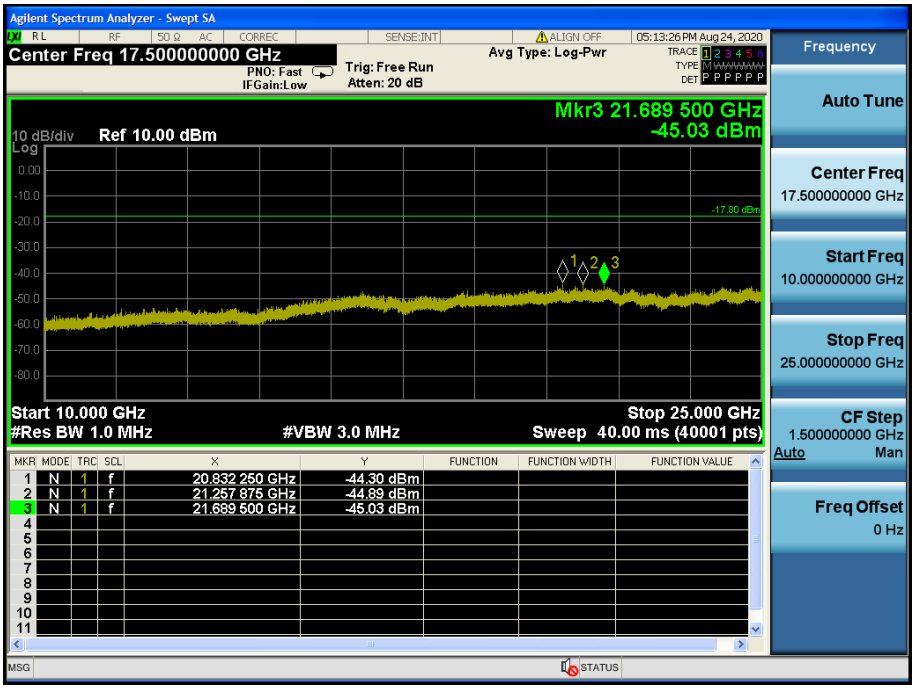
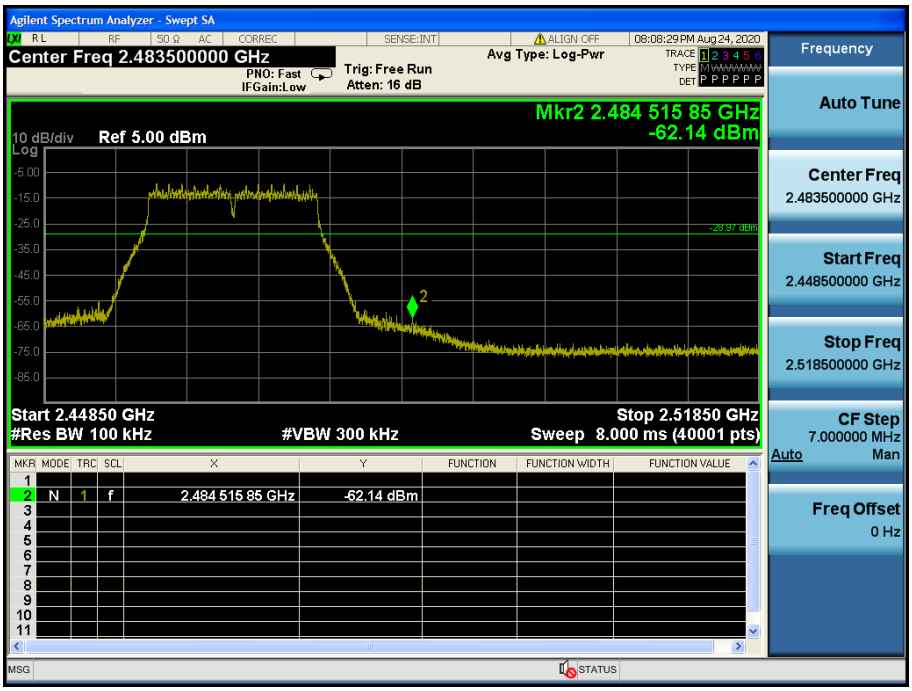
Conducted Spurious Emissions



TM 2 & ANT 2 & 2 467

Reference

High Band-edge



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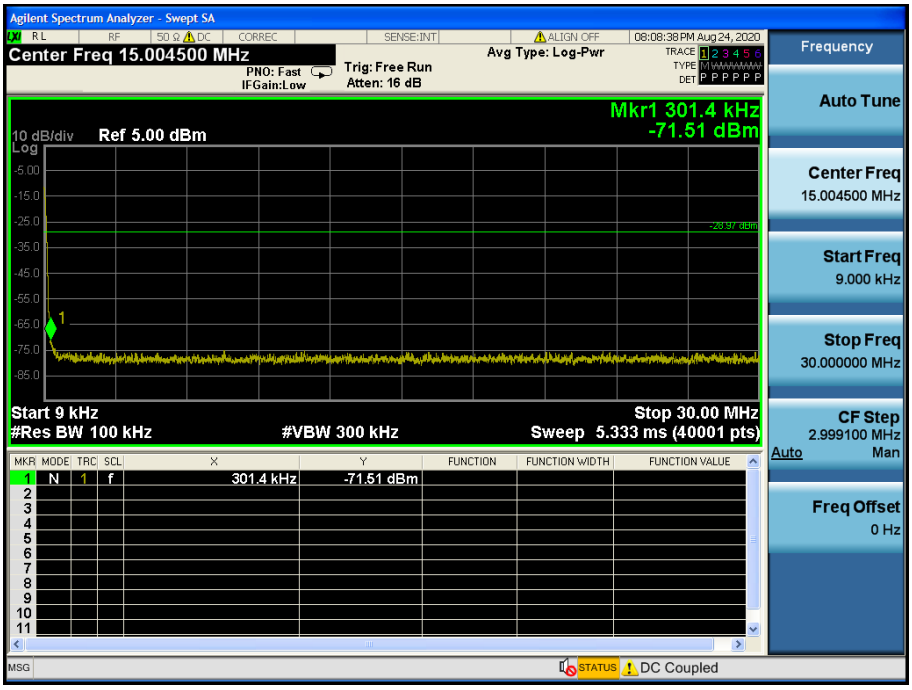

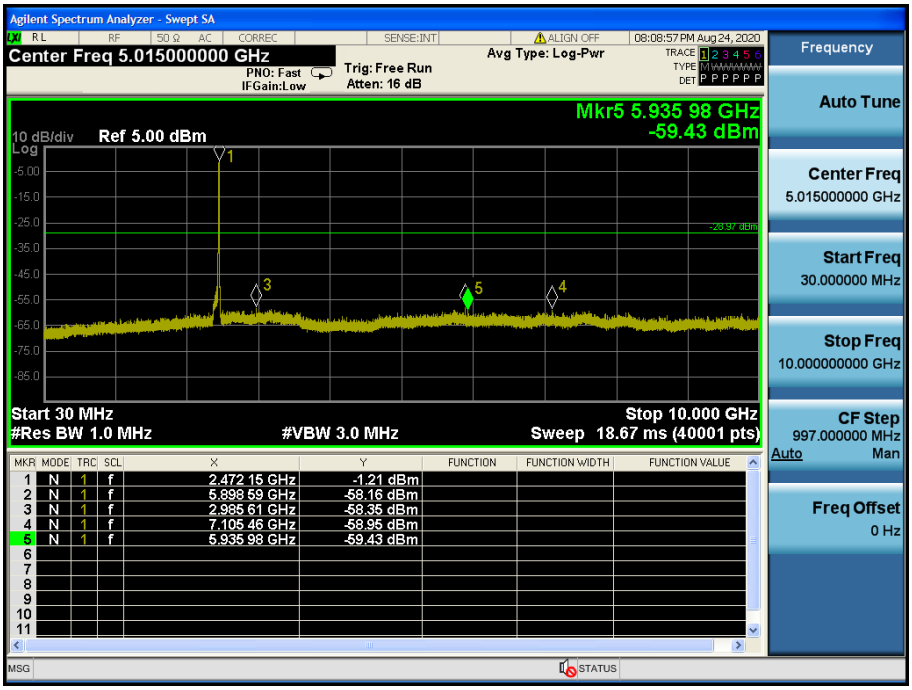

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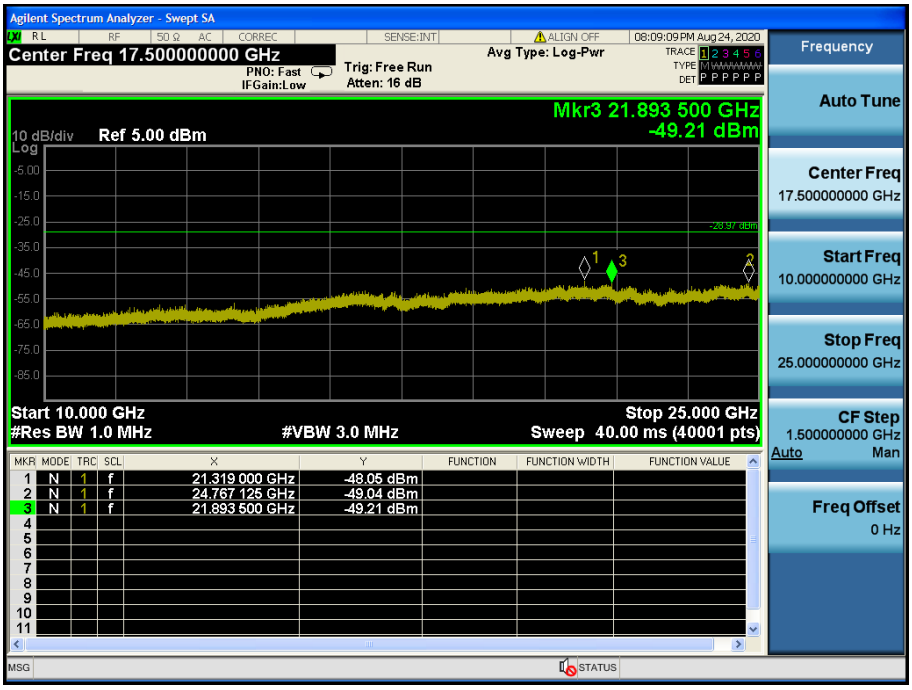
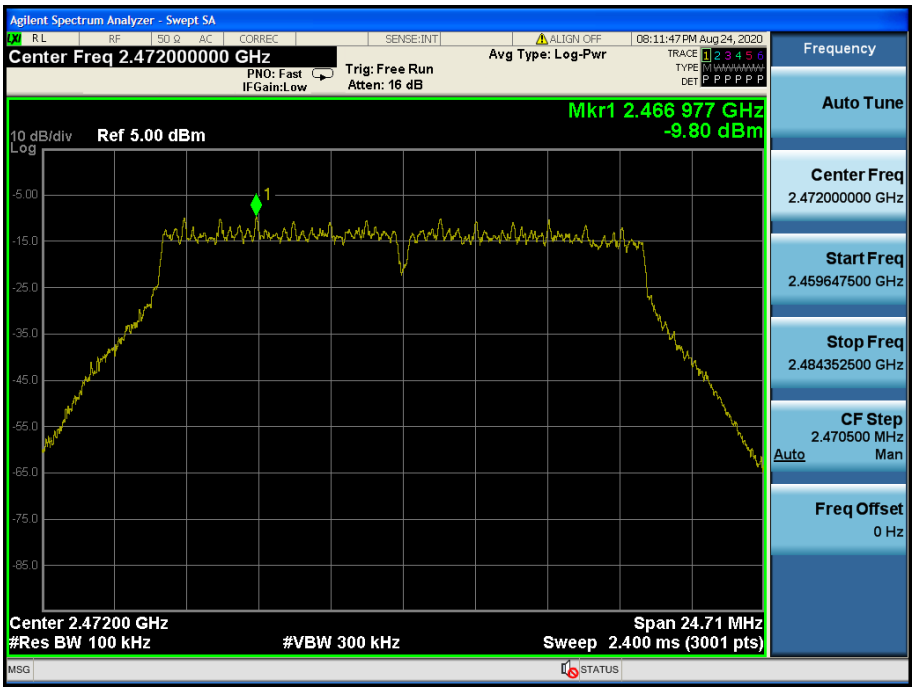
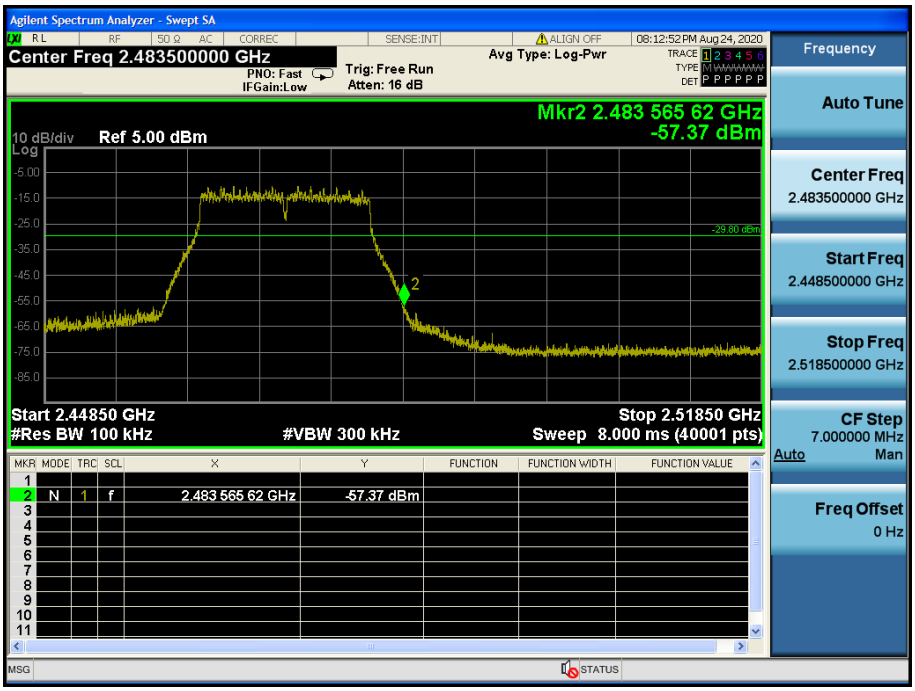


TM 2 & ANT 2 & 2 472

Reference



High Band-edge



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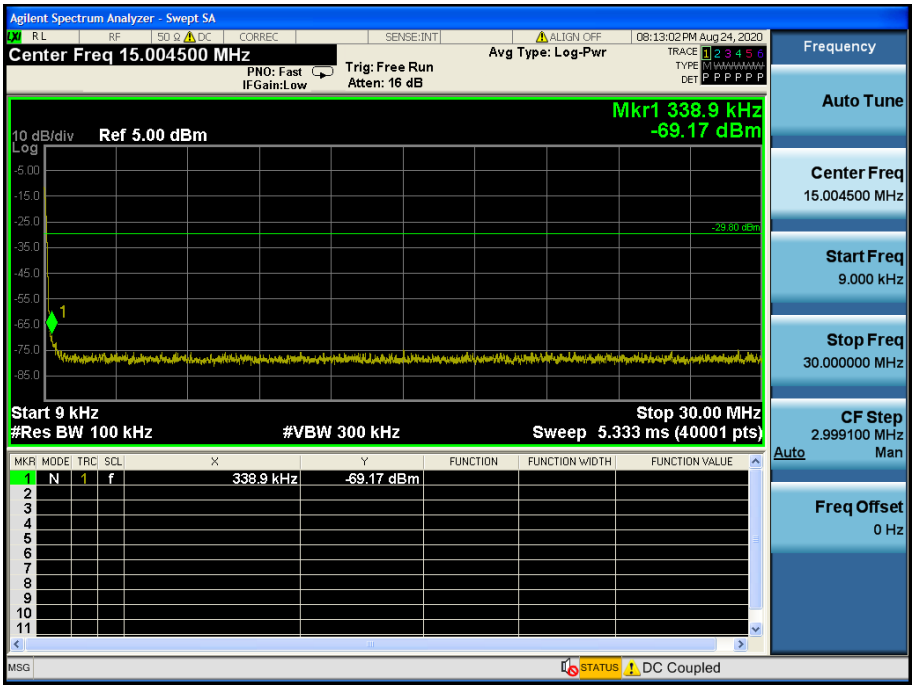

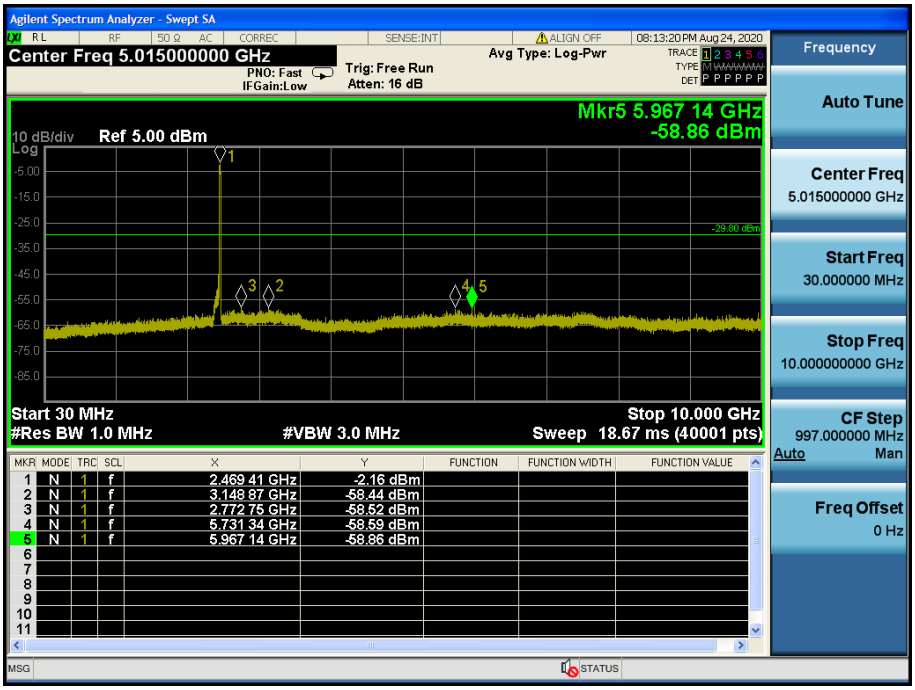

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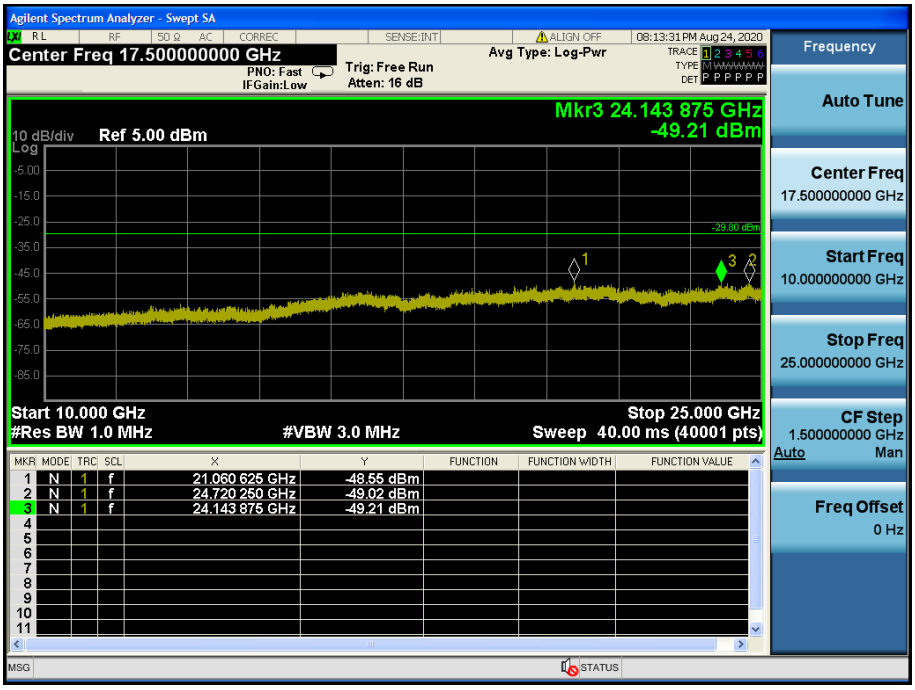
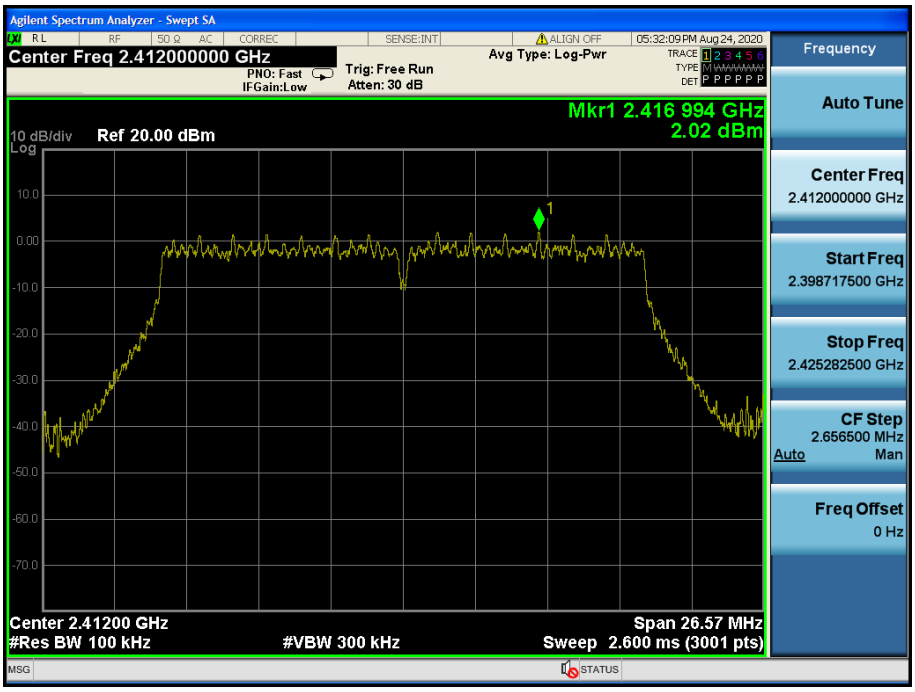
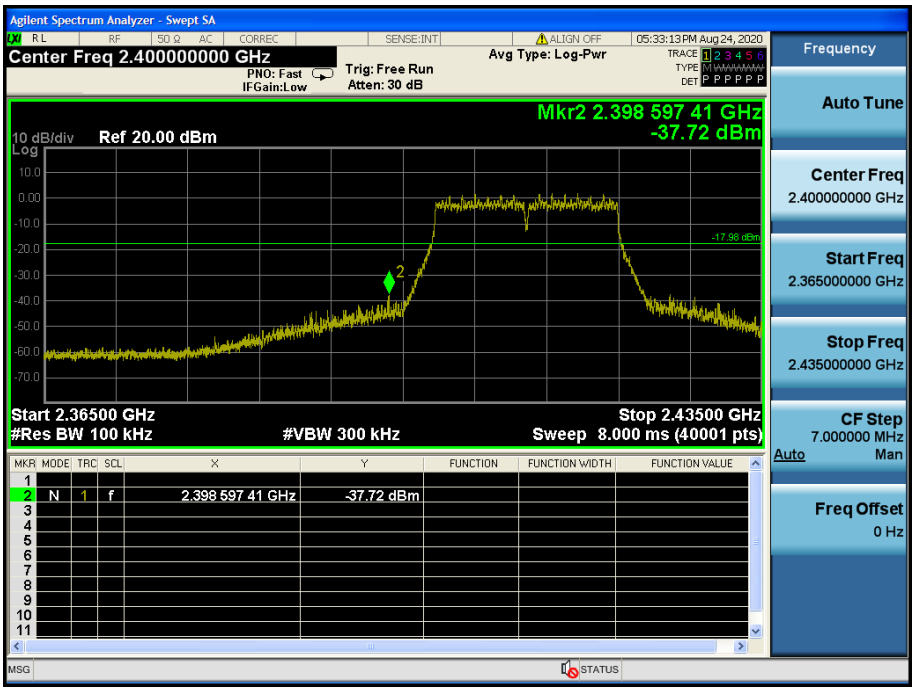


