

Japan Radio Law Test Report (Thread)

Applicant: Nordic Semiconductor ASA

Address of Applicant: Otto Nielsens veg 12
7052 Trondheim, Norway
Postal address: P.O Box 2336, 7004

Product Name: nRF7002 DK

Model No.: nRF7002 DK

Brand Name:  **NORDIC**
SEMICONDUCTOR

Test Standards: Article 2 Paragraph 1 of Item 19 (WW)

Date of Sample Receipt: June 09, 2025

Date of Test: June 10 to 24, 2025

Date of Report Issue:
June 25, 2025

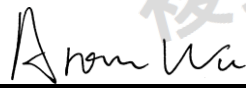
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Report Revision History

Rev.	Issue Date	Description
V00	June 25, 2025	Initial Release

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1 Laboratory Introduction

1.1 Laboratory Location

Company Name:	Shenzhen Acote Technology Co., Ltd.
Address:	Room 238, Building 2, Hongrongyuan Xiyuan, East Side of Bao'an Avenue, Shaqi Community, Xinqiao Street, Bao'an District, Shenzhen
Website:	www.acotelabs.com
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1.2 Announcement

Shenzhen Acote Technology Co., Ltd. tested the equipment in accordance with the requirements set forth in the test standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by Shenzhen Acote Technology Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Shenzhen Acote Technology Co., Ltd. will constitute fraud and shall nullify the document.

2 Equipment Under Test Information

2.1 Application Information

Applicant:	Nordic Semiconductor ASA
Address of Applicant:	Otto Nielsens veg 12 7052 Trondheim, Norway Postal address: P.O Box 2336, 7004
Manufacturer:	Nordic Semiconductor ASA
Address of Manufacturer:	Otto Nielsens veg 12 7052 Trondheim, Norway Postal address: P.O Box 2336, 7004
Factory:	InterPhone Service Sp. z o.o.
Address of Factory:	Inwestorów 8, 39-300 Mielec, Puola

2.2 Product Information

Product Name:	nRF7002 DK
Model No.:	nRF7002 DK
Description of Model Differentiation:	N/A
Hardware Version:	1.0.3
Software Version:	NCS 2.9.0

2.3 EUT Technical Parameters

Operation Frequency:	2405 MHz ~ 2480 MHz
Modulation Technology:	Other Modulation
Modulation Type:	O-QPKS
Data Speed:	250 Kbps
Channel Numbers:	16
Antenna Type:	Ceramic Antenna
Antenna Gain:	ANT1: 1.9 dBi (declared by applicant) ANT2: 1.5 dBi (declared by applicant)
Power Supply:	5Vdc
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

3 Test Information

3.1 Test Methodology

The tests documented in this report were performed in accordance with:

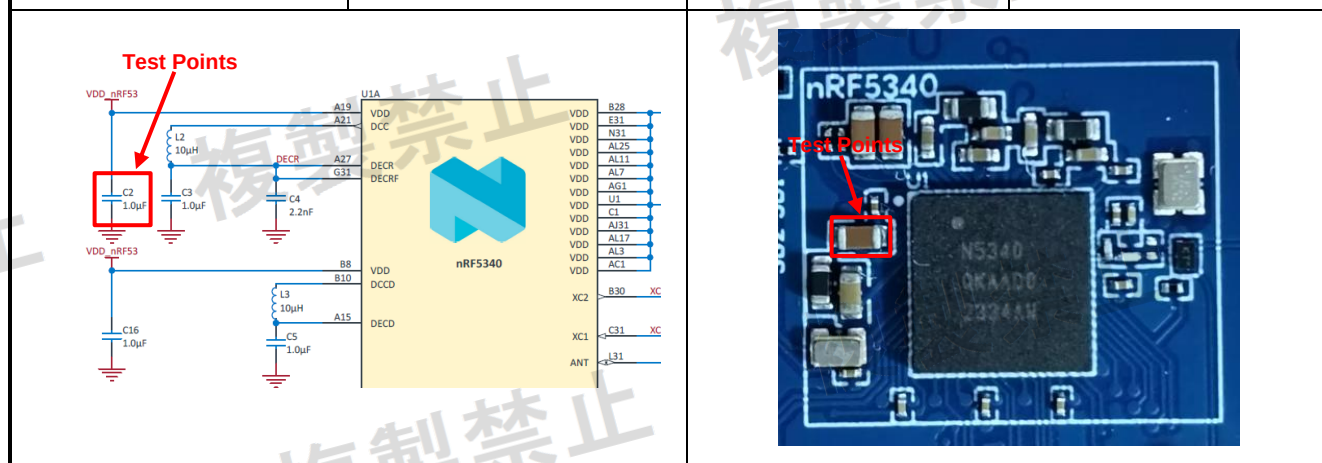
- Article 2, Paragraph 1, Item 19 (WW)
- MIC Notification No.88 of 2004, Annex 43

