TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 22, 74 and 90

TEST REPORT

For

Hytera Communications Corporation Limited

Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, 518057 China

FCC ID:YAMCHU-P0BA00

Report Type:	**Product Type:**
Original Report	Base Station Channel Unit(CHU)

Report Number:	RDG200611009-00A
Report Date:	2020-08-28
Reviewed By:	Ivan Cao Assistant Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	Base Station Channel Unit(CHU)
EUT Model:	CHU-P0BA00
Mutiple Models:	CHU-S0BA00
Modulation Type:	4FSK
Channel Spacing:	12.5 kHz
Frequency Range:	136-174 MHz
Rated Output Power: (Conducted)	High Power Level: 50W Low Power Level: 5W
Rated Input Voltage:	DC 13.6V ,15A
Serial Number:	RDG200611009‐RF-S1
EUT Received Date:	2020.05.19
EUT Received Status:	Good

Note:
The device is a Base Station.
The series product, models CHU-P0BA00, CHU-S0BA00 and CHU-P0BA00 are electrically identical, The difference between them please refer to the declaration letter for details.We selected CHU-P0BA00 for fully test.

Objective

This test report is prepared on behalf of ***Hytera Communications Corporation Limited*** in accordance with Part 2, and Part 22,74 and 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

Test Methodology

All tests and measurements indicated in this document were performed in accordance with:

the Code of federal Regulations Title 47, Part 2, Part 22, Part 74, Part 90

ANSI C63.26-2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

TIA-603-E-2016, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz ~ 1GHz:5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "△ ". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

EUT Exercise Software

No exercise software was used.

Special Accessories

Manufacturer	Description	Model	Serial Number	Note
Kenbotong Communication LTD	Antenna	TQJ-150M1	TQJ-150M1-S1	input impedance: 50 ohm Antenna Gain:9.6dBi

Note: Per the test method, the antenna sold with the device was not used during the test.

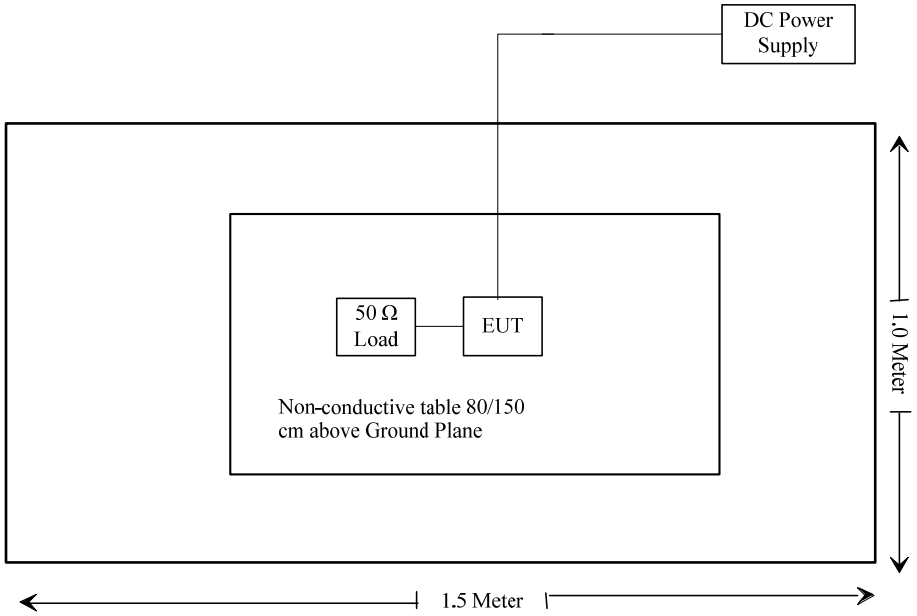
Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Weinschel	50Ω Load Terminal	MD477	1440-3
HP	RF Communication Tester	8920A	3438A05201
Pro instrument	DC Power Supply	pps3300	3300012

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1310 and §2.1093	RF Exposure	Compliance
§2.1046; § 22.727; §74.461; §90.205	RF Output Power	Compliance
§2.1047	Modulation Characteristic	Not Applicable
§2.1049;§22.357;§ 22.731; §74.462;§90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliance
§2.1051; §22.861; §74.462; §90.210	Spurious Emission at Antenna Terminal	Compliance
§2.1053;§22.861; §74.462;§90.210	Spurious Radiated Emissions	Compliance
§2.1055; § 22.355; §74.464; §90.213	Frequency Stability	Compliance
§90.214	Transient Frequency Behavior	Compliance

Note: the test is Not Applicable for Digital modulation.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated emissions below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	EMI Test Receiver	ESR3	102453	2019-09-12	2020-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2020-05-06	2021-05-06
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
Agilent	Signal Generator	E8247C	MY43321350	2019-12-10	2020-12-10
Ouli	Band Rejector Filter	136-174M	021	2020-07-23	2021-07-23
Radiated emissions above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Agilent	Spectrum Analyzer	E4440A	SG43360054	2020-05-09	2021-05-09
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
Mini-Circuit	Amplifier	ZVA-213-S+	54201245	2019-09-05	2020-09-05
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
Agilent	Signal Generator	E8247C	MY43321350	2019-12-10	2020-12-10
Ouli	Band Rejector Filter	136-174M	021	2020-07-23	2021-07-23
RF Conducted Test					
R&S	Spectrum Analyzer	FSU 26	200256	2020-07-07	2021-07-07
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201048	Each time	N/A
Weinschel	Coaxial Attenuators	53-20-34	LN749	Each time	N/A
E-Microwave	Coaxial Attenuators	EMCA40-200SN-6	OE01201046	Each time	N/A
Agilent	Signal Generator	E8247C	MY43321350	2019-12-10	2020-12-10
HP	RF Communications Test Set	8920A	3438A05201	2020-05-09	2021-05-09
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2020-03-26	2021-03-26
UNI-T	Multimeter	UT39A	M130199938	2019-07-23	2021-07-23

**** Statement of Traceability:*** *Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for Maximum Permissible Exposure (MPE)

Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time |E|, |H| or S (minutes)**
0.3- 3.0	614	1.63	(100)*	6
3.0 - 30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6

f = frequency in MHz;
* = Plane-wave equivalent power density;

MPE Calculation

Prediction of power density at the distance of the applicable MPE limit

$$S = PG/4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

MPE Results

Frequency (MHz)	Antenna Gain		Maximum Peak output power including Tune-up Tolerance (mW)	Duty cycle	Evaluation Distance (cm)	Power Density (mW/cm^2)	Power Density Limit (mW/cm^2)
	(dBi)	(numeric)					
136-174	7.1	5.13	60000	50%	120	0.85	1.0

Note: the Maximum Peak output power including Tune-up Tolerance was 60W declared by manufacturer.

Result: The device meet FCC MPE of the Occupational/Controlled use at120 cm distance.

