## 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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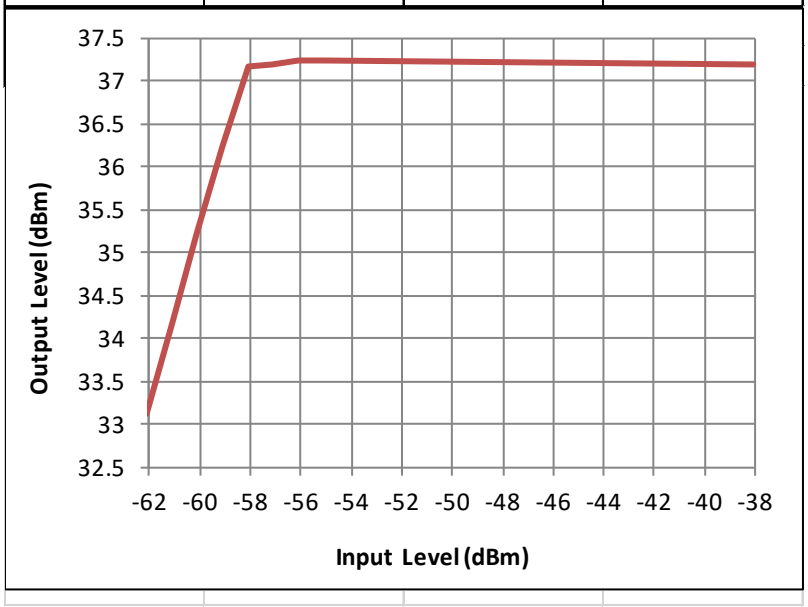
# ANNEX II – MEASUREMENT DATA

## KDB 935210 4.2 AGC THRESHOLD

Test Engineer: FR
Test Date: JUL 24, 2020

### 406.1125 MHz, Uplink

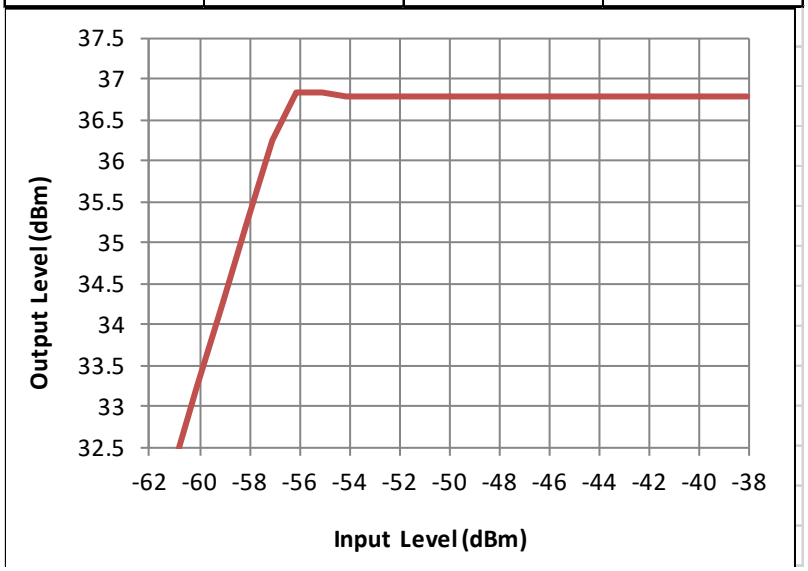
| INPUT (dBm) | CORRECTED INPUT (dBm) | CORRECTED OUTPUT (dBm) | GAIN (dB) |
|---|---|---|---|
| -62 | -62.1 | 33.12 | 95.2 |
| -61 | -61.1 | 34.19 | 95.3 |
| -60 | -60.1 | 35.21 | 95.3 |
| -59 | -59.1 | 36.25 | 95.4 |
| -58 | -58.1 | 37.17 | 95.3 |
| -57 | -57.1 | 37.19 | 94.3 |
| -56 | -56.1 | 37.23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



## 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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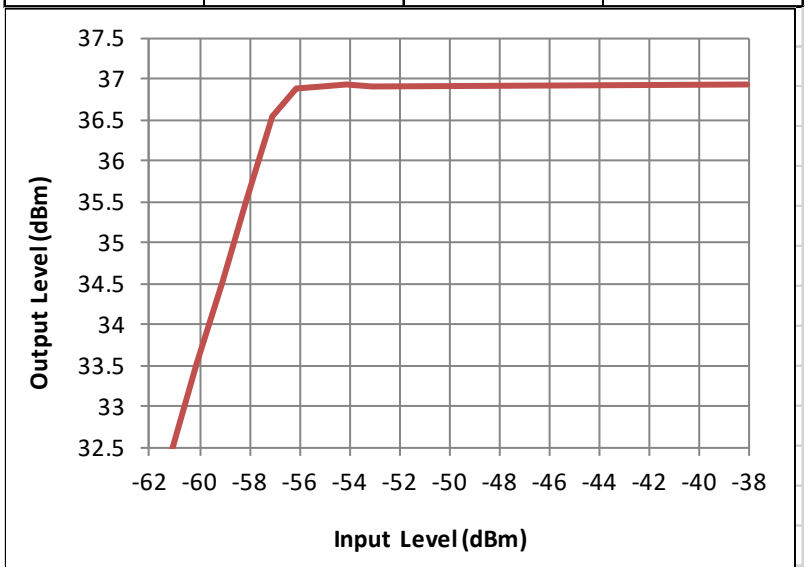
## AGC Level

## 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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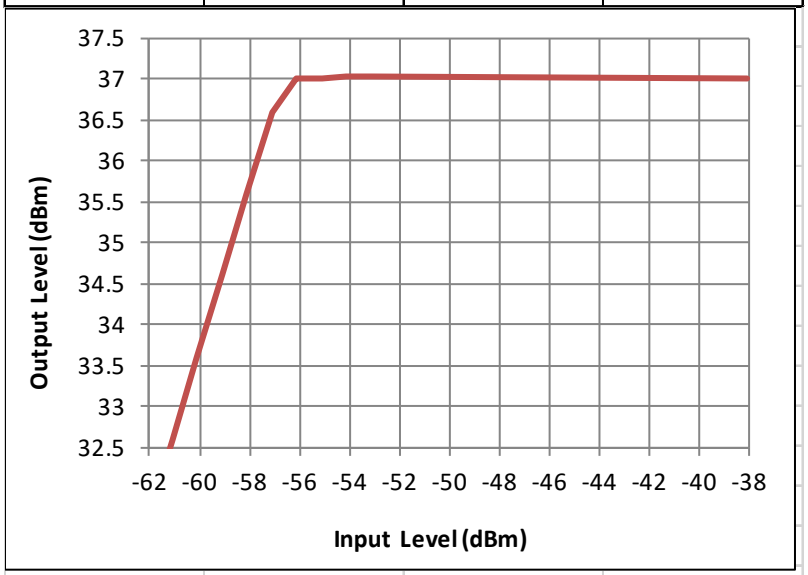
## AGC Level

## 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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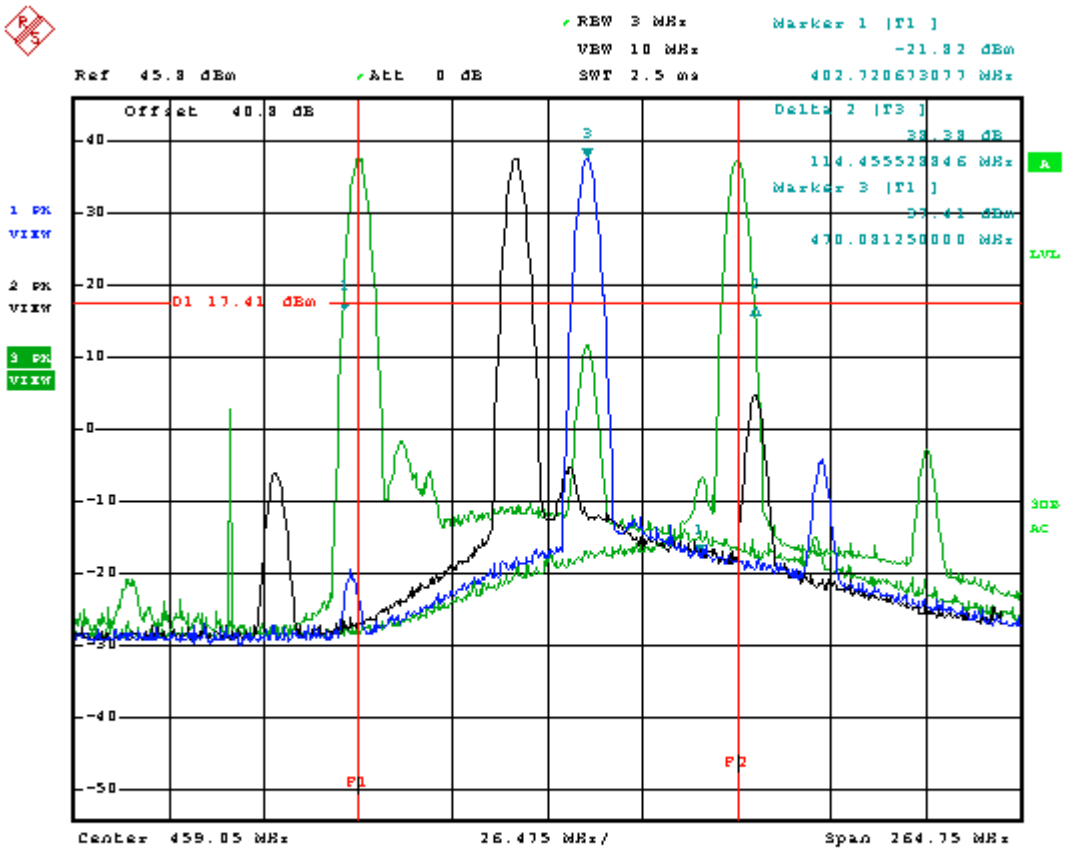
## KDB 935210 4.3 OUT OF BAND REJECTION

Test Engineer: FR
Test Date: JUL 28, 2020

### UHF Out of Band Rejection Plot




**Note:** Class B Out of Band Rejection mode is shown above. The device allows for channel bandwidths up to 500 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

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

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**

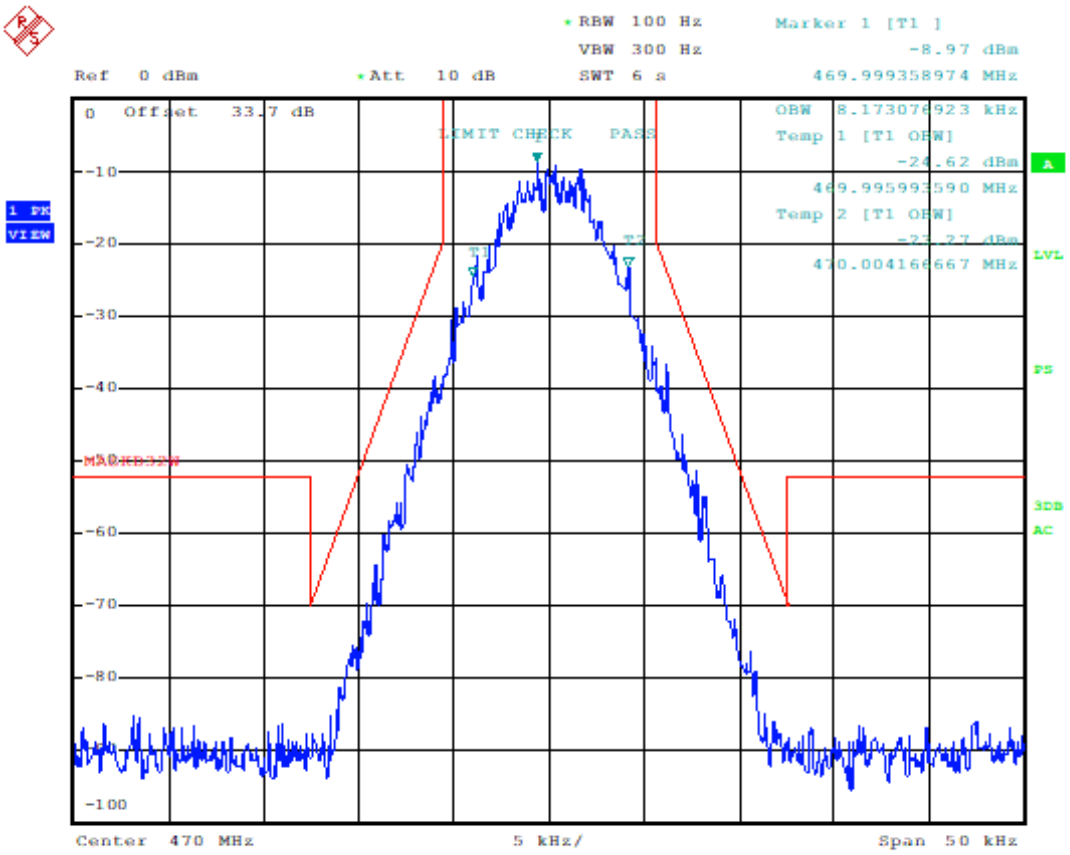
**90.210 EMISSION MASKS**

**KDB 935210 4.4 INPUT VS OUTPUT COMPARISON**

Test Engineer: FR
Test Date: JUL 27, 2020

**Input Signals**

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



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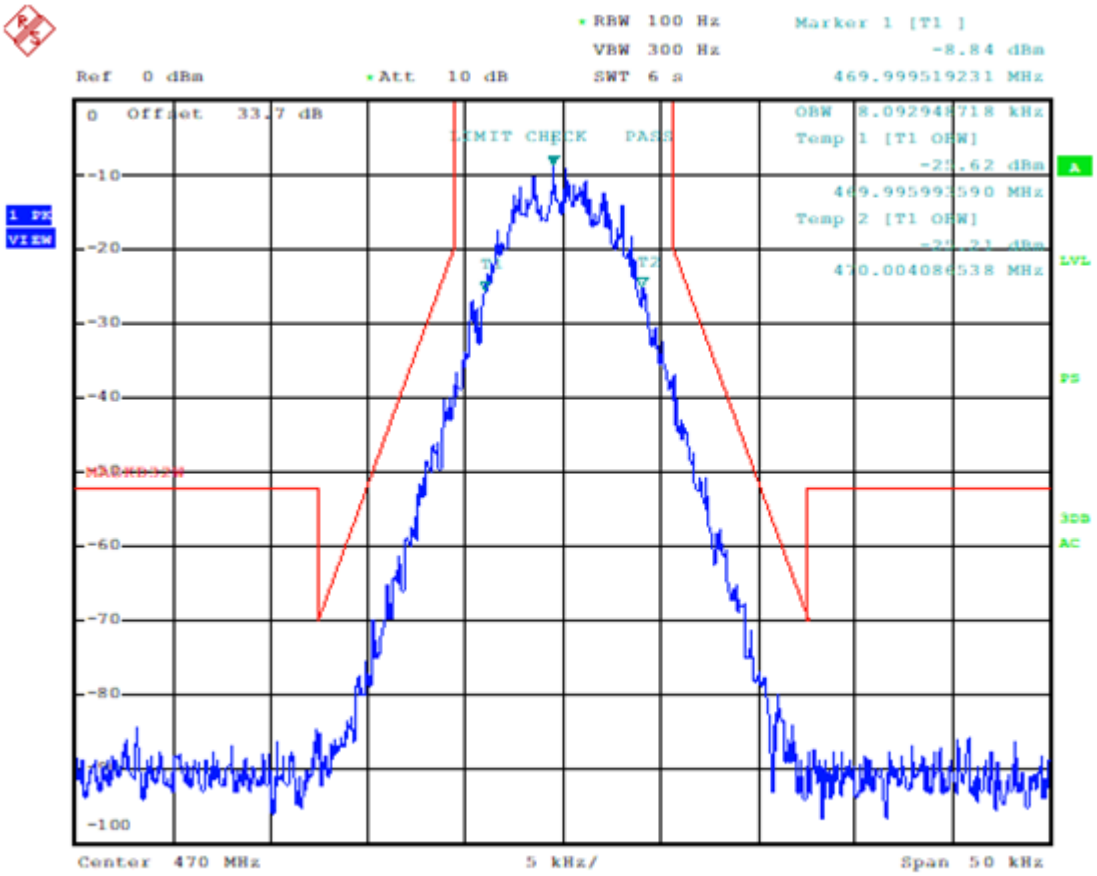
## Input Signals

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



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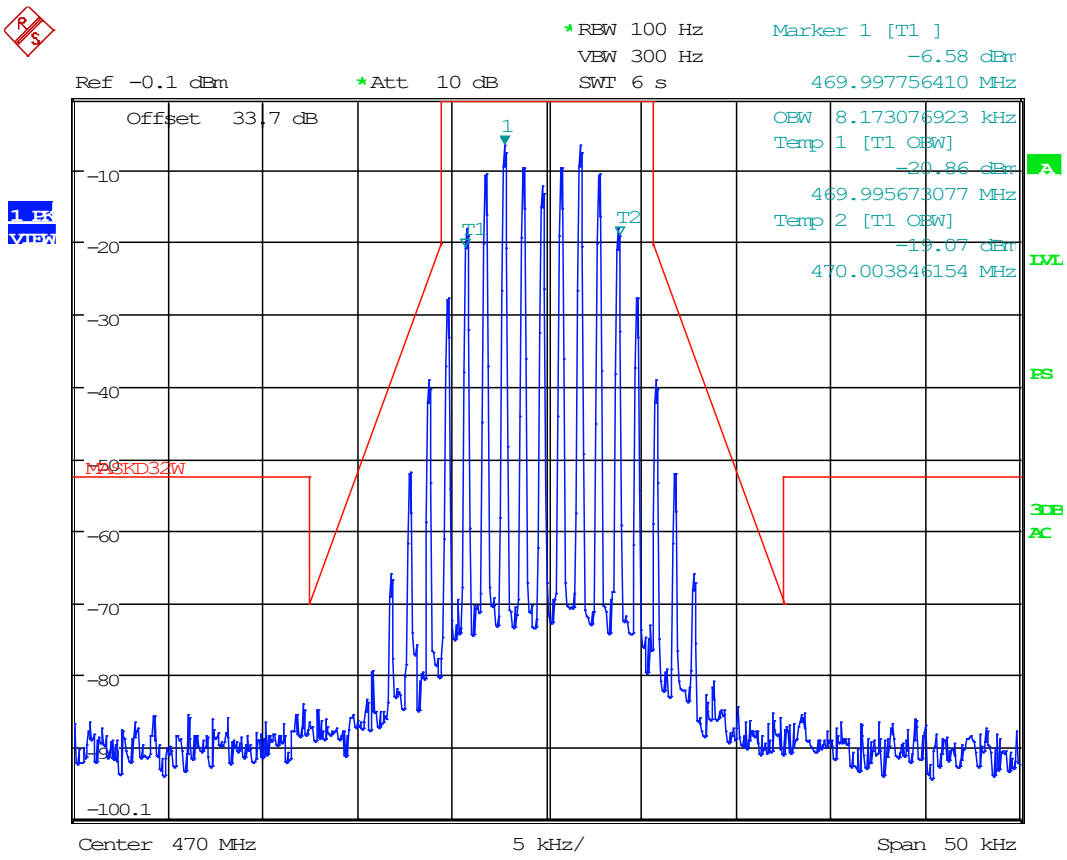
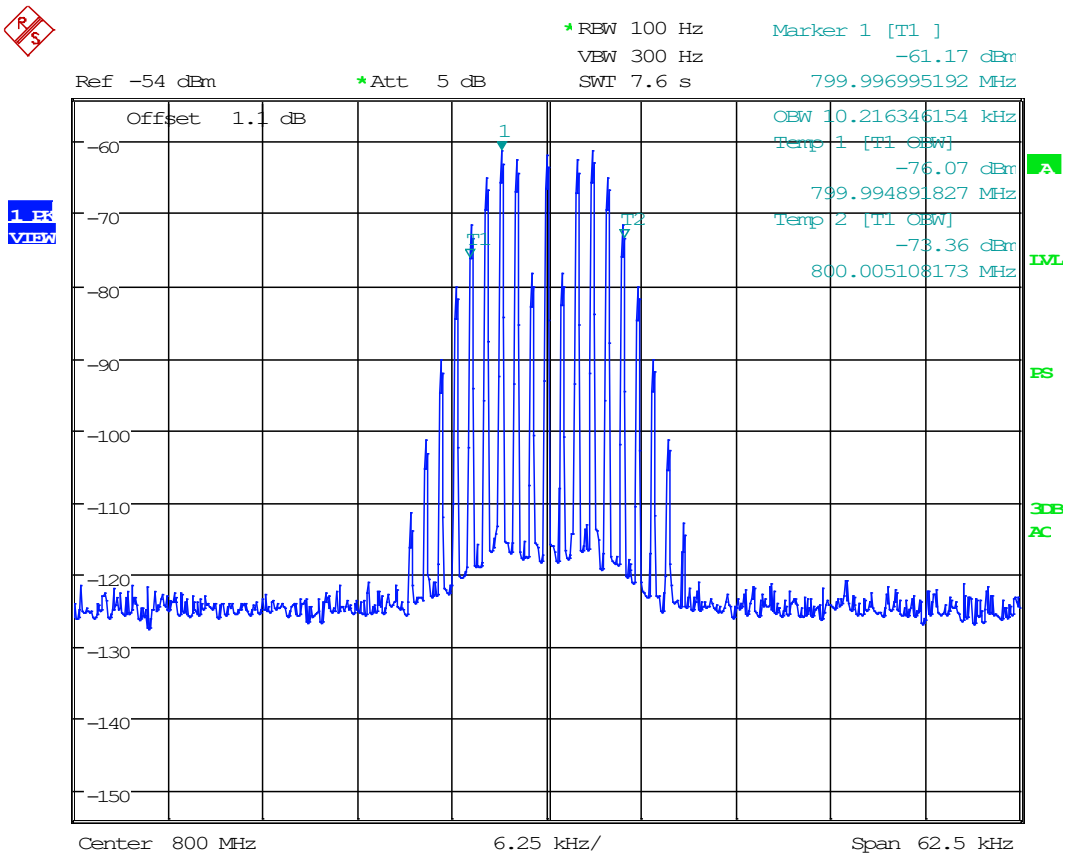
## Input Signals

## 11K3F3E (Narrowband Analog FM Voice)



## Input Signals

### 16K0F3E (Wideband Analog FM Voice)




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



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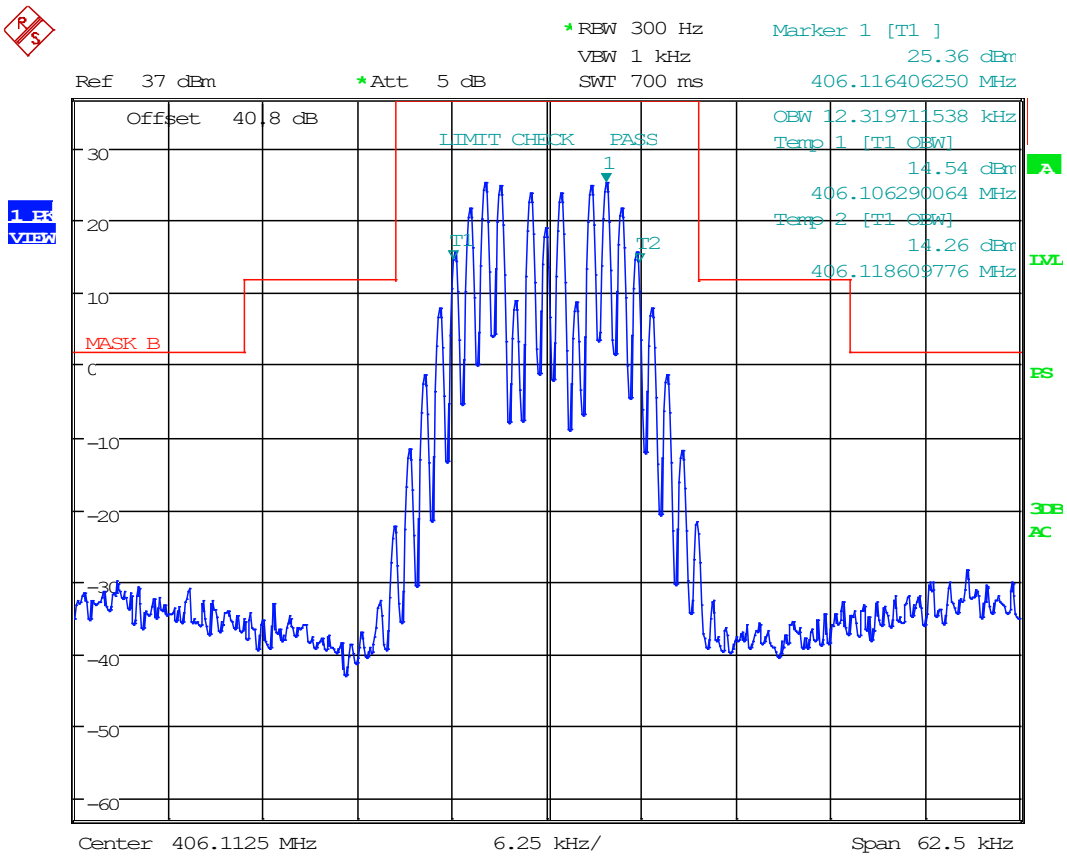
## EMISSION MASK & IVO

### 406.1125 MHz, Uplink, 25k FM, At AGC

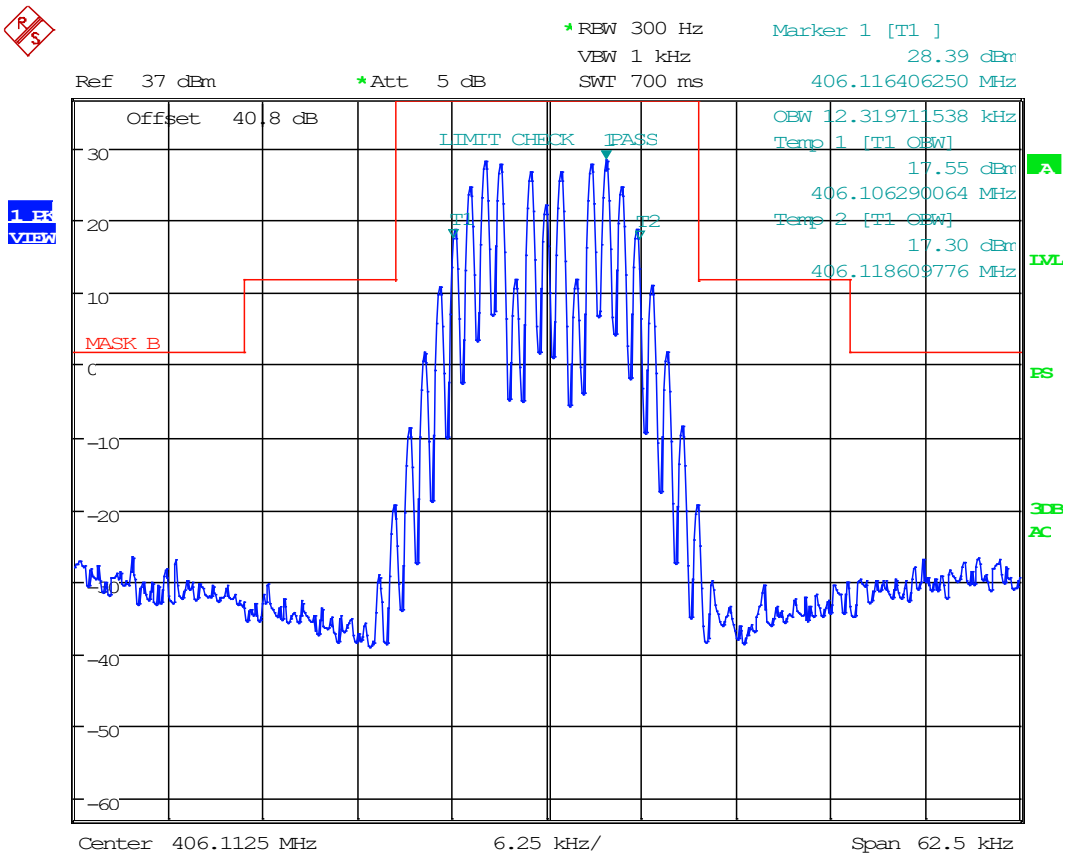



Date: 27.JUL.2020 17:40:49

**Comparison to Input:** Complies with Standards

## EMISSION MASK & IVO

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




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

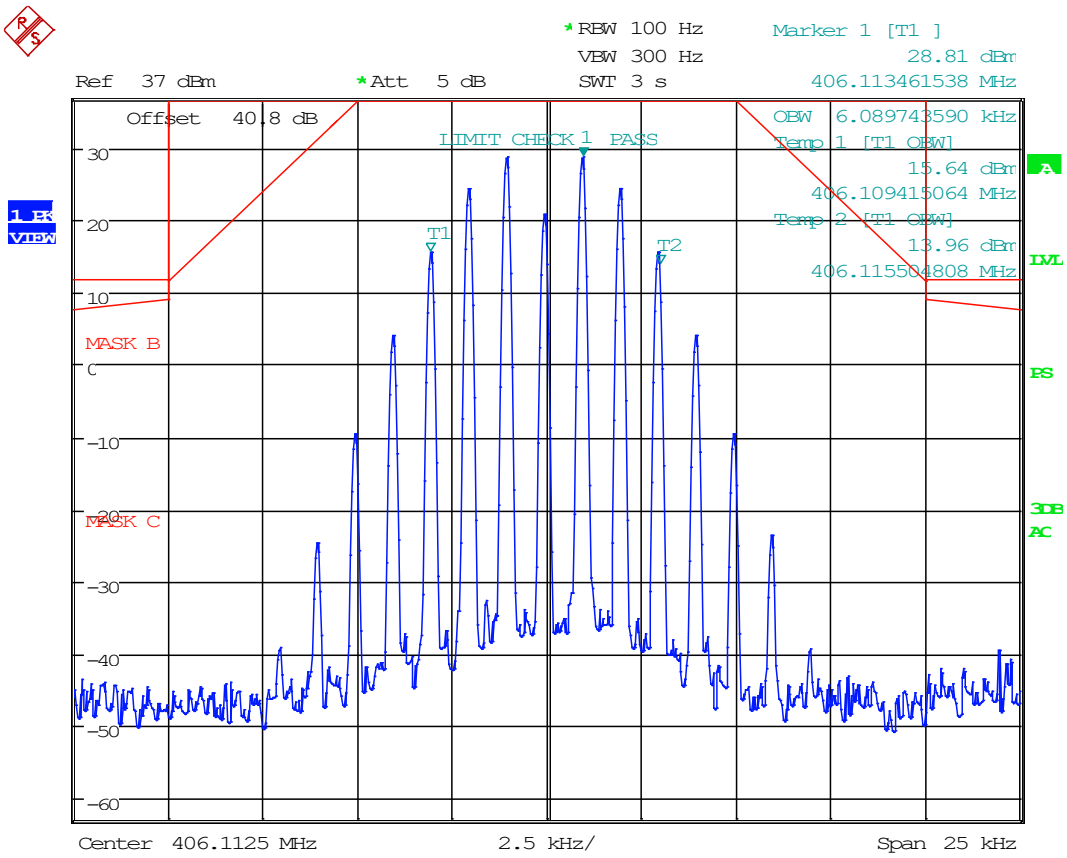
**Comparison to Input:** Complies with Standards



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.

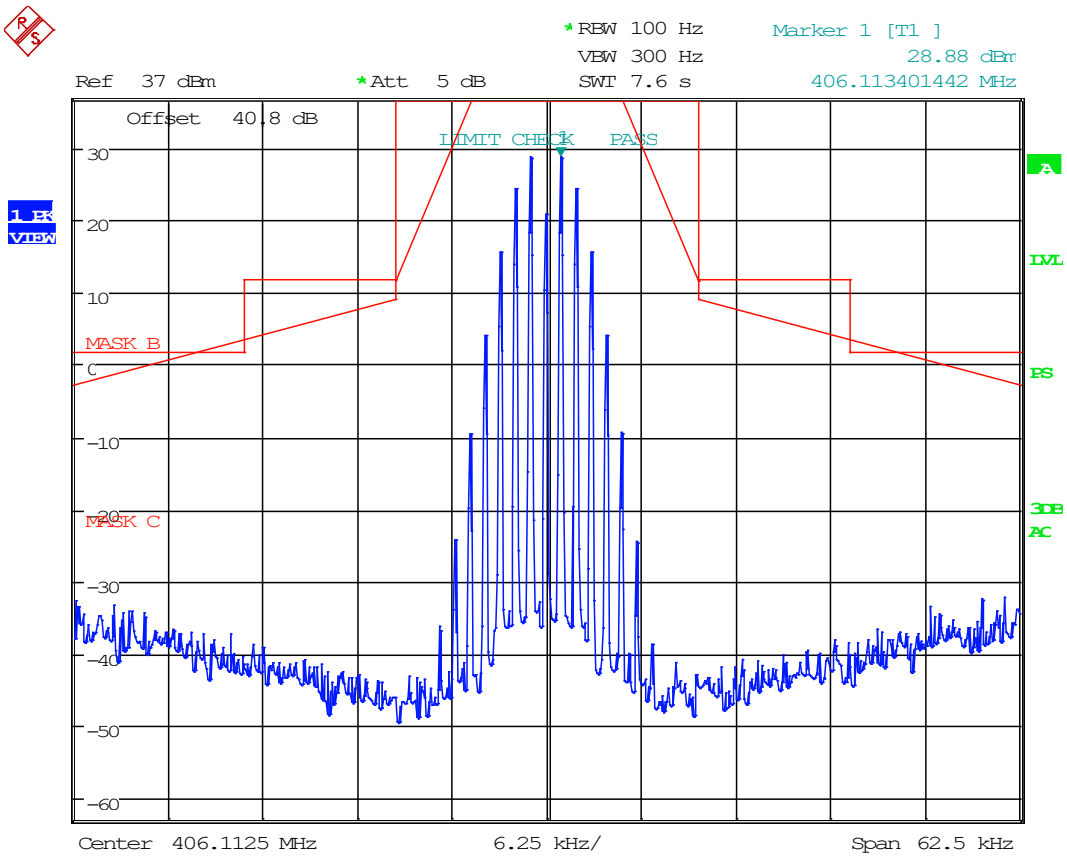
**Comparison to Input:** Complies with Standards



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

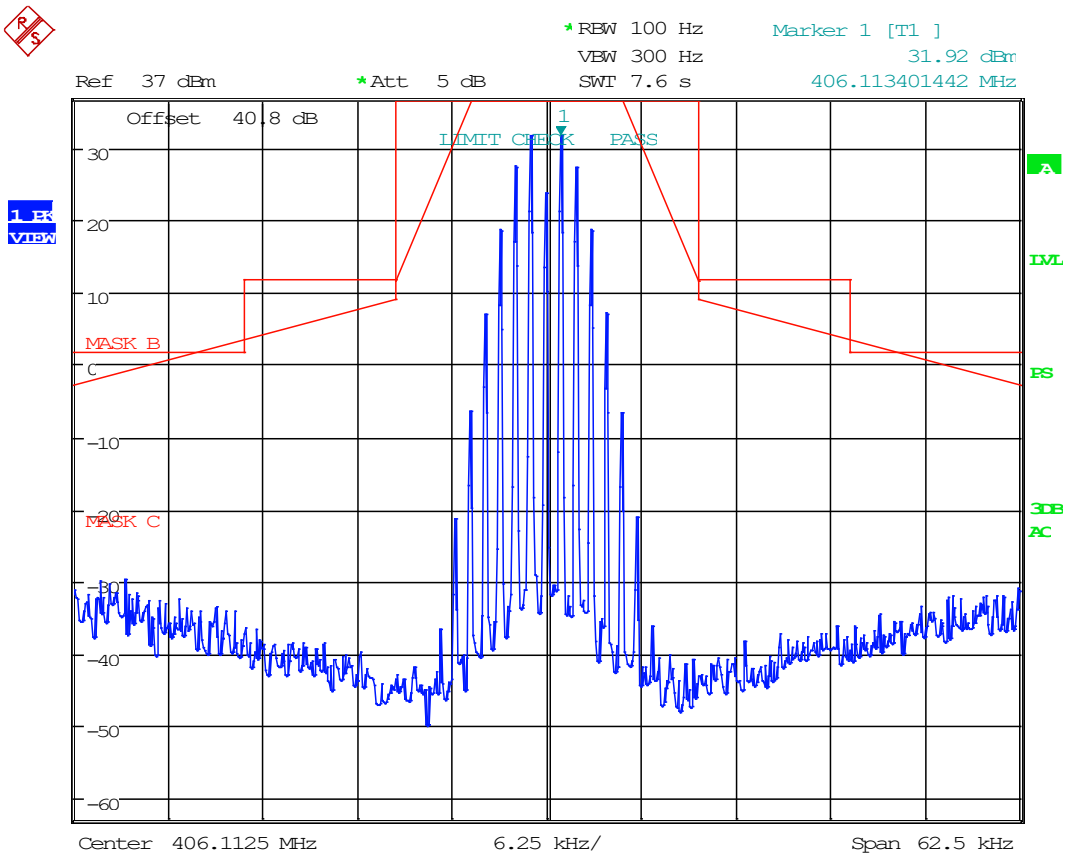
**Comparison to Input:** Complies with Standards



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

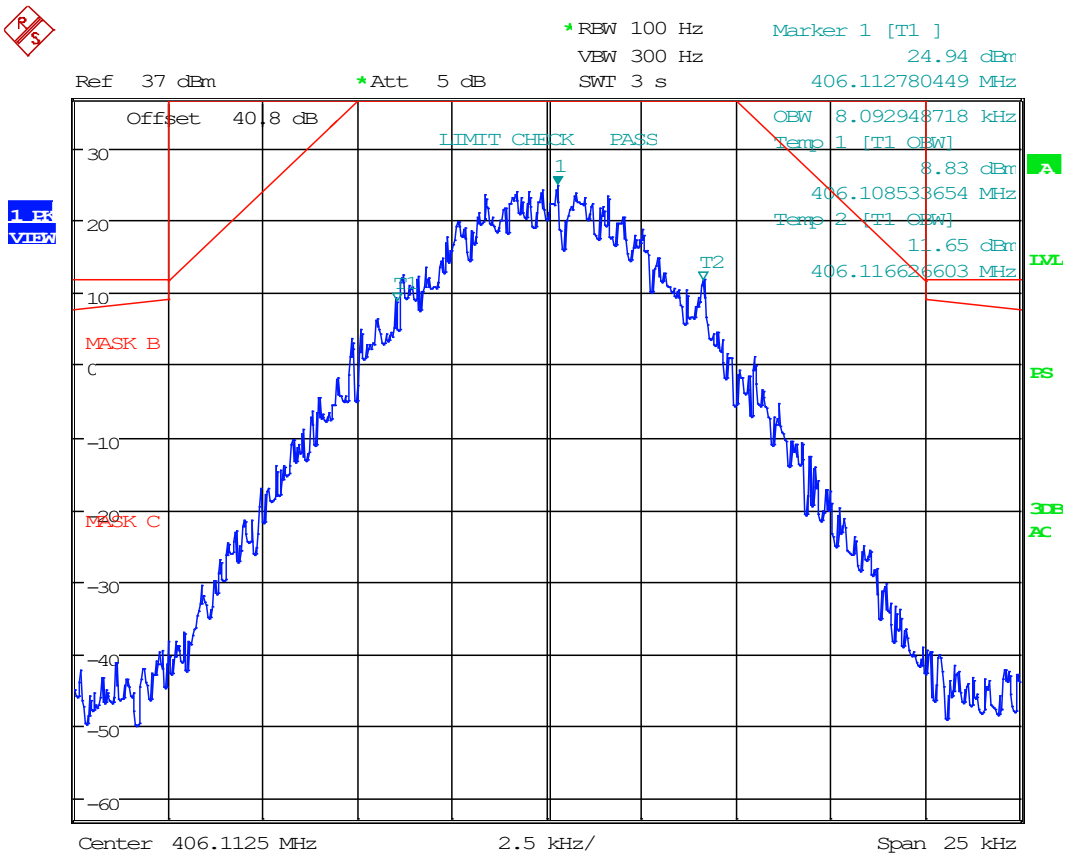
**Comparison to Input:** Complies with Standards



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



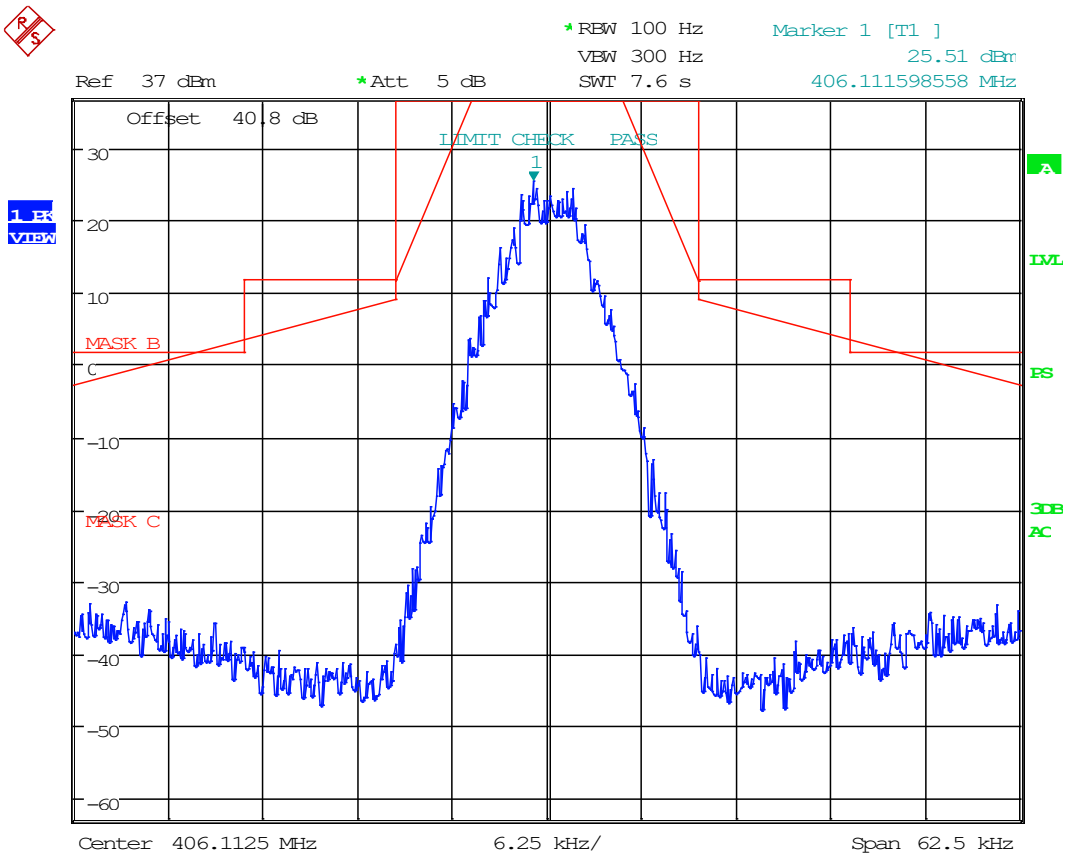

Date: 27.JUL.2020 17:30:55

**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

## EMISSION MASK & IVO

### 406.1125 MHz, Uplink, C4FM, At AGC




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

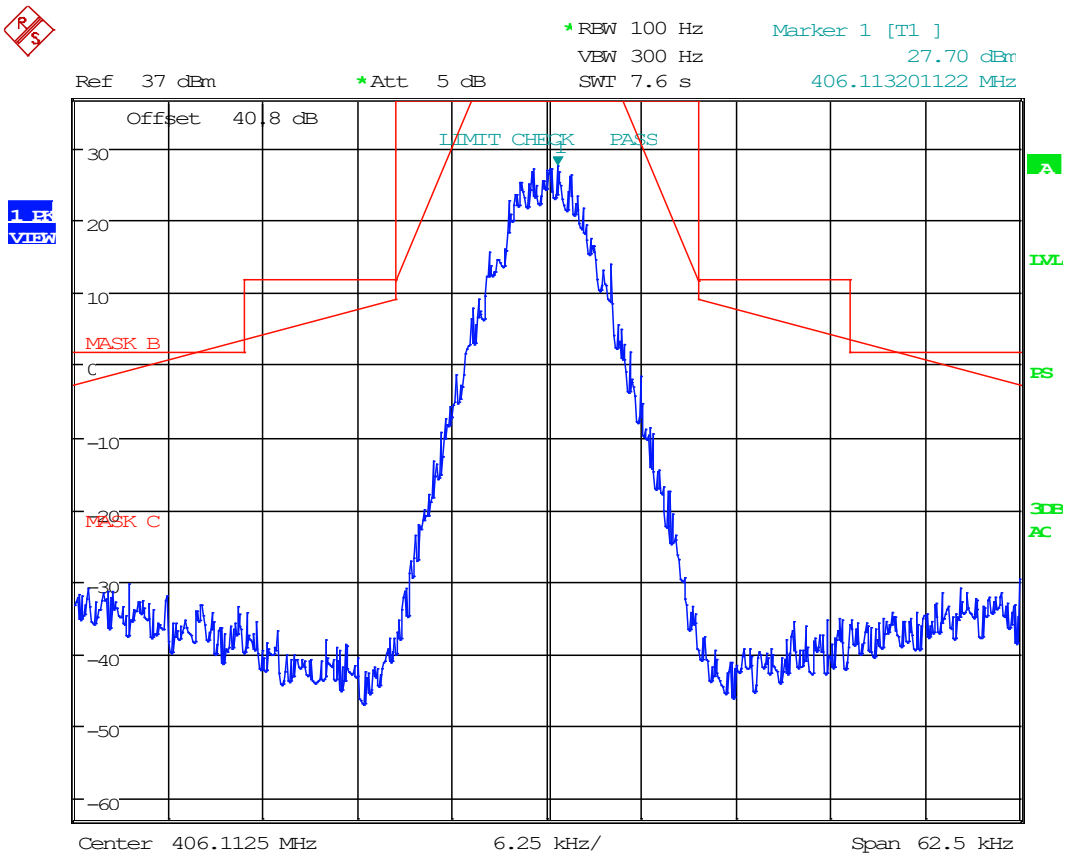
**Comparison to Input:** Complies with Standards



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

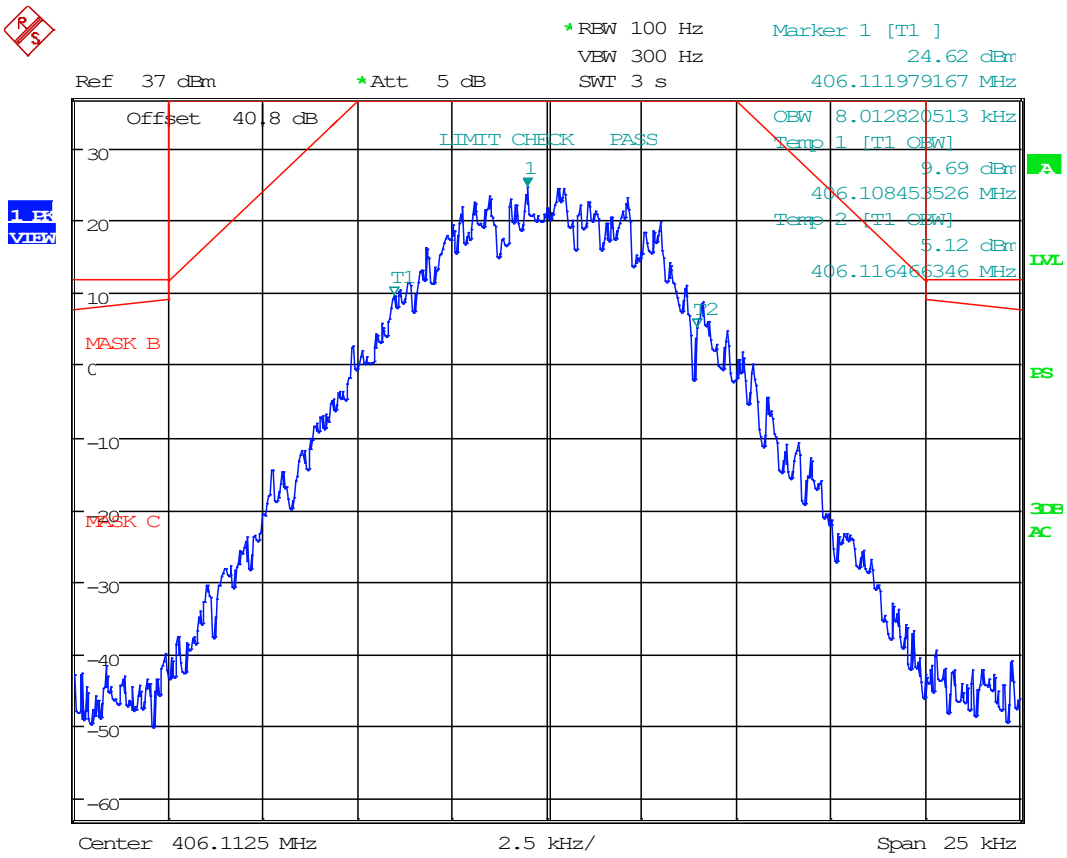
**Comparison to Input:** Complies with Standards



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.

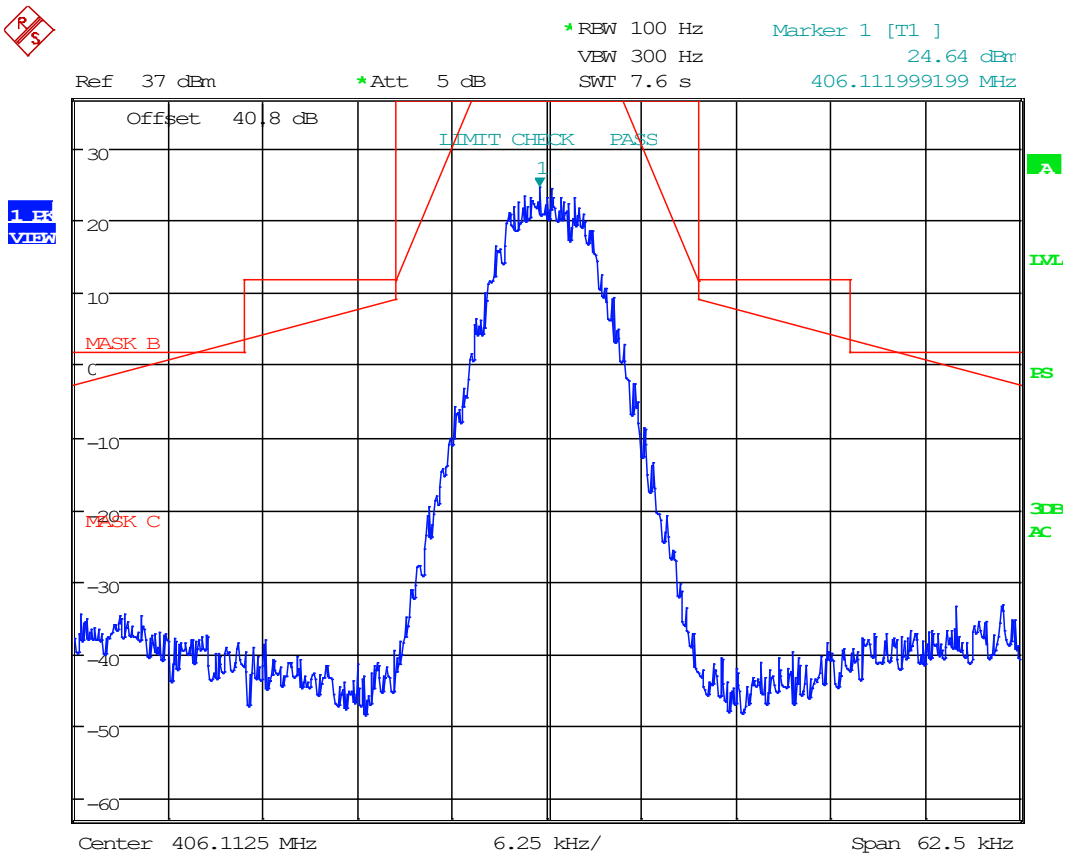
**Comparison to Input:** Complies with Standards



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

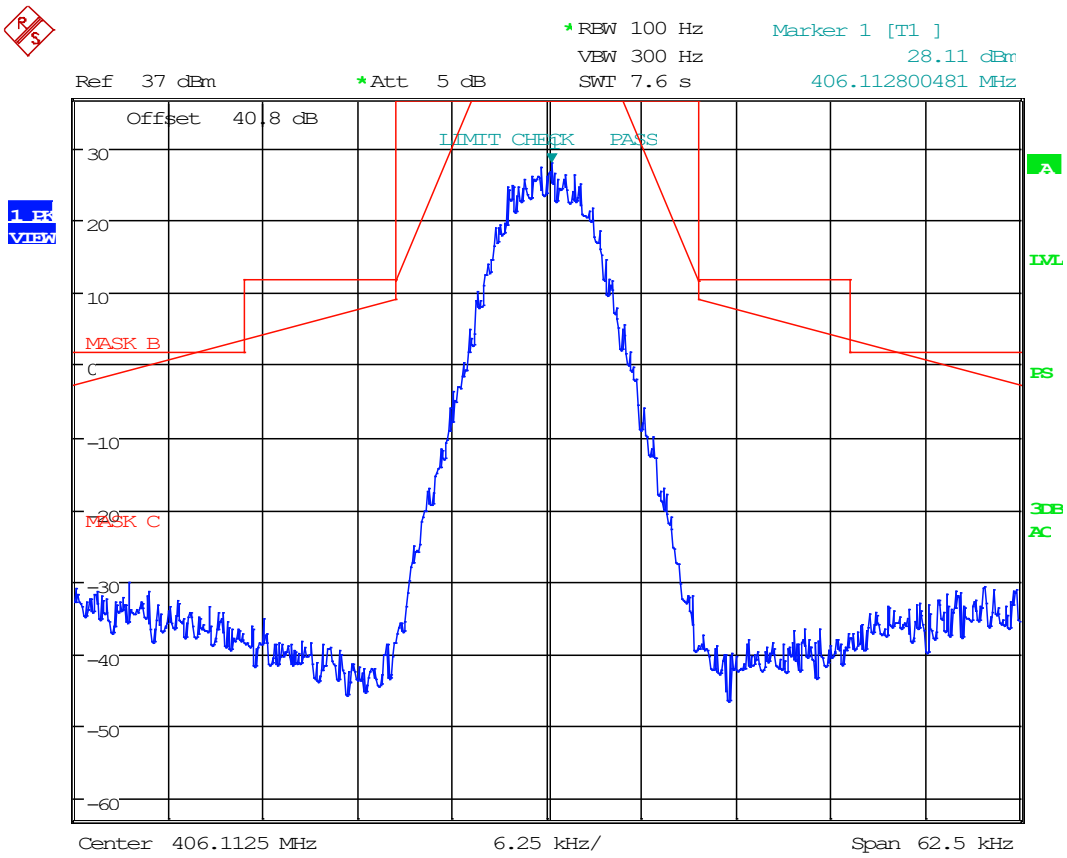
**Comparison to Input:** Complies with Standards



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

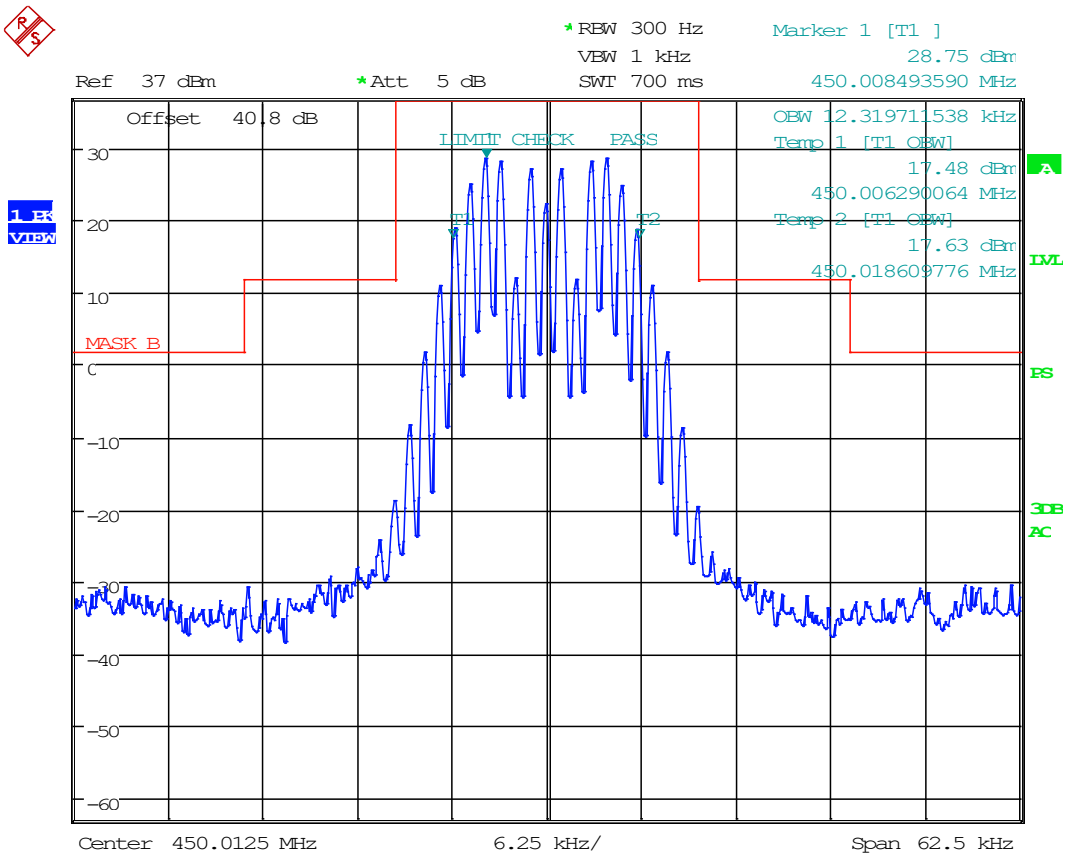
**Comparison to Input:** Complies with Standards



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




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

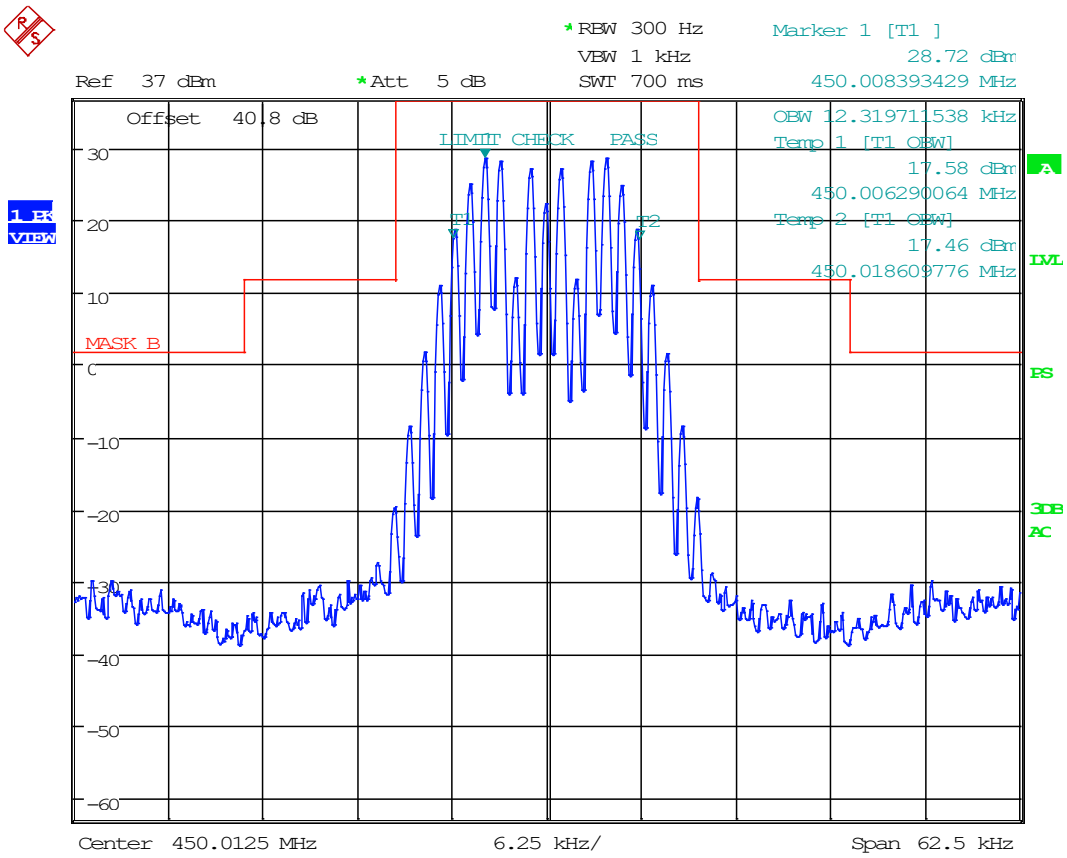
**Comparison to Input:** Complies with Standards



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

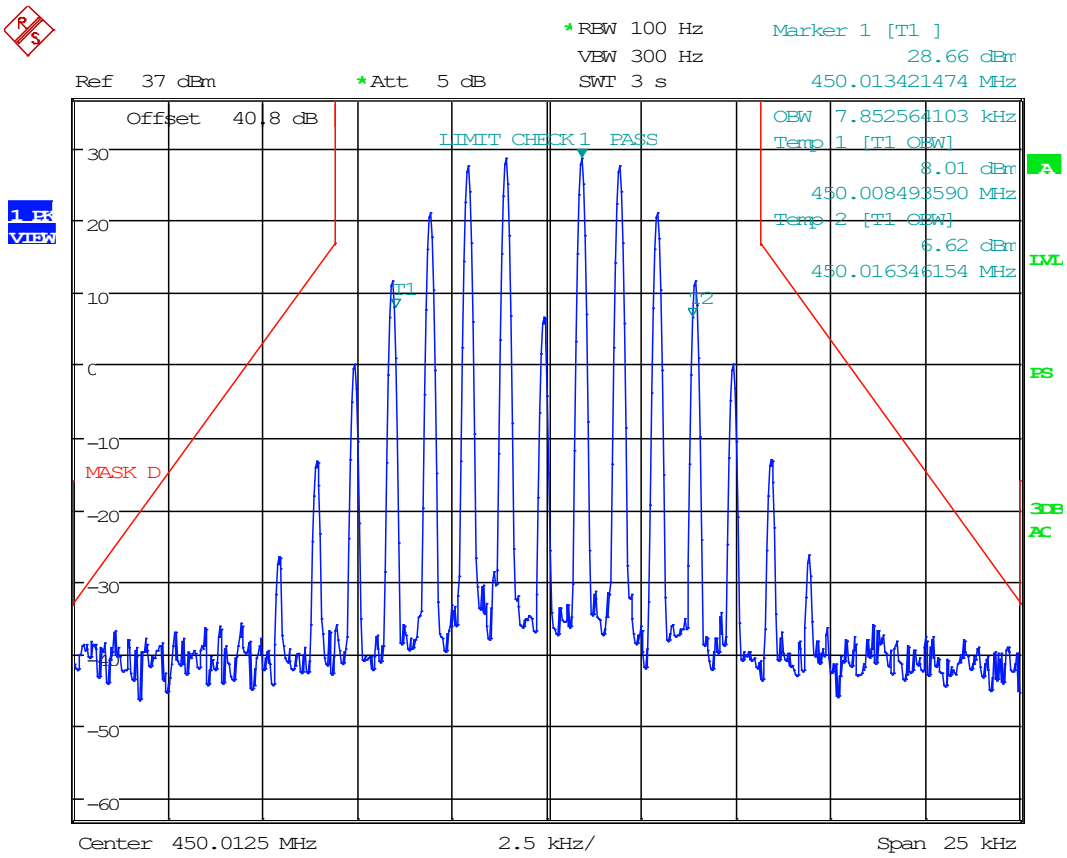
**Comparison to Input:** Complies with Standards



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

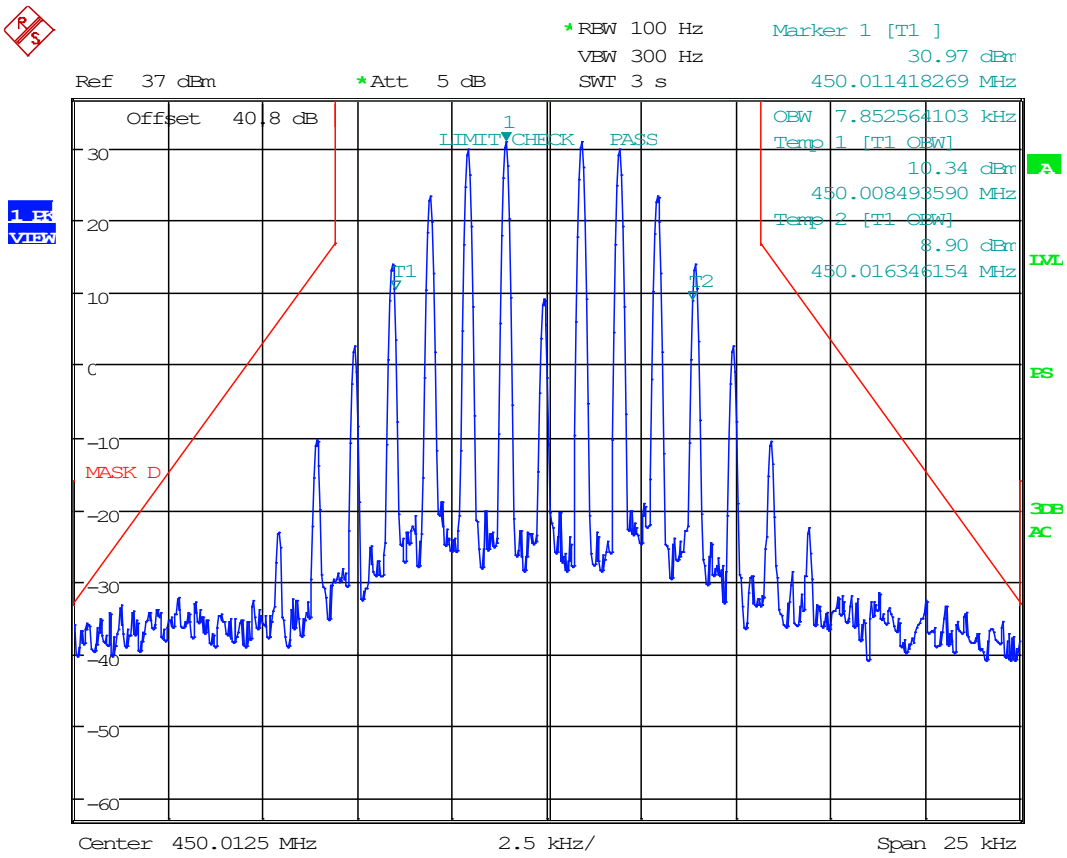
**Comparison to Input:** Complies with Standards



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

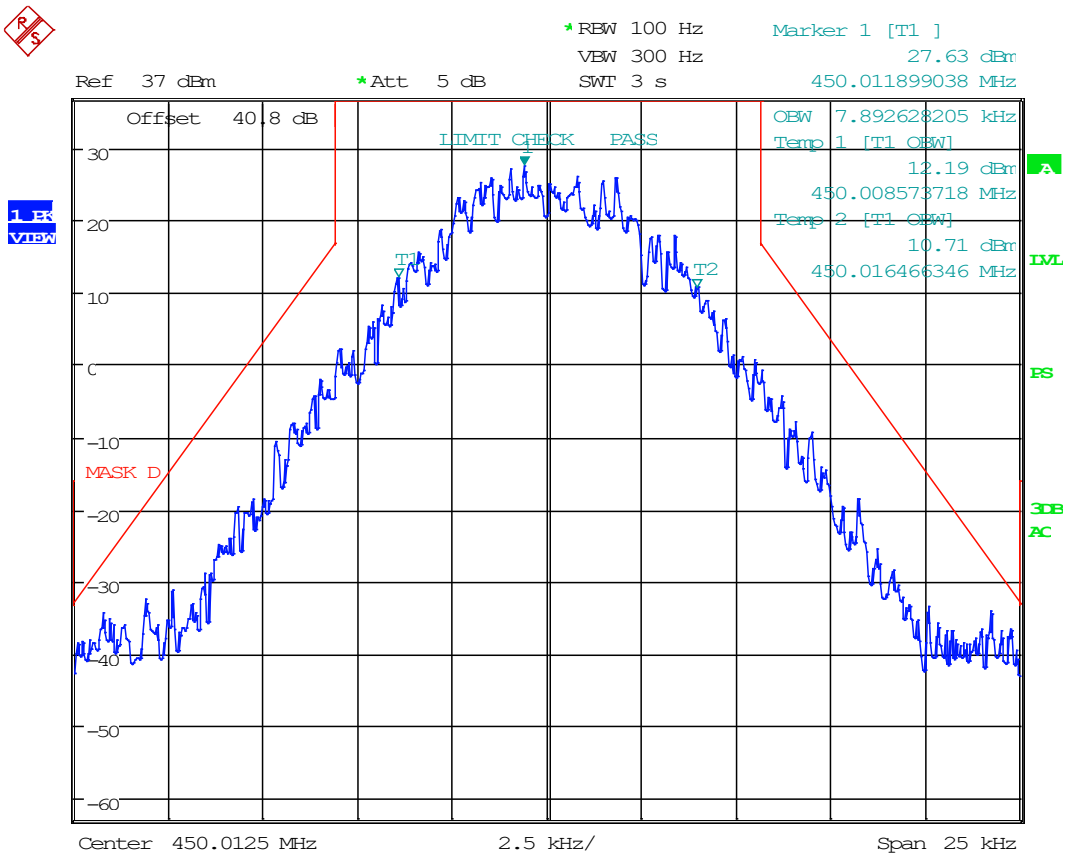
**Comparison to Input:** Complies with Standards



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

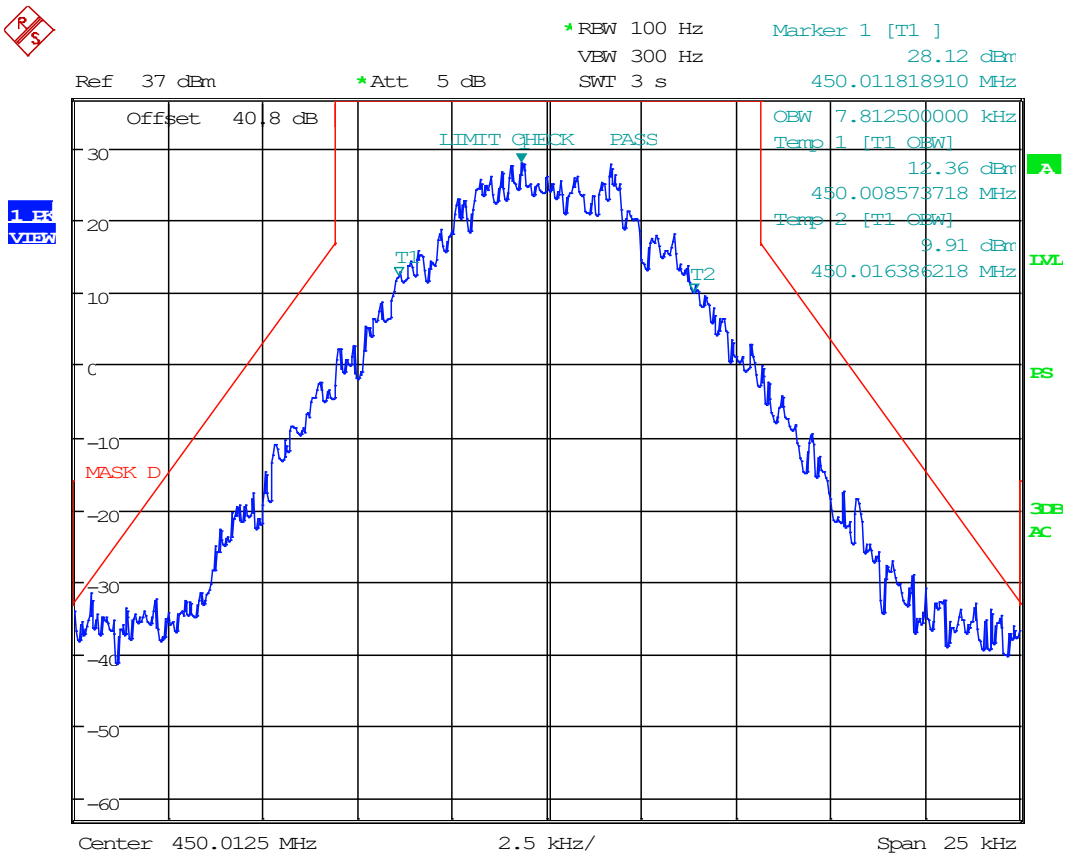
**Comparison to Input:** Complies with Standards



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

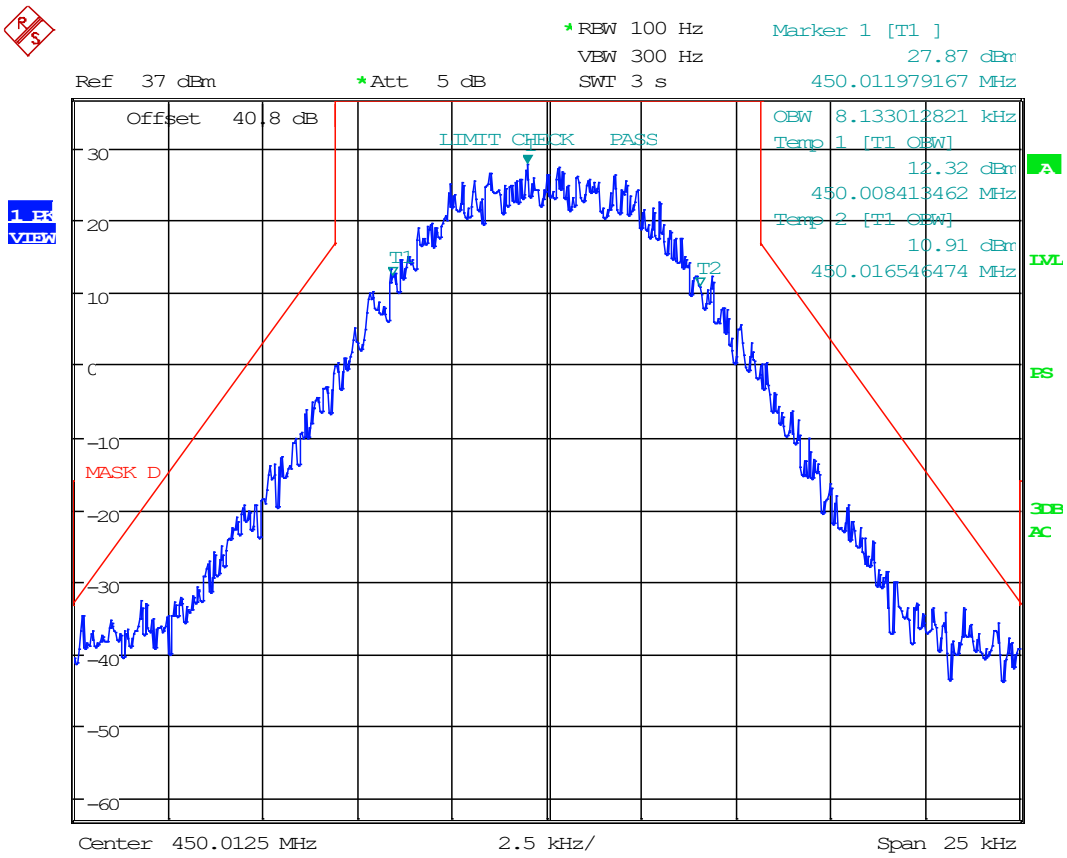
**Comparison to Input:** Complies with Standards



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

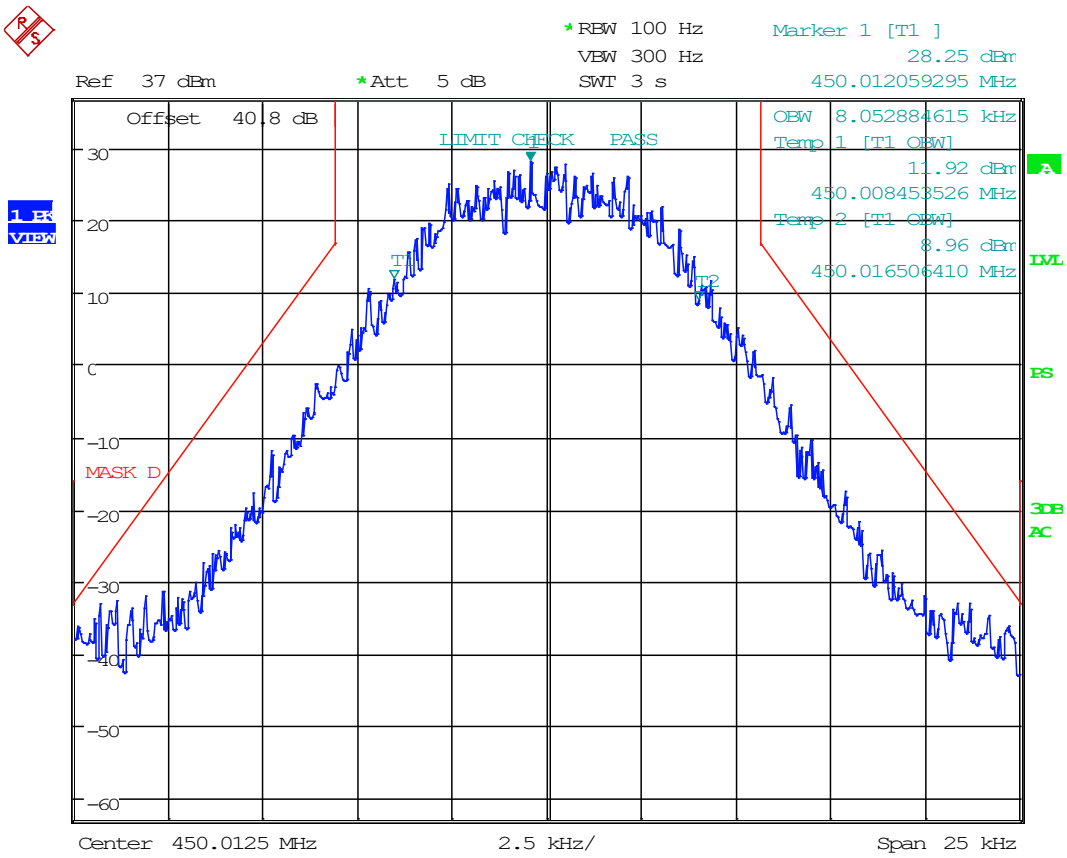
**Comparison to Input:** Complies with Standards



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

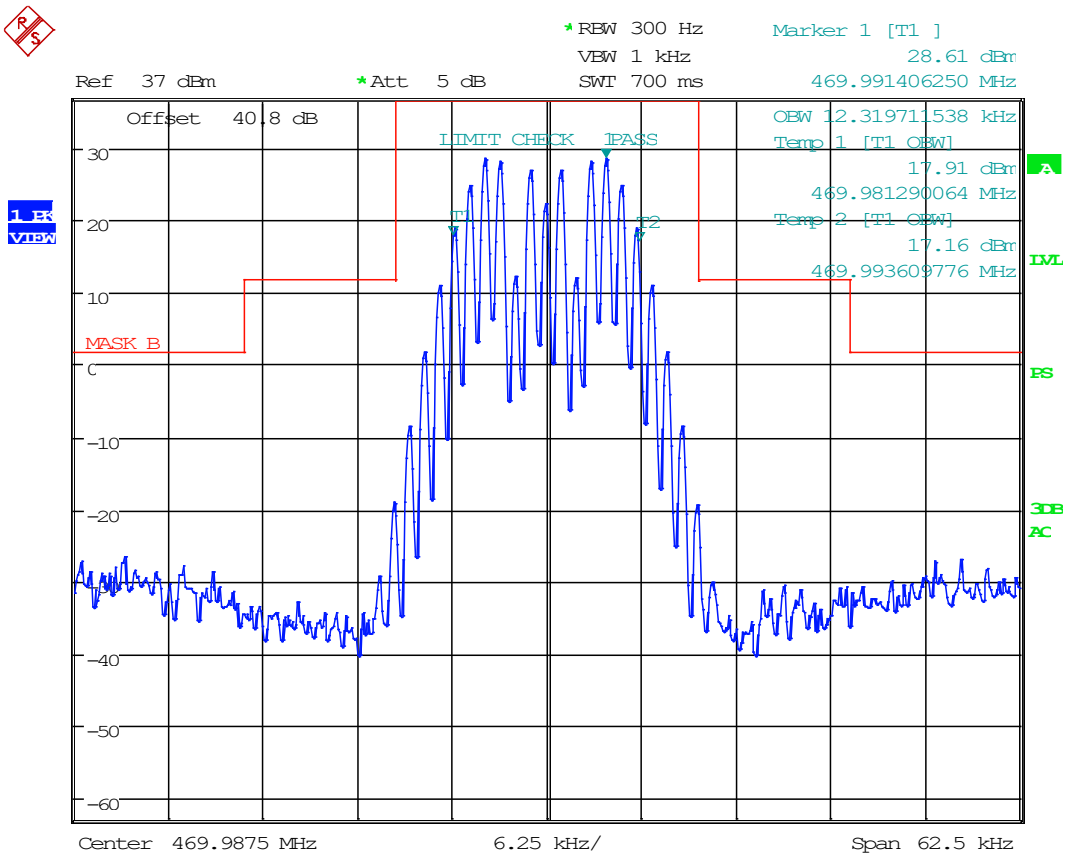



Date: 24.JUL.2020 18:47:07

**Comparison to Input:** Complies with Standards

## EMISSION MASK & IVO

### 469.9875 MHz, Downlink, 25k FM, At AGC




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

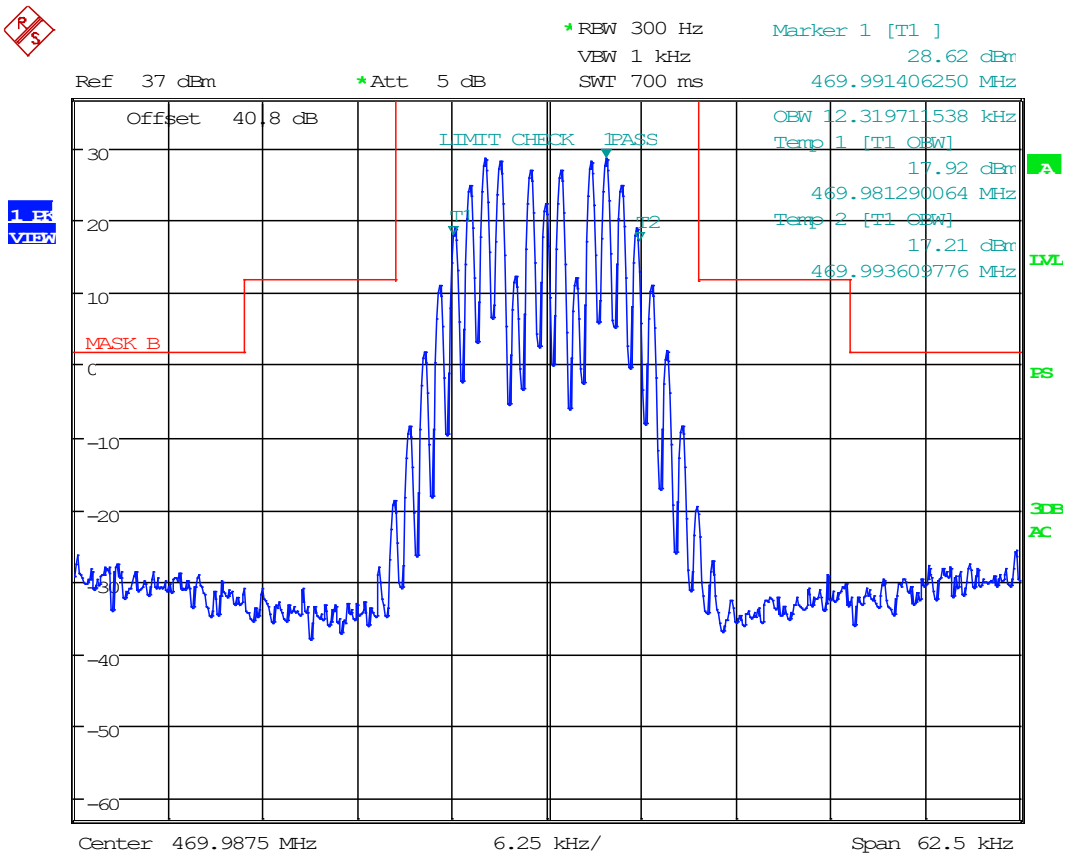
**Comparison to Input:** Complies with Standards



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

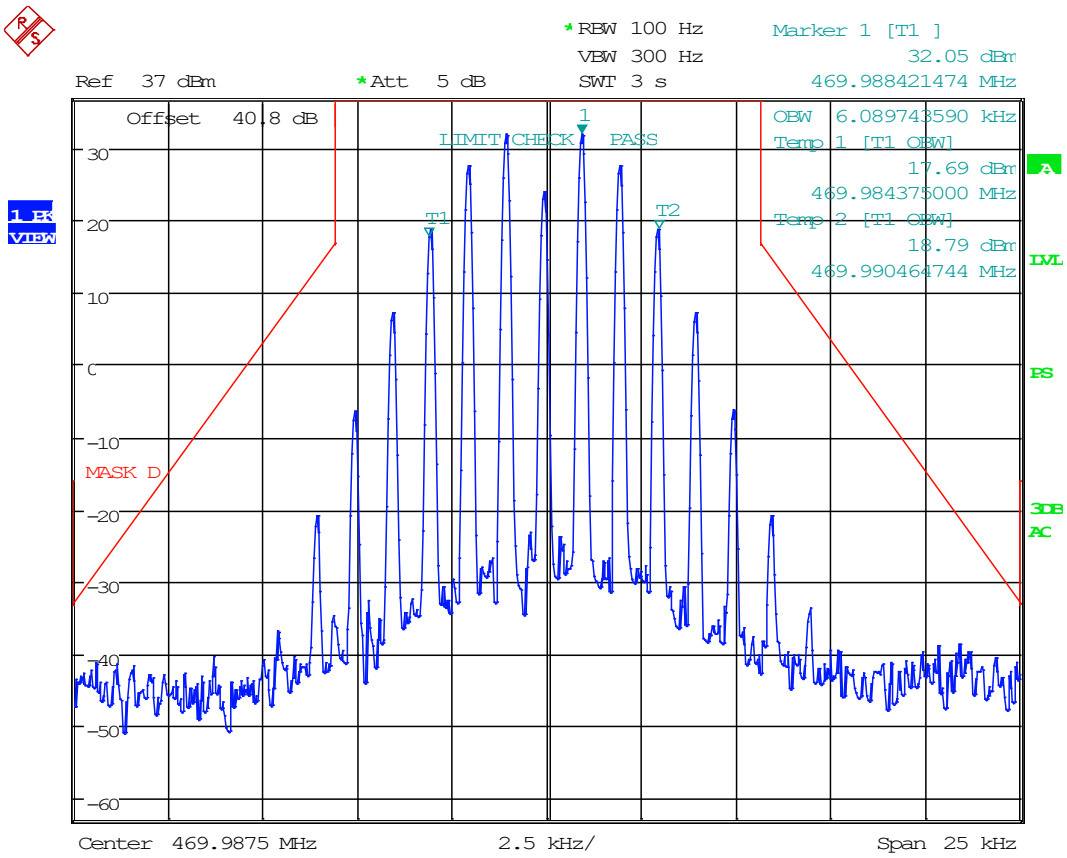
**Comparison to Input:** Complies with Standards



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

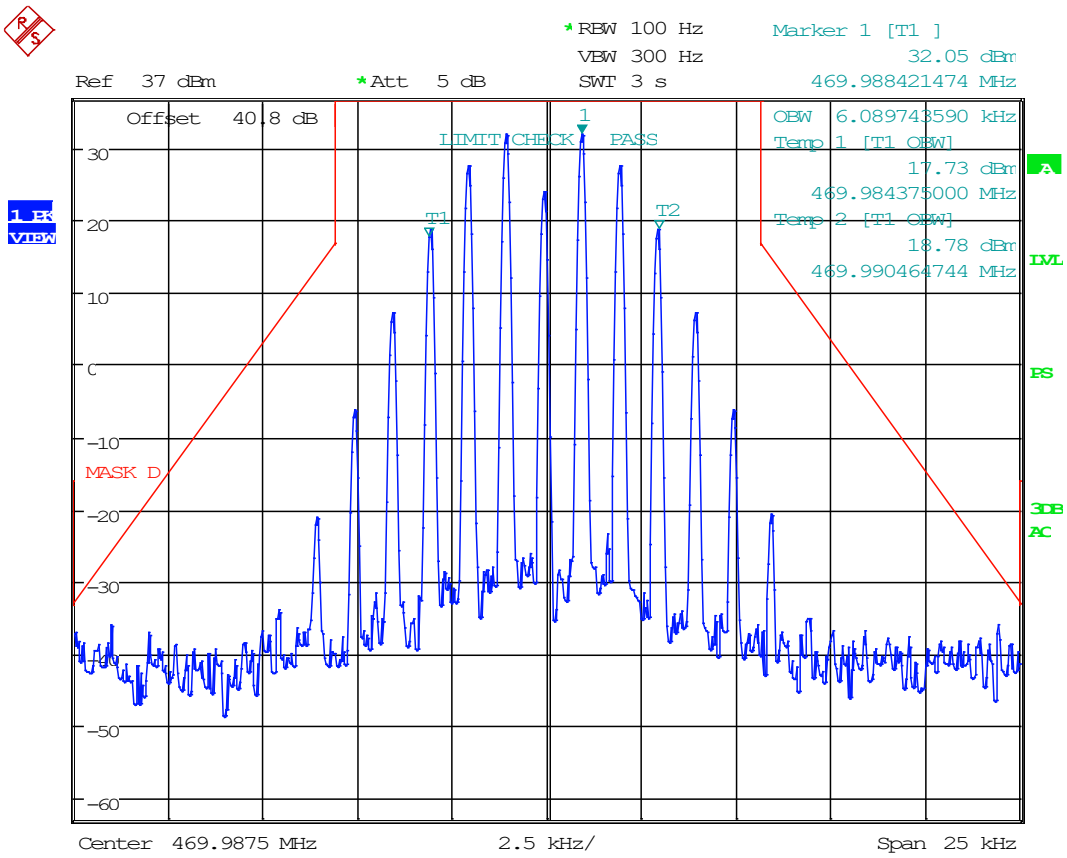
**Comparison to Input:** Complies with Standards



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

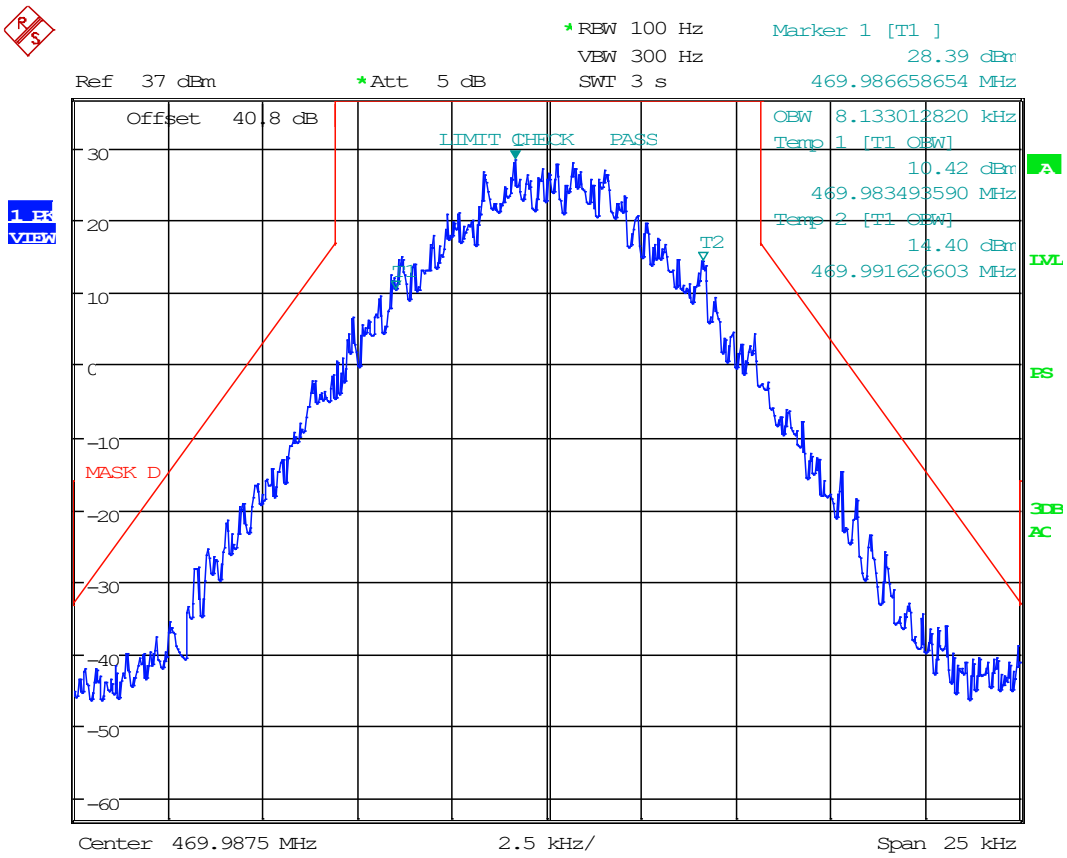
**Comparison to Input:** Complies with Standards



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

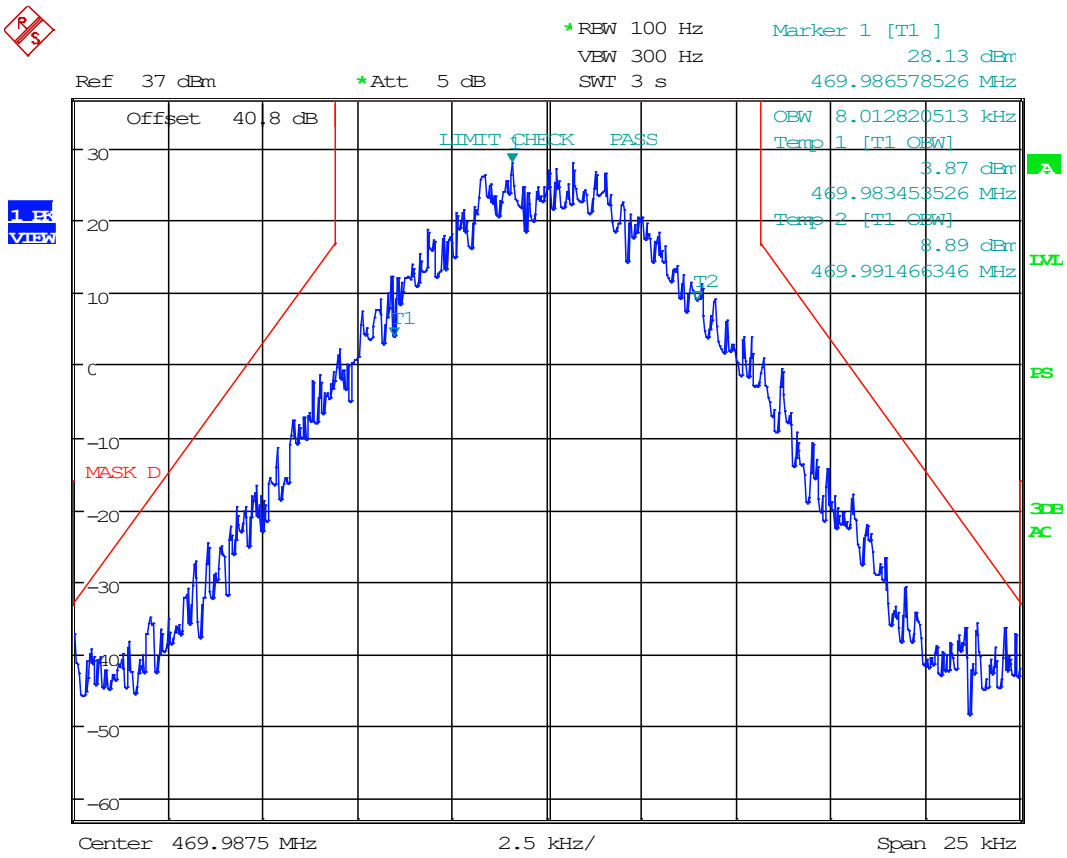
**Comparison to Input:** Complies with Standards



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

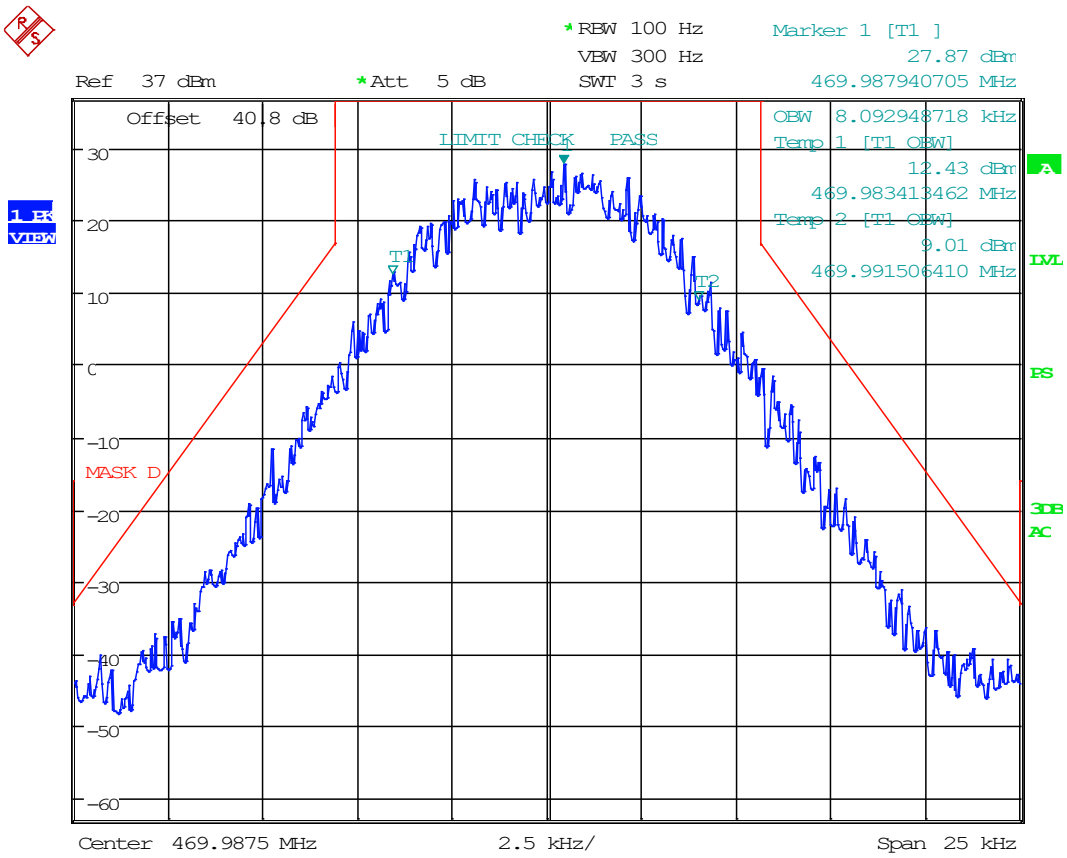
**Comparison to Input:** Complies with Standards



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

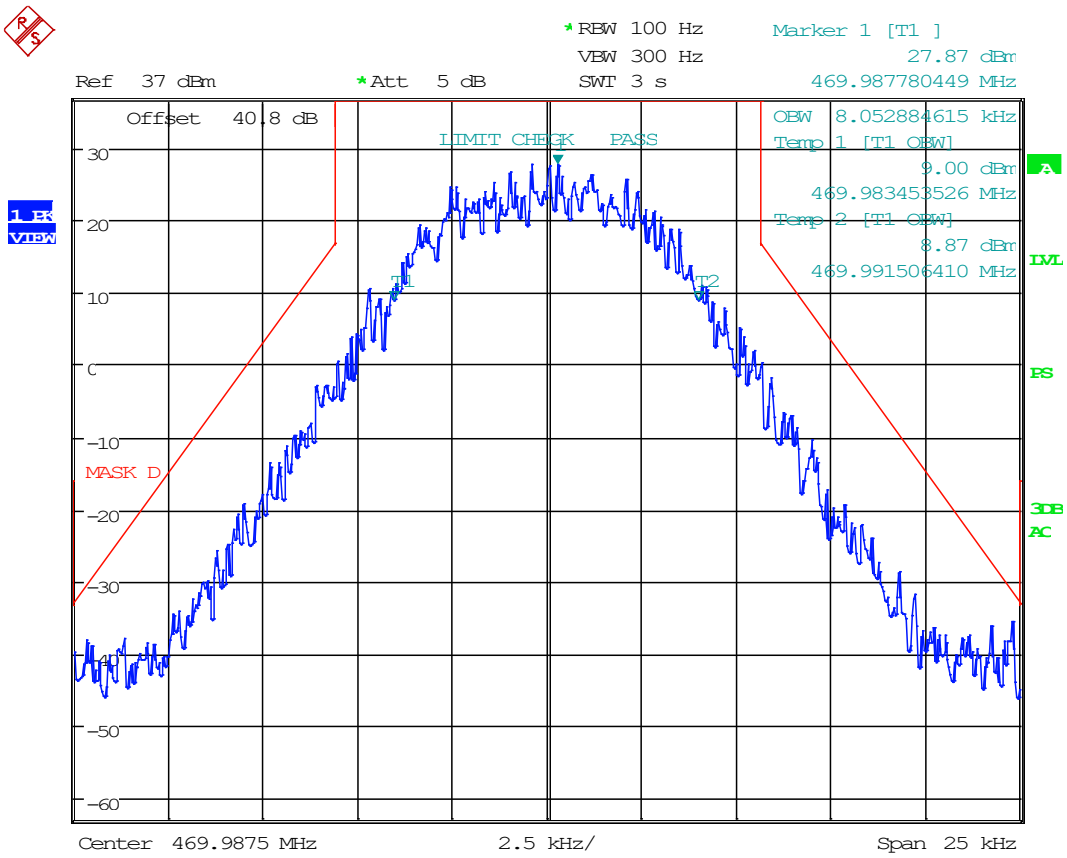
**Comparison to Input:** Complies with Standards



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

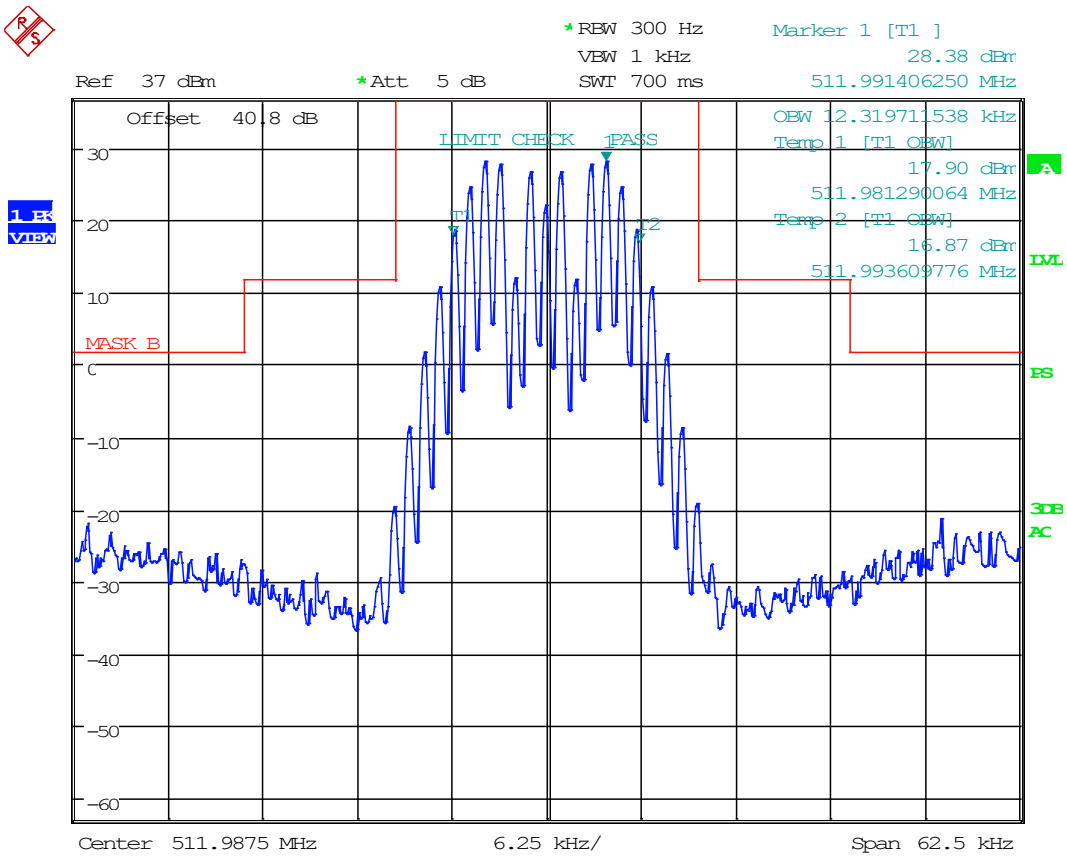
**Comparison to Input:** Complies with Standards



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

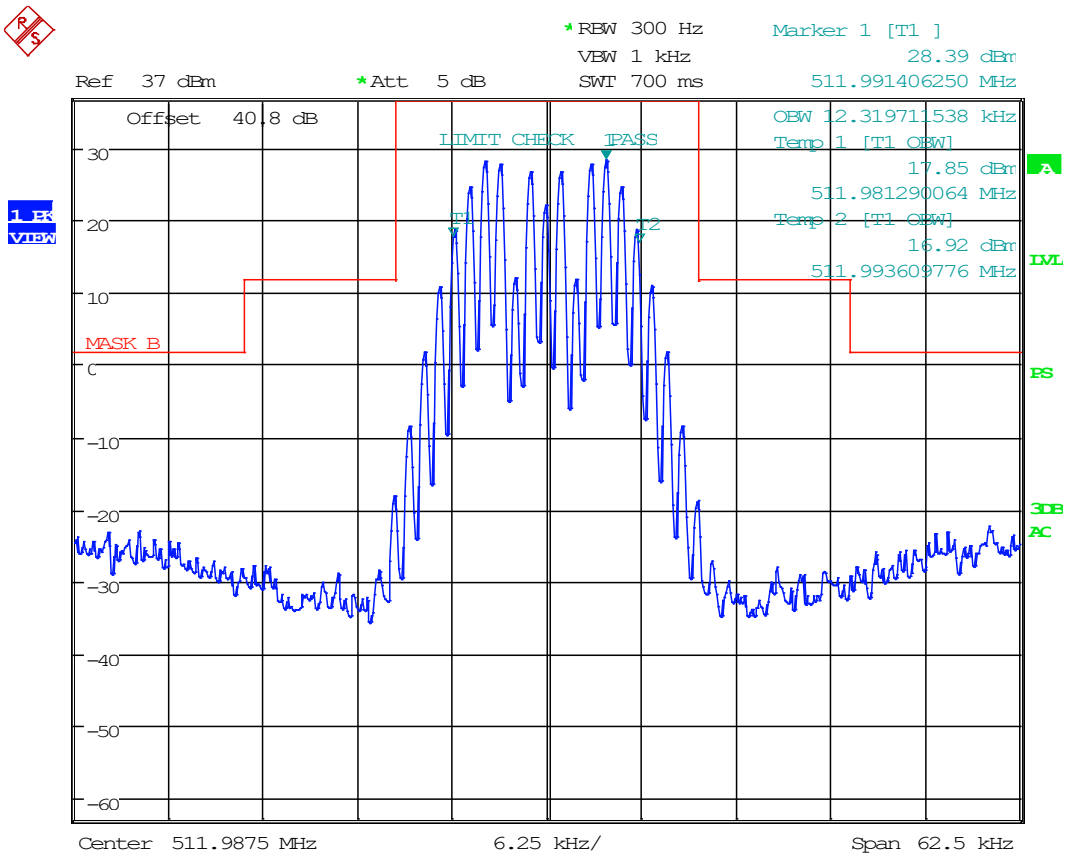
**Comparison to Input:** Complies with Standards



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

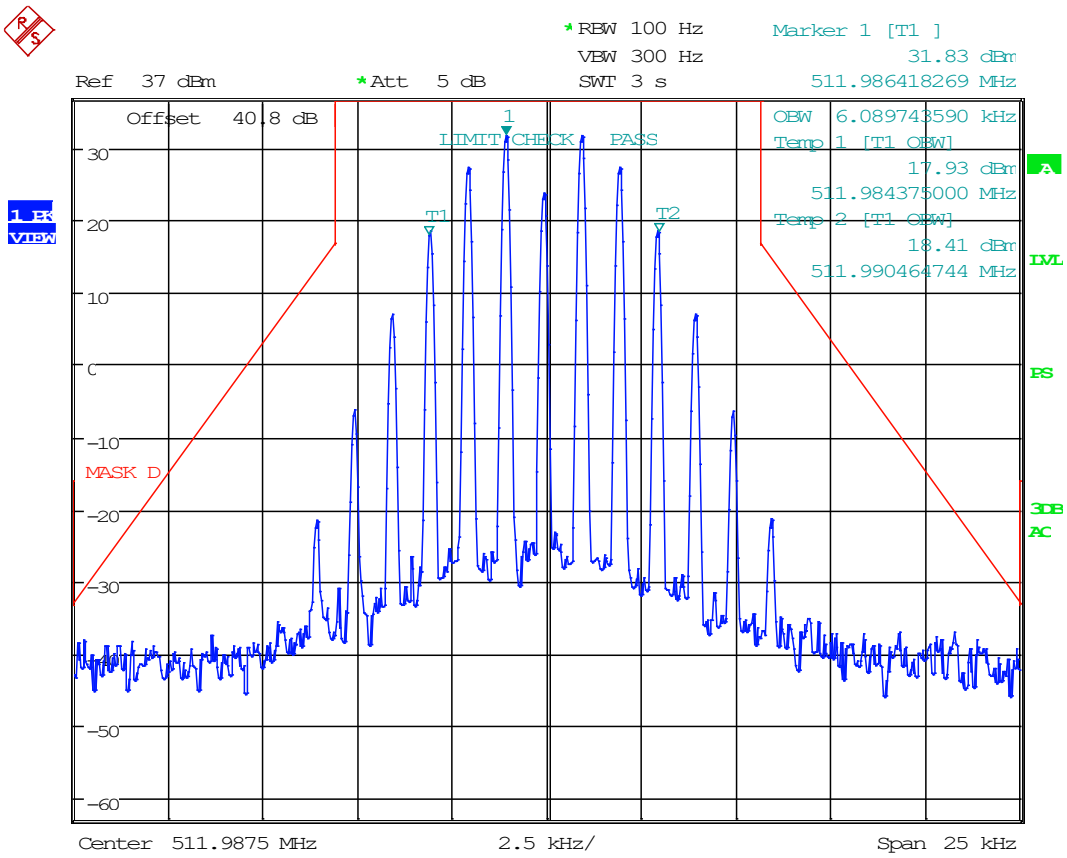



Date: 27.JUL.2020 19:05:23

**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

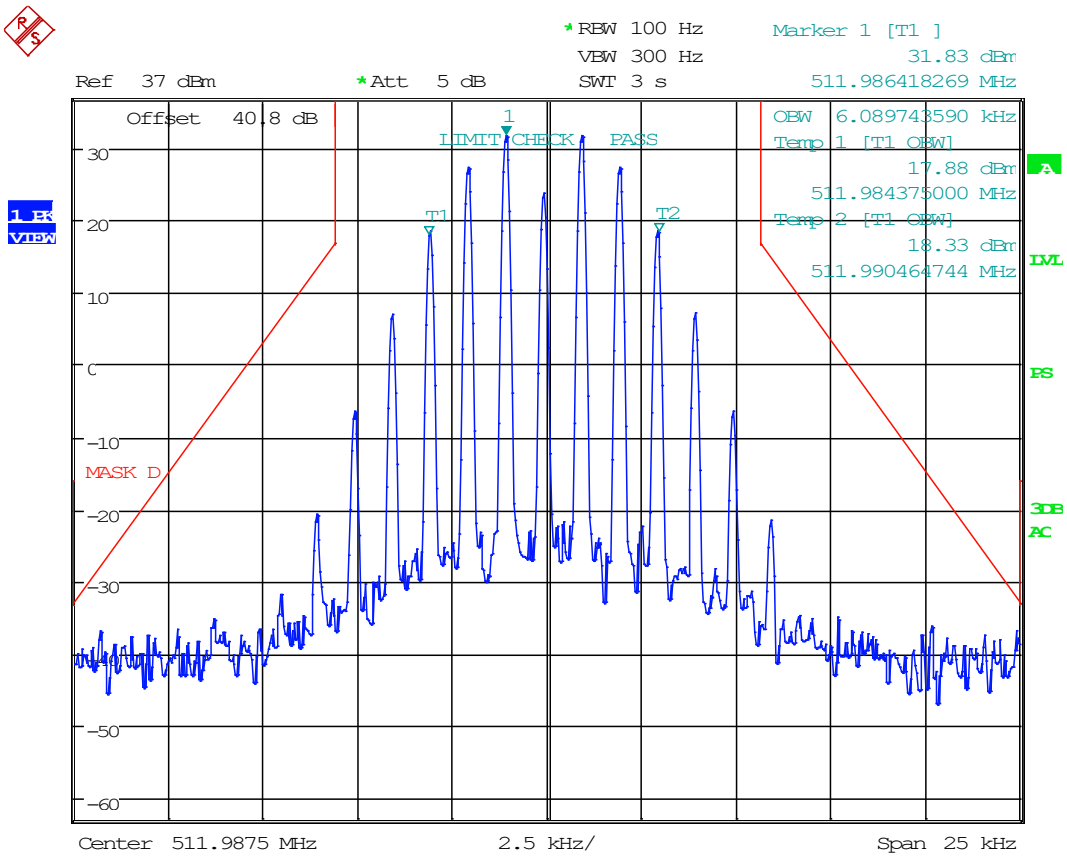
**Comparison to Input:** Complies with Standards



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

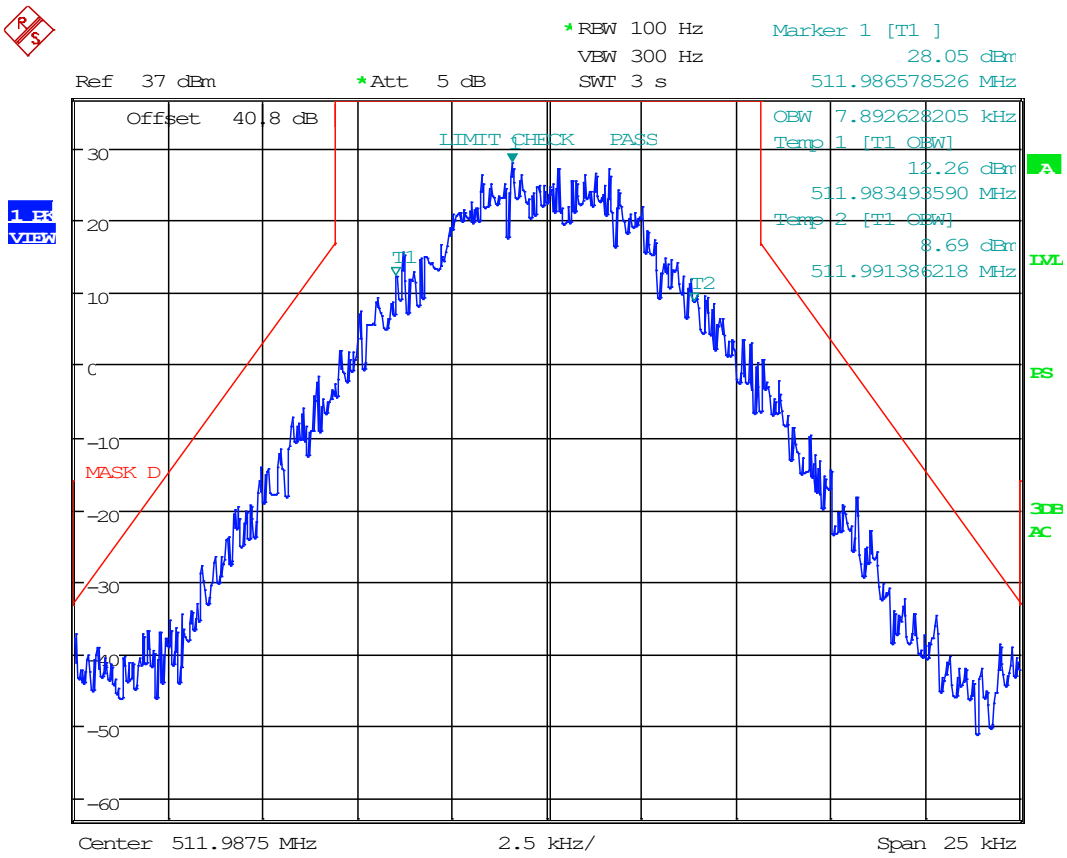
**Comparison to Input:** Complies with Standards



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

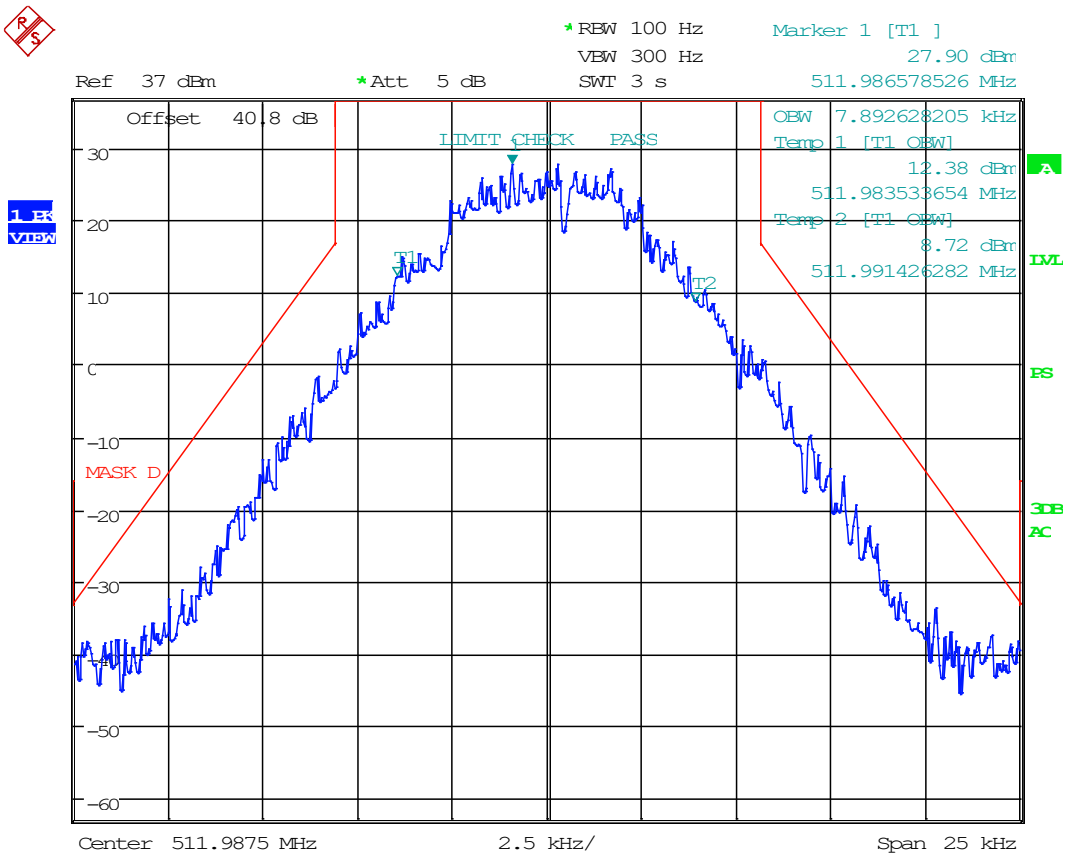
**Comparison to Input:** Complies with Standards



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

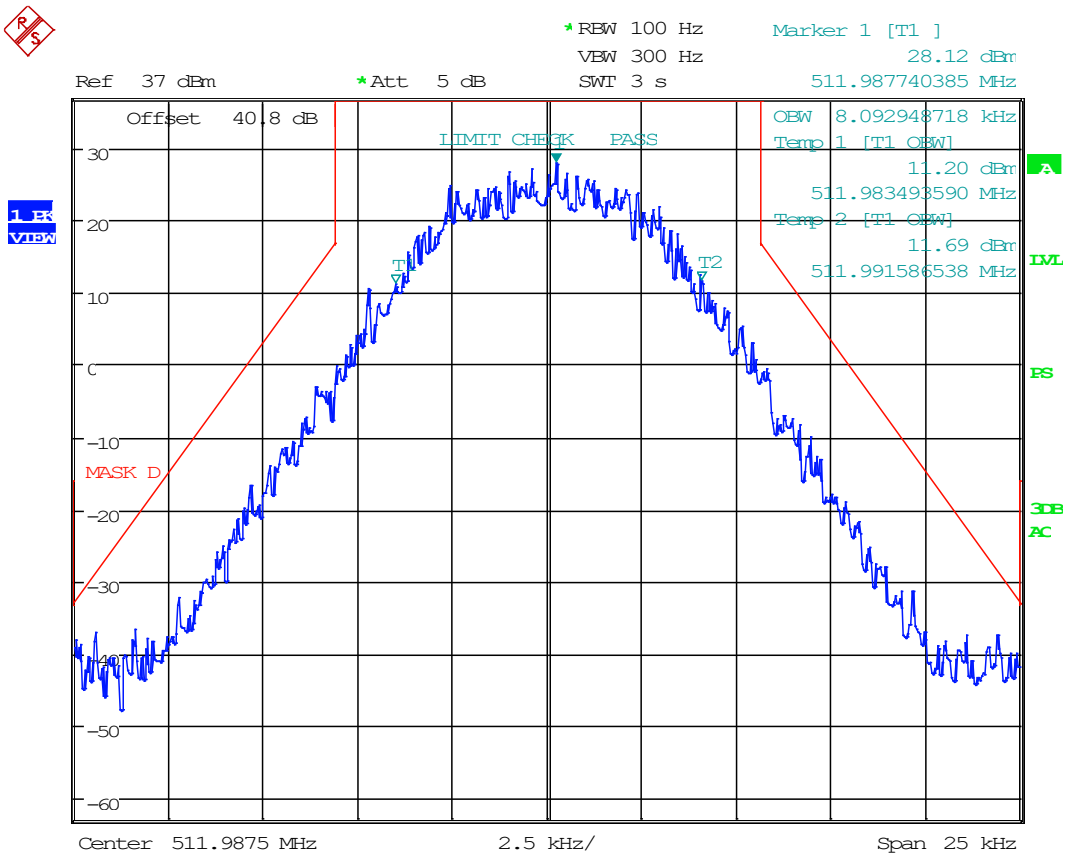
**Comparison to Input:** Complies with Standards



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



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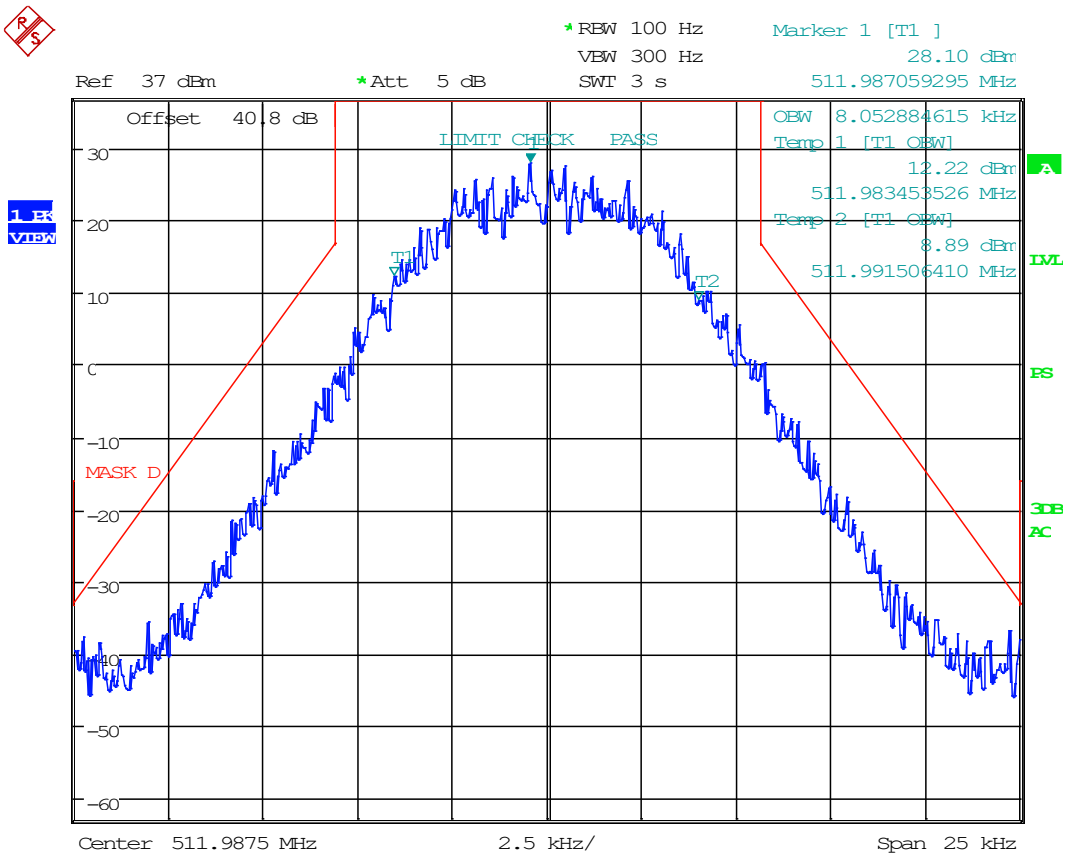
## EMISSION MASK & IVO

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




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

**Comparison to Input:** Complies with Standards



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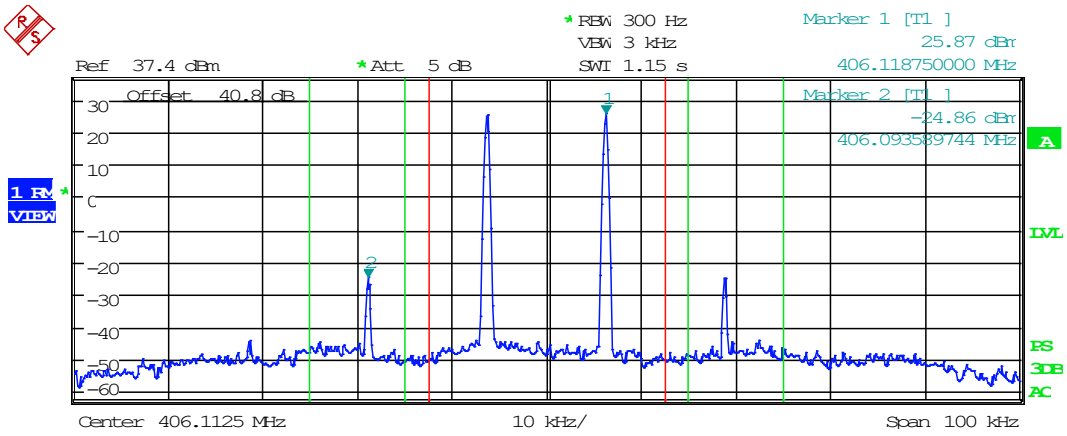
## KDB 935210 4.7.2 INTERMODULATION

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
Spacing 20 kHz
Lower -23.93 dBm
Upper -23.79 dBm

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



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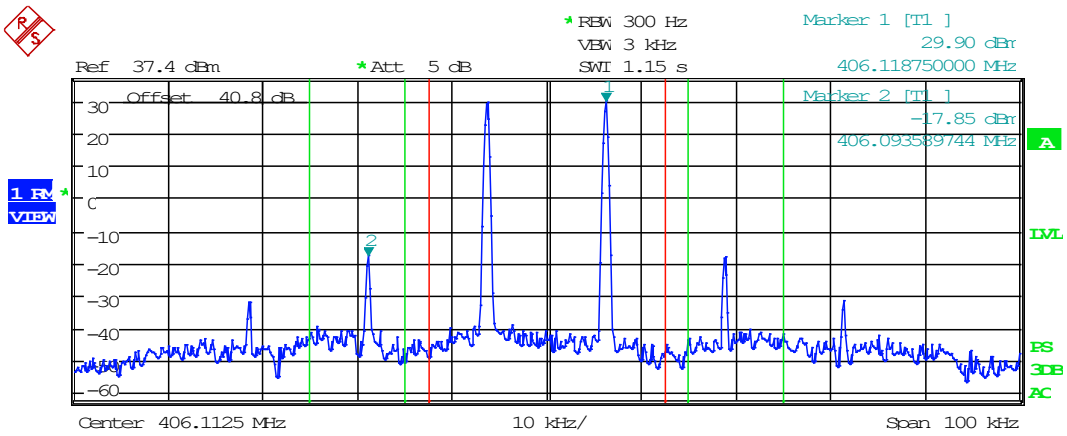
## INTERMODULATION

### 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



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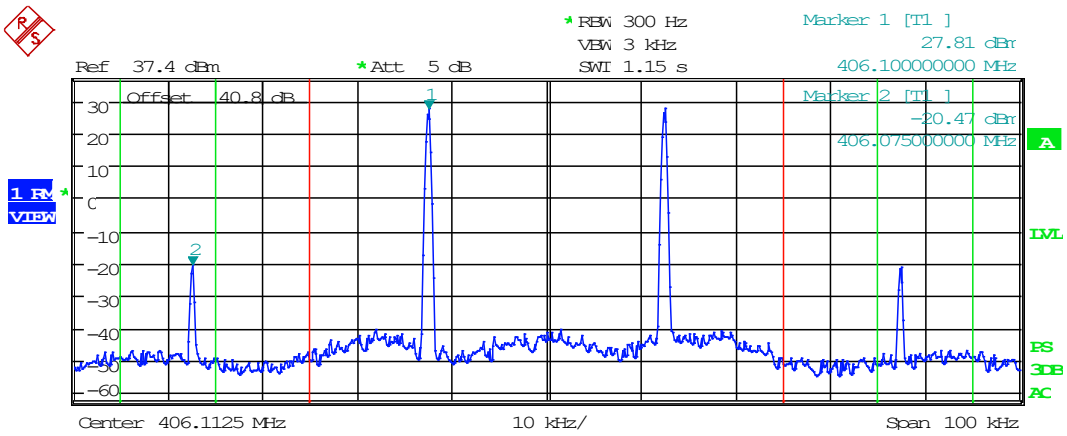
## INTERMODULATION

### 406.1125 MHz, Uplink, 25K, At AGC




**Tx Channel**
Bandwidth 50 kHz

Power 31.14 dBm

**Adjacent Channel**
Bandwidth 10 kHz
Spacing 40 kHz

Lower -20.05 dBm
Upper -20.35 dBm

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



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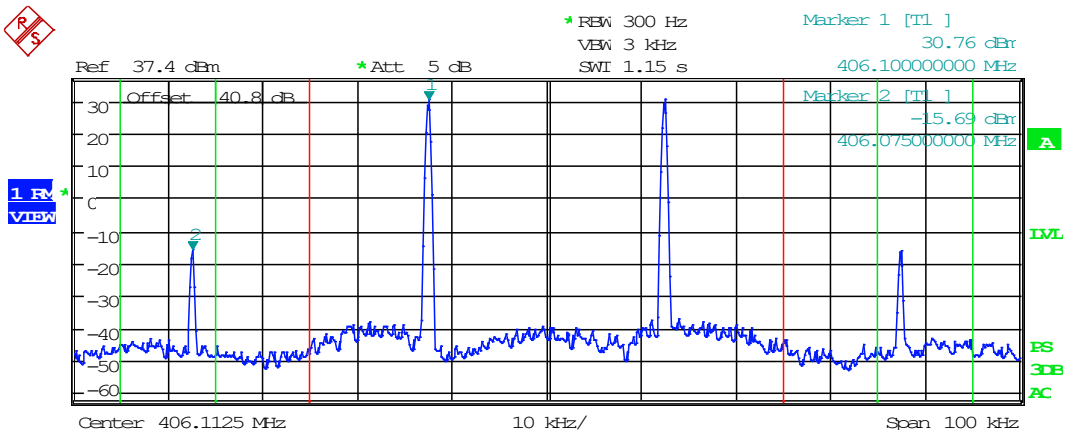
## INTERMODULATION

### 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



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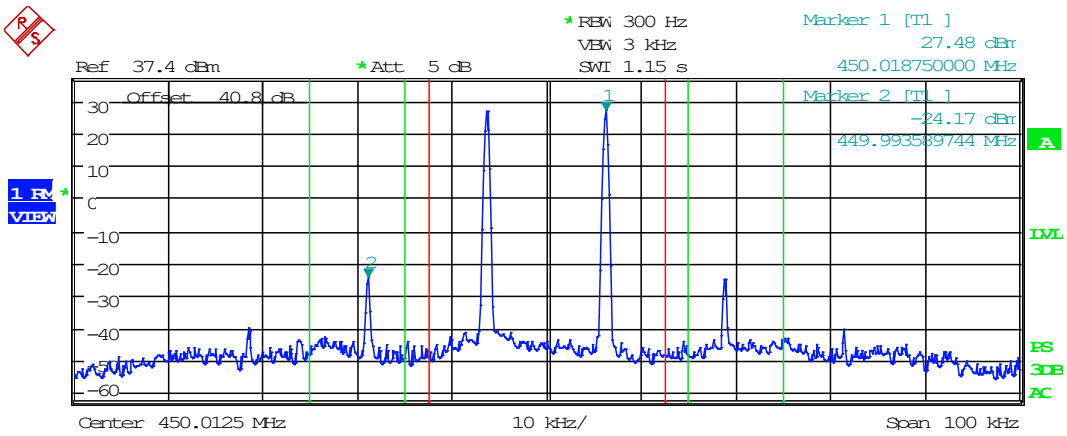
## INTERMODULATION

### 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



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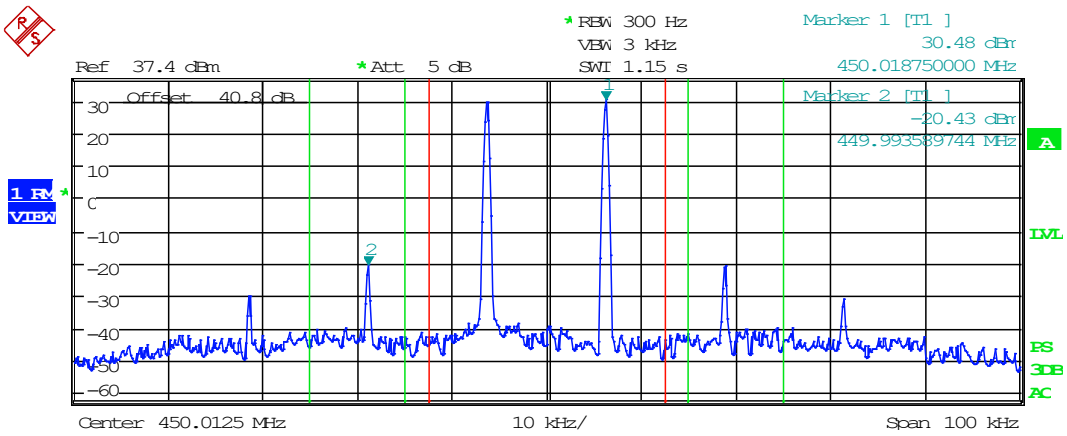
## INTERMODULATION

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




| | | | |
|---|---|---|---|
| **Tx Channel** | | | |
| Bandwidth | 25 kHz | Power | 33.80 dBm |
| **Adjacent Channel** | | | |
| Bandwidth | 10 kHz | Lower | -19.69 dBm |
| Spacing | 20 kHz | Upper | -19.65 dBm |

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



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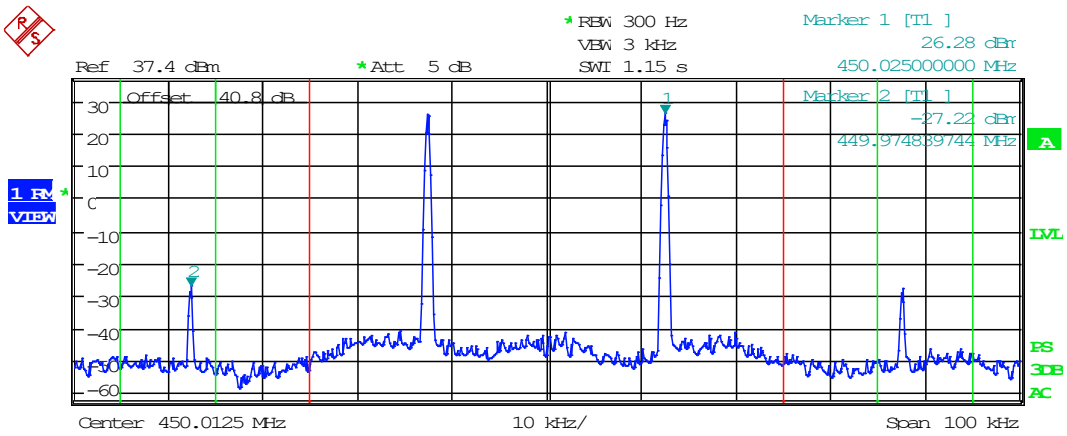
## INTERMODULATION

### 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



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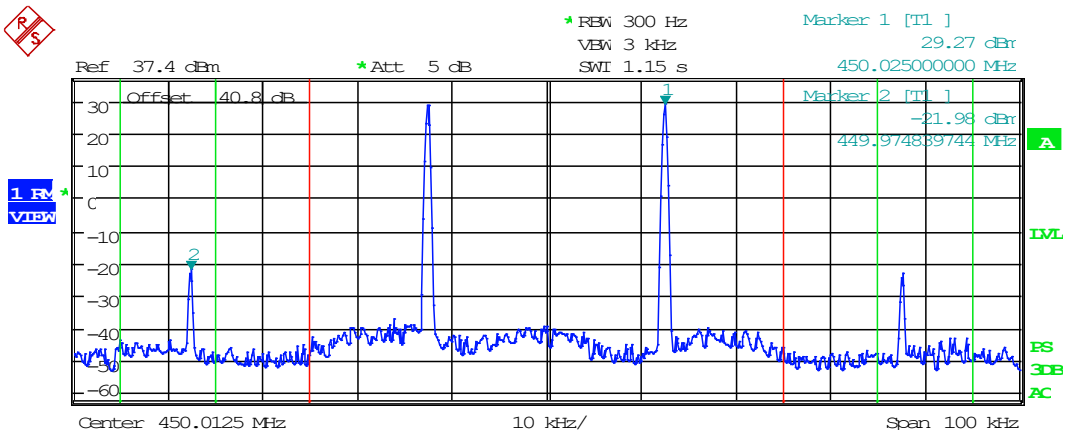
## INTERMODULATION

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




**Tx Channel**
Bandwidth 50 kHz

Power 32.66 dBm

**Adjacent Channel**
Bandwidth 10 kHz
Spacing 40 kHz

Lower -21.14 dBm
Upper -22.36 dBm

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



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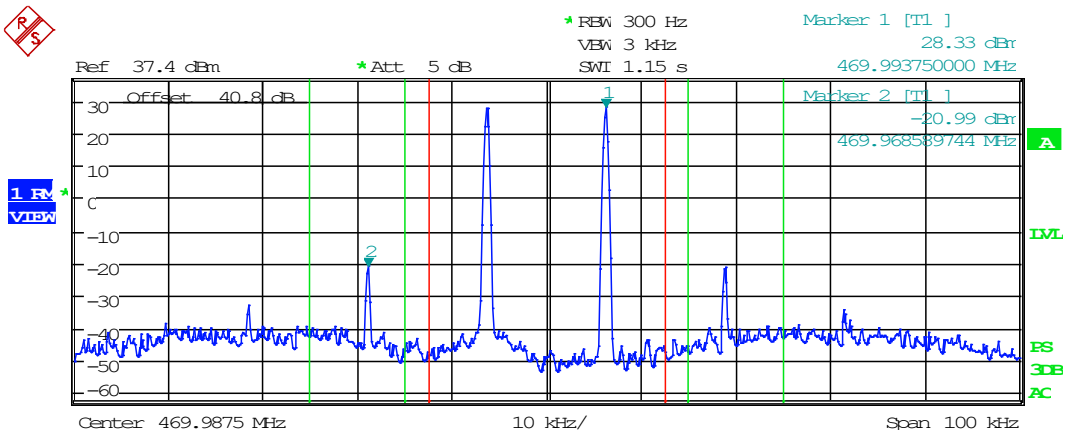
## INTERMODULATION

### 469.9875 MHz, Downlink, 12.5k, At AGC




**Tx Channel**
Bandwidth 25 kHz

Power 31.76 dBm

**Adjacent Channel**
Bandwidth 10 kHz
Spacing 20 kHz

Lower -20.04 dBm
Upper -20.04 dBm

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



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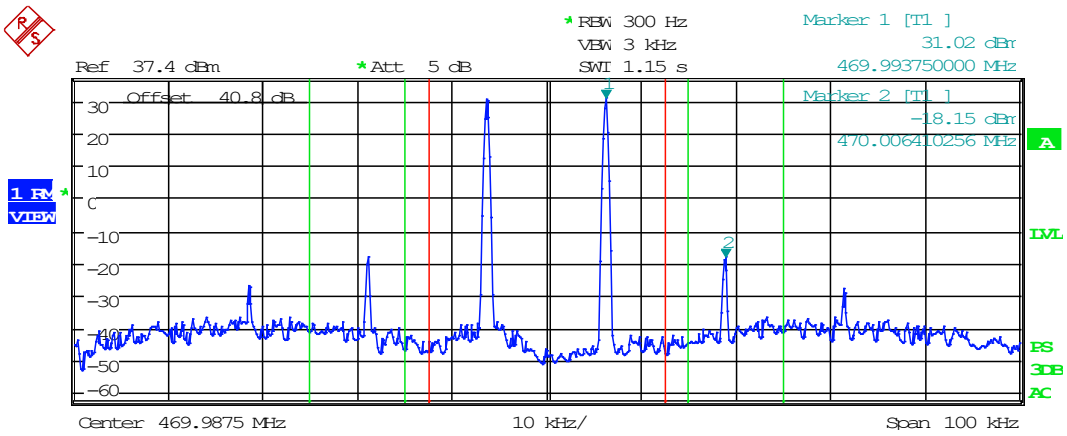
## INTERMODULATION

### 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



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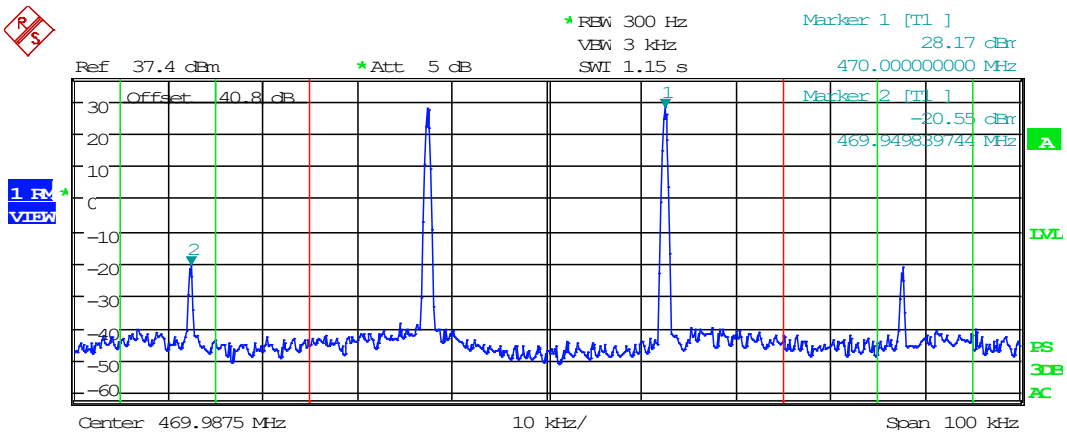
## INTERMODULATION

### 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



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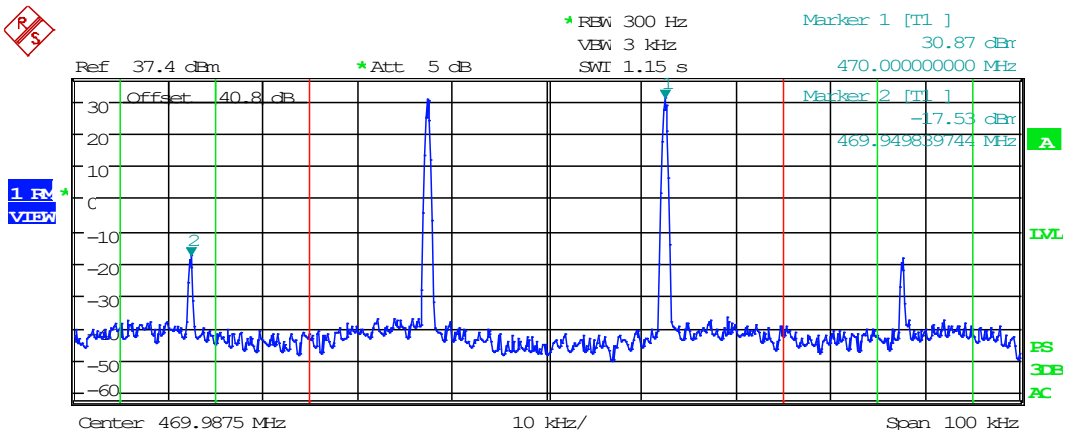
## INTERMODULATION

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

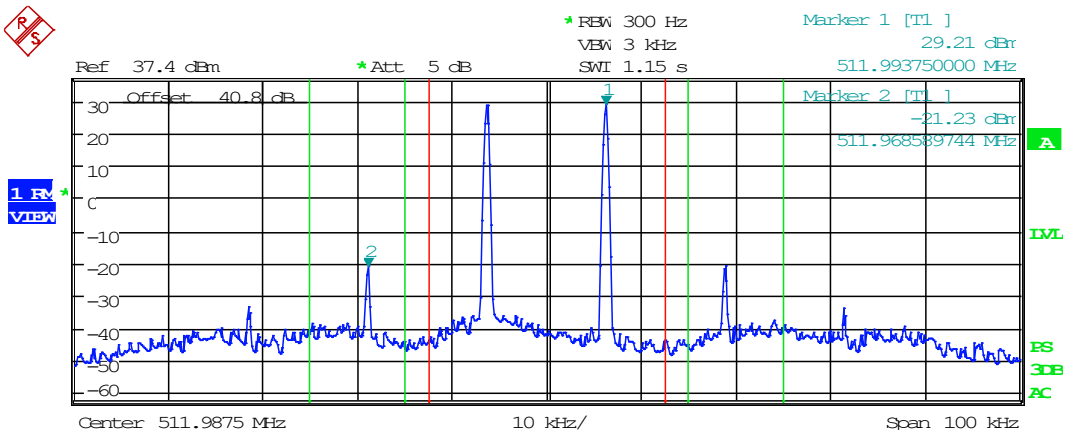



| | | | |
|---|---|---|---|
| **Tx Channel** | | | |
| Bandwidth | 50 kHz | Power | 34.26 dBm |
| **Adjacent Channel** | | | |
| Bandwidth | 10 kHz | Lower | -16.47 dBm |
| Spacing | 40 kHz | Upper | -17.49 dBm |

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

## 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



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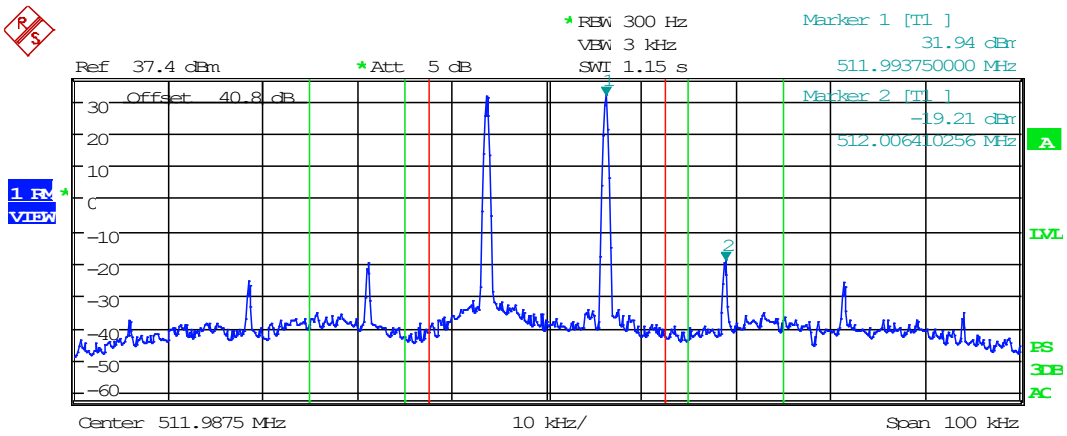
## INTERMODULATION

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

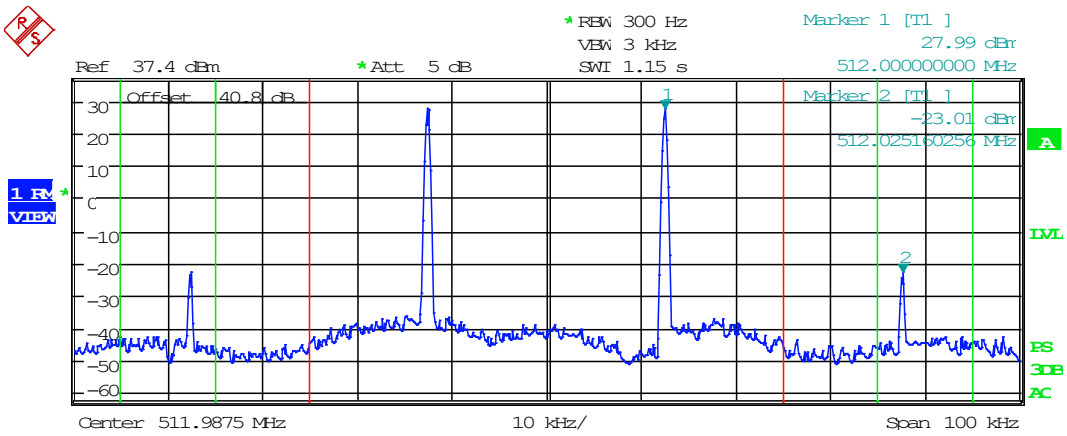



| | | | |
|---|---|---|---|
| **Tx Channel** | | | |
| Bandwidth | 25 kHz | Power | 35.26 dBm |
| **Adjacent Channel** | | | |
| Bandwidth | 10 kHz | Lower | -18.37 dBm |
| Spacing | 20 kHz | Upper | -17.63 dBm |

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



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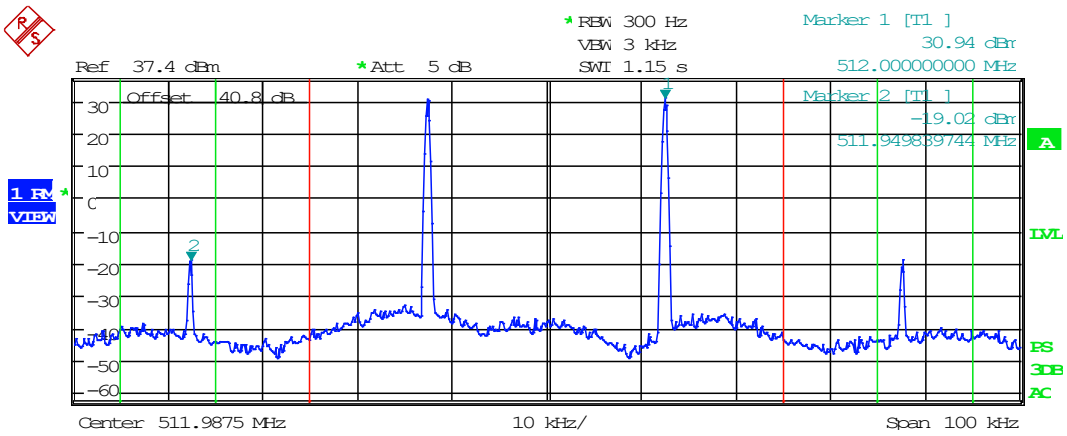
## INTERMODULATION

### 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



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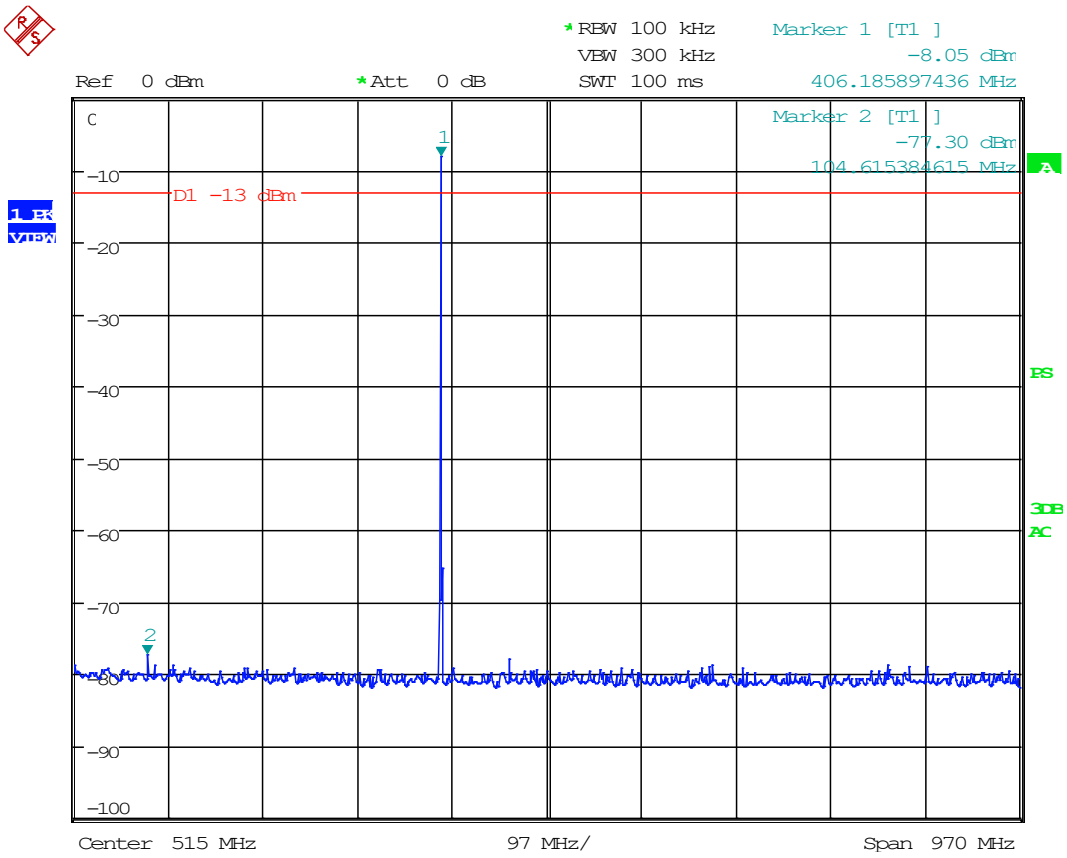
## 2.1051 CONDUCTED SPURIOUS EMISSIONS

## KDB 935210 4.7.3 CONDUCTED SPURIOUS EMISSIONS

Test Engineer: FR
Test Date: JUL 28, 2020

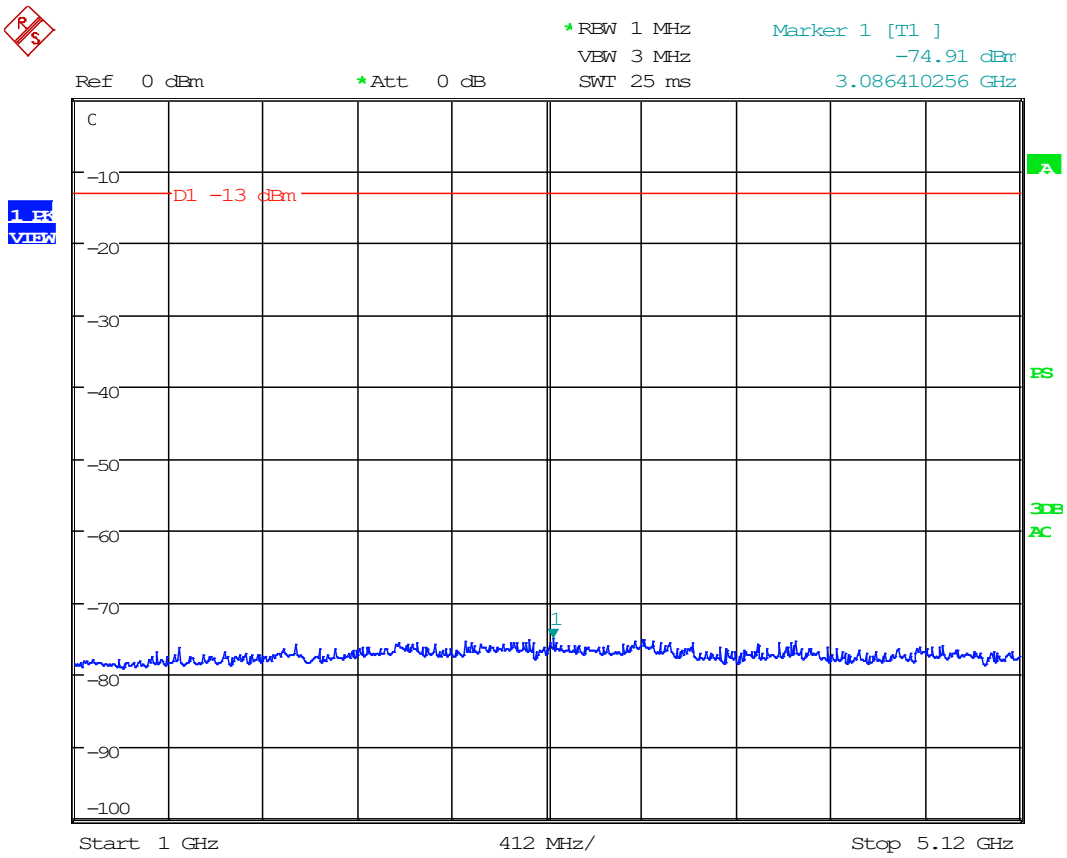
### 406.1125 MHz, Uplink, Below 1 GHz




Date: 28.JUL.2020 13:01:31

## Conducted Spurious Emissions

### 406.1125 MHz, Uplink, Above 1 GHz



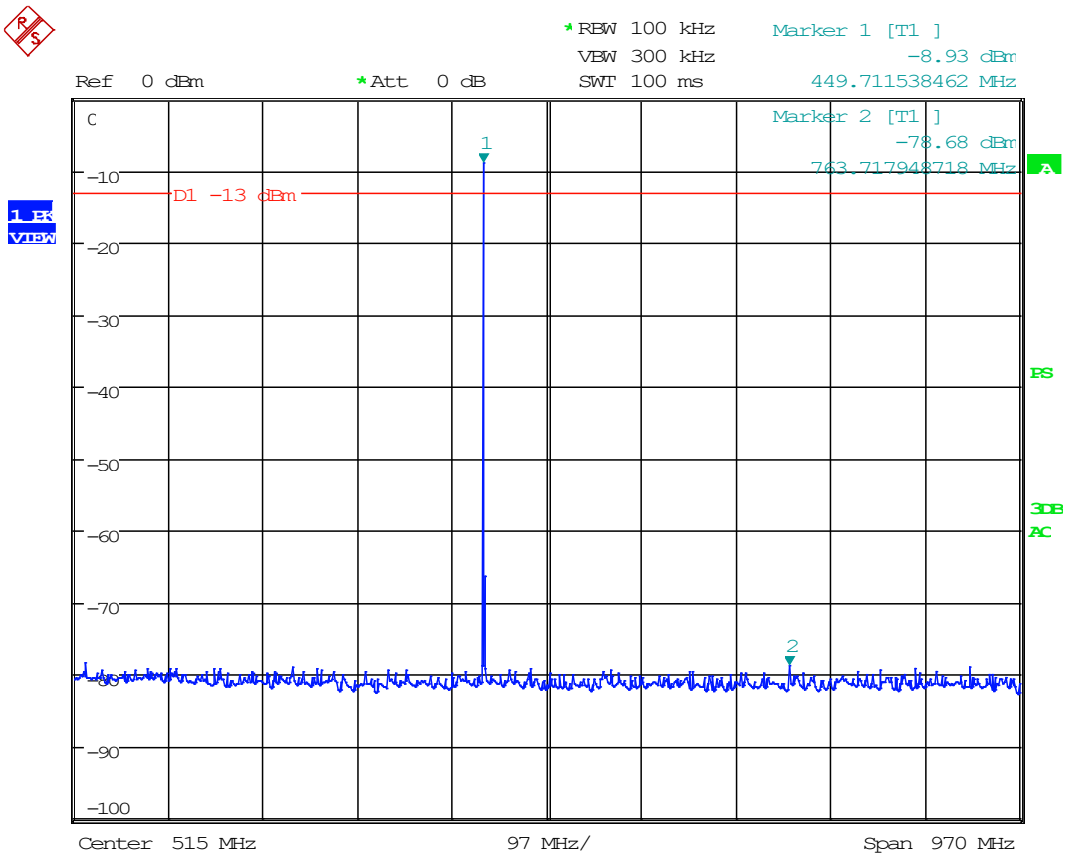

Date: 28.JUL.2020 13:02:46



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

### 450.0125 MHz, Uplink, Below 1 GHz



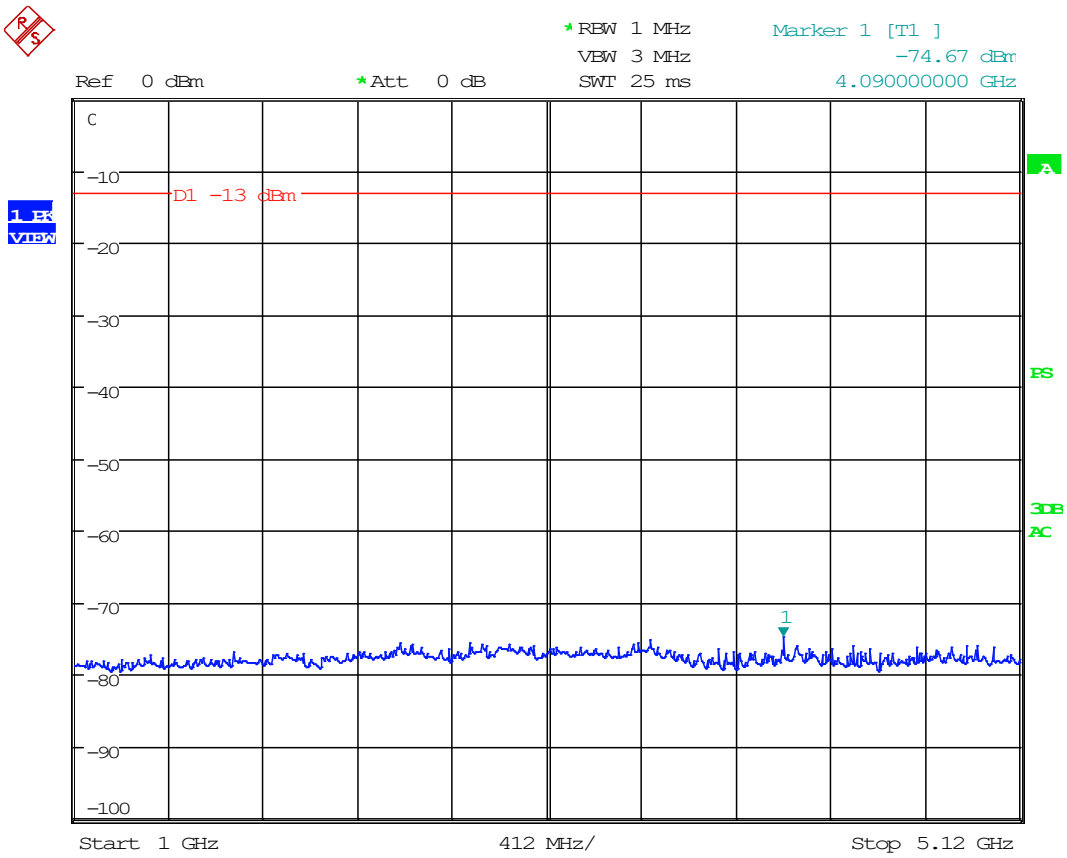

Date: 28.JUL.2020 13:41:00



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

### 450.0125 MHz, Uplink, Above 1 GHz




Date: 28.JUL.2020 13:42:19



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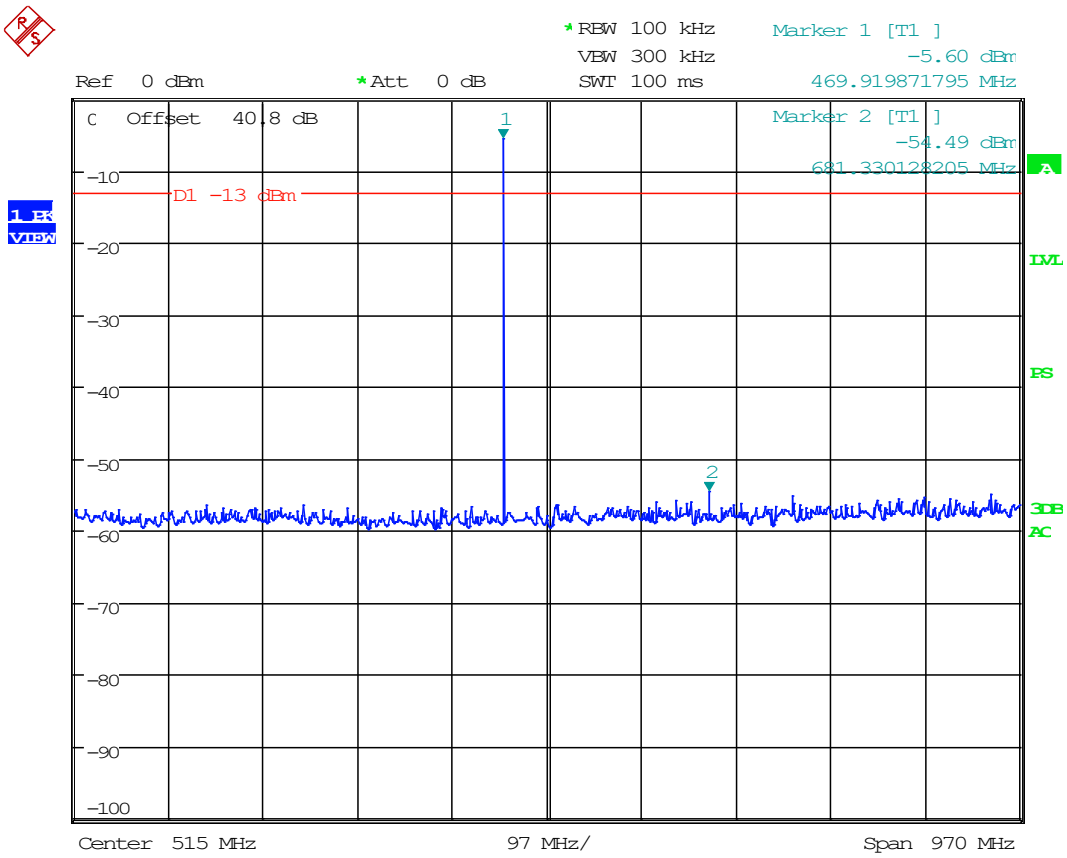
## Conducted Spurious Emissions

### 469.9875 MHz, Downlink, Below 1 GHz




Date: 29.JUL.2020 19:55:09



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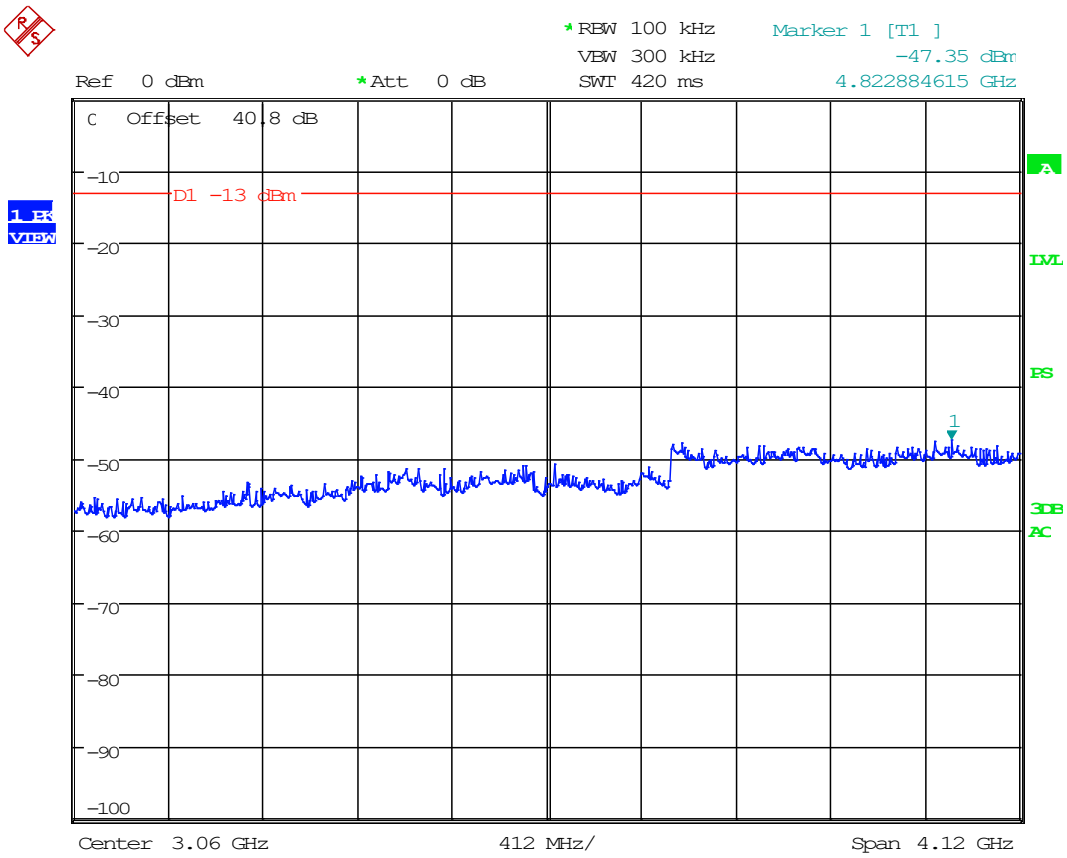
## Conducted Spurious Emissions

### 469.9875 MHz, Downlink, Above 1 GHz




Date: 29.JUL.2020 19:57:25



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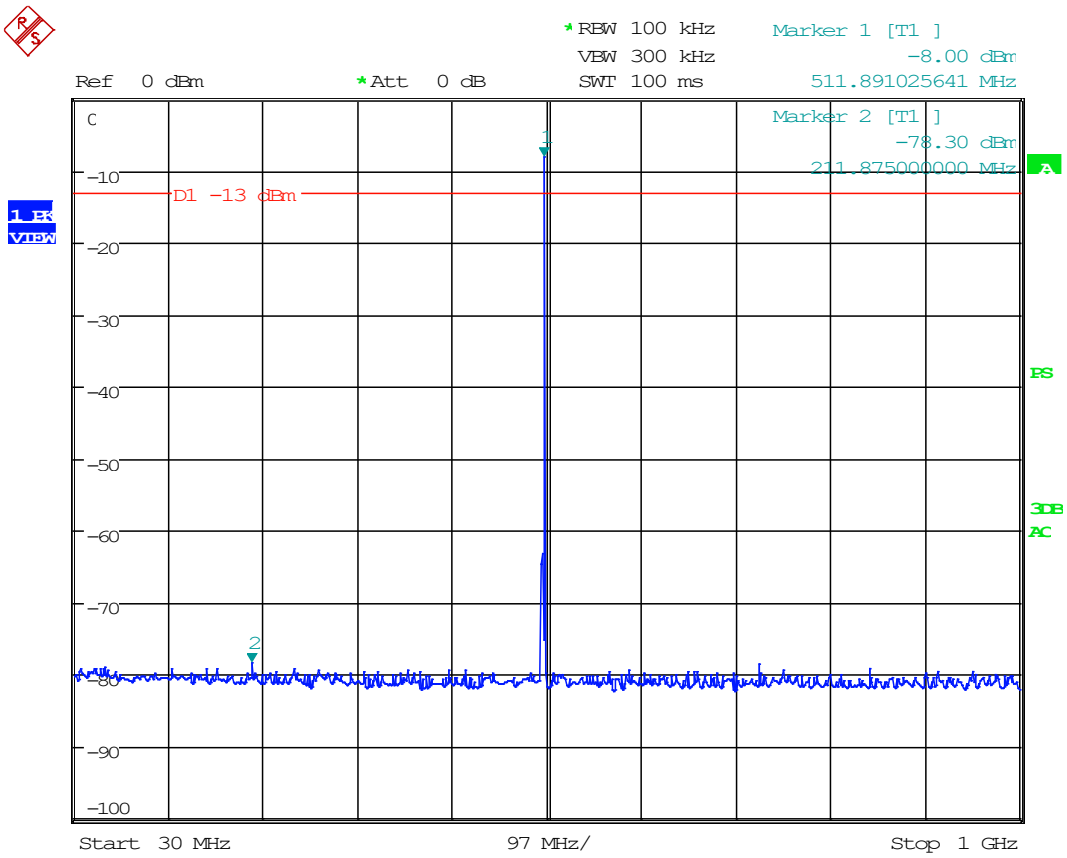
## Conducted Spurious Emissions

### 511.9875 MHz, Downlink, Below 1 GHz



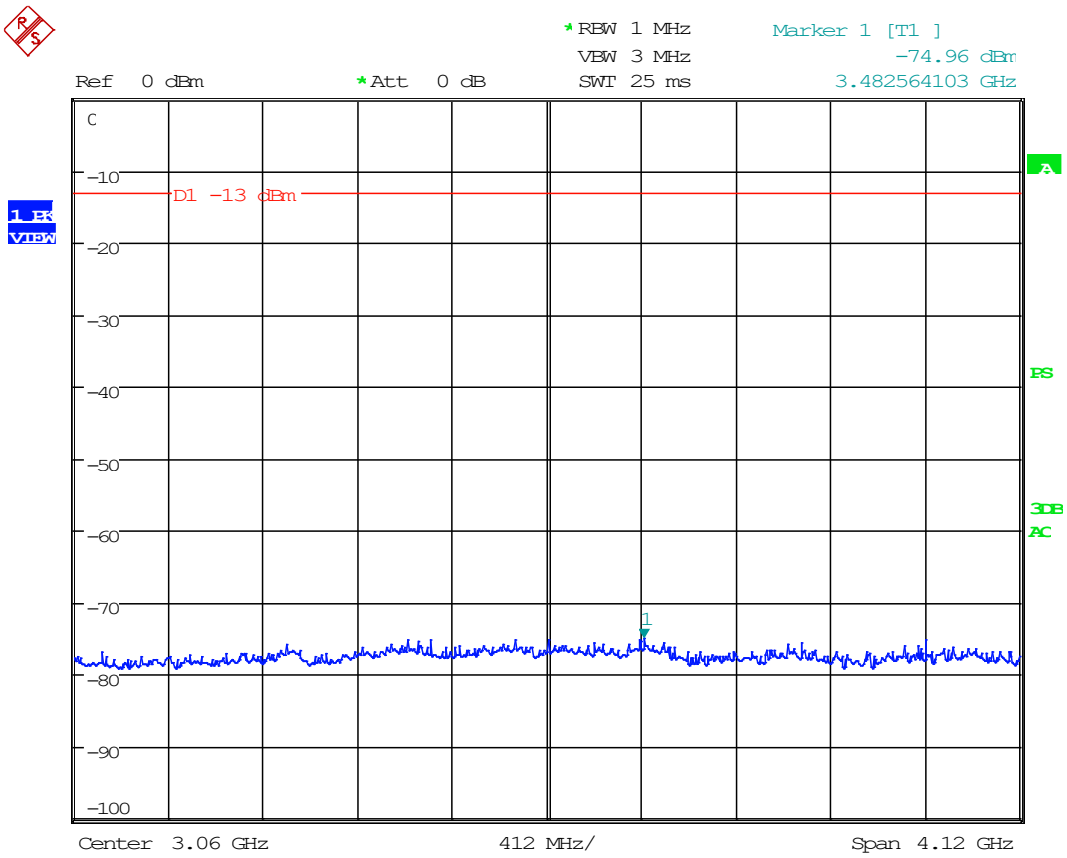

Date: 28.JUL.2020 12:53:01



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

### 511.9875 MHz, Downlink, Above 1 GHz




Date: 28.JUL.2020 12:51:45



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## 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

### Subharmonics, all frequencies

| 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 | 56.56 | H | 2.12 | 13.70 | 3.00 | 72.38 | -25.00 | -13.00 | 12.00 |
| 350.00 | PK | 54.81 | V | 2.11 | 14.00 | 3.00 | 70.92 | -26.46 | -13.00 | 13.46 |
| 273.08 | PK | 54.58 | H | 2.06 | 12.41 | 3.00 | 69.05 | -28.33 | -13.00 | 15.33 |
| 71.96 | PK | 59.47 | V | 1.01 | 6.29 | 3.00 | 66.77 | -30.61 | -13.00 | 17.61 |
| 139.79 | PK | 41.89 | H | 1.34 | 15.18 | 3.00 | 58.41 | -38.97 | -13.00 | 25.97 |
| 189.10 | PK | 42.62 | H | 1.59 | 13.72 | 3.00 | 57.93 | -39.45 | -13.00 | 26.45 |

### 406.1125 MHz, 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 | 2842.79 | PK | 14.31 | H | 6.20 | 32.34 | 3.00 | 52.86 | -44.52 | -13.00 | 31.52 |
| 406.11 | 3248.90 | PK | 12.82 | V | 6.65 | 32.68 | 3.00 | 52.15 | -45.23 | -13.00 | 32.23 |
| 406.11 | 3655.01 | PK | 11.63 | H | 6.62 | 33.20 | 3.00 | 51.45 | -45.93 | -13.00 | 32.93 |
| 406.11 | 2842.79 | PK | 12.64 | V | 6.20 | 32.34 | 3.00 | 51.19 | -46.19 | -13.00 | 33.19 |
| 406.11 | 3248.90 | PK | 11.79 | H | 6.65 | 32.68 | 3.00 | 51.12 | -46.26 | -13.00 | 33.26 |
| 406.11 | 4061.13 | PK | 9.71 | V | 7.17 | 33.38 | 3.00 | 50.26 | -47.11 | -13.00 | 34.11 |

### 450.0125 MHz, 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 450.01 | 2250.06 | PK | 24.90 | H | 5.43 | 31.23 | 3.00 | 61.56 | -35.82 | -13.00 | 22.82 |
| 450.01 | 2250.06 | PK | 24.60 | V | 5.43 | 31.23 | 3.00 | 61.26 | -36.12 | -13.00 | 23.12 |
| 450.01 | 1800.05 | PK | 22.90 | H | 4.90 | 30.29 | 3.00 | 58.09 | -39.29 | -13.00 | 26.29 |
| 450.01 | 1800.05 | PK | 22.90 | V | 4.90 | 30.29 | 3.00 | 58.09 | -39.29 | -13.00 | 26.29 |
| 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 |

### 469.9875 MHz, 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 | 2349.94 | PK | 26.10 | V | 5.58 | 31.93 | 3.00 | 63.60 | -33.78 | -13.00 | 20.78 |
| 469.99 | 2349.94 | PK | 25.20 | H | 5.58 | 31.93 | 3.00 | 62.70 | -34.68 | -13.00 | 21.68 |
| 469.99 | 1879.95 | PK | 23.60 | H | 5.03 | 30.94 | 3.00 | 59.57 | -37.80 | -13.00 | 24.80 |
| 469.99 | 1879.95 | PK | 23.50 | V | 5.03 | 30.94 | 3.00 | 59.47 | -37.90 | -13.00 | 24.90 |
| 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 |

### 511.9875 MHz, 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 511.99 | 3583.91 | PK | 13.66 | H | 6.70 | 33.06 | 3.00 | 53.42 | -43.96 | -13.00 | 30.96 |
| 511.99 | 3071.93 | PK | 13.63 | V | 6.43 | 32.69 | 3.00 | 52.75 | -44.63 | -13.00 | 31.63 |
| 511.99 | 3583.91 | PK | 12.93 | V | 6.70 | 33.06 | 3.00 | 52.69 | -44.69 | -13.00 | 31.69 |
| 511.99 | 5119.88 | PK | 10.70 | V | 7.87 | 34.09 | 3.00 | 52.66 | -44.72 | -13.00 | 31.72 |
| 511.99 | 2559.94 | PK | 14.33 | H | 5.71 | 32.57 | 3.00 | 52.61 | -44.77 | -13.00 | 31.77 |
| 511.99 | 4095.90 | PK | 11.13 | H | 7.12 | 33.40 | 3.00 | 51.65 | -45.73 | -13.00 | 32.73 |

For all measurements greater than 20 dB below limits, the 6 highest emissions were shown.



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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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