



Radio Test Report

Redtail Telematics Ltd

VLU6M4VP

47 CFR Part 90I & 90B Effective Date 1st October 2024

TNB: Licensed Non-Broadcast Station Transmitter

Test Date: 25th November 2025 to 23rd December 2025

Report Number: 12-15017-12-25 Issue 01

The testing was carried out by Kiwa Ltd trading as Kiwa Electrical Compliance, an independent test house, at their test facility located at:

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Arnolds Court, Arnolds Farm Lane, Mountnessing, Brentwood Essex, CM13 1UT

Certificate of Test 15017-12

The equipment noted below has been fully tested by Kiwa Electrical Compliance and, where appropriate, conforms to the relevant subpart of 47 CFR Part 90I & 90B. This is a certificate of test only and should not be confused with an equipment authorisation. Other standards may also apply.

Equipment:	VLU6M4VP
Model Number:	VLU6M4VP
Unique Serial Number:	Low channel 124C0AF (MSK) Low channel 124C0B0 (FSK and CW) Mid channel 124C0B2 (MSK) Mid channel 124C0B3 (FSK and CW) High channel 124C0B5 (MSK) High channel 124C0B6 (FSK and CW)
Applicant:	Redtail Telematics Ltd Plextek Building, London Road Great Chesterford, Essex CB10 1NY UK
Proposed FCC ID	2AXB-F-VLU6M4VP
Full measurement results are detailed in Report Number:	12-15017-12-25 Issue 01
Test Standards:	47 CFR Part 90I & 90B Effective Date 1st October 2024 TNB: Licensed Non-Broadcast Station Transmitter

DEVIATIONS:

No deviations have been applied.

This certificate relates only to the unit tested as identified by a unique serial number and in the condition at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of unit not meeting the intentions of the standard or the requirements of the Federal Regulations, particularly under different conditions to those during testing. Any compliance statements are made reliant on (a) the application of the product and use of the assigned band being acceptable to the FCC and (b) the modes of operation as instructed to us by the Customer based on their specific knowledge of the application and functionality of the EUT. Statements of compliance, where measurements were made, do not include the measurement uncertainty. The measurement uncertainty, where stated, is the expanded uncertainty based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Date of Test: 25th November 2025 to 23rd December 2025

Test Engineer:
Graham Blake

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2 Equipment under test (EUT)

2.1 Equipment specification

Applicant	Redtail Telematics Ltd Plextek Building London Road Great Chesterford Essex CB10 1NY UK	
Manufacturer of EUT	Redtail Telematics Ltd	
Full Name of EUT	VLU6M4VP	
Model Number of EUT (HVIN)	VLU6M4VP	
Serial Number of EUT	Low channel 124C0AF (MSK) Low channel 124C0B0 (FSK and CW) Mid channel 124C0B2 (MSK) Mid channel 124C0B3 (FSK and CW) High channel 124C0B5 (MSK) High channel 124C0B6 (FSK and CW)	
Date Received	21st October 2025	
Date of Test:	25th November 2025 to 23rd December 2025	
Date Report Issued	13 th April 2026	
Main Function	The device is covertly installed into a host vehicle. If the vehicle is reported stolen, the device is remotely activated via a VHF network. It then starts transmitting an identification code which can be received by specialist equipment carried on law enforcement vehicles. The device can also be used for remote disconnection of the fuel pump in the host vehicle, again using signalling over a VHF network	
EUT Specification	Height	30 mm
	Width	55 mm
	Depth	130 mm
	Weight	0.170 kg
	Voltage	12V DC
	Current	1.5 Amp

2.2 Applicant declarations for testing

General Parameters	
EUT Normal use position	Vehicle mounted
Choice of model(s) for type tests	Sample
Antenna details	Single wire monopole 2.16 metres
Antenna port	Internal port. Interface jig provided for testing purposes
Baseband Data port (yes/no)?	No
Highest Signal generated in EUT	173.225 MHz
Lowest Signal generated in EUT	32.768 kHz
Hardware Version (HVIN)	VLU6M4VP
Firmware Version (FVIN)	V113.26.339
Type of Equipment	Multi-radio
Technology Type	PMR
Geo-location (yes/no)	Yes
TX Parameters	
Alignment range – transmitter	173.075 - 173.225 MHz
EUT Declared Modulation Parameters	FSK and MSK
EUT Declared Power level	30 - 34 dBm conducted
EUT Declared Signal Bandwidths	3.6 kHz
EUT Declared Channel Spacing's	Radio is set to a single frequency which is country specific: USA, Argentina and Mexico Frequency is 173.075 MHz Peru Frequency is 173.130 MHz Ecuador Frequency is 173.225 MHz
EUT Declared Duty Cycle	For MSK mode, 200ms every 2 seconds. For FSK, 1 second every 60 seconds.
Unmodulated carrier available?	Yes, for test purposes
Declared frequency stability	30 ppm
RX Parameters	
Alignment range – receiver	173.075 - 173.225 MHz
EUT Declared RX Signal Bandwidth	Not declared
Receiver Signal Level (RSL)	Not declared
Method of Monitoring Receiver BER	Monitoring successful message count indicated on attached laptop PC connected to EUT internal serial port
FCC Parameters	
FCC Transmitter Class	TNB: Licensed Non-Broadcast Station Transmitter

2.3 Functional description

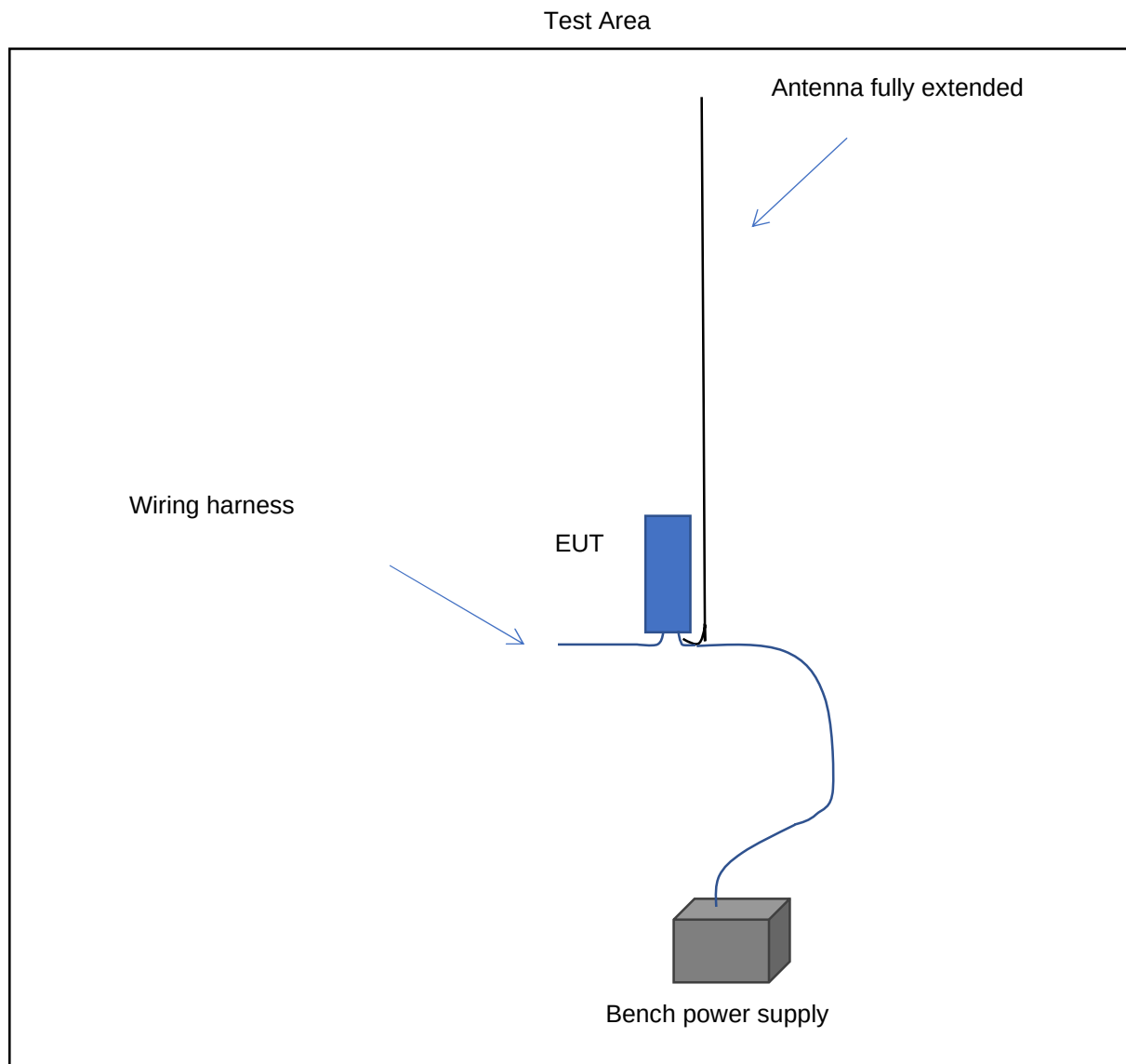
The device is designed for after an market installation in motor vehicles to assist in the recovery in the event of a theft. The device is powered by the host vehicle's 12V supply. An internal 6V backup battery is used if there is an interruption to the primary power source.

The radio architecture is designed around a single transceiver chip. An external RF front end is employed to increase the transmit power and improve the receiver sensitivity. An antenna tuning unit is used to maximise the transmitted output power.

2.4 Modes of operation

Mode Reference	Description	Used for testing
TX LOW (MSK)	The EUT is transmitting bursts of data at 173.075 MHz, MSK modulation.	Yes
TX MID (MSK)	The EUT is transmitting bursts of data at 173.13 MHz, MSK modulation.	Yes
TX HIGH (MSK)	The EUT is transmitting bursts of data at 173.225 MHz, MSK modulation.	Yes
TX LOW (FSK)	The EUT is transmitting bursts of data at 173.075 MHz, FSK modulation.	Yes
TX MID (FSK)	The EUT is transmitting bursts of data at 173.13 MHz, FSK modulation.	Yes
TX HIGH (FSK)	The EUT is transmitting bursts of data at 173.225 MHz, FSK modulation.	Yes
TX LOW (CW)	The EUT is transmitting bursts of data at 173.075 MHz, without modulation.	Yes
TX MID (CW)	The EUT is transmitting bursts of data at 173.13 MHz, without modulation.	Yes
TX HIGH (CW)	The EUT is transmitting bursts of data at 173.225 MHz, without modulation.	Yes

2.5 Emissions configuration



The unit was powered from a bench power supply set to 12V DC. The EUT was placed on a turntable. The EUTs VHF transmit antenna was extended fully vertically in accordance with the instructions as this was considered by the applicant to be worst-case in terms of RF power and emissions. For the purposes of test, the applicant provided separate test units which were tuned to spot frequencies as stated in section 2.4. Additional test units were provided which had been configured to transmit either a CW signal or FSK / MSK modulation.

2.5.1 Signal leads

Port Name	Cable Type	Connected
VHF antenna	PVC coated wire	Yes
Supply ground	PVC coated wire	Yes
Vehicle supply	PVC coated wire	Yes
GPIO (3 lines)	PVC coated wire	Yes

3 Summary of test results

The VLU6M4VP was tested for compliance to the following standard:

47 CFR Part 90I Effective Date 1st October 2024
TNB: Licensed Non-Broadcast Station Transmitter

Any compliance statements are made reliant on (a) the application of the product and use of the assigned band being acceptable to the FCC and (b) the modes of operation as instructed to us by the Customer based on their specific knowledge of the application and functionality of the EUT. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of equipment not meeting the intentions of the standard or the essential requirements of the directive, particularly under different conditions to those during testing. Statements of compliance, where measurements were made, do not include the measurement uncertainty. The measurement uncertainty, where stated, is the expanded uncertainty based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Title	References	Results
Transmitter Tests		
1. Radiated emissions	47 CFR Part 90I Clause 90.210(d), 47 CFR Part 2J Clause 2.1053	PASSED
2. Conducted emissions	47 CFR Part 90I Clause 90.210(d), 47 CFR Part 2J Clause 2.1051	NOT APPLICABLE ¹
3. Conducted power	47 CFR Part 90B Clause 90.20(e)(6)(iii) 47 CFR Part 2J Clause 2.1046	PASSED
4. Frequency stability	47 CFR Part 90I Clause 90.213(a)	PASSED
5. Occupied bandwidth	47 CFR Part 90I Clause 90.209	PASSED
6. Emission mask	47 CFR Part 90I Clause 90.210(d)	PASSED
7. Modulation limiting	47 CFR Part 2J Clause 2.1047(b)	NOT APPLICABLE ²
8. Modulation frequency response	47 CFR Part 2J Clause 2.1047(a)	NOT APPLICABLE ²
9. Transient frequency behaviour	47 CFR Part 90I Clause 90.214	PASSED
10. Adjacent channel power	47 CFR Part 90I Clause 90.221	NOT APPLICABLE ³
11. Duty Cycle / TX on times	47 CFR Part 90B Clause 90.20(e)6(v)	PASSED

¹ The EUT has no antenna port, and a temporary connection could not be made to 50ohms measuring equipment without the need for a matching board which attenuated maximum power observed by approx. 15.8 dB in band. Therefore, radiated emissions tests performed with permanent antenna in place.

² Not Applicable to Digitally modulated EUT's.

³ Only applicable to transmitters within the 450 - 470 MHz, 809 - 824 MHz and 854 - 869 MHz frequency bands.

4 Specifications

The tests were performed and operated in accordance with Kiwa Electrical Compliance procedures and the relevant standards listed below.

4.1 Relevant standards

Ref.	Standard Number	Version	Description
4.1.1	47 CFR Part 90I	2024	Part 90 - Private Land Mobile Radio Services - Subpart I - General Technical standards
4.1.2	47 CFR Part 2J	2024	Part 2 – Frequency Allocations and radio treaty matters; General rules and regulations
4.1.3	ANSI C63.26	2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
4.1.4	47 CFR Part 90B	2024	Part 90 - Private Land Mobile Radio Services - Subpart B – Public Safety Radio Pool

4.2 Deviations

No deviations were applied

4.3 Tests at extremes of temperature & voltage

The following test conditions were used to simulate testing at nominal or extremes.

Temperature Test Conditions		Voltage Test Conditions	
T nominal	20 °C	V nominal	12V DC
T minimum	-30 °C	V minimum	10.2V DC
T maximum	50 °C	V maximum	13.8VDC

Extremes of voltage are based on nominal +/-15%.

Extremes of temperature are based upon the requirements of 47 CFR 2.1055.

The ambient test conditions of humidity and pressure in the laboratory were as specified in each specific test section within this report

4.4 Test fixtures

In order to measure RF parameters at temperature extremes, the EUT was tested in a temperature-controlled chamber as follows:

A temporary RF port was created for testing by use a matching network board supplied by applicant. The matching network board had a declared insertion loss of 15.8dB.

5 Tests, methods and results

5.1 Radiated emissions

5.1.1 Test methods

Test Requirements:	47 CFR Part 90I Clause 90.210(d) [Reference 4.1.1 of this report], 47 CFR Part 2J Clause 2.1053 [Reference 4.1.2 of this report]
Test Method:	ANSI C63.26 Clause 5.5 [Reference 4.1.3 of this report]
Limits:	47 CFR Part 90I Clause 90.210(d)(3) [Reference 4.1.1 of this report]

5.1.2 Configuration of EUT

The EUT was tested in an ALSE and ambient conditions were monitored. Three orthogonal planes were examined. All test modes specified in section 2.4 were initially checked; MSK modulation scheme was found to be worst case for emissions and, therefore the EUT was operated in TX LOW (MSK), TX MID (MSK) and TX HIGH (MSK) modes for this test.

5.1.3 Test procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment' Section at Site H. Peak field strength from the EUT was maximised by rotating it 360 degrees.

An RMS detector was used for final measurements.

25MHz - 1GHz.

The measuring antenna was scanned 1 - 4m in both Horizontal and Vertical polarisations. Substitution method was performed using tuned dipoles / a calibrated bi-conical antenna.

1GHz – 26GHz.

The measuring antenna was used in both Horizontal and Vertical polarisations. Substitution method was performed using standard gain horn antennas.

5.1.4 Test equipment

CAL09, E005, E231, E268, E642, E745, E914, E932, LPE261, LPE333, TMS78, TMS79, TMS812

See Section 8 for more details

5.1.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Setup Table

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	MSK
Low channel	173.075 MHz
Mid channel	173.13 MHz
High channel	173.225 MHz

Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Difference to Limit (dB)	Antenna Polarisation	EUT Polarisation
All emissions were greater than 20dB below the limit				

LIMITS:

Part 90.210(d)(3), On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation: $50 + 10 \log (P)$ dB = -20 dBm.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty ($K=2$) is as follows:

30MHz - 1000MHz ± 6.1 dB

1 – 18 GHz ± 3.5 dB

18 – 26.5 GHz ± 3.9 dB

5.2 Conducted emissions

NOT APPLICABLE: The EUT has no antenna port and a temporary connection could not be made to 50 Ohms measuring equipment without the need for a matching board which attenuated maximum power observed by approx. 15.8 dB in band. Therefore, Radiated emissions tests performed with permanent antenna in place.

5.3 Conducted power

5.3.1 Test methods

Test Requirements:	47 CFR Part 90B Clause 90.20(e)(6)(iii) [Reference 4.1.4 of this report], 47 CFR Part 2J Clause 2.1046 [Reference 4.1.2 of this report]
Test Method:	ANSI C63.26 Clause 5.2 [Reference 4.1.3 of this report]
Limits:	47 CFR Part 90B Clause 90.20(e)(6)(iii) [Reference 4.1.4 of this report]

5.3.2 Configuration of EUT

The EUT was measured on a bench using a spectrum analyser connected to the temporary RF port. The EUT was operated in TX LOW (MSK), TX MID (MSK), TX HIGH (MSK), TX LOW (FSK), TX MID (FSK) and TX HIGH (FSK) modes for this test. The EUT was set to each mode and test signal in turn (see section 2.4) and highest power levels recorded.

5.3.3 Test procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment' Section. Peak power measurements were made via a test fixture which matched the impedance of the radio to 50 ohms. The test fixture has a declared loss of 15.8 dB which has been compensated for in the final result. Measurements were made on a test bench in site A.

5.3.4 Test equipment

E434, E517, F480, H071, N579

See Section 8 for more details

5.3.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	MSK
Low channel	173.075 MHz
Mid channel	173.13 MHz
High channel	173.225 MHz

Test conditions	Carrier Power (dBm)	Carrier Power (dBm)	Carrier Power (dBm)
	Low channel	Mid channel	High channel
Maximum TX Power observed (dBm)	32.6	33.0	29.8

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	FSK
Low channel	173.075 MHz
Mid channel	173.13 MHz
High channel	173.225 MHz

Test conditions	Carrier Power (dBm)	Carrier Power (dBm)	Carrier Power (dBm)
	Low channel	Mid channel	High channel
Maximum TX Power observed (dBm)	32.7	32.1	32.1

LIMITS:

Part 90B: 90.20(e)(6) (iii) Mobile transmitters operating on this frequency with emissions authorized in a maximum bandwidth of 12.5 kHz are limited to 5.0 watts power output (37 dBm). Mobile transmitters operating on this frequency with emissions authorized in a maximum bandwidth of 20 kHz are limited to 2.5 watts power output (34 dBm).

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:
UR02D <3 GHz ± 0.56 dB

5.4 Frequency stability

5.4.1 Test methods

Test Requirements:	47 CFR Part 90I Clause 90.213(a) [Reference 4.1.1 of this report]
Test Method:	47 CFR Part 2J Clause 2.1055 [Reference 4.1.2 of this report]
Limits:	47 CFR Part 90I Clause 90.213(a) [Reference 4.1.1 of this report]

5.4.2 Configuration of EUT

The EUT was placed in a temperature-controlled chamber and thermal balance was achieved before tests began. The EUT emissions were observed by means of a test fixture. It was found that there was no difference between modulation schemes and therefore the EUT was operated in TX LOW (MSK) and TX MID (MSK) and TX HIGH (MSK) modes for this test.

5.4.3 Test procedure

Tests were made in accordance with the Test Method noted above, using the measuring equipment listed in the 'Test Equipment' Section. Temperature stability was achieved at each test level before taking measurements. The frequency count function of the spectrum analyser was used to measure the frequency of the carrier breakthrough. Tests were performed using Test Site A.

5.4.4 Test equipment

E434, E755, F480, L264, N579, TMS38

See Section 8 for more details

5.4.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	MSK
Low channel	173.075 MHz
Mid channel	173.13 MHz
High channel	173.225 MHz

Test conditions		Frequency Error (MHz)	Frequency Error (MHz)	Frequency Error (MHz)
		Low channel	Mid channel	High channel
-30°C	Volts Nominal (12V)	173.075008	173.129982	173.225051
-20°C	Volts Nominal (12V)	173.075028	173.129979	173.225008
-10°C	Volts Nominal (12V)	173.075021	173.129987	173.225046
0°C	Volts Nominal (12V)	173.075063	173.130013	173.225047
10°C	Volts Nominal (12V)	173.075063	173.130045	173.225090
20°C	Volts Minimum (10.2V)	173.075061	173.130021	173.225006
	Volts Nominal (12V)	173.075066	173.129980	173.225007
	Volts Maximum (13.8V)	173.075062	173.129984	173.225006
30°C	Volts Nominal (12V)	173.075071	173.130092	173.225063
40°C	Volts Nominal (12V)	173.075078	173.130084	173.225058
50°C	Volts Nominal (12V)	173.075080	173.130064	173.225081
Max Frequency Error per chan (Hz)		+14 / -58	+112 / -1	+83 / -1
Max Frequency Error observed (MHz)		-0.000058	0.000112	0.000083

LIMITS:

Channel Separation (kHz)	Frequency error limit (kHz)				
	below 47 MHz	47 to 137 MHz	above 137 to 300 MHz	above 300 to 500 MHz	above 500 to 1000 MHz
20 and 25	±0.60	±1.35	±2.00	±2.00	±2.50 (note)
12.5	±0.60	±1.00	±1.50	±1.50 (note)	No value specified

The limit used for test was ±1.50kHz based on a carrier frequency of 164.175MHz and a channels separation of 12.5kHz.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:
<± 0.7 ppm

5.5 Occupied bandwidth

5.5.1 Test methods

Test Requirements:	47 CFR Part 90I Clause 90.209 [Reference 4.1.1 of this report]
Test Method:	47 CFR Part 2J Clause 2.1049 [Reference 4.1.2 of this report]
Limits:	47 CFR Part 90I Clause 90.209(b)(5) [Reference 4.1.1 of this report]

5.5.2 Configuration of EUT

The EUT was operated on a test bench. Measurements were made at the temporary RF port. The EUT was operated in TX LOW (MSK), TX MID (MSK), TX HIGH (MSK), TX LOW (FSK), TX MID (FSK) and TX HIGH (FSK) modes.

5.5.3 Test procedure

Tests were performed using Test Site A.

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment' Section. A 200 Hz RBW, 3x VBW, auto sweep time and max hold settings were used for the 99% bandwidth.

5.5.4 Test equipment

E434, E517, F480, H071, N579

See Section 8 for more details

5.5.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	MSK
Low channel	173.075 MHz
Mid channel	173.13 MHz
High channel	173.225 MHz

	Low channel	Mid channel	High channel
99 % Bandwidth (kHz) Nominal Temp & Volts	7.096	7.093	7.059
Plot for 99 % Bandwidth (kHz) Nominal Temp & Volts	15017-12 MSK LOW	15017-12 MSK MID	15017-12 MSK HIGH

FLOW Worst case (MHz)	173.071452	173.1264535	173.2214705
FHIGH Worst case (MHz)	173.078548	173.1335465	173.2285295

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	FSK
Low channel	173.075 MHz
Mid channel	173.13 MHz
High channel	173.225 MHz

	Low channel	Mid channel	High channel
99 % Bandwidth (kHz) Nominal Temp & Volts	4.756	4.963	4.757
Plot for 99 % Bandwidth (kHz) Nominal Temp & Volts	15017-12 FSK LOW	15017-12 FSK MID	15017-12 FSK HIGH

FLOW Worst case (MHz)	173.072622	173.1275185	173.2226215
FHIGH Worst case (MHz)	173.077378	173.1324815	173.2273785

Any analyser plots can be found in Section 6 of this report.

LIMITS:

Part 90.209 (B)(5), Operations using equipment designed to operate with a 12.5 kHz channel bandwidth will be authorized a 11.25 kHz bandwidth.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:
UR19B ± 0.17 %

5.6 Emission mask

5.6.1 Test methods

Test Requirements:	47 CFR Part 90I Clause 90.210(d) [Reference 4.1.1 of this report]
Test Method:	ANSI C63.26 Clause 5.5 [Reference 4.1.3 of this report]
Limits:	47 CFR Part 90I Clause 90.210(d) [Reference 4.1.1 of this report]

5.6.2 Configuration of EUT

The EUT was operated on a test bench. Measurements were made at the temporary RF port. The EUT was operated in TX LOW (MSK), TX MID (MSK), TX HIGH (MSK), TX LOW (FSK), TX MID (FSK) and TX HIGH (FSK) modes.

5.6.3 Test procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment listed in the 'Test equipment used' Section. The analyser was tuned to the nominal centre frequency with span initially greater than 250% bandwidth and allowed to sweep enough times to capture the entire power envelope. The frequencies at which the spurious emission limits were last exceeded were noted. Plots were taken referenced to the applicable spectrum mask.

Tests were performed is test site A.

5.6.4 Test equipment

E434, F480, H071, N579

See Section 8 for more details

5.6.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	MSK
Low channel	173.075 MHz
Mid channel	173.13 MHz
High channel	173.225 MHz

	Low channel	Mid channel	High channel
Nominal plot reference	15017-12 MSK Low channel FCC part 90.210 emission mask D (12.5kHz)	15017-12 MSK Mid channel FCC part 90.210 emission mask D (12.5kHz)	15017-12 MSK High channel FCC part 90.210 emission mask D (12.5kHz)

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	FSK
Low channel	173.075 MHz
Mid channel	173.13 MHz
High channel	173.225 MHz

	Low channel	Mid channel	High channel
Nominal plot reference	15017-12 FSK Low channel FCC part 90.210 emission mask D (12.5kHz)	15017-12 FSK Mid channel FCC part 90.210 emission mask D (12.5kHz)	15017-12 FSK High channel FCC part 90.210 emission mask D (12.5kHz)

Any analyser plots can be found in Section 6 of this report.

LIMITS:

Part 90.210

(d) *Emission Mask D—12.5 kHz channel bandwidth equipment.* For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:
 $\pm 2.8 \text{ dB up to } 26.5 \text{ GHz}$

5.7 Modulation limiting

NOT APPLICABLE: Not Applicable to Digitally modulated EUT's.

5.8 Modulation frequency response

NOT APPLICABLE: Not Applicable to Digitally modulated EUT's.

5.9 Transient frequency behaviour

5.9.1 Test methods

Test Requirements:	47 CFR Part 90I Clause 90.214 [Reference 4.1.1 of this report]
Test Method:	ANSI C63.26 Clause 6.5.2.2 [Reference 4.1.3 of this report]
Limits:	47 CFR Part 90I Clause 90.214 [Reference 4.1.1 of this report]

5.9.2 Configuration of EUT

The EUT was operated on a test bench. Measurements were made at the temporary RF port. All test modes specified in section 2.4 were tested. The EUT was operated in TX LOW (CW), TX MID (CW) and TX HIGH (CW) modes for this test.

5.9.3 Test procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment' Section at Site A. The EUT repeatedly keyed up and down and the frequency vs. time curve observed from the discriminator output of a modulation analyser was recorded using a storage oscilloscope.

5.9.4 Test equipment

E256, E434, E479, E704, E778, F136, F353, F412, N579, TMS30

See Section 8 for more details

5.9.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	CW mode
Low channel	173.075 MHz
Mid channel	173.13 MHz
High channel	173.225 MHz

	Low channel	Mid channel	High channel
TX ON Result	PASSED	PASSED	PASSED
TX ON Plot Reference	15017-12 TX on transient 173.075 MHz	15017-12 TX on transient 173.13 MHz	15017-12 TX on transient 173.225 MHz
TX OFF Result	PASSED	PASSED	PASSED
TX OFF Plot Reference	15017-12 TX off transient 173.075 MHz	15017-12 TX off transient 173.13 MHz	15017-12 TX off transient 173.225 MHz

LIMITS:

Channel Separation	Time Period ^{1,2}	Transient Period	Maximum frequency difference ³
12.5 kHz	t_1^4	5 ms	±12.5 kHz
	t_2	20 ms	±6.25 kHz
	t_3^4	5 ms	±12.5 kHz

¹_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.

t_1 is the time period immediately following t_{on} .

T_2 is the time period immediately following t_1 .

T_3 is the time period from the instant when the transmitter is turned off until t_{off} .

t_{off} is the instant when the 1 kHz test signal starts to rise.

² During the time from the end of t_2 to the beginning of t_3 , the frequency difference must not exceed the limits specified in § 90.213.

³ Difference between the actual transmitter frequency and the assigned transmitter frequency.

⁴ If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:
<± 185 Hz

5.10 Adjacent channel power

NOT APPLICABLE: Only applicable to transmitters within the 450 - 470 MHz, 809 - 824 MHz and 854 - 869 MHz frequency bands.

5.11 Duty Cycle / TX on times

5.11.1 Test methods

Test Requirements:	FCC Part 90B Clause 90.20(e)6(v) [Reference 4.1.4 of this report]
Test Method:	ANSI C63.26 Clause 6.5.2.2 [Reference 4.1.3 of this report]
Limits:	FCC Part 90B Clause 90.20(e)6(v) [Reference 4.1.4 of this report]

5.11.2 Configuration of EUT

The EUT was operated on a test bench. Measurements were made at the temporary RF port. All test modes specified in section 2.4 were tested. TX MID (MSK) and TX MID (FSK) mode for this test.

5.11.3 Test procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment listed in the 'Test Equipment' Section. An analyser in zerospan/Time Domain mode, was centred on the EUT frequency and the EUT was allowed to automatically key up and down. The observed time domain was plotted and timings calculated.

Tests were performed in Site A.

5.11.4 Test equipment

E301, E434, F480, H071, N579

See Section 8 for more details

5.11.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	Normal mode - MSK
Mid channel	173.13 MHz

Mid channel	
TX on time (mS)	198.9
TX on Plot filename	15017-12 Duty cycle MSK On-time Mid channel Normal mode
TX repetition time (S)	15.7
TX repetition Plot filename	15017-12 Duty cycle MSK Cycle-time Mid channel Normal mode
Calculated TX Duty cycle (%)	1.267

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	Tracking mode - MSK
Mid channel	173.13 MHz

	Mid channel
TX on time (mS)	199.3
TX on Plot filename	15017-12 Duty cycle MSK On time Mid Channel Tracking mode
TX repetition time (S)	2.0
TX repetition Plot filename	15017-12 Duty cycle MSK Cycle time Mid Channel Tracking mode
Calculated TX Duty cycle (%)	9.965

Band	173.075-173.225 MHz
Power Level	Maximum
Channel Spacing	12.5 kHz
Mod Scheme	Status update mode - FSK
Mid channel	173.13 MHz

	Mid channel
TX on time (mS)	1.46
TX on Plot filename	15017-12 Duty cycle FSK On time Mid Channel Status Update mode
TX repetition time (S)	58
TX repetition Plot filename	15017-12 Duty cycle FSK Cycle time Mid Channel Status Update mode
Calculated TX Duty cycle (%)	0.003

Note: Status update mode was provided in an increased cycle time/period for test only and is typically every seven days / once a week transmission rate.

LIMITS:

90.20(e)6(v) Transmissions from mobiles shall be limited to 400 milliseconds for every 10 seconds, except when a vehicle is being tracked actively transmissions are limited to 400 milliseconds for every second. Alternatively, transmissions from mobiles shall be limited to 7200 milliseconds for every 300 seconds with a maximum of six such messages in any 30-minute period.

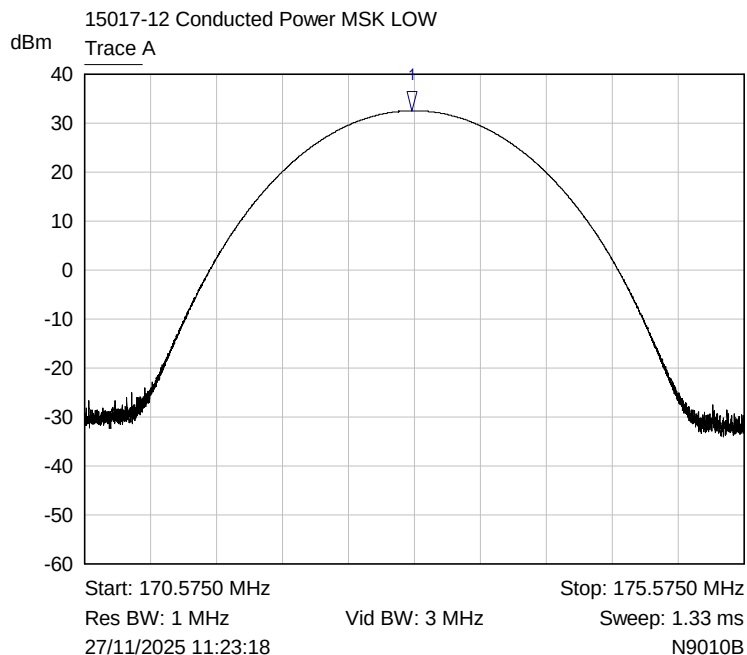
These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:
Duty cycle|<± 2.57 ms

6 Plots/Graphical results

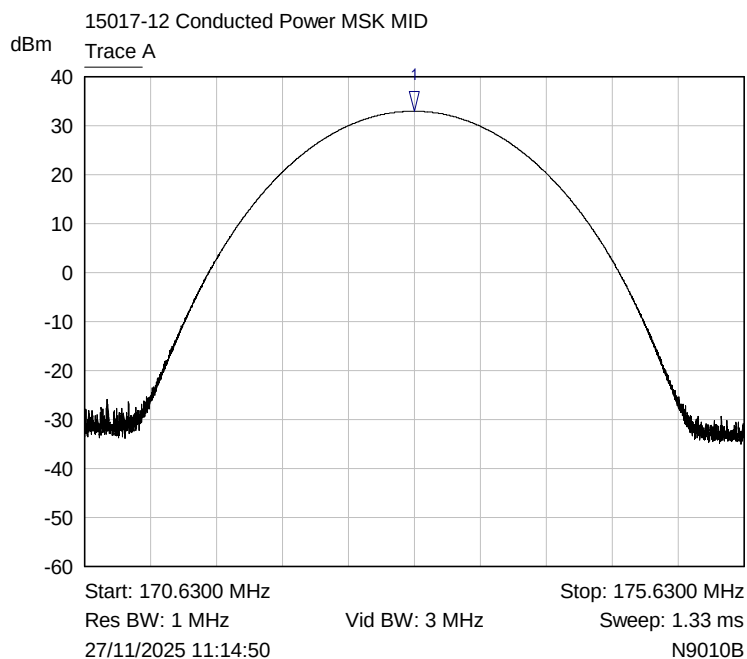
6.1 Conducted power

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.075 MHz



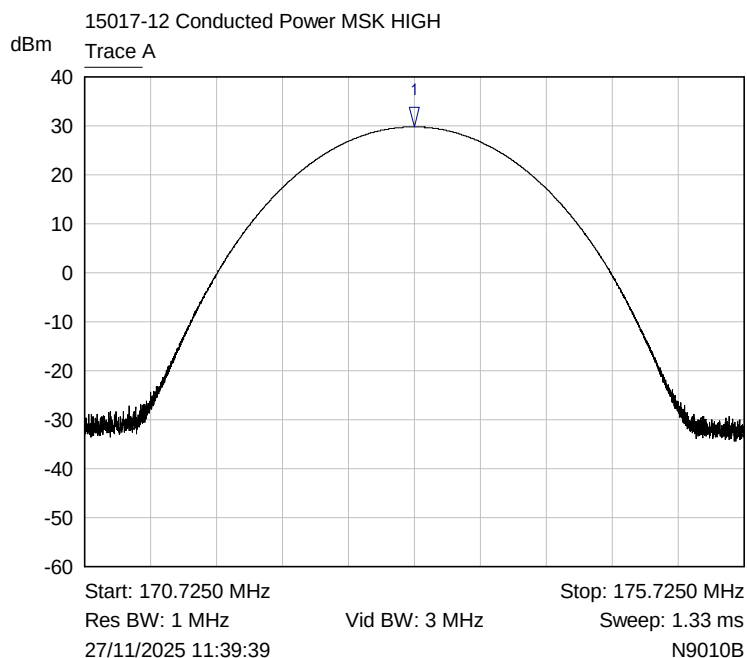
Mkr	Trace	X-Axis	Value	Notes
1 ▾	Trace A	173.0552 MHz	32.57 dBm	

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.13 MHz



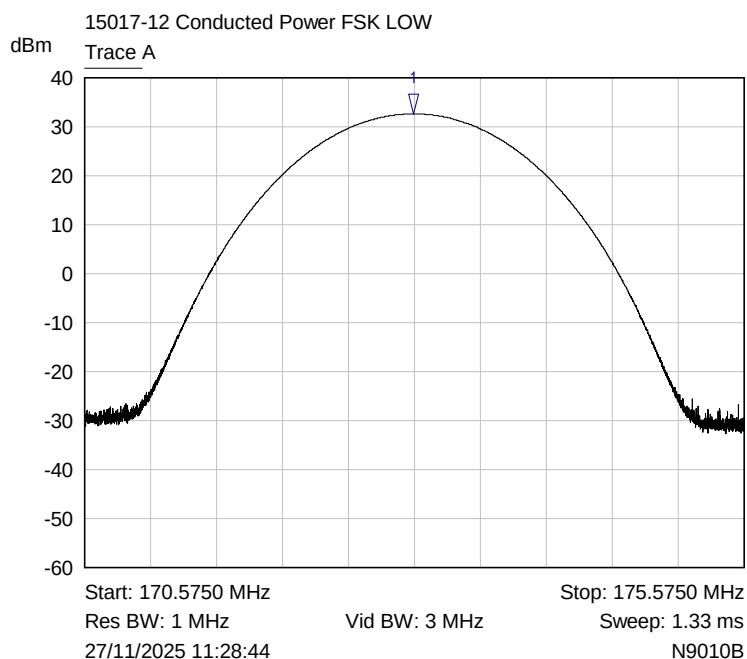
Mkr	Trace	X-Axis	Value	Notes
1 ▾	Trace A	173.1303 MHz	33.00 dBm	

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.225 MHz



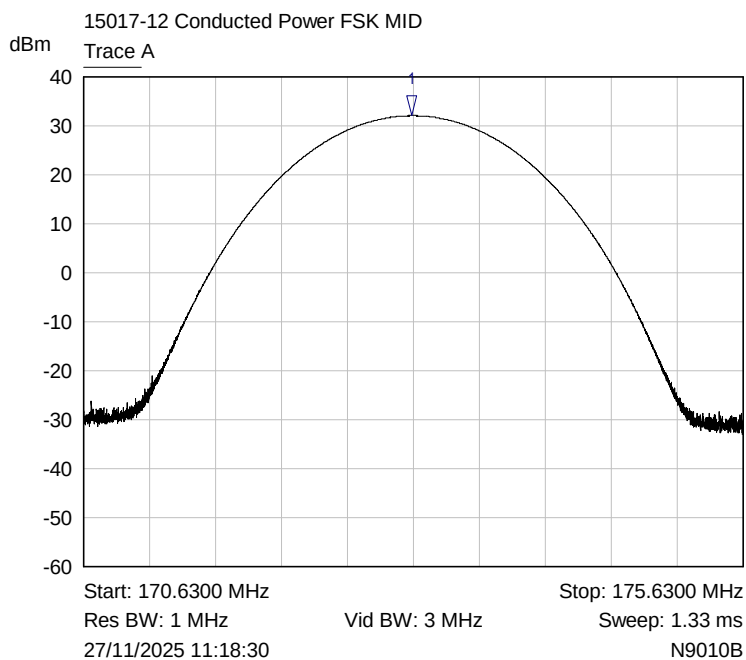
Mkr	Trace	X-Axis	Value	Notes
1 ▾	Trace A	173.2253 MHz	29.83 dBm	

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation FSK, Channel 173.075 MHz



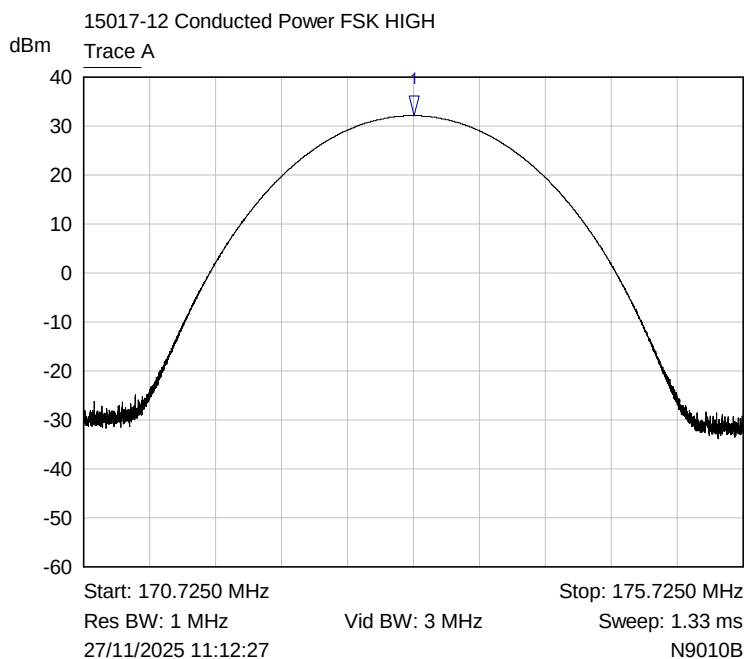
Mkr	Trace	X-Axis	Value	Notes
1 ▾	Trace A	173.0667 MHz	32.67 dBm	

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation FSK, Channel 173.13 MHz



Mkr	Trace	X-Axis	Value	Notes
1 ▾	Trace A	173.1202 MHz	32.10 dBm	

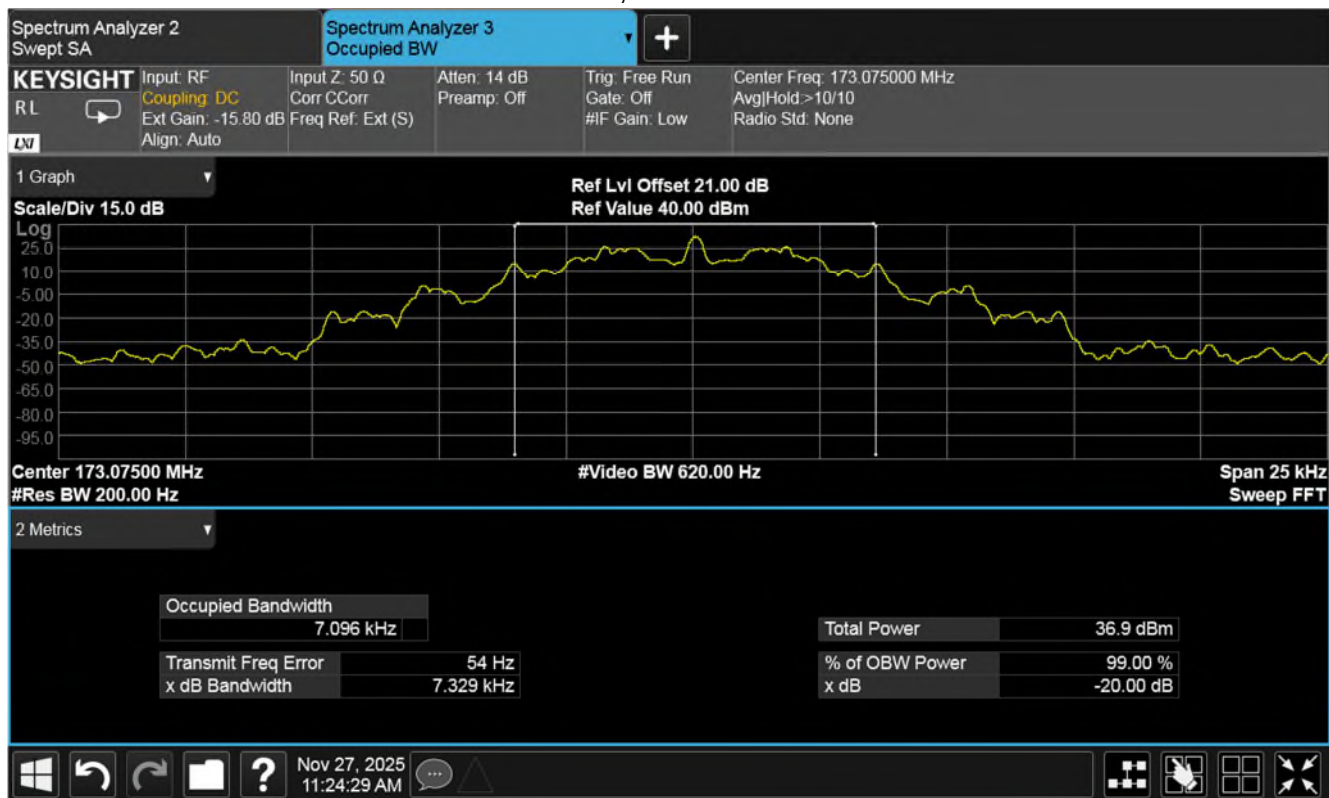
RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation FSK, Channel 173.225 MHz



Mkr	Trace	X-Axis	Value	Notes
1 ▾	Trace A	173.2328 MHz	32.14 dBm	

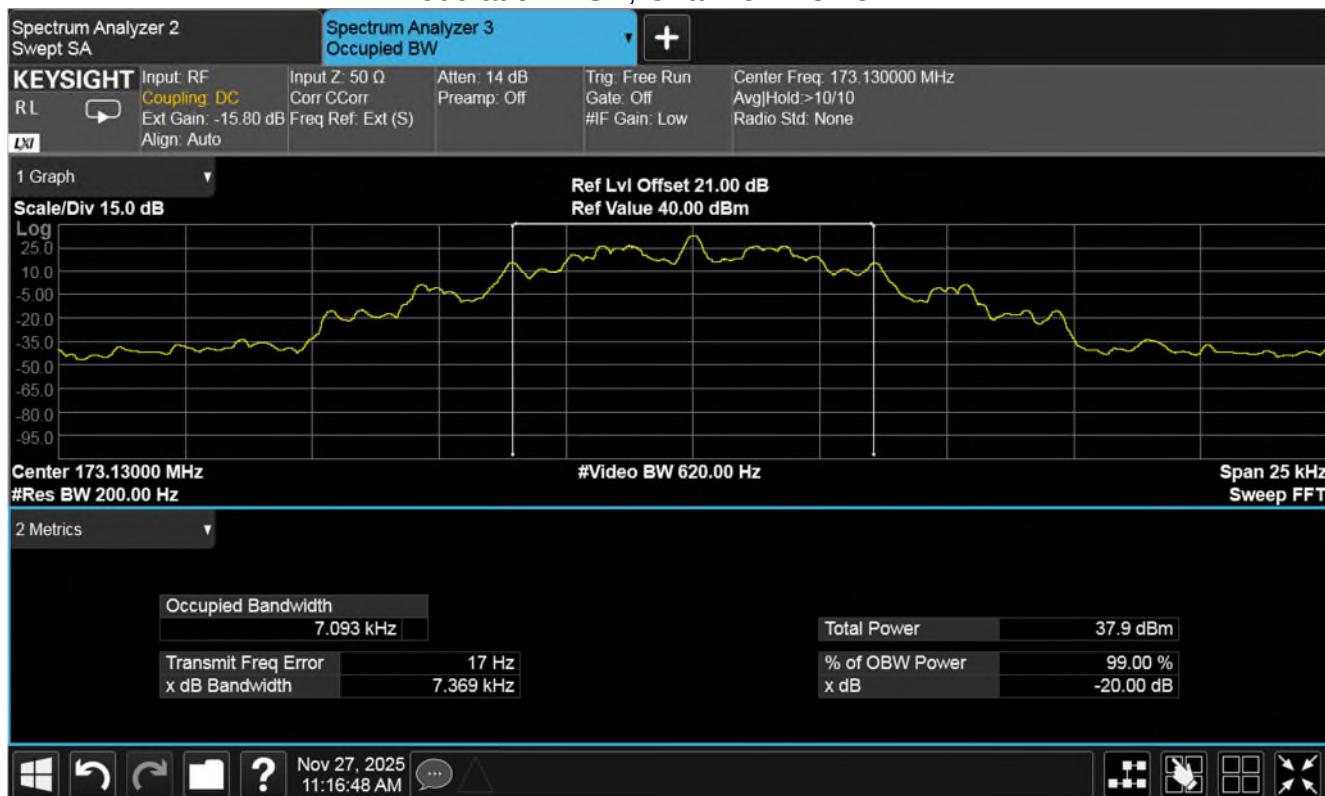
6.2 Occupied bandwidth

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.075 MHz



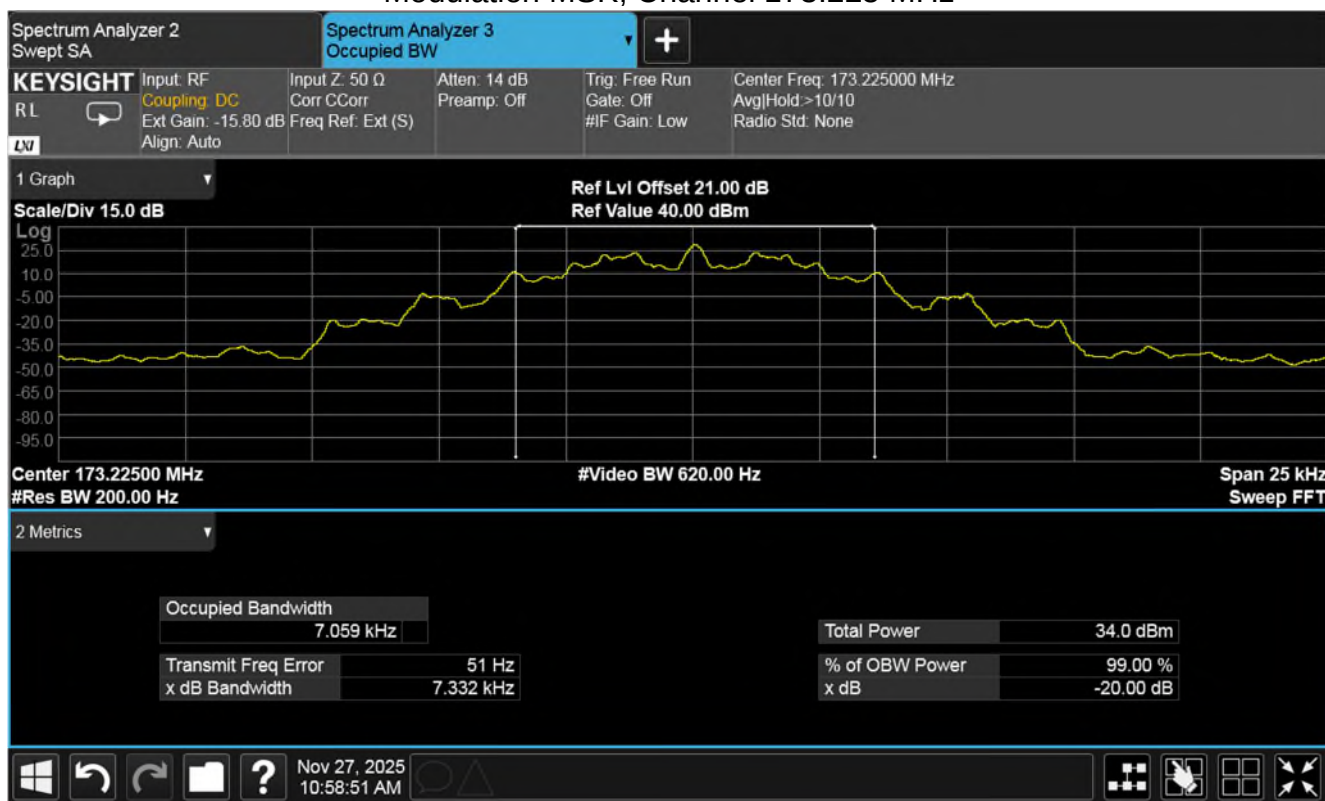
Plot for 99 % Bandwidth (kHz) Nominal Temp & Volts

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.13 MHz



Plot for 99 % Bandwidth (kHz) Nominal Temp & Volts

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.225 MHz



Plot for 99 % Bandwidth (kHz) Nominal Temp & Volts

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation FSK, Channel 173.075 MHz



Plot for 99 % Bandwidth (kHz) Nominal Temp & Volts

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation FSK, Channel 173.13 MHz



Plot for 99 % Bandwidth (kHz) Nominal Temp & Volts

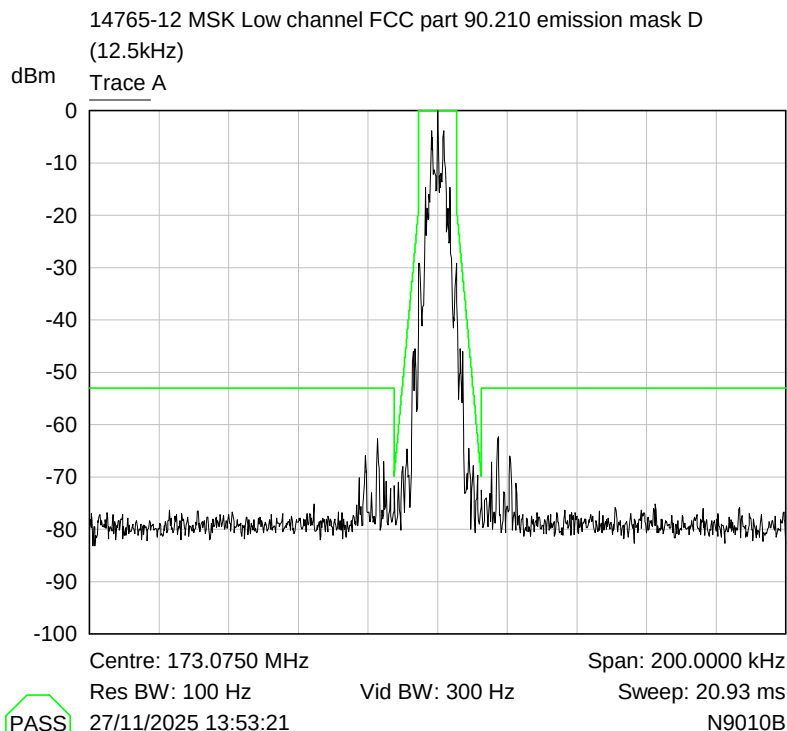
RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation FSK, Channel 173.225 MHz



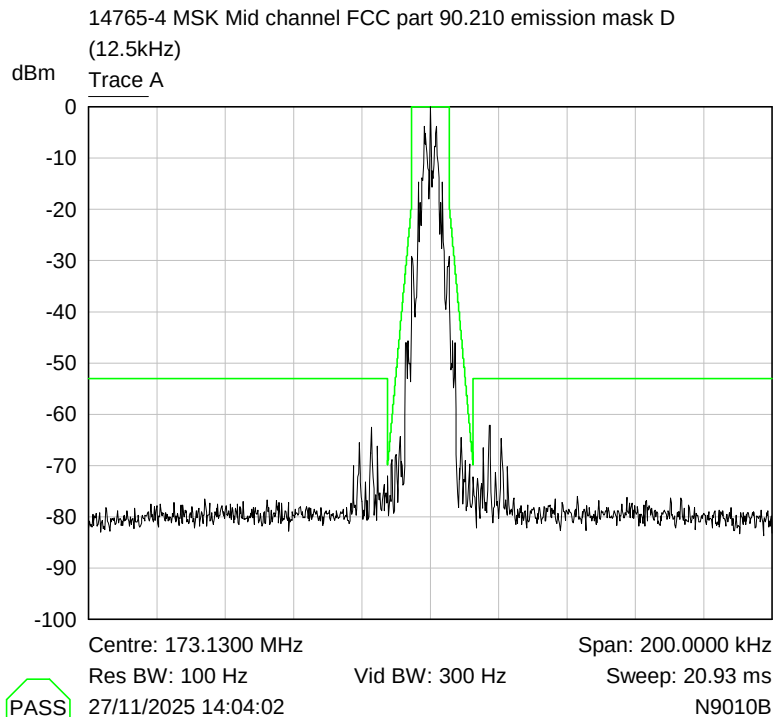
Plot for 99 % Bandwidth (kHz) Nominal Temp & Volts

6.3 Emission mask

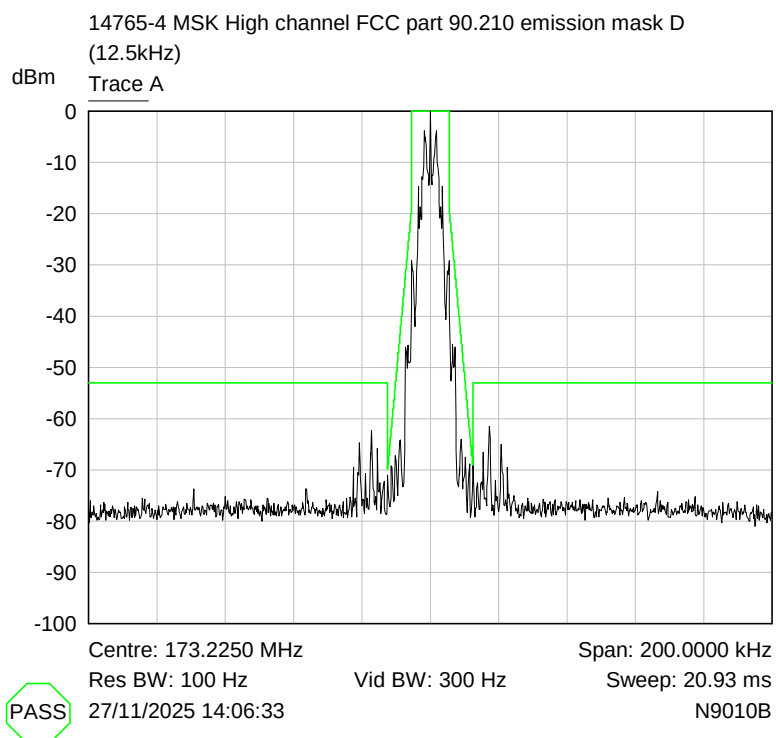
RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.075 MHz



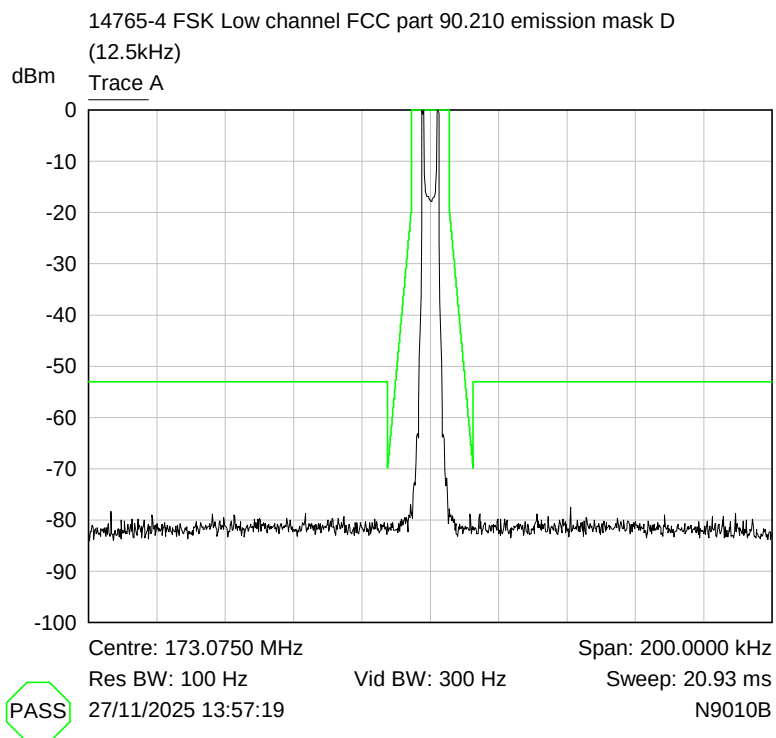
RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.13 MHz



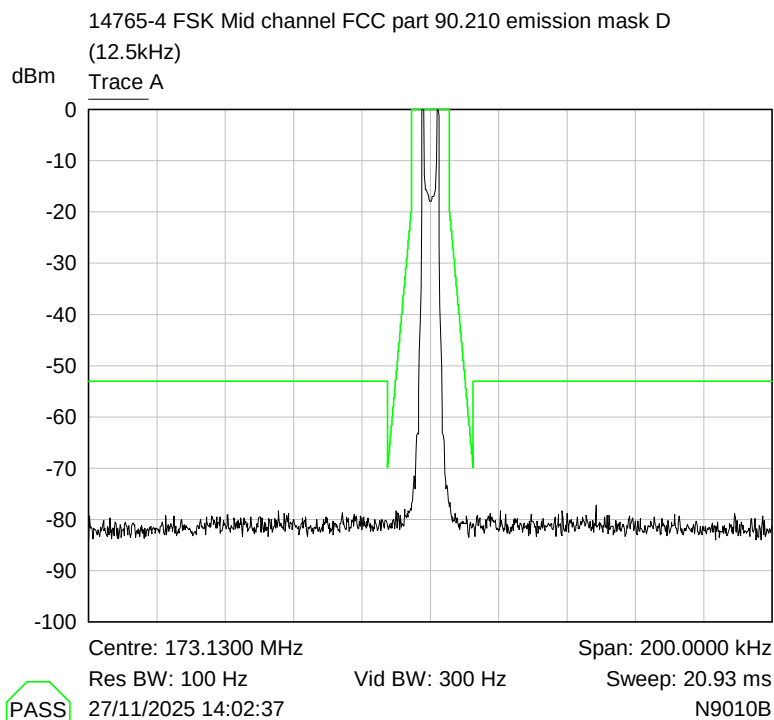
RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.225 MHz



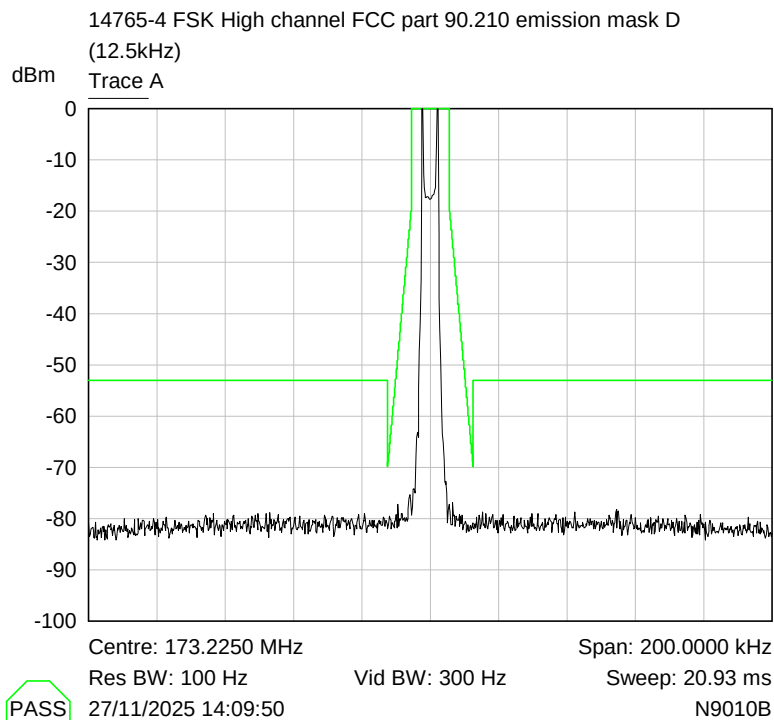
RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation FSK, Channel 173.075 MHz



RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation FSK, Channel 173.13 MHz

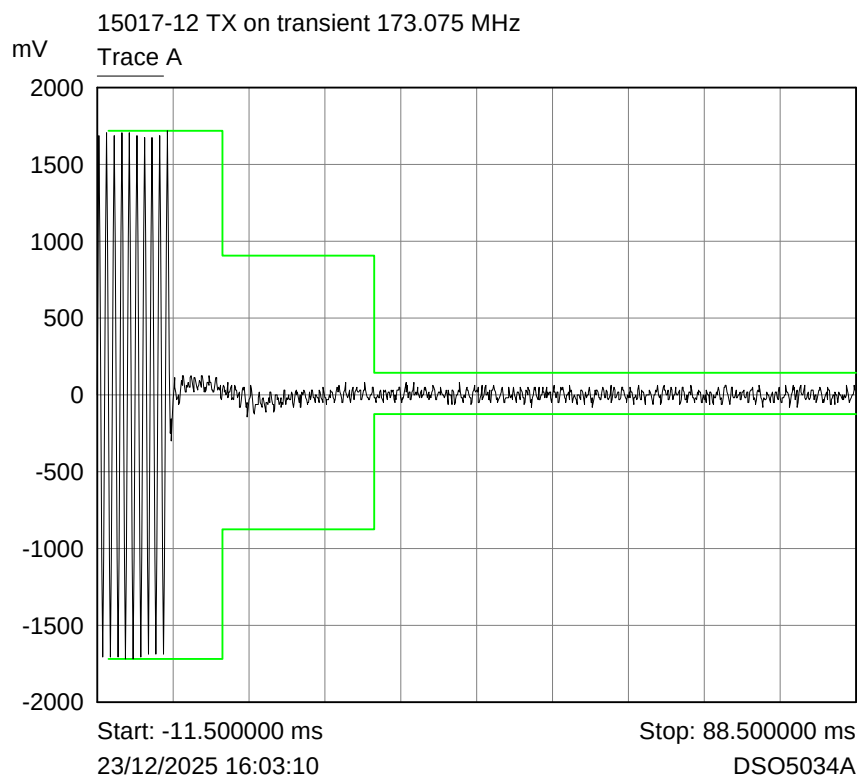


RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation FSK, Channel 173.225 MHz

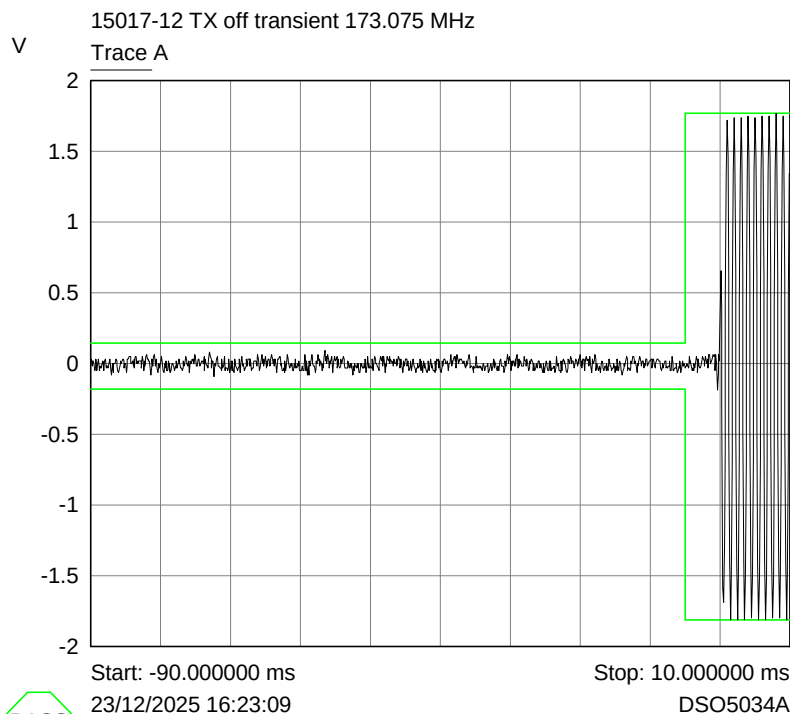


6.4 Transient frequency behaviour

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.075 MHz



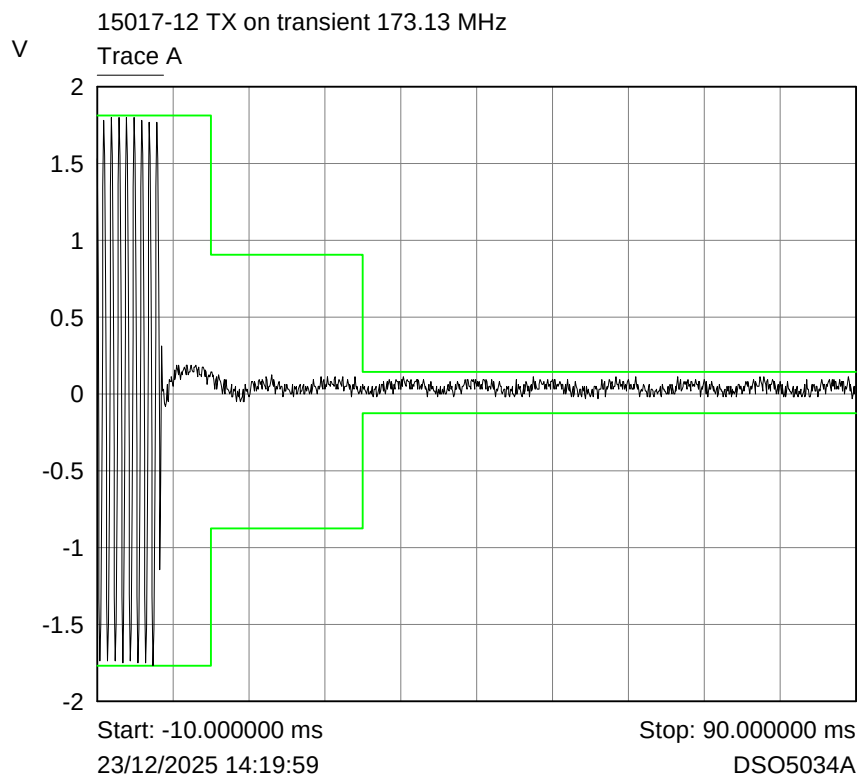
TX ON Result



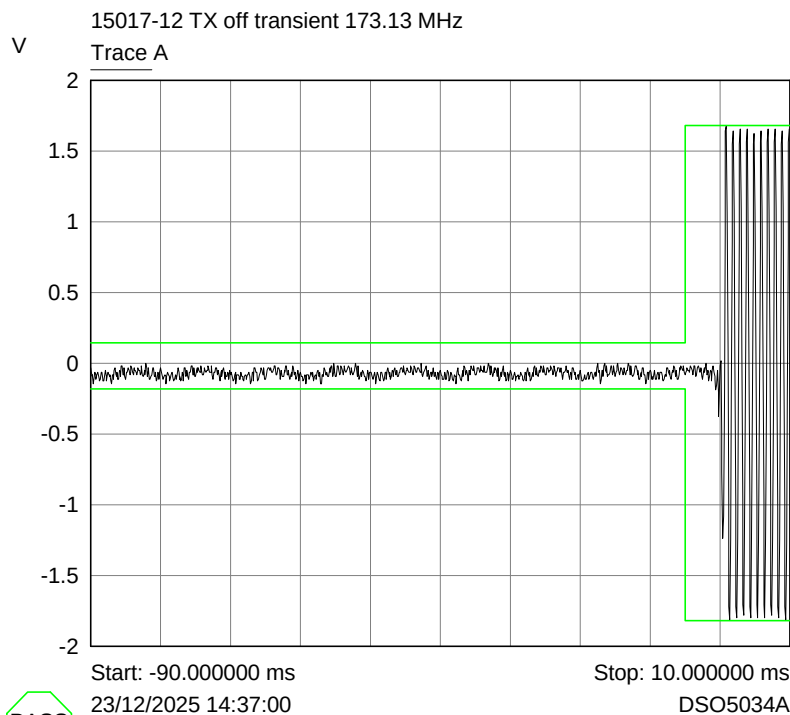
PASS

TX OFF Result

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.13 MHz



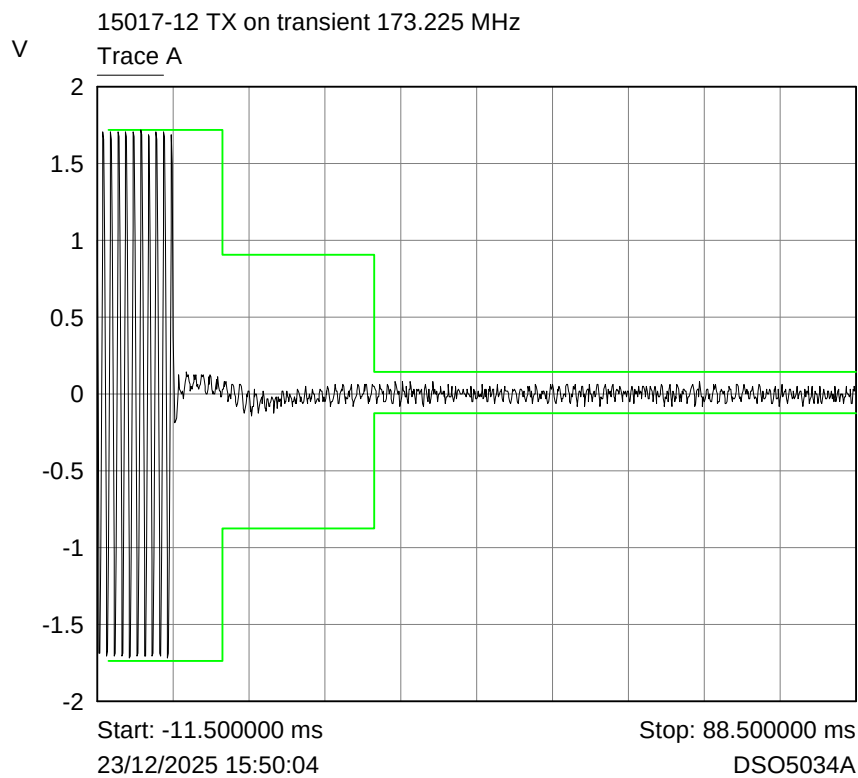
TX ON Result



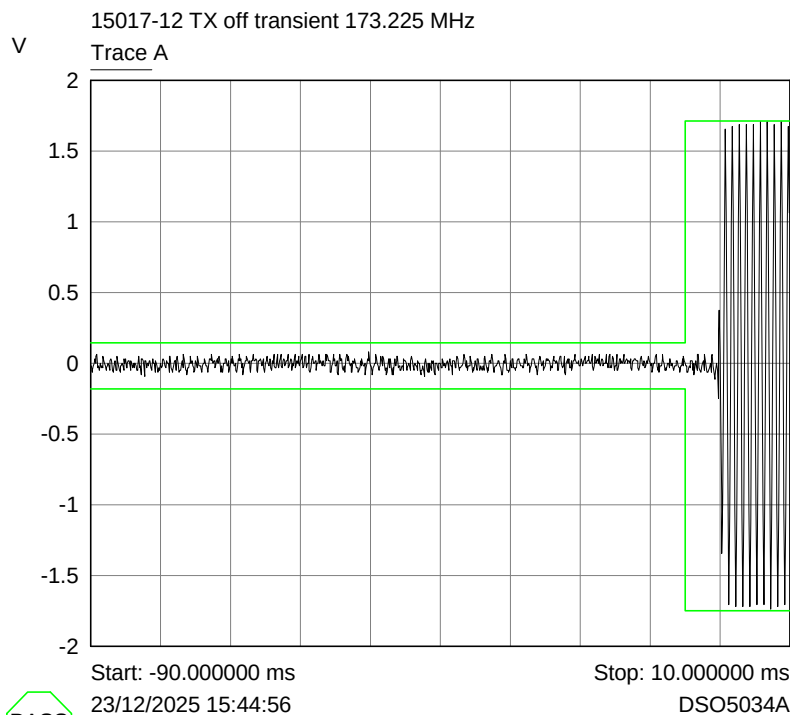
PASS

TX OFF Result

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation MSK, Channel 173.225 MHz



TX ON Result

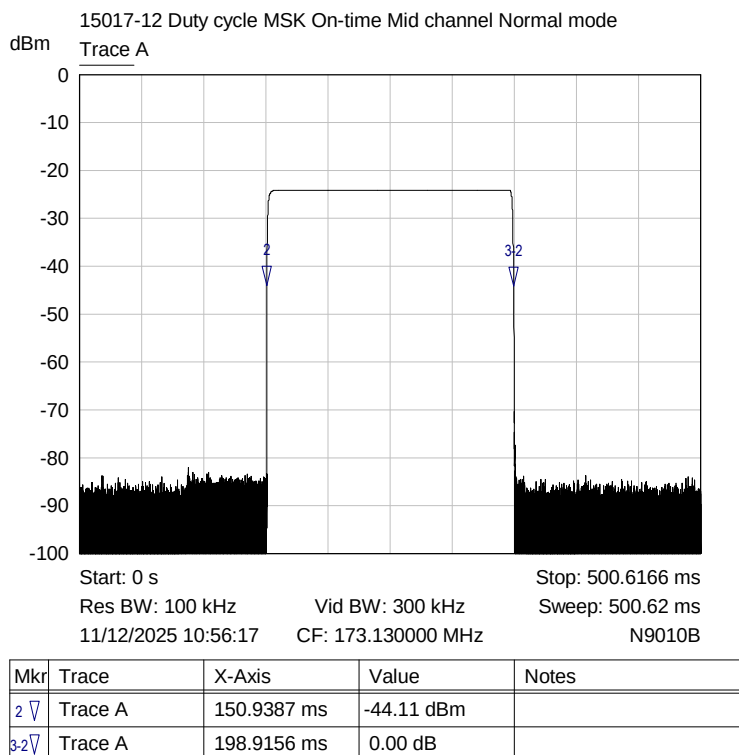


PASS

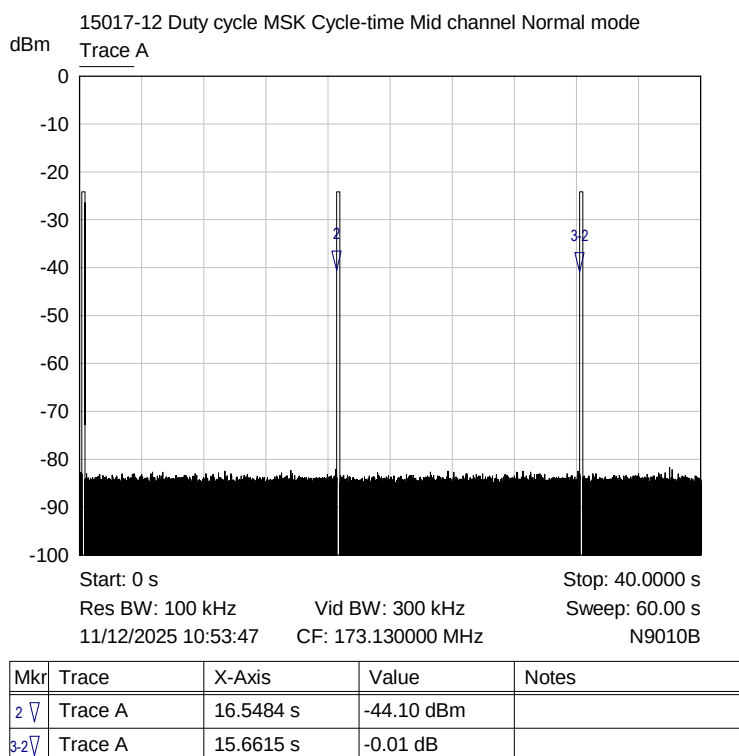
TX OFF Result

6.5 Duty Cycle / TX on times

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation Normal

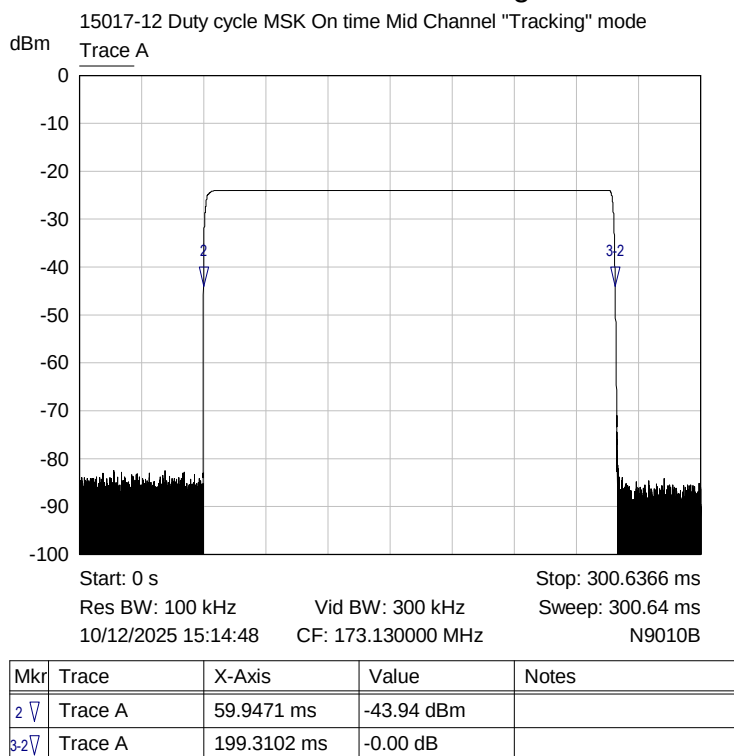


TX on time (ms)

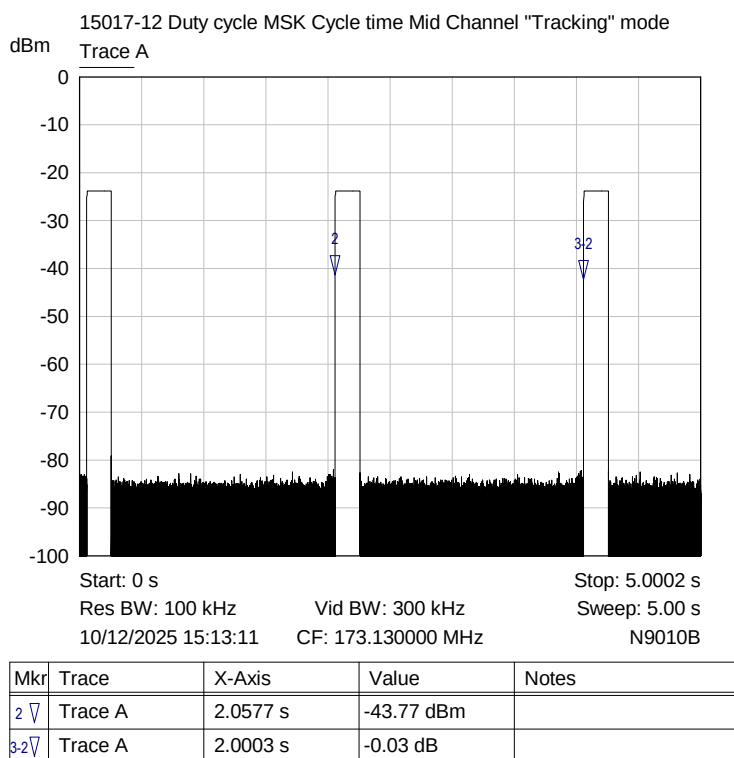


TX repetition time (S)

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation Tracking

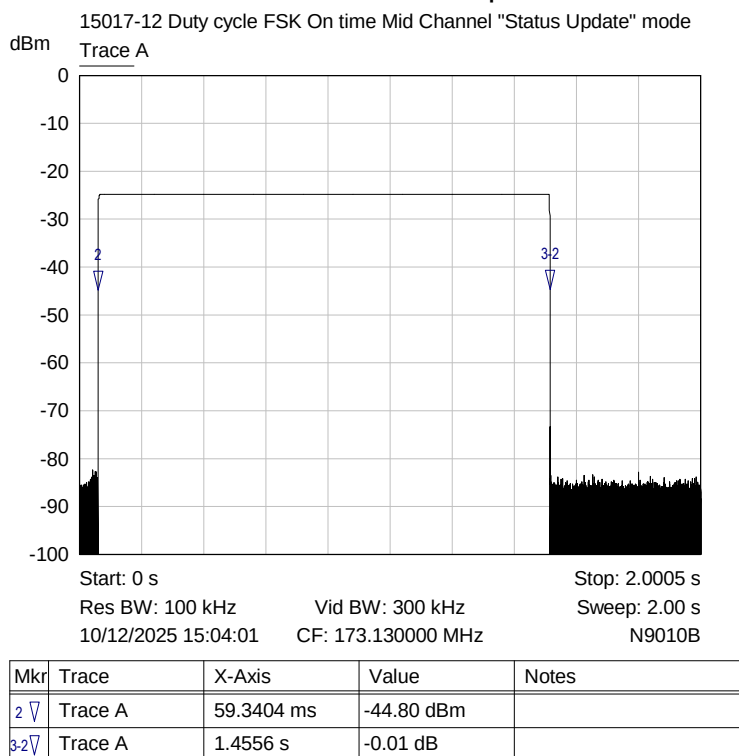


TX on time (ms)

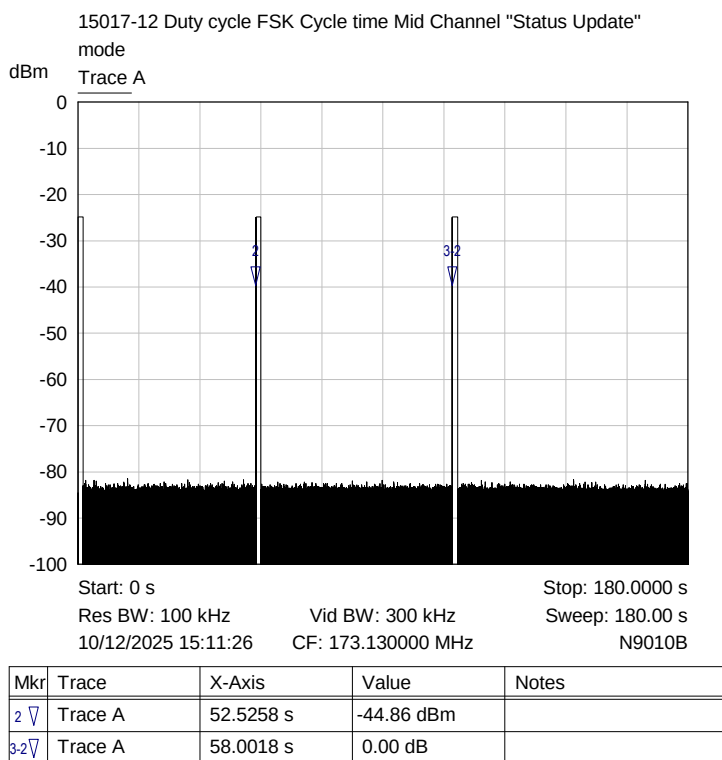


TX repetition time (S)

RF Parameters: Band 173.075-173.225 MHz, Power Maximum, Channel Spacing 12.5 kHz,
Modulation Status update



TX on time (ms)



TX repetition time (S)

7 Explanatory Notes

7.1 Explanation of Table of Signals Measured

Measurements are made as required by the standard. These measurements are made and recorded using detectors, either peak, quasi peak or average dependant on the test. A table of results has been given following the relevant plots. This table looks similar to the one illustrated below dependant on the measurements required by the test: -

Signal No.	Freq (MHz)	Peak Amp (dBμV)	Pk – Lim 1 (dB)	QP Amp (dBμV)	QP - Lim1 (dB)	Av Amp (dBμV)	Av - Lim1 (dB)
1	12345	54.9	-10.5	48	-12.6	37.6	-14.4

Column One - Labelled Signal No. is an incremental number that the receiver has given to each signal that has been measured.

Column Two - Labelled Freq (MHz) is the approximate frequency of the signal received.

Column Three - Labelled Peak Amp (dBμV) is the level of received signal that was measured in dB above 1μV using the peak detector.

Column Four - Labelled Pk - Lim1 (dB) is the difference in level from the peak signal given to the active limit line. If this column appears in the table the peak detector measurement is required by the standard for this test. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

Column Five - Labelled QP Amp (dBμV) is the level of received signal that was measured in dB above 1μV using the quasi-peak detector.

Column Six - Labelled QP - Lim1 (dB) is the difference in level from the quasi-peak signal given to the active limit line. If this column appears in the table the quasi-peak detector measurement is required by the standard for this test. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

Column Seven - Labelled Av Amp (dBμV) is the level of received signal that was measured in dB above 1μV using the average detector.

Column Eight - Labelled Av - Lim1 (dB) is the difference in level from the average signal given to the active limit line. If this column appears in the table the average detector measurement is required by the standard for this test. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

Only signals highlighted in red are deemed to exceed the limit of the detector required.

7.2 Explanation of limit line calculations for radiated measurements

The limits given in the test standard are normally expressed as absolute values (e.g. in μV/m at a specified distance), whereas the measured values are expressed as peak, quasi peak or average values in dBμV/m referenced to the measuring instrument inputs. Kiwa Electrical Compliance calibrate the test set-up to account for any path losses, antenna gains, etc. so that the value read at the receiver relates directly to the absolute value required, except that it is expressed in dB relative to one microVolt and may need to take account of any alternative measuring distance used. Examples:

(a) limit of 500 μV/m equates to $20.\log(500) = 54$ dB μV/m.

(b) limit of 300 μV/m at 10m equates to $20.\log(300 \cdot 10/3) = 60$ dB μV/m at 3m

(c) limit of 30 $\mu\text{V/m}$ at 30m, but below 30MHz, equates to $20.\log(30) + 40.\log(30/3) = 69.5 \text{ dB}\mu\text{V/m}$ at 3m, as extrapolation factor below 30MHz is 40dB/decade per 15.31(f)(2).

The measurement receiver used for emissions testing, performs the field strength (FS) calculations automatically.

The receiver combines the signal amplitude (RA), Antenna Factor (AF) and Cable Loss (CL) factors for the frequency to be measured.

Example calculation: - FS = RA + AF + CL.

Receiver amplitude (RA)	Antenna factor (3m) (AF)	Cable loss (CL)	Field strength result (3m) (FS)
20dBuV	25 dB	3 dB	48dBuV/m

Additional calculation examples per ANSI C63.10 clause 9.4 – 9.6 equations 21, 22, 25 & 26:

Equation 21: $E_{\text{Linear}} = 10^{((E_{\log} - 120)/20)}$

And therefore equation 21 transposed is: $E_{\log} = 20 \times \log(E_{\text{Linear}}) + 120$

Where:

E_{Linear} is the field strength of the emission in V/m

$E_{\log}$ is the field strength of the emissions in dB $\mu\text{V/m}$

Equation 22: $\text{EIRP} = 21.98 - 20\log(\lambda) + 20\log(d_{\text{Meas}}) + P - G$

Where:

EIRP is equivalent isotropically radiated power in dBm

λ is the wavelength of the emission under investigation ($300/f(\text{MHz})$) in m

d_{Meas} is the measurement distance in metres

P is the power measured at the output of the measurement antenna, in dBm

G is the gain of the measurement antenna in dBi

Equation 25: $\text{PD} = \text{EIRP}_{\text{Linear}} / 4\pi d^2$

And therefore equation 25 transposed is: $\text{EIRP}_{\text{Linear}} = \text{PD} \times 4\pi d^2$

Where:

PD is the power density at distance specified by the limit, in W/m²

$\text{EIRP}_{\text{Linear}}$ is the equivalent isotropically radiated power in Watts

d is the distance at which the power density limit is specified in metres

Equation 26: $\text{PD} = E_{\text{Spec limit}}^2 / 377$

And therefore equation 26 transposed is: $E_{\text{Spec limit}} = \sqrt{\text{PD} \times 377}$

Where:

PD is the power density at distance specified by the limit, in W/m²

$E_{\text{Spec limit}}$ is the field strength at the distance specified by the limit in V/m

Example:

Radiated spurious emissions limit at 3metres of 90pW/cm².

$90\text{pW/cm}^2 \times 100^2 = 0.9 \mu\text{W/m}^2 = (\text{EIRP Linear})$

Equation 25 transposed: $0.9 \times 10^{-6} \times 4 \times \pi \times 3^2 = 0.0001017876 \text{ W}$

And

Equation 26 transposed: $E_{\text{Spec limit}} = \sqrt{(0.9 \times 10^{-6} \times 377)} = 0.01842 \text{ V/m}$.

And

Equation 21 transposed: $E_{\log} = 20\log(0.01842) + 120 = 85.3\text{dB}\mu\text{V/m} @ 3\text{m}$.

8 Photographs

No Photos included at the request of applicant. Separate photo documents will be provided at time of FCC certification due to to confidentiality request purposes.

8.1 Radiated emission diagrams

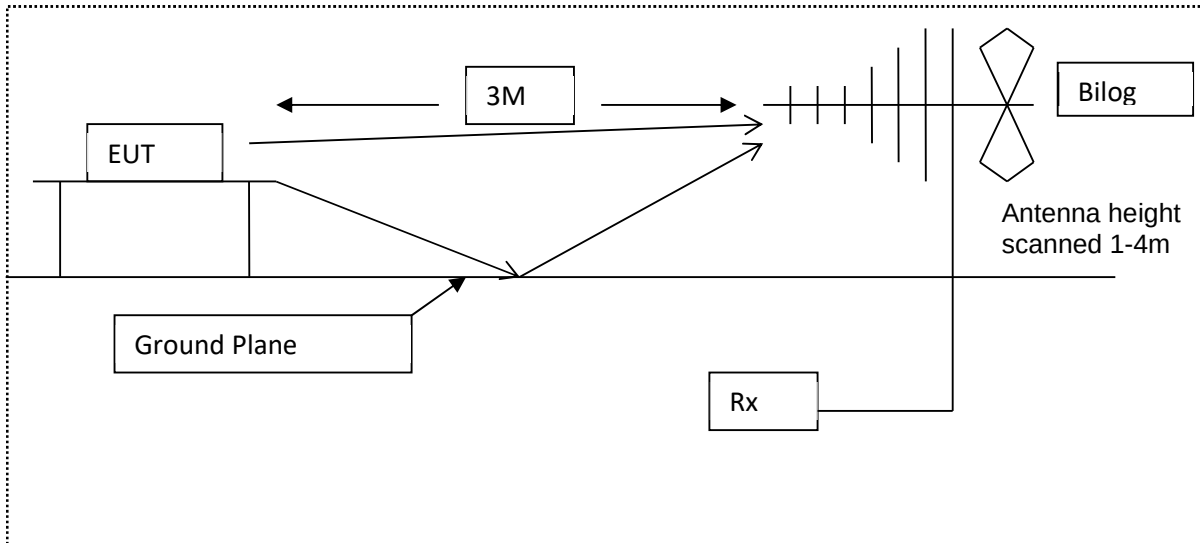


Diagram of the radiated emissions test setup 30 - 1000 MHz

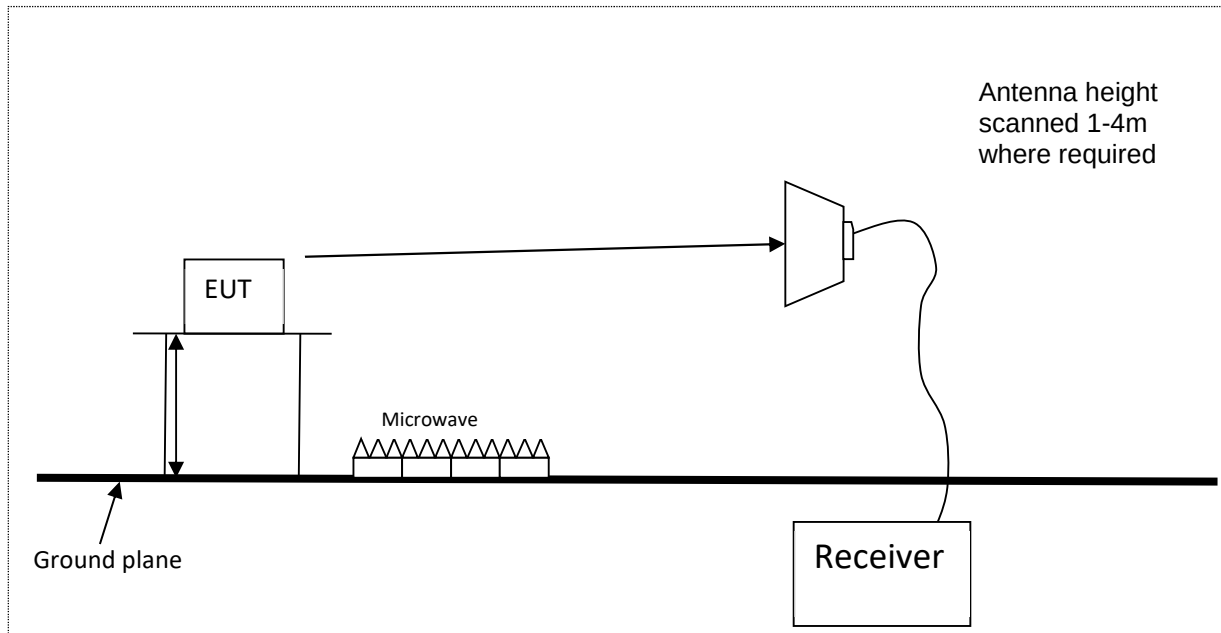


Diagram of the radiated emissions test setup above 1GHz

9 Test equipment calibration list

The following is a list of the test equipment used by Kiwa Electrical Compliance to test the unit detailed within this report. In line with our procedures, the equipment was within calibration for the period during which testing was carried out.

KEC No	Model	Description	Manufacturer	Calibrated Date	Period
CAL09	ACO-020-5100010K4K4	Cable 2.92mm male to 2.92mm male 2m Yellow (H)	Atlantic Microwave	11/11/2025	6 months
E005	8447F	Pre-Amplifier 10MHz to 1000MHz	MCL Microwave+Mini-circuits	20/06/2025	12 months
E231	MP526B	Filter HPF 240 MHz	Anritsu	29/07/2025	12 months
E256	44	Attenuator 10dB 18GHz	Weinschel Engineering	14/04/2025	12 months
E268	BHA 9118	Horn Antenna 1 - 18 GHz	Schaffner	06/01/2025	12 months
E301	8493C	Attenuator 20dB 26.5GHz	Hewlett Packard	06/05/2025	12 months
E434	G3RUH	10 MHz GPS Disciplined Oscillator	G3RUH - James Miller	11/09/2025	12 months
E479	3750	Variable Electronic Filter	Krohn-Hite	#15/12/2025	12 months
E517	E4421B	Signal Generator 250 kHz - 3 GHz	Hewlett Packard	16/09/2025	12 months
E642	E4440A	PSA 3 Hz - 26.5 GHz	Agilent Technologies	20/02/2024	24 months
E704	E4422B	Signal Generator 0.25-4000MHz	Agilent Technologies	#16/01/2026	12 months
E745	2017 4/2dB	Attenuator 4/2dB 30-1000MHz	KEC	17/02/2025	12 months
E755	N9030B	PXA Signal Analyser 3 Hz to 50 GHz	Keysight Technologies	29/07/2025	12 months
E778	D151	Detector 0.2 MHz to 1 GHz	Wavetek	08/01/2025	12 months
E914	VULB 9163	Antenna BiLog 30MHz to 3GHz	Schwarzbeck	28/06/2024	24 months
E932	N5181A	Signal Generator 100 kHz to 6 GHz	Agilent Technologies	06/06/2025	12 months
F136	DSO5034A	Oscilloscope 300MHz 4CH	Agilent Technologies	#17/12/2024	12 months
F353	535-MN	50 Ohm N type termination 12.4GHz	Weinschel	19/05/2025	12 months
F412	ZA2CS-62-40W-N+	Power splitter 100-600MHz 40W	Mini-Circuits	#15/01/2026	12 months
F480	2082-6194-20	Attenuator 18GHz SMA 20 dB	MACOM	08/09/2025	12 months
H071	N9010B	EXA Signal Analyser 10 Hz to 44 GHz	Keysight Technologies	09/07/2025	24 months
L264	DT75	Digital Thermometer	Instrotech Ltd	28/05/2024	24 months
LPE261	3115	Horn Antenna 1 - 18 GHz	EMCO	06/01/2025	12 months
LPE333	8449B	Pre-Amplifier 1GHz - 26.5GHz	Hewlett Packard	10/07/2025	12 months
N579	71043	Frequency Standard Distribution	Marconi Instruments	05/07/2023	12 months
TMS30	778D	Dual Directional Coupler 100MHz to 2GHz	Hewlett Packard	#15/12/2025	12 months
TMS38	VMT04/140	Environmental Oven	Heraeus Votsch	22/02/2025	12 months
TMS78	3160-08	Horn Std Gain 12.4 - 18 GHz	ETS Systems	30/10/2025	12 months
TMS79	3160-09	Horn Std Gain 18 - 26.5 GHz	ETS Systems	21/07/2025	12 months
TMS812	MP534A MP651A	Dipole Set 200 - 1700 MHz	Anritsu	27/10/2025	12 months

Equipment items marked # have been re-calibrated since/during date of tests

10 Auxiliary and peripheral equipment

10.1 Customer supplied equipment

No customer supplied equipment was used.

10.2 Kiwa Electrical Compliance supplied equipment

No Kiwa Electrical Compliance supplied equipment was used.

11 Condition of the equipment tested

In order for the EUT to produce the results shown within this report the following modifications, if any, were implemented.

11.1 Modifications before test

No modifications were made before test by Kiwa Electrical Compliance.

11.2 Modifications during test

No modifications were made during test by Kiwa Electrical Compliance.

12 Description of test sites

Site A	Radio Laboratory and Anechoic Chamber
Site B	Semi-Anechoic Chamber and Control Room FCC Registration No. 654321, ISED Registration No. 5612A-4
Site C	Transient Laboratory
Site D	Screened Room (Conducted Immunity)
Site E	Screened Room (Control Room for Site D)
Site F	Screened Room (Conducted Emissions)
Site G	Screened Room (Control Room for Site H)
Site H	3m Semi-Anechoic Chamber (indoor OATS) FCC Registration No. 654321, ISED Registration No. 5612A-2, VCCI Registration No. 4065
Site J	Transient Laboratory
Site K	Screened Room (Control Room for Site M)
Site M	3m Semi-Anechoic Chamber (indoor OATS) FCC Registration No. 654321, ISED Registration No. 5612A-3
Site N	Radio Laboratory
Site Q	Fully-Anechoic Chamber
Site OATS3m and 10m Open Area Test Site	FCC Registration No. 654321, ISED Registration No. 5612A-1
Site R	Screened Room (Conducted Immunity)
Site S	Safety Laboratory
Site T	Transient Laboratory

CAB identifier as issued by Innovation, Science and Economic Development Canada is UK0002

CAB identifier as issued by FCC is UK2015

13 Abbreviations and units

%	Percent	dBμV	decibels relative to 1μV
λ	Wavelength	dBμV/m	decibels relative to 1μV/m
μA/m	microAmps per metre	dBc	decibels relative to Carrier
μV	microVolts	dBd	decibels relative to dipole gain
μW	microWatts	dBi	decibels relative to isotropic gain
AC	Alternating Current	dBm	decibels relative to 1mW
ACK	ACKnowledgement	dB	decibels relative to a maximum value
ACP	Adjacent Channel Power	dBW	decibels relative to 1W
AFA	Adaptive Frequency Agility	DC	Direct Current
ALSE	Absorber Lined Screened Enclosure	DFS	Dynamic Frequency Selection
AM	Amplitude Modulation	DMO	Dynamic Modulation Order
Amb	Ambient	DSSS	Direct Sequence Spread Spectrum
ANSI	American National Standards Institute	DTA	Digital Transmission Analyser
ATPC	Automatic Transmit Power Control	EIRP	Equivalent Isotropic Radiated Power
AVG	Average	emf	electromotive force
AWGN	Additive White Gaussian Noise	ERC	European Radiocommunications Committee
BER	Bit Error Rate	ERP	Effective Radiated Power
BPSK	Binary Phase Shift Keying	ETSI	European Telecommunications Standards Institute
BT	BlueTooth	EU	European Union
BLE	BlueTooth Low Energy	EUT	Equipment Under Test
BW	Bandwidth	FCC	Federal Communications Commission
°C	Degrees Celsius	FER	Frame Error Rate
C/I	Carrier / Interferer	FHSS	Frequency Hopping Spread Spectrum
CAC	Channel Availability Check	FM	Frequency Modulation
CCA	Clear Channel Assessment	FSK	Frequency Shift Keying
CEPT	European Conference of Postal and Telecommunications Administrations	FSS	Fixed Satellite Service
CFR	Code of Federal Regulations	g	Grams
CISPR	Comité International Spécial des Perturbations Radioélectriques	GHz	GigaHertz
cm	centimetre	GNSS	Global Navigation Satellite System
COFDM	Coherent OFDM	GPS	Global Positioning System
COT	Channel Occupancy Time	Hz	Hertz
CS	Channel Spacing	IEEE	Institute of Electrical and Electronics Engineers
CW	Continuous Wave	IF	Intermediate Frequency
DAA	Detect And Avoid	ISED	Innovation Science and Economic Development
dB	decibels	ITU	International Telecommunications Union
dBμA/m	decibels relative to 1μA/m	KDB	Knowledge DataBase

kg	kilogram	pW	picoWatts
kHz	kiloHertz	QAM	Quadrature Amplitude Modulation
kPa	Kilopascal	QP	Quasi Peak
LBT	Listen Before Talk	QPSK	Quadrature Phase Shift Keying
LISN	Line Impedance Stabilisation Network	RBW	Resolution Band Width
LNA	Low Noise Amplifier	RED	Radio Equipment Directive
LNB	Low Noise Block	R&TTE	Radio and Telecommunication Terminal Equipment
LO	Local Oscillator	Ref	Reference
m	metre	RF	Radio Frequency
mA	milliAmps	RFC	Remote Frequency Control
max	maximum	RFID	Radio Frequency IDentification
Mbit/s	MegaBits per second	RLAN	Radio Local Area Network
MCS	Modulation and Coding Scheme	RMS	Root Mean Square
MHz	MegaHertz	RNSS	Radio Navigation Satellite Service
mic	Microphone	RSL	Received Signal Level
MIMO	Multiple Input, Multiple Output	RSSI	Received Signal Strength Indicator
min	minimum	RTP	Room Temperature and Pressure
mm	millimetres	RTPC	Remote Transmit Power Control
ms	milliseconds	Rx	Receiver
mW	milliWatts	s	Seconds
NA	Not Applicable	SINAD	Signal to Noise And Distortion
NFC	Near Field Communications	SRD	Short Range Device
nom	Nominal	Tx	Transmitter
nW	nanoWatt	UKAS	United Kingdom Accreditation Service
OATS	Open Area Test Site	UKCA	United Kingdom Conformity Assessed
OBW	Occupied Band Width	UKRER	United Kingdom Radio Equipment Regulations
OCW	Occupied Channel Width	UHF	Ultra High Frequency
OFDM	Orthogonal Frequency Division Multiplexing	U-NII	Unlicensed National Information Infrastructure
OOB	Out Of Band	USB	Universal Serial Bus
ppm	Parts per million	UWB	Ultra Wide Band
PER	Packet Error Rate	V	Volts
PK	Peak	V/m	Volts per metre
PMR	Private Mobile Radio	VBW	Video Band Width
PRBS	Pseudo Random Bit Sequence	VHF	Very High Frequency
PRF	Pulse Repetition Frequency	VSAT	Very Small Aperture Terminal
PSD	Power Spectral Density	W	Watts
PSU	Power Supply Unit		

14 Revision History

Issue Number	Revision History	Page Reference(s)
01	First Issue	-

===== END OF TEST REPORT =====