TM 3 & ANT 2 & 2 412

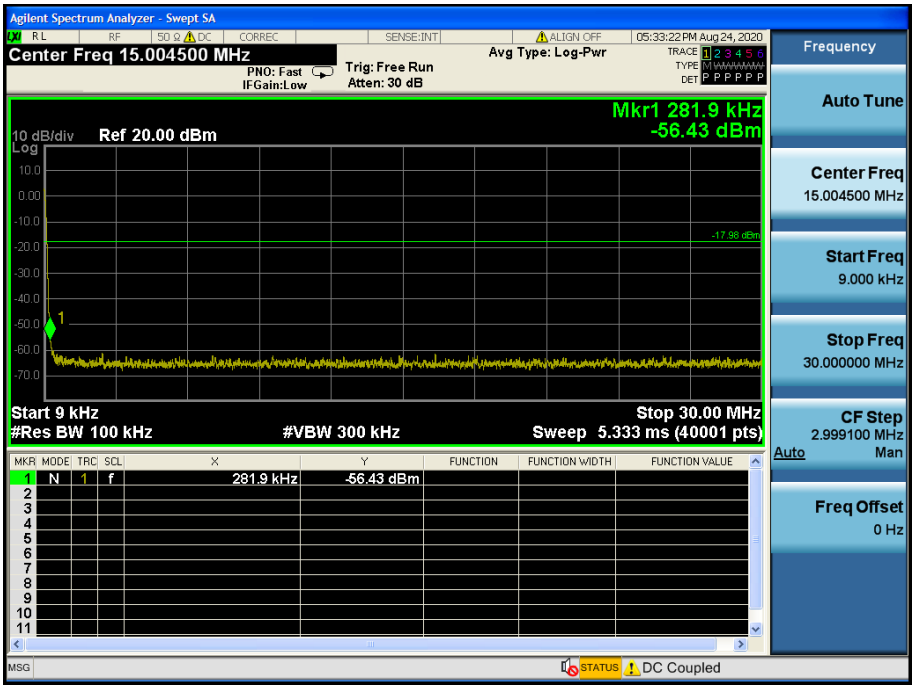
Reference

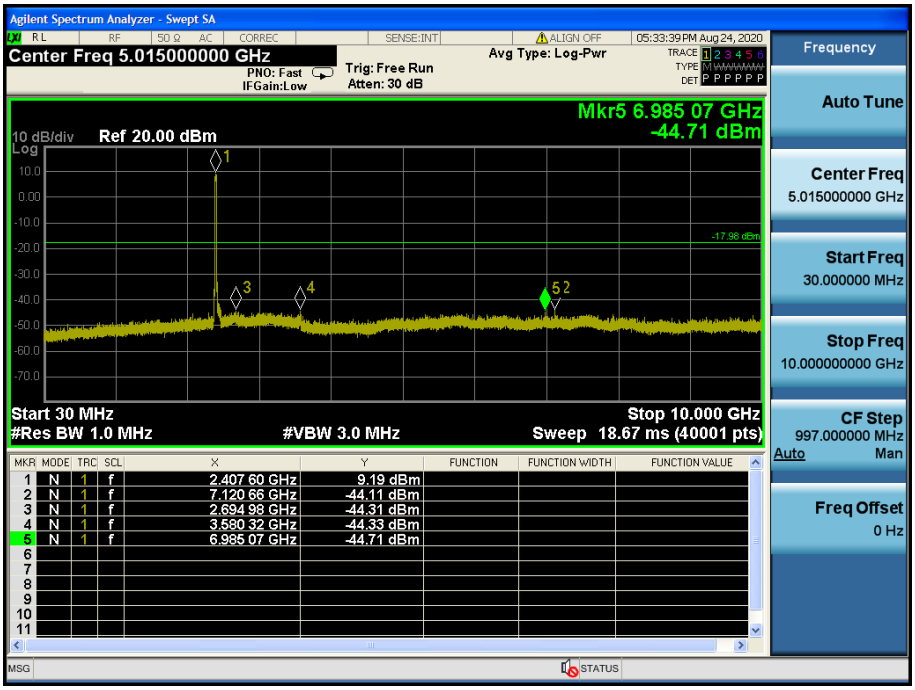


Low Band-edge

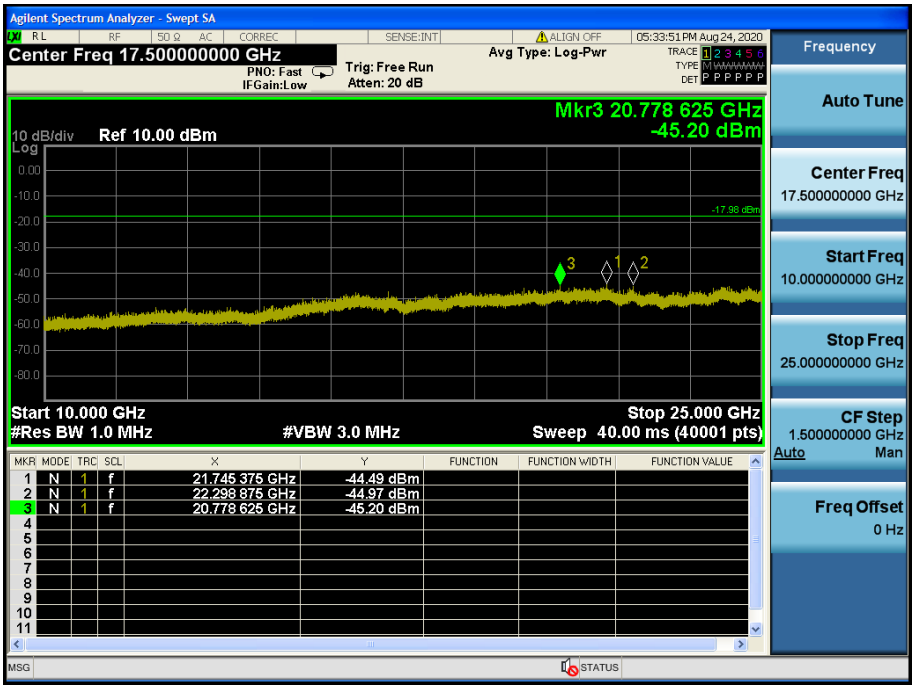


Conducted Spurious Emissions



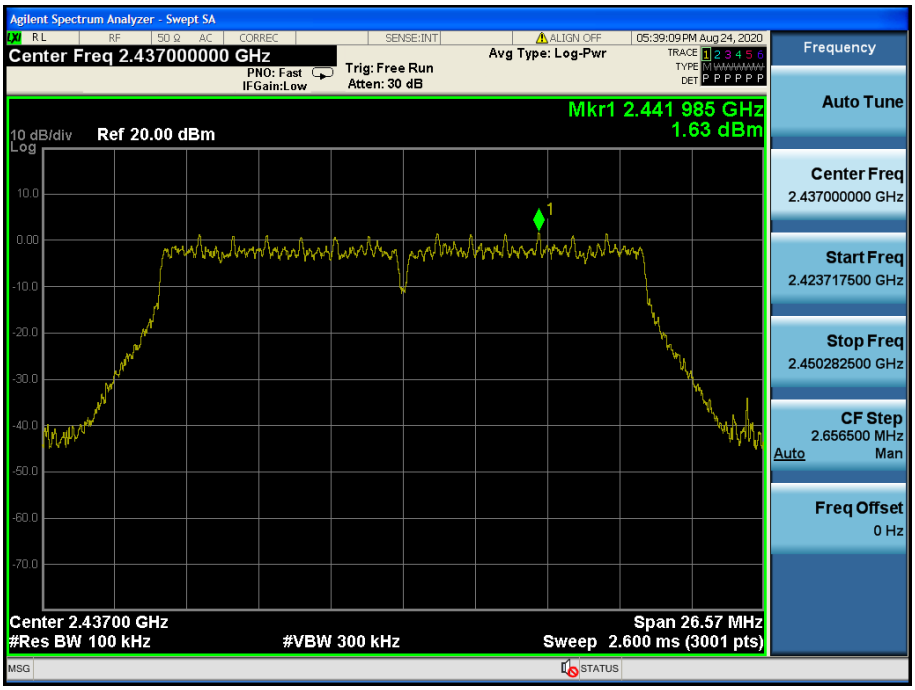


Conducted Spurious Emissions



TM 3 & ANT 2 & 2 437

Reference



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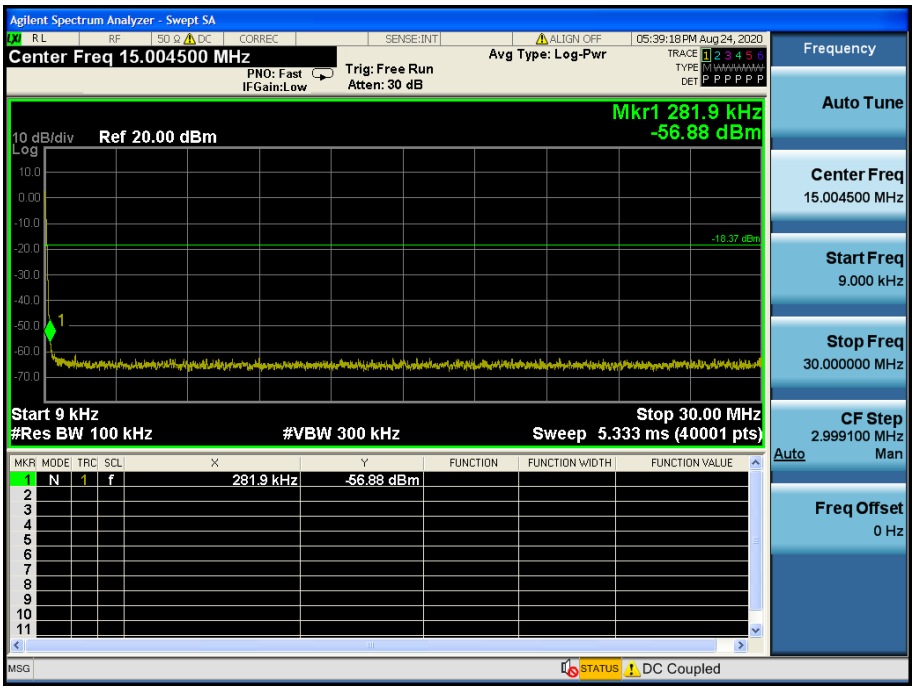

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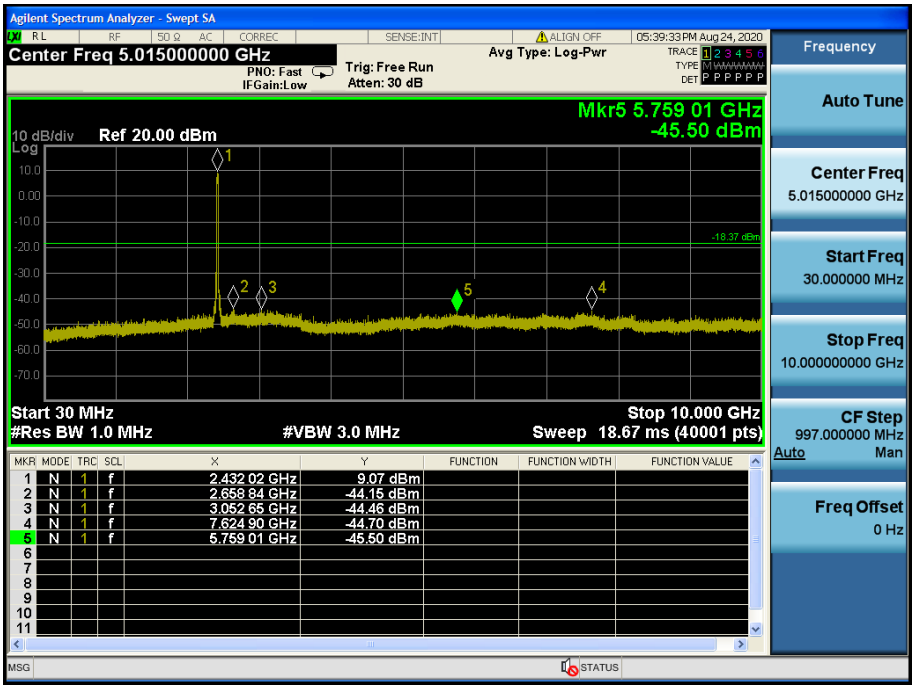

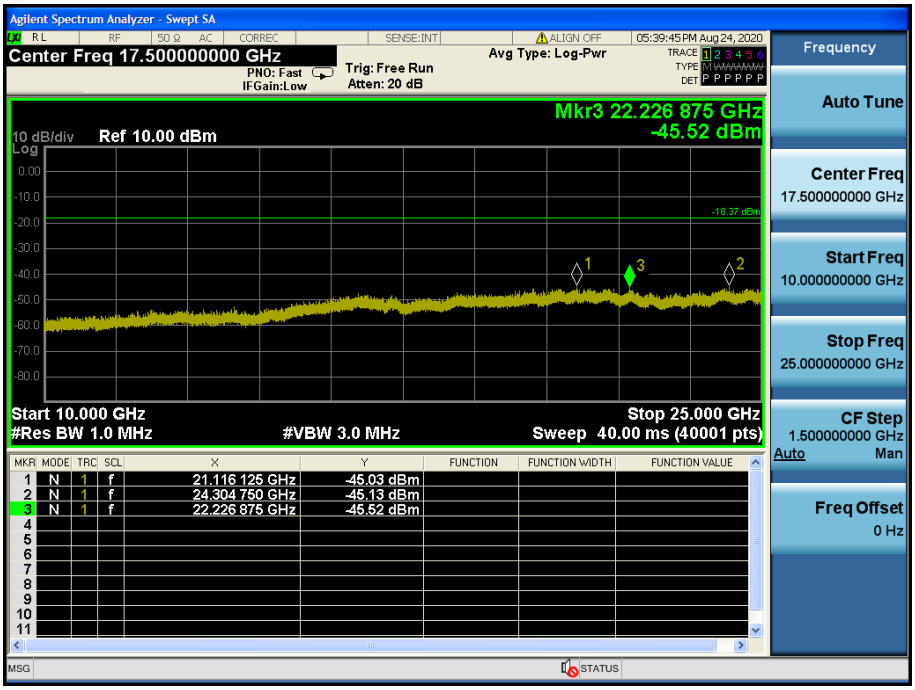

TM 3 & ANT 2 & 2 462

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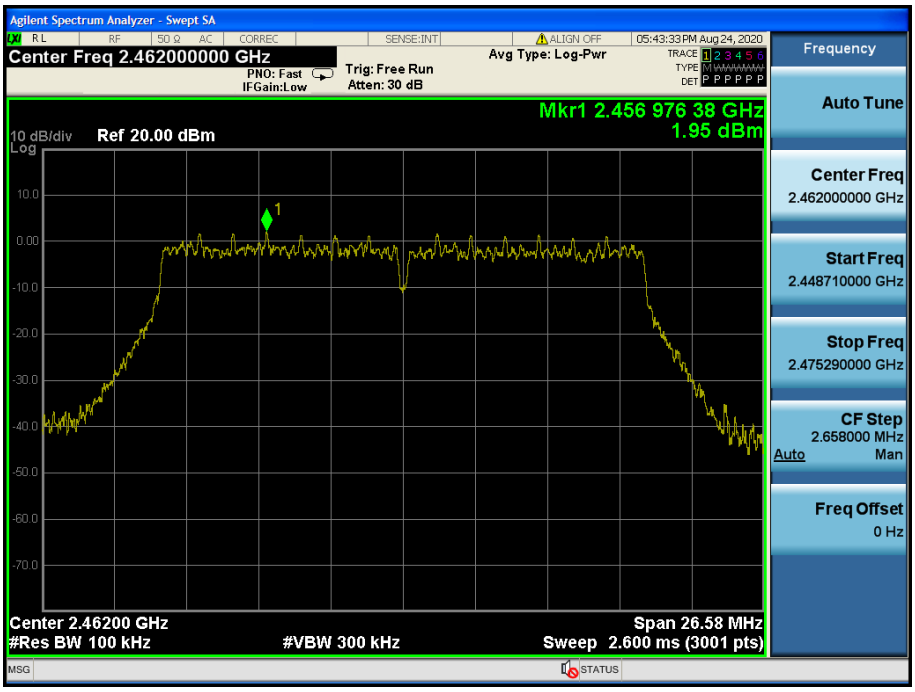
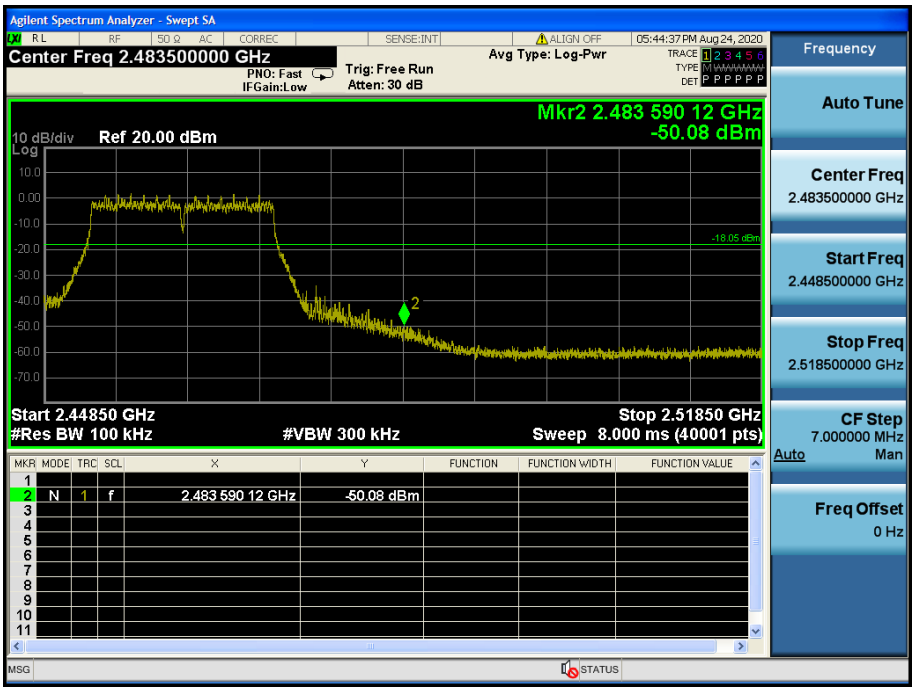


High Band-edge



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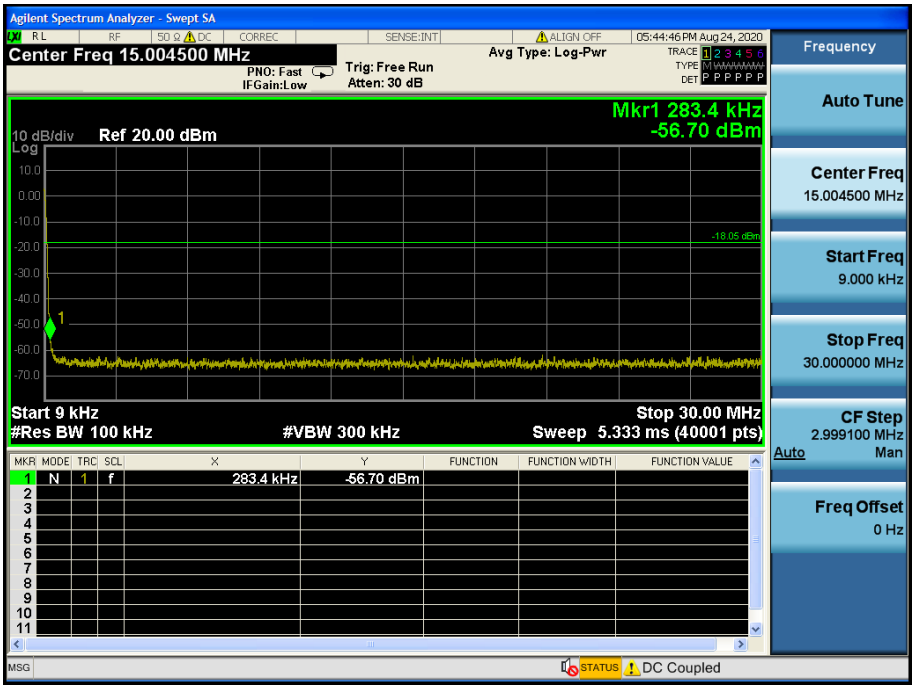

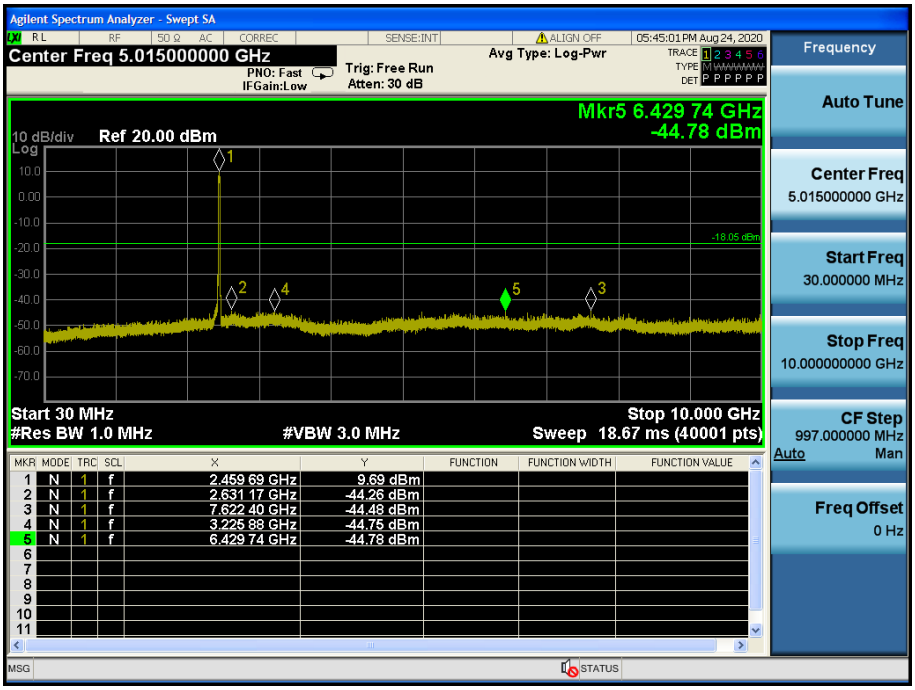

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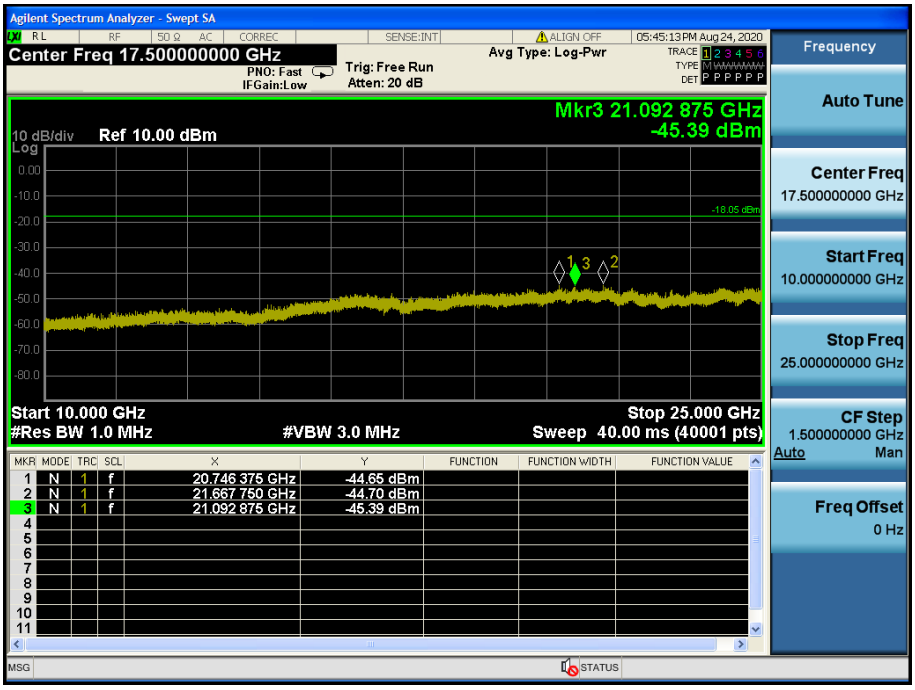

TM 3 & ANT 2 & 2 467

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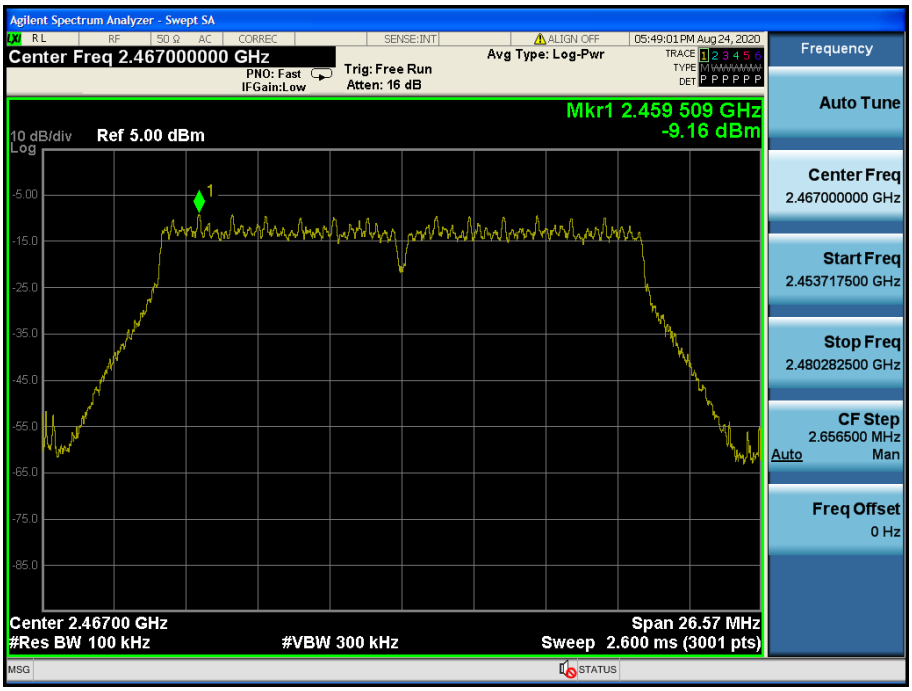
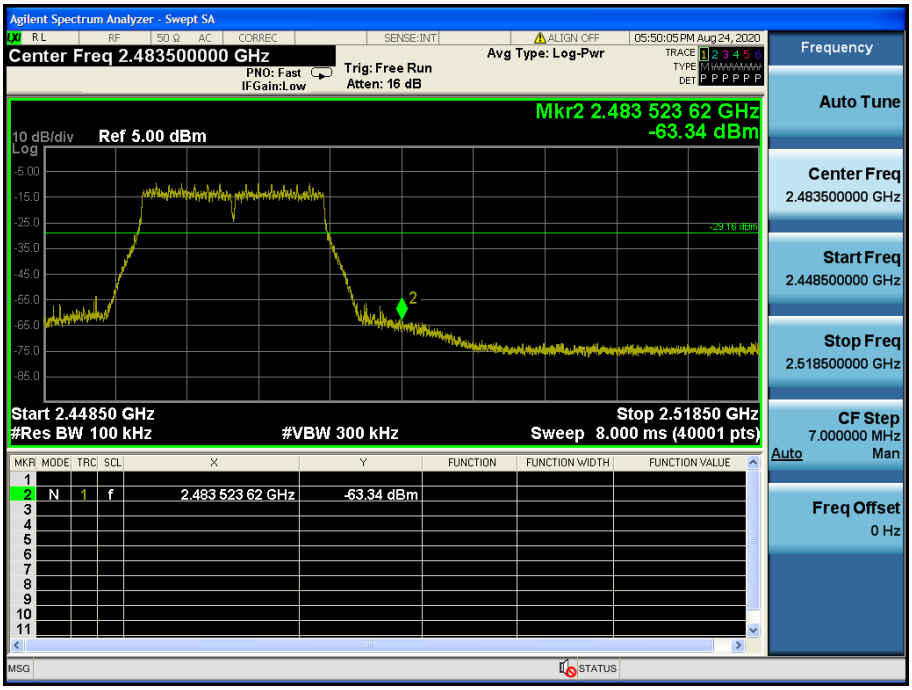


High Band-edge



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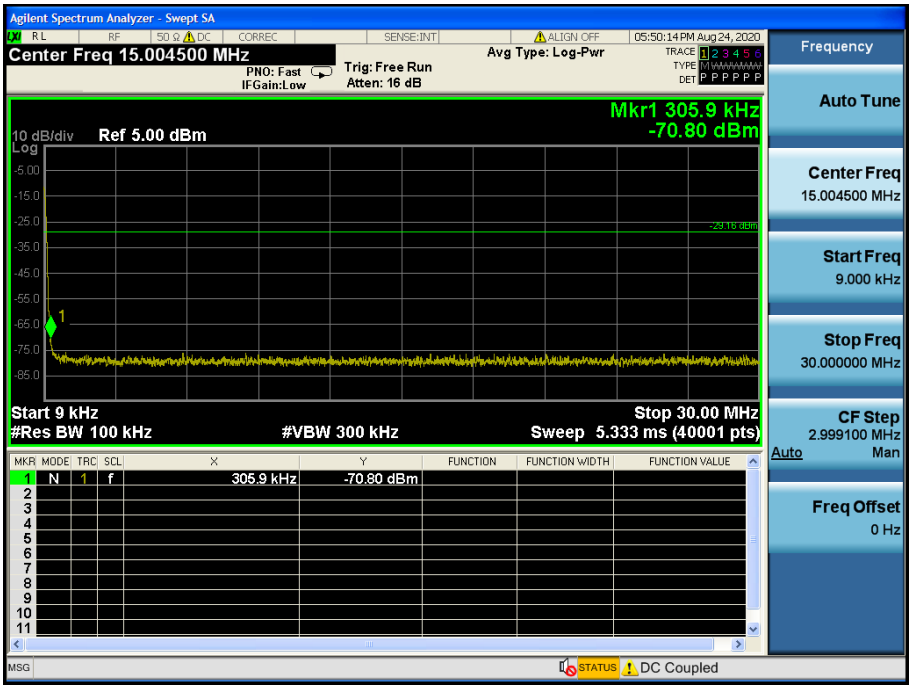

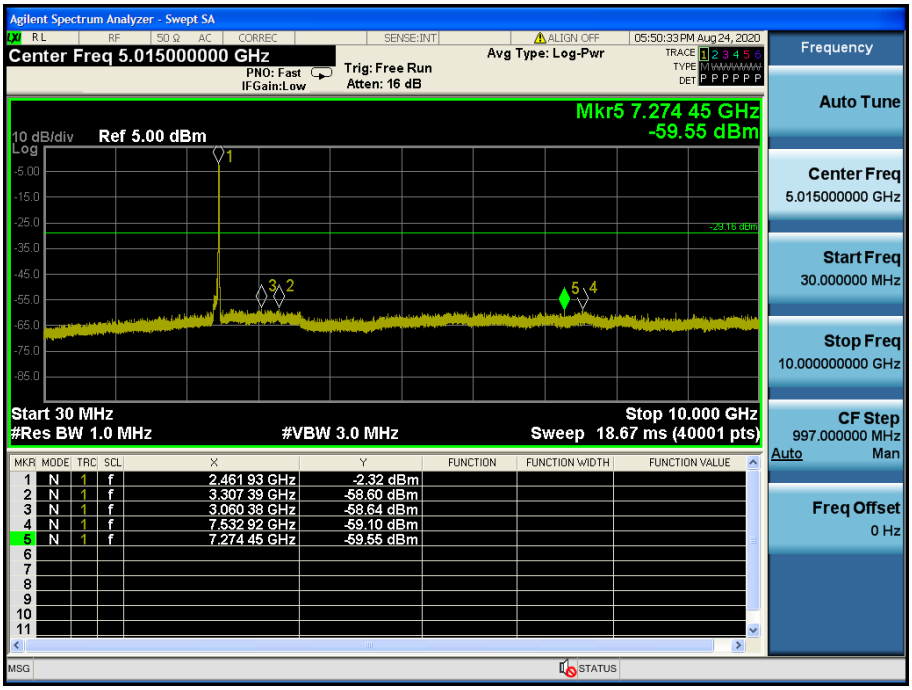

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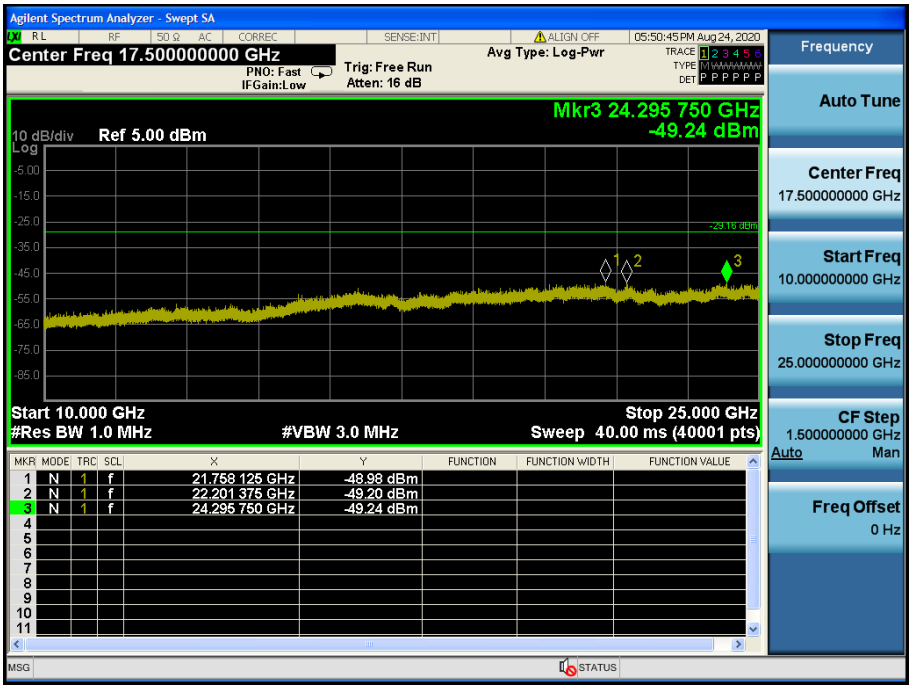
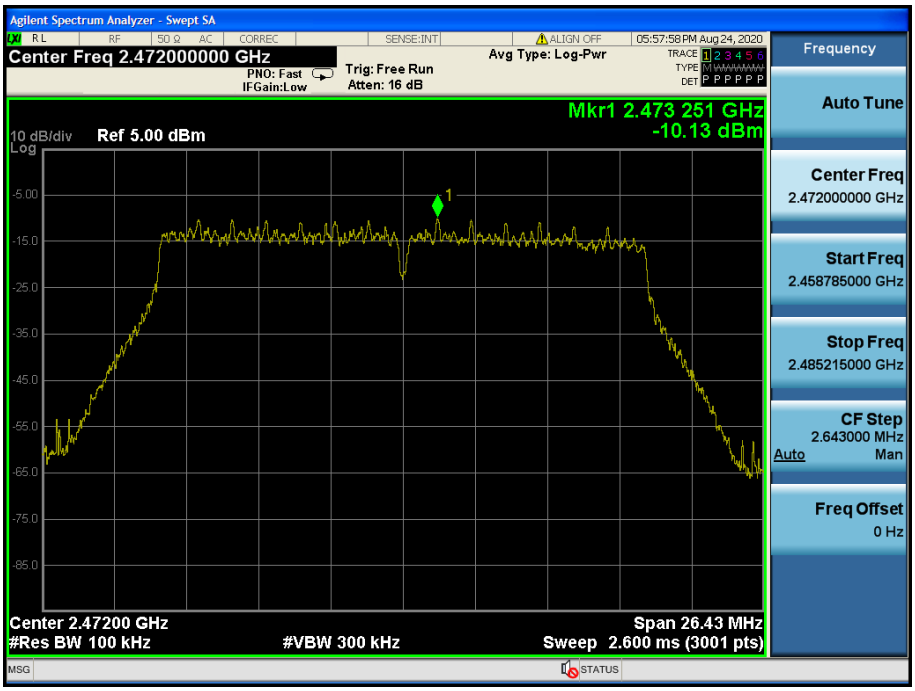
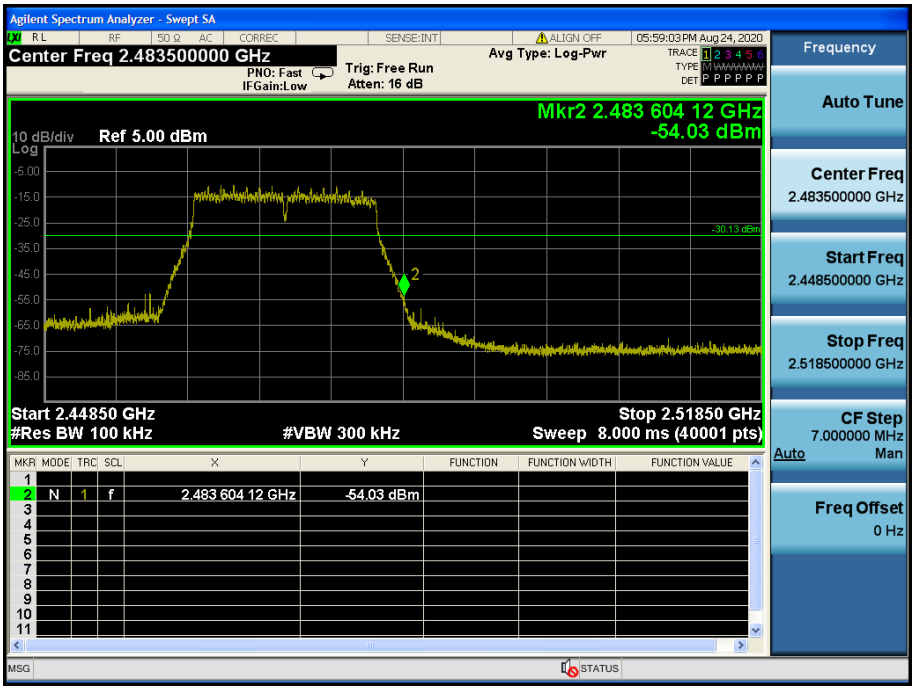


TM 3 & ANT 2 & 2 472

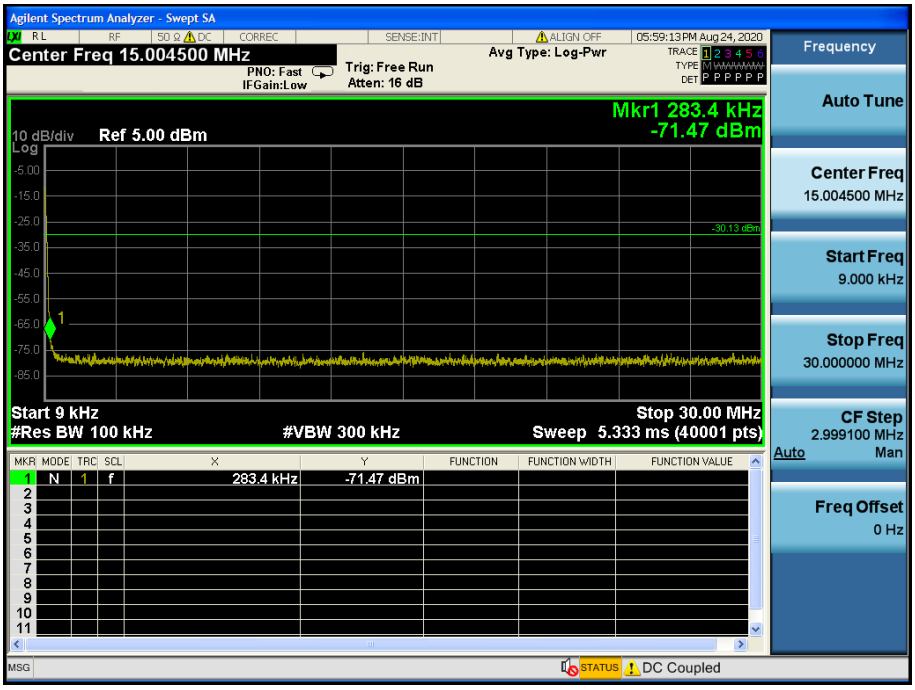
Reference

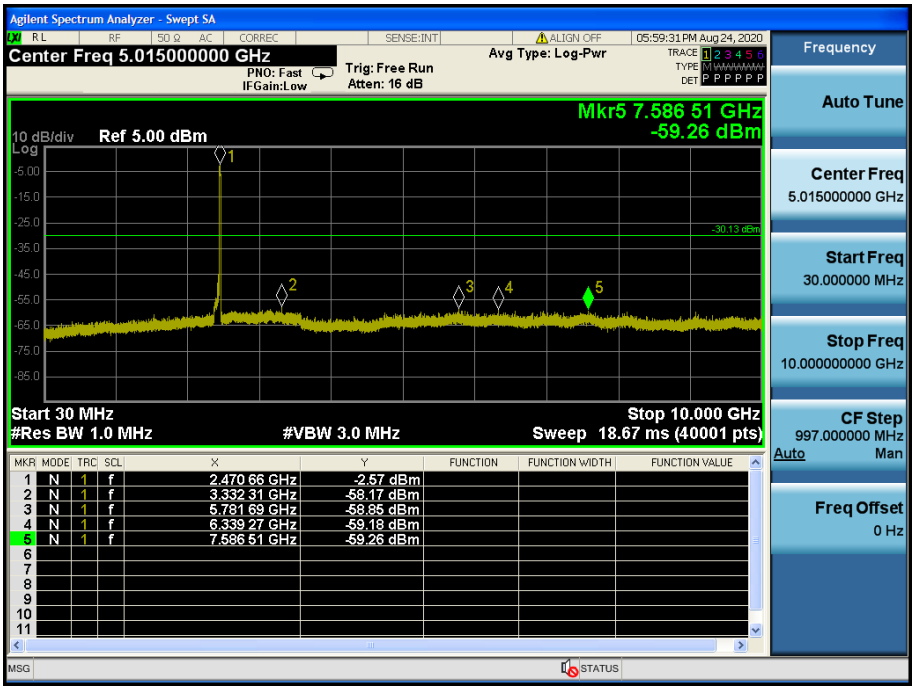


High Band-edge

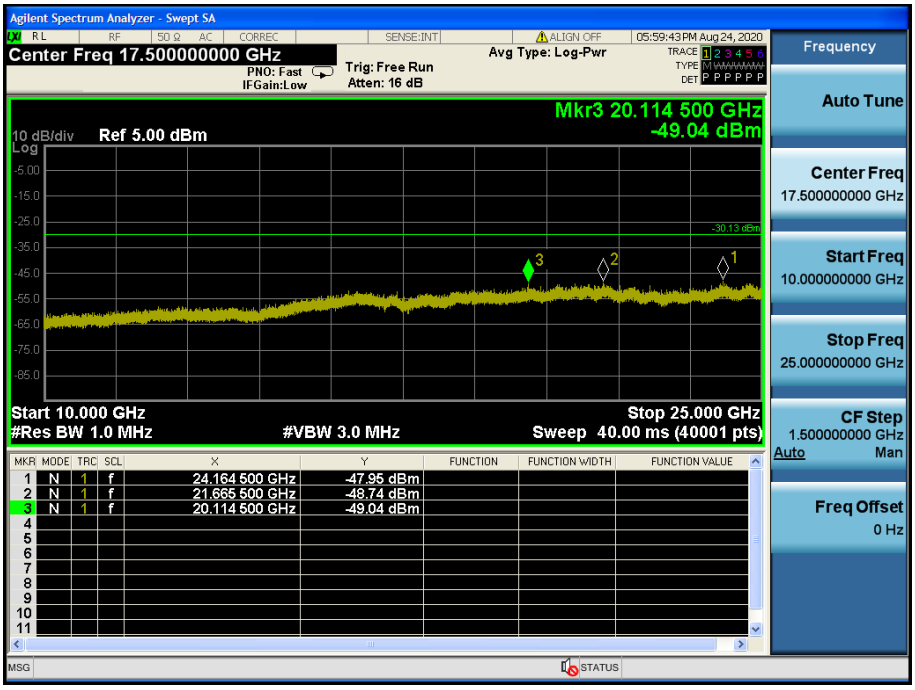


Conducted Spurious Emissions





Conducted Spurious Emissions



8.5 Radiated spurious emissions

▣ Test Requirements and limit, §15.247(d), §15.205, §15.209

In any 100 kHz bandwidth outside the operating frequency band, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band. In case the emission fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed.

