ETSI EN 300 328 V1.8.1: 2012
TEST REPORT

FOR

Product Name: 2.4 GHz IEEE 802.15.4™ RF Transceiver Module
Brand Name: Microchip
Model No.: MRF24J40MA
Model Difference: N/A
Report No.: E2/2014/80070
Issue Date: Oct. 13, 2014

Prepared for:
Microchip Technology Inc.
2355 West Chandler Blvd., Chandler,
Arizona 85224-6199, USA
SGS Taiwan Ltd.
Electronics & Communication Laboratory
No.134, Wu Kung Road, New Taipei Industrial
Park, Wuku District, New Taipei City, Taiwan
24803

Prepared by:
SGS Taiwan Ltd.
Electronics & Communication Laboratory
No.134, Wu Kung Road, New Taipei Industrial
Park, Wuku District, New Taipei City, Taiwan
24803

Note: This report shall not be reproduced except in full,
without the written approval of SGS Taiwan Ltd. This
document may be altered or revised by SGS Taiwan Ltd.
personnel only, and shall be noted in the revision section of
the document.
VERIFICATION OF COMPLIANCE

Applicant: Microchip Technology Inc.
2355 West Chandler Blvd., Chandler, Arizona 85224-6199, USA
Product Name: 2.4 GHz IEEE 802.15.4™ RF Transceiver Module
Brand Name: Microchip
Model No.: MRF24J40MA
Model Difference: N/A
File Number: E2/2014/80070
Date of test: Aug. 29, 2014 ~ Oct. 13, 2014
Date of EUT Received: Aug. 29, 2014

APPLICABLE STANDARDS

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>TEST RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETSI EN 300 328 V1.8.1: 2012</td>
<td>Complied</td>
</tr>
</tbody>
</table>

The above equipment was tested by SGS Taiwan Ltd., Electronics & Communication Laboratory for compliance with the requirements set forth in the European Standard ETSI EN 300 328 V1.8.1: 2012 under R&TTE Directive 1999/5/EC Class II. The results of testing in this report apply to the product system that was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Test By: JJ Chen
Date: Oct. 13, 2014

Prepared By: Sui Lim
Date: Oct. 13, 2014

Approved By: Jim Chang
Date: Oct. 13, 2014
### Version

<table>
<thead>
<tr>
<th>Version No.</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Oct. 13, 2014</td>
<td>Initial creation of document</td>
</tr>
</tbody>
</table>

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at [www.sgs.com/terms_and_conditions.htm](http://www.sgs.com/terms_and_conditions.htm) and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at [www.sgs.com/terms_e-document.htm](http://www.sgs.com/terms_e-document.htm). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company’s findings at the time of its intervention only and within the limits of Client’s instructions, if any. The Company’s sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.
TABLE OF CONTENTS

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) ................................................................. 5
2. DESCRIPTION OF TEST MODES .................................................................................................. 6
3. GENERAL DESCRIPTION OF APPLIED STANDARDS .............................................................. 7
4. TEST FACILITY .............................................................................................................................. 7
5. SUPPORT EQUIPMENT .................................................................................................................. 8
6. MEASUREMENT UNCERTAINTY ................................................................................................... 9
7. SUMMARY OF TEST RESULTS ..................................................................................................... 10
8. MEASUREMENT EQUIPMENT USED: .......................................................................................... 11
9. ETSI EN 300 328 SUB-CLAUSE 4.3.1.1 & 4.3.2.1 RF OUTPUT POWER ...................................... 12
10. ETSI EN 300 328 SUB-CLAUSE 4.3.2.2 POWER SPECTRAL DENSITY ........................................ 14
11. ETSI EN 300 328 SUB-CLAUSE 4.3.1.2 OR 4.3.2.3 DUTY CYCLE, TX-SEQUENCE, TX-GAP .... 16
12. ETSI EN 300 328 SUB-CLAUSE 4.3.1.3 DWELL TIME, MINIMUM FREQUENCY OCCUPATION AND HOPPING SEQUENCE ................................................................. 17
13. ETSI EN 300 328 SUB-CLAUSE 4.3.1.4 HOPPING FREQUENCY SEPARATION ......................... 19
14. ETSI EN 300 328 SUB-CLAUSE 4.3.1.5 OR 4.3.2.4 MEDIUM UTILISATION ............................ 20
15. ETSI EN 300 328 SUB-CLAUSE 4.3.1.6 OR 4.3.2.5 ADAPTIVITY (ADAPTIVE FREQUENCY HOPPING) ................................................................................................................................. 21
16. ETSI EN 300 328 SUB-CLAUSE 4.3.1.7 OR 4.3.2.6 OCCUPIED CHANNEL BANDWIDTH .......... 25
17. ETSI EN 300 328 SUB-CLAUSE 4.3.1.8 OR 4.3.2.7 TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN ................................................................. 27
18. ETSI EN 300 328 SUB-CLAUSE 4.3.1.9 OR 4.3.2.8 TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN ............................................................................................................................. 30
19. TSI EN 300 328 SUB-CLAUSE 4.3.1.10 OR 4.3.2.9 RECEIVER SPURIOUS EMISSIONS ........... 33
20. ETSI EN 300 328 SUB-CLAUSE 4.3.1.11 & 4.3.2.10 RECEIVER BLOCKING ............................. 35

