Test Report # TR_4786-20_FCC_PT90_Booster Class A_2
Revision: 2
Issue Date: December 10, 2020
Final Test Date: December 22, 2020

ACCREDITED
CERT #0955.01

TIMCO ENGINEERING, Inc.
An IIA Company

Test Report - FCC PART 90 Booster Class A (B9A)
Prepared For: Fiplex Communications Inc.

Approved for Release By:

Signature: Bruno Clavier

Name & Title: Bruno Clavier, General Manager
Date of Signature
(YYYY-MM-DD): 2020-12-10

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1. Customer Information

Applicant: Fiplex Communications Inc.
Address: 2101 NW 79th Ave.
MIAMI FL 33122

Contact: Mr. Fernando Sommariva
Telephone: 305-884-8991
Email address: fernando.sommariva@fiplex.com

1.1 Test Result Summary

The following test procedure and guidance were used for measuring FCC PART 90 (PRIVATE LAND MOBILE RADIO SERVICES) known as Licensed Land Mobile; ANSI C63.26-2015 and FCC KDB 935210 D05 v01r04 Industrial Signal Boosters. Full test results are available in this report.

No additions to the test methods were needed. There were no deviations, or exclusions from the test methods. No test results are from external providers or from the customer. The test results relate only to the items tested. Timco does not offer opinions and interpretations, only a pass/fail statement.

The Following is for Test item FCC ID: P3TDH437-3XX

Applicable Clauses from Part 2		
FCC Part 2 Clauses	Description of the requirements	Result: (Pass, Fail, N/A)
2.202	Bandwidth & Emission	Pass
2.1033 (c)(8)	Power at the Final Amplifier	Pass
2.1046 (a)	RF Output Power	Pass
2.1047	Modulation characteristics	n/a
2.1049	Occupied Bandwidth	Pass
2.1051	Spurious emissions at antenna terminals	Pass
2.1053	Field strength of spurious radiation	Pass
2.1055	Frequency stability	n/a

Applicable Clauses from Part 90 Subpart I		
FCC Part 90 Clauses	Description of the requirements	Result: (Pass, Fail, N/A)
90.205	Transmitter Power	Pass
90.207	Types of Emissions	Pass
90.209	Bandwidth limitations	Pass
90.210	Emission masks, In-band	Pass
90.210	Emission masks, Out-of-band	Pass
90.213	Frequency stability	n/a
90.214	Transient Frequency Behavior	n/a
90.219 (d)(6)(i)	ERP of intermodulation products	n/a[1]
90.219 (d)(6)(ii)	ERP of noise within the passband	n/a[1]
90.219 (d)(6)(iii)	ERP of noise on spectrum < 1 MHz outside of the passband	n/a[1]
90.219 (d)(3)(i), (e)(1)	ERP of Radiated Power	n/a[1]
90.219 (e)(2)	Noise figure	Pass
90.219 (e)(3)	Spurious emissions	Pass
90.219 (e)(4)(i)(ii)(iii)	Retransmitted Signals	Pass
90.221	Adjacent channel power limits	Pass

Note 1: Requirements in Part 90.219 (d) apply at deployment of this EUT, therefore are not applicable at certification.

KDB 935210 D05 v01r04		
FCC KDB 935210 D05 Clauses	Description of the requirements	Result: (Pass, Fail, N/A)
4.1	Test Signals for PLMRS (Input Signals)	Pass
4.2	AGC Threshold	Reported
4.3	Out-of-Band Rejection	Reported
4.4	Input-versus-Output Signal Comparison	Pass
4.5	Output Power	Pass
4.5	Amplifier/Booster Gain (optional)	Reported
4.6	Noise Figure	Pass
4.7.2	Out-of-band/Out-of-block Conducted Emissions (Intermodulation Products)	Pass
4.7.3	EUT Spurious Conducted Emissions	Pass
4.8	Frequency Stability	n/a
4.9	Spurious Radiated Emissions	Pass

2. Location of Testing

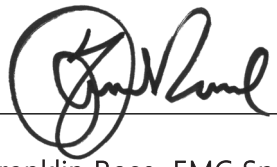
2.1 Test Laboratory

Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA").
Testing was performed at Timco's permanent laboratory located at 849 NW State Road 45, Newberry, Florida 32669

FCC test firm # 578780
FCC Designation # US1070
FCC site registration is under A2LA certificate # 0955.01
ISED Canada test site registration # 2056A
EU Notified Body # 1177
For all designations see A2LA scope # 0955.01

2.2 Testing was performed, reviewed by

Dates of Testing: December 10, 2020 – December 22, 2020

Signature: 

Name & Title: Franklin Rose, EMC Specialist
Date of Signature
(YYYY-MM-DD): 2020-12-10

Signature: 

Sr. EMC Engineer
EMC-003838-NE

Name & Title: Tim Royer, EMC Engineer
Date of Signature
(YYYY-MM-DD): 2020-12-10

3. Test Sample(s) (EUT/DUT)

The test sample was received: October 2, 2020

3.1 Definitions

Signal booster: A device or system that automatically receives, amplifies, and retransmits signals from wireless stations into and out of building interiors, tunnels, shielded outdoor areas and other locations where these signals would otherwise be too weak for reliable communications. Signal booster systems may contain both Class A and Class B signal boosters as components.

Class A signal booster: A signal booster designed to retransmit signals on one or more specific channels. A signal booster is deemed to be a Class A signal booster if none of its passbands exceed 75 kHz.

Class B signal booster: A signal booster designed to retransmit any signals within a wide frequency band. A signal booster is deemed to be a Class B signal booster if it has a passband that exceeds 75 kHz.

3.2 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

Identification	
FCC ID:	P3TDH437-3XX
Brief Description	BDA
Type of Modular	n/a
Model(s) #	DH437-3XX
Firmware version	3.01-00
Software version	1.02
Serial Number	20101178FU

Technical Characteristics	
Technology	Bi-Directional Industrial Signal Booster
Frequency Range	UL: 424 – 430 MHz DL: 424 – 426 MHz
RF O/P Power (Max.)	UL: 24 dBm (0.25 W) DL: 37 dBm (5 W)
Modulation	n/a
Bandwidth & Emission Class	11K3F3E, 8K10F1D, 8K10F1E, 8K10F1W, 9K80F1D, 9K80F1E, 9K80D7W
Number of Channels	Variable.
Duty Cycle	100%
Antenna Connector	N
Voltage Rating (AC or Batt.)	28 V DC (internally)

Antenna Characteristics				
Antenna Name	Frequency Range	Antenna Type	Dimensions	Antenna Gain
n/a	n/a	n/a	n/a	n/a

Note: This EUT does not include antenna(s).

3.3 Configuration of EUT

Test Modes		
Band	Link Direction	Test Frequencies
424 – 430 MHz	Uplink	424.025 MHz
		429.975 MHz
424 – 426 MHz	Downlink	425.000 MHz

Operating conditions during Testing:

No other modifications of the device under test (including firmware, specific software settings, and input/output signal levels to the EUT) were made.

Peripherals used during Testing:

A laptop was used to control the EUT.

3.4 Test Setup of EUT

Equipment, antenna, and cable arrangement. The setup of the equipment and cable or wire placement on the test site that produces the highest radiated and the highest ac power line conducted emissions shall be shown clearly and described. Information on the orientation of portable equipment during testing shall be included. Drawings or photographs may be used for this purpose.

Test Setups are included in the test report.

4. Test methods & Applicable Regulatory Limits

4.1 Test methods/Standards/Guidance:

Test procedures and guidance for measuring Licensed Part 90 Licensed device:

1) ANSI C63.26-2015
2) FCC KDB 935210 D05 v01r04 Industrial Signal Boosters

4.2 Applied Limits and Regulatory Limits:

1) FCC CFR 47 Part 90 Subpart I, 90.219

5. Measurement Uncertainty

Parameter	Uncertainty (dB)
Conducted Emissions	± 3.14 dB
Radiated Emissions (9kHz – 30 MHz)	± 3.08 dB
Radiated Emissions (30 – 200 MHz)	± 2.16 dB
Radiated Emissions (200 – 1000 MHz)	± 2.15 dB
Radiated Emissions (1 GHz – 18 GHz)	± 2.14 dB
Radiated Emissions (18 GHz – 40 GHz)	± 2.31 dB
Note: The uncertainties provided in this table represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of K=2.	

6. Environmental Conditions

6.1 Temperature & Humidity

Measurements performed at the test site did not exceed the following:

Temperature	23 C +/- 5%
Humidity	55% +/- 5%
Note: Specific environmental conditions that are applicable to a specific test are available in the test result section.	

7. List of Test Equipment and Test Facility

The test equipment used identified by type, manufacturer, serial number, or other identification and the date on which the next calibration or service check is due.

Description of the firmware or software used to operate EUT for testing purposes.

A complete list of all test equipment used shall be included with the test report. The manufacturer's model and serial numbers, and date of last calibration, and calibration interval shall be included. Measurement cable loss, measuring instrument bandwidth and detector function, video bandwidth, if appropriate, and antenna factors shall also be included where applicable.

7.1 List of Test Equipment

Device	Manufacturer	Model	SN #	Current Cal	Cal Due
Signal Generator HP 8648C	HP	8648C	3847A04696	9/11/20	9/11/2023
Signal Generator R&S SMU-200A	Rohde & Schwarz	SMU200A	103195	4/23/18	4/22/2021
Digital Multimeter	Fluke	77	43850817	7/20/19	7/19/2022
Active Loop	ETS-Lindgren	6502	00062529	10/20/20	10/20/2023
Biconical 1057	Eaton	94455-1	1057	10/16/20	10/16/2023
Log-Periodic 1243	Eaton	96005	1243	4/20/18	4/19/2021
Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	2/25/20	2/24/2023
Double-Ridged Horn 18-40 GHz	EMCO	3116	9011-2145	10/19/20	10/19/2023
CHAMBER	Panashield	3M	N/A	3/12/19	3/11/2021
Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	2/27/19	2/26/2022
EMI Test Receiver R&S ESU 40	Rohde & Schwarz	ESU 40	100320	8/28/18	8/27/2021

Type	Device	Manufacturer	Model	SN #	Last Verified
Adapter	Type NF to BM		91836 UG-201A/U	91836 UG-201A/U 02	12/10/20
Adapter	Type NF to BM		KINGS KN-99-46	KINGS KN-99-46	12/10/20
Adapter	Type NM to BF	Pasternack	PE9002	PE9002 01	12/10/20
Adapter	Type NM to BF	Pasternack	PE9005	#98	12/10/20
Attenuator	NM to NF 20dB 20W DC-12G	Narda	768-20-SP	#7	12/10/20
Attenuator	NM to NF 20dB 20W DC-12G	Narda	768-20-SP	#6	12/10/20
Coaxial Cable	BMBM-0122-00 Silver	Unknown		BMBM-0122-00	12/10/20
Coaxial Cable	BMBM-0122-01 RG400	Pasternack	PE3582LF-48	BMBM-0122-01	12/10/20
Coaxial Cable	BMBM-0122-02 RG400	Pasternack	PE3582LF-48	BMBM-0122-02	12/10/20
Coaxial Cable	BMBM-0122-03 RG400	Pasternack	PE3582LF-48	BMBM-0122-03	12/10/20
Coaxial Cable	BMBM-0122-04 RG400	Pasternack	PE3582LF-48	BMBM-0122-04	12/10/20
Coaxial Cable	Chamber 3 cable set (backup)	Micro-Coax	Chamber 3 cable set (backup)	KMKM-0244-02 ; KMKM-0670-0	12/10/20
Combiner	Splitter/Combiner 1-1000MHz	Mini-Circuits	ZFSC-4-1-BNC+	U115700825	12/10/20
Combiner	Splitter/Combiner 1-1000MHz	Mini-Circuits	ZFSC-4-1-BNC+	U115700826	12/10/20
Terminator	Terminator BNC 50OHM 1W	Amphenol	000-46650-51RFX	#120	12/10/20
Terminator	Terminator BNC 50OHM 1W	Amphenol		#122	12/10/20
Terminator	Terminator BNC 50OHM 1W	Amphenol	000-46650-51RFX	#119	12/10/20
Terminator	Terminator BNC 50OHM 1W	Unknown	Unknown	#121	12/10/20
Test Equipment Adapter	Type R&S to NF			Test Equipment Adapter 04	12/10/20

Software	Author	Version
ESU Firmware	Rohde & Schwarz	4.43 SP3; BIOS v5.1-24-3
RSCommander	Rohde & Schwarz	1.6.4
Field Strength	Timco	v4.10.7.0

8. Test Results

The results of the test are usually indicated in the form of tables, spectrum analyzer plots, charts, sample calculations, as appropriate for each test procedure.

A description and/or a block diagram of the test setup is usually provided.

The measurement results, along with the appropriate limits for comparison, may be presented in tabular or graphical form. In addition, any variation in the measurement environment may be reported if applicable (e.g., a significant change of temperature that could affect the cable loss and amplifier response).

Unless noted otherwise in the referenced standard, the measurements of ac power-line conducted emissions and conducted power output will be reported in units of dBµV. Unless noted otherwise in the referenced standard, the measurements of radiated emissions will be reported in units of decibels, referenced to one microvolt per meter (dBµV/m) for electric fields, or to one ampere per meter (dBA/m) for magnetic fields, at the distance specified in the appropriate standards or requirements. The measurements of antenna-conducted power for receivers may be reported in units of dBµV if the impedance of the measuring instrument is also reported. Otherwise, antenna-conducted power will be reported in units of decibels referenced to one milliwatt (dBm). All formulas for data conversions and conversion factors, if used, will be included in this measurement report.

8.1 Power at the Final Amplifier

Limits from FCC Part 2.1033 (c)(8).

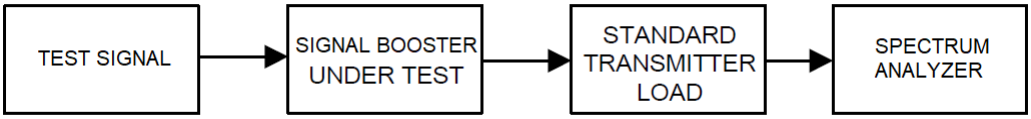
No method of measurement is specified. The result has been calculated based on all available information.

Test Results		
EUT Operating Voltage (V)	EUT Current (A)	Power at the Final Amplifier
28 V DC	3.57	100 W

8.2 RF Output Power & Gain

Limits from FCC Parts 2.1046(a), and 90.205 and test procedure from ANSI C63.26-2015 and FCC KDB 935210 D05 v01r04 Industrial Signal Boosters.

Test Setup



Test Results, Power Output

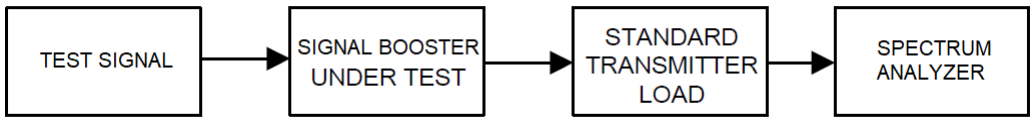
Link Direction	Max Power Output (dBm)	Max Power Output (W)	Tuning Tolerance (dB)
Uplink	24.0	0.25	+/- 2.0
Downlink	37.0	5.0	+/- 2.0

Test Results, Gain

Link Direction	Tuned Frequency (MHz)	Input Level	Power Input (dBm)	Power Output (dBm)	Gain (dB)
Uplink	424.025	AGC	-55.71	24.83	80.54
		AGC+3	-52.71	24.83	77.54
		Maximum	0	24.83	24.83
	429.975	AGC	-55.71	25.07	80.78
		AGC+3	-52.71	25.07	77.78
		Maximum	0	25.07	25.07
Downlink	425.000	AGC	-44.71	36.43	81.14
		AGC+3	-41.71	36.43	78.14
		Maximum	0	36.43	36.43

8.3 Out-of-band Rejection

Limits and test method from FCC KDB 935210 D05 v01r04 Industrial Signal Boosters.

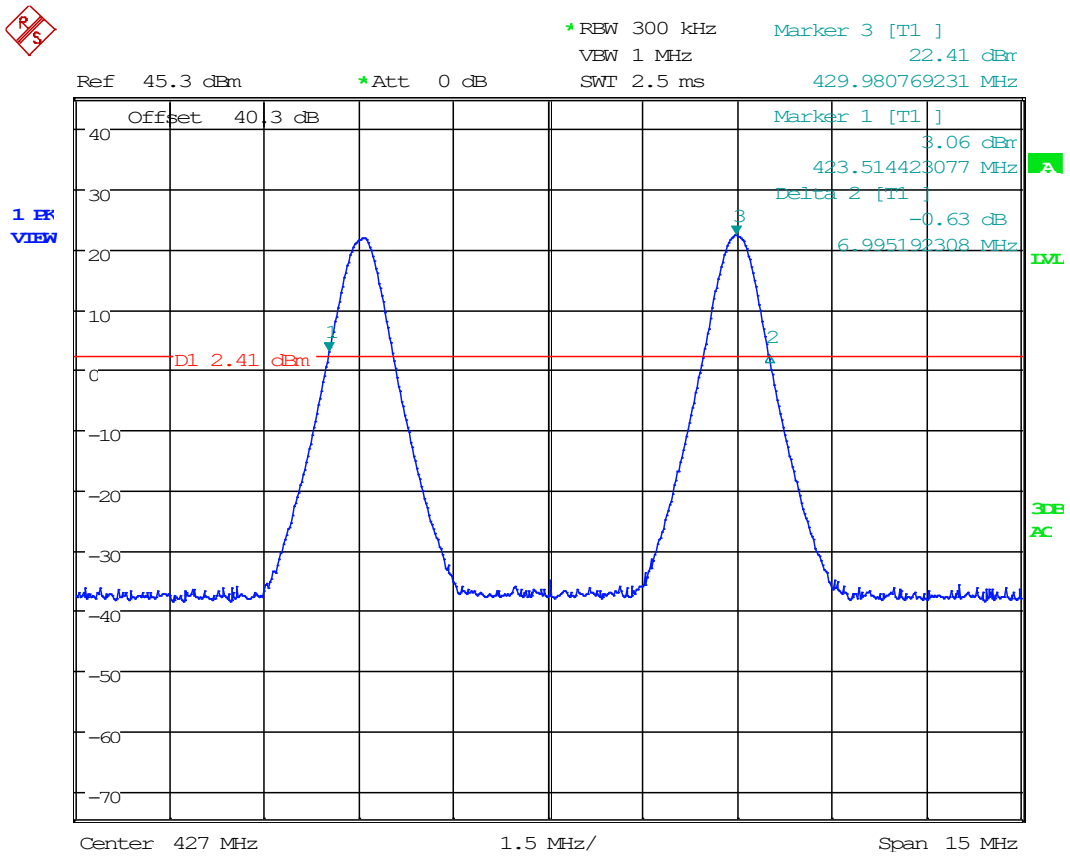
Test Setup


Test Results, Out-of-band Rejection and Class of Operation			
Operating Band	Link Direction	Passband (kHz)	Class of Operation
424 – 430 MHz	Uplink	< 75 kHz	Class A
424 – 426 MHz	Downlink	< 75 kHz	Class A

NOTE: The equipment under test is channelized and will only allow the specified channel(s) to pass.

Out-of-band Rejection, Spectrum Plots

8.3.1 Uplink



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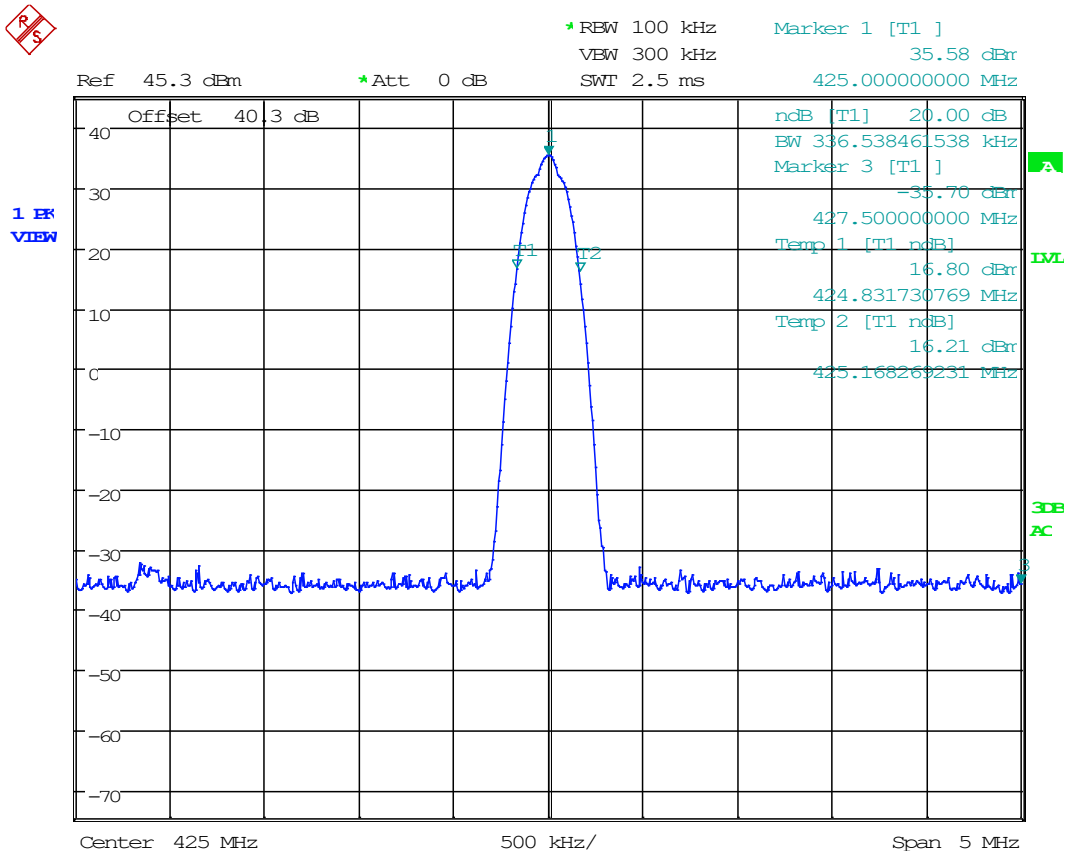
8.3.2 Downlink



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8.4 Bandwidth & Emission

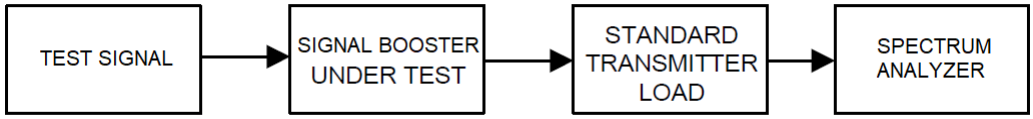
Limits from FCC Parts 90.209 and FCC KDB 935210 D05 v01r04 Industrial Signal Boosters.

Authorized Bandwidth		
Rule Part	Operating Range	Authorized Bandwidth
Part 90	424 – 430 MHz	11.25 kHz

Applicable Input Signals		
Signal	Occupied Bandwidth (MHz)	Representative Emission Designator(s)
CW	n/a	n/a
12.5 kHz FM	11.3	11K3F3E
C4FM (P25 Phase I)	8.1	8K10F1D, 8K10F1E
HCPM (P25 Phase II SU)	8.1	8K10F1W
HDQPSK (P25 Phase II BS)	9.8	9K80F1D, 9K80F1E, 9K80D7W

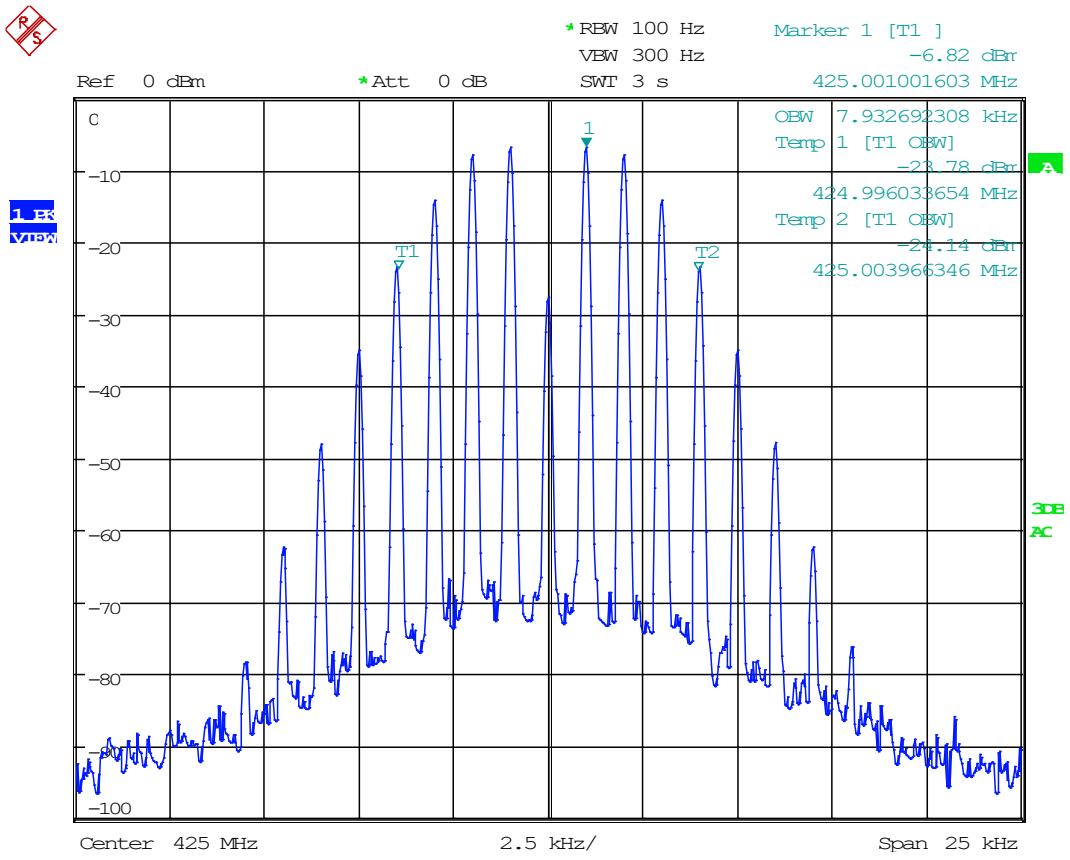
8.5 Input VS Output Signal Comparison

Limits from FCC Parts 90.210 and test procedure from ANSI C63.26-2015 and FCC KDB 935210 D05 v01r04 Industrial Signal Boosters.

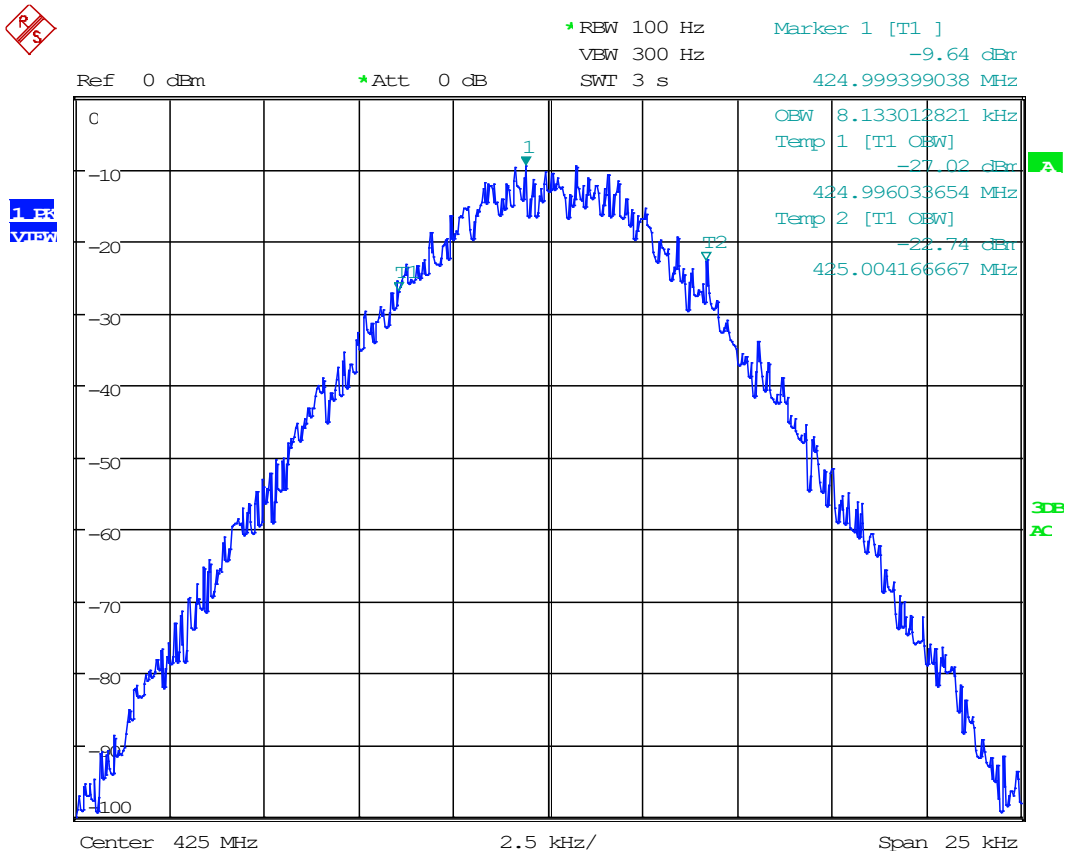
Test Setup


Input VS Output, Input Spectrum Plots

8.5.1 12.5 kHz FM, Input Signal

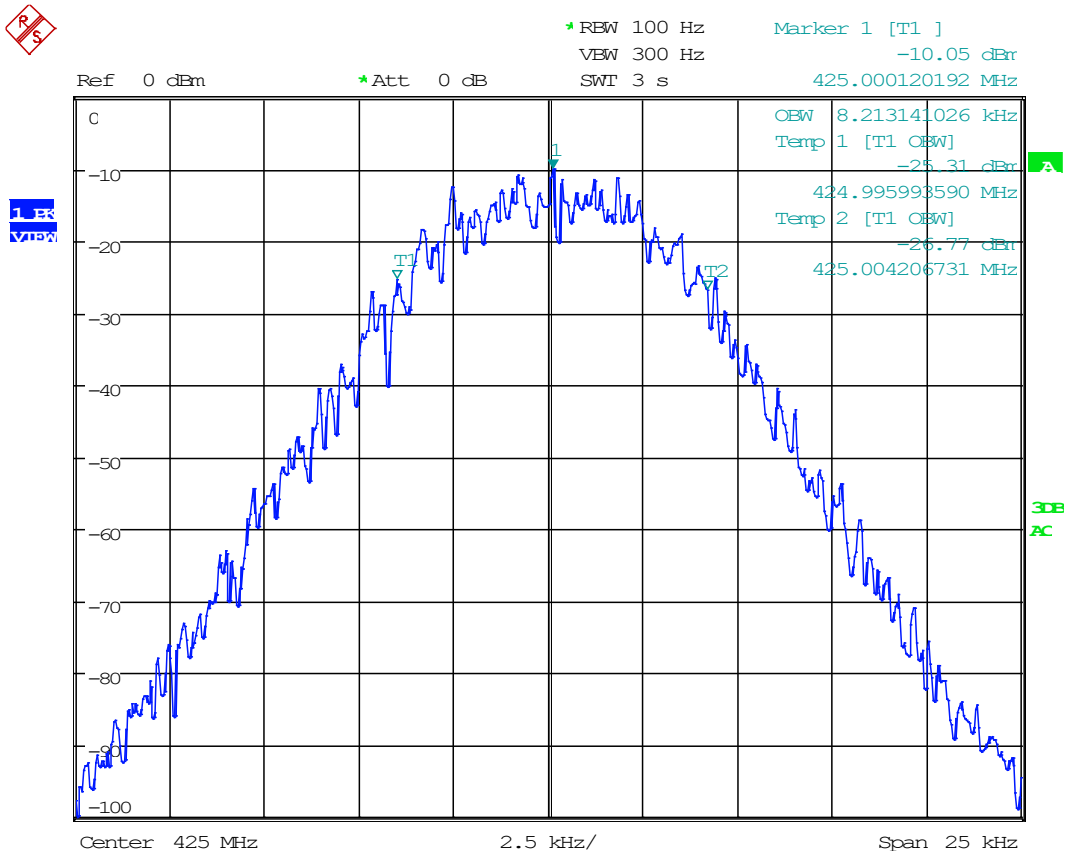


8.5.2 C4FM, Input Signal



Date: 4.JAN.2021 11:42:36

8.5.3 H-CPM, Input Signal



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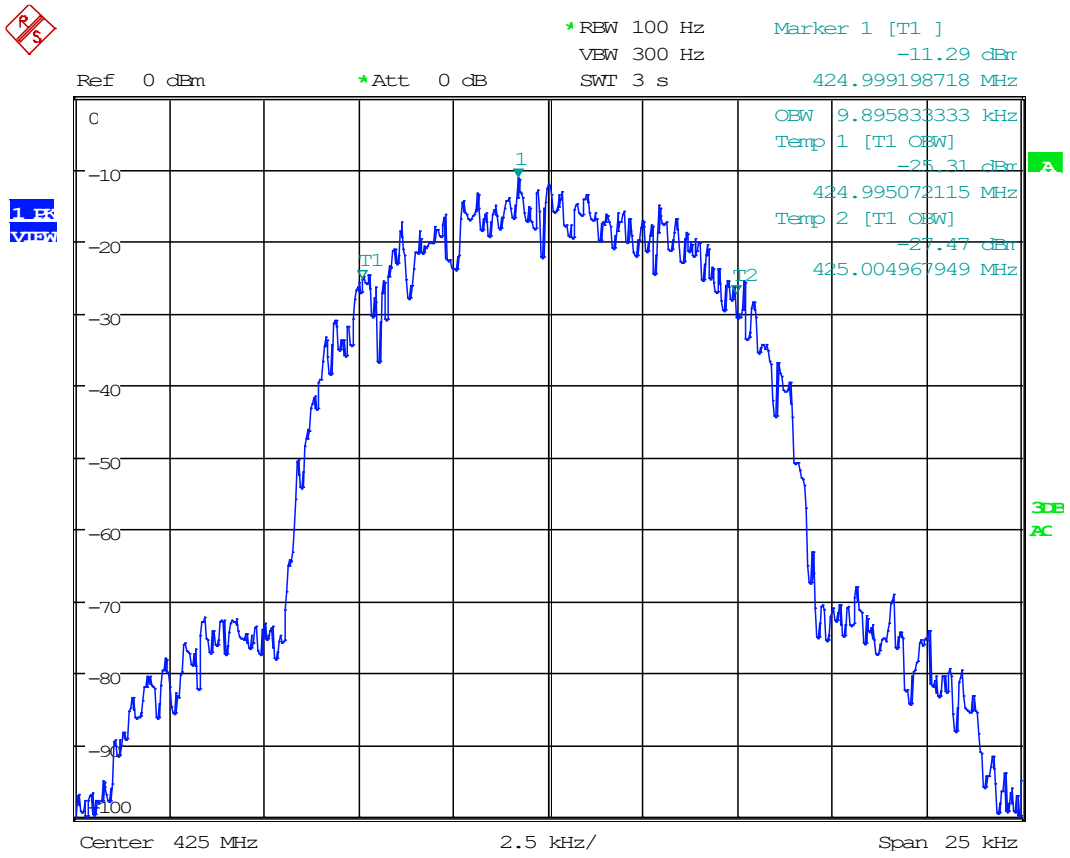
8.5.4 H-DQPSK, Input Signal



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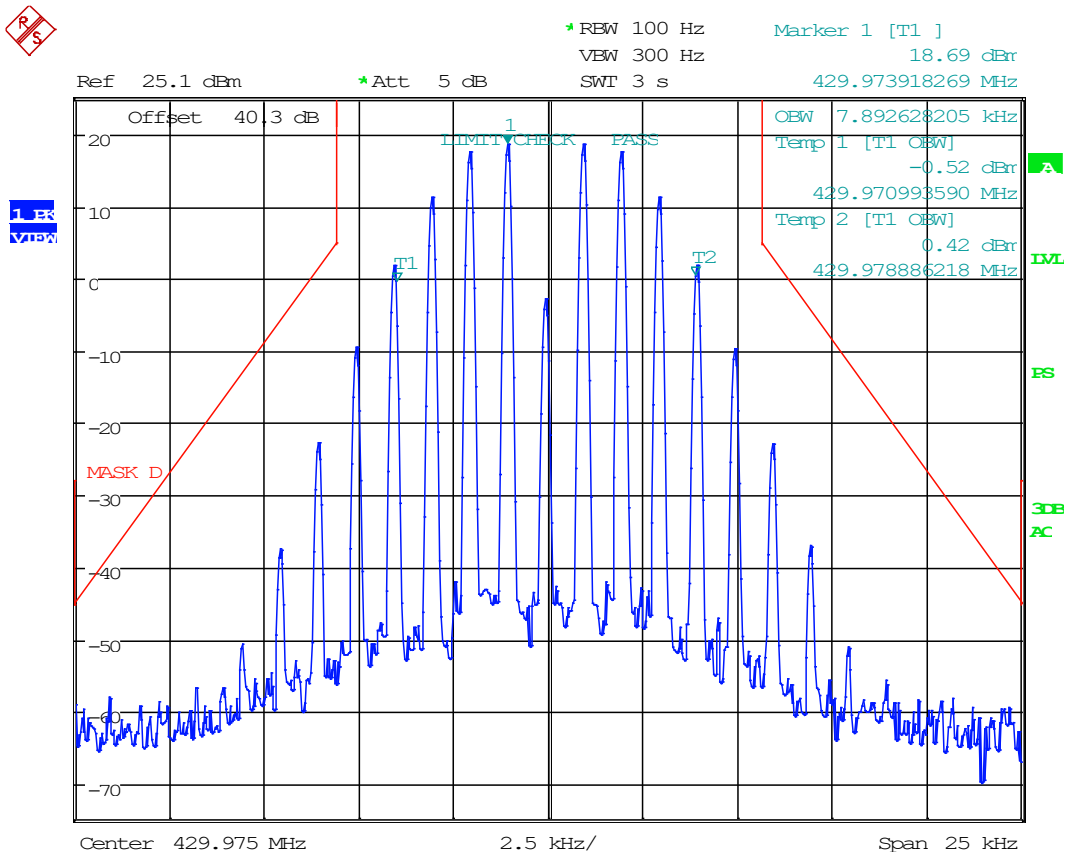
Input VS Output, Output Spectrum Plots, UHF Band

8.5.5 12.5 kHz FM, Uplink, AGC



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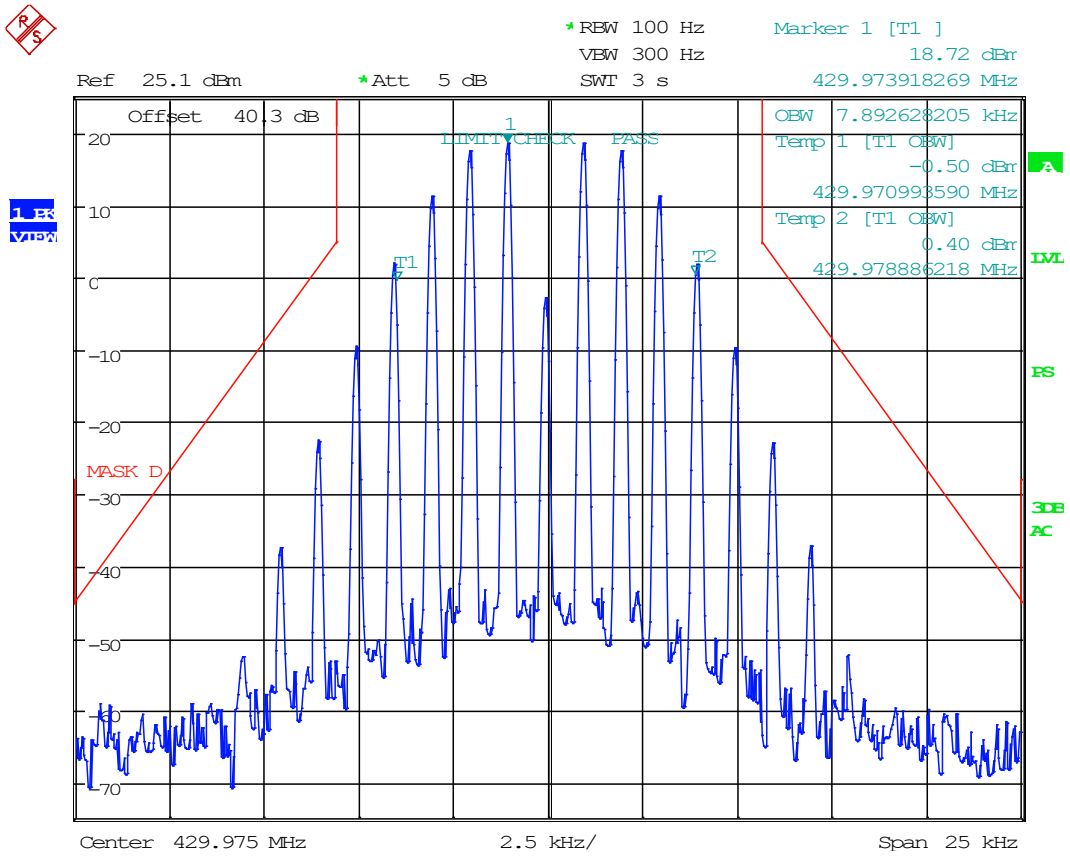
8.5.6 12.5 kHz FM, Uplink, AGC +3dB



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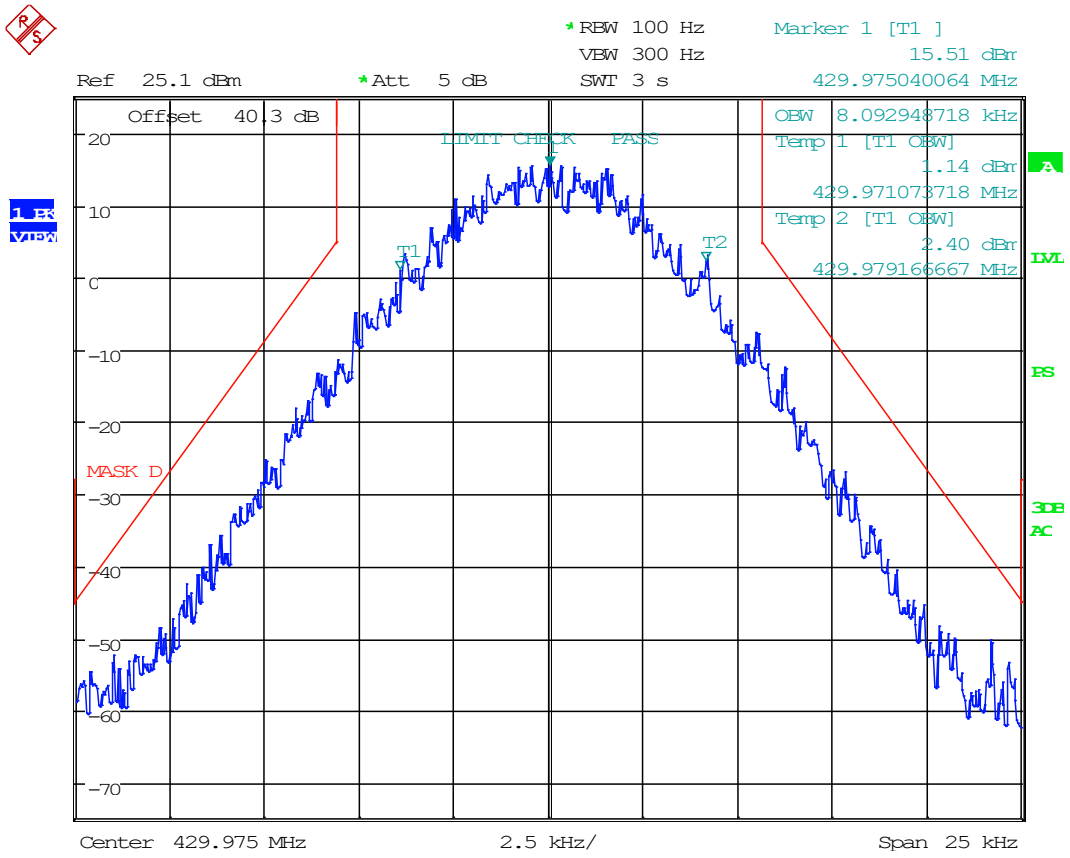
8.5.7 C4FM, Uplink, AGC



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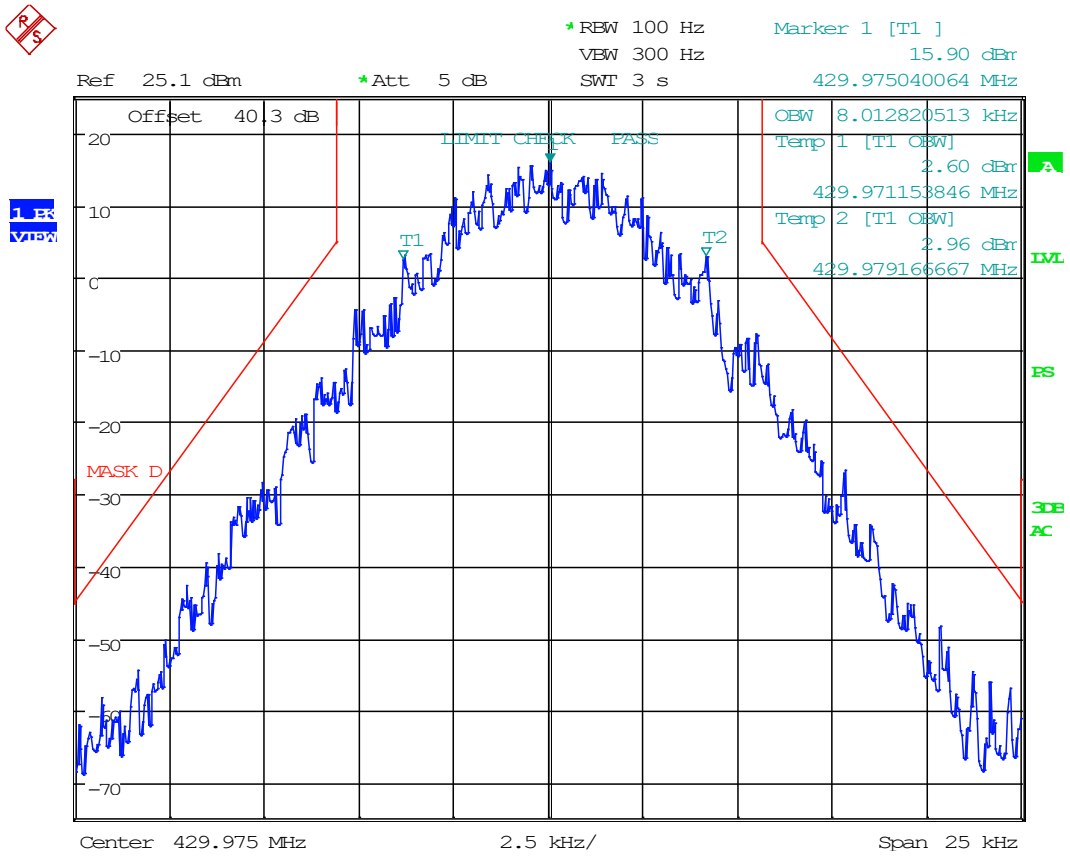
8.5.8 C4FM, Uplink, AGC +3dB



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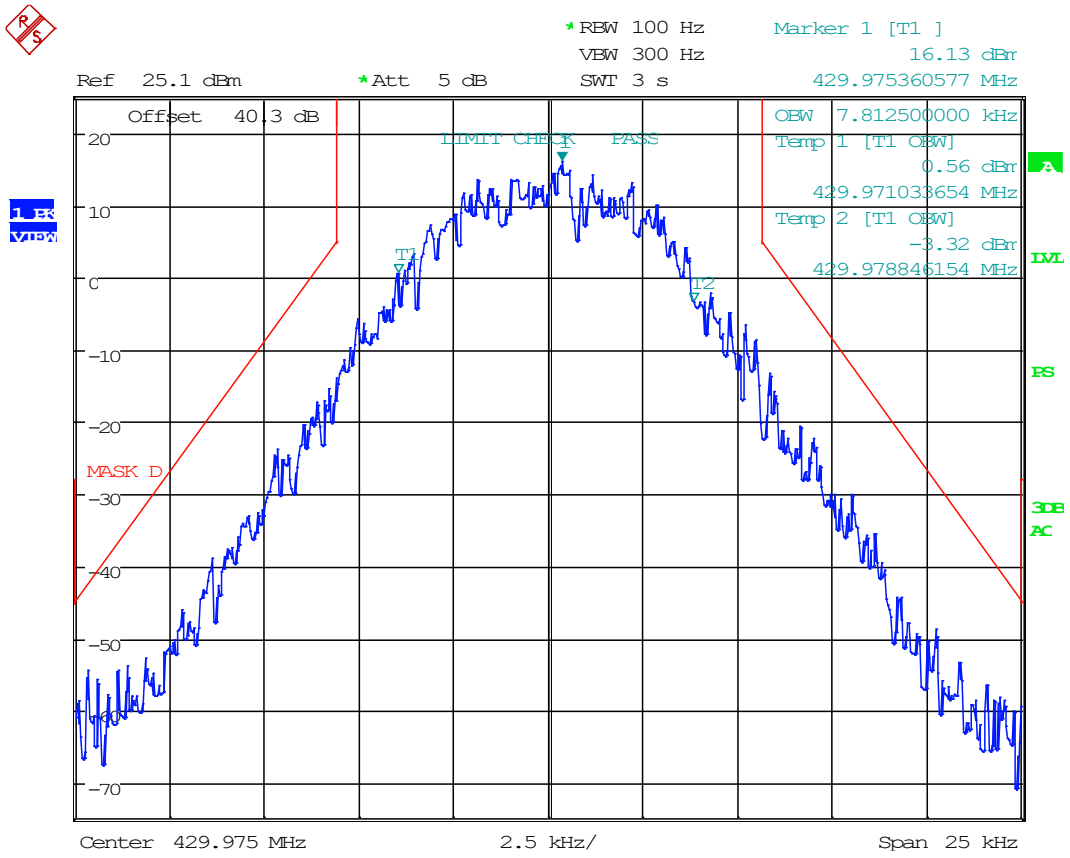
8.5.9 H-CPM, Uplink, AGC



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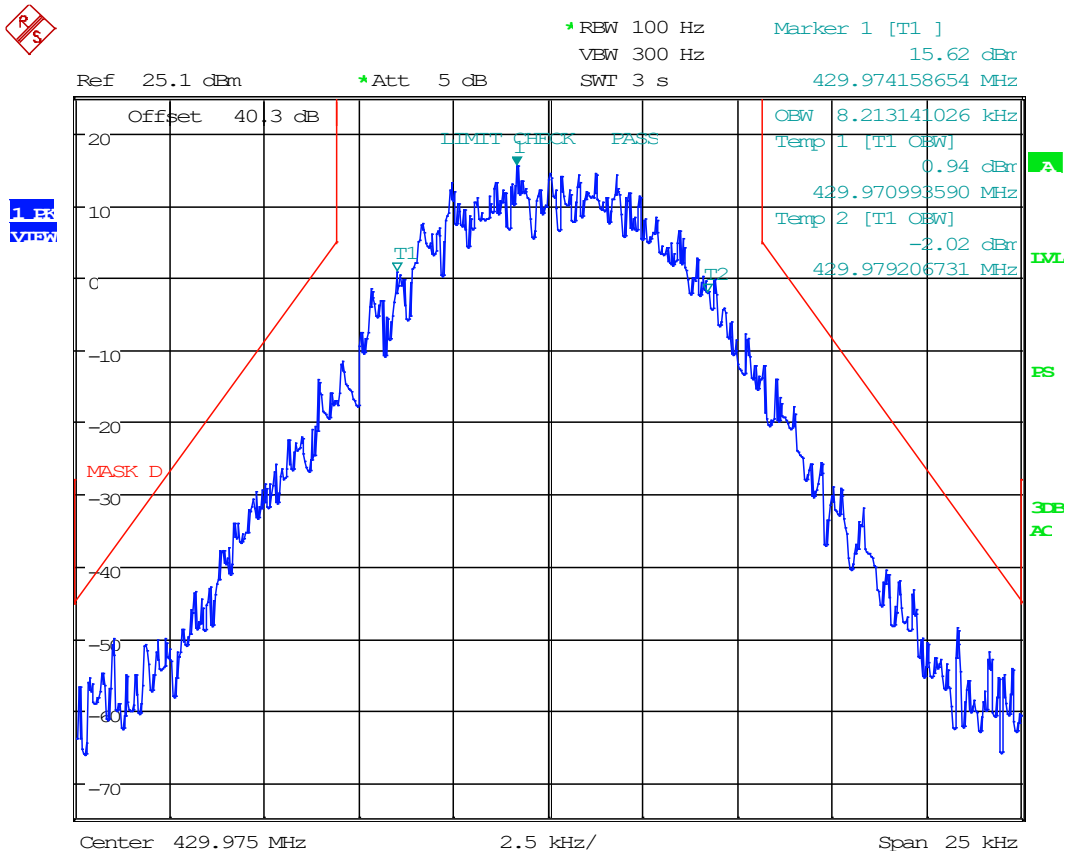
8.5.10 H-CPM, Uplink, AGC +3dB



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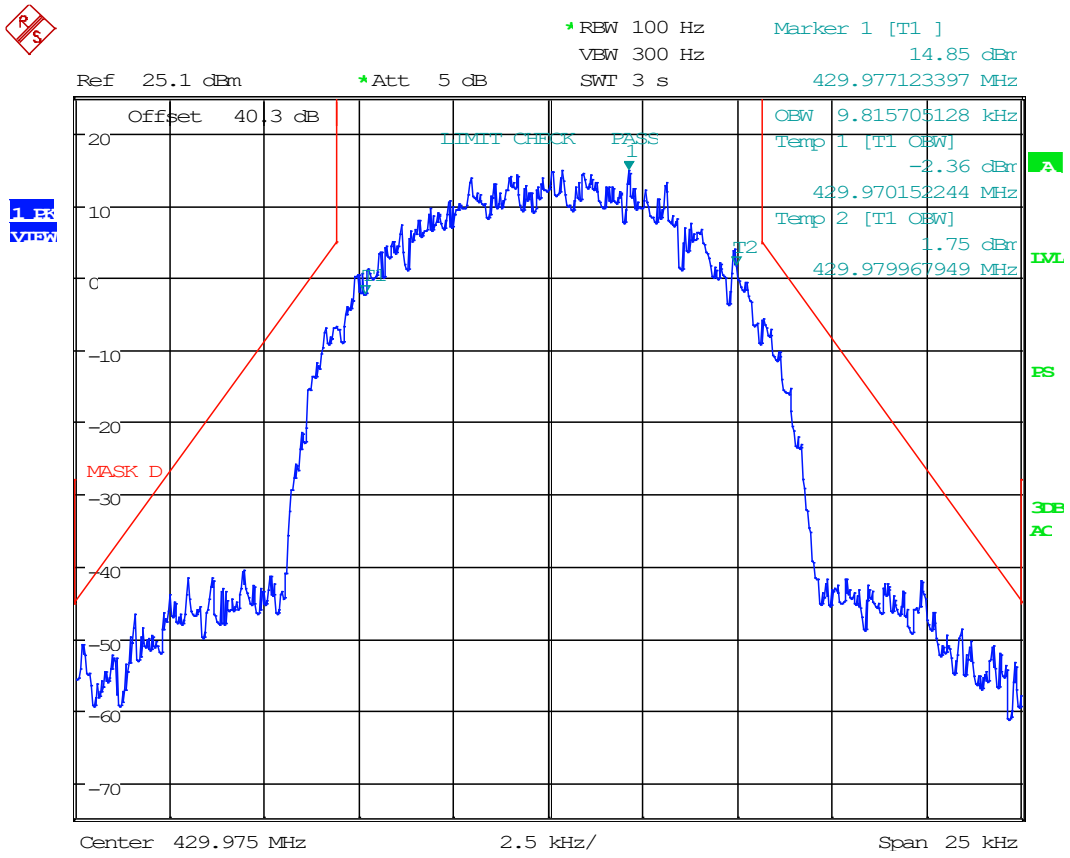
8.5.11 H-DQPSK, Uplink, AGC



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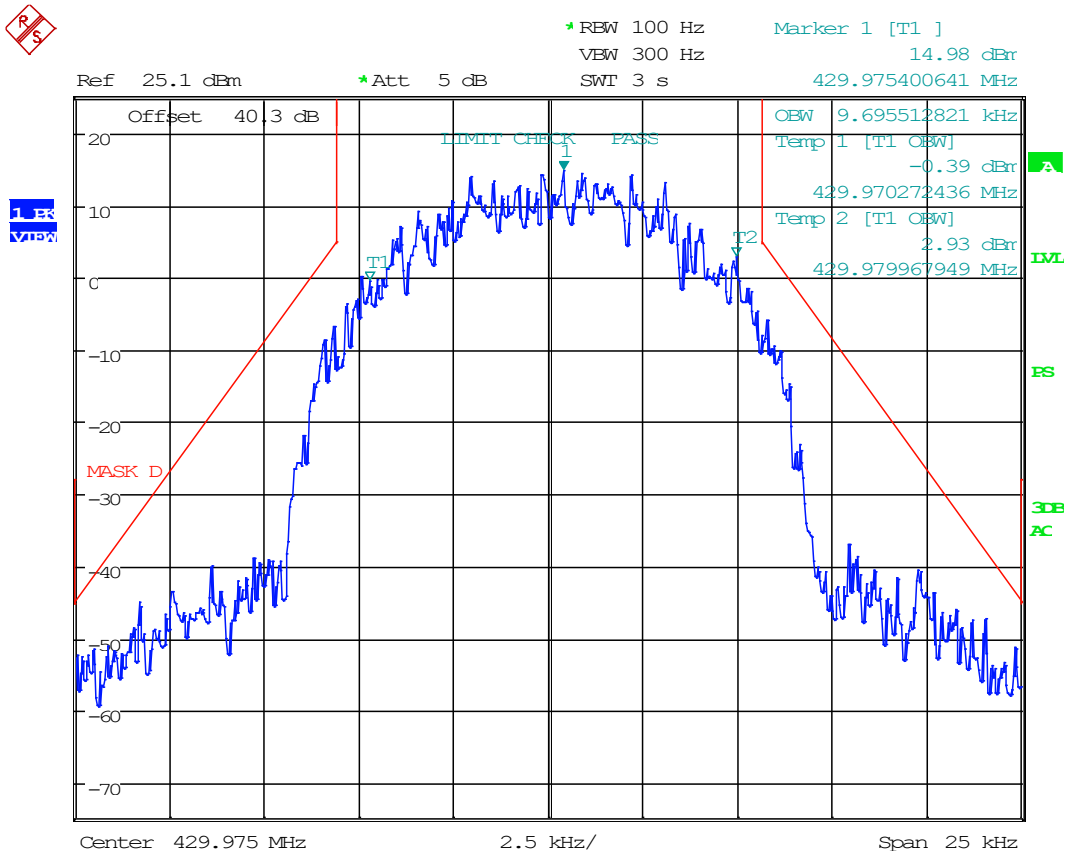
8.5.12 H-DQPSK, Uplink, AGC +3dB



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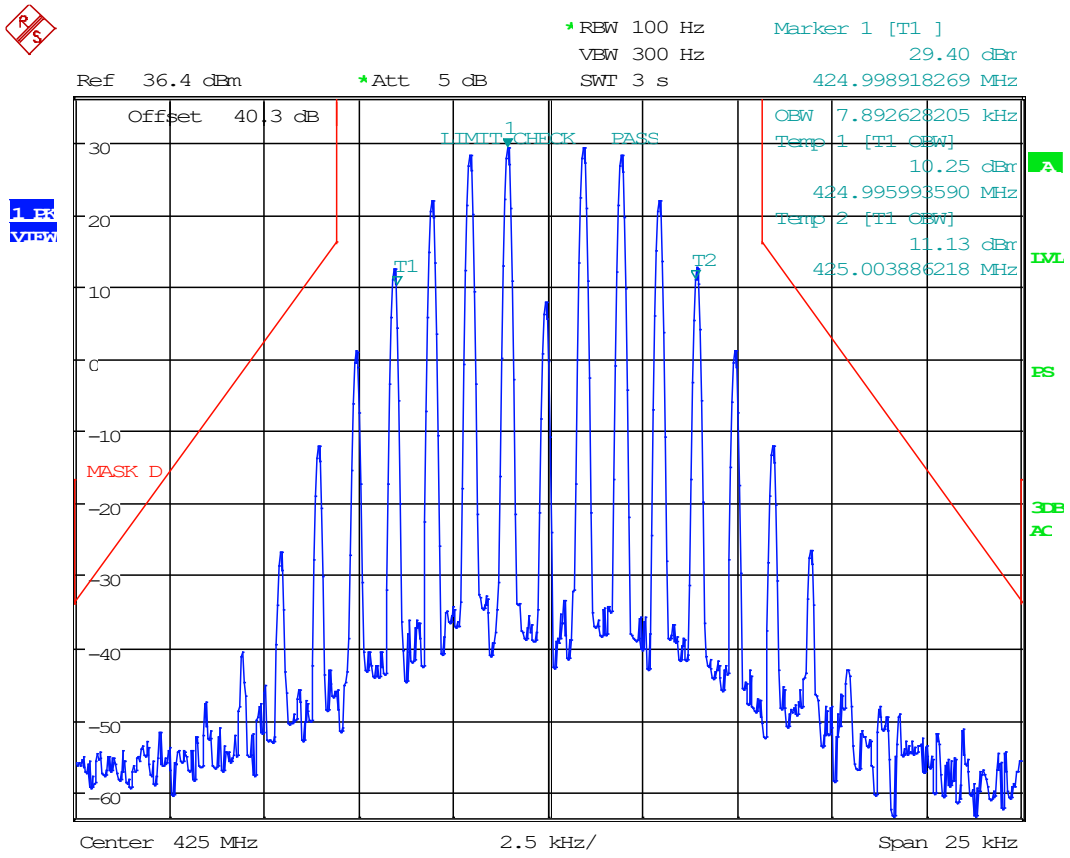
8.5.13 12.5 kHz FM, Downlink, AGC



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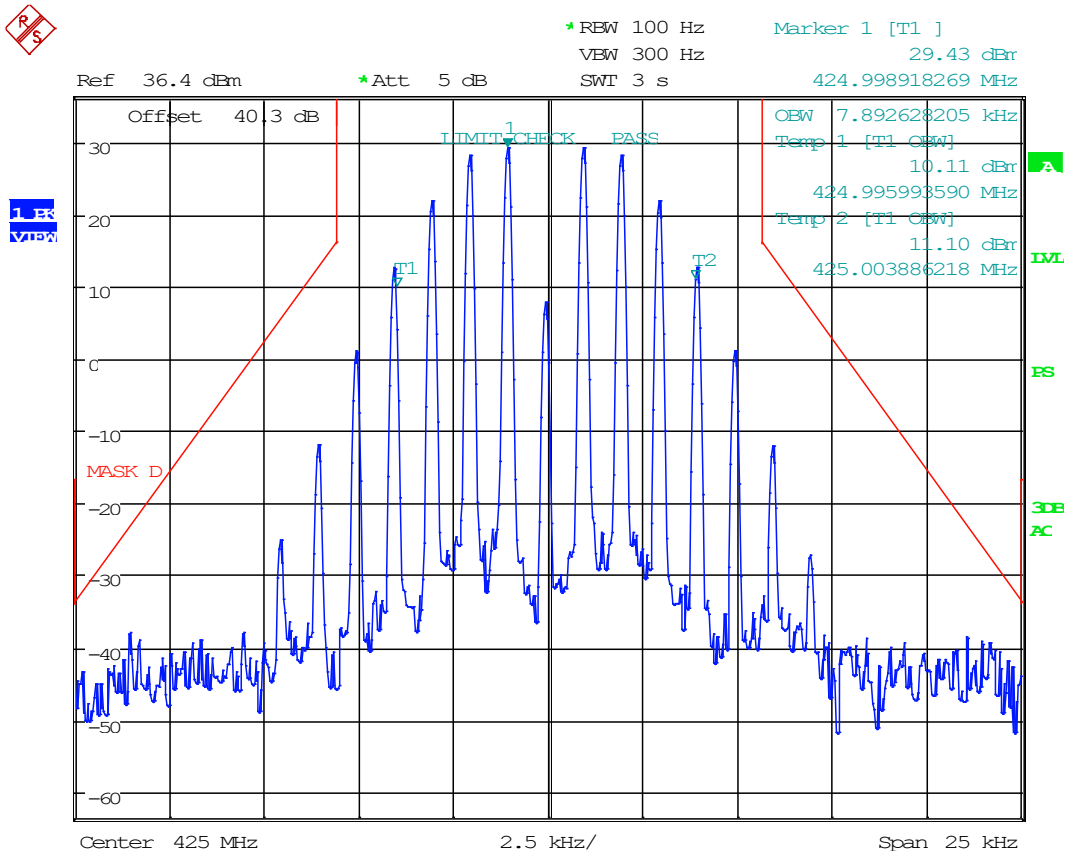
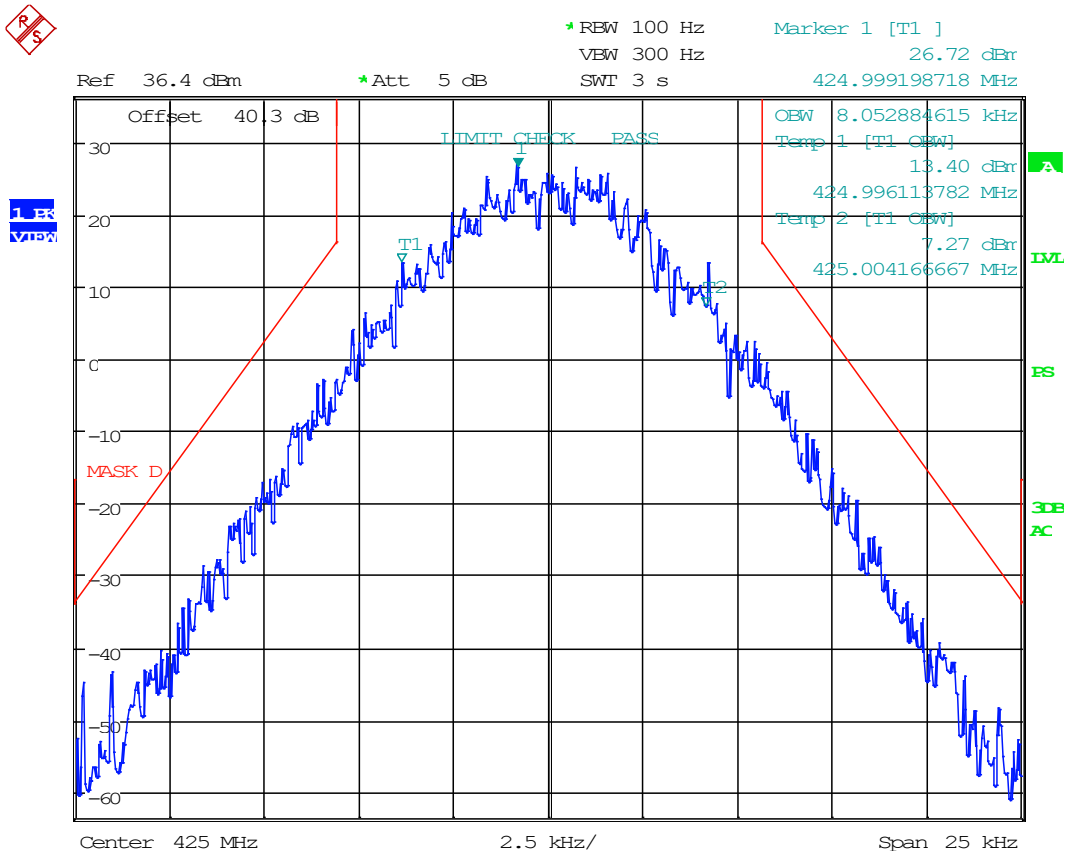
8.5.14 12.5 kHz FM, Downlink, AGC +3dB



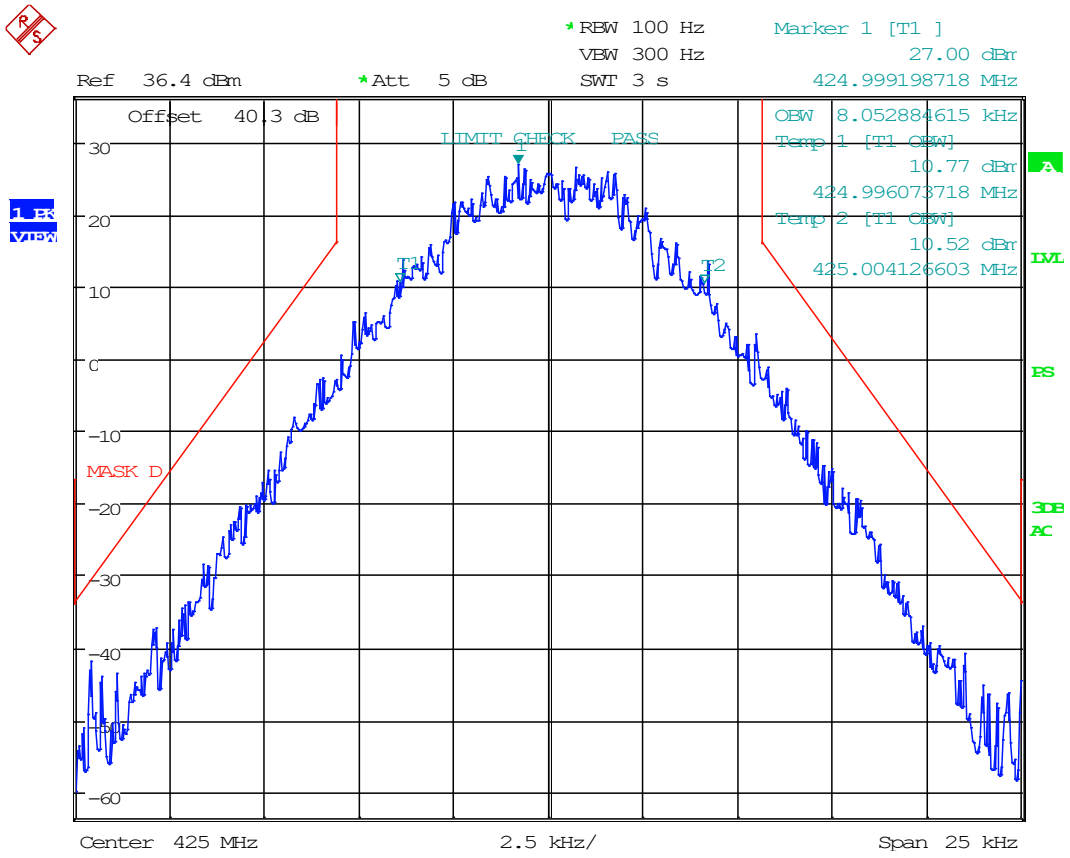
Date: 21.DEC.2020 16:00:25

8.5.15 C4FM, Downlink, AGC



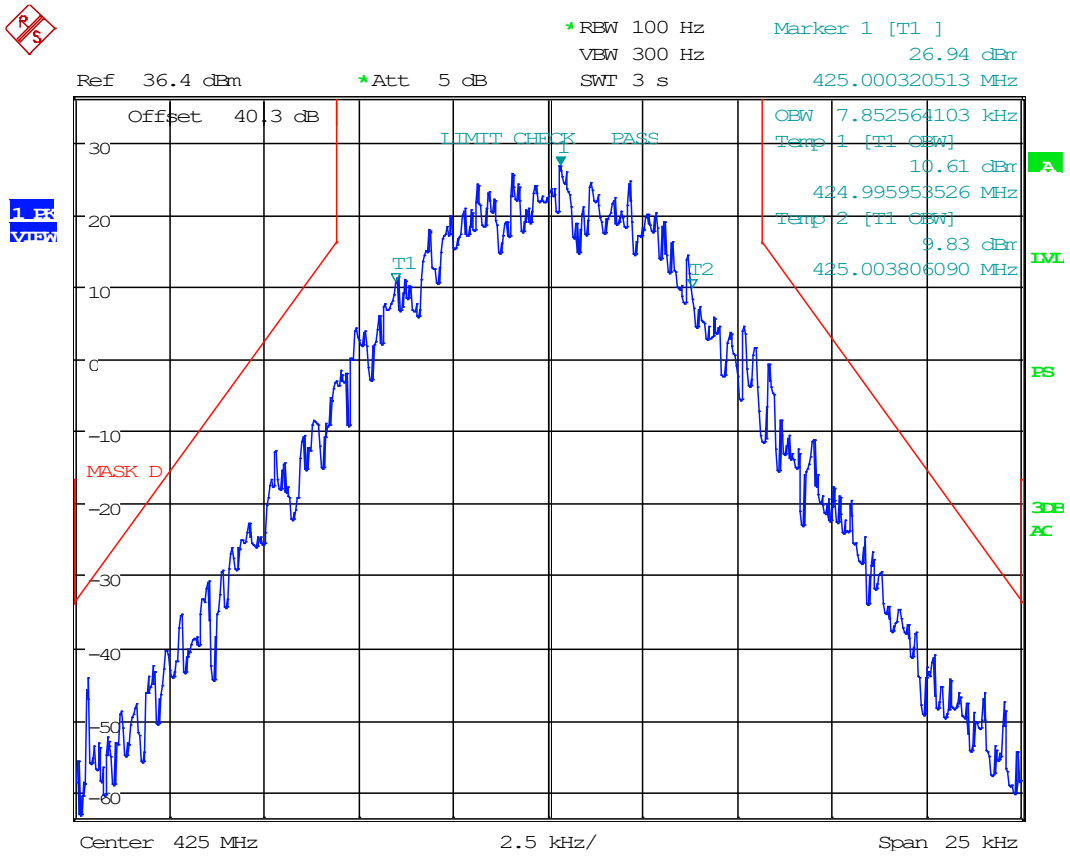
Date: 21.DEC.2020 15:55:48

8.5.16 C4FM, Downlink, AGC +3dB



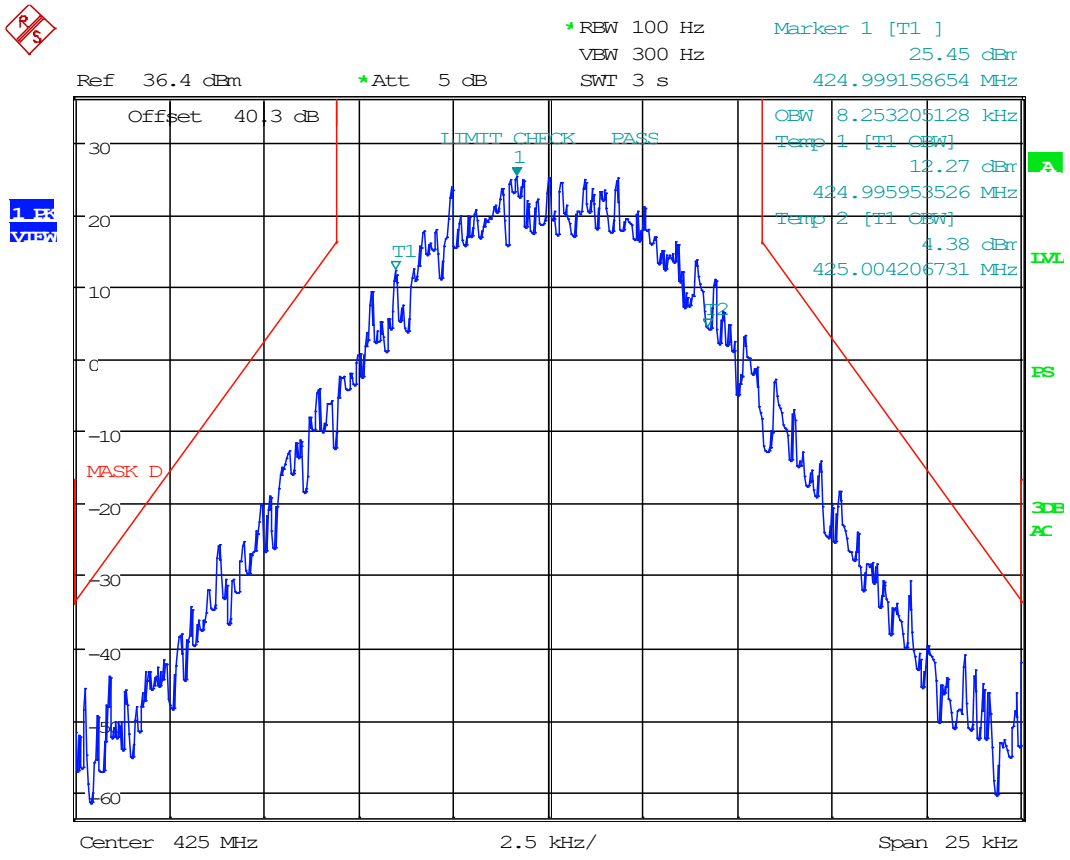
Date: 21.DEC.2020 15:55:25

8.5.17 H-CPM, Downlink, AGC



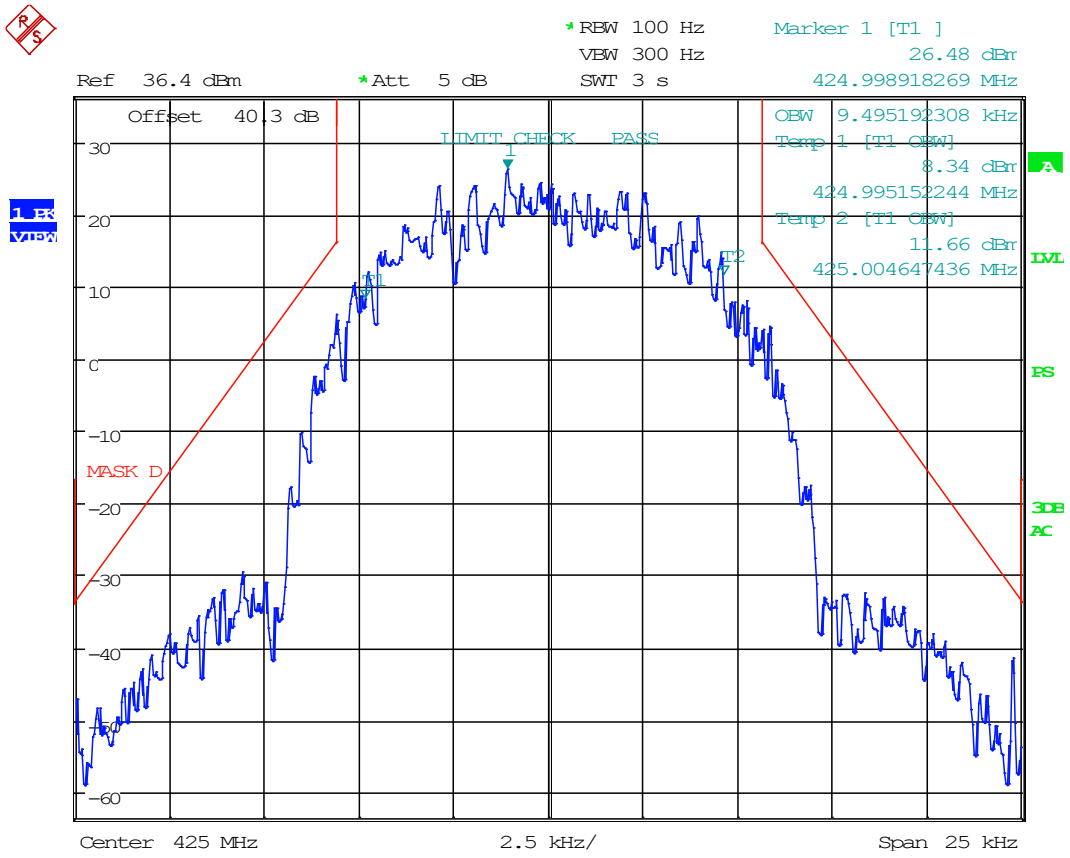
Date: 21.DEC.2020 15:56:18

8.5.18 H-CPM, Downlink, AGC +3dB



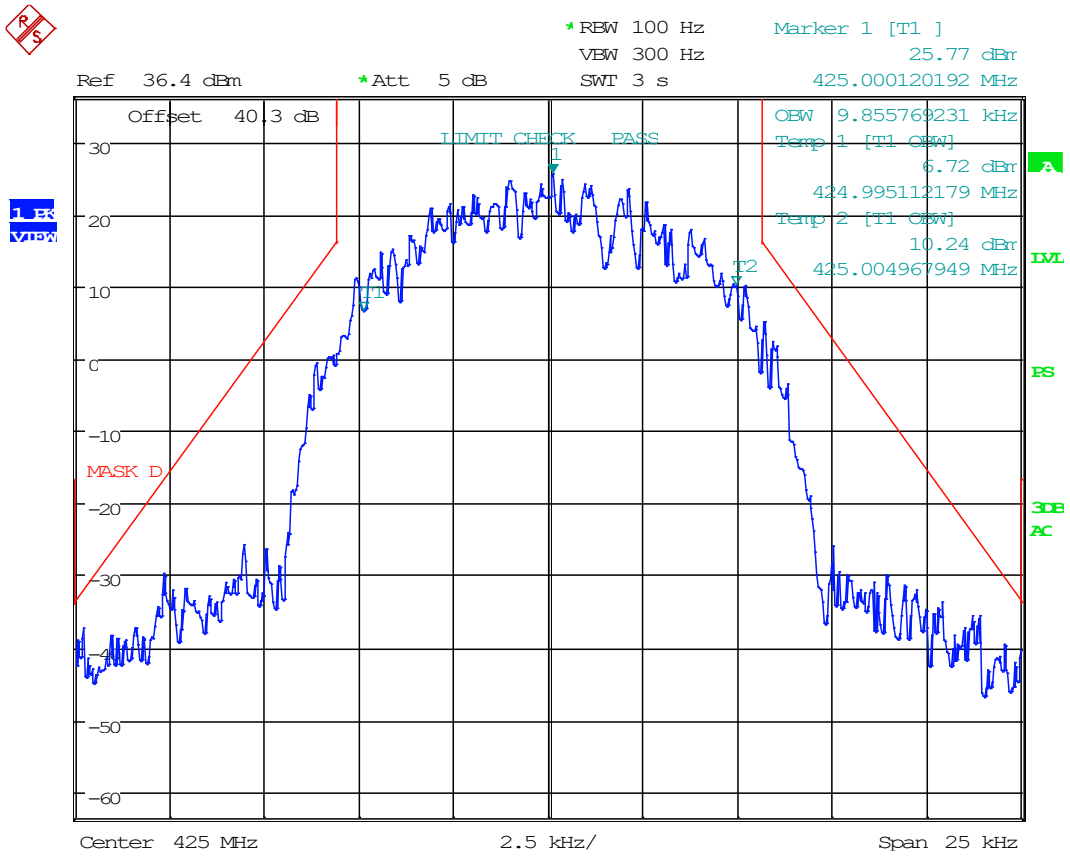
Date: 21.DEC.2020 15:56:37

8.5.19 H-DQPSK, Downlink, AGC



Date: 21.DEC.2020 15:57:35

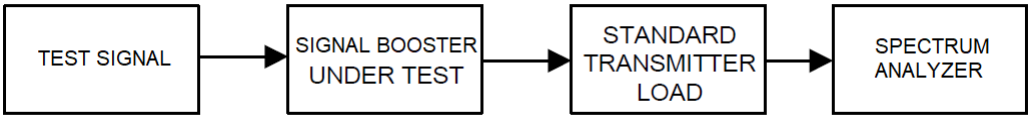
8.5.20 H-DQPSK, Downlink, AGC +3dB



Date: 21.DEC.2020 15:57:12

8.6 Noise Figure

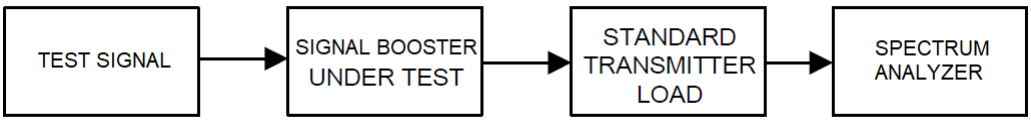
Limits from FCC KDB 935210 D05 v01r04 Industrial Signal Boosters. Test method from "Noise Figure Measurement Accuracy: The Y-Factor Method" by Keysight Technologies.

Test Setup


Test Results, Out-of-band Rejection and Class of Operation			
Operating Band	Link Direction	Noise Figure	Limit
424 – 430 MHz	Uplink	4.97 dB	< 9 dB
424 – 426 MHz	Downlink	2.91 dB	< 9 dB

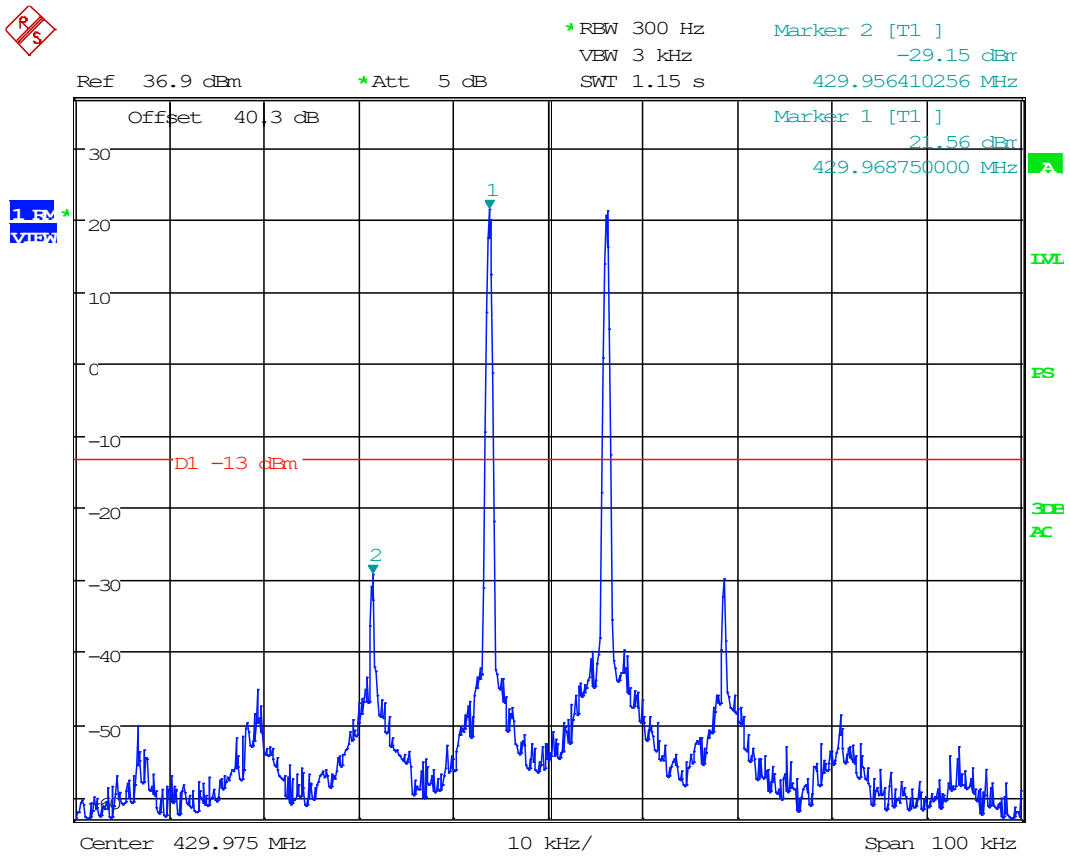
8.7 Out-of-Band/Out-of-Block Emissions (Intermodulation Products)

Limits from FCC Parts 2.1051, 90.210 and test procedure from ANSI C63.26-2015 and FCC KDB 935210 D05 v01r04 Industrial Signal Boosters.

Test Setup


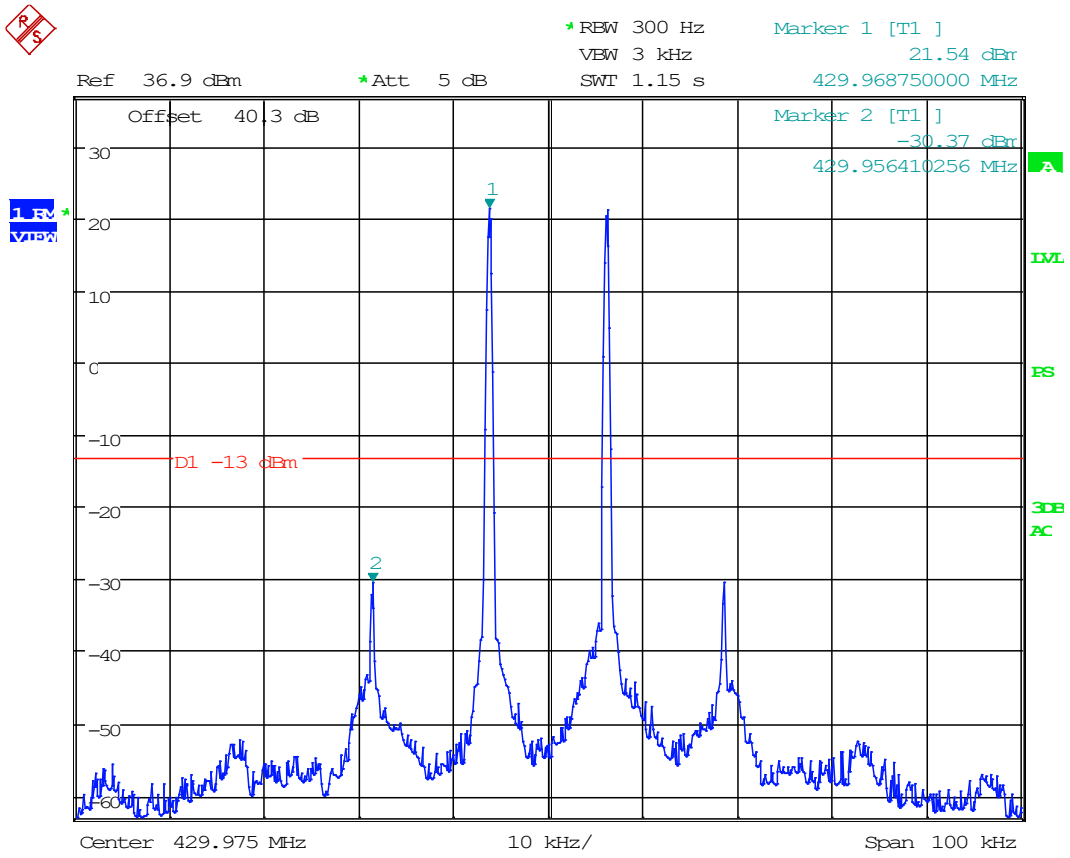
Intermodulation Products Spectrum Plots, UHF Band

8.7.1 12.5 kHz Signal, Uplink, AGC



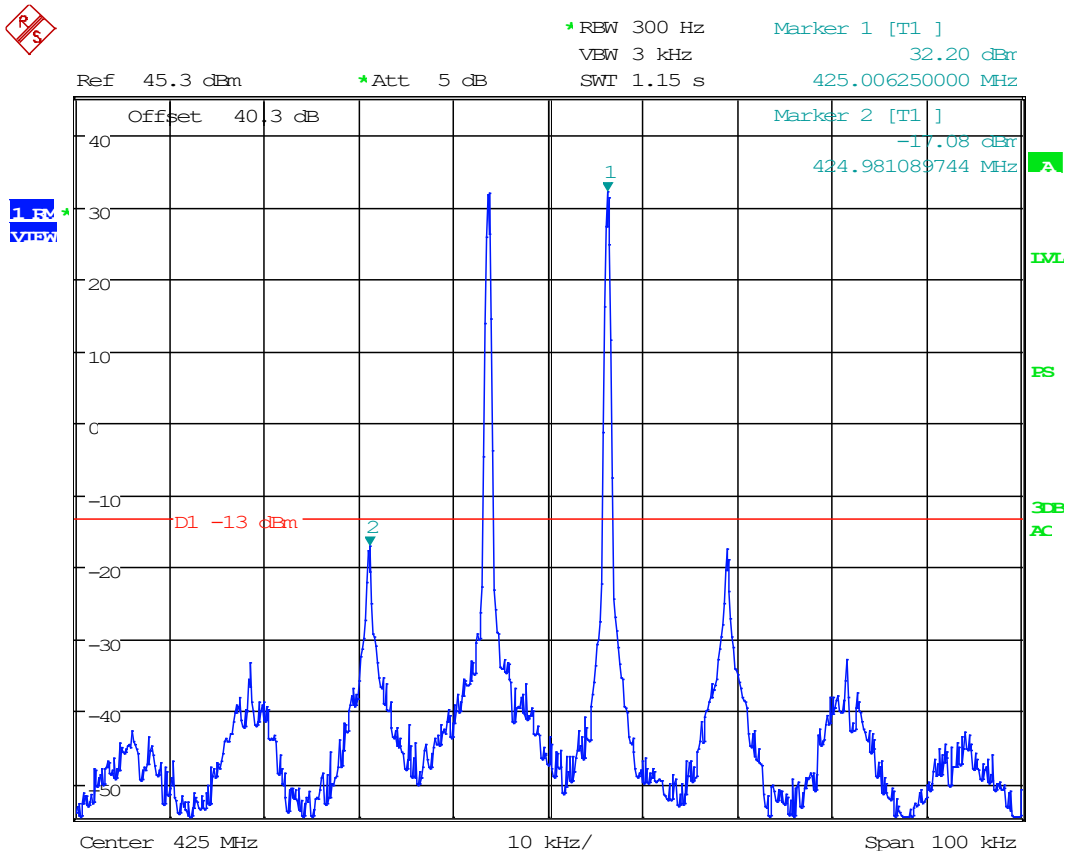
Date: 21.DEC.2020 13:54:14

8.7.2 12.5 kHz Signal, Uplink, AGC +3dB



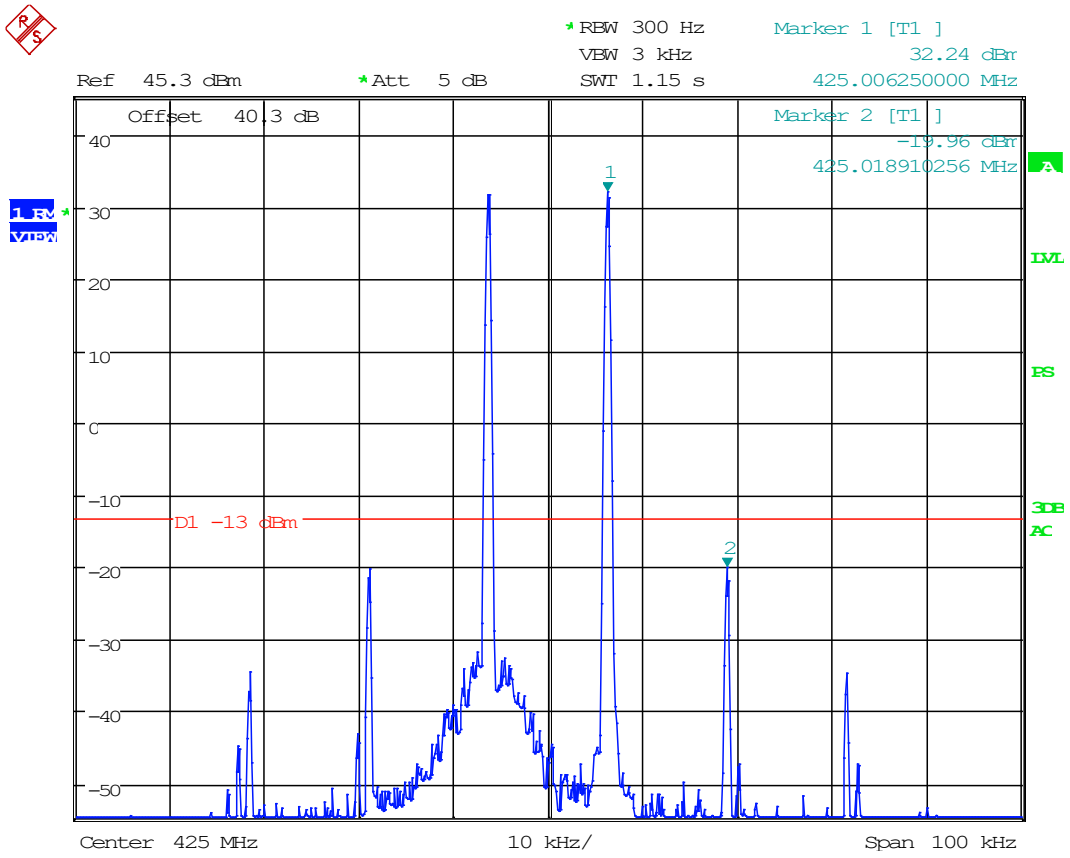
Date: 21.DEC.2020 13:59:59

8.7.3 12.5 kHz Signal, Downlink, AGC



Date: 21.DEC.2020 16:08:45

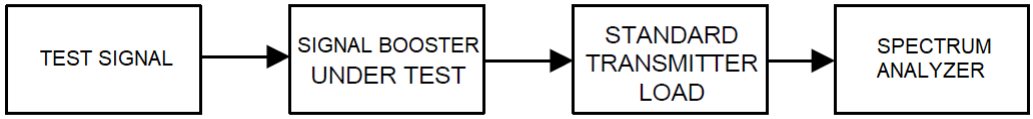
8.7.4 12.5 kHz Signal, Downlink, AGC +3dB



Date: 21.DEC.2020 16:11:07

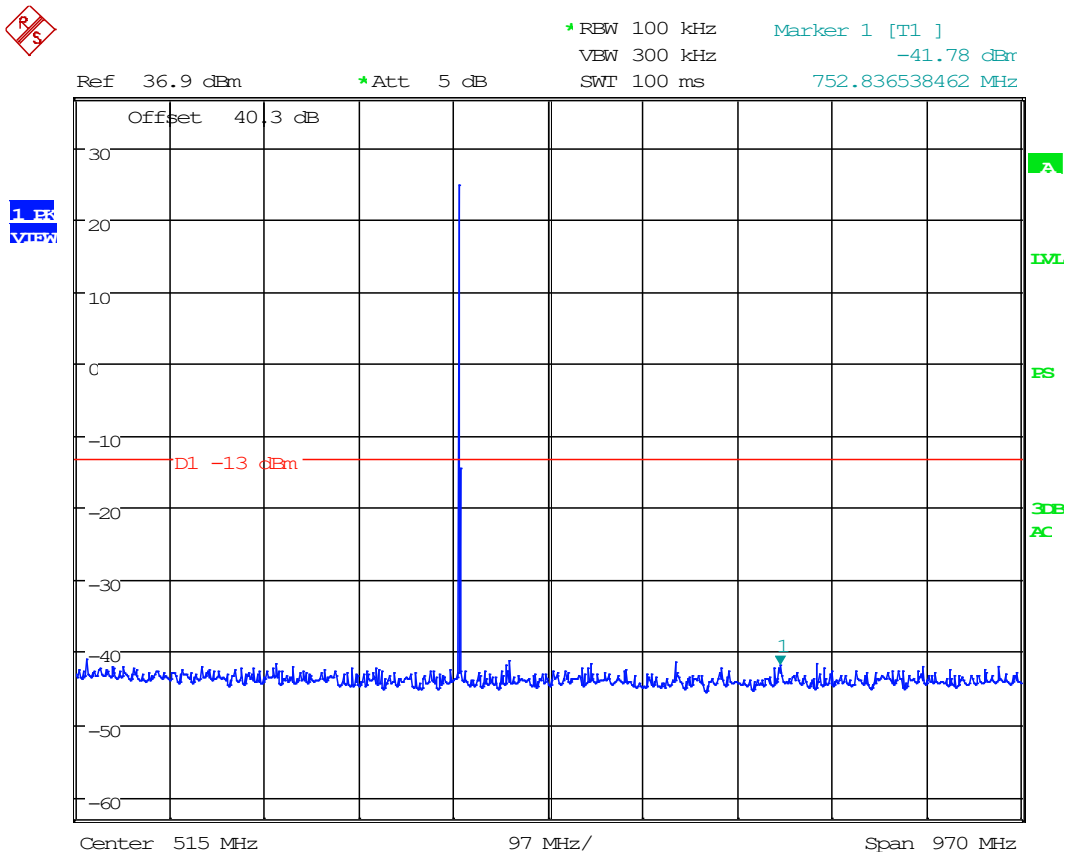
8.8 Emission Mask, Out-of-Band

Limits from FCC Parts 2.1051, 90.210 and test procedure from ANSI C63.26-2015 and FCC KDB 935210 D05 v01r04 Industrial Signal Boosters.

Test Setup


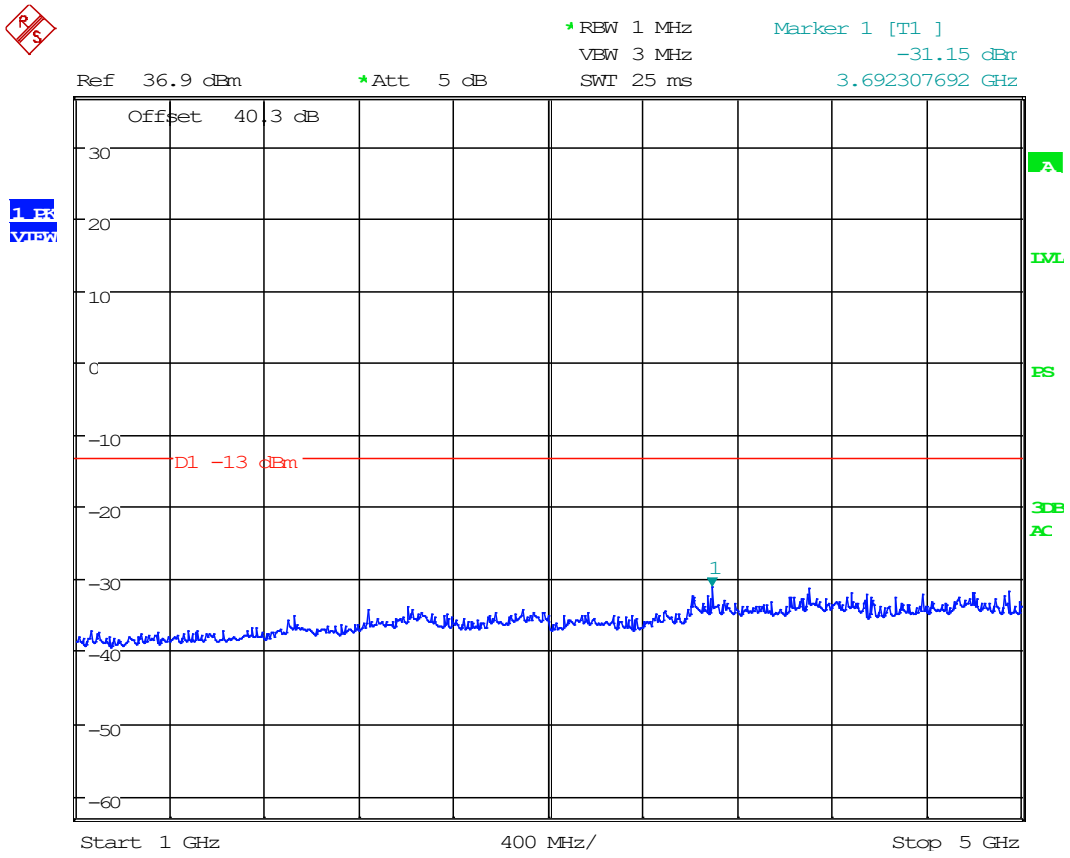
Conducted Emissions Spectrum Plots

8.8.1 30 MHz to 1 GHz, Uplink, 424.025 MHz



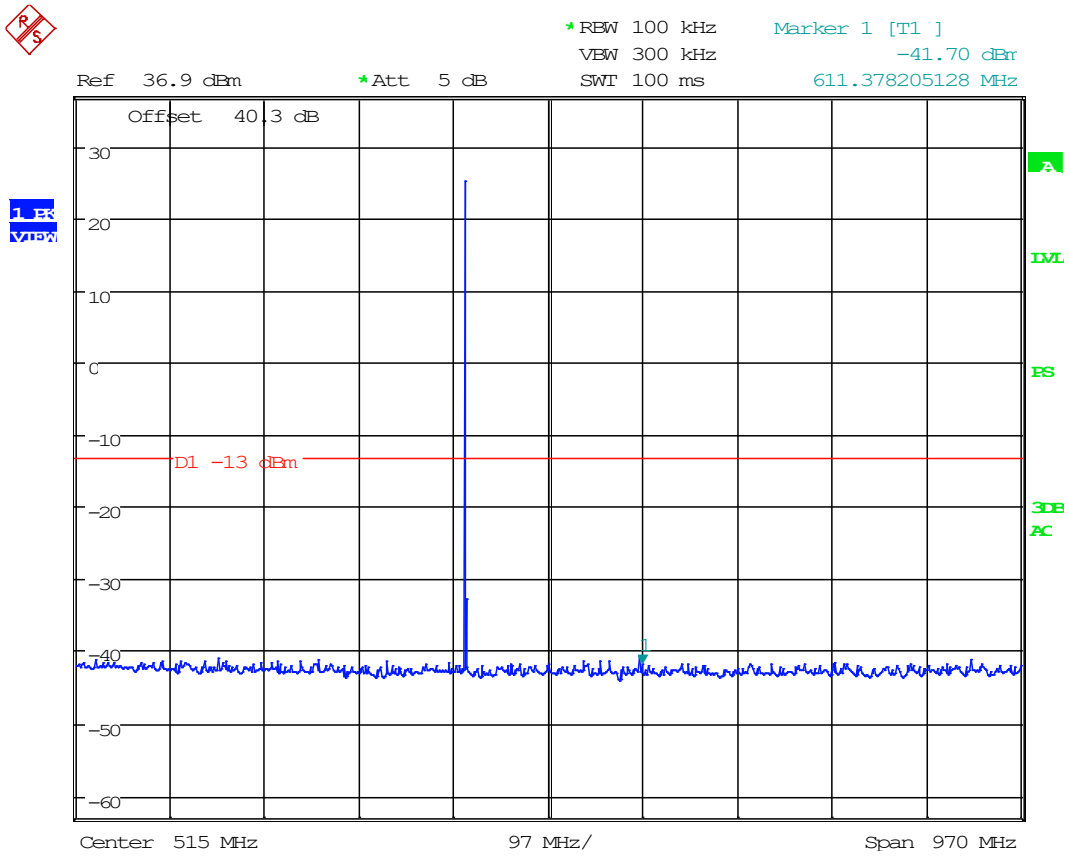
Date: 21.DEC.2020 13:48:20

8.8.2 1 GHz to 10th Harmonic, Uplink, 424.025 MHz

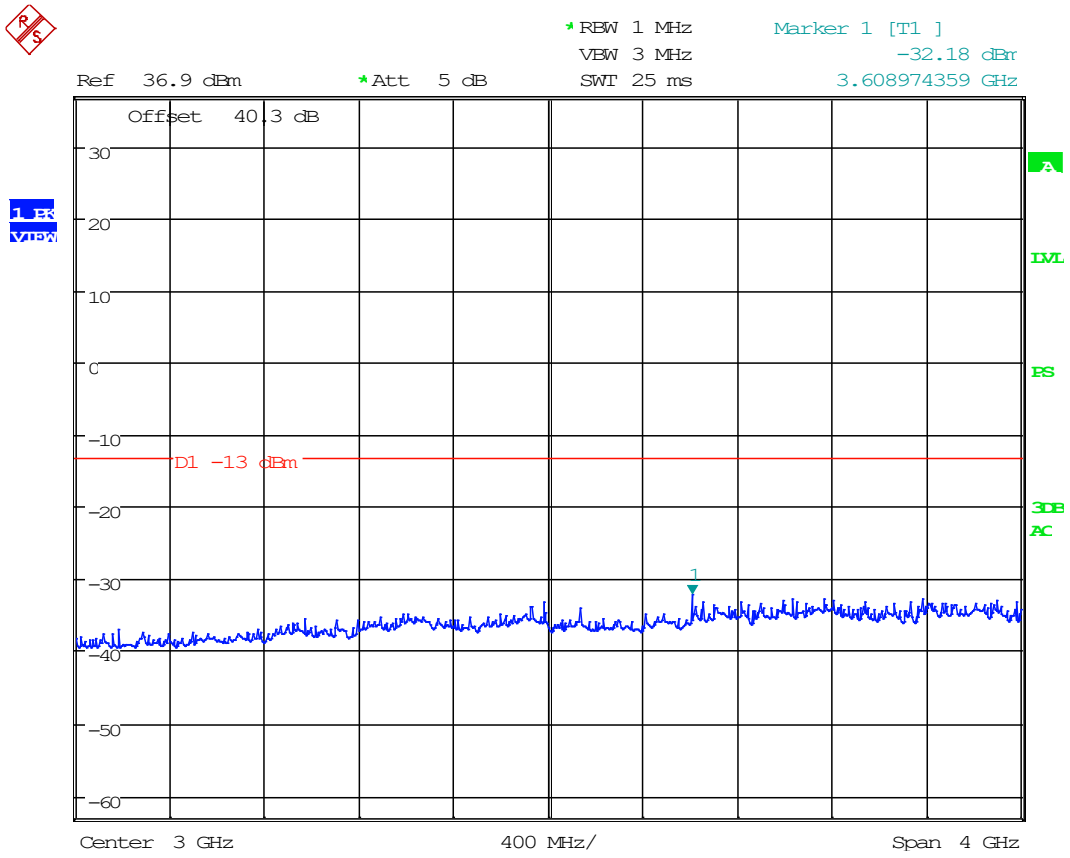


Date: 21.DEC.2020 16:04:17

8.8.1 30 MHz to 1 GHz, Uplink, 429.975 MHz

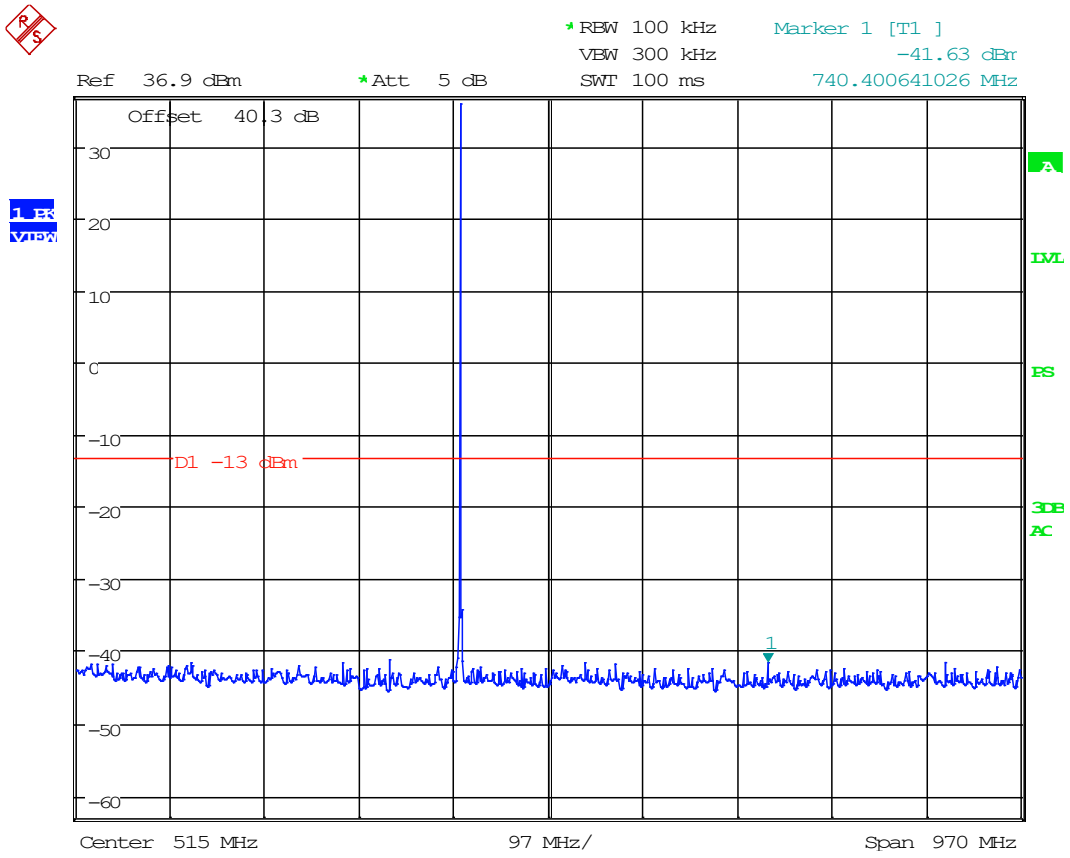


8.8.2 1 GHz to 10th Harmonic, Uplink, 429.975 MHz



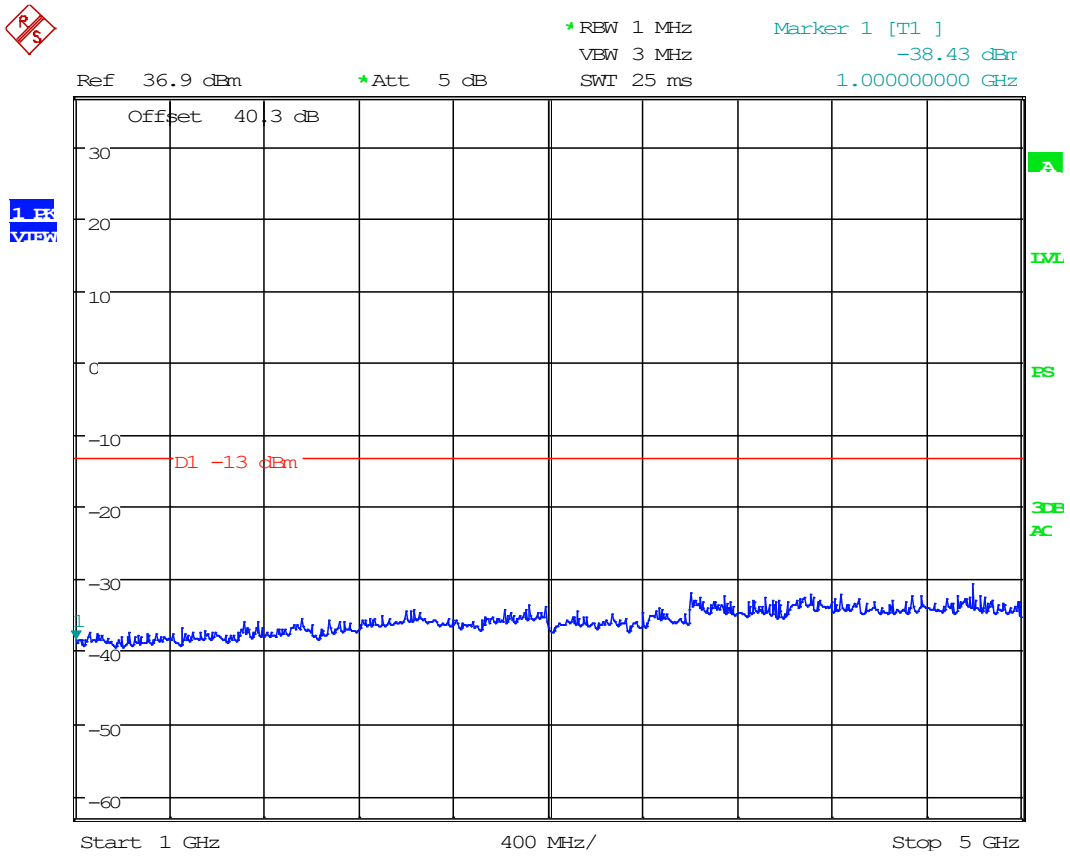
Date: 21.DEC.2020 16:05:09

8.8.3 30 MHz to 1 GHz, Downlink, 425.0 MHz



Date: 21.DEC.2020 16:01:43

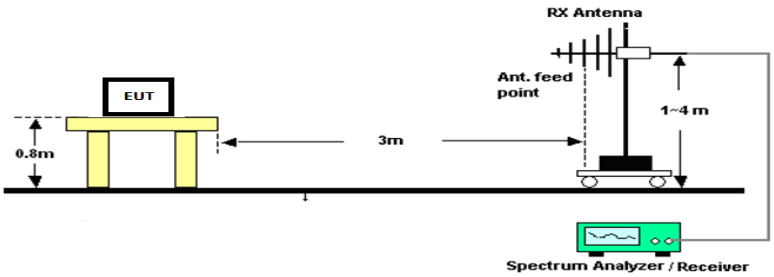
8.8.4 1 GHz to 10th Harmonic, Downlink, 425.0 MHz

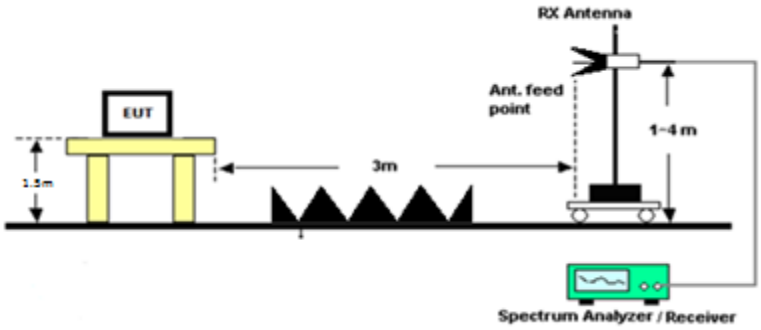


Date: 21.DEC.2020 16:02:13

8.9 Spurious Radiated Emissions

Limits from FCC Parts 2.1053, 90.210 and test procedure from ANSI C63.26-2015 and FCC KDB 935210 D05 v01r04 Industrial Signal Boosters.

Radiated Test Setup, 30 – 1000 MHz


Radiated Test Setup, Above 1000 MHz


Note: Testing was done simultaneously on all combinations of Uplinks and Downlinks to address co-location of signals.

Radiated Emissions, Tabular Data

8.9.1 Uplink, 424.025 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBm)	Antenna Polarity	Coax Loss (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Spurious Limit (dBm)	Margin (dB)
424.03	38.99	PK	46.13	H	0.69	13.30	3.00	60.12	-37.25	-13.00	24.25
424.03	73.58	PK	44.58	H	1.02	6.62	3.00	52.22	-45.16	-13.00	32.16
424.03	73.58	PK	50.84	V	1.02	6.62	3.00	58.48	-38.90	-13.00	25.90
424.03	38.44	PK	62.11	V	0.69	13.36	3.00	76.16	-21.22	-13.00	8.22
424.03	848.05	PK	19.95	H	3.48	22.10	3.00	45.53	-51.85	-13.00	38.85
424.03	848.05	PK	19.68	V	3.48	22.10	3.00	45.26	-52.12	-13.00	39.12
424.03	1272.08	PK	11.63	H	4.12	28.53	3.00	44.28	-53.10	-13.00	40.10
424.03	1272.08	PK	11.11	V	4.12	28.53	3.00	43.76	-53.62	-13.00	40.62
424.03	1696.10	PK	11.24	H	4.78	29.03	3.00	45.05	-52.33	-13.00	39.33
424.03	1696.10	PK	11.00	V	4.78	29.03	3.00	44.81	-52.57	-13.00	39.57
424.03	2120.13	PK	11.53	H	5.35	31.12	3.00	48.00	-49.37	-13.00	36.37
424.03	2120.13	PK	11.28	V	5.35	31.12	3.00	47.75	-49.62	-13.00	36.62
424.03	2544.15	PK	12.36	H	5.69	32.57	3.00	50.62	-46.76	-13.00	33.76
424.03	2544.15	PK	12.73	V	5.69	32.57	3.00	50.99	-46.39	-13.00	33.39
424.03	2968.18	PK	12.54	H	6.30	32.40	3.00	51.25	-46.13	-13.00	33.13
424.03	2968.18	PK	13.43	V	6.30	32.40	3.00	52.14	-45.24	-13.00	32.24
424.03	3392.20	PK	12.44	H	6.77	32.65	3.00	51.86	-45.52	-13.00	32.52
424.03	3392.20	PK	11.89	V	6.77	32.65	3.00	51.31	-46.07	-13.00	33.07
424.03	3816.23	PK	10.76	H	6.39	33.16	3.00	50.31	-47.07	-13.00	34.07
424.03	3816.23	PK	9.96	V	6.39	33.16	3.00	49.51	-47.87	-13.00	34.87
424.03	4240.25	PK	10.70	H	7.15	33.33	3.00	51.18	-46.20	-13.00	33.20
424.03	4240.25	PK	11.03	V	7.15	33.33	3.00	51.51	-45.87	-13.00	32.87

8.9.1 Uplink, 429.975 MHz

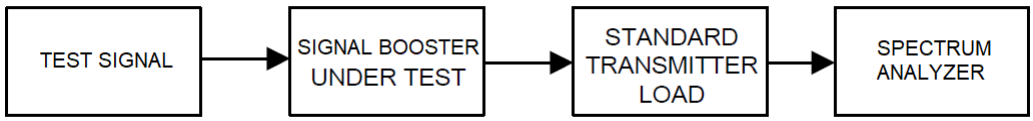
Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBm)	Antenna Polarity	Coax Loss (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Spurious Limit (dBm)	Margin (dB)
429.98	155.00	PK	10.28	H	1.43	16.60	3.00	28.31	-69.07	-13.00	56.07
429.98	126.44	PK	41.20	V	1.28	12.09	3.00	54.56	-42.81	-13.00	29.81
429.98	102.74	PK	15.75	H	1.17	10.70	3.00	27.62	-69.76	-13.00	56.76
429.98	73.31	PK	49.62	V	1.02	6.56	3.00	57.20	-40.18	-13.00	27.18
429.98	38.99	PK	41.28	H	0.69	13.30	3.00	55.27	-42.10	-13.00	29.10
429.98	38.99	PK	62.30	H	0.69	13.30	3.00	76.29	-21.08	-13.00	8.08
429.98	859.95	PK	19.89	H	3.49	22.20	3.00	45.58	-51.80	-13.00	38.80
429.98	859.95	PK	20.95	V	3.49	22.20	3.00	46.64	-50.74	-13.00	37.74
429.98	1289.93	PK	11.16	H	4.15	28.62	3.00	43.94	-53.44	-13.00	40.44
429.98	1289.93	PK	11.09	V	4.15	28.62	3.00	43.87	-53.51	-13.00	40.51
429.98	1719.90	PK	11.22	H	4.81	29.33	3.00	45.36	-52.02	-13.00	39.02
429.98	1719.90	PK	10.35	V	4.81	29.33	3.00	44.49	-52.89	-13.00	39.89
429.98	2149.88	PK	12.24	H	5.35	31.24	3.00	48.83	-48.54	-13.00	35.54
429.98	2149.88	PK	11.45	V	5.35	31.24	3.00	48.04	-49.33	-13.00	36.33
429.98	2579.85	PK	11.18	H	5.75	32.49	3.00	49.42	-47.96	-13.00	34.96
429.98	2579.85	PK	13.18	V	5.75	32.49	3.00	51.42	-45.96	-13.00	32.96
429.98	3009.83	PK	12.04	H	6.34	32.55	3.00	50.93	-46.45	-13.00	33.45
429.98	3009.83	PK	12.97	V	6.34	32.55	3.00	51.86	-45.52	-13.00	32.52
429.98	3439.80	PK	13.55	H	6.88	32.61	3.00	53.03	-44.34	-13.00	31.34
429.98	3439.80	PK	13.23	V	6.88	32.61	3.00	52.71	-44.66	-13.00	31.66
429.98	3869.78	PK	10.23	H	6.70	33.21	3.00	50.15	-47.23	-13.00	34.23
429.98	3869.78	PK	11.89	V	6.70	33.21	3.00	51.81	-45.57	-13.00	32.57
429.98	4299.75	PK	11.73	H	7.48	33.46	3.00	52.67	-44.71	-13.00	31.71
429.98	4299.75	PK	12.45	V	7.48	33.46	3.00	53.39	-43.99	-13.00	30.99

8.9.2 Downlink, 425.00 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBm)	Antenna Polarity	Coax Loss (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Spurious Limit (dBm)	Margin (dB)
425.00	38.99	PK	62.36	V	0.69	13.30	3.00	76.35	-21.02	-13.00	8.02
425.00	38.99	PK	55.80	H	0.69	13.30	3.00	69.79	-27.58	-13.00	14.58
425.00	73.31	PK	51.47	V	1.02	6.56	3.00	59.05	-38.33	-13.00	25.33
425.00	73.31	PK	46.87	H	1.02	6.56	3.00	54.45	-42.93	-13.00	29.93
425.00	850.00	PK	20.11	H	3.49	22.10	3.00	45.70	-51.68	-13.00	38.68
425.00	850.00	PK	20.22	V	3.49	22.10	3.00	45.81	-51.57	-13.00	38.57
425.00	1275.00	PK	11.53	H	4.12	28.55	3.00	44.20	-53.18	-13.00	40.18
425.00	1275.00	PK	10.82	V	4.12	28.55	3.00	43.49	-53.89	-13.00	40.89
425.00	1700.00	PK	10.46	H	4.78	29.07	3.00	44.31	-53.07	-13.00	40.07
425.00	1700.00	PK	13.08	V	4.78	29.07	3.00	46.93	-50.45	-13.00	37.45
425.00	2125.00	PK	10.44	H	5.36	31.14	3.00	46.94	-50.44	-13.00	37.44
425.00	2125.00	PK	11.55	V	5.36	31.14	3.00	48.05	-49.33	-13.00	36.33
425.00	2550.00	PK	11.12	H	5.69	32.61	3.00	49.42	-47.96	-13.00	34.96
425.00	2550.00	PK	12.67	V	5.69	32.61	3.00	50.97	-46.41	-13.00	33.41
425.00	2975.00	PK	11.92	H	6.31	32.43	3.00	50.66	-46.72	-13.00	33.72
425.00	2975.00	PK	12.45	V	6.31	32.43	3.00	51.19	-46.19	-13.00	33.19
425.00	3400.00	PK	11.64	H	6.79	32.65	3.00	51.08	-46.30	-13.00	33.30
425.00	3400.00	PK	12.46	V	6.79	32.65	3.00	51.90	-45.48	-13.00	32.48
425.00	3825.00	PK	9.72	H	6.44	33.17	3.00	49.33	-48.04	-13.00	35.04
425.00	3825.00	PK	10.13	V	6.44	33.17	3.00	49.74	-47.63	-13.00	34.63
425.00	4250.00	PK	10.67	H	7.19	33.34	3.00	51.20	-46.18	-13.00	33.18
425.00	4250.00	PK	9.78	V	7.19	33.34	3.00	50.31	-47.07	-13.00	34.07

8.10 Modulation Characteristics

Limits from FCC Parts 2.1047, and test procedure from ANSI C63.26-2015.

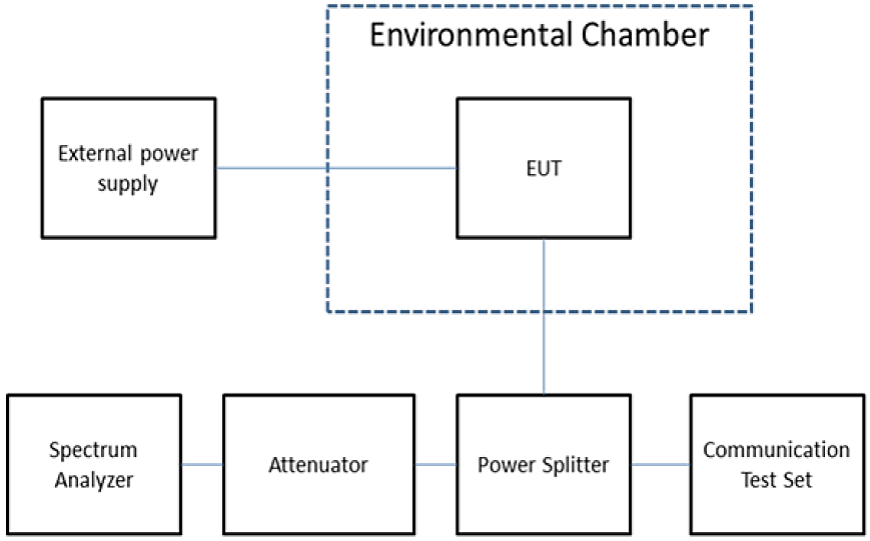
Test Setup


N/A. The EUT does not have any means to modulate the incoming signal.

8.11Frequency Stability

Limits from FCC Parts 2.1055, 90.213 (a); and test procedure from ANSI C63.26-2015 and FCC KDB 935210 D05 v01r04 Industrial Signal Boosters.

Test Setup



Test Results, Mode 1		
Tuned Frequency (MHz)	Max Deviation (ppm)	Limit (ppm)
n/a	n/a	n/a

N/A. The EUT does not alter the input signal in any way.

8.12 Transient Frequency Behavior

Limits from FCC Part 90.214; and test procedure from ANSI C63.26-2015.

N/A. The EUT does not "key-on" or "key off", and instead transmits indefinitely.

8.13 Adjacent channel power limits

Limits from FCC Part 90.221, and test procedure from ANSI C63.26-2015.

N/A. Device does not operate in a band requiring ACP measurement.

9. ANNEX-A - Photographs of the EUT

Photographs of the EUT and any manufacturer supplied accessories to be used with the EUT are in separate supplementary documents labelled EXTERNAL PHOTOS and INTERNAL PHOTOS.

10. ANNEX-B – Test Setup Photographs

Test setup photographs are located in a separate supplementary ANNEX-B document.

11. History of Test Report Changes

Test Report #	Revision #	Description	Date of Issue
TR_4786-20_FCC_PT90_Booster Class A_1	1	Initial release	December 10, 2020
TR_4786-20_FCC_PT90_Booster Class A_2	2	Updated input signals; Clerical Updates	January 4, 2020

END OF TEST REPORT