RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & IC Certification Report

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XL-185P
VHF C1D1

FCC ID: OWDTR-0153-E
IC: 3636B-0153

October 2, 2017

Standards Referenced for this Report	
Part 2: 2016	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 22: 2016	Public Mobile Services
Part 74: 2016	Experimental Radio, Auxiliary, Special Broadcast and Other Program Distributional Services
Part 80: 2016	Stations in the Maritime Services
Part 90: 2016	Private Land Mobile Radio Services
RSS-119 Issue 12	Land Mobile and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz
ANSI C63.26: 2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

Report Prepared By: Daniel W. Baltzell

Document Number: 2017075TNF

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANAB. Refer to certificate and scope of accreditation AT-1445.

Frequency Range (MHz)	Rated Conducted Output Power (W)	Frequency Tolerance (ppm)	Transmit Mode	Emission Designator
136 – 174	1 - 6	0.9	2-level FSK 4800 Data / Digital Voice (XNarrowband) / EDACS	7K10F1D/E
136-174	1-6	0.9	P25 Phase 2 Data/Voice (H-CPM TDMA)	8K10DXW
136 – 174	1 - 6	0.9	C4FM Data/Voice / P25 Phase 1	8K40F1D/E
136 – 174	1 - 6	0.9	Analog FM (Narrowband) / EDACS/CONV	11K0F3E
136 – 174	1 - 6	0.9	2-level FSK 9600 Data/Digital Voice (Narrowband) / EDACS	11K7F1D/E
136 – 174	1 - 6	0.9	Analog FM (Wideband) / EDACS/CONV	16K0F3E
136 – 174	1 - 6	0.9	2-level FSK 9600 Data/Digital Voice (Wideband) / EDACS	16K0F1D/E

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1 Test Result Summary

Test	IC Reference	FCC Reference	Result
RF Power Output	RSS-119 5.4	2.1046(a), 22.659, 74.461, 80.215	Complies
Spurious Emissions at Antenna Terminals	RSS-119 5.8	2.1051, 22.359, 80.217, 90.210	Complies
Field Strength of Spurious Radiation	RSS-119 5.8	2.1053(a), 22.359, 80.211(f)(3), 90.210	Complies
Occupied Bandwidth/ Emission Masks	RSS-119 5.5	2.1049(c)(1), 22.359(b), 74.462, 80.205, 80.211, 90.210	Complies
Frequency Stability vs. Temperature and Voltage	RSS-119 5.3	2.1055, 22.355, 74.464, 80.209, 90.213	Complies
Modulation Characteristics	RSS-119 5.2	2.1047(a)(b), 74.463, 80.213	Complies
Transient Frequency Behavior	RSS-119 5.9	74.462(c), 90.214	Complies

2 General Information

The following Certification Report is prepared on behalf of **Harris Corporation** in accordance with the Federal Communications Commission and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the **XL-185P; FCC ID: OWDTR-0153-E, IC: 3636B-0153.**

The radio is subject to FCC DoC. DoC testing was performed and the data is contained in a separate DoC report.

All measurements contained in this application were conducted in accordance with the applicable sections of FCC Rules and Regulations CFR 47 Parts 2, 22, 74, 80 and 90. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

2.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report submitted to, and approved by, the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

2.2 Related Submittal(s)/Grant(s)

N/A

2.3 Grant Notes

Power is continuously variable from 1 – 6 W for VHF band. EF grant note is requested.

2.4 Tested System Details

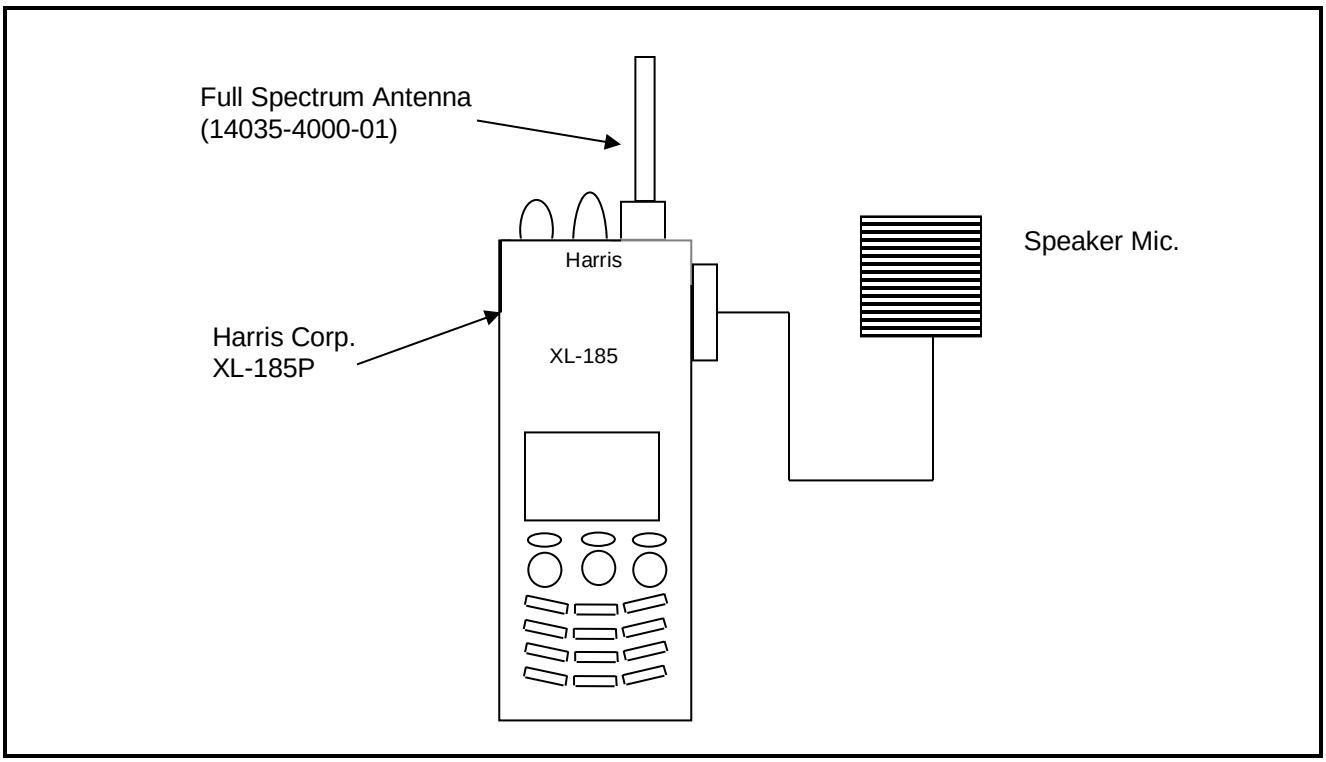
The test sample was received on May 4, 2017. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

The device was programmed for multiple modes of operation and modulation types.

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Radio	Harris Corporation	XL-185P	C1D1/E00009	OWDTR-0153-E	22518
Speaker/ Microphone	Harris Corporation	EM105	N/A	N/A	21563
Full-Spectrum Multiband Antenna	Harris Corporation	14035-4000-01	N/A	N/A	22519
Li-Ion Rechargeable Battery	Harris Corporation	N/A	BAT-L-CASE-R-HR003	N/A	21552

Figure 2-1: Configuration of Tested System



3 FCC §2.1033(C)(8) Voltages and Currents Through The Final Amplifying Stage

7.4 V / 1.2 A VHF

4 FCC §2.1046(a): RF Power Output: Conducted, §90.541: Transmitting Power Limits; §80.215: Transmitter Power; §22.659: Effective Radiated Power Limits; §74.461: Transmitter Power; RSS-119 5.4: Transmitter Power

4.1 Test Procedure

ANSI C63-26, section 5.2

The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

§80.215 Transmitter Power

(a) Transmitter power shown on the radio station authorization is the maximum power the licensee is authorized to use. Power is expressed in the following terms:
(5) For all other emissions: the carrier power multiplied by 1.67.

(e) Ship stations frequencies above 27500 kHz:
The maximum power must not exceed the values listed below.
(1) Ship stations 156–162 MHz: 25W
(2) Marine utility stations and hand-held portable transmitters: 156–162 MHz: 10W

Maximum Power Authorized to Use: 10.02W for VHF

Manufacturer's Rated Power: 6.0 W for VHF

4.2 Test Data

Table 4-1: RF Conducted Output Power - Measured

Frequency (MHz)	Power (dBm)	Power (W)
136	38.1	6.4
138	38.0	6.4
141	38.0	6.3
144	38.0	6.3
148	37.9	6.1
150	37.8	6.0
156.8	37.8	6.0
162	38.0	6.3
174	38.1	6.4

Notes: Data presented is for analog mode. All other modes were investigated and found to have equivalent power within measurement tolerances.

Table 4-2: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	3/22/18
901139	MCE Weinschel	48-20-34	Attenuator, 20 dB, DC-18 GHz, 100 W	BK5859	3/30/18

Test Personnel:

Daniel W. Baltzell		May 5, 2017
EMC Test Engineer	Signature	Date of Test

5 FCC §2.1051: Spurious Emissions at Antenna Terminals; §90.210: Emission Limitations; §80.217: Suppression of Interference Aboard Ships; §22.359: Emission Limitations; RSS-119 5.8.9.2: Out-of-band Emission Limit

5.1 Test Procedure

ANSI C63-26, section 5.7

The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer.

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence.

§80.217 Suppression of Interference Aboard Ships

(a) A voluntarily equipped ship station receiver must not cause harmful interference to any receiver required by statute or treaty.
(b) The electromagnetic field from receivers required by statute or treaty must not exceed the following value at a distance over sea water of one nautical mile from the receiver:

Frequency of Interfering Emissions	Power to Artificial Antenna in Microwatts
Below 30 MHz	0.1
30 to 100 MHz	3
100 to 300 MHz	1.0
Over 300 MHz	3.0

or

Deliver not more than the following amounts of power, to an artificial antenna having electrical characteristics equivalent to those of the average receiving antenna(s) use on shipboard:

Frequency of Interfering Emissions	Power to Artificial Antenna in Microwatts
Below 30 MHz	400 (4 dBm)
30 to 100 MHz	4,000 (6 dBm)
100 to 300 MHz	40,000 (16 dBm)
Over 300 MHz	400,000 (26 dBm)

5.2 Test Data

Frequency range of measurement per §2.1057: 9 kHz to 10 x Fc

Limits: (43 + 10 LOG P(W)) for wideband and 50 + 10 LOG P(W)) for narrowband

The following channels (in MHz) were investigated:

VHF: 136, 138, 141, 144, 148, 150, 156.8, 162, and 174

Both high and low power settings were checked; high power was found to be worst case. All modes were investigated and analog mode is presented as representative data.

All frequencies were found to be greater than 20 dB below the limit, no data is shown.

Table 5-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	3/22/18
900948	Weinschel Corp	47-10-43	10 dB Attenuator; 50 W	BH1481	9/1/18
901129	Par Electronics	188-174 (25W)	VHF Notch Filters	N/A	9/26/17
901135	Par Electronics	400-512 (25W)	UHF Notch Filter	N/A	9/26/17
901128	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	9/26/17

Test Personnel:

Daniel W. Baltzell		May 9, 2017
EMC Test Engineer	Signature	Date of Test

6 FCC §90.210(g) and §2.1053(a): Field Strength of Spurious Radiation; §90.210, §90.543(f)(3): Out of Band Emissions Limit; RSS-119 5.8.9.2: Out-of-band Emission Limit

6.1 Test Procedure

ANSI C63-26, section 5.5.3

Analog Modulation: The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz.

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP and 9,600 bps for P25 and EDACS modes.

The spurious emissions levels were measured, and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna (dBi) was added to achieve the EIRP level, then converted from the corrected signal generator level (dBm) to dBW and compared to the limit.

6.2 Test Data

6.2.1 §90.210 Requirements

The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.
The following measurements were attenuated less than 20 dB below the FCC limit and presented as worst case measurements, all others were More than 20 dB below the FCC narrowband limit.

Table 6-1: Field Strength of Spurious Radiation; 136 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
272.000	49.4	-37.0	0.2	-0.5	75.7	-17.6

Table 6-2: Field Strength of Spurious Radiation; 138 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
276.000	60.3	-26.0	0.2	-0.5	64.7	-6.7
414.000	43.2	-36.8	0.2	-0.4	75.4	-17.4

Table 6-3: Field Strength of Spurious Radiation; 141 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
282.000	51.1	-35.0	0.2	-0.6	73.7	-15.7

Table 6-4: Field Strength of Spurious Radiation; 144 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
288.000	46.7	-38.9	0.2	-0.6	77.7	-19.7

Table 6-5: Field Strength of Spurious Radiation; 156.8 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
313.600	47.6	-37.3	0.2	-0.6	75.9	-18.1

Table 6-6: Field Strength of Spurious Radiation; 162 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
324.000	46.2	-38.2	0.2	-0.6	76.9	-19.0

Table 6-7: Field Strength of Spurious Radiation; 174 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
348.000	45.5	-38.2	0.2	-0.5	76.9	-18.8

Table 6-8: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	OATS1	N/A
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	8/3/17
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/1/17
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	N/A
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	3/22/18
901582	Rohde & Schwarz	1167.0000.02	Signal Generator	101903	3/20/18
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	6/11/17
900321	EMCO	3161-03	Horn Antennas (4 – 8 GHz)	9508-1020	4/9/18
900323	EMCO	3160-07	Horn Antennas (8.2 – 12 GHz)	9605-1054	4/9/18
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	4/9/18
901128	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	9/26/17
901129	Par Electronics	188-174 (25W)	VHF Notch Filters	N/A	9/26/17
901135	Par Electronics	400-512 (25W)	UHF Notch Filter	N/A	9/26/17

Test Personnel:

Daniel W. Baltzell		May 5-23, 2017
Test Engineer	Signature	Dates of Tests

7 FCC §2.1049(c)(1): Occupied Bandwidth; §90.543(d), §90.210 Authorized Bandwidth; §74.462: Authorized Bandwidth and Emissions; §80.205: Bandwidths; §80.211: Emission Limitations; RSS-119 5.5: Channel Bandwidth, Authorized Bandwidth, Occupied Bandwidth and Spectrum Masks

Occupied Bandwidth - Compliance with the Emission Masks

7.1 Test Procedure

ANSI C63.26 5.4

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence.

Applicable FCC Emission Masks

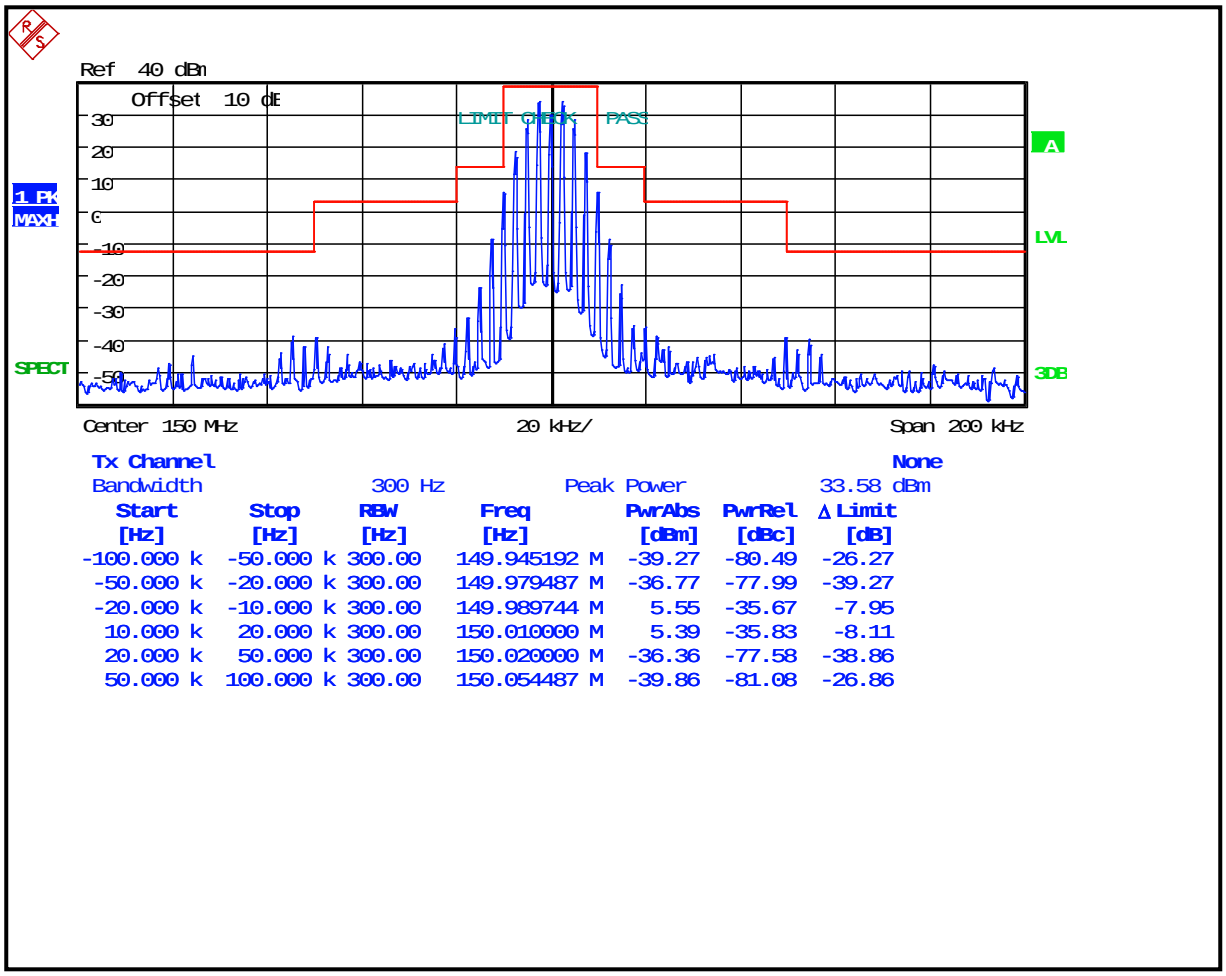
Frequency Band (MHz)	Mask for Equipment with Audio Low Pass Filter	Mask for Equipment Without Audio Low Pass Filter
Below 25 [1]	A or B	A or C
25–50.....	B	C
72–76.....	B	C
150–174 [2]	B, D, or E	C, D, or E
150 Paging-only	B	C
220–222	F	F
421–512 [2]	B, D, or E	C, D, or E
450 Paging-only	B	G
806–809/851–854	B	H
809–824/854–869 [3]	B	G
896–901/935–940	I	J
902–928	K	K
929–930	B	G
4940–4990 MHz ……	L or M	L or M
5850–5925 [4]		
All other bands	B	C

1 Equipment using single sideband J3E emission must meet the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.
2 Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.
3 Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of § 90.691.
4 DSRCS Roadside Units equipment in the 5850–5925 MHz band is governed under subpart M of this part.

Applicable IC Emission Masks					
Frequency Band (MHz)	**Related SRSP for Channeling Plan and ERP**	**Channel Bandwidth (kHz)**	**Authorized Bandwidth (kHz)**	**Masks for Equipment With Audio Filter**	**Masks for Equipment Without Audio Filter**
138-144, 148-149.9, 150.05-174	SRSP-500	30	20	B	C
		15	11.25	D	D
		7.5	6	E	E

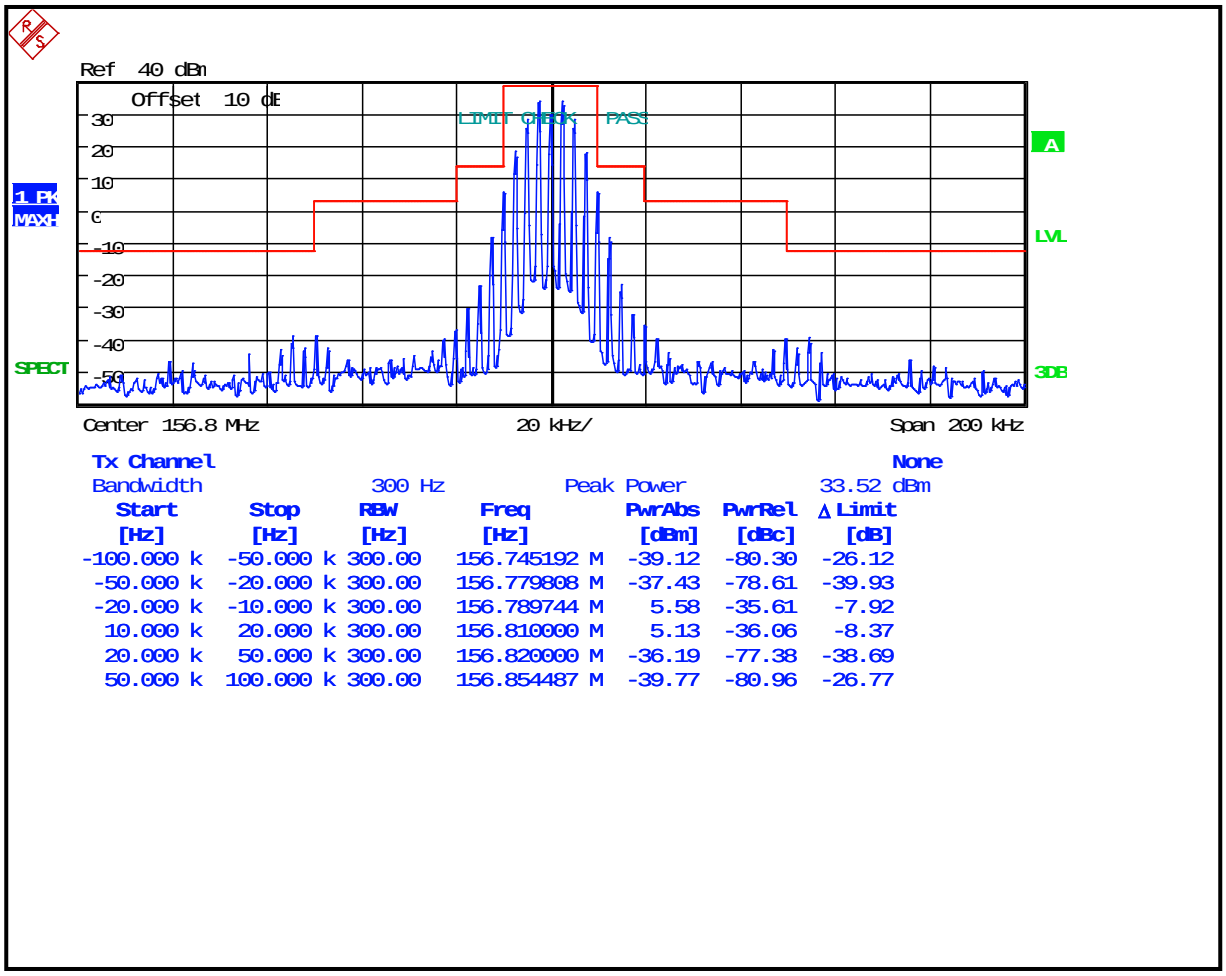
7.2 Test Data

Plot 7-1: Occupied Bandwidth – 150 MHz; Analog WB (Mask B)



Tx Channel						None
Bandwidth		300 Hz	Peak Power			33.58 dBm
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-50.000 k	300.00	149.945192 M	-39.27	-80.49	-26.27
-50.000 k	-20.000 k	300.00	149.979487 M	-36.77	-77.99	-39.27
-20.000 k	-10.000 k	300.00	149.989744 M	5.55	-35.67	-7.95
10.000 k	20.000 k	300.00	150.010000 M	5.39	-35.83	-8.11
20.000 k	50.000 k	300.00	150.020000 M	-36.36	-77.58	-38.86
50.000 k	100.000 k	300.00	150.054487 M	-39.86	-81.08	-26.86

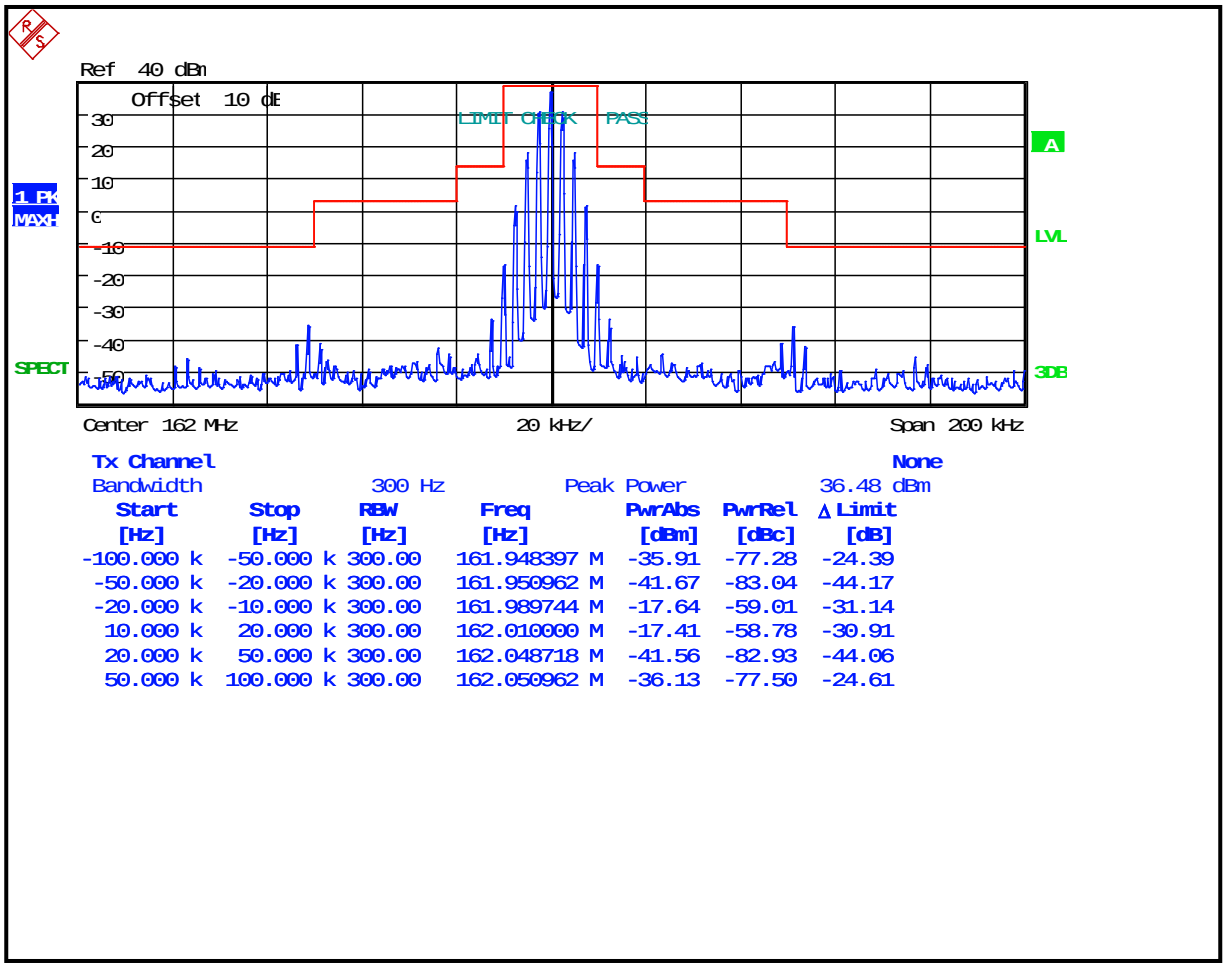
Plot 7-2: Occupied Bandwidth – 156.8 MHz; Analog WB (Mask B)



Tx Channel: None
Bandwidth: 300 Hz
Peak Power: 33.52 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-50.000 k	300.00	156.745192 M	-39.12	-80.30	-26.12
-50.000 k	-20.000 k	300.00	156.779808 M	-37.43	-78.61	-39.93
-20.000 k	-10.000 k	300.00	156.789744 M	5.58	-35.61	-7.92
10.000 k	20.000 k	300.00	156.810000 M	5.13	-36.06	-8.37
20.000 k	50.000 k	300.00	156.820000 M	-36.19	-77.38	-38.69
50.000 k	100.000 k	300.00	156.854487 M	-39.77	-80.96	-26.77

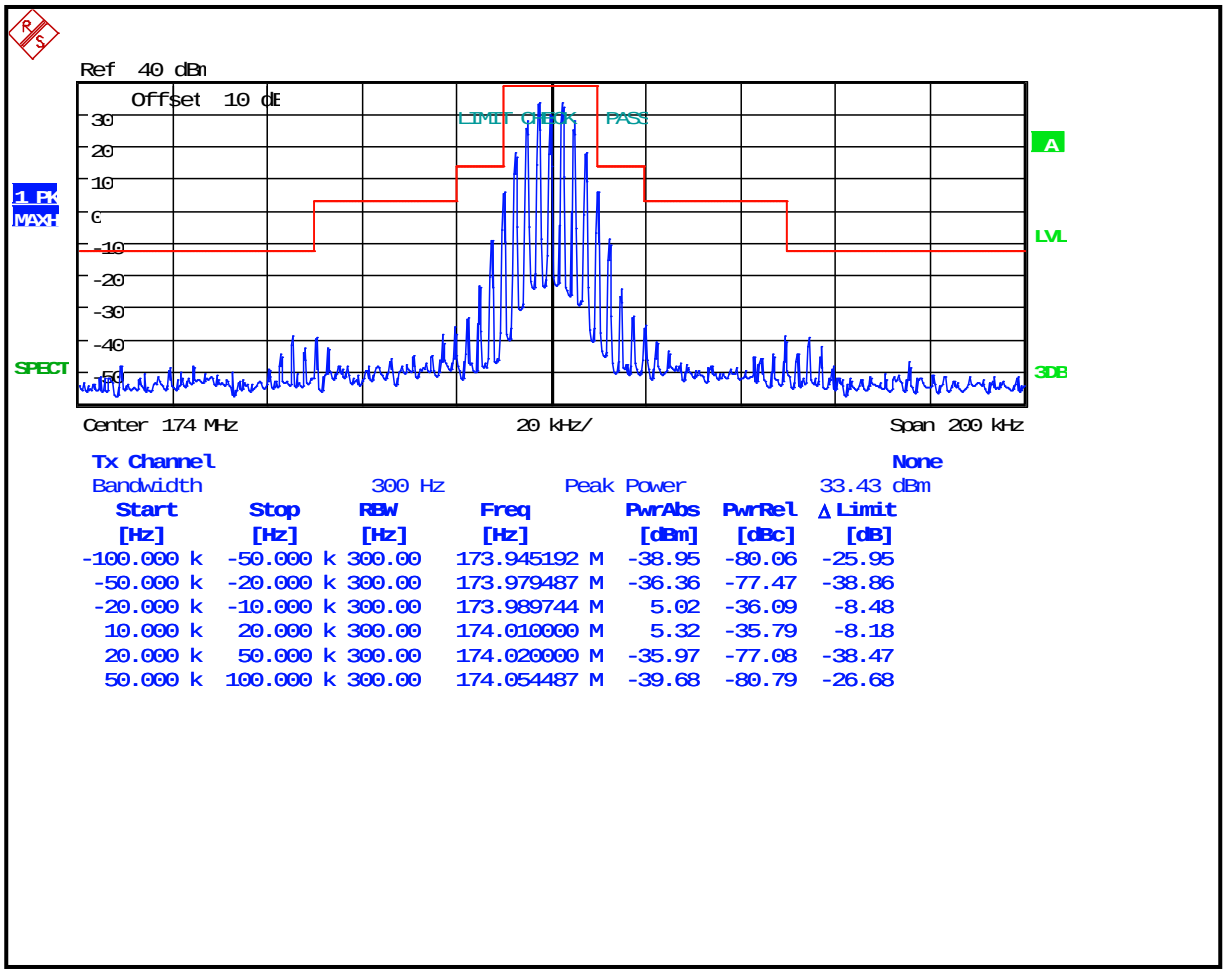
Plot 7-3: Occupied Bandwidth – 162 MHz; Analog WB (Mask B)



Tx Channel: None
Bandwidth: 300 Hz
Peak Power: 36.48 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-50.000 k	300.00	161.948397 M	-35.91	-77.28	-24.39
-50.000 k	-20.000 k	300.00	161.950962 M	-41.67	-83.04	-44.17
-20.000 k	-10.000 k	300.00	161.989744 M	-17.64	-59.01	-31.14
10.000 k	20.000 k	300.00	162.010000 M	-17.41	-58.78	-30.91
20.000 k	50.000 k	300.00	162.048718 M	-41.56	-82.93	-44.06
50.000 k	100.000 k	300.00	162.050962 M	-36.13	-77.50	-24.61

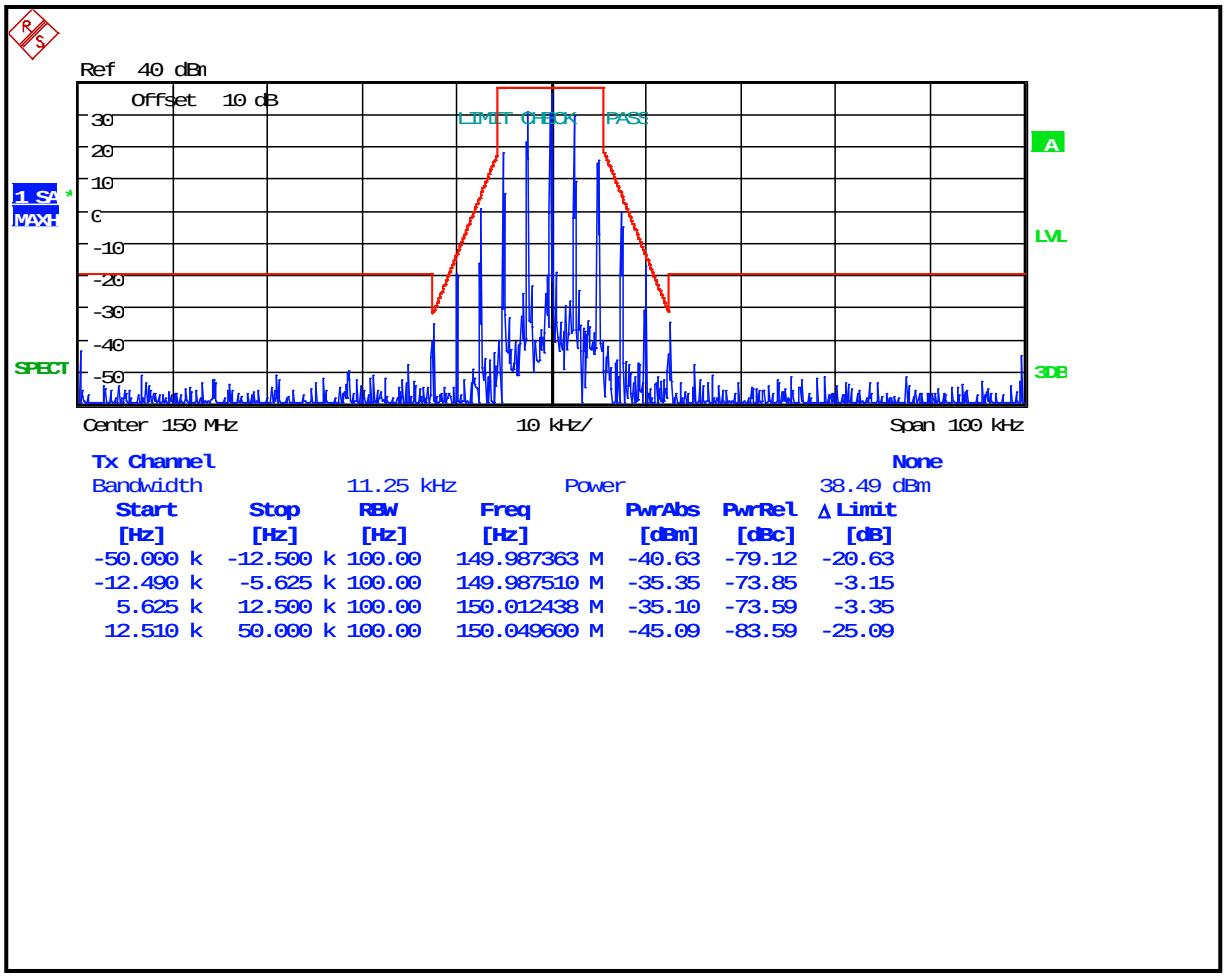
Plot 7-4: Occupied Bandwidth – 174 MHz; Analog WB (Mask B)



Tx Channel: None
Bandwidth: 300 Hz
Peak Power: 33.43 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-50.000 k	300.00	173.945192 M	-38.95	-80.06	-25.95
-50.000 k	-20.000 k	300.00	173.979487 M	-36.36	-77.47	-38.86
-20.000 k	-10.000 k	300.00	173.989744 M	5.02	-36.09	-8.48
10.000 k	20.000 k	300.00	174.010000 M	5.32	-35.79	-8.18
20.000 k	50.000 k	300.00	174.020000 M	-35.97	-77.08	-38.47
50.000 k	100.000 k	300.00	174.054487 M	-39.68	-80.79	-26.68

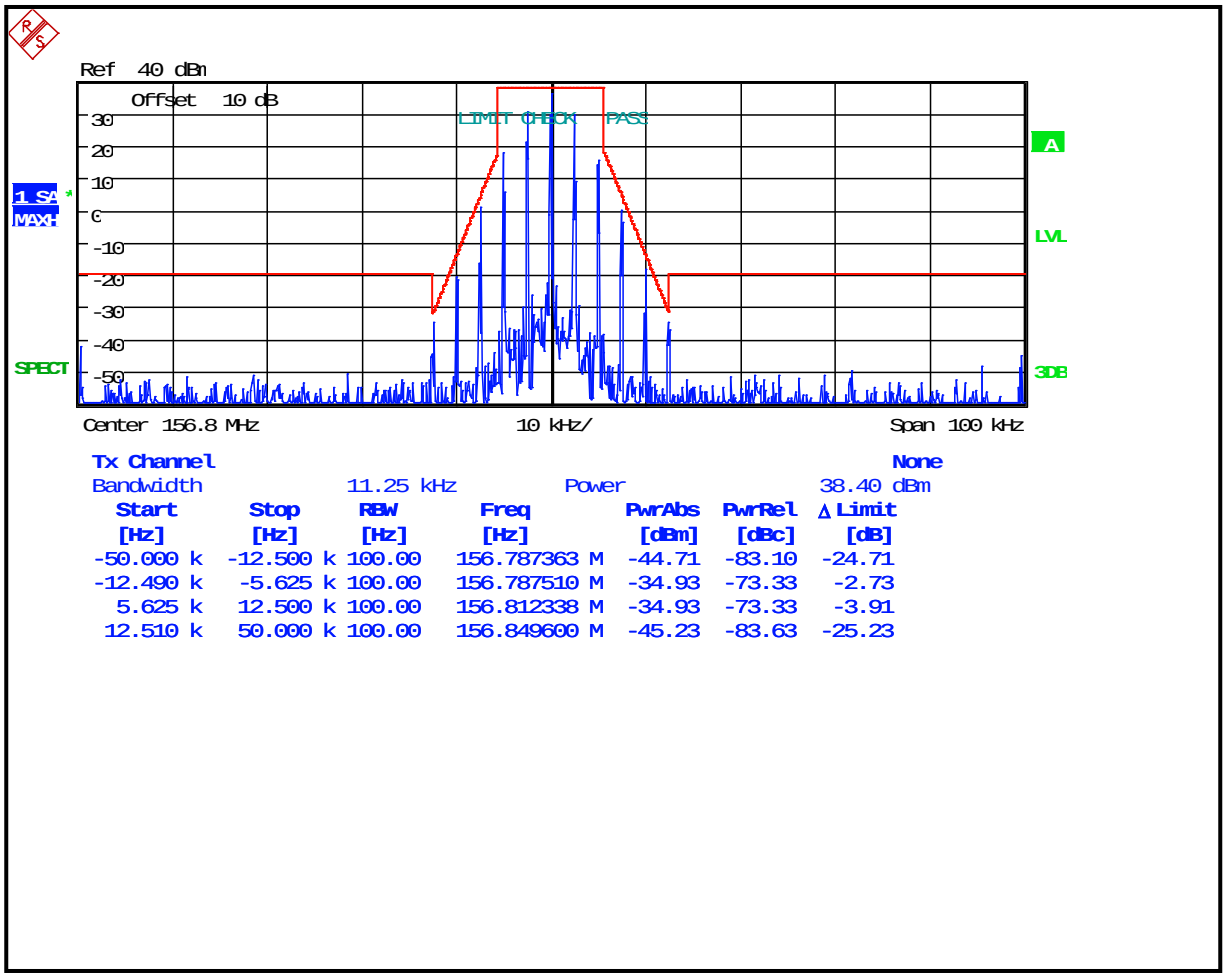
Plot 7-5: Occupied Bandwidth – 150 MHz; Analog NB (Mask D)



Tx Channel: None
Bandwidth: 11.25 kHz
Power: 38.49 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	149.987363 M	-40.63	-79.12	-20.63
-12.490 k	-5.625 k	100.00	149.987510 M	-35.35	-73.85	-3.15
5.625 k	12.500 k	100.00	150.012438 M	-35.10	-73.59	-3.35
12.510 k	50.000 k	100.00	150.049600 M	-45.09	-83.59	-25.09

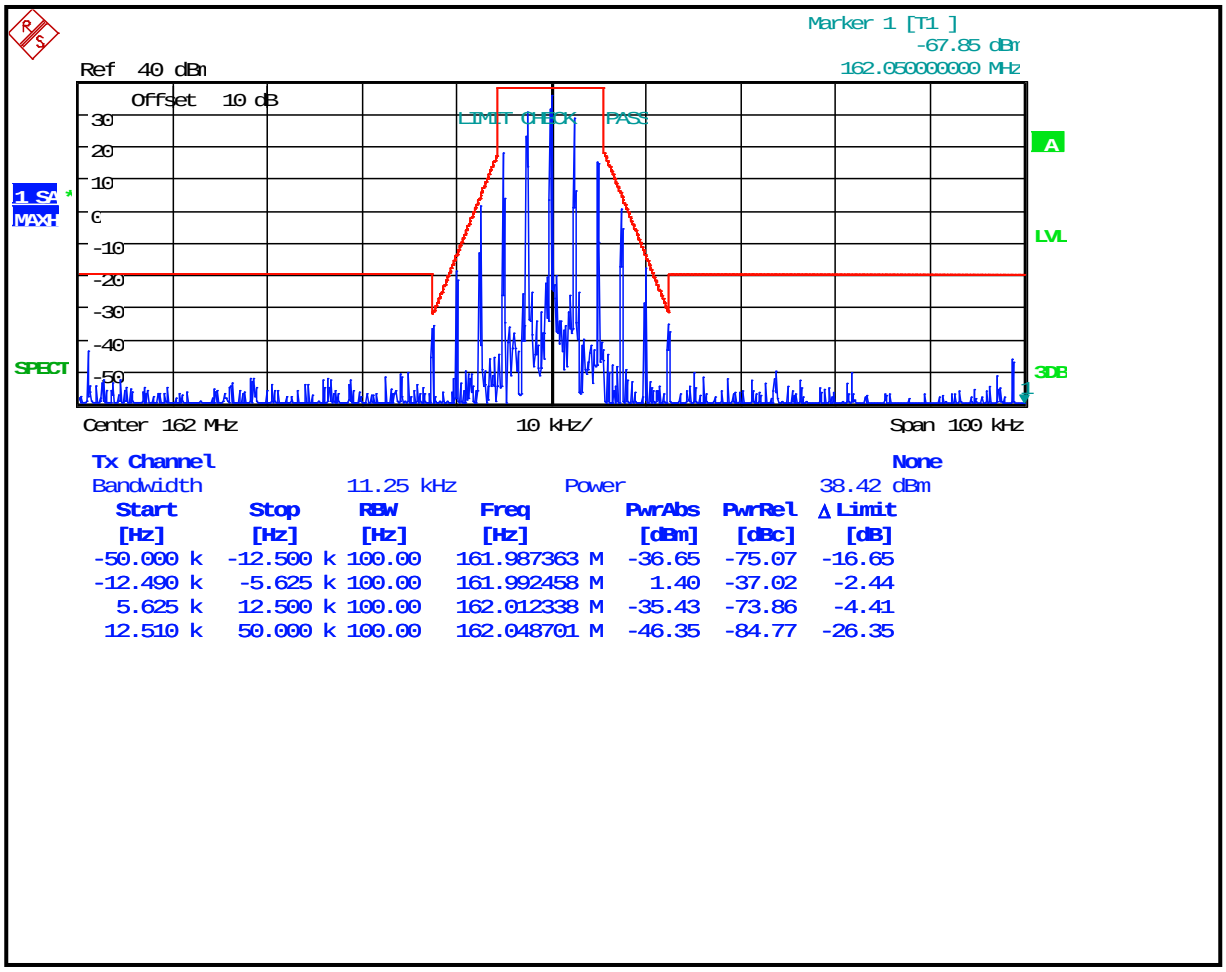
Plot 7-6: Occupied Bandwidth – 156.8 MHz; Analog NB (Mask D)



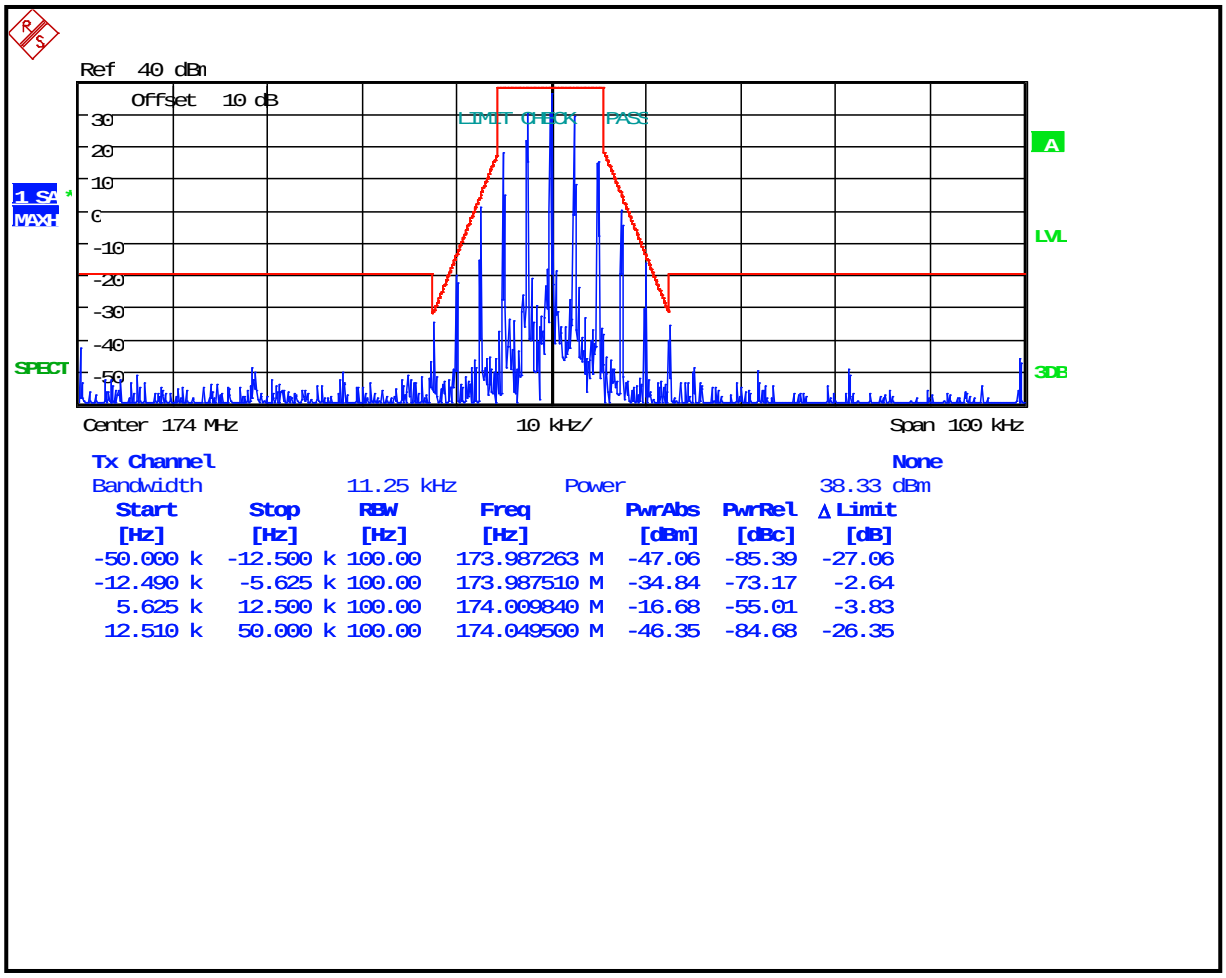
Tx Channel: None
Bandwidth: 11.25 kHz Power: 38.40 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	156.787363 M	-44.71	-83.10	-24.71
-12.490 k	-5.625 k	100.00	156.787510 M	-34.93	-73.33	-2.73
5.625 k	12.500 k	100.00	156.812338 M	-34.93	-73.33	-3.91
12.510 k	50.000 k	100.00	156.849600 M	-45.23	-83.63	-25.23

