2.1055 FREQUENCY STABILITY

§2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

☐ (1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

☐ (2) From −20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.

☐ (3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

☐ (c) In addition to all other requirements of this section, the following information is required for equipment incorporating heater type crystal oscillators to be used in mobile stations, for which type acceptance is first requested after March 25, 1974, except for battery powered, hand carried, portable equipment having less than 3 watts mean output power.

(1) Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance. Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0° centigrade and + 30° centigrade with no primary power applied.

(2) Beginning at each temperature level specified in paragraph (c)(1) of this section, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to rise more than 10° centigrade above the respective beginning ambient temperature level.

(3) The elapsed time necessary for the frequency to stabilize within the applicable tolerance from each beginning ambient temperature level as determined from the tests specified in this paragraph shall be specified in the instruction book for the transmitter furnished to the user.

(4) When it is impracticable to subject the complete transmitter to this test because of its physical dimensions or power rating, only its frequency determining and stabilizing portions need be tested.

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FREQUENCY STABILITY

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c), and (d) of this section. (For example measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

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90.213 FREQUENCY STABILITY

§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.

(b) For the purpose of determining the frequency stability limits, the power of a transmitter is considered to be the maximum rated output power as specified by the manufacturer.

Applies to EUT	Frequency range (MHz)	Fixed and base stations (ppm)	Mobile stations > 2 watts output power (ppm)	Mobile stations ≤ 2 watts output power (ppm)
☒	421-512	[7] [11] [14] 0.5 / 1.5 / 2.5 / 5	[8] 1 / 2.5 / 5	[8] 1 / 2.5 / 5

FREQUENCY STABILITY

☒ [7]In the 421-512 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.

☐ [8]In the 421-512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

☐ [11]Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band.

☐ [14]Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

§90.241 Radio call box operations.

☐ (c) Frequencies in the 450-470 MHz band which are designated as available for assignment to central control stations and radio call box installations in §90.20(c) or §90.20(d)(58) may be assigned in the Public Safety Pool for highway call box systems subject to the following requirements:

(2) Maximum transmitter power for call boxes will be either 2.5 watts input to the final amplifier stage or one watt output. The central control station shall not exceed 25 watts effective radiated power (ERP).

(11) Call box transmitter frequency tolerance shall be 0.001 percent.

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FREQUENCY STABILITY

Test Procedure: ANSI C63.26 S 5.6.3

5.6.3 Procedure for frequency stability testing

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

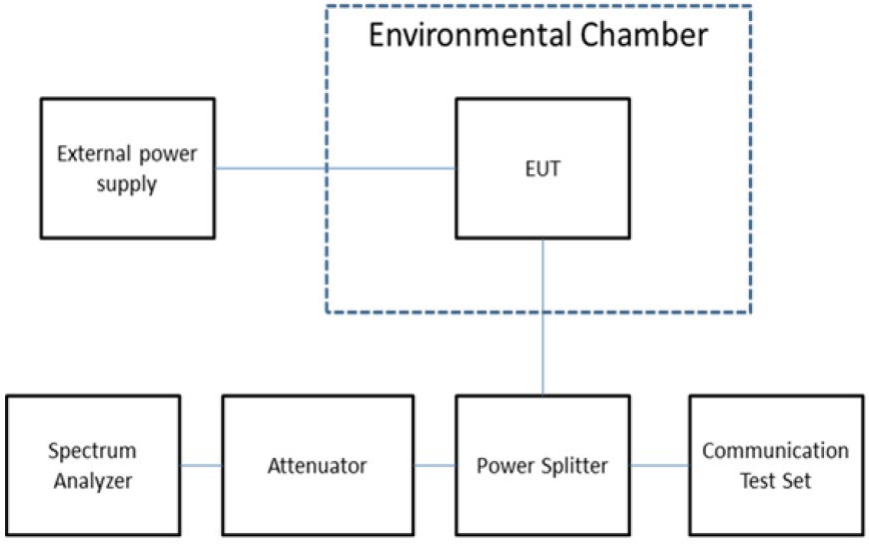
a) At 10 °C intervals of temperatures between −30 °C and +50 °C at the manufacturer's rated supply voltage, and

b) At +20 °C temperature and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage then the −15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

Test Setup Block Diagram:



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KDB 935210 S. 4.8 FREQUENCY STABILITY

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.

When performing frequency stability measurements on these types of devices, the instability associated with the EUT must be isolated from any frequency instability associated with the measurement instrumentation. One method for realizing such isolation is to connect the reference clock input of the signal generator to the reference output of the frequency counter, to confirm that any frequency instability is associated with the EUT, and is not due to differences between the reference oscillators internal to the measurement instrumentation.

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STATEMENT OF MEASUREMENT UNCERTAINTY

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 EN TR 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
TR 100 028 PARAGRAPH 7.1.1 – FREQUENCY ERROR < 30 MHz	± 0.063 ppm	(1)
TR 100 028 PARAGRAPH 7.1.1 - FREQUENCY ERROR < 200 MHz	± 0.051 ppm	(1)
TR 100 028 PARAGRAPH 7.1.1 - FREQUENCY ERROR < 1 GHz	± 0.051 ppm	(1)
TR 100 028 PARAGRAPH 7.1.1 - FREQUENCY ERROR ≤ 18 GHz	± 0.051 ppm	(1)
TR 100 028 PARAGRAPH 7.1.1 - FREQUENCY ERROR ≤ 40 GHz	± 0.051 ppm	(1)
TR 100 028 PARAGRAPH 7.1.2 - CONDUCTED POWER MEASUREMENT	±0.643 dB	(1)
TR 100 028 PARAGRAPH 7.1.4.1 - CONDUCTED SPURIOUS EMISSIONS 9 kHz – 150 kHz	± 3.14 dB	(1)
TR 100 028 PARAGRAPH 7.1.4.1 - CONDUCTED SPURIOUS EMISSIONS 150 kHz – 30 MHz	± 3.08 dB	(1)
TR 100 028 PARAGRAPH 7.2 – RADIATED EMISSIONS < 200 MHz	± 2.16 dB	(1)
TR 100 028 PARAGRAPH 7.2 – RADIATED EMISSIONS < 1 GHz	± 2.15 dB	(1)
TR 100 028 PARAGRAPH 7.2 – RADIATED EMISSIONS < 18 GHz	± 2.14 dB	(1)
TR 100 028 PARAGRAPH 7.2 – RADIATED EMISSIONS ≤ 40 GHz	± 2.31 dB	(1)
FLUKE Multimeter AC Voltage Uncertainty	± 2.263 %	(1)
FLUKE Multimeter DC Voltage Uncertainty	± 0.453 %	(1)
Temperature (C°)	± 0.81 C°	

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

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EMC EQUIPMENT LIST

Device	Manufacturer	Model	SN	Calibration Date	Cal Due Date
EMI Test Receiver R & S ESU 40 firmware v 4.43 SP 3 BIOS v5.1-24-3	Rohde & Schwarz	ESU 40	100320	08/28/18	08/28/20
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
Coaxial Cable - Chamber 3 cable set (backup)	Micro-Coax	Chamber 3 cable set (backup)	KMKM-0244-02 KMKM-0670-01 KFKF-0197-00	02/27/19	02/27/21
CHAMBER	Panashield	3M	N/A	03/15/19	03/15/21
Antenna: Active Loop	ETS-Lindgren	6502	00062529	12/11/17	12/11/20
Antenna: Biconical 1057	Eaton	94455-1	1057	12/13/17	12/13/20
Antenna: Log-Periodic 1243	Electro-Metrics	96005	1243	04/20/18	04/20/21
Ant: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	02/25/20	02/25/23
Noise Source 10 MHz – 18 GHz	Agilent	346B	MY44421884	n/a	n/a
Splitter 1-1000MHz	Mini-Circuits	ZFSC-4-1-BNC+	U115700825	11/19/17	11/19/20

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ANNEX I – MANUFACTURER-PROVIDED INFORMATION

Note: The accuracy and precision of the following information provided by the manufacturer of the equipment under test has not been verified using test methods, cannot be verified, or is not necessary to verify.

n/a

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ANNEX II – MEASUREMENT DATA

KDB 935210 4.2 AGC THRESHOLD

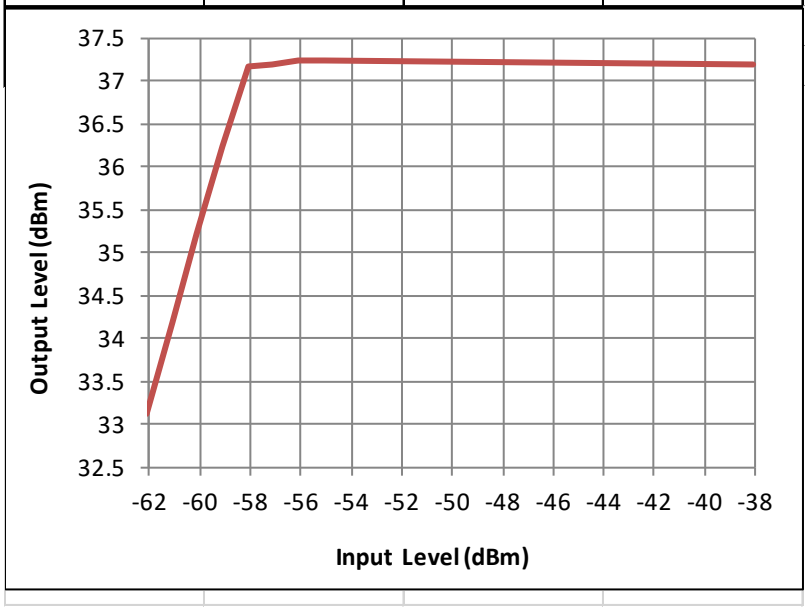
(Data is re-used from test report "2567-20_PT90 UHF Booster CLB TestReport" per KDB 484596)

Test Engineer: FR

Test Date: JUL 24, 2020

406.1125 MHz, Uplink

INPUT (dBm)	CORRECTED INPUT (dBm)	CORRECTED OUTPUT (dBm)	GAIN (dB)
-62	-62.1	33.12	95.2
-61	-61.1	34.19	95.3
-60	-60.1	35.21	95.3
-59	-59.1	36.25	95.4
-58	-58.1	37.17	95.3
-57	-57.1	37.19	94.3
-56	-56.1	37.23	93.3
-55	-55.1	37.23	92.3
-38	-38.1	37.2	75.3



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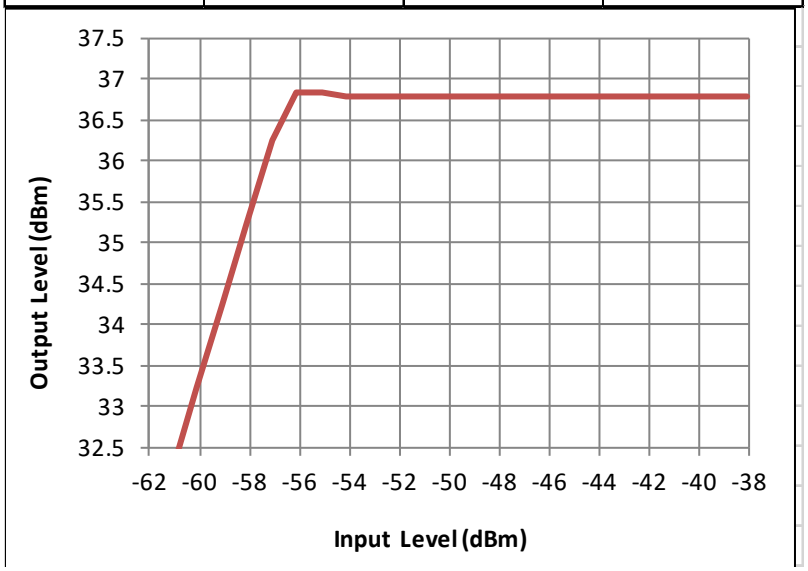
AGC Level

450.0125 MHz, Uplink

INPUT (dBm)	CORRECTED INPUT (dBm)	CORRECTED OUTPUT (dBm)	GAIN (dB)
-62	-62.1	31.17	93.3
-61	-61.1	32.22	93.3
-60	-60.1	33.23	93.3
-59	-59.1	34.24	93.3
-58	-58.1	35.23	93.3
-57	-57.1	36.25	93.4
-56	-56.1	36.84	92.9
-55	-55.1	36.84	91.9
-54	-54.1	36.8	90.9
-53	-53.1	36.8	89.9
-52	-52.1	36.8	88.9
-38	-38.1	36.8	74.9



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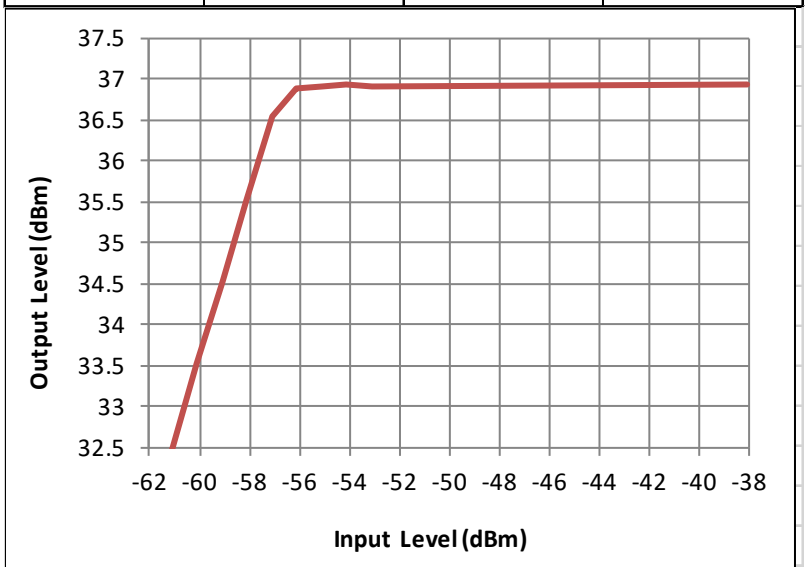
AGC Level

469.9875 MHz, Downlink

INPUT (dBm)	CORRECTED INPUT (dBm)	CORRECTED OUTPUT (dBm)	GAIN (dB)
-65	-65.1	28.44	93.5
-64	-64.1	29.4	93.5
-63	-63.1	30.45	93.6
-62	-62.1	31.51	93.6
-61	-61.1	32.5	93.6
-60	-60.1	33.52	93.6
-59	-59.1	34.51	93.6
-58	-58.1	35.52	93.6
-57	-57.1	36.54	93.6
-56	-56.1	36.88	93.0
-55	-55.1	36.91	92.0
-54	-54.1	36.93	91.0
-53	-53.1	36.92	90.0
-38	-38.1	36.94	75.0



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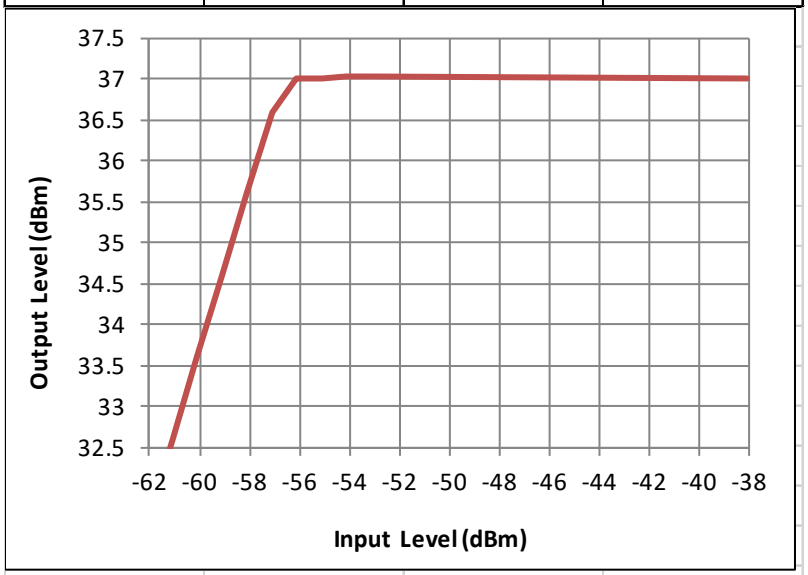
AGC Level

511.9875 MHz, Downlink

INPUT (dBm)	CORRECTED INPUT (dBm)	CORRECTED OUTPUT (dBm)	GAIN (dB)
-65	-65.1	28.55	93.7
-64	-64.1	29.55	93.7
-63	-63.1	30.57	93.7
-62	-62.1	31.57	93.7
-61	-61.1	32.59	93.7
-60	-60.1	33.6	93.7
-59	-59.1	34.61	93.7
-58	-58.1	35.6	93.7
-57	-57.1	36.6	93.7
-56	-56.1	37.01	93.1
-55	-55.1	37.01	92.1
-54	-54.1	37.02	91.1
-53	-53.1	37.02	90.1
-38	-38.1	37	75.1



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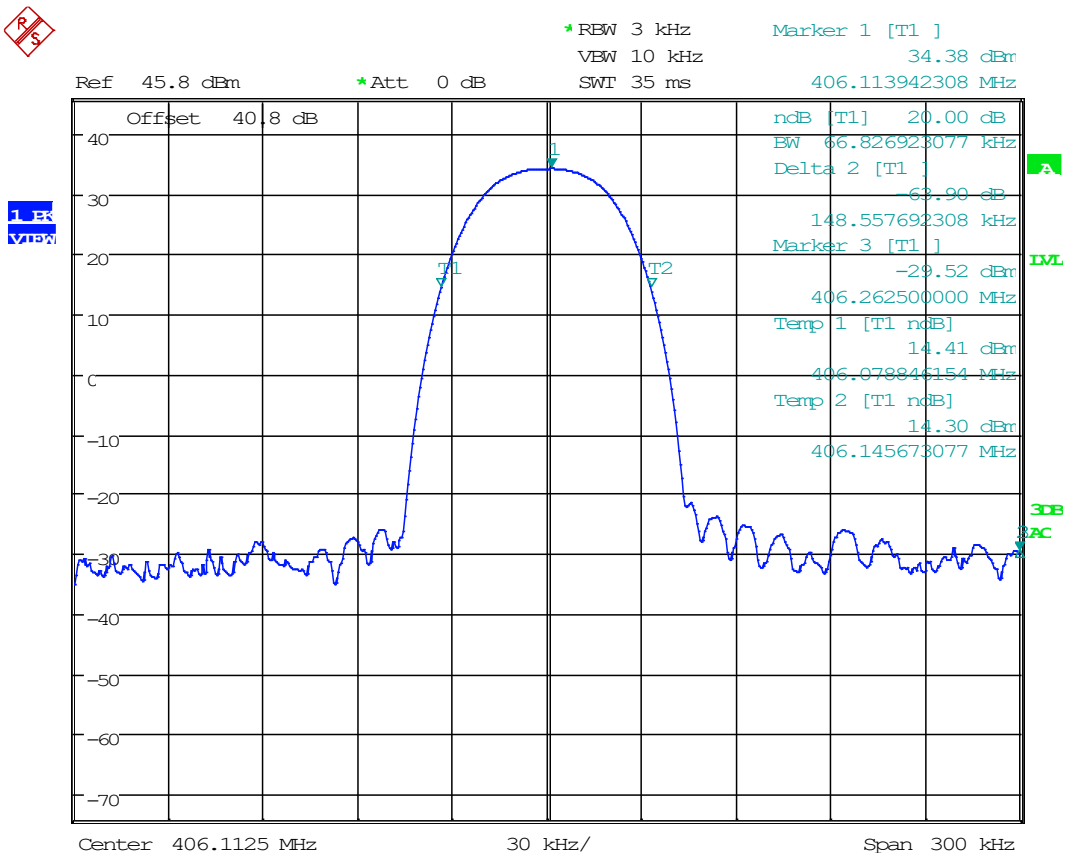
KDB 935210 4.3 OUT OF BAND REJECTION

Test Engineer: FR
Test Date: JUL 28, 2020

406.1125 MHz Out of Band Rejection Plot

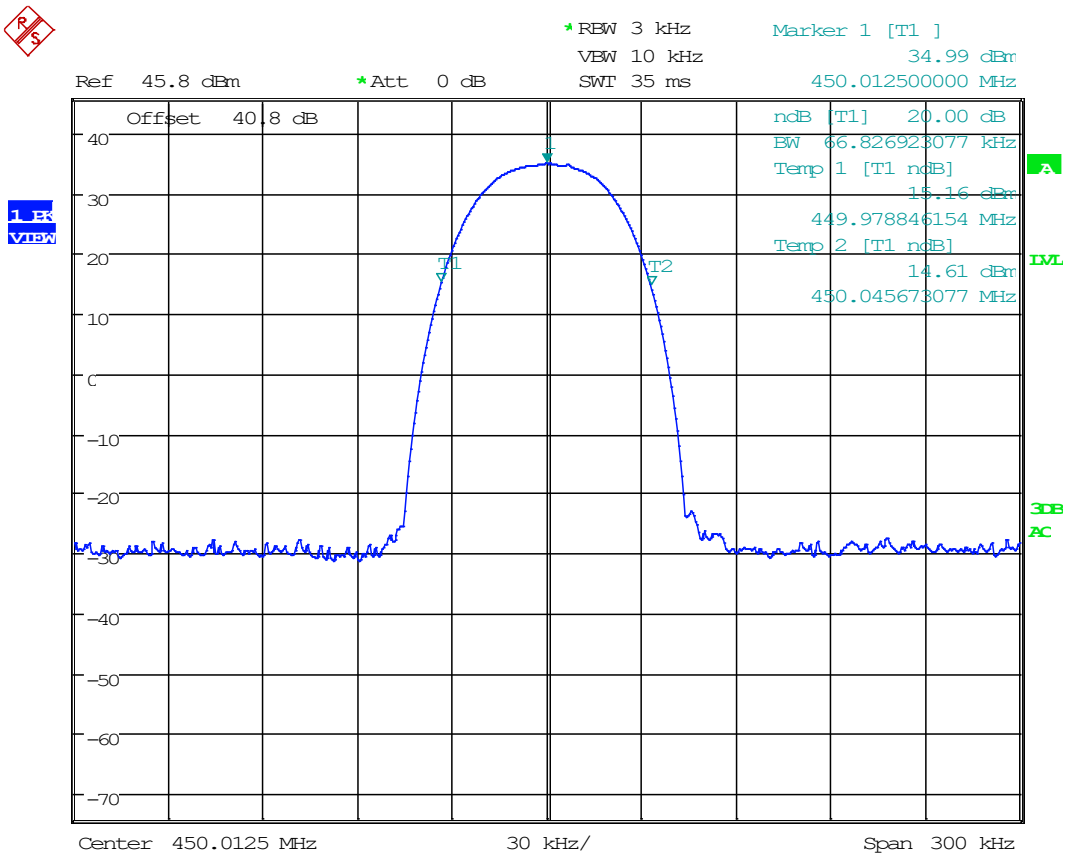


Date: 27.JUL.2020 17:11:29

Note: Class A Out of Band Rejection mode is shown above. The device allows for channel bandwidths up to 25 kHz. User software prevents the end-user from tuning the channels to operate outside the intended band.

Out of Band Rejection

450.0125 MHz Out of Band Rejection Plot

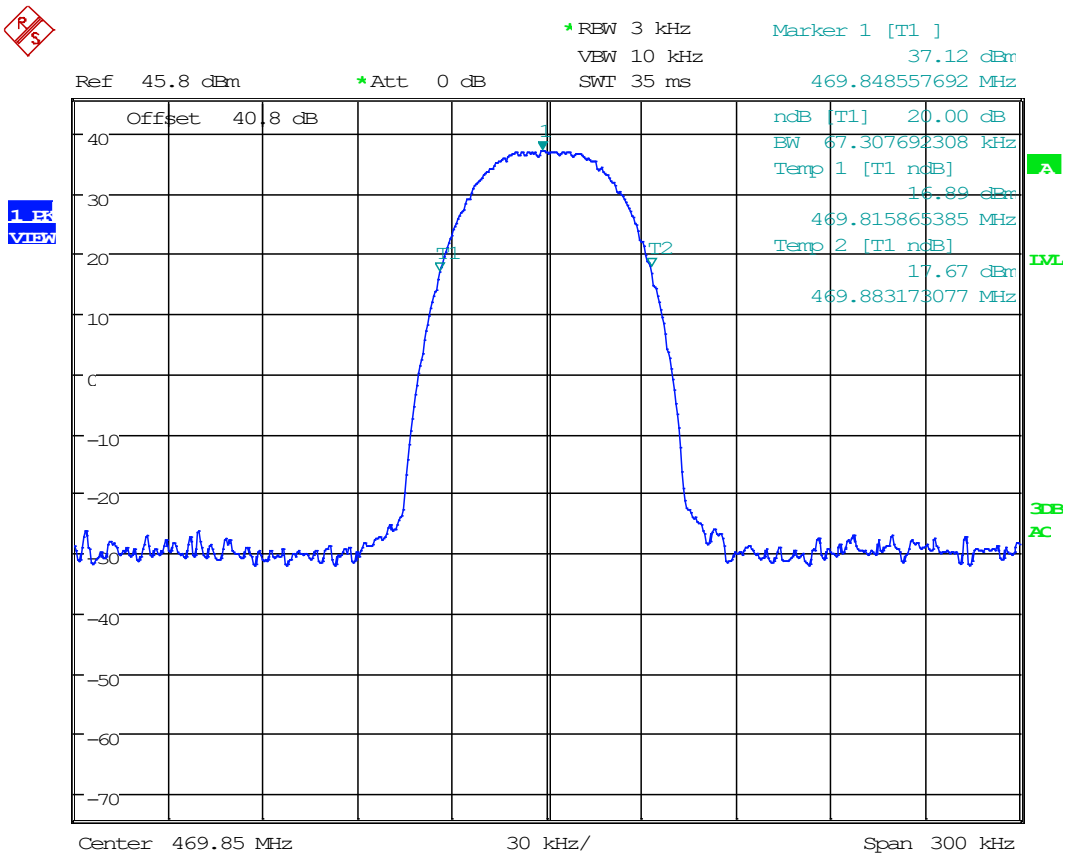


Date: 27.JUL.2020 15:11:04

Note: Class A Out of Band Rejection mode is shown above. The device allows for channel bandwidths up to 25 kHz. User software prevents the end-user from tuning the channels to operate outside the intended band.

Out of Band Rejection

469.9875 MHz Out of Band Rejection Plot



Date: 27.JUL.2020 14:29:57

Note: Class A Out of Band Rejection mode is shown above. The device allows for channel bandwidths up to 25 kHz. User software prevents the end-user from tuning the channels to operate outside the intended band.

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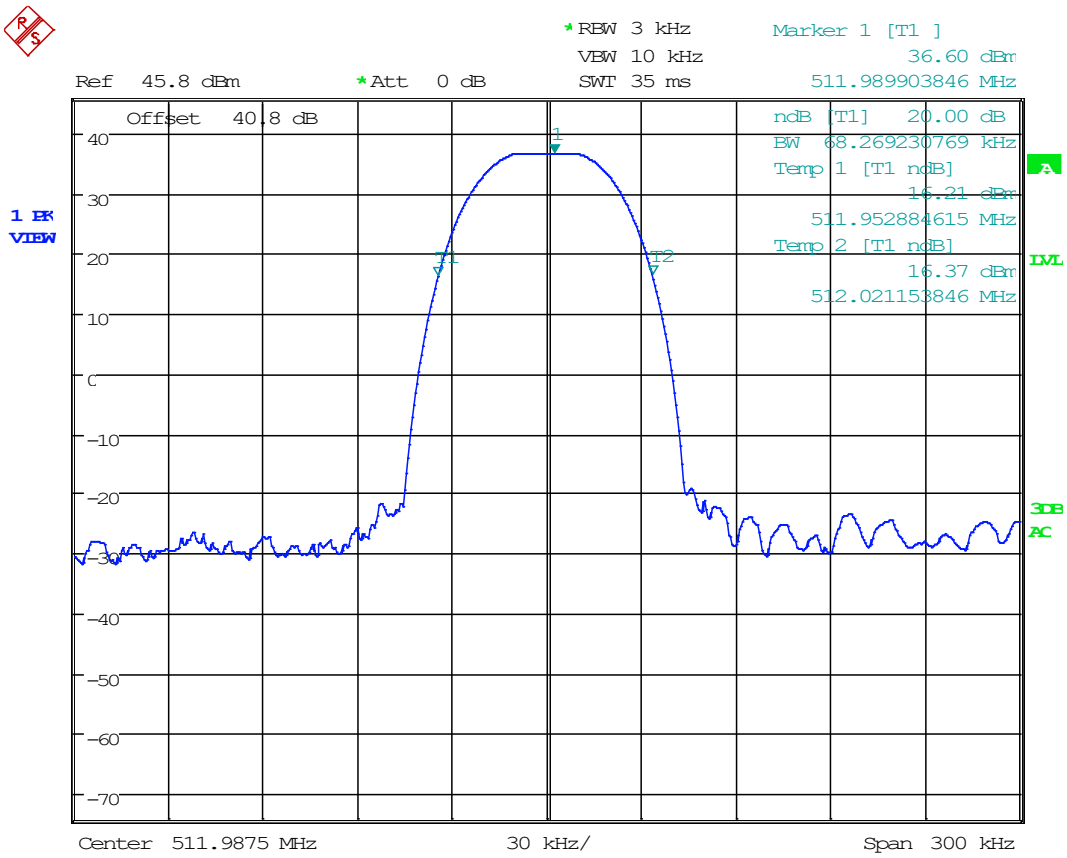
Out of Band Rejection

511.9875 MHz Out of Band Rejection Plot



Date: 27.JUL.2020 18:38:10

Note: Class A Out of Band Rejection mode is shown above. The device allows for channel bandwidths up to 25 kHz. User software prevents the end-user from tuning the channels to operate outside the intended band.

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2.1046 RF POWER OUTPUT

KDB 935210 4.5 RF POWER OUTPUT & GAIN

(Data is re-used from test report "2567-20_PT90 UHF Booster CLB TestReport" per KDB 484596)

Test Engineer: FR
Test Date: DEC 16 2020

Frequency	AGC Level	Input (dBm)	Output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Gain (dB)	Output ERP (W)
406.1125	AGC	-56.1	37.23	0.00	0.24	93.3	5.00
406.1125	AGC +3	-53.1	37.2	0.00	0.21	90.3	5.00
406.1125	Saturation	-38.1	37.2	0.00	0.21	75.3	5.00
450.0125	AGC	-56.1	36.84	0.00	0.00	92.9	4.83
450.0125	AGC +3	-53.1	36.84	0.00	0.00	89.9	4.83
450.0125	Saturation	-38.1	36.8	0.00	0.00	74.9	4.79
469.9875	AGC	-56.1	36.88	0.00	0.00	93.0	4.88
469.9875	AGC +3	-53.1	36.92	0.00	0.00	90.0	4.92
469.9875	Saturation	-38.1	36.94	0.00	0.00	75.0	4.94
511.9875	AGC	-56.1	37.01	0.00	0.02	93.1	5.00
511.9875	AGC +3	-53.1	37.02	0.00	0.03	90.1	5.00
511.9875	Saturation	-38.1	37	0.00	0.01	75.1	5.00

Note: "Cable Loss" represents the value of loss that will be used upon signal booster deployment to keep the device compliant with the standard.

Max Power Output = 36.99 dBm (5 W)

Max Gain = 93.3 dB

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KDB 935210 4.6 NOISE FIGURE

(Data is re-used from test report "2567-20_PT90 UHF Booster CLB TestReport" per KDB 484596)

Test Engineer: FR
Test Date: JUL 29, 2020

406.1125 MHz, Uplink

FCC KDB 935210 S. 4.6, ISED RSS-131 S. 6.4 - NOISE FIGURE	
Measurement Freq. (MHz)	**406.1125**
Noise Source ENR (dB)	15.1126
Noise Source T_s^{OFF}, T_O (K)	290
Noise Source T_s^{ON} (K)	9701.4518
Noise Source Cal N_2^{off} (dB)	**-125.09**
Noise Source Cal N_2^{off} (pW)	0.00031
Noise Source Cal N_2^{on} (dB)	**-119.4**
Noise Source Cal N_2^{on} (pW)	0.00115
Calibration Ratio Y_2	3.7068
Calibration T_2	3186.9568
Noise + EUT N_{12}^{off} (dB)	**-34.43**
Noise + EUT N_{12}^{off} (pW)	360578.64
Noise + EUT N_{12}^{on} (dB)	**-23.61**
Noise + EUT N_{12}^{on} (pW)	4355118.74
Noise + EUT Ratio Y_{12}	12.0781
Noise + EUT T_{12}	559.5517
Gain (Ratio)	4764413633.5087
Gain (dB)	96.7801
2nd Stage Correction T_1	559.551748290210
Noise Factor F	2.92949
Noise Figure (dB)	**4.67**
Limit (dB)	9.00
Margin (dB)	4.33

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Noise Figure

450.0125 MHz, Uplink

FCC KDB 935210 S. 4.6, ISED RSS-131 S. 6.4 - NOISE FIGURE	
Measurement Freq. (MHz)	**450.0125**
Noise Source ENR (dB)	15.1072
Noise Source T_s^{OFF}, T_O (K)	290
Noise Source T_s^{ON} (K)	9689.8315
Noise Source Cal N_2^{off} (dB)	**-111.47**
Noise Source Cal N_2^{off} (pW)	0.00713
Noise Source Cal N_2^{on} (dB)	**-107.21**
Noise Source Cal N_2^{on} (pW)	0.01901
Calibration Ratio Y_2	2.6669
Calibration T_2	5349.2492
Noise + EUT N_{12}^{off} (dB)	**-27.17**
Noise + EUT N_{12}^{off} (pW)	1918668.74
Noise + EUT N_{12}^{on} (dB)	**-17.37**
Noise + EUT N_{12}^{on} (pW)	18323144.22
Noise + EUT Ratio Y_{12}	9.5499
Noise + EUT T_{12}	809.4050
Gain (Ratio)	1380586339.6563
Gain (dB)	91.4006
2nd Stage Correction T_1	809.405023388252
Noise Factor F	3.79105
Noise Figure (dB)	**5.79**
Limit (dB)	9.00
Margin (dB)	3.21

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Noise Figure

469.9875 MHz, Downlink

FCC KDB 935210 S. 4.6, ISED RSS-131 S. 6.4 - NOISE FIGURE	
Measurement Freq. (MHz)	**469.9875**
Noise Source ENR (dB)	15.1048
Noise Source T_s^{OFF}, T_O (K)	290
Noise Source T_s^{ON} (K)	9684.5488
Noise Source Cal N_2^{off} (dB)	**-111.47**
Noise Source Cal N_2^{off} (pW)	0.00713
Noise Source Cal N_2^{on} (dB)	**-107.21**
Noise Source Cal N_2^{on} (pW)	0.01901
Calibration Ratio Y_2	2.6669
Calibration T_2	5346.0800
Noise + EUT N_{12}^{off} (dB)	**-37.77**
Noise + EUT N_{12}^{off} (pW)	167109.06
Noise + EUT N_{12}^{on} (dB)	**-26.32**
Noise + EUT N_{12}^{on} (pW)	2333458.06
Noise + EUT Ratio Y_{12}	13.9637
Noise + EUT T_{12}	434.6821
Gain (Ratio)	182318041.2317
Gain (dB)	82.6083
2nd Stage Correction T_1	434.682022479565
Noise Factor F	2.49890
Noise Figure (dB)	**3.98**
Limit (dB)	9.00
Margin (dB)	5.02

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Noise Figure

511.9875 MHz, Downlink

FCC KDB 935210 S. 4.6, ISED RSS-131 S. 6.4 - NOISE FIGURE	
Measurement Freq. (MHz)	**511.9875**
Noise Source ENR (dB)	15.0996
Noise Source T_s^{OFF}, T_O (K)	290
Noise Source T_s^{ON} (K)	9673.4511
Noise Source Cal N_2^{off} (dB)	**-123.85**
Noise Source Cal N_2^{off} (pW)	0.00041
Noise Source Cal N_2^{on} (dB)	**-119.47**
Noise Source Cal N_2^{on} (pW)	0.00113
Calibration Ratio Y_2	2.7416
Calibration T_2	5097.9136
Noise + EUT N_{12}^{off} (dB)	**-36.28**
Noise + EUT N_{12}^{off} (pW)	235504.93
Noise + EUT N_{12}^{on} (dB)	**-24.4**
Noise + EUT N_{12}^{on} (pW)	3630780.55
Noise + EUT Ratio Y_{12}	15.4170
Noise + EUT T_{12}	360.8600
Gain (Ratio)	4730783348.8871
Gain (dB)	96.7493
2nd Stage Correction T_1	360.859966488933
Noise Factor F	2.24434
Noise Figure (dB)	**3.51**
Limit (dB)	9.00
Margin (dB)	5.49

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2.1047 AUDIO FREQUENCY RESPONSE

2.1047 LOW PASS FILTER RESPONSE

Test Engineer:_____
Test Date:_____

N/A. Device does not accept audio input.

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2.1047 MODULATION LIMITING

Test Engineer:_____
Test Date:_____

N/A. Device does not have means to limit modulation.

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90.209 OCCUPIED BANDWIDTH

90.210 EMISSION MASKS

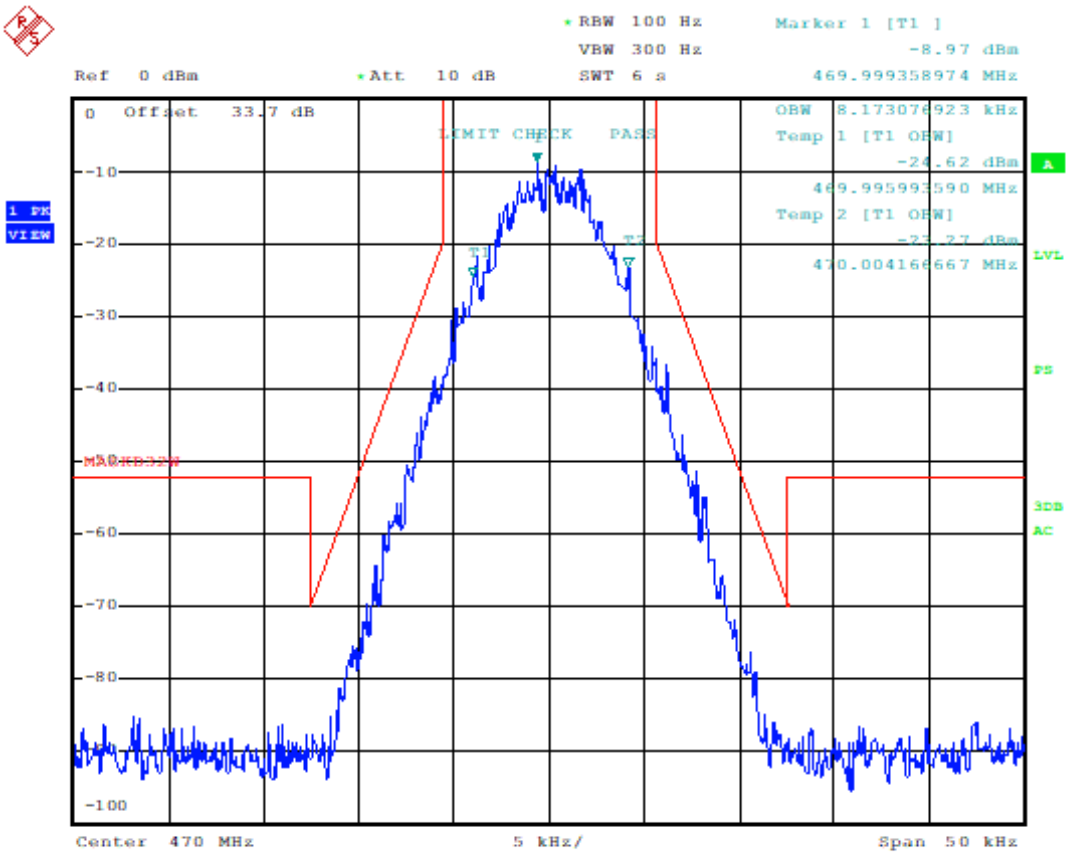
KDB 935210 4.4 INPUT VS OUTPUT COMPARISON

(Data is re-used from test report "2567-20_PT90 UHF Booster CLB TestReport" per KDB 484596)

Test Engineer: FR
Test Date: JUL 27, 2020

Input Signals

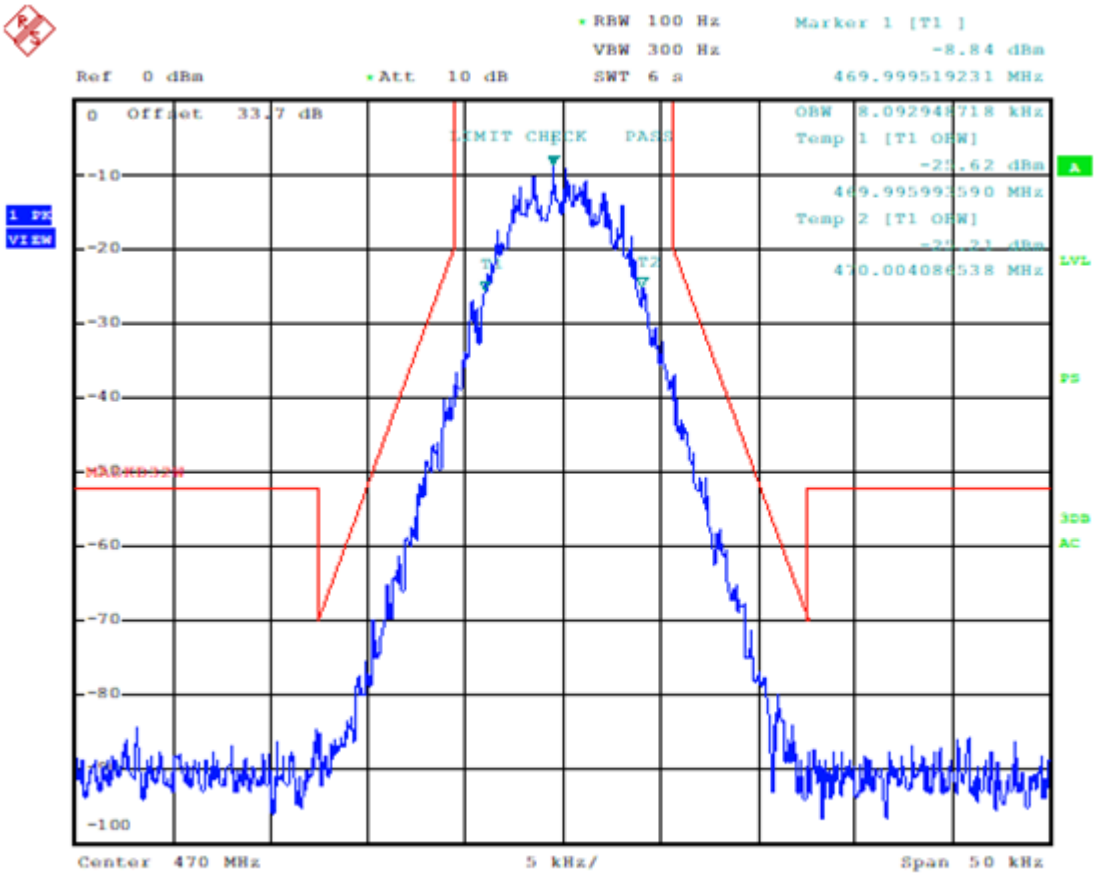
8K10F1E/F1D (P25 Phase I C4FM Voice, Data)



849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

Input Signals

8K10F1W (P25 Phase II H-CPM Voice & Data)



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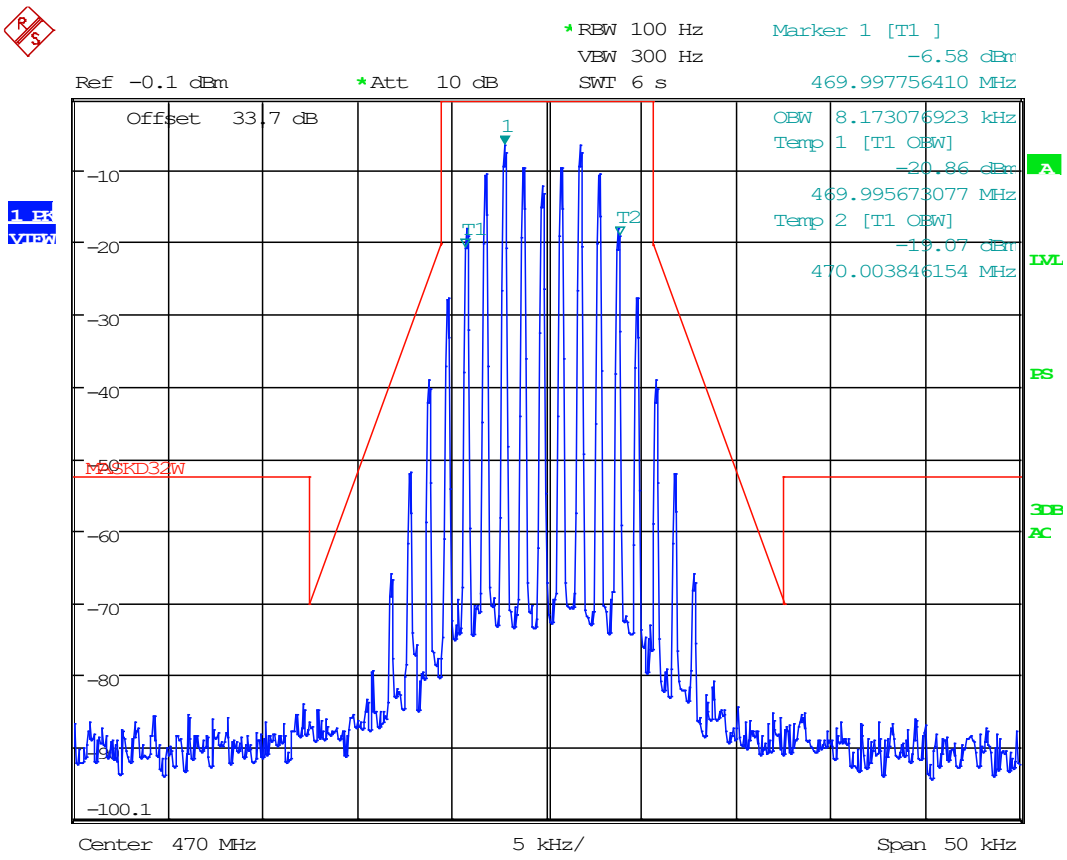
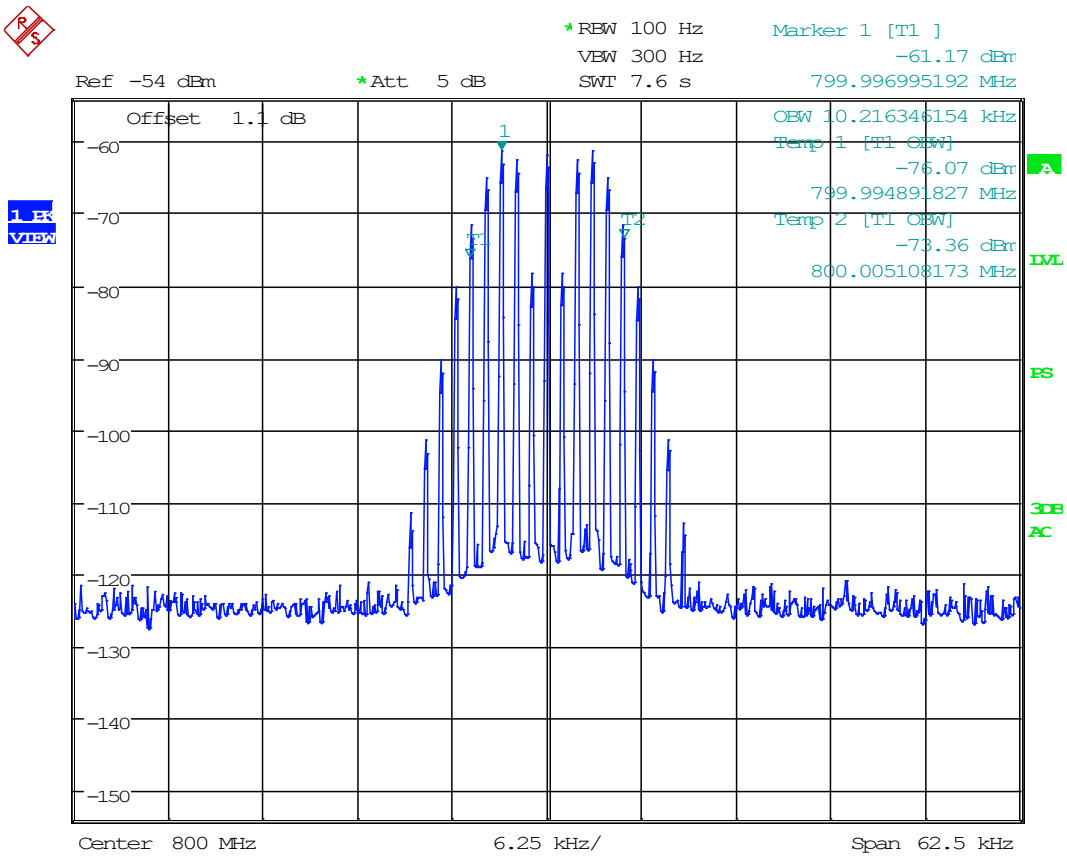
Input Signals

11K3F3E (Narrowband Analog FM Voice)



Input Signals

16K0F3E (Wideband Analog FM Voice)

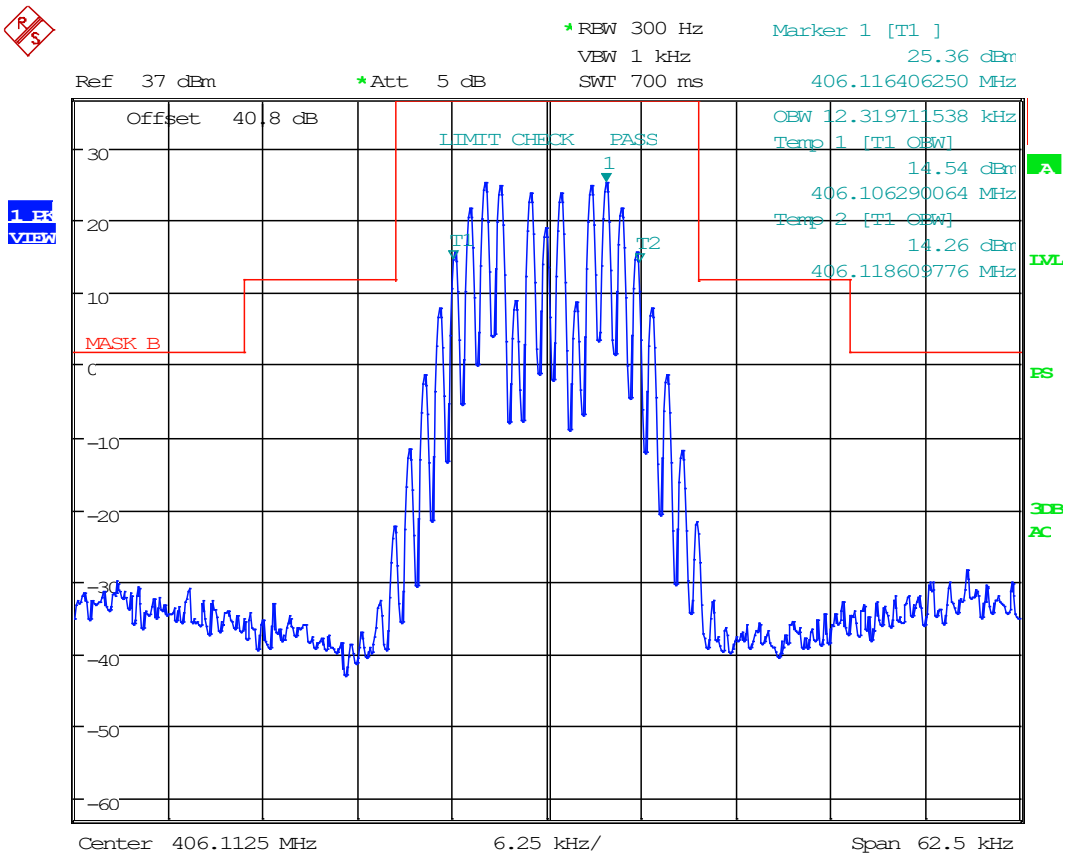


Date: 30.JAN.2019 14:23:14

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, 25k FM, At AGC



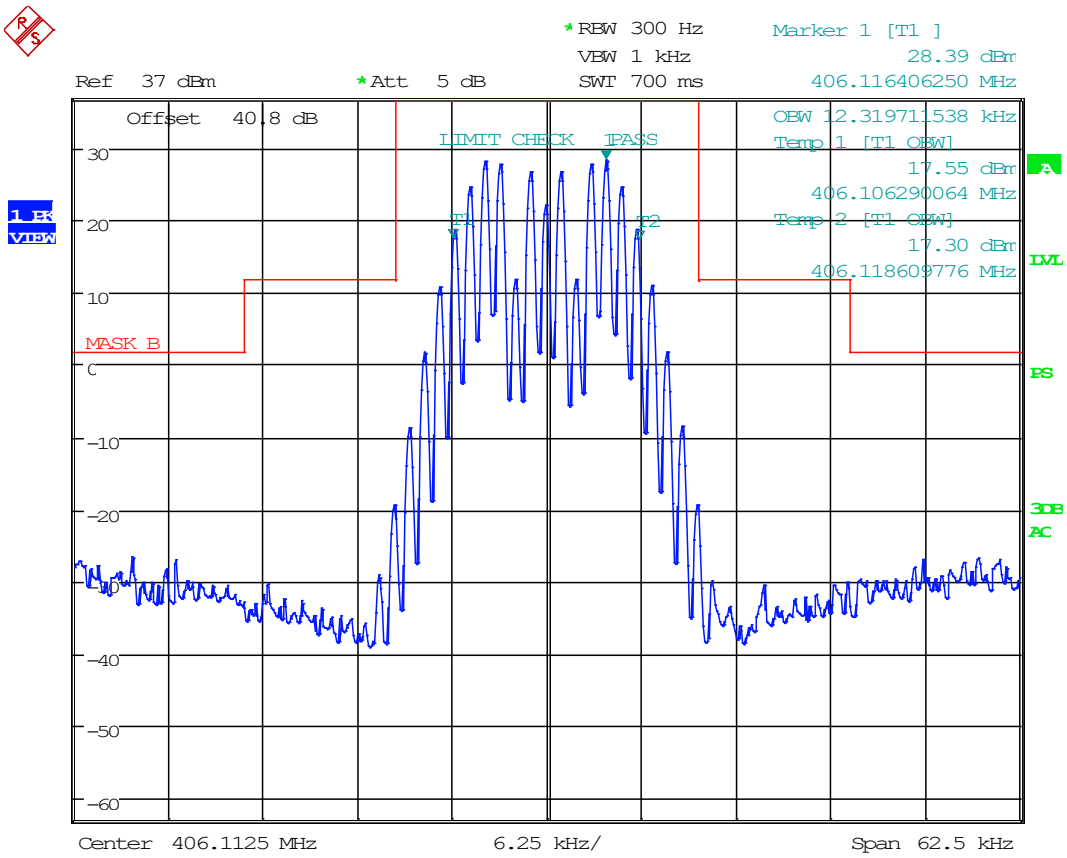
Date: 27.JUL.2020 17:40:49

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, 25k FM, At AGC +3 dB



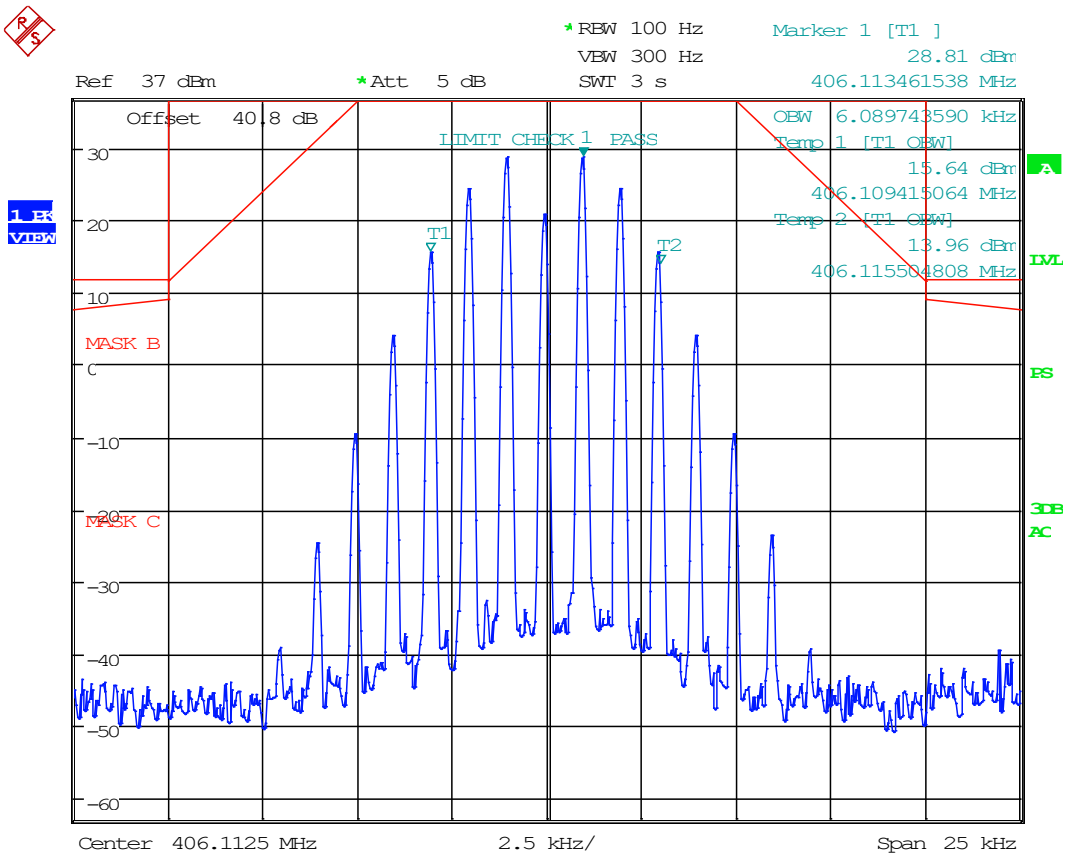
Date: 27.JUL.2020 17:41:32

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, 12.5k FM, OBW



Date: 27.JUL.2020 17:29:43

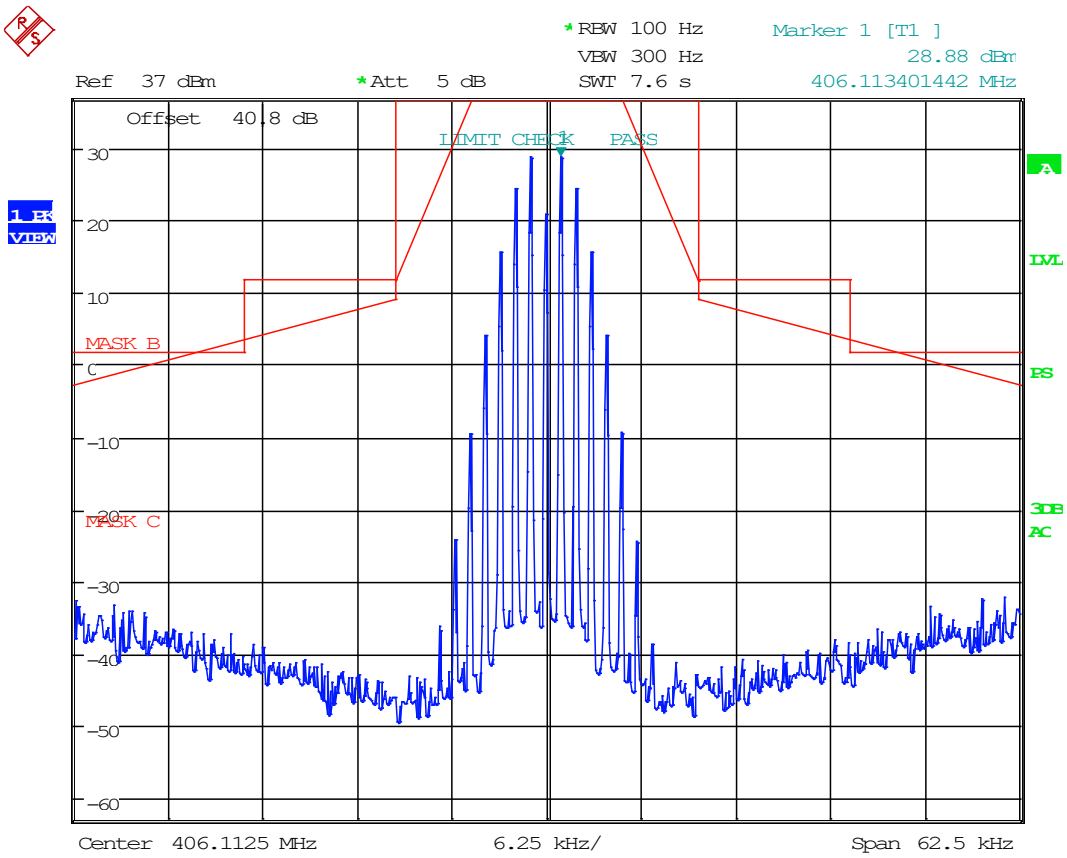
Note: Occupied Bandwidth (99%) for this emission was taken separately, due to measurement setup being incompatible with the setup used in Emission Mask compliance.

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, 12.5k FM, At AGC



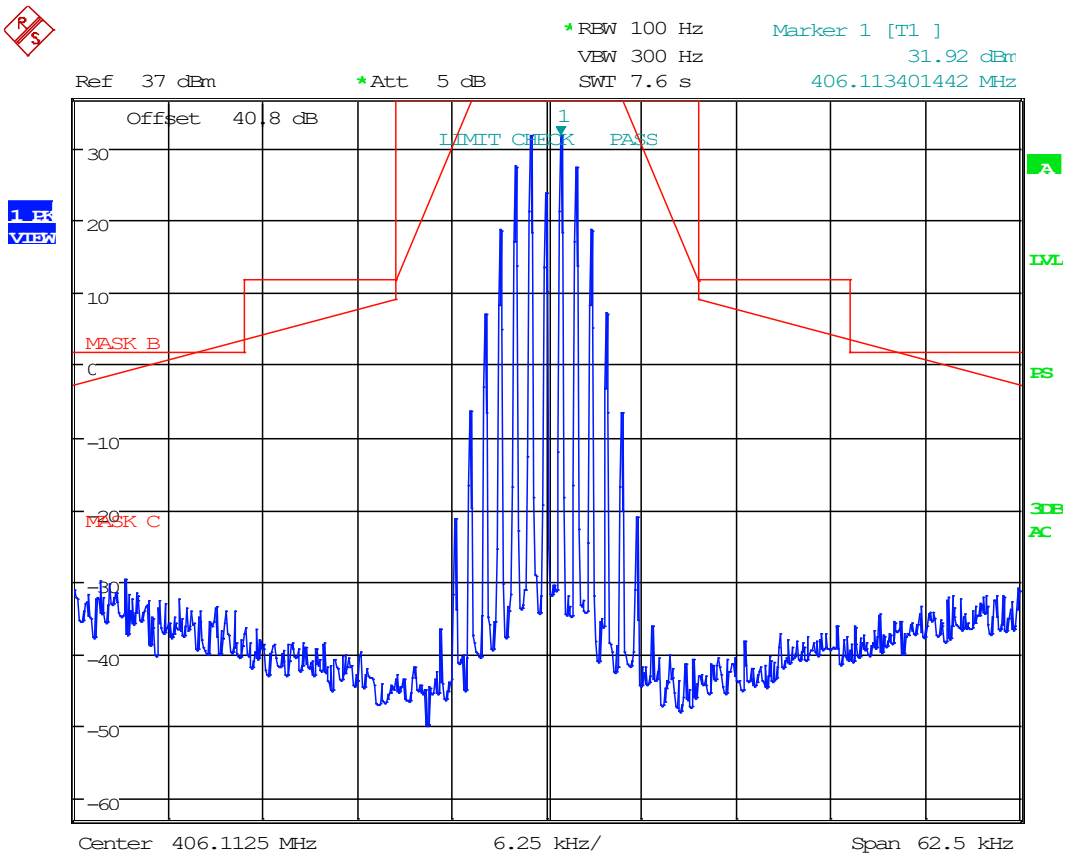
Date: 27.JUL.2020 17:28:31

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, 12.5k FM, At AGC +3 dB



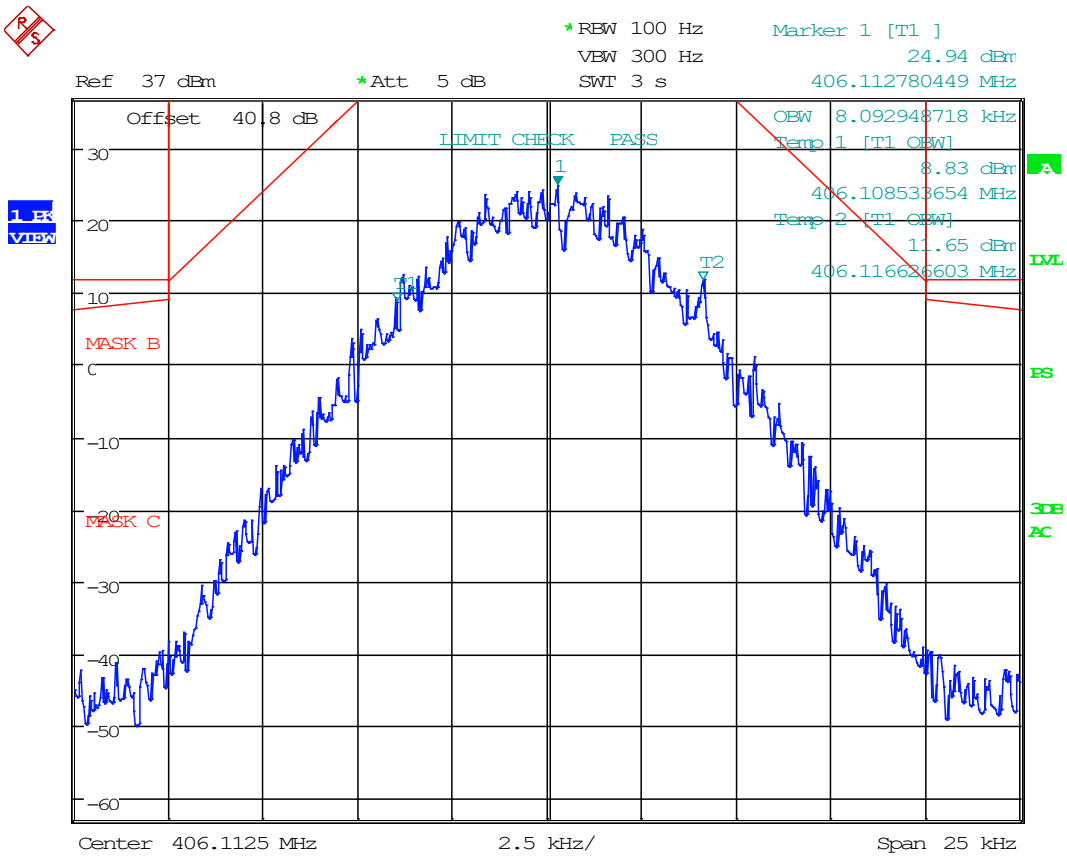
Date: 27.JUL.2020 17:27:34

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, C4FM, OBW



Date: 27.JUL.2020 17:30:55

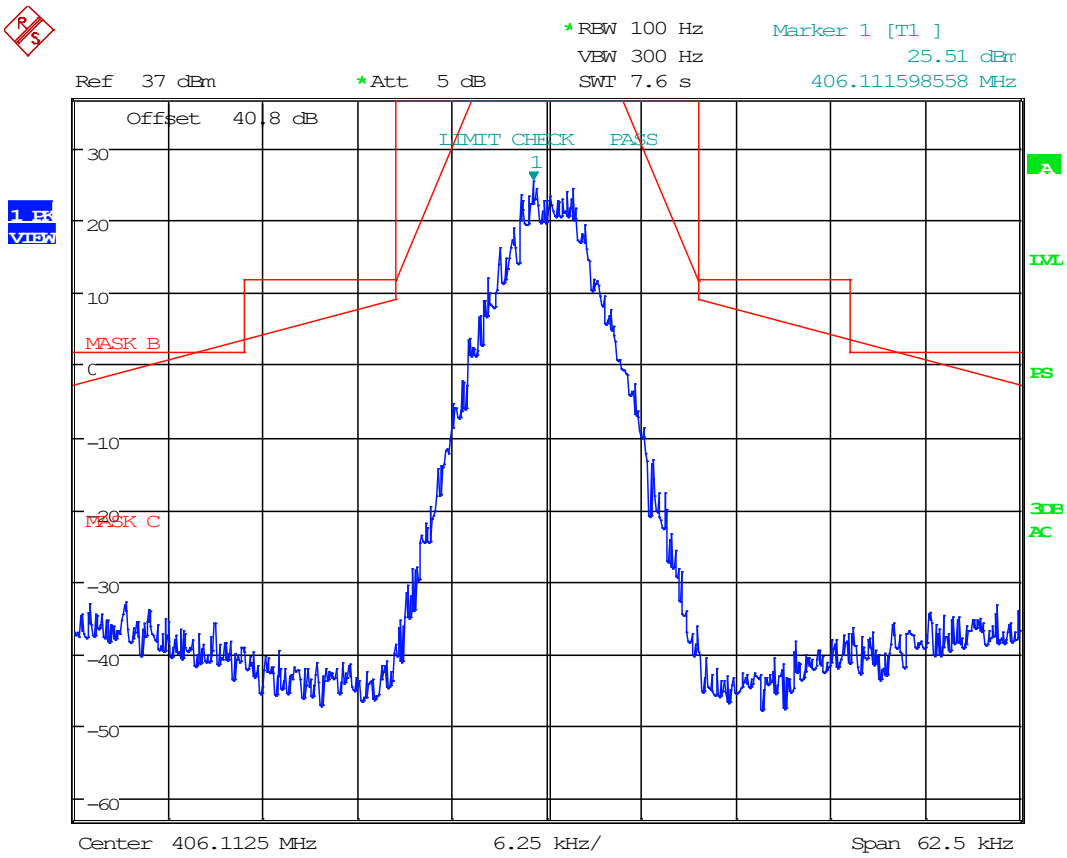
Note: Occupied Bandwidth (99%) for this emission was taken separately, due to measurement setup being incompatible with the setup used in Emission Mask compliance.

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, C4FM, At AGC



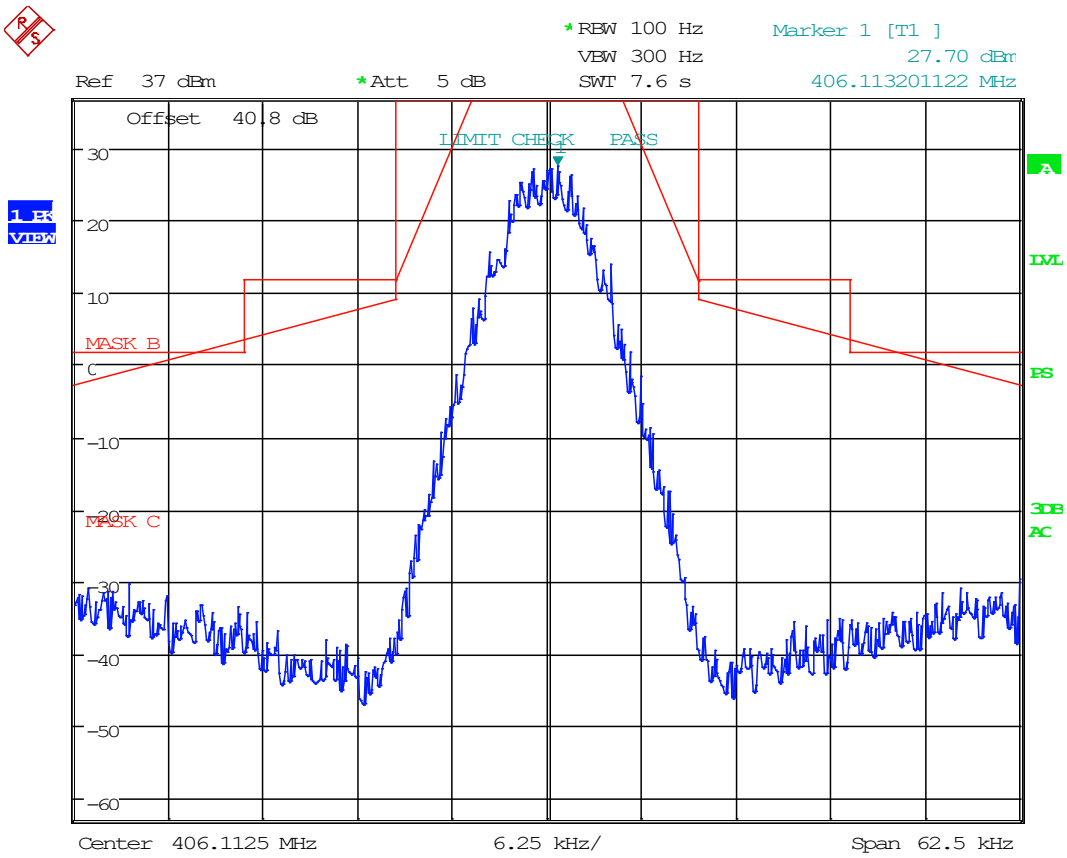
Date: 27.JUL.2020 17:37:59

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, C4FM, At AGC +3 dB



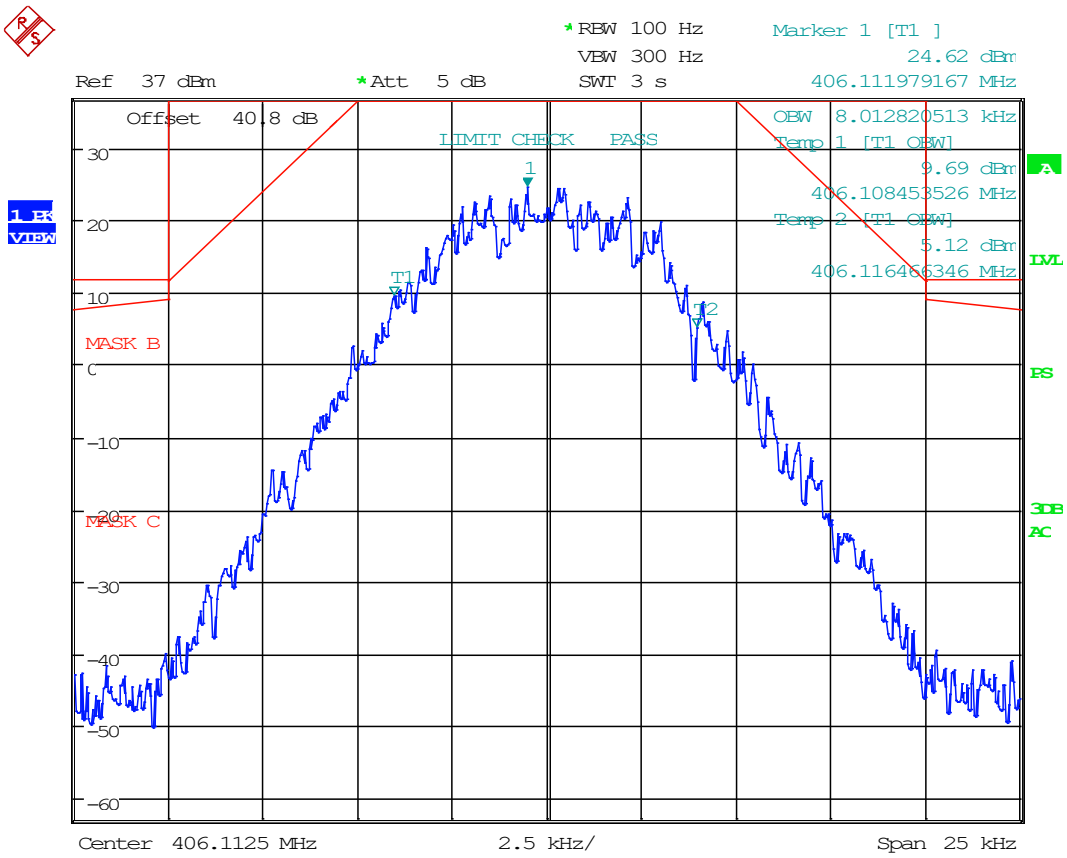
Date: 27.JUL.2020 17:38:59

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, H-CPM, OBW



Date: 27.JUL.2020 17:31:41

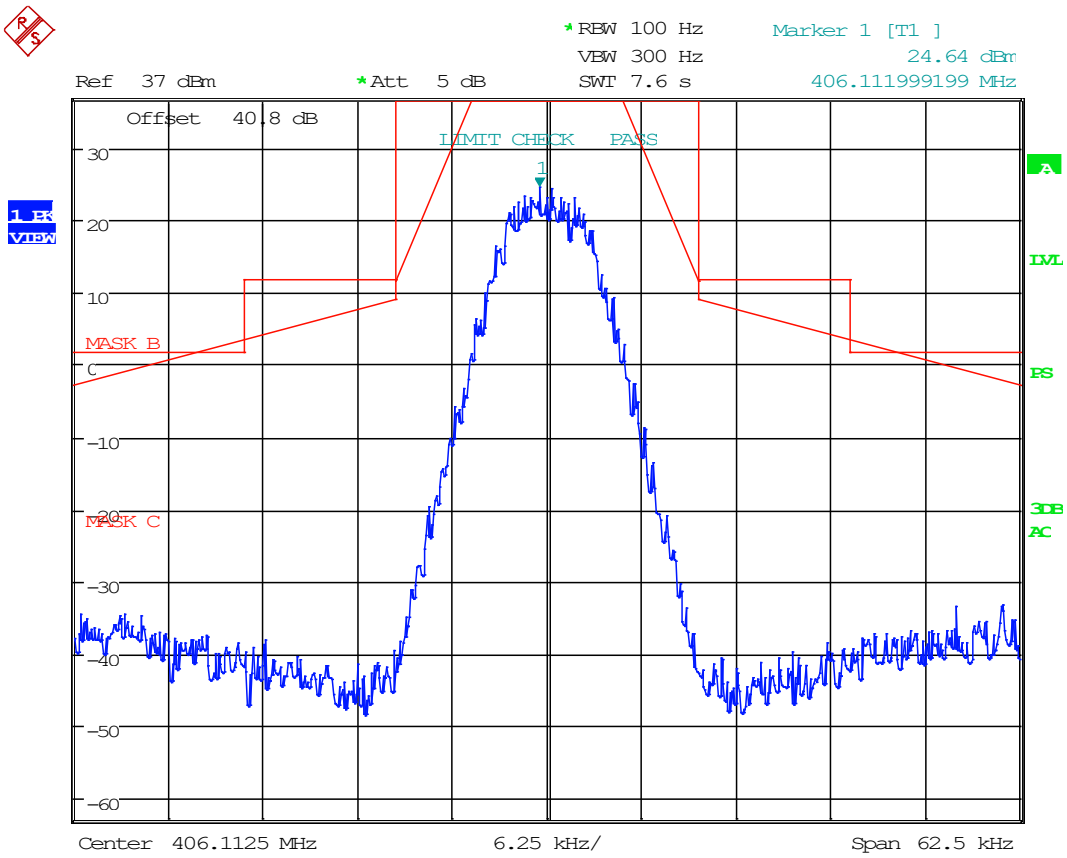
Note: Occupied Bandwidth (99%) for this emission was taken separately, due to measurement setup being incompatible with the setup used in Emission Mask compliance.

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, H-CPM, AT AGC



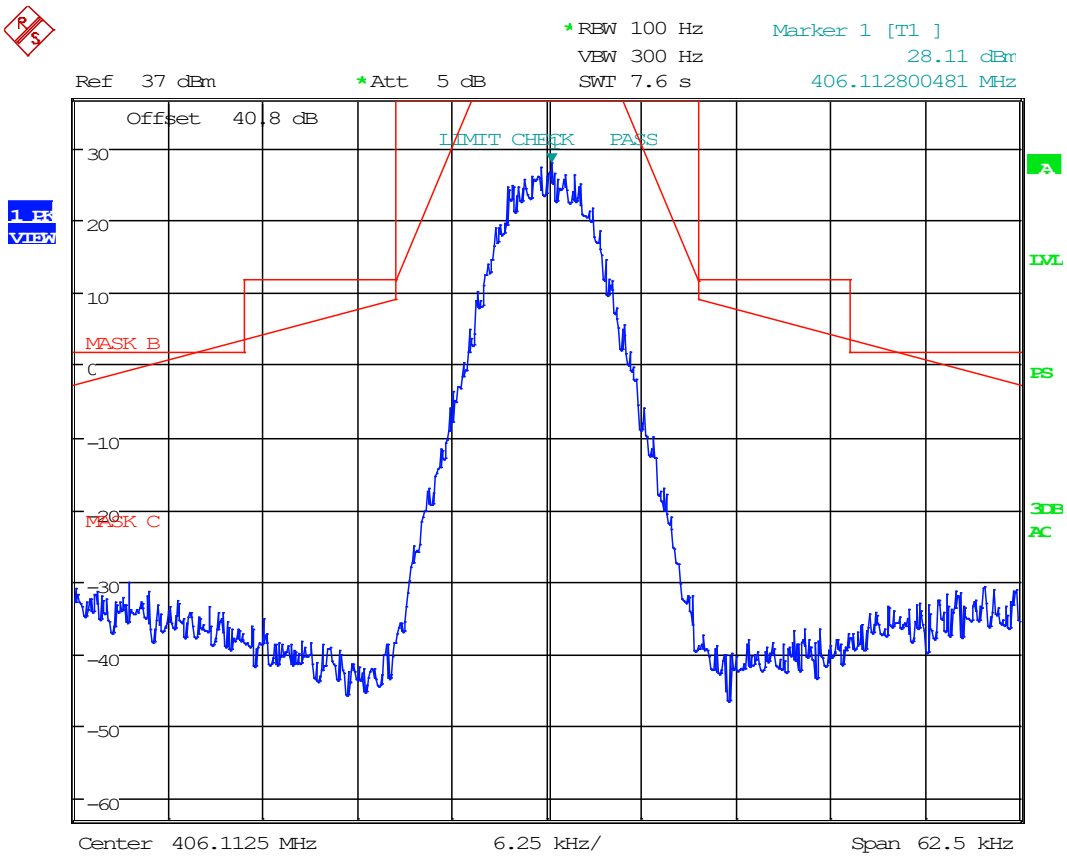
Date: 27.JUL.2020 17:36:52

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

406.1125 MHz, Uplink, H-CPM, AT AGC +3 DB

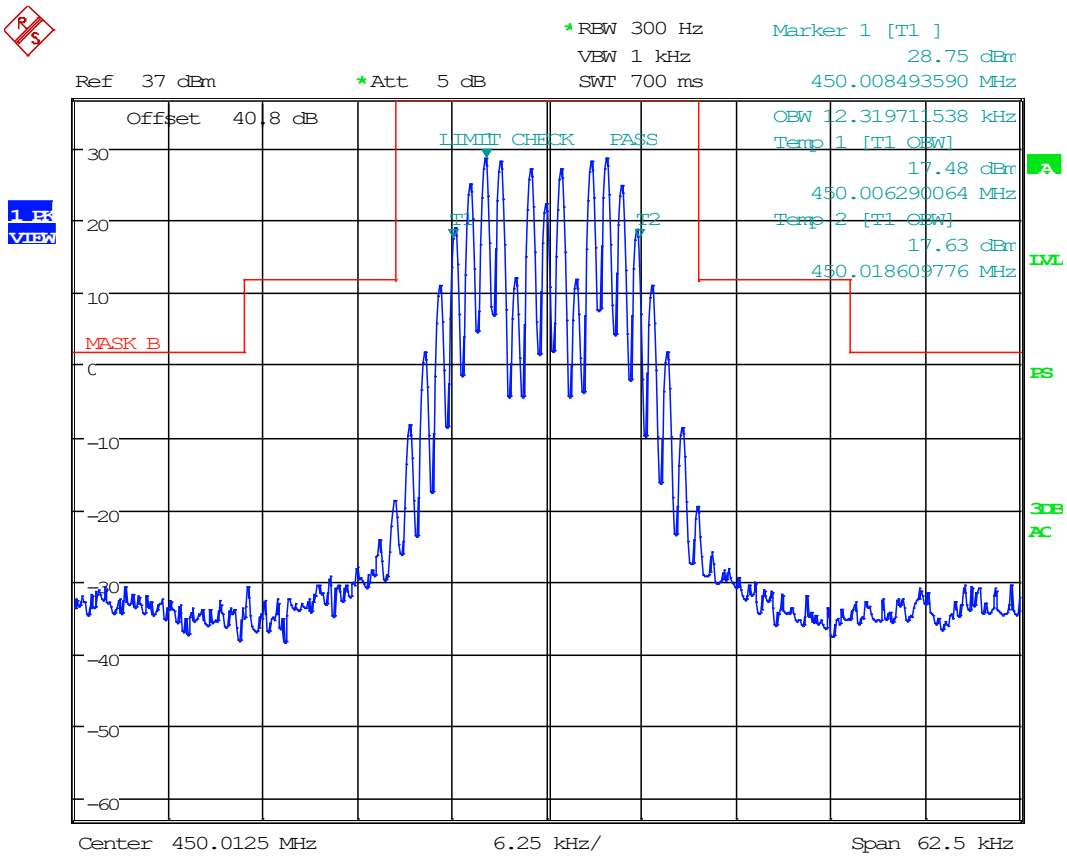


Date: 27.JUL.2020 17:35:59

Comparison to Input: Complies with Standards

EMISSION MASK & IVO

450.0125 MHz, Uplink, 25k FM, At AGC



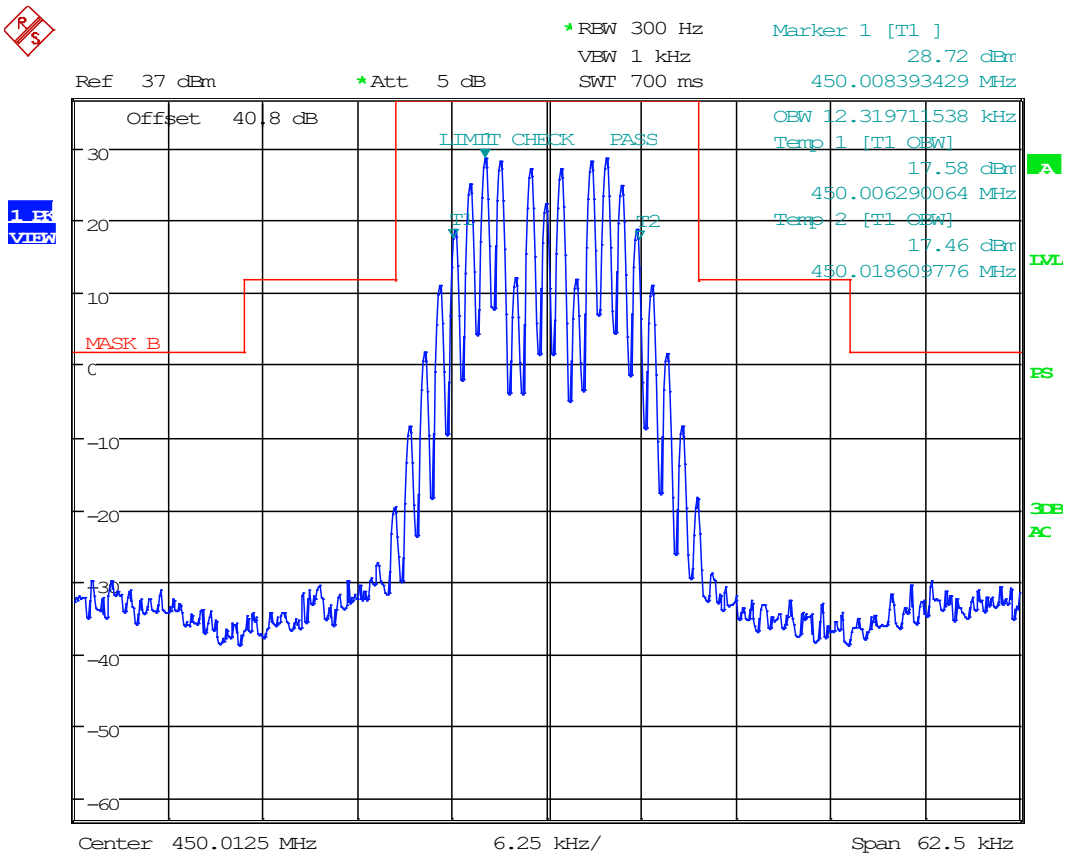
Date: 27.JUL.2020 11:23:18

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

450.0125 MHz, Uplink, 25k FM, At AGC +3 dB



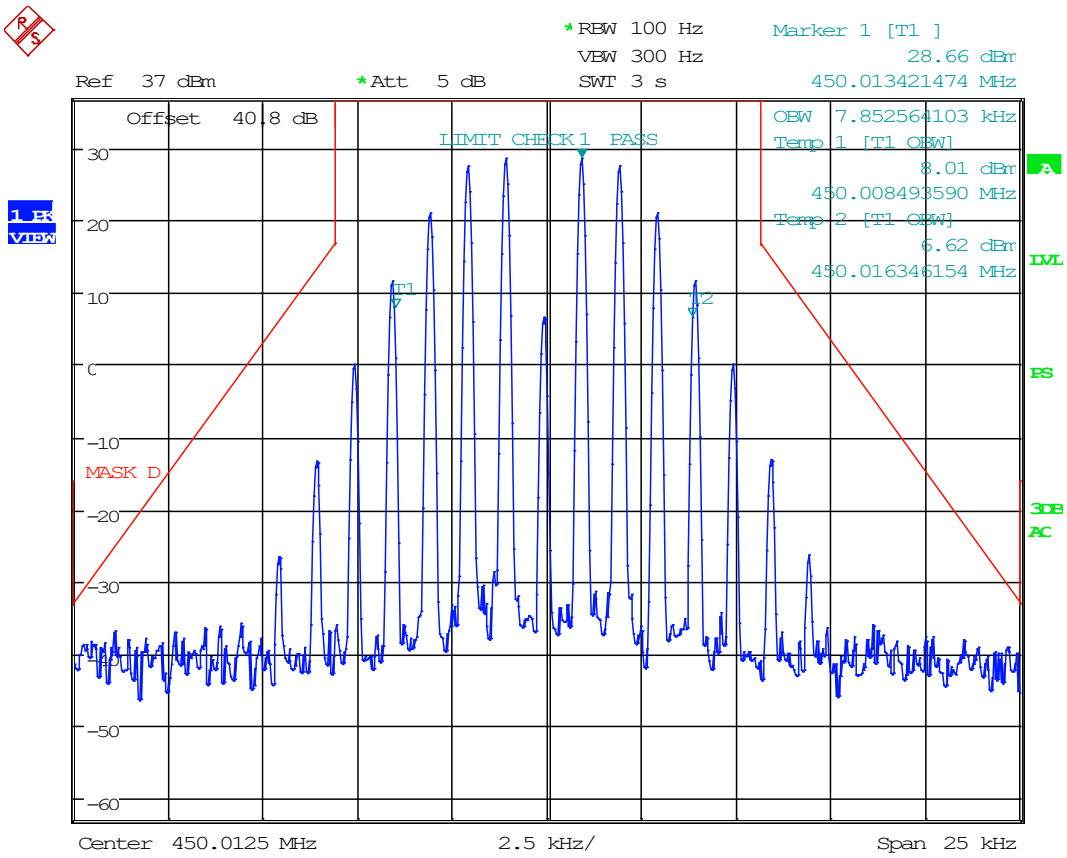
Date: 27.JUL.2020 11:24:07

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

450.0125 MHz, Uplink, 12.5k FM, At AGC



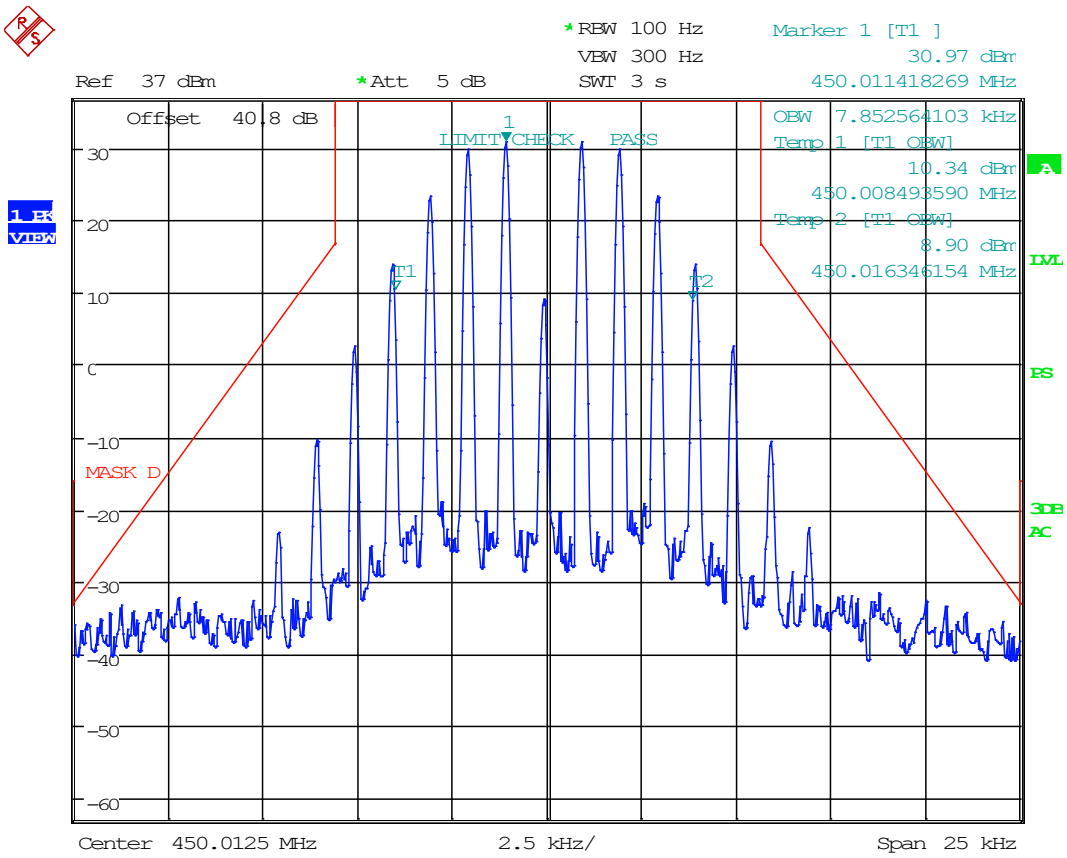
Date: 24.JUL.2020 18:41:05

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

450.0125 MHz, Uplink, 12.5k FM, At AGC +3 dB



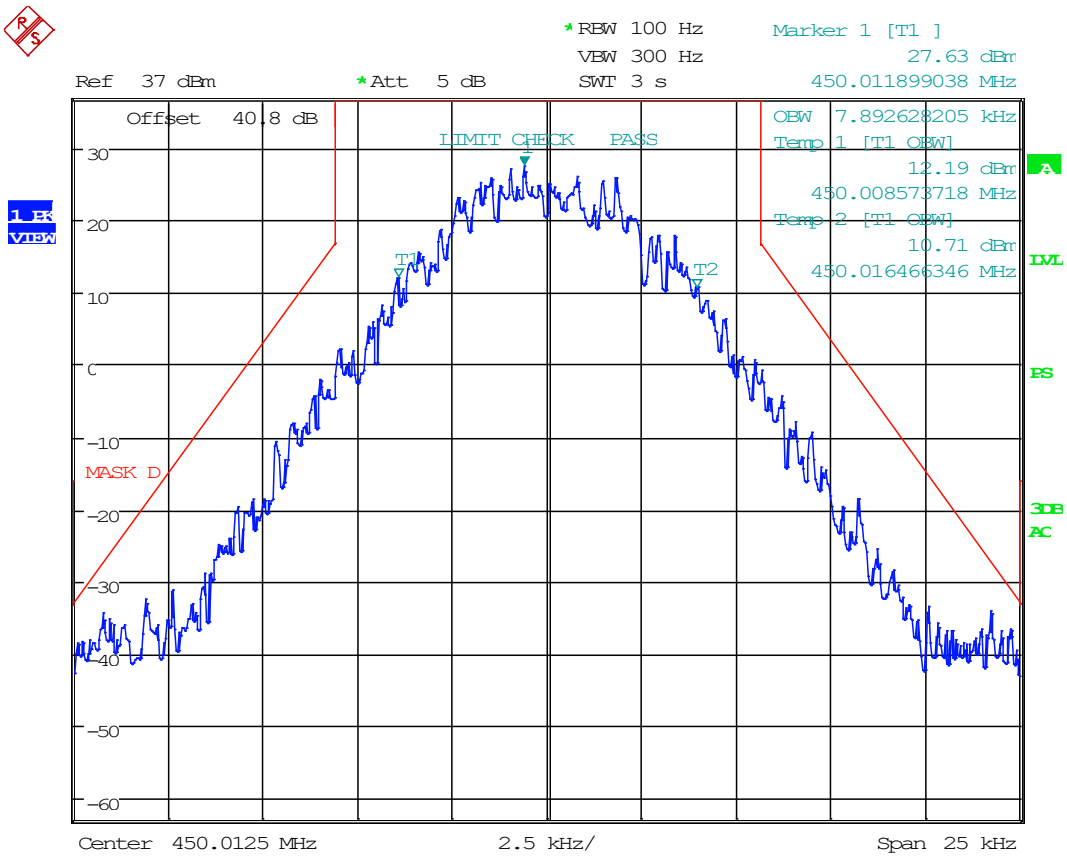
Date: 24.JUL.2020 18:42:24

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

450.0125 MHz, Uplink, C4FM, At AGC



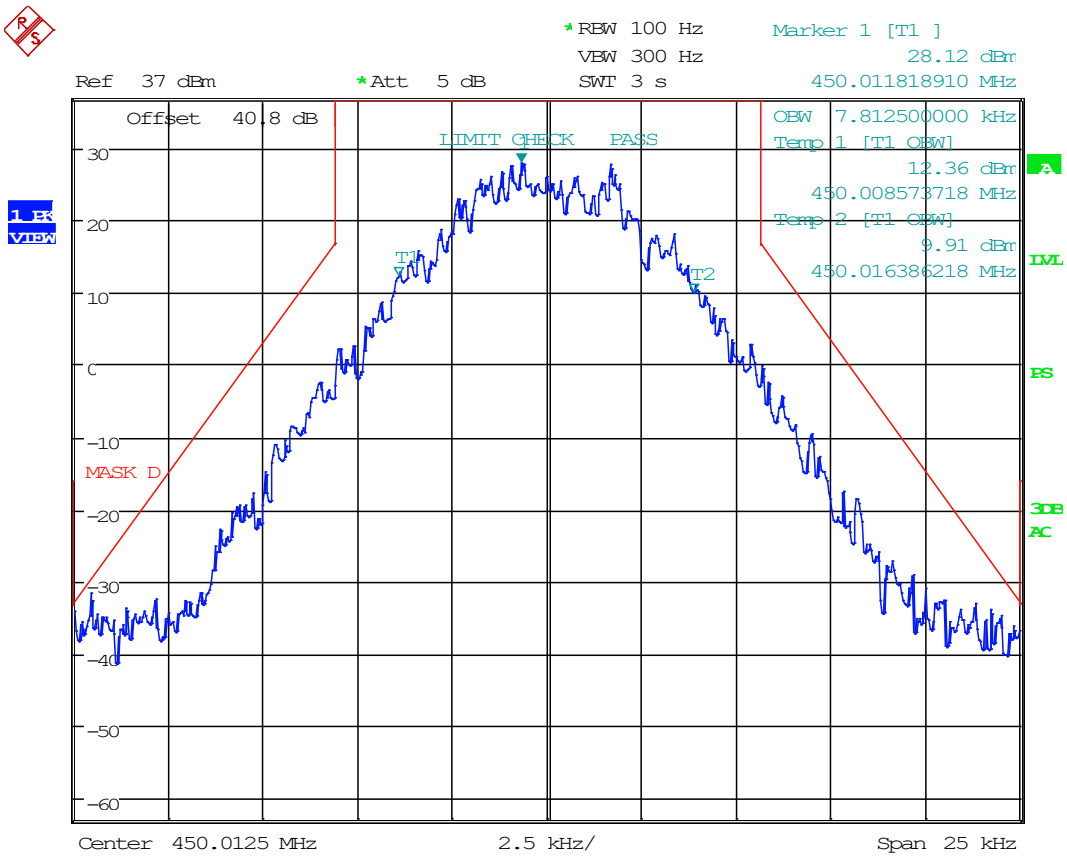
Date: 24.JUL.2020 18:43:31

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

450.0125 MHz, Uplink, C4FM, At AGC +3 dB



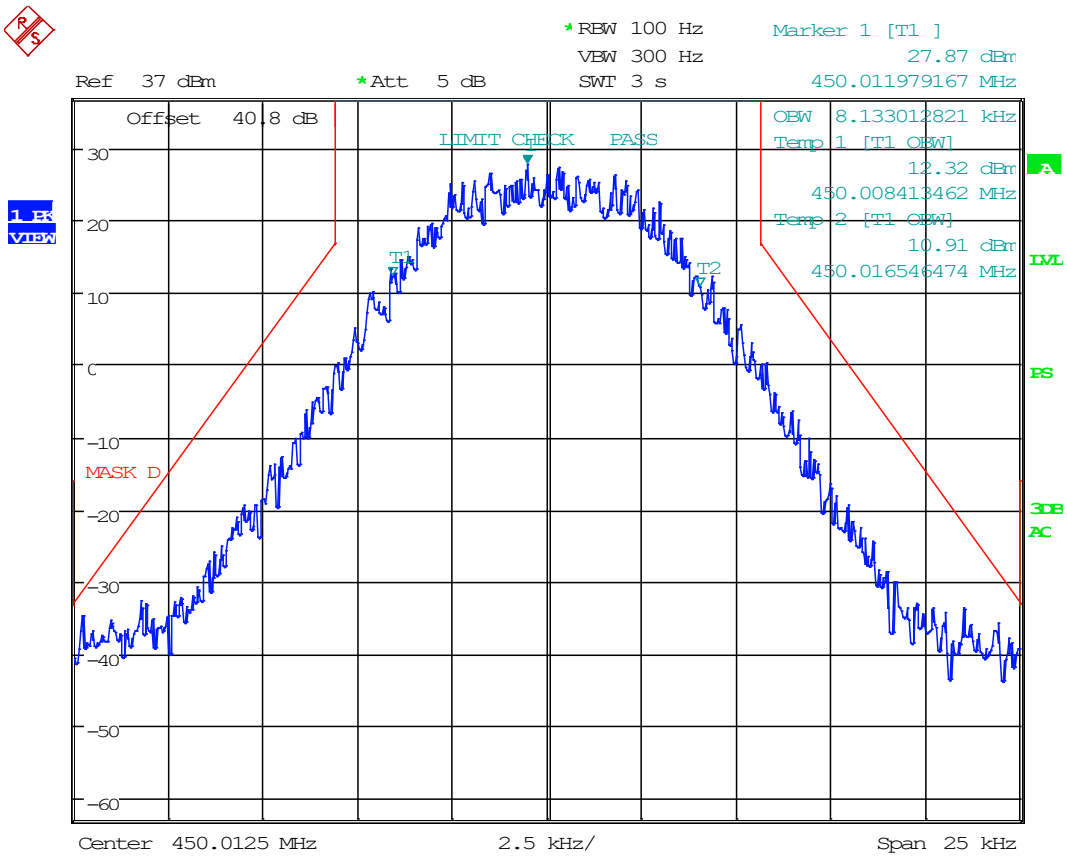
Date: 24.JUL.2020 18:44:18

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

450.0125 MHz, Uplink, H-CPM, AT AGC



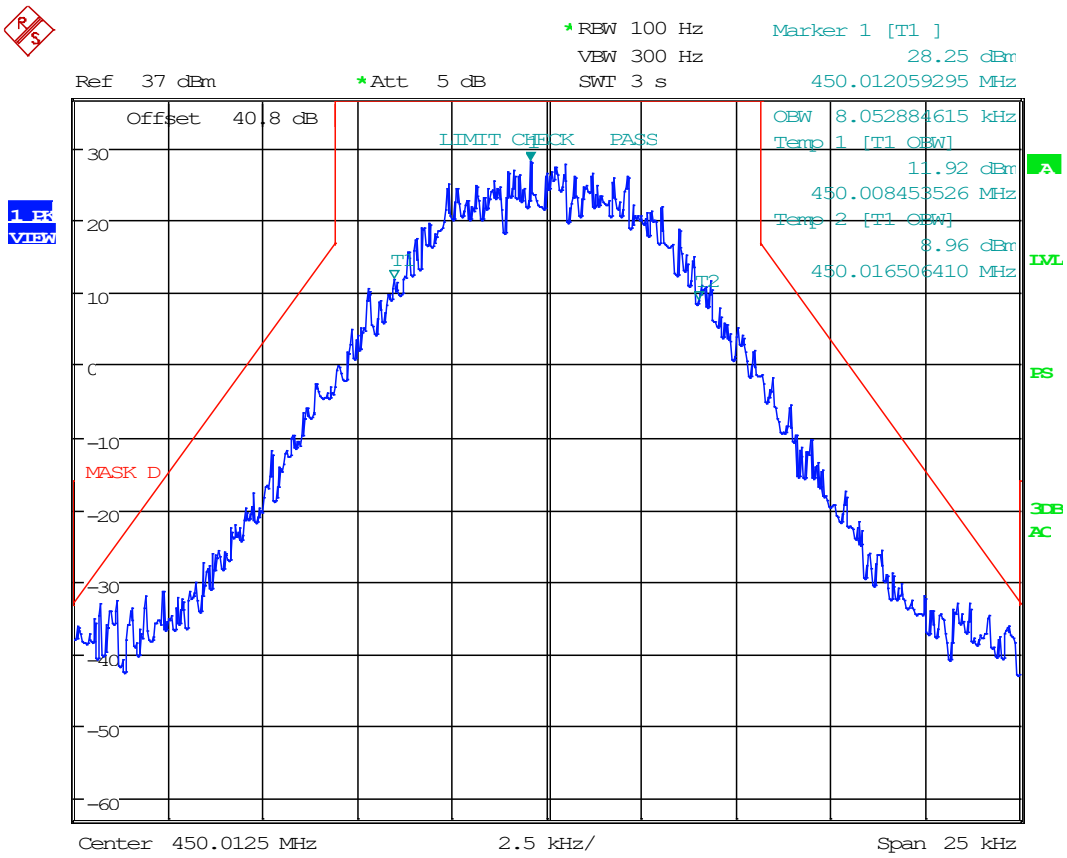
Date: 24.JUL.2020 18:46:07

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

450.0125 MHz, Uplink, H-CPM, AT AGC +3 DB

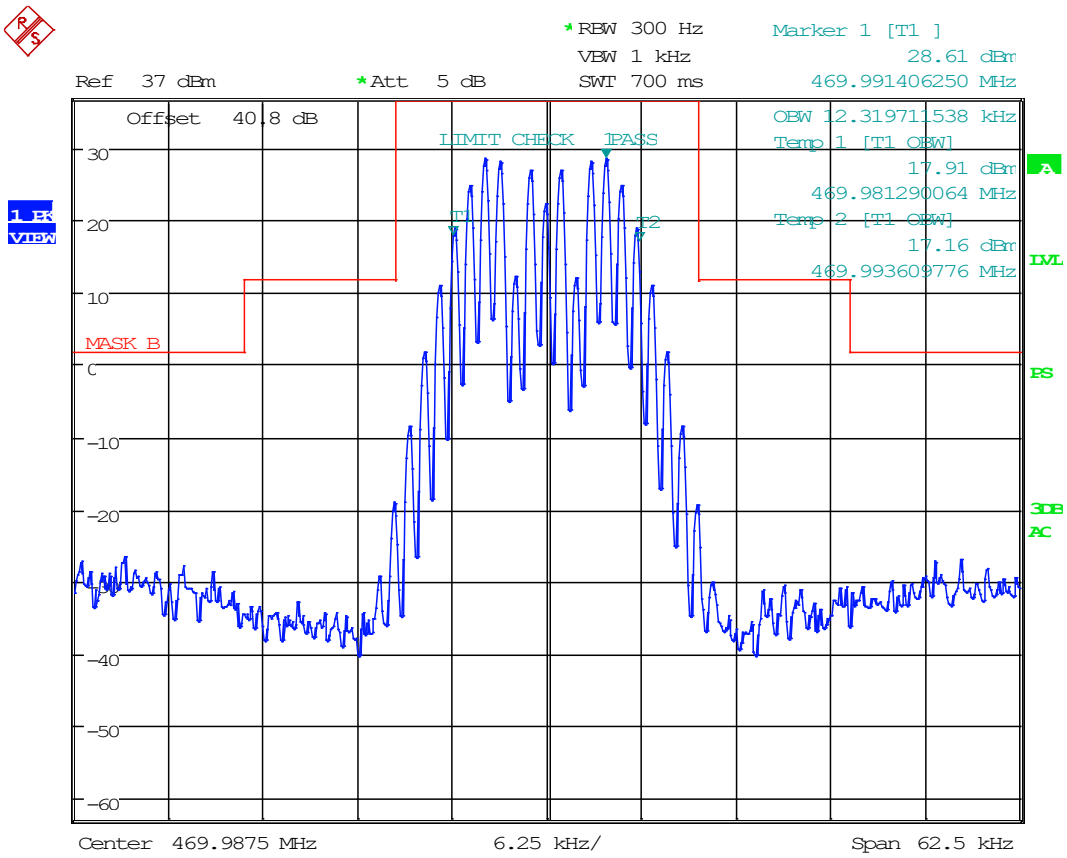


Date: 24.JUL.2020 18:47:07

Comparison to Input: Complies with Standards

EMISSION MASK & IVO

469.9875 MHz, Downlink, 25k FM, At AGC



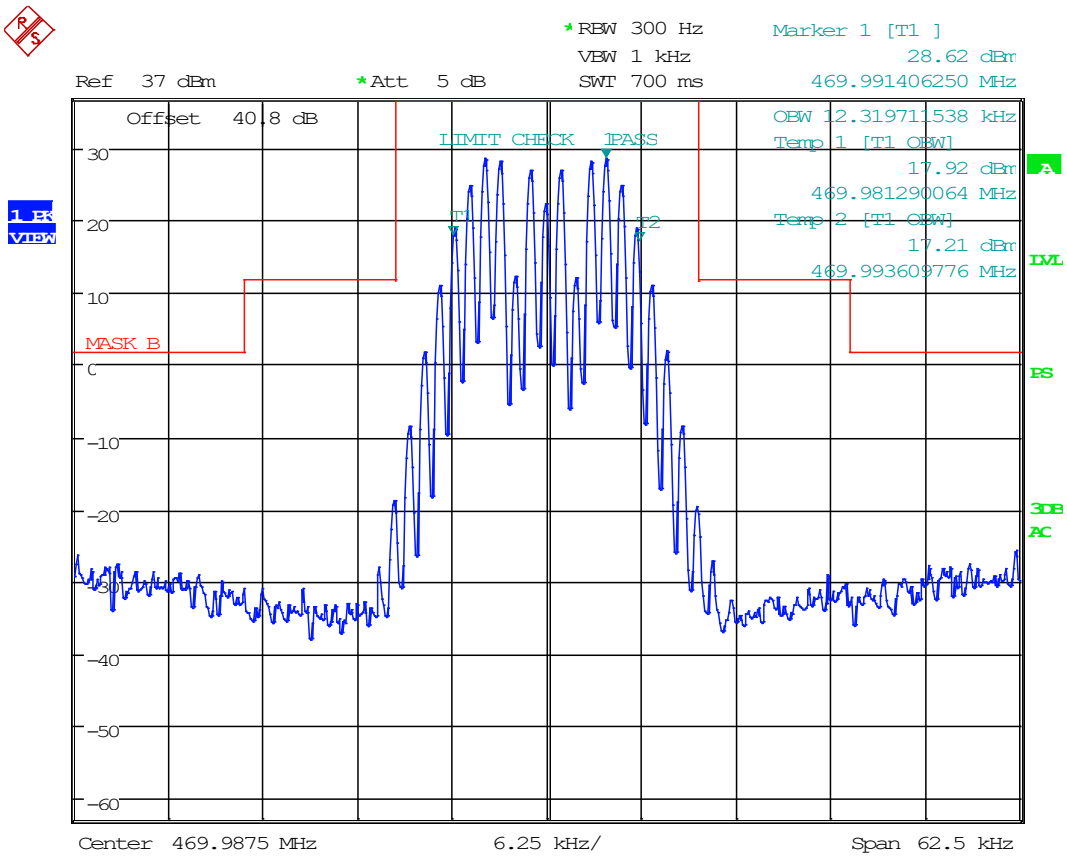
Date: 27.JUL.2020 13:05:22

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

469.9875 MHz, Downlink, 25k FM, At AGC +3 dB



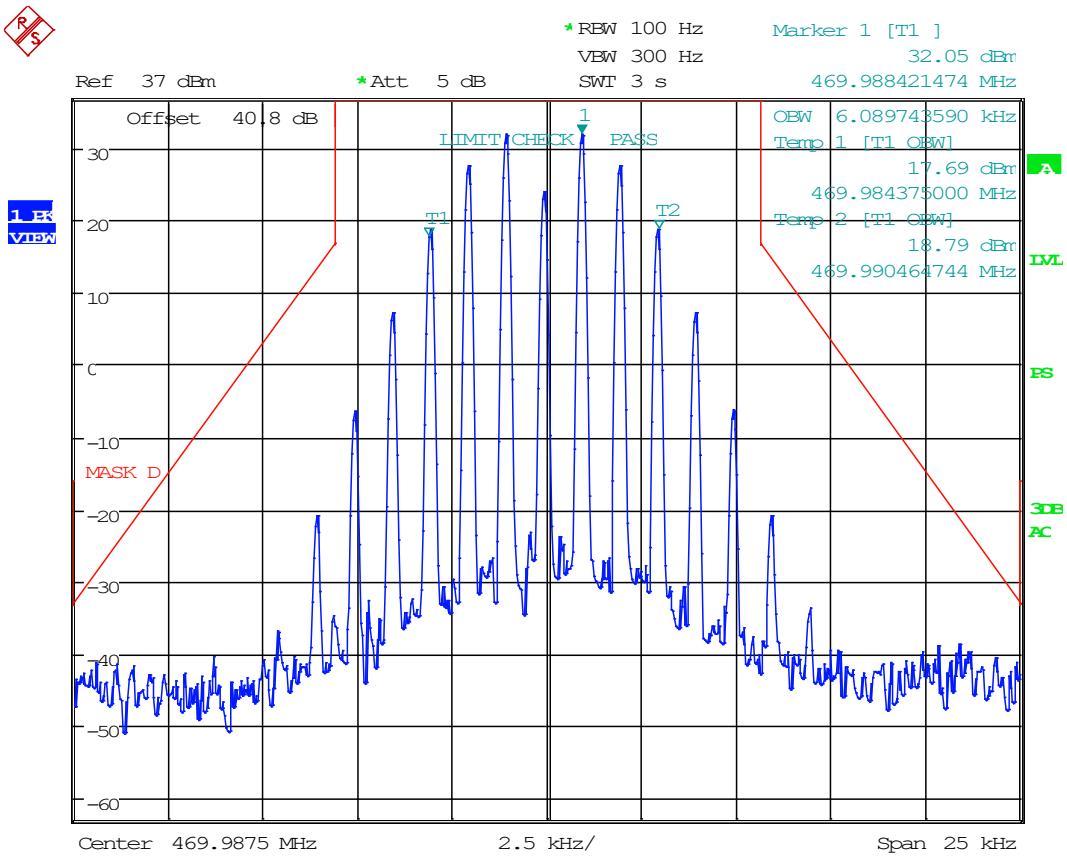
Date: 27.JUL.2020 13:05:58

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

469.9875 MHz, Downlink, 12.5k FM, At AGC



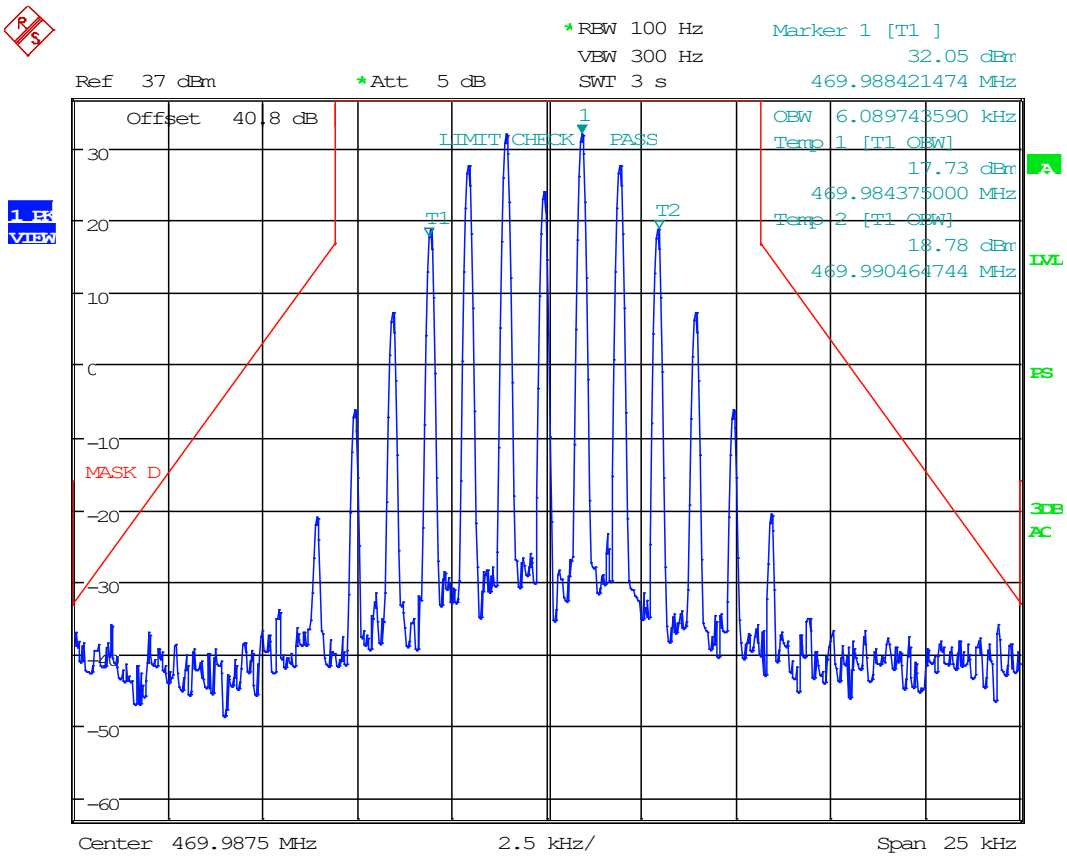
Date: 27.JUL.2020 12:56:26

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

469.9875 MHz, Downlink, 12.5k FM, At AGC +3 dB



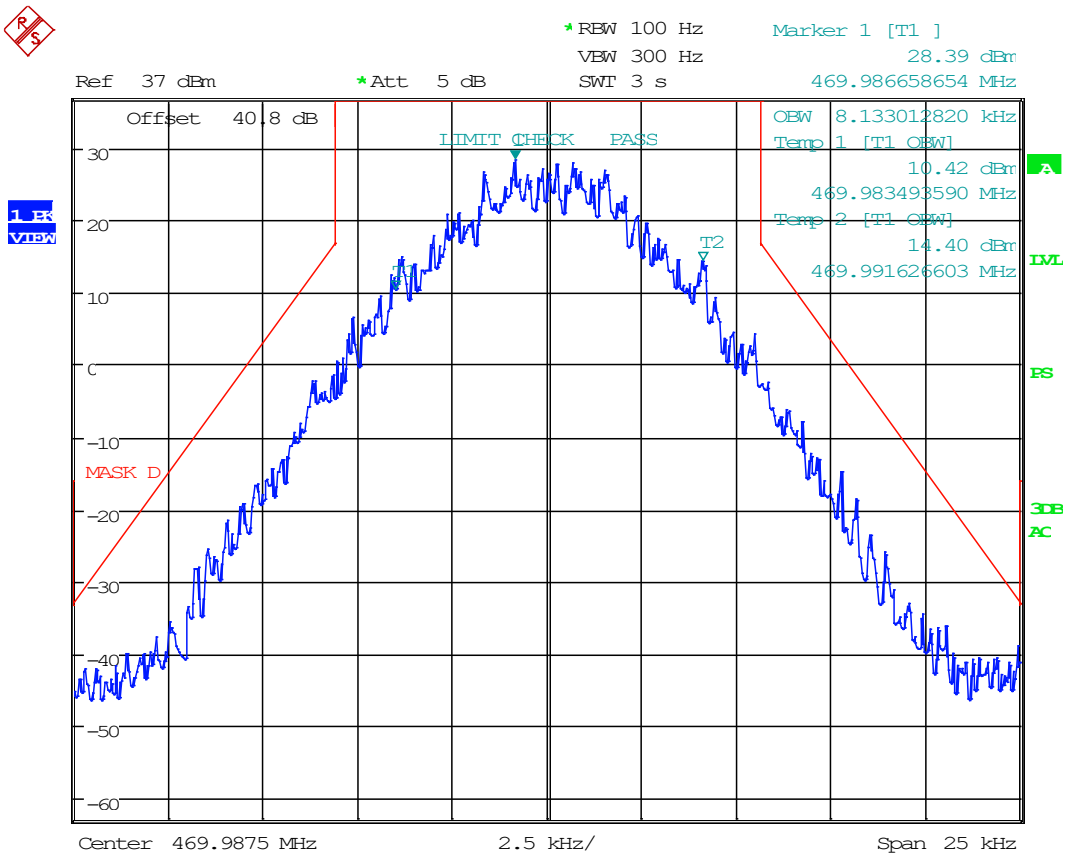
Date: 27.JUL.2020 12:57:09

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

469.9875 MHz, Downlink, C4FM, At AGC



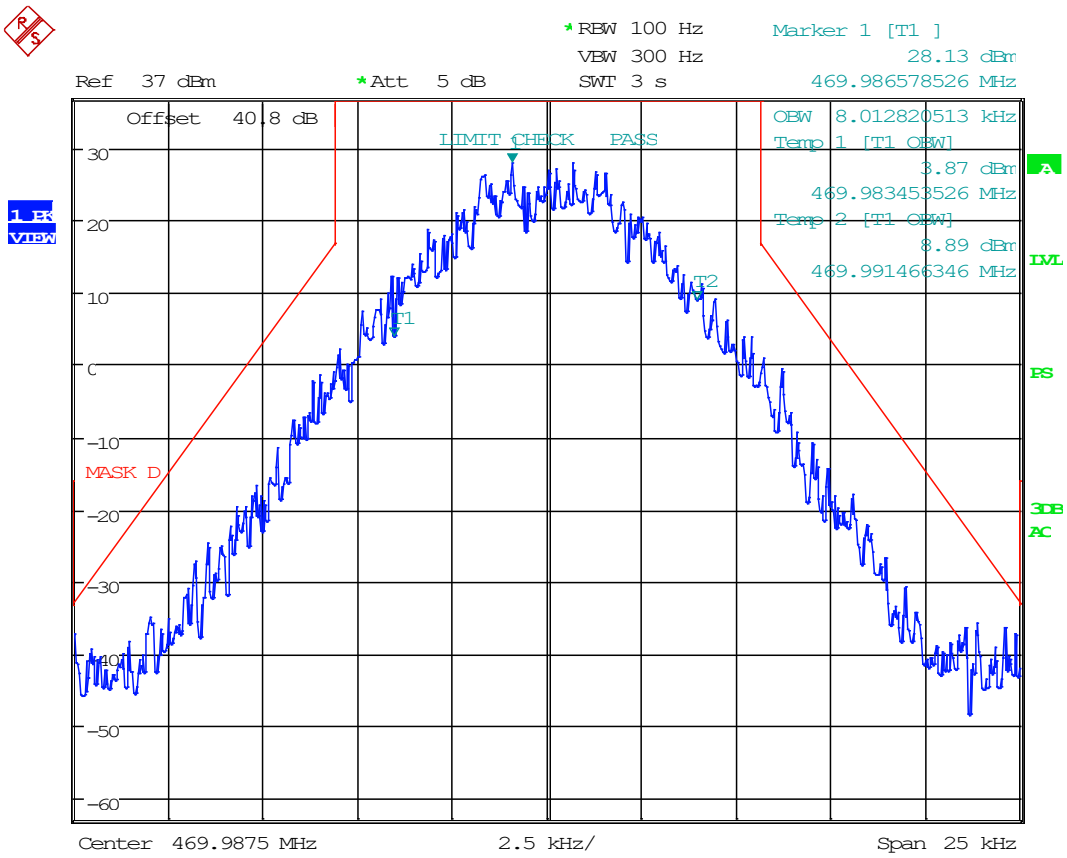
Date: 27.JUL.2020 13:01:12

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

469.9875 MHz, Downlink, C4FM, At AGC +3 dB



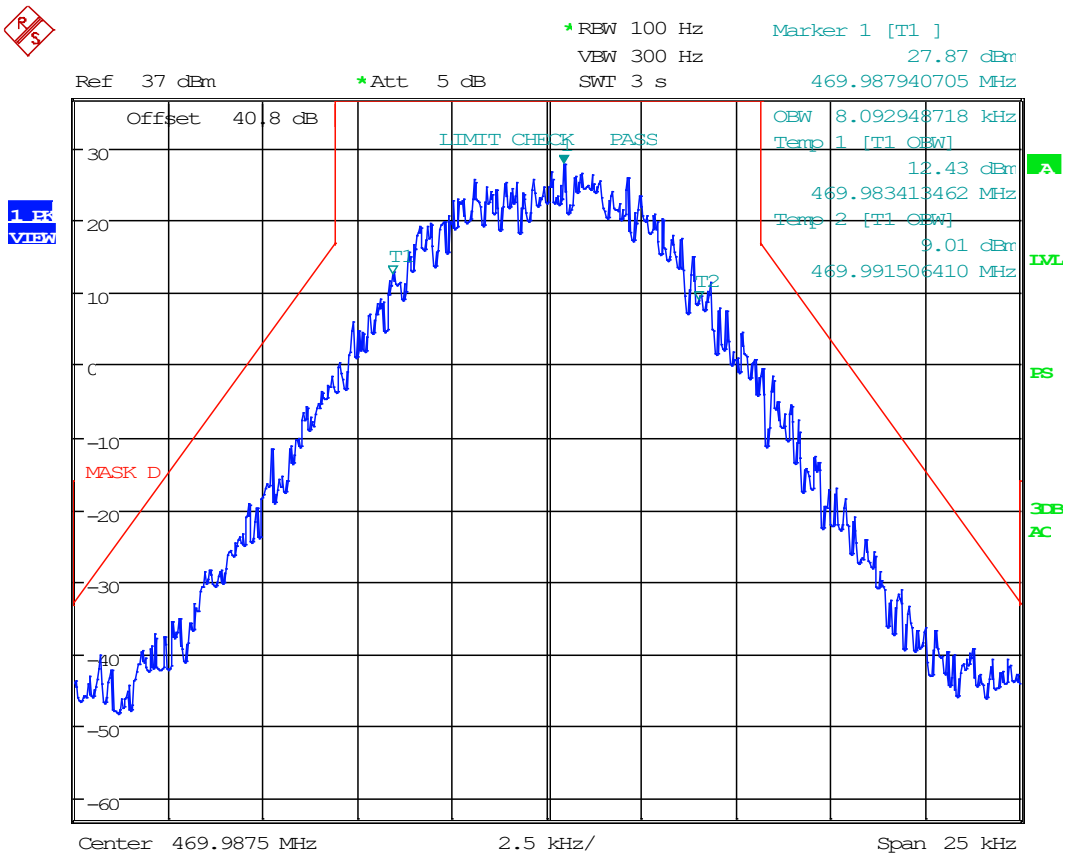
Date: 27.JUL.2020 13:01:36

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

469.9875 MHz, Downlink, H-CPM, AT AGC



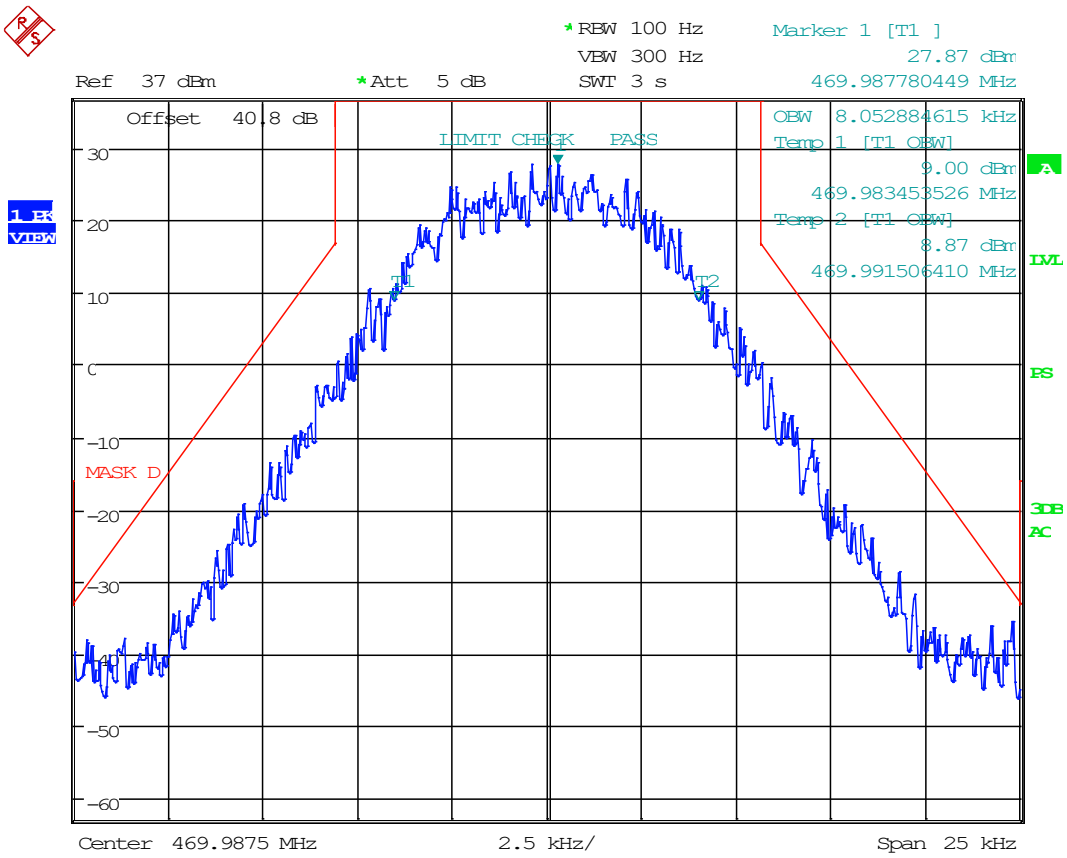
Date: 27.JUL.2020 13:00:31

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

469.9875 MHz, Downlink, H-CPM, AT AGC +3 DB



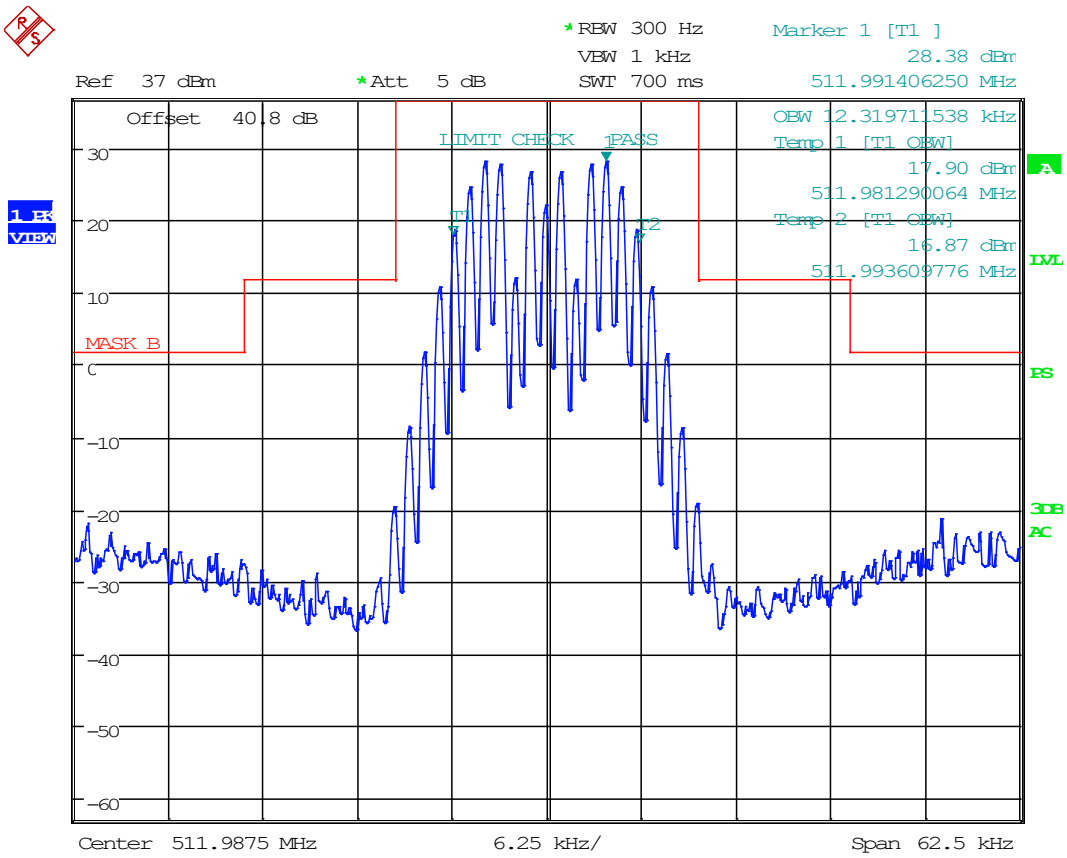
Date: 27.JUL.2020 12:59:52

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

511.9875 MHz, Downlink, 25k FM, At AGC



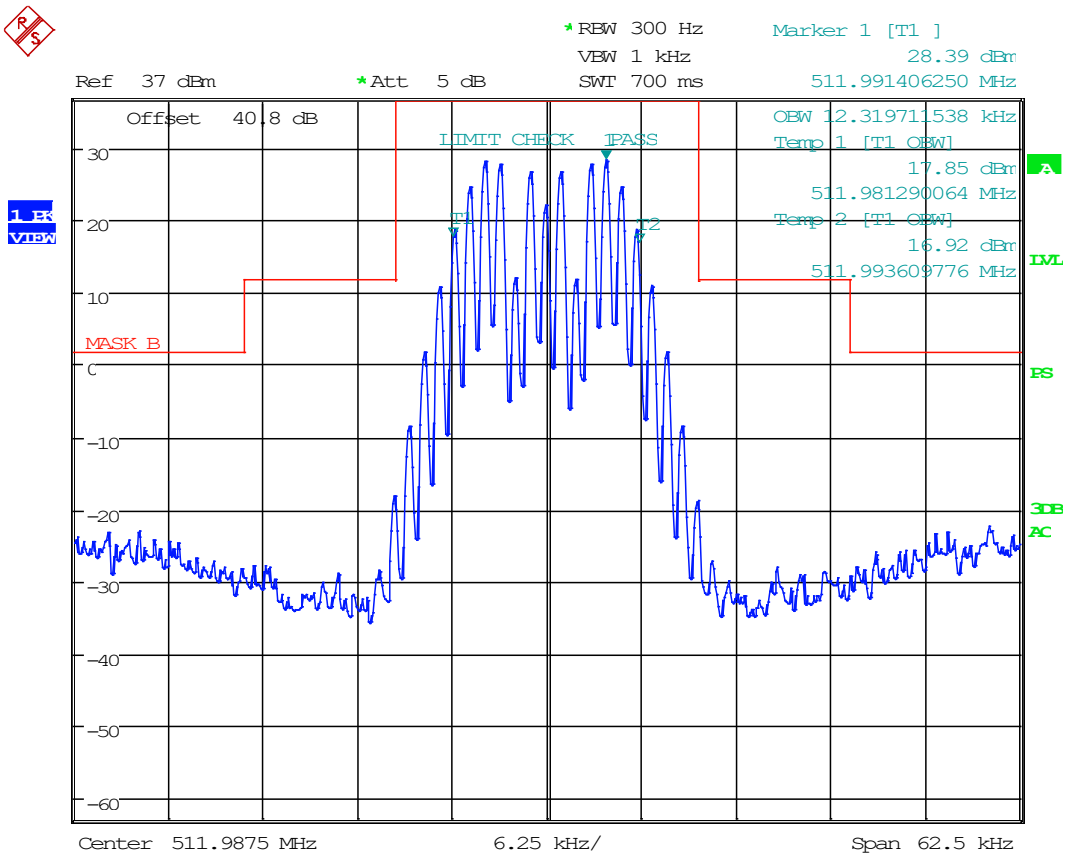
Date: 27.JUL.2020 19:04:30

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

511.9875 MHz, Downlink, 25k FM, At AGC +3 dB

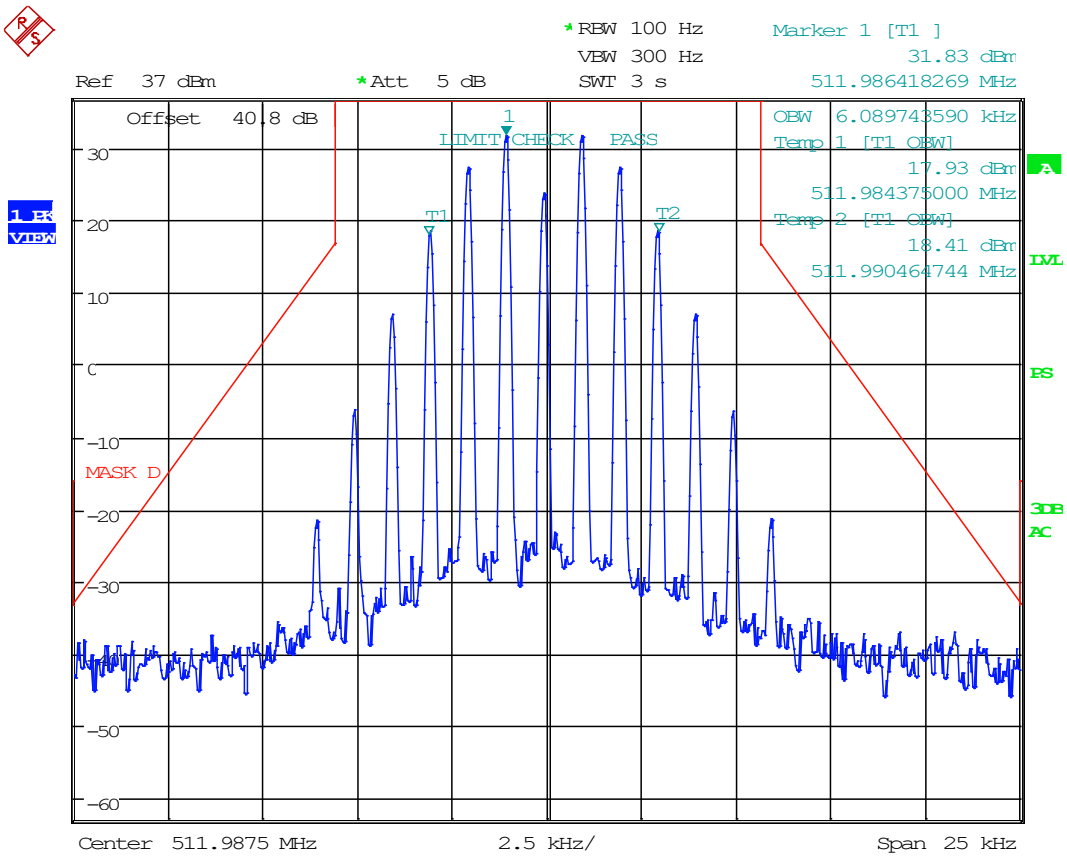


Date: 27.JUL.2020 19:05:23

Comparison to Input: Complies with Standards

EMISSION MASK & IVO

511.9875 MHz, Downlink, 12.5k FM, At AGC



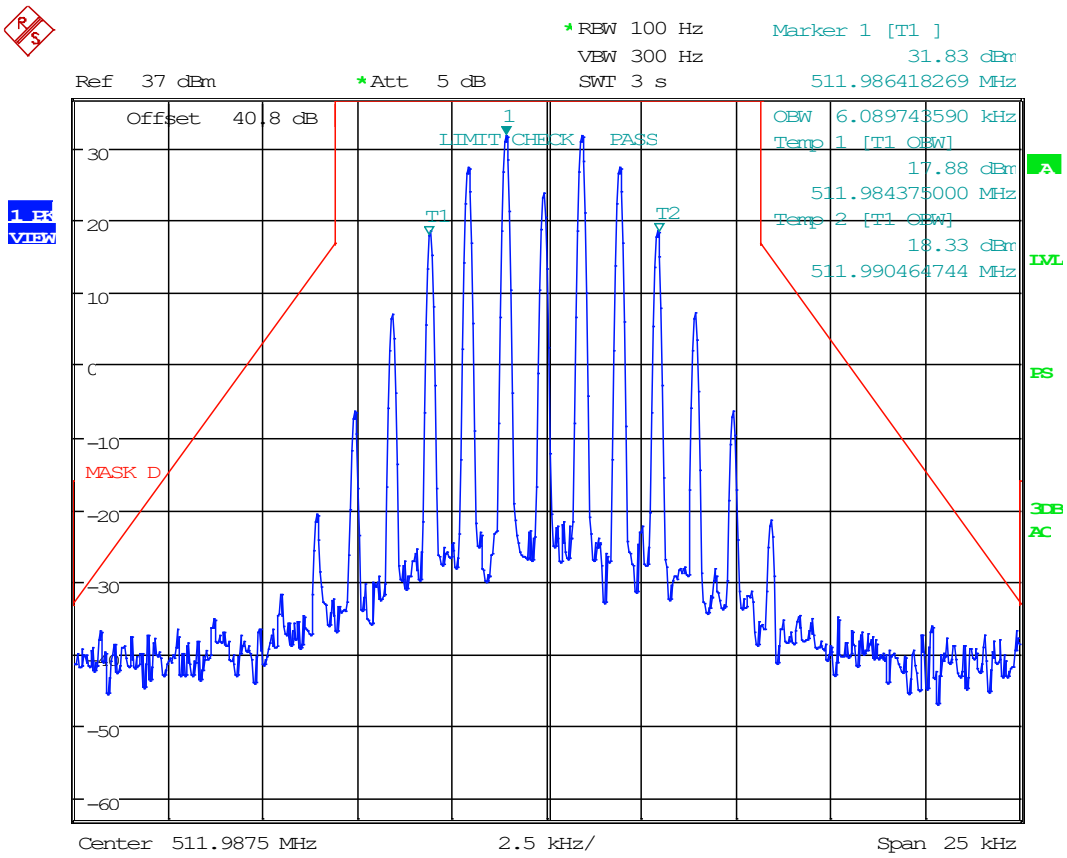
Date: 27.JUL.2020 18:45:40

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

511.9875 MHz, Downlink, 12.5k FM, At AGC +3 dB



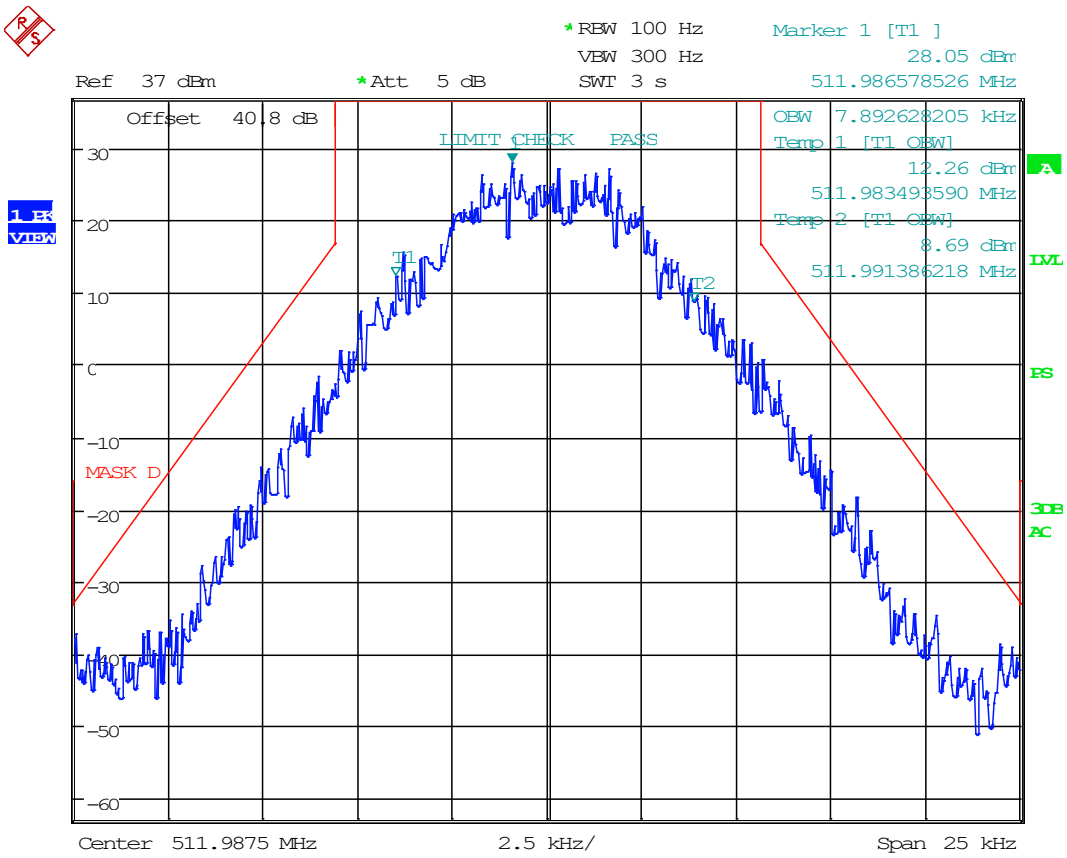
Date: 27.JUL.2020 18:46:32

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

511.9875 MHz, Downlink, C4FM, At AGC



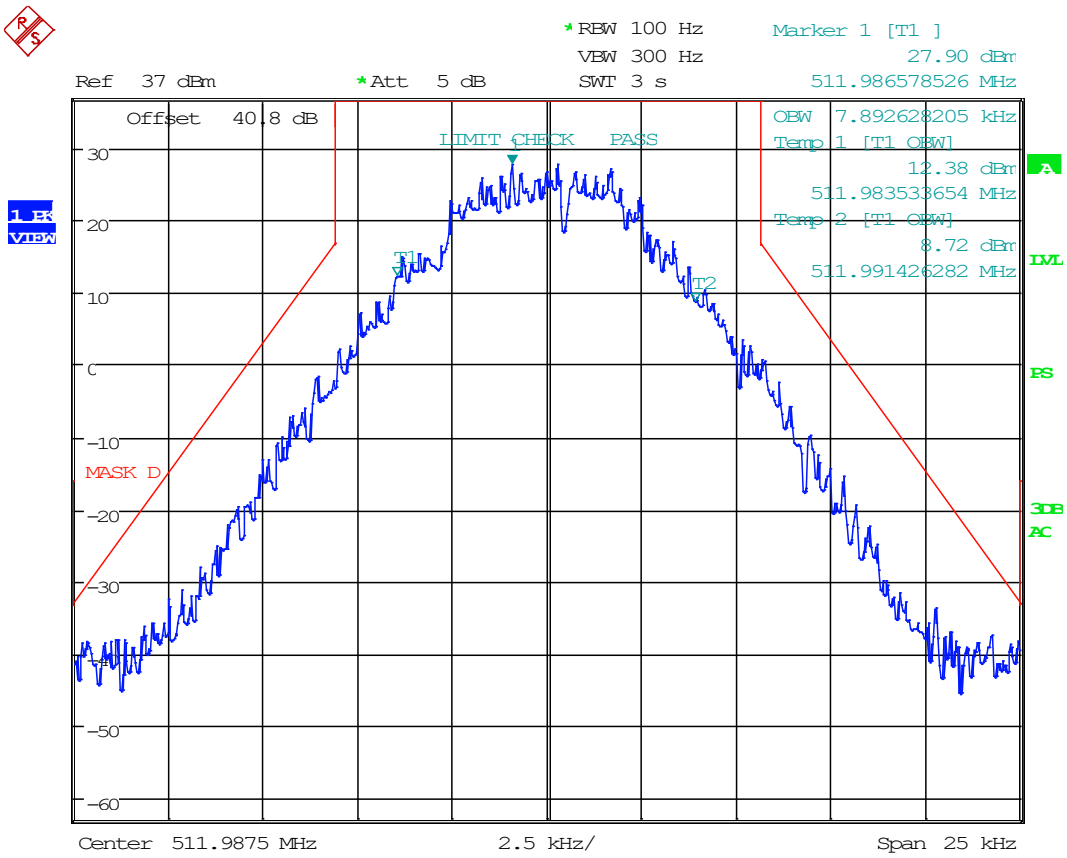
Date: 27.JUL.2020 18:57:51

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

511.9875 MHz, Downlink, C4FM, At AGC +3 dB



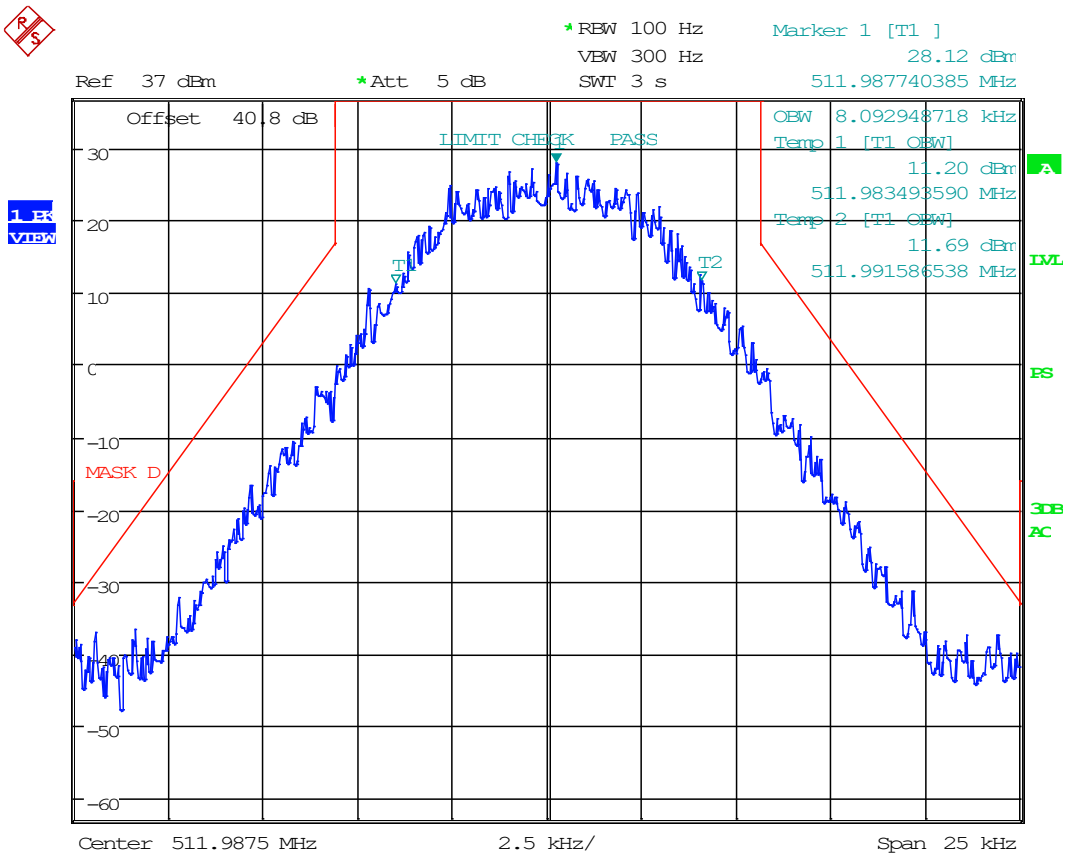
Date: 27.JUL.2020 18:58:46

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

511.9875 MHz, Downlink, H-CPM, AT AGC



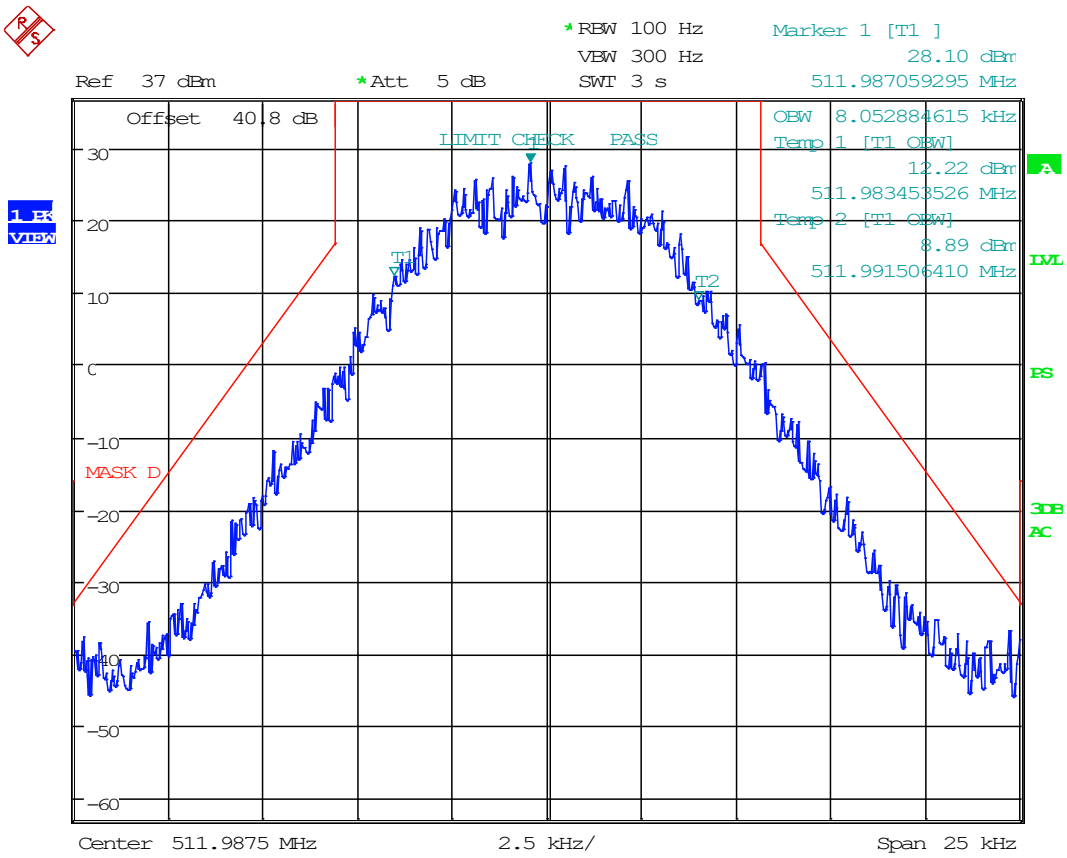
Date: 27.JUL.2020 18:59:32

Comparison to Input: Complies with Standards

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

EMISSION MASK & IVO

511.9875 MHz, Downlink, H-CPM, AT AGC +3 DB



Date: 27.JUL.2020 19:00:06

Comparison to Input: Complies with Standards

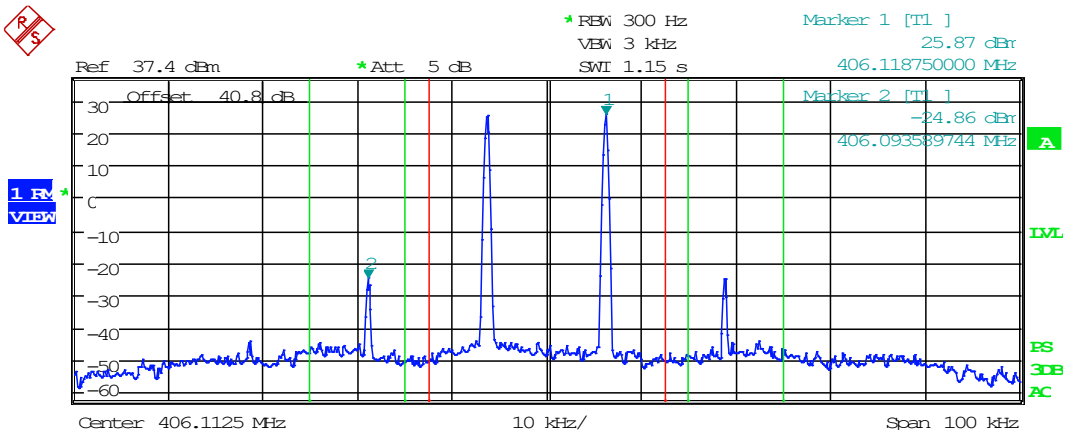
849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

KDB 935210 4.7.2 INTERMODULATION

(Data is re-used from test report "2567-20_PT90 UHF Booster CLB TestReport" per KDB 484596)

Test Engineer: FR
Test Date: JUL 27, 2020

406.1125 MHz, Uplink, 12.5k, At AGC



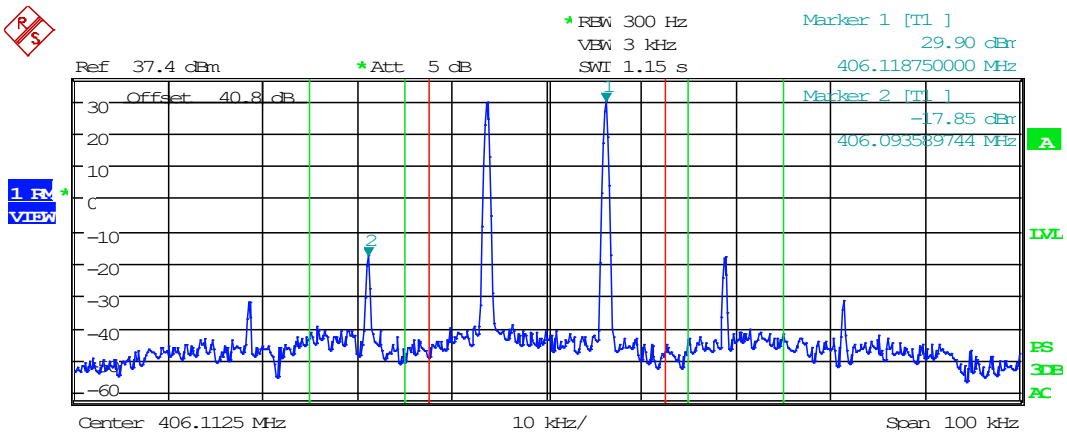
Tx Channel			
Bandwidth	25 kHz	Power	29.21 dBm
Adjacent Channel			
Bandwidth	10 kHz	Lower	-23.93 dBm
Spacing	20 kHz	Upper	-23.79 dBm

Date: 27.JUL.2020 18:07:59

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

406.1125 MHz, Uplink, 12.5k, At AGC +3 dB



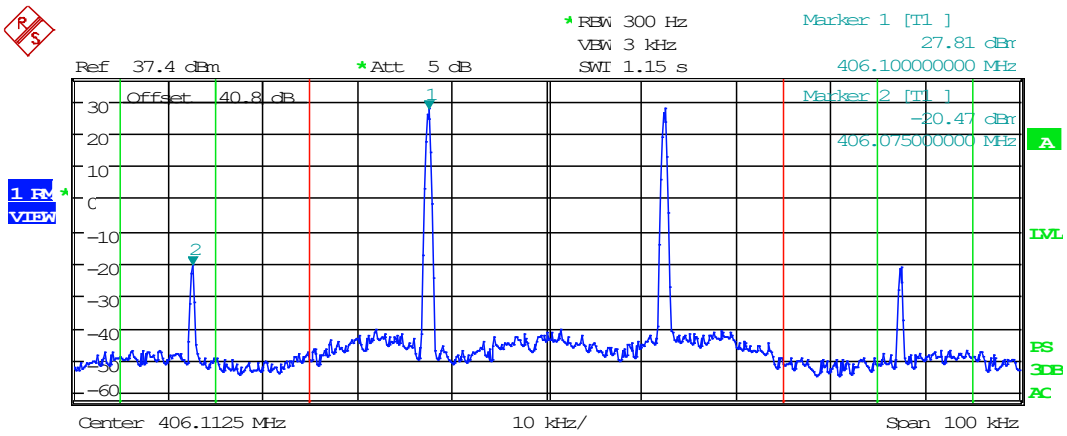
Tx Channel			
Bandwidth	25 kHz	Power	33.26 dBm
Adjacent Channel			
Bandwidth	10 kHz	Lower	-17.23 dBm
Spacing	20 kHz	Upper	-17.28 dBm

Date: 27.JUL.2020 18:09:10

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

406.1125 MHz, Uplink, 25K, At AGC



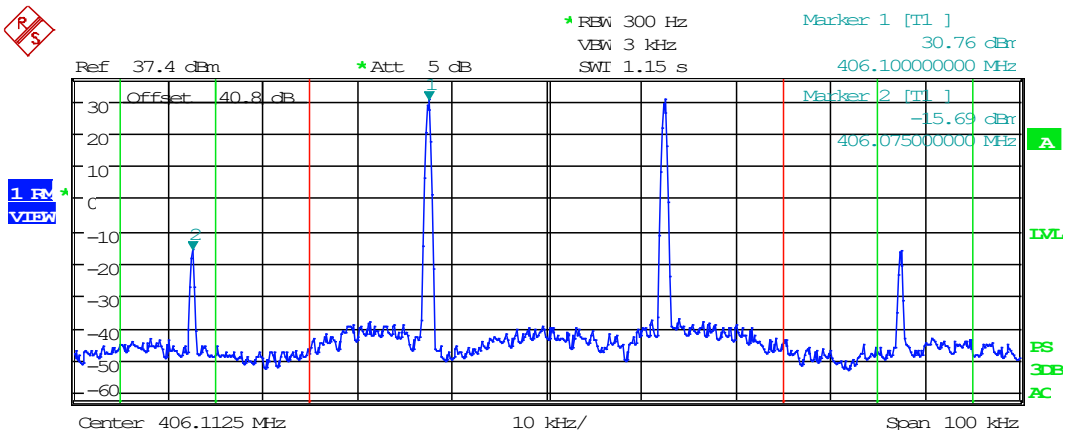
Tx Channel			
Bandwidth	50 kHz	Power	31.14 dBm
Adjacent Channel			
Bandwidth	10 kHz	Lower	-20.05 dBm
Spacing	40 kHz	Upper	-20.35 dBm

Date: 27.JUL.2020 18:12:00

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

406.1125 MHz, Uplink, 25K, At AGC +3 dB



Tx Channel
Bandwidth 50 kHz

Power 34.09 dBm

Adjacent Channel
Bandwidth 10 kHz
Spacing 40 kHz

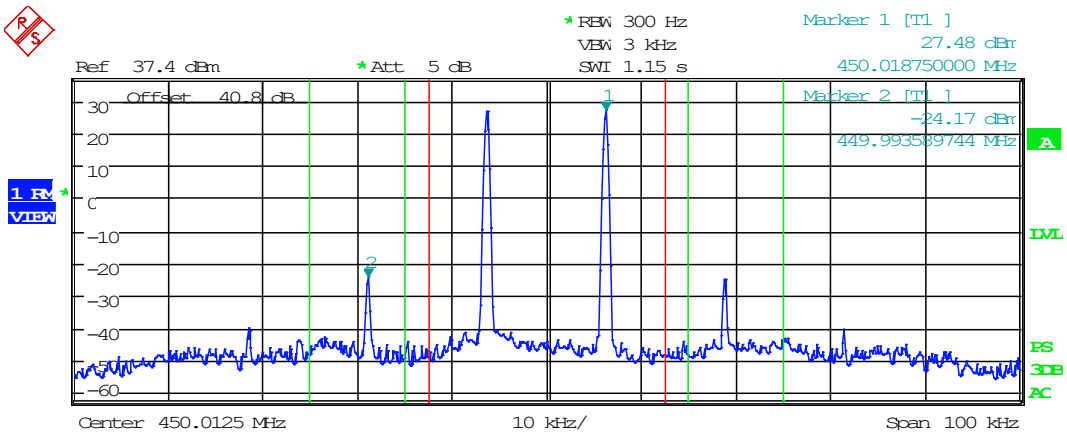
Lower -15.32 dBm
Upper -15.39 dBm

Date: 27.JUL.2020 18:16:33

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

450.0125 MHz, Uplink, 12.5k, At AGC



Tx Channel
Bandwidth 25 kHz

Power 30.90 dBm

Adjacent Channel
Bandwidth 10 kHz
Spacing 20 kHz

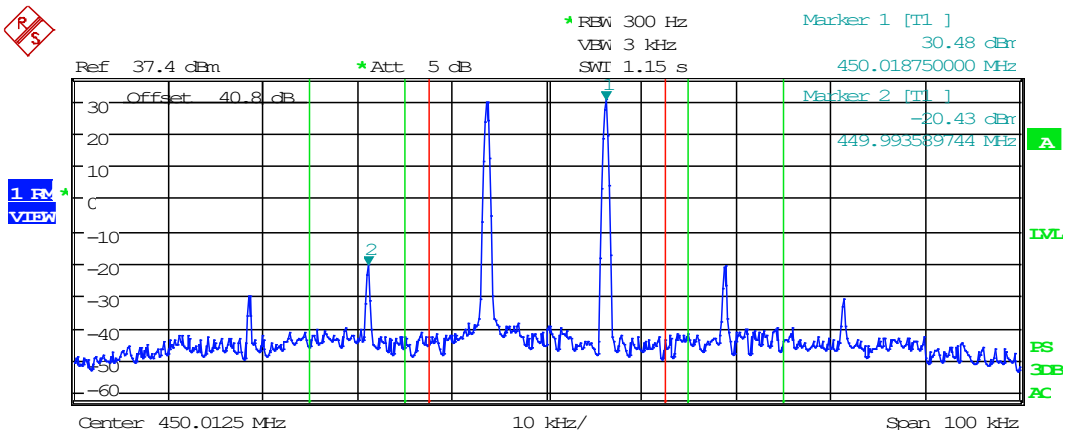
Lower -23.18 dBm
Upper -23.46 dBm

Date: 27.JUL.2020 12:10:19

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

450.0125 MHz, Uplink, 12.5k, At AGC +3 dB



Tx Channel
Bandwidth 25 kHz

Power 33.80 dBm

Adjacent Channel
Bandwidth 10 kHz
Spacing 20 kHz

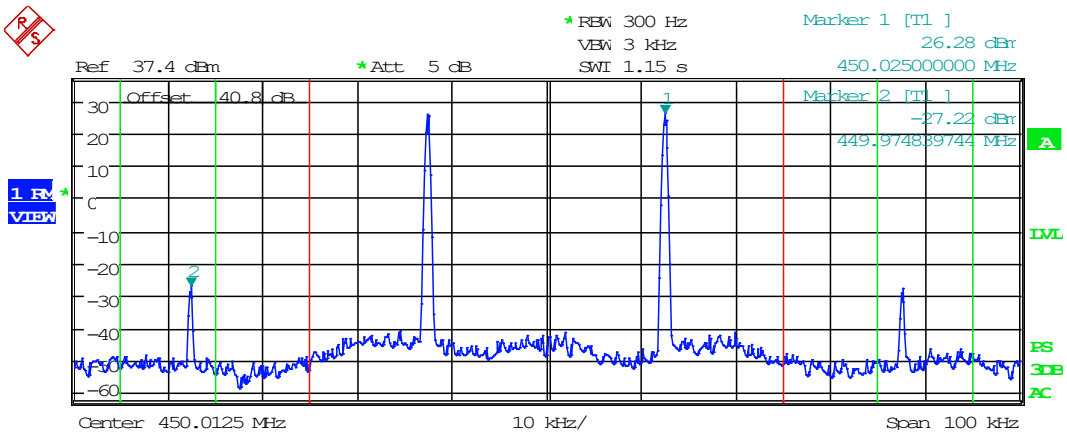
Lower -19.69 dBm
Upper -19.65 dBm

Date: 27.JUL.2020 12:09:40

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

450.0125 MHz, Uplink, 25K, At AGC



Tx Channel
Bandwidth 50 kHz

Power 29.75 dBm

Adjacent Channel
Bandwidth 10 kHz
Spacing 40 kHz

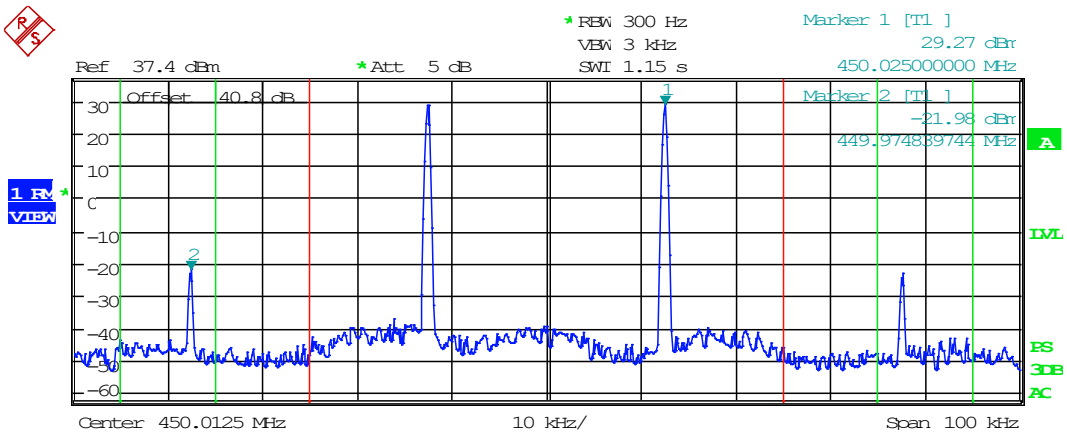
Lower -26.39 dBm
Upper -26.89 dBm

Date: 27.JUL.2020 12:12:38

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

450.0125 MHz, Uplink, 25K, At AGC +3 dB



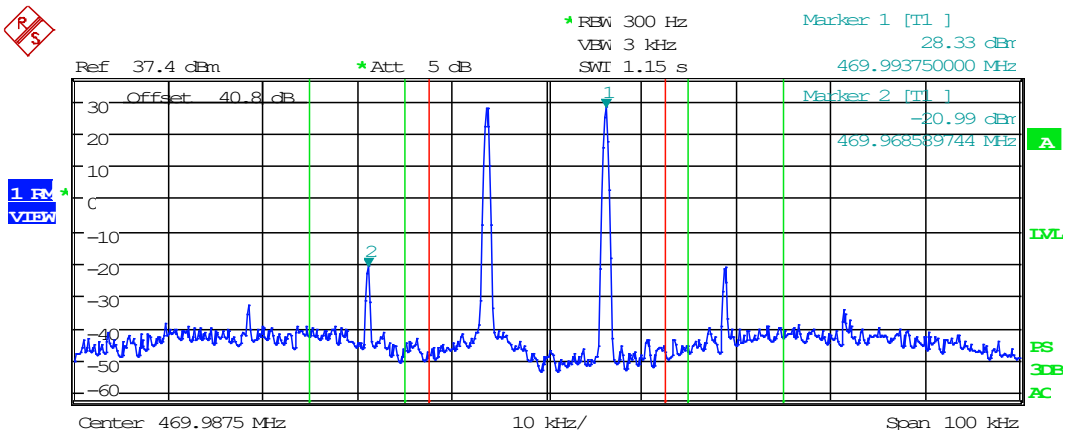
Tx Channel			
Bandwidth	50 kHz	Power	32.66 dBm
Adjacent Channel			
Bandwidth	10 kHz	Lower	-21.14 dBm
Spacing	40 kHz	Upper	-22.36 dBm

Date: 27.JUL.2020 12:13:41

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

469.9875 MHz, Downlink, 12.5k, At AGC

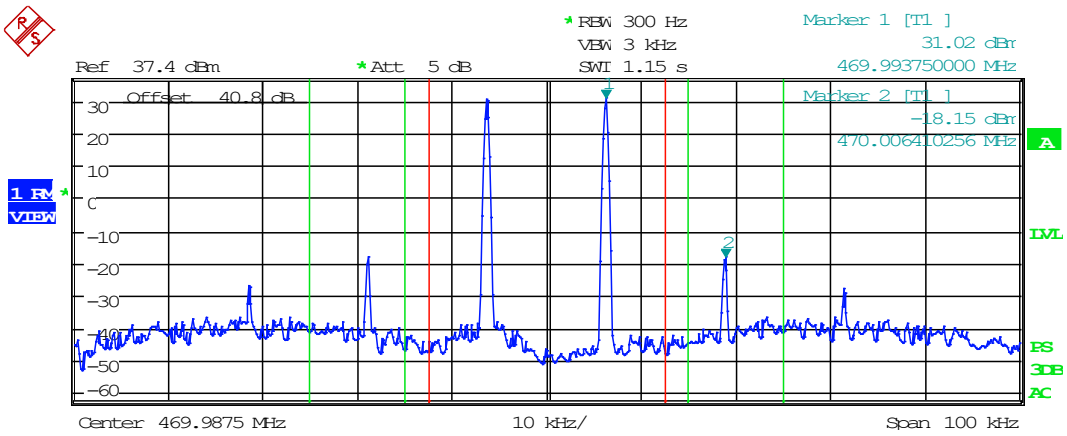


Tx Channel			
Bandwidth	25 kHz	Power	31.76 dBm
Adjacent Channel			
Bandwidth	10 kHz	Lower	-20.04 dBm
Spacing	20 kHz	Upper	-20.04 dBm

Date: 27.JUL.2020 12:36:32

INTERMODULATION

469.9875 MHz, Downlink, 12.5k, At AGC +3 dB



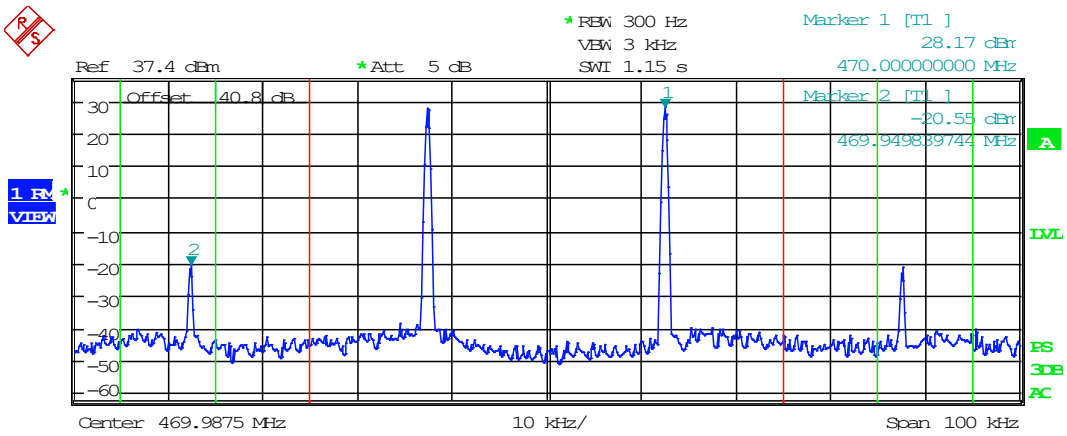
Tx Channel			
Bandwidth	25 kHz	Power	34.37 dBm
Adjacent Channel			
Bandwidth	10 kHz	Lower	-17.28 dBm
Spacing	20 kHz	Upper	-16.91 dBm

Date: 27.JUL.2020 12:37:15

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

469.9875 MHz, Downlink, 25K, At AGC



Tx Channel
Bandwidth 50 kHz

Power 31.63 dBm

Adjacent Channel
Bandwidth 10 kHz
Spacing 40 kHz

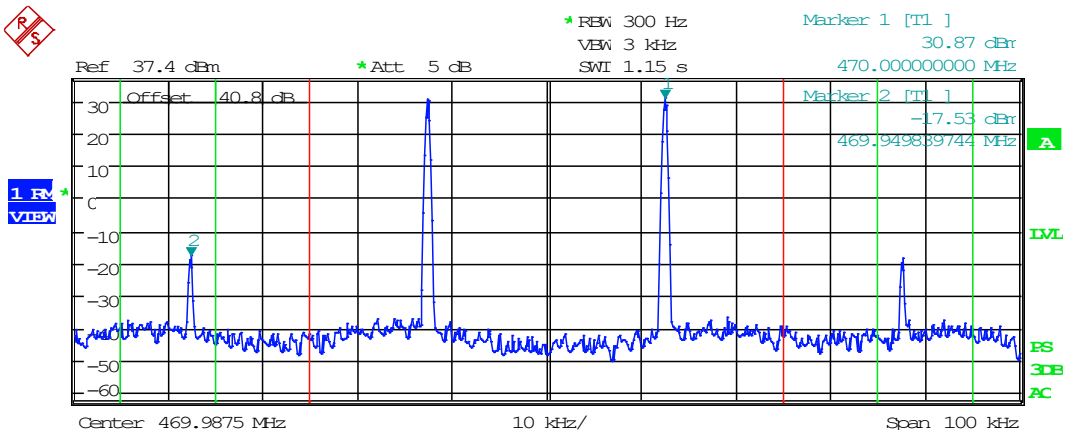
Lower -19.61 dBm
Upper -20.56 dBm

Date: 27.JUL.2020 12:24:34

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

469.9875 MHz, Downlink, 25K, At AGC +3 dB



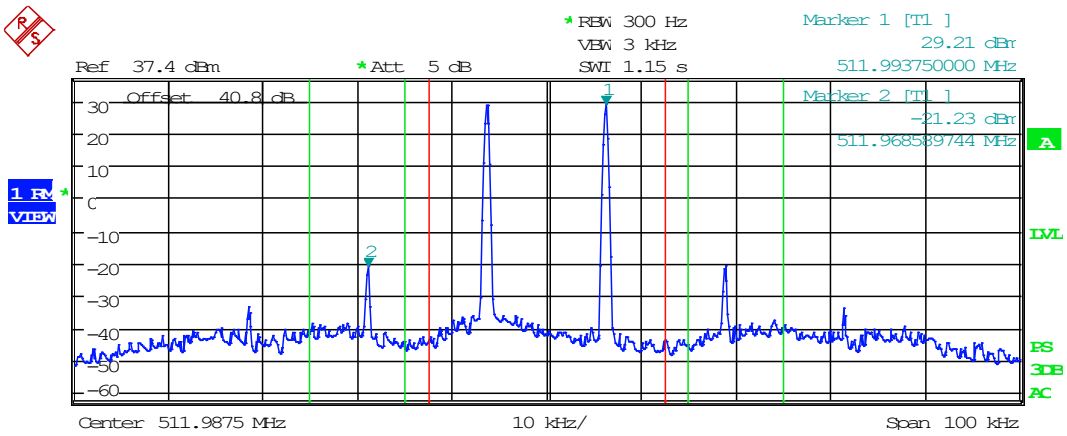
Tx Channel			
Bandwidth	50 kHz	Power	34.26 dBm
Adjacent Channel			
Bandwidth	10 kHz	Lower	-16.47 dBm
Spacing	40 kHz	Upper	-17.49 dBm

Date: 27.JUL.2020 12:25:08

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

511.9875 MHz, Downlink, 12.5k, At AGC



Tx Channel
Bandwidth 25 kHz

Power 32.61 dBm

Adjacent Channel
Bandwidth 10 kHz
Spacing 20 kHz

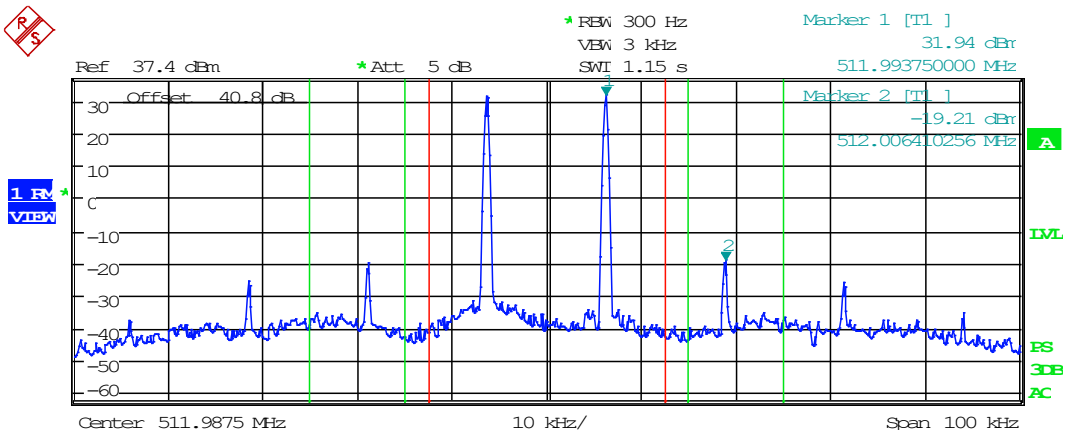
Lower -19.97 dBm
Upper -19.69 dBm

Date: 27.JUL.2020 19:16:31

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

INTERMODULATION

511.9875 MHz, Downlink, 12.5k, At AGC +3 dB

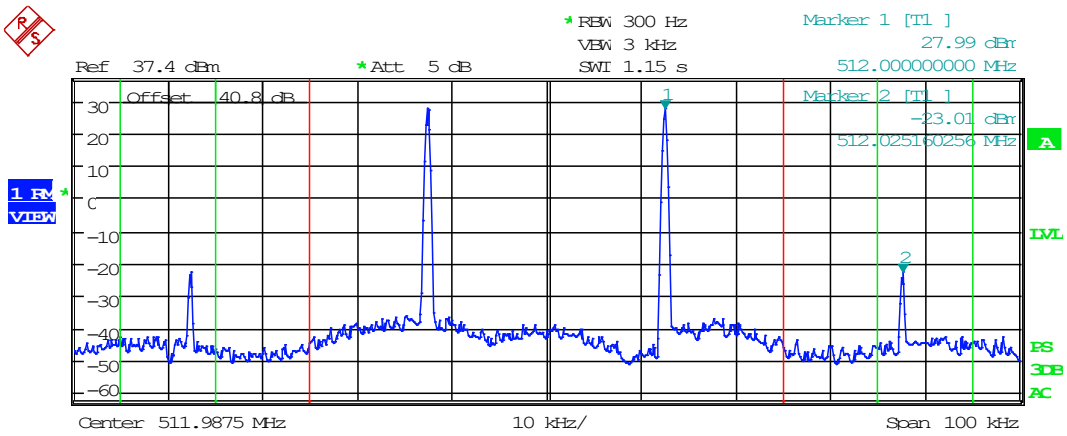


Tx Channel			
Bandwidth	25 kHz	Power	35.26 dBm
Adjacent Channel			
Bandwidth	10 kHz	Lower	-18.37 dBm
Spacing	20 kHz	Upper	-17.63 dBm

Date: 27.JUL.2020 19:17:22

INTERMODULATION

511.9875 MHz, Downlink, 25K, At AGC



Tx Channel
Bandwidth 50 kHz

Power 31.50 dBm

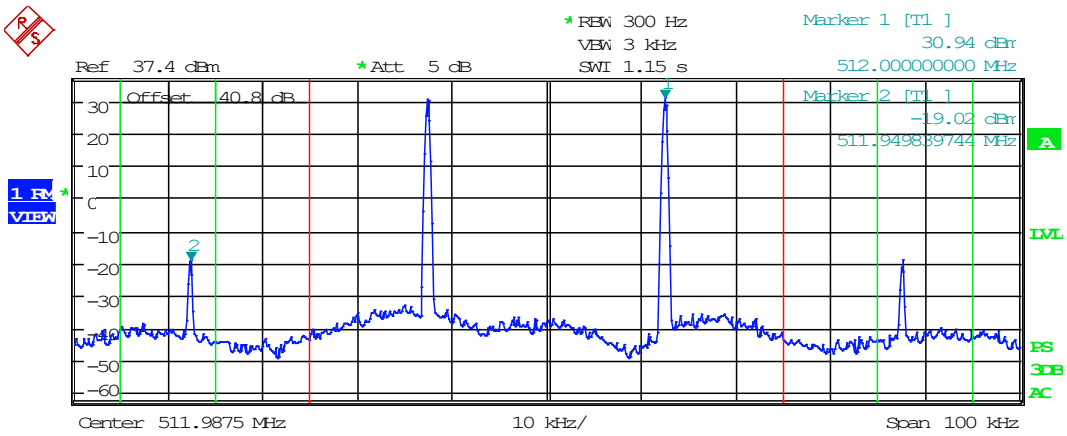
Adjacent Channel
Bandwidth 10 kHz
Spacing 40 kHz

Lower -21.84 dBm
Upper -22.01 dBm

Date: 27.JUL.2020 19:18:56

INTERMODULATION

511.9875 MHz, Downlink, 25K, At AGC +3 dB



Tx Channel
Bandwidth 50 kHz

Power 34.38 dBm

Adjacent Channel
Bandwidth 10 kHz
Spacing 40 kHz

Lower -17.80 dBm
Upper -18.42 dBm

Date: 27.JUL.2020 19:19:49

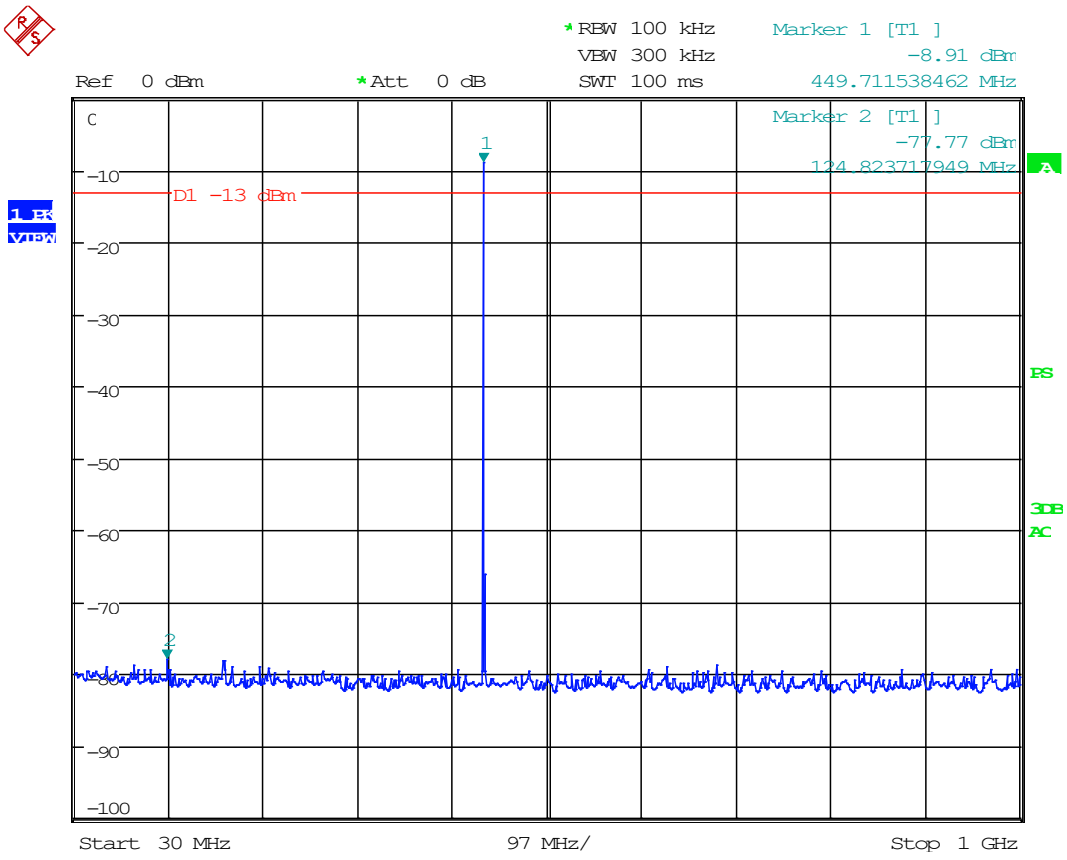
849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

2.1051 CONDUCTED SPURIOUS EMISSIONS

KDB 935210 4.7.3 CONDUCTED SPURIOUS EMISSIONS

Test Engineer: FR
Test Date: JUL 28, 2020

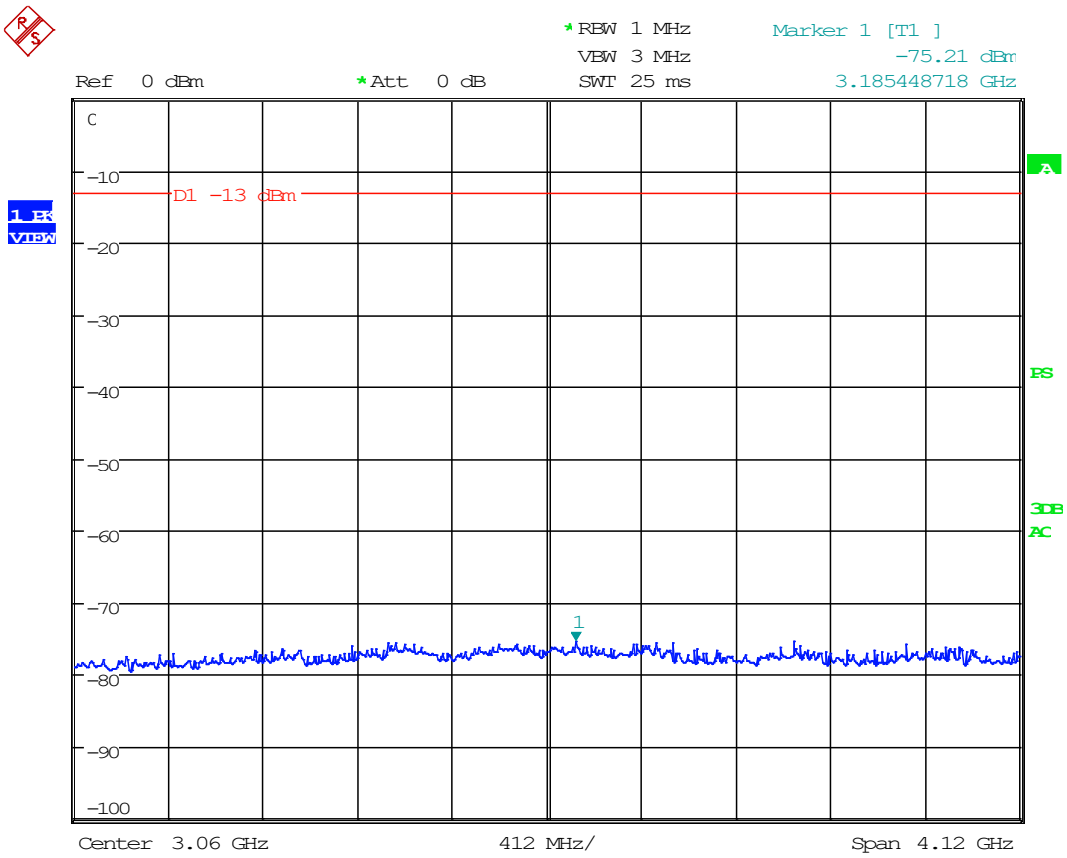
Spot-Check of Class A Uplink, Below 1 GHz



Date: 28.JUL.2020 13:45:17

Conducted Spurious Emissions

Spot-Check of Class A Uplink, Above 1 GHz

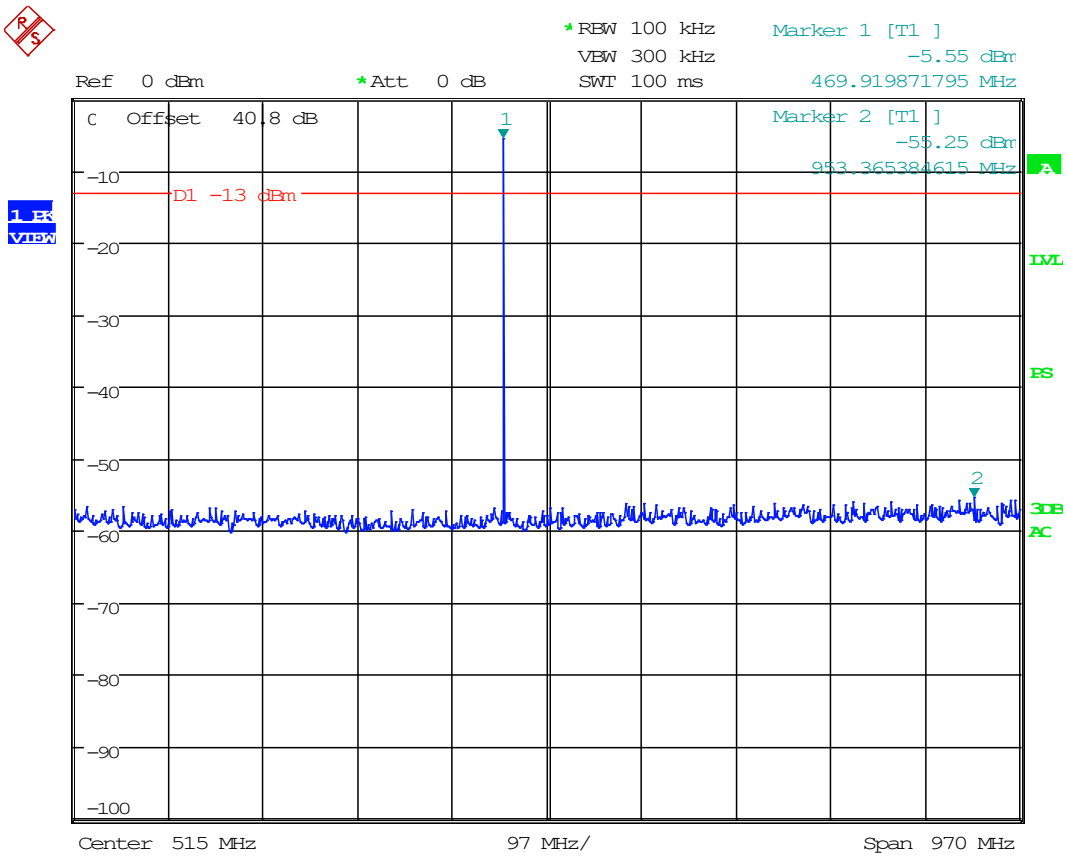


Date: 28.JUL.2020 13:44:26

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

Conducted Spurious Emissions

Spot-Check of Class A Downlink, Below 1 GHz

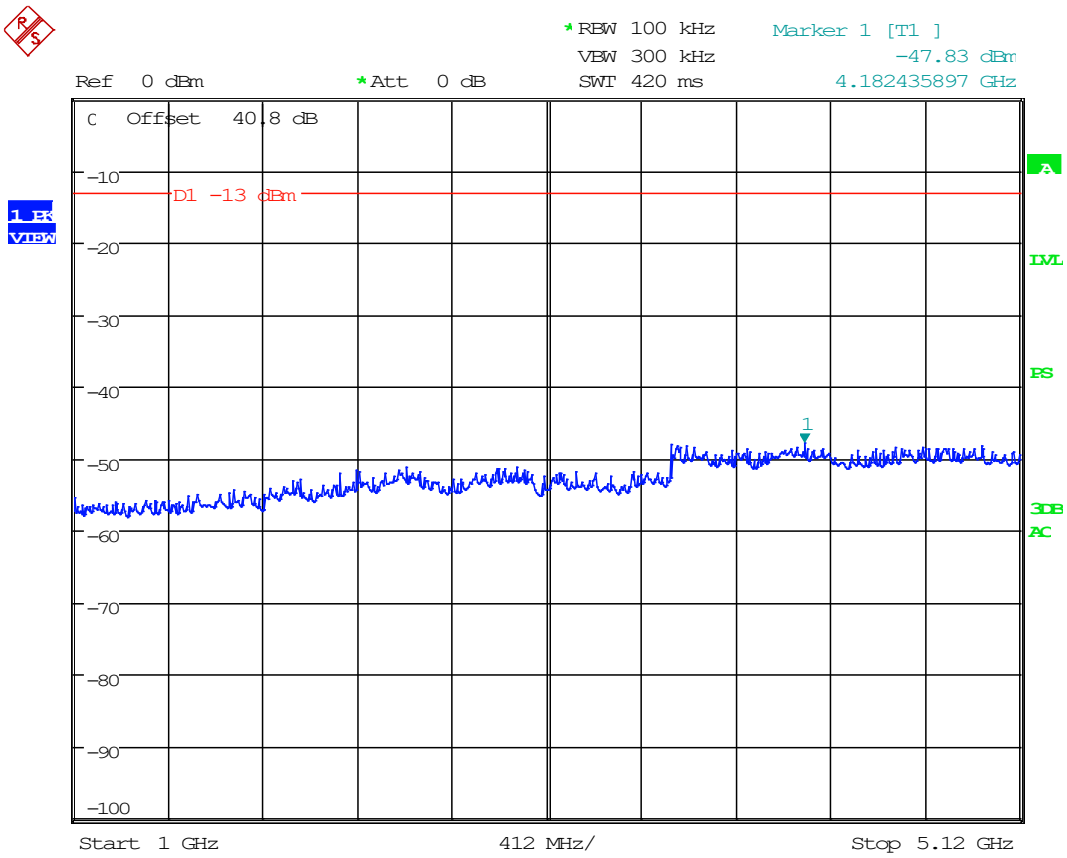


Date: 29.JUL.2020 19:56:03

849 NW STATE ROAD 45 NEWBERRY, FL 32669 USA | PHONE: 888.472.2424 | EMAIL: INFO@TIMCOENGR.COM | WEB: HTTP://WWW.TIMCOENGR.COM

Conducted Spurious Emissions

Spot-Check of Class A Downlink, Above 1 GHz



Date: 29.JUL.2020 19:56:44

2.1053 FIELD STRENGTH OF SPURIOUS EMISSIONS

KDB 935210 4.9 FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Engineer: FR, TR
Test Date: JUL 30, 2020

Spot-Check of Class A Subharmonics, Uplink & Downlink

Emission Frequency (MHz)	Detector	Meter Reading (dBm)	Antenna Polarity	Coax Loss (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Spurious Limit (dBm)	Margin (dBm)
343.59	PK	56.91	H	2.12	13.70	3.00	72.73	-24.65	-13.00	11.65
350.00	PK	54.81	V	2.11	14.00	3.00	70.92	-26.46	-13.00	13.46
71.96	PK	61.07	V	1.01	6.29	3.00	68.37	-29.01	-13.00	16.01
273.08	PK	53.13	H	2.06	12.41	3.00	67.60	-29.78	-13.00	16.78
137.07	PK	43.23	H	1.33	14.71	3.00	59.26	-38.11	-13.00	25.11
184.47	PK	42.18	H	1.57	13.40	3.00	57.15	-40.22	-13.00	27.22

Spot-Check of Class A Uplink

Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBm)	Antenna Polarity	Coax Loss (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Spurious Limit (dBm)	Margin (dBm)
406.11	812.23	PK	0.54	H	3.38	20.44	3.00	24.37	-73.01	-13.00	60.01
406.11	812.23	PK	2.01	V	3.38	20.44	3.00	25.84	-71.54	-13.00	58.54
406.11	1218.34	PK	10.20	H	4.03	28.18	3.00	42.41	-54.97	-13.00	41.97
406.11	1218.34	PK	12.68	V	4.03	28.18	3.00	44.89	-52.49	-13.00	39.49
Tuned Frequency (MHz)	**Emission Frequency (MHz)**	**Detector**	**Meter Reading (dBm)**	**Antenna Polarity**	**Coax Loss (dB)**	**Antenna Correction Factor (dB/m)**	**Distance (m)**	**Field Strength (dBµV/m)**	**ERP (dBm)**	**Spurious Limit (dBm)**	**Margin (dBm)**
450.01	900.03	PK	21.90	H	3.54	21.70	3.00	47.14	-50.23	-13.00	37.23
450.01	900.03	PK	21.80	V	3.54	21.70	3.00	47.04	-50.33	-13.00	37.33
450.01	1350.04	PK	23.00	H	4.26	28.76	3.00	56.02	-41.36	-13.00	28.36
450.01	1350.04	PK	21.80	V	4.26	28.76	3.00	54.82	-42.56	-13.00	29.56

Spot-Check of Class A Downlink,

Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBm)	Antenna Polarity	Coax Loss (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Spurious Limit (dBm)	Margin (dBm)
469.99	939.98	PK	22.00	H	3.59	22.60	3.00	48.19	-49.19	-13.00	36.19
469.99	939.98	PK	21.80	V	3.59	22.60	3.00	47.99	-49.39	-13.00	36.39
469.99	1409.96	PK	21.80	H	4.31	28.39	3.00	54.50	-42.88	-13.00	29.88
469.99	1409.96	PK	21.80	V	4.31	28.39	3.00	54.50	-42.88	-13.00	29.88
Tuned Frequency (MHz)	**Emission Frequency (MHz)**	**Detector**	**Meter Reading (dBm)**	**Antenna Polarity**	**Coax Loss (dB)**	**Antenna Correction Factor (dB/m)**	**Distance (m)**	**Field Strength (dBµV/m)**	**ERP (dBm)**	**Spurious Limit (dBm)**	**Margin (dBm)**
511.99	1023.98	PK	11.82	H	3.74	26.94	3.00	42.50	-54.88	-13.00	41.88
511.99	1023.98	PK	13.86	V	3.74	26.94	3.00	44.54	-52.84	-13.00	39.84
511.99	1535.96	PK	10.50	H	4.55	27.76	3.00	42.81	-54.57	-13.00	41.57
511.99	1535.96	PK	11.85	V	4.55	27.76	3.00	44.16	-53.22	-13.00	40.22

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2.1055 FREQUENCY STABILITY

KDB 935210 4.8 FREQUENCY STABILITY

90.213 FREQUENCY STABILITY

Test Engineer:_____
Test Date:_____

N/A. Device does not use a frequency determining element and is exempt.

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90.214 TRANSIENT FREQUENCY RESPONSE

Test Engineer:_____
Test Date:_____

N/A. Device does not key on or off, and does not exhibit transients.

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END OF TEST REPORT

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