ENGINEERING TEST REPORT

VHF DIGITAL TRANSCEIVER
IC-F52D-UL (with BT moduleUT-136B)
AFJ395100 Containing AFJ381510

Applicant:
ICOM Incorporated
1-1-32, Kamiminami,
Hirano-ku, Osaka
Japan 547-0003

In Accordance With
Federal Communications Commission (FCC)
Part 15, Subpart C, Section 15.209
& ISED, RSS-Gen, Issue 5
Transmitter Spurious Emissions

UltraTech's File No.: 25ICOM627_FCC15C

This Test report is Issued under the Authority of
Tri M. Luu
Vice President of Engineering
UltraTech Group of Labs

Date: May 16, 2025

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Issued Date: May 16, 2025	Test Dates: May 13-15, 2025

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.247 & RSS-Gen, Issue 5
Title:	Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15 – Radio Frequency Devices
Purpose of Test:	C2PC for integrating BT in a host
Test Procedures:	▪ ANSI C63.4 ▪ ANSI C63.10 ▪ RSS-Gen, Issue 5

1.2. RELATED SUBMITTAL(S)/GRANT(S)

None.

1.3. NORMATIVE REFERENCES

Publication	Year	Title
47 CFR Parts 0-19	2025	Code of Federal Regulations (CFR), Title 47 – Telecommunication
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40 GHz
ANSI C63.10	2020	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
RSS-Gen, Issue 5	2018	General Requirements for Compliance of Radio Apparatus

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

Applicant
Name and Address: Icom Incorporated 1-1-32, Kamiminami Hirano-ku, Oaska Japan, 547-0003
Contact Person: Mr. Tatsuo Yano Phone #: +81 6 6793 5302 Fax #: +81 6 6793 0013 Email Address: isales@icom.co.jp
Manufacturer: Same as Applicant

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name:	ICOM Incorporated
Product Name:	VHF DIGITAL TRANSCEIVER
Model Name or Number:	IC-F52D-UL
Serial Number:	12000203
Type of Equipment:	Licensed Non-Broadcast Station Transmitter
Power Supply Requirement:	7.5 VDC nominal
Transmitting/Receiving Antenna Type:	Non-integral
Primary User Functions of EUT:	2-Way Wireless Voice & Data Communication

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	Portable
Power Supply Requirement:	7.5 VDC
RF Output Power Rating: maximum peak conducted power	5W for Licensed land mobile VHF/UHF transceiver 9.6mW for integrated BT module
Operating Frequency Range:	2402 - 2480 MHz for BT module
Duty Cycle:	Continuous
Modulation Type:	GFSK, $\pi/4$ DQPSK,8DPSK
Antenna Connector Types:	Integral for BT Non-Integral for VHF/UHF

LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Terminated with
1	Speaker-Microphone Connector	1	ICOM Multi-connector Jack	Speaker-Microphone
2	Antenna Connector	1	Special type	50 Ohm Load

ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

Ancillary Equipment # 1	
Description:	Speaker Microphone
Brand Name:	Icom Inc.
Model Name or Number:	HM-184UL

EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21 to 23 °C
Humidity:	45 to 58%
Pressure:	102 kPa
Power Input Source:	7.5 VDC nominal

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	The BT transmitter was operated in a continuous transmission mode with the carrier modulated in the host device.
Special Test Software:	Test configurations were set in the software provided by the applicant.
Special Hardware Used:	None
Transmitter Test Antenna:	The EUT is tested with the BT module integral antenna integrated to the host device

Transmitter Test Signals	
Frequency Band(s):	2402 - 2480 MHz
Frequency(ies) Tested:	2402 MHz, 2441 MHz and 2480 MHz
RF Power Output: (maximum peak conducted output power)	9.6mW
Normal Test Modulation:	GFSK, π/4 DQPSK,8DPSK
Modulating Signal Source:	Internal

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with ANAB File No.: AT-1945.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Section(s)	Test Requirements	Compliance (Yes/No)
15.209 & 15.205	Transmitter Spurious Radiated Emissions	Yes

* The EUT complies with the requirement; BT employs an integral antenna.

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None.

4.4. TRANSMITTER SPURIOUS RADIATED EMISSIONS AT 3 METERS [§§ 15.247(d), 15.209 & 15.205]

4.4.1. Limit(s)

Section 15.205(a) - Restricted Bands of Operation

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	[2]
13.36–13.41.			

[1] Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.
[2] Above 38.6

Section 15.209(a) - Field Strength Limits within Restricted Frequency Bands

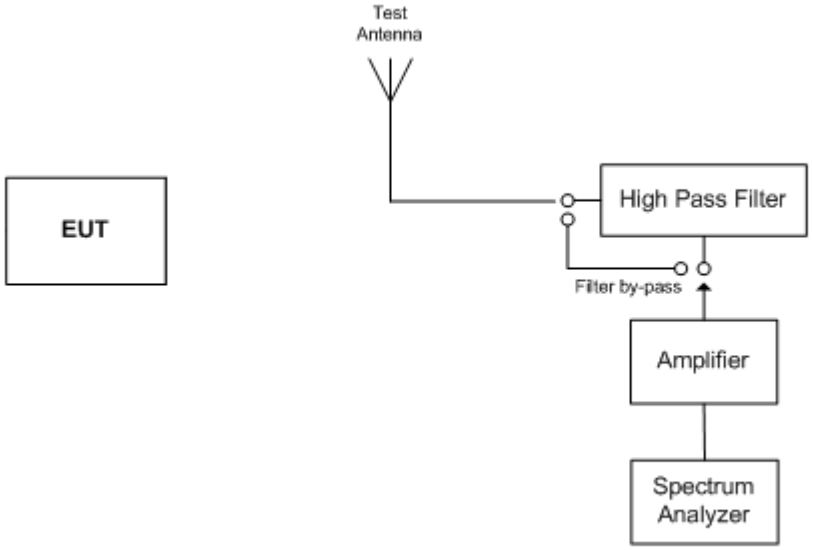
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2,400 / F (kHz)	300
0.490 - 1.705	24,000 / F (kHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

4.4.2. Method of Measurements

ANSI C63.10.

4.4.3. Test Arrangement

Transmitter Radiated Emission



4.4.4. Test Data

Remark(s):
- All spurious emissions that are in excess of 20 dB below the specified limit shall be recorded.
- EUT shall be tested in three orthogonal positions.
- The following test data represent the worst-case derived from exploratory tests.

4.4.4.1. EUT with BT transmission

4.4.4.1.1. Radiated Spurious Emission

Fundamental Frequency: 2402 MHz
Test Frequency Range: 30 MHz – 25 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Margin (dB)	Pass/ Fail
4804.0	47.6	31.2	V	54.0	-22.8	Pass*
4804.0	48.6	36.4	H	54.0	-17.6	Pass*
7206.0	51.9	46.4	V	54.0	-7.6	Pass
7206.0	50.9	45.1	H	54.0	-8.9	Pass
9608.0	47.5	36.0	V	54.0	-18.0	Pass
9608.0	48.4	36.8	H	54.0	-17.2	Pass

All other spurious emissions and harmonics are more than 20 dB below the applicable limit.

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Fundamental Frequency: 2441 MHz
Test Frequency Range: 30 MHz – 25 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Margin (dB)	Pass/ Fail
7323.0	50.9	44.2	V	54.0	-9.8	Pass*
7323.0	50.1	43.4	H	54.0	-10.6	Pass*
9764.0	49.7	38.6	V	54.0	-15.4	Pass
9764.0	49.2	38.8	H	54.0	-15.2	Pass

All other spurious emissions and harmonics are more than 20 dB below the applicable limit.

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Fundamental Frequency:	2480 MHz					
Test Frequency Range:	30 MHz – 25 GHz					
Frequency (MHz)	**RF Peak Level (dBµV/m)**	**RF Avg Level (dBµV/m)**	**Antenna Plane (H/V)**	**Limit 15.209 (dBµV/m)**	**Margin (dB)**	**Pass/ Fail**
7440.0	49.2	41.7	V	54.0	-12.3	Pass*
7440.0	48.8	39.9	H	54.0	-14.1	Pass*
9920.0	47.7	36.6	V	54.0	-17.4	Pass
9920.0	49.1	39.3	H	54.0	-14.7	Pass
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.						

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

EXHIBIT 5. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Attenuator	Pasternack	PE7024-10	3	DC - 26.5 GHz	See Note 1
Termination	Mini-Circuits	KARN-50+	00834-B	DC – 8GHz	See Note 1
Horn Antenna	ETS	3115	9701-5061	1 – 18 GHz	04-Sep-2025
Horn Antenna	ETS	3160-09	00118385	18GHz – 26.5GHz	02-Feb-2027
EMI Receiver	Rohde & Schwarz	ESU40	100037	20 Hz - 40 GHz	18-Sep-2025
Biconilog Antenna	EMCO	3142C	00034792	26 - 2000 MHz	16 Dec 2025
Preamp	Com-Power	PAM-118A	551052	500 MHz - 18 GHz	07-Oct-2025
Preamp	Com-Power	PAM-840A	18050002	18 GHz - 40 GHz	26-Nov-2025
High Pass Filter	Micro-Tronics	BRM50701	105	2.4 GHz	See Note 1
Note 1: Internal Verification/Calibration check					

EXHIBIT 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement.

Test Description	Expanded Uncertainty, K=2 for 95% Confidence Level
Radiated Emissions	±4.82 dB (30 MHz – 1 GHz)
	±3.43 dB (1 – 18 GHz)
	±3.11 dB (18 – 26.5 GHz)