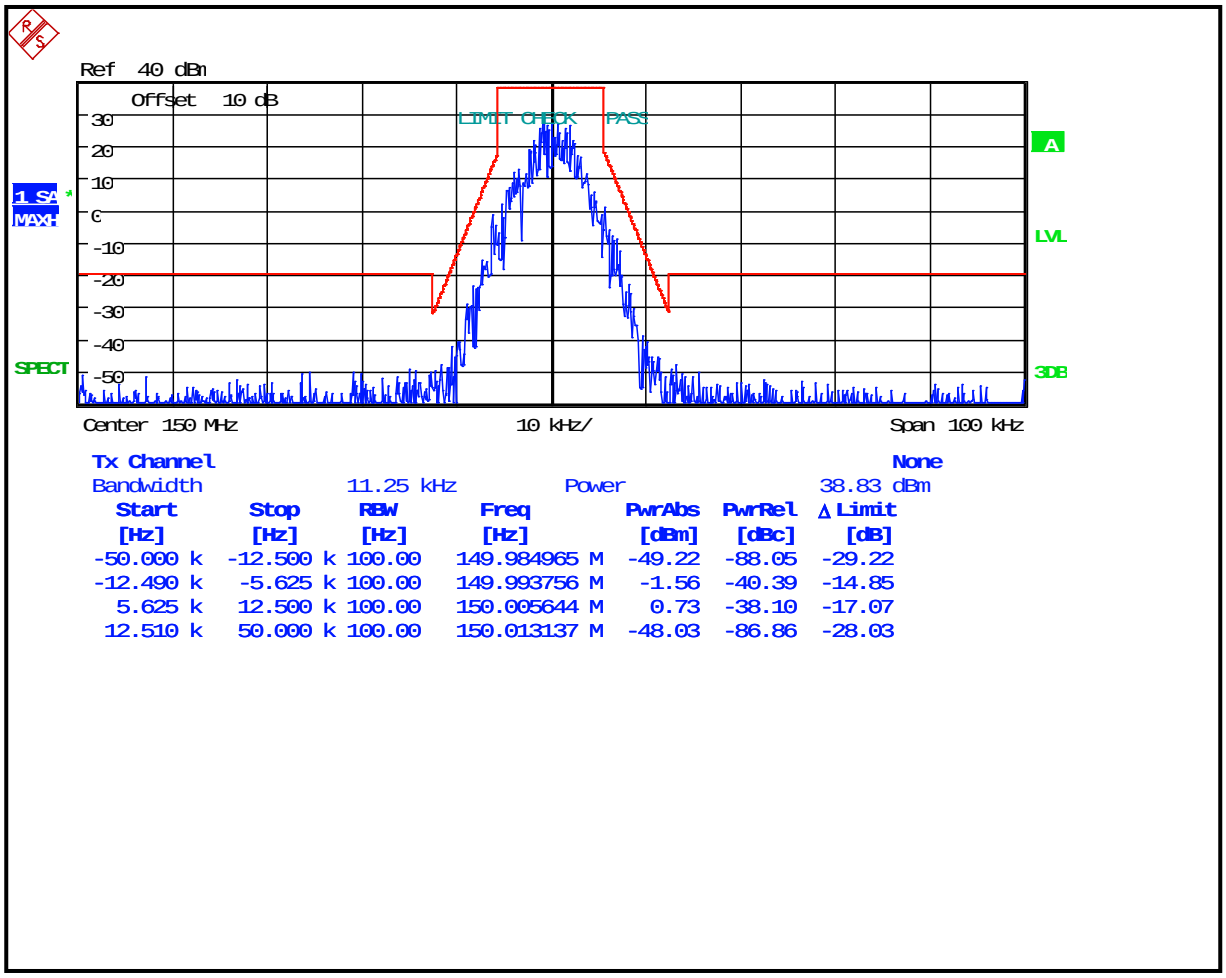
Plot 7-7: Occupied Bandwidth – 162 MHz; Analog NB (Mask D)



Plot 7-8: Occupied Bandwidth – 174 MHz; Analog NB (Mask D)



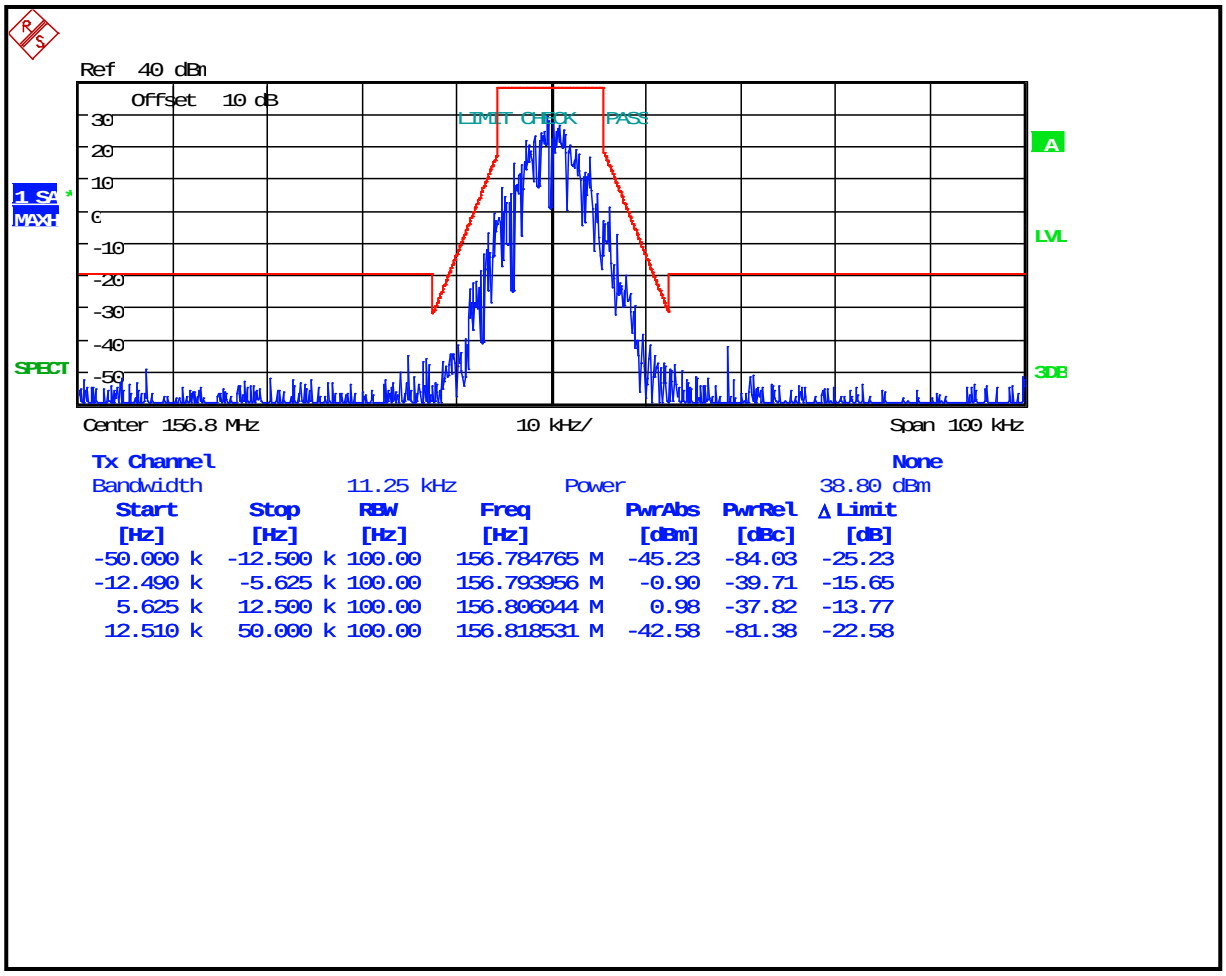
Plot 7-9: Occupied Bandwidth – 150 MHz; P25; (Mask D)



Tx Channel: None
Bandwidth: 11.25 kHz
Power: 38.83 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	149.984965 M	-49.22	-88.05	-29.22
-12.490 k	-5.625 k	100.00	149.993756 M	-1.56	-40.39	-14.85
5.625 k	12.500 k	100.00	150.005644 M	0.73	-38.10	-17.07
12.510 k	50.000 k	100.00	150.013137 M	-48.03	-86.86	-28.03

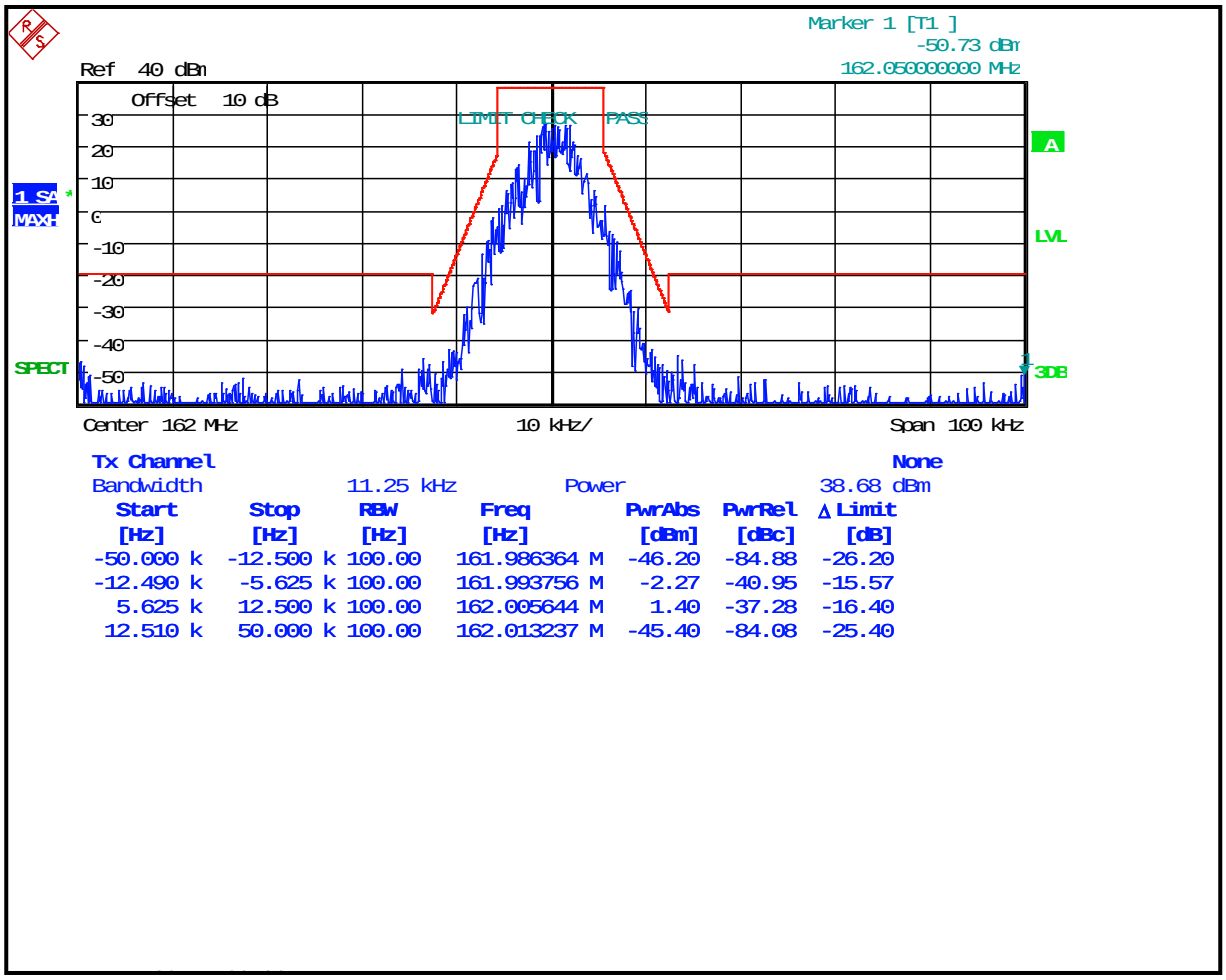
Plot 7-10: Occupied Bandwidth – 156.8 MHz; P25; (Mask D)



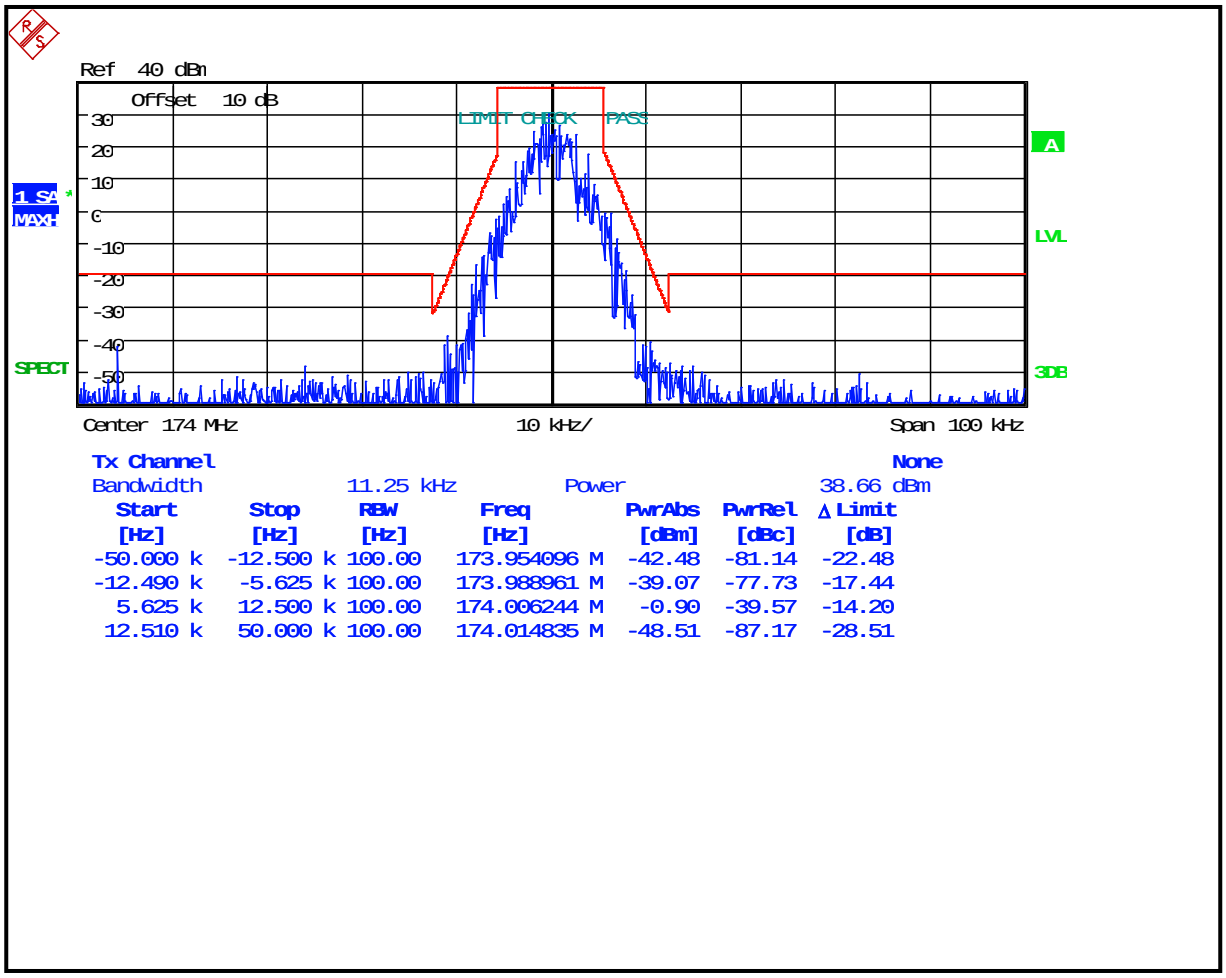
Tx Channel: None
Bandwidth: 11.25 kHz
Power: 38.80 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	156.784765 M	-45.23	-84.03	-25.23
-12.490 k	-5.625 k	100.00	156.793956 M	-0.90	-39.71	-15.65
5.625 k	12.500 k	100.00	156.806044 M	0.98	-37.82	-13.77
12.510 k	50.000 k	100.00	156.818531 M	-42.58	-81.38	-22.58

Plot 7-11: Occupied Bandwidth – 162 MHz; P25; (Mask D)

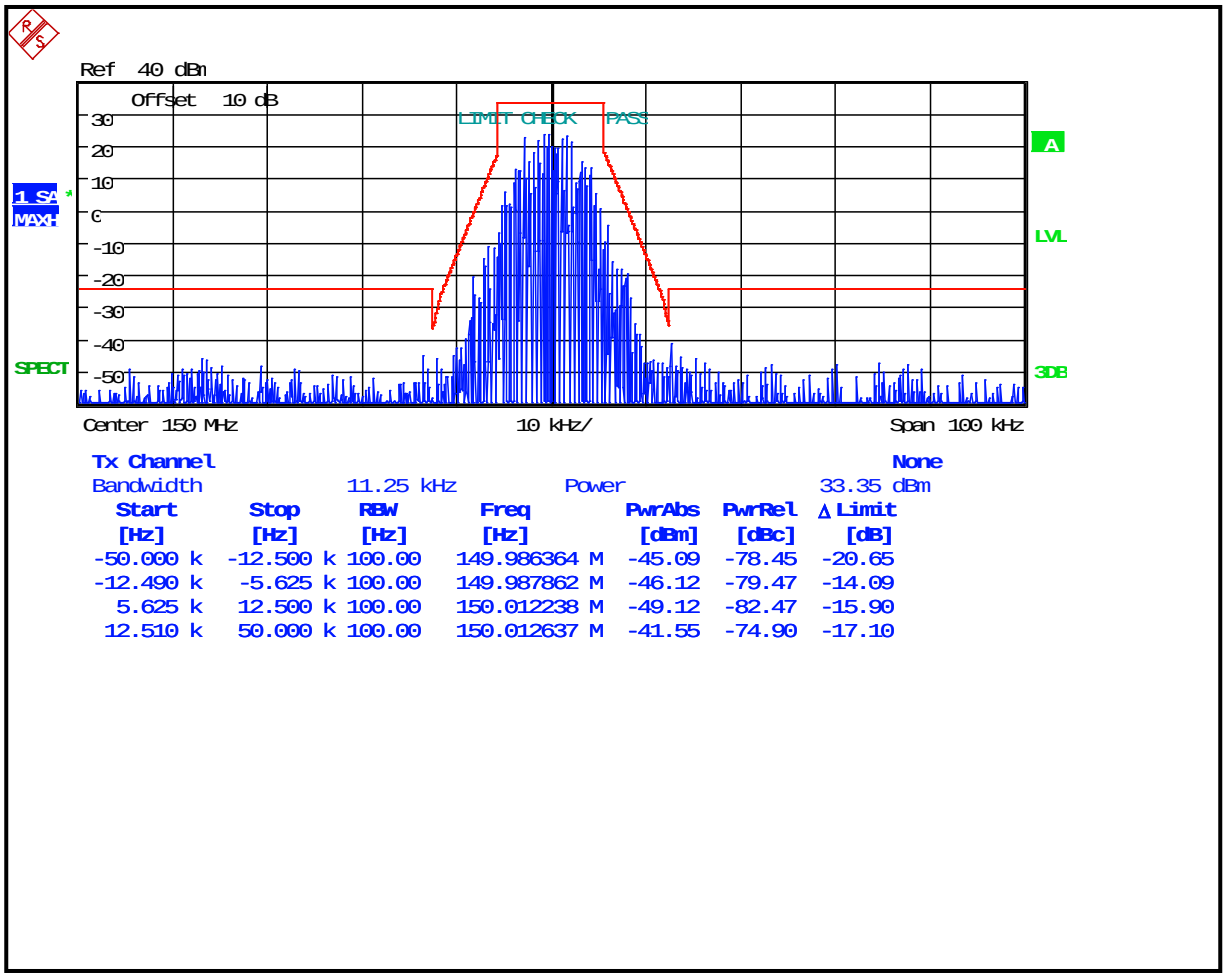


Plot 7-12: Occupied Bandwidth – 174 MHz; P25; (Mask D)



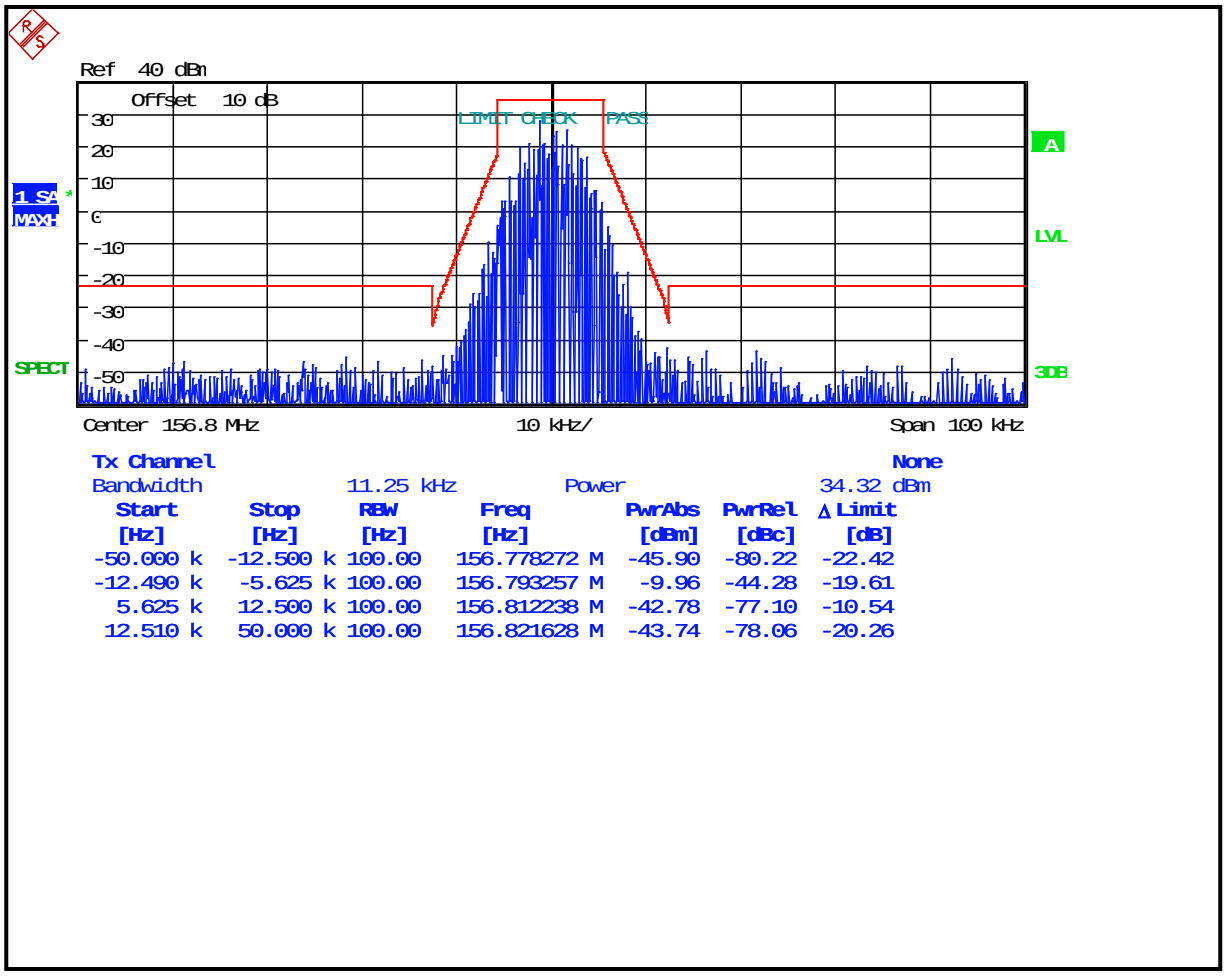
Tx Channel				Bandwidth	11.25 kHz	Power	38.66 dBm
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]	None
-50.000 k	-12.500 k	100.00	173.954096 M	-42.48	-81.14	-22.48	
-12.490 k	-5.625 k	100.00	173.988961 M	-39.07	-77.73	-17.44	
5.625 k	12.500 k	100.00	174.006244 M	-0.90	-39.57	-14.20	
12.510 k	50.000 k	100.00	174.014835 M	-48.51	-87.17	-28.51	

Plot 7-13: Occupied Bandwidth – 150 MHz; CPM TDMA TDMA; (Mask D)

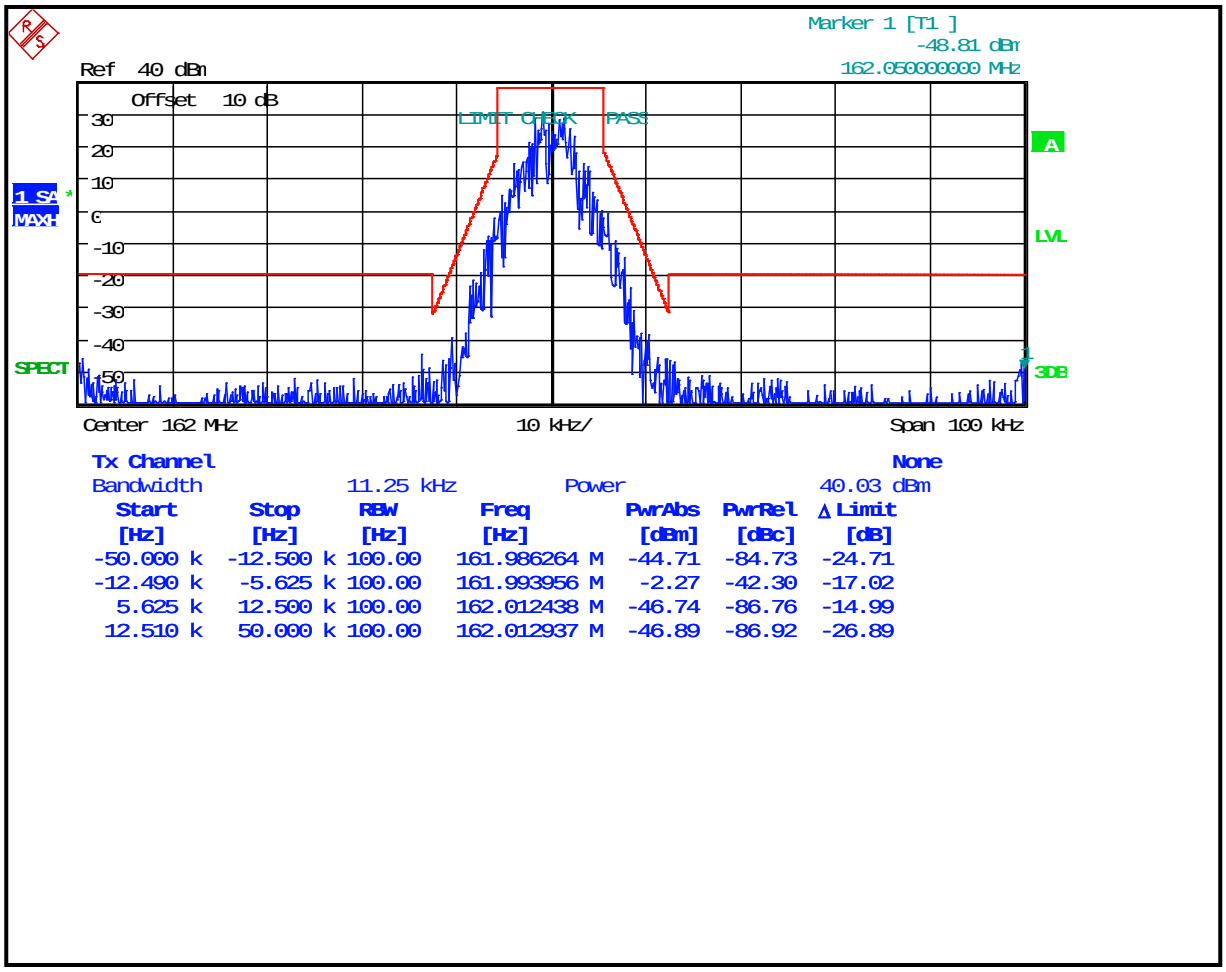


Tx Channel				Bandwidth	11.25 kHz	Power	33.35 dBm	None
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]		
-50.000 k	-12.500 k	100.00	149.986364 M	-45.09	-78.45	-20.65		
-12.490 k	-5.625 k	100.00	149.987862 M	-46.12	-79.47	-14.09		
5.625 k	12.500 k	100.00	150.012238 M	-49.12	-82.47	-15.90		
12.510 k	50.000 k	100.00	150.012637 M	-41.55	-74.90	-17.10		

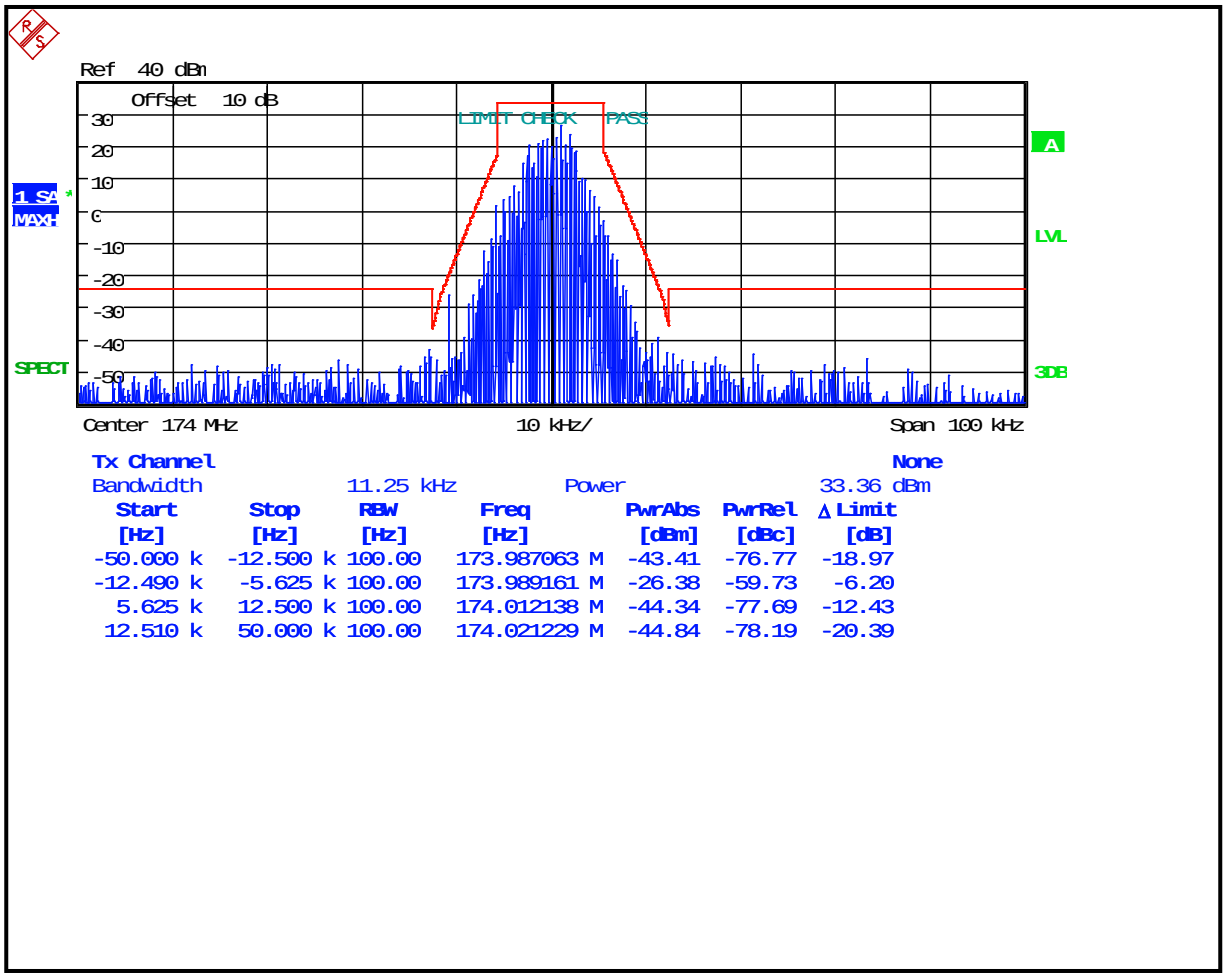
Plot 7-14: Occupied Bandwidth – 156.8 MHz; CPM TDMA TDMA; (Mask D)



Plot 7-15: Occupied Bandwidth – 162 MHz; CPM TDMA TDMA; (Mask D)



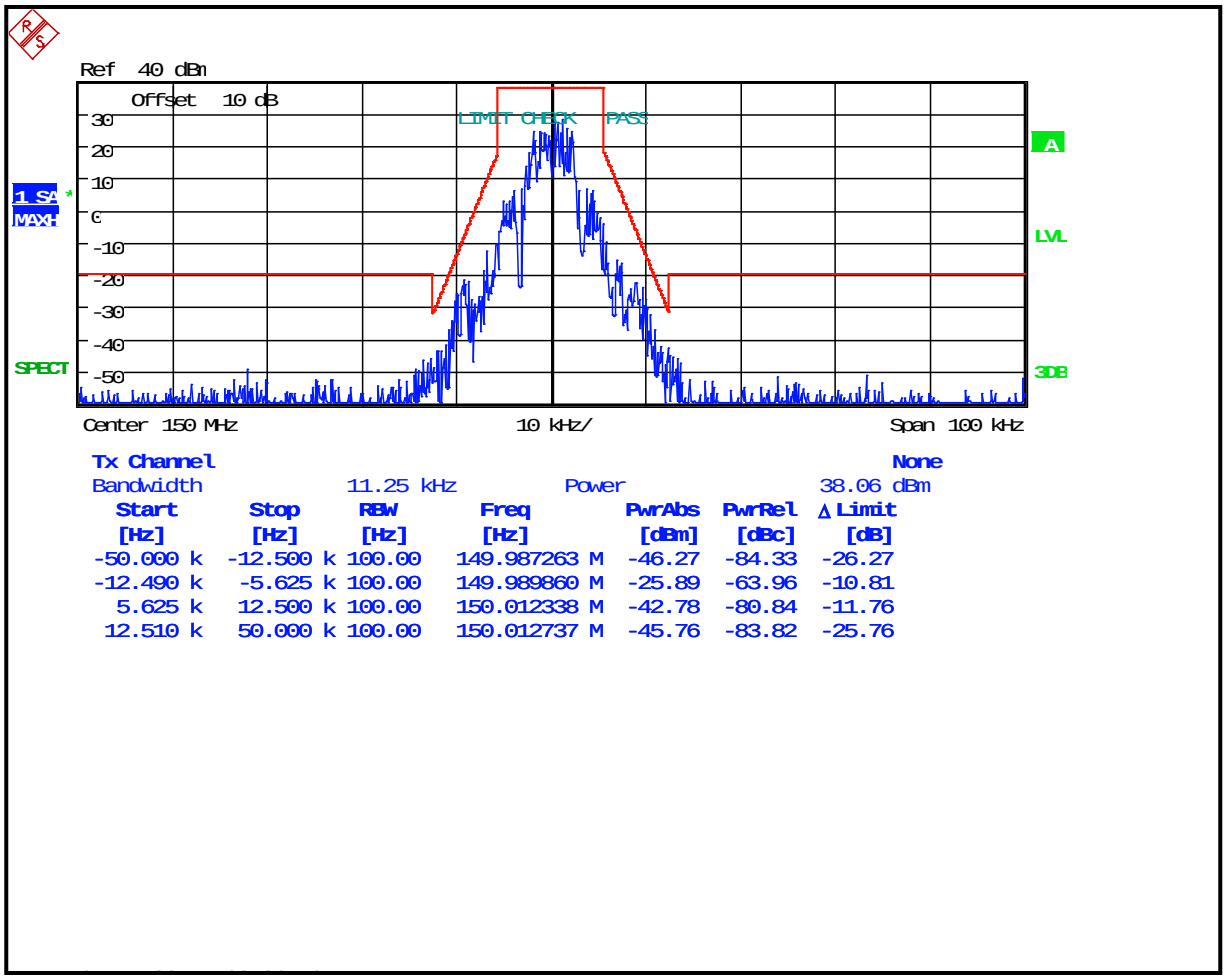
Plot 7-16: Occupied Bandwidth – 174 MHz; CPM TDMA TDMA; (Mask D)



Tx Channel: None
Bandwidth: 11.25 kHz
Power: 33.36 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	173.987063 M	-43.41	-76.77	-18.97
-12.490 k	-5.625 k	100.00	173.989161 M	-26.38	-59.73	-6.20
5.625 k	12.500 k	100.00	174.012138 M	-44.34	-77.69	-12.43
12.510 k	50.000 k	100.00	174.021229 M	-44.84	-78.19	-20.39

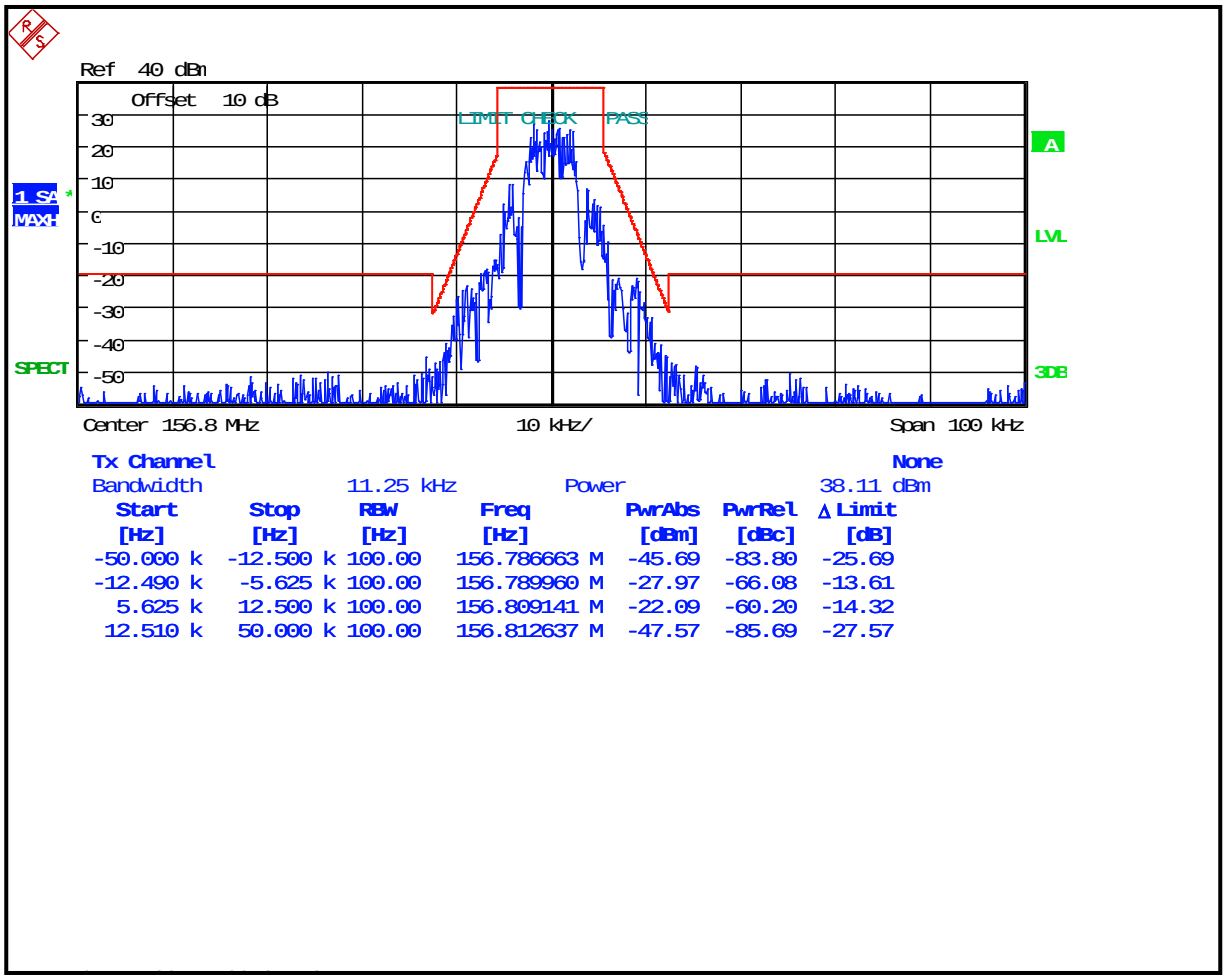
Plot 7-17: Occupied Bandwidth – 150 MHz; 2-Level FSK 4800; XNB EDACS; (Mask D)



Tx Channel: None
Bandwidth: 11.25 kHz
Power: 38.06 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	149.987263 M	-46.27	-84.33	-26.27
-12.490 k	-5.625 k	100.00	149.989860 M	-25.89	-63.96	-10.81
5.625 k	12.500 k	100.00	150.012338 M	-42.78	-80.84	-11.76
12.510 k	50.000 k	100.00	150.012737 M	-45.76	-83.82	-25.76

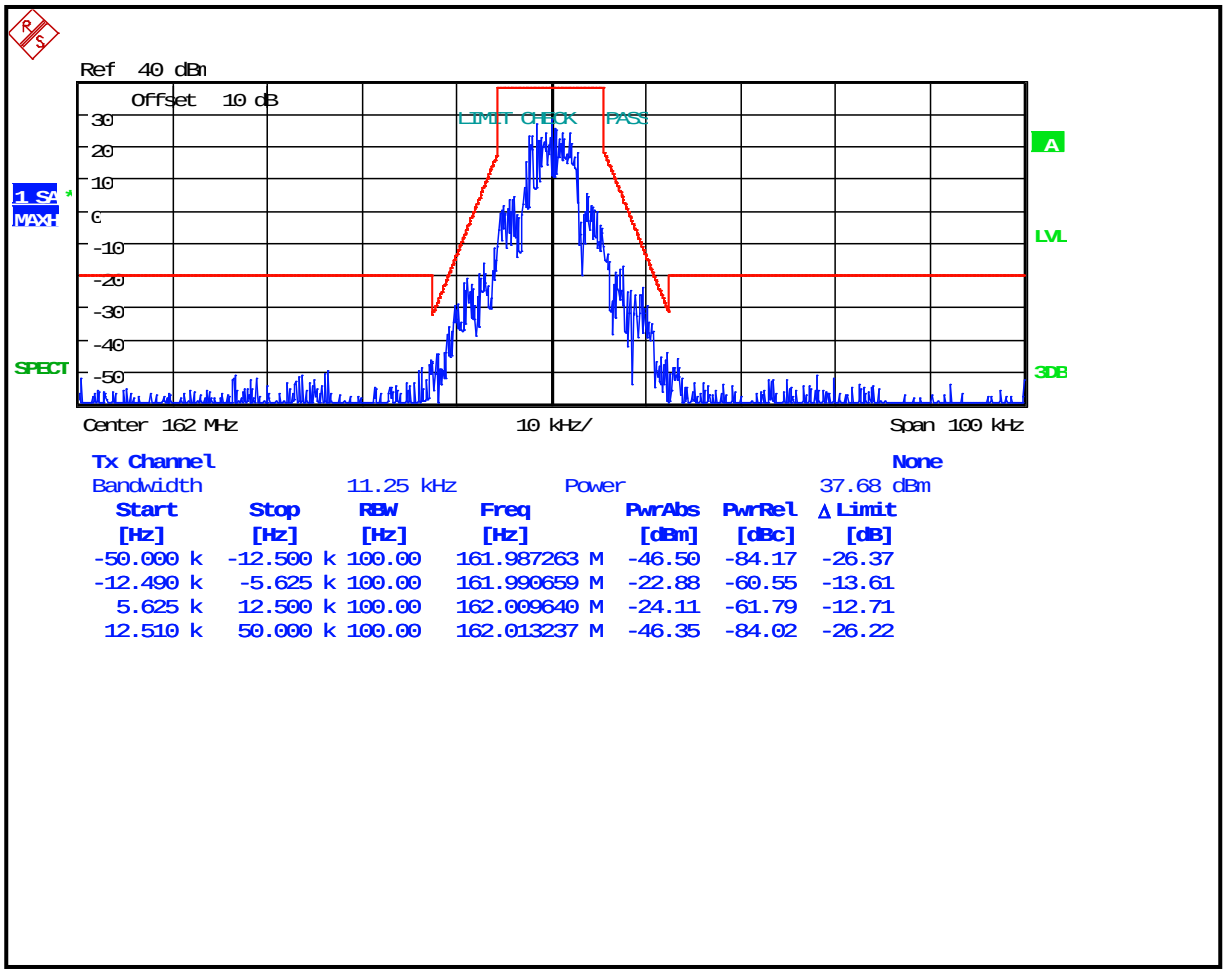
Plot 7-18: Occupied Bandwidth – 156.8 MHz; 2-Level FSK 4800; XNB EDACS; (Mask D)



Tx Channel: None
Bandwidth: 11.25 kHz
Power: 38.11 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	156.786663 M	-45.69	-83.80	-25.69
-12.490 k	-5.625 k	100.00	156.789960 M	-27.97	-66.08	-13.61
5.625 k	12.500 k	100.00	156.809141 M	-22.09	-60.20	-14.32
12.510 k	50.000 k	100.00	156.812637 M	-47.57	-85.69	-27.57

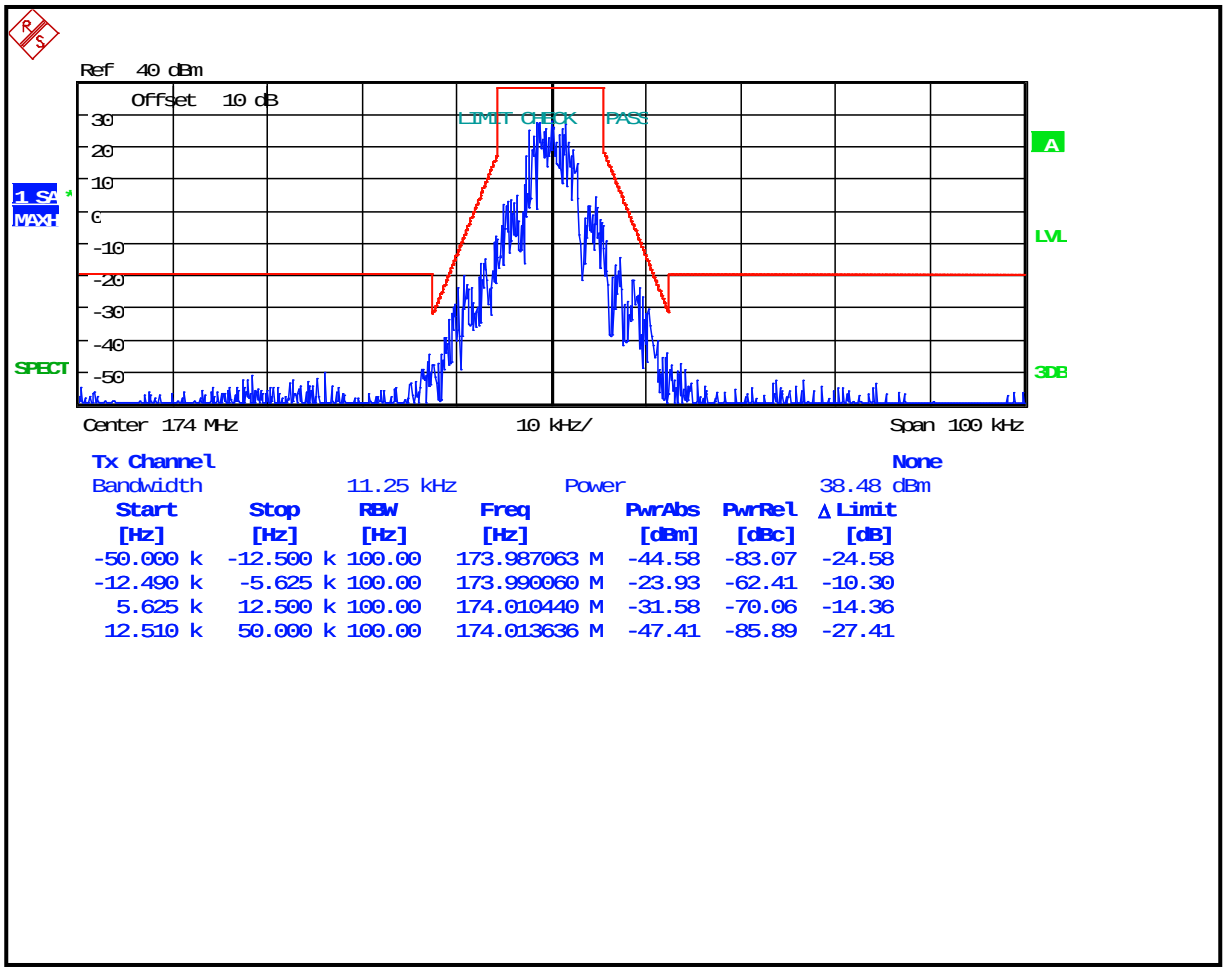
Plot 7-19: Occupied Bandwidth – 162 MHz; 2-Level FSK 4800; XNB EDACS; (Mask D)



Tx Channel: None
Bandwidth: 11.25 kHz
Power: 37.68 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	161.987263 M	-46.50	-84.17	-26.37
-12.490 k	-5.625 k	100.00	161.990659 M	-22.88	-60.55	-13.61
5.625 k	12.500 k	100.00	162.009640 M	-24.11	-61.79	-12.71
12.510 k	50.000 k	100.00	162.013237 M	-46.35	-84.02	-26.22

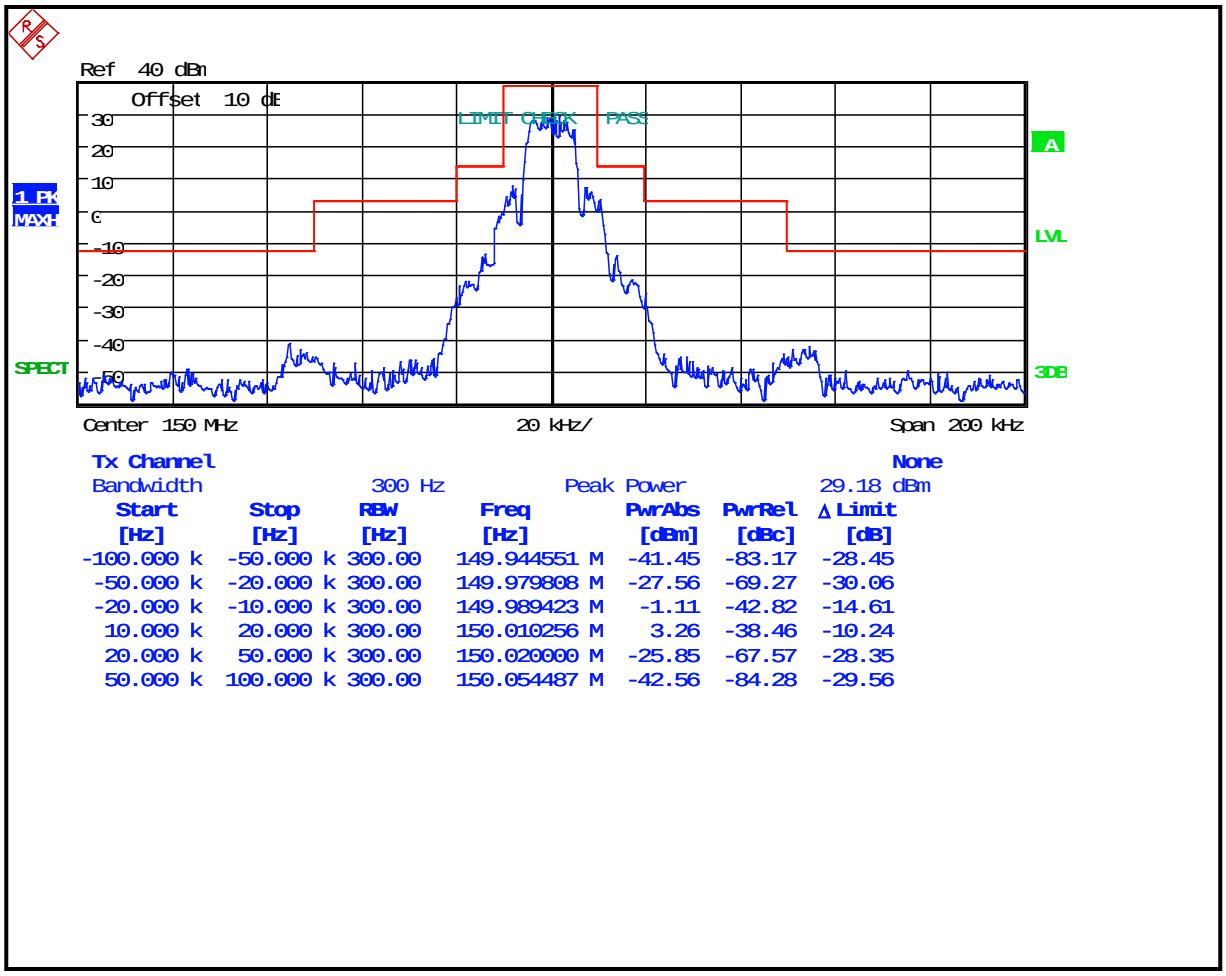
Plot 7-20: Occupied Bandwidth – 174 MHz; 2-Level FSK 4800; XNB EDACS; (Mask D)



Tx Channel: None
Bandwidth: 11.25 kHz
Power: 38.48 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	173.987063 M	-44.58	-83.07	-24.58
-12.490 k	-5.625 k	100.00	173.990060 M	-23.93	-62.41	-10.30
5.625 k	12.500 k	100.00	174.010440 M	-31.58	-70.06	-14.36
12.510 k	50.000 k	100.00	174.013636 M	-47.41	-85.89	-27.41

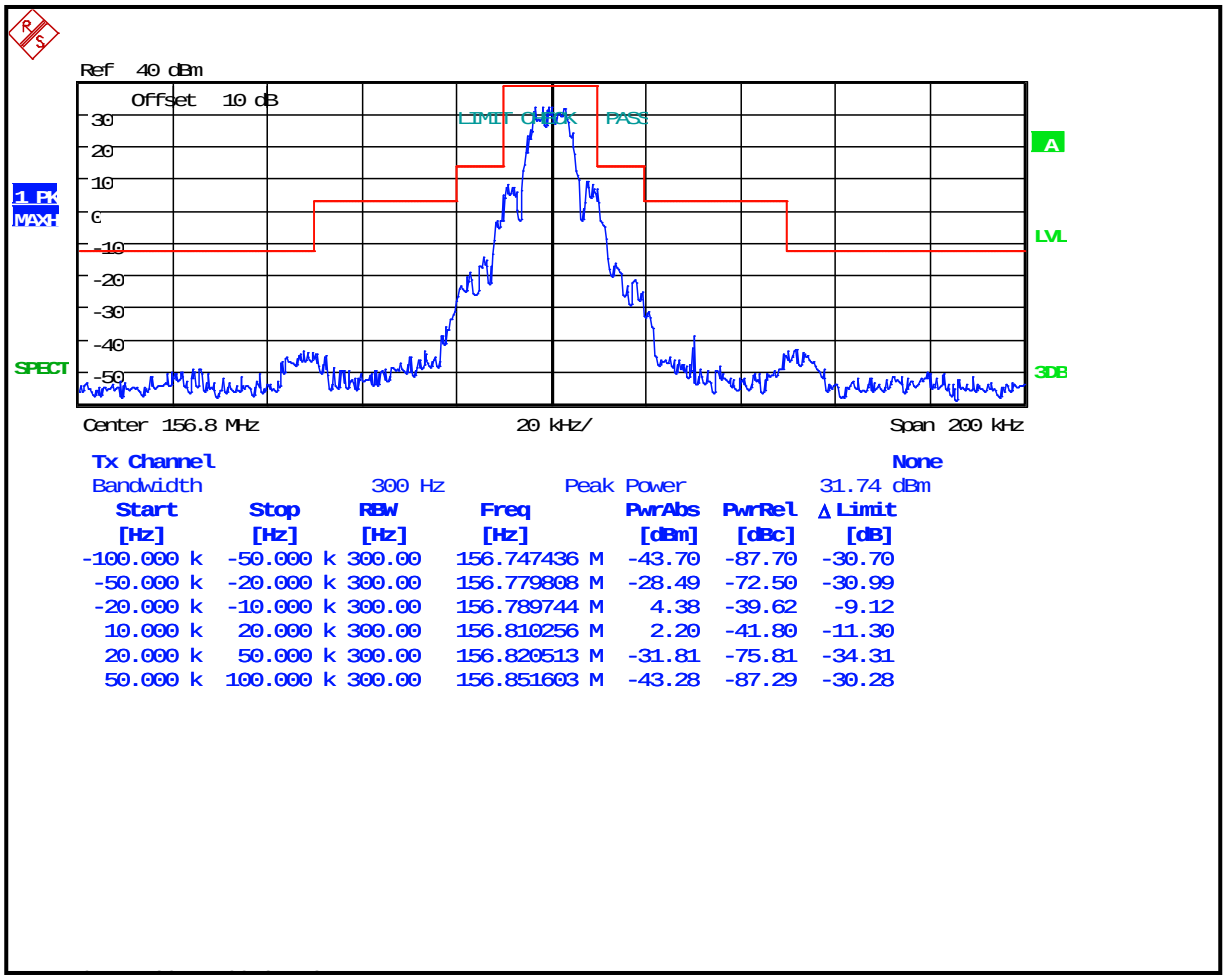
Plot 7-21: Occupied Bandwidth – 150 MHz; 2-Level FSK 9600; WB EDACS; (Mask B)



Tx Channel: None
Bandwidth: 300 Hz
Peak Power: 29.18 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-50.000 k	300.00	149.944551 M	-41.45	-83.17	-28.45
-50.000 k	-20.000 k	300.00	149.979808 M	-27.56	-69.27	-30.06
-20.000 k	-10.000 k	300.00	149.989423 M	-1.11	-42.82	-14.61
10.000 k	20.000 k	300.00	150.010256 M	3.26	-38.46	-10.24
20.000 k	50.000 k	300.00	150.020000 M	-25.85	-67.57	-28.35
50.000 k	100.000 k	300.00	150.054487 M	-42.56	-84.28	-29.56

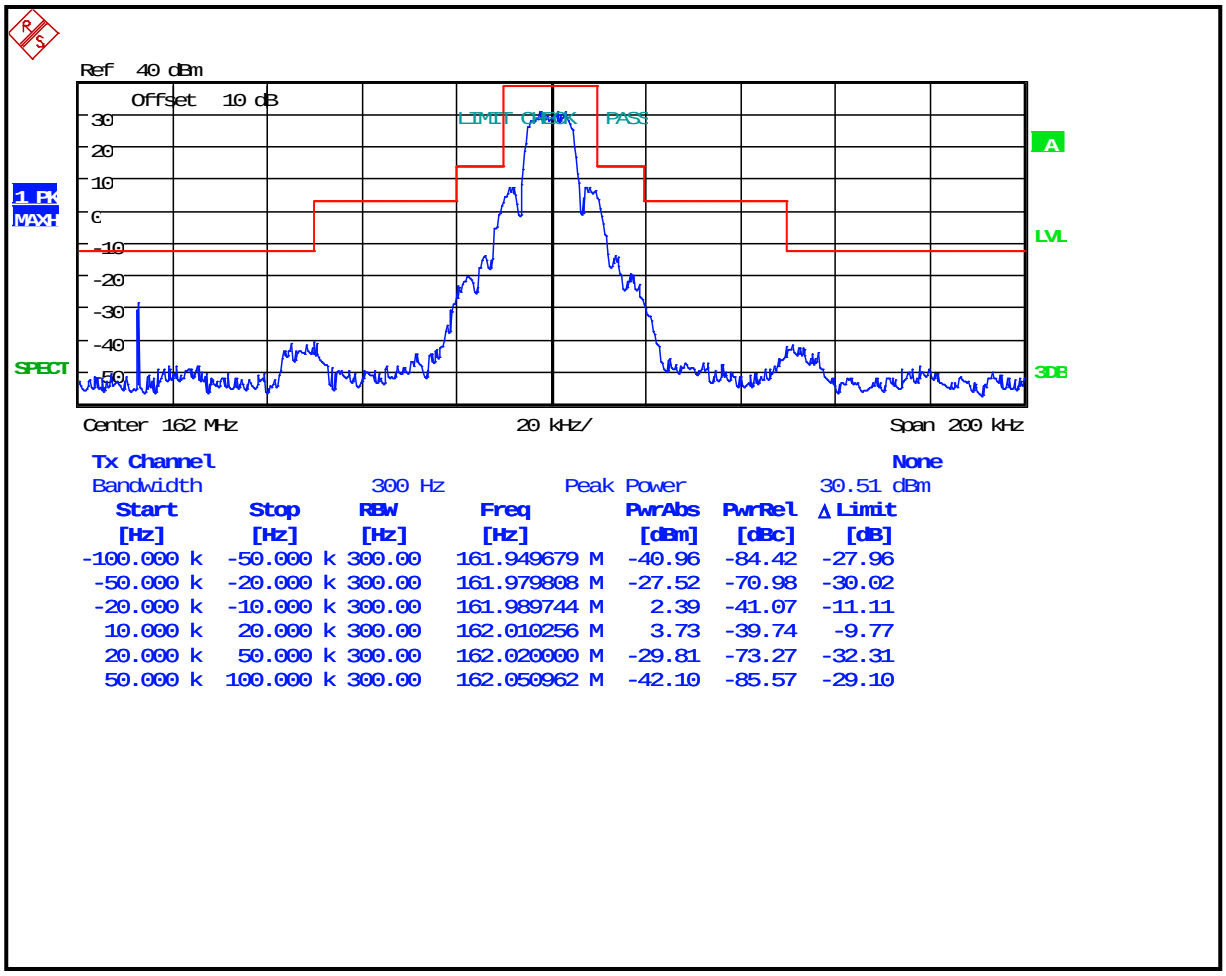
Plot 7-22: Occupied Bandwidth – 156.8 MHz; 2-Level FSK 9600; WB EDACS; (Mask B)



Tx Channel: None
Bandwidth: 300 Hz
Peak Power: 31.74 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-50.000 k	300.00	156.747436 M	-43.70	-87.70	-30.70
-50.000 k	-20.000 k	300.00	156.779808 M	-28.49	-72.50	-30.99
-20.000 k	-10.000 k	300.00	156.789744 M	4.38	-39.62	-9.12
10.000 k	20.000 k	300.00	156.810256 M	2.20	-41.80	-11.30
20.000 k	50.000 k	300.00	156.820513 M	-31.81	-75.81	-34.31
50.000 k	100.000 k	300.00	156.851603 M	-43.28	-87.29	-30.28

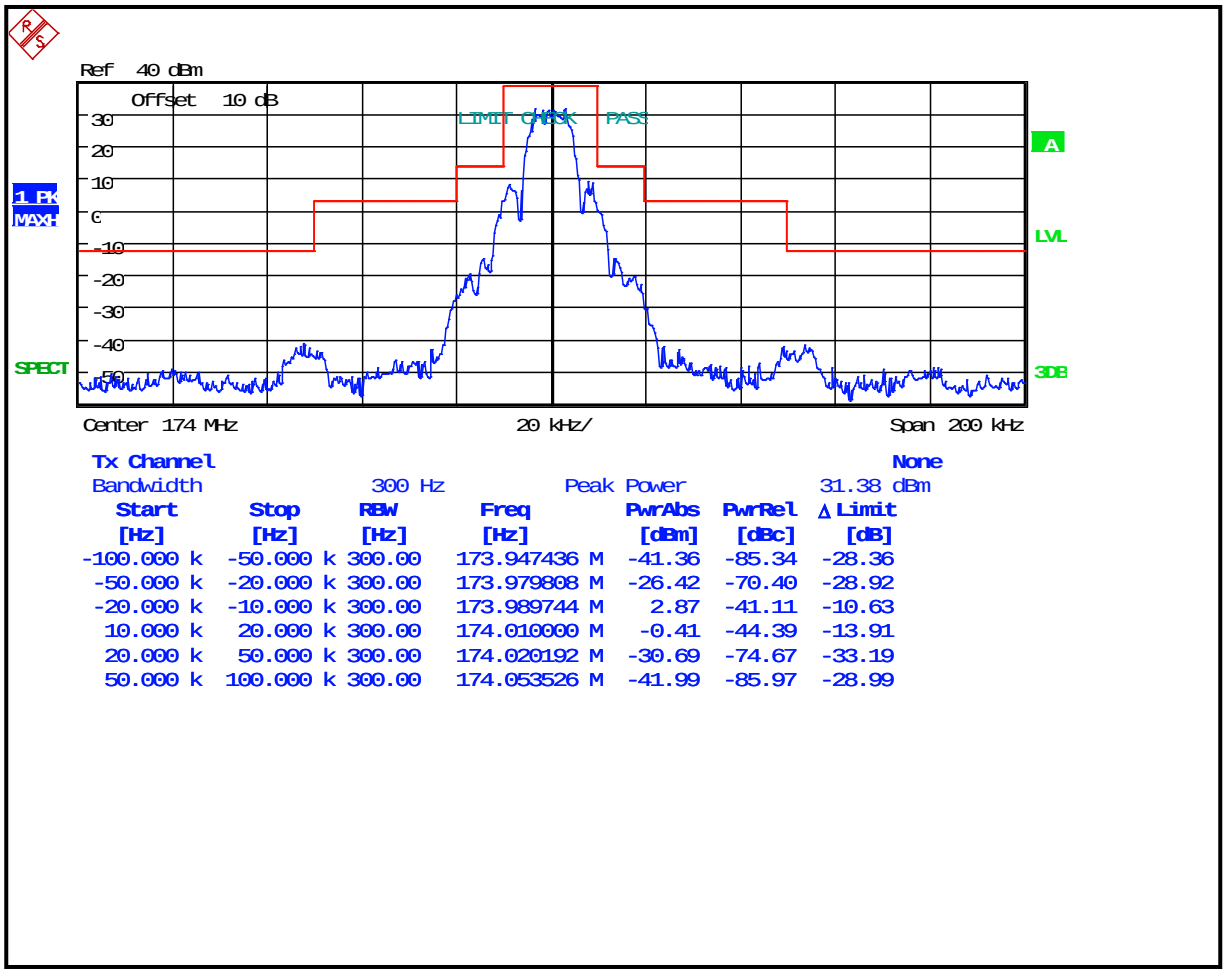
Plot 7-23: Occupied Bandwidth – 162 MHz; 2-Level FSK 9600; WB EDACS; (Mask B)



Tx Channel — None
Bandwidth 300 Hz — Peak Power 30.51 dBm

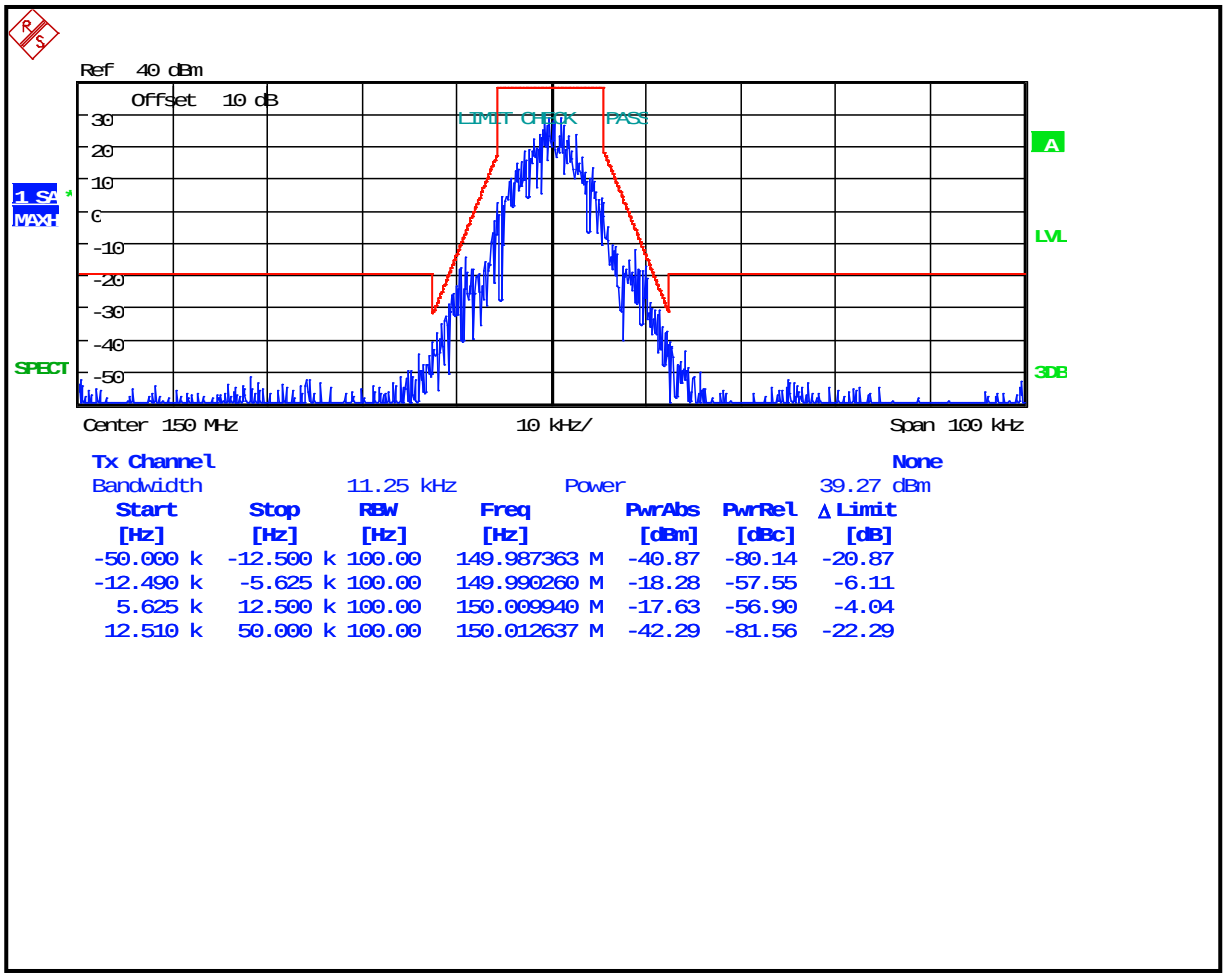
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-50.000 k	300.00	161.949679 M	-40.96	-84.42	-27.96
-50.000 k	-20.000 k	300.00	161.979808 M	-27.52	-70.98	-30.02
-20.000 k	-10.000 k	300.00	161.989744 M	2.39	-41.07	-11.11
10.000 k	20.000 k	300.00	162.010256 M	3.73	-39.74	-9.77
20.000 k	50.000 k	300.00	162.020000 M	-29.81	-73.27	-32.31
50.000 k	100.000 k	300.00	162.050962 M	-42.10	-85.57	-29.10

Plot 7-24: Occupied Bandwidth – 174 MHz; 2-Level FSK 9600; WB EDACS; (Mask B)



Tx Channel						None
Bandwidth		300 Hz	Peak Power			31.38 dBm
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-50.000 k	300.00	173.947436 M	-41.36	-85.34	-28.36
-50.000 k	-20.000 k	300.00	173.979808 M	-26.42	-70.40	-28.92
-20.000 k	-10.000 k	300.00	173.989744 M	2.87	-41.11	-10.63
10.000 k	20.000 k	300.00	174.010000 M	-0.41	-44.39	-13.91
20.000 k	50.000 k	300.00	174.020192 M	-30.69	-74.67	-33.19
50.000 k	100.000 k	300.00	174.053526 M	-41.99	-85.97	-28.99

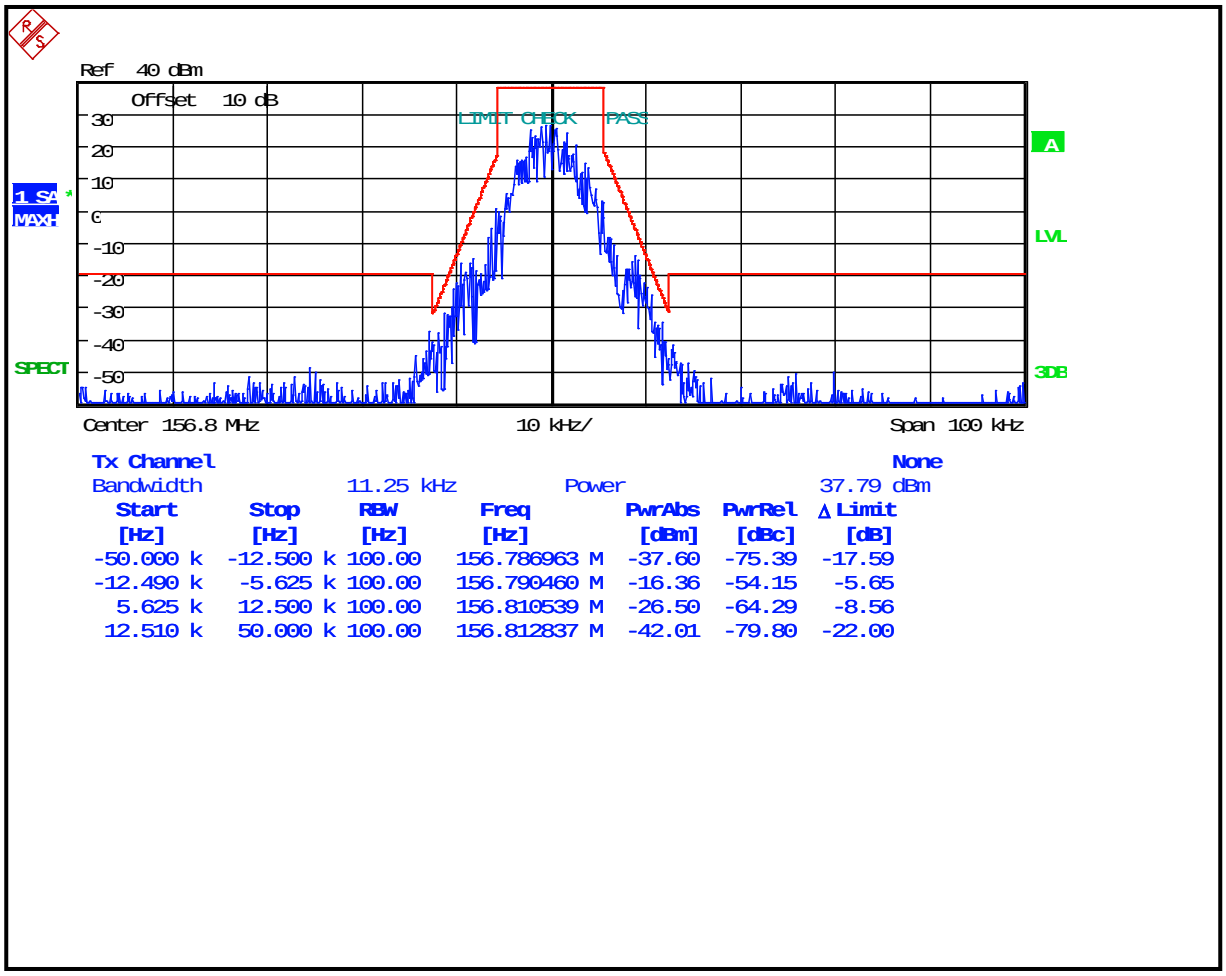
Plot 7-25: Occupied Bandwidth – 150 MHz; 2-Level FSK 9600; NB EDACS; (Mask D)



Tx Channel **None**
Bandwidth 11.25 kHz Power 39.27 dBm

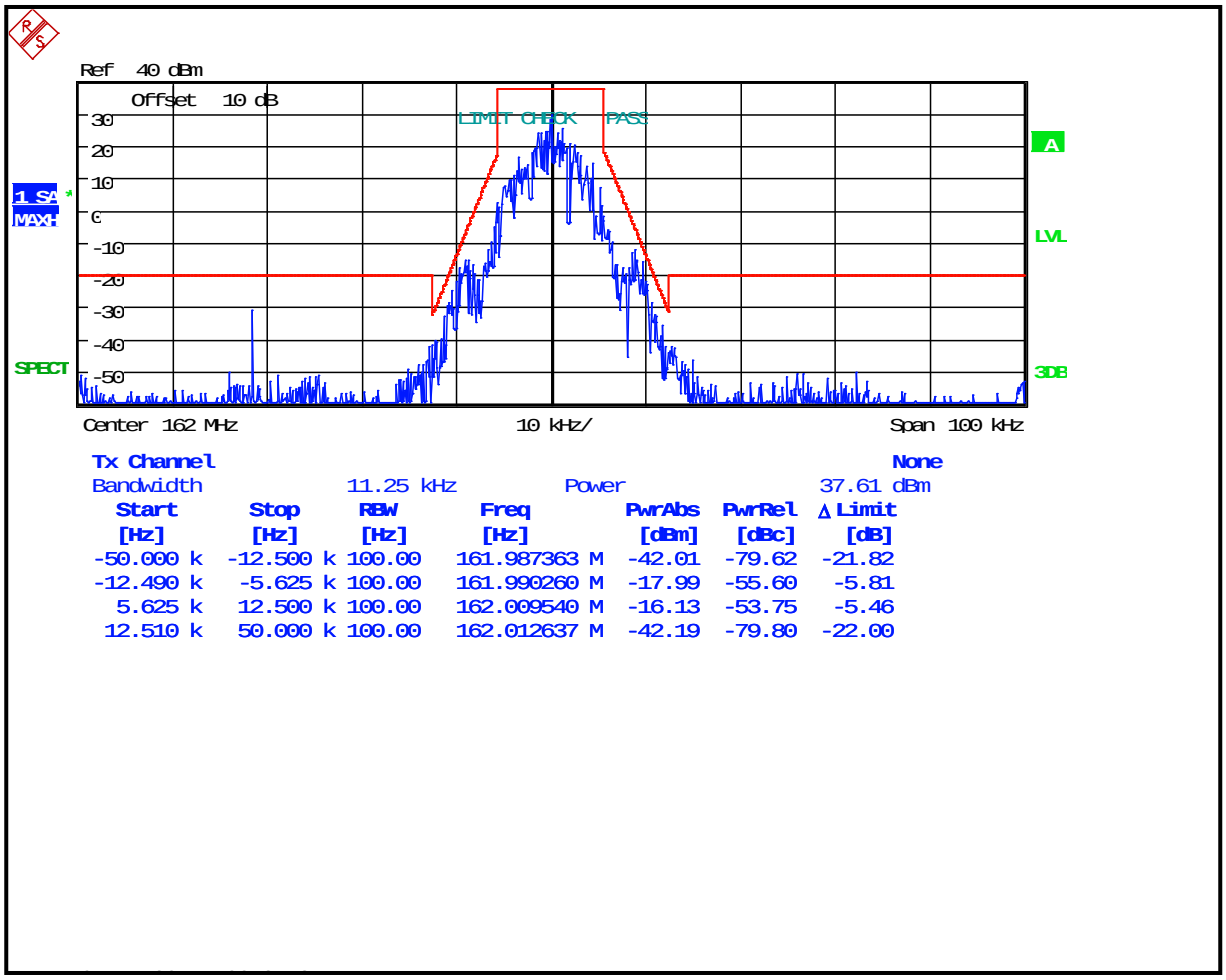
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	149.987363 M	-40.87	-80.14	-20.87
-12.490 k	-5.625 k	100.00	149.990260 M	-18.28	-57.55	-6.11
5.625 k	12.500 k	100.00	150.009940 M	-17.63	-56.90	-4.04
12.510 k	50.000 k	100.00	150.012637 M	-42.29	-81.56	-22.29

Plot 7-26: Occupied Bandwidth – 156.8 MHz; 2-Level FSK 9600; NB EDACS; (Mask D)



Tx Channel				None		
Bandwidth		11.25 kHz	Power		37.79 dBm	
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	156.786963 M	-37.60	-75.39	-17.59
-12.490 k	-5.625 k	100.00	156.790460 M	-16.36	-54.15	-5.65
5.625 k	12.500 k	100.00	156.810539 M	-26.50	-64.29	-8.56
12.510 k	50.000 k	100.00	156.812837 M	-42.01	-79.80	-22.00

Plot 7-27: Occupied Bandwidth – 162 MHz; 2-Level FSK 49600; NB EDACS; (Mask D)



Tx Channel: None
Bandwidth: 11.25 kHz
Power: 37.61 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-12.500 k	100.00	161.987363 M	-42.01	-79.62	-21.82
-12.490 k	-5.625 k	100.00	161.990260 M	-17.99	-55.60	-5.81
5.625 k	12.500 k	100.00	162.009540 M	-16.13	-53.75	-5.46
12.510 k	50.000 k	100.00	162.012637 M	-42.19	-79.80	-22.00

Plot 7-28: Occupied Bandwidth – 174 MHz; 2-Level FSK 9600; NB EDACS; (Mask D)

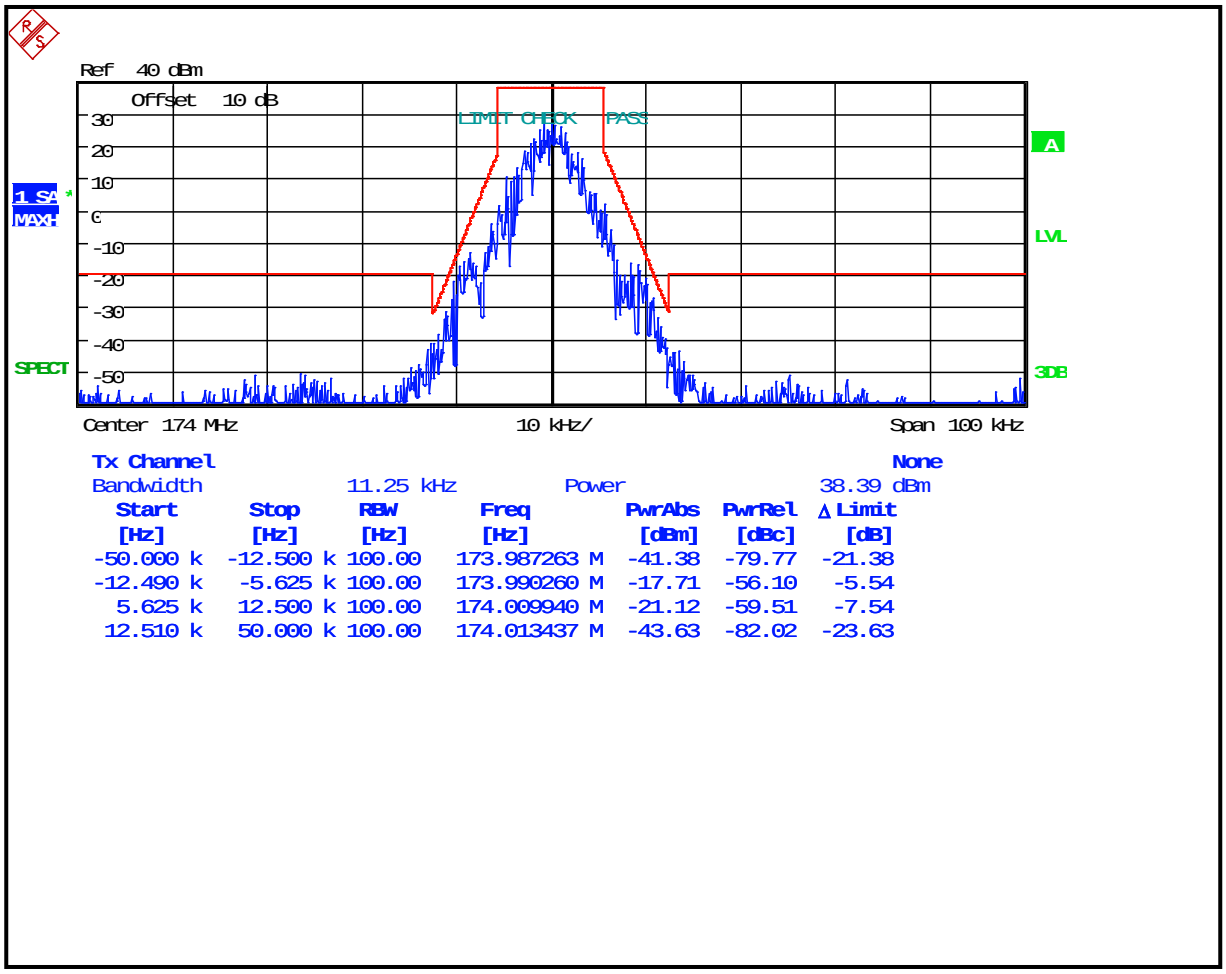


Table 7-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	3/22/18
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	9/1/18
901057	Hewlett Packard	3336B	Synthesizer/ Level Generator	2514A02585	4/13/18

Test Personnel:

Daniel Baltzell — Test Engineer
Signature
May 25, 2017 — Date of Tests

8 FCC §2.1055: Frequency Stability; §22.355: Frequency Tolerance; §74.464; Frequency Tolerance; §80.209: Frequency Stability; §90.213: Frequency Stability; RSS-119 5.3 Transmitter Frequency Stability

8.1 Test Procedure

ANSI C63.26 5.6

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The EUT was evaluated over the temperature range -30°C to +55°C.

The temperature was initially set to -30°C and a 1-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½-hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter. Additionally, the power supply voltage of the EUT was varied +/-15% nominal input voltage.

§80.209: 10 ppm. 400-466 MHz 5 ppm

§90.213: Mobile stations over 2 W operating power - 1.5 ppm.

§90.213 Frequency Stability

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

MINIMUM FREQUENCY STABILITY
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3] 100	100	200
25–50	20	20	50
72–76	5	.....	50
150–174	[5,11] 5	[6] 5	[4,6] 50
216–220	1.0	.....	1.0
220–222 [12]	0.1	1.5	1.5
421–512	[7,11,14] 2.5	[8] 5	[8] 5
806–809	[14] 1.0	1.5	1.5
809–824	[14] 1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	[14] 0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928 [13]	2.5	2.5	2.5
929–930	1.5	.....	.....
935–940	0.1	1.5	1.5
1427–1435	[9] 300	300	300
Above 2450 [10]	.....	.....	.....

8.2 Test Data

Table 8-1: Temperature Frequency Stability – 162 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	161.999938	-0.38
-20	161.999959	-0.25
-10	161.999847	-0.94
0	161.999894	-0.65
10	162.000020	0.12
20 (reference)	162.000000	0.00
30	161.999999	-0.01
40	161.999865	-0.84
50	161.999963	-0.23
55	161.999948	-0.32

Result: The EUT is compliant.

8.2.1 Frequency Stability/Voltage Variation

Table 8-2: Frequency Stability/Voltage Variation – 162 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
5.75 (Battery End Point)	161.999852	-0.91
6.375	161.999875	-0.77
7.5	162.000000	0.00
8.625	161.999986	-0.08

Table 8-3: Test Equipment Used For Testing Frequency Stability

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	3/26/18
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	4/26/18
901338	Weinschel Corp	46-40-34	40 dB Attenuator; 25 W	BM0556	9/1/18
901350	Meterman	33XR	Digital Multimeter	N/A	4/26/19

Test Personnel:

Daniel W. Baltzell		May 10, 2017
EMC Test Engineer	Signature	Date of Test

9 FCC §2.1047(a)(b): Modulation Characteristics; §74.463: Modulation Requirements; §80.213: Modulation Requirements; RSS-119 5.2: Types of Modulation

§80.213 Modulation requirements.

(a)(2) When phase or frequency modulation is used in the 156–162 MHz band, the peak modulation must be maintained between 75 and 100 percent. A frequency deviation of ±5 kHz is defined as 100 percent peak modulation.
(b) Radiotelephone transmitters using A3E, F3E and G3E emission must have a modulation limiter to prevent any modulation over 100 percent. This requirement does not apply to survival craft transmitters, to transmitters that do not require a license, or to transmitters whose output power does not exceed 3 watts.
(d) Ship and coast station transmitters operating in the 156–162 MHz and 216–220 MHz bands must be capable of proper operation with a frequency deviation that does not exceed ±5 kHz when using any emission authorized by §80.207.
(e) Coast station transmitters operating in the 156–162 MHz band must be equipped with an audio low-pass filter. The filter must be installed between the modulation limiter and the modulated radio frequency stage. At frequencies between 3 kHz and 20 kHz it must have an attenuation greater than at 1 kHz by at least 60log10(f/3) dB where ‘‘f’’ is the audio frequency in kilohertz. At frequencies above 20 kHz the attenuation must be at least 50 dB greater than at 1 kHz.

9.1 Test Procedures

9.1.1 Audio Frequency Response

ANSI C63.26 5.3.3

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz was set to produce 20% of the rated system deviation. This point is shown as the 0 dB reference level, noted DEVref. The audio signal generator was varied from 100 Hz to 5 kHz with the input level held constant. The deviation in kHz was recorded using a modulation analyzer as DEVfreq. The response in dB relative to 1 kHz was calculated as follows:

Audio Frequency Response = 20 LOG (DEVfreq/DEVref)

9.1.2 Audio Low Pass Filter Response

ANSI C63.26 5.3

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter circuit above 3000 Hz.

9.1.3 Modulation Limiting

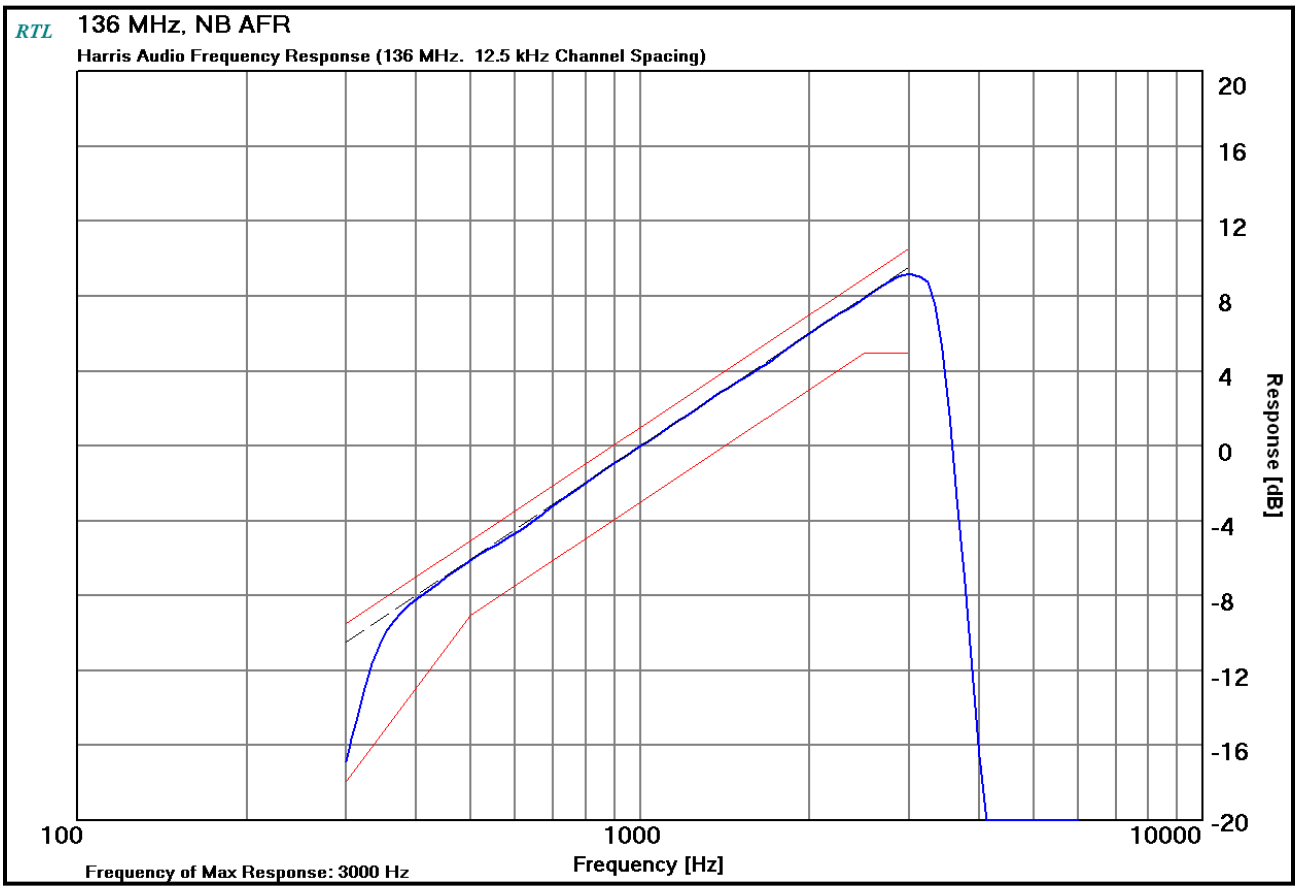
ANSI C63.26 5.3.2

The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level (0 dB) as a reference, the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500 Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

9.2 Test Data

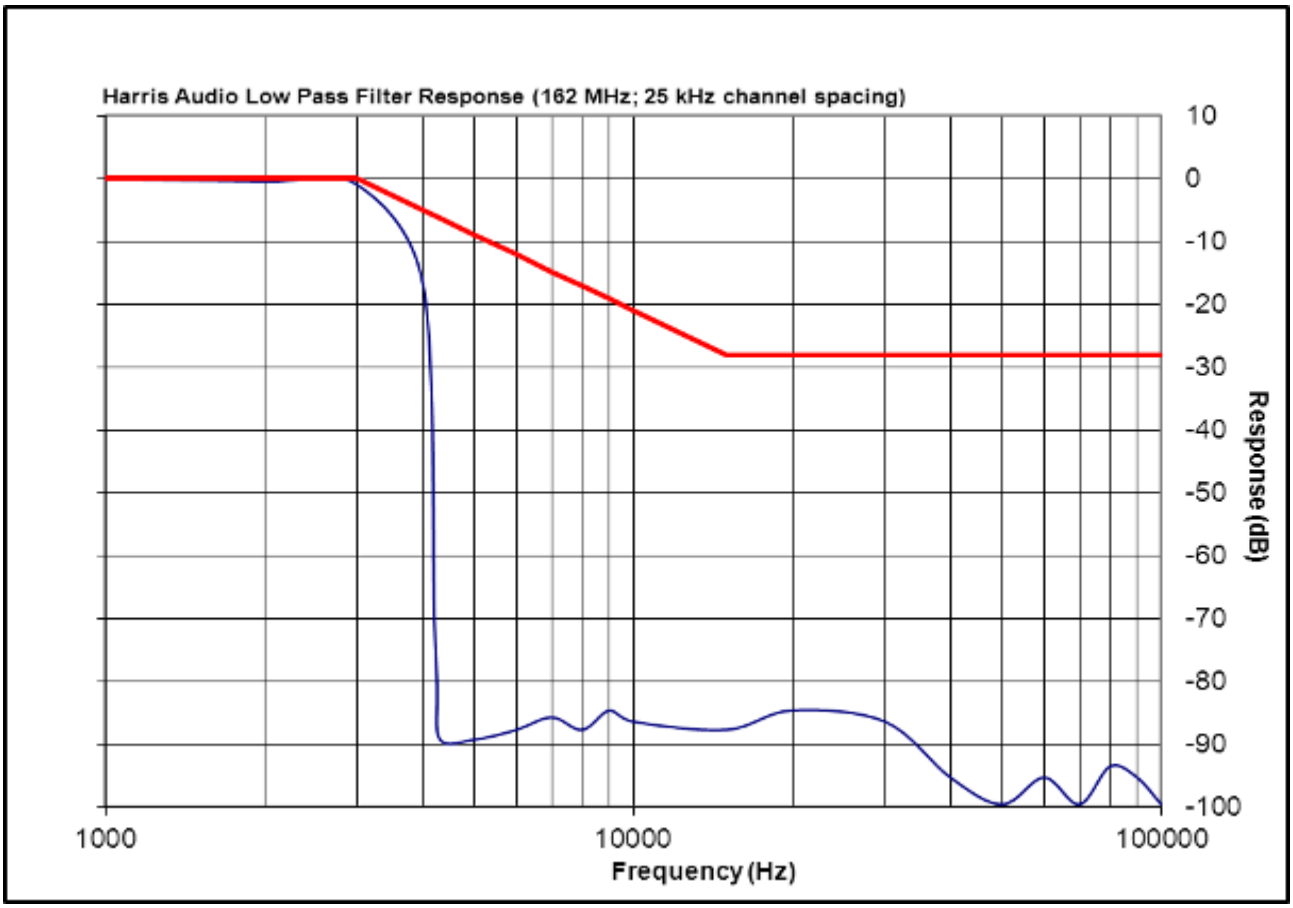
9.2.1 Audio Frequency Response

Plot 9-1: Modulation Characteristics - Audio Frequency Response - 136 MHz

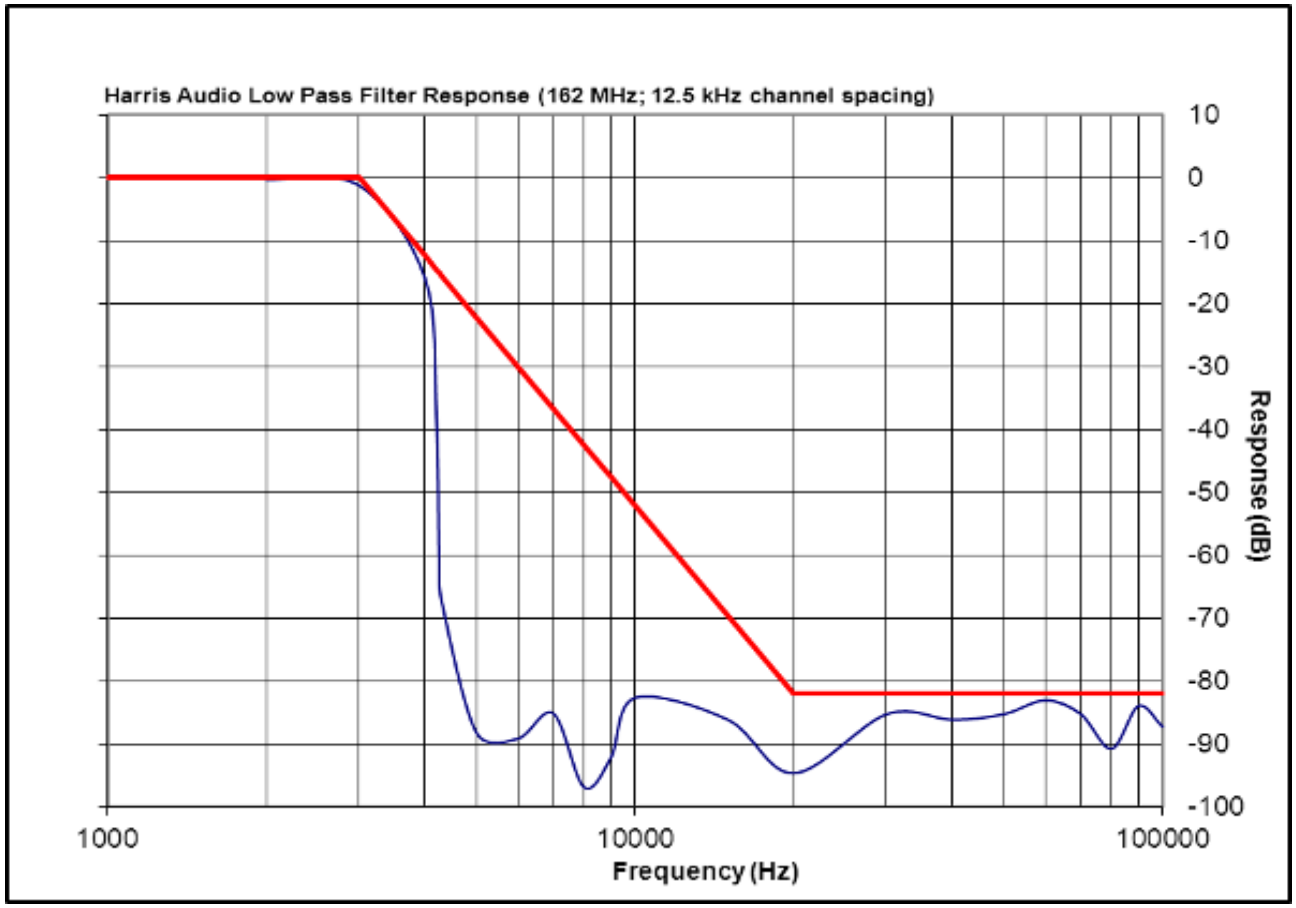


9.2.2 Audio Low Pass Filter Response

Plot 9-2: Modulation Characteristics – Audio Low Pass Filter - 162 MHz (WB)

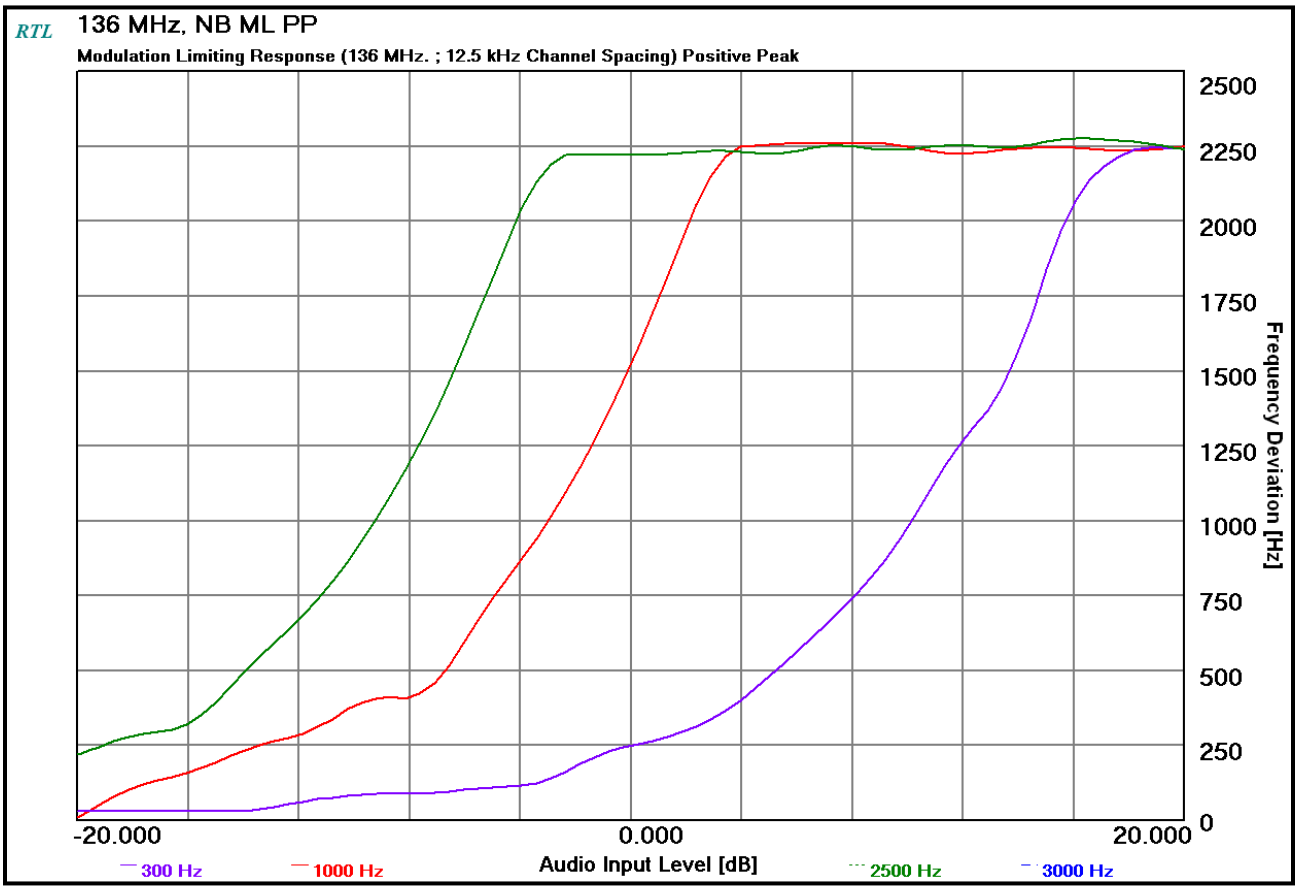


Plot 9-3: Modulation Characteristics – Audio Low Pass Filter - 162 MHz (NB)

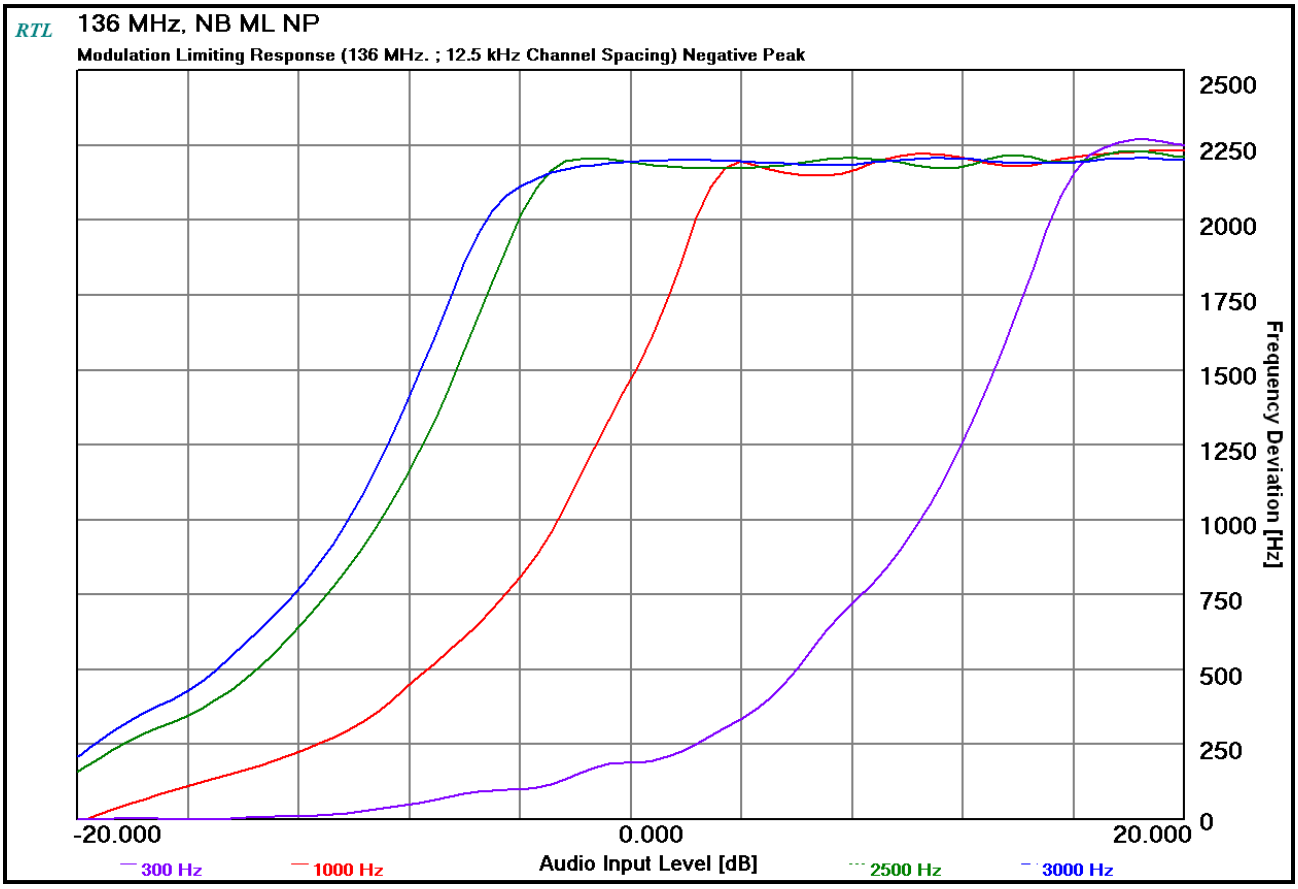


9.2.3 Modulation Limiting

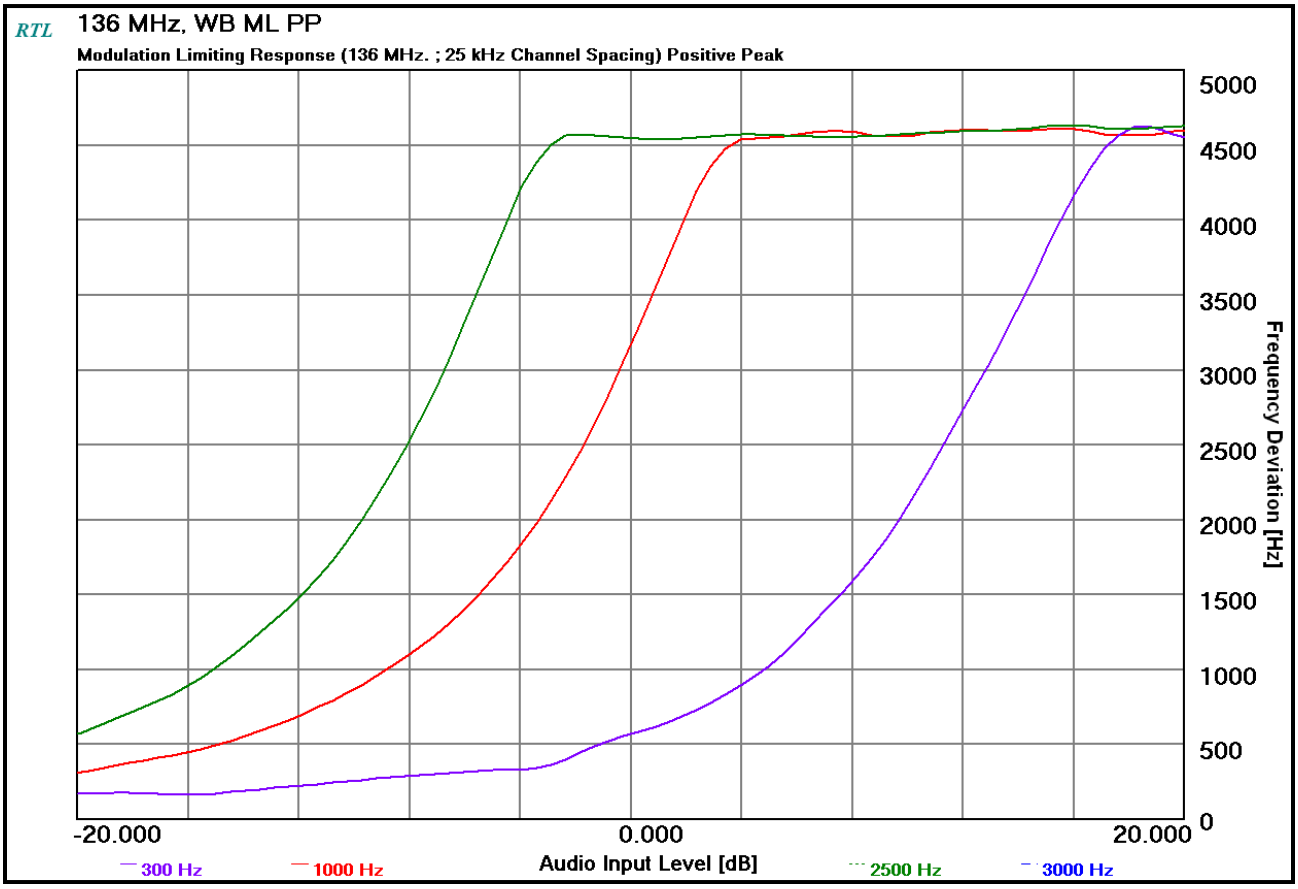
Plot 9-4: Modulation Characteristics – Modulation Limiting - 136 MHz; Positive Peak; NB



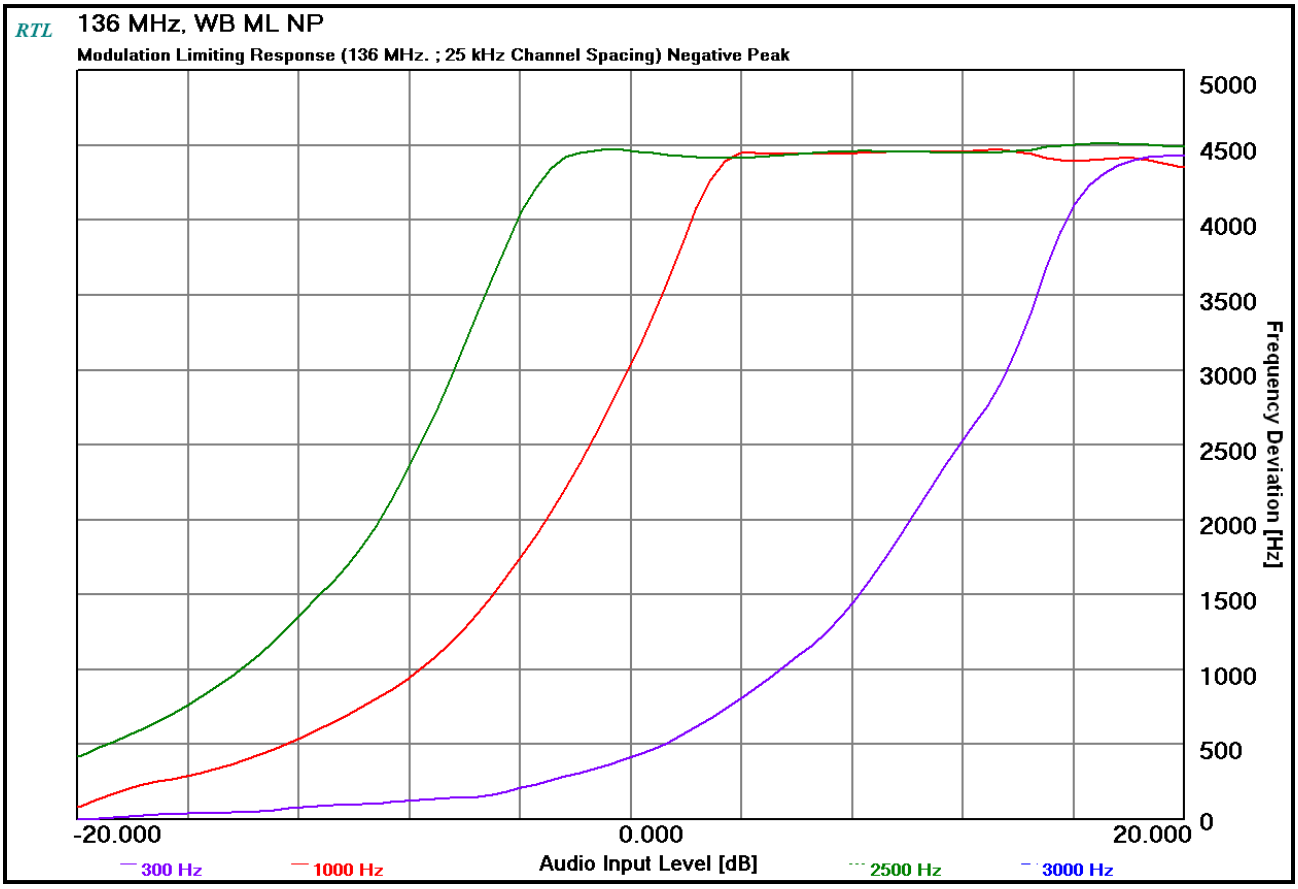
Plot 9-5: Modulation Characteristics – Modulation Limiting - 136 MHz; Negative Peak; NB



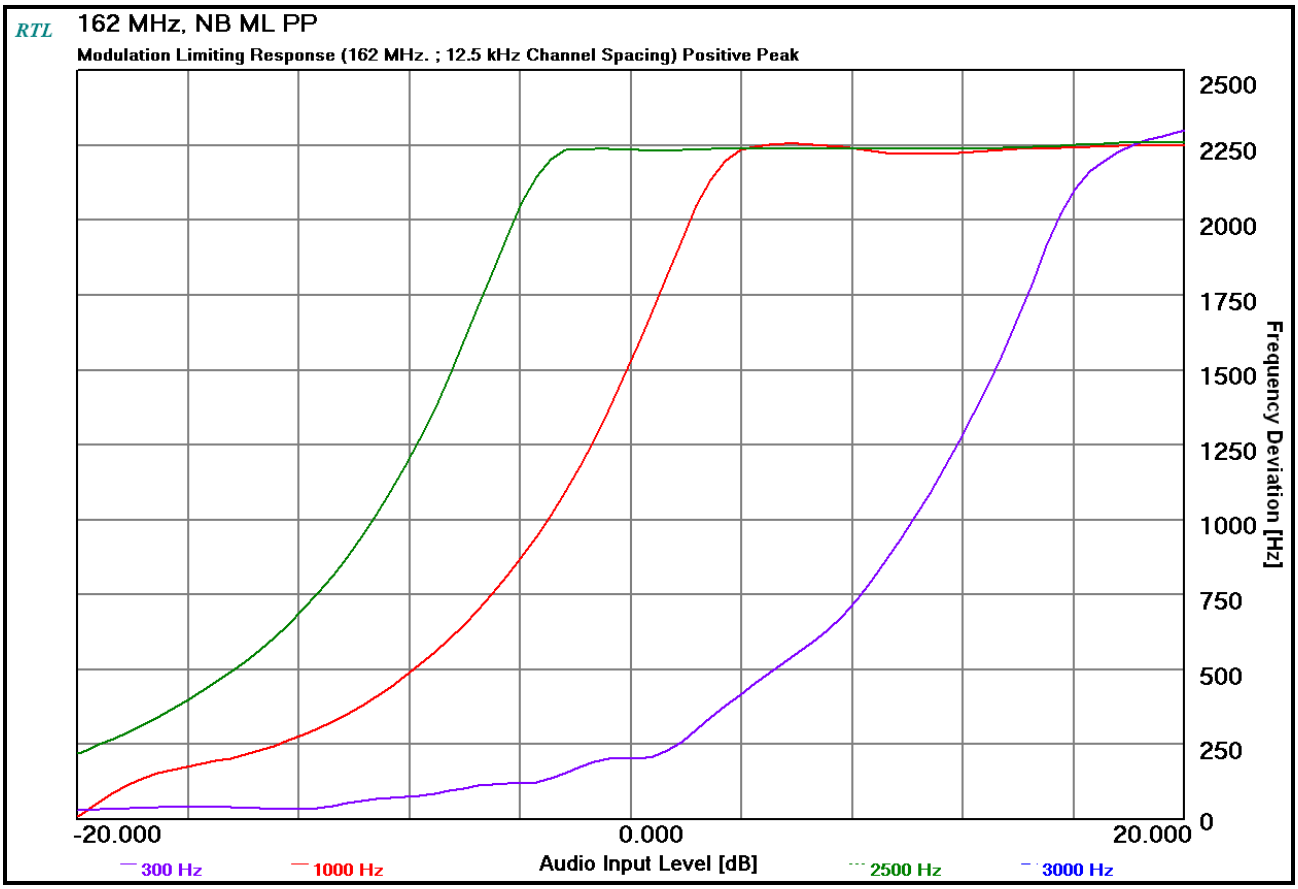
Plot 9-6: Modulation Characteristics – Modulation Limiting - 136 MHz; Positive Peak; WB



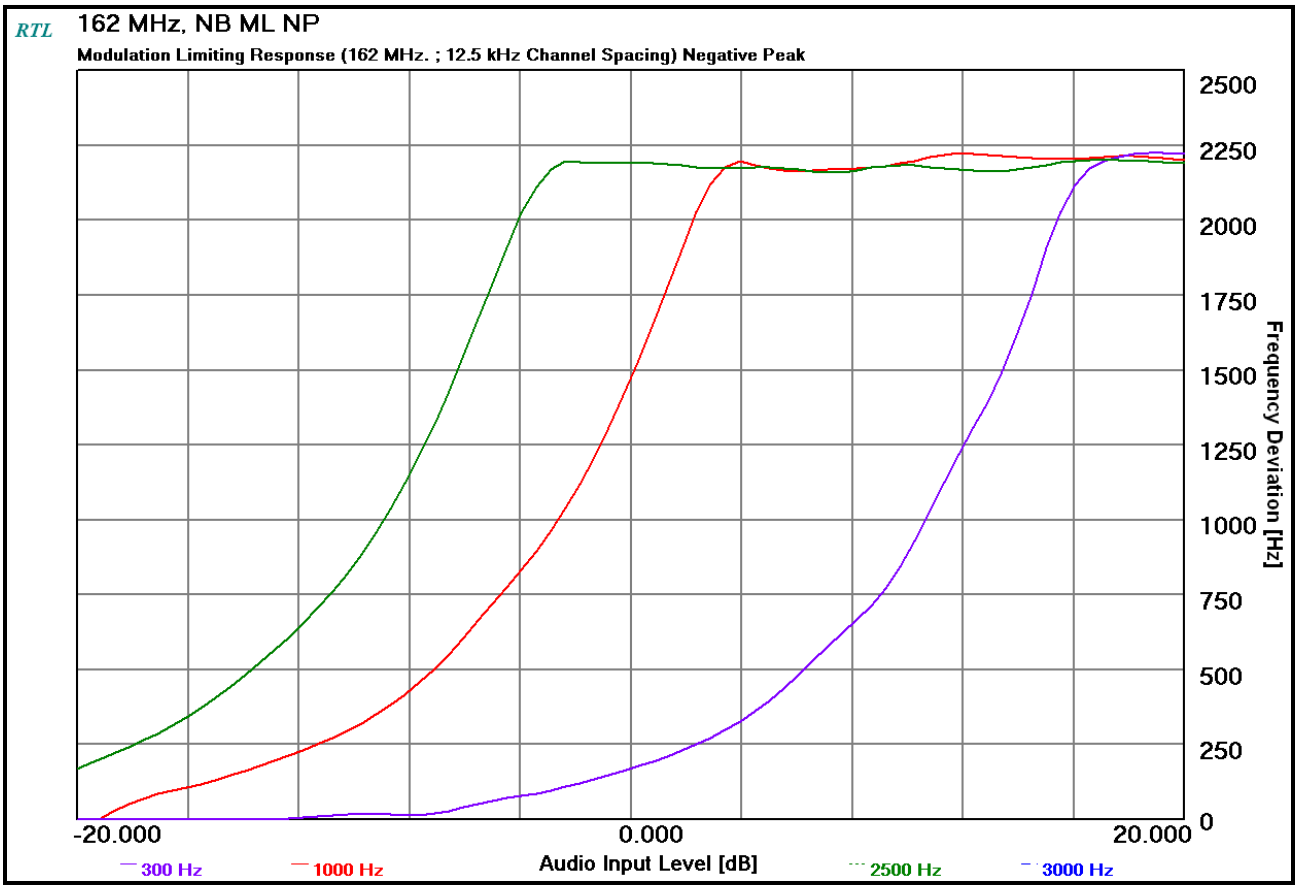
Plot 9-7: Modulation Characteristics – Modulation Limiting - 136 MHz; Negative Peak; WB



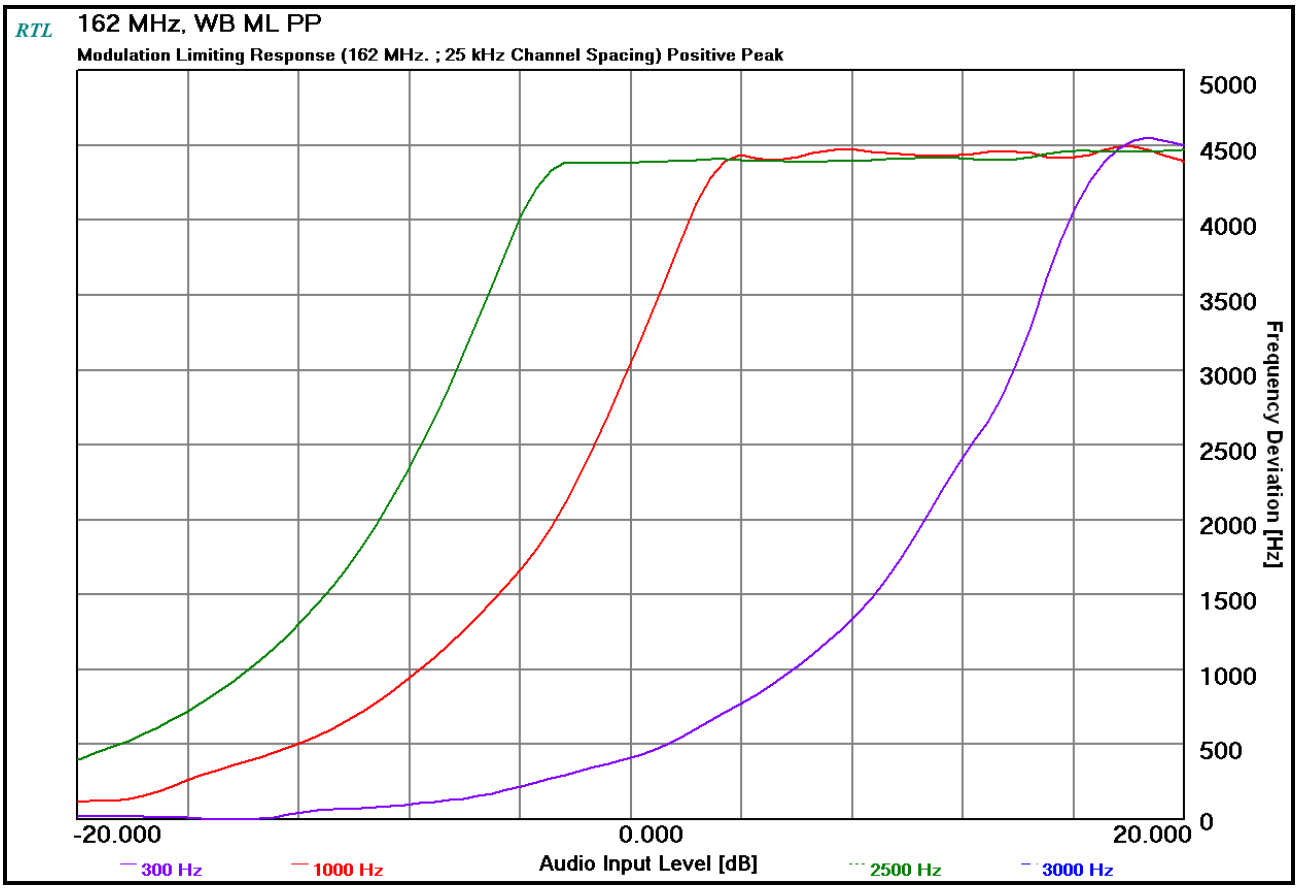
Plot 9-8: Modulation Characteristics – Modulation Limiting - 162 MHz; Positive Peak; NB