PHOTOGRAPHS OF SET UP ................................................................................................................ 37

PHOTOGRAPHS OF EUT ......................................................................................................................... 39

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company’s findings at the time of its intervention only and within the limits of Client’s instructions, if any. The Company’s sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.
1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

<table>
<thead>
<tr>
<th>General:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Name:</strong></td>
</tr>
<tr>
<td>2.4 GHz IEEE 802.15.4™ RF Transceiver Module</td>
</tr>
<tr>
<td><strong>Brand Name:</strong></td>
</tr>
<tr>
<td>Microchip</td>
</tr>
<tr>
<td><strong>Model No.:</strong></td>
</tr>
<tr>
<td>MRF24J40MA</td>
</tr>
<tr>
<td><strong>Model Difference:</strong></td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td><strong>Hardware Version:</strong></td>
</tr>
<tr>
<td>Rev3</td>
</tr>
<tr>
<td><strong>Software Version:</strong></td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td><strong>Power Supply:</strong></td>
</tr>
<tr>
<td>3.3Vdc from power supply</td>
</tr>
<tr>
<td><strong>Operation Frequency:</strong></td>
</tr>
<tr>
<td>2405~2480MHz</td>
</tr>
<tr>
<td><strong>Channel number:</strong></td>
</tr>
<tr>
<td>16 channels</td>
</tr>
<tr>
<td><strong>Channel Spacing:</strong></td>
</tr>
<tr>
<td>5MHz</td>
</tr>
<tr>
<td><strong>Modulation Type:</strong></td>
</tr>
<tr>
<td>DSSS</td>
</tr>
<tr>
<td><strong>Transmit Power:</strong></td>
</tr>
<tr>
<td>2.79dBm EIRP</td>
</tr>
<tr>
<td><strong>Antenna Designation:</strong></td>
</tr>
<tr>
<td>PCB Antenna, 2.09dBi</td>
</tr>
</tbody>
</table>
2. DESCRIPTION OF TEST MODES

The EUT has been tested under Operating and standby condition. And used to control the EUT for staying in engineering mode that enables selectable of channel, and capable of continuous transmitting and constant receiving mode.

RF output power
Zigbee: Lowest (2405MHz), Mid (2440MHz) and Highest (2480MHz)

Power Density
Zigbee: Lowest (2405MHz), Mid (2440MHz) and Highest (2480MHz)

Occupied Bandwidth:
Zigbee: Lowest (2405MHz) and Highest (2480MHz)

Transmitter unwanted emissions in the out-of-band domain:
Zigbee: Lowest (2405MHz), Mid (2440MHz) and Highest (2480MHz)

Transmitter unwanted emissions in the spurious domain:
Zigbee: Lowest (2405MHz) and Highest (2480MHz)

Receiving Spurious Emission:
Zigbee: Lowest (2405MHz) and Highest (2480MHz)
Normal test conditions:
Temperature: +15 °C to 35 °C
Relative humidity: 20 % to 75 %

Normal power source

The normal test voltage for the equipment shall be the nominal voltage for which the equipment was designed. (3.3Vdc)

Extreme Condition:

Extreme temperatures

For tests at extreme temperatures, measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.

Low Temperature: -40 °C
High Temperature: 85 °C

Extreme power source voltages

For tests at extreme voltages, measurements shall be made over the extremes of the power source voltage range as declared by the manufacturer.

When the equipment under test is designed for operation as part of and powered by another system or piece of equipment, than the limit values of the host equipment or combined equipment as stated by the manufacturer shall apply to the combination to be tested.

Normal Voltage: 3.3Vdc

3. GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT According to the Specifications, it must comply with the requirements of the following standards:

ETSI EN 300 328 V1.8.1 : 2012 – Electromagnetic compatibility and Radio spectrum Matters (ERM) ; Wideband transmission systems; Data transmission equipment operating in the 2.4GHz ISM band and using wide band modulation techniques:

4. TEST FACILITY

SGS Taiwan Ltd.
Electronics & Communication Laboratory
No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803.
A 11m*6m*6m fully anechoic chamber was used for the radiated spurious emissions test.
5. SUPPORT EQUIPMENT

Fig. 5-1 Configuration of Tested System

Table 5-1 Equipment Used in Tested System

<table>
<thead>
<tr>
<th>Item</th>
<th>Equipment</th>
<th>Mfr/Brand</th>
<th>Model/Type No.</th>
<th>Series No.</th>
<th>Data Cable</th>
<th>Power Cord</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Test Software</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2.</td>
<td>Notebook</td>
<td>Lenovo</td>
<td>L412</td>
<td>LR-027LM</td>
<td>shielding</td>
<td>Un-shielding</td>
</tr>
<tr>
<td>3.</td>
<td>DC power supply</td>
<td>DHA</td>
<td>DPS-3003</td>
<td>9411005787</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
6. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been calculated in accordance with TR 100 028-1.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

