



FCC CFR47 PART 15 SUBPART C

DTS Wireless LAN(802.11ax)

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, ANT+, NFC and WPT

MODEL NUMBER : SM-N970F/DS, SM-N970F, SM-N970X

FCC ID: A3LSMN970F

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TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	06/28/19	Initial issue	Seokhwan Hong
V2	07/01/19	Updated to address TCB's question	Seokhwan Hong

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, ANT+, NFC and WPT

MODEL NUMBER: SM-N970F/DS, SM-N970F, SM-N970X

SERIAL NUMBER: R38M6037DNE, R38M60378FH (CONDUCTED)
R38M502Q83H, R38M603796L, R38M6037CGW,
R38M6037F5L (RADIATED);

DATE TESTED: MAY 23, 2019 – JUN 28, 2019;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

Tested By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Seokhwan Hong
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 DTS Meas Guidance v05r02.
4. ANSI C63.10-2013.
5. KDB 662911 D01 v02r01

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Chamber 1
☒ Chamber 2
☒ Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.86 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.97 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.57 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, ANT+, NFC and WPT. This test report addresses the DTS (WLAN) operational mode.

This report covers the Samsung models SM-N970F/DS, SM-N970F and SM-N970X. These models are identical in hardware except SM-N970F has single SIM tray and model SM-N970X has been disabled all cellular bands by software. With some pre-scan, model SM-N970F/DS was set for final test.

WiFi Operating mode

Frequency Range	Mode	Antenna1	Antenna2
2.4GHz	802.11 b	TX/RX	TX/RX
	802.11 g	TX/RX	TX/RX
	802.11 g MIMO	TX/RX	TX/RX
	802.11 n	TX/RX	TX/RX
	802.11 n MIMO	TX/RX	TX/RX
	802.11 ax	TX/RX	TX/RX
	802.11 ax MIMO	TX/RX	TX/RX
5GHz	802.11 a	TX/RX	TX/RX
	802.11 a MIMO	TX/RX	TX/RX
	802.11 n	TX/RX	TX/RX
	802.11 n MIMO	TX/RX	TX/RX
	802.11 ac	TX/RX	TX/RX
	802.11 ac MIMO	TX/RX	TX/RX
	802.11 ax	TX/RX	TX/RX
	802.11 ax MIMO	TX/RX	TX/RX

Simultaneous TX Condition

Simultaneous Tx condition - **RSDB**

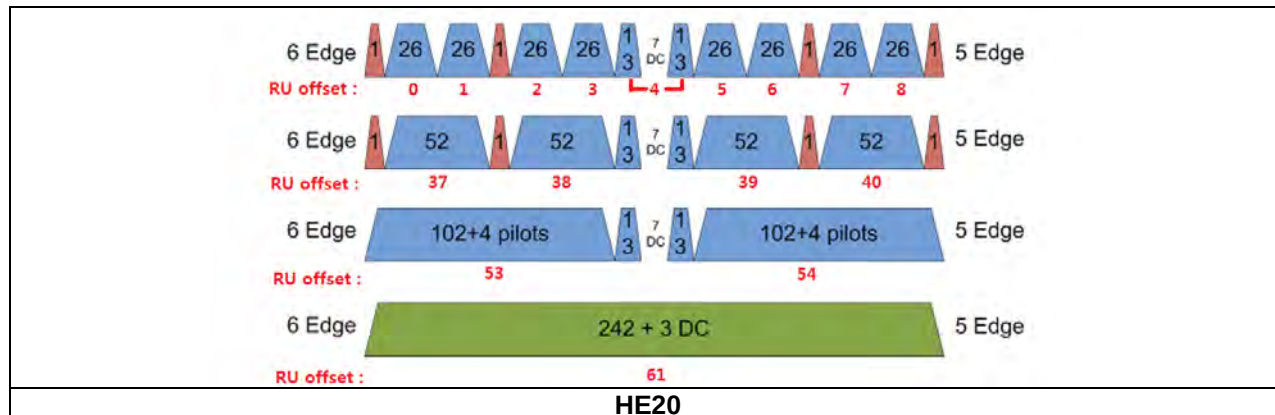
Mode	# of TX	5GHz		2.4GHz		Test Case
		Ant1	Ant2	Ant1	Ant2	
2.4GHz + 5GHz RSDB Only	2	A	-	-	B	V
	2	-	A	B	-	V
	2	A	-	B	-	-
	2	-	A	-	B	-
2.4GHz + 5GHz RSDB & MIMO	3	A	A	B	-	-
	3	A	A	-	B	-
	3	A	-	B	B	-
	3	-	A	B	B	-
2.4GHz + 5GHz RSDB MIMO	4	A	A	B	B	V

Simultaneous Tx condition - **Bluetooth with 5 GHz WLAN(not RSDB)**

Mode	# of TX	5GHz WLAN		2.4GHz Bluetooth	Test Case
		Ant1	Ant2	Ant1	
2.4GHz Bluetooth +5GHz WLAN (Not RSDB)	2	A	-	B	-
	2	-	A	B	-
	3	A		B	V

Spurious Emissions for Simultaneous Transmission were reported on the UNII 802.11ax test report(4789014604-E9) section 11.9.

802.11ax RU allocations



Test RU offset for tones

Mode	Tones number in RU	RU offset
HE20	26T	0
		4
		8
	52T	37
		38
		40
	106T	53
		54
	242T / SU ^{Note 1}	61 / -

Note 1: Full RU(Resource Unit) 242T mode and SU(Single Unit) mode have no difference in physical waveform. This report has been reported the SU mode with highest output power in SISO and the SU mode with highest output power in MIMO.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Frequency Range [MHz]	Mode	Output Power [dBm]		Output Power [mW]	
		Antenna1	Antenna2	Antenna1	Antenna2
2412 - 2472	802.11ax HE20 SISO	16.63	16.68	46.03	46.56
	802.11ax HE20 MIMO	16.70		46.77	

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antennas, with antenna1's maximum gain of -5.2 dBi and antenna2's maximum gain of -5.6 dBi .

WIFI1 and WIFI2 as indicated in antenna specification are written as ANT1 (Antenna 1) and ANT2 (Antenna 2) in this report

5.4. LIST OF TEST REDUCTION AND MODES

The output power on covered modes is equal to or less than one referenced.

Frequency Range (MHz)	Mode	Covered by
2412 - 2472	802.11ax HE20 RU 242T mode 1TX	802.11ax HE20 SU mode 1TX
	802.11ax HE20 RU 242T mode 2TX	802.11ax HE20 SU mode 2TX CDD

5.5. TESTED CHANNELS LIST

RU mode (for partial)	CHANNEL	Frequency (MHz)
LOW	1	2412
MID	6	2437
HIGH	11	2462
REDUCTION HIGH 1	12	2467
REDUCTION HIGH 2	13	2472

SU and 242T mode	CHANNEL	Frequency (MHz)
REDUCTION LOW	1	2412
LOW	2	2417
MID	6	2437
HIGH	10	2457
REDUCTION HIGH 1	11	2462
REDUCTION HIGH 2	12	2467
REDUCTION HIGH 3	13	2472

5.6. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

For SISO (ANT1), the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

For SISO (ANT2), the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

For MIMO, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

Based on the baseline scan, the worst-case data rates were:

802.11ax HE20 mode: MCS0 (1TX, SISO)

802.11ax HE20 mode: MCS0 (2TX CDD, MIMO)

Note : All radiated and power line conducted tests were performed attached with travel adapter for the worst case condition mode.

Worst-case selection criteria for test items :

For the radiated band-edge test, it was tested at RU allocations adjacent to band-edge for each RU Tones.

For the spurious emissions, it was tested at the RU allocation with actual highest power and RU allocation with actual highest PSD for channel.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37M5DL3FL1SE3	N/A
Data Cable	SAMSUNG	EP-DG977	N/A	N/A

I/O CABLE

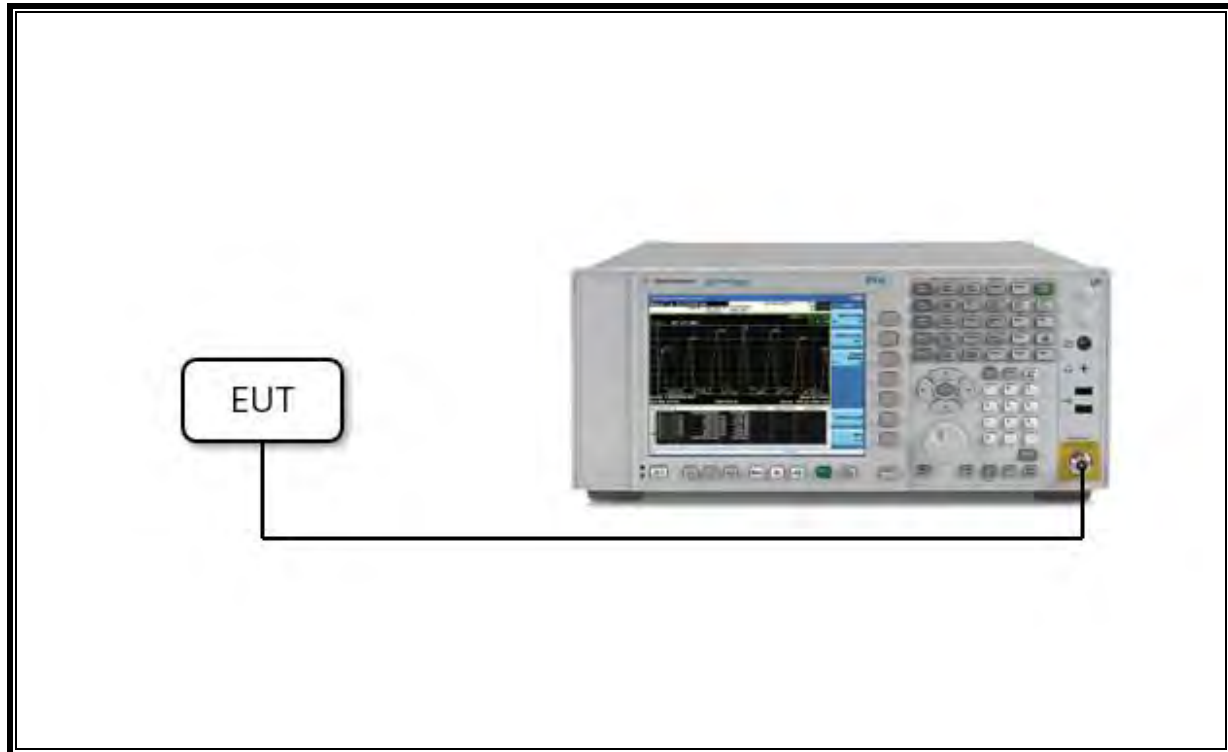
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0m	N/A

TEST SETUP

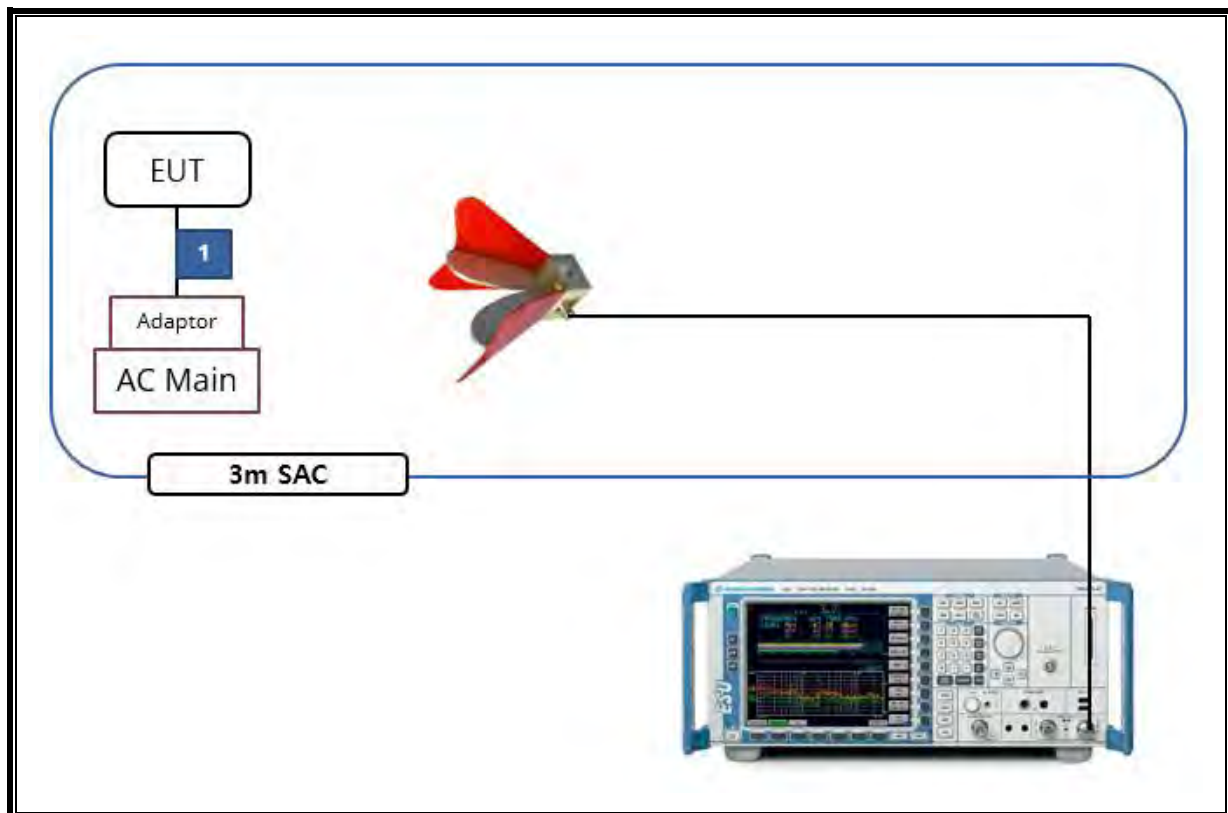
The EUT is a stand-alone unit during the tests.
Test software in hidden menu exercised the EUT to enable DTS mode.

This EUT is able to equipped with S-pen on the inside. Spot check were performed both inserted and removed condition. Because there is no deviation between the two data, all tests were performed under equipped with the S-pen.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	New Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-14-20
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-09-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-19
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	08-06-19
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-07-19
Attenuator	PASTERNAK	PE7087-10	A001	08-08-19
Attenuator	PASTERNAK	PE7087-10	A008	08-08-19
Attenuator	PASTERNAK	PE7004-10	2	08-07-19
Attenuator	PASTERNAK	PE7087-10	A009	08-08-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-06-19
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-06-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-06-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-06-19
LISN	R&S	ENV-216	101837	08-09-19
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

7. REFERENCE MEASUREMENT RESULTS

7.1. ON TIME AND DUTY CYCLE RESULTS

Mode		ANT	Tone	On Time [mS]	Period [mS]	Duty Cycle X [linear]	Duty Cycle X [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
802.11ax	HE20	Single	26T	4.774	4.818	0.99	99.09	0.04	0.010
			52T	5.149	5.192	0.99	99.17	0.04	0.010
			106T	4.130	4.174	0.99	98.95	0.05	0.010
			242T	3.095	3.137	0.99	98.66	0.06	0.010
			SU	5.205	5.306	0.98	98.10	0.08	0.010
		ALL	26T	5.156	5.201	0.99	99.13	0.04	0.010
			52T	5.386	5.430	0.99	99.19	0.04	0.010
			106T	2.107	2.148	0.98	98.09	0.08	0.010
			242T	5.617	5.660	0.99	99.24	0.03	0.010
			SU	5.295	5.395	0.98	98.15	0.08	0.010

LIMITS

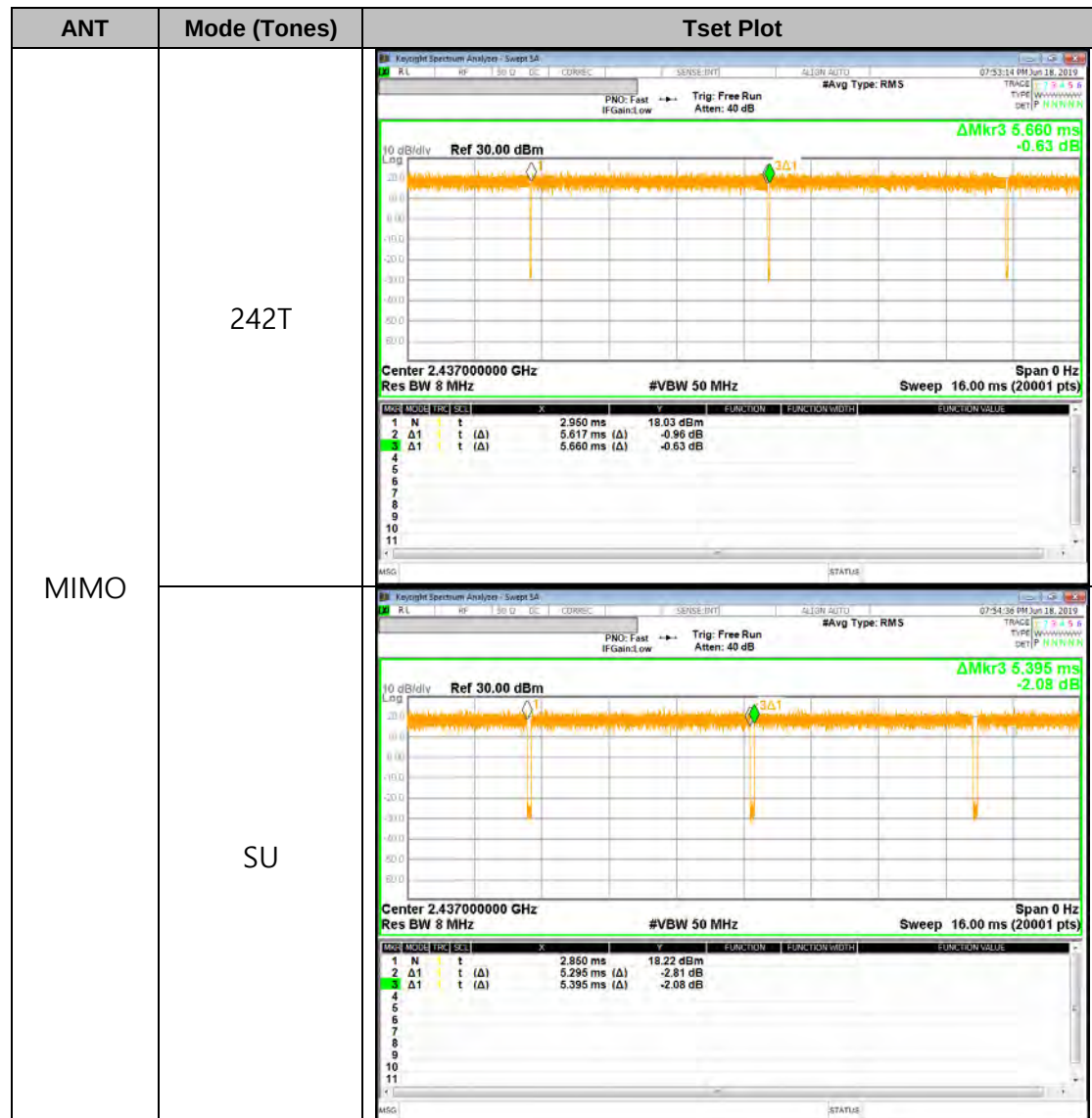
None; for reporting purposes only.

7.1.1. ON TIME AND DUTY CYCLE PLOT









8. MEASUREMENT METHODS

6 dB BW : KDB 558074 D01 v05r02, Section 8.2

OUTPUT POWER : KDB 558074 D01 v05r02, Section 8.3.2.3.

POWER SPECTRAL DENSITY : KDB 558074 D01 v05r02, Section 8.4.

Out-of-band EMISSIONS (Conducted) : KDB 558074 D01 v05r02, Section 8.5.

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: KDB 558074 D01 v05r02, Section 8.5.

Out-of-band EMISSIONS IN RESTRICTED BANDS KDB 558074 D01 v05r02, Section 8.6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.

9. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Band width (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-30dBc		Pass
15.247 (b)(3)	TX conducted output power	<30dBm		Pass
15.247 (e)	PSD	<8dBm		Pass
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

Reference to KDB 558074 D01 15.247 Meas Guidance: The transmitter output is connected to a spectrum analyzer with the RBW set to 100KHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

RESULTS

10.1.1. 802.11ax HE20 MODE IN THE 2.4 GHz BAND

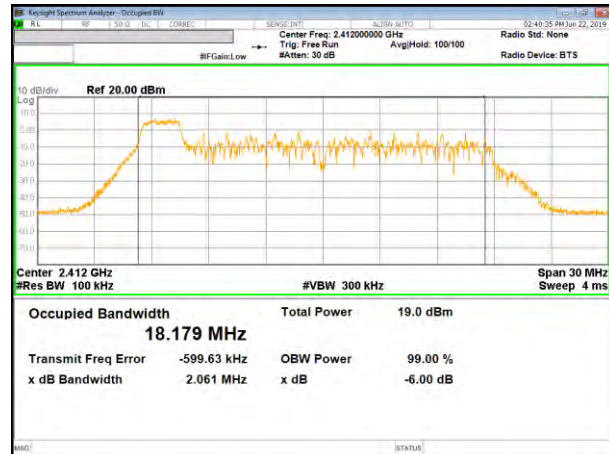
Channel	Center Freq.(MHz)	Tones	RU offset	6 dB BW (MHz)		Minimum Limit (MHz)
				ANT1	ANT2	
1	2412	26T	0	2.034	2.061	0.5
6	2437	26T	0	2.054	2.061	0.5
11	2462	26T	0	2.065	2.058	0.5
12	2467	26T	0	2.029	2.084	0.5
13	2472	26T	0	2.051	2.048	0.5
Mnimum 6dB BW (MHz)				2.029	2.048	0.5

10.1.2. 6 dB BANDWIDTH PLOTS



1TX_ANT 2_26T_ORU

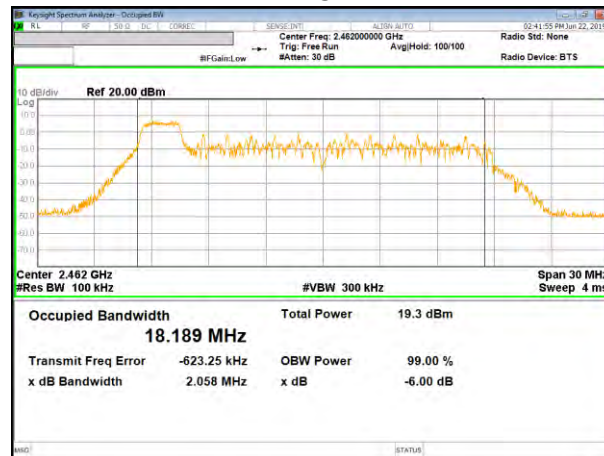
1 CH



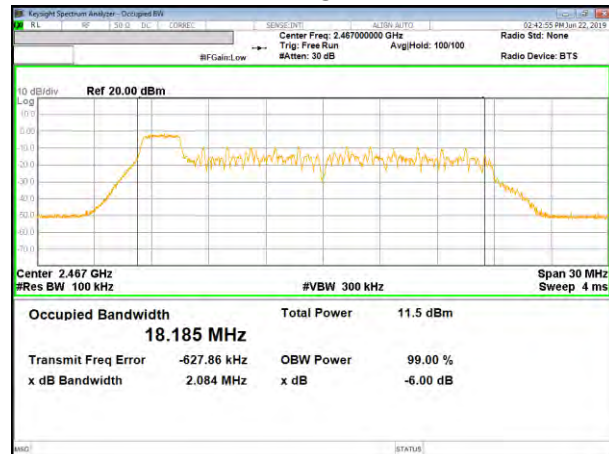
6 CH



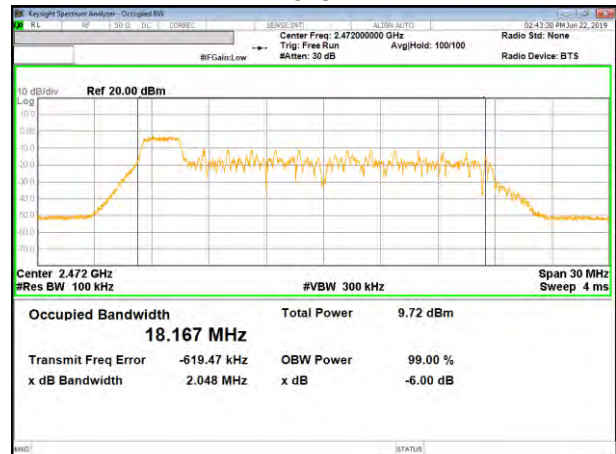
11 CH



12 CH



13 CH



10.2. OUTPUT POWER

LIMITS

FCC §15.247

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

Output power measurement was performed utilizing the 8.3.2.3 under KDB558074 D01 15.247 Meas Guidance.

