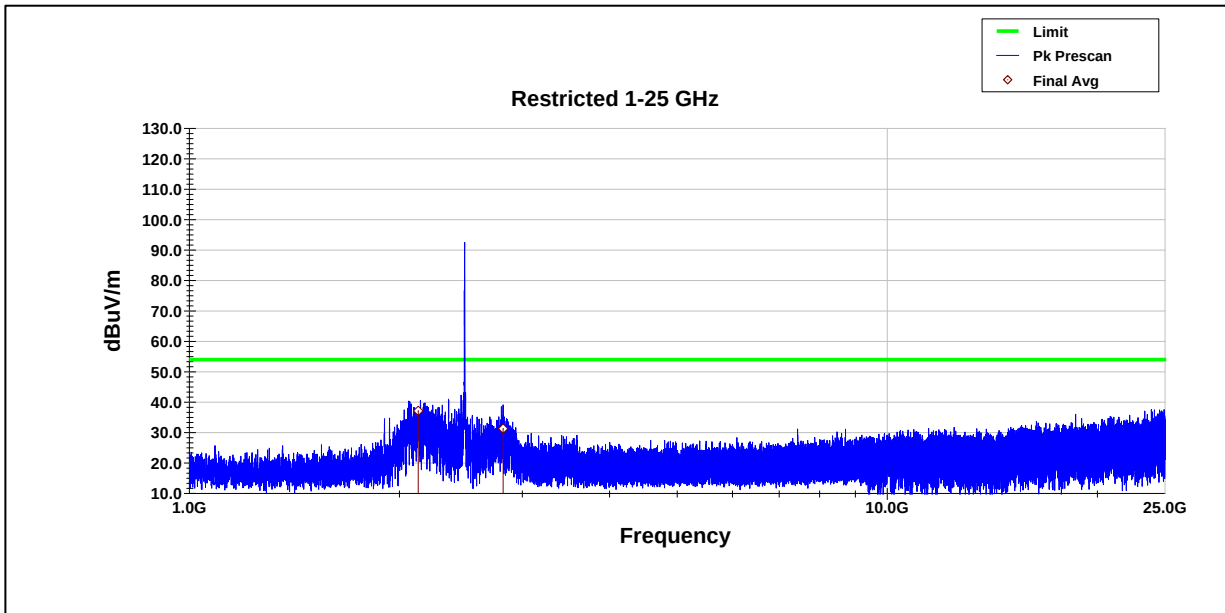


BLE 2M High Ch

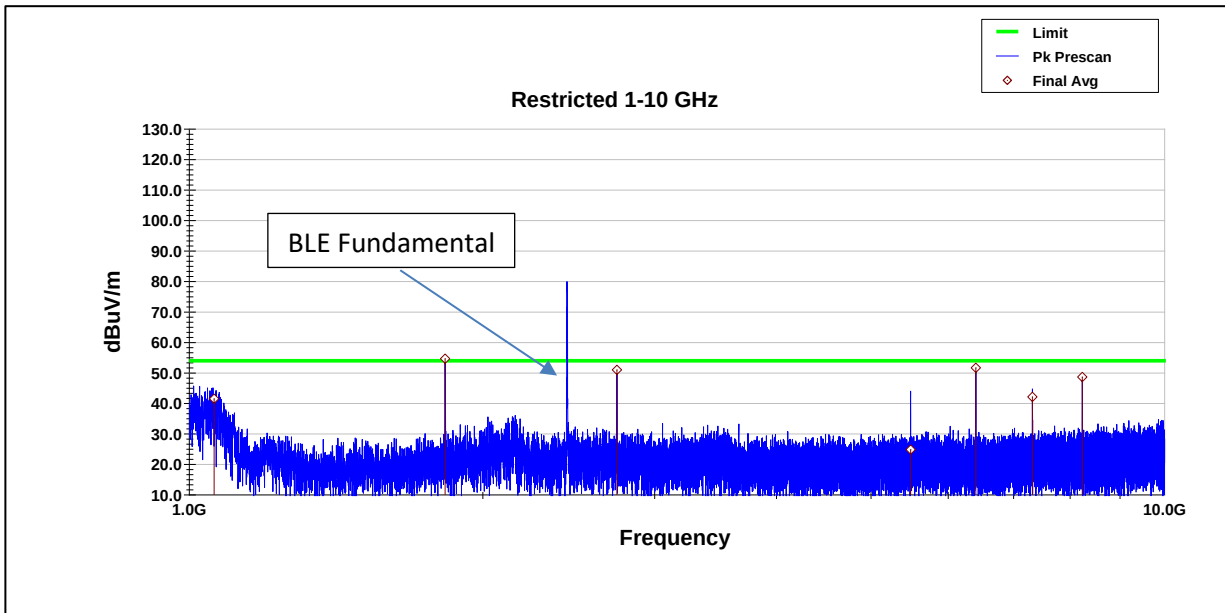


Frequency	Raw Avg	Path Loss	Conversion	Final Avg	Limit	Margin
MHz	dBm	dB	dB	dBuV/m	dBuV/m	dB
2128.385	-61.70	3.60	95.30	37.10	54.00	-16.90
2816.002	-67.80	3.80	95.30	31.30	54.00	-22.70
Final = Raw + Path Loss + Conversion						
Margin = Final - Limit						

Simultaneous Transmission Conducted Test Data

1-10 GHz

BLE 2M Mid LoRa FHSS SF7 High

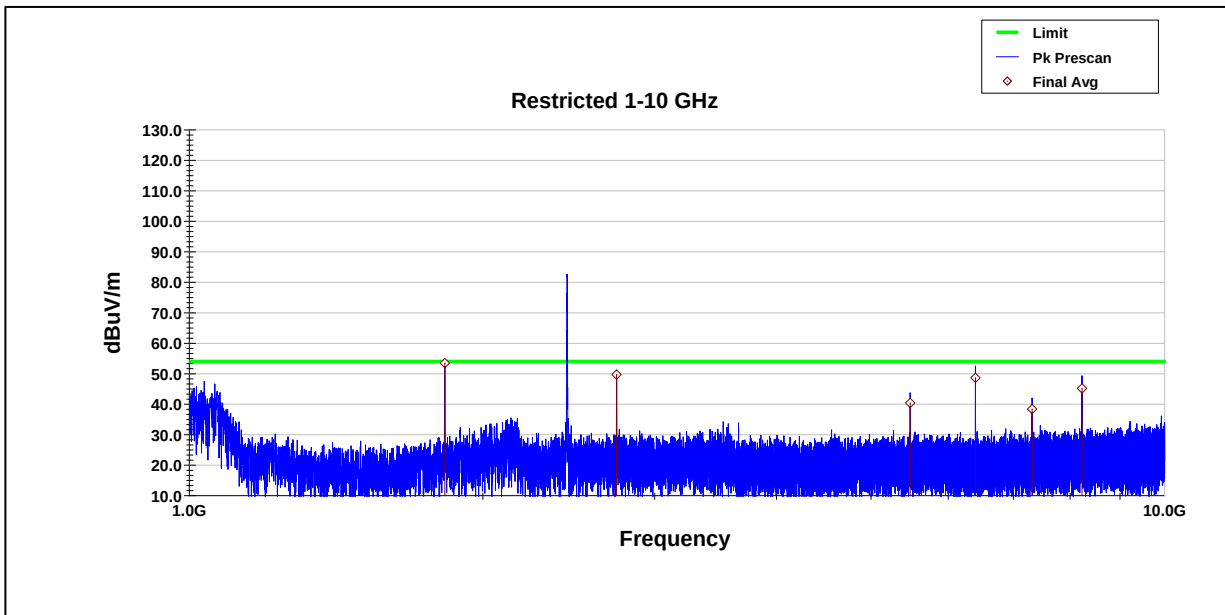


Frequency	Raw Avg	Path Loss	Conversion	Final Avg	Limit	Margin
MHz	dBm	dB	dB	dBuV/m	dBuV/m	dB
1060.469	-61.50	7.80	95.30	41.50	54.00	-12.40
1829.768	-49.40	8.80	95.30	54.70	54.00	0.70
2744.71	-52.20	8.00	95.30	51.00	54.00	-3.00
5491.381	-79.50	9.10	95.30	24.90	54.00	-29.10
6404.238	-52.70	9.20	95.30	51.70	54.00	-2.30
7319.199	-62.50	9.40	95.30	42.20	54.00	-11.80
8234.085	-56.60	10.00	95.30	48.70	54.00	-5.30

