Client: Epitel Inc | Date: 9 Oct 2022 | DNB Job: 16032

EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: General limit of 15.209 | Tech: CL Payne

Low Channel: 2402 | Result: Pass

RADIATED SPURIOUS										
Freq (MHz)	Meter (dBuV/m)	Pre-Amp (dB)	Cable (dB)	Antenna (dB)	Corrected (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Polarity	Type	Axis
4804.000	36.1	25.7	5.9	33.1	49.43	74.0	-24.57	H	Peak	X axis
4804.000	27.0	25.7	5.9	33.1	40.33	54.0	-13.67	H	Ave	X axis
4804.000	35.0	25.7	5.9	33.1	48.31	74.0	-25.69	V	Peak	X axis
4804.000	25.0	25.7	5.9	33.1	38.35	54.0	-15.65	V	Ave	X axis
4804.000	34.6	25.7	5.9	33.1	47.97	74.0	-26.03	H	Peak	Y axis
4804.000	23.6	25.7	5.9	33.1	36.92	54.0	-17.08	H	Ave	Y axis
4804.000	34.2	25.7	5.9	33.1	47.56	74.0	-26.44	V	Peak	Y axis
4804.000	23.6	25.7	5.9	33.1	36.97	54.0	-17.03	V	Ave	Y axis
4804.000	35.0	25.7	5.9	33.1	48.35	74.0	-25.65	H	Peak	Z axis
4804.000	24.5	25.7	5.9	33.1	37.84	54.0	-16.16	H	Ave	Z axis
4804.000	36.4	25.7	5.9	33.1	49.72	74.0	-24.28	V	Peak	Z axis
4804.000	24.1	25.7	5.9	33.1	37.42	54.0	-16.58	V	Ave	Z axis

Client: Epitel Inc | Date: 9 Oct 2022 | DNB Job: 16032

EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: General limit of 15.209 | Tech: CL Payne

Mid Channel: 2440 | Result: Pass

RADIATED SPURIOUS										
Freq (MHz)	Meter (dBuV/m)	Pre-Amp (dB)	Cable (dB)	Antenna (dB)	Corrected (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Polarity	Type	Axis
4880.000	35.5	25.6	6.0	33.4	49.20	74.0	-24.80	H	Peak	X axis
4880.000	24.8	25.6	6.0	33.4	38.42	54.0	-15.58	H	Ave	X axis
4880.000	35.0	25.6	6.0	33.4	48.67	74.0	-25.33	V	Peak	X axis
4880.000	25.1	25.6	6.0	33.4	38.74	54.0	-15.26	V	Ave	X axis
4880.000	36.2	25.6	6.0	33.4	49.83	74.0	-24.17	H	Peak	Y axis
4880.000	27.3	25.6	6.0	33.4	40.98	54.0	-13.02	H	Ave	Y axis
4880.000	34.8	25.6	6.0	33.4	48.51	74.0	-25.49	V	Peak	Y axis
4880.000	25.0	25.6	6.0	33.4	38.66	54.0	-15.34	V	Ave	Y axis
4880.000	34.0	25.6	6.0	33.4	47.62	74.0	-26.38	H	Peak	Z axis
4880.000	23.3	25.6	6.0	33.4	37.00	54.0	-17.00	H	Ave	Z axis
4880.000	31.8	25.6	6.0	33.4	45.44	74.0	-28.56	V	Peak	Z axis
4880.000	18.5	25.6	6.0	33.4	32.18	54.0	-21.82	V	Ave	Z axis

Client: Epitel Inc Date: 9 Oct 2022 DNB Job: 16032

EUT: EEG Sensor with BLE Transmitter Model No: E001

Requirement: General limit of 15.209 Tech: CL Payne

High Channel: 2480 Result: Pass

RADIATED SPURIOUS										
Freq (MHz)	Meter (dBuV/m)	Pre-Amp (dB)	Cable (dB)	Antenna (dB)	Corrected (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Polarity	Type	Axis
4960.000	32.1	25.6	6.0	33.7	46.09	74.0	-27.91	H	Peak	X axis
4960.000	20.2	25.6	6.0	33.7	34.20	54.0	-19.80	H	Ave	X axis
4960.000	33.8	25.6	6.0	33.7	47.84	74.0	-26.16	V	Peak	X axis
4960.000	23.5	25.6	6.0	33.7	37.56	54.0	-16.44	V	Ave	X axis
4960.000	32.5	25.6	6.0	33.7	46.49	74.0	-27.51	V	Peak	Y axis
4960.000	20.7	25.6	6.0	33.7	34.71	54.0	-19.29	V	Ave	Y axis
4960.000	32.5	25.6	6.0	33.7	46.55	74.0	-27.45	H	Peak	Z axis
4960.000	20.9	25.6	6.0	33.7	34.94	54.0	-19.06	H	Ave	Z axis
4960.000	31.7	25.6	6.0	33.7	45.74	74.0	-28.26	V	Peak	Z axis
4960.000	19.0	25.6	6.0	33.7	33.04	54.0	-20.96	V	Ave	Z axis
4960.000	34.2	25.6	6.0	33.7	48.18	74.0	-25.82	H	Peak	Y axis
4960.000	24.1	25.6	6.0	33.7	38.12	54.0	-15.88	H	Ave	Y axis

15.247 (d) Restricted Bands ANSI C63.10-2013 Clause 11.12.2

11.12.2 Antenna-port conducted measurements

11.12.2.1 General

Antenna-port conducted measurements may also be used as an alternative to radiated measurements for determining compliance in the restricted frequency bands requirements. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case emissions is required.

11.12.2.2 General procedure for conducted measurements in restricted bands

The general procedure for conducted measurements in restricted bands is as follows:

a) Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 11.12.2.3 through 11.12.2.5 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).

b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP (see 11.12.2.6 for guidance on determining the applicable antenna gain).

c) Add the appropriate maximum ground reflection factor to the EIRP (6 dB for frequencies ≤ 30 MHz; 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive; and 0 dB for frequencies > 1000 MHz).

d) For MIMO devices, measure the power of each chain and sum the EIRP of all chains in linear terms (i.e., watts and mW).

e) Convert the resultant EIRP to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20 \log d + 104.8$$

where
E is the electric field strength in dBμV/m
EIRP is the equivalent isotropically radiated power in dBm
d is the specified measurement distance in m

f) Compare the resultant electric field strength level with the applicable regulatory limit.

g) Perform the radiated spurious emission test.

15.247 (d) Restricted Bands - *continued*

Note: With respect to steps e) and f) a limit line (EIRP) based upon the dBuV/m limit was calculated and put on the plots to satisfy the requirement of step f) above. Formula is: (E + 20 log *d*) - 104.8 = (EIRP limit). The appropriate correction factor from step c) was included in the final calculation.

Limit Calculation:

Formula: E – 104.8 + 20log(3) – antenna gain – ground reflection factor

30 MHz - 88 MHz	40 - 104.8 + 20log(d) - 2 - 4.7	= -61.96 dBm
88 MHz - 216 MHz	43 - 104.8 + 20log(d) - 2 - 4.7	= -58.96 dBm
216 MHz - 960 MHz	46 - 104.8 + 20log(d) - 2 - 4.7	= -55.96 dBm
960 MHz - 1000 MHz	54 - 104.8 + 20log(d) - 2 - 4.7	= -47.96 dBm
> 1000 MHz	54 - 104.8 + 20log(d) - 2 - 0	= -43.26 dBm

Note: (d) = Measurement distance in meters = 3 meters

Requirement: FCC Part 15.247 Clause (d)

