

Radio Test Report

Manufacturer: LEGO System A/S
Model: HANDSET NO. 3



In accordance with ARIB STD-T66 and MIC No.
88 Annex 43 (Article 2 Paragraph 1 Item 19)
(2.4 GHz Bluetooth Low Energy)

Prepared for: LEGO System A/S
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COMMERCIAL-IN-CONFIDENCE

Document 75962746-08 Issue 01

SIGNATURE

A handwritten signature in black ink, appearing to read 'S. Marshall'.

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Steve Marshall	Senior Engineer	Authorised Signatory	28 March 2025

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with ARIB STD-T66 3.7 (2014-10) and MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19): for the tests detailed in section 1.3.



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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	28 March 2025

Table 1

1.2 Introduction

Applicant	LEGO System A/S
Manufacturer	LEGO System A/S
Model Number(s)	HANDSET NO. 3
Serial Number(s)	COD2449CC01042, COD2449CC00936 and COD2449CC00811
Hardware Version(s)	EP2
Software Version(s)	0.3.1
Number of Samples Tested	3
Test Specification/Issue/Date	ARIB STD-T66 3.7 (2014-10) MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19)
Order Number	7000395231
Date	15-October-2024
Date of Receipt of EUT	20-January-2025 and 03-March-2025
Start of Test	21-January-2025
Finish of Test	20-March-2025
Name of Engineer(s)	Thomas Biddlecombe and George Williams
Related Document(s)	Radio Equipment Regulations, Article 24 Radio Equipment Regulations, Article 14 Radio Equipment Regulations, Article 5 Table 1 Radio Equipment Regulations, Article 7, Table 3 Radio Equipment Regulations, Article 6, Table 2 Radio Equipment Regulations, Article 49-20 Radio Equipment Regulations, Article 9-4



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with ARIB STD-T66 and MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19) is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: 2.4 GHz Bluetooth Low Energy				
2.1	3.2 (2)	Antenna Power	Pass	Radio Equipment Regulations, Article 14
2.2	3.2 (4)	Frequency Deviation	Pass	Radio Equipment Regulations, Article 5 Table 1
2.3	3.2 (7)	Allowable Value for Occupied Bandwidth	Pass	Radio Equipment Regulations, Article 6, Table 2
2.4	-	Voltage Variations	Satisfactory	
2.5	3.6 (2)	Antenna Gain	Pass	Radio Equipment Regulations, Article 49- 20
2.6	3.4 (1)	Interference Protection Function	Pass	Radio Equipment Regulations, Article 9-4
2.7	3.2 (6)	Permissible Value of Spurious or Unnecessary Radiation Intensity	Pass	Radio Equipment Regulations, Article 7, Table 3
2.8	3.3 (1)	Limit on Secondary Radiation	Pass	Radio Equipment Regulations, Article 24

Table 2



1.4 Application Form

The type of Wideband Data Transmission Equipment

FHSS ☐	non-FHSS ☒
-------------------------------	--

Table 3

The different transmit operating modes (tick all that apply)

Operating mode 1: Single Antenna Equipment	☒
Equipment with only one antenna	☒
Equipment with two diversity antennas but only one antenna active at any moment in time	☐
Smart Antenna Systems with two or more antennas but operating in a (legacy) mode where only one antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)	☐
Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming	☐
Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)	☐
High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1	☐
High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2	☐
Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming	☐
Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)	☐
High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1	☐
High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2	☐
NOTE: Add more lines if more channel bandwidths are supported.	

Table 4



In case of Smart Antenna Systems

The number of Receive chains:		
The number of Transmit chains:		
———— symmetrical power distribution	☐	
———— asymmetrical power distribution	☐	
In case of beam forming, the maximum (additional) beam forming gain:		dB
NOTE: The additional beam forming gain does not include the basic gain of a single antenna.		

Table 5

Operating Frequency Range(s) of the Equipment

Operating Frequency Range 1:	2402	MHz to	2480	MHz
Operating Frequency Range 2:		MHz to		MHz
NOTE: Add more lines if more Frequency Ranges are supported.				

Table 6

Nominal Channel Bandwidth

Nominal Channel Bandwidth 1:	1, 2	MHz
Nominal Channel Bandwidth 2:		MHz
NOTE: Add more lines if more channel bandwidths are supported.		

Table 7

Type of Equipment (stand-alone, combined, plug-in radio device, etc.)

Stand-alone:			☐
Combined Equipment:			☒
Plug-in radio device:			☐
Other:	☐	Please specify:	

Table 8



The normal and extreme operating conditions that apply to the equipment

Normal operating conditions (if applicable):					
Operating temperature:				25	°C
Other (please specify if applicable):				25	°C
Extreme operating conditions:					
Operating temperature:		Minimum	0	°C to Maximum	35 °C
Other (Storage):		Minimum	0	°C to Maximum	55 °C
Details provided are for the:					
stand-alone equipment					☐
combined equipment					☒
test jig					☐

Table 9

The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels

Antenna Type:			
Integral Antenna – Chip Antenna – datasheet included			☒
Antenna Gain:		-6.63	dBi
If applicable, additional beamforming gain (excluding basic antenna gain):			dB
Temporary RF connector provided			☒
No temporary RF connector provided			☐
Integral Antenna – Chip Antenna			☒
Dedicated Antennas (equipment with antenna connector)			☐
Single power level with corresponding antenna(s)			☒
Multiple power settings and corresponding antenna(s)			☐
Number of different Power Levels:			
Power Level 1		0	dBm
Power Level 2			dBm
Power Level 3			dBm
NOTES: Add more lines in case the equipment has more power levels. These power levels are conducted power levels (at antenna connector).			
For each of the power levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable			
Power Level 1			dBm
Number of antenna assemblies provided for this power level:			
Assembly #	Gain (dBi)	e.i.r.p (dBm)	Part number or model number
1			
2			
3			
Power Level 2			dBm



Number of antenna assemblies provided for this power level:			
Assembly #	Gain (dBi)	e.i.r.p (dBm)	Part number or model number
1			
2			
3			
Power Level 3			dBm
Number of antenna assemblies provided for this power level:			
Assembly #	Gain (dBi)	e.i.r.p (dBm)	Part number or model number
1			
2			
3			
NOTE 3: Add more rows in case more antenna assemblies are supported for this power level.			

Table 10

The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined equipment or test jig in case of plug-in devices

Details provided are for the:				
stand-alone equipment				☐
combined equipment				☐
test jig				☐
Supply Voltage				
AC mains	☐	AC voltage:		V
DC	☒	DC voltage:	3.80	V
In case of DC, indicate the type of power source				
Internal Power Supply				☐
External Power Supply or AC/DC adapter				☐
Battery				☒
Other:	☐	Please specify:		

Table 11

Describe the test modes available which can facilitate testing

Approve Test Mode – ATM Safety Test Mode – STM Direct Test Mode – DTM/PTM

Table 12

The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3] IEEE 802.15.4™, proprietary, etc.)

Bluetooth Low Energy

Table 13



Modulation

ITU Class(es) of emission:	1M00F1D			
Can the transmitter operate unmodulated?	Yes	☒	No	☐

Table 14

Duty Cycle

The transmitter is intended for:	
Continuous duty	☐
Intermittent duty	☐
Continuous operation possible for testing purposes	☒

Table 15

About the UUT

The equipment submitted are representative production models	☐
If not, the equipment submitted are pre-production models?	☒
If pre-production equipment are submitted, the final production equipment will be identical in all respects with the equipment tested	☒
If not, supply full details:	

Table 16

Additional items and/or supporting equipment provided

Spare batteries (e.g. for portable equipment)	☒
Battery charging device - Multi-Charger system	☒
External Power Supply or AC/DC adapter - Interface cables USB-A (test system side) to UART (on USB-C socket at DUT side, in test mode for HCI)	☒
Test Jig or interface box	☐
RF test fixture (for equipment with integrated antennas)	☐
Combined equipment	☐
Manufacturer:	☐
Model:	☐
Model Name:	☐
User Manual	☒
Technical documentation (Handbook and circuit diagrams)	☒

Table 17



Cable Loss

Adapter Cable Loss (Conducted sample)	Cable + Connector 0.3	0.3 dB
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Table 18

The above information was provided by the applicant.



1.5 Product Information

1.5.1 Technical Description

The Equipment under test (EUT) was a LEGO System A/S, Model: HANDSET NO. 3 incorporating Bluetooth Low Energy and NFC transmitters.

The primary function of the EUT is a Toy for use in a classroom.

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Model: HANDSET NO. 3, Serial Number: COD2449CC00936			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: HANDSET NO. 3, Serial Number: COD2449CC01042			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: HANDSET NO. 3, Serial Number: COD2449CC00811			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 19



1.8 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 2.4 GHz Bluetooth Low Energy		
Antenna Power	Thomas Biddlecombe	UKAS
Frequency Deviation	Thomas Biddlecombe	UKAS
Allowable Value for Occupied Bandwidth	Thomas Biddlecombe	UKAS
Voltage Variations	George Williams	UKAS
Antenna Gain	Thomas Biddlecombe	UKAS
Interference Protection Function	George Williams	UKAS
Permissible Value of Spurious or Unnecessary Radiation Intensity	George Williams	UKAS
Limit on Secondary Radiation	George Williams	UKAS

Table 20

Office Address:

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Antenna Power

2.1.1 Specification Reference

ARIB STD-T66 Clause 3.2 (2) and MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19)

2.1.2 Equipment Under Test and Modification State

HANDSET NO. 3, S/N: COD2449CC00811 - Modification State 0

2.1.3 Date of Test

04-March-2025

2.1.4 Test Method

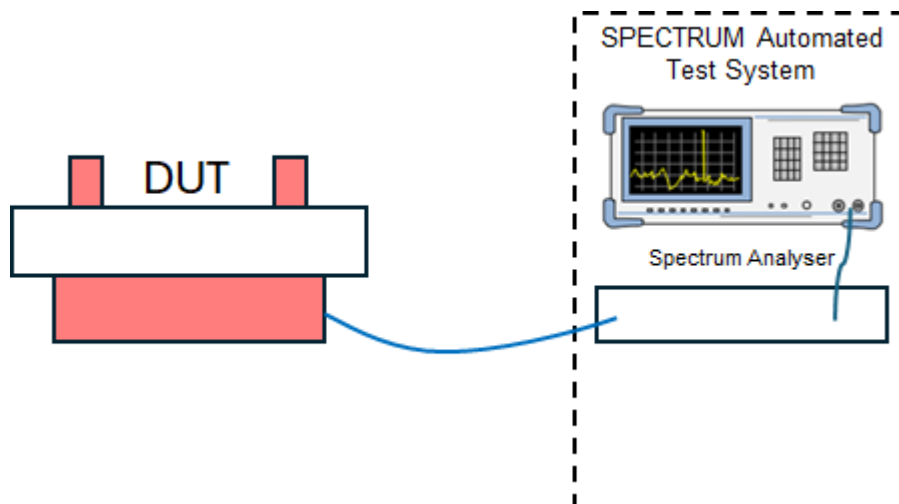
The Power Spectral Density was measured using a spectrum analyser which was tuned to the test frequency with the relevant RBW to match the limit. The max hold function on the analyser was used to obtain output power.

The Conducted Output Power was measured using a wideband power meter set to measure peak power. A percentage deviation from the measured power to the declared power was calculated and assessed against the tolerance limits.

The DUT was charged to full during testing.

The DUT was configured to transmit a modulated package with a 37-byte PRBS payload at max power.

2.1.5 Test Setup Diagram



2.1.6 Environmental Conditions

Ambient Temperature	19.9 °C
Relative Humidity	24.4 %



2.1.7 Test Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	3.2 (2)(b) 3.2 (3)	Test Method(s):	Refer to Test Method
Additional Reference(s):	3.6		

DUT Configuration			
Mode:	BLE GFSK (LE 1M)	Duty Cycle (%):	63.5
Antenna Configuration:	SISO	DCCF (dB):	1.97
Active Port(s):	A	Peak Antenna Gain (dBi):	-6.63

Test Frequency (MHz)	Conducted Output Power Density (mW/MHz)					Limit (mW/MHz)
	A	B	C	D	Σ	
2402	0.68	-	-	-	-	10.00
2442	0.46	-	-	-	-	10.00
2480	0.27	-	-	-	-	10.00

Table 21 - Output Power Density Results

Test Frequency (MHz)	Conducted Output Power (mW)					Declared (mW)	Tolerance (%)	Limit (%)
	A	B	C	D	Σ			
2402	1.20	-	-	-	-	1.26	-3.99%	$-80 \leq n \leq +20$
2442	1.00	-	-	-	-	1.26	-19.65%	$-80 \leq n \leq +20$
2480	0.84	-	-	-	-	1.26	-32.59%	$-80 \leq n \leq +20$

Table 22 - Output Power Tolerance Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	3.2 (2)(b) 3.2 (3)	Test Method(s):	Refer to Test Method
Additional Reference(s):	3.6		

DUT Configuration			
Mode:	BLE GFSK (LE 2M)	Duty Cycle (%):	34.0
Antenna Configuration:	SISO	DCCF (dB):	4.69
Active Port(s):	A	Peak Antenna Gain (dBi):	-6.63

Test Frequency (MHz)	Conducted Output Power Density (mW/MHz)					Limit (mW/MHz)
	A	B	C	D	Σ	
2402	0.38	-	-	-	-	10.00
2442	0.22	-	-	-	-	10.00
2480	0.06	-	-	-	-	10.00

Table 23 - Output Power Density Results

Test Frequency (MHz)	Conducted Output Power (mW)					Declared (mW)	Tolerance (%)	Limit (%)
	A	B	C	D	Σ			
2402	1.18	-	-	-	-	1.26	-5.35%	$-80 \leq n \leq +20$
2442	1.00	-	-	-	-	1.26	-20.33%	$-80 \leq n \leq +20$
2480	0.83	-	-	-	-	1.26	-33.27%	$-80 \leq n \leq +20$

Table 24 - Output Power Tolerance Results

ARIB STD T-66, Limit Clause 3.2

Clause	Requirement
3.2(2)(b)	10 mW/MHz

Table 25 - Antenna Power Limit



2.1.8 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	I-1000	2891	12	02-Dec-2025
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	18-Sep-2025
USB Power Sensor	Boonton	RTP5008	5833	12	26-Jul-2025
GPSDR Frequency standard	Orolia	SecureSync 2402-053	6339	6	23-Mar-2025
Signal Conditioning Unit	TUV SUD	SPECTRUM_SCU001	6350	12	02-Aug-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6638	12	02-Aug-2025

Table 26

2.2 Frequency Deviation

2.2.1 Specification Reference

ARIB STD-T66 Clause 3.2 (4) and MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19)

2.2.2 Equipment Under Test and Modification State

HANDSET NO. 3, S/N: COD2449CC00811 - Modification State 0

2.2.3 Date of Test

04-March-2025

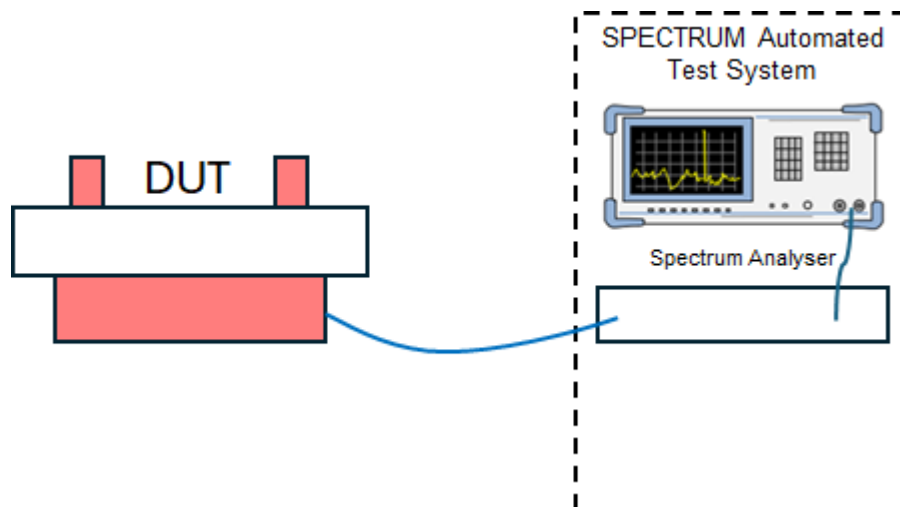
2.2.4 Test Method

The frequency of the spectrum was measured using a spectrum analyser by finding the centre point of the 10 dB bandwidth. The deviation of the measured value from the assigned frequency was calculated in ppm.

The DUT was fully charged during testing.

The DUT was configured to transmit a modulated package with a 37-byte PRBS payload at max power.

2.2.5 Test Setup Diagram



2.2.6 Environmental Conditions

Ambient Temperature	19.9 °C
Relative Humidity	24.4 %

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	3.2 (4)	Test Method(s):	Refer to Test Method
Additional Reference(s):	-		

DUT Configuration			
Mode:	BLE GFSK (LE 1M)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	A	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	Frequency Error (ppm)				Limit (ppm)
	A	B	C	D	
2402	-3.618	-	-	-	±50.0
2442	-2.027	-	-	-	±50.0
2480	-3.238	-	-	-	±50.0

Spectrum Analyzer 1
Swept SA

KEYSIGHT Input: RF
Coupling: AC
Align: Partial

R T →

Input Z: 50 Ω
Corr: CCorr
Freq Ref: Ext (S)

Atten: 10 dB
Preamp: Off

PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off

#Avg Type: Voltage
Avg/Hold: 100/100
Trig: Free Run

1 2 3 4 5 6
M W W W W W
P N N N N N

1 Spectrum
Scale/Div 10 dB
Log

Ref Lvl Offset 22.94 dB
Ref Level 22.94 dBm

FL1 2.4015 GHz
FL2 2.4024 GHz

DL1 1.47 dBm
DL2 -8.53 dBm

Center 2.402000 GHz
#Res BW 100 kHz

#Video BW 300 kHz

Span 2.200 MHz
#Sweep 1.00 s (10001 pts)

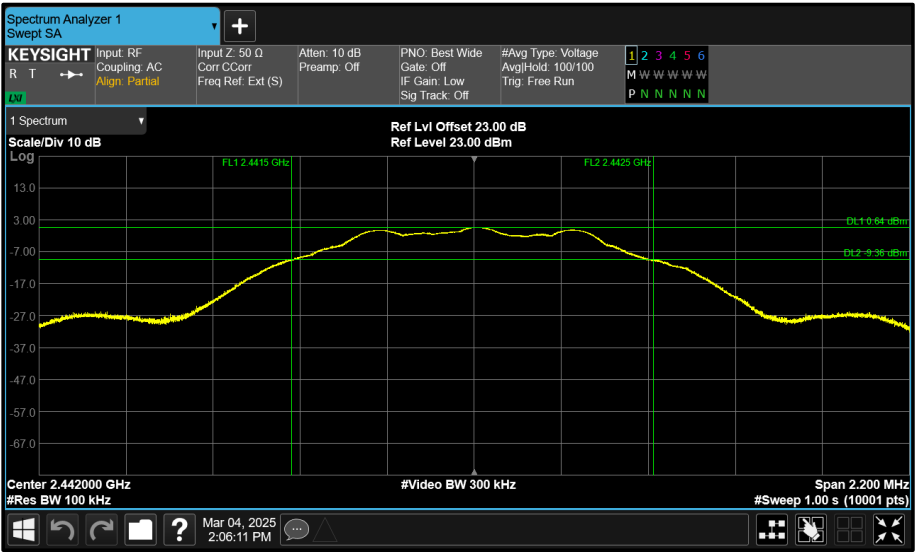


Figure 2 - BLE 1M 2442 MHz (CH18)

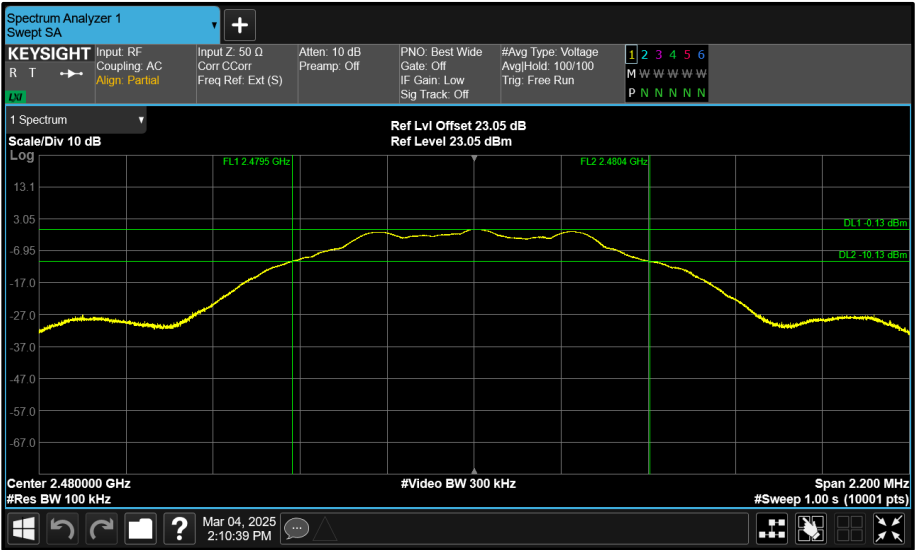


Figure 3 - BLE 1M 2480 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	3.2 (4)	Test Method(s):	Refer to Test Method
Additional Reference(s):	-		

DUT Configuration			
Mode:	BLE GFSK (LE 2M)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	A	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	Frequency Error (ppm)				Limit (ppm)
	A	B	C	D	
2402	-8.131	-	-	-	±50.0
2442	-8.342	-	-	-	±50.0
2480	-8.552	-	-	-	±50.0

Table 28 - Frequency Tolerance Results

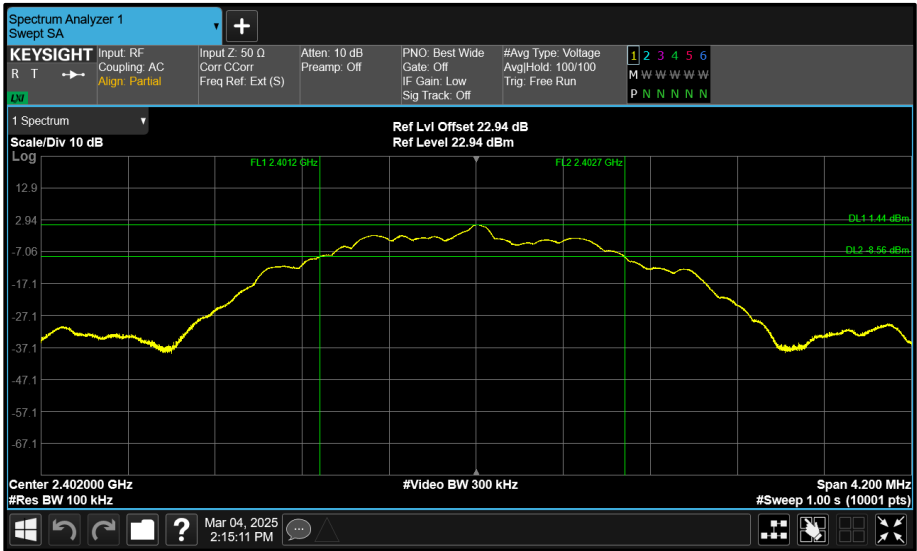


Figure 4 - BLE 2M 2402 MHz (CH37)

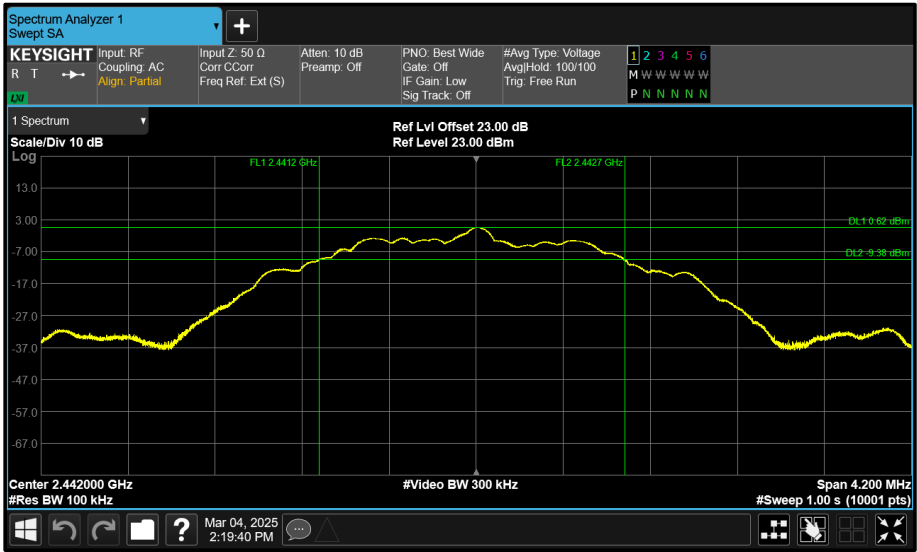


Figure 5 - BLE 2M 2442 MHz (CH18)

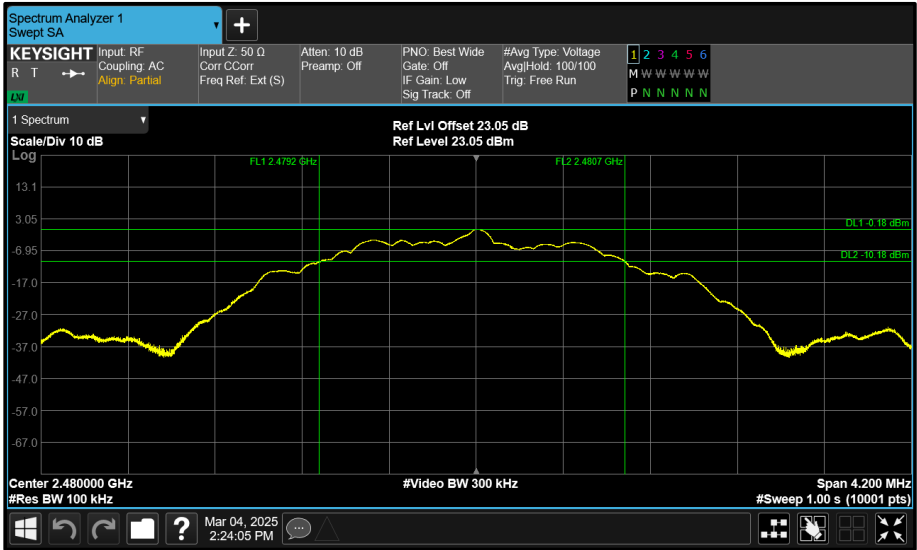


Figure 6 - BLE 2M 2480 MHz (CH39)

ARIB STD T-66, Limit Clause 3.2 (4)

$\pm 50 \times 10^{-6}$.



2.2.8 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	I-1000	2891	12	02-Dec-2025
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	18-Sep-2025
GPSDR Frequency standard	Orolia	SecureSync 2402-053	6339	6	23-Mar-2025
Signal Conditioning Unit	TUV SUD	SPECTRUM_SCU001	6350	12	02-Aug-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6638	12	02-Aug-2025

Table 29

2.3 Allowable Value for Occupied Bandwidth

2.3.1 Specification Reference

ARIB STD-T66, Clause 3.2 (7) and MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19)

2.3.2 Equipment Under Test and Modification State

HANDSET NO. 3, S/N: COD2449CC00811 - Modification State 0

2.3.3 Date of Test

04-March-2025

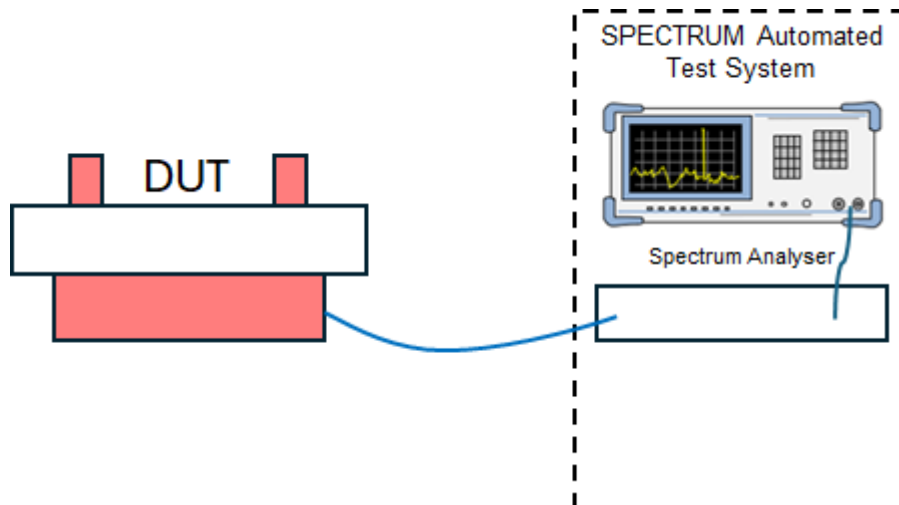
2.3.4 Test Method

OBW was measured using the test method in Article 2, Item 19, Appendix 43.4 to find 99% Bandwidth and compared against the clause in ARIB T-66 3.2 (7) for "any other system".

The DUT was fully charged during testing.

The DUT was configured to transmit a modulated package with a 37-byte PRBS payload at max power.

2.3.5 Test Setup Diagram



2.3.6 Environmental Conditions

Ambient Temperature	19.9 °C
Relative Humidity	24.4 %



2.3.7 Test Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	3.2 (7)	Test Method(s):	Article 2, Item 19, Appendix 43.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	BLE GFSK (LE 1M)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	A	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	99% Bandwidth (MHz)					Limit (MHz)
	A	B	C	D	Maximum	
2402	1.322	-	-	-	1.322	≤26.0
2442	1.349	-	-	-	1.349	≤26.0
2480	1.333	-	-	-	1.333	≤26.0

Table 30 - 99% Bandwidth Results

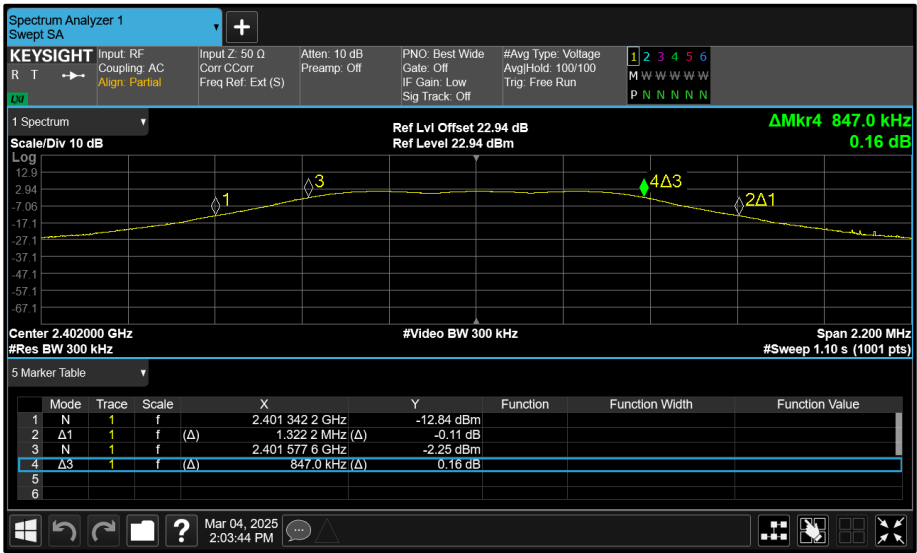


Figure 7 - BLE 1M 2402 MHz (CH37)

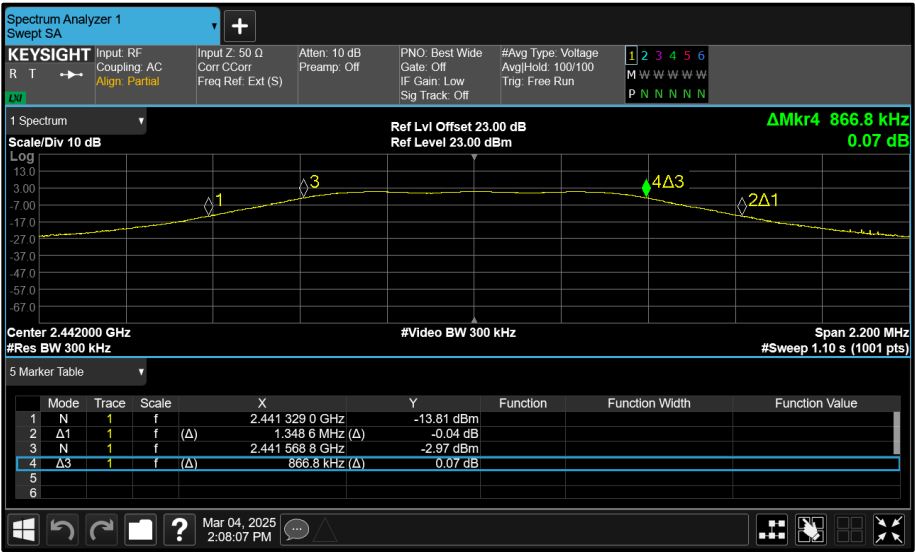


Figure 8 - BLE 1M 2442 MHz (CH18)

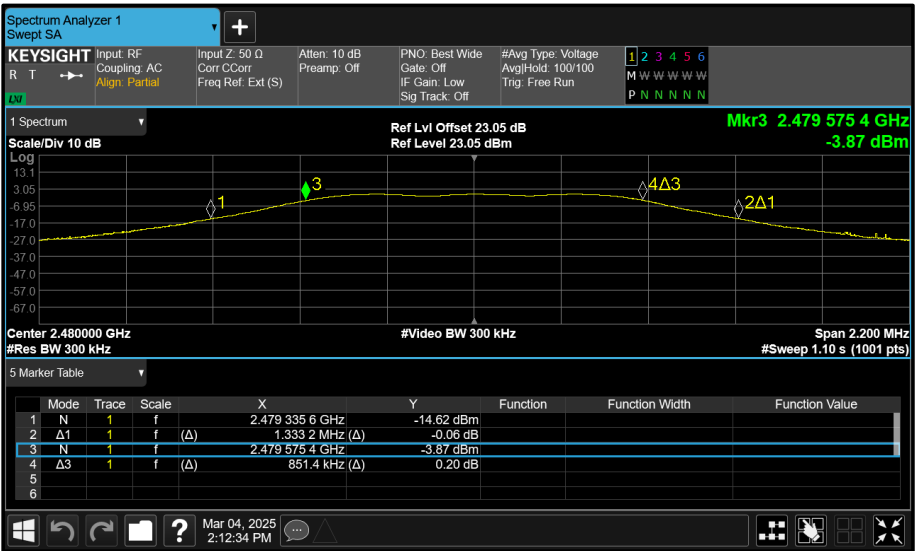


Figure 9 - BLE 1M 2480 MHz (CH39)



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	3.2 (7)	Test Method(s):	Article 2, Item 19, Appendix 43.4
Additional Reference(s):	-		

DUT Configuration			
Mode:	BLE GFSK (LE 2M)	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	A	Peak Antenna Gain (dBi):	-

Test Frequency (MHz)	99% Bandwidth (MHz)					Limit (MHz)
	A	B	C	D	Maximum	
2402	2.176	-	-	-	2.176	≤26.0
2442	2.180	-	-	-	2.180	≤26.0
2480	2.192	-	-	-	2.192	≤26.0

Table 31 - 99% Bandwidth Results

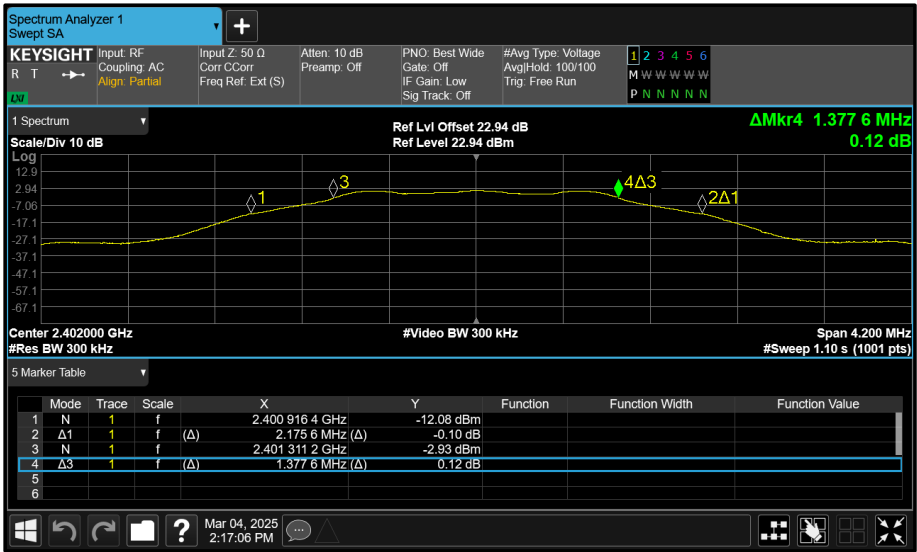


Figure 10 - BLE 2M 2402 MHz (CH37)

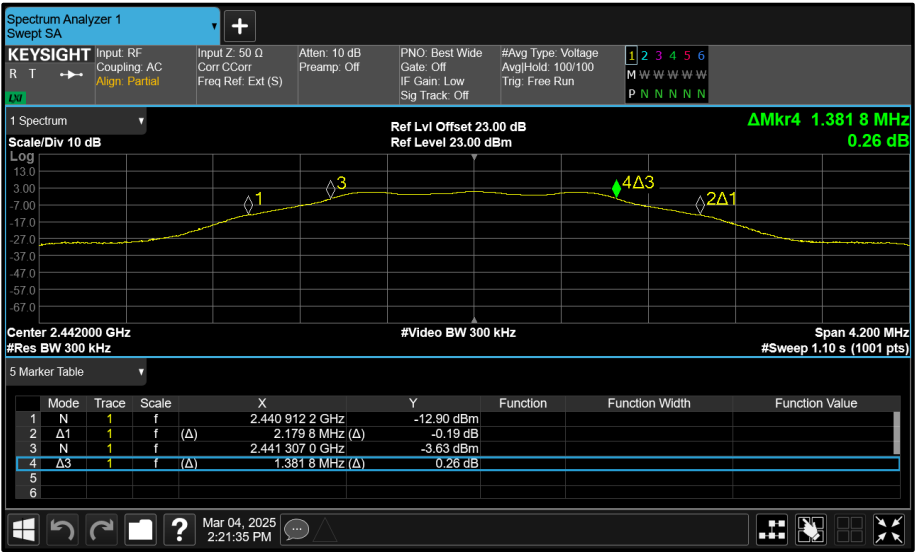


Figure 11 - BLE 2M 2442 MHz (CH18)

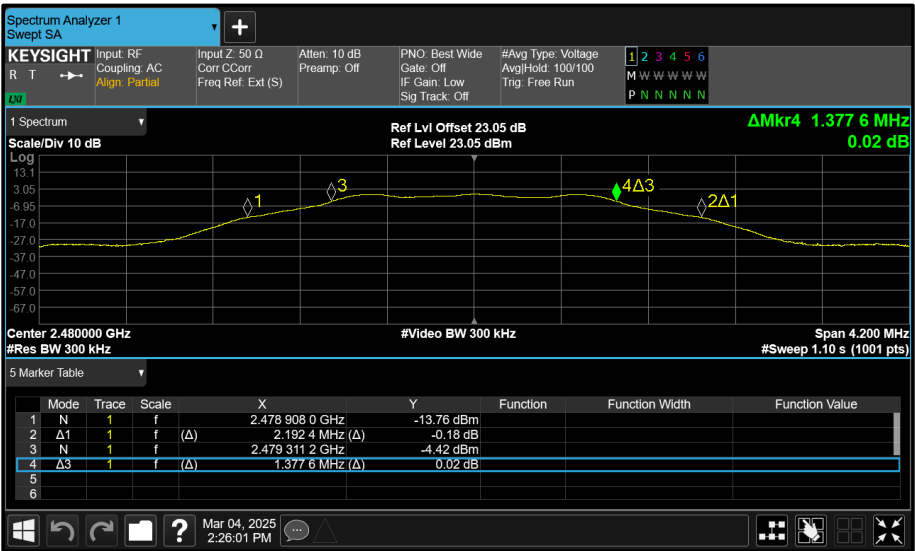


Figure 12 - BLE 2M 2480 MHz (CH39)

ARIB STD T-66, Limit Clause 3.2 (7)

Permissible value of occupied frequency bandwidth for transmission devices using a FH system, a DS-FH hybrid system, or a FH-OFDM hybrid system is at most 83.5MHz; for transmission devices using an OFDM system is at most 38MHz; and for transmission devices using any other system the necessary frequency bandwidth is at most 26MHz.



2.3.8 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	I-1000	2891	12	02-Dec-2025
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	18-Sep-2025
GPSDR Frequency standard	Orolia	SecureSync 2402-053	6339	6	23-Mar-2025
Signal Conditioning Unit	TUV SUD	SPECTRUM_SCU001	6350	12	02-Aug-2025
SCU Cable Assembly	TUV SUD	SPECTRUM_SCU_CA	6638	12	02-Aug-2025

Table 32

2.4 Voltage Variations

2.4.1 Specification Reference

MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19)

2.4.2 Equipment Under Test and Modification State

HANDSET NO. 3, S/N: COD2449CC01042 - Modification State 0

2.4.3 Date of Test

20-March-2025

2.4.4 Test Method

2.4 GHz Bluetooth Low Energy

The input voltage was set to $\pm 10\%$ of the nominal voltage specified by the manufacturer. Using a DVM the input voltage to the RF circuit was measured.

2.4.5 Test Setup Diagram

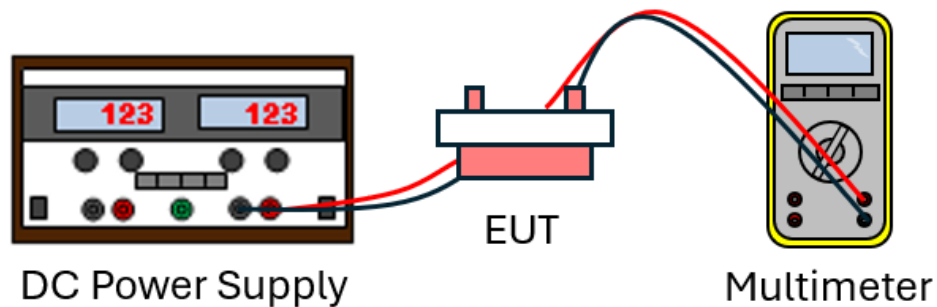


Figure 13 – Voltage Variation Setup Diagram

2.4.6 Environmental Conditions

Ambient Temperature	23.4 °C
Relative Humidity	36.3 %

2.4.7 Test Results

Input Supply Voltage	Measured Voltage at RF Circuitry
3.420 VDC	3.279 VDC
3.800 VDC	3.278 VDC
4.180 VDC	3.280 VDC

Table 33 - Voltage Variation Results



Figure 14 - Photograph showing the test point at which the voltage was measured to the RF Circuitry

The input voltage to the receiver RF circuit varied less than $\pm 1\%$ as the input voltage from the external power supply to the receiver was varied $\pm 10\%$ therefore tests are performed only at the manufacturers nominal voltage.



2.4.8 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Dual Power Supply Unit	Hewlett Packard	6253A	271	-	O/P Mon
True RMS Multimeter	Fluke	79 Series III	411	12	09-Jan-2026
Hygrometer	Rotronic	I-1000	2891	12	02-Dec-2025

Table 34

O/P Mon – Output Monitored using calibrated equipment



2.5 Antenna Gain

2.5.1 Specification Reference

ARIB STD-T66 and MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19), Clause 3.6 (2)

2.5.2 Equipment Under Test and Modification State

HANDSET NO. 3, S/N: COD2449CC00811 - Modification State 0

2.5.3 Date of Test

04-March-2025

2.5.4 Test Method

The maximum half power beamwidth was calculated by determining the EIRP relative to an antenna with a transmitting power of 12.14 dBm/MHz (16.37 mW/MHz).

$$A = \text{EIRP (mW/MHz)} / 16.37$$

$$\text{Maximum Half-Power Beamwidth} = 360 \text{ degrees} / A.$$

2.5.5 Environmental Conditions

Ambient Temperature 19.9 °C

Relative Humidity 24.4 %

2.5.6 Test Results

2.4 GHz Bluetooth Low Energy

Parameter	Results
Frequency Range (MHz)	2400-2483.5
Antenna Gain (dBi)	-6.63
Half-Power Beamwidth	90 degrees
EIRP (mW/MHz)	0.15
A	0.0092
Calculated Maximum Half-Power Beamwidth	360 degrees

Table 35

ARIB STD-T66, Limit Clause 3.6 (2)

The absolute gain of transmitting antennas must be at most 12.14 dB.

2.6 Interference Protection Function

2.6.1 Specification Reference

ARIB STD-T66, Clause 3.4 (1) and MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19)

2.6.2 Equipment Under Test and Modification State

HANDSET NO. 3, S/N: COD2449CC00936 - Modification State 0

2.6.3 Date of Test

27-January-2025

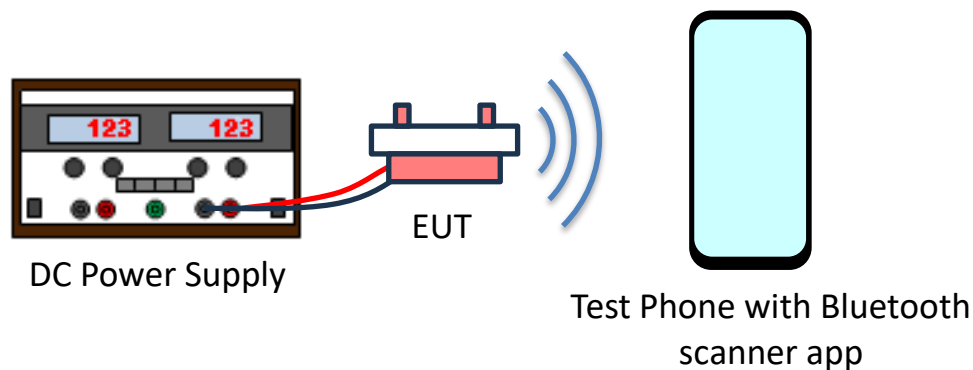
2.6.4 Test Method

This test was performed in accordance with Notification 88, Annex 45, clause 9.

Evidence of the device transmitting a MAC address was captured through the use of a Bluetooth scanner application on an android mobile phone.

The Device was powered by 3.80 VDC from a DC power supply for the duration of the test.

2.6.5 Test Setup Diagram



2.6.6 Environmental Conditions

Ambient Temperature	20.7 °C
Relative Humidity	38.7 %



2.6.7 Test Results

2.4 GHz Bluetooth Low Energy

Result: The client device under test transmitted an identification code to the master device to identify itself as a valid/authorised client.



Figure 15 - Evidence

Radio Equipment Regulations Article 9-4, paragraph 1, item 8

Client devices should send an identification code to the master device in order to identify itself as a valid/authorized client.



2.6.8 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 3.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Multimeter	White Gold	WG022	190	12	18-Nov-2025
Hygrometer	Rotronic	A1	2138	12	28-Nov-2025
Programmable Power Supply 188 W	Rohde & Schwarz	HMP2020x0	6598	-	O/P Mon

Table 36

O/P Mon – Output Monitored using calibrated equipment

2.7 Permissible Value of Spurious or Unnecessary Radiation Intensity

2.7.1 Specification Reference

ARIB STD-T66, Clause 3.2 (6) and MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19)

2.7.2 Equipment Under Test and Modification State

HANDSET NO. 3, S/N: COD2449CC00811 - Modification State 0

2.7.3 Date of Test

14-March-2025

2.7.4 Test Method

This test was performed in accordance with ARIB STD-T66 Clause 3.2 (6).

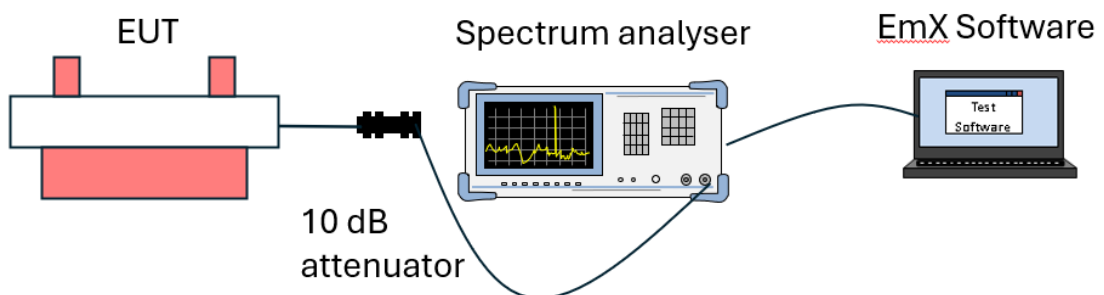
The EUT was connected via a 1m cable and 10 dB of attenuation.

A preliminary sweep was performed using EmX and for results within 10 dB a final measurement was performed.

A measurement bandwidth of 100 kHz was used for below 1 GHz and 1 MHz was used for above 1 GHz.

The EUT was battery powered and fully charged prior to testing.

2.7.5 Test Setup Diagram



2.7.6 Environmental Conditions

Ambient Temperature	28.3 °C
Relative Humidity	20.4 %



2.7.7 Test Results

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 37 - CH37_LE1M, 2402 MHz, 30 MHz to 13 GHz

*No emissions found within 6 dB of the limit.

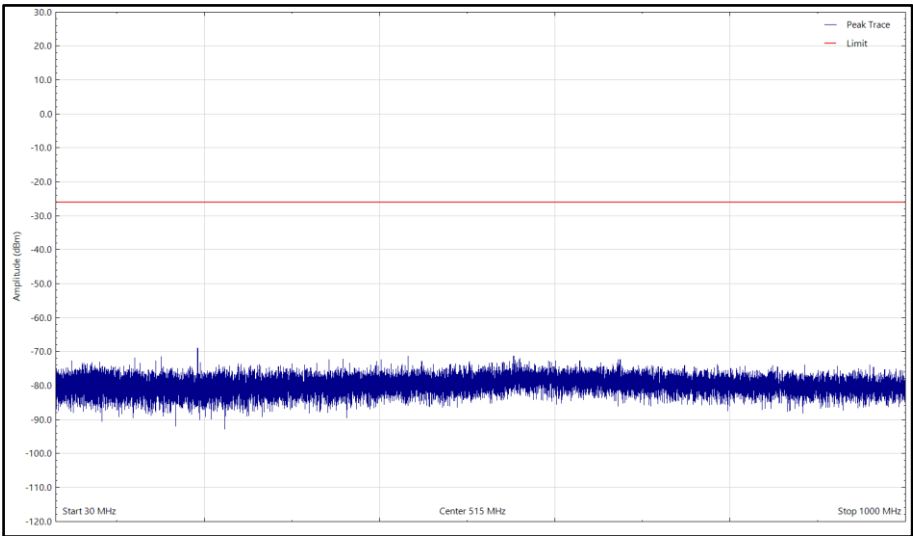


Figure 16 - CH37_LE1M, 2402 MHz, 30 MHz to 1 GHz, Vertical (Peak)

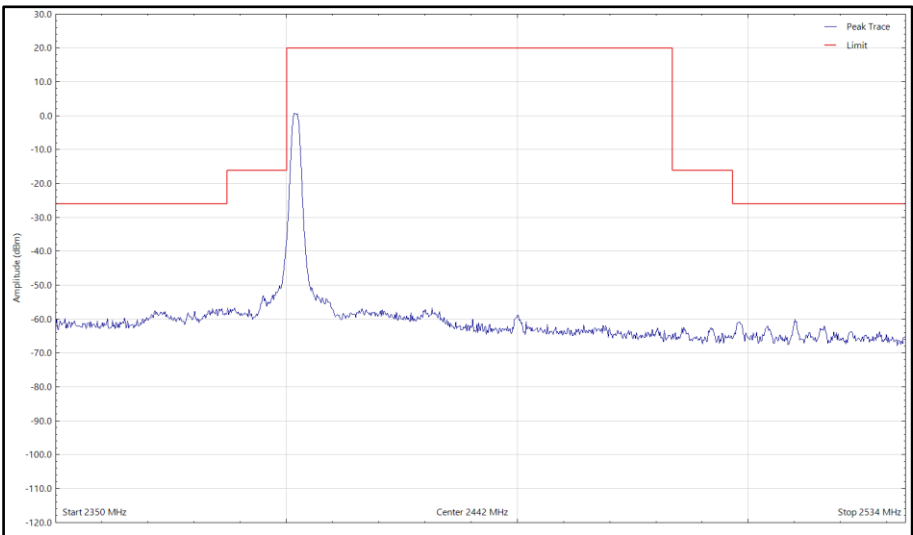


Figure 17 - CH37_LE1M, 2402 MHz, 2 GHz to 3 GHz, Vertical (Peak)

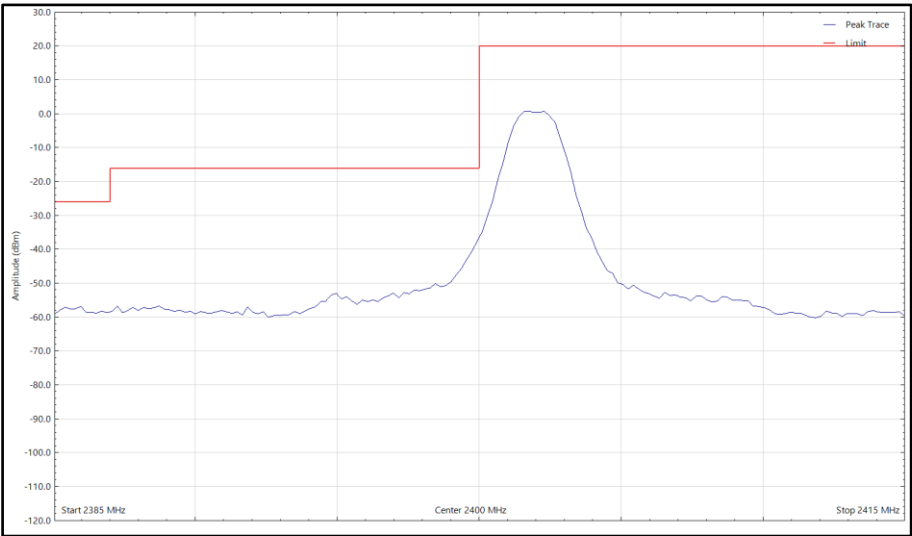


Figure 18 - CH37_LE1M, 2402 MHz, 2.385 GHz to 2.415 GHz, Vertical (Peak)

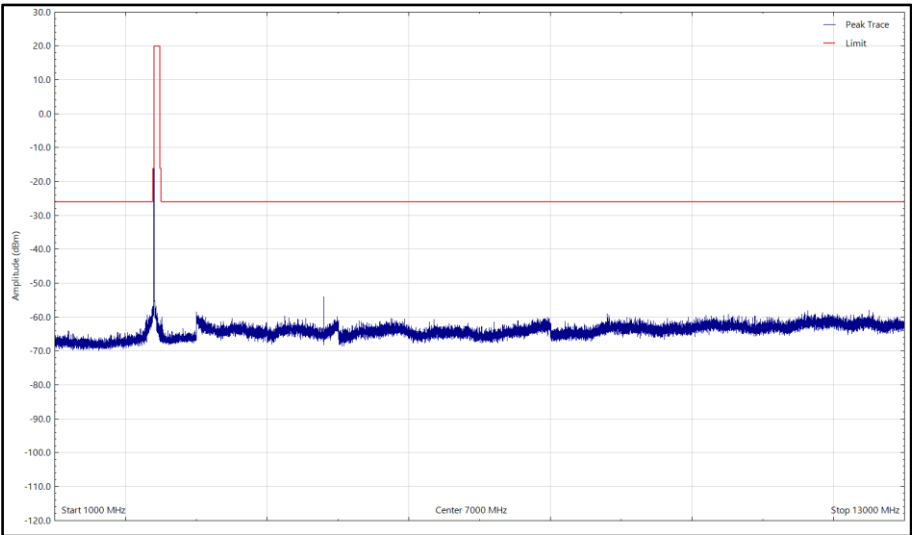


Figure 19 - CH37_LE1M, 2402 MHz, 1 GHz to 13 GHz, Vertical (Peak)



Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 38 - CH17_LE1M, 2440 MHz, 30 MHz to 13 GHz

*No emissions found within 6 dB of the limit.

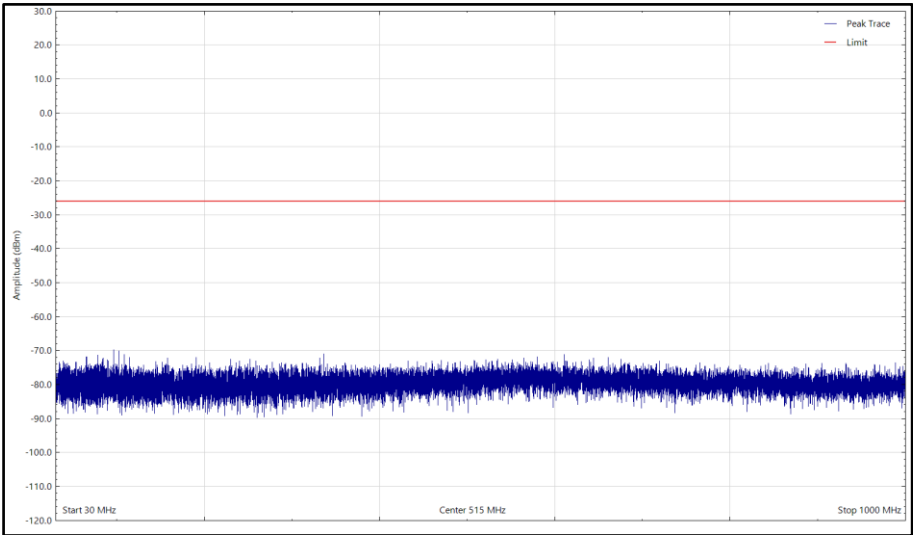


Figure 20 - CH17_LE1M, 2440 MHz, 30 MHz to 1 GHz, Vertical (Peak)

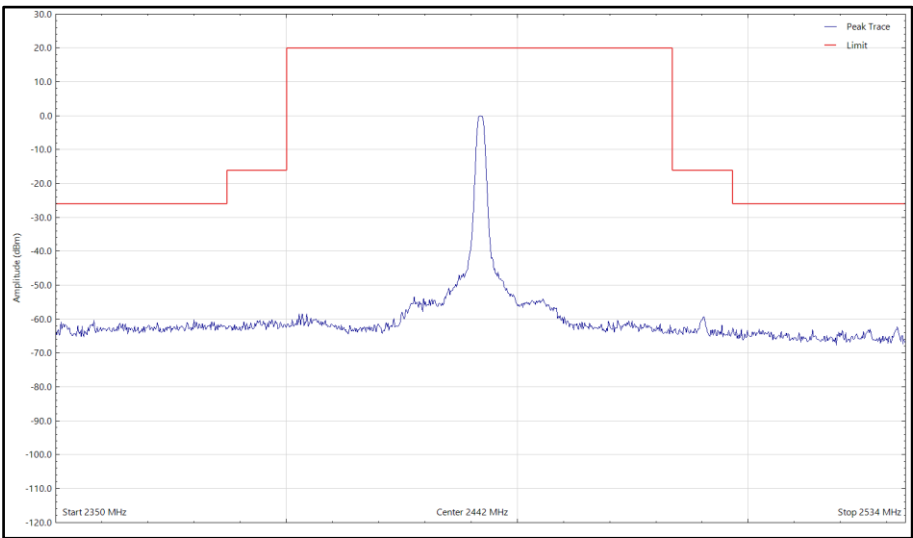


Figure 21 - CH17_LE1M, 2440 MHz, 2 GHz to 3 GHz, Vertical (Peak)

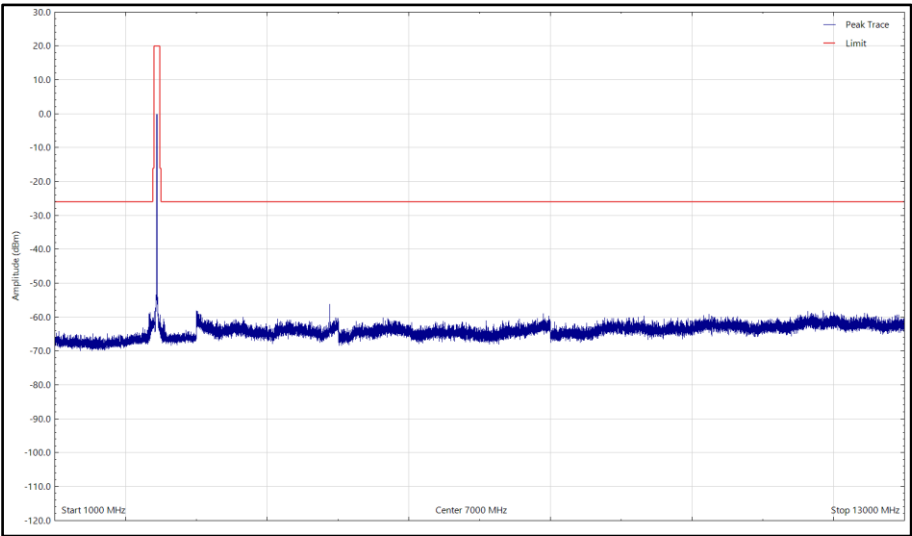


Figure 22 - CH17_LE1M, 2440 MHz, 1 GHz to 13 GHz, Vertical (Peak)



Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 39 - CH39_LE1M, 2480 MHz, 30 MHz to 13 GHz

*No emissions found within 6 dB of the limit.

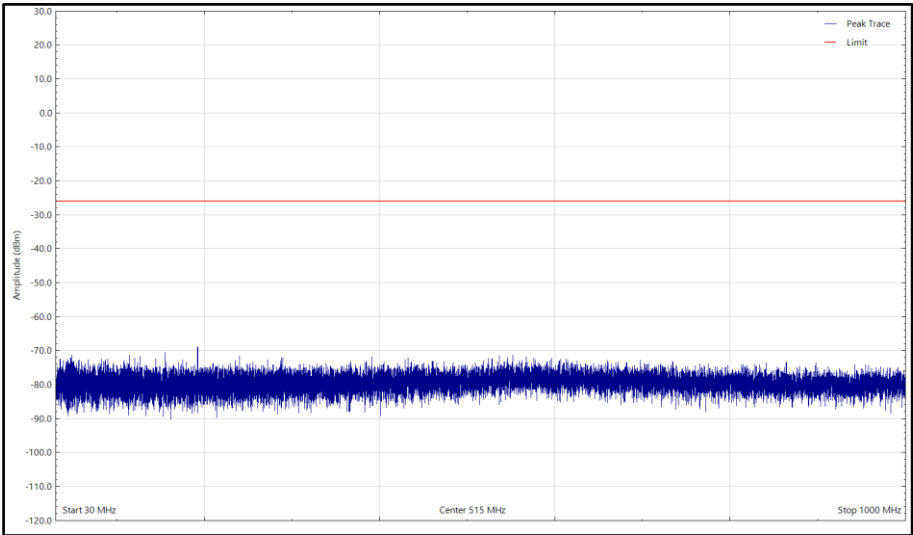


Figure 23 - CH39_LE1M, 2480 MHz, 30 MHz to 1 GHz, Vertical (Peak)

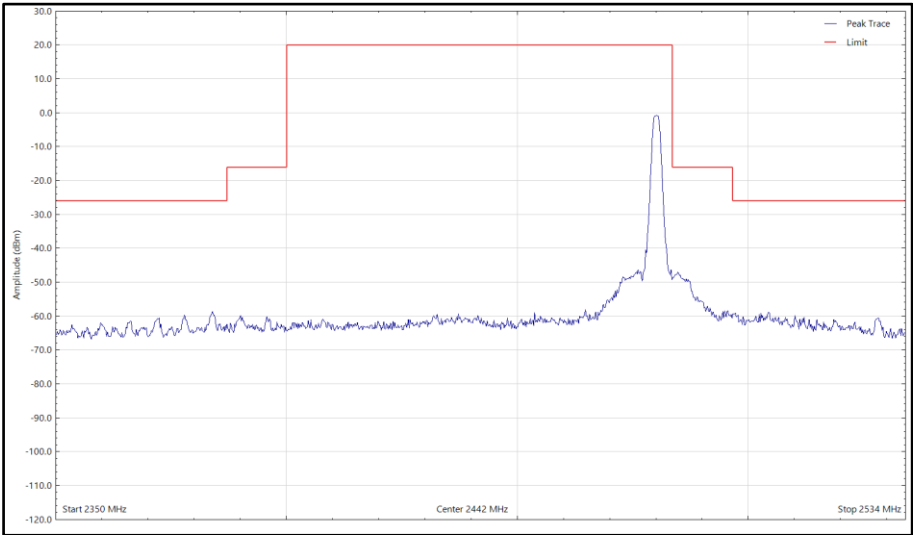


Figure 24 - CH39_LE1M, 2480 MHz, 2 GHz to 3 GHz, Vertical (Peak)

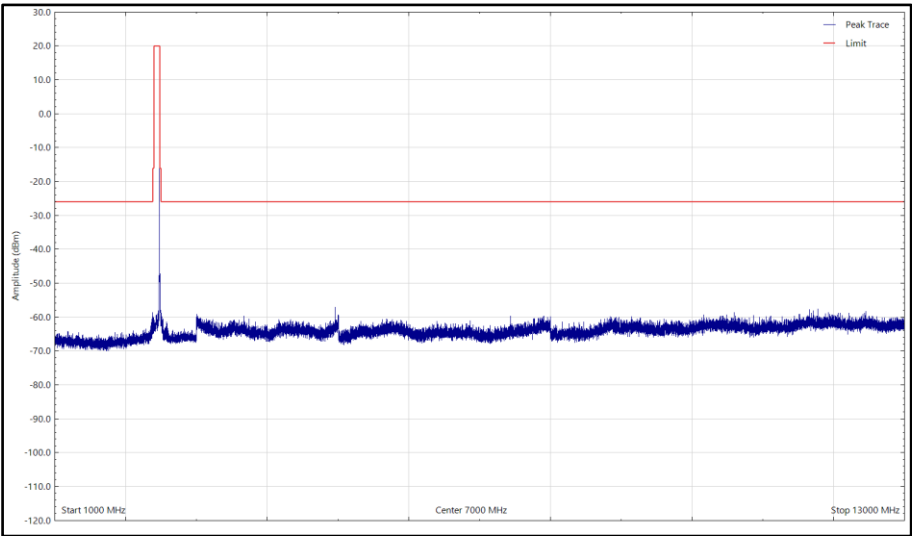


Figure 25 - CH39_LE1M, 2480 MHz, 1 GHz to 13 GHz, Vertical (Peak)



Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 40 - CH37_LE2M, 2402 MHz, 30 MHz to 13 GHz

*No emissions found within 6 dB of the limit.

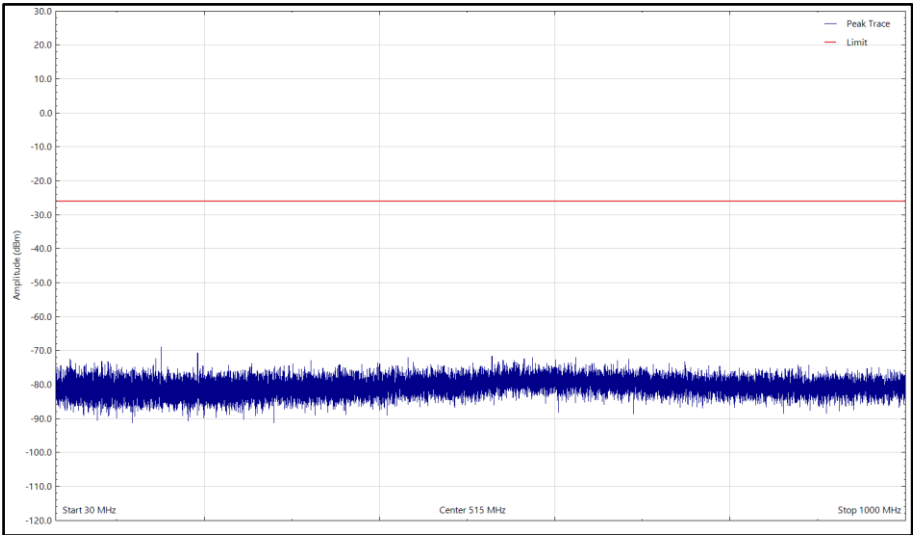


Figure 26 - CH37_LE2M, 2402 MHz, 30 MHz to 1 GHz, Vertical (Peak)

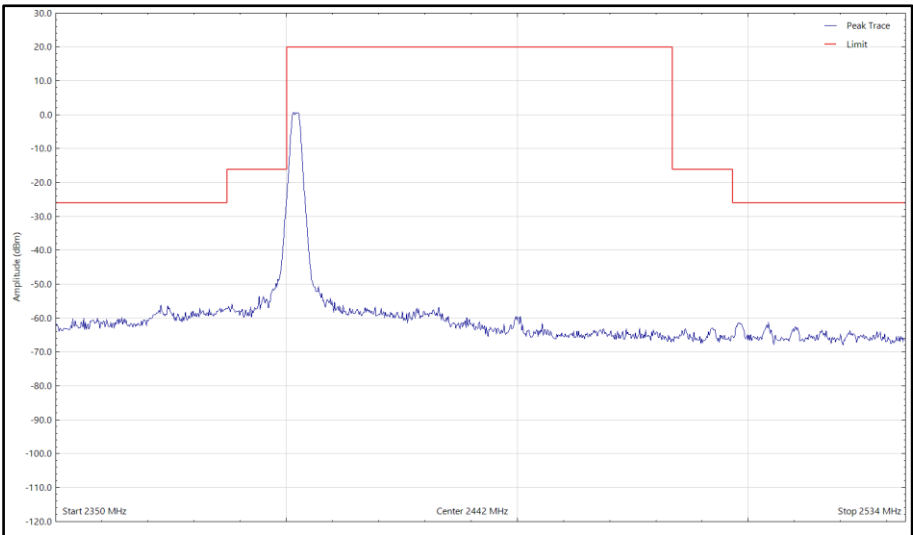


Figure 27 - CH37_LE2M, 2402 MHz, 2 GHz to 3 GHz, Vertical (Peak)

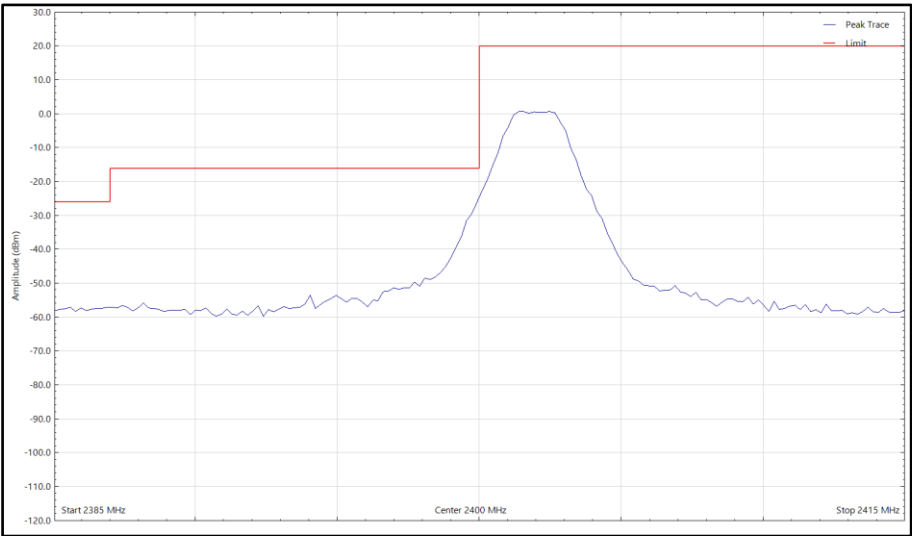


Figure 28 - CH37_LE2M, 2402 MHz, 2.385 GHz to 2.415 GHz, Vertical (Peak)

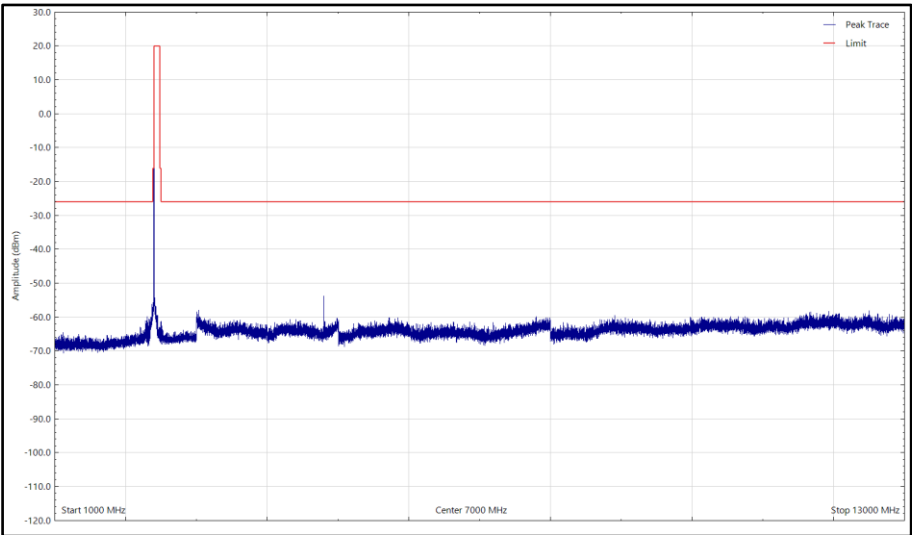


Figure 29 - CH37_LE2M, 2402 MHz, 1 GHz to 13 GHz, Vertical (Peak)



Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 41 - CH17_LE2M, 2440 MHz, 30 MHz to 13 GHz

*No emissions found within 6 dB of the limit.

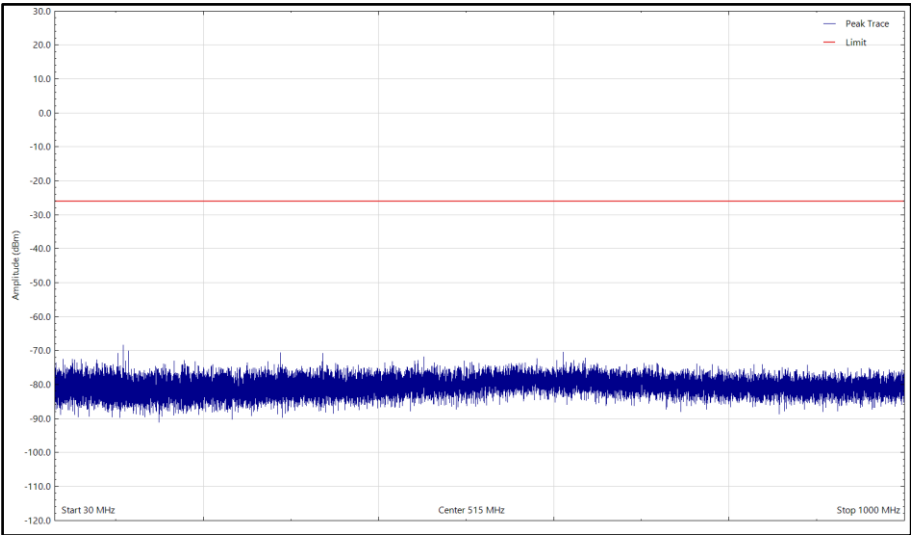


Figure 30 - CH17_LE2M, 2440 MHz, 30 MHz to 1 GHz, Vertical (Peak)

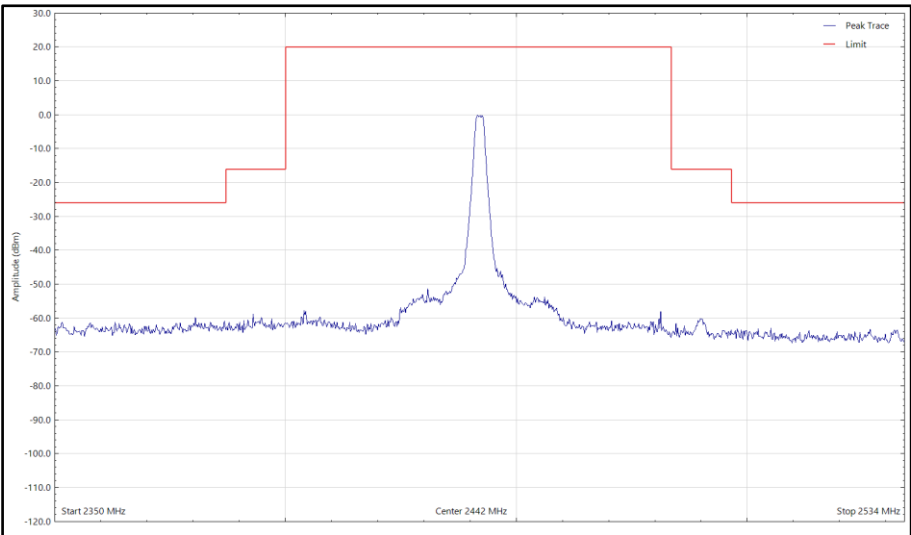


Figure 31 - CH17_LE2M, 2440 MHz, 2 GHz to 3 GHz, Vertical (Peak)

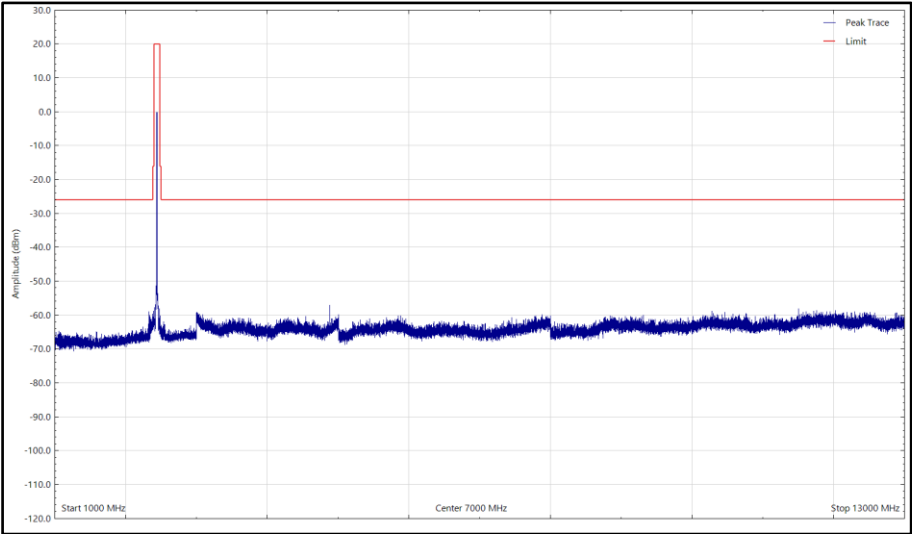


Figure 32 - CH17_LE2M, 2440 MHz, 1 GHz to 13 GHz, Vertical (Peak)



Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 42 - CH39_LE2M, 2480 MHz, 30 MHz to 13 GHz

*No emissions found within 6 dB of the limit.

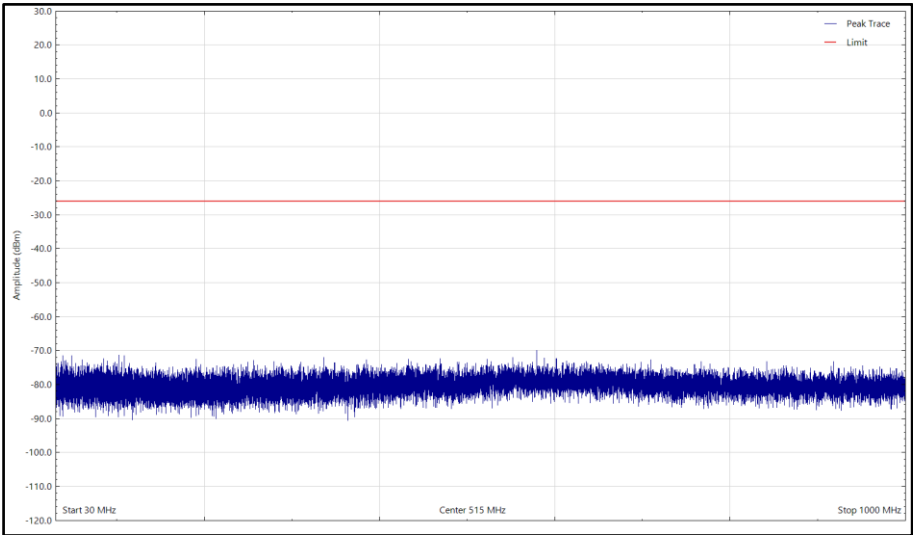


Figure 33 - CH39_LE2M, 2480 MHz, 30 MHz to 1 GHz, Vertical (Peak)

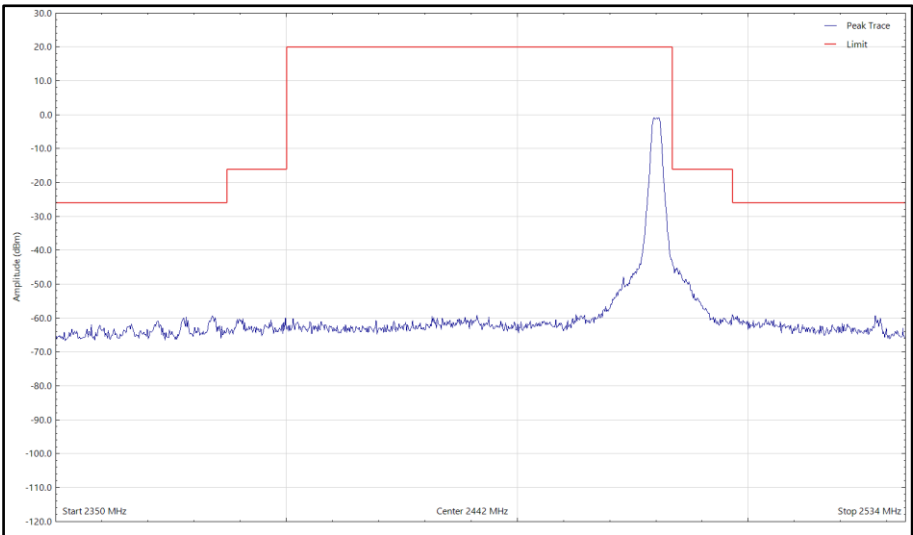


Figure 34 - CH39_LE2M, 2480 MHz, 2 GHz to 3 GHz, Vertical (Peak)

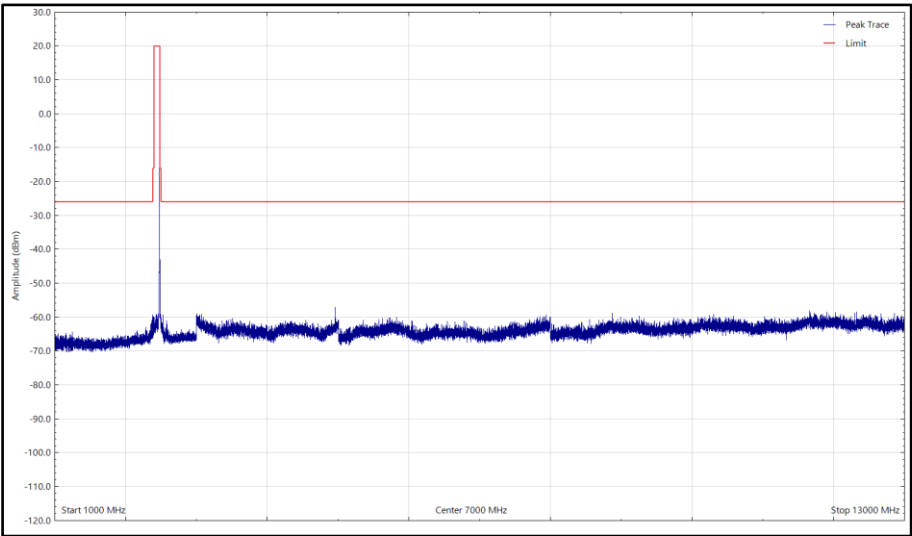


Figure 35 - CH39_LE2M, 2480 MHz, 1 GHz to 13 GHz, Vertical (Peak)

ARIB STD-T66, Limit Clause 3.2 (6)

Frequency Range	Limit
2387 MHz to 2400 MHz and 2483.5 MHz to 2496.5 MHz	25 μ W or -16 dBm
9 kHz to <2387 MHz and >2496.5 MHz to 25 GHz	2.5 μ W or -26 dBm

2.7.8 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	I-1000	3220	12	02-Dec-2025
Emissions Software	TUV SUD	EmX V3.4.2	5125	-	Software
Test Receiver	Rohde & Schwarz	ESW44	5382	12	09-Sep-2025
Cable (K-Type to K-Type, 1 m)	Junkosha	MWX241-01000KMSKMS/A	5512	12	23-May-2025
3 GHz High pass Filter	Wainwright	WHKX12-2580-3000-18000-80SS	5547	12	29-May-2025
Coaxial Fixed Attenuator DC-18GHz 5W 10dB	RF-Lambda	RFS5G18B10SMP	6172	12	18-Jul-2025

Table 43

2.8 Limit on Secondary Radiation

2.8.1 Specification Reference

ARIB STD-T66, Clause 3.3 (1) and MIC No. 88 Annex 43 (Article 2 Paragraph 1 Item 19)

2.8.2 Equipment Under Test and Modification State

HANDSET NO. 3, S/N: COD2449CC00811 - Modification State 0

2.8.3 Date of Test

14-March-2025

2.8.4 Test Method

This test was performed in accordance with ARIB STD-T66 Clause 3.3 (1).

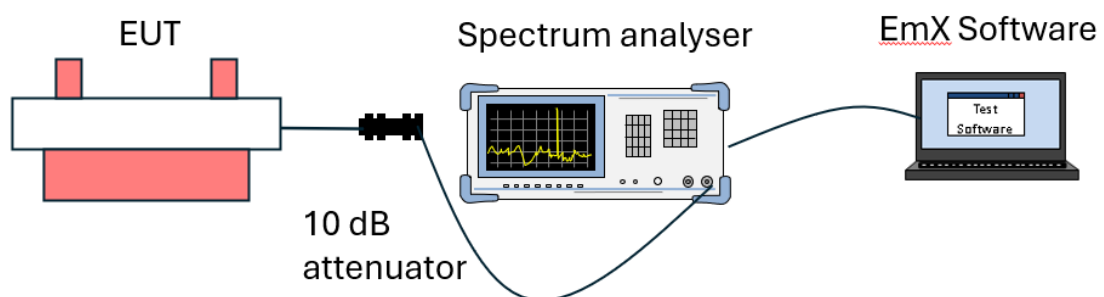
The EUT was connected via a 1m cable and 10 dB of attenuation.

A preliminary sweep was performed using EmX and for results within 10 dB a final measurement was performed.

A measurement bandwidth of 100 kHz was used for below 1 GHz and 1 MHz was used for above 1 GHz.

The EUT was battery powered and fully charged prior to testing.

2.8.5 Test Setup Diagram



2.8.6 Environmental Conditions

Ambient Temperature	20.5 °C
Relative Humidity	28.3 %



2.8.7 Test Results

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 56 - CH37_Rx, 2402 MHz, 30 MHz to 13 GHz

*No emissions found within 6 dB of the limit.

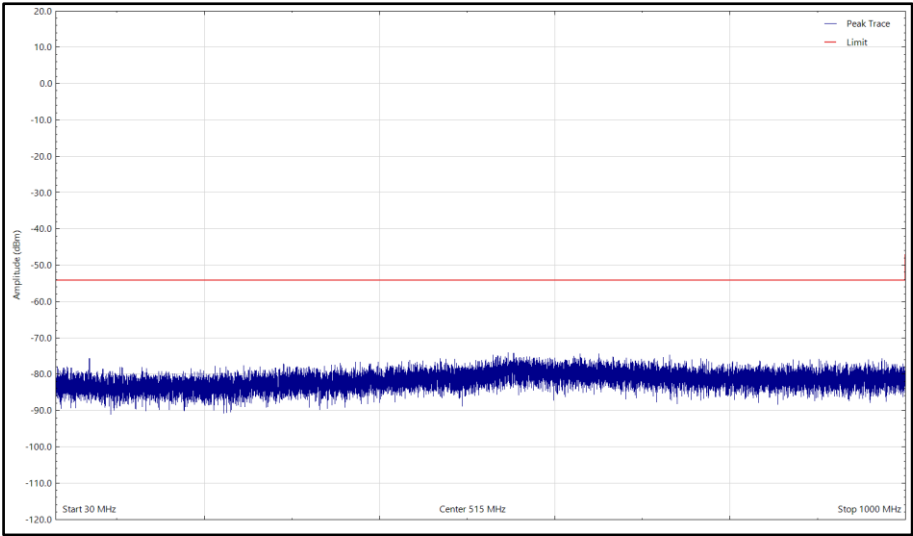


Figure 33 - CH37_Rx, 2402 MHz, 30 MHz to 1 GHz, Vertical (Peak)

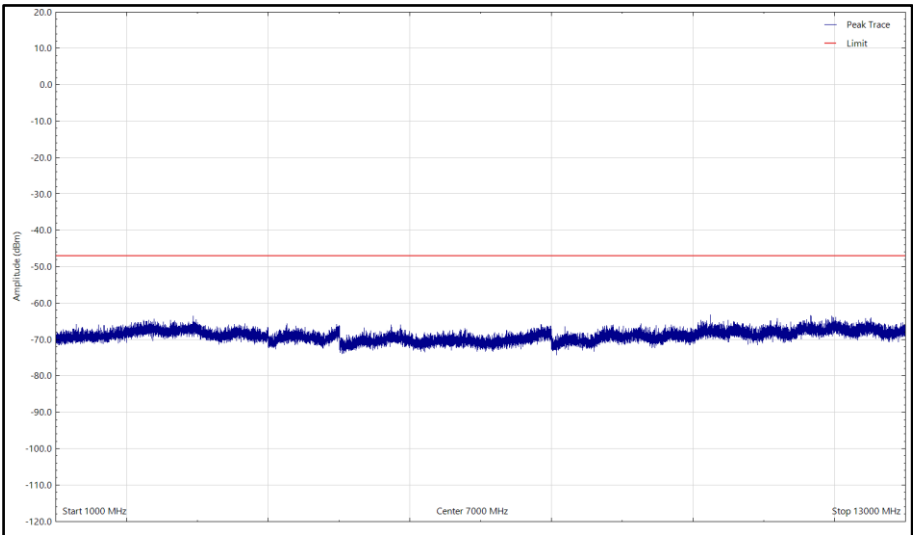


Figure 33 - CH37_Rx, 2402 MHz, 1 GHz to 13 GHz, Vertical (Peak)



Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 56 - CH17_Rx, 2440 MHz, 30 MHz to 13 GHz

*No emissions found within 6 dB of the limit.

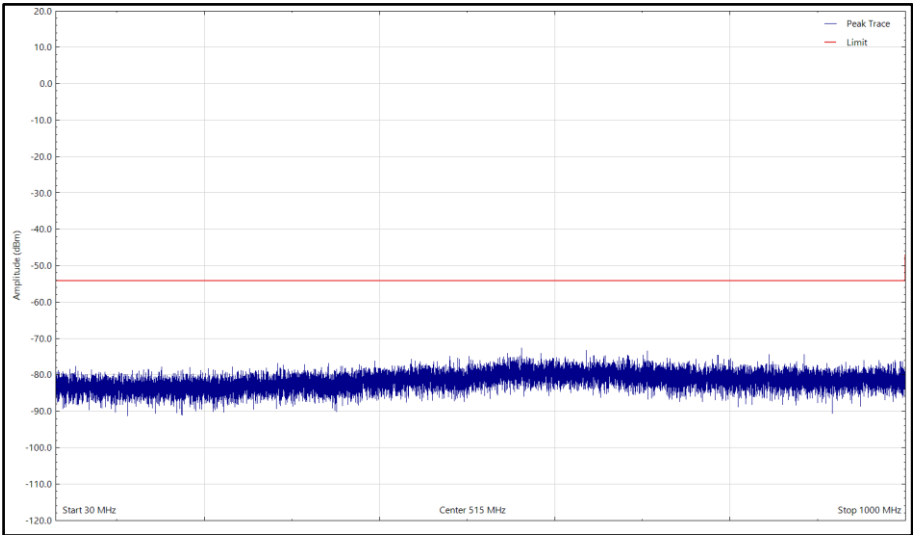


Figure 33 - CH17_Rx, 2440 MHz, 30 MHz to 1 GHz, Vertical (Peak)

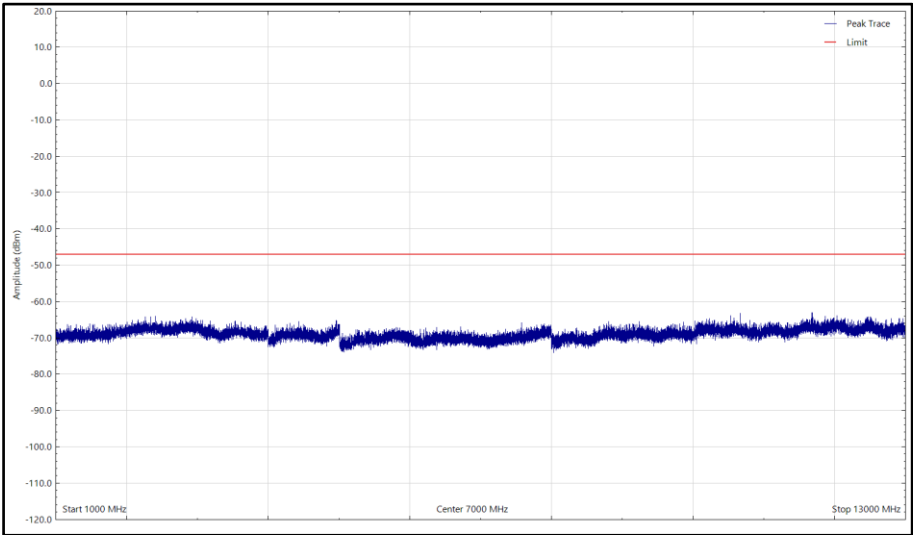


Figure 33 - CH17_Rx, 2440 MHz, 1 GHz to 13 GHz, Vertical (Peak)



Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 56 - CH39_Rx, 2480 MHz, 30 MHz to 13 GHz

*No emissions found within 6 dB of the limit.

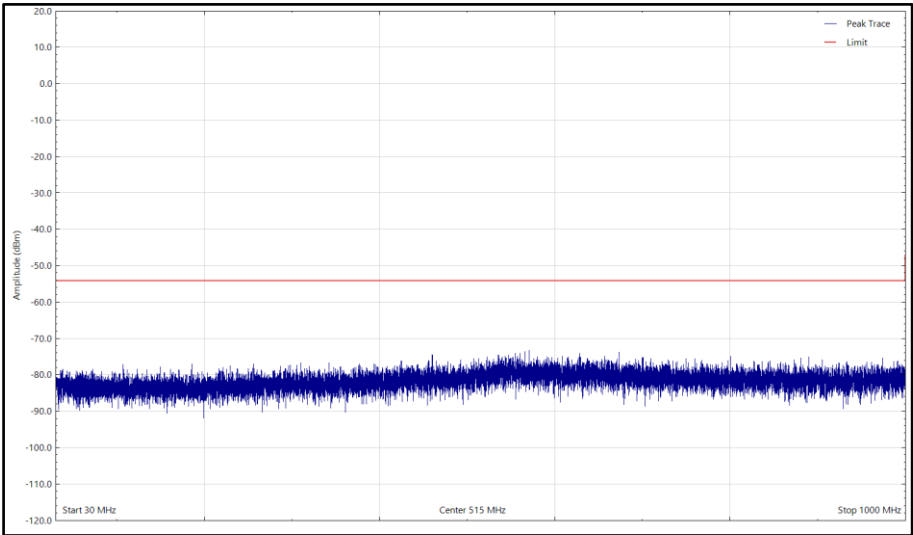


Figure 33 - CH39_Rx, 2480 MHz, 30 MHz to 1 GHz, Vertical (Peak)

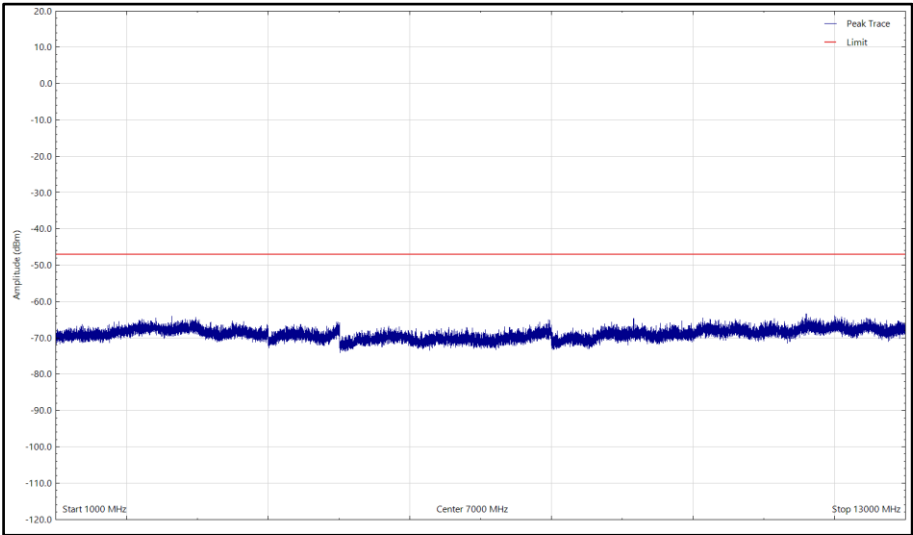


Figure 33 - CH39_Rx, 2480 MHz, 1 GHz to 13 GHz, Vertical (Peak)



ARIB STD-T66, Limit Clause 3.3 (1)

The limit at which secondary radiation will not hinder the function of other radio equipment is, if a fictional antenna circuit with the same electrical constant as the receiving antenna were to be used in calculations, at most 4nW if using a frequency below 1GHz and at most 20nW if using a frequency above or equal to 1GHz.

2.8.8 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	I-1000	3220	12	02-Dec-2025
Emissions Software	TUV SUD	EmX V3.4.2	5125	-	Software
Test Receiver	Rohde & Schwarz	ESW44	5382	12	09-Sep-2025
Cable (K-Type to K-Type, 1 m)	Junkosha	MWX241-01000KMSKMS/A	5512	12	23-May-2025
Coaxial Fixed Attenuator DC-18GHz 5W 10dB	RF-Lambda	RFS5G18B10SMP	6172	12	18-Jul-2025

Table 44

3 Photographs

3.1 Equipment Under Test (EUT)



Figure 36 – HANDSET NO. 3_Radiated Sample_Front View

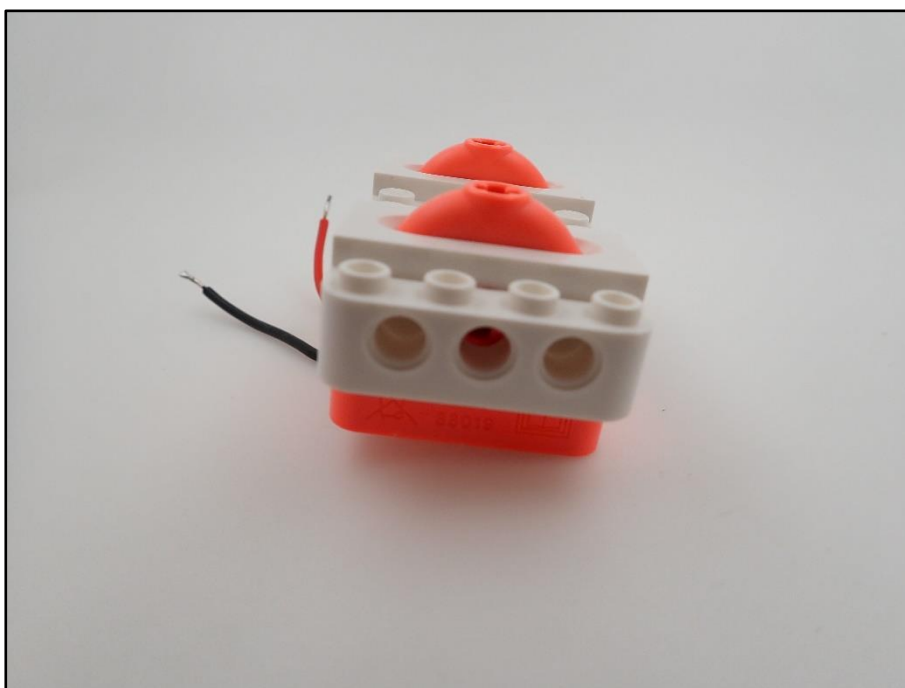


Figure 37 – HANDSET NO. 3_Radiated Sample_Side View

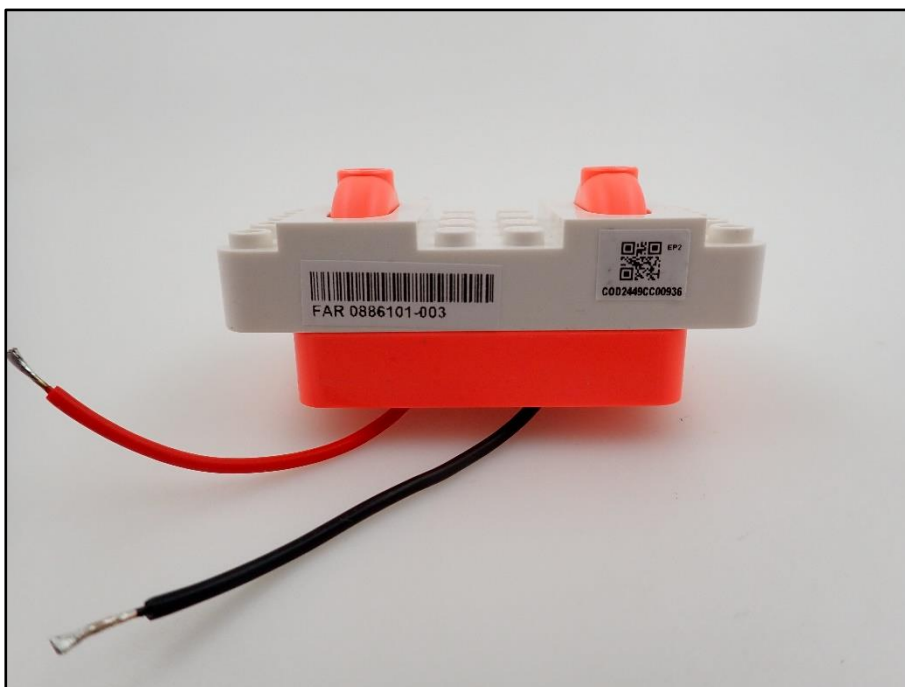


Figure 38 – HANDSET NO. 3_Radiated Sample_Rear View

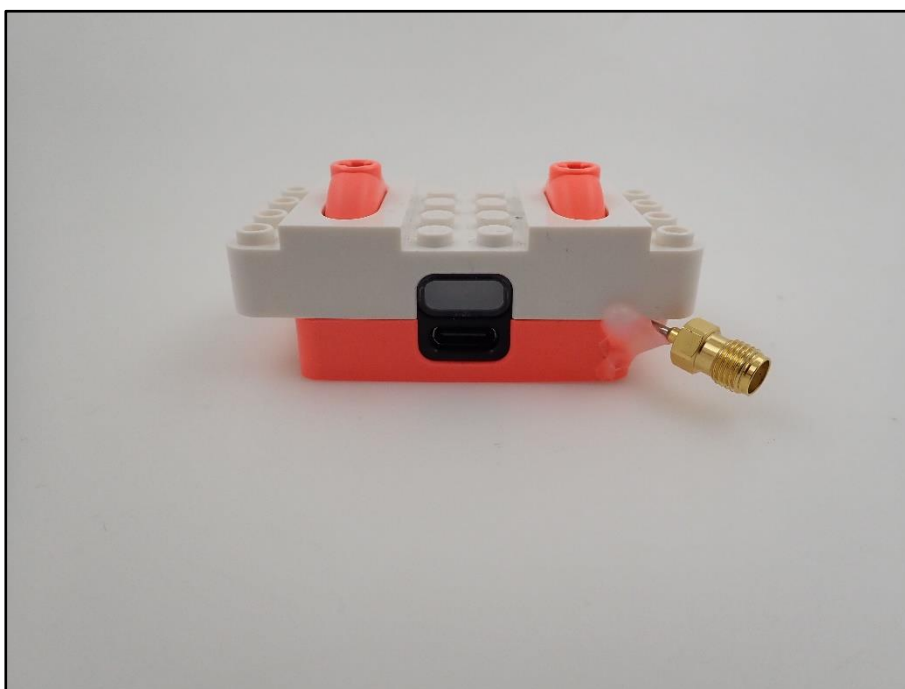


Figure 39 – HANDSET NO. 3_Conducted Sample_Front View

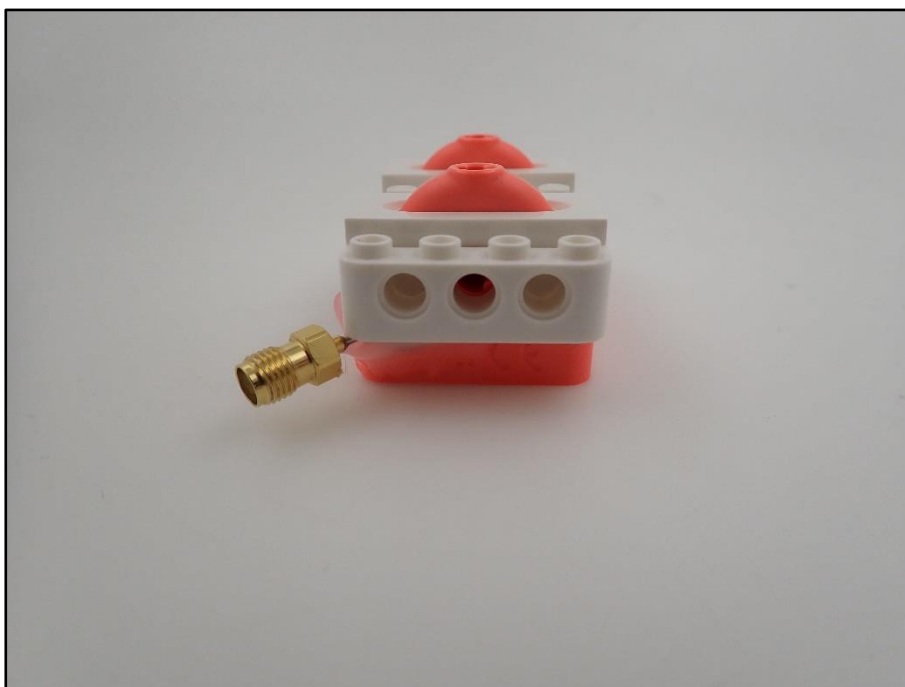


Figure 40 – HANDSET NO. 3_Conducted Sample_Side View



Figure 41 – HANDSET NO. 3_Conducted Sample_Rear View



4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Antenna Power	± 0.64 dB
Frequency Deviation	± 25.32 kHz
Allowable Value for Occupied Bandwidth	± 42.21 kHz
Voltage Variations	-
Antenna Gain	-
Interference Protection Function	-
Permissible Value of Spurious or Unnecessary Radiation Intensity	± 3.454 dB
Limit on Secondary Radiation	± 3.45 dB

Table 45

Measurement Uncertainty Decision Rule – Accuracy Method

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2021, Clause 4.4.3 (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.