Duty cycle correction factor is already added to the average output power results for duty cycle factor < 98%.

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains.
The directional gain is:

2.4GHz

Frequency	Antenna1	Antenna2	Correlated Chains
Band	Gain	Gain	Directional
[MHz]	[dBi]	[dBi]	Gain
2400 ~ 2483.5	-5.20	-5.60	-2.39

RESULTS

10.2.1. 802.11ax HE20 SISO MODE IN THE 2.4 GHz BAND

Limits

Frequency Range [MHz]	Directional Gain ANTENNA1 [dBi]	Directional Gain ANTENNA2 [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
2412 - 2472	-5.20	-5.60	30.00	30

Included in Calculations of Corr'd Power				
Duty Cycle CF [dB]	HE20	26T	0.00	dB
		52T	0.00	dB
		106T	0.00	dB
		SU	0.00	dB

Calculation of Output Power result

Corr'd Power [dBm] = Meas Power [dBm] + Duty CF [dB]

Output Power Results

Channel	Frequency [MHz]	Tones	RU offset	Antenna 1 Meas Power [dBm]	Antenna 2 Meas Power [dBm]	Antenna 1 Corr'd Power [dBm]	Antenna 2 Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
1	2412	26T	0	10.14	10.43	10.14	10.43	30.00	-19.57
			4	10.97	10.97	10.97	10.97	30.00	-19.03
			8	10.96	10.48	10.96	10.48	30.00	-19.04
		52T	37	11.24	11.52	11.24	11.52	30.00	-18.48
			38	11.74	10.95	11.74	10.95	30.00	-18.26
			40	11.88	11.43	11.88	11.43	30.00	-18.12
		106T	53	14.56	14.50	14.56	14.50	30.00	-15.44
			54	14.14	14.50	14.14	14.50	30.00	-15.50
		SU	-	14.84	14.55	14.84	14.55	30.00	-15.16
2	2417	26T	0	10.61	10.04	10.61	10.04	30.00	-19.39
			4	10.28	10.93	10.28	10.93	30.00	-19.07
			8	10.41	10.91	10.41	10.91	30.00	-19.09
		52T	37	10.84	11.20	10.84	11.20	30.00	-18.80
			38	11.43	11.66	11.43	11.66	30.00	-18.34
			40	11.95	11.67	11.95	11.67	30.00	-18.05
		106T	53	14.03	14.29	14.03	14.29	30.00	-15.71
			54	14.84	14.62	14.84	14.62	30.00	-15.16
		SU	-	16.62	16.50	16.62	16.50	30.00	-13.38
6	2437	26T	0	10.33	10.41	10.33	10.41	30.00	-19.59
			4	10.39	10.73	10.39	10.73	30.00	-19.27
			8	9.96	10.70	9.96	10.70	30.00	-19.30
		52T	37	11.54	11.71	11.54	11.71	30.00	-18.29
			38	10.96	11.61	10.96	11.61	30.00	-18.39
			40	10.83	11.59	10.83	11.59	30.00	-18.41
		106T	53	14.73	14.53	14.73	14.53	30.00	-15.27
			54	14.24	14.41	14.24	14.41	30.00	-15.59
		SU	-	16.63	16.63	16.63	16.63	30.00	-13.37
10	2437	26T	0	9.75	10.42	9.75	10.42	30.00	-19.58
			4	9.97	10.50	9.97	10.50	30.00	-19.50
			8	10.74	10.63	10.74	10.63	30.00	-19.26
		52T	37	11.04	11.67	11.04	11.67	30.00	-18.33
			38	11.60	11.41	11.60	11.41	30.00	-18.40
			40	11.80	11.88	11.80	11.88	30.00	-18.12
		106T	53	14.10	14.41	14.10	14.41	30.00	-15.59
			54	14.74	14.56	14.74	14.56	30.00	-15.26
		SU	-	16.54	16.68	16.54	16.68	30.00	-13.32

Channel	Frequency [MHz]	Tones	RU offset	Antenna 1 Meas Power [dBm]	Antenna 2 Meas Power [dBm]	Antenna 1 Corr'd Power [dBm]	Antenna 2 Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
11	2462	26T	0	10.07	10.56	10.07	10.56	30.00	-19.44
			4	10.80	10.64	10.80	10.64	30.00	-19.20
			8	10.35	10.71	10.35	10.71	30.00	-19.29
		52T	37	10.91	11.64	10.91	11.64	30.00	-18.36
			38	11.69	11.16	11.69	11.16	30.00	-18.31
			40	11.60	11.72	11.60	11.72	30.00	-18.28
		106T	53	14.25	14.90	14.25	14.90	30.00	-15.10
			54	14.51	14.79	14.51	14.79	30.00	-15.21
		SU	-	14.29	14.85	14.29	14.85	30.00	-15.15
12	2467	26T	0	2.85	2.68	2.85	2.68	30.00	-27.15
			4	3.21	3.46	3.21	3.46	30.00	-26.54
			8	2.24	2.32	2.24	2.32	30.00	-27.68
		52T	37	2.90	2.87	2.90	2.87	30.00	-27.10
			38	2.64	3.48	2.64	3.48	30.00	-26.52
			40	2.55	2.59	2.55	2.59	30.00	-27.41
		106T	53	3.09	3.09	3.09	3.09	30.00	-26.91
			54	3.04	2.98	3.04	2.98	30.00	-26.96
		SU	-	3.14	3.10	3.14	3.10	30.00	-26.86
13	2472	26T	0	0.77	1.04	0.77	1.04	30.00	-28.96
			4	1.26	0.97	1.26	0.97	30.00	-28.74
			8	0.18	1.37	0.18	1.37	30.00	-28.63
		52T	37	0.92	1.19	0.92	1.19	30.00	-28.81
			38	1.27	1.18	1.27	1.18	30.00	-28.73
			40	0.02	1.32	0.02	1.32	30.00	-28.68
		106T	53	1.07	0.70	1.07	0.70	30.00	-28.93
			54	0.74	1.35	0.74	1.35	30.00	-28.65
		SU	-	1.07	1.35	1.07	1.35	30.00	-28.65

10.2.2. 802.11ax HE20 MIMO MODE IN THE 2.4 GHZ BAND

Limits

Frequency Range [MHz]	Correlated Chains Directional Gain [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
2412 - 2472	-2.39	30.00	30

Included in Calculations of Corr'd Power				
Duty Cycle CF [dB]	HE20	26T	0.00	dB
		52T	0.00	dB
		106T	0.00	dB
		SU	0.00	dB

Calculation of Output Power result

Sum PW
= Ant1_Meas Power [mW] + Ant1_Meas Power [mW]
Total Corr'd Power [dBm]
= Sum PW [dBm] + Duty CF [dB]

Output Power Results

Channel	Frequency [MHz]	Tones	RU offset	Antenna 1 Meas Power [dBm]	Antenna 2 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
1	2412	26T	0	7.25	7.25	10.26	30.00	-19.74
			4	7.70	7.80	10.76	30.00	-19.24
			8	7.99	7.12	10.59	30.00	-19.41
		52T	37	8.45	8.63	11.55	30.00	-18.45
			38	8.81	8.61	11.72	30.00	-18.28
			40	8.92	8.14	11.56	30.00	-18.44
		106T	53	10.97	11.23	14.11	30.00	-15.89
			54	11.40	11.21	14.32	30.00	-15.68
		SU	-	11.50	11.40	14.46	30.00	-15.54
2	2417	26T	0	6.51	6.84	9.69	30.00	-20.31
			4	7.90	7.59	10.76	30.00	-19.24
			8	7.82	7.50	10.67	30.00	-19.33
		52T	37	7.80	8.00	10.91	30.00	-19.09
			38	8.26	8.23	11.26	30.00	-18.74
			40	8.93	8.45	11.71	30.00	-18.29
		106T	53	10.63	10.73	13.69	30.00	-16.31
			54	11.43	11.36	14.41	30.00	-15.59
		SU	-	12.97	12.75	15.87	30.00	-14.13
6	2437	26T	0	7.65	7.25	10.46	30.00	-19.54
			4	7.34	7.46	10.41	30.00	-19.59
			8	7.10	7.30	10.21	30.00	-19.79
		52T	37	8.39	8.73	11.57	30.00	-18.43
			38	8.23	8.18	11.22	30.00	-18.78
			40	7.20	7.45	10.34	30.00	-19.66
		106T	53	11.25	11.26	14.27	30.00	-15.73
			54	10.98	11.18	14.09	30.00	-15.91
		SU	-	13.79	13.58	16.70	30.00	-13.30
10	2437	26T	0	6.64	7.57	10.14	30.00	-19.86
			4	6.82	7.58	10.23	30.00	-19.77
			8	7.31	7.31	10.32	30.00	-19.68
		52T	37	7.69	8.63	11.20	30.00	-18.80
			38	8.21	8.84	11.55	30.00	-18.45
			40	8.48	8.77	11.64	30.00	-18.36
		106T	53	10.65	11.65	14.19	30.00	-15.81
			54	11.22	11.40	14.32	30.00	-15.68
		SU	-	12.93	12.95	15.92	30.00	-14.08

Channel	Frequency [MHz]	Tones	RU offset	Antenna 1 Meas Power [dBm]	Antenna 2 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
11	2462	26T	0	7.20	7.76	10.50	30.00	-19.50
			4	7.15	7.46	10.32	30.00	-19.68
			8	7.04	7.22	10.14	30.00	-19.86
		52T	37	7.57	8.35	10.99	30.00	-19.01
			38	7.70	8.16	10.95	30.00	-19.05
			40	8.45	8.85	11.66	30.00	-18.34
		106T	53	10.68	11.36	14.04	30.00	-15.96
			54	11.10	11.30	14.21	30.00	-15.79
		SU	-	11.31	11.87	14.61	30.00	-15.39
12	2467	26T	0	-0.45	0.13	2.86	30.00	-27.14
			4	-0.87	-0.11	2.54	30.00	-27.46
			8	-0.90	-0.60	2.26	30.00	-27.74
		52T	37	-0.65	0.26	2.84	30.00	-27.16
			38	-1.09	-0.28	2.34	30.00	-27.66
			40	-0.55	-0.32	2.58	30.00	-27.42
		106T	53	-0.08	0.46	3.21	30.00	-26.79
			54	-0.17	0.33	3.10	30.00	-26.90
		SU	-	-1.10	-0.30	2.33	30.00	-27.67
13	2472	26T	0	-2.18	-2.07	0.24	30.00	-29.76
			4	-2.55	-2.53	1.13	30.00	-28.87
			8	-2.84	-2.70	0.32	30.00	-29.68
		52T	37	-2.04	-1.73	0.02	30.00	-29.98
			38	-3.17	-2.25	0.34	30.00	-29.66
			40	-3.28	-2.71	0.01	30.00	-29.99
		106T	53	-2.70	-2.65	0.71	30.00	-29.29
			54	-3.20	-2.81	1.02	30.00	-28.98
		SU	-	-2.11	-1.87	1.02	30.00	-28.98

10.3. PSD

LIMITS

FCC §15.247

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Power Spectral Density was performed utilizing the section 8.4 under KDB558074 D01 15.247 Meas Guidance.

RESULTS

10.3.1. 802.11ax HE20 SISO MODE IN THE 2.4 GHz BAND

Calculation of PPSD result

- Corr'd PPSD [dBm] = Meas PPSD [dBm] + Duty Cycle CF [dB] + Corr'd factor [dB]

Included in Calculations of Corr'd PPSD				
Duty Cycle CF [dB]	HE20	26T	0.04	dB
		52T	0.04	dB
		106T	0.05	dB
		SU	0.08	dB

Actual RBW	Ref. Bandwidth	Corr'd factor
100 kHz	3 kHz	-15.23 dB

PPSD Results

Channel	Frequency [MHz]	Tones	RU offset	Antenna 1 Meas PPSD [dBm]	Antenna 2 Meas PPSD [dBm]	Antenna 1 Corr'd PPSD [dBm]	Antenna 2 Corr'd PPSD [dBm]	PSD Limit [dBm]	Power Margin [dB]
1	2412	26T	0	-2.33	-2.19	-17.52	-17.38	11.00	-28.38
			4	-1.32	-1.30	-16.51	-16.49	11.00	-27.49
			8	-1.53	-2.06	-16.72	-17.25	11.00	-27.72
		52T	37	-4.26	-3.90	-19.45	-19.09	11.00	-30.09
			38	-4.13	-3.04	-19.32	-18.23	11.00	-29.23
			40	-3.51	-3.67	-18.70	-18.86	11.00	-29.70
		106T	53	-3.91	-3.82	-19.09	-19.00	11.00	-30.00
			54	-3.70	-3.82	-18.88	-19.00	11.00	-29.88
		SU	-	-7.34	-7.34	-22.49	-22.51	11.00	-33.49
2	2417	SU	-	-5.30	-5.41	-20.47	-20.58	11.00	-31.47
6	2437	26T	0	-2.03	-2.24	-17.48	-16.77	11.00	-27.77
			4	-1.97	-2.09	-17.98	-17.33	11.00	-28.33
			8	-2.75	-2.89	-19.95	-19.11	11.00	-30.11
		52T	37	-3.55	-3.22	-19.18	-18.77	11.00	-29.77
			38	-4.35	-3.98	-18.77	-18.79	11.00	-29.77
			40	-4.31	-3.47	-19.23	-19.28	11.00	-30.23
		106T	53	-3.64	-3.74	-18.77	-19.10	11.00	-29.77
			54	-4.03	-3.77	-15.18	-15.18	11.00	-26.18
		SU	-	-5.19	-5.00	-20.47	-17.43	11.00	-28.43
10	2457	SU	-	-5.36	-4.99	-20.36	-20.17	11.00	-31.17
11	2462	26T	0	-2.87	-2.07	-18.06	-17.26	11.00	-28.26
			4	-1.33	-1.15	-16.52	-16.34	11.00	-27.34
			8	-2.43	-1.83	-17.62	-17.02	11.00	-28.02
		52T	37	-4.31	-3.73	-19.50	-18.92	11.00	-29.92
			38	-3.81	-3.34	-19.00	-18.53	11.00	-29.53
			40	-4.23	-3.75	-19.42	-18.94	11.00	-29.94
		106T	53	-4.18	-3.68	-19.36	-18.86	11.00	-29.86
			54	-3.81	-3.59	-18.99	-18.77	11.00	-29.77
		SU	-	-7.39	-6.88	-22.54	-22.05	11.00	-33.05

10.3.2. 802.11ax HE20 MIMO MODE IN THE 2.4 GHz BAND

Calculation of PPSD result

- Sum Power [mW] = Ant1_Meas Power [mW] + Ant2_Meas Power [mW]
- Total Corr'd Power [dBm] = Sum Power [dBm] + Duty Cycle CF [dB] + Corr'd factor [dB]

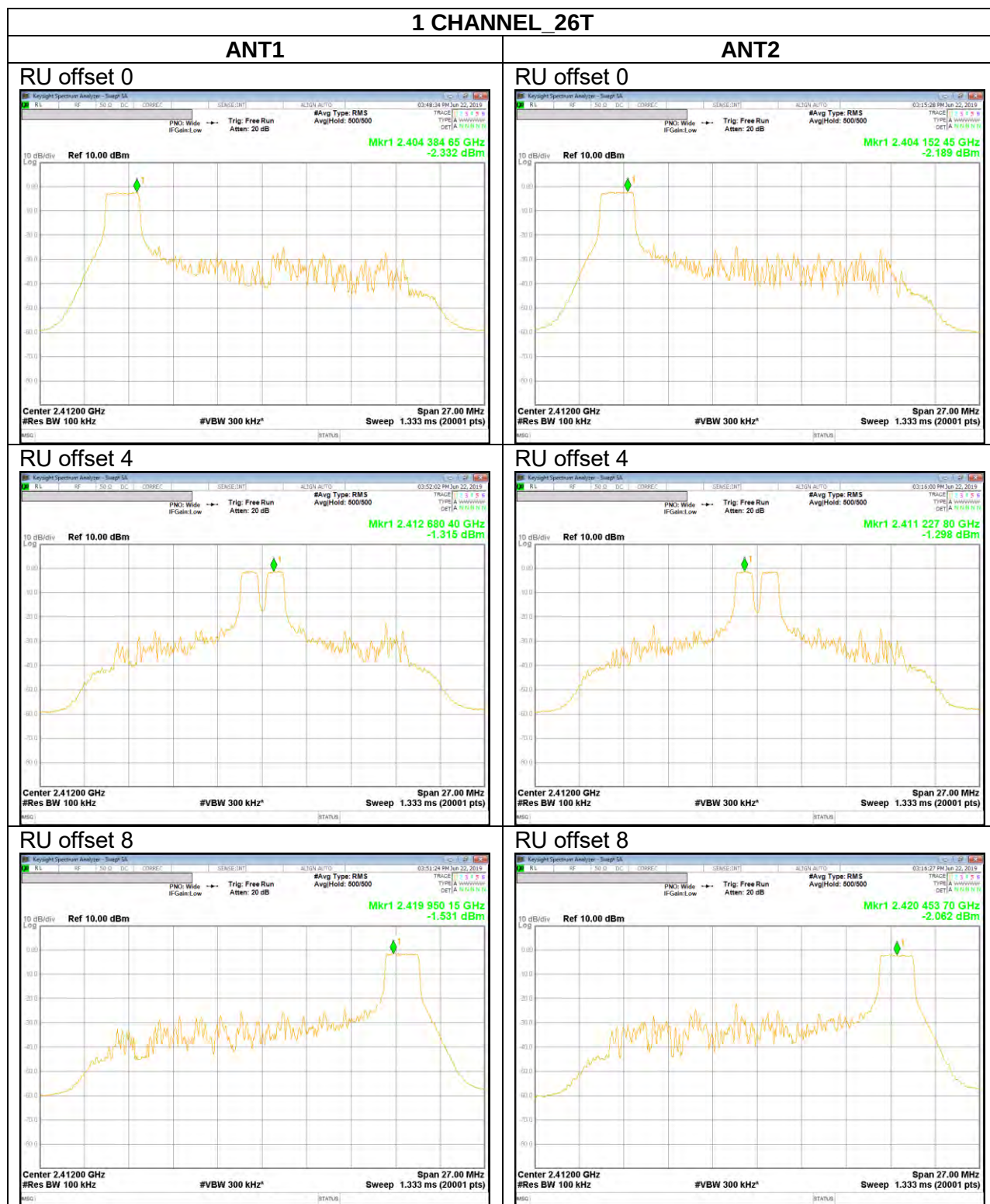
Included in Calculations of Corr'd PPSD				
Duty Cycle CF [dB]	HE20	26T	0.04	dB
		52T	0.04	dB
		106T	0.08	dB
		SU	0.08	dB

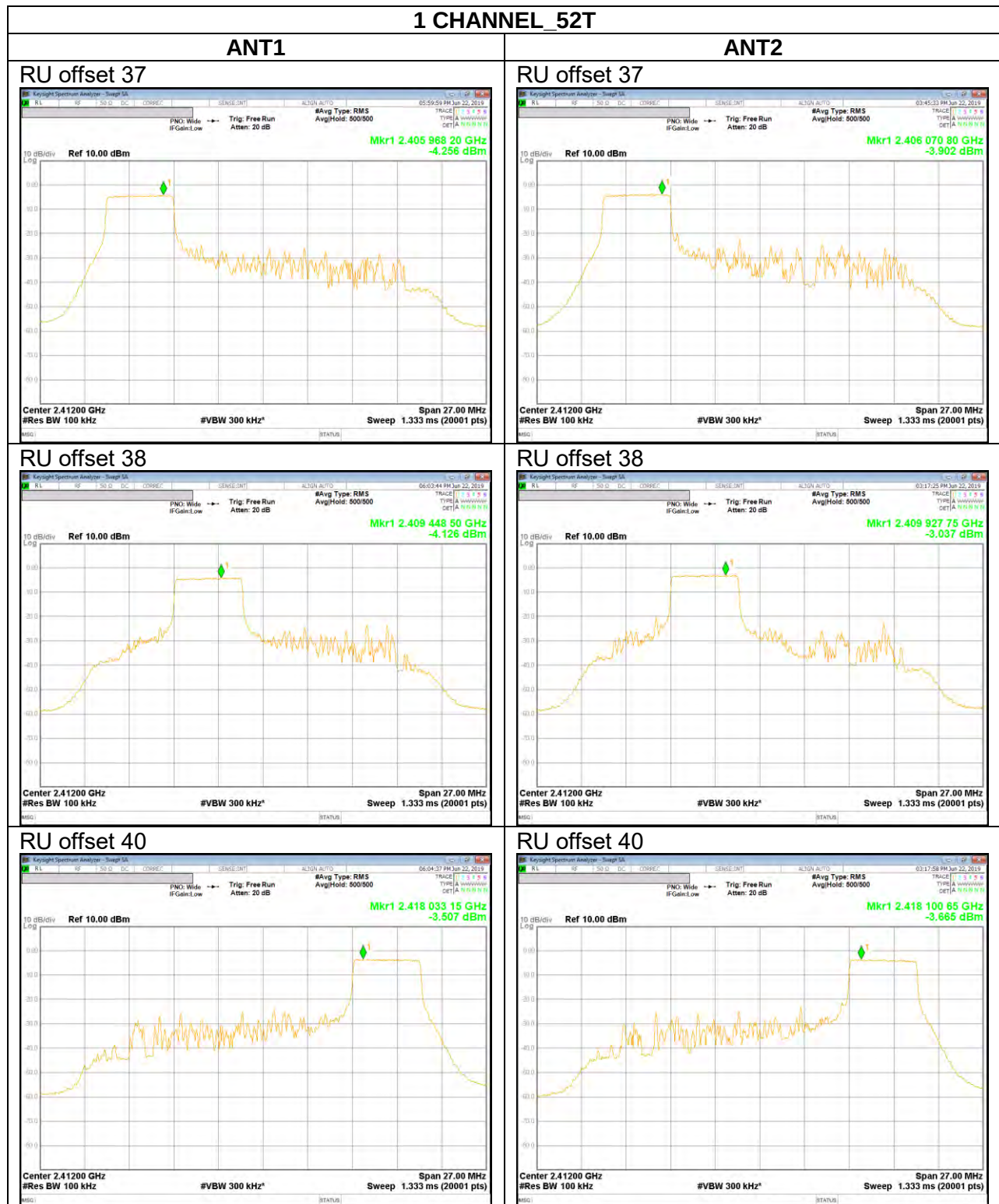
Actual RBW	Ref. Bandwidth	Corr'd factor
100 kHz	3 kHz	-15.23 dB