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

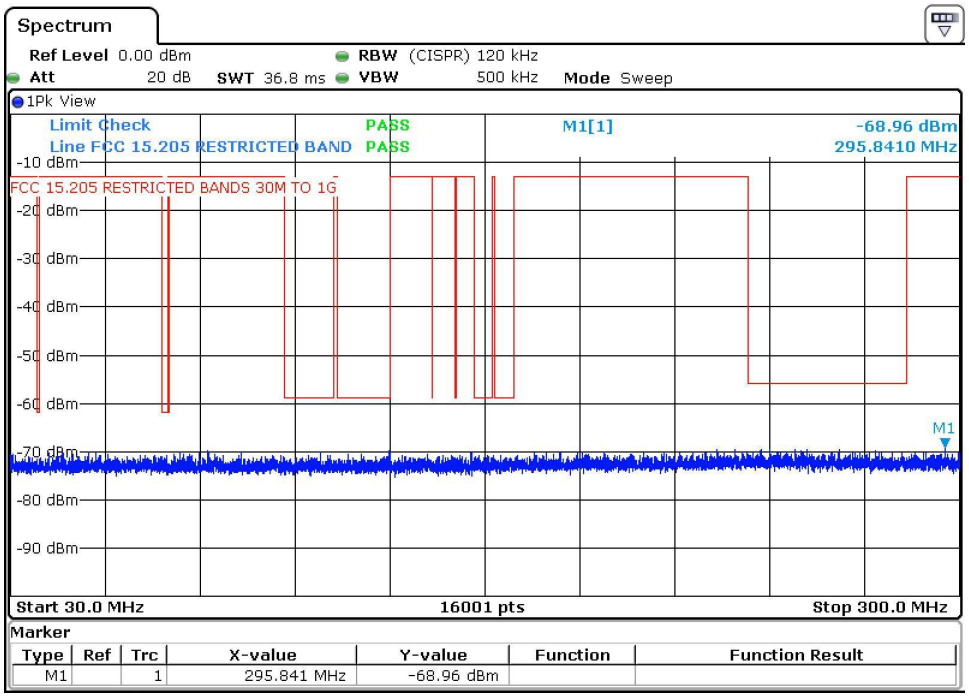
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Low Channel: 2402 MHz | Data Rate: 1Mb/s

Frequency Range: 30 MHz to 300 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

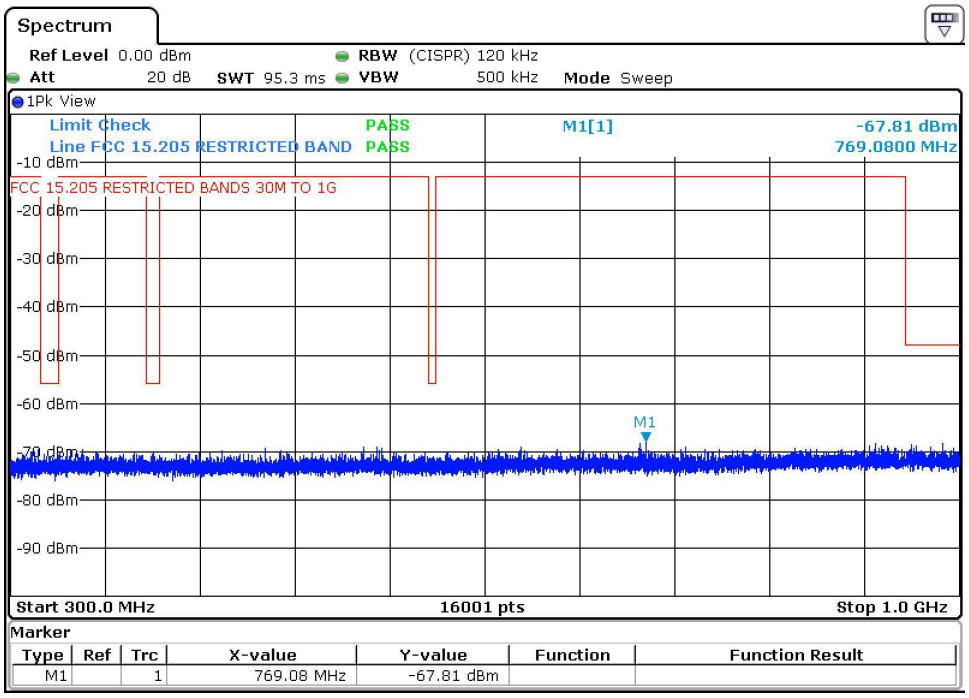
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Low Channel: 2402 MHz | Data Rate: 1Mb/s

Frequency Range: 300 MHz to 1000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

EUT: EEG Sensor with BLE Transmitter | Model No: E001

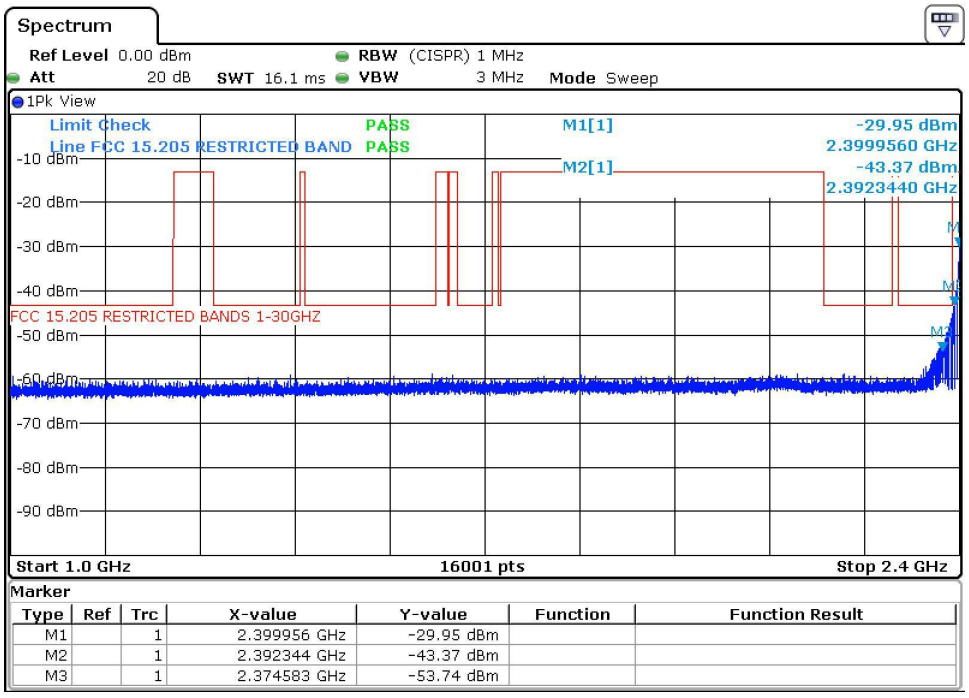
Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Low Channel: 2402 MHz | Data Rate: 1Mb/s

Frequency Range: 1000 MHz to 2400 MHz | Result: Pass

Detector Function: Peak

Note: Following page is zoomed into the area close to the band edge.



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

EUT: EEG Sensor with BLE Transmitter | Model No: E001

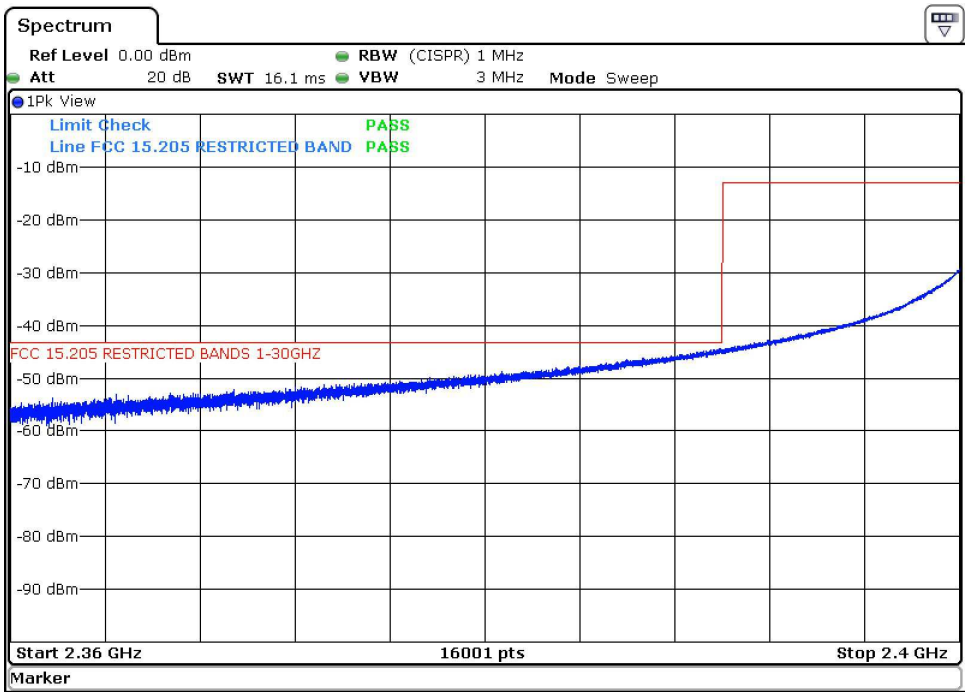
Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Low Channel: 2402 MHz | Data Rate: 1Mb/s

