HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

Hermon Laboratories Ltd.
P.O. Box 23, Binyamina 3055001, Israel
Tel. +972 4628 8001
Fax. +972 4628 8277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO: FCC CFR 47 PART 90, section 90.219

FOR:

Axell Wireless Ltd.

Distributed Antenna System (DAS) Remote Radio Unit (RRU0043)

Model: id-DAS-RRU-3604-PS-NFPA-AC

FCC ID:NEO36IDRU420

This report is in conformity with ISO/ IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.

Table of contents

1 Applicant information ... 3
2 Equipment under test attributes ... 3
3 Manufacturer information ... 3
4 Test details ... 3
5 Tests summary ... 4
6 EUT description ... 5
6.1 General information ... 5
6.2 Ports and lines ... 5
6.3 Auxiliary equipment ... 5
6.4 EUT block diagram for test configuration ... 6
6.5 Transmitter characteristics ... 7
6.6 Changes made in the EUT ... 7
7 Transmitter tests according to FCC part 90 requirements ... 8
7.1 Automatic gain control (AGC) threshold test ... 8
7.2 Occupied bandwidth test ... 10
7.3 Out-of-band rejection test ... 31
7.4 Input/output power and booster gain test ... 34
7.5 Emission mask test ... 52
7.6 Radiated spurious emission measurements ... 66
7.7 Spurious emissions at RF antenna connector test ... 76
7.8 ERP intermodulation product test ... 86
7.9 Frequency stability test ... 101
7.10 Noise figure test ... 105
8 APPENDIX A Test equipment and ancillaries used for tests ... 109
8.1 Test equipment and ancillaries used for tests ... 110
9 APPENDIX B Measurement uncertainties ... 111
10 APPENDIX C Test facility description ... 112
11 APPENDIX D Specification references ... 112
12 APPENDIX E Test equipment correction factors ... 113
13 APPENDIX F Abbreviations and acronyms ... 121

1 Applicant information

Client name:	Axell Wireless Limited trading as Cobham Wireless
Address:	The Cobham Centre, Fourth Avenue, Marlow, Buckinghamshire, SL7 1TF, UK
Telephone:	+44 (0)1494 777 014
Fax:	+44 (0)1494 777 002
E-mail:	brian.barton@cobham.com
Contact name:	Mr. Brian Barton

2 Equipment under test attributes

Product description:	idDAS (Intelligent Digital DAS) UHF Public Safety idRU
Product name:	Distributed Antenna System (DAS) Remote Radio Unit (RRU0043)
Product type:	Class B Booster
Model(s):	id-DAS-RRU-3604-PS-NFPA-AC
Serial number:	19091003
Hardware version:	Rev 2
Software release:	Common: 3.0.0.4915 System: 3.0.0.2523
Receipt date	09-Sep-19

3 Manufacturer information

Manufacturer name:	Axell Wireless Limited trading as Cobham Wireless
Address:	The Cobham Centre, Fourth Avenue, Marlow, Buckinghamshire, SL7 1TF, UK
Telephone:	+44 (0)1494 777 014
Fax:	+44 (0)1494 777 002
E-Mail:	brian.barton@cobham.com
Contact name:	Mr. Brian Barton

4 Test details

Project ID:	34236
Location:	Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started:	18-Sep-19
Test completed:	3-Nov-19
Test specification(s):	47CFR part 90, section 90.219

5 Tests summary

Test	
Section 90.219(e)(1), Automatic gain control threshold	Pass
Section 90.209(b)(5), 90.219(d)(2), Occupied bandwidth and Out-of-band rejection	Pass
Section 90.219(e)(1), Radiated output power	Pass
Section 90.219(d)(6)(i), ERP of intermodulation products	Pass
Sections 90.210(b), 90.210(h), Emission mask	Pass
Sections 90.219(e)(2), 90.219(d)(6)(ii), 90.219(d)(6)(iii),Noise figure and ERP of noise test	Pass
Section 90.219(e)(3), Conducted spurious emissions	Pass
Section 90.219(e)(3), Radiated spurious emissions	Pass
Section 90.213, Frequency stability	Pass
Section 2.1091, RF radiation exposure evaluation	Pass, exhibit provided in Application for certification

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.
The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, Technical Manager, EMC and Radio	November 3, 2019	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	April 13, 2020	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	April 22, 2020	

6 EUT description

Note: The following data in this clause is provided by the customer and represents his sole responsibility

6.1 General information

The EUT, idDAS, is a Distributed Antenna System (DAS) Remote Radio Unit, powered by 120VAC.
The idDAS provides a flexible, customizable and expandable cellular and data coverage solution for multiple operators and services over a common infrastructure.
Analogue RF services and sectors from a range of macro BTS, low power BTS as well as small cells are conditioned, digitized and then transported utilizing CPRI links over SMF, MMF, Cat 5/6 cable infrastructure to remote locations. Cellular services are converged with Wi-Fi and small cells' IP backhaul for distribution over the same CPRI link infrastructure.
BTS sectors are dynamically allocated across the different zones of the building. The process is software controlled according to user pre-defined profiles. These different profiles can be manually selected or based on time schedules, thus dynamically changing the allocation of RAN resources across the building.

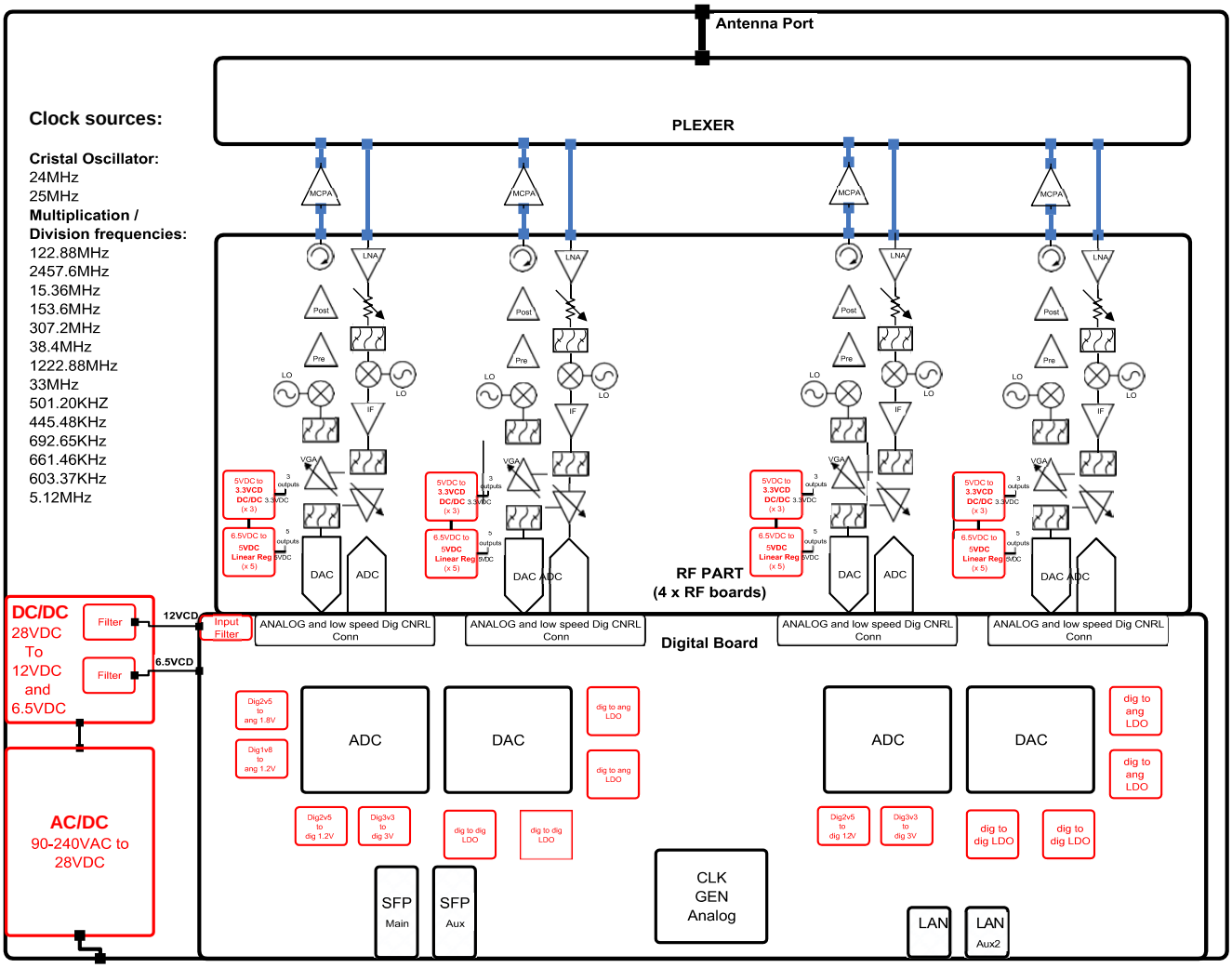
6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length	Indoor / outdoor
Power	AC power	EUT	AC mains	1	Unshielded	1.8 m	Indoor
RF	Service antenna	EUT	Signal generator & Signal analyzer via Attenuator & Splitter	1	Coax	10 m	Outdoor
Control	EXT ALARM	EUT	Open circuit	1	Unshielded	5 m	Outdoor
Telecom	MAIN	EUT	id-DAS-MSDH-12VDC	1	Fiber optic	10 m	Outdoor
Telecom	LAN, AUX1/2	EUT	Not connected	3	NA	NA	NA
GND	GND	EUT	GND	1	Unshielded	1.5 m	Outdoor

6.3 Auxiliary equipment

Description	Manufacturer	Model number	Serial number
Intelligent Digital DAS – Indoor unit	Axell Wireless Limited trading as Cobham Wireless	id-DAS-MSDH-12VDC	1605D104
Intelligent Digital DAS – Indoor unit	Axell Wireless Limited trading as Cobham Wireless	id-DAS-MTDI-4-CH-SM-MM-12VDC	1601D012
Power supply	Agilent Technologies	N5747A	US25F6762C
Laptop	Dell	LATITUDE E5440	JBT5TZ1
Signal generator	HP	E4432B	GB40051136, GB39340603, US40052223
Signal generator	Agilent	N5182A	MY47071059, MY53050563
Signal generator	Agilent	E4438C	MY45090513
Signal generator	Marconi Instruments	2022	119019/237
Signal generator	Rohde&Schwarz	SMJ 100A	101777
Signal analyzer	Rohde&Schwarz	FSV	101630
Signal analyzer	IFR	2310	231001/118
Splitter	TIGER	TGP-A0411	11-JSPE902-018, 11-JSPE902-019
Attenuator	Midwest Microwave	ATT-0527-30-SMA-07	NA

6.4 EUT block diagram for test configuration



6.5 Transmitter characteristics

Type of equipment	
V	Stand-alone (Equipment with or without its own control provisions)
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)
	Plug-in card (Equipment intended for a variety of host systems)

Intended use		**Condition of use**
V	fixed	Always at a distance more than 2 m from all people
	mobile	Always at a distance more than 20 cm from all people
	portable	May operate at a distance closer than 20 cm to human body

Assigned frequency ranges	421.303 – 423.135 MHz downlink 426.303 – 428.135 MHz uplink
Operating frequency ranges	421.363 – 423.075 MHz downlink 426.363 – 428.075 MHz uplink
Authorized bandwidth	6/11.25/20/22 kHz
Channel bandwidth	6.25/12.5/25 kHz
Maximum rated output power	Total power over the entire band — DL 36.0 dBm
Maximum measured output power	At maximum gain, output port — DL: 36.98 dBm

Is transmitter output power variable?					
		No			
V	Yes		continuous variable		
		V	stepped variable with stepsize	1.0 dB	
		minimum RF power		NA	
		maximum RF power		DL: 36.98 dBm	

Antenna connection				
unique coupling	**V**	standard connector	Integral	with temporary RF connector
				without temporary RF connector

Antenna/s technical characteristics No Antennas included in the accessories

Type	Manufacturer	Model number	Antenna gain, dBi	Cable loss, dB
External (Indoor)	NA	NA	NA	NA
External (Outdoor)	NA	NA	NA	NA

Transmitter aggregate data rate/s, Mbps				
Transmitter 99% power bandwidth	Type of modulation			
	P25 phase 1 (C4FM)	P25 phase 2 (DQPSK)	Tetra	Analog FM
	14800 kbps	26000 kbps	18000 kbps	NA

Transmitter power source			
	DC	Nominal rated voltage	
V	AC	Nominal rated voltage	120 VAC, Frequency 60 Hz

Common power source for transmitter and receiver	V	yes	no

6.6 Changes made in the EUT

No changes were implemented in the EUT during testing.

Test specification:	**Section 90.219(e)(1), AGC threshold test**		
Test procedure:	KDB 935210 D05 v01r04, section 4.2		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

7 Transmitter tests according to FCC part 90 requirements

7.1 Automatic gain control (AGC) threshold test

7.1.1 General

This test was performed to measure the AGC threshold of the EUT.

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

7.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.

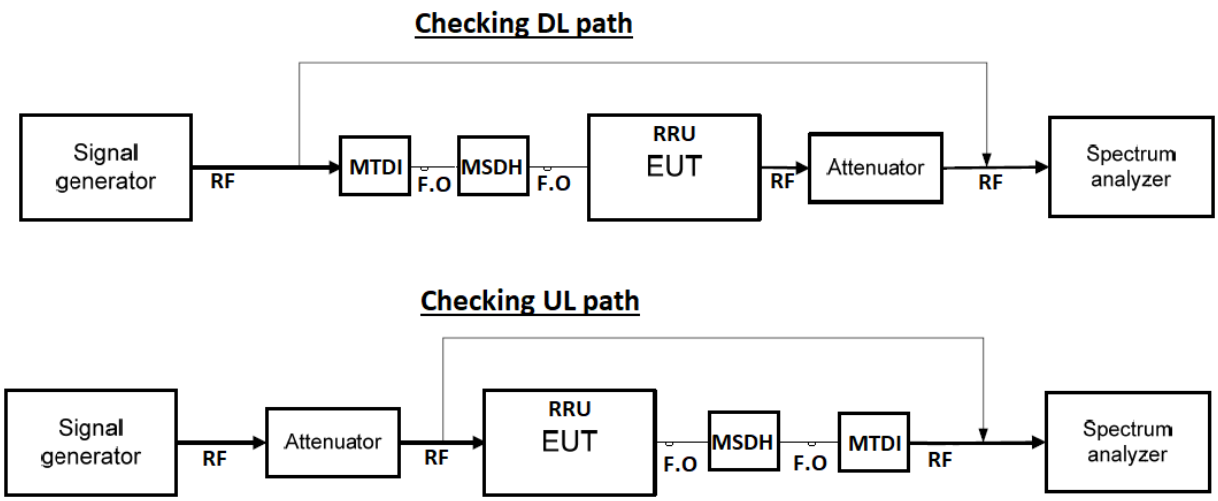
7.1.2.3 The signal generator was adjusted to produce either of required test signals.

7.1.2.4 While the peak output power of EUT was measured using spectrum analyzer, the input level was increased until a 1 dB increasing in the input signal power no longer causes a 1 dB increasing in the output power.

7.1.2.5 The test result was provided in the associated tables and plots.

7.1.2.6 The test was repeated with the rest test signals.

Figure 7.1.1 AGC Threshold level test setup



Test specification:	**Section 90.219(e)(1), AGC threshold test**		
Test procedure:	KDB 935210 D05 v01r04, section 4.2		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Table 7.1.1 AGC Threshold level test results

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
426.363 – 428.075 MHz (Uplink)
DETECTOR USED: Peak
VIDEO BANDWIDTH: 3 x RBW
MODULATING SIGNAL: CW

Frequency, MHz	AGC threshold level, dBm	SA reading, dBm		RBW, kHz	Booster gain, dB	Margin*, dB	Verdict
		Input power	Output power				
Downlink transmit mode							
Modulation CW							
421.66	-39.23	-39.23	36.14	100	75.37	NA	Pass
Modulation Analog FM (Authorized bandwidth 6.0 kHz)							
421.66	-39.25	-39.25	36.91	0.1	76.16	NA	Pass
Modulation Analog FM (Authorized bandwidth 11.25kHz)							
421.66	-39.25	-39.25	36.91	0.1	76.16	NA	Pass
Modulation Analog FM (Authorized bandwidth 20.0 kHz)							
421.66	-39.25	-39.25	36.91	0.3	76.16	NA	Pass
Modulation P25 Phase 1 (C4FM)							
421.66	-39.25	-39.25	36.91	0.1	76.16	NA	Pass
Modulation P25 Phase 2 (H-DQPSK)							
421.66	-39.98	-39.98	36.67	0.1	76.65	NA	Pass
Modulation Tetra							
421.66	-39.49	-39.49	36.74	0.3	76.23	NA	Pass
Uplink transmit mode							
Modulation CW							
427.06	-51.57	-51.57	-14.40	100	37.17	NA	Pass
Modulation Analog FM (Authorized bandwidth 6.0 kHz)							
427.06	-51.18	-51.18	-13.84	0.1	37.34	NA	Pass
Modulation Analog FM (Authorized bandwidth 11.25kHz)							
427.06	-51.18	-51.18	-13.84	0.1	37.34	NA	Pass
Modulation Analog FM (Authorized bandwidth 20.0 kHz)							
427.06	-51.19	-51.19	-13.91	0.3	37.28	NA	Pass
Modulation P25 Phase 1 (C4FM)							
427.06	-51.34	-51.34	-13.96	0.1	37.38	NA	Pass
Modulation P25 Phase 2 (H-DQPSK)							
427.06	-51.35	-51.35	-14.03	0.1	37.32	NA	Pass
Modulation Tetra							
427.06	-51.27	-51.27	-14.05	0.3	37.22	NA	Pass

Reference numbers of test equipment used

HL 0539	HL 2909	HL 3818	HL 4354	HL 5409			

Full description is given in Appendix A.

Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points, %	Authorized bandwidth, kHz
Downlink		
421.303 – 423.135 MHz	99	6.0 / 11.25 / 20 / 22
Uplink		
426.303 – 428.135 MHz	99	6.0 / 11.25 / 20 / 22

7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

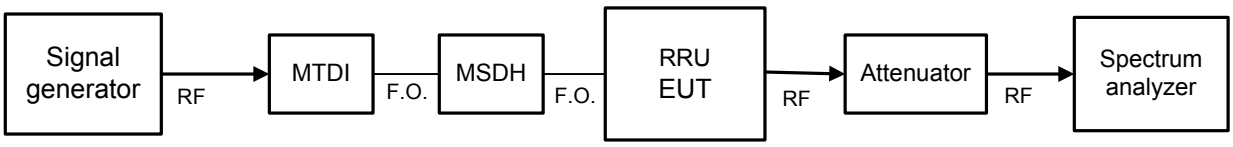
7.2.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.

7.2.2.3 The EUT was set to transmit the normally modulated carrier.

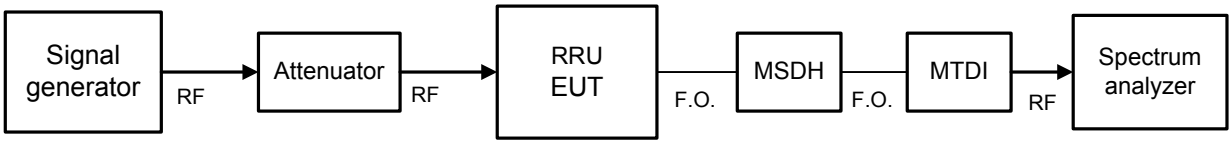
7.2.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.2.2, Table 7.2.3 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup

Checking DL path



Checking UL path



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

Table 7.2.2 Occupied bandwidth test results, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
DETECTOR USED: Peak hold
VIDEO BANDWIDTH: 3 x RBW
MODULATION ENVELOPE REFERENCE POINTS: 99%

Carrier frequency, MHz	Input signal modulation	Occupied bandwidth, kHz	RBW, Hz	Authorized BW, kHz	Margin*, kHz	Verdict
421.363	Analog FM	4.138	100	6.0	-1.862	Pass
422.525	Analog FM	4.139	100	6.0	-1.861	Pass
423.075	Analog FM	4.135	100	6.0	-1.865	Pass
421.363	Analog FM	9.960	100	11.25	-1.290	Pass
422.525	Analog FM	9.963	100	11.25	-1.287	Pass
423.075	Analog FM	9.962	100	11.25	-1.288	Pass
421.363	P25 phase 1	7.998	100	11.25	-3.252	Pass
422.525	P25 phase 1	8.022	100	11.25	-3.228	Pass
423.075	P25 phase 1	7.916	100	11.25	-3.334	Pass
421.363	P25 phase 2	9.702	100	11.25	-1.548	Pass
422.525	P25 phase 2	9.779	100	11.25	-1.471	Pass
423.075	P25 phase 2	9.672	100	11.25	-1.578	Pass
421.363	Analog FM	15.990	100	20.0	-4.010	Pass
422.525	Analog FM	15.991	100	20.0	-4.009	Pass
423.075	Analog FM	15.990	100	20.0	-4.010	Pass
421.363	Tetra	20.449	300	22.0	-1.551	Pass
422.525	Tetra	20.941	300	22.0	-1.059	Pass
423.075	Tetra	20.335	300	22.0	-1.665	Pass

Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

Table 7.2.3 Occupied bandwidth test results, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
DETECTOR USED: Peak hold
VIDEO BANDWIDTH: 3 x RBW
MODULATION ENVELOPE REFERENCE POINTS: 99%

Carrier frequency, MHz	Input signal modulation	Occupied bandwidth, kHz	RBW, Hz	Authorized BW, kHz	Margin*, kHz	Verdict
426.363	Analog FM	4.121	100	6.0	-1.879	Pass
427.425	Analog FM	4.121	100	6.0	-1.879	Pass
428.075	Analog FM	4.121	100	6.0	-1.879	Pass
426.363	Analog FM	9.955	100	11.25	-1.295	Pass
427.425	Analog FM	9.955	100	11.25	-1.295	Pass
428.075	Analog FM	9.955	100	11.25	-1.295	Pass
426.363	P25 phase 1	7.925	100	11.25	-3.325	Pass
427.425	P25 phase 1	8.092	100	11.25	-3.158	Pass
428.075	P25 phase 1	7.932	100	11.25	-3.318	Pass
426.363	P25 phase 2	9.775	100	11.25	-1.475	Pass
427.425	P25 phase 2	9.766	100	11.25	-1.484	Pass
428.075	P25 phase 2	9.779	100	11.25	-1.471	Pass
426.363	Analog FM	16.001	300	20.0	-3.999	Pass
427.425	Analog FM	16.003	300	20.0	-3.997	Pass
428.075	Analog FM	16.002	300	20.0	-3.998	Pass
426.363	Tetra	20.934	300	22.0	-1.066	Pass
427.425	Tetra	20.905	300	22.0	-1.095	Pass
428.075	Tetra	20.889	300	22.0	-1.111	Pass

* Margin = Occupied bandwidth - Limit

Reference numbers of test equipment used

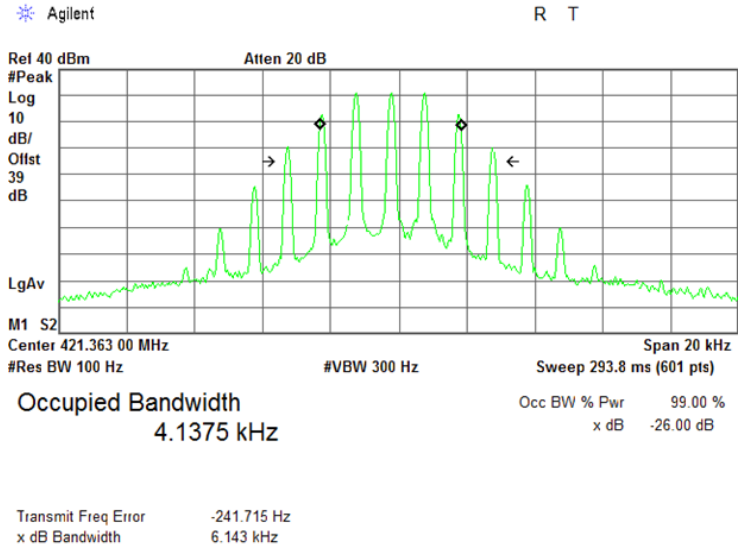
HL 0539	HL 2909	HL 3818	HL 4354	HL 5409	

Full description is given in Appendix A.

Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

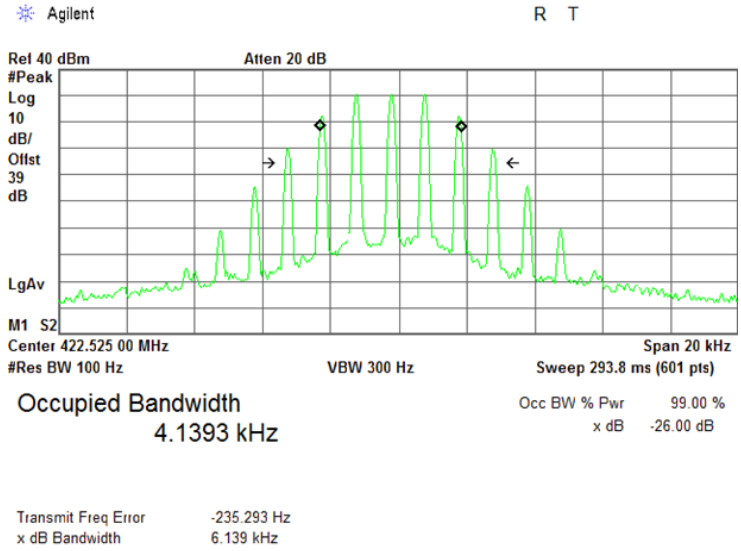
Plot 7.2.1 Occupied bandwidth test results at low frequency, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 421.363 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 6.0 kHz



Plot 7.2.2 Occupied bandwidth test results at mid frequency, Downlink

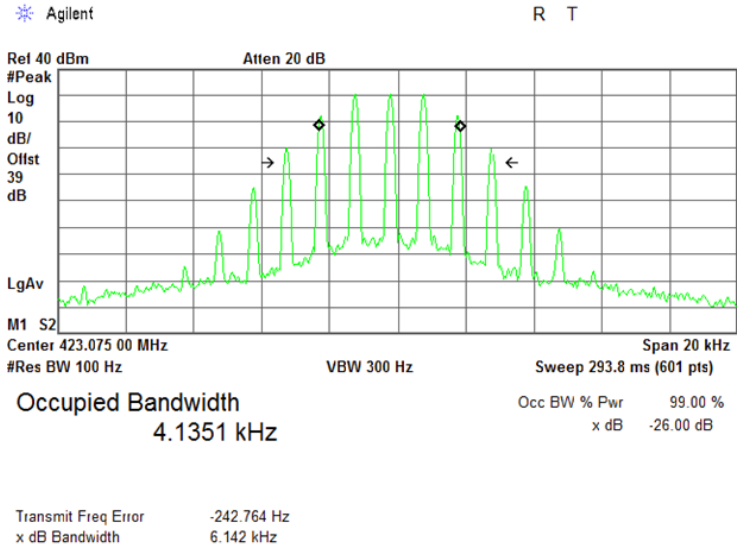
OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 422.525 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 6.0 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

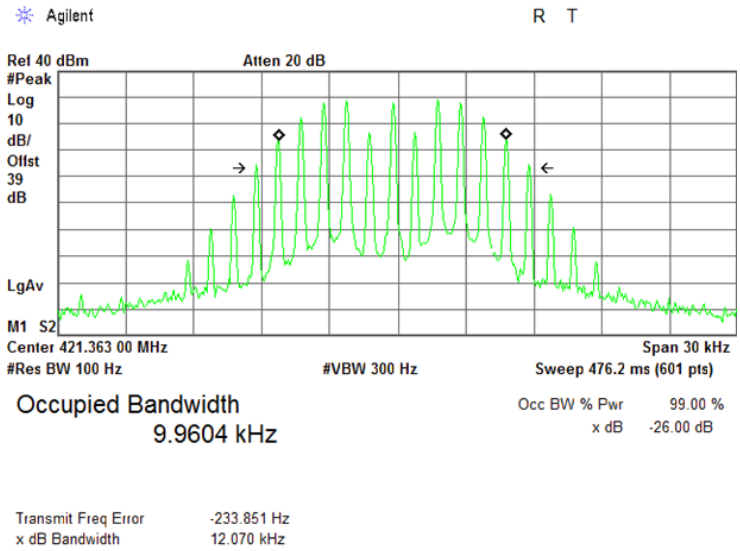
Plot 7.2.3 Occupied bandwidth test results at high frequency, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 423.075 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 6.0 kHz



Plot 7.2.4 Occupied bandwidth test results at low frequency, Downlink

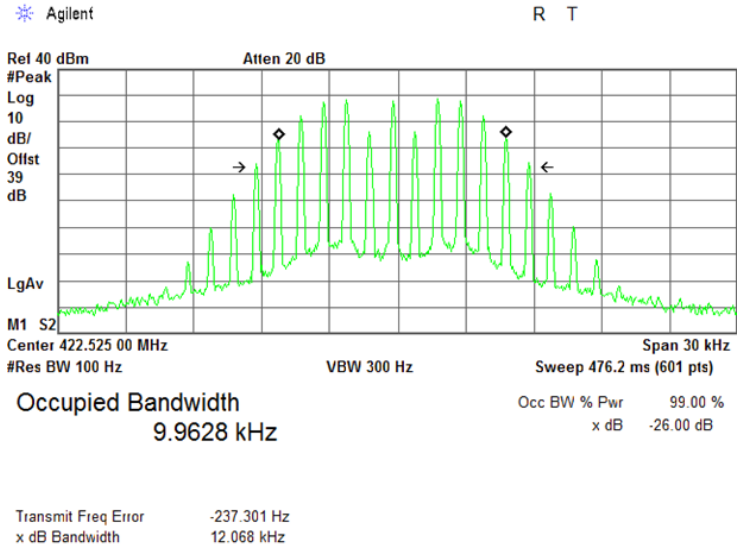
OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 421.363 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	Section 90.209(b)(5), Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	Relative Humidity: 51 %	Air Pressure: 1014 hPa	Power: 120 V/60 Hz
Remarks:			

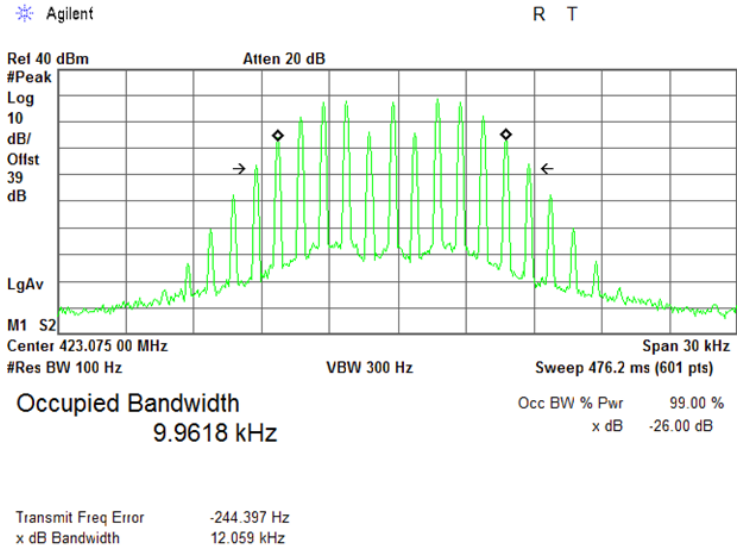
Plot 7.2.5 Occupied bandwidth test results at mid frequency, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 422.525 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 11.25 kHz



Plot 7.2.6 Occupied bandwidth test results at high frequency, Downlink

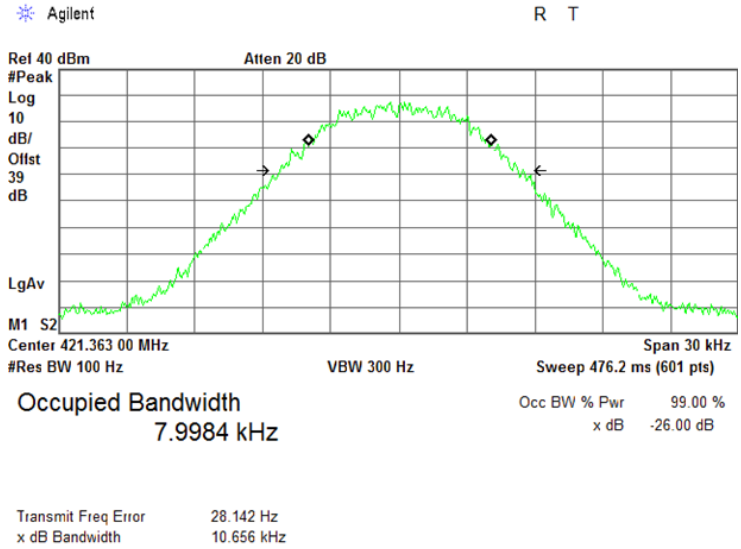
OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 423.075 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

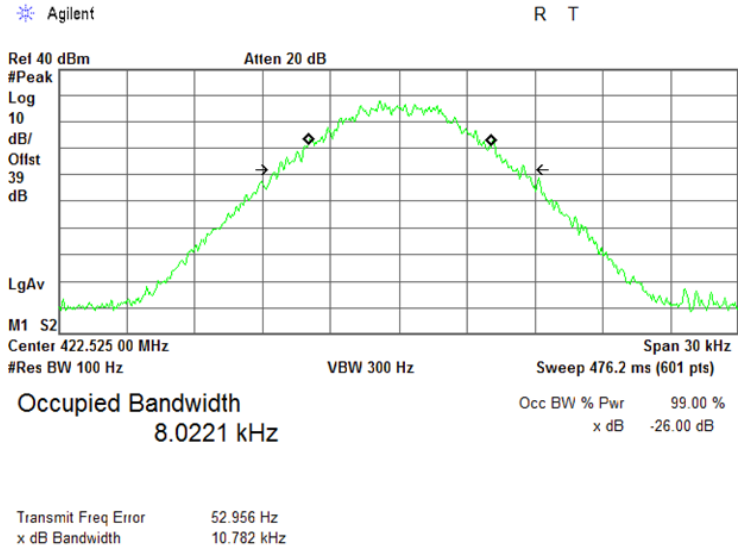
Plot 7.2.7 Occupied bandwidth test results at low frequency, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 421.363 MHz
MODULATION: P25 phase 1
AUTHORIZED BANDWIDTH: 11.25 kHz



Plot 7.2.8 Occupied bandwidth test results at mid frequency, Downlink

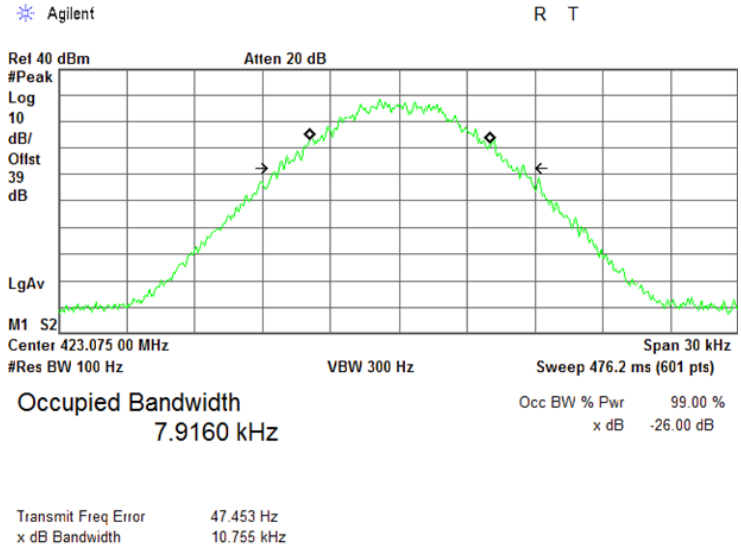
OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 422.525 MHz
MODULATION: P25 phase 1
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

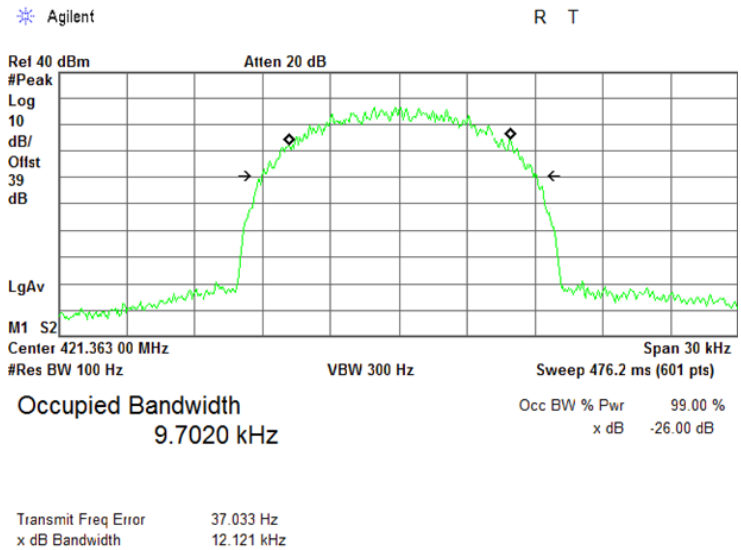
Plot 7.2.9 Occupied bandwidth test results at high frequency, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 423.075 MHz
MODULATION: P25 phase 1
AUTHORIZED BANDWIDTH: 11.25 kHz



Plot 7.2.10 Occupied bandwidth test results at low frequency, Downlink

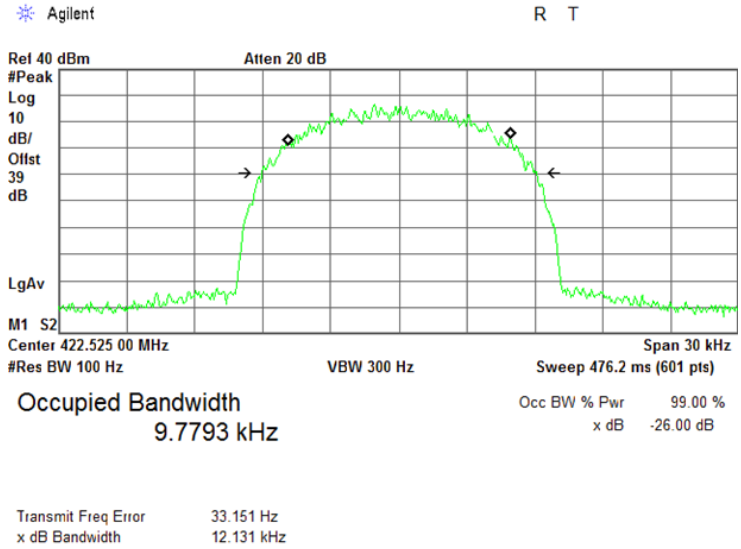
OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 421.363 MHz
MODULATION: P25 phase 2
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

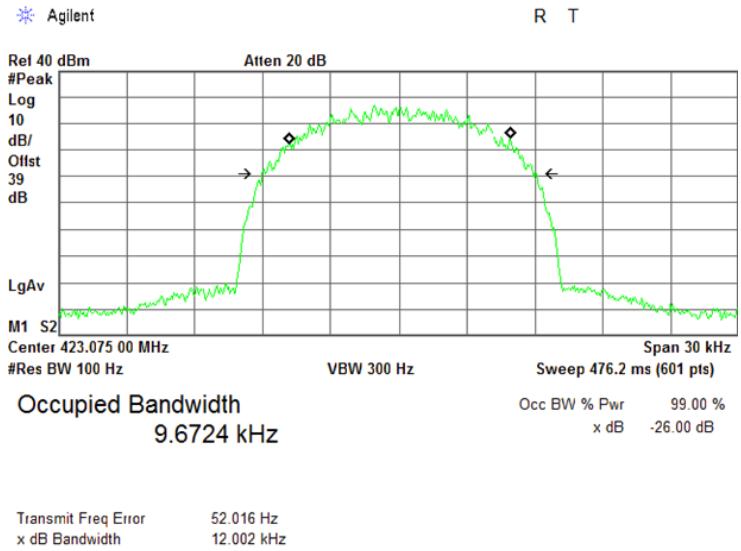
Plot 7.2.11 Occupied bandwidth test results at mid frequency, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 422.525 MHz
MODULATION: P25 phase 2
AUTHORIZED BANDWIDTH: 11.25 kHz



Plot 7.2.12 Occupied bandwidth test results at high frequency, Downlink

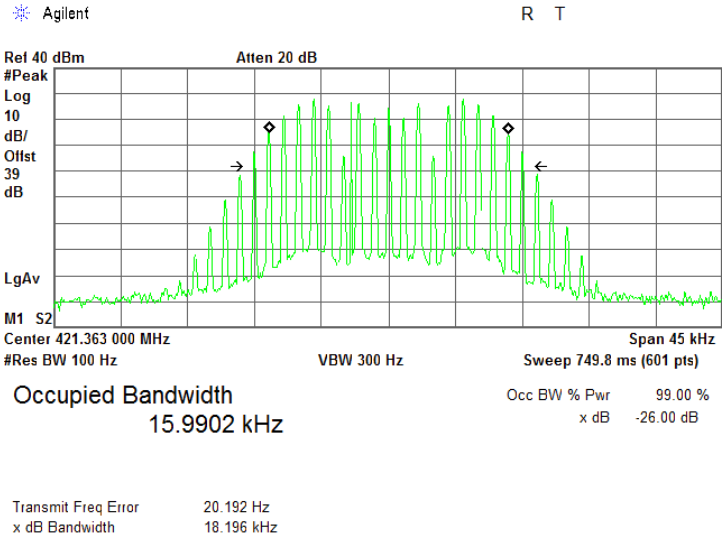
OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 423.075 MHz
MODULATION: P25 phase 2
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

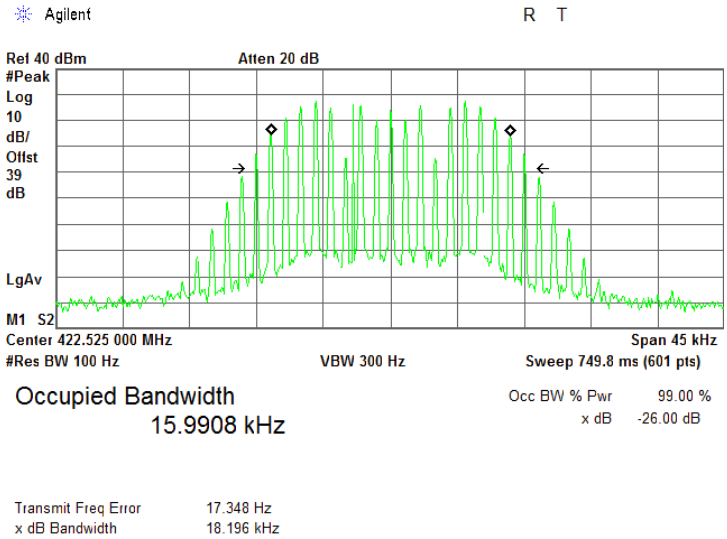
Plot 7.2.13 Occupied bandwidth test results at low frequency, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 421.363 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 20.0 kHz



Plot 7.2.14 Occupied bandwidth test results at mid frequency, Downlink

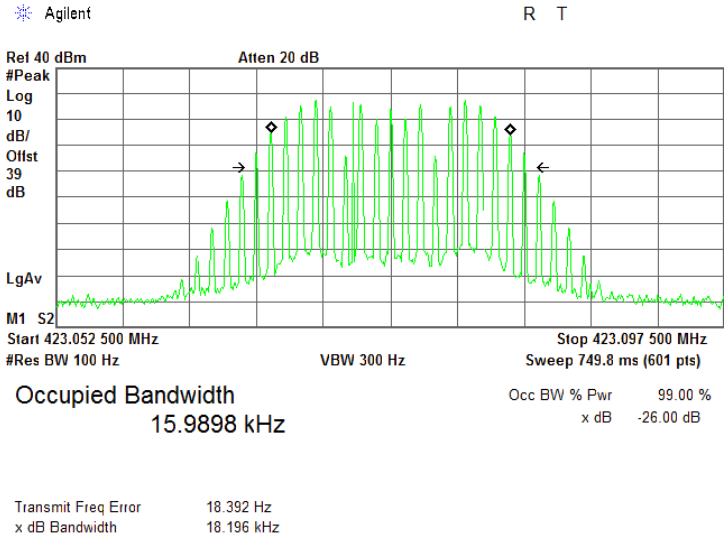
OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 422.525 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 20.0 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

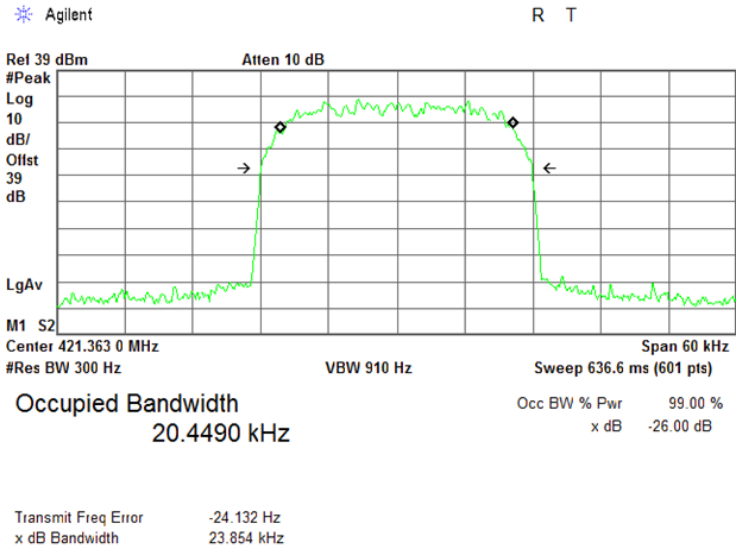
Plot 7.2.15 Occupied bandwidth test results at high frequency, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 423.075 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 20.0 kHz



Plot 7.2.16 Occupied bandwidth test results at low frequency, Downlink

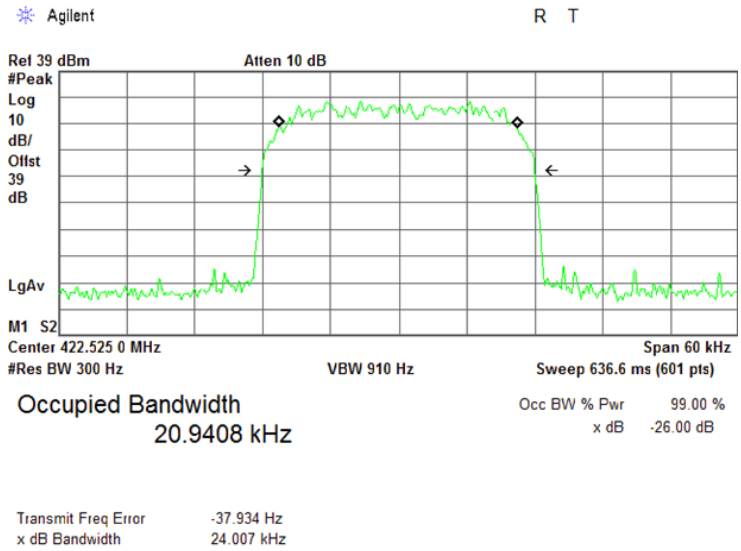
OPERATING FREQUENCY RANGE: 421.363 – 423.075MHz (Downlink)
CARRIER FREQUENCY: 421.363 MHz
MODULATION: Tetra
AUTHORIZED BANDWIDTH: 22.0 kHz



Test specification:	Section 90.209(b)(5), Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	Relative Humidity: 51 %	Air Pressure: 1014 hPa	Power: 120 V/60 Hz
Remarks:			

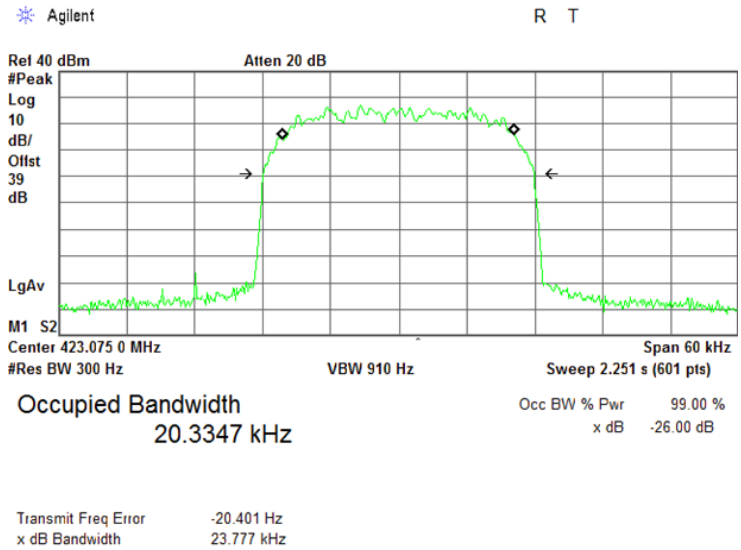
Plot 7.2.17 Occupied bandwidth test results at mid frequency, Downlink

OPERATING FREQUENCY RANGE: 421.363 – 423.075MHz (Downlink)
CARRIER FREQUENCY: 422.525 MHz
MODULATION: Tetra
AUTHORIZED BANDWIDTH: 22.0 kHz



Plot 7.2.18 Occupied bandwidth test results at high frequency, Downlink

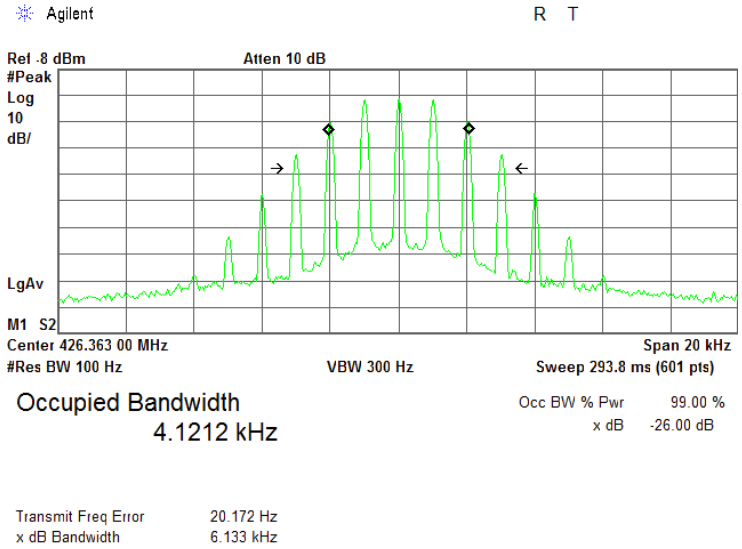
OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
CARRIER FREQUENCY: 423.075 MHz
MODULATION: Tetra
AUTHORIZED BANDWIDTH: 22.0 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

