Frequency Range GHz = [1, 17]

Equipment Type = Digital Transmission System (DTS)

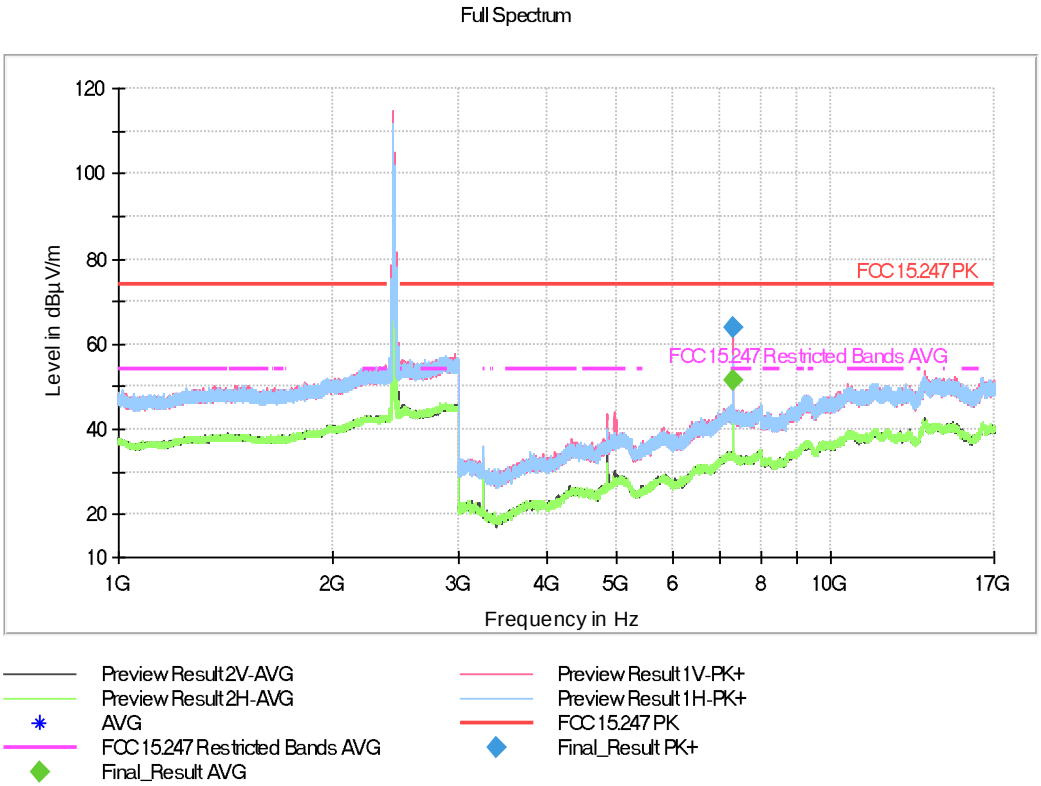
Modulation = 802.11ax HE20 (OFDMA MCS0) RU 26 (Worst RU and offset according to preliminary testing)

Frequency MHz = 2437.00000

MIMO Mode = SISO

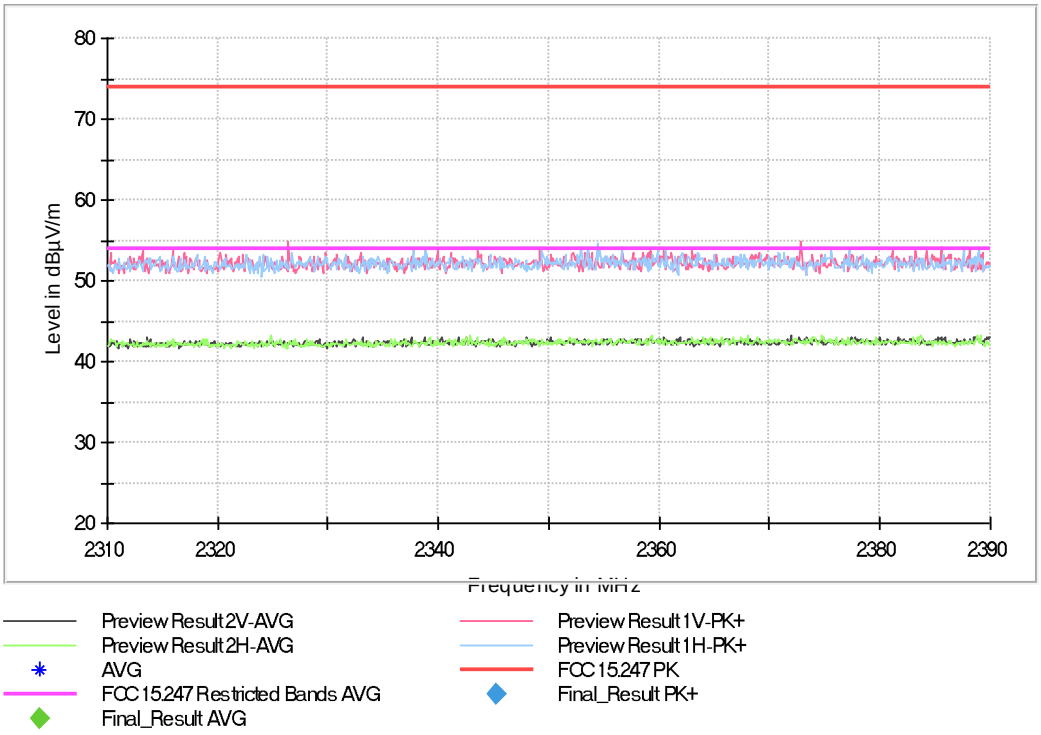
Active Port = 1

Images:

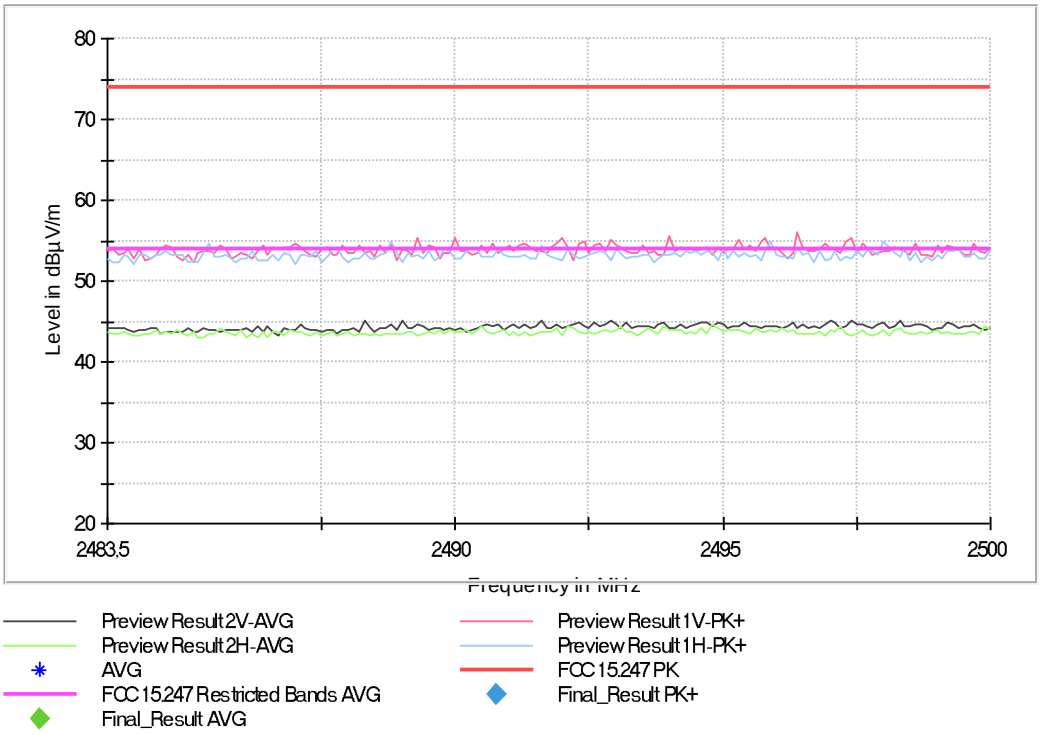


Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
7303.600000	63.70	---	74.00	10.30	1000.000	300.0	V	280.0
7303.600000	---	51.74	54.00	3.26	1000.000	300.0	V	280.0

Full Spectrum



Full Spectrum



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 17 GHz	140,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency Range GHz = [1, 17]

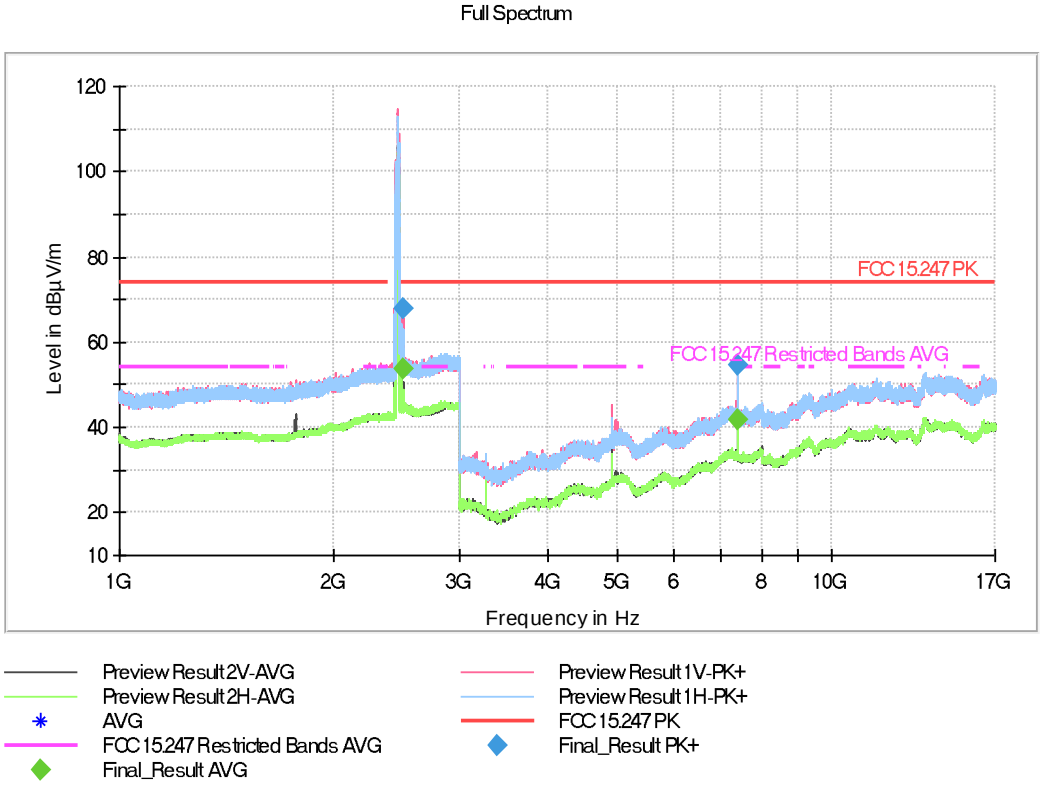
Modulation = 802.11ax HE20 (OFDMA MCS0) RU 26 (Worst RU and offset according to preliminary testing)

MIMO Mode = SISO

Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 2457.00000

Active Port = 1



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
2498.600000	---	53.92	54.00	0.08	249.0	V	63.0
2498.600000	67.80	---	74.00	6.20	249.0	V	63.0
7395.533333	---	41.82	54.00	12.18	257.0	V	97.0
7395.533333	54.64	---	74.00	19.36	257.0	V	97.0

Frequency Range GHz = [1, 17]

Equipment Type = Digital Transmission System (DTS)

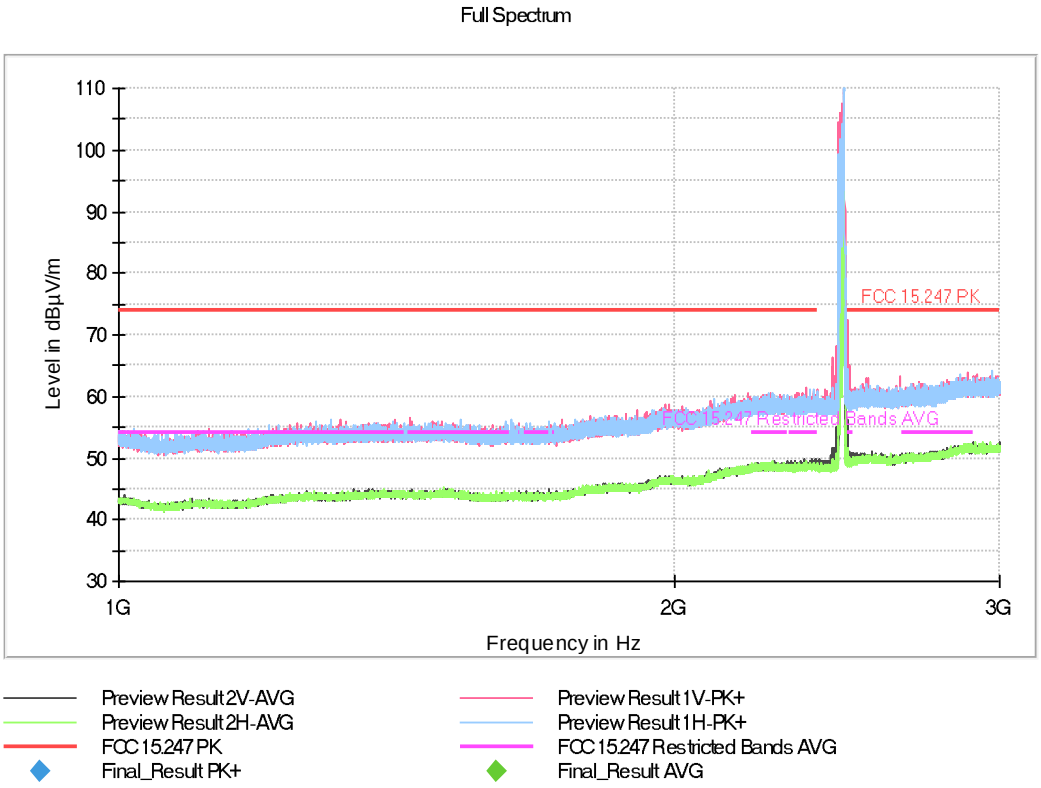
Modulation = 802.11ax HE20 (OFDMA MCS0) RU 26 (Worst RU and offset according to preliminary testing)

Frequency MHz = 2462.00000

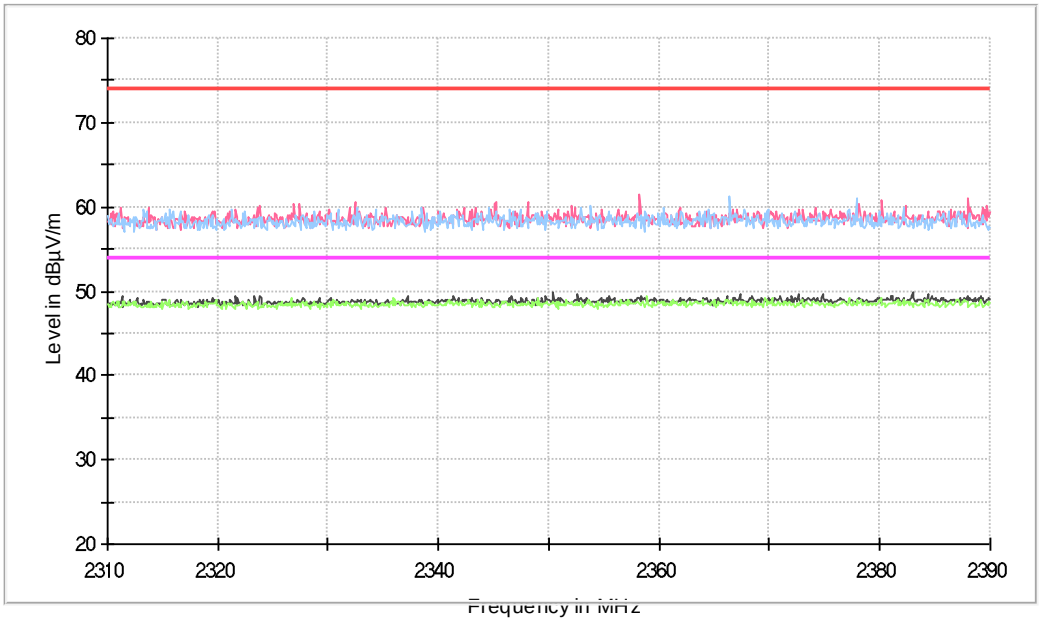
MIMO Mode = SISO

Active Port = 1

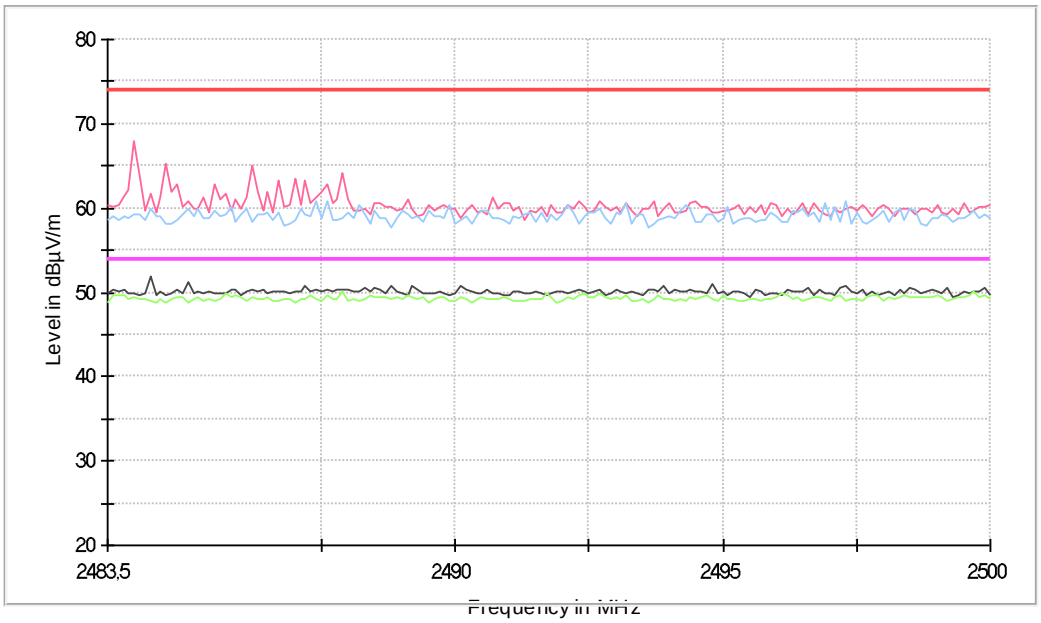
Images:

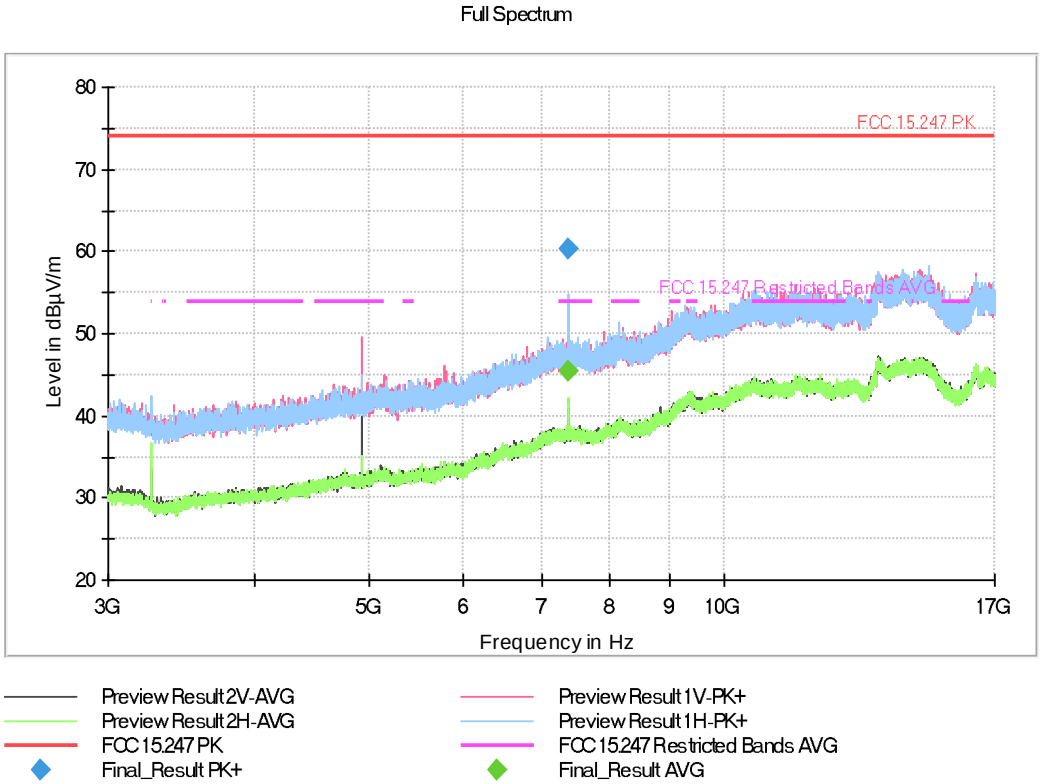


Full Spectrum



Full Spectrum





Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 17 GHz	140,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Results