Frequency Range: 2360 MHz to 2400 MHz | Result: Pass

Detector Function: Peak

Plot provided to show peak reading under restricted band limit near band edge



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

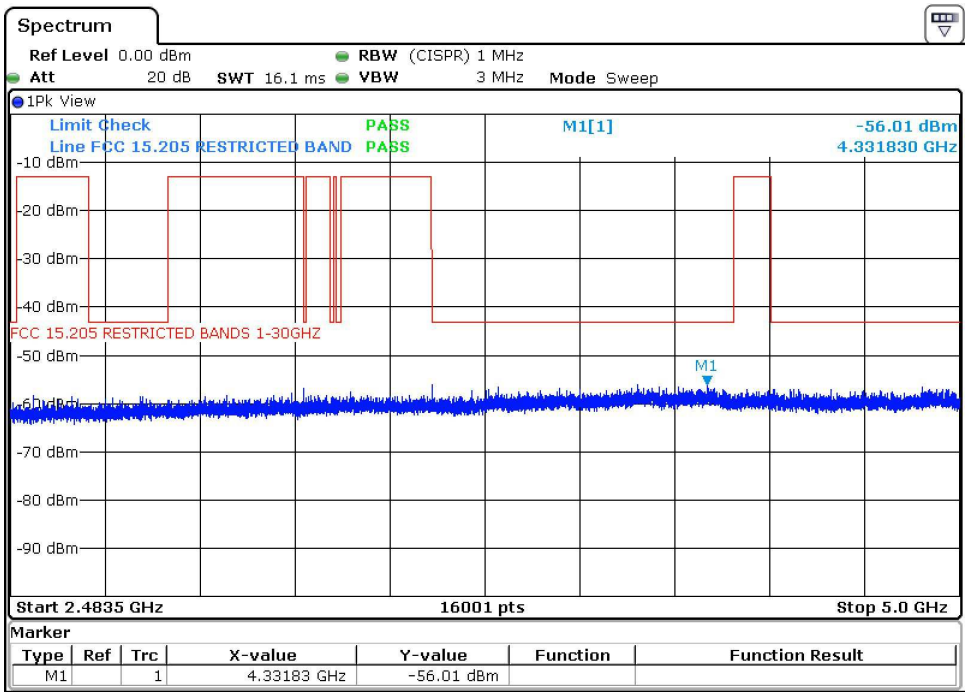
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Low Channel: 2402 MHz | Data Rate: 1Mb/s

Frequency Range: 2483.5 MHz to 5000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc Date: 8 Oct 2022 DNB Job: 16032

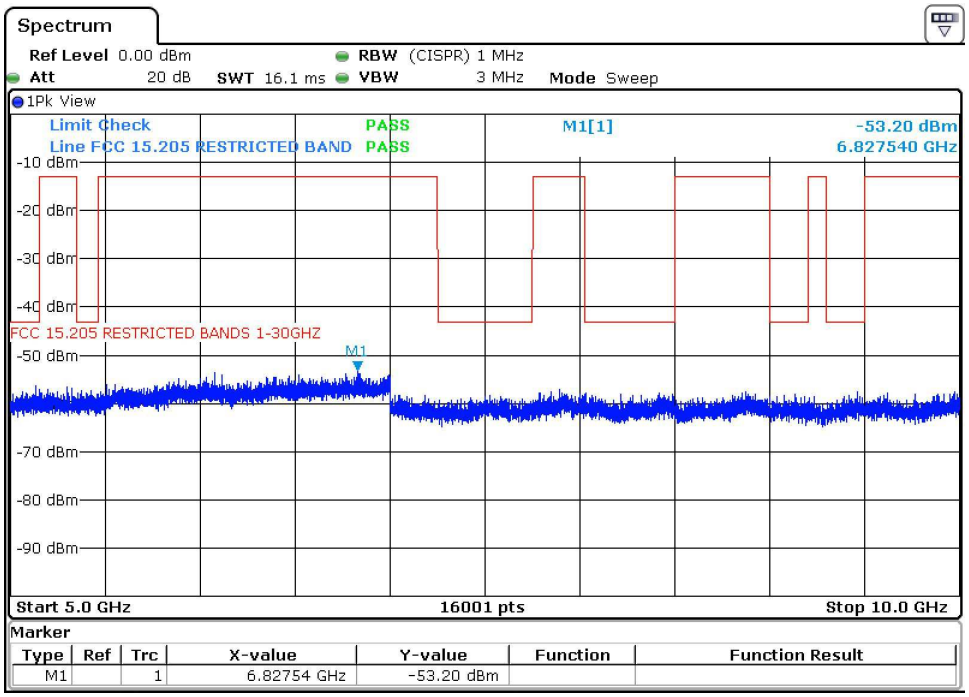
EUT: EEG Sensor with BLE Transmitter Model No: E001

Requirement: Emissions Below Restricted Band Limits Tech: CL Payne

Low Channel: 2402 MHz Data Rate: 1Mb/s

Frequency Range: 5000 MHz to 10000 MHz Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

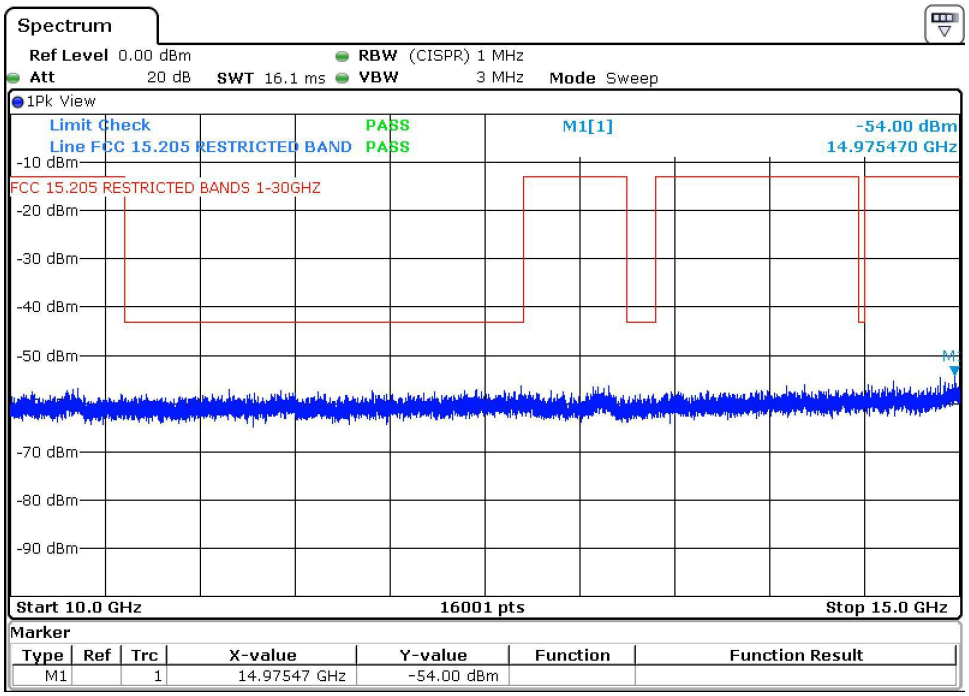
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Low Channel: 2402 MHz | Data Rate: 1Mb/s

Frequency Range: 10000 MHz to 15000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

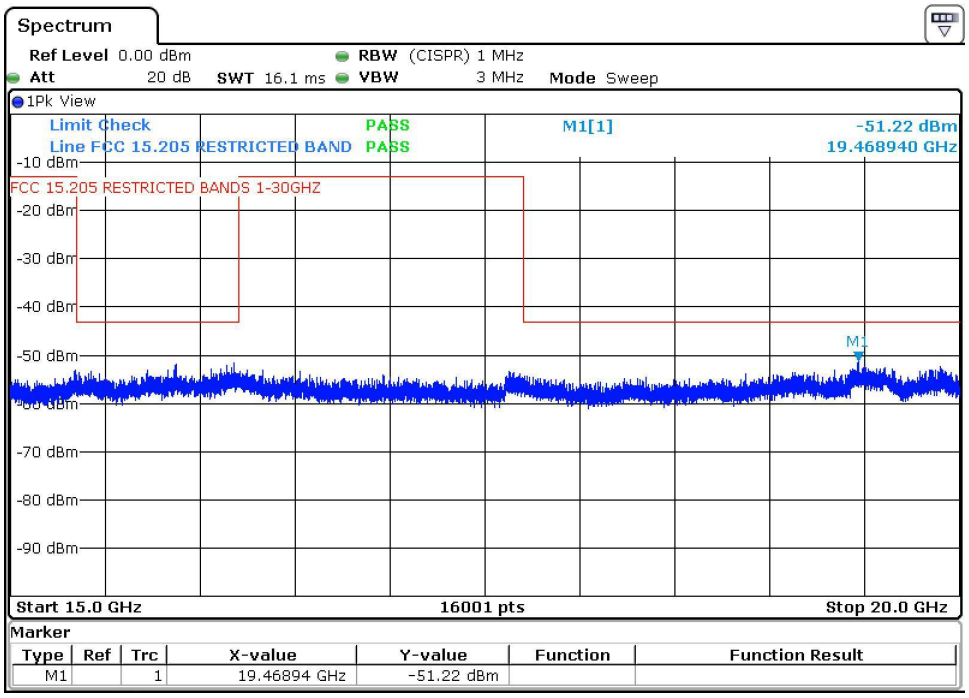
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Low Channel: 2402 MHz | Data Rate: 1Mb/s

