

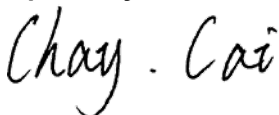
ETSI EN 300 220 Radio Test Report

Project No. : 2109C096A
Equipment : Tapo Smart Button
Brand Name : tp-link, tapo
Test Model : Tapo S200B
Series Model : Tapo S200D
Applicant : TP-Link Corporation Limited
Address : Room 901, 9/F. , New East Ocean Centre, 9 Science Museum Road,
Tsim Sha Tsui, Kowloon, Hong Kong
Manufacturer : TP-Link Corporation Limited
Address : Room 901, 9/F. , New East Ocean Centre, 9 Science Museum Road,
Tsim Sha Tsui, Kowloon, Hong Kong
Date of Receipt : Sep. 10, 2021
Jul. 27, 2022
Date of Test : Feb. 15, 2022 ~ Mar. 22, 2022
Aug. 01, 2022 ~ Sep. 09, 2022
Issued Date : Oct. 04, 2022
Report Version : R00
Test Sample : Engineering Sample No.: DG20220311105, DG2022072850 for others,
DG2022021515, DG2022072848 for blocking, DG2022072848 for Duty
Cycle, DG20220311106, DG2022072849, DG2022072847 for radiated.
Standard(s) : ETSI EN 300 220-1 V3.1.1 (2017-02)
ETSI EN 300 220-2 V3.2.1 (2018-06)

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc. (Dongguan)



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TESTING CERT #5123.02

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The report must not be used by the client to claim product certification, approval, or endorsement by NIST, A2LA, or any agency of the U.S. Government.

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BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-ETSP-1-2109C096A	R00	Compared with original report (BTL-ETSP-1-2109C096), added the nominal operating frequency (863.35MHz, 864.35MHz). So all test items of new nominal operating frequency are tested and recorded. Other are kept the same.	Oct. 04, 2022	Valid

1. RF EMISSIONS MEASUREMENT

1.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-CB15/TR13/TR17** at the location of No. 3 Jinshagang 1st Rd. Shixia, Dalang Town Dongguan City, Guangdong 523792 People's Republic of China.

1.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor) $k=1.96$ or $k=2$ (which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Measurement Uncertainty for a Level of Confidence of 95 %, $U=2 \times U_c(y)$.

The BTL measurement uncertainty as below table:

Radio frequency	± 53.46 Hz
RF power, conducted	± 0.95 dB
Conducted spurious emission of transmitter, valid up to 6 GHz	± 2.71 dB
Conducted emission of receivers	± 2.71 dB
Radiated emission of transmitter, valid up to 6 GHz	± 3.50 dB
Radiated emission of receiver, valid up to 6 GHz	± 3.54 dB
RF level uncertainty for a given BER	± 1.5 dB
Occupied Bandwidth	± 5 %
Temperature	$\pm 0.08^\circ\text{C}$
Humidity	± 1.5 %

1.3 TEST CONDITIONS AND CHANNEL

	Normal Test Conditions	Extreme Test Conditions
Temperature	$+15^\circ\text{C}$ to $+35^\circ\text{C}$	0°C to $+40^\circ\text{C}$
Relative Humidity	20% to 75%	N/A
Supply Voltage	DC 3V	DC 2.7V-3.3V

Test Item	Temperature	Humidity	Test Voltage	Tested By
Unwanted emissions in the spurious domain	$22-26^\circ\text{C}$	39-64%	DC 3V	Andrew Jiang Nelson Ma
TX effective radiated power	Normal & Extreme	54.1-56.3%	Normal & Extreme	Kirito Li
TX Duty cycle	24°C	54%	DC 3V	Kirito Li Cloud Liang
TX Occupied bandwidth	Normal & Extreme	54-56.3%	Normal & Extreme	Kirito Li Ansel Yang
TX out of band emissions	Normal & Extreme	54.1-56.3%	Normal & Extreme	Kirito Li
TX Transient Power	$24-24.7^\circ\text{C}$	54-56.3%	DC 3V	Kirito Li
TX behaviour under low voltage conditions	24°C	54%	Normal & Extreme	Kirito Li Cloud Liang
RX Blocking	$23-25.6^\circ\text{C}$	61-61.6%	DC 3V	Mark Wu Kirito Li

Note:

- (1) For tests at extreme temperatures, measurements shall be made in accordance with the procedures specified in clause 4.3.4.1.1(EN 300 220-1) at the upper and lower temperatures of the range as follows:

General	-20°C to +55°C
Portable	-10°C to +55°C
Normal indoor use	+5°C to +35°C
Automotive	-40°C to +125°C

(2) **Mains voltage:**

The extreme test voltages for equipment to be connected to an AC mains source shall be the nominal mains voltage $\pm 10\%$. For equipment that operates over a range of mains voltages clause 4.3.4.2.4 applies.

Regulated lead-acid battery power sources:

When the radio equipment is intended for operation from the usual type of regulated lead-acid battery power sources the extreme test voltages shall be 1,3 and 0,9 multiplied by the nominal voltage of the battery (6 V, 12 V, etc.).

For float charge applications using "gel-cell" type batteries the extreme voltage shall be 1,15 and 0,85 multiplied by the nominal voltage of the declared battery voltage.

Power sources using other types of batteries:

The lower extreme test voltages for equipment with power sources using batteries shall be as follows::

- For equipment with a battery indicator, the end point voltage as indicated;
- For equipment without a battery indicator the following end point voltages shall be used:
 - For the Leclanché or the lithium type of battery:
 - 0,85 multiplied by the nominal voltage of the battery
 - For the nickel-cadmium type of battery:
 - 0,9 multiplied the nominal voltage of the battery
- For other types of battery or equipment, the lower extreme test voltage for the discharged condition shall be declared by the equipment manufacturer.

The upper extreme voltage shall be declared by the equipment manufacturer if different from the nominal voltage.

1.4 TEST METHODOLOGY AND RESULTS

Harmonised Standard ETSI EN 300 220-2					
Essential Requirement			Requirement Conditionality		Result
No	Description	Reference: Clause No	U/C	Condition	-
1	Operating frequency	4.2.1	U	-	Pass
2	Unwanted emissions in the spurious domain	4.2.2	U	-	Pass
3	TX effective radiated power	4.3.1	U	-	Pass
4	TX Maximum e.r.p. spectral density	4.3.2	C	Applies to EUT using annex B band I. Applies to EUT using DSSS or wideband techniques other than FHSS modulation, using annex C band W, AA or AC.	N/A
5	TX Duty cycle	4.3.3	C	Not applicable to EUT with polite spectrum access where permitted in annex B, table B.1.	Pass
6	TX Occupied bandwidth	4.3.4	U	-	Pass
7	TX out of band emissions	4.3.5	C	Applies to EUT with OCW > 25 kHz.	Pass
8	TX Transient	4.3.6	U	-	Pass
9	TX Adjacent channel power	4.3.7	C	Applies to EUT with OCW ≤ 25 kHz.	N/A
10	TX behaviour under low voltage conditions	4.3.8	C	Applies to battery powered EUT.	Pass
11	TX Adaptive power control	4.3.9	C	Applies to EUT with adaptive power control using annex C band AF.	N/A
12	TX FHSS	4.3.10	C	Applies to FHSS EUT using the band 863 MHz to 870 MHz.	N/A
13	TX Short term behaviour	4.3.11	C	Applies to EUT using annex C bands AD, AE, AF, AG, AH, or AI.	N/A
14	RX sensitivity	4.4.1	C	Applies to EUT employing polite spectrum access.	N/A
15	RX Blocking	4.4.2	U	-	Pass
16	Clear channel assessment threshold	4.5.2	C	Applies to EUT employing polite spectrum access.	N/A
17	Polite spectrum access timing parameters	4.5.3	C	Applies to EUT employing polite spectrum access.	N/A
18	Adaptive Frequency Agility	4.5.4	C	Applies to EUT with AFA.	N/A

Note:

- (1) "U/C": Indicates whether the requirement is unconditionally applicable (U) or is conditional upon the manufacturer's claimed functionality of the equipment (C).

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Tapo Smart Button
Brand Name	tp-link, tapo
Test Model	Tapo S200B
Series Model	Tapo S200D
Model Difference(s)	The difference between Tapo S200B and Tapo S200D is that the Tapo S200D has one more panel than the Tapo S200B. The panel is used to meet the requirements of the Tapo S200B 's wall installation, and the hardware design is identical (Tapo S200D=Tapo S200B+ panel).
Power Source	Battery supplied.
Power Rating	DC 3V
Operational Frequency band	863.00 MHz to 868.60 MHz
Nominal Operating Frequency	863.35MHz, 864.35MHz, 868.35MHz
Operating Channel width(s)	200kHz
Data Rate	50kbps
Modulation Type	GFSK
Effective radiated power(Max)	8.33dBm

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

EUT Test Channel	Test Frequency
CH01	863.35MHz
CH02	864.35MHz
CH03	868.35MHz

3. Table for Filed Antenna:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	tp-link	6037500192	on board	N/A	-1.90

Note: The antenna gain is provided by the manufacturer.

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Items	Mode	Data Rate	Frequency (MHz)
Unwanted emissions in the spurious domain	TX Mode RX Mode	50kbps	863.35/864.35/868.35
TX effective radiated power	TX Mode	50kbps	863.35/864.35/868.35
TX Duty cycle	TX Mode	50kbps	863.35/864.35/868.35
TX Occupied bandwidth	TX Mode	50kbps	863.35/864.35/868.35
TX out of band emissions	TX Mode	50kbps	863.35/864.35/868.35
TX Transient Power	TX Mode	50kbps	863.35/864.35/868.35
TX behaviour under low voltage conditions	TX Mode	50kbps	863.35/864.35/868.35
RX Blocking	RX Mode	50kbps	863.35/864.35/868.35

2.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

Test Software Version	N/A		
Frequency (MHz)	863.35	864.35	868.35
Parameters	Default	Default	Default

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model No.	Series No.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
-	-	-	-	-

3. UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

3.1 APPLIED PROCEDURES / LIMIT

Clause	4.2.2 of ETSI EN 300 220-2 V3.2.1			
Test Item	Unwanted emissions in the spurious domain			
Limit	Frequency	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
	State			
	TX mode	-54 dBm	-36 dBm	-30 dBm
	RX and all other modes	-57 dBm	-57 dBm	-47 dBm

3.2 TEST PROCEDURES

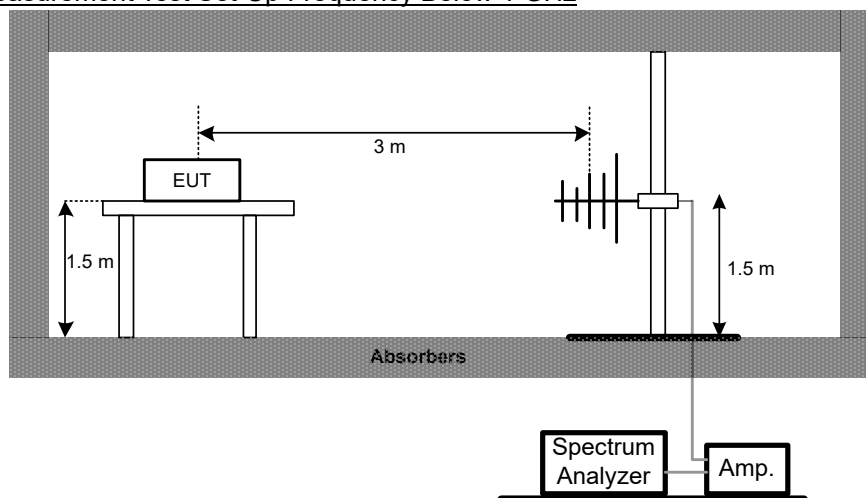
Please refer to chapter 5.9.3.3.1 & 5.9.3.3.2 of ETSI EN 300 220-1 V3.1.1.

3.3 TEST SETUP LAYOUT

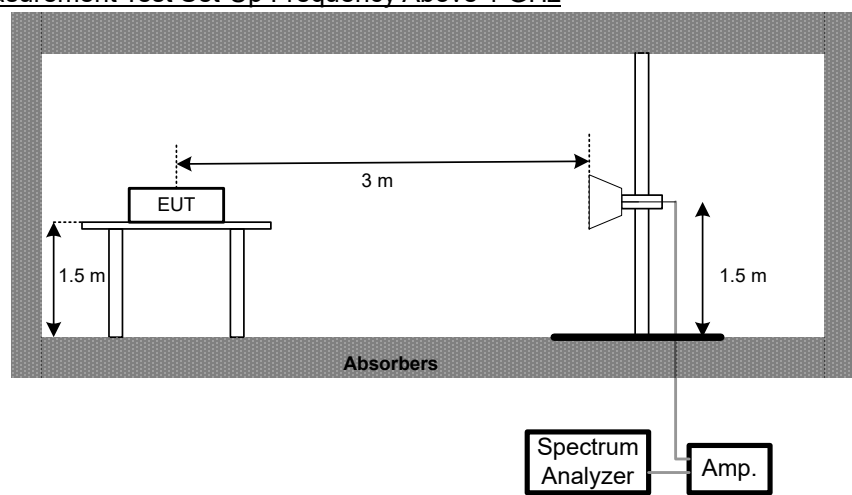
Conducted Measurement



Radiated Measurement Test Set-Up Frequency Below 1 GHz



Radiated Measurement Test Set-Up Frequency Above 1 GHz



3.4 TEST DEVIATION

There is no deviation with the original standard.

3.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting or receiving.

3.6 TEST RESULTS

Please refer to the Appendix A.

4. EFFECTIVE RADIATED POWER

4.1 APPLIED PROCEDURES / LIMIT

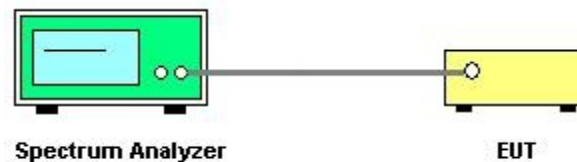
Clause	4.3.1 of ETSI EN 300 220-2 V3.2.1	
Test Item	Effective Radiated Power	
Limit	The effective radiated power shall not be greater than the value allowed in annexes B or C (EN 300 220-2) for the chosen operational frequency band(s).	
	Frequency Band	Maximum effective radiated power
	433.04MHz to 434.79MHz	10mW
	868.00MHz to 868.60MHz	25mW

4.2 TEST PROCEDURES

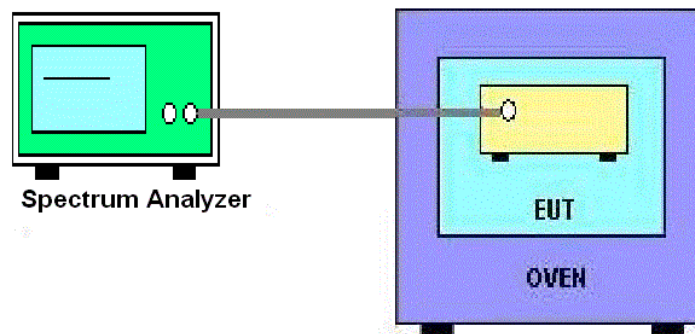
Please refer to chapter 5.2.2.1.2 of ETSI EN 300 220-1 V3.1.1

4.3 TEST SETUP LAYOUT

Normal Condition



Extreme Condition



4.4 TEST DEVIATION

There is no deviation with the original standard.

4.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

4.6 TEST RESULTS

Please refer to the Appendix B.

5. DUTY CYCLE

5.1 APPLIED PROCEDURES / LIMIT

Clause	4.3.3 of ETSI EN 300 220-2 V3.2.1
Test Item	Duty Cycle
Limit	The Duty Cycle at the operating frequency shall not be greater than values in annex B or any NRI for the chosen operational frequency band(s).

5.2 TEST PROCEDURES

Please refer to chapter 5.4.2 of ETSI EN 300 220-1 V3.1.1

5.3 TEST SETUP LAYOUT



5.4 TEST DEVIATION

There is no deviation with the original standard.

5.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

5.6 TEST RESULTS

Please refer to the Appendix C.

6. OCCUPIED BANDWIDTH

6.1 APPLIED PROCEDURES / LIMIT

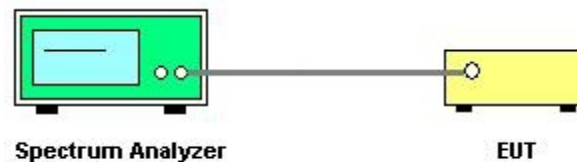
Clause	4.3.4 of ETSI EN 300 220-2 V3.2.1
Test Item	Occupied Bandwidth
Limit	The Operating Channel shall be declared and shall reside entirely within the Operational Frequency Band. The Maximum Occupied Bandwidth at 99 % shall reside entirely within the Operating Channel defined by F_{low} and F_{high} .

6.2 TEST PROCEDURES

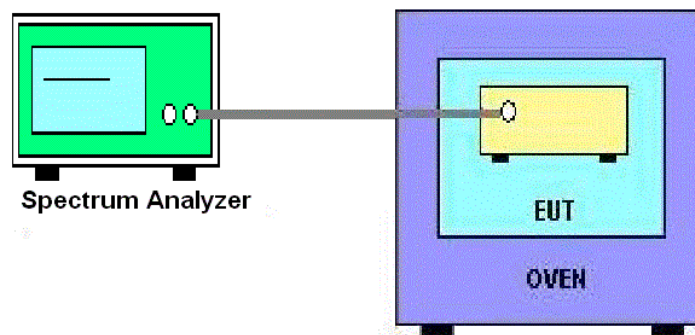
Please refer to chapter 5.5.2.2 of ETSI EN 300 220-1 V3.1.1

6.3 TEST SETUP LAYOUT

Normal Condition



Extreme Condition



6.4 TEST DEVIATION

There is no deviation with the original standard.

6.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

6.6 TEST RESULTS

Please refer to the Appendix D.

7. TX OUT OF BAND EMISSIONS

7.1 APPLIED PROCEDURES / LIMIT

Clause	4.3.5 of ETSI EN 300 220-2 V3.2.1				
Test Item	Tx Out of Band Emissions				
Limit	OOB limits applicable to Operational Frequency Band (See Figure 6)	Domain	Frequency Range	RBW _{REF}	Max power limit
			$f \leq f_{\text{low_OFB}} - 400 \text{ kHz}$	10 kHz	-36 dBm
			$F_{\text{low_OFB}} - 400 \text{ kHz} \leq f \leq f_{\text{low_OFB}} - 200 \text{ kHz}$	1 kHz	-36 dBm
			$f_{\text{low}} - 200 \text{ kHz} \leq f < f_{\text{low_OFB}}$	1 kHz	See Figure 6
			$f = f_{\text{low_OFB}}$	1 kHz	0 dBm
			$f = f_{\text{high_OFB}}$	1 kHz	0 dBm
			$F_{\text{high_OFB}} < f \leq f_{\text{high_OFB}} + 200 \text{ kHz}$	1 kHz	See Figure 6
			$F_{\text{high_OFB}} + 200 \text{ kHz} \leq f \leq f_{\text{high_OFB}} + 400 \text{ kHz}$	1 kHz	-36 dBm
			$F_{\text{high_OFB}} + 400 \text{ kHz} \leq f$	10 kHz	-36 dBm
	OOB limits applicable to Operating Channel (See Figure 5)		$f = f_c - 2.5 \times \text{OCW}$	1 kHz	-36 dBm
			$f_c - 2.5 \times \text{OCW} \leq f \leq f_c - 0.5 \times \text{OCW}$	1 kHz	See Figure 5
			$f = f_c - 0.5 \times \text{OCW}$	1 kHz	0 dBm
			$f = f_c + 0.5 \times \text{OCW}$	1 kHz	0 dBm
			$f_c + 0.5 \times \text{OCW} \leq f \leq f_c + 2.5 \times \text{OCW}$	1 kHz	See Figure 5
			$f = f_c + 2.5 \times \text{OCW}$	1 kHz	-36 dBm
	NOTE: f is the measurement frequency. f _c is the Operating Frequency. f _{low_OFB} is the lower edge of the Operational Frequency Band. f _{high_OFB} is the upper edge of the Operational Frequency Band. OCW is the operating channel bandwidth.				

7.2 TEST PROCEDURES

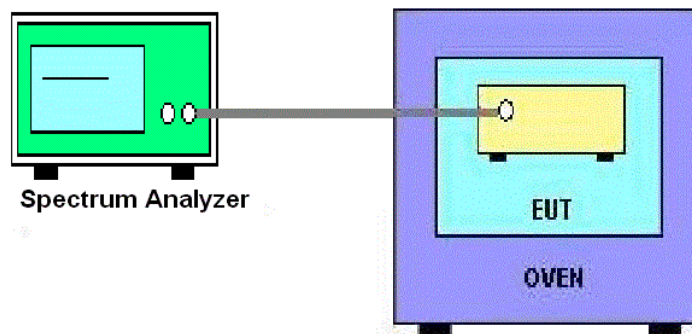
Please refer to chapter 5.8.3.4 of ETSI EN 300 220-1 V3.1.1

7.3 TEST SETUP LAYOUT

Normal Condition



Extreme Condition



7.4 TEST DEVIATION

There is no deviation with the original standard.

7.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

7.6 TEST RESULTS

Please refer to the Appendix E

8. TRANSIENT POWER

8.1 APPLIED PROCEDURES / LIMIT

Clause	4.3.6 of ETSI EN 300 220-2 V3.2.1		
Test Item	Transient power		
Limit	Absolute offset from centre frequency	RBW_{REF}	Peak power limit applicable at measurement points
	≤ 400 kHz	1 kHz	0 dBm
	> 400 kHz	1 kHz	-27 dBm

8.2 TEST PROCEDURES

Please refer to chapter 5.10.3.2 of ETSI EN 300 220-1 V3.1.1

8.3 TEST SETUP LAYOUT



8.4 TEST DEVIATION

There is no deviation with the original standard.

8.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

8.6 TEST RESULTS

Please refer to the Appendix F.

9. ADJACENT CHANNEL POWER

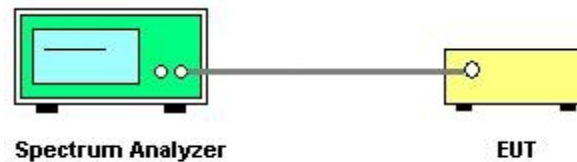
9.1 APPLIED PROCEDURES / LIMIT

Clause	4.3.7 of ETSI EN 300 220-2 V3.2.1			
Test Item	Adjacent Channel Power			
Limit			Adjacent Channel power integrated over 0,7 x OCW	Alternate Adjacent Channel power integrated over 0,7 x OCW
	OCW < 20 kHz	Normal test conditions	-20 dBm	-20 dBm
		Extreme test conditions	-15 dBm	-20 dBm
	OCW ≥ 20 kHz	Normal test conditions	-37 dBm	-40 dBm
		Extreme test conditions	-32 dBm	-37 dBm

9.2 TEST PROCEDURES

Please refer to chapter 5.11.3.4 of ETSI EN 300 220-1 V3.1.1

9.3 TEST SETUP LAYOUT



9.4 TEST DEVIATION

There is no deviation with the original standard.

9.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

9.6 TEST RESULTS

Please refer to the Appendix G.

10. TX BEHAVIOUR UNDER LOW VOLTAGE CONDITIONS

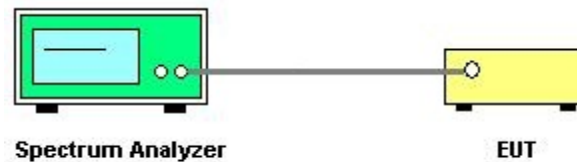
10.1 APPLIED PROCEDURES / LIMIT

Clause	4.3.8 of ETSI EN 300 220-2 V3.2.1
Test Item	TX behaviour under Low Voltage Conditions
Limit	The equipment shall either: a) remain in the Operating Channel OC without exceeding any applicable limits (e.g. Duty Cycle); or b) reduce its effective radiated power below the Spurious Emission limits without exceeding any applicable limits (e.g. Duty Cycle); or c) shut down, (ceasing function); as the voltage falls below the manufacturers declared operating voltage.

10.2 TEST PROCEDURES

Please refer to chapter 5.12.3.2 of ETSI EN 300 220-1 V3.1.1

10.3 TEST SETUP LAYOUT



10.4 TEST DEVIATION

There is no deviation with the original standard.

10.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

10.6 TEST RESULTS

Please refer to the Appendix H.

11. RX BLOCKING

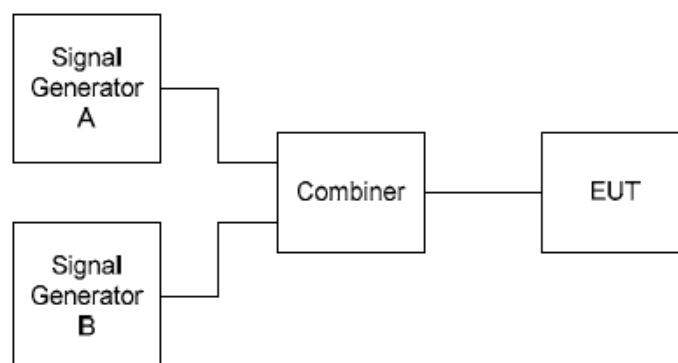
11.1 APPLIED PROCEDURES / LIMIT

Clause	4.4.2 of ETSI EN 300 220-2 V3.2.1																														
Test Item	RX Blocking																														
Limit	Table 41: Blocking level parameters for RX category 2 <table> <tr> <th>Requirement</th><th>Limits</th></tr> <tr> <td></td><td>Receiver category 2</td></tr> <tr> <td>Blocking at ± 2 MHz from OC edge f_{high} and f_{low}</td><td>≥ -69 dBm</td></tr> <tr> <td>Blocking at ± 10 MHz from OC edge f_{high} and f_{low}</td><td>≥ -44 dBm</td></tr> <tr> <td>Blocking at ± 5 % of Centre Frequency or 15 MHz, whichever is the greater</td><td>≥ -44 dBm</td></tr> </table> Table 42: Blocking level parameters for RX category 1.5 <table> <tr> <th>Requirement</th><th>Limits</th></tr> <tr> <td></td><td>Receiver category 1.5</td></tr> <tr> <td>Blocking at ± 2 MHz from OC edge f_{high} and f_{low}</td><td>≥ -43 dBm</td></tr> <tr> <td>Blocking at ± 10 MHz from OC edge f_{high} and f_{low}</td><td>≥ -33 dBm</td></tr> <tr> <td>Blocking at ± 5 % of Centre Frequency or 15 MHz, whichever is the greater</td><td>≥ -33 dBm</td></tr> </table> Table 43: Blocking level parameters for RX category 1 <table> <tr> <th>Requirement</th><th>Limits</th></tr> <tr> <td></td><td>Receiver category 1</td></tr> <tr> <td>Blocking at ± 2 MHz from Centre Frequency</td><td>≥ -20 dBm</td></tr> <tr> <td>Blocking at ± 10 MHz from Centre Frequency</td><td>≥ -20 dBm</td></tr> <tr> <td>Blocking at ± 5 % of Centre Frequency or 15 MHz, whichever is the greater</td><td>≥ -20 dBm</td></tr> </table>	Requirement	Limits		Receiver category 2	Blocking at ± 2 MHz from OC edge f_{high} and f_{low}	≥ -69 dBm	Blocking at ± 10 MHz from OC edge f_{high} and f_{low}	≥ -44 dBm	Blocking at ± 5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -44 dBm	Requirement	Limits		Receiver category 1.5	Blocking at ± 2 MHz from OC edge f_{high} and f_{low}	≥ -43 dBm	Blocking at ± 10 MHz from OC edge f_{high} and f_{low}	≥ -33 dBm	Blocking at ± 5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -33 dBm	Requirement	Limits		Receiver category 1	Blocking at ± 2 MHz from Centre Frequency	≥ -20 dBm	Blocking at ± 10 MHz from Centre Frequency	≥ -20 dBm	Blocking at ± 5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -20 dBm
Requirement	Limits																														
	Receiver category 2																														
Blocking at ± 2 MHz from OC edge f_{high} and f_{low}	≥ -69 dBm																														
Blocking at ± 10 MHz from OC edge f_{high} and f_{low}	≥ -44 dBm																														
Blocking at ± 5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -44 dBm																														
Requirement	Limits																														
	Receiver category 1.5																														
Blocking at ± 2 MHz from OC edge f_{high} and f_{low}	≥ -43 dBm																														
Blocking at ± 10 MHz from OC edge f_{high} and f_{low}	≥ -33 dBm																														
Blocking at ± 5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -33 dBm																														
Requirement	Limits																														
	Receiver category 1																														
Blocking at ± 2 MHz from Centre Frequency	≥ -20 dBm																														
Blocking at ± 10 MHz from Centre Frequency	≥ -20 dBm																														
Blocking at ± 5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -20 dBm																														

11.2 TEST PROCEDURES

Please refer to chapter 5.18.6.4 of ETSI EN 300 220-1 V3.1.1

11.3 TEST SETUP LAYOUT



11.4 TEST DEVIATION

There is no deviation with the original standard.

11.5 EUT OPERATION DURING TEST

The measurements shall be performed during normal receiving.

11.6 TEST RESULTS

Please refer to the Appendix I.

12. INFORMATION TO DECLARE ACCORDING TO ETSI EN 300 220-2

- a) The name of the manufacturer or his trademark

TP-Link Corporation Limited

- b) The type equipment designation

Tapo Smart Button

- c) The Application(s) of the equipment

N/A

- d) The operating channel OC or channels (nominal centre frequency, Flow and Fhigh of each OC)

863.35MHz , 864.35MHz , 868.35MHz

- e) The operational frequency band(s)

863.00 MHz to 868.60 MHz

- f) The operating channel(s) width(s)

200kHz

The operating channel is less than or equal to 25 kHz? ☐

- g) Maximum radio-frequency power transmitted in the frequency band(s) in which the radio equipment operates. Where multiple powers are possible, also state rated power for each level or range of levels.

8.33dBm

- k) What is the spectrum access mechanism of the equipment?

☒ Duty Cycle

☐ Polite spectrum access

- l) In case of polite spectrum access:

The CCA time implemented by the equipment is..... ms.

The minimal unit of deferral period is:

The deadtime T_{DIS} is ms.

m) Is the equipment battery powered?

☒ Yes ☐ No

n) Is the equipment frequency agile?

☐ Yes ☒ No

o) Is the equipment declared as FHSS?

☐ Yes ☒ No

p) In case of FHSS equipment:

The declared hop channel bandwidth is kHz.

The number of non-overlapping channels or hopping positions separated by the declared hop channel bandwidth is.....

The dwell time per channel is ms.

The return time to a hop channel is ms.

Is CCA implemented in the equipment? ☐ Yes ☐ No

13. MEASUREMENT INSTRUMENTS LIST

Unwanted emissions in the spurious domain(Radiated Measurement)					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	587	Nov. 08, 2022
2	DRG Horn Antenna	ETS	3117-PA	221576	Mar. 08, 2023
3	Amplifier	HP	8447D	2944A11203	Jan. 22, 2023
4	Preamplifier	ETS	3117-PA	221576	Jul. 03, 2023
5	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Jan. 22, 2023
6	Controller	Innco Systems Gmbh	CO3000-4port	CO3000/1155/45430119/P	N/A
7	Cable	Talent microwave	L6-NMNM-3M	19052129	N/A
8	Cable	Talent microwave	A81-SMAMSMAM-2M	19052134	N/A
9	Cable	Talent microwave	A81-SMAMSMAM-12.5M	19052135	N/A
10	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

TX effective radiated power & TX occupied bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Jul. 03, 2023
2	Cable	emci	EMC104-SM-SM-9000(0.01GHz—26.5GHz)	N/A	N/A
3	Const Temp. & Humidity Chamber	CEPREI	CEEC-M64T-40	15-008	Jan. 22, 2023

TX out of band emissions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EXA Spectrum Analyzer	Agilent	N9010A	MY55150209	Jul. 03, 2023
2	Cable	emci	EMC104-SM-SM-9000(0.01GHz—26.5GHz)	N/A	N/A
3	Const Temp. & Humidity Chamber	CEPREI	CEEC-M64T-40	15-008	Jan. 22, 2023

TX behaviour under low voltage conditions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1*	Multi-output DC Power Supply	GW Instek	GPC-3030DN	EK880675	Jul. 25, 2023

Mask & TX transient power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EXA Spectrum Analyzer	Agilent	N9010A	MY55150209	Jul. 03, 2023
2	Cable	emci	EMC104-SM-SM-9000(0.01GHz—26.5GHz)	N/A	N/A

Duty cycle					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Jul. 03, 2023
2	Cable	emci	EMC104-SM-SM-9000(0.01GHz—26.5GHz)	N/A	N/A

RX Blocking					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Jul. 03, 2023
2	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Jan. 22, 2023
3*	POWER SPLITTER	Mini-Circuits	ZN4PD1-63-S+	SF9335D1045-2	Jan. 23, 2025
4	Attenuator	WOKEN	6SM3502	VAS1214NL	N/A
5	shielding box	airtac	KP404035	N/A	N/A
6	Tapo Smart Button	tp-link	Tapo S200B	N/A	N/A

Remark: "N/A" denotes no model name, serial no. or calibration specified.

