



**3.4 Frequency stability**

**3.4.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.215(c)  
 Industry Canada RSS-GEN

**3.4.2 Equipment Under Test and Modification State**

P2LPR, S/N: N/A - Modification State 0

Frequency stability was performed only once because all EUTs an EUT configurations contain the same electronic and transceiver hardware.

**3.4.3 Date of Test**

2019-08-07

**3.4.4 Test Method**

The test was performed in accordance with  
 ANSI C63.10  
 KDB 890966 D01  
 RSS-Gen

**3.4.5 Environmental Conditions**

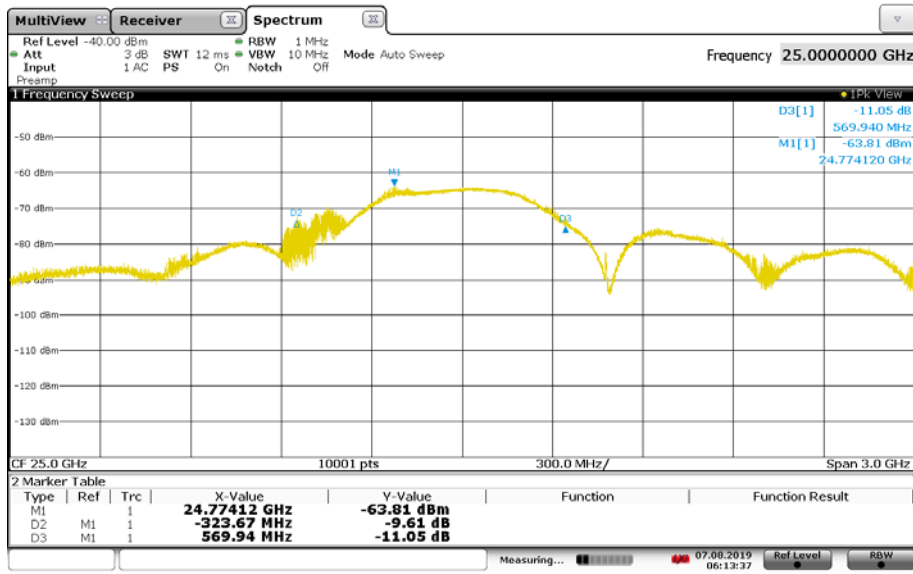
Ambient Temperature 25,0 °C  
 Relative Humidity 56,0 %

**3.4.6 Test Results**

Normal operation mode: Measurement with pulsed signal

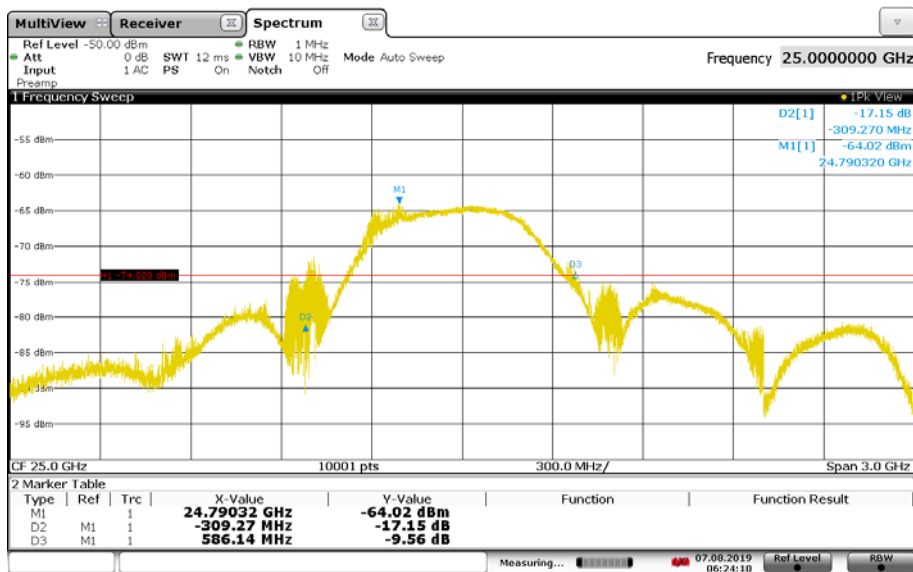
<b>Operating Conditions</b>	<b>10 dB Bandwidth (MHz)</b>	<b>f-10dB lower (GHz)</b>	<b>f-10 upper (GHz)</b>
10.2V DC / +20°C	893.61	24.45045	25.34406
34.5V DC / +20°C	895.41	24.48105	25.37646
24V DC / -20°C	1029.8	24.65823	25.68803
24V DC / -10°C	1011.2	24.47116	25.48236
24V DC / 0°C	1046.9	24.43605	25.48295
24V DC / +10°C	1001.9	24.45255	25.45445
24V DC / +20°C	878.61	24.45735	25.33596
24V DC / +30°C	980.3	24.43156	25.41186
24V DC / +40°C	907.11	24.45405	25.36116
24V DC / +50°C	915.21	24.44265	25.35786

**Table 10**



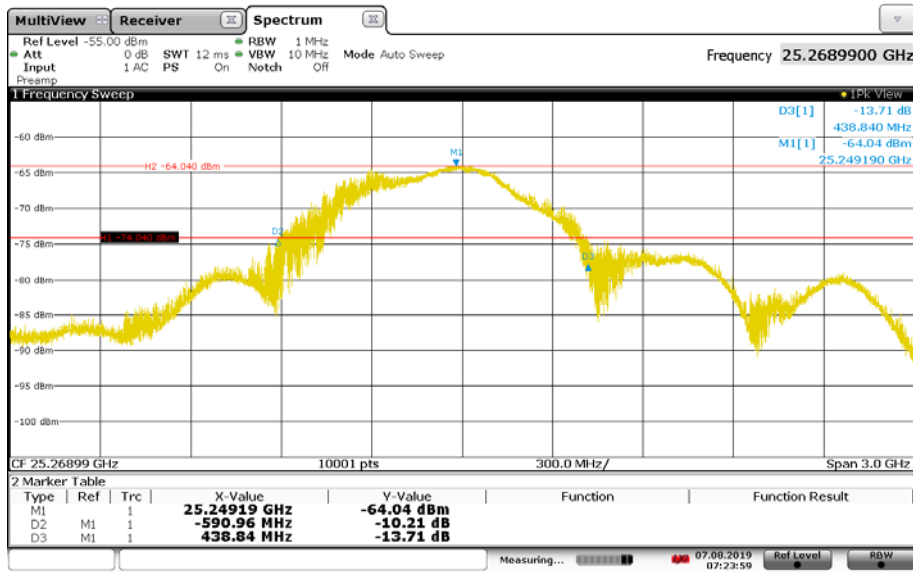
06:13:38 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 10.2V DC / +20°C**



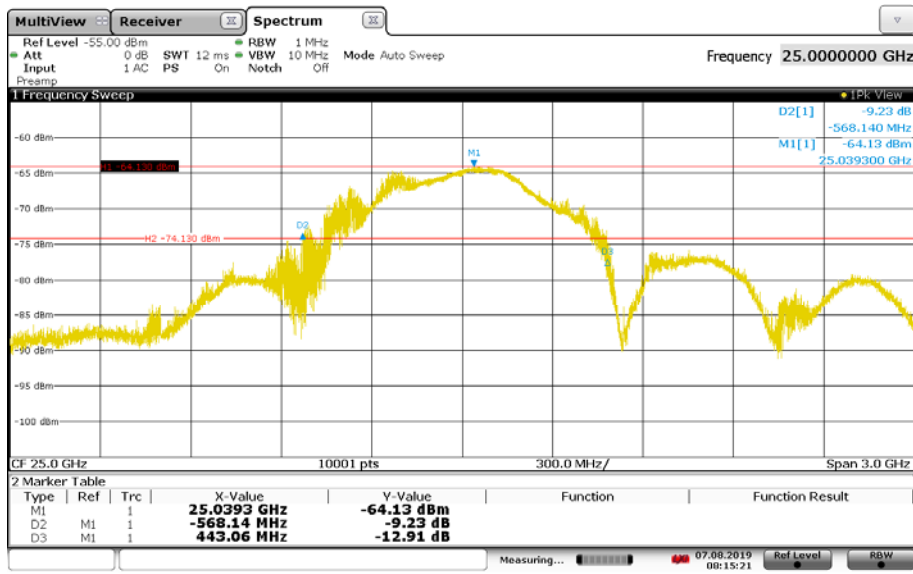
06:24:11 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 34.5V DC / +20°C**



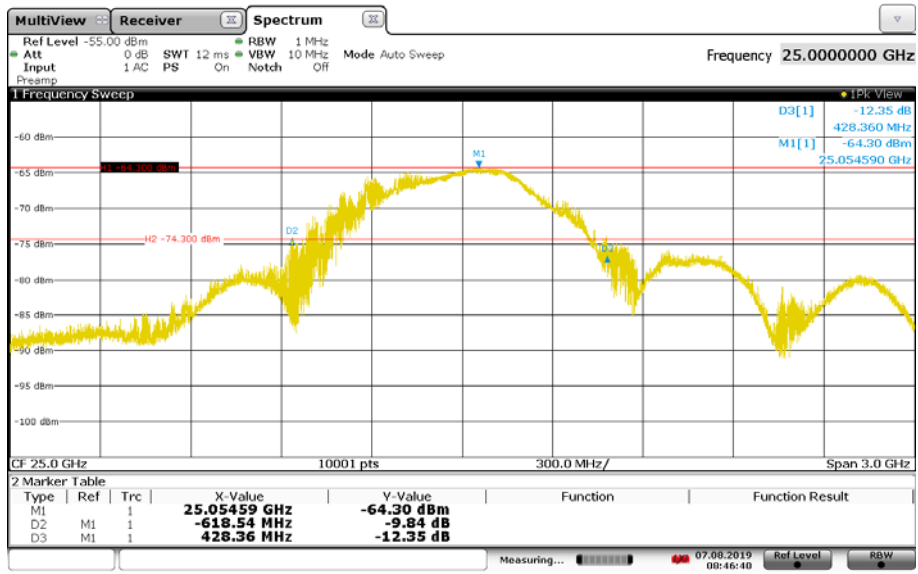
07:24:00 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 24.0V DC / -20°C**



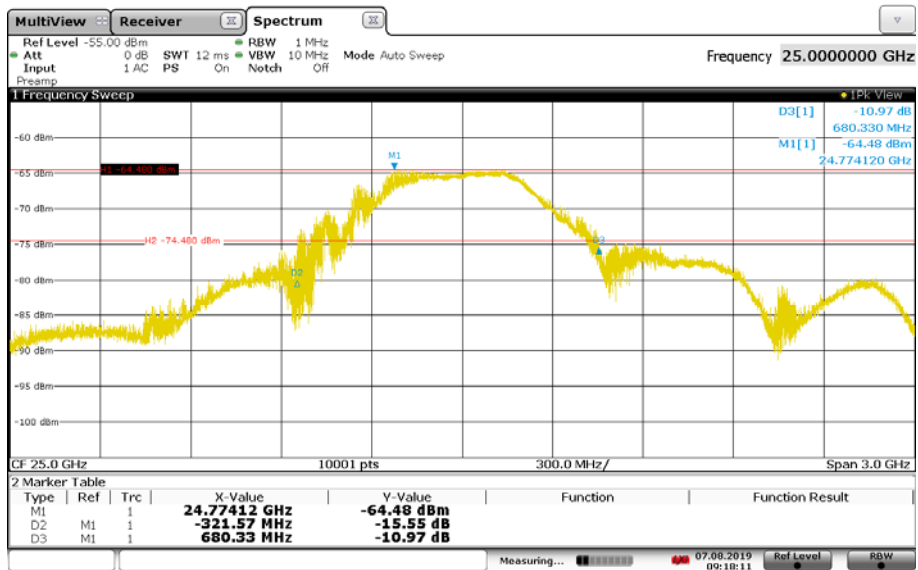
08:15:22 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 24.0V DC / -10°C**



08:46:40 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 24.0V DC / 0°C**



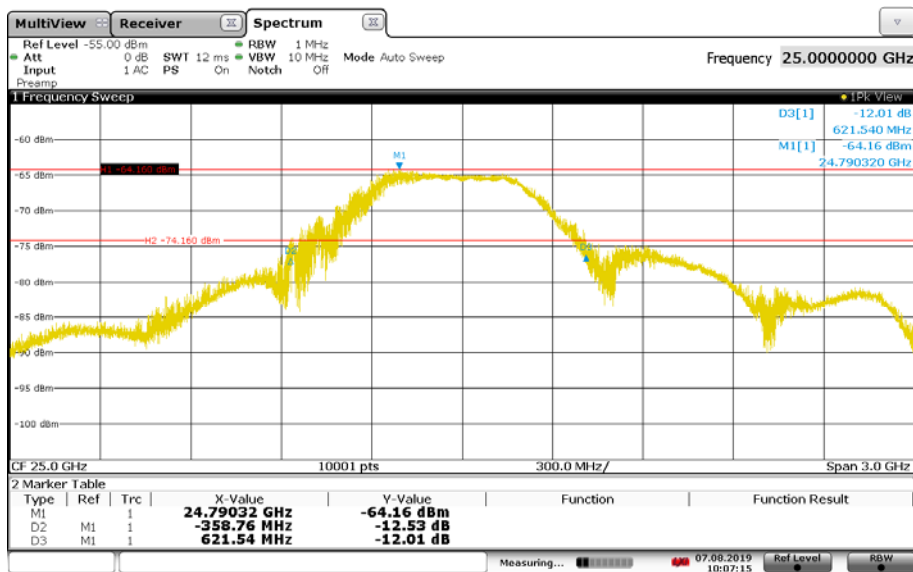
09:18:11 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 24.0V DC / +10°C**



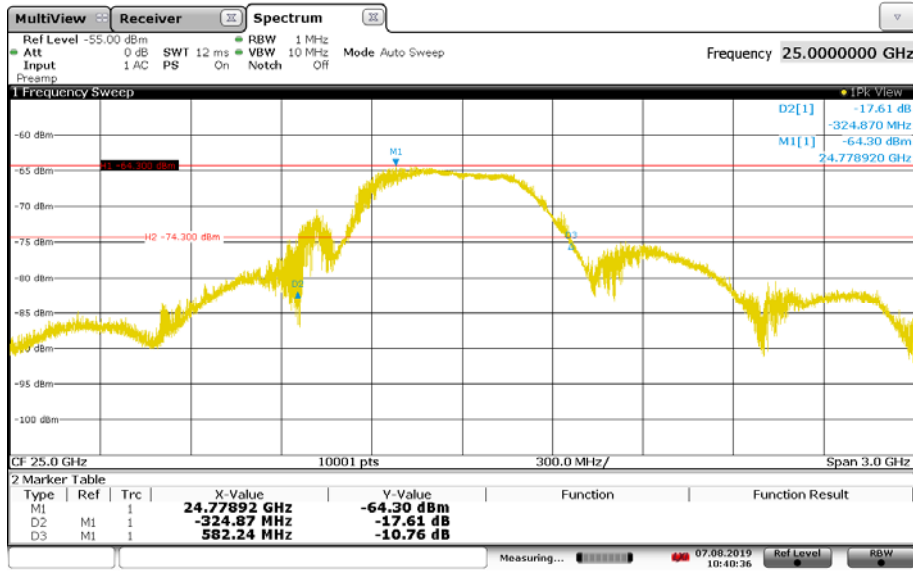
06:08:42 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 24.0V DC / +20°C**



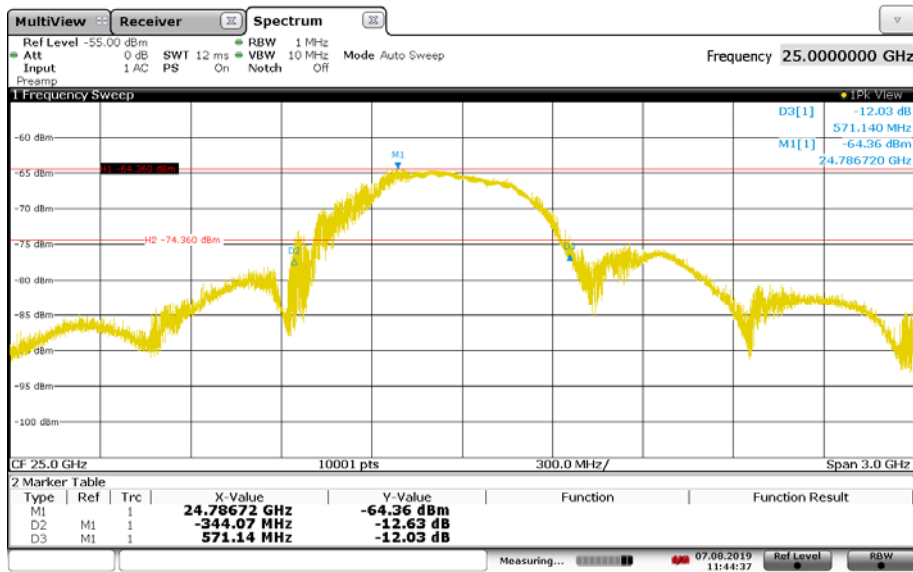
10:07:16 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 24.0V DC / +30°C**



10:40:36 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 24.0V DC / +40°C**



11:44:38 07.08.2019

**Fundamental Emission -10 dB Bandwidth – 24.0V DC / +50°C**

FCC 47 CFR Part 15, Limit Clause 15.215 and Industry Canada RSS GEN, Limit Clause 6.11  
 Emission shall fall fully into designated frequency band 24.05 to 29.00 GHz.



### 3.4.7 Test Location and Test Equipment Used

This test was carried out in Fully Anechoic Room no. 2.

<i>T-ID</i>	<i>Designation</i>	<i>Type</i>	<i>Last Cal.</i>	<i>Next Cal.</i>
19125	Horn antenna	3160-09	Verified	
19383	Double ridged waveguide horn antenna	3115	2017-02	2020-02
19442	Horn antenna	3160-10	Verified	
19946	Horn antenna	24240-20	Verified	
22553	Waveguide mixer	FS-Z170	2016-08	2019-08
25849	Waveguide mixer	FS-Z60	2017-04	2020-04
25850	Waveguide mixer	FS-Z90	2016-12	2019-12
25851	Waveguide mixer	FS-Z110	2016-11	2019-11
27898	Horn antenna	26240-20	Verified	
27899	Horn antenna	27240-20	Verified	
39897	EMI test receiver	ESW44	2019-02	2020-02
36954	Harmonic Mixer	FS-Z220	2018-03	2021-03
36955	Harmonic Mixer	FS-Z325	2018-02	2021-02
37863	Horn antenna	30240-20 WG30	Verified	
37864	Horn antenna	32240-20 WG32	Verified	
38401	ULTRALOG Antenna	HL562E	2018-05	2021-05

**Table 11**



Product Service

### **3.5 Unwanted emissions**

#### **3.5.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.209  
Industry Canada RSS-GEN

#### **3.5.2 Equipment Under Test and Modification State**

P2LPR, S/N: N/A - Modification State  
P4LPR, S/N: N/A - Modification State  
P5LPR, S/N: N/A - Modification State

#### **3.5.3 Date of Test**

2018-07-30 to 2019-08-06

#### **3.5.4 Test Method**

The test was performed in accordance with  
ANSI C63.10  
RSS-GEN

#### **3.5.5 Environmental Conditions**

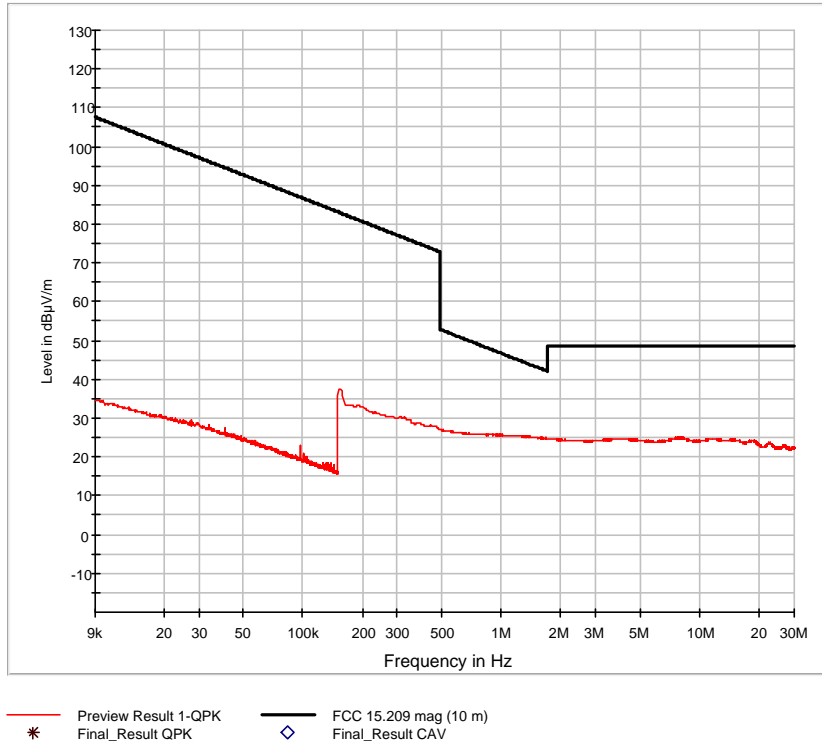
Ambient Temperature	22,0 °C
Relative Humidity	31,0 %

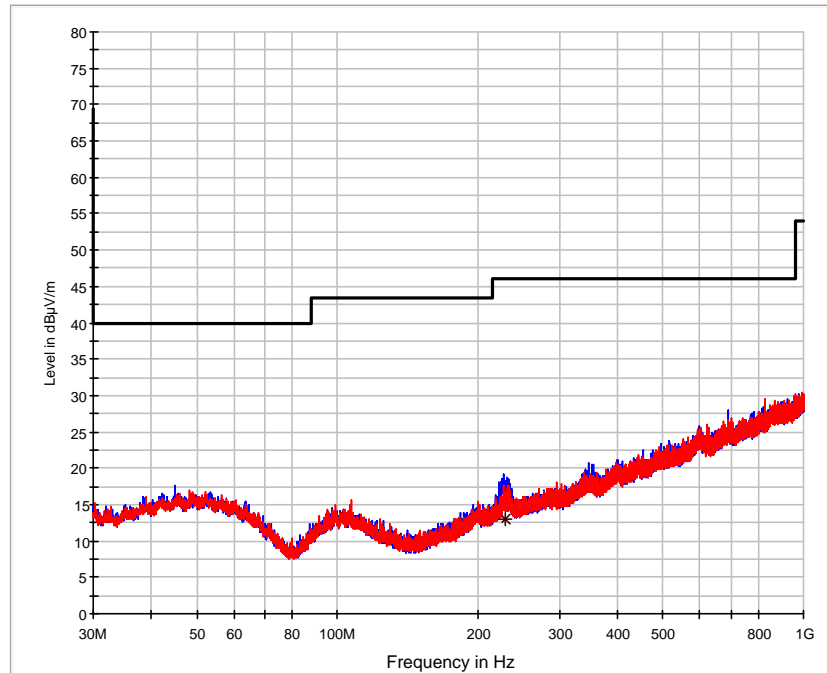




### 3.5.6 Test Results

EUT: P2LPR in LPR operation (radar without tank)  
Normal operation mode: Measurement with pulsed signal

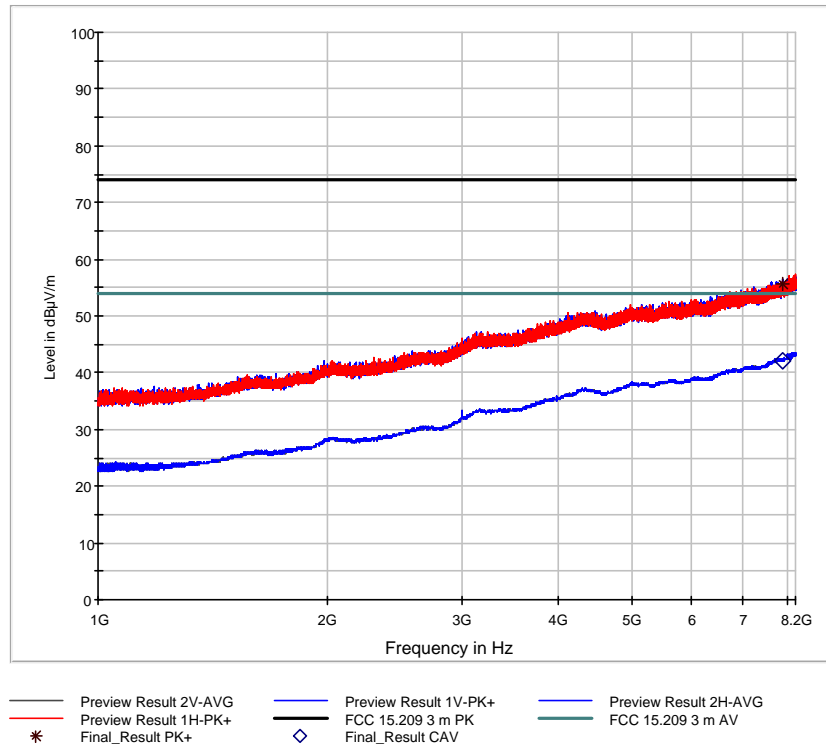




— Preview Result 1V-PK+      — Preview Result 1H-PK+  
— FCC 15.209\_3m              \* Final\_Result QPK

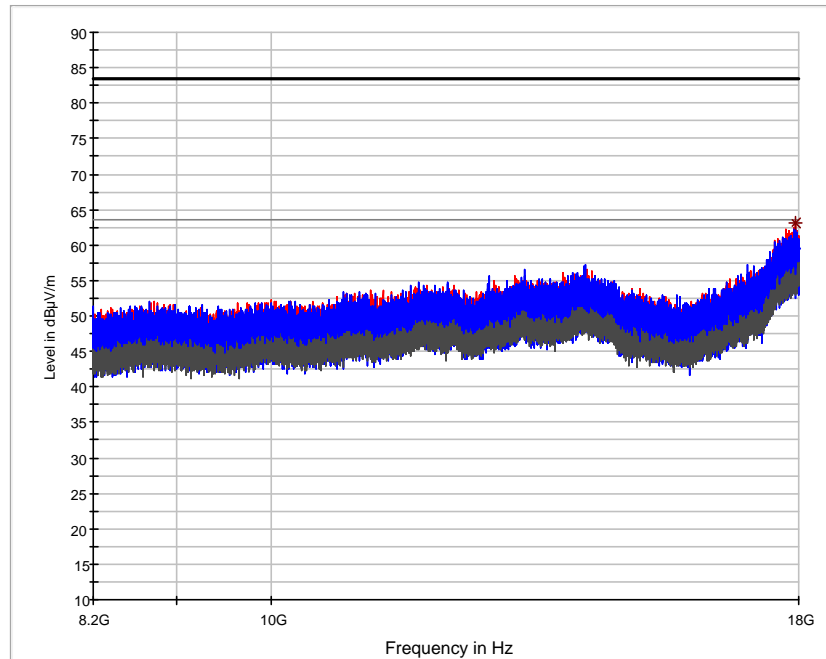
**Final Results:**

Frequency MHz	QuasiPeak dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
228.840000	13.00	46.00	33.00	1000.0	120.000	133.0	V	-14.0	13.6



**Final Results:**

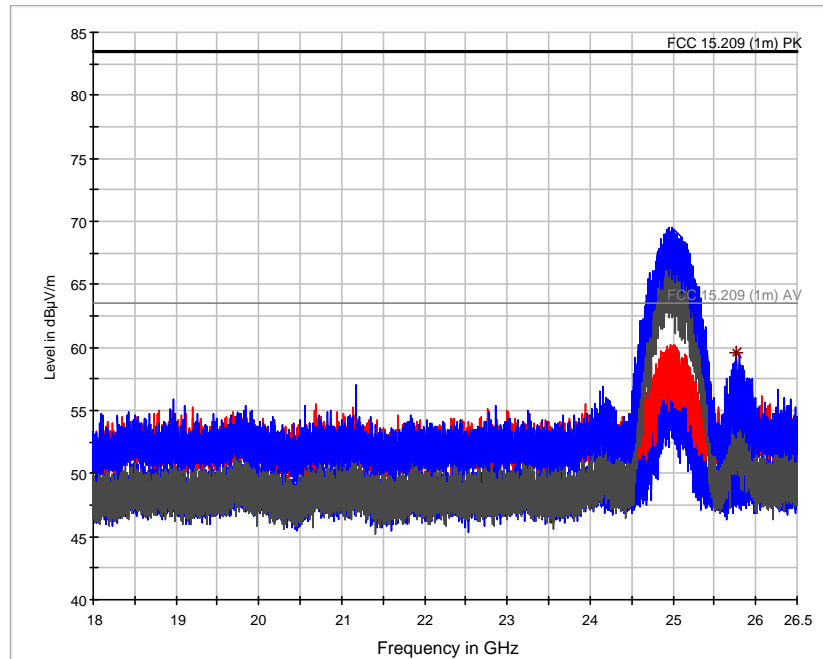
Frequency MHz	MaxPeak dBµV/m	CAverage dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
7871.750000	---	42.07	53.98	11.91	1000.0	1000.000	395.0	V	27.0	46.2
7871.750000	55.66	---	73.97	18.31	1000.0	1000.000	395.0	V	27.0	46.2



— Preview Result 2H-AVG      — Preview Result 1H-PK+      — Preview Result 2V-AVG  
— Preview Result 1V-PK+      — FCC 15.209 (1m) PK      — FCC 15.209 (1m) AV  
\* Final\_Result PK+      ◇ Final\_Result AVG

**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
17857.900000	---	59.58	63.50	3.92	2.5	1000.000	150.0	H	42.0	48.0
17951.326667	63.14	---	83.50	20.36	2.5	1000.000	150.0	H	0.0	48.3

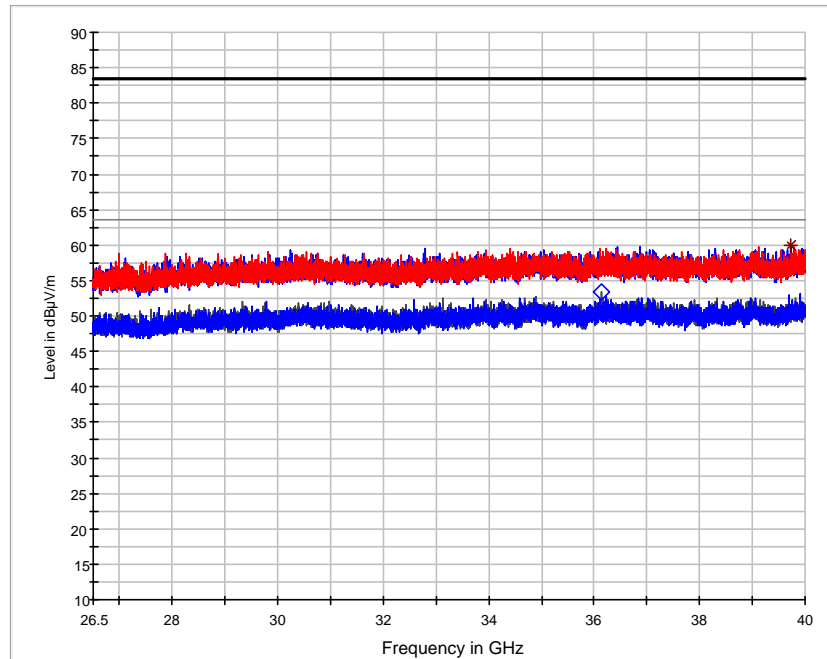


— Preview Result 2H-AVG      — Preview Result 1H-PK+      — Preview Result 2V-AVG  
— Preview Result 1V-PK+      — FCC 15.209 (1m) PK      — FCC 15.209 (1m) AV  
\* Final\_Result PK+      ◇ Final\_Result AVG

**Final Result:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
25012.500000	---	68.73	#1 NA	#1 NA	2.5	1000.000	150.0	V	7.0	40
25768.613636	59.60	---	#1 NA	#1 NA	2.5	1000.000	150.0	V	7.0	41

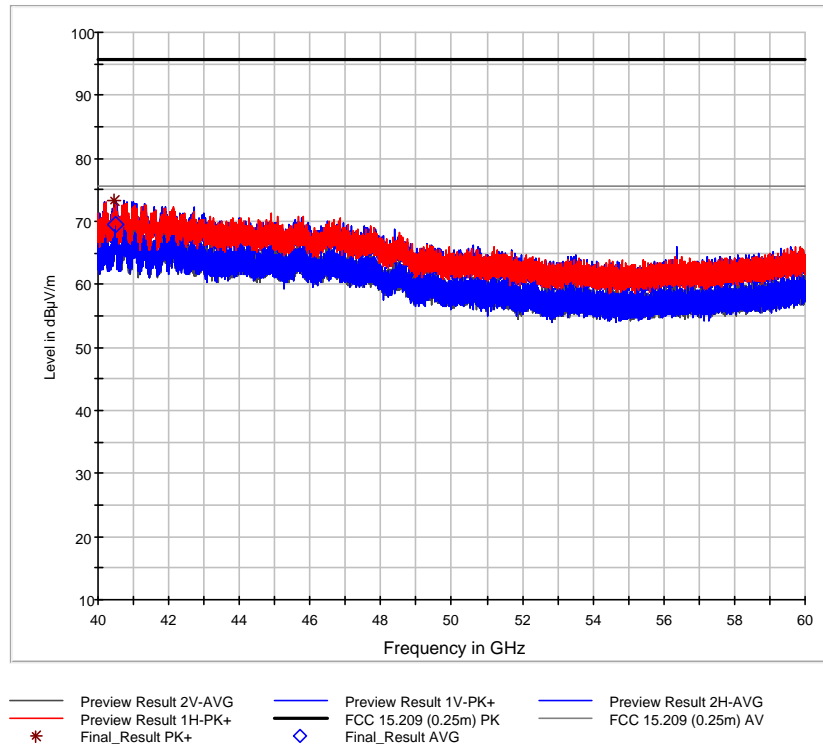
#1 Intentional Emission within 24.05-29.00 GHz band



— Preview Result 2V-AVG      — Preview Result 1V-PK+      — Preview Result 2H-AVG  
\* Preview Result 1H-PK+      — FCC 15.209 (1m) PK      — FCC 15.209 (1m) AV  
\* Final\_Result PK+      ◇ Final\_Result AVG

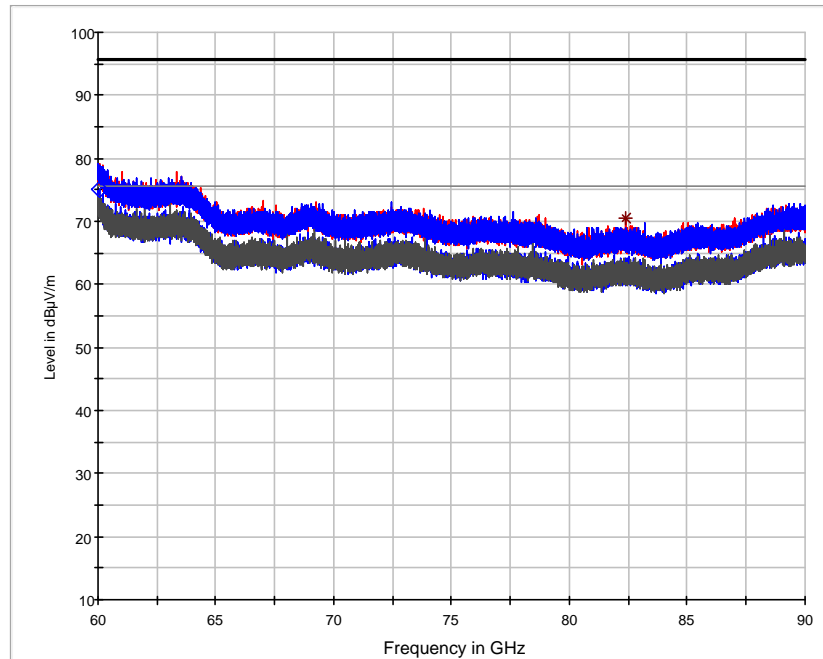
**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
36132.250000	---	53.43	63.50	10.07	2.5	1000.000	150.0	V	260.0	43.6
39721.900000	60.03	---	83.50	23.47	2.5	1000.000	150.0	V	42.0	43.8



**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
40473.750000	73.22	--	95.60	22.38	2.5	1000.000	150.0	H	339.0	44.2
40485.000000	---	69.58	75.60	6.02	2.5	1000.000	150.0	H	61.0	44.2

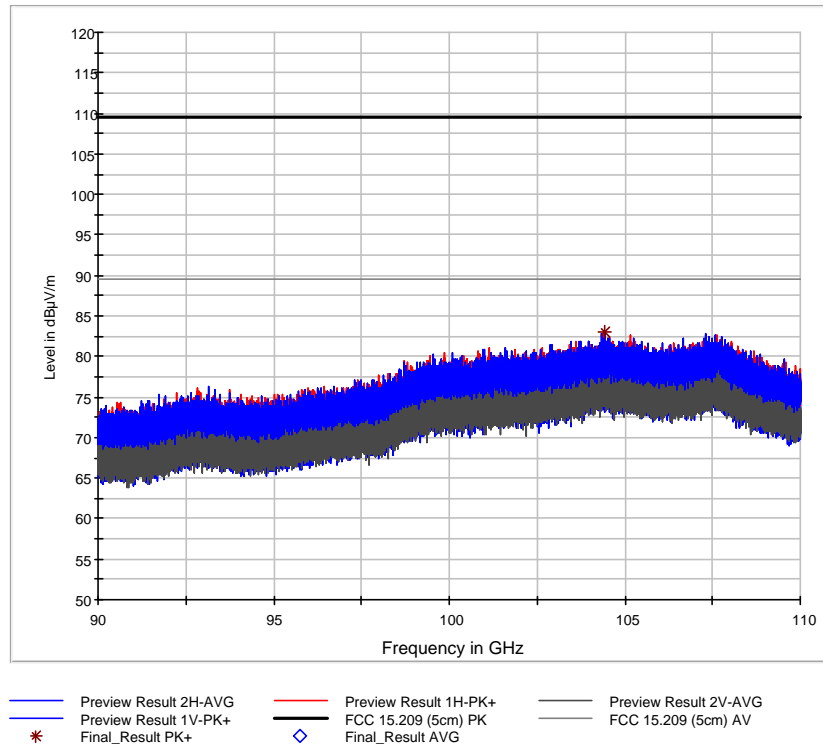


— Preview Result 2H-AVG      — Preview Result 1H-PK+      — Preview Result 2V-AVG  
— Preview Result 1V-PK+      — FCC 15.209 (0.25m) PK      — FCC 15.209 (0.25m) AV  
\* Final\_Result PK+      ◇ Final\_Result AVG

**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
60042.187500	---	75.08	75.60	0.52	2.5	1000.000	150.0	H	149.0	47.8
82375.312500	70.63	---	95.60	24.97	2.5	1000.000	150.0	H	0.0	48.0



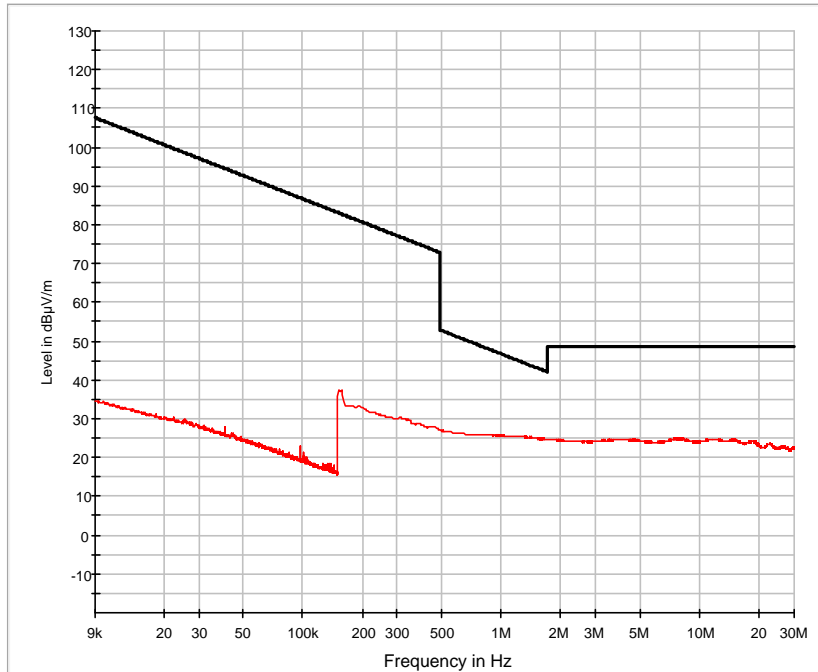


**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
104433.777778	---	80.73	89.56	8.83	2.5	1000.000	150.0	V	282.0	50
104433.777778	82.97	---	109.56	26.59	2.5	1000.000	150.0	V	282.0	50

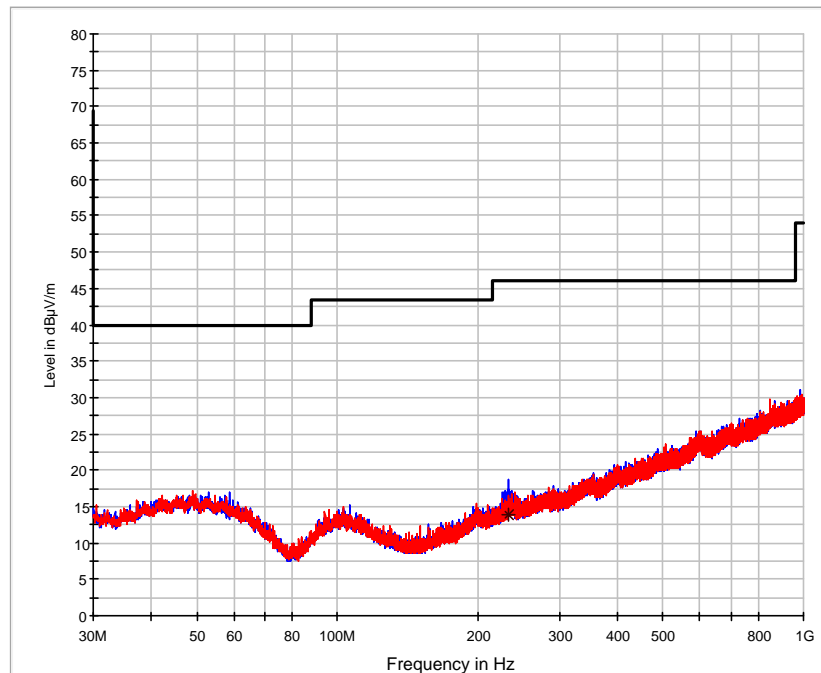


EUT: P4LPR in LPR operation (radar without tank)  
Normal operation mode: Measurement with pulsed signal



\* Preview Result 1-QPK  
Final\_Result QPK

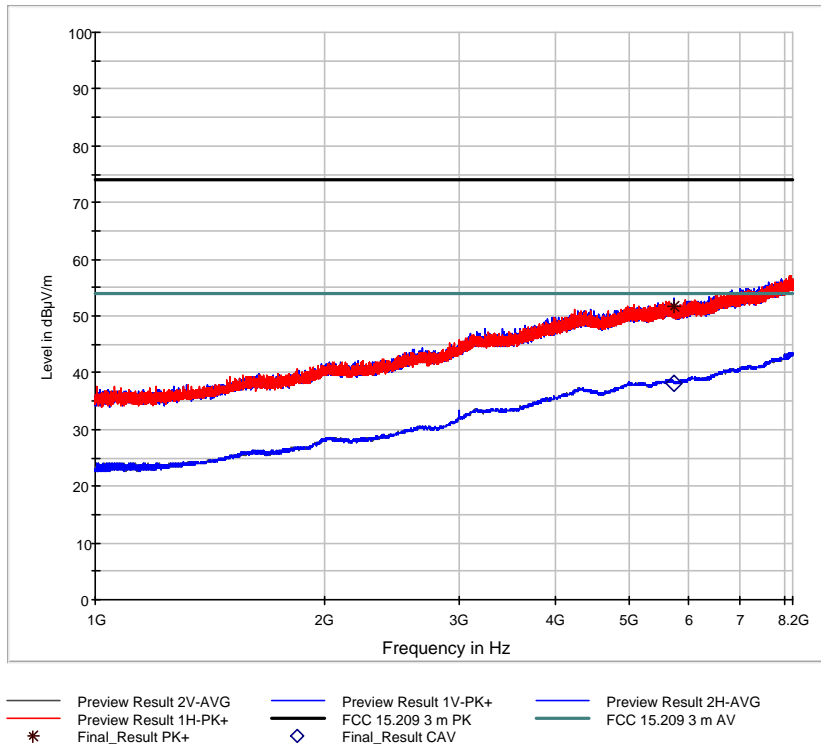
◇ FCC 15.209 mag (10 m)  
Final\_Result CAV



— Preview Result 1V-PK+  
— Preview Result 1H-PK+  
— FCC 15.209\_3m  
\* Final\_Result QPK

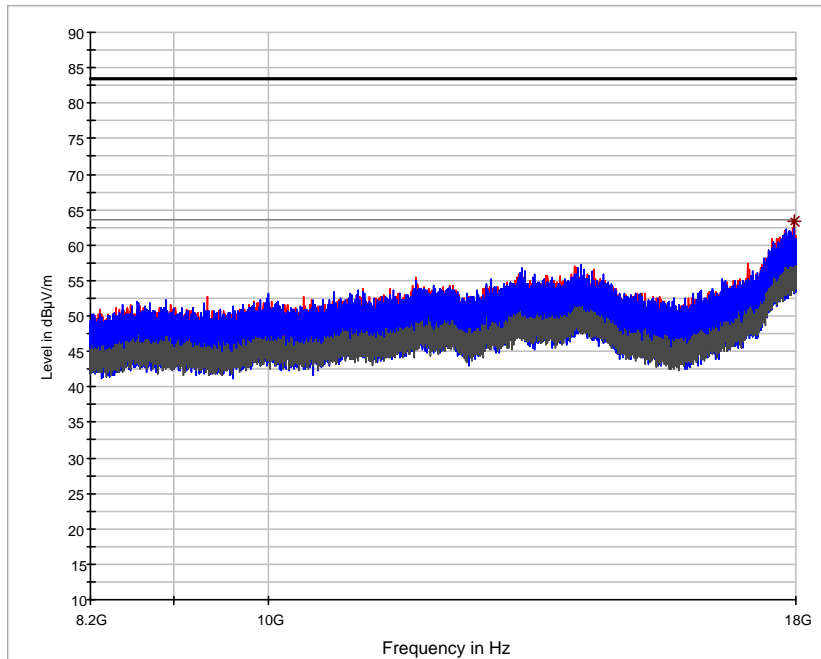
**Final Results:**

Frequency MHz	QuasiPeak dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
232.655000	13.80	46.00	32.20	1000.0	120.000	150.0	V	-3.0	13.7



**Final Results:**

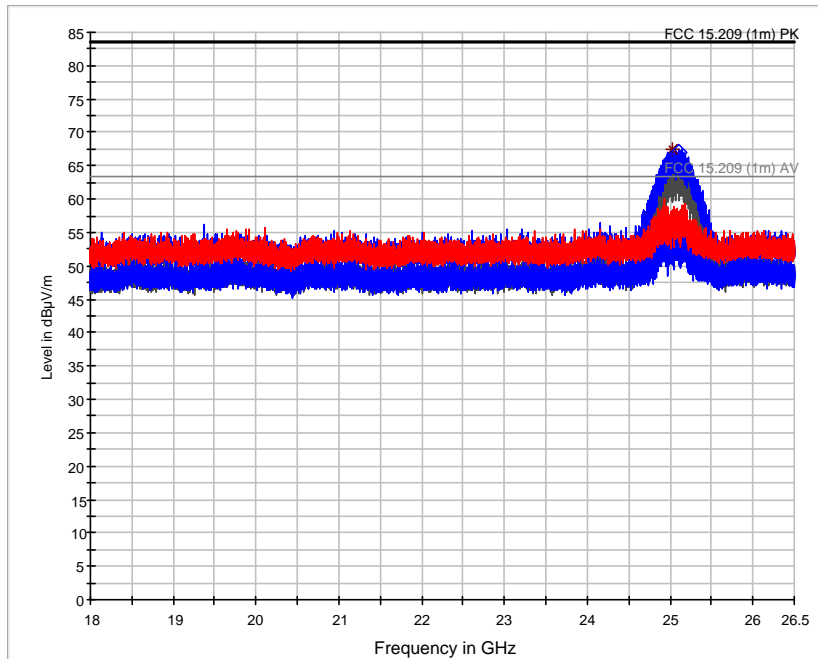
Frequency MHz	MaxPeak dBµV/m	CAverage dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
5742.250000	---	38.17	53.98	15.81	1000.0	1000.000	104.0	V	-38.0	41.6
5742.250000	51.62	---	73.97	22.35	1000.0	1000.000	104.0	V	-38.0	41.6



— Preview Result 2H-AVG      — Preview Result 1H-PK+      — Preview Result 2V-AVG  
— Preview Result 1V-PK+      — FCC 15.209 (1m) PK      — FCC 15.209 (1m) AV  
\* Final\_Result PK+      ◇ Final\_Result AVG

**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
17807.593333	---	59.46	63.50	4.04	2.5	1000.000	150.0	V	0.0	47.9
17956.553333	63.34	---	83.50	20.16	2.5	1000.000	150.0	H	38.0	48.3

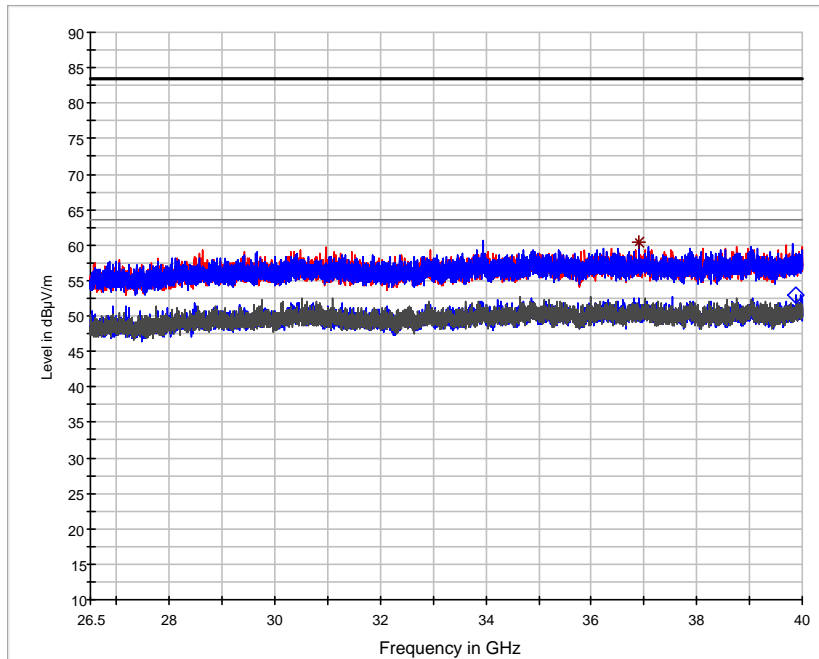


Preview Result 2V-AVG      Preview Result 1V-PK+      Preview Result 2H-AVG  
 Preview Result 1H-PK+      FCC 15.209 (1m) PK      FCC 15.209 (1m) AV  
 \* Final\_Result PK+      ◊ Final\_Result AVG

**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
25033.363636	67.52	---	#1 NA	#1 NA	2.5	1000.000	150.0	V	13.0	40.4
25100.204546	---	66.94	#1 NA	#1 NA	2.5	1000.000	150.0	V	13.0	40.4

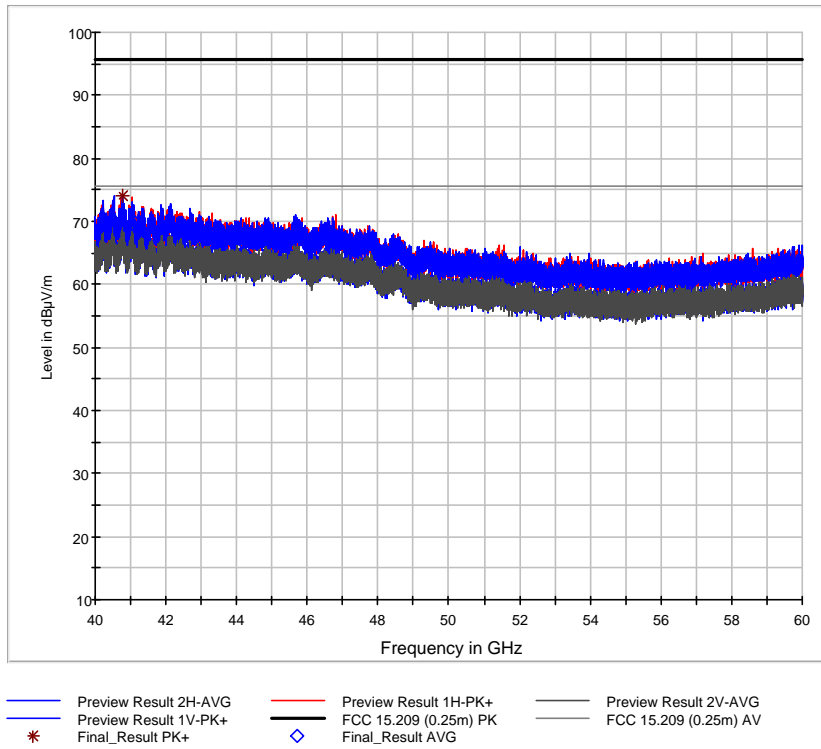
#1 Intentional Emission within 24.05-29.00 GHz band



— Preview Result 2H-AVG      — Preview Result 1H-PK+      — Preview Result 2V-AVG  
— Preview Result 1V-PK+      — FCC 15.209 (1m) PK      — FCC 15.209 (1m) AV  
\* Final\_Result PK+      ◇ Final\_Result AVG

**Final Results:**

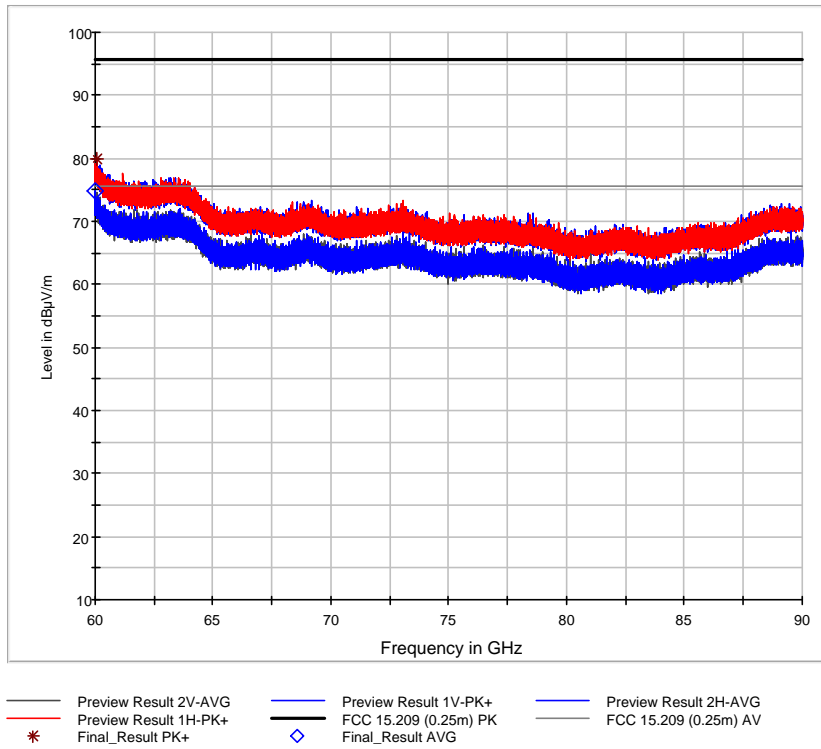
Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
36904.450000	60.50	---	83.50	23.00	2.5	1000.000	150.0	V	274.0	43.7
39875.800000	---	52.89	63.50	10.61	2.5	1000.000	150.0	H	260.0	43.8



**Final Results:**

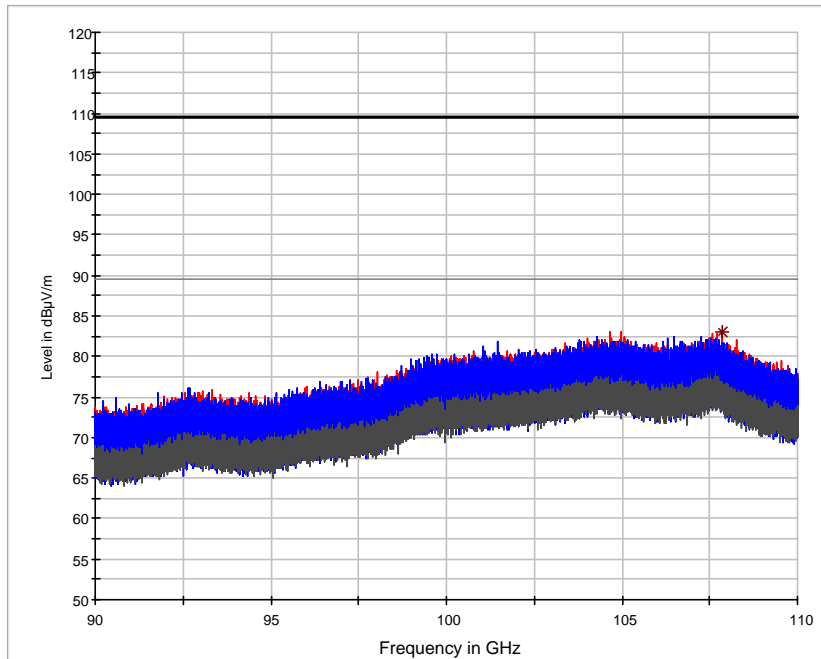
<i>Frequency</i>	<i>MaxPeak</i>	<i>Average</i>	<i>Limit</i>	<i>Margin</i>	<i>Meas. Time</i>	<i>Bandwidth</i>	<i>Height</i>	<i>Pol</i>	<i>Azimuth</i>	<i>Corr.</i>
<i>MHz</i>	<i>dBµV/m</i>	<i>dBµV/m</i>	<i>dBµV/m</i>	<i>dB</i>	<i>ms</i>	<i>kHz</i>	<i>cm</i>		<i>deg</i>	<i>dB</i>
40779.375000	74.05	---	95.60	21.55	2.5	1000.000	150.0	V	136.0	44.2
41078.125000	---	69.66	75.60	5.94	2.5	1000.000	150.0	V	0.0	44.2





**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
60030.937500	---	74.85	75.60	0.75	2.5	1000.000	150.0	H	226.0	47.8
60092.812500	79.79	---	95.60	15.81	2.5	1000.000	150.0	H	327.0	47.8



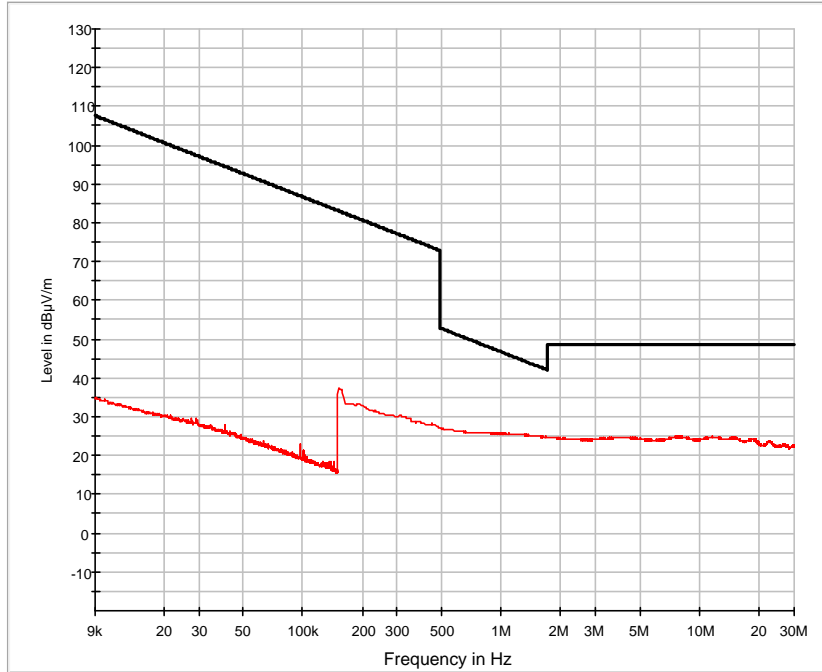
— Preview Result 2H-AVG      — Preview Result 1H-PK+      — Preview Result 2V-AVG  
— Preview Result 1V-PK+      — FCC 15.209 (5cm) PK      — FCC 15.209 (5cm) AV  
\* Final\_Result PK+      ◇ Final\_Result AVG

**Final Results:**

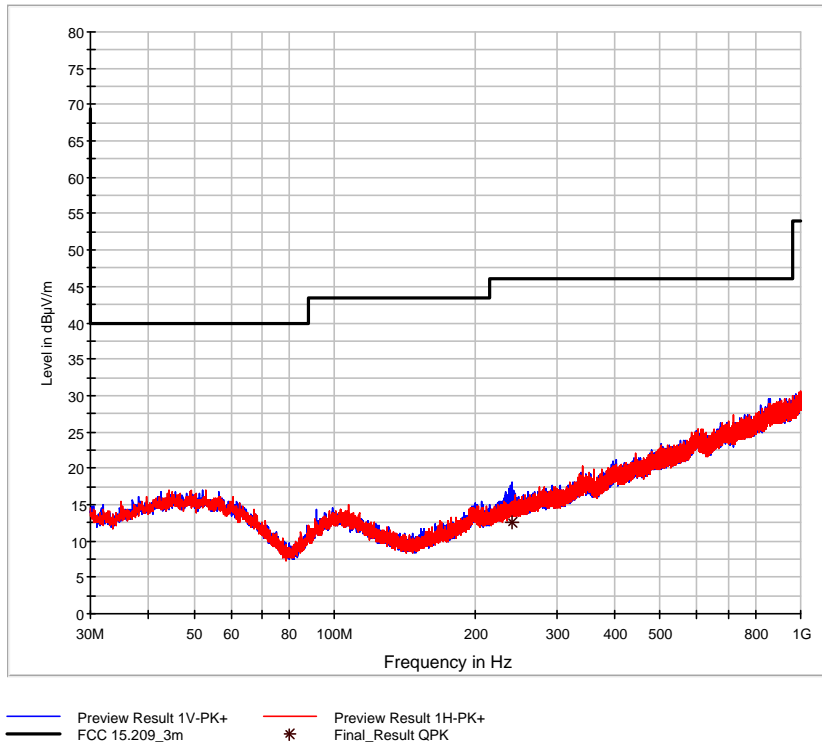
Frequency	MaxPeak	Average	Limit	Margin	Meas. Time	Bandwidth	Height	Pol	Azimuth	Corr.
MHz	dBµV/m	dBµV/m	dBµV/m	dB	ms	kHz	cm		deg	dB/m
107596.444445	---	79.85	89.56	9.71	2.5	1000.000	150.0	H	175.0	50
107842.666667	83.11	---	109.56	26.45	2.5	1000.000	150.0	H	75.0	50



EUT: P5LPR in LPR operation (radar without tank)  
Normal operation mode: Measurement with pulsed signal

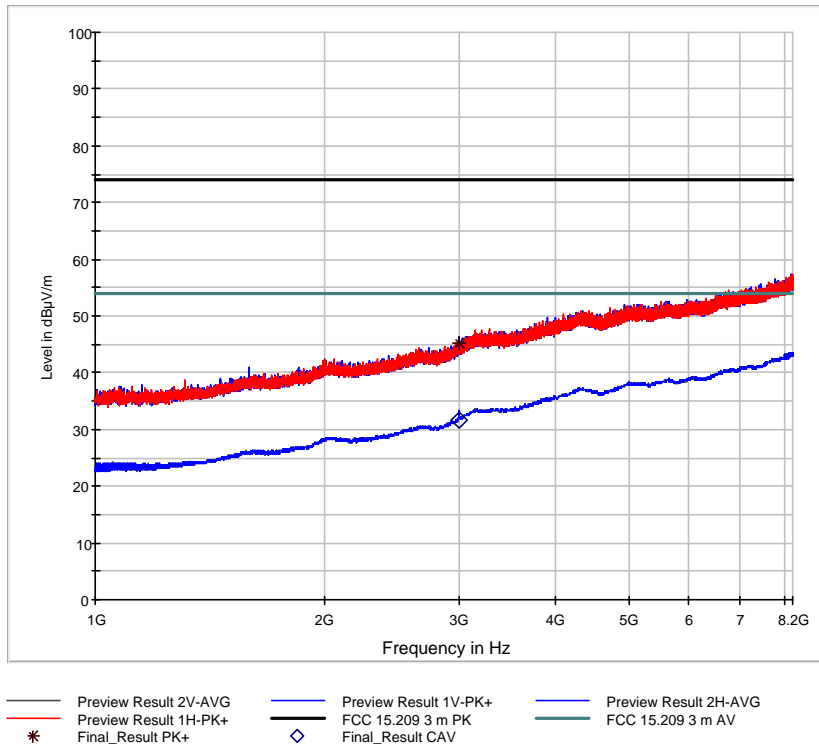


\* Preview Result 1-QPK      — FCC 15.209 mag (10 m)  
Final\_Result QPK          ◊ Final\_Result CAV



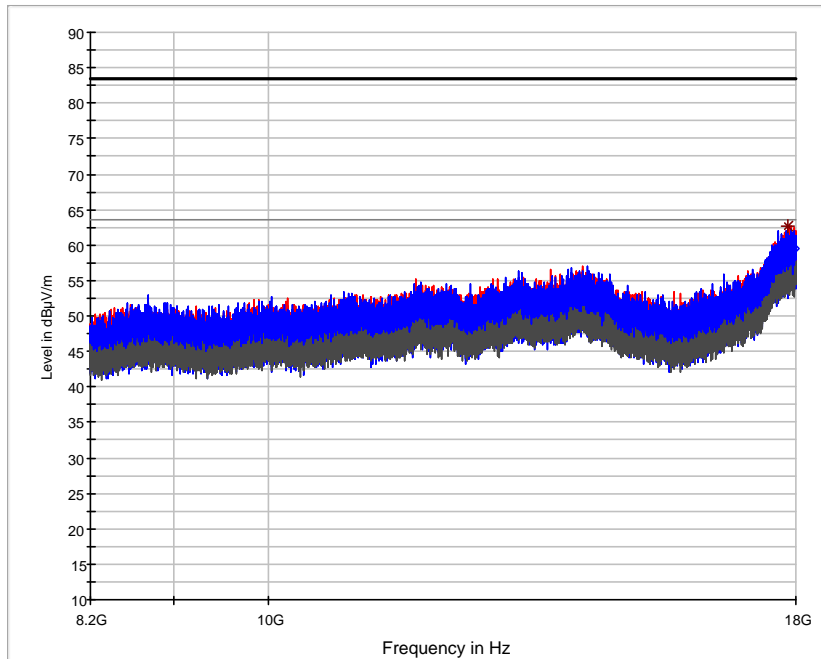
**Final Results:**

Frequency MHz	QuasiPeak dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
239.835000	12.58	46.00	33.42	1000.0	120.000	136.0	V	-139.0	14.0



**Final Results:**

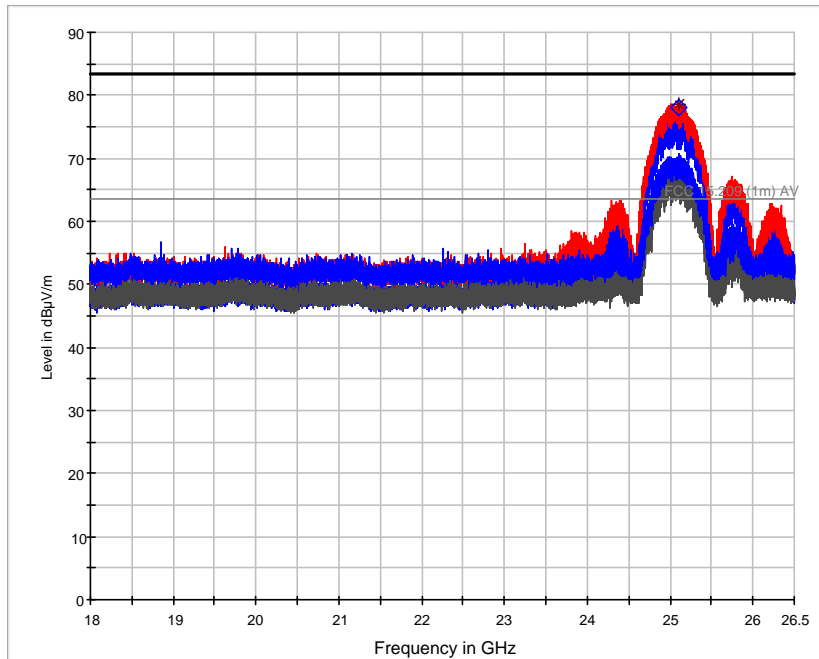
Frequency MHz	MaxPeak dBµV/m	CAverage dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
2995.500000	---	31.54	53.98	22.44	1000.0	1000.000	400.0	V	-115.0	35.2
2995.500000	45.23	---	73.97	28.74	1000.0	1000.000	400.0	V	-115.0	35.2



— Preview Result 2H-AVG     — Preview Result 1H-PK+     — Preview Result 2V-AVG  
\* Final\_Result PK+     — FCC 15.209 (1m) PK     — FCC 15.209 (1m) AV  
◇ Final\_Result AVG

**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
17827.193333	62.69	---	83.50	20.81	2.5	1000.000	150.0	H	249.0	47.9
17891.220000	---	59.60	63.50	3.90	2.5	1000.000	150.0	V	258.0	48.0

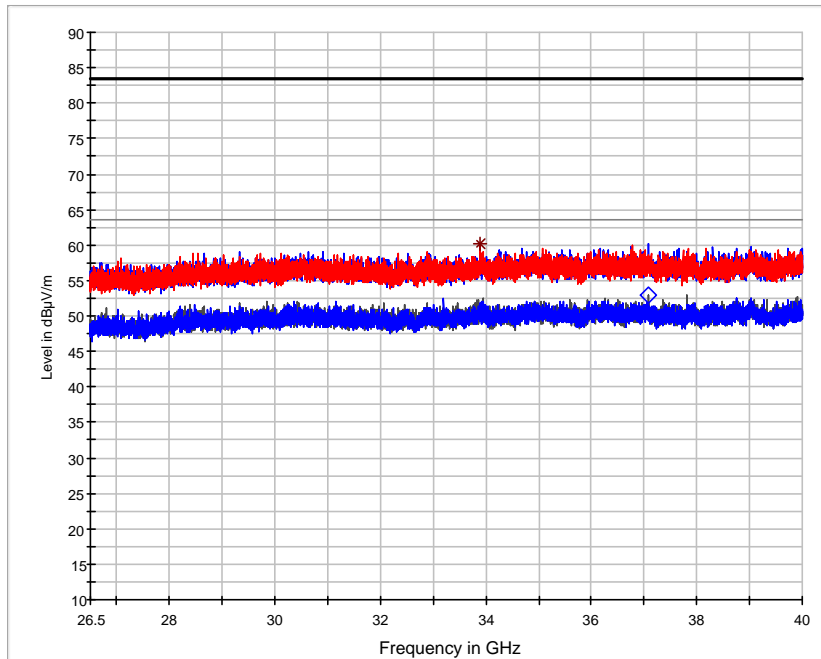


— Preview Result 2H-AVG      — Preview Result 1H-PK+      — Preview Result 2V-AVG  
— Preview Result 1V-PK+      — FCC 15.209 (1m) PK      — FCC 15.209 (1m) AV  
\* Final\_Result PK+      ◇ Final\_Result AVG

**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
25110.636364	---	77.98	#1 NA	#1 NA	2.5	1000.000	150.0	H	12.0	40.4
25110.636364	78.50	---	#1 NA	#1 NA	2.5	1000.000	150.0	H	12.0	40.4

#1 Intentional Emission within 24.05-29.00 GHz band



— Preview Result 2V-AVG      — Preview Result 1V-PK+      — Preview Result 2H-AVG  
 — Preview Result 1H-PK+      — FCC 15.209 (1m) PK      — FCC 15.209 (1m) AV  
 \* Final\_Result PK+      ◊ Final\_Result AVG

**Final Results:**

Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
33889.900000	60.06	---	83.50	23.44	2.5	1000.000	150.0	H	171.0	43.6
37079.950000	---	53.05	63.50	10.45	2.5	1000.000	150.0	V	109.0	43.7