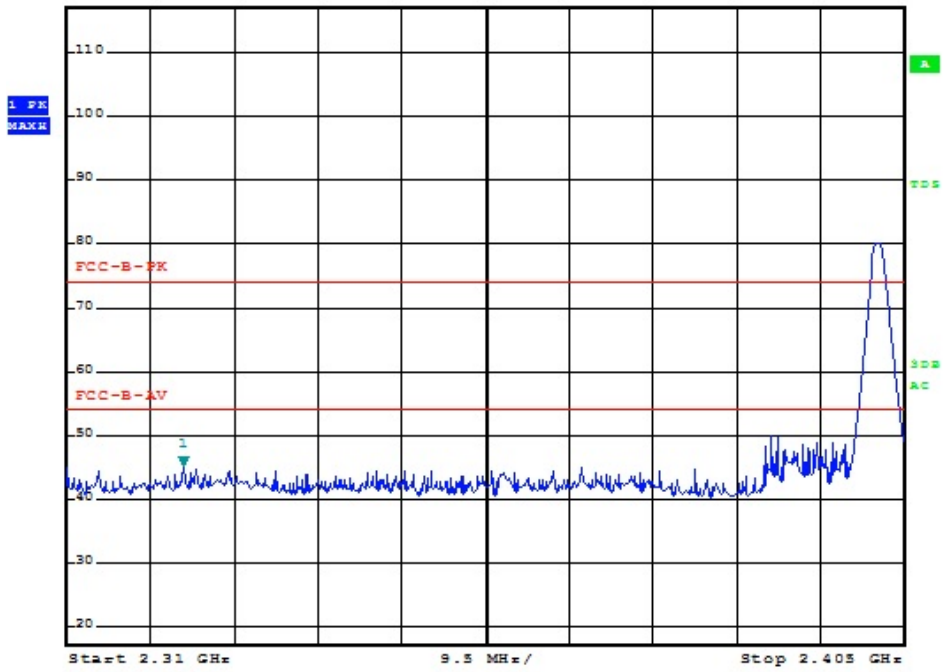
Conducted



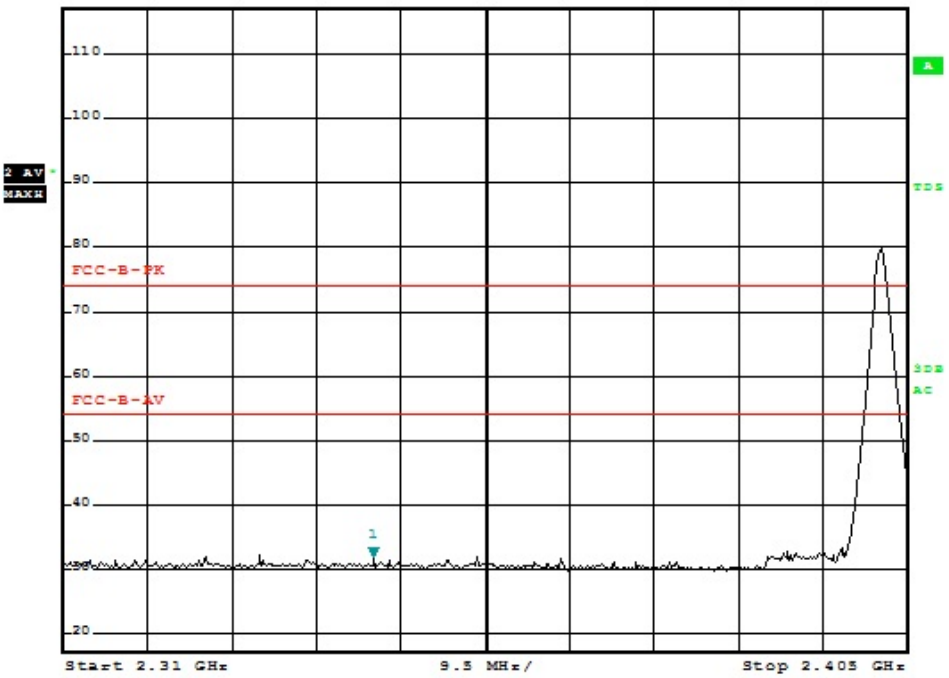


Radiated

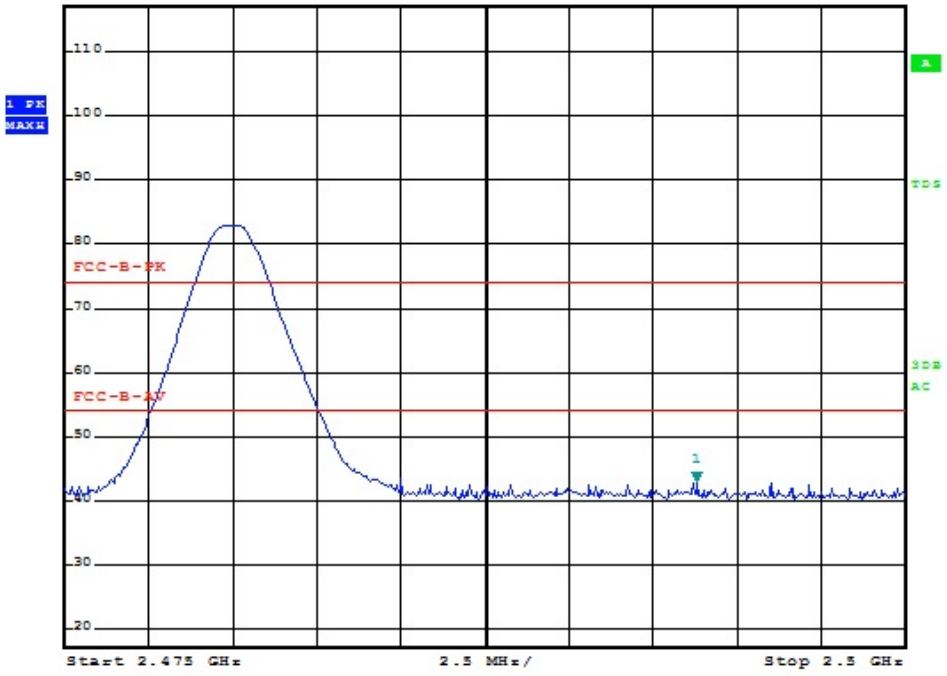
Peak Detector: RBW: 1 MHz, VBW: 1 MHz (2 310 MHz - 2 390 MHz), Worst case (Low, Vertical)



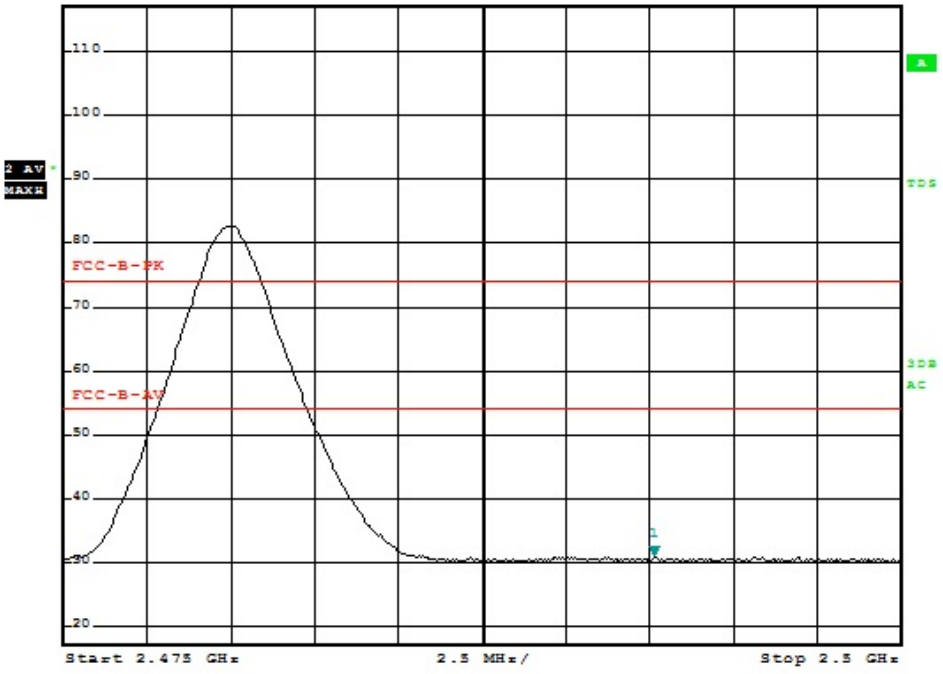
AV Detector: RBW: 1 MHz, VBW: 10 Hz (2 310 MHz - 2 390 MHz), Worst case (Low, Vertical)



Peak Detector: RBW: 1 MHz, VBW: 1 MHz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)



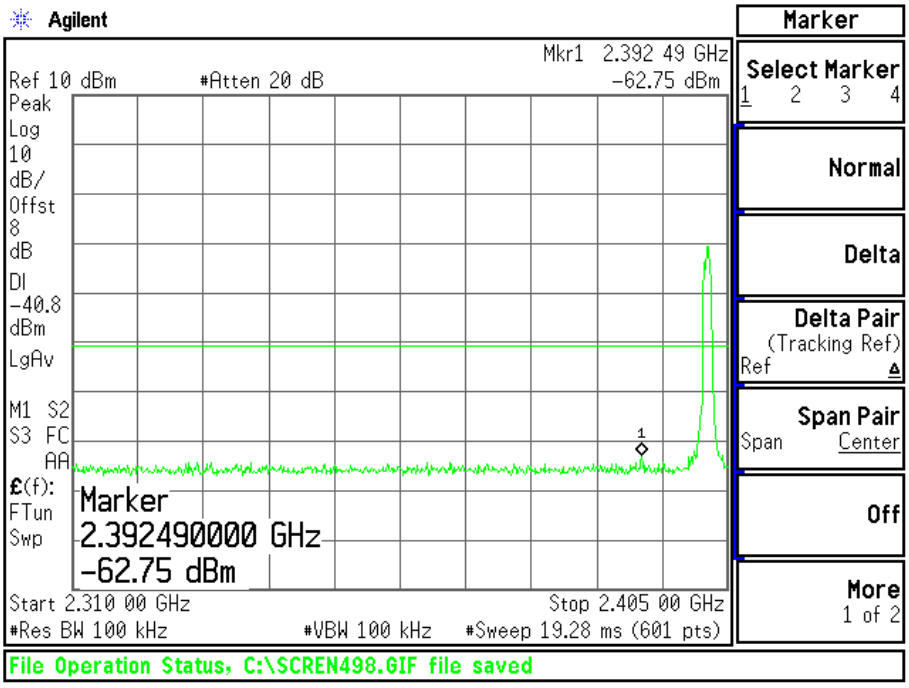
AV Detector: RBW: 1 MHz, VBW: 10 Hz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)

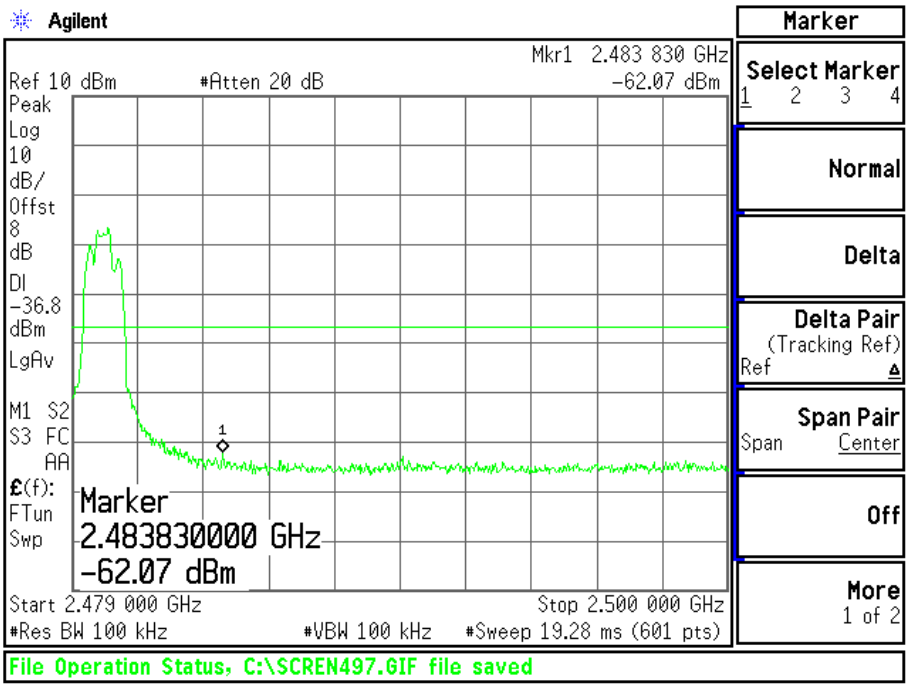


Plots of Bandwidth of Frequency Band Edges (EDR)

[Non-hopping mode]

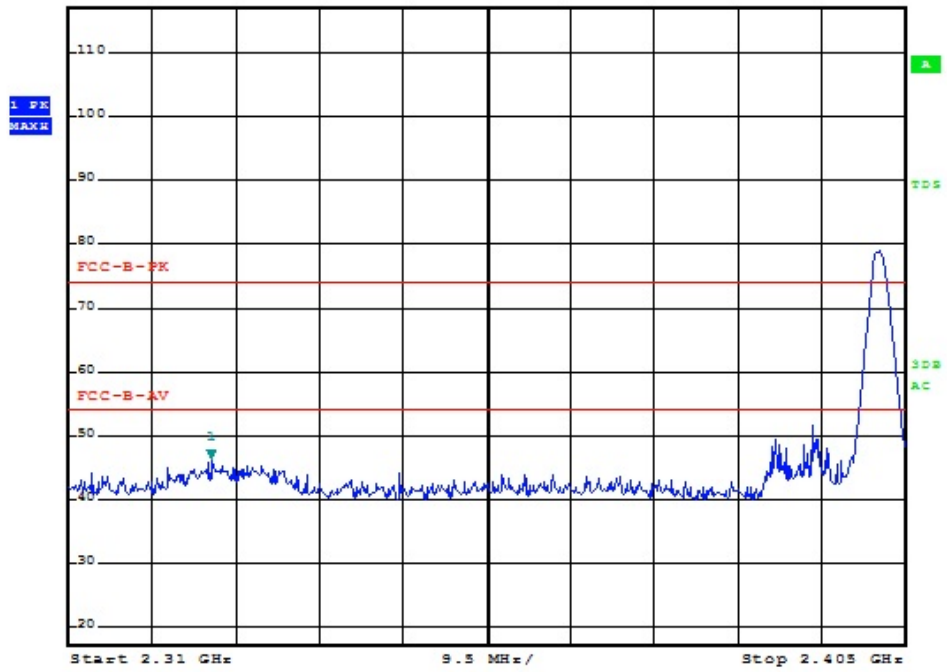
Conducted



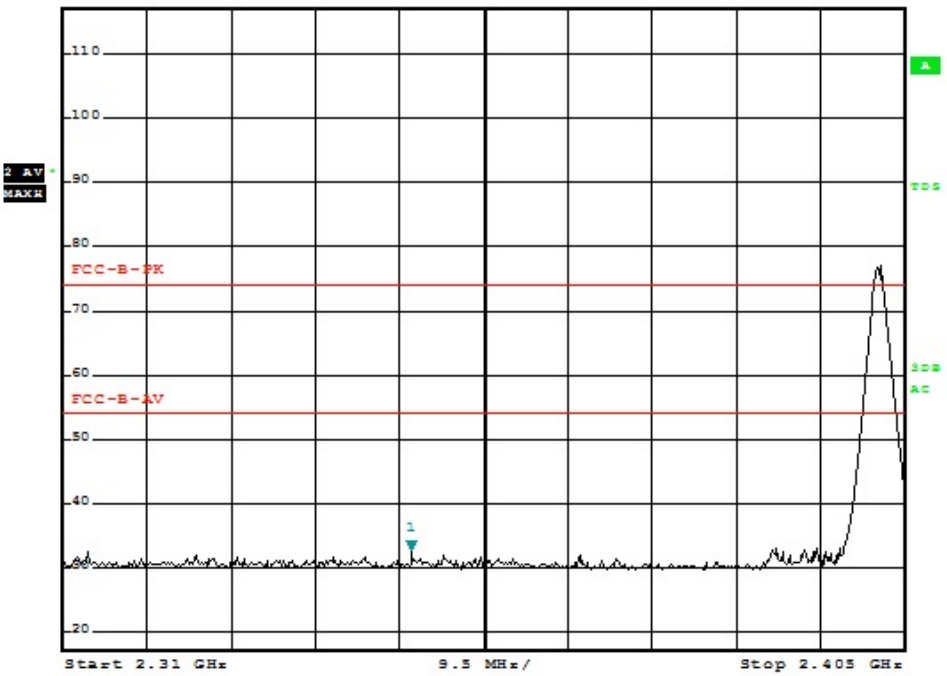


Radiated

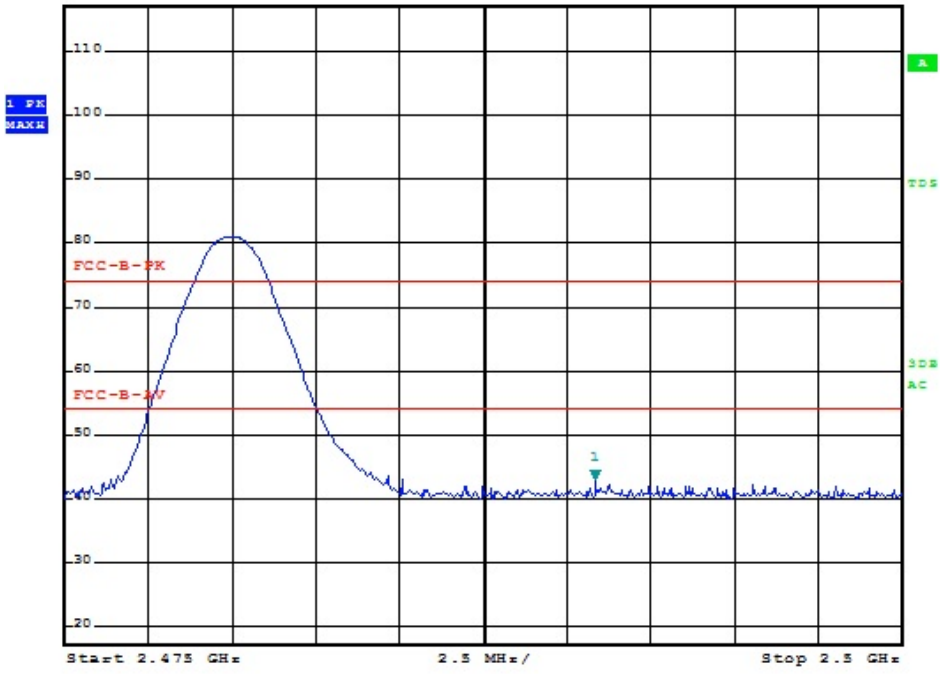
Peak Detector: RBW: 1 MHz, VBW: 1 MHz (2 310 MHz - 2 390 MHz), Worst case (Low, Vertical)



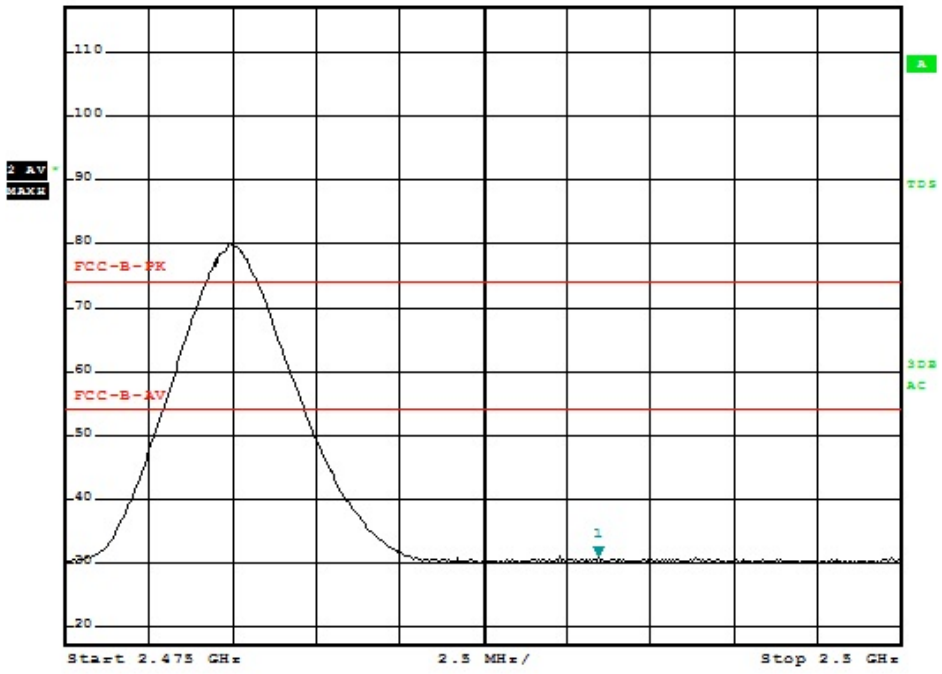
AV Detector: RBW: 1 MHz, VBW: 10 Hz (2 310 MHz - 2 390 MHz), Worst case (Low, Vertical)



Peak Detector: RBW: 1 MHz, VBW: 1 MHz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)



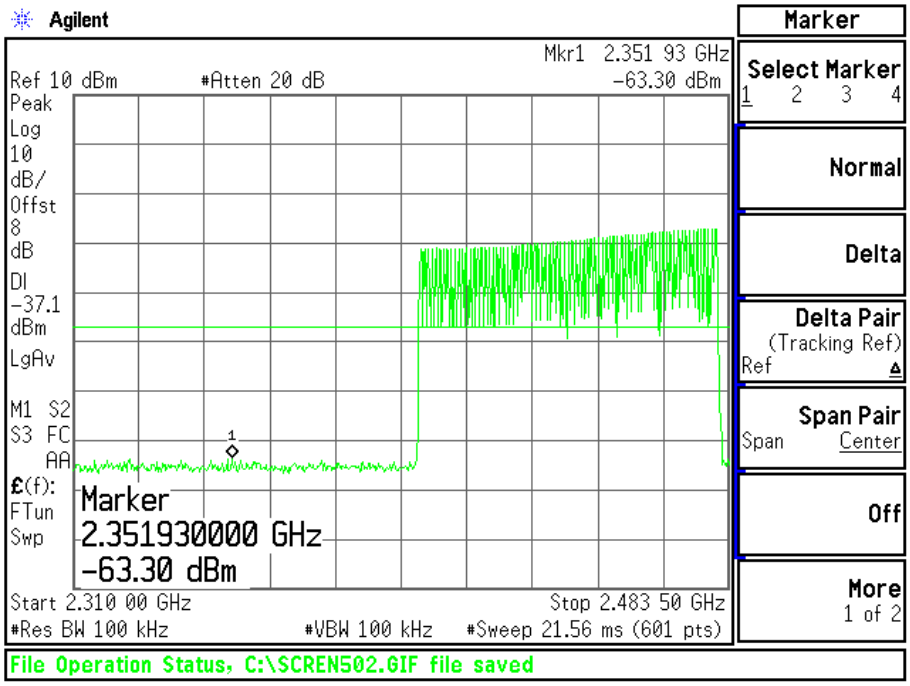
AV Detector: RBW: 1 MHz, VBW: 10 Hz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)

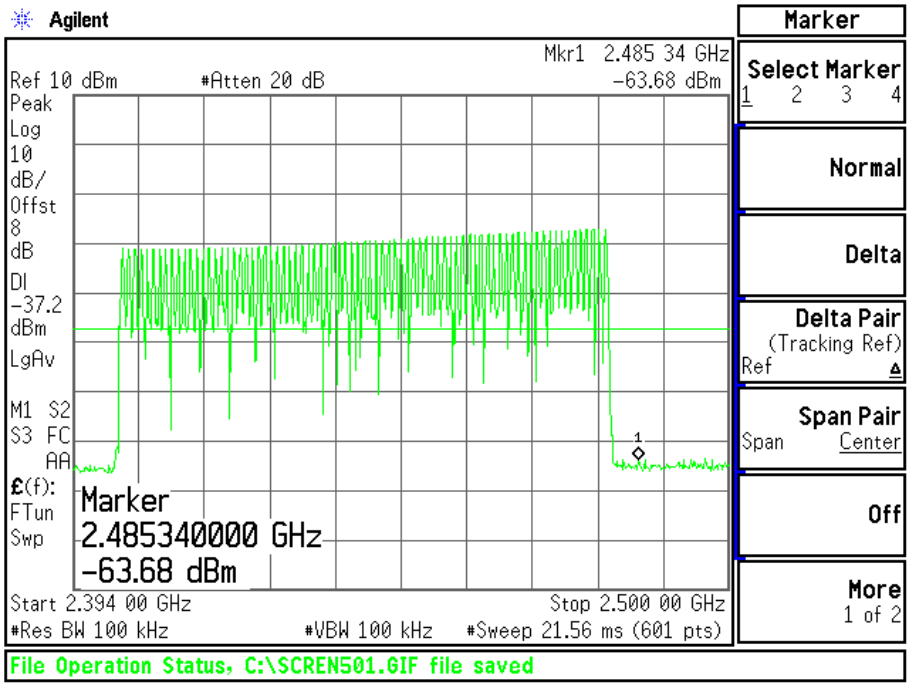


Plots of Bandwidth of Frequency Band Edges (BDR)

[Hopping mode]

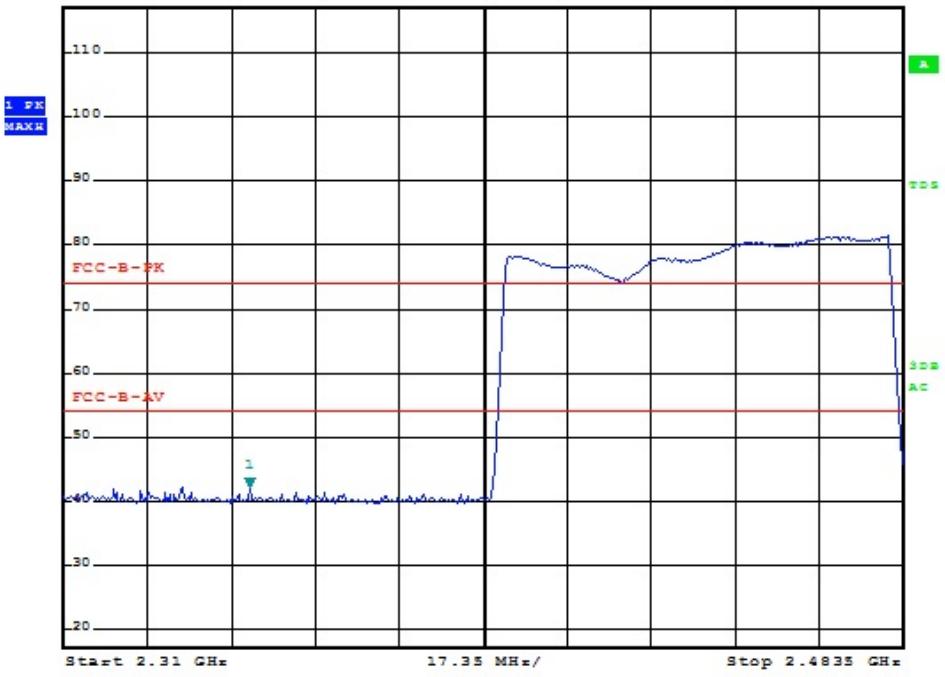
Conducted



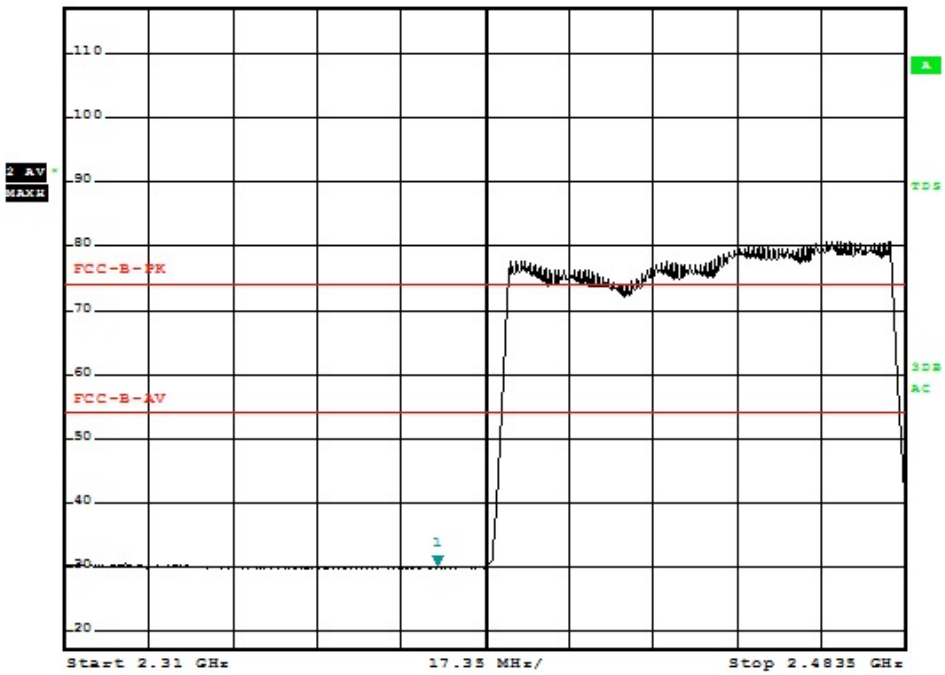


Radiated

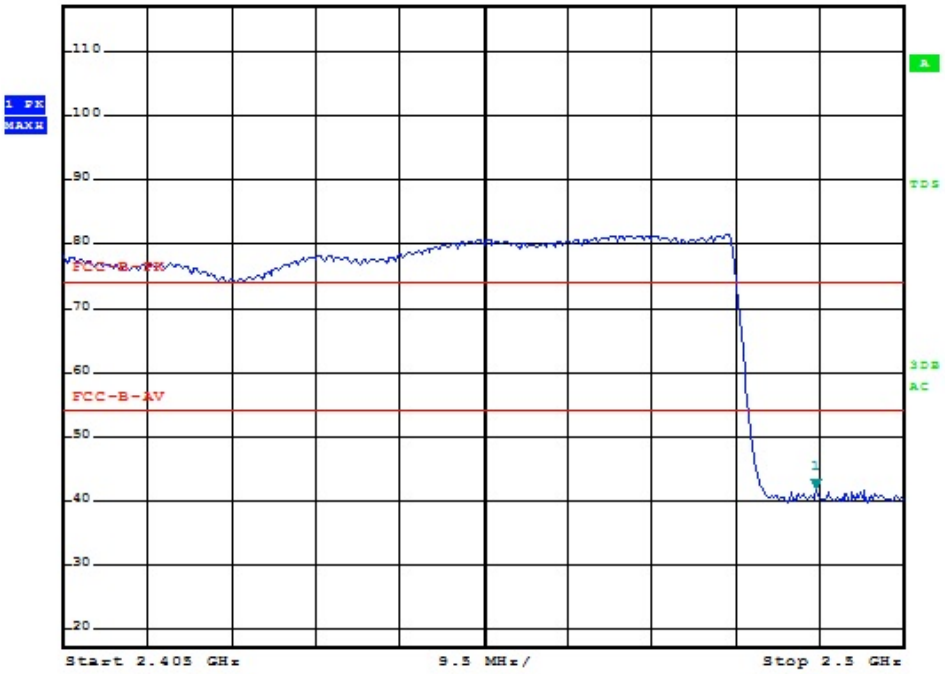
Peak Detector: RBW: 1 MHz, VBW: 1 MHz (2 310 MHz - 2 390 MHz), Worst case (Low, Vertical)



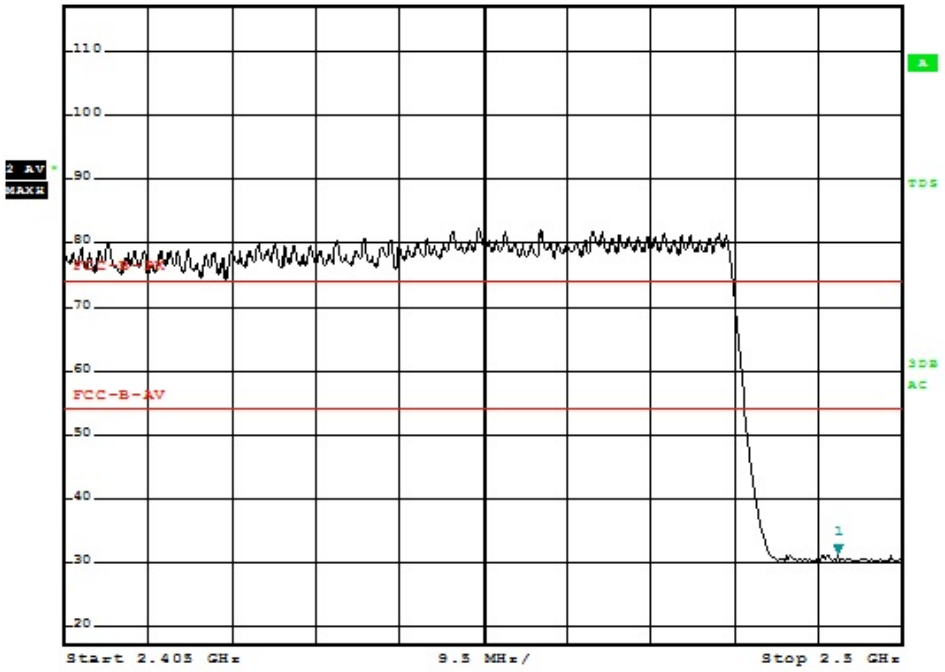
AV Detector: RBW: 1 MHz, VBW: 10 Hz (2 310 MHz - 2 390 MHz), Worst case (Low, Vertical)



Peak Detector: RBW: 1 MHz, VBW: 1 MHz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)



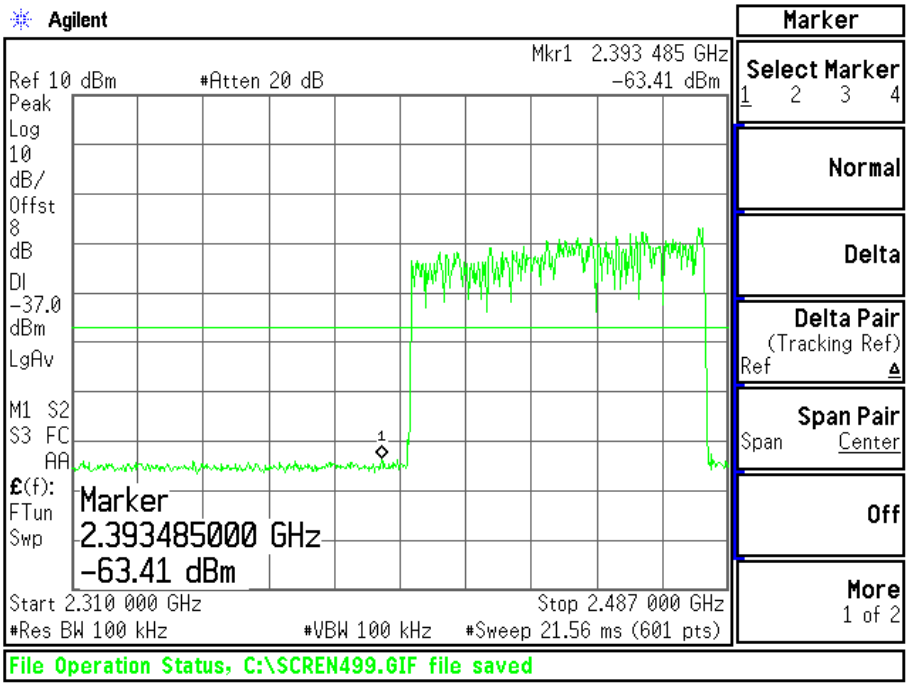
AV Detector: RBW: 1 MHz, VBW: 10 Hz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)

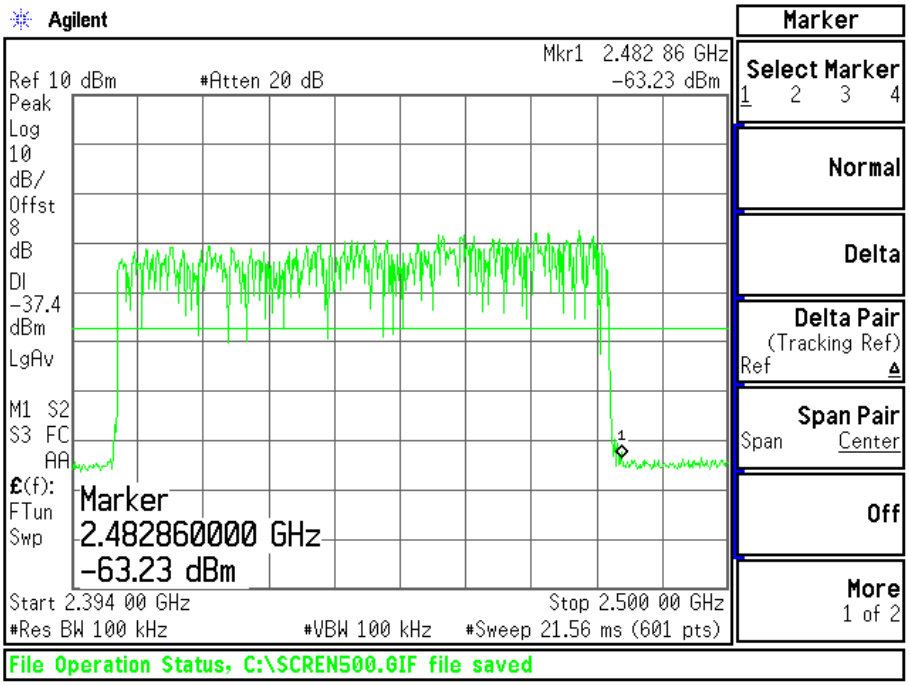


Plots of Bandwidth of Frequency Band Edges (EDR)

[Hopping mode]

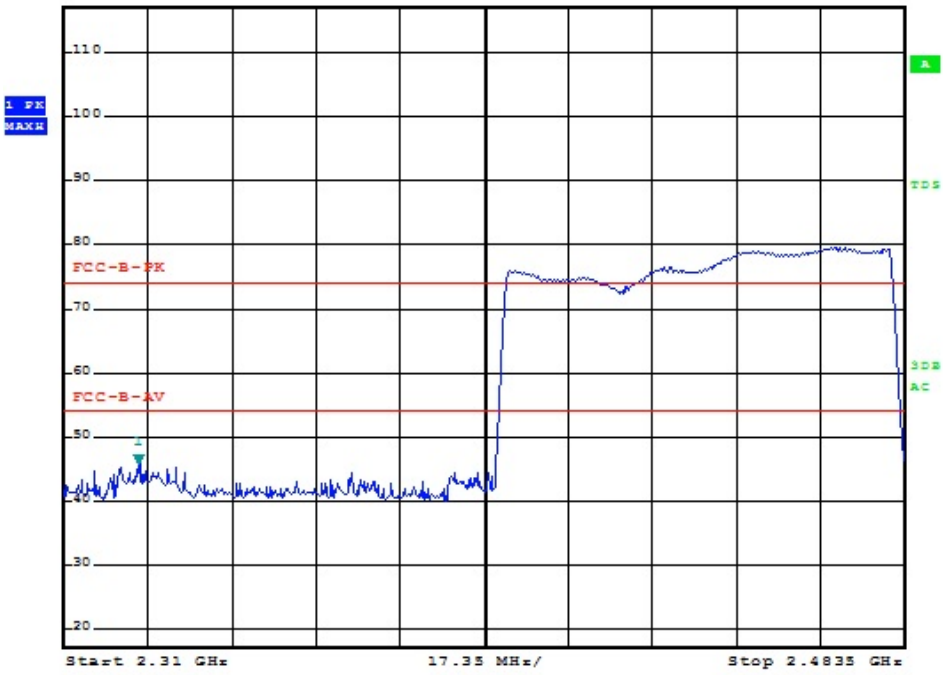
Conducted



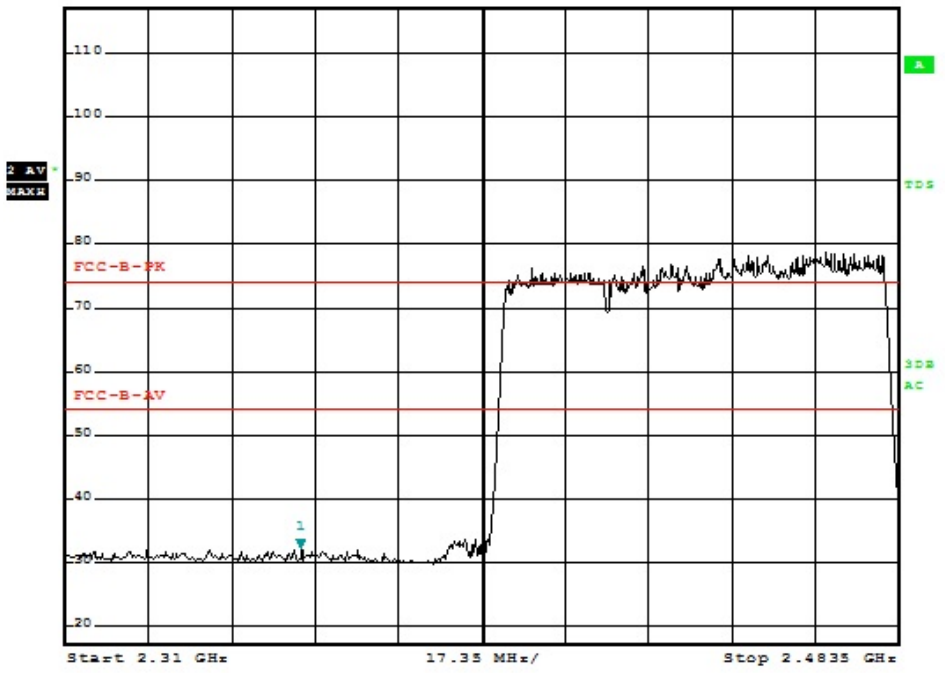


Radiated

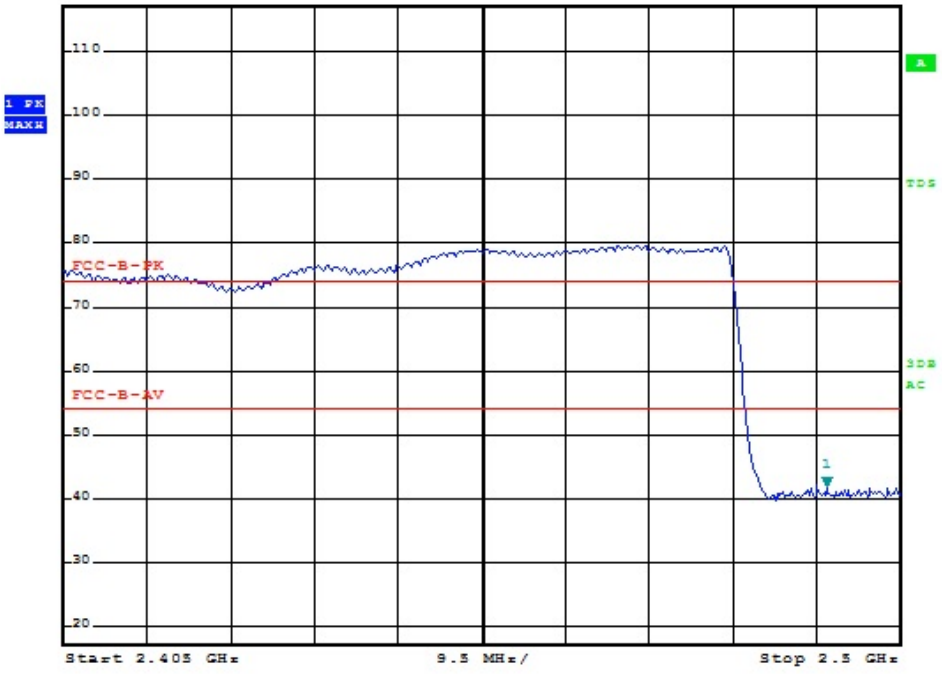
Peak Detector: RBW: 1 MHz, VBW: 1 MHz (2 310 MHz - 2 390 MHz), Worst case (Low, Vertical)



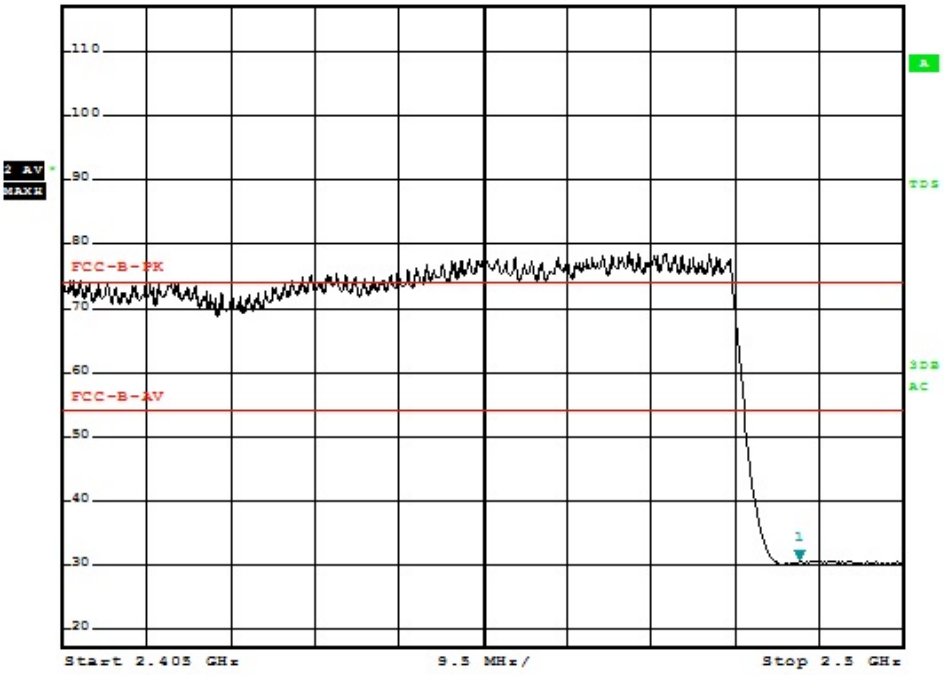
AV Detector: RBW: 1 MHz, VBW: 10 Hz (2 310 MHz - 2 390 MHz), Worst case (Low, Vertical)



Peak Detector: RBW: 1 MHz, VBW: 1 MHz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)



AV Detector: RBW: 1 MHz, VBW: 10 Hz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)



6.5 Number of Hopping Channels

Limit

Frequency hopping systems in the 2 400.0 MHz - 2 483.5 MHz band shall use at least 15 channels.

Test Data

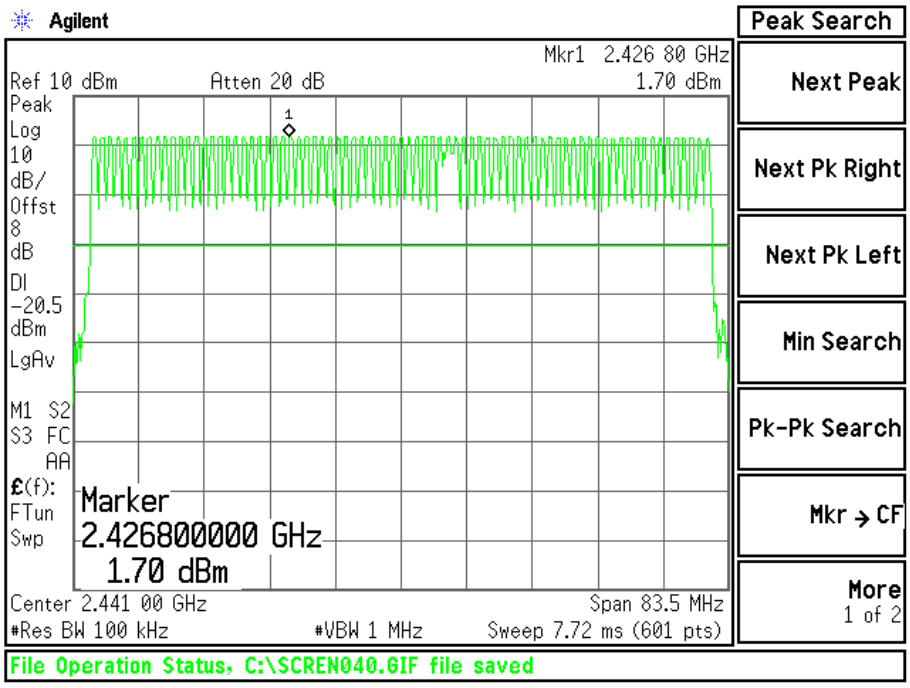
Type of Modulation	Result	Limit
BDR	79	> 15 Channel
EDR	79	

NOTES:

1. Measure number of hopping channel of relevant channel using spectrum analyzer.
2. Please see the measured plot in next page.

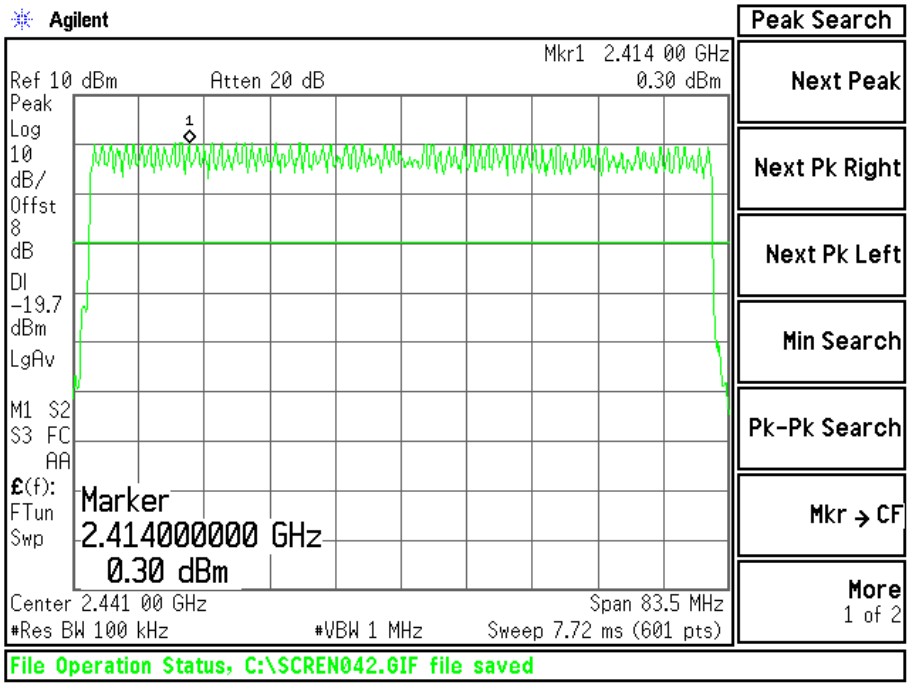
Plots of Number of Hopping Channels (BDR)

[Hopping Channels]



Plots of Number of Hopping Channels (EDR)

[Hopping Channels]



6.6 Time of Occupancy

Limit

Frequency hopping systems in the 2 400.0 MHz - 2 483.5 MHz band. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test Data

Time of Occupancy

Test period = 0.4 [seconds/channel] x 79 [channel]
Actual = Reading x (Hopping rate/Number of channels) x Test period
- Hopping rate (DH5 Packet) = 1 600 [hopping/second] / 6 [time slot] = 266.667
- Hopping rate (3DH5 Packet) = 1 600 [hopping/second] / 6 [time slot] = 266.667

- Type of Modulation: BDR

0.4 s x 79 (CH) = 31.6 s
2.900 ms x (266.667/79) x 31.6 s = 309.333 ms

- Type of Modulation: EDR

0.4 s x 79 (CH) = 31.6 s
2.875 ms x (266.667/79) x 31.6 s = 302.294 ms

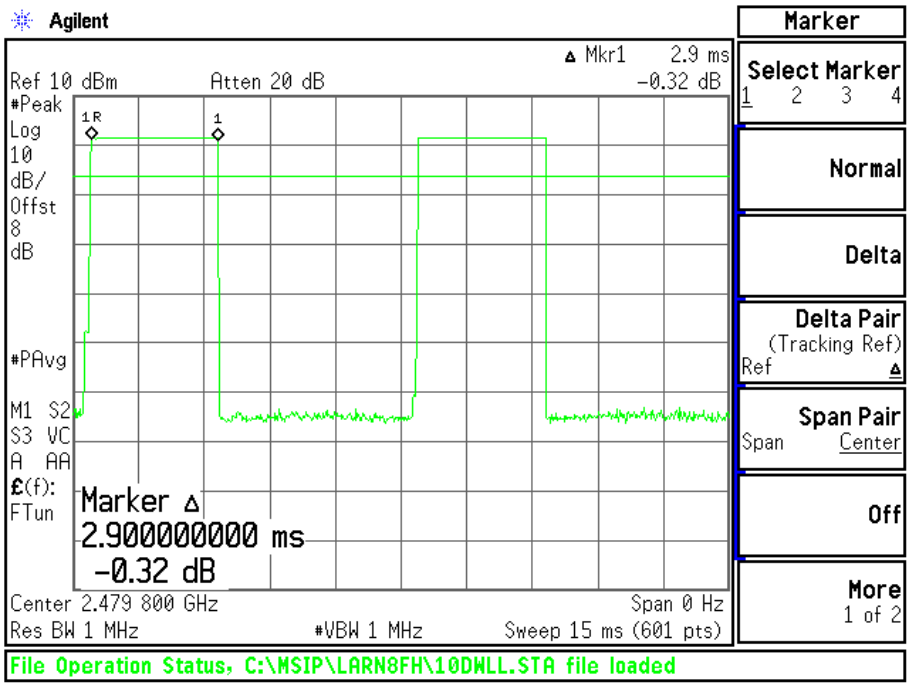
Type of Modulation	Pulse Time [ms]	Total of Dwell [ms]	Limit [ms]
BDR	2.900	309.333	400.000
EDR	2.875	306.667	400.000

NOTES:

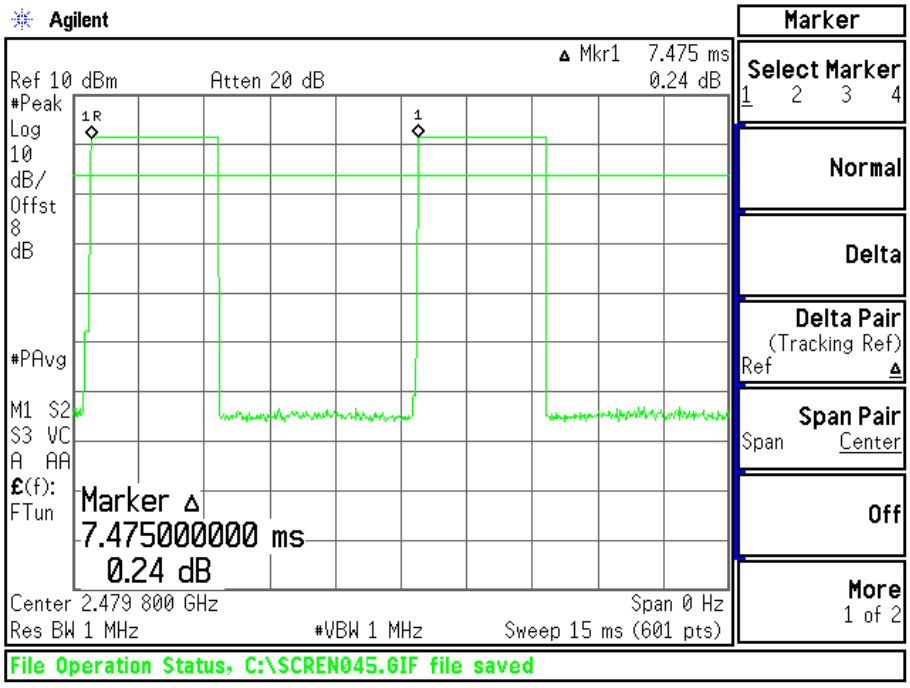
1. BDR: This test was applied both to DH1, DH3 and DH5. (Worst case: DH5)
2. EDR: This test was applied both to 2DH1, 2DH3, 2DH5, 3DH1, 3DH3 and 3DH5. (Worst case: 3DH5)
3. Measure time of occupancy of relevant channel using spectrum analyzer.
4. Please see the measured plot in next page.

Plots of Time of Occupancy (BDR)

[Continuous Time]

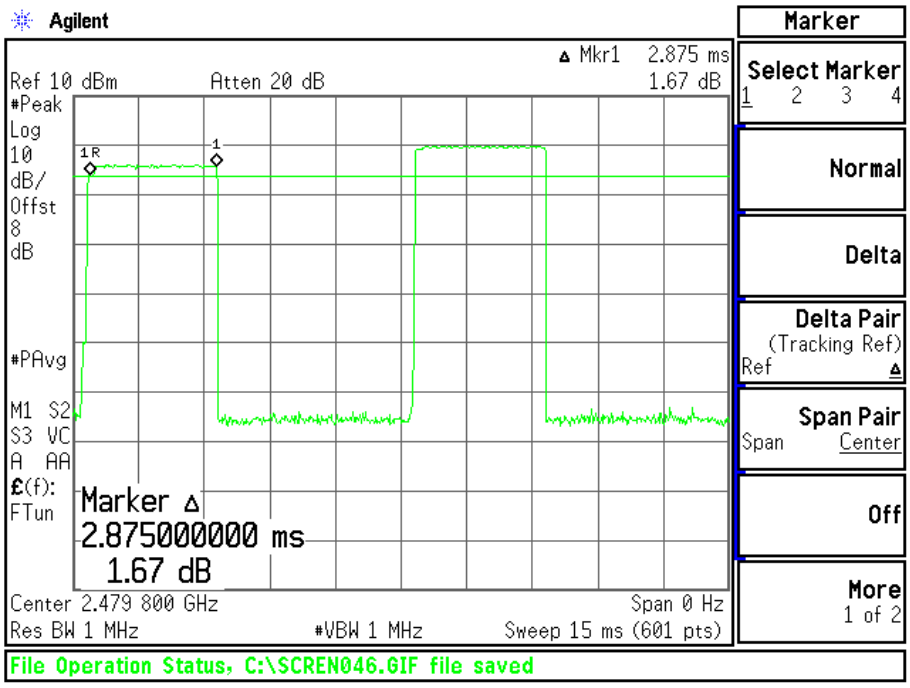


[Hopping Period]

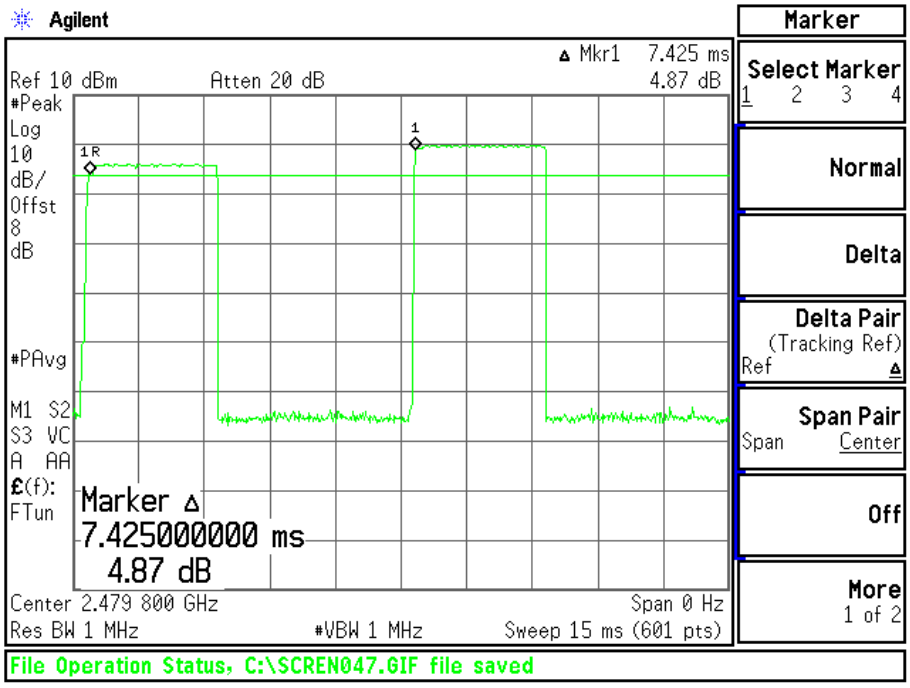


Plots of Time of Occupancy (EDR)

[Continuous Time]



[Hopping Period]



6.7 Spurious Emissions

Limit

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequencies [MHz]	Field Strength [μV/m]	Measurement Distance [m]
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30.0	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 MHz - 72 MHz, 76 MHz - 88 MHz, 174 MHz - 216 MHz or 470 MHz - 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

Test Results

- Refer to see the measured plot in next page.

Radiated Emissions Test data

- 9 kHz to 30 MHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.
Detector mode: CISPR Quasi-Peak mode (100 Hz, 9 kHz)

- Type of Modulation: BDR, EDR

Frequency [MHz]	Reading [dB(μV)]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
	Emission attenuated more than 20 dB below the limit are not reported.						

Result: All emissions below noise floor of 20 dB(μV/m).

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss
3. Margin = Limit - Result
4. The measurement was performed for the frequency range 9 kHz to 30 MHz according to FCC Part 15.209.

- Below 1 GHz (30 MHz to 1 GHz)

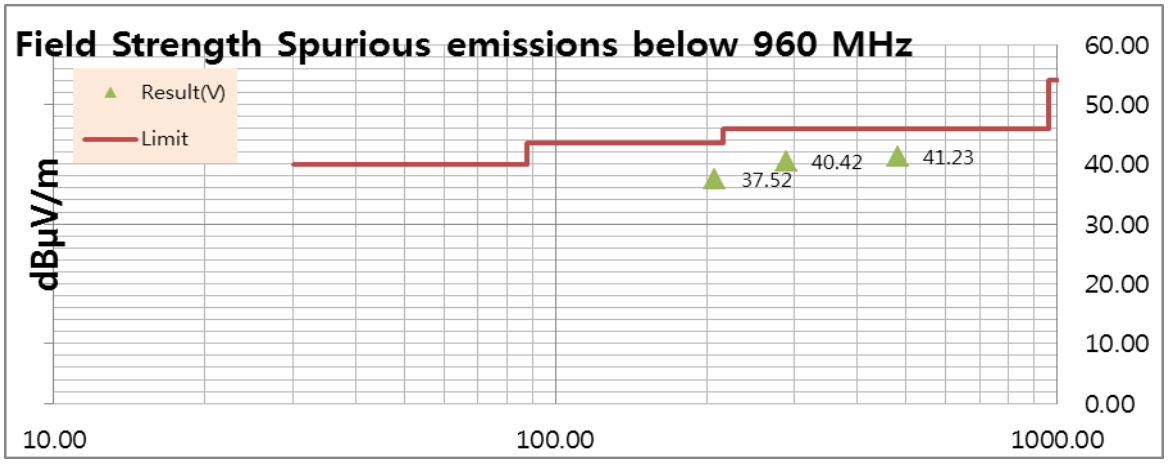
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 120 kHz)

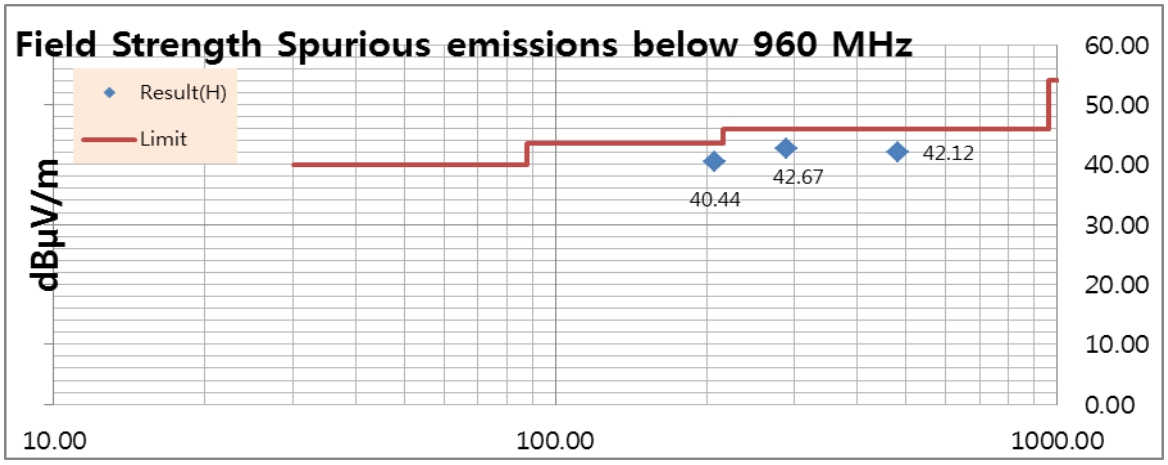
- Type of Modulation: BDR (Worst case)

Emission Frequency [MHz]	Measure Value [dBµV]	Antenna Pola V/H	Antenna Factor [dB/m]	Cable Loss [dB]	Field Strength dBµV/m @ 3m	Limit dBµV/m @ 3m	Margin [dB]
207.85	26.55	V	9.80	1.17	37.52	43.5	5.98
287.99	26.21	V	12.80	1.41	40.42	46.0	5.58
480.53	21.95	V	17.33	1.95	41.23	46.0	4.77
207.85	29.47	H	9.80	1.17	40.44	43.5	3.06
287.99	28.46	H	12.80	1.41	42.67	46.0	3.33
480.53	22.84	H	17.33	1.95	42.12	46.0	3.88

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss
3. Margin value = Limit - Result
4. The measurement was performed for the frequency range above 30 MHz according to FCC Part 15.209.





- Above 1 GHz (1 GHz to 25 GHz)

- Type of Modulation: BDR

1. Low CH

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average				Peak	Average	Peak	Average	Peak	Average
5616.10	65.09	53.11	V	33.49	5.69	55.19	44.06	73.97	53.97	25.7	15.2

2. Middle CH

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average				Peak	Average	Peak	Average	Peak	Average
5616.10	66.01	54.09	V	33.49	5.69	54.57	43.67	73.97	53.97	25.4	14.9

3. High CH

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average				Peak	Average	Peak	Average	Peak	Average
5114.00	65.78	53.47	V	32.57	5.60	51.26	40.71	73.97	53.97	23.1	13.7

Result: No signal detect above second harmonic.

- Type of Modulation: EDR

1. Low CH

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average				Peak	Average	Peak	Average	Peak	Average
5616.10	64.15	52.67	V	33.49	5.69	54.17	42.77	73.97	53.97	24.1	15.0

2. Middle CH

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average				Peak	Average	Peak	Average	Peak	Average
5616.10	66.09	55.10	V	33.49	5.69	53.77	44.20	73.97	53.97	25.9	15.4

3. High CH

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average				Peak	Average	Peak	Average	Peak	Average
5114.00	64.54	52.66	V	32.57	5.60	50.94	41.64	73.97	53.97	22.9	14.6

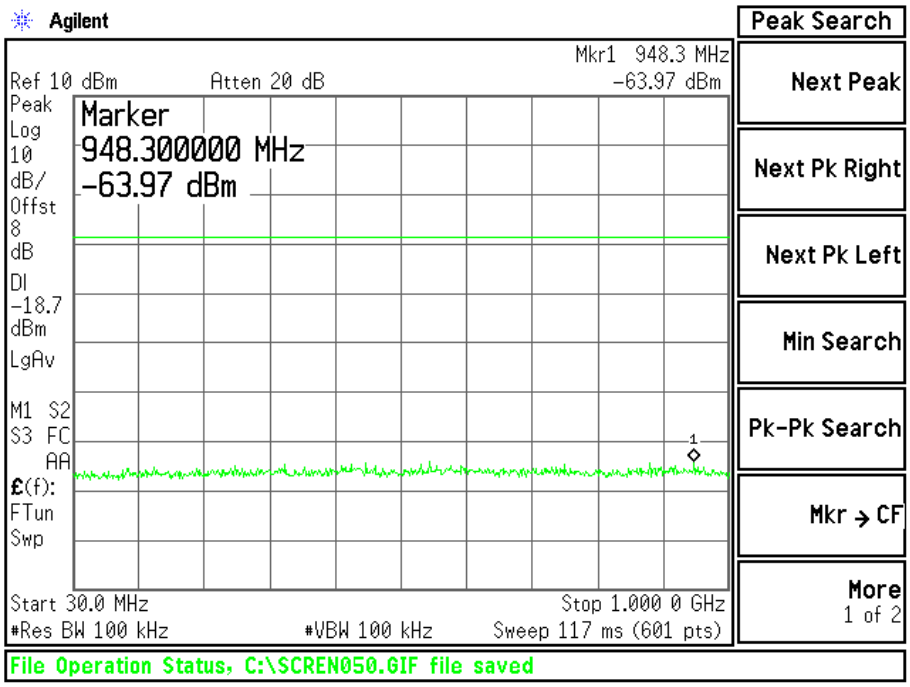
Result: No signal detect above second harmonic.

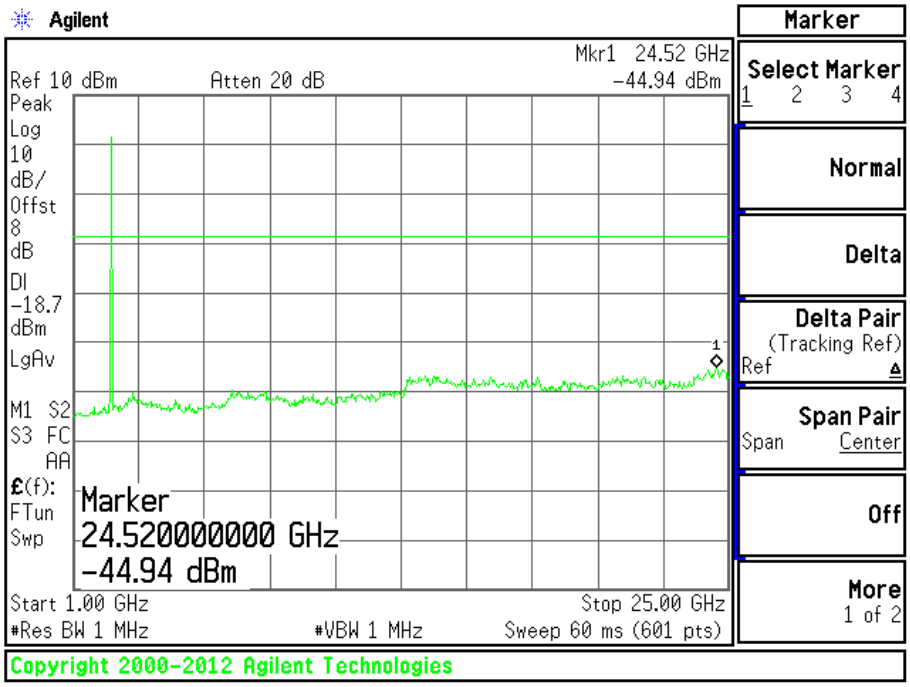
NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Cable loss = Cable loss + Amp. Gain
3. Result = Reading + Antenna factor + Cable loss
4. Margin value = Limit - Result
5. Measuring frequencies from 1 GHz to the 10^{th} harmonic of highest fundamental frequency.
6. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded(ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
7. Spectrum setting:
   a. Peak Setting 1 GHz to 10^{th} harmonics of fundamental, RBW = 1 MHz, VBW = 1 MHz, Sweep = Auto
   b. AV Setting 1 GHz to 10^{th} harmonics of fundamental, RBW = 1 MHz, VBW = 10 Hz, Sweep = Auto

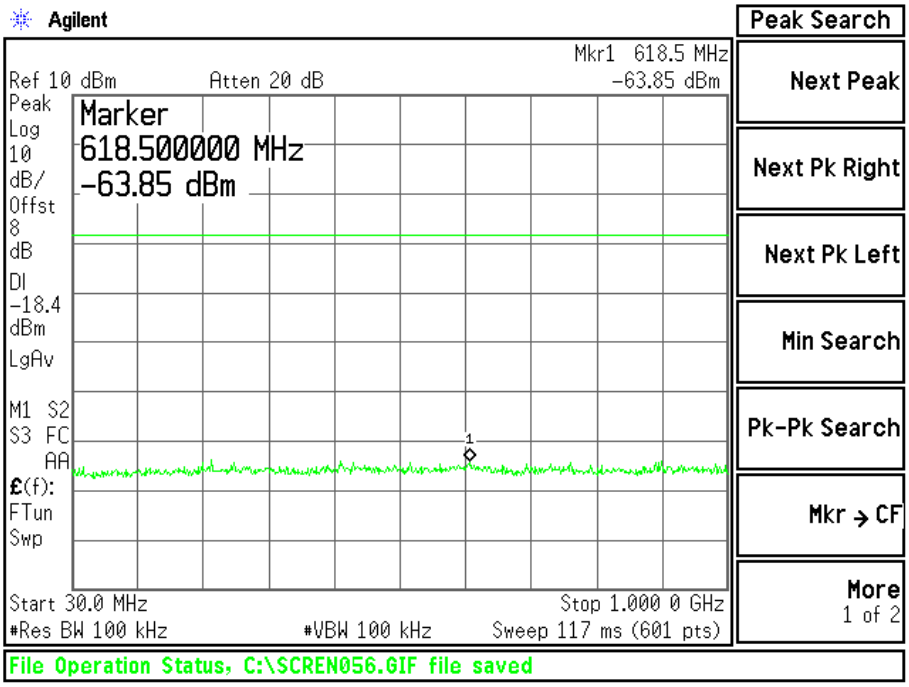
Plots of Spurious Emissions (Conducted Measurement) (BDR)

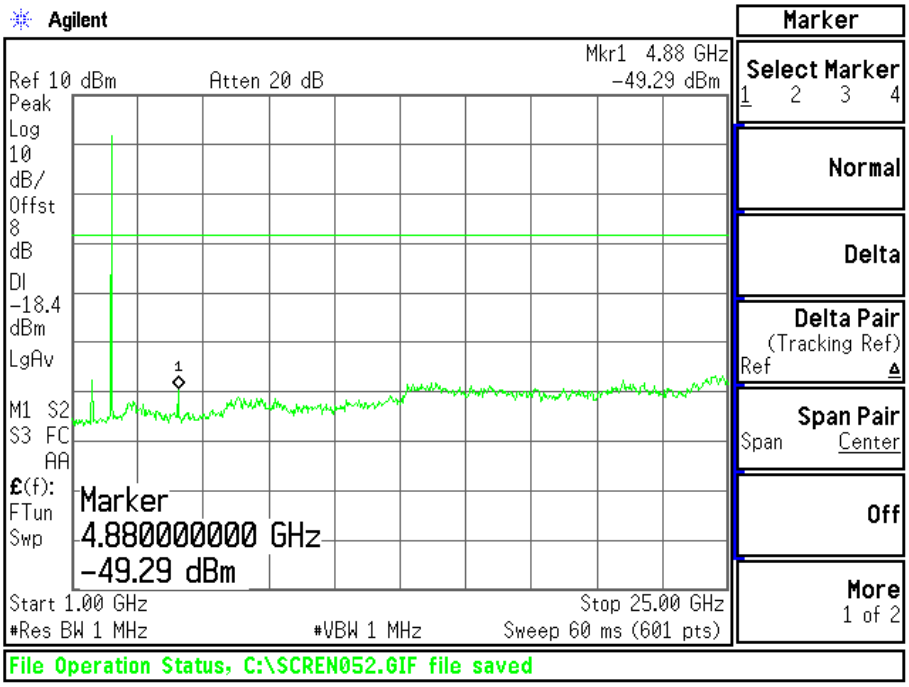
[CH Low]



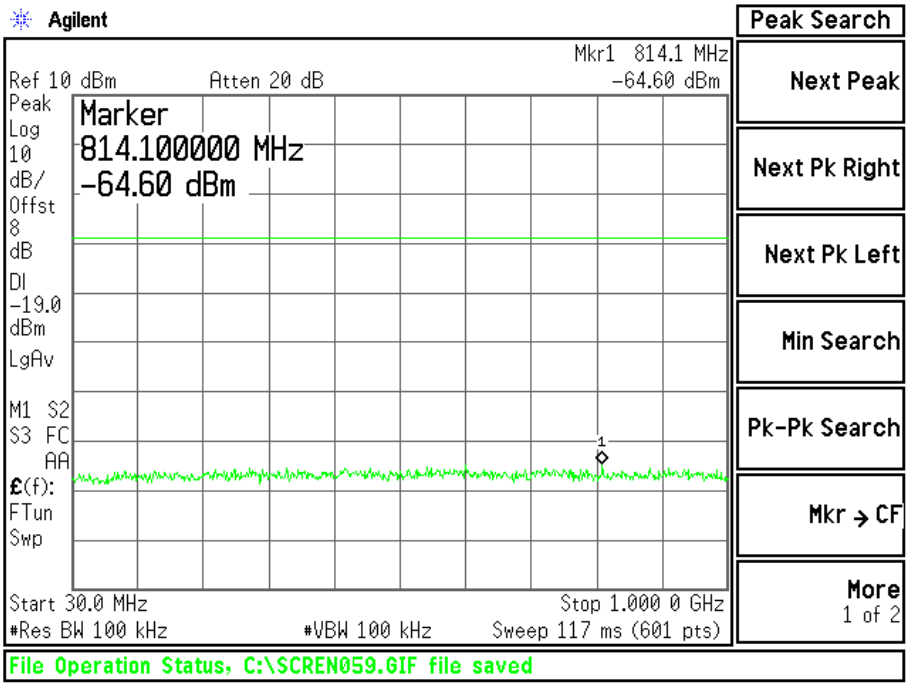


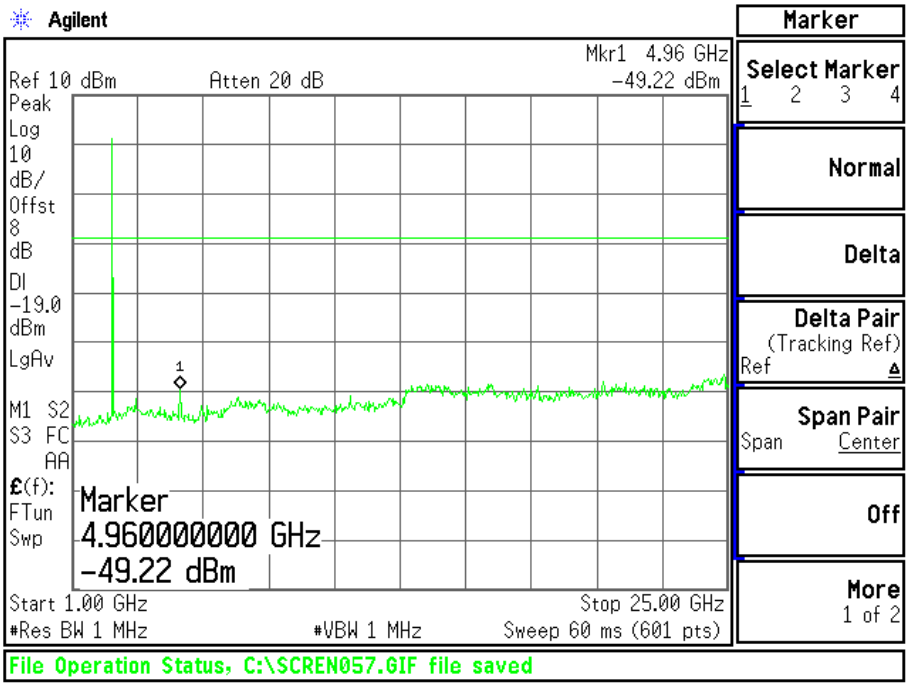
[CH Mid]


Agilent
Mkr1 618.5 MHz
Ref 10 dBm
Atten 20 dB
-63.85 dBm
Peak
Log
10
dB/
Offst
8
dB
Dl
-18.4
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
618.500000 MHz
-63.85 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 1.000 0 GHz
Sweep 117 ms (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, C:\SCREN056.GIF file saved


Agilent
Mkr1 4.88 GHz
Ref 10 dBm
Atten 20 dB
-49.29 dBm
Peak
Log
10
dB/
Offst
8
dB
Dl
-18.4
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
4.880000000 GHz
-49.29 dBm
Start 1.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 25.00 GHz
Sweep 60 ms (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, C:\SCREN052.GIF file saved

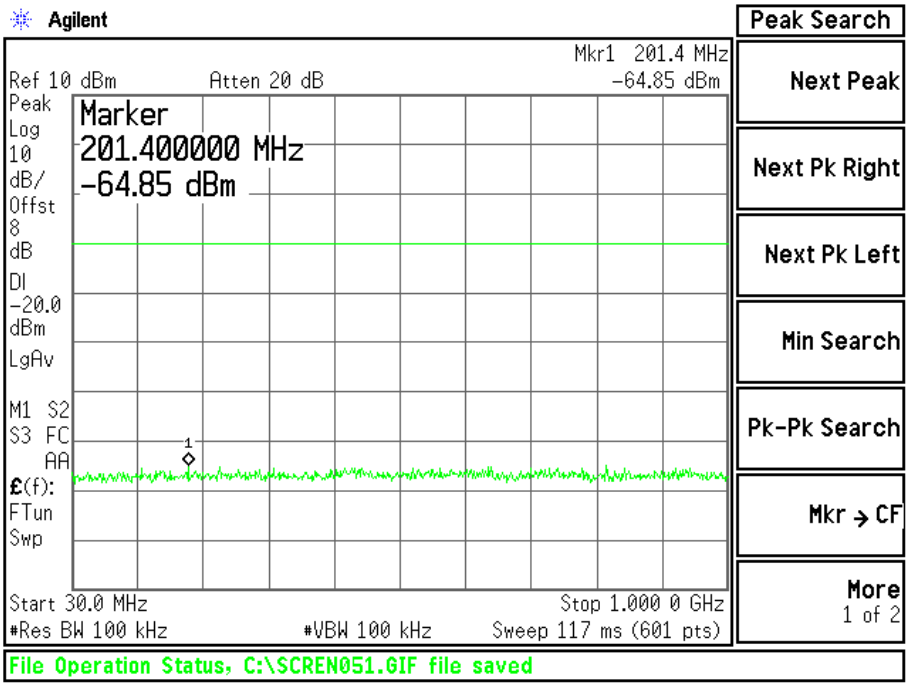
[CH High]

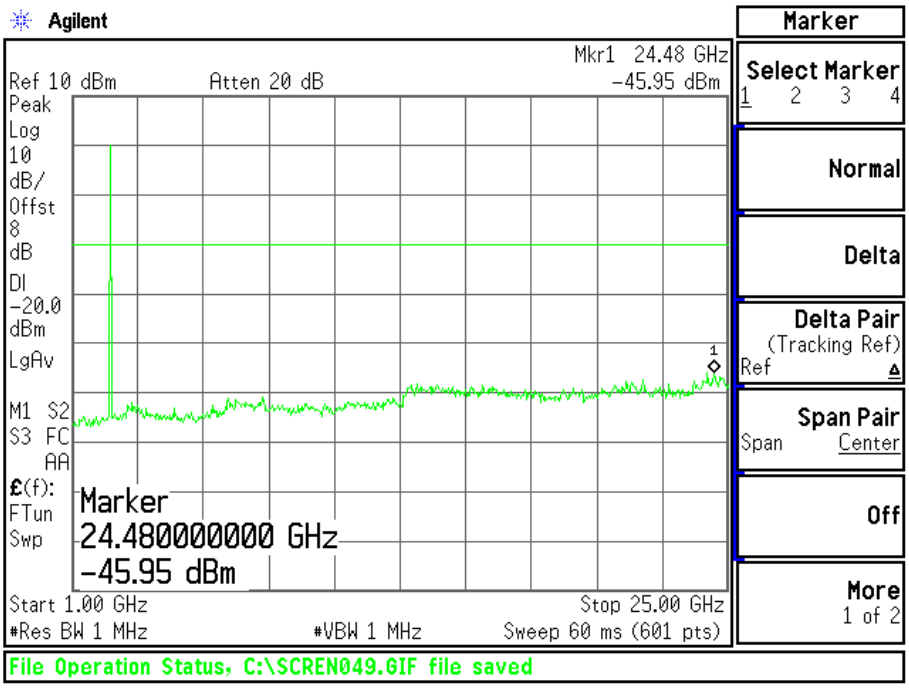

Agilent
Peak Search
Mkr1 814.1 MHz
Ref 10 dBm
Atten 20 dB
-64.60 dBm
Peak
Log
10
dB/
Offst
8
dB
Dl
-19.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
814.100000 MHz
-64.60 dBm
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 30.0 MHz
Stop 1.000 0 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 117 ms (601 pts)
File Operation Status, C:\SCREN059.GIF file saved


Agilent
Marker
Mkr1 4.96 GHz
Ref 10 dBm
Atten 20 dB
-49.22 dBm
Peak
Log
10
dB/
Offst
8
dB
Dl
-19.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
4.960000000 GHz
-49.22 dBm
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Start 1.00 GHz
Stop 25.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 60 ms (601 pts)
File Operation Status, C:\SCREN057.GIF file saved

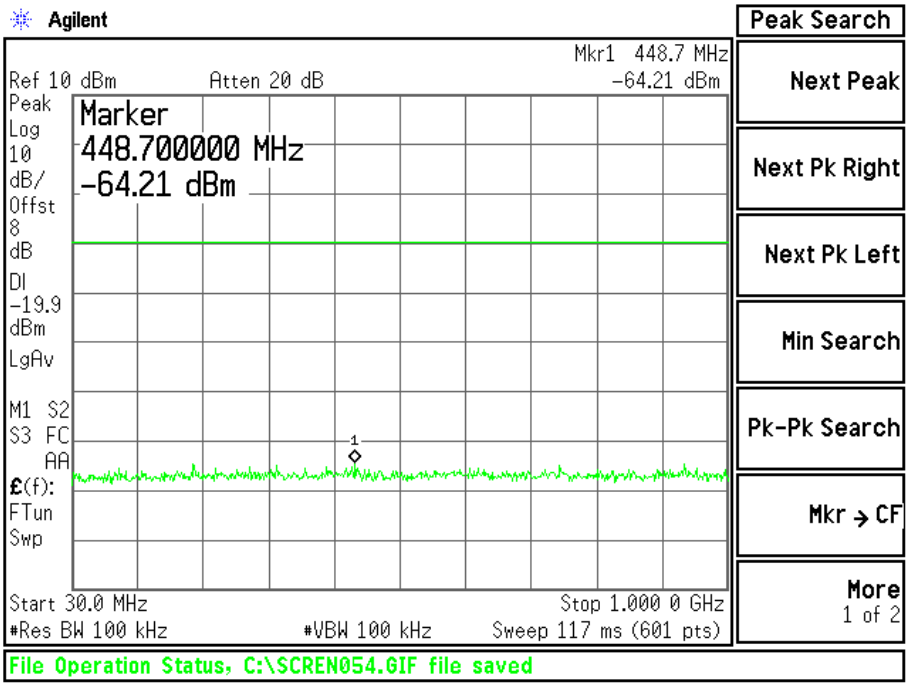
Plots of Spurious Emissions (Conducted Measurement) (EDR)

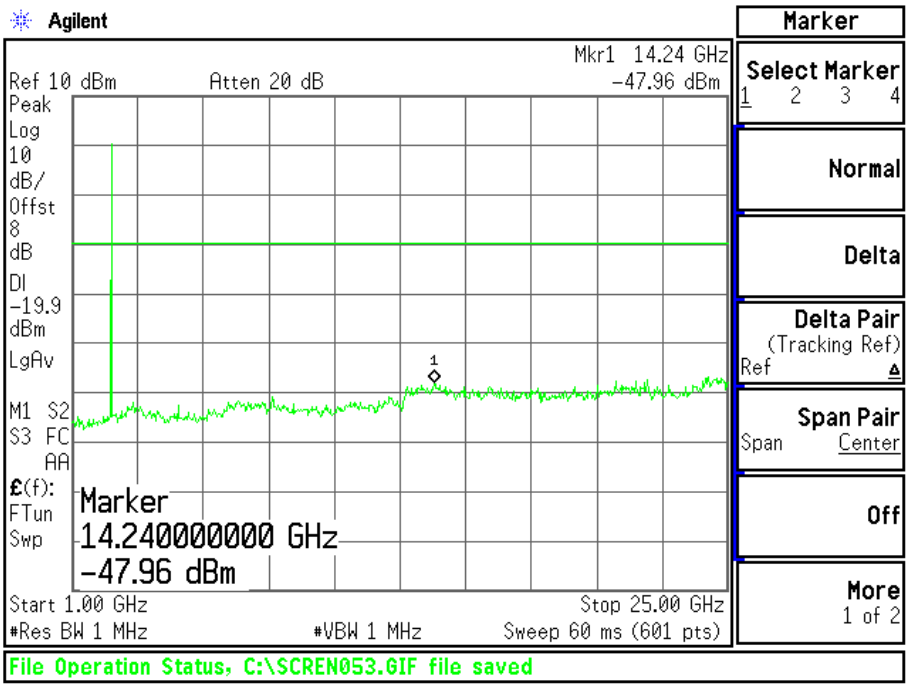
[CH Low]



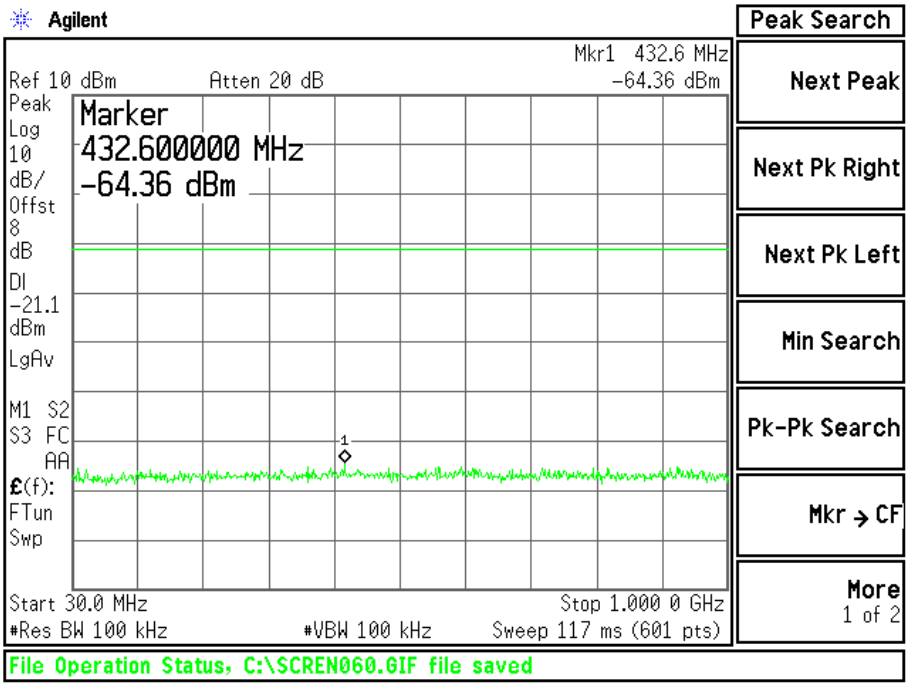


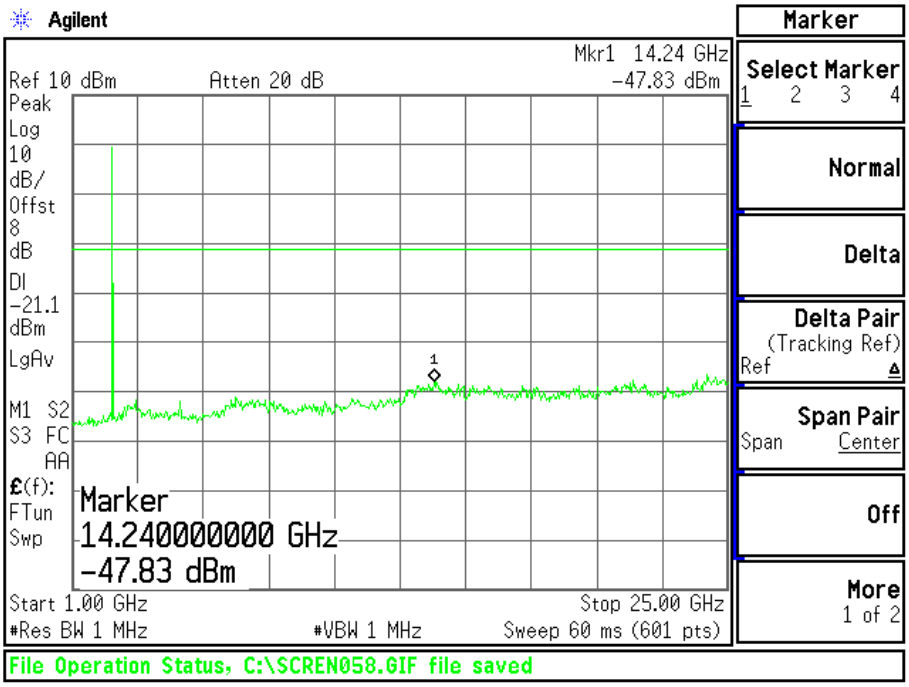
[CH Mid]


Agilent
Peak Search
Mkr1 448.7 MHz
Ref 10 dBm
Atten 20 dB
-64.21 dBm
Peak
Log
10
dB/
Offst
8
dB
Dl
-19.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
448.700000 MHz
-64.21 dBm
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 30.0 MHz
Stop 1.000 0 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 117 ms (601 pts)
File Operation Status, C:\SCREN054.GIF file saved


Agilent
Marker
Mkr1 14.24 GHz
Ref 10 dBm
Atten 20 dB
-47.96 dBm
Peak
Log
10
dB/
Offst
8
dB
Dl
-19.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
14.240000000 GHz
-47.96 dBm
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Start 1.00 GHz
Stop 25.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 60 ms (601 pts)
File Operation Status, C:\SCREN053.GIF file saved

[CH High]


Agilent
Peak Search
Mkr1 432.6 MHz
Ref 10 dBm
Atten 20 dB
-64.36 dBm
Peak
Log
10
dB/
Offst
8
dB
Dl
-21.1
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
432.600000 MHz
-64.36 dBm
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 30.0 MHz
Stop 1.000 0 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 117 ms (601 pts)
File Operation Status, C:\SCREN060.GIF file saved


Agilent
Marker
Mkr1 14.24 GHz
Ref 10 dBm
Atten 20 dB
-47.83 dBm
Peak
Log
10
dB/
Offst
8
dB
Dl
-21.1
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
14.240000000 GHz
-47.83 dBm
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Start 1.00 GHz
Stop 25.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 60 ms (601 pts)
File Operation Status, C:\SCREN058.GIF file saved

6.8 Conducted Emissions Measurement

Limit

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 μH/50 ohms 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 frequencies ranges.

Frequency of Emission [MHz]	Conducted limit [dB(μV)]	
	Quasi-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.

Test Results : Pass

- Refer to see the measured plot in next page.

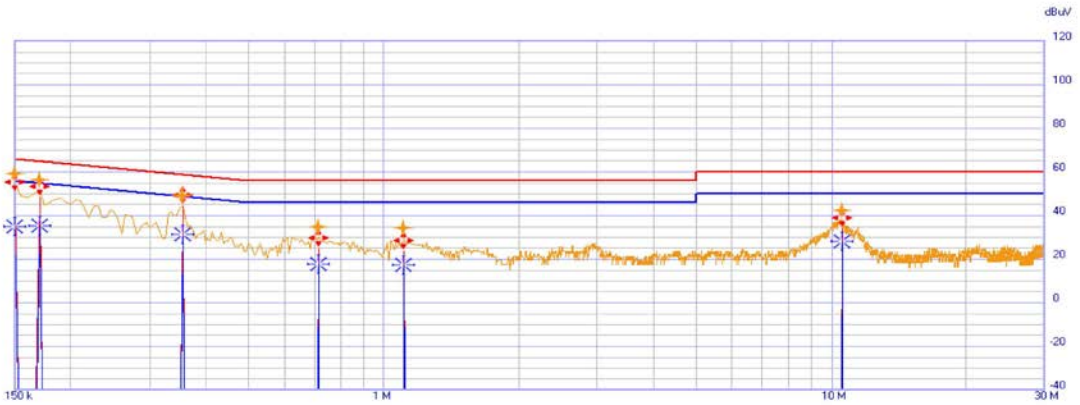
Conducted Emission Test Data

The following data and graph shows the highest levels of conducted emissions on both polarizations of hot and neutral line.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 9 kHz)

NOTES:

1. Please see the measured data and graph in next page.
2. The c.f value was included the antenna factor and cable loss.
3. Result value = Reading + c.f
4. Margin value = Limit – Result
5. Measurements were performed at the AC Power Inlet in the frequency band of 150 kHz ~ 30 MHz according to the FCC Part 15 Class A.

Line: HOT



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (5 kHz)	P Q C Class B_QP Class B_CAV	1500 ms	9 kHz	0	ON	ON	...	...

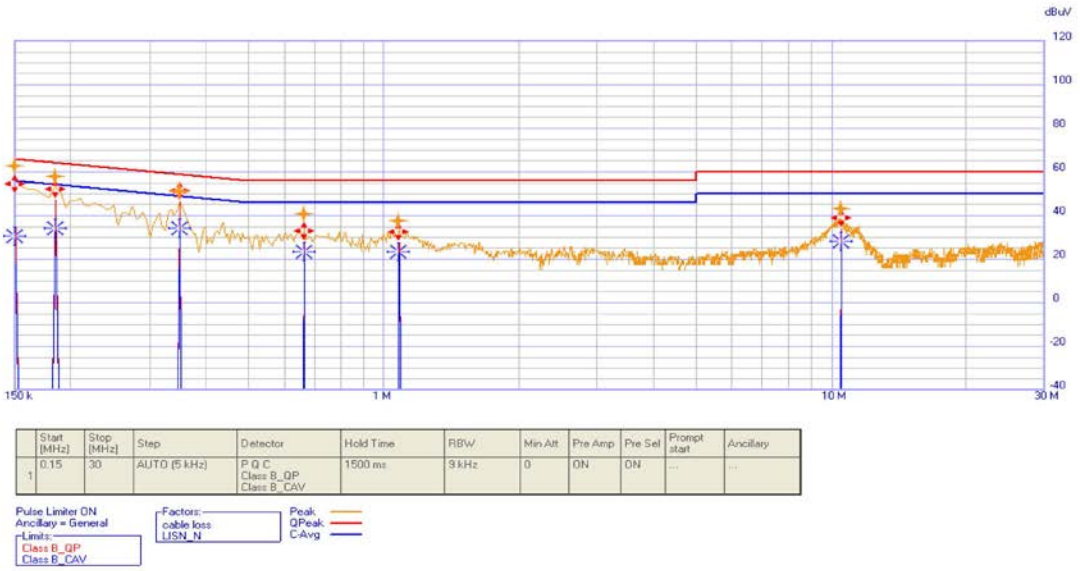
Pulse Limiter ON
Ancillary = General
Limits:
Class B_QP
Class B_CAV

Factors:
cable loss
LISN_L

Peak
QPeak
CAvg

	Frequency [MHz]	QPeak [dBuV]	Limit Class B_QP [dBuV]	Delta [dB]	C-Avg [dBuV]	Limit Class B_CAV [dBuV]	Delta [dB]	Factor cable loss [dB]	Factor LISN_L [dB]
1	0.15	50.52	66.00	-15.48	34.63	56.00	-21.37	0.04	9.59
2	0.17	48.54	64.96	-16.42	35.15	54.96	-19.81	0.04	9.59
3	0.355	44.44	58.84	-14.40	30.97	48.84	-17.87	0.09	9.58
4	0.715	24.76	56.00	-31.24	17.47	46.00	-28.53	0.09	9.59
5	1.11	23.57	56.00	-32.43	17.13	46.00	-28.87	0.05	9.60
6	10.525	33.91	60.00	-26.09	27.98	50.00	-22.02	0.15	9.68

Line: Neutral



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (5 kHz)	P Q C Class B_QP Class B_CAV	1500 ms	9 kHz	0	ON	ON	...	...

Pulse Limiter ON
Ancillary = General
Limits:
Class B_QP
Class B_CAV

Factors:
cable loss
LISN_N

Peak
QPeak
CAvg

	Frequency [MHz]	QPeak [dBuV]	Limit Class B_QP [dBuV]	Delta [dB]	C-Avg [dBuV]	Limit Class B_CAV [dBuV]	Delta [dB]	Factor cable loss [dB]	Factor LISN_N [dB]
1	0.15	49.65	66.00	-16.35	30.31	56.00	-25.69	0.04	9.59
2	0.185	47.23	64.26	-17.03	33.72	54.26	-20.54	0.05	9.59
3	0.35	46.54	58.96	-12.42	33.81	48.96	-15.15	0.09	9.59
4	0.665	28.00	56.00	-28.00	23.10	46.00	-22.90	0.10	9.59
5	1.085	27.50	56.00	-28.50	22.92	46.00	-23.08	0.05	9.60
6	10.44	34.15	60.00	-25.85	27.90	50.00	-22.10	0.15	9.69

6.9 Radio Frequency Exposure

Standard Applicable:

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Portable device with its physical nature to be used nearby, the distance between radiating structure and human is less than 20 cm.

As per KDB 447498 D01, The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] *
[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

f (GHz) is the RF channel transmit frequency in GHz
Power and distance are rounded to the nearest mW and mm before calculation
The result is rounded to one decimal place for comparison

Measurement Result:

This is a portable device and the Max peak output power is (**1.47 mW**) lower than the threshold given and derived as above, where

= 1.47 (mW) / 5 (mm) * √2.441 (GHz) = 0.46 < 3.00

As the result of calculation result indicates, the RF exposure generating from given transmitter (transmitter employed digital modulation) can be excluded from SAR measurement, and is deemed compliant with RF exposure as per FCC.

Type of Modulation	Frequency [MHz]	Output Power [dBm]	Target power W/ tolerance [dBm]	Max tune up power [dBm]	Max tune up power [mW]	Separation distance [mm]	RF exposure	Limit
BDR	**2 402**	1.53	1 ~ 2	2	1.47	5	0.46	3.00
	2 441	**1.68**	**1 ~ 2**	**2**	**1.47**	**5**	**0.46**	**3.00**
	2 480	1.52	1 ~ 2	2	1.47	5	0.46	3.00
EDR	**2 402**	0.75	0 ~ 1	1	1.21	5	0.38	3.00
	2 441	0.82	0 ~ 1	1	1.21	5	0.38	3.00
	2 480	0.33	0 ~ 1	1	1.21	5	0.38	3.00

7. SAMPLE CALCULATION

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - PA

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
PA* = Preamplifier Factor

* PA is only be used for the measuring frequency above 1 GHz.

$dB(\mu V) = 20 \log_{10} (\mu V)$: Equation
$dB(\mu V) = dBm + 107$

Example : @ 480.53 MHz

Class B Limit	= 46.00 dB(μV/m)	
Reading	= 22.84 dB(μV)	
Antenna Factor + Cable Loss		= 17.33 + 1.95 = 19.28 dB(μV/m)
Total		= 42.12 dB(μV/m)
Margin	= 46.00-42.12 = 3.88 dB	
	= 3.88 dB below Limit	