$$\text{Final} = \text{Raw} + \text{Path Loss} + \text{Conversion}$$

$$\text{Margin} = \text{Final} - \text{Limit}$$

BLE 2M mid LoRa DTS SF11 High

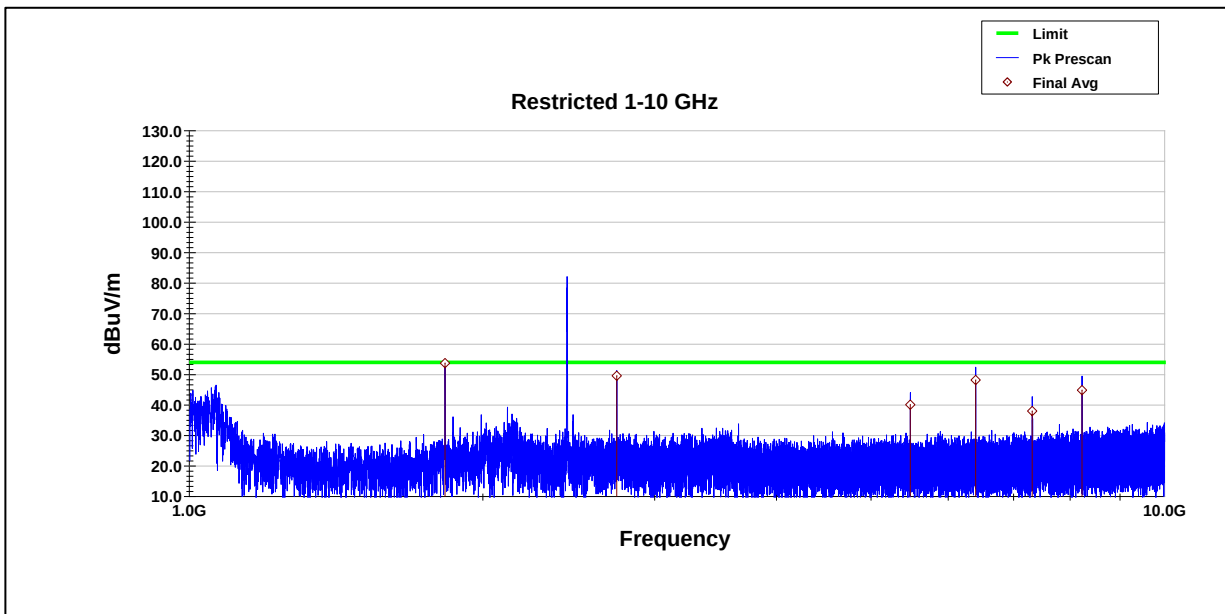


Frequency	Raw Avg	Path Loss	Conversion	Final Avg	Limit	Margin
MHz	dBm	dB	dB	dBuV/m	dBuV/m	dB
1828.342	-50.60	8.80	95.30	53.50	54.00	-0.50
2742.651	-53.50	8.00	95.30	49.70	54.00	-4.30
5485.016	-63.90	9.00	95.30	40.40	54.00	-13.60
6398.725	-55.80	9.10	95.30	48.60	54.00	-5.40
7314.413	-66.30	9.40	95.30	38.40	54.00	-15.60
8228.437	-60.10	10.00	95.30	45.10	54.00	-8.80

$$\text{Final} = \text{Raw} + \text{Path Loss} + \text{Conversion}$$

$$\text{Margin} = \text{Final} - \text{Limit}$$

BLE 2M Mid Sidewalk LoRa DTS Mid

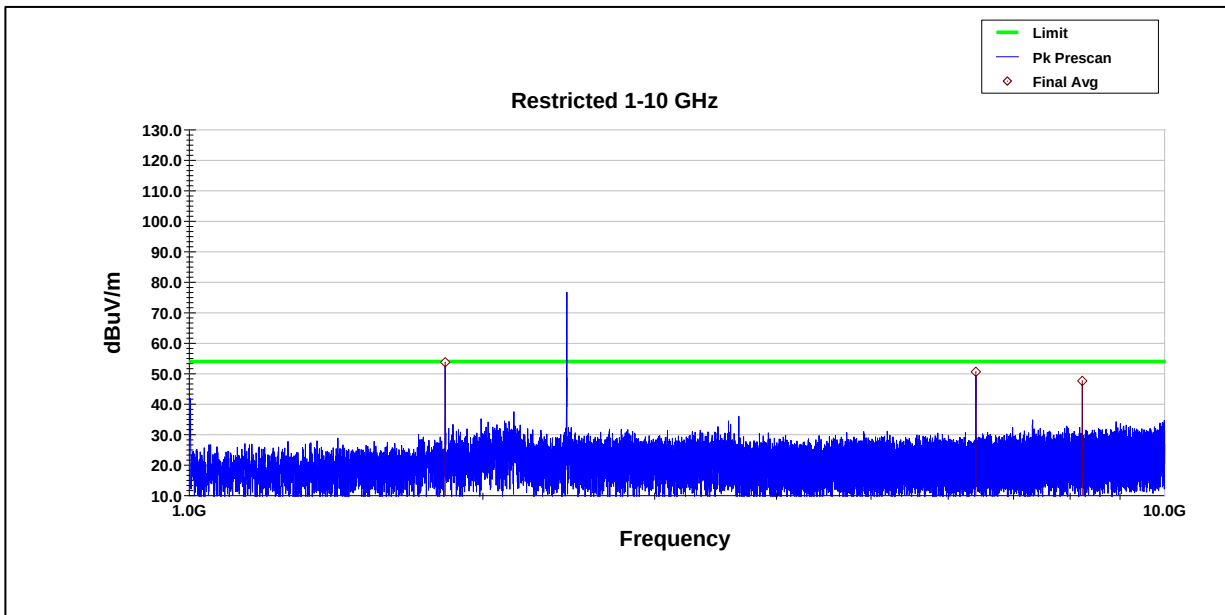


Frequency	Raw Avg	Path Loss	Conversion	Final Avg	Limit	Margin
MHz	dBm	dB	dB	dBuV/m	dBuV/m	dB
1828.993	-50.30	8.80	95.30	53.80	54.00	-0.20
2743.506	-53.60	8.00	95.30	49.60	54.00	-4.40
5486.721	-64.20	9.00	95.30	40.10	54.00	-13.90
6401.45	-56.20	9.10	95.30	48.20	54.00	-5.80
7315.864	-66.70	9.40	95.30	38.00	54.00	-16.00
8229.284	-60.30	10.00	95.30	44.90	54.00	-9.10

$$\text{Final} = \text{Raw} + \text{Path Loss} + \text{Conversion}$$

$$\text{Margin} = \text{Final} - \text{Limit}$$

BLE 2M Mid Sidewalk FSK Mid



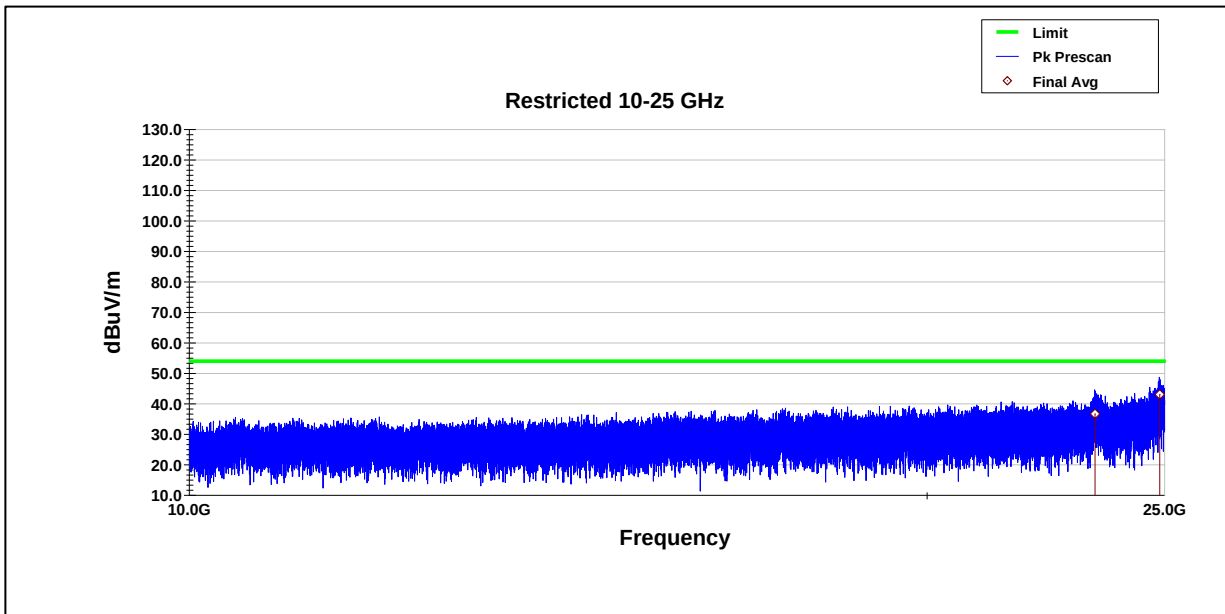
Frequency	Raw Avg	Path Loss	Conversion	Final Avg	Limit	Margin
MHz	dBm	dB	dB	dBuV/m	dBuV/m	dB
1829.957	-50.30	8.80	95.30	53.80	54.00	-0.20
6404.967	-53.80	9.20	95.30	50.60	54.00	-3.40
8234.962	-57.60	10.00	95.30	47.60	54.00	-6.40