"*" calibration period of equipment list is three year.

Except * item, all calibration period of equipment list is one year.

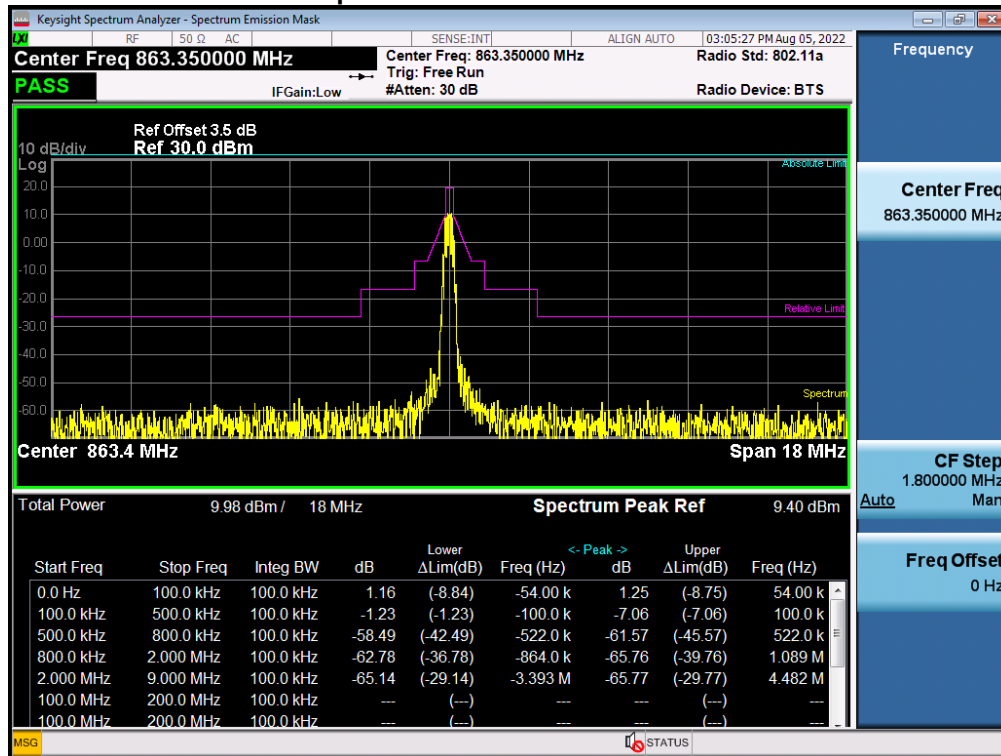
14. EUT TEST PHOTO



APPENDIX A - UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

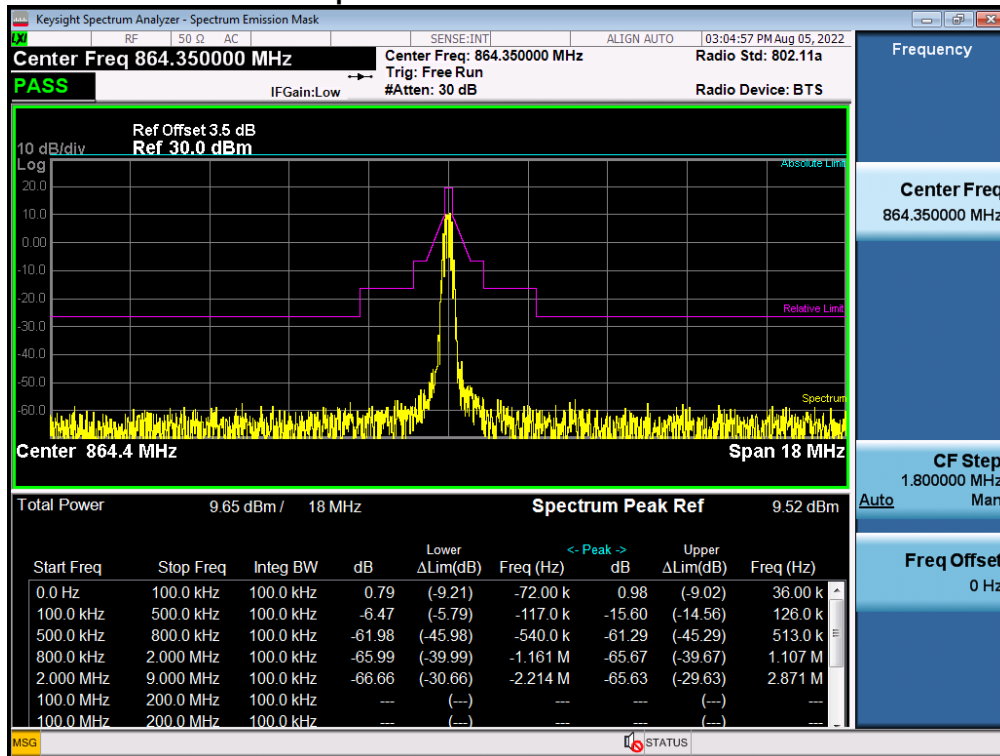
Test Mode 863.35MHz_Transmit_Mask

Spectrum Mask for Unwanted Emissions in the Spurious Domain with reference BW



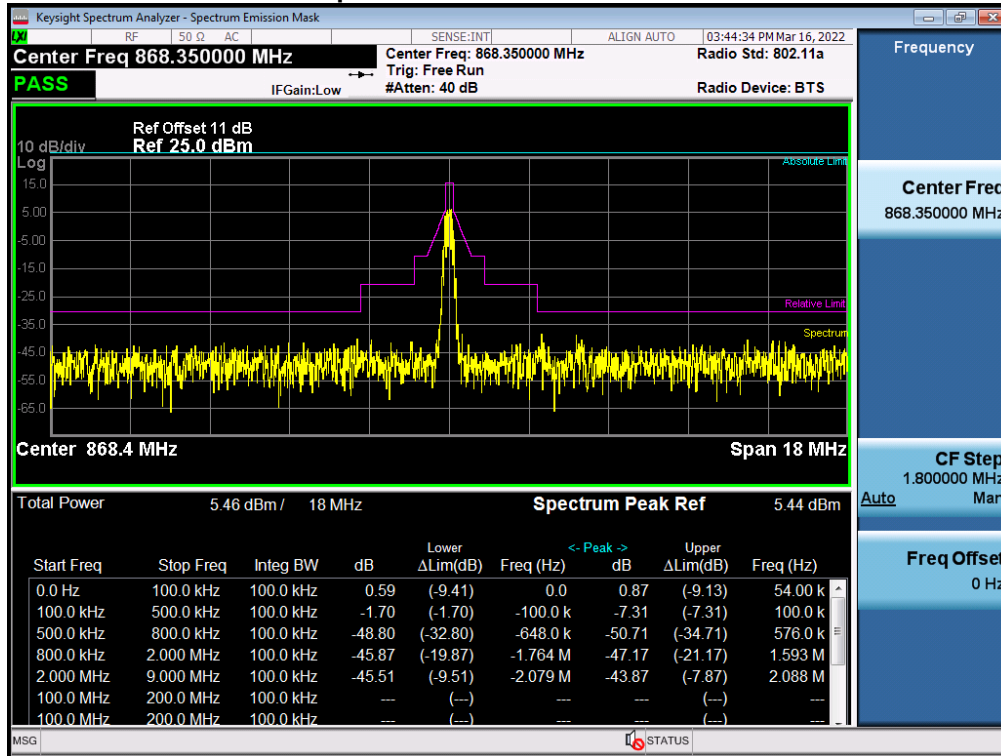
Test Mode 864.35MHz_Transmit_Mask

Spectrum Mask for Unwanted Emissions in the Spurious Domain with reference BW

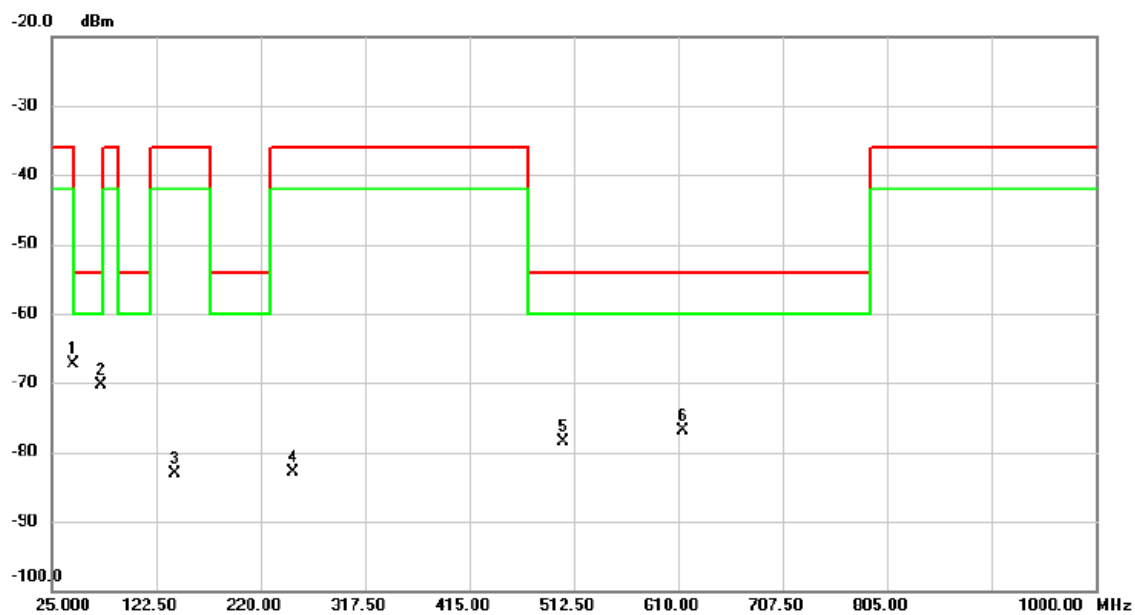


Test Mode 868.35MHz_Transmit_Mask

Spectrum Mask for Unwanted Emissions in the Spurious Domain with reference BW

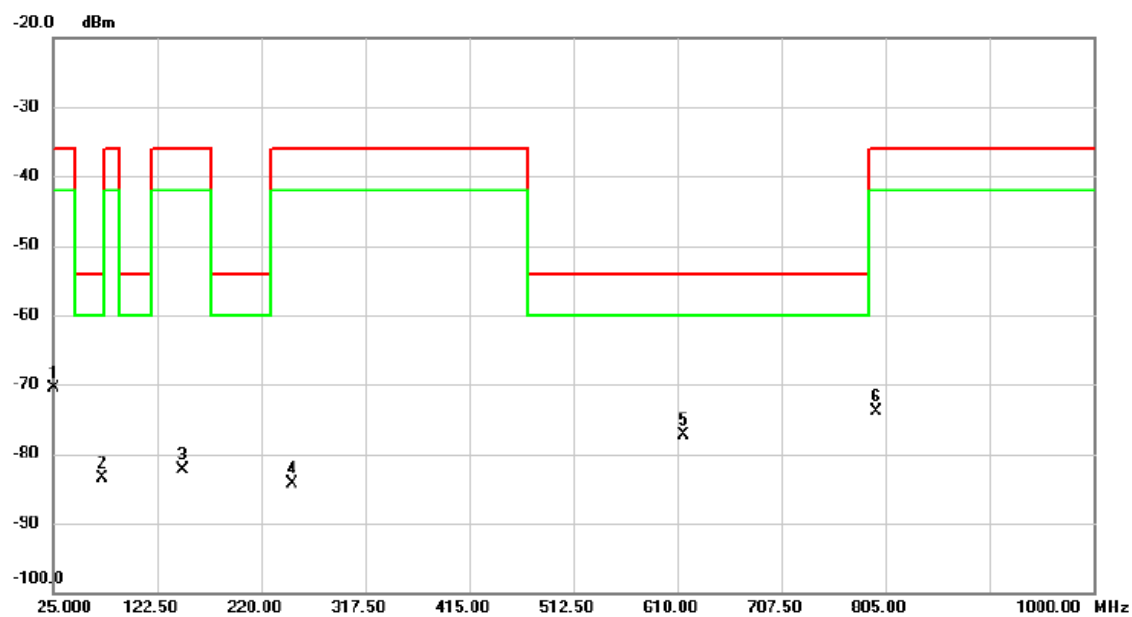


Test Mode	863.35MHz_Transmit_Operating	Polarization	Vertical
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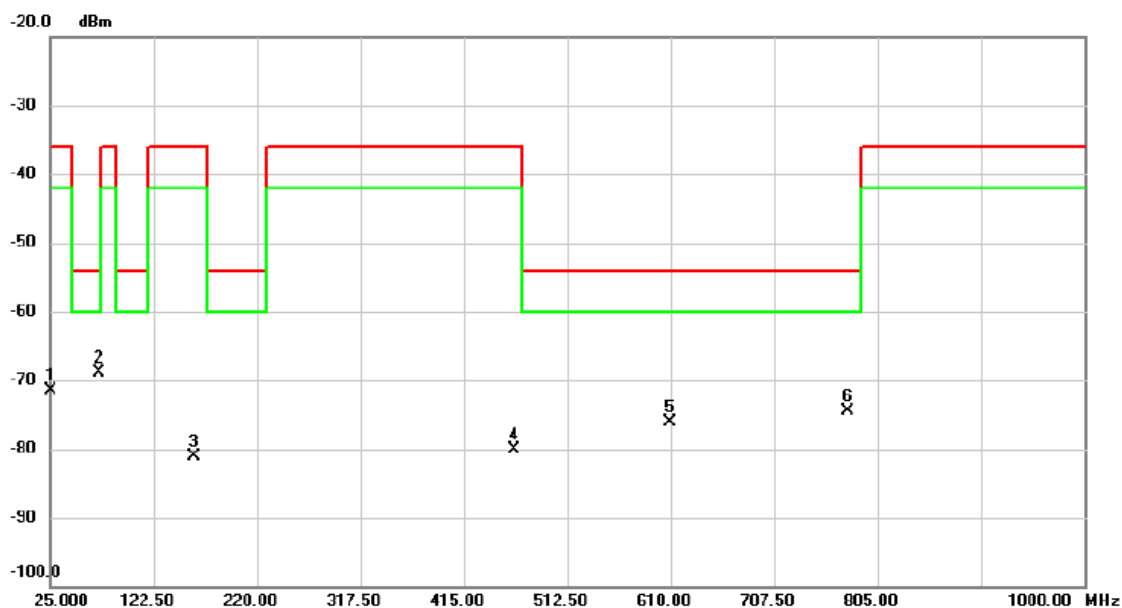
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		44.890	-65.99	-1.23	-67.22	-36.00	-31.22	peak	
2	*	70.630	-65.34	-4.98	-70.32	-54.00	-16.32	peak	
3		139.952	-79.64	-3.42	-83.06	-36.00	-47.06	peak	
4		250.518	-78.84	-4.04	-82.88	-36.00	-46.88	peak	
5		503.140	-78.34	-0.26	-78.60	-54.00	-24.60	peak	
6		614.095	-79.08	2.14	-76.94	-54.00	-22.94	peak	

Test Mode	863.35MHz_Transmit_Operating	Polarization	Horizontal
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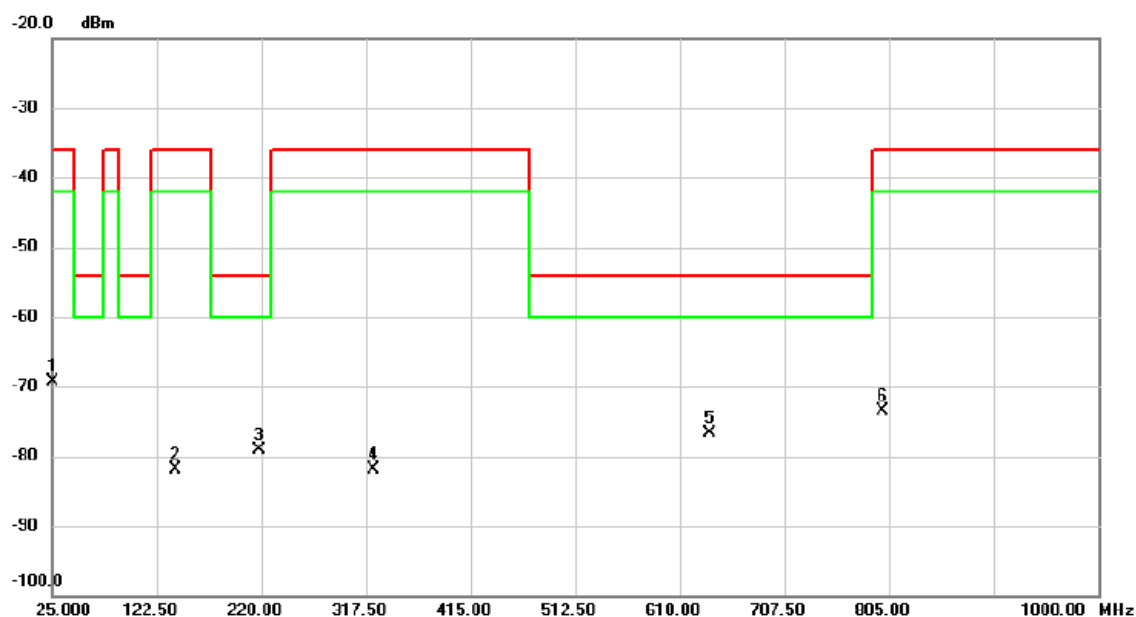
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		25.000	-68.28	-2.15	-70.43	-36.00	-34.43	peak	
2		70.728	-75.93	-7.47	-83.40	-54.00	-29.40	peak	
3		146.485	-78.88	-3.47	-82.35	-36.00	-46.35	peak	
4		249.153	-79.74	-4.49	-84.23	-36.00	-48.23	peak	
5	*	615.362	-79.37	1.99	-77.38	-54.00	-23.38	peak	
6		796.322	-79.34	5.46	-73.88	-36.00	-37.88	peak	

Test Mode	864.35MHz_Transmit_Operating	Polarization	Vertical
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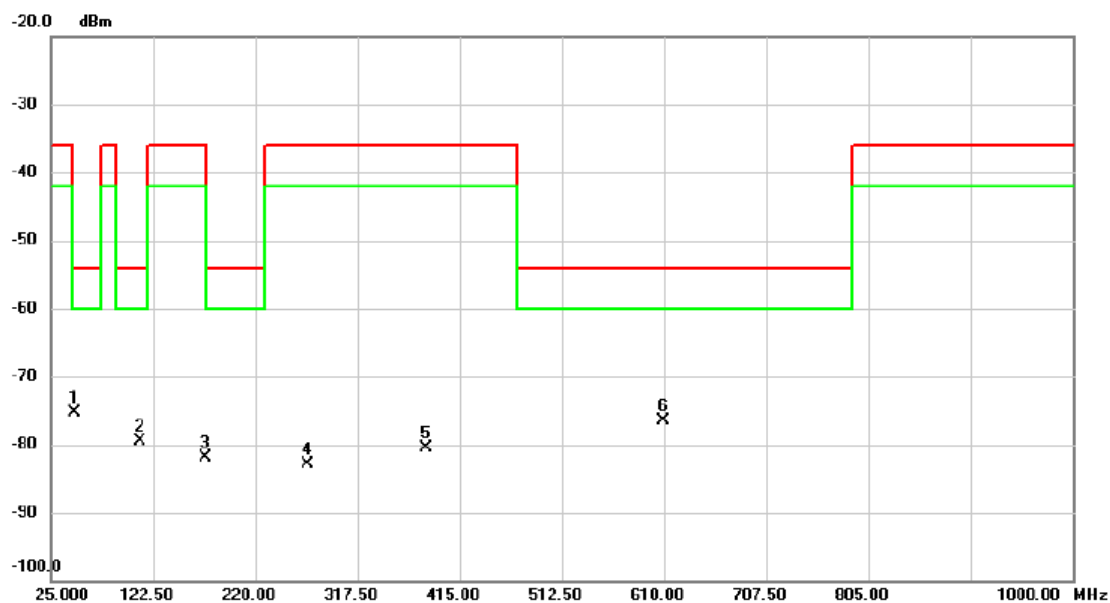
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		25.000	-69.36	-2.15	-71.51	-36.00	-35.51	peak	
2	*	70.825	-63.83	-5.03	-68.86	-54.00	-14.86	peak	
3		160.330	-77.76	-3.28	-81.04	-36.00	-45.04	peak	
4		462.775	-79.00	-1.03	-80.03	-36.00	-44.03	peak	
5		609.317	-78.22	2.15	-76.07	-54.00	-22.07	peak	
6		776.530	-79.30	4.87	-74.43	-54.00	-20.43	peak	

Test Mode	864.35MHz_Transmit_Operating	Polarization	Horizontal
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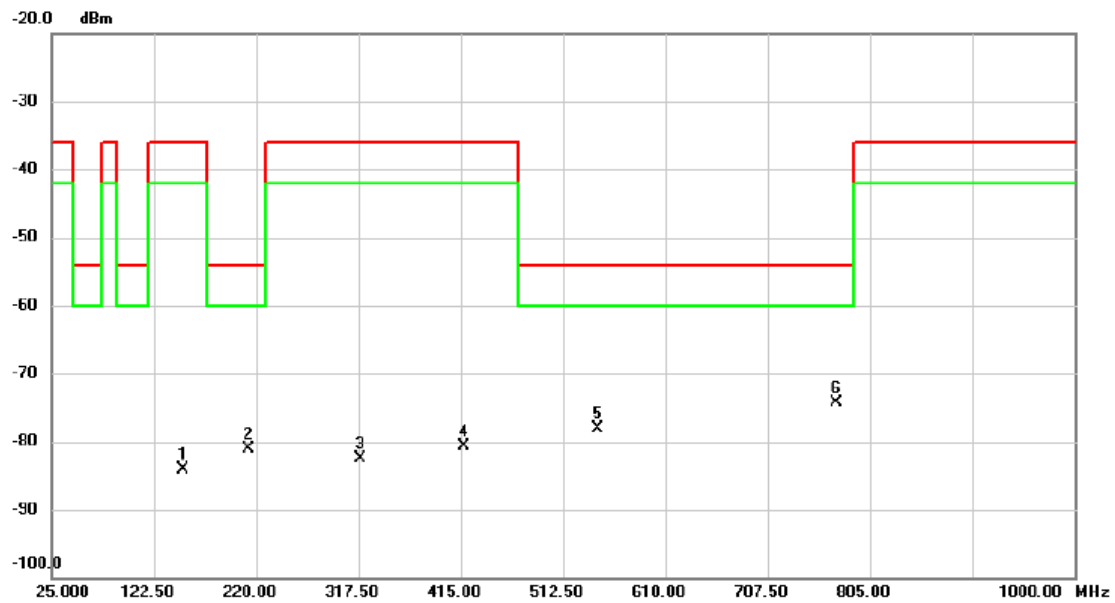
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		25.000	-67.05	-2.15	-69.20	-36.00	-33.20	peak	
2		140.537	-78.25	-3.63	-81.88	-36.00	-45.88	peak	
3		217.465	-72.99	-6.18	-79.17	-54.00	-25.17	peak	
4		324.618	-79.01	-2.82	-81.83	-36.00	-45.83	peak	
5	*	637.982	-78.57	1.93	-76.64	-54.00	-22.64	peak	
6		799.442	-79.07	5.54	-73.53	-36.00	-37.53	peak	

Test Mode	868.35MHz_Transmit_Operating	Polarization	Vertical
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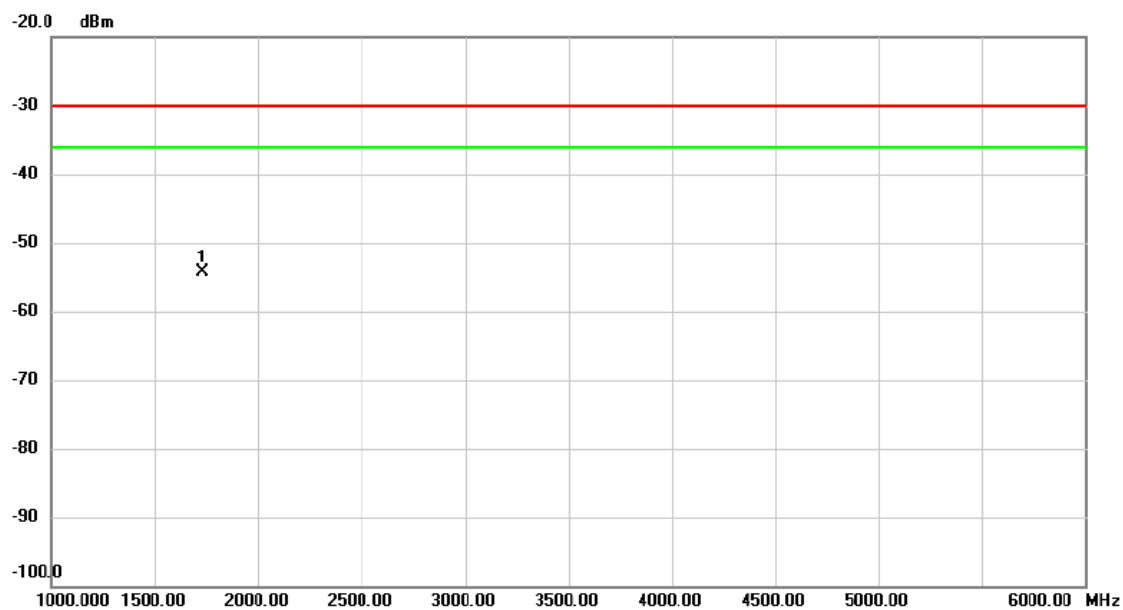
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	47.133	-73.95	-1.35	-75.30	-54.00	-21.30	peak	
2		110.118	-70.93	-8.66	-79.59	-54.00	-25.59	peak	
3		172.713	-76.99	-4.83	-81.82	-36.00	-45.82	peak	
4		270.017	-79.38	-3.52	-82.90	-36.00	-46.90	peak	
5		382.728	-78.72	-1.70	-80.42	-36.00	-44.42	peak	
6		609.903	-78.70	2.15	-76.55	-54.00	-22.55	peak	

Test Mode	868.35MHz_Transmit_Operating	Polarization	Horizontal
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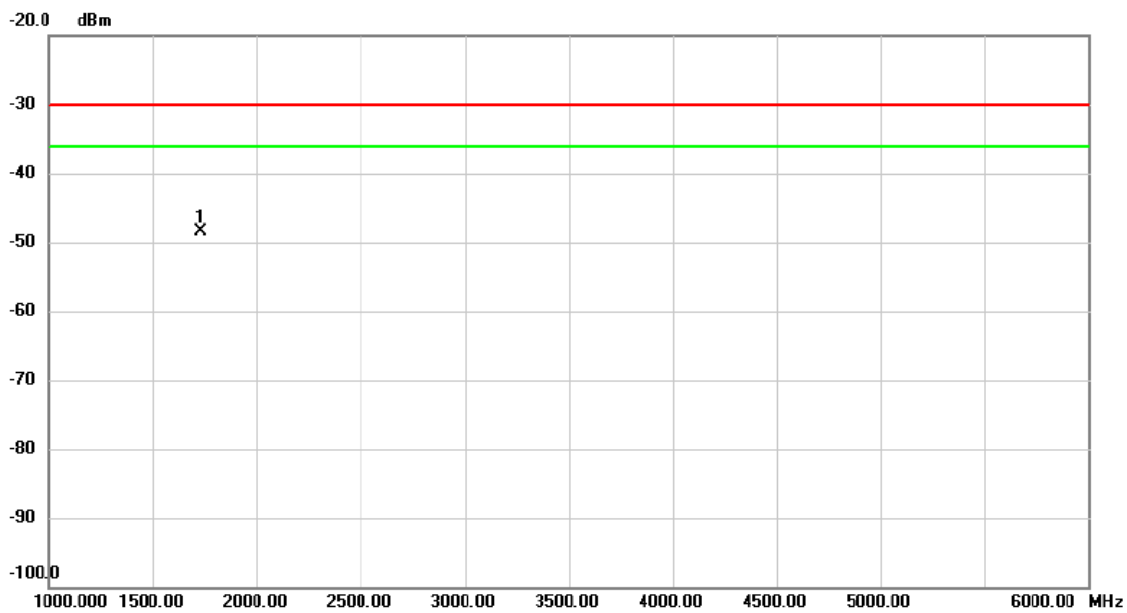
No. Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	151.067	-80.56	-3.49	-84.05	-36.00	-48.05	peak	
2	212.688	-74.57	-6.54	-81.11	-54.00	-27.11	peak	
3	319.645	-79.72	-2.82	-82.54	-36.00	-46.54	peak	
4	417.827	-79.51	-1.27	-80.78	-36.00	-44.78	peak	
5	545.455	-78.13	0.01	-78.12	-54.00	-24.12	peak	
6 *	773.215	-79.01	4.80	-74.21	-54.00	-20.21	peak	

Test Mode	863.35MHz_Transmit_Operating	Polarization	Vertical
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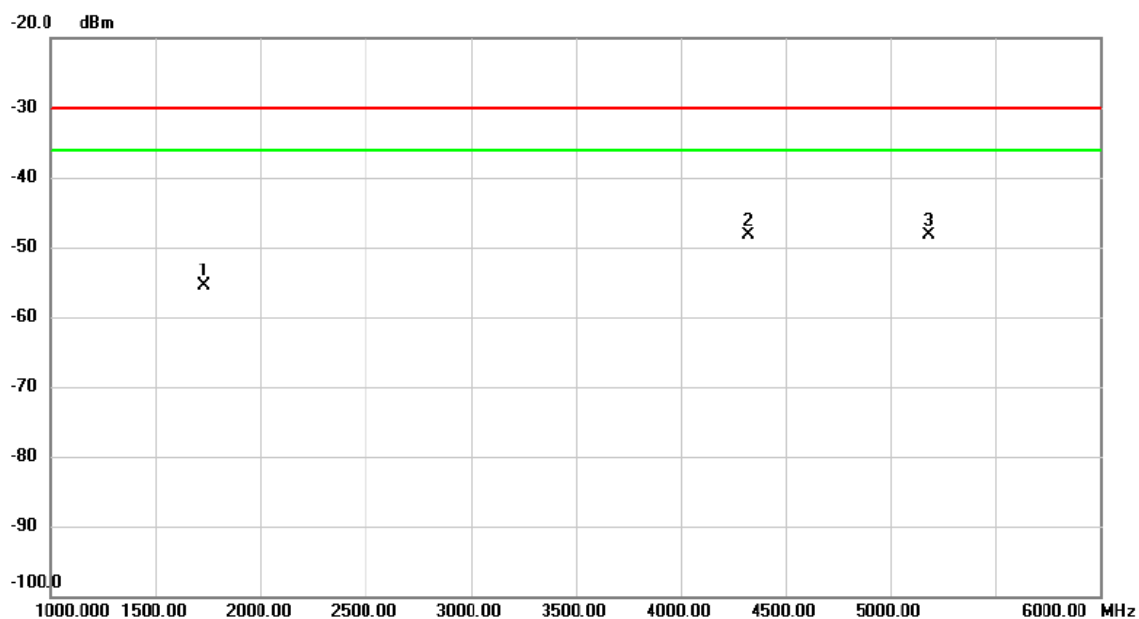
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1726.750	-46.14	-8.20	-54.34	-30.00	-24.34	peak	

Test Mode	863.35MHz_Transmit_Operating	Polarization	Horizontal
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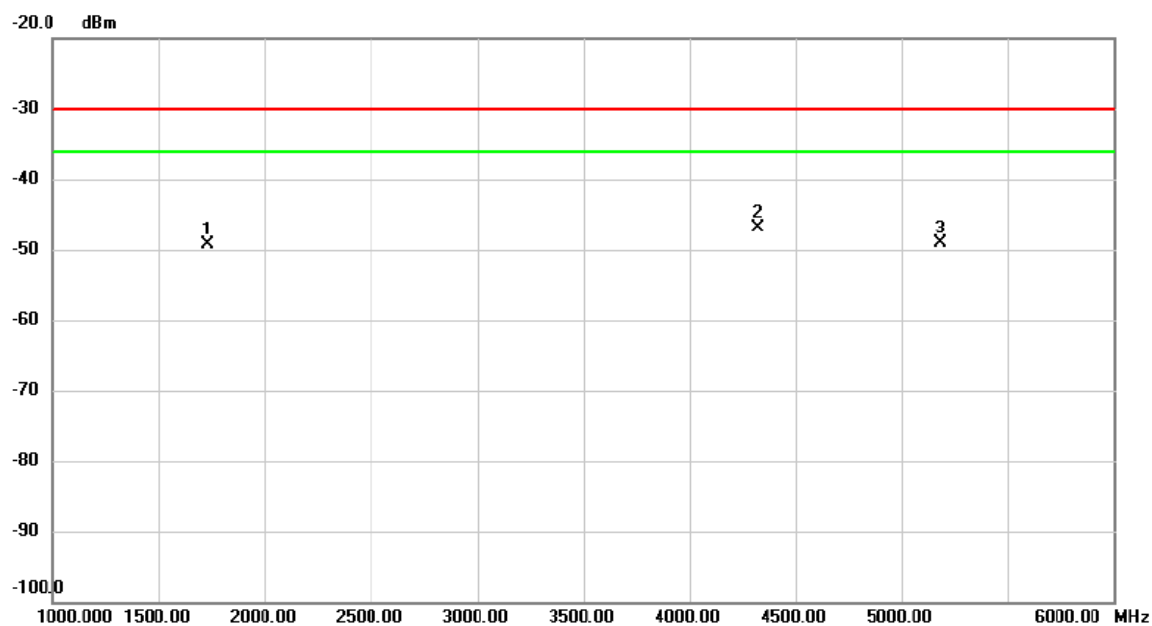
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	1726.750	-40.19	-8.35	-48.54	-30.00	-18.54	peak	

Test Mode	864.35MHz_Transmit_Operating	Polarization	Vertical
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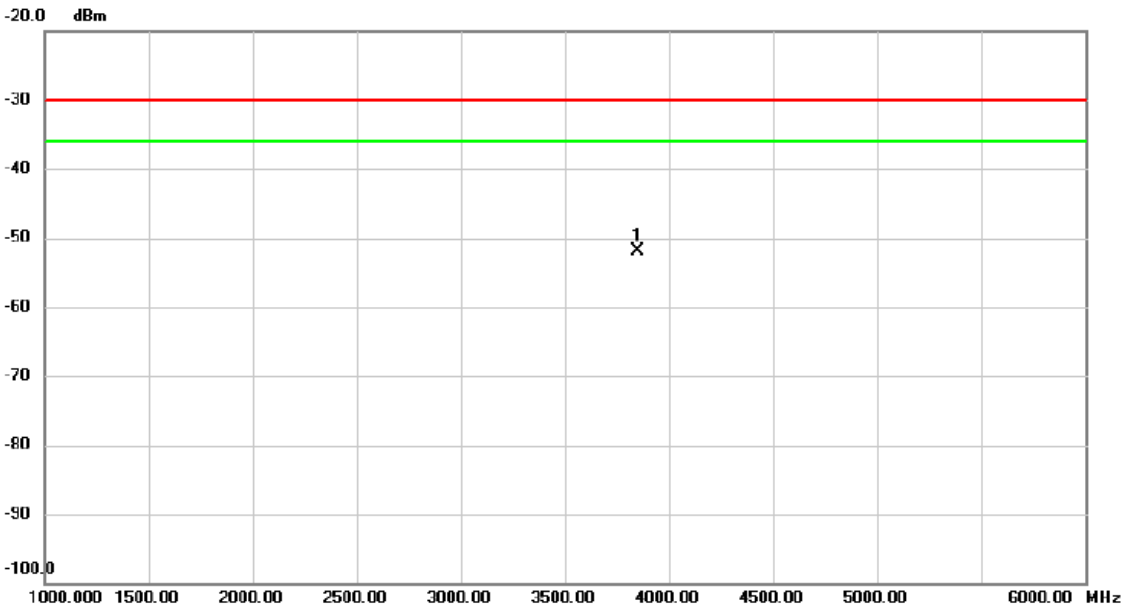
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		1728.500	-47.39	-8.17	-55.56	-30.00	-25.56	peak	
2		4322.000	-46.54	-1.80	-48.34	-30.00	-18.34	peak	
3	*	5186.250	-47.83	-0.48	-48.31	-30.00	-18.31	peak	

Test Mode	864.35MHz_Transmit_Operating	Polarization	Horizontal
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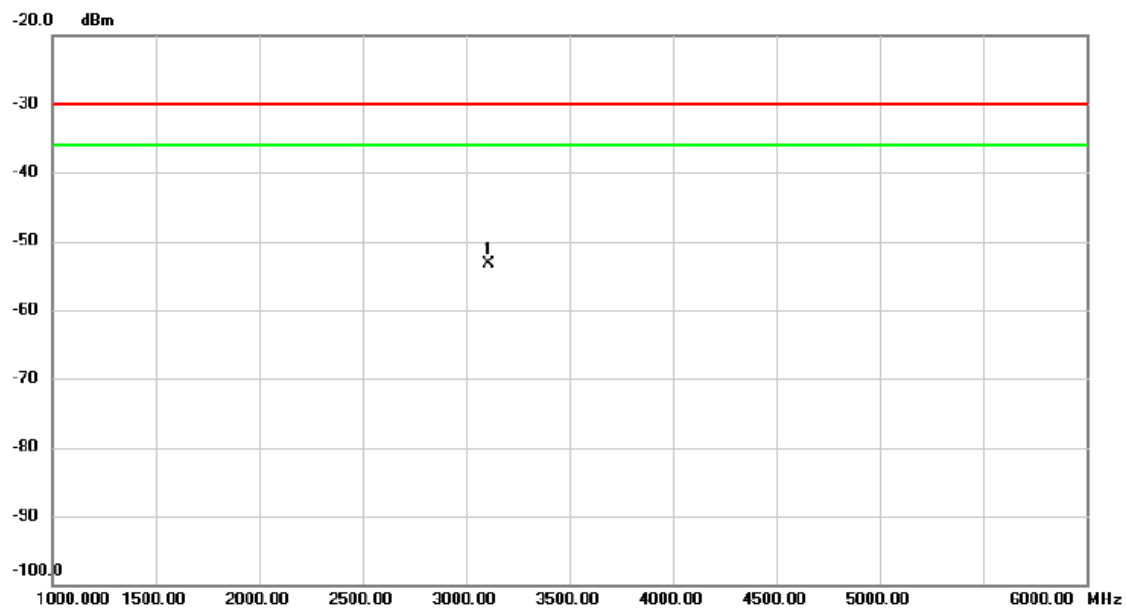
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		1728.750	-41.01	-8.32	-49.33	-30.00	-19.33	peak	
2	*	4322.000	-44.96	-1.86	-46.82	-30.00	-16.82	peak	
3		5186.500	-48.03	-1.15	-49.18	-30.00	-19.18	peak	

Test Mode	868.35MHz_Transmit_Operating	Polarization	Vertical
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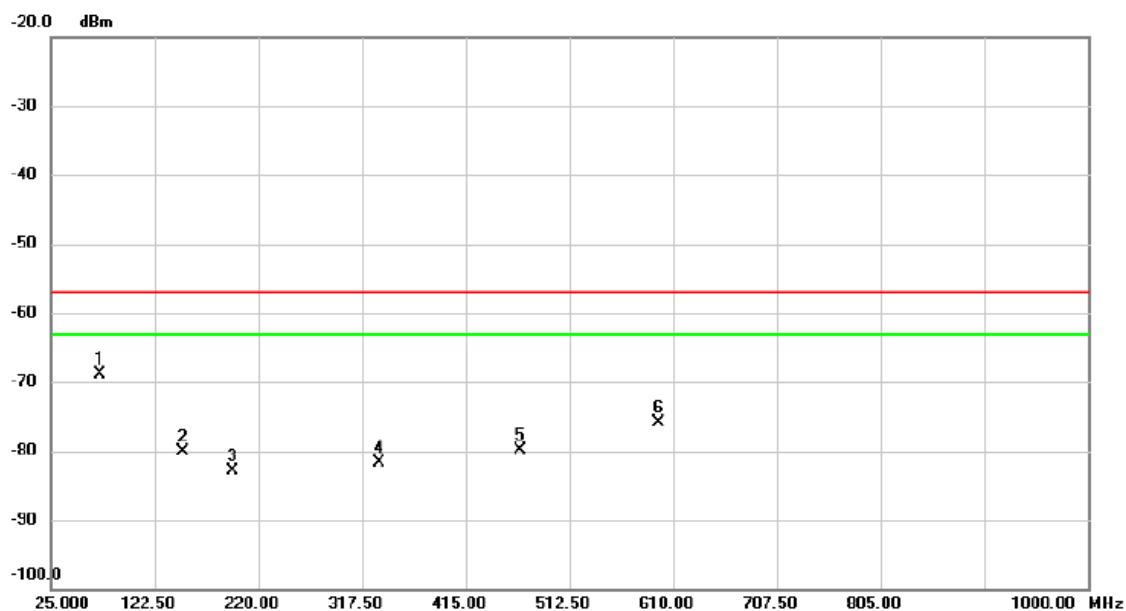
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	3849.750	-54.28	2.35	-51.93	-30.00	-21.93	peak	

Test Mode	868.35MHz_Transmit_Operating	Polarization	Horizontal
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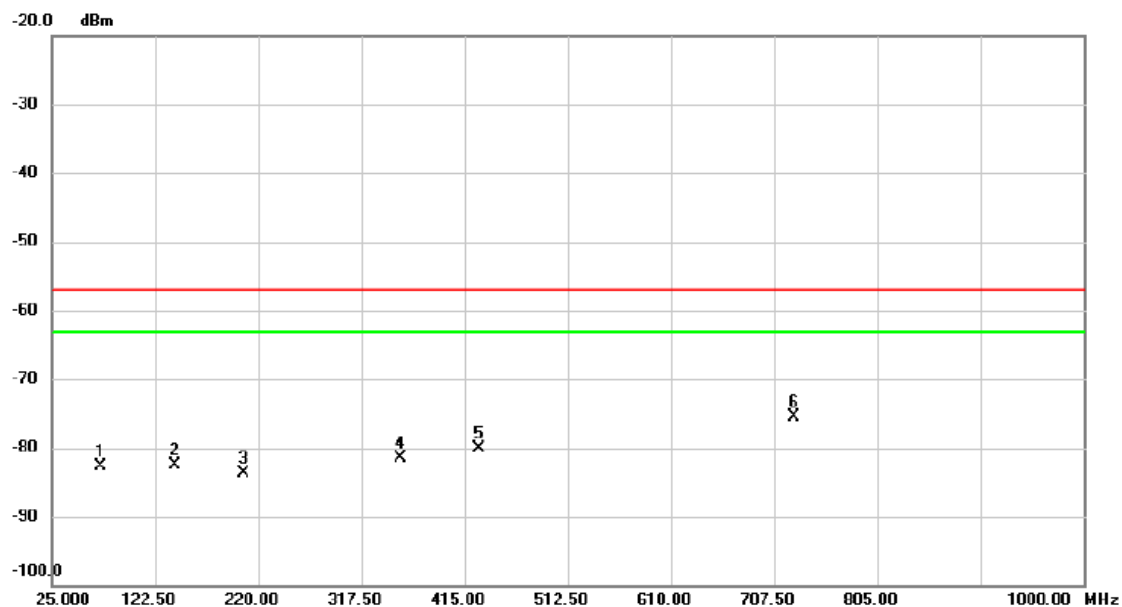
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	3106.750	-54.06	0.69	-53.37	-30.00	-23.37	peak	

Test Mode	863.35MHz_Receiver_Standby	Polarization	Vertical
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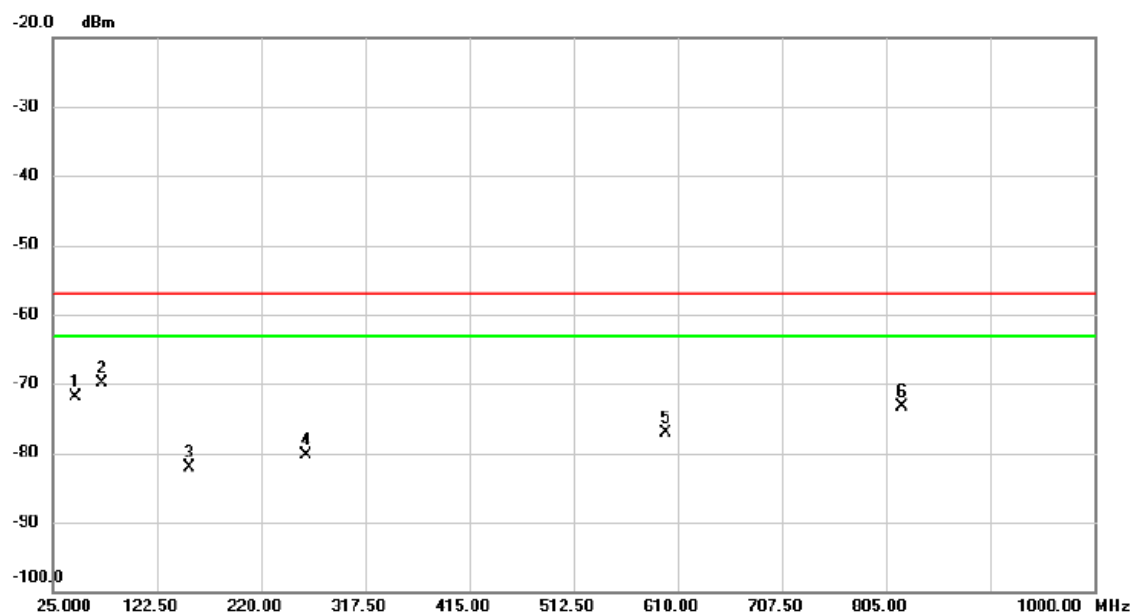
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	70.825	-63.82	-5.03	-68.85	-57.00	-11.85	peak	
2		149.020	-77.94	-2.18	-80.12	-57.00	-23.12	peak	
3		195.625	-75.12	-7.79	-82.91	-57.00	-25.91	peak	
4		333.197	-79.01	-2.72	-81.73	-57.00	-24.73	peak	
5		466.967	-78.92	-1.00	-79.92	-57.00	-22.92	peak	
6		596.643	-77.94	2.03	-75.91	-57.00	-18.91	peak	

Test Mode	863.35MHz_Receiver_Standby	Polarization	Horizontal
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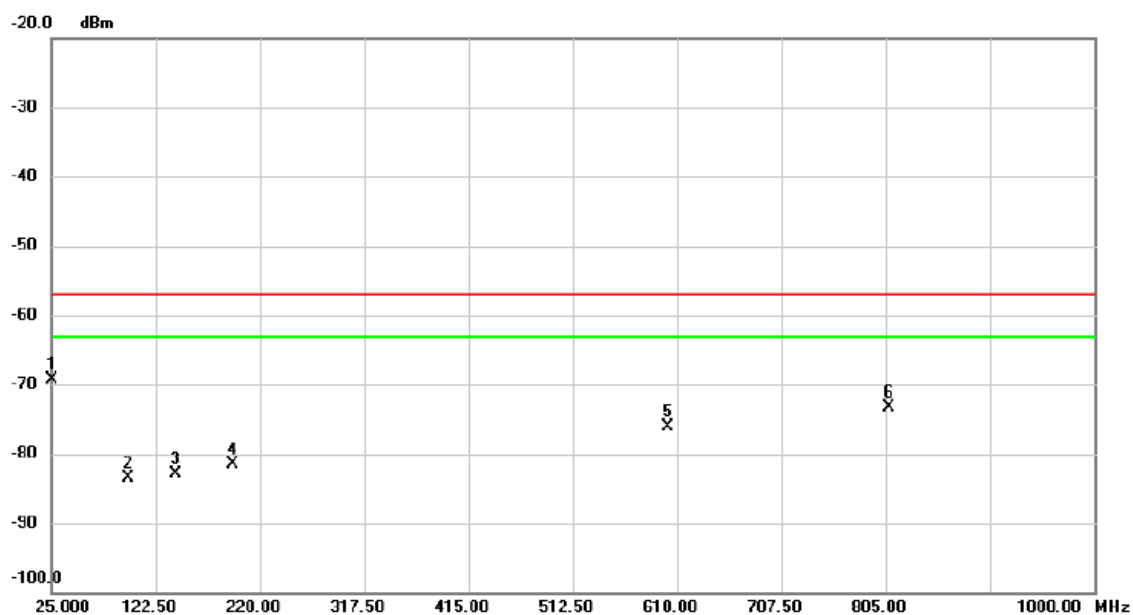
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBm	dB	dBm	dBm	dB		
1		70.728	-75.29	-7.47	-82.76	-57.00	-25.76	peak	
2		141.708	-78.90	-3.60	-82.50	-57.00	-25.50	peak	
3		206.643	-76.82	-6.80	-83.62	-57.00	-26.62	peak	
4		354.842	-78.93	-2.47	-81.40	-57.00	-24.40	peak	
5		428.065	-78.73	-1.39	-80.12	-57.00	-23.12	peak	
6	*	725.928	-78.85	3.41	-75.44	-57.00	-18.44	peak	

Test Mode	864.35MHz_Receiver_Standby	Polarization	Vertical
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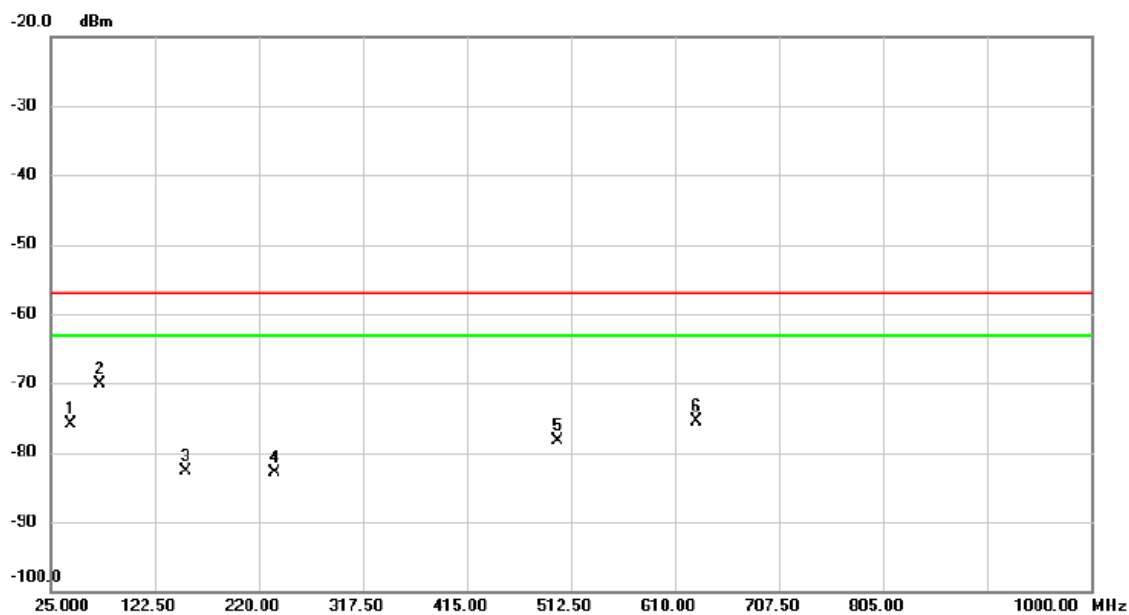
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBm	dB	dBm	dBm	dB		
1		46.060	-70.59	-1.27	-71.86	-57.00	-14.86	peak	
2	*	70.630	-64.83	-4.98	-69.81	-57.00	-12.81	peak	
3		152.433	-79.84	-2.34	-82.18	-57.00	-25.18	peak	
4		262.022	-76.48	-3.86	-80.34	-57.00	-23.34	peak	
5		598.982	-79.30	2.14	-77.16	-57.00	-20.16	peak	
6		820.503	-78.50	5.14	-73.36	-57.00	-16.36	peak	

Test Mode	864.35MHz_Receiver_Standby	Polarization	Horizontal
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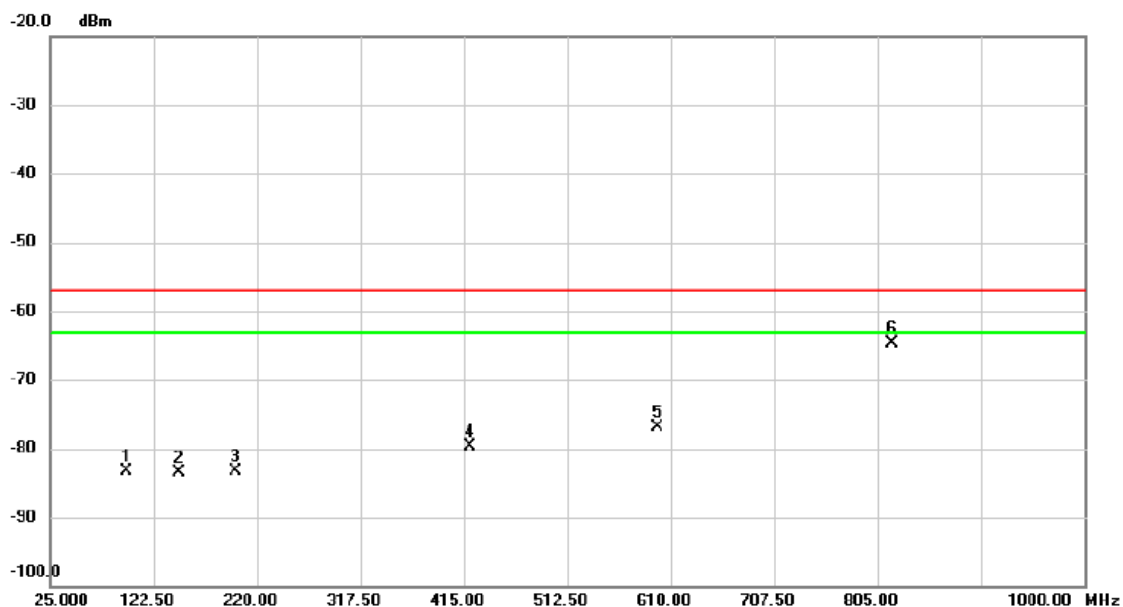
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	25.000	-67.09	-2.15	-69.24	-57.00	-12.24	peak	
2		96.662	-72.28	-11.12	-83.40	-57.00	-26.40	peak	
3		141.512	-79.26	-3.61	-82.87	-57.00	-25.87	peak	
4		195.137	-74.56	-6.85	-81.41	-57.00	-24.41	peak	
5		602.102	-78.03	2.03	-76.00	-57.00	-19.00	peak	
6		808.803	-78.74	5.49	-73.25	-57.00	-16.25	peak	

Test Mode	868.35MHz_Receiver_Standby	Polarization	Vertical
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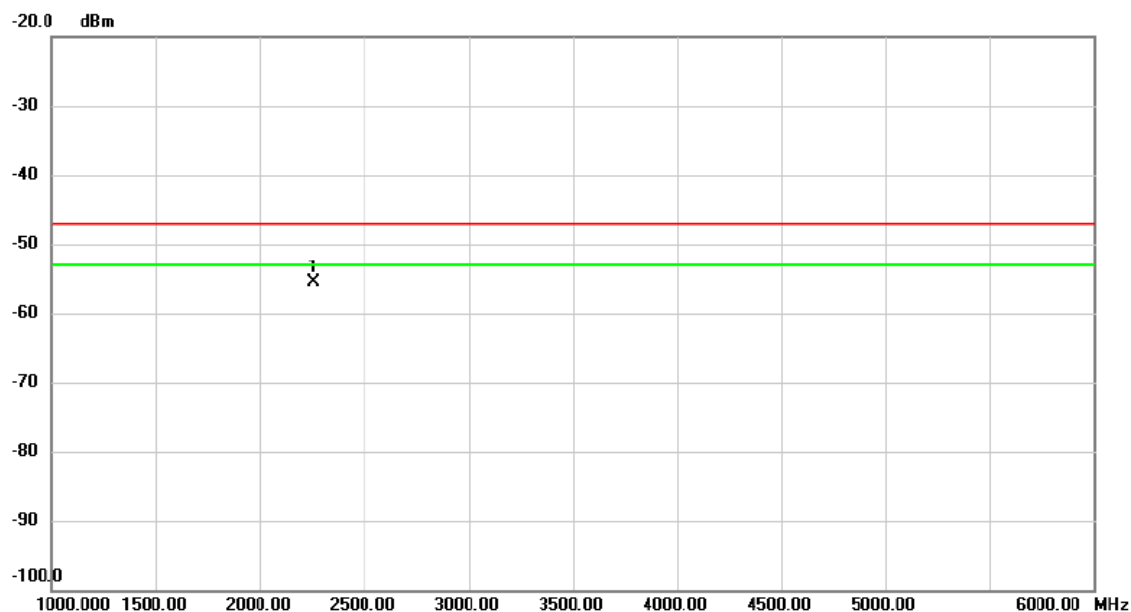
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		43.330	-74.09	-1.78	-75.87	-57.00	-18.87	peak	
2	*	70.825	-65.08	-5.03	-70.11	-57.00	-13.11	peak	
3		151.653	-80.39	-2.25	-82.64	-57.00	-25.64	peak	
4		235.308	-77.55	-5.37	-82.92	-57.00	-25.92	peak	
5		500.313	-77.96	-0.28	-78.24	-57.00	-21.24	peak	
6		629.597	-77.61	2.10	-75.51	-57.00	-18.51	peak	

Test Mode	868.35MHz_Receiver_Standby	Polarization	Horizontal
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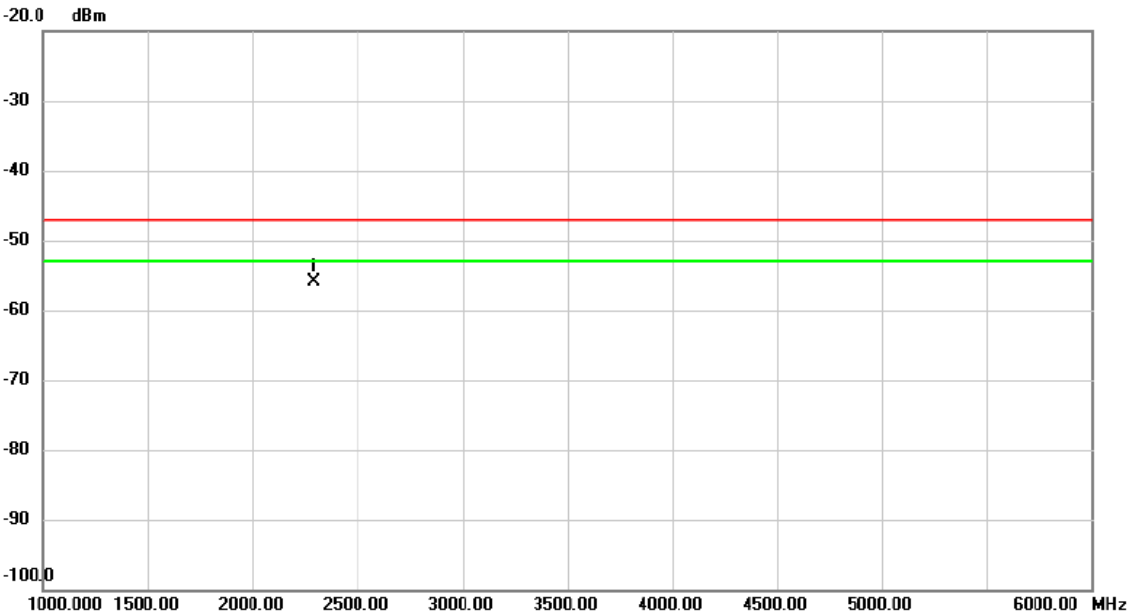
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		97.540	-72.15	-11.05	-83.20	-57.00	-26.20	peak	
2		146.875	-79.99	-3.46	-83.45	-57.00	-26.45	peak	
3		200.403	-76.48	-6.88	-83.36	-57.00	-26.36	peak	
4		421.435	-78.49	-1.23	-79.72	-57.00	-22.72	peak	
5		598.105	-78.84	1.96	-76.88	-57.00	-19.88	peak	
6	*	818.455	-70.12	5.40	-64.72	-57.00	-7.72	peak	

Test Mode	863.35MHz_Receiver_Standby	Polarization	Vertical
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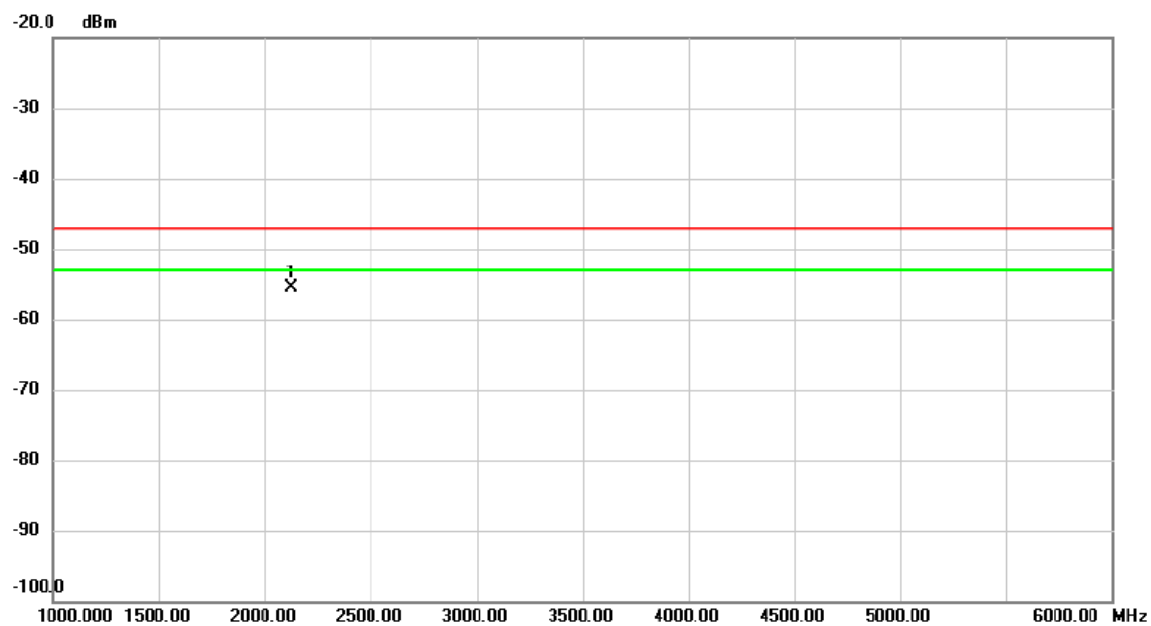
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	2255.750	-51.85	-3.66	-55.51	-47.00	-8.51	peak	