Plot 9-9: Modulation Characteristics – Modulation Limiting - 162 MHz; Negative Peak; NB



Plot 9-10: Modulation Characteristics – Modulation Limiting - 162 MHz; Positive Peak; WB



Plot 9-11: Modulation Characteristics – Modulation Limiting - 162 MHz; Negative Peak; WB

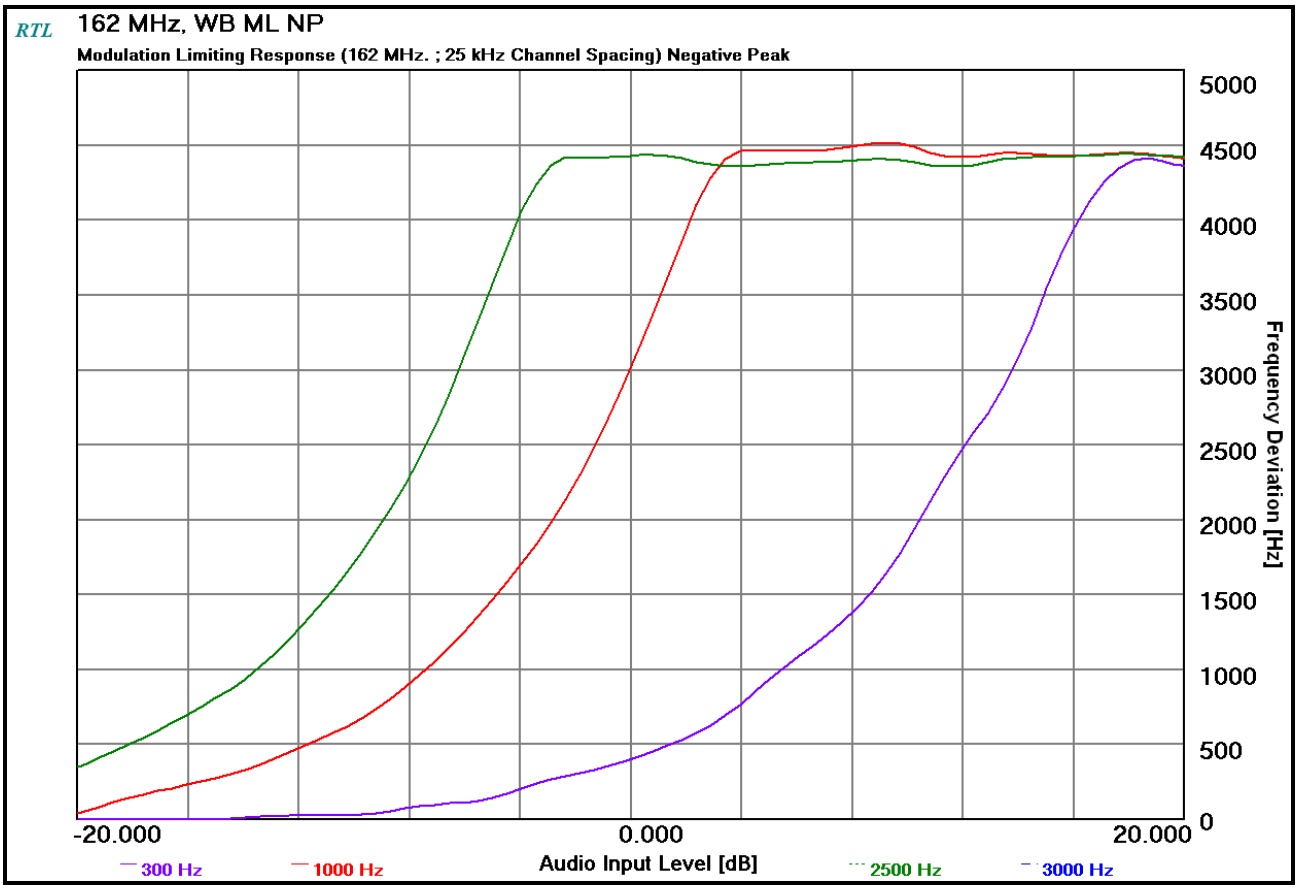


Table 9-1: Test Equipment Used For Modulation Requirements

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/ Level Generator	2514A02585	4/13/18
901118	Hewlett Packard	HP8901B	Modulation Analyzer 150 kHz-1300 MHz	N/A	4/14/18
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	3/22/18
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	9/1/18

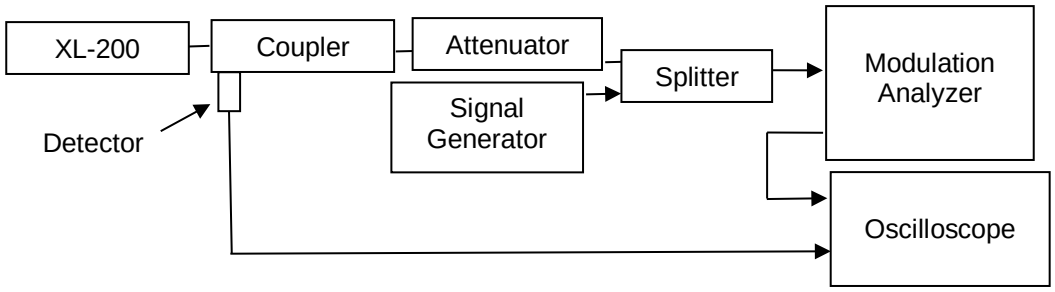
Test Personnel:

Daniel W. Baltzell	Daniel W. Baltzell	May 17-25, 2017
EMC Test Engineer	Signature	Dates of Tests

10 FCC §74.462(c): Authorized Bandwidth and Emissions; §90.214: Transient Frequency Response; RSS-119 5.9: Transient Frequency Behavior

10.1 Test Procedure

ANSI C63-26 6.5.2.2



§90.214 Transient Frequency Behavior

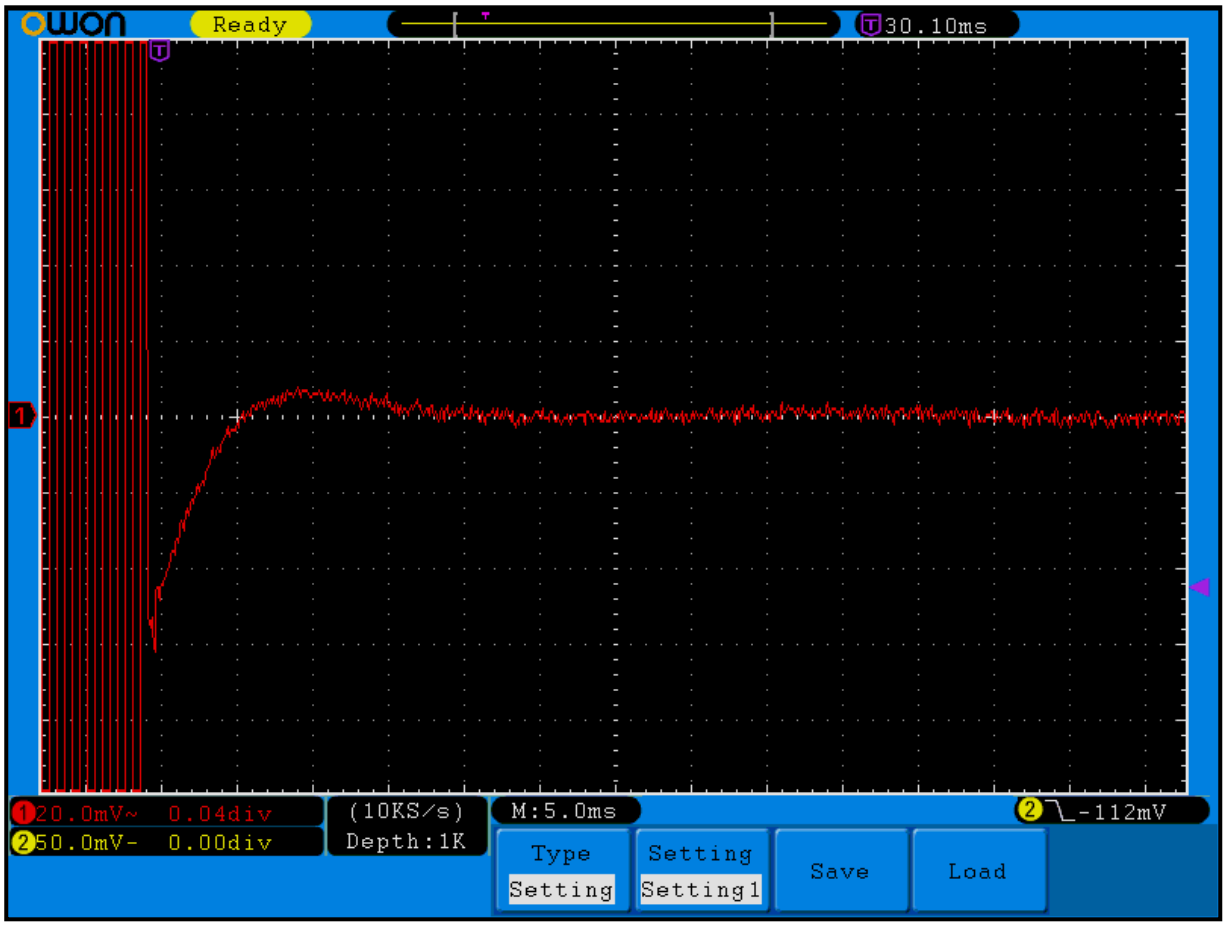
Transmitters designed to operate in the 150–174 MHz and 421–512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time intervals [1,2]	Maximum frequency difference [3]	All equipment	
		150 to 174 MHz	421 to 512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t_1 [4]	±25.0 kHz	5.0 ms	10.0 ms
t_2	±12.5 kHz	20.0 ms	25.0 ms
t_3 [4]	±25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t_1 [4]	±12.5 kHz	5.0 ms	10.0 ms
t_2	±6.25 kHz	20.0 ms	25.0 ms
t_3 [4]	±12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t_1 [4]	±6.25 kHz	5.0 ms	10.0 ms
t_2	±3.125 kHz	20.0 ms	25.0 ms
t_3 [4]	±6.25 kHz	5.0 ms	10.0 ms

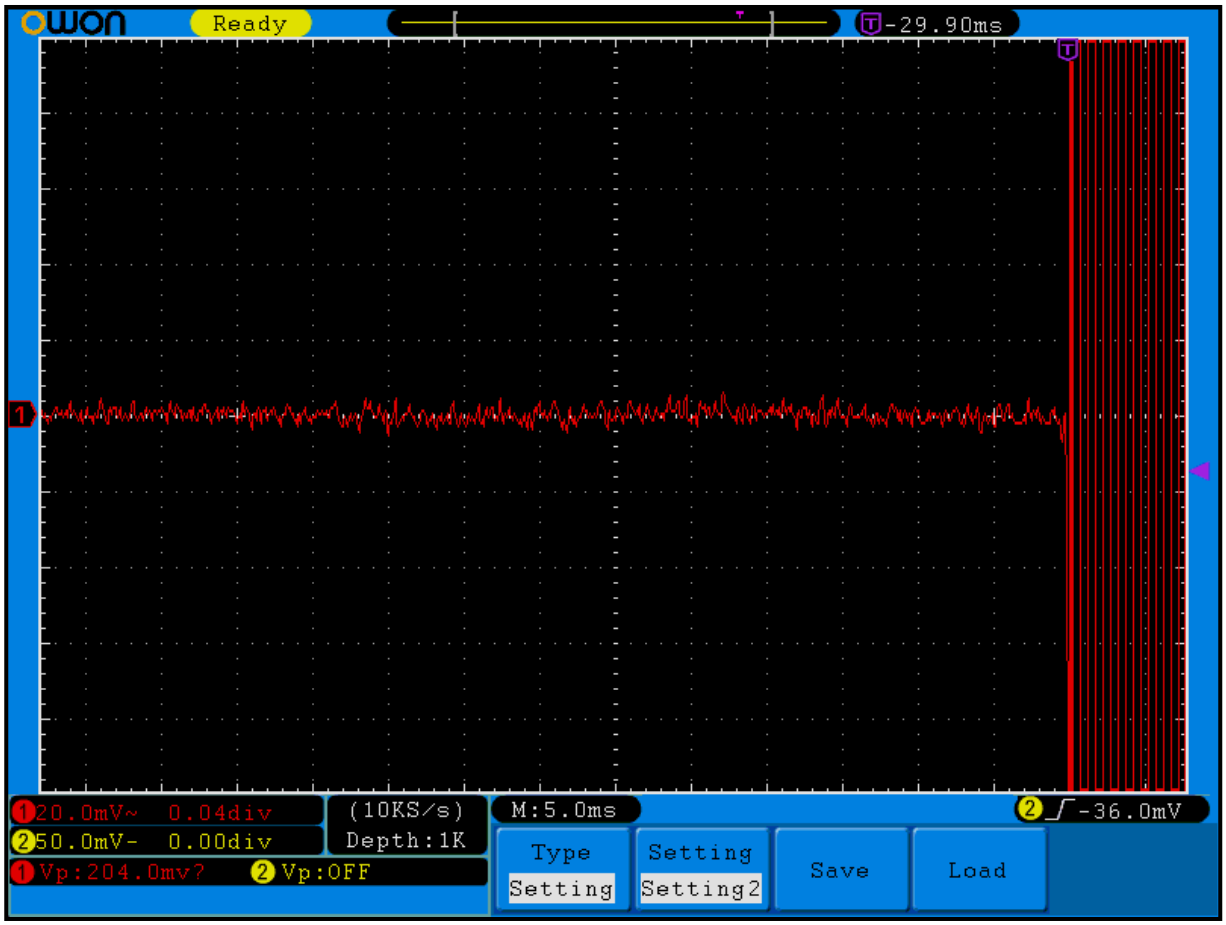
[1] t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.
t_1 is the time period immediately following t_{on}.
t_2 is the time period immediately following t_1.
t_3 is the time period from the instant when the transmitter is turned off until t_{off}.
t_{off} is the instant when the 1 kHz test signal starts to rise.
[2] During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in § 90.213.
[3] Difference between the actual transmitter frequency and the assigned transmitter frequency.
[4] If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

10.2 Test Data

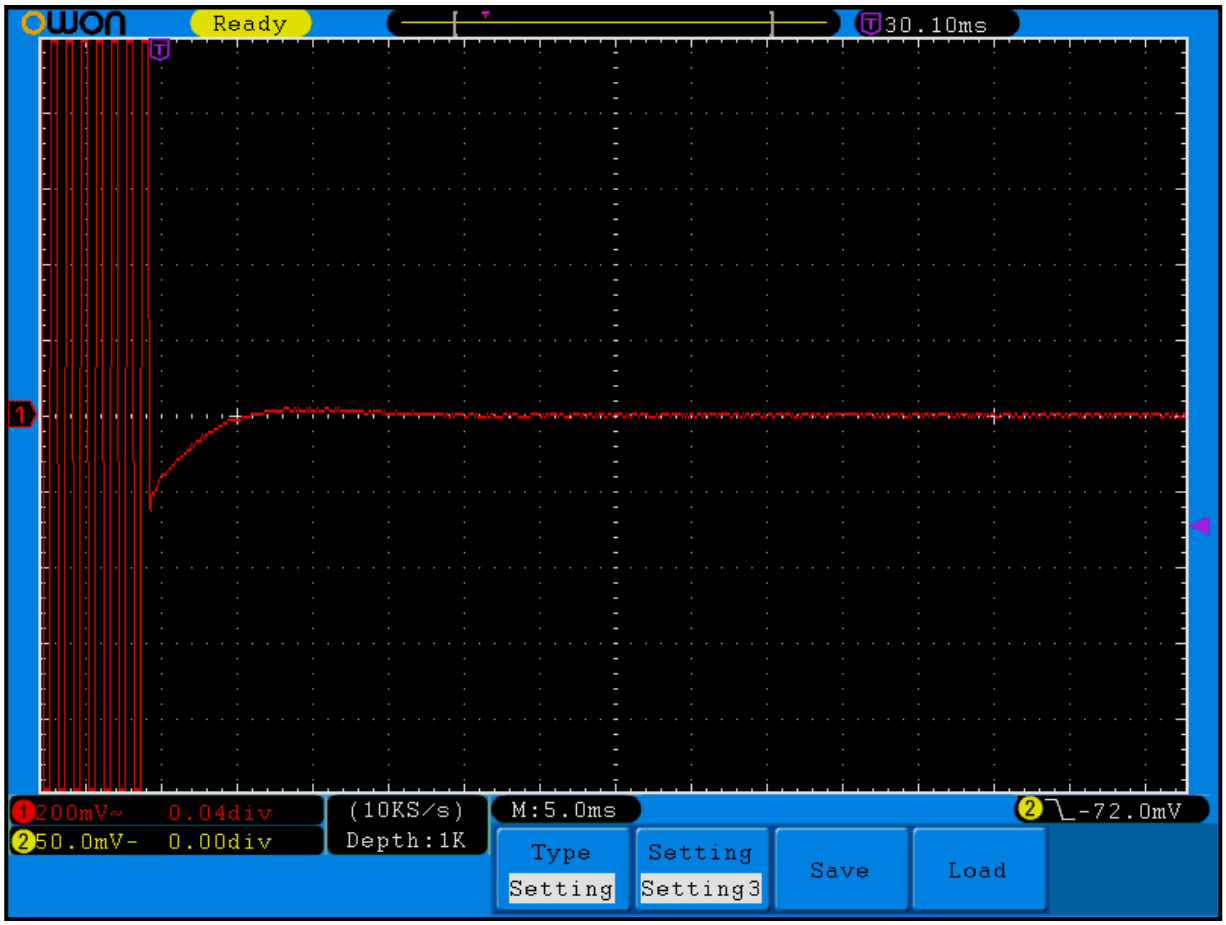
Plot 10-1: Transient Frequency Behavior – 150 MHz; High Power; Narrowband; Carrier ON Time



Plot 10-2: Transient Frequency Behavior – 162 MHz; High Power; Narrowband; Carrier OFF Time



Plot 10-3: Transient Frequency Behavior – 174 MHz; High Power; Wideband; Carrier ON Time



Plot 10-4: Transient Frequency Behavior – 174 MHz; High Power; Wideband; Carrier OFF Time

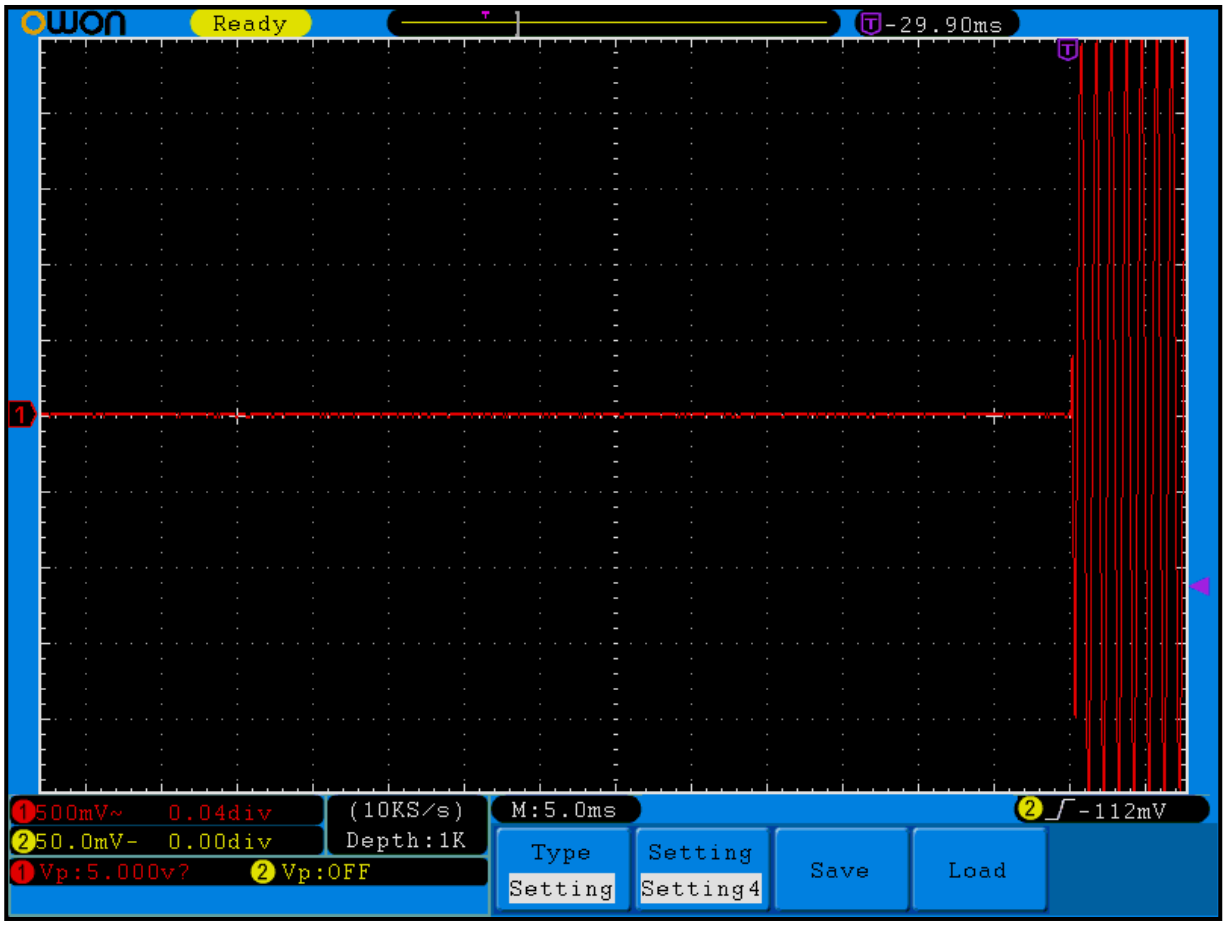


Table 10-1: Test Equipment Used For Testing Transient Frequency Behavior

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901582	Rohde & Schwarz	1167.0000.02	Signal Generator	101903	3/20/18
901118	Hewlett Packard	HP8901B	Modulation Analyzer 150 kHz-1300 MHz	N/A	4/14/18
901651	OWON	SmartDS7102V	Oscilloscope	SDS71021434850	10/20/17
901463	Werlatone Inc.	C1795	Directional Coupler, 100W, 40 dB, 1-1000 MHz	4067	9/30/17
901263	Agilent	.01-12 GHz	SMA Detector	2936A05505	Not Required
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	9/1/18
901511	Pasternack	PE 2003	Power Divider, 10 MHz - 1 GHz	NA	Not Required

Test Personnel:

Daniel W. Baltzell		May 17, 2017
Test Engineer	Signature	Date of Tests

11 FCC §2.202: Necessary Bandwidth and Emission Bandwidth

Type of Emissions: F3E, F1D, F1E

Voice – 25 kHz channel separation
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 5
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 16.0 kHz
Emission designator: 16K0F3E

Voice – 12.5 kHz channel separation
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 2.5
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 11.0 kHz
Emission designator: 11K0F3E

P25 – Phase 1 Data/Voice
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 1800
Bn = $[9600/\log_2(4) + 2 (1800) (1) = 8.400$ kHz
Emission designator: 8K40F1D/E

P25 Phase 2 Data/Voice (H-CPM TDMA)
Calculation:
Data rate in bps (R) =12000
Peak deviation of carrier (D) = 1050
Bn = $[12000/\log_2(4) + 2 (1050) (1) = 8.1$ kHz
Emission designator: 8K10DXW

(2-level FSK 4800; XNB) EDACS
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 4.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 14.0 kHz
Emission designator: 7K10F1D/E

(2-level FSK 9600; NB) EDACS
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 4.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 14.0 kHz
Emission designator: 11K7F1D/E

(2-level FSK 9600; WB) EDACS
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 4.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 14.0 kHz
Emission designator: 16K0F1D/E

12 Conclusion

The data in this measurement report shows that the **Harris Corporation** Model **XL-185P, FCC ID: OWDTR-0153-E, IC: 3636B-0153,** complies with the applicable requirements of FCC Parts 2, 22, 74, 80, and 90 and IC RSS-119.