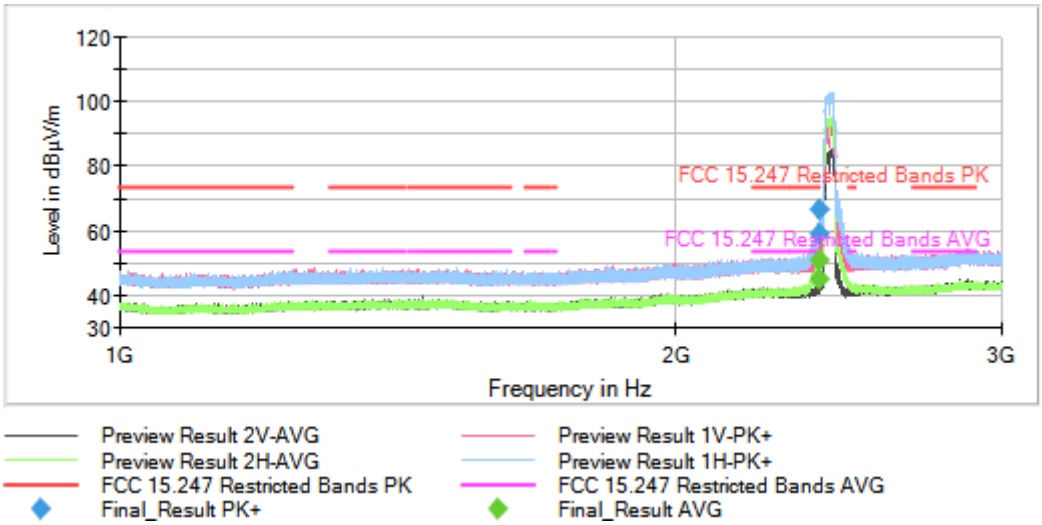
Modulation: 802.11n HT40 (OFDM MCS0)

MIMO Mode: SISO

Attachments

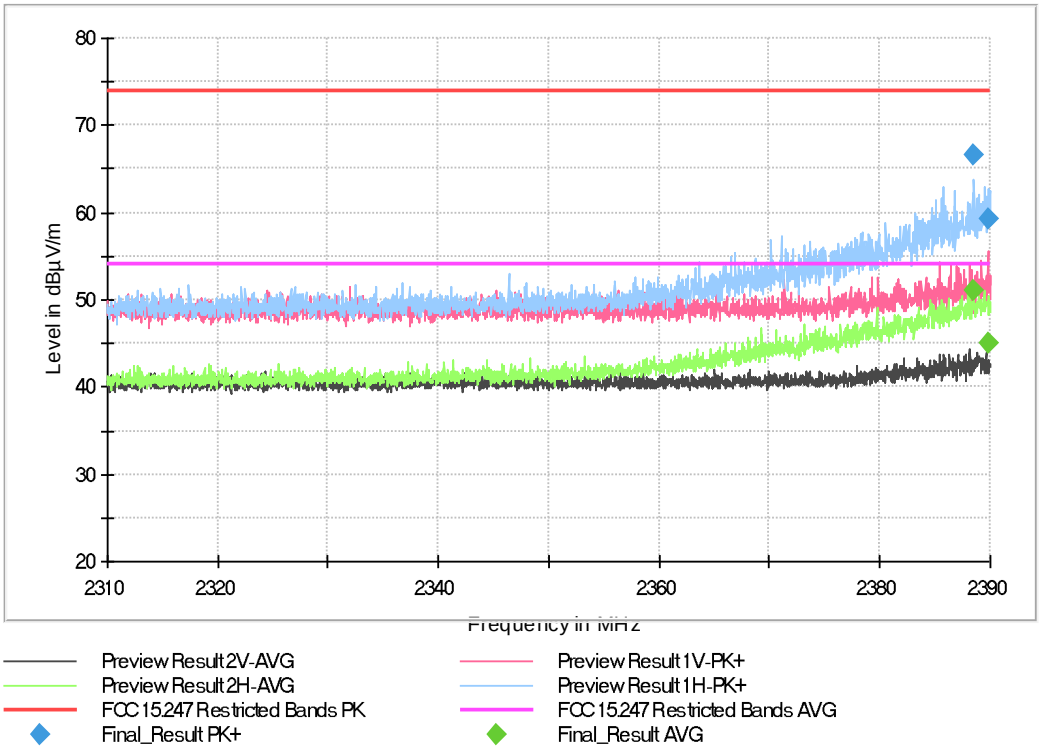
Frequency Range GHz = [1, 3]	Equipment Type = Digital Transmission System (DTS)
Modulation = 802.11n HT40 (OFDM MCS0)	Frequency MHz = 2422.00000
MIMO Mode = SISO	Active Port = 1

Images:

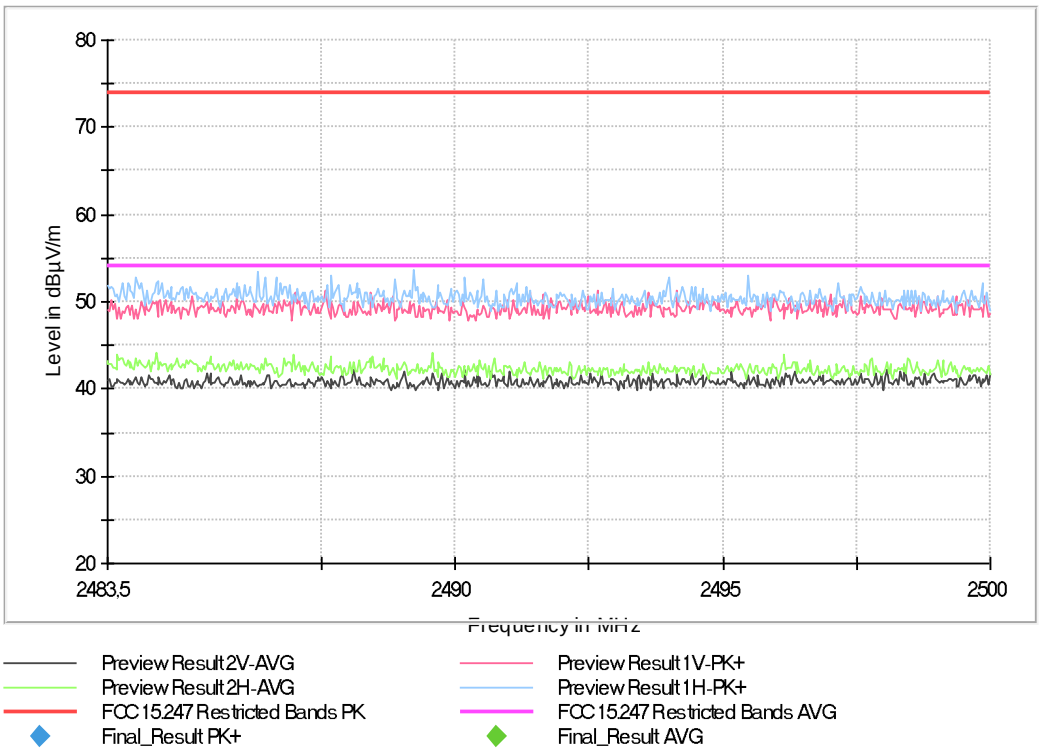


Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)
2388.523077	---	51.02	54.00	2.98	H	0.0
2388.523077	66.62	---	74.00	7.38	H	0.0
2389.753846	---	45.12	54.00	8.88	V	142.0
2389.753846	59.22	---	74.00	14.78	V	142.0

Full Spectrum



Full Spectrum



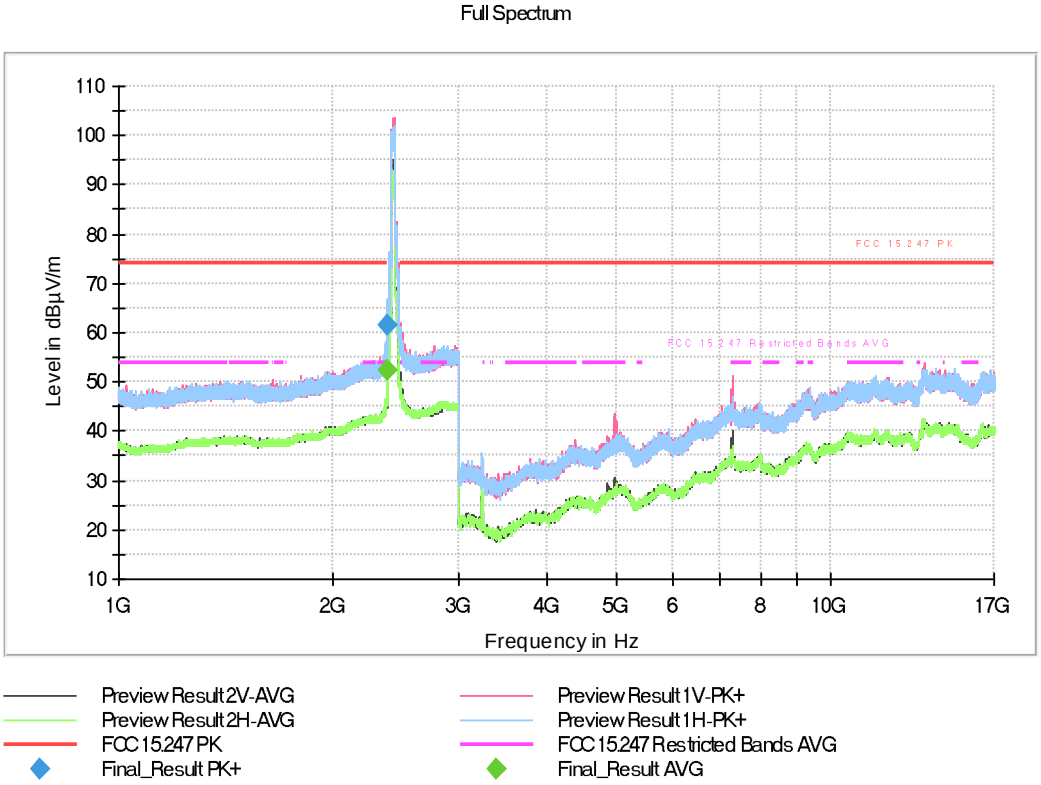
Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Attachments

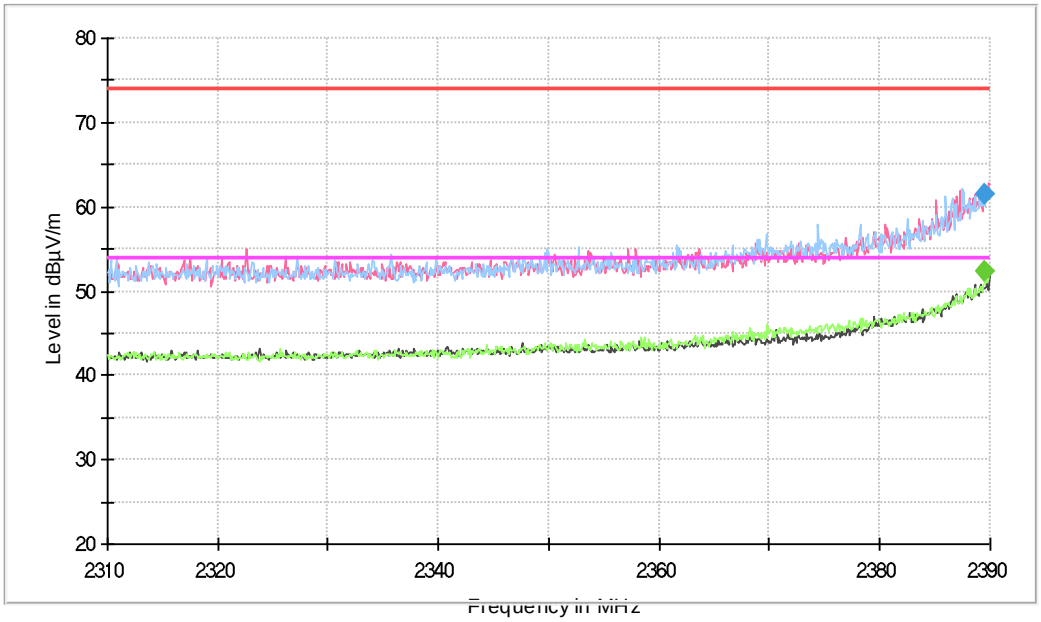
Frequency Range GHz = [1, 17]
Equipment Type = Digital Transmission System (DTS)
Modulation = 802.11n HT40 (OFDM MCS0)
Frequency MHz = 2432.00000
MIMO Mode = SISO
Active Port = 1

Images:

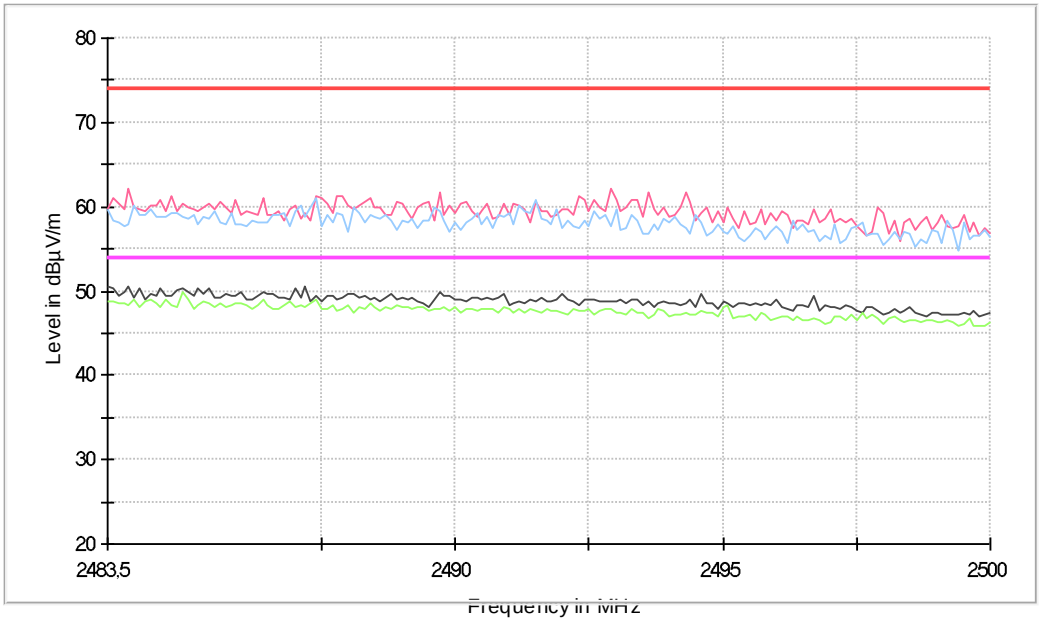


Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
2389.500000	---	52.38	54.00	1.62	167.0	V	0.0
2389.500000	61.53	---	74.00	12.47	167.0	V	0.0

Full Spectrum



Full Spectrum



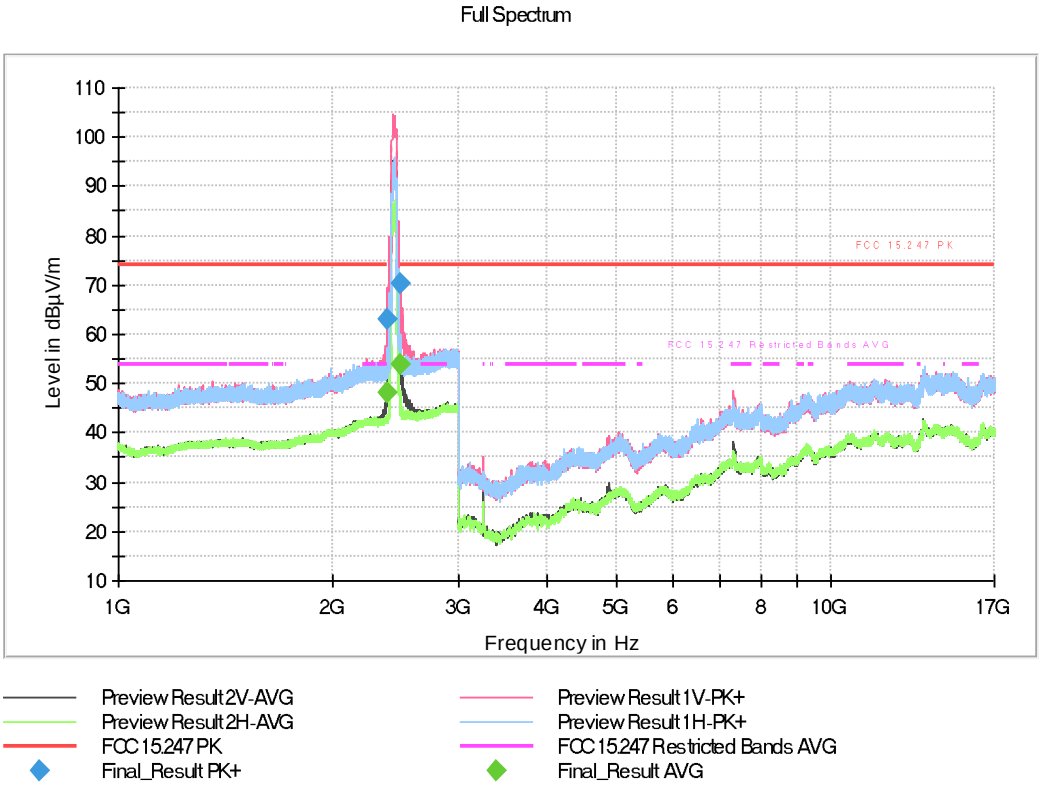
Tables:

Spectrum Analyzer Parameters

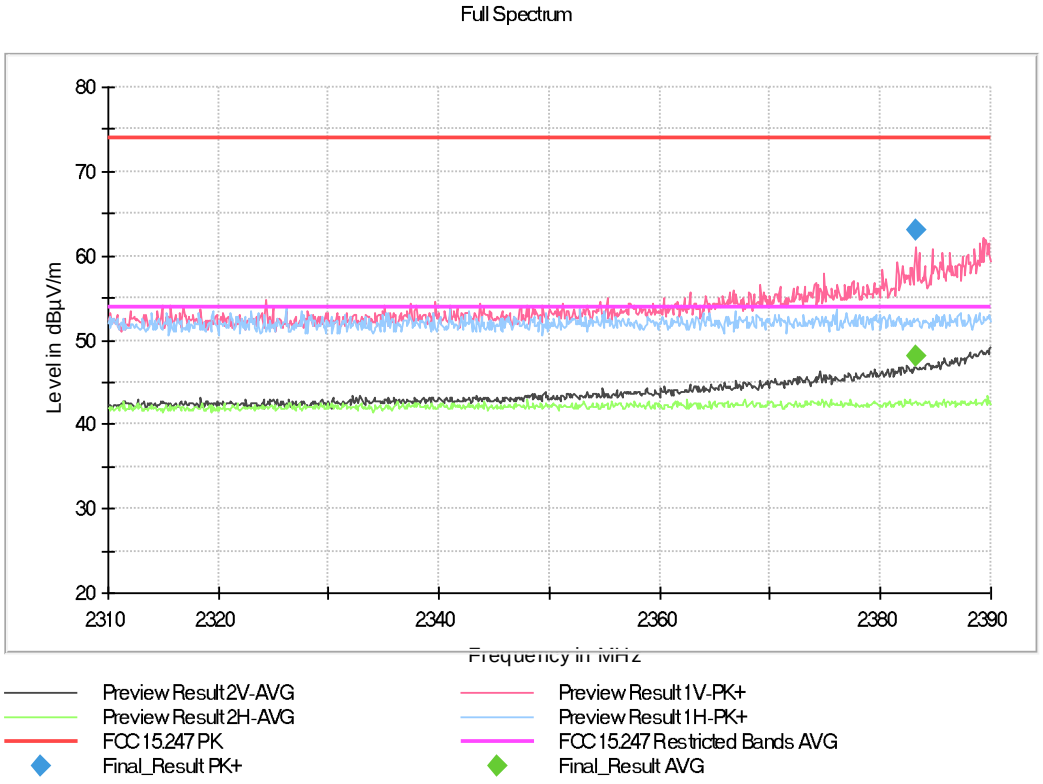
	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

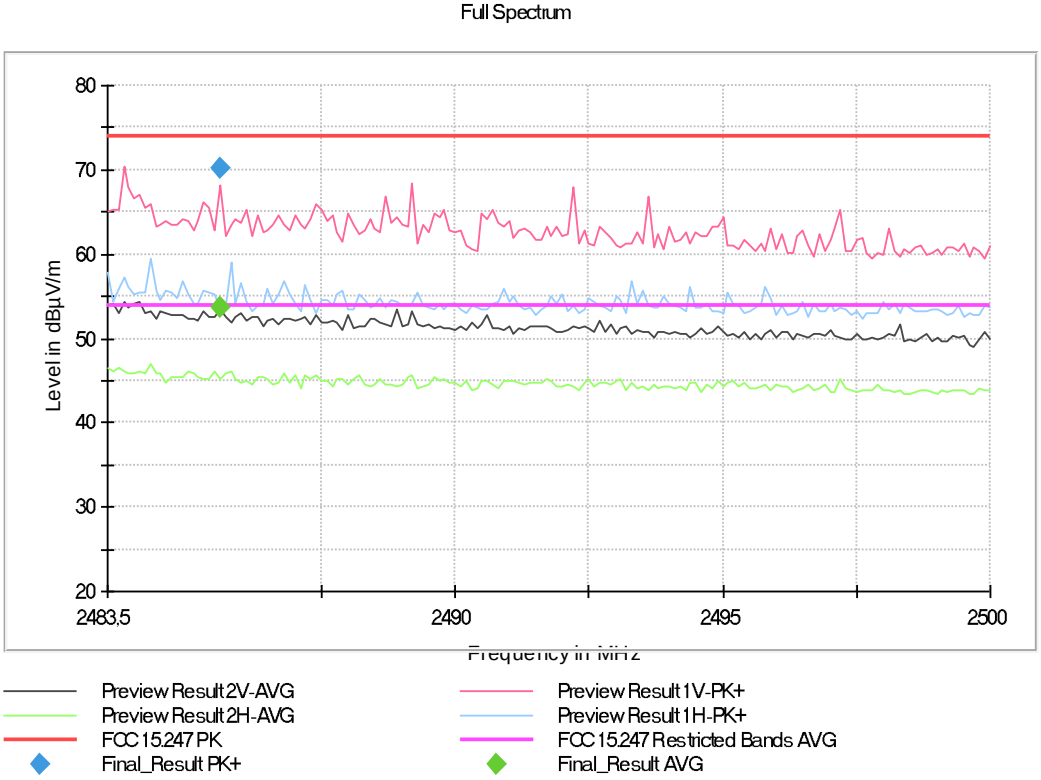
Frequency Range GHz = [1, 17]
Equipment Type = Digital Transmission System (DTS)
Modulation = 802.11n HT40 (OFDM MCS0)
Frequency MHz = 2437.00000
MIMO Mode = SISO
Active Port = 1

Images:



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
2383.200000	63.00	---	74.00	11.00	160.0	V	227.0
2383.200000	---	48.04	54.00	5.96	160.0	V	227.0
2485.600000	70.22	---	74.00	3.78	167.0	V	56.0
2485.600000	---	53.74	54.00	0.26	167.0	V	56.0





Tables:

Spectrum Analyzer Parameters

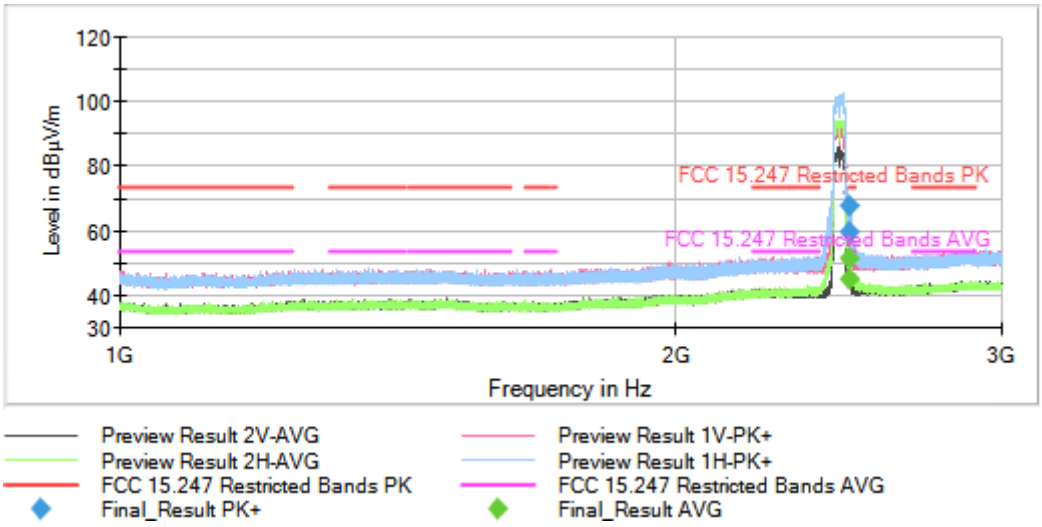
	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency Range GHz = [1, 3] Equipment Type = Digital Transmission System (DTS)

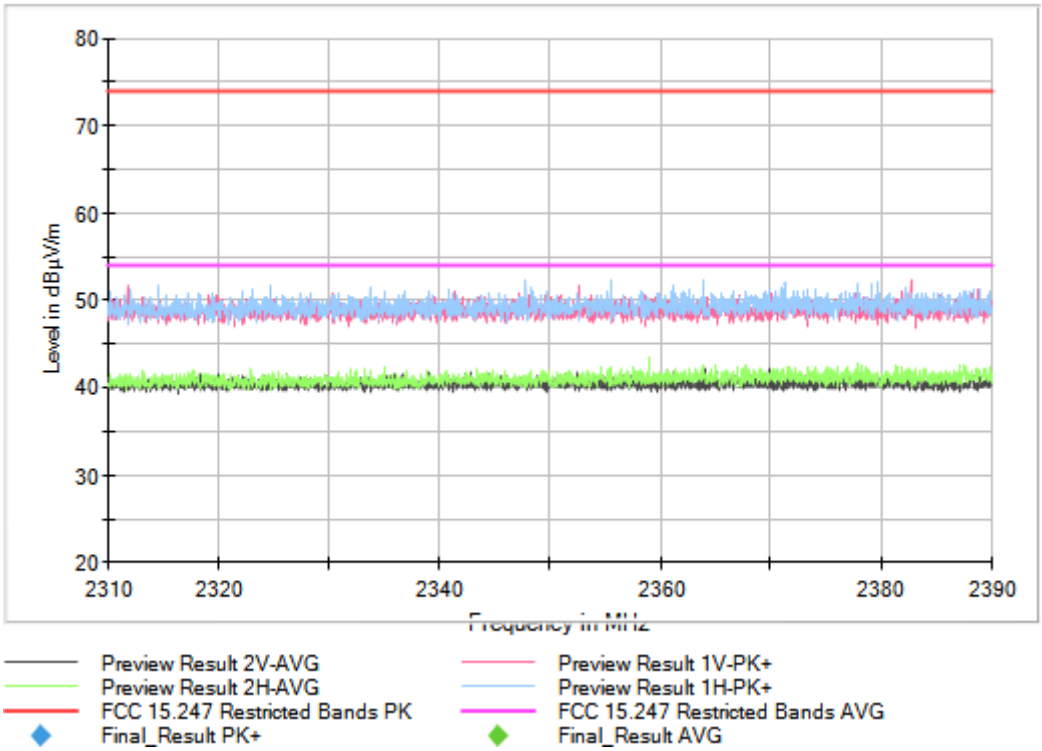
Modulation = 802.11n HT40 (OFDM MCS0) Frequency MHz = 2452.00000

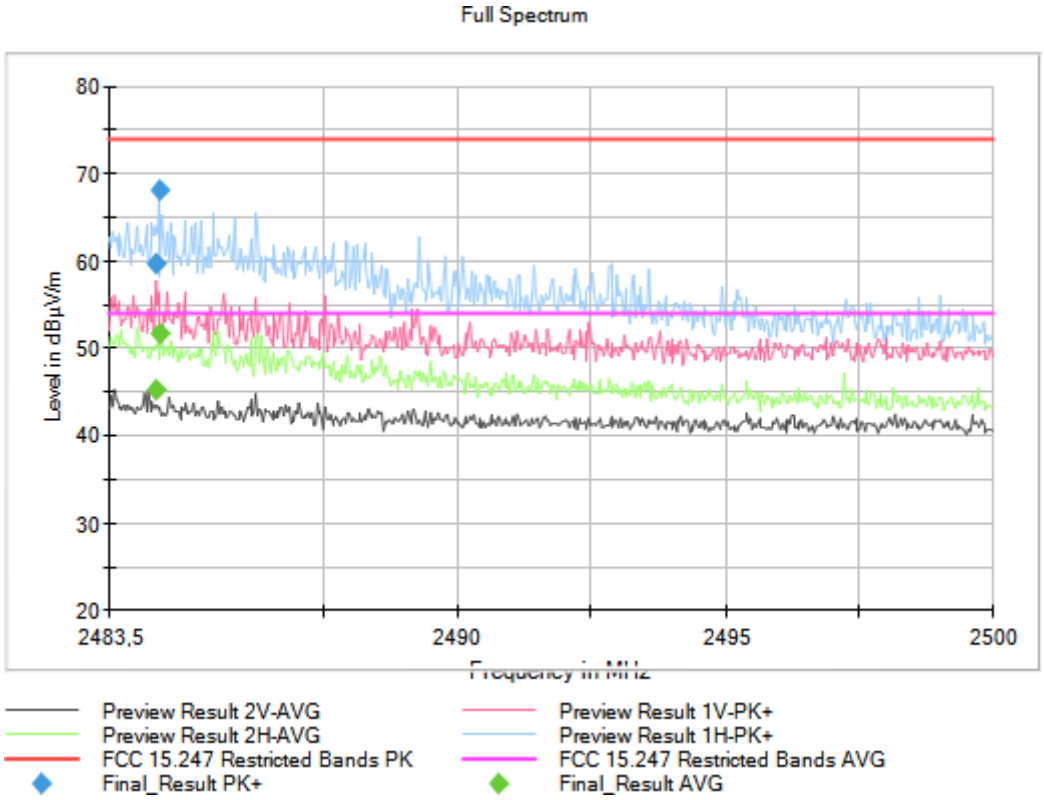
MIMO Mode = SISO Active Port = 1

Images:



Full Spectrum





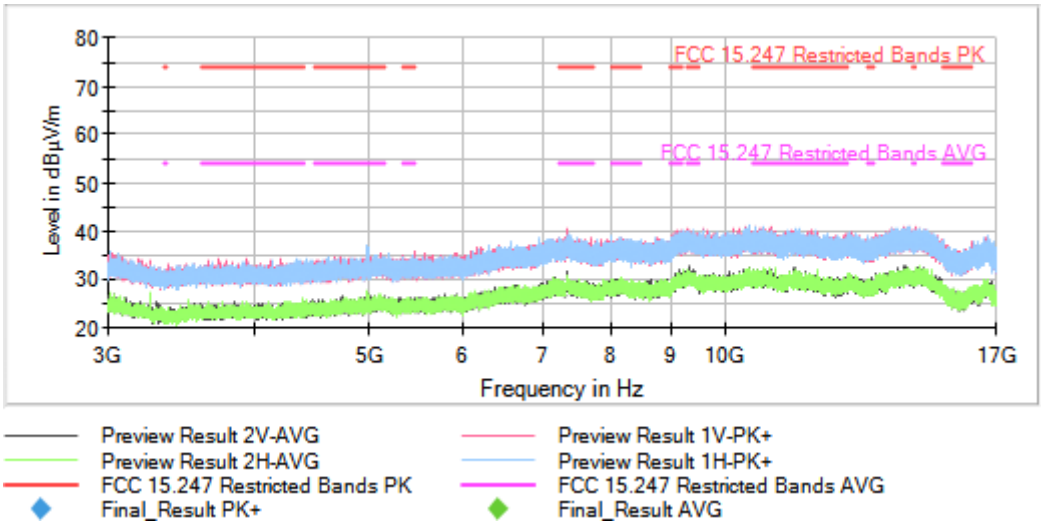
Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency Range GHz = [3, 17]
Equipment Type = Digital Transmission System (DTS)
Modulation = 802.11n HT40 (OFDM MCS0)
Frequency MHz = 2452.00000
MIMO Mode = SISO
Active Port = 1

Images:



Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	30 dB

Appendix C: Test results. ZigBee

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99dBw Occupied Channel Bandwidth 99% *323*
RSS-247 5.2 (a) / FCC 15.247 (a) (2) [6dBw] 6 dB Bandwidth *328*
RSS-247 5.2 (b) / FCC 15.247 (e) [Psd] Power spectral density *333*
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RSS-247 5.5 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter) *351*

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal: 3.3 V

Type of Power Supply: DC internal.

ANTENNA (*):

Chain #	Antenna Gain (dBi)
PRO-EX-333	3,6dBi
PRO-EX-296	3,0dBi
PRO-IS-237	3,0dBi
PRO-IS-299	2,5dBi

Radiated testing has been performed with the antenna PRO-IS-299 after a preliminary RSE testing

Conducted EIPR has been calculated using the highest antenna gain.

TEST FREQUENCIES (*):

Modulation	Data rates	Low Channel:	Power adjustment	Middle Channel	Power adjustment	High Channel (1)	Power adjustment	High Channel (2)	Power adjustment
ZIGBEE O-QPSK	250 kbps	2405 MHz	15	2445 MHz	15	2475 MHz	15	2480 MHz	14

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. Power adjustment correspond to the parameter value configured in the SW tool.

All channels with frequencies avobe High Channel (1) will be configured at the same power adjustment as high Channel (2)

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).

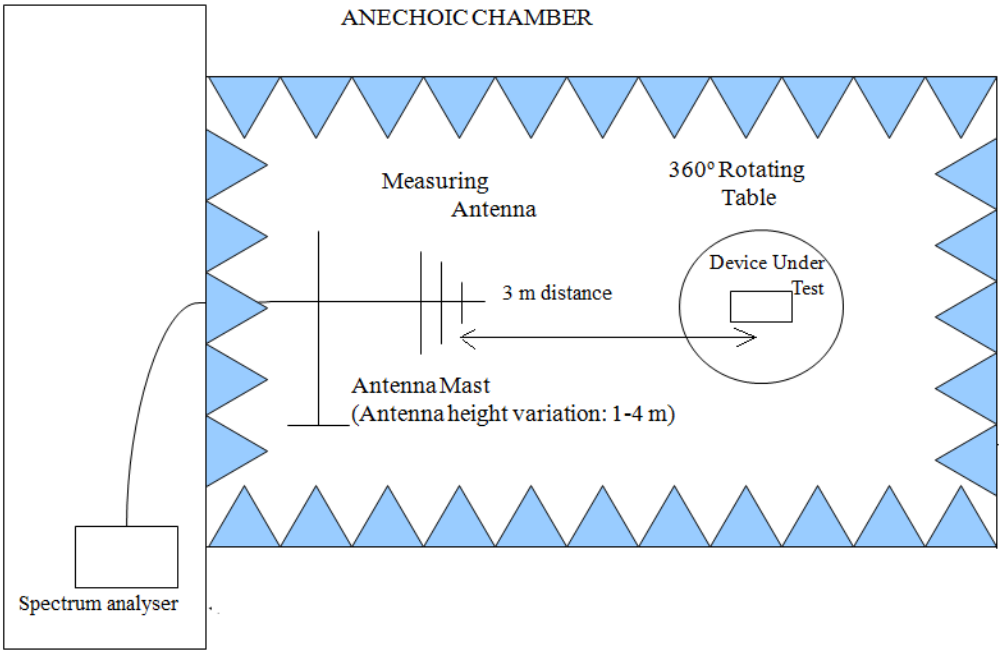
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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 360º 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.

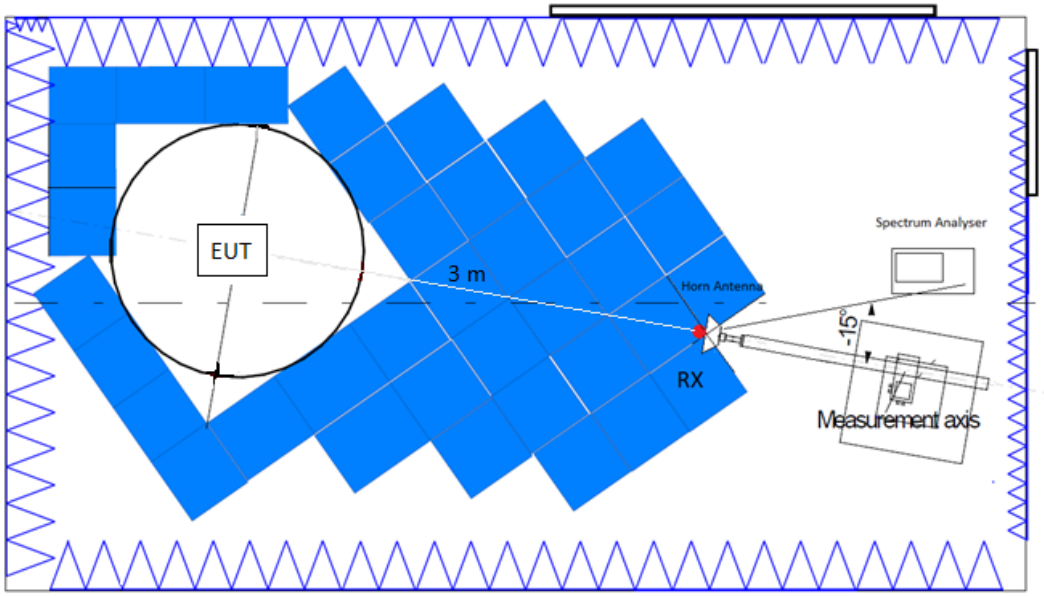
A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

Radiated measurements setup from 30 MHz to 1 GHz:

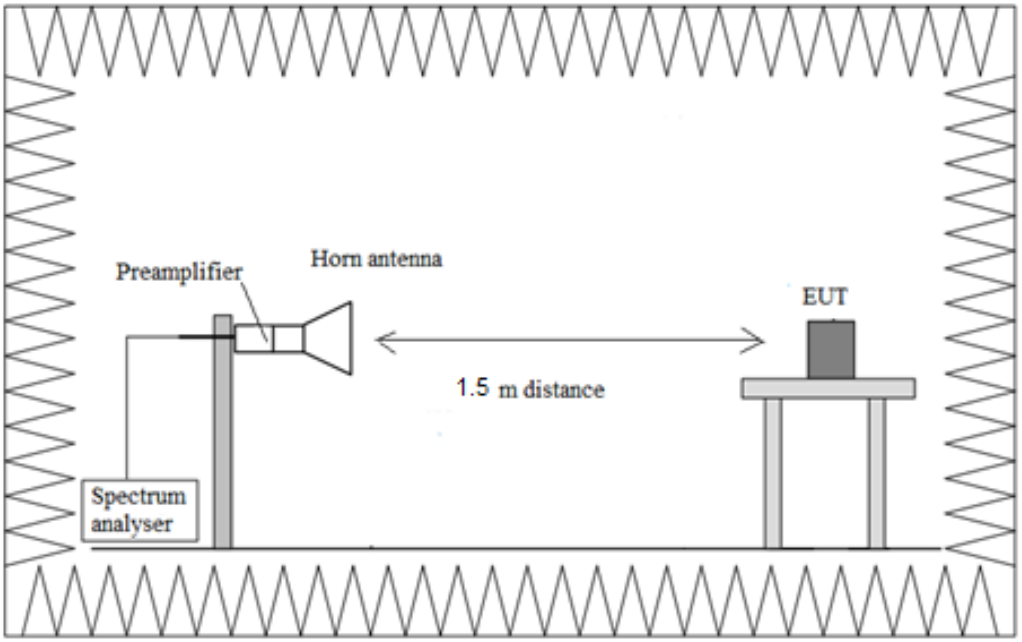


Shielded Control Room For Radiated Measurements

Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup f > 17 GHz:



TEST CASES DETAILS

99dBw Occupied Channel Bandwidth 99%

Limits

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.

Results

Modulation: 802.15.4 (DSSS)

MIMO Mode: SISO

Equipment	BW (MHz)	Freq (MHz)	Port	Occ Ch BW (MHz)
Digital Transmission System (DTS)	2	2405.00000	1	2.297
		2445.00000		2.337
		2475.00000		2.337
		2480.00000		2.297

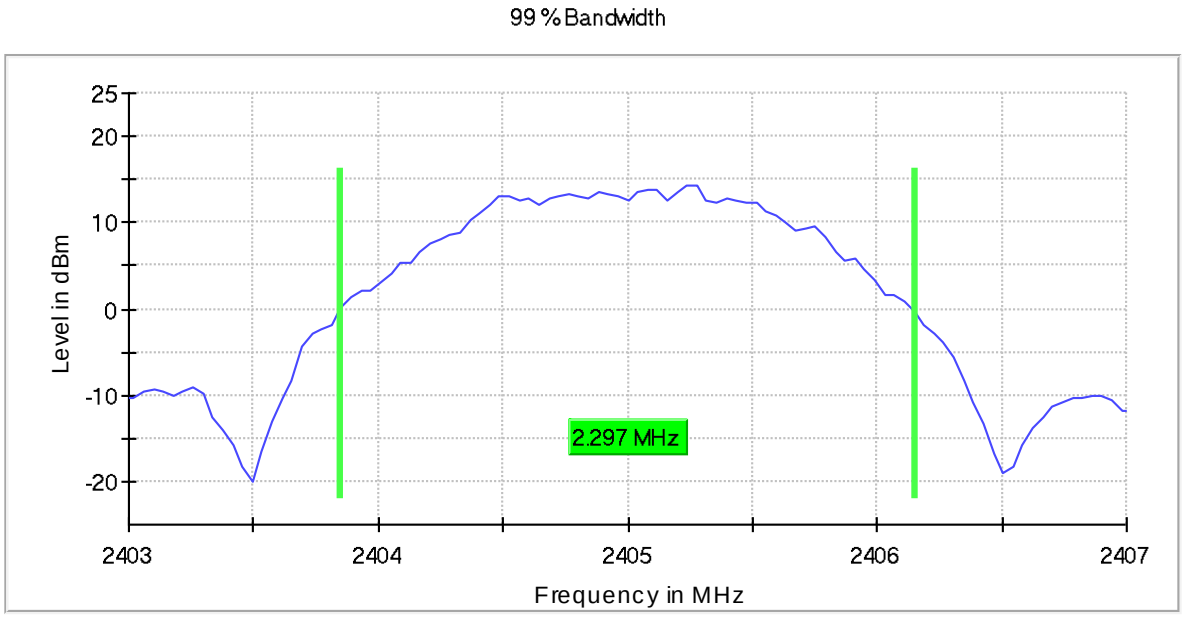
Verdict

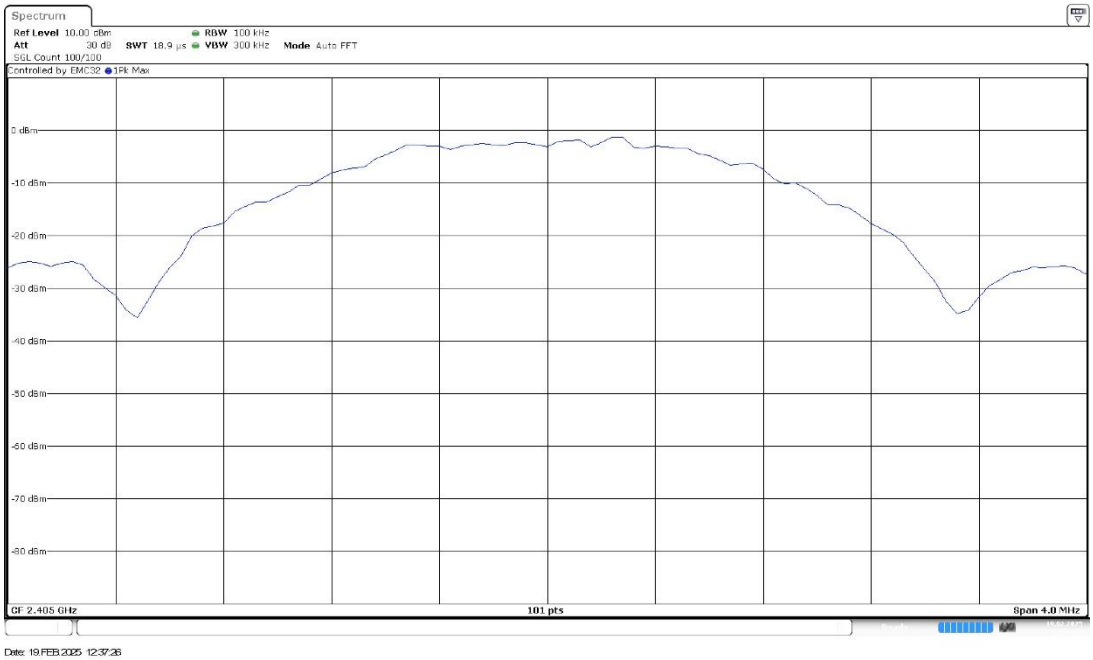
Pass

Attachments

Equipment Type = Digital Transmission System (DTS)	Bandwidth MHz = 2
Modulation = 802.15.4 (DSSS)	Frequency MHz = 2405.00000
MIMO Mode = SISO	Active Port = 1

Images:



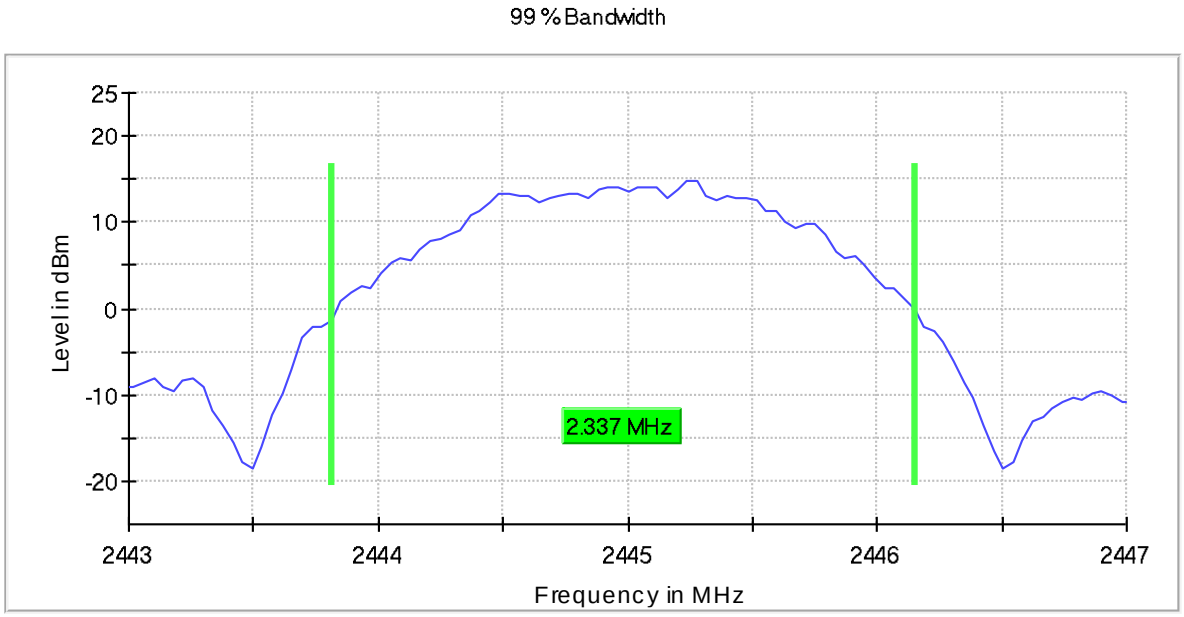


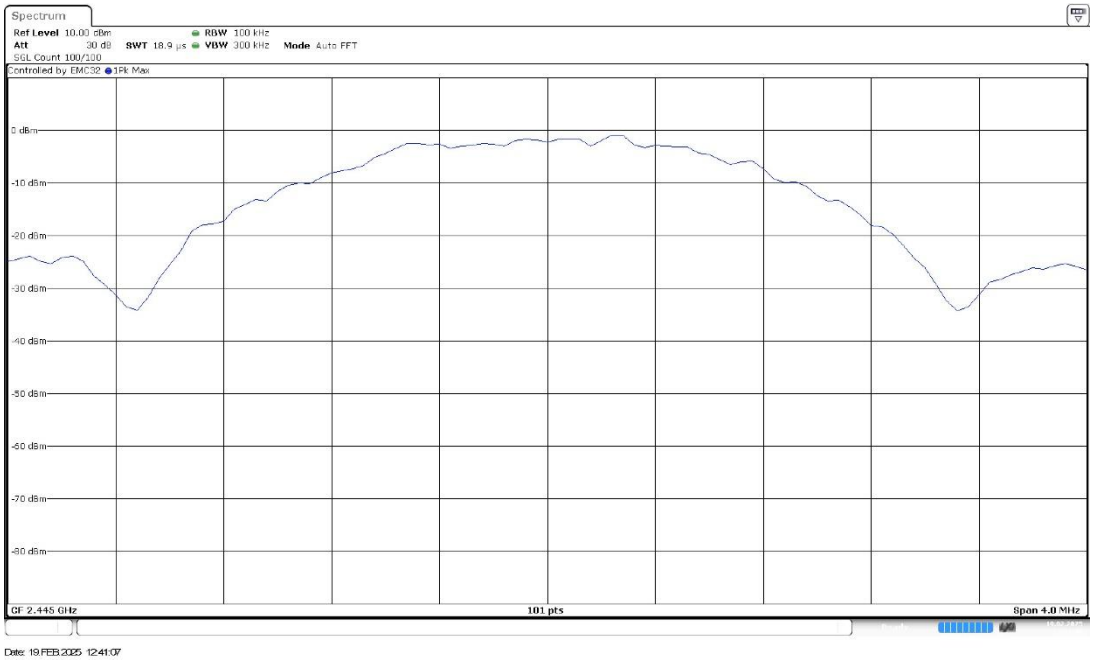
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2

Modulation = 802.15.4 (DSSS) Frequency MHz = 2445.00000

MIMO Mode = SISO Active Port = 1

Images:





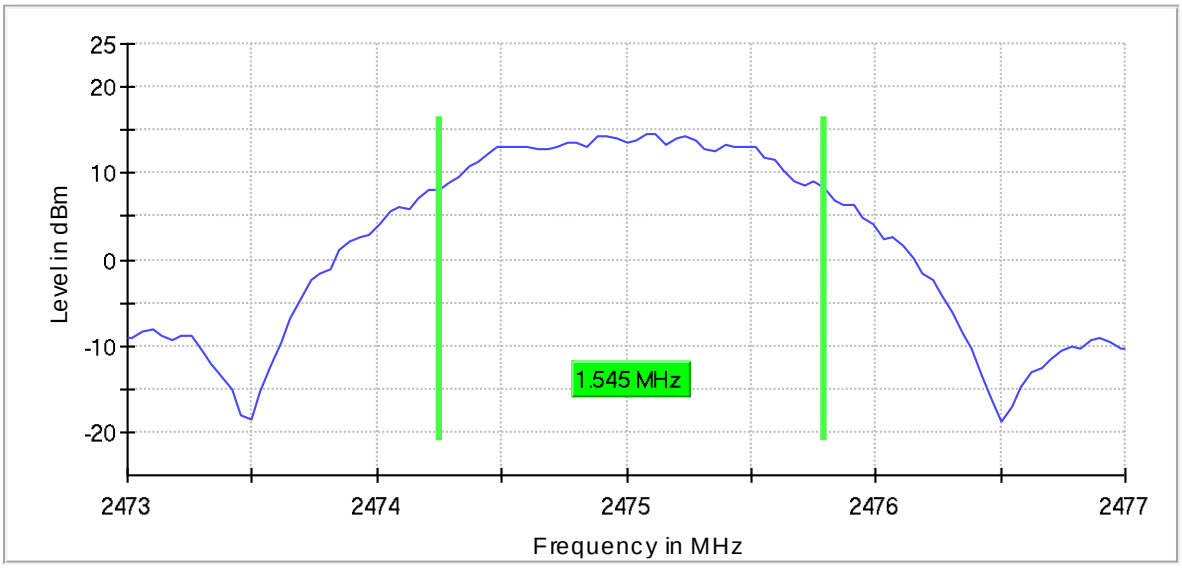
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2

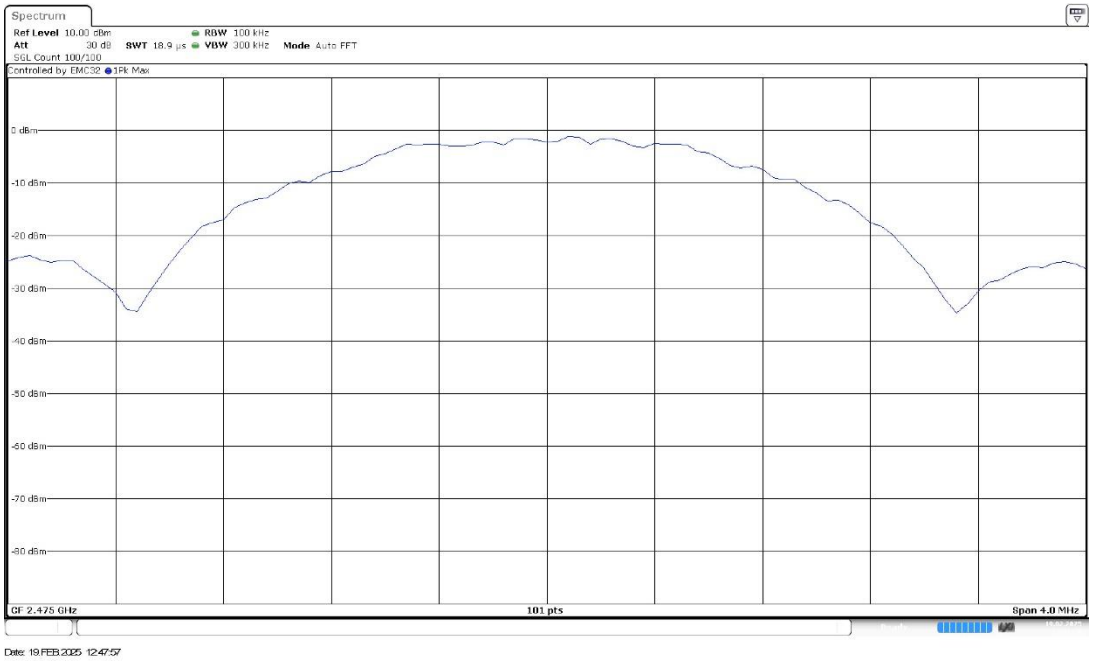
Modulation = 802.15.4 (DSSS) Frequency MHz = 2475.00000

MIMO Mode = SISO Active Port = 1

Images:

6 dB Bandwidth



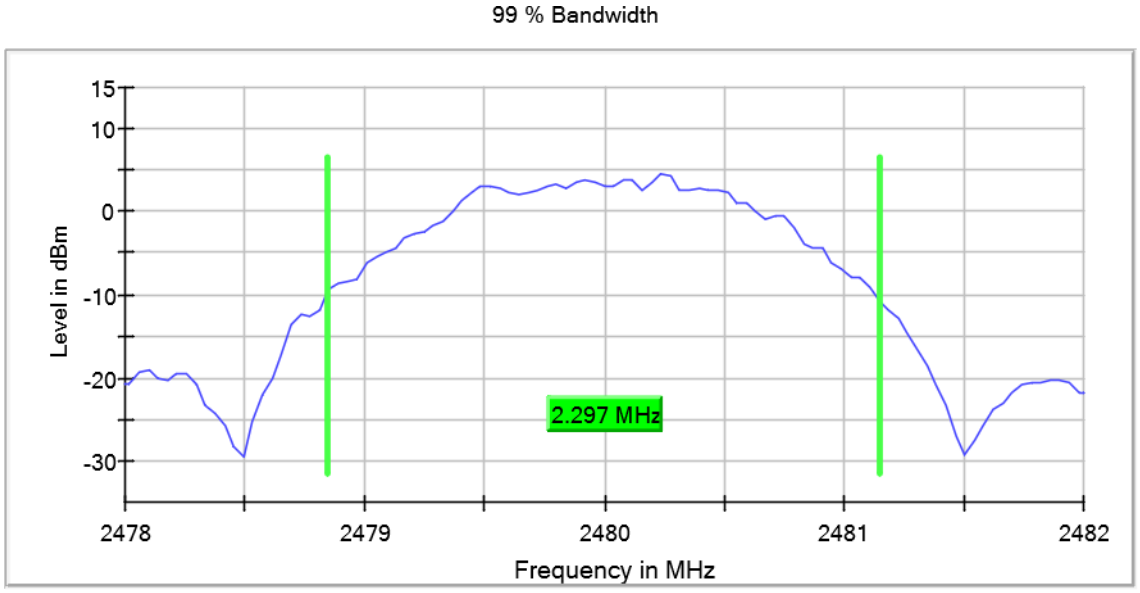


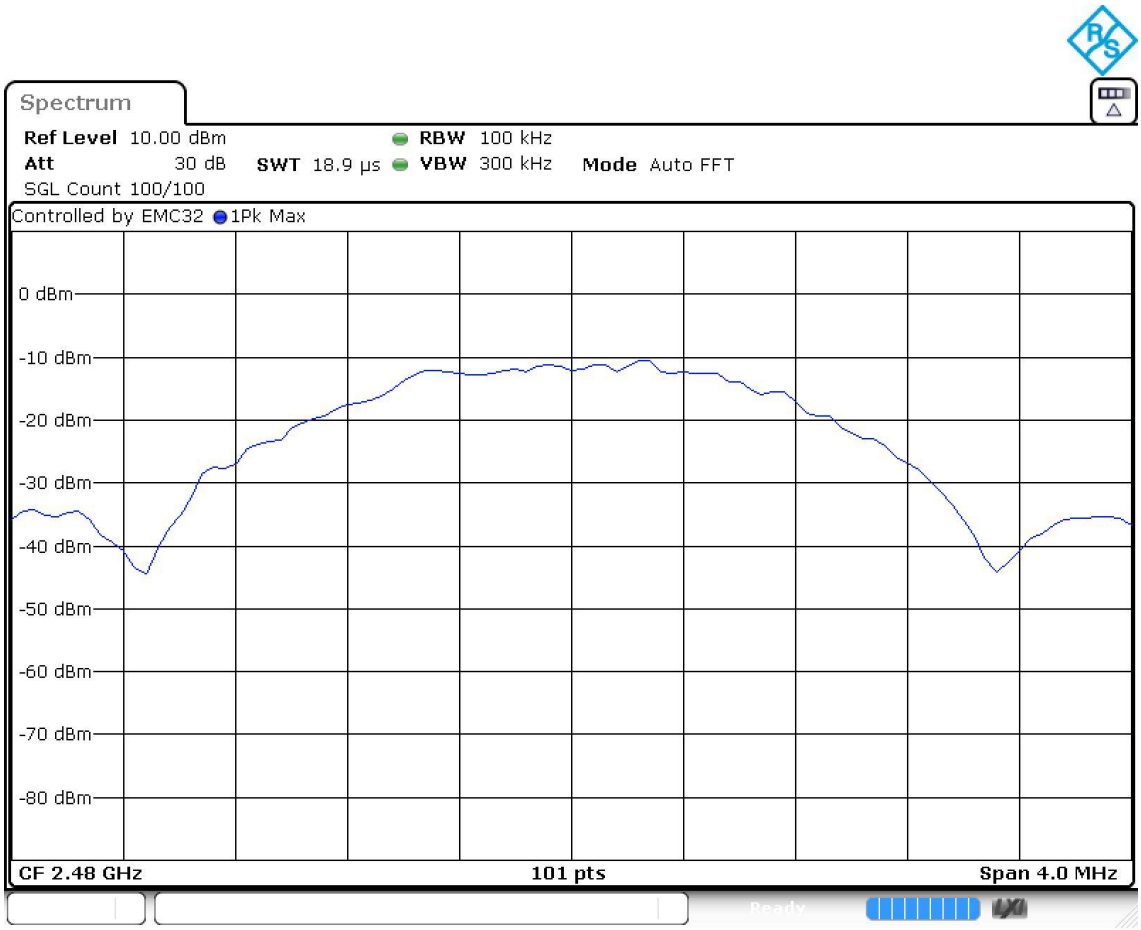
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2

Modulation = 802.15.4 (DSSS) Frequency MHz = 2480.00000

MIMO Mode = SISO Active Port = 1

Images:





RSS-247 5.2 (a) / FCC 15.247 (a) (2) [6dBw] 6 dB Bandwidth

Limits

The minimum 6 dB bandwidth shall be at least 500 kHz.

Results

Modulation: 802.15.4 (DSSS)

MIMO Mode: SISO

BW (MHz)	Freq (MHz)	Port	Ebw (MHz)
2	2405.00000	1	1.505
	2445.00000		1.505
	2475.00000		1.545
	2480.00000		1.584

Verdict

Pass

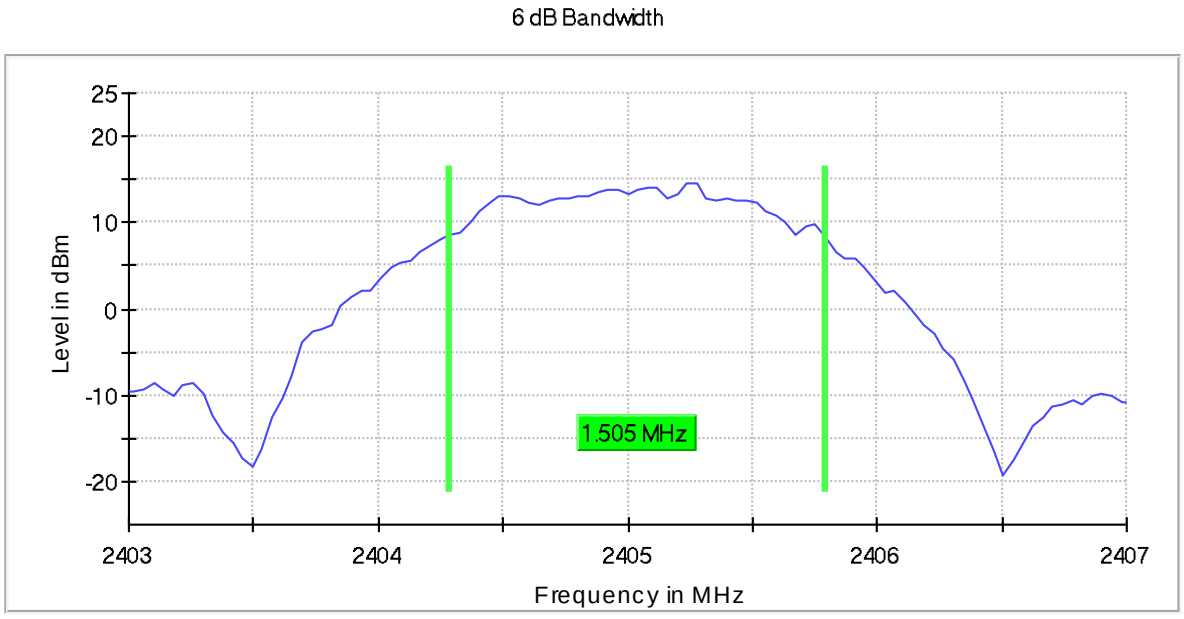
Attachments

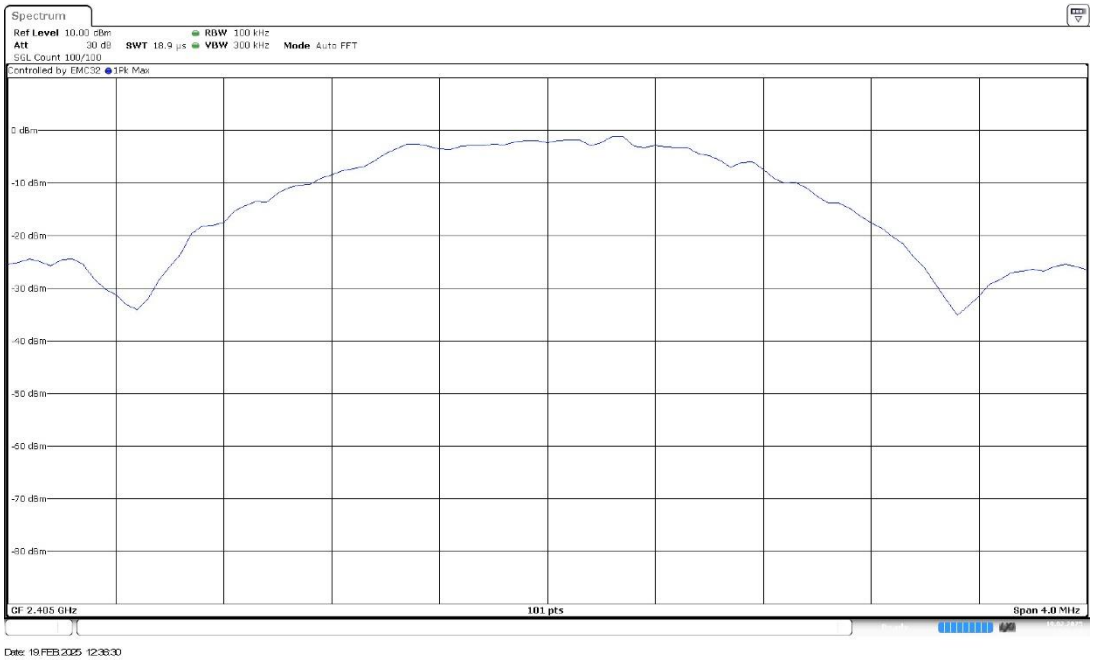
Bandwidth MHz = 2 Modulation = 802.15.4 (DSSS)

Frequency MHz = 2405.00000 MIMO Mode = SISO

Active Port = 1

Images:





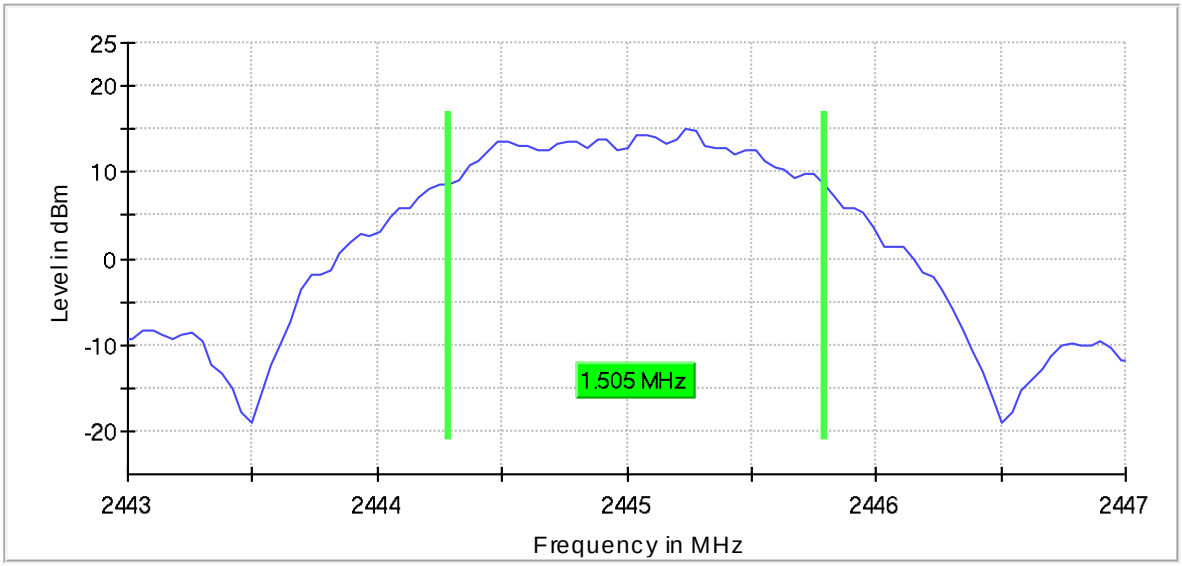
Bandwidth MHz = 2 Modulation = 802.15.4 (DSSS)

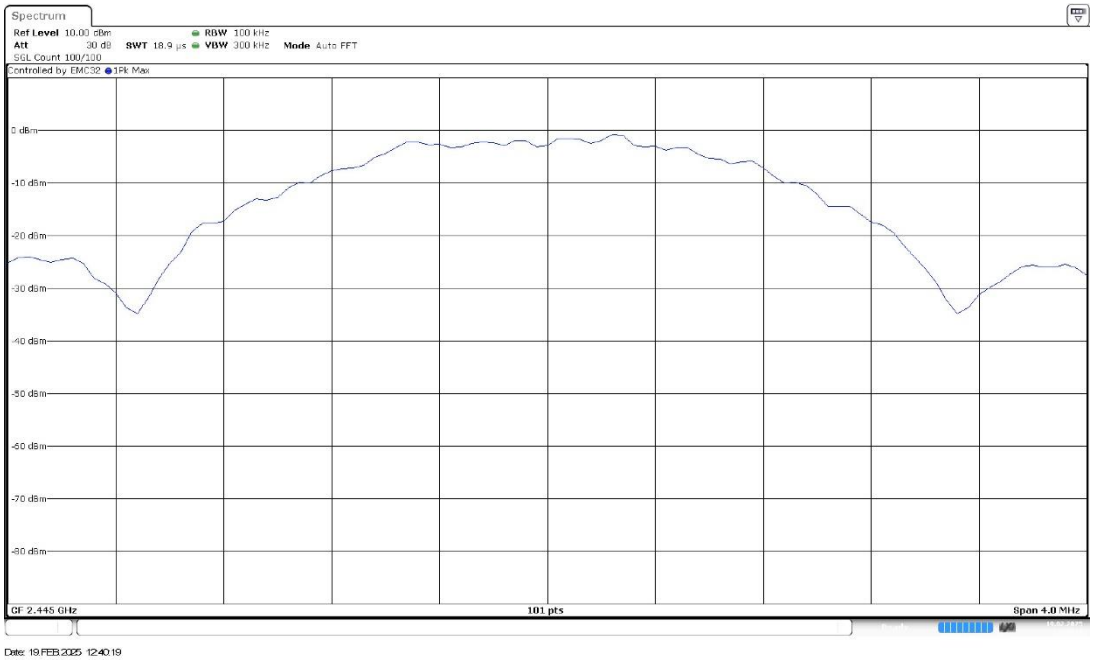
Frequency MHz = 2445.00000 MIMO Mode = SISO

Active Port = 1

Images:

6 dB Bandwidth



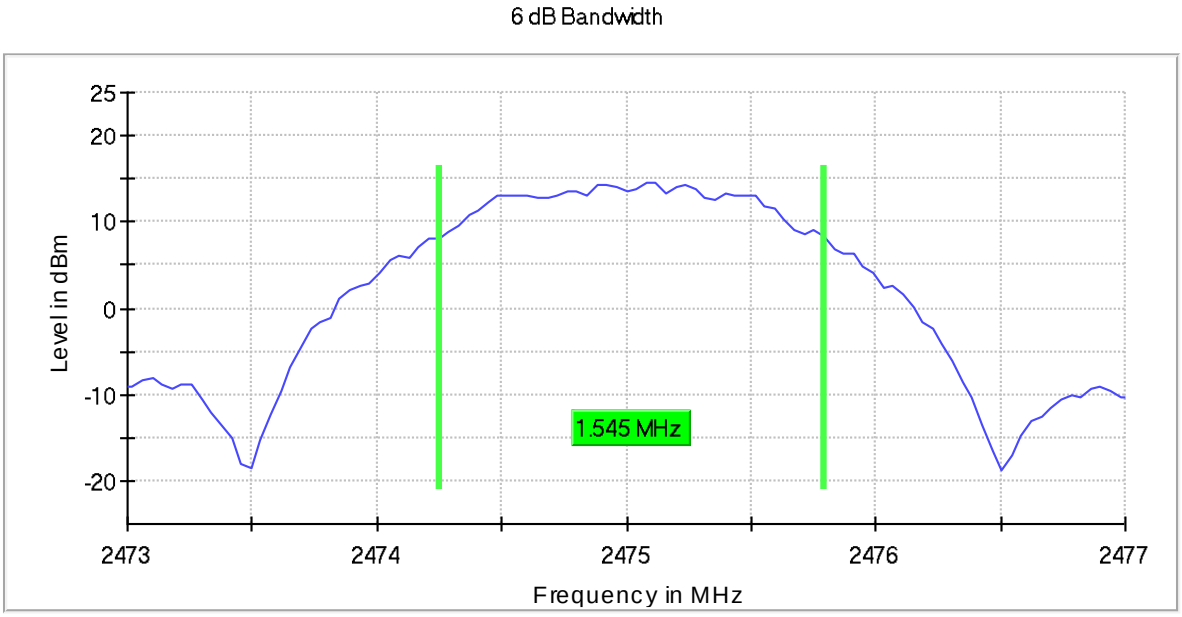


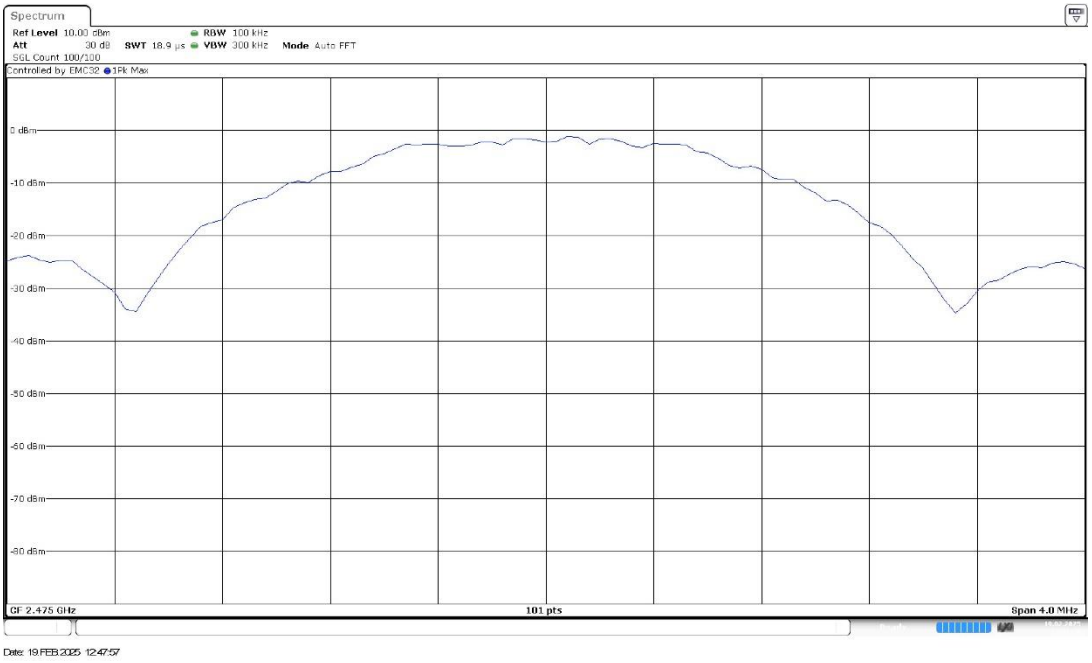
Bandwidth MHz = 2 Modulation = 802.15.4 (DSSS)

Frequency MHz = 2475.00000 MIMO Mode = SISO

Active Port = 1

Images:





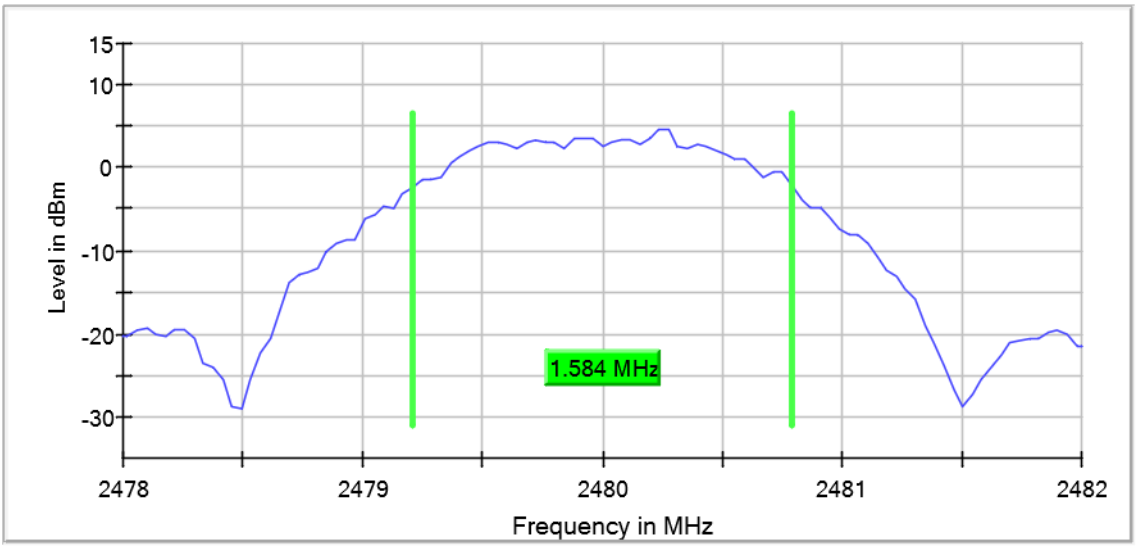
Bandwidth MHz = 2 Modulation = 802.15.4 (DSSS)

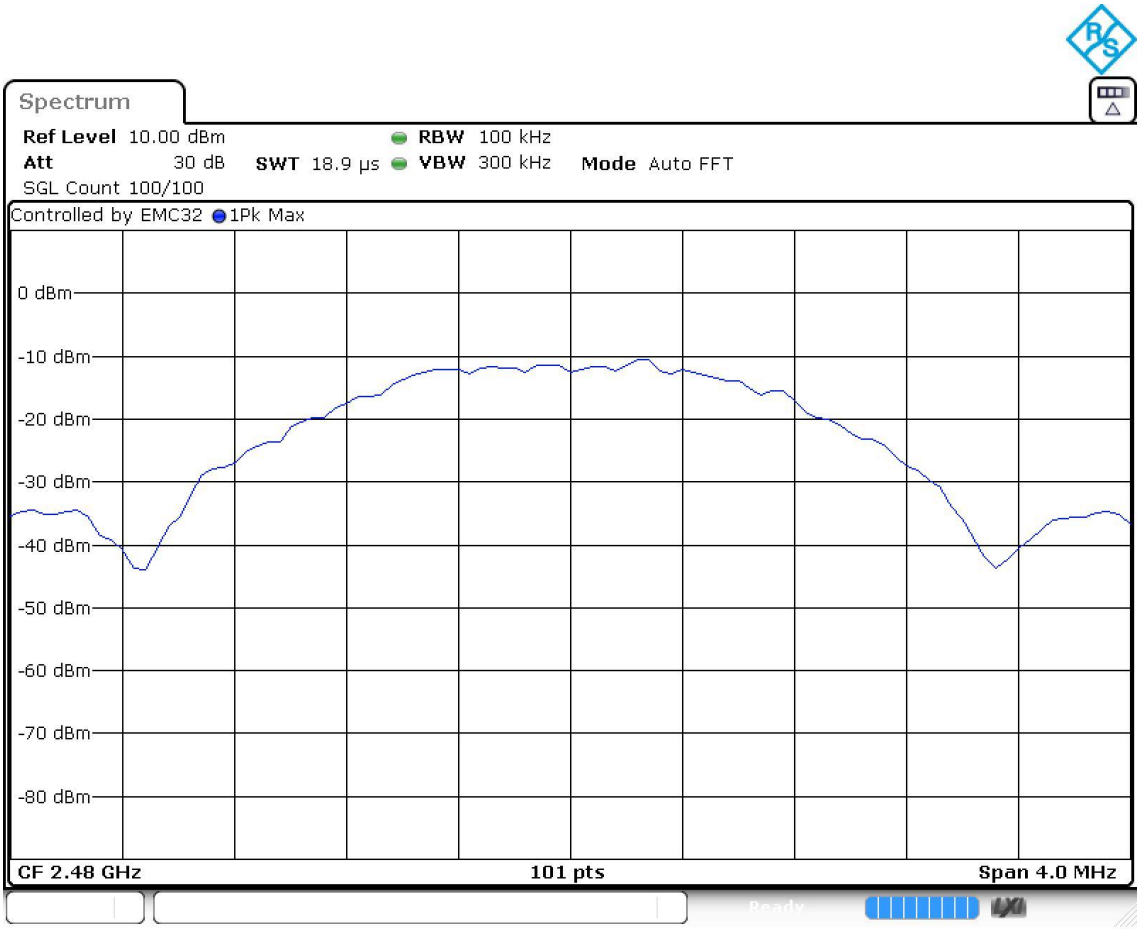
Frequency MHz = 2480.00000 MIMO Mode = SISO

Active Port = 1

Images:

6 dB Bandwidth





RSS-247 5.2 (b) / FCC 15.247 (e) [Psd] Power spectral density

Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Results

Modulation: 802.15.4 (DSSS)

MIMO Mode: SISO

Equipment	BW (MHz)	Freq (MHz)	Port	PSD (dBm)
Digital Transmission System (DTS)	2	2405.00000	1	5.895
		2440.00000		6.275
		2478.00000		6.598
		2480.00000		-1.01

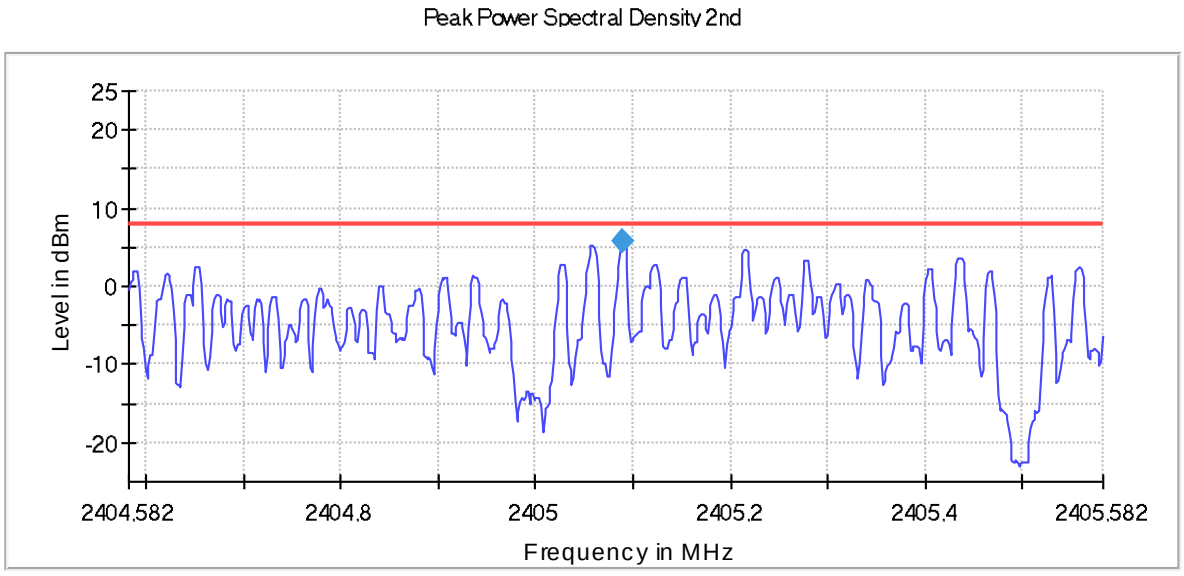
Verdict

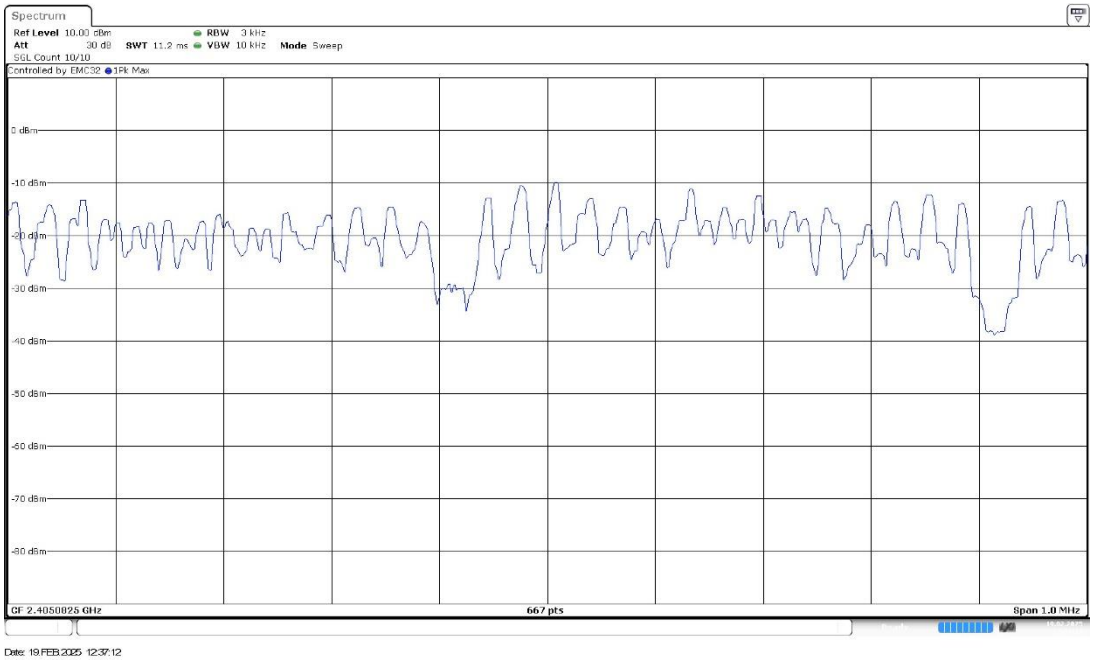
Pass

Attachments

Equipment Type = Digital Transmission System (DTS)	Bandwidth MHz = 2
Modulation = 802.15.4 (DSSS)	Frequency MHz = 2405.00000
MIMO Mode = SISO	Active Port = 1

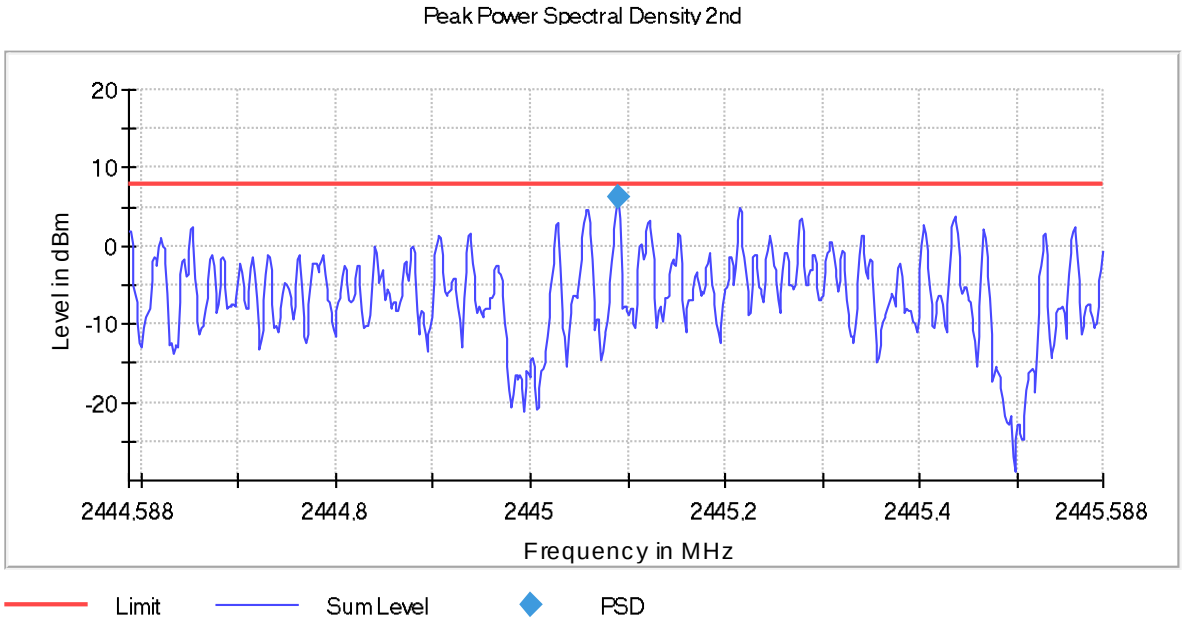
Images:

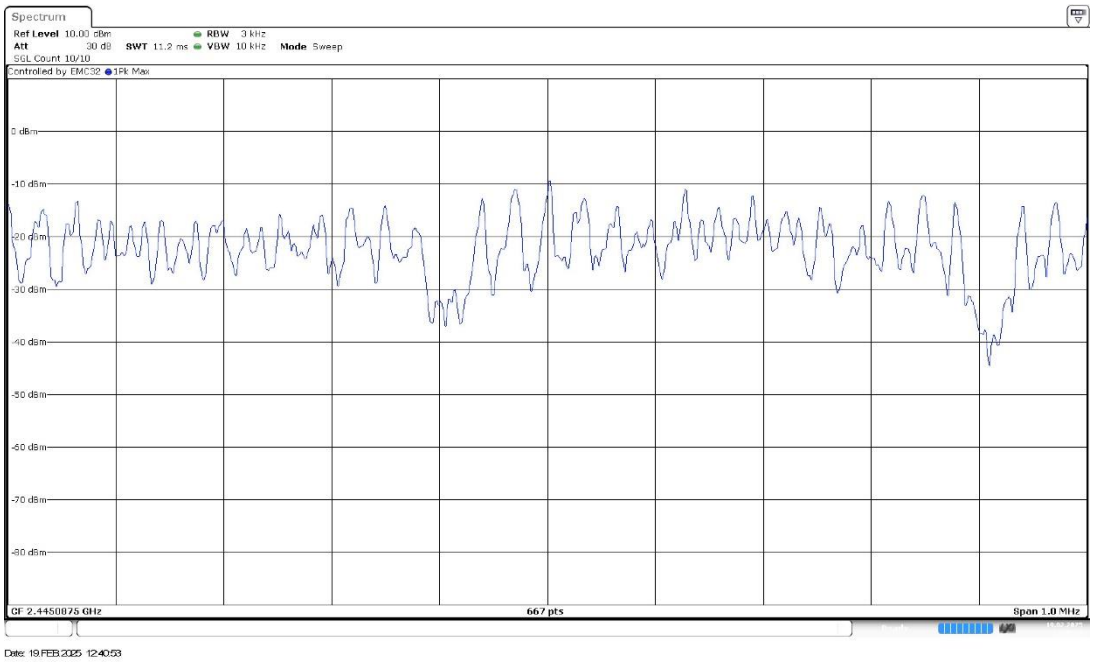




Equipment Type = Digital Transmission System (DTS)	Bandwidth MHz = 2
Modulation = 802.15.4 (DSSS)	Frequency MHz = 2445.00000
MIMO Mode = SISO	Active Port = 1

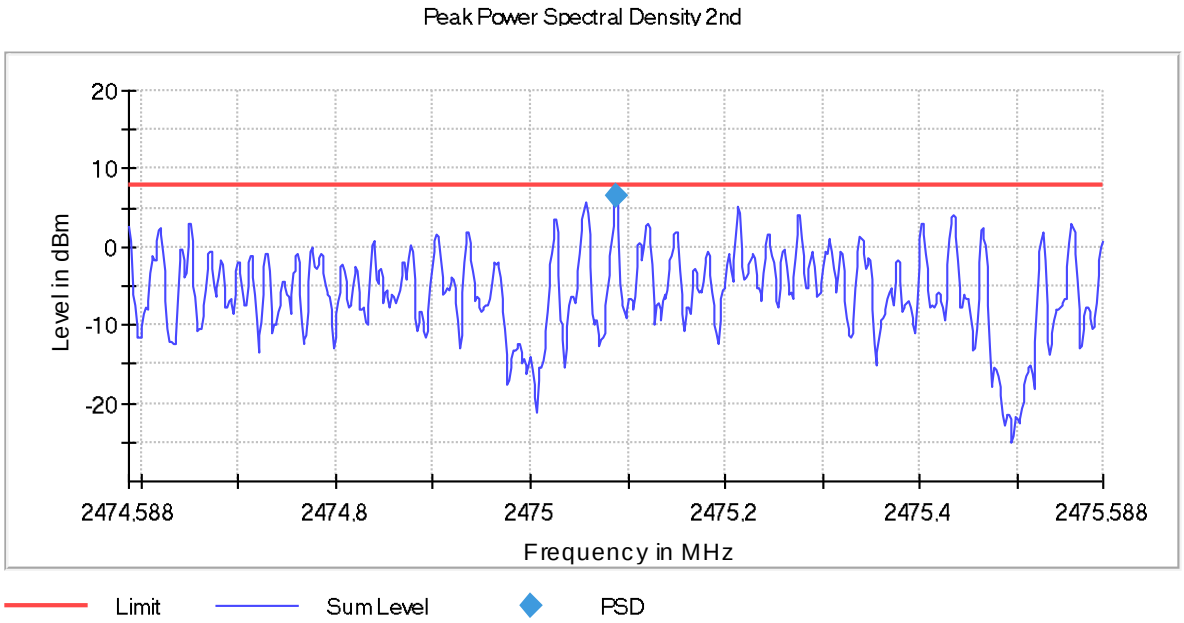
Images:

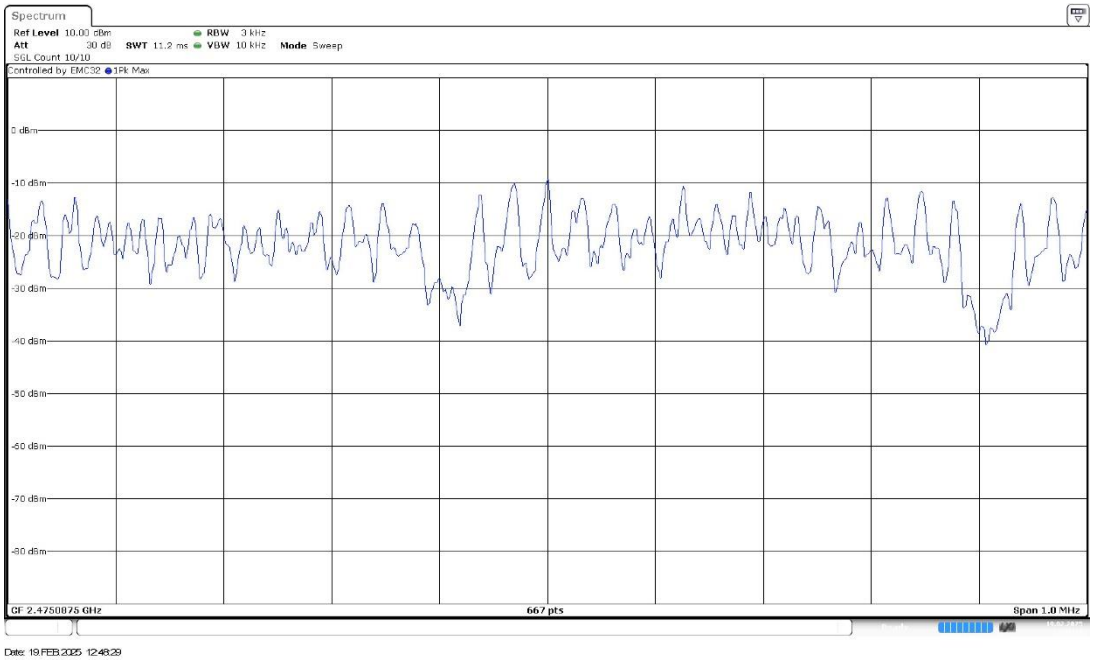




Equipment Type = Digital Transmission System (DTS)	Bandwidth MHz = 2
Modulation = 802.15.4 (DSSS)	Frequency MHz = 2475.00000
MIMO Mode = SISO	Active Port = 1

Images:



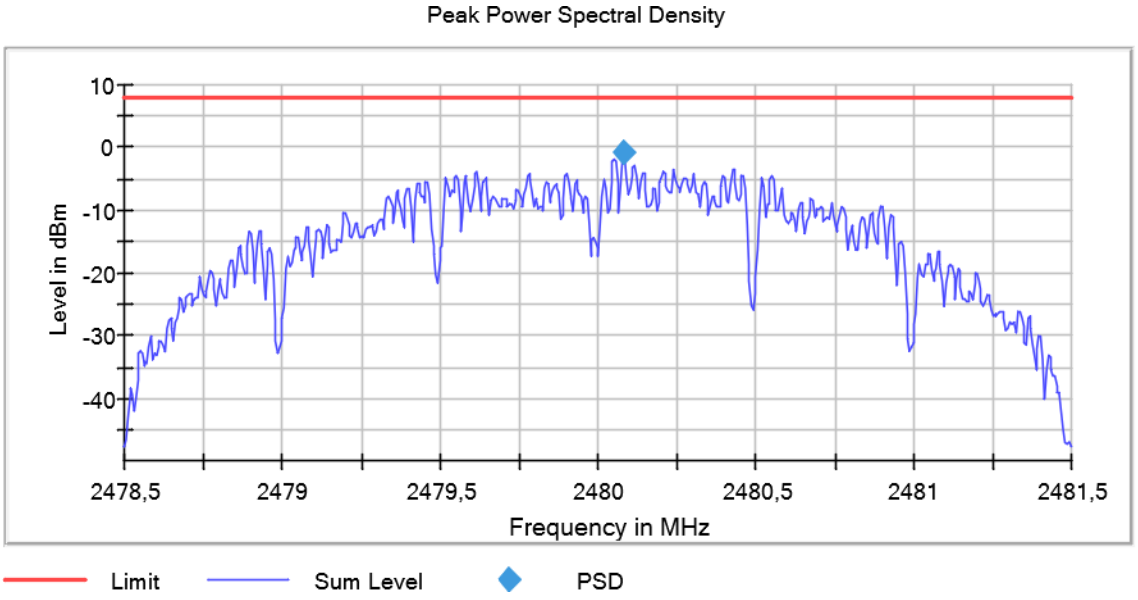


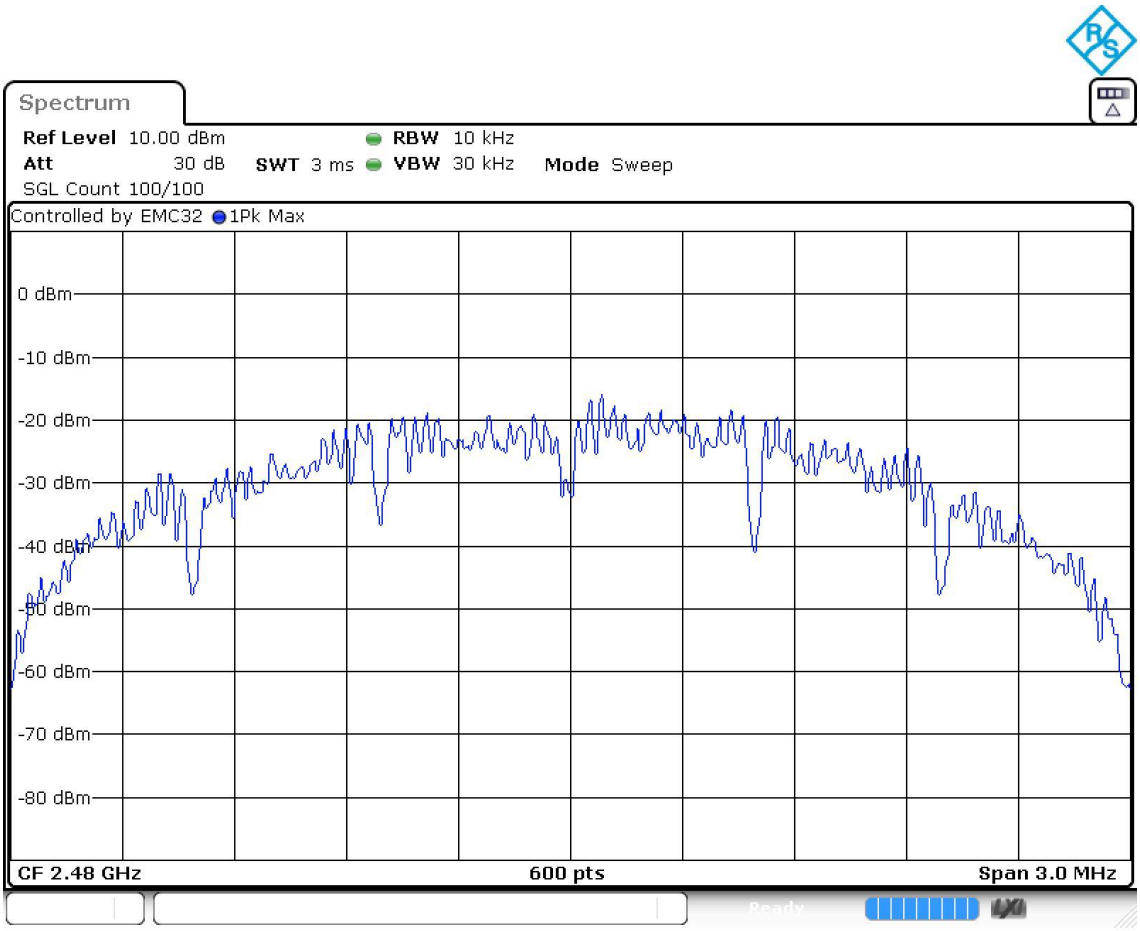
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2

Modulation = 802.15.4 (DSSS) Frequency MHz = 2480.00000

MIMO Mode = SISO Active Port = 1

Images:





RSS-247 5.4 (d) / FCC 15.247 (b) (3) [Pkcp] Maximum Peak Conducted output power

Limits

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).

The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

Results

Modulation: 802.15.4 (DSSS)

MIMO Mode: SISO

Equipment	BW (MHz)	Freq (MHz)	Port	Peak Power (dBm)	EIRP Power (dBm)
Digital Transmission System (DTS)	2	2405.00000	1	14.383	17.983
Digital Transmission System (DTS)	2	2445.00000	1	14.675	18.275
Digital Transmission System (DTS)	2	2475.00000	1	15.007	18.607
Digital Transmission System (DTS)	2	2480.00000	1	7.9500	11.5500

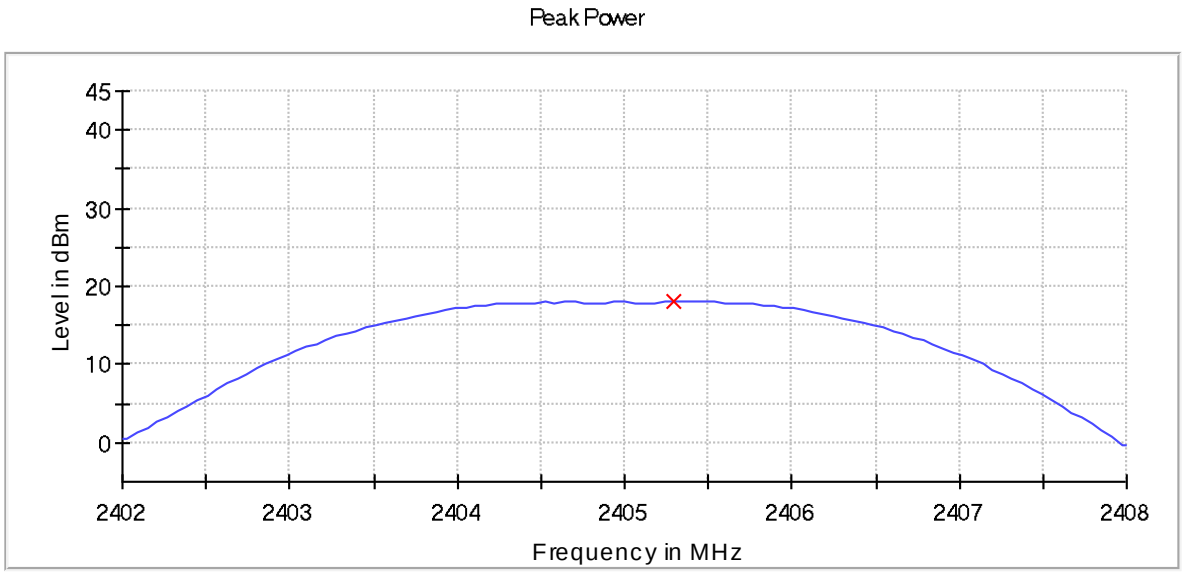
Verdict

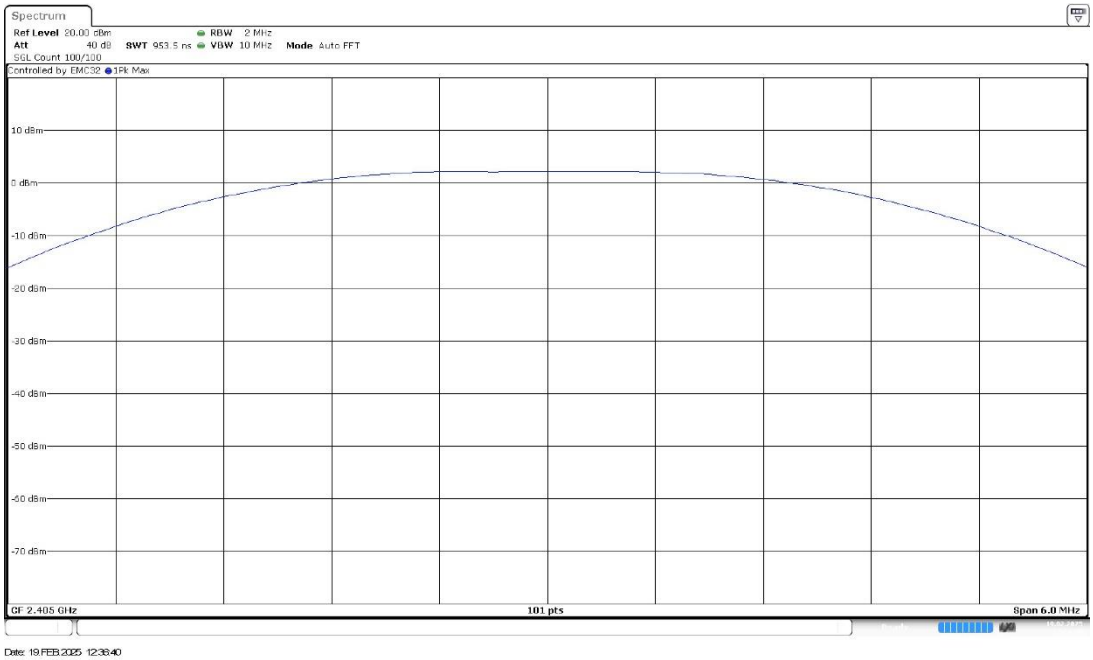
Pass

Attachments

Equipment Type = Digital Transmission System (DTS)
Bandwidth MHz = 2
Modulation = 802.15.4 (DSSS)
Frequency MHz = 2405.00000
MIMO Mode = SISO
Active Port = 1

Images:



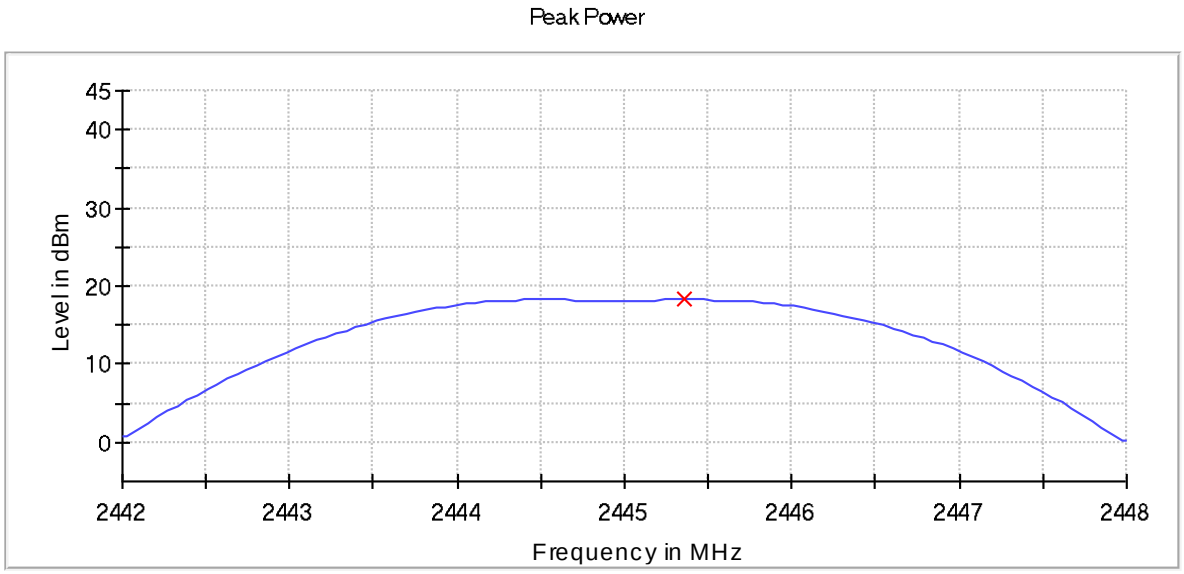


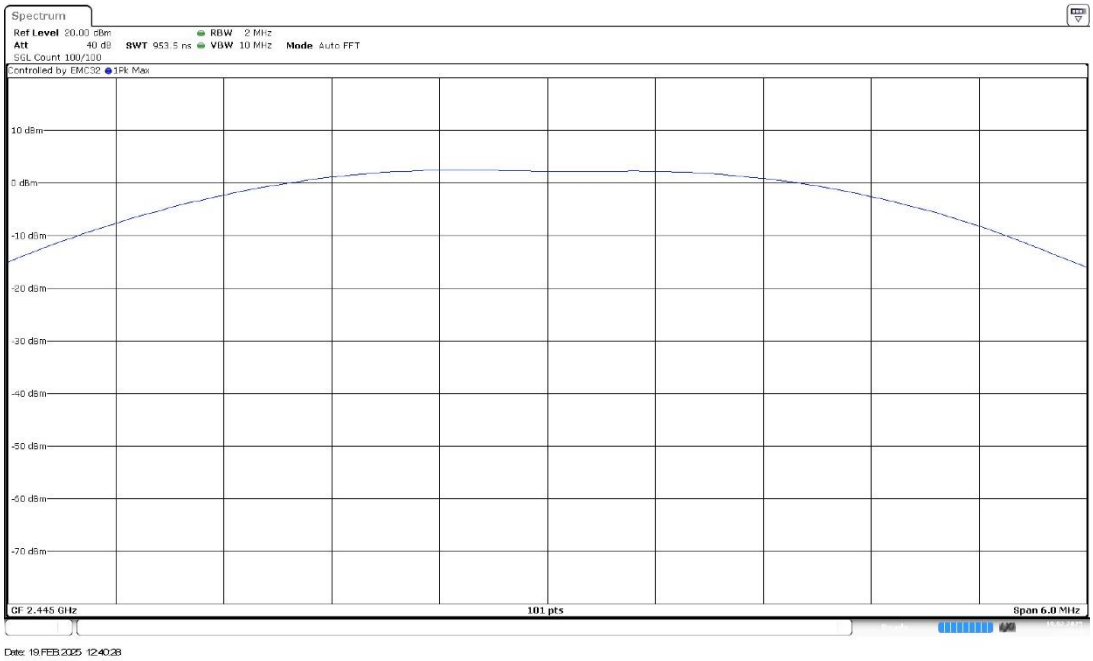
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2

Modulation = 802.15.4 (DSSS) Frequency MHz = 2445.00000

MIMO Mode = SISO Active Port = 1

Images:



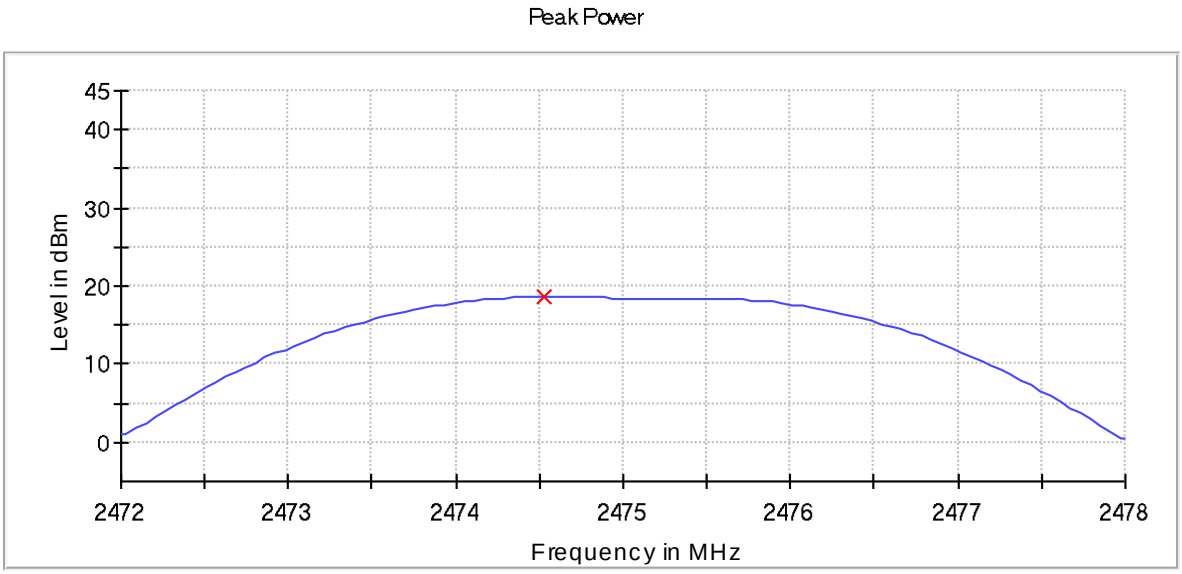


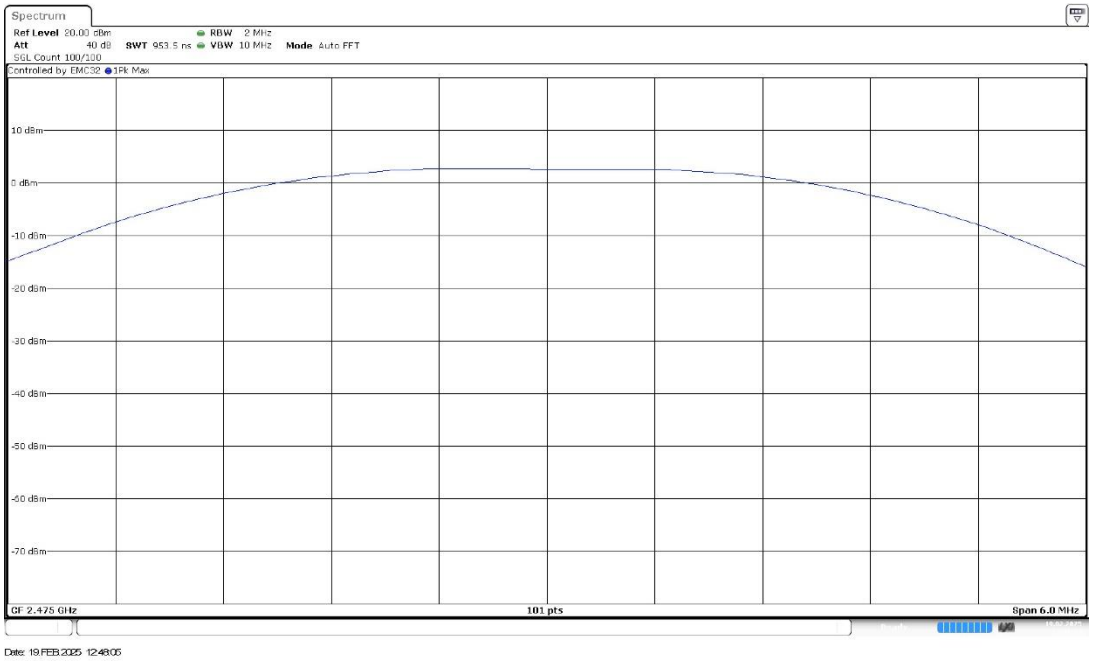
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2

Modulation = 802.15.4 (DSSS) Frequency MHz = 2475.00000

MIMO Mode = SISO Active Port = 1

Images:



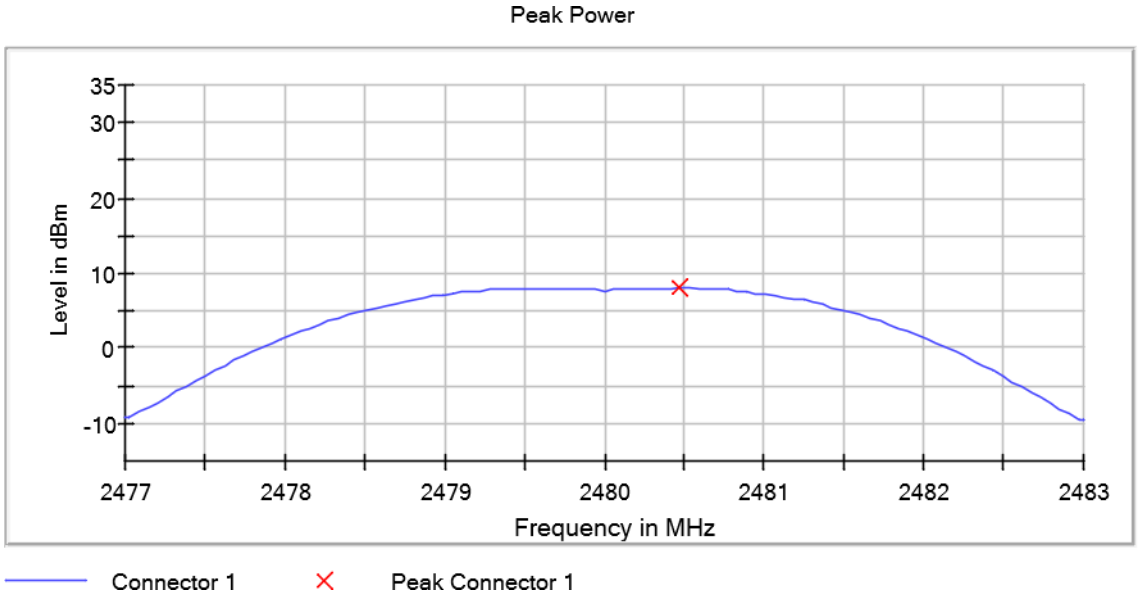


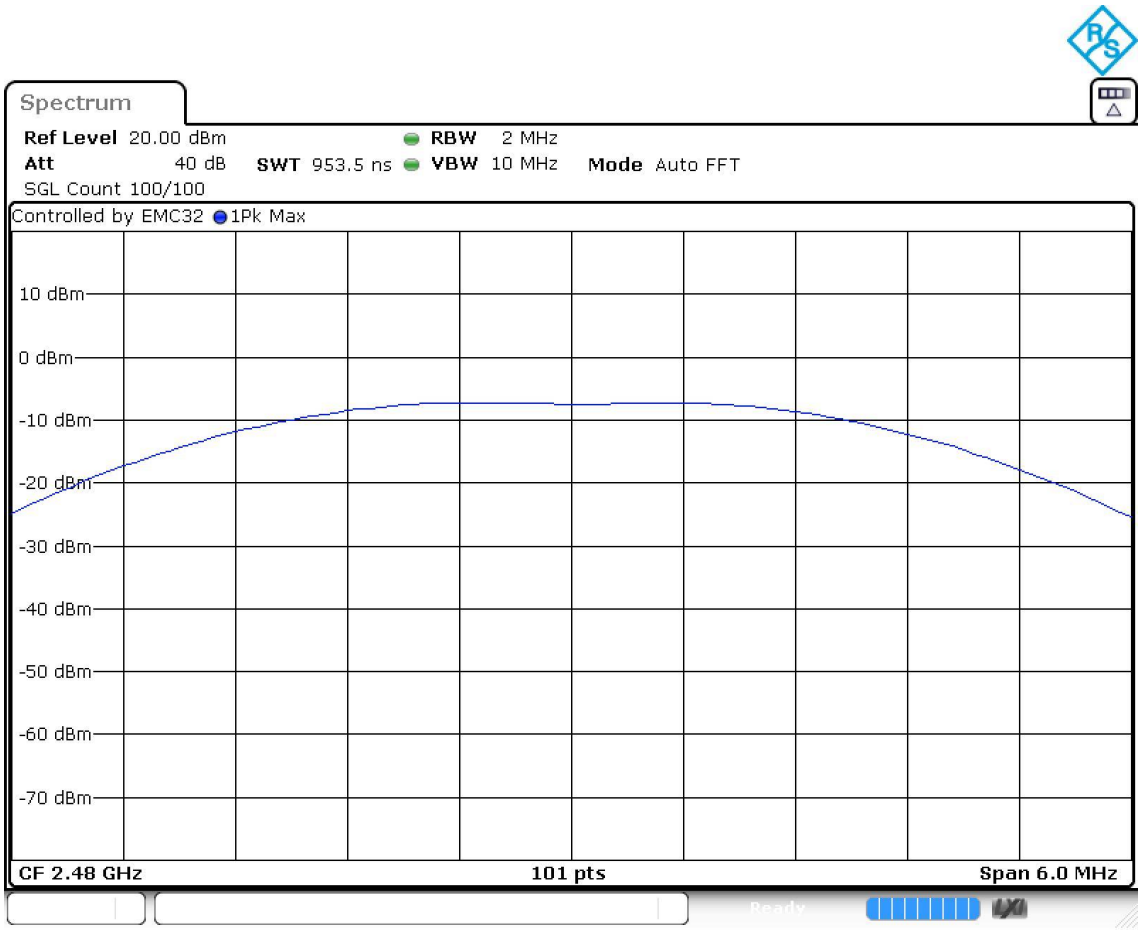
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2

Modulation = 802.15.4 (DSSS) Frequency MHz = 2480.00000

MIMO Mode = SISO Active Port = 1

Images:





RSS-247 5.5 / FCC 15.247 (d) [Bndedge] Band-edge emissions compliance (Transmitter)

Limits

In any 100 kHz bandwidths outside the frequency band in which the 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Results

Modulation: 802.15.4 (DSSS)

MIMO Mode: SISO

Equipment	BW (MHz)	Freq (MHz)	Port	Freq (MHz)	Lvl (dBm)
Digital Transmission System (DTS)	2	2405.00000	1	2399.475000	-39.342
Digital Transmission System (DTS)	2	2405.00000	1	2399.525000	-39.570
Digital Transmission System (DTS)	2	2405.00000	1	2399.975000	-39.600
Digital Transmission System (DTS)	2	2405.00000	1	2399.775000	-40.301
Digital Transmission System (DTS)	2	2405.00000	1	2399.925000	-40.488
Digital Transmission System (DTS)	2	2405.00000	1	2399.425000	-40.573
Digital Transmission System (DTS)	2	2405.00000	1	2399.875000	-40.932
Digital Transmission System (DTS)	2	2405.00000	1	2355.875000	-40.937
Digital Transmission System (DTS)	2	2405.00000	1	2399.725000	-40.972
Digital Transmission System (DTS)	2	2405.00000	1	2375.475000	-41.240
Digital Transmission System (DTS)	2	2405.00000	1	2386.175000	-41.288
Digital Transmission System (DTS)	2	2405.00000	1	2399.825000	-41.322
Digital Transmission System (DTS)	2	2405.00000	1	2386.225000	-41.347
Digital Transmission System (DTS)	2	2405.00000	1	2312.725000	-41.375
Digital Transmission System (DTS)	2	2405.00000	1	2397.525000	-41.411
Digital Transmission System (DTS)	2	2475.00000	1	2489.125000	-39.957
Digital Transmission System (DTS)	2	2475.00000		2487.125000	-40.115
Digital Transmission System (DTS)	2	2475.00000		2484.975000	-40.159
Digital Transmission System (DTS)	2	2475.00000		2489.175000	-40.159
Digital Transmission System (DTS)	2	2475.00000		2487.075000	-40.166
Digital Transmission System (DTS)	2	2475.00000		2485.375000	-40.167
Digital Transmission System (DTS)	2	2475.00000		2484.925000	-40.233
Digital Transmission System (DTS)	2	2475.00000		2483.825000	-40.333
Digital Transmission System (DTS)	2	2475.00000		2484.075000	-40.365
Digital Transmission System (DTS)	2	2475.00000		2484.125000	-40.479
Digital Transmission System (DTS)	2	2475.00000		2483.775000	-40.561

Equipment	BW (MHz)	Freq (MHz)	Port	Freq (MHz)	Lvl (dBm)
Digital Transmission System (DTS)	2	2475.00000		2485.425000	-40.608
Digital Transmission System (DTS)	2	2475.00000		2487.675000	-40.728
Digital Transmission System (DTS)	2	2475.00000		2489.075000	-40.977
Digital Transmission System (DTS)	2	2475.00000		2483.625000	-40.995
Digital Transmission System (DTS)	2	2480.00000	1	2484.275000	-39.8
Digital Transmission System (DTS)	2	2480.00000	1	2484.325000	-40.2
Digital Transmission System (DTS)	2	2480.00000	1	2484.225000	-40.4
Digital Transmission System (DTS)	2	2480.00000	1	2485.825000	-41.2
Digital Transmission System (DTS)	2	2480.00000	1	2485.875000	-41.3
Digital Transmission System (DTS)	2	2480.00000	1	2486.625000	-41.5
Digital Transmission System (DTS)	2	2480.00000	1	2483.875000	-41.5
Digital Transmission System (DTS)	2	2480.00000	1	2483.625000	-41.7
Digital Transmission System (DTS)	2	2480.00000	1	2497.825000	-41.7
Digital Transmission System (DTS)	2	2480.00000	1	2483.825000	-41.8
Digital Transmission System (DTS)	2	2480.00000	1	2483.725000	-41.8
Digital Transmission System (DTS)	2	2480.00000	1	2486.675000	-41.9
Digital Transmission System (DTS)	2	2480.00000	1	2486.775000	-42.0
Digital Transmission System (DTS)	2	2480.00000	1	2486.025000	-42.0
Digital Transmission System (DTS)	2	2480.00000	1	2486.725000	-42.1

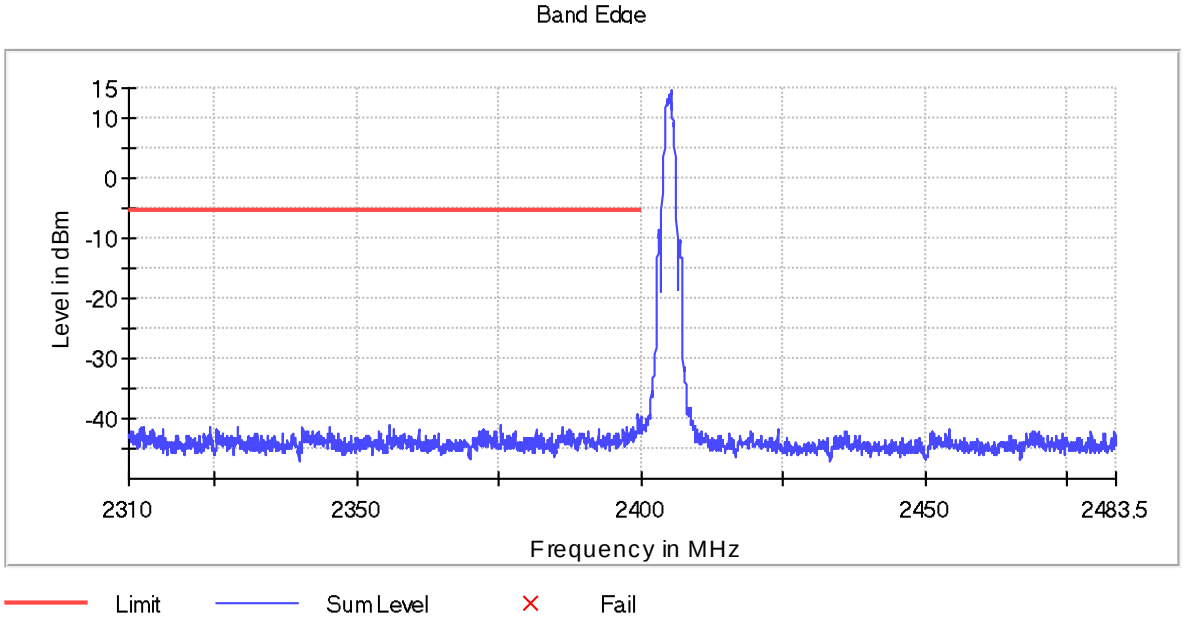
Verdict

Pass

Attachments

Equipment Type = Digital Transmission System (DTS)
Bandwidth MHz = 2
Modulation = 802.15.4 (DSSS)
Frequency MHz = 2405.00000
MIMO Mode = SISO
Active Port = 1

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	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150

Setting	Instrument Value	Target Value
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Spectrum Analyzer Parameters 2

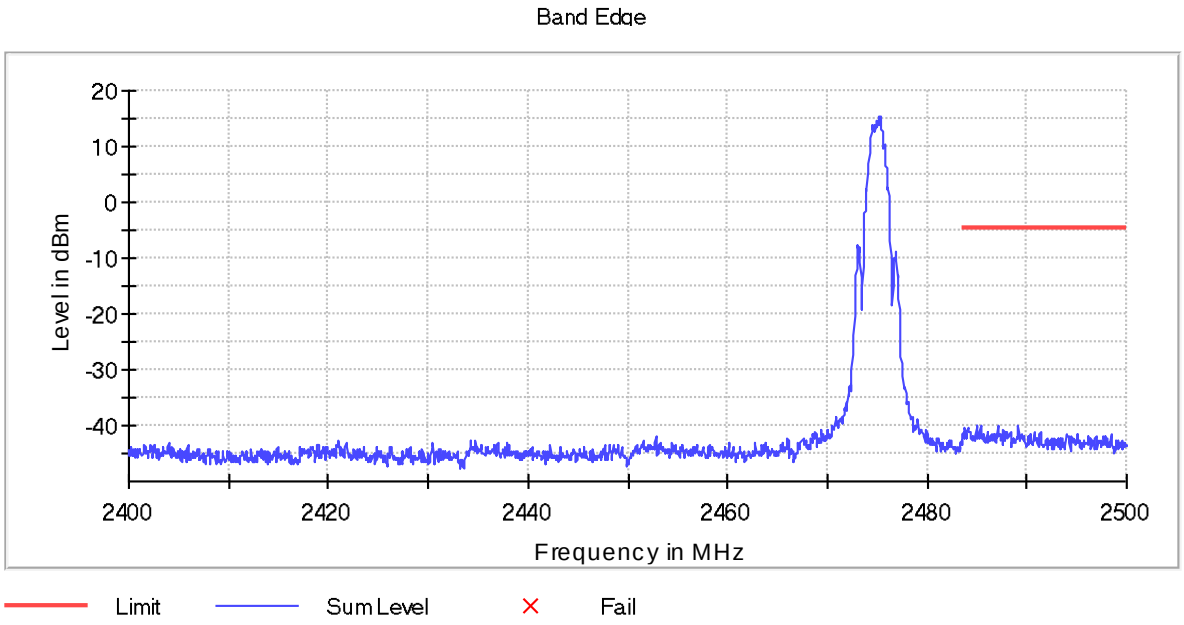
Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	94.727 µs	AUTO
Reference Level	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.19 dB	0.50 dB

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2

Modulation = 802.15.4 (DSSS) Frequency MHz = 2475.00000

MIMO Mode = SISO Active Port = 1

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	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3

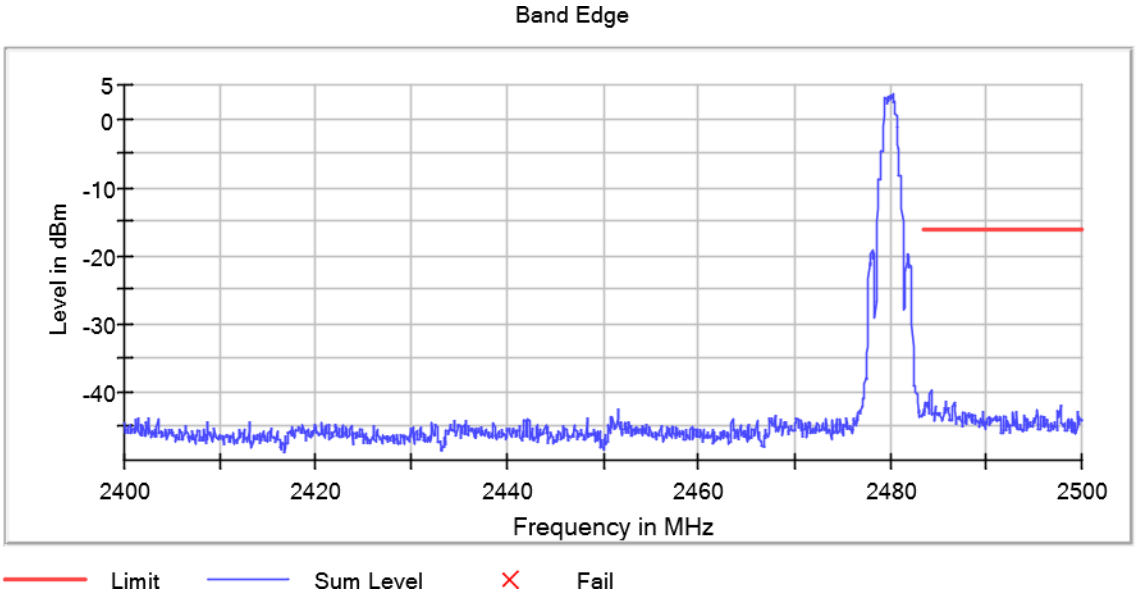
Setting	Instrument Value	Target Value
Max Stable Difference	0.00 dB	0.50 dB

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	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.19 dB	0.50 dB

Equipment Type = Digital Transmission System (DTS)
Bandwidth MHz = 2
Modulation = 802.15.4 (DSSS)
Frequency MHz = 2480.00000
MIMO Mode = SISO
Active Port = 1

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	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	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	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.19 dB	0.50 dB

RSS-247 5.5 / 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 (µV/m)	Field strength (dBµV/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.

Verdict

Pass

Results

Modulation: 802.15.4 (DSSS)

MIMO Mode: SISO

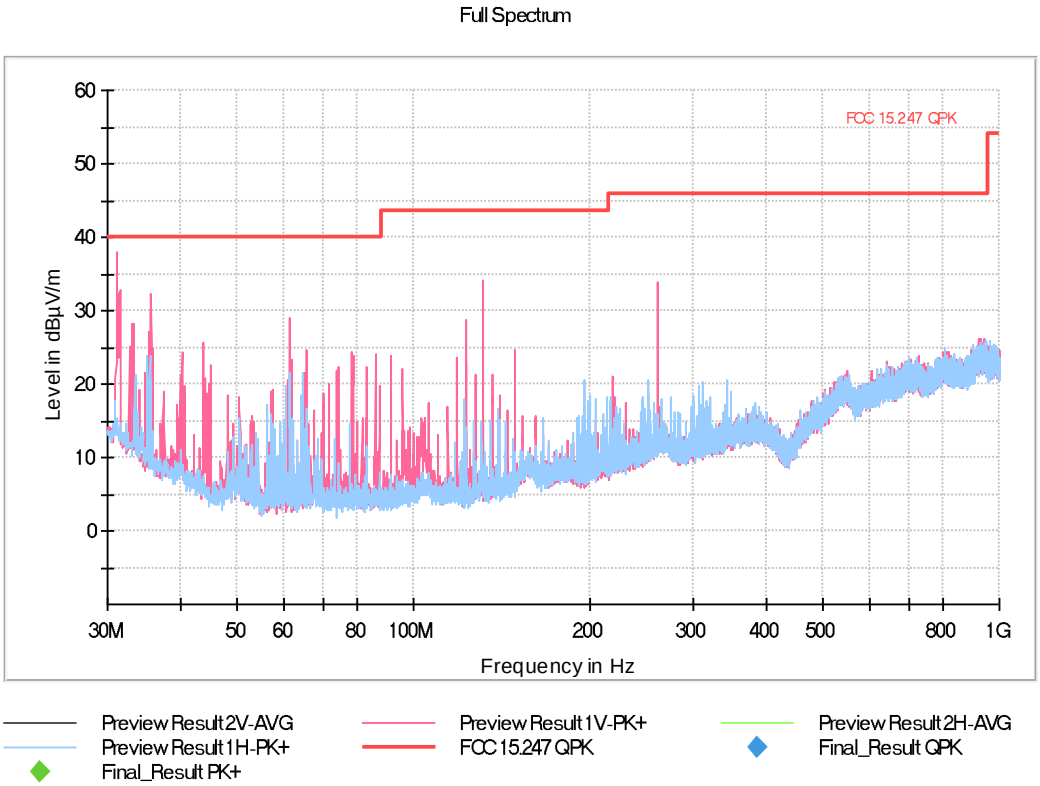
Attachments

Spectrum analyzer parameter:

Subrange	**Step Size**	**Detectors**	**Bandwidth**	**Sweep Time**	**Preamp**
Receiver: [ESW 44]					
30 MHz - 1 GHz	9,7 kHz	PK+	100 kHz	1 s	0 dB
1 GHz - 3 GHz	20 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency Range GHz = [0.03, 1]	Equipment Type = Digital Transmission System (DTS)
Modulation = 802.15.4 (DSSS)	Frequency MHz = The spurious frequencies detected do not depend on the transmission channel
MIMO Mode = SISO	Active Port = 1

Images:



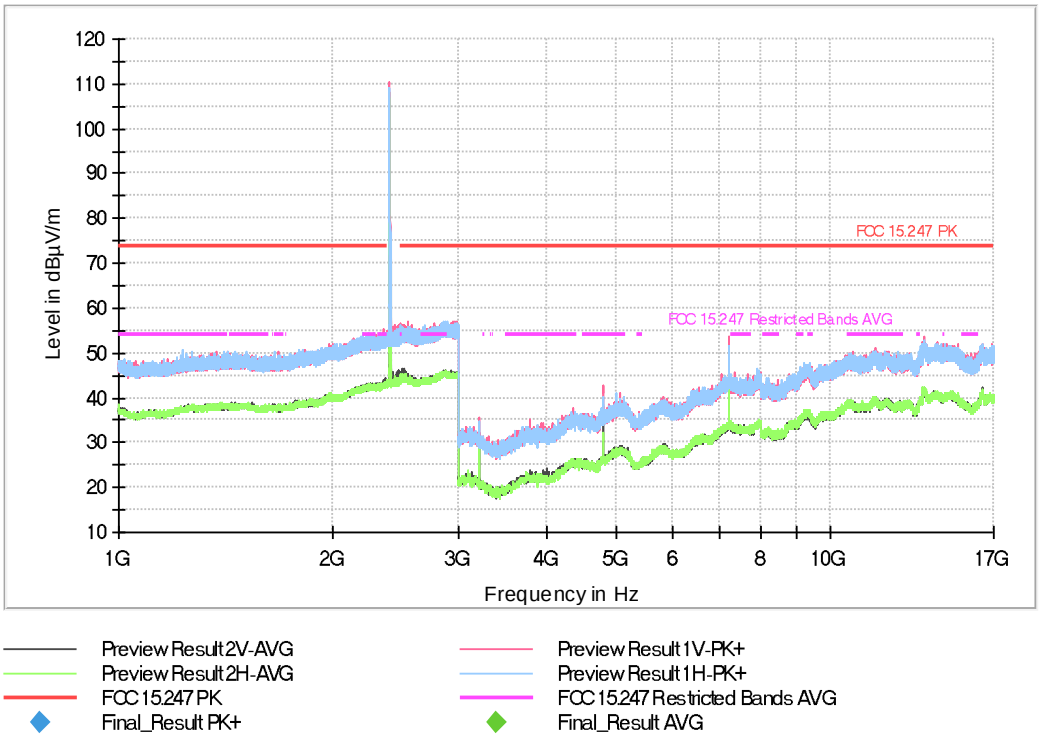
Frequency Range GHz = [1, 17] Equipment Type = Digital Transmission System (DTS)

Modulation = 802.15.4 (DSSS) Frequency MHz = 2402.00000

MIMO Mode = SISO Active Port = 1

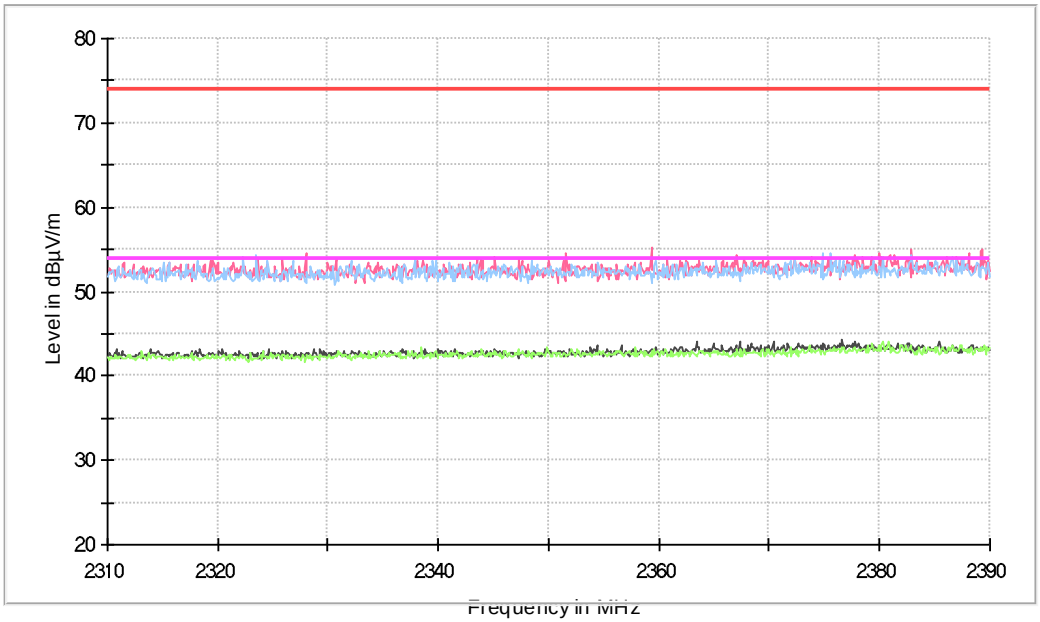
Images:

Full Spectrum



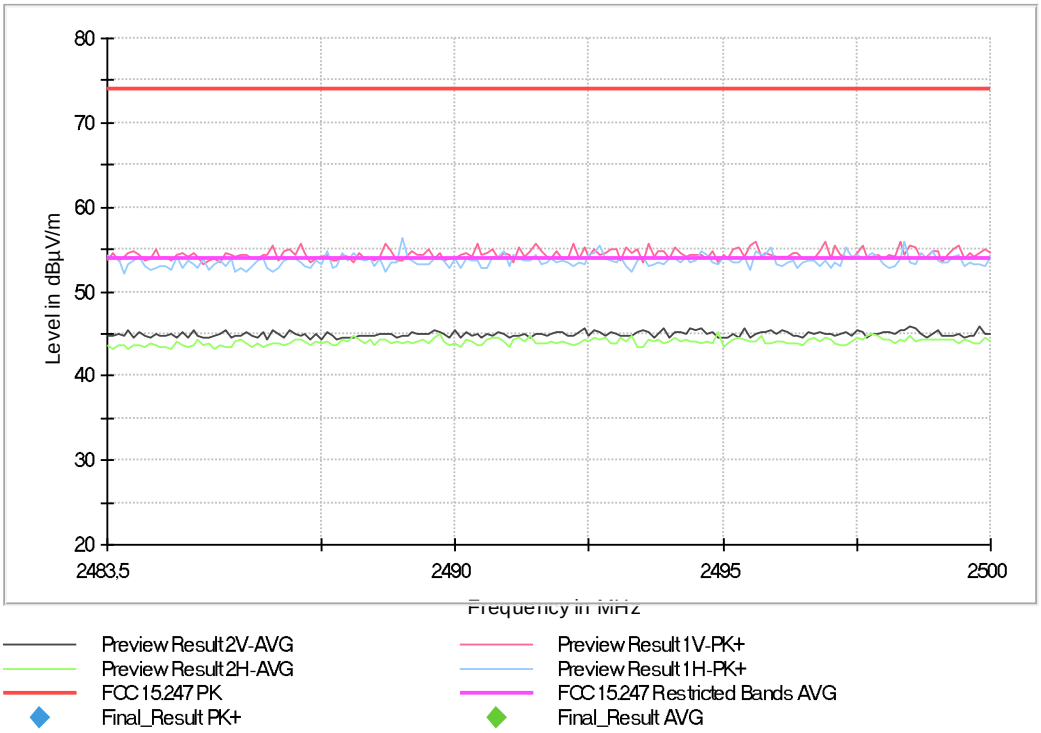
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

Full Spectrum



Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

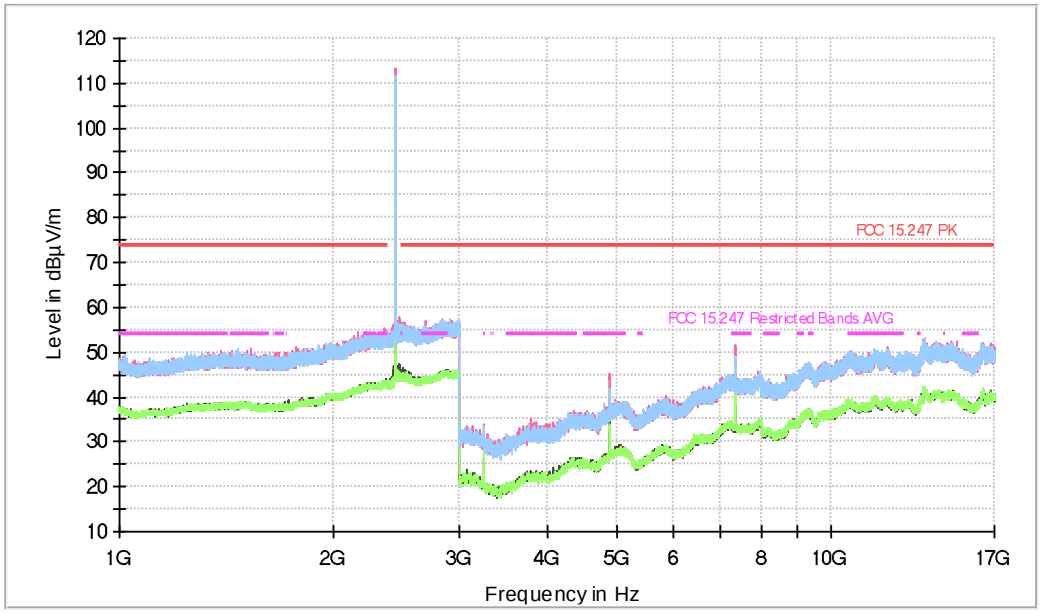
Full Spectrum



Frequency Range GHz = [1, 17]	Equipment Type = Digital Transmission System (DTS)
Modulation = 802.15.4 (DSSS)	Frequency MHz = 2445.00000
MIMO Mode = SISO	Active Port = 1

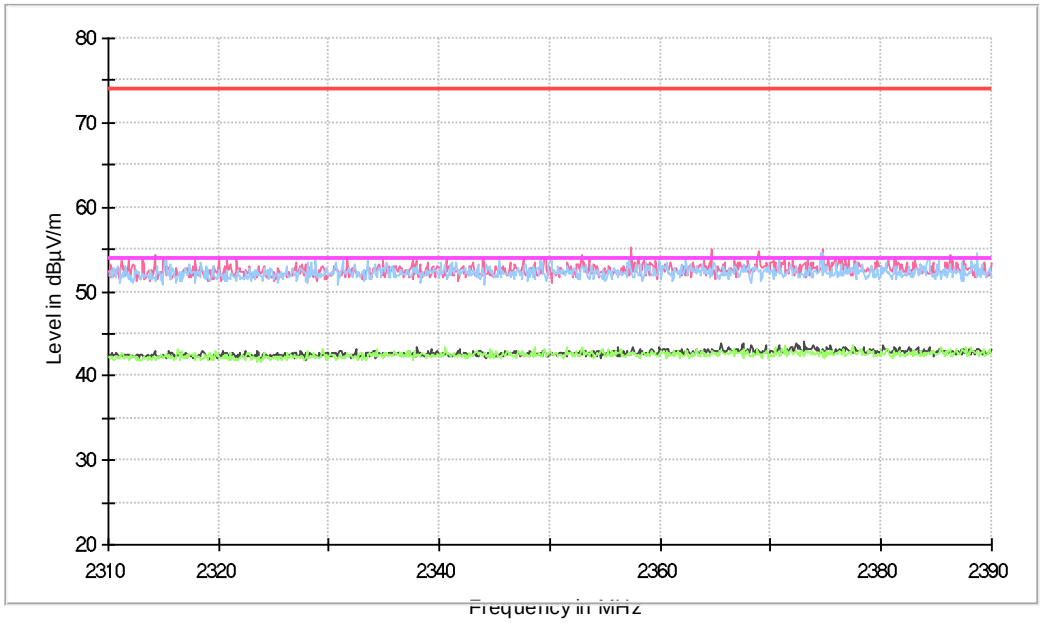
Images:

Full Spectrum



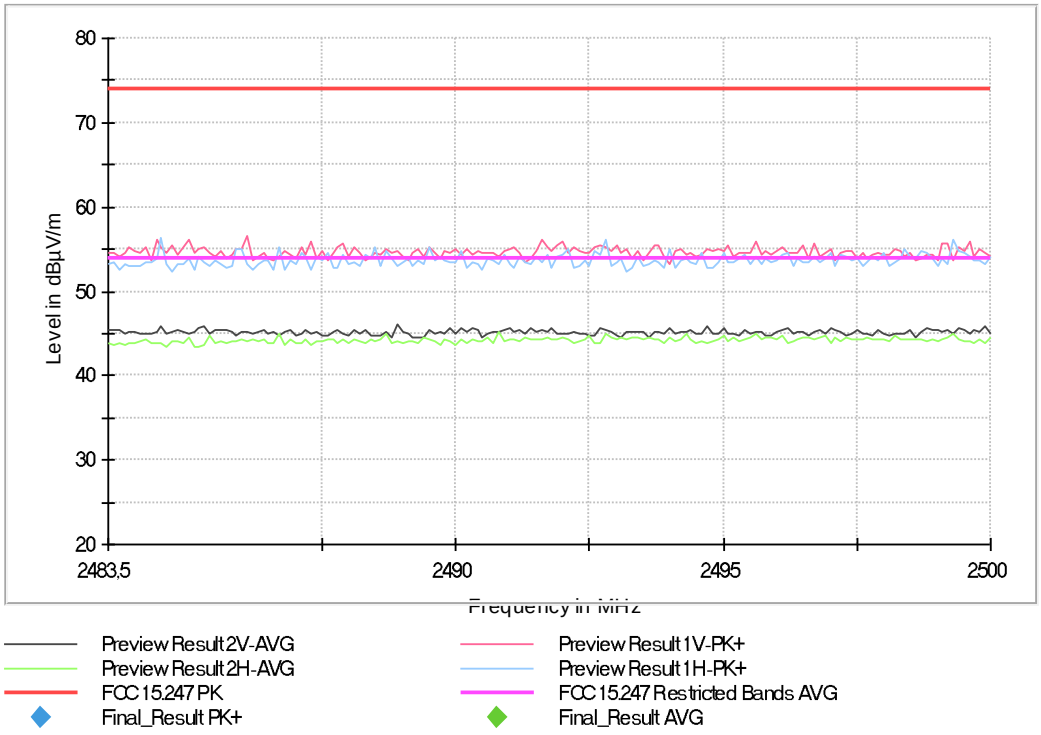
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

Full Spectrum



Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

Full Spectrum

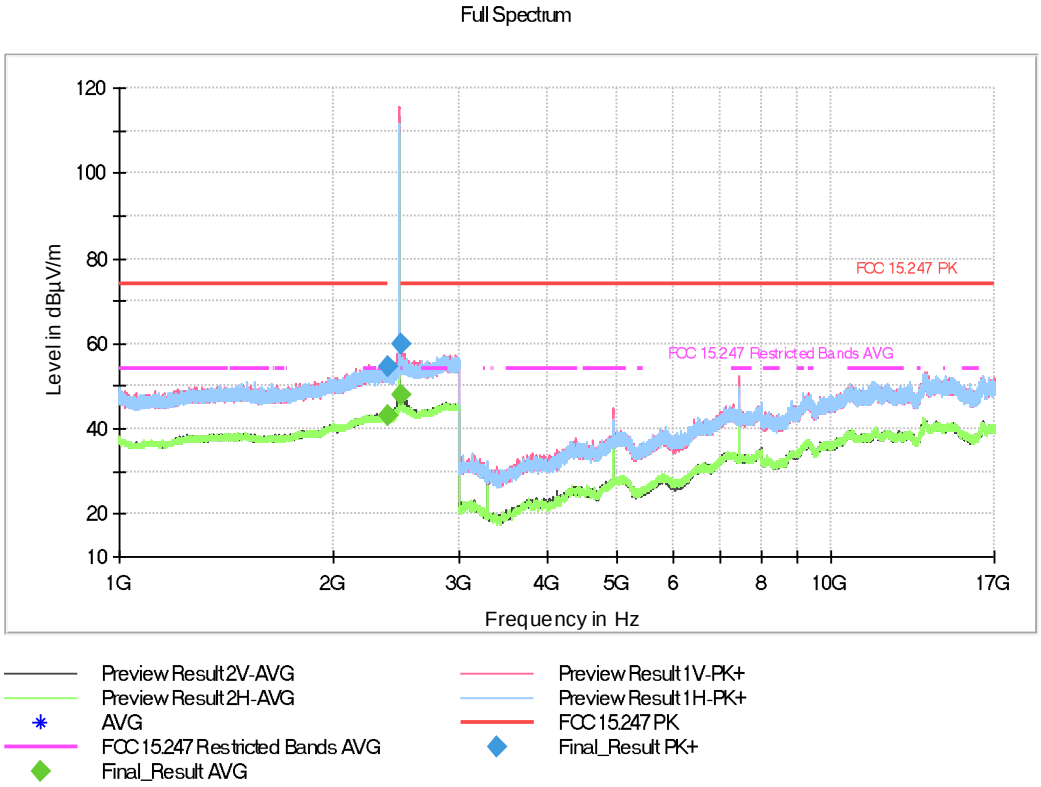


Frequency Range GHz = [1, 17] Equipment Type = Digital Transmission System (DTS)

Modulation = 802.15.4 (DSSS) Frequency MHz = 2475.00000

MIMO Mode = SISO Active Port = 1

Images:



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
2387.900000	---	43.02	54.00	10.98	259.0	H	12.0
2387.900000	54.74	---	74.00	19.26	259.0	H	12.0
2487.600000	---	48.03	54.00	5.97	326.0	V	286.0
2487.600000	60.04	---	74.00	13.96	326.0	V	286.0