TIMCO ENGINEERING, Inc.

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FCC PT. 90 TEST REPORT
220 – 222 MHz Band Amplifier

APPLICANT	CRESCEND TECHNOLOGIES, LLC
ADDRESS	140 E. State Parkway SCHAUMBURG IL 60173 USA
FCC ID	CWWP10XXFA4
MODEL NUMBER	P10-1FA4-C5-001
PRODUCT DESCRIPTION	POWER AMPLIFIER
DATE SAMPLE RECEIVED	2/22/2018
DATE TESTED	3/16/2018
TESTED BY	Franklin Rose
APPROVED BY	Tim Royer
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Version Number	Description	Issue Date
280AUT18TestReport	Rev1	Initial Issue	03/16/2018
280AUT18TestReport	Rev2	Update Power Output data	07/10/2018
280AUT18TestReport	Rev3	Updated Calibration Date	07/18/2018

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:
☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.
☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669
Tested by:

Tested By: Franklin Rose, Project Manager/EMC Test Technician

Date: 03/16/2018

Reviewed by: Tim Royer

Date: 3/19/2018

GENERAL INFORMATION

EUT Specification

EUT Description	POWER AMPLIFIER
FCC ID:	CWWP10XXFA4
Model Number	P10-1FA4-C5-001
Operating Frequency	220 – 222 MHz
Test Frequencies	220.025, 220.82, 220.8225, 220.825, 221.975 MHz
Rated Antenna Gain	-13 dBi
Type of Emission	4K00F1E, 11K3F3E, 16K0F3E, 8K10F1E, 7K60FXE, 8K01F1D, 8K01F1W, 5K76G1E, 9K78D1W, 10K1D7W
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power 48V
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable
Test Conditions	Temperature: 24-26ºC Relative Humidity: 50 - 65%. Barometer 1010.2mb
Modification to the EUT	None
Applicable Standards	FCC CFR 47 Part 90.219, FCC Part 2, KDB 935210 DO 02 v03 02, DO5 v01r01, ANSI/TIA 603-E:2016
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070

Notes:

TEST RESULTS SUMMARY

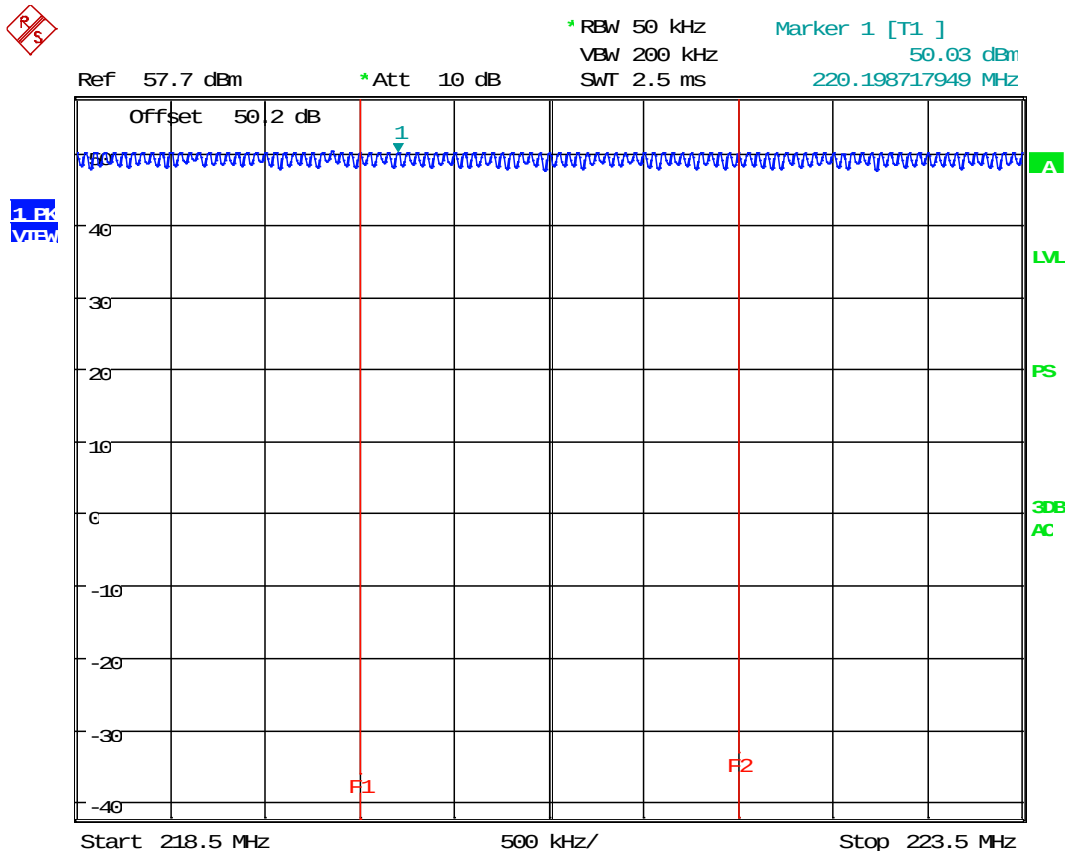
FCC RULE PART	REQUIREMENT	TEST DESCRIPTION	RESULT
KDB 935210-D05 v01r01 §4.3	Reporting Only	Out-Of-band rejection	**CLASS B**
90.219(e)(1) AND KDB 935210-D05 v01r01 §4.5	Reporting Only	Input/output power	**PASS**
KDB 935210-D05 v01r01 §4.2	Reporting Only	AGC Threshold	**PASS**
90.219(e)(3) AND KDB 935210-D05 v01r01 §4.7.2	-13 dBm	Out-of-band/out-of-block Intermodulation	**NOT REQUIRED**
90.219(e)(2) AND KDB 935210-D05 v01r01 §4.6	9 dB	Noise Figure	**PASS**
90.219(e)(3) AND KDB 935210-D05 v01r01 §4.7.3	-13 dBm	Spurious Emissions Conducted	**PASS**
90.219(e)(4) AND KDB 935210-D05 v01r01 §4.4	Reporting Only	Input-versus-output signal comparison	**PASS**
90.219(e)(3) AND KDB 935210-D05 v01r01 §4.9	-13 dBm	Spurious emissions radiated	**PASS**
90.213 AND KDB 935210-D05 v01r01 §4.8	N/A	Frequency Stability	**NOT REQUIRED**

OUT-OF-BAND REJECTION

Rule Part No.: KDB 935210 §4.3 Out of band rejection

Requirements: Reporting Only

Test Data: Amplifier Passband



Date: 2.MAR.2018 17:05:59

Operating Range: 220 MHz to 222 MHz = 2 MHz Passband

(Not authorized for transmission outside authorized band; for use solely with 220 – 222 FCC Part 90 certified devices using a conducted input).

RESULT: CLASS B EQUIPMENT

INPUT OUTPUT POWER

Applicable Rule Part: **90.219(d)(3), 90.729(a), KDB 935210-D05 v01r01 §4.5**

Requirements:

90.219(d)(3) The output power capability of a signal booster must be designed for deployments providing a radiated power not exceeding 5 Watts ERP for each retransmitted channel.

90.729(a) The permissible effective radiated power (ERP) with respect to antenna heights for land mobile, paging, or fixed stations transmitting on frequencies in the 220-221 MHz band shall be determined from the following Table. These are maximum values and applicants are required to justify power levels requested.

ERP VS. ANTENNA HEIGHT TABLE[2]

Antenna height above average terrain (HAAT), meters	Effective radiated power, watts[1]
Up to 150	500
150 to 225	250
225 to 300	125
300 to 450	60
450 to 600	30
600 to 750	20
750 to 900	15
900 to 1050	10
Above 1050	5

[1]Transmitter PEP shall be used to determine ERP.

[2]These power levels apply to stations used for land mobile, paging, and fixed operations.

The stricter of the ERP limit of 90.219(d)(3) and 90.729(a) = **5.0 W**

Input Freq. (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (W)	ERP Limit of 90.219 (W)	Ant. Gain (dBi)	ERP (dBm)	ERP (W)	Final Gain (dB)
220.025	30.04	49.97	99.31	5.00	-13.00	36.97	5.0	6.9
221.975	30.04	50.03	100.69	5.00	-13.00	37.03	5.0	7.0
220.025	36.00	49.93	98.40	5.00	-13.00	36.93	4.9	0.9
221.975	36.00	49.99	99.77	5.00	-13.00	36.99	5.0	1.0

RESULT: MEETS REQUIREMENTS

AGC THRESHOLD

Rule Part No.: KDB935210 § 4.2

Requirements: Reporting only, used to determine test input levels

Procedure: KDB935210 Measurement Guidance for Industrial Boosters
§ 4.2 Measuring AGC threshold

Test Data: Downlink Output 1 Measurement Table

Gen Freq (MHz)	Gen Output (dBm)	Test Signal Amplifier Output(dBm)	Insertion Loss (dB)	Booster Input (dBm)	Booster Output (dBm)
221.00	-12.00	28.05	0.3	28.4	0.00
221.00	-11.00	29.05	0.3	29.4	0.00
221.00	-10.00	30.04	0.3	30.3	50.03
221.00	-9.00	31.04	0.3	31.3	50.03
221.00	-8.00	32.00	0.3	32.3	50.02
221.00	-7.00	33.96	0.3	34.3	50.03

NOTE: Yellow denotes amplifier “turn-on” level; Green denotes +3 dBm above “turn-on” level.

RESULT: Device does not employ AGC

INTERMODULATION PRODUCTS

Applicable Rule Part: **90.219(e)(3), KDB 935210-D05 v01r01 §4.7.2**

Requirements: Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth.

KDB 935210-D05 v01r01 §4.7.1

NOTE—Intermodulation-product spurious emission measurements are not required for single-channel boosters that cannot accommodate two simultaneous signals within the passband.

Findings: This EUT is only capable of passing one signal at a time; Intermodulation products require two input signals and were unable to be tested.

Conclusion: The EUT does not experience intermodulation since it:

a) is meant for permanent connection to the antenna port of one (1) FCC Part 90 transmitter, and;
b) only receives and is only capable of receiving one signal at a time.

RESULT: N/A

NOISE FIGURE

Applicable Rule Part: **90.219(e)(2), KDB 935210-D05 v01r01 §4.6**

Requirements: The noise figure of a signal booster must not exceed 9 dB in either direction.

KDB 935210-D05 v01r01 §4.6

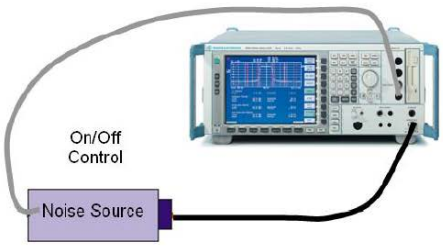
Section 90.219(e)(2) limits the noise figure of a signal booster to ≤ 9 dB in either direction. The following discussion provides guidance for demonstrating compliance with this requirement.

Several widely recognized methods for performing noise figure measurements are available. Some require the use of specialized equipment, such as a noise figure analyzer and/or an excess noise ratio (ENR) calibrated noise source, while others involve the use of conventional measurement instrumentation such as a spectrum analyzer. Methods that require use of a noise figure analyzer are generally accepted as producing the most accurate results, and are considered to be the reference method within this document, while others are considered to be acceptable alternative methods. Consult the relevant instrumentation application notes for detailed guidance regarding the selection and application of an appropriate methodology for performing noise figure measurements. Note also that noise figure measurements require that any AGC circuitry be disabled over the duration of the measurement.

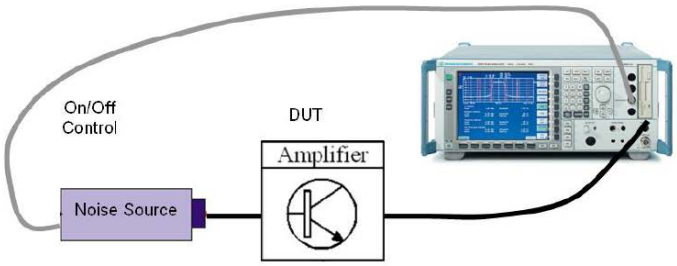
Procedure: 1MA178_2e R&S Application Note the Y Factor Technique Noise Figure
§2 Background Theory and Equations
§3 Detailed Measurement Steps

Setup Diagram:

Calibration



Measurement



NOISE FIGURE §6.4

Test Data: Downlink Measurement Table

Fc (MHz)	Source ENR (dB)	$T^{ON\ source}$ (K)	$T^{OFF\ source}$ (K)
221	15.15	9782.880151	290

Step 1 Calibration of Noise Source with ESU 40

$N^{SA\ off}$		$N^{SA\ on}$		Y^{SA}	T^{SA}	NF^{SA}
dBm	fW	dBm	fW	Linear	Analyzer	dB
-115.19	3.03	-106.93	20.28	6.70	1375.75	7.59

Step 2 Noise Measurement with EUT

$N^{EUT\ \&\ SA\ off}$		$N^{EUT\ \&\ SA\ on}$		$Y^{EUT\ \&\ SA}$	$T^{EUT\ \&\ SA}$	NF
dBm	fW	dBm	fW	Linear	Cascade	dB
-115.93	2.55	-115.15	3.05	1.20	47960.76	22.21

Step 3 Noise Figure Calcualtion for EUT

Gain	Gain	T^{EUT}
Num	dB	EUT
0.029114337	-15.36	707.24

NF	Limit	Margin
dB	≤ dB	dB
5.36	9.00	3.64

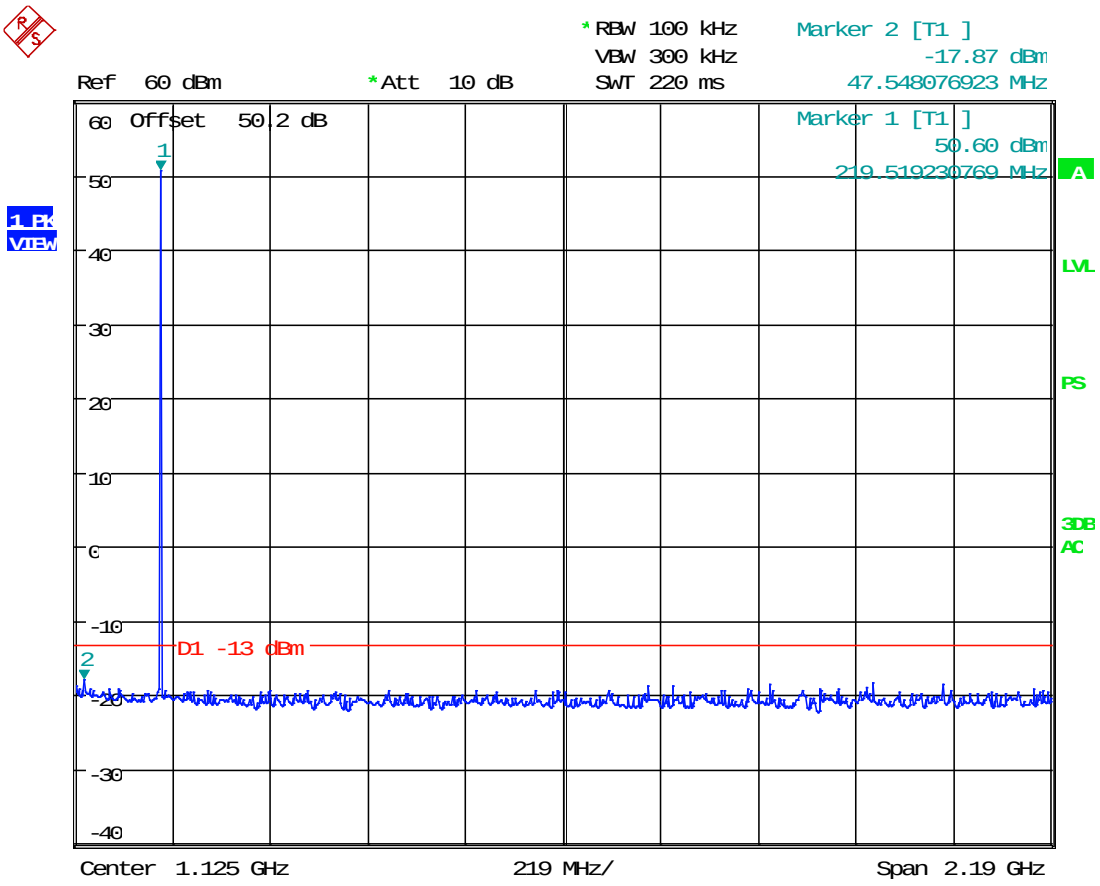
RESULT: MEETS REQUIREMENTS

CONDUCTED SPURIOUS EMISSIONS

Applicable Rule Part: **90.219(e)(3), KDB 935210-D05 v01r01 §4.7.3**

Requirements: Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth.

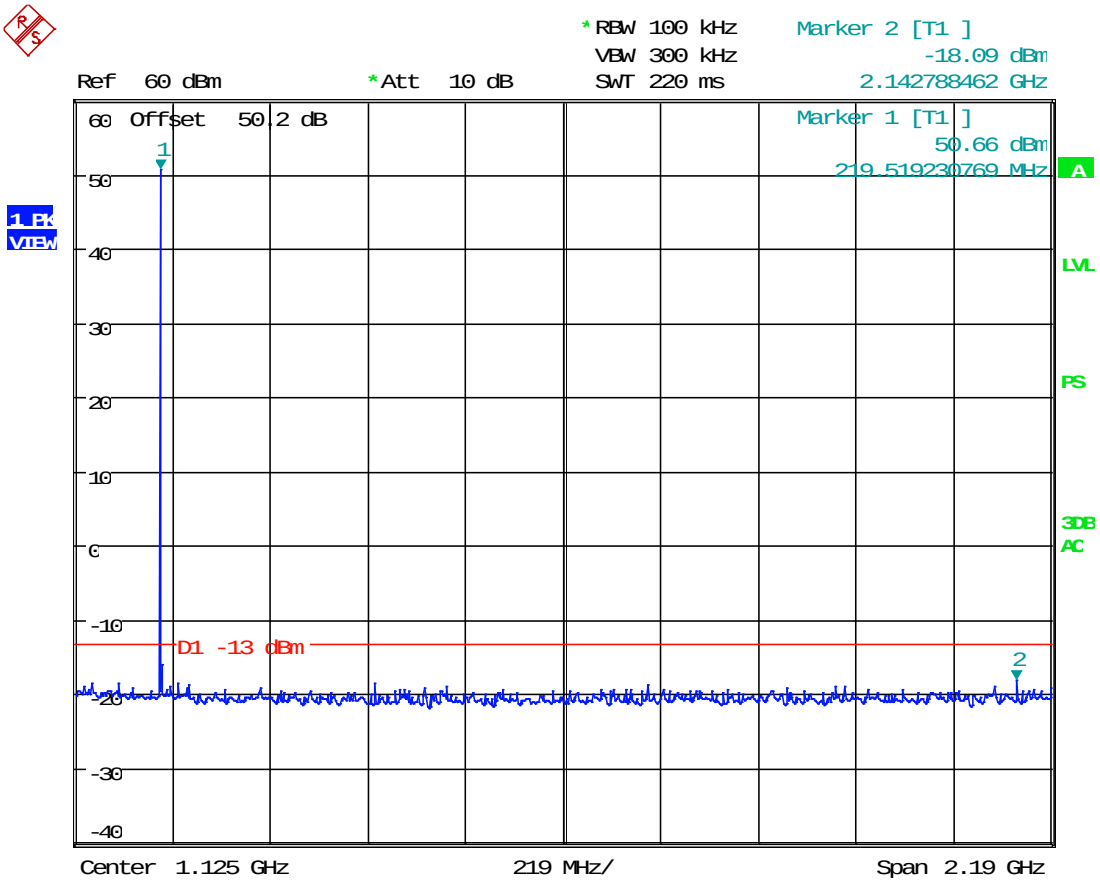
Test Data: **220.025 MHz Channel**



Date: 5.MAR.2018 12:09:19

SPURIOUS EMISSIONS §6.5

Test Data: 221.975 MHz Channel



Date: 5.MAR.2018 12:08:02

RESULT: MEETS REQUIREMENTS

INPUT VS OUTPUT SIGNAL COMPARISON

Applicable Rule Part: 90.219(e)(4), KDB 935210-D05 v01r01 §4.4

Requirements: A signal booster must be designed such that all signals that it retransmits meet the following requirements:

The signals are retransmitted on the same channels as received. Minor departures from the exact provider or reference frequencies of the input signals are allowed, provided that the retransmitted signals meet the requirements of §90.213.

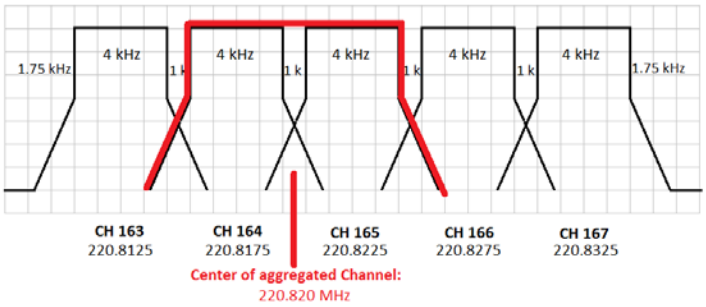
There is no change in the occupied bandwidth of the retransmitted signals.

The retransmitted signals continue to meet the unwanted emissions limits of §90.210 applicable to the corresponding received signals (assuming that these received signals meet the applicable unwanted emissions limits by a reasonable margin).

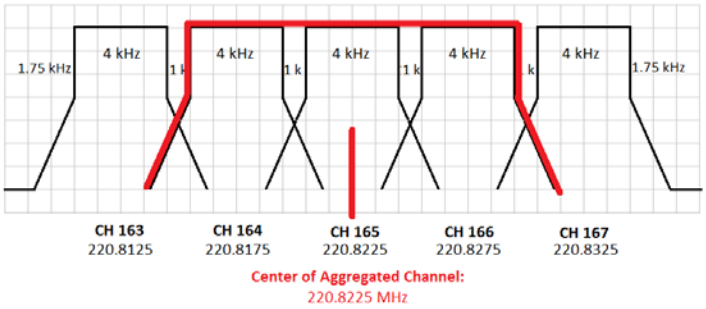
INPUT VS OUTPUT SIGNAL COMPARISON

The Aggregated Channels used with Emission Mask F in this test report are as follows. These are not indicative of the equipment under test. The EUT is capable of reproducing the input signal in any desired bandwidth within 220 – 222 MHz.

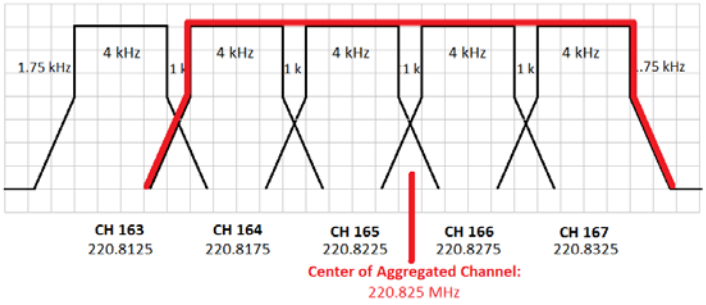
2 Aggregate Channel Emission Mask: "Mask_F2"



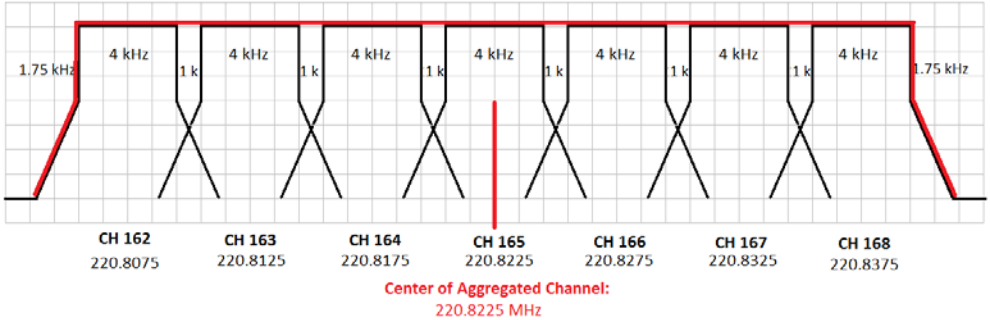
3 Aggregate Channel Emission Mask: "Mask_F3"



4 Aggregate Channel Emission Mask: "Mask_F4"

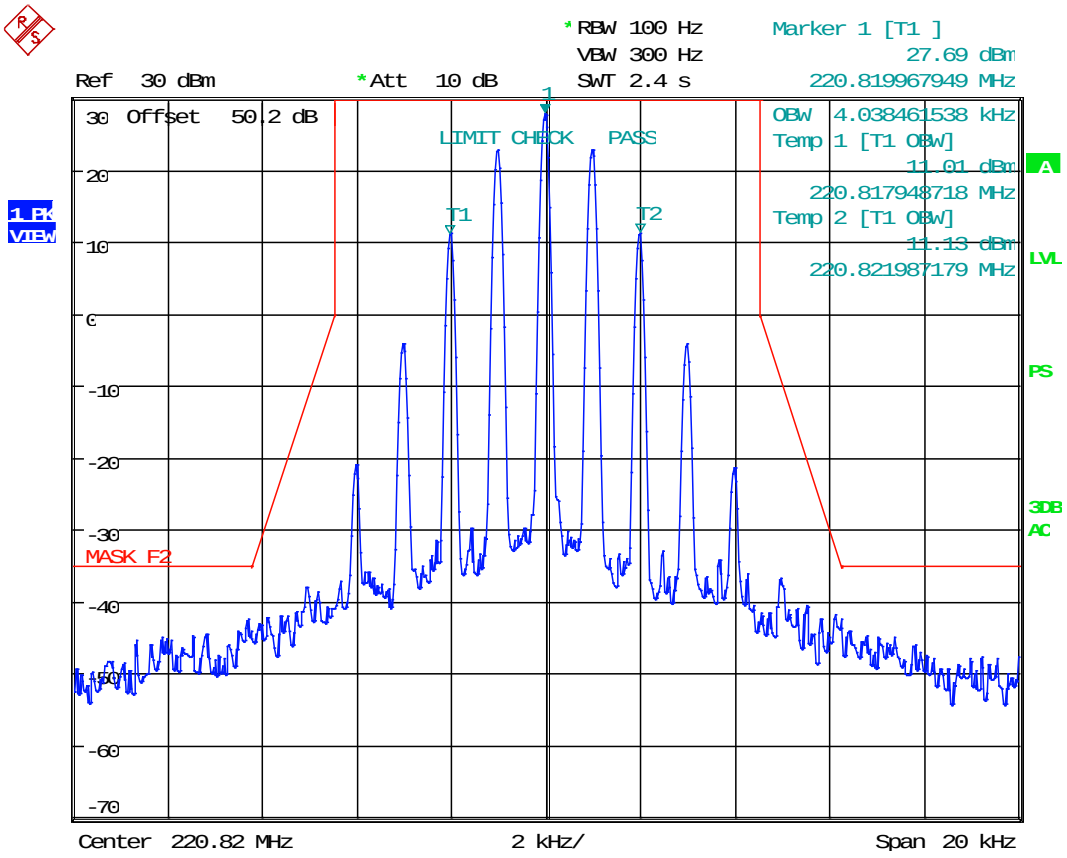


7 Aggregate Channel Emission Mask: "Mask_F7"



INPUT VS OUTPUT SIGNAL COMPARISON

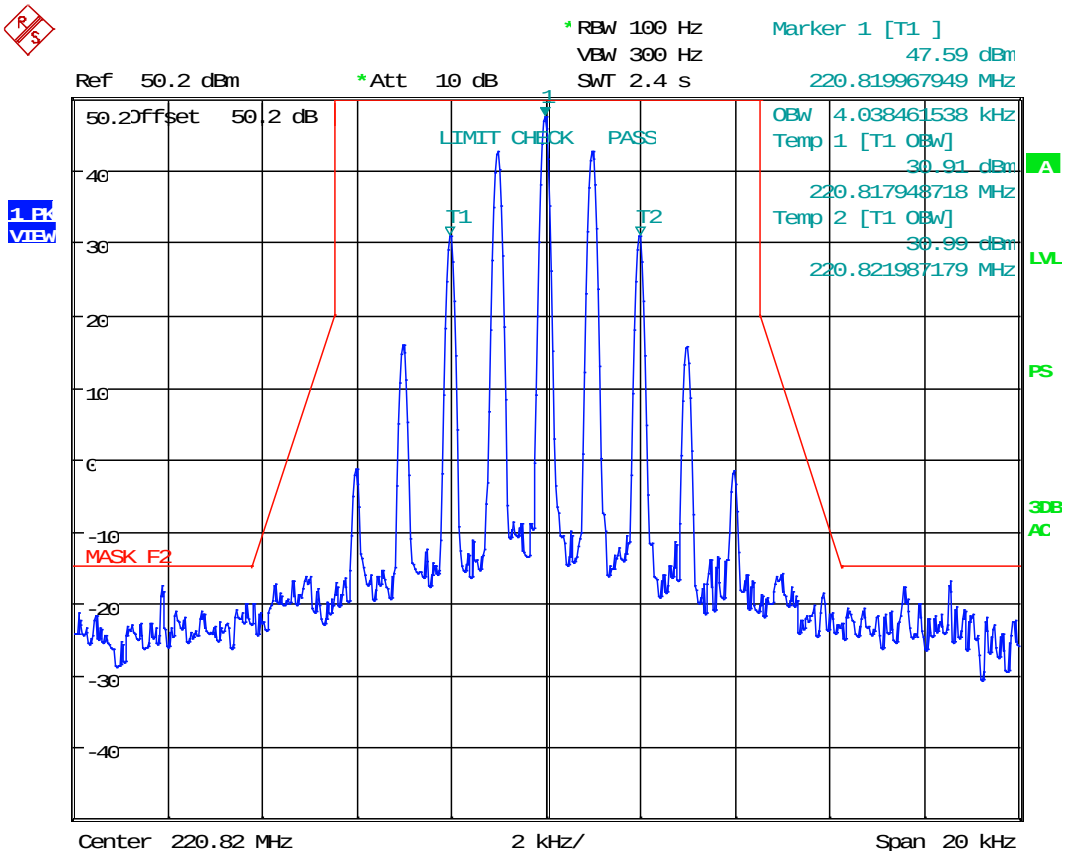
Test Data: 4K00F1E (NXDN Voice) Test Signal



Date: 16.MAR.2018 15:07:25

INPUT VS OUTPUT SIGNAL COMPARISON

Test Data: 4K00F1E (NXDN Voice) Output Signal

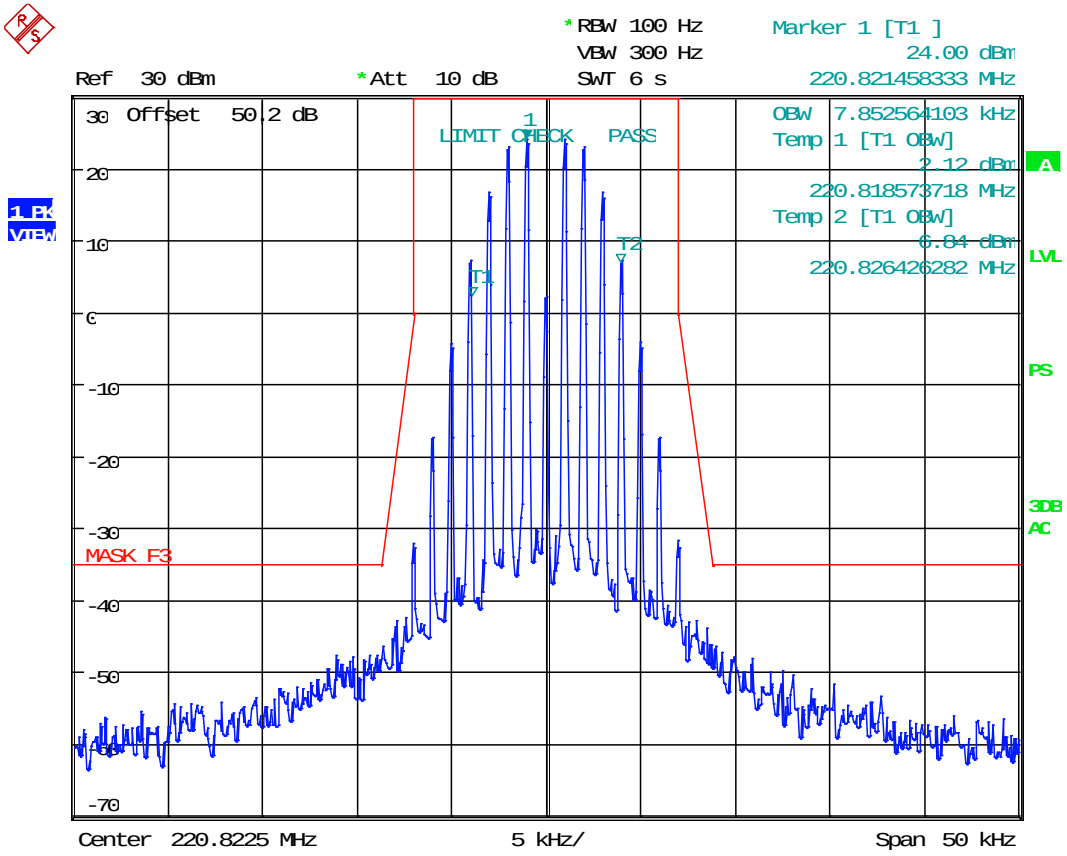


Date: 6.MAR.2018 14:05:57

99% OBW of 4K00F1E Signal: 4.04 kHz

INPUT VS OUTPUT SIGNAL COMPARISON

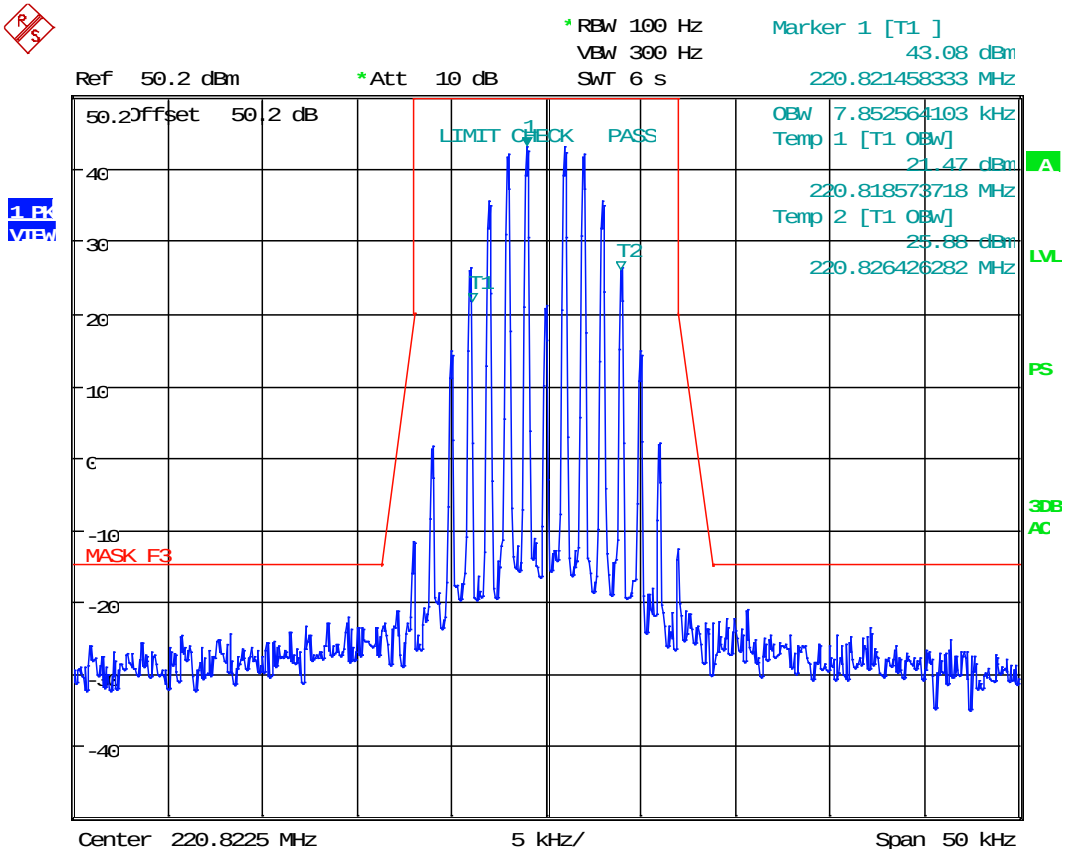
Test Data: 11K3F3E (12.5 kHz FM Voice), 5K76G1E (P25 PI CQPSK Voice), 8K10F1E (P25 PI C4FM Voice), 7K60FXE (2-SLOT DMR TDMA Voice) Test Signal



Date: 16.MAR.2018 15:05:21

INPUT VS OUTPUT SIGNAL COMPARISON

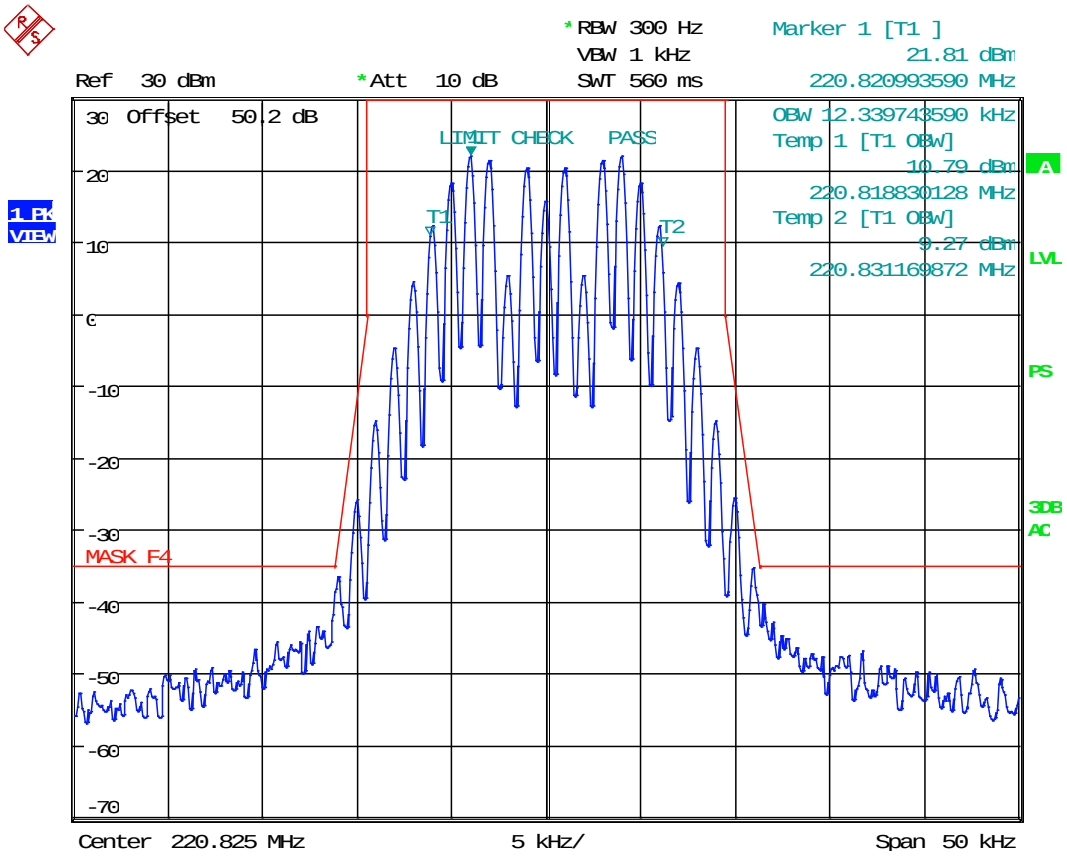
Test Data: 11K3F3E (12.5 kHz FM Voice), 5K76G1E (P25 PI CQPSK Voice), 8K10F1E (P25 PI C4FM Voice), 7K60FXE (2-SLOT DMR TDMA Voice) Output Signal



99% OBW of 11K3F3E/5K76G1E/8K10F1E/7K60FXE Signal: 7.85 kHz

INPUT VS OUTPUT SIGNAL COMPARISON

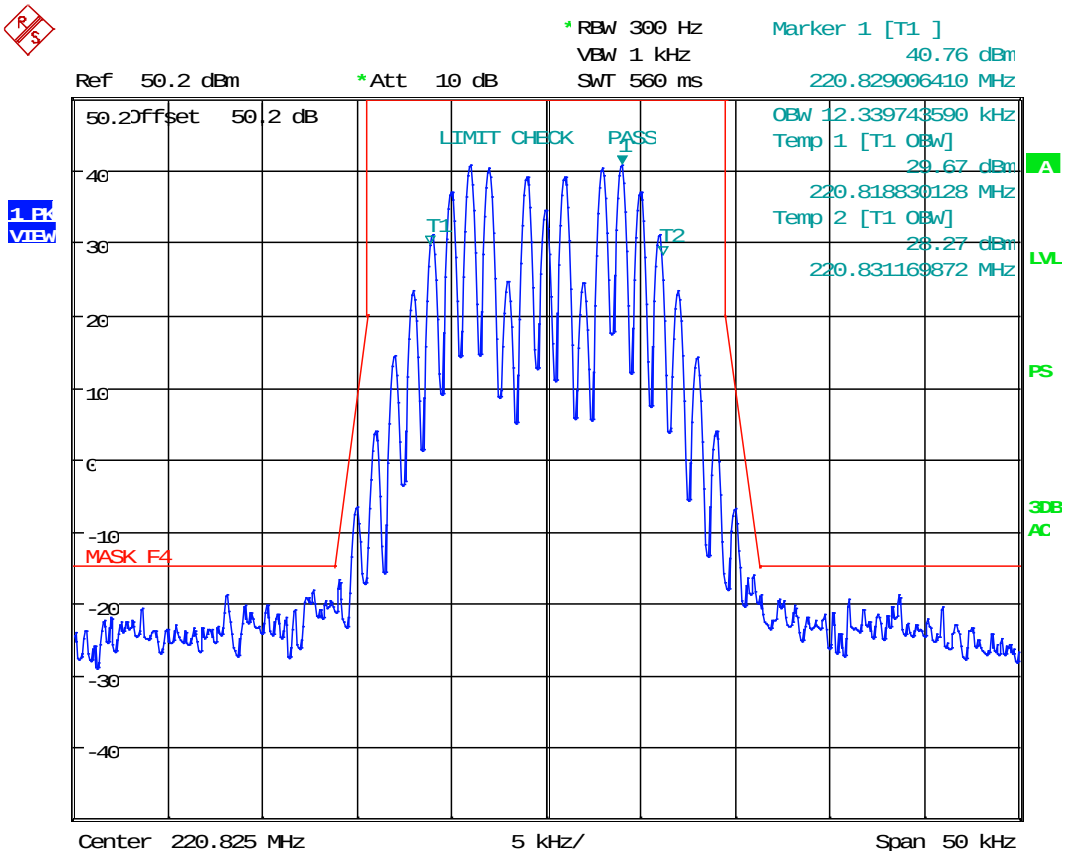
Test Data: 16K0F3E (25 kHz FM Voice) Test Signal



Date: 16.MAR.2018 15:09:34

INPUT VS OUTPUT SIGNAL COMPARISON

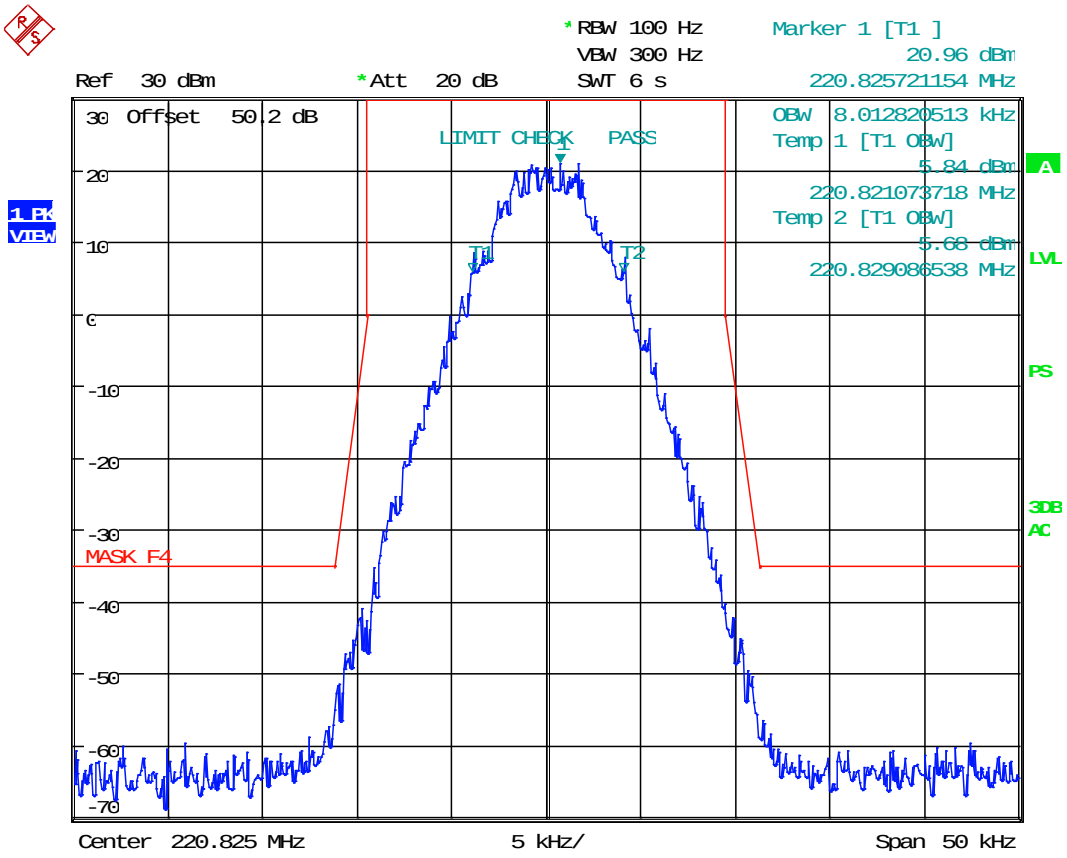
Test Data: 16K0F3E (25 kHz FM Voice) Test Signal



99% OBW of 16K0F3E Signal: 12.34 kHz

INPUT VS OUTPUT SIGNAL COMPARISON

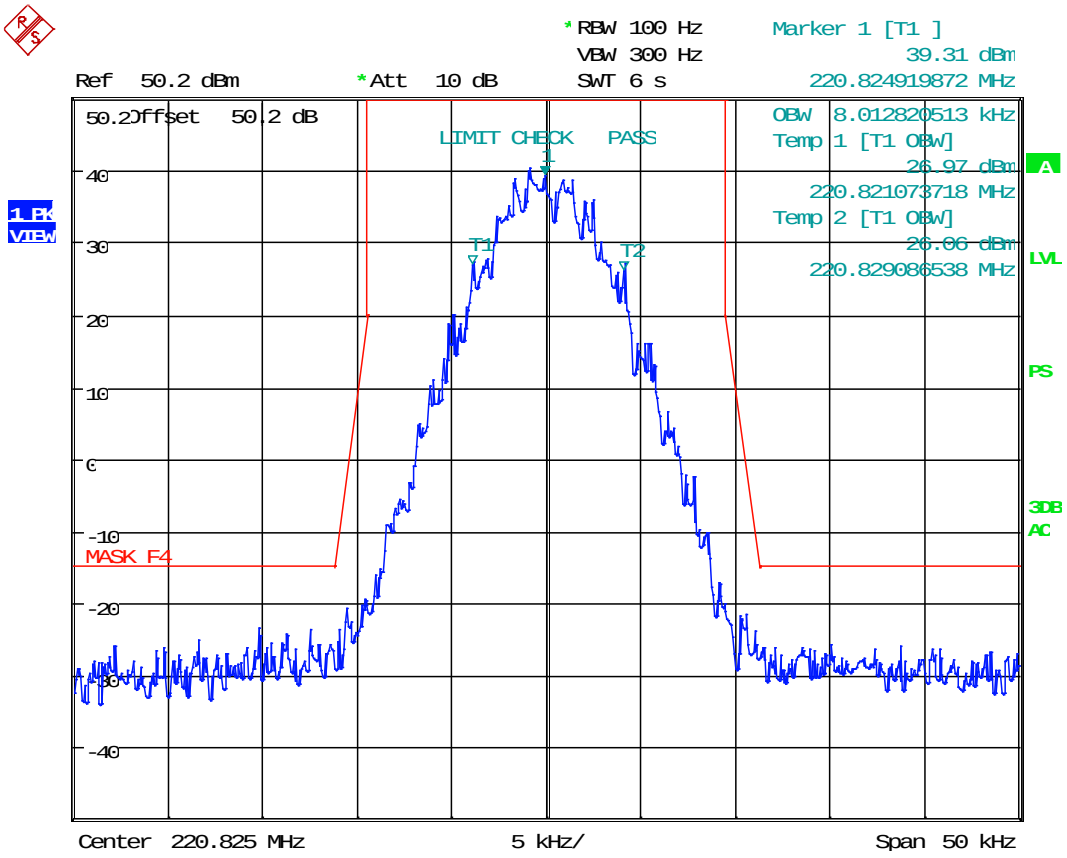
Test Data: 8K01F1D (P25 PI C4FM Data) Test Signal



Date: 16.MAR.2018 15:13:14

INPUT VS OUTPUT SIGNAL COMPARISON

Test Data: 8K01F1D (P25 PI C4FM Data) Output Signal

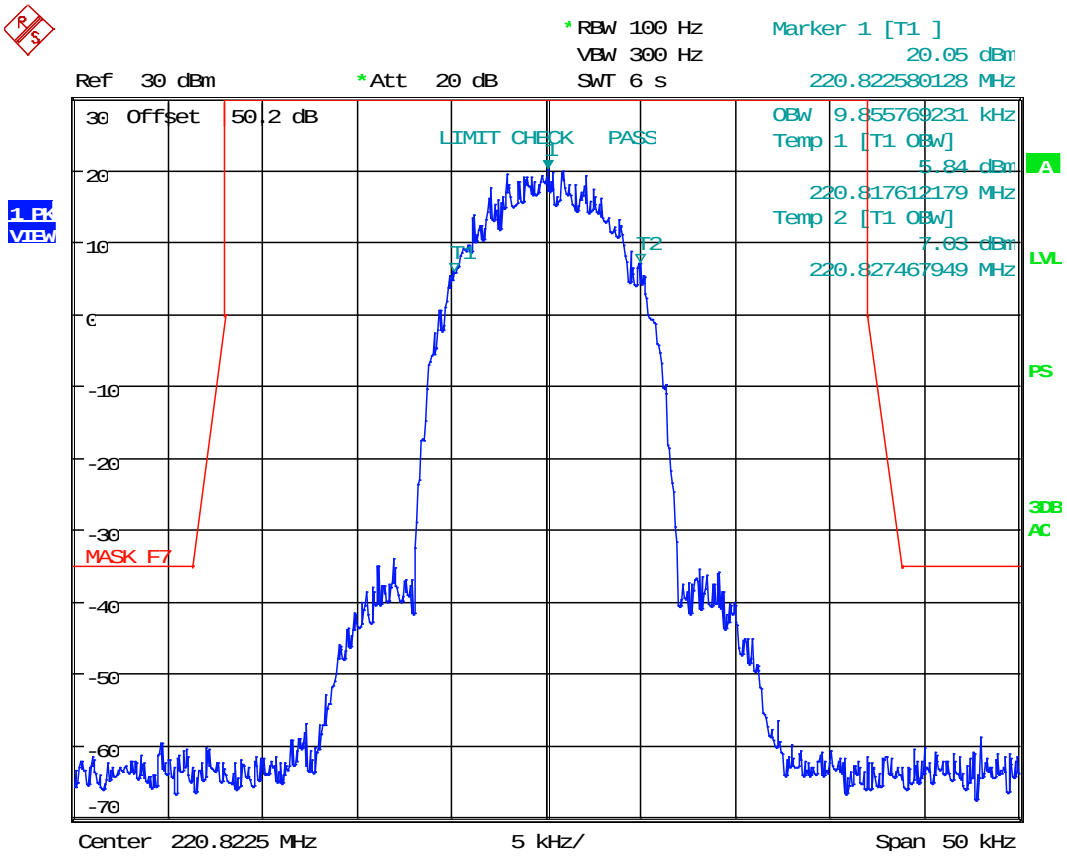


Date: 14.MAR.2018 10:36:33

99% OBW of 8K01F1D Signal: 8.01 kHz

INPUT VS OUTPUT SIGNAL COMPARISON

Test Data: 10K1D7W (P25 PII H-DQPSK) Test Signal



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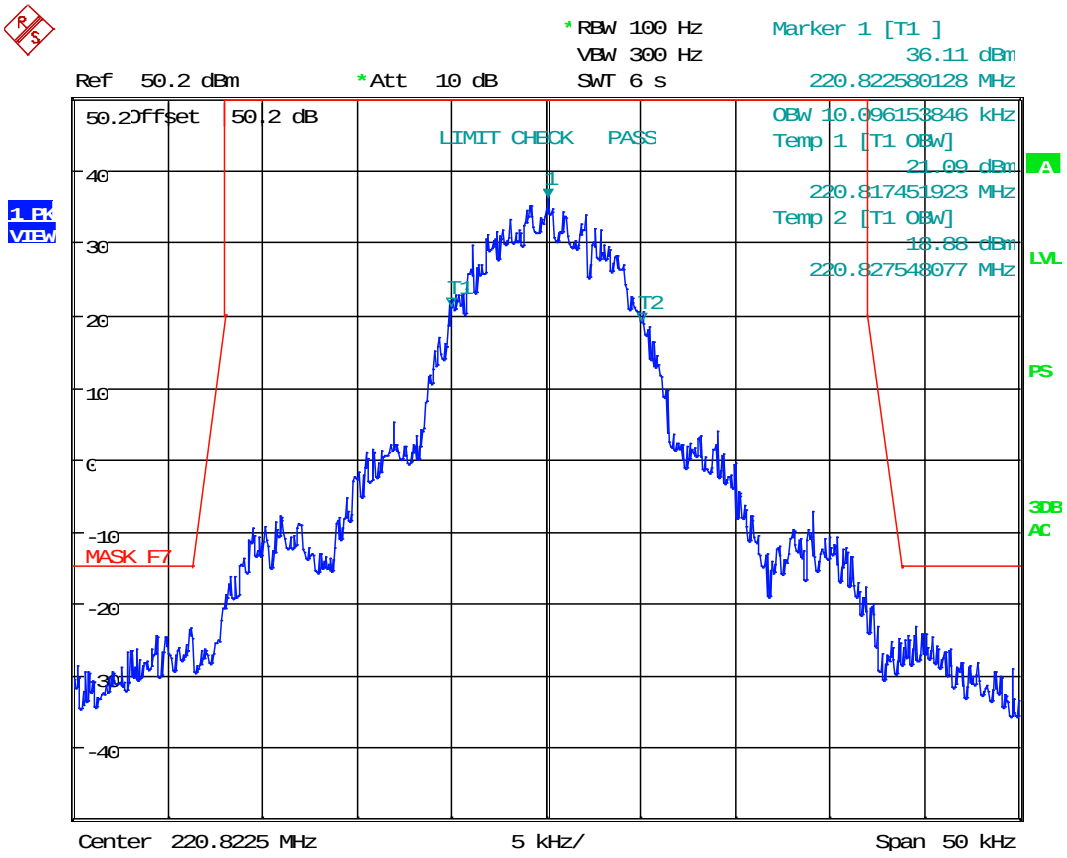
INPUT VS OUTPUT SIGNAL COMPARISON

Test Data: 10K1D7W (P25 PII H-DQPSK) Output Signal

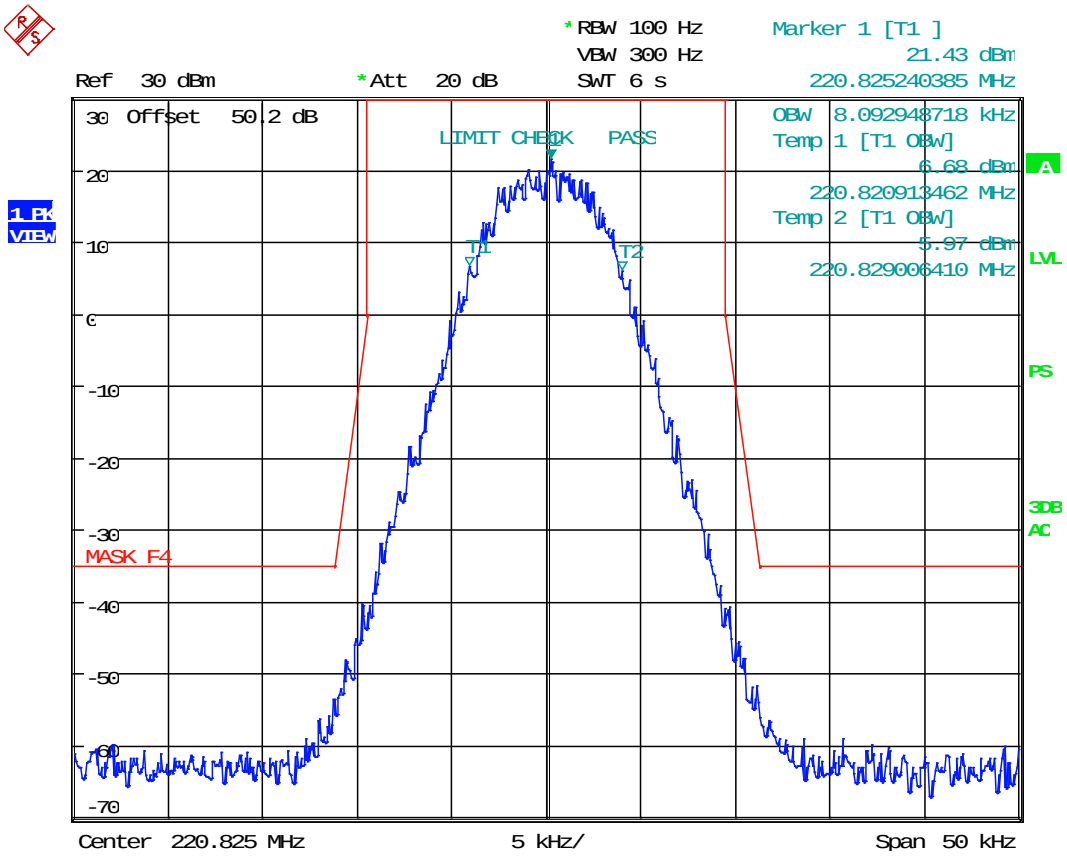


Date: 14.MAR.2018 13:59:46

99% OBW of 10K1D7W Signal: 10.10 kHz

INPUT VS OUTPUT SIGNAL COMPARISON

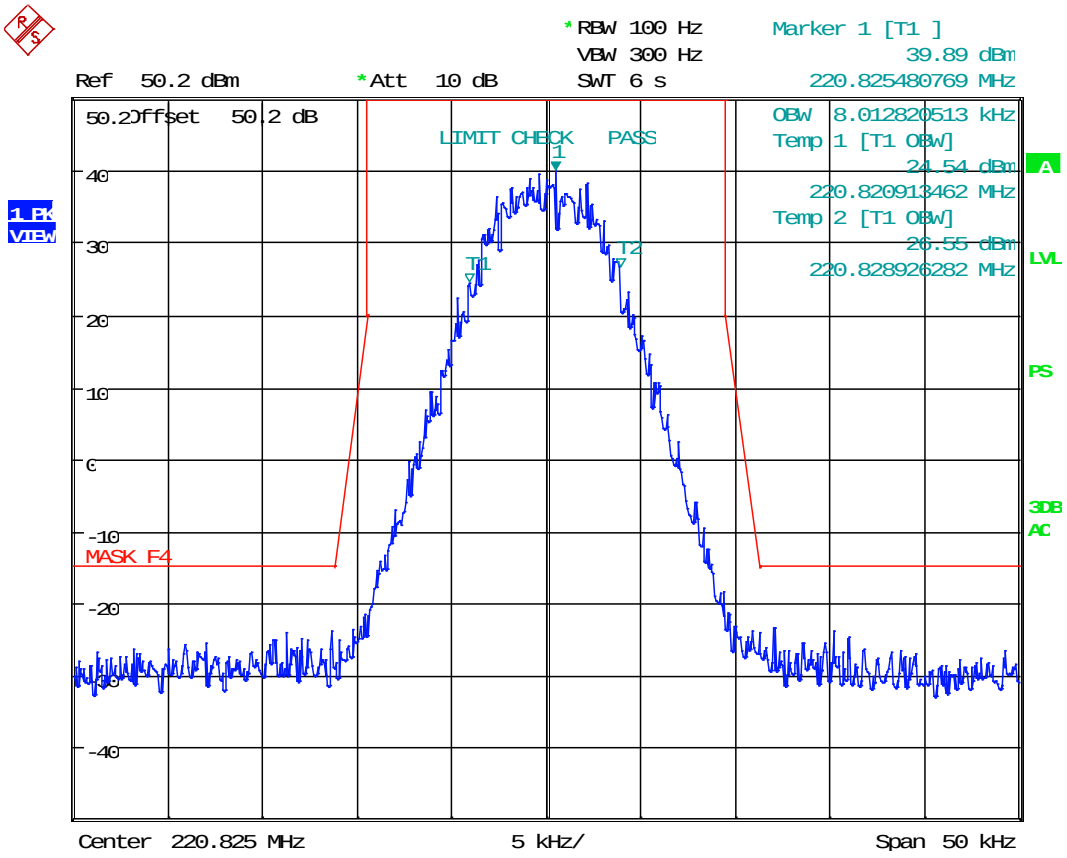
Test Data: 8K01F1W (P25 PII H-CPM) Test Signal