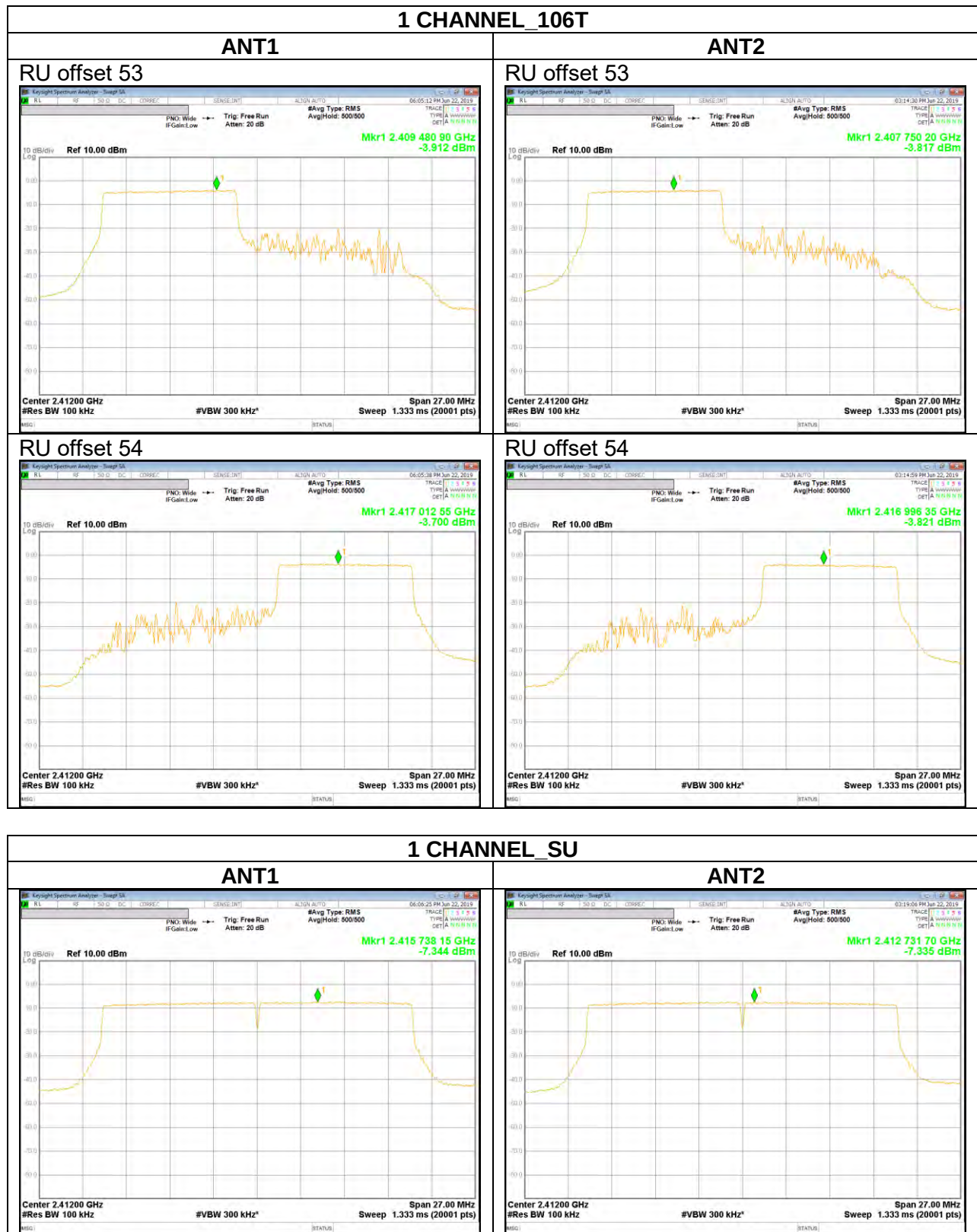
PPSD Results

Channel	Frequency [MHz]	Tones	RU offset	Antenna 1 Meas PPSD [dBm]	Antenna 2 Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PSD Limit [dBm]	Power Margin [dB]
1	2412	26T	0	-5.85	-4.89	-17.52	11.00	-28.52
			4	-4.63	-4.10	-16.54	11.00	-27.54
			8	-4.49	-4.50	-16.67	11.00	-27.67
		52T	37	-6.97	-7.01	-19.17	11.00	-30.17
			38	-7.09	-6.50	-18.96	11.00	-29.96
			40	-6.51	-6.61	-18.74	11.00	-29.74
		106T	53	-7.44	-7.28	-19.50	11.00	-30.50
			54	-6.87	-7.23	-19.19	11.00	-30.19
		SU	-	-10.55	-10.21	-22.52	11.00	-33.52
2	2417	SU	-	-8.83	-9.06	-21.08	11.00	-32.08
6	2437	26T	0	-3.28	-5.02	-16.24	11.00	-27.24
			4	-5.22	-4.97	-17.28	11.00	-28.28
			8	-5.63	-5.39	-17.69	11.00	-28.69
		52T	37	-6.90	-6.59	-18.92	11.00	-29.92
			38	-7.21	-7.22	-19.39	11.00	-30.39
			40	-7.25	-6.63	-19.11	11.00	-30.11
		106T	53	-6.90	-6.59	-18.88	11.00	-29.88
			54	-7.25	-7.12	-19.32	11.00	-30.32
		SU	-	-7.93	-8.16	-12.19	11.00	-23.19
10	2457	SU	-	-8.89	-8.86	-21.02	11.00	-32.02
11	2462	26T	0	-5.45	-5.14	-17.47	11.00	-28.47
			4	-5.52	-5.23	-17.55	11.00	-28.55
			8	-5.69	-6.02	-18.03	11.00	-29.03
		52T	37	-7.23	-6.50	-19.03	11.00	-30.03
			38	-6.82	-6.23	-18.70	11.00	-29.70
			40	-7.20	-6.75	-19.14	11.00	-30.14
		106T	53	-7.24	-6.66	-19.08	11.00	-30.08
			54	-7.10	-6.69	-19.03	11.00	-30.03
		SU	-	-10.51	-10.09	-22.43	11.00	-33.43