▪ **FCC Part 15.209(a) and (b)**

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 – 0.490	2 400 / F (kHz)	300
0.490 – 1.705	24 000 / F (kHz)	30
1.705 – 30.000	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

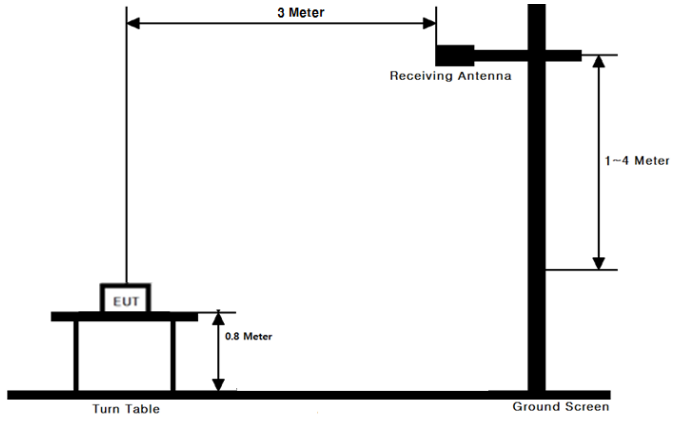
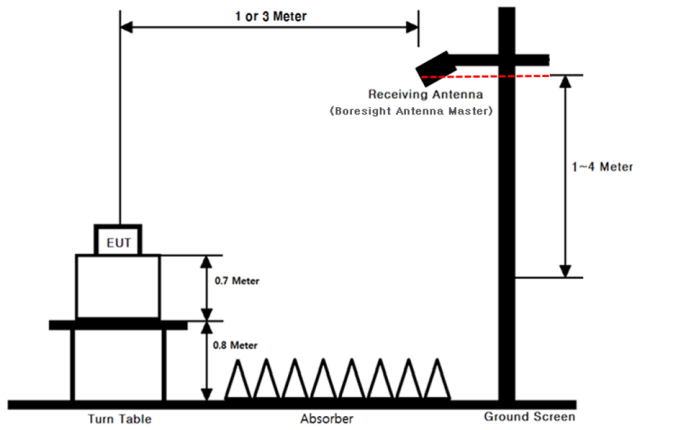
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 MHz - 72 MHz, 76 MHz - 88 MHz, 174 MHz - 216 MHz or 470 MHz - 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.414 25 ~ 8.414 75	108 ~ 121.94	1 300 ~ 1 427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1 435 ~ 1 626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.173 5 ~ 2.190 5	12.519 75 ~ 12.520 25	149.9 ~ 150.05	1 645.5 ~ 1 646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.12 5 ~ 4.128	12.576 75 ~ 12.577 25	156.524 75 ~ 156.525 25	1 660 ~ 1 710	8.025 ~ 8.5	22.01 ~ 23.12
4.177 25 ~ 4.177 75	13.36 ~ 13.41	156.7 ~ 156.9	1 718.8 ~ 1 722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.207 25 ~ 4.207 75	16.42 ~ 16.423	162.012 5 ~ 167.17	2 200 ~ 2 300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.694 75 ~ 16.695 25	167.72 ~ 173.2	2 310 ~ 2 390	10.6 ~ 12.7	36.43 ~ 36.5
6.267 75 ~ 6.268 25	16.804 25 ~ 16.804 75	240 ~ 285	2 483.5 ~ 2 500	13.25 ~ 13.4	Above 38.6
6.311 75 ~ 6.312 25	25.5 ~ 25.67	322 ~ 335.4	2 655 ~ 2 900		
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3 260 ~ 3 267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3 332 ~ 3 339		
8.376 25 ~ 8.386 75	74.8 ~ 75.2	960 ~ 1240	3 345.8 ~ 3 358		
			3 600 ~ 4 400		

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector.
Above 1 000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

▣ Test Configuration

Below 1 GHz	Above 1 GHz
	

▣ Test Procedure

1. The EUT is placed on a non-conductive table, emission measurements at below 1 GHz, the table height is 80 cm and above 1 GHz, the table height is 1.5 m.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1 m or 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

▣ Measurement Instrument Setting for Radiated Emission Measurements.

The radiated emission was tested according to the section 6.3, 6.4, 6.5 and 6.6 of the ANSI C63.10-2013 with following settings.

Peak Measurement

RBW = As specified in below table, VBW ≥ 3 x RBW, Sweep = Auto, Detector = Peak, Trace mode = Max Hold until the trace stabilizes.

Frequency	RBW
9 kHz – 150 kHz	200 Hz – 300 Hz
0.15 MHz – 30 MHz	9 kHz – 10 kHz
30 MHz – 1 000 MHz	100 kHz – 120 kHz
> 1 000 MHz	1 MHz

Average Measurement:

1. RBW = 1 MHz (unless otherwise specified).
2. VBW ≥ 3 x RBW.
3. Detector = RMS (Number of points ≥ 2 x Span / RBW)
4. Averaging type = power. (i.e., RMS)
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.
7. A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

1) If power averaging (RMS) mode was used in step 4, then the applicable correction factor is 10 log(1 / D), where x is the duty cycle.
2) If linear voltage averaging mode was used in step 4, then the applicable correction factor is 20 log(1 / D), where x is the duty cycle.
3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

Duty Cycle Correction factor

Test Mode	Date rate	T_{on}(ms)	T_{on+off} (ms)	D = T_{on} / (T_{on+off})	DCCF = 10 log(1 / D) (dB)
TM 1	1 Mbps	12.210	12.290	0.993	NA
TM 2	36 Mbps	0.358	0.393	0.910	0.41
TM 3	MCS 4	0.350	0.385	0.908	0.42

Note1: Where, T= Transmission duration / D = Duty cycle

Note2: Please refer to the appendix I for duty cycle plots.

▣ Test Results: Comply

Please refer to next page for data table and the appendix II for worst data plots.

Test Notes.

1. The radiated emissions were investigated 9 kHz to 25 GHz. And no other spurious and harmonic emissions were found below listed frequencies.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL + HL + AL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, HL = High pass filter Loss, AL = Attenuator Loss, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Information of Distance Factor
   For finding emissions, the test distance might be reduced from 3 m to 1 m. In this case, the distance factor(-9.54 dB) is applied to the result.
   Calculation of distance factor = 20 log(applied distance / required distance) = 20 log(1 m / 3 m) = -9.54 dB
   When distance factor is "N/A", the distance is 3 m and distance factor is not applied.
4. For TM 1 was tested under Single transmitting (Ant 1, 2) and the worst case data are reported.
5. Radiated tested was performed in swivel mode and non-swiveled position, worst case(Swivel mode) data is reported.

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 1 ANT 1

Tested Frequency (MHz)	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 412	2 389.22	H	X	PK	51.12	4.80	N/A	N/A	55.92	74.00	18.08
	2 389.23	H	X	AV	39.07	4.80	N/A	N/A	43.87	54.00	10.13
	4 823.69	V	Z	PK	49.22	0.93	N/A	N/A	50.15	74.00	23.85
	4 823.64	V	Z	AV	38.33	0.93	N/A	N/A	39.26	54.00	14.74
2 437	4 874.02	V	Z	PK	49.36	1.17	N/A	N/A	50.53	74.00	23.47
	4 873.98	V	Z	AV	39.02	1.17	N/A	N/A	40.19	54.00	13.81
2 462	2 484.26	H	X	PK	49.15	5.26	N/A	N/A	54.41	74.00	19.59
	2 483.88	H	X	AV	39.18	5.26	N/A	N/A	44.44	54.00	9.56
	4 923.72	V	Z	PK	49.37	1.44	N/A	N/A	50.81	74.00	23.19
	4 923.81	V	Z	AV	38.75	1.44	N/A	N/A	40.19	54.00	13.81
2 467	2 485.00	H	X	PK	49.15	5.27	N/A	N/A	54.42	74.00	19.58
	2 484.09	H	X	AV	38.40	5.26	N/A	N/A	43.66	54.00	10.34
	4 933.67	V	Z	PK	50.75	1.49	N/A	N/A	52.24	74.00	21.76
	4 934.29	V	Z	AV	39.71	1.49	N/A	N/A	41.20	54.00	12.80
2 472	2 484.32	H	X	PK	49.20	5.26	N/A	N/A	54.46	74.00	19.54
	2 483.63	H	X	AV	39.30	5.25	N/A	N/A	44.55	54.00	9.45
	4 944.04	V	Z	PK	49.91	1.54	N/A	N/A	51.45	74.00	22.55
	4 944.31	V	Z	AV	38.91	1.54	N/A	N/A	40.45	54.00	13.55

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 1_ ANT 2

Tested Frequency (MHz)	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 412	2 389.94	H	Y	PK	49.79	4.80	N/A	N/A	54.59	74.00	19.41
	2 389.01	H	Y	AV	39.00	4.80	N/A	N/A	43.80	54.00	10.20
	4 823.87	V	Z	PK	48.81	0.93	N/A	N/A	49.74	74.00	24.26
	4 823.98	V	Z	AV	38.38	0.93	N/A	N/A	39.31	54.00	14.69
2 437	4 873.63	V	Z	PK	49.36	1.17	N/A	N/A	50.53	74.00	23.47
	4 874.18	V	Z	AV	38.71	1.18	N/A	N/A	39.89	54.00	14.11
2 462	2 484.59	H	Y	PK	49.79	5.27	N/A	N/A	55.06	74.00	18.94
	2 484.14	H	Y	AV	38.76	5.26	N/A	N/A	44.02	54.00	9.98
	4 924.39	V	Z	PK	49.07	1.45	N/A	N/A	50.52	74.00	23.48
	4 923.79	V	Z	AV	38.65	1.44	N/A	N/A	40.09	54.00	13.91
2 467	2 485.38	H	Y	PK	49.94	5.28	N/A	N/A	55.22	74.00	18.78
	2 484.11	H	Y	AV	38.44	5.26	N/A	N/A	43.70	54.00	10.30
	4 934.08	V	Z	PK	50.21	1.49	N/A	N/A	51.70	74.00	22.30
	4 933.90	V	Z	AV	39.79	1.49	N/A	N/A	41.28	54.00	12.72
2 472	2 484.27	H	Y	PK	48.88	5.26	N/A	N/A	54.14	74.00	19.86
	2 483.87	H	Y	AV	38.99	5.26	N/A	N/A	44.25	54.00	9.75
	4 944.14	V	Z	PK	49.47	1.54	N/A	N/A	51.01	74.00	22.99
	4 943.61	V	Z	AV	38.77	1.54	N/A	N/A	40.31	54.00	13.69

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 2

Tested Frequency (MHz)	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 412	2 389.66	H	Y	PK	55.05	4.80	N/A	N/A	59.85	74.00	14.15
	2 389.94	H	Y	AV	42.13	4.80	0.41	N/A	47.34	54.00	6.66
	4 823.88	V	Z	PK	48.75	0.93	N/A	N/A	49.68	74.00	24.32
	4 824.11	V	Z	AV	38.53	0.93	0.41	N/A	39.87	54.00	14.13
2 437	4 874.03	V	Z	PK	50.03	1.17	N/A	N/A	51.20	74.00	22.80
	4 874.41	V	Z	AV	38.79	1.18	0.41	N/A	40.38	54.00	13.62
2 462	2 483.64	H	Y	PK	54.12	5.25	N/A	N/A	59.37	74.00	14.63
	2 483.71	H	Y	AV	41.84	5.25	0.41	N/A	47.50	54.00	6.50
	4 923.53	V	Z	PK	49.35	1.44	N/A	N/A	50.79	74.00	23.21
	4 924.11	V	Z	AV	38.98	1.45	0.41	N/A	40.84	54.00	13.16
2 467	2 484.17	H	Y	PK	49.54	5.26	N/A	N/A	54.80	74.00	19.20
	2 483.62	H	Y	AV	39.12	5.25	0.41	N/A	44.78	54.00	9.22
	4 934.16	V	Z	PK	50.58	1.49	N/A	N/A	52.07	74.00	21.93
	4 934.23	V	Z	AV	39.60	1.49	0.41	N/A	41.50	54.00	12.50
2 472	2 483.53	H	Y	PK	51.65	5.25	N/A	N/A	56.90	74.00	17.10
	2 483.88	H	Y	AV	39.45	5.26	0.41	N/A	45.12	54.00	8.88
	4 943.56	V	Z	PK	49.39	1.53	N/A	N/A	50.92	74.00	23.08
	4 944.10	V	Z	AV	39.00	1.54	0.41	N/A	40.95	54.00	13.05

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 3

Tested Frequency (MHz)	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 412	2 388.99	H	Y	PK	54.47	4.80	N/A	N/A	59.27	74.00	14.73
	2 389.83	H	Y	AV	43.09	4.80	0.42	N/A	48.31	54.00	5.69
	4 824.24	V	Z	PK	49.24	0.93	N/A	N/A	50.17	74.00	23.83
	4 823.69	V	Z	AV	38.17	0.93	0.42	N/A	39.52	54.00	14.48
2 437	4 874.07	V	Z	PK	49.76	1.18	N/A	N/A	50.94	74.00	23.06
	4 874.37	V	Z	AV	39.01	1.18	0.42	N/A	40.61	54.00	13.39
2 462	2 483.88	H	Y	PK	56.61	5.26	N/A	N/A	61.87	74.00	12.13
	2 483.95	H	Y	AV	42.71	5.26	0.42	N/A	48.39	54.00	5.61
	4 923.69	V	Z	PK	50.00	1.44	N/A	N/A	51.44	74.00	22.56
	4 924.34	V	Z	AV	38.89	1.45	0.42	N/A	40.76	54.00	13.24
2 467	2 484.29	H	Y	PK	48.95	5.26	N/A	N/A	54.21	74.00	19.79
	2 484.30	H	Y	AV	39.27	5.26	0.42	N/A	44.95	54.00	9.05
	4 934.09	V	Z	PK	50.68	1.49	N/A	N/A	52.17	74.00	21.83
	4 933.74	V	Z	AV	39.65	1.49	0.42	N/A	41.56	54.00	12.44
2 472	2 483.68	H	Y	PK	51.75	5.25	N/A	N/A	57.00	74.00	17.00
	2483.62	H	Y	AV	40.31	5.25	0.42	N/A	45.98	54.00	8.02
	4 944.46	V	Z	PK	49.61	1.54	N/A	N/A	51.15	74.00	22.85
	4 943.81	V	Z	AV	38.79	1.54	0.42	N/A	40.75	54.00	13.25

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 4 _ non-swiveled position

Tested Frequency (MHz)	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 462	2 483.89	V	Z	PK	54.59	5.26	N/A	N/A	59.85	74.00	14.15
	2 483.96	V	Z	AV	42.20	5.26	N/A	N/A	47.46	54.00	6.54
	4 923.56	V	Z	PK	50.63	1.44	N/A	N/A	52.07	74.00	21.93
	4 924.09	V	Z	AV	38.97	1.45	N/A	N/A	40.42	54.00	13.58
	7 386.33	V	Z	PK	46.59	9.41	N/A	N/A	56.00	74.00	18.00
	7 385.64	V	Z	AV	35.64	9.41	N/A	N/A	45.05	54.00	8.95

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 5 _ With Wireless Charging

Tested Frequency (MHz)	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 462	2 484.37	H	X	PK	54.69	5.26	N/A	N/A	59.95	74.00	14.05
	2 484.16	H	X	AV	42.02	5.26	N/A	0.42	47.70	54.00	6.30
	4 924.22	H	X	PK	49.18	1.45	N/A	N/A	50.63	74.00	23.37
	4 923.96	H	X	AV	38.88	1.45	N/A	0.42	40.75	54.00	13.25
	7 385.70	H	X	PK	46.40	9.41	N/A	N/A	55.81	74.00	18.19
	7 385.65	H	X	AV	35.39	9.41	N/A	0.42	45.22	54.00	8.78

8.6 Power-line conducted emissions

▣ Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network(LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5.0	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

▣ Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to the test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

▣ Test Results: Comply(Refer to next page.)

The worst data was reported.

▣ RESULT PLOTS

AC Line Conducted Emissions (Graph)

TM 2 & Lowest

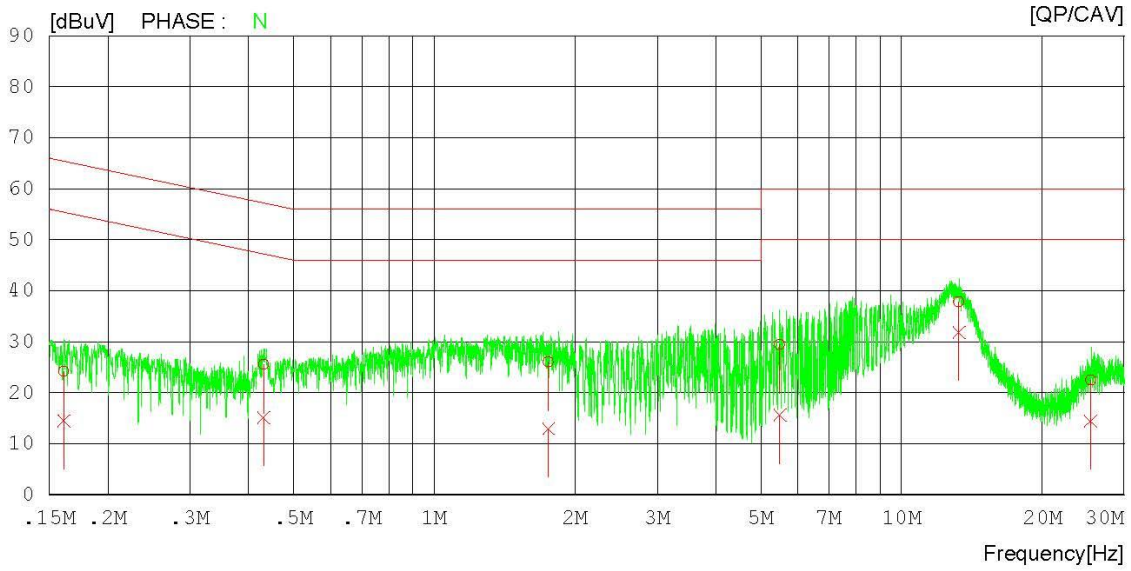
Results of Conducted Emission

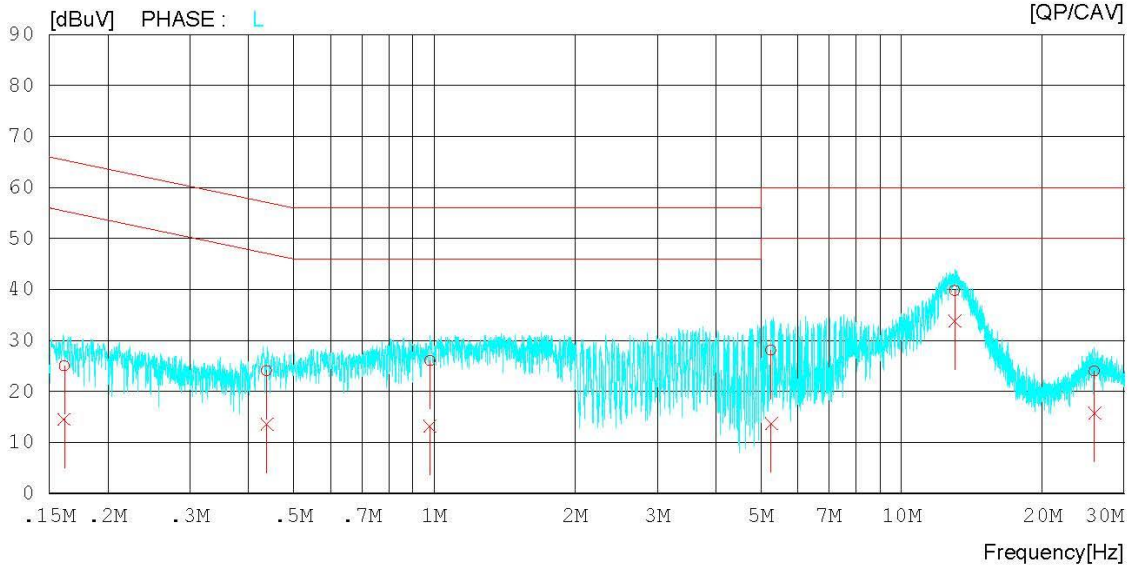
DTNC Date 2020-08-21

Order No.		Referrence No.	
Model No.	LM-F100EMW	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 42 %
Test Condition	2.4G	Operator	J.W. Kim

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV





AC Line Conducted Emissions (List)

TM 2 & Lowest

Results of Conducted Emission

DTNC

Date 2020-08-21

Order No.		Referrence No.	
Model No.	LM-F100EMW	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 42 %
Test Condition	2.4G	Operator	J.W. Kim

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.16131	14.29	4.56	9.96	24.25	14.52	65.40	55.40	41.15	40.88	N
2	0.43154	15.55	5.13	9.97	25.52	15.10	57.22	47.22	31.70	32.12	N
3	1.75426	15.98	2.95	10.01	25.99	12.96	56.00	46.00	30.01	33.04	N
4	5.48635	19.23	5.43	10.18	29.41	15.61	60.00	50.00	30.59	34.39	N
5	13.25801	27.40	21.46	10.41	37.81	31.87	60.00	50.00	22.19	18.13	N
6	25.39637	11.90	3.84	10.58	22.48	14.42	60.00	50.00	37.52	35.58	N
7	0.16153	15.01	4.54	9.95	24.96	14.49	65.38	55.38	40.42	40.89	L
8	0.43796	14.06	3.58	9.95	24.01	13.53	57.10	47.10	33.09	33.57	L
9	0.97914	16.03	3.20	9.98	26.01	13.18	56.00	46.00	29.99	32.82	L
10	5.26067	17.82	3.52	10.16	27.98	13.68	60.00	50.00	32.02	36.32	L
11	13.00519	29.38	23.35	10.39	39.77	33.74	60.00	50.00	20.23	16.26	L
12	25.86218	13.42	5.15	10.55	23.97	15.70	60.00	50.00	36.03	34.30	L

9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	20/06/24	21/06/24	US47360812
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48011700
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY50410357
DC Power Supply	Agilent Technologies	66332A	20/06/24	21/06/24	US37473422
Multimeter	FLUKE	17B	19/12/16	20/12/16	26030065WS
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	ANRITSU	MG3695C	19/12/16	20/12/16	173501
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-1
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-2
Thermohygrometer	BODYCOM	BJ5478	20/07/01	21/07/01	N/A
HYGROMETER	TESTO	608-H1	20/01/21	21/01/21	34862883
Loop Antenna	ETS-Lindgren	6502	19/09/18	21/09/18	00226186
BILOG ANTENNA	Schwarzbeck	VULB 9160	19/04/23	21/04/23	9160-3362
Horn Antenna	ETS-Lindgren	3115	20/01/30	21/01/30	6419
Horn Antenna	Schwarzbeck	BBHA 9120C	19/12/04	20/12/04	9120C-561
Horn Antenna	A.H.Systems Inc.	SAS-574	20/06/24	21/06/24	155
PreAmplifier	tsj	MLA-0118-B01-40	19/12/16	20/12/16	1852267
PreAmplifier	tsj	MLA-1840-J02-45	20/06/24	21/06/24	16966-10728
PreAmplifier	H.P	8447D	19/12/16	20/12/16	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	20/06/24	21/06/24	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	20/06/24	21/06/24	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	20/06/24	21/06/24	3
Attenuator	Hefei Shunze	SS5T2.92-10-40	20/06/24	21/06/24	16012202
Attenuator	SRTechnology	F01-B0606-01	20/06/24	21/06/24	13092403
Attenuator	Aeroflex/Weinschel	56-3	20/06/24	21/06/24	Y2370
Attenuator	SMAJK	SMAJK-2-3	20/06/24	21/06/24	2
Attenuator	SMAJK	SMAJK-50-10	20/06/24	21/06/24	15081903
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A MA2490A	20/06/24	21/06/24	1306007 1249001
EMI Test Receiver	ROHDE&SCHWARZ	ESR	19/12/17	20/12/17	101767
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	19/09/17	20/09/17	101333
LISN	SCHWARZBECK	NSLK 8128 RC	19/11/04	20/11/04	8128 RC-387
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-04
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-07
Cable	DT&C	Cable	20/01/13	21/01/13	G-13
Cable	DT&C	Cable	20/01/13	21/01/13	G-14
Cable	HUBER+SUHNER	SUCOFLEX 104	20/01/13	21/01/13	G-15
Cable	Radiall	TESTPRO3	20/01/16	21/01/16	M-01
Cable	Junkosha	MWX315	20/01/16	21/01/16	M-05
Cable	Junkosha	MWX221	20/01/16	21/01/16	M-06
Cable	DT&C	Cable	20/01/16	21/01/16	RF-82
Test Software	tsj	Radiated Emission Measurement	N/A	N/A	Version 2.00.0177
Test Software	tsj	Noise Terminal Voltage Measurement	N/A	N/A	Version 2.00.0170

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017
Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

APPENDIX I

Duty cycle plots

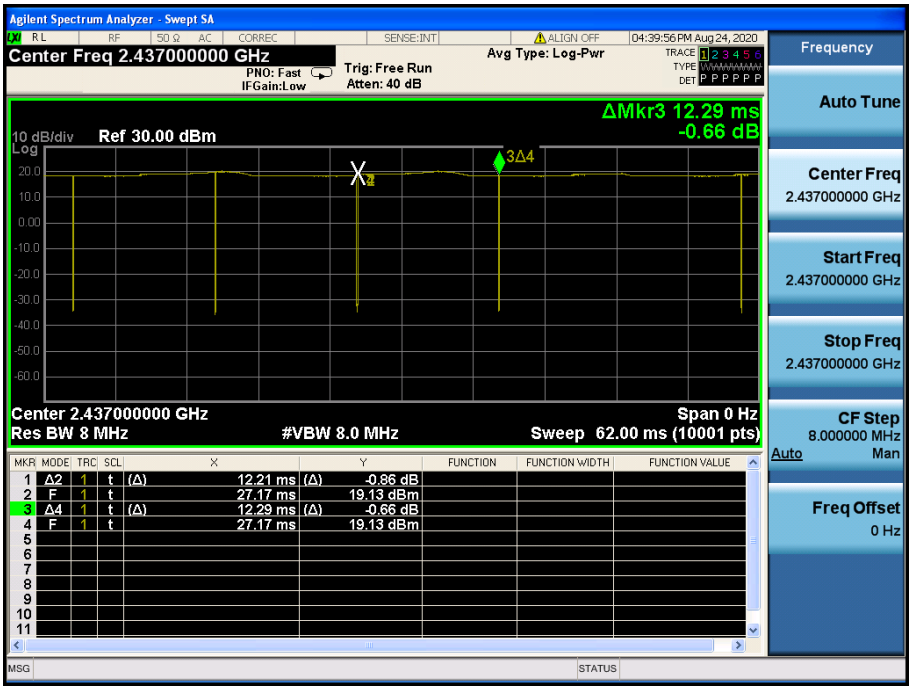
▪ Test Procedure

Duty Cycle was measured using **section 6.0 b) of KDB558074 D01v05r02 :**

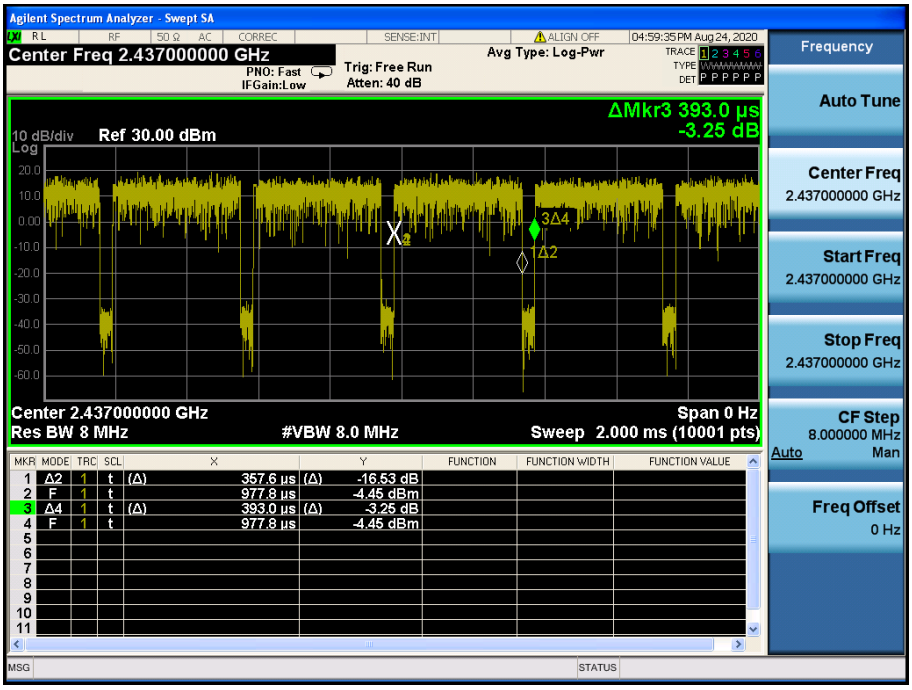
The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average.

The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

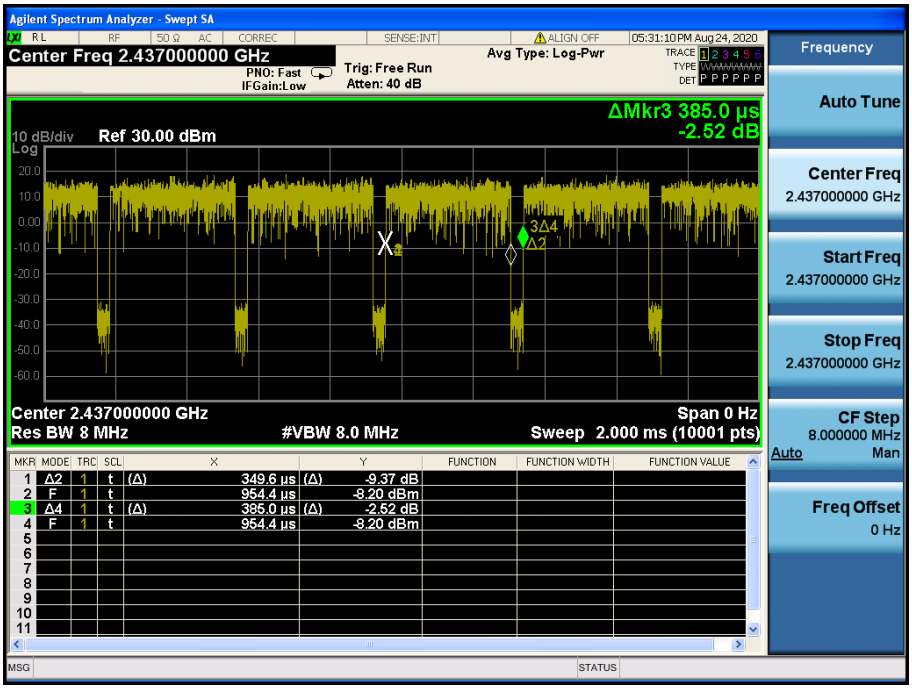
Duty Cycle TM 1 & ANT 1 & 2 437 MHz & 1 Mbps



Duty Cycle TM 2 & ANT 1 & 2 437 MHz & 36 Mbps



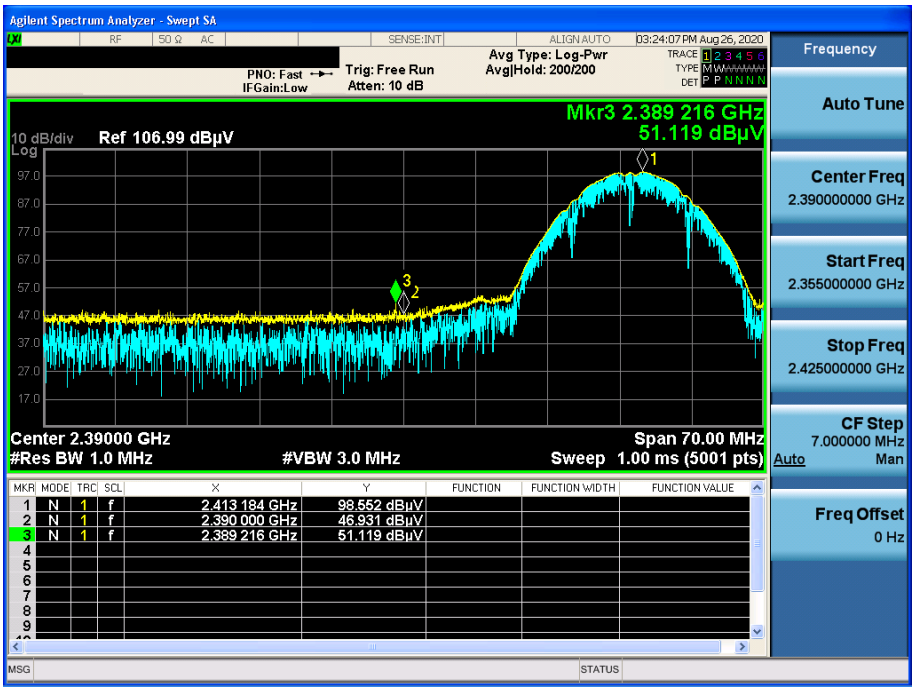
Duty Cycle TM 3 & ANT 1 & 2 437 MHz & MCS 4



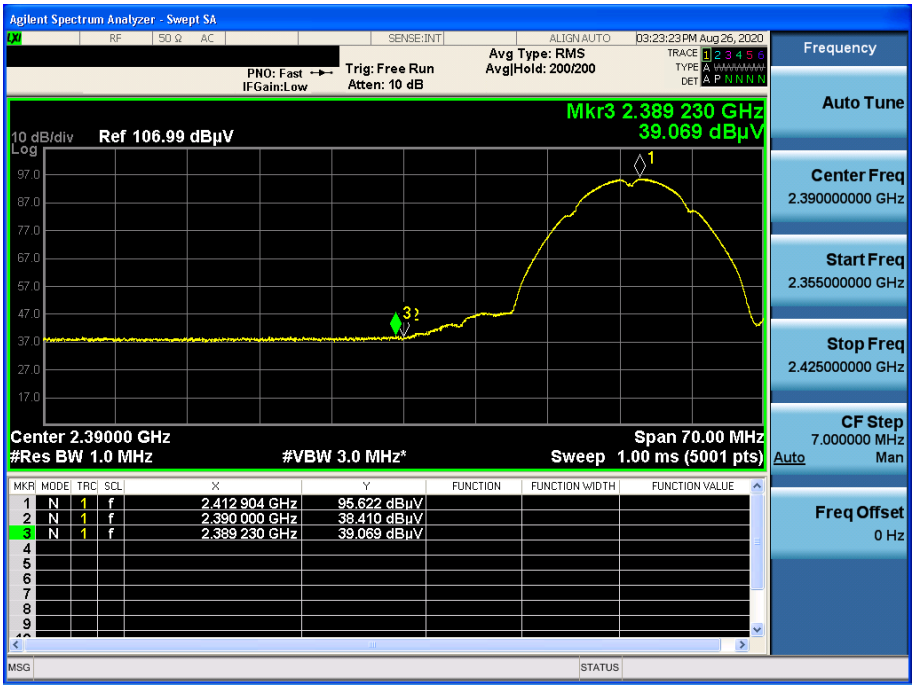
APPENDIX II

Unwanted Emissions (Radiated) Test Plot

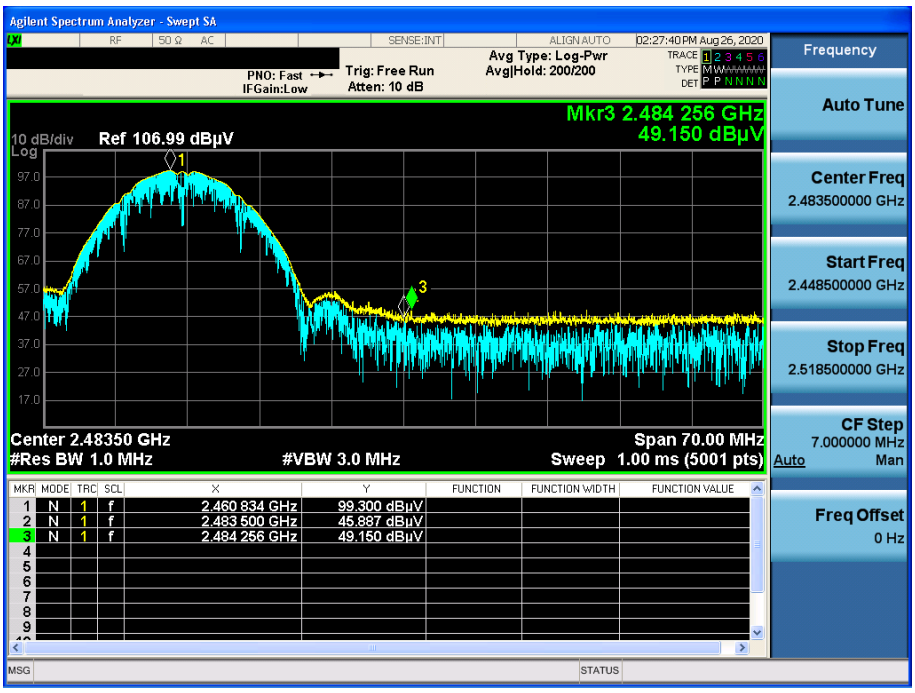
TM 1 & ANT1 & 2 412 & X axis & Hor **Detector Mode : PK**



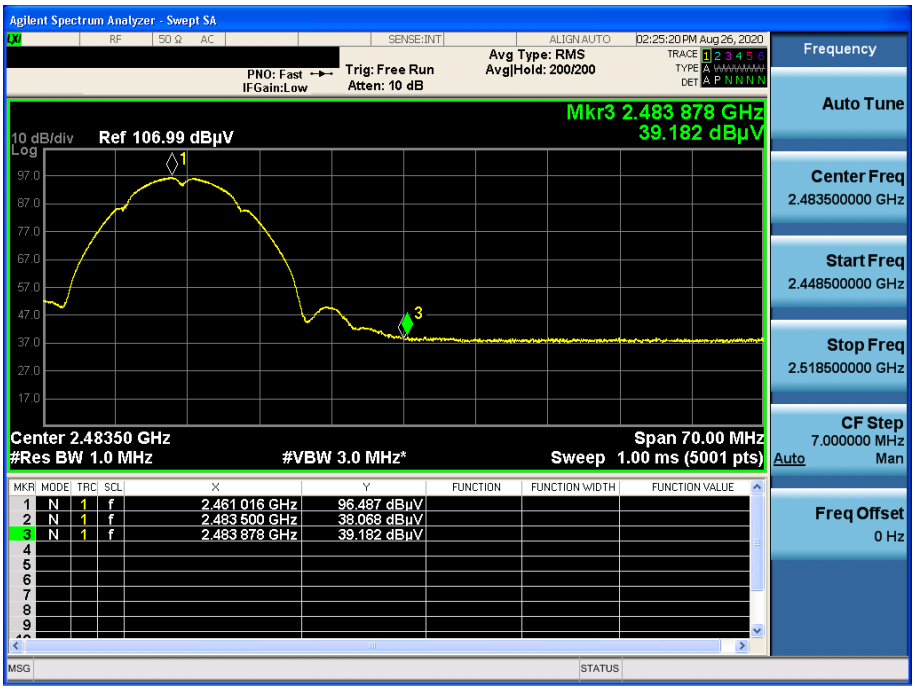
TM 1 & ANT1 & 2 412 & X axis & Hor **Detector Mode : AV**



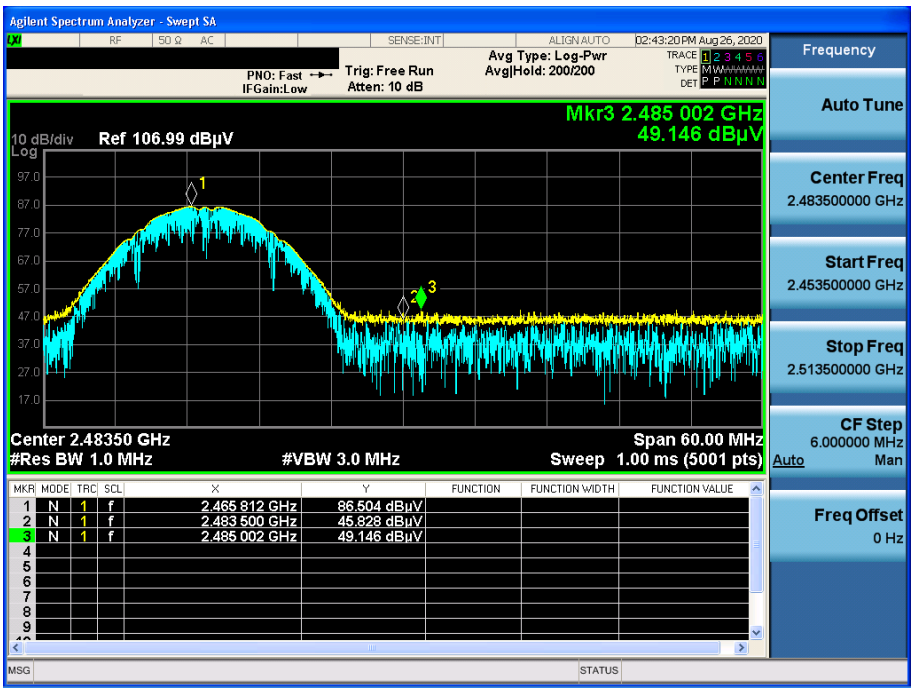
TM 1 & ANT1 & 2 462 & X axis & Hor **Detector Mode : PK**



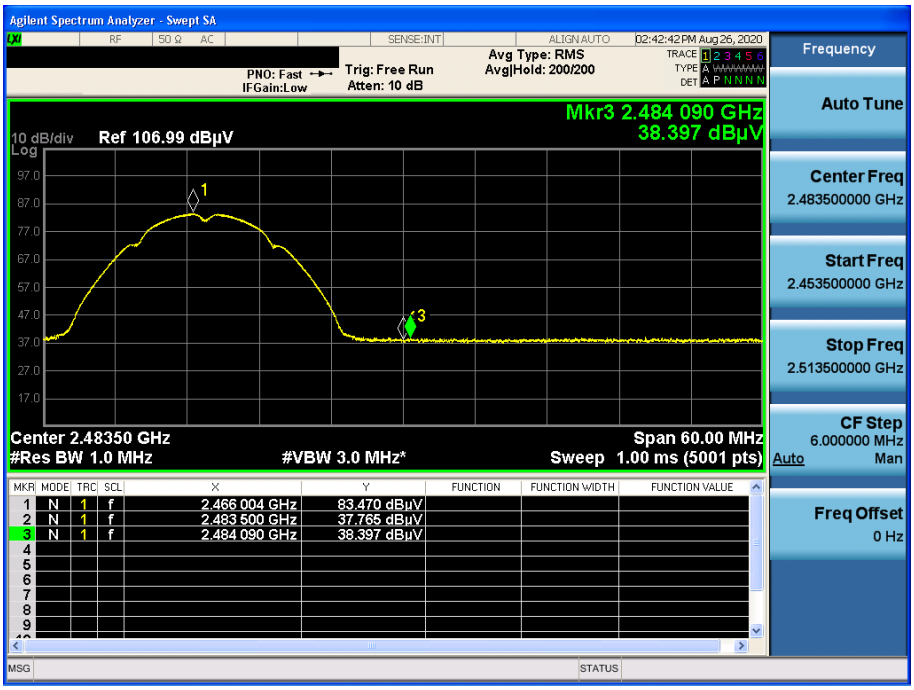
TM 1 & ANT1 & 2 462 & X axis & Hor **Detector Mode : AV**



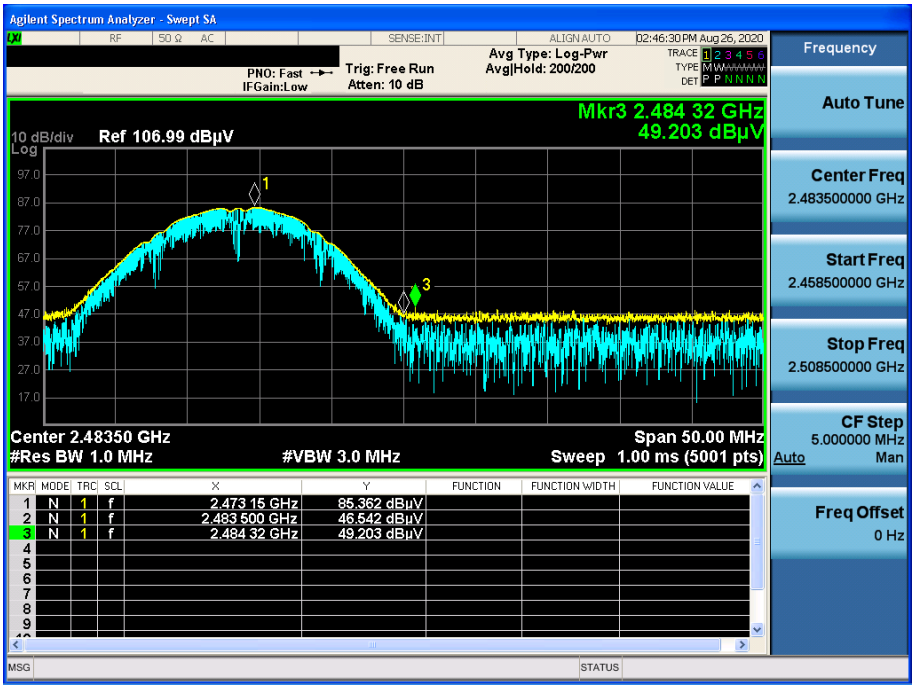
TM 1 & ANT1 & 2 467 & X axis & Hor **Detector Mode : PK**



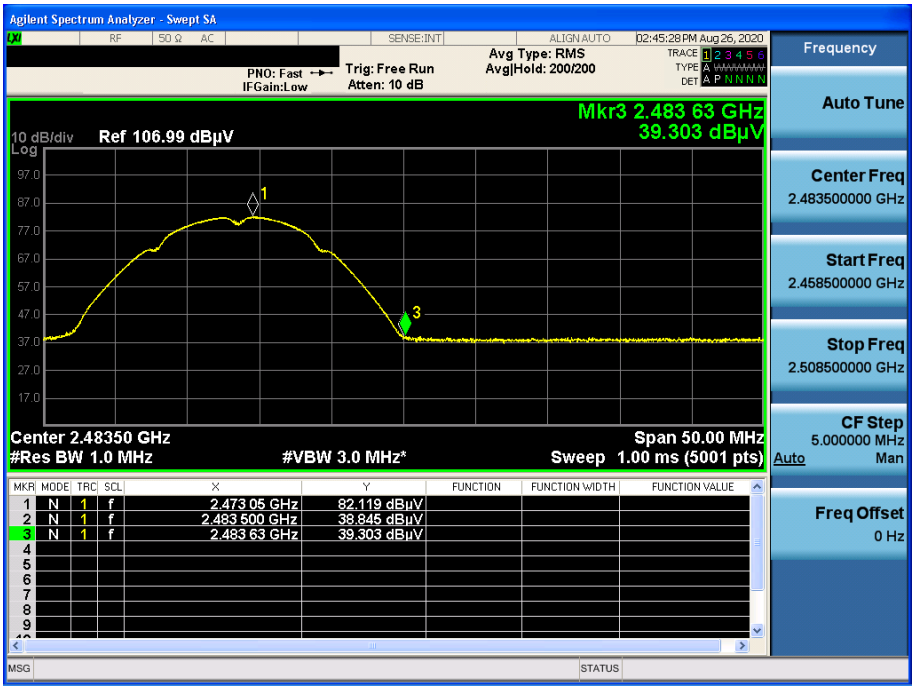
TM 1 & ANT1 & 2 467 & X axis & Hor **Detector Mode : AV**



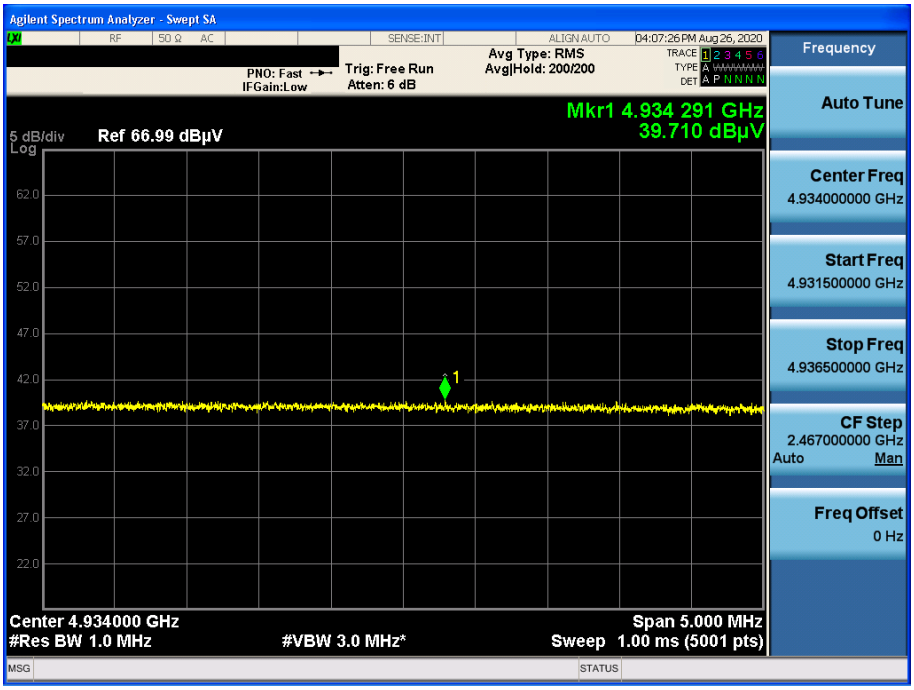
TM 1 & ANT1 & 2 472 & X axis & Hor **Detector Mode : PK**



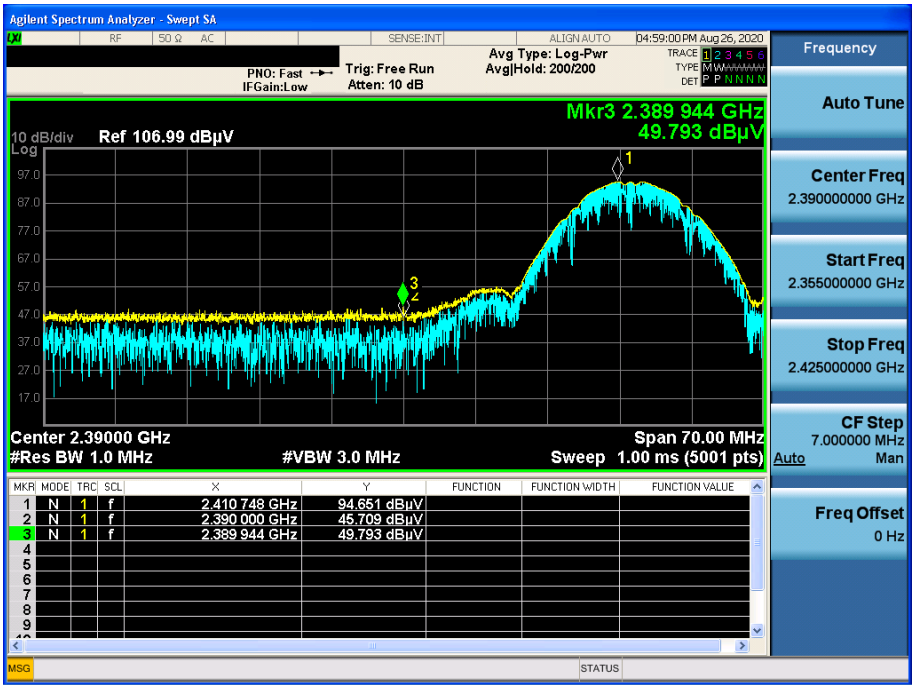
TM 1 & ANT1 & 2 472 & X axis & Hor **Detector Mode : AV**



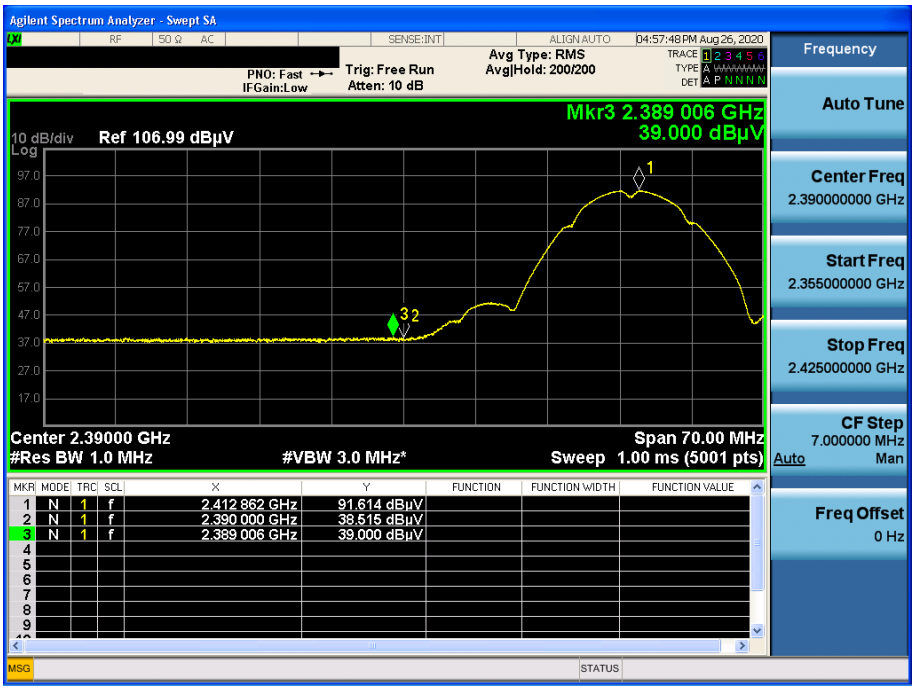
TM 1 & ANT1 & 2 467 & Z axis & Ver **Detector Mode : AV**



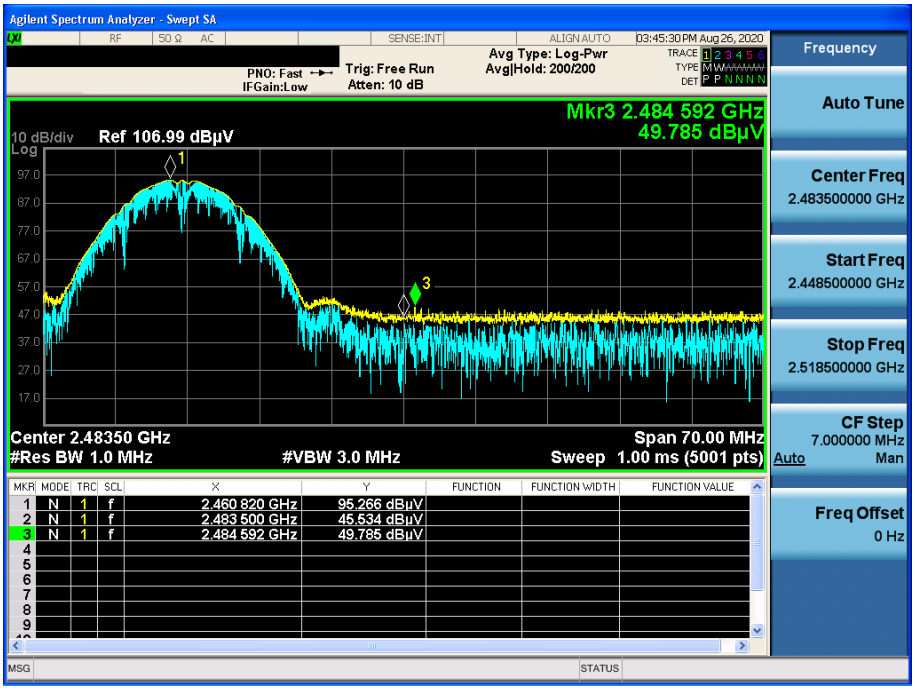
TM 1 & ANT2 & 2 412 & Y axis & Hor **Detector Mode : PK**



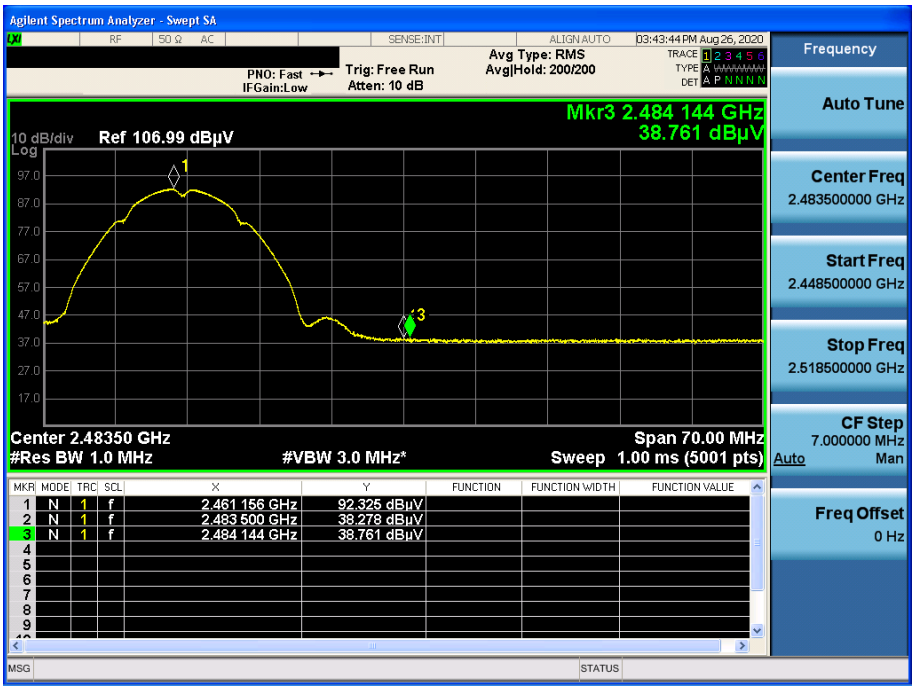
TM 1 & ANT2 & 2 412 & Y axis & Hor **Detector Mode : AV**



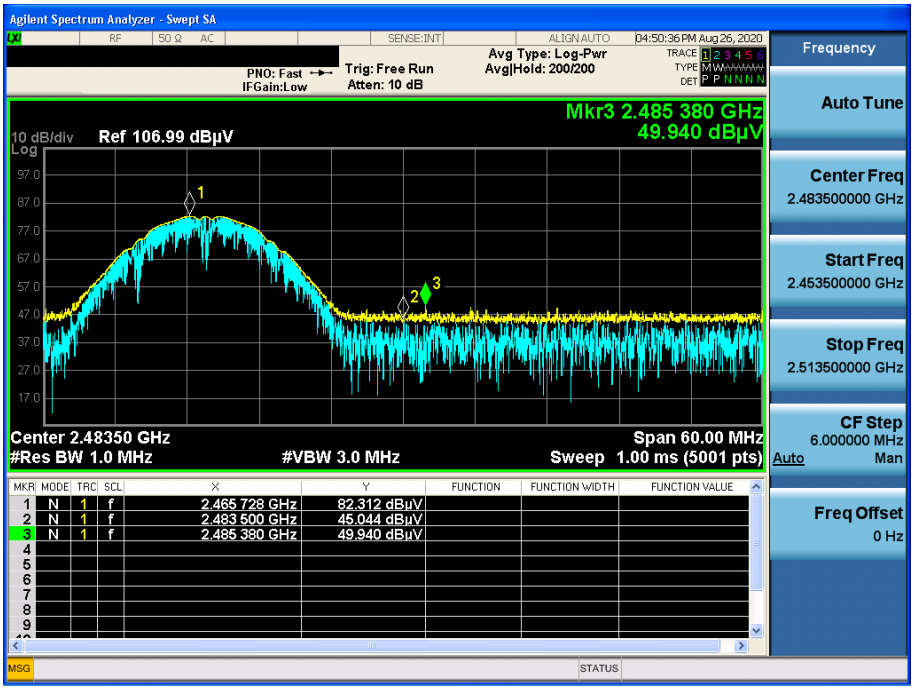
TM 1 & ANT2 & 2 462 & Y axis & Hor **Detector Mode : PK**



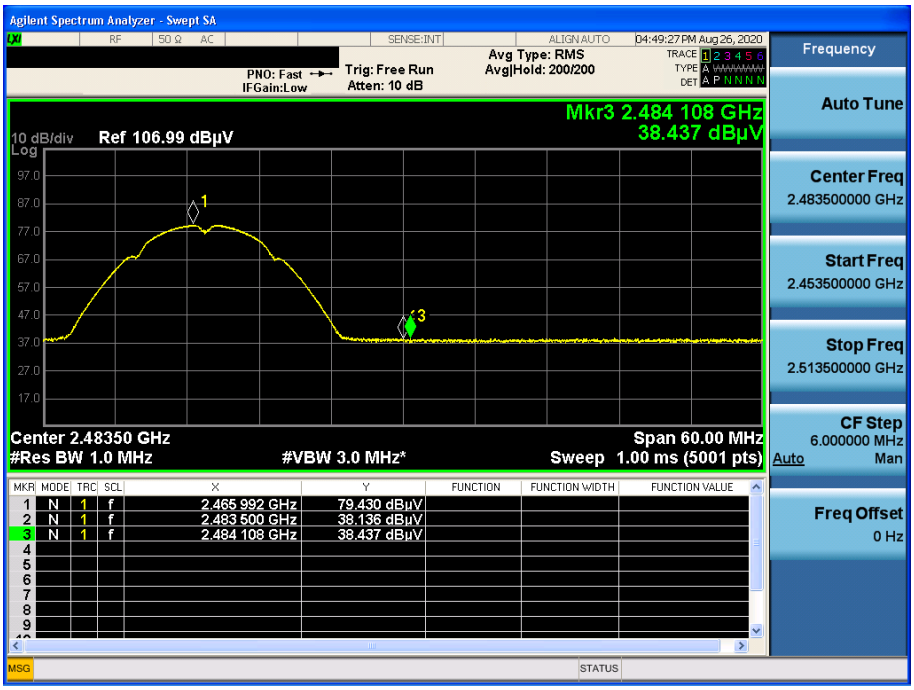
TM 1 & ANT2 & 2 462 & Y axis & Hor **Detector Mode : AV**



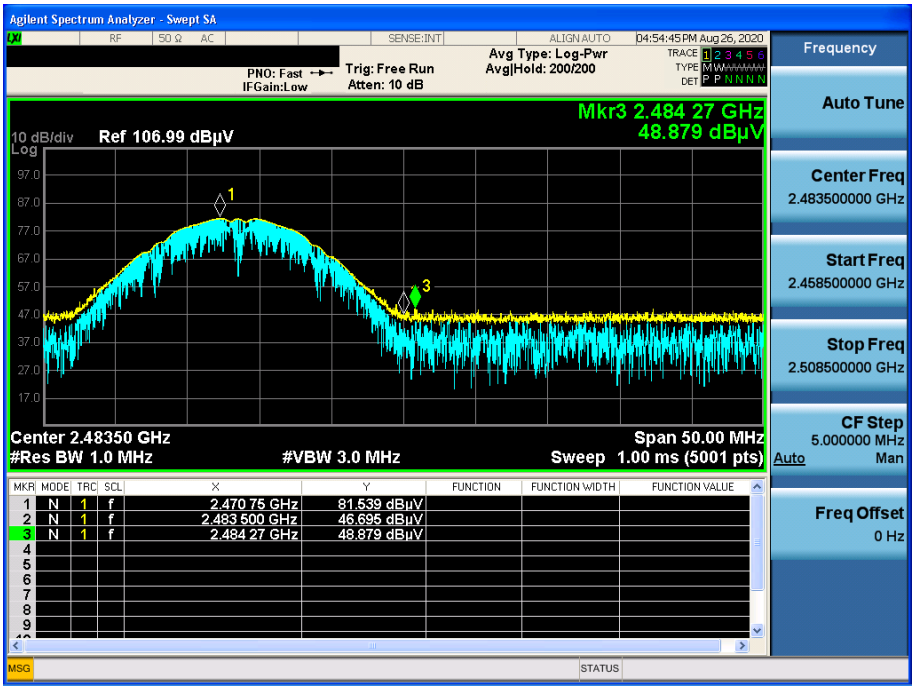
TM 1 & ANT2 & 2 467 & Y axis & Hor **Detector Mode : PK**



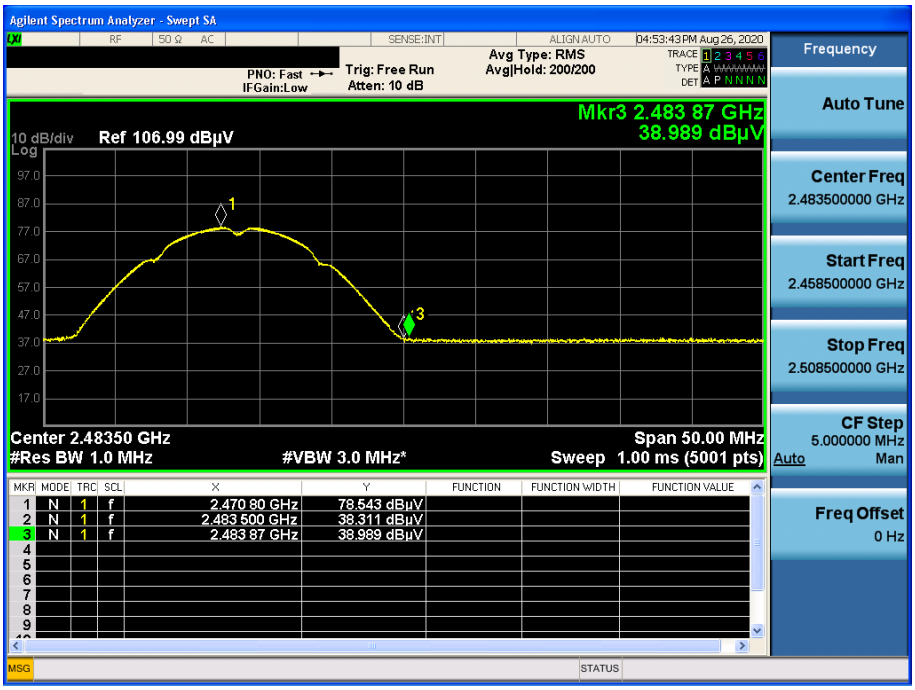
TM 1 & ANT2 & 2 467 & Y axis & Hor **Detector Mode : AV**



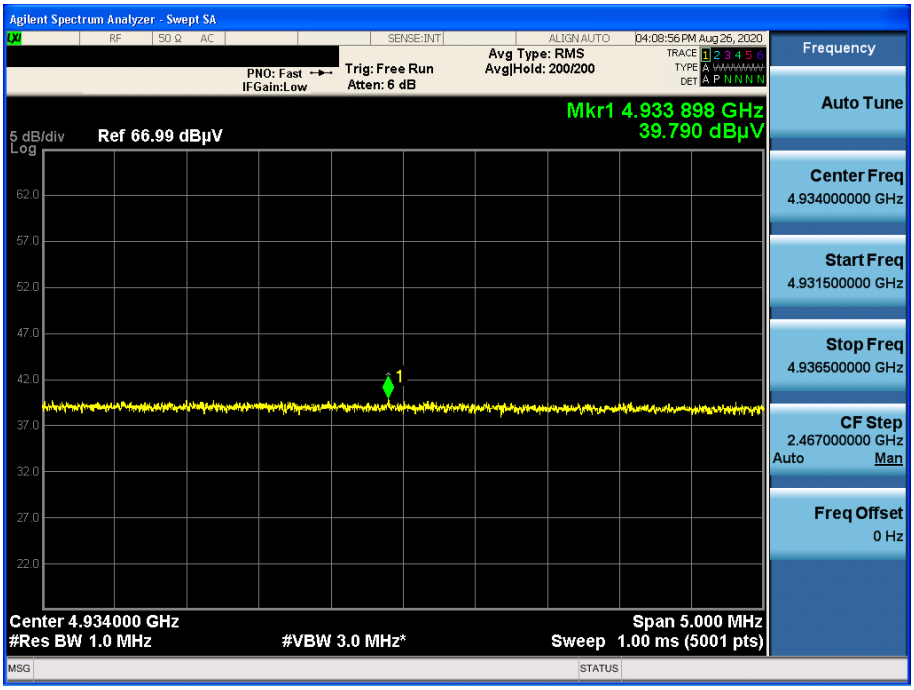
TM 1 & ANT2 & 2 472 & Y axis & Hor **Detector Mode : PK**



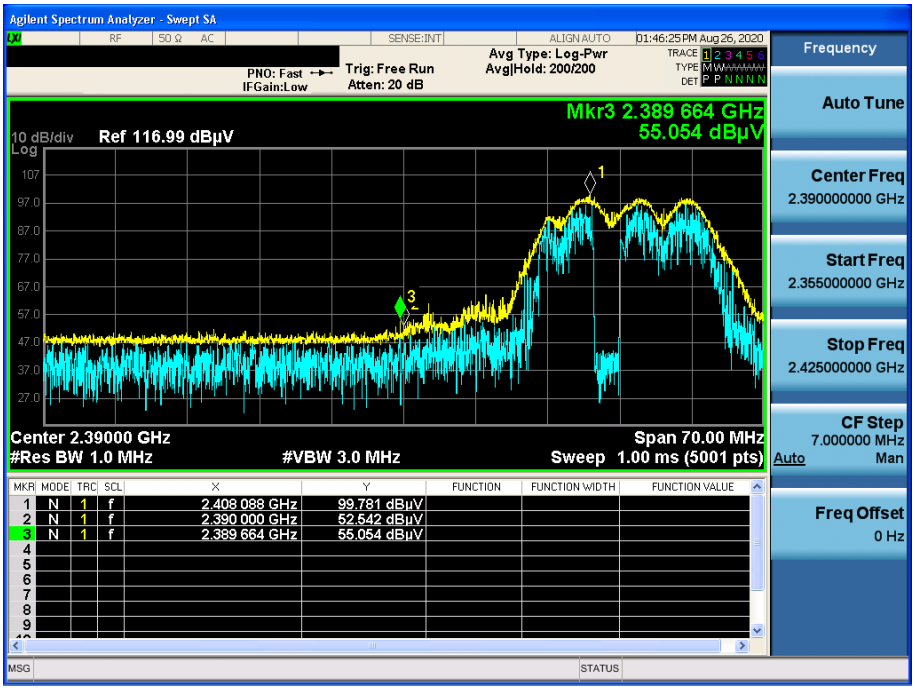
TM 1 & ANT2 & 2 472 & Y axis & Hor **Detector Mode : AV**



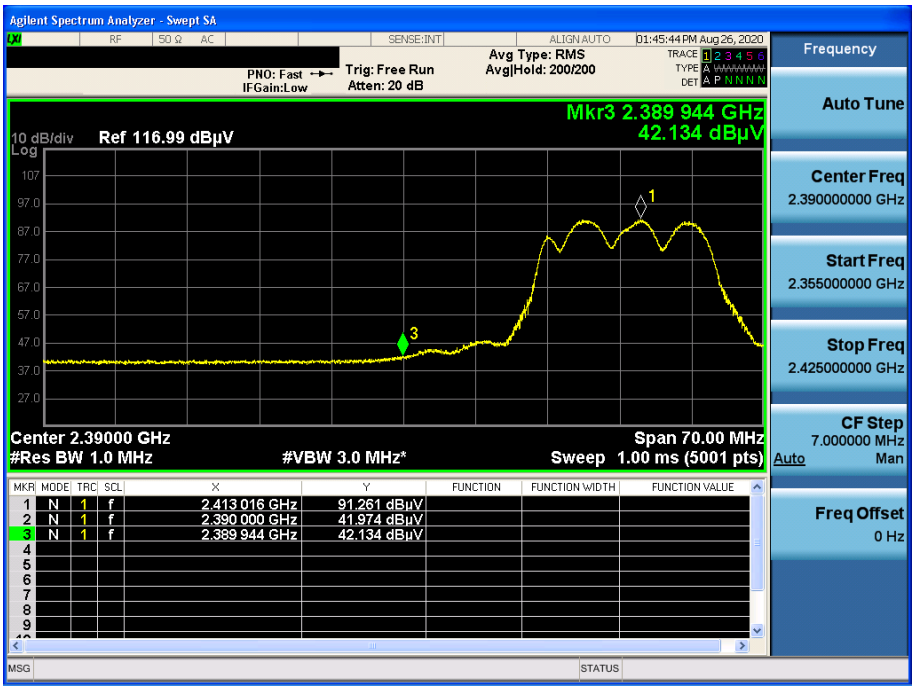
TM 1 & ANT2 & 2 467 & Z axis & Ver **Detector Mode : AV**



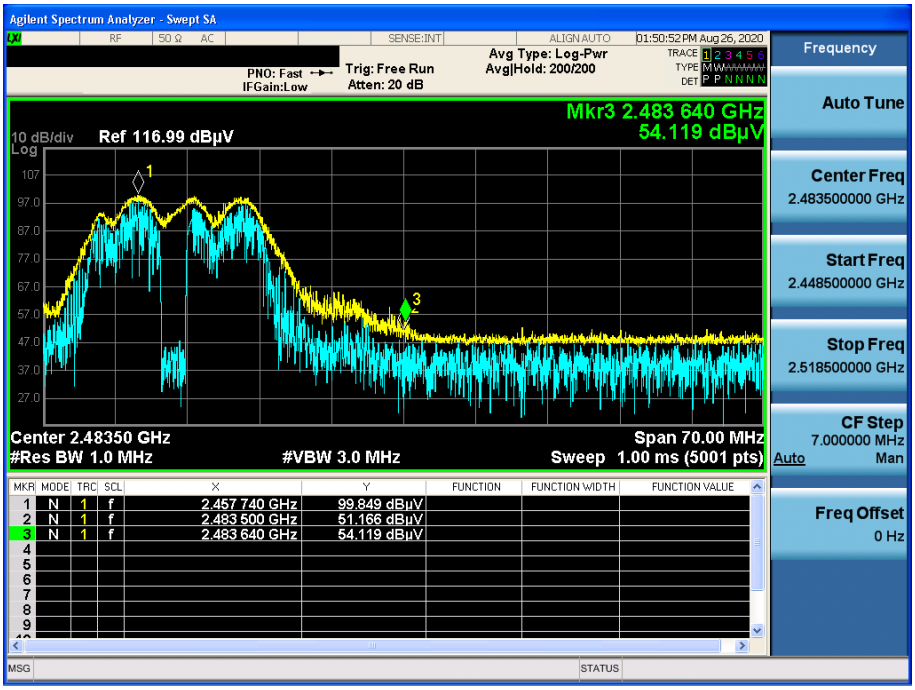
TM 2 & 2 412 & Y axis & Hor **Detector Mode : PK**



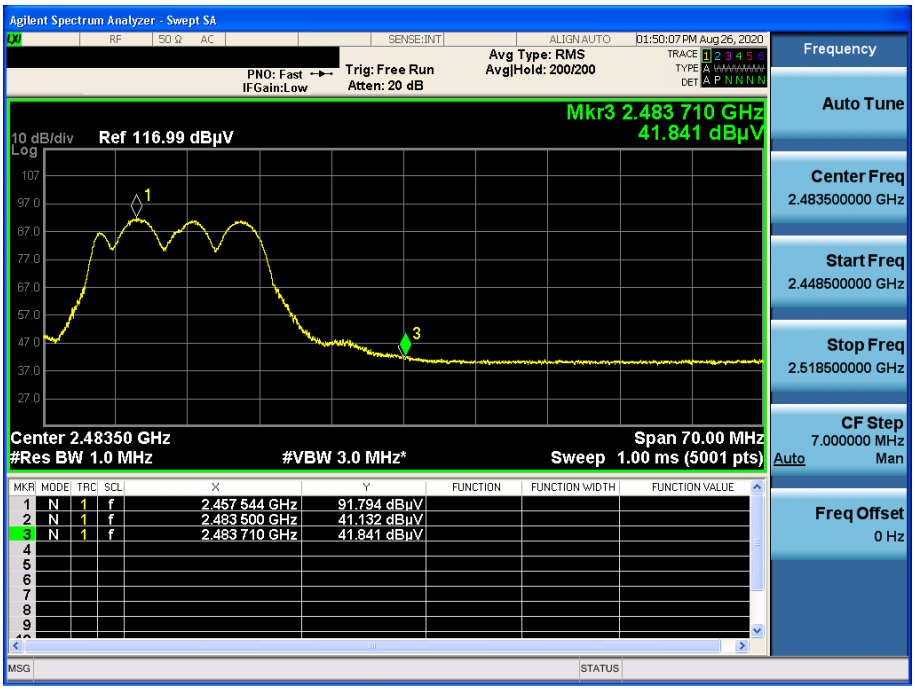
TM 2 & 2 412 & Y axis & Hor **Detector Mode : AV**



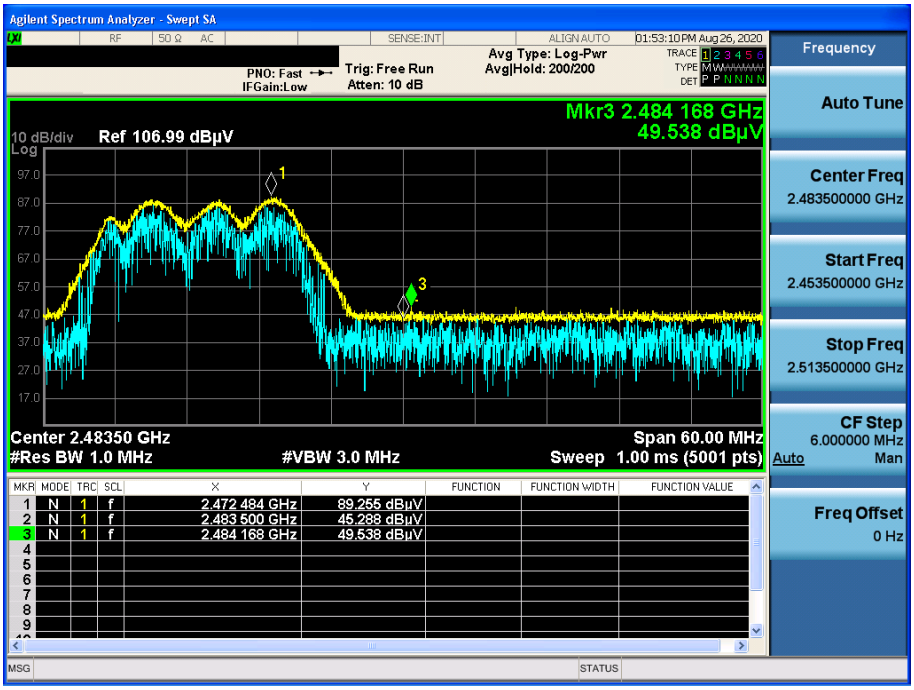
TM 2 & 2 462 & Y axis & Hor **Detector Mode : PK**



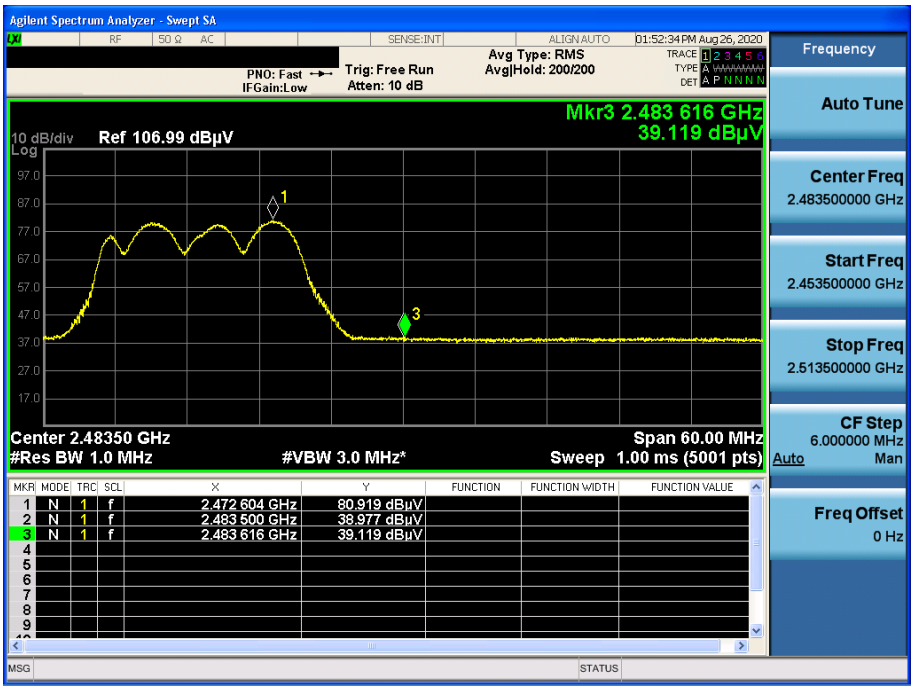
TM 2 & 2 462 & Y axis & Hor **Detector Mode : AV**



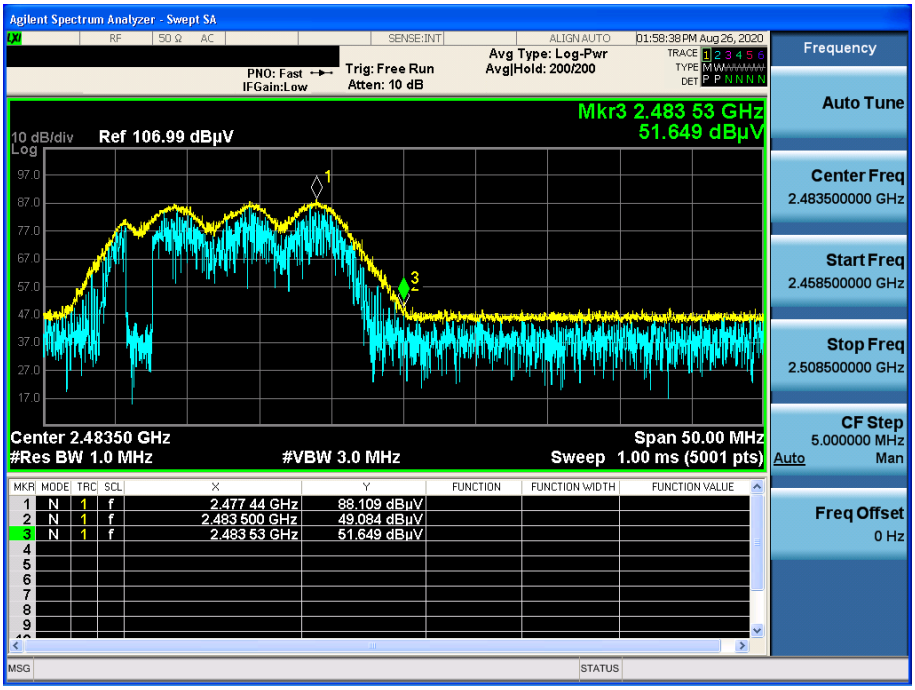
TM 2 & 2 467 & Y axis & Hor **Detector Mode : PK**



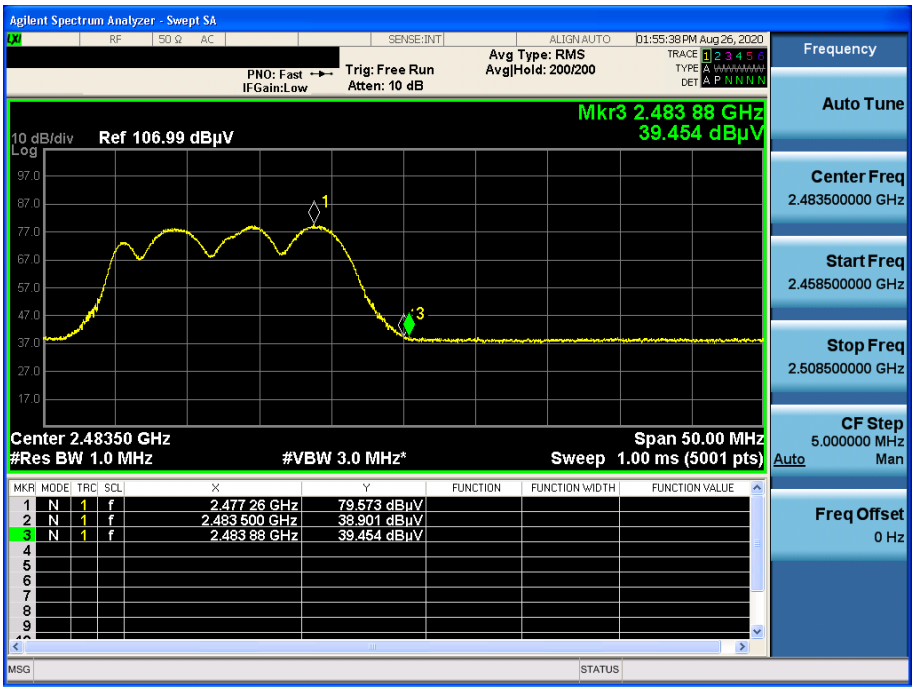
TM 2 & 2 467 & Y axis & Hor **Detector Mode : AV**



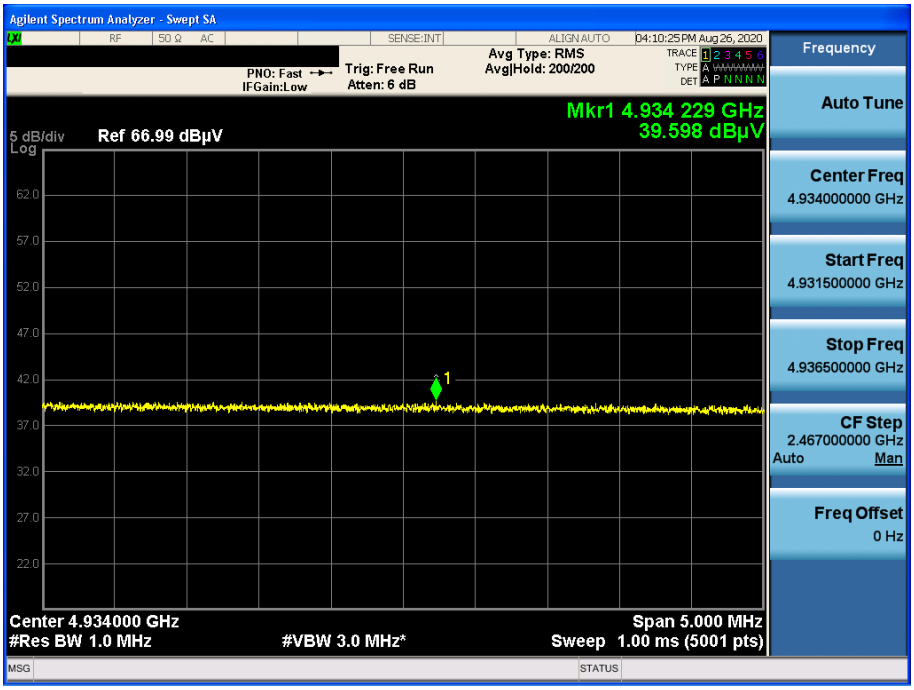
TM 2 & 2 472 & Y axis & Hor **Detector Mode : PK**



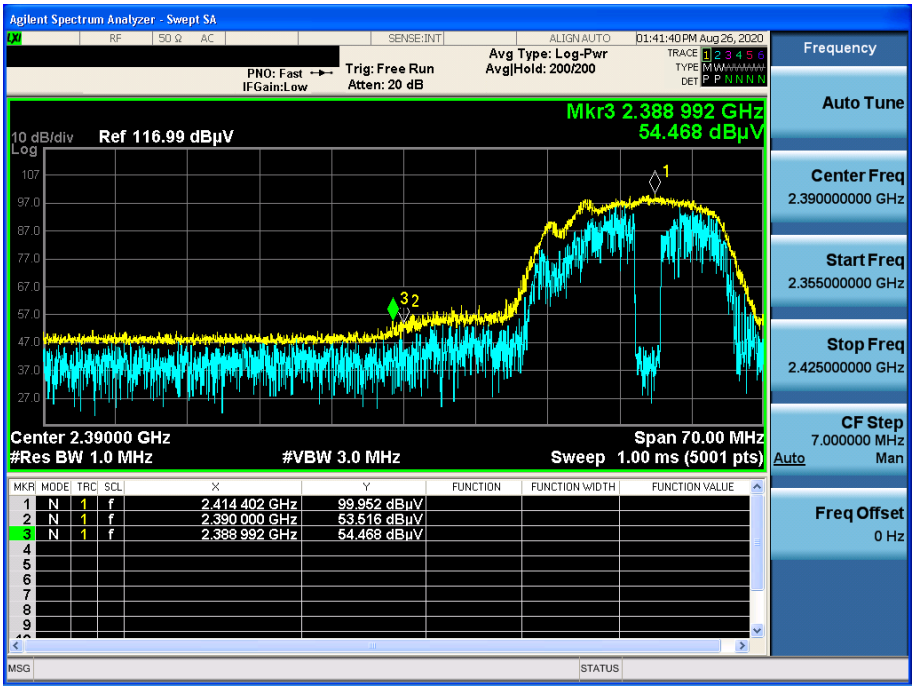
TM 2 & 2 472 & Y axis & Hor **Detector Mode : AV**



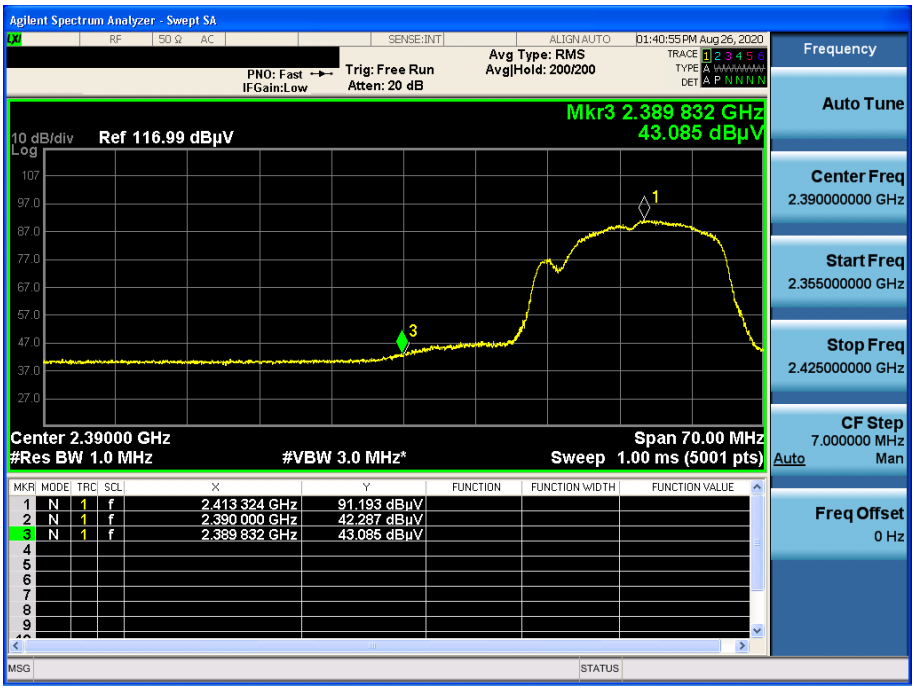
TM 2 & 2 467 & Z axis & Ver **Detector Mode : AV**



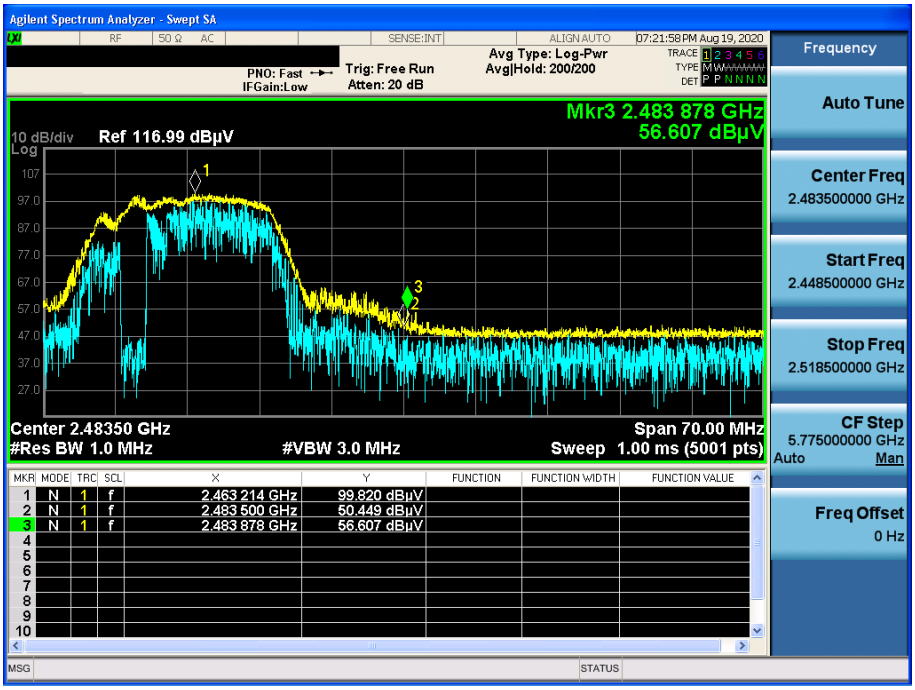
TM 3 & 2 412 & Y axis & Hor **Detector Mode : PK**



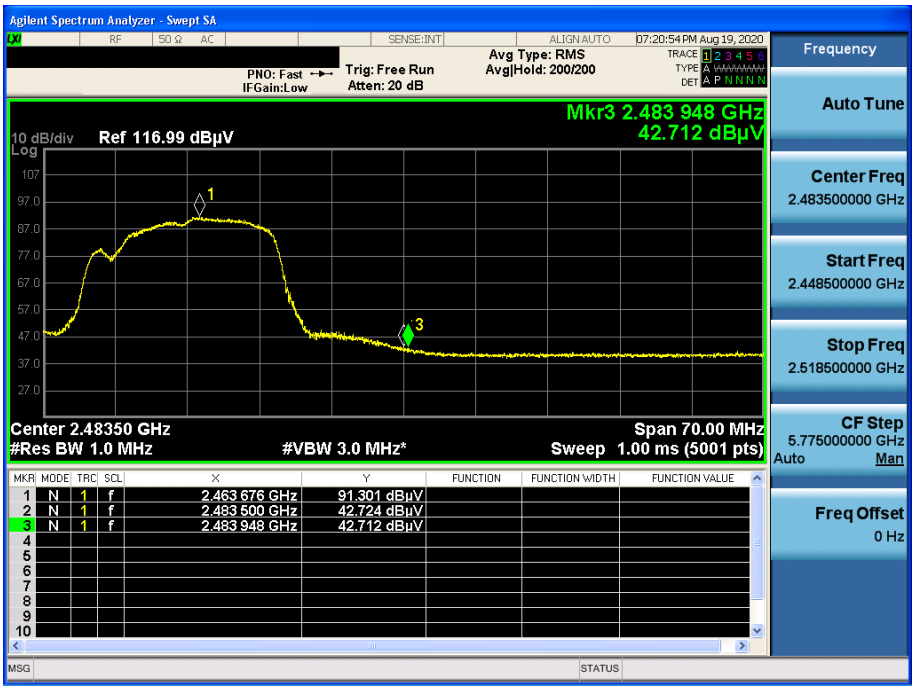
TM 3 & 2 412 & Y axis & Hor **Detector Mode : AV**



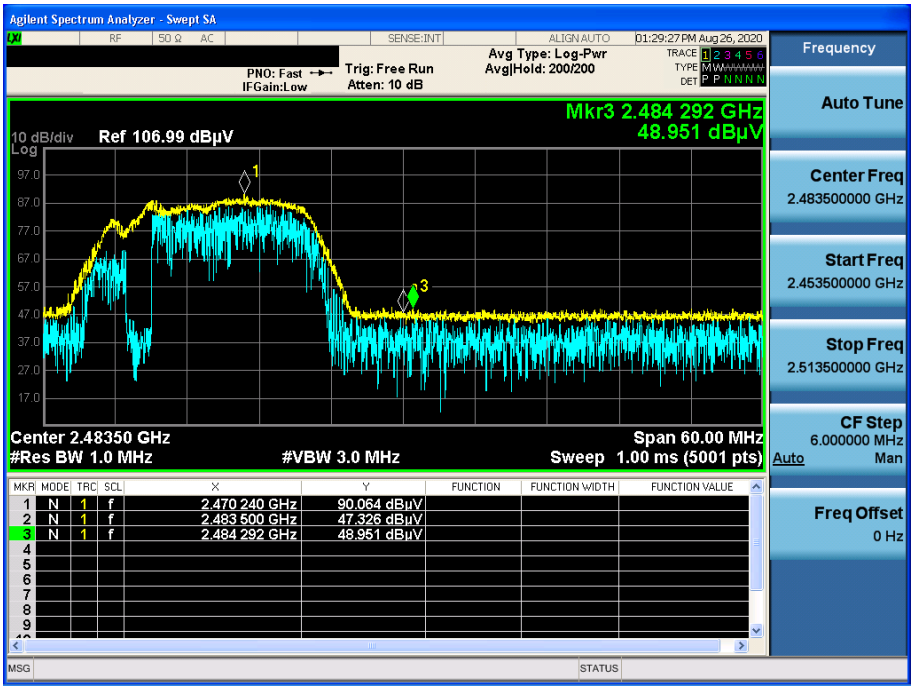
TM 3 & 2 462 & Y axis & Hor **Detector Mode : PK**



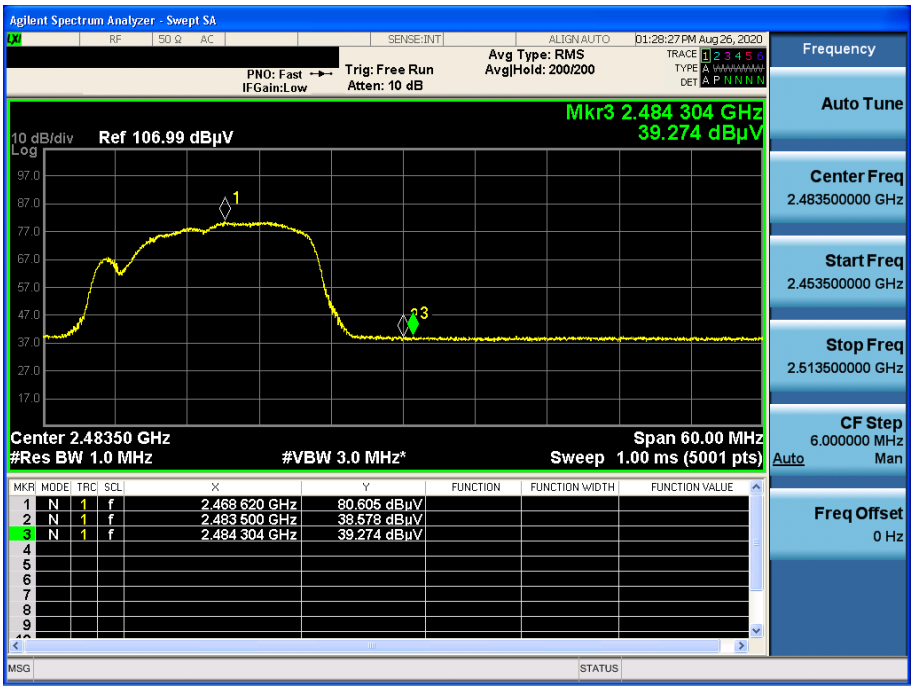
TM 3 & 2 462 & Y axis & Hor **Detector Mode : AV**



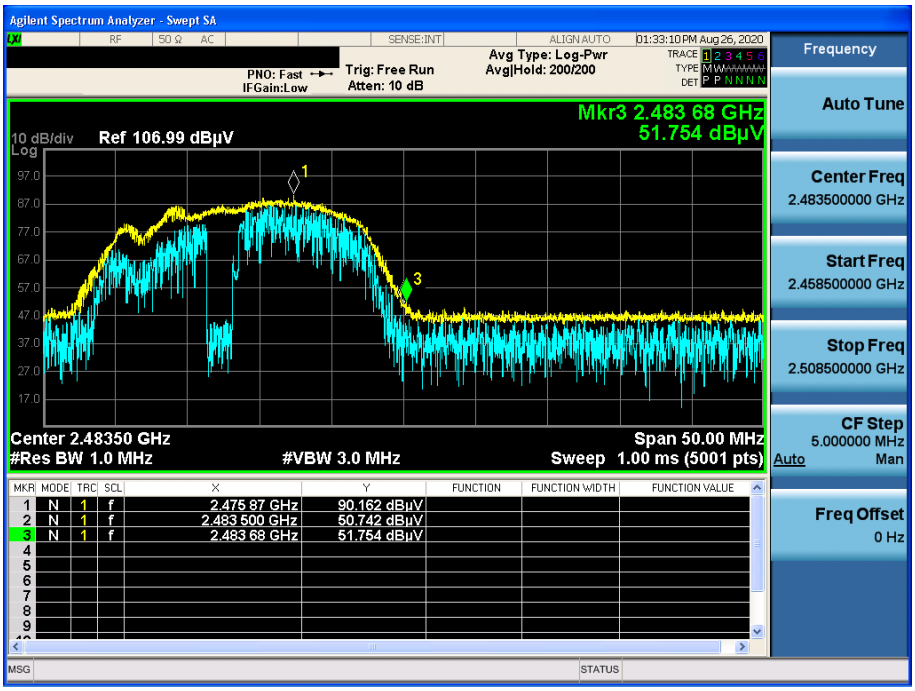
TM 3 & 2 467 & Y axis & Hor **Detector Mode : PK**



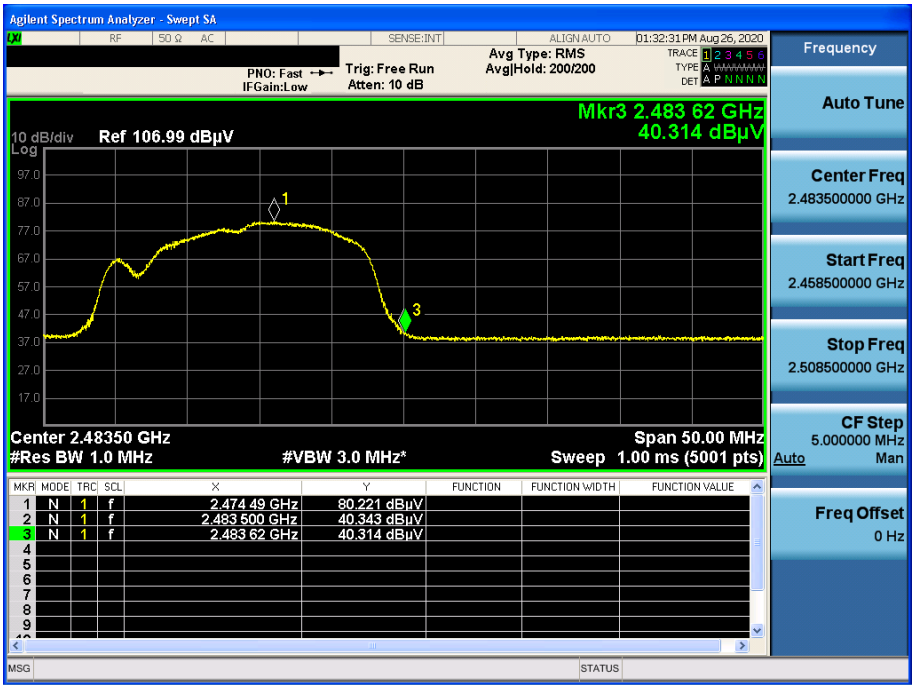
TM 3 & 2 467 & Y axis & Hor **Detector Mode : AV**



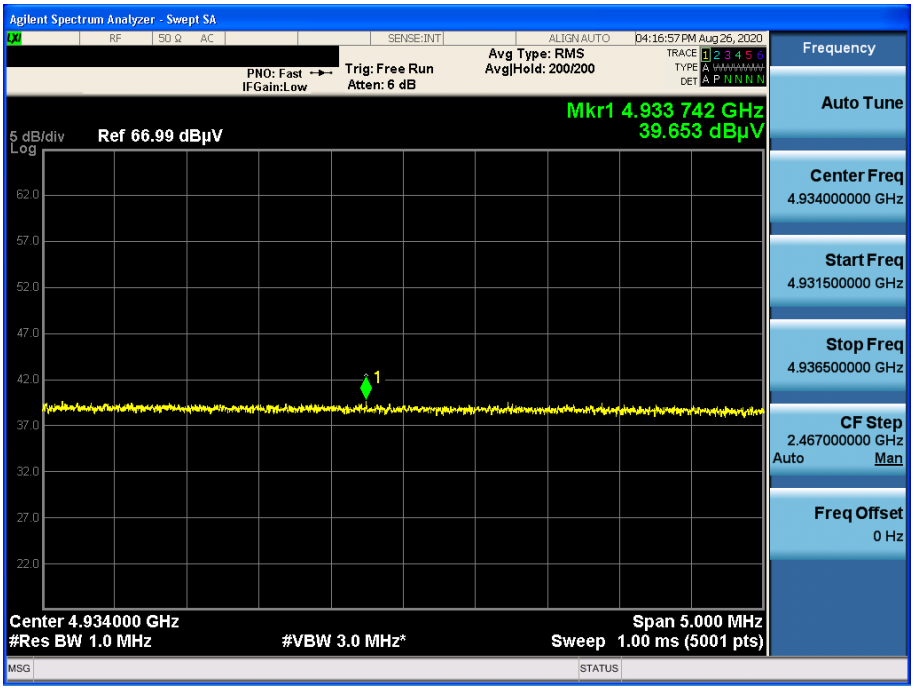
TM 3 & 2 472 & Y axis & Hor **Detector Mode : PK**



TM 3 & 2 472 & Y axis & Hor **Detector Mode : AV**

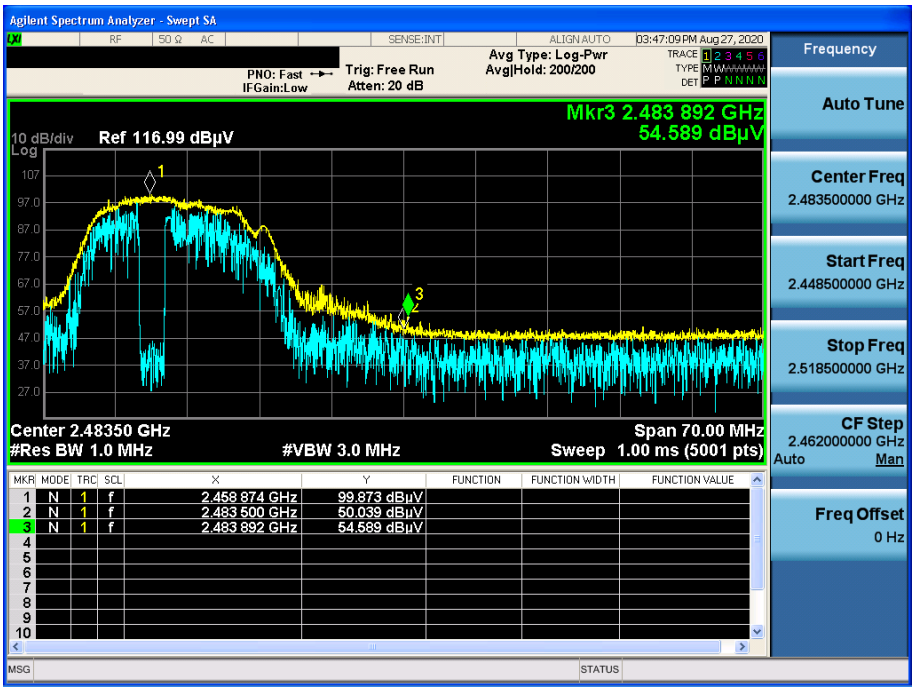


TM 3 & 2 467 & Z axis & Ver **Detector Mode : AV**

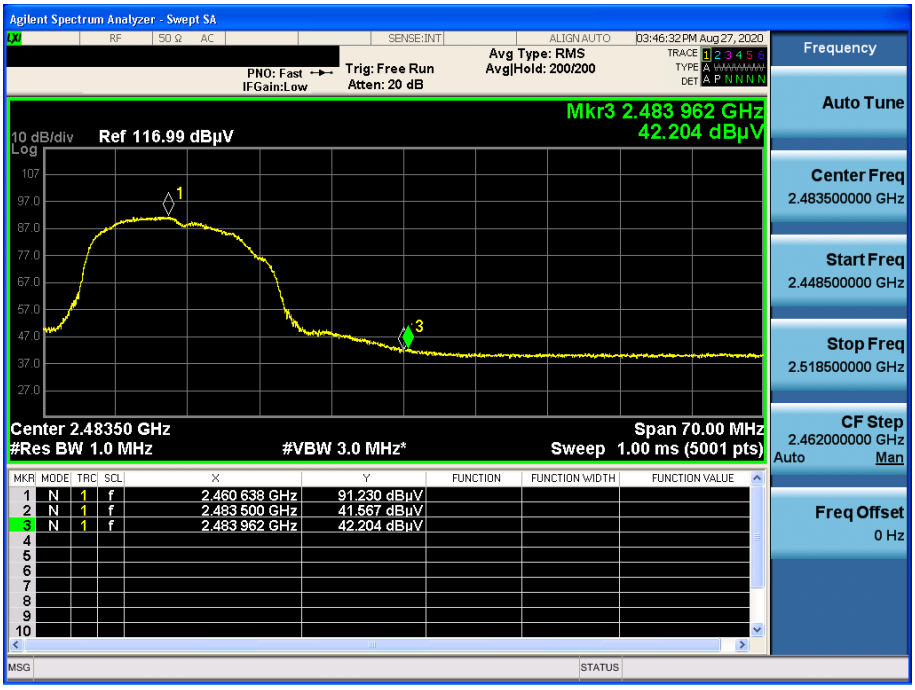


Unwanted Emissions (Radiated) Test Plot _ non-swiveled position

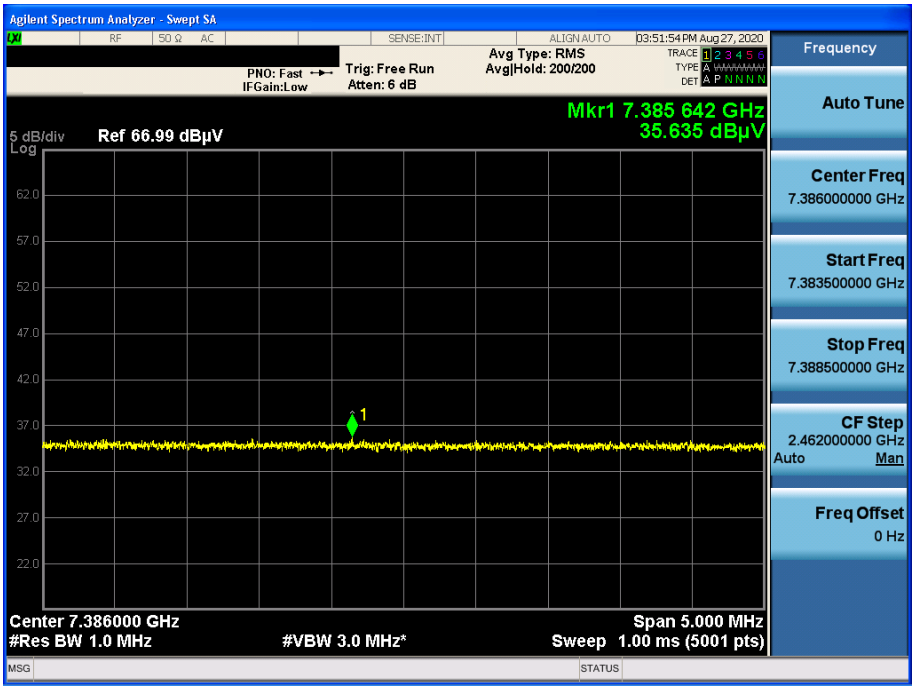
TM 4 & 2 462 & Z axis & Ver **Detector Mode : PK**



TM 4 & 2 462 & Z axis & Ver **Detector Mode : AV**

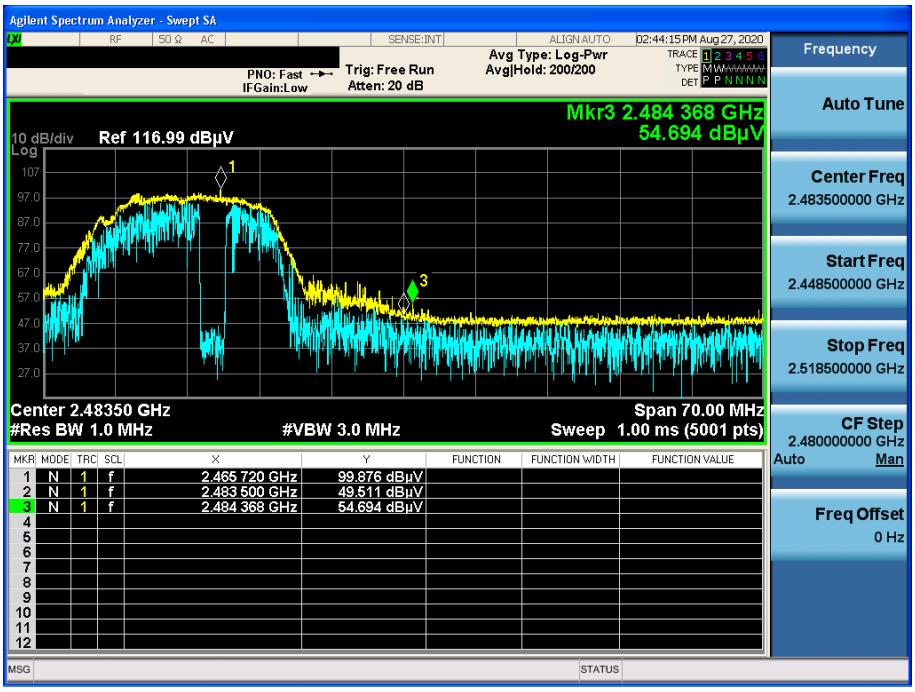


TM 4 & 2 462 & Z axis & Ver **Detector Mode : AV**

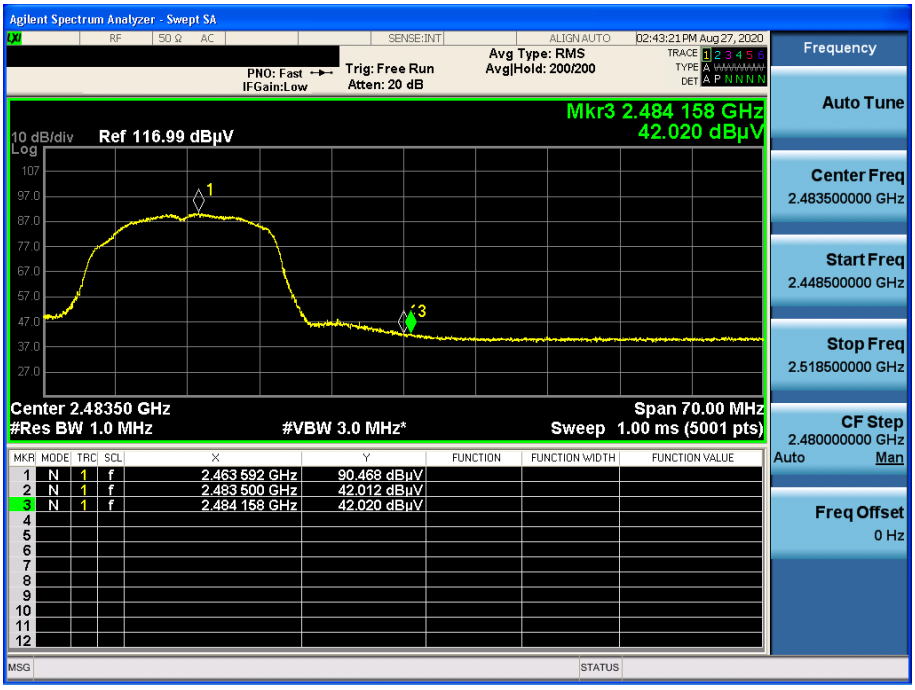
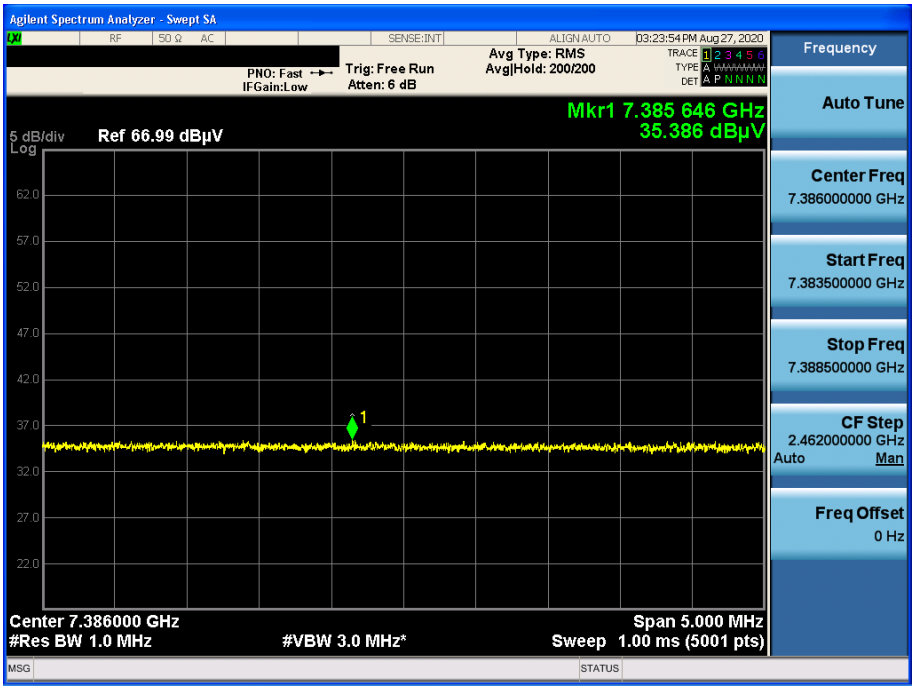


Unwanted Emissions (Radiated) Test Plot _ With Wireless Charging

TM 5 & 2 462 & X axis & Hor **Detector Mode : PK**



TM 5 & 2 462 & X axis & Hor **Detector Mode : AV**



TM 5 & 2 462 & X axis & Hor **Detector Mode : AV**