FCC Part 47 §15.247 2400-2483.5 MHz 2018

Hardware Setup: WMS Measurements\TS8997 Hardware Setup

Spectrum Analyzer:	SA FSV 40 (SA FSV 40) @ VISA (ADR TCPIP::192.168.48.100::inst0::instr), SN 1321.3008K40/101752, FW 3.60
Vector Generator:	VG SMW200A (VG SMW200A) @ GPIB0 (ADR 28)
Generator:	SMB100A (SMB100A) @ VISA (ADR TCPIP::192.168.48.110::inst0::INSTR), SN 180599, FW 3.20.390.24 / Drv:Rev 2.21.0, 07/2016, CVI 2015
OSP:	OSP-B157W8PLUS (OSP-B157W8PLUS) @ VISA (ADR TCPIP::192.168.48.157::inst0::instr), SN 1527.1144.06 / 100955, FW 2.00.1.0

Summary

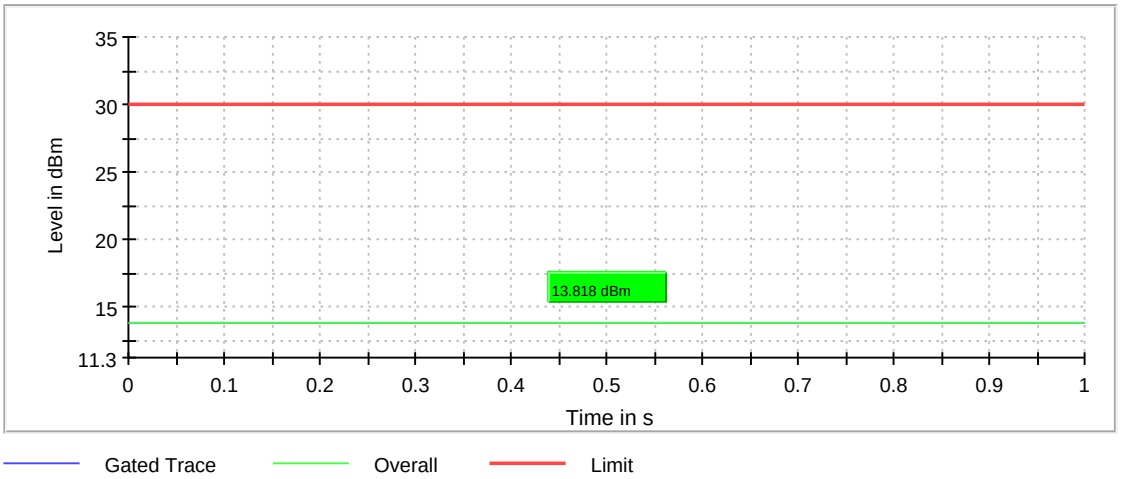
Test	Frequency (MHz)	Nominal Power (dBm)	Nominal Bandwidth (MHz)	Result
RF output power	2405.000	20.0	2.000000	PASS
Minimum Emission Bandwidth 6 dB	2405.000	20.0	2.000000	PASS
Peak Power Spectral Density	2405.000	20.0	2.000000	PASS
Occupied Channel Bandwidth 99%	2405.000	20.0	2.000000	PASS
Band Edge low	2405.000	20.0	2.000000	PASS
Tx Spurious Emission	2405.000	20.0	2.000000	PASS
Emissions in restricted frequency bands (Average)	2405.000	20.0	2.000000	PASS
RF output power	2440.000	20.0	2.000000	PASS
Minimum Emission Bandwidth 6 dB	2440.000	20.0	2.000000	PASS
Peak Power Spectral Density	2440.000	20.0	2.000000	PASS
Occupied Channel Bandwidth 99%	2440.000	20.0	2.000000	PASS
Band Edge low	2440.000	20.0	2.000000	PASS
Tx Spurious Emission	2440.000	20.0	2.000000	PASS
RF output power	2470.000	20.0	2.000000	PASS
Peak Power Spectral Density	2470.000	20.0	2.000000	PASS
RF output power	2475.000	20.0	2.000000	PASS
Minimum Emission Bandwidth 6 dB	2475.000	20.0	2.000000	PASS
Peak Power Spectral Density	2475.000	20.0	2.000000	PASS
Occupied Channel Bandwidth 99%	2475.000	20.0	2.000000	PASS
Band Edge high	2475.000	20.0	2.000000	PASS
Tx Spurious Emission	2475.000	20.0	2.000000	PASS

RF output power (2405 MHz; 20.000 dBm; 2 MHz)

Customized settings.

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2405.000000	13.8	30.0	16.5	100.000	PASS



OSP PowerMeter settings

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

Minimum Emission Bandwidth 6 dB (2405 MHz; 20.000 dBm; 2 MHz)

Customized settings.

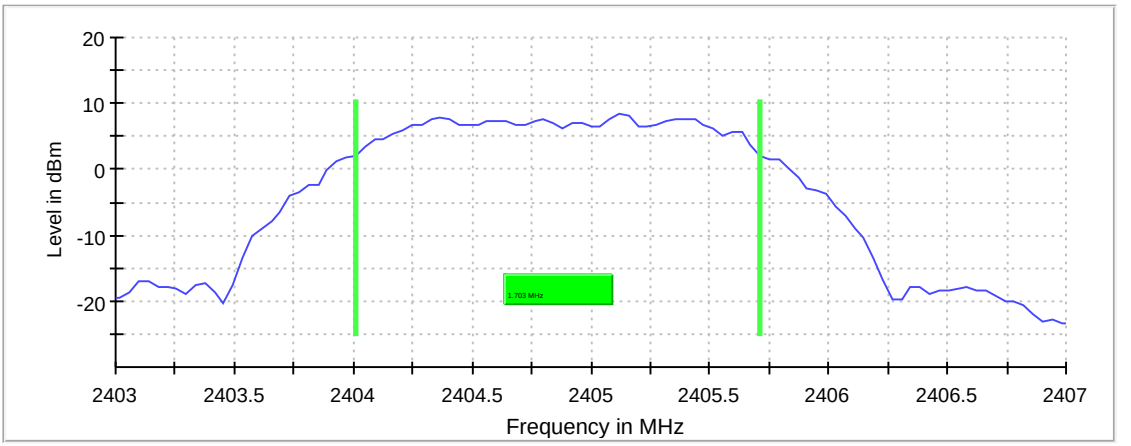
6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2405.000000	1.702970	0.500000	---	2404.009901	2405.712871

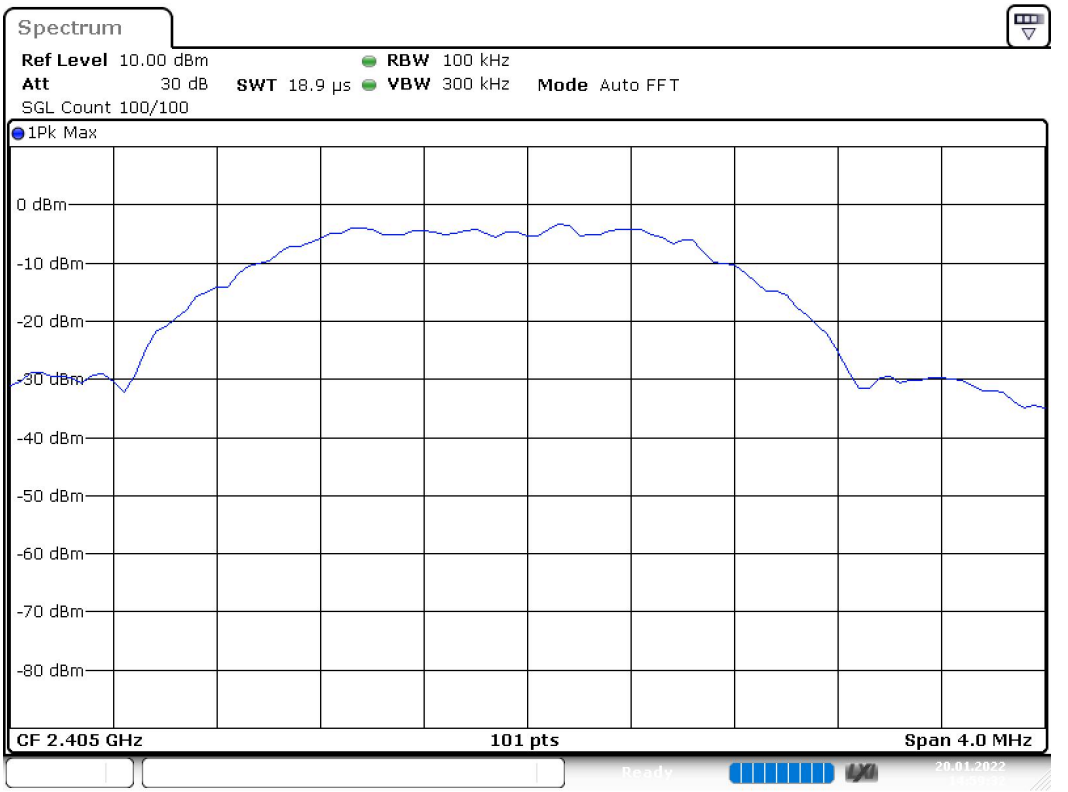
(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2405.000000	8.5	PASS

6 dB Bandwidth



Bandwidth



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Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40300 GHz	2.40300 GHz
Stop Frequency	2.40700 GHz	2.40700 GHz
Span	4.000 MHz	4.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 80
Sweeptime	18.938 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
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	19 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.50 dB

Peak Power Spectral Density (2405 MHz; 20.000 dBm; 2 MHz)

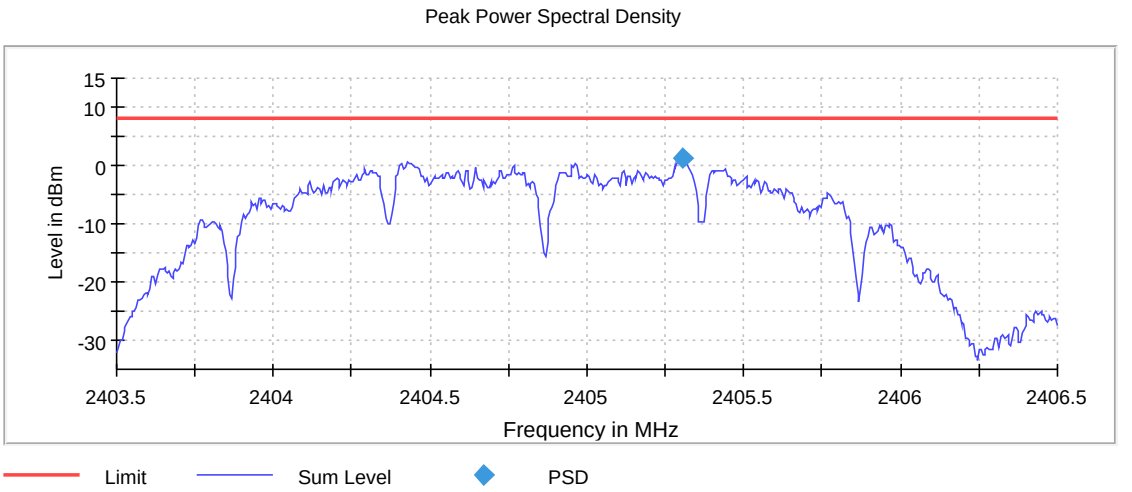
Customized settings.

Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2405.000000	2405.302500	1.147	8.0	PASS

Ports

Port	State
1	used



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40350 GHz	2.40350 GHz
Stop Frequency	2.40650 GHz	2.40650 GHz
Span	3.000 MHz	3.000 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	600	~ 600
Sweeptime	3.000 ms	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	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.44 dB	0.50 dB

Occupied Channel Bandwidth 99% (2405 MHz; 20.000 dBm; 2 MHz)

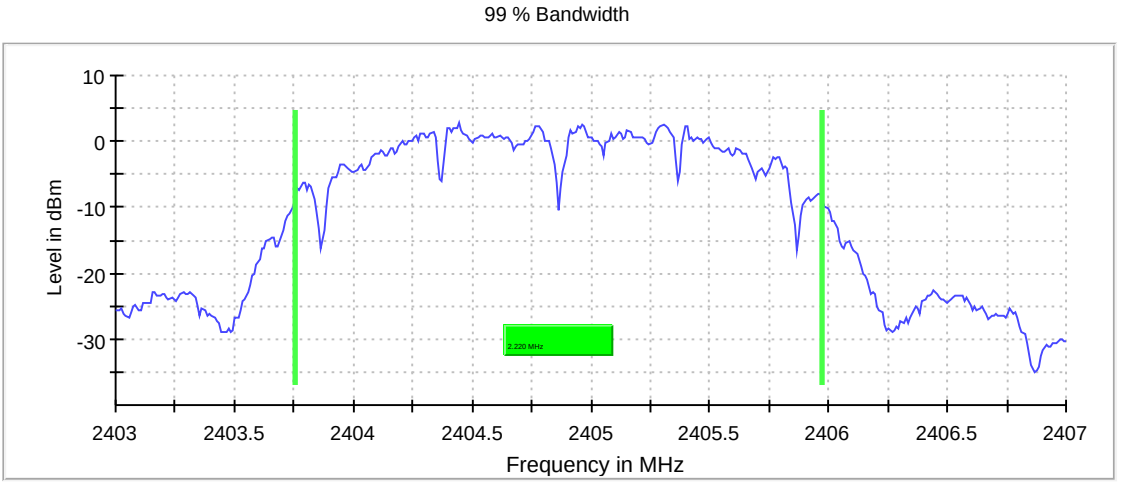
Customized settings.

99 % Bandwidth

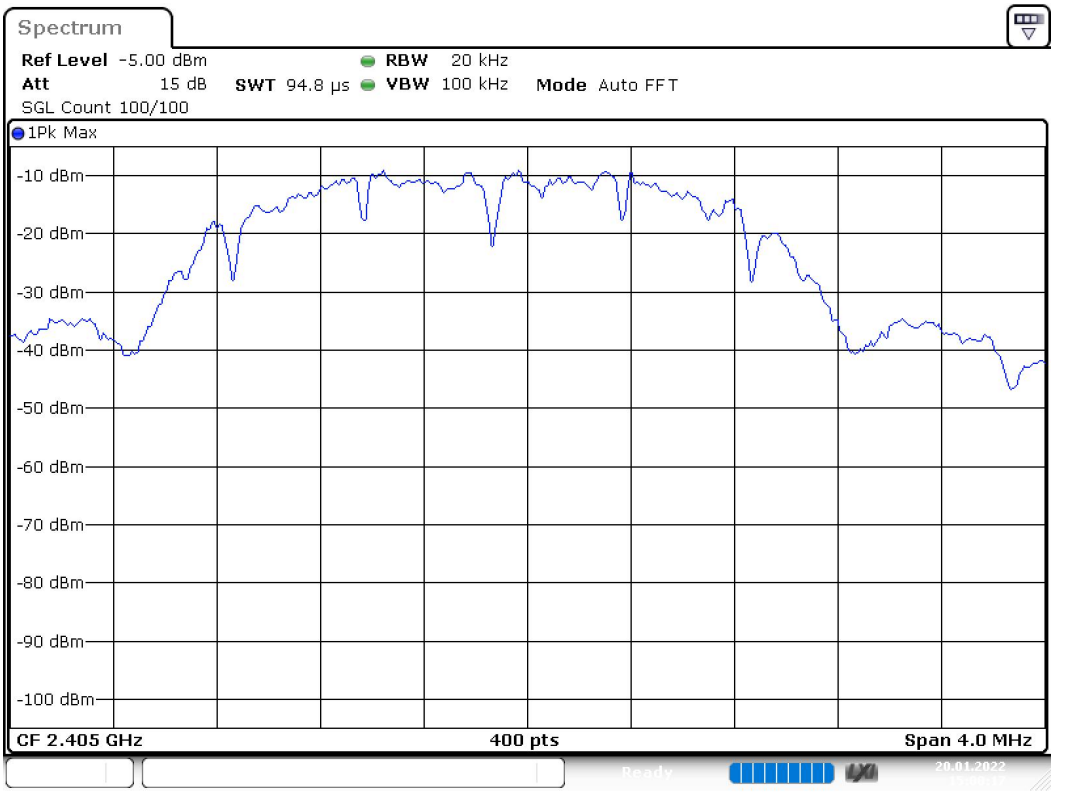
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2405.000000	2.220000	---	---	2403.755000	2405.975000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2405.000000	PASS



Bandwidth



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Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40300 GHz	2.40300 GHz
Stop Frequency	2.40700 GHz	2.40700 GHz
Span	4.000 MHz	4.000 MHz
RBW	20.000 kHz	>= 20.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	400	~ 400
Sweeptime	94.824 µs	AUTO
Reference Level	-5.000 dBm	-5.000 dBm
Attenuation	15.000 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	0.30 dB	0.30 dB
Run	16 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.13 dB	0.30 dB

Band Edge low (2405 MHz; 20.000 dBm; 2 MHz)

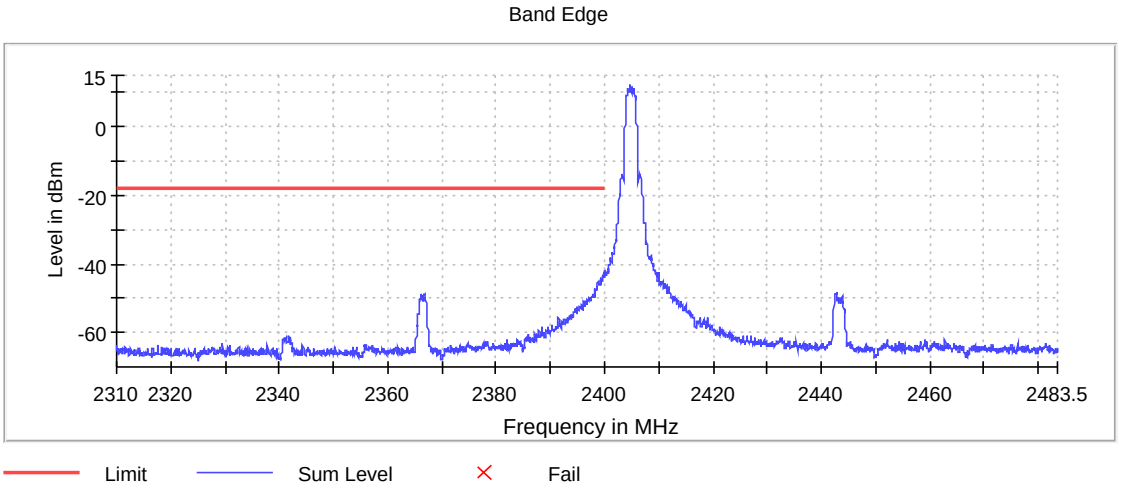
Customized settings.

Result

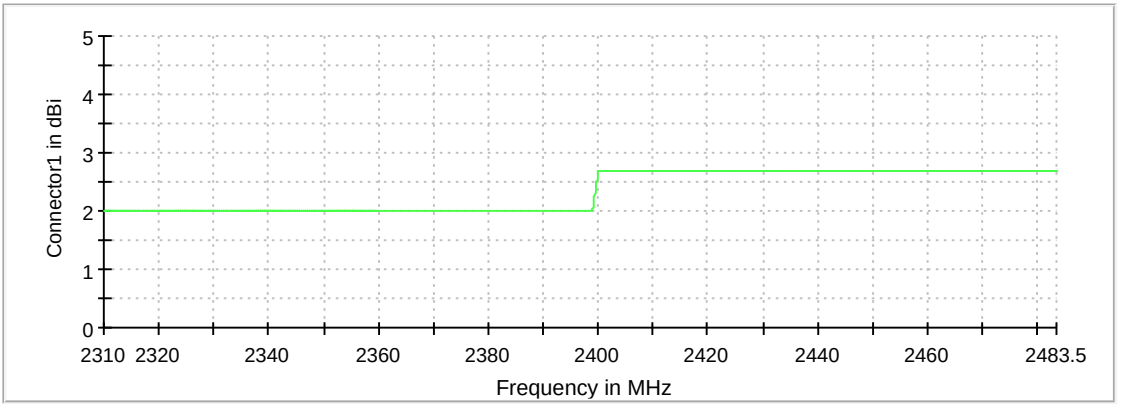
DUT Frequency (MHz)	Result
2405.000000	PASS

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.875000	-42.4	24.5	-17.9	PASS
2399.825000	-42.5	24.7	-17.9	PASS
2399.925000	-43.4	25.6	-17.9	PASS
2399.775000	-43.6	25.7	-17.9	PASS
2399.675000	-43.6	25.7	-17.9	PASS
2399.725000	-43.8	25.9	-17.9	PASS
2399.975000	-44.0	26.1	-17.9	PASS
2399.625000	-44.1	26.2	-17.9	PASS
2399.325000	-44.2	26.3	-17.9	PASS
2399.275000	-44.4	26.6	-17.9	PASS
2399.575000	-44.7	26.8	-17.9	PASS
2399.525000	-44.8	26.9	-17.9	PASS
2399.375000	-44.8	26.9	-17.9	PASS
2399.425000	-45.2	27.3	-17.9	PASS
2399.475000	-45.2	27.4	-17.9	PASS

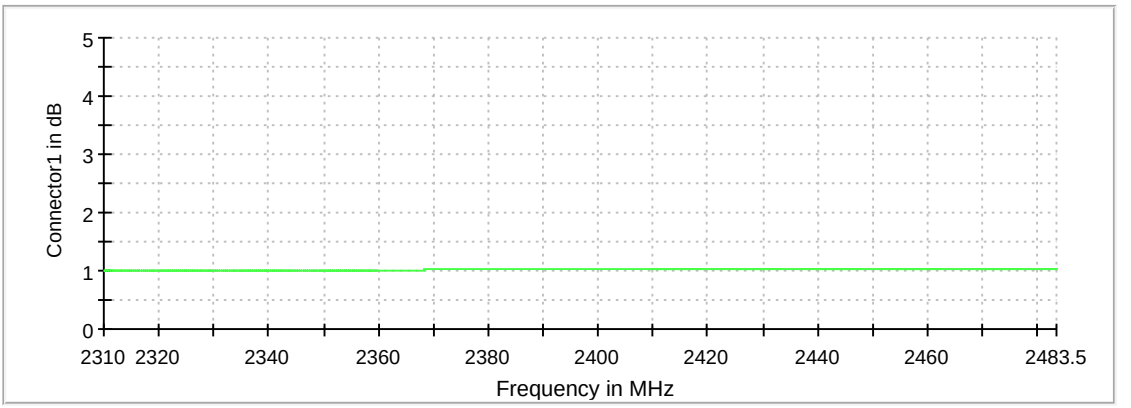


Gain



Connector1

Attenuation



Connector1

Measurement 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	-30.000 dBm
Attenuation	20.000 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	23 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Measurement 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	-30.000 dBm
Attenuation	20.000 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	24 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.07 dB	0.50 dB

Tx Spurious Emission (2405 MHz; 20.000 dBm; 2 MHz)

Customized settings.