Test Mode	863.35MHz_Receiver_Standby	Polarization	Horizontal
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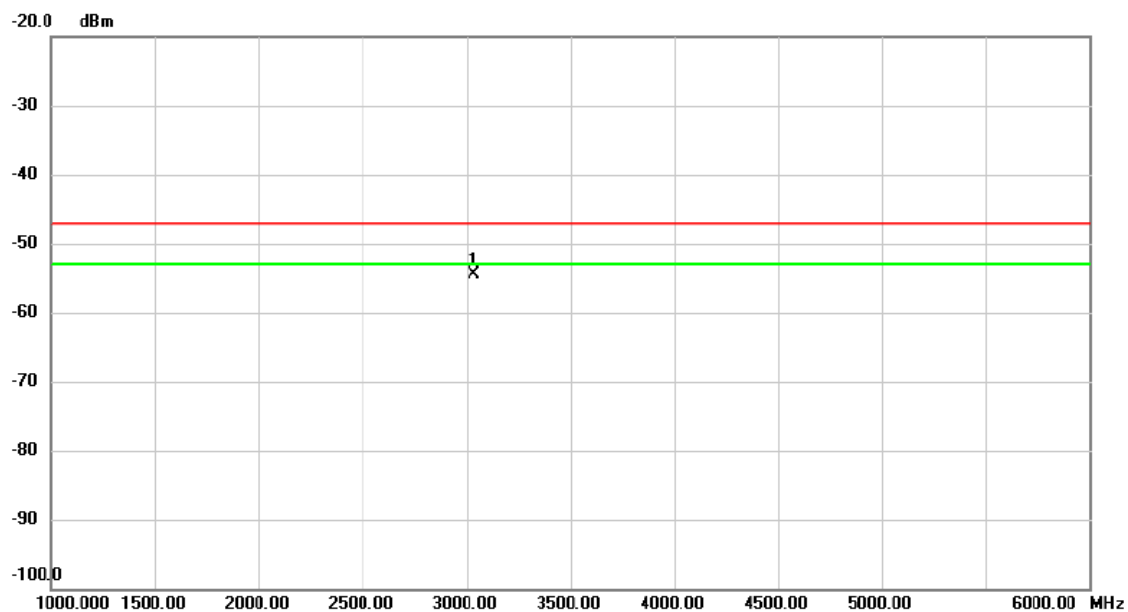
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	2288.000	-51.91	-3.90	-55.81	-47.00	-8.81	peak	

Test Mode	864.35MHz_Receiver_Standby	Polarization	Vertical
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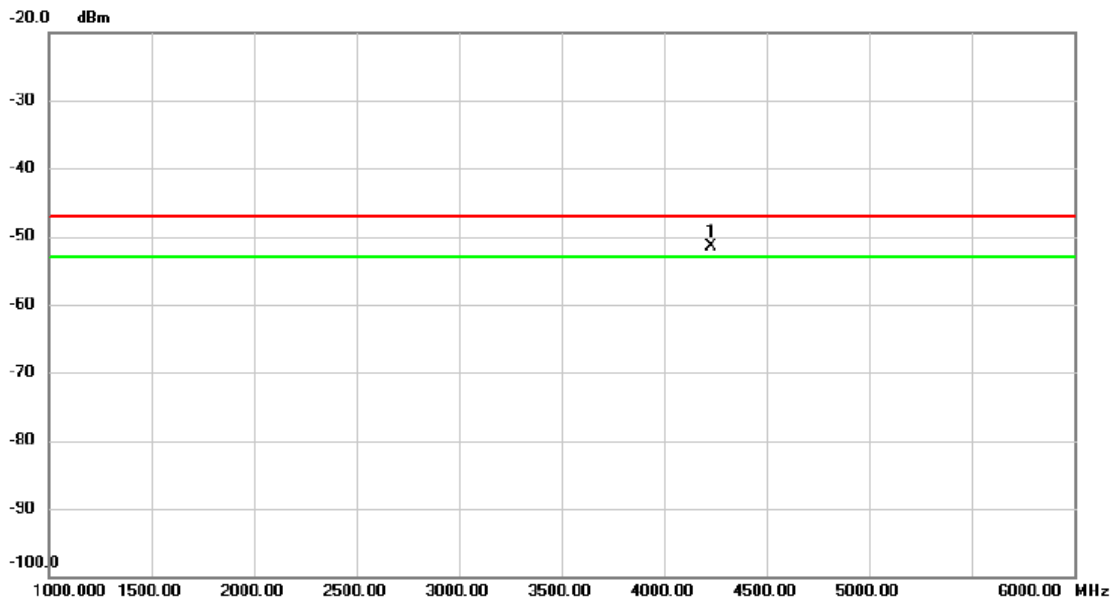
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	2124.250	-51.53	-3.96	-55.49	-47.00	-8.49	peak	

Test Mode	864.35MHz_Receiver_Standby	Polarization	Horizontal
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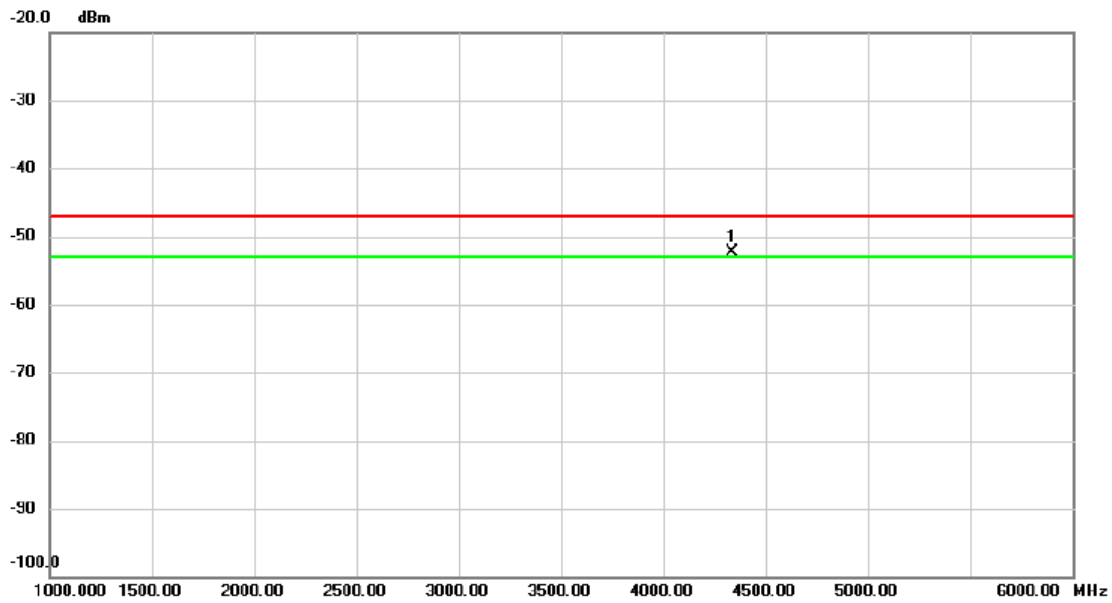
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	3037.750	-51.66	-2.86	-54.52	-47.00	-7.52	peak	

Test Mode	868.35MHz_Receiver_Standby	Polarization	Vertical
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No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBm	dB	dBm	dBm	dB		
1	*	4229.500	-54.35	2.78	-51.57	-47.00	-4.57	peak	

Test Mode	868.35MHz_Receiver_Standby	Polarization	Horizontal
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No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	4338.000	-54.89	2.66	-52.23	-47.00	-5.23	peak	

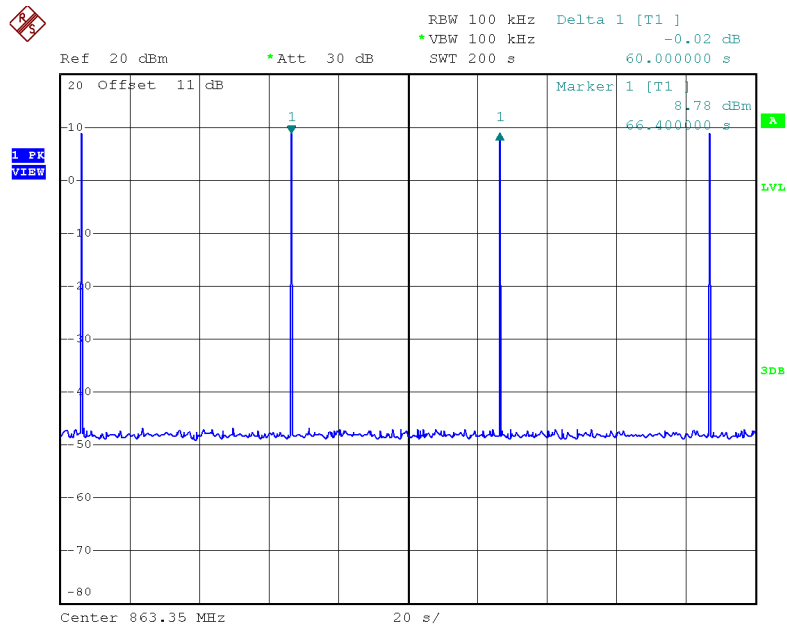
APPENDIX B - EFFECTIVE RADIATED POWER

Test Mode	TX Mode
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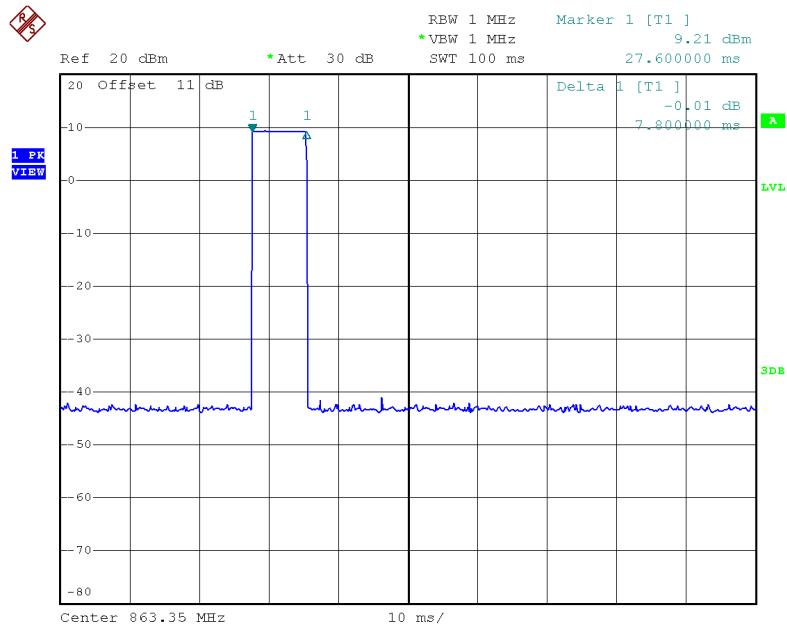
TEST CONDITIONS						e.r.p. (dBm)		
						863.35MHz	864.35MHz	868.35MHz
T _{nom}	24.7-24.5	°C	V _{nom}	3	V	6.71	6.70	8.30
T _{min}	0	°C	V _{max}	3.3	V	6.70	6.72	8.32
	0	°C	V _{min}	2.7	V	6.72	6.73	8.31
T _{max}	40	°C	V _{max}	3.3	V	6.66	6.71	8.28
	40	°C	V _{min}	2.7	V	6.68	6.67	8.33
Max. e.r.p. (dBm)						8.33		
Limit						25mW(13.98dBm)		
Result						Complies		

APPENDIX C - TX DUTY CYCLE

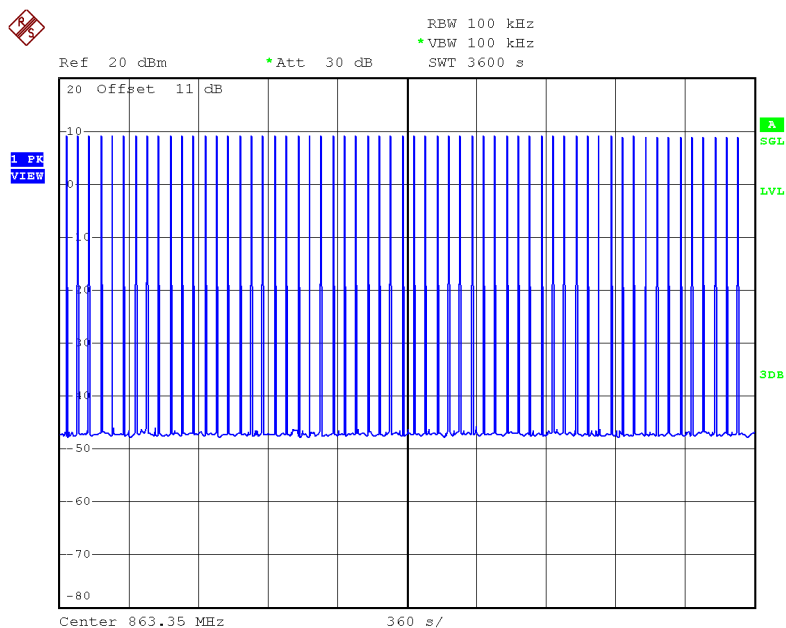
Test Mode TX Mode_863.35MHz



Date: 25.AUG.2022 17:59:18



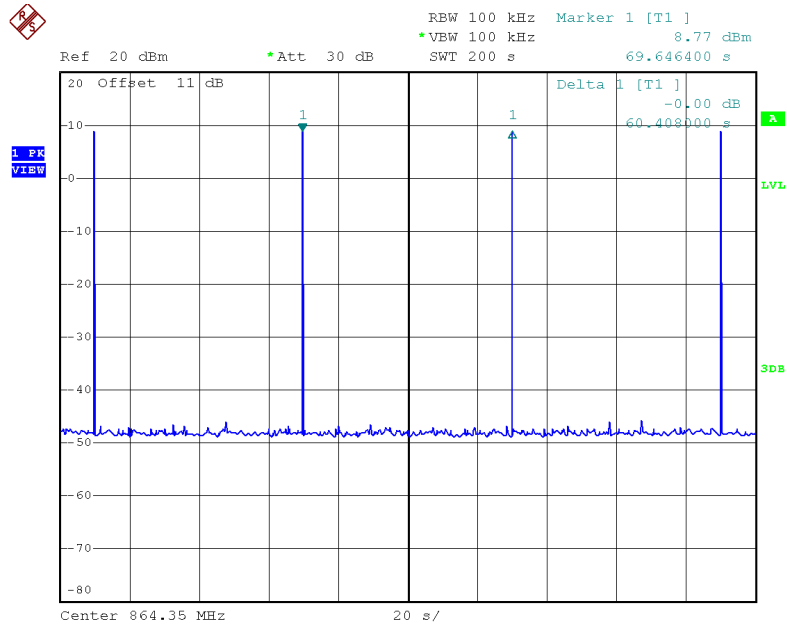
Date: 25.AUG.2022 18:04:10



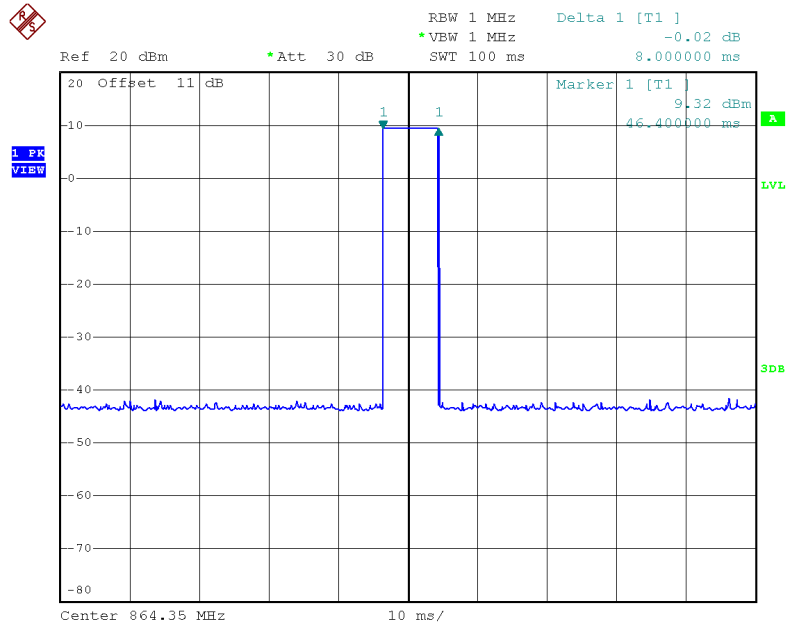
Date: 25.AUG.2022 13:44:30

On time(ms)	Total time(ms)	1H On time(s)	Duty Cycle(%)	Limit (%)	Test Result
7.80	60000	3600	0.01	1.00	Complies

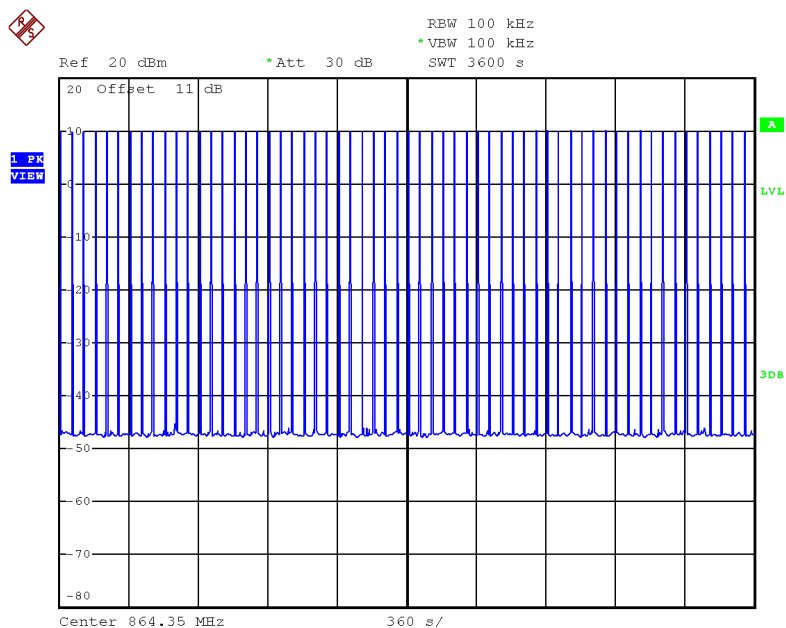
Test Mode TX Mode_864.35MHz



Date: 25.AUG.2022 18:25:26



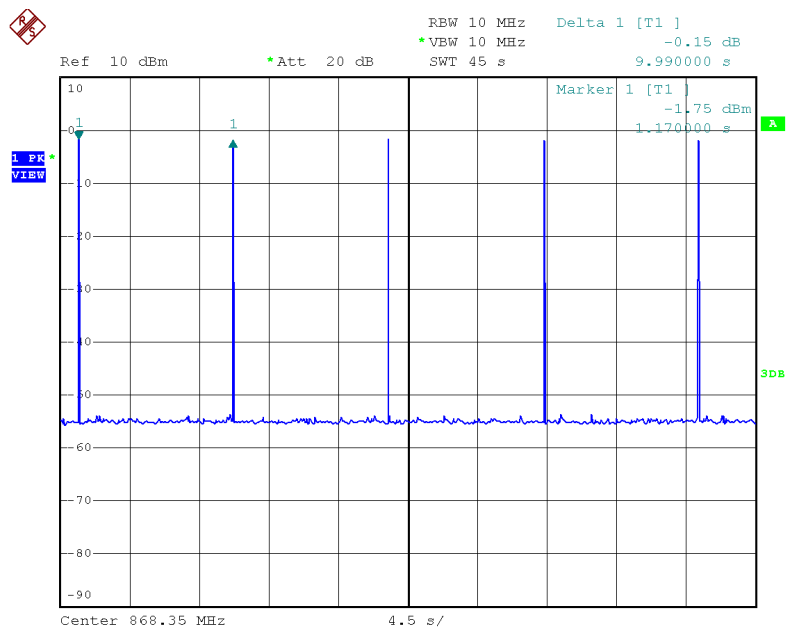
Date: 25.AUG.2022 18:07:32



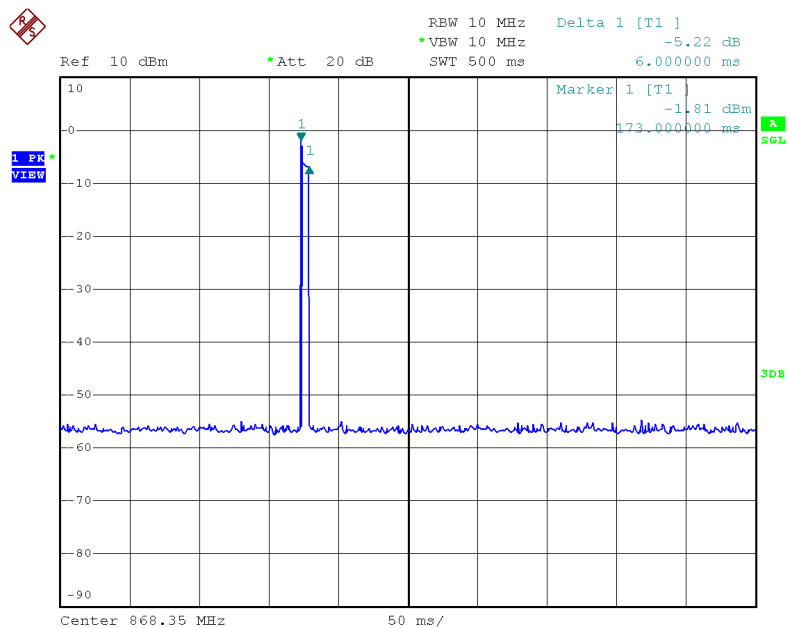
Date: 23.AUG.2022 18:58:27

On time(ms)	Total time(ms)	1H On time(s)	Duty Cycle(%)	Limit (%)	Test Result
8.00	60408	3600	0.01	0.01	Complies

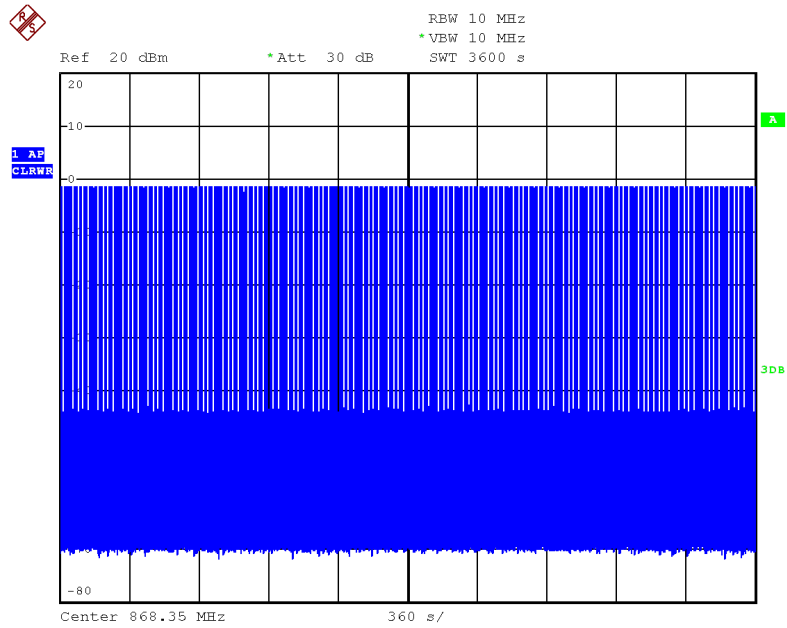
Test Mode TX Mode_868.35MHz



Date: 30.MAY.2022 17:13:47



Date: 30.MAY.2022 17:15:58



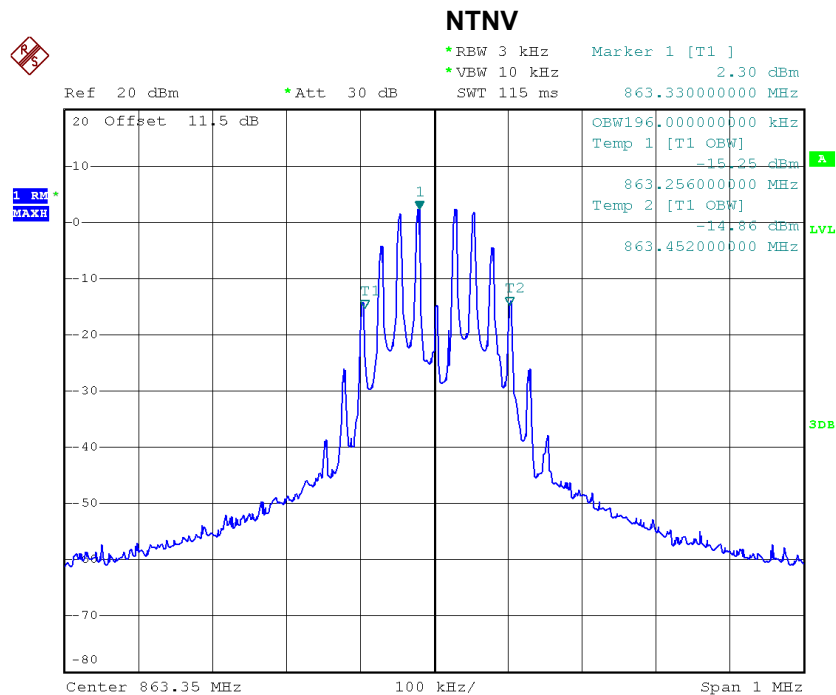
Date: 17.FEB.2022 22:06:23

On time(ms)	Total time(ms)	1H On time(s)	Duty Cycle(%)	Limit (%)	Test Result
6.00	9990	3600	0.06	1.00	Complies

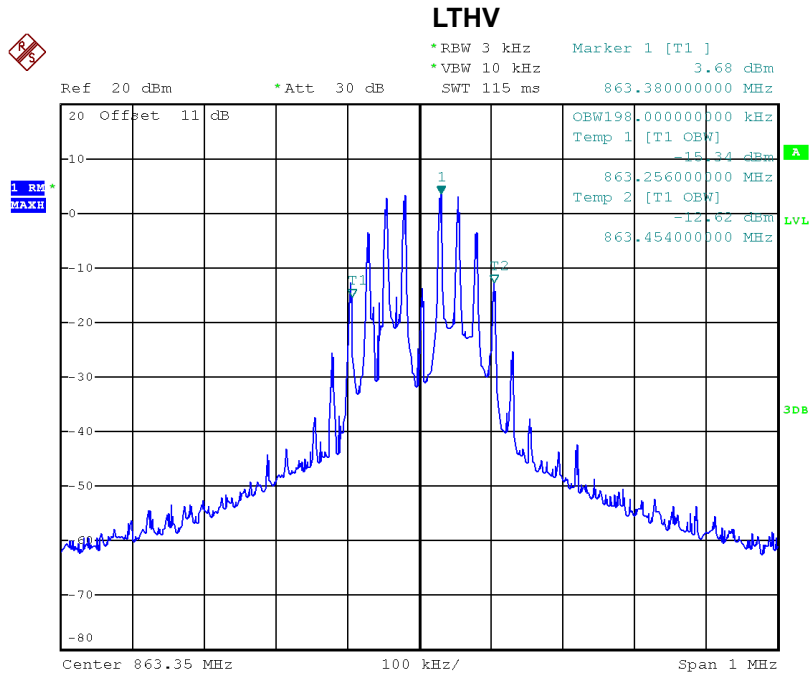
APPENDIX D - TX OCCUPIED BANDWIDTH

Test Mode	TX Mode_863.35MHz
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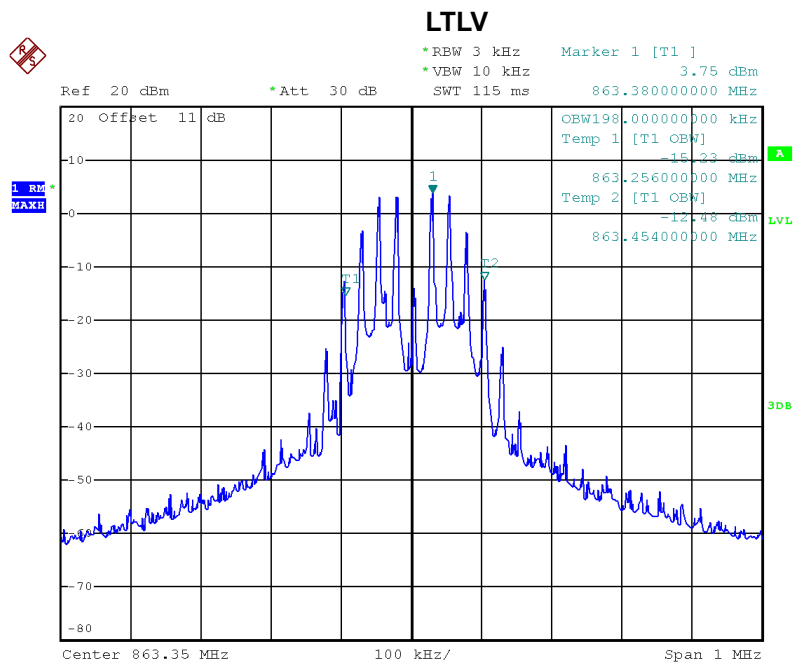
TEST CONDITIONS						Occupied Channel Bandwidth (MHz)	F _L at 99% BW (MHz)	F _H at 99% BW (MHz)
T _{nom}	24	°C	V _{nom}	3	V	0.196	863.26	863.45
T _{min}	0	°C	V _{max}	3.3	V	0.198	863.26	863.45
			V _{min}	2.7	V	0.198	863.26	863.45
T _{max}	40	°C	V _{max}	3.3	V	0.196	863.26	863.45
			V _{min}	2.7	V	0.196	863.26	863.45
Limit						-	F _L >863.00	F _H <865.00
Result						Pass		



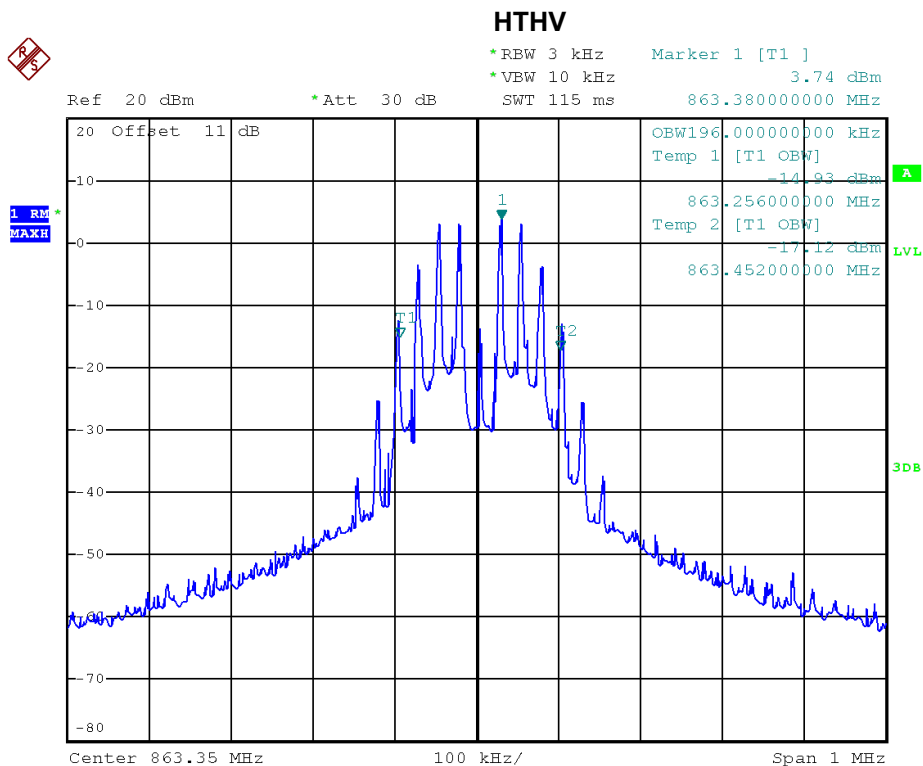
Date: 11.AUG.2022 02:14:18



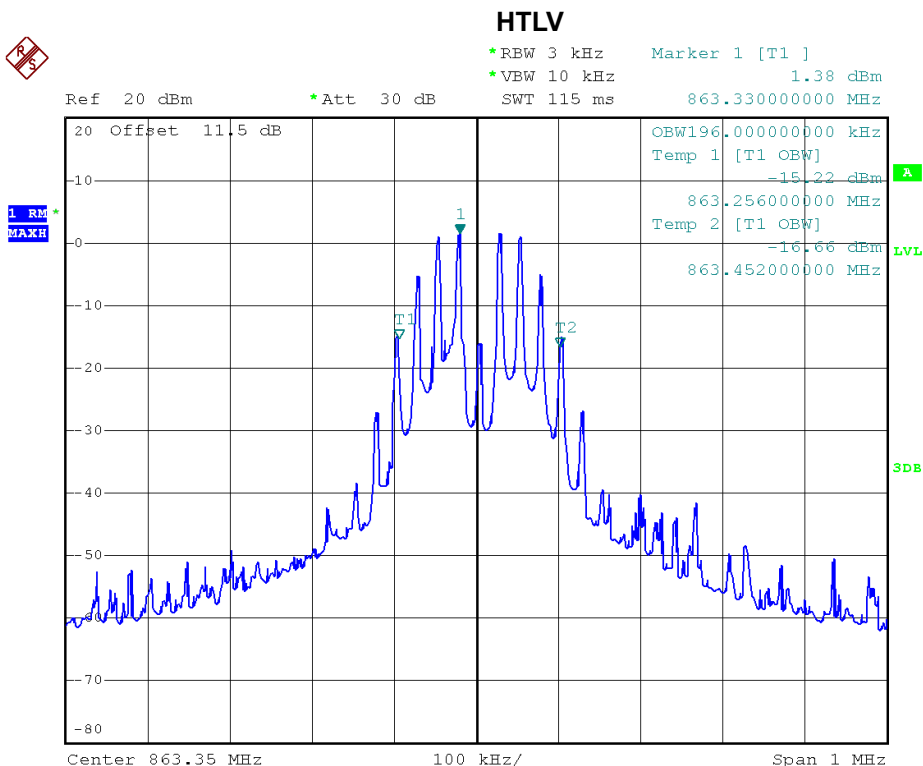
Date: 23.AUG.2022 17:44:57



Date: 23.AUG.2022 17:46:08



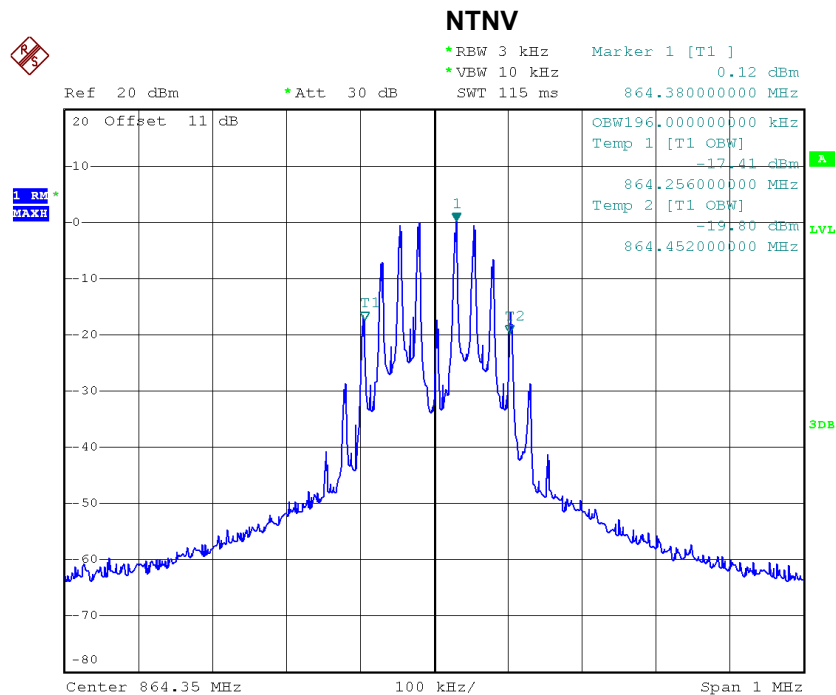
Date: 23.AUG.2022 17:42:52



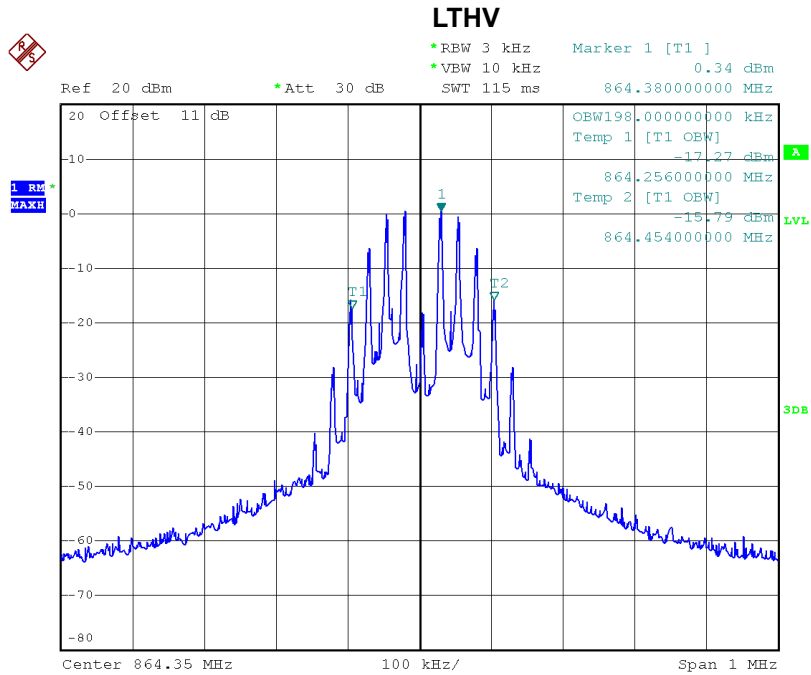
Date: 11.AUG.2022 02:10:01

Test Mode	TX Mode_864.35MHz
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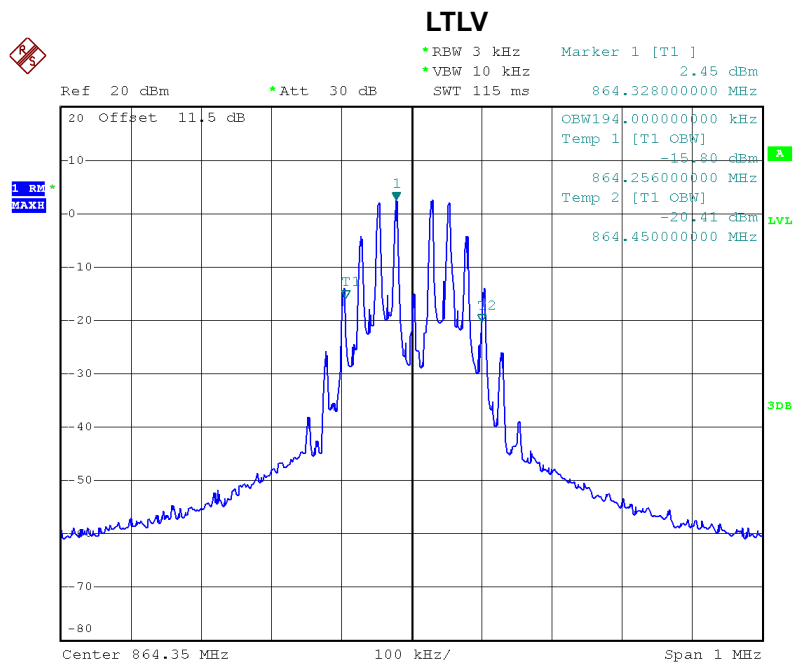
TEST CONDITIONS						Occupied Channel Bandwidth (MHz)	F _L at 99% BW (MHz)	F _H at 99% BW (MHz)
T _{nom}	24	°C	V _{nom}	3	V	0.196	864.26	864.45
T _{min}	0	°C	V _{max}	3.3	V	0.198	864.26	864.45
			V _{min}	2.7	V	0.194	864.26	864.45
T _{max}	40	°C	V _{max}	3.3	V	0.196	864.26	864.45
			V _{min}	2.7	V	0.196	864.26	864.45
Limit						-	F _L >863.00	F _H <865.00
Result						Pass		



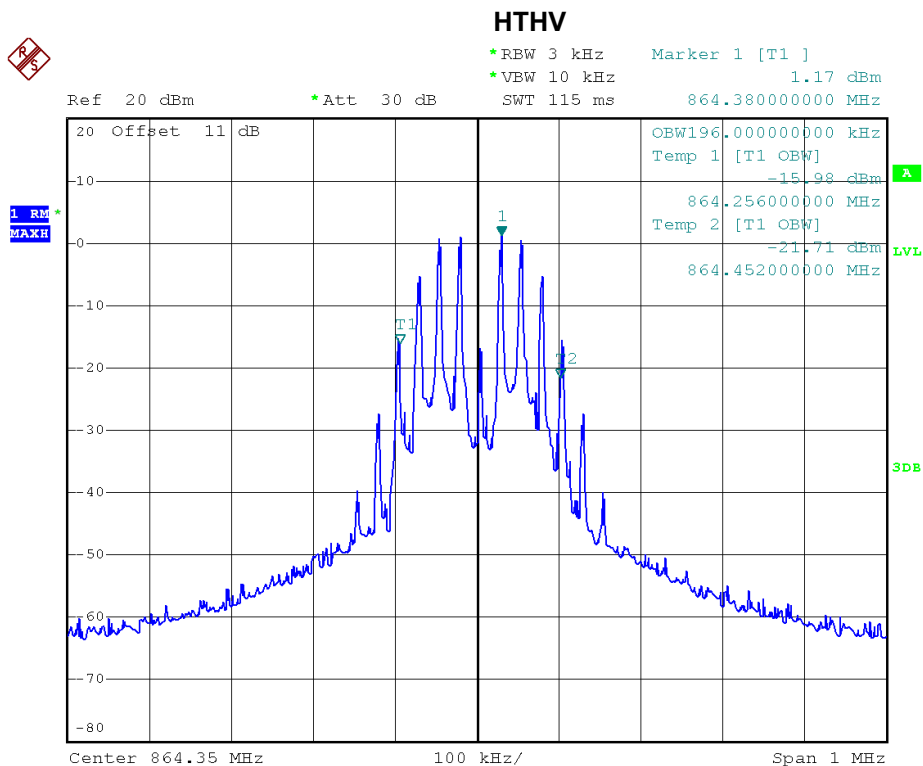
Date: 23.AUG.2022 19:46:58



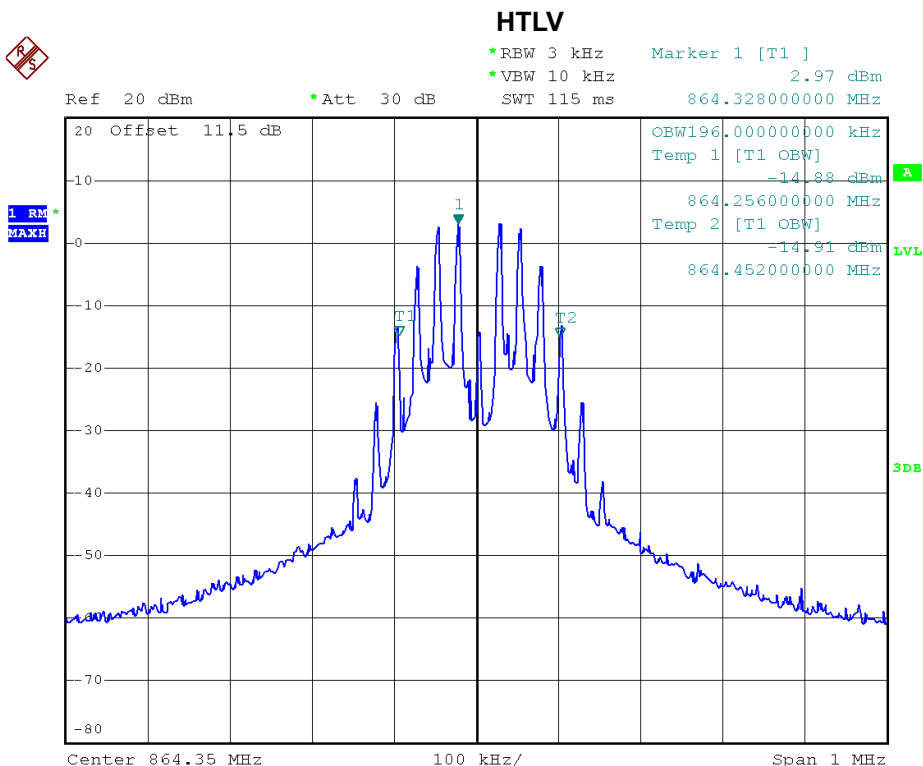
Date: 23.AUG.2022 19:44:44



Date: 11.AUG.2022 02:21:32



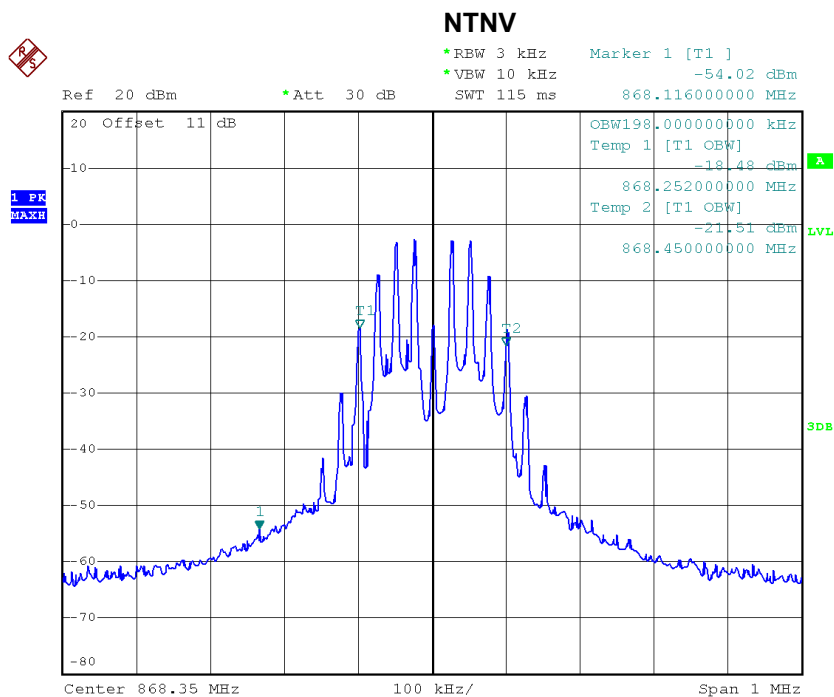
Date: 23.AUG.2022 19:42:54



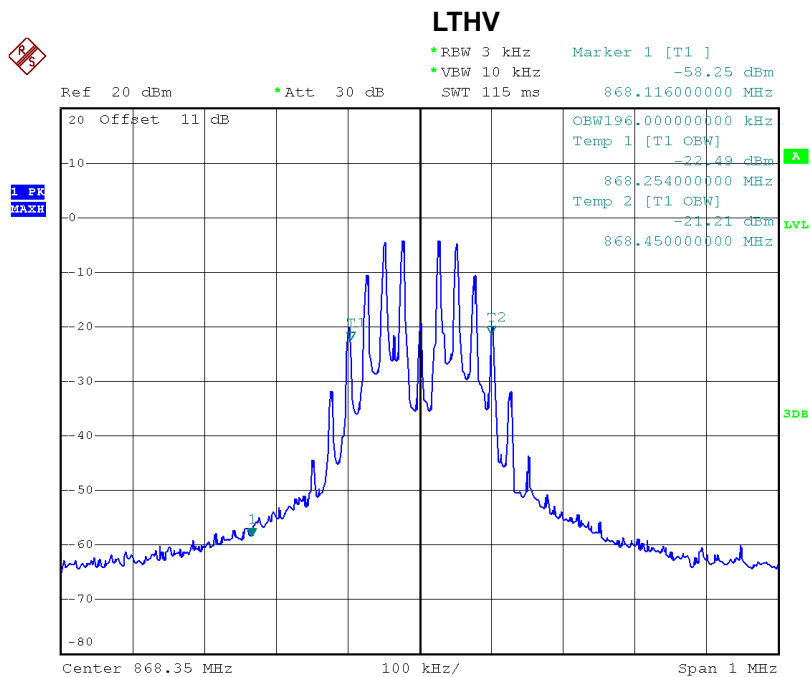
Date: 11.AUG.2022 02:19:13

Test Mode	TX Mode_868.35MHz
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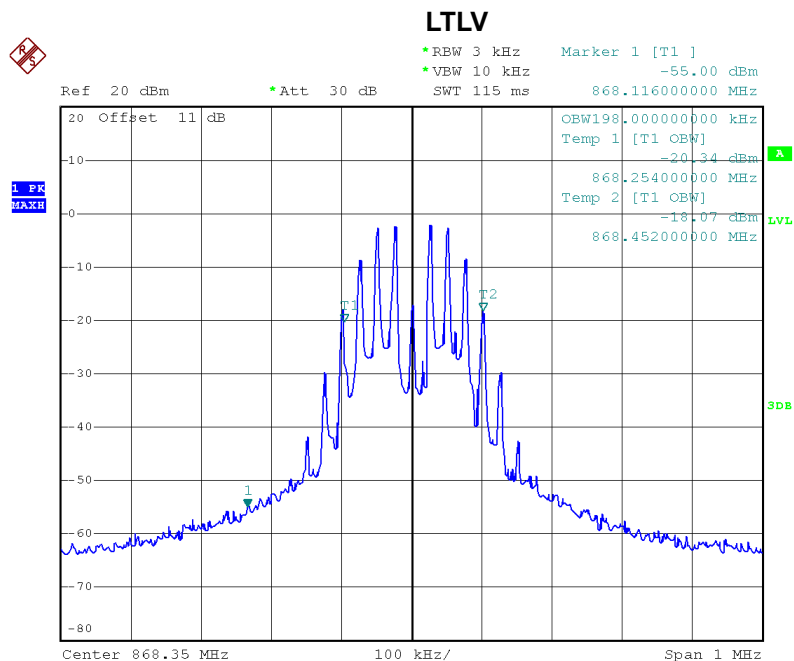
TEST CONDITIONS						Occupied Channel Bandwidth (MHz)	F _L at 99% BW (MHz)	F _H at 99% BW (MHz)
T _{nom}	24.7	°C	V _{nom}	3	V	0.198	868.25	868.45
T _{min}	0	°C	V _{max}	3.3	V	0.196	868.25	868.45
			V _{min}	2.7	V	0.198	868.25	868.45
T _{max}	40	°C	V _{max}	3.3	V	0.196	868.25	868.45
			V _{min}	2.7	V	0.196	868.25	868.45
Limit						-	F _L >863.00	F _H <865.00
Result						Pass		



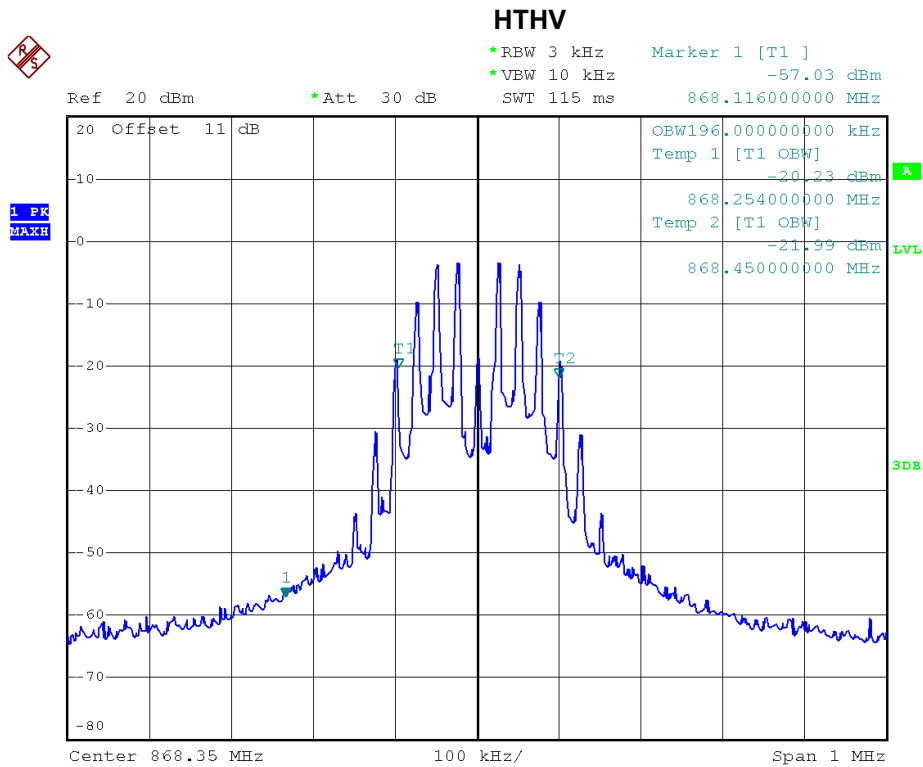
Date: 16.MAR.2022 16:50:30



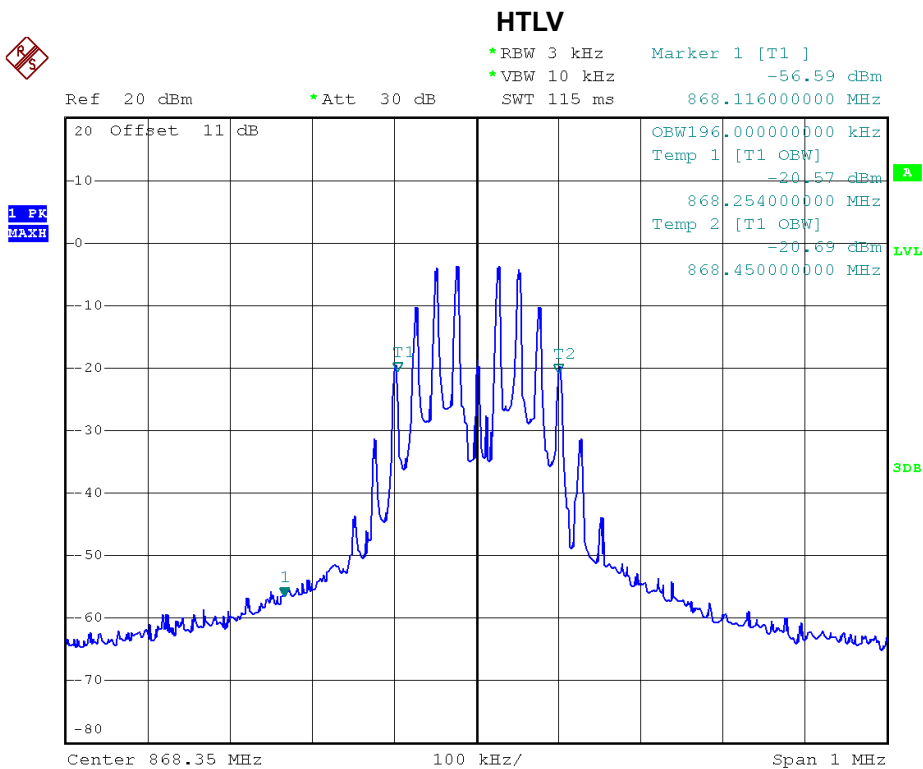
Date: 16.MAR.2022 16:42:36



Date: 16.MAR.2022 16:56:38



Date: 16.MAR.2022 16:30:49

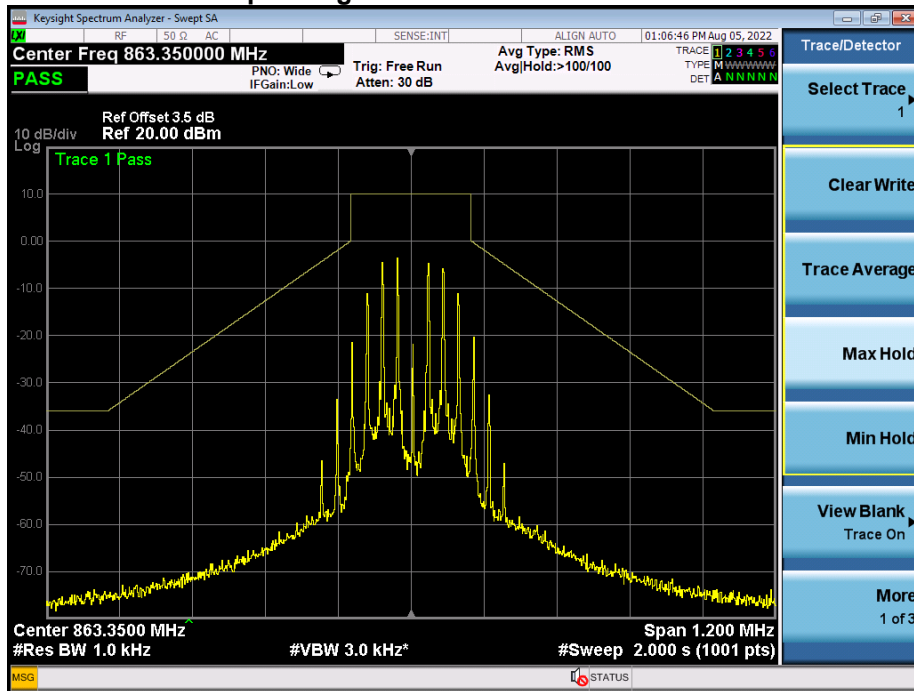


Date: 16.MAR.2022 16:36:36

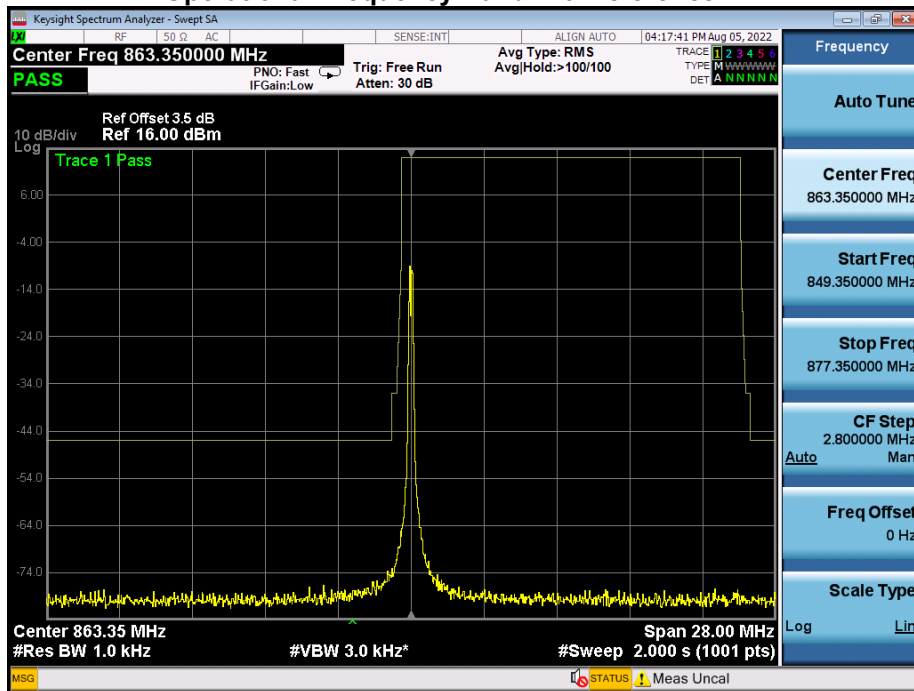
APPENDIX E - TX OUT OF BAND EMISSIONS

Test Mode	TX Mode_863.35MHz
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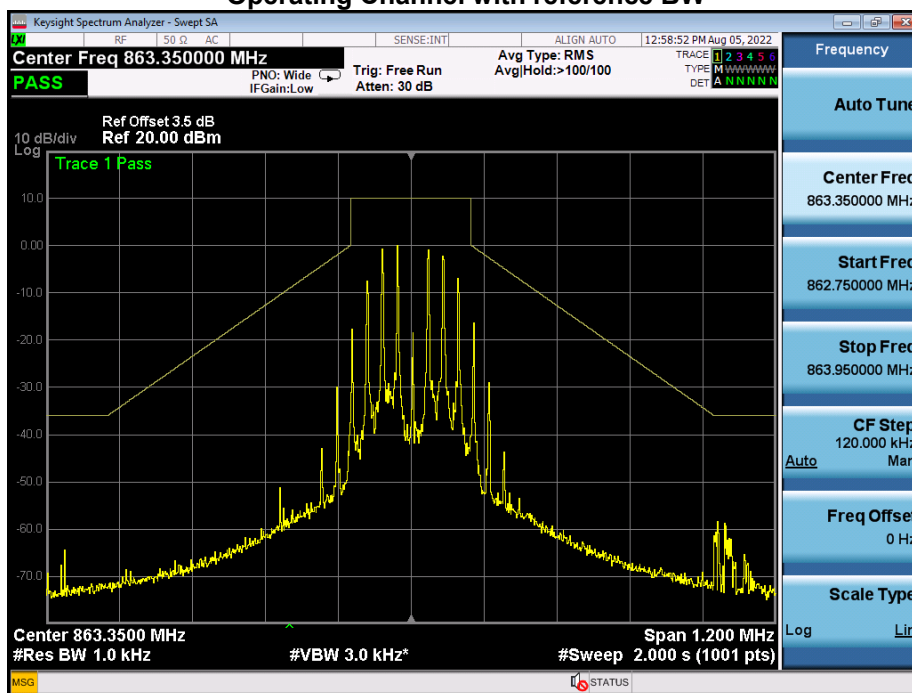
NTNV Operating Channel with reference BW



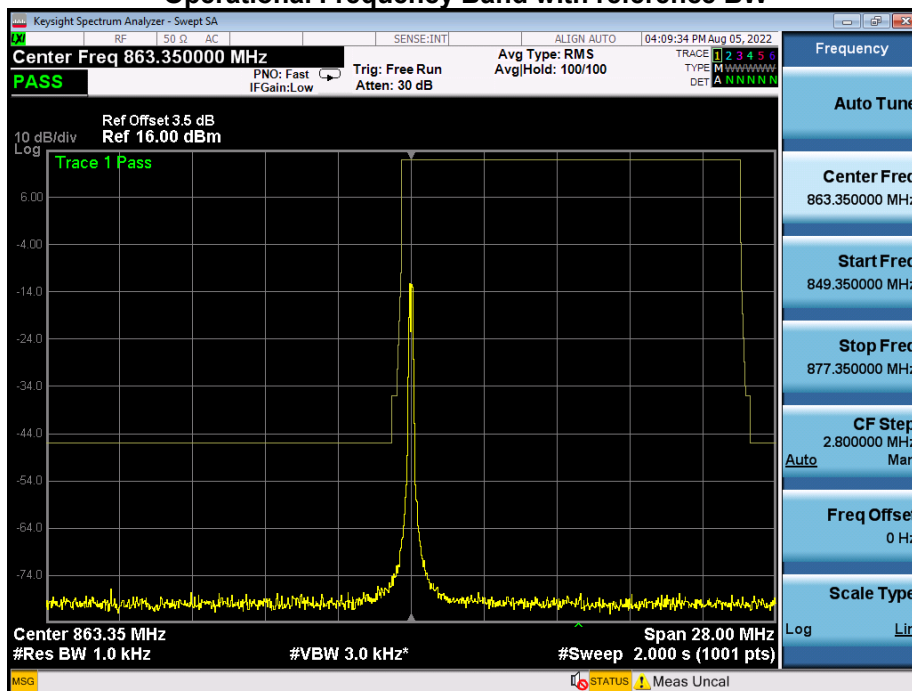
Operational Frequency Band with reference BW



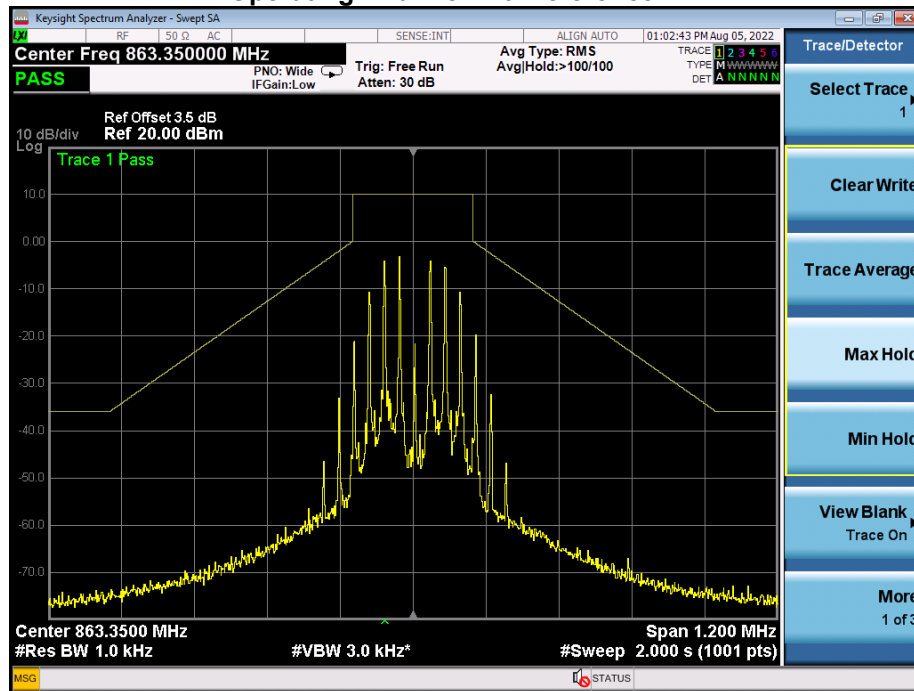
LTHV Operating Channel with reference BW



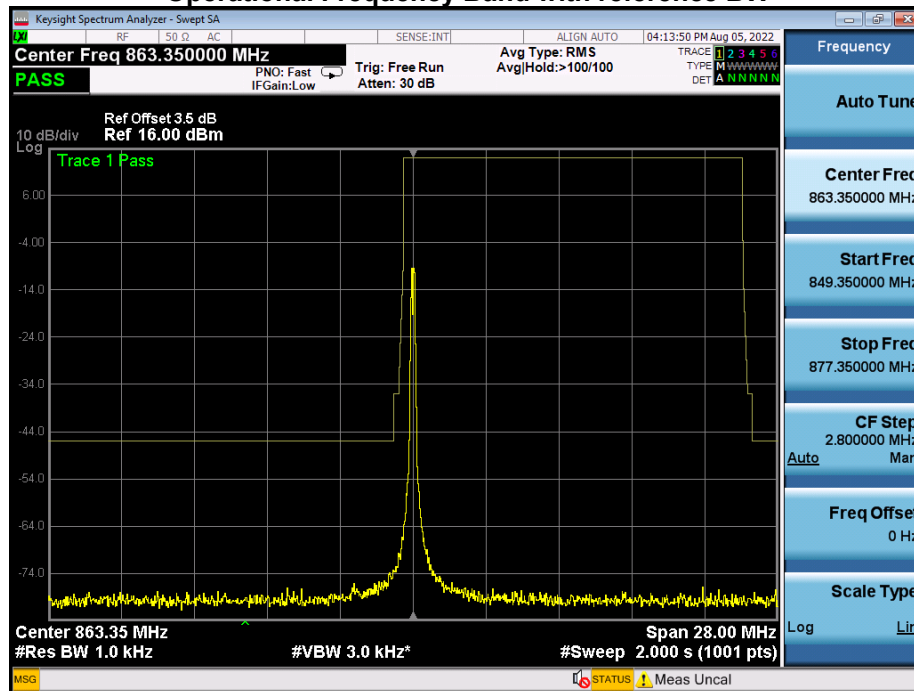
Operational Frequency Band with reference BW



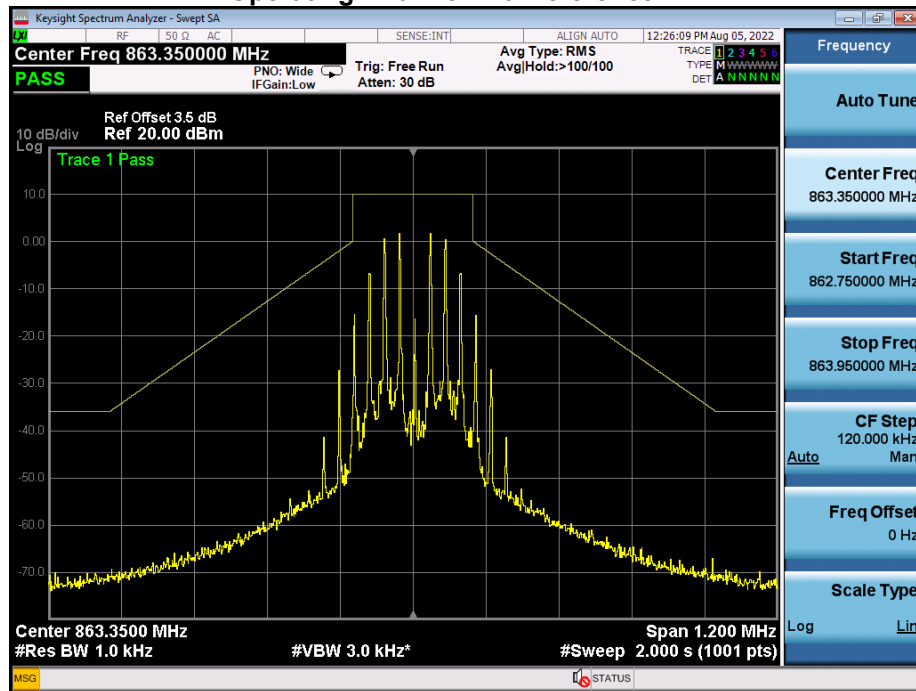
LTLV Operating Channel with reference BW



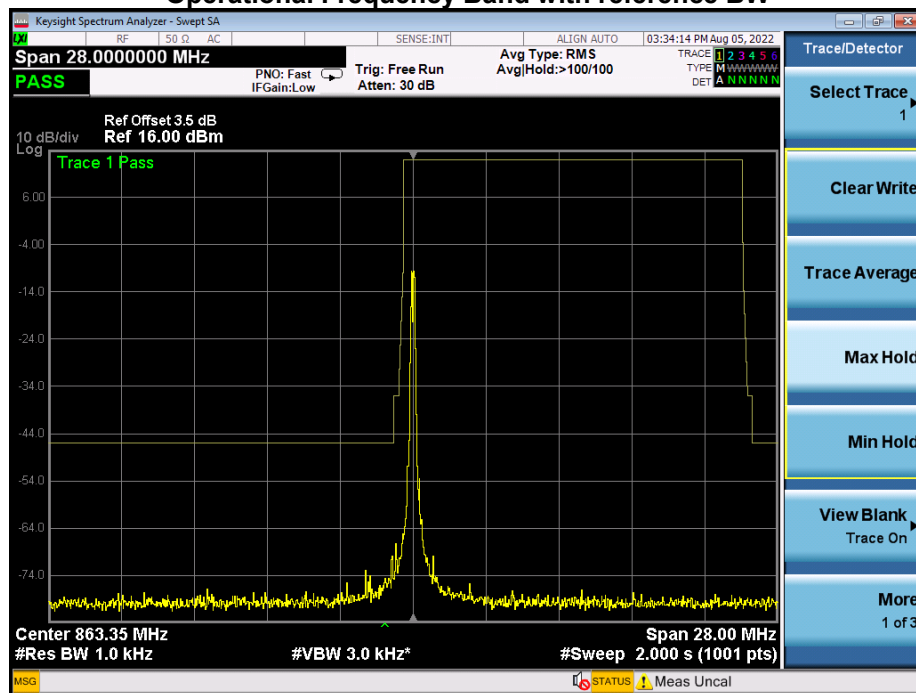
Operational Frequency Band with reference BW



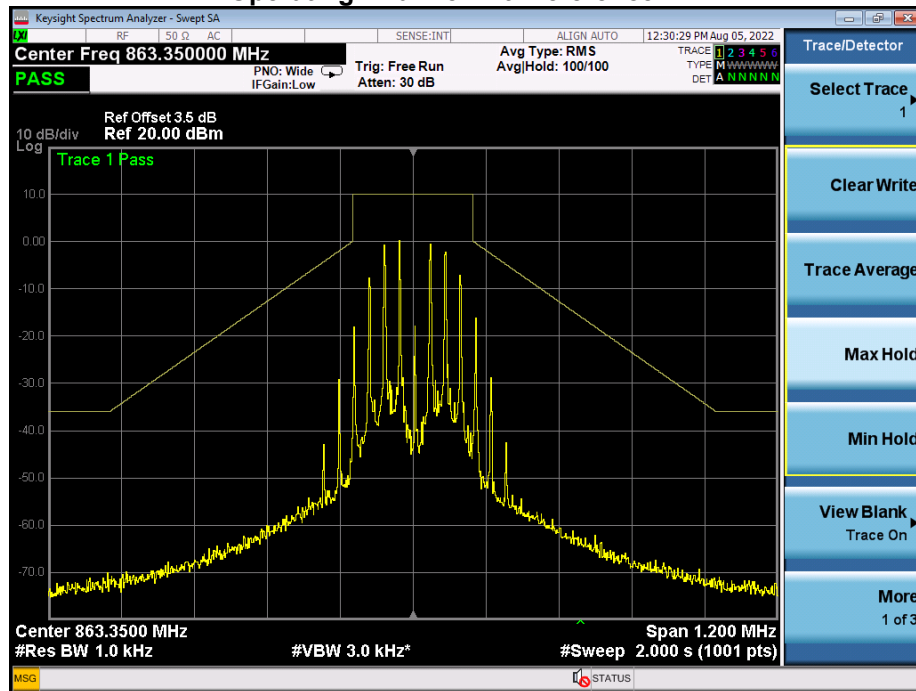
HTHV Operating Channel with reference BW



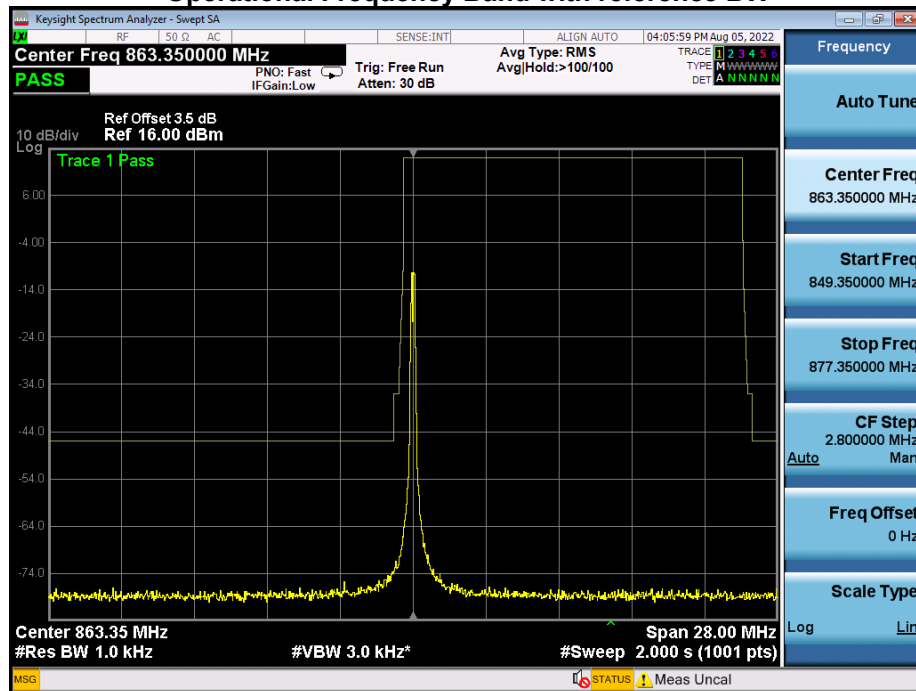
Operational Frequency Band with reference BW



HTLV Operating Channel with reference BW

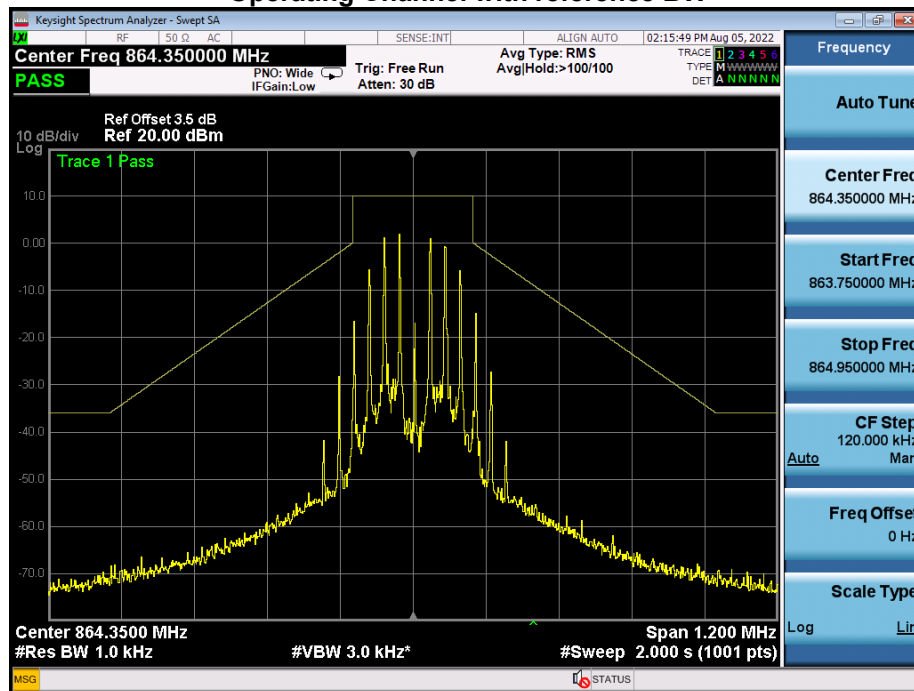


Operational Frequency Band with reference BW

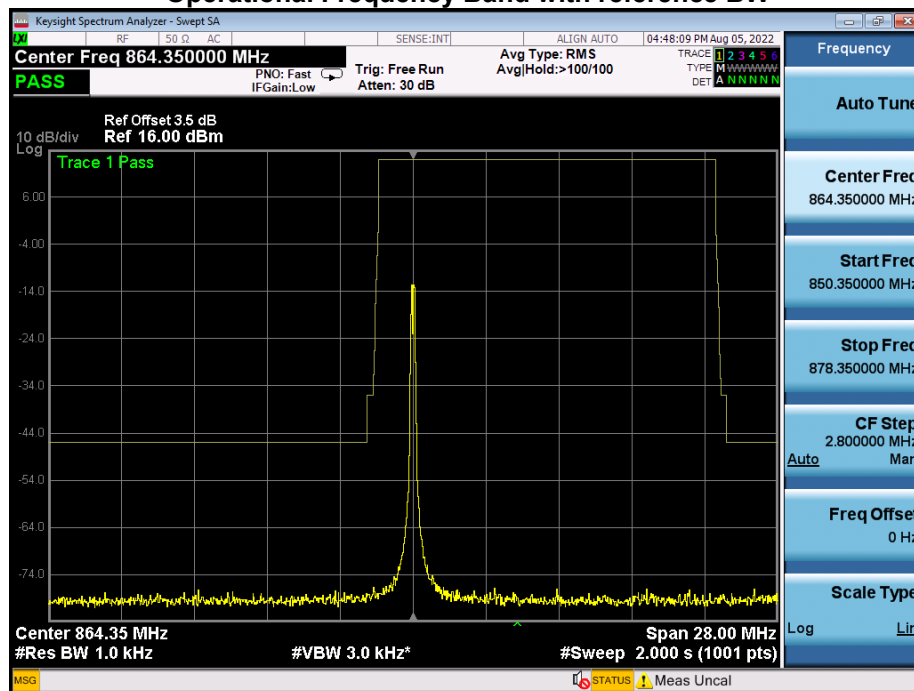


Test Mode TX Mode_864.35MHz

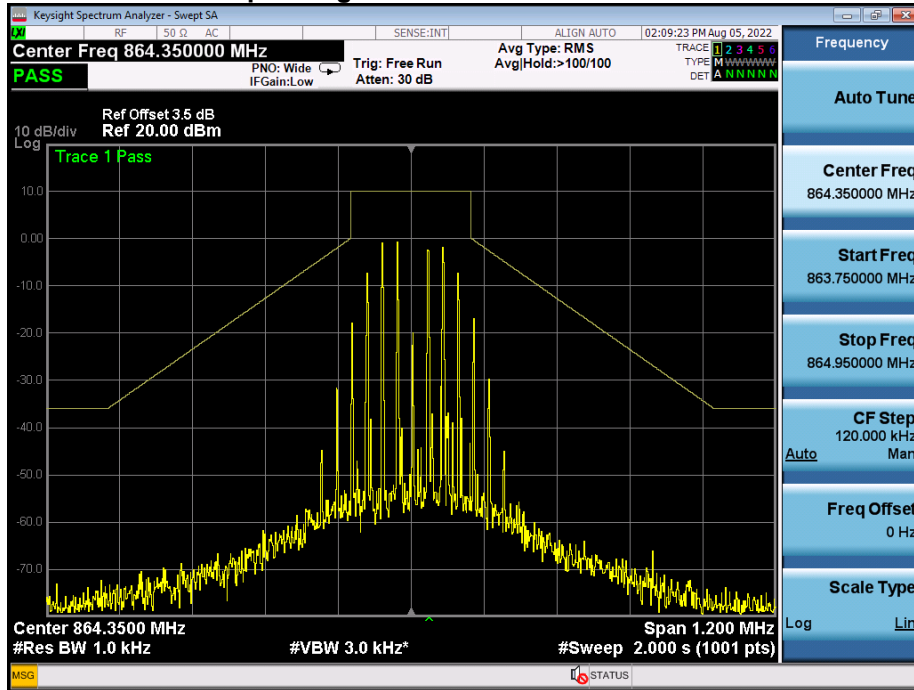
NTNV Operating Channel with reference BW



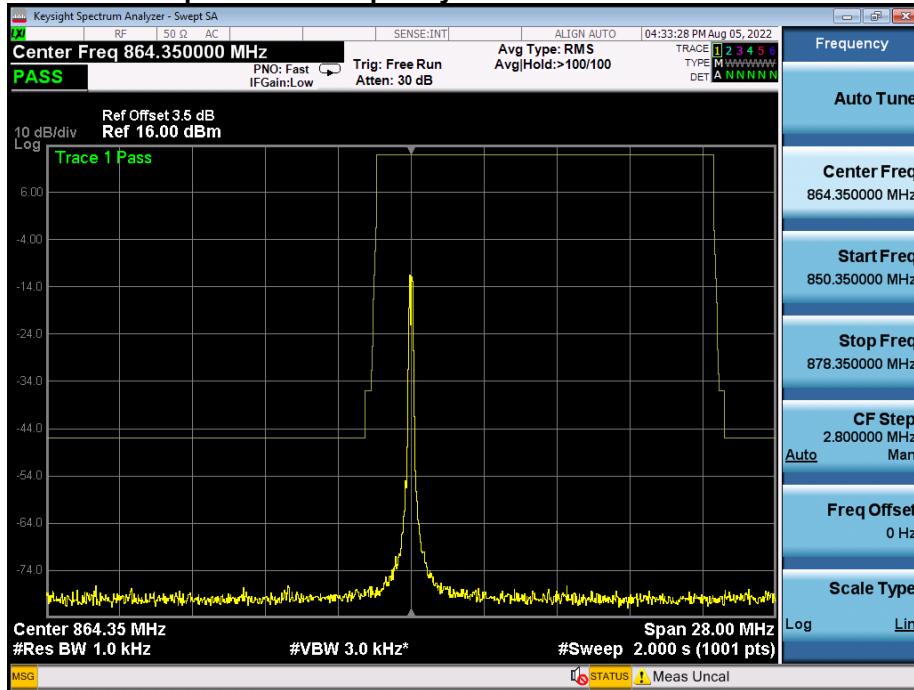
Operational Frequency Band with reference BW



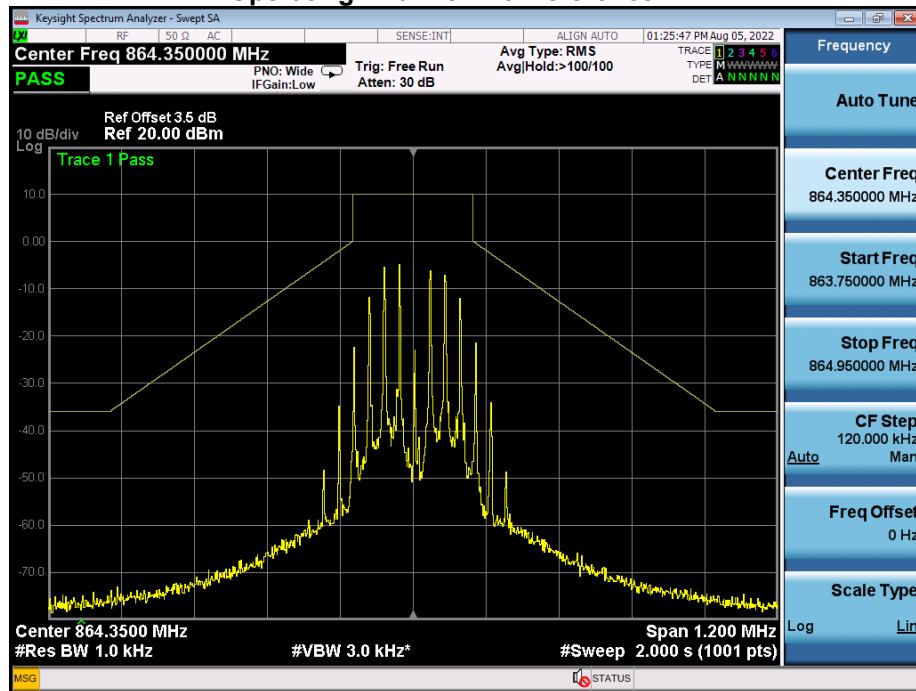
LTHV Operating Channel with reference BW



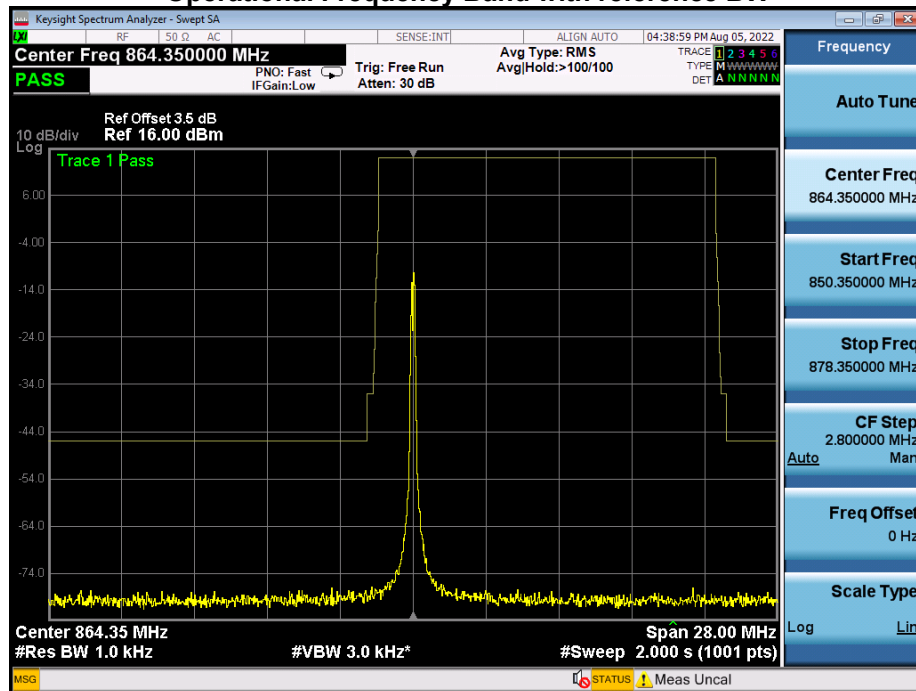
Operational Frequency Band with reference BW



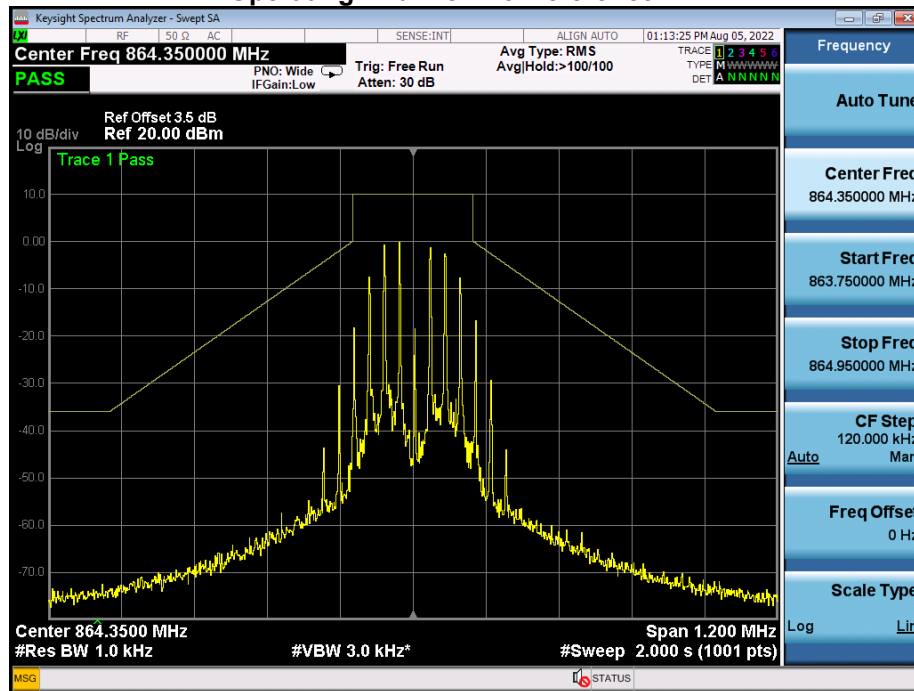
LTLV Operating Channel with reference BW



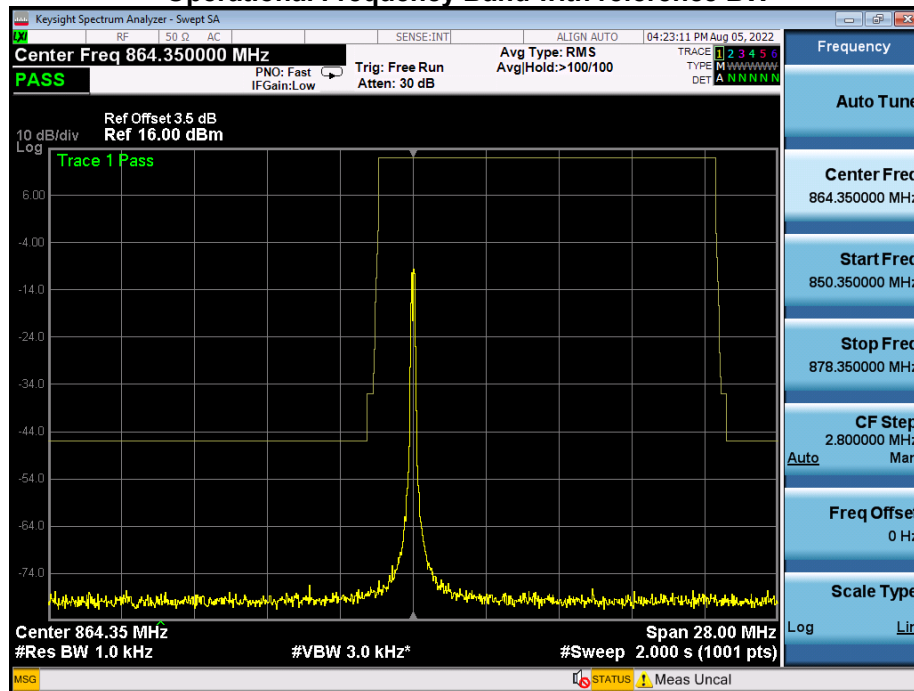
Operational Frequency Band with reference BW



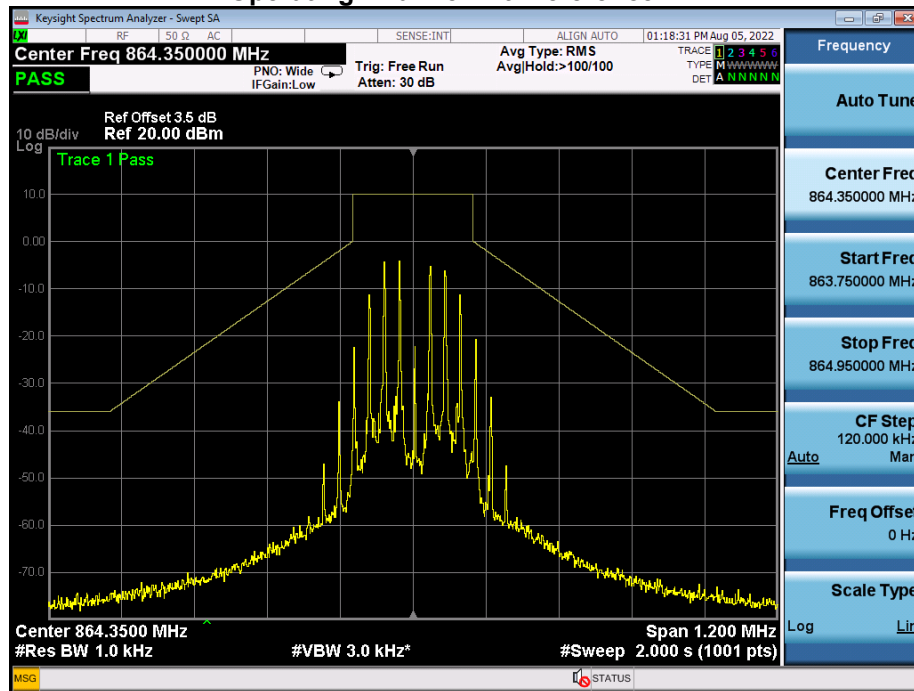
HTHV Operating Channel with reference BW



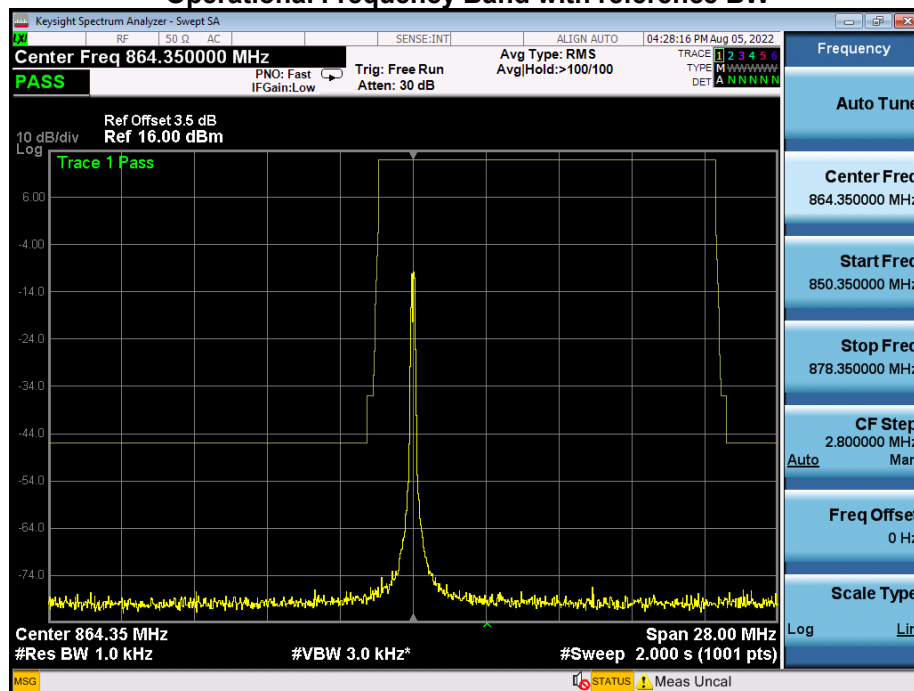
Operational Frequency Band with reference BW



HTLV Operating Channel with reference BW

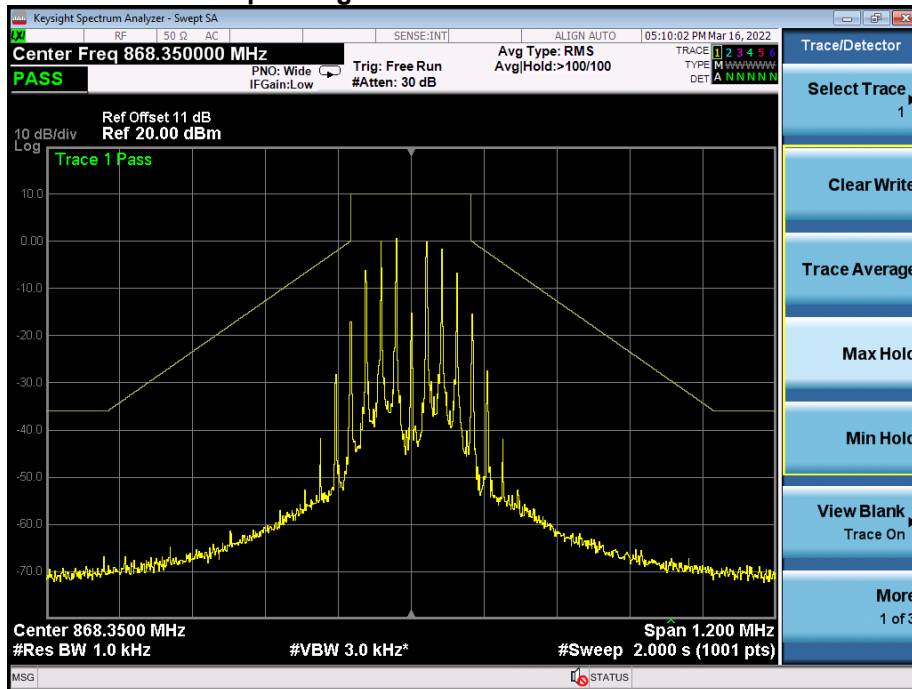


Operational Frequency Band with reference BW

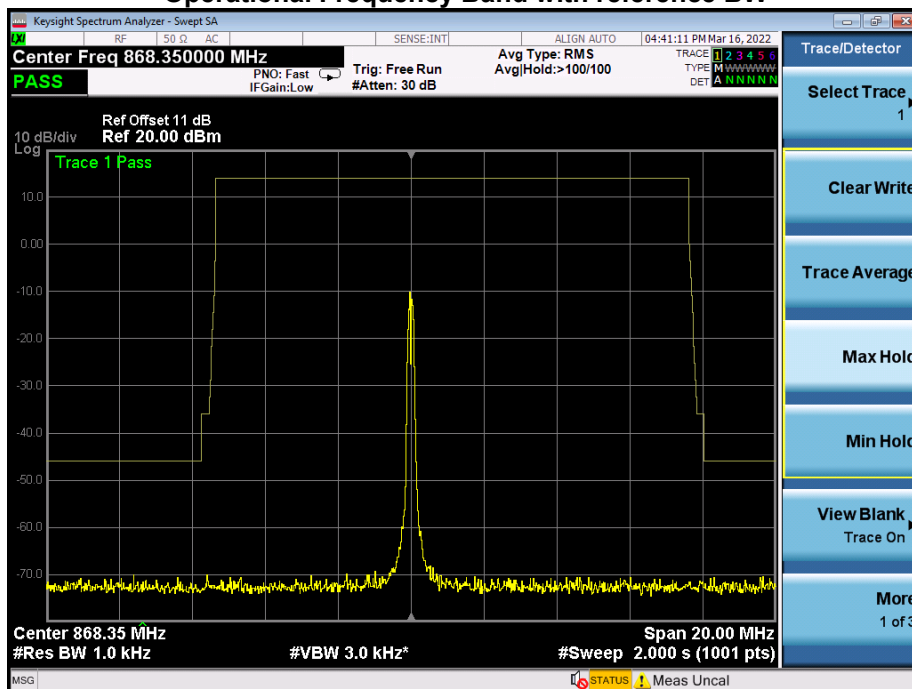


Test Mode TX Mode_868.35MHz

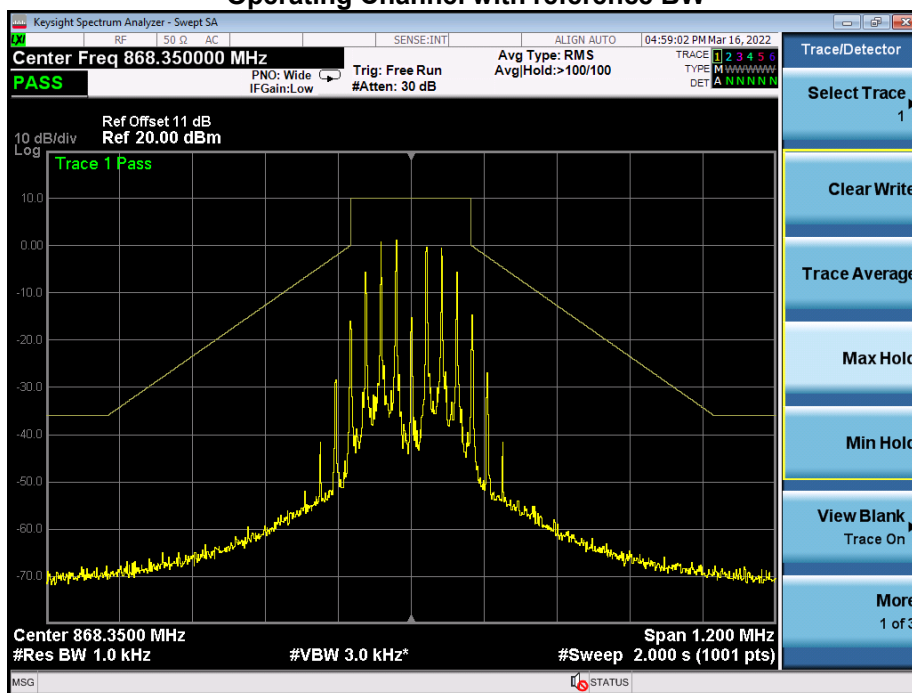
NTNV Operating Channel with reference BW



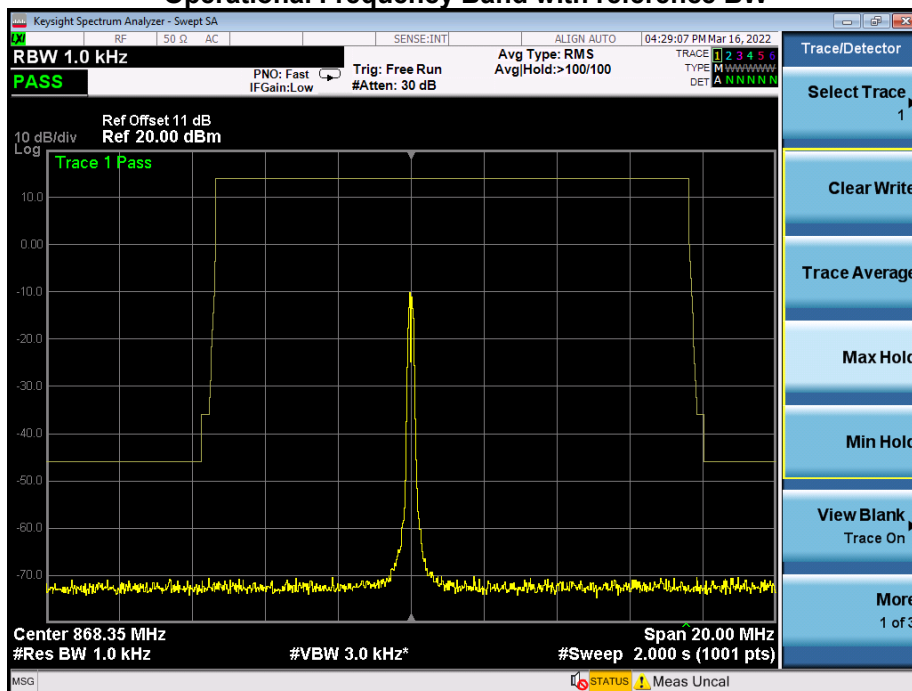
Operational Frequency Band with reference BW



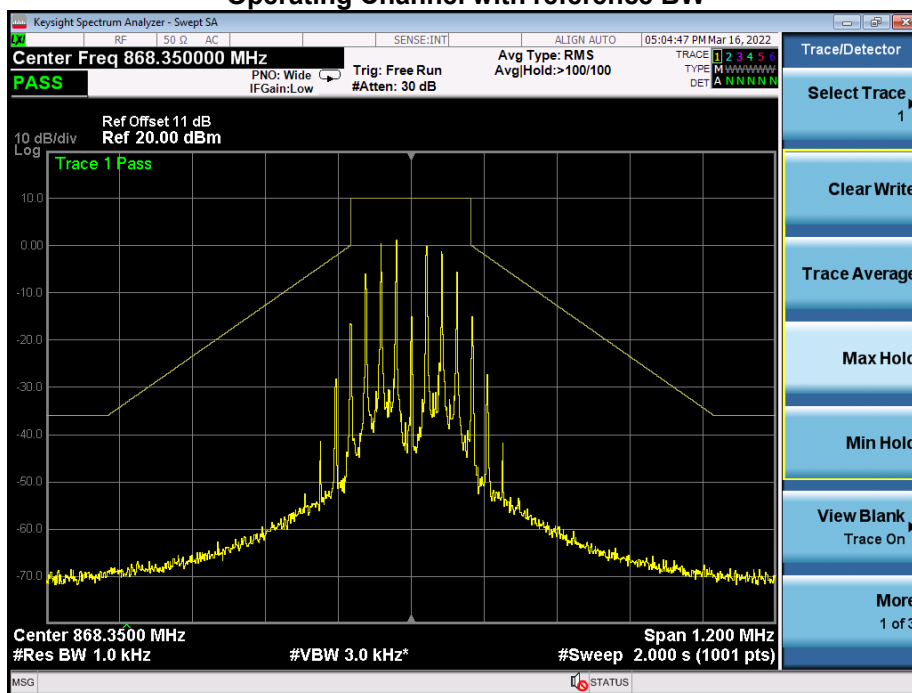
LTHV Operating Channel with reference BW



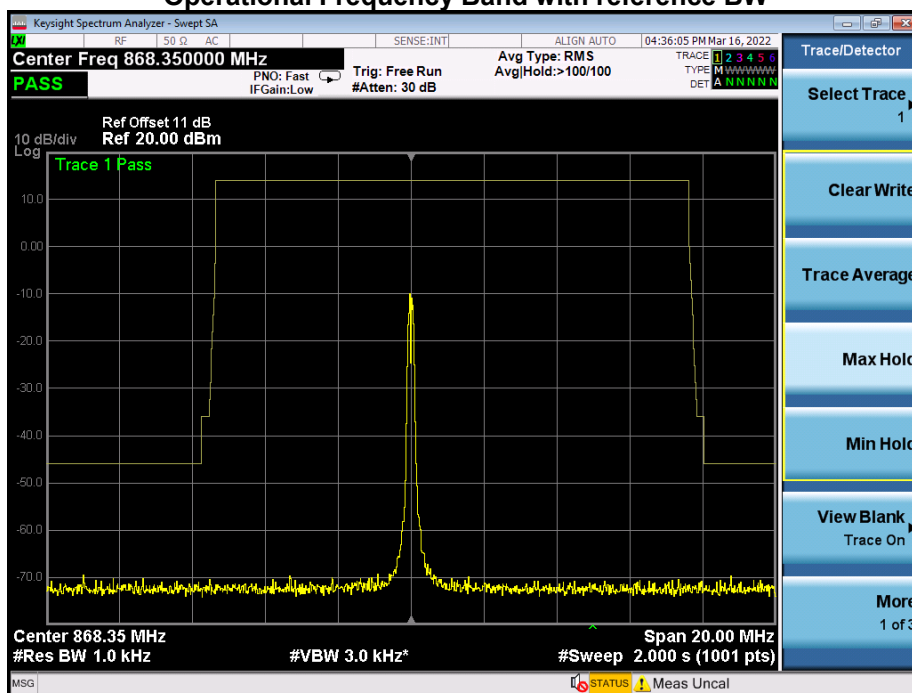
Operational Frequency Band with reference BW



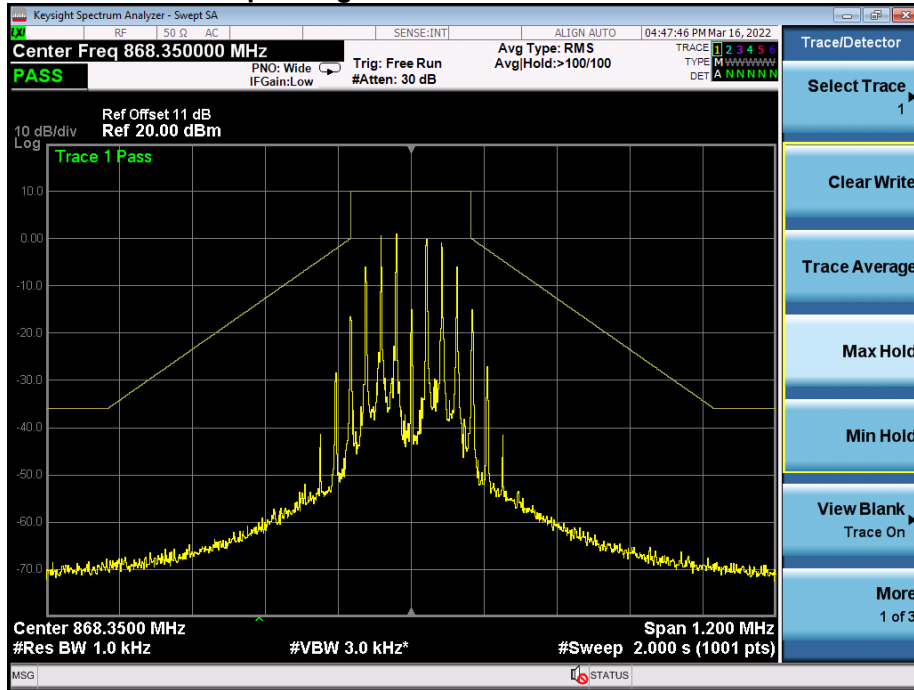
LTLV Operating Channel with reference BW



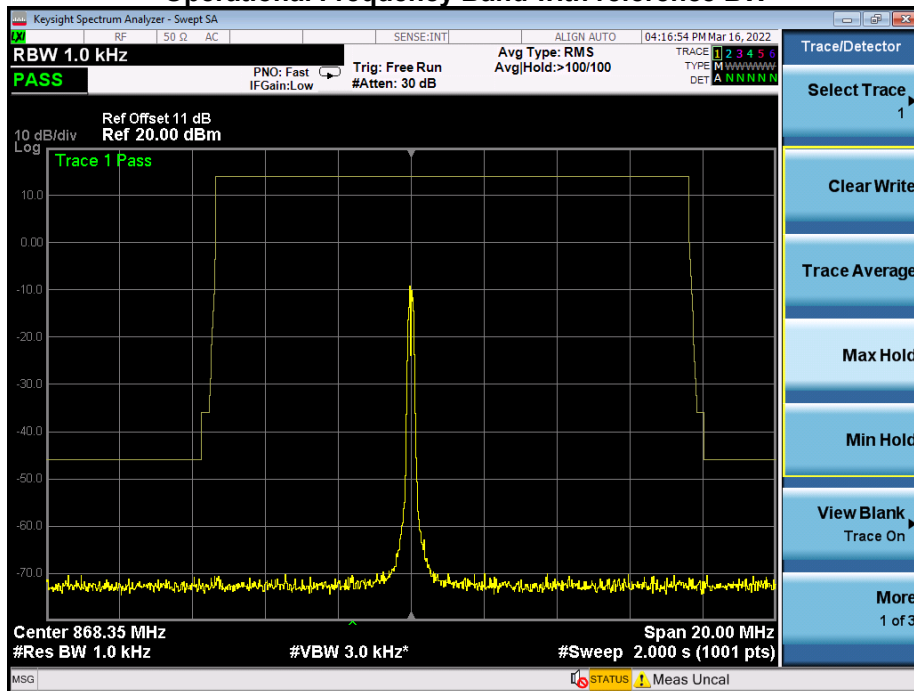
Operational Frequency Band with reference BW



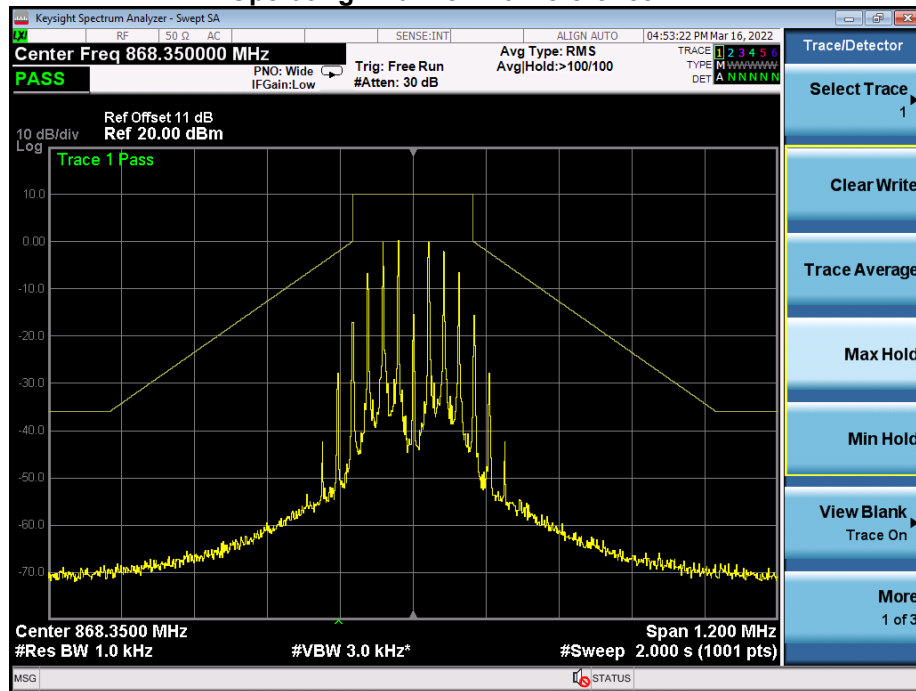
HTHV Operating Channel with reference BW



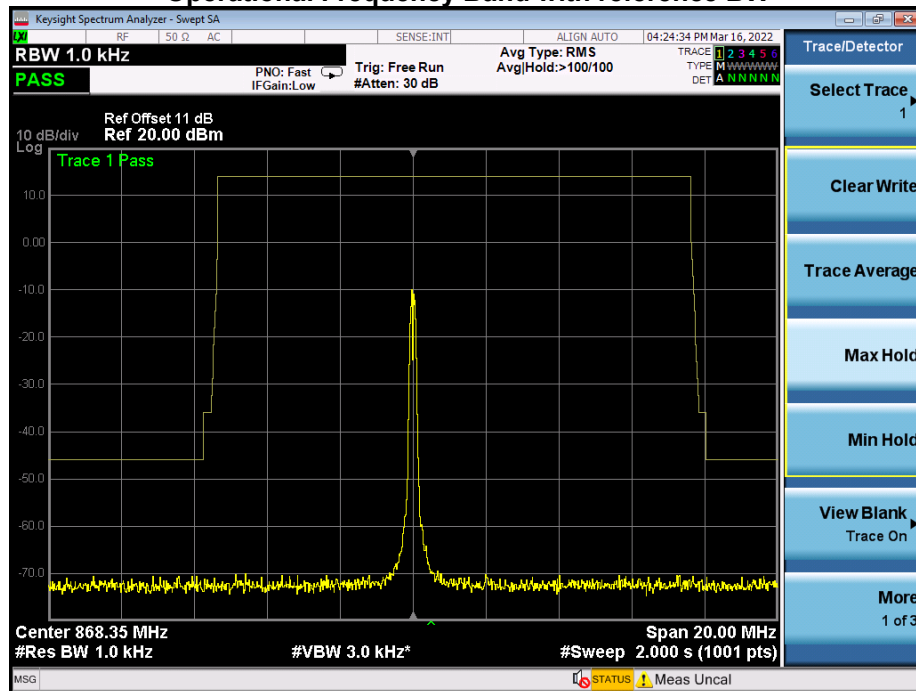
Operational Frequency Band with reference BW



HTLV Operating Channel with reference BW



Operational Frequency Band with reference BW



APPENDIX F - TX TRANSIENT POWER

Test Mode	TX Mode_863.35MHz
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Measurement points: offset from centre frequency	Frequency (MHz)	Analyser RBW (kHz)	RBW _{REF} (kHz)	Read level (dBm)	Transient power (dBm)	Limit (dBm)
-0.5 x OCW - 3 kHz	863.2470	1	1	-34.3350	-34.3350	0
0.5 x OCW + 3 kHz	863.4530	1	1	-11.7410	-11.7410	0
-12.5 kHz or -OCW(whichever is the greater)	863.1500	10	1	-44.7450	-54.7450	0
12.5 kHz or OCW(whichever is the greater)	863.5500	10	1	-44.1830	-54.1830	0
-0.5 x OCW - 400 kHz	862.8500	100	1	-52.8260	-72.8260	-27
0.5 x OCW + 400 kHz	863.8500	100	1	-52.5600	-72.5600	-27
-0.5 x OCW -1200 kHz	862.0500	300	1	-56.1380	-80.9092	-27
0.5 x OCW + 1200 kHz	864.6500	300	1	-55.8660	-80.6372	-27
OCW (kHz)	200					
Centre Frequency (MHz)	863.35					

Test Mode	TX Mode_864.35MHz
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Measurement points: offset from centre frequency	Frequency (MHz)	Analyser RBW (kHz)	RBW _{REF} (kHz)	Read level (dBm)	Transient power (dBm)	Limit (dBm)
-0.5 x OCW - 3 kHz	864.2470	1	1	-35.8810	-35.8810	0
0.5 x OCW + 3 kHz	864.4530	1	1	-11.7310	-11.7310	0
-12.5 kHz or -OCW(whichever is the greater)	864.1500	10	1	-45.6340	-55.6340	0
12.5 kHz or OCW(whichever is the greater)	864.5500	10	1	-43.8720	-53.8720	0
-0.5 x OCW - 400 kHz	863.8500	100	1	-51.9630	-71.9630	-27
0.5 x OCW + 400 kHz	864.8500	100	1	-52.5490	-72.5490	-27
-0.5 x OCW -1200 kHz	863.0500	300	1	-7.8640	-32.6352	-27
0.5 x OCW + 1200 kHz	865.6500	300	1	-55.8700	-80.6412	-27
OCW (kHz)	200					
Centre Frequency (MHz)	864.35					

Test Mode	TX Mode_868.35MHz
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Measurement points: offset from centre frequency	Frequency (MHz)	Analyser RBW (kHz)	RBW _{REF} (kHz)	Read level (dBm)	Transient power (dBm)	Limit (dBm)
-0.5 x OCW - 3 kHz	868.2470	1	1	-31.3330	-31.3330	0
0.5 x OCW + 3 kHz	868.4530	1	1	-24.5640	-24.5640	0
-12.5 kHz or -OCW(whichever is the greater)	868.1500	10	1	-48.5490	-58.5490	0
12.5 kHz or OCW(whichever is the greater)	868.5500	10	1	-48.2240	-58.2240	0
-0.5 x OCW - 400 kHz	867.8500	100	1	-51.4170	-71.4170	-27
0.5 x OCW + 400 kHz	868.8500	100	1	-51.3790	-71.3790	-27
-0.5 x OCW -1200 kHz	867.0500	300	1	-50.2560	-75.0272	-27
0.5 x OCW + 1200 kHz	869.6500	300	1	-50.3910	-75.1622	-27
OCW (kHz)	200					
Centre Frequency(MHz)	868.35					

APPENDIX G - TX ADJACENT CHANNEL POWER

Test Mode: N/A

Note: "N/A" denotes test is not applicable to this device.

APPENDIX H - TX BEHAVIOUR UNDER LOW VOLTAGE CONDITIONS

Test Mode	TX Mode_863.35MHz
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TEST CONDITIONS						Use Condition Under Low Voltage
						863.35MHz
T _{nom}	24	°C	V _{nom}	3	V	Normal Function
T _{nom}	24	°C	V _{min work}	2.7	V	Normal Function
T _{nom}	24	°C	V _{min stop}	2.5	V	Function Stop
Limit						Manufacturer declared operating voltage 2.5Vdc
Result						PASS

Test Mode	TX Mode_864.35MHz
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TEST CONDITIONS						Use Condition Under Low Voltage
						864.35MHz
T _{nom}	24	°C	V _{nom}	3	V	Normal Function
T _{nom}	24	°C	V _{min work}	2.7	V	Normal Function
T _{nom}	24	°C	V _{min stop}	2.5	V	Function Stop
Limit						Manufacturer declared operating voltage 2.5Vdc
Result						PASS

Test Mode	TX Mode_868.35MHz
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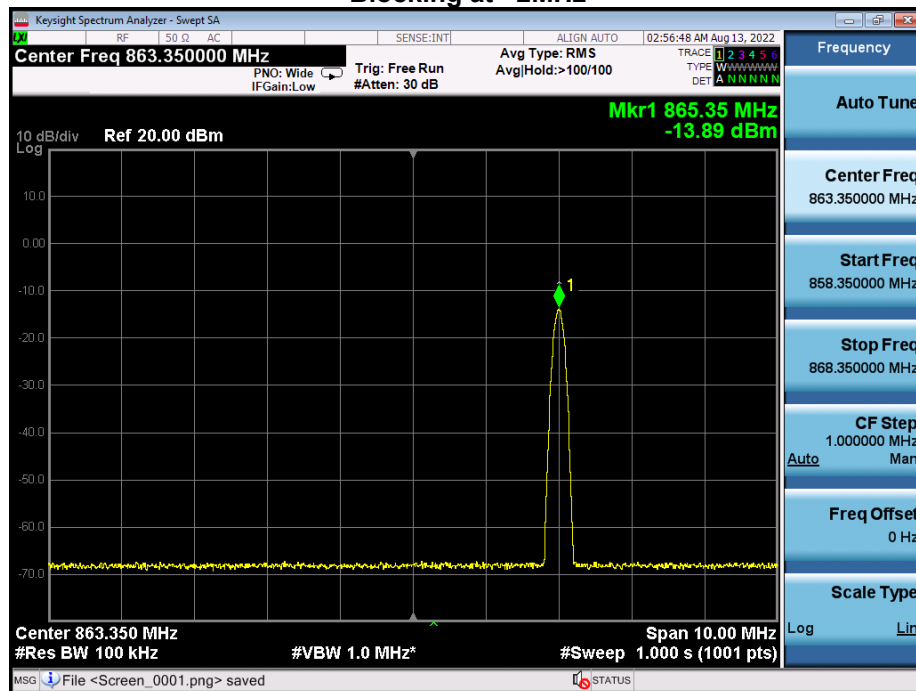
TEST CONDITIONS						Use Condition Under Low Voltage
						868.35MHz
T _{nom}	24.7	°C	V _{nom}	3	V	Normal Function
T _{nom}	24.7	°C	V _{min work}	2.7	V	Normal Function
T _{nom}	24.7	°C	V _{min stop}	2.5	V	Function Stop
Limit						Manufacturer declared operating voltage 2.5Vdc
Result						PASS

APPENDIX I - RX BLOCKING

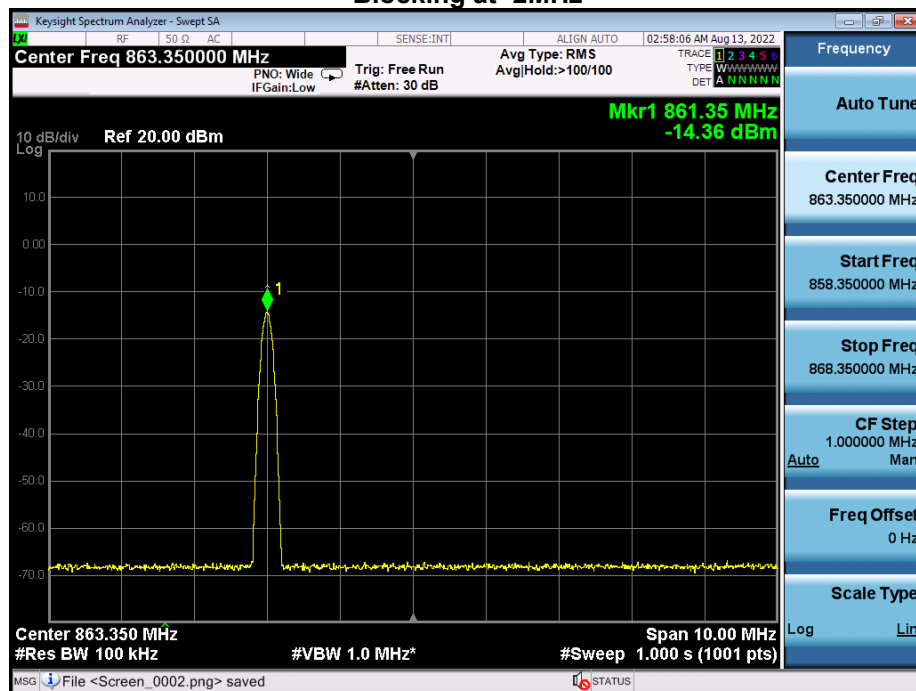
Test Mode	RX Mode_ 863.35MHz
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Receiver Category	Frequency offset	Limit	Results
2	±2MHz	≥ -20dBm	PASS
2	±10MHz	≥ -20dBm	PASS
2	±43MHz	≥ -20dBm	PASS

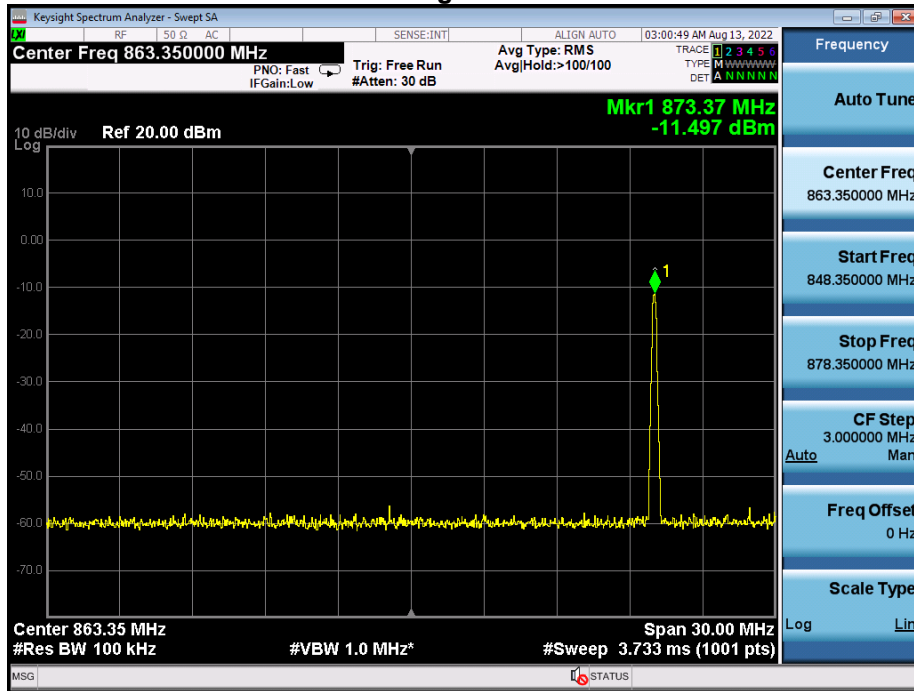
Blocking at +2MHz



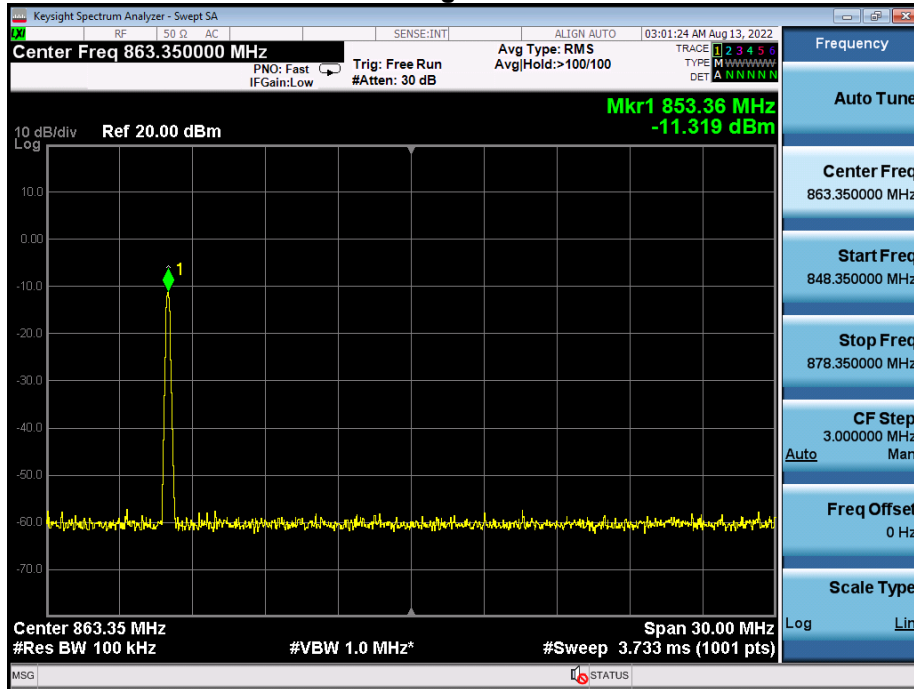
Blocking at -2MHz



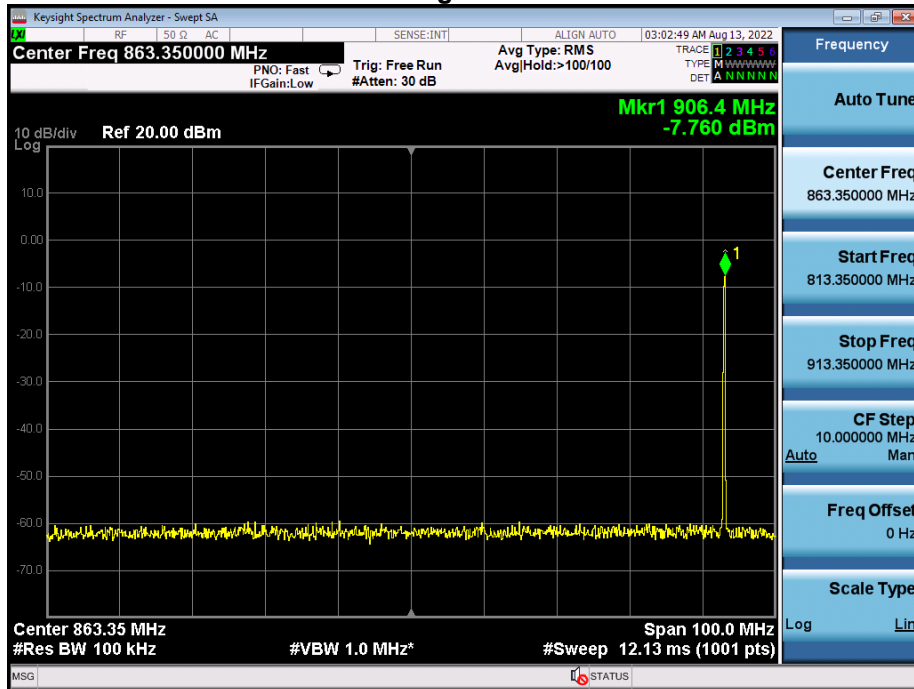
Blocking at +10MHz



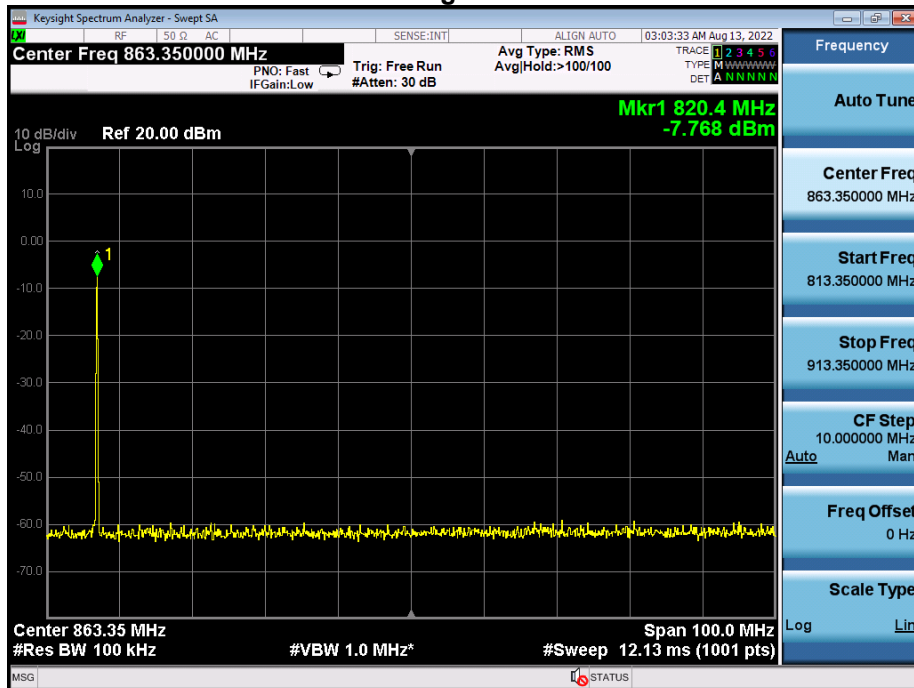
Blocking at -10MHz



Blocking at +43MHz



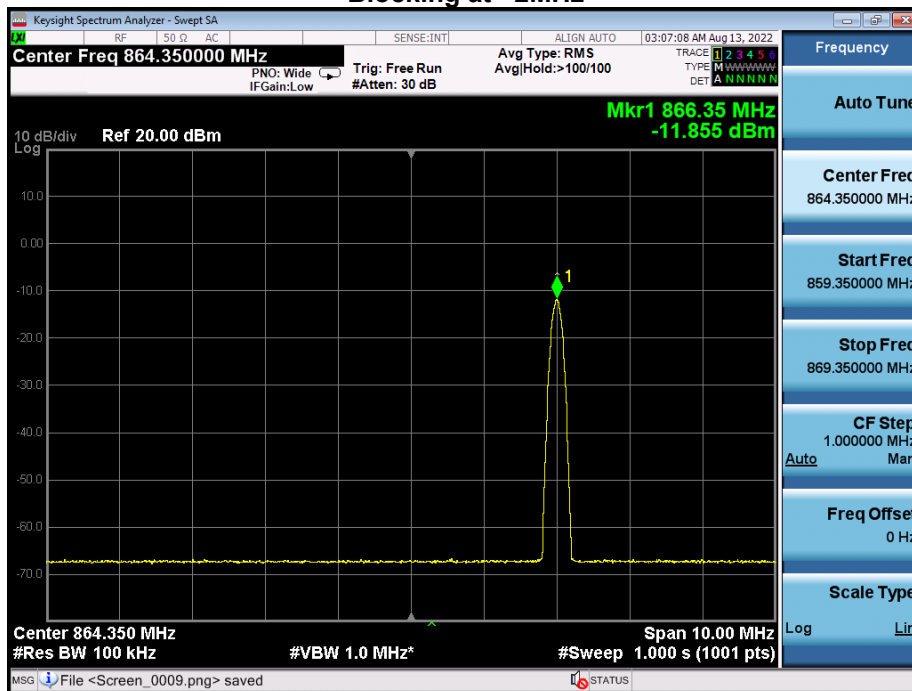
Blocking at -43MHz



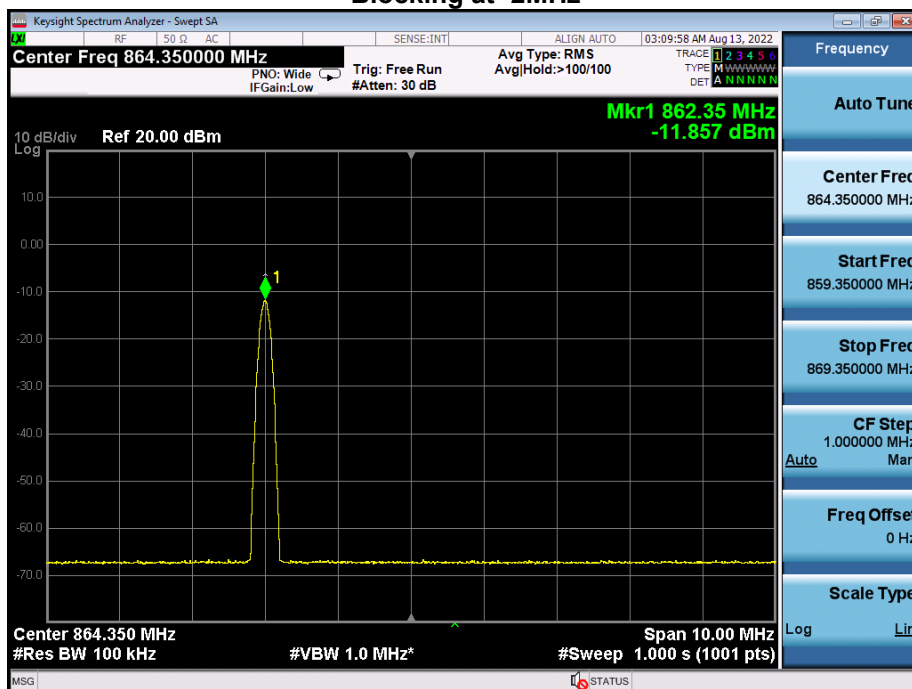
Test Mode	RX Mode_ 864.35MHz
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Receiver Category	Frequency offset	Limit	Results
2	±2MHz	≥ -20dBm	PASS
2	±10MHz	≥ -20dBm	PASS
2	±43MHz	≥ -20dBm	PASS

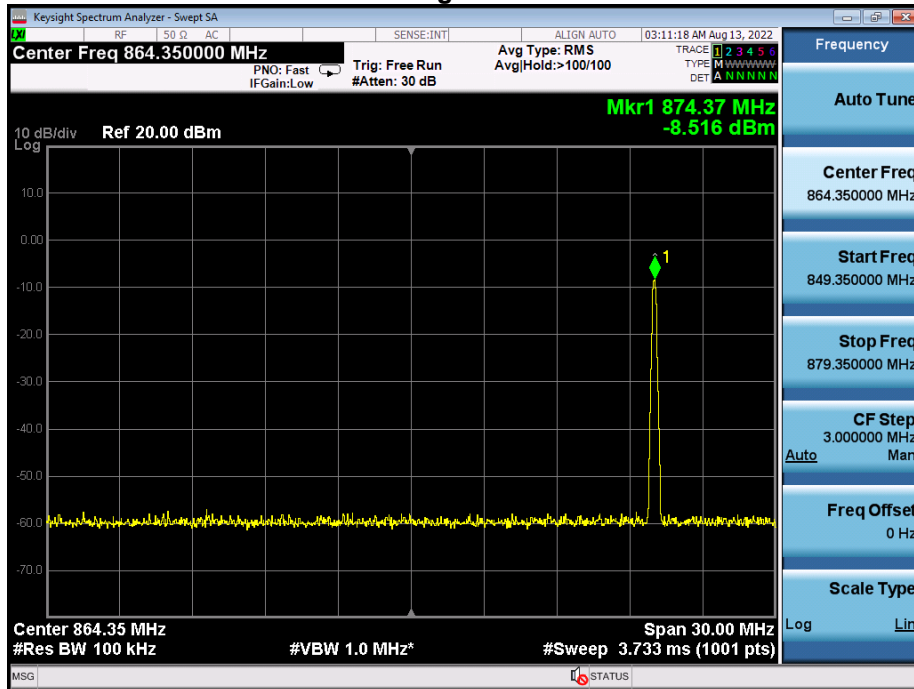
Blocking at +2MHz



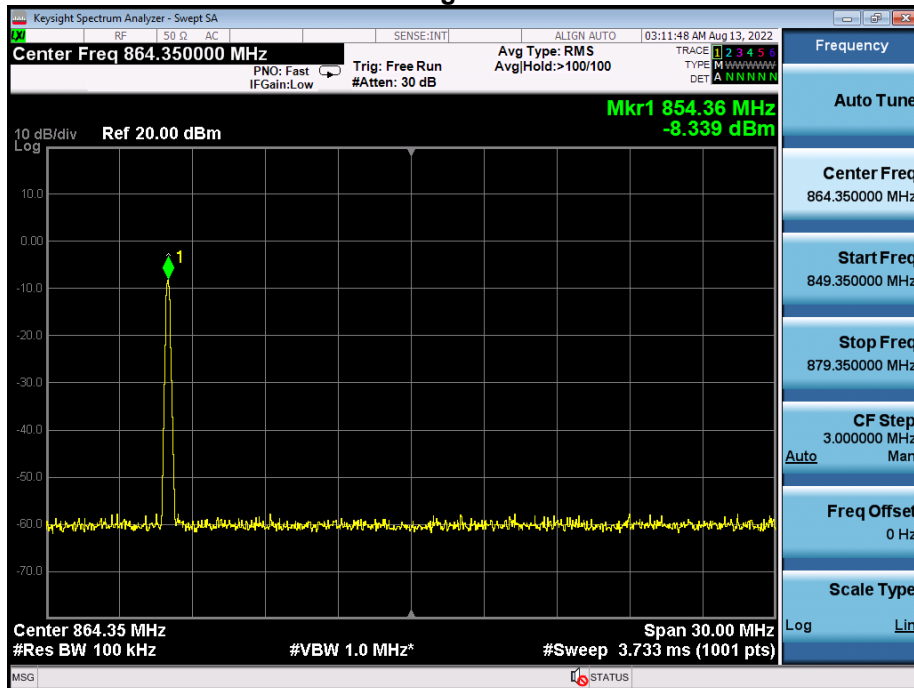
Blocking at -2MHz



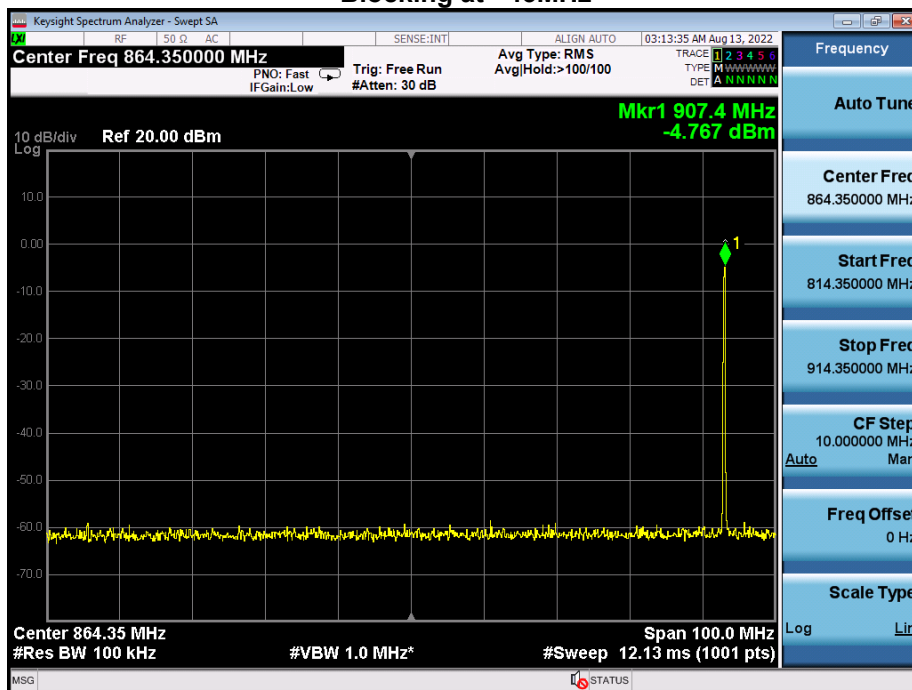
Blocking at +10MHz



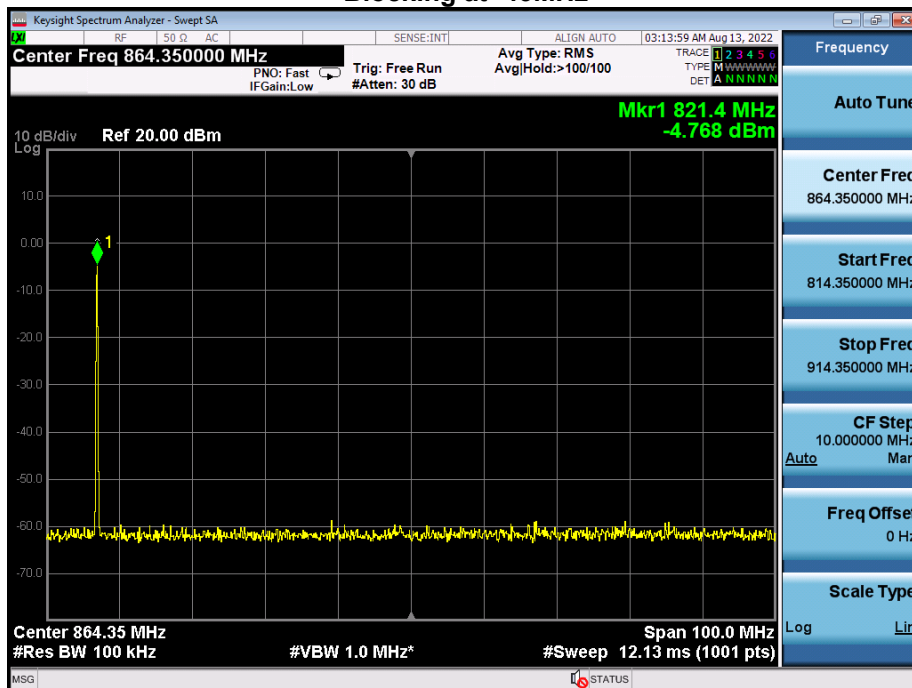
Blocking at -10MHz



Blocking at +43MHz



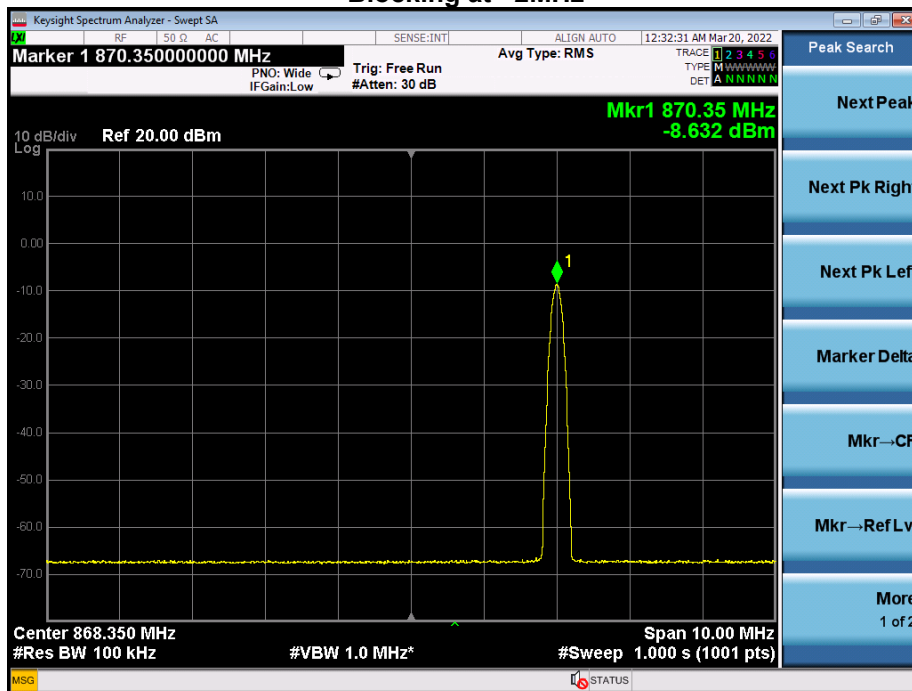
Blocking at -43MHz



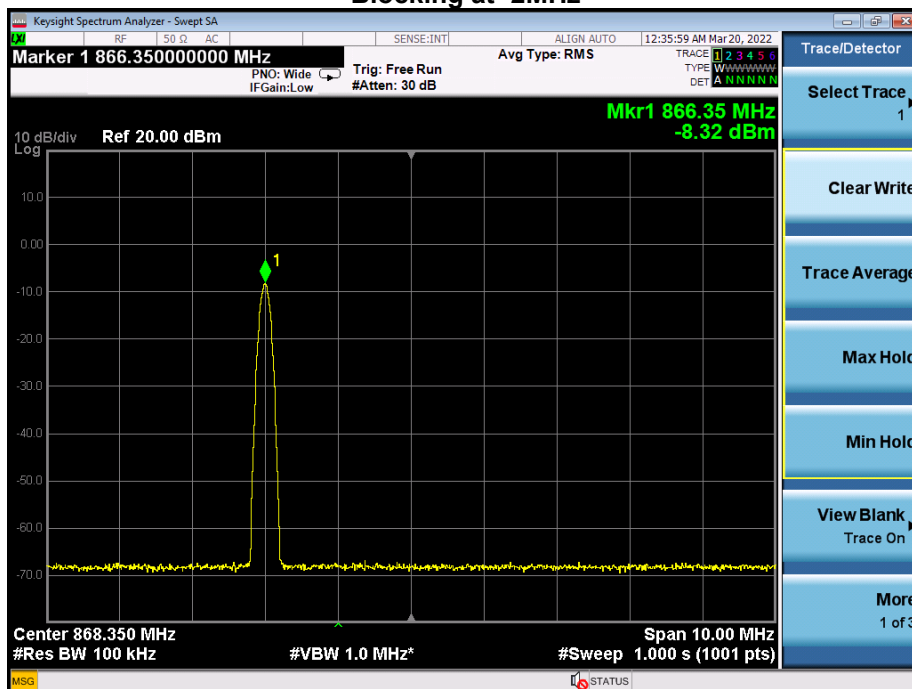
Test Mode	RX Mode_ 868.35MHz
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Receiver Category	Frequency offset	Limit	Results
2	±2MHz	≥ -69dBm	PASS
2	±10MHz	≥ -44dBm	PASS
2	±43MHz	≥ -44dBm	PASS

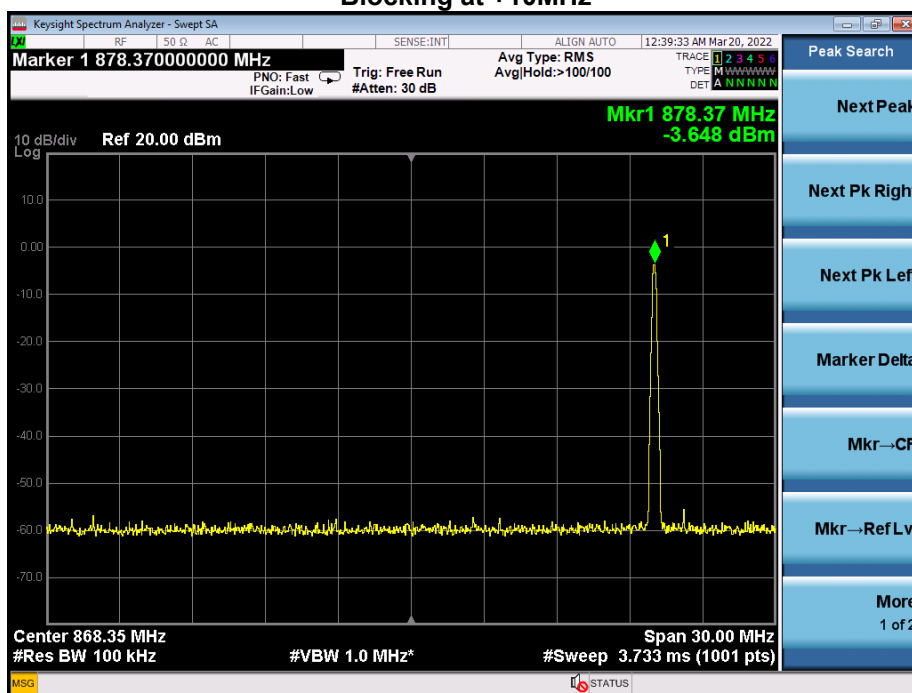
Blocking at +2MHz



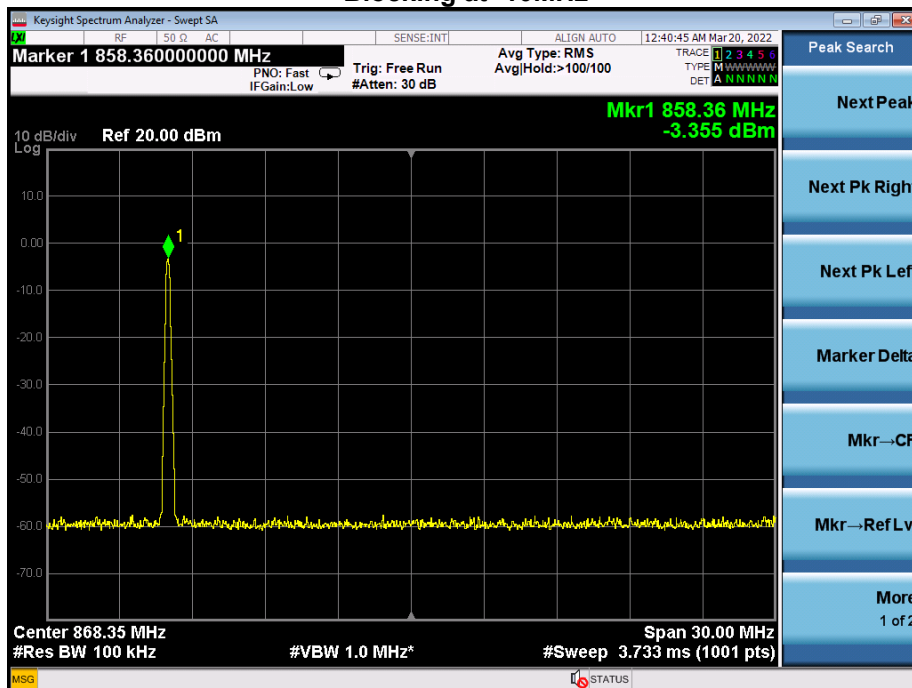
Blocking at -2MHz



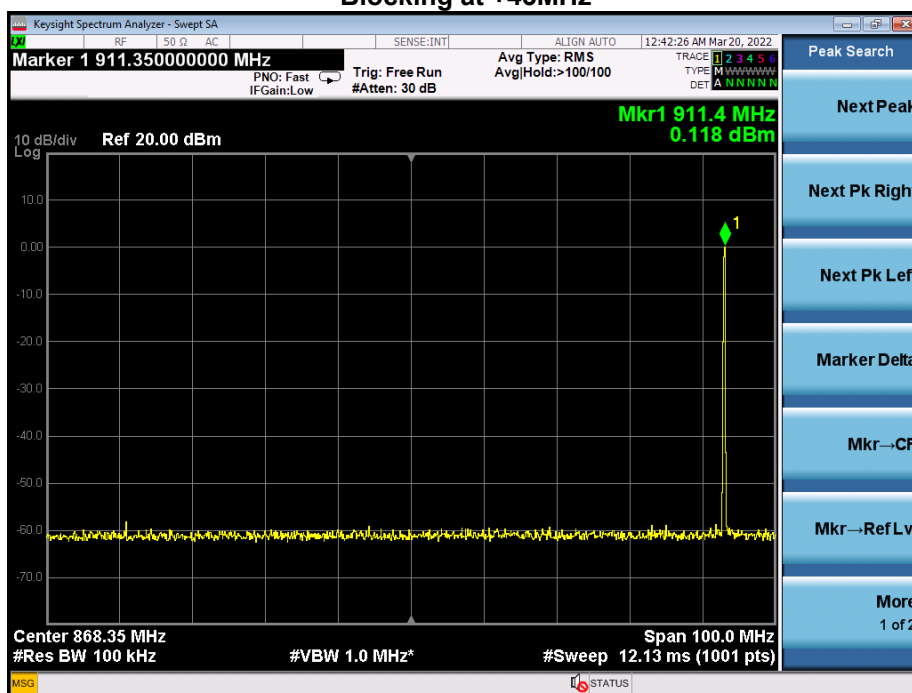
Blocking at +10MHz



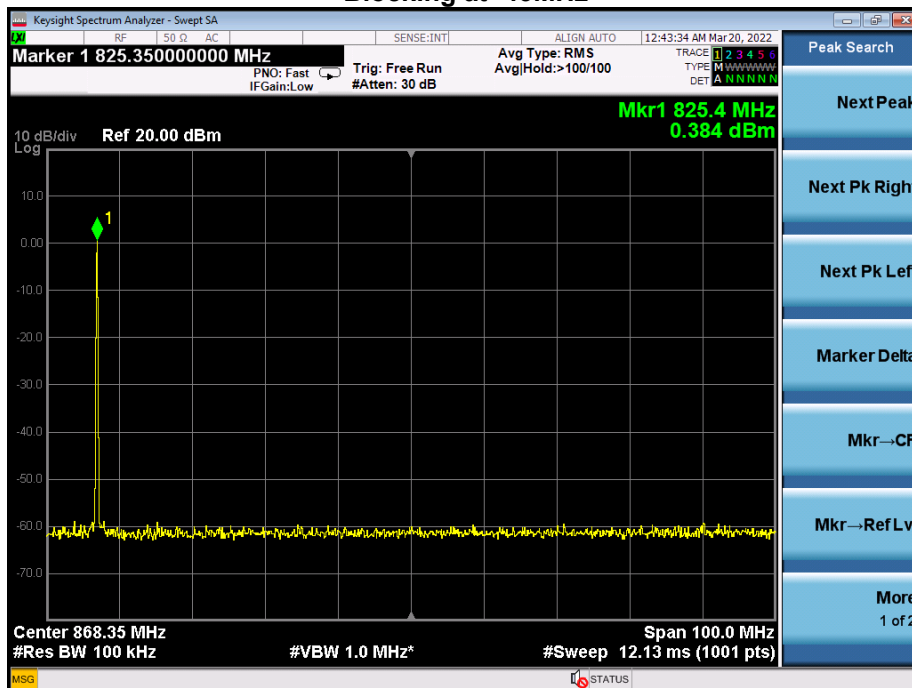
Blocking at -10MHz



Blocking at +43MHz



Blocking at -43MHz



End of Test Report