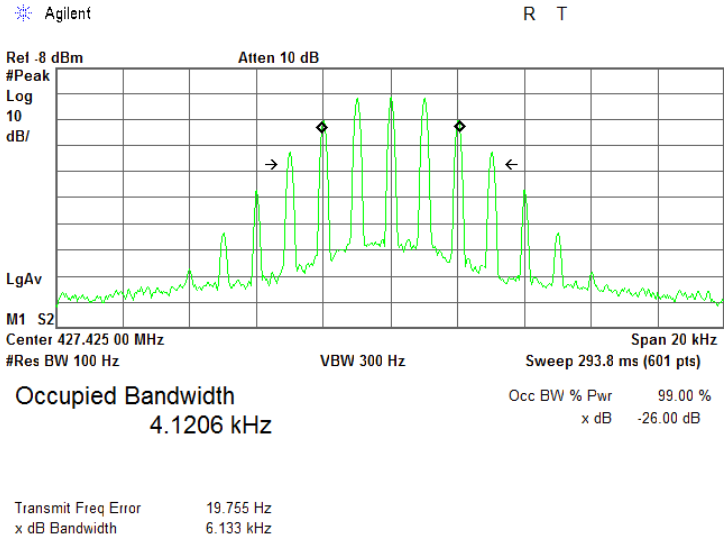
Plot 7.2.19 Occupied bandwidth test results at low frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 426.363 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 6.0 kHz



Plot 7.2.20 Occupied bandwidth test results at mid frequency, Uplink

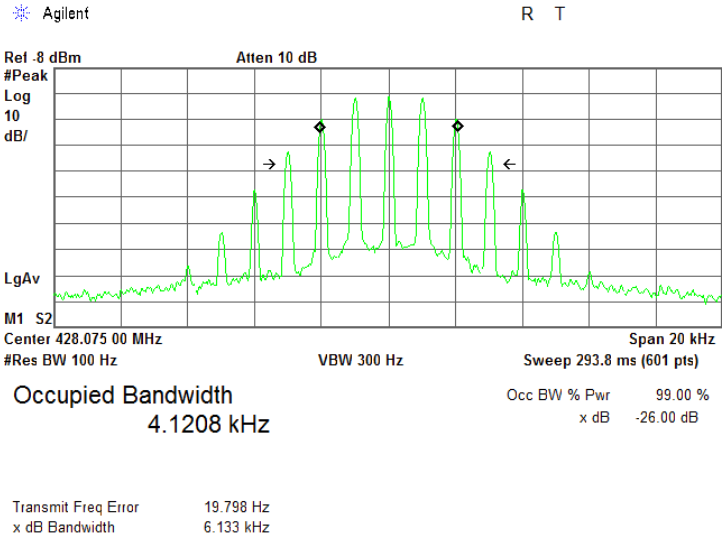
OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 427.425 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 6.0 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

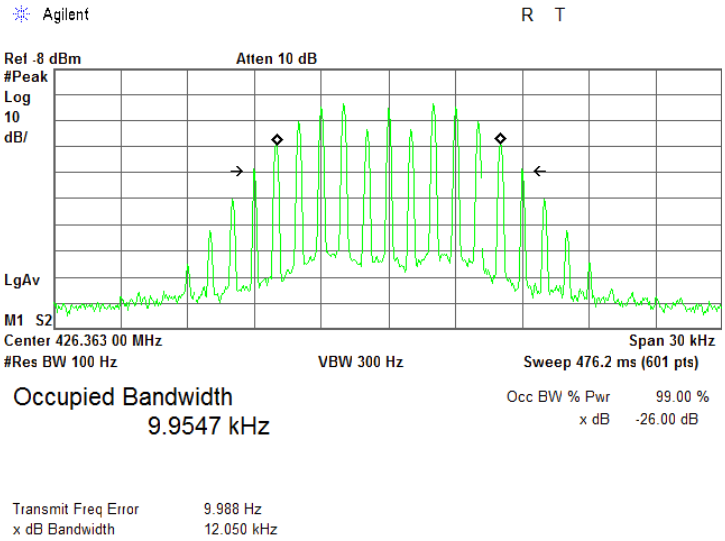
Plot 7.2.21 Occupied bandwidth test results at high frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 428.075 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 6.0 kHz



Plot 7.2.22 Occupied bandwidth test results at low frequency, Uplink

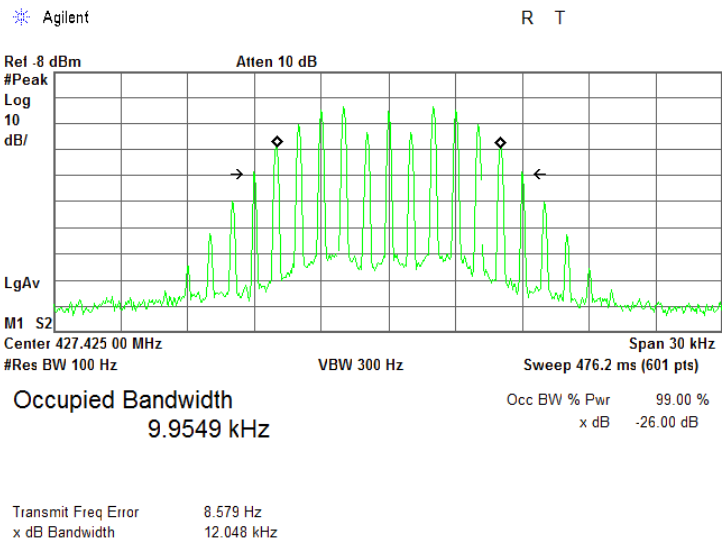
OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 426.363 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

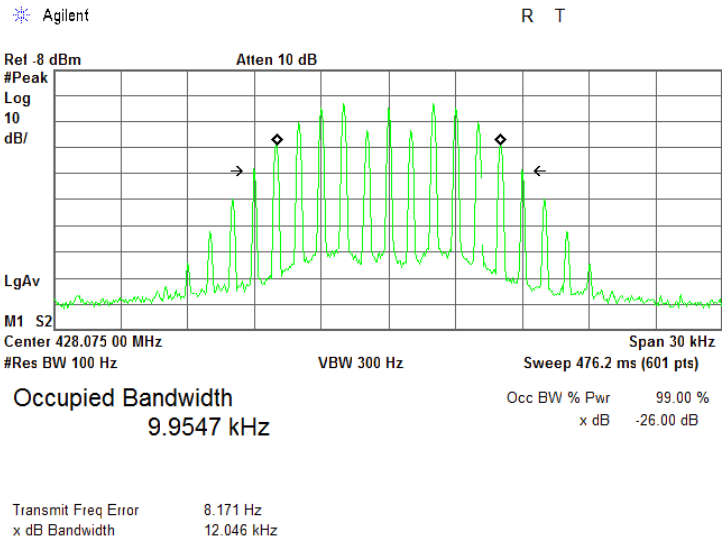
Plot 7.2.23 Occupied bandwidth test results at mid frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 427.425 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 11.25 kHz



Plot 7.2.24 Occupied bandwidth test results at high frequency, Uplink

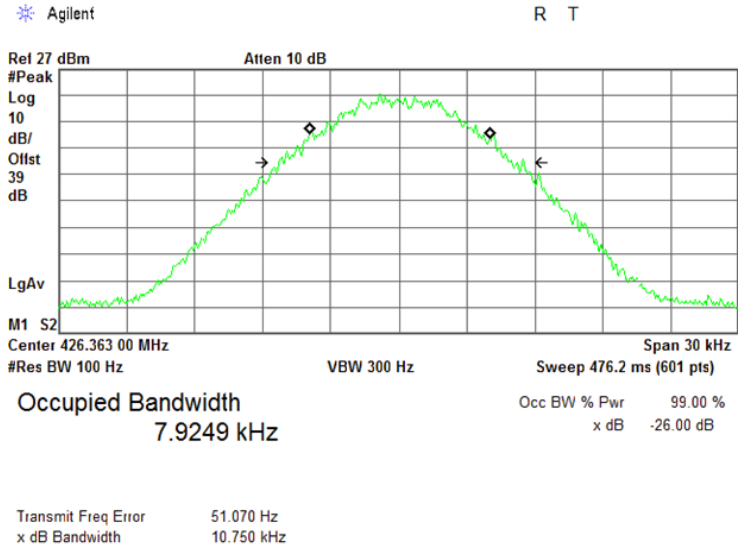
OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 428.075 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

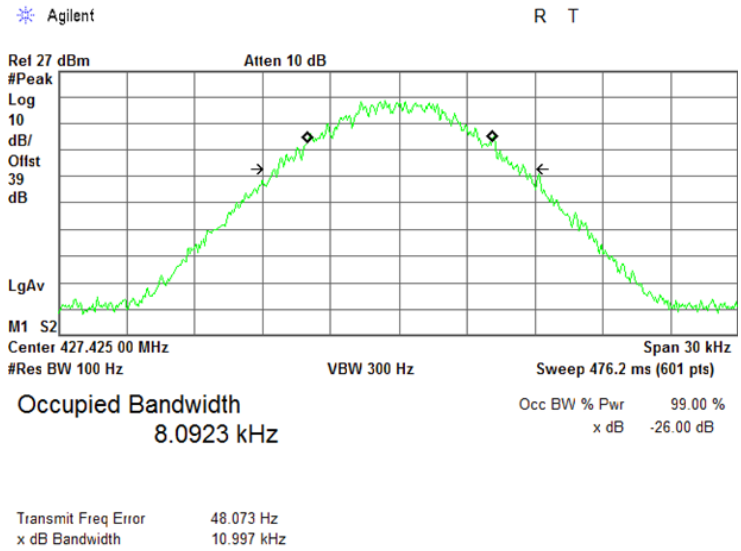
Plot 7.2.25 Occupied bandwidth test results at low frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 426.363 MHz
MODULATION: P25 phase 1
AUTHORIZED BANDWIDTH: 11.25 kHz



Plot 7.2.26 Occupied bandwidth test results at mid frequency, Uplink

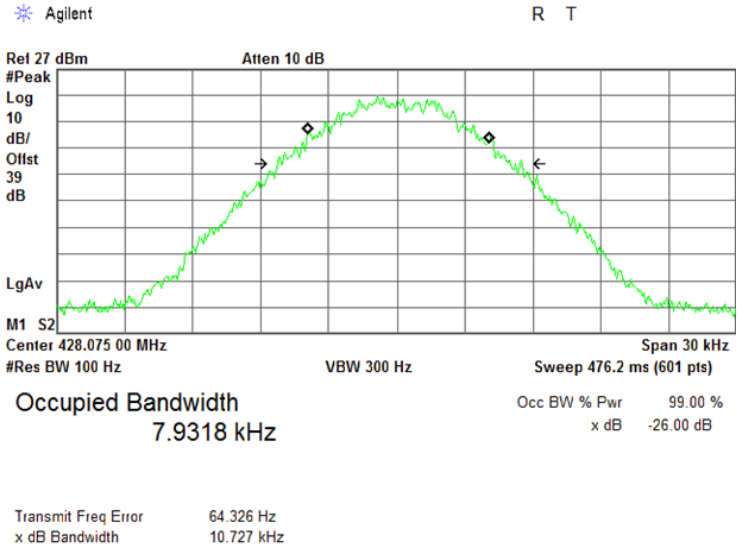
OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 427.425MHz
MODULATION: P25 phase 1
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

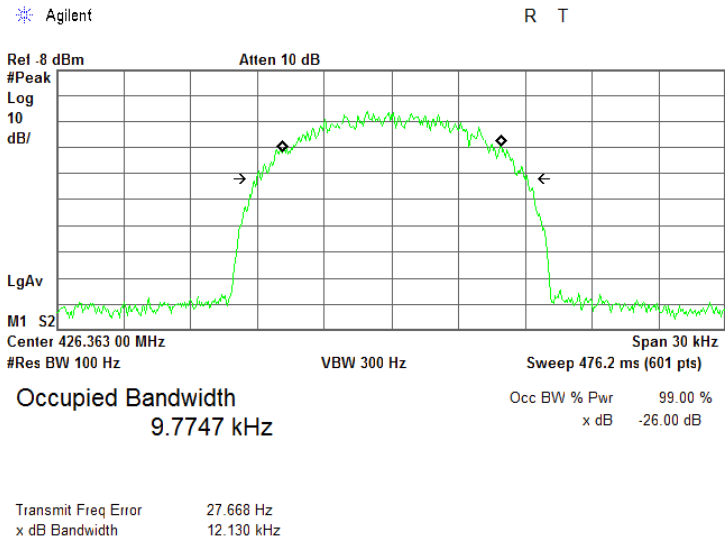
Plot 7.2.27 Occupied bandwidth test results at high frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 428.075 MHz
MODULATION: P25 phase 1
AUTHORIZED BANDWIDTH: 11.25 kHz



Plot 7.2.28 Occupied bandwidth test results at low frequency, Uplink

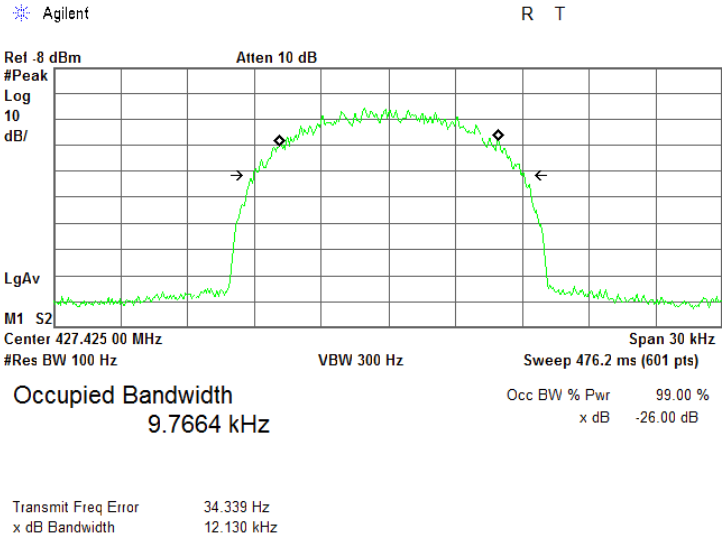
OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 426.363 MHz
MODULATION: P25 phase 2
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

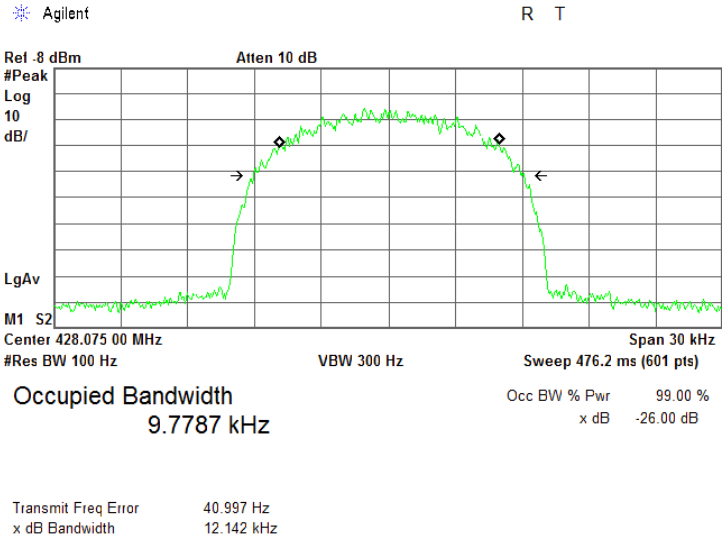
Plot 7.2.29 Occupied bandwidth test results at mid frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 427.425MHz
MODULATION: P25 phase 2
AUTHORIZED BANDWIDTH: 11.25 kHz



Plot 7.2.30 Occupied bandwidth test results at high frequency, Uplink

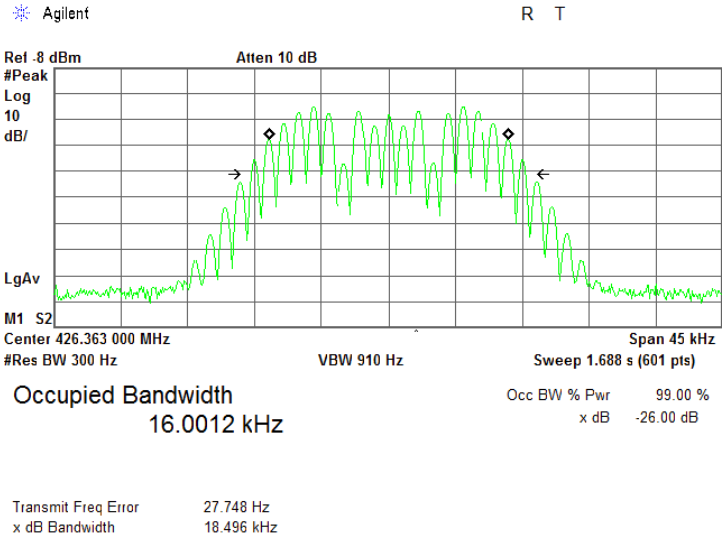
OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 428.075 MHz
MODULATION: P25 phase 2
AUTHORIZED BANDWIDTH: 11.25 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

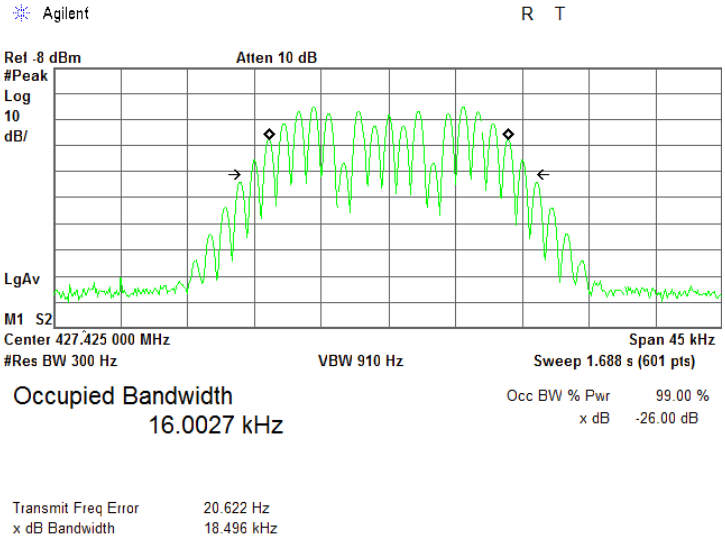
Plot 7.2.31 Occupied bandwidth test results at low frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 426.363 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 20.0 kHz



Plot 7.2.32 Occupied bandwidth test results at mid frequency, Uplink

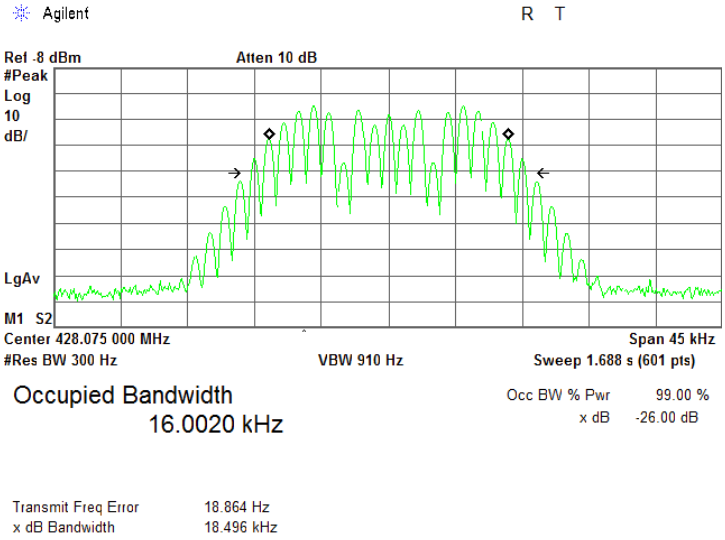
OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 427.425 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 20.0 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

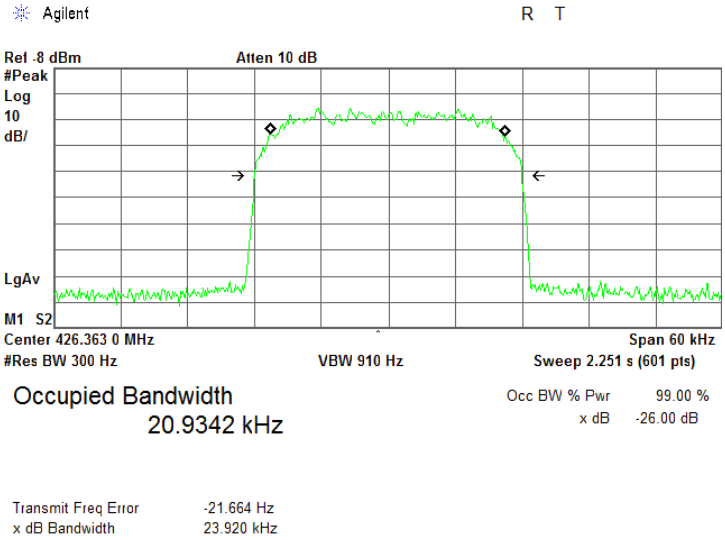
Plot 7.2.33 Occupied bandwidth test results at high frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 428.075 MHz
MODULATION: Analog FM
AUTHORIZED BANDWIDTH: 20.0 kHz



Plot 7.2.34 Occupied bandwidth test results at low frequency, Uplink

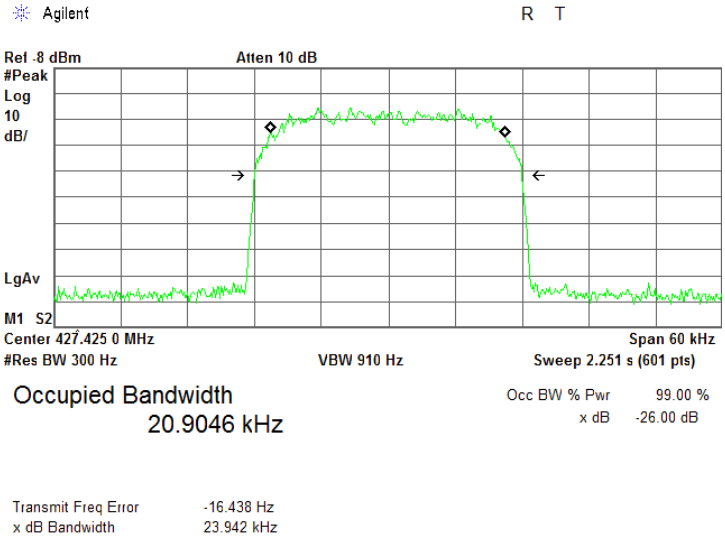
OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 426.363 MHz
MODULATION: Tetra
AUTHORIZED BANDWIDTH: 22.0 kHz



Test specification:	**Section 90.209(b)(5), Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

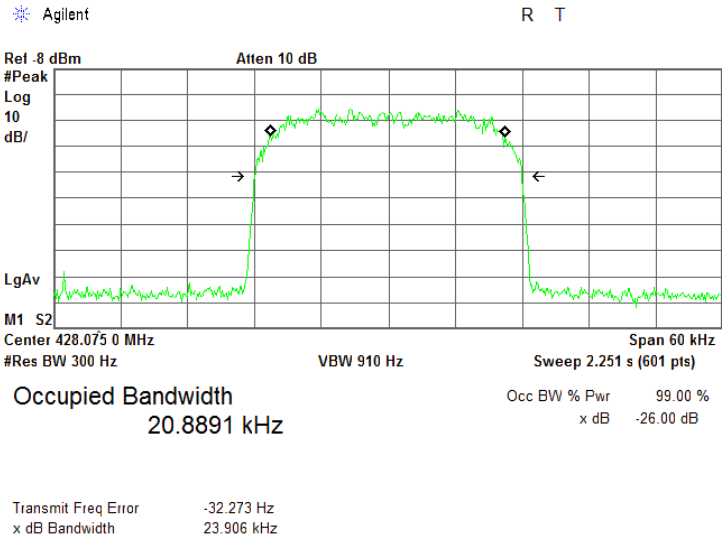
Plot 7.2.35 Occupied bandwidth test results at mid frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 427.425 MHz
MODULATION: Tetra
AUTHORIZED BANDWIDTH: 22.0 kHz



Plot 7.2.36 Occupied bandwidth test results at high frequency, Uplink

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
CARRIER FREQUENCY: 428.075 MHz
MODULATION: Tetra
AUTHORIZED BANDWIDTH: 22.0 kHz



Test specification:	**Section 90.219(d)(2), Out-of-band rejection test**		
Test procedure:	KDB 935210 D05 v01r04, section 4.3		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

7.3 Out-of-band rejection test

7.3.1 General

This test was performed to measure out-of-band rejection. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Out-of-band rejection limits

F; requency range, MHz*	Tested frequency range	Modulation envelope reference points**, dBc
421.3505 – 423.0875	±250% of the pass band	20
426.3505 – 428.0875	±250% of the pass band	20

*Was calculated as 421.363 – 0.5xCBW = 421.363 – 0.5 x 0.025 = 421.3505 (MHz);

423.075 + 0.5xCBW = 423.075 + 0.0125=423.0875 (MHz)

** - Modulation envelope reference points are provided in terms of attenuation below the unmodulated carrier.

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

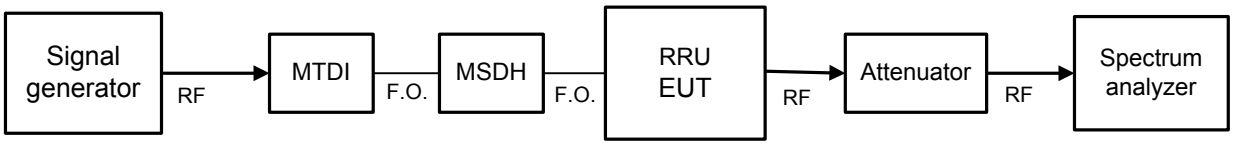
7.3.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.