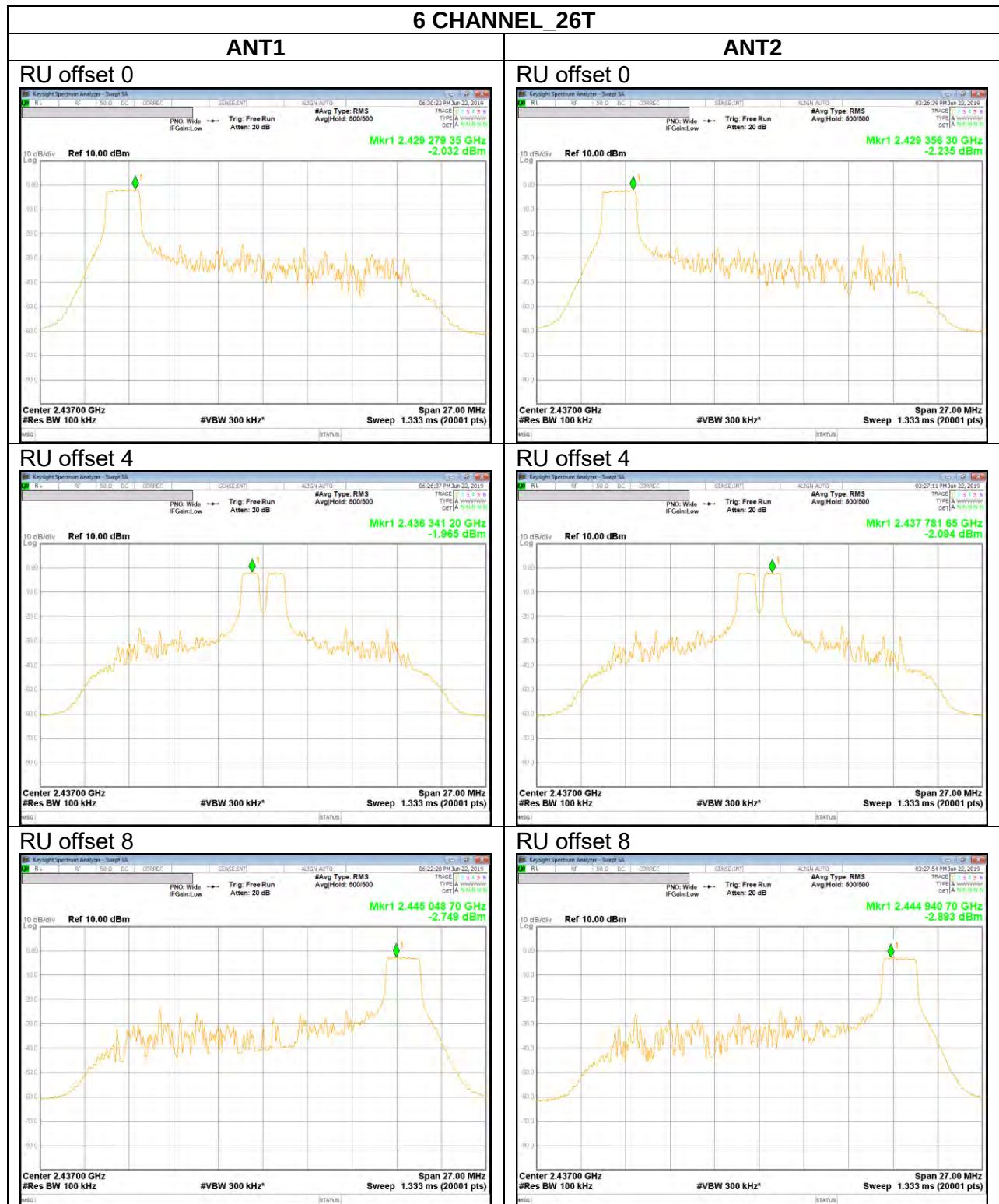
10.3.3. SISO_PSD_RESULT

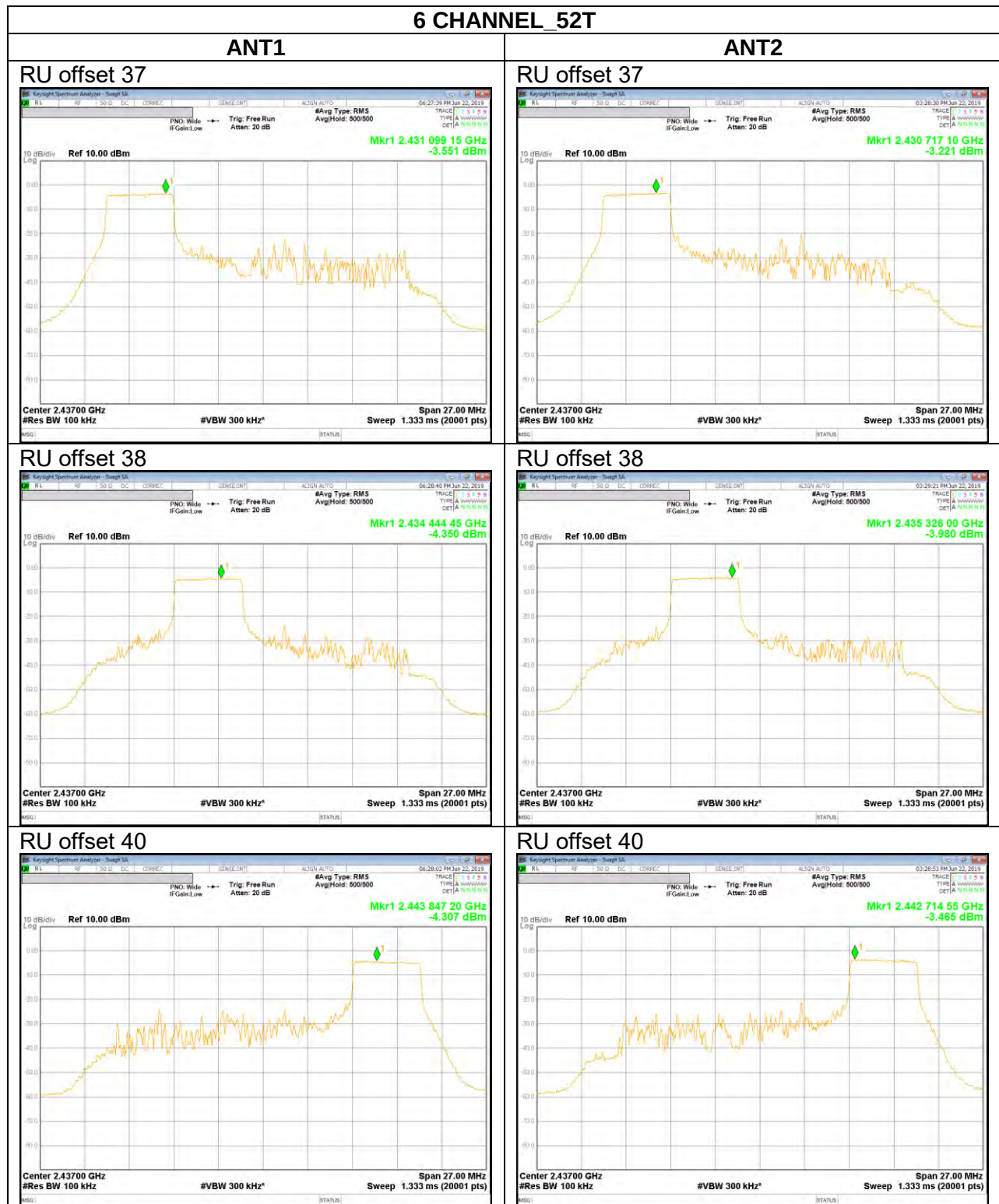


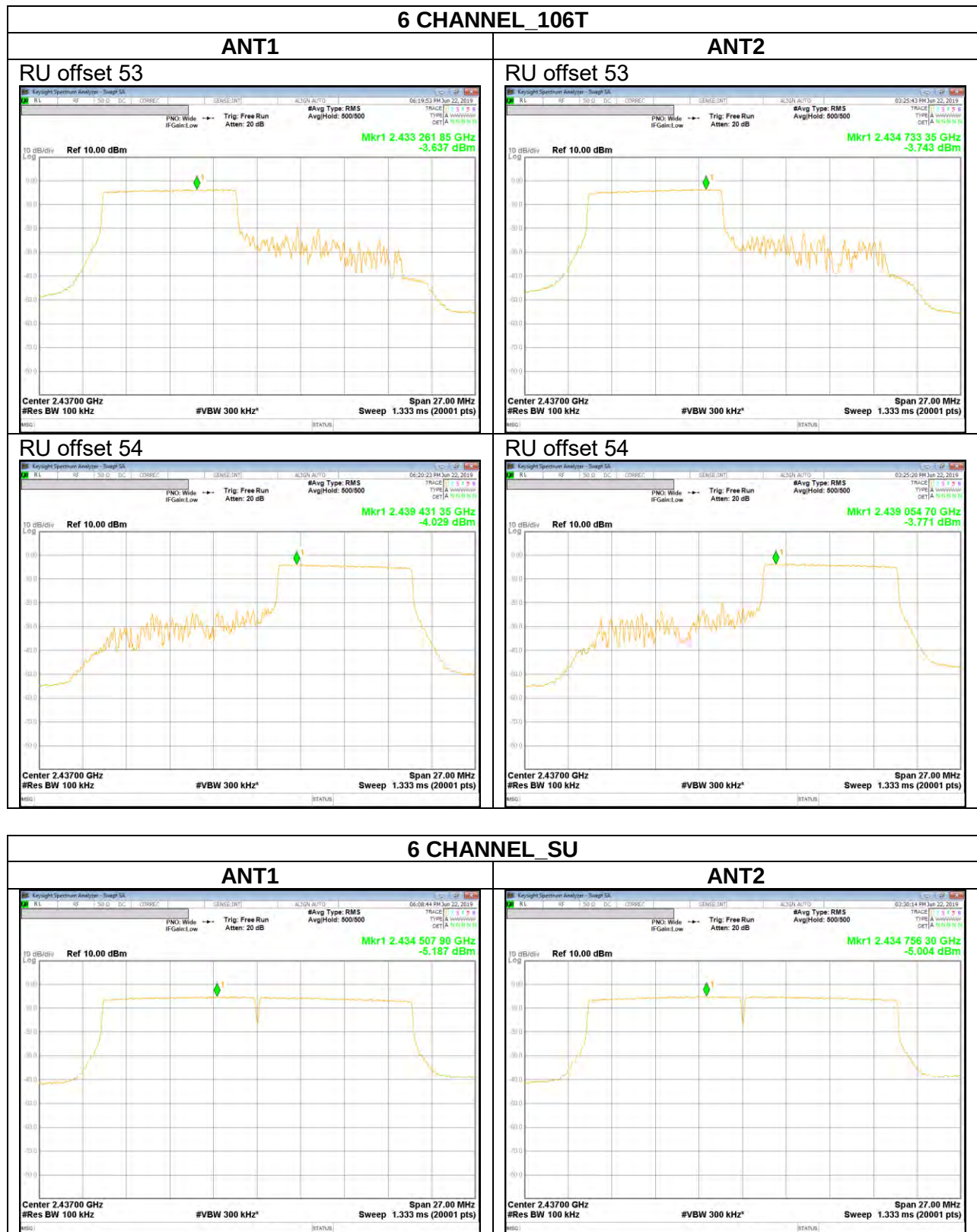


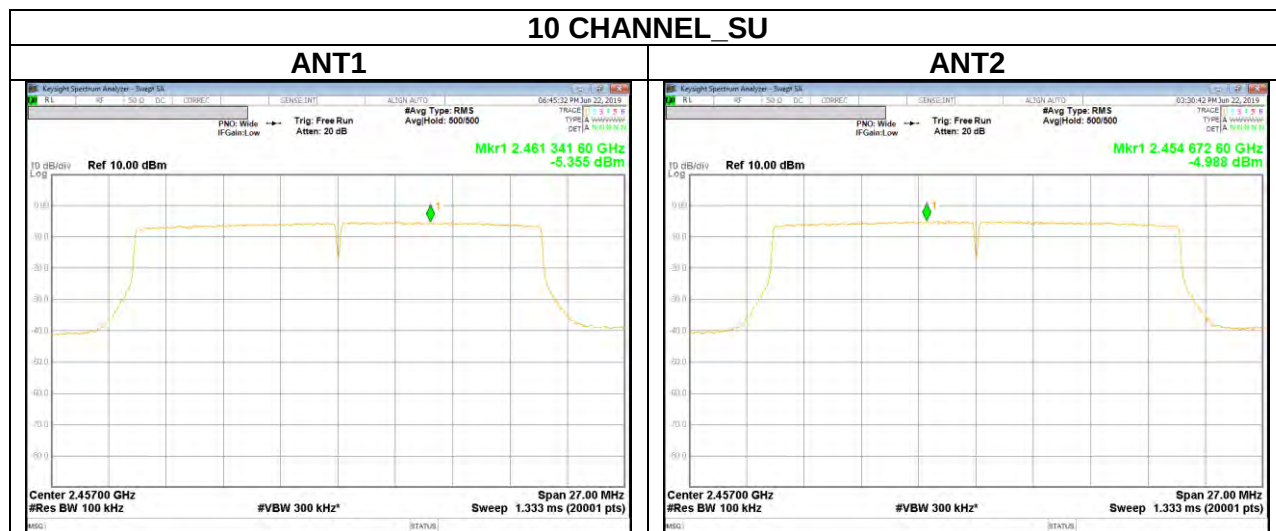






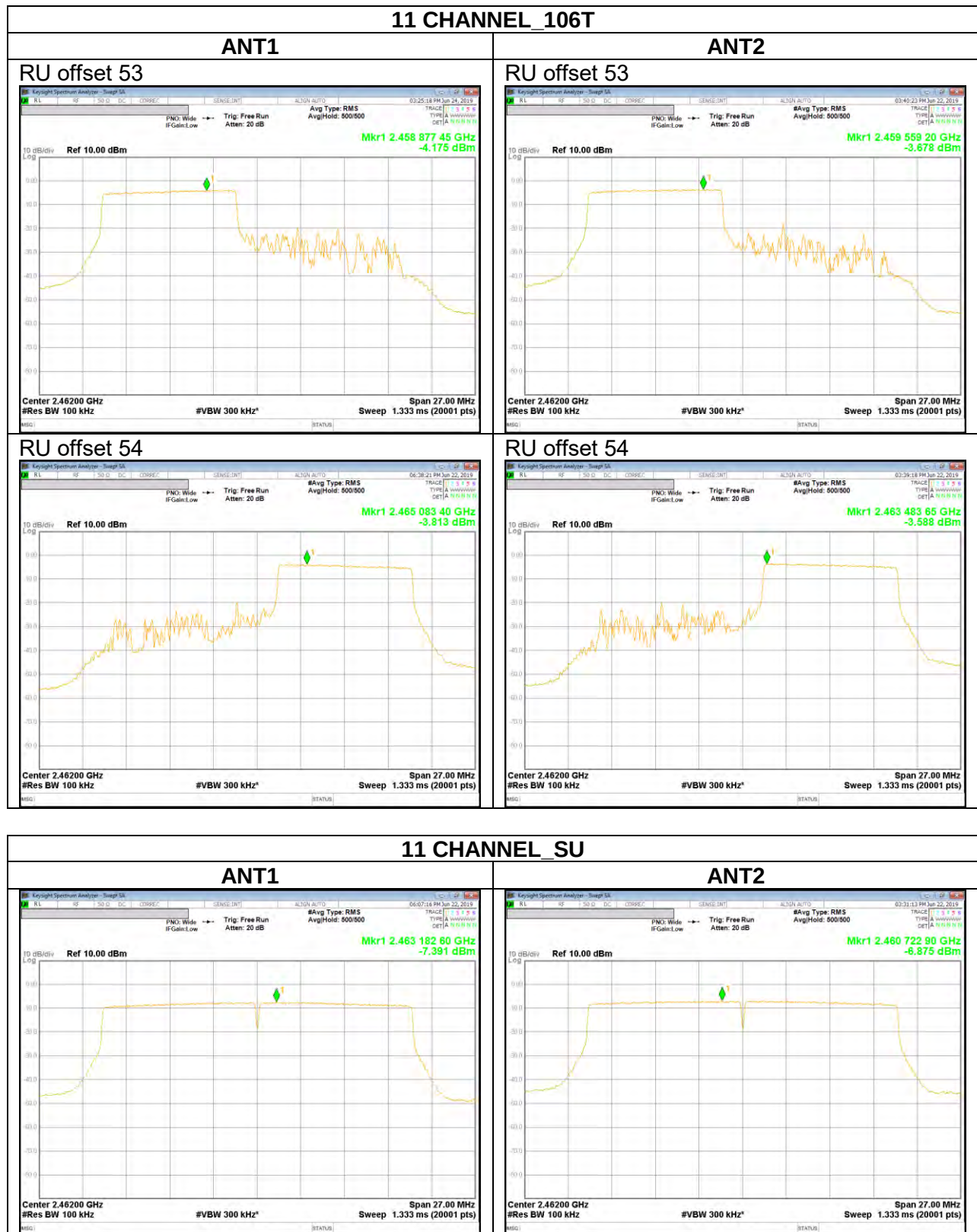




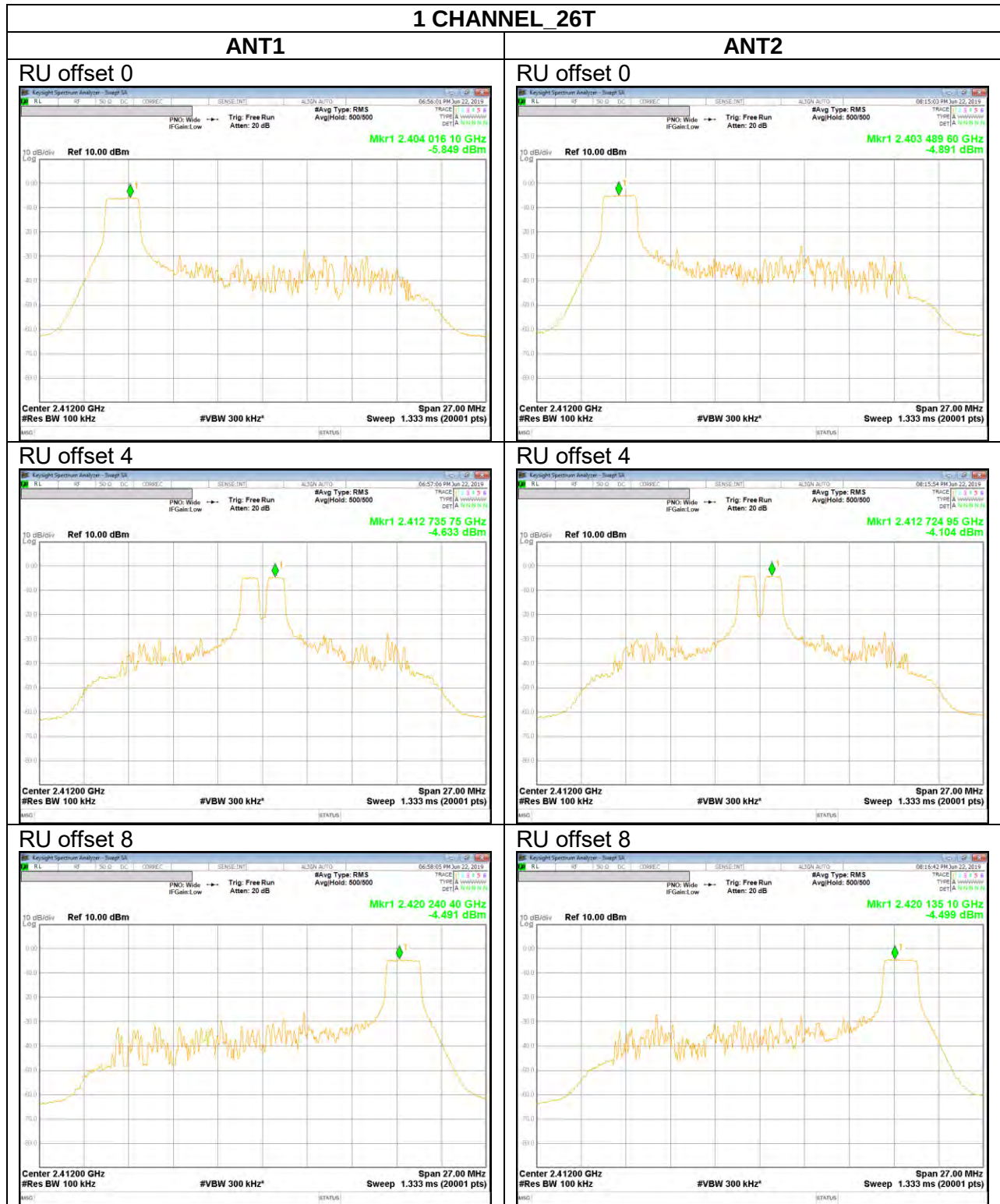


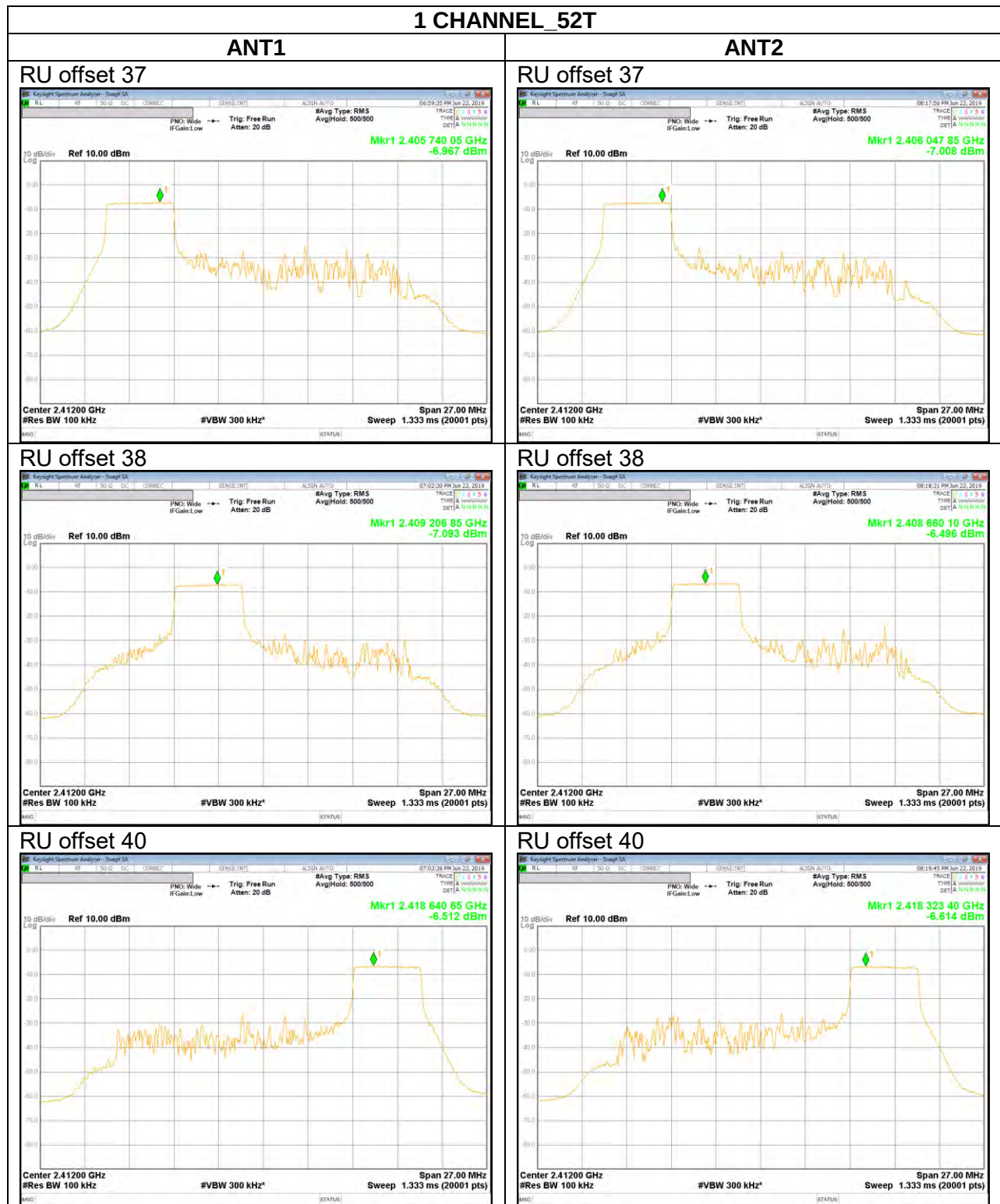


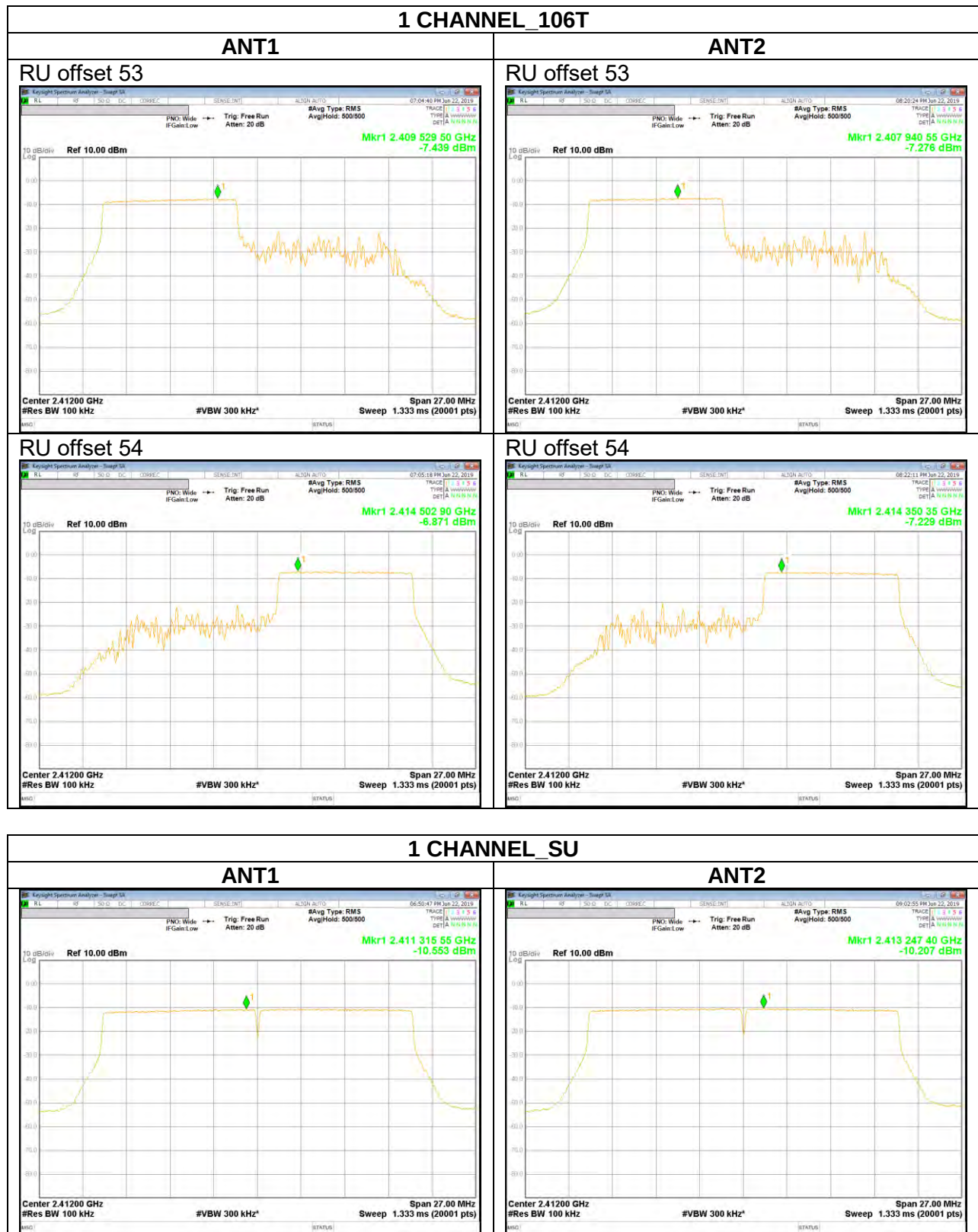


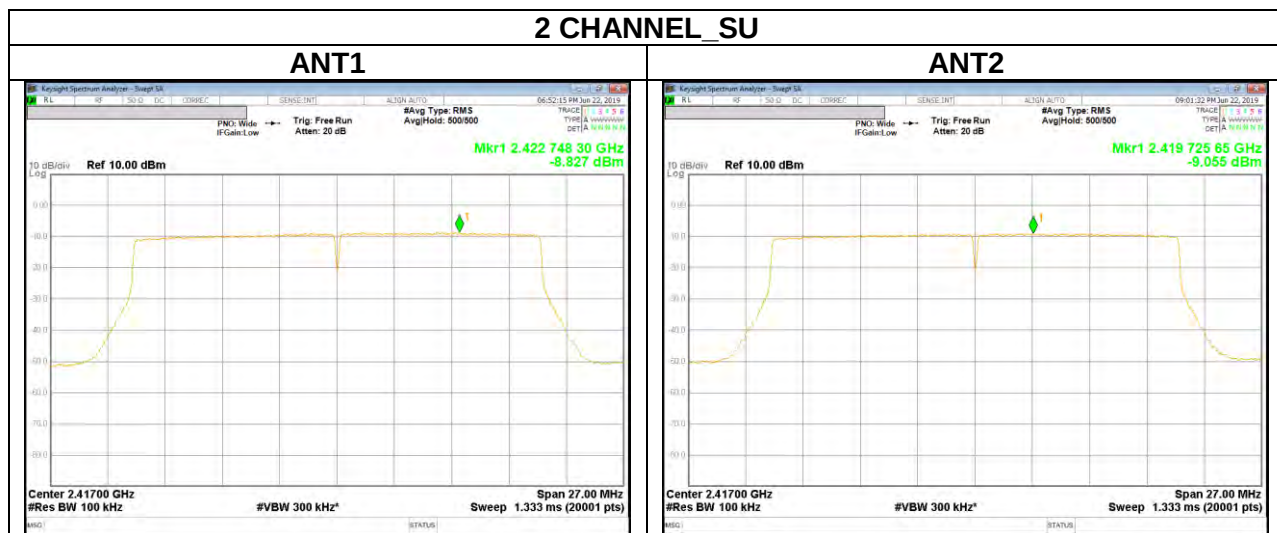


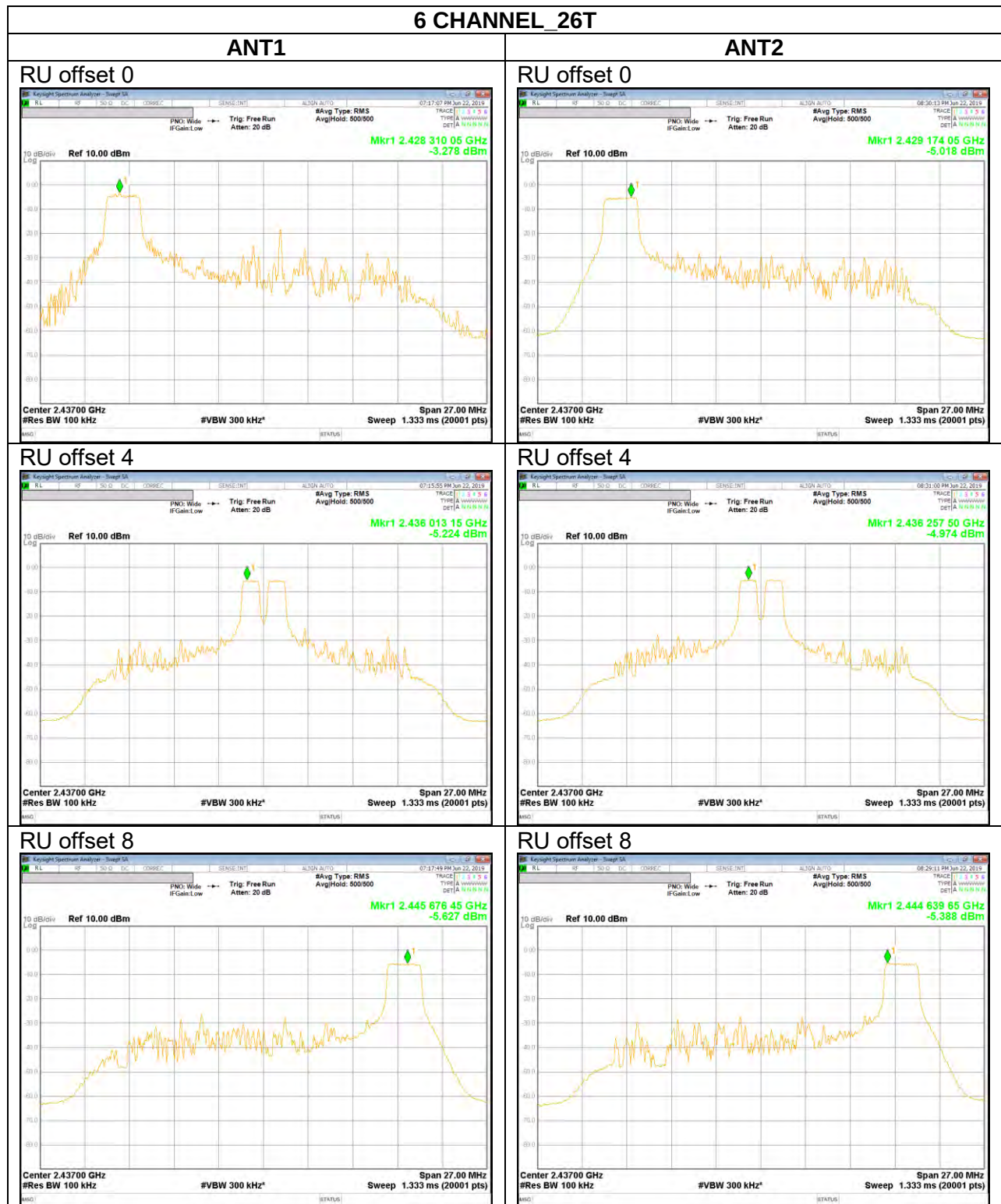
10.3.1. MIMO_PSD_RESULT

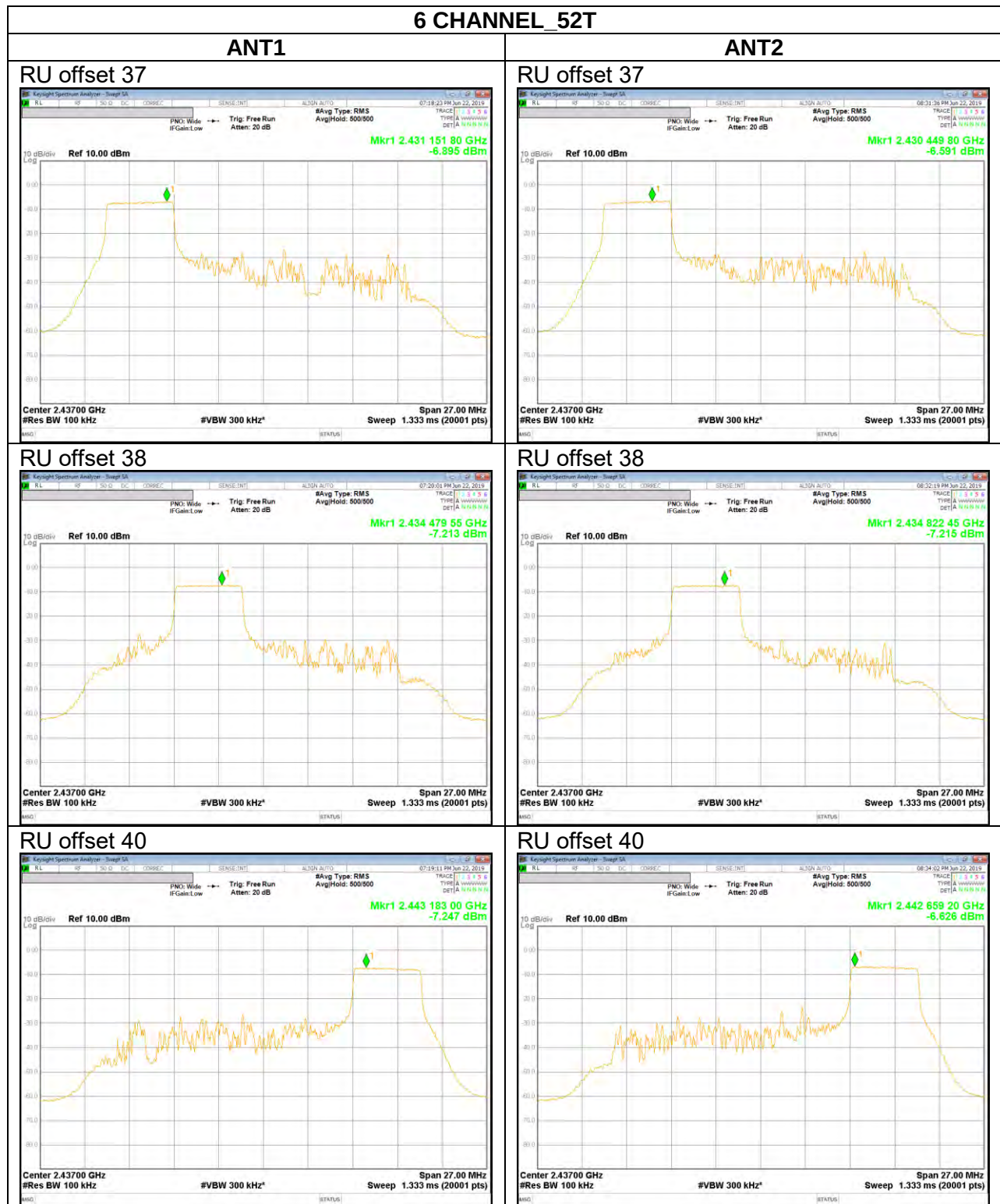


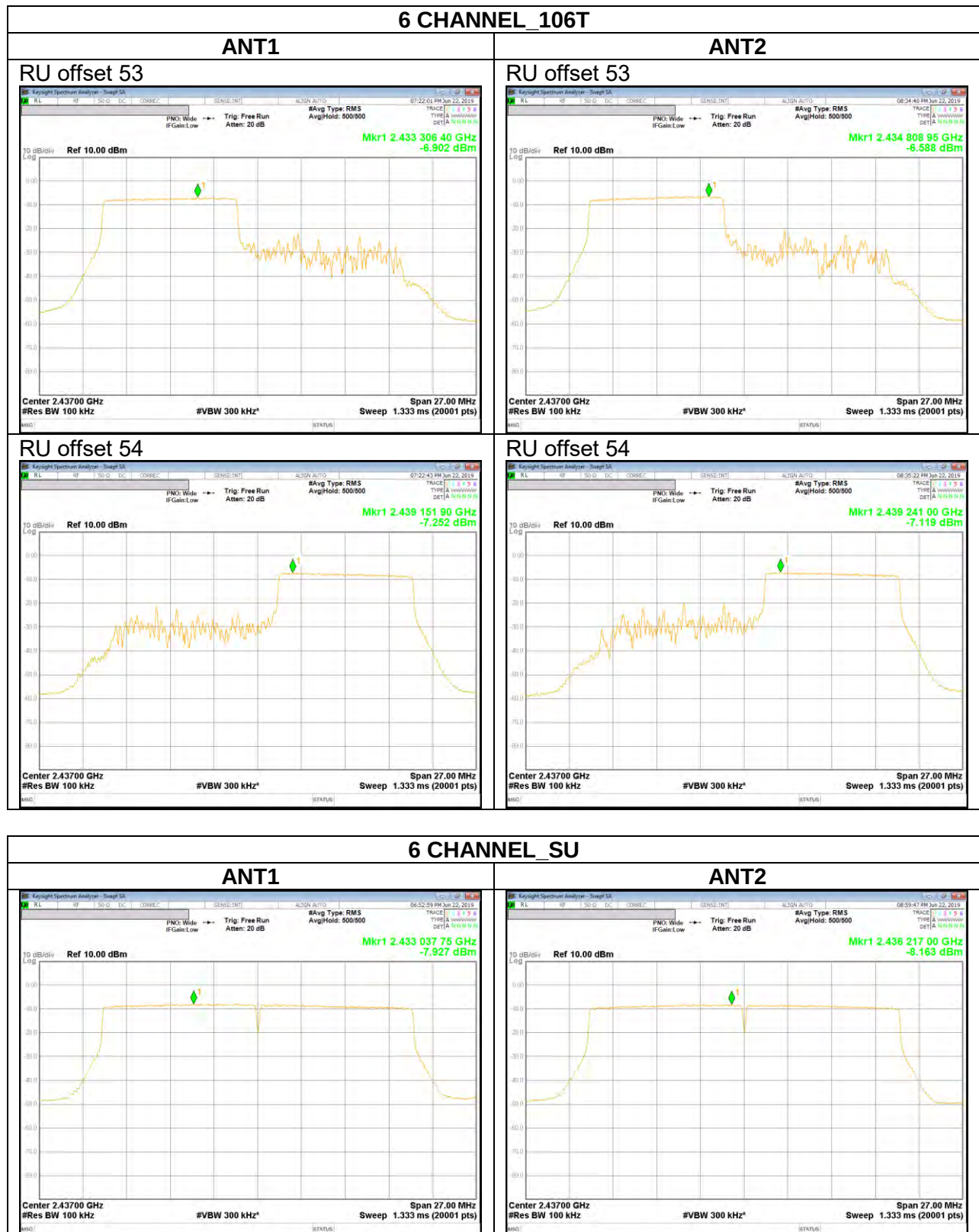




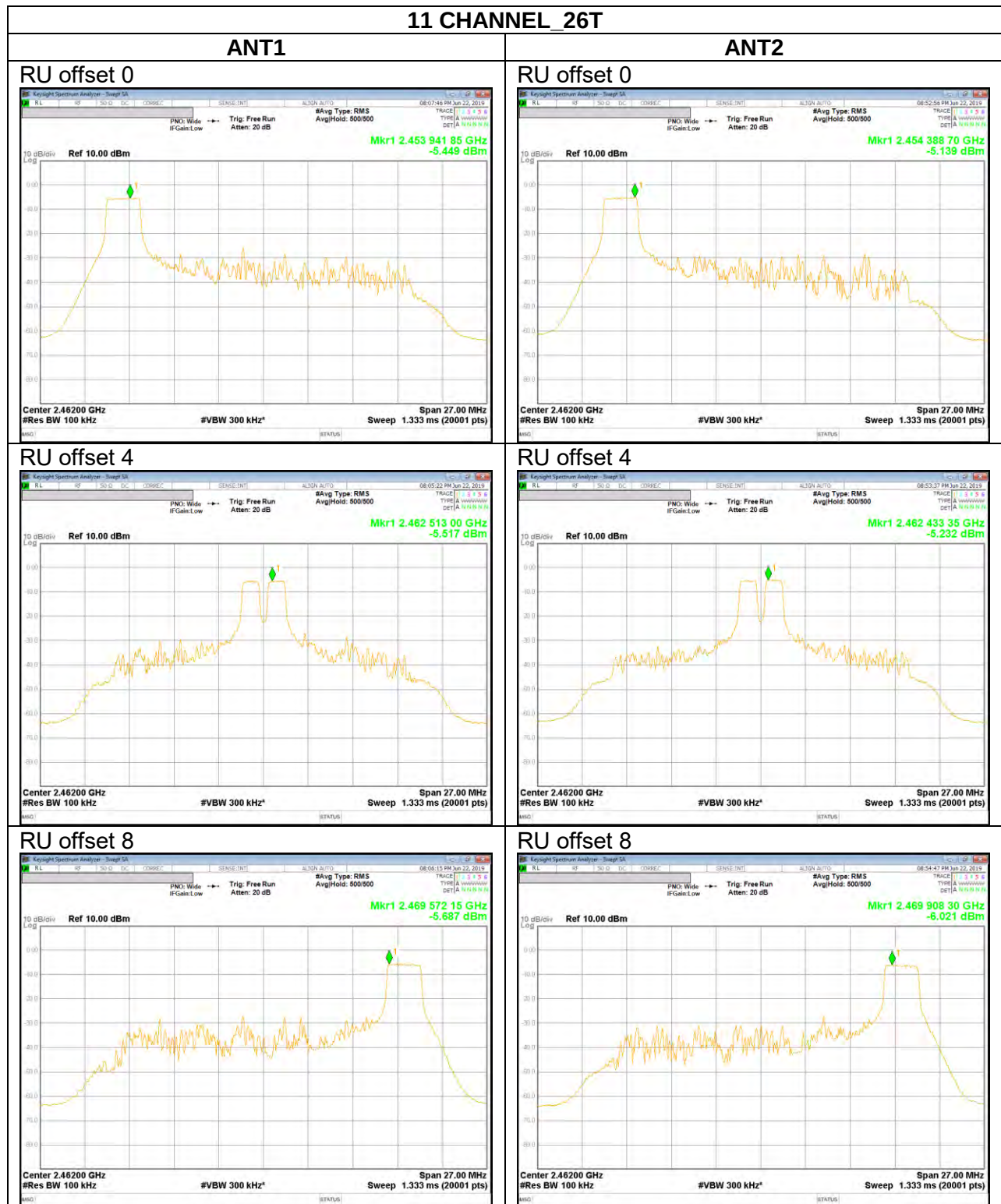


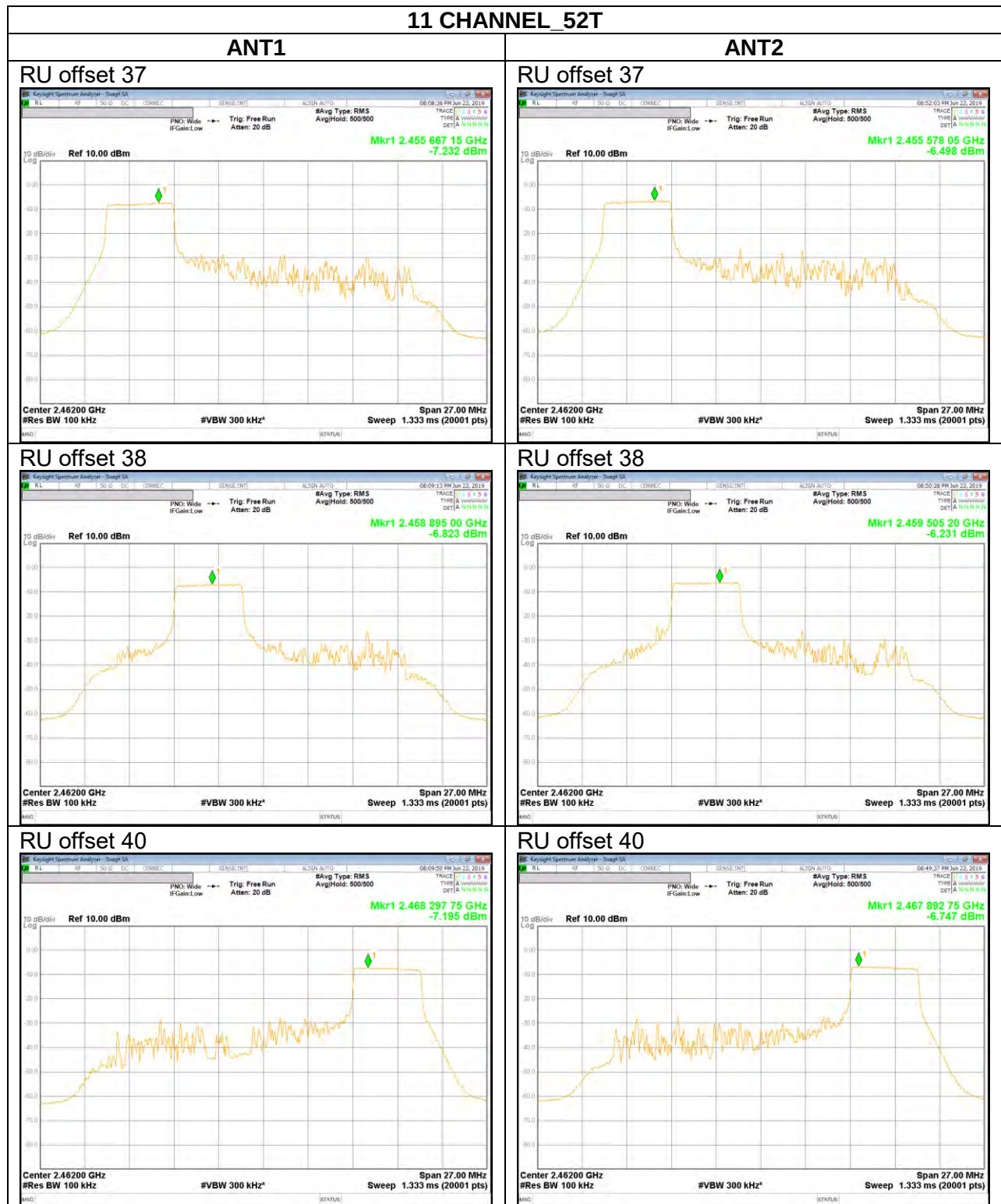


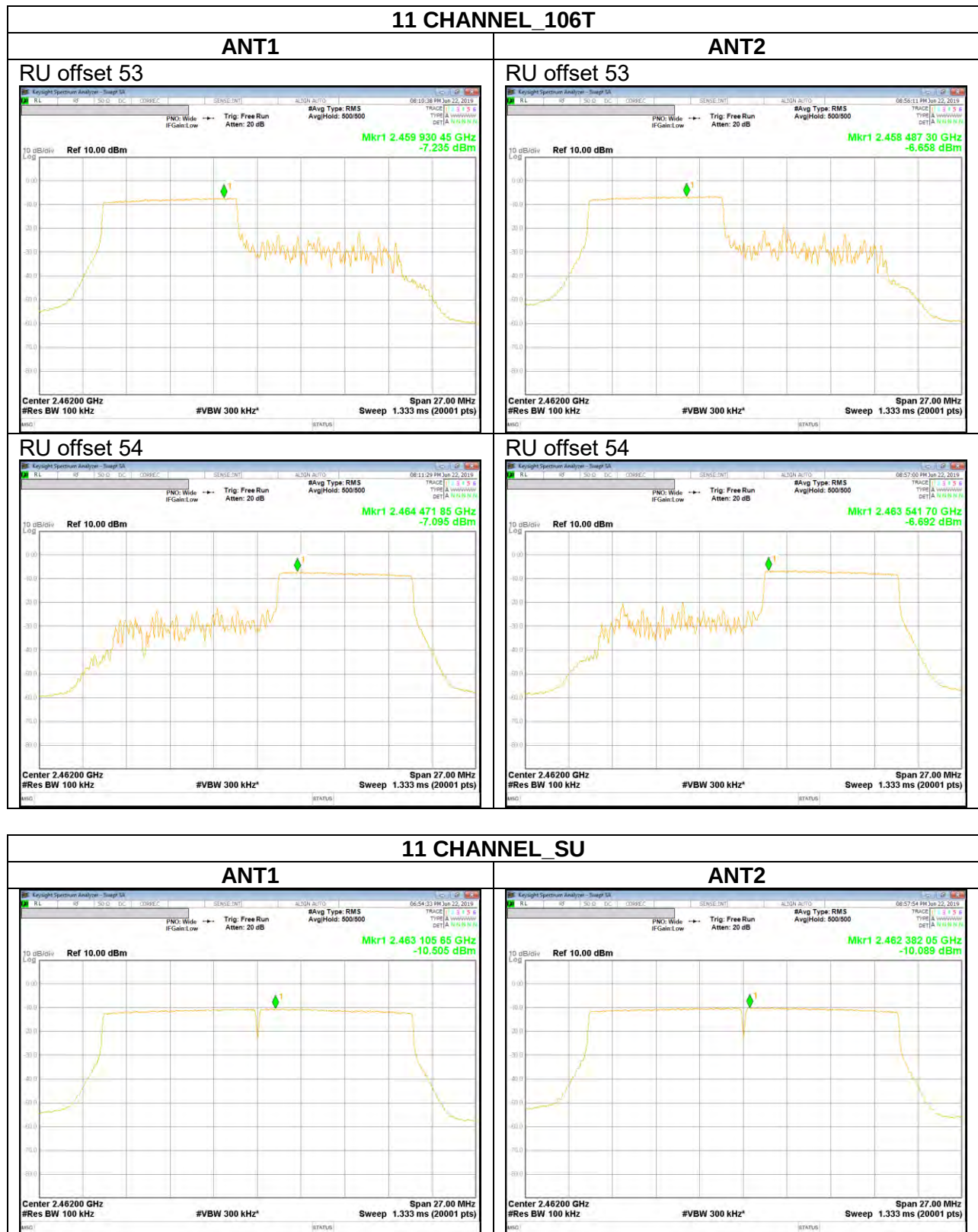












10.4. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, 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 that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

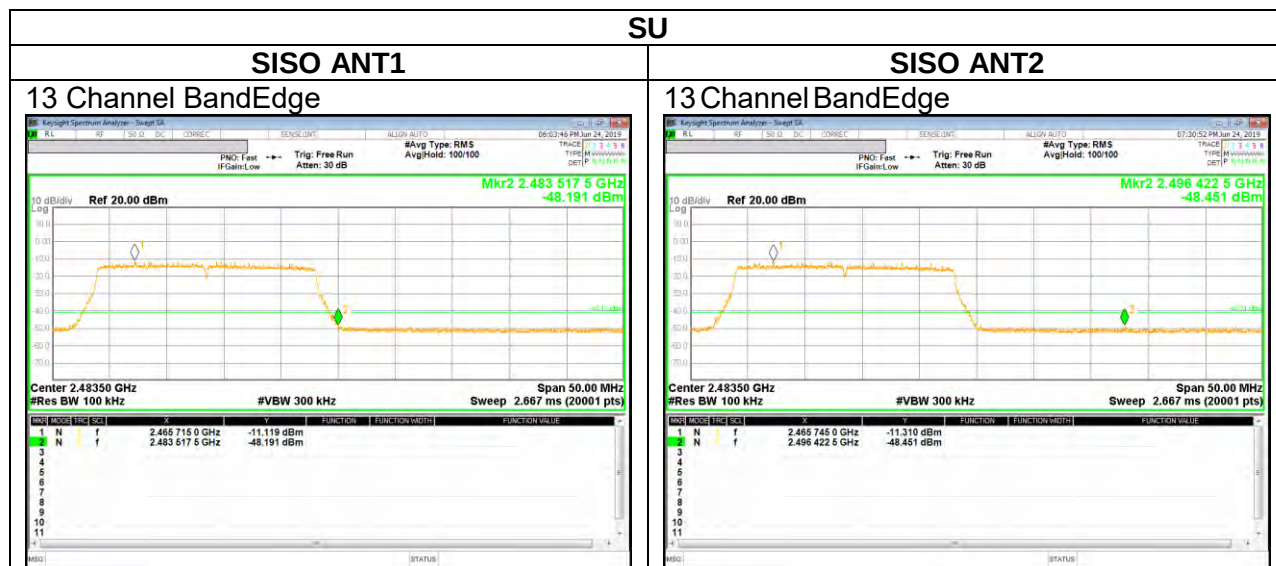
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

10.4.1. 802.11ax HE20 MODE IN THE 2.4 GHz BAND











242T / Low: 61, Mid(Ref): 61, High: 61

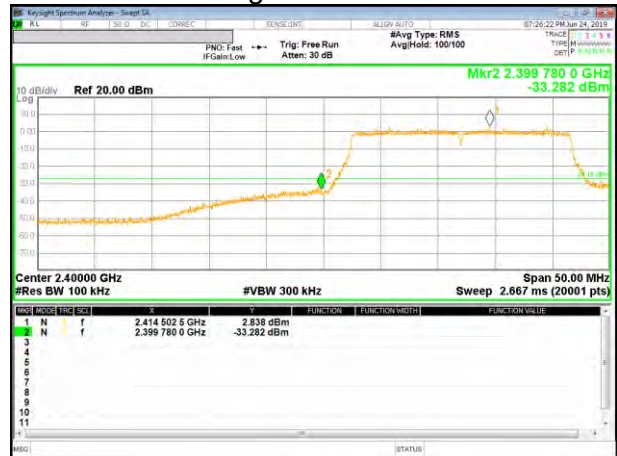
SISO ANT1

1 Channel BandEdge



SISO ANT2

1 Channel BandEdge



11 Channel BandEdge



11 Channel BandEdge

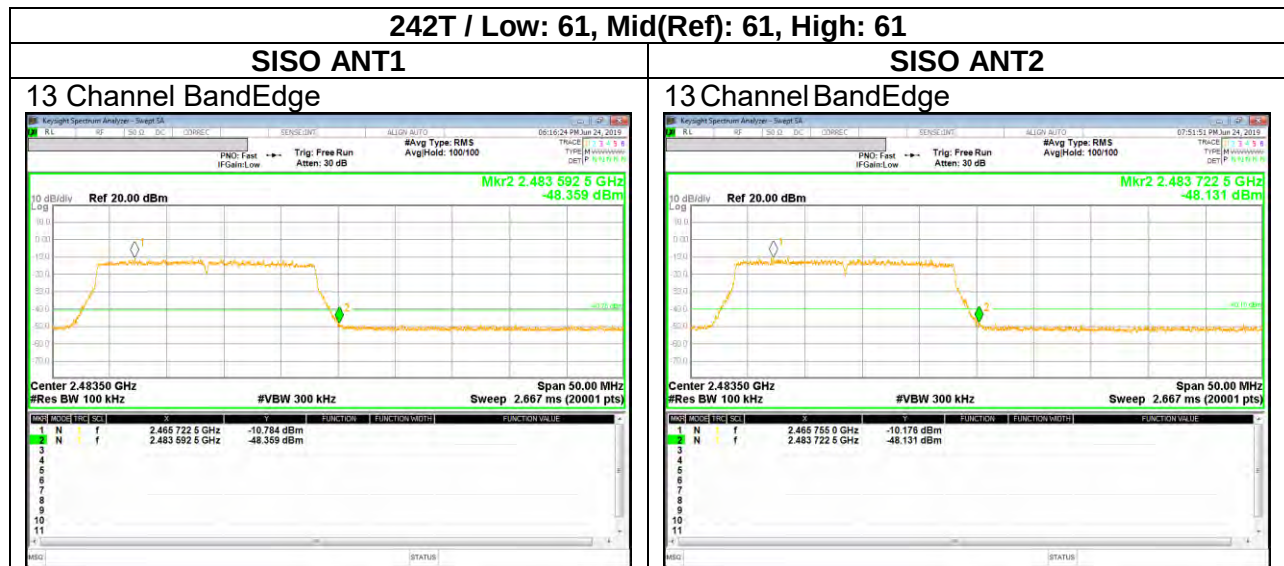


12 Channel BandEdge



12 Channel BandEdge





NOTE : Conducted band edge test results of SU mode is worse than Full RU(262T) mode. Also output power level of SU mode is higher than Full RU(242T) mode. So radiated band edge test results of Full RU(262T) mode were covered by SU mode results.

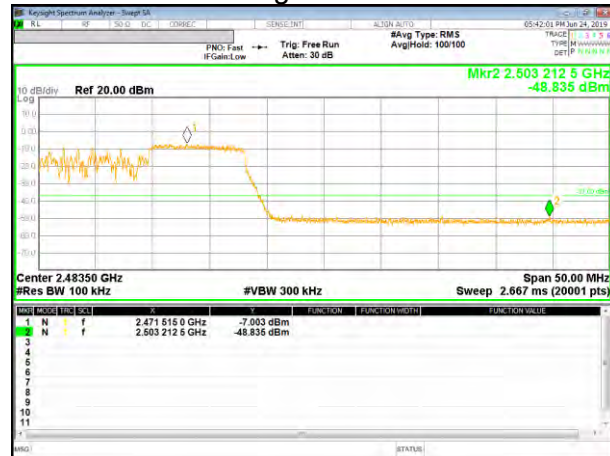
106T / Low: 53, Mid(Ref): 53, High: 54



106T / 54

SISO ANT1

12 Channel BandEdge



SISO ANT2

12 Channel BandEdge



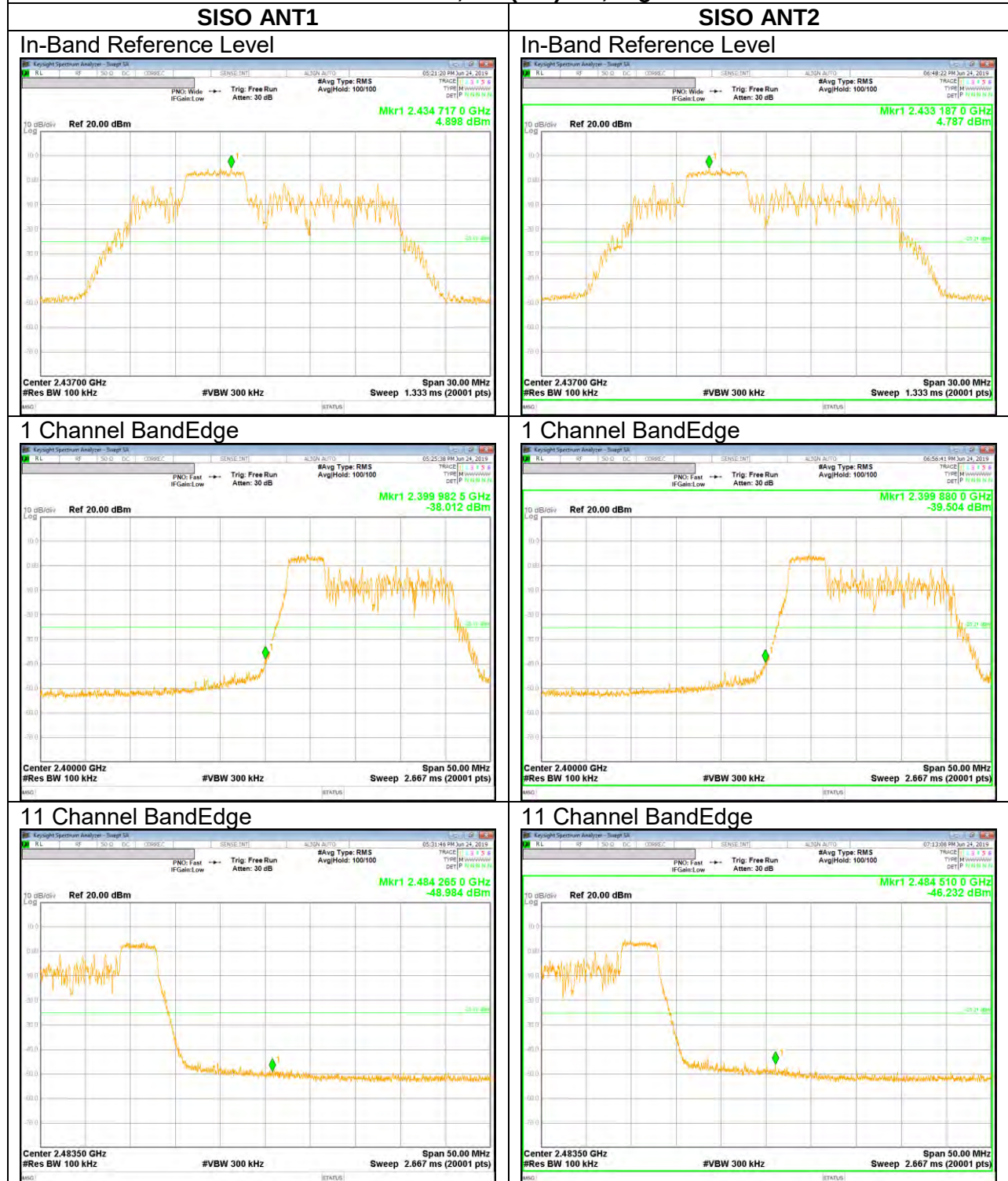
13 Channel BandEdge



13 Channel BandEdge



52T / Low: 37, Mid(Ref): 38, High: 40



52T / 40



26T / Low: 0, Mid(Ref): 4, High: 8



26T / 8



26T / Low: 0, Mid: 4 High: 4



11. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
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 paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. (Restricted bandedge, Final detection of spurious harmonic emissions)

Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

The spectrum from 1 GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site.

Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

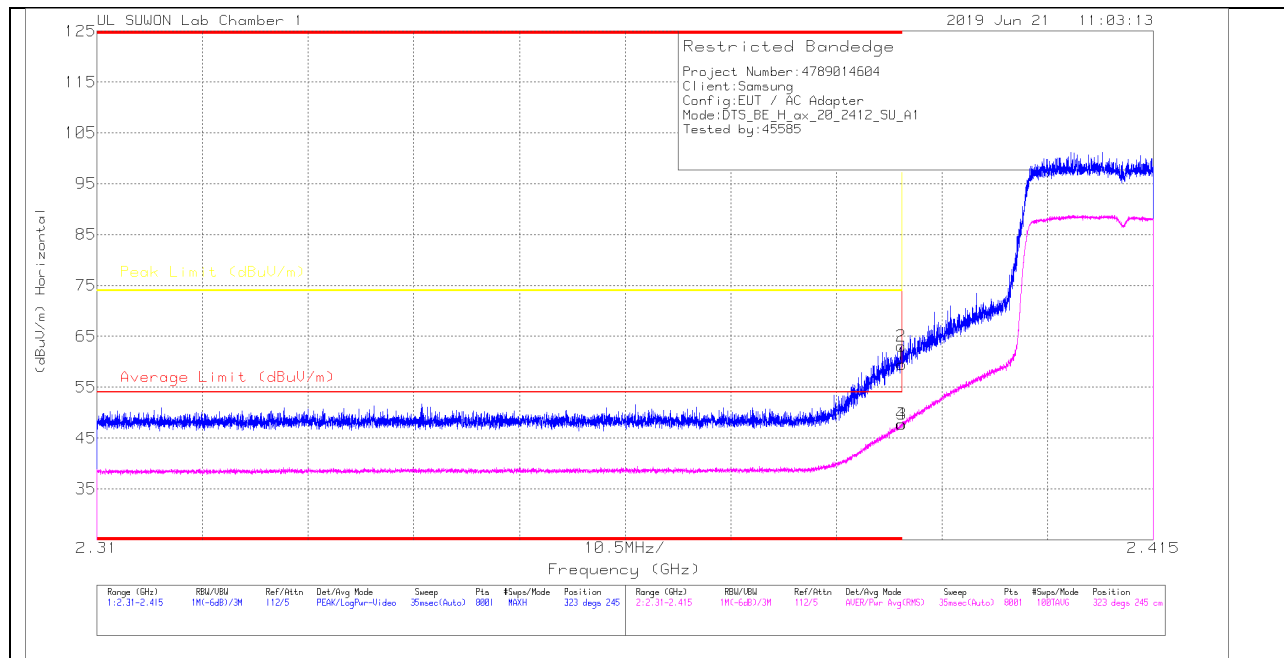
11.1. TRANSMITTER ABOVE 1 GHz_SISO

11.1.1. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (1 CHANNEL)

SU mode (ANT_1)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

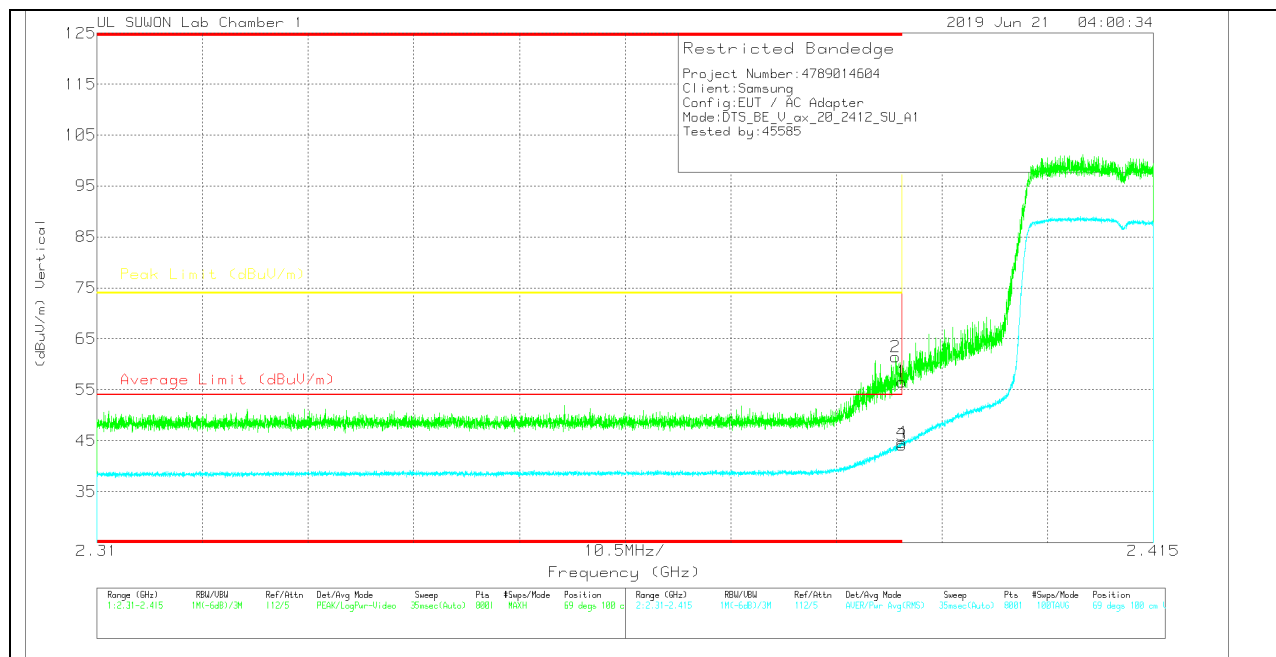
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	53.34	Pk	31.7	-25.5	0	59.54	-	-	74	-14.46	323	245	H
2	* 2.38997	56.91	Pk	31.7	-25.5	0	63.11	-	-	74	-10.89	323	245	H
3	* 2.39	41.58	RMS	31.7	-25.5	0	47.78	54	-6.22	-	-	323	245	H
4	* 2.38996	41.57	RMS	31.7	-25.5	0	47.77	54	-6.23	-	-	323	245	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	50.37	Pk	31.7	-25.5	0	56.57	-	-	74	-17.43	69	100	V
2	* 2.38937	55.21	Pk	31.7	-25.5	0	61.41	-	-	74	-12.59	69	100	V
3	* 2.39	37.97	RMS	31.7	-25.5	0	44.17	54	-9.83	-	-	69	100	V
4	* 2.38998	38.45	RMS	31.7	-25.5	0	44.65	54	-9.35	-	-	69	100	V

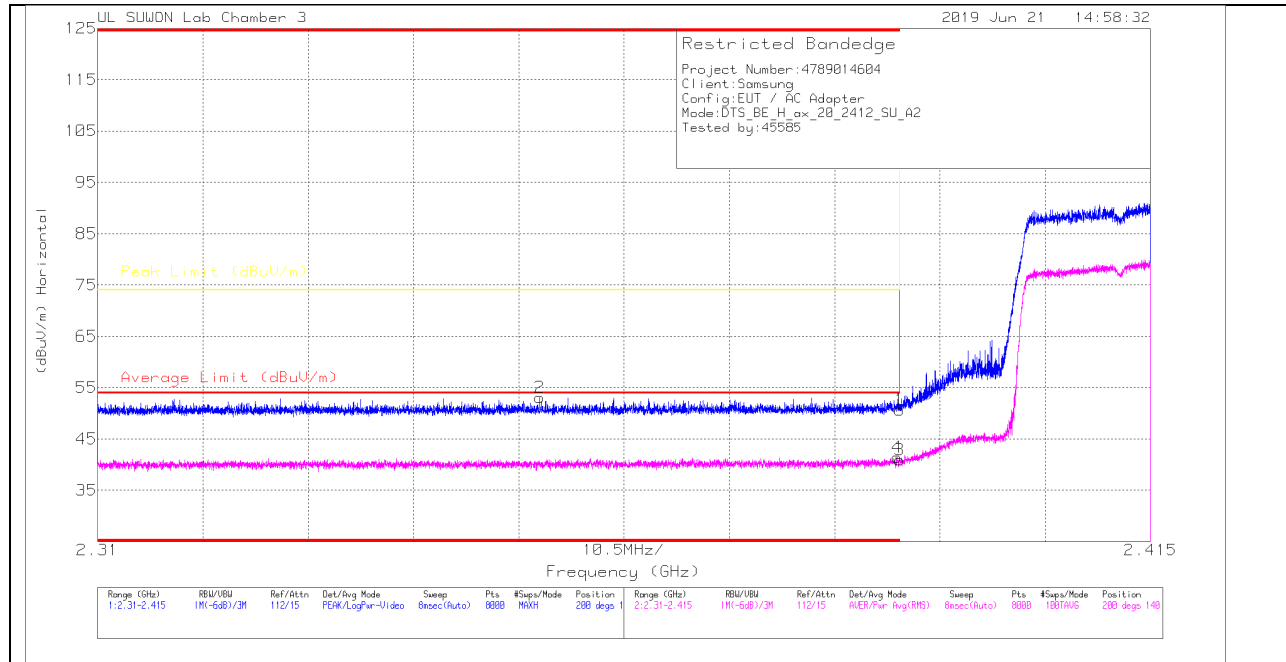
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

SU mode (ANT_2)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

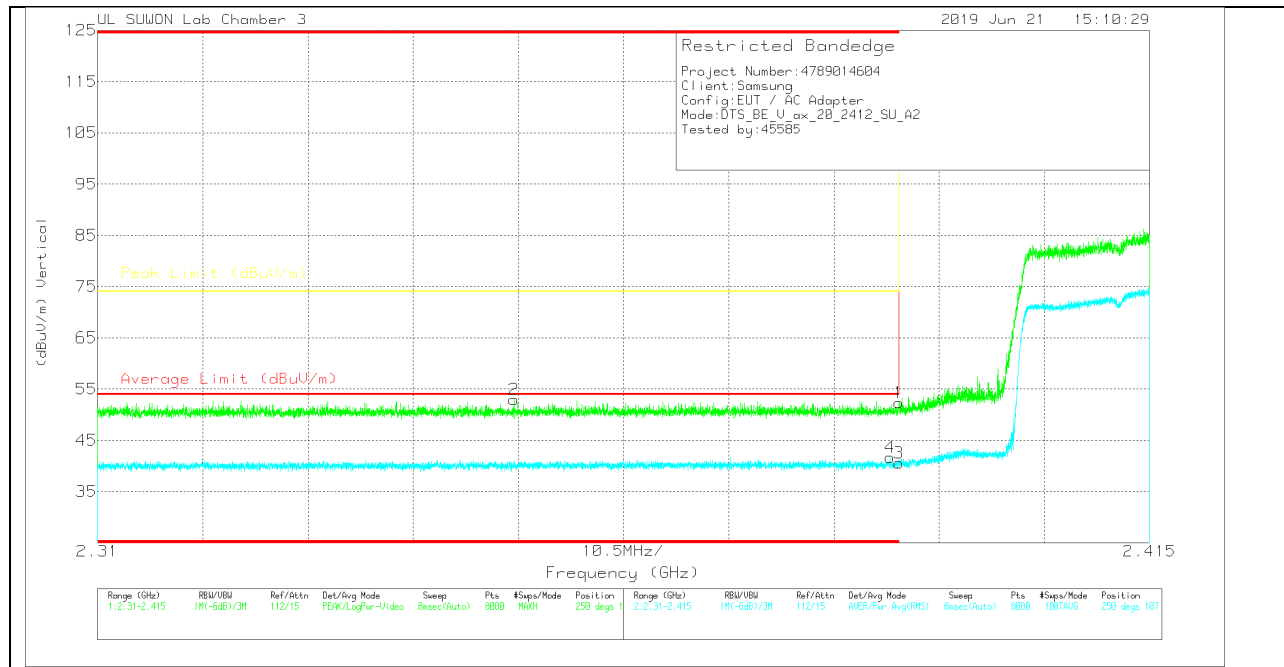
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.4	Pk	31.7	-23.4	0	50.7	-	-	74	-23.3	200	140	H
2	* 2.354	44.84	Pk	31.6	-23.4	0	53.04	-	-	74	-20.96	200	140	H
3	* 2.39	32.62	RMS	31.7	-23.4	0	40.92	54	-13.08	-	-	200	140	H
4	* 2.39	33.14	RMS	31.7	-23.4	0	41.44	54	-12.56	-	-	200	140	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	44.05	Pk	31.7	-23.4	0	52.35	-	-	74	-21.65	250	107	V
2	* 2.352	44.72	Pk	31.6	-23.4	0	52.92	-	-	74	-21.08	250	107	V
3	* 2.39	32.23	RMS	31.7	-23.4	0	40.53	54	-13.47	-	-	250	107	V
4	* 2.389	33.38	RMS	31.7	-23.4	0	41.68	54	-12.32	-	-	250	107	V

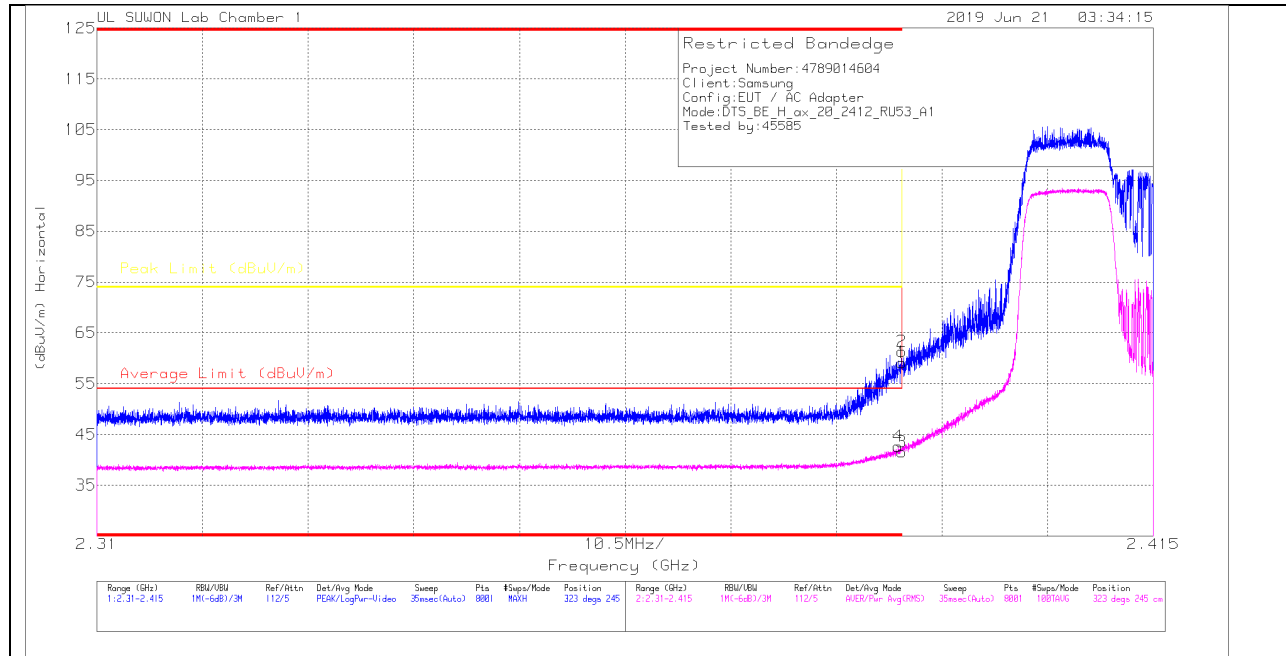
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

106T RU mode (ANT_1 / RU offset 53)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

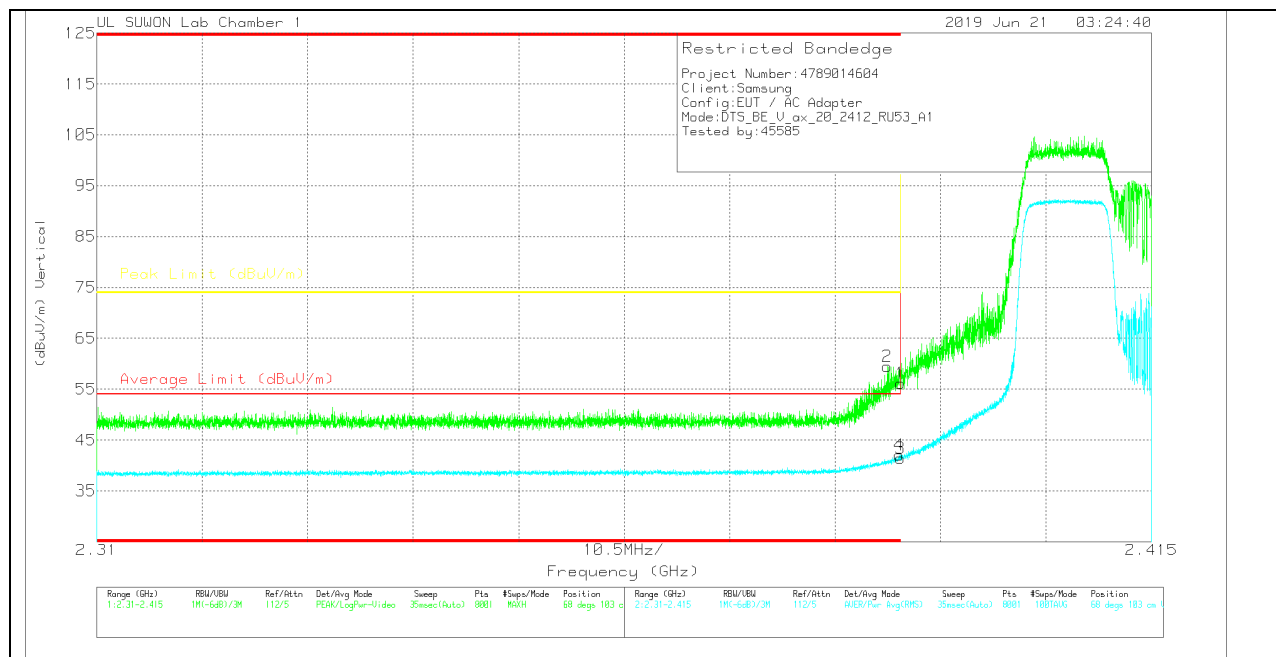
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	52.97	Pk	31.7	-25.5	0	59.17	-	-	74	-14.83	323	245	H
2	* 2.38998	55.15	Pk	31.7	-25.5	0	61.35	-	-	74	-12.65	323	245	H
3	* 2.39	35.36	RMS	31.7	-25.5	0	41.56	54	-12.44	-	-	323	245	H
4	* 2.38964	36.45	RMS	31.7	-25.5	0	42.65	54	-11.35	-	-	323	245	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	49.96	Pk	31.7	-25.5	0	56.16	-	-	74	-17.84	68	103	V
2	* 2.38868	53.3	Pk	31.7	-25.5	0	59.5	-	-	74	-14.5	68	103	V
3	* 2.39	35.24	RMS	31.7	-25.5	0	41.44	54	-12.56	-	-	68	103	V
4	* 2.38989	35.84	RMS	31.7	-25.5	0	42.04	54	-11.96	-	-	68	103	V

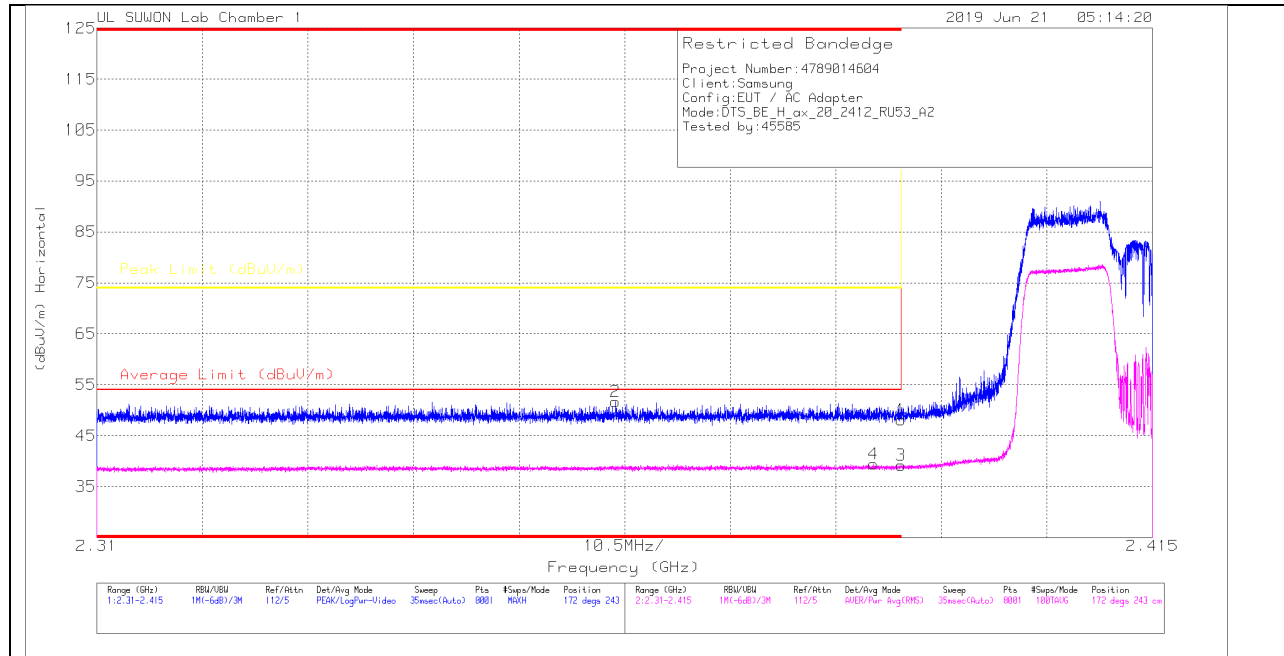
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

106T RU mode (ANT_2 / RU offset 53)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

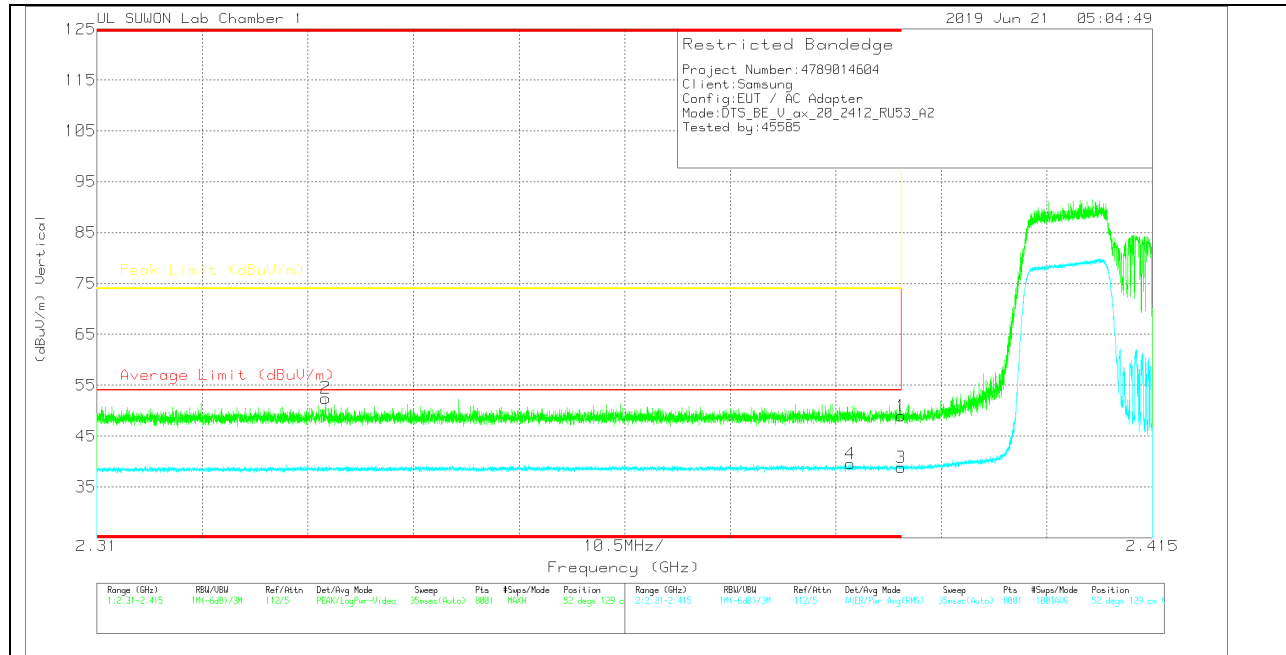
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.93	Pk	31.7	-25.5	0	48.13	-	-	74	-25.87	172	243	H
2	* 2.36161	45.7	Pk	31.6	-25.6	0	51.7	-	-	74	-22.3	172	243	H
3	* 2.39	32.97	RMS	31.7	-25.5	0	39.17	54	-14.83	-	-	172	243	H
4	* 2.38725	33.22	RMS	31.7	-25.5	0	39.42	54	-14.58	-	-	172	243	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.74	Pk	31.7	-25.5	0	48.94	-	-	74	-25.06	52	129	V
2	* 2.33276	46.69	Pk	31.5	-25.7	0	52.49	-	-	74	-21.51	52	129	V
3	* 2.39	32.65	RMS	31.7	-25.5	0	38.85	54	-15.15	-	-	52	129	V
4	* 2.38496	33.37	RMS	31.7	-25.5	0	39.57	54	-14.43	-	-	52	129	V

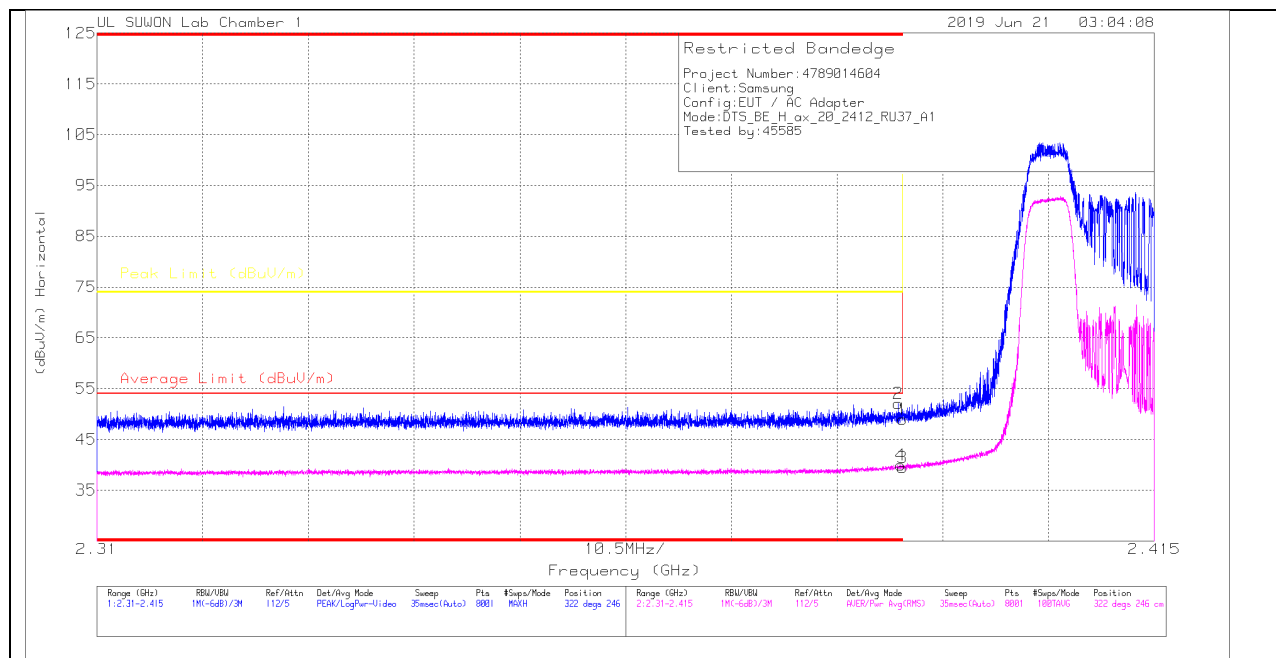
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

52T RU mode (ANT_1 / RU offset 37)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

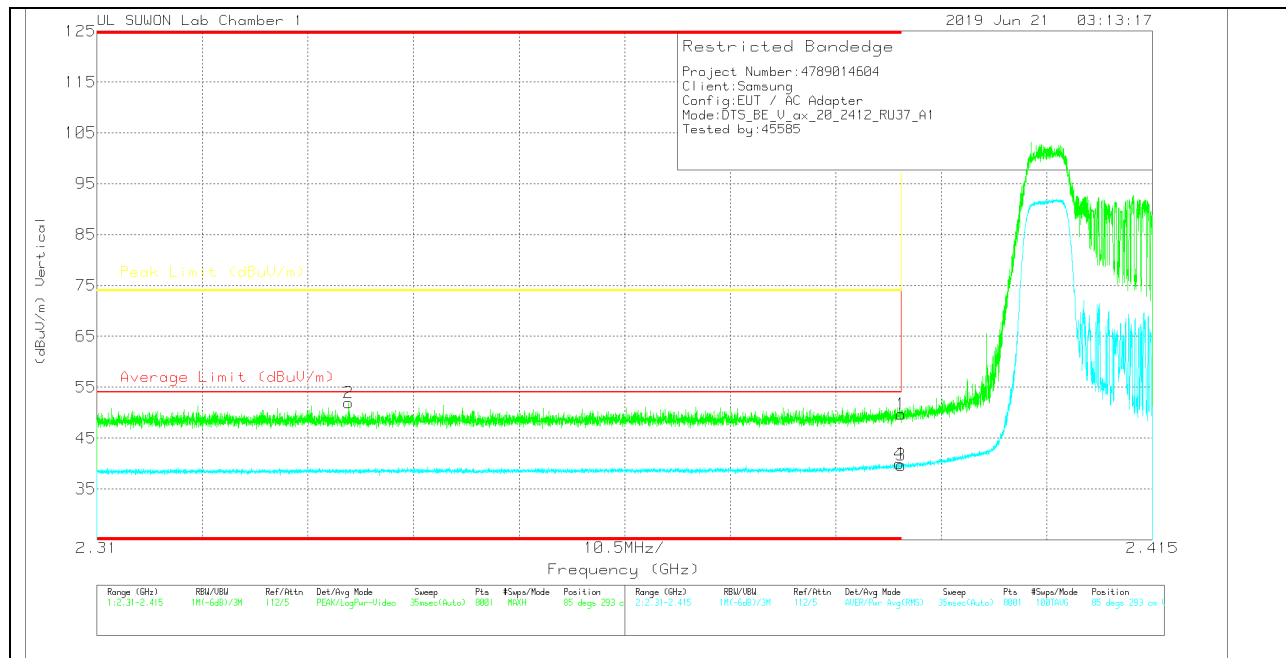
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.78	Pk	31.7	-25.5	0	48.98	-	-	74	-25.02	322	246	H
2	* 2.38958	45.87	Pk	31.7	-25.5	0	52.07	-	-	74	-21.93	322	246	H
3	* 2.39	33.2	RMS	31.7	-25.5	0	39.4	54	-14.6	-	-	322	246	H
4	* 2.38984	33.79	RMS	31.7	-25.5	0	39.99	54	-14.01	-	-	322	246	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	43.46	Pk	31.7	-25.5	0	49.66	-	-	74	-24.34	85	293	V
2	* 2.33507	46.08	Pk	31.5	-25.7	0	51.88	-	-	74	-22.12	85	293	V
3	* 2.39	33.43	RMS	31.7	-25.5	0	39.63	54	-14.37	-	-	85	293	V
4	* 2.3898	33.72	RMS	31.7	-25.5	0	39.92	54	-14.08	-	-	85	293	V

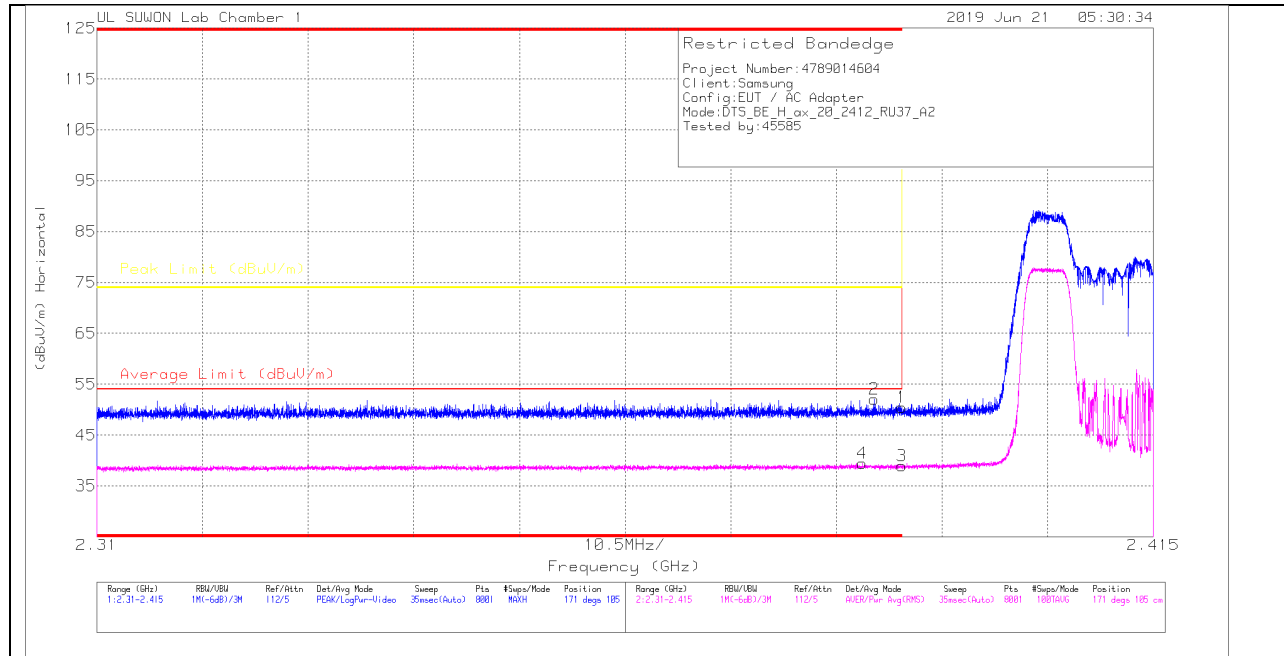
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

52T RU mode (ANT_2 / RU offset 37)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

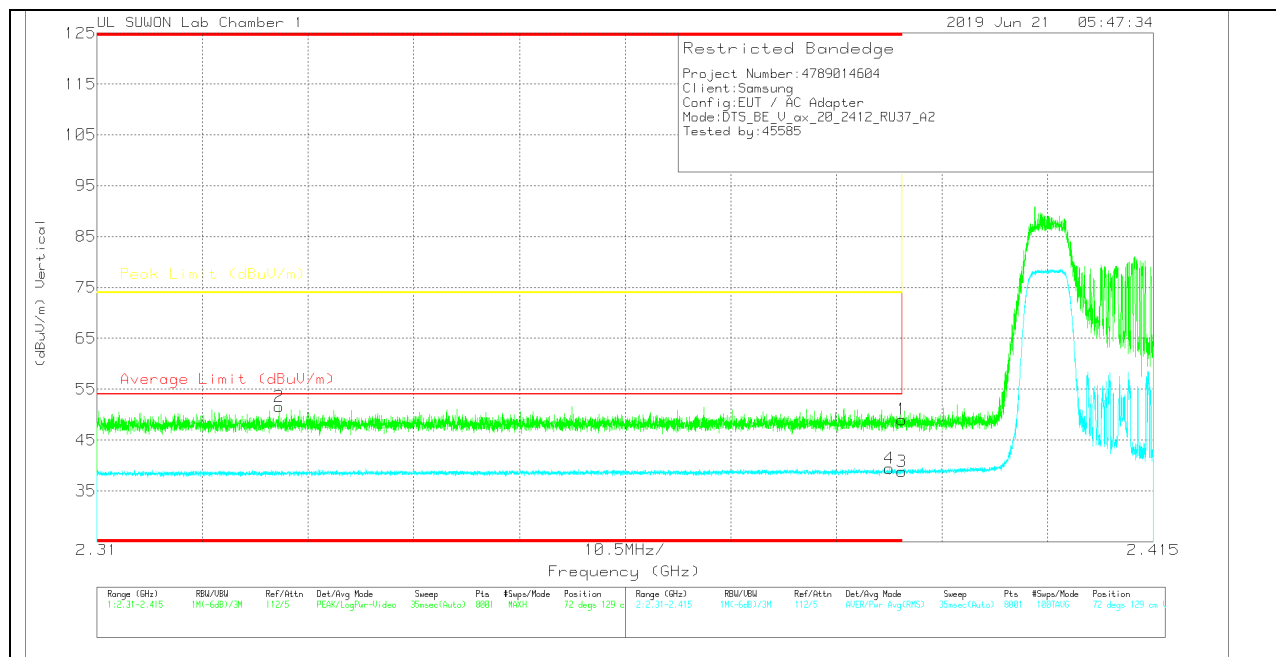
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	44.21	Pk	31.7	-25.5	0	50.41	-	-	74	-23.59	171	105	H
2	* 2.38724	45.82	Pk	31.7	-25.5	0	52.02	-	-	74	-21.98	171	105	H
3	* 2.39	32.72	RMS	31.7	-25.5	0	38.92	54	-15.08	-	-	171	105	H
4	* 2.38609	33.28	RMS	31.7	-25.5	0	39.48	54	-14.52	-	-	171	105	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.83	Pk	31.7	-25.5	0	49.03	-	-	74	-24.97	72	129	V
2	* 2.32809	45.77	Pk	31.5	-25.7	0	51.57	-	-	74	-22.43	72	129	V
3	* 2.39	32.65	RMS	31.7	-25.5	0	38.85	54	-15.15	-	-	72	129	V
4	* 2.38876	33.29	RMS	31.7	-25.5	0	39.49	54	-14.51	-	-	72	129	V

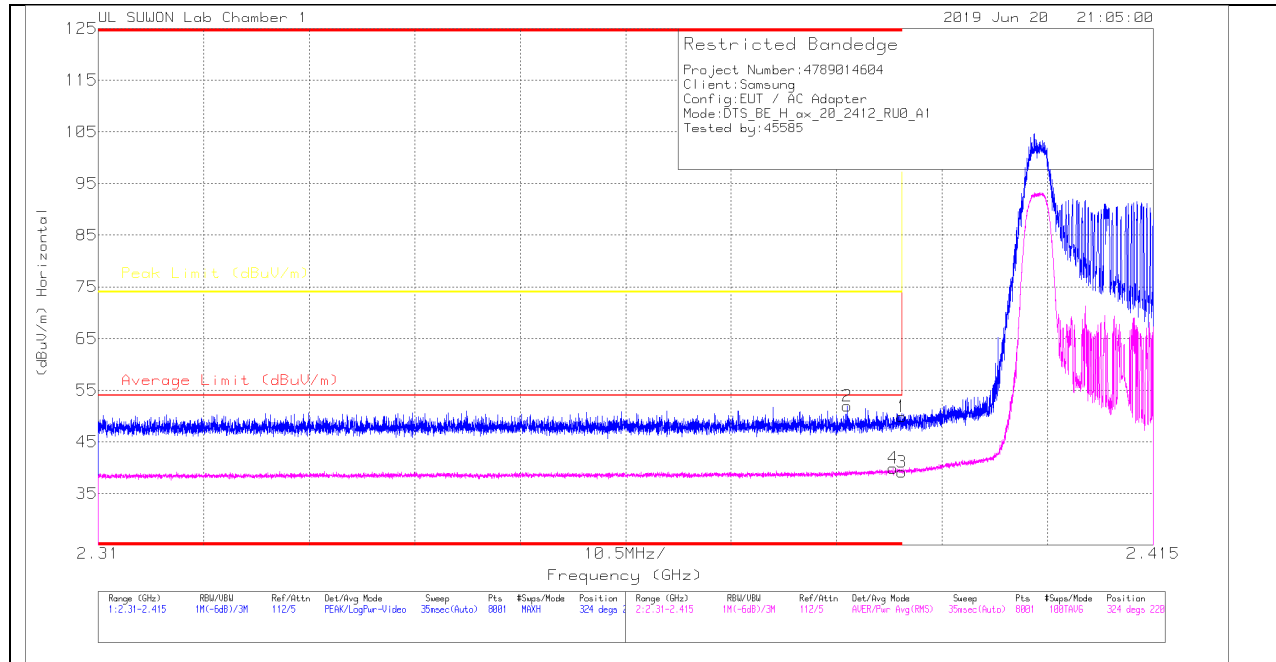
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

26T RU mode (ANT_1 / RU offset 0)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

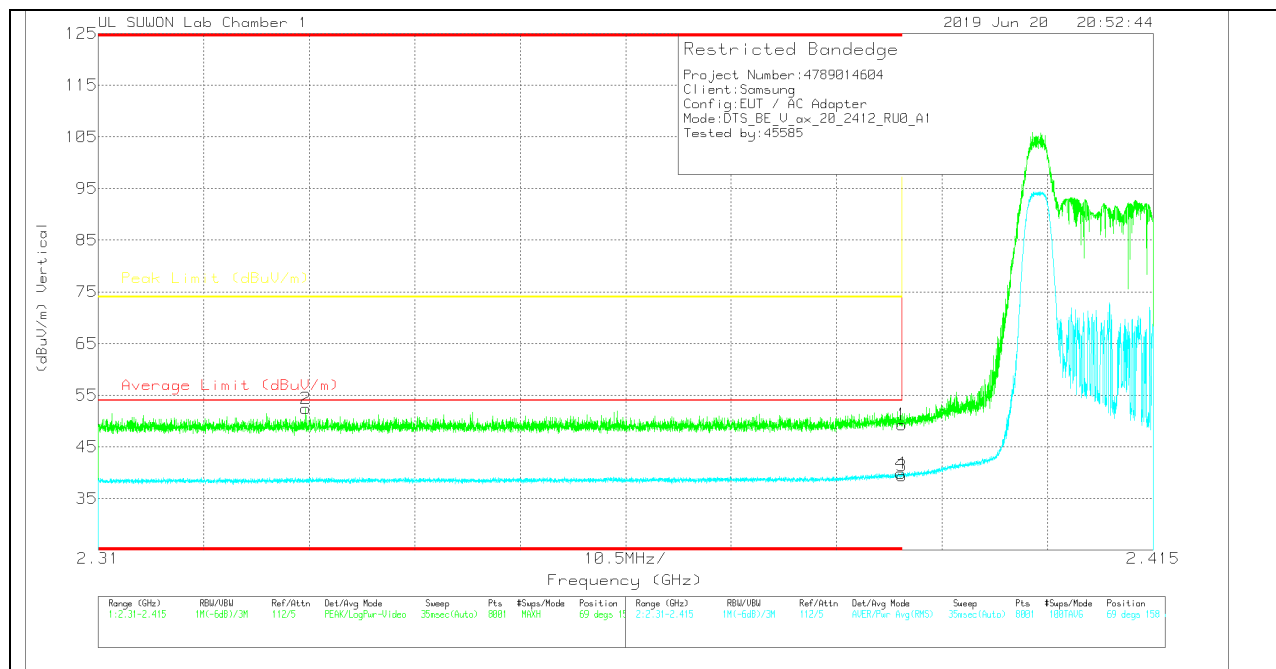
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.39	43.69	Pk	31.7	-25.5	0	49.89	-	-	74	-24.11	324	220	H
2	* 2.38456	45.74	Pk	31.7	-25.5	0	51.94	-	-	74	-22.06	324	220	H
3	* 2.39	32.93	RMS	31.7	-25.5	0	39.13	54	-14.87	-	-	324	220	H
4	* 2.3891	33.71	RMS	31.7	-25.5	0	39.91	54	-14.09	-	-	324	220	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	43.09	Pk	31.7	-25.5	0	49.29	-	-	74	-24.71	69	158	V
2	* 2.33067	46.64	Pk	31.5	-25.7	0	52.44	-	-	74	-21.56	69	158	V
3	* 2.39	33.18	RMS	31.7	-25.5	0	39.38	54	-14.62	-	-	69	158	V
4	* 2.38989	33.69	RMS	31.7	-25.5	0	39.89	54	-14.11	-	-	69	158	V

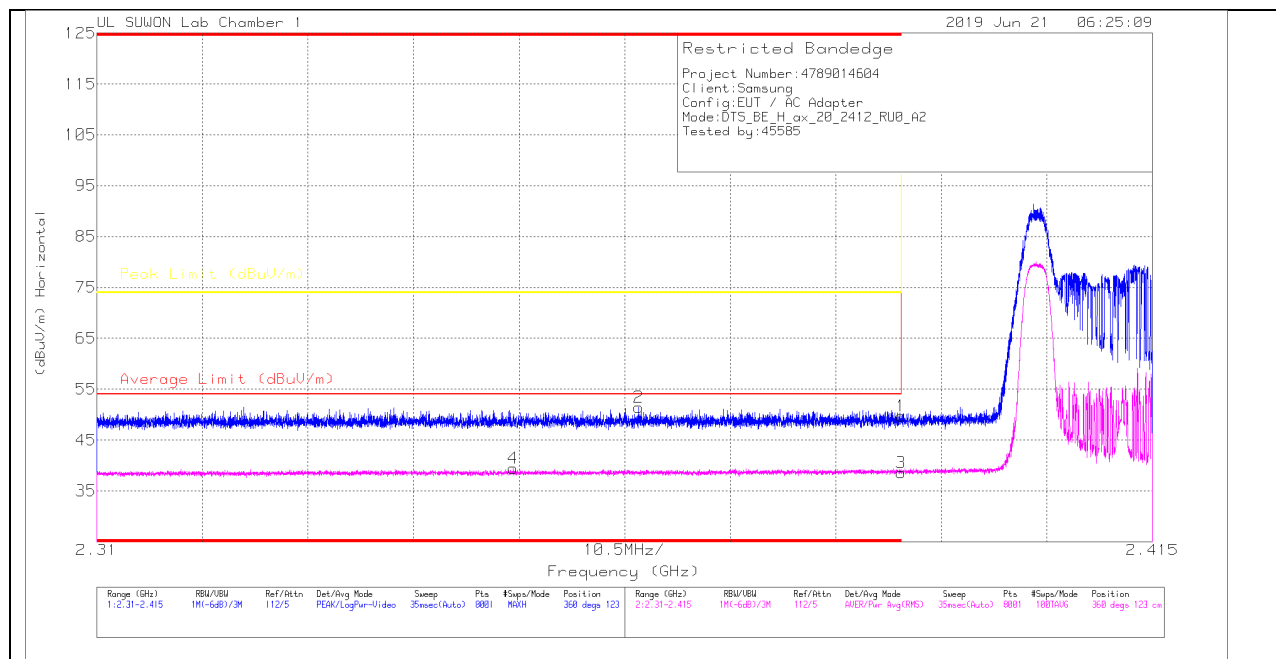
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

26T RU mode (ANT_2 / RU offset 0)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

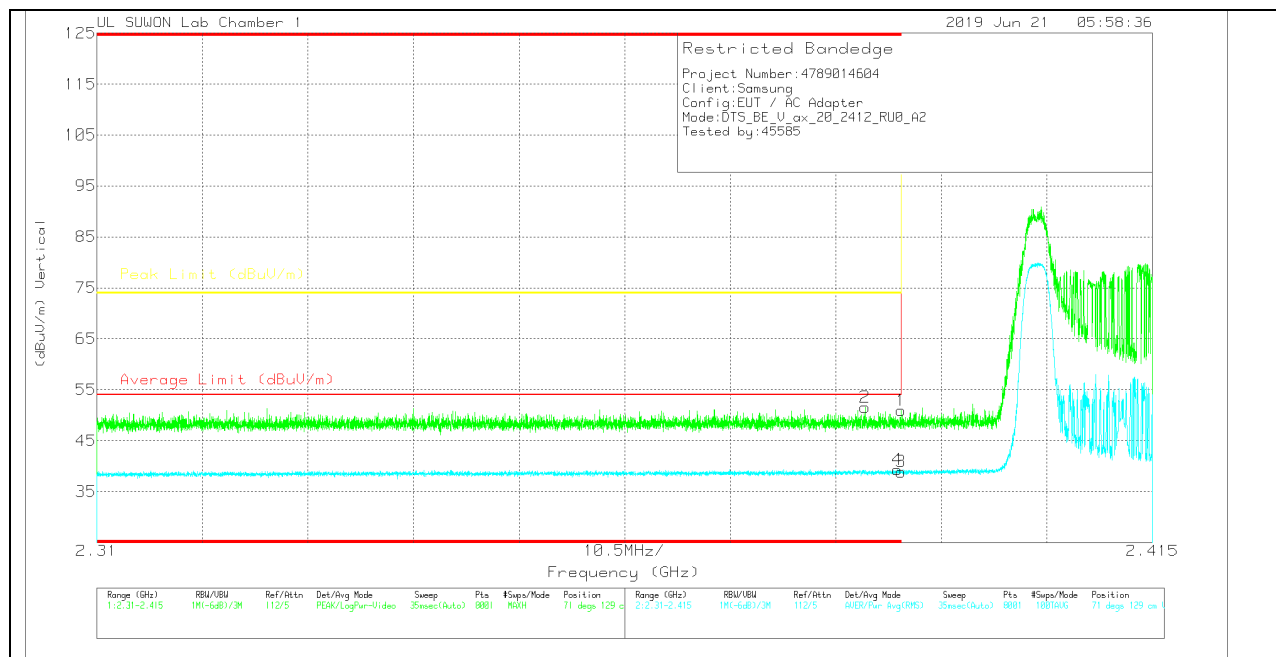
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	43.52	Pk	31.7	-25.5	0	49.72	-	-	74	-24.28	360	123	H
2	* 2.3639	45.57	Pk	31.6	-25.7	0	51.47	-	-	74	-22.53	360	123	H
3	* 2.39	32.36	RMS	31.7	-25.5	0	38.56	54	-15.44	-	-	360	123	H
4	* 2.3514	33.54	RMS	31.6	-25.7	0	39.44	54	-14.56	-	-	360	123	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	44.71	Pk	31.7	-25.5	0	50.91	-	-	74	-23.09	71	129	V
2	* 2.38641	45.4	Pk	31.7	-25.5	0	51.6	-	-	74	-22.4	71	129	V
3	* 2.39	32.69	RMS	31.7	-25.5	0	38.89	54	-15.11	-	-	71	129	V
4	* 2.38964	33.14	RMS	31.7	-25.5	0	39.34	54	-14.66	-	-	71	129	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

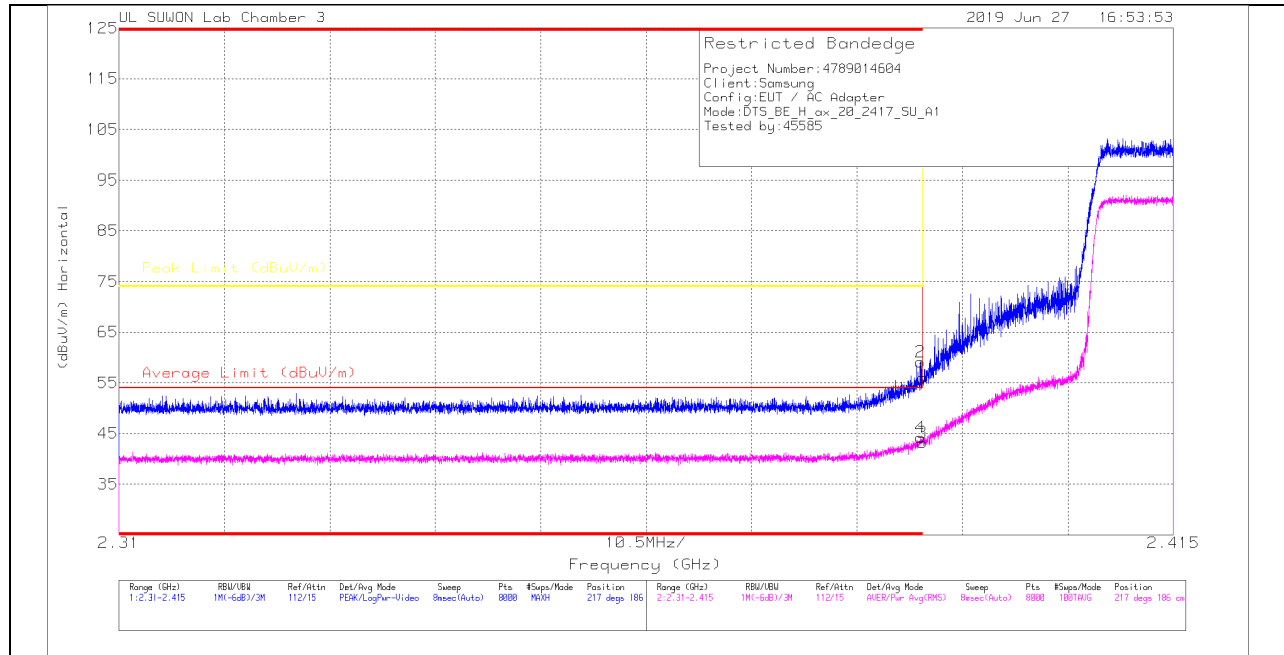
Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (2 CHANNEL)

SU mode (ANT_1)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

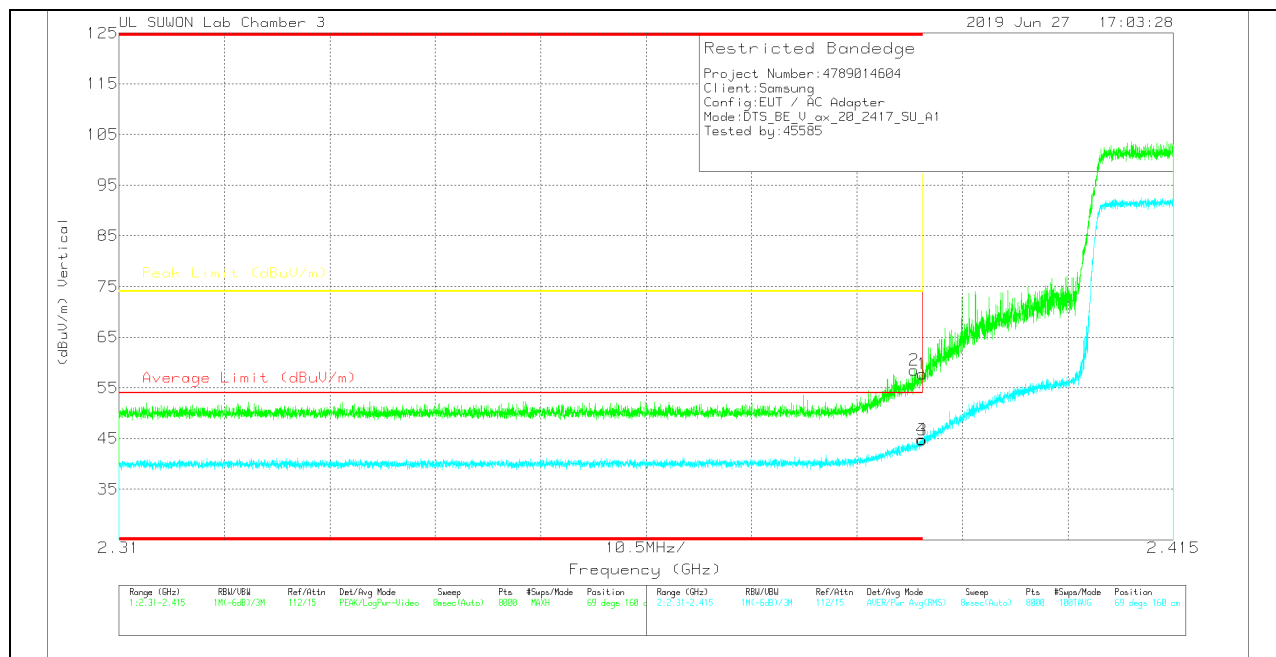
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	47.68	PK	31.7	-23.4	0	55.98	-	-	74	-18.02	217	186	H
2	* 2.39	50.75	PK	31.7	-23.4	0	59.05	-	-	74	-14.95	217	186	H
3	* 2.39	34.89	RMS	31.7	-23.4	0	43.19	54	-10.81	-	-	217	186	H
4	* 2.39	35.95	RMS	31.7	-23.4	0	44.25	54	-9.75	-	-	217	186	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	49.45	Pk	31.7	-23.4	0	57.75	-	-	74	-16.25	69	160	V
2	* 2.389	50.24	Pk	31.7	-23.4	0	58.54	-	-	74	-15.46	69	160	V
3	* 2.39	36.39	RMS	31.7	-23.4	0	44.69	54	-9.31	-	-	69	160	V
4	* 2.39	36.51	RMS	31.7	-23.4	0	44.81	54	-9.19	-	-	69	160	V

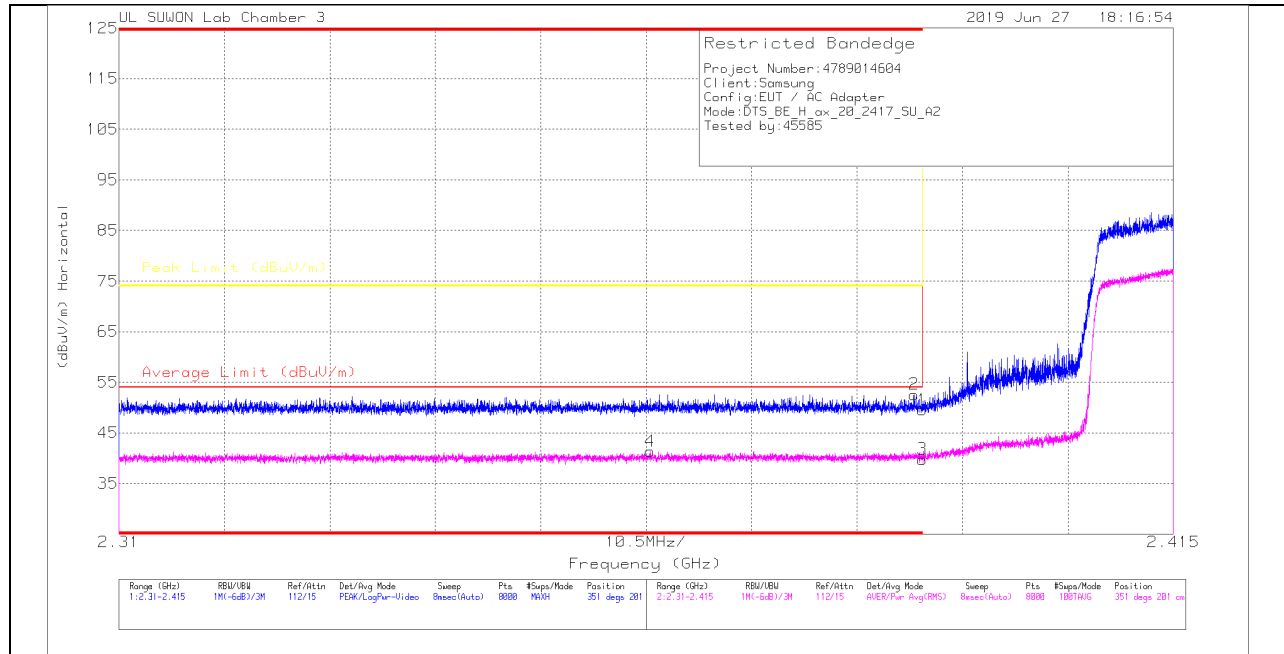
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

SU mode (ANT_2)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

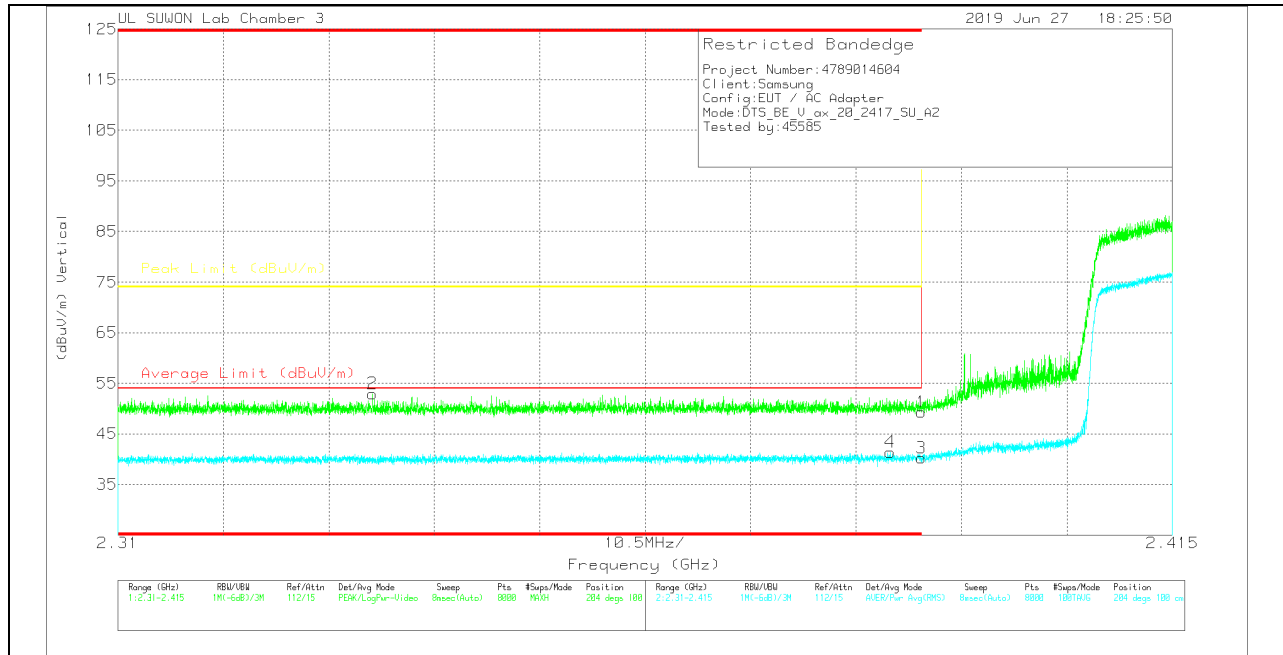
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.28	Pk	31.7	-23.4	0	49.58	-	-	74	-24.42	351	201	H
2	* 2.389	44.29	Pk	31.7	-23.4	0	52.59	-	-	74	-21.41	351	201	H
3	* 2.39	31.5	RMS	31.7	-23.4	0	39.8	54	-14.2	-	-	351	201	H
4	* 2.363	33.2	RMS	31.6	-23.4	0	41.4	54	-12.6	-	-	351	201	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.95	Pk	31.7	-23.4	0	49.25	-	-	74	-24.75	204	100	V
2	* 2.335	44.86	Pk	31.5	-23.4	0	52.96	-	-	74	-21.04	204	100	V
3	* 2.39	31.9	RMS	31.7	-23.4	0	40.2	54	-13.8	-	-	204	100	V
4	* 2.387	33.11	RMS	31.7	-23.4	0	41.41	54	-12.59	-	-	204	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

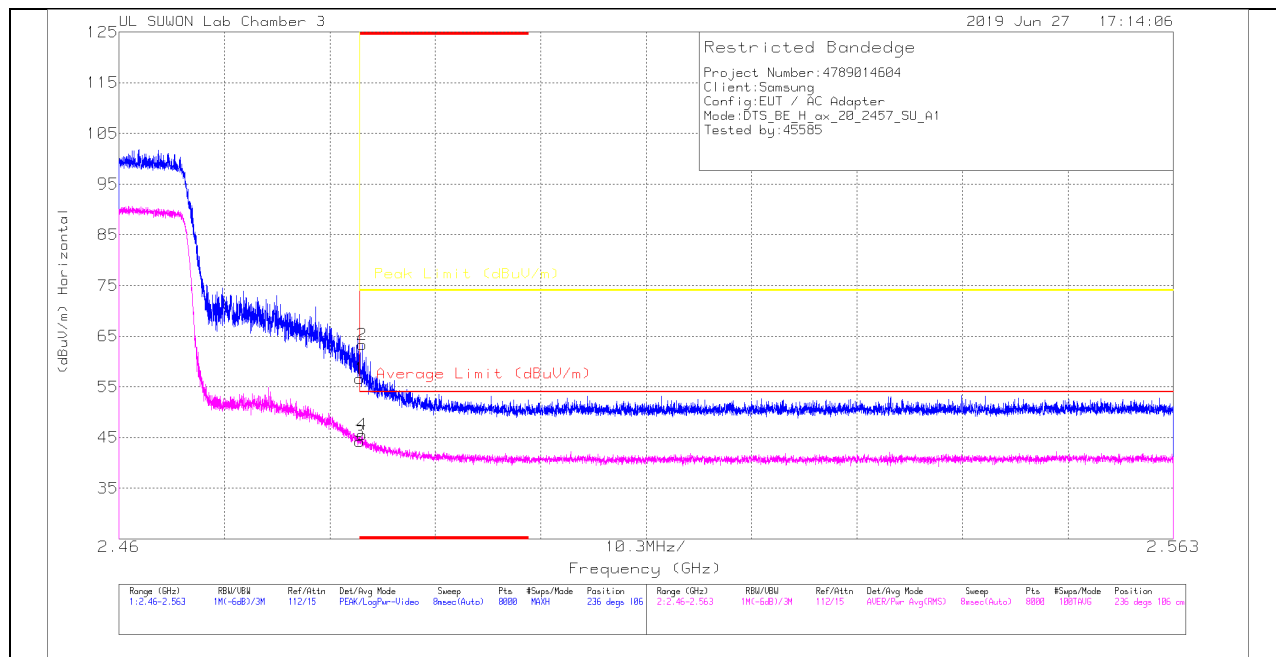
Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (10 CHANNEL)

SU mode (ANT_1)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

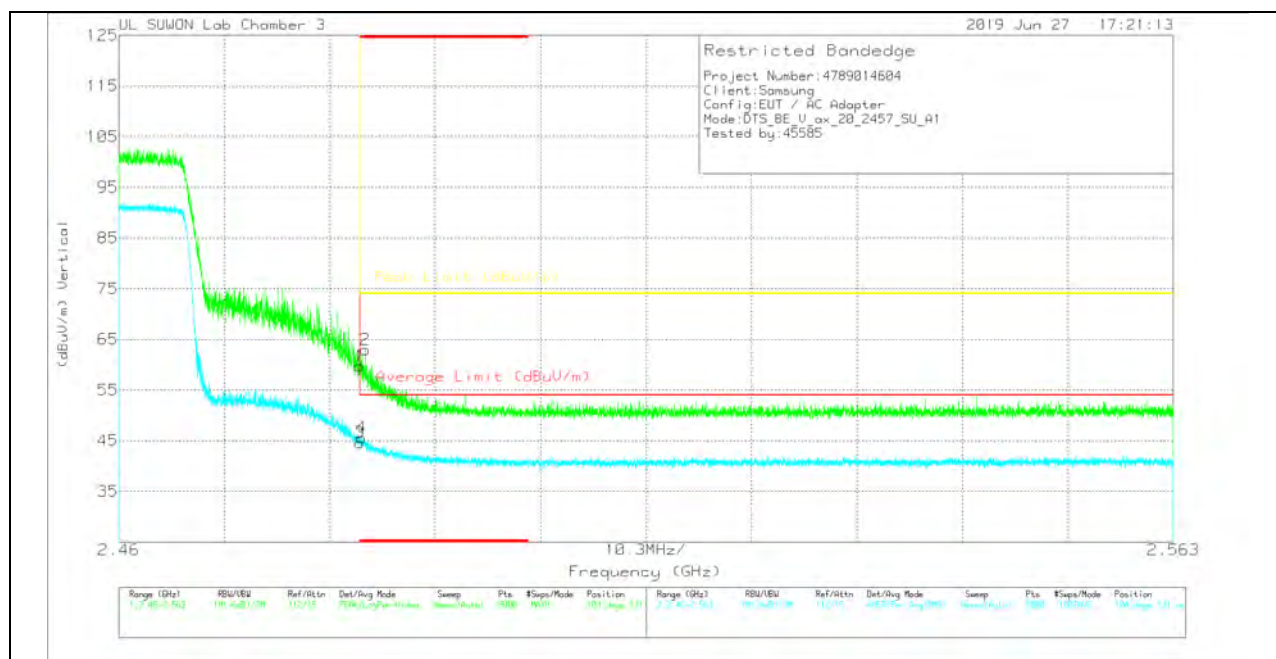
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	47.96	PK	31.9	-23.2	0	56.66	-	-	74	-17.34	236	106	H
2	* 2.484	54.71	PK	31.9	-23.3	0	63.31	-	-	74	-10.69	236	106	H
3	* 2.484	35.54	RMS	31.9	-23.2	0	44.24	54	-9.76	-	-	236	106	H
4	* 2.484	37.02	RMS	31.9	-23.3	0	45.62	54	-8.38	-	-	236	106	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	51.03	Pk	31.9	-23.2	0	59.73	-	-	74	-14.27	104	131	V
2	* 2.484	54.34	Pk	31.9	-23.3	0	62.94	-	-	74	-11.06	104	131	V
3	* 2.484	35.91	RMS	31.9	-23.2	0	44.61	54	-9.39	-	-	104	131	V
4	* 2.484	36.99	RMS	31.9	-23.3	0	45.59	54	-8.41	-	-	104	131	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection