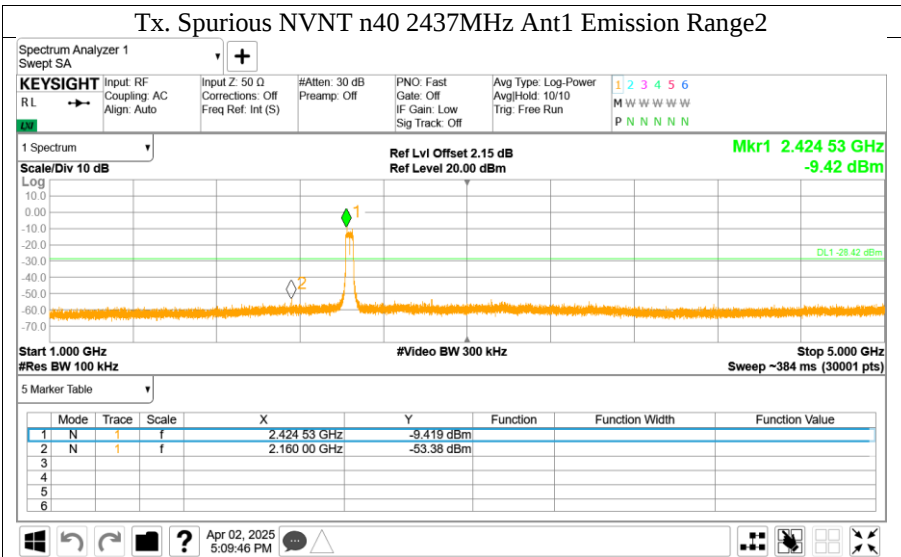
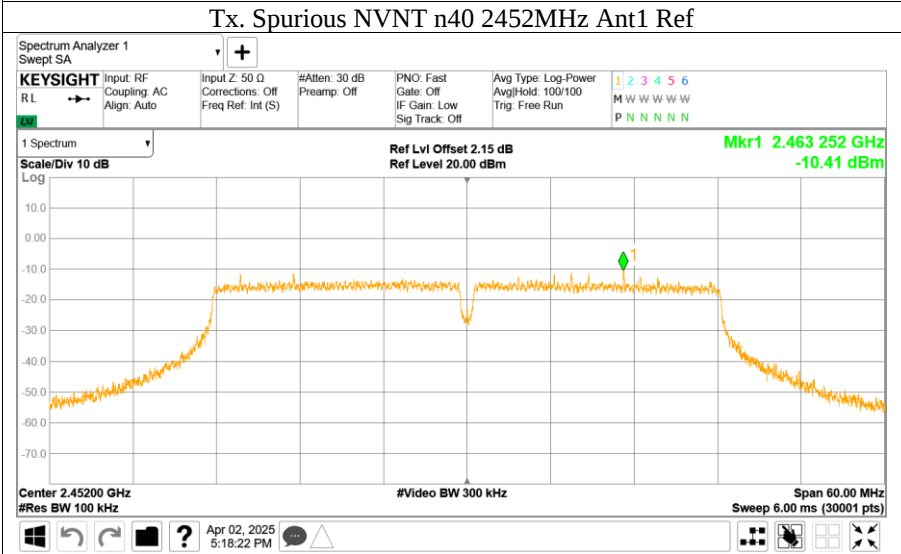
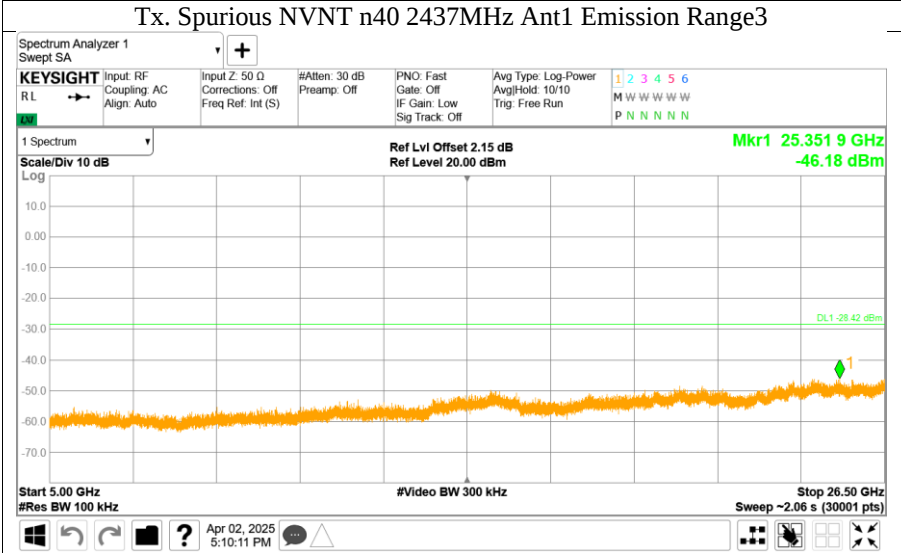
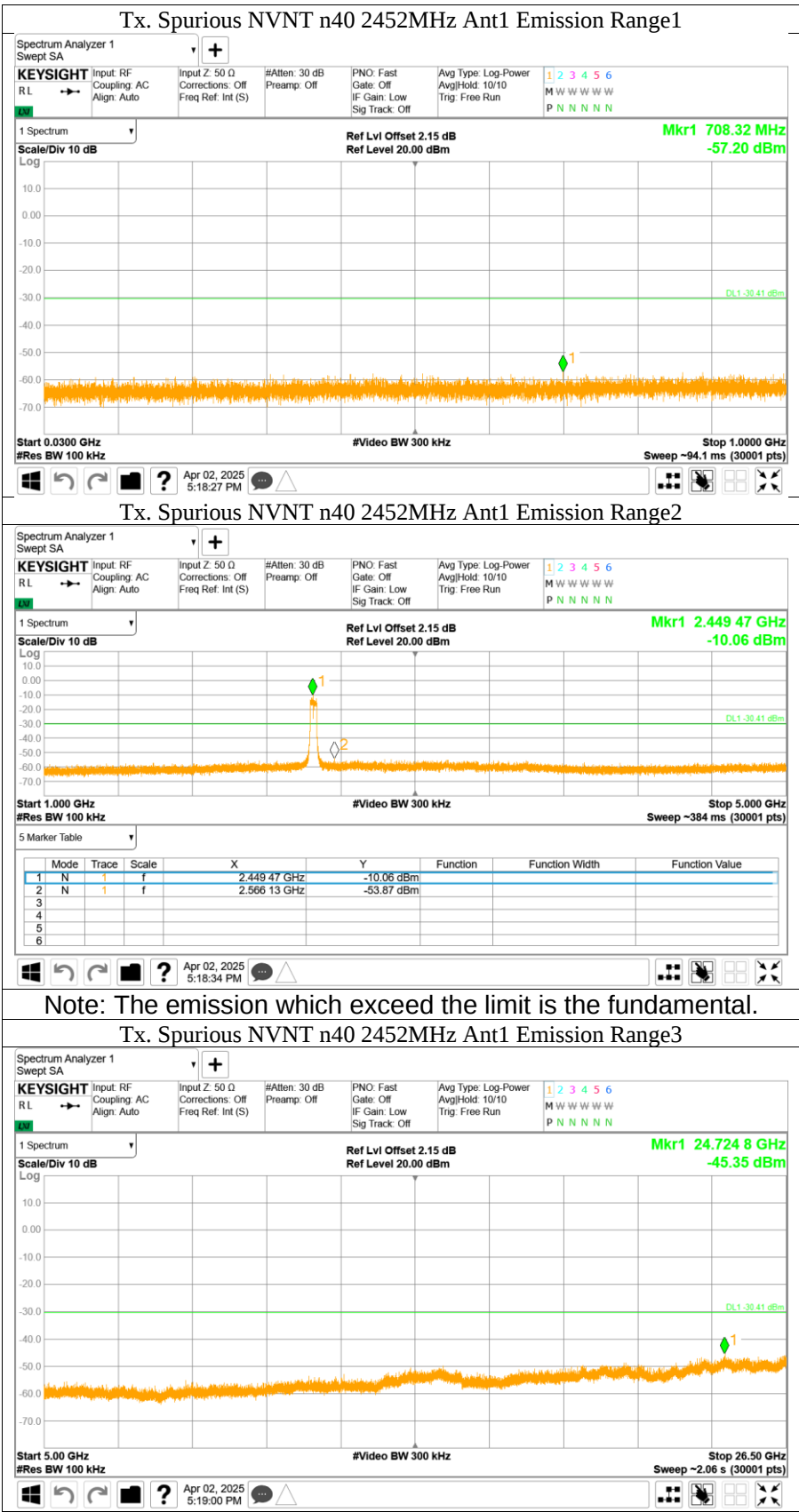
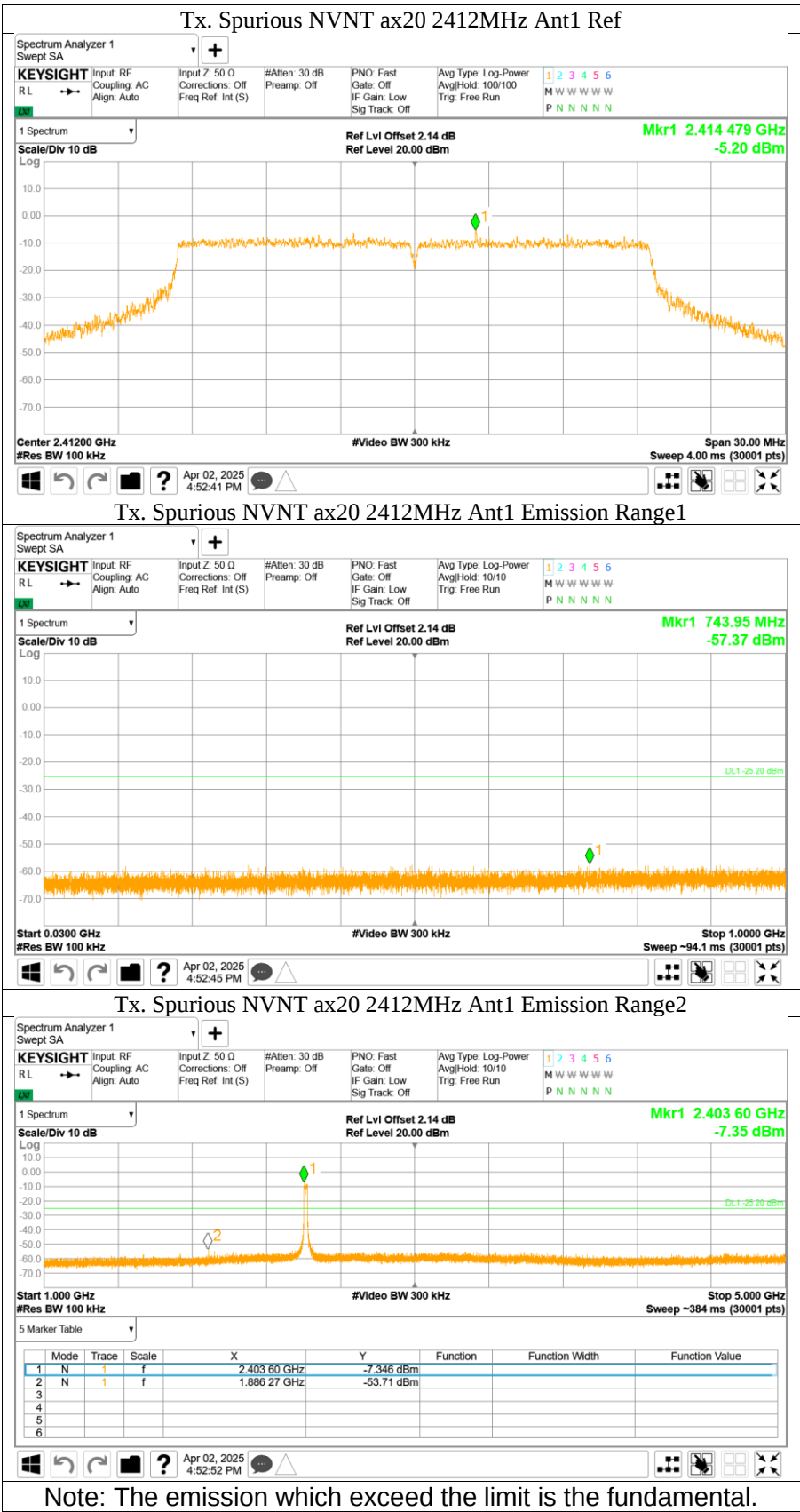


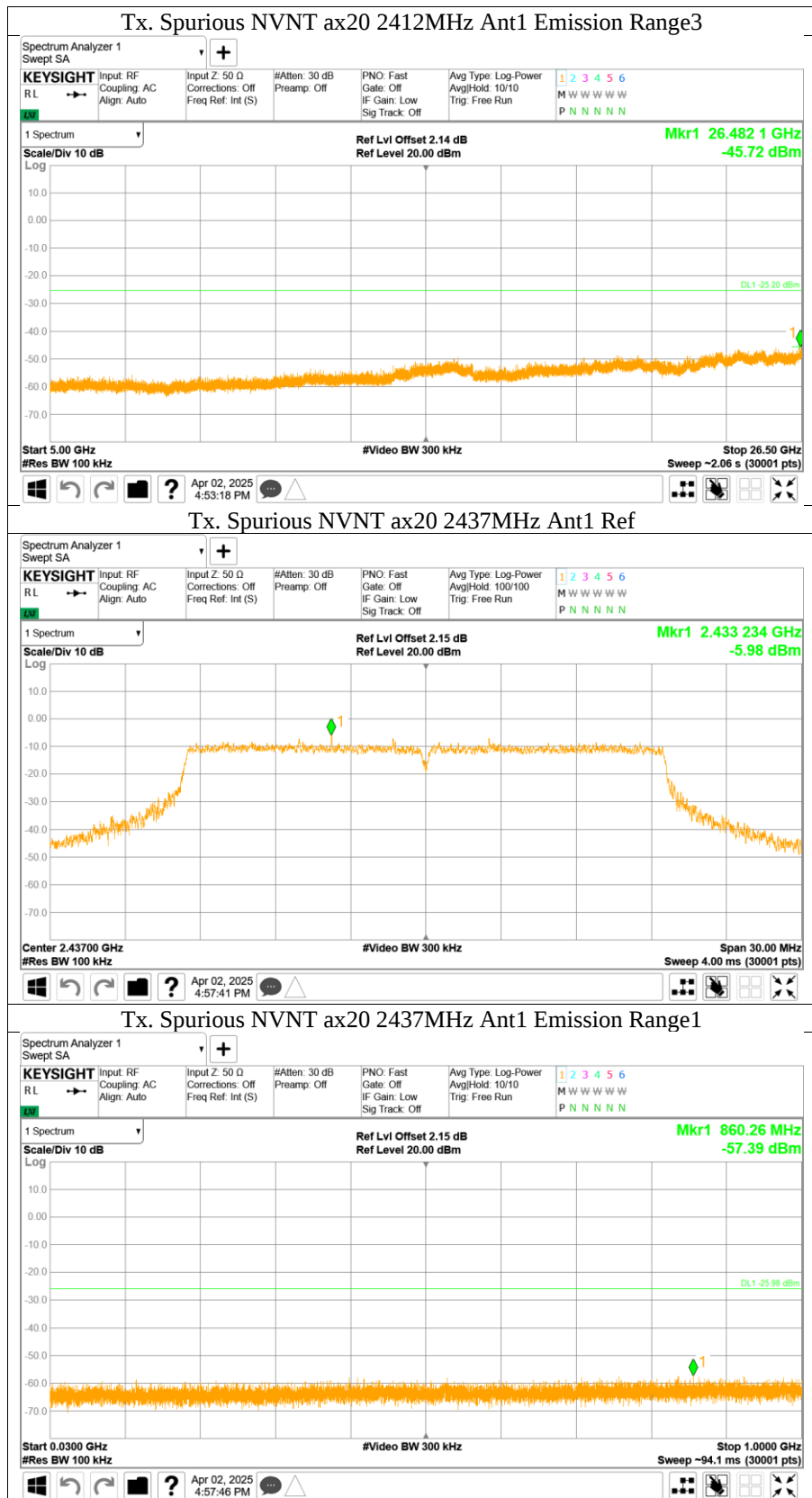


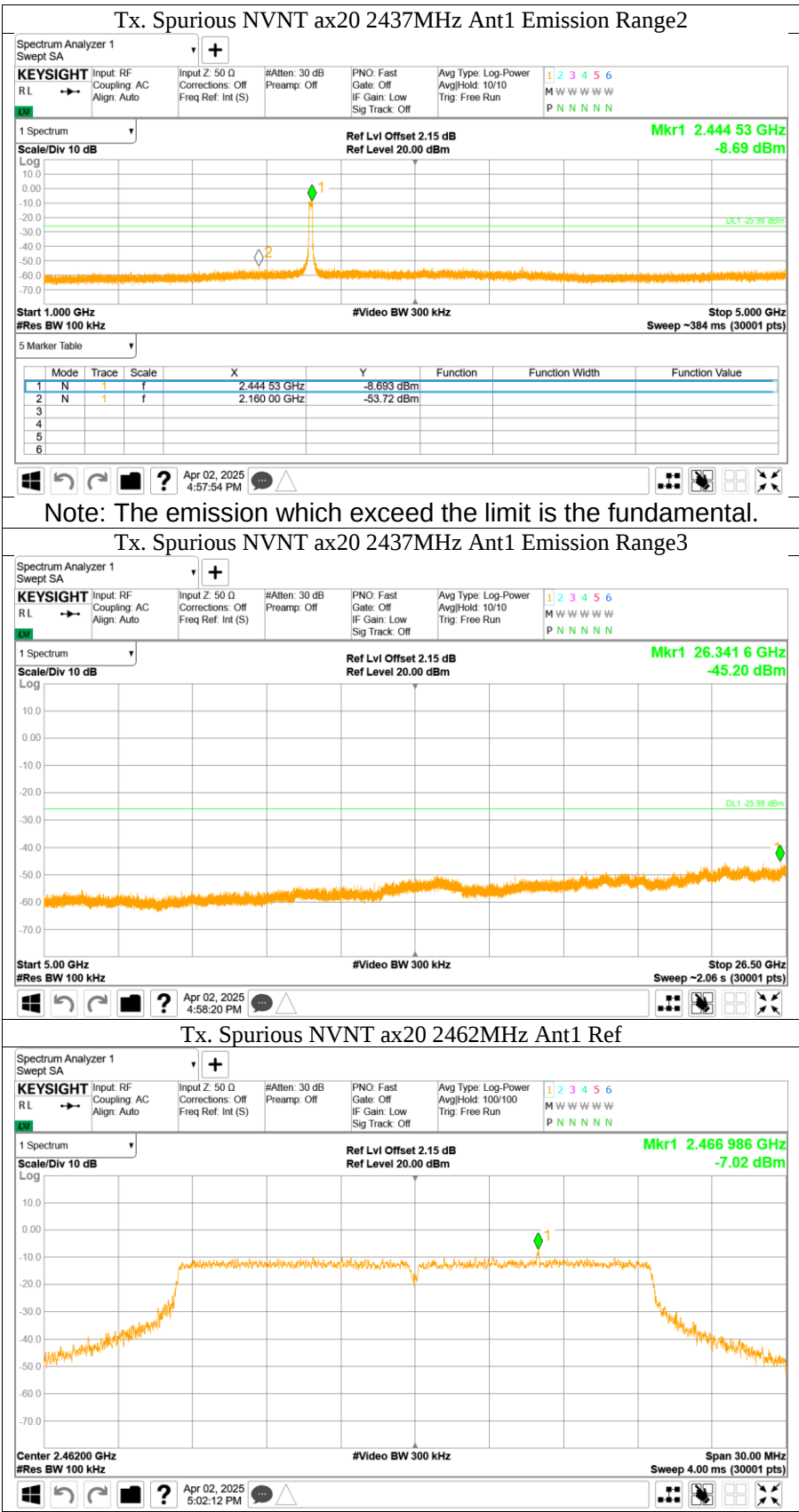
Note: The emission which exceed the limit is the fundamental.

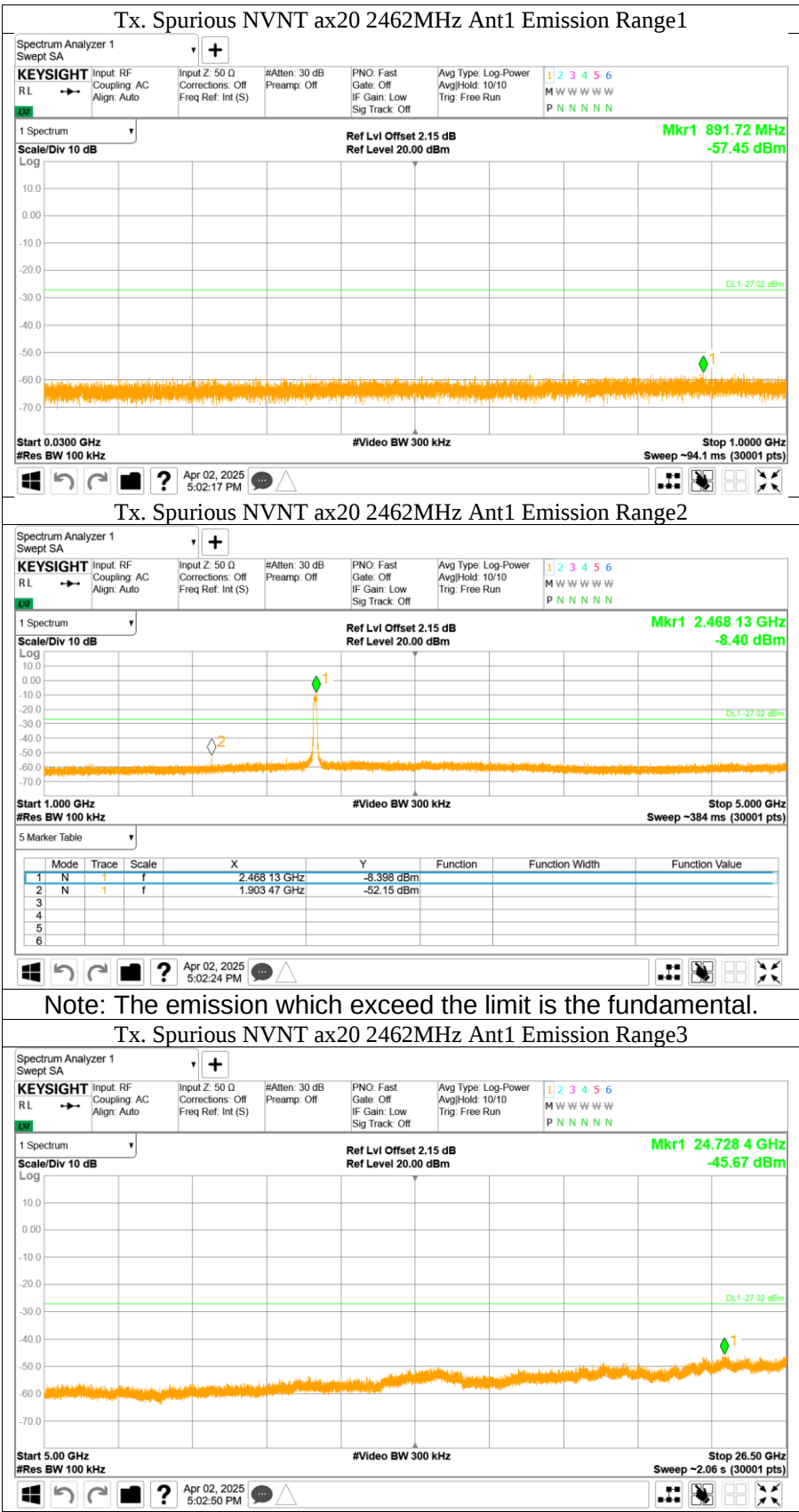


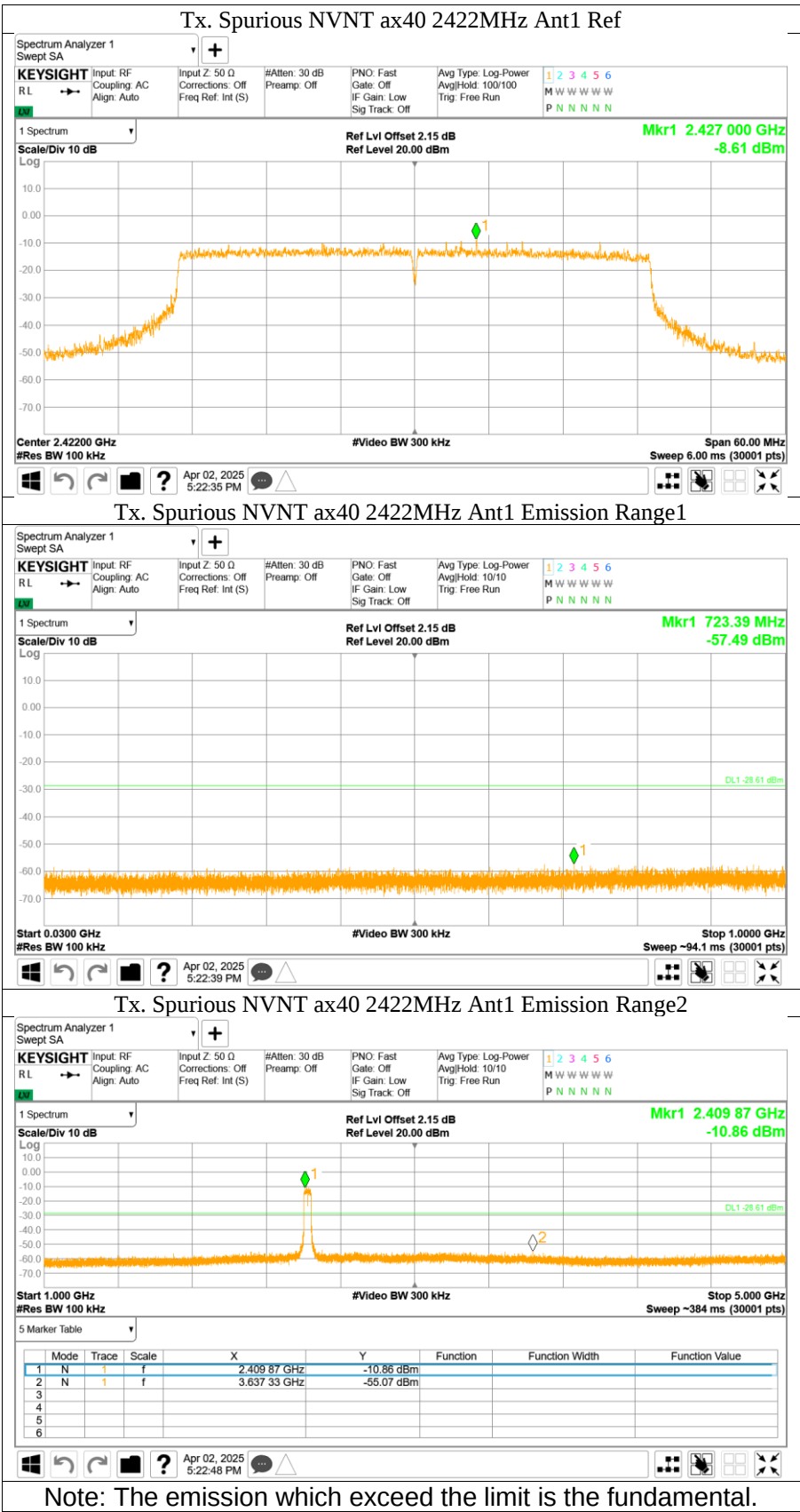


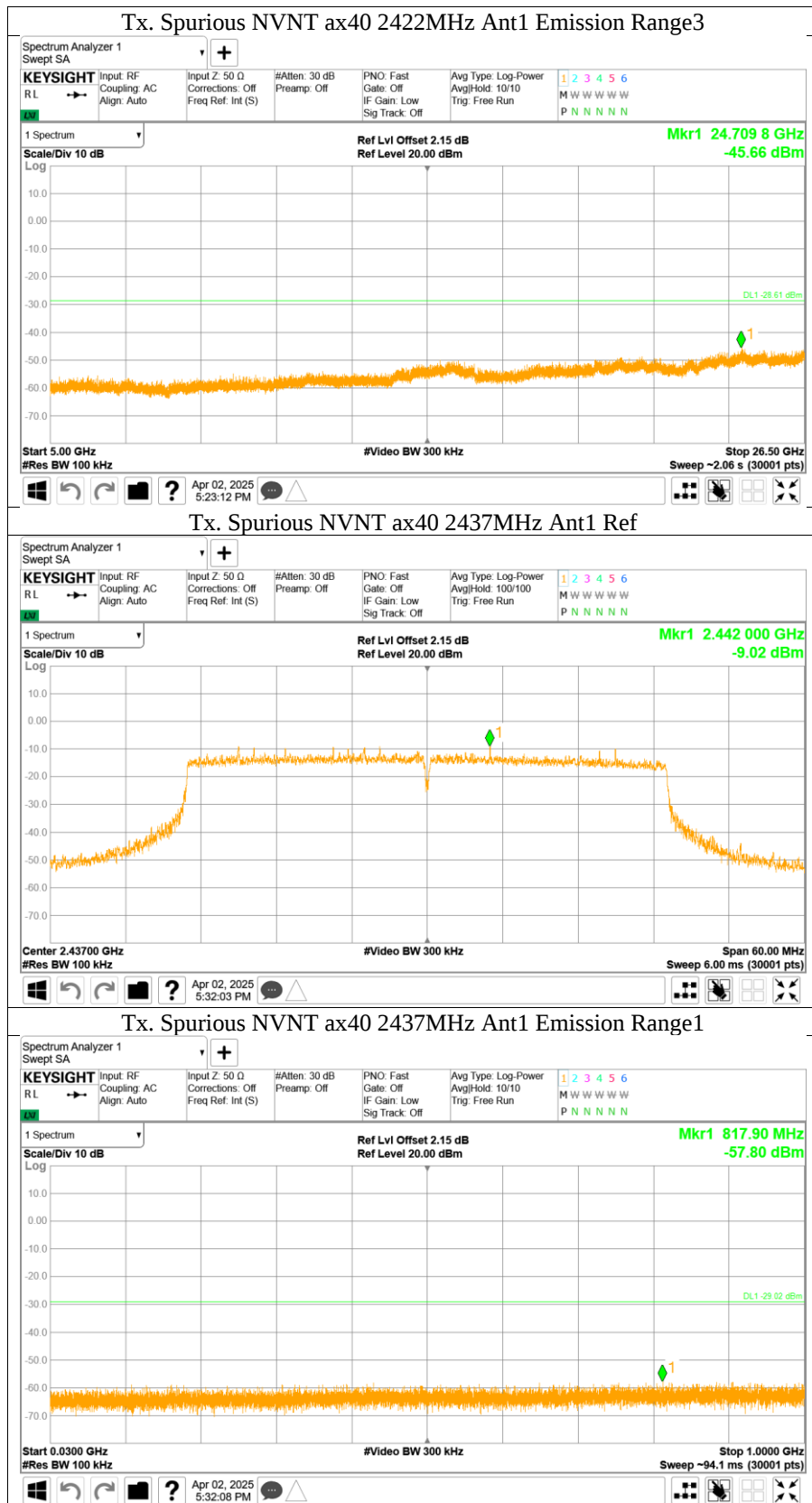


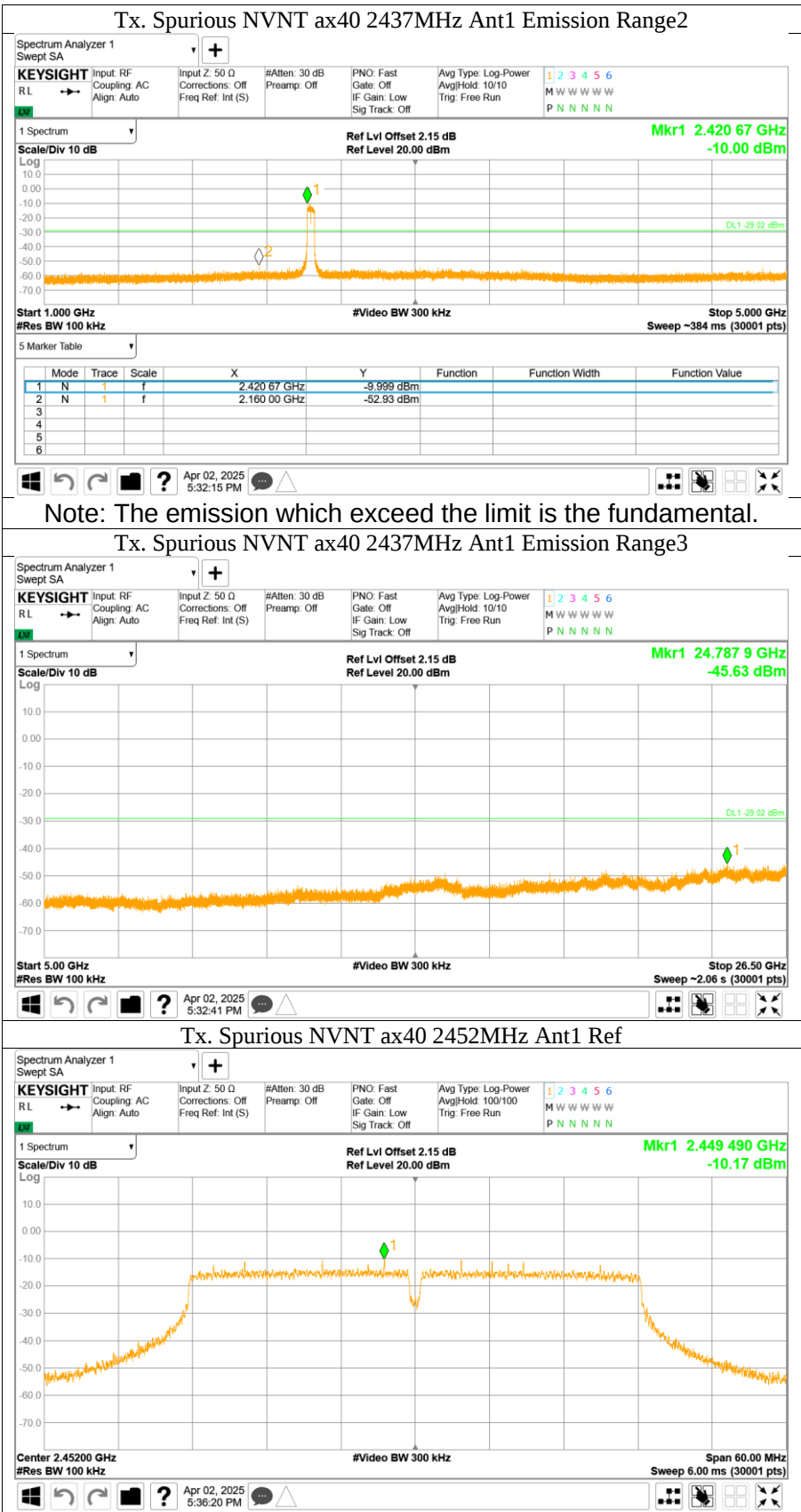


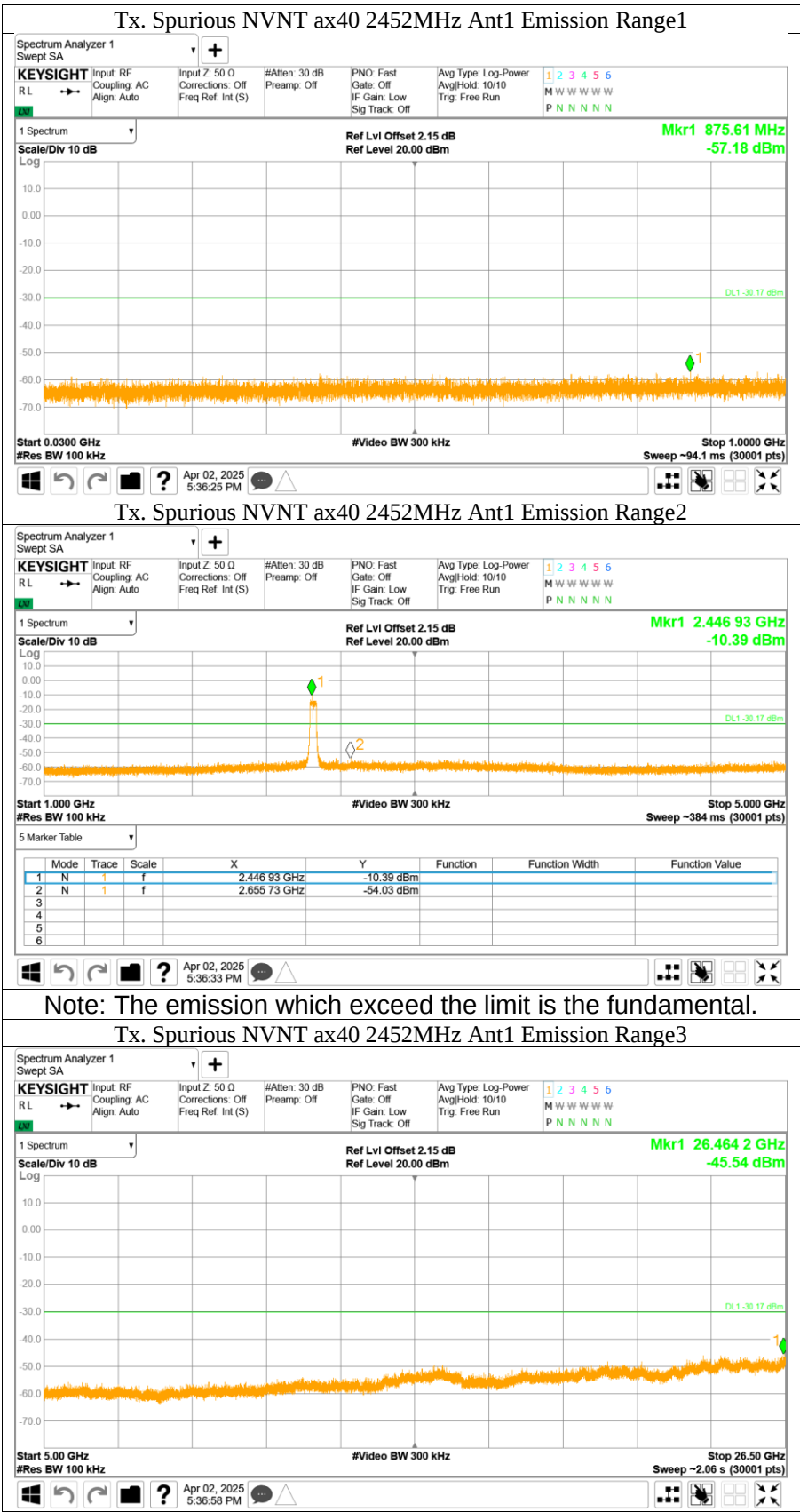














10.6 Band edge

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize, use the peak and delta measurement to record the result.
5. The level displayed must comply with the limit specified in this Section.
6. Repeat above procedures until all frequencies measured were complete and submit all the plots.

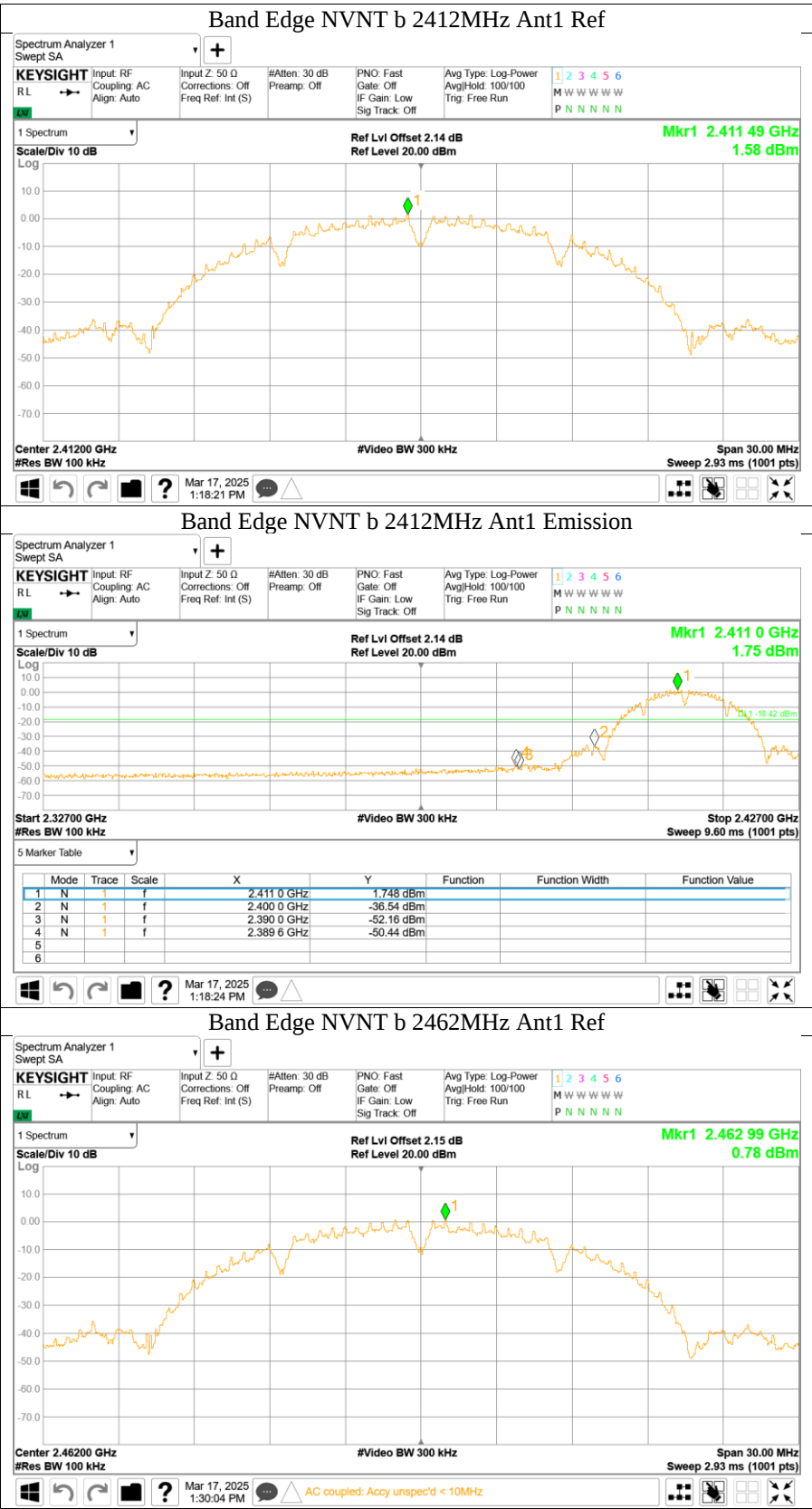
Limit:

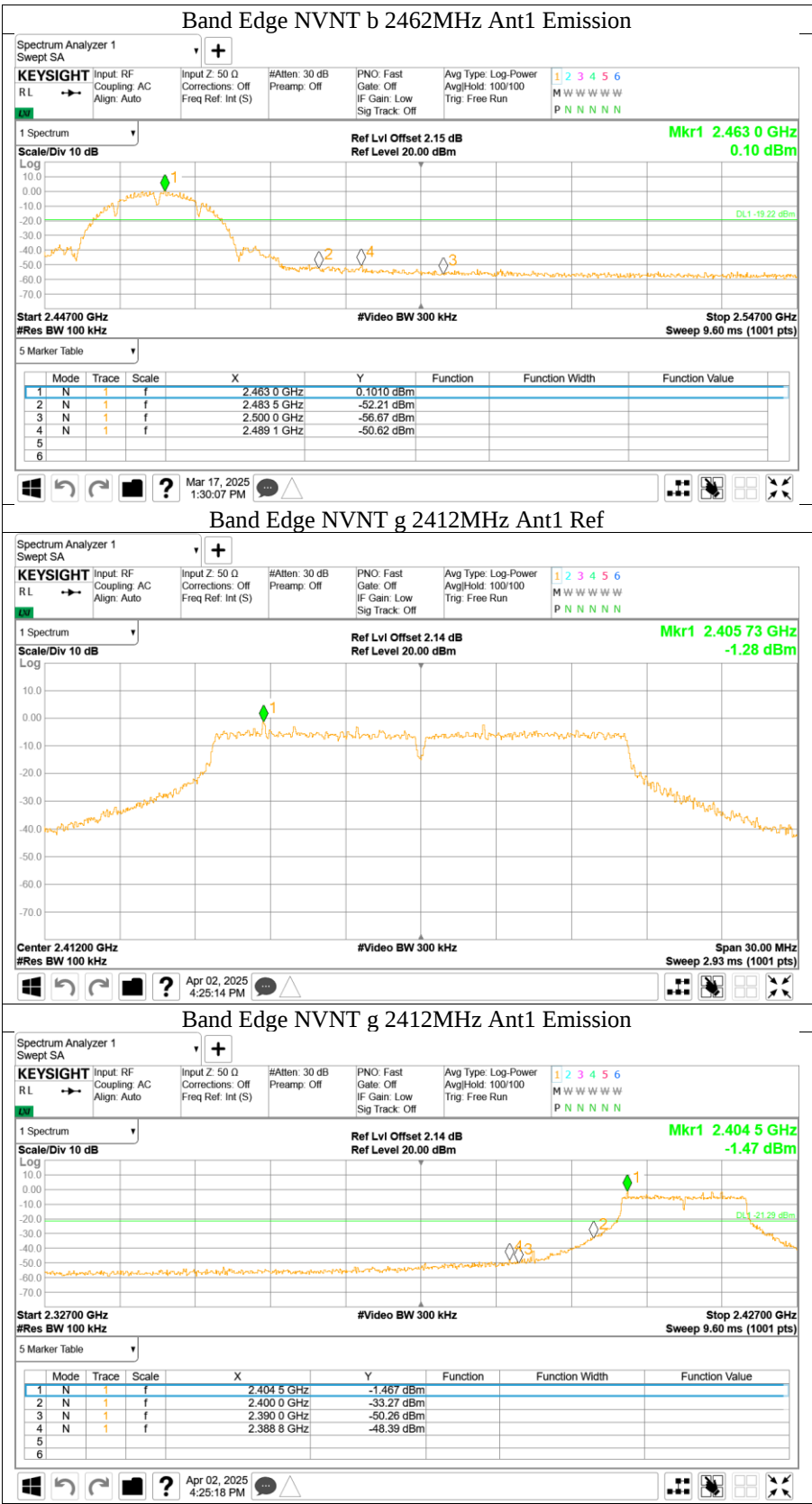
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that 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 § 15.247(b)(3) and RSS-247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB.

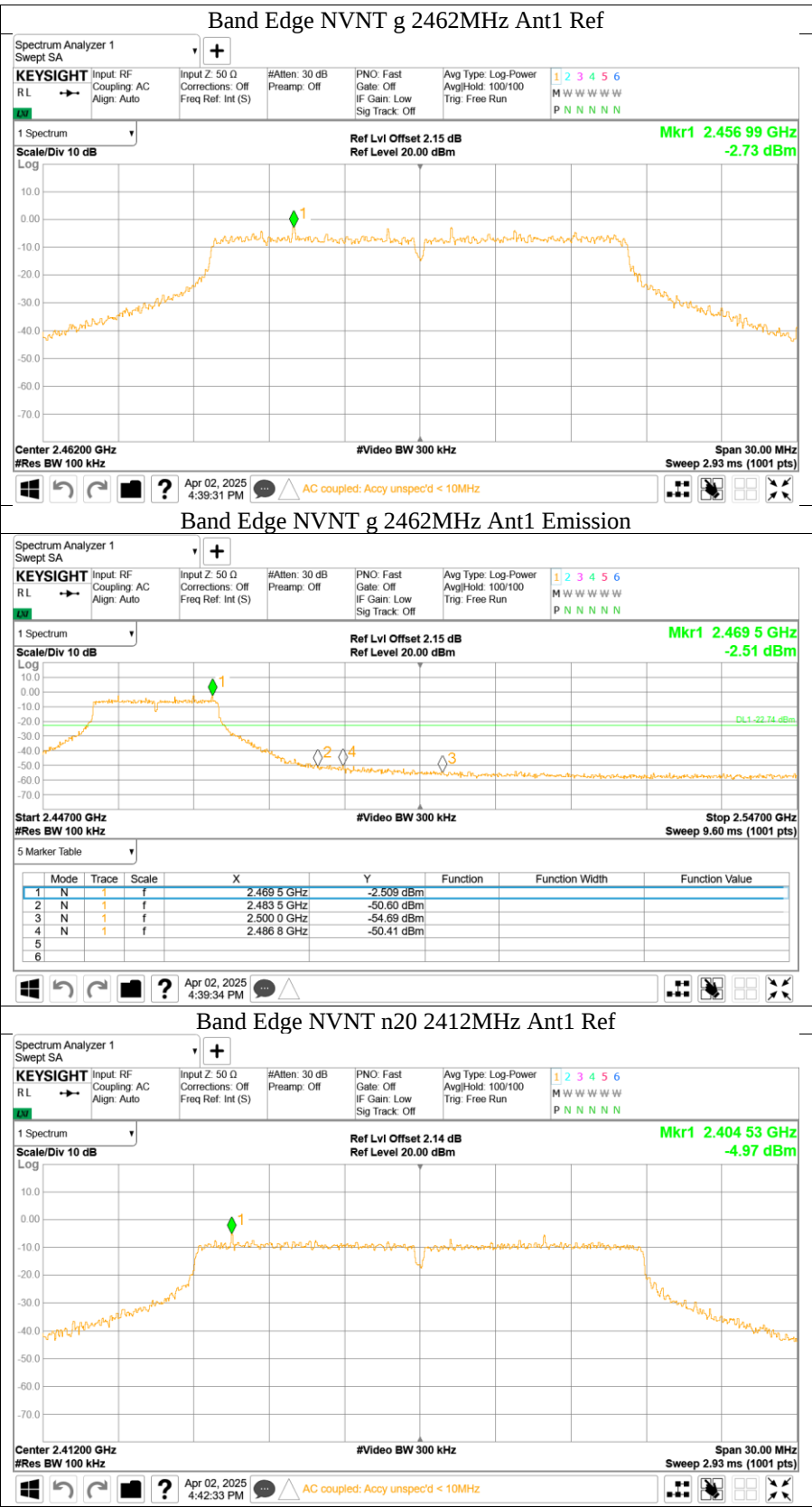
Frequency Range MHz	Limit (dBc)
30-25000	-20

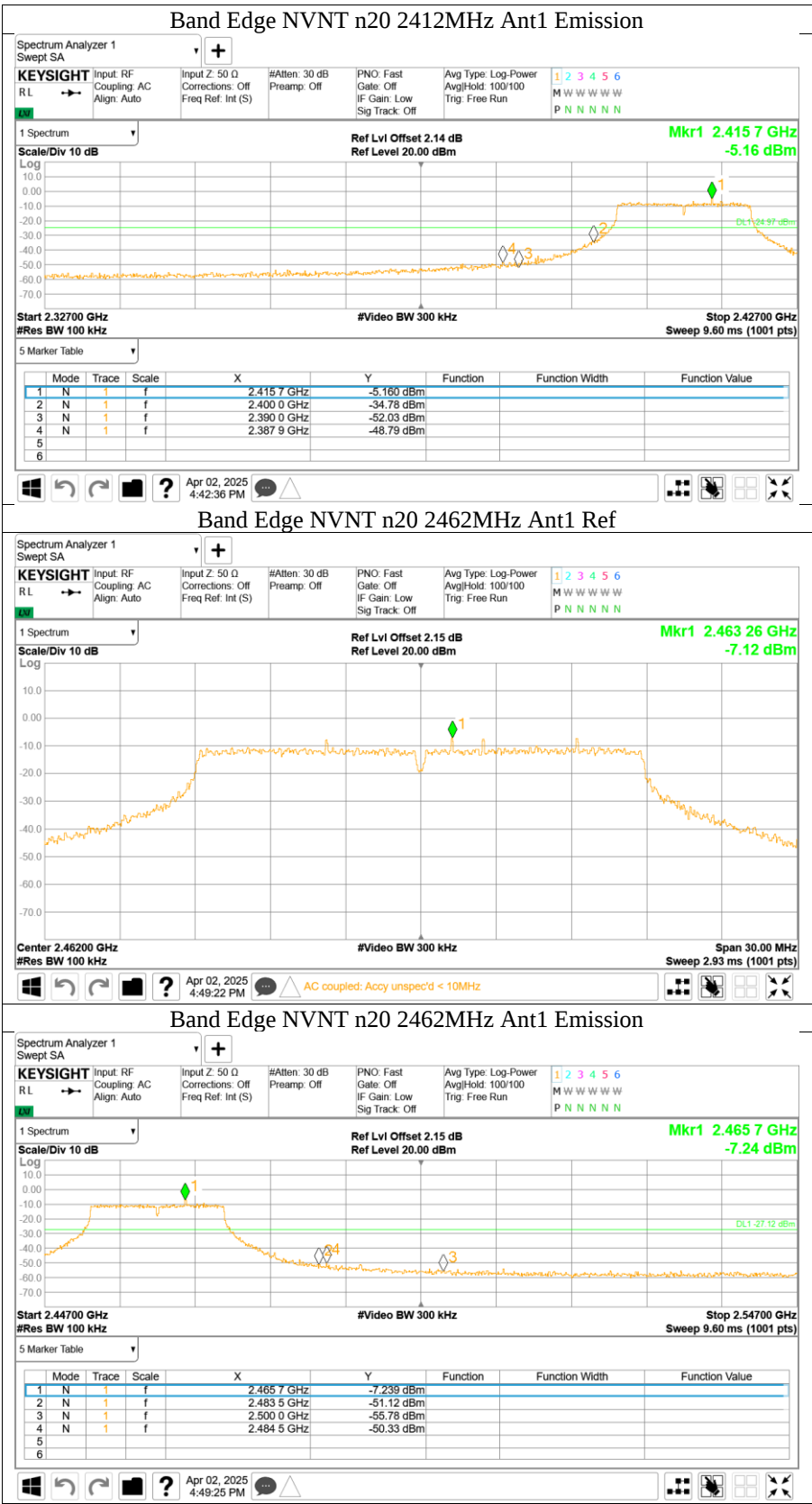


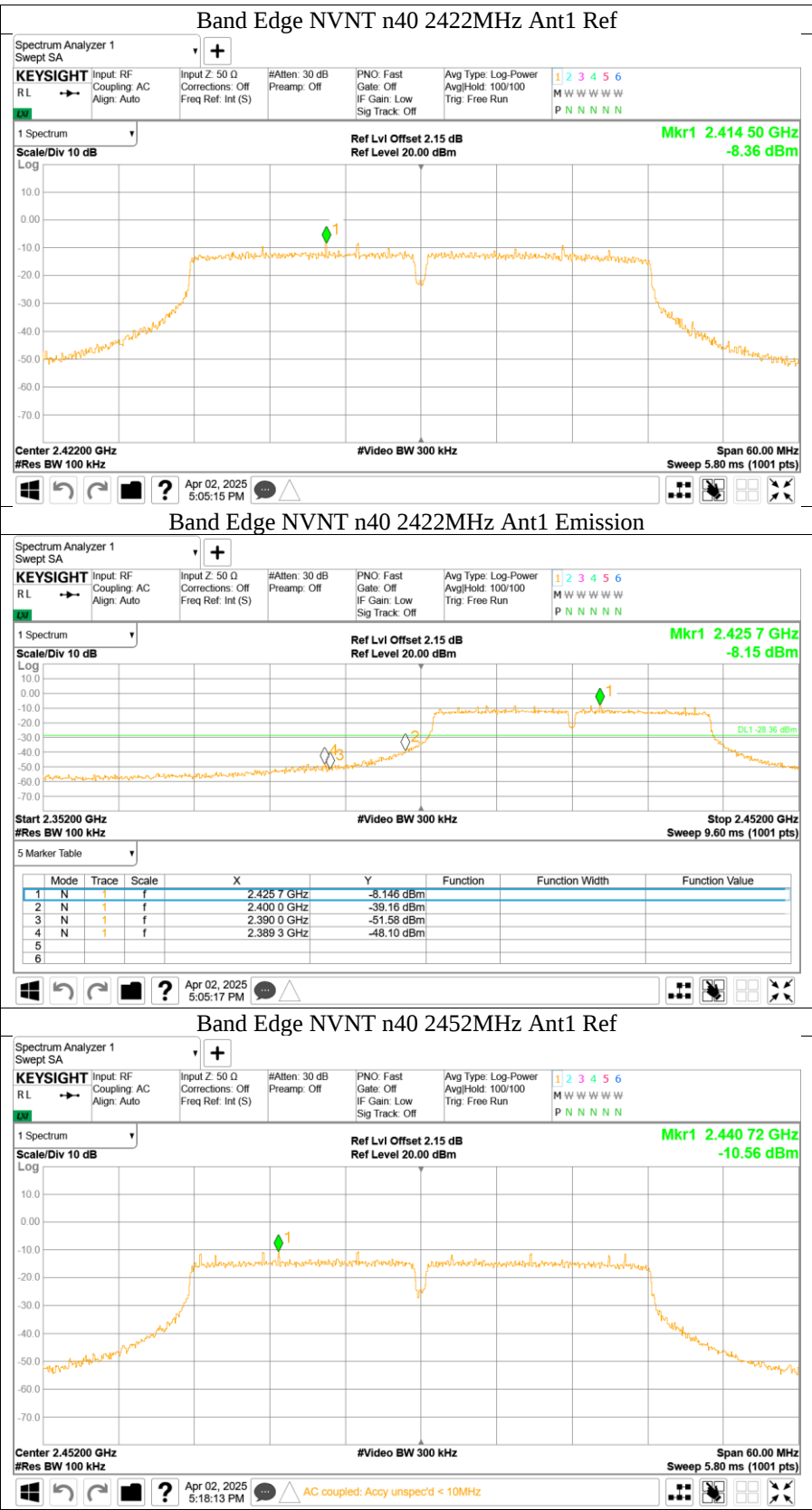
Test result

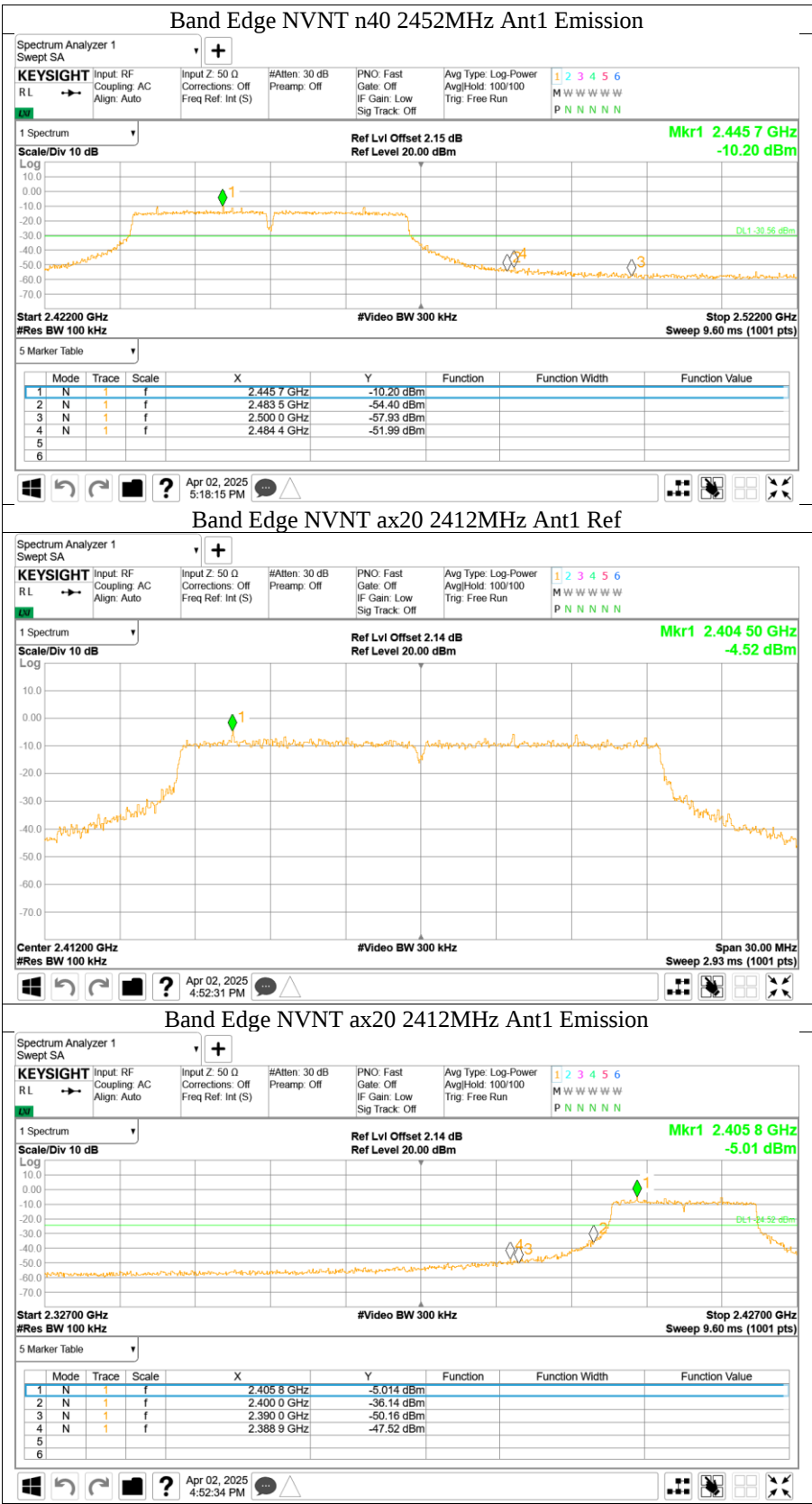


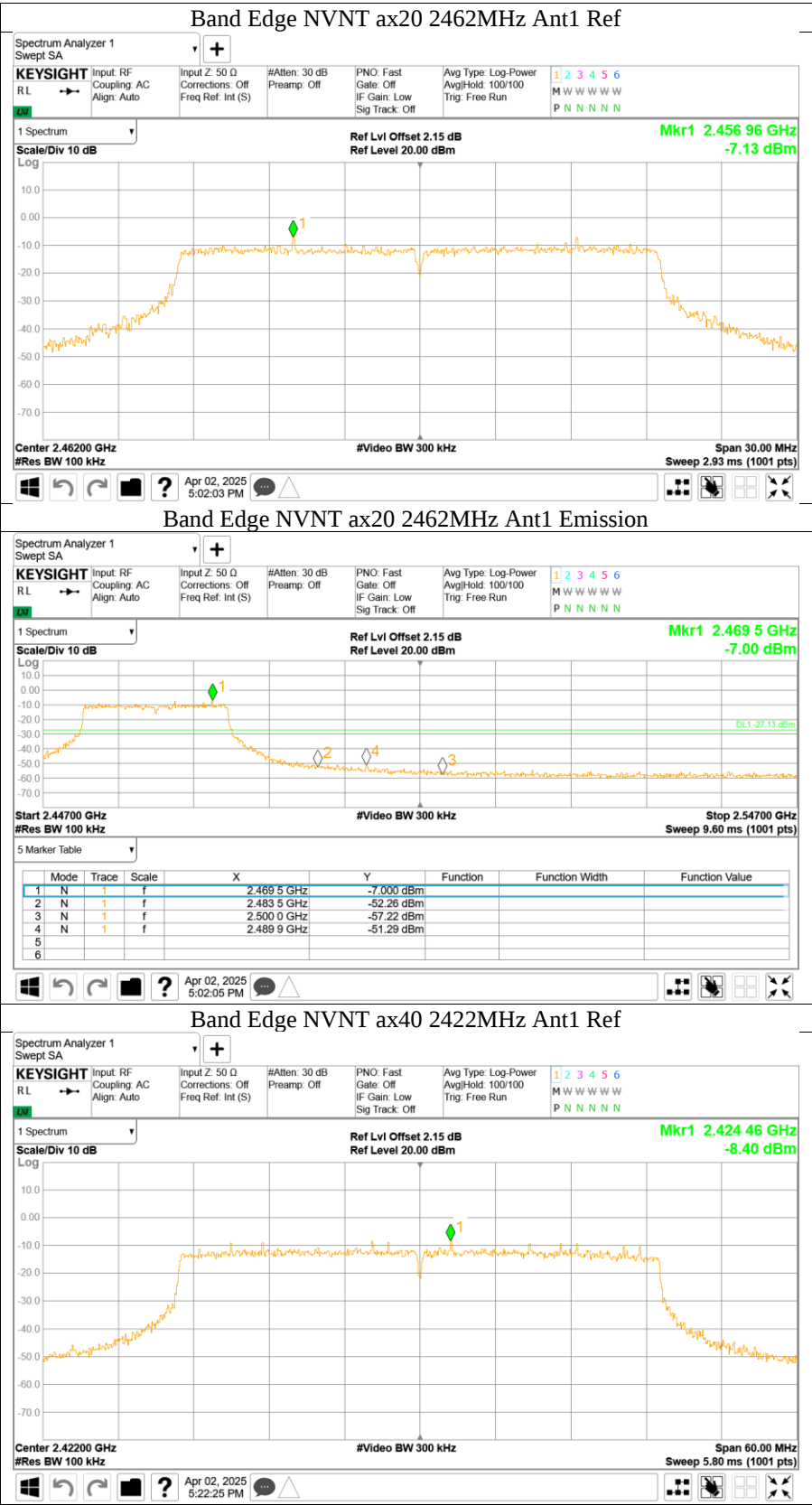


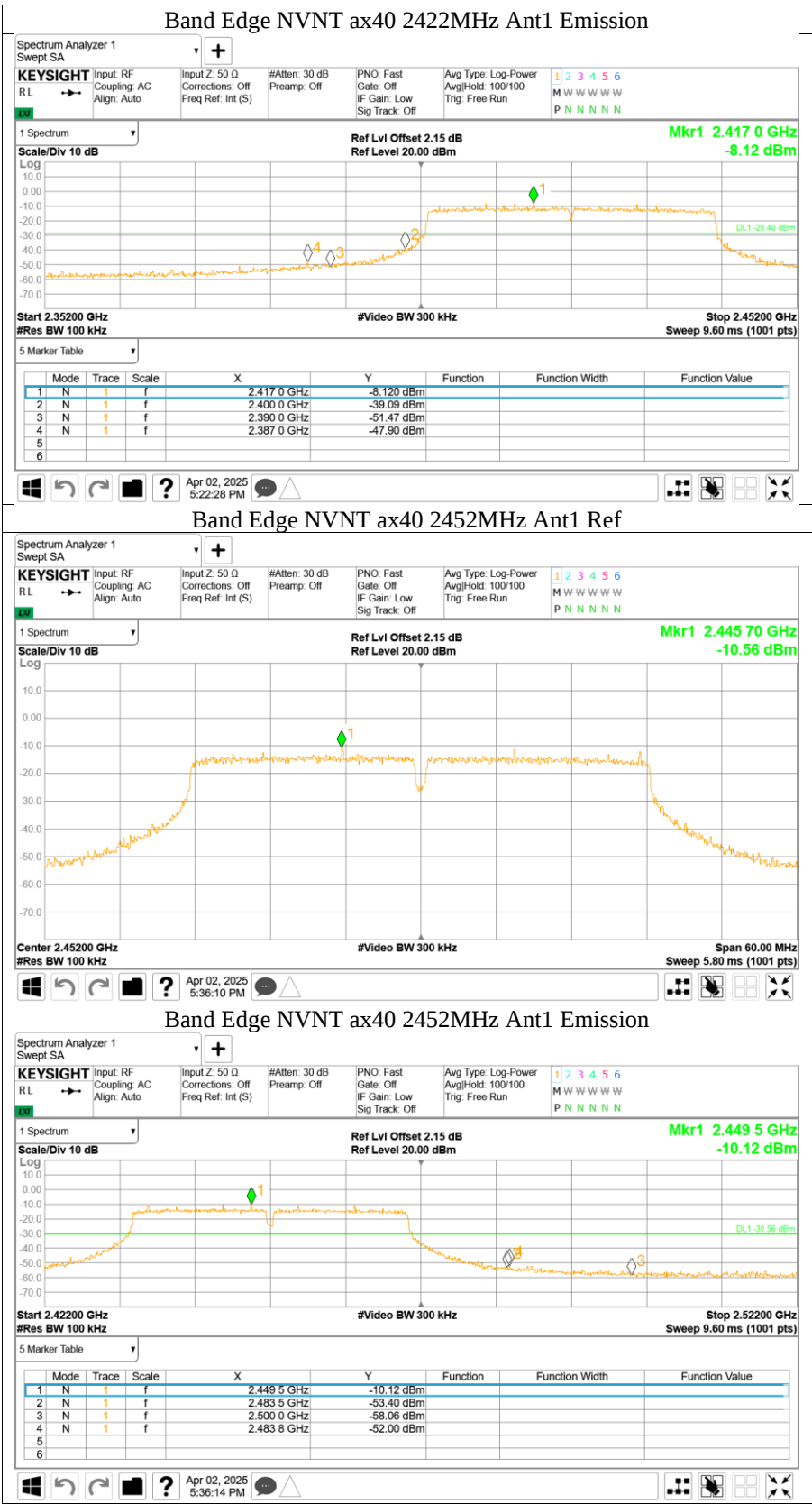














10.7 Spurious radiated emissions for transmitter

Test Method

1. The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. Use the following spectrum analyzer settings According to C63.10
 - 1) Procedure for Unwanted Emissions Measurements Below 1000 MHz
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz to 120kHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.
 - 2) For Peak unwanted emissions Above 1GHz:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.
Procedures for average unwanted emissions measurements above 1GHz
 - a) RBW = 1MHz.
 - b) $VBW \setminus [3 \times RBW]$.
 - c) Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \setminus RBW / 2$.
Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
 - d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
 - e) Sweep time = auto.
 - f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of $1 / D$, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
 - g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is $[10 \log (1 / D)]$, where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.
 - 2) If linear voltage averaging mode was used in the preceding step e), then the correction



factor is $[20 \log (1 / D)]$, where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.

3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission (AV) at frequency above 1GHz.

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that 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 § 15.247(b)(3) and RSS 247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in § 15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a) and RSS-Gen section 8.9, must also comply with the radiated emission limits specified in § 15.209(a) and RSS-Gen section 8.10.

Frequency MHz	Field Strength μV/m	Field Strength dBμV/m	Detector	Measurement distance meters
0.009-0.490	2400/F(kHz)	48.5-13.8	AV	300
0.490-1.705	24000/F(kHz)	33.8-23.0	QP	30
1.705-30	30	29.5	QP	30
30-88	100	40	QP	3
88-216	150	43.5	QP	3
216-960	200	46	QP	3
960-1000	500	54	QP	3
Above 1000	500	54	AV	3
Above 1000	5000	74	PK	3

Note 1: Limit 3m(dBμV/m)=Limit 300m(dBμV/m)+40Log(300m/3m) (Below 30MHz)

Note 2: Limit 3m(dBμV/m)=Limit 30m(dBμV/m)+40Log(30m/3m) (Below 30MHz)

Spurious Radiated Emissions for Transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.



Test result

The worst case of Radiated Emission below 1GHz: Only the worst case listed as below.

0.009-30MHz Radiated Emission

EUT Information

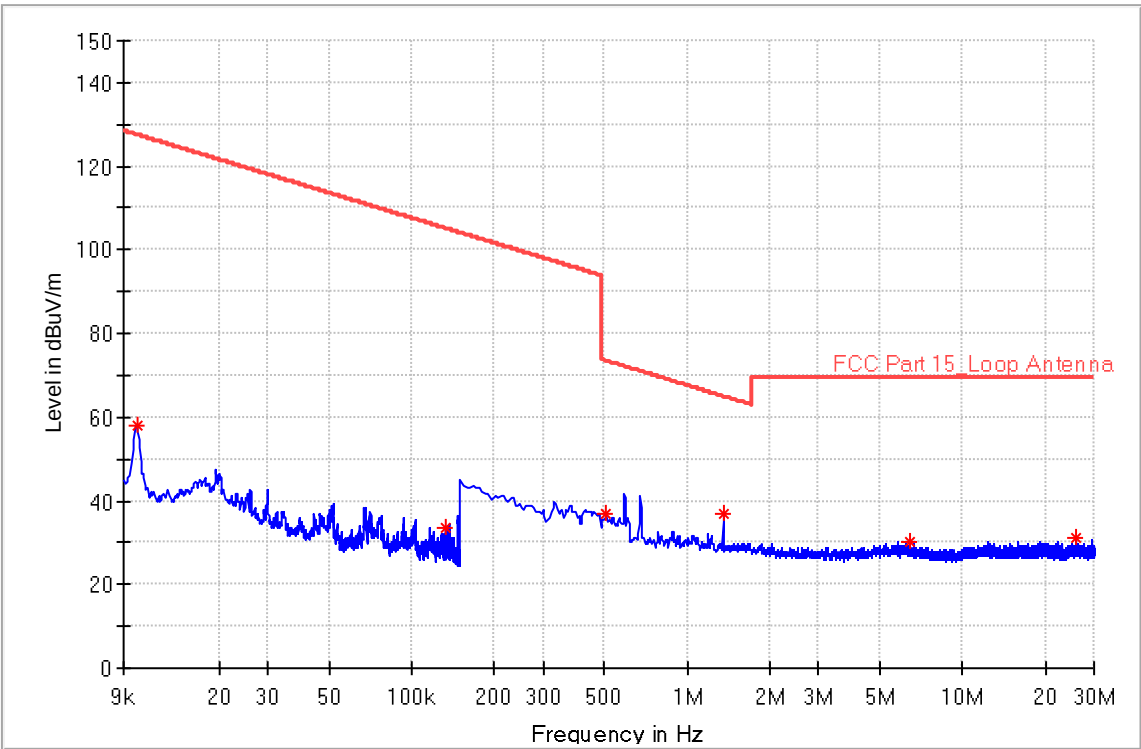
EUT Name:	DEFENDER
Model:	IP8MDSCB1
Client:	Empowerment Technologies Inc.
Op Cond:	Transmit mode, 802.11g Tx_2462MHz (worst case)
Operator:	Chengjie GUO
Test Spec:	FCC Part 15.209(a)
Sample No:	SHA-891853-3

Sweep Setup: RE_VULB9168_pre_Cont_30-1000 [EMI radiated]

Hardware Setup:	RE_Loop Antenna V
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
9 kHz - 150 kHz	70.5 Hz	PK+	200 Hz	0.01 s	0 dB
150 kHz - 30 MHz	3.731 kHz	PK+	9 kHz	0.01 s	0 dB

Full Spectrum





Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.010058	58.14	127.55	69.41	100.0	H	136.0	19.6
0.133433	33.74	105.10	71.35	100.0	H	0.0	18.8
0.509956	36.86	73.45	36.59	100.0	H	110.0	18.7
1.352780	37.11	64.98	27.87	100.0	H	28.0	18.8
6.422890	30.23	69.54	39.31	100.0	H	145.0	18.9
25.970250	30.91	69.54	38.63	100.0	H	60.0	19.5

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)



0.009-30MHz Radiated Emission

EUT Information

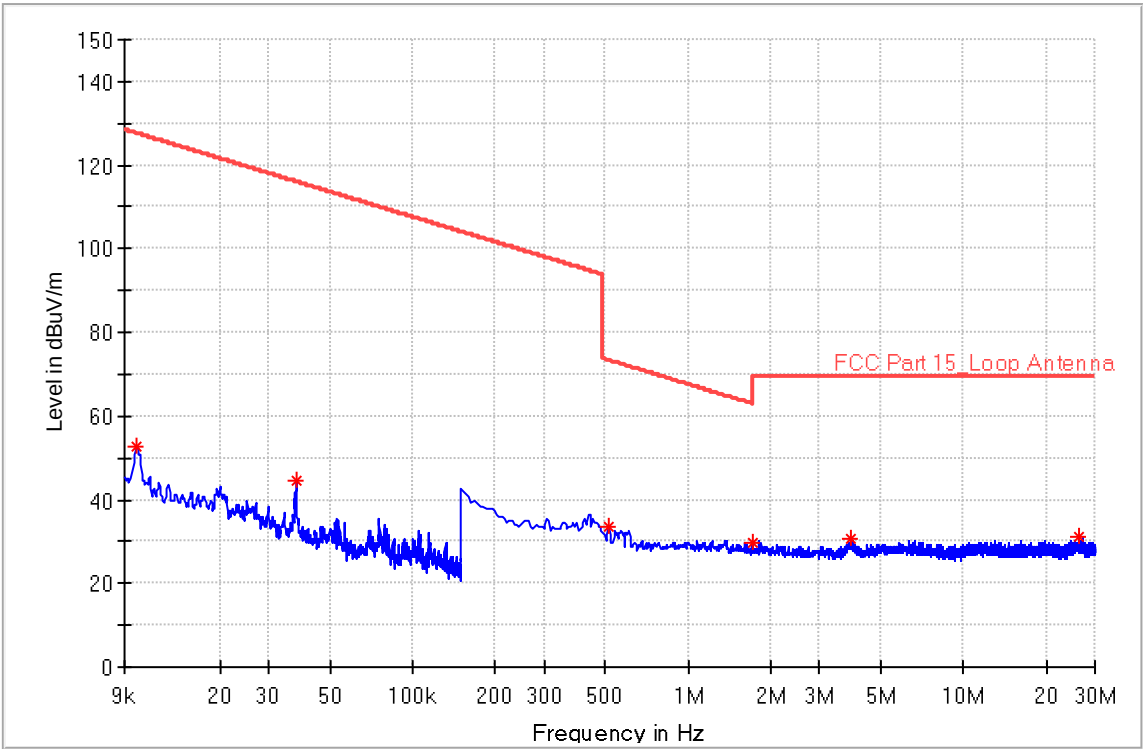
EUT Name: DEFENDER
Model: IP8MDSCB1
Client: Empowerment Technologies Inc.
Op Cond: Transmit mode, 802.11g Tx_2462MHz (worst case)
Operator: Chengjie GUO
Test Spec: FCC Part 15.209(a)
Sample No: SHA-891853-3

Sweep Setup: RE_VULB9168_pre_Cont_30-1000 [EMI radiated]

Hardware Setup: RE_Loop Antenna V
Receiver: [ESR 3]
Level Unit: dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
9 kHz - 150 kHz	70.5 Hz	PK+	200 Hz	0.01 s	0 dB
150 kHz - 30 MHz	3.731 kHz	PK+	9 kHz	0.01 s	0 dB

Full Spectrum





Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
26.356544	31.08	69.54	38.46	100.0	V	60.0	19.5
0.037905	44.69	116.03	71.34	100.0	V	191.0	18.9
3.911978	30.57	69.54	38.97	100.0	V	202.0	19.2
0.009969	52.82	127.63	74.82	100.0	V	255.0	19.6
0.518735	33.65	73.31	39.65	100.0	V	286.0	18.7
1.703956	29.62	62.98	33.36	100.0	V	328.0	18.9

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

30-1000MHz Radiated Emission

EUT Information

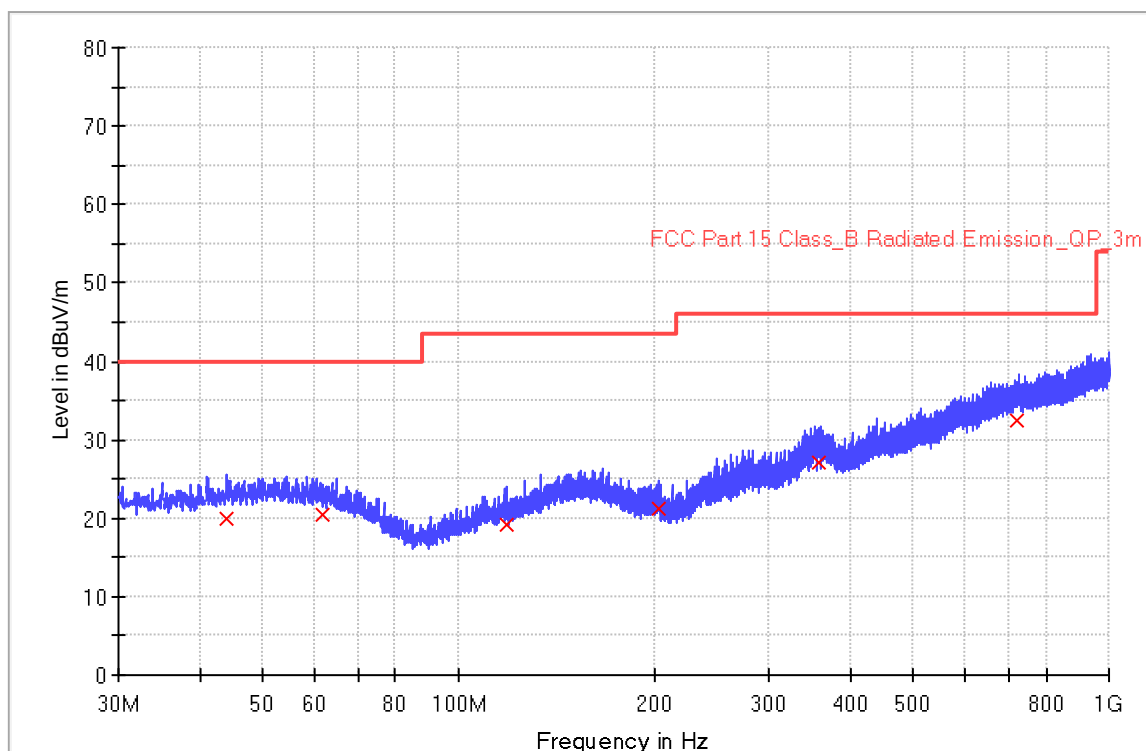
EUT Name: DEFENDER
Model: IP8MDSCB1
Client: Empowerment Technologies Inc.
Op Cond: Transmit mode, 802.11g Tx_2462MHz (worst case)
Operator: Chengjie GUO
Test Spec: FCC Part 15.209(a)
Sample No: SHA-891853-3

Sweep Setup: RE_VULB9168_pre_Cont_30-1000 [EMI radiated]

Hardware Setup: RE_VULB9168
Receiver: [ESR 3]
Level Unit: dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	0.2 s	20 dB

RE_VULB9168_pre_Cont_30-1000





Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)
44.000000	19.9	1000.0	120.000	135.0	H	359.0	20.3	20.1
61.920000	20.3	1000.0	120.000	175.0	H	143.0	20.3	19.7
118.480000	19.1	1000.0	120.000	164.0	H	177.0	18.3	24.4
202.800000	21.3	1000.0	120.000	186.0	H	165.0	17.8	22.2
356.800000	27.0	1000.0	120.000	156.0	H	51.0	23.1	19.0
722.960000	32.3	1000.0	120.000	143.0	H	133.0	31.5	13.7

(continuation of the "Limit and Margin" table from column 16 ...)

Frequency (MHz)	Limit - QPK (dBuV/m)	Comment
44.000000	40.0	
61.920000	40.0	
118.480000	43.5	
202.800000	43.5	
356.800000	46.0	
722.960000	46.0	

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
 Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

30-1000MHz Radiated Emission

EUT Information

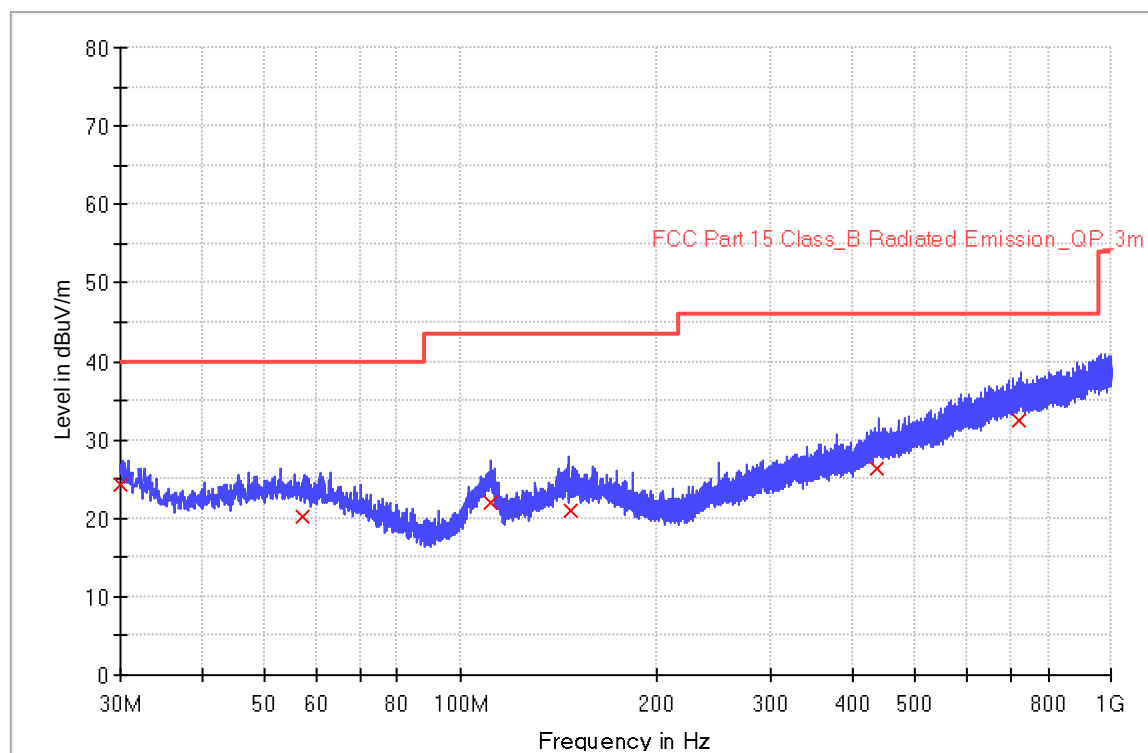
EUT Name: DEFENDER
Model: IP8MDSCB1
Client: Empowerment Technologies Inc.
Op Cond: Transmit mode, 802.11g Tx_2462MHz (worst case)
Operator: Chengjie GUO
Test Spec: FCC Part 15.209(a)
Sample No: SHA-891853-3

Sweep Setup: RE_VULB9168_pre_Cont_30-1000 [EMI radiated]

Hardware Setup: RE_VULB9168
Receiver: [ESR 3]
Level Unit: dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	0.2 s	20 dB

RE_VULB9168_pre_Cont_30-1000





Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)
30.040000	24.2	1000.0	120.000	164.0	V	2.0	18.9	15.8
57.200000	20.3	1000.0	120.000	231.0	V	130.0	20.8	19.7
111.040000	22.0	1000.0	120.000	215.0	V	74.0	18.0	21.5
147.920000	21.0	1000.0	120.000	174.0	V	100.0	21.1	22.5
436.520000	26.3	1000.0	120.000	211.0	V	156.0	25.7	19.7
723.360000	32.3	1000.0	120.000	186.0	V	181.0	31.5	13.7

(continuation of the "Limit and Margin" table from column 16 ...)

Frequency (MHz)	Limit - QPK (dBuV/m)	Comment
30.040000	40.0	
57.200000	40.0	
111.040000	43.5	
147.920000	43.5	
436.520000	46.0	
723.360000	46.0	

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)