3.2 Test Result Summary

Report Section	Test Items	Test Result
5.1	Frequency Tolerance	Pass
5.2	Occupied Bandwidth	Pass
5.3	Strength of Spurious Emission or Unwanted Emission	Pass
5.4	Antenna Power and Tolerance	Pass
5.5	Strength of Secondary Radiated Emission	Pass
5.6	Transmitting Antenna Absolute Gain	Pass
5.7	Main Lobe Width of Transmitting Antenna	N/A
5.8	Interference Suppression Function	Pass
Remark: <i>Pass: The EUT complies with the essential requirements in the standard.</i> <i>N/A: Not applicable.</i>		

Temperature:	Normal: 24°C
Humidity:	Normal: 56% RH
Atmospheric Pressure:	1010 mbar
Test Voltage:	Nominal: 5Vdc Extreme: 4.5Vdc for low voltage, 5.5Vdc for high voltage

External power supply	IC power supply	Deviation from normal	Deviation
5.0V	1.8V	---	---
4.5V	1.8V	0.00V	0.00%
5.5V	1.8V	0.00V	0.00%



3.4 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Radio Frequency	$\pm 1.2 \times 10^{-9}$
RF Power, Conducted	± 0.64 dB
Spurious emission, Conducted	± 1.18 dB
Bandwidth, Conducted	$\pm 1 \times 10^{-8}$
Temperature	± 0.3 °C
Voltage	± 0.1 %
Humidity	± 2 %

Note: All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

3.5 Description of Support Units

The EUT was test as an independent unit.

3.6 Test Instruments List

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm/dd/yy)	Due. date (mm/dd/yy)	Cal. By	Note
Spectrum Analyzer	Keysight	N9020A	ACT-R-001	12/19/2024	12/18/2025	DEEPURE	3
Multimeter	FLUKE	F15B+	ACT-R-008	12/16/2024	12/15/2025	CCIC	3
RF Control Unit	MWRFTest	MW100-RFCB	ACT-R-004	N/A			
Test Software	MWRFTest	MTS 8310	Version: 2.0.0.0				

Note:

- 1) Calibration conducted by the National Institute of Information and Communications Technology (NICT) in Japan (hereinafter referred to as *NICT*) or a designated calibration agency under Article 102-18 paragraph (1) in JRL.
- 2) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Act (Act No.51 of 1992)
- 3) Calibration conducted in countries except Japan, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
- 4) Calibration, etc. conducted by using measuring instruments and other equipment listed in the right column of appended table No. 3, which shall have been given any type of calibration, etc. listed above from (2) to (4).

From JRL Article 24-2, paragraph 4, Item 2.

4 Test Configuration of EUT

4.1 Channels Selected to Perform the Tests

Channels	Channel No.	Frequency (MHz)
Lowest	11	2405
Middle	18	2440
Highest	26	2480