Result

DUT Frequency (MHz)	Result
2405.000000	PASS

Final measurements

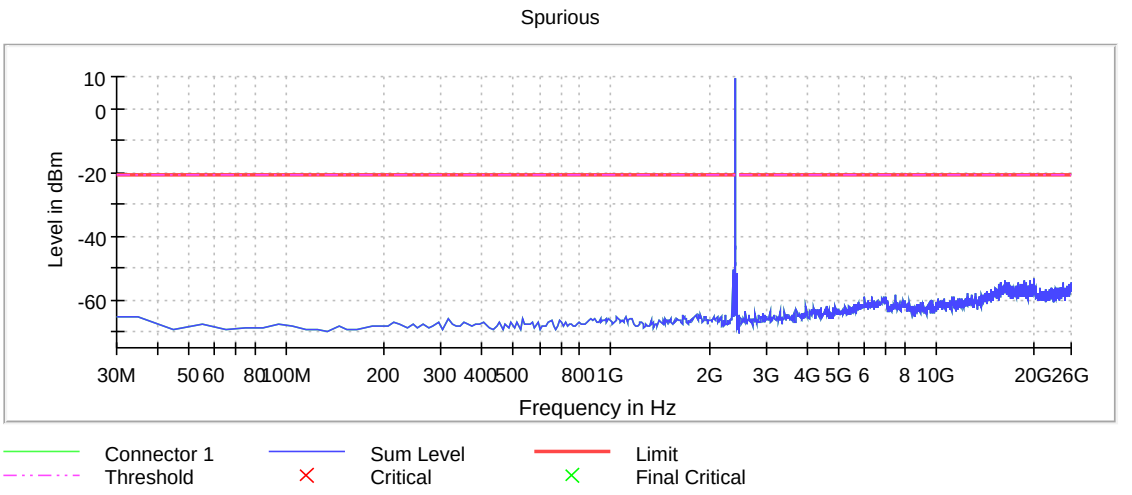
Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
---	---	---	---	---	---

Pre Measurements

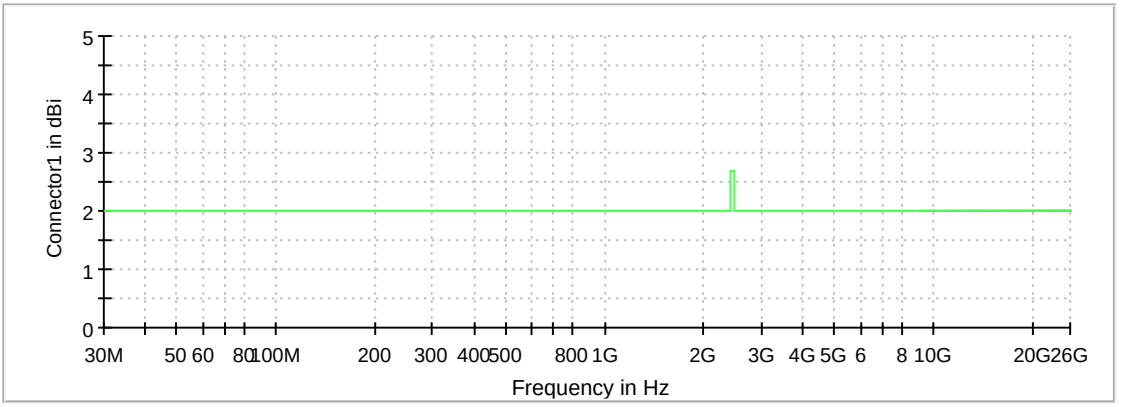
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2395.021008	-48.6	27.8	-20.8
2365.147059	-50.4	29.5	-20.8
19918.491181	-53.2	32.3	-20.8
18539.282937	-53.9	33.1	-20.8
16180.636953	-53.9	33.1	-20.8
19888.508394	-54.0	33.2	-20.8
19538.709201	-54.1	33.3	-20.8
18859.099341	-54.2	33.3	-20.8
15850.826286	-54.4	33.5	-20.8
24645.777412	-54.5	33.6	-20.8
15810.849235	-54.5	33.6	-20.8
16710.332873	-54.5	33.7	-20.8
19968.462495	-54.5	33.7	-20.8
25955.025818	-54.5	33.7	-20.8
19898.502656	-54.6	33.8	-20.8

Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	2400.000000	1	1
2400.000000	2483.500000	1	1
2483.500000	26000.000000	1	1

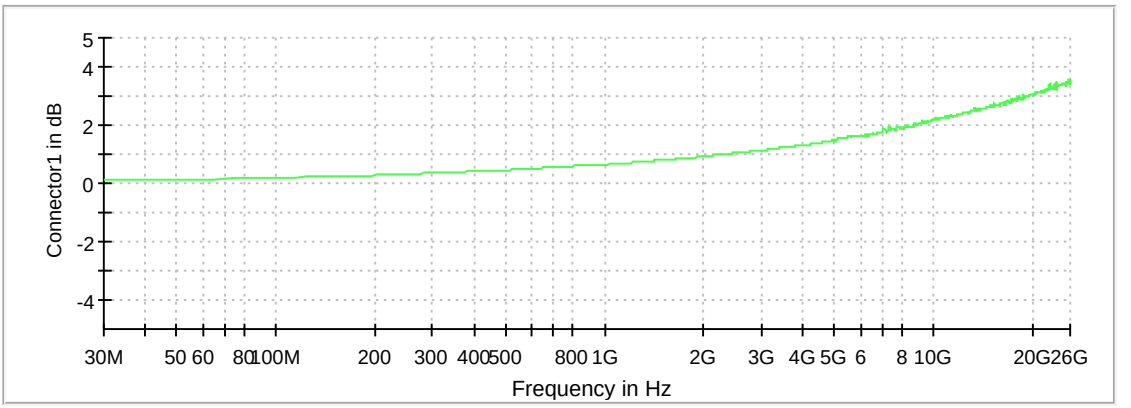


Gain



Connector1

Attenuation



Connector1

Emissions in restricted frequency bands (Average) (2405 MHz; 20.000 dBm; 2 MHz)

Customized settings.

Result

DUT Frequency (MHz)	Result
2405.000000	PASS

Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
---	---	---	---	---	---

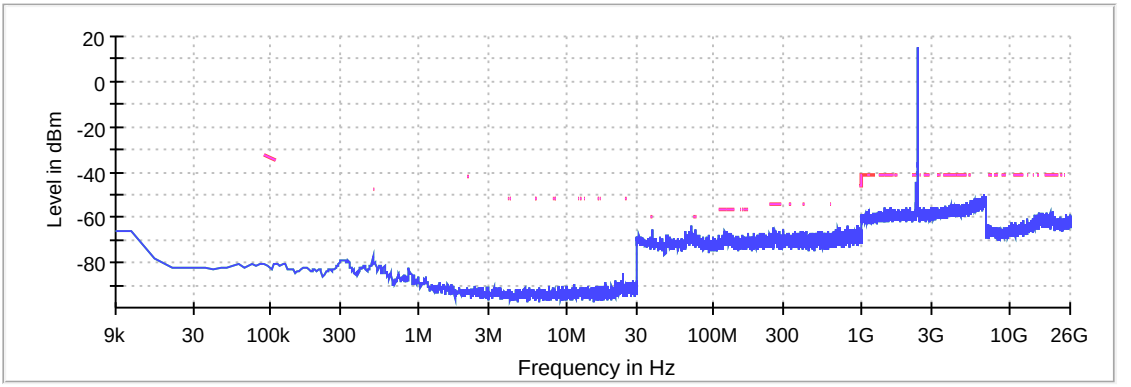
Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2366.250000	-44.7	3.5	-41.2
2366.750000	-45.2	4.0	-41.2
2367.250000	-45.5	4.3	-41.2
2365.750000	-46.7	5.5	-41.2
2367.750000	-48.0	6.8	-41.2
73.075000	-68.7	8.8	-59.9
73.025000	-68.7	8.8	-59.9
73.125000	-68.8	8.9	-59.9
73.775000	-69.0	9.1	-59.9
73.725000	-69.1	9.2	-59.9
73.225000	-69.1	9.2	-59.9
73.175000	-69.1	9.2	-59.9
38.225000	-69.2	9.3	-59.9
75.125000	-69.2	9.3	-59.9
73.475000	-69.3	9.4	-59.9

Measurement Settings

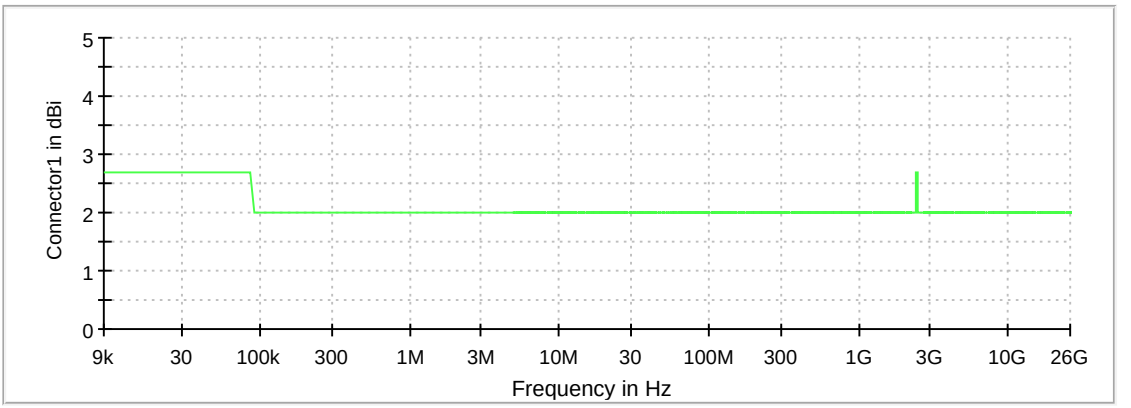
Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
0.009000	30.000000	2	2
30.000000	1000.000000	2	2
1000.000000	7000.000000	1	1
7000.000000	26000.000000	1	1

Restricted Band



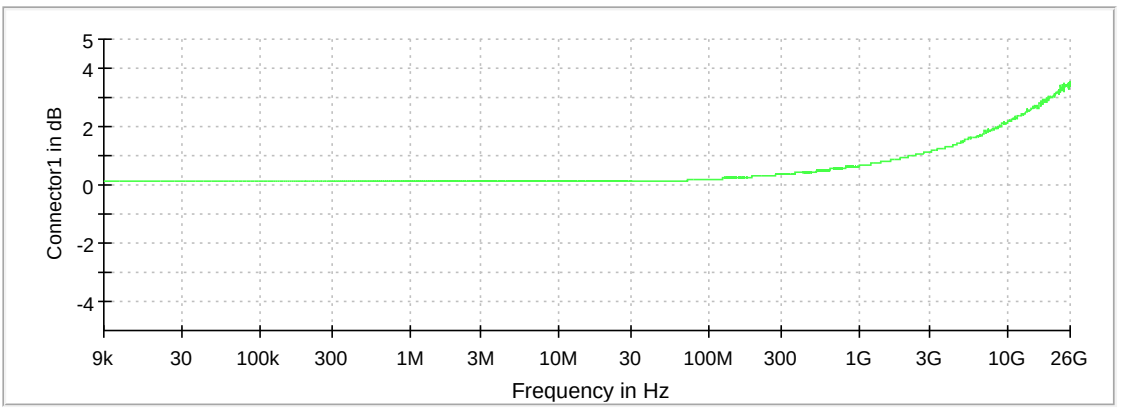
Limit
Sum Level
Threshold
Critical
Connector 1
Final Critical

Gain



Connector1

Attenuation



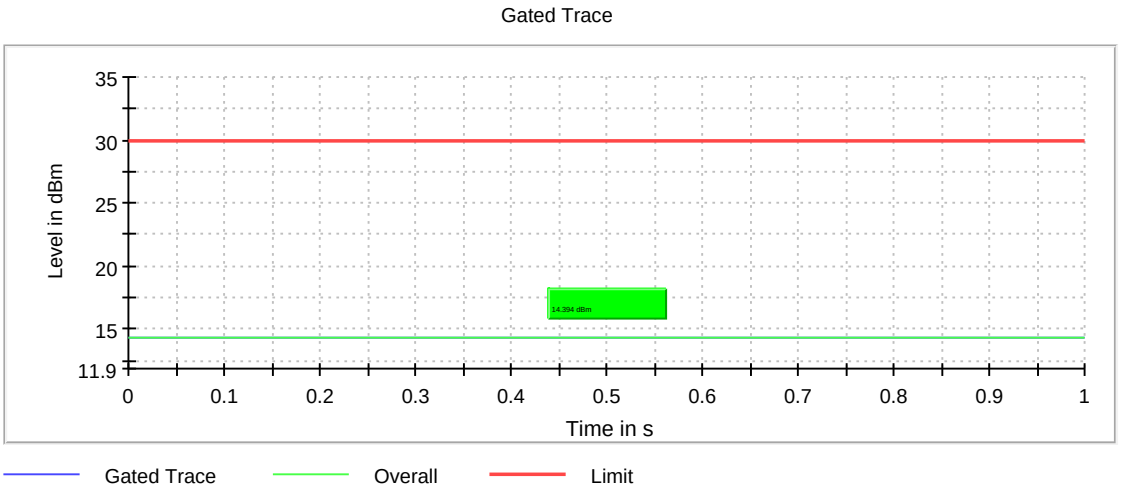
Connector1

RF output power (2440 MHz; 20.000 dBm; 2 MHz)

Customized settings.

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2440.000000	14.4	30.0	17.1	100.000	PASS



Minimum Emission Bandwidth 6 dB (2440 MHz; 20.000 dBm; 2 MHz)

Customized settings.

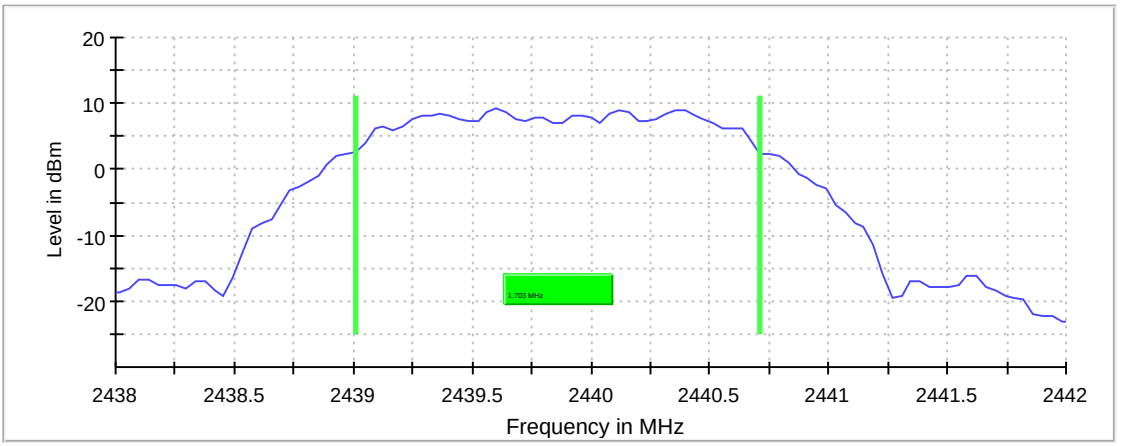
6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2440.000000	1.702970	0.500000	---	2439.009901	2440.712871

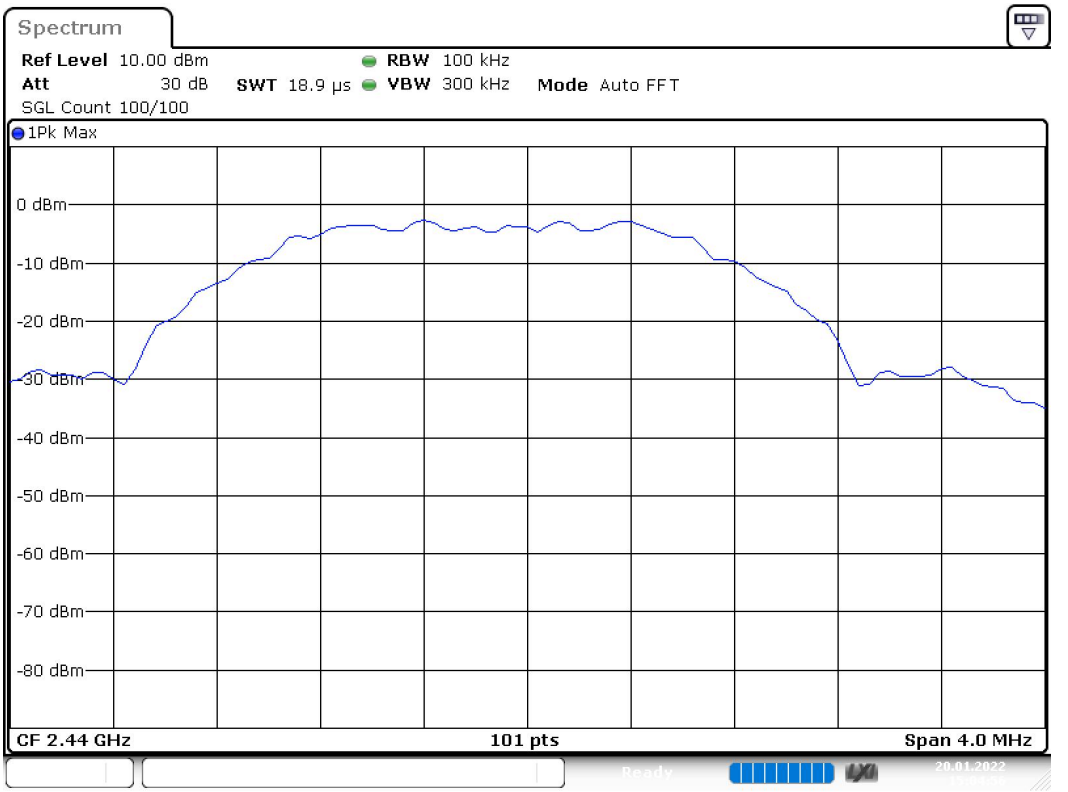
(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2440.000000	9.1	PASS

6 dB Bandwidth



Bandwidth



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Peak Power Spectral Density (2440 MHz; 20.000 dBm; 2 MHz)

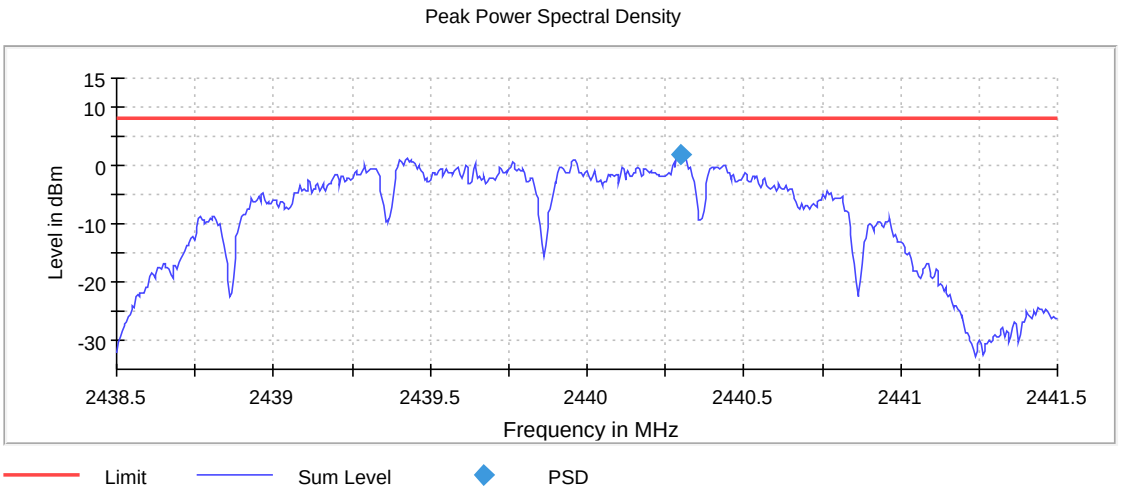
Customized settings.

Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2440.000000	2440.297500	1.791	8.0	PASS

Ports

Port	State
1	used



Occupied Channel Bandwidth 99% (2440 MHz; 20.000 dBm; 2 MHz)

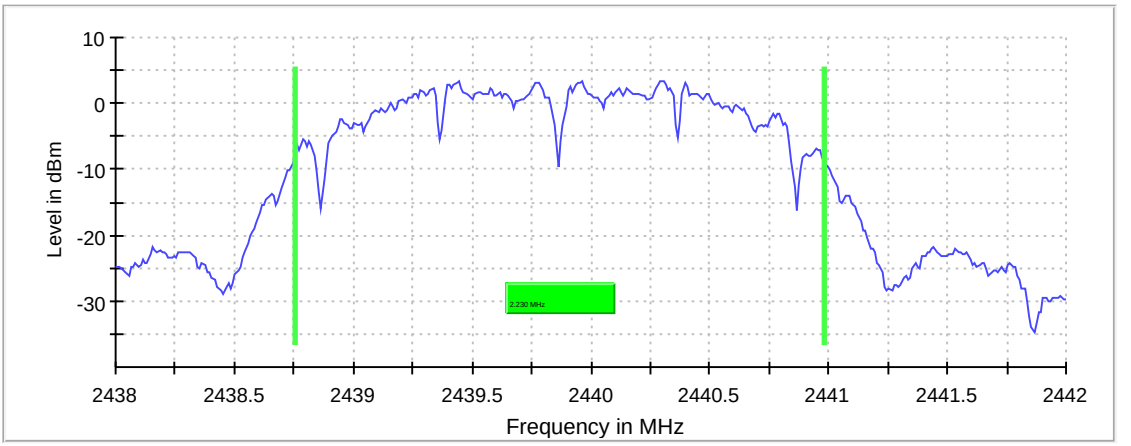
Customized settings.

99 % Bandwidth

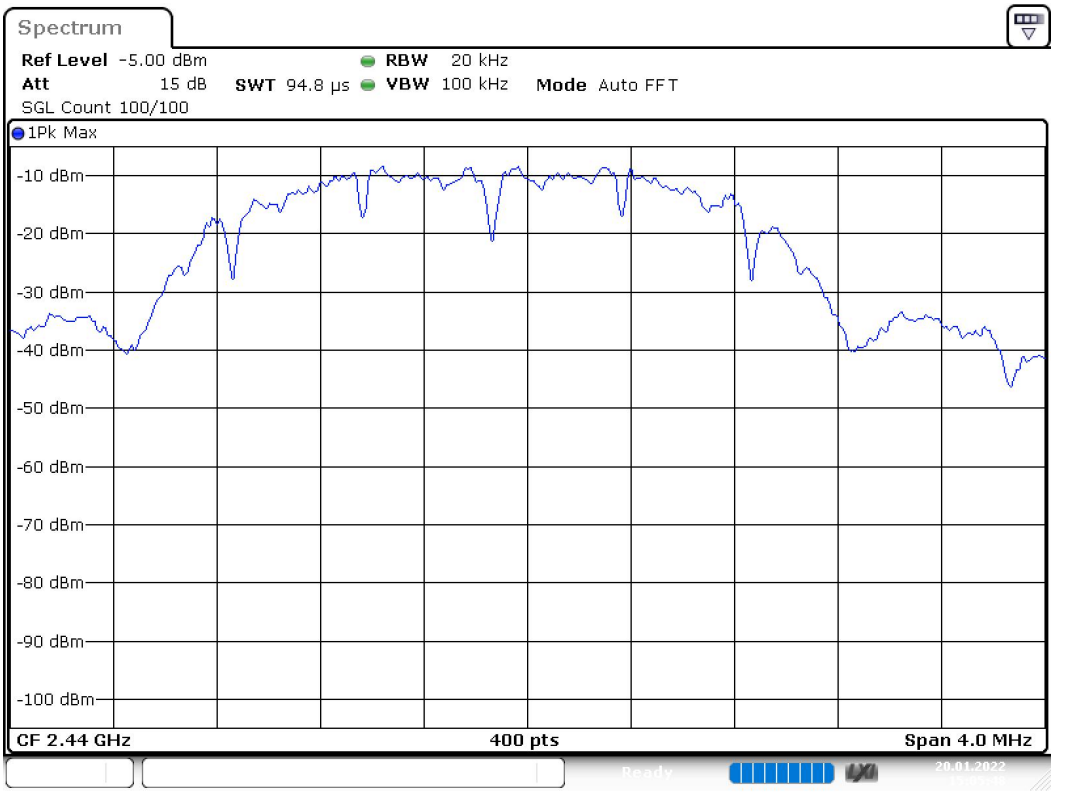
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2440.000000	2.230000	---	---	2438.755000	2440.985000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2440.000000	PASS



Bandwidth



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Band Edge low (2440 MHz; 20.000 dBm; 2 MHz)

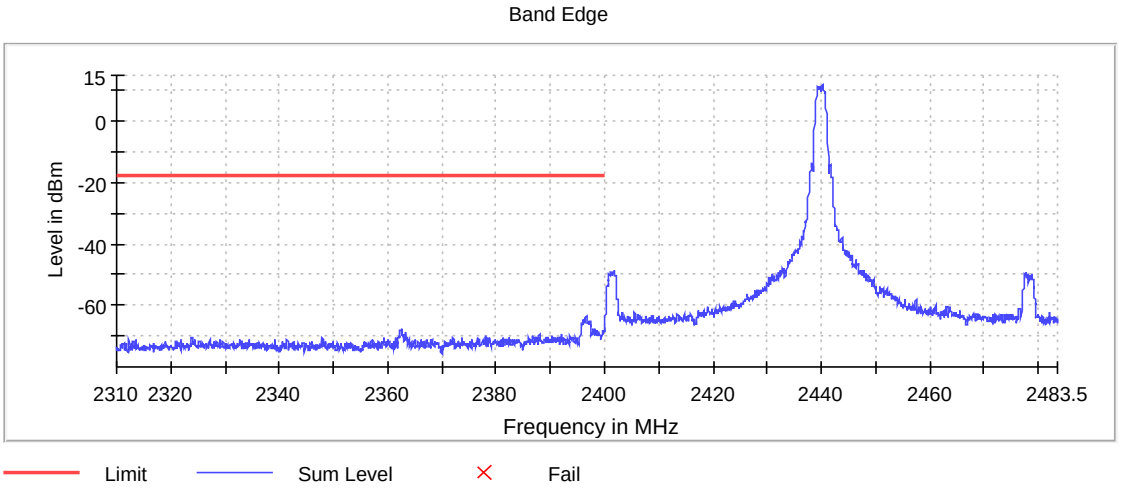
Customized settings.

Result

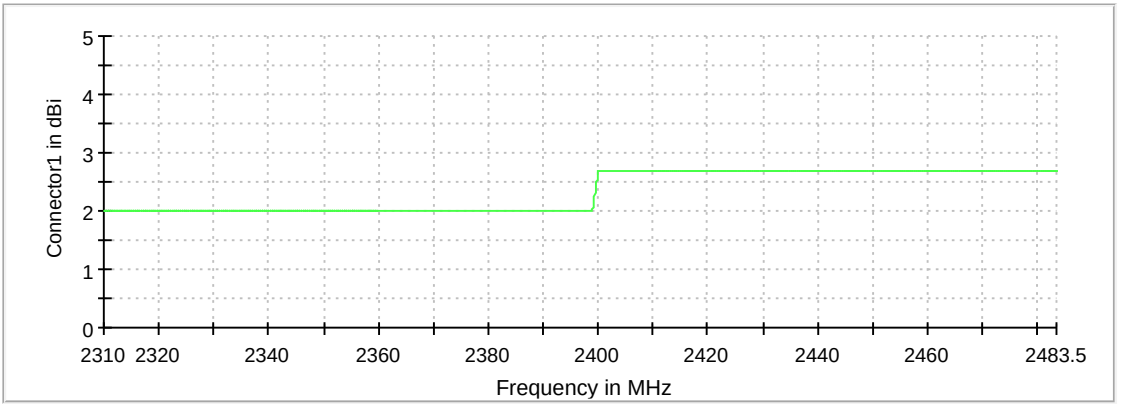
DUT Frequency (MHz)	Result
2440.000000	PASS

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2396.575000	-63.6	45.8	-17.8	PASS
2396.525000	-63.7	45.9	-17.8	PASS
2396.275000	-64.3	46.5	-17.8	PASS
2396.625000	-64.4	46.6	-17.8	PASS
2396.225000	-64.6	46.8	-17.8	PASS
2396.125000	-64.6	46.8	-17.8	PASS
2396.425000	-64.8	47.0	-17.8	PASS
2396.075000	-64.8	47.0	-17.8	PASS
2397.125000	-65.0	47.2	-17.8	PASS
2397.175000	-65.2	47.4	-17.8	PASS
2397.275000	-65.3	47.5	-17.8	PASS
2396.375000	-65.3	47.5	-17.8	PASS
2397.325000	-65.3	47.5	-17.8	PASS
2396.775000	-65.3	47.5	-17.8	PASS
2396.325000	-65.3	47.5	-17.8	PASS

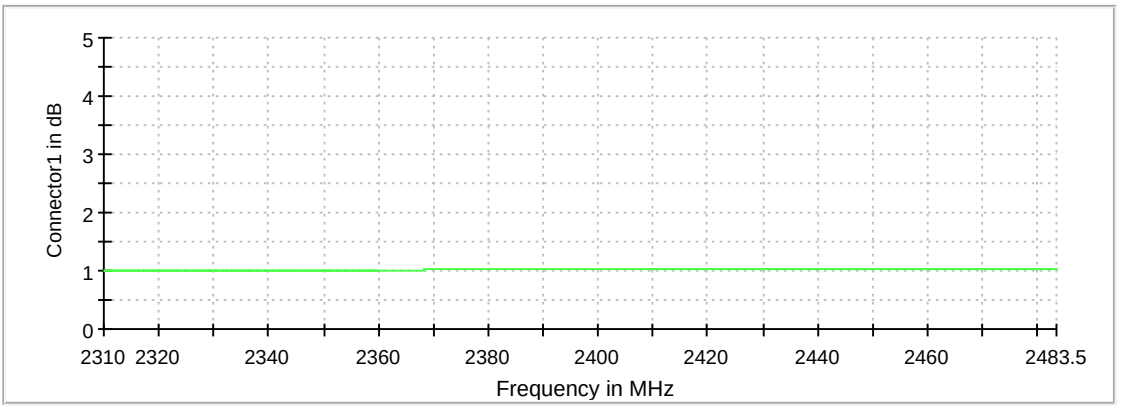


Gain



Connector1

Attenuation



Connector1

Tx Spurious Emission (2440 MHz; 20.000 dBm; 2 MHz)

Customized settings.

Result

DUT Frequency (MHz)	Result
2440.000000	PASS

Final measurements

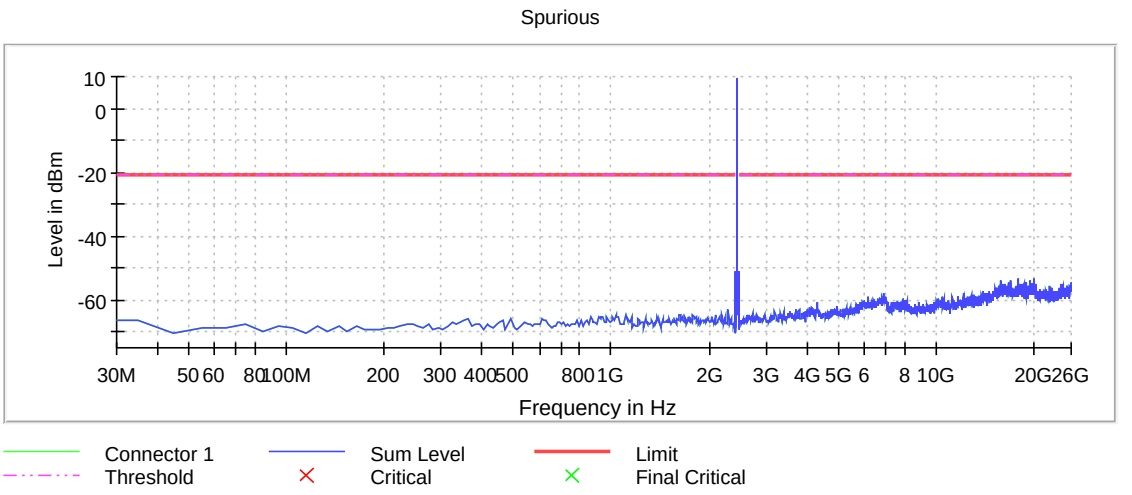
Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
---	---	---	---	---	---

Pre Measurements

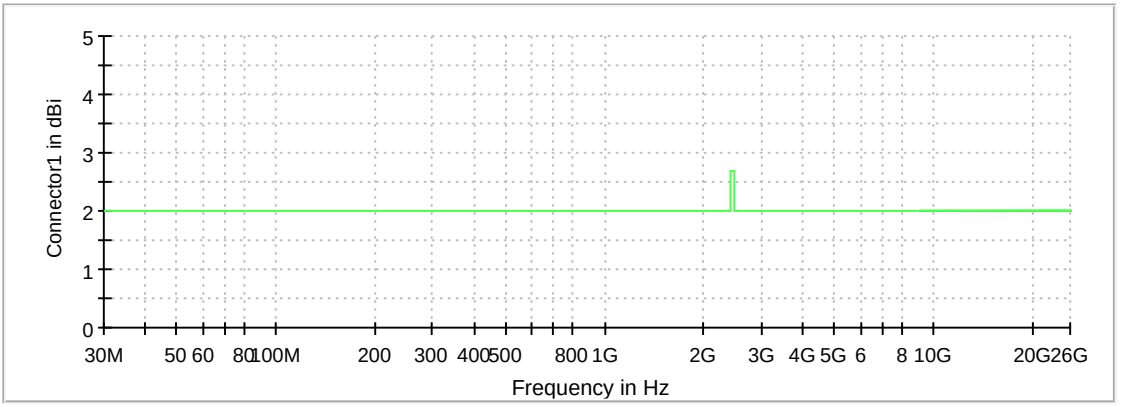
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
19868.519868	-53.3	32.5	-20.8
17909.644390	-53.4	32.5	-20.8
19548.703464	-53.7	32.8	-20.8
15840.832023	-53.9	33.1	-20.8
19898.502656	-54.1	33.3	-20.8
16830.264025	-54.2	33.3	-20.8
18899.076392	-54.2	33.4	-20.8
25875.071717	-54.4	33.6	-20.8
18919.064917	-54.7	33.8	-20.8
16760.304186	-54.7	33.9	-20.8
25975.014343	-54.8	33.9	-20.8
17899.650127	-54.8	33.9	-20.8
24695.748725	-54.8	33.9	-20.8
25925.043030	-54.8	34.0	-20.8
16790.286974	-54.8	34.0	-20.8

Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	2400.000000	1	1
2400.000000	2483.500000	1	1
2483.500000	26000.000000	1	1

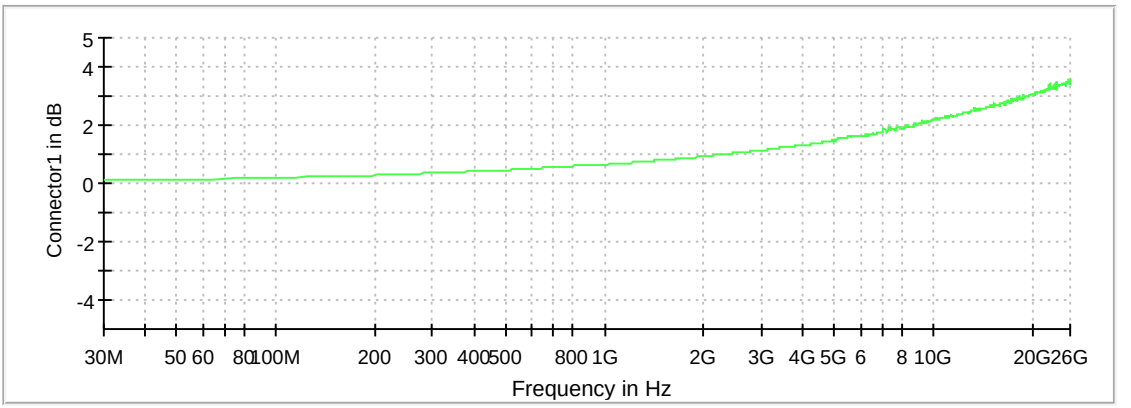


Gain



Connector1

Attenuation



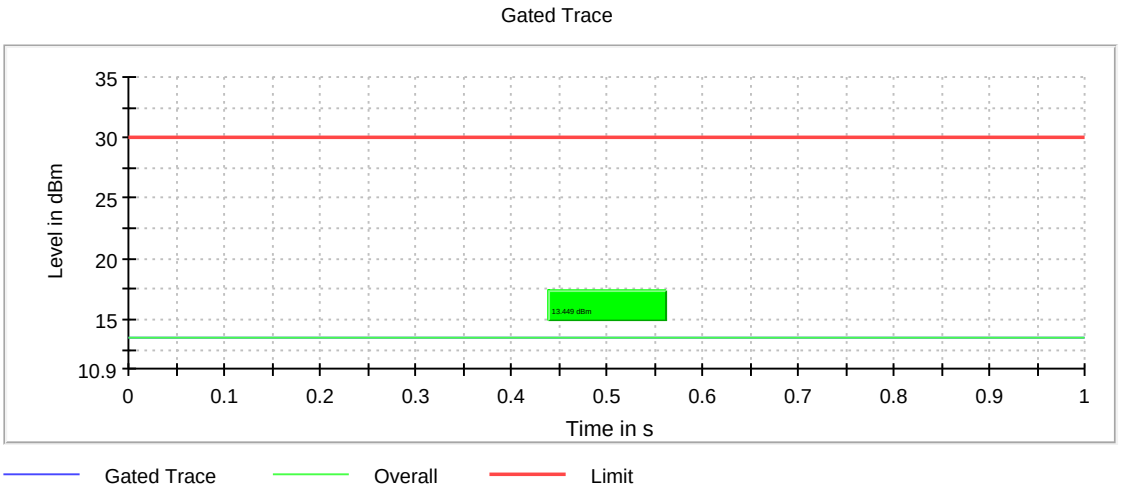
Connector1

RF output power (2470 MHz; 20.000 dBm; 2 MHz)

Customized settings.

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2470.000000	13.4	30.0	16.1	100.000	PASS



Peak Power Spectral Density (2470 MHz; 20.000 dBm; 2 MHz)

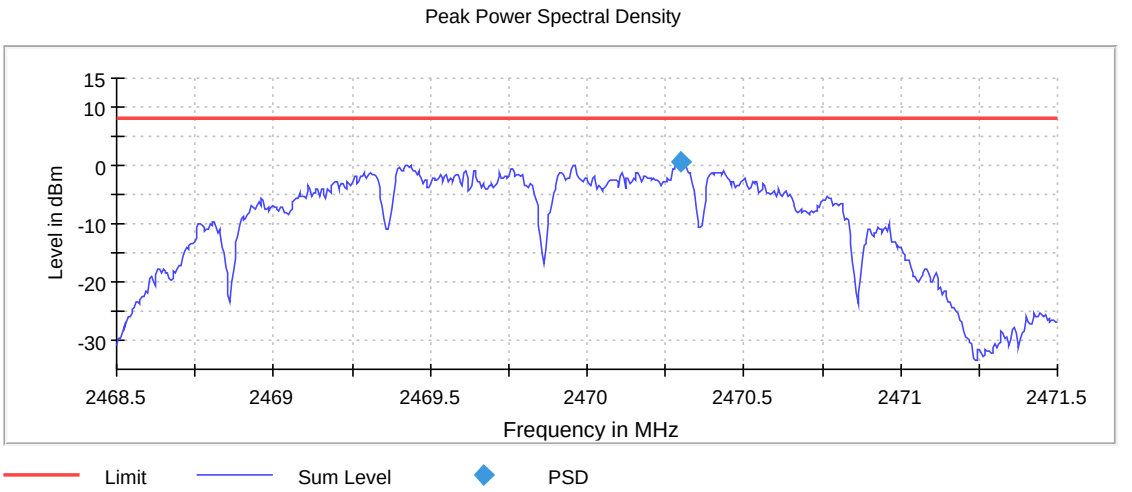
Customized settings.

Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2470.000000	2470.297500	0.739	8.0	PASS

Ports

Port	State
1	used

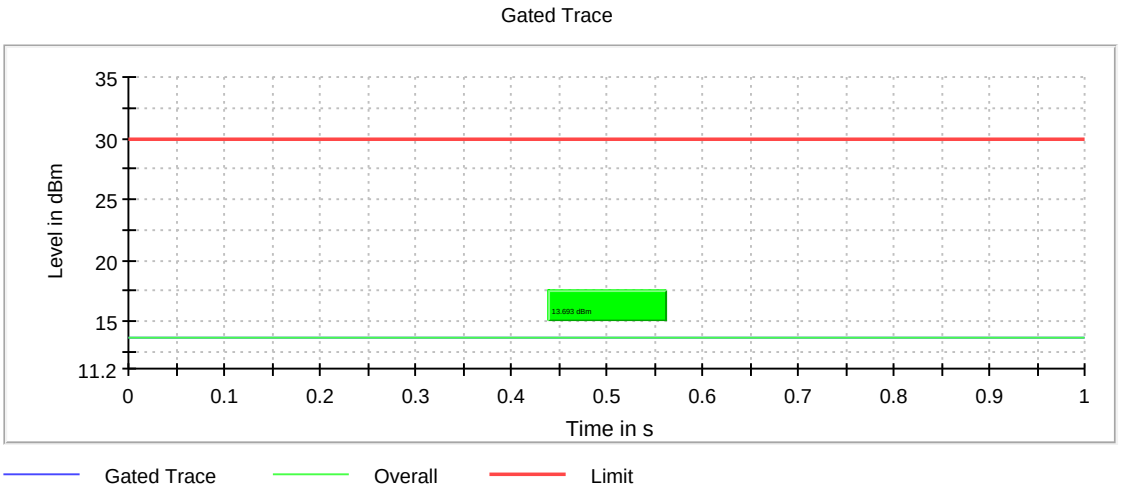


RF output power (2475 MHz; 20.000 dBm; 2 MHz)

Customized settings.

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2475.000000	13.7	30.0	16.4	100.000	PASS



Minimum Emission Bandwidth 6 dB (2475 MHz; 20.000 dBm; 2 MHz)

Customized settings.

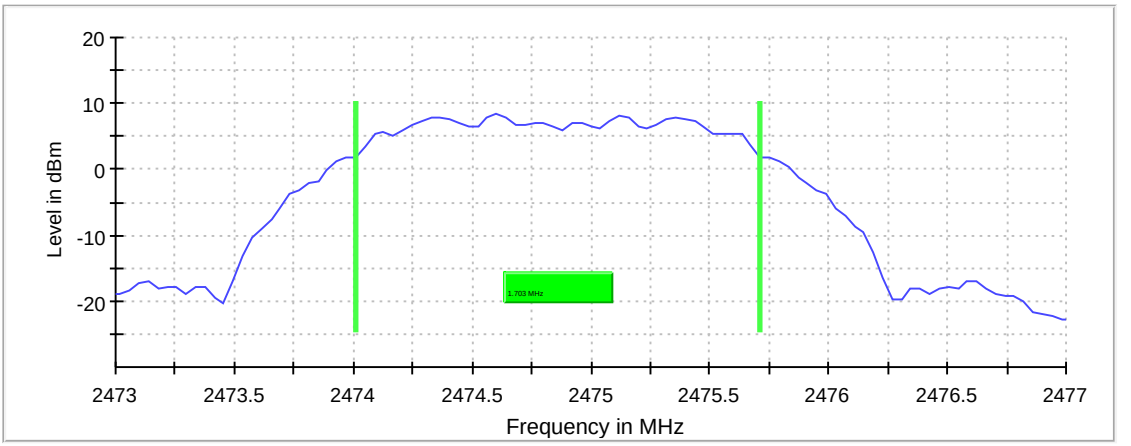
6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2475.000000	1.702970	0.500000	---	2474.009901	2475.712871

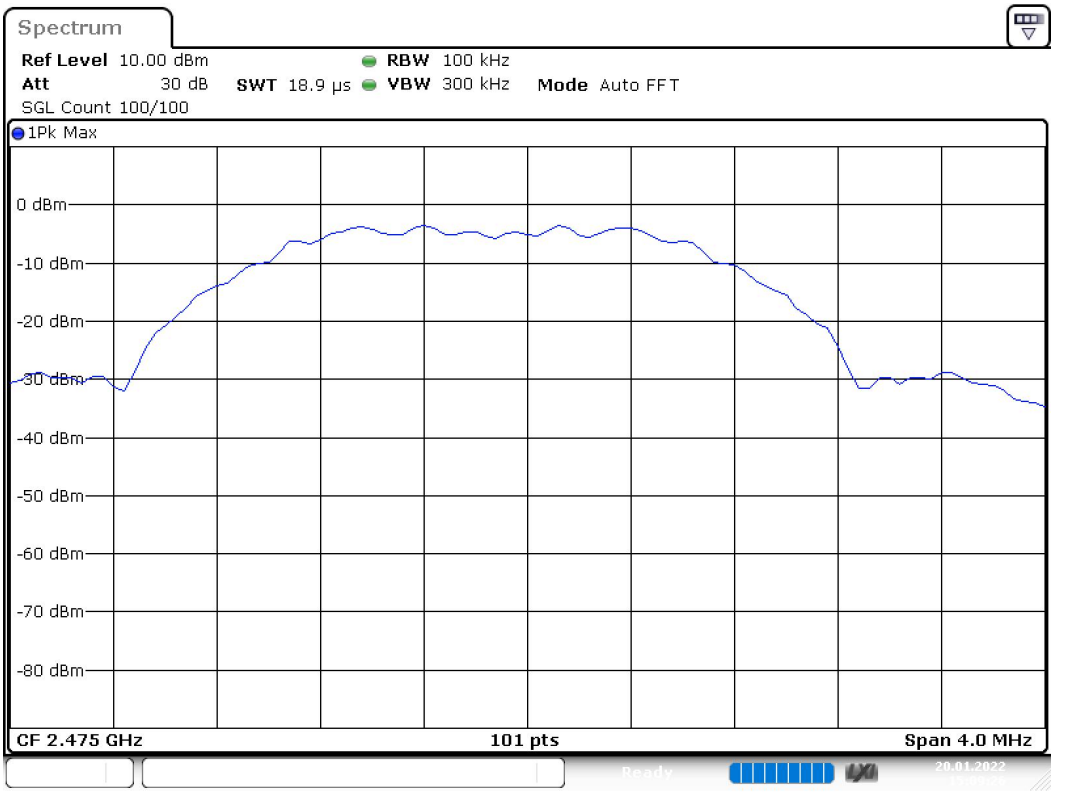
(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2475.000000	8.3	PASS

6 dB Bandwidth



Bandwidth



Date: 20.JAN.2022 15:09:27

Peak Power Spectral Density (2475 MHz; 20.000 dBm; 2 MHz)

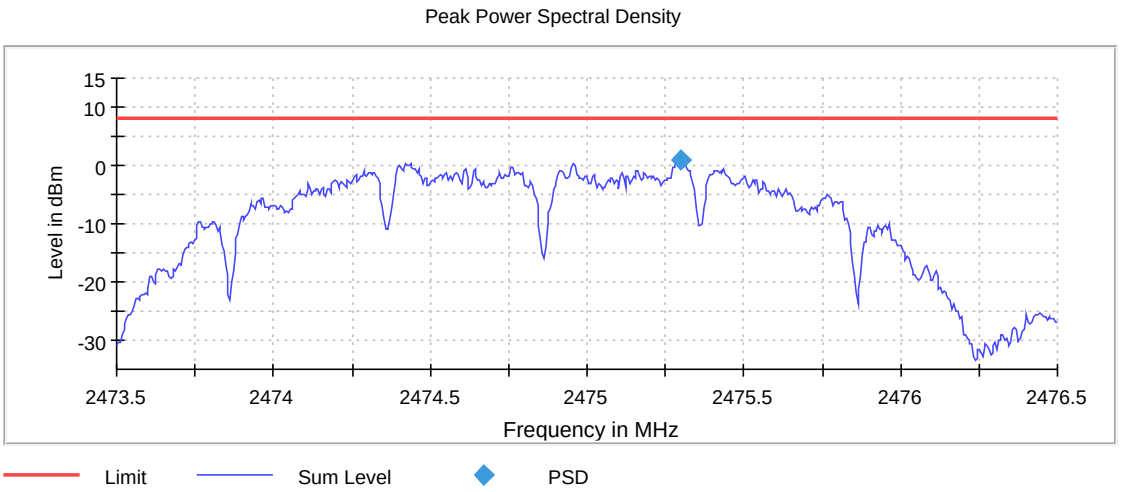
Customized settings.

Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2475.000000	2475.297500	0.953	8.0	PASS

Ports

Port	State
1	used



Occupied Channel Bandwidth 99% (2475 MHz; 20.000 dBm; 2 MHz)

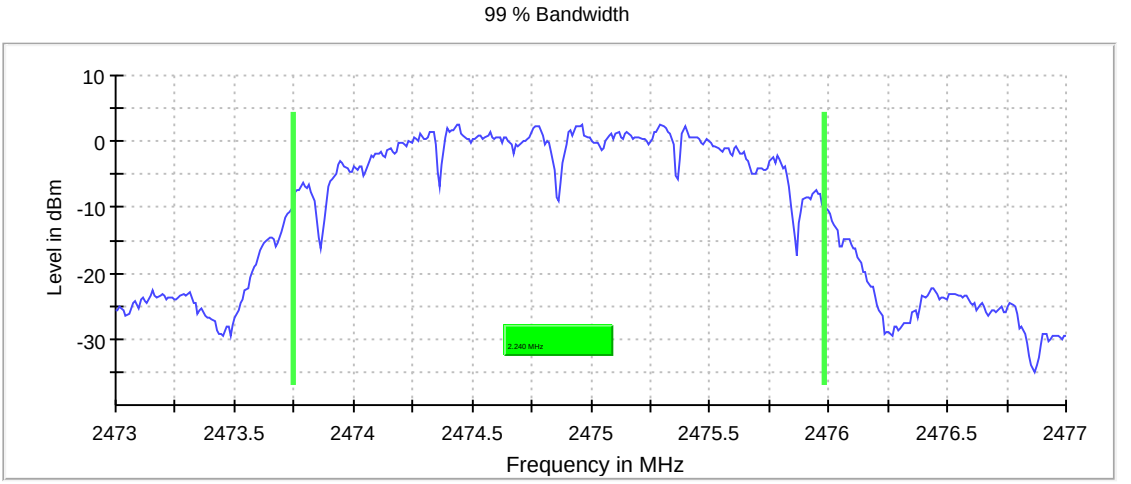
Customized settings.

99 % Bandwidth

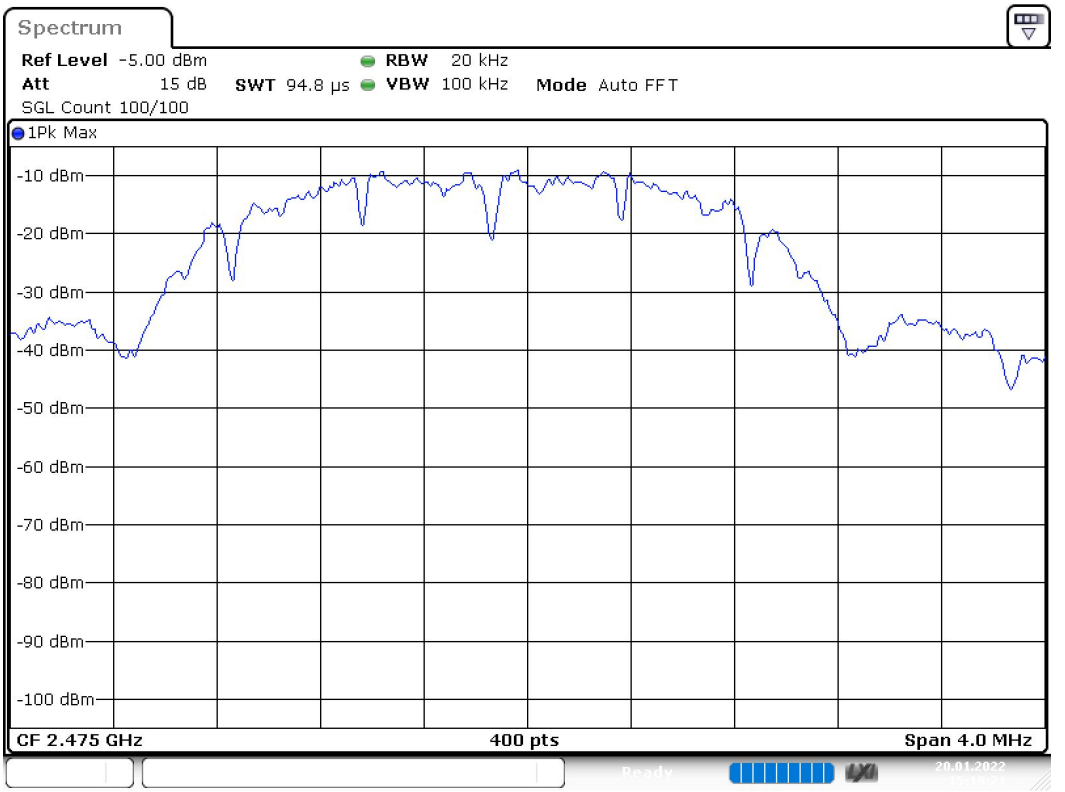
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2475.000000	2.240000	---	---	2473.745000	2475.985000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2475.000000	PASS



Bandwidth



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Band Edge high (2475 MHz; 20.000 dBm; 2 MHz)

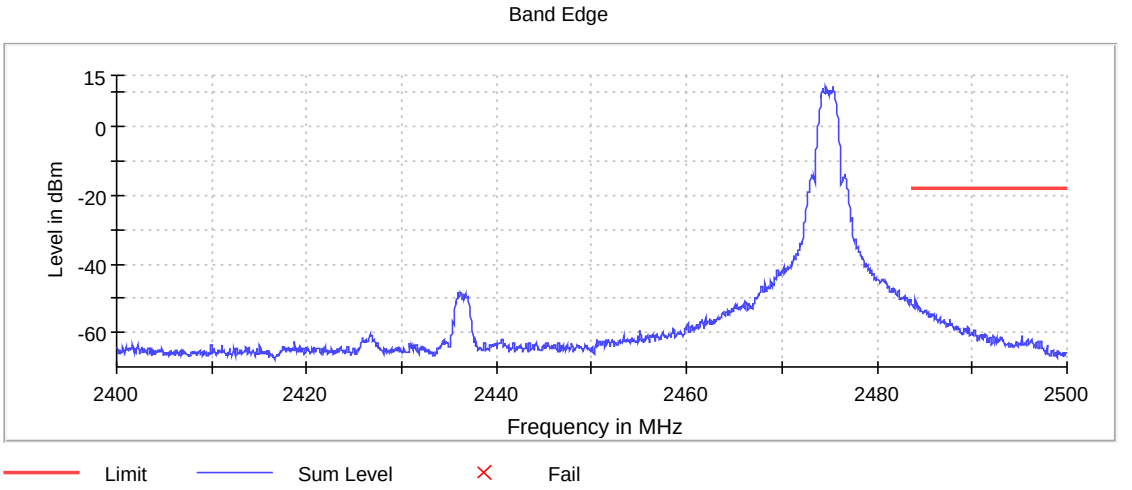
Customized settings.

Result

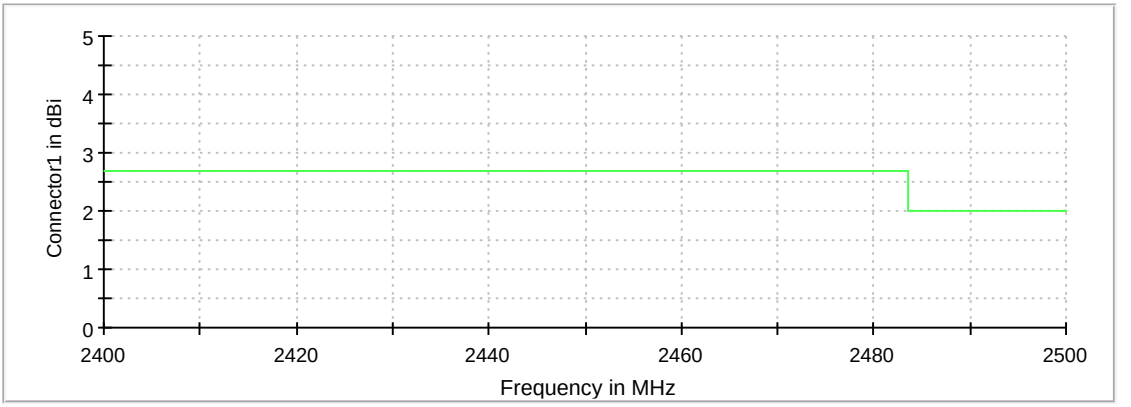
DUT Frequency (MHz)	Result
2475.000000	PASS

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.025000	-50.3	32.2	-18.1	PASS
2484.075000	-50.4	32.3	-18.1	PASS
2483.975000	-51.2	33.1	-18.1	PASS
2483.525000	-51.2	33.1	-18.1	PASS
2484.175000	-51.5	33.4	-18.1	PASS
2484.225000	-51.5	33.4	-18.1	PASS
2484.275000	-51.6	33.4	-18.1	PASS
2483.575000	-52.0	33.9	-18.1	PASS
2483.725000	-52.1	34.0	-18.1	PASS
2483.675000	-52.1	34.0	-18.1	PASS
2483.625000	-52.2	34.0	-18.1	PASS
2484.475000	-52.4	34.3	-18.1	PASS
2484.125000	-52.4	34.3	-18.1	PASS
2483.875000	-52.5	34.4	-18.1	PASS
2484.425000	-52.5	34.4	-18.1	PASS

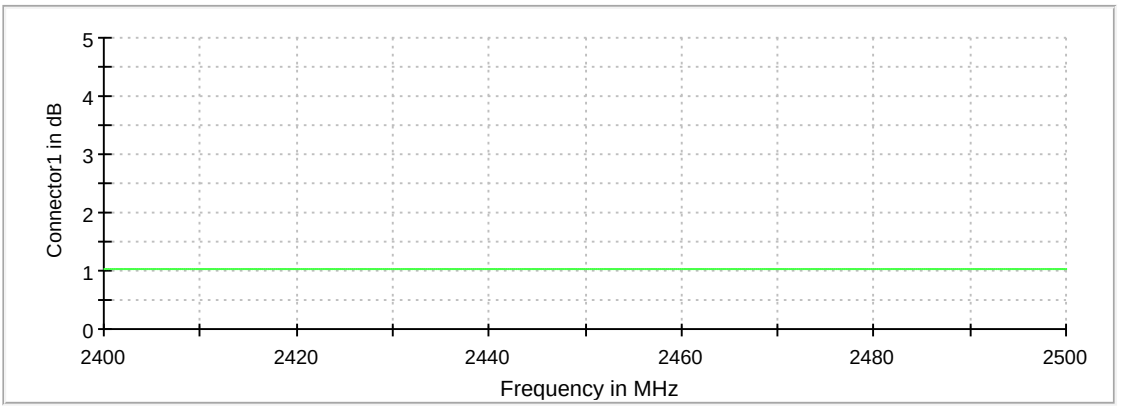


Gain



Connector1

Attenuation



Connector1

Tx Spurious Emission (2475 MHz; 20.000 dBm; 2 MHz)

Customized settings.

Result

DUT Frequency (MHz)	Result
2475.000000	PASS

Final measurements

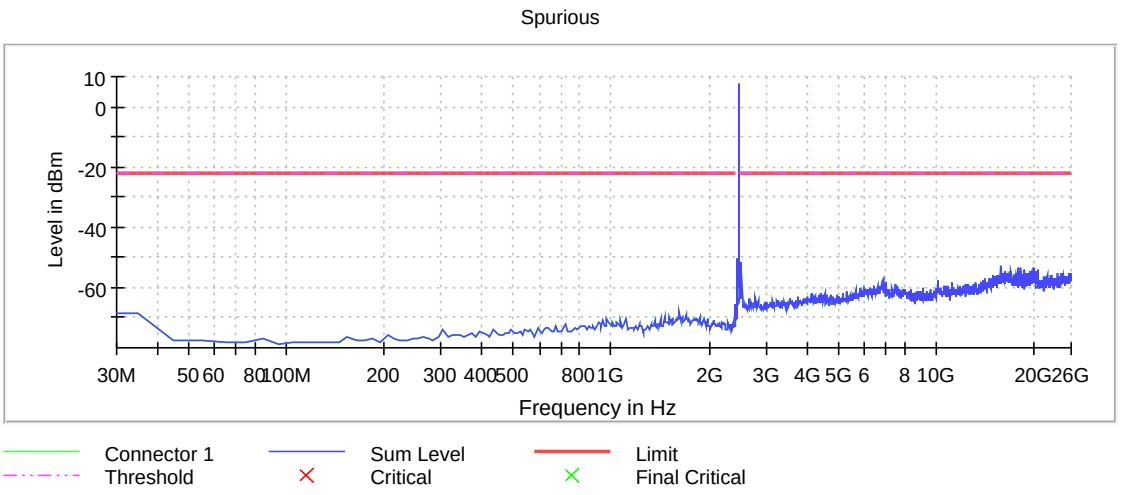
Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
---	---	---	---	---	---

Pre Measurements

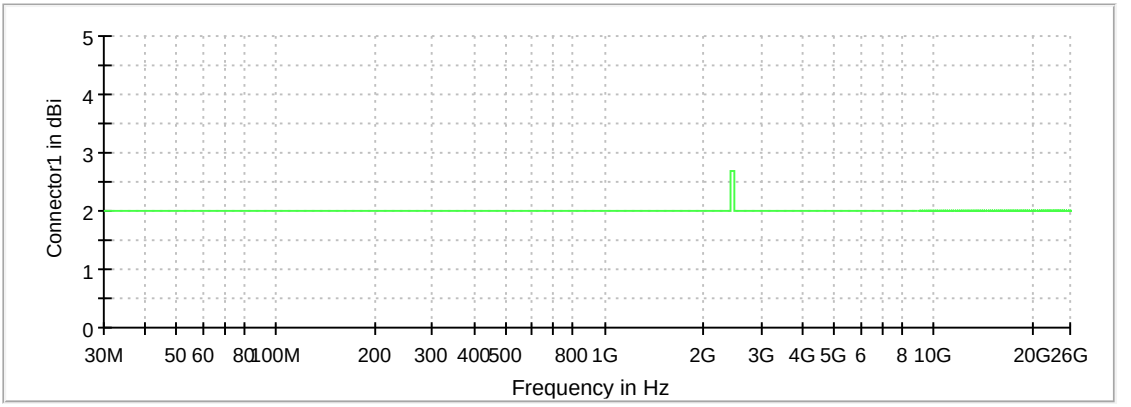
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2508.485657	-51.9	29.5	-22.3
15800.854972	-53.1	30.8	-22.3
19928.485444	-53.2	30.9	-22.3
18189.483744	-53.3	31.0	-22.3
17879.661602	-53.5	31.2	-22.3
18579.259987	-54.2	31.9	-22.3
20648.072354	-54.3	32.0	-22.3
2518.479919	-54.4	32.1	-22.3
18229.460795	-54.5	32.2	-22.3
19898.502656	-54.5	32.2	-22.3
19878.514131	-54.5	32.2	-22.3
17909.644390	-54.5	32.2	-22.3
19518.720676	-54.5	32.2	-22.3
15870.814811	-54.5	32.2	-22.3
16190.631215	-54.5	32.2	-22.3

Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	2400.000000	1	1
2400.000000	2483.500000	1	1
2483.500000	26000.000000	1	1

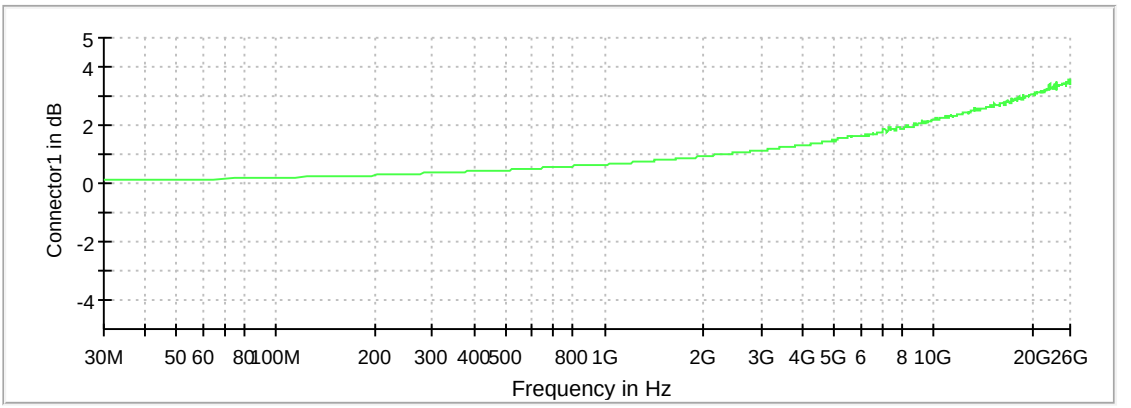


Gain



Connector1

Attenuation



Connector1