TEST REPORT

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Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2009-0270
2. Customer
   - Name : LG Electronics USA.
   - Address : 111 Sylvan Avenue North Building, Englewood Cliffs, New Jersey, United States, 07632
3. Use of Report : Class II Permissive Change
4. Product Name / Model Name : Telematics / TCAA19ANANN
   FCC ID : BEJTCAA19ANANN
5. FCC Regulation(s): Part 15.247
   Test Method Used : KDB558074 D01v05r02, ANSI C63.10-2013
6. Date of Test : 2020.08.14 ~ 2020.08.24
7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
8. Testing Environment : See appended test report.
9. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by Name : JungWoo Kim (Signature)	Reviewed by Name : JaeJin Lee (Signature)

2020. 09. 01.

DT&C Co., Ltd.

Not abided by KS Q ISO / IEC 17025 and KOLAS accreditation.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2009-0270	Sep. 01, 2020	Initial issue	JungWoo Kim	JaeJin Lee

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1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	Telematics
Model Name	TCAA19ANANN
Add Model Name	NA
Power Supply	DC 12 V
Frequency Range	▪ 802.11b/g/n/ac(20 MHz) : 2 412 MHz ~ 2 462 MHz ▪ 802.11n/ac(40 MHz) : 2 422 MHz ~ 2 452 MHz
Max. RF Output Power	2.4 GHz Band ▪ 802.11b : 18.46 dBm ▪ 802.11g : 23.10 dBm ▪ 802.11ac (VHT20) : 23.78 dBm ▪ 802.11ac (VHT40) : 22.64 dBm
Modulation Type	▪ 802.11b: CCK, DSSS ▪ 802.11g/n/ac: OFDM
Antenna Specification	**Antenna type**: External Antenna(2EA) **Antenna gain:** Refer to the clause 7 in test report.

Transmitting configuration of EUT

Mode	SISO		MIMO(CDD)	MIMO(SDM)
	Ant 1	Ant 2	Ant 1 & 2	Ant 1 & 2
	Data rate			
802.11b	1~11 Mbps	1~11 Mbps	1~11 Mbps	-
802.11g	6~54Mbps	6~54Mbps	6~54Mbps	-
802.11ac(VHT20)	NSS1 MCS 0 ~ 8	NSS1 MCS 0 ~ 8	NSS1 MCS 0 ~ 8	NSS2 MCS 0 ~ 8
802.11ac(VHT40)	NSS1 MCS 0 ~ 9	NSS1 MCS 0 ~ 9	NSS1 MCS 0 ~ 9	NSS2 MCS 0 ~ 9

Note1: SDM = Spatial Diversity Multiplexing, CDD = Cycle Delay Diversity

2. INFORMATION ABOUT TESTING

2.1 Test mode

Test mode	Worst case data rate	Tested Frequency(MHz)		
		Lowest	Middle	Highest
TM 1	802.11b 1 Mbps (CDD Multiple transmitting)	2 412	2 437	2 462
TM 2	802.11g 6 Mbps (CDD Multiple transmitting)	2 412	2 437	2 462
TM 3	802.11ac(VHT20) NSS 1 MCS 0 (CDD Multiple transmitting)	2 412	2 437	2 462
TM 4	802.11ac(VHT40) NSS 1 MCS 0 (CDD Multiple transmitting)	2 422	2 437	2 452
TM 5	802.11ac(VHT20) NSS 2 MCS 0 (SDM Multiple transmitting)	2 412	2 437	2 462
TM 6	802.11ac(VHT40) NSS 2 MCS 0 (SDM Multiple transmitting)	2 422	2 437	2 452

Note 1: Based on the original report, the test was performed in the worst case.

2.2 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.3 Tested environment

Temperature	:	+22 ºC ~ +24 ºC
Relative humidity content	:	+42 % ~ +47 %
Details of power supply	:	DC 12 V

2.4 EMI suppression Device(s) / Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

2.5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014 and ANSI C 63.10-2013. All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

Test items	Measurement uncertainty
Transmitter Output Power	0.9 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz Below)	4.9 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz ~ 18 GHz)	5.1 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (18 GHz Above)	5.3 dB (The confidence level is about 95 %, k = 2)

3. SUMMARY OF TESTS

FCC Part	Parameter	Limit	Test Condition	Status Note 1
15.247(a)	6 dB Bandwidth	> 500 kHz	Conducted	NT
15.247(b)	Transmitter Output Power	< 1 Watt		C
15.247(d)	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW		NT
15.247(e)	Transmitter Power Spectral Density	< 8 dBm/3 kHz		NT
-	Occupied Bandwidth (99 %)	RSS-Gen(6.7)		NT
15.247(d) 15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC 15.209 limits	Radiated	C Note 3
15.207	AC Line Conducted Emissions	FCC 15.207 limits	AC Line Conducted	NT
15.203	Antenna Requirements	FCC 15.203	-	C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS.

Note 3: This test item was performed at the worst case based on the original filing.

4. TEST METHODOLOGY

The measurement procedures described in the ANSI C63.10-2013 and the guidance provided in KDB558074 D01v05r02 were used in measurement of the EUT.

The EUT was tested per the guidance of KDB558074 D01v05r02. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

4.1 EUT configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

4.3 General test procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB558074 D01v05r02.

So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector

Radiated Emissions

Basically the radiated tests were performed with KDB558074 D01v05r02. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10 as stated on section 12.1 of the KDB558074 D01V05R02.

The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through one orthogonal axes.

4.4 Description of test modes

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics.

A test program is used to control the EUT for staying in continuous transmitting mode.

5. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

6. FACILITIES AND ACCREDITATIONS

6.1 Facilities

DT&C Co., Ltd.		
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of § 2.948 according to ANSI C63.4-2014. **- FCC & ISED MRA Designation No. : KR0034**		
www.dtnc.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

6.2 Equipment

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, loop, horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

7. ANTENNA REQUIREMENTS

7.1 According to FCC 47 CFR §15.203

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna is attached on the device by means of unique coupling method.
Therefore this E.U.T Complies with the requirement of §15.203

7.2 Directional antenna gain:

Band	**SISO**						**MIMO (CDD) Note 2.**	**MIMO (SDM) Note 3**
	ANT 1 [dBi]	Cable 1 Loss[dB]	**Total 1 Note1**	ANT 2 [dBi]	Cable 2 Loss[dB]	**Total 2 Note1**	**Directional Gain [dBi]**	**Directional Gain [dBi]**
2.4 GHz	2.10	-0.80	1.30	2.10	-1.20	0.90	4.11	1.10

Note 1. The antenna gain was included cable loss.
Note 2. Directional gain (Correlated signal with unequal antenna gain and equal transmit power)
$10 \log [(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi
Note 3. Directional gain (Completely uncorrelated signal with unequal antenna gain and equal transmit power)
$10 \log [(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10}) / N_{ANT}]$ dBi

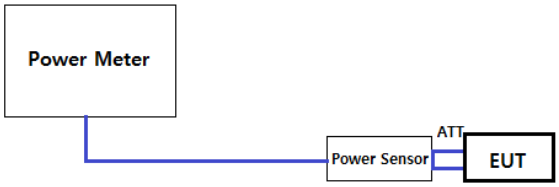
8. TEST RESULT

8.1 Maximum peak conducted output power

▣ Test Requirements and limit, §15.247(b)

The maximum permissible conducted output power is **1 Watt**.

▣ Test Configuration



▣ Test Procedure

1. **PKPM1 Peak power meter method of KDB558074 D01V05R02**
   The maximum conducted output powers were measured using a broadband peak RF power meter which has greater video bandwidth than DUT's DTS bandwidth and utilize a fast-responding diode detector.