$$\text{Final} = \text{Raw} + \text{Path Loss} + \text{Conversion}$$

$$\text{Margin} = \text{Final} - \text{Limit}$$

10-25 GHz

BLE 2M Mid LoRa FHSS SF 7 High

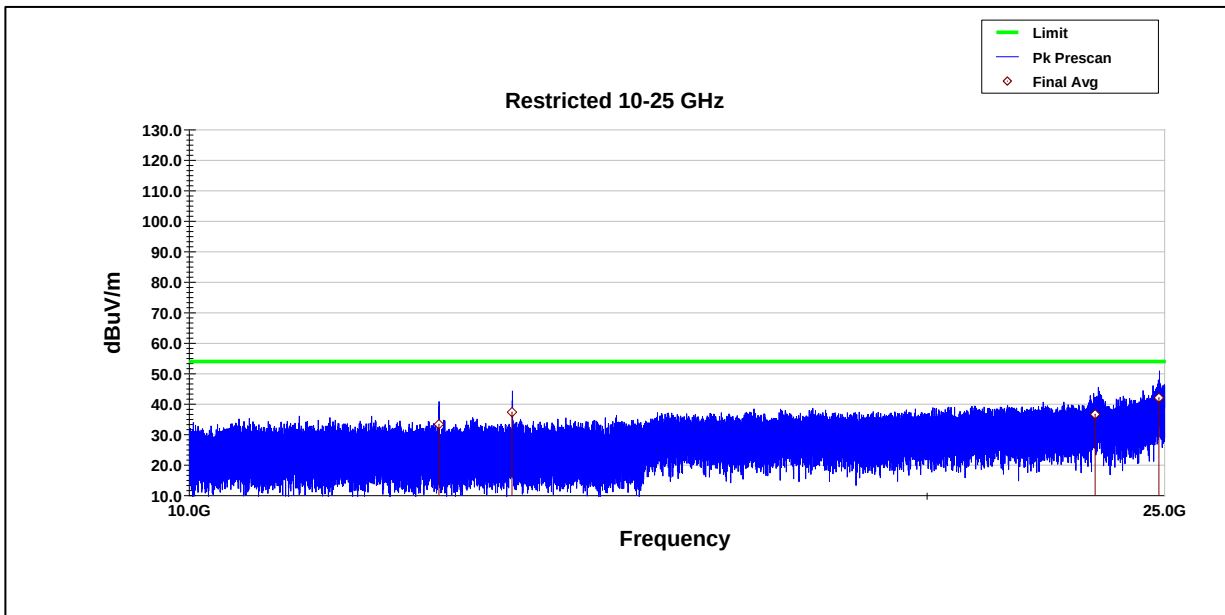


Frequency	Raw Avg	Path Loss	Conversion	Final Avg	Limit	Margin
MHz	dBm	dB	dB	dBuV/m	dBuV/m	dB
23418.915	-73.80	15.20	95.30	36.70	54.00	-17.30
24887.666	-72.50	20.30	95.30	43.10	54.00	-10.90

$$\text{Final} = \text{Raw} + \text{Path Loss} + \text{Conversion}$$

$$\text{Margin} = \text{Final} - \text{Limit}$$

BLE 2M Mid LoRa DTS SF 11 High

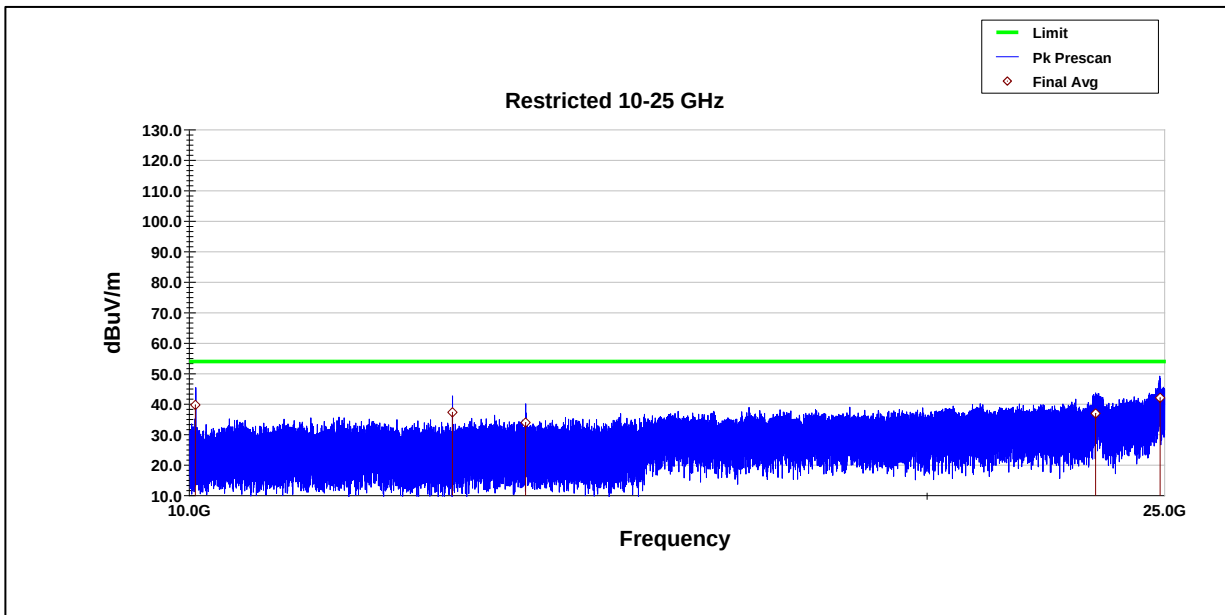


Frequency	Raw Avg	Path Loss	Conversion	Final Avg	Limit	Margin
MHz	dBm	dB	dB	dBuV/m	dBuV/m	dB
12644.32	-71.80	9.90	95.30	33.40	54.00	-20.60
13542.405	-68.80	10.90	95.30	37.40	54.00	-16.60
23420.327	-73.80	15.20	95.30	36.60	54.00	-17.30
24867.066	-72.50	19.30	95.30	42.10	54.00	-11.90

$$\text{Final} = \text{Raw} + \text{Path Loss} + \text{Conversion}$$

$$\text{Margin} = \text{Final} - \text{Limit}$$

BLE 2M Mid Sidewalk LoRa Mid

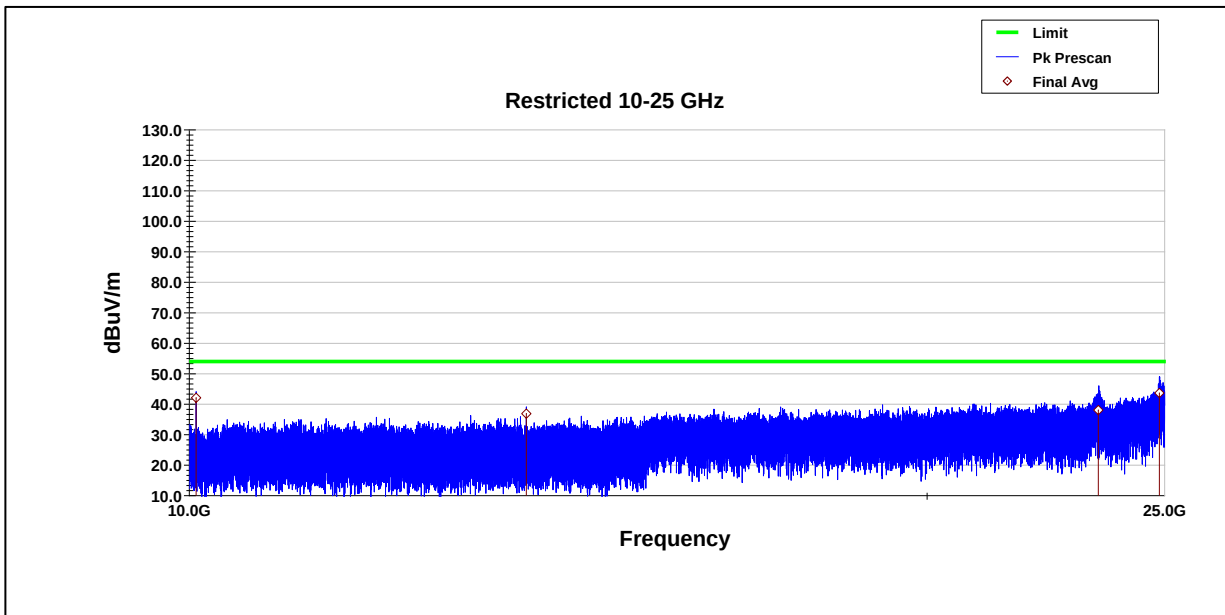


Frequency	Raw Avg	Path Loss	Conversion	Final Avg	Limit	Margin
MHz	dBm	dB	dB	dBuV/m	dBuV/m	dB
10057.829	-65.60	10.00	95.30	39.70	54.00	-14.20
12804.898	-68.30	10.40	95.30	37.30	54.00	-16.70
13716.004	-72.30	11.00	95.30	33.90	54.00	-20.00
23432.066	-73.60	15.20	95.30	36.90	54.00	-17.00
24896.609	-72.60	19.40	95.30	42.10	54.00	-11.90

