FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2019.05.10

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

FM full power on Low ch. (72.1 MHz), Mid ch. (74.7 MHz), and High ch. (75.9 MHz); 400 Hz sine wave tone at -11 modulation

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

WILM0050 - 6
WILM0050 - 7
WILM0050 - 8
WILM0050 - 9

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Filter - High Pass	Mini Circuits	BHP-150+	HIA	24-Oct-2018	12 mo
Receiver	Rohde & Schwarz	ESR7	ARI	8-Jul-2019	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	25-Jan-2018	24 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	2-Nov-2018	12 mo
Attenuator	Fairview Microwave	SA18E-10	TYA	24-Sep-2018	12 mo

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

AV = CISPR Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the general method in ANSI C63.10 section 6.10.6 Marker-Delta. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

The method allows for a resolution bandwidth was of 1-5% of the span to be used with a minimum of 30 kHz. As this is a general method, a resolution bandwidth of 3 kHz was used based on engineering judgement. FCC 15.237 allows for 3 sub-bands varying from 800-1000 kHz wide with an occupied bandwidth limit of 200 kHz. Industry standard channel selection places the channels at half the allowed bandwidth from the authorized band edge ex: 72.1 MHz. Using a 30 kHz resolution bandwidth in this frequency range over estimates the emissions skirt at the band edge for an FM carrier.

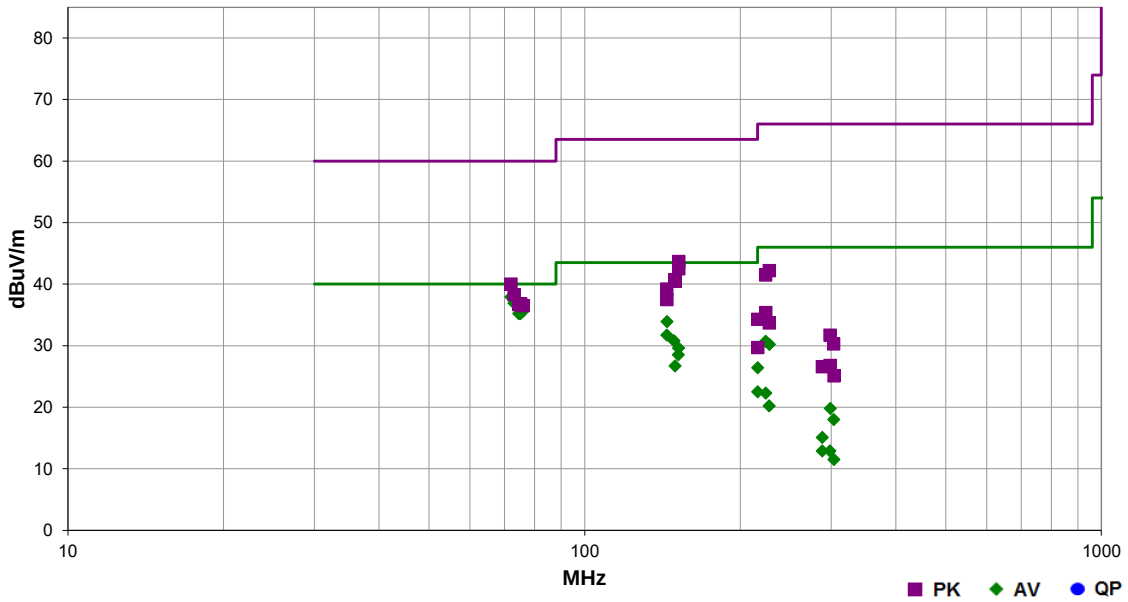
FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

EmiR5 2019.08.01 PSA-ESCI 2019.05.10

Work Order:	WILM0050	**Date:**	29-Aug-2019		
Project:	None	**Temperature:**	21.6 °C		
Job Site:	MN05	**Humidity:**	55.8% RH		
Serial Number:	Tom 2	**Barometric Pres.:**	1009 mbar	**Tested by:**	Andrew Rogstad
EUT:	FM T55				
Configuration:	9				
Customer:	Williams Sound, LLC				
Attendees:	Lawrence Herrington				
EUT Power:	110VAC/60Hz				
Operating Mode:	FM full power on Low ch. (72.1 MHz), Mid ch. (74.7 MHz), and High ch. (75.9 MHz); 400 Hz sine wave tone at -11 modulation				
Deviations:	None				
Comments:	Tom 2, PCA 293 #3, ANT005; Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used.				

Test Specifications	**Test Method**
FCC 15.237:2019	ANSI C63.10:2013

Run #	25	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
72.000	16.2	11.7	2.9	1.9	3.0	10.0	Vert	AV	0.0	37.9	40.0	-2.1	72.1 MHz: Fund 76.1 dBuV + -59.2 dBc = 16.2 dBuV (calc. amp.)
73.000	15.2	11.7	3.6	185.9	3.0	10.0	Vert	AV	0.0	36.9	40.0	-3.1	72.9 MHz: Fund 75.2 dBuV + -60.0 dBc = 15.2 dBuV (calc. amp.)
76.000	13.9	11.7	3.1	51.0	3.0	10.0	Vert	AV	0.0	35.6	40.0	-4.4	75.9 MHz: Fund 74.3 dBuV + -60.4 dBc = 13.9 dBuV (calc. amp.)
74.800	13.6	11.7	3.8	44.0	3.0	10.0	Vert	AV	0.0	35.3	40.0	-4.7	74.7 MHz: Fund 74.5 dBuV + -60.9 dBc = 13.6 dBuV (calc. amp.)
74.600	13.5	11.7	3.8	44.0	3.0	10.0	Vert	AV	0.0	35.2	40.0	-4.8	74.7 MHz: Fund 74.5 dBuV + -61.0 dBc = 13.5 dBuV (calc. amp.)
75.200	13.5	11.7	3.6	26.0	3.0	10.0	Vert	AV	0.0	35.2	40.0	-4.8	75.3 MHz: Fund 74.1 dBuV + -60.6 dBc = 13.5 dBuV (calc. amp.)
144.370	38.3	-4.4	1.7	189.9	3.0	0.0	Horz	AV	0.0	33.9	43.5	-9.6	Low ch.
144.303	36.1	-4.4	1.4	253.9	3.0	0.0	Vert	AV	0.0	31.7	43.5	-11.8	Low ch.
148.946	35.2	-4.4	1.8	275.9	3.0	0.0	Horz	AV	0.0	30.8	43.5	-12.7	Mid ch.
151.948	34.2	-4.6	1.0	192.0	3.0	0.0	Vert	AV	0.0	29.6	43.5	-13.9	High ch.
151.915	33.1	-4.6	1.9	258.9	3.0	0.0	Horz	AV	0.0	28.5	43.5	-15.0	High ch.
224.163	34.1	-3.4	1.4	257.9	3.0	0.0	Horz	AV	0.0	30.7	46.0	-15.3	Mid ch.
227.773	34.0	-3.8	1.43	252.0	3.0	0.0	Horz	AV	0.0	30.2	46.0	-15.8	High ch.
149.676	31.2	-4.5	1.0	160.0	3.0	0.0	Vert	AV	0.0	26.7	43.5	-16.8	Mid ch.
216.298	30.5	-4.1	1.5	218.9	3.0	0.0	Horz	AV	0.0	26.4	46.0	-19.6	Low ch.
152.166	48.3	-4.6	1.0	192.0	3.0	0.0	Vert	PK	0.0	43.7	63.5	-19.8	High ch.
72.000	18.3	11.7	2.9	1.9	3.0	10.0	Vert	PK	0.0	40.0	60.0	-20.0	72.1 MHz: Fund 77.5 dBuV + -59.2 dBc = 18.3 dBuV (calc. amp.)

Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
152.148	47.1	-4.6	1.9	258.9	3.0	0.0	Horz	PK	0.0	42.5	63.5	-21.0	High ch.
73.000	16.6	11.7	3.6	185.9	3.0	10.0	Vert	PK	0.0	38.3	60.0	-21.7	72.9 MHz: Fund 76.6 dBuV + -60.0 dBc = 16.6 dBuV (calc. amp.)
149.355	45.1	-4.4	1.8	275.9	3.0	0.0	Horz	PK	0.0	40.7	63.5	-22.8	Mid ch.
149.751	45.0	-4.5	1.0	160.0	3.0	0.0	Vert	PK	0.0	40.5	63.5	-23.0	Mid ch.
74.800	15.1	11.7	3.8	44.0	3.0	10.0	Vert	PK	0.0	36.8	60.0	-23.2	74.7 MHz: Fund 76.0 dBuV + -60.9 dBc = 15.1 dBuV (calc. amp.)
75.200	15.1	11.7	3.6	26.0	3.0	10.0	Vert	PK	0.0	36.8	60.0	-23.2	75.3 MHz: Fund 75.7 dBuV + -60.6 dBc = 15.1 dBuV (calc. amp.)
74.600	15.0	11.7	3.8	44.0	3.0	10.0	Vert	PK	0.0	36.7	60.0	-23.3	74.7 MHz: Fund 76.0 dBuV + -61.0 dBc = 15.0 dBuV (calc. amp.)
76.000	14.8	11.7	3.1	51.0	3.0	10.0	Vert	PK	0.0	36.5	60.0	-23.5	75.9 MHz: Fund 75.2 dBuV + -60.4 dBc = 14.8 dBuV (calc. amp.)
216.297	26.6	-4.1	2.8	324.0	3.0	0.0	Vert	AV	0.0	22.5	46.0	-23.5	Low ch.
224.137	25.7	-3.4	1.6	294.9	3.0	0.0	Vert	AV	0.0	22.3	46.0	-23.7	Mid ch.
227.574	46.0	-3.8	1.4	252.0	3.0	0.0	Horz	PK	0.0	42.2	66.0	-23.8	High ch.
144.222	43.6	-4.4	1.7	189.9	3.0	0.0	Horz	PK	0.0	39.2	63.5	-24.3	Low ch.
224.020	44.9	-3.4	1.4	257.9	3.0	0.0	Horz	PK	0.0	41.5	66.0	-24.5	Mid ch.
227.635	24.0	-3.8	1.3	292.0	3.0	0.0	Vert	AV	0.0	20.2	46.0	-25.8	High ch.
144.237	41.9	-4.4	1.4	253.9	3.0	0.0	Vert	PK	0.0	37.5	63.5	-26.0	Low ch.
298.925	22.1	-2.3	1.0	113.9	3.0	0.0	Horz	AV	0.0	19.8	46.0	-26.2	Mid ch.
303.490	19.7	-1.7	1.0	130.0	3.0	0.0	Horz	AV	0.0	18.0	46.0	-28.0	High ch.
224.075	38.8	-3.4	1.6	294.9	3.0	0.0	Vert	PK	0.0	35.4	66.0	-30.6	Mid ch.
288.348	18.1	-3.0	1.0	109.9	3.0	0.0	Horz	AV	0.0	15.1	46.0	-30.9	Low ch.
216.365	38.4	-4.1	1.5	218.9	3.0	0.0	Horz	PK	0.0	34.3	66.0	-31.7	Low ch.
227.584	37.5	-3.8	1.3	292.0	3.0	0.0	Vert	PK	0.0	33.7	66.0	-32.3	High ch.
298.442	15.2	-2.3	1.0	351.0	3.0	0.0	Vert	AV	0.0	12.9	46.0	-33.1	Mid ch.
288.332	15.9	-3.0	1.0	322.9	3.0	0.0	Vert	AV	0.0	12.9	46.0	-33.1	Low ch.
298.397	34.0	-2.3	1.0	113.9	3.0	0.0	Horz	PK	0.0	31.7	66.0	-34.3	Mid ch.
303.727	13.1	-1.6	1.0	355.9	3.0	0.0	Vert	AV	0.0	11.5	46.0	-34.5	High ch.
303.382	32.0	-1.7	1.0	130.0	3.0	0.0	Horz	PK	0.0	30.3	66.0	-35.7	High ch.
216.250	33.8	-4.1	2.8	324.0	3.0	0.0	Vert	PK	0.0	29.7	66.0	-36.3	Low ch.
298.461	29.1	-2.3	1.0	351.0	3.0	0.0	Vert	PK	0.0	26.8	66.0	-39.2	Mid ch.
288.317	29.6	-3.0	1.0	109.9	3.0	0.0	Horz	PK	0.0	26.6	66.0	-39.4	Low ch.
303.680	26.7	-1.6	1.0	355.9	3.0	0.0	Vert	PK	0.0	25.1	66.0	-40.9	High ch.
288.325	27.3	-3.0	1.0	322.9	3.0	0.0	Vert	PK	0.0	24.3	66.0	-41.7	Low ch.

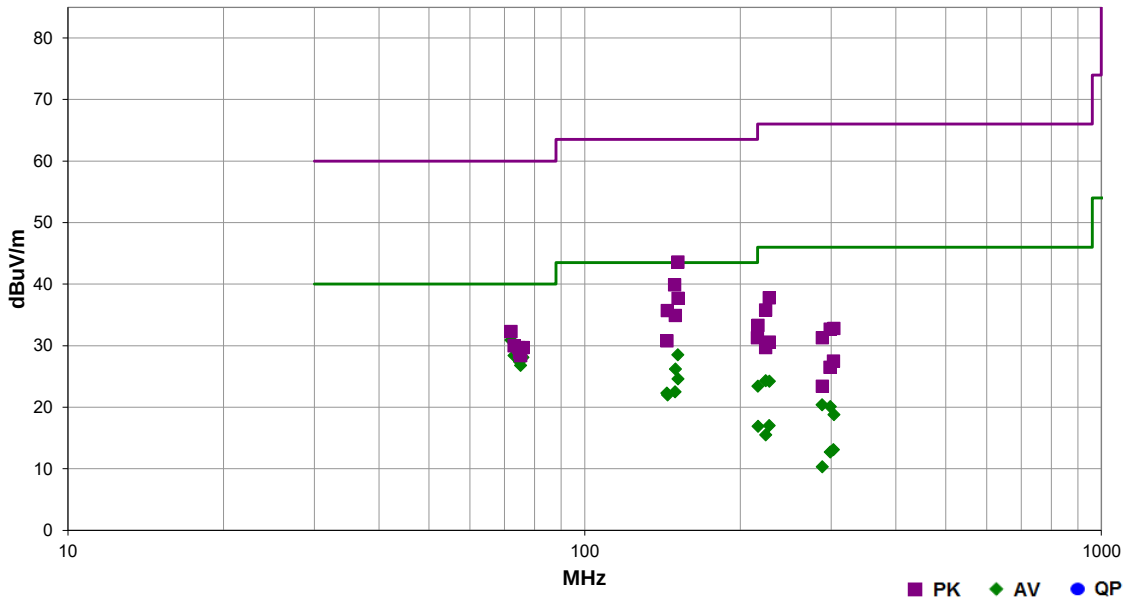
FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

EmiR5 2019.08.01 PSA-ESCI 2019.05.10

Work Order:	WILM0050	**Date:**	28-Aug-2019		
Project:	None	**Temperature:**	21.5 °C		
Job Site:	MN05	**Humidity:**	56.6% RH		
Serial Number:	Tom 2	**Barometric Pres.:**	1014 mbar	**Tested by:**	Andrew Rogstad
EUT:	FM T55				
Configuration:	8				
Customer:	Williams Sound, LLC				
Attendees:	Lawrence Herrington				
EUT Power:	110VAC/60Hz				
Operating Mode:	FM full power on Low ch. (72.1 MHz), Mid ch. (74.7 MHz), and High ch. (75.9 MHz); 400 Hz sine wave tone at -11 modulation				
Deviations:	None				
Comments:	Tom 2, PCA 293 #3, ANT021; Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used.				

Test Specifications	**Test Method**
FCC 15.237:2019	ANSI C63.10:2013

Run #	35	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
72.000	9.2	11.7	4.0	250.0	3.0	10.0	Horz	AV	0.0	30.9	40.0	-9.1	72.1 MHz: Fund 68.6 dBuV + -59.4 dBc = 9.2 dBuV (calc. amp.)
73.000	6.7	11.7	3.9	253.0	3.0	10.0	Horz	AV	0.0	28.4	40.0	-11.6	72.9 MHz: Fund 67.8 dBuV + -61.1 dBc = 6.7 dBuV (calc. amp.)
74.600	6.5	11.7	4.0	246.0	3.0	10.0	Horz	AV	0.0	28.2	40.0	-11.8	74.7 MHz: Fund 66.9 dBuV + -60.4 dBc = 6.5 dBuV (calc. amp.)
76.000	6.4	11.7	4.0	239.9	3.0	10.0	Horz	AV	0.0	28.1	40.0	-11.9	75.9 MHz: Fund 65.8 dBuV + -59.4 dBc = 6.4 dBuV (calc. amp.)
74.800	5.7	11.7	4.0	246.0	3.0	10.0	Horz	AV	0.0	27.4	40.0	-12.6	74.7 MHz: Fund 66.9 dBuV + -61.2 dBc = 5.7 dBuV (calc. amp.)
75.200	5.1	11.7	3.9	247.9	3.0	10.0	Horz	AV	0.0	26.8	40.0	-13.2	75.3 MHz: Fund 65.9 dBuV + -60.8 dBc = 5.1 dBuV (calc. amp.)
151.501	33.0	-4.5	1.0	159.0	3.0	0.0	Vert	AV	0.0	28.5	43.5	-15.0	High ch.
149.896	30.7	-4.5	1.0	189.0	3.0	0.0	Vert	AV	0.0	26.2	43.5	-17.3	Mid ch.
151.570	29.1	-4.5	2.3	225.0	3.0	0.0	Horz	AV	0.0	24.6	43.5	-18.9	High ch.
151.481	48.1	-4.5	1.0	159.0	3.0	0.0	Vert	PK	0.0	43.6	63.5	-19.9	High ch.
149.708	27.0	-4.5	1.9	254.9	3.0	0.0	Horz	AV	0.0	22.5	43.5	-21.0	Mid ch.
144.273	26.7	-4.4	2.2	282.9	3.0	0.0	Horz	AV	0.0	22.3	43.5	-21.2	Low ch.
144.700	26.4	-4.4	1.0	156.0	3.0	0.0	Vert	AV	0.0	22.0	43.5	-21.5	Low ch.
224.168	27.7	-3.4	1.1	185.9	3.0	0.0	Horz	AV	0.0	24.3	46.0	-21.7	Mid ch.
227.767	28.0	-3.8	1.3	239.0	3.0	0.0	Horz	AV	0.0	24.2	46.0	-21.8	High ch.
216.397	27.5	-4.1	1.0	119.0	3.0	0.0	Horz	AV	0.0	23.4	46.0	-22.6	Low ch.
149.310	44.3	-4.4	1.0	189.0	3.0	0.0	Vert	PK	0.0	39.9	63.5	-23.6	Mid ch.
288.243	23.4	-3.0	1.0	116.0	3.0	0.0	Horz	AV	0.0	20.4	46.0	-25.6	Low ch.

Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
151.574	42.2	-4.5	2.3	225.0	3.0	0.0	Horz	PK	0.0	37.7	63.5	-25.8	High ch.
298.923	22.4	-2.3	1.0	120.9	3.0	0.0	Horz	AV	0.0	20.1	46.0	-25.9	Mid ch.
303.750	20.4	-1.6	1.0	95.9	3.0	0.0	Horz	AV	0.0	18.8	46.0	-27.2	High ch.
72.000	10.6	11.7	4.0	250.0	3.0	10.0	Horz	PK	0.0	32.3	60.0	-27.7	72.1 MHz: Fund 70.0 dBuV + -59.4 dBc = 10.6 dBuV (calc. amp.)
144.490	40.1	-4.4	1.0	156.0	3.0	0.0	Vert	PK	0.0	35.7	63.5	-27.8	Low ch.
227.693	41.6	-3.8	1.3	239.0	3.0	0.0	Horz	PK	0.0	37.8	66.0	-28.2	High ch.
149.744	39.4	-4.5	1.9	254.9	3.0	0.0	Horz	PK	0.0	34.9	63.5	-28.6	Mid ch.
227.625	20.8	-3.8	1.0	48.0	3.0	0.0	Vert	AV	0.0	17.0	46.0	-29.0	High ch.
216.530	21.0	-4.1	1.0	189.9	3.0	0.0	Vert	AV	0.0	16.9	46.0	-29.1	Low ch.
73.000	8.3	11.7	3.9	253.0	3.0	10.0	Horz	PK	0.0	30.0	60.0	-30.0	72.9 MHz: Fund 69.4 dBuV + -61.1 dBc = 8.3 dBuV (calc. amp.)
224.007	39.2	-3.4	1.1	185.9	3.0	0.0	Horz	PK	0.0	35.8	66.0	-30.2	Mid ch.
74.600	8.0	11.7	4.0	246.0	3.0	10.0	Horz	PK	0.0	29.7	60.0	-30.3	74.7 MHz: Fund 68.4 dBuV + -60.4 dBc = 8.0 dBuV (calc. amp.)
76.000	8.0	11.7	4.0	239.9	3.0	10.0	Horz	PK	0.0	29.7	60.0	-30.3	75.9 MHz: Fund 67.4 dBuV + -59.4 dBc = 8.0 dBuV (calc. amp.)
224.115	18.9	-3.4	1.0	181.9	3.0	0.0	Vert	AV	0.0	15.5	46.0	-30.5	Mid ch.
74.800	7.2	11.7	4.0	246.0	3.0	10.0	Horz	PK	0.0	28.9	60.0	-31.1	74.7 MHz: Fund 68.4 dBuV + -61.2 dBc = 7.2 dBuV (calc. amp.)
75.200	6.7	11.7	3.9	247.9	3.0	10.0	Horz	PK	0.0	28.4	60.0	-31.6	75.3 MHz: Fund 67.5 dBuV + -60.8 dBc = 6.7 dBuV (calc. amp.)
215.902	35.4	-4.1	1.0	189.9	3.0	0.0	Vert	PK	0.0	31.3	63.5	-32.2	Low ch.
144.232	35.2	-4.4	2.2	282.9	3.0	0.0	Horz	PK	0.0	30.8	63.5	-32.7	Low ch.
216.427	37.4	-4.1	1.0	119.0	3.0	0.0	Horz	PK	0.0	33.3	66.0	-32.7	Low ch.
303.118	14.8	-1.7	1.1	198.0	3.0	0.0	Vert	AV	0.0	13.1	46.0	-32.9	High ch.
303.435	34.5	-1.7	1.0	95.9	3.0	0.0	Horz	PK	0.0	32.8	66.0	-33.2	High ch.
298.622	35.0	-2.3	1.0	120.9	3.0	0.0	Horz	PK	0.0	32.7	66.0	-33.3	Mid ch.
298.938	15.0	-2.3	1.2	145.0	3.0	0.0	Vert	AV	0.0	12.7	46.0	-33.3	Mid ch.
288.275	34.3	-3.0	1.0	116.0	3.0	0.0	Horz	PK	0.0	31.3	66.0	-34.7	Low ch.
227.569	34.4	-3.8	1.0	48.0	3.0	0.0	Vert	PK	0.0	30.6	66.0	-35.4	High ch.
288.270	13.3	-3.0	1.0	149.9	3.0	0.0	Vert	AV	0.0	10.3	46.0	-35.7	Low ch.
224.007	33.1	-3.4	1.0	181.9	3.0	0.0	Vert	PK	0.0	29.7	66.0	-36.3	Mid ch.
303.137	29.2	-1.7	1.1	198.0	3.0	0.0	Vert	PK	0.0	27.5	66.0	-38.5	High ch.
298.462	28.8	-2.3	1.2	145.0	3.0	0.0	Vert	PK	0.0	26.5	66.0	-39.5	Mid ch.
288.290	26.4	-3.0	1.0	149.9	3.0	0.0	Vert	PK	0.0	23.4	66.0	-42.6	Low ch.

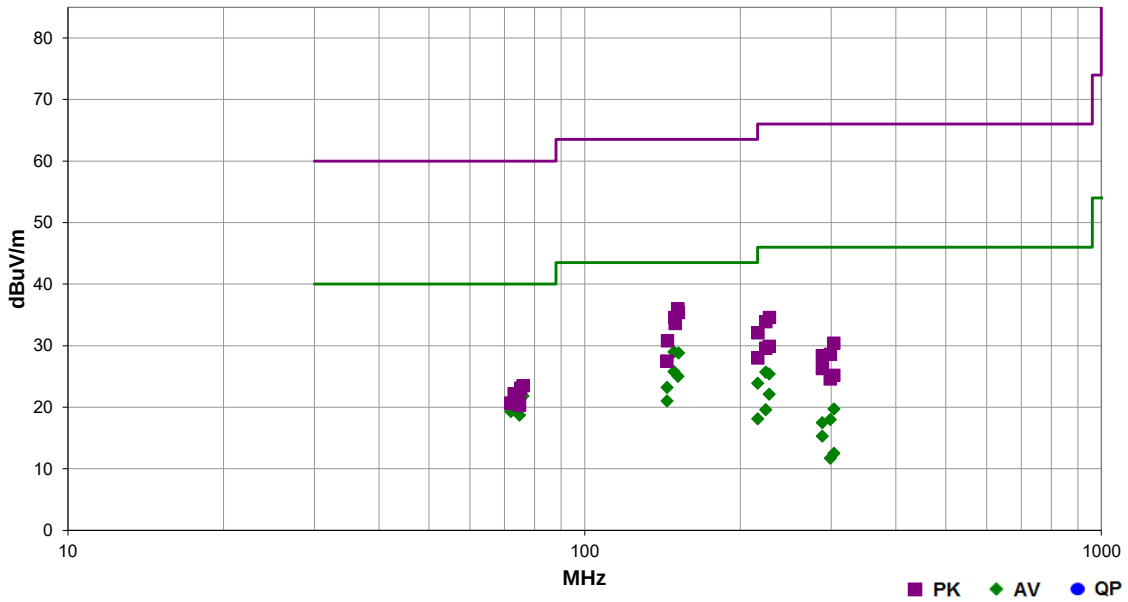
FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

EmiR5 2019.08.01 PSA-ESCI 2019.05.10

Work Order:	WILM0050	**Date:**	3-Sep-2019		
Project:	None	**Temperature:**	21.6 °C		
Job Site:	MN05	**Humidity:**	69.6% RH		
Serial Number:	Tom 2	**Barometric Pres.:**	1011 mbar	**Tested by:**	Andrew Rogstad
EUT:	FM T55				
Configuration:	7				
Customer:	Williams Sound, LLC				
Attendees:	Lawrence Herrington				
EUT Power:	110VAC/60Hz				
Operating Mode:	FM full power on Low ch. (72.1 MHz), Mid ch. (74.7 MHz), and High ch. (75.9 MHz); 400 Hz sine wave tone at -11 modulation				
Deviations:	None				
Comments:	Tom 2, PCA 293 #3, ANT024; Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used.				

Test Specifications	**Test Method**
FCC 15.237:2019	ANSI C63.10:2013

Run #	40	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
148.916	33.4	-4.4	1.8	307.0	3.0	0.0	Vert	AV	0.0	29.0	43.5	-14.5	Mid ch.
151.980	33.4	-4.6	1.8	1.0	3.0	0.0	Vert	AV	0.0	28.8	43.5	-14.7	High ch.
148.918	30.2	-4.4	1.0	199.9	3.0	0.0	Horz	AV	0.0	25.8	43.5	-17.7	Mid ch.
76.000	0.1	11.7	1.0	44.0	3.0	10.0	Vert	AV	0.0	21.8	40.0	-18.2	75.9 MHz: Fund 59.4 dBuV + -59.3 dBc = 0.1 dBuV (calc. amp.)
151.584	29.5	-4.5	1.5	206.0	3.0	0.0	Horz	AV	0.0	25.0	43.5	-18.5	High ch.
75.200	-0.3	11.7	1.0	325.9	3.0	10.0	Vert	AV	0.0	21.4	40.0	-18.6	75.3 MHz: Fund 59.0 dBuV + -59.3 dBc = -0.3 dBuV (calc. amp.)
73.000	-1.0	11.7	1.9	350.0	3.0	10.0	Vert	AV	0.0	20.7	40.0	-19.3	72.9 MHz: Fund 59.0 dBuV + -60.0 dBc = -1.0 dBuV (calc. amp.)
74.600	-1.5	11.7	1.2	311.0	3.0	10.0	Vert	AV	0.0	20.2	40.0	-19.8	74.7 MHz: Fund 58.2 dBuV + -59.7 dBc = -1.5 dBuV (calc. amp.)
224.098	29.1	-3.4	1.3	239.0	3.0	0.0	Horz	AV	0.0	25.7	46.0	-20.3	Mid ch.
144.343	27.6	-4.4	1.7	184.0	3.0	0.0	Horz	AV	0.0	23.2	43.5	-20.3	Low ch.
227.697	29.2	-3.8	1.0	105.0	3.0	0.0	Horz	AV	0.0	25.4	46.0	-20.6	High ch.
72.000	-2.4	11.7	1.9	351.0	3.0	10.0	Vert	AV	0.0	19.3	40.0	-20.7	72.1 MHz: Fund 58.8 dBuV + -61.2 dBc = -2.4 dBuV (calc. amp.)
74.800	-3.0	11.7	1.2	311.0	3.0	10.0	Vert	AV	0.0	18.7	40.0	-21.3	74.7 MHz: Fund 58.2 dBuV + -61.2 dBc = -3.0 dBuV (calc. amp.)
216.295	28.0	-4.1	1.0	216.0	3.0	0.0	Horz	AV	0.0	23.9	46.0	-22.1	Low ch.
144.391	25.4	-4.4	3.2	346.0	3.0	0.0	Vert	AV	0.0	21.0	43.5	-22.5	Low ch.
227.695	25.9	-3.8	1.5	19.0	3.0	0.0	Vert	AV	0.0	22.1	46.0	-23.9	High ch.
303.648	21.3	-1.6	1.0	126.0	3.0	0.0	Horz	AV	0.0	19.7	46.0	-26.3	High ch.
224.098	23.0	-3.4	1.0	319.9	3.0	0.0	Vert	AV	0.0	19.6	46.0	-26.4	Mid ch.

Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
151.542	40.5	-4.5	1.5	206.0	3.0	0.0	Horz	PK	0.0	36.0	63.5	-27.5	High ch.
216.302	22.2	-4.1	1.0	307.9	3.0	0.0	Vert	AV	0.0	18.1	46.0	-27.9	Low ch.
298.862	20.3	-2.3	1.0	117.0	3.0	0.0	Horz	AV	0.0	18.0	46.0	-28.0	Mid ch.
151.885	40.0	-4.6	1.8	1.0	3.0	0.0	Vert	PK	0.0	35.4	63.5	-28.1	High ch.
288.433	20.5	-3.0	1.0	170.0	3.0	0.0	Horz	AV	0.0	17.5	46.0	-28.5	Low ch.
149.368	39.0	-4.4	1.8	307.0	3.0	0.0	Vert	PK	0.0	34.6	63.5	-28.9	Mid ch.
149.695	38.1	-4.5	1.0	199.9	3.0	0.0	Horz	PK	0.0	33.6	63.5	-29.9	Mid ch.
288.345	18.3	-3.0	1.0	336.0	3.0	0.0	Vert	AV	0.0	15.3	46.0	-30.7	Low ch.
227.760	38.4	-3.8	1.0	105.0	3.0	0.0	Horz	PK	0.0	34.6	66.0	-31.4	High ch.
224.058	37.3	-3.4	1.3	239.0	3.0	0.0	Horz	PK	0.0	33.9	66.0	-32.1	Mid ch.
144.674	35.2	-4.4	1.7	184.0	3.0	0.0	Horz	PK	0.0	30.8	63.5	-32.7	Low ch.
303.642	14.1	-1.6	1.0	343.9	3.0	0.0	Vert	AV	0.0	12.5	46.0	-33.5	High ch.
216.365	36.2	-4.1	1.0	216.0	3.0	0.0	Horz	PK	0.0	32.1	66.0	-33.9	Low ch.
298.855	14.0	-2.3	1.0	355.9	3.0	0.0	Vert	AV	0.0	11.7	46.0	-34.3	Mid ch.
303.507	32.1	-1.7	1.0	126.0	3.0	0.0	Horz	PK	0.0	30.4	66.0	-35.6	High ch.
144.247	31.9	-4.4	3.2	346.0	3.0	0.0	Vert	PK	0.0	27.5	63.5	-36.0	Low ch.
227.690	33.7	-3.8	1.5	19.0	3.0	0.0	Vert	PK	0.0	29.9	66.0	-36.1	High ch.
224.050	33.0	-3.4	1.0	319.9	3.0	0.0	Vert	PK	0.0	29.6	66.0	-36.4	Mid ch.
76.000	1.8	11.7	1.0	44.0	3.0	10.0	Vert	PK	0.0	23.5	60.0	-36.5	75.9 MHz: Fund 61.1 dBuV + -59.3 dBc = 1.8 dBuV (calc. amp.)
75.200	1.4	11.7	1.0	325.9	3.0	10.0	Vert	PK	0.0	23.1	60.0	-36.9	75.3 MHz: Fund 60.7 dBuV + -59.3 dBc = 1.4 dBuV (calc. amp.)
298.747	30.9	-2.3	1.0	117.0	3.0	0.0	Horz	PK	0.0	28.6	66.0	-37.4	Mid ch.
288.294	31.4	-3.0	1.0	170.0	3.0	0.0	Horz	PK	0.0	28.4	66.0	-37.6	Low ch.
73.000	0.5	11.7	1.9	350.0	3.0	10.0	Vert	PK	0.0	22.2	60.0	-37.8	72.9 MHz: Fund 60.5 dBuV + -60.0 dBc = 0.5 dBuV (calc. amp.)
216.242	32.1	-4.1	1.0	307.9	3.0	0.0	Vert	PK	0.0	28.0	66.0	-38.0	Low ch.
74.600	0.1	11.7	1.2	311.0	3.0	10.0	Vert	PK	0.0	21.8	60.0	-38.2	74.7 MHz: Fund 59.8 dBuV + -59.7 dBc = 0.1 dBuV (calc. amp.)
72.000	-1.0	11.7	1.9	351.0	3.0	10.0	Vert	PK	0.0	20.7	60.0	-39.3	72.1 MHz: Fund 60.2 dBuV + -61.2 dBc = -1.0 dBuV (calc. amp.)
74.800	-1.4	11.7	1.2	311.0	3.0	10.0	Vert	PK	0.0	20.3	60.0	-39.7	74.7 MHz: Fund 59.8 dBuV + -61.2 dBc = -1.4 dBuV (calc. amp.)
288.362	29.3	-3.0	1.0	336.0	3.0	0.0	Vert	PK	0.0	26.3	66.0	-39.7	Low ch.
303.608	26.9	-1.7	1.0	343.9	3.0	0.0	Vert	PK	0.0	25.2	66.0	-40.8	High ch.
298.704	26.9	-2.3	1.0	355.9	3.0	0.0	Vert	PK	0.0	24.6	66.0	-41.4	Mid ch.

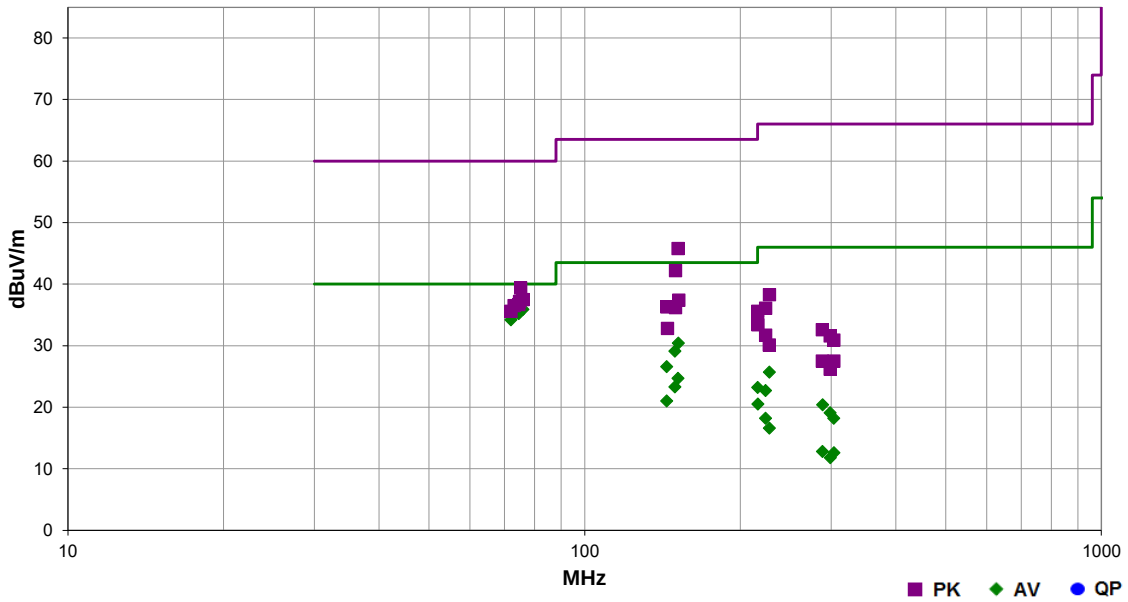
FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

EmiR5 2019.08.01 PSA-ESCI 2019.05.10

Work Order:	WILM0050	**Date:**	29-Aug-2019		
Project:	None	**Temperature:**	21.6 °C		
Job Site:	MN05	**Humidity:**	55.8% RH		
Serial Number:	Tom 2	**Barometric Pres.:**	1009 mbar	**Tested by:**	Andrew Rogstad
EUT:	FM T55				
Configuration:	6				
Customer:	Williams Sound, LLC				
Attendees:	Lawrence Herrington				
EUT Power:	110VAC/60Hz				
Operating Mode:	FM full power on Low ch. (72.1 MHz), Mid ch. (74.7 MHz), and High ch. (75.9 MHz); 400 Hz sine wave tone at -11 modulation				
Deviations:	None				
Comments:	Tom 2, PCA 293 #3, ANT025; Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used.				

Test Specifications	**Test Method**
FCC 15.237:2019	ANSI C63.10:2013

Run #	30	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



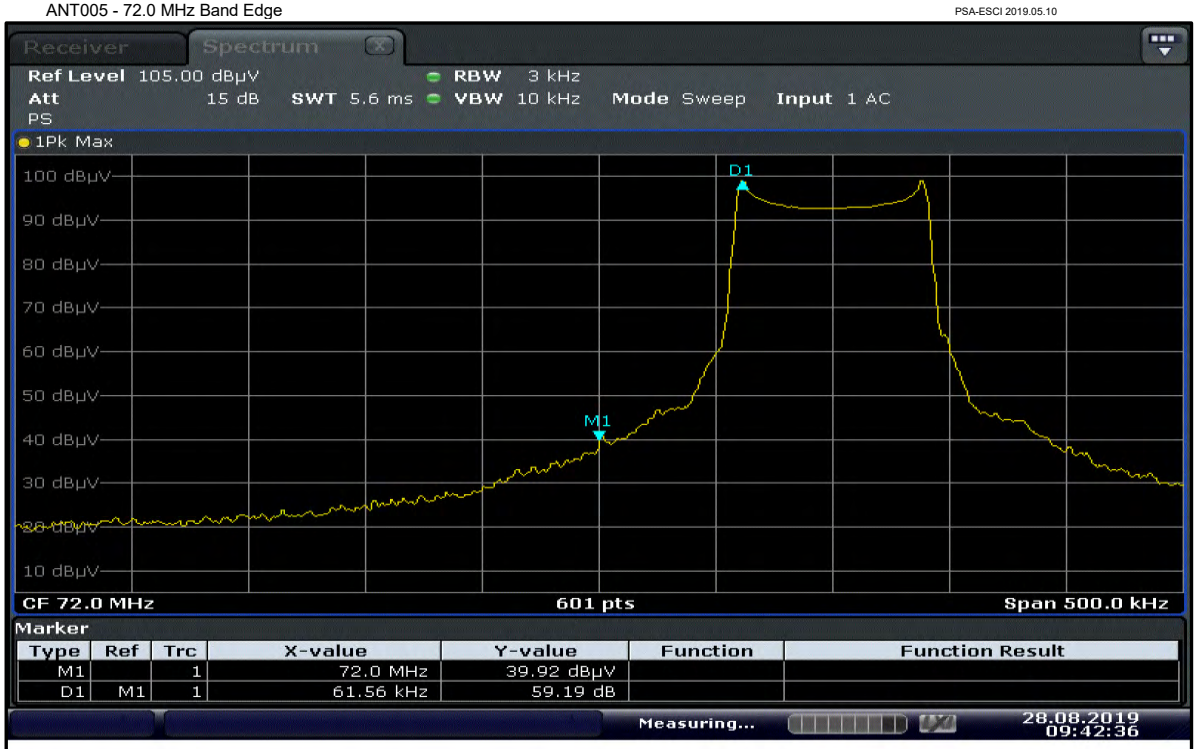
Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
75.200	16.2	11.7	1.0	124.9	3.0	10.0	Vert	AV	0.0	37.9	40.0	-2.1	75.3 MHz: Fund 75.4 dBuV + -59.2 dBc = 16.2 dBuV (calc. amp.)
76.000	14.2	11.7	1.0	142.0	3.0	10.0	Vert	AV	0.0	35.9	40.0	-4.1	75.9 MHz: Fund 75.7 dBuV + -61.5 dBc = 14.2 dBuV (calc. amp.)
74.800	14.0	11.7	1.6	138.9	3.0	10.0	Vert	AV	0.0	35.7	40.0	-4.3	74.7 MHz: Fund 74.9 dBuV + -60.9 dBc = 14.0 dBuV (calc. amp.)
74.600	13.5	11.7	1.6	138.9	3.0	10.0	Vert	AV	0.0	35.2	40.0	-4.8	74.7 MHz: Fund 74.9 dBuV + -61.4 dBc = 13.5 dBuV (calc. amp.)
73.000	13.4	11.7	1.0	135.0	3.0	10.0	Vert	AV	0.0	35.1	40.0	-4.9	72.9 MHz: Fund 73.5 dBuV + -60.1 dBc = 13.4 dBuV (calc. amp.)
72.000	12.5	11.7	1.4	162.0	3.0	10.0	Vert	AV	0.0	34.2	40.0	-5.8	72.1 MHz: Fund 72.6 dBuV + -60.1 dBc = 12.5 dBuV (calc. amp.)
151.920	35.0	-4.6	1.1	178.9	3.0	0.0	Vert	AV	0.0	30.4	43.5	-13.1	High ch.
149.558	33.6	-4.5	1.1	196.0	3.0	0.0	Vert	AV	0.0	29.1	43.5	-14.4	Mid ch.
144.212	31.0	-4.4	1.0	217.0	3.0	0.0	Vert	AV	0.0	26.6	43.5	-16.9	Low ch.
151.614	50.3	-4.5	1.1	178.9	3.0	0.0	Vert	PK	0.0	45.8	63.5	-17.7	High ch.
151.590	29.2	-4.5	2.3	88.9	3.0	0.0	Horz	AV	0.0	24.7	43.5	-18.8	High ch.
149.528	27.8	-4.5	2.1	63.9	3.0	0.0	Horz	AV	0.0	23.3	43.5	-20.2	Mid ch.
227.795	29.5	-3.8	1.1	228.9	3.0	0.0	Horz	AV	0.0	25.7	46.0	-20.3	High ch.
75.200	17.7	11.7	1.0	124.9	3.0	10.0	Vert	PK	0.0	39.4	60.0	-20.6	75.3 MHz: Fund 76.9 dBuV + -59.2 dBc = 17.7 dBuV (calc. amp.)
149.884	46.7	-4.5	1.1	196.0	3.0	0.0	Vert	PK	0.0	42.2	63.5	-21.3	Mid ch.
76.000	15.8	11.7	1.0	142.0	3.0	10.0	Vert	PK	0.0	37.5	60.0	-22.5	75.9 MHz: Fund 77.3 dBuV + -61.5 dBc = 15.8 dBuV (calc. amp.)

Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
144.193	25.4	-4.4	1.8	253.0	3.0	0.0	Horz	AV	0.0	21.0	43.5	-22.5	Low ch.
74.800	15.5	11.7	1.6	138.9	3.0	10.0	Vert	PK	0.0	37.2	60.0	-22.8	74.7 MHz: Fund 76.4 dBuV + -60.9 dBc = 15.5 dBuV (calc. amp.)
216.348	27.3	-4.1	1.0	77.0	3.0	0.0	Horz	AV	0.0	23.2	46.0	-22.8	Low ch.
74.600	15.0	11.7	1.6	138.9	3.0	10.0	Vert	PK	0.0	36.7	60.0	-23.3	74.7 MHz: Fund 76.4 dBuV + -61.4 dBc = 15.0 dBuV (calc. amp.)
224.030	26.1	-3.4	1.0	83.0	3.0	0.0	Horz	AV	0.0	22.7	46.0	-23.3	Mid ch.
73.000	14.8	11.7	1.0	135.0	3.0	10.0	Vert	PK	0.0	36.5	60.0	-23.5	72.9 MHz: Fund 74.9 dBuV + -60.1 dBc = 14.8 dBuV (calc. amp.)
72.000	13.9	11.7	1.4	162.0	3.0	10.0	Vert	PK	0.0	35.6	60.0	-24.4	72.1 MHz: Fund 74.0 dBuV + -60.1 dBc = 13.9 dBuV (calc. amp.)
216.363	24.6	-4.1	1.1	109.0	3.0	0.0	Vert	AV	0.0	20.5	46.0	-25.5	Low ch.
288.789	23.4	-3.0	1.0	92.9	3.0	0.0	Horz	AV	0.0	20.4	46.0	-25.6	Low ch.
152.149	42.0	-4.6	2.3	88.9	3.0	0.0	Horz	PK	0.0	37.4	63.5	-26.1	High ch.
298.682	21.4	-2.3	1.2	102.9	3.0	0.0	Horz	AV	0.0	19.1	46.0	-26.9	Mid ch.
144.275	40.7	-4.4	1.0	217.0	3.0	0.0	Vert	PK	0.0	36.3	63.5	-27.2	Low ch.
149.898	40.7	-4.5	2.1	63.9	3.0	0.0	Horz	PK	0.0	36.2	63.5	-27.3	Mid ch.
227.812	42.1	-3.8	1.1	228.9	3.0	0.0	Horz	PK	0.0	38.3	66.0	-27.7	High ch.
303.464	19.9	-1.7	1.0	110.9	3.0	0.0	Horz	AV	0.0	18.2	46.0	-27.8	High ch.
224.004	21.6	-3.4	2.2	126.0	3.0	0.0	Vert	AV	0.0	18.2	46.0	-27.8	Mid ch.
227.762	20.4	-3.8	1.3	92.9	3.0	0.0	Vert	AV	0.0	16.6	46.0	-29.4	High ch.
224.035	39.5	-3.4	1.0	83.0	3.0	0.0	Horz	PK	0.0	36.1	66.0	-29.9	Mid ch.
216.310	39.7	-4.1	1.0	77.0	3.0	0.0	Horz	PK	0.0	35.6	66.0	-30.4	Low ch.
144.629	37.2	-4.4	1.8	253.0	3.0	0.0	Horz	PK	0.0	32.8	63.5	-30.7	Low ch.
216.405	37.5	-4.1	1.1	109.0	3.0	0.0	Vert	PK	0.0	33.4	66.0	-32.6	Low ch.
288.493	15.8	-3.0	2.6	23.9	3.0	0.0	Vert	AV	0.0	12.8	46.0	-33.2	Low ch.
288.249	35.6	-3.0	1.0	92.9	3.0	0.0	Horz	PK	0.0	32.6	66.0	-33.4	Low ch.
303.713	14.2	-1.6	2.4	166.0	3.0	0.0	Vert	AV	0.0	12.6	46.0	-33.4	High ch.
298.902	14.1	-2.3	2.8	128.9	3.0	0.0	Vert	AV	0.0	11.8	46.0	-34.2	Mid ch.
224.005	35.1	-3.4	2.2	126.0	3.0	0.0	Vert	PK	0.0	31.7	66.0	-34.3	Mid ch.
298.684	33.9	-2.3	1.2	102.9	3.0	0.0	Horz	PK	0.0	31.6	66.0	-34.4	Mid ch.
303.442	32.6	-1.7	1.0	110.9	3.0	0.0	Horz	PK	0.0	30.9	66.0	-35.1	High ch.
227.697	33.9	-3.8	1.3	92.9	3.0	0.0	Vert	PK	0.0	30.1	66.0	-35.9	High ch.
303.409	29.2	-1.7	2.4	166.0	3.0	0.0	Vert	PK	0.0	27.5	66.0	-38.5	High ch.
288.297	30.5	-3.0	2.6	23.9	3.0	0.0	Vert	PK	0.0	27.5	66.0	-38.5	Low ch.
298.719	28.5	-2.3	2.8	128.9	3.0	0.0	Vert	PK	0.0	26.2	66.0	-39.8	Mid ch.

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

ANT005 - 72.0 MHz Band Edge

PSA-ESCI 2019.05.10



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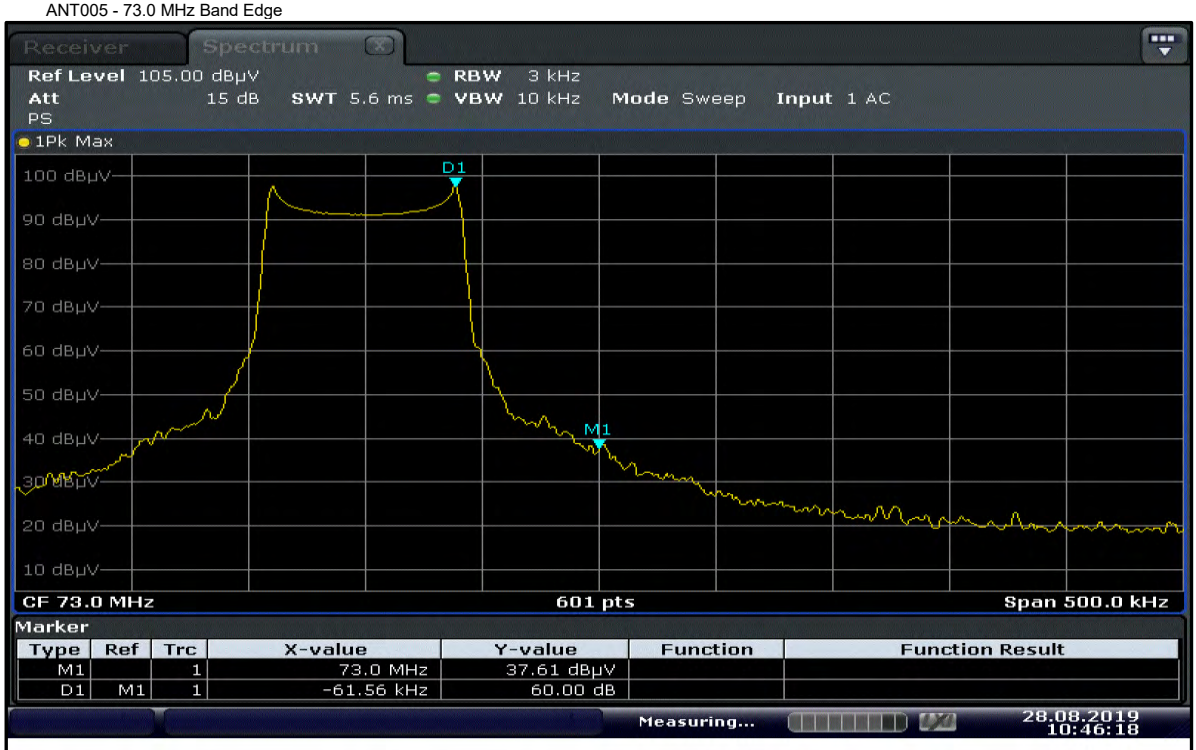
ANT005 - 73.0 MHz Band Edge



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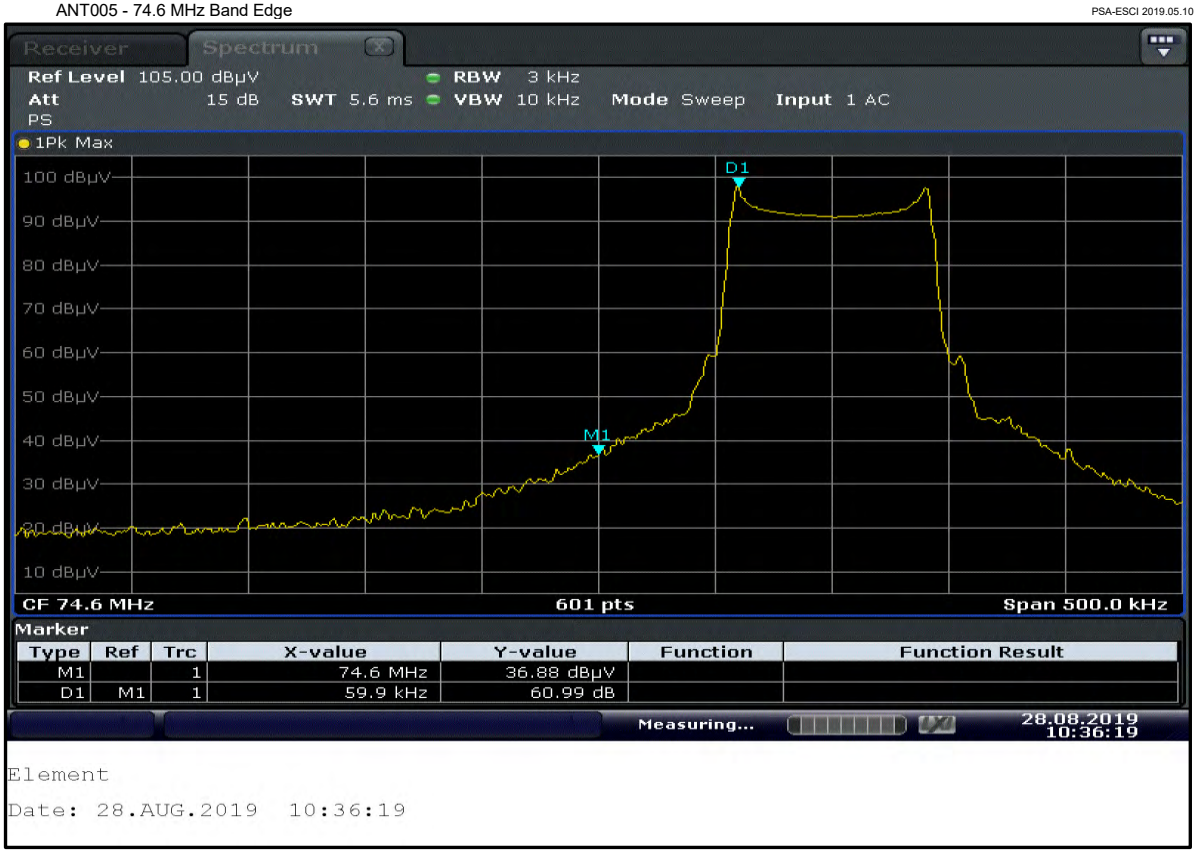
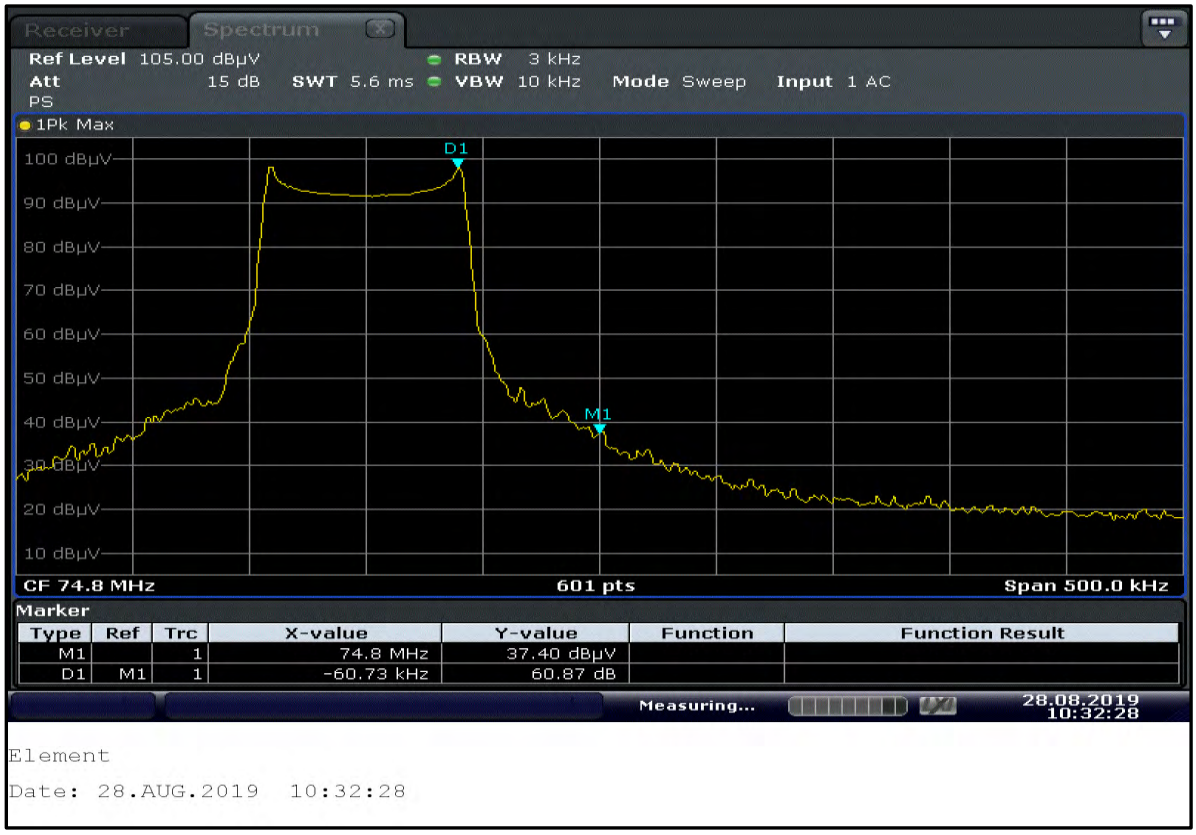
ANT005 - 74.6 MHz Band Edge

PSA-ESCI 2019.05.10

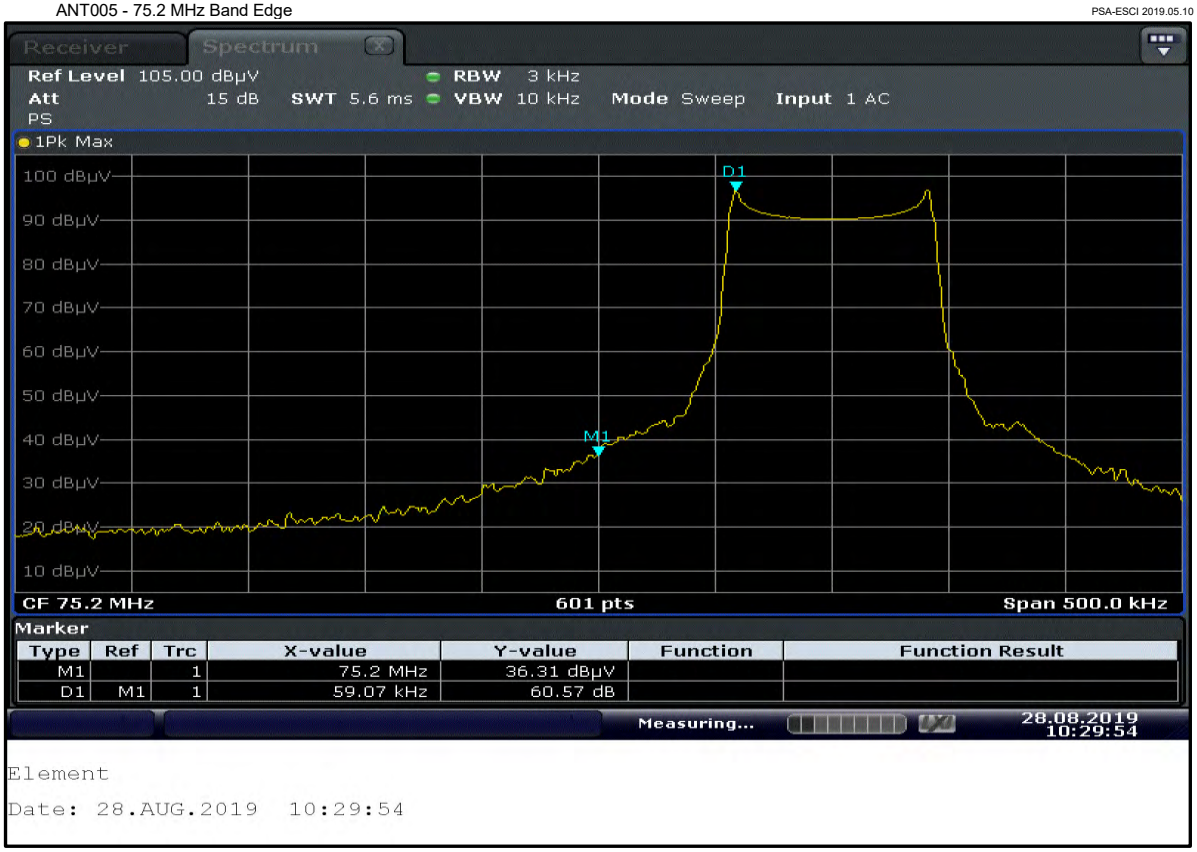


ANT005 - 74.8 MHz Band Edge

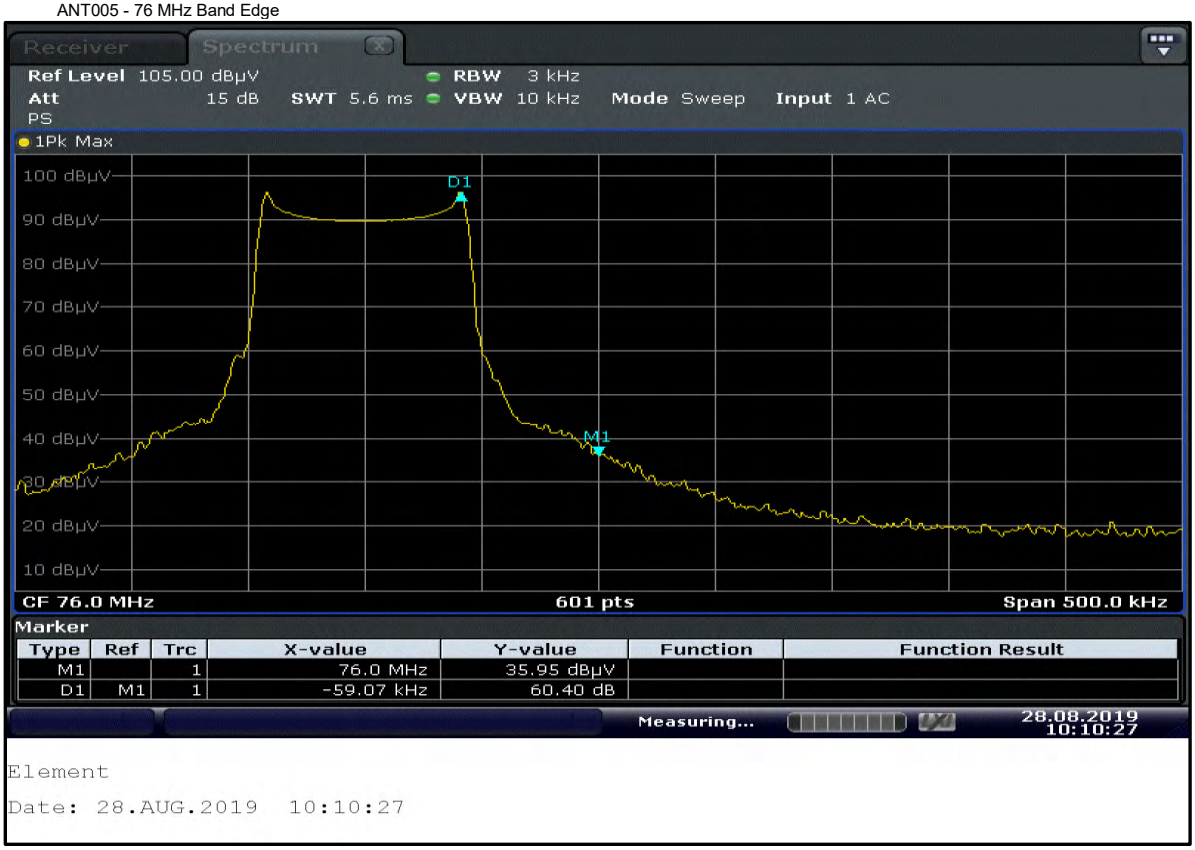


ANT005 - 75.2 MHz Band Edge

PSA-ESCI 2019.05.10

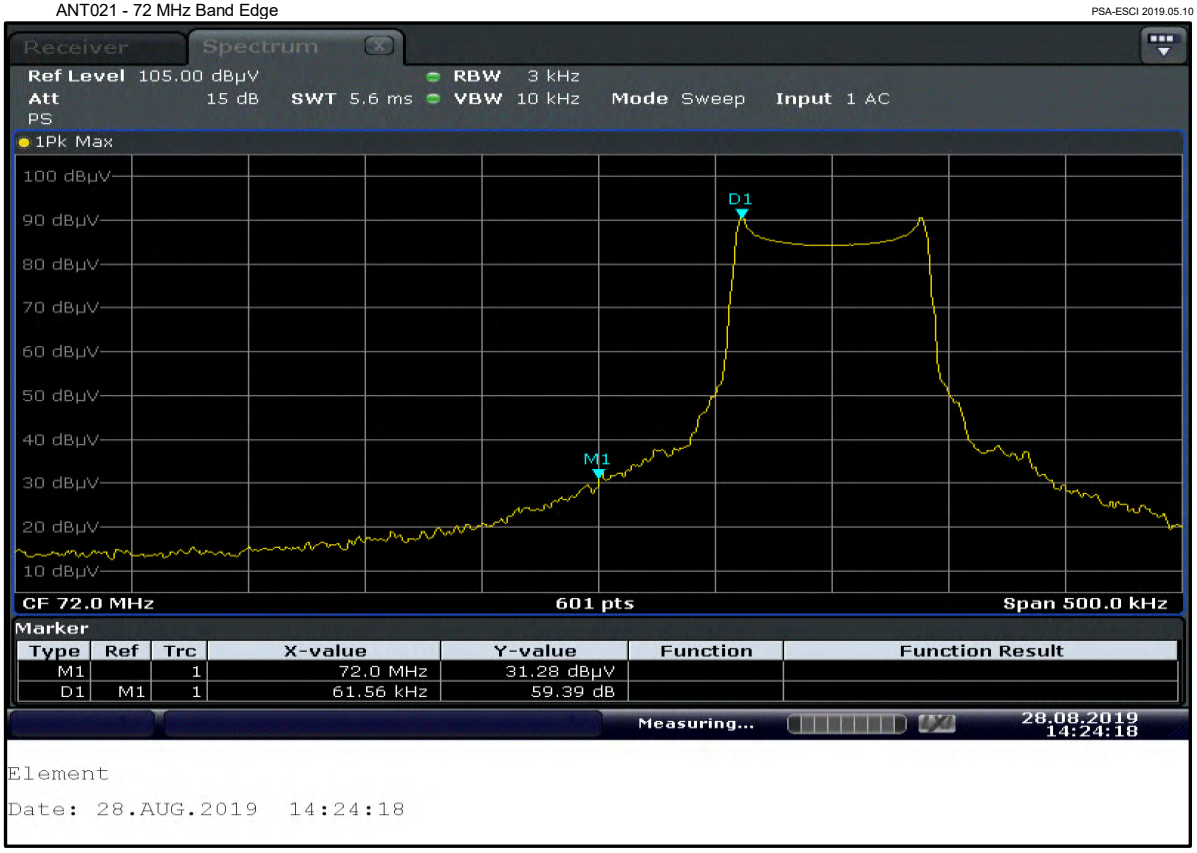


ANT005 - 76 MHz Band Edge

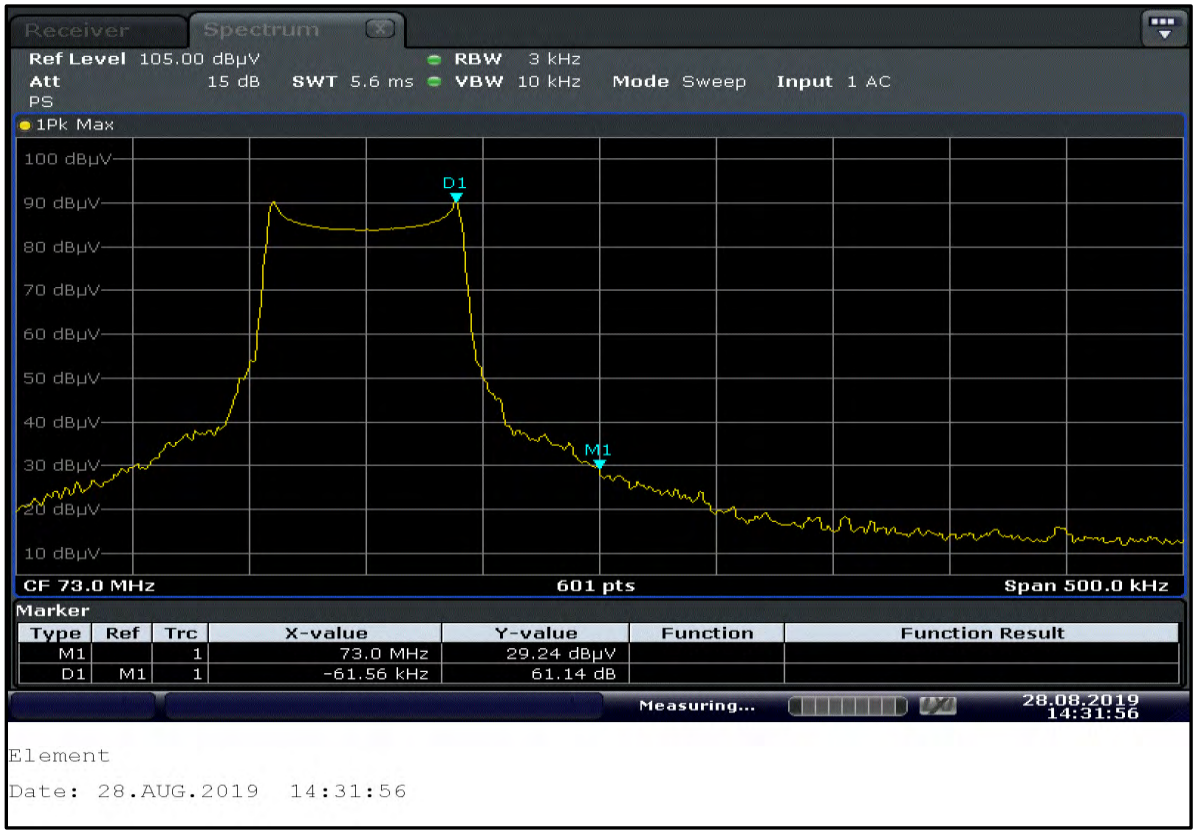


ANT021 - 72 MHz Band Edge

PSA-ESCI 2019.05.10

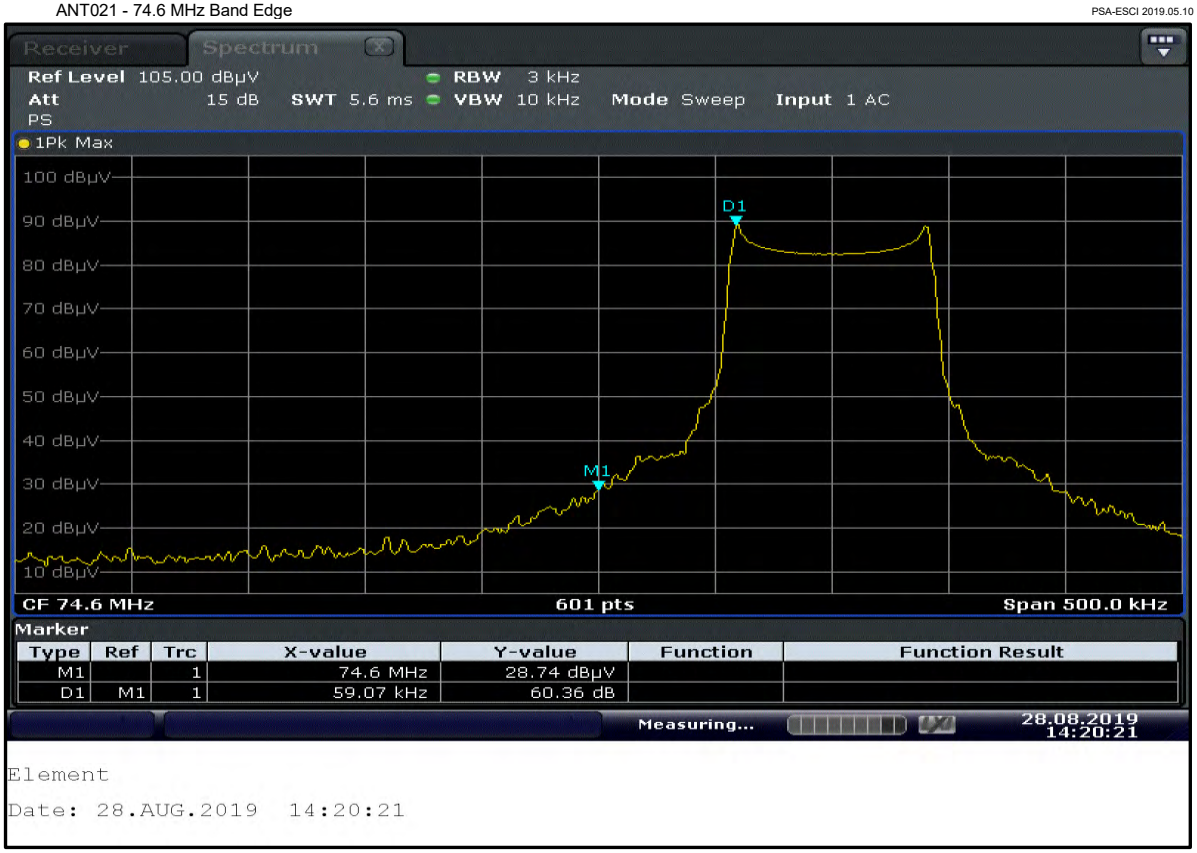


ANT021 - 73 MHz Band Edge

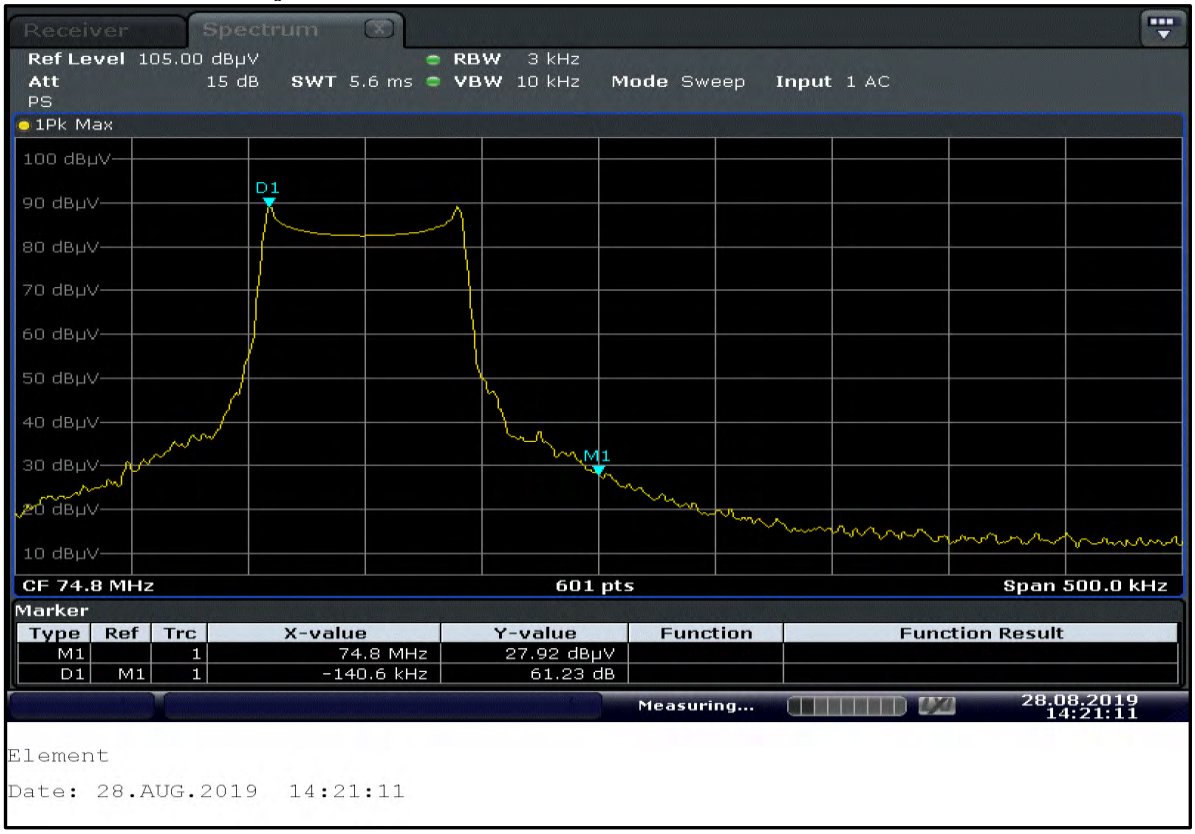


ANT021 - 74.6 MHz Band Edge

PSA-ESCI 2019.05.10

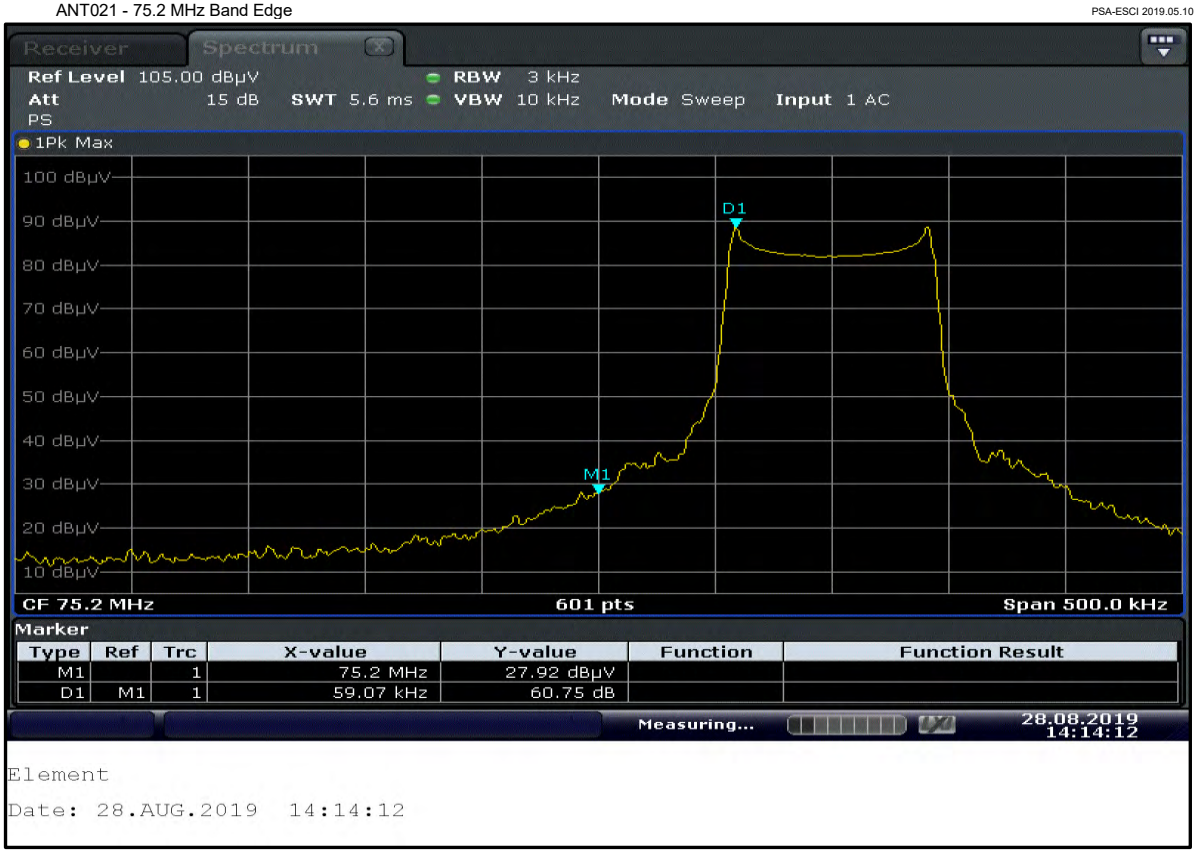


ANT021 - 74.8 MHz Band Edge

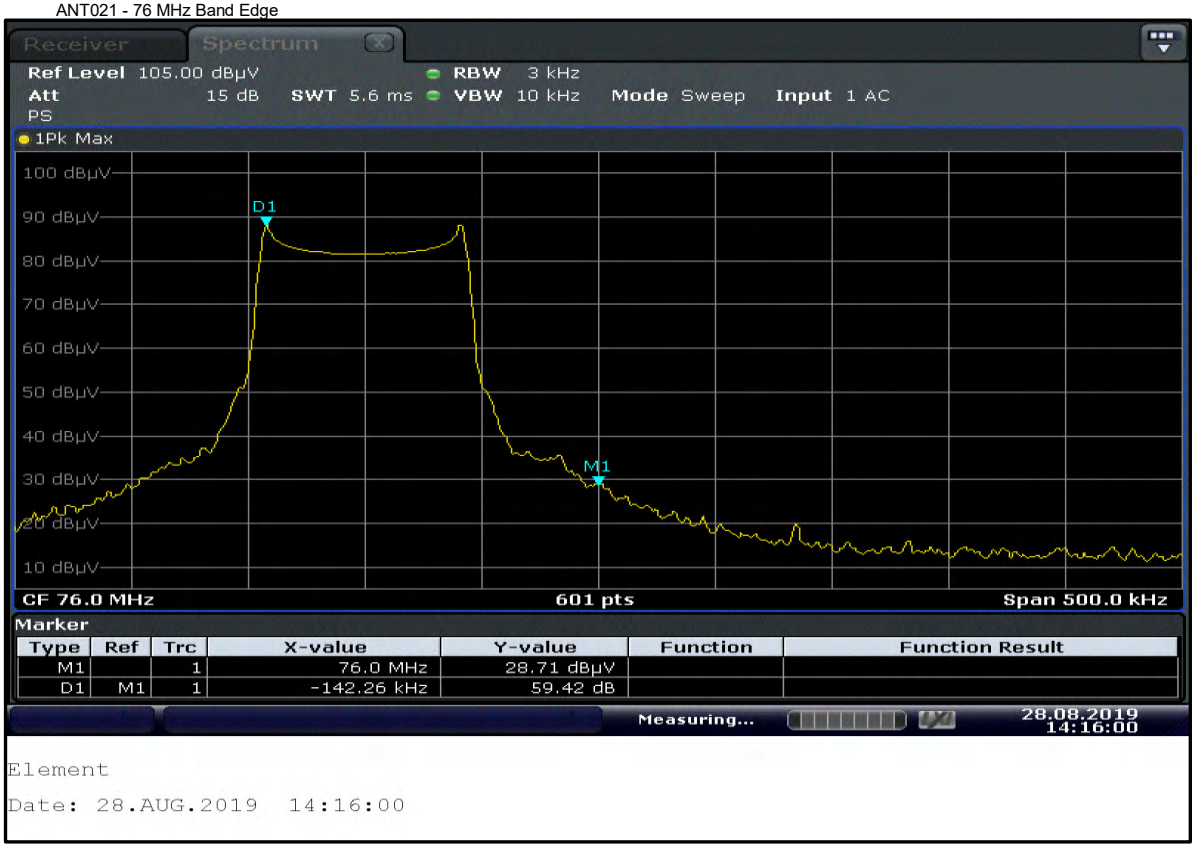


ANT021 - 75.2 MHz Band Edge

PSA-ESCI 2019.05.10

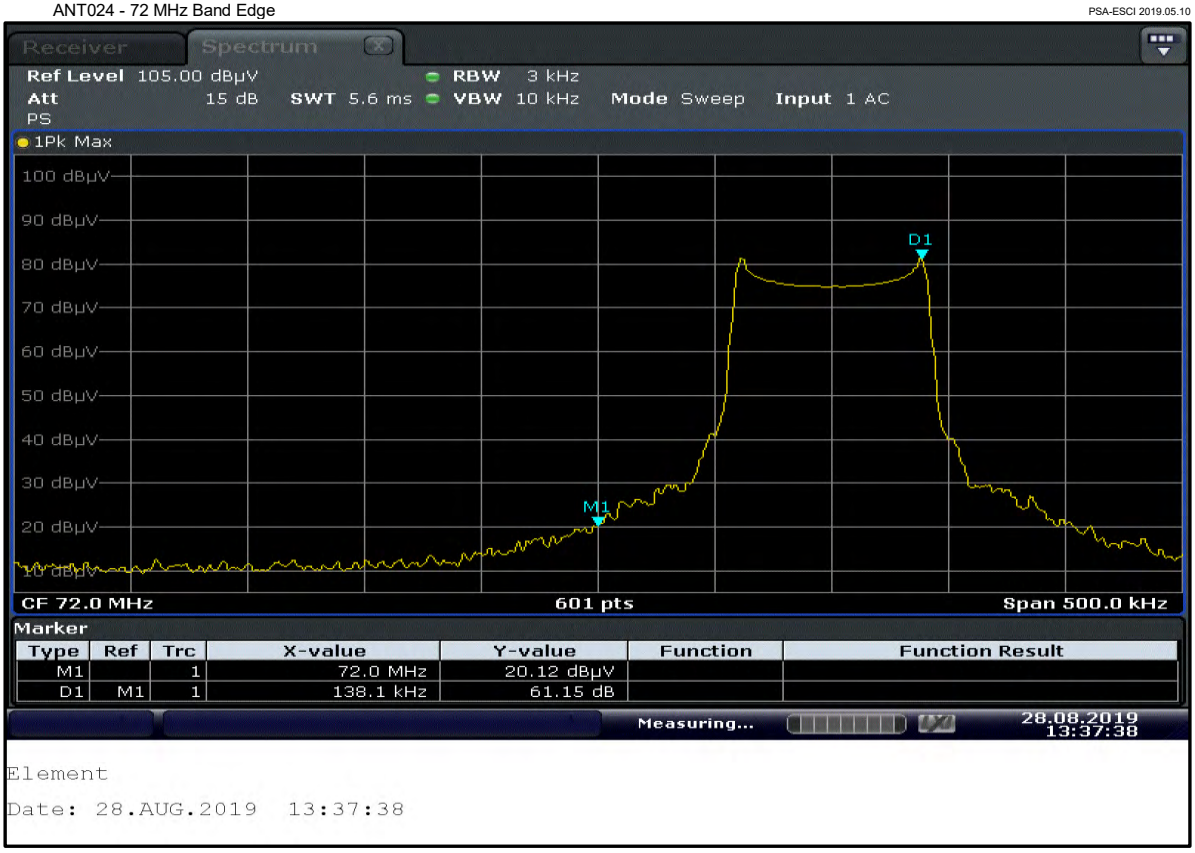


ANT021 - 76 MHz Band Edge

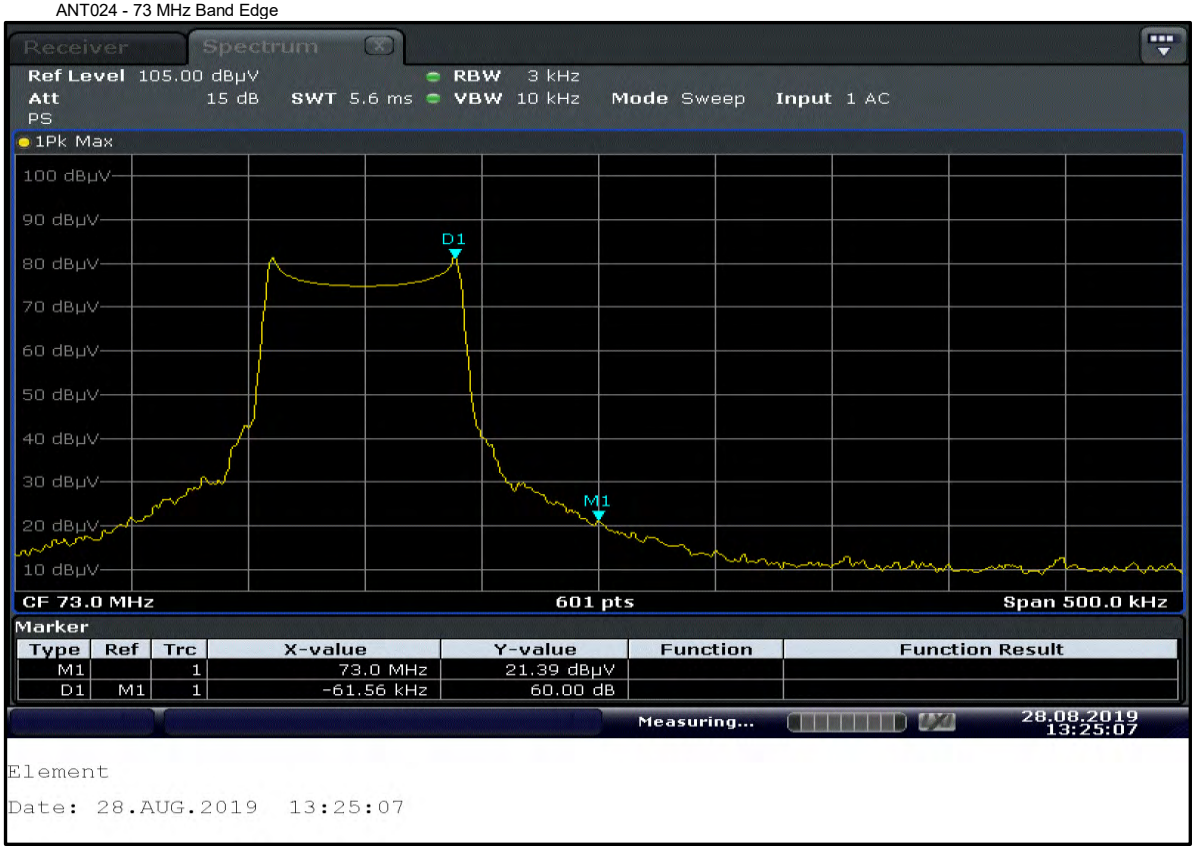


ANT024 - 72 MHz Band Edge

PSA-ESCI 2019.05.10

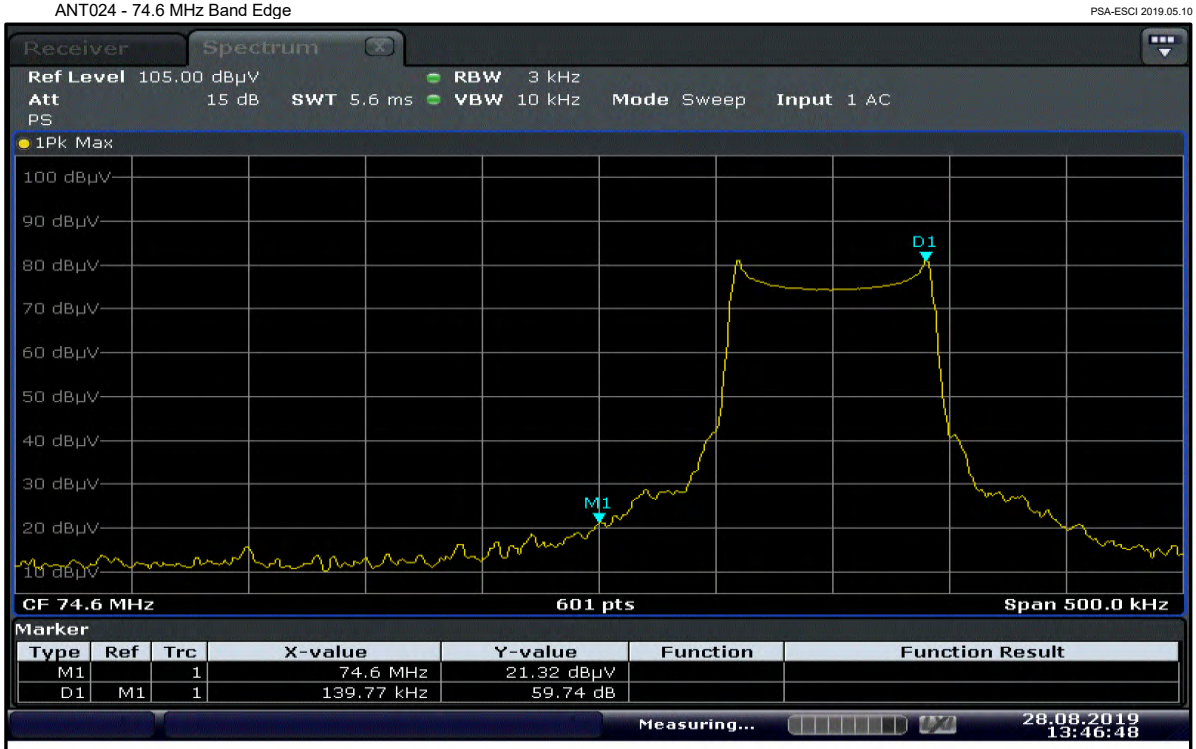


ANT024 - 73 MHz Band Edge



ANT024 - 74.6 MHz Band Edge

PSA-ESCI 2019.05.10



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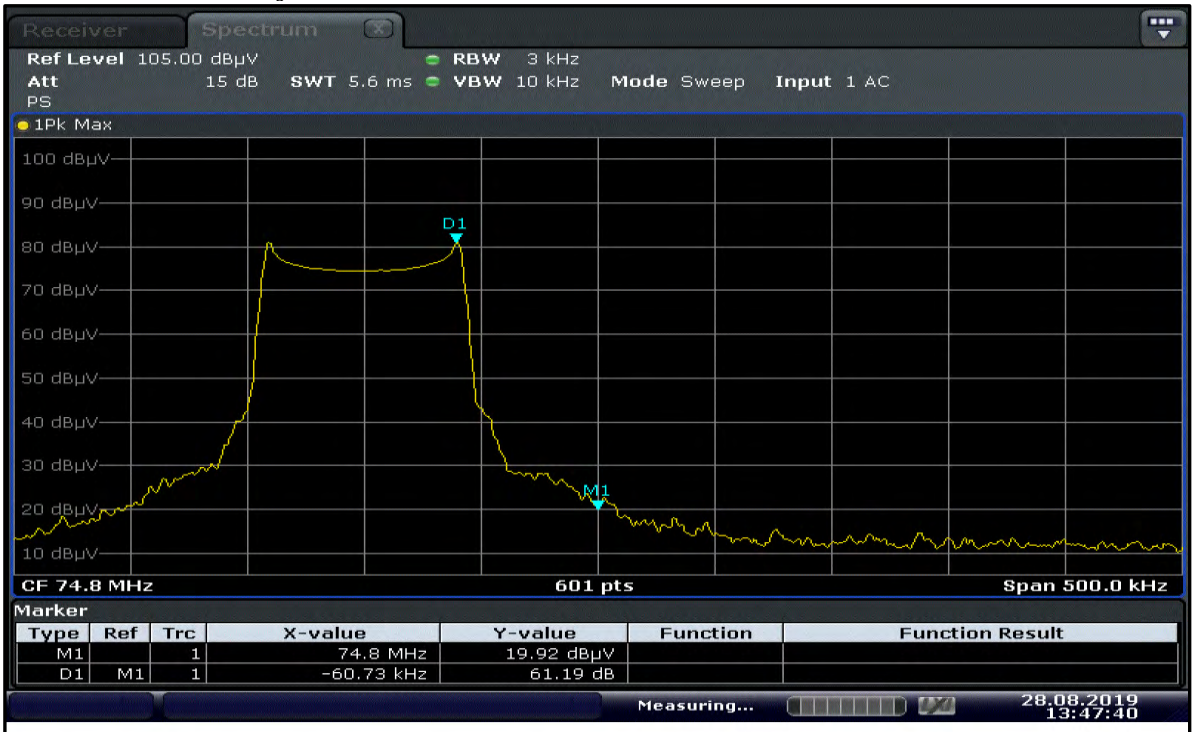
ANT024 - 74.8 MHz Band Edge



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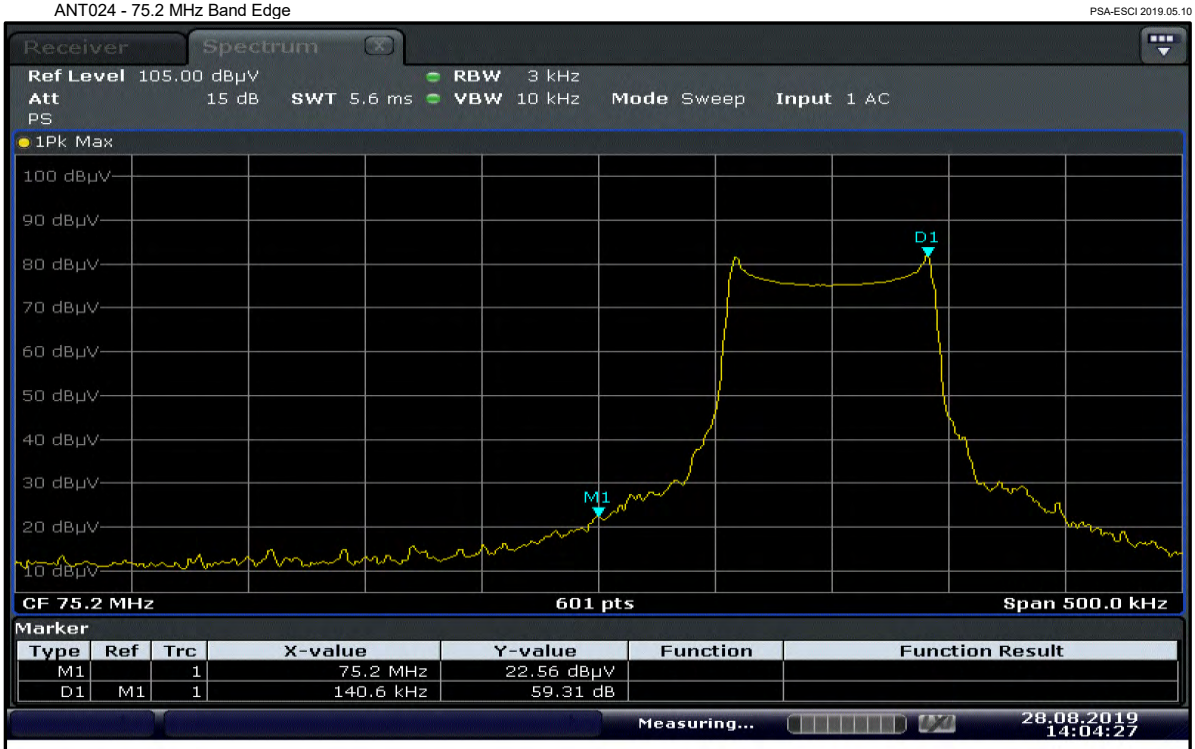
ANT024 - 75.2 MHz Band Edge

PSA-ESCI 2019.05.10



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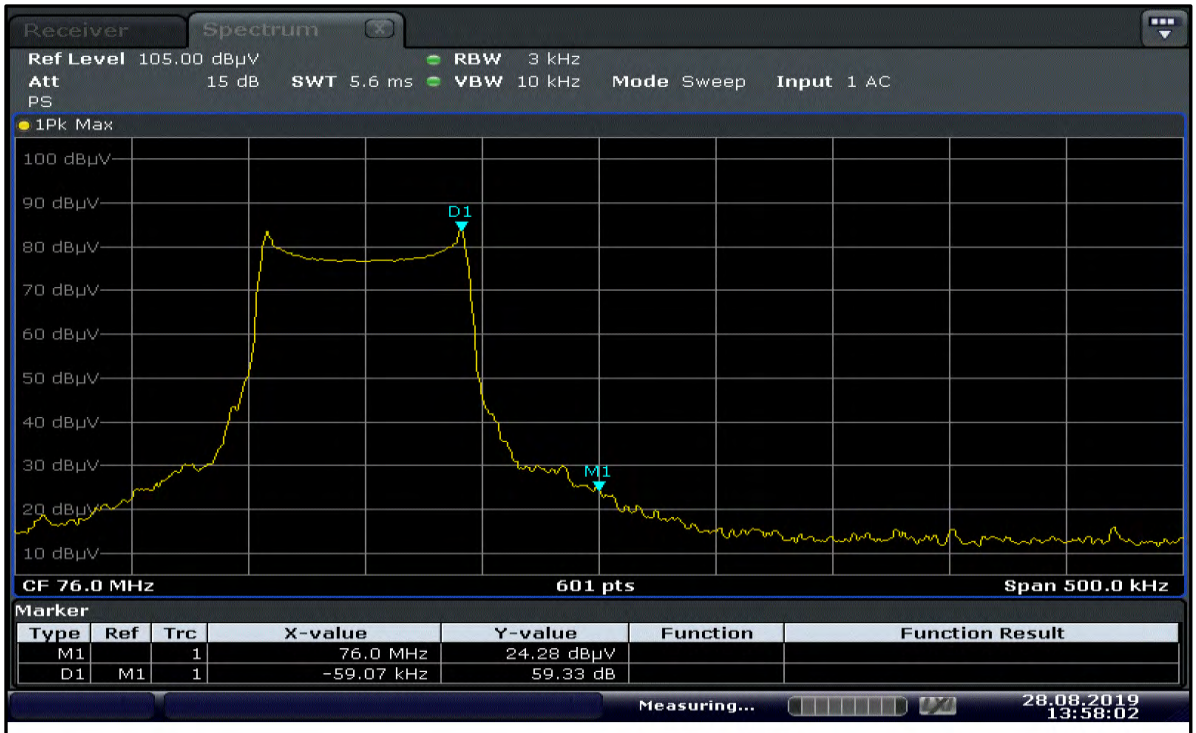
ANT024 - 76 MHz Band Edge



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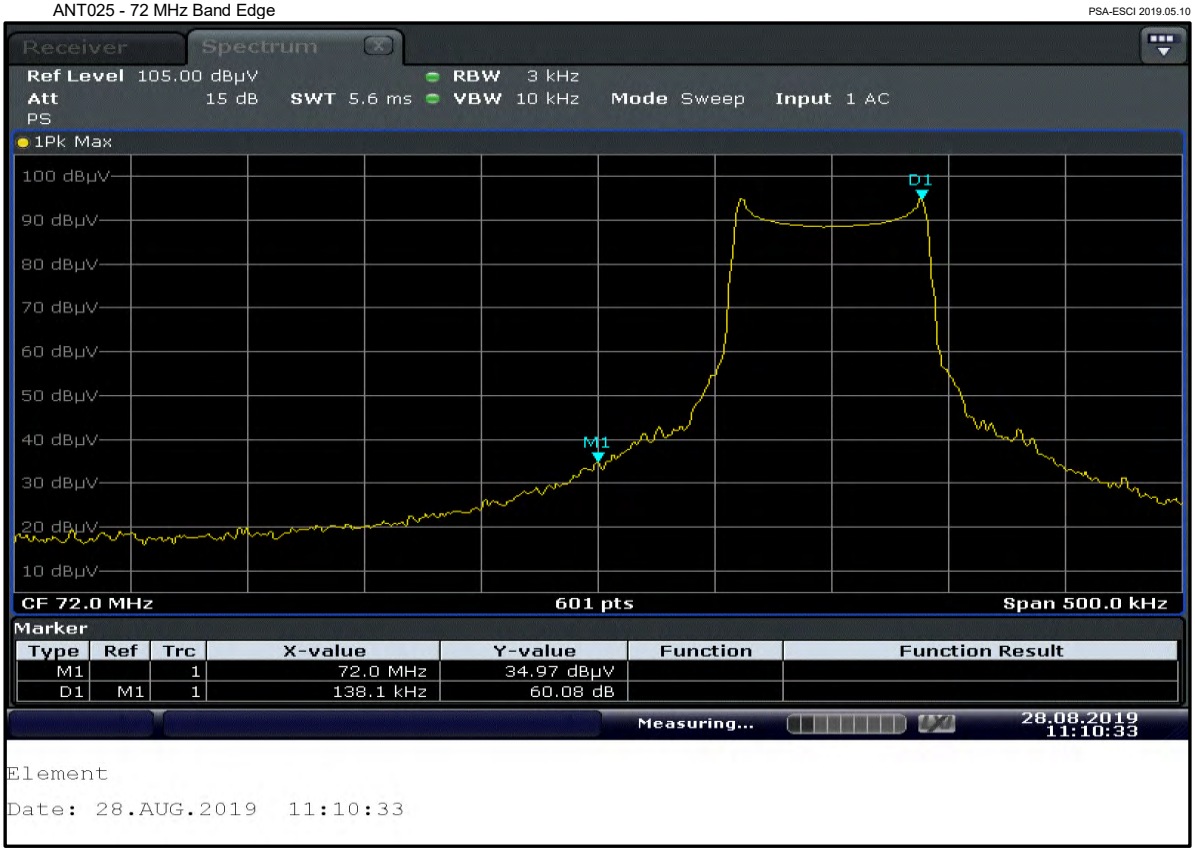
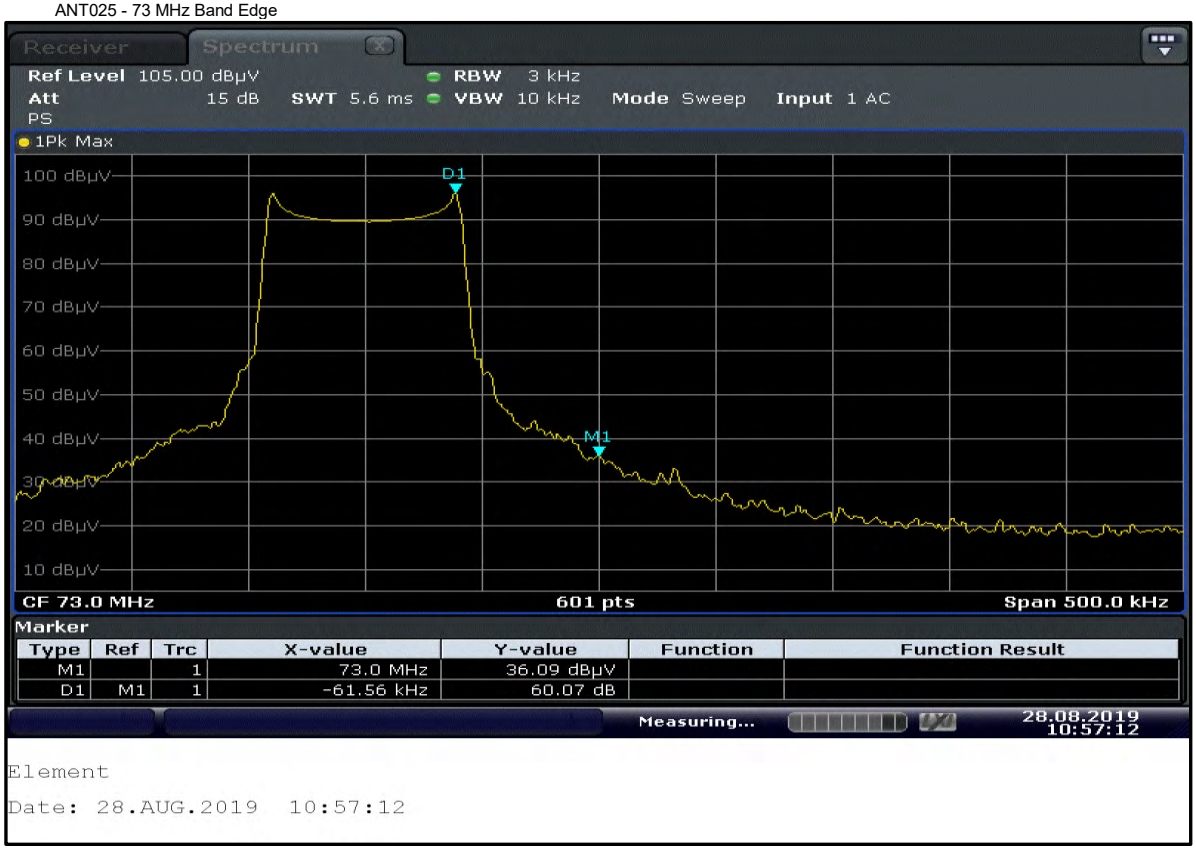
ANT025 - 72 MHz Band Edge

PSA-ESCI 2019.05.10

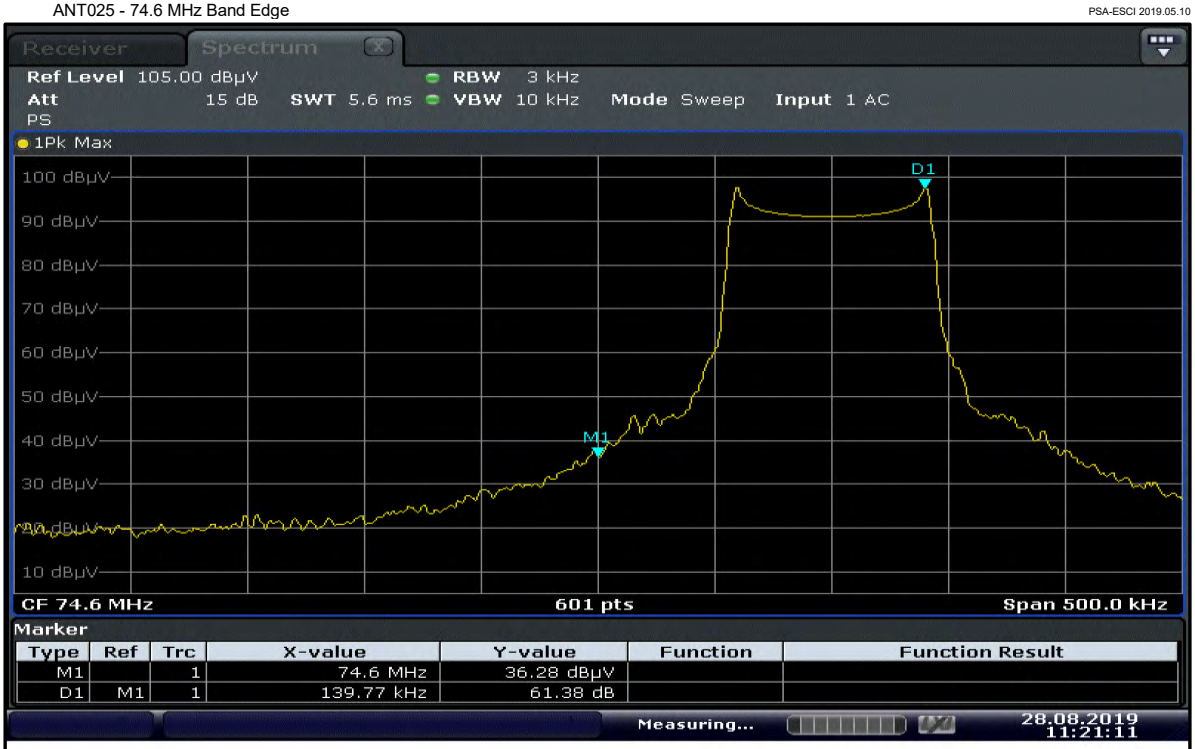


ANT025 - 73 MHz Band Edge



ANT025 - 74.6 MHz Band Edge

PSA-ESCI 2019.05.10



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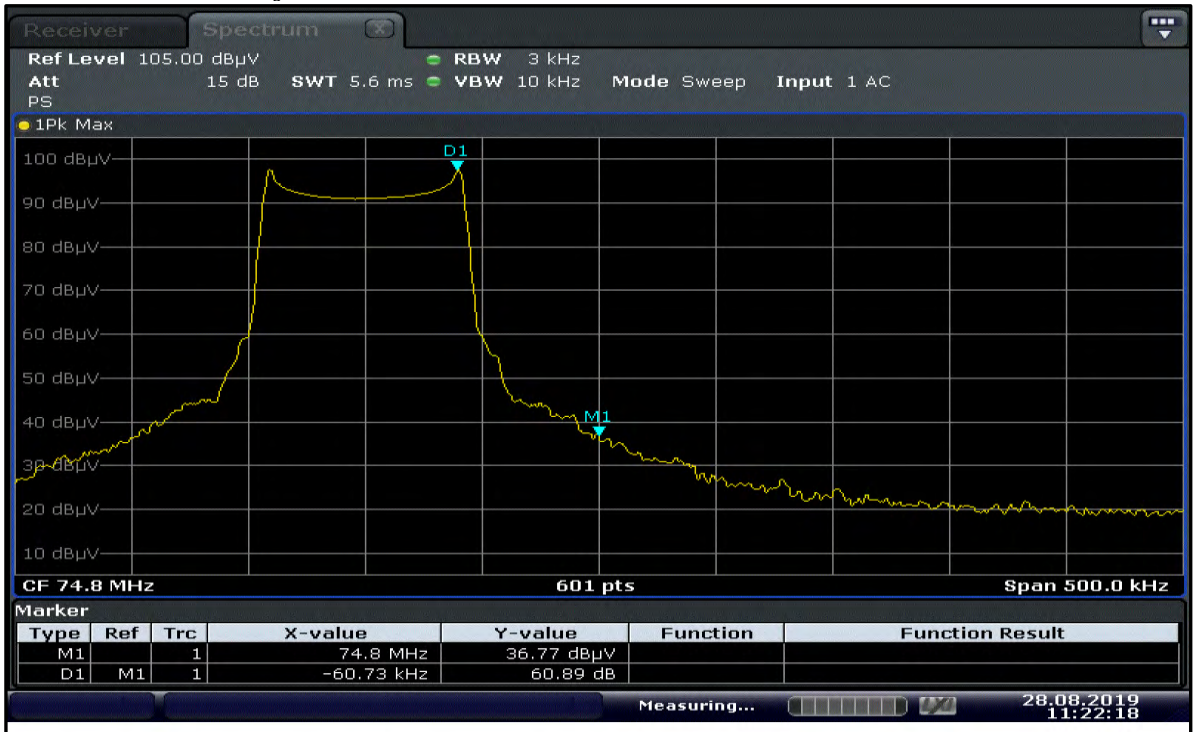
ANT025 - 74.8 MHz Band Edge



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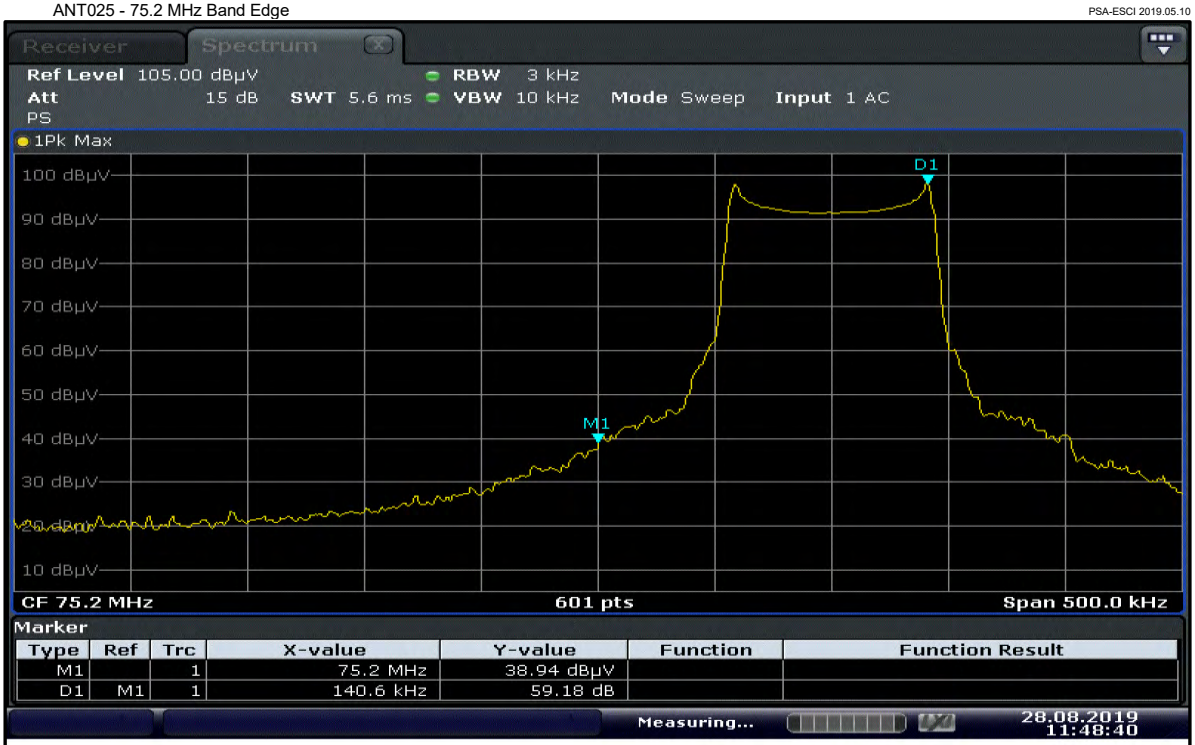
ANT025 - 75.2 MHz Band Edge

PSA-ESCI 2019.05.10



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Date: 28.AUG.2019 11:48:40

ANT025 - 76 MHz Band Edge

Element

Date: 28.AUG.2019 11:41:26