2. **Method AVGPM-G (Measurement using a gated RF average power meter) of KDB558074 D01V05R02**
   The average conducted output powers were measured using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

▣ Test Results: Comply

▪ Multiple transmitting CDD

Mode	Freq. (MHz)	Det.	Test Result [dBm]		
			Antenna 1	Antenna 2	SUM (ANT1+ANT2)
802.11b	2 412	PK	15.44	15.45	18.46
		AV	12.94	12.73	15.85
	2 437	PK	15.31	15.02	18.18
		AV	12.89	12.53	15.72
	2 462	PK	14.91	14.88	17.91
		AV	12.27	12.18	15.24

Mode	Freq. (MHz)	Det.	Test Result [dBm]		
			Antenna 1	Antenna 2	SUM (ANT1+ANT2)
802.11g	2 412	PK	19.22	19.55	22.40
		AV	13.23	13.15	16.20
	2 437	PK	20.27	19.91	23.10
		AV	15.45	14.78	18.14
	2 462	PK	18.75	18.18	21.48
		AV	12.57	12.61	15.60

Mode	Freq. (MHz)	Det.	Test Result [dBm]		
			Antenna 1	Antenna 2	SUM (ANT1+ANT2)
802.11ac (VHT20)	2 412	PK	18.81	19.16	22.00
		AV	12.56	12.44	15.51
	2 437	PK	21.10	20.41	23.78
		AV	15.25	14.74	18.01
	2 462	PK	18.41	17.87	21.16
		AV	11.90	11.86	14.89

Mode	Freq. (MHz)	Det.	Test Result [dBm]		
			Antenna 1	Antenna 2	SUM (ANT1+ANT2)
802.11ac (VHT40)	2 412	PK	17.01	16.58	19.81
		AV	10.90	10.25	13.60
	2 437	PK	19.74	19.51	22.64
		AV	14.53	14.45	17.50
	2 462	PK	16.52	16.78	19.66
		AV	10.17	10.80	13.51

▪ **Multiple transmitting SDM**

Mode	Freq. (MHz)	Det.	Test Result [dBm]		
			Antenna 1	Antenna 2	SUM (ANT1+ANT2)
802.11ac (VHT20)	2 412	PK	17.01	16.58	19.81
		AV	10.90	10.25	13.60
	2 437	PK	20.04	20.01	23.04
		AV	14.53	14.45	17.50
	2 462	PK	16.52	16.78	19.66
		AV	10.17	10.80	13.51

Mode	Freq. (MHz)	Det.	Test Result [dBm]		
			Antenna 1	Antenna 2	SUM (ANT1+ANT2)
802.11ac (VHT40)	2 412	PK	16.71	16.57	19.65
		AV	10.55	10.28	13.43
	2 437	PK	19.31	19.22	22.28
		AV	14.44	14.49	17.48
	2 462	PK	16.08	16.72	19.42
		AV	10.15	10.77	13.48

8.2 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

adiator 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	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 – 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

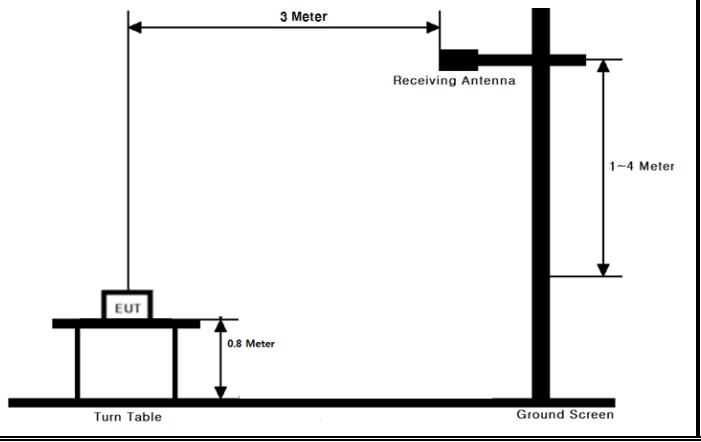
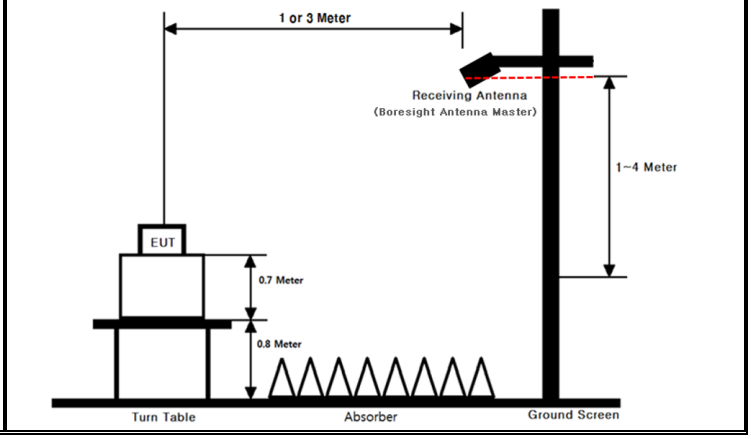
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 MHz - 72 MHz, 76 MHz - 88 MHz, 174 MHz - 216 MHz or 470 MHz - 806 MHz. However, operation within these frequency bands is permitted under other 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	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~ 167.17	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.72 ~ 173.2	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	240 ~ 285	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	608 ~ 614	3345.8 ~ 3358		
		960 ~ 1240	3600 ~ 4400		

▪ **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.

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 / x), 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 / x), 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	120.6	120.4	0.998 3	NA
TM 2	6 Mbps	2.163	2.047	0.946 4	0.24
TM 3	MCS 0	2.054	1.916	0.932 8	0.30
TM 4	MCS 0	1.051	0.944	0.898 2	0.47

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 I for worst data plots.

Test Notes.

1. The radiated emissions were tested on the worst-case mode and channel from the original filing.
2. The radiated emissions were investigated 9 kHz to 25 GHz. And no other spurious and harmonic emissions were found below listed frequencies.
3. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
4. Information of Distance Factor
   For finding emissions, measurements may be performed at a distance closer than that specified in the regulations.
   In this case, the distance factor is applied to the result.
   - Calculation of distance factor
   At frequencies below 30 MHz = 40 log(tested distance / specified distance)
   At frequencies at or above 30 MHz = 20 log(tested distance / specified distance)
   When distance factor is “N/A”, the measurements were performed at the specified distance and distance factor is not applied.

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 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	2 389.41	V	X	PK	55.58	1.49	N/A	N/A	57.07	74.00	16.93
	2 389.64	V	X	AV	45.30	1.49	N/A	N/A	46.79	54.00	7.21
	4 823.90	V	X	PK	49.97	5.68	N/A	N/A	55.65	74.00	18.35
	4 823.98	V	X	AV	46.22	5.68	N/A	N/A	51.90	54.00	2.10
2 437	4 873.91	V	X	PK	49.58	5.85	N/A	N/A	55.43	74.00	18.57
	4 874.02	V	X	AV	46.04	5.85	N/A	N/A	51.89	54.00	2.11
2 462	2 484.70	V	X	PK	55.54	1.60	N/A	N/A	57.14	74.00	16.86
	2 484.41	V	X	AV	46.07	1.60	N/A	N/A	47.67	54.00	6.33
	4 923.90	V	X	PK	48.43	5.83	N/A	N/A	54.26	74.00	19.74
	4 924.02	V	X	AV	44.00	5.83	N/A	N/A	49.83	54.00	4.17

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	2 389.58	V	X	PK	63.71	1.49	N/A	N/A	65.20	74.00	8.80
	2 389.92	V	X	AV	49.11	1.49	0.24	N/A	50.84	54.00	3.16
	4 828.52	V	X	PK	52.60	5.69	N/A	N/A	58.29	74.00	15.71
	4 823.54	V	X	AV	41.40	5.68	0.24	N/A	47.32	54.00	6.68
2 462	2 483.96	V	X	PK	62.15	1.60	N/A	N/A	63.75	74.00	10.25
	2 483.82	V	X	AV	49.27	1.60	0.24	N/A	51.11	54.00	2.89
	4 923.10	V	X	PK	49.77	5.83	N/A	N/A	55.60	74.00	18.40
	4 923.97	V	X	AV	38.97	5.83	0.24	N/A	45.04	54.00	8.96

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	2 389.47	V	X	PK	61.27	1.49	N/A	N/A	62.76	74.00	11.24
	2 389.82	V	X	AV	49.33	1.49	0.30	N/A	51.12	54.00	2.88
	4 823.95	V	X	PK	49.75	5.68	N/A	N/A	55.43	74.00	18.57
	4 824.09	V	X	AV	39.45	5.68	0.30	N/A	45.43	54.00	8.57
2 462	2 483.75	V	X	PK	61.06	1.60	N/A	N/A	62.66	74.00	11.34
	2 483.60	V	X	AV	49.29	1.60	0.30	N/A	51.19	54.00	2.81
	4 923.74	V	X	PK	46.85	5.83	N/A	N/A	52.68	74.00	21.32
	4 923.89	V	X	AV	37.35	5.83	0.30	N/A	43.48	54.00	10.52