7.3.2.3 The EUT was set to transmit the normally modulated carrier.

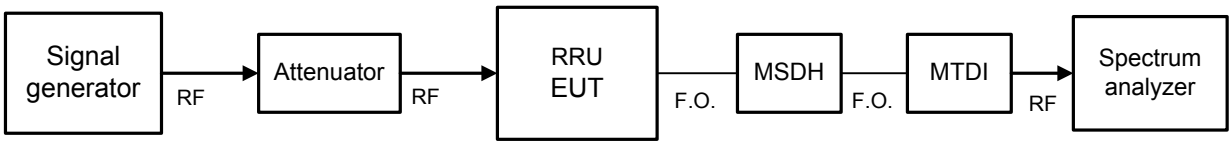
7.3.2.4 The transmitter out-of-band rejection was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.3.2 and the associated plots.

Figure 7.3.1 Out-of-band rejection test setup

Checking DL path



Checking UL path



Test specification:	**Section 90.219(d)(2), Out-of-band rejection test**		
Test procedure:	KDB 935210 D05 v01r04, section 4.3		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

Table 7.3.2 Out-of-band rejection test results

OPERATING FREQUENCY RANGE:	421.363 – 423.075 MHz Downlink 426.363 – 428.075 MHz Uplink
DETECTOR USED:	Peak hold
RESOLUTION BANDWIDTH:	30 kHz
VIDEO BANDWIDTH:	91 kHz
MODULATION ENVELOPE REFERENCE POINTS:	20 dBc
INPUT LEVEL:	3 dB below AGC threshold level

Input Power, dBm	Start Band frequency, MHz	Stop Band frequency, MHz	Passband, MHz	Limit, MHz	Verdict
Downlink					
- 43.00	421.14	423.34	2.20	421 - 430	Pass
Uplink					
- 54.00	426.12	428.34	2.22	421 - 430	Pass

Note: the AGC threshold level in Downlink is equal to -40 dBm, in Uplink is -51 dBm.

Reference numbers of test equipment used

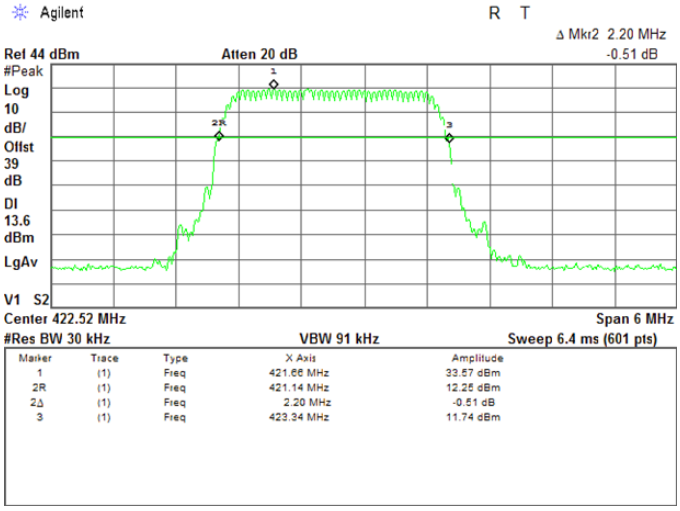
HL 0539	HL 1809	HL 3818					

Full description is given in Appendix A.

Test specification:	Section 90.219(d)(2), Out-of-band rejection test		
Test procedure:	KDB 935210 D05 v01r04, section 4.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Sep-19		
Temperature: 24.5 ºC	Relative Humidity: 51 %	Air Pressure: 1014 hPa	Power: 120 V/60 Hz
Remarks:			

Plot 7.3.1 Out-of-band rejection test result

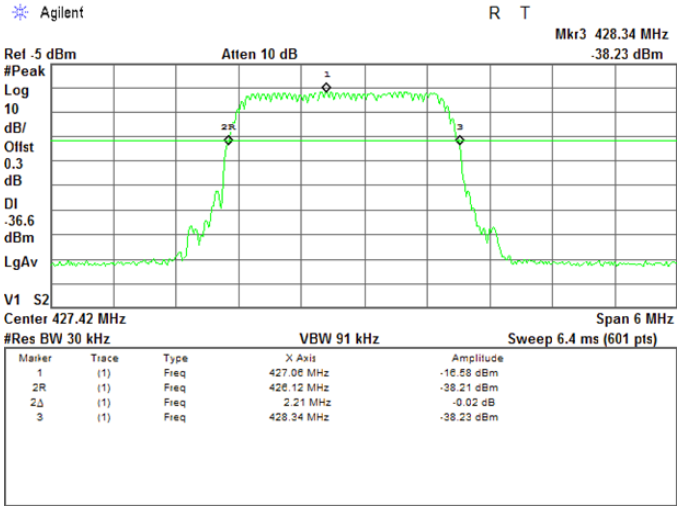
OPERATING FREQUENCY RANGE: 421.363 – 423.075 MHz Downlink
SWEEP FREQUENCY RANGE: 419.52 – 425.52 MHz
DETECTOR USED: Peak hold
OUTPUT PORT: SERV/MOB (RRU)
INPUT POWER: 3 dB below AGC threshold level



Note: f_0= 421.66 MHz

Plot 7.3.2 Out-of-band rejection test result

OPERATING FREQUENCY RANGE: 426.363 – 428.075 MHz Uplink
SWEEP FREQUENCY RANGE: 424.42 – 430.42 MHz
DETECTOR USED: Peak hold
OUTPUT PORT: UL1 (KPR1)
INPUT POWER: 3 dB below AGC threshold level



Note: f_0= 427.06 MHz

Test specification:	Section 90.219(e)(1), Output power		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	Relative Humidity: 49 %	Air Pressure: 1012 hPa	Power: 120 V/60 Hz
Remarks:			

7.4 Input/output power and booster gain test

7.4.1 General

This test was performed to measure the input/output power and booster gain of EUT. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Mean output power limits

Assigned frequency range, MHz	Maximum ERP		
	W	dBm	Declared by manufacturer (conducted)
421.303 – 423.135 (Downlink)	5	37	36
426.303 – 428.135 (Uplink)	5	37	-14.5

7.4.2 Test procedure

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and its proper operation was checked.

7.4.2.2 The EUT was adjusted to produce maximum available to the end user RF output power and to the maximum gain.

7.4.2.3 The input power level was set to maximum input rating, while confirming that the EUT is not capable of operating in saturation at the rated input level.

7.4.2.4 The signal generator was set to CW test signal and to the frequency f_0. The CW amplitude was adjusted 3 dB below the AGC threshold level, but not more than 0.5 dB below.

7.4.2.5 The RBW of the spectrum analyzer was set 100 kHz and VBW > 3xRBW.

7.4.2.6 The detector was set to Peak and the trace to Max-Hold.

7.4.2.7 The peak output power was measured with spectrum analyzer and provided in Table 7.4.2 and the associated plots.

7.4.2.8 The EUT input signal power was measured using the spectrum analyzer connected directly to the signal generator and using the same signal generator settings. The mean gain of the EUT was determined according to next equation:

Gain (dB) = Output power (dBm) – Input power (dBm)

and provided in Table 7.4.2 and the associated plots.

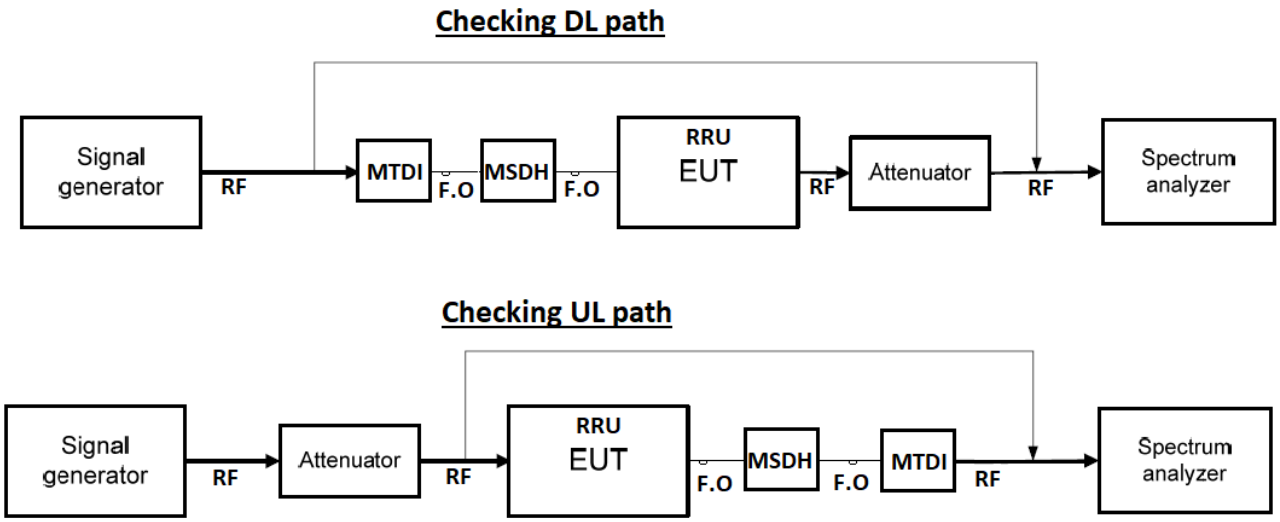
7.4.2.9 The test was repeated with the input signal amplitude set 3 dB above the AGC threshold level

7.4.2.10 The test was repeated with the rest narrow band test signals.

7.4.2.11 The test was repeated for all frequency bands authorized for use by the EUT.The test results provided in Table 7.4.2, Table 7.4.3.

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Figure 7.4.1 Peak output power test setup



Test specification:	Section 90.219(e)(1), Output power		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	Relative Humidity: 49 %	Air Pressure: 1012 hPa	Power: 120 V/60 Hz
Remarks:			

Table 7.4.2 Input/output power and booster gain test results, Downlink

OPERATING FREQUENCY RANGE: 421.363–423.075 (Downlink)
OPERATING FREQUENCY fo: 421.66 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: 3xRBW
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
INPUT SIGNAL: Below AGC threshold level

Input signal modulation	SA reading, dBm		Booster gain, dB**	Antenna assembly gain***, dBd	ERP, dBm	ERP limit, dBm	Margin*, dB	Verdict
	Input	Output						
CW	-39.33	36.10	75.43	-6.0	30.10	37.0	-6.90	Pass
Analog FM (CS 6.25 kHz)	-39.36	36.90	76.26	-6.0	30.90	37.0	-6.10	Pass
Analog FM (CS 12.5 kHz)	-39.34	36.93	76.27	-6.0	30.93	37.0	-6.07	Pass
Analog FM (CS 25 kHz)	-39.38	36.87	76.25	-6.0	30.87	37.0	-6.13	Pass
P25 phase 1 (C4FM)	-39.59	36.76	76.35	-6.0	30.76	37.0	-6.24	Pass
P25 phase 2 (H-DQPSK)	-39.21	36.68	75.89	-6.0	30.68	37.0	-6.32	Pass
Tetra	-39.28	36.87	76.15	-6.0	30.87	37.0	-6.13	Pass

INPUT SIGNAL: AGC threshold level +3 dB

Input signal modulation	SA reading, dBm		Booster gain, dB**	Antenna assembly gain***, dBd	ERP, dBm	ERP limit, dBm	Margin*, dB	Verdict
	Input	Output						
CW	-36.33	36.55	72.88	-6.0	30.55	37.0	-6.45	Pass
Analog FM (CS 6.25 kHz)	-36.36	36.41	72.77	-6.0	30.41	37.0	-6.59	Pass
Analog FM (CS 12.5 kHz)	-36.34	36.44	72.78	-6.0	30.44	37.0	-6.56	Pass
Analog FM (CS 25 kHz)	-36.37	36.59	72.96	-6.0	30.59	37.0	-6.41	Pass
P25 phase 1 (C4FM)	-36.50	36.89	73.39	-6.0	30.89	37.0	-6.11	Pass
P25 phase 2 (H-DQPSK)	-36.32	36.98	73.30	-6.0	30.98	37.0	-6.02	Pass
Tetra	-36.27	36.97	73.24	-6.0	30.97	37.0	-6.03	Pass

* - Margin = Maximum ERP (output power) – specification limit
** - Booster Gain (dB) = Output SA Reading (dBm) – Input power (dBm)
*** - Antenna Assembly Gain (dBd) = Antenna Gain (dBi) – 2.15 - Feeder Loss (dB) – Splitter Loss
Note: ERP = Maximum value from SA reading (Without ALC or With ALC) + Antenna Assembly gain (dBd)
In DAS system, we suppose a loss due to cable insertion, splitter, etc, about of 6 dB.
There are no specific antennas supplied as a part of the unit that is why the maximum antenna assembly gain in dBd shall not exceed the power margin in dB.

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Table 7.4.3 Input/output power and booster gain test results, Uplink

OPERATING FREQUENCY RANGE: 426.363 - 428.075 (Uplink)
OPERATING FREQUENCY fo: 427.06 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: 3xRBW
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
INPUT SIGNAL: Below AGC threshold level

Input signal modulation	Input power, dBm	SA reading, dBm	Booster Gain, dB**	ERP, dBm	ERP limit, dBm	Margin*, dB	Verdict
CW	-51.57	-14.40	37.17	-14.40	37.0	-51.40	Pass
Analog FM (CS 6.25 kHz)	-51.18	-13.84	37.34	-13.84	37.0	-50.84	Pass
Analog FM (CS 12.5 kHz)	-51.18	-13.88	37.30	-13.88	37.0	-50.88	Pass
Analog FM (CS 25 kHz)	-51.19	-13.91	37.28	-13.91	37.0	-50.91	Pass
P25 phase 1 (C4FM)	-51.34	-13.96	37.38	-13.96	37.0	-50.96	Pass
P25 phase 1 (H-DQPSK)	-51.35	-14.03	37.32	-14.03	37.0	-51.03	Pass
Tetra	-51.27	-14.05	37.22	-14.05	37.0	-51.05	Pass

INPUT SIGNAL: AGC threshold level +3 dB

Input signal modulation	Input power, dBm	SA reading, dBm	Booster Gain, dB**	ERP, dBm	ERP limit, dBm	Margin*, dB	Verdict
CW	-48.23	-14.21	34.02	-14.21	37.0	-51.21	Pass
Analog FM (CS 6.25 kHz)	-48.19	-13.92	34.27	-13.92	37.0	-50.92	Pass
Analog FM (CS 12.5 kHz)	-48.19	-13.91	34.28	-13.91	37.0	-50.91	Pass
Analog FM (CS 25 kHz)	-48.20	-13.92	34.28	-13.92	37.0	-50.92	Pass
P25 phase 1 (C4FM)	-48.37	-13.99	34.38	-13.99	37.0	-50.99	Pass
P25 phase 1 (H-DQPSK)	-48.56	-14.03	34.53	-14.03	37.0	-51.03	Pass
Tetra	-48.41	-13.96	34.45	-13.96	37.0	-50.96	Pass

* - Margin = Maximum ERP (output power) – specification limit
** - Booster Gain (dB) = Output SA Reading (dBm) – Input power (dBm)

Reference numbers of test equipment used

HL 0539	HL 2909	HL 3818	HL 4354	HL 5409	

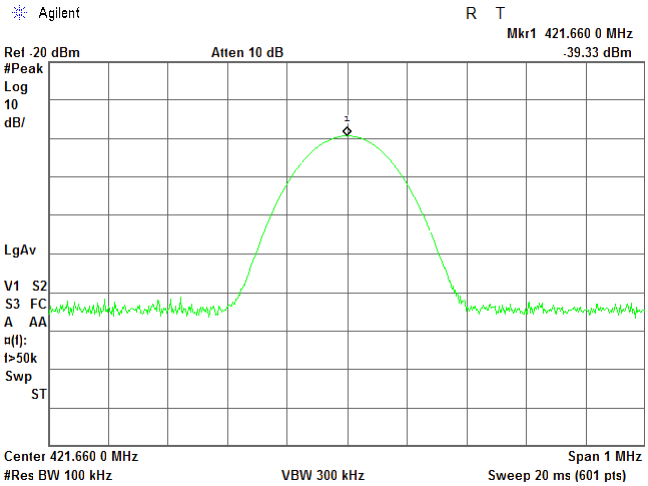
Full description is given in Appendix A.

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

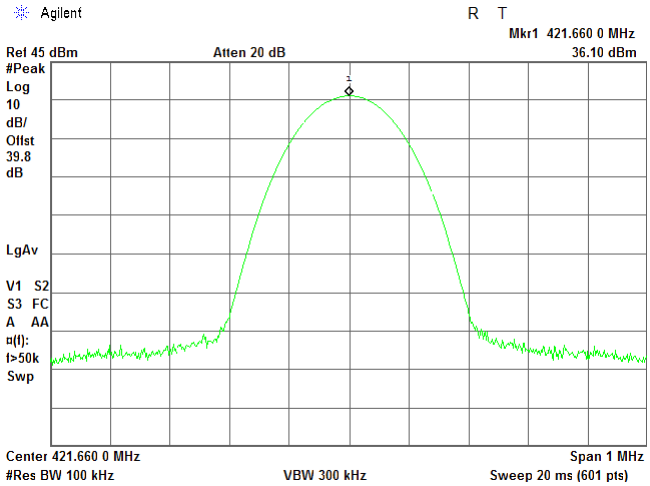
Plot 7.4.1 Input/output power test results at f_o frequency (Downlink)

OPERATING FREQUENCY RANGE: 421.363 – 423.075 (Downlink)
CARRIER FREQUENCY: 421.66 MHz
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: CW

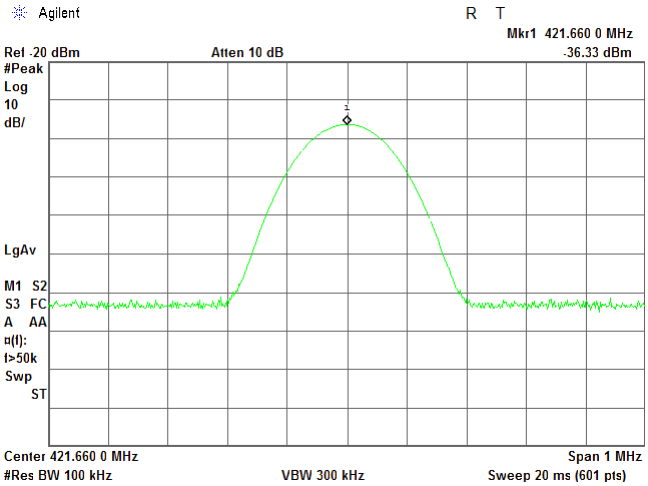
INPUT SIGNAL: Below AGC threshold level



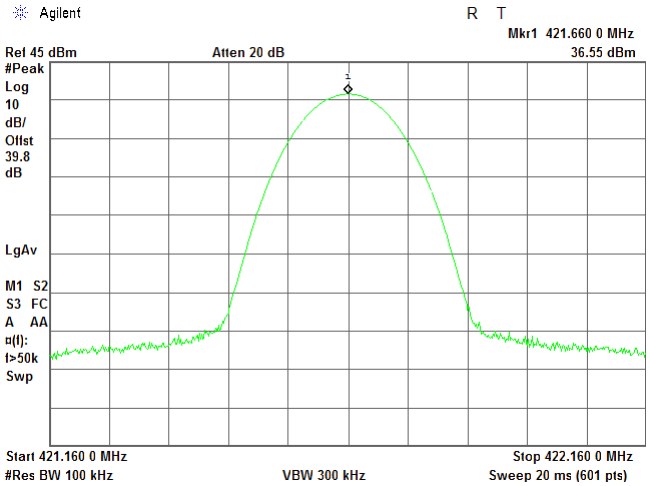
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



OUTPUT SIGNAL:

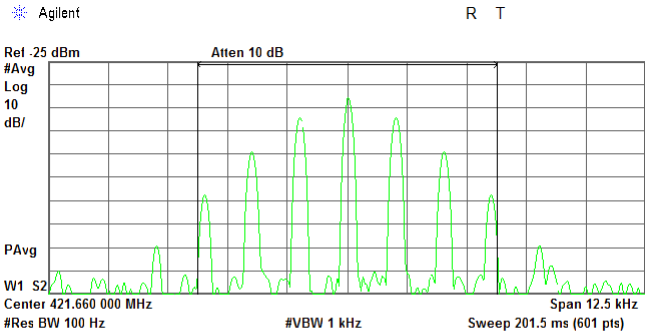


Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.2 Input/output power test results at f_o frequency (Downlink)

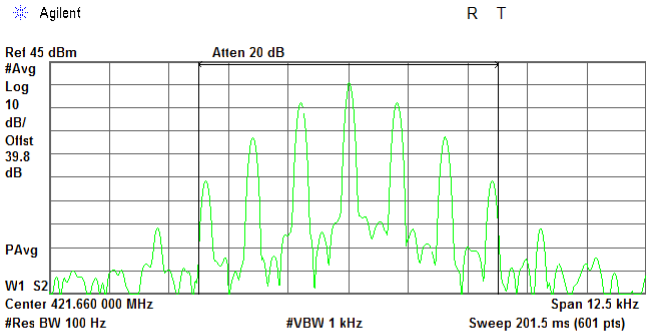
OPERATING FREQUENCY RANGE: 421.363 – 423.075 (Downlink)
CARRIER FREQUENCY: 421.66 MHz
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: Analog FM (OBW 6.25 kHz)

INPUT SIGNAL: Below AGC threshold level



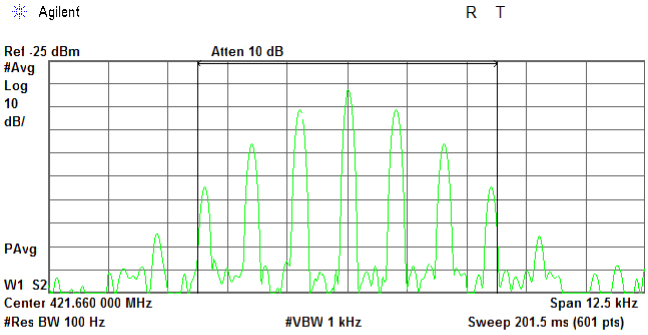
Channel Power: -39.36 dBm / 6.2500 kHz
Power Spectral Density: -77.32 dBm/Hz

OUTPUT SIGNAL:



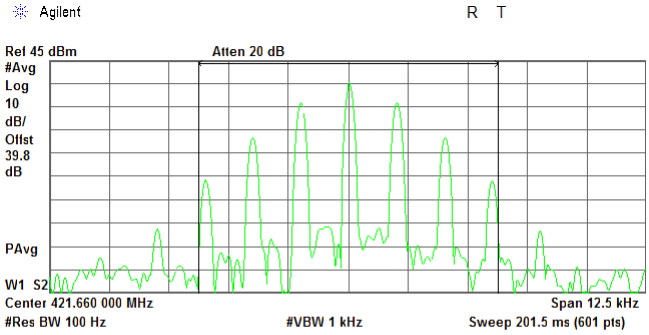
Channel Power: 36.90 dBm / 6.2500 kHz
Power Spectral Density: -1.06 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -36.36 dBm / 6.2500 kHz
Power Spectral Density: -74.32 dBm/Hz

OUTPUT SIGNAL:



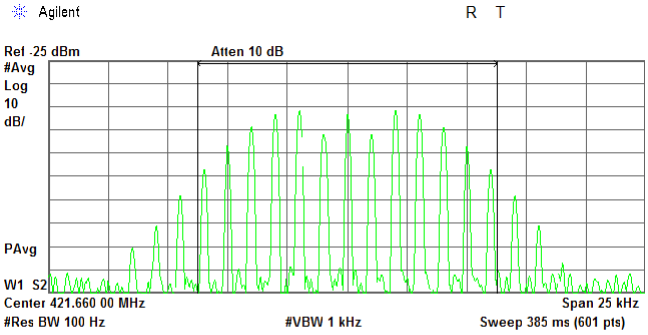
Channel Power: 36.41 dBm / 6.2500 kHz
Power Spectral Density: -1.55 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.3 Input/output power test results at f_o frequency (Downlink)

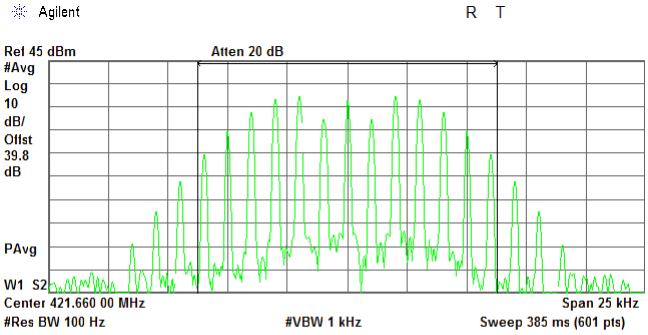
OPERATING FREQUENCY RANGE: 421.363 – 423.075 (Downlink)
CARRIER FREQUENCY: 421.66 MHz
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: Analog FM (OBW 12.5 kHz)

INPUT SIGNAL: Below AGC threshold level



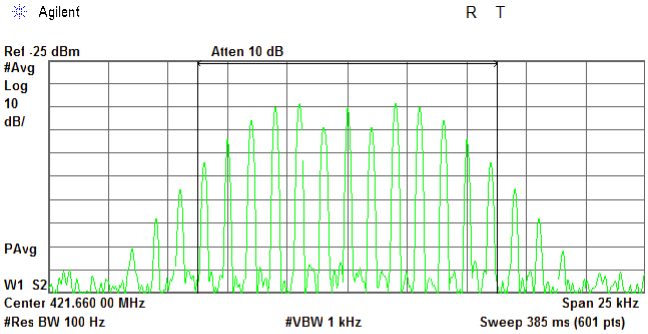
Channel Power: -39.34 dBm / 12.5000 kHz
Power Spectral Density: -80.31 dBm/Hz

OUTPUT SIGNAL:



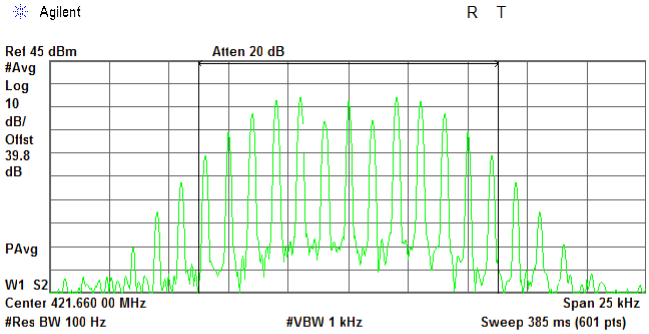
Channel Power: 36.93 dBm / 12.5000 kHz
Power Spectral Density: -4.04 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -36.34 dBm / 12.5000 kHz
Power Spectral Density: -77.31 dBm/Hz

OUTPUT SIGNAL:



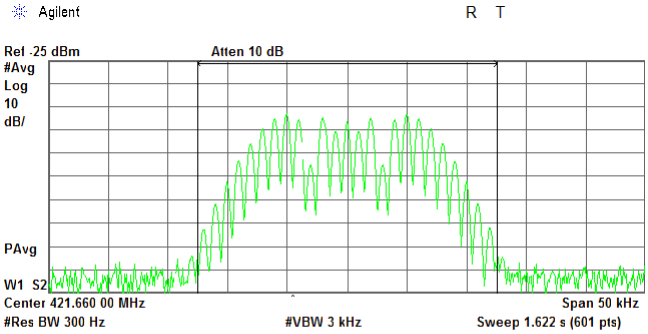
Channel Power: 36.44 dBm / 12.5000 kHz
Power Spectral Density: -4.53 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.4 Input/output power test results at f_o frequency (Downlink)

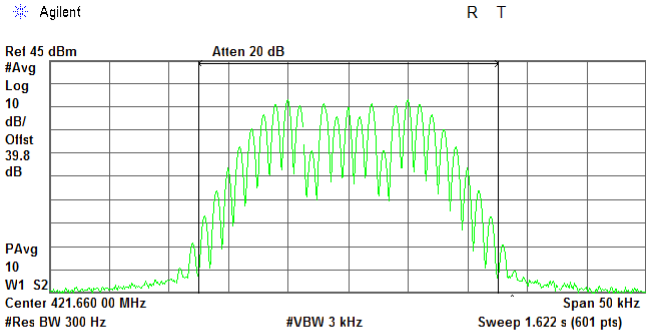
OPERATING FREQUENCY RANGE: 421.363 – 423.075 (Downlink)
CARRIER FREQUENCY: 421.66 MHz
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: Analog FM (OBW 25 kHz)

INPUT SIGNAL: Below AGC threshold level



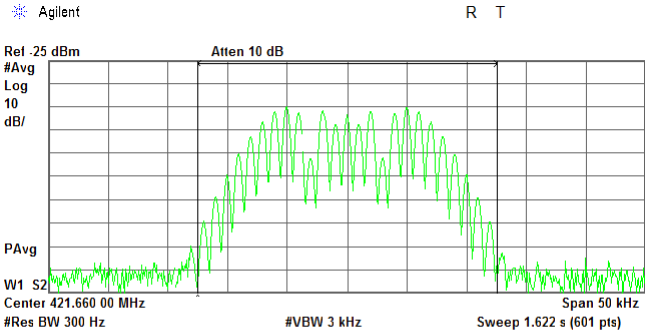
Channel Power: -39.38 dBm / 25.0000 kHz
Power Spectral Density: -83.36 dBm/Hz

OUTPUT SIGNAL:



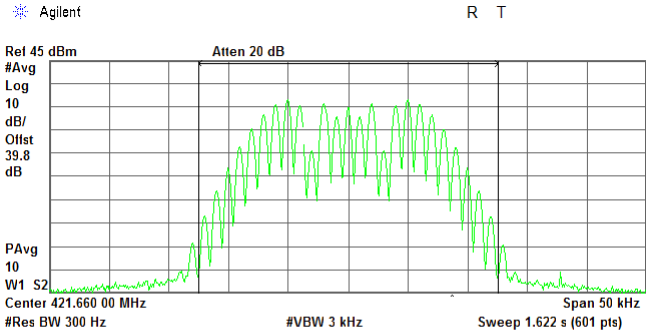
Channel Power: 36.87 dBm / 25.0000 kHz
Power Spectral Density: -7.11 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -36.37 dBm / 25.0000 kHz
Power Spectral Density: -80.35 dBm/Hz

OUTPUT SIGNAL:



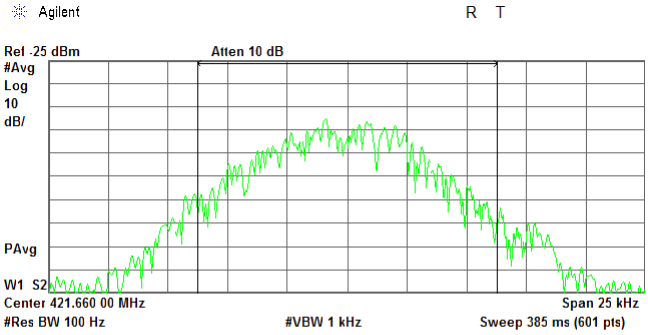
Channel Power: 36.59 dBm / 25.0000 kHz
Power Spectral Density: -7.39 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.5 Input/output power test results at f_o frequency (Downlink)

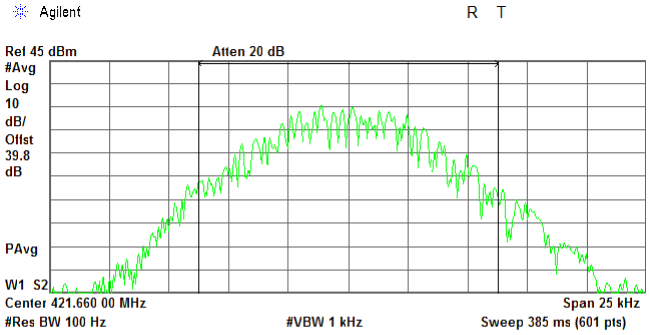
OPERATING FREQUENCY RANGE: 421.363 – 423.075 (Downlink)
CARRIER FREQUENCY: 421.66 MHz
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: P25 phase 1 (C4FM)

INPUT SIGNAL: Below AGC threshold level



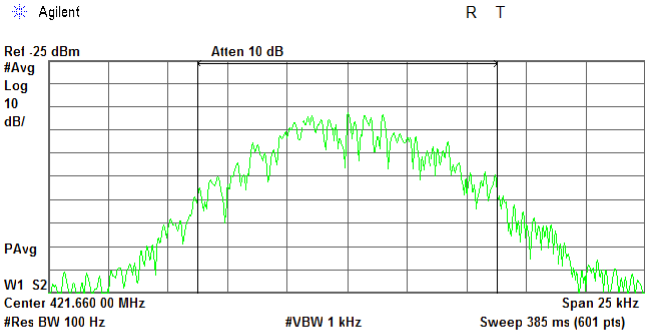
Channel Power: -39.59 dBm / 12.5000 kHz
Power Spectral Density: -80.56 dBm/Hz

OUTPUT SIGNAL:



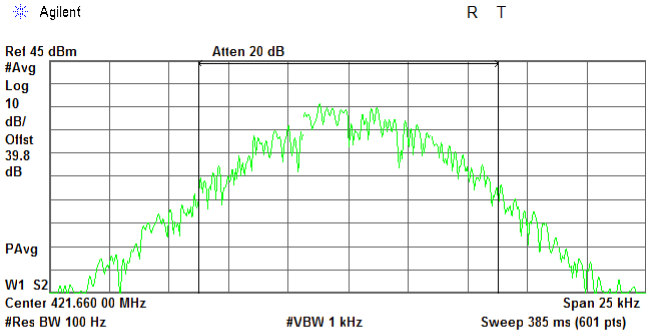
Channel Power: 36.76 dBm / 12.5000 kHz
Power Spectral Density: -4.21 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -36.50 dBm / 12.5000 kHz
Power Spectral Density: -77.47 dBm/Hz

OUTPUT SIGNAL:



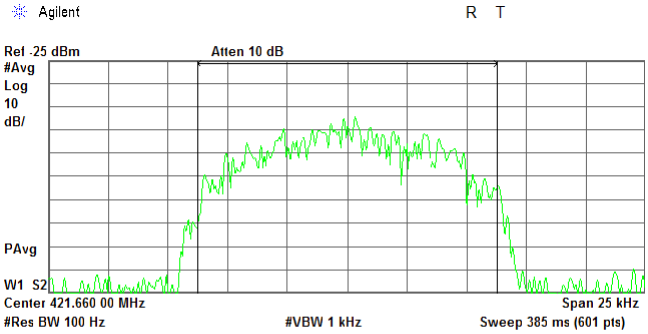
Channel Power: 36.89 dBm / 12.5000 kHz
Power Spectral Density: -4.08 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.6 Input/output power power test results at f_o frequency (Downlink)

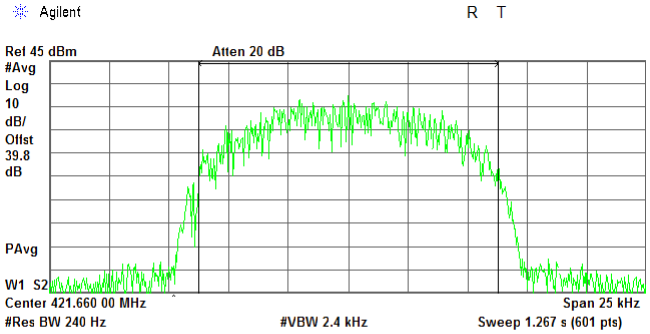
OPERATING FREQUENCY RANGE: 421.363 – 423.075 (Downlink)
CARRIER FREQUENCY: 421.66 MHz
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: P25 phase 2 (H-DQPSK)

INPUT SIGNAL: Below AGC threshold level



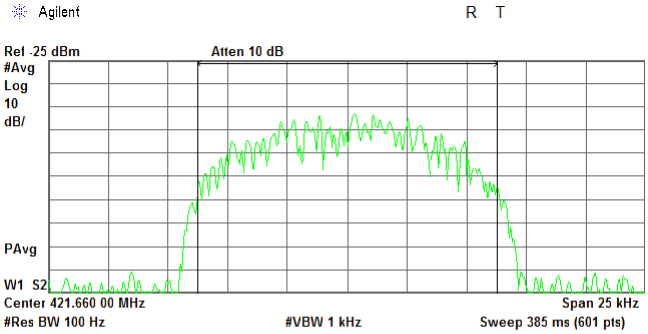
Channel Power: -39.21 dBm / 12.5000 kHz
Power Spectral Density: -80.18 dBm/Hz

OUTPUT SIGNAL:



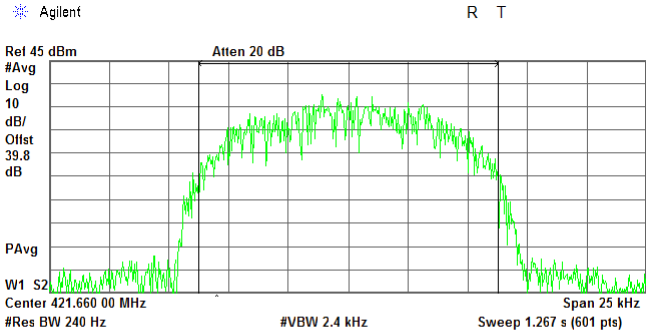
Channel Power: 36.68 dBm / 12.5000 kHz
Power Spectral Density: -4.29 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -36.32 dBm / 12.5000 kHz
Power Spectral Density: -77.29 dBm/Hz

OUTPUT SIGNAL:



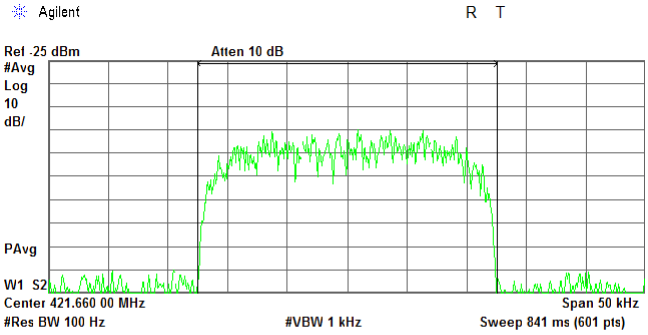
Channel Power: 36.98 dBm / 12.5000 kHz
Power Spectral Density: -3.99 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.7 Input/output power test results at f_o frequency (Downlink)

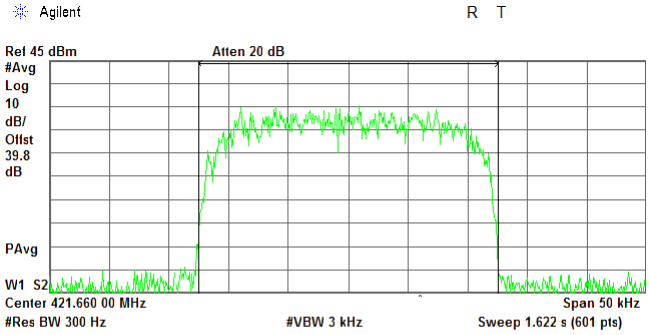
OPERATING FREQUENCY RANGE: 421.363 – 423.075 (Downlink)
CARRIER FREQUENCY: 421.66 MHz
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: Tetra

INPUT SIGNAL: Below AGC threshold level



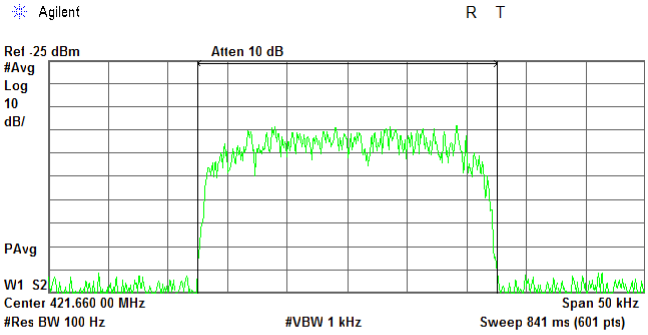
Channel Power: -39.28 dBm / 25.0000 kHz
Power Spectral Density: -83.26 dBm/Hz

OUTPUT SIGNAL:



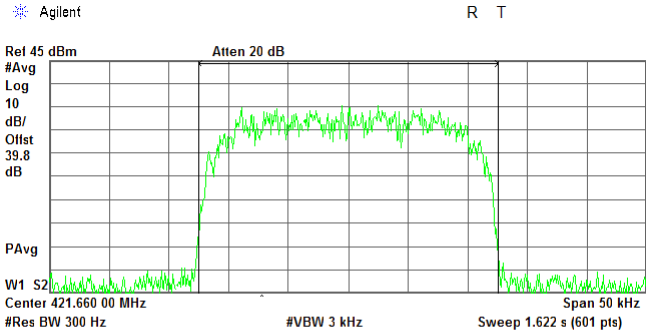
Channel Power: 36.87 dBm / 25.0000 kHz
Power Spectral Density: -7.11 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -36.27 dBm / 25.0000 kHz
Power Spectral Density: -80.25 dBm/Hz

OUTPUT SIGNAL:



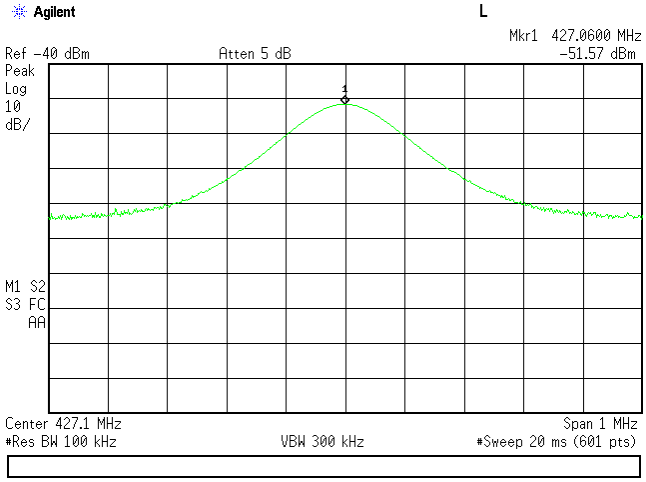
Channel Power: 36.97 dBm / 25.0000 kHz
Power Spectral Density: -7.01 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

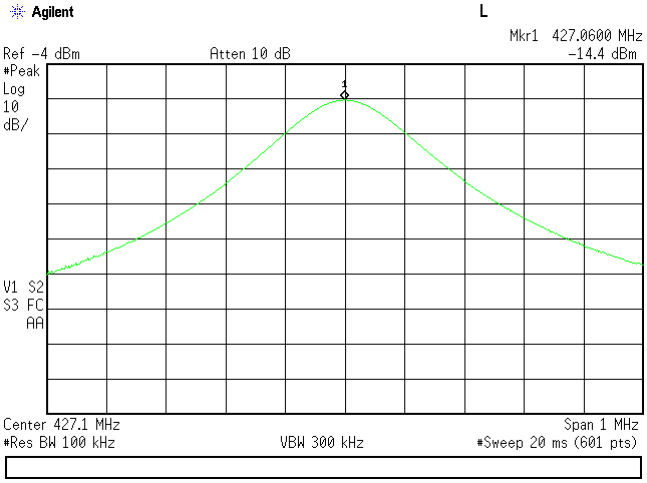
Plot 7.4.8 Input/output power power test results at f_o frequency (Uplink)

OPERATING FREQUENCY RANGE: 426.363 – 428.075 (Uplink)
CARRIER FREQUENCY: 427.06 MHz
OUTPUT PORT: UL1 (KPR1)
MODULATION: CW

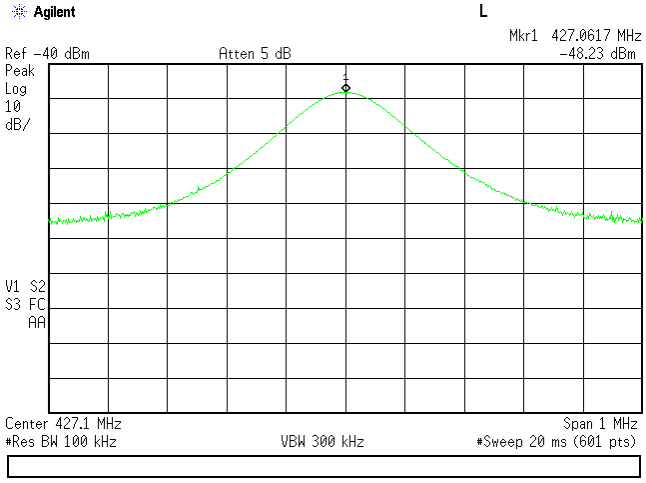
INPUT SIGNAL: Below AGC threshold level



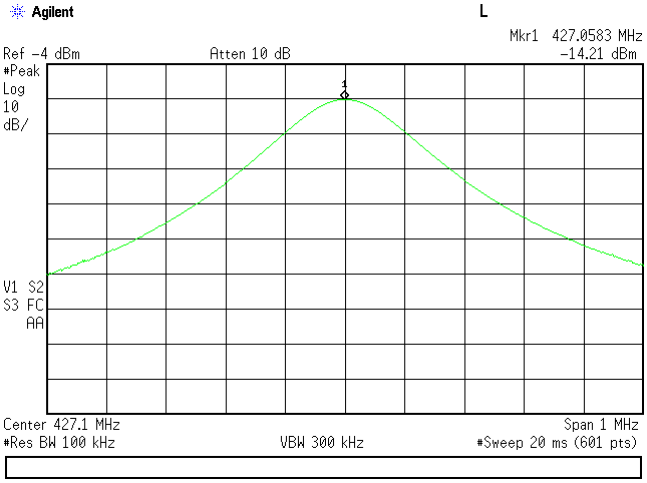
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



OUTPUT SIGNAL:

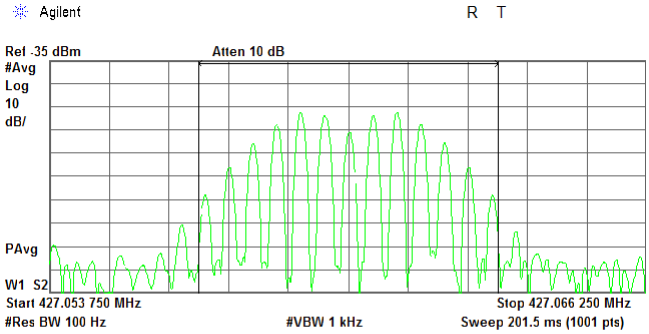


Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.9 Input/output power test results at f_o frequency (Uplink)

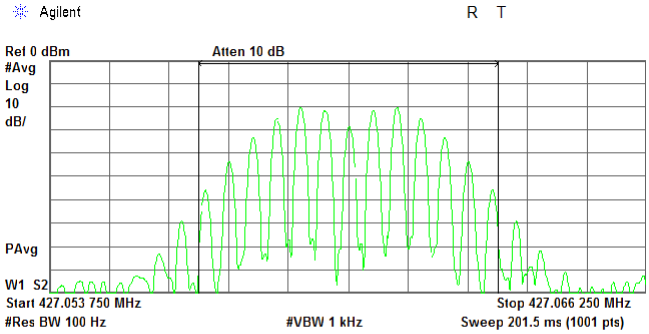
OPERATING FREQUENCY RANGE: 426.363 – 428.075 (Uplink)
CARRIER FREQUENCY: 427.06 MHz
OUTPUT PORT: UL1 (KPR1)
MODULATION: Analog FM (OBW 6.25 kHz)

INPUT SIGNAL: Below AGC threshold level



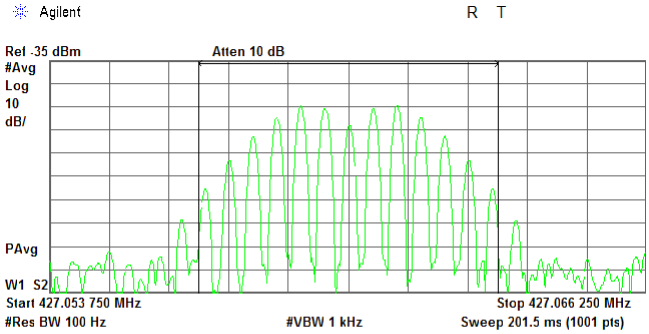
Channel Power: -51.18 dBm / 6.2500 kHz
Power Spectral Density: -89.14 dBm/Hz

OUTPUT SIGNAL:



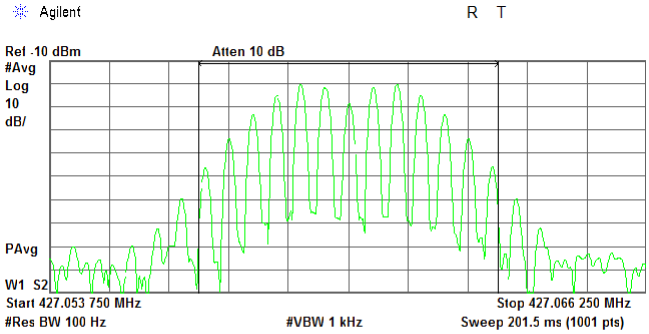
Channel Power: -13.84 dBm / 6.2500 kHz
Power Spectral Density: -51.80 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -48.19 dBm / 6.2500 kHz
Power Spectral Density: -86.15 dBm/Hz

OUTPUT SIGNAL:



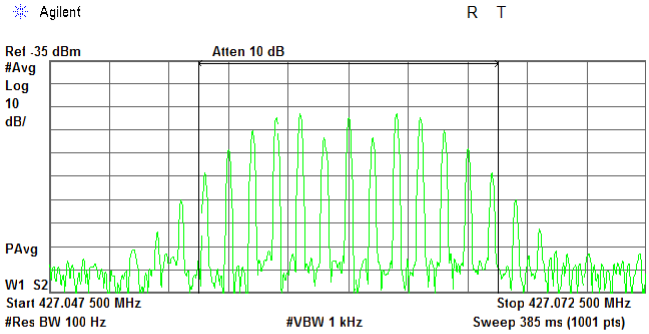
Channel Power: -13.92 dBm / 6.2500 kHz
Power Spectral Density: -51.88 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.10 Input/output power test results at f_o frequency (Uplink)