FCC §2.1046 & § 22.727 & §74.461 & §90.205 - RF OUTPUT POWER

Applicable Standard

FCC §2.1046, § 22.727, §74.461 and §90.205

Test Procedure

Conducted RF Output Power:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

R B/W	Video B/W
100 kHz	300 kHz

Test Data

Environmental Conditions

Temperature:	25.3~27.2 ℃
Relative Humidity:	61~64 %
ATM Pressure:	100.3~100.4 kPa
Tester:	James Chen
Test Date:	2020-08-04 ~ 2020-08-25

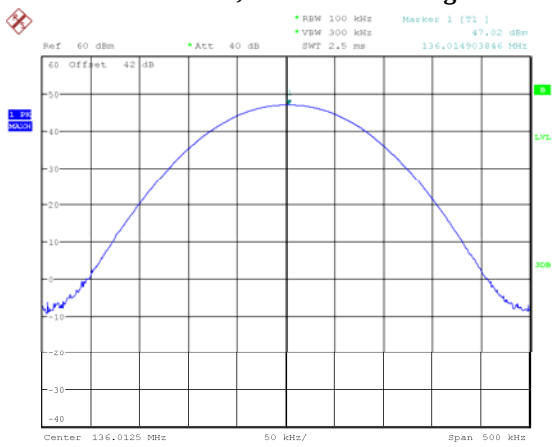
Test Mode: Transmitting

Test Result: Compliance. Please refer to following table:

Test Channel	Test Frequency (MHz)	Conducted Output Power (dBm)		Limit (dBm)		Note
		High Power Level	Low Power Level	High Power Level	Low Power Level	
Low	136.0125	47.02	37.18	47.78	37.78	For federal
Middle	155.7525	47.07	37.20	47.78	37.78	FCC part 90
High	173.9875	46.61	36.80	47.78	37.78	For federal
Additional	150.8125	47.08	37.31	47.78	37.78	FCC part 22
Additional	161.1000	47.10	37.29	47.78	37.78	FCC part 74

Note: The high rated power level is 50W(47dBm), and low rated power level is 5 W(37dBm).
The output power shall not exceed by more than 20 percent the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

Low Channel, 136.0125 MHz High Power



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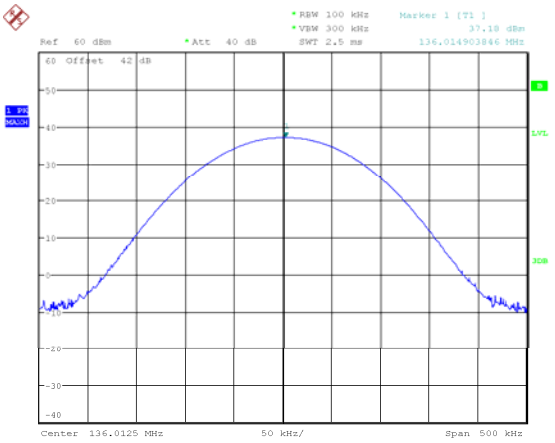

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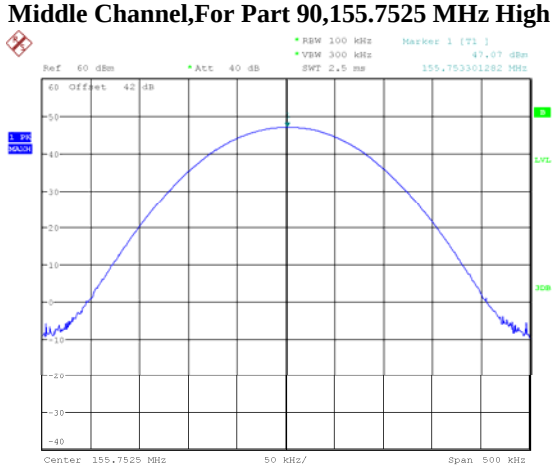
Middle Channel,For Part 90,155.7525 MHz High Power



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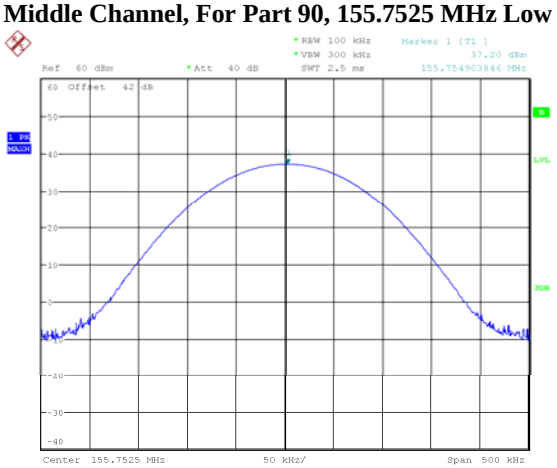
Middle Channel, For Part 90, 155.7525 MHz Low Power



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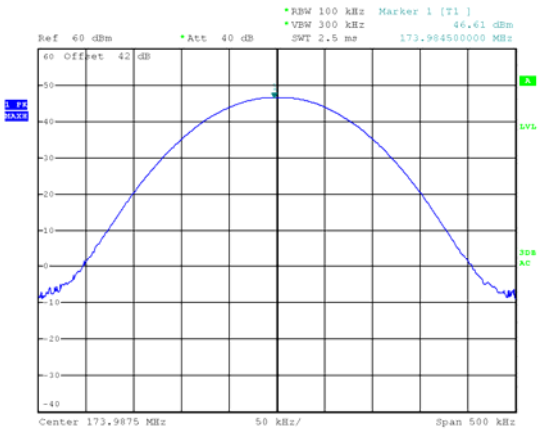
High Channel, 173.9857 MHz High Power



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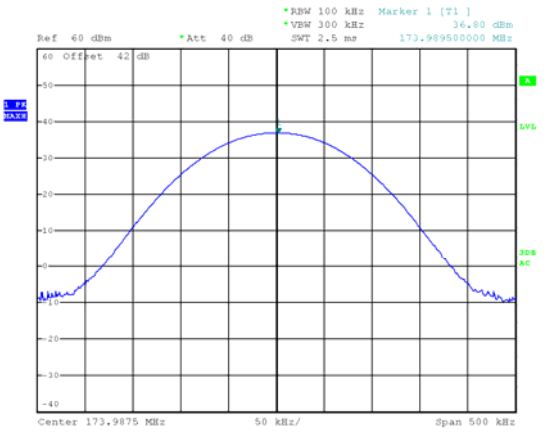
High Channel,173.9875 MHz Low Power



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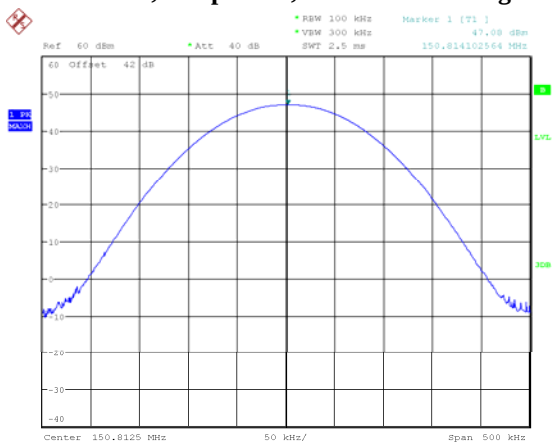
Additional, For part 22, 150.8125 MHz High Power



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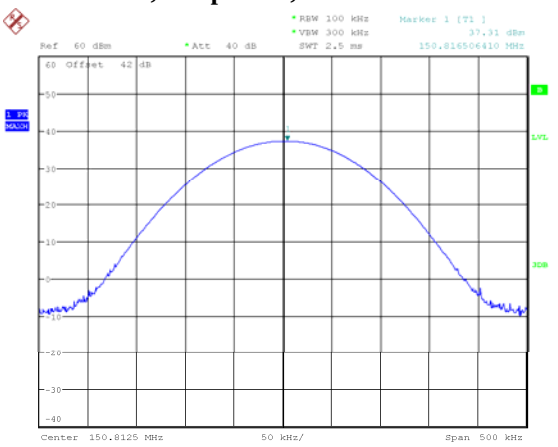
Additional, For part 22, 150.8125 MHz Low Power



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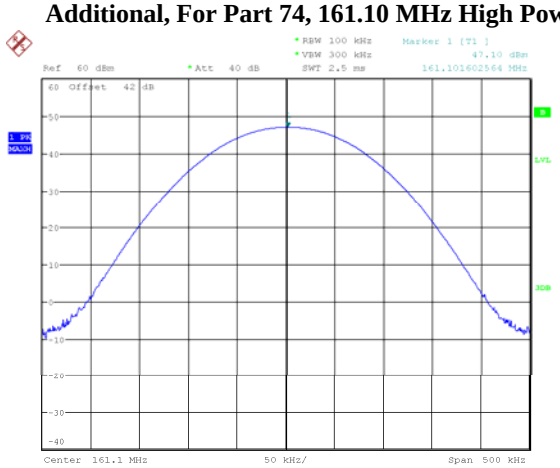
Additional, For Part 74, 161.10 MHz High Power



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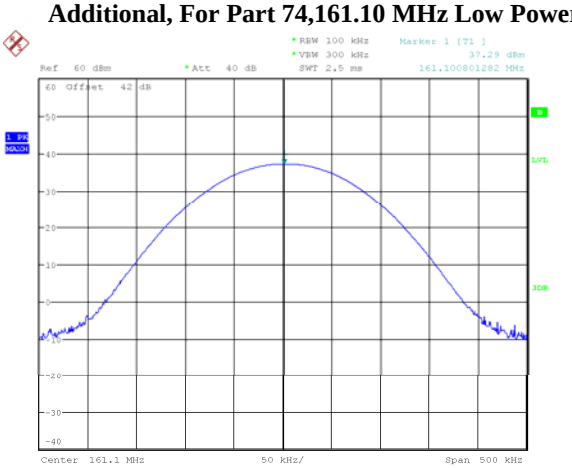
Additional, For Part 74,161.10 MHz Low Power



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FCC §2.1049 & §22.357 & § 22.731 & §74.462 & §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

Applicable Standard

FCC §2.1049, §22.357, § 22.731, §74.462, §90.209 and §90.210

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 100 Hz or 300 Hz and the spectrum was recorded in the frequency band ±50 kHz from the carrier frequency.

Test Data

Environmental Conditions

Temperature:	28.6 ℃
Relative Humidity:	52 %
ATM Pressure:	100.3 kPa
Tester:	James Chen
Test Date:	2020-08-04

Test mode: transimitting

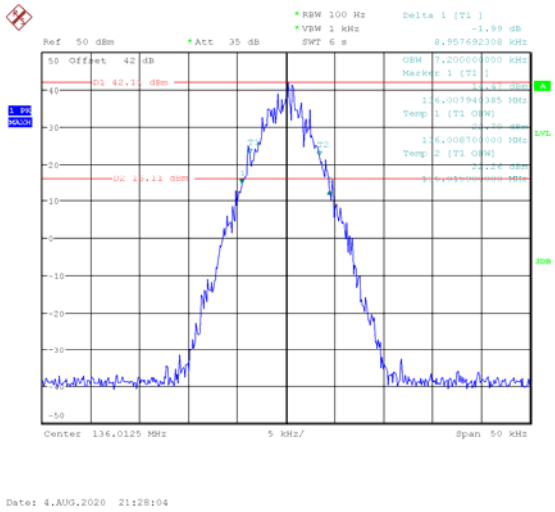
Test Channel	Test Frequency (MHz)	High Power Level		Low Power Level		Note
		99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)	
Low	136.0125	7.200	8.958	7.100	8.878	For federal
Middle	155.7525	7.300	8.878	7.100	9.119	FCC part 90
High	173.9875	7.400	8.900	7.400	8.800	For federal
Additional	150.8125	7.200	9.439	7.300	9.199	FCC part 22
Additional	161.1000	7.000	9.038	7.200	8.958	FCC part 74

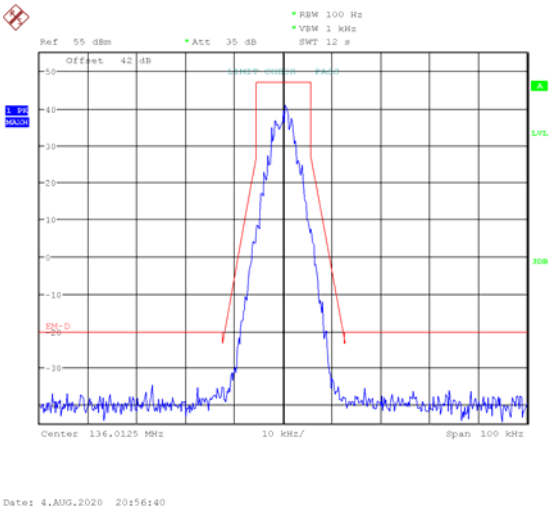
Note: Emission bandwidth was based on calculation method instead of measurement.
Emission Designator
Per CFR 47 §2.201& §2.202, BW = 2M + 2D

For Digital Mode (Channel Spacing: 12.5 kHz)
Emission Designator 7K60F1D and 7K60F1E
The 99% energy rule (title 47CFR 2.1049) was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 7.60 kHz. The emission mask was obtained from 47CFR 90.210(d).
F1D and F1E portion of the designator indicates digital information.
Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60F1D and 7K60F1E.

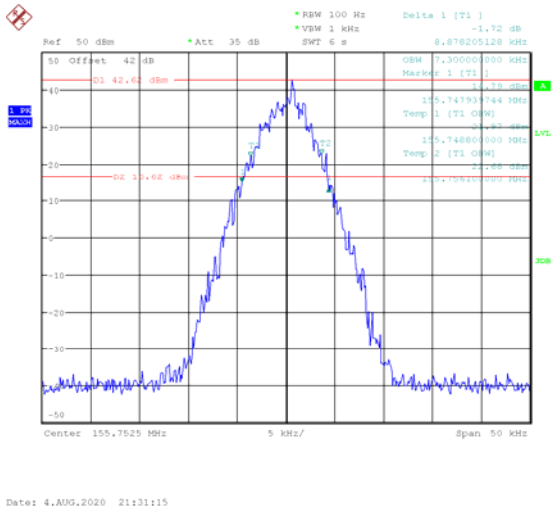
High Power:

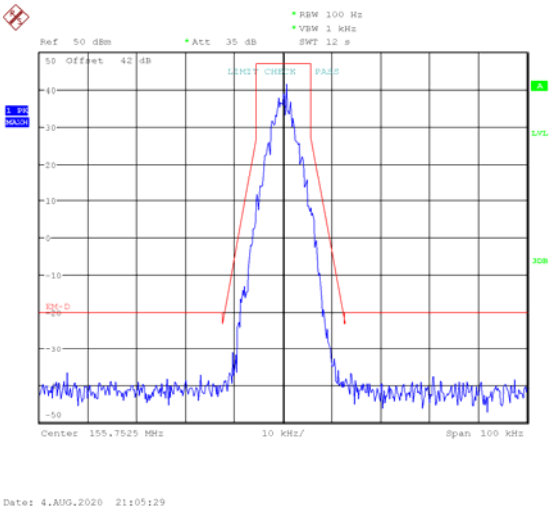
Low Channel, 136.0125 MHz



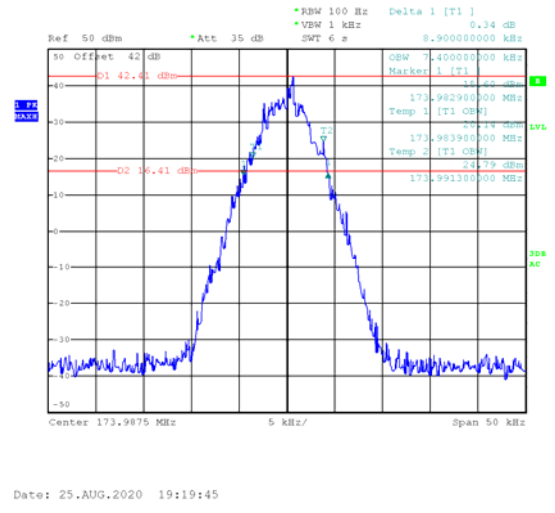


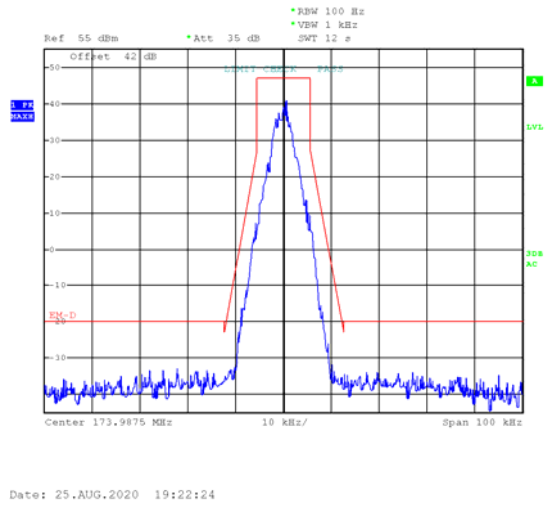
Middle Channel,For Part 90,155.7525 MHz



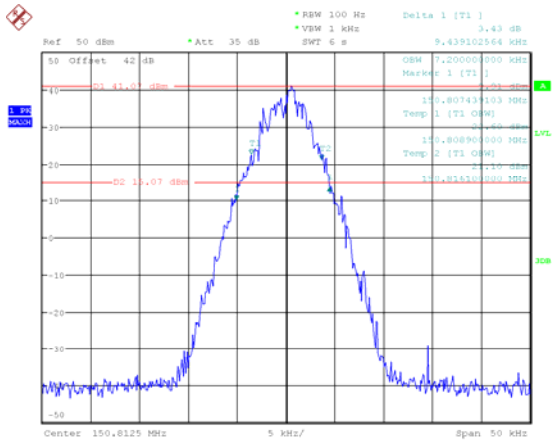


High Channel, 173.9857 MHz





Additional, For part 22, 150.8125 MHz



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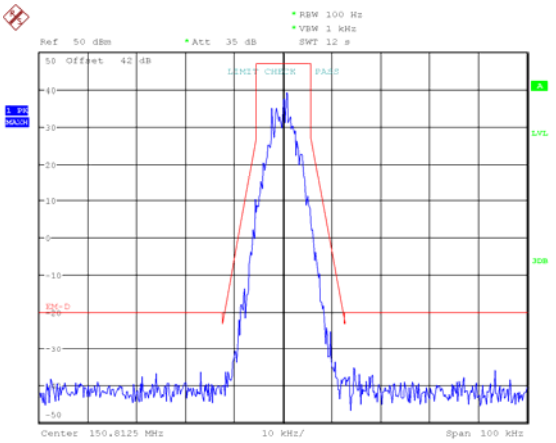

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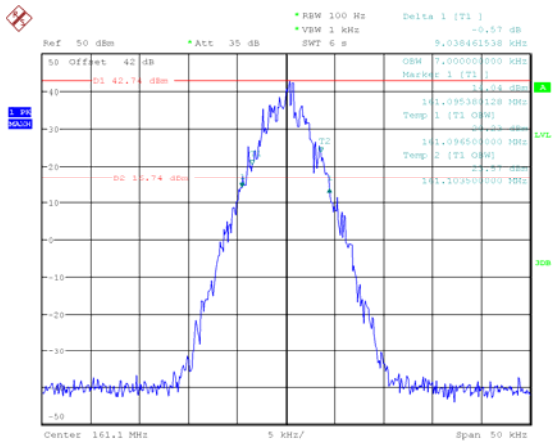
Additional, For Part 74, 161.10 MHz



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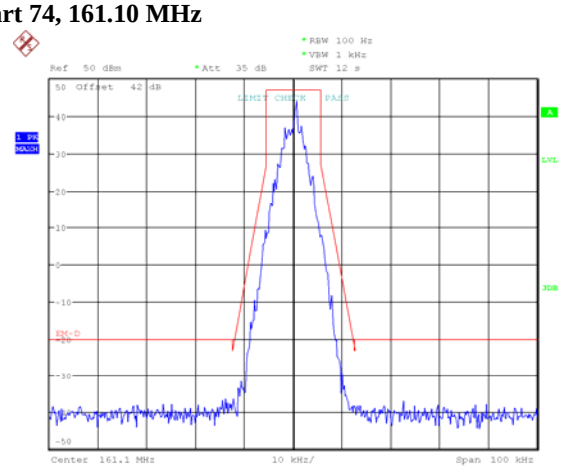

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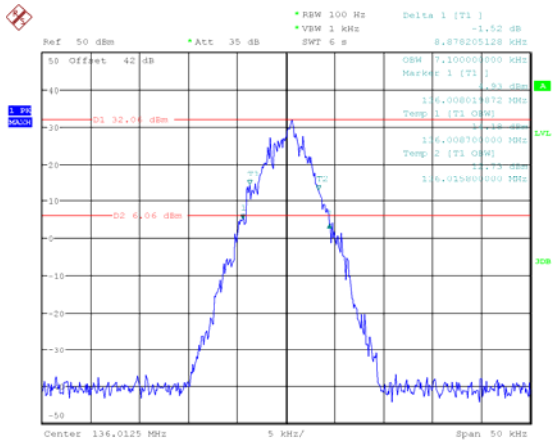
Lower Power:

Low Channel, 136.0125 MHz



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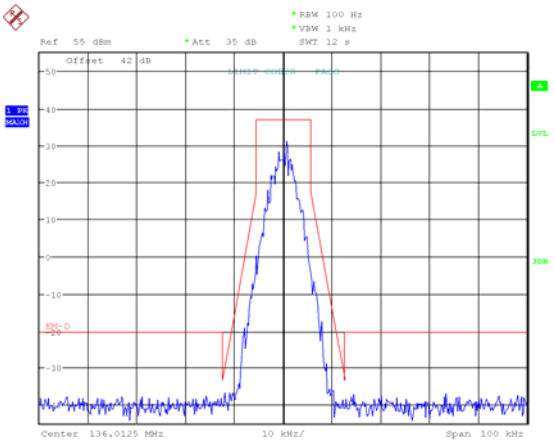

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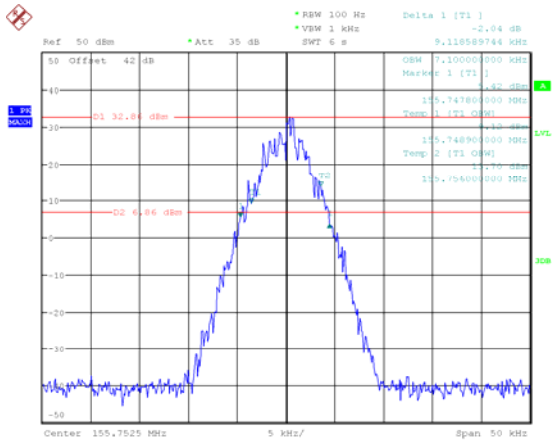
Middle Channel,For Part 90,155.7525 MHz



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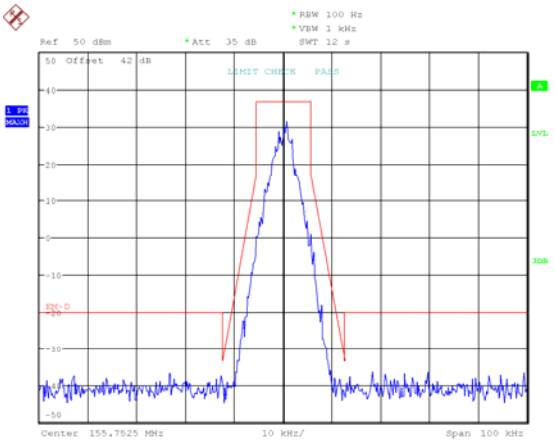

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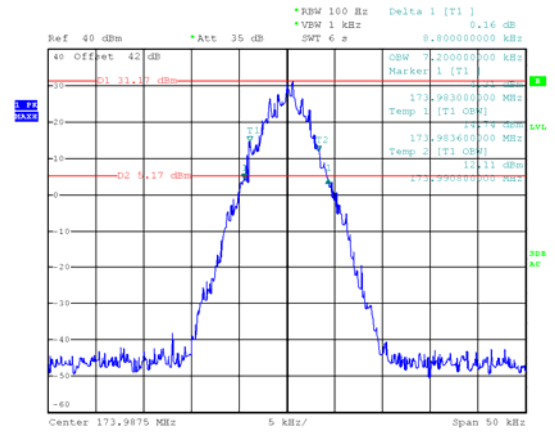
High Channel, 173.9857 MHz



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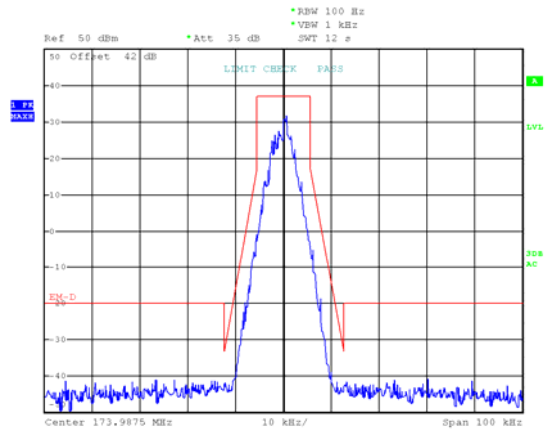
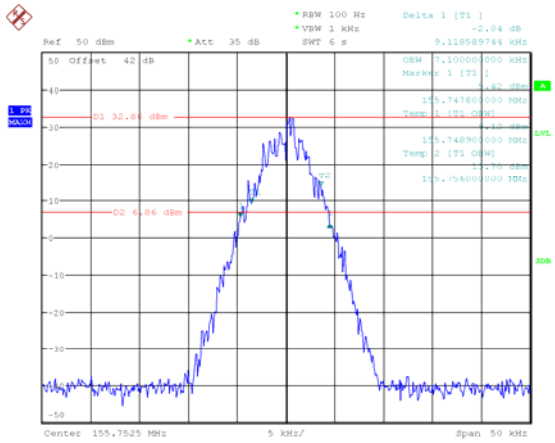


Date: 25.AUG.2020 19:24:33

Additional, For part 22, 150.8125 MHz



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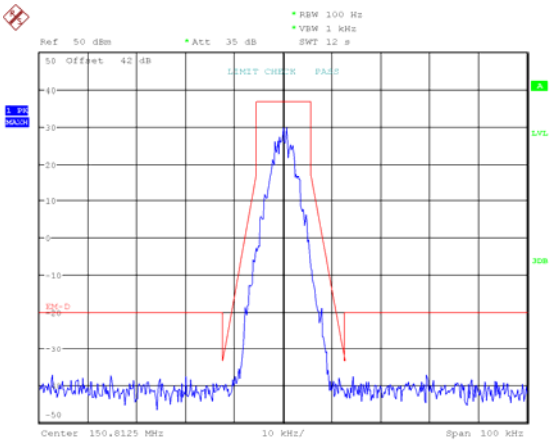
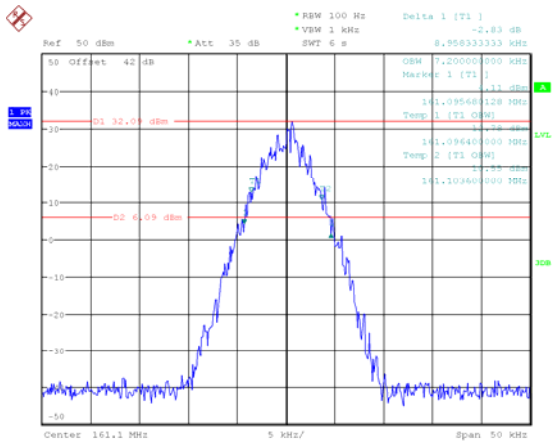


Date: 4.AUG.2020 21:13:48

Additional, For Part 74, 161.10 MHz



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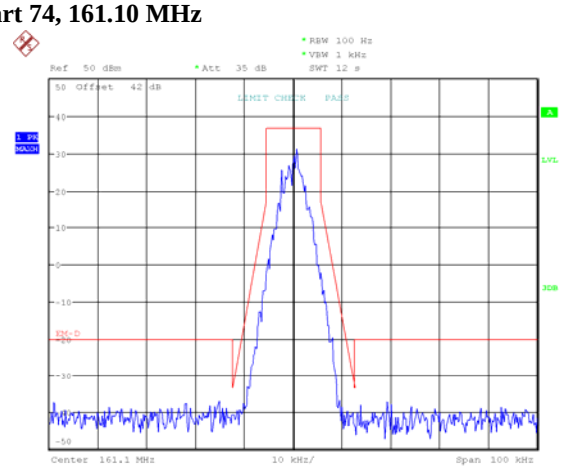


Date: 4.AUG.2020 21:09:26

FCC §2.1051 & §22.861 & §74.462 & §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

FCC §2.1051, §22.861, §74.462, and §90.210

Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Data

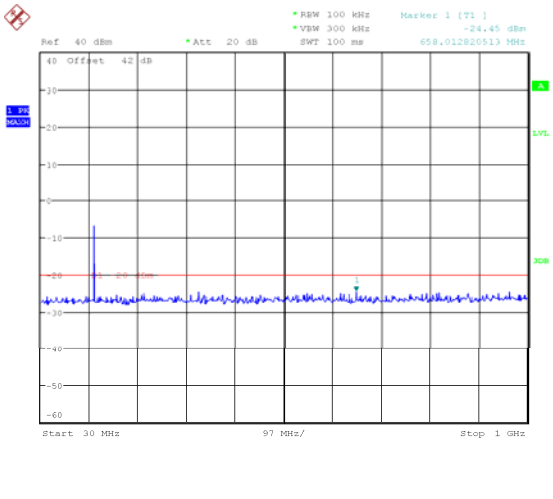
Environmental Conditions

Temperature:	28.6 ℃
Relative Humidity:	52 %
ATM Pressure:	100.3 kPa
Tester:	James Chen
Test Date:	2020-08-04

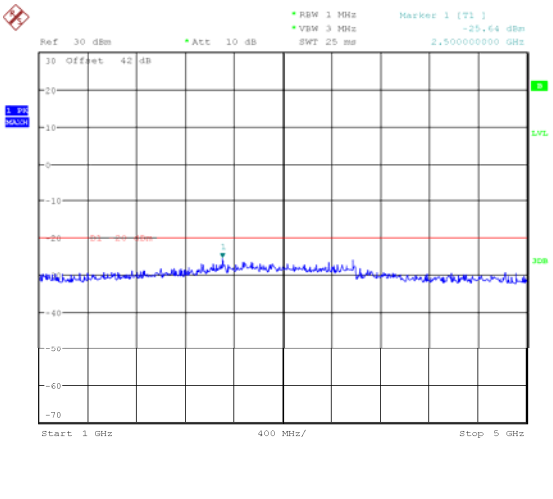
Test Mode: Transmitting

Test Result: Compliance, test performed at high power level with Band rejector filter, please refer to the following plots.

Low Channel, 136.0125 MHz

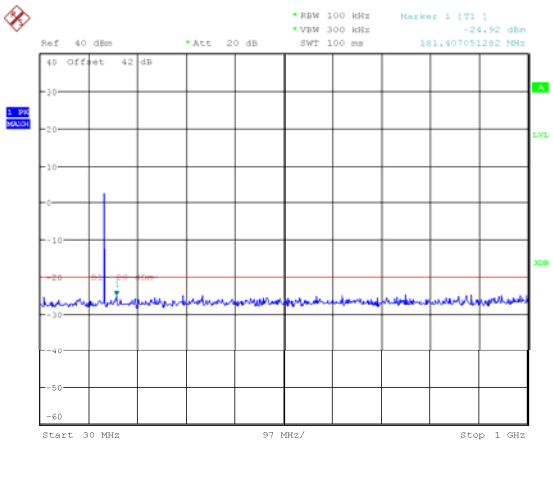


Date: 4.AUG.2020 21:55:10

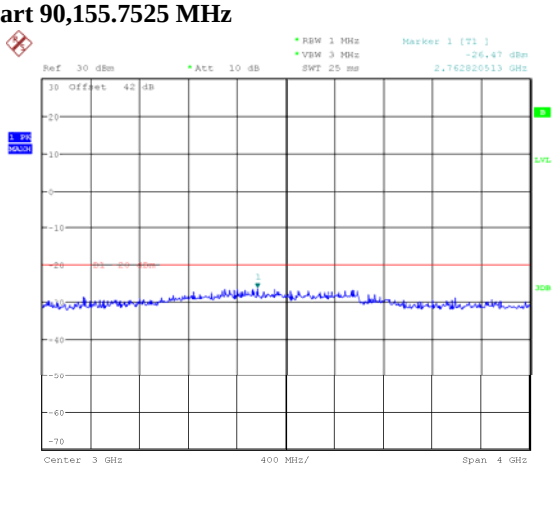


Date: 4.AUG.2020 21:55:25

Middle Channel,For Part 90,155.7525 MHz

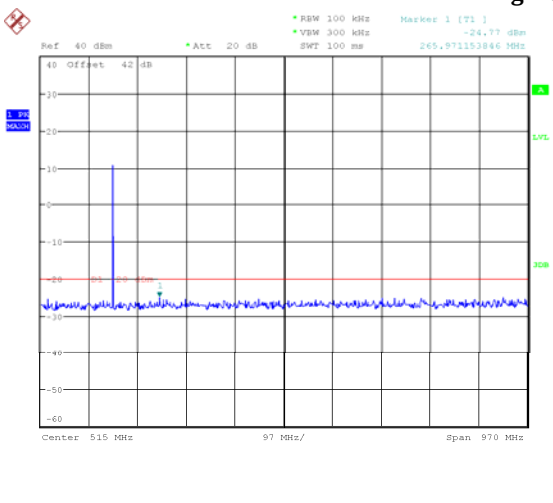


Date: 4.AUG.2020 21:56:10

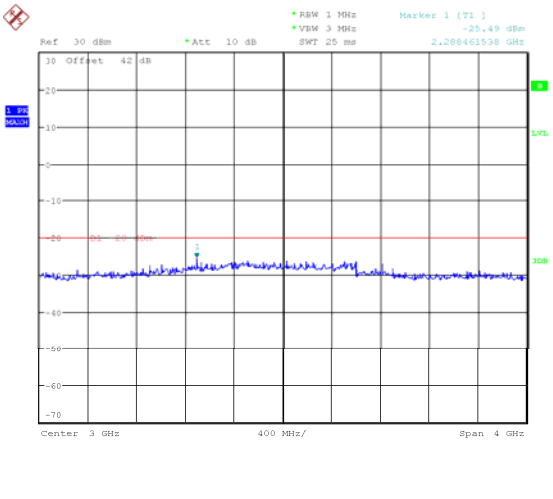


Date: 4.AUG.2020 21:55:51

High Channel, 173.9857 MHz

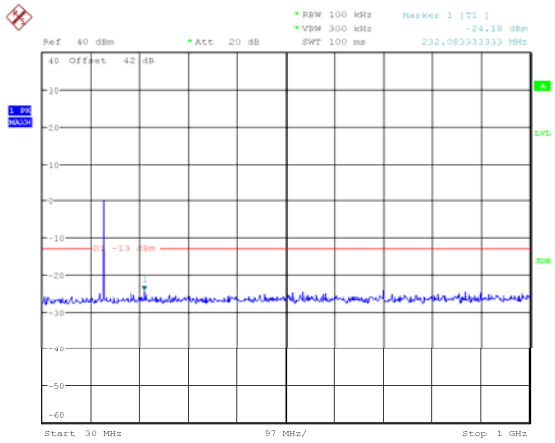


Date: 4.AUG.2020 21:56:42

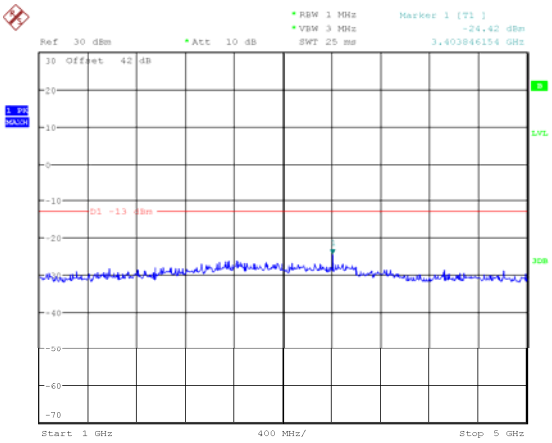


Date: 4.AUG.2020 21:57:06

Additional, For part 22, 150.8125 MHz

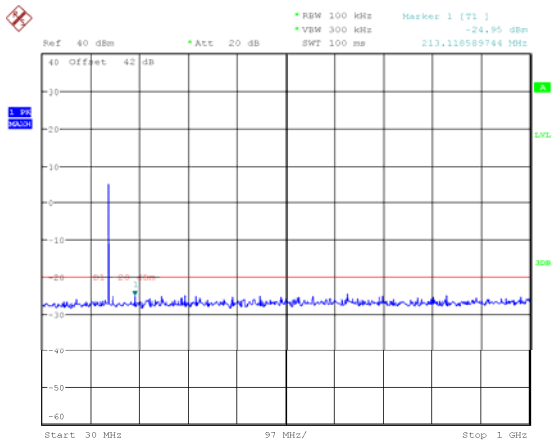


Date: 4.AUG.2020 21:58:40

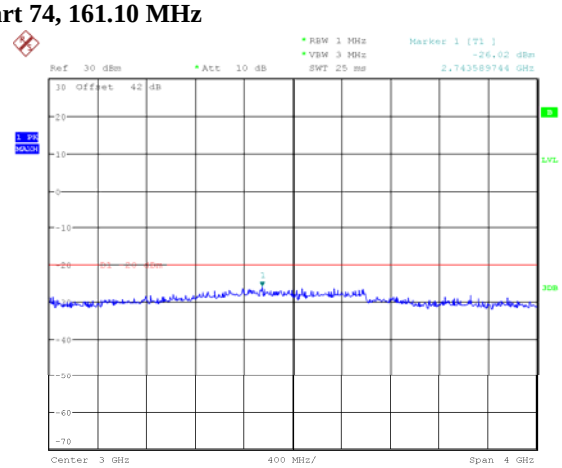


Date: 4.AUG.2020 21:59:04

Additional, For Part 74, 161.10 MHz



Date: 4.AUG.2020 21:57:52



Date: 4.AUG.2020 21:57:35

FCC §2.1053 & §22.861 & §74.462 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053, §22.861, §74.462 and §90.210

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =10 1g (TXpwr in Watts/0.001)-the absolute level

Test Data

Environmental Conditions

Temperature:	24.2 ℃
Relative Humidity:	49 %
ATM Pressure:	100.1 kPa
Tester:	Bond Qin, Jalon Liu
Test Date:	2020-07-26

Test Mode: Transmitting

Test Result: Compliance, test performed at high power level with Band rejector filter, please refer to the following table.

30MHz - 2GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Low Channel Frequency: 136.0125MHz-12.5 kHz								
272.025	H	34.96	-74.02	0.00	0.51	-74.53	-20.0	54.53
272.025	V	33.38	-78.10	0.00	0.51	-78.61	-20.0	58.61
408.038	H	34.28	-70.48	0.00	0.62	-71.10	-20.0	51.10
408.038	V	33.67	-74.43	0.00	0.62	-75.05	-20.0	55.05
544.050	H	35.82	-67.48	0.00	0.73	-68.21	-20.0	48.21
544.050	V	40.87	-65.57	0.00	0.73	-66.30	-20.0	46.30
680.063	H	33.76	-67.81	0.00	0.90	-68.71	-20.0	48.71
680.063	V	33.76	-70.44	0.00	0.90	-71.34	-20.0	51.34
816.075	H	32.96	-65.45	0.00	0.95	-66.40	-20.0	46.40
816.075	V	33.41	-68.48	0.00	0.95	-69.43	-20.0	49.43
952.088	H	34.21	-60.76	0.00	0.89	-61.65	-20.0	41.65
952.088	V	35.01	-61.60	0.00	0.89	-62.49	-20.0	42.49
1088.10	H	40.11	-63.73	7.46	0.99	-57.26	-20.0	37.26
1088.10	V	40.85	-63.41	7.46	0.99	-56.94	-20.0	36.94
1224.11	H	48.65	-54.53	7.54	1.11	-48.10	-20.0	28.10
1224.11	V	50.16	-54.07	7.54	1.11	-47.64	-20.0	27.64
1360.13	H	42.35	-61.20	8.72	1.20	-53.68	-20.0	33.68
1360.13	V	49.22	-55.05	8.72	1.20	-47.53	-20.0	27.53

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Middle Channel, For part 90, Frequency:155.7525MHz-12.5 kHz								
311.505	H	35.30	-72.90	0.00	0.53	-73.43	-20.0	53.43
311.505	V	33.64	-76.13	0.00	0.53	-76.66	-20.0	56.66
467.258	H	34.59	-69.83	0.00	0.68	-70.51	-20.0	50.51
467.258	V	34.04	-73.52	0.00	0.68	-74.20	-20.0	54.20
623.010	H	36.09	-65.88	0.00	0.80	-66.68	-20.0	46.68
623.010	V	41.10	-63.95	0.00	0.80	-64.75	-20.0	44.75
778.763	H	34.08	-65.16	0.00	0.93	-66.09	-20.0	46.09
778.763	V	34.11	-68.62	0.00	0.93	-69.55	-20.0	49.55
934.515	H	33.27	-62.43	0.00	0.94	-63.37	-20.0	43.37
934.515	V	33.77	-63.70	0.00	0.94	-64.64	-20.0	44.64
1090.27	H	40.36	-63.48	7.45	0.99	-57.02	-20.0	37.02
1090.27	V	41.87	-62.39	7.45	0.99	-55.93	-20.0	35.93
1246.02	H	39.16	-64.20	7.76	1.14	-57.58	-20.0	37.58
1246.02	V	40.21	-64.16	7.76	1.14	-57.54	-20.0	37.54
1401.77	H	46.32	-57.10	9.01	1.20	-49.29	-20.0	29.29
1401.77	V	49.77	-54.24	9.01	1.20	-46.43	-20.0	26.43
1557.53	H	39.53	-65.20	9.85	0.96	-56.31	-20.0	36.31
1557.53	V	46.73	-58.39	9.85	0.96	-49.50	-20.0	29.50
High Channel,Frequency:173.9875MHz-12.5 kHz								
346.775	H	34.90	-71.95	0.00	0.56	-72.51	-20.0	52.51
346.775	V	33.18	-75.95	0.00	0.56	-76.51	-20.0	56.51
520.163	H	34.25	-69.56	0.00	0.72	-70.28	-20.0	50.28
520.163	V	33.78	-73.10	0.00	0.72	-73.82	-20.0	53.82
693.550	H	35.75	-65.73	0.00	0.93	-66.66	-20.0	46.66
693.550	V	40.77	-63.23	0.00	0.93	-64.16	-20.0	44.16
866.938	H	33.81	-63.83	0.00	1.01	-64.84	-20.0	44.84
866.938	V	33.67	-66.56	0.00	1.01	-67.57	-20.0	47.57
1040.33	H	40.23	-63.60	7.70	0.85	-56.75	-20.0	36.75
1040.33	V	41.39	-62.96	7.70	0.85	-56.11	-20.0	36.11
1213.71	H	42.63	-60.46	7.44	1.10	-54.12	-20.0	34.12
1213.71	V	44.63	-59.54	7.44	1.10	-53.20	-20.0	33.20
1387.10	H	39.65	-63.79	8.91	1.20	-56.08	-20.0	36.08
1387.10	V	40.87	-63.21	8.91	1.20	-55.50	-20.0	35.50
1560.49	H	47.56	-57.16	9.86	0.94	-48.24	-20.0	28.24
1560.49	V	50.12	-55.01	9.86	0.94	-46.09	-20.0	26.09
1733.88	H	42.69	-61.20	10.90	0.73	-51.03	-20.0	31.03
1733.88	V	48.33	-56.16	10.90	0.73	-45.99	-20.0	25.99

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
For Part 74, Frequency: 161.1000MHz-12.5 kHz								
322.20	H	36.55	-71.24	0.00	0.54	-71.78	-20.0	51.78
322.20	V	35.01	-74.57	0.00	0.54	-75.11	-20.0	55.11
483.30	H	34.82	-69.51	0.00	0.69	-70.20	-20.0	50.20
483.30	V	33.76	-73.65	0.00	0.69	-74.34	-20.0	54.34
644.40	H	33.19	-68.63	0.00	0.84	-69.47	-20.0	49.47
644.40	V	35.24	-69.49	0.00	0.84	-70.33	-20.0	50.33
805.50	H	33.89	-64.68	0.00	0.94	-65.62	-20.0	45.62
805.50	V	33.92	-68.31	0.00	0.94	-69.25	-20.0	49.25
966.60	H	33.75	-60.62	0.00	0.84	-61.46	-20.0	41.46
966.60	V	34.51	-61.40	0.00	0.84	-62.24	-20.0	42.24
1288.80	H	43.41	-60.30	8.19	1.18	-53.29	-20.0	33.29
1288.80	V	43.16	-61.47	8.19	1.18	-54.46	-20.0	34.46
1449.90	H	38.06	-66.06	9.25	1.27	-58.08	-20.0	38.08
1449.90	V	43.47	-61.00	9.25	1.27	-53.02	-20.0	33.02
1611.00	H	46.73	-57.80	10.18	0.69	-48.31	-20.0	28.31
1611.00	V	45.46	-59.67	10.18	0.69	-50.18	-20.0	30.18
For Part 22, Frequency: 150.8125MHz-12.5 kHz								
301.63	H	33.69	-74.89	0.00	0.52	-75.41	-13.0	62.41
301.63	V	33.38	-76.57	0.00	0.52	-77.09	-13.0	64.09
452.44	H	34.08	-70.43	0.00	0.66	-71.09	-13.0	58.09
452.44	V	33.76	-73.93	0.00	0.66	-74.59	-13.0	61.59
603.25	H	33.76	-68.35	0.00	0.77	-69.12	-13.0	56.12
603.25	V	33.50	-71.84	0.00	0.77	-72.61	-13.0	59.61
754.06	H	33.25	-66.68	0.00	0.93	-67.61	-13.0	54.61
754.06	V	34.35	-68.74	0.00	0.93	-69.67	-13.0	56.67
904.88	H	34.97	-61.97	0.00	1.03	-63.00	-13.0	50.00
904.88	V	34.25	-64.66	0.00	1.03	-65.69	-13.0	52.69
1206.50	H	38.65	-64.38	7.37	1.10	-58.11	-13.0	45.11
1206.50	V	38.80	-65.32	7.37	1.10	-59.05	-13.0	46.05
1357.31	H	38.06	-65.51	8.70	1.20	-58.01	-13.0	45.01
1357.31	V	40.20	-64.09	8.70	1.20	-56.59	-13.0	43.59
1508.13	H	39.52	-65.31	9.55	1.30	-57.06	-13.0	44.06
1508.13	V	40.38	-64.59	9.55	1.30	-56.34	-13.0	43.34

Note 1:The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.
Note 2:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

FCC §2.1055 & § 22.355 & §74.464 & §90.213 - FREQUENCY STABILITY

Applicable Standard

FCC §2.1055, § 22.355, §74.464 and §90.213

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Test Data

Environmental Conditions

Temperature:	27.4 ℃
Relative Humidity:	50 %
ATM Pressure:	101 kPa

The testing was performed by James Chen on 2020-08-06

Test Mode: Transmitting

FCC Part 90:

4FSK, 12.5kHz, Reference Frequency: 155.7525MHz, Limit: ±2.5 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	13.6	155.75265	0.33
-20		155.75254	0.09
-10		155.75257	0.16
0		155.75276	0.58
10		155.75265	0.33
20		155.75261	0.24
30		155.75264	0.31
40		155.75269	0.42
50		155.75256	0.13
20	11.0	155.75259	0.20
20	15.6	155.75264	0.31

FCC Part 74:

4FSK, 12.5kHz, Reference Frequency: 161.1000 MHz, Limit: ±5.0 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	13.6	161.1001000	0.62
-20		161.1000000	0.00
-10		161.1000000	0.00
0		161.1000000	0.00
10		161.1000000	0.00
20		161.1000000	0.00
30		161.1000000	0.00
40		161.1000000	0.00
50		161.1000000	0.00
20	11.0	161.1000000	0.00
20	15.6	161.1000000	0.00

FCC Part 22:

4FSK,12.5kHz, Reference Frequency: 155.7525 MHz, Limit: ±5.0 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	13.6	155.7528000	1.93
-20		155.7525000	0.00
-10		155.7528000	1.93
0		155.7525000	0.00
10		155.7523000	-1.28
20		155.7525000	0.00
30		155.7525000	0.00
40		155.7525000	0.00
50		155.7525000	0.00
20	11.0	155.7525000	0.00
20	15.6	155.7525000	0.00

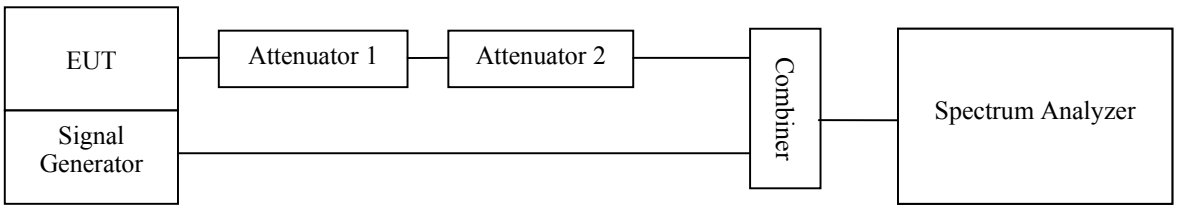
FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

Applicable Standard

Regulations: FCC §90.214
Test method: ANSI/TIA-603-D 2010, section 2.2.19.3

Test Procedure

a) Connect the EUT and test equipment as shown on the following block diagram.
b) Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
c) Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at ±12.5 kHz deviation and set its output level to -100dBm.
d) Turn on the transmitter.
e) Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as P_0.
f) Turn off the transmitter.
g) Adjust the RF level of the signal generator to provide RF power equal to P_0. This signal generator RF level shall be maintained throughout the rest of the measurement.
h) Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
i) Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at ±4 divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "tiger offset" to -10ms for turn on and -15ms for turn off.
j) Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be t_{on}. The trace should be maintained within the allowed divisions during the period t_1 and t_2.
k) Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period t_3.



Test Data

Environmental Conditions

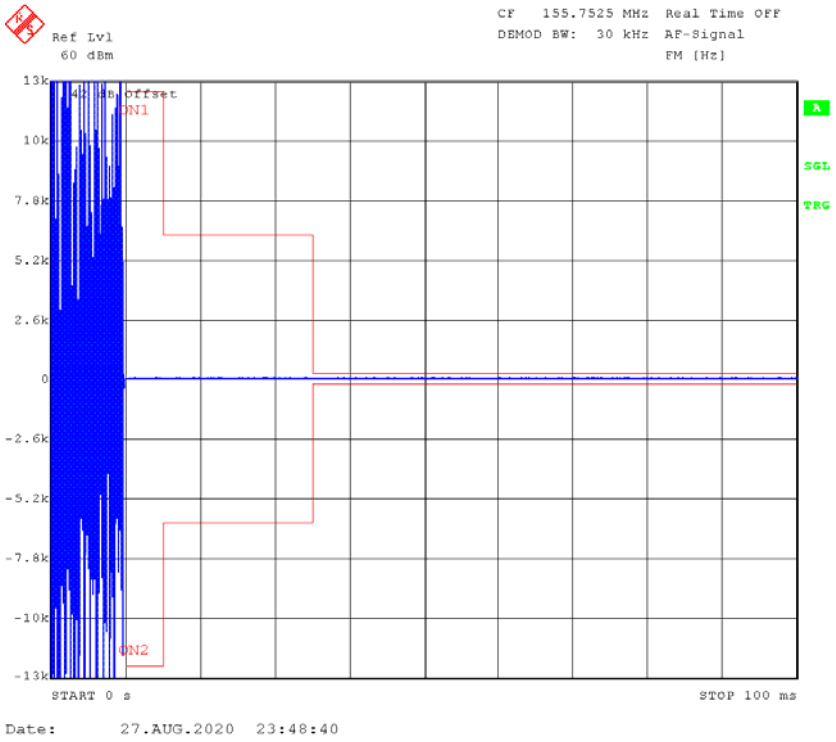
Temperature:	29.4℃
Relative Humidity:	50 %
ATM Pressure:	100.9kPa
Tester:	James Chen
Test Date:	2020-08-28

Channel Spacing (kHz)	Transient Period (ms)	Transient Frequency	Result
12.5	<10(t_1)	±12.5 kHz	Pass
	<25(t_2)	±6.25 kHz	
	<10(t_3)	±12.5 kHz	

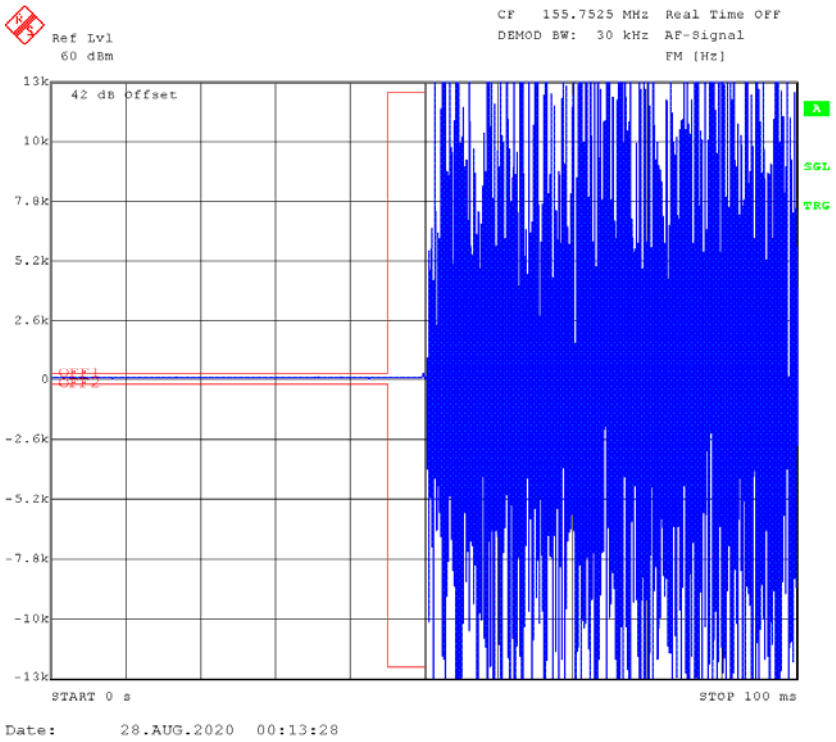
Please refer to the following plots.

High Power Channel: 155.7525 MHz

Turn on



Turn off



******* END OF REPORT *******