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 4

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	2 389.06	V	X	PK	69.60	1.49	N/A	N/A	71.09	74.00	2.91
	2 389.59	V	X	AV	49.03	1.49	0.47	N/A	50.99	54.00	3.01
	4 844.14	V	X	PK	44.82	5.75	N/A	N/A	50.57	74.00	23.43
	4 844.02	V	X	AV	36.44	5.75	0.47	N/A	42.66	54.00	11.34
2 462	2 484.47	V	X	PK	66.48	1.60	N/A	N/A	68.08	74.00	5.92
	2 484.52	V	X	AV	49.02	1.60	0.47	N/A	51.09	54.00	2.91
	4 904.16	V	X	PK	44.33	5.91	N/A	N/A	50.24	74.00	23.76
	4 903.92	V	X	AV	35.41	5.91	0.47	N/A	41.79	54.00	12.21

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
DC power supply	SM techno	SDP30-5D	20/06/24	21/06/24	305DNF079
Multimeter	FLUKE	17B+	19/12/16	20/12/16	36390701WS
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-2
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-1
Thermohygrometer	BODYCOM	BJ5478	20/07/01	21/07/01	N/A
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	ANRITSU	MG3695C	19/12/16	20/12/16	173501
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
Power Meter & Wide Bandwidth Sensor	Agilent Technologies	N1911A N1921A	20/06/24	21/06/24	MY53360016 MY53360018
HORN ANT	ETS	3117	20/04/24	21/04/24	00140394
HORN ANT	A.H.Systems	SAS-574	20/06/24	21/06/24	155
PreAmplifier	H.P	8447D	19/12/16	20/12/16	2944A07774
PreAmplifier	Agilent	8449B	20/06/24	21/06/24	3008A02108
High-pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	20/06/24	21/06/24	3
Cable	DTNC	Cable	20/08/03	21/08/03	M-07
Cable	DTNC	Cable	20/08/03	21/08/03	M-08
Cable	Junkosha	MWX315	20/01/16	21/01/16	M-05
Cable	Junkosha	MWX221	20/01/16	21/01/16	M-06
Cable	DTNC	Cable	20/01/16	21/01/16	RF-09

Note 1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017
Note 2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

APPENDIX I

Duty cycle plots

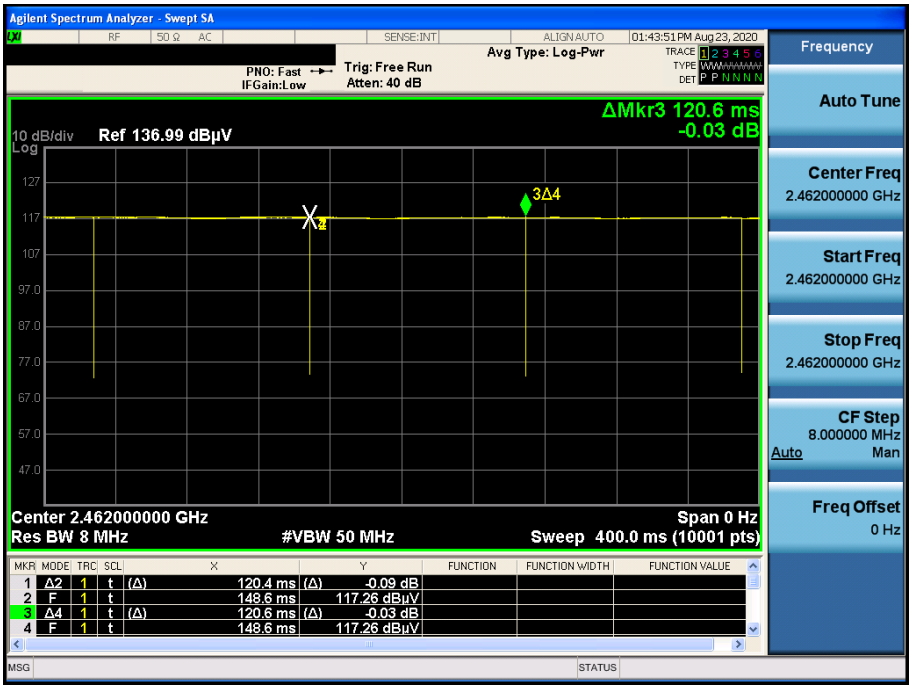
▪ Test Procedure

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

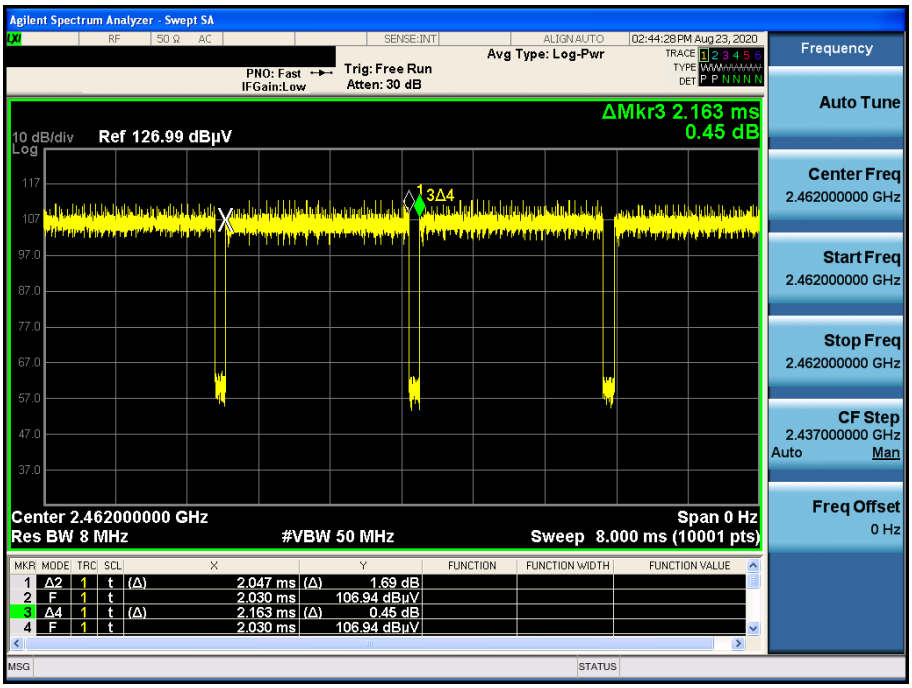
The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. 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.)

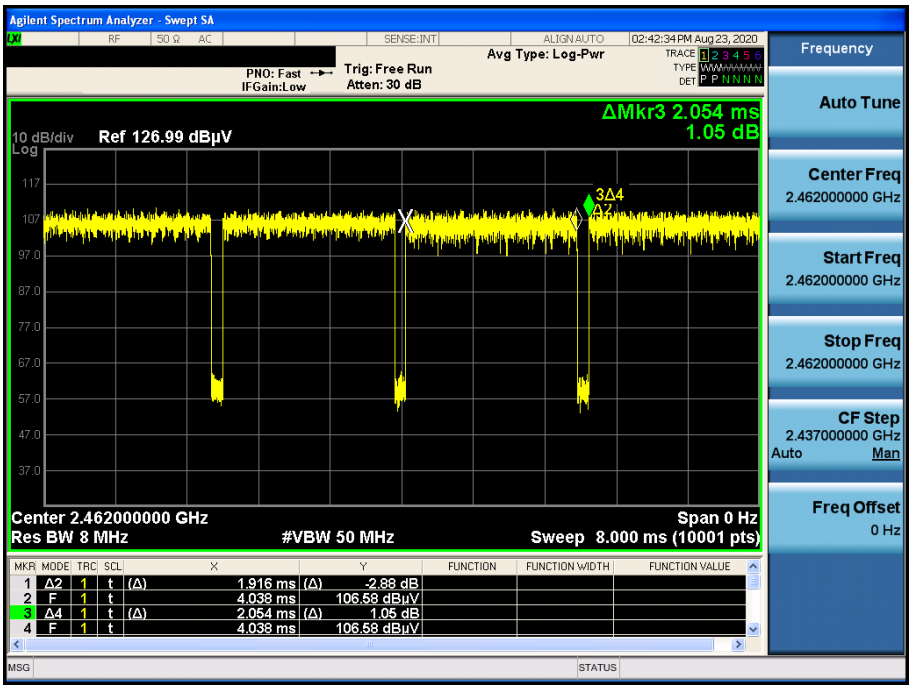
Duty Cycle TM 1 & ANT 1 & 2 462 MHz



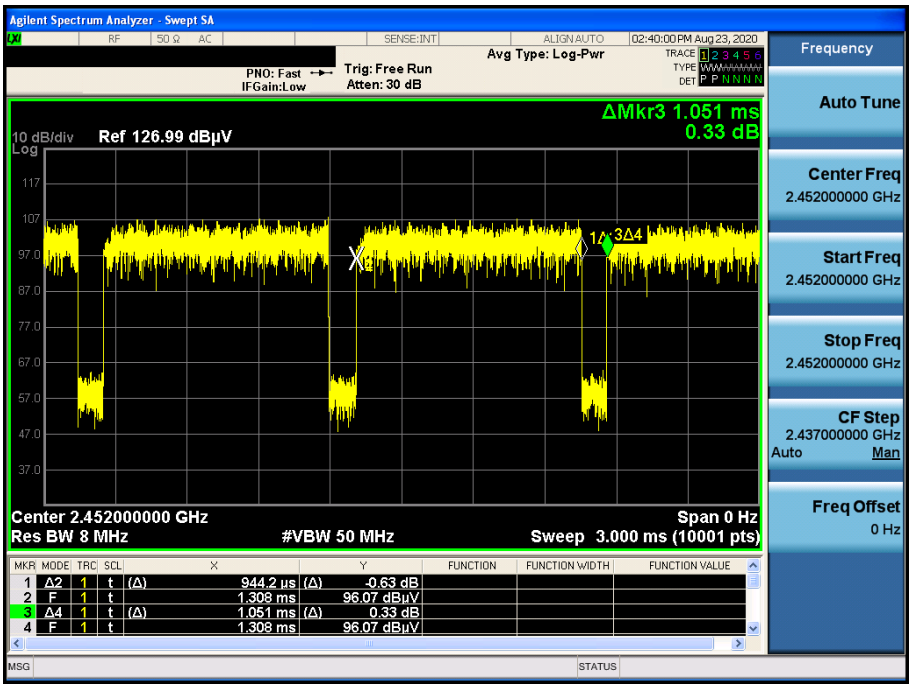
Duty Cycle TM 2 & ANT 1 & 2 462 MHz



Duty Cycle TM 3 & ANT 1 & 2 462 MHz



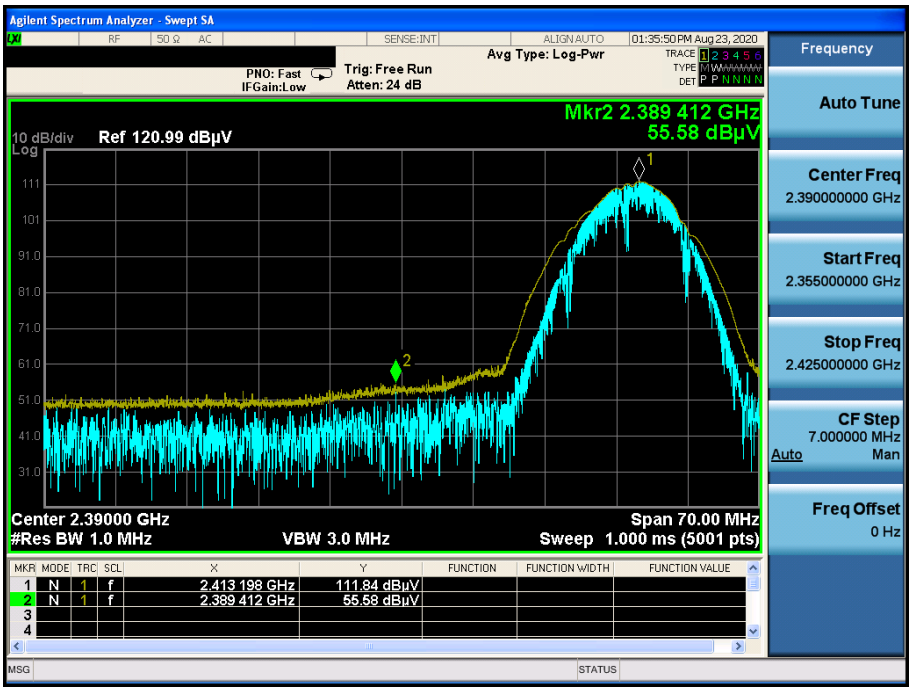
Duty Cycle TM 4 & ANT 1 & 2 452 MHz



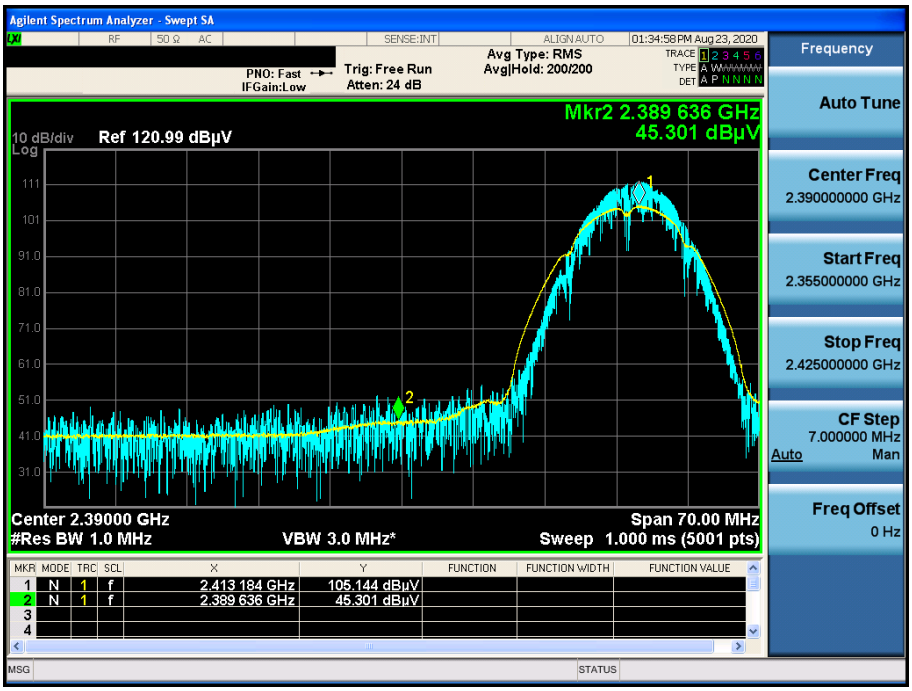
APPENDIX II

Unwanted Emissions (Radiated) Test Plot

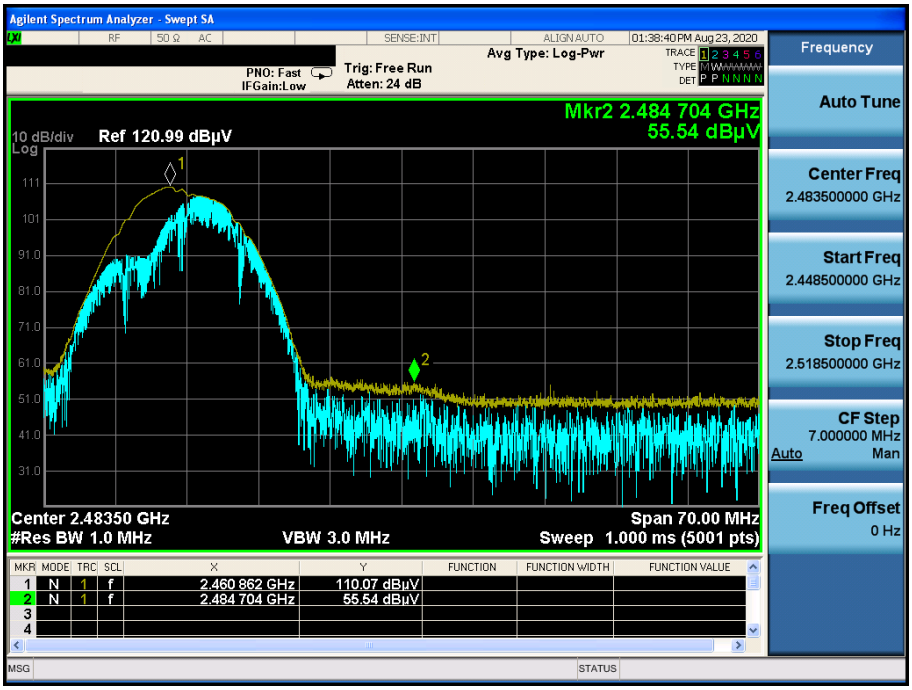
TM 1 & 2 412 & X axis & Ver **Detector Mode : PK**



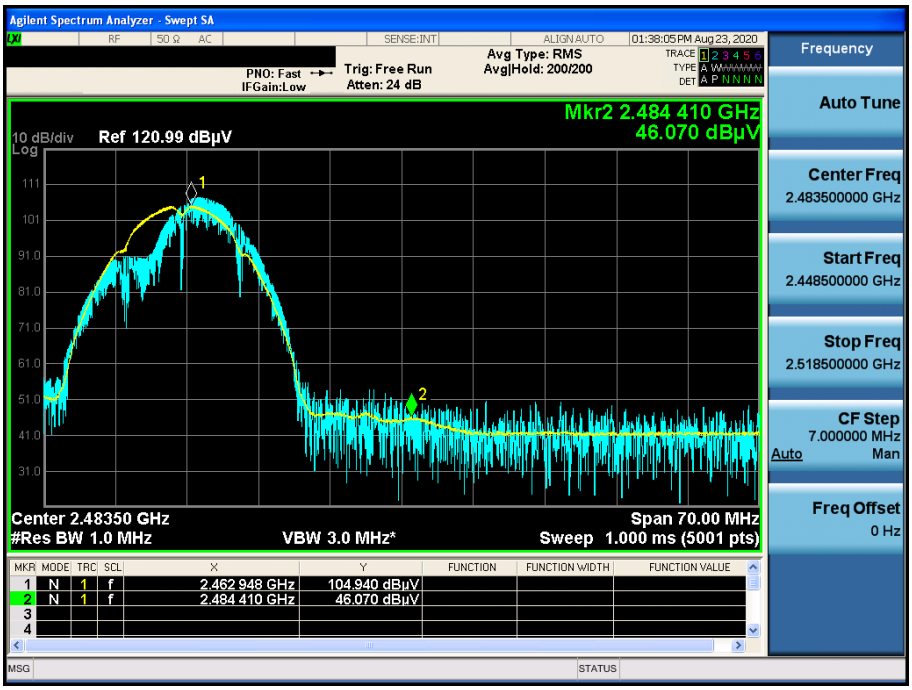
TM 1 & 2 412 & X axis & Ver **Detector Mode : AV**



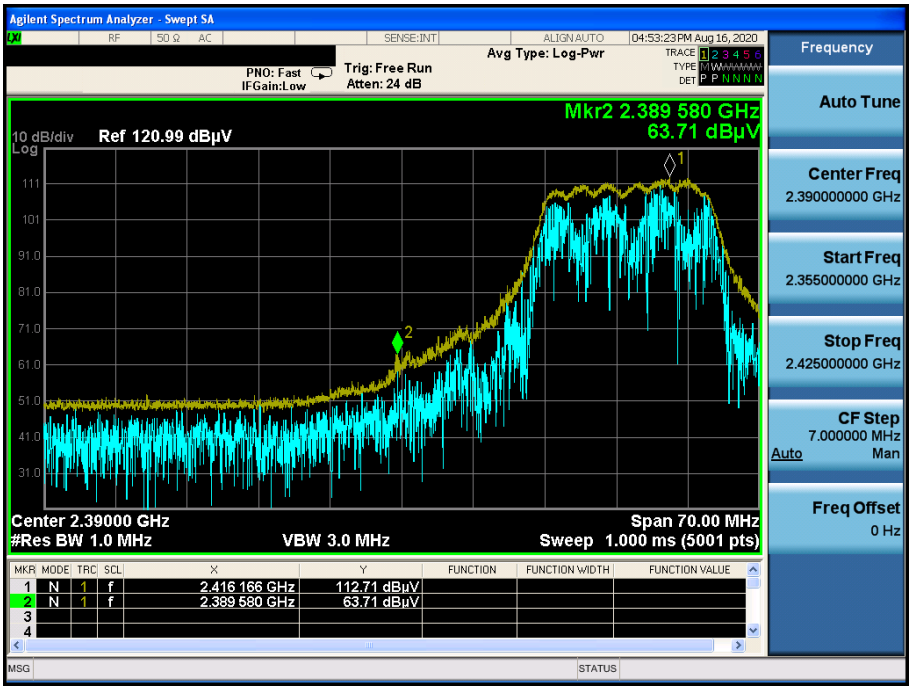
TM 1 & 2 462 & X axis & Ver **Detector Mode : PK**



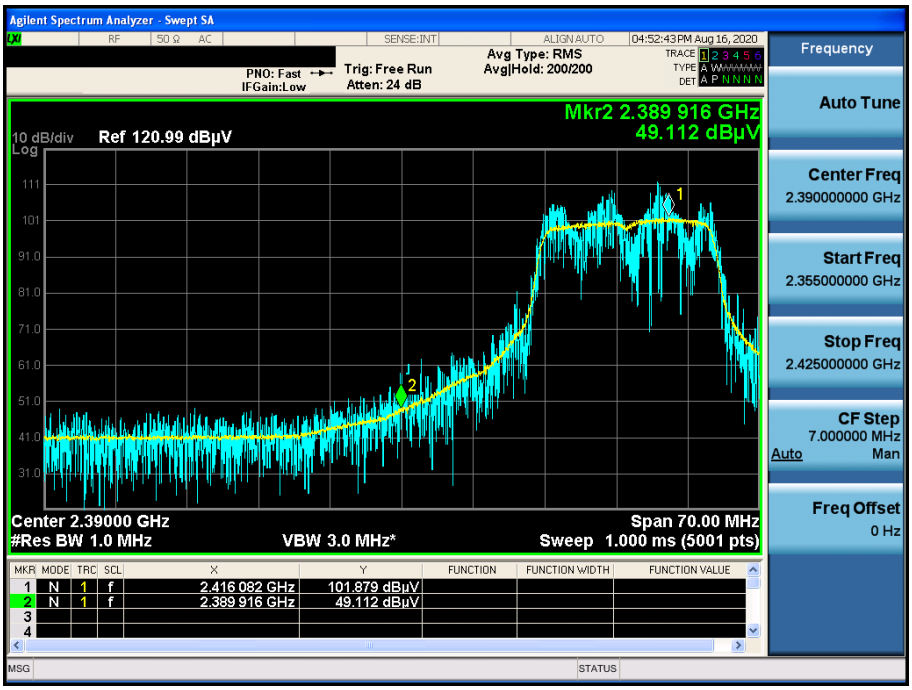
TM 1 & 2 462 & X axis & Ver **Detector Mode : AV**



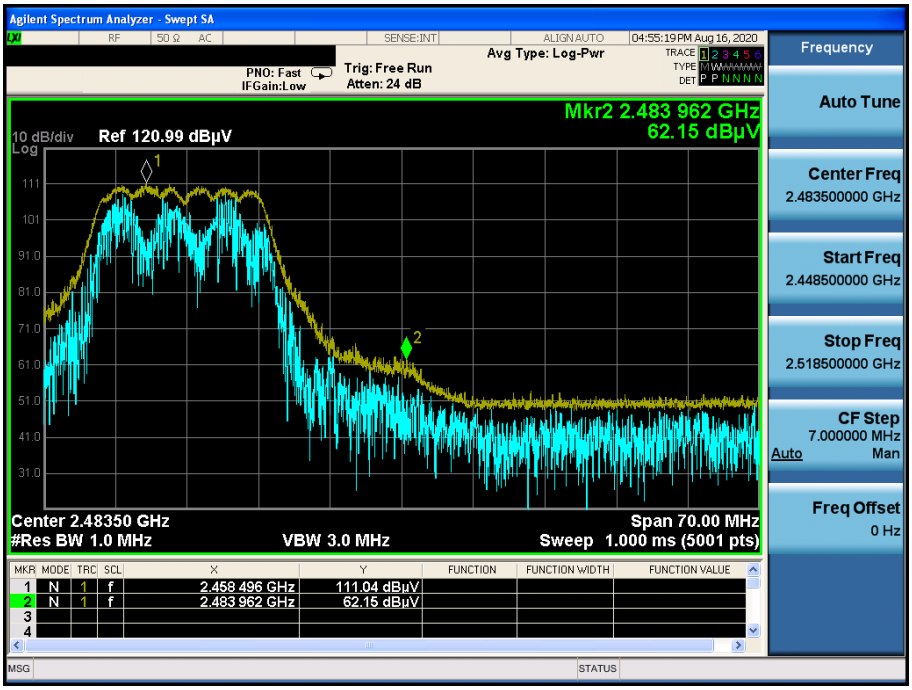
TM 2 & 2 412 & X axis & Ver **Detector Mode : PK**