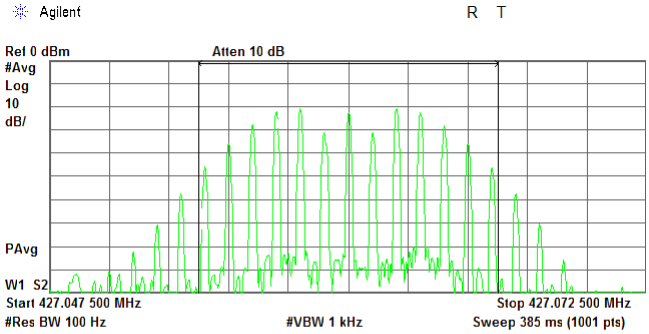
OPERATING FREQUENCY RANGE: 426.363 – 428.075 (Uplink)
CARRIER FREQUENCY: 427.06 MHz
OUTPUT PORT: UL1 (KPR1)
MODULATION: Analog FM (OBW 12.5 kHz)

INPUT SIGNAL: Below AGC threshold level



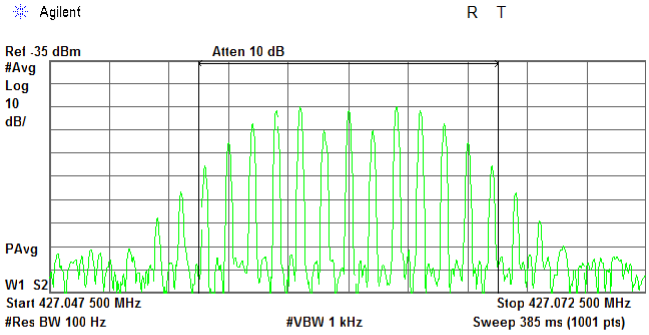
Channel Power: -51.18 dBm / 12.5000 kHz
Power Spectral Density: -92.15 dBm/Hz

OUTPUT SIGNAL:



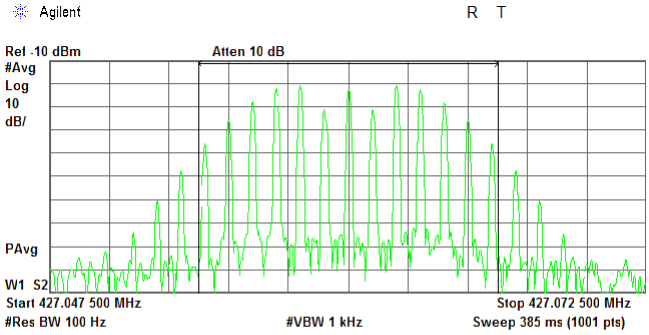
Channel Power: -13.88 dBm / 12.5000 kHz
Power Spectral Density: -54.85 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -48.19 dBm / 12.5000 kHz
Power Spectral Density: -89.16 dBm/Hz

OUTPUT SIGNAL:



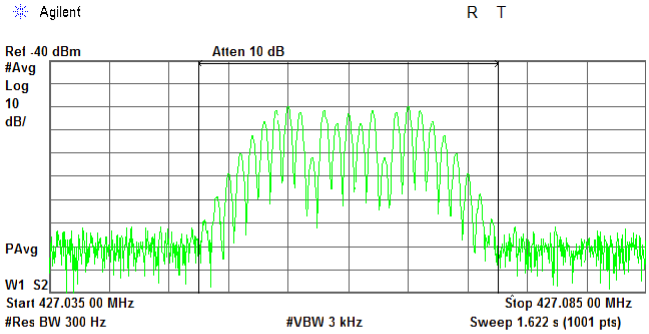
Channel Power: -13.91 dBm / 12.5000 kHz
Power Spectral Density: -54.88 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.11 Input/output power test results at f_o frequency (Uplink)

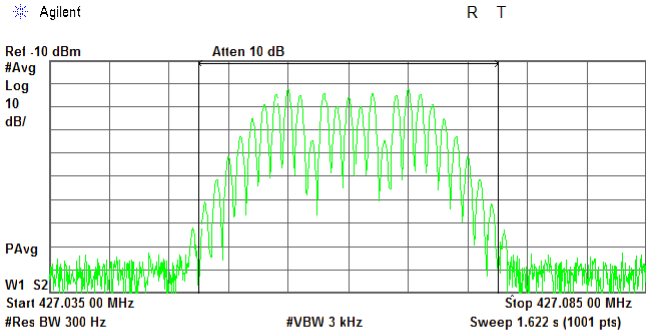
OPERATING FREQUENCY RANGE: 426.363 – 428.075 (Uplink)
CARRIER FREQUENCY: 427.06 MHz
OUTPUT PORT: UL1 (KPR1)
MODULATION: Analog FM (OBW 25 kHz)

INPUT SIGNAL: Below AGC threshold level



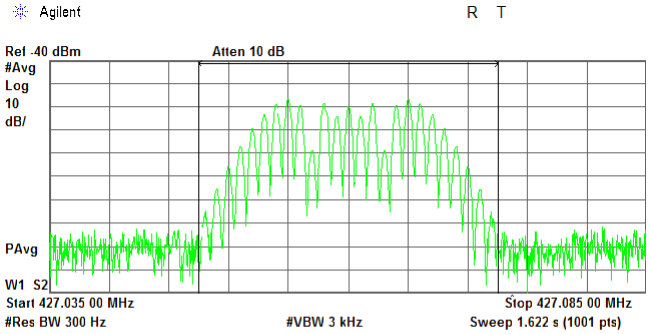
Channel Power: -51.19 dBm / 25.0000 kHz
Power Spectral Density: -95.17 dBm/Hz

OUTPUT SIGNAL:



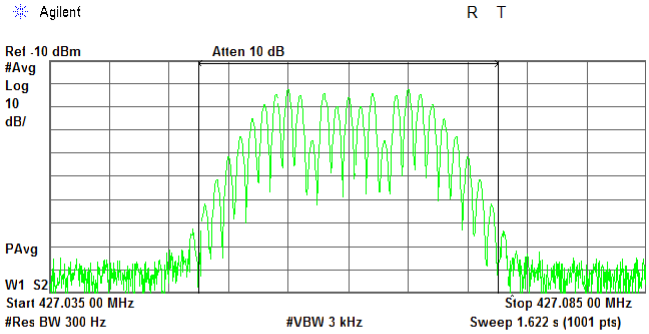
Channel Power: -13.91 dBm / 25.0000 kHz
Power Spectral Density: -57.89 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -48.20 dBm / 25.0000 kHz
Power Spectral Density: -92.18 dBm/Hz

OUTPUT SIGNAL:



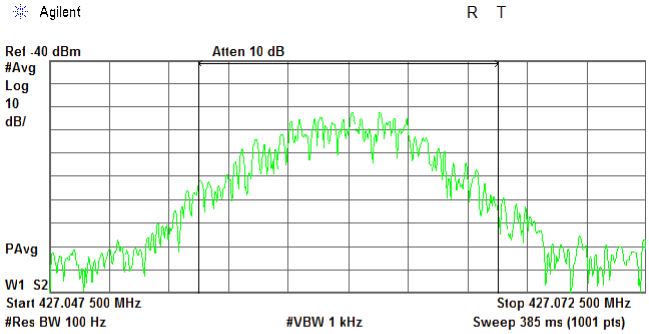
Channel Power: -13.92 dBm / 25.0000 kHz
Power Spectral Density: -57.90 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.12 Input/output power test results at f_o frequency (Uplink)

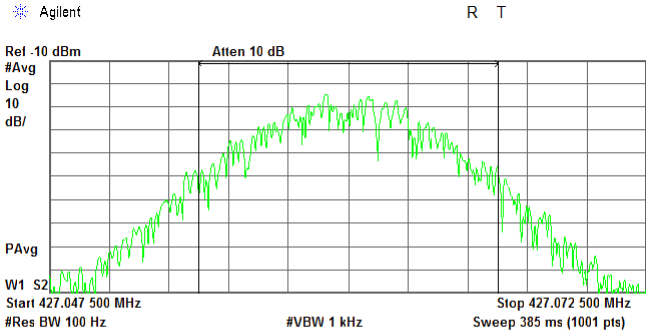
OPERATING FREQUENCY RANGE: 426.363 – 428.075 (Uplink)
CARRIER FREQUENCY: 427.06 MHz
OUTPUT PORT: UL1 (KPR1)
MODULATION: P25 phase 1 (C4FM)

INPUT SIGNAL: Below AGC threshold level



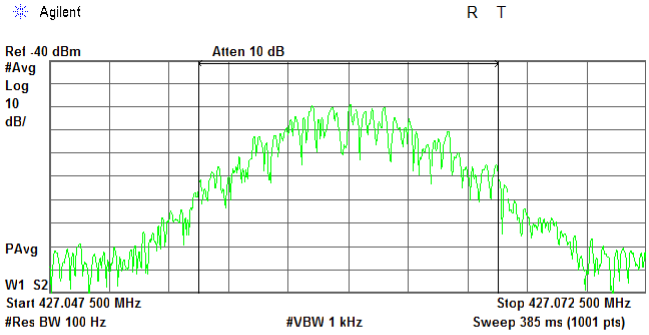
Channel Power: -51.34 dBm / 12.5000 kHz
Power Spectral Density: -92.31 dBm/Hz

OUTPUT SIGNAL:



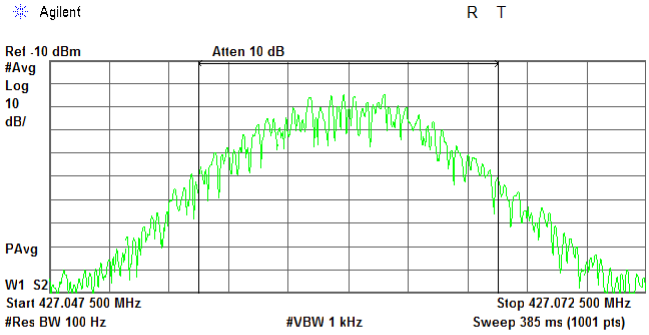
Channel Power: -13.96 dBm / 12.5000 kHz
Power Spectral Density: -54.93 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -48.37 dBm / 12.5000 kHz
Power Spectral Density: -89.34 dBm/Hz

OUTPUT SIGNAL:



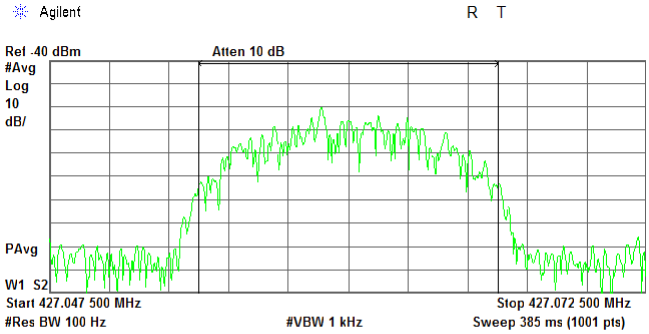
Channel Power: -13.99 dBm / 12.5000 kHz
Power Spectral Density: -54.96 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.13 Input/output power test results at f_o frequency (Uplink)

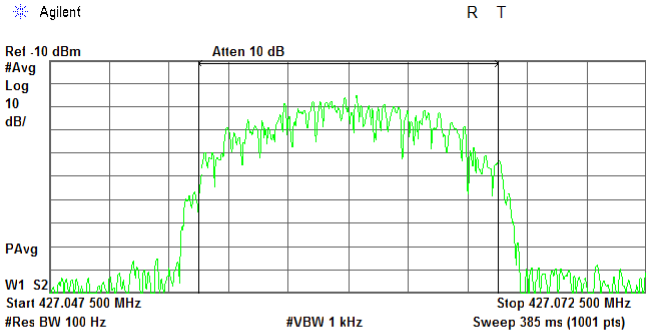
OPERATING FREQUENCY RANGE: 426.363 – 428.075 (Uplink)
CARRIER FREQUENCY: 427.06 MHz
OUTPUT PORT: UL1 (KPR1)
MODULATION: P25 phase 2 (H-DQPSK)

INPUT SIGNAL: Below AGC threshold level



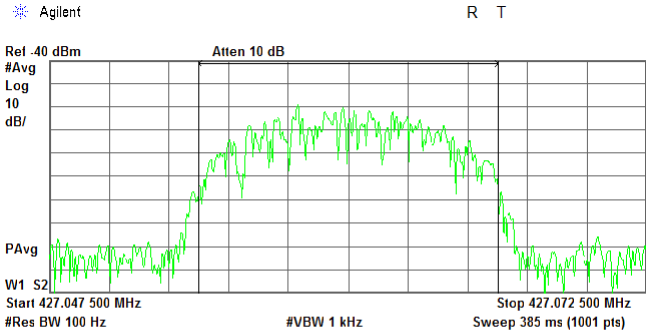
Channel Power: -51.35 dBm / 12.5000 kHz
Power Spectral Density: -92.32 dBm/Hz

OUTPUT SIGNAL:



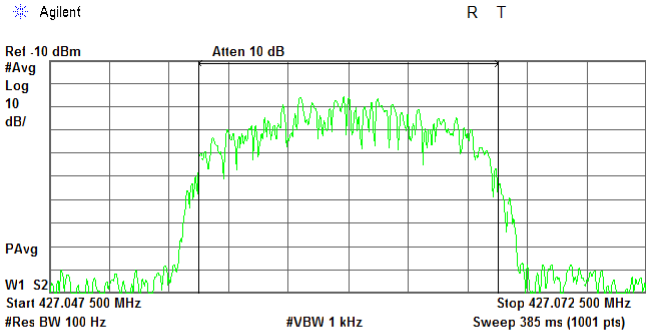
Channel Power: -14.03 dBm / 12.5000 kHz
Power Spectral Density: -55.00 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -48.56 dBm / 12.5000 kHz
Power Spectral Density: -89.53 dBm/Hz

OUTPUT SIGNAL:



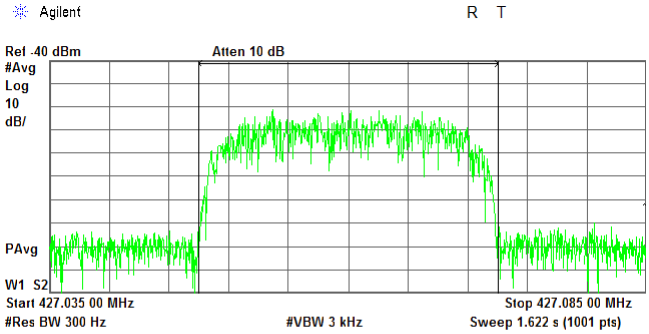
Channel Power: -14.03 dBm / 12.5000 kHz
Power Spectral Density: -55.00 dBm/Hz

Test specification:	**Section 90.219(e)(1), Output power**		
Test procedure:	KDB 935210 D05 v01r04, section 4.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	22-Sep-19		
Temperature: 22.9 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1012 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.4.14 Input/output power test results at f_o frequency (Uplink)

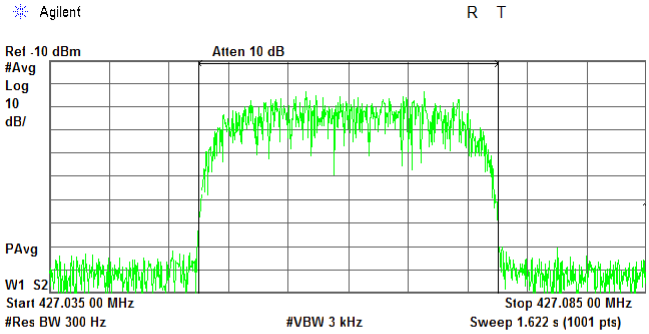
OPERATING FREQUENCY RANGE: 426.363 – 428.075 (Uplink)
CARRIER FREQUENCY: 427.06 MHz
OUTPUT PORT: UL1 (KPR1)
MODULATION: Tetra

INPUT SIGNAL: Below AGC threshold level



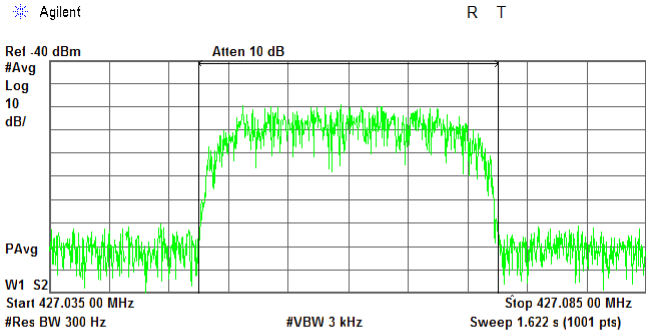
Channel Power: -51.27 dBm / 25.0000 kHz
Power Spectral Density: -95.25 dBm/Hz

OUTPUT SIGNAL:



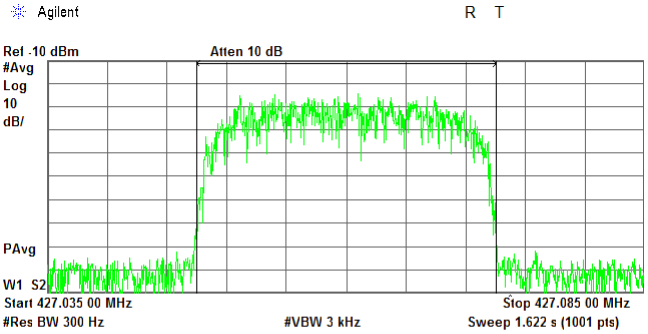
Channel Power: -14.05 dBm / 25.0000 kHz
Power Spectral Density: -58.03 dBm/Hz

INPUT SIGNAL: AGC threshold level +3dB



Channel Power: -48.41 dBm / 25.0000 kHz
Power Spectral Density: -92.39 dBm/Hz

OUTPUT SIGNAL:



Channel Power: -13.96 dBm / 25.0000 kHz
Power Spectral Density: -57.94 dBm/Hz

Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

7.5 Emission mask test

7.5.1 General

This test was performed to measure emission mask at RF antenna connector. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Emission mask limits

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask C (Channel bandwidth 25.0 kHz, authorized bandwidth 20.0 kHz)	
0 – 5.0 kHz	0
5.0 – 10.0 kHz	0 – 25.0*
10.0 – 50 kHz	$29 \log_{10}(f_d^2/11)$ =27.8 – 68.3* or 50 dBc whichever is the lesser
More than 50.0 kHz	43+10logP(W)
Emission mask D (Channel bandwidth 12.5 kHz, authorized bandwidth 11.25 kHz)	
0 – 5.625 kHz	0
5.625 – 12.5 kHz	$7.27(f_d–2.88)$ = 20 – 69.9*
More than 12.5 kHz	70dBc or 50+10logP(W) whichever is the lesser
Emission mask E (Channel bandwidth 6.25 kHz, authorized bandwidth 6.0 kHz)	
0 – 3 kHz	0
3 – 4.6 kHz	30.0 + 16.67(fd -3) = 30.0 – 56.7* or 55+10logP(W)
More than 4.6 kHz	57.0 dBc or 55+10logP(W) whichever is the lesser
Emission mask B (Channel bandwidth 25 kHz, authorized bandwidth 22 kHz)	
0 – 11 kHz	0
11 – 22 kHz	25
22 – 55 kHz	35
More than 55 kHz	43+10logP(W)

fd – displacement frequency
* - linearly increase with frequency
** - emission mask includes carrier modulation envelope within ± 250 % of the authorized bandwidth; the frequency range removed beyond ± 250 % of the authorized bandwidth from carrier was investigated as spurious emission

7.5.2 Test procedure

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.

7.5.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.

7.5.2.3 The signal generator was adjusted to produce the appropriate test signal associated with the emission designation. The amplitude was adjusted below the AGC threshold level.

7.5.2.4 The spectrum analyzer center frequency was set to the nominal channel center frequency and the span range was set between 2x to 5x the OBW.

7.5.2.5 The RBW of the spectrum analyzer was set according to emission type and VBW = 3xRBW, the detector was set to Peak and the trace to Max-Hold, the reference level was set to accommodate the maximum input amplitude level.

7.5.2.6 After the trace was stabilized, was monitored that the signal is contained within the appropriate emission mask.

7.5.2.7 The EUT input signal power was measured using the spectrum analyzer directly from the signal generator

7.5.2.8 The spectral plot of the output signal was compared to the input signal to affirm they are similar. The test result was provided in the associated tables and plots

7.5.2.9 The test was repeated with the input signal amplitude set 3 dB above the AGC threshold level

7.5.2.10 The test was repeated with the rest emission type signals.

7.5.2.11 The test was repeated for all authorized operational bands. The test results provided in Table 7.5.2.

Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

Figure 7.5.1 Emission mask test setup

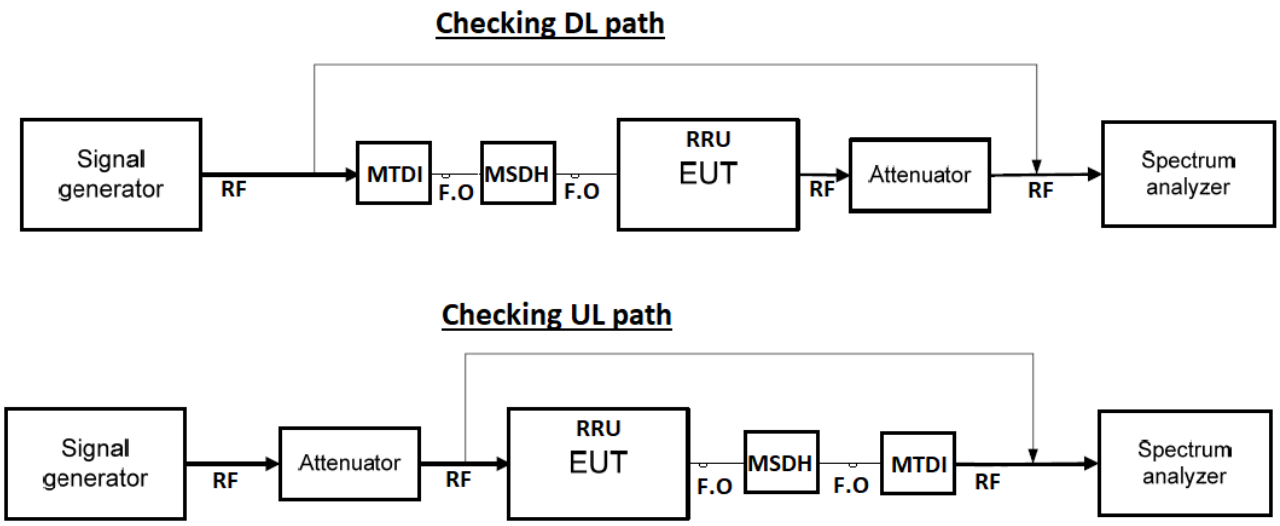


Table 7.5.2 Emission mask test results

Carrier frequency, MHz	Modulation	Limit	Verdict
Downlink			
422.525	Analog FM	Emission mask C	Pass
	Analog FM	Emission mask D	Pass
	Phase 1 (C4FM)	Emission mask D	Pass
	Phase 2 (DQPSK)	Emission mask D	Pass
	Analog FM	Emission mask E	Pass
	Tetra	Emission mask B	Pass
Uplink			
427.525	Analog FM	Emission mask C	Pass
	Analog FM	Emission mask D	Pass
	Phase 1 (C4FM)	Emission mask D	Pass
	Phase 2 (DQPSK)	Emission mask D	Pass
	Analog FM	Emission mask E	Pass
	Tetra	Emission mask B	Pass

Reference numbers of test equipment used

HL 3433	HL 3818						

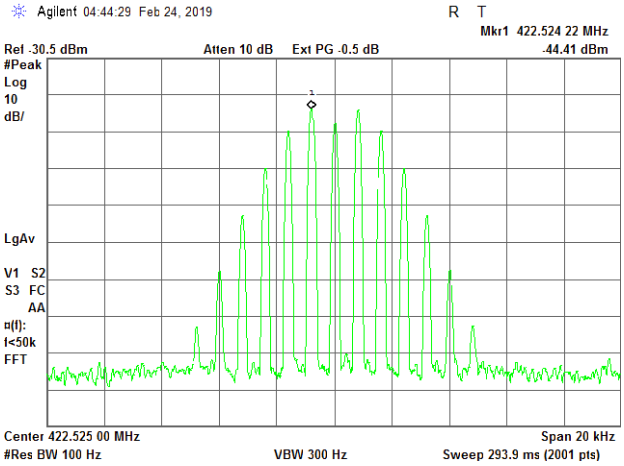
Full description is given in Appendix A.

Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

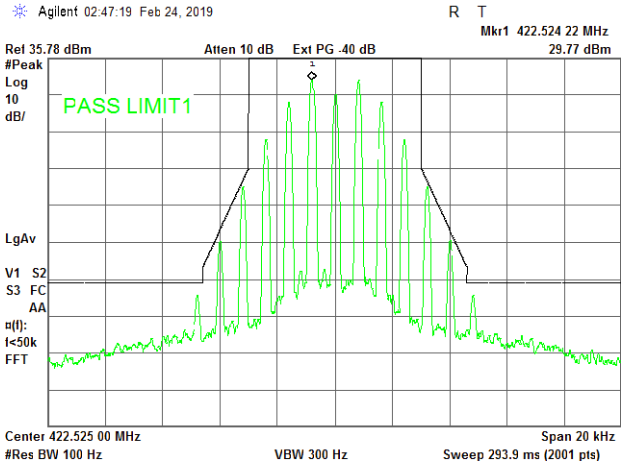
Plot 7.5.1 Emission mask test result at mid frequency carrier, Downlink

FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: Analog FM (Authorized bandwidth 6.0 kHz)
EMISSION MASK: 90.210 (E)

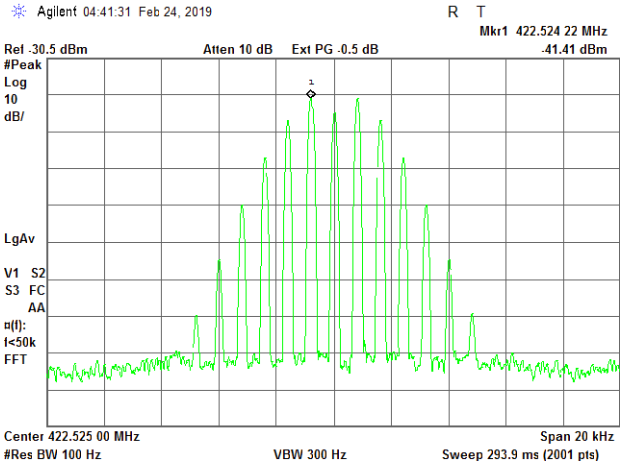
INPUT SIGNAL: Below AGC threshold level



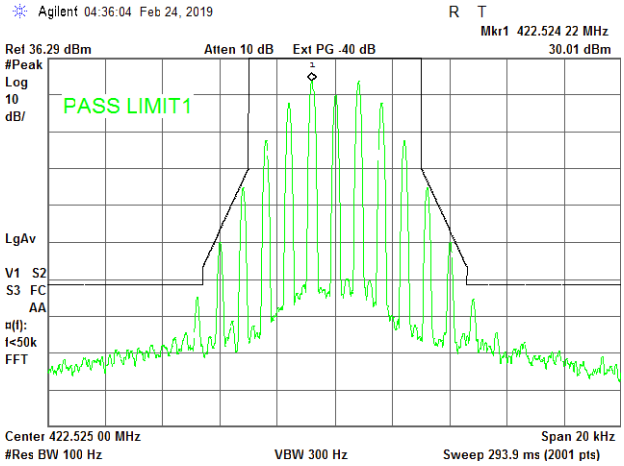
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



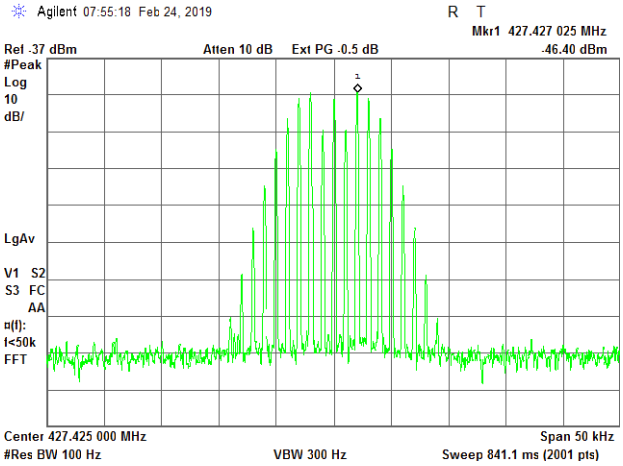
OUTPUT SIGNAL:



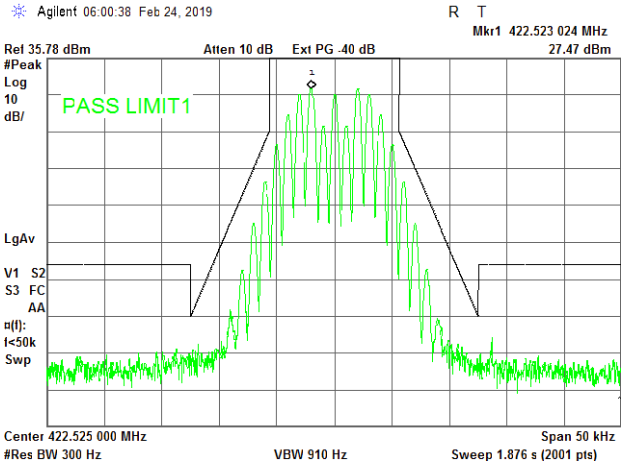
Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.5.2 Emission mask test result at mid frequency carrier, Downlink

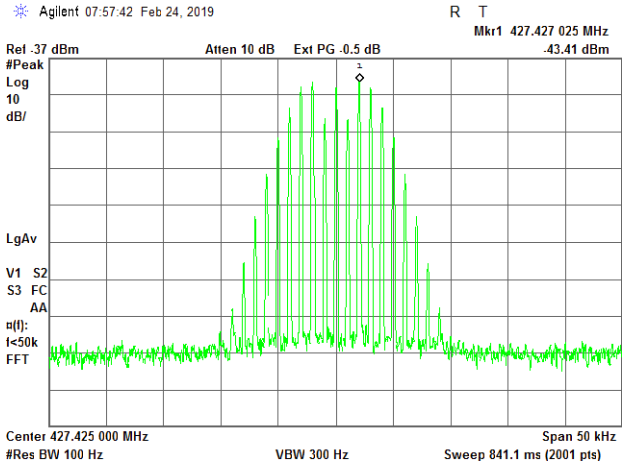
FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: Analog FM (Authorized bandwidth 11.25 kHz)
EMISSION MASK: 90.210 (D)
INPUT SIGNAL: Below AGC threshold level



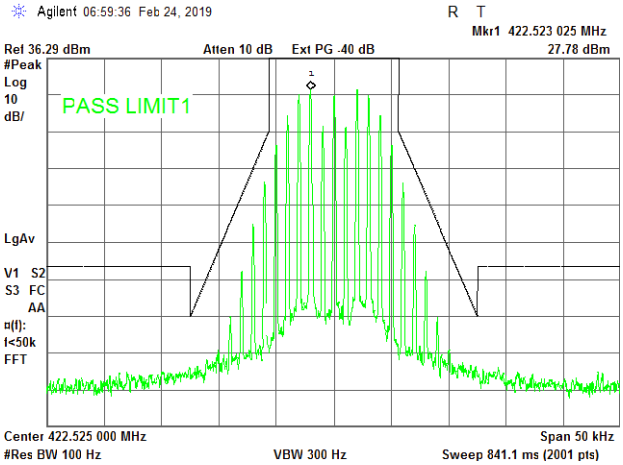
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



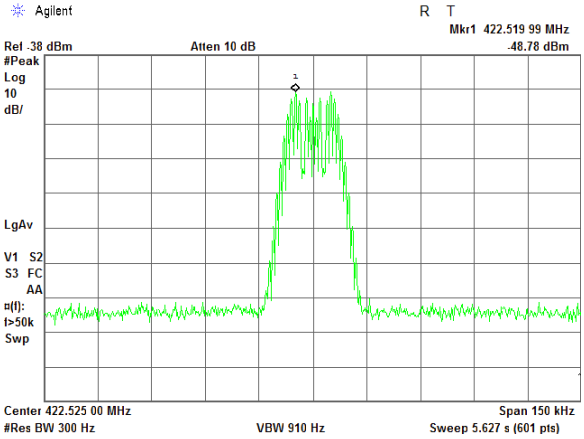
OUTPUT SIGNAL:



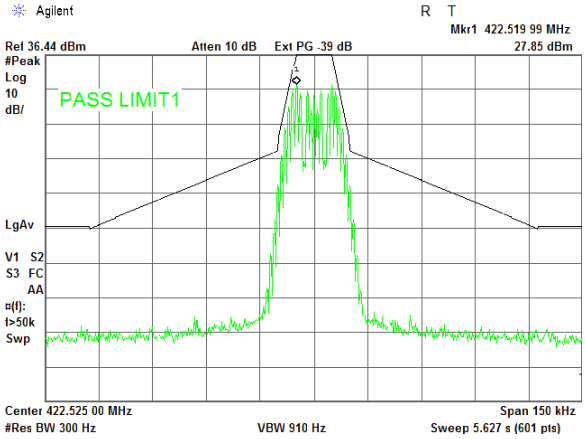
Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.5.3 Emission mask test result at mid frequency carrier, Downlink

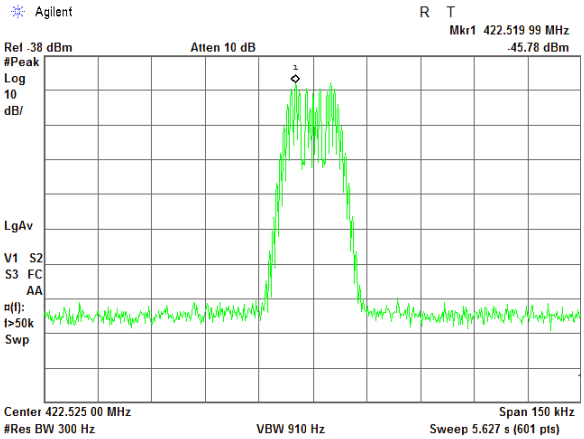
FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: Analog FM (Authorized bandwidth 20.0 kHz)
EMISSION MASK: 90.210 (C)
INPUT SIGNAL: Below AGC threshold level



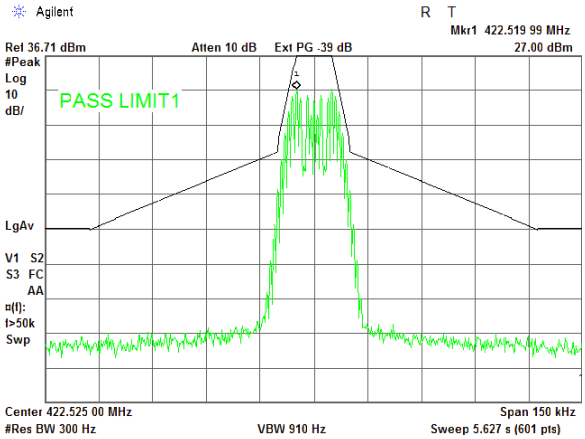
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



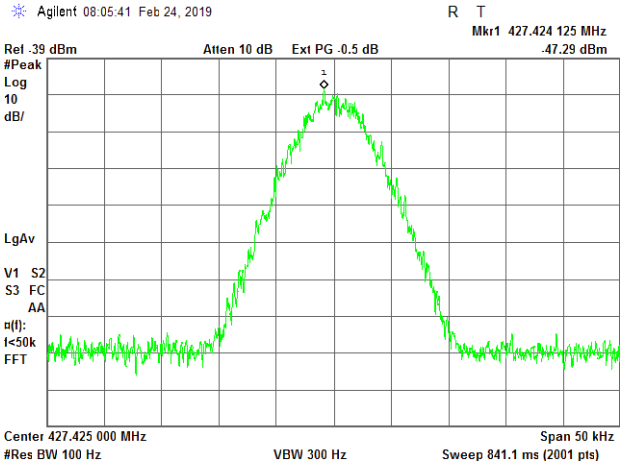
OUTPUT SIGNAL:

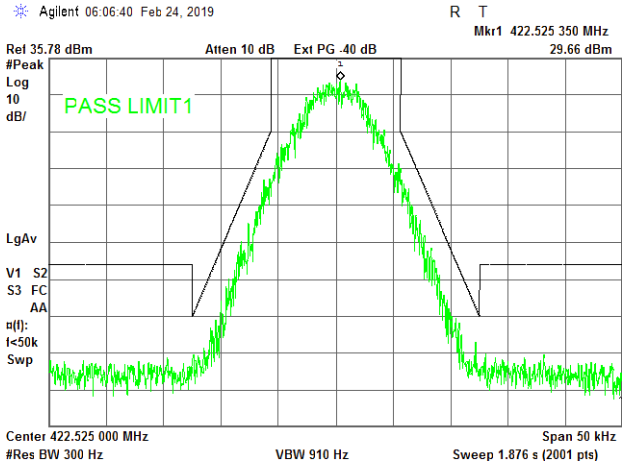


Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

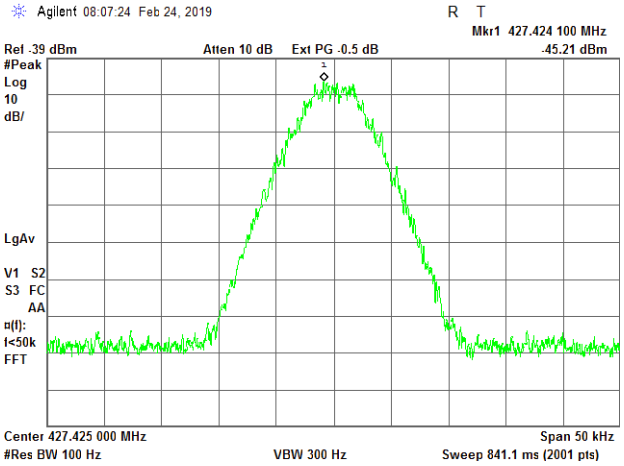
Plot 7.5.4 Emission mask test result at mid frequency carrier, Downlink

FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: P25 Phase 1 (C4FM)
EMISSION MASK: 90.210 (D)
INPUT SIGNAL: Below AGC threshold level
OUTPUT SIGNAL:

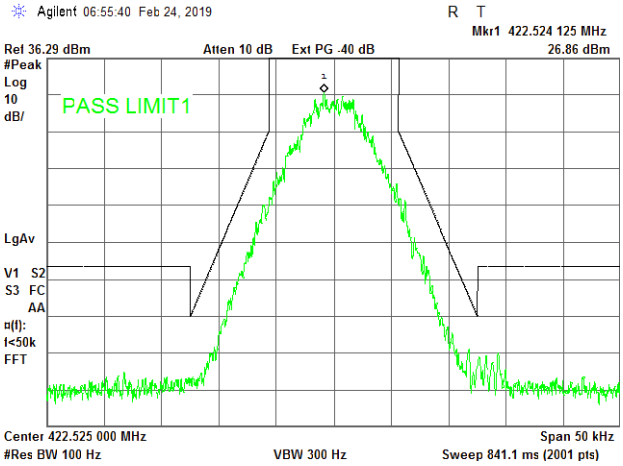




INPUT SIGNAL: AGC threshold level +3dB



OUTPUT SIGNAL:

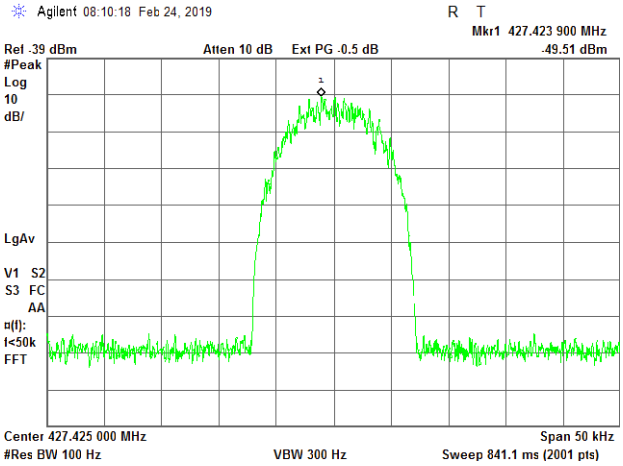


Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

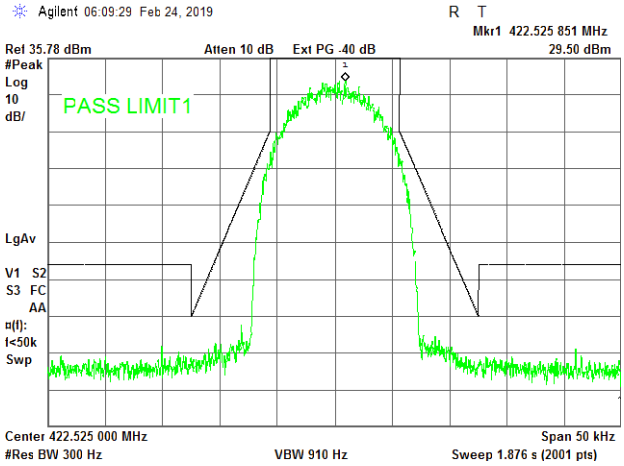
Plot 7.5.5 Emission mask test result at mid frequency carrier, Downlink

FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: P25 Phase 2 (H-DQPSK)
EMISSION MASK: 90.210 (D)

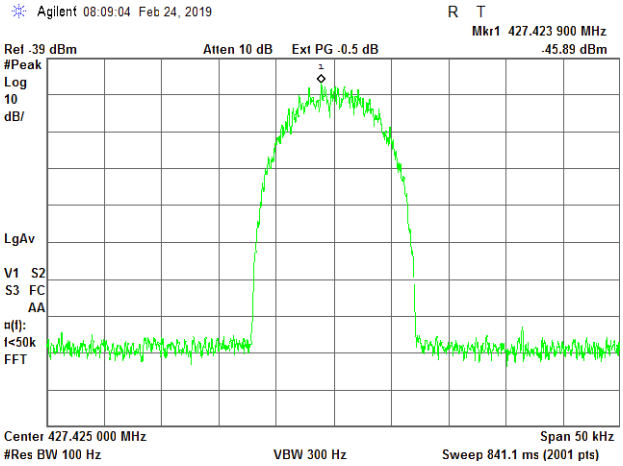
INPUT SIGNAL: Below AGC threshold level



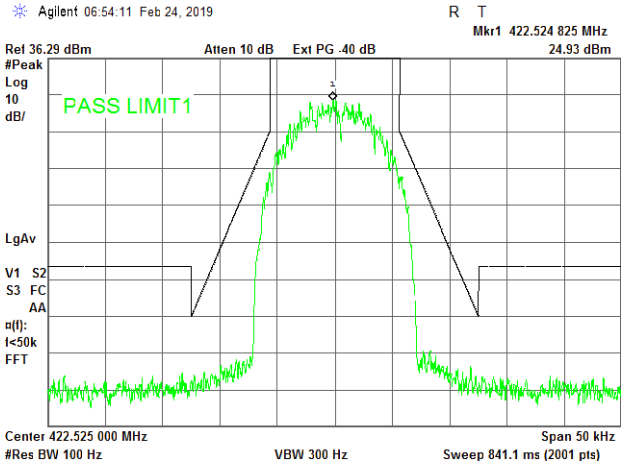
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



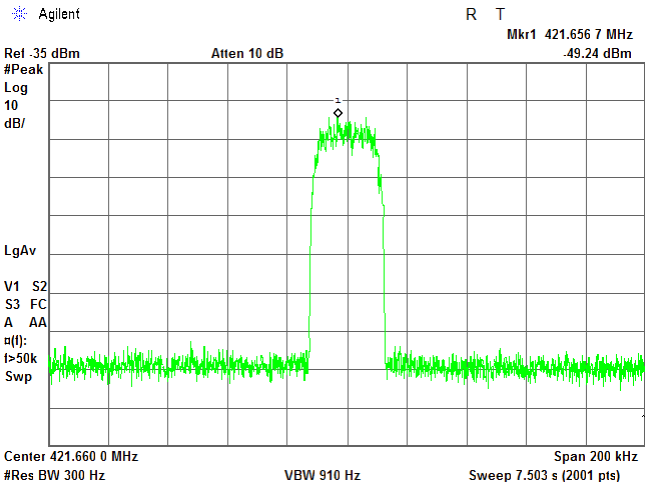
OUTPUT SIGNAL:



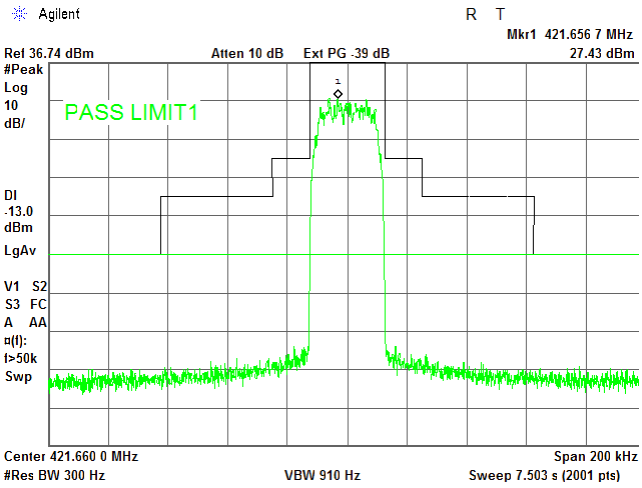
Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.5.6 Emission mask test result at mid frequency carrier, Downlink

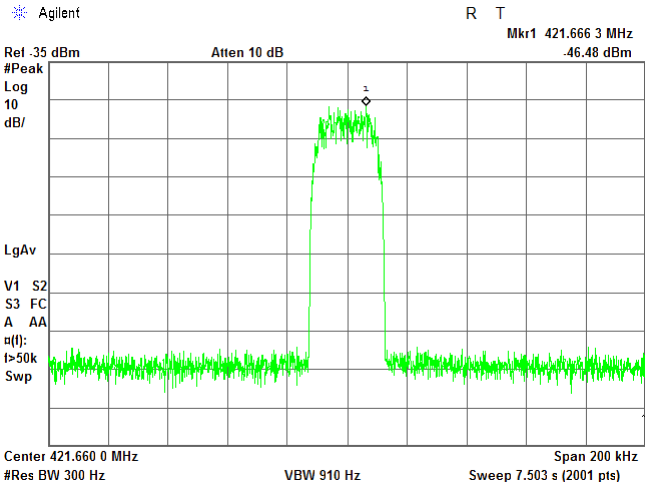
FREQUENCY RANGE: 421.363 – 423.075 MHz (Downlink)
OUTPUT PORT: SERV/MOB (RRU)
MODULATION: Tetra
EMISSION MASK: 90.210 (B)
INPUT SIGNAL: Below AGC threshold level



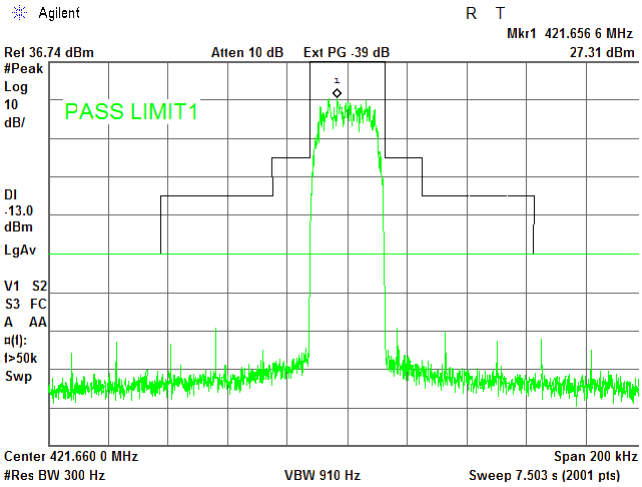
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



OUTPUT SIGNAL:

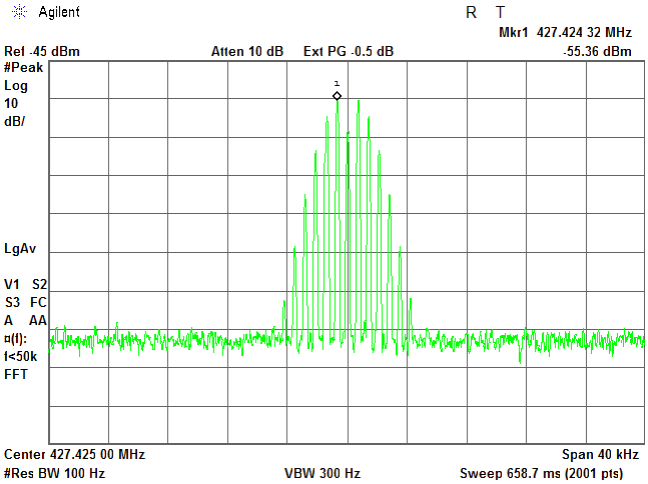


Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

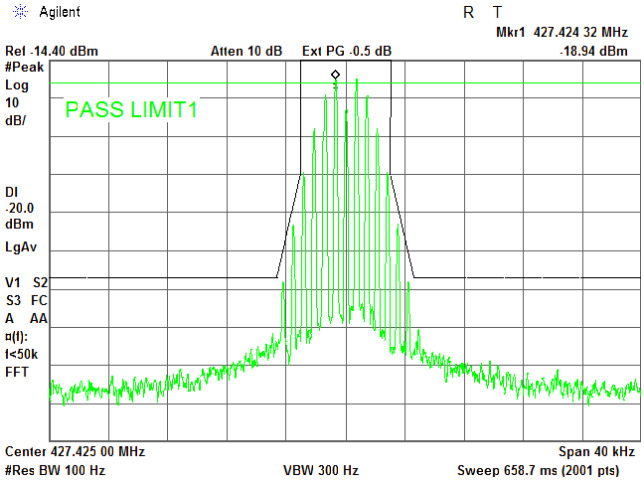
Plot 7.5.7 Emission mask test result at mid frequency carrier, Uplink

FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
OUTPUT PORT: UL1 (KPR1)
MODULATION: Analog FM (Authorized bandwidth 6.0 kHz)
EMISSION MASK: 90.210 (E)