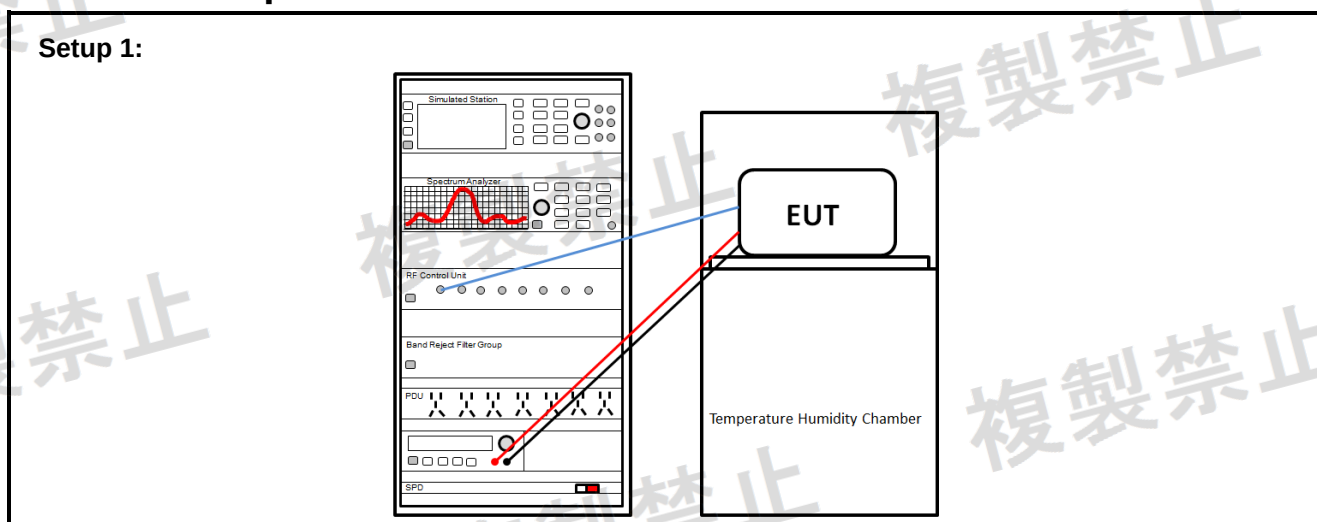
4.2 Test mode

TM 1:	Keep the EUT in continuously transmitting mode
TM 2:	Keep the EUT in continuously receiving mode
TM 3:	Keep the EUT in normal working mode

4.3 Test Configuration for Each Items

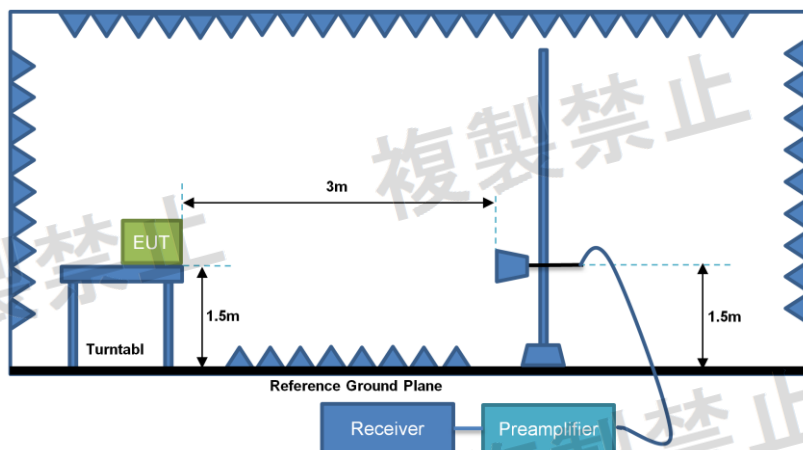
Report Section	Test Channel	Test Mode	Test Conditions
5.1	L, M, H	TM 1	N.T.
5.2	L, M, H	TM 1	N.T.
5.3	L, M, H	TM 1	N.T.
5.4	L, M, H	TM 1	N.T.
5.5	L, M, H	TM 2	N.T.
5.6	L, M, H	TM 1	N.T.
5.8	/	TM 3	N.T.
Remark: N.T.: Normal Temperature.			

4.4 Test Setup Block

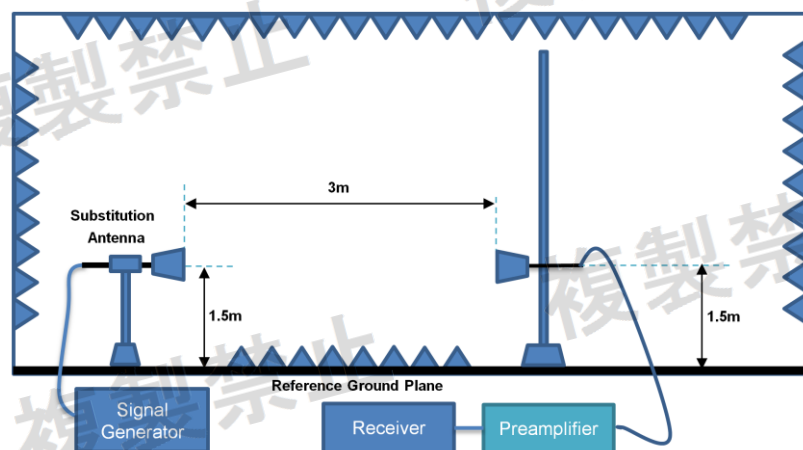




Setup 2:



Setup 3:



Setup 4:

Transmitting Identification Code



Receiving Identification Code



5 Technical requirements specification

5.1 Frequency Tolerance

5.1.1 Test Method

MIC Notification No.88 of 2004, Annex 43 section 3.