Date: 16.MAR.2018 15:15:05

INPUT VS OUTPUT SIGNAL COMPARISON

Test Data: 8K01F1W (P25 PII H-CPM) Output Signal

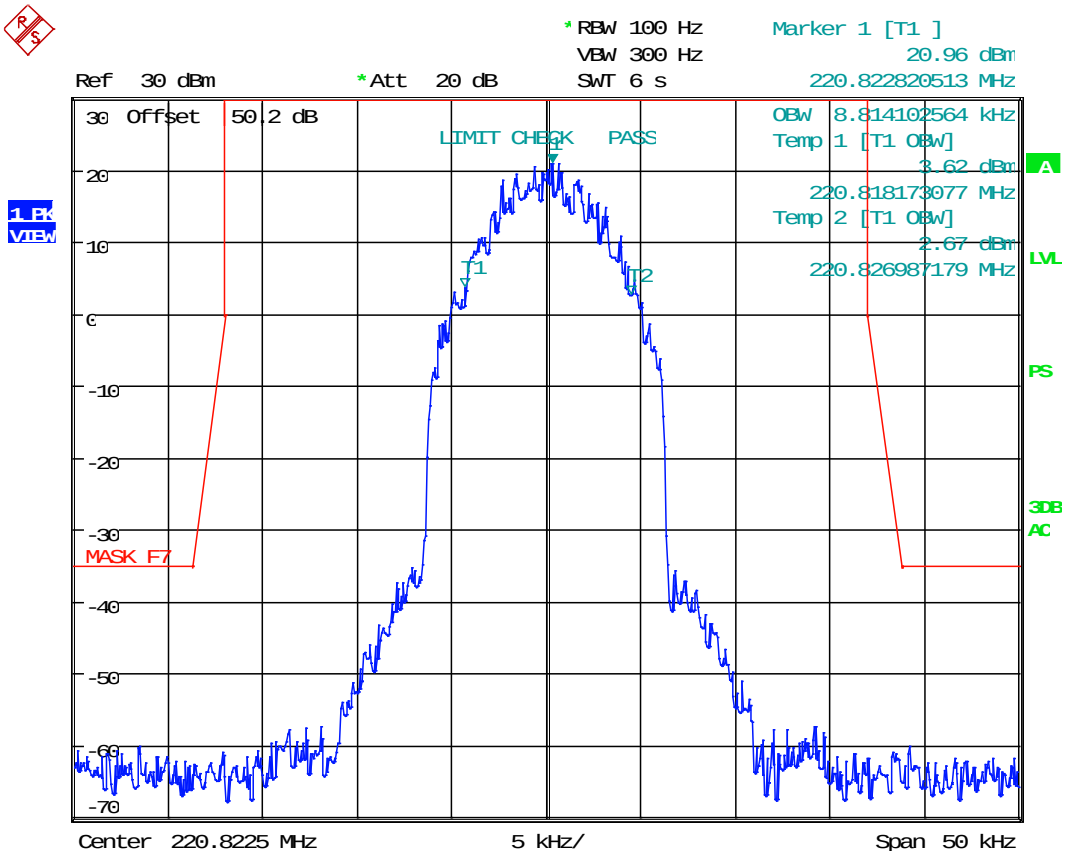


Date: 14.MAR.2018 10:37:51

99% OBW of 8K01F1W Signal: 8.01 kHz

INPUT VS OUTPUT SIGNAL COMPARISON

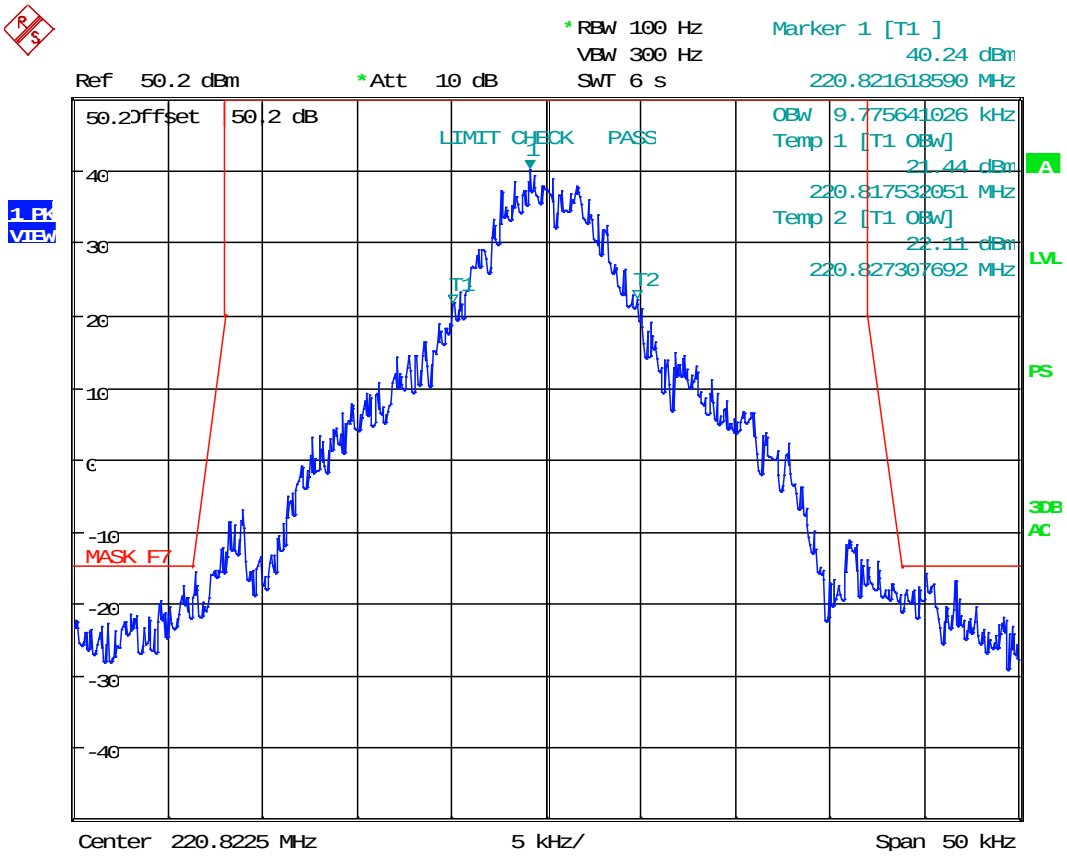
Test Data: 9K78D1W (P25 LSM) Test Signal



Date: 16.MAR.2018 15:21:15

INPUT VS OUTPUT SIGNAL COMPARISON

Test Data: 9K78D1W (P25 LSM) Output Signal



Date: 14.MAR.2018 13:43:56

99% OBW of 9K78D1W Signal: 9.78 kHz

FIELD STRENGTH OF RADIATED EMISSIONS -

Applicable Rule Part: **90.219(e)(3), KDB 935210-D05 v01r01 §4.9**

Requirements: Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth.

The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 9 KHz to at least the tenth harmonic of the fundamental. The EUT was oriented in the worst-case polarity, and was scanned in the worst-case emission range as determined in prior testing. Measurements were made at the test site of **TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.**

Test Data: 220.025 MHz Radiated Emission Table

Emission Freq. (MHz)	Meter Reading (dBuV)	Ant. Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Field Strength (dBuV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
440.050	25.560	H	2.400	16.200	44.160	-53.217	-13.00	40.217
440.050	23.210	V	2.400	16.200	41.810	-55.567	-13.00	42.567
660.075	19.110	V	3.000	19.800	41.910	-55.467	-13.00	42.467
660.075	18.150	H	3.000	19.800	40.950	-56.427	-13.00	43.427
880.100	18.150	H	3.540	21.700	43.390	-53.987	-13.00	40.987
880.100	17.670	V	3.540	21.700	42.910	-54.467	-13.00	41.467
1100.125	25.000	H	3.940	28.130	57.070	-40.307	-13.00	27.307
1100.125	29.930	V	3.940	28.130	62.000	-35.377	-13.00	22.377
1320.150	28.210	V	4.296	29.620	62.126	-35.251	-13.00	22.251
1320.150	26.220	H	4.296	29.620	60.136	-37.241	-13.00	24.241
1540.175	28.550	H	4.616	28.040	61.206	-36.171	-13.00	23.171
1540.175	27.110	V	4.616	28.040	59.766	-37.611	-13.00	24.611
1760.200	25.050	V	4.950	29.960	59.960	-37.417	-13.00	24.417
1760.200	25.250	H	4.950	29.960	60.160	-37.217	-13.00	24.217
1980.225	26.670	H	5.342	31.930	63.942	-33.435	-13.00	20.435
1980.225	25.200	V	5.342	31.930	62.472	-34.905	-13.00	21.905
2200.250	25.950	V	5.630	30.710	62.290	-35.087	-13.00	22.087
2200.250	26.310	H	5.630	30.710	62.650	-34.727	-13.00	21.727

UNWANTED EMISSIONS - FIELD STRENGTH §6.6

Test Data: 221.975 MHz Radiated Emission Table

Emission Frequency (MHz)	Meter Reading (dBuV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Field Strength (dBuV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
443.950	23.580	H	2.424	16.100	42.104	-55.273	-13.00	42.273
443.950	23.390	V	2.424	16.100	41.914	-55.463	-13.00	42.463
665.925	22.450	V	3.018	20.300	45.768	-51.609	-13.00	38.609
665.925	20.000	H	3.018	20.300	43.318	-54.059	-13.00	41.059
887.900	18.130	H	3.556	21.600	43.286	-54.091	-13.00	41.091
887.900	18.630	V	3.556	21.600	43.786	-53.591	-13.00	40.591
1109.875	28.010	H	3.946	28.190	60.146	-37.231	-13.00	24.231
1109.875	25.350	V	3.946	28.190	57.486	-39.891	-13.00	26.891
1331.850	24.580	V	4.306	29.680	58.566	-38.812	-13.00	25.812
1331.850	27.100	H	4.306	29.680	61.086	-36.292	-13.00	23.292
1553.825	25.700	H	4.650	28.090	58.440	-38.938	-13.00	25.938
1553.825	24.920	V	4.650	28.090	57.660	-39.718	-13.00	26.718
1775.800	26.920	V	5.014	30.270	62.204	-35.173	-13.00	22.173
1775.800	24.450	H	5.014	30.270	59.734	-37.643	-13.00	24.643
1997.775	27.610	H	5.394	31.730	64.734	-32.643	-13.00	19.643
1997.775	25.730	V	5.394	31.730	62.854	-34.523	-13.00	21.523
2219.750	26.220	V	5.652	31.190	63.062	-34.315	-13.00	21.315
2219.750	27.100	H	5.652	31.190	63.942	-33.435	-13.00	20.435

RESULT: MEETS REQUIREMENTS

FREQUENCY STABILITY §6.6

Applicable Rule Part: 90.213, KDB 935210-D05 v01r01 §4.8

KDB 935210-D05 v01r01 §4.8 Frequency stability measurements Section 90.219(e)(4)(i) requires that a signal being retransmitted by an amplifier, repeater, or industrial booster meets the frequency stability requirements of Section 90.213. However, this requirement presumes that the EUT processes an input signal in ways that can influence the output signal frequency/frequencies; however, most signal boosters do not incorporate an oscillator). **If the amplifier, booster, or repeater does not alter the input signal in any way, then a frequency stability test may not be required.**

Result: n/a

STATE OF THE MEASUREMENT UNCERTAINTY – 160419

The data and results referenced in this document are true and accurate. The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16 – 4 or ENTR 100-028 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: "Uncertainty in EMC Measurements" and is documented in the Timco Engineering, Inc. quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Timco Engineering, Inc. is reported:

Test Items	Measurement Uncertainty	Notes
RF Conducted Power	±1.4dB	(1)
RF Antenna Conducted Emissions	± 2.4 dB	(1)
Maximum Deviation	± 1.3%	(1)
Occupied Bandwidth	± 2.5%	(1)
Adjacent Channel Power	± 1.5dB	(1)
Frequency Stability	± 69.5 Hz	(1)
Transmitter power Radiated Substitution Method	±4.0 dB	(1)
Transmitter Transient Frequency Response	±2.0 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Coaxial Cable - BMBM-0065-01 Black DC-2G	Belden		BMBM-0065-01	07/18/16	07/18/18
Antenna: Biconical 1096	Eaton	94455-1	1096	08/01/17	08/01/19
Antenna: Log-Periodic 1152	Eaton	96005	1243	02/09/16	04/09/18
Coaxial Cable - Chamber 3 cable set (backup)	Micro-Coax	Chamber 3 cable set (backup)	KMKM-0244-02 ; KMKM-0670-01; KFKF-0197-00	N/A	N/A
CHAMBER	Panashield	3M	N/A	04/25/16	08/01/18
HP Signal Generator	HP	8648C	3847A04696	04/05/2017	04/05/19
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	03/01/17	03/01/19
EMI Test Receiver R & S ESIB 40 Screen Room	Rohde & Schwarz	ESIB 40	100274	08/16/16	08/16/18
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
Antenna: Active Loop	ETS-Lindgren	6502	00062529	12/11/17	12/11/19
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Coaxial Cable - BMBM-0130-00 Black	Alpha Wire		BMBM-0130-00	05/24/16	05/24/18
Coaxial Cable - BMBM-0155-01 Black	BELDEN		BMBM-0155-01	06/01/16	06/01/18
Coaxial Cable - BMBM-0065-00 Black	Belden		BMBM-0065-00	06/08/16	06/08/18
Coaxial Cable - BMBM-0155-00 Black	MIYAZAKI		BMBM-0155-00	05/24/16	05/24/18
Signal Generator R & S SMU 200A	Rohde & Schwarz	SMU200A	103195	02/29/16	03/28/18
Non Radiating 50 OHM Load	Sierra Elec	160B-600X	1038	09/13/16	09/13/18
Attenuator N 20dB 2W DC-13G	Narda	757C	30201	05/24/17	05/24/19
Attenuator N 20dB 2W DC-13G	Narda	777C	36124	05/24/17	05/23/19
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	N/A	N/A
Noise Source 10MHz - 18GHz	Agilent	346B	MY44421884	N/A	N/A

***EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

END OF REPORT