Frequency Range: 15000 MHz to 20000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

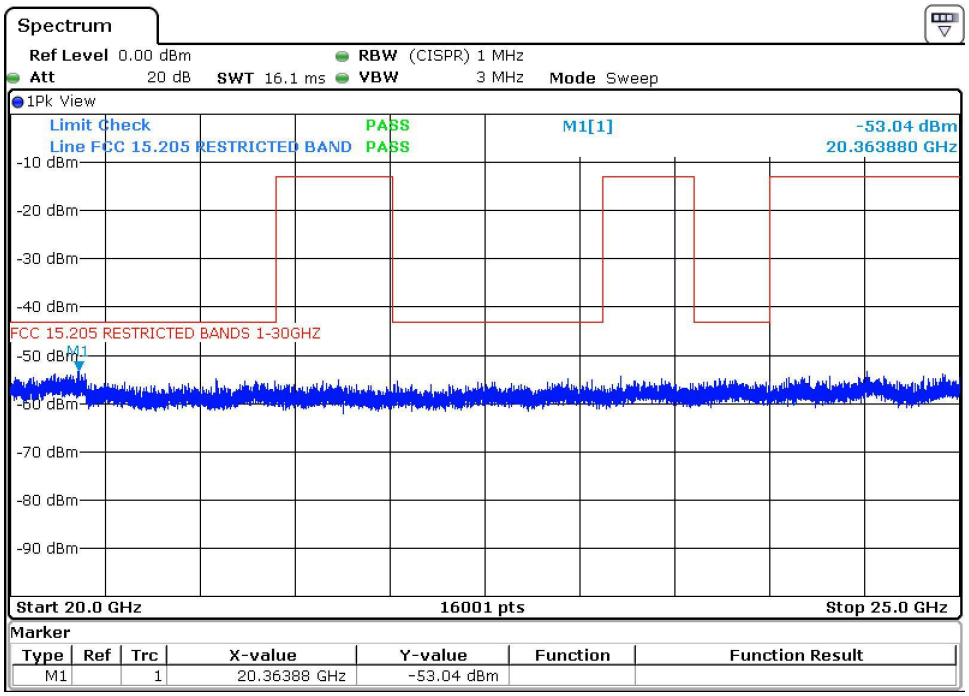
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Low Channel: 2402 MHz | Data Rate: 1Mb/s

Frequency Range: 20000 MHz to 25000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

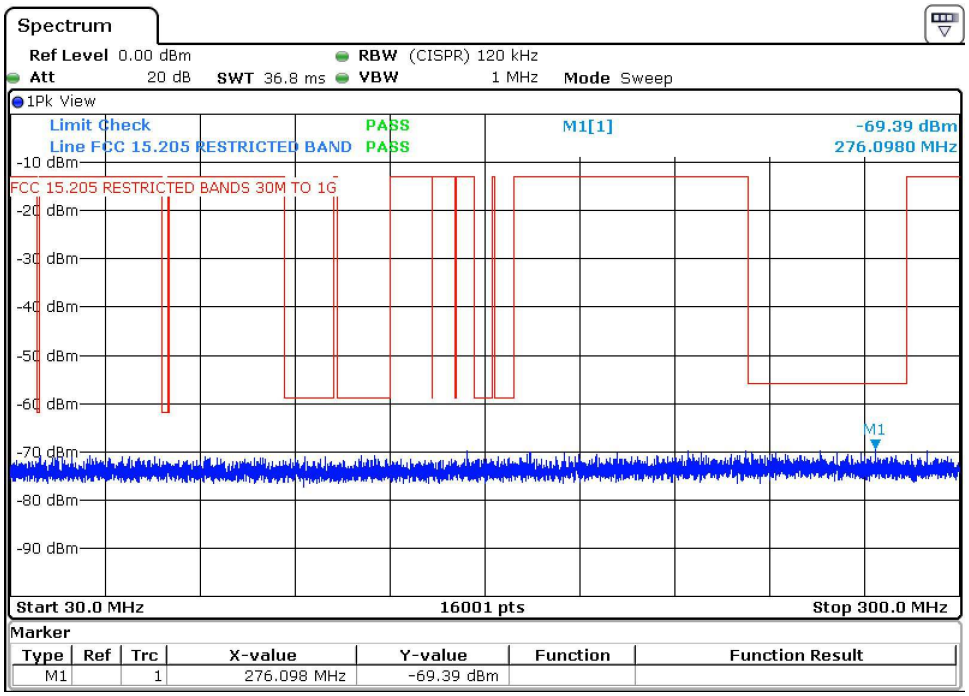
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Mid Channel: 2440 MHz | Data Rate: 1Mb/s

Frequency Range: 30 MHz to 300 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

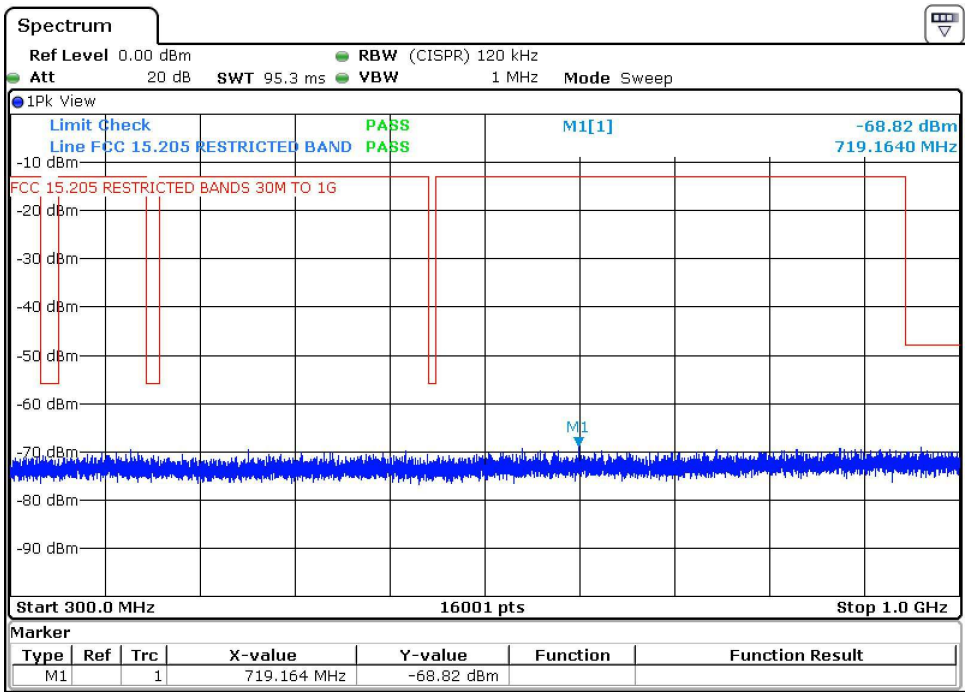
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Mid Channel: 2440 MHz | Data Rate: 1Mb/s

Frequency Range: 300 MHz to 1000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

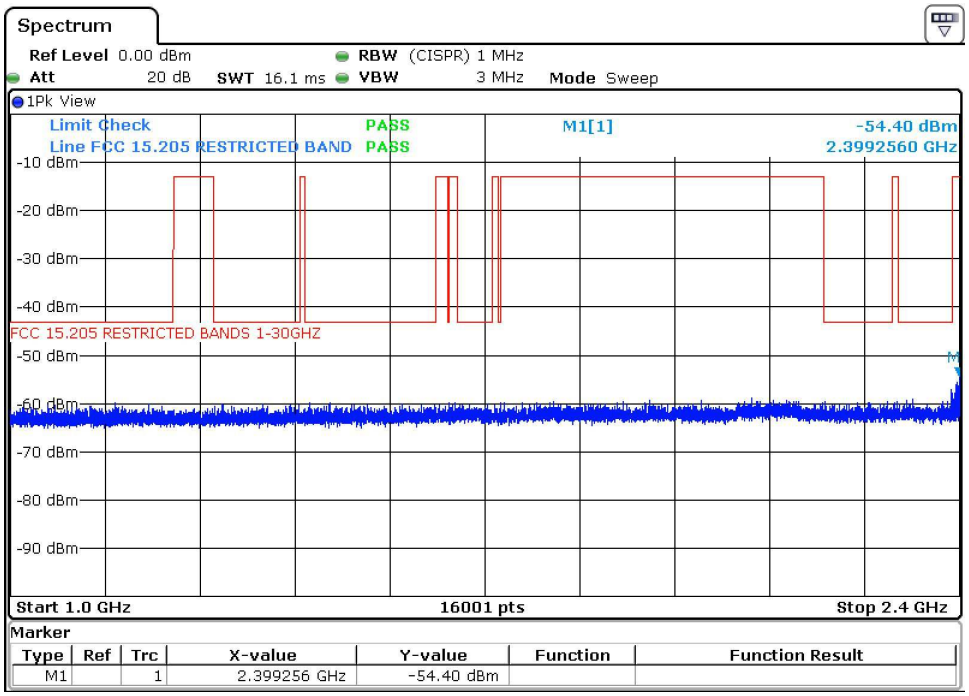
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Mid Channel: 2440 MHz | Data Rate: 1Mb/s

Frequency Range: 1000 MHz to 2400 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

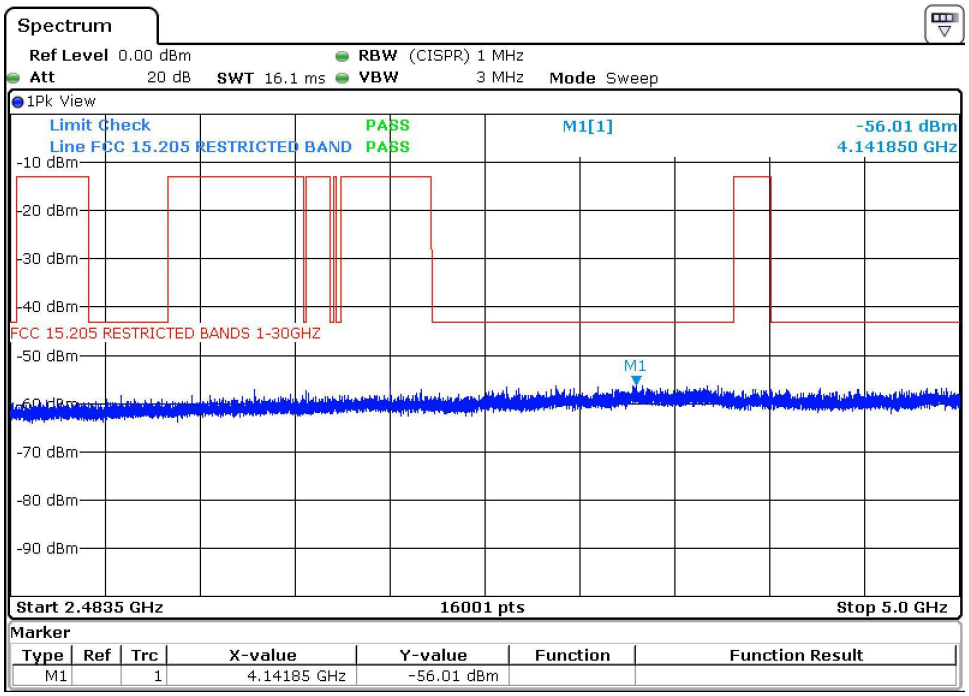
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Mid Channel: 2440 MHz | Data Rate: 1Mb/s

Frequency Range: 2483.5 MHz to 5000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

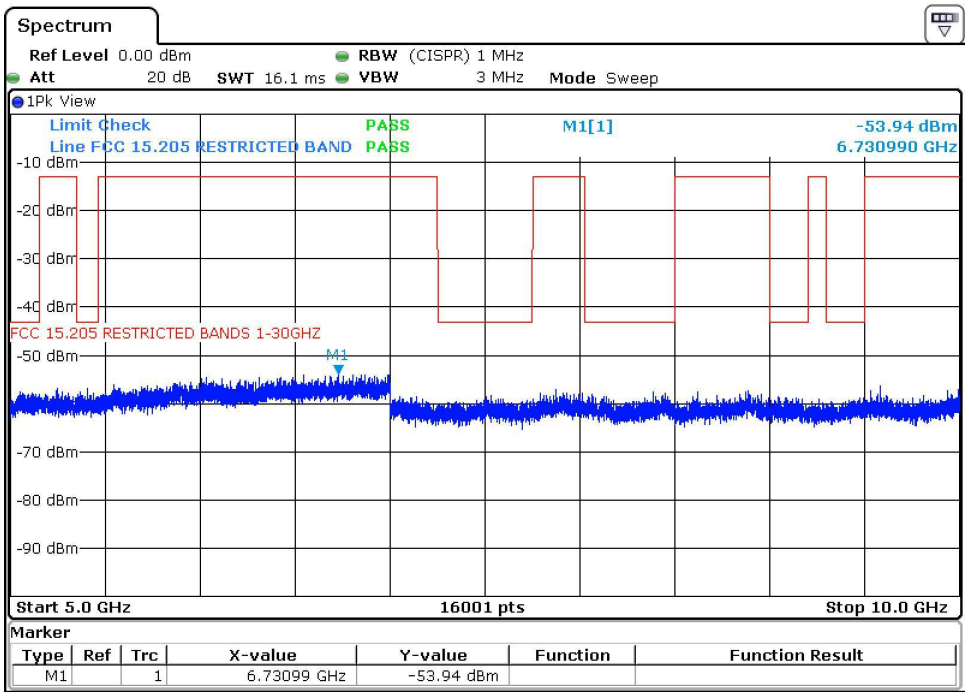
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Mid Channel: 2440 MHz | Data Rate: 1Mb/s

Frequency Range: 5000 MHz to 10000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

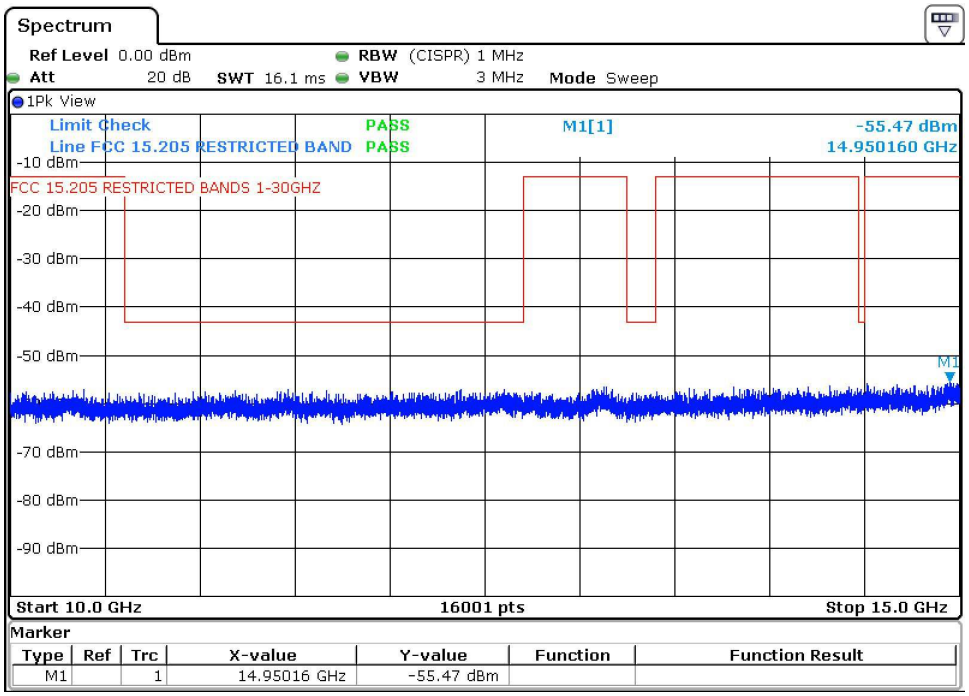
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Mid Channel: 2440 MHz | Data Rate: 1Mb/s

Frequency Range: 10000 MHz to 15000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

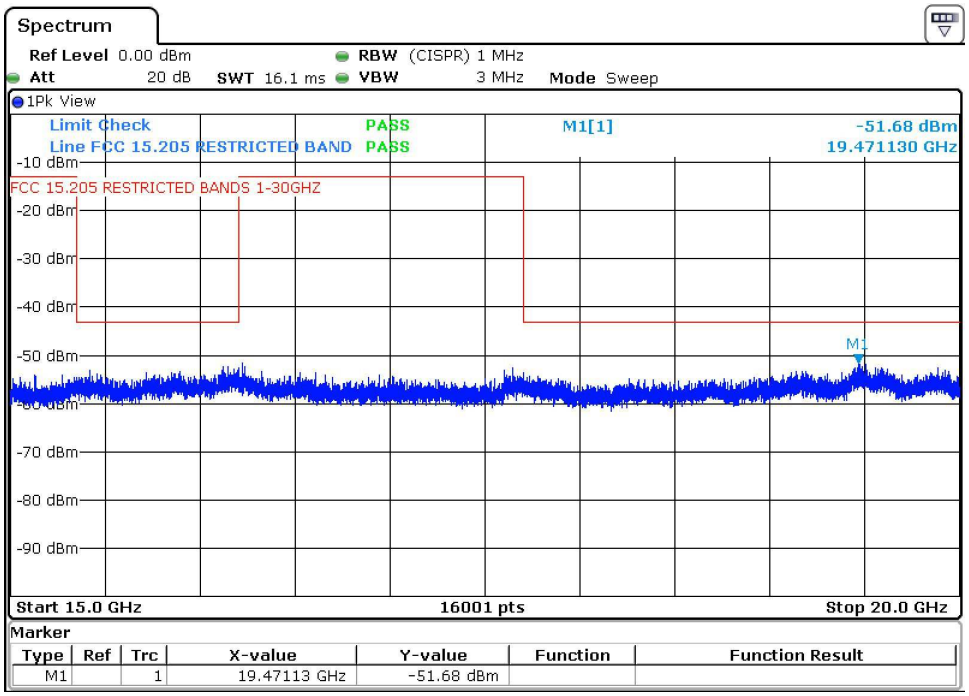
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Mid Channel: 2440 MHz | Data Rate: 1Mb/s

Frequency Range: 15000 MHz to 20000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

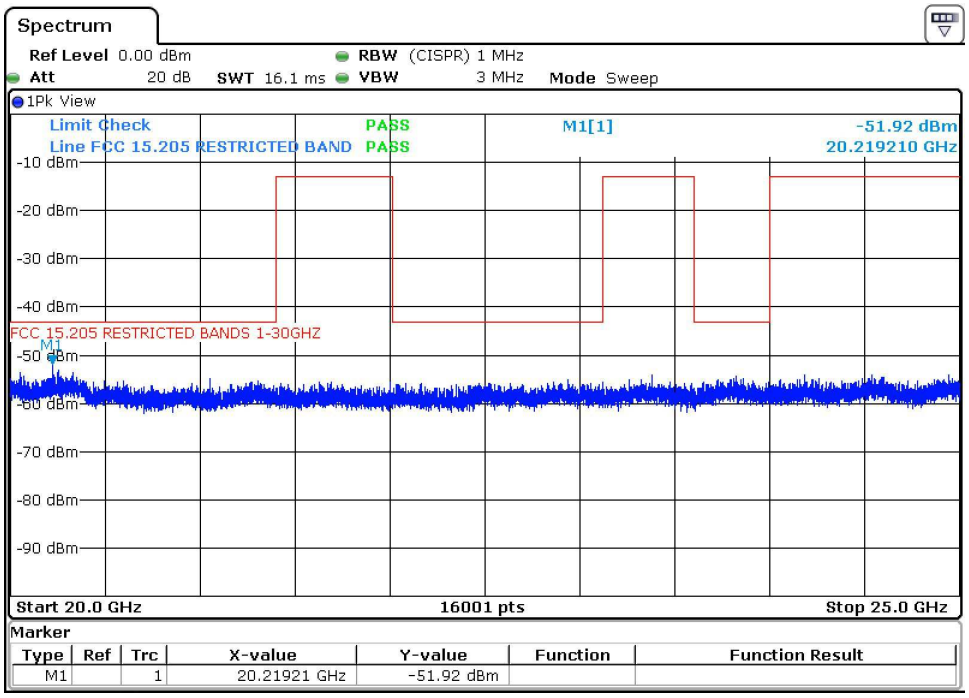
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

Mid Channel: 2440 MHz | Data Rate: 1Mb/s

Frequency Range: 20000 MHz to 25000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

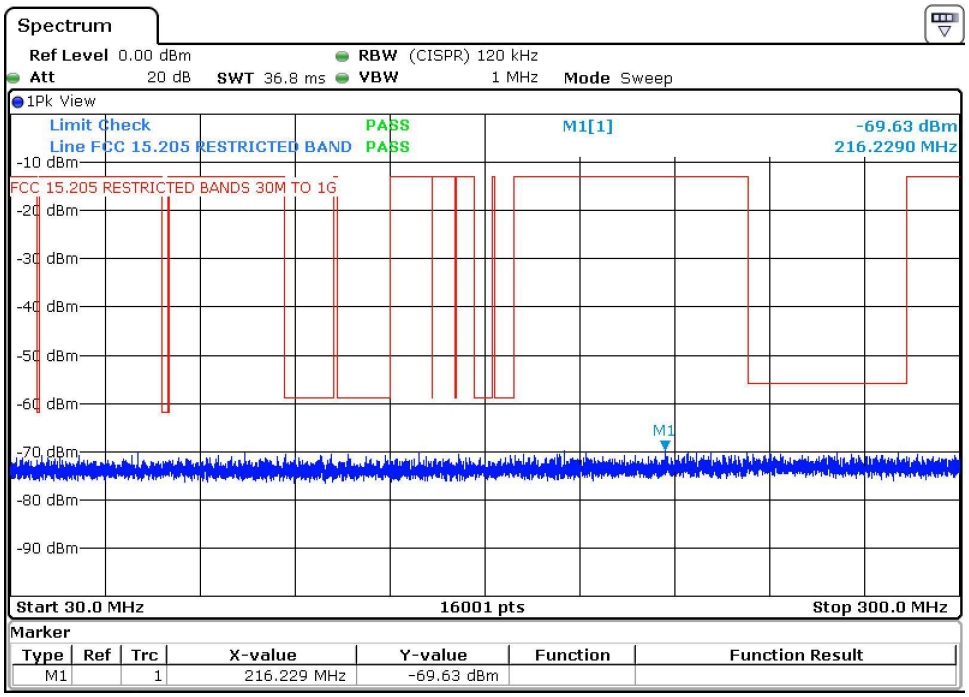
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

High Channel: 2480 MHz | Data Rate: 1Mb/s

Frequency Range: 30 MHz to 300 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

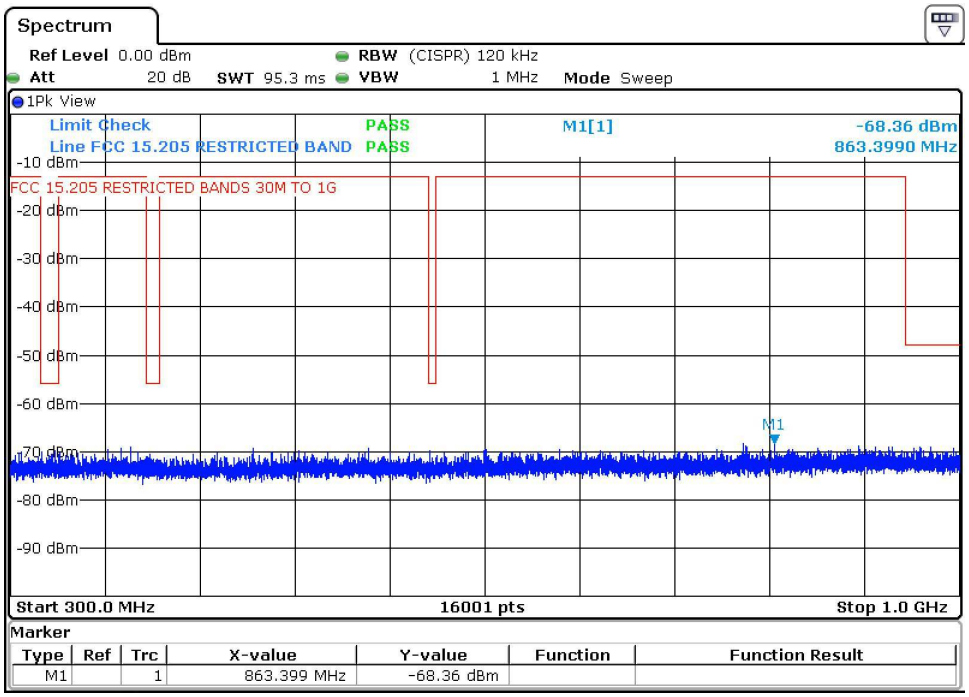
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

High Channel: 2480 MHz | Data Rate: 1Mb/s

Frequency Range: 300 MHz to 1000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

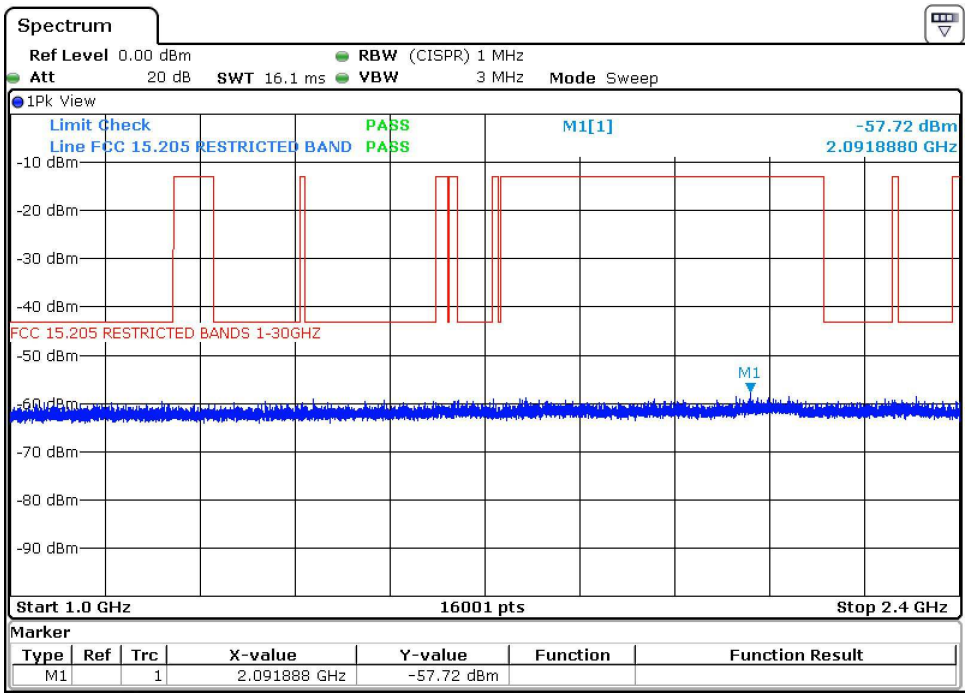
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

High Channel: 2480 MHz | Data Rate: 1Mb/s

Frequency Range: 1000 MHz to 2400 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

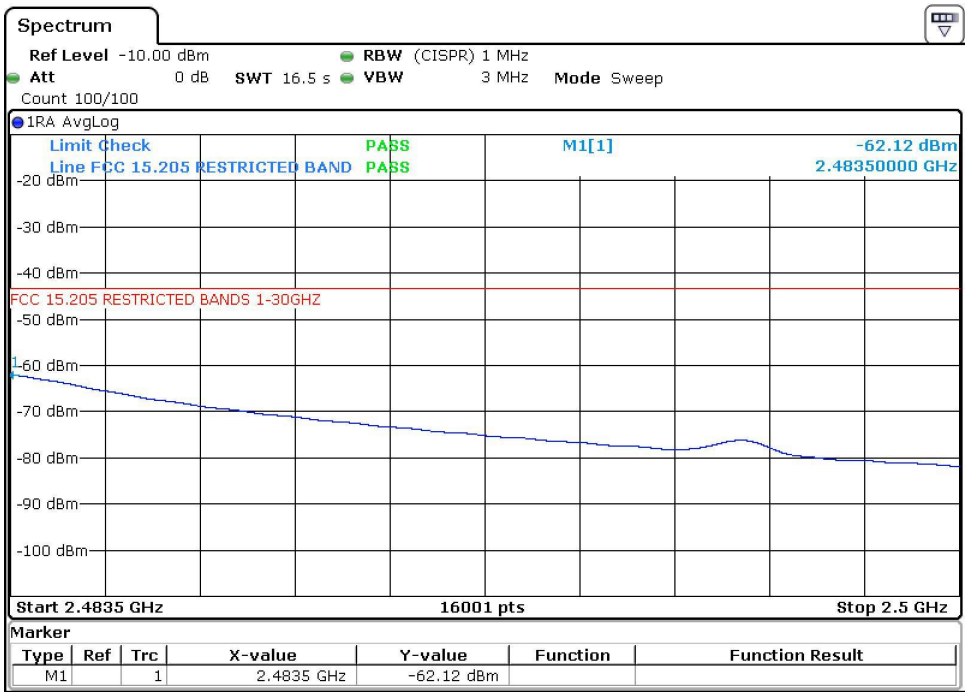
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

High Channel: 2480 MHz | Data Rate: 1Mb/s

Frequency Range: 2483.5 MHz to 2500 MHz | Result: Pass

Detector Function: Average (RMS)



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

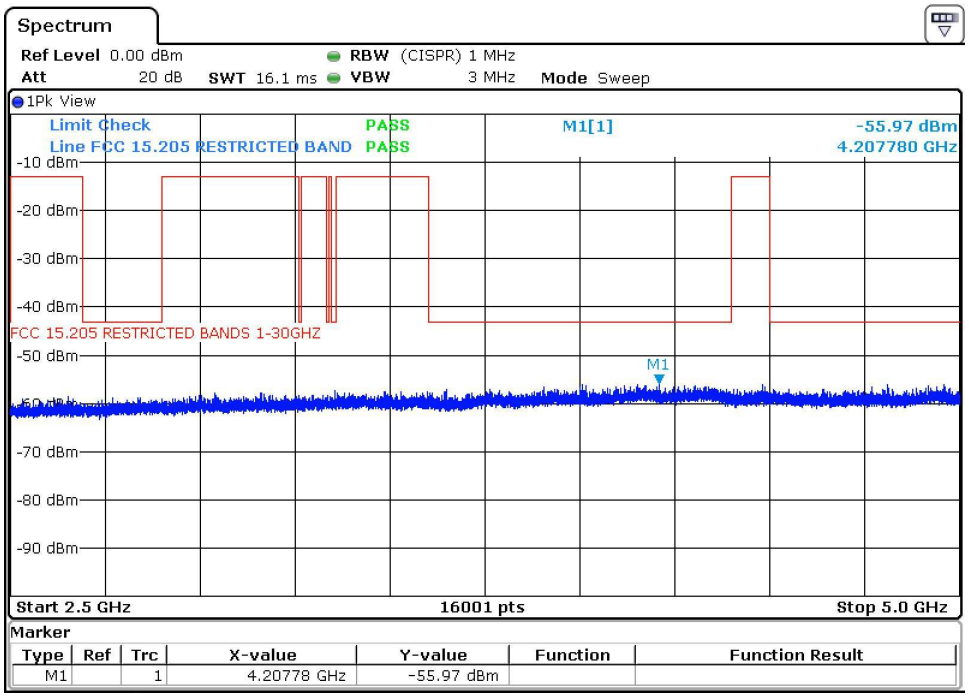
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

High Channel: 2480 MHz | Data Rate: 1Mb/s

Frequency Range: 2500 MHz to 5000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

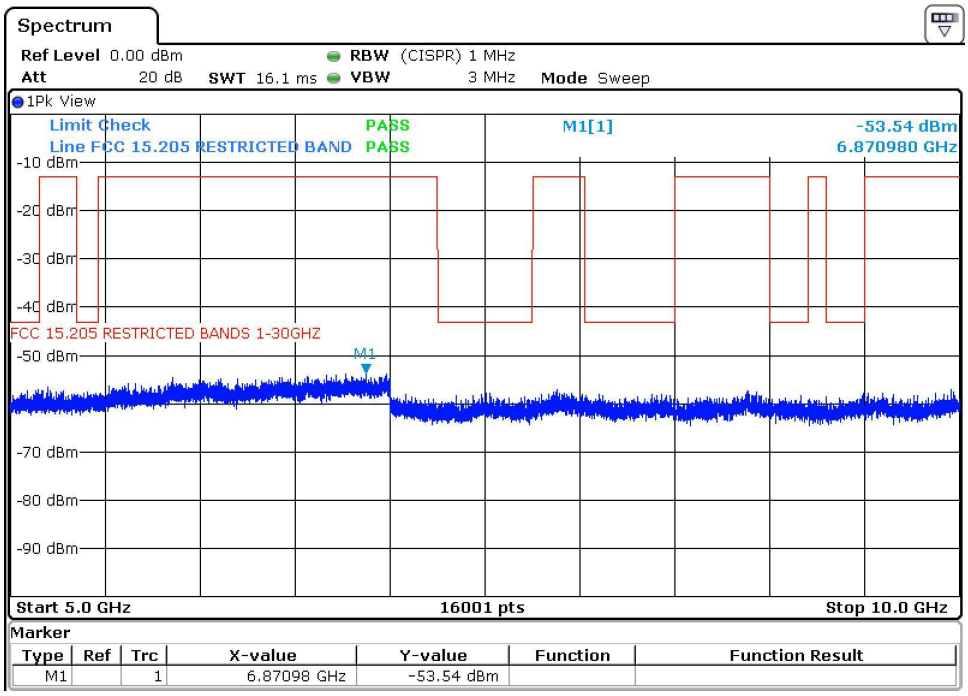
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

High Channel: 2480 MHz | Data Rate: 1Mb/s

Frequency Range: 5000 MHz to 10000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

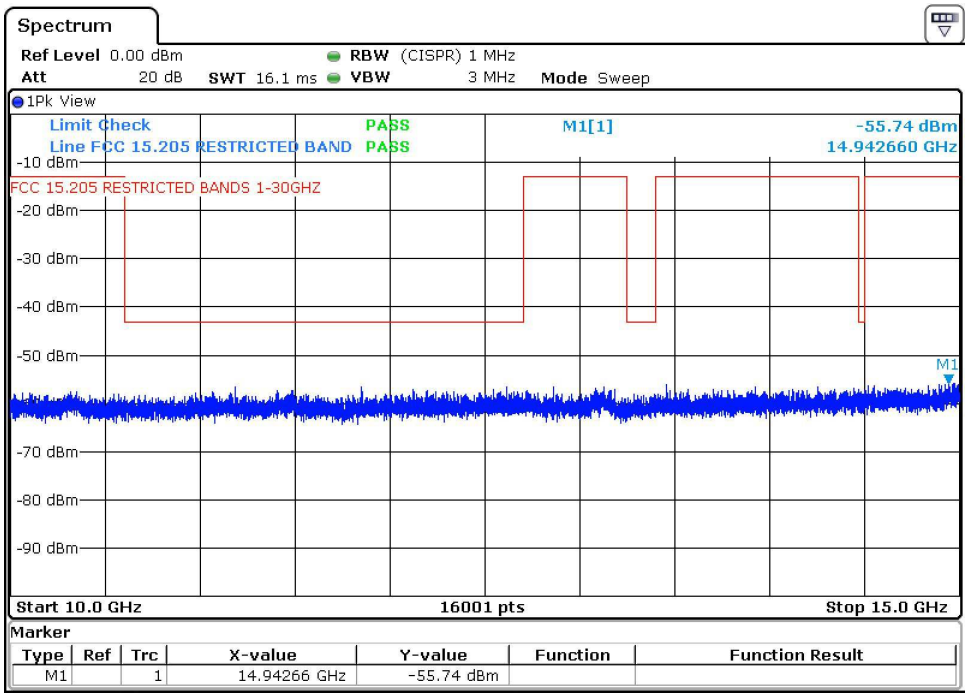
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

High Channel: 2480 MHz | Data Rate: 1Mb/s

Frequency Range: 10000 MHz to 15000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

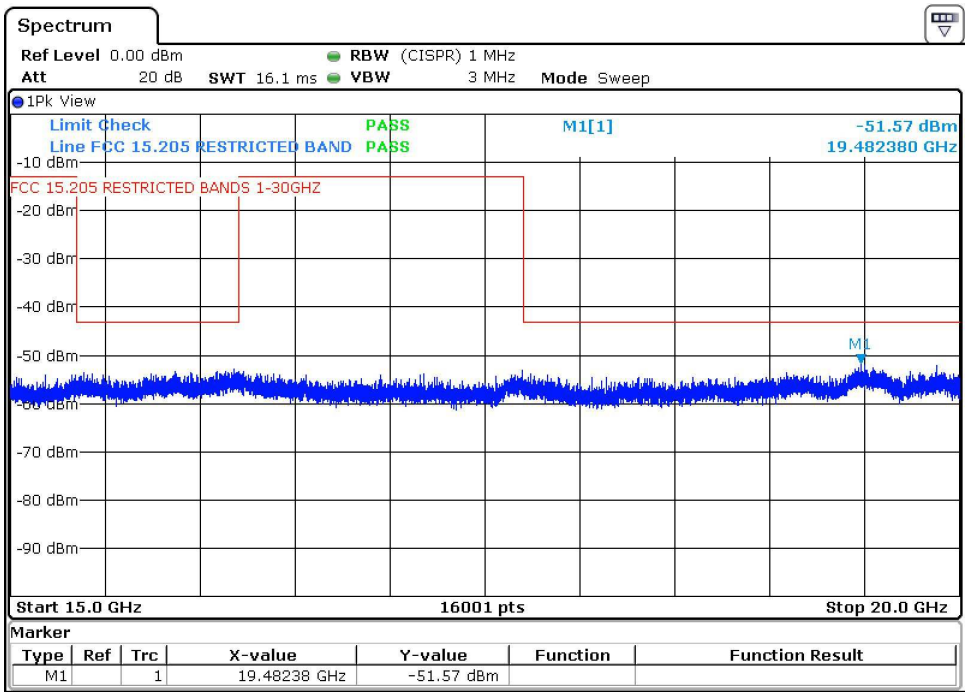
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

High Channel: 2480 MHz | Data Rate: 1Mb/s

Frequency Range: 15000 MHz to 20000 MHz | Result: Pass

Detector Function: Peak



Client: Epitel Inc | Date: 8 Oct 2022 | DNB Job: 16032

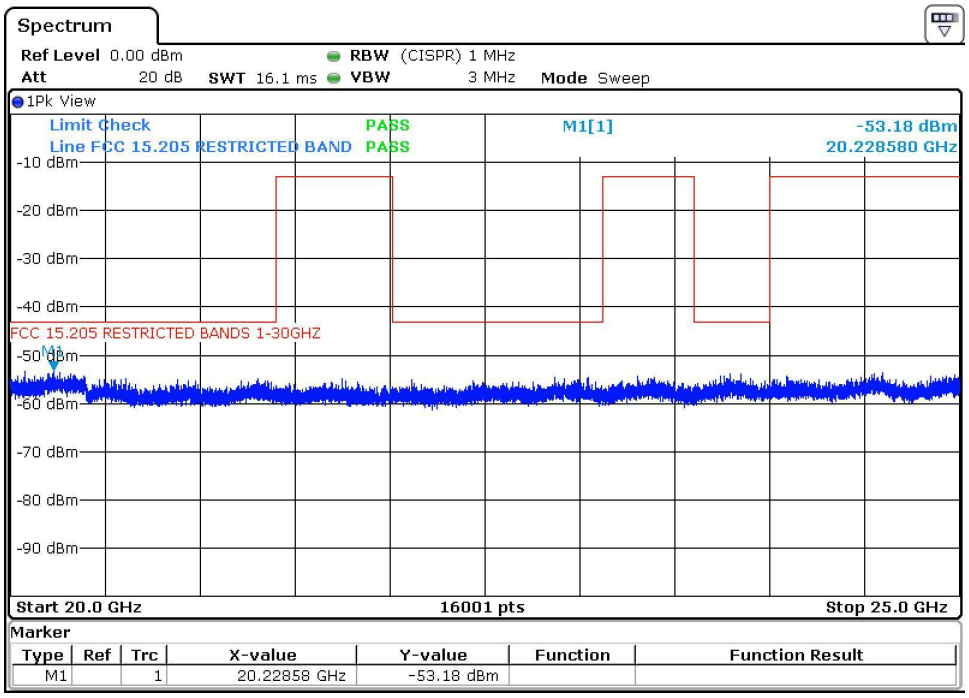
EUT: EEG Sensor with BLE Transmitter | Model No: E001

Requirement: Emissions Below Restricted Band Limits | Tech: CL Payne

High Channel: 2480 MHz | Data Rate: 1Mb/s

Frequency Range: 20000 MHz to 25000 MHz | Result: Pass

Detector Function: Peak



End of Report UT16032D-005