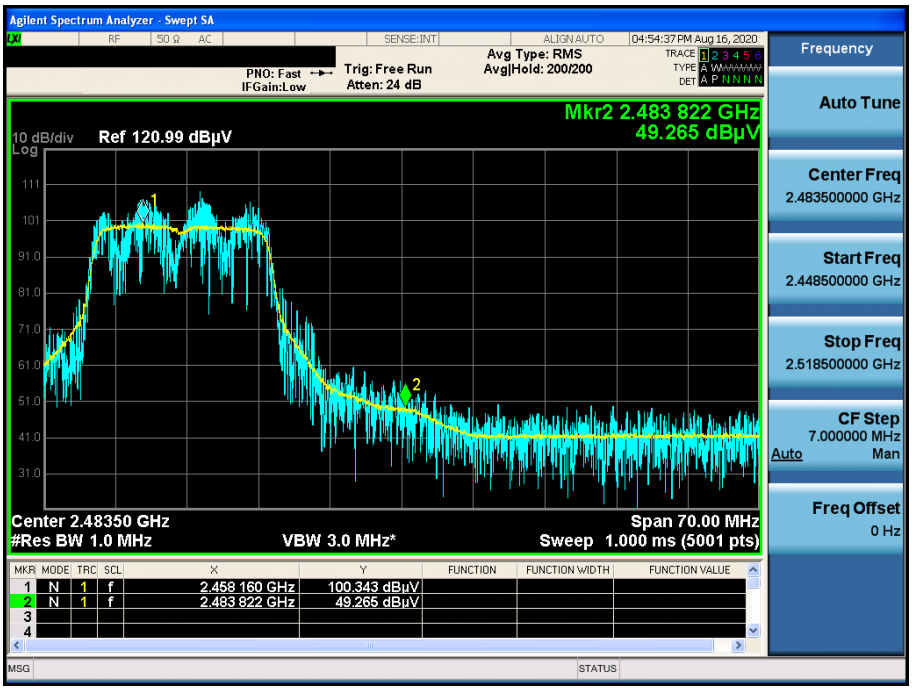
TM 2 & 2 412 & X axis & Ver **Detector Mode : AV**



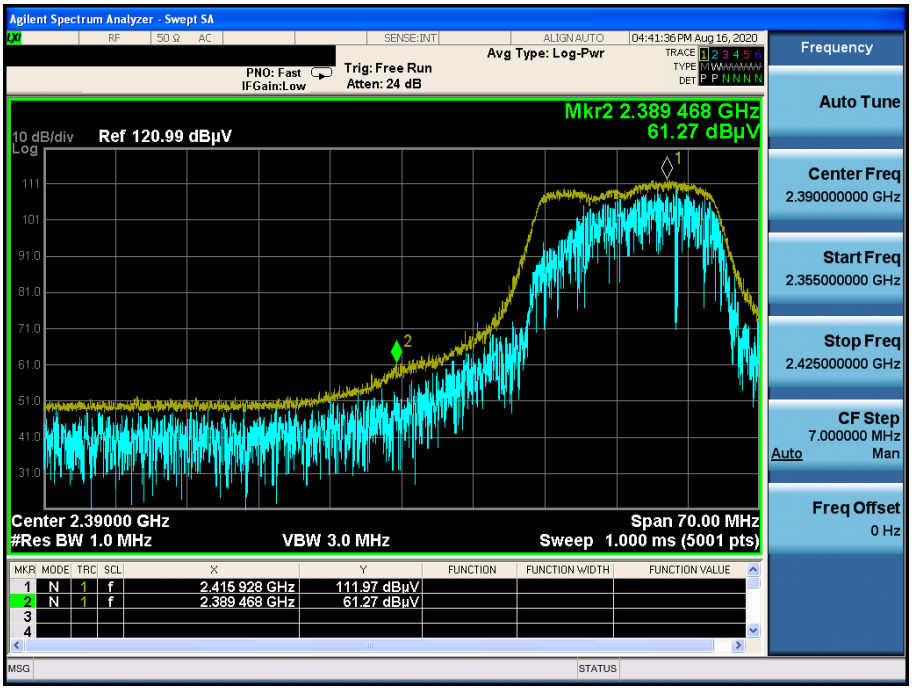
TM 2 & 2 462 & X axis & Ver **Detector Mode : PK**



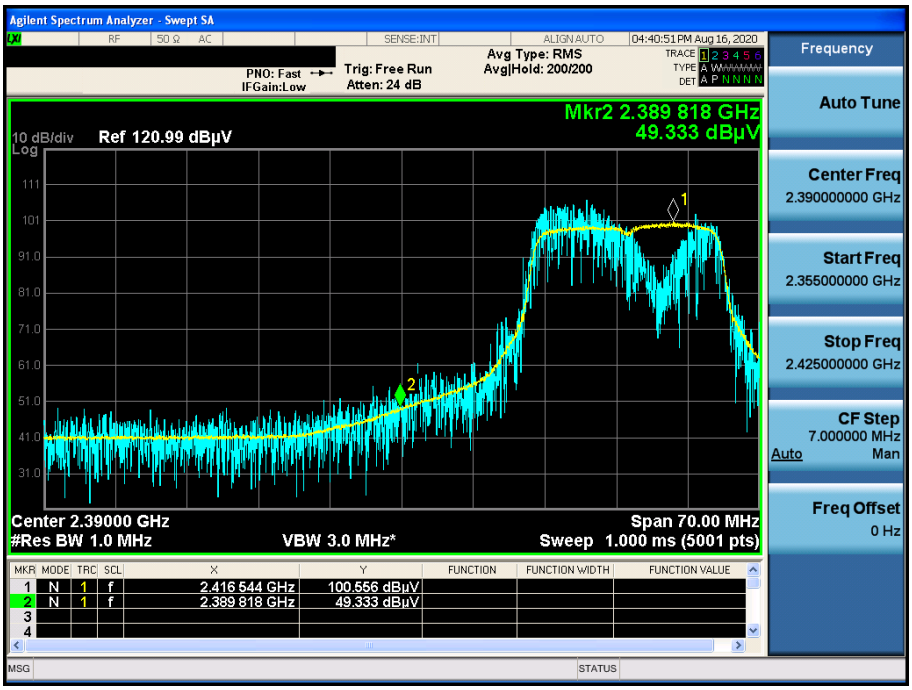
TM 2 & 2 462 & X axis & Ver **Detector Mode : AV**



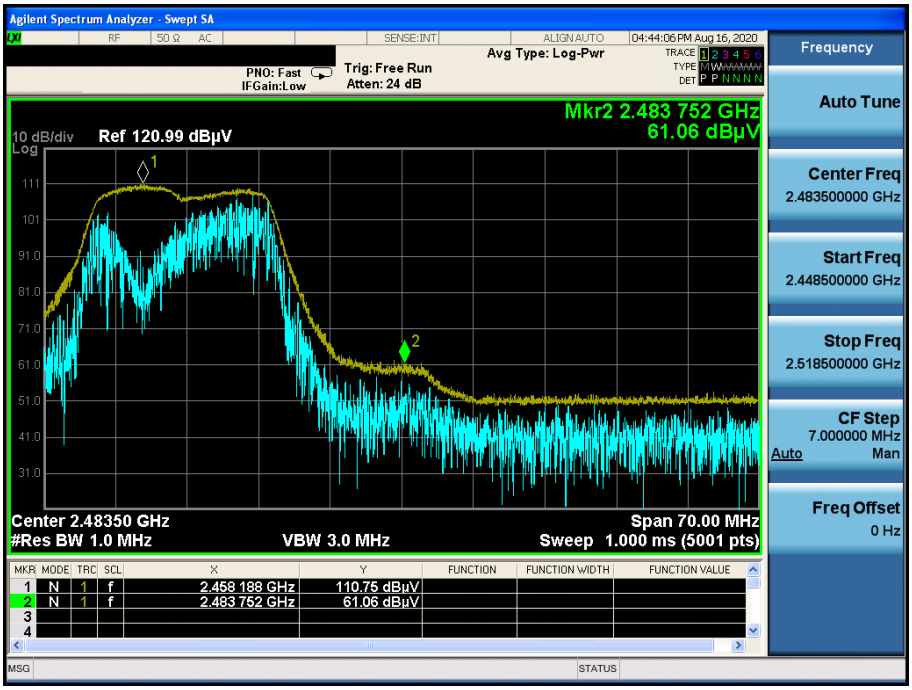
TM 3 & 2 412 & X axis & Ver **Detector Mode : PK**



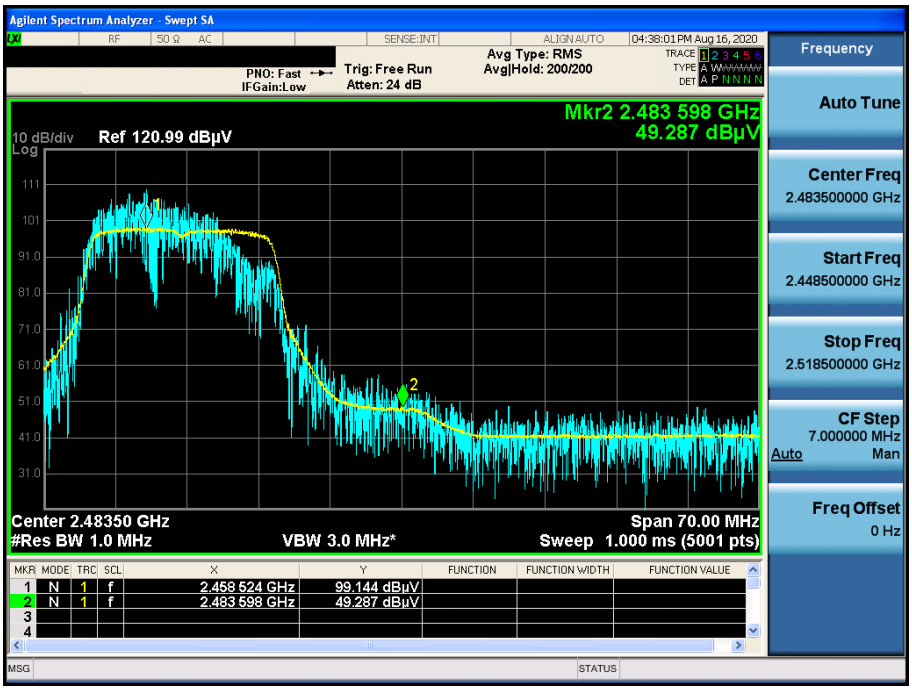
TM 3 & 2 412 & X axis & Ver **Detector Mode : AV**



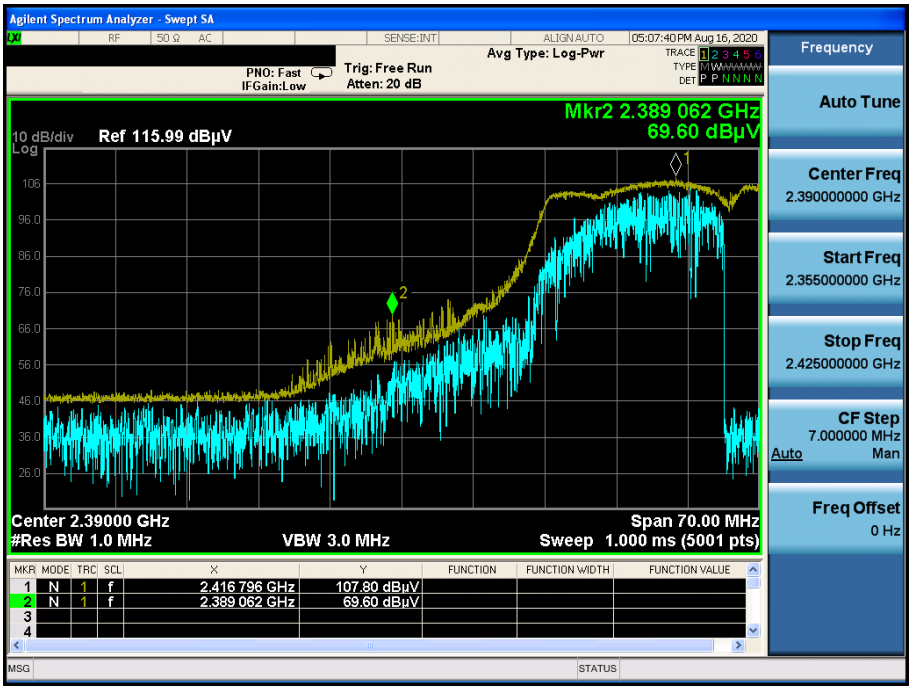
TM 3 & 2 462 & X axis & Ver **Detector Mode : PK**



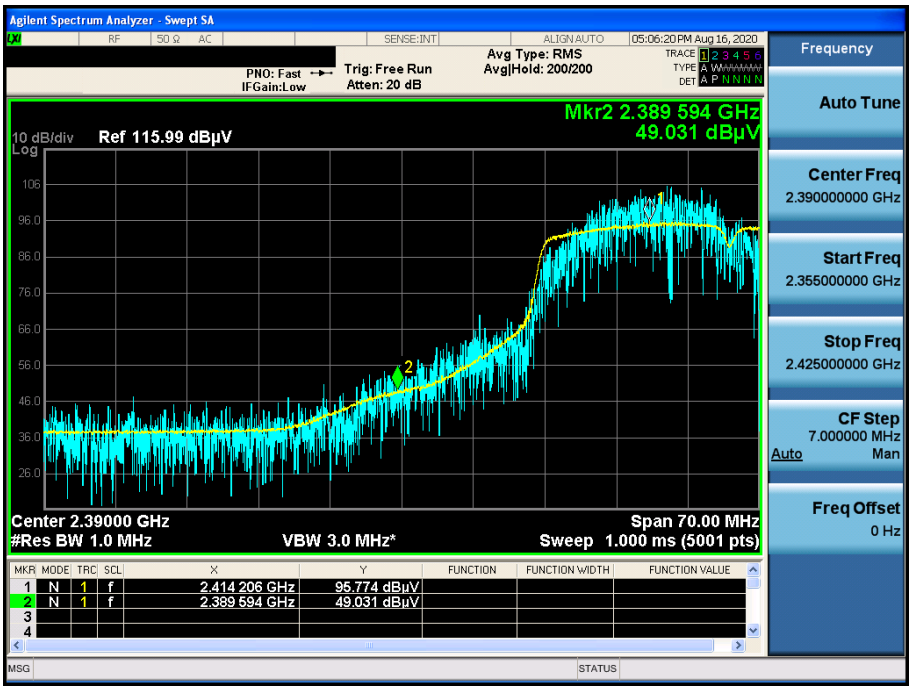
TM 3 & 2 462 & X axis & Ver **Detector Mode : AV**



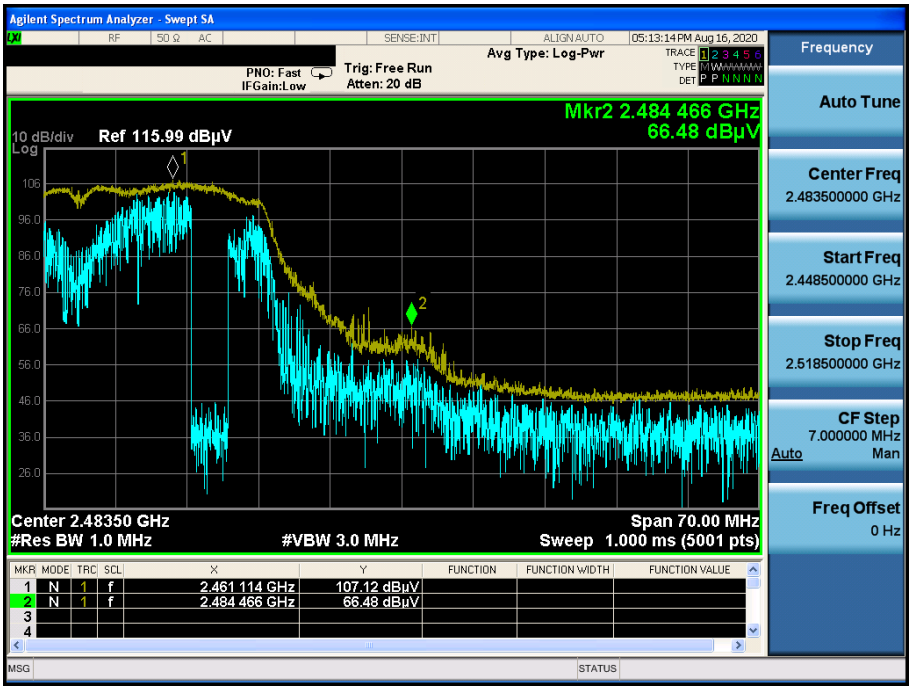
TM 4 & 2 422 & X axis & Ver **Detector Mode : PK**



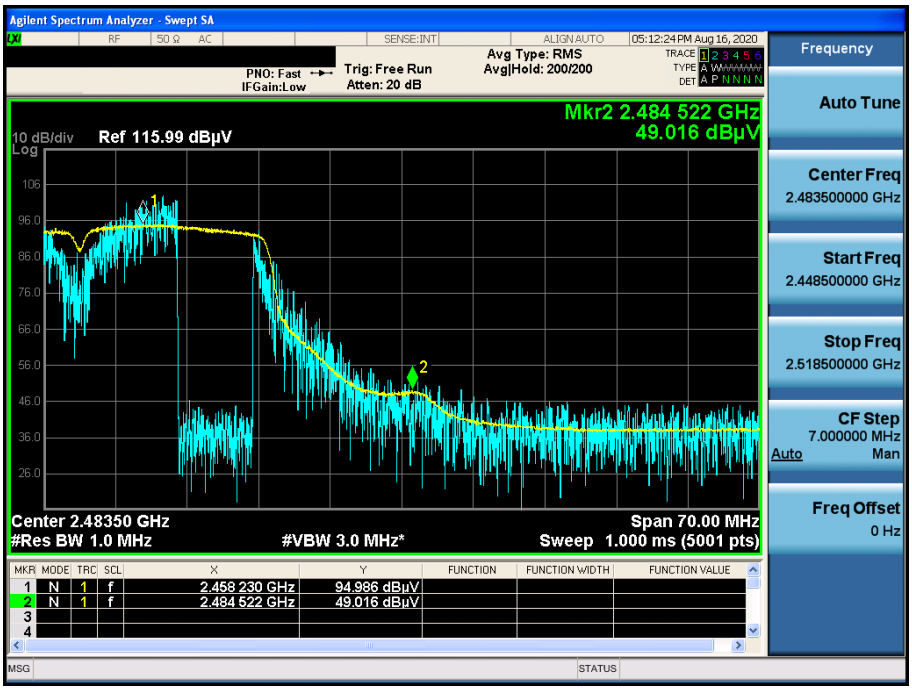
TM 4 & 2 422 & X axis & Ver **Detector Mode : AV**



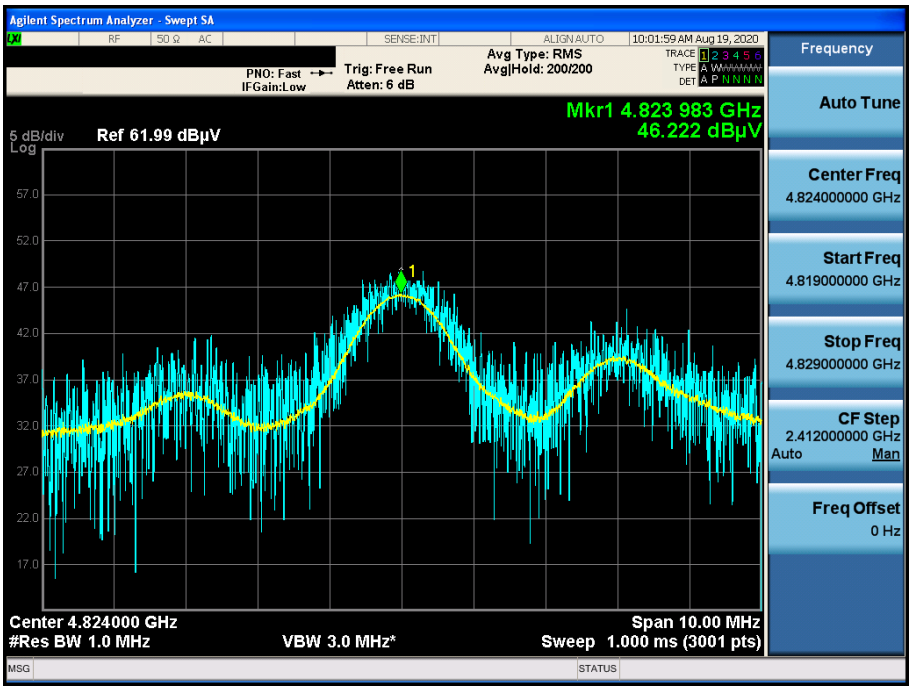
TM 4 & 2 452 & X axis & Ver **Detector Mode : PK**



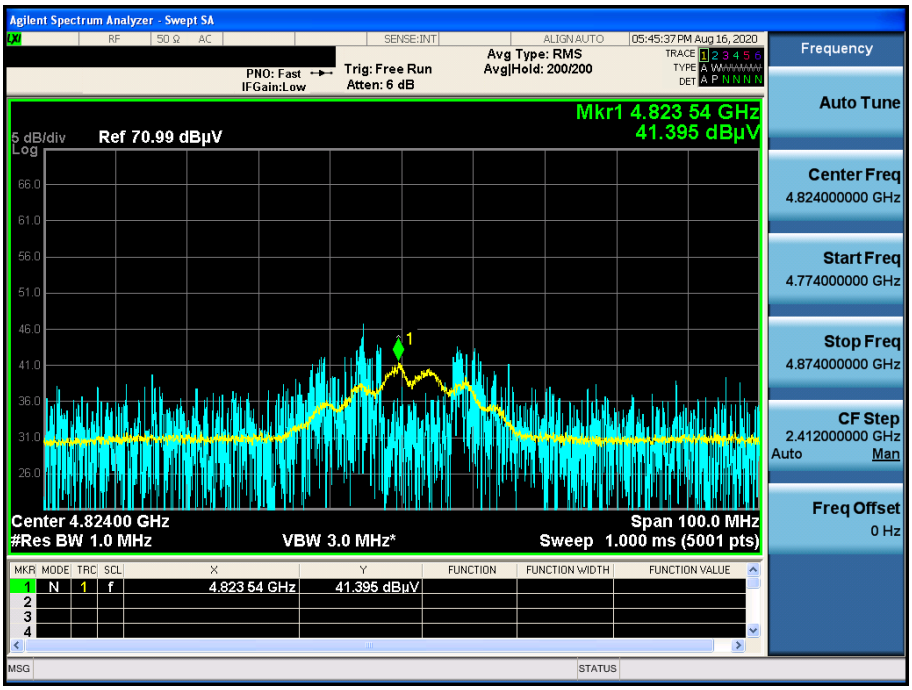
TM 4 & 2 452 & X axis & Ver **Detector Mode : AV**



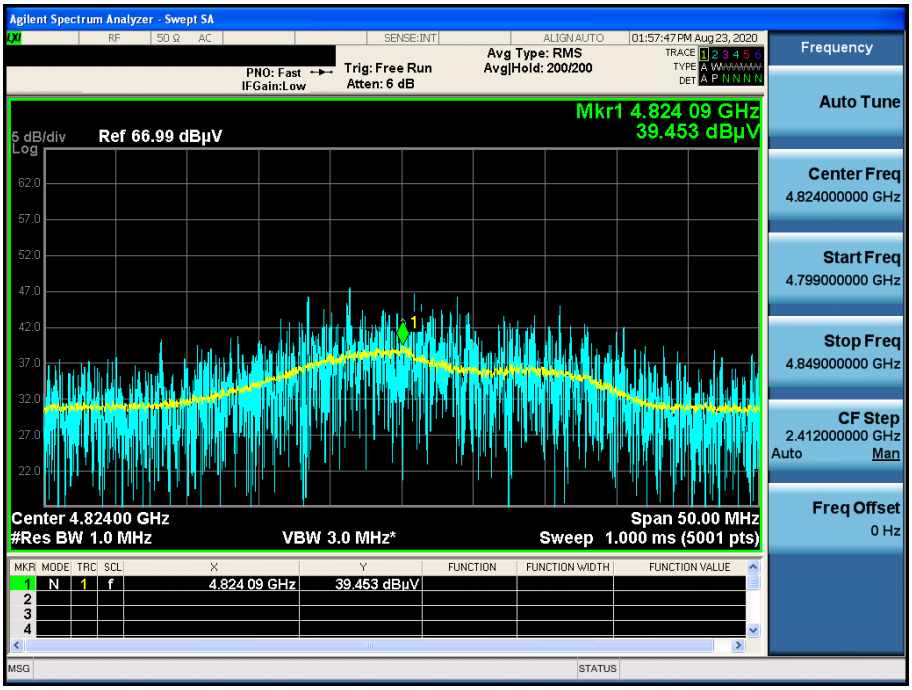
TM 1 & 2 412 & X axis & Ver **Detector Mode : AV**



TM 2 & 2 412 & X axis & Ver **Detector Mode : AV**



TM 3 & 2 412 & X axis & Ver **Detector Mode : AV**



TM 4 & 2 422 & X axis & Ver **Detector Mode : AV**