$$\text{Final} = \text{Raw} + \text{Path Loss} + \text{Conversion}$$

$$\text{Margin} = \text{Final} - \text{Limit}$$

BLE 2M Mid Sidewalk FSK Mid



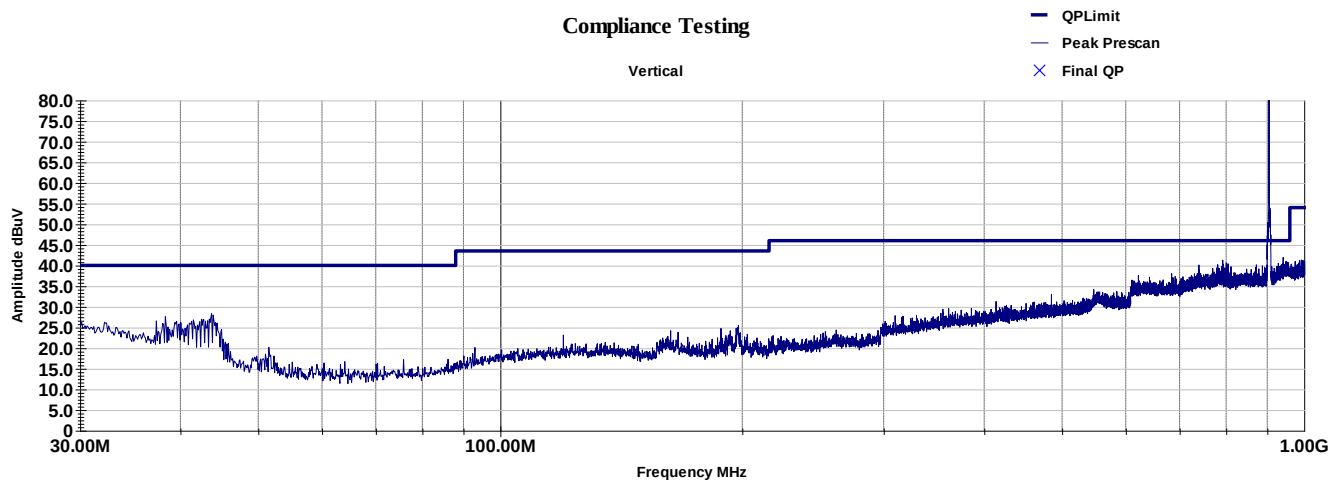
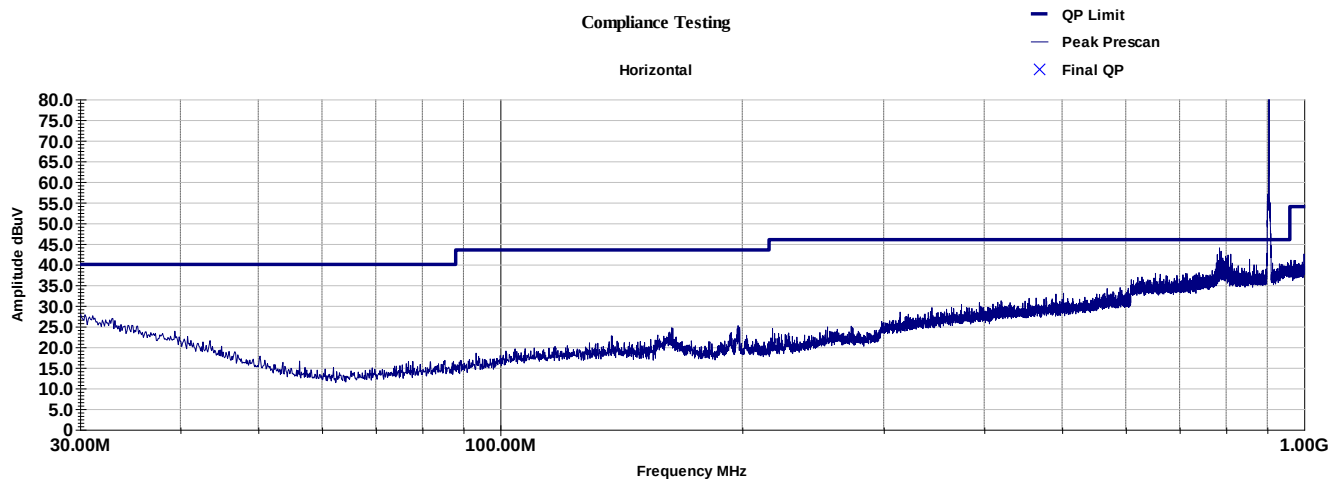
Frequency	Raw Avg	Path Loss	Converston	Final Avg	Limit	Margin
MHz	dBm	dB	dB	dBuV/m	dBuV/m	dB
10064.879	-63.20	10.00	95.30	42.10	54.00	-11.90
13725.243	-69.40	11.10	95.30	36.90	54.00	-17.10
23490.425	-73.60	16.30	95.30	38.00	54.00	-15.90
24877.791	-72.40	20.80	95.30	43.60	54.00	-10.30

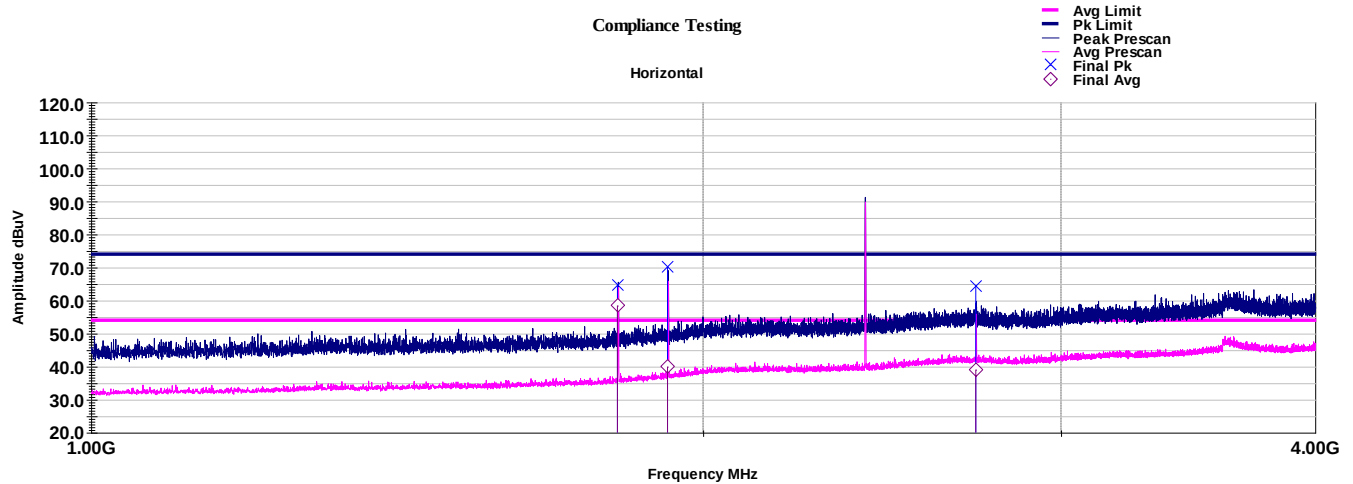
$$\text{Final} = \text{Raw} + \text{Path Loss} + \text{Conversion}$$

$$\text{Margin} = \text{Final} - \text{Limit}$$

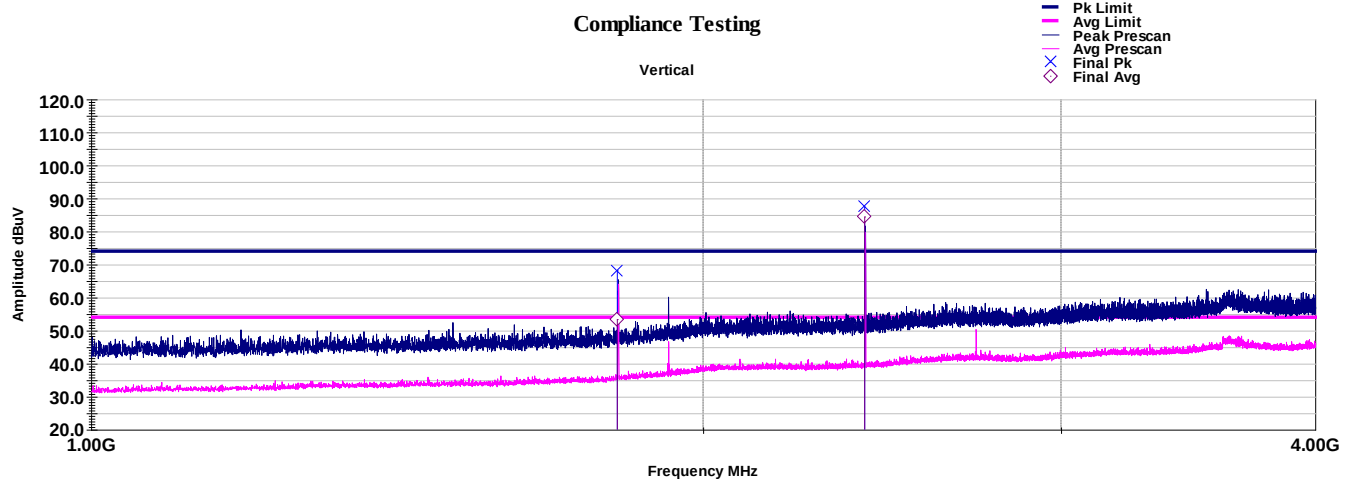
Radiated Test Data

BLE 1M Low Ch



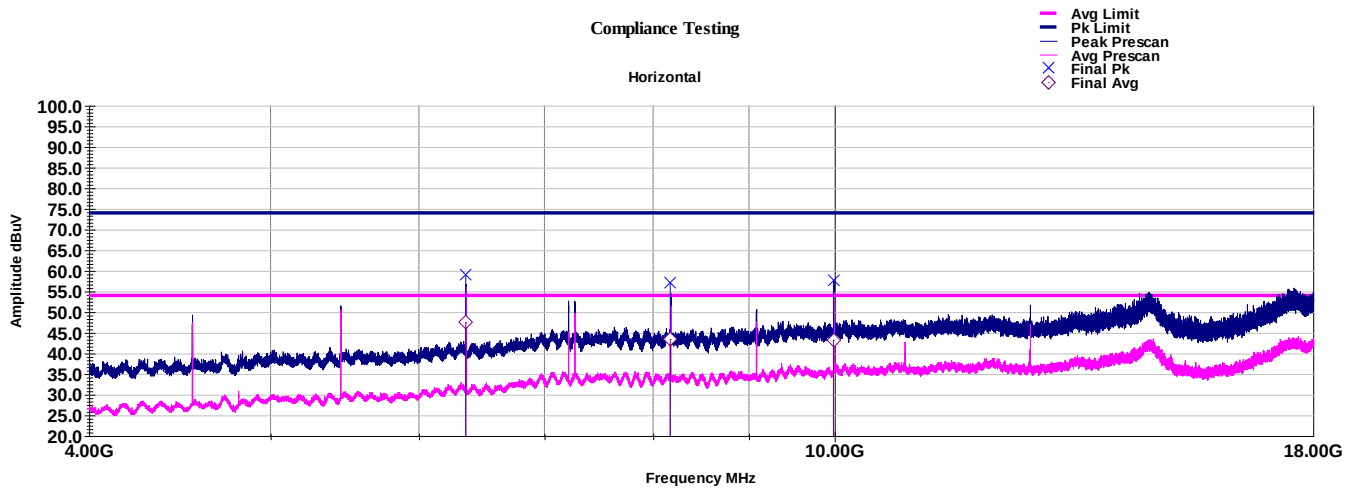


Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1815.281	172	105	33.664	27.47	30.97	64.6	NA	NA	58.4	NA	NA
1921.184	172	306	38.061	7.807	32.158	70.2	74	-3.8	40	54	-14
2723.844	164	100	28.785	3.433	35.602	64.4	74	-9.6	39	54	-15



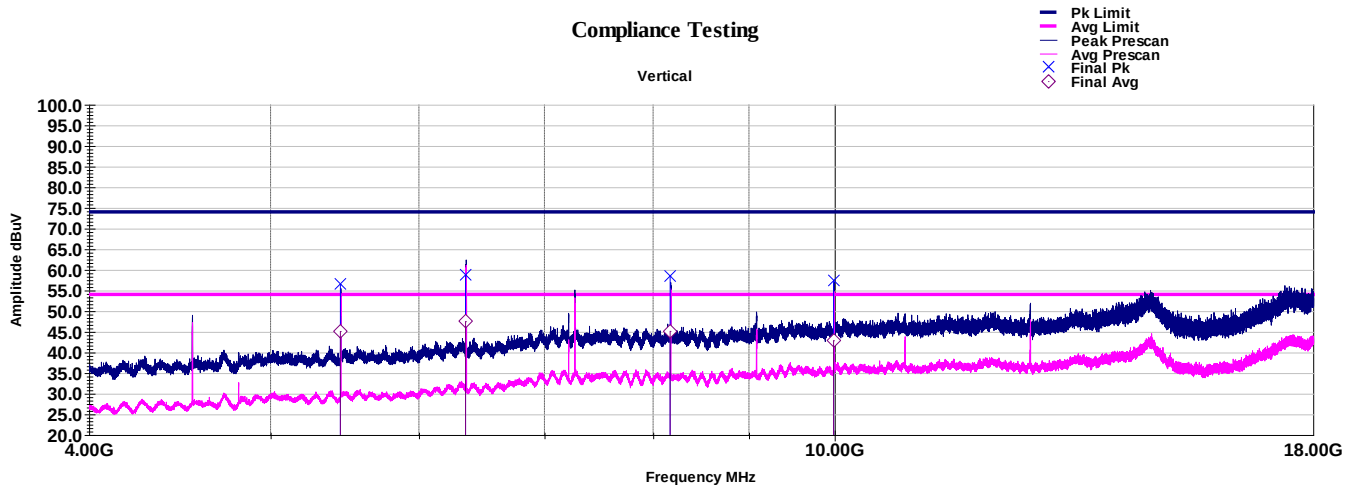
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1815.114	180	227	37.24	22.486	30.968	68.2	NA	NA	53.5	NA	NA
2401.84	181	236	53.742	50.806	33.708	87.5	NA	NA	84.5	NA	NA

Compliance Testing



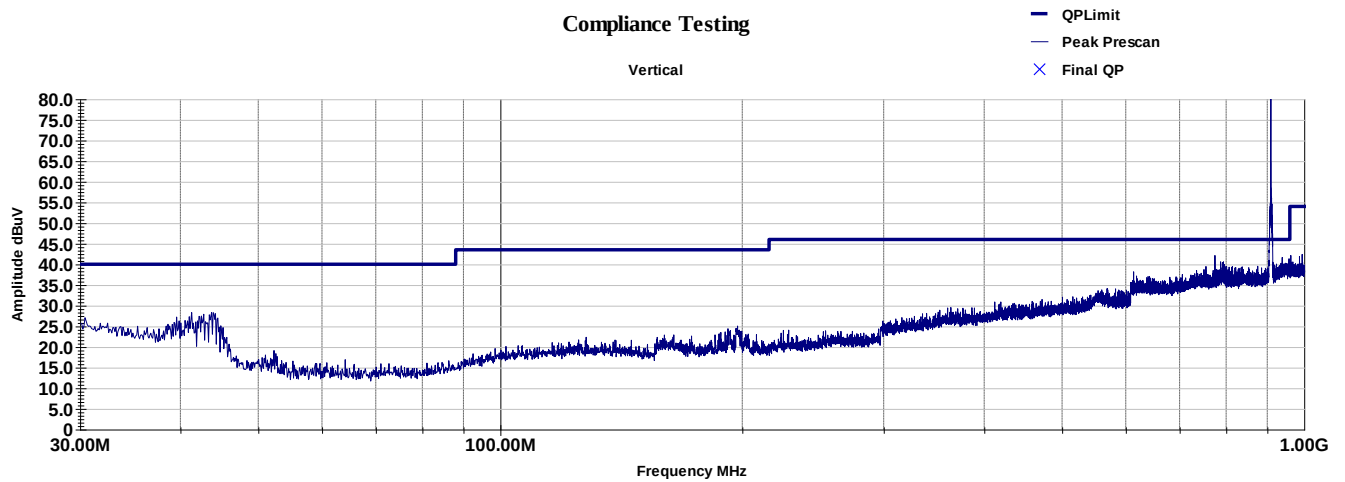
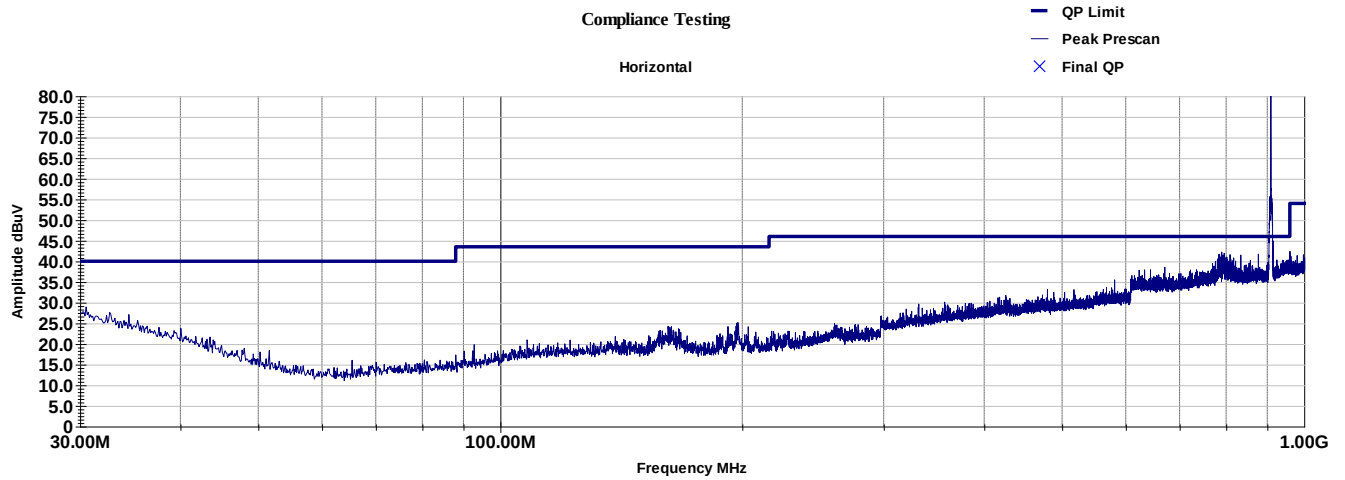
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
6355.599	355	175	60.651	49.23	-1.698	58.953	74	-15.047	47.531	54	-6.469
8170.843	307	100	54.242	40.628	2.822	57.064	74	-16.936	43.45	54	-10.55
9985.184	344	100	51.247	36.844	6.411	57.658	74	-16.342	43.255	54	-10.745

