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TEST REPORT

Mark-IV Bi-Directional Amplifier (Repeater)
Model: M4DBDAUU

tested to the

Code of Federal Regulations (CFR) 47

Part 90 –Private Land Mobile Services

for

Canam Technology Inc

This Test Report is issued with the authority of:

Andrew Cutler- General Manager

Table of Contents

1. COMPLIANCE STATEMENT

The **Mark-IV Bi-Directional Amplifier (Repeater) Model: M4DBDAUU** complies with the limits defined in 47 CFR Part 90 and 47 CFR Part 2 when tested in-accordance with the test methods described in ANSI C63.26: 2015 and FCC KDB 935210 D04 v01r04 April 3, 2020 as a Class A Industrial Signal Booster.

2. RESULT SUMMARY

The results of testing carried out between the 16th – 30th March 2026 and between 28th April and the 5th May 2026 are summarised below.

Clause	Description	Result
90.203	Certification required	Noted
2.1046 (KDB 4.5) 90.205	RF power output Power and antenna height limits	Noted Complies
2.1049 2.202 90.207 90.209 90.210 (KDB 4.4)	Occupied bandwidth Bandwidths Types of emissions Bandwidth limitations Emission masks	Noted Noted Complies Complies Complies
2.1051 (KDB 4.7.3)	Spurious emissions at antenna terminals	Complies
2.1053 (KDB 4.9)	Field strength of spurious radiation	Not tested. See Report 241101.4B.
2.1055 90.213	Frequency stability Frequency stability	Not tested. See Report 241101.4B.
90.214	Transient frequency behaviour	Not applicable
1.1310	Radio frequency exposure limits	Complies
KDB 4.2	Automatic Gain Threshold	Not tested. See Report 241101.4B.
KDB 4.3	Out of Band Rejection	Complies
KDB 4.7.2	Intermodulation Products	Complies

3. ATTESTATION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification with the following conditions:

The client selected the test sample.

The report relates only to the sample tested.

Any corrections or erasures in this report are detailed in the revision table below.

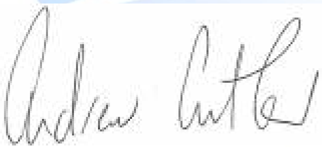
Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards.

I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.



Andrew Cutler
General Manager
EMC Technologies NZ Ltd

Report Revision Table

Version	Change Made	Date
260402.1	Initial Issue	5th May 2026
260402.1A	Typographical Corrections after Client Review	25th May 2026

4. CLIENT INFORMATION

Company Name	Canam Technology Inc
Postal Address	5318 East 2nd Street, #700 Long Beach
State	CA 90803
Country	United States of America
Contact	Victor Bermudez

5. TEST SAMPLE DESCRIPTION

Model Number	M4DBDAUU
Product	Bi-Directional Amplifier (Repeater)
Manufacturer	Canam Technology Inc
Manufactured in	United States of America
System Serial No	1153
Rated supply	110 – 240 Vac
FCC ID:	TCJ-M4DBDAUU

The sample tested is a Bi-Directional Amplifier (Repeater) that is defined as an FCC Class A Industrial Signal Booster

The sample testing has the following specifications:

Exiting FCC Certified Bands of operation:

406.100 – 430.000 MHz
500.000 – 512.900 MHz

Additional Bands of operation that FCC Certification is being sought:

450.000 – 470.000 MHz
470.000 – 490.000 MHz

Test Frequencies:

465.000 MHz
486.000 MHz

Composite Channel Power +37 dBm (5 W)

Channel Spacing: 12.5 kHz

Receiver Intermediate Frequency: 70 MHz

Modulations supported: Analogue speech (FM), Digital Speech and Data (P25 protocols)

Modulation designators: 11k3F3E, 8k10F1W, 9k80D7W

Transmitter Duty Cycle: 100%

Transmitter Duty Cycle: 100%

High clock frequency in use: 737.280 MHz

The sample tested was fitted with 4 RF ports which were terminated using various attenuators and dummy loads when that port was not being tested.

When under test the port combination would be terminated using suitable attenuators to the required measurement equipment.

Testing was carried out with reference to the test plan supplied by the client.

6. TEST RESULTS

Certification required

As this device will transmit in the 450.0 – 470.0 MHz band and the 470.0 – 490.0 MHz band certification of this Directional Amplifier (Repeater) will be required as an FCC Class A Industrial Signal Booster in accordance with FCC part 90.

Clause 90.205 RF power output

Measurements were carried out at the RF output terminals of the transmitter using a power attenuator and a RF Power meter when the transmitter was un-modulated as detailed below.

Testing was carried out on a single frequency in each band which was indicative of the composite power for each band.

Testing was carried out when the transmitter was powered at 120 Vac

Frequency (MHz)	Power (dBm)
465.000	+36.6
486.000	+36.2

The client has stated that the rated composite power of transmitter in each band is 5 W (+37 dBm).

Part 90 does not specify the transmitter output power.

The power output should remain within +/- 1 dB of the rated power

Result: Complies.
Measurement Uncertainty: ± 0.5 dB

Clause 90.207 and Clause 90.209: Emission types and bandwidth limitations:

The following modulation types have been declared by the client along with a description as to how these input signals to the power amplifier were simulated by the laboratory.

11K3F3E:
11.3 kHz occupied bandwidth
FM modulation
Frequency deviation is set to 2.5 kHz and an audio tone of 2550 Hz is used.

8K70D1W:
8.7 kHz occupied bandwidth.
C4FM modulation
Frequency deviation of 1.8 kHz and 6000 symbols/sec.
This simulates a H-CPM P25 Phase 2 UL TDMA Subscriber Unit.

9K80D7W:
9.8 kHz occupied bandwidth
PI/4 DQPSK modulation
8000 symbols/ second
This simulate a H-DQPSK P25 Phase 2 DL Fixed Base

Occupied Bandwidth testing for each of the three emission types to be used was carried out where a 12.5 kHz channel step size is used:

Testing was carried out using a Keysight Spectrum Analyser that was operating in Occupied Bandwidth mode.

The measured occupied bandwidths closely approximate the bandwidths declared by the client.

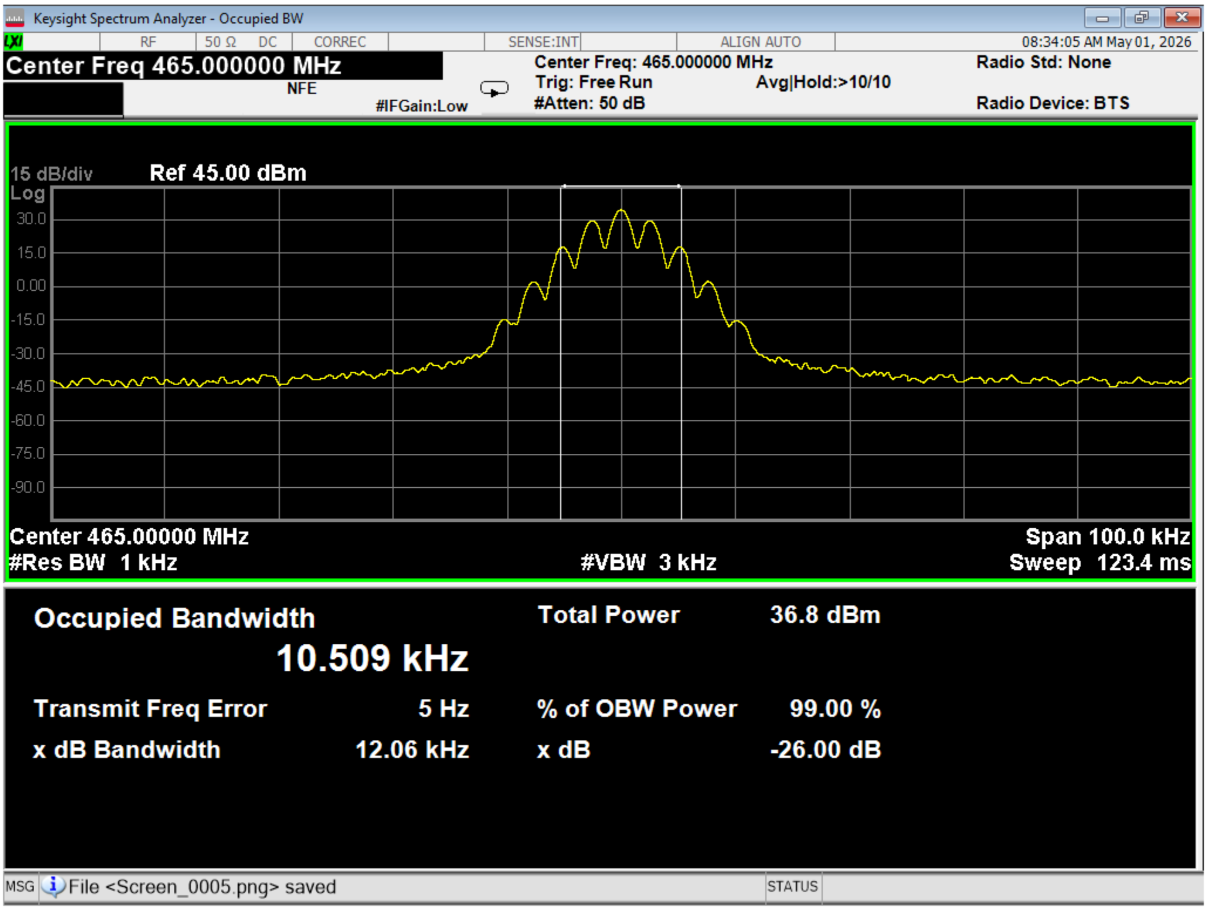
An authorised bandwidth of 11.25 kHz which is typically applied to transmitters operating with channel spacing's of 12.5 kHz in the bands where this amplifier is used.

Result: Complies.

Occupied Bandwidth

F3E 11K3 bandwidth – 12.5 kHz channel spacing with a frequency deviation of 2.5 kHz with a 2550 Hz tone.

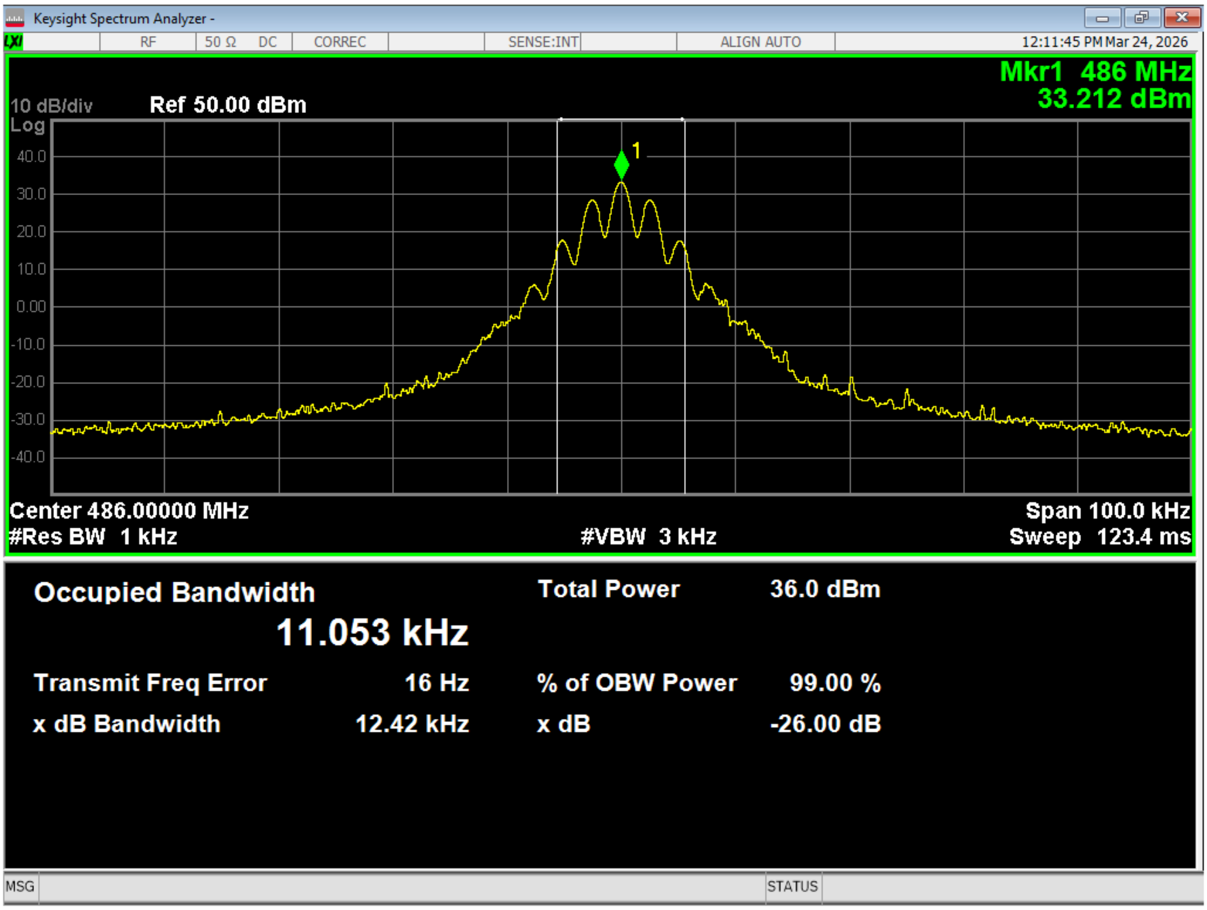
465.000 MHz



Occupied Bandwidth

F3E 11K3 bandwidth – 12.5 kHz channel spacing with frequency deviation of 2.5 kHz with a 2550 Hz tone.

486.000 MHz



Occupied Bandwidth

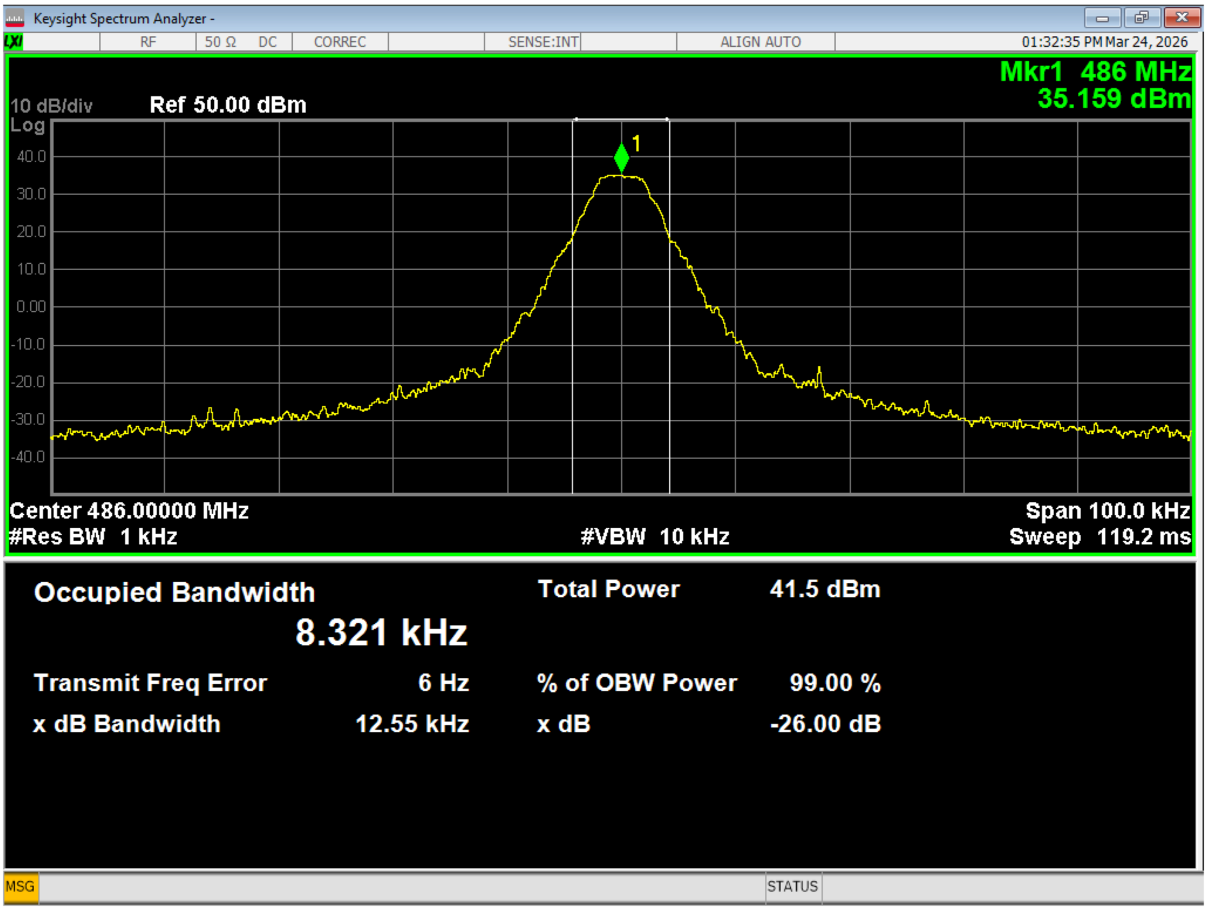
8K10F1W – C4FM with a deviation of 1.8 kHz and 6000 symbols/sec

465.000 MHz

Occupied Bandwidth

8K10F1W – C4FM with a deviation of 1.8 kHz and 6000 symbols/sec

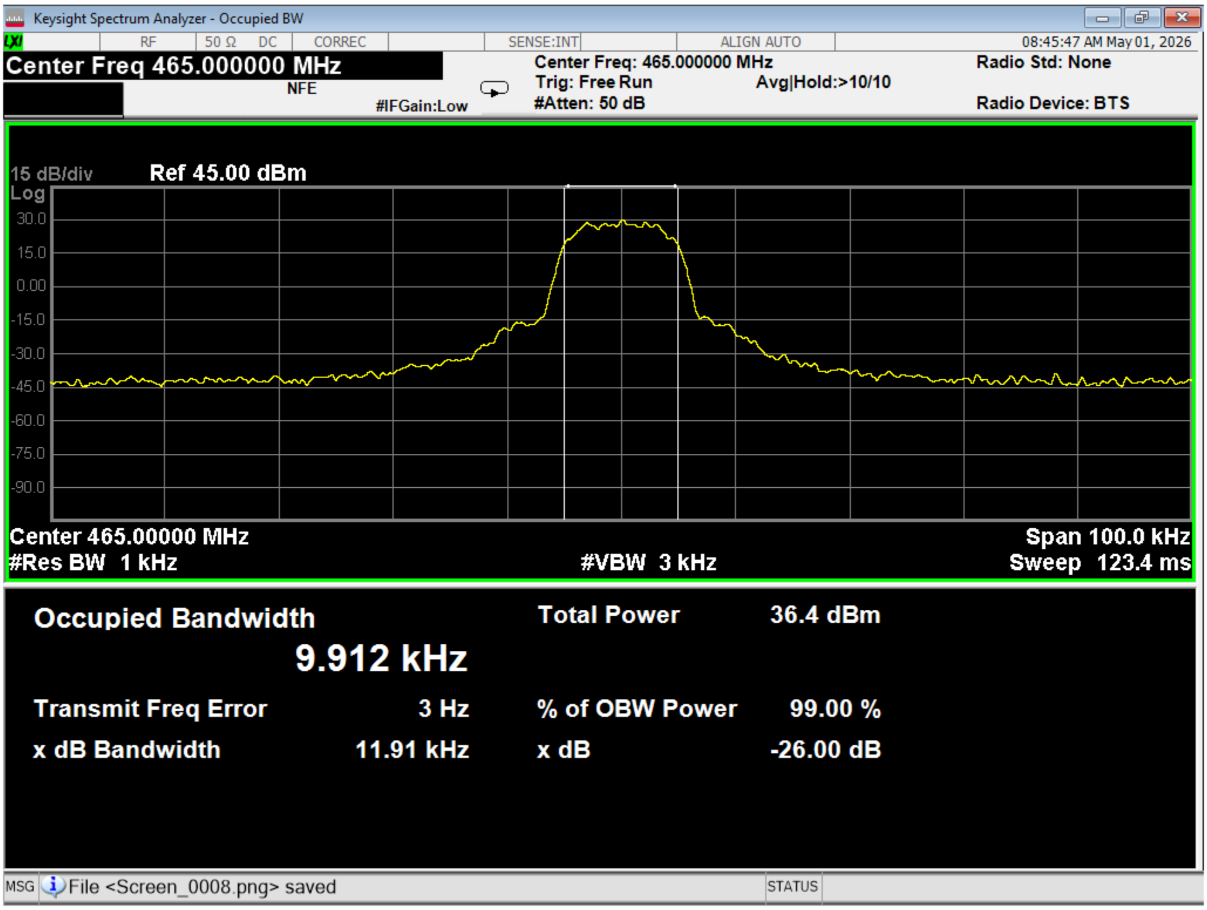
486.000 MHz



Occupied Bandwidth

9K80D7W – PI/4 DQPSK using 8000 symbols/sec

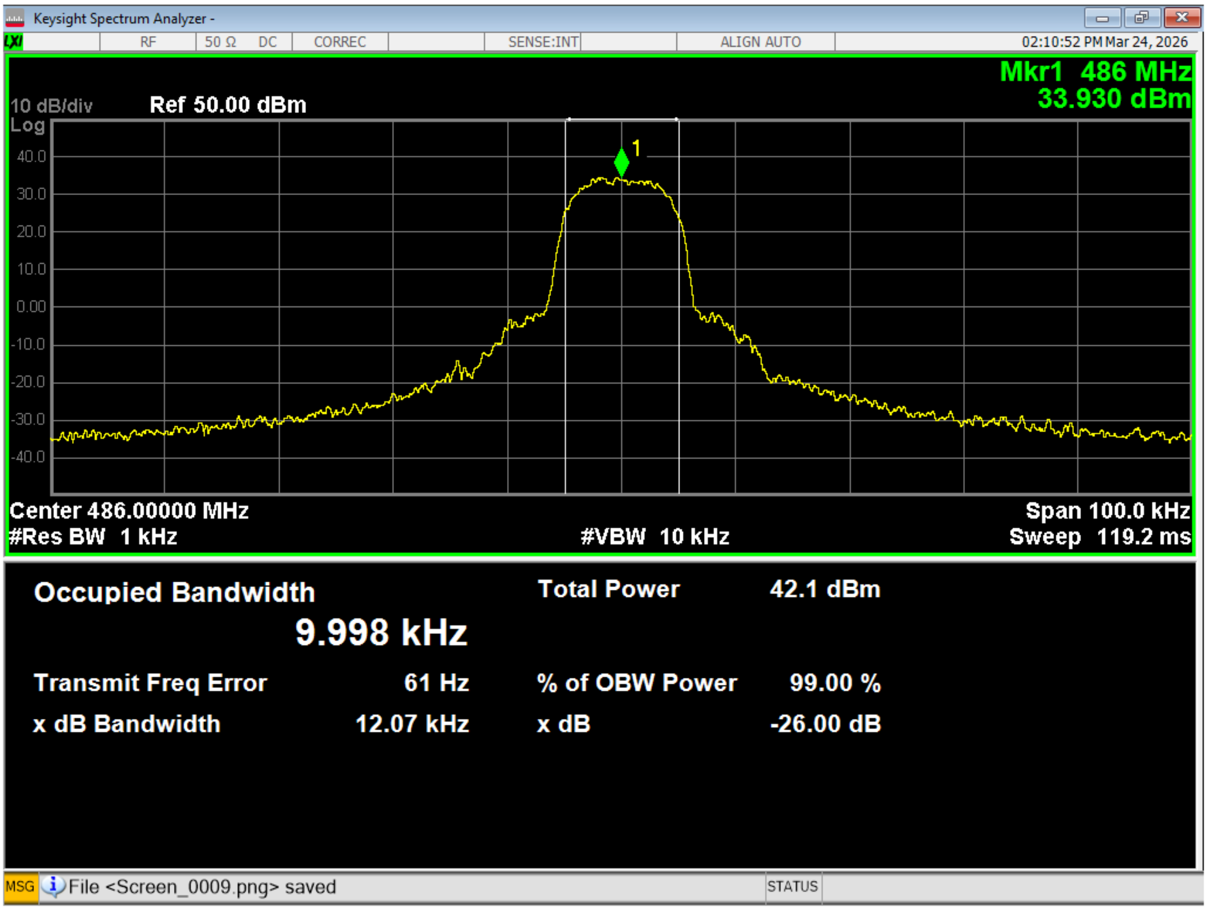
465.000 MHz



Occupied Bandwidth

9K80D7W – PI/4 DQPSK with 8000 symbols/sec

486.000 MHz



Clause 90.210: Spectrum Emission Mask measurements

The product operates with an audio low pass filter, following masks have been applied:

As per Section 90.210(d) – Mask D have been applied as the transmitter is designed to using an authorised bandwidth of 11.25 kHz and a channel spacing of 12.5 kHz as per Section 90.209(b)(5).

The reference level for the following emission mask measurements has been determined using a resolution bandwidth of 120 kHz with the transmitter modulated.

For all measurements a power attenuator is placed between the transmitter and the spectrum analyser.

Corresponding correction factors have been included in the measured plots.

Measurements were made using a peak detector in max hold function.

The following modulation types were generated using a signal generator and applied to

11K3F3E: 11.3 kHz occupied bandwidth. Frequency deviation is set to 2.5 kHz and an audio tone of 1 kHz is used.

8K70D1W: 8.7 kHz occupied bandwidth. C4FM modulation. Frequency deviation of 1.8 kHz and 6000 symbols/sec. This simulates a H-CPM P25 Phase 2 UL TDMA Subscriber Unit.

9K80D7W: 9.8 kHz occupied bandwidth. PI/4 DQPSK modulation 8000 symbols/ second This simulates a H-DQPSK P25 Phase 2 DL Fixed Base

Mask measurements have been made on both 465 MHz and 486 MHz

The Yellow trace corresponds to the modulated signal under test.

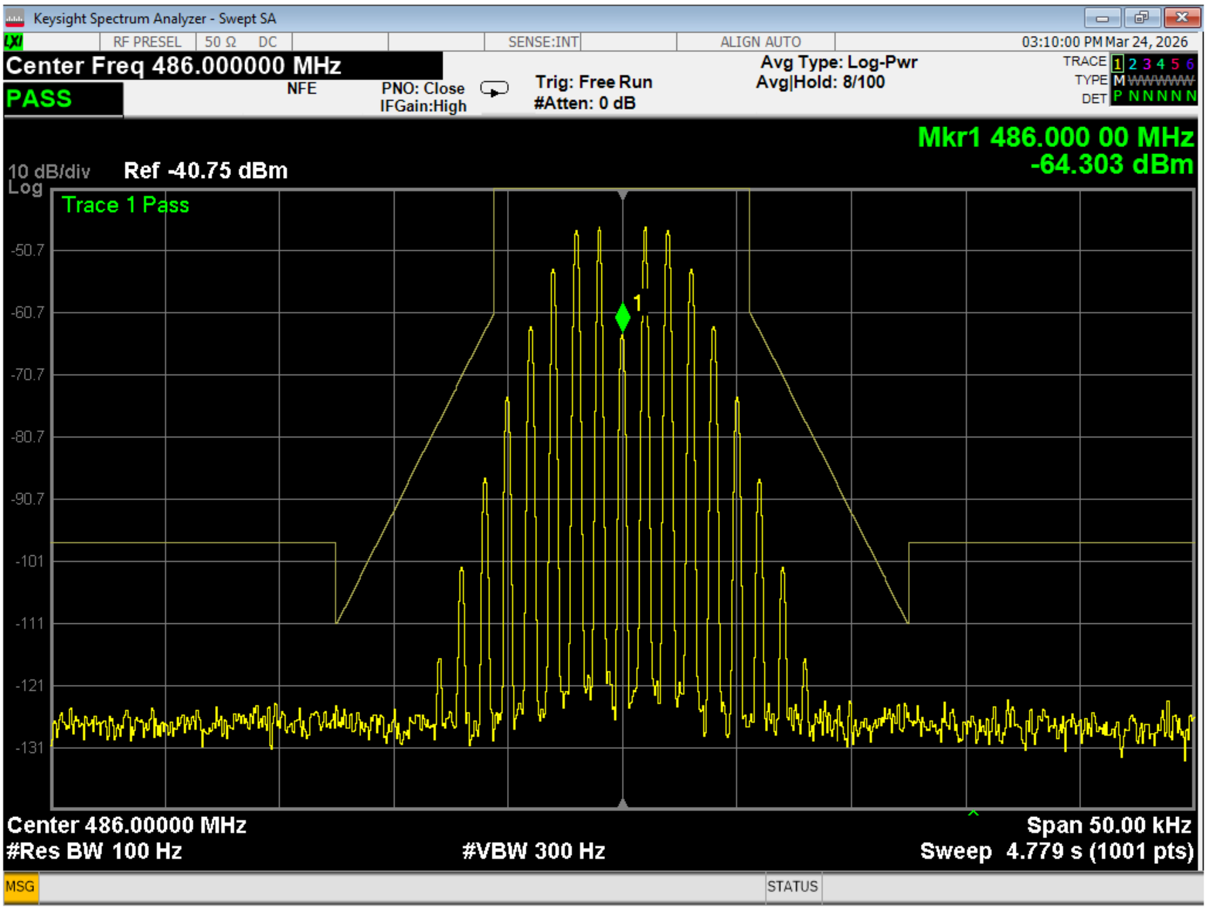
Mask measurements have been made using high power only.

Result: Complies.

Emission Mask (Input)

Mask D – F3E – 1 kHz tone with a deviation frequency of 2.5 kHz

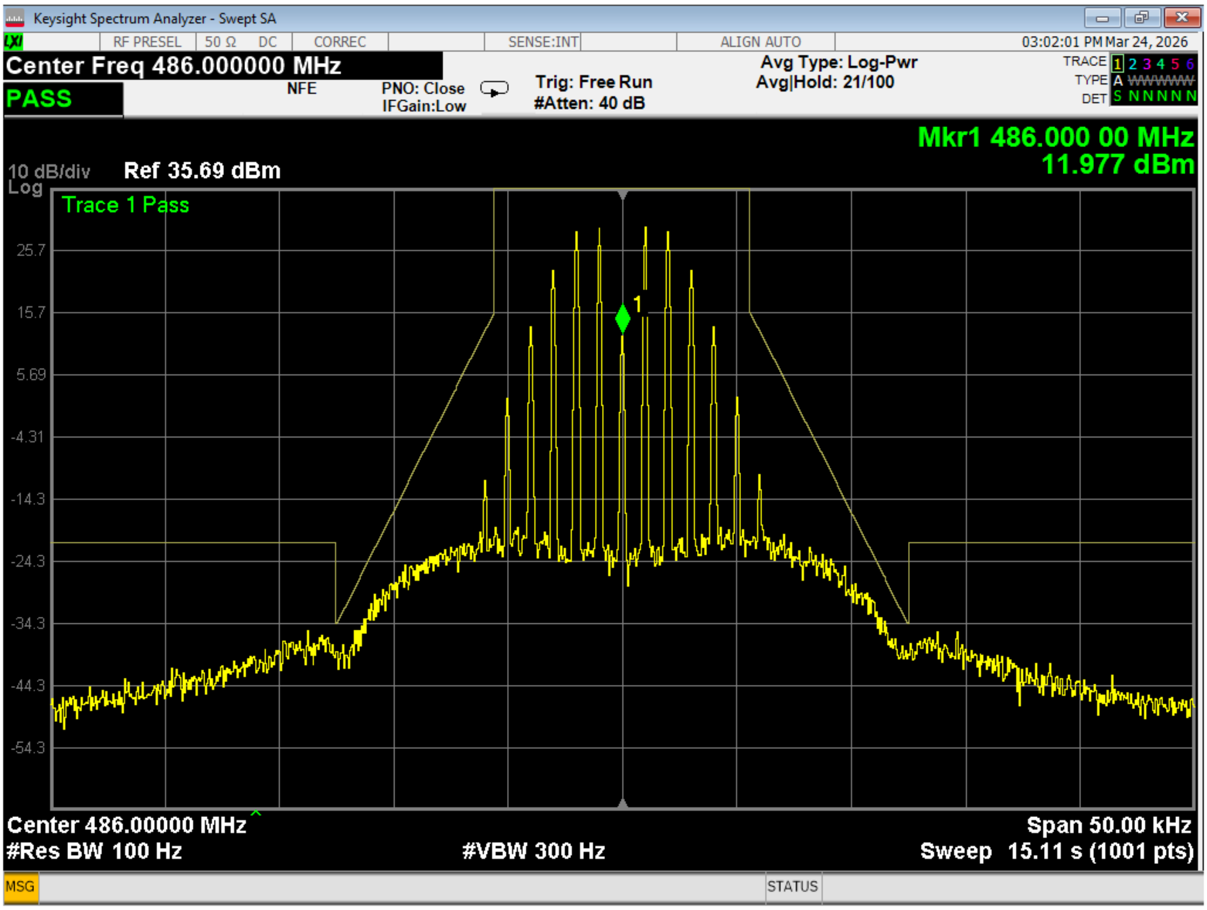
486.000 MHz



Emission Mask (Output)

Mask D – F3E – 1 kHz tone with a deviation frequency of 2.5 kHz

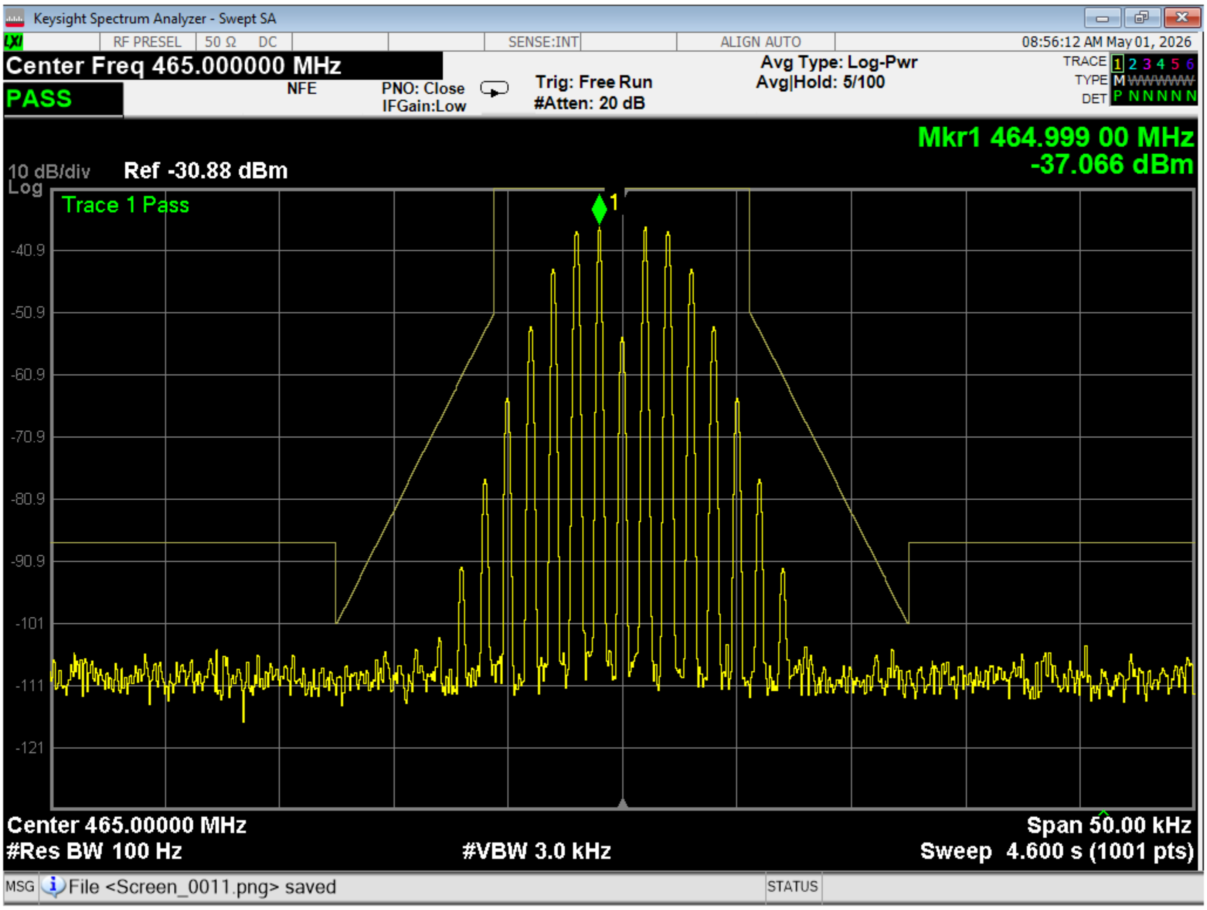
486.000 MHz



Emission Mask (Input)

Mask D – F3E – 1 kHz tone with a deviation frequency of 2.5 kHz

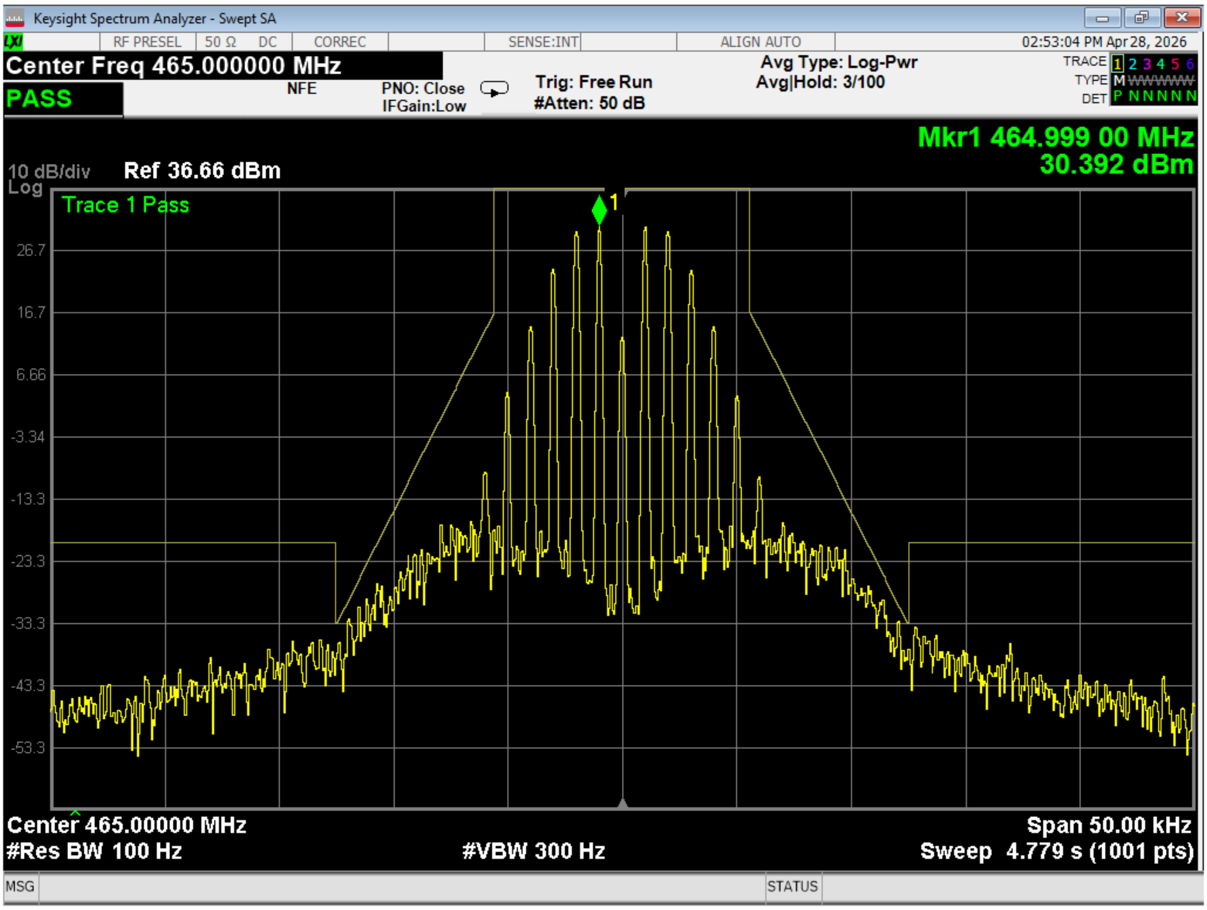
465.000 MHz



Emission Mask (Output)

Mask D – F3E – 1 kHz tone with a deviation frequency of 2.5 kHz

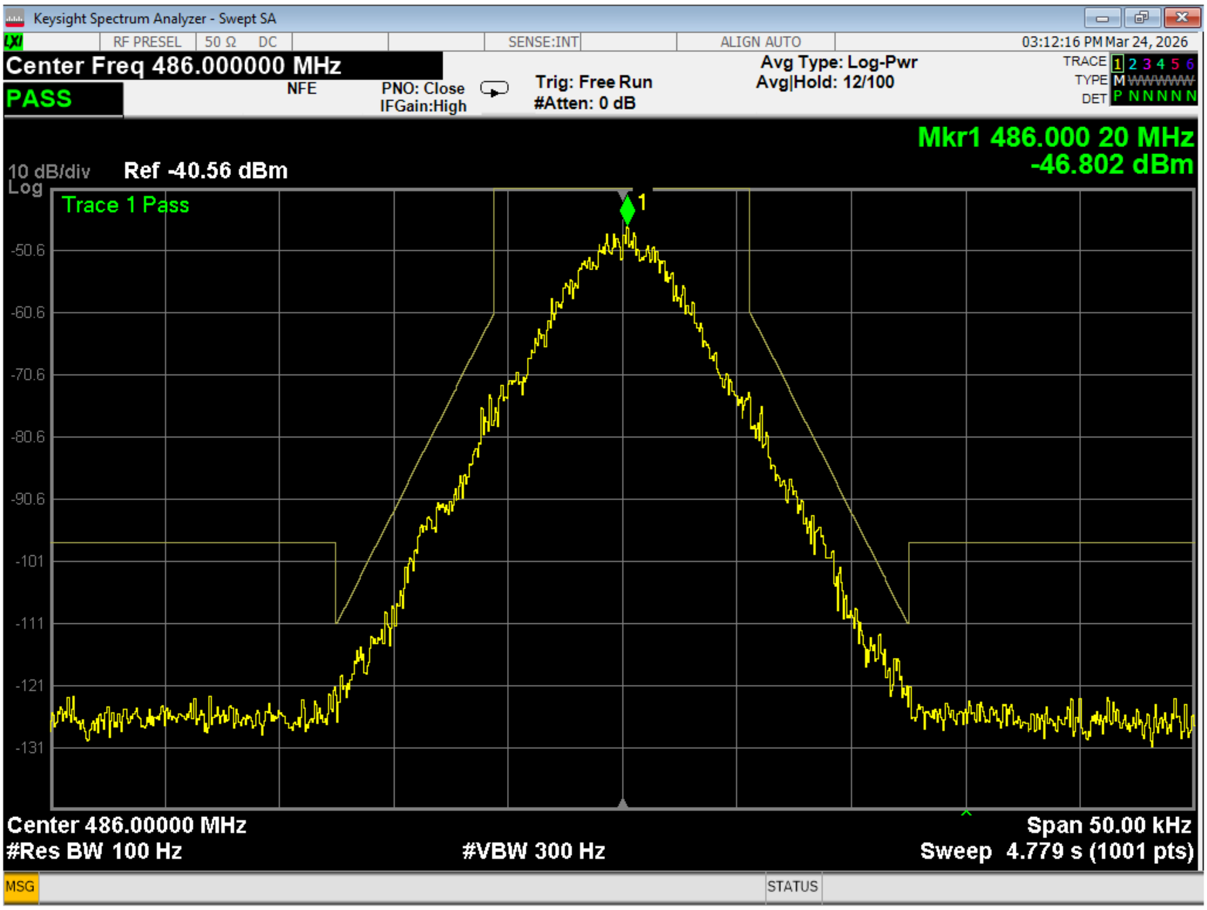
465.000 MHz



Emission Mask (Input)

Mask D – 8K10F1W – C4FM – 1.8 kHz deviation with 6000 symbols/sec

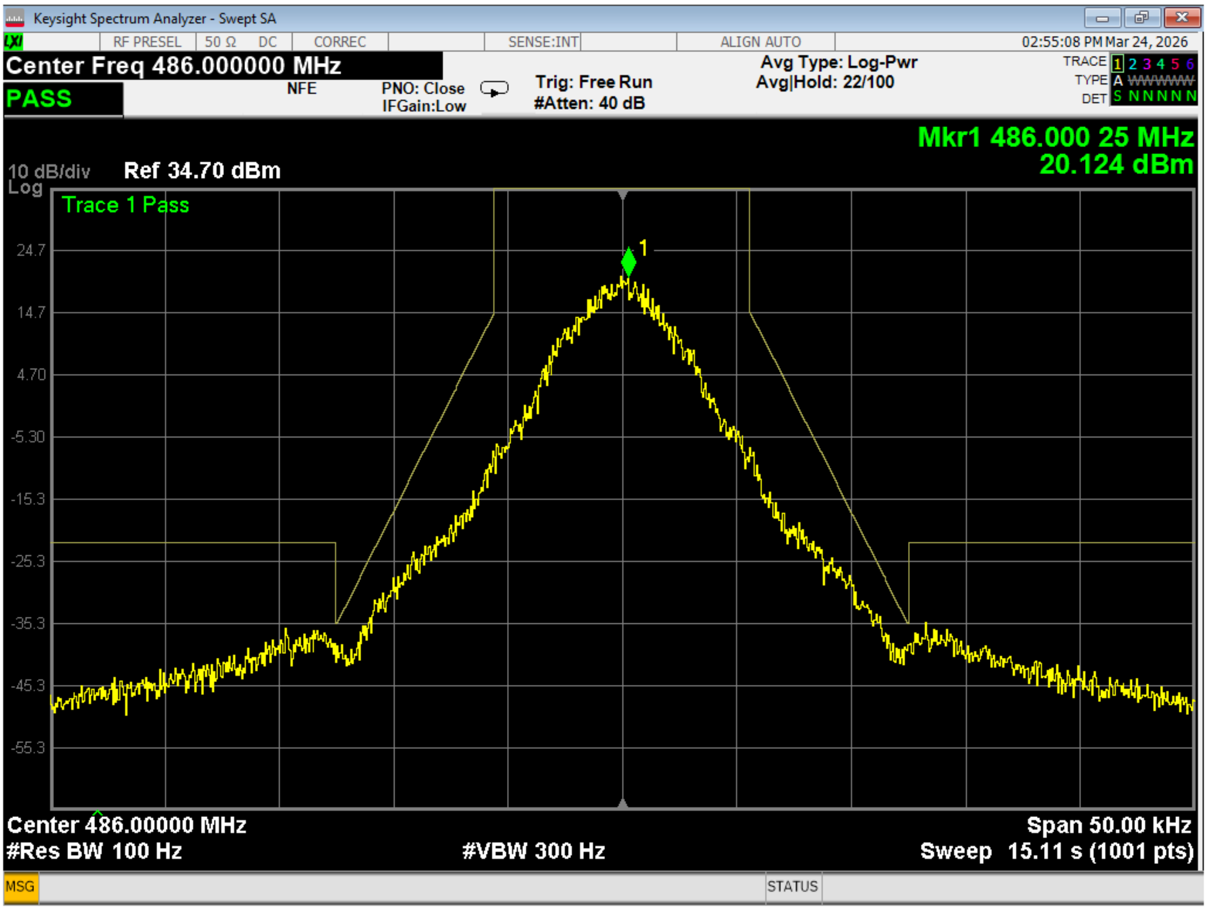
486.000 MHz



Emission Mask (Output)

Mask D – 8K10F1W – C4FM – 1.8 kHz deviation with 6000 symbols/sec

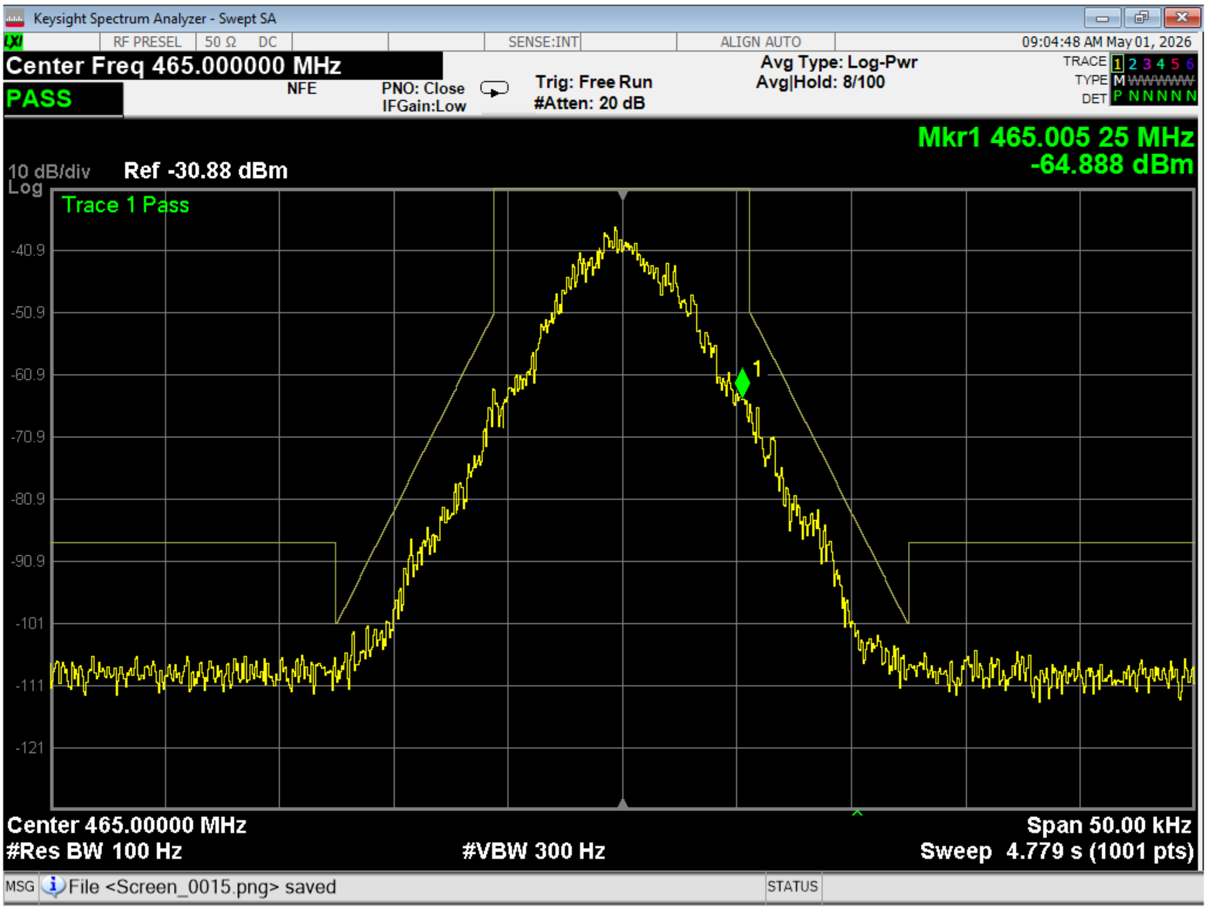
486.000 MHz



Emission Mask (Input)

Mask D – 8K10F1W – C4FM – 1.8 kHz deviation with 6000 symbols/sec

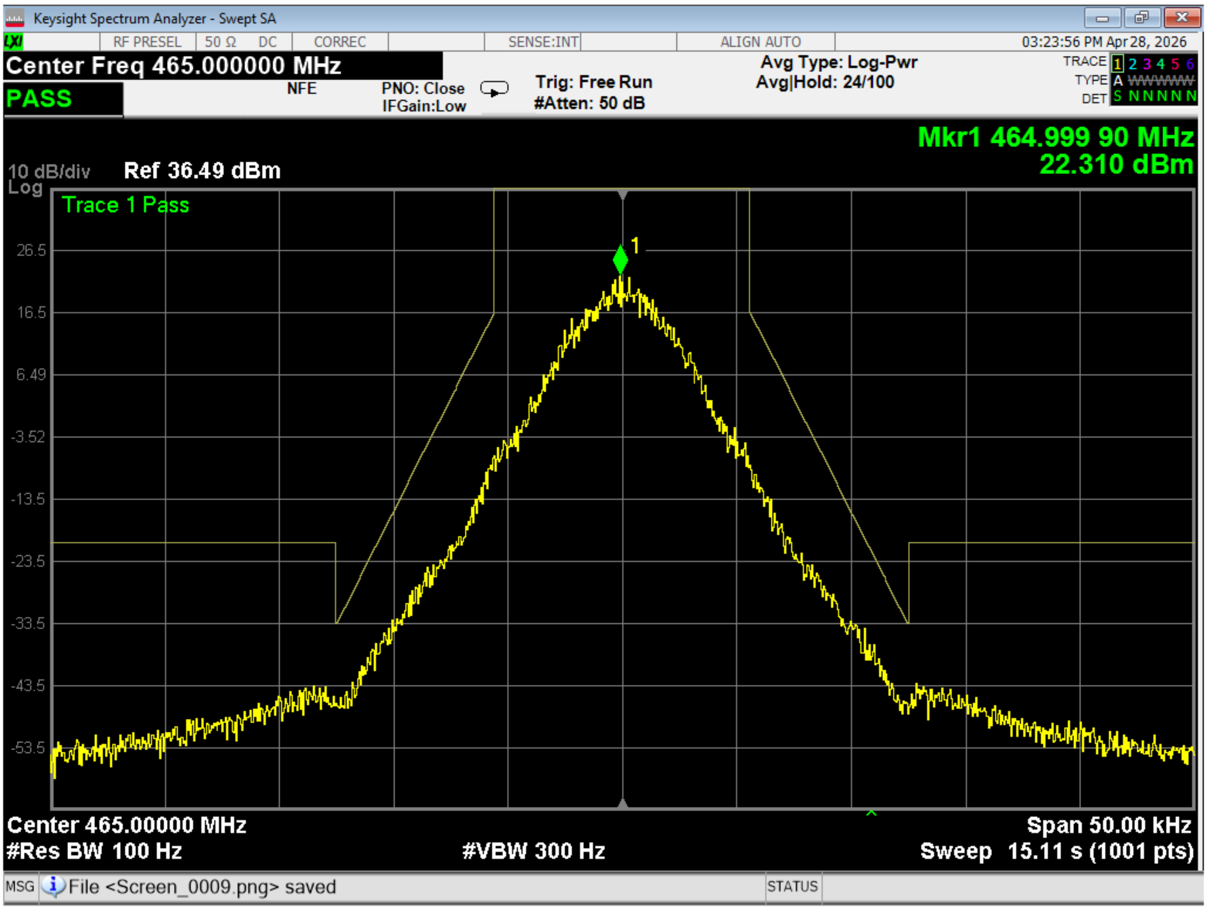
465 MHz



Emission Mask (Output)

Mask D – 8K10F1W – C4FM – 1.8 kHz deviation with 6000 symbols/sec

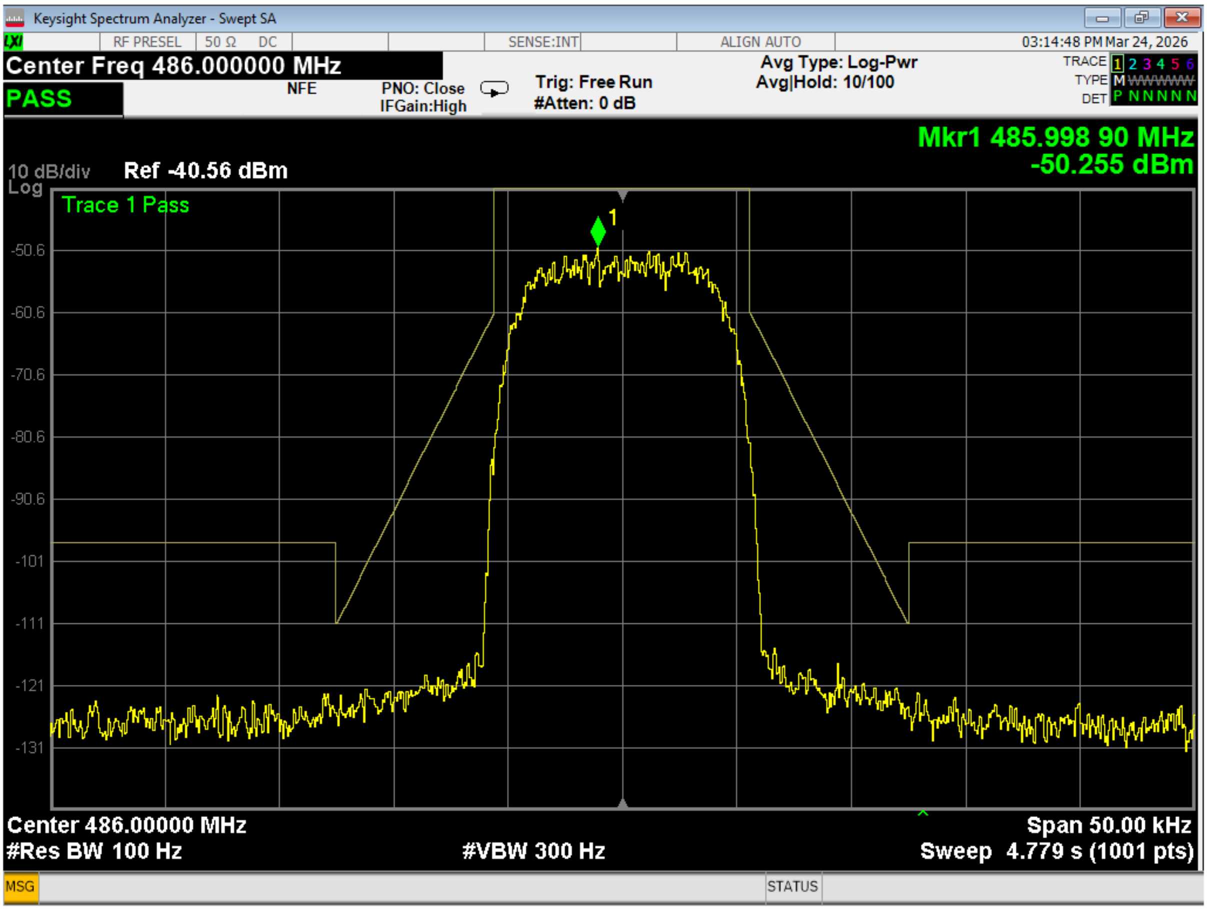
465 MHz



Emission Mask (Input)

Mask D – 9K80D7W - Pi/4DQPSK – 8000 symbols/sec

486.000 MHz



Emission Mask (Output)

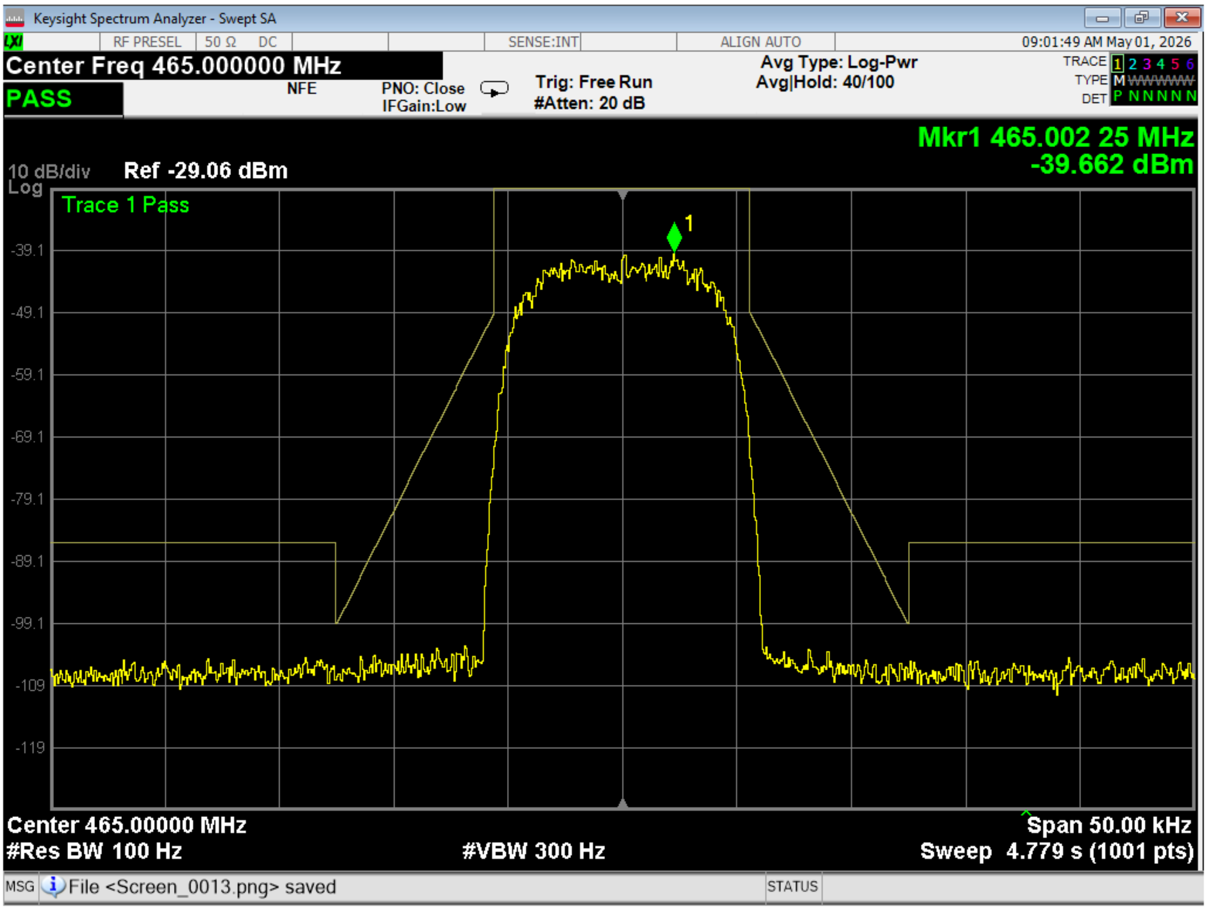
Mask D – 9K80D7W - Pi/4DQPSK – 8000 symbols/sec

486.000 MHz

Emission Mask (Input)

Mask D – 9K80D7W - Pi/4DQPSK – 8000 symbols/sec

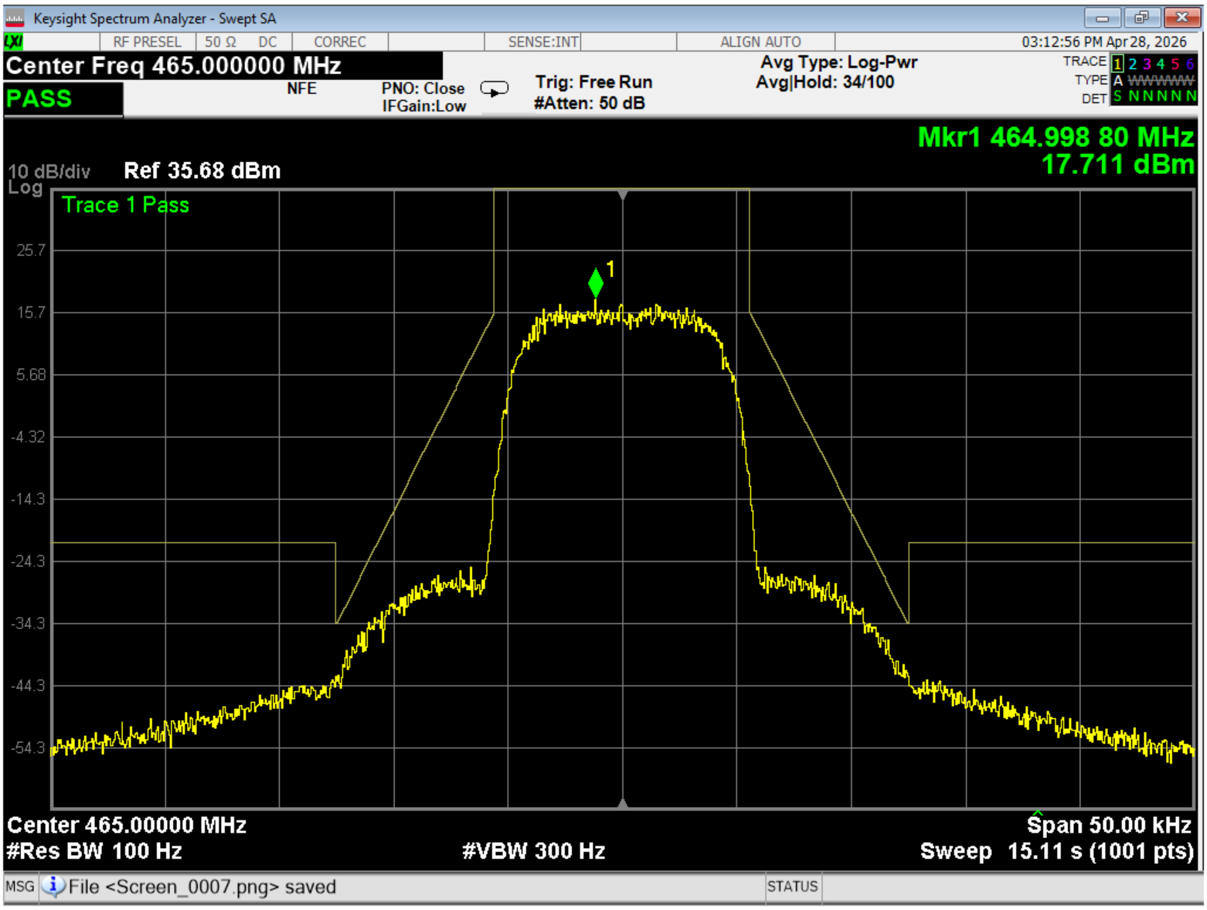
465.000 MHz



Emission Mask (Output)

Mask D – 9K80D7W - Pi/4DQPSK – 8000 symbols/sec

465.000 MHz



Clause 2.1051: Transmitter spurious emissions at the antenna terminals

Attached to the input of the Keysight spectrum analyser was an external power attenuator and a notch filter.

Measurements were made using a peak detector with a 100 kHz resolution bandwidth when transmitting an unmodulated carrier output at maximum rated power of 5 watts (+37.0 dBm).

Frequency: 486.000 MHz

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)
972.000	-60.8	-20.0
1458.000	Less than -70.0 dBm	-20.0
1944.000	Less than -70.0 dBm	-20.0
2430.000	Less than -70.0 dBm	-20.0
2916.000	Less than -70.0 dBm	-20.0
3402.000	Less than -70.0 dBm	-20.0
3888.000	Less than -70.0 dBm	-20.0
4374.000	Less than -70.0 dBm	-20.0
4860.000	Less than -70.0 dBm	-20.0

Frequency: 465.000 MHz

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)
930	-70.0	-20.0
1395	Less than -70.0 dBm	-20.0
1860	Less than -70.0 dBm	-20.0
2325	Less than -70.0 dBm	-20.0
2790	Less than -70.0 dBm	-20.0
3255	Less than -70.0 dBm	-20.0
3720	Less than -70.0 dBm	-20.0
4185	Less than -70.0 dBm	-20.0
4650	Less than -70.0 dBm	-20.0

Limit:
Part 90.210(d) Mask D, (3) on any frequency removed from the centre of the authorised bandwidth by a displacement frequency of more than 12.5 kHz shall be attenuated by at least 50 + 10 log (P) or 70 dB whichever is the lesser attenuation.

The spurious emission limit defined by Mask D has been applied as this transmitter can operate using channel spacing of 12.5 kHz.

Part 2.1051 states that emissions greater than 20 dB below the limit need not be specified.

Part 2.1057 states that the spectrum should be investigated up to the 10^{th} harmonic if the transmitter operates below 10 GHz.

No measurements were made above the 10^{th} harmonic.

Result: Complies.
Measurement Uncertainty: ± 0.5 dB

KDB 4.3 - Out of Band Rejection

As required by FCC part 90 out of band rejection measurements were carried out.

The operating range of the additional bands has been declared to be

450.000 – 470.000 MHz which gives and operating range of 20 MHz
470.000 – 490.000 MHz which gives and operating range of 20 MHz

The input filters for each additional band were configured to operate on 8 channels spaced by 100 kHz above and below the main test frequencies of 465.000 MHz and 486.000 MHz.

When operating in the 470 – 490 MHz band the signal generator swept between 430.000 – 530.000 MHz with 50 kHz steps and a dwell time of 100 ms

When operating in the 450 – 470 MHz band the signal generator swept between 410.000 – 510.000 MHz with 50 kHz steps and a dwell time of 100 ms

Spectrum Analyser Settings: Res BW 100 kHz, Video BW 300 kHz

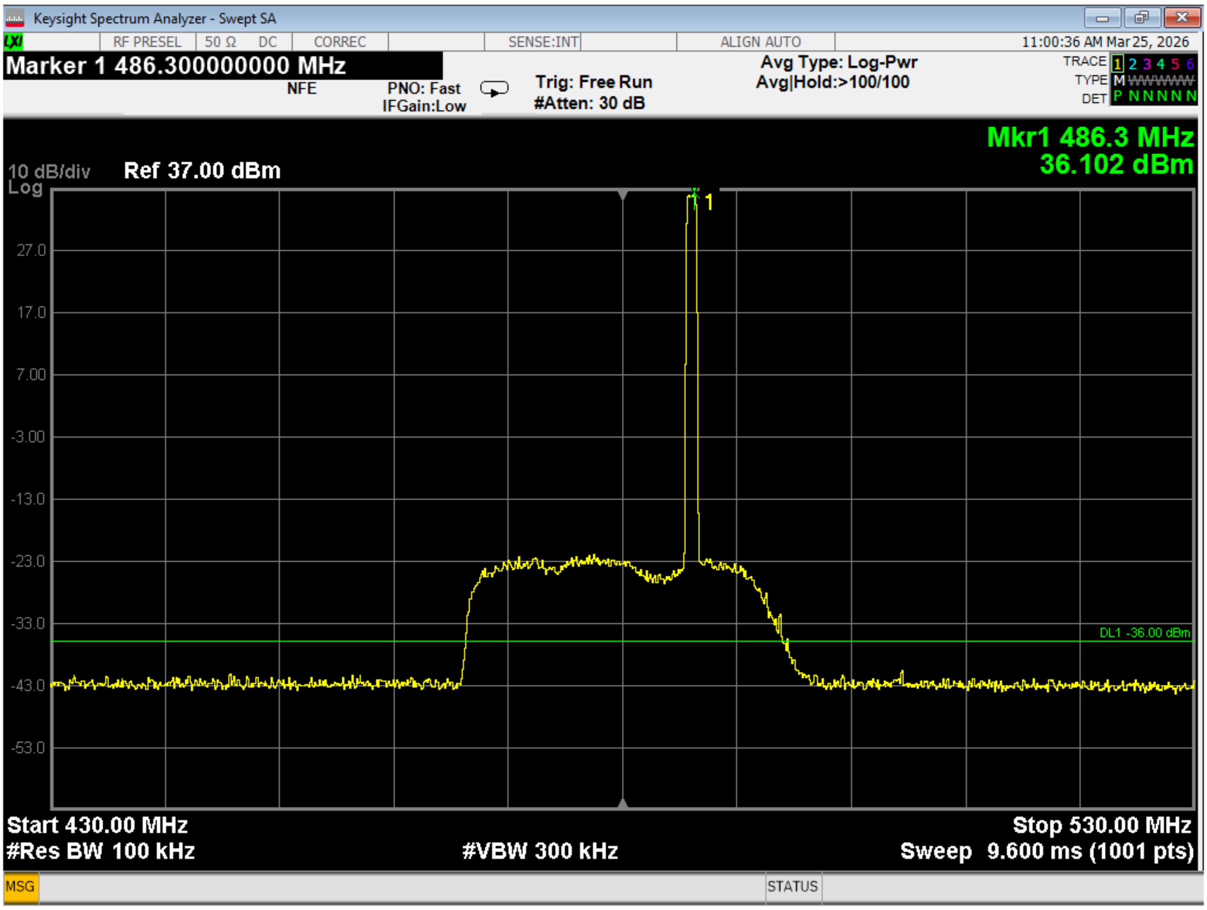
Plots of these observations are attached.

A limit of -36 dBm will apply

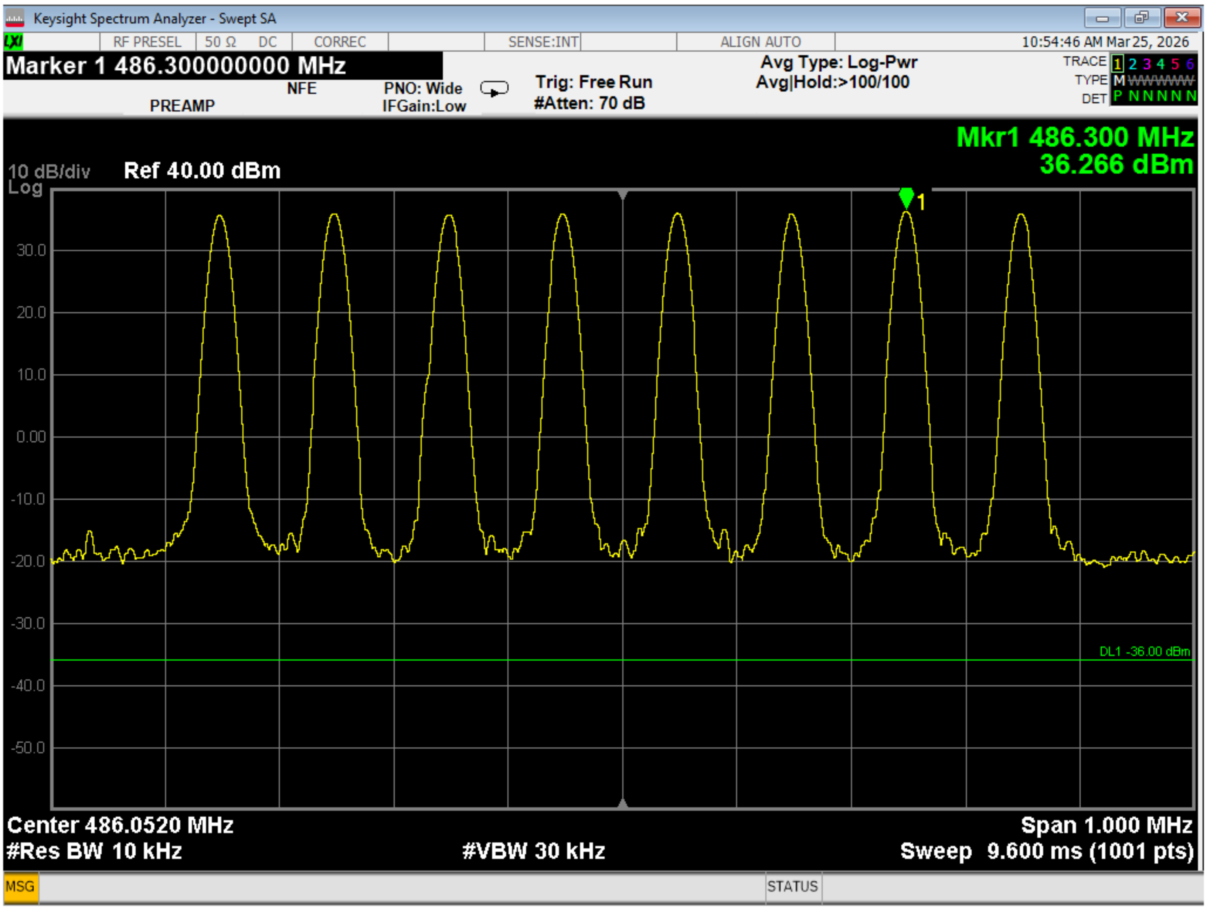
Observations: No frequency responses detected.

Result: Complies

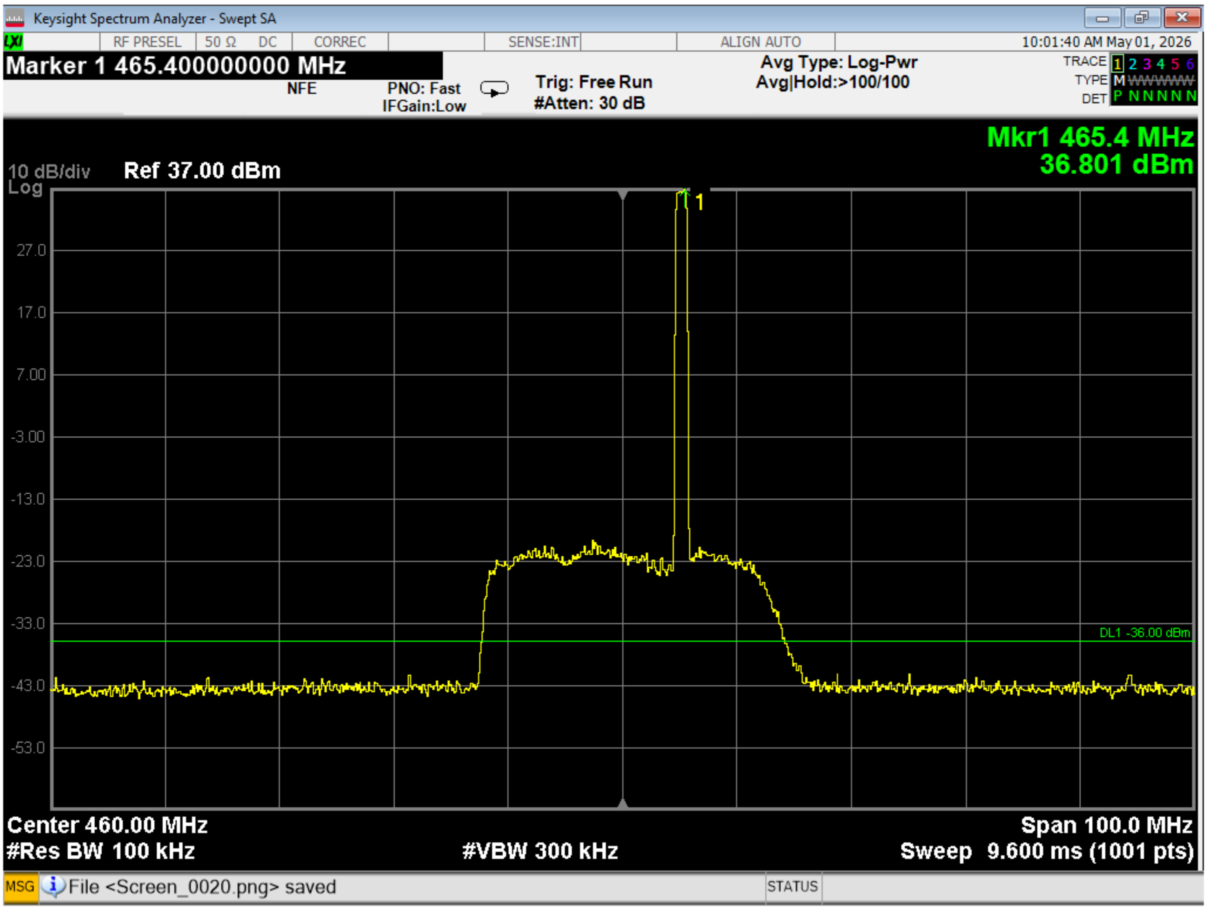
470.000 – 490.000 band of operation



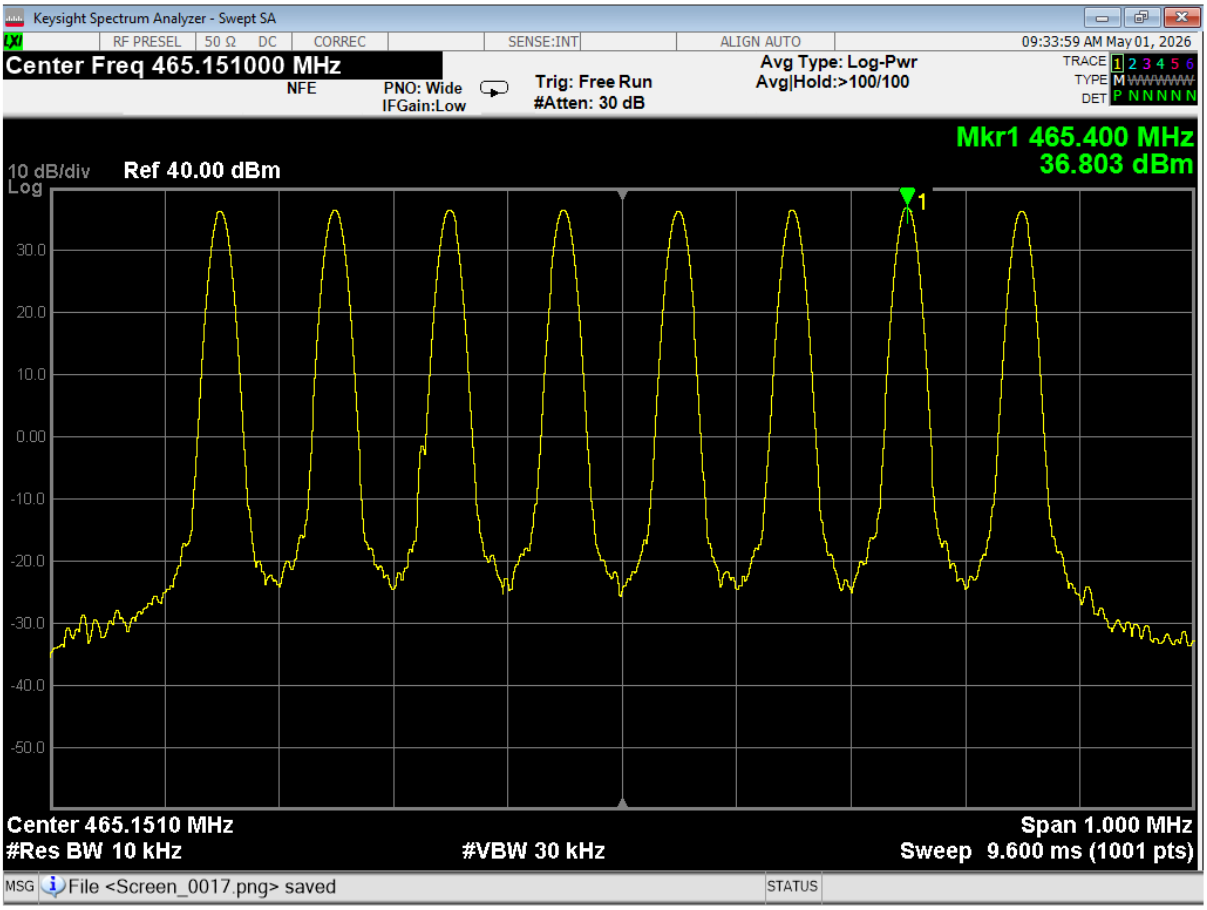
8 channels in use between 485.700 MHz and 486.400 MHz



450.000 – 470.000 MHz band of operation



8 channels in use between 464.800 MHz and 465.500 MHz



KDB 4.7.2 - Intermodulation Characteristics

Testing was carried out as per FCC part 2 section 2.1047 and FCC Part 90 Section 90.210.

Two signals, 200 kHz apart, were applied to the input of the amplifier at a level of -60 dBm.

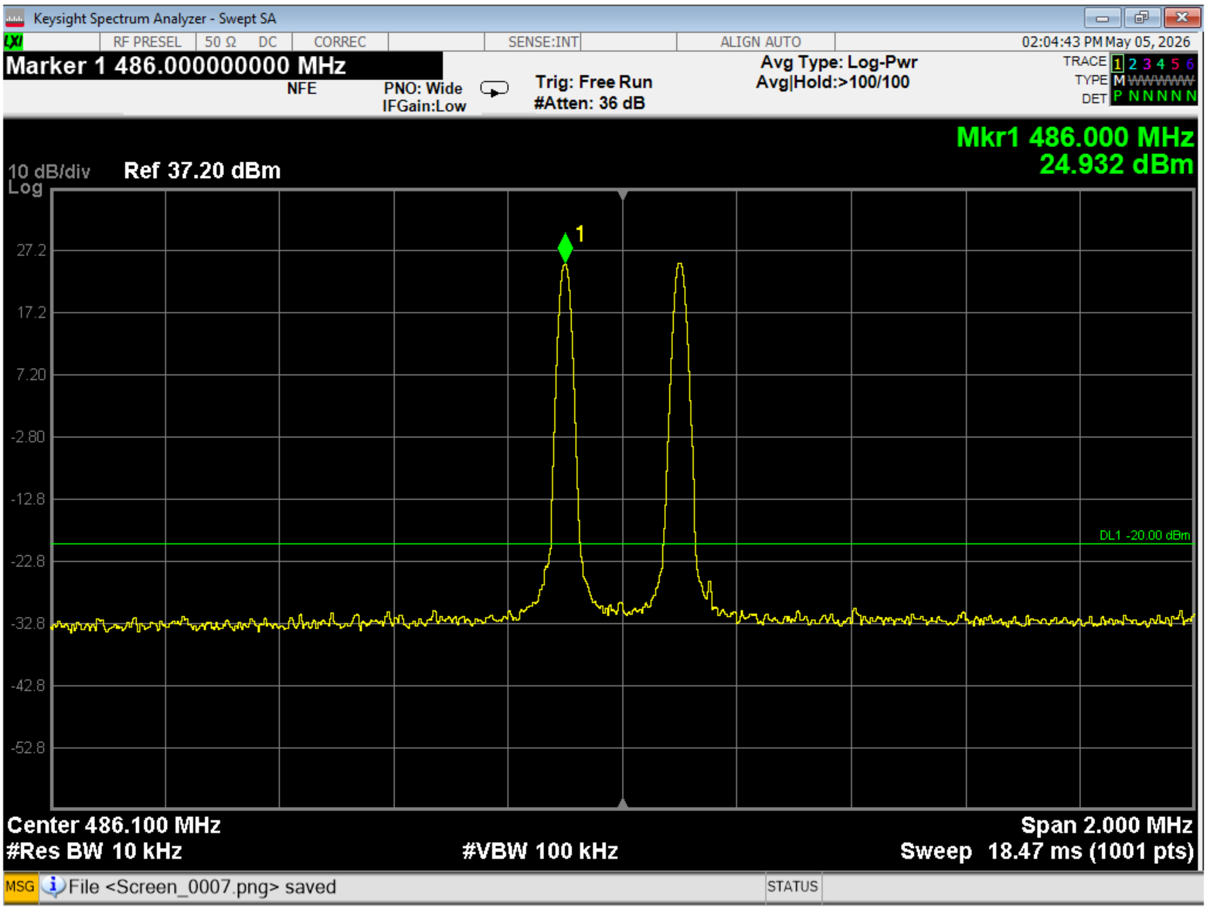
The filters on the transmitter out were reconfigured in order that two output signals were generated 200 kHz apart at a level of approximately +25 dBm each as the composite power for this device is +37 dBm.

When operating 16 channels would be used giving a power per channel of +25 dBm (316 mW).

The following intermodulation products were observed.

A limit of -20 dBm has been applied.

Input 486.000 MHz and 486.200 MHz – Output + 25 dBm

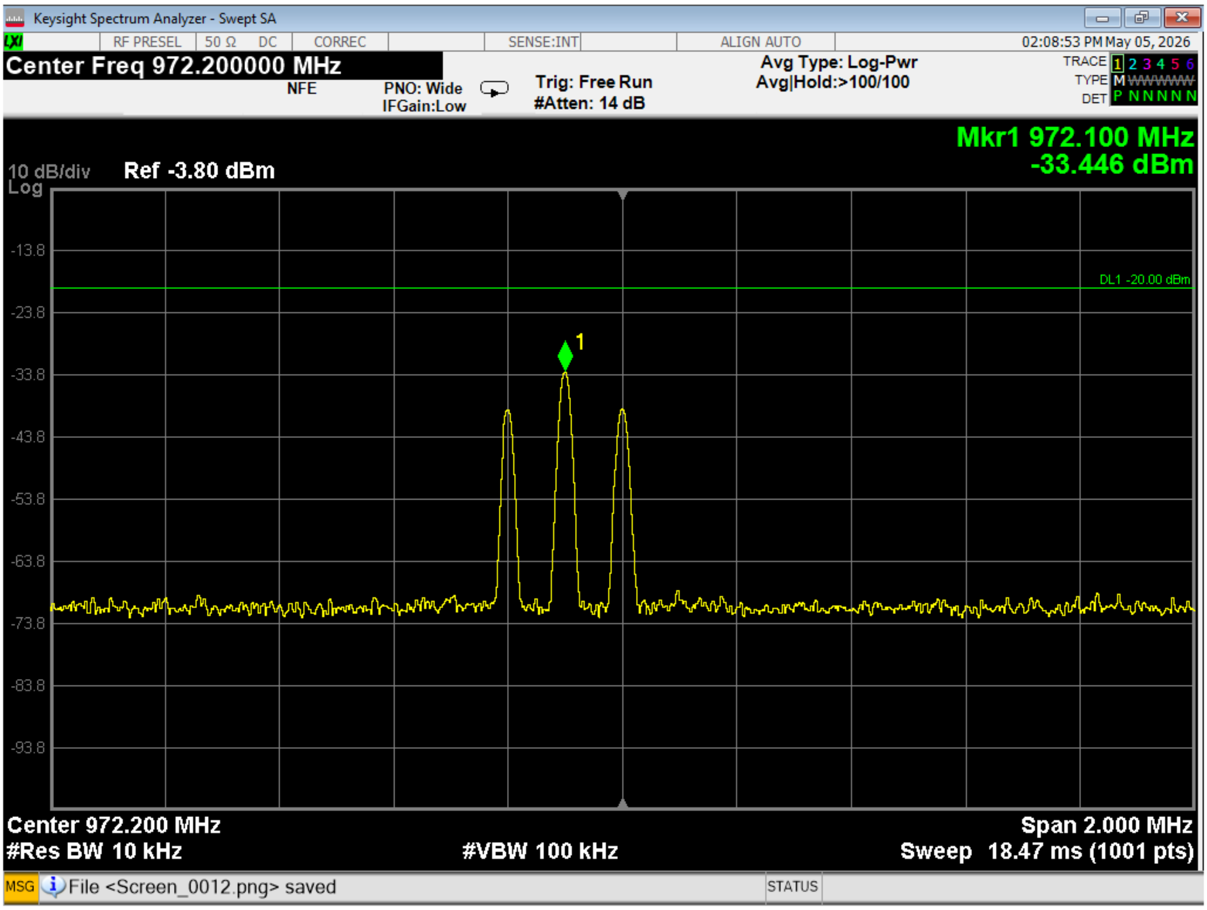


No inter-modulation emissions observed to exceed -30 dBm

Result: Complies

Input 486.000 MHz and 486.100 MHz – Output +25 dBm

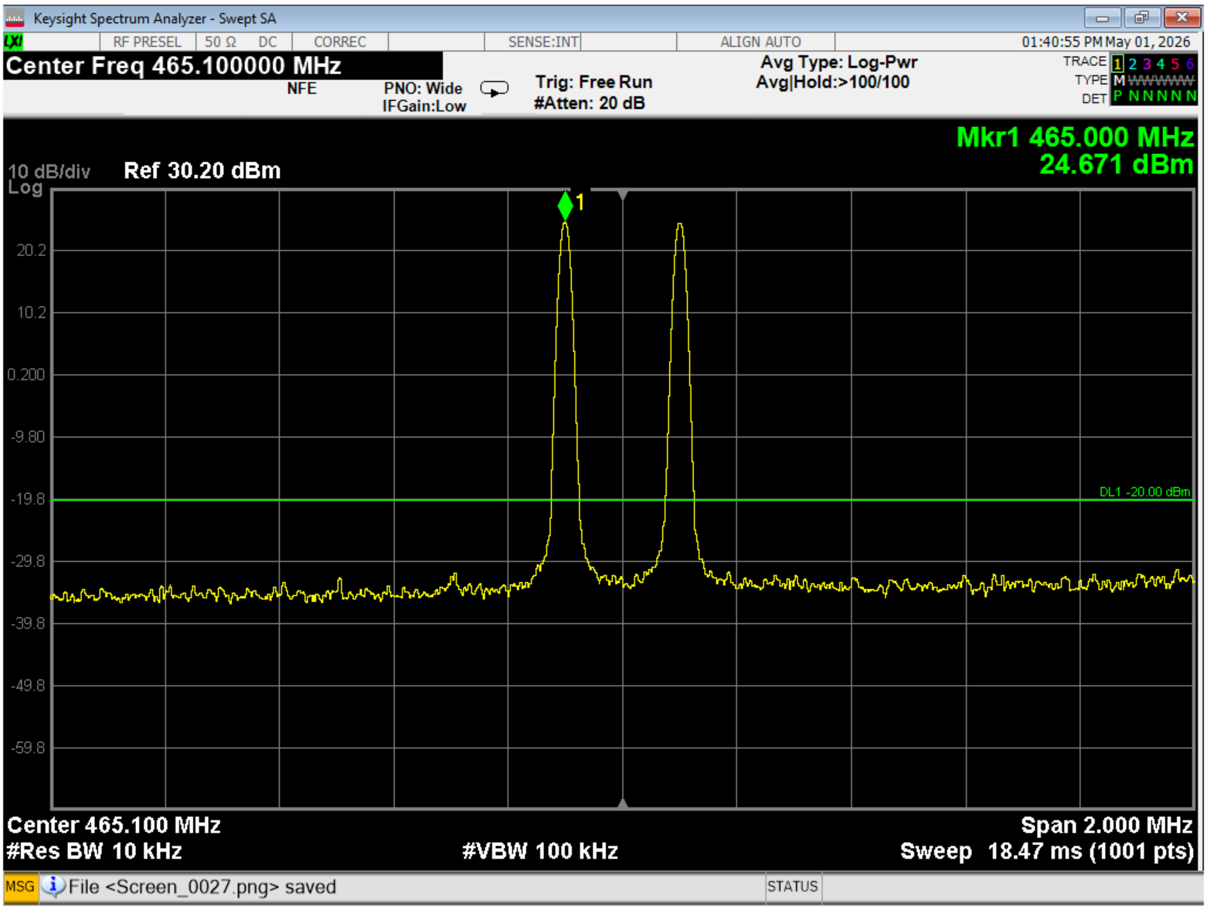
2nd Harmonic Observations



Frequency (MHz)	Level (dBm)	Limit (dBm)
972.0000	-37.8	-20.0
972.2000	-33.2	-20.0
972.4000	-38.2	-20.0

No 3rd harmonic emissions observed

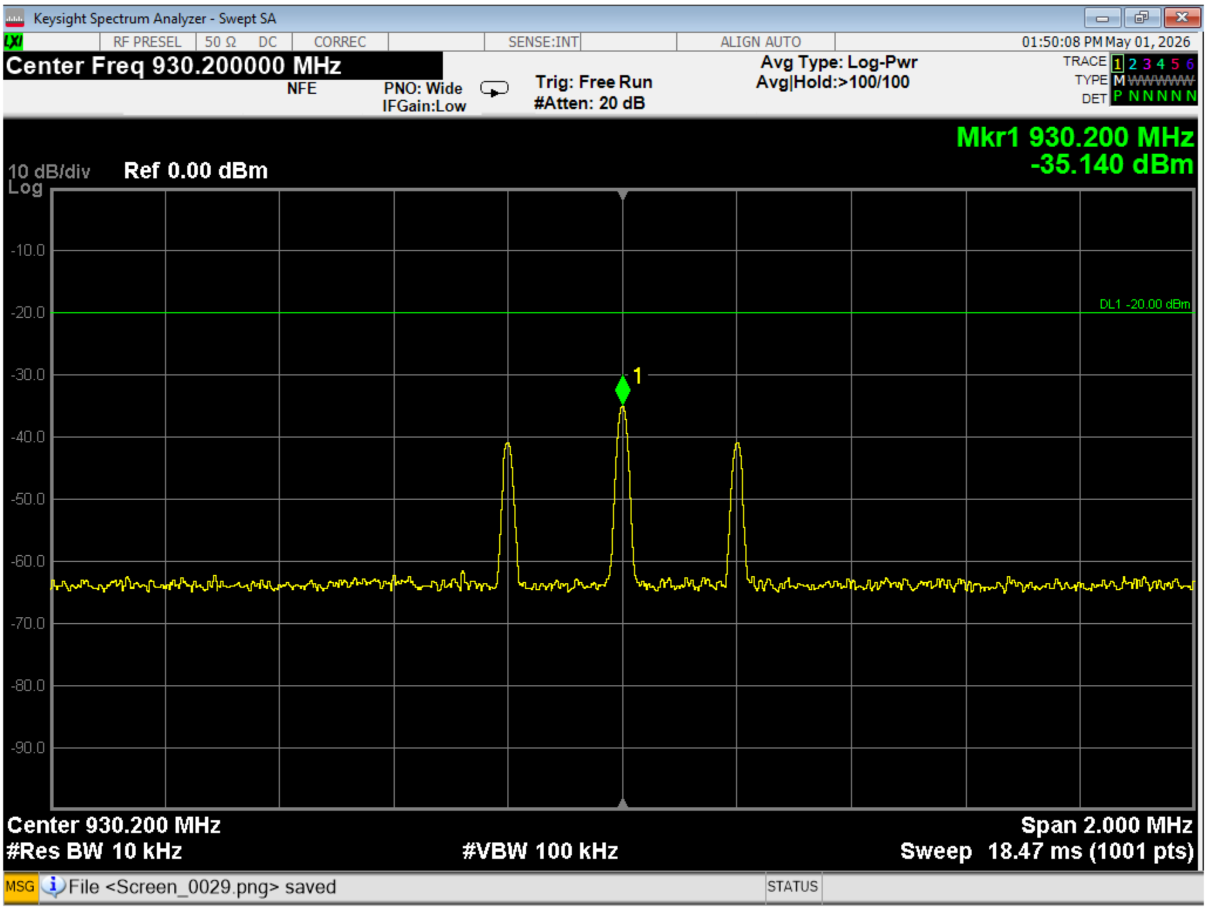
Input 465.000 MHz and 465.200 MHz – Output + 25 dBm



No inter-modulation emissions observed to exceed -30 dBm

Input 465.000 MHz and 465.100 MHz – Output +25 dBm

2nd Harmonic Observations



Frequency (MHz)	Level (dBm)	Limit (dBm)
930.0000	-40.9	-20.0
930.2000	-35.3	-20.0
930.4000	-41.0	-20.0

No 3rd harmonic emissions observed

Result: Complies

Exposure of humans to RF fields

The product under test is a UHF bi-directional amplifier (repeater) that cane transmit between 406.1 – 512 MHz

Testing in this report has been carried out in the 450 – 470 MHz band and in the 470 – 490 MHz band however this assessment has been carried out on 406.1 MHz as a worst case as the composite power is identical across the operating range of the system.

At this point the type of antennas and coax to be used have not been defined.

For the purposes of the Exposure of humans to RF fields evaluation it will be assumed that the connecting cables are short and have no associated losses and high gain directional antennas have been used which have a gain of at least 10 dBi when the amplifier is operating with a duty cycle of 100% when the composite power is set to a maximum of +37 dBm (5 watts).

As per FCC KDB 447498 D01 and Section 2.1091 radio frequency transmitters are required to be operated in a manner that ensures the public is not exposed to RF energy levels.

Calculations have been made using the General Public/Uncontrolled Exposure limits that are defined in Section 1.1310.

The limits for maximum permissible exposure (MPE) have been calculated below for a worst case at 406.1 MHz

- Occupational /Controlled exposure is f/300 which gives a limit of 1.354 mW/cm2

- General Population / Uncontrolled exposure is f/1500 which gives a limit of 0.271 mW/cm2

Minimum safe distances have been calculated below.

For a Controlled Environment
Power Density = 1.354 mW/cm2 = E2/3770
E= $\sqrt{1.354*3770}$
E = 71.4 V/m

For an Uncontrolled Environment
Power Density = 0.271 mW/cm2 = E2/3770
E= $\sqrt{0.271*3770}$
E = 32.0 V/m

The rated maximum transmitter composite power = 5 W (+37 dBm).

A worst case scenario duty cycle of 100% has been used for the calculations.

The antenna gain has been assumed to +10 dBi which equates to a numeric gain of 10.

The minimum distance from the antenna at which the MPE is met is calculated from the following

Field strength in V/m (FS),
Transmit power in watts (P)
Transmit antenna gain (G)
Transmitter duty cycle (DC)
Separation distance in metres (D)

The calculation is as follows:

$FS = (\sqrt{(30 * P * G * DC)}) / D$

For Uncontrolled environments, the minimum distance is:

$D = (\sqrt{(30 * P * G * DC)}) / FS$
P = 5 W
FS = E = 71.4 V/m
G = 10
DC = 1
$D = (\sqrt{(30 * 5 * 10 * 1)}) / 71.4$
D = 0.542 m or 54.2 cm

For Controlled environments, the minimum distance is:

$D = (\sqrt{(30 * P * G * DC)}) / FS$
P = 5 W
FS = E = 32.0 V/m
G = 10
DC = 1
$D = (\sqrt{(30 * 5 * 10 * 1)}) / 32.0$
D = 1.210 m or 121.0 cm

Result: Complies if the safe distances shown above are applied based upon the assumptions presented.

7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial #	Cal Due	Interval
Signal Generator	Rohde & Schwarz	SMHU	E1493	11/05/28	2.0 years
Signal Generator	Agilent	E4433B	ESG-D	24/07/26	2.0 years
DC Power Supply	Hewlett Packard	HP6032A	2743A-02859	-	-
Receiver	Rohde & Schwarz	ESIB-40	100295	30/05/26	2.0 years
Spectrum Analyzer	Keysight	N9038A	MY57290153	20/11/26	3.0 year
Thermal chamber	Contherm	M180F	86025	N/a	N/a
Thermometer	DSIR	RT200	35	11/04/27	5.0 years

At the time of testing all test equipment was within calibration.

8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd designation as a FCC Accredited Laboratory by International Accreditation New Zealand, designation number: NZ0002 under the APEC TEL MRA.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025, Accreditation Number 424 dated 26th June 1991.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025 Accreditation Number 424 dated 26th June 1991.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies.

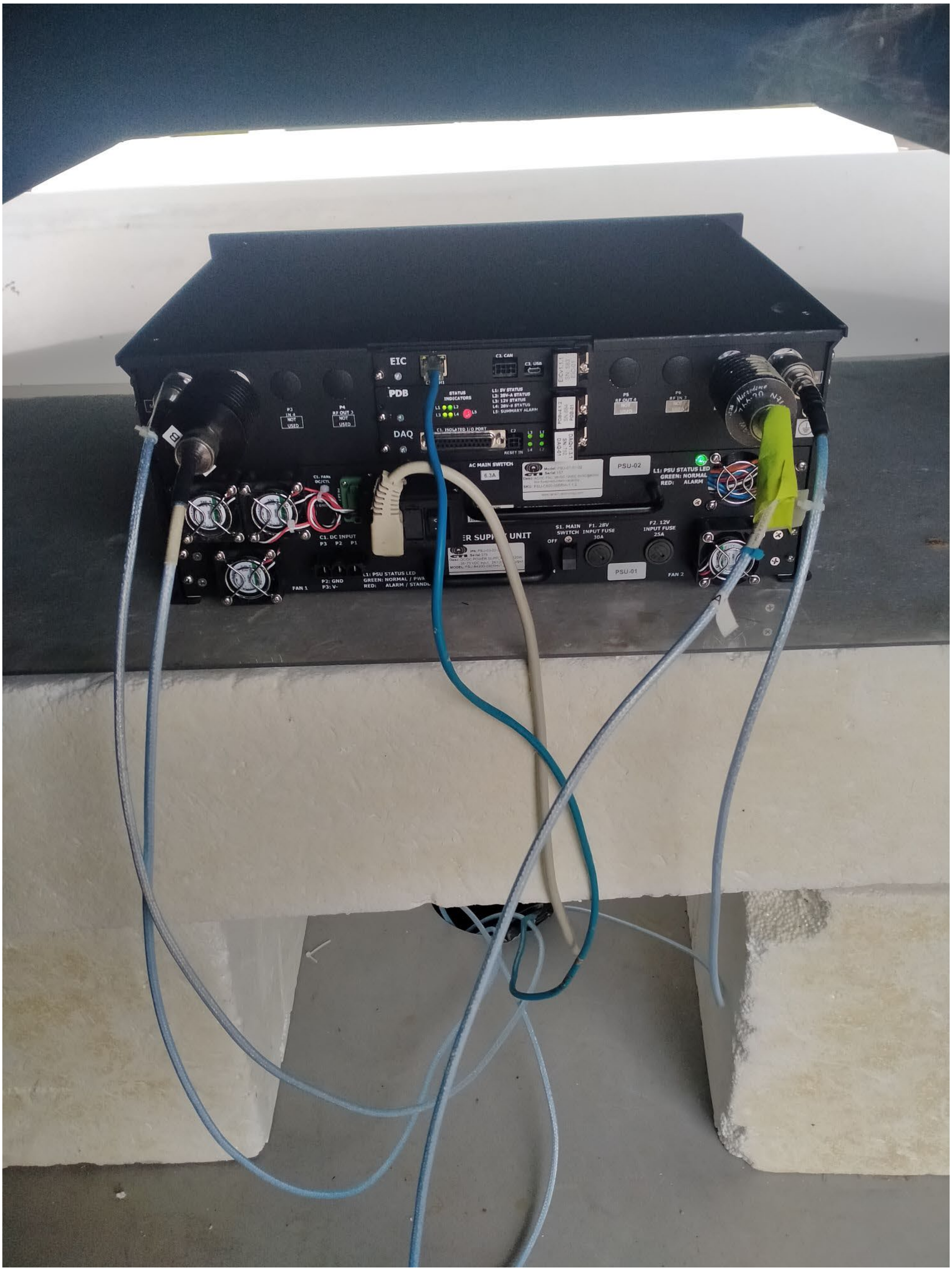
This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

9. PHOTOGRAPHS

Overall


CTI
CHANNELIZED
REPEATER AMPLIFIER
STATUS
MAJOR ALARM
MINOR ALARM
F1

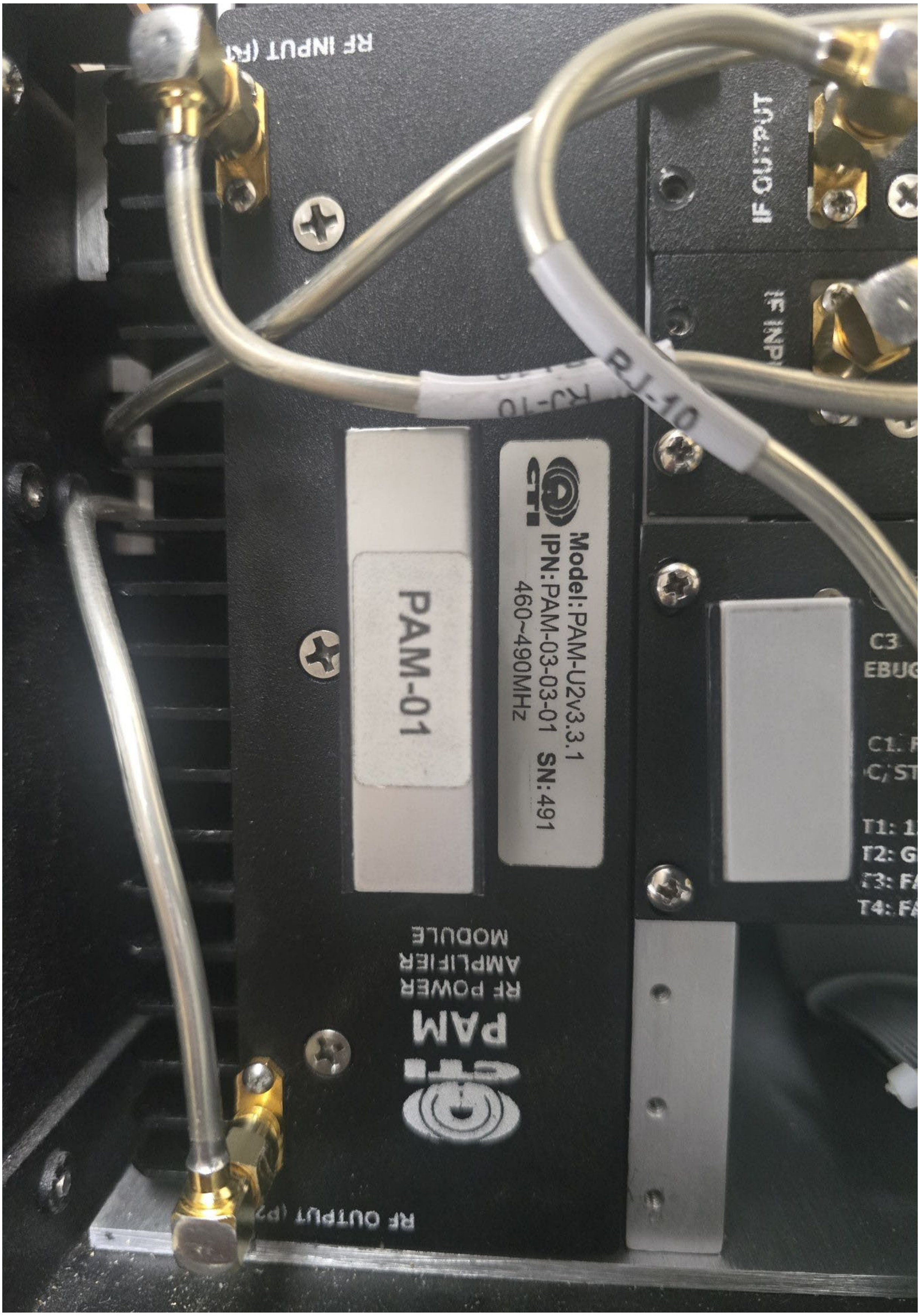

EIC
C2. CAN
C3. USB
PDB
STATUS INDICATORS
L1: 5V STATUS
L2: 28V-A STATUS
L3: 12V STATUS
L4: 28V-B STATUS
L5: SUMMARY ALARM
DAQ
ISOLATED I/O PORT
P3 IN 4 NOT USED
P4 RF OUT 3 NOT USED
P5 RF OUT 4
P6 RF IN 3
AC MAIN SWITCH
6.3A
PSU-02
L1: PSU STATUS LED
GREEN: NORMAL
RED: ALARM
POWER SUPPLY UNIT
SWITCH
INPUT FUSE 30A
INPUT FUSE 25A
PSU-01
FAN 1
FAN 2
P3 P2 P1
GREEN: NORMAL / PWR
RED: ALARM / STAND


EIC
PDB
DAQ
PSU-02
PSU-01

External view of modules fitted

External view of DSP module

Power Amplifier Module

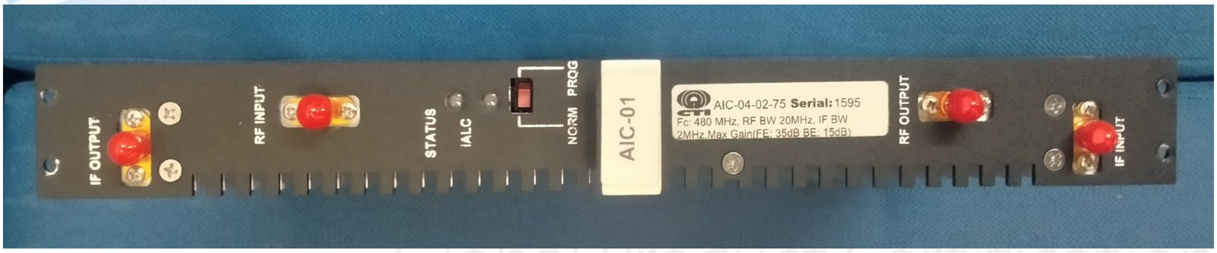

Model: PAM-U2v3.3.1
IPN: PAM-03-03-01 SN: 491
460~490MHz
PAM-01
PAM
RF POWER
AMPLIFIER
MODULE
RF INPUT
RF OUTPUT
IF OUTPUT
RJ-10


CTI
Model: MCPA-46030-05v1
Description:460~490MHz +37dBm PA BW
30MHz
Serial: 20231214C039
www.canamtechnology.com

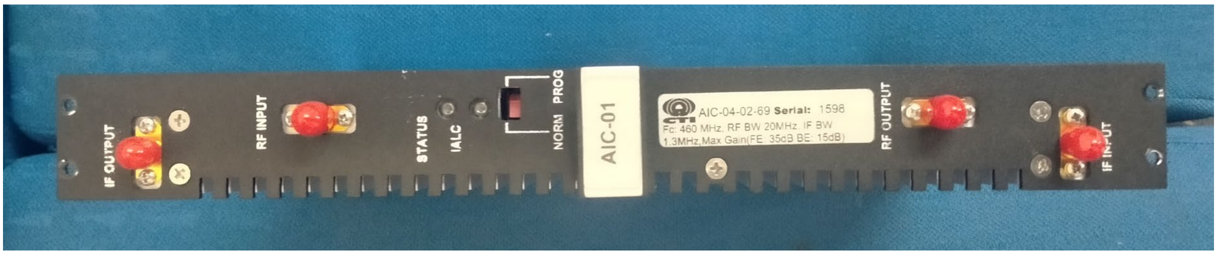

475M
RF IN
NC
GND
DC-IN
3.3V
BOT
485B
485A
V1.8
1.Output over-power
2.High Temp
3.High output VSWR
4.Temp monitor
5.PA Enable/Disable status
6.Ref pwr monitor
7.Fwd pwr monitor
8.PA Enable/Disable Ctrl
9.ALC Enable/Disable Ctrl
I/O
QC Tested
Model: MCPA-46030-05v1
Serial: 20231214C039
Description: 460~490MHz +37dBm PA
BW 30MHz
www.canamtechnology.com
RF OUT

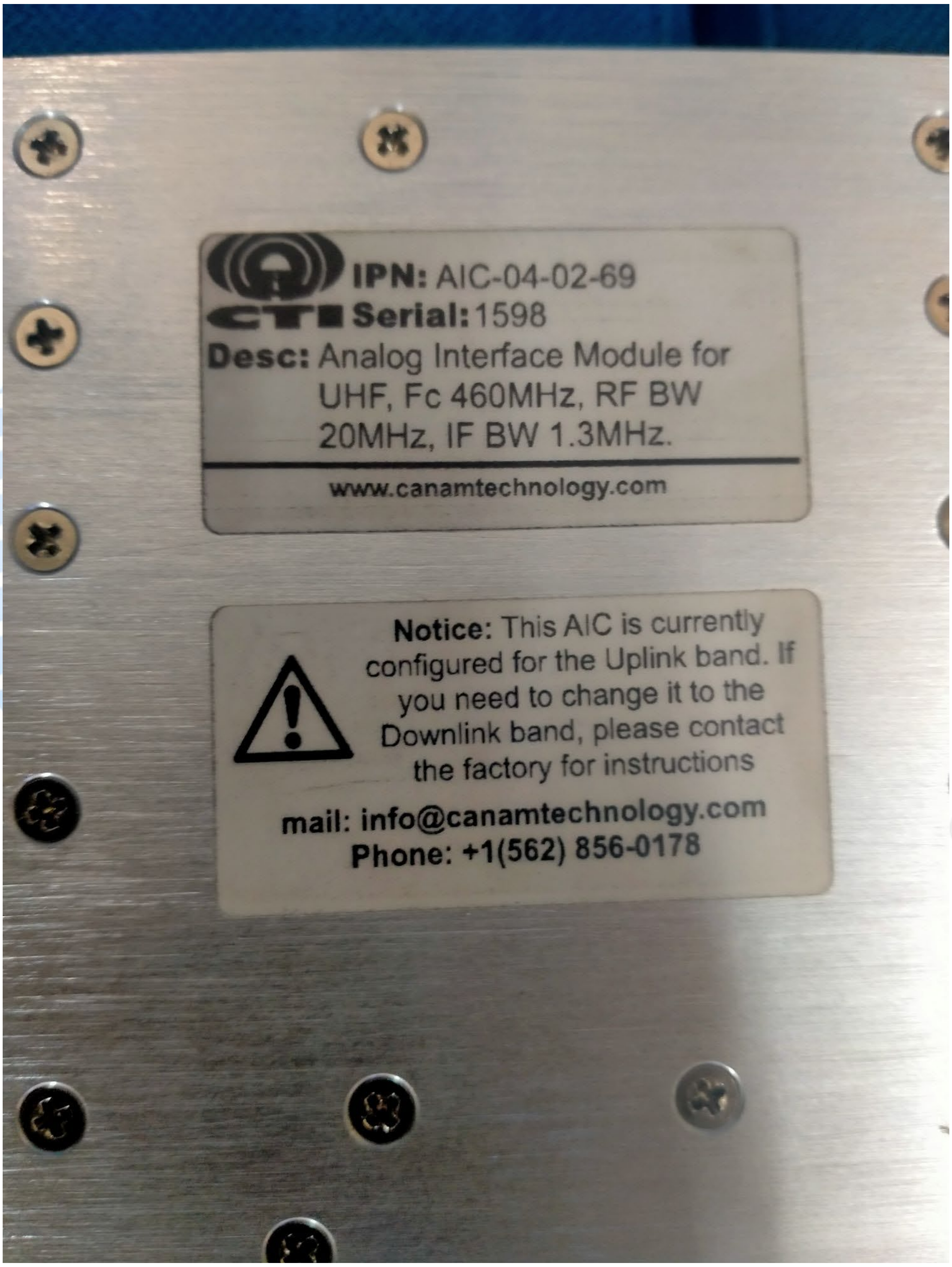

QC Tested
3.3V
BOT
485B
485A
V1.8
Model: MCPA-46030-05v1
Serial: 20231214C039
Description: 460~490MHz +37dBm PA
BW 30MHz
www.canamtechnology.com


CTI
IPN: AIC-04-02-75
Serial: 1595
Desc: Analog Interface Module for UHF, Fc 480MHz, RF BW 20MHz, IF BW 2MHz.
www.canamtechnology.com
Notice: This AIC is currently configured for the Uplink band. If you need to change it to the Downlink band, please contact the factory for instructions
mail: info@canamtechnology.com
Phone: +1(562) 856-0178


IF OUTPUT
RF INPUT
STATUS
IALC
NORM
PROG
AIC-01
AIC-04-02-75 Serial: 1595
Fc: 480 MHz, RF BW 20MHz, IF BW
2MHz Max Gain(FE: 35dB BE: 15dB)
RF OUTPUT
IF INPUT


AIC-01
CTI
AIC-04-02-75 Serial: 1595
Fc: 480 MHz, RF BW 20MHz, IF BW
2MHz,Max Gain(FE: 35dB BE: 15dB)
RF OUTPUT


IF OUTPUT
RF INPUT
STATUS
IALC
NORM
PROG
AIC-01
AIC-04-02-69 Serial: 1598
Fc: 460 MHz, RF BW 20MHz, IF BW
1.3MHz,Max Gain(FE: 35dB BE: 15dB)
RF OUTPUT
IF INPUT


IPN: AIC-04-02-69
CTI Serial: 1598
Desc: Analog Interface Module for
UHF, Fc 460MHz, RF BW
20MHz, IF BW 1.3MHz.
www.canamtechnology.com
Notice: This AIC is currently
configured for the Uplink band. If
you need to change it to the
Downlink band, please contact
the factory for instructions
mail: info@canamtechnology.com
Phone: +1(562) 856-0178

Close up of module labels