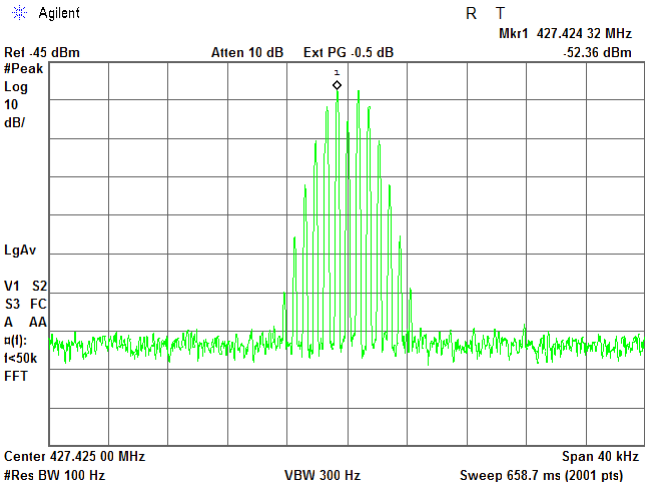
INPUT SIGNAL: Below AGC threshold level



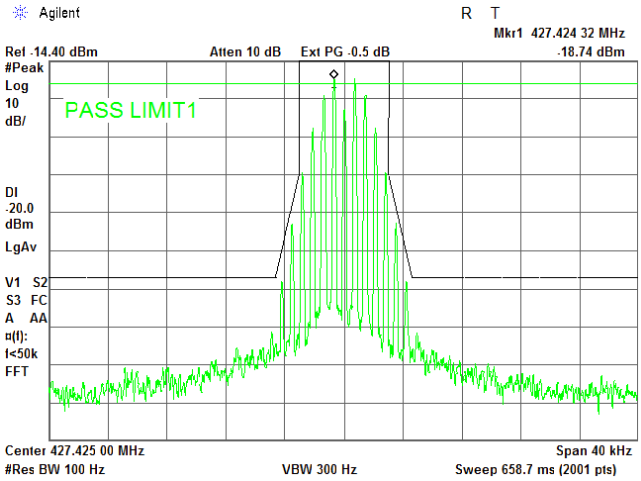
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



OUTPUT SIGNAL:

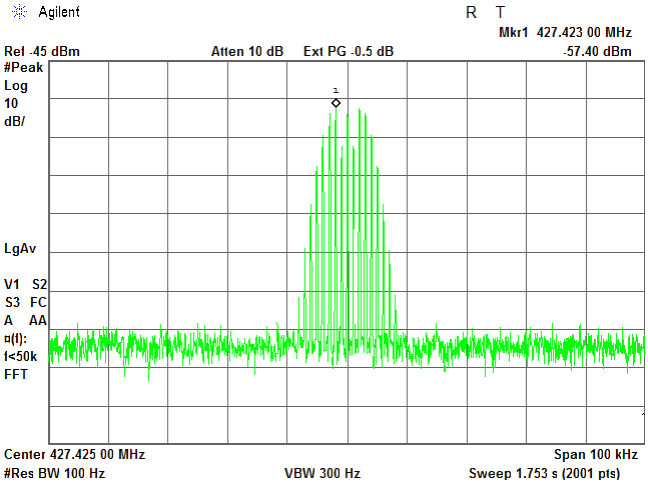


Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

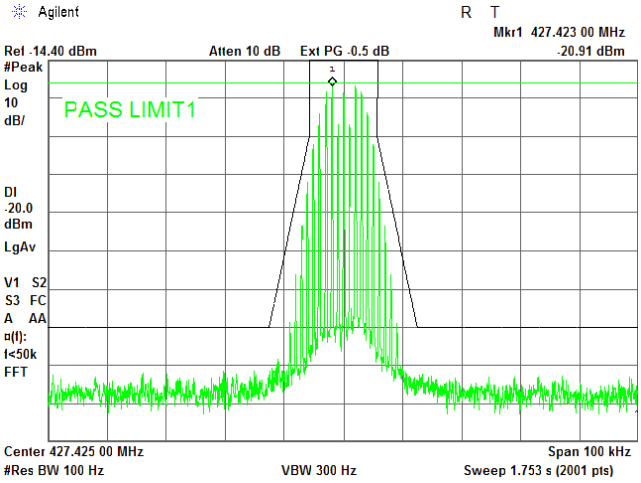
Plot 7.5.8 Emission mask test result at mid frequency carrier, Uplink

FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
OUTPUT PORT: UL1 (KPR1)
MODULATION: Analog FM (Authorized bandwidth 11.25 kHz)
EMISSION MASK: 90.210 (D)

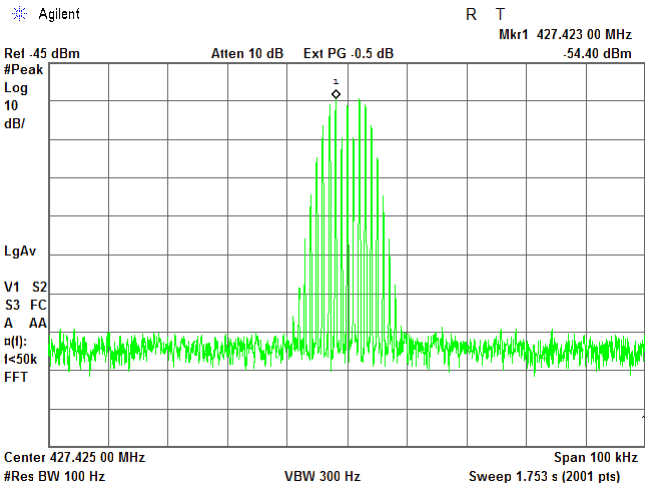
INPUT SIGNAL: Below AGC threshold level



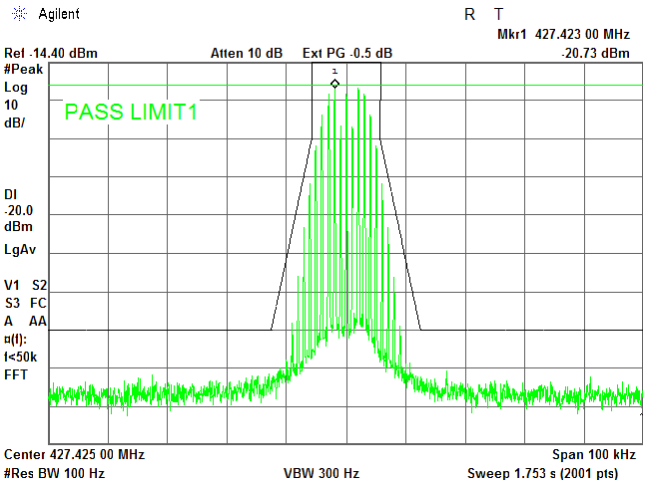
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



OUTPUT SIGNAL:

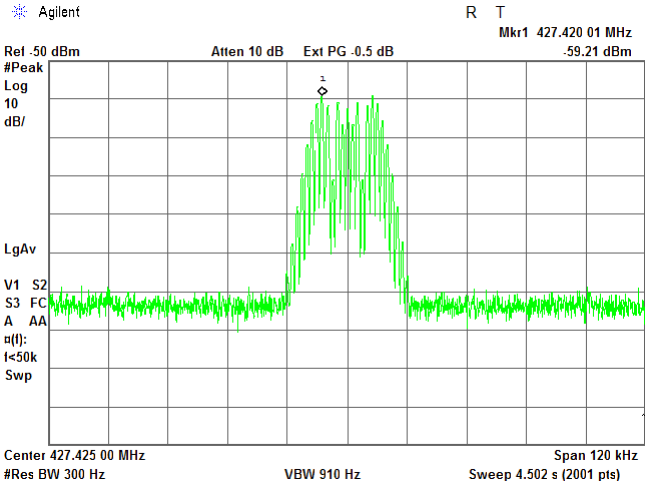


Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

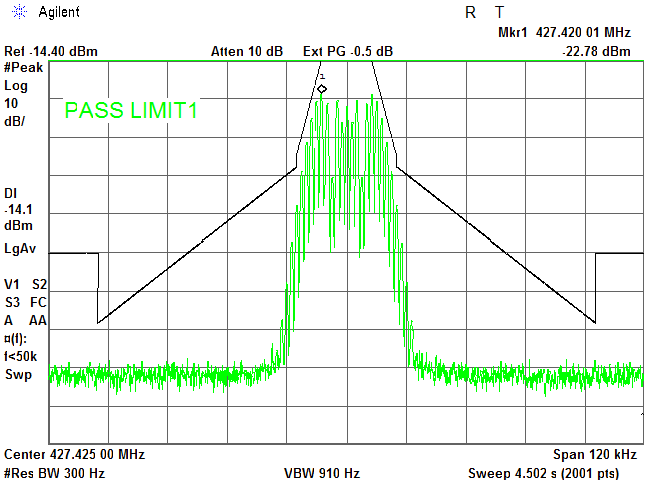
Plot 7.5.9 Emission mask test result at mid frequency carrier, Uplink

FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
OUTPUT PORT: UL1 (KPR1)
MODULATION: Analog FM (Authorized bandwidth 20.0 kHz)
EMISSION MASK: 90.210 (C)

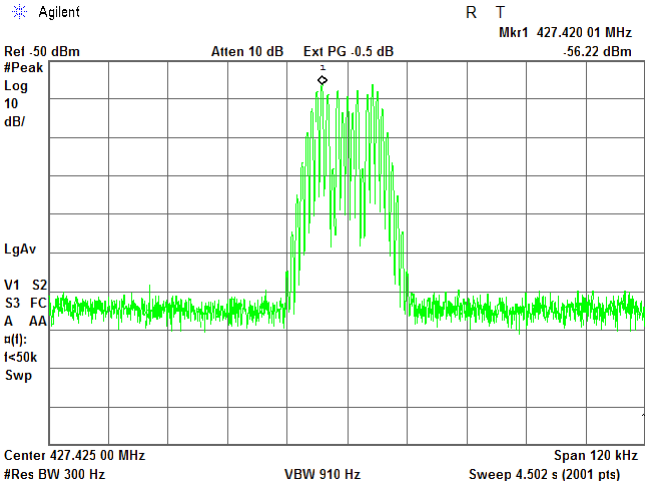
INPUT SIGNAL: Below AGC threshold level



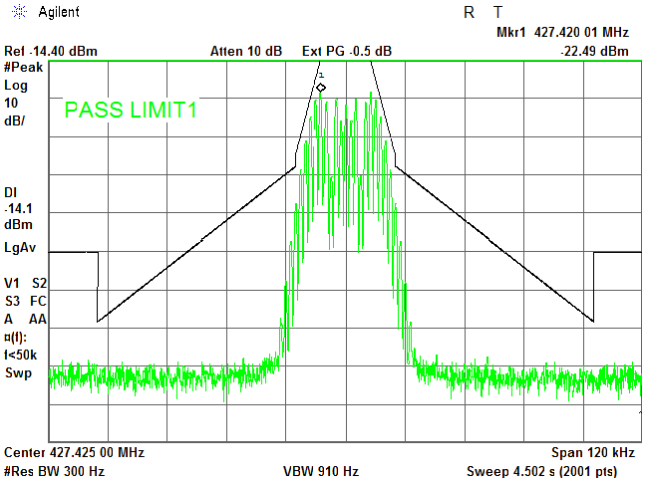
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



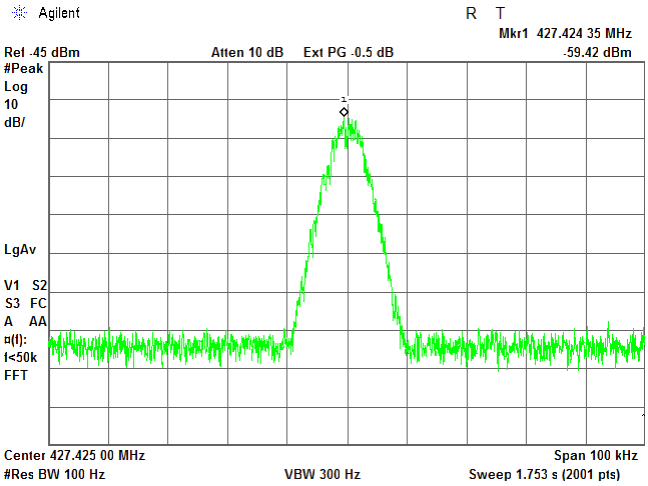
OUTPUT SIGNAL:



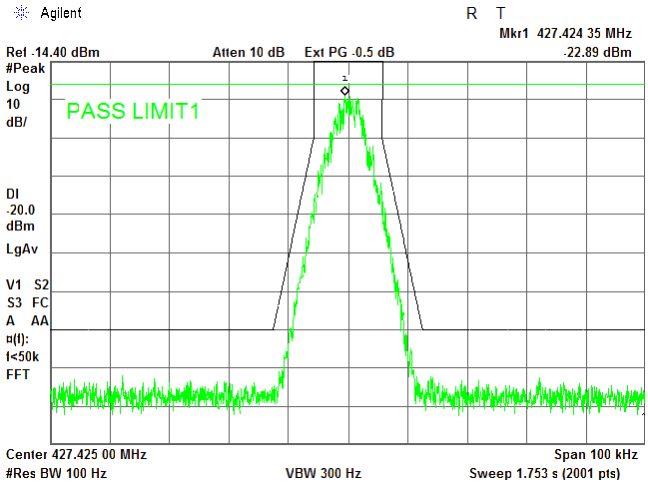
Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.5.10 Emission mask test result at mid frequency carrier, Uplink

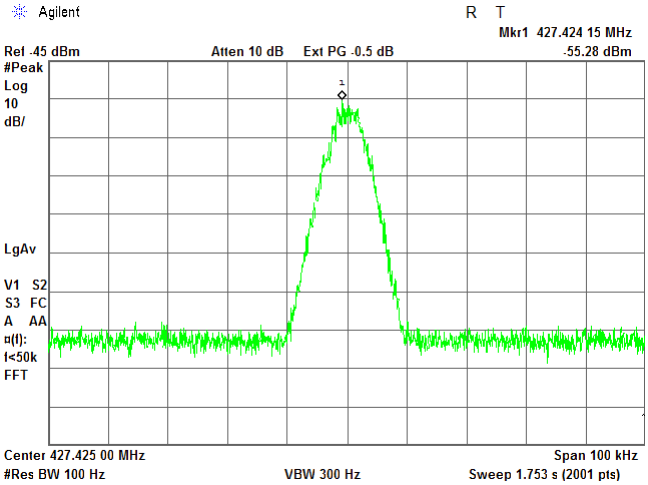
FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
OUTPUT PORT: UL1 (KPR1)
MODULATION: P25 Phase 1 (C4FM)
EMISSION MASK: 90.210 (D)
INPUT SIGNAL: Below AGC threshold level



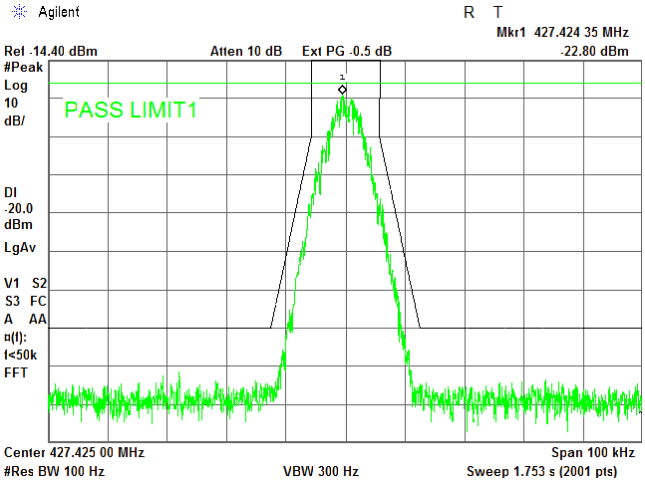
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



OUTPUT SIGNAL:

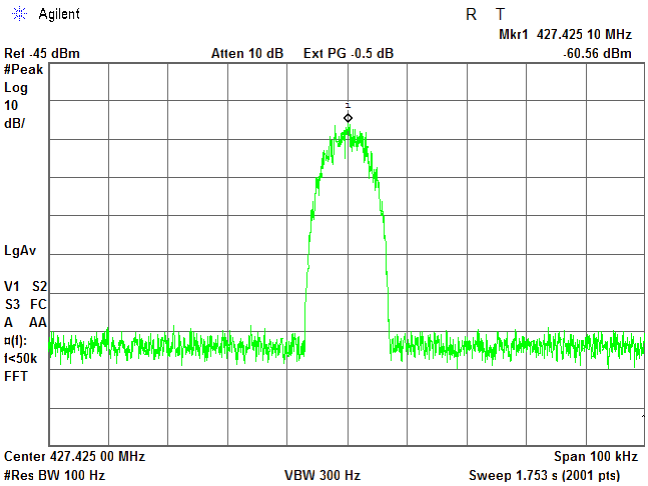


Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

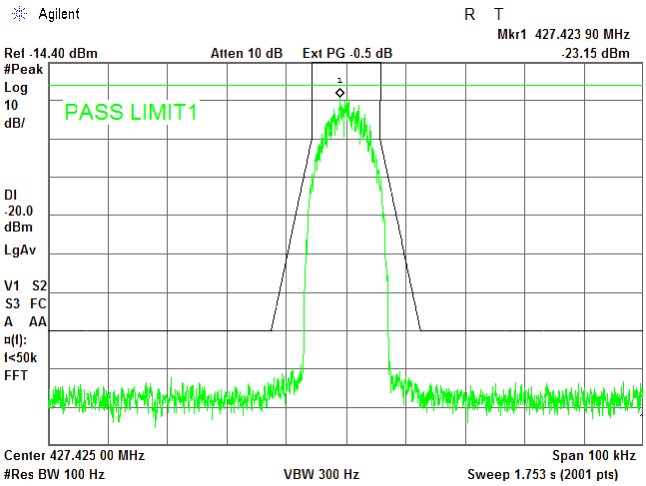
Plot 7.5.11 Emission mask test result at mid frequency carrier, Uplink

FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
OUTPUT PORT: UL1 (KPR1)
MODULATION: P25 Phase 2 (DQPSK)
EMISSION MASK: 90.210 (D)

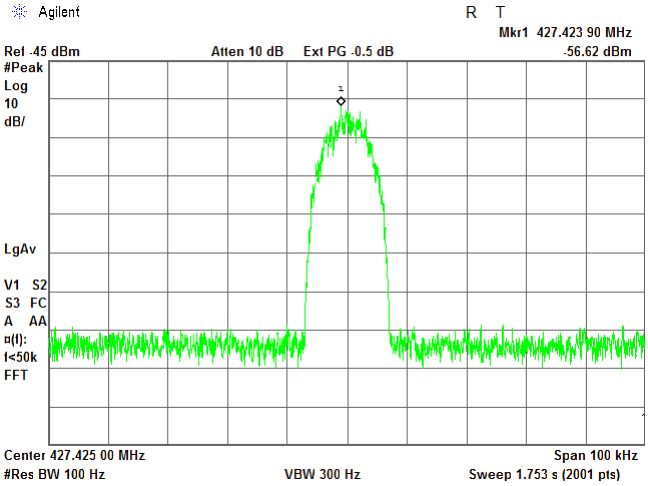
INPUT SIGNAL: Below AGC threshold level



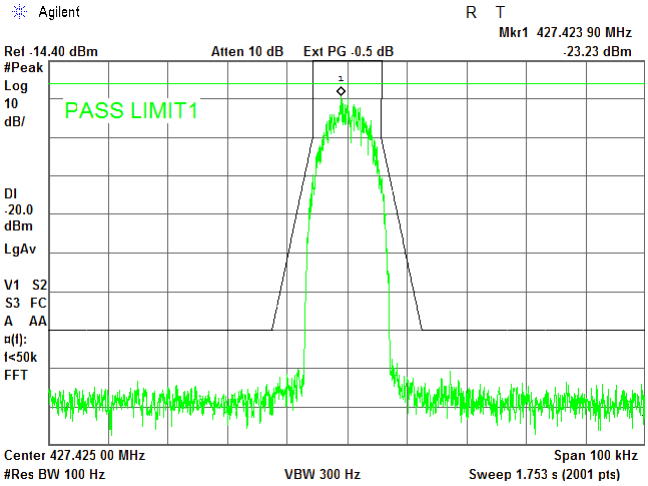
OUTPUT SIGNAL:



INPUT SIGNAL: AGC threshold level +3dB



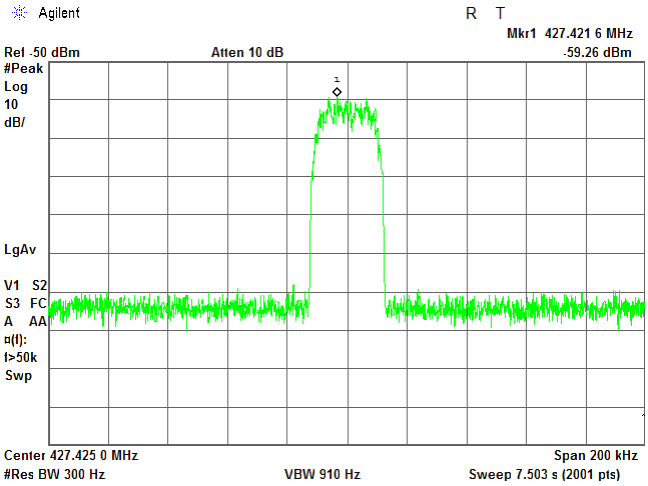
OUTPUT SIGNAL:

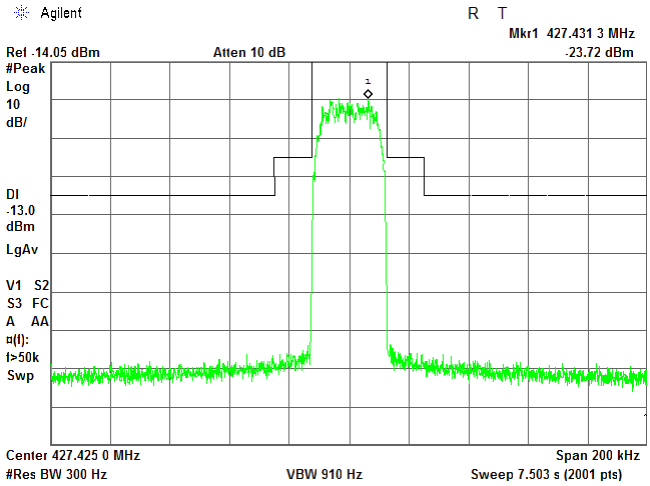
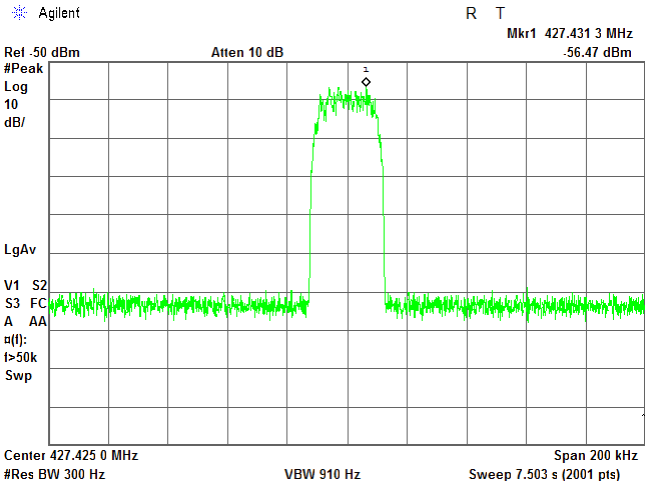
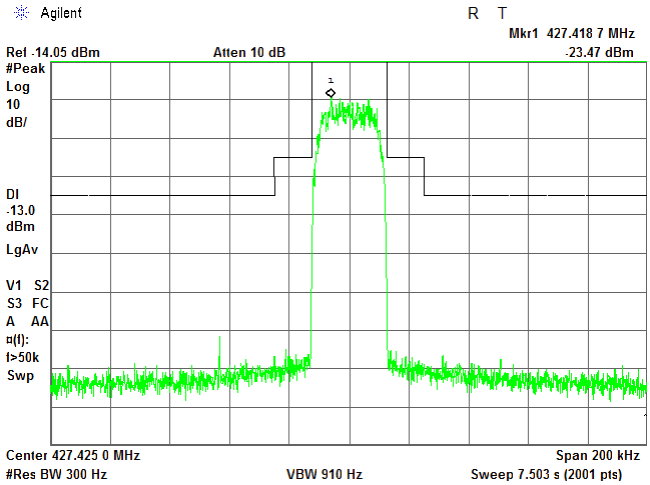


Test specification:	**Sections 90.210(b), 90.210(h), Emission mask**		
Test procedure:	KDB 935210 D05 v01r04, section 4.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	17-Oct-19		
Temperature: 24.8 ºC	**Relative Humidity:** 49 %	**Air Pressure:** 1014 hPa	**Power:** 120 V/60 Hz
Remarks:			

Plot 7.5.12 Emission mask test result at mid frequency carrier, Uplink

FREQUENCY RANGE: 426.363 – 428.075 MHz (Uplink)
OUTPUT PORT: UL1 (KPR1)
MODULATION: Tetra
EMISSION MASK: 90.210 (B)
INPUT SIGNAL: Below AGC threshold level
OUTPUT SIGNAL:





INPUT SIGNAL: AGC threshold level +3dB
INPUT SIGNAL: AGC threshold level +3dB
OUTPUT SIGNAL:
OUTPUT SIGNAL: