

Maximum Power Spectral Density

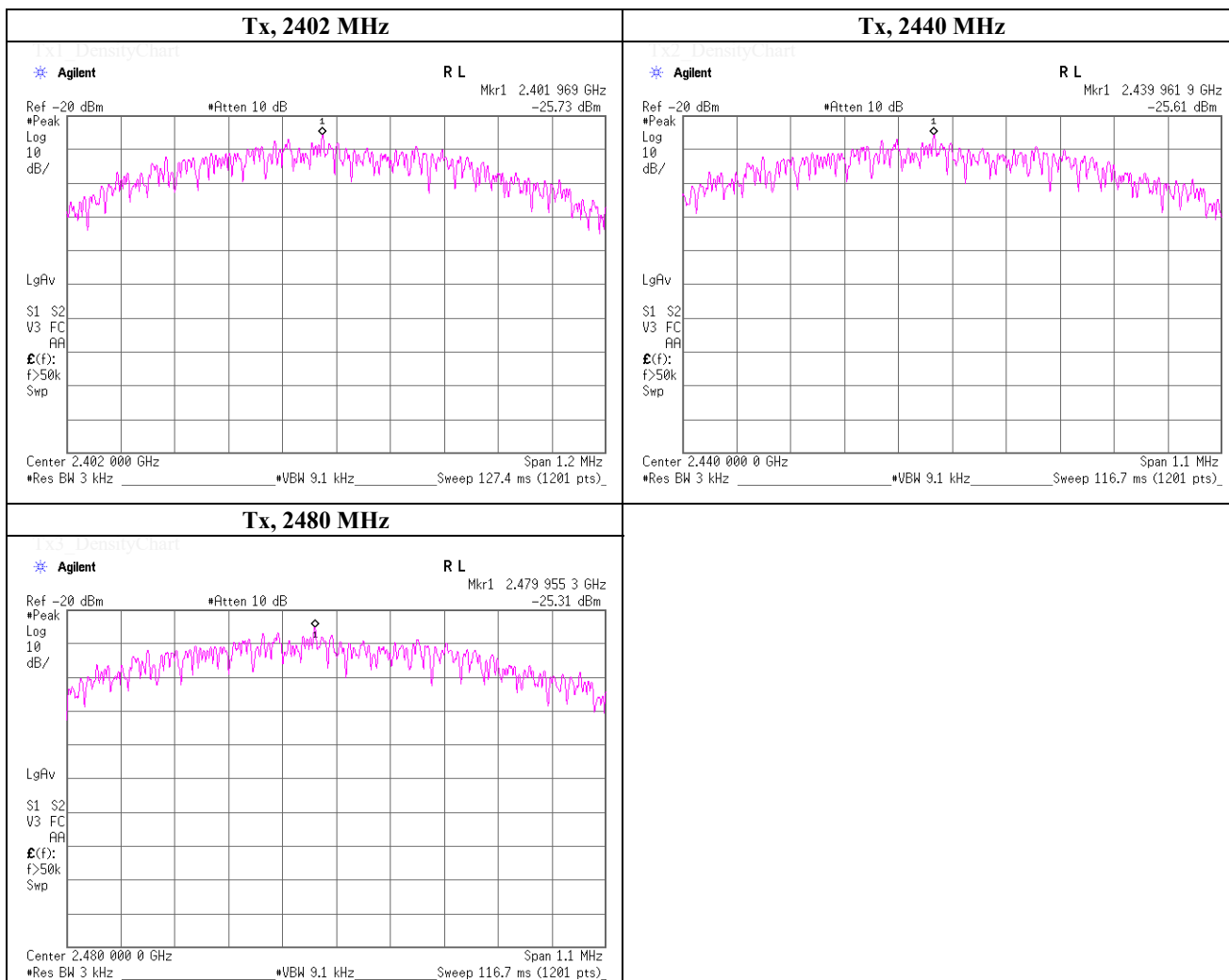
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	August 18, 2020	
Temperature / Humidity	24 deg.C , 48 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, Bluetooth Low Energy, PRBS9	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2402.0000	2401.97	-25.73	1.66	9.88	-14.19	8.00	22.19
2440.0000	2439.96	-25.61	1.66	9.88	-14.07	8.00	22.07
2480.0000	2479.96	-25.31	1.67	9.89	-13.75	8.00	21.75

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

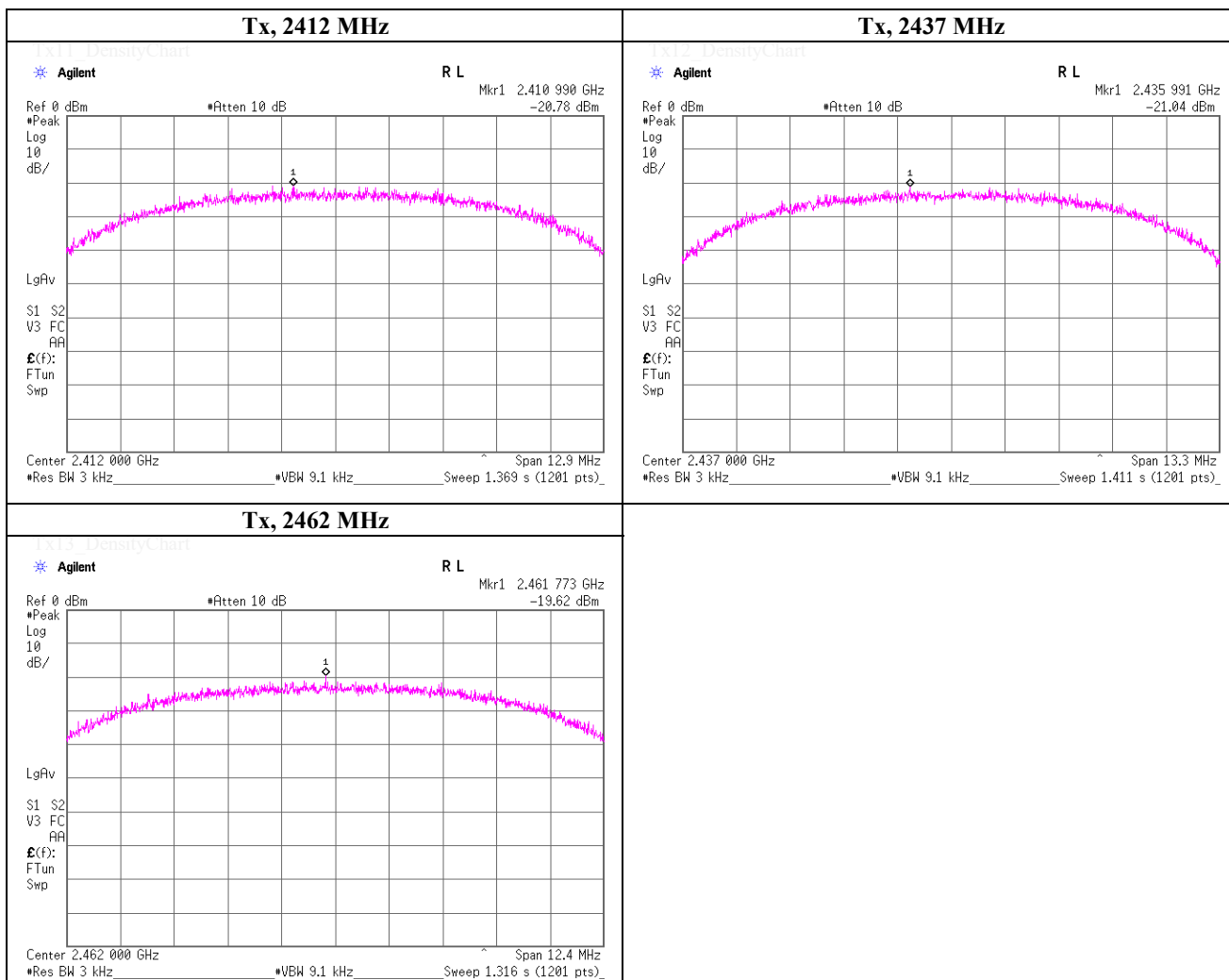
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	January 8, 2021	
Temperature / Humidity	23 deg.C , 40 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11b, PN9, antenna port 0, worst data mode 11 Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2410.99	-20.78	1.66	9.88	-9.24	8.00	17.24
2437.0000	2435.99	-21.04	1.66	9.88	-9.50	8.00	17.50
2462.0000	2461.77	-19.62	1.67	9.89	-8.06	8.00	16.06

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



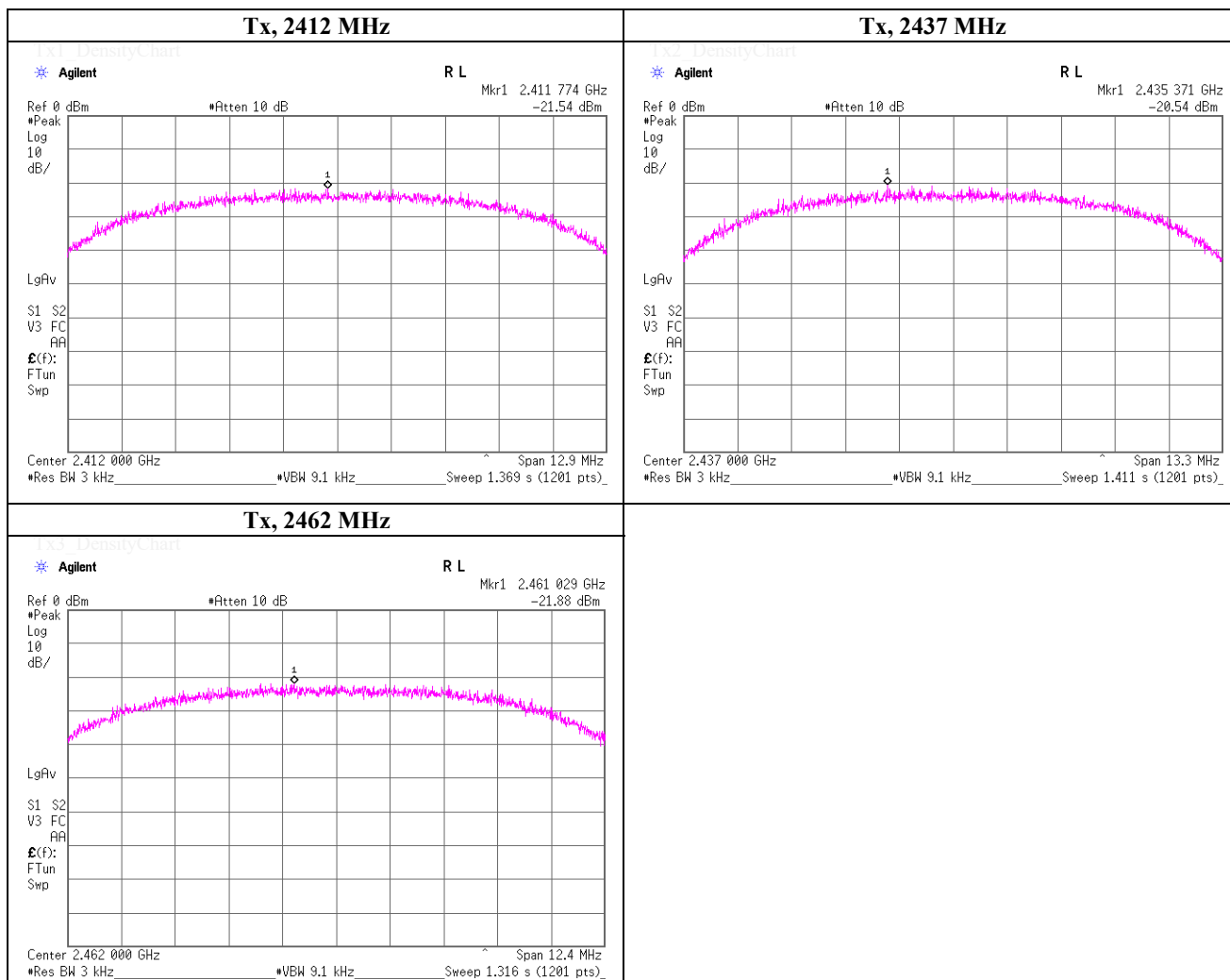
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	January 8, 2021	
Temperature / Humidity	23 deg.C , 40 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11b, PN9, antenna port 1, worst data mode 11 Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2411.77	-21.54	1.66	9.88	-10.00	8.00	18.00
2437.0000	2435.37	-20.54	1.66	9.88	-9.00	8.00	17.00
2462.0000	2461.03	-21.88	1.67	9.89	-10.32	8.00	18.32

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



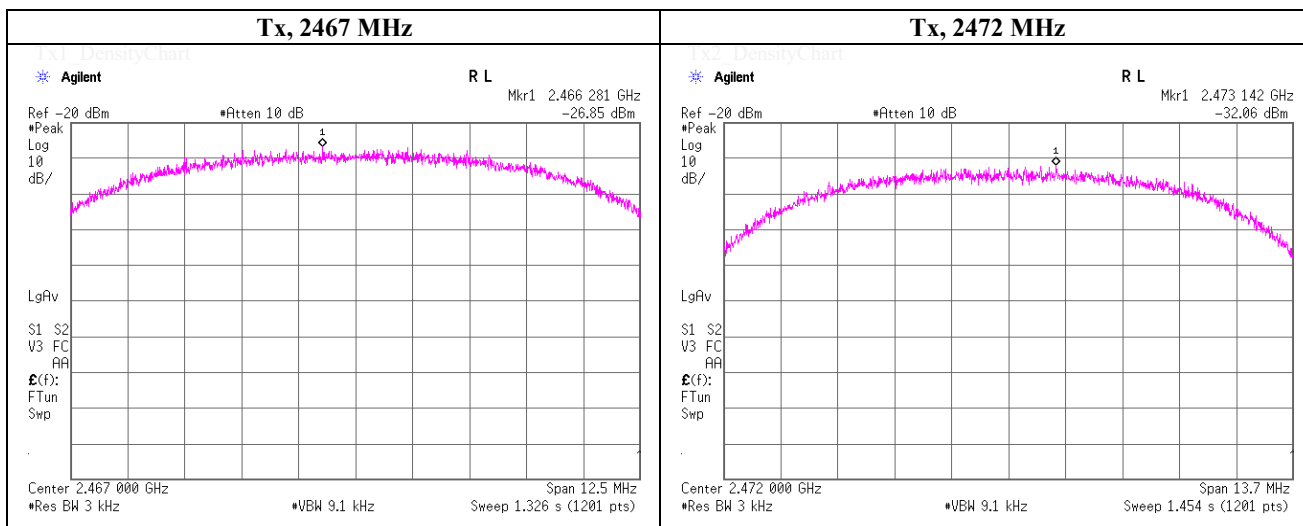
UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Maximum Power Spectral Density (PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	February 11, 2021	
Temperature / Humidity	23 deg.C , 35 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, IEEE802.11b, PN9, antenna port 0, worst data mode 11 Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2466.28	-26.85	1.67	9.89	-15.29	8.00	23.29
2472.0000	2473.14	-32.06	1.67	9.89	-20.50	8.00	28.50
-	-	-	-	-	-	-	-

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



Tx3_DensityChart

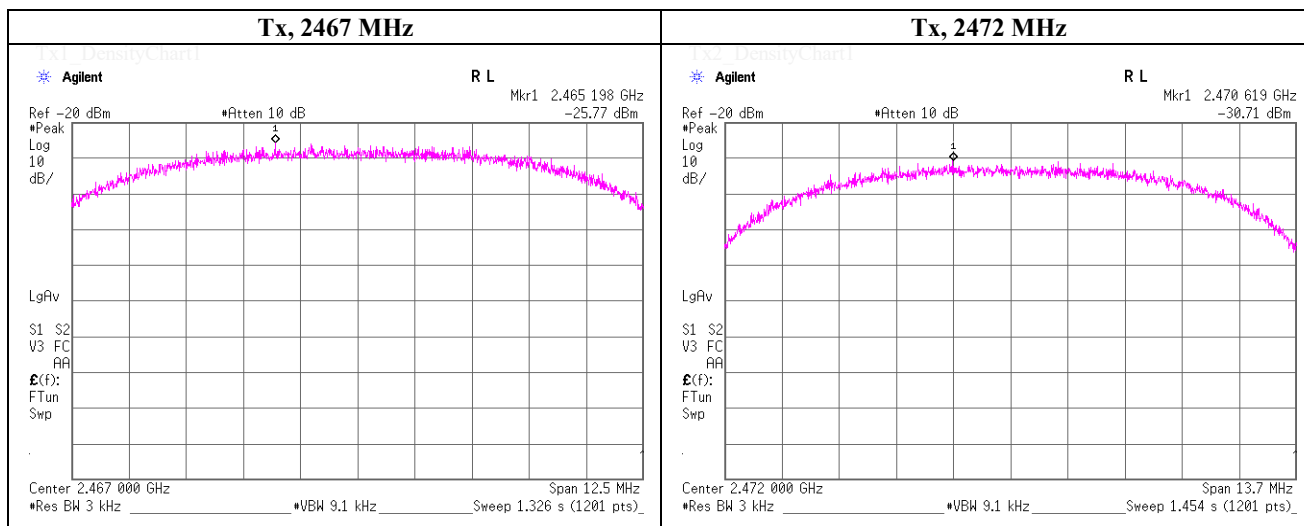
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	August 20, 2020	
Temperature / Humidity	25 deg.C , 40 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, IEEE802.11b, PN9, antenna port 1, worst data mode 11 Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2465.20	-25.77	1.67	9.89	-14.21	8.00	22.21
2472.0000	2470.62	-30.71	1.67	9.89	-19.15	8.00	27.15
-	-	-	-	-	-	-	-

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



Tx3_DensityChart

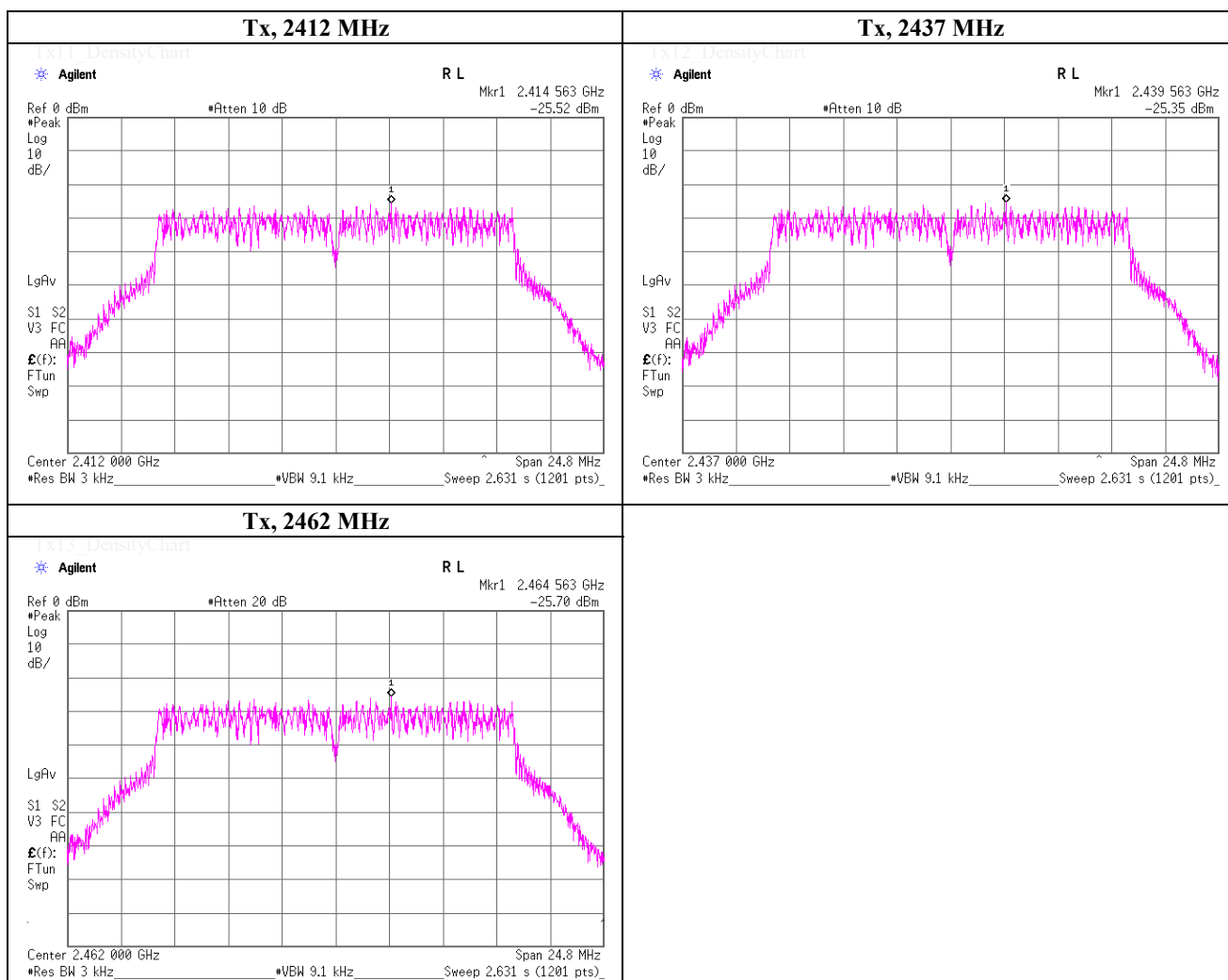
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	January 8, 2021	
Temperature / Humidity	23 deg.C , 40 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11g, PN9, antenna port 0, worst data mode 48 Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2414.56	-25.52	1.66	9.88	-13.98	8.00	21.98
2437.0000	2439.56	-25.35	1.66	9.88	-13.81	8.00	21.81
2462.0000	2464.56	-25.70	1.67	9.89	-14.14	8.00	22.14

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

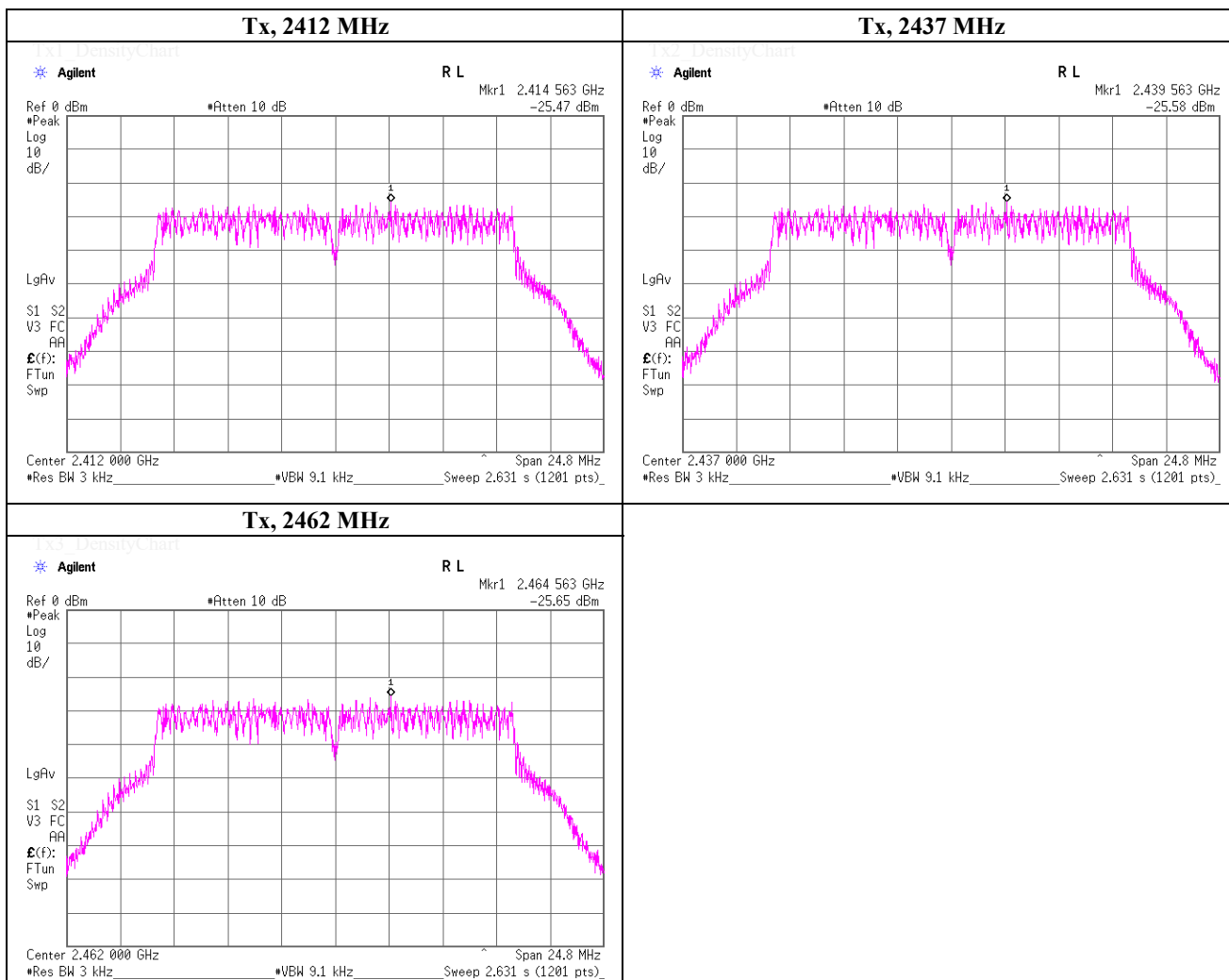
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	January 8, 2021	
Temperature / Humidity	23 deg.C , 40 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11g, PN9, antenna port 1, worst data mode 48 Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2414.56	-25.47	1.66	9.88	-13.93	8.00	21.93
2437.0000	2439.56	-25.58	1.66	9.88	-14.04	8.00	22.04
2462.0000	2464.56	-25.65	1.67	9.89	-14.09	8.00	22.09

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



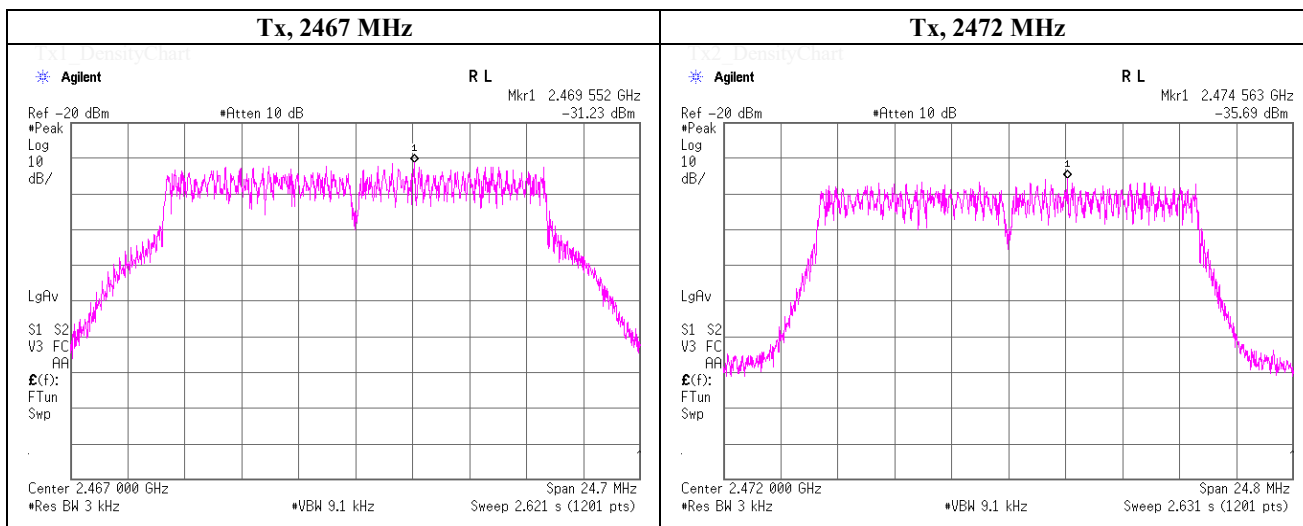
UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Maximum Power Spectral Density (PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	February 11, 2021	
Temperature / Humidity	23 deg.C , 35 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, IEEE802.11g, PN9, antenna port 0, worst data mode 48 Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2469.55	-31.23	1.67	9.89	-19.67	8.00	27.67
2472.0000	2474.56	-35.69	1.67	9.89	-24.13	8.00	32.13
-	-	-	-	-	-	-	-

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



Tx3_DensityChart

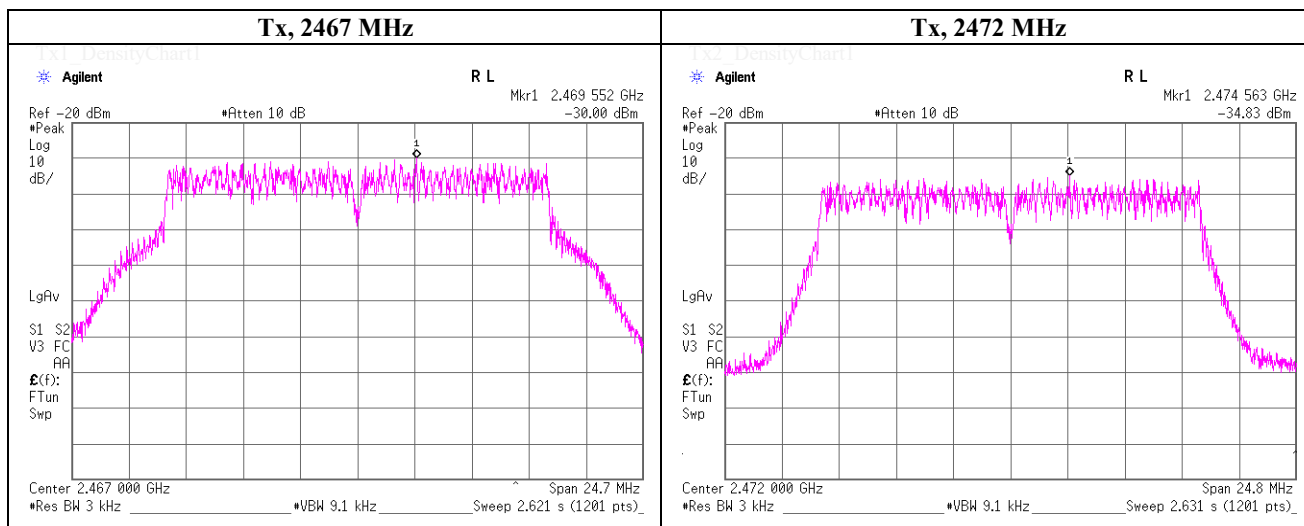
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	August 20, 2020	
Temperature / Humidity	25 deg.C , 40 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, IEEE802.11g, PN9, antenna port 1, worst data mode 48 Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2469.55	-30.00	1.67	9.89	-18.44	8.00	26.44
2472.0000	2474.56	-34.83	1.67	9.89	-23.27	8.00	31.27
-	-	-	-	-	-	-	-

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



Tx3_DensityChart

Maximum Power Spectral Density

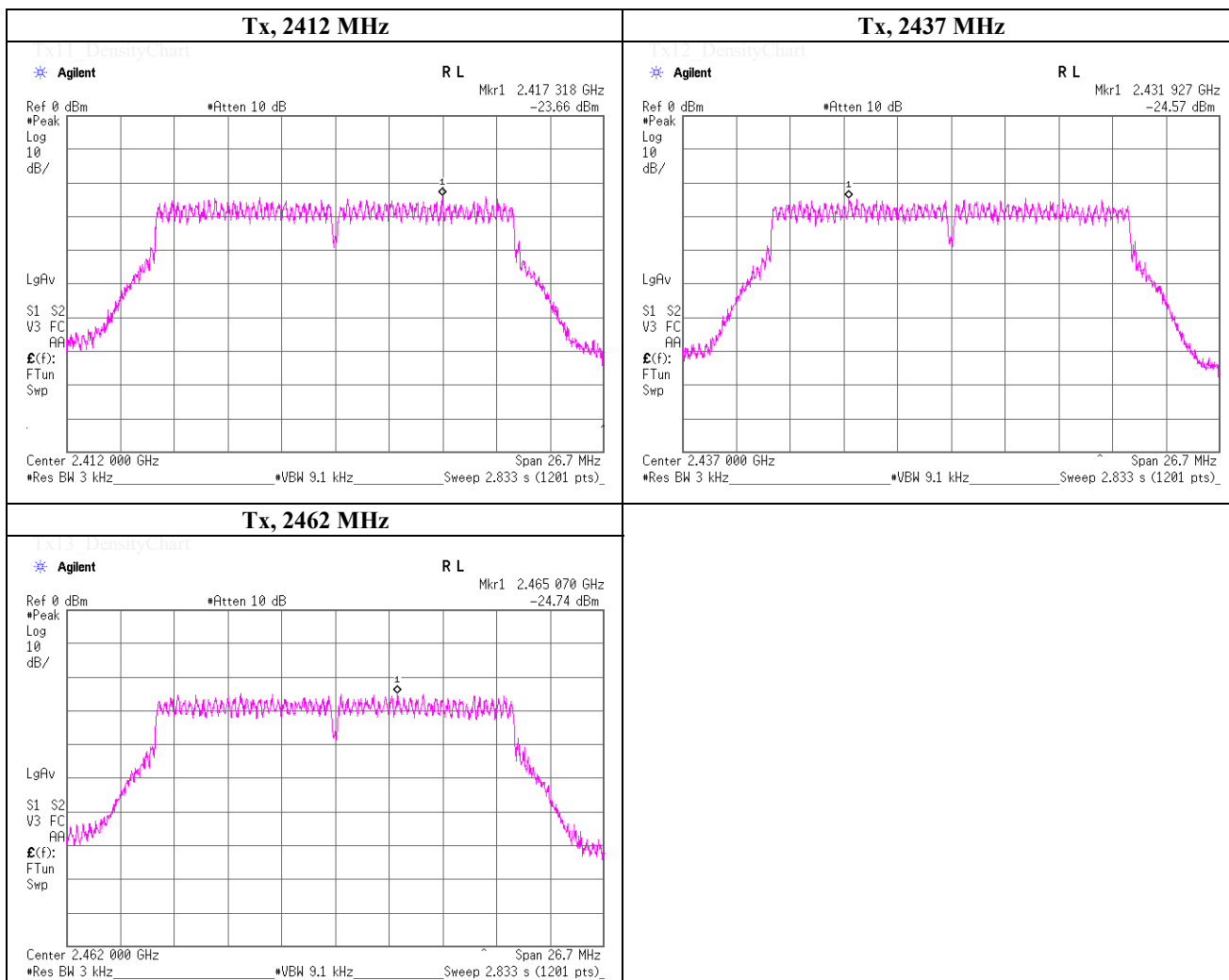
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	January 8, 2021	
Temperature / Humidity	23 deg.C , 40 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11n-20 (SISO), PN9, antenna port 0, worst data mode 3 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2417.32	-23.66	1.66	9.88	-12.12	8.00	20.12
2437.0000	2431.93	-24.57	1.66	9.88	-13.03	8.00	21.03
2462.0000	2465.07	-24.74	1.67	9.89	-13.18	8.00	21.18

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

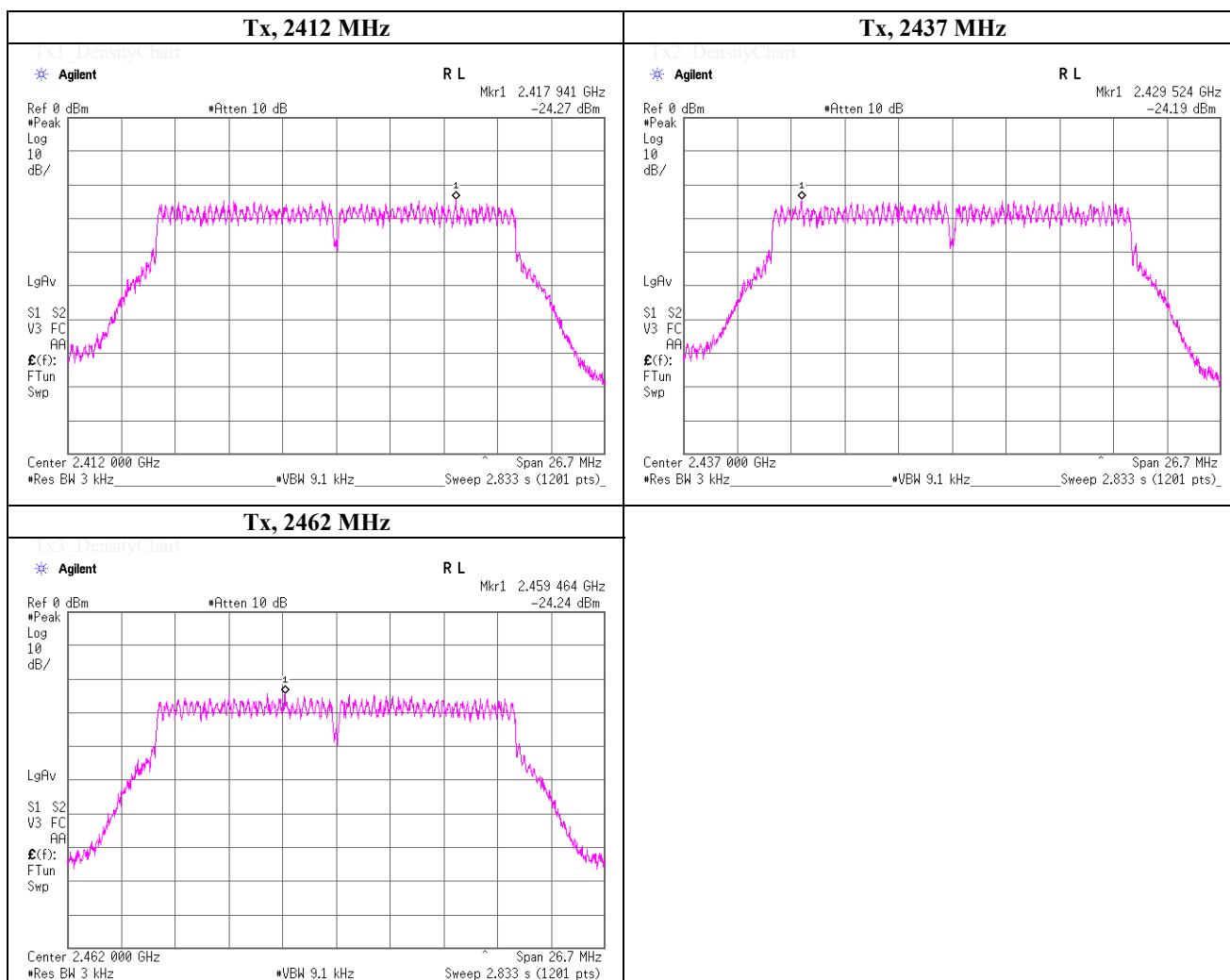
Facsimile : +81 463 50 6401

Maximum Power Spectral Density (PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	January 8, 2021	
Temperature / Humidity	23 deg.C , 40 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11n-20 (SISO), PN9, antenna port 1, worst data mode 3 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2417.94	-24.27	1.66	9.88	-12.73	8.00	20.73
2437.0000	2429.52	-24.19	1.66	9.88	-12.65	8.00	20.65
2462.0000	2459.46	-24.24	1.67	9.89	-12.68	8.00	20.68

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



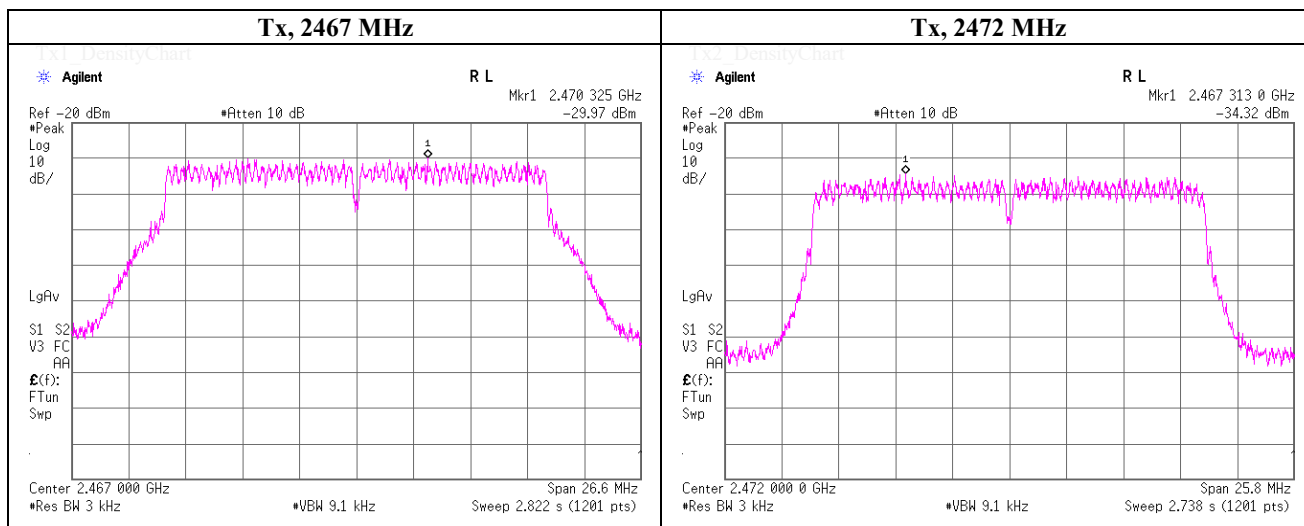
UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Maximum Power Spectral Density (PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	February 11, 2021	
Temperature / Humidity	23 deg.C , 35 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, IEEE802.11n-20 (SISO), PN9, antenna port 0, worst data mode 3 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2470.33	-29.97	1.67	9.89	-18.41	8.00	26.41
2472.0000	2467.31	-34.32	1.67	9.89	-22.76	8.00	30.76
-	-	-	-	-	-	-	-

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



Tx3_DensityChart

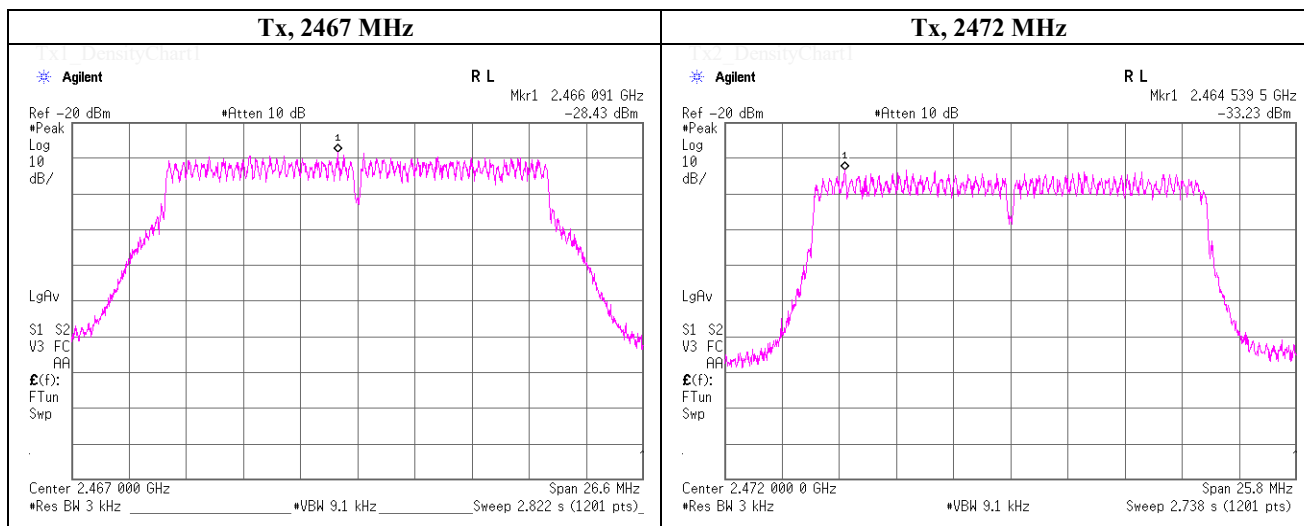
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	August 20, 2020	
Temperature / Humidity	25 deg.C , 40 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, IEEE802.11n-20 (SISO), PN9, antenna port 1, worst data mode 3 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2466.09	-28.43	1.67	9.89	-16.87	8.00	24.87
2472.0000	2464.54	-33.23	1.67	9.89	-21.67	8.00	29.67
-	-	-	-	-	-	-	-

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



Tx3_DensityChart

Maximum Power Spectral Density

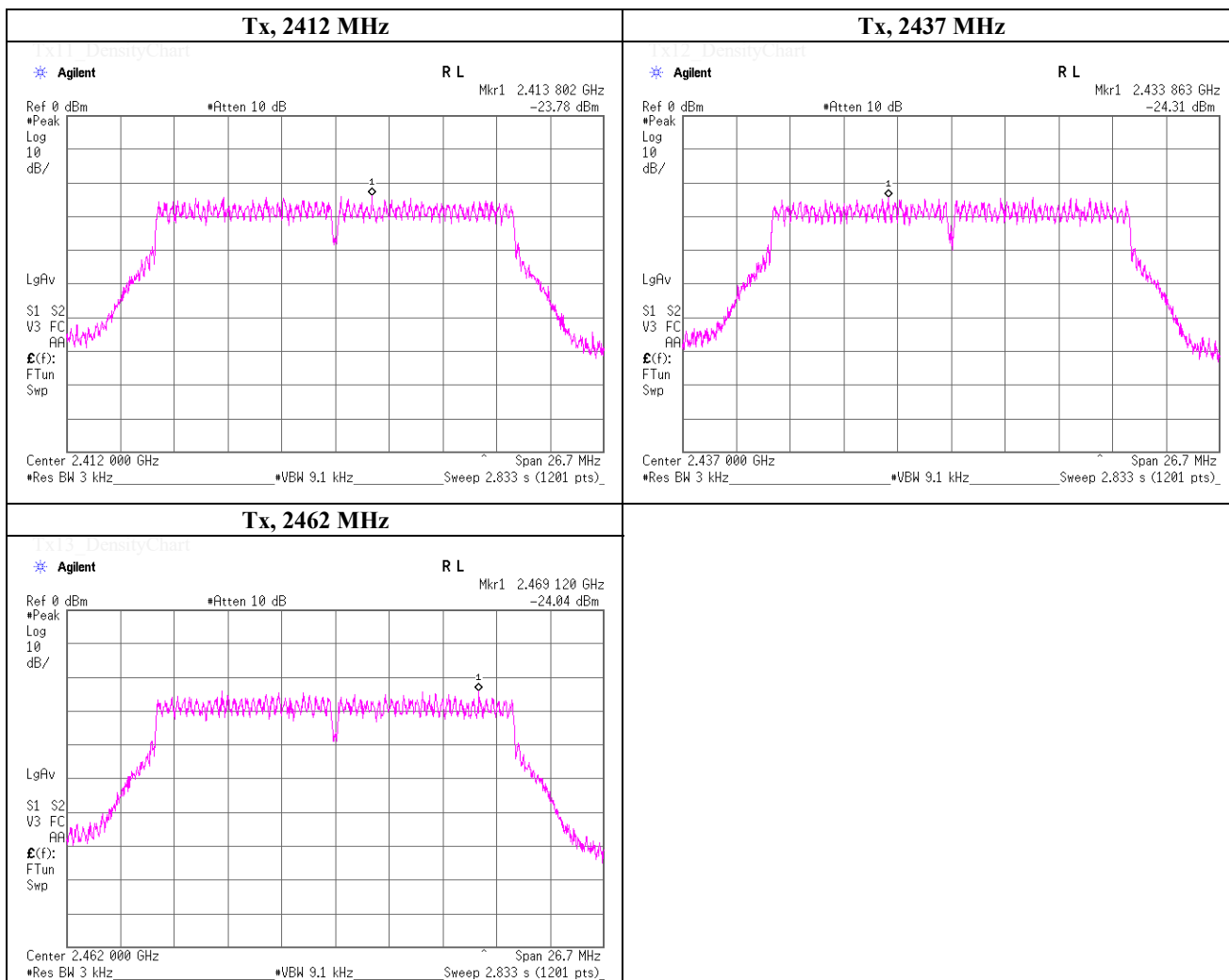
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	January 8, 2021	
Temperature / Humidity	23 deg.C , 40 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, OFDM VHT20 (SISO), PN9, antenna port 0, worst data mode 3 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2413.80	-23.78	1.66	9.88	-12.24	8.00	20.24
2437.0000	2433.86	-24.31	1.66	9.88	-12.77	8.00	20.77
2462.0000	2469.12	-24.04	1.67	9.89	-12.48	8.00	20.48

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

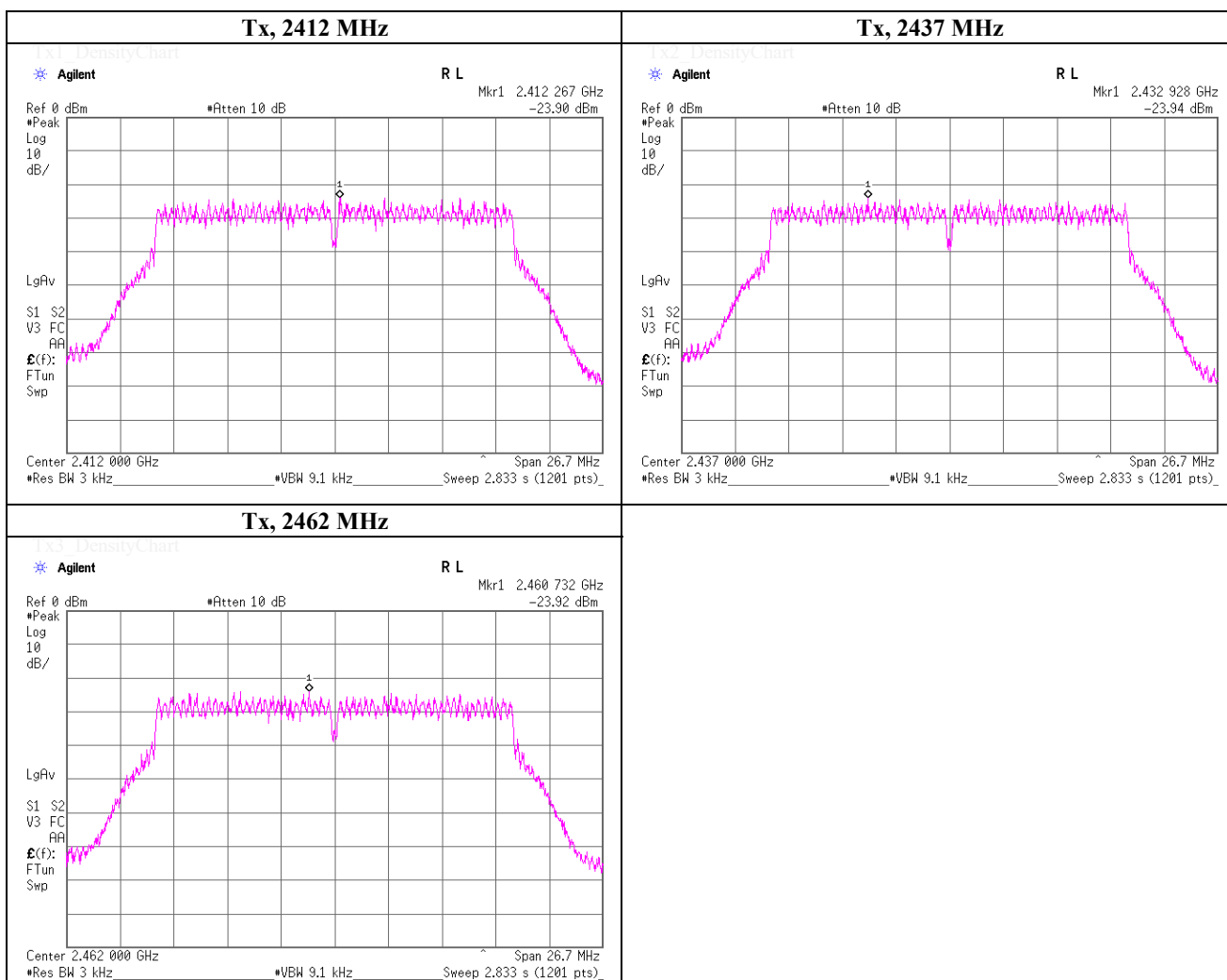
Facsimile : +81 463 50 6401

Maximum Power Spectral Density (PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	January 8, 2021	
Temperature / Humidity	23 deg.C , 40 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, OFDM VHT20 (SISO), PN9, antenna port 1, worst data mode 3 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2412.27	-23.90	1.66	9.88	-12.36	8.00	20.36
2437.0000	2432.93	-23.94	1.66	9.88	-12.40	8.00	20.40
2462.0000	2460.73	-23.92	1.67	9.89	-12.36	8.00	20.36

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

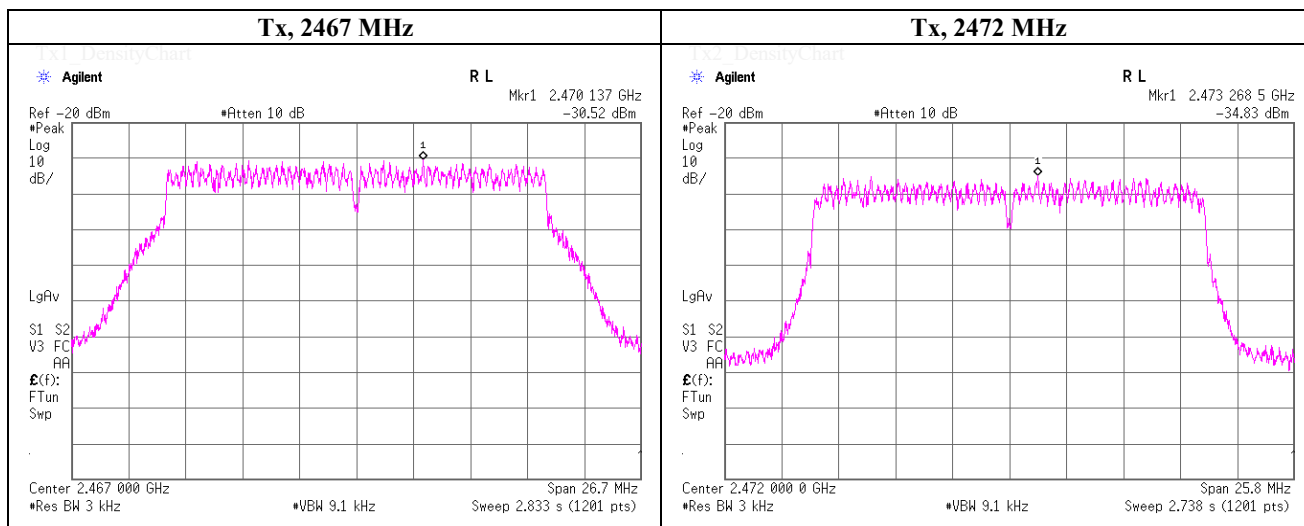
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	February 11, 2021	
Temperature / Humidity	23 deg.C , 35 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, OFDM VHT20 (SISO), PN9, antenna port 0, worst data mode 6 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2470.14	-30.52	1.67	9.89	-18.96	8.00	26.96
2472.0000	2473.27	-34.83	1.67	9.89	-23.27	8.00	31.27
-	-	-	-	-	-	-	-

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



Tx3_DensityChart

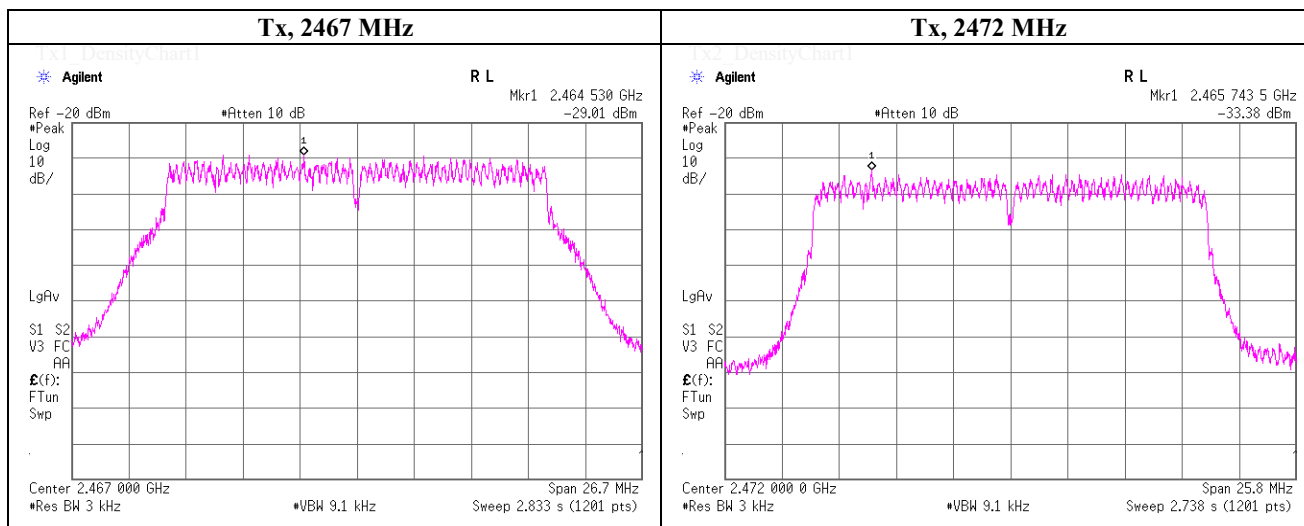
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	August 20, 2020	
Temperature / Humidity	25 deg.C , 40 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, OFDM VHT20 (SISO), PN9, antenna port 1, worst data mode 6 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2464.53	-29.01	1.67	9.89	-17.45	8.00	25.45
2472.0000	2465.74	-33.38	1.67	9.89	-21.82	8.00	29.82
-	-	-	-	-	-	-	-

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



Tx3_DensityChart

Maximum Power Spectral Density

(PKPSD)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date August 21, 2020
 Temperature / Humidity 25 deg.C , 42 %RH
 Engineer Yusuke Tanikawara
 Mode Tx, IEEE802.11n-20 (MIMO), PN9, worst data mode 11 (MCS)

Antenna 0

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2414.49	-35.70	1.66	19.94	3.01	-11.09	8.00	19.09
2437.0000	2439.49	-36.26	1.66	19.94	3.01	-11.65	8.00	19.65
2462.0000	2458.26	-35.41	1.67	19.94	3.01	-10.79	8.00	18.79

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

Antenna 1

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2419.48	-35.54	1.66	19.94	3.01	-10.93	8.00	18.93
2437.0000	2434.49	-35.05	1.66	19.94	3.01	-10.44	8.00	18.44
2462.0000	2460.71	-35.10	1.67	19.94	3.01	-10.48	8.00	18.48

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

*) This test was measured based on Method In-Band Power Spectral Density (PSD) Measurements (2) of
 "Emissions Testing of Transmitters with Multiple Outputs in the Same Band (KDB662911 D1)"

UL Japan, Inc.**Shonan EMC Lab.**

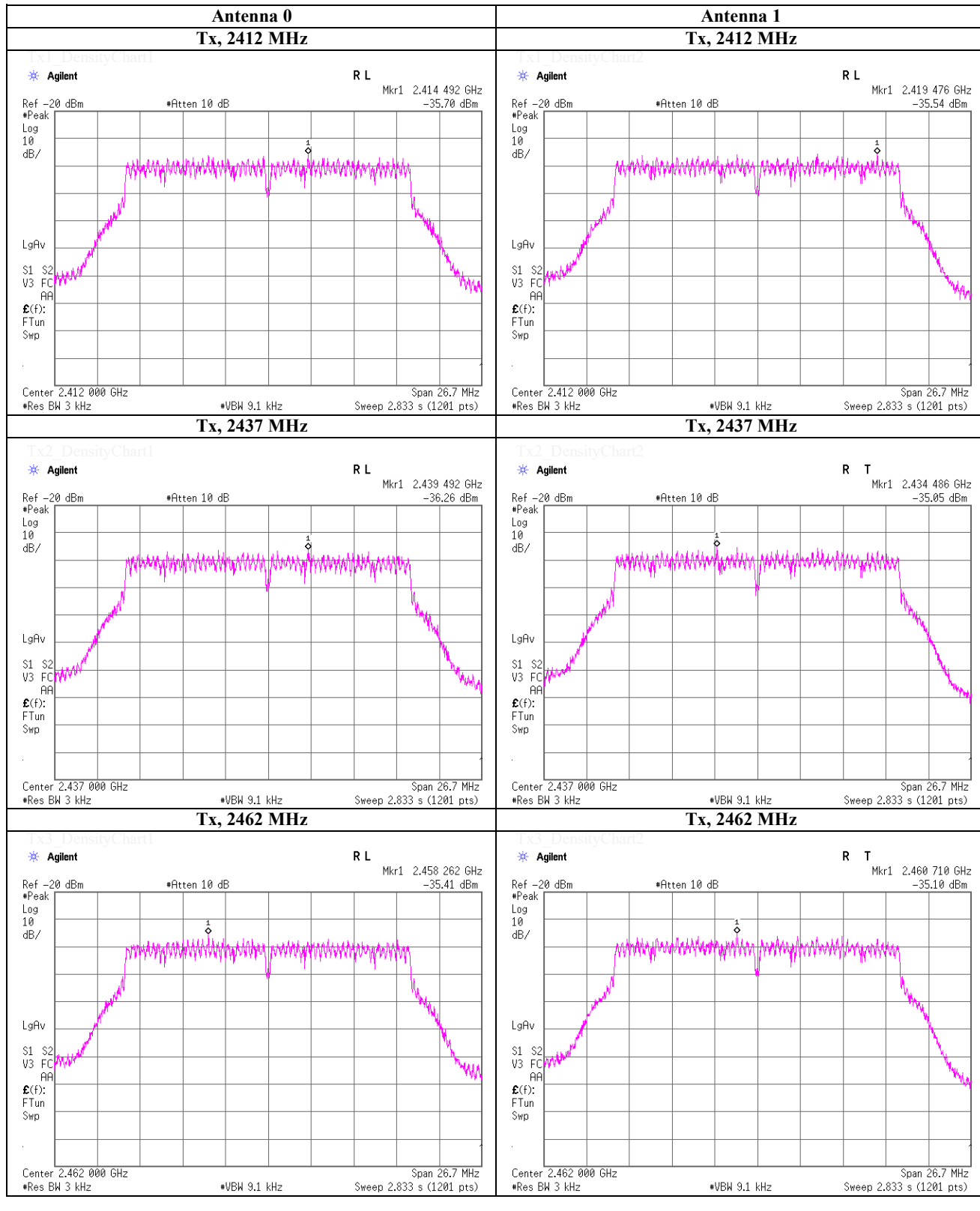
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date August 21, 2020
 Temperature / Humidity 25 deg.C , 42 %RH
 Engineer Yusuke Tanikawara

Maximum Power Spectral Density



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Maximum Power Spectral Density
(PKPSD)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date February 3, 2021
Temperature / Humidity 24 deg.C , 55 %RH
Engineer Takahiro Kawakami
Mode Tx, IEEE802.11n-20 (MIMO), PN9, worst data mode 11 (MCS)

Antenna 0

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2462.90	-29.46	1.67	9.89	3.01	-14.89	8.00	22.89
2472.0000	2469.18	-34.11	1.67	9.89	3.01	-19.54	8.00	27.54
-	-	-	-	-	-	-	-	-

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

Antenna 1

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2463.28	-27.94	1.67	9.89	3.01	-13.37	8.00	21.37
2472.0000	2470.72	-32.69	1.67	9.89	3.01	-18.12	8.00	26.12
-	-	-	-	-	-	-	-	-

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

*) This test was measured based on Method In-Band Power Spectral Density (PSD) Measurements (2) of "Emissions Testing of Transmitters with Multiple Outputs in the Same Band (KDB662911 D1)"

UL Japan, Inc.

Shonan EMC Lab.

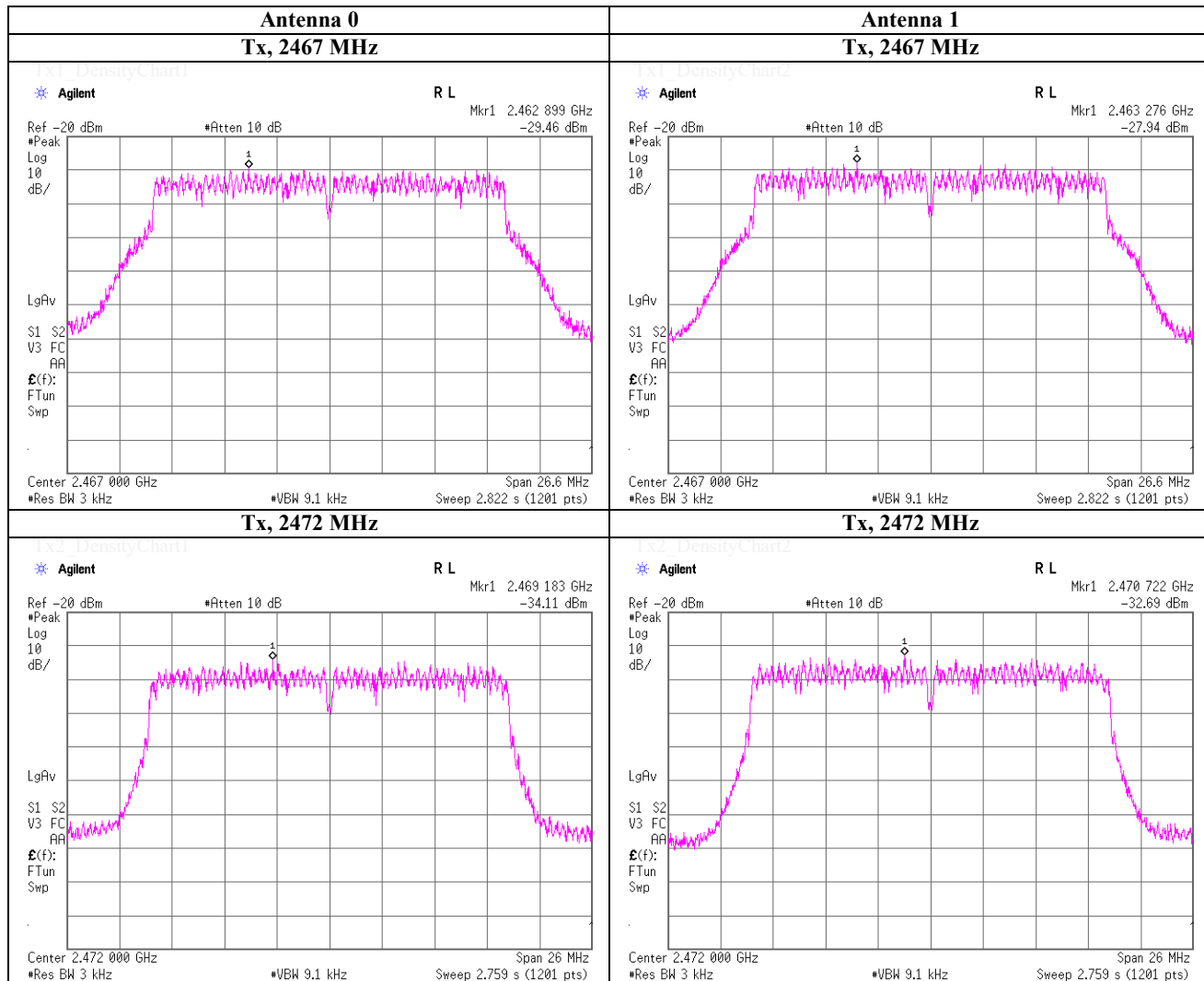
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date February 3, 2021
 Temperature / Humidity 24 deg.C , 55 %RH
 Engineer Takahiro Kawakami

Maximum Power Spectral Density



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Maximum Power Spectral Density

(PKPSD)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date August 21, 2020
Temperature / Humidity 25 deg.C , 42 %RH
Engineer Yusuke Tanikawara
Mode Tx, OFDM VHT20 (MIMO), PN9, worst data mode 3 (MCS)

Antenna 0

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2410.69	-36.07	1.66	19.94	3.01	-11.46	8.00	19.46
2437.0000	2436.67	-36.58	1.66	19.94	3.01	-11.97	8.00	19.97
2462.0000	2459.19	-36.60	1.67	19.94	3.01	-11.98	8.00	19.98

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

Antenna 1

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412.0000	2406.95	-34.91	1.66	19.94	3.01	-10.30	8.00	18.30
2437.0000	2429.46	-35.92	1.66	19.94	3.01	-11.31	8.00	19.31
2462.0000	2456.99	-36.14	1.67	19.94	3.01	-11.52	8.00	19.52

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

*) This test was measured based on Method In-Band Power Spectral Density (PSD) Measurements (2) of
"Emissions Testing of Transmitters with Multiple Outputs in the Same Band (KDB662911 D1)"

UL Japan, Inc.**Shonan EMC Lab.**

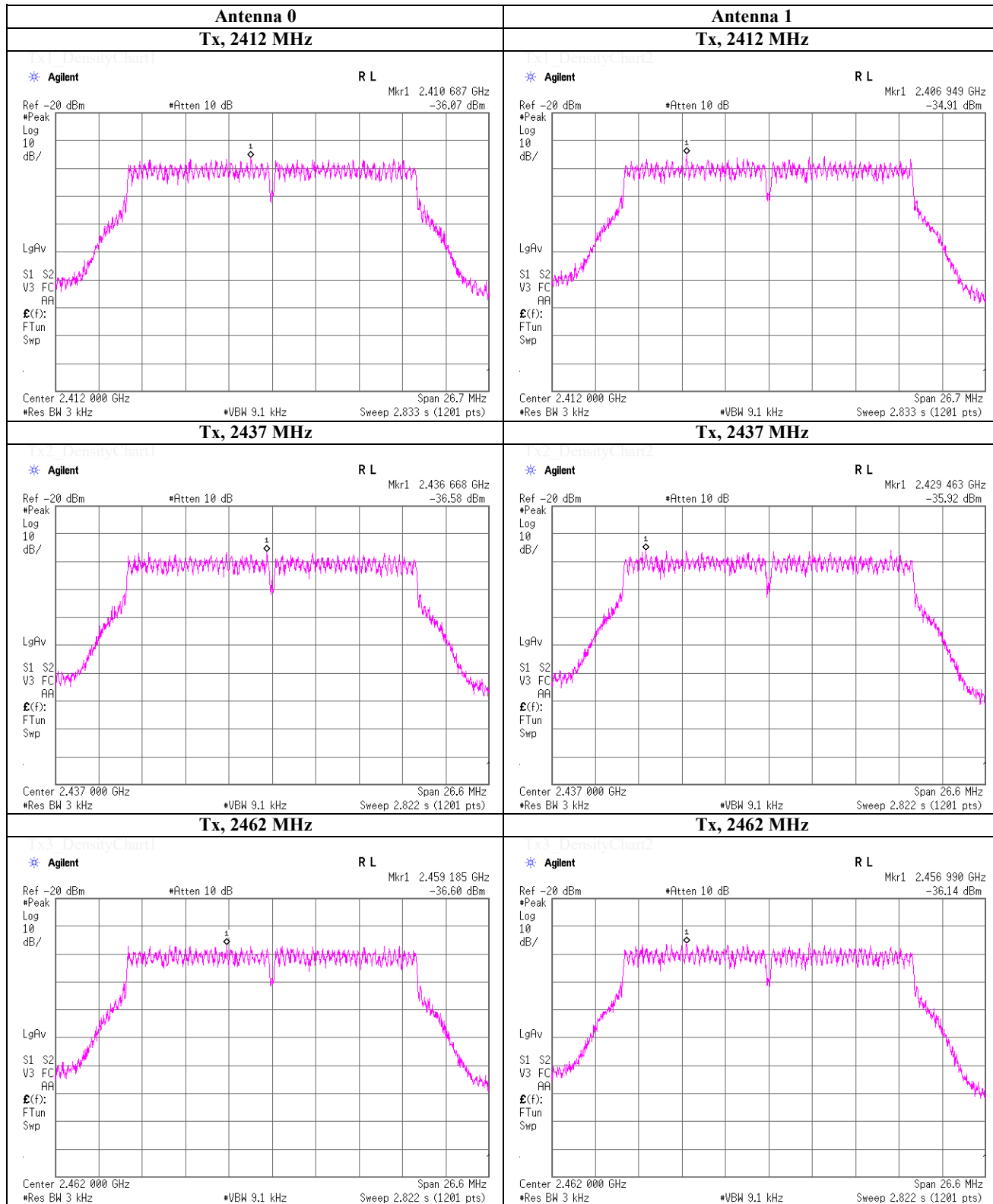
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date August 21, 2020
 Temperature / Humidity 25 deg.C , 42 %RH
 Engineer Yusuke Tanikawara

Maximum Power Spectral Density



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	February 3, 2021	
Temperature / Humidity	24 deg.C , 55 %RH	
Engineer	Takahiro Kawakami	
Mode	Tx, OFDM VHT20 (MIMO), PN9, worst data mode 3 (MCS)	

Antenna 0

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2467.93	-29.70	1.67	9.89	3.01	-15.13	8.00	23.13
2472.0000	2468.50	-35.53	1.67	9.89	3.01	-20.96	8.00	28.96
-	-	-	-	-	-	-	-	-

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

Antenna 1

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2467.0000	2460.73	-28.58	1.67	9.89	3.01	-14.01	8.00	22.01
2472.0000	2465.72	-33.60	1.67	9.89	3.01	-19.03	8.00	27.03
-	-	-	-	-	-	-	-	-

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

*) This test was measured based on Method In-Band Power Spectral Density (PSD) Measurements (2) of "Emissions Testing of Transmitters with Multiple Outputs in the Same Band (KDB662911 D1)"

UL Japan, Inc.

Shonan EMC Lab.

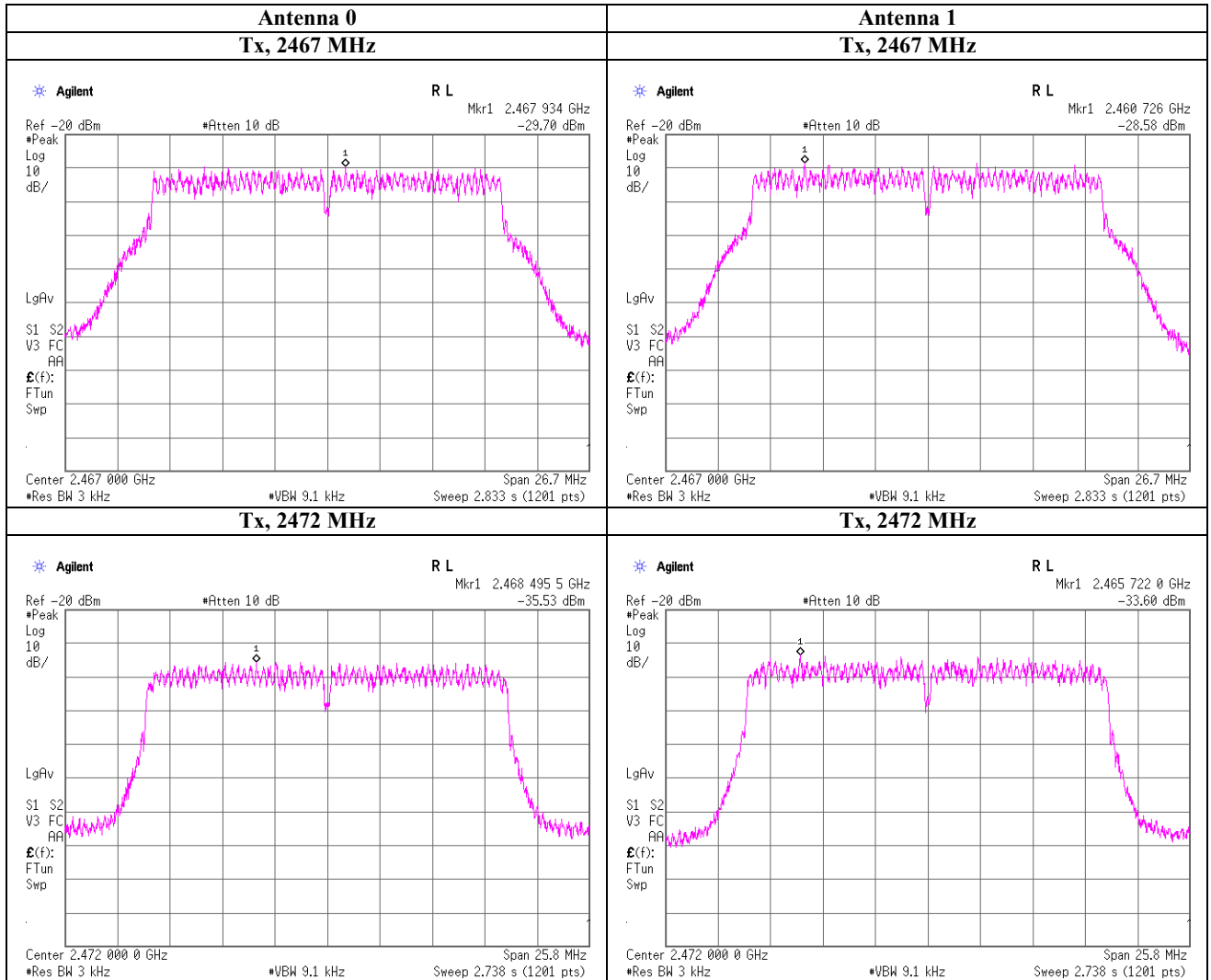
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date February 3, 2021
 Temperature / Humidity 24 deg.C , 55 %RH
 Engineer Takahiro Kawakami

Maximum Power Spectral Density



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

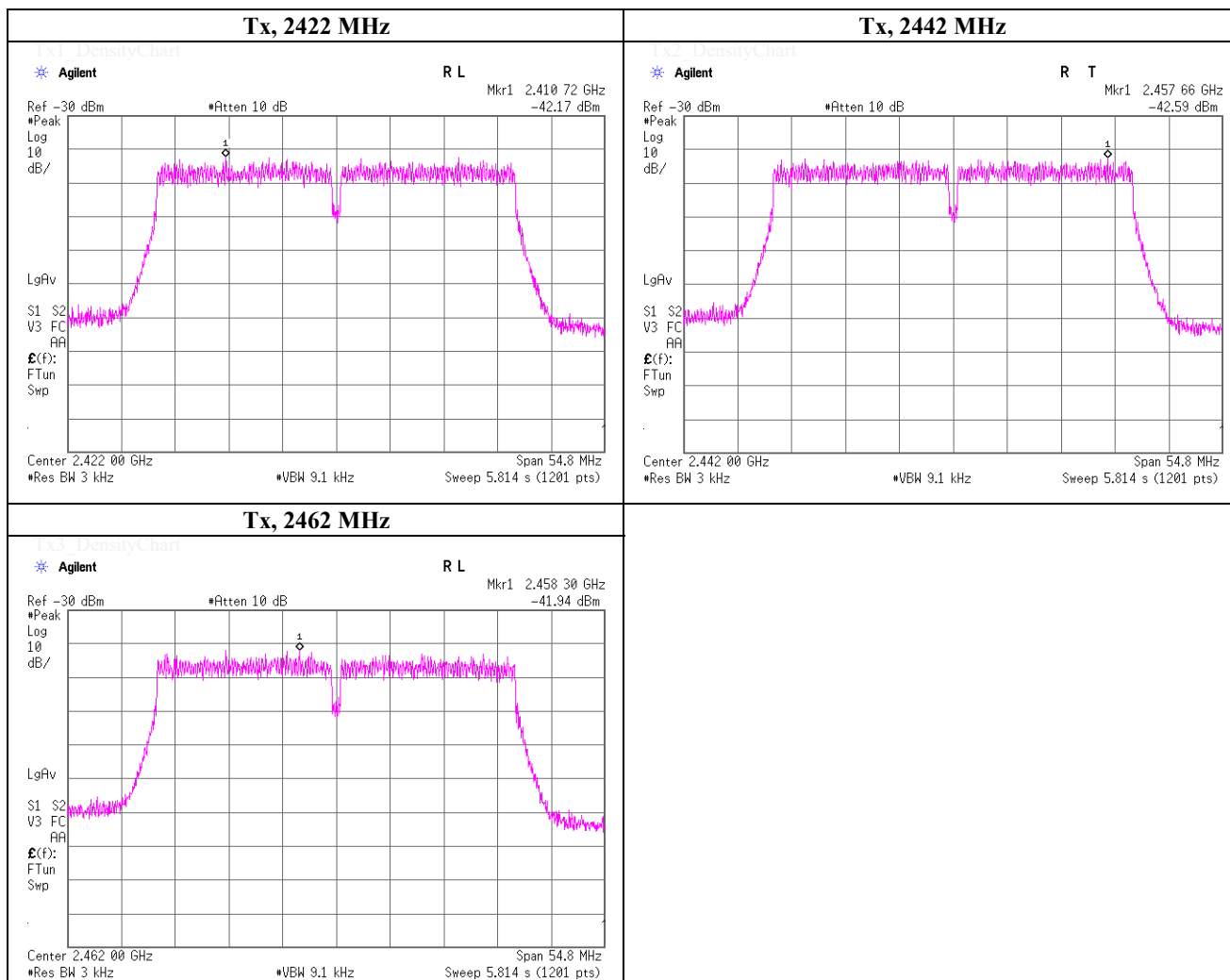
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	February 11, 2021	
Temperature / Humidity	23 deg.C , 35 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, IEEE802.11n-40 (SISO), PN9, antenna port 0, worst data mode 3 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2422.0000	2410.72	-42.17	1.66	19.94	-20.57	8.00	28.57
2442.0000	2457.66	-42.59	1.66	19.94	-20.99	8.00	28.99
2462.0000	2458.30	-41.94	1.67	19.94	-20.33	8.00	28.33

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



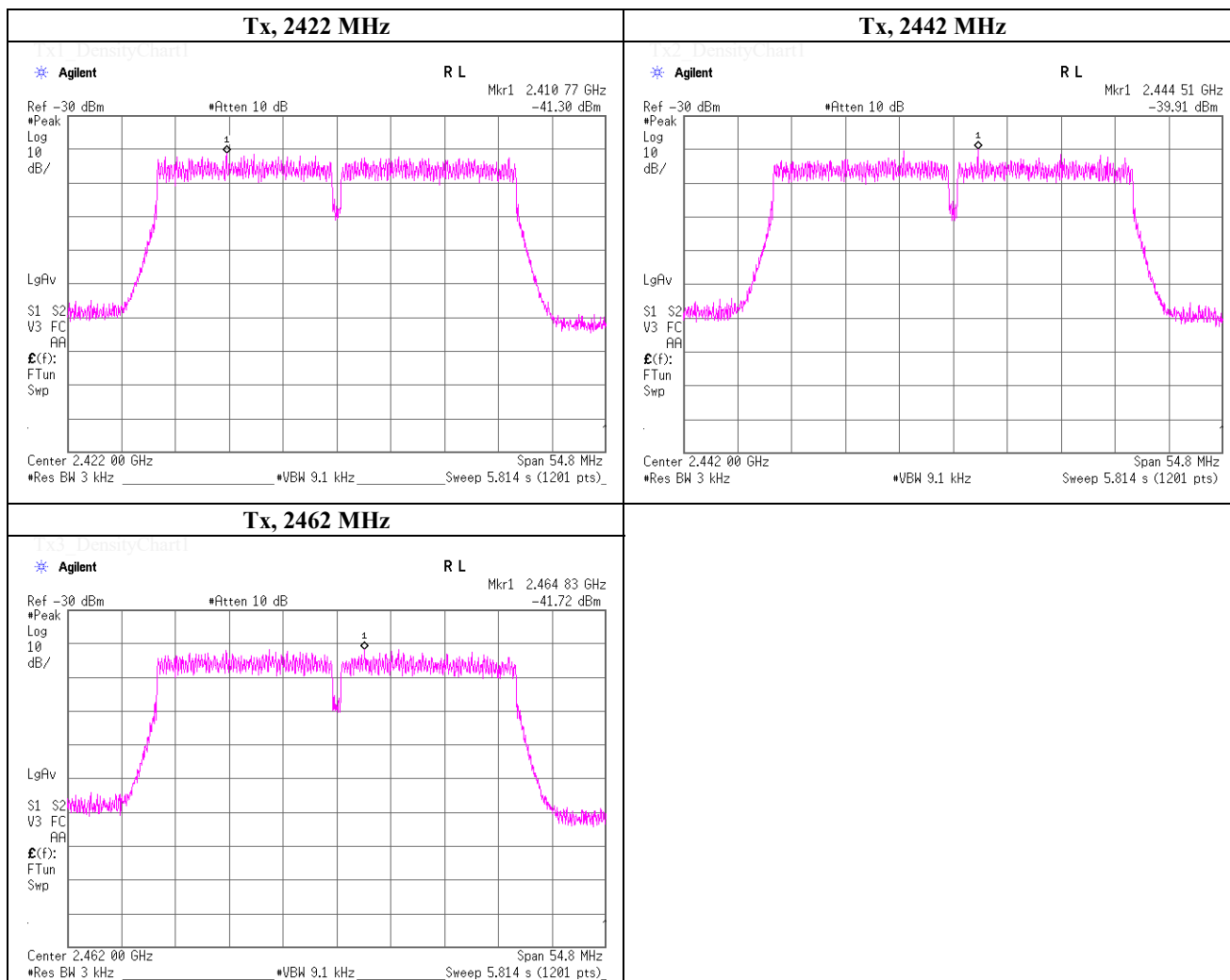
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	August 20, 2020	
Temperature / Humidity	25 deg.C , 40 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, IEEE802.11n-40 (SISO), PN9, antenna port 1, worst data mode 3 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2422.0000	2410.77	-41.30	1.66	19.94	-19.70	8.00	27.70
2442.0000	2444.51	-39.91	1.66	19.94	-18.31	8.00	26.31
2462.0000	2464.83	-41.72	1.67	19.94	-20.11	8.00	28.11

Sample Calculation:
 Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Maximum Power Spectral Density

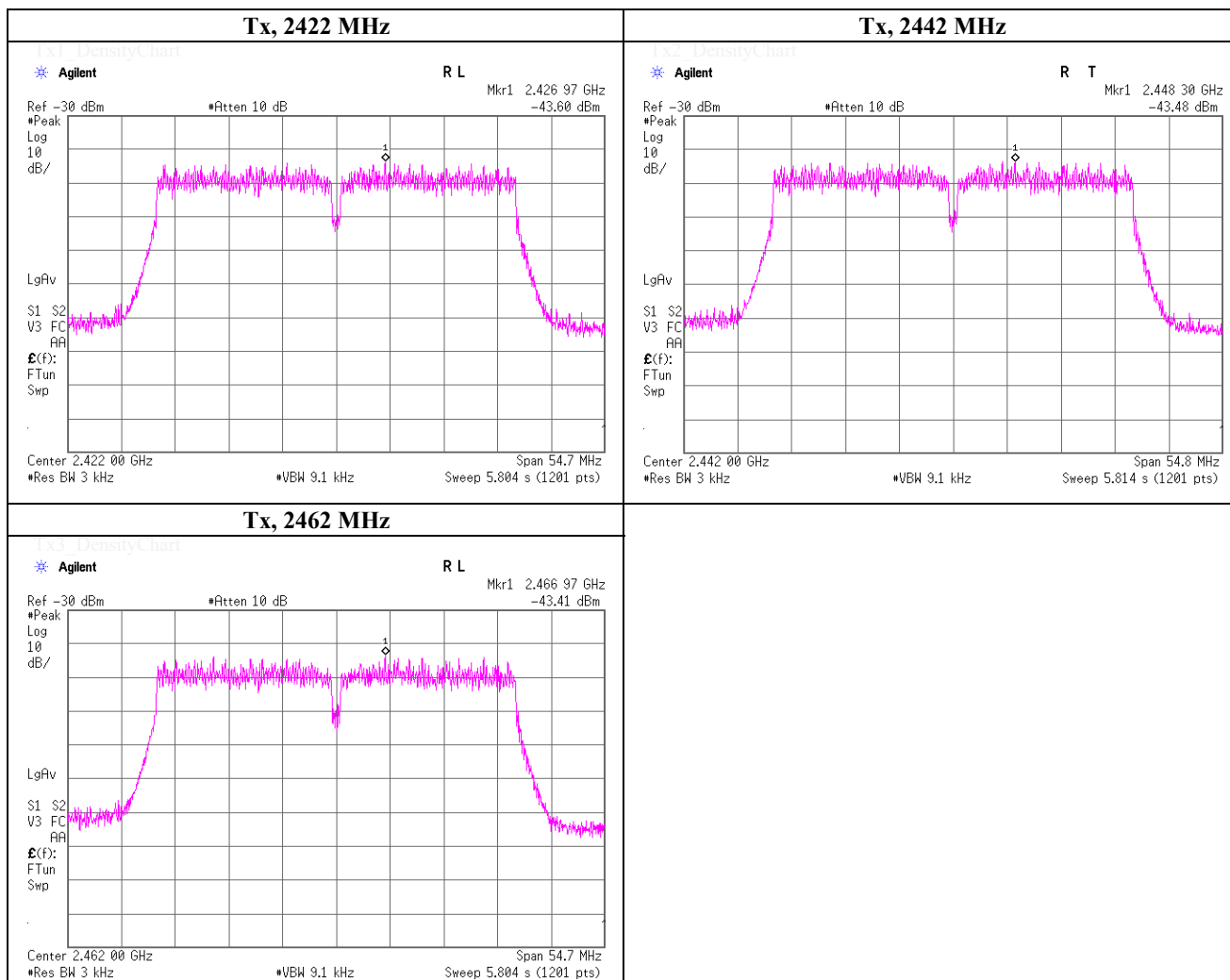
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	February 11, 2021	
Temperature / Humidity	23 deg.C , 35 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, OFDM VHT40 (SISO), PN9, antenna port 0, worst data mode 9 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2422.0000	2426.97	-43.60	1.66	19.94	-22.00	8.00	30.00
2442.0000	2448.30	-43.48	1.66	19.94	-21.88	8.00	29.88
2462.0000	2466.97	-43.41	1.67	19.94	-21.80	8.00	29.80

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

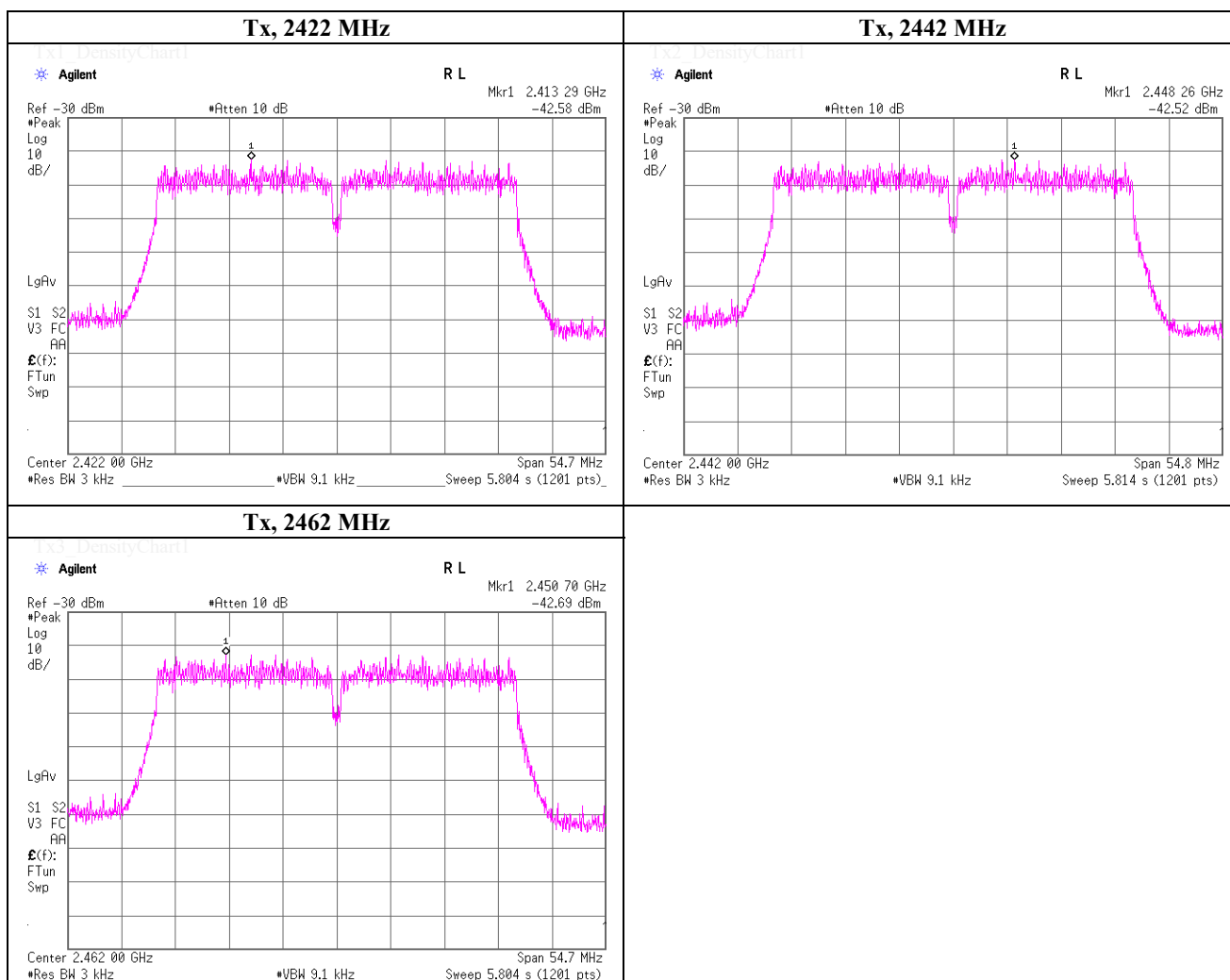
Maximum Power Spectral Density

(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	August 20, 2020	
Temperature / Humidity	25 deg.C , 40 %RH	
Engineer	Yusuke Tanikawara	
Mode	Tx, OFDM VHT40 (SISO), PN9, antenna port 1, worst data mode 9 (MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2422.0000	2413.29	-42.58	1.66	19.94	-20.98	8.00	28.98
2442.0000	2448.26	-42.52	1.66	19.94	-20.92	8.00	28.92
2462.0000	2450.70	-42.69	1.67	19.94	-21.08	8.00	29.08

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Maximum Power Spectral Density

(PKPSD)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date February 5, 2021
Temperature / Humidity 24 deg.C , 30 %RH
Engineer Takahiro Kawakami
Mode Tx, IEEE802.11n-40 (MIMO), PN9, worst data mode 11 (MCS)

Antenna 0

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2422.0000	2416.93	-32.82	1.66	9.88	3.01	-18.27	8.00	26.27
2442.0000	2454.47	-33.31	1.66	9.89	3.01	-18.75	8.00	26.75
2462.0000	2467.61	-32.99	1.67	9.89	3.01	-18.42	8.00	26.42

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

Antenna 1

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2422.0000	2410.72	-31.88	1.66	9.88	3.01	-17.33	8.00	25.33
2442.0000	2439.44	-31.50	1.66	9.89	3.01	-16.94	8.00	24.94
2462.0000	2470.71	-32.04	1.67	9.89	3.01	-17.47	8.00	25.47

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

*) This test was measured based on Method In-Band Power Spectral Density (PSD) Measurements (2) of "Emissions Testing of Transmitters with Multiple Outputs in the Same Band (KDB662911 D1)"

UL Japan, Inc.**Shonan EMC Lab.**

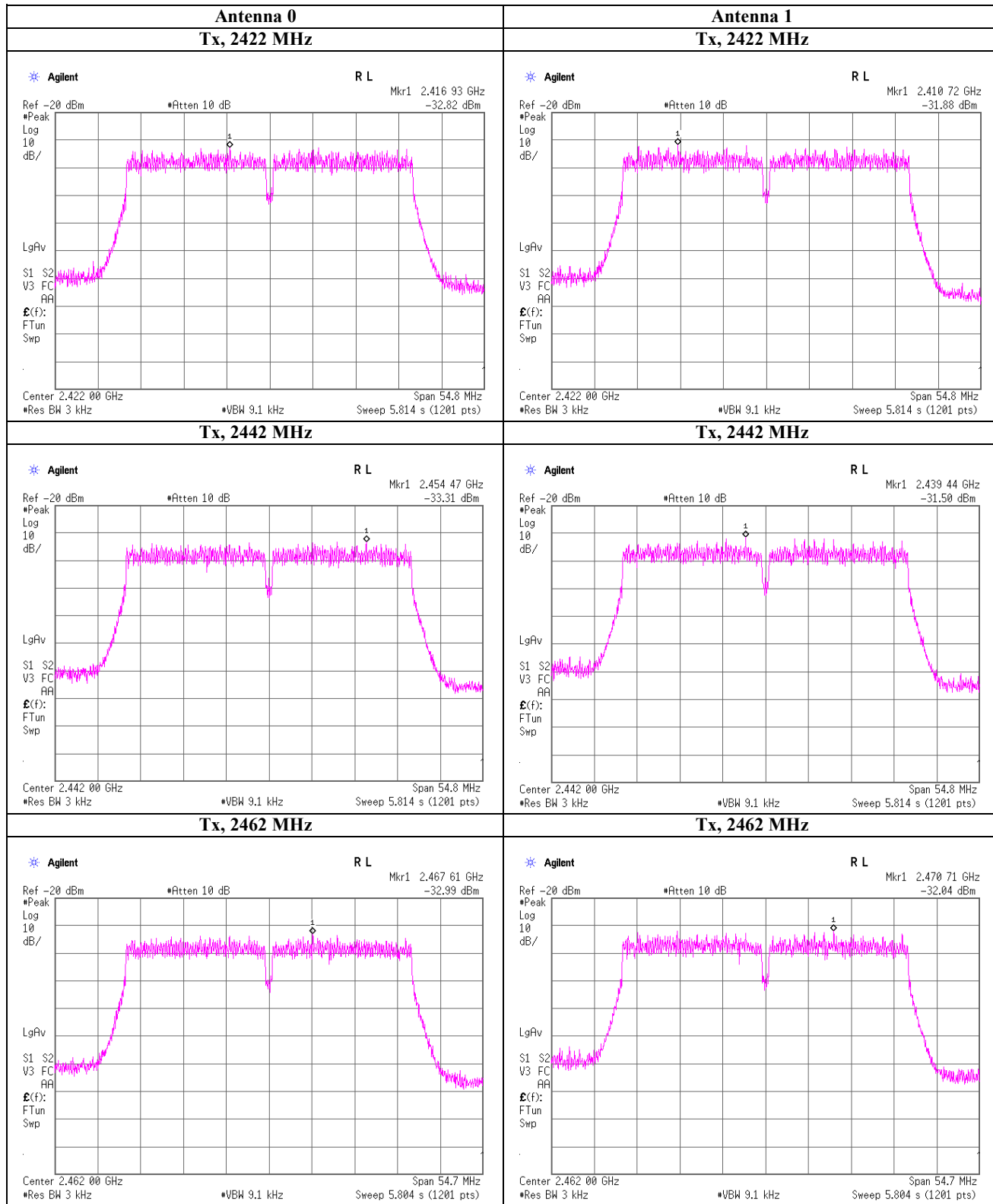
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date February 5, 2021
 Temperature / Humidity 24 deg.C , 30 %RH
 Engineer Takahiro Kawakami

Maximum Power Spectral Density



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Maximum Power Spectral Density

(PKPSD)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date February 5, 2021
Temperature / Humidity 24 deg.C , 30 %RH
Engineer Takahiro Kawakami
Mode Tx, OFDM VHT40 (MIMO), PN9, worst data mode 4 (MCS)

Antenna 0

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2422.0000	2428.26	-33.47	1.66	9.88	3.01	-18.92	8.00	26.92
2442.0000	2444.51	-33.17	1.66	9.89	3.01	-18.61	8.00	26.61
2462.0000	2458.26	-32.65	1.67	9.89	3.01	-18.08	8.00	26.08

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

Antenna 1

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. [dB]	10log (N _{ANT})* [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2422.0000	2408.25	-31.88	1.66	9.88	3.01	-17.33	8.00	25.33
2442.0000	2454.44	-32.07	1.66	9.89	3.01	-17.51	8.00	25.51
2462.0000	2468.26	-31.58	1.67	9.89	3.01	-17.01	8.00	25.01

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 10log(NANT)

*) This test was measured based on Method In-Band Power Spectral Density (PSD) Measurements (2) of
"Emissions Testing of Transmitters with Multiple Outputs in the Same Band (KDB662911 D1)"

UL Japan, Inc.**Shonan EMC Lab.**

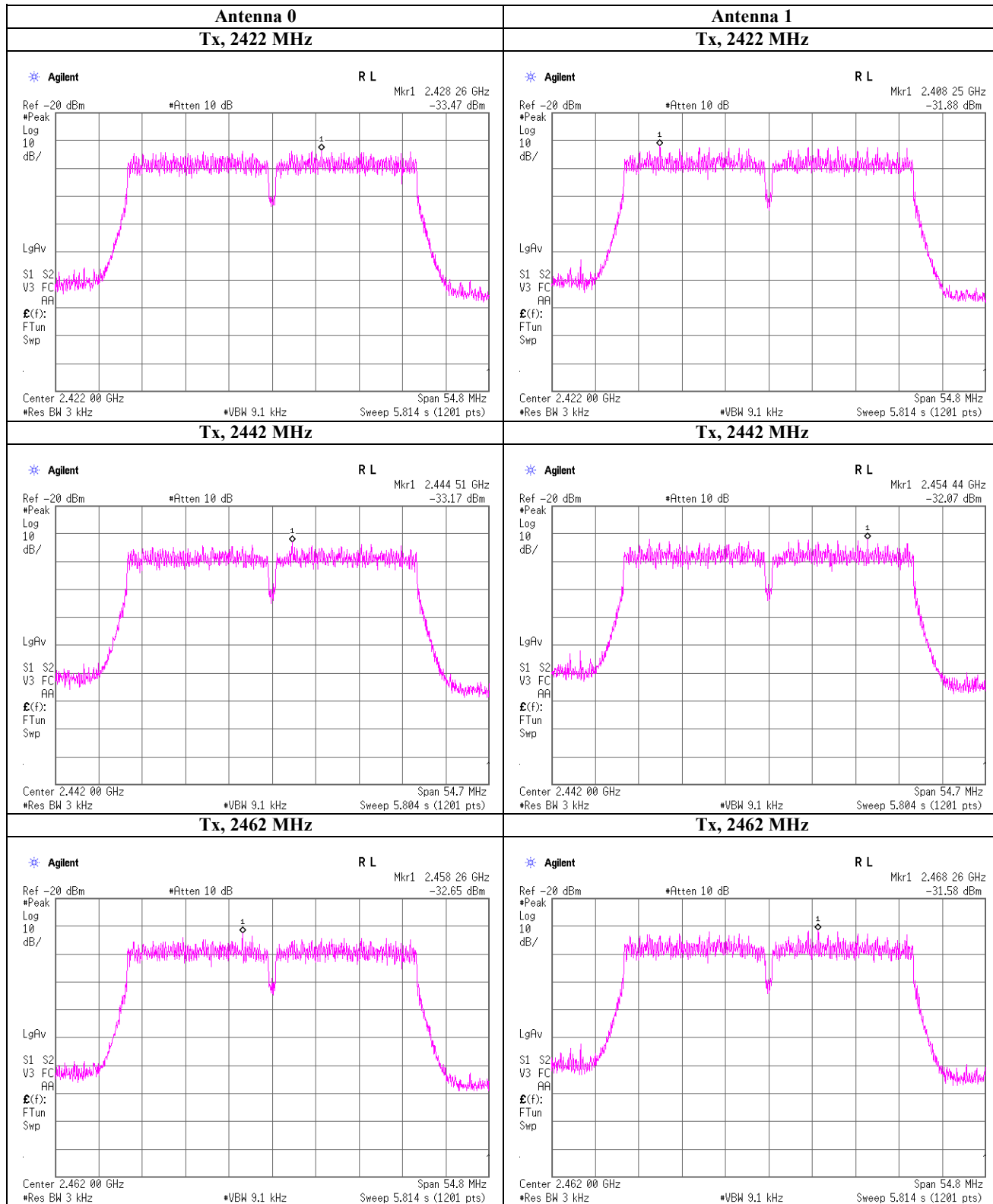
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date February 5, 2021
 Temperature / Humidity 24 deg.C , 30 %RH
 Engineer Takahiro Kawakami

Maximum Power Spectral Density



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

APPENDIX 2: Test instruments**Test equipment (1/2)**

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	SCC-C9/C10/SRSE-03	145036	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	2021/04/12	12
CE	SLS-02	145539	LISN	Rohde & Schwarz	ENV216	100512	2021/02/24	12
CE	SLS-05	145542	LISN	Rohde & Schwarz	ENV216	100516	2021/02/12	12
CE	SOS-24	191841	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/10/01	12
CE	STM-02	145746	Terminator	TME	CT-01 BP	-	2020/12/07	12
RE	KHA-02	144941	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	230	2021/05/10	12
RE	KHA-04	146351	Horn Antenna	EMCO	3160-09	1278	2021/05/20	12
RE	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2020/11/24	12
RE	SAEC-03(NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2021/04/27	12
RE	SAEC-03(SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2021/05/21	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2021/02/10	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2021/02/08	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2021/03/01	12
RE	SAT10-05	145136	Attenuator	Keysight Technologies Inc	8493C-010	74864	2020/10/05	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2021/02/10	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2021/05/15	12
RE	SCC-C1/C2/C3/C4/C5/C10/SRSE-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2021/04/12	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2021/03/01	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2021/01/19	12
RE	SCC-G41	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2021/01/19	12
RE	SCC-G43	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	SN MY 13406/4E	2021/05/17	12
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2021/05/18	12
RE	SCC-G58	183047	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800287/4A	2021/05/17	12
RE	SCC-G70	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2020/07/07	12
RE	SFL-02	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2020/10/05	12
RE	SFL-18	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2021/04/08	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2020/06/15	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2020/06/15	12
RE	SHA-10	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2021/03/03	12
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2021/05/15	12
RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2021/04/13	12
RE	SSA-03	145801	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250152	2020/08/12	12

UL Japan, Inc.**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE,CE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
RE,CE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
RE,CE	SOS-23	191840	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/09/28	12
RE,CE	STR-08	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2020/12/02	12
RE,CE	STS-03	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2020/10/19	12
AT	KTS-08	145095	Digital Tester	SANWA	PC500	7019224	2021/04/26	12
AT	SAT10-12	151609	Attenuator	Weinschel Corp.	54A-10	81601	2021/03/01	12
AT	SAT20-06	145146	Attenuator	Weinschel Corp.	54A-20	31506	2021/04/02	12
AT	SCC-G64	196945	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803414/2	2021/03/01	12
AT	SOS-13	146321	Humidity Indicator	CUSTOM. Inc	CTH-202	Q.C.17	-	-
AT	SOS-28	191846	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/09/29	12
AT	SPM-07	146247	Power Meter	Keysight Technologies Inc	8990B	MY5100272	2021/05/25	12
AT	SPM-13	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2021/01/25	12
AT	SPSS-04	146310	Power sensor	Keysight Technologies Inc	N1923A	MY5326009	2021/05/25	12
AT	SPSS-06	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2021/01/25	12
AT	SRENT-09	150461	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186392	2021/02/22	12
AT	STM-G6	146207	Terminator	JFW	50T-128	-	2020/11/19	12
AT	STM-G8	171615	Terminator	Weinschel - API Technologies Corp	M1459A	88997	2021/05/17	12
AT	STM-G9	171616	Terminator	Weinschel - API Technologies Corp	M1459A	89025	2021/05/18	12

*Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

The expiration date of the calibration is the end of the expired month.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test item: **RE: Radiated Emission test**
 AT: Antenna Terminal Conducted test

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401