

Attachments

Operation Band MHz = [2400, 2483.5]

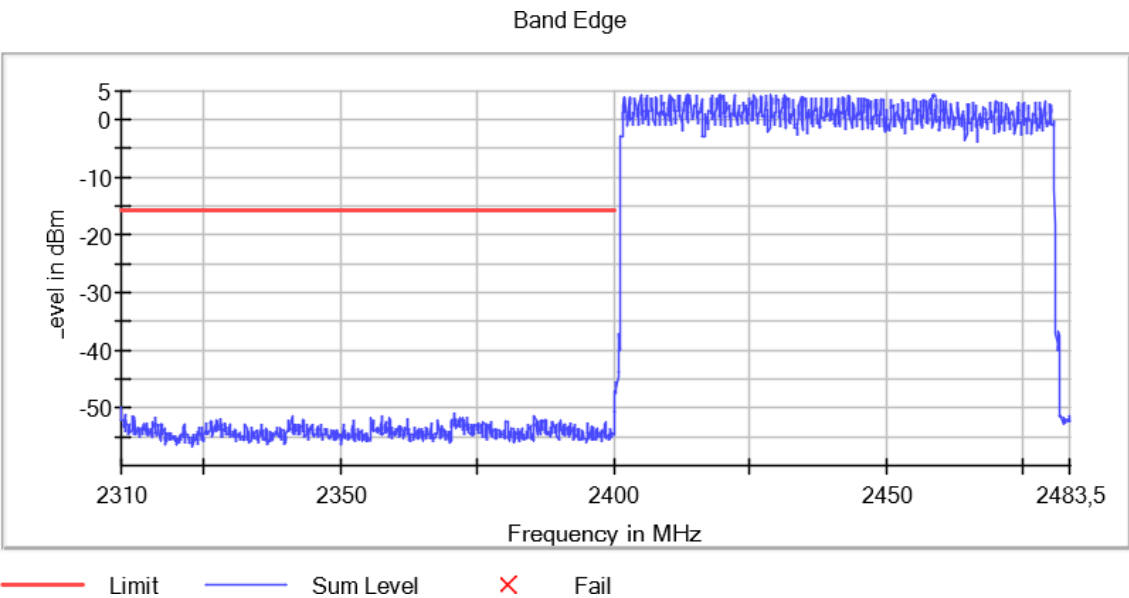
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = Hopping mode

Active Port = 1

Modulation = BT (8DPSK 3-DH5)

Images:



Tables:

Spectrum Analyzer Parameters 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
Sweeptime	113.672 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3

Setting	Instrument Value	Target Value
Max Stable Difference	0.00 dB	0.50 dB

Spectrum Analyzer Parameters 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	94.727 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	129 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.39 dB	0.50 dB

Operation Band MHz = [2400, 2483.5]

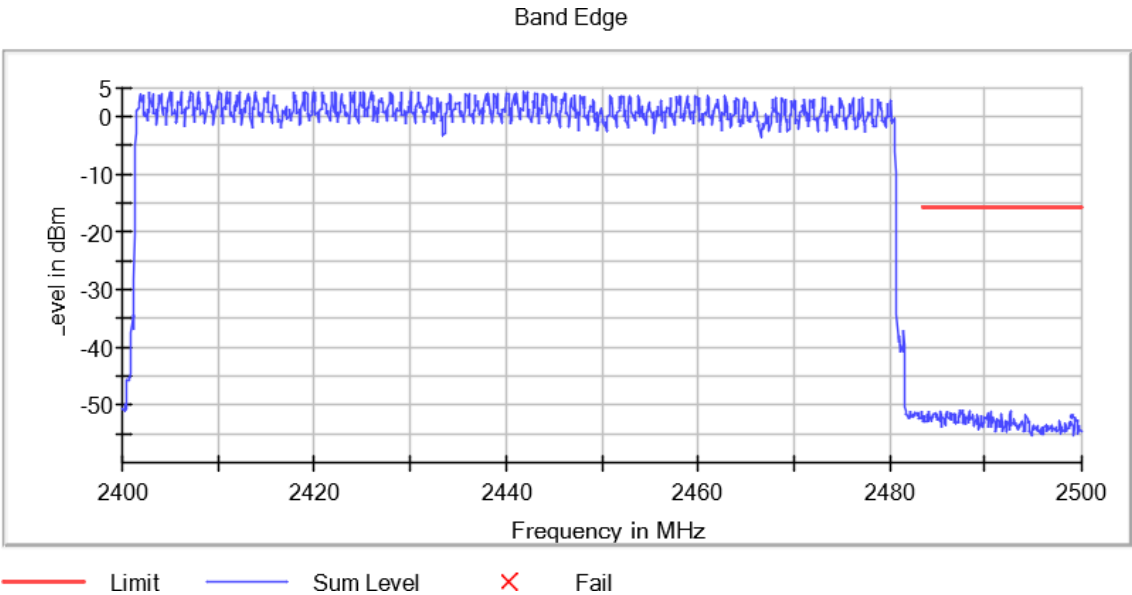
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = Hopping mode

Active Port = 1

Modulation = BT (8DPSK 3-DH5)

Images:



Tables:

Spectrum Analyzer Parameters 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	113.672 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Spectrum Analyzer Parameters 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	94.727 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	129 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.39 dB	0.50 dB

Operation Band MHz = [2400,
2483.5]

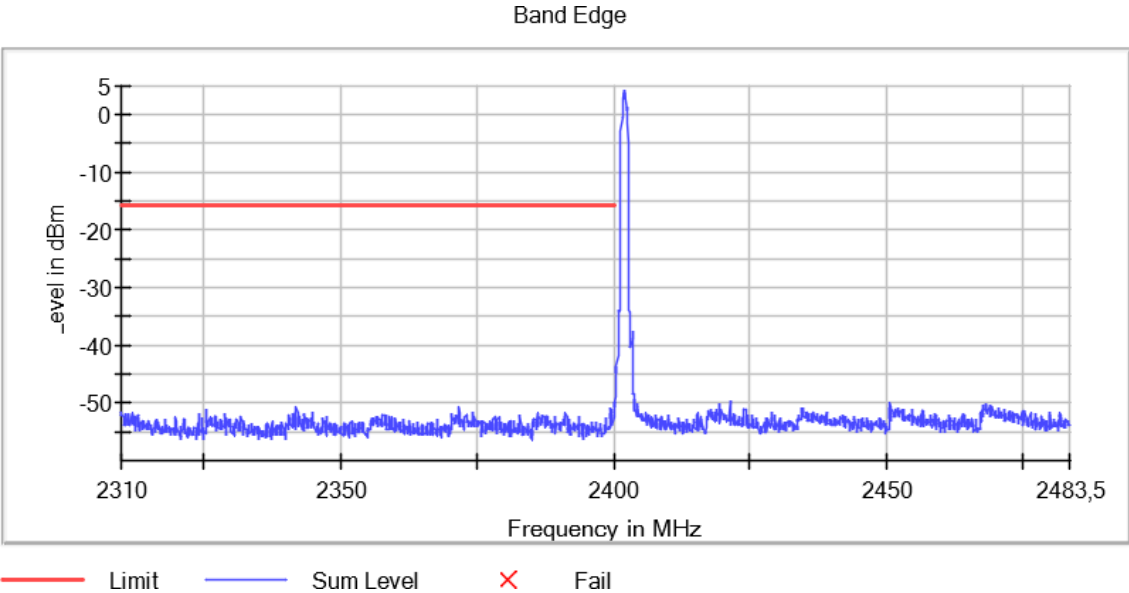
Equipment Type = Frequency Hopping Spread Spectrum systems
(DSS)

Frequency MHz = 2402.00000

Active Port = 1

Modulation = BT (8DPSK 3-DH5)

Images:



Tables:

Spectrum Analyzer Parameters 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	113.672 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Spectrum Analyzer Parameters 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	94.727 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	129 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.39 dB	0.50 dB

Operation Band MHz = [2400,
2483.5]

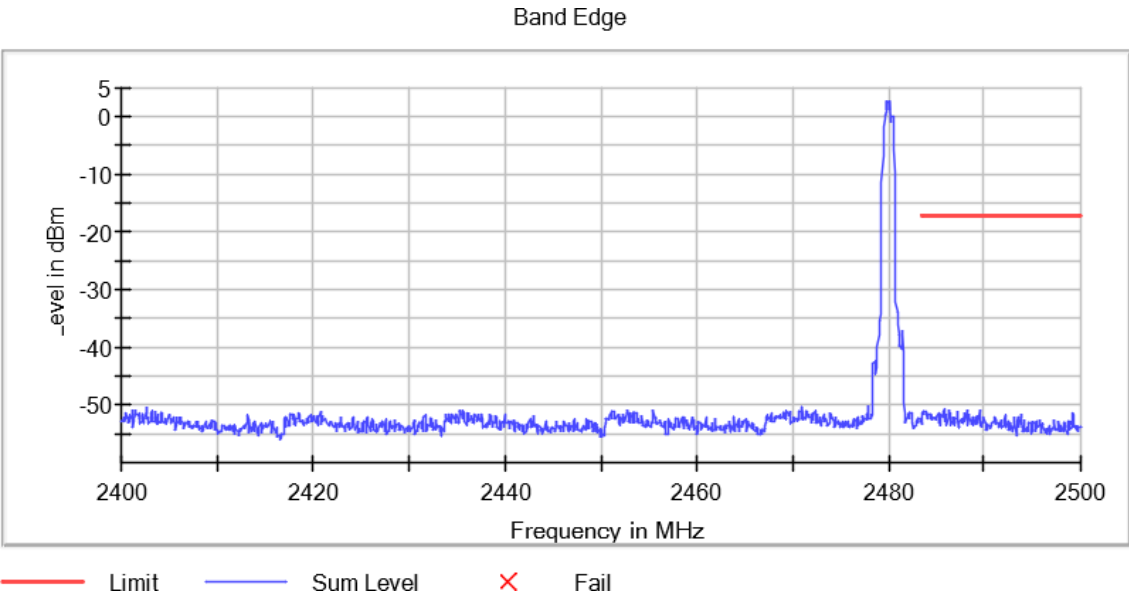
Equipment Type = Frequency Hopping Spread Spectrum systems
(DSS)

Frequency MHz = 2480.00000

Active Port = 1

Modulation = BT (8DPSK 3-DH5)

Images:



Tables:

Spectrum Analyzer Parameters 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	113.672 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Spectrum Analyzer Parameters 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	94.727 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	129 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.39 dB	0.50 dB

RSS-247 6.6 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter)

Limits

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)/RSS-Gen):

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247: Attenuation below the general field strength limits specified in RSS-Gen is not required.

Frequency range tested for Radiated emissions:

Start frequency: no radiofrequency signal generated in the device found below 10th sub-harmonic, no further investigation required.

Stop frequency: it has been performed the radiated spurious emissions until 10th harmonic.

Modulation: BT (GFSK 1-DH5)

Results

- Frequency range [30MHz - 1GHz]

The spurious frequencies do not depend on modulation and channel operation.

Spurious frequencies detected at less than 20 dB below the limit:

Operation Band (MHz)	Freq Rng (GHz)	Freq (MHz)	Port	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)
[2400, 2483.5]	[0.03, 1]	2402.00000	1	45.811	41.12	V	PK	-41.0	3	8.0	73.2
				45.811	34.03	V	QP	-41.0	3	8.0	66.1
				319.965	37.40	V	PK	-41.0	3	13.6	58.4
				319.965	34.11	V	QP	-41.0	3	13.6	61.7
				480.015	43.36	V	PK	-40.3	3	18.7	52.6
				480.015	33.94	V	QP	-40.3	3	18.7	62.0
				559.943	43.54	V	PK	-40.4	3	20.3	60.6
				559.943	41.94	V	QP	-40.4	3	20.3	59.0
				575.011	41.48	V	PK	-40.4	3	20.3	58.6
				575.011	39.92	V	QP	-40.4	3	20.3	57.0
		600.004		41.16	H	PK	-40.4	3	21.0	57.5	
		600.004		38.24	H	QP	-40.4	3	21.0	54.6	
		2441.00000		43.127	40.95	V	PK	-43.1	3	9.0	72.1
				43.127	33.95	V	QP	-43.1	3	9.0	65.1
				47.363	40.57	V	PK	-43.0	3	7.5	66.5
				47.363	34.06	V	QP	-43.0	3	7.5	73.0
				559.943	43.28	V	PK	-40.4	3	20.3	60.3
				559.943	41.66	V	QP	-40.4	3	20.3	58.7
				575.011	41.84	H	PK	-40.4	3	20.3	58.9
				575.011	40.37	H	QP	-40.4	3	20.3	57.5
				600.004	40.16	V	PK	-40.4	3	21.0	56.5
				600.004	37.42	V	QP	-40.4	3	21.0	53.7

- Frequency range [1 - 17GHz]

No spurious frequencies detected at less than 20 dB below the limit.

- Frequency range [17 - 26GHz]

The spurious frequencies do not depend on modulation and channel operation.

No spurious frequencies detected at less than 20 dB below the limit.

Verdict

Pass

Attachments

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [0.03, 1]

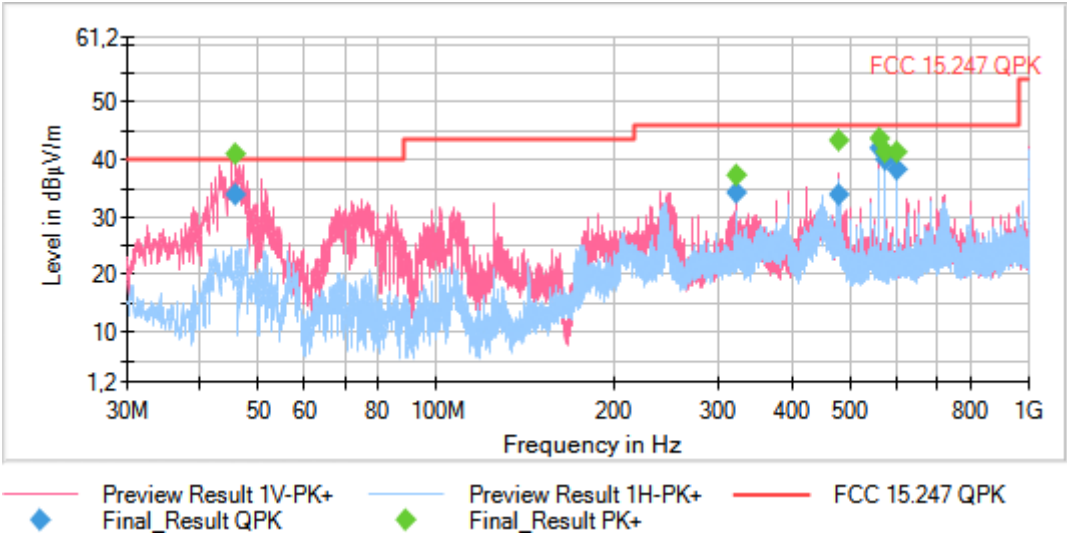
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2402.00000

Active Port = 1

Modulation = BT (GFSK 1-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESW 44]					
30 MHz - 1 GHz	32,333 kHz	PK+	100 kHz	Coupled	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

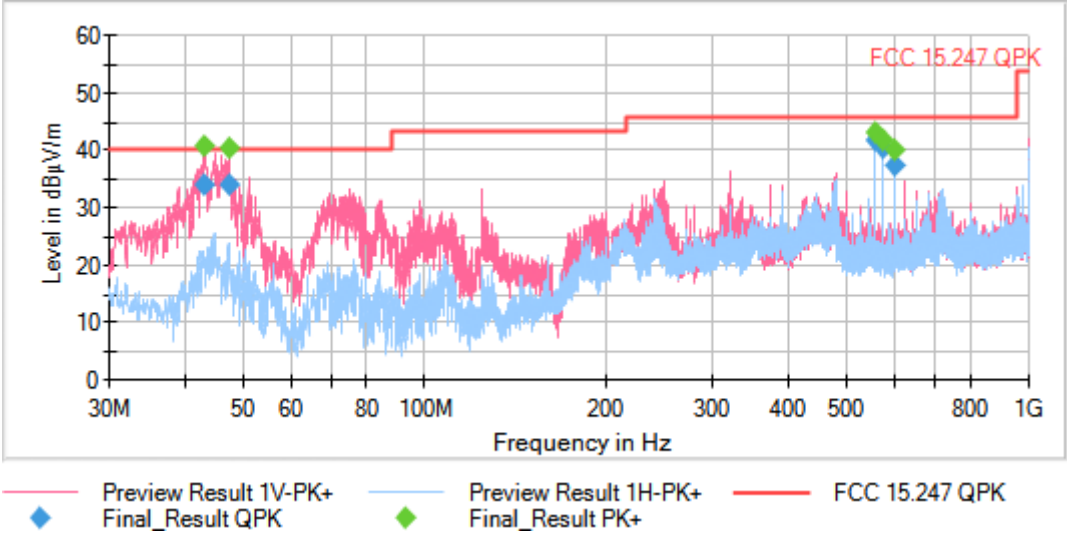
Active Port = 1

Frequency Range GHz = [0.03, 1]

Frequency MHz = 2441.00000

Modulation = BT (GFSK 1-DH5)

Images:



Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	30 MHz - 1 GHz	32,333 kHz	PK+	100 kHz	Coupled	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [1, 3]

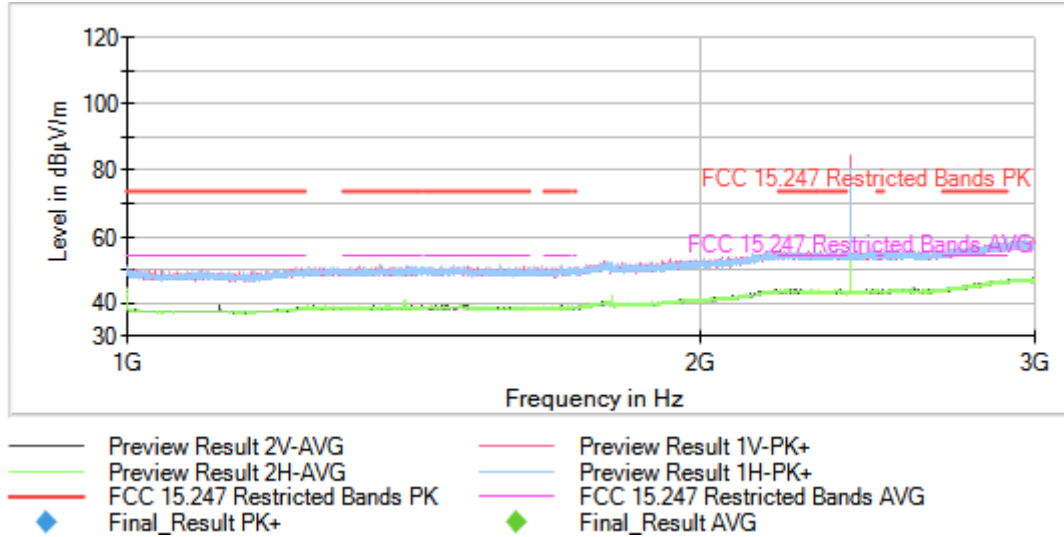
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2402.00000

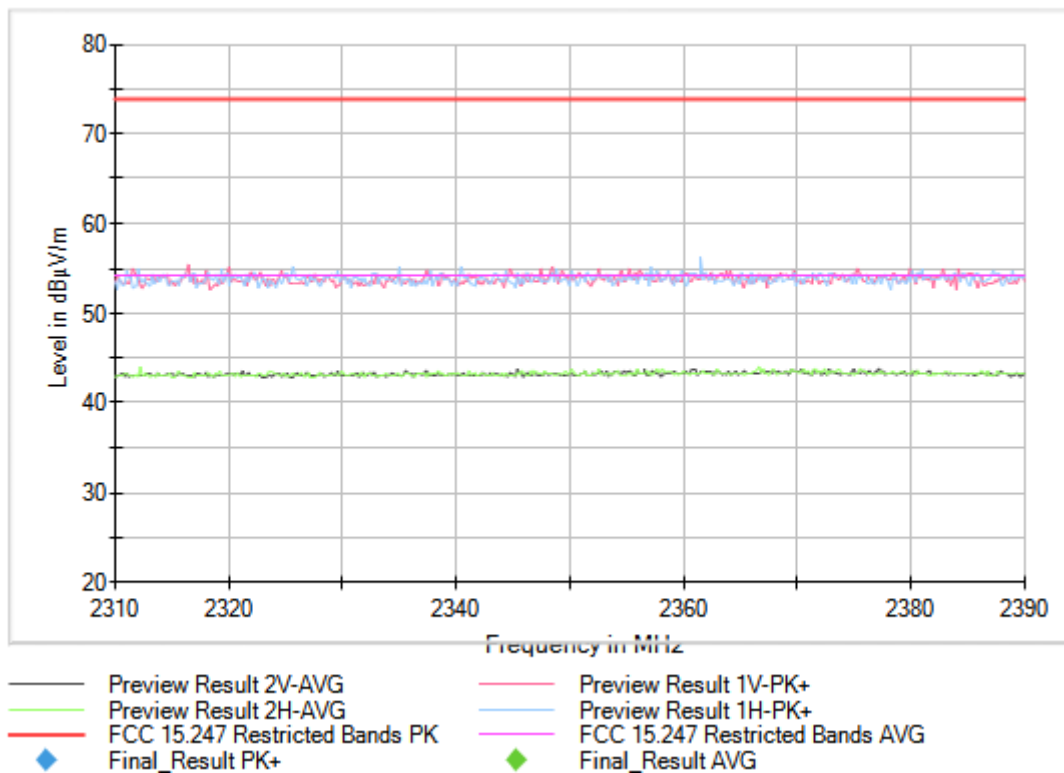
Active Port = 1

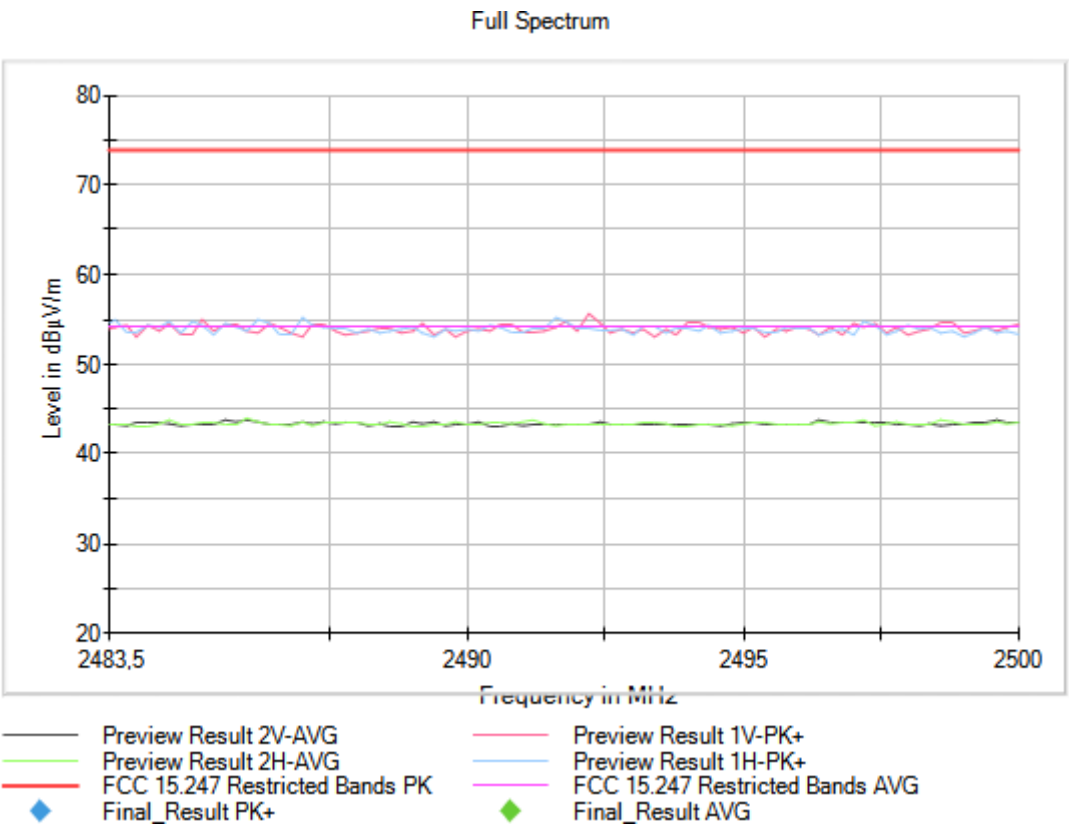
Modulation = BT (GFSK 1-DH5)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	200 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [1, 3]

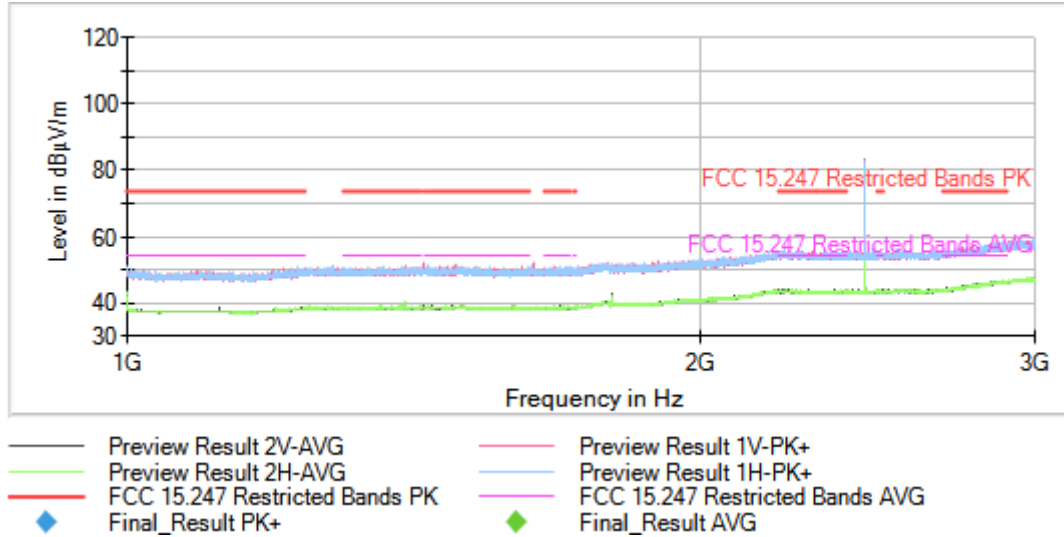
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2441.00000

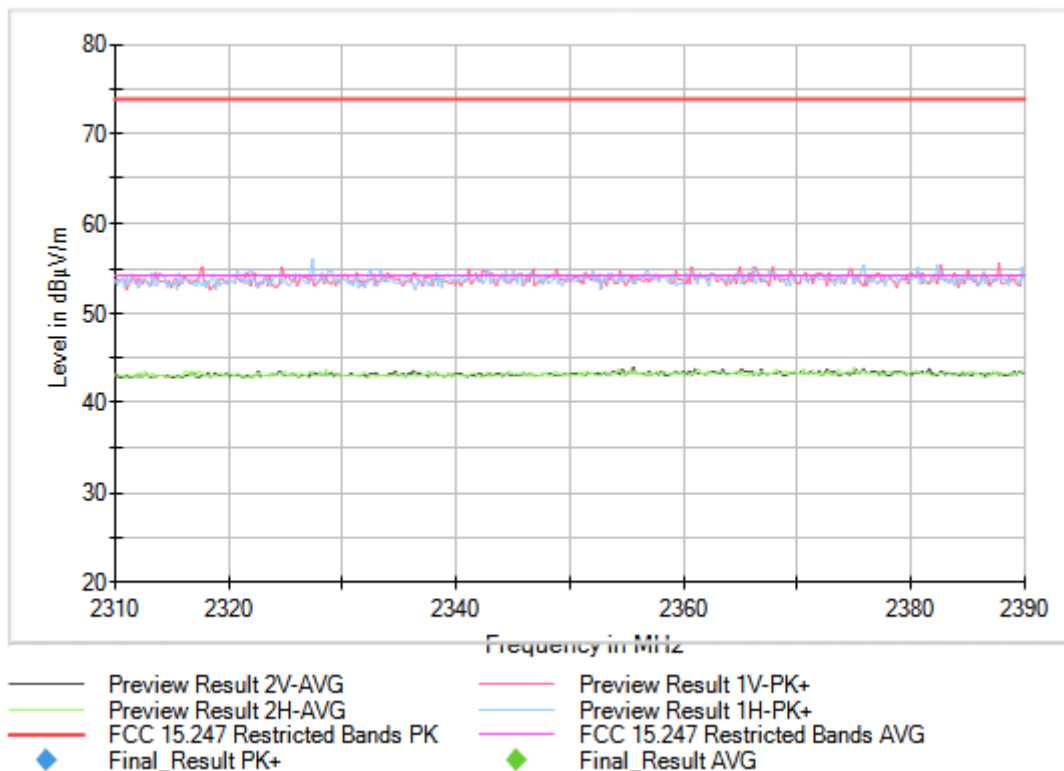
Active Port = 1

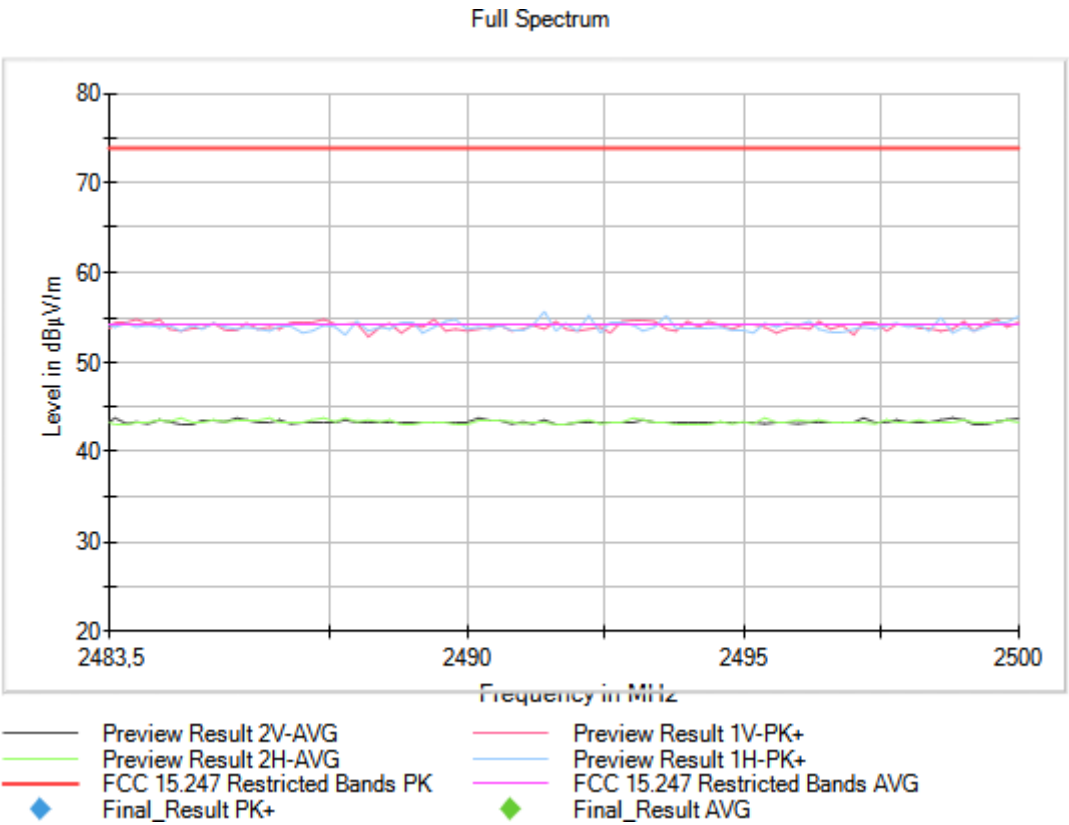
Modulation = BT (GFSK 1-DH5)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	200 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [1, 3]

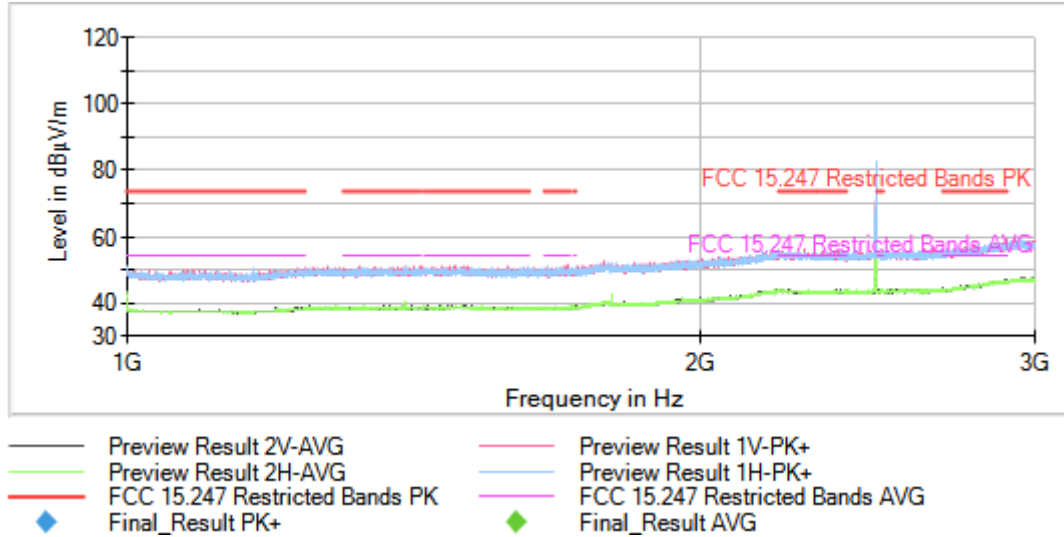
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2480.00000

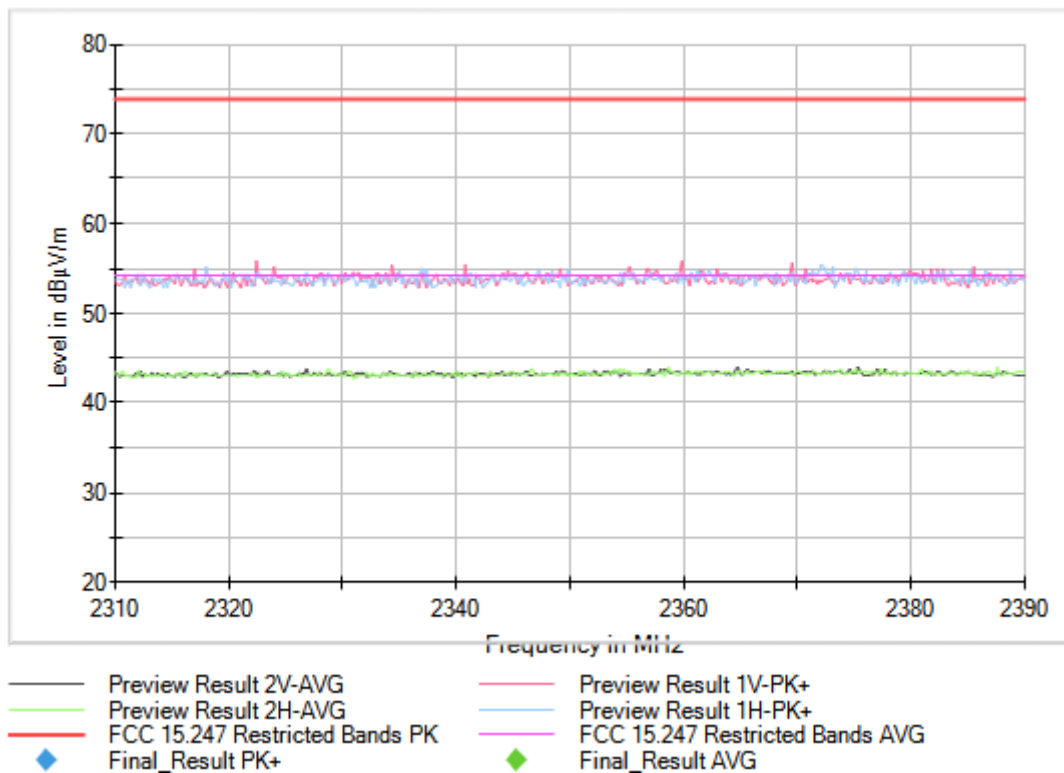
Active Port = 1

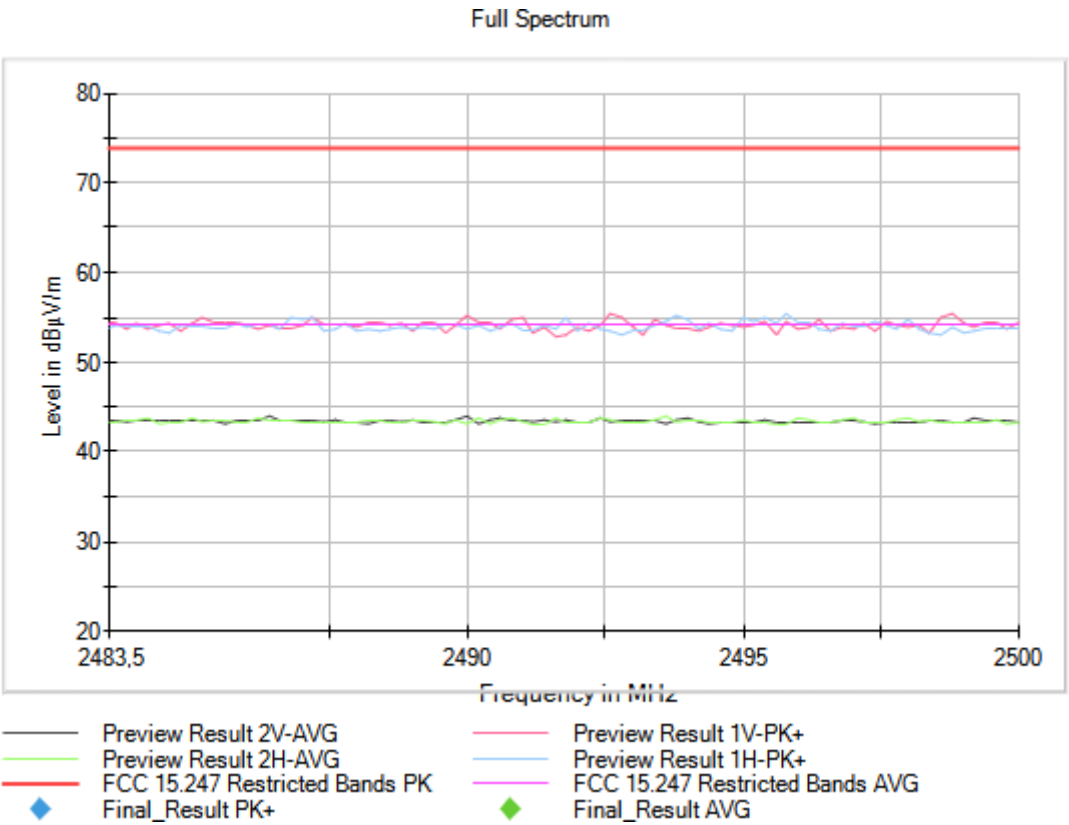
Modulation = BT (GFSK 1-DH5)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	200 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

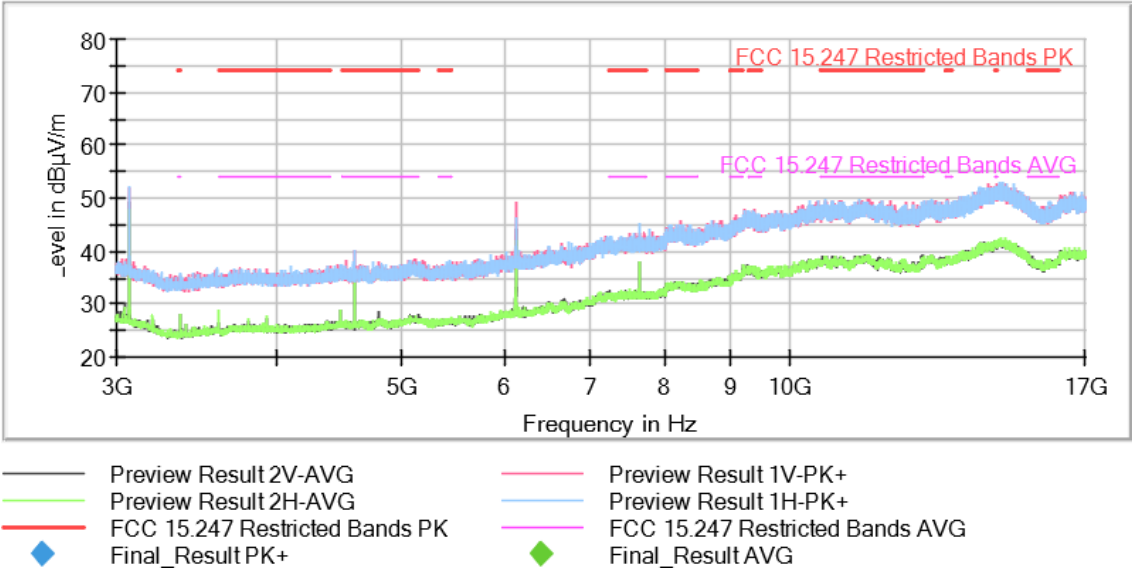
Active Port = 1

Frequency Range GHz = [3, 17]

Frequency MHz = 2402.00000

Modulation = BT (GFSK 1-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

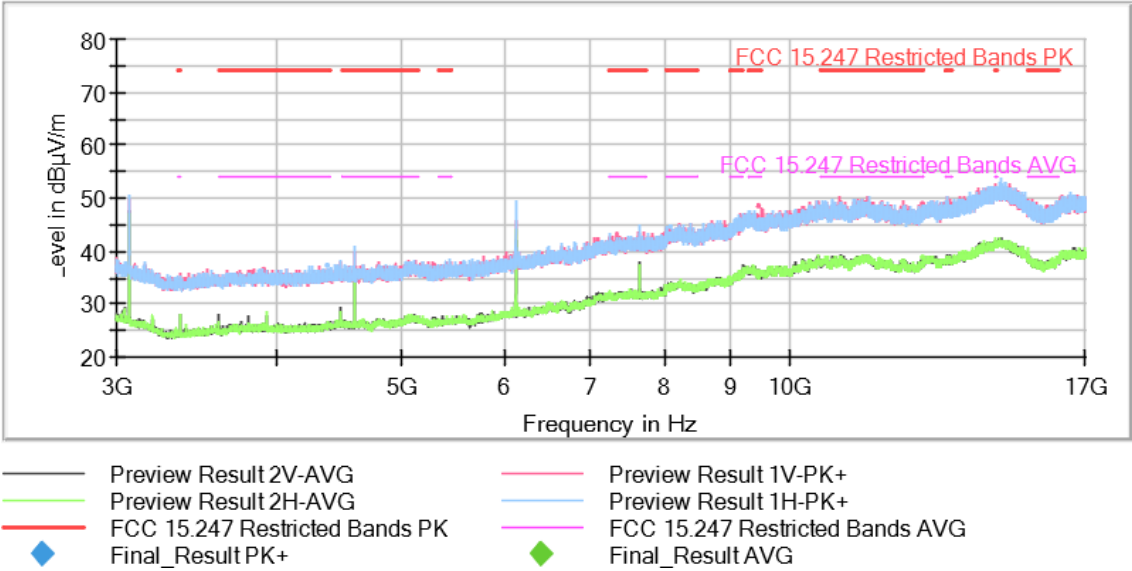
Active Port = 1

Frequency Range GHz = [3, 17]

Frequency MHz = 2441.00000

Modulation = BT (GFSK 1-DH5)

Images:

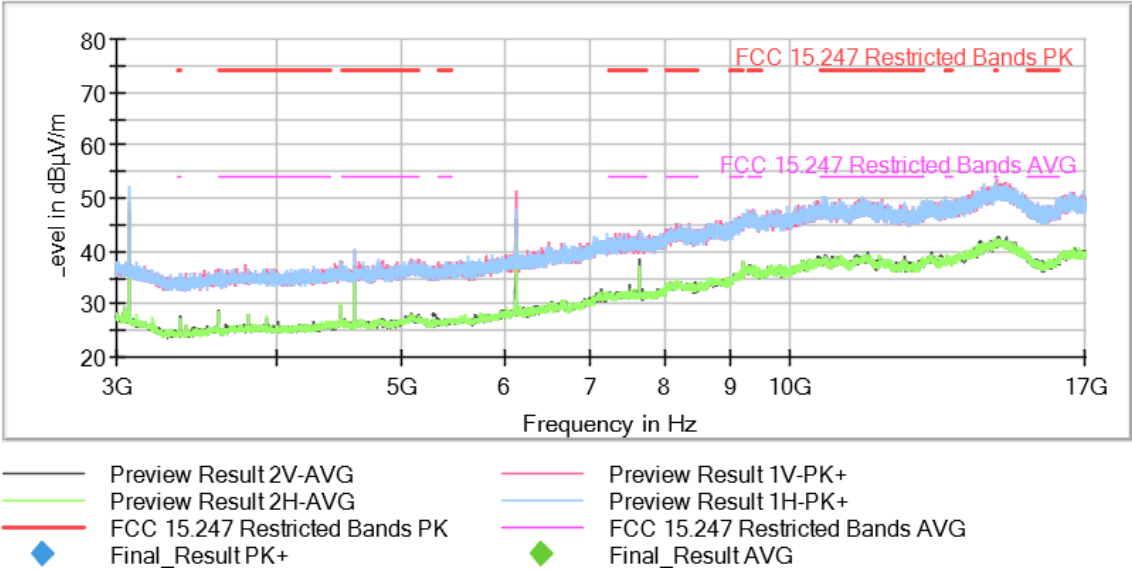


Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5] Frequency Range GHz = [3, 17]
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2480.00000
Active Port = 1 Modulation = BT (GFSK 1-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

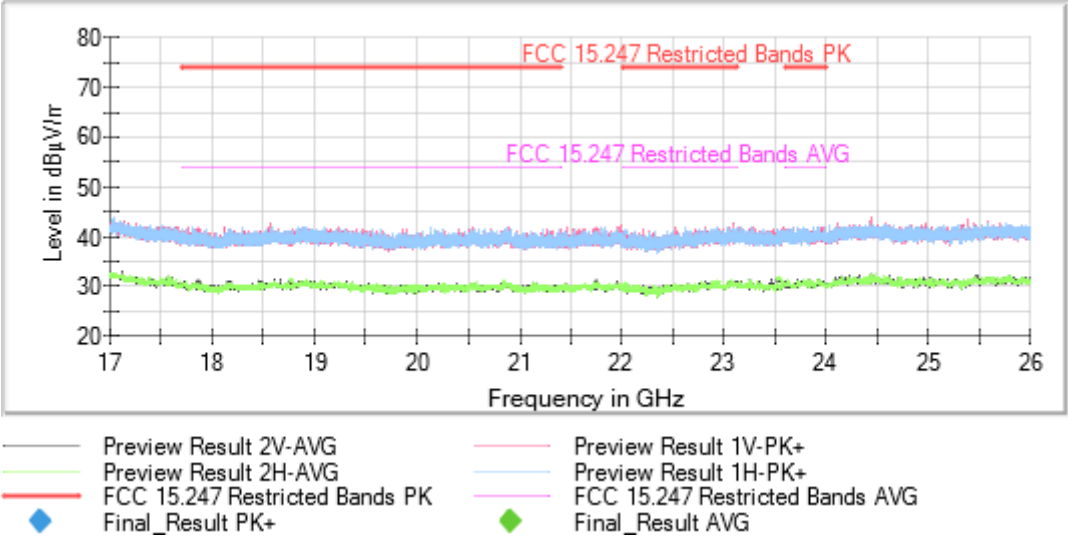
Active Port = 1

Frequency Range GHz = [17, 26]

Frequency MHz = 2402.00000

Modulation = BT (GFSK 1-DH5)

Images:



Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSV 40]					
	17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

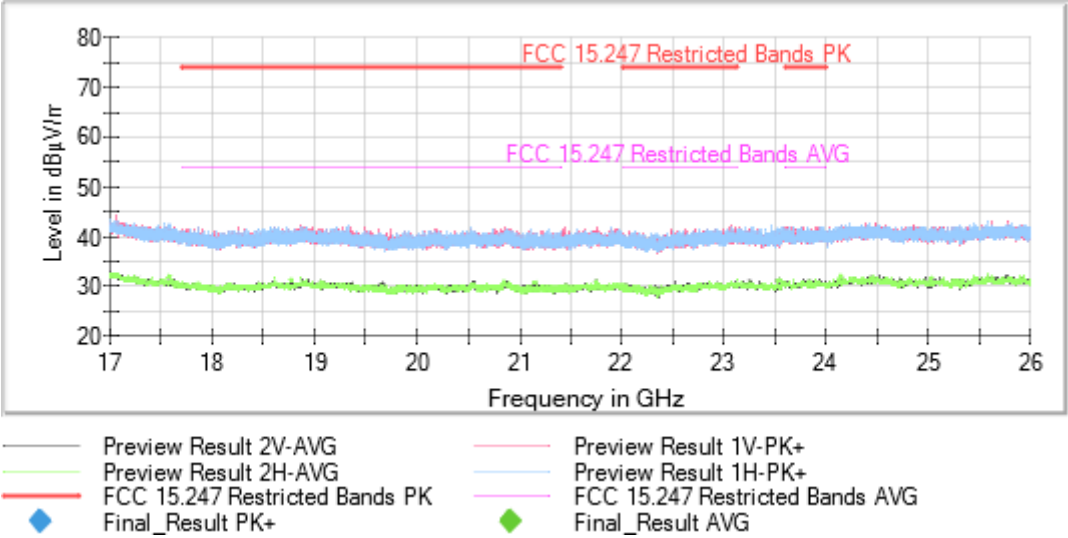
Active Port = 1

Frequency Range GHz = [17, 26]

Frequency MHz = 2441.00000

Modulation = BT (GFSK 1-DH5)

Images:



Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSV 40]					
	17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Modulation: BT (Pi/4 DQPSK 2-DH5)

Results

- Frequency range [30MHz - 1GHz]

The spurious frequencies do not depend on modulation and channel operation.

Spurious frequencies detected at less than 20 dB below the limit:

Operation Band (MHz)	Freq Rng (GHz)	Freq (MHz)	Port	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	PoI	Detector	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)
[2400, 2483.5]	[0.03, 1]	2402.00000	1	124.995	32.55	V	PK	-42.1	3	7.6	72.5
				124.995	29.38	V	QP	-42.1	3	7.6	66.1
				47.040	40.15	V	PK	-43.0	3	7.6	72.9
				47.040	33.74	V	QP	-43.0	3	7.6	66.6
				47.072	40.55	V	PK	-43.0	3	6.8	64.0
				47.072	34.21	V	QP	-43.0	3	6.8	72.5
				51.049	39.41	V	PK	-43.0	3	7.6	64.0
				51.049	30.91	V	QP	-43.0	3	7.6	60.8
				559.943	42.87	V	PK	-40.4	3	20.3	59.9
				559.943	41.06	V	QP	-40.4	3	20.3	58.1
				575.011	40.65	V	PK	-40.4	3	20.3	56.0
				575.011	38.90	V	QP	-40.4	3	20.3	57.7

- Frequency range [1 - 17GHz]

No spurious frequencies detected at less than 20 dB below the limit.

- Frequency range [17 - 26GHz]

The spurious frequencies do not depend on modulation and channel operation.

No spurious frequencies detected at less than 20 dB below the limit.

Verdict

Pass

Attachments

Operation Band MHz = [2400, 2483.5]

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

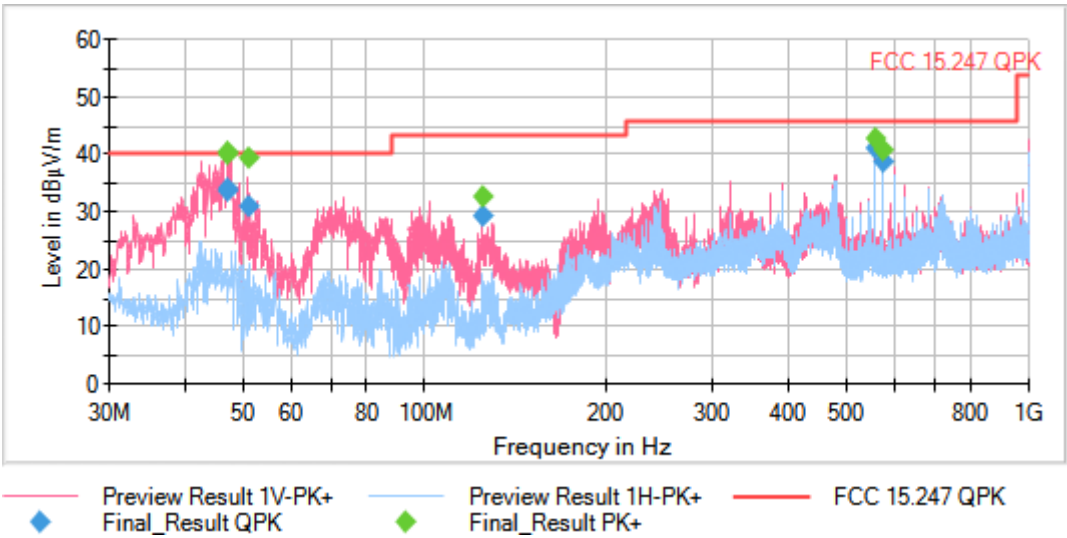
Active Port = 1

Frequency Range GHz = [0.03, 1]

Frequency MHz = 2402.00000

Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	30 MHz - 1 GHz	32,333 kHz	PK+	100 kHz	Coupled	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [1, 3]

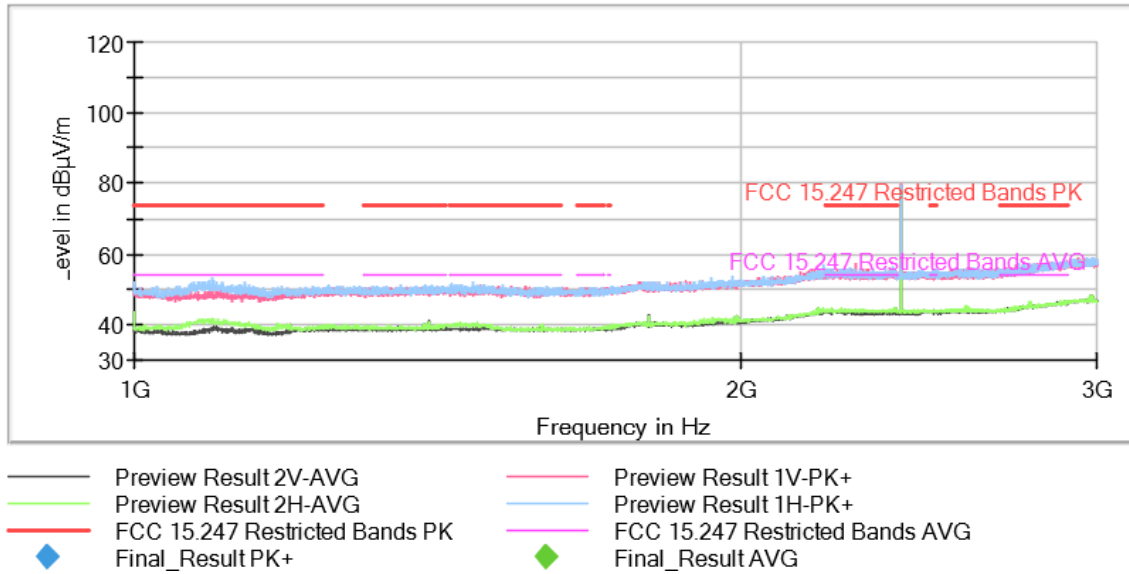
Equipment Type = Frequency Hopping Spread Spectrum systems
(DSS)

Frequency MHz = 2402.00000

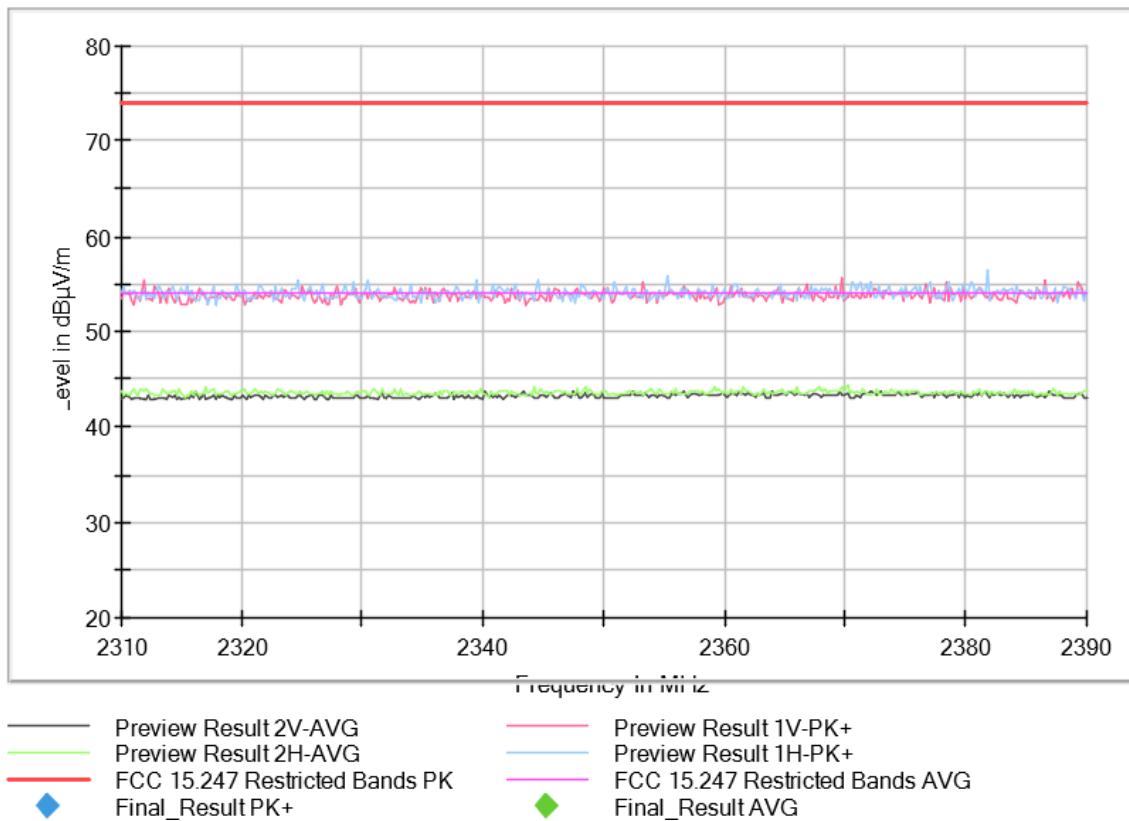
Active Port = 1

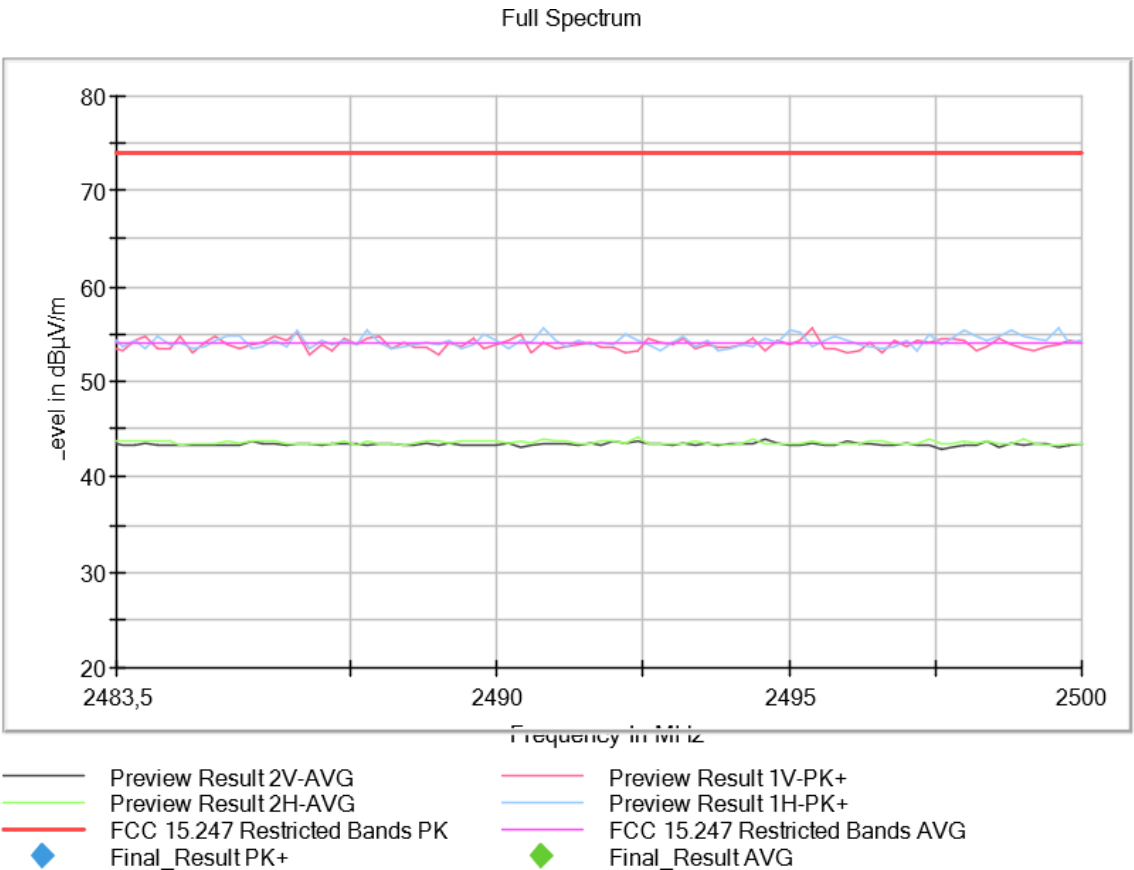
Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	200 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [1, 3]

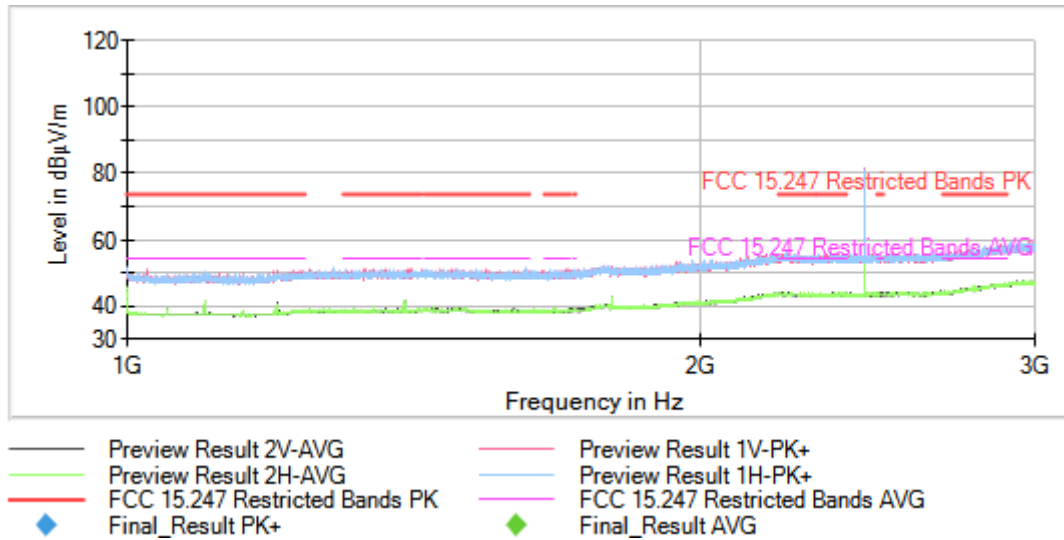
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2441.00000

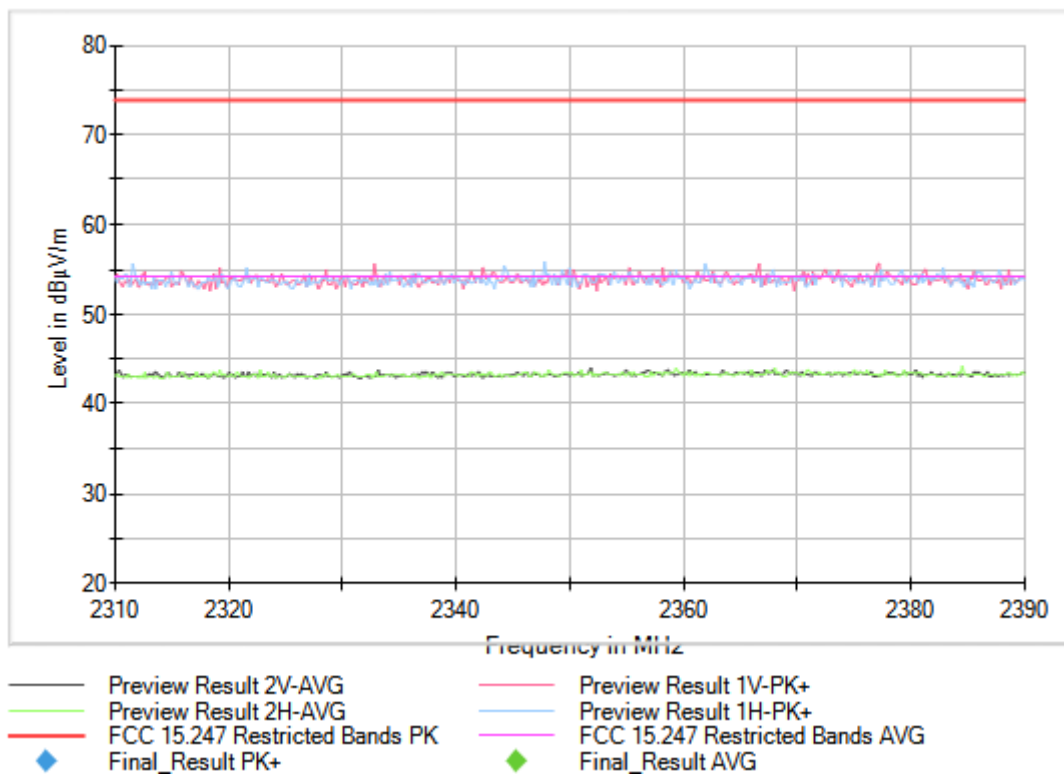
Active Port = 1

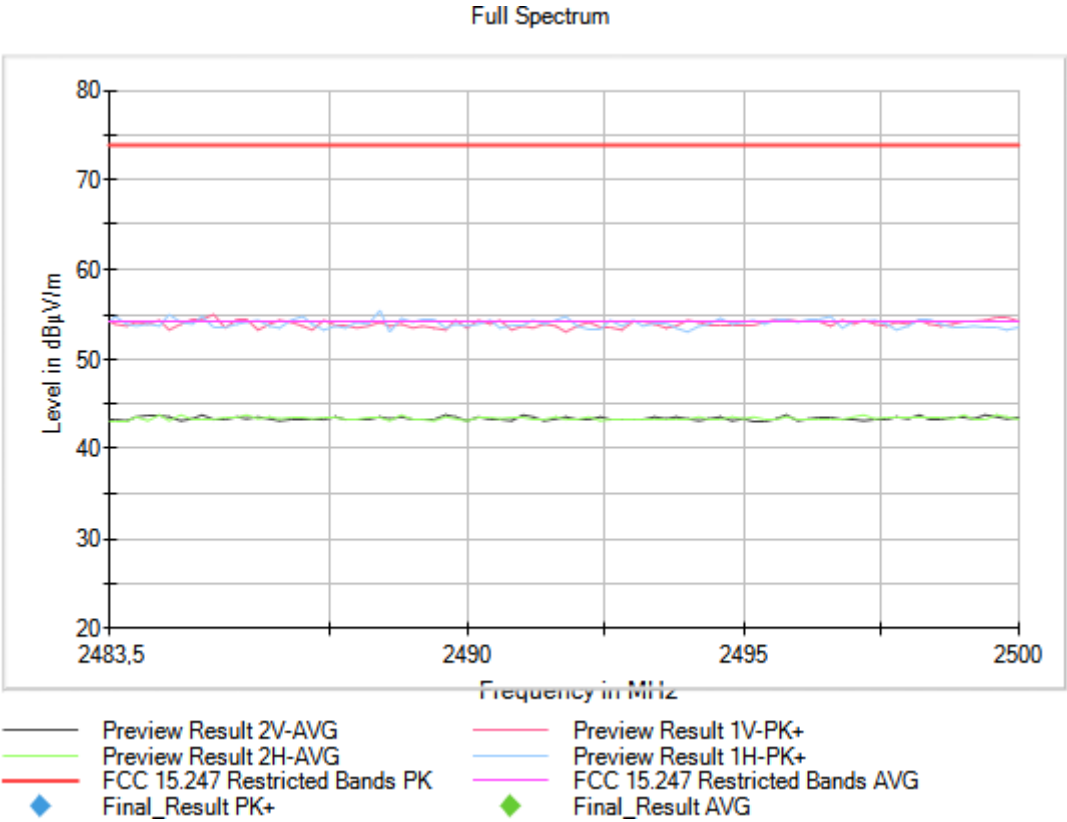
Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	200 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [1, 3]

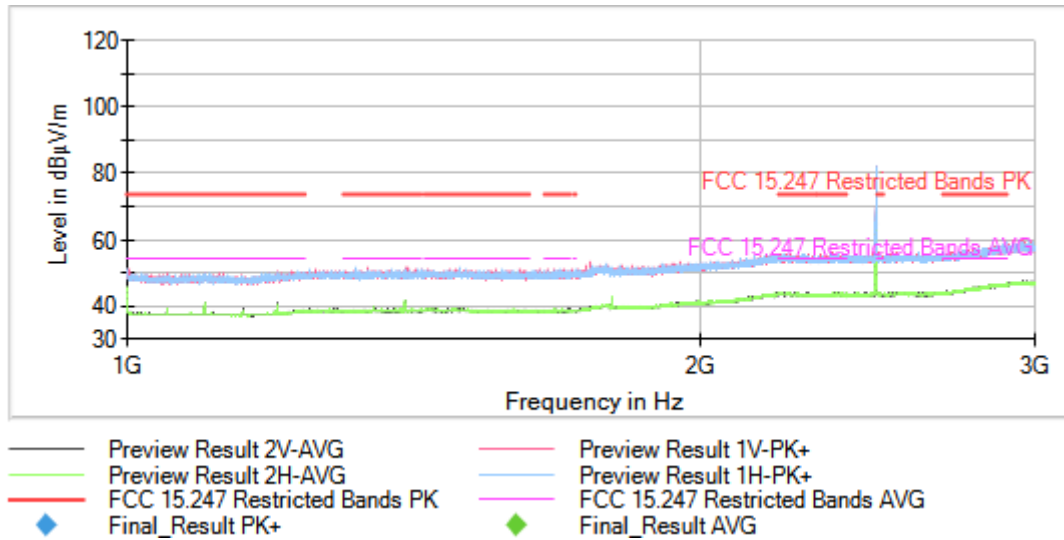
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2480.00000

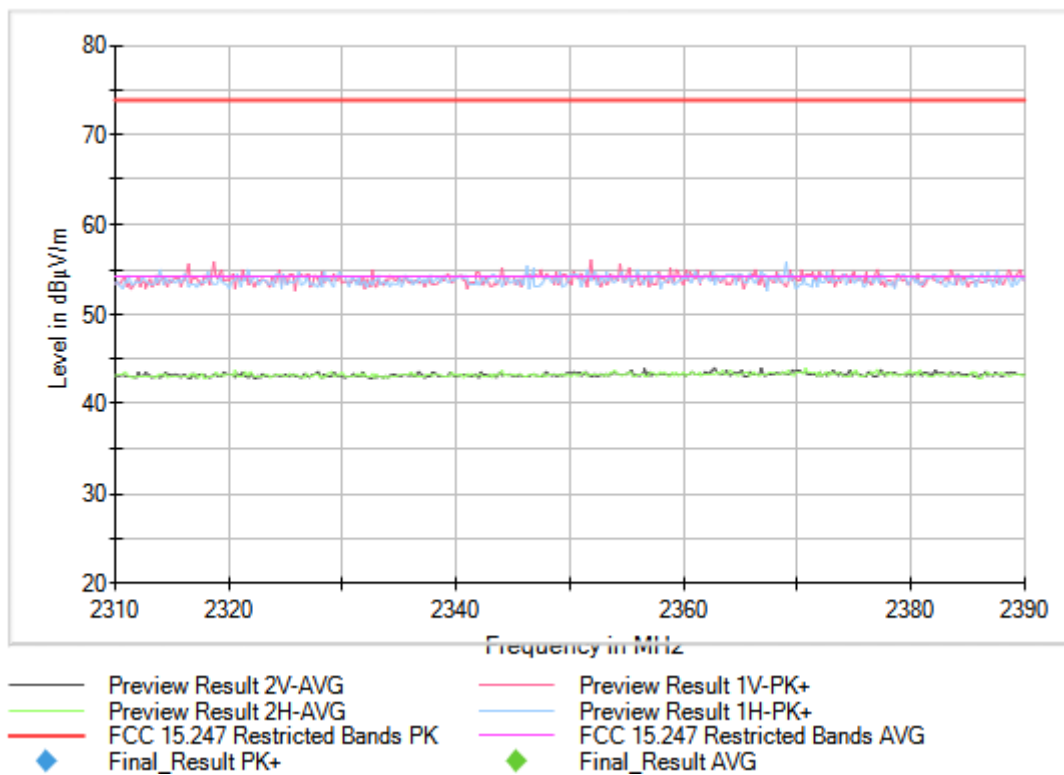
Active Port = 1

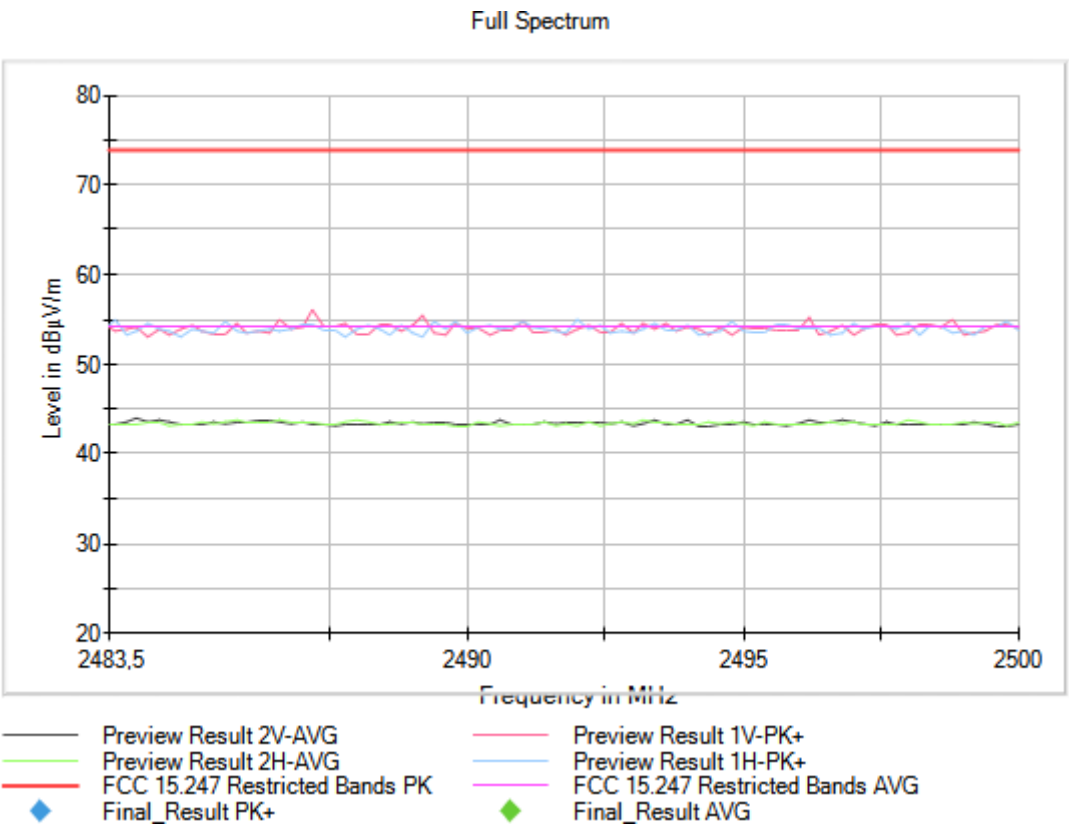
Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	200 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [3, 17]

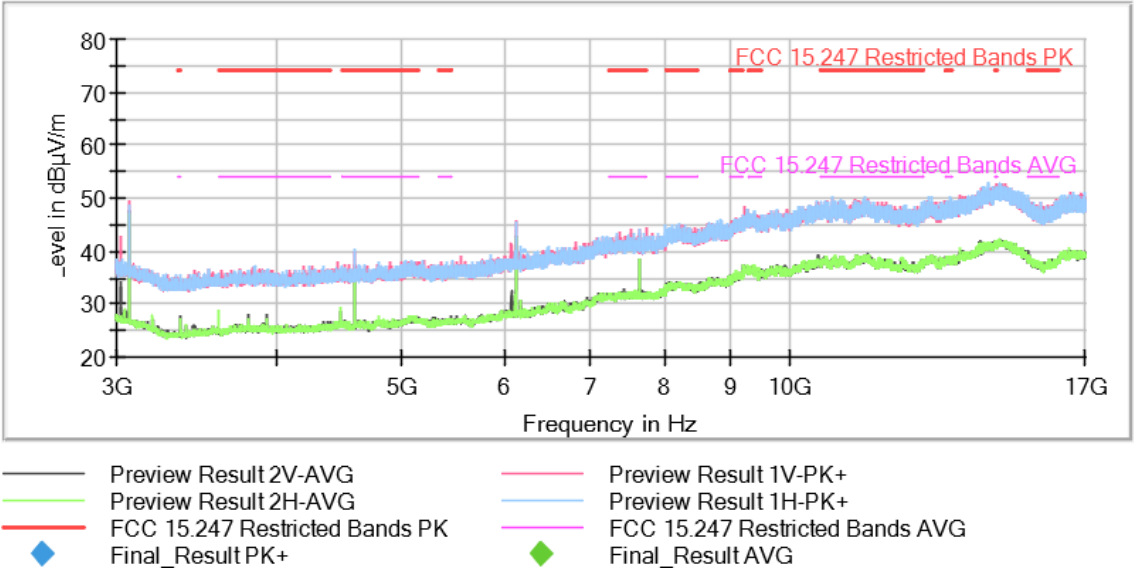
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2402.00000

Active Port = 1

Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [3, 17]

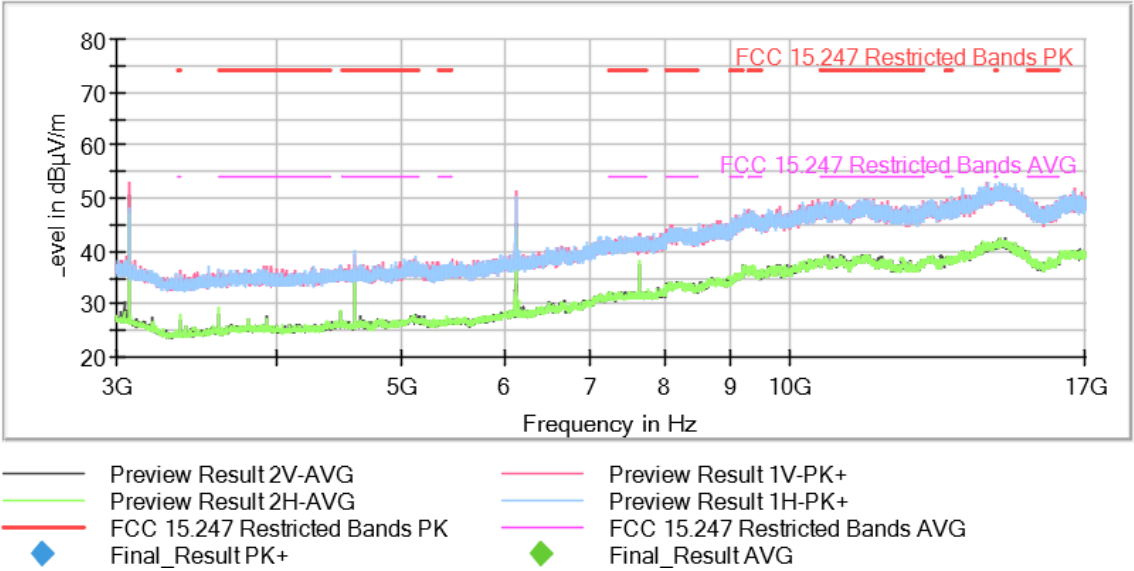
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2441.00000

Active Port = 1

Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [3, 17]

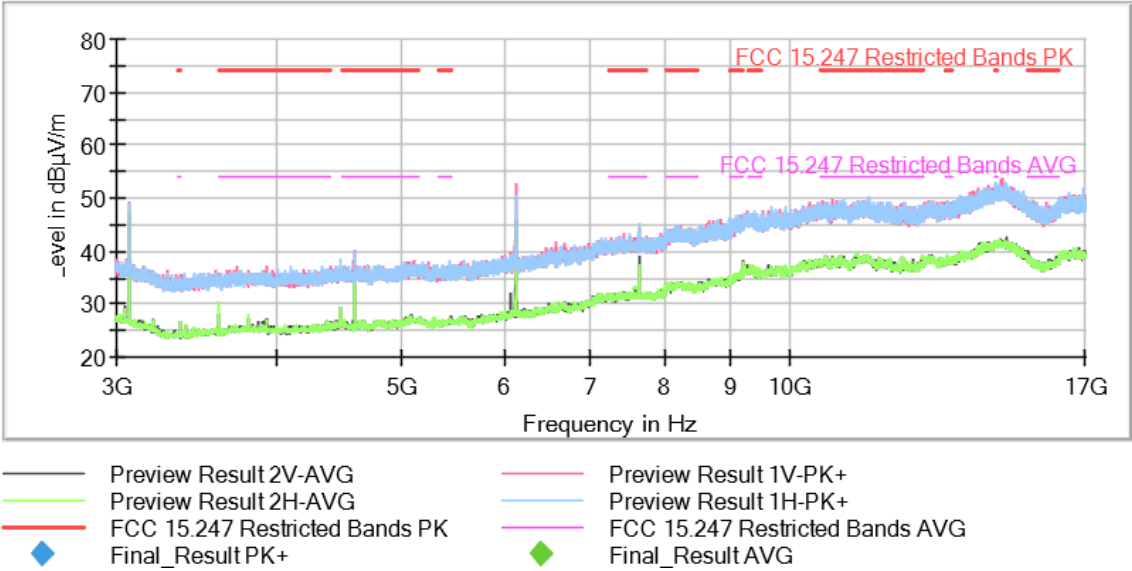
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2480.00000

Active Port = 1

Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [17, 26]

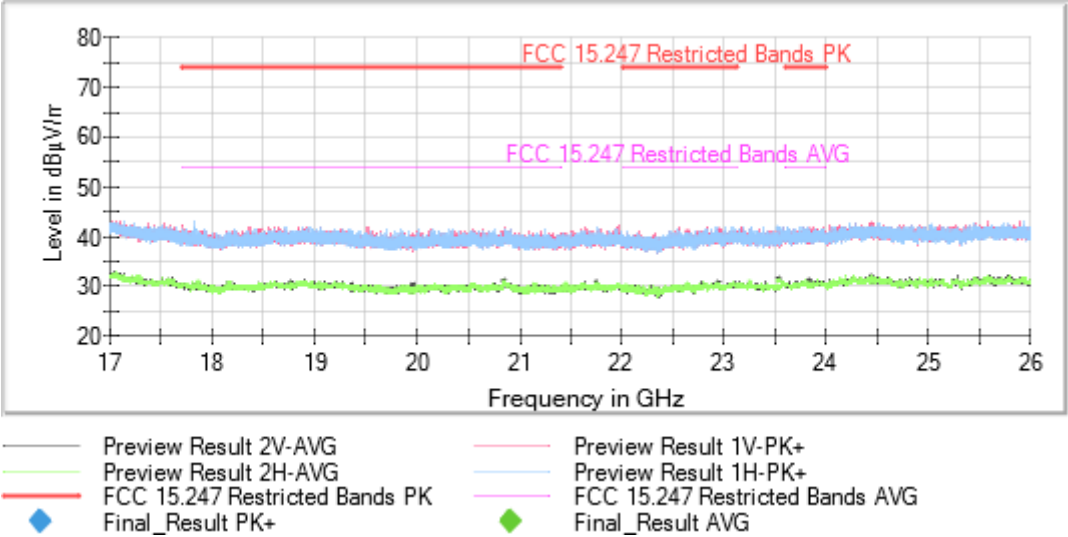
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2402.00000

Active Port = 1

Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSV 40]					
	17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Modulation: BT (8DPSK 3-DH5)

Results

- Frequency range [30MHz - 1GHz]

The spurious frequencies do not depend on modulation and channel operation.

No spurious frequencies detected at less than 20 dB below the limit.

- Frequency range [1 - 17GHz]

No spurious frequencies detected at less than 20 dB below the limit.

- Frequency range [17 - 26GHz]

The spurious frequencies do not depend on modulation and channel operation.

No spurious frequencies detected at less than 20 dB below the limit.

Verdict

Pass

Attachments

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [1, 3]

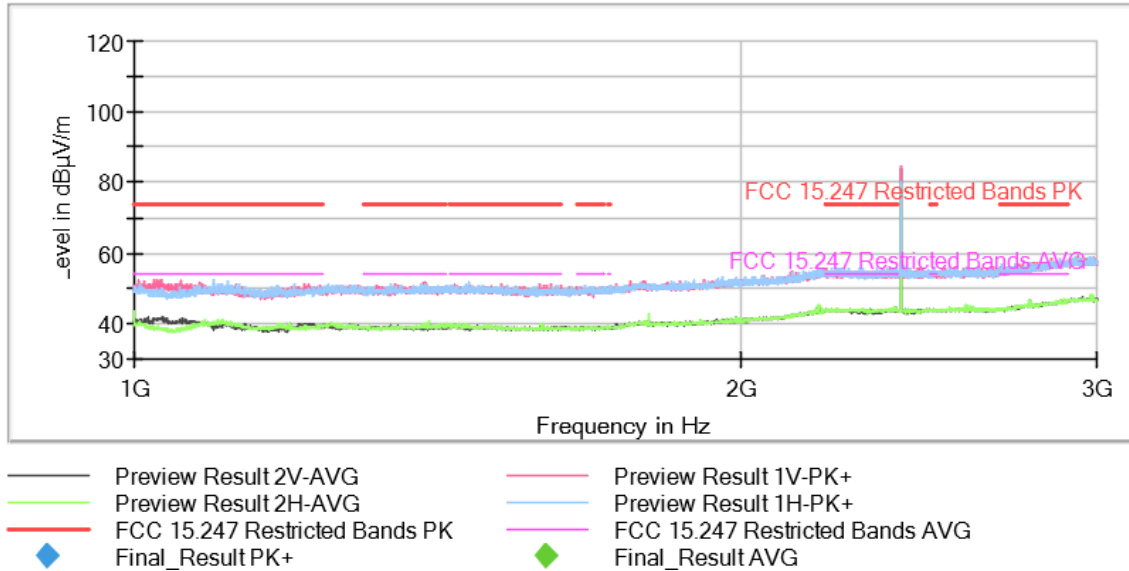
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2402.00000

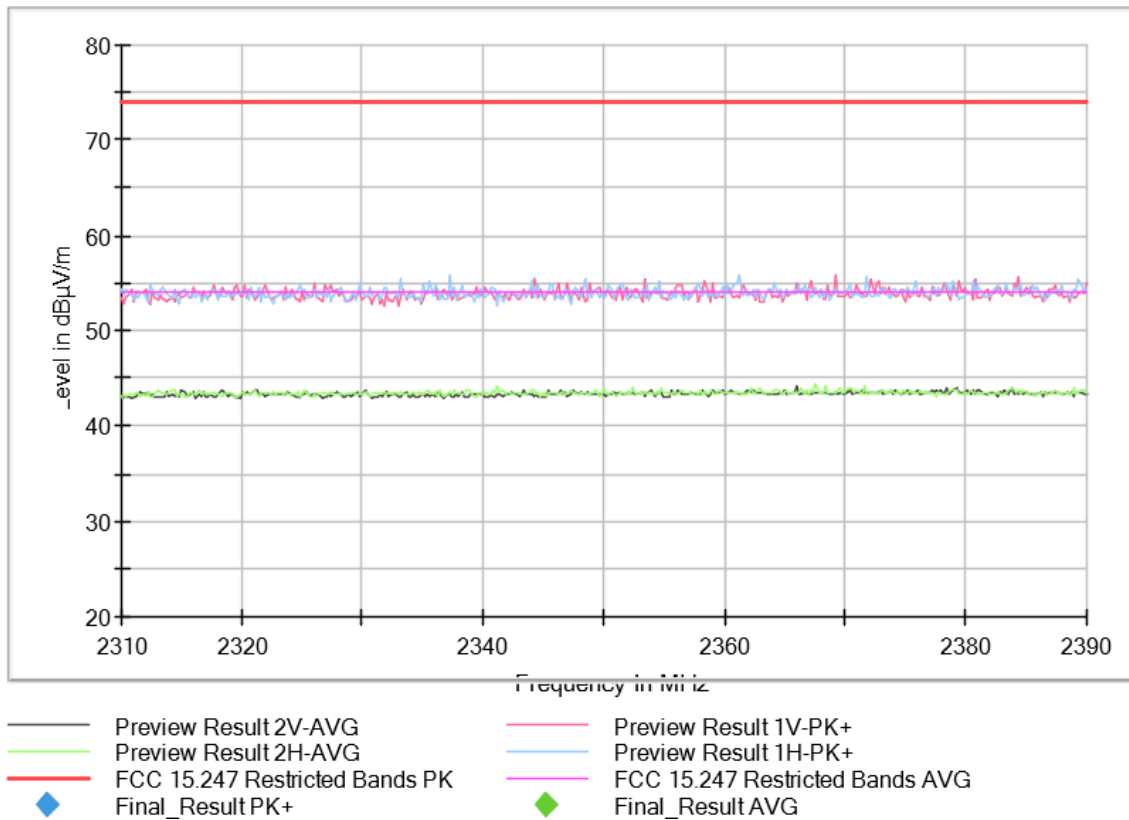
Active Port = 1

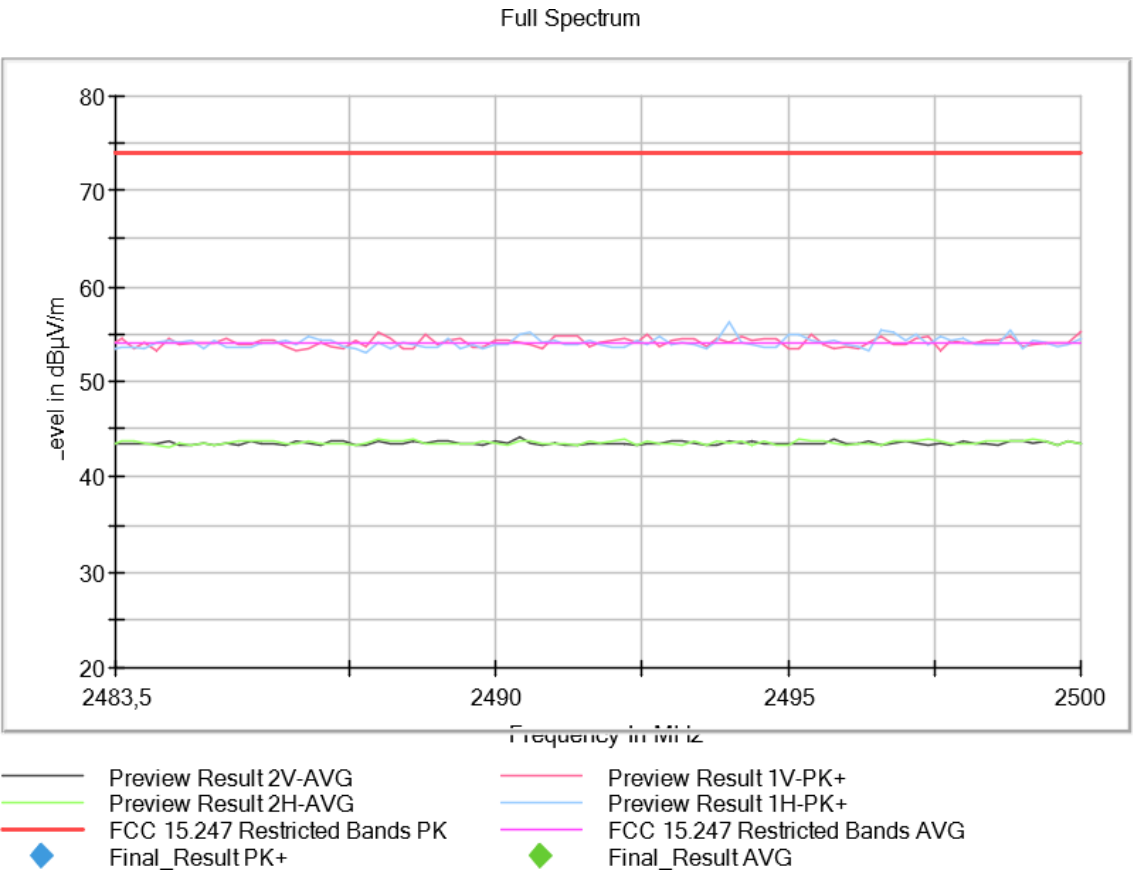
Modulation = BT (8DPSK 3-DH5)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	200 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [1, 3]

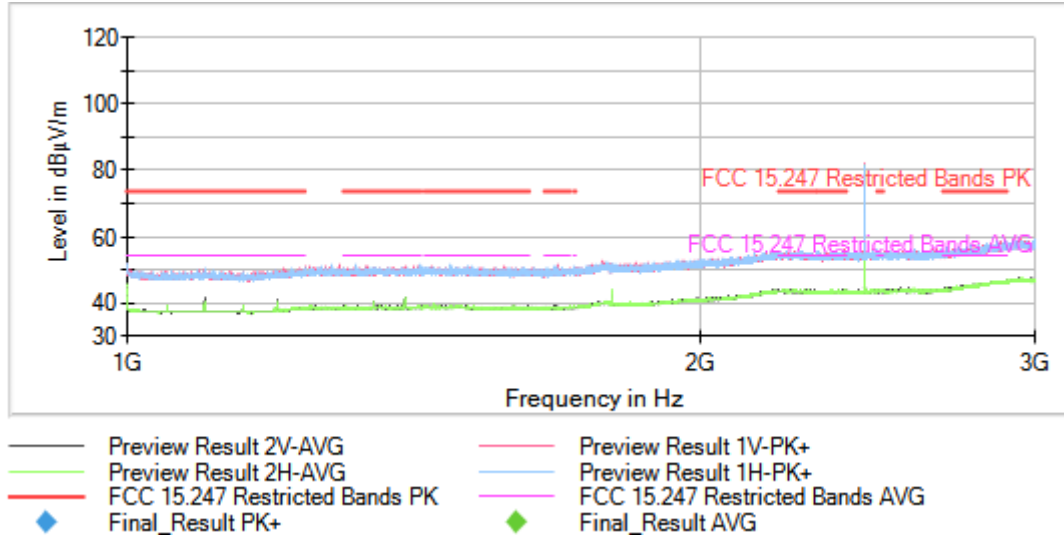
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2441.00000

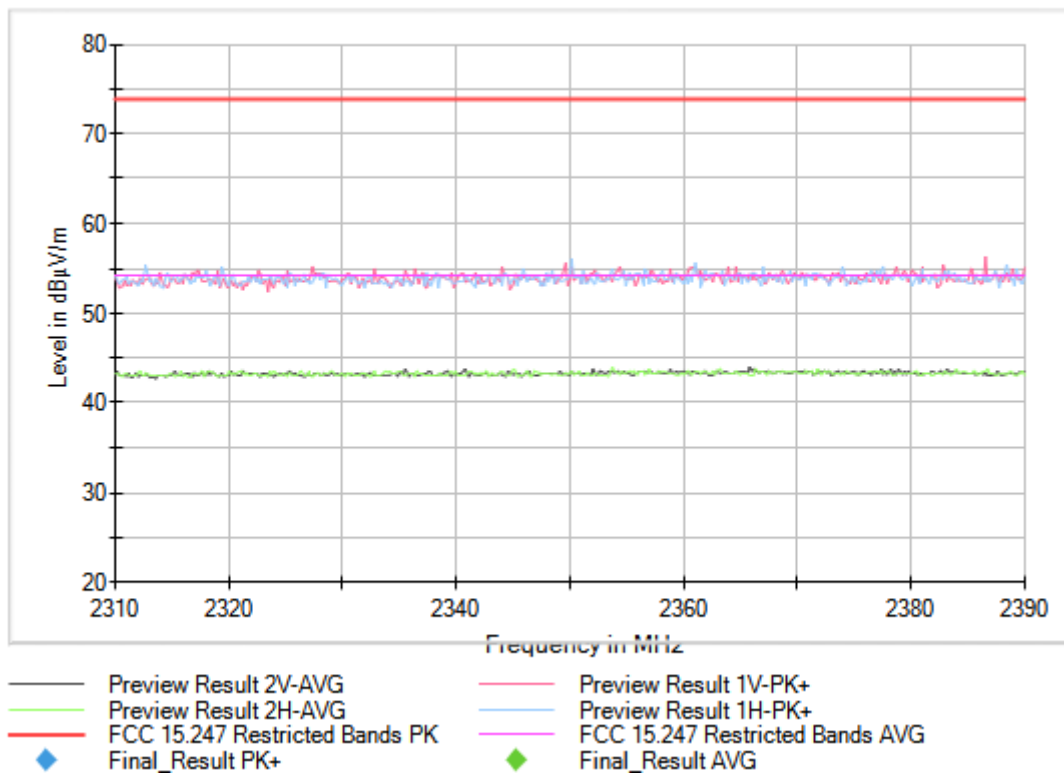
Active Port = 1

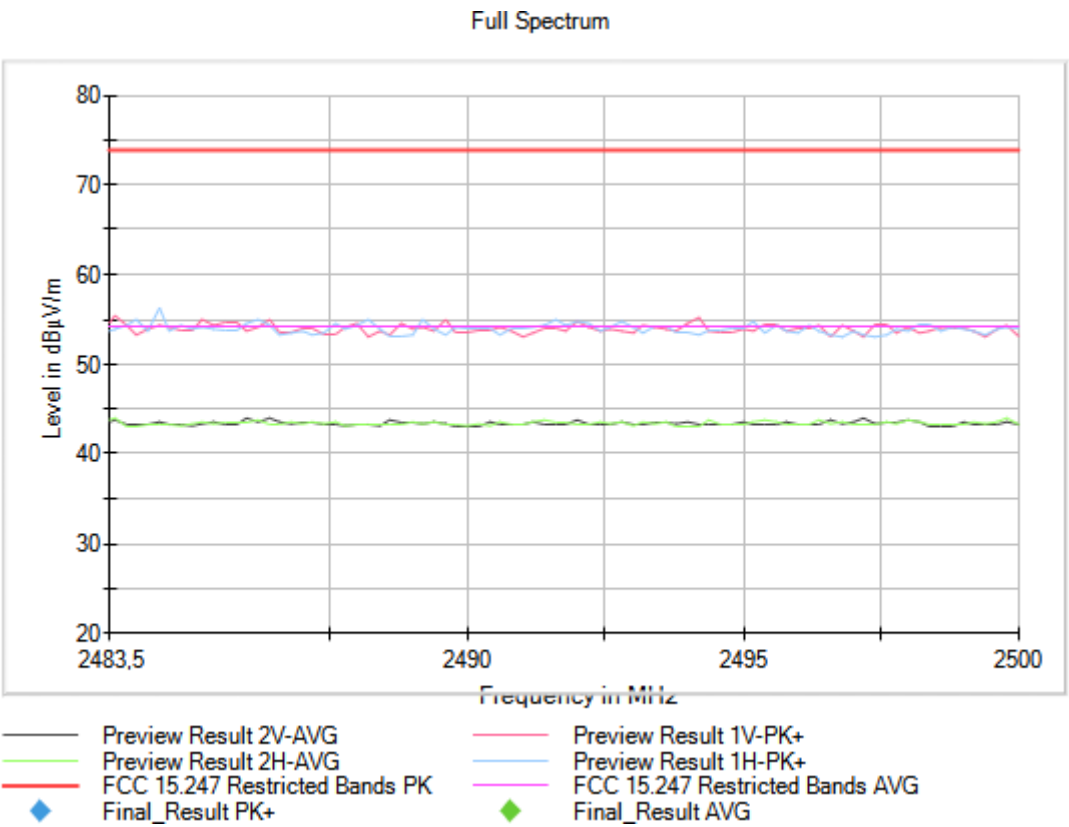
Modulation = BT (8DPSK 3-DH5)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	200 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [1, 3]

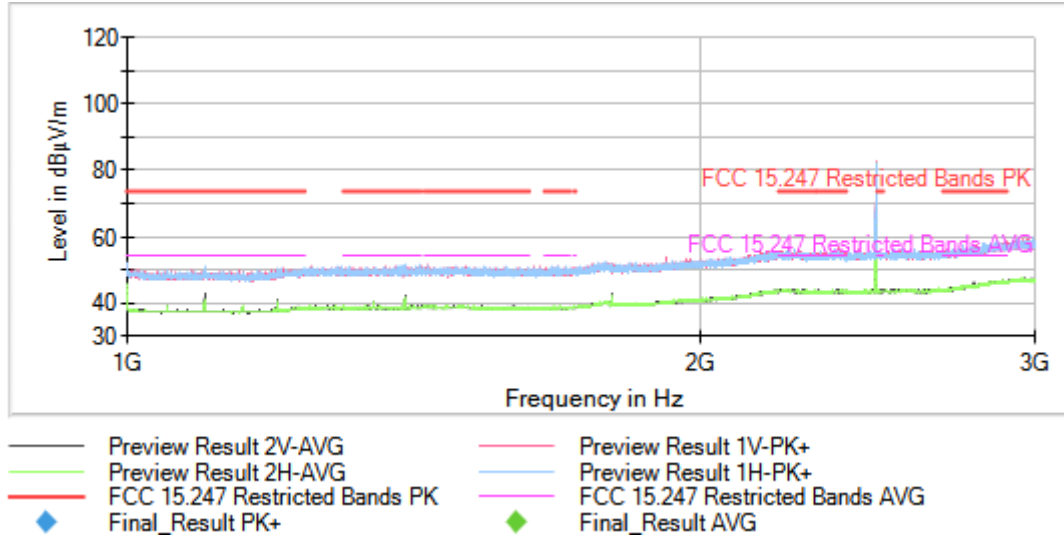
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2480.00000

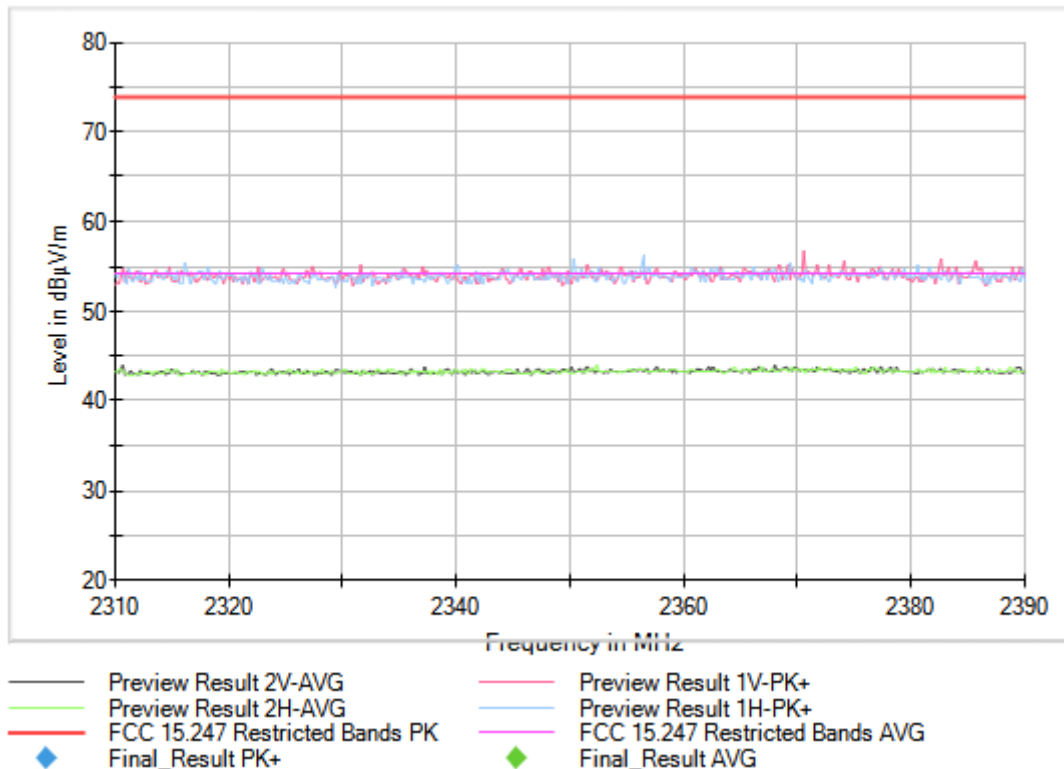
Active Port = 1

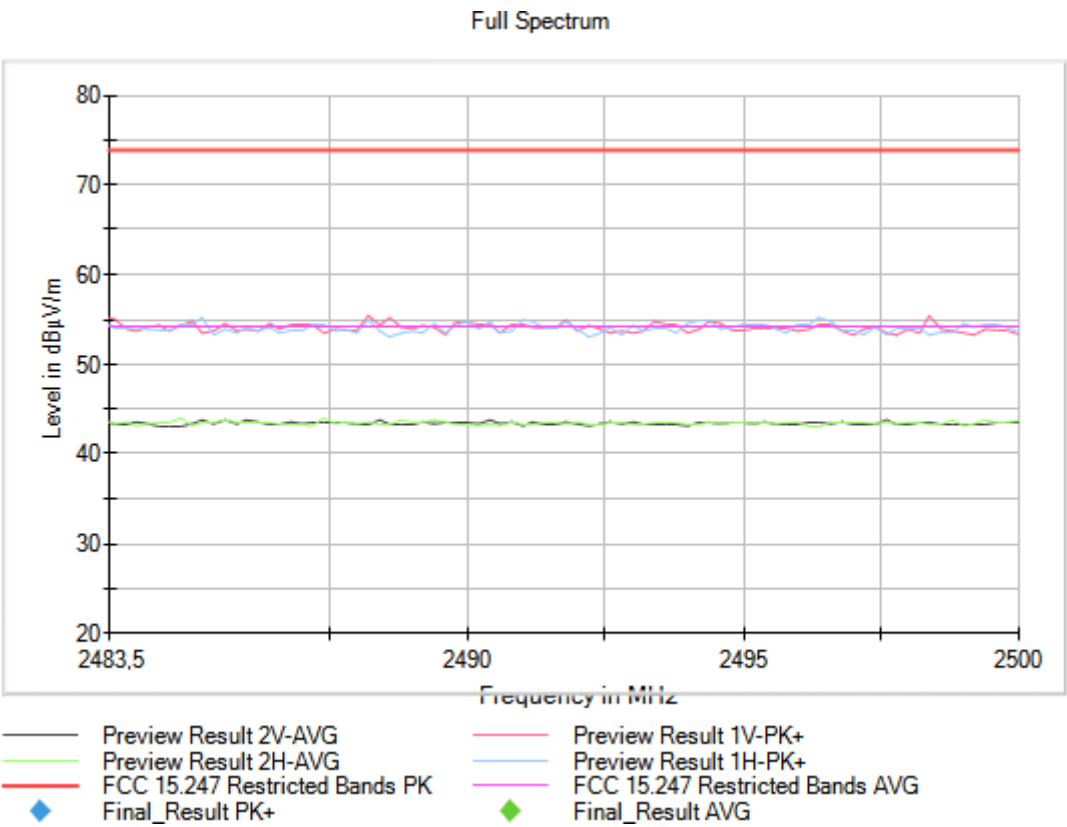
Modulation = BT (8DPSK 3-DH5)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	200 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

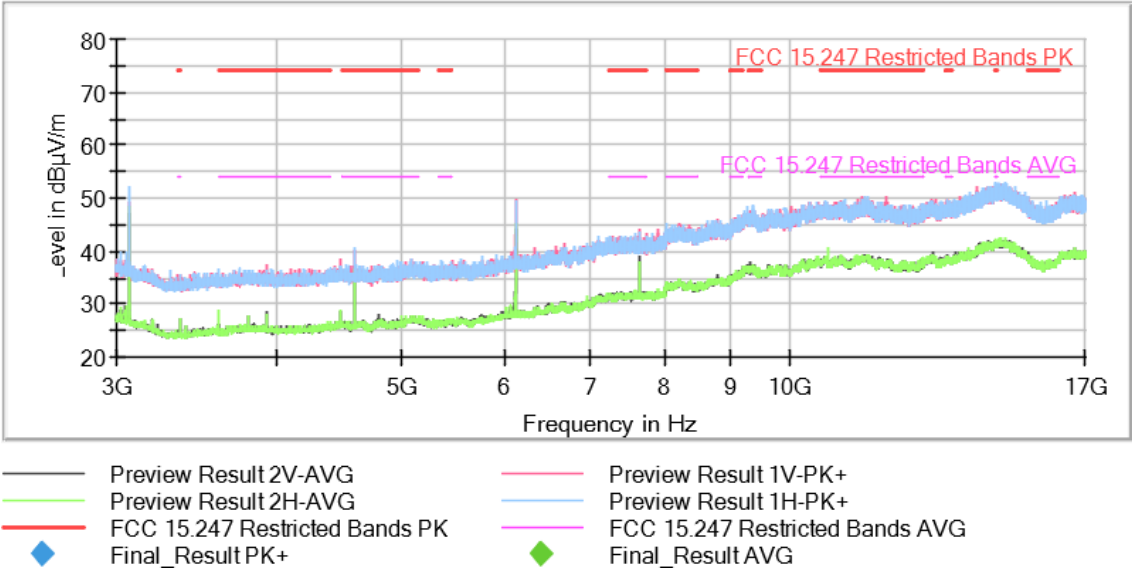
Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [3, 17]

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2402.00000

Active Port = 1 Modulation = BT (8DPSK 3-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

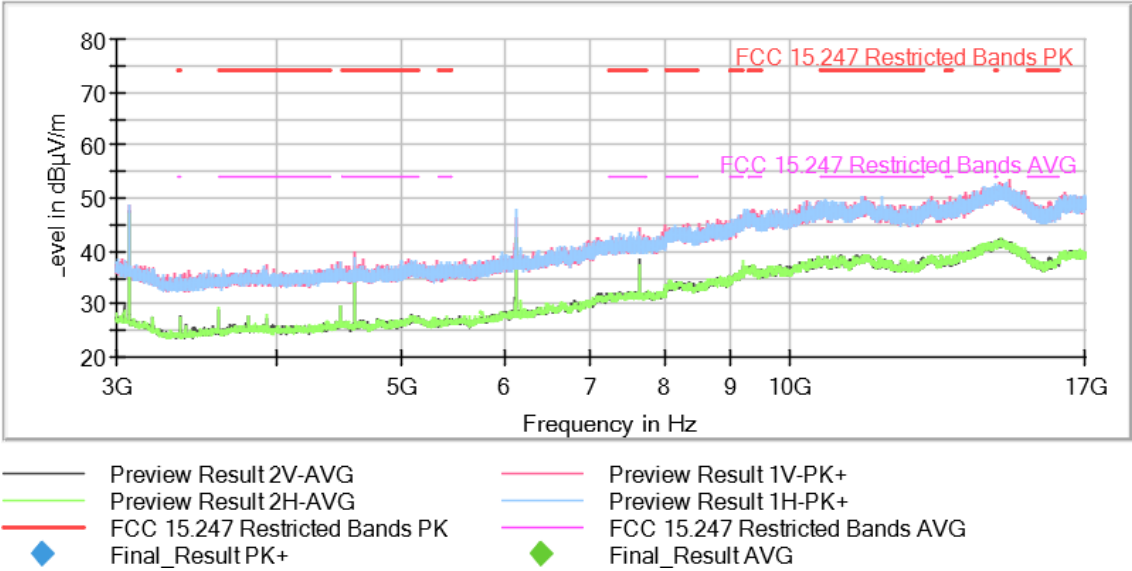
Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [3, 17]

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2441.00000

Active Port = 1 Modulation = BT (8DPSK 3-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

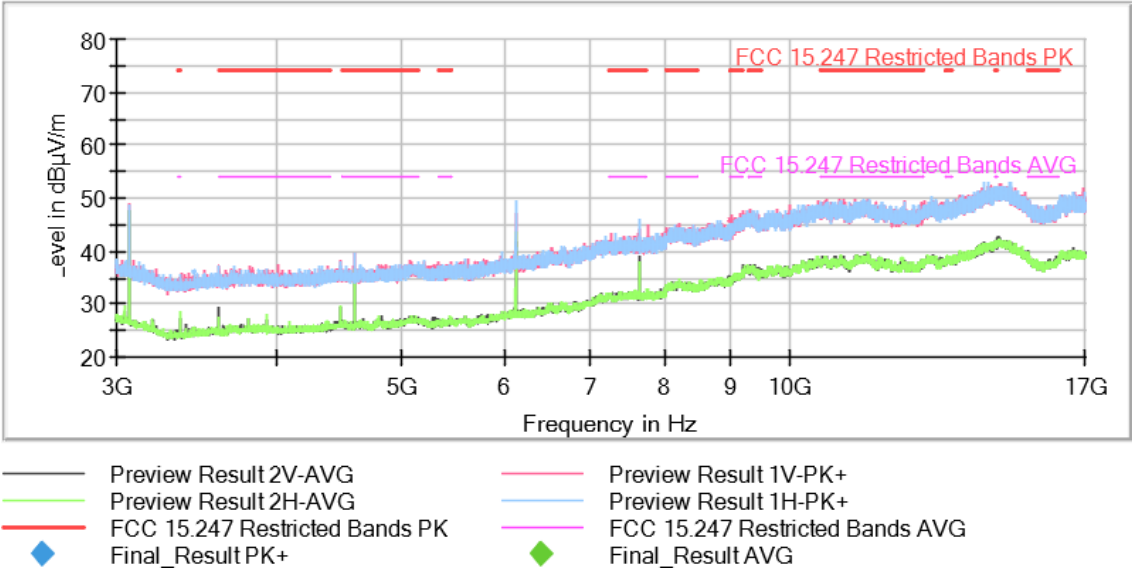
Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [3, 17]

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2480.00000

Active Port = 1 Modulation = BT (8DPSK 3-DH5)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Appendix B: Test results. Bluetooth EDR (Smartphone)

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TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal: 12Vdc
Type of Power Supply: External power supply

ANTENNA (*):

Type of Antenna: PCB integrated slot antenna
Maximum Declared Antenna Gain: 2.67 dBi

TEST FREQUENCIES (*):

Modulation	Data rates	Low Channel:	Middle Channel	High Channel
BTEDR GFSK	1-DH5	2402 MHz	2441 MHz	2480 MHz
BTEDR PI/4 DQPSK	2-DH5	2402 MHz	2441 MHz	2480 MHz
BTEDR 8DPSK	3-DH5	2402 MHz	2441 MHz	2480 MHz

During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the modulation schemes and test channels as required.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.



RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

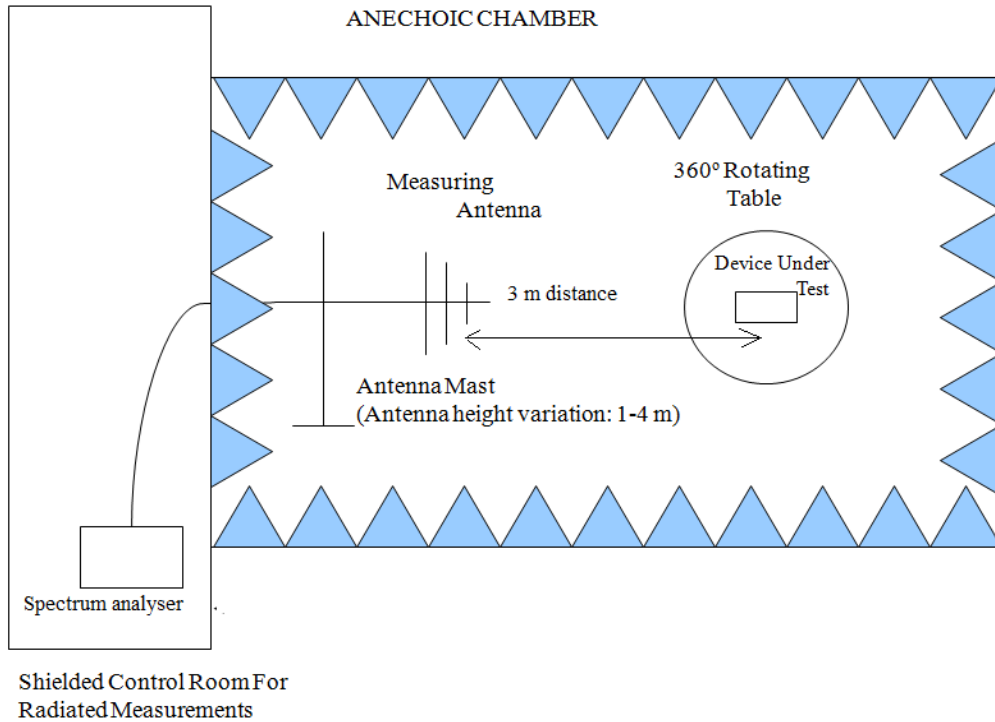
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

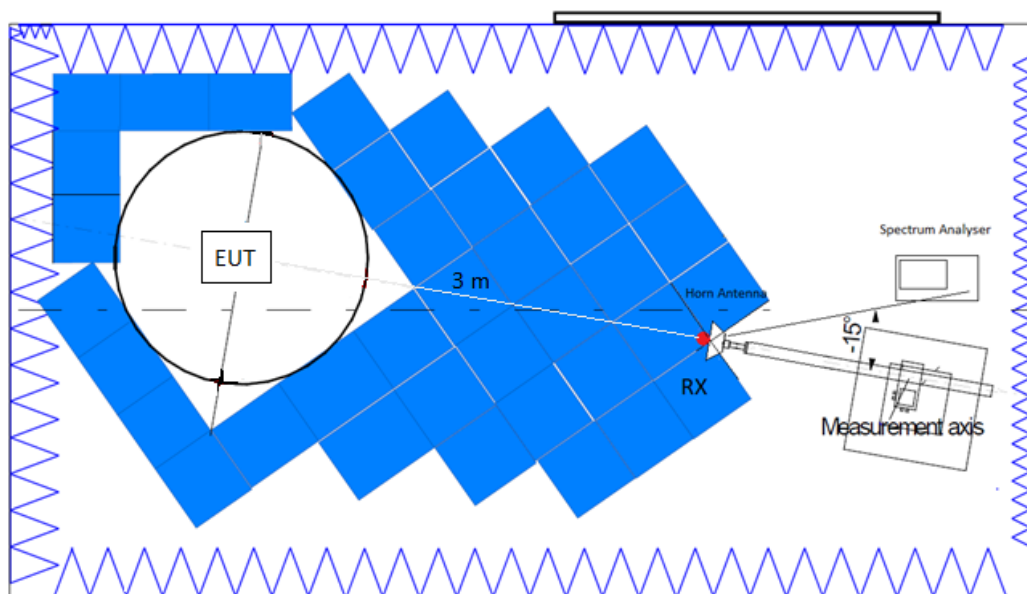
Measurements were made in both horizontal and vertical planes of polarization.

A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

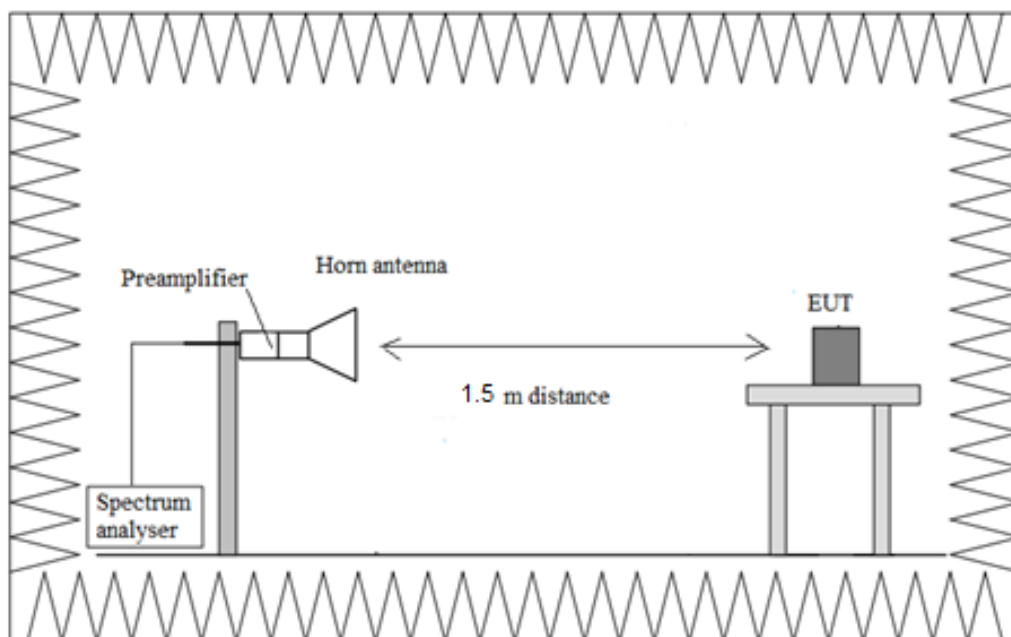
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



SAMPLE CALCULATION

For radiated measurements:

Values measures by the test receiver / analyzer are converted to field strength, in dBuV/m, at the regulatory distance using the following calculation:

$$\text{Unwanted Lvl (dBuV/m)} = \text{Raw Rec (dBuV)} + \text{Preamp (dB)} + \text{Trd Corre. (dB/m)} + \text{SigPath (dB)}$$

Where,

Raw Rec (dBuV): Measured voltage in the receiver / spectrum analyzer in dBuV

Preamp (dB): Path loses due to preamplifier

Trd Corr. (dB/m): Antenna factor in dB/m

SigPath (dB) = Cable loss (dB) – External Gain amplifier (dB) – Distance factor (dB)

Cable loss (dB): Cable loss

External Gain amplifier (dB): Gain from external amplifier (when used)

Distance factor (dB): Distance factor in dB. When measurement distance is different to limit distance

The field strength, calculated by this way is compared with the regulatory limit.

TEST CASES DETAILS

99dBw Occupied Channel Bandwidth 99%

Limits

RSS-Gen 6.7 / FCC 2.1049 - Occupied Channel Bandwidth 99%

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

Modulation: BT (GFSK 1-DH5)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Occ Ch BW (MHz)
[2400, 2483.5]	Frequency Hopping Spread Spectrum systems (DSS)	2402.00000	1	0.850
		2441.00000		0.850
		2480.00000		0.850

Verdict

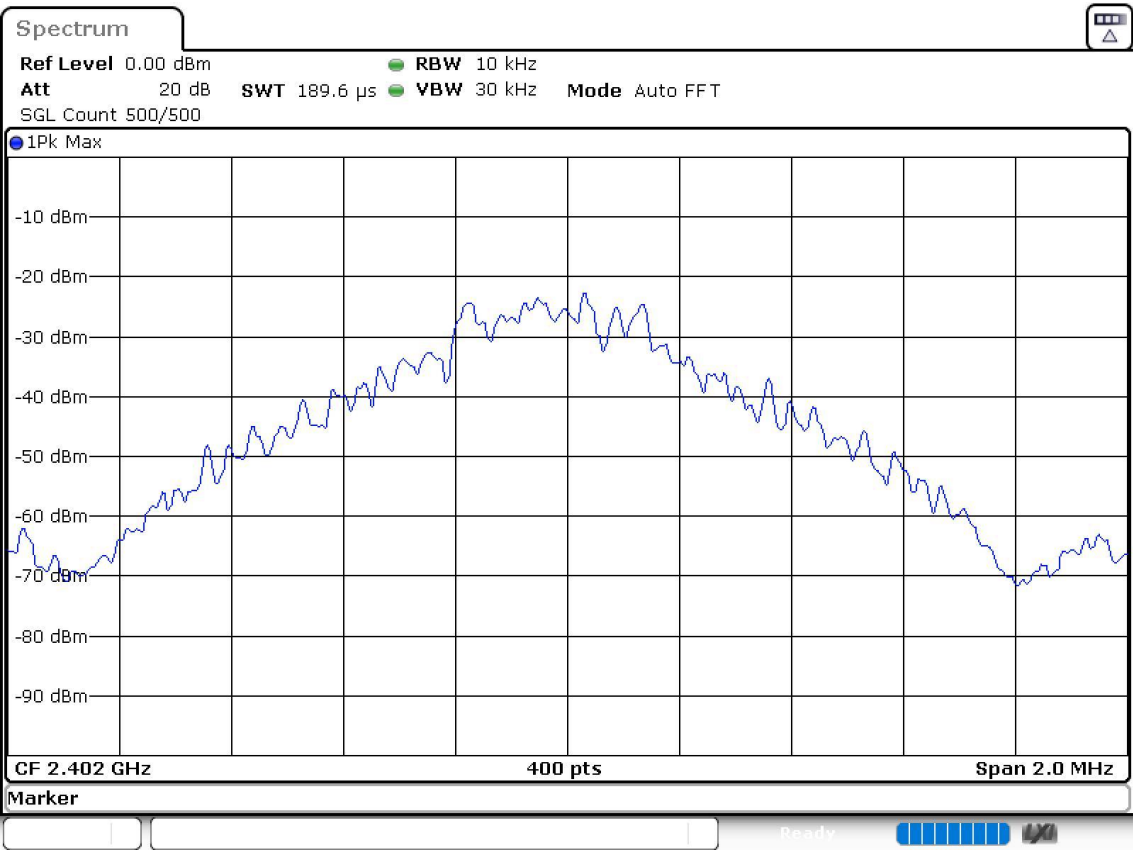
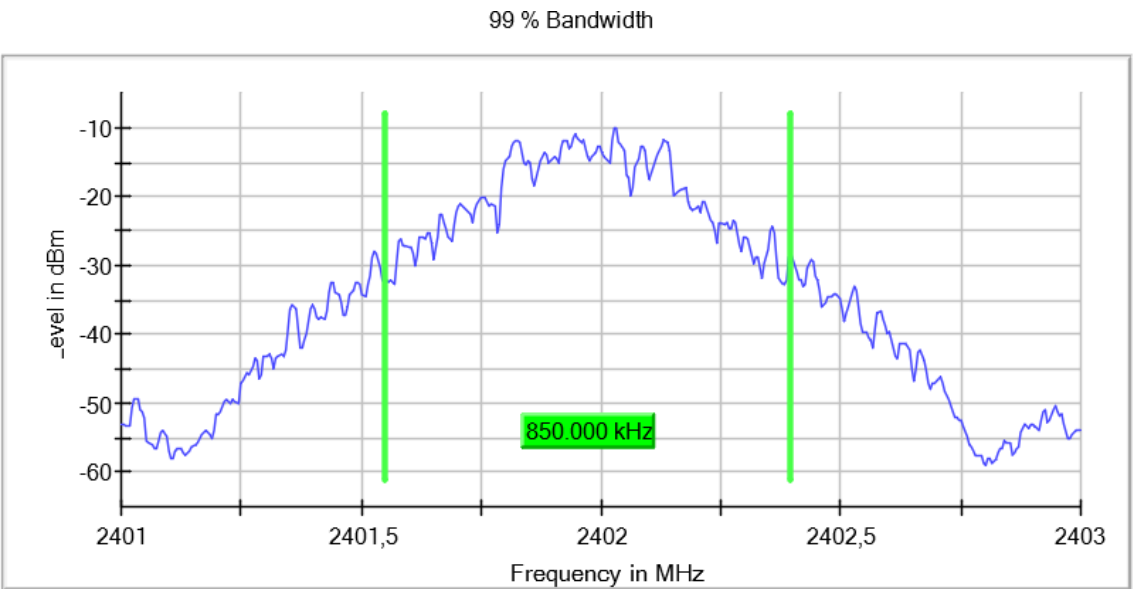
Pass

Attachments

Operation Band MHz = [2400, 2483.5]
Frequency MHz = 2402.00000
Modulation = BT (GFSK 1-DH5)

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)
Active Port = 1

Images:



Operation Band MHz = [2400,
2483.5]

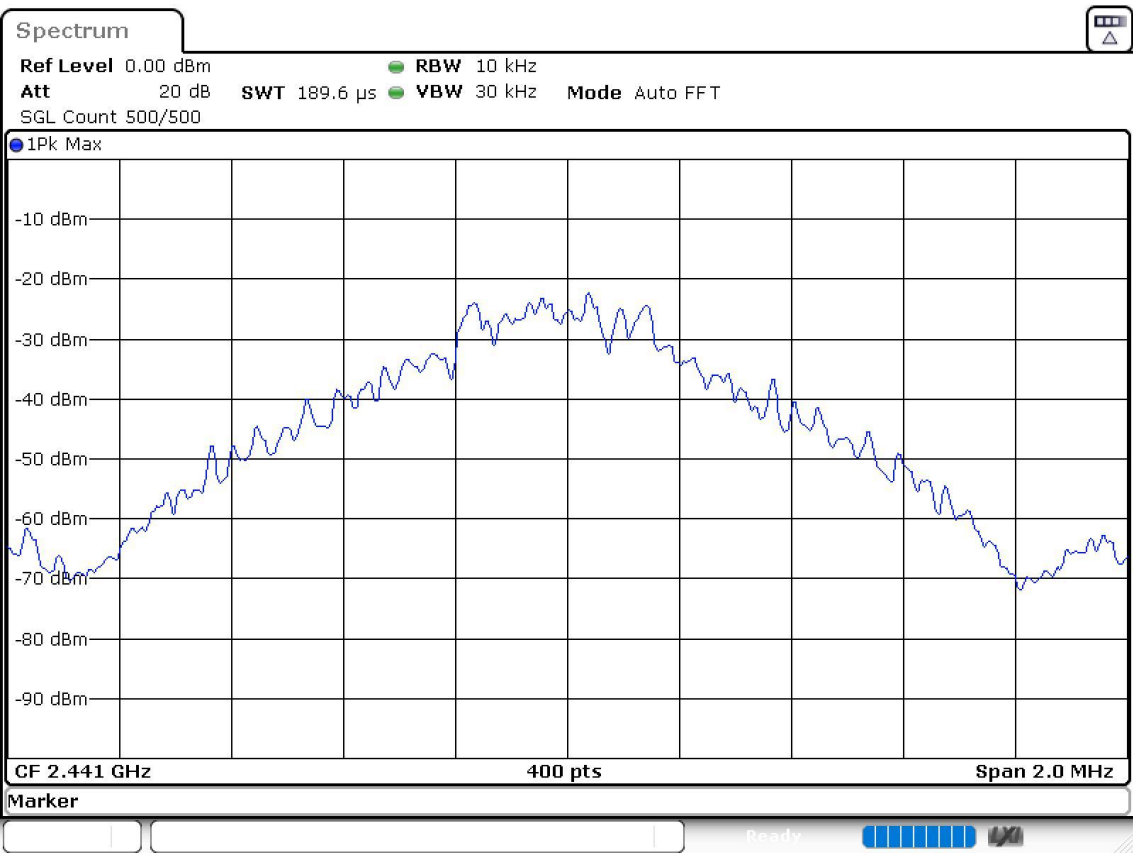
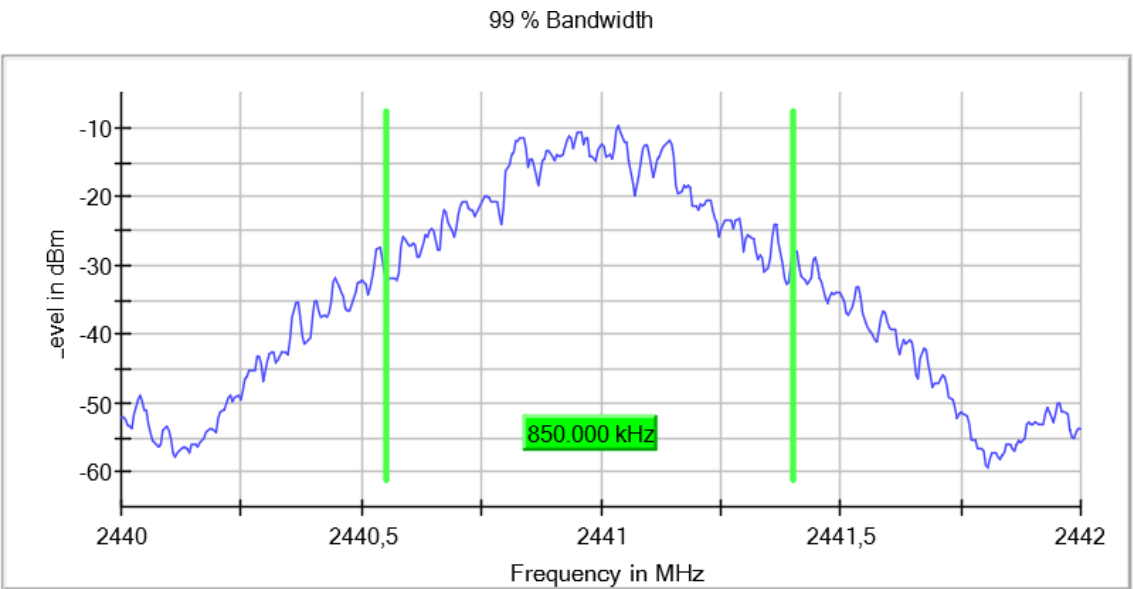
Equipment Type = Frequency Hopping Spread Spectrum systems
(DSS)

Frequency MHz = 2441.00000

Active Port = 1

Modulation = BT (GFSK 1-DH5)

Images:



Operation Band MHz = [2400,
2483.5]

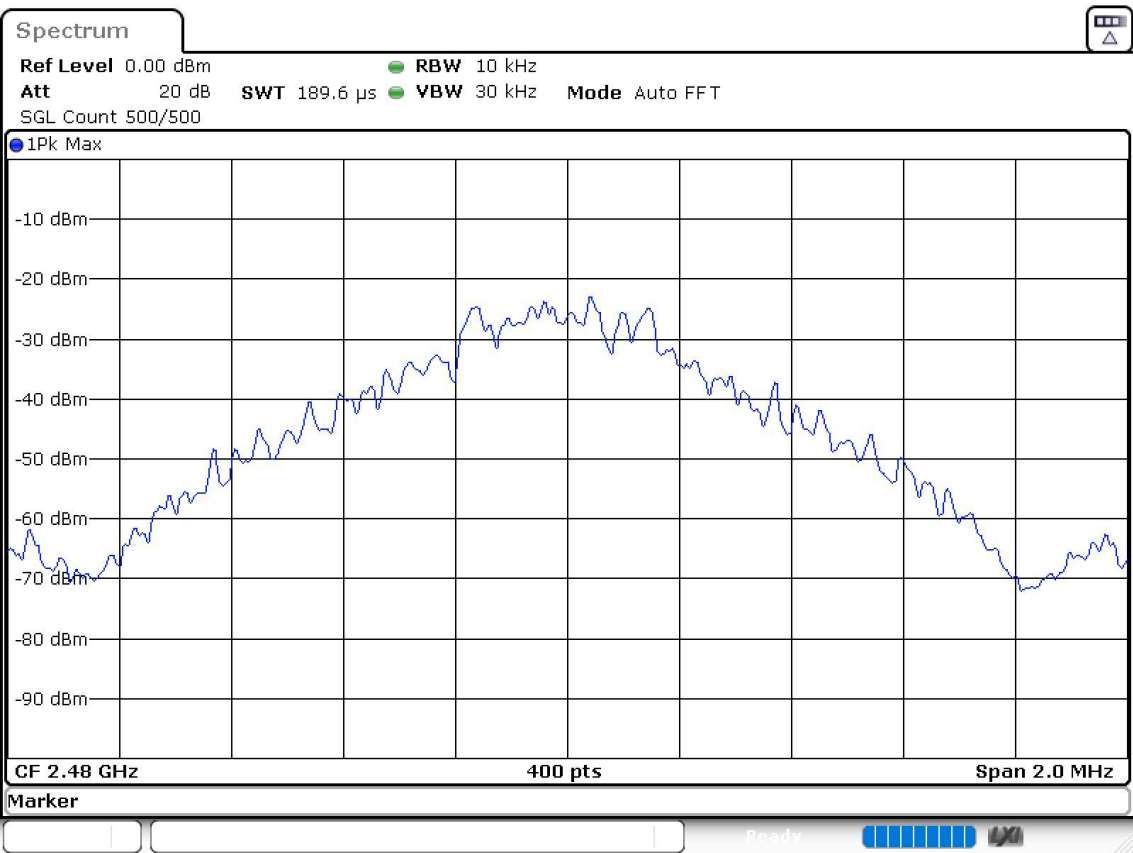
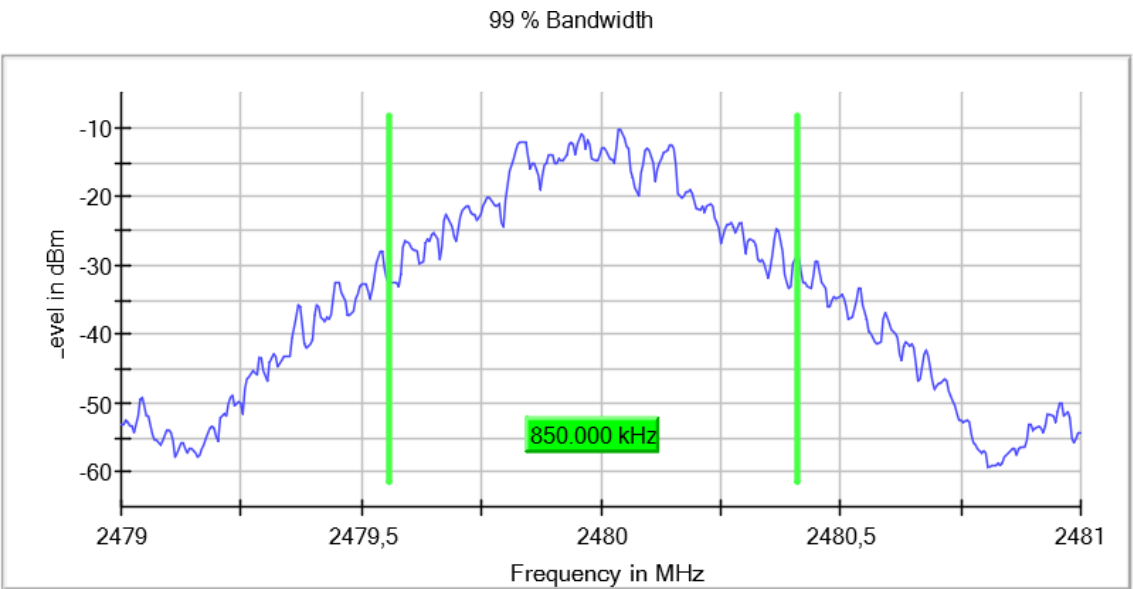
Equipment Type = Frequency Hopping Spread Spectrum systems
(DSS)

Frequency MHz = 2480.00000

Active Port = 1

Modulation = BT (GFSK 1-DH5)

Images:



Modulation: BT (Pi/4 DQPSK 2-DH5)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Occ Ch BW (MHz)
[2400, 2483.5]	Frequency Hopping Spread Spectrum systems (DSS)	2402.00000	1	1.190
		2441.00000		1.190
		2480.00000		1.190

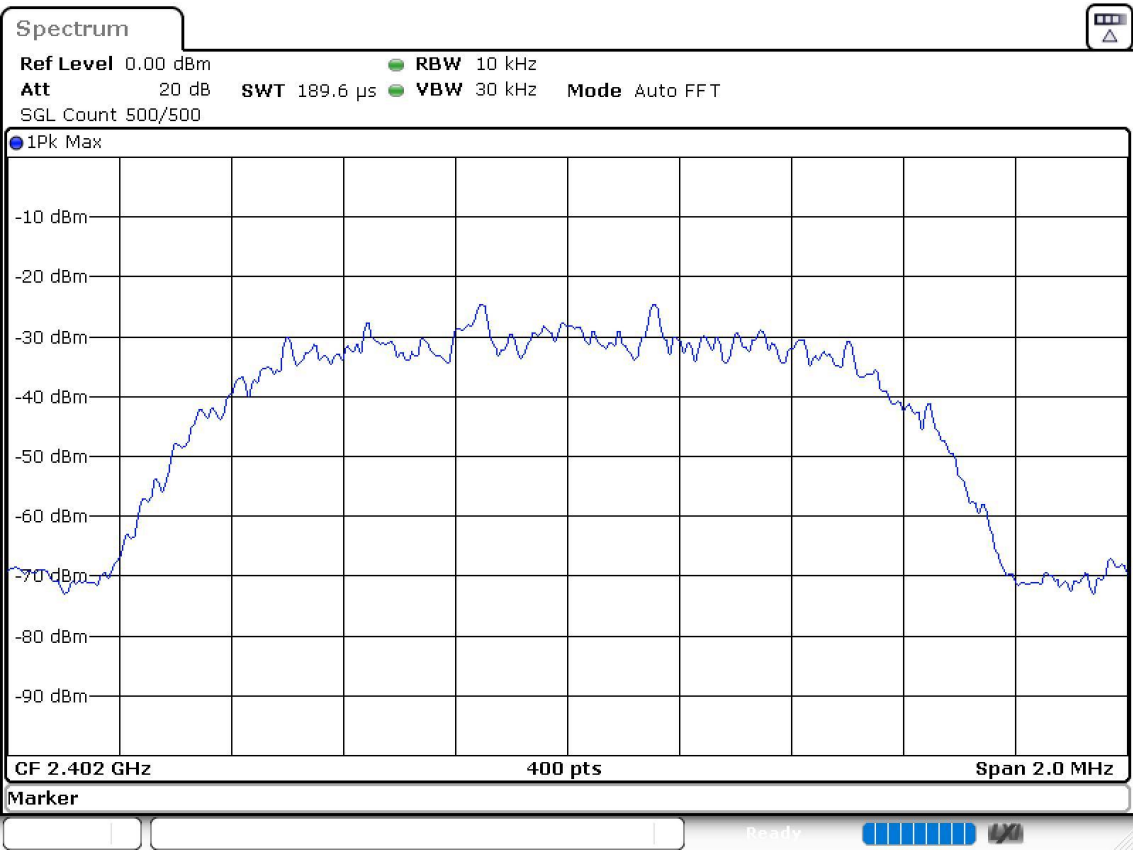
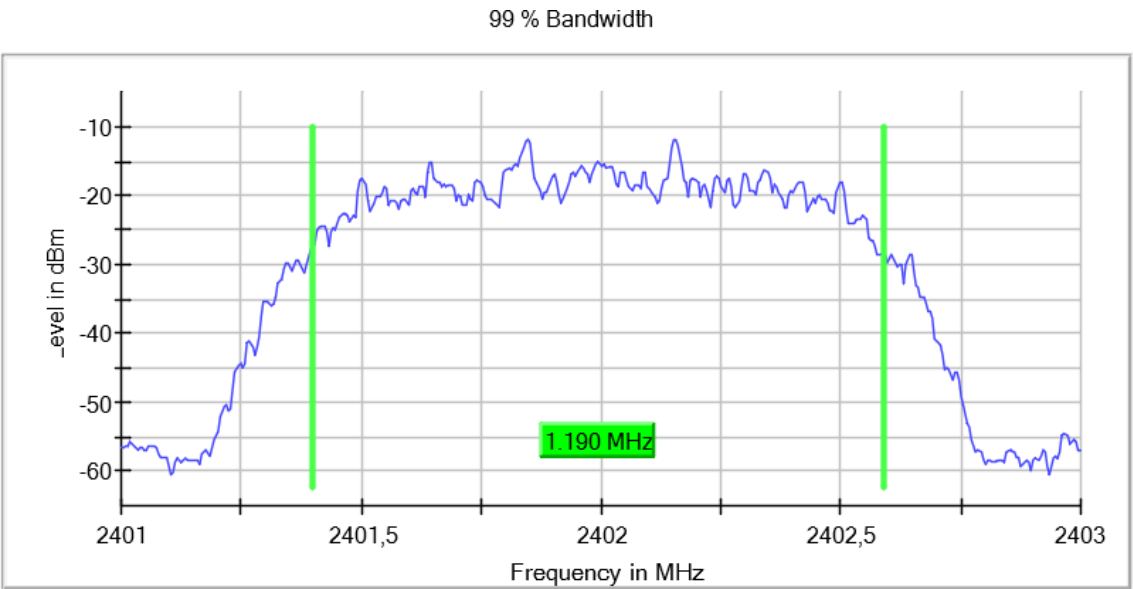
Verdict

Pass

Attachments

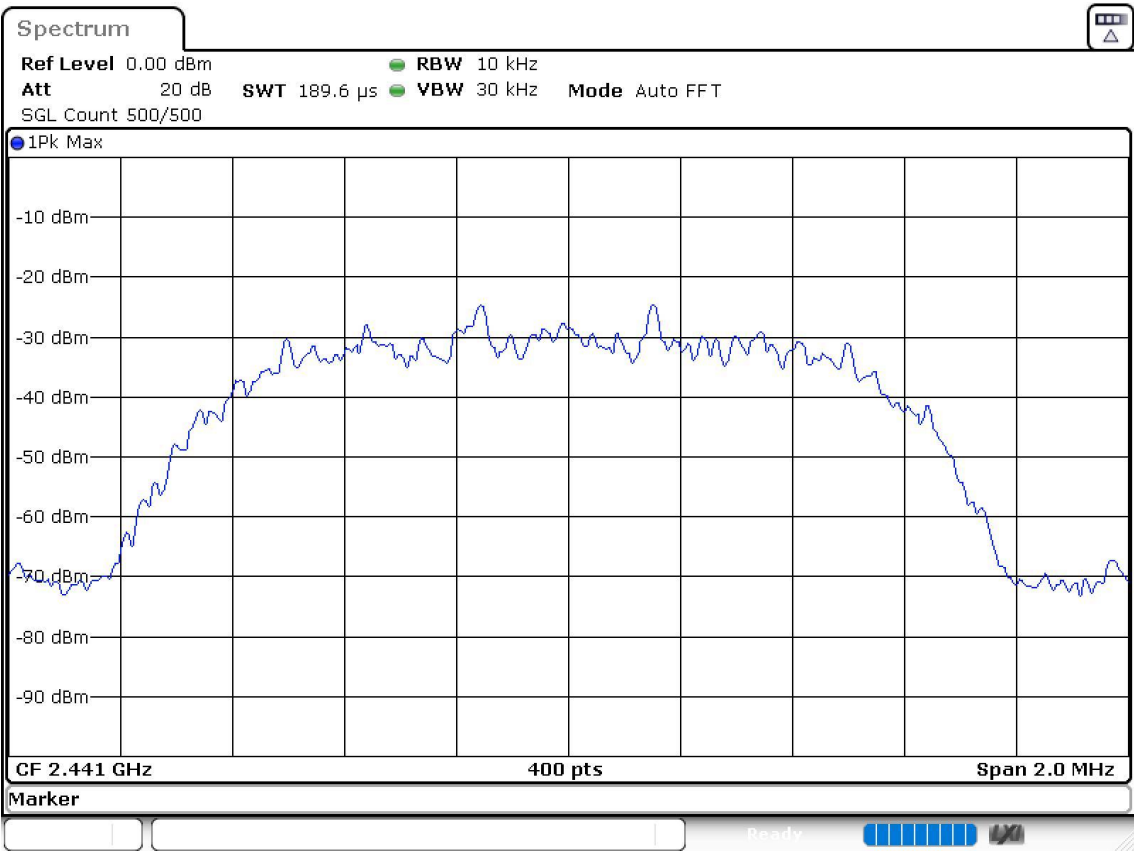
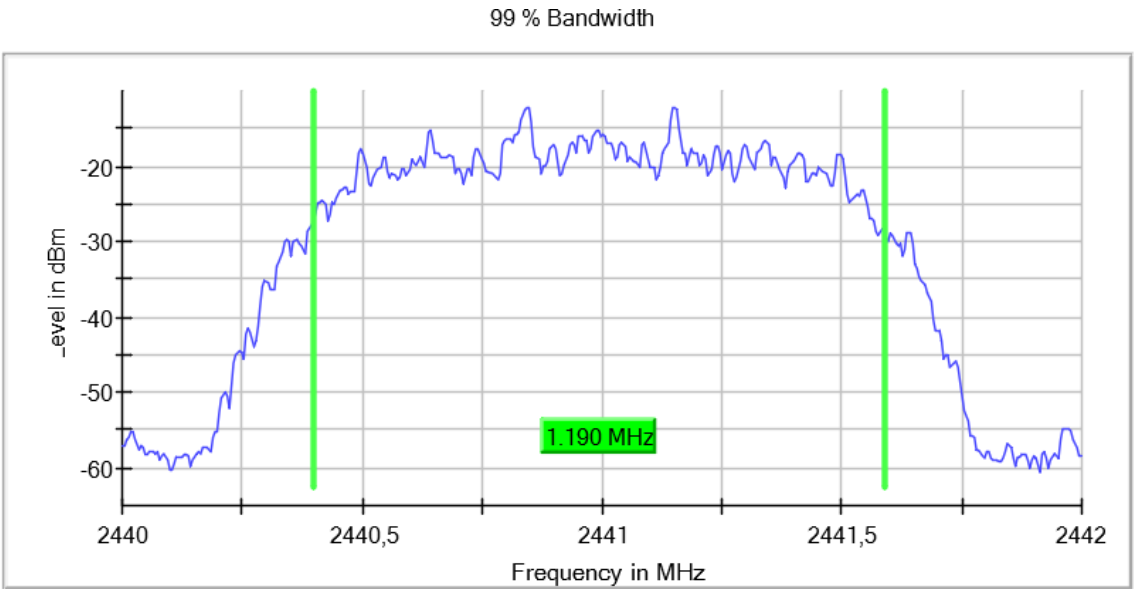
Operation Band MHz = [2400, 2483.5] Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



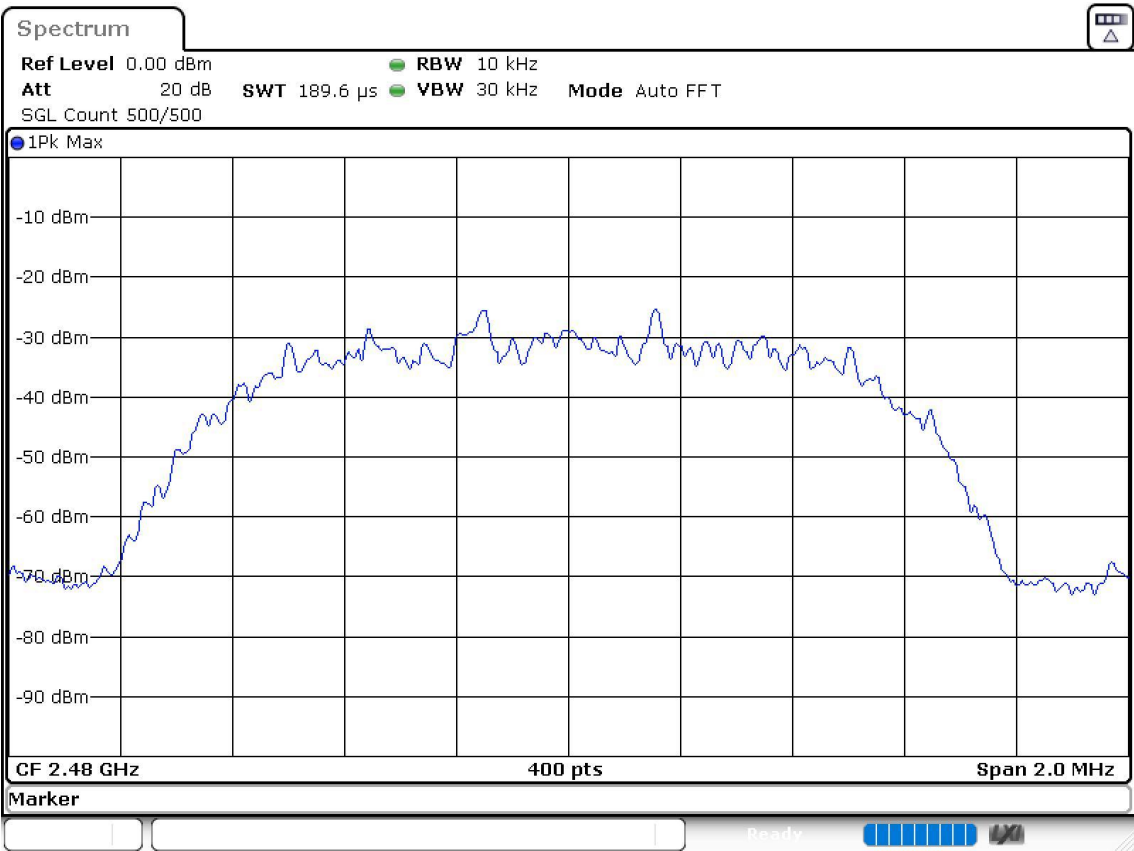
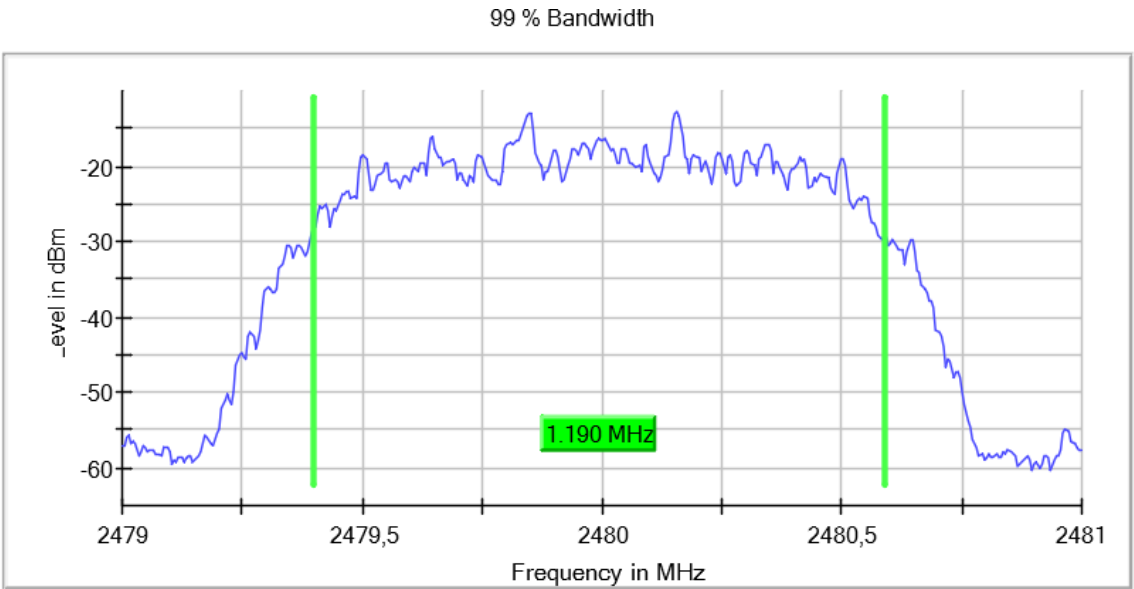
Operation Band MHz = [2400, 2483.5] Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)
Frequency MHz = 2441.00000 Active Port = 1
Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Operation Band MHz = [2400, 2483.5] Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)
Frequency MHz = 2480.00000 Active Port = 1
Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Modulation: BT (8DPSK 3-DH5)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Occ Ch BW (MHz)
[2400, 2483.5]	Frequency Hopping Spread Spectrum systems (DSS)	2402.00000	1	1.200
		2441.00000		1.195
		2480.00000		1.200

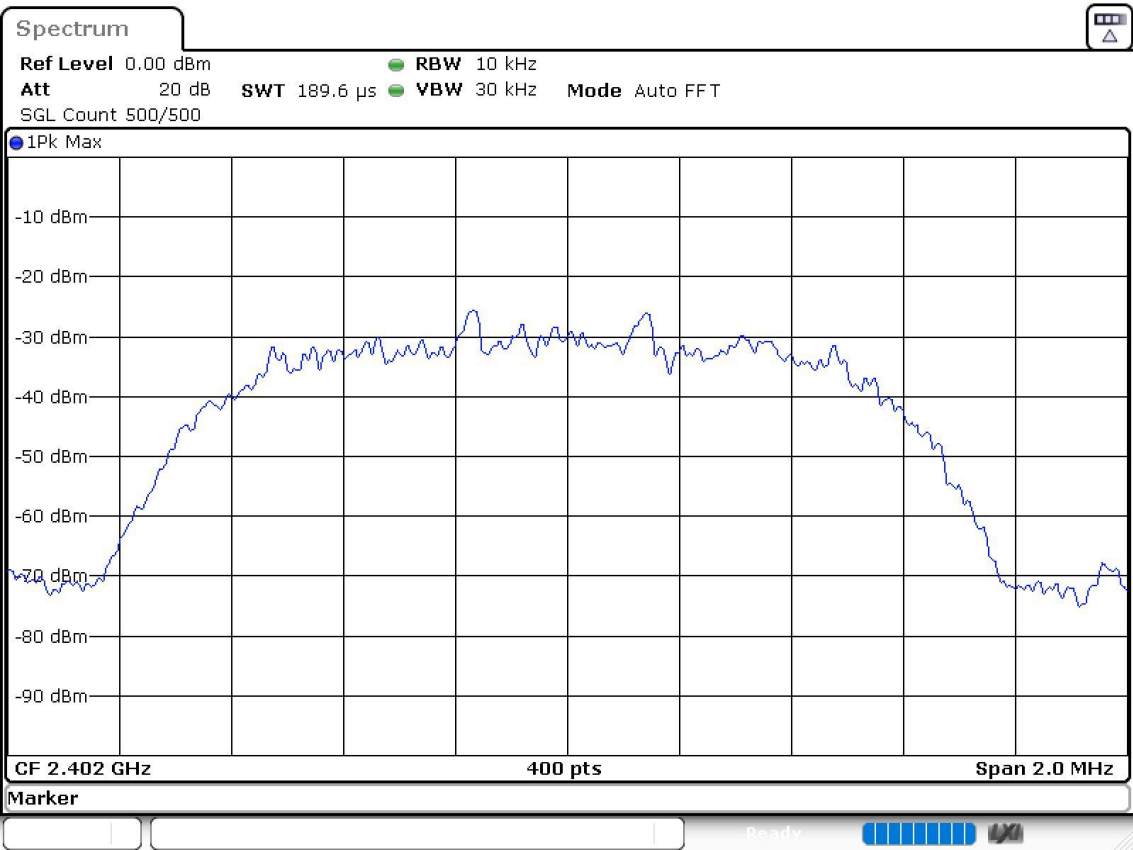
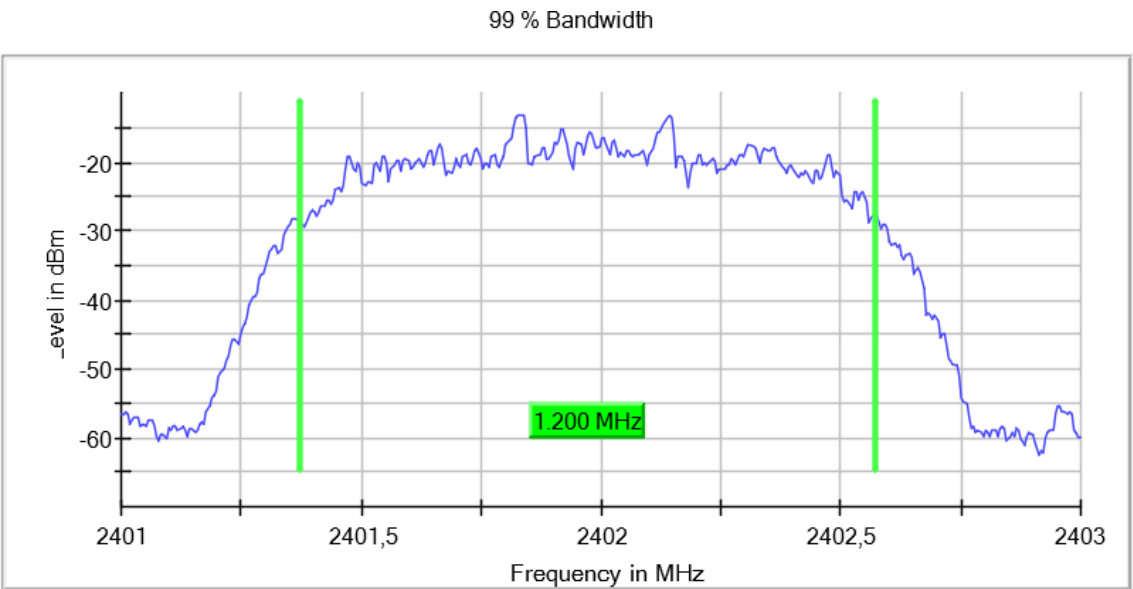
Verdict

Pass

Attachments

Operation Band MHz = [2400, 2483.5] Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BT (8DPSK 3-DH5)

Images:



Operation Band MHz = [2400,
2483.5]

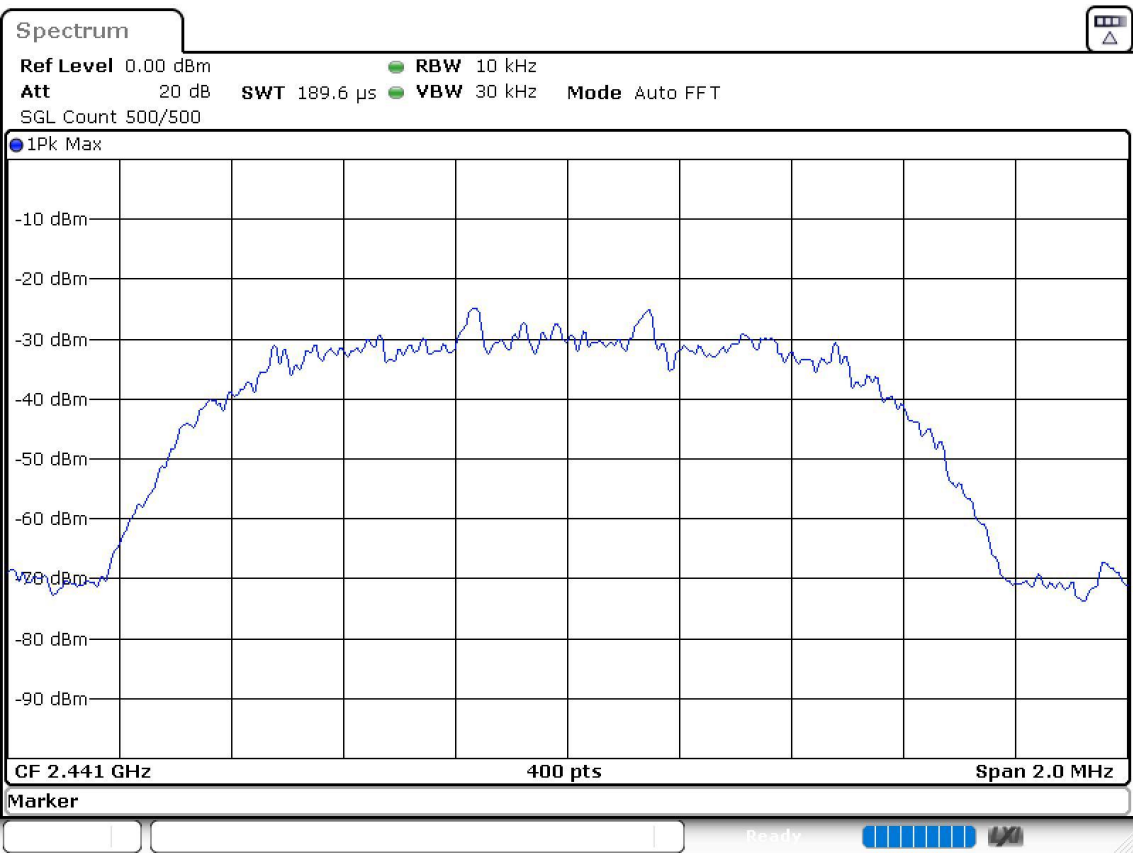
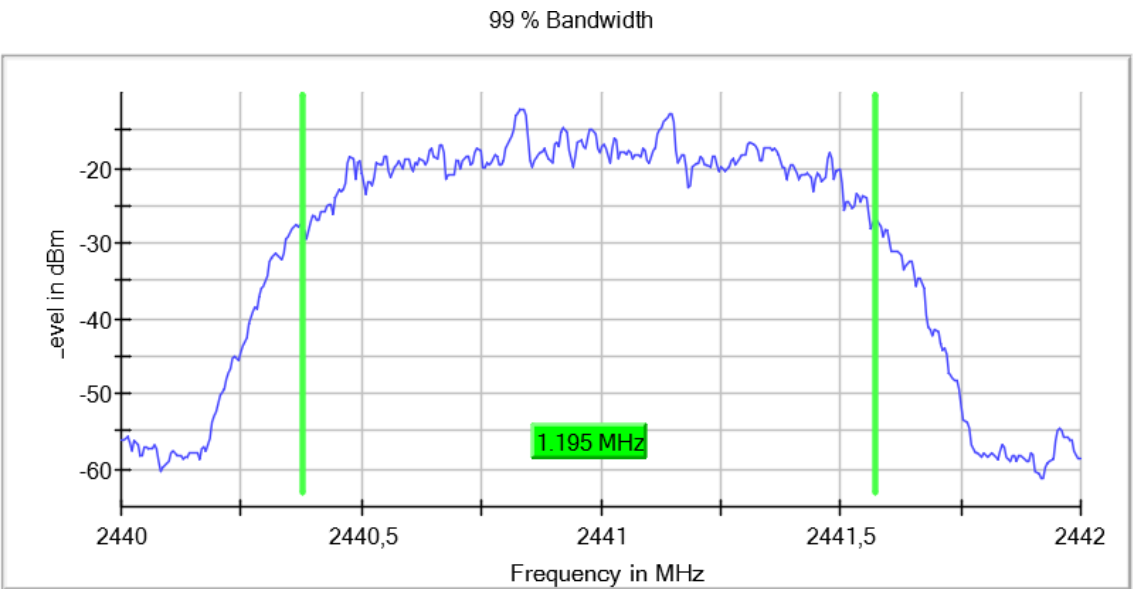
Equipment Type = Frequency Hopping Spread Spectrum systems
(DSS)

Frequency MHz = 2441.00000

Active Port = 1

Modulation = BT (8DPSK 3-DH5)

Images:



Operation Band MHz = [2400,
2483.5]

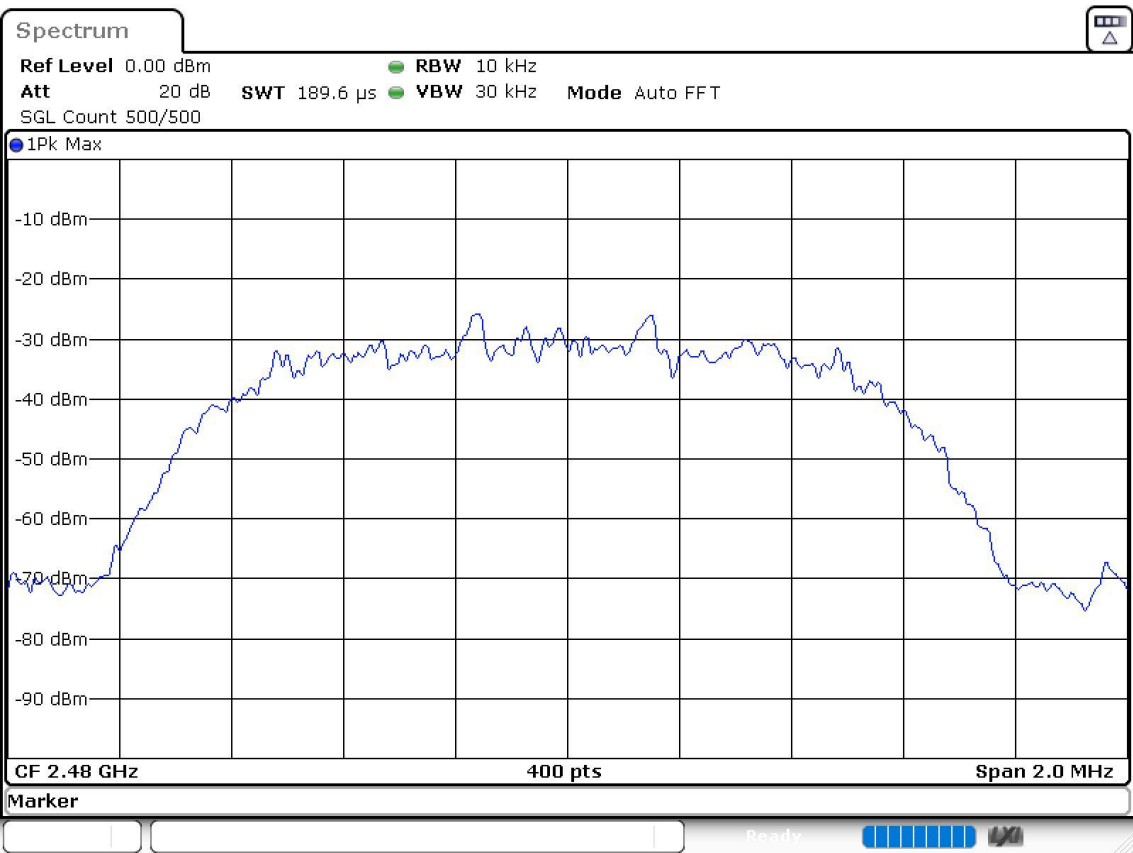
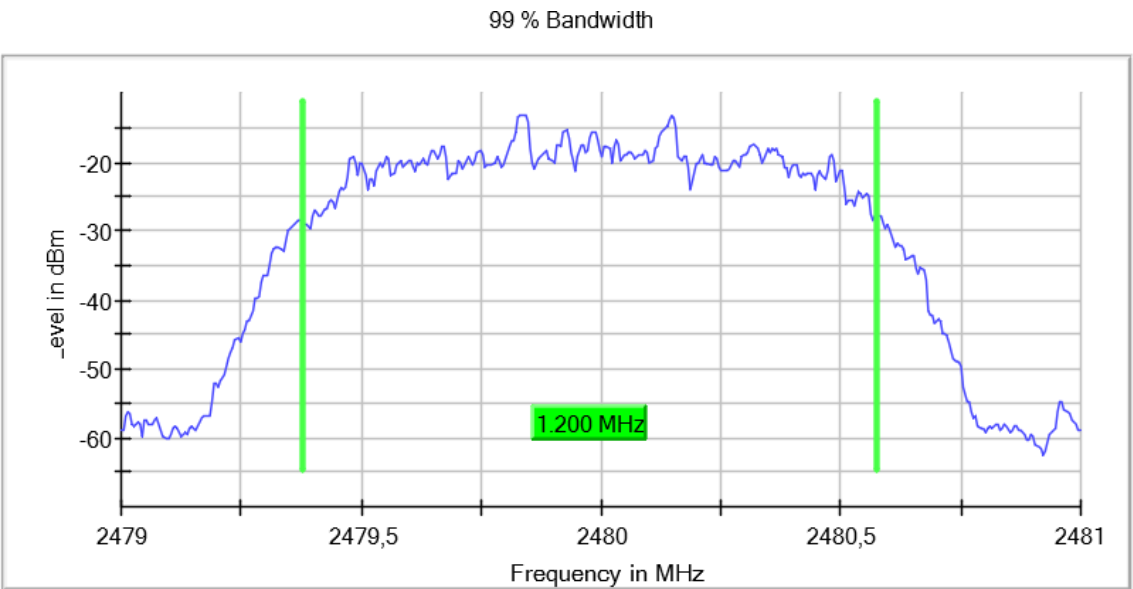
Equipment Type = Frequency Hopping Spread Spectrum systems
(DSS)

Frequency MHz = 2480.00000

Active Port = 1

Modulation = BT (8DPSK 3-DH5)

Images:



RSS-247 6.2.3.1 (a) / FCC 15.247 (a) (1) [20dBW] 20 dB Bandwidth

Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 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, provided the systems operate with an output power no greater than 125 mW.

Modulation: BT (GFSK 1-DH5)

Results

Equipment	Freq (MHz)	Port	Ebw (MHz)
Frequency Hopping Spread Spectrum systems (DSS)	2402.00000	1	0.930
	2441.00000		0.930
	2480.00000		0.930

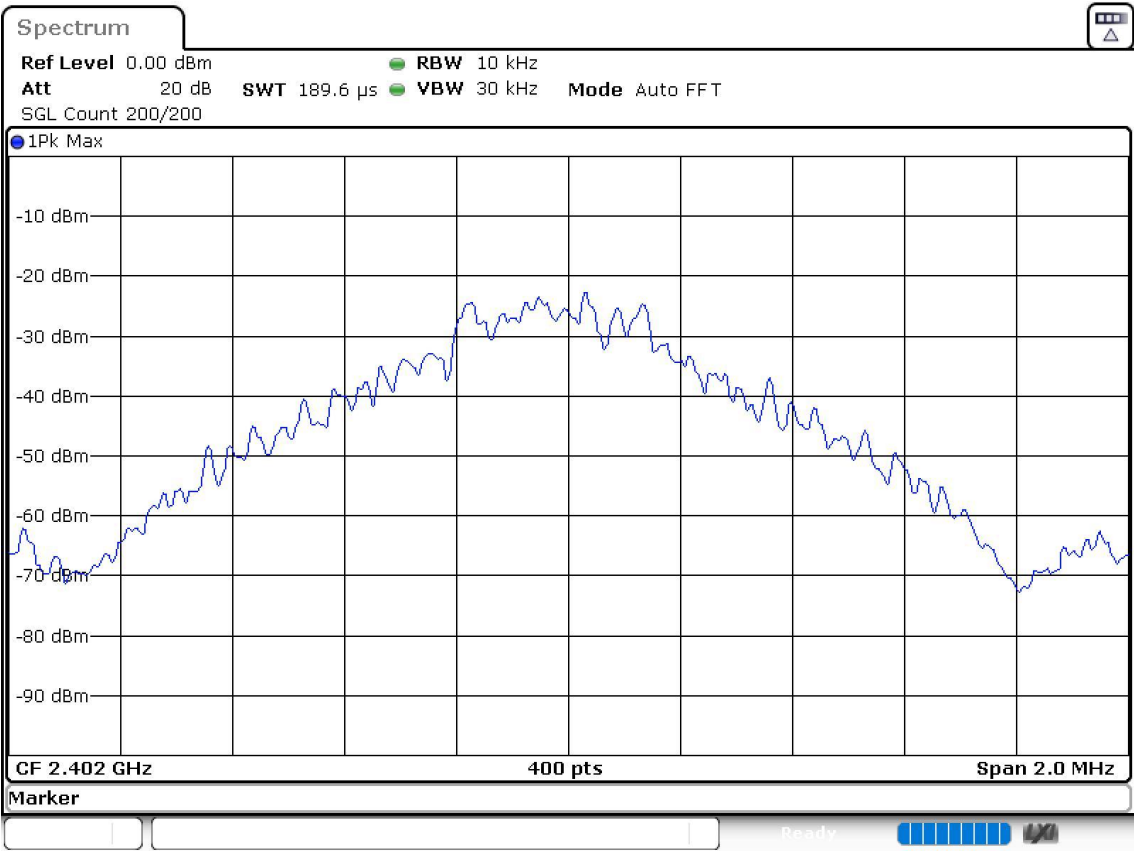
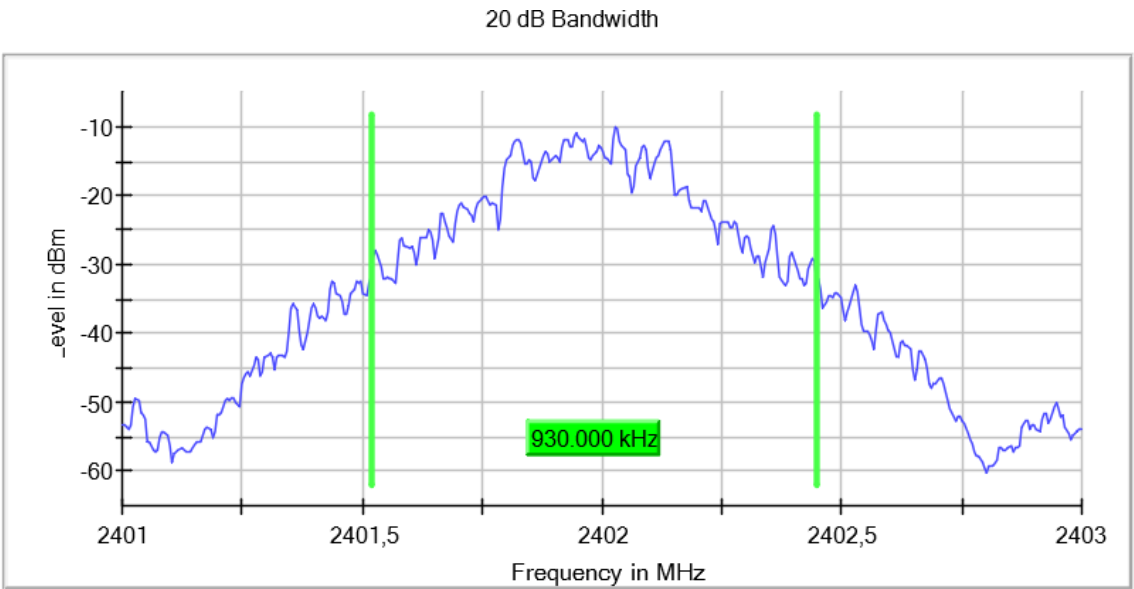
Verdict

Pass

Attachments

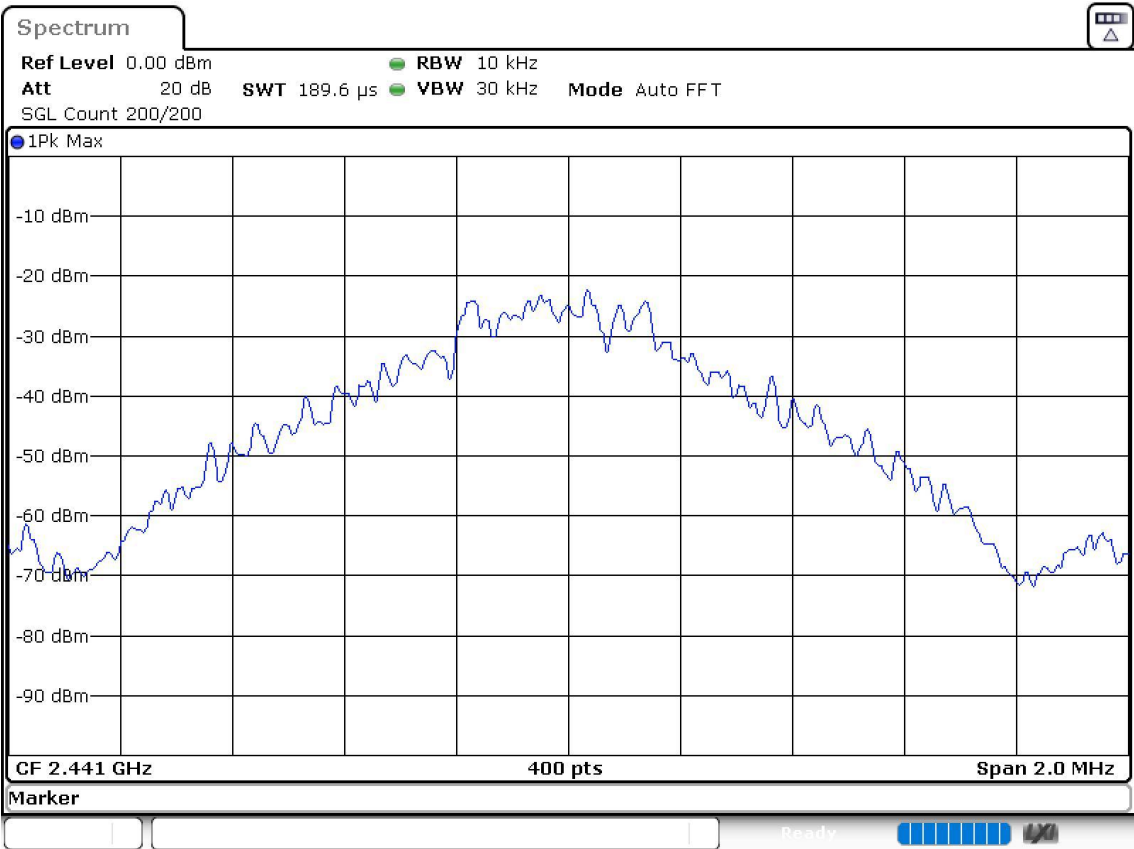
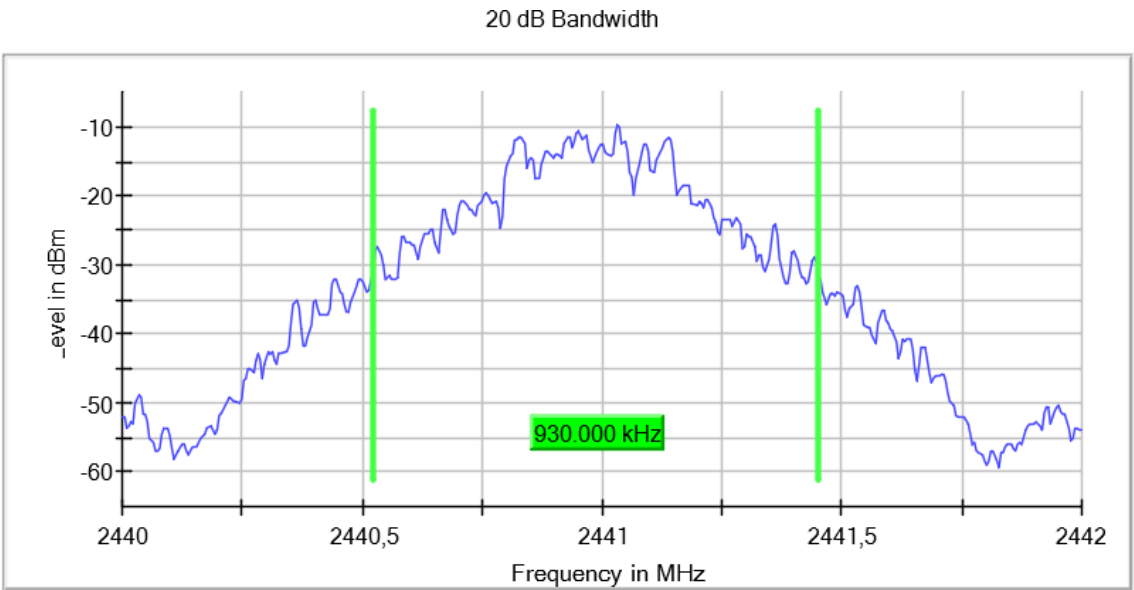
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2402.00000
Active Port = 1 Modulation = BT (GFSK 1-DH5)

Images:



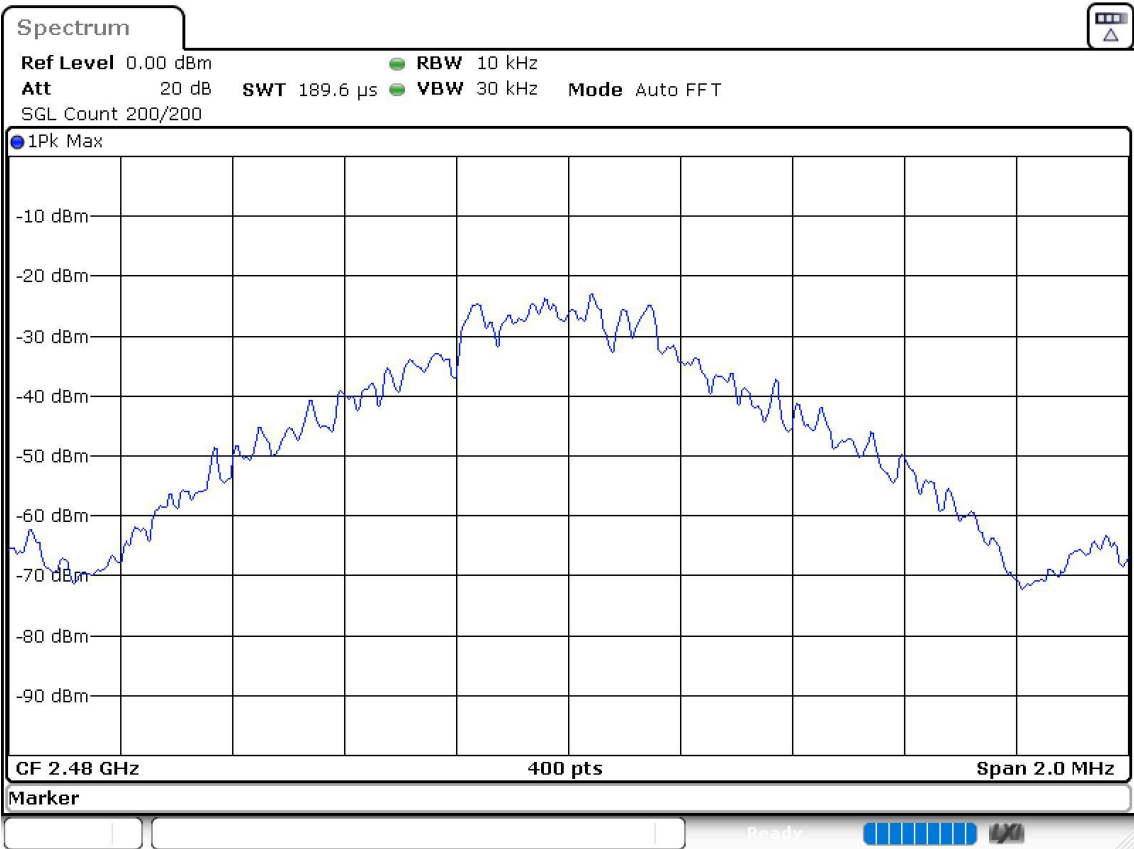
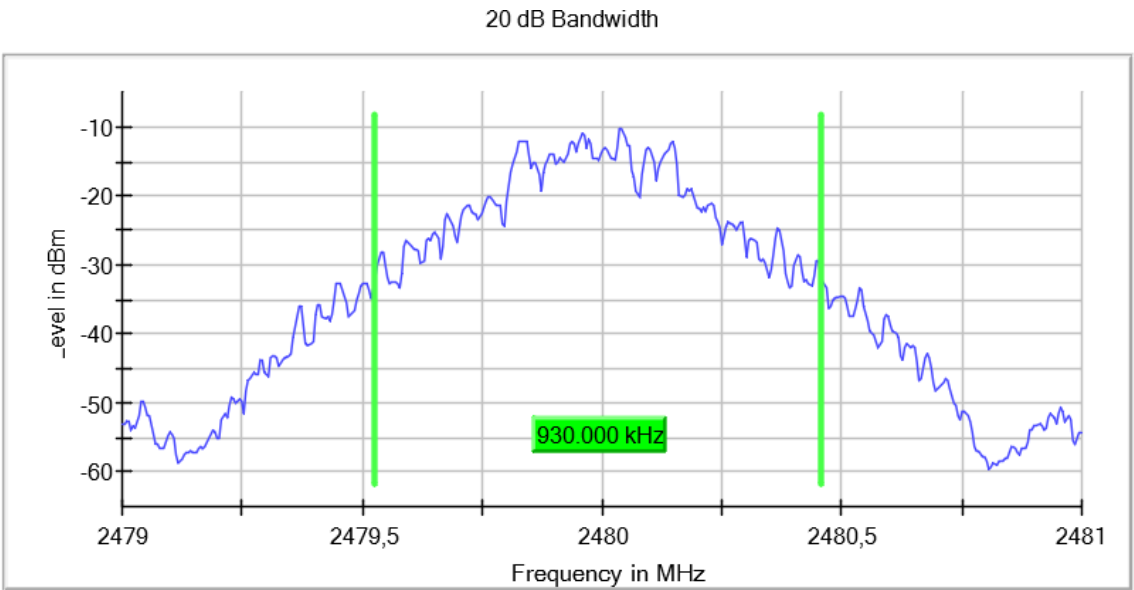
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2441.00000
Active Port = 1 Modulation = BT (GFSK 1-DH5)

Images:



Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2480.00000
Active Port = 1 Modulation = BT (GFSK 1-DH5)

Images:



Modulation: BT (Pi/4 DQPSK 2-DH5)

Results

Equipment	Freq (MHz)	Port	Ebw (MHz)
Frequency Hopping Spread Spectrum systems (DSS)	2402.00000	1	1.325
	2441.00000		1.325
	2480.00000		1.325

Verdict

Pass

Attachments

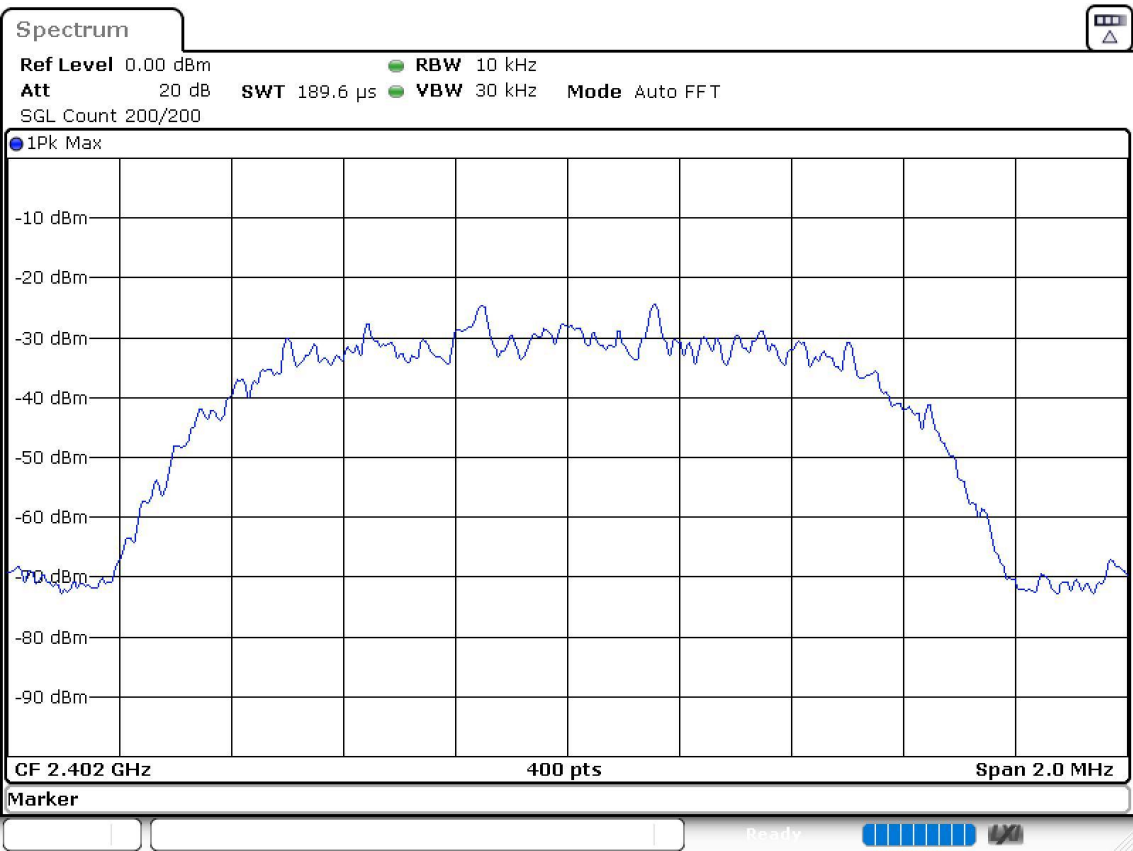
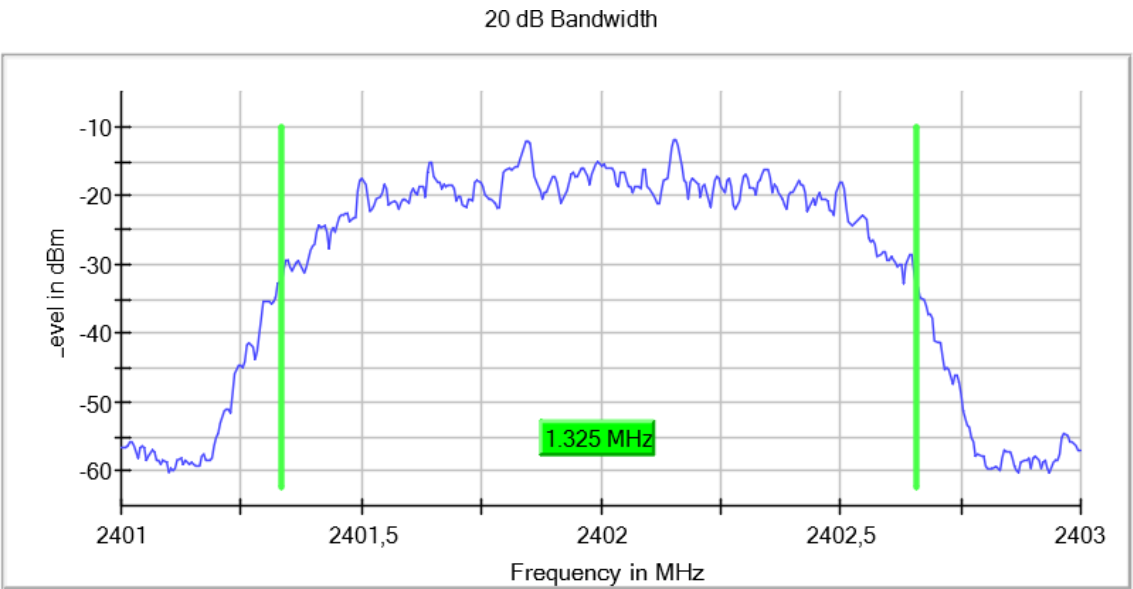
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Active Port = 1

Frequency MHz = 2402.00000

Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



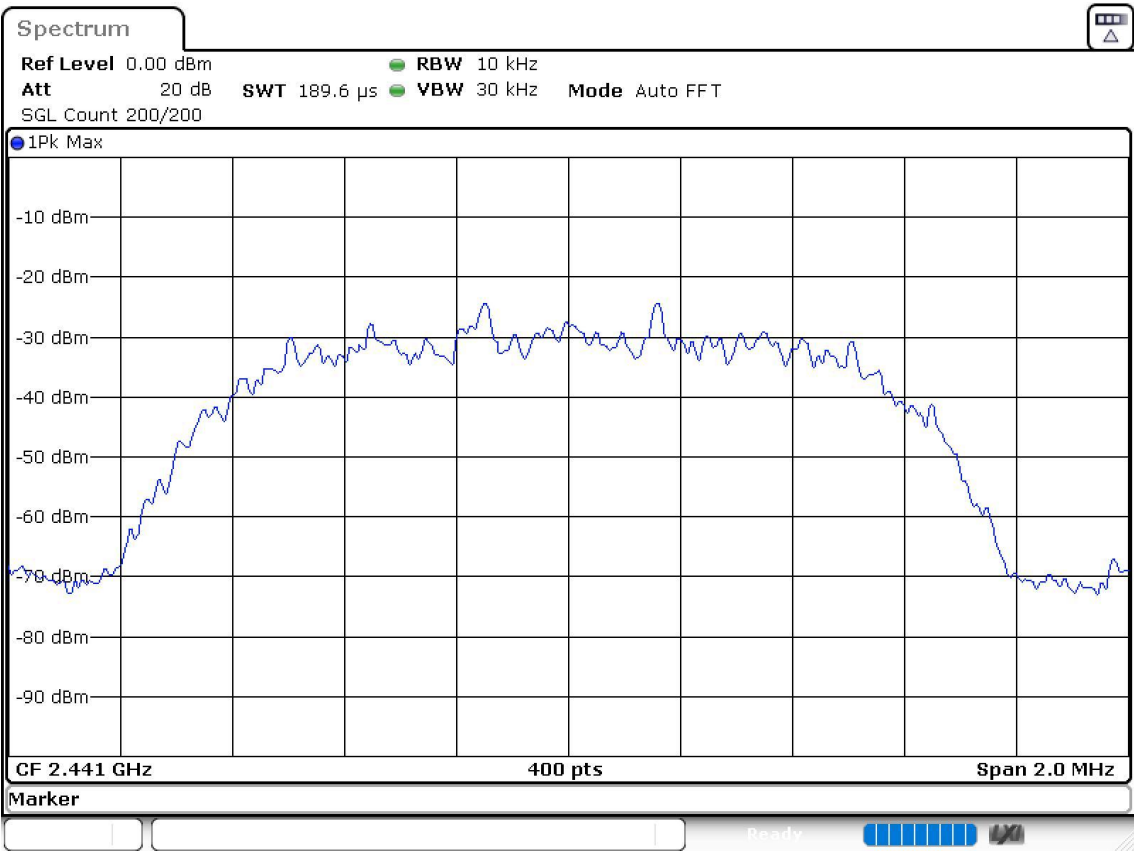
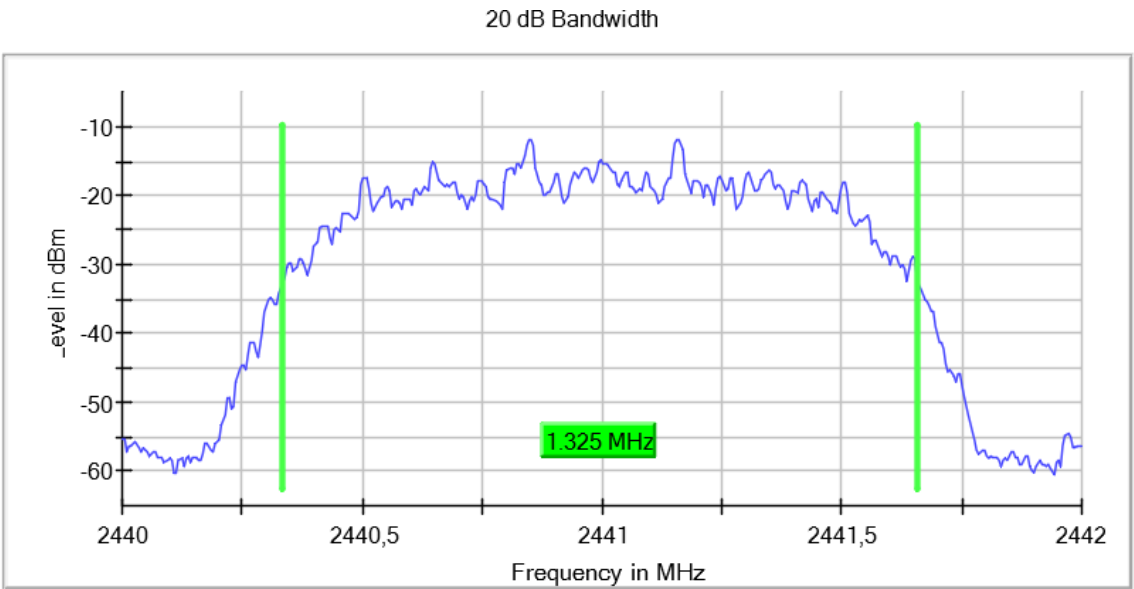
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Active Port = 1

Frequency MHz = 2441.00000

Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



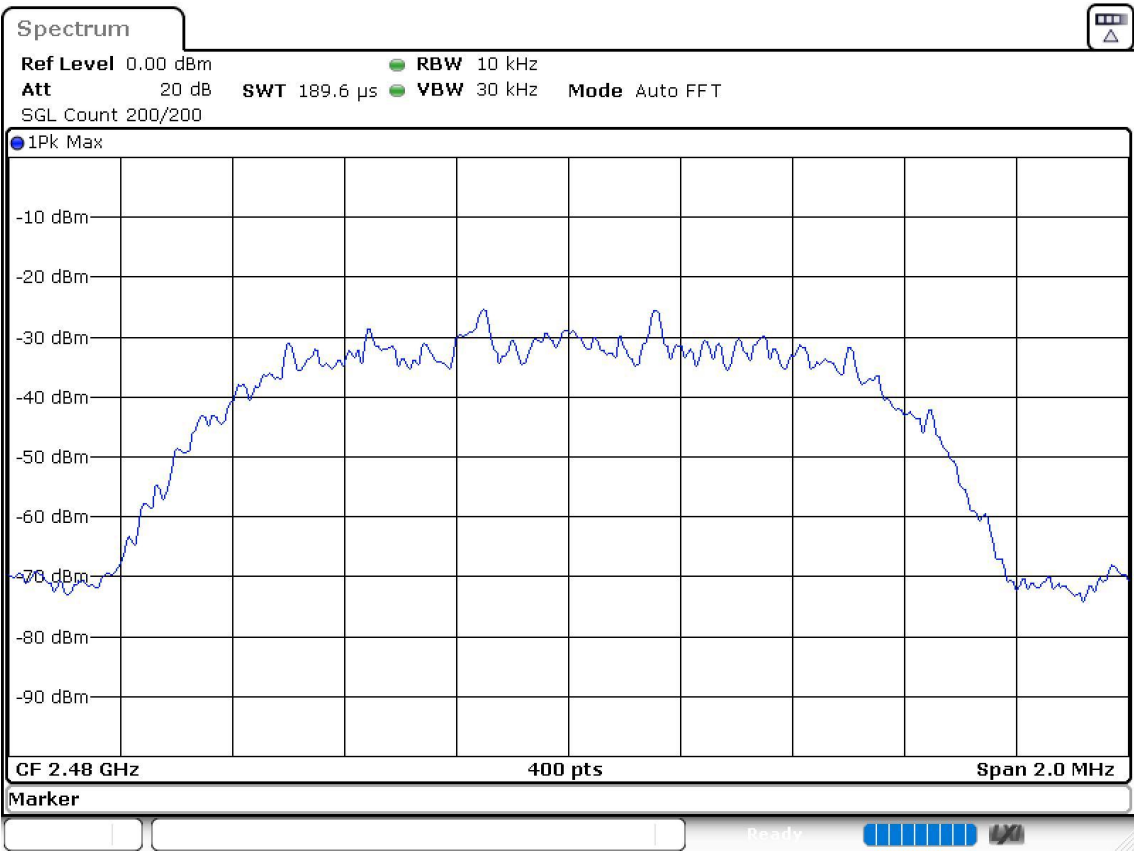
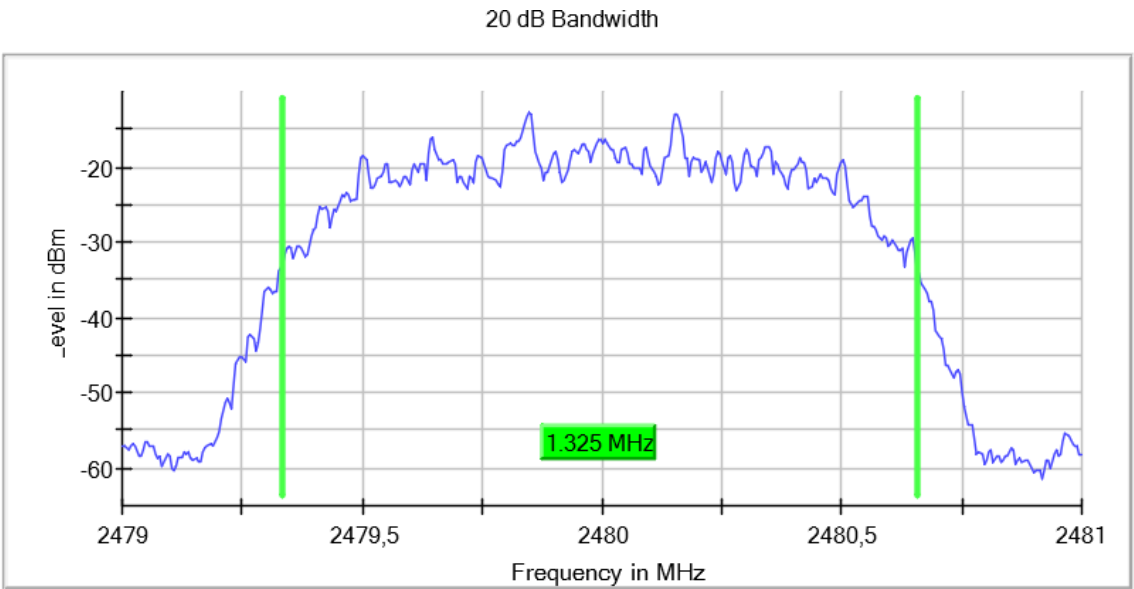
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)

Frequency MHz = 2480.00000

Active Port = 1

Modulation = BT (Pi/4 DQPSK 2-DH5)

Images:



Modulation: BT (8DPSK 3-DH5)

Results

Equipment	Freq (MHz)	Port	Ebw (MHz)
Frequency Hopping Spread Spectrum systems (DSS)	2402.00000	1	1.325
	2441.00000		1.325
	2480.00000		1.325

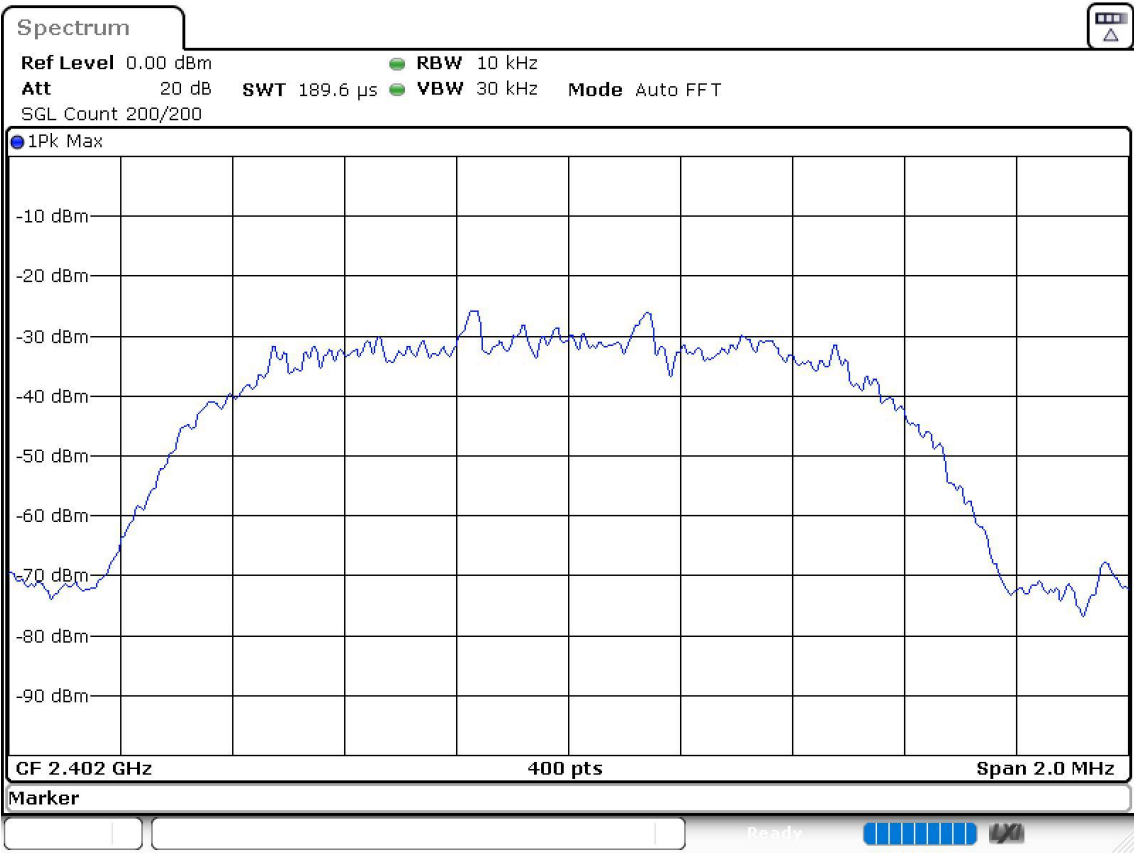
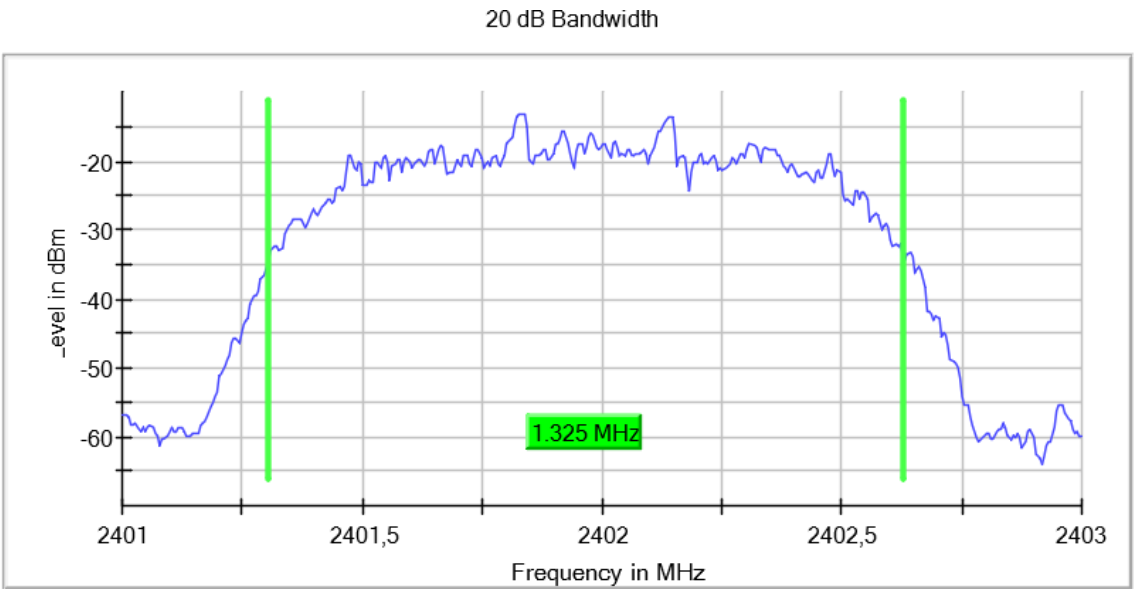
Verdict

Pass

Attachments

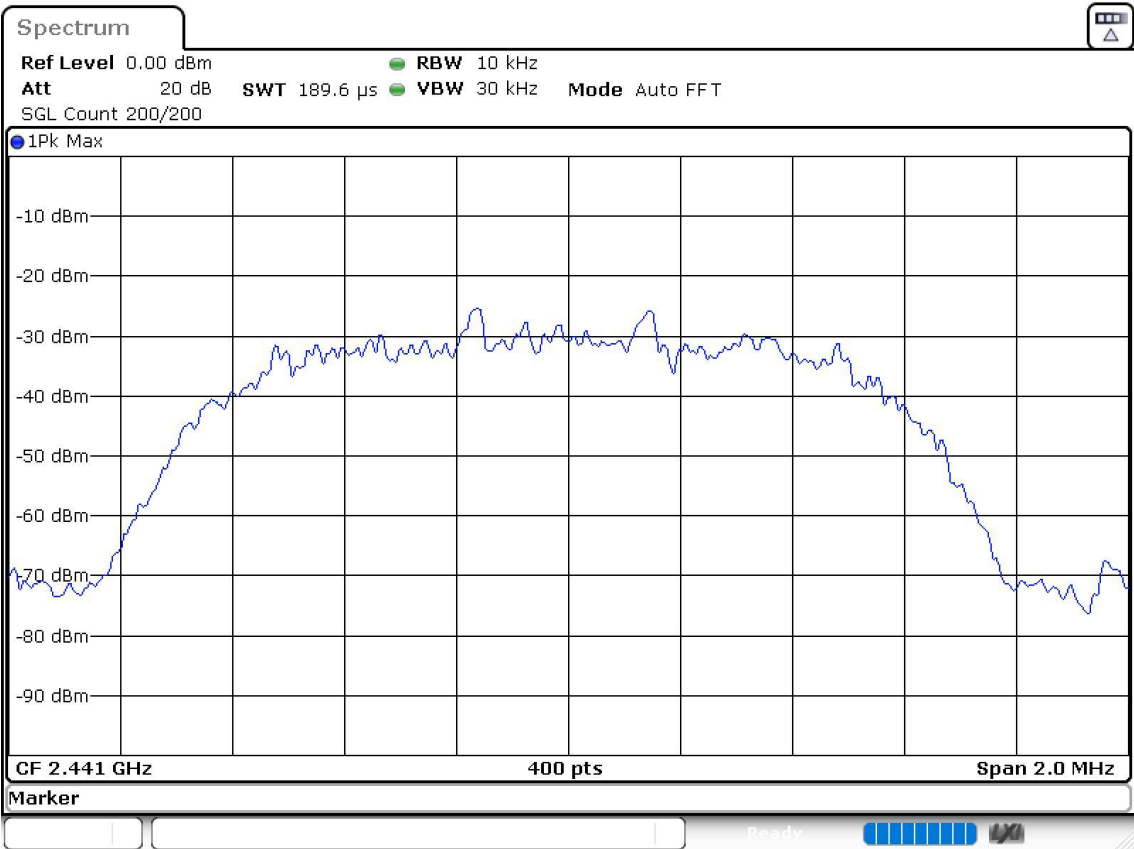
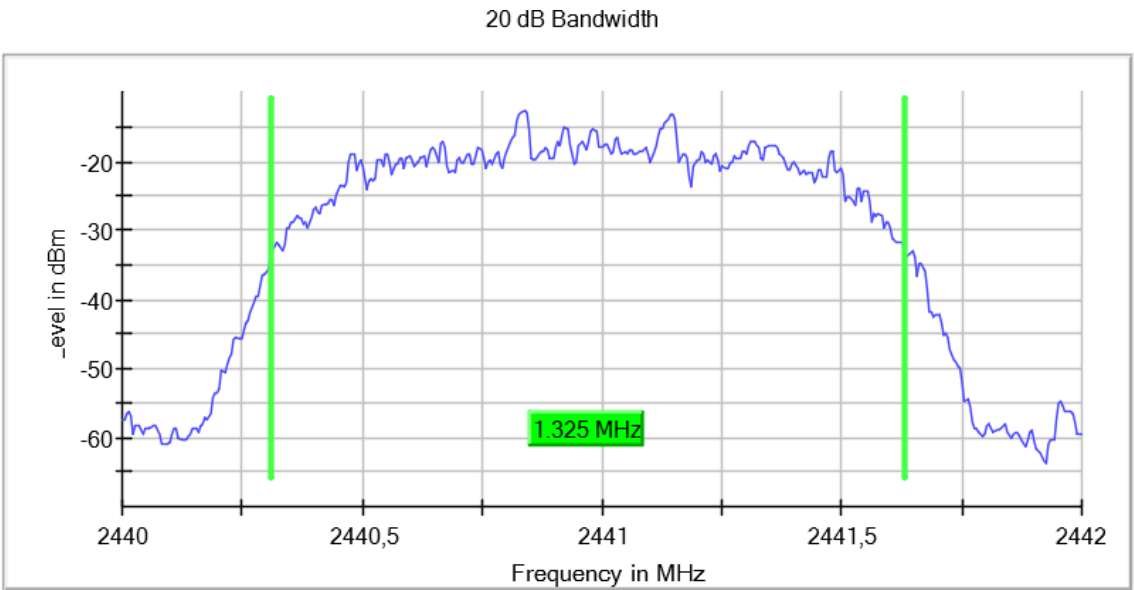
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2402.00000
Active Port = 1 Modulation = BT (8DPSK 3-DH5)

Images:



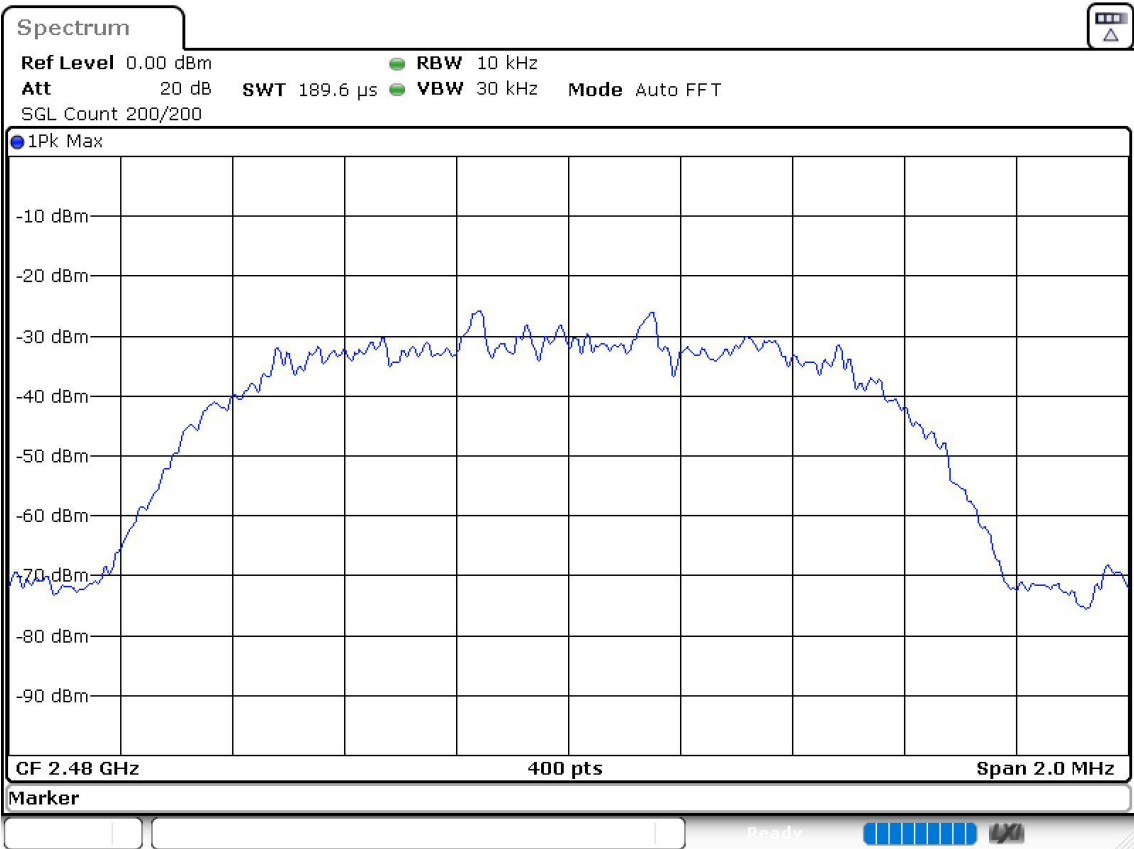
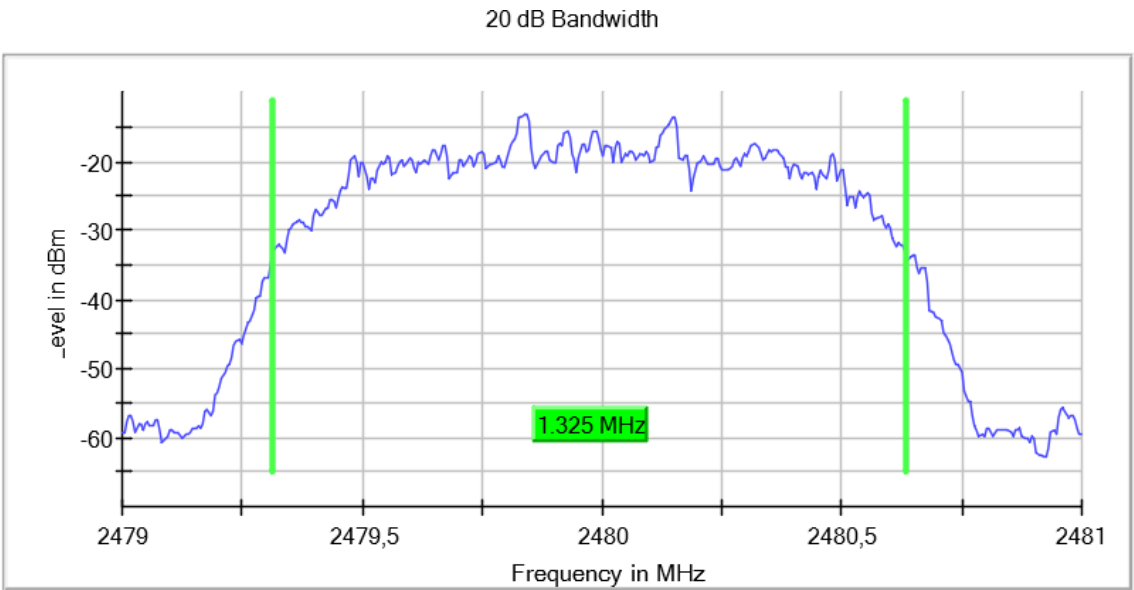
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2441.00000
Active Port = 1 Modulation = BT (8DPSK 3-DH5)

Images:



Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Frequency MHz = 2480.00000
Active Port = 1 Modulation = BT (8DPSK 3-DH5)

Images:



RSS-247 6.2.3.1 (a) / FCC 15.247 (a) (1) [CFS] Carrier Frequency Separation

Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 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, provided the systems operate with an output power no greater than 125 mW.

Modulation: BT (GFSK 1-DH5)

Results

Equipment	Port	Freq Sep (MHz)
Frequency Hopping Spread Spectrum systems (DSS)	1	1.01

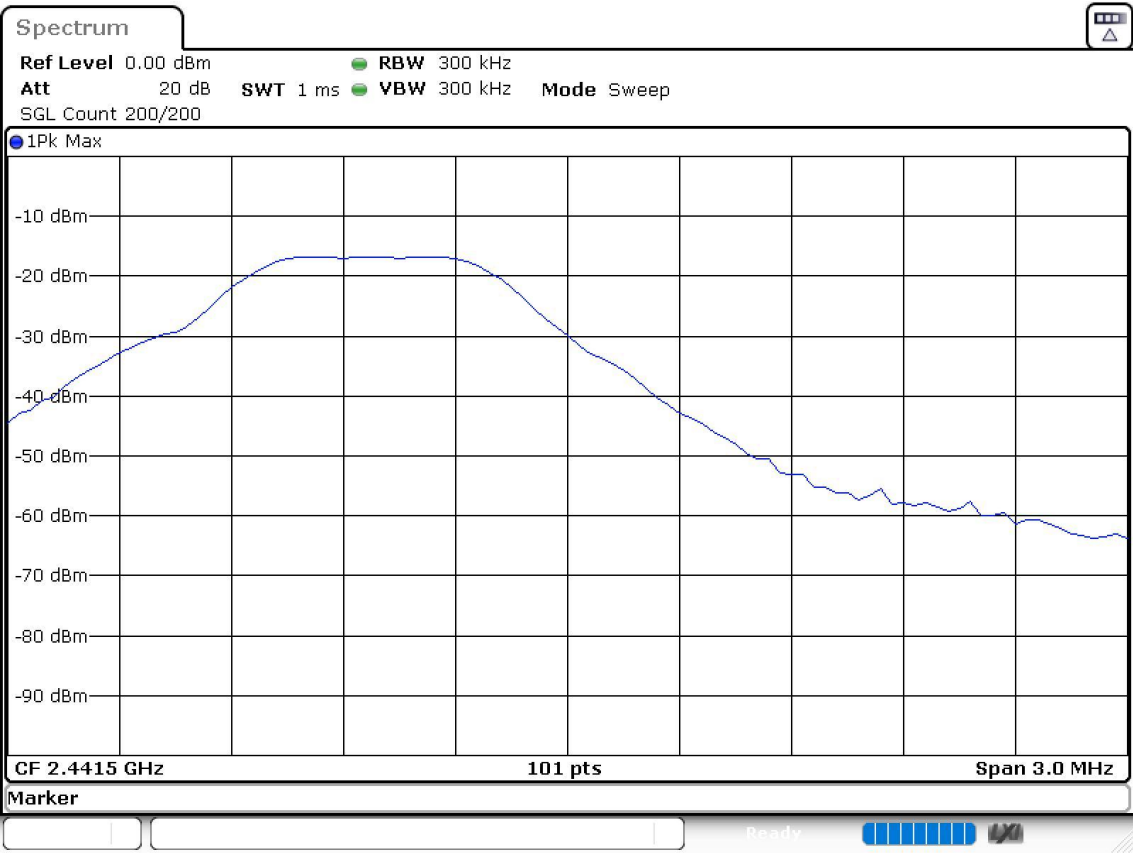
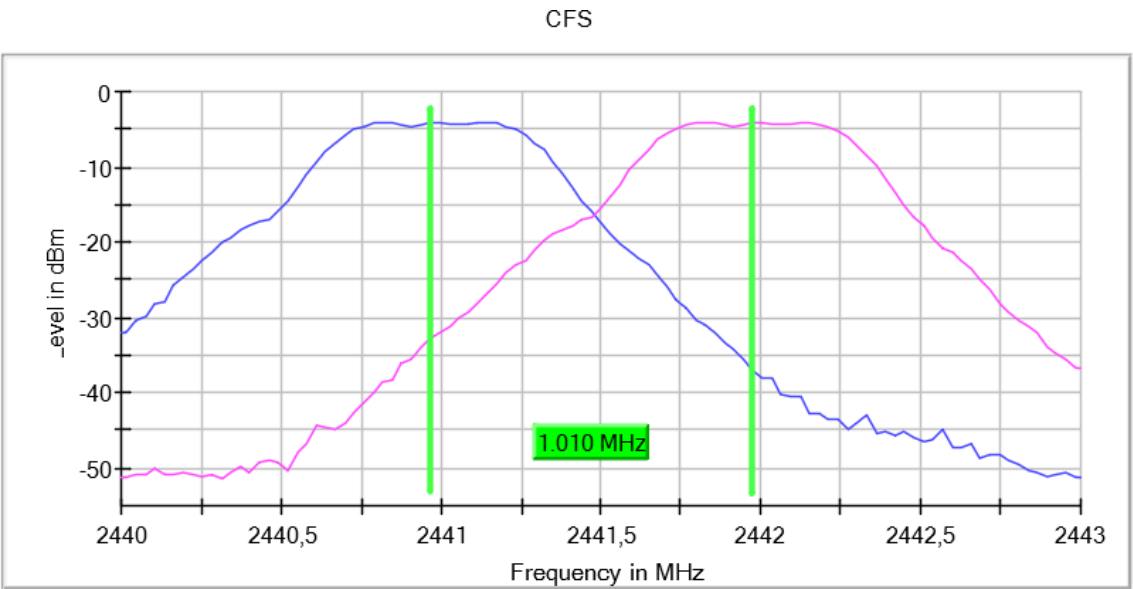
Verdict

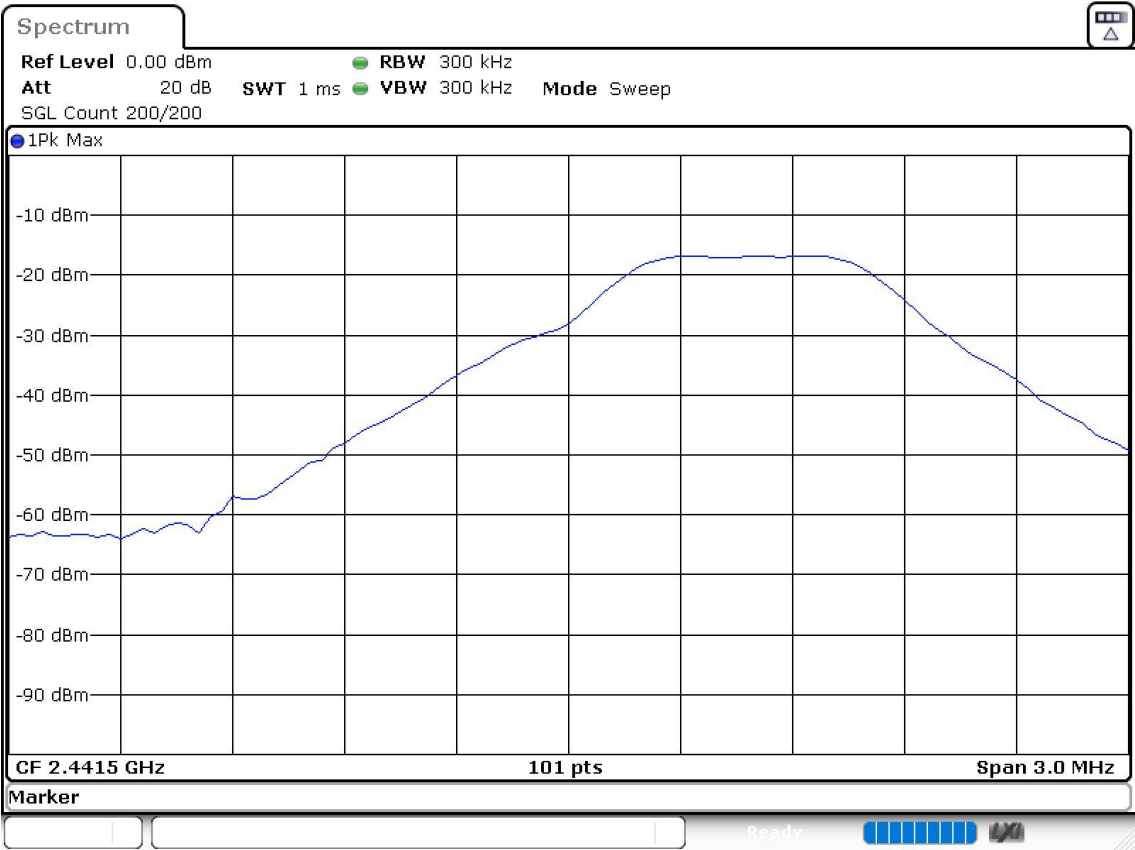
Pass

Attachments

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Active Port = 1
Modulation = BT (GFSK 1-DH5)

Images:





Modulation: BT (Pi/4 DQPSK 2-DH5)

Results

Equipment	Port	Freq Sep (MHz)
Frequency Hopping Spread Spectrum systems (DSS)	1	0.98

Verdict

Pass