5.1.2 Limit

$\leq \pm 50$ ppm

5.1.3 Test Procedure

Options 1:

- The EUT is configured to the un-modulation mode, and transmitting at maximum power.
- The spectrum analyzer settings are as follows:
 - Test frequency: The centre frequency of the channel under test.
 - RBW = 10kHz
 - VBW = 10kHz
 - Span: Wide enough to cover the complete envelope of the signal.
 - Sweep time = Auto
 - Detect mode = Positive peak
- The frequency deviation is calculated as follows:
 - Frequency Deviation = $(f-f_c)/f_c \times 10^6$ ppm
 - f is using the mark cursor to mark the peak frequency value
 - f_c is declaring of channel frequency

Options 2:

- The EUT is configured to the modulation mode, and transmitting at maximum power.
- The spectrum analyzer settings are as follows:
 - Test frequency: The centre frequency of the channel under test.
 - RBW = 10kHz
 - VBW = 10kHz
 - Span: Wide enough to cover the complete envelope of the signal.
 - Sweep time = Auto
 - Detect mode = Positive peak
- Mark the lower frequency (f_L) and upper frequency (f_H) points of the -20dBc bandwidth.
- The frequency tolerance is calculated as follows:
 - $[(f_L + f_H)/2 - f_c]/f_c \times 10^6$
 - f_c is declaring of channel frequency

5.1.4 Test Setup

See setup 1 in section 4.4.

5.1.5 Test Instruments

Refer to section 3.6.

5.1.6 Test Results

Pass.

The detailed test data see: Appendix – Thread.

5.2 Occupied Bandwidth

5.2.1 Test Method

MIC Notification No.88 of 2004, Annex 43 section 4.

5.2.2 Limit

Occupied bandwidth: ≤ 26 MHz

5.2.3 Test Procedure

- a) The EUT is configured to the modulation mode, and transmitting at maximum power.
- b) The spectrum analyzer settings are as follows:
 - Test frequency: The centre frequency of the channel under test.
 - RBW = 300kHz
 - VBW = 300kHz
 - Span: Wide enough to cover the complete envelope of the signal.
 - Sweep time = Auto
 - Detect mode = Positive peak
 - Trace mode = Max Hold
 - Use the spectrum analyzer 99% occupied bandwidth function to measure the occupied bandwidth.

5.2.4 Test Setup

See setup 1 in section 4.4.

5.2.5 Test Instruments

Refer to section 3.6.

5.2.6 Test Results

Pass.

The detailed test data see: Appendix – Thread.

5.3 Strength of Spurious Emission or Unwanted Emission

5.3.1 Test Method

MIC Notification No.88 of 2004, Annex 43 section 5.

5.3.2 Limit

30MHz ~ 1000MHz: 2.5 μ W/MHz (-26dBm/MHz)

1000MHz ~ 2387MHz: 2.5 μ W/MHz (-26dBm/MHz)

2387MHz ~ 2400MHz: 25 μ W/MHz (-16dBm/MHz)

2483.5 MHz ~ 2496.5MHz: 25 μ W/MHz (-16dBm/MHz)

2496.5MHz ~ 12.75GHz: 2.5 μ W/MHz (-26dBm/MHz)

5.3.3 Test Procedure

- a) The EUT is configured to the modulation mode, and transmitting at maximum power.
- b) When searching for Spurious Emission or unwanted emissions, the spectrum analyzer should be set as follows:
 - Test frequency range = 30MHz to 5 times the carrier frequency
 - RBW = 100kHz, VBW = 100kHz (for 30MHz~1000MHz)
 - RBW = 1MHz, VBW = 1MHz (for above 1GHz)
 - Sweep time = Auto
 - Sweep mode = Single sweep
 - Detect mode = Positive peak
- c) When measuring the amplitude of spurious emission or unwanted emissions, the spectrum analyzer should be set as follows:
 - Center frequency = The frequency found in step b)
 - Span = 0
 - RBW = 1MHz
 - VBW = 1MHz
 - Sweep time = Auto
 - Sweep mode = Single sweep
 - Detect mode = Sample or RMS

5.3.4 Test Setup

See setup 1 in section 4.4.

5.3.5 Test Instruments

Refer to section 3.6.

5.3.6 Test Results

Pass.

The detailed test data see: Appendix – Thread.

5.4 Antenna Power and Tolerance

5.4.1 Test Method

MIC Notification No.88 of 2004, Annex 43 section 6.

5.4.2 Limit

Antenna Power: $\leq 10\text{mW}$

Tolerance: $\leq + 20\%$

5.4.3 Test Procedure

- a) Configure EUT at maximum power transmission with modulation.
- b) The spectrum analyzer settings are as follows:
 - Test Frequency: The centre frequency of the channel under test.
 - RBW $\geq$ OBW
 - VBW $\leq 3 \times$ RBW
 - Span: Wide enough to cover the complete power envelope of the signal.
 - Sweep time = Auto
 - Sweep mode = Continuous sweep
 - Detect mode = RMS
 - Trace mode = Max Hold
- c) Calculated the Maximum deviation and recorded the results:
 - Deviation = (Antenna Power – Rated Output Power) / Rated Output Power * 100%

5.4.4 Test Setup

See setup 1 in section 4.4.

5.4.5 Test Instruments

Refer to section 3.6.

5.4.6 Test Results

Pass.

The detailed test data see: Appendix – Thread.

5.5 Strength of Secondary Radiated Emission

5.5.1 Test Method

MIC Notification No.88 of 2004, Annex 43 section 7.

5.5.2 Limit

30MHz ~ 1000MHz: 4nW/100kHz (-54dBm/100kHz)

1000MHz ~ 12.75GHz: 20nW/MHz (-47dBm/MHz)

5.5.3 Test Procedure

- a) Configure EUT at continuously receiving mode.
- b) When searching for the limits of secondary radio waves, set the spectrum analyzer as follows:
 - Test frequency range = 30MHz to 5 times the carrier frequency
 - RBW = 100kHz, VBW = 100kHz (for 30MHz~1000MHz)
 - RBW = 1MHz, VBW = 1MHz (for above 1GHz)
 - Sweep time = Auto
 - Sweep mode = Single sweep
 - Detect mode = Positive peak
- c) When measuring secondary emissions, set the spectrum analyzer as follows:
 - Center frequency = Secondary emission frequency
 - Span = 0
 - RBW = 100kHz, VBW = 100kHz (for 30MHz~1000MHz)
 - RBW = 1MHz, VBW = 1MHz (for above 1GHz)
 - Sweep time = Auto
 - Sweep mode = Single sweep
 - Detect mode = Sample or RMS

5.5.4 Test Setup

See setup 1 in section 4.4.

5.5.5 Test Instruments

Refer to section 3.6.

5.5.6 Test Results

Pass.

The detailed test data see: Appendix – Thread.

5.6 Transmitting Antenna Absolute Gain

5.6.1 Test Method

MIC Notification No.88 of 2004, Annex 43 section 12.

5.6.2 Limit

EIRP: $\leq 12.14\text{dBm}$

5.6.3 Test Procedure

- The EUT is configured to the modulation mode, and transmitting at maximum power..
- Set EUT and measuring antenna at the same height and roughly facing each other.
- Move the measuring antenna height up and down within $\pm 50\text{cm}$ of EUT height and swing it to find the maximum output of the measuring antenna. The output level at the spectrum analyzer is read "E".
- Remove the EUT from the turn table and put the replacing antenna facing to measuring antenna at same height. Set the standard signal generator (SSG) at same frequency and transmit on then receive the signal.
- Swing the replacing antenna give a maximum receiving level.
- Move the measuring antenna height up and down within $\pm 50\text{cm}$ of replacing antenna height and swing it to find the maximum receiving level.
- Set SSG output power at P_t to give the equivalent output level of "E" or calculate P_t with SSG output which gives the nearest of "E" and difference ($\pm 1\text{dB}$). Record the P_t .
- Calculate EIRP by the formula below $\text{EIRP} = G_t - L + P_t$.
 - G_t : gain of replacing antenna (dBi).
 - L : feeder loss between SSG and replacing antenna.
 - P_t : Output power of the SSG.
- If the antenna for the EUT has circular polarization, sum of V-field and H-field will be result if measuring antenna is linear polarization.

5.6.4 Test Setup

See setup 2 and setup 3 in section 4.4.

5.6.5 Test Instruments

Refer to section 3.6.

5.6.6 Test Results

Pass.

The detailed test data see: Appendix – Thread.

5.7 Main Lobe Width of Transmitting Antenna

5.7.1 Test Method

MIC Notification No.88 of 2004, Annex 43 section 13.

5.7.2 Limit

The receiving power at the side lobes except the main lobe (Θ_0) is 3dB lower or more than the maximum receiving power.

5.7.3 Test Procedure

- a) Configure EUT at maximum power transmission with modulation.
- b) Put the radio equipment and the test antenna approximately to face each other.
- c) The spectrum analyzer settings are as follows:
 - Test Frequency: The centre frequency of the channel under test.
 - RBW = 1MHz
 - VBW = 1kHz
 - Span = 0
 - Detector=Peak
- d) Adjust the radio equipment rotating horizontally and vertically so as to coincide to the maximum power direction.
- e) Changing the height of the test antenna between +50cm against the height of the radio equipment and adjusting its direction too, look out a maximum point of the receiving power. The indication of the spectrum analyzer at this point is referred as "E".
- f) Using the equivalent isotropic radiation power (PE) which was already measured, calculate the allowable main lobe width (Θ_0) concerning horizontal and vertical planes. Allowable main lobe width (Θ_0) = $360/A$ here, Θ_0 : Allowable main lobe width of the transmitting antenna of the radio equipment (half-width) ($^\circ$) PE : Equivalent isotropic radiation power of the radio equipment (dBm) A : This is calculated as the equivalent isotropic radiation power divided by absolute gain 2.14dBi of transmitting antenna being fed by average antenna power 10mW (10mW/MHz for the orthogonal frequency division multiplexing system, the direct diffusion system, the frequency hopping system, the compound system of direct diffusion and frequency hopping, and the compound system of orthogonal frequency division multiplexing and frequency hopping).
- g) Rotating the radio equipment horizontally a round as possible, confirm that the receiving power at the side lobes except main lobe width (Θ_0) is lower than 3dB or more of the maximum receiving power "E".
- h) Once put the radio equipment back to the state (3). Inclining the radio equipment vertically as far as possible (more than 90 degree; it may be possible to measure referring "6. Other conditions"), confirm that the receiving power at the side lobes except main lobe width (Θ_0) is lower than 3dB or more of the maximum receiving power "E".

5.7.4 Test Setup

See setup 2 in section 4.4.

5.7.5 Test Instruments

Refer to section 3.6.

5.7.6 Test Results

N/A.

The maximum E.I.R.P. of EUT is less than 12.14 dBm, so it's unnecessary testing.

The maximum E.I.R.P is detailed test data see: Appendix – Thread.

5.8 Interference Suppression Function

5.8.1 Test Method

MIC Notification No.88 of 2004, Annex 43 section 14.

5.8.2 Requirement

- a) The demodulator shall be able to demodulate the transmitting signal from the radio equipment and to display contents of the identification code.
- b) The opposite equipment shall be able to transmit the identification code as same as the transmitting signal from the radio equipment.

5.8.3 Test Procedure

- 1) The radio equipment with automatic transmitting function of identification code:
 - a) Transmit the assigned identification code from the radio equipment.
 - b) Confirm the identification code received by the demodulator.
- 2) The radio equipment with automatic receiving function of identification code:
 - a) Transmit the assigned identification code from the opposite equipment.
 - b) Confirm that the usual communication is available.
 - c) Transmit the identification code distinct from the assigned one from the opposite equipment.
 - d) Confirm that the radio equipment is stopped or an indication is displayed as the identification code is different.

5.8.4 Test Setup

See setup 4 in section 4.4.

5.8.5 Test Instruments

Refer to section 3.6.

5.8.6 Test Results

Pass.

Identification code: f4ce36ad7e8127d5

```
uart:~$ > ot eui64  
ot eui64  
f4ce36ad7e8127d5
```



6 Test Setup Photo



7 EUT Constructional Details

Reference to the test report No.: ACTR2504002-1.

----- End of report -----