

# EN300220 RF Test Report

**APPLICANT** : Shanghai PANCHIP Microelectronics Co., Ltd  
**EQUIPMENT** : RF Module  
**BRAND NAME** : NA  
**MODEL NAME** : PAN3028  
**STANDARD** : EN 300220-1, EN 300220-2

Applicant : Shanghai PANCHIP Microelectronics Co., Ltd  
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Hi-Tech Park Road

Date of Receipt : May. 18, 2022  
Test Date : May. 18, 2022 to Jun. 8, 2022  
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Performed Location : EPINTEK Suzhou Ltd., Suzhou Industrial Park Branch  
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The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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## 1. General Information

### 1.1 EUT Description

Product Name	RF Module
Model No.	PAN3028
EUT Voltage	DC 3.3V
Test Voltage	DC 3.3V
<b>Chirp</b>	
Frequency Range	433.05 ~ 434.79 MHz
TX Frequency Range	62.5KHz:433.8~434.4 MHz 125KHz:433.15~434.7 MHz 250KHz:433.2~434.6 MHz 500KHz:433.3~434.5 MHz
Channel Number	NA
Type of Modulation	Chirp

## 1.2 Antenna List

Antenna manufacturer	胶棒天线	
Model No.	NA	
Brand Name	NA	
Antenna Delivery	1*TX+1*RX	
Antenna technology	SISO	
Antenna Type	External	Dipole
Antenna Gain #1	0dBi	

**Note:** Antenna gain is maximum average gain, the data is provided by customer. EPINTEK is not responsible for the authenticity of this data.

## 1.3 Test Channel

Band width	Center Frequency
62.5KHz	433.8~434.4 MHz
125KHz	433.15~434.7 MHz
250KHz	433.2~434.6 MHz
500KHz	433.3~434.5 MHz

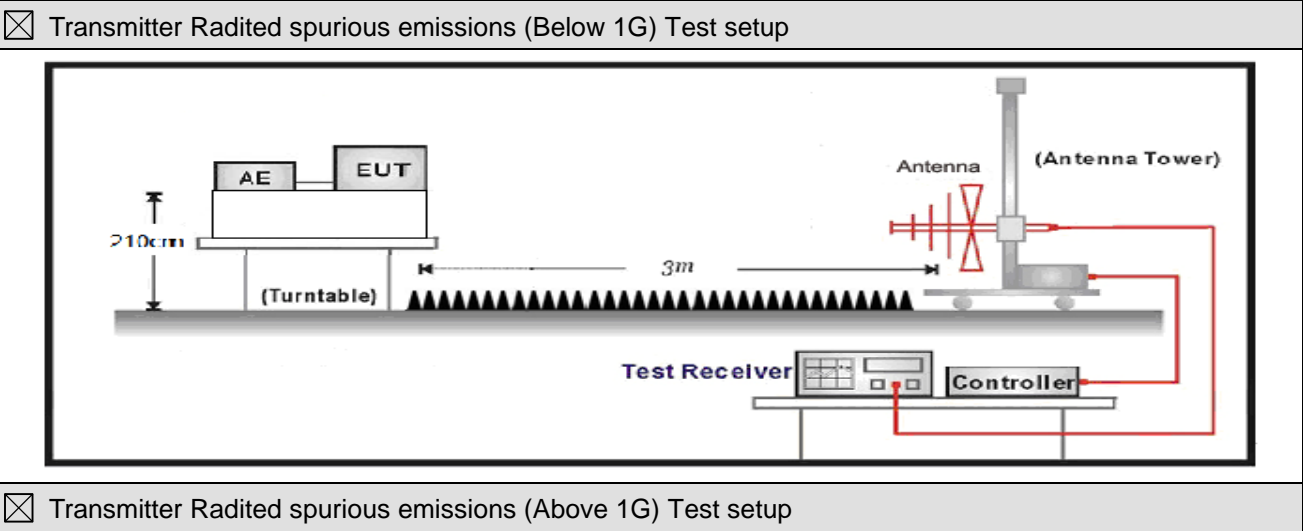
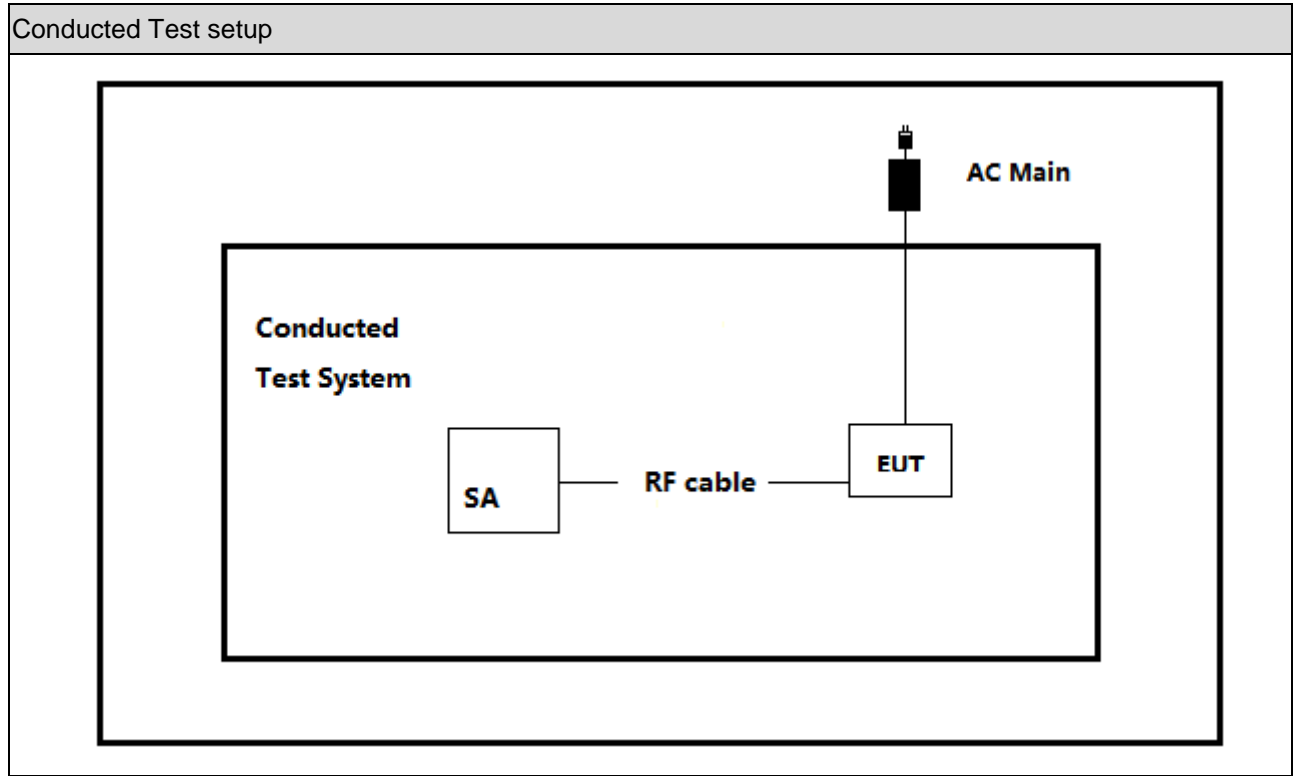
## 1.4 The test modes of the EUT can support:

Test Mode	Band width	Ant 1
Chirp	62.5KHz, 125KHz, 250KHz ,500KHz	√

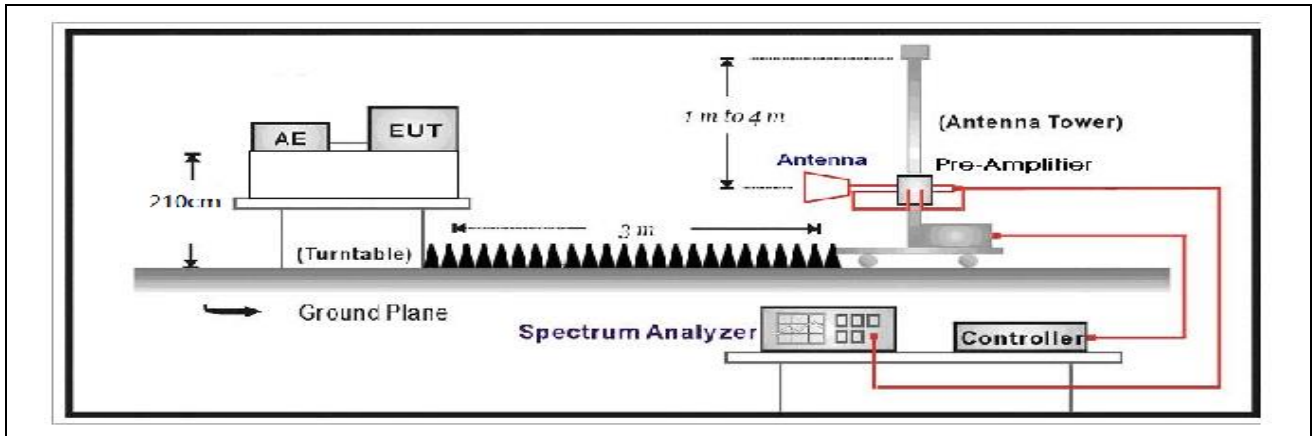
1.5 EUT Operational Condition

EUT Voltage	3.3V
Test Voltage	3.3V
Extreme Temperature	T <sub>nom</sub> (25°C)

1.6 Configuration of Tested System



☒ Transmitter Radited spurious emissions (Above 1G) Test setup



## 1.7 Test Equipment

RF Test system				
Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
MXA Signal Analyzer	Agilent	N9020A	MY51110329	2021.09.29
EMI receiver	R&S	ESR3	102489	2022-12-24
Bilog Antenna	SCHWARZBECK	VULB 9168	01099	2023.03.13
Horn Antenna	Schwarzbeck	BBHA9120D	01938	2021.09.22
Note: All equipment are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.				

## 1.8 Test set parame for EUT

Band width	Center Frequency MHz	Power setting
62.5KHz	433.8	9dbm
	434.4	4.5dbm
125KHz	433.15	9dbm
	434.7	9dbm
250KHz	433.2	9dbm
	434.6	9dbm
500KHz	433.3	9dbm
	434.5	9dbm

## 1.9 The Applicability of test items

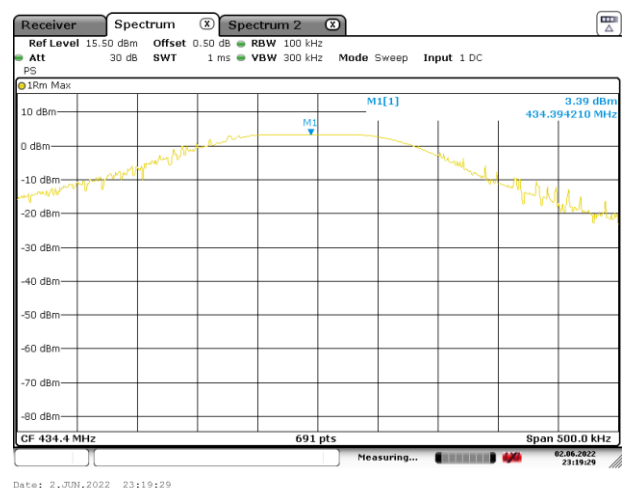
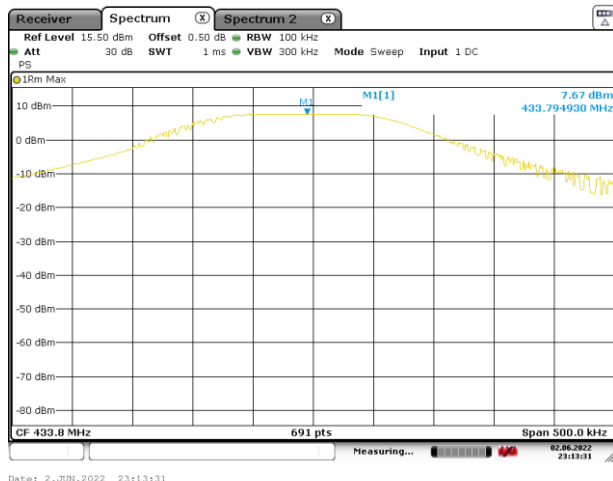
Performed Test Item	Test Procedure	Result	Note
Effective Radiated Power	5.2 Effective Radiated Power	NA	
Maximum Effective Radiated Power spectral density	5.3 Maximum Effective Radiated Power spectral density	Pass	
Occupied Bandwidth	5.6 Occupied Bandwidth	Pass	
Out Of Band Domain for Operating Channel	5.8 Tx Out Of Band Emissions	Pass	
Out Of Band Domain for Operational Frequency Band		Pass	
Unwanted emissions in the spurious domain For TX mode	5.9 Unwanted emissions in the spurious domain	Pass	
Unwanted emissions in the spurious domain For all other mode		Pass	

## 2. Test Result

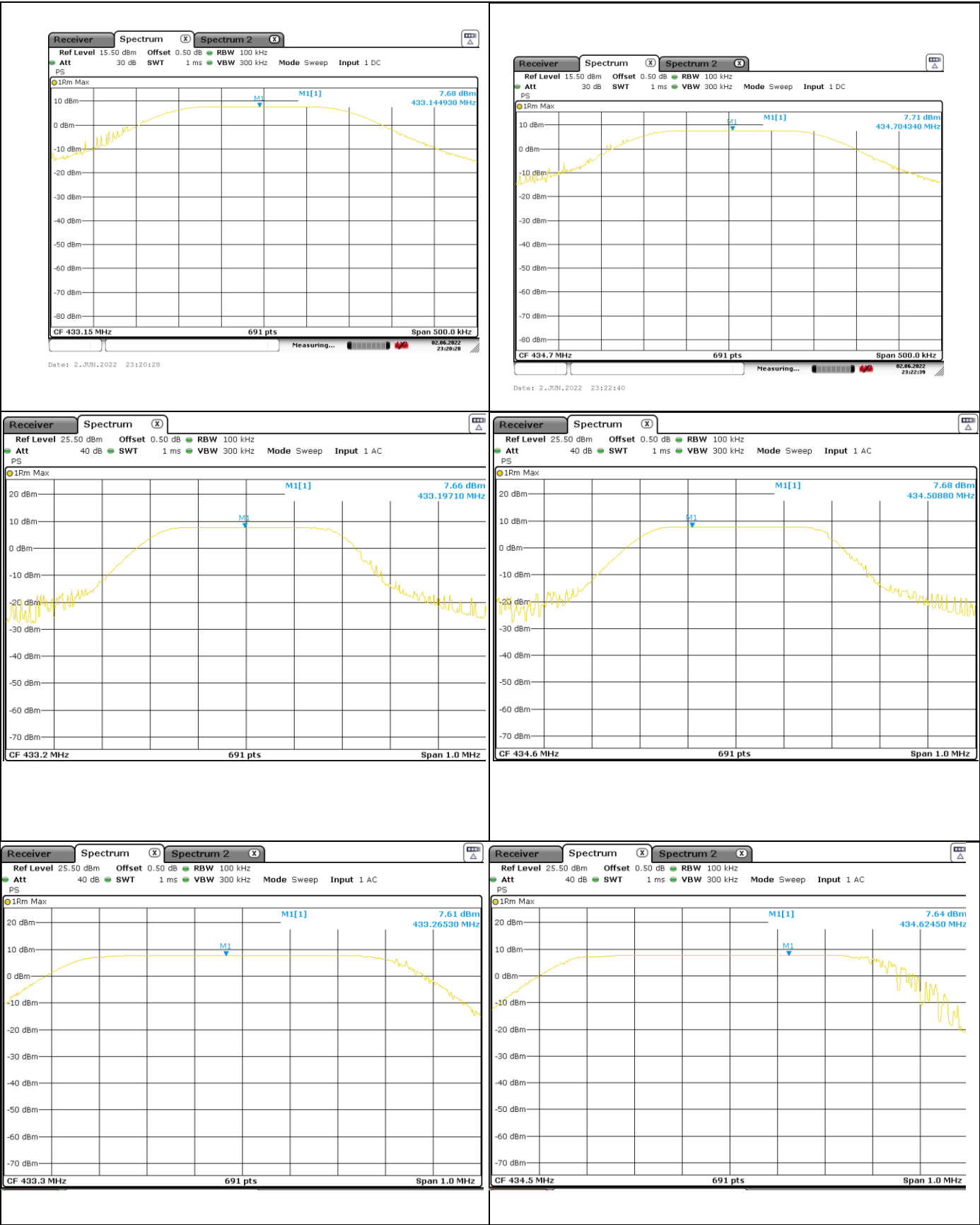
## 2.1 Effective Radiated Power

Test Item	:	Effective Radiated Power
Test Mode	:	Chirp
Ant Gain	:	0dBi

Test Conditions	BandWidth	Frequency (MHz)	Measured Power (dBm)	Limit (dBm)	Result
Tnom (25°C)	62.5KHz	433.8	7.67	10	Pass
		434.4	3.39	10	Pass
	125KHz	433.15	7.68	10	Pass
		434.7	7.71	10	Pass
	250KHz	433.2	7.66	10	Pass
		434.6	7.68	10	Pass
	500KHz	433.3	7.61	10	Pass
		434.5	7.61	10	Pass

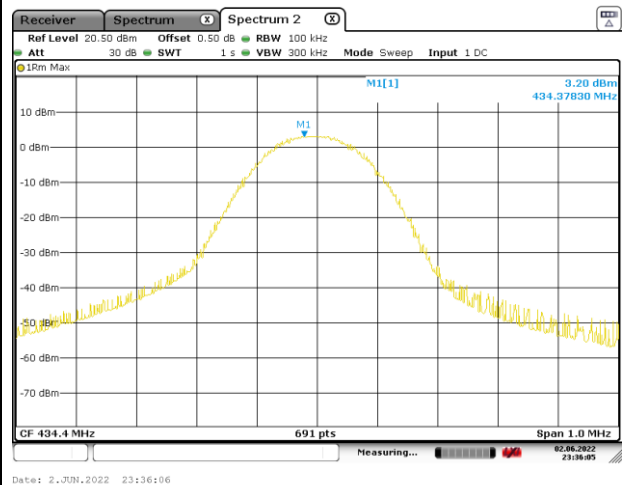
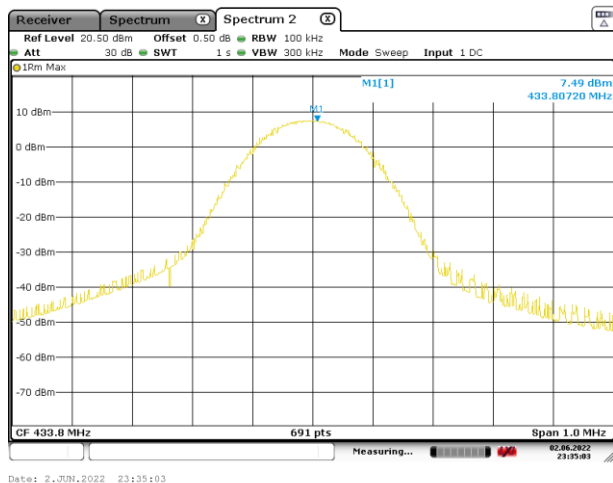


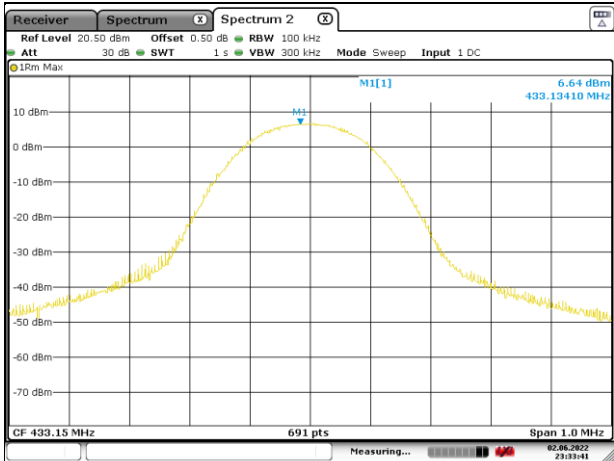




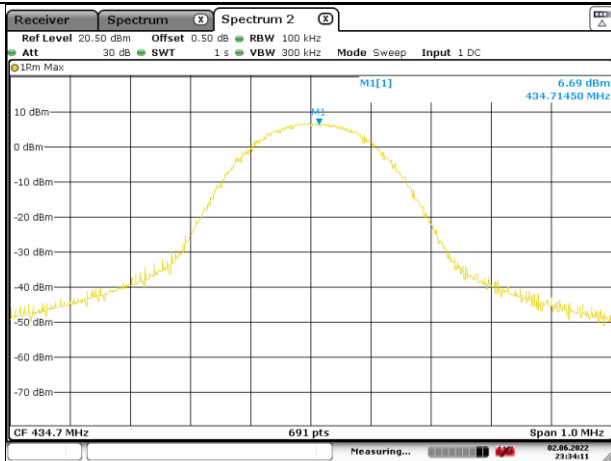
## 2.2 Maximum Effective Radiated Power spectral density

Test Conditions	BandWidth	Frequency (MHz)	Measured Power (dBm)
Tnom (25°C)	62.5KHz	433.8	7.49
		434.4	3.20
	125KHz	433.15	6.64
		434.7	6.69
	250KHz	433.2	4.70
		434.6	4.81
	500KHz	433.3	2.76
		434.5	2.96

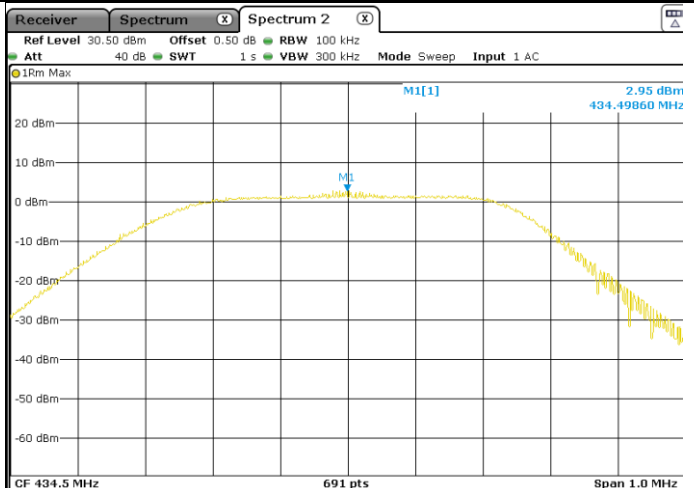
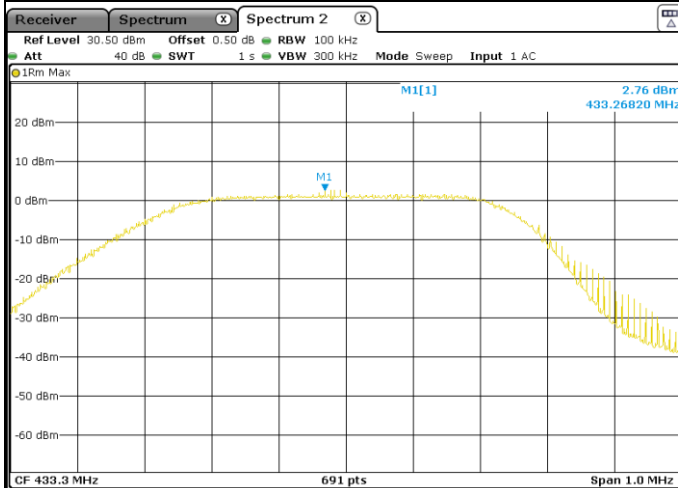
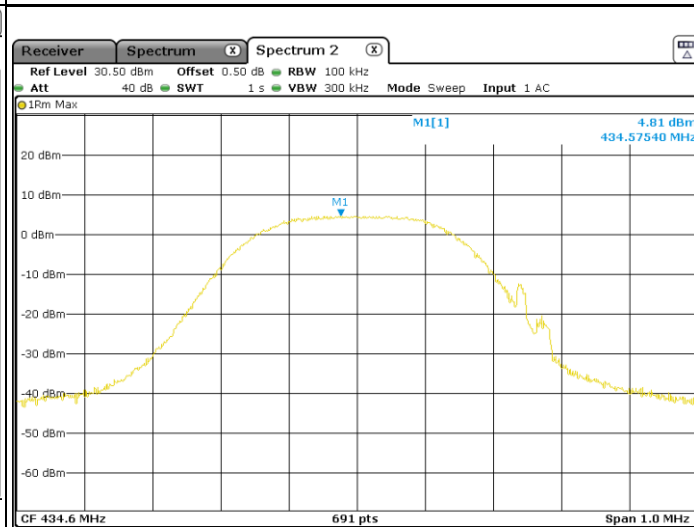
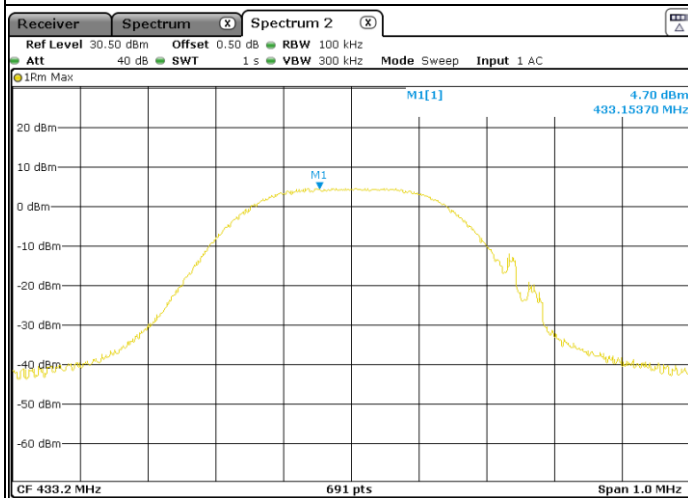




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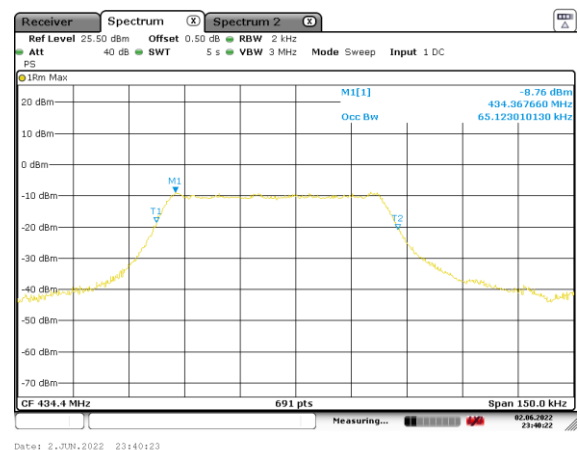
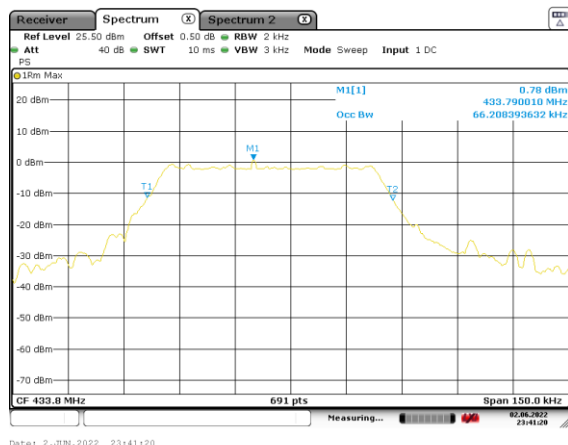


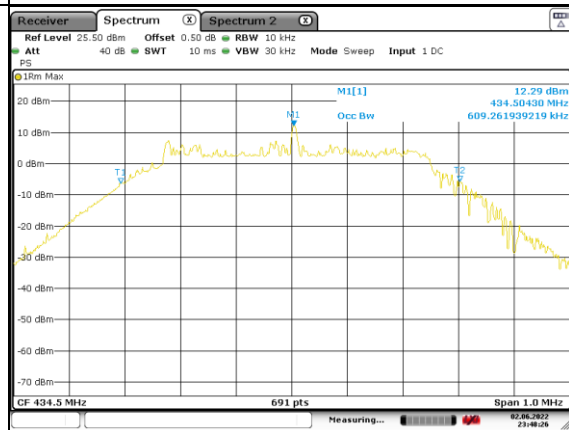
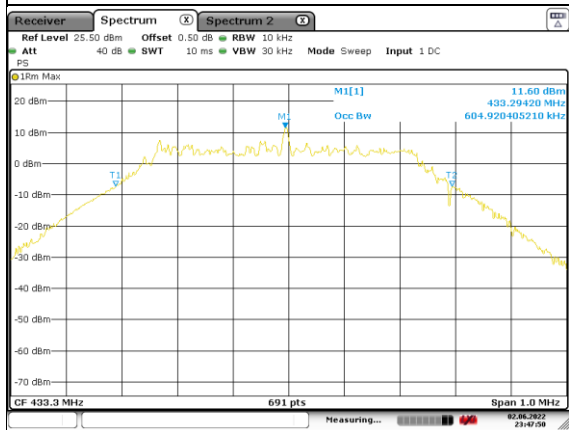
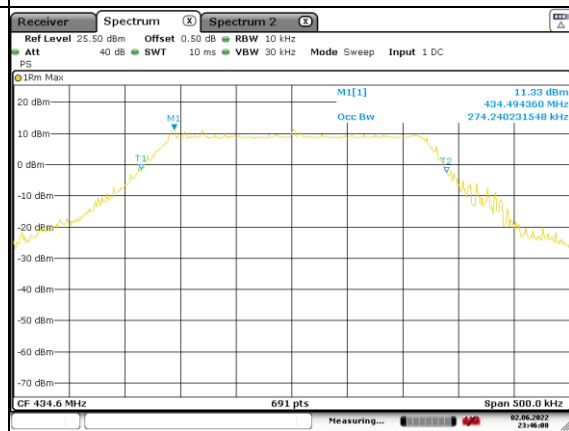
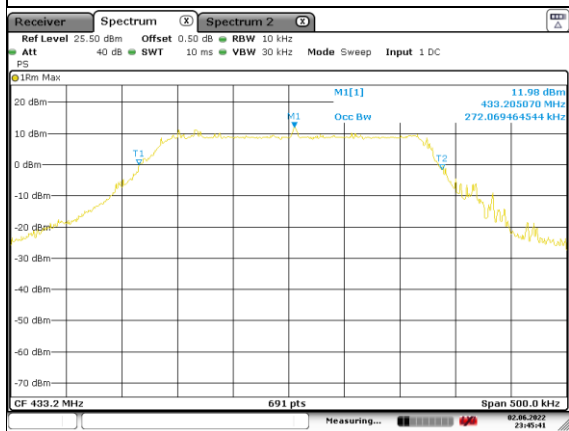
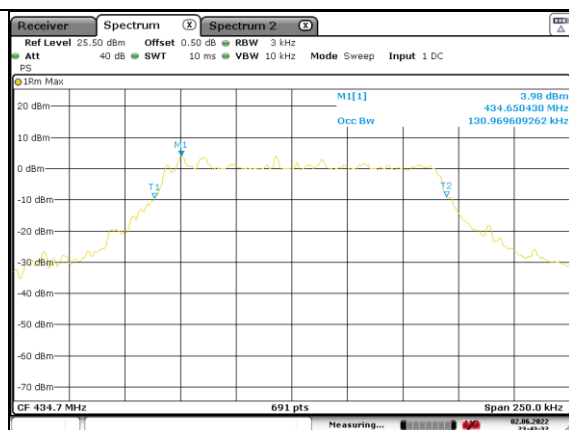
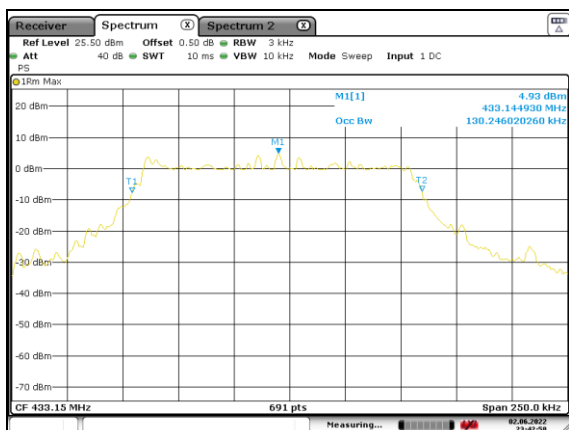
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## 2.3 Occupied Bandwidth

Test Conditions	BandWidth	Frequency (MHz)	Limit	Result
Tnom (25°C)	62.5KHz	433.8	The whole band	Pass
		434.4		Pass
	125KHz	433.15		Pass
		434.7		Pass
	250KHz	433.2		Pass
		434.6		Pass
	500KHz	433.3		Pass
		434.5		Pass





## 2.4 Unwanted emissions in the spurious domain For all other mode

### Conducted test result

Test Conditions	BandWidth	Frequency (MHz)	Result
Tnom (25°C)	62.5KHz	433.8	Pass
		434.4	Pass
	125KHz	433.15	Pass
		434.7	Pass
	250KHz	433.2	Pass
		434.6	Pass
	500KHz	433.3	Pass
		434.5	Pass

Unwanted emissions in the spurious domain For all other mode Limiti

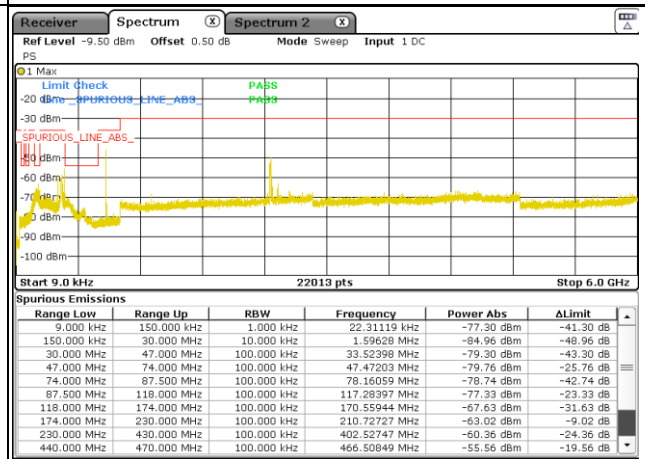
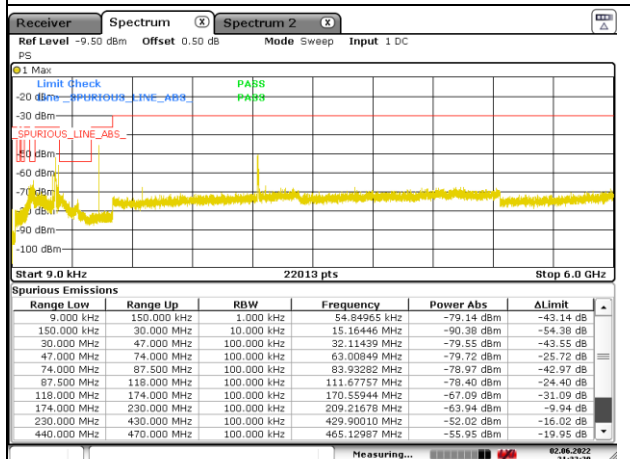
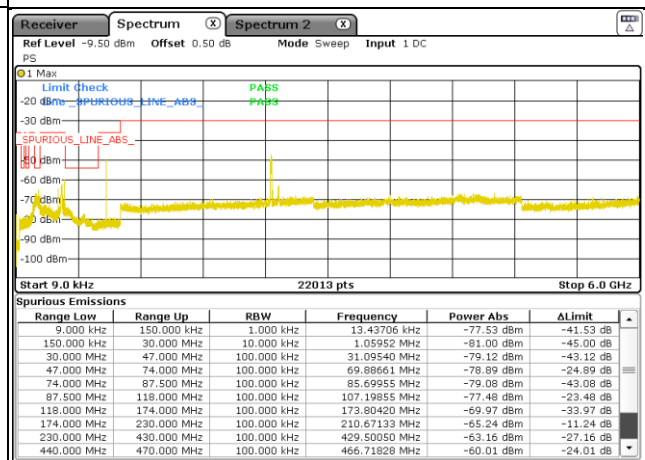
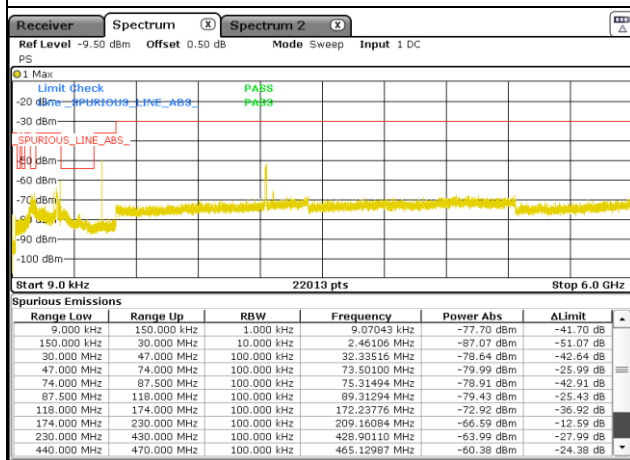
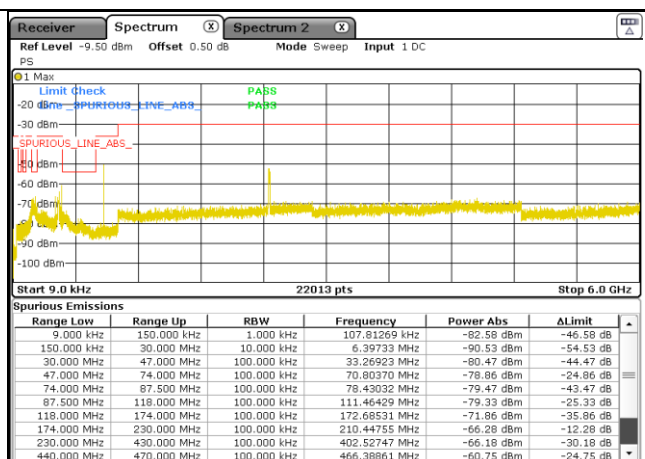
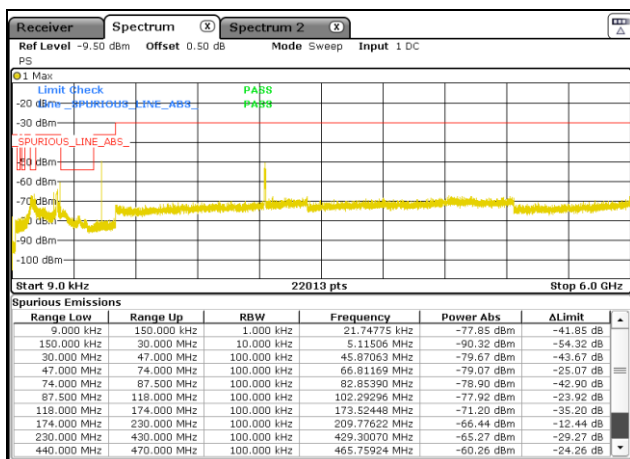
**Table 20: Parameters for TX Spurious Radiations Measurement**

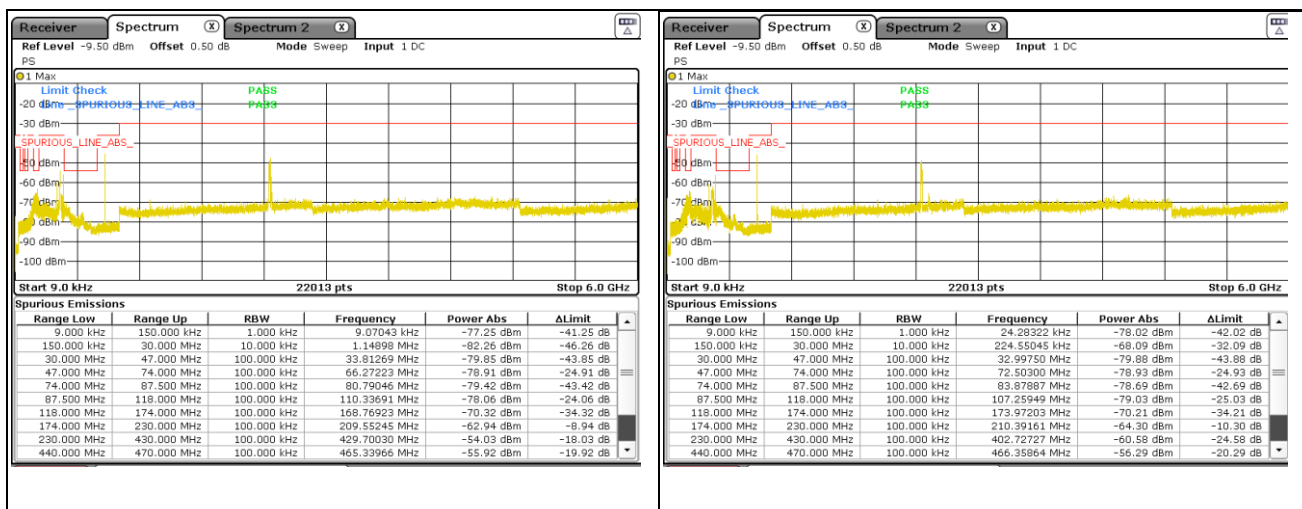
Operating Mode	Frequency Range	RBW <sub>REF</sub> (see note 2)
Transmit mode	$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz
	$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz
	$30 \text{ MHz} \leq f < f_c - m$	100 kHz
	$f_c - m \leq f < f_c - n$	10 kHz
	$f_c - n \leq f < f_c - p$	1 kHz
	$f_c + p < f \leq f_c + n$	1 kHz
	$f_c + n < f \leq f_c + m$	10 kHz
	$f_c + m < f \leq 1 \text{ GHz}$	100 kHz
	$1 \text{ GHz} < f \leq 6 \text{ GHz}$	1 MHz

NOTE 1: f is the measurement frequency.  
 $f_c$  is the Operating Frequency.  
m is 10 x OCW or 500 kHz, whichever is the greater.  
n is 4 x OCW or 100 kHz, whichever is the greater.  
p is 2,5 x OCW.

NOTE 2: If the value of RBW used for measurement is different from RBW<sub>REF</sub>, use bandwidth correction from clause 4.3.10.1.

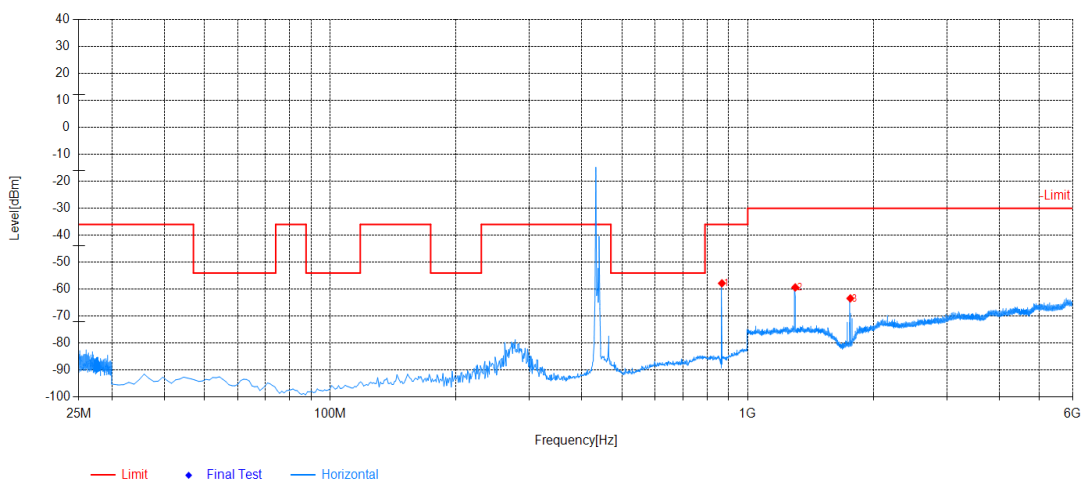
Frequency \ State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
<b>TX mode</b>	-54 dBm	-36 dBm	-30 dBm
<b>RX and all other modes</b>	-57 dBm	-57 dBm	-47 dBm





## Radiated test result

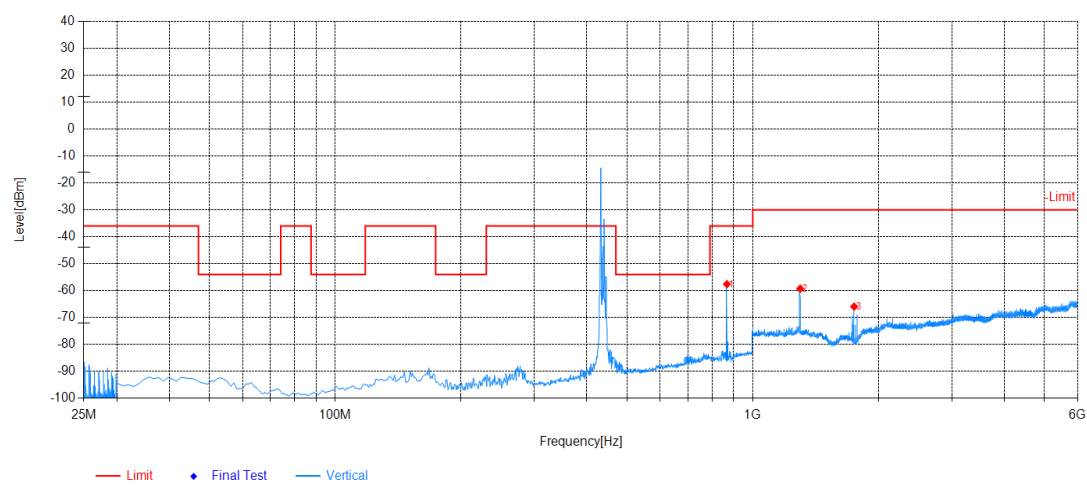
125K 433.15



Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	867.11	-49.60	-57.80	-36.00	21.80	-8.20	Horizontal
2	1299.5	-44.18	-59.32	-30.00	29.32	-15.14	Horizontal
3	1761	-50.52	-63.38	-30.00	33.38	-12.86	Horizontal

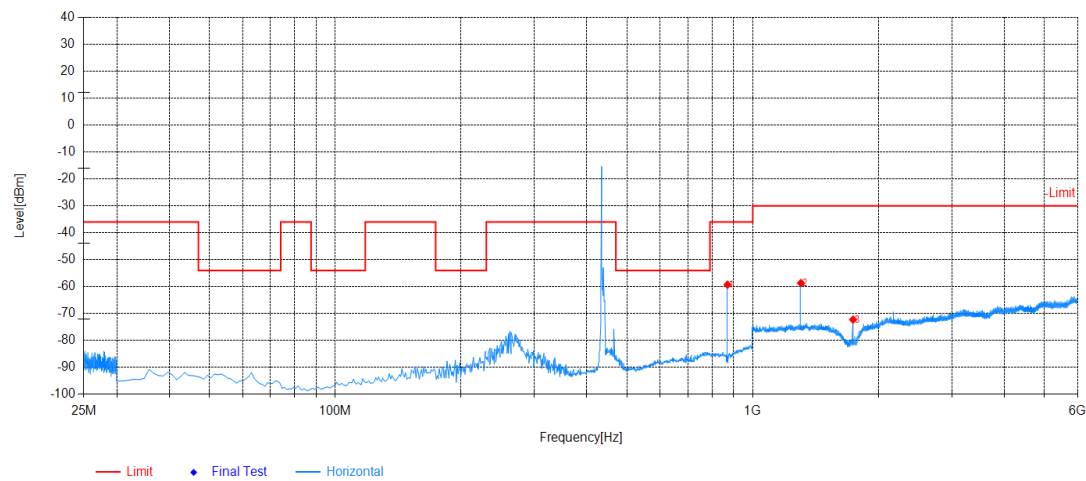


125K 433.15



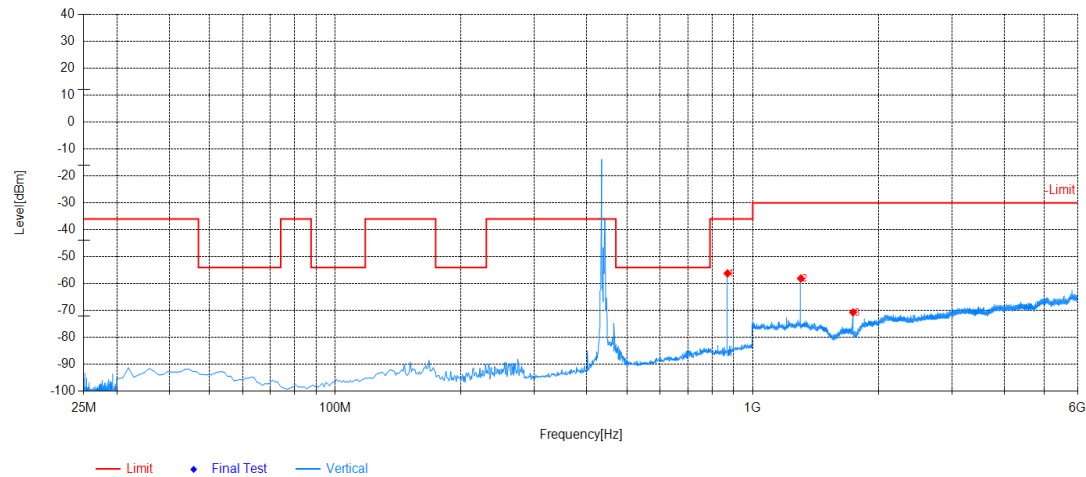
Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	867.11	-49.48	-57.59	-36.00	21.59	-8.11	Vertical
2	1299.5	-44.27	-59.25	-30.00	29.25	-14.98	Vertical
3	1749.5	-52.65	-65.91	-30.00	35.91	-13.26	Vertical

125K 434.7



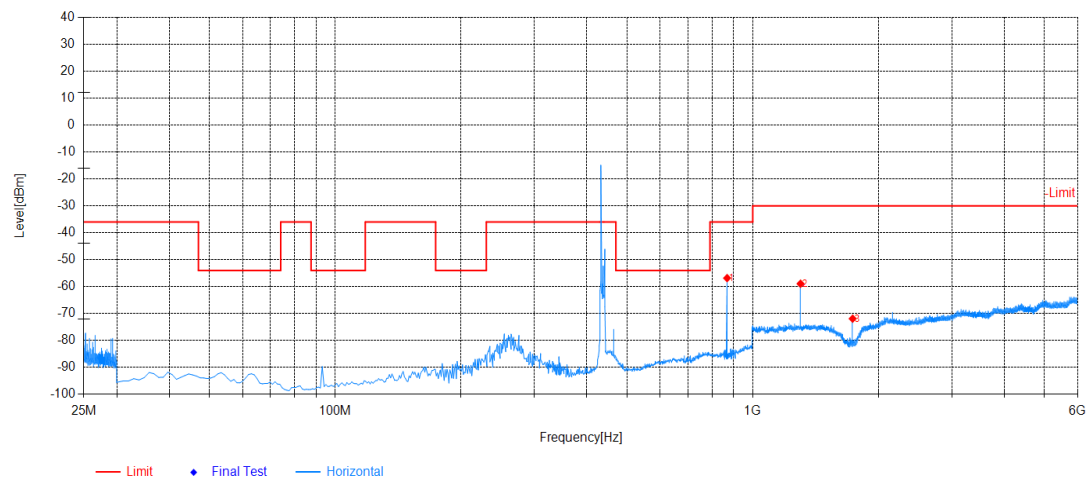
Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	870.02	-51.09	-59.25	-36.00	23.25	-8.16	Horizontal
2	1304	-43.51	-58.65	-30.00	28.65	-15.14	Horizontal
3	1739	-58.87	-72.22	-30.00	42.22	-13.35	Horizontal

125K 434.7



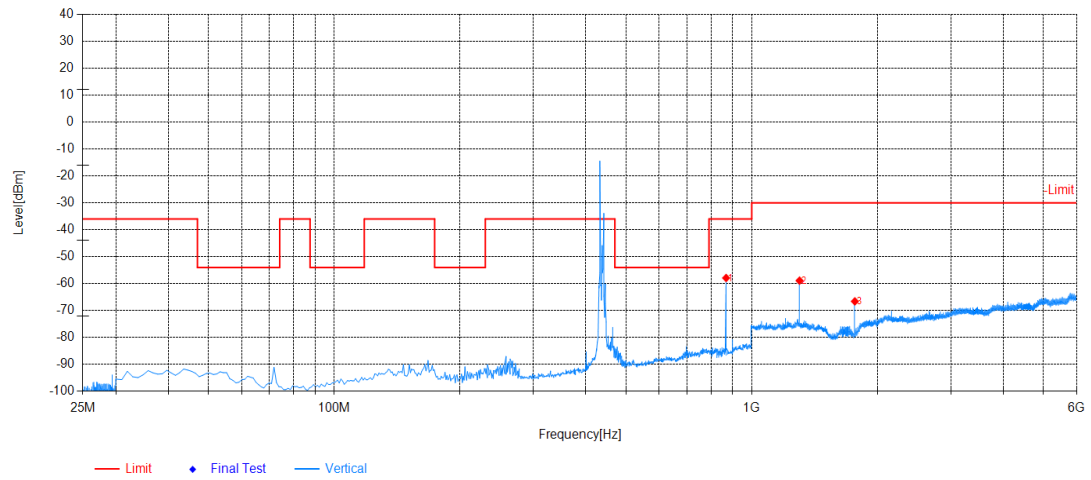
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NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	870.02	-48.10	-56.21	-36.00	20.21	-8.11	Vertical
2	1304	-43.03	-58.05	-30.00	28.05	-15.02	Vertical
3	1739	-57.18	-70.66	-30.00	40.66	-13.48	Vertical

62.5K 433.8



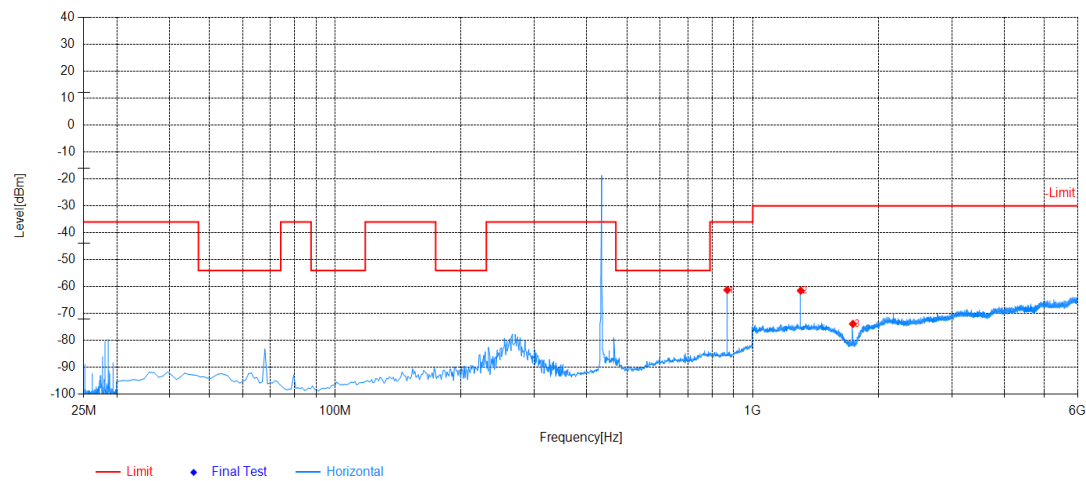
Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	868.08	-48.63	-56.82	-36.00	20.82	-8.19	Horizontal
2	1301.5	-43.77	-58.91	-30.00	28.91	-15.14	Horizontal
3	1735	-58.44	-71.88	-30.00	41.88	-13.44	Horizontal

## 62.5K 433.8



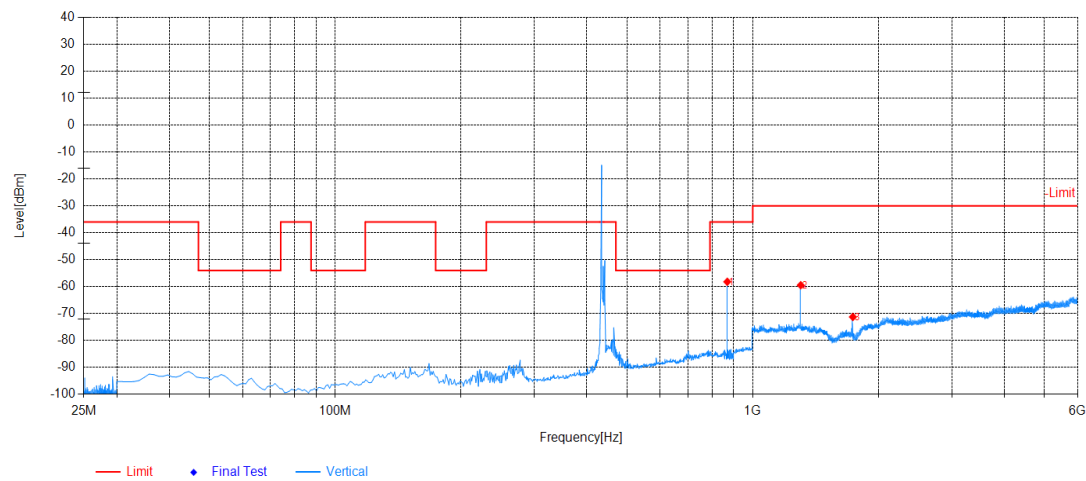
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1	868.08	-49.78	-57.89	-36.00	21.89	-8.11	Vertical
2	1301.5	-43.89	-58.88	-30.00	28.88	-14.99	Vertical
3	1766	-53.65	-66.57	-30.00	36.57	-12.92	Vertical

62.5K 434.4



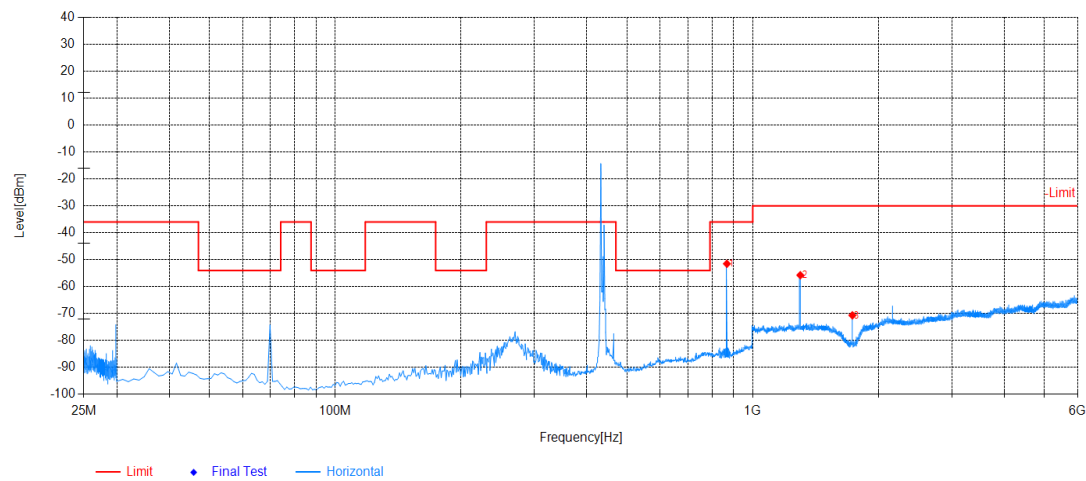
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NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	869.05	-53.06	-61.23	-36.00	25.23	-8.17	Horizontal
2	1303	-46.33	-61.47	-30.00	31.47	-15.14	Horizontal
3	1737.5	-60.46	-73.84	-30.00	43.84	-13.38	Horizontal

62.5K 434.4



Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	869.05	-50.07	-58.18	-36.00	22.18	-8.11	Vertical
2	1303	-44.45	-59.46	-30.00	29.46	-15.01	Vertical
3	1737.5	-57.73	-71.24	-30.00	41.24	-13.51	Vertical

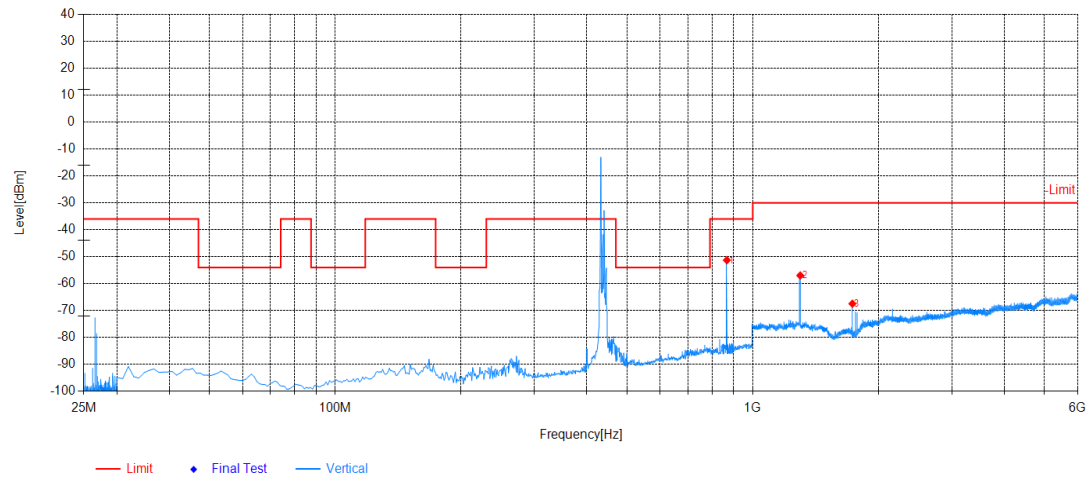
250K 433.2



Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	867.11	-43.31	-51.51	-36.00	15.51	-8.20	Horizontal
2	1300	-40.60	-55.74	-30.00	25.74	-15.14	Horizontal
3	1732.5	-57.15	-70.64	-30.00	40.64	-13.49	Horizontal

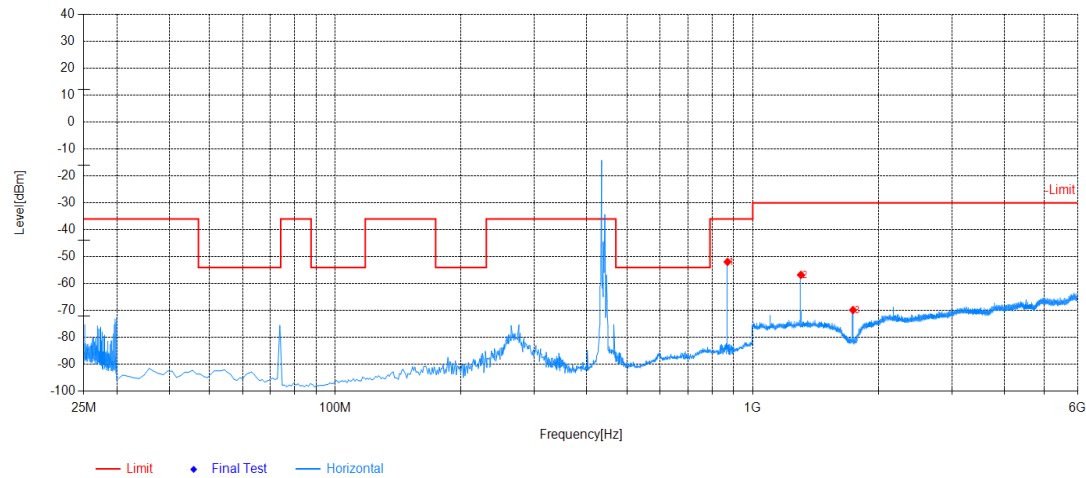


250K 433.2



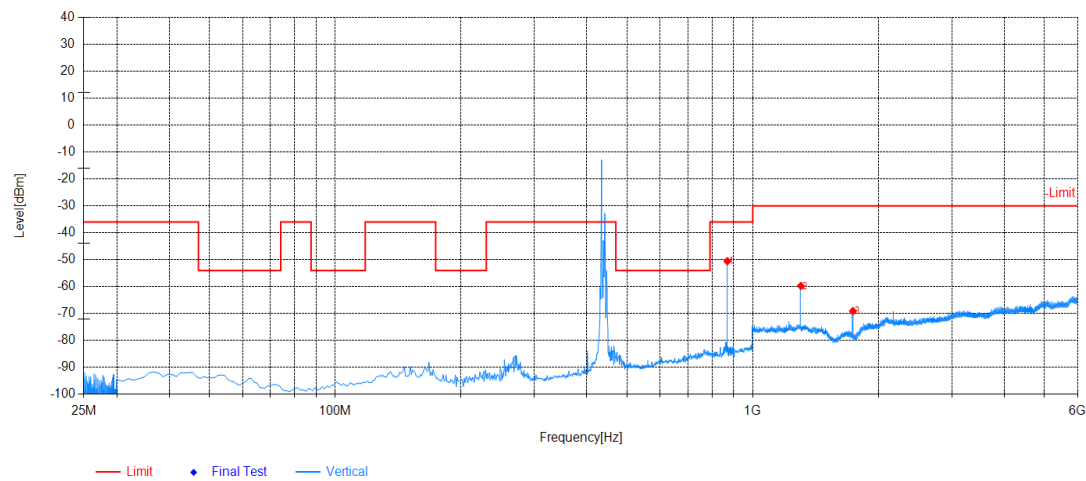
Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	867.11	-43.18	-51.29	-36.00	15.29	-8.11	Vertical
2	1299.5	-41.98	-56.96	-30.00	26.96	-14.98	Vertical
3	1732.5	-53.83	-67.44	-30.00	37.44	-13.61	Vertical

250K 434.6



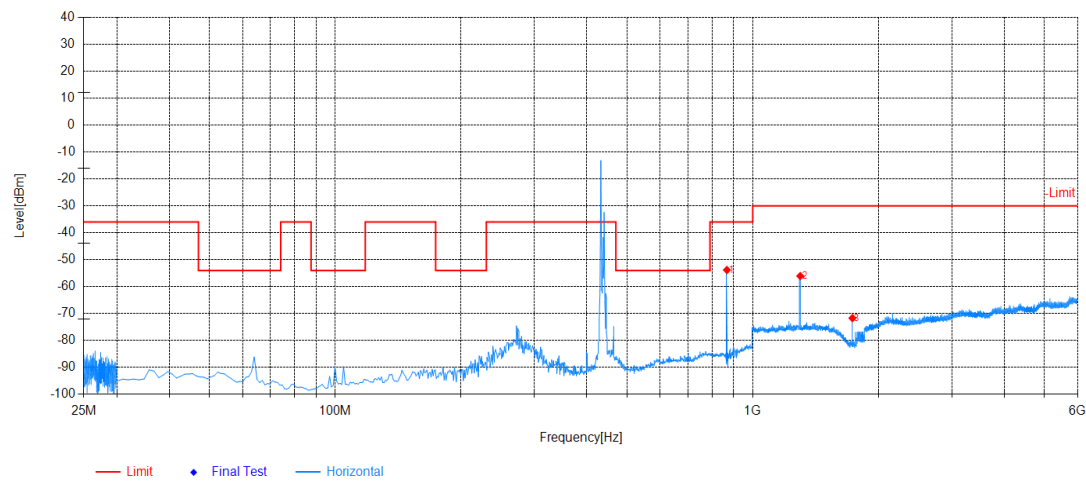
Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	870.02	-43.76	-51.92	-36.00	15.92	-8.16	Horizontal
2	1304	-41.60	-56.74	-30.00	26.74	-15.14	Horizontal
3	1738.5	-56.43	-69.79	-30.00	39.79	-13.36	Horizontal

250K 434.6



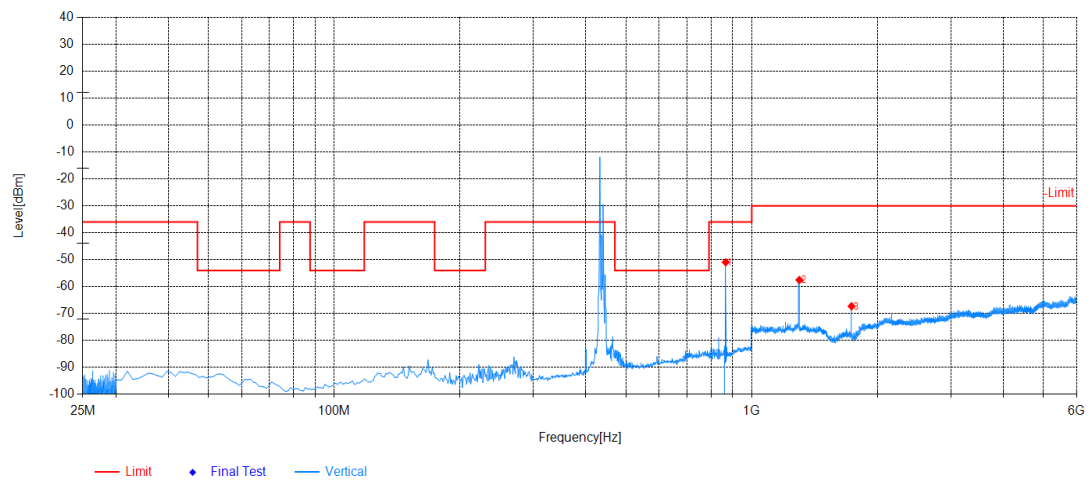
Data List							
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1	869.05	-42.45	-50.56	-36.00	14.56	-8.11	Vertical
2	1304	-44.72	-59.74	-30.00	29.74	-15.02	Vertical
3	1738	-55.56	-69.06	-30.00	39.06	-13.50	Vertical

500K 433.3



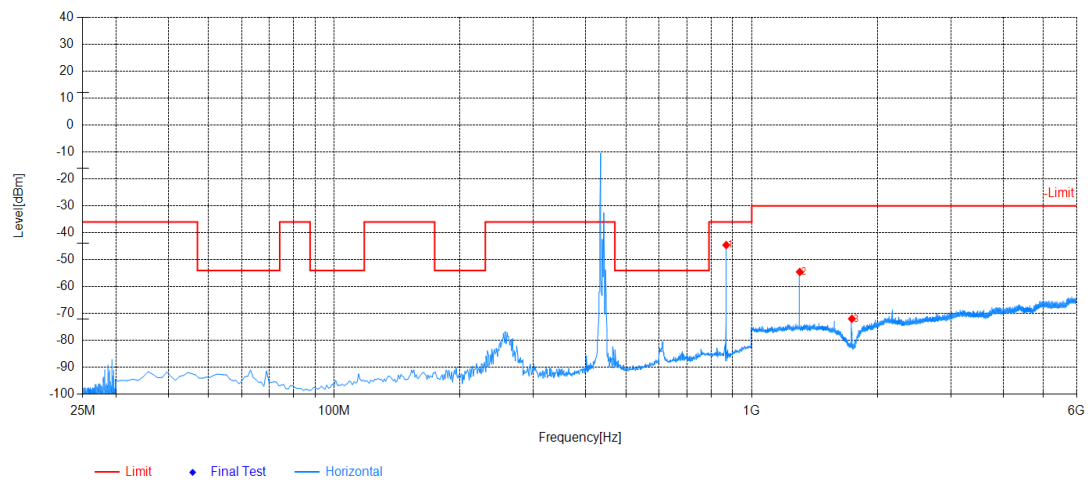
Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	867.11	-45.62	-53.82	-36.00	17.82	-8.20	Horizontal
2	1299.5	-40.91	-56.05	-30.00	26.05	-15.14	Horizontal
3	1733	-58.19	-71.67	-30.00	41.67	-13.48	Horizontal

### 500K 433.3



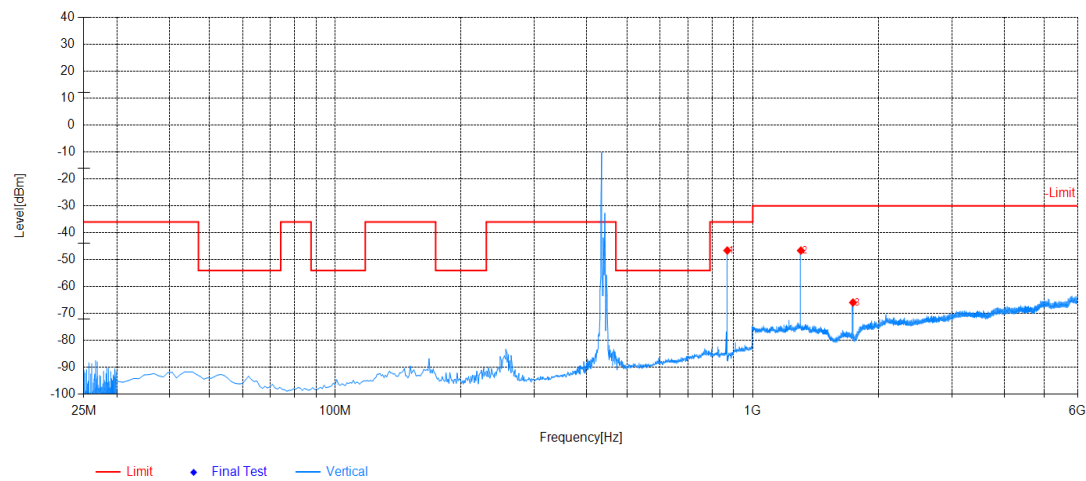
Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	866.14	-42.82	-50.93	-36.00	14.93	-8.11	Vertical
2	1300.5	-42.54	-57.52	-30.00	27.52	-14.98	Vertical
3	1734	-53.69	-67.27	-30.00	37.27	-13.58	Vertical

### 500K 434.5



Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	869.05	-36.39	-44.56	-36.00	8.56	-8.17	Horizontal
2	1303.5	-39.40	-54.54	-30.00	24.54	-15.14	Horizontal
3	1737	-58.53	-71.92	-30.00	41.92	-13.39	Horizontal

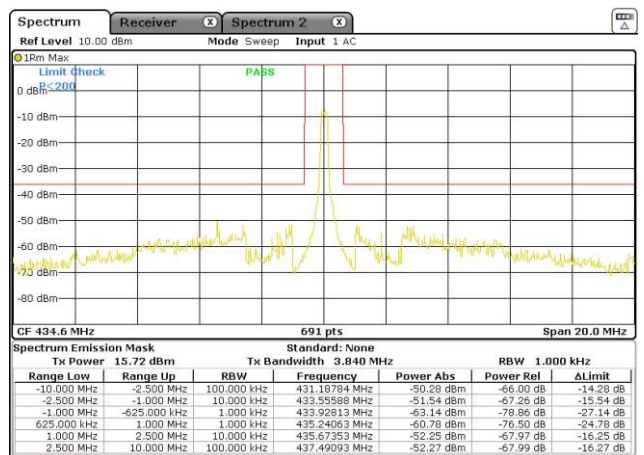
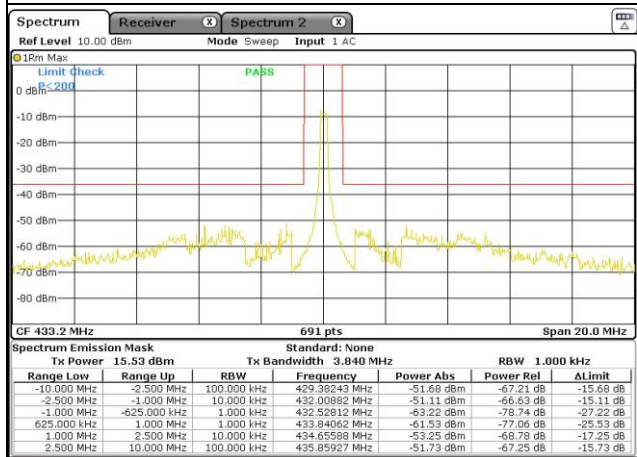
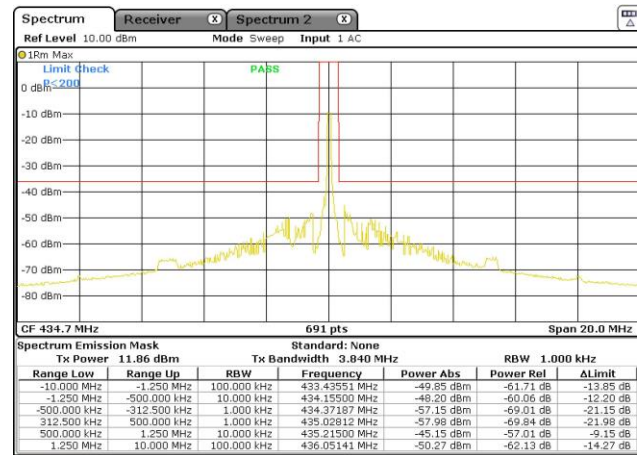
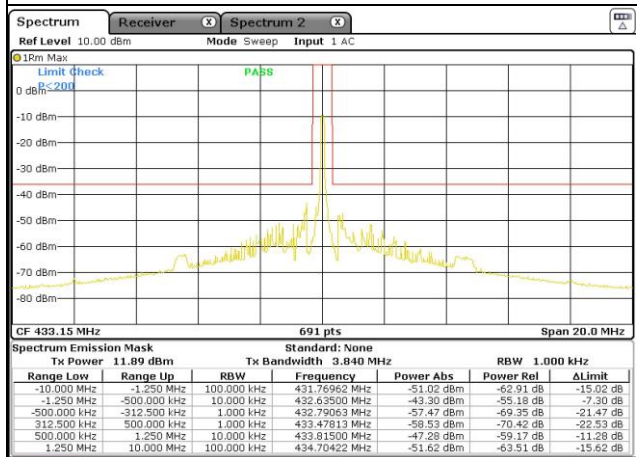
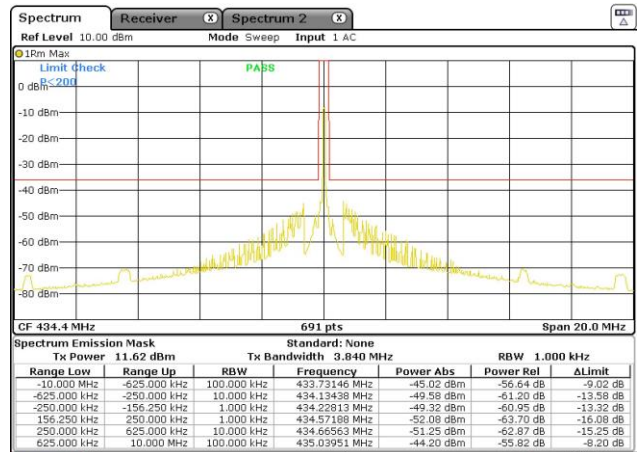
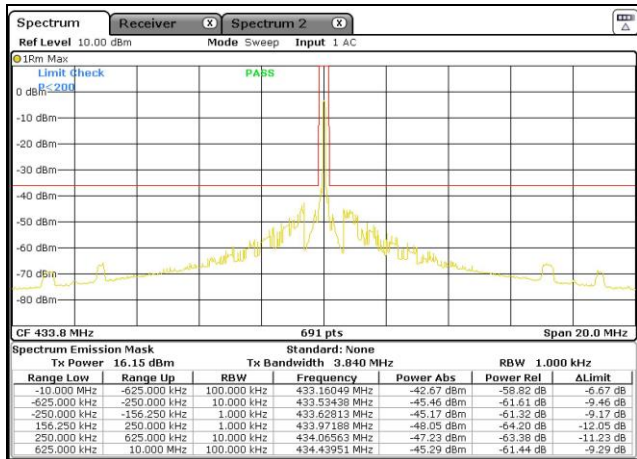
500K 434.5

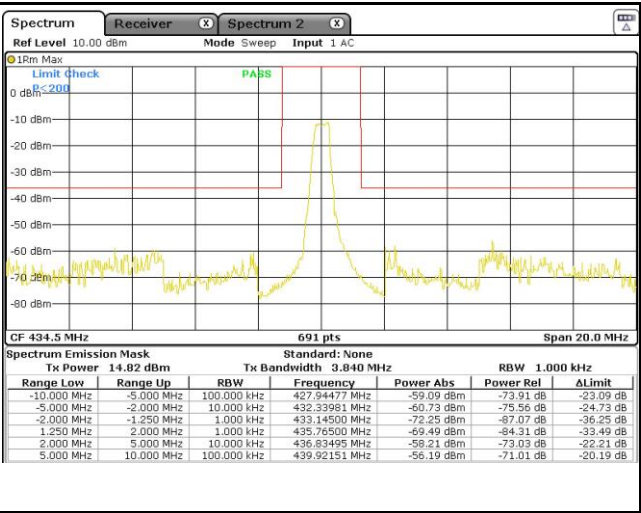
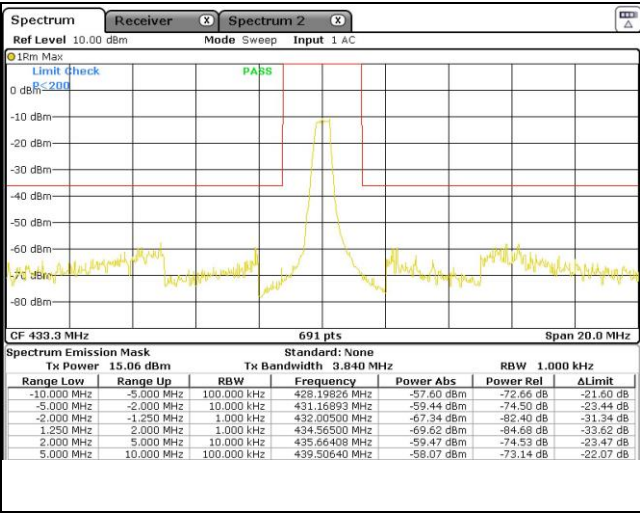


Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	869.05	-38.48	-46.59	-36.00	10.59	-8.11	Vertical
2	1304	-31.59	-46.61	-30.00	16.61	-15.02	Vertical
3	1738.5	-52.40	-65.89	-30.00	35.89	-13.49	Vertical







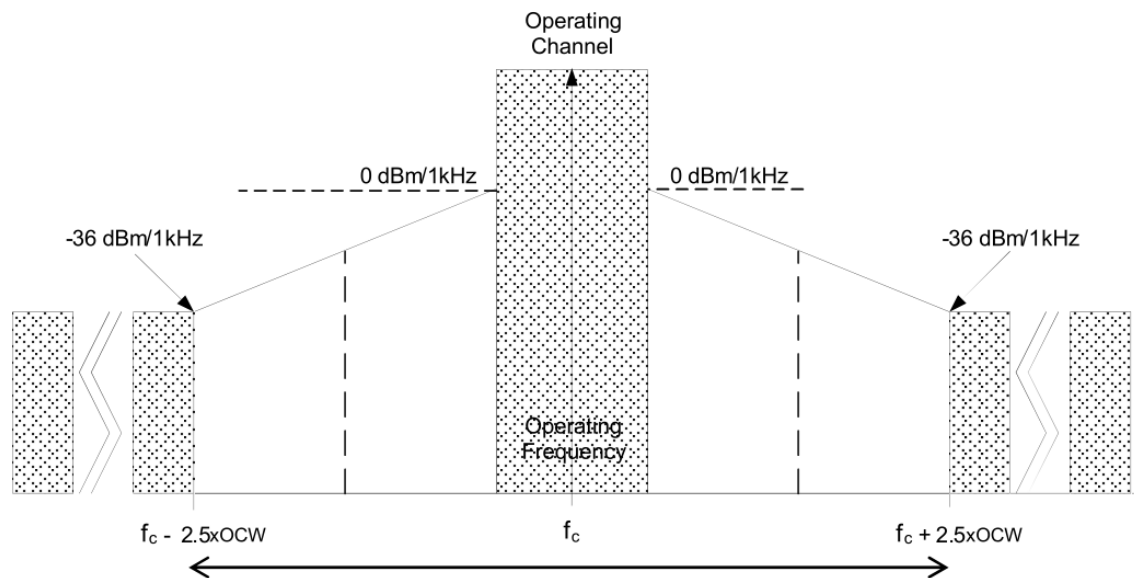


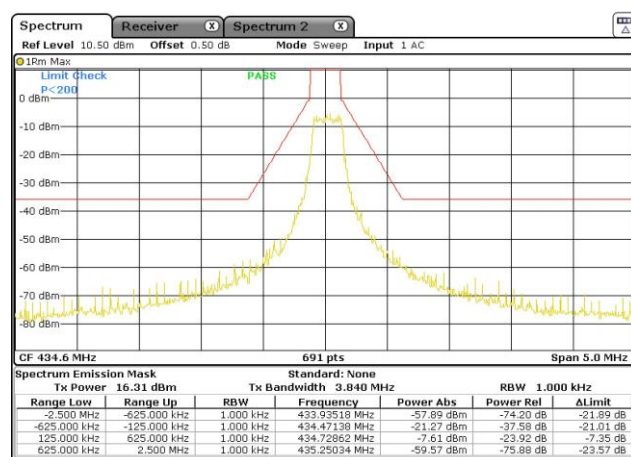
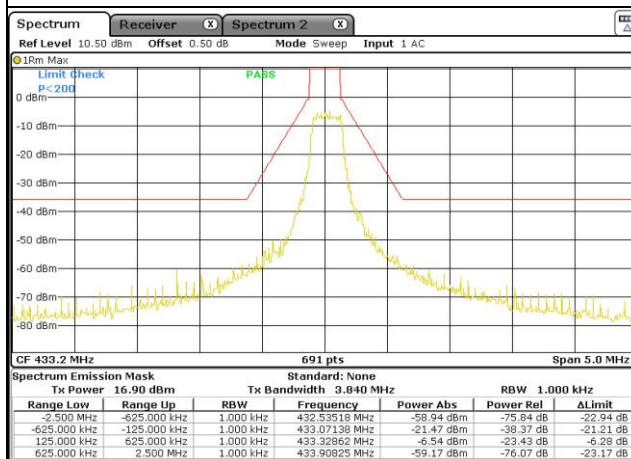
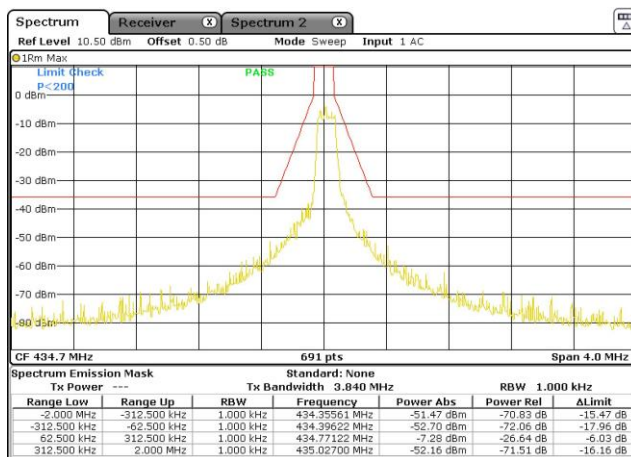
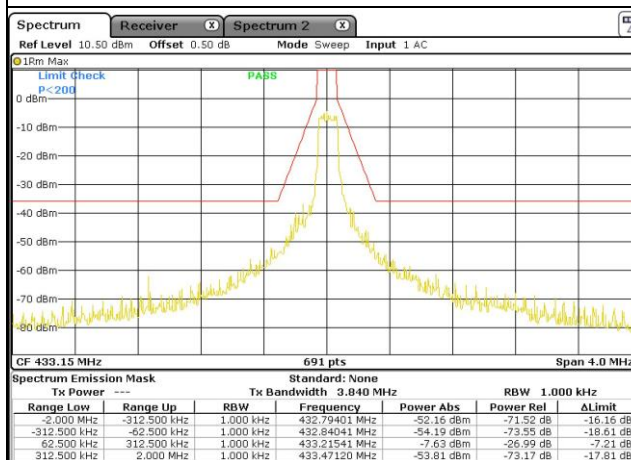
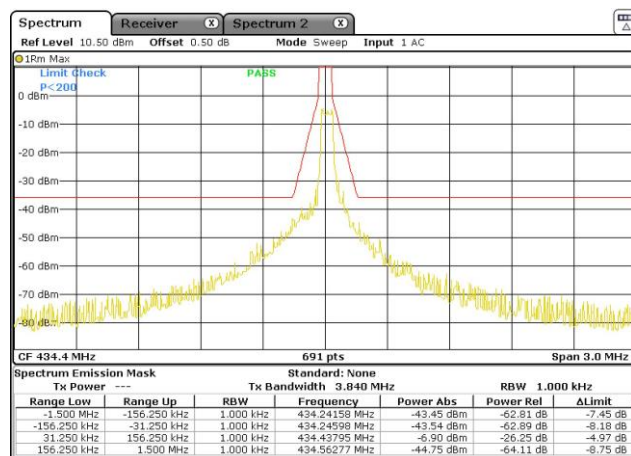
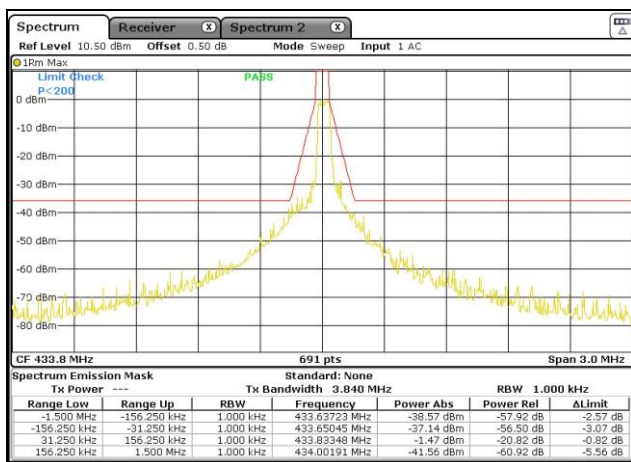
## 2.6 Out Of Band Domain for Operating Channel

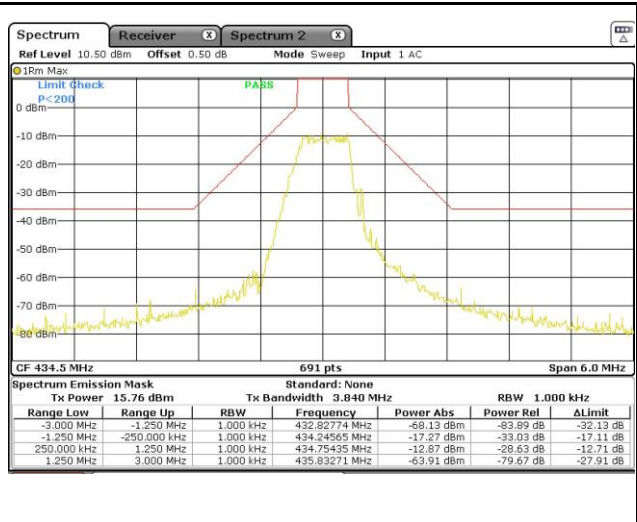
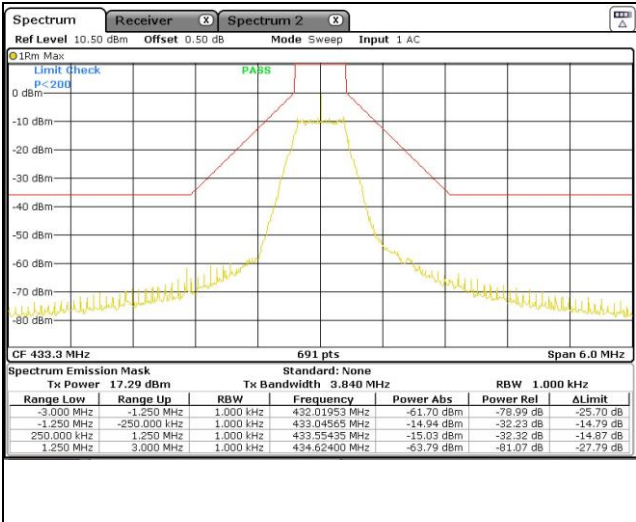
### Conducted Test result

Test Conditions	BandWidth	Frequency (MHz)	Result
Tnom (25°C)	62.5KHz	433.8	Pass
		434.4	Pass
	125KHz	433.15	Pass
		434.7	Pass
	250KHz	433.2	Pass
		434.6	Pass
	500KHz	433.3	Pass
		434.5	Pass

### Out Of Band Domain for Operating Channel Limiti

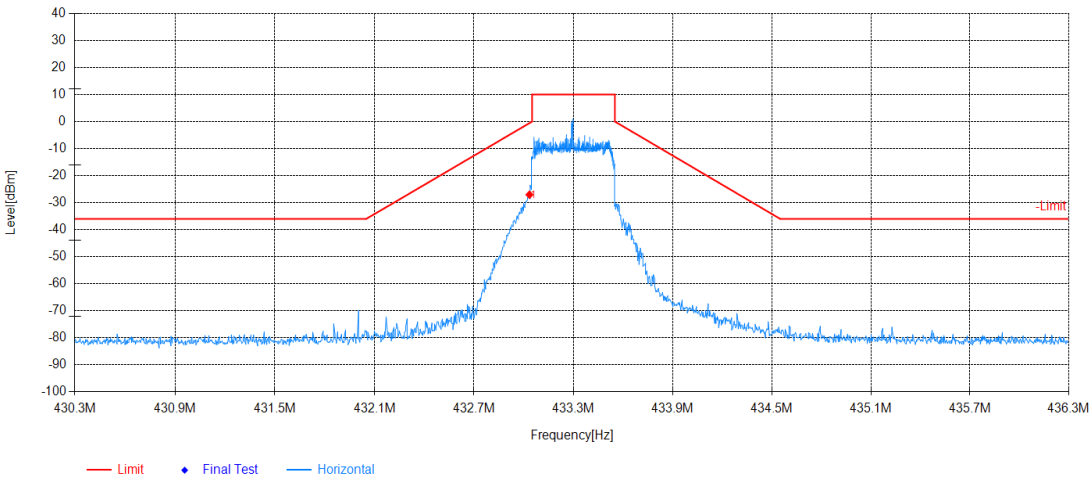






## Radiated Test result

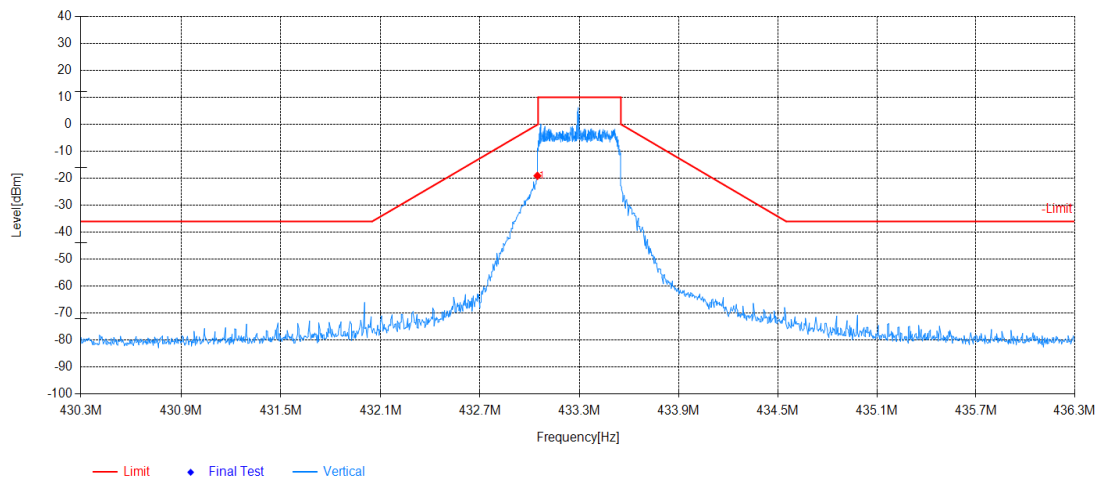
500K 433.3 OOB



Suspected Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	433.0342	-54.72	-27.04	-0.57	26.47	27.68	Horizontal

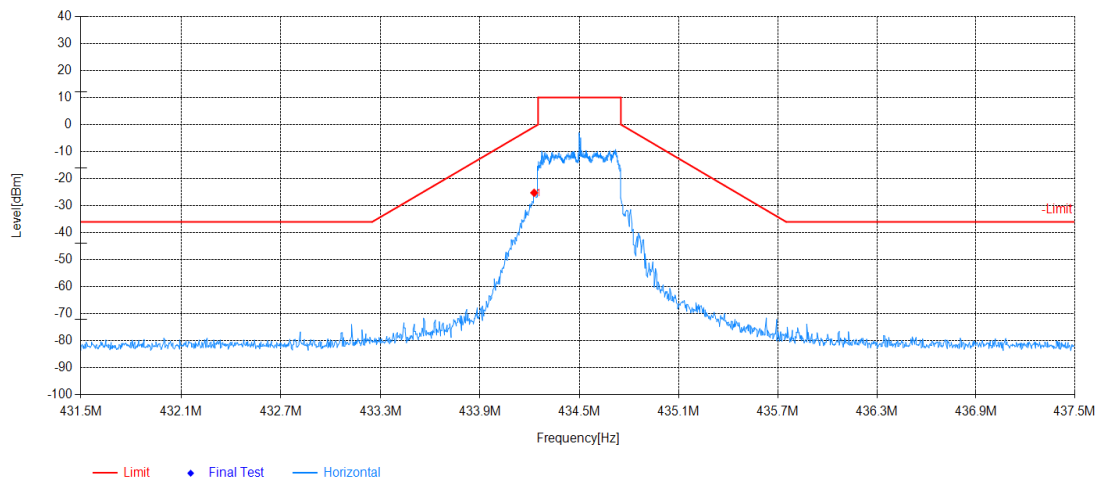
500K 433.3 OOB





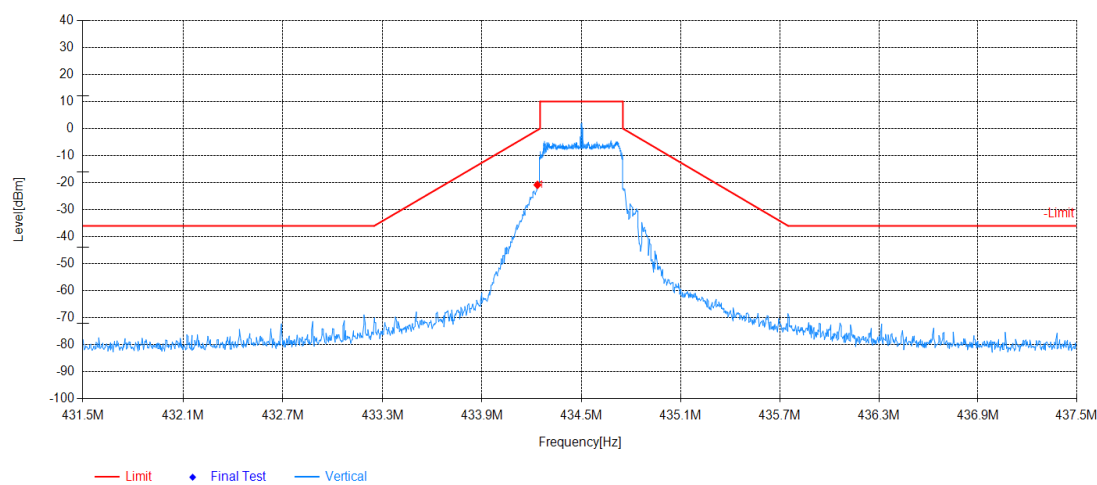
Suspected Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	433.0461	-46.83	-19.09	-0.14	18.95	27.74	Vertical

500K 434.5 OOB



Suspected Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	434.2263	-52.92	-25.23	-0.85	24.38	27.69	Horizontal

500K 434.5 OOB



Suspected Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	434.2342	-48.59	-20.85	-0.57	20.28	27.74	Vertical

## 2.7 Out Of Band Domain for Operational Frequency Band

### Conducted Test Result

Test Conditions	BandWidth	Frequency (MHz)	Result
Tnom (25°C)	62.5KHz	433.8	Pass
		434.4	Pass
	125KHz	433.15	Pass
		434.7	Pass
	250KHz	433.2	Pass
		434.6	Pass
	500KHz	433.3	Pass
		434.5	Pass

### Out Of Band Domain for Operational Frequency Band Limiti

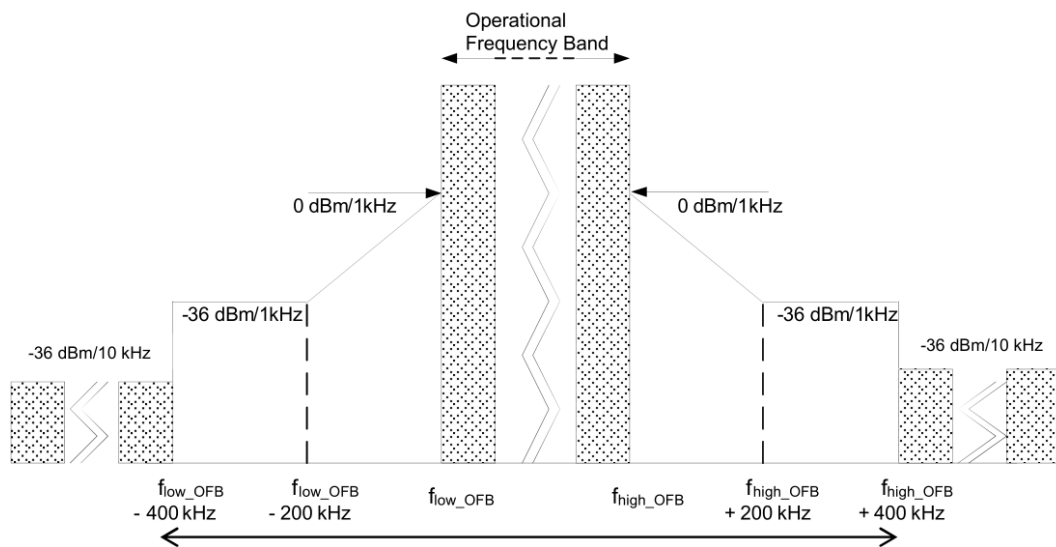
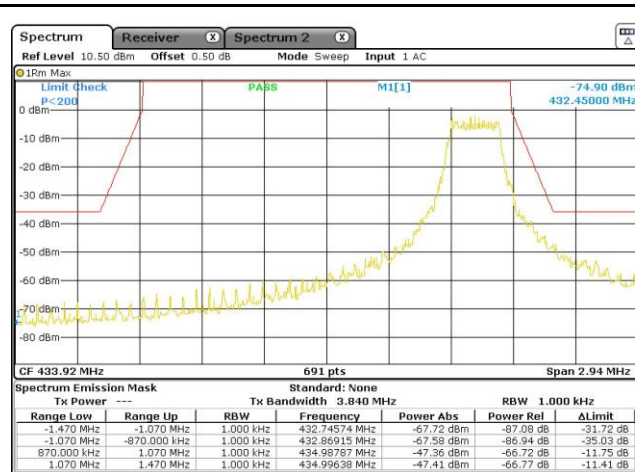
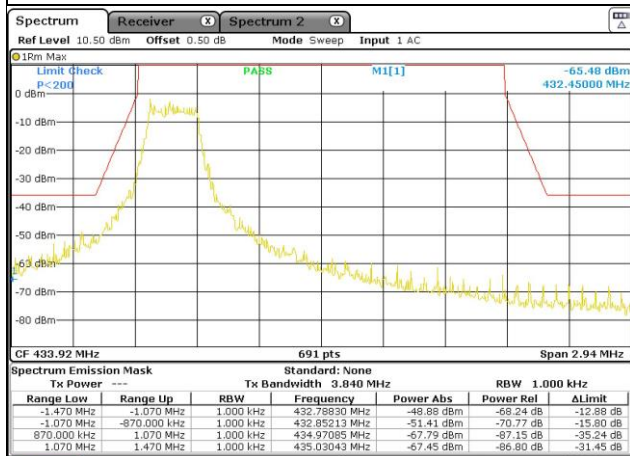
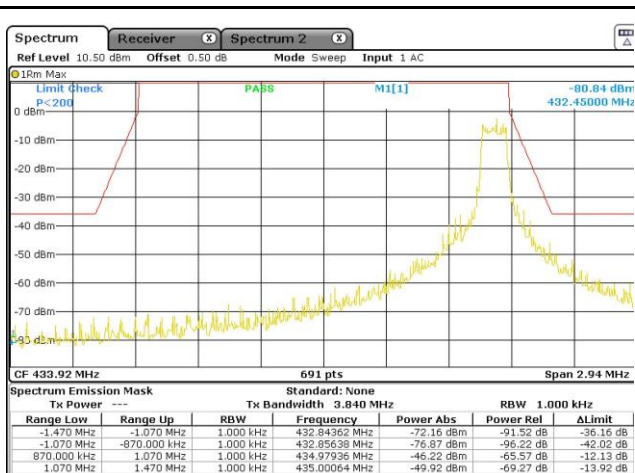
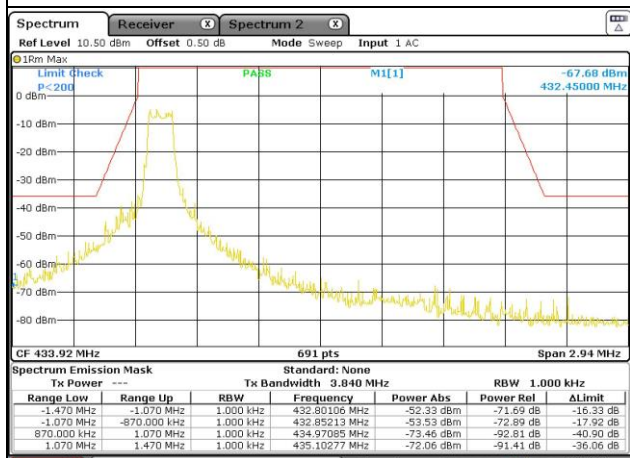
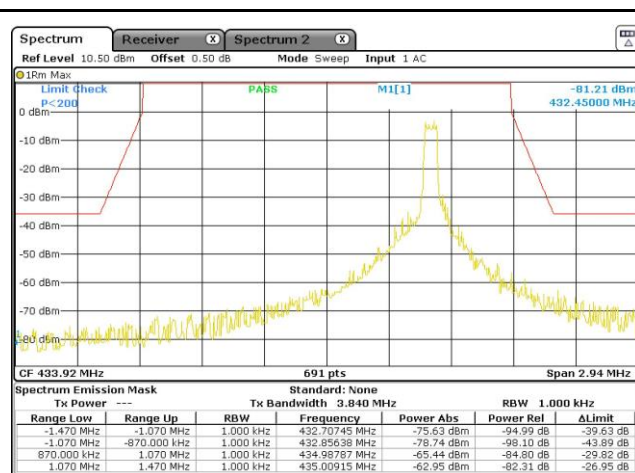
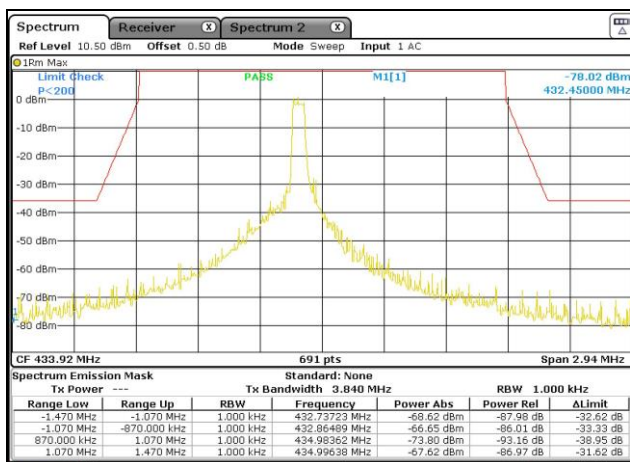
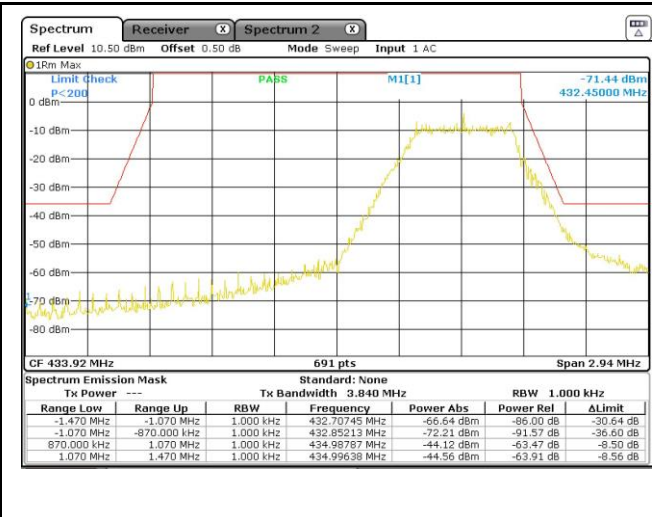
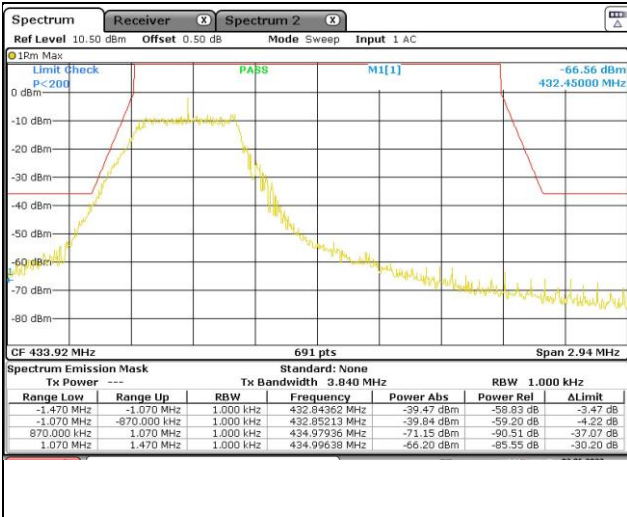


Figure 6: Out Of Band Domain for Operational Frequency Band with reference BW

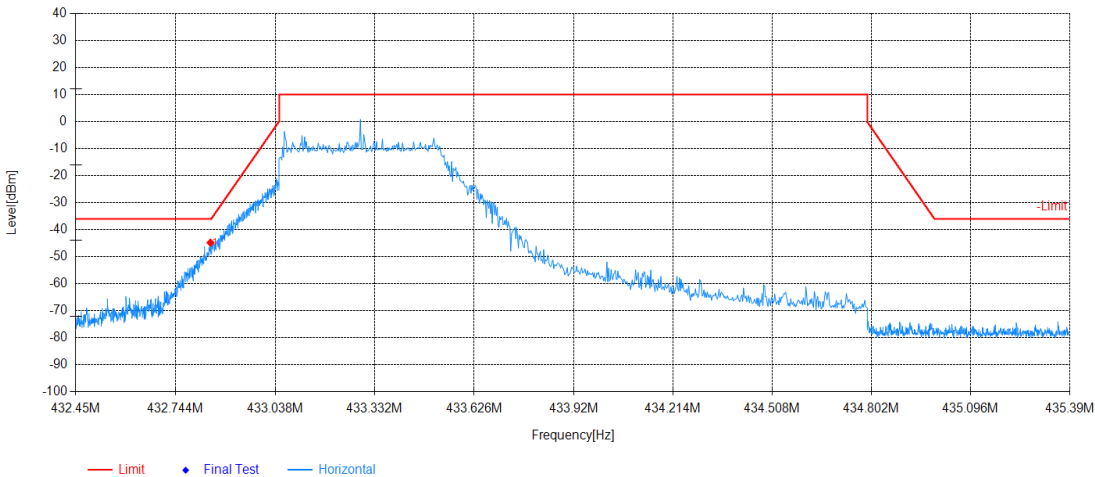






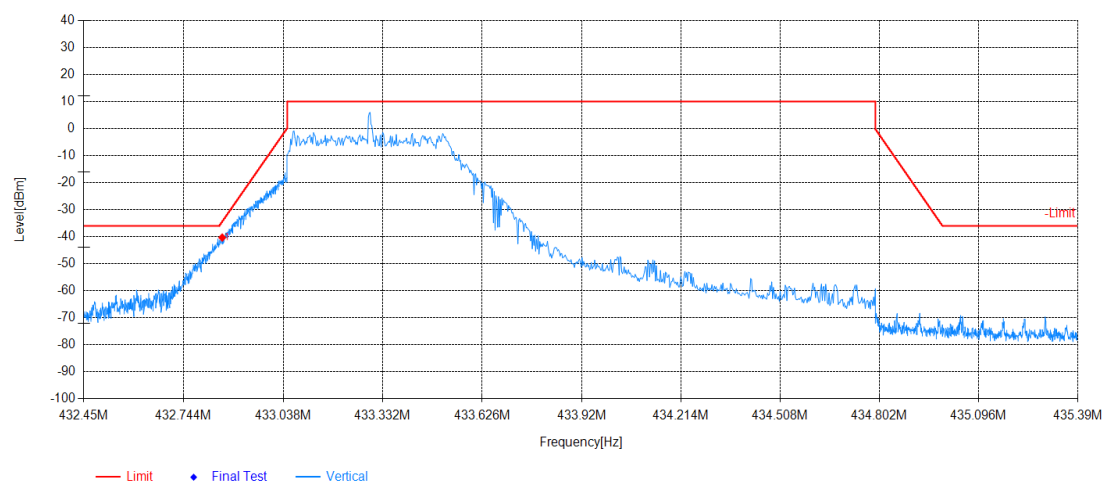
## Radiated Test Result

500K 433.3 OFB



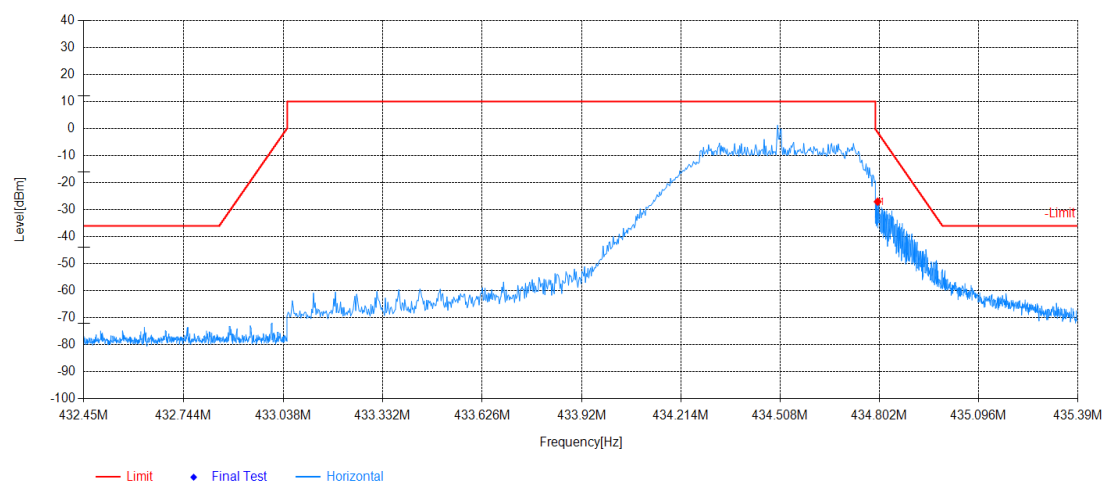
Suspected Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	432.8468	-72.47	-44.79	-36.00	8.79	27.68	Horizontal

500K 433.3 OFB



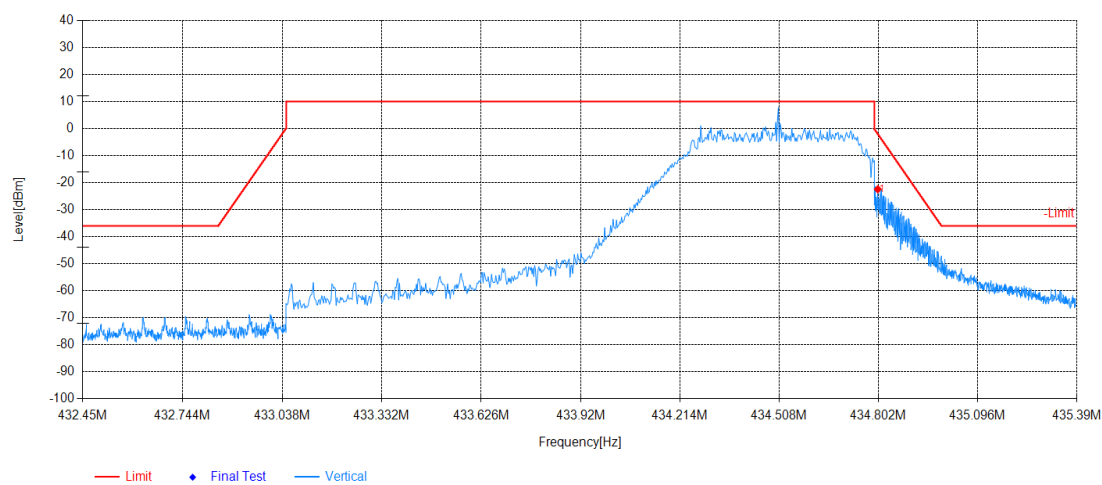
Suspected Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	432.858	-68.05	-40.31	-34.55	5.76	27.74	Vertical

500K 434.5 OFB



Suspected Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	434.7969	-54.73	-27.04	-1.24	25.80	27.69	Horizontal

500K 434.5 OFB



Suspected Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	434.8003	-50.18	-22.44	-1.86	20.58	27.74	Vertical

## 2.8 Attachment

EUT Photograph

(1) EUT Photo



-----End-----