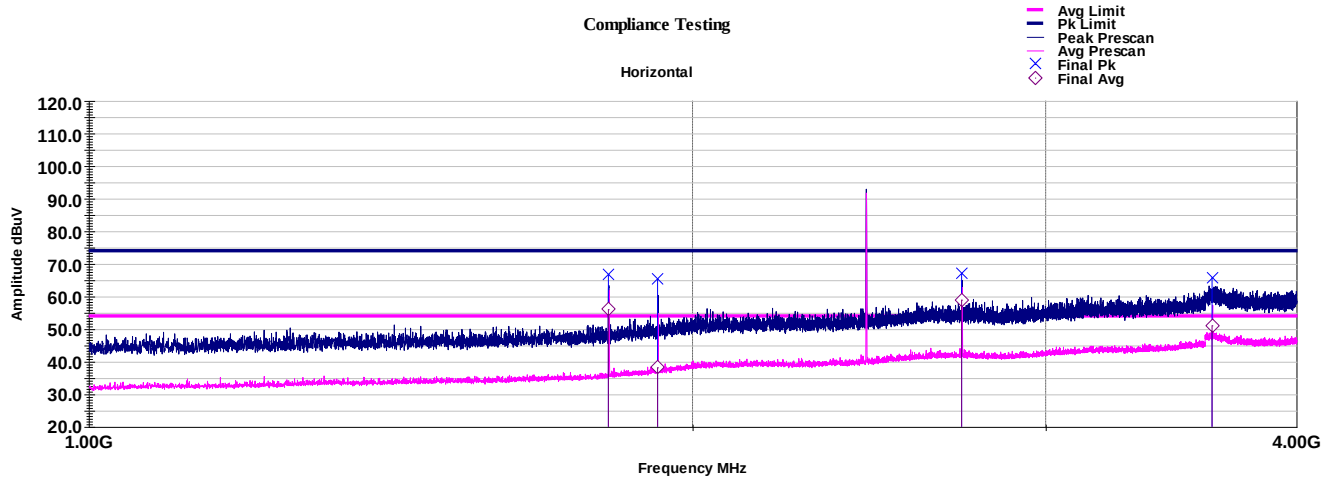
Compliance Testing



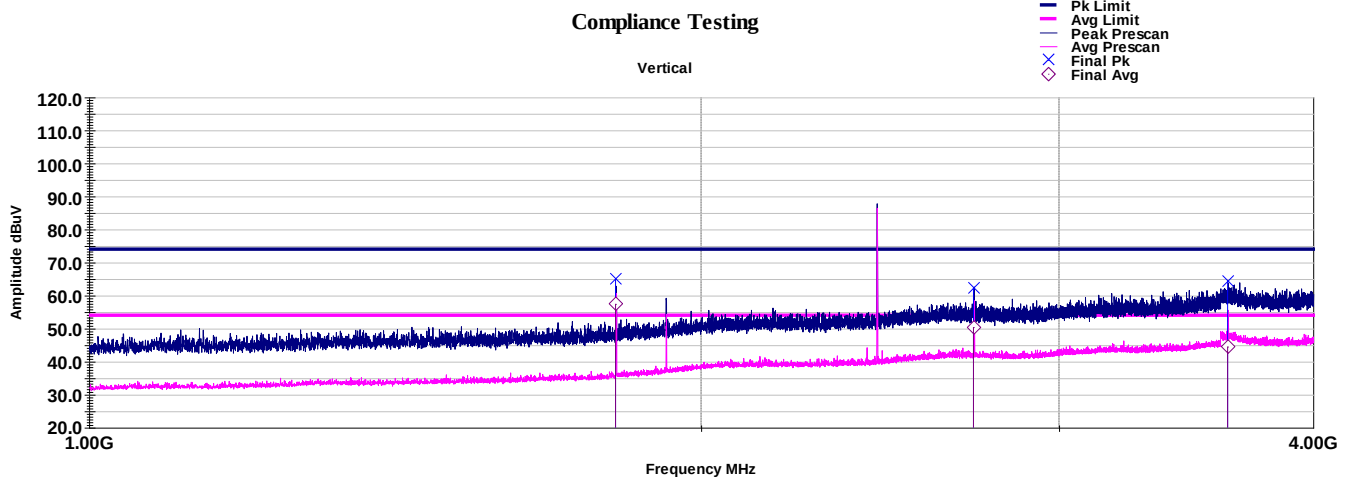
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
5447.888	309	100	60.727	49.377	-4.227	56.5	74	-17.5	45.15	54	-8.85
6353.936	351	325	60.403	49.24	-1.701	58.702	74	-15.298	47.539	54	-6.461
8169.598	344	184	55.731	42.36	2.82	58.551	74	-15.449	45.18	54	-8.82
9986.022	286	100	51.046	36.498	6.412	57.458	74	-16.542	42.91	54	-11.09

BLE 1M Mid Ch





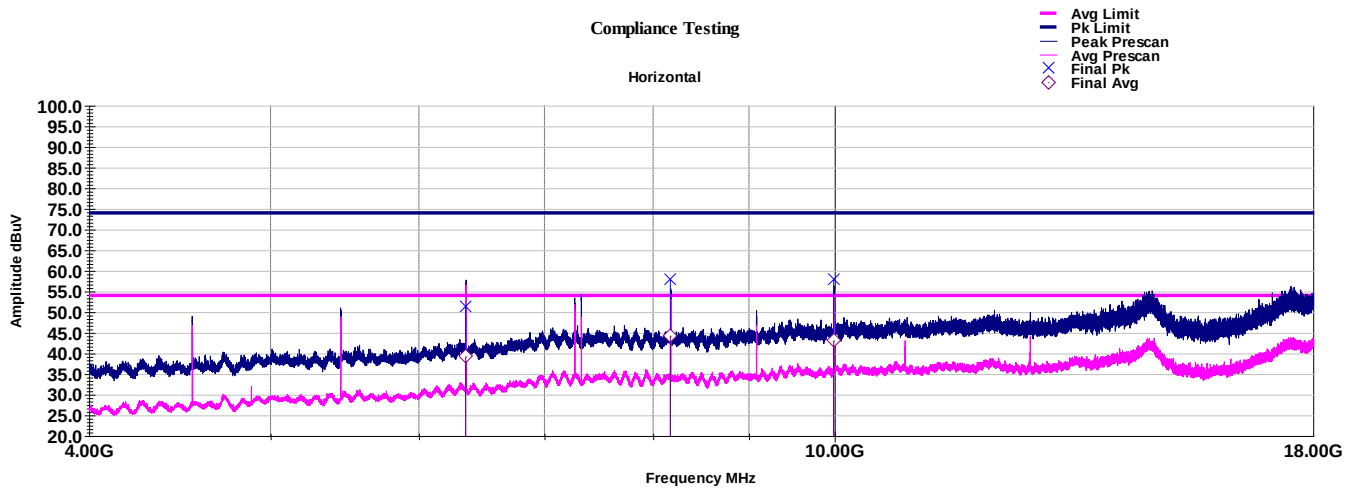
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1806.565	179	325	32.949	26.43	30.856	63.8	NA	NA	57.3	NA	NA
1926.494	132	331	28.412	6.075	32.216	60.6	NA	NA	38.3	NA	NA
2709.204	189	394	27.612	10.274	35.552	63.2	74	-10.8	45.8	54	-8.2



Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
2708.595	107	326	27.466	13.477	35.55	63	74	-11	49	54	-5

Compliance Testing

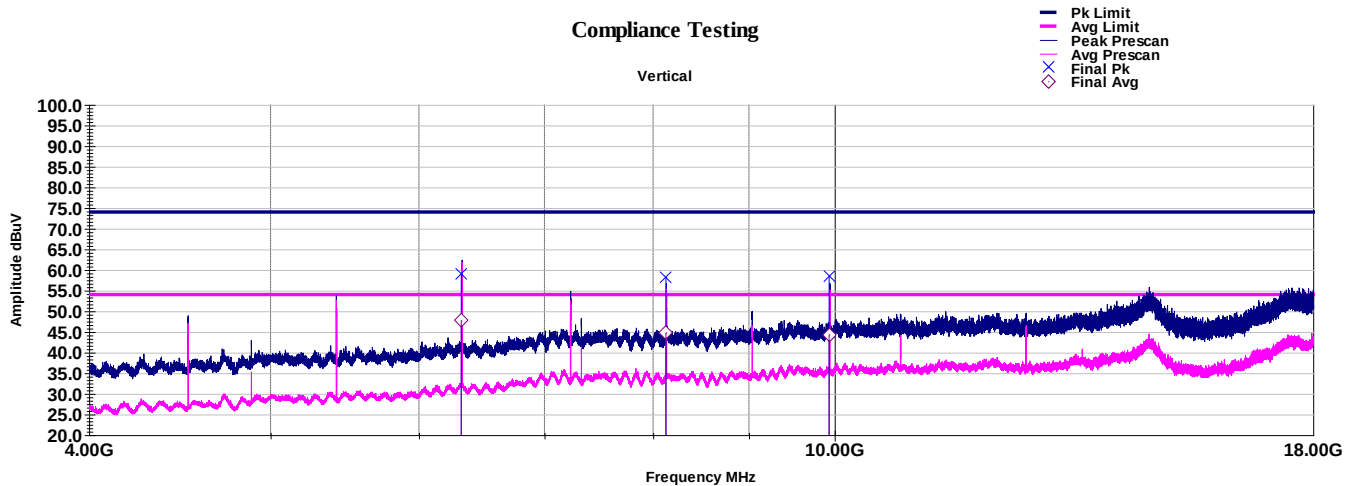
Horizontal



Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
6354.806	204	325	53.068	40.889	-1.7	51.368	74	-22.632	39.19	54	-14.81
8172.051	293	109	54.986	41.42	2.823	57.809	74	-16.191	44.242	54	-9.758
9987.744	343	100	51.378	36.643	6.415	57.793	74	-16.207	43.058	54	-10.942

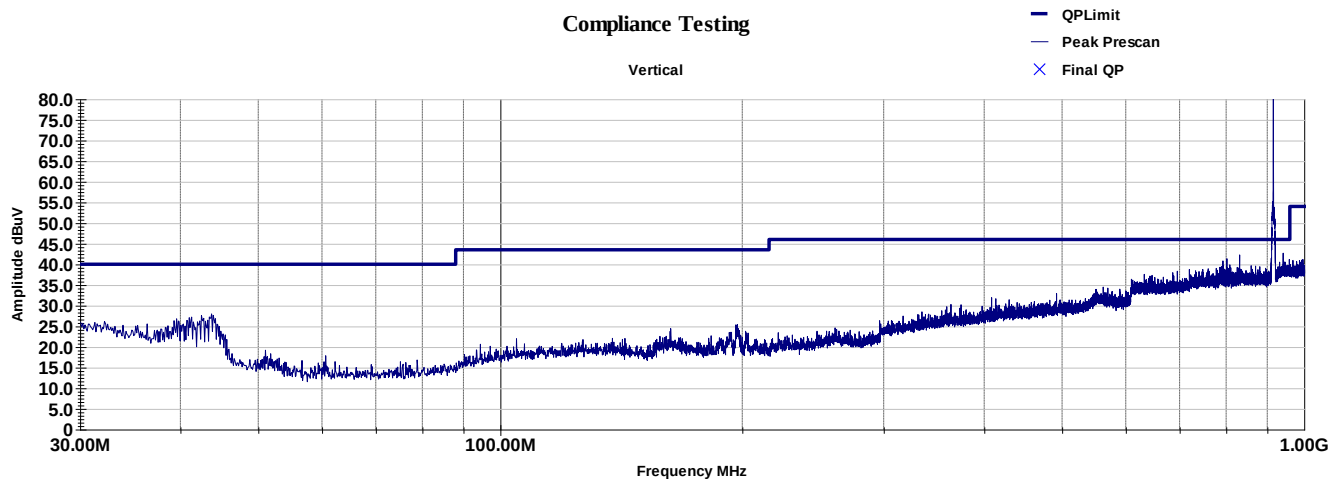
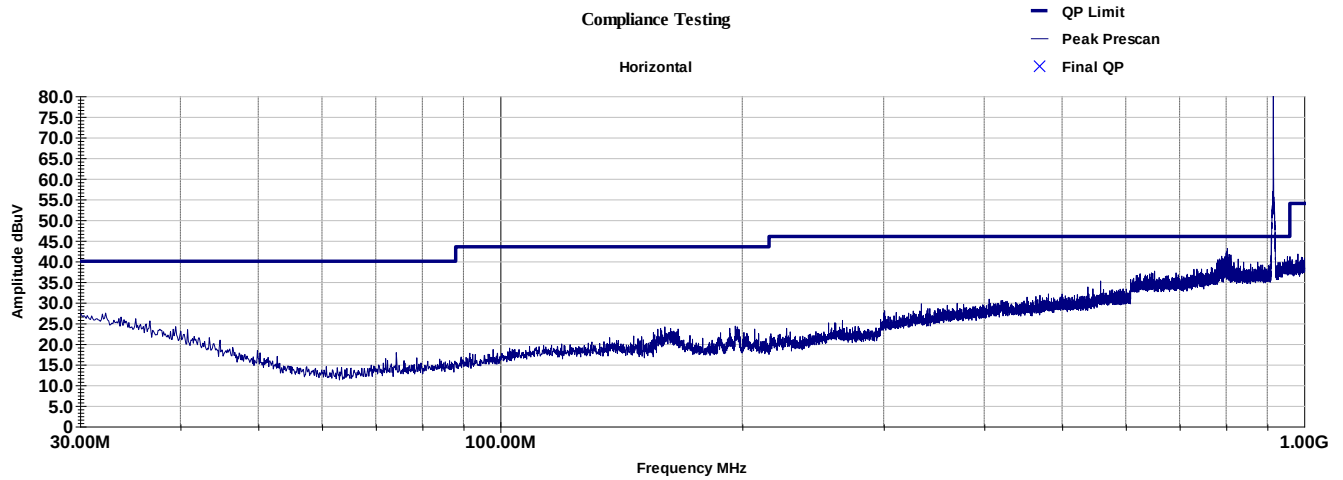
Compliance Testing

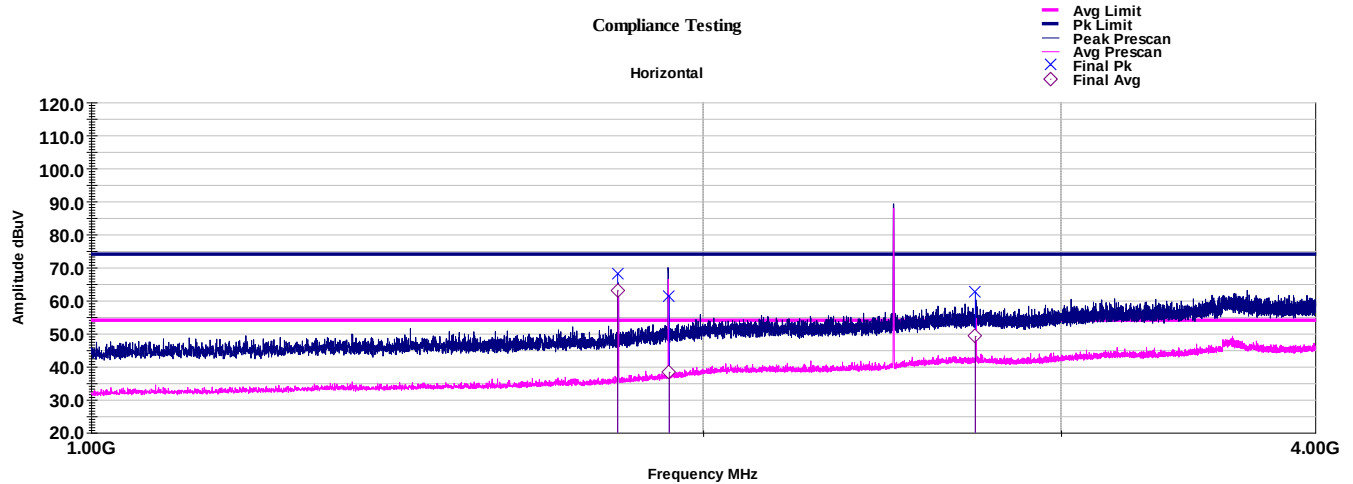
Vertical



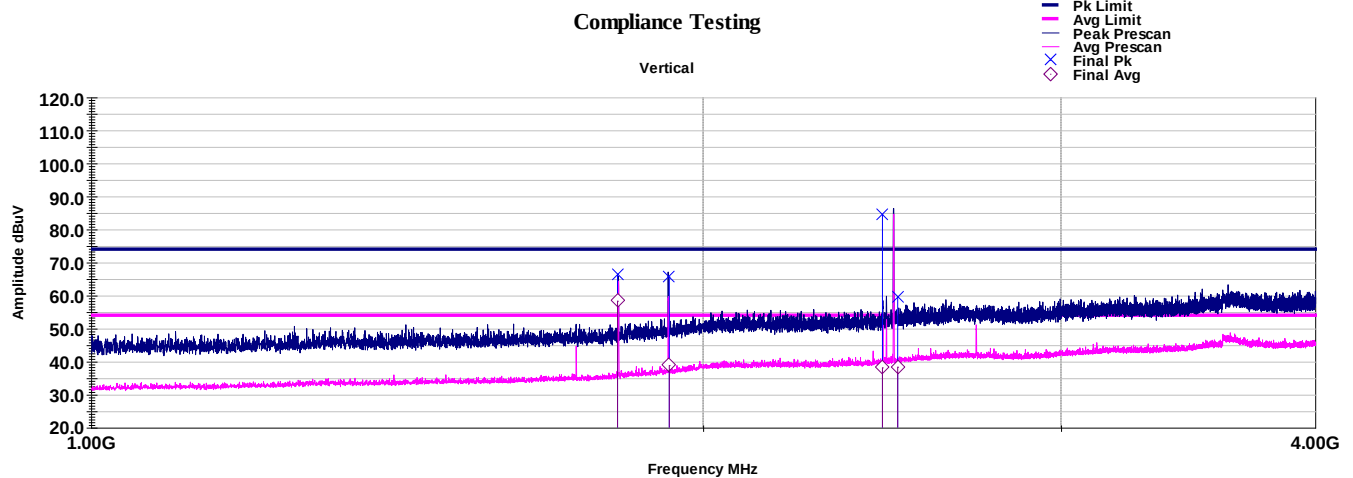
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
6355.908	355	325	60.351	49.08	-1.697	58.654	74	-15.346	47.383	54	-6.617
14766.87	285	210	38.723	22.579	17.195	55.918	74	-18.082	39.774	54	-14.226

BLE 1M High Ch



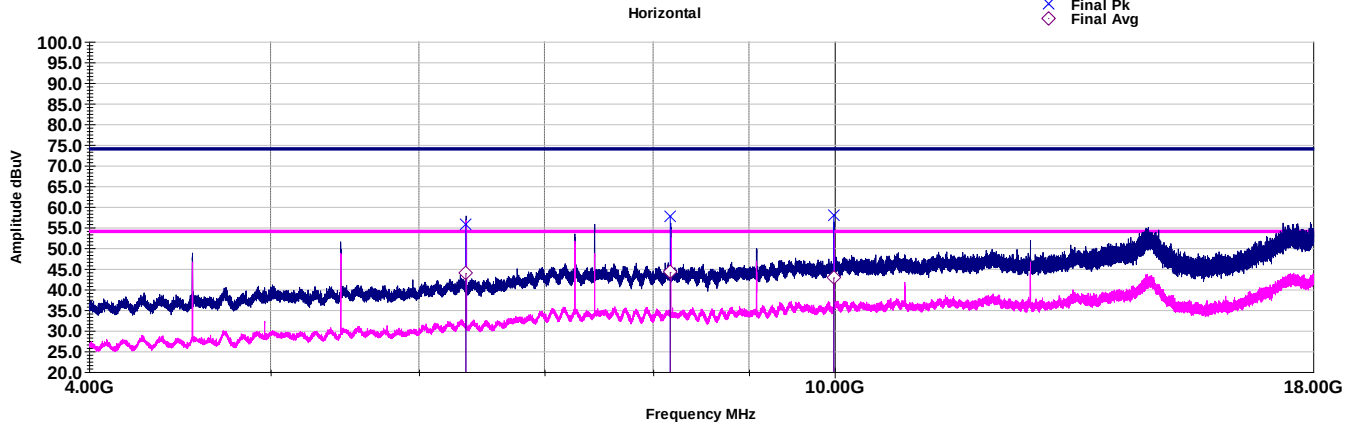


Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1815.643	160	124	37.151	32.064	30.975	68.1	NA	NA	63	NA	NA
1924.925	158	381	29.027	6.192	32.199	61.2	NA	NA	38.4	NA	NA
2722.742	158	159	26.937	13.579	35.599	62.5	74	-11.5	49.2	54	-4.8



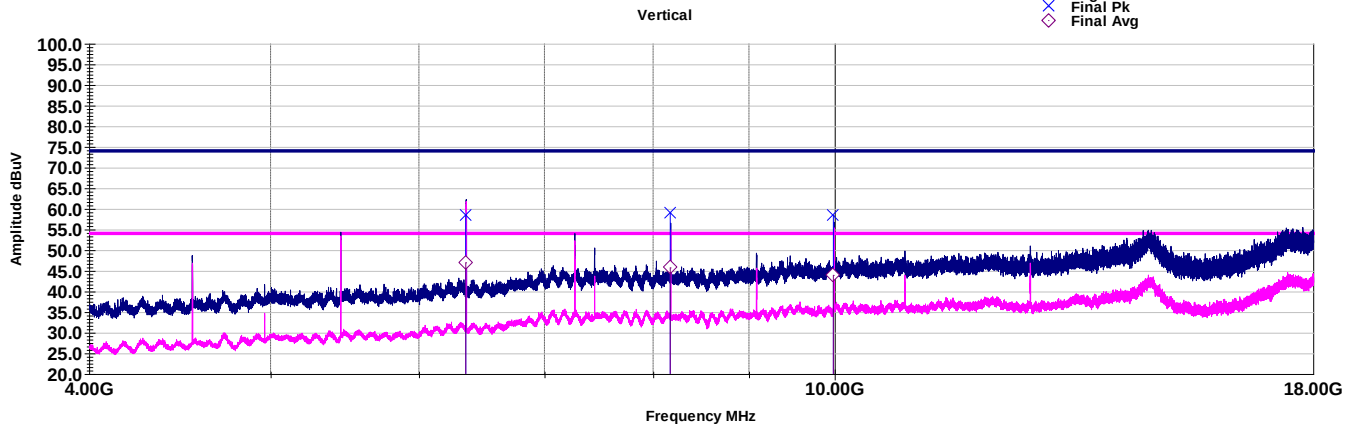
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1815.386	138	117	35.57	27.412	30.971	66.5	NA	NA	58.4	NA	NA
1925.021	341	347	33.505	6.714	32.2	65.7	NA	NA	38.9	NA	NA
2450.54	163	121	50.489	4.235	33.962	84.5	NA	NA	38.2	NA	NA
2493.297	168	144	25.261	4.054	34.357	59.6	74	-14.4	38.4	54	-15.6

Compliance Testing

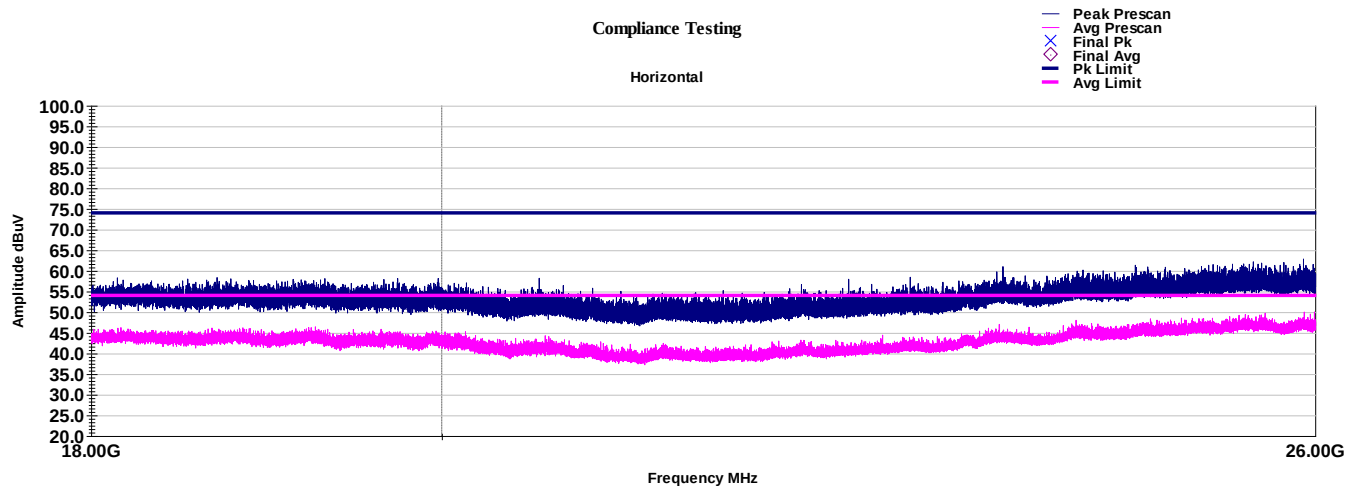


Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
6356.282	224	217	57.521	45.623	-1.697	55.824	74	-18.176	43.927	54	-10.073
8171.196	293	113	54.905	41.356	2.822	57.727	74	-16.273	44.178	54	-9.822
9988.218	345	100	51.562	36.444	6.416	57.978	74	-16.022	42.86	54	-11.14

Compliance Testing



Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
6355.154	342	325	60.197	48.733	-1.699	58.498	74	-15.502	47.034	54	-6.966
8170.249	346	205	56.274	42.984	2.821	59.095	74	-14.905	45.805	54	-8.195
9983.939	6	100	52.037	37.549	6.409	58.446	74	-15.554	43.958	54	-10.042



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
18 – 26 GHz horn	Emco	3116	i00085	02/22/2021	02/22/2023
Horn Antenna	ARA	DRG-118/A	i00271	08/11/22	08/10/24
Bi-Log antenna	Teseq	CBL 6111Dk	i00349	01/20/21	01/20/23
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	7/17/20	7/17/23
Spectrum Analyzer	Agilent	E4445A	i00471	12/27/2021	12/27/2022
EMI Analyzer	Rohde & Schwarz	FSU 26	i00501	05/10/22	05/10/23
EMI Receiver	Keysight	N9038A	i00552	02/24/22	02/24/23
Environmental Sensor	Omega	iBTHX-W-5	i00631	11/03/21	11/03/22*
Preamplifier	Eravant	SBB-0115034018-2F2F-E3	i00650	Verified on: 11/15/22	

*Calibration extended with the approval of Quality Manager.

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

Measurement Uncertainty

Measurement Uncertainty (U_{lab}) for Compliance Testing is listed in the table below.

Measurement	U_{lab}
Radio Frequency	$\pm 3.3 \times 10^{-8}$
RF Power, conducted	± 1.5 dB
RF Power Density, conducted	± 1.0 dB
Conducted Emissions	± 1.8 dB
Radiated Emissions	± 4.5 dB
Temperature	± 1.5 deg C
Humidity	± 4.3 %
DC voltage	± 0.20 VDC
AC Voltage	± 1.2 VAC

The reported expanded uncertainty $\pm U_{lab}(\text{dB})$ has been estimated at a 95% confidence level ($k=2$)

U_{lab} is less than or equal to U_{ETSI} therefore

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit
- Non-Compliance is deemed to occur if any measured disturbance exceeds the disturbance li

END OF TEST REPORT