This lab’s measurement uncertainty ULab, is low than Table 7: Maximum measurement uncertainty of ETSI EN 300 328, therefore compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Uncertainty Criterion</th>
<th>Measurement Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupied Channel Bandwidth</td>
<td>□ 5%</td>
<td>0.4%</td>
</tr>
<tr>
<td>RF Output Power, conducted</td>
<td>□ 1.5 dB</td>
<td>1.13 dB</td>
</tr>
<tr>
<td>Power Spectral Density, conducted</td>
<td>□ 3 dB</td>
<td>2.35 dB</td>
</tr>
<tr>
<td>Unwanted Emission, conducted</td>
<td>□ 3 dB</td>
<td>2.39 dB</td>
</tr>
<tr>
<td>Time</td>
<td>□ 5%</td>
<td>0.585%</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>□ 5%</td>
<td>0.585%</td>
</tr>
<tr>
<td>Temperature</td>
<td>□ 1 □</td>
<td>0.8 □</td>
</tr>
<tr>
<td>Humidity</td>
<td>□ 5%</td>
<td>4.7%</td>
</tr>
<tr>
<td>DC and low frequency voltages</td>
<td>□ 3%</td>
<td>1.0%</td>
</tr>
<tr>
<td>All emissions, radiated</td>
<td>□ 6 dB</td>
<td>5.04 dB</td>
</tr>
</tbody>
</table>
### 7. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<table>
<thead>
<tr>
<th>Clause</th>
<th>Test Parameter</th>
<th>Remarks</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3.1.1 or 4.3.2.1</td>
<td>RF Output Power</td>
<td>Applicable</td>
<td>Pass</td>
</tr>
<tr>
<td>4.3.2.2</td>
<td>Power Spectral Density</td>
<td>Applicable</td>
<td>Pass</td>
</tr>
<tr>
<td>4.3.1.2 or 4.3.2.3</td>
<td>Duty cycle, Tx-Sequence, Tx-gap</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4.3.1.3</td>
<td>Dwell time, Minimum Frequency Occupation &amp; Hopping Sequence</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4.3.1.4</td>
<td>Hopping Frequency Separation</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4.3.1.5 or 4.3.2.4</td>
<td>Medium Utilisation</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4.3.1.6 or 4.3.2.5</td>
<td>Adativity</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4.3.1.7 or 4.3.2.6</td>
<td>Occupied Channel Bandwidth</td>
<td>Applicable</td>
<td>Pass</td>
</tr>
<tr>
<td>4.3.1.8 or 4.3.2.7</td>
<td>Transmitter unwanted emissions in the OOB domain</td>
<td>Applicable</td>
<td>Pass</td>
</tr>
<tr>
<td>4.3.1.9 or 4.3.2.8</td>
<td>Transmitter unwanted emissions in the spurious domain</td>
<td>Applicable</td>
<td>Pass</td>
</tr>
<tr>
<td>4.3.1.10 or 4.3.2.9</td>
<td>Receiver spurious emissions</td>
<td>Applicable</td>
<td>Pass</td>
</tr>
<tr>
<td>4.3.1.11 or 4.3.2.10</td>
<td>Receiver Blocking</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company’s findings at the time of its intervention only and within the limits of Client’s instructions, if any. The Company’s sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.
Member of SGS Group
### 8. MEASUREMENT EQUIPMENT USED:

#### 8.1. Conducted Emission

<table>
<thead>
<tr>
<th>EQUIPMENT TYPE</th>
<th>MFR</th>
<th>MODEL NUMBER</th>
<th>SERIAL NUMBER</th>
<th>LAST CAL.</th>
<th>CAL DUE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXA Spectrum Analyzer</td>
<td>Agilent</td>
<td>N9030A</td>
<td>MY53120760</td>
<td>01/04/2014</td>
<td>01/03/2015</td>
</tr>
<tr>
<td>Temperature Chamber</td>
<td>TERCHY</td>
<td>MHG-120LF</td>
<td>911009</td>
<td>05/07/2014</td>
<td>05/06/2015</td>
</tr>
<tr>
<td>DC Block</td>
<td>Mini-Circuits</td>
<td>BLK-18-S+</td>
<td>1</td>
<td>02/27/2014</td>
<td>02/26/2015</td>
</tr>
<tr>
<td>Attenuator</td>
<td>Mini-Circuit</td>
<td>BW-S10W2+</td>
<td>002</td>
<td>02/27/2014</td>
<td>02/26/2015</td>
</tr>
<tr>
<td>Splitter</td>
<td>RF-LAMBAD</td>
<td>RFLT2W1G18G</td>
<td>11-JSPF412-01</td>
<td>02/27/2014</td>
<td>02/26/2015</td>
</tr>
<tr>
<td>DC Power Supply</td>
<td>Agilent</td>
<td>E3640A</td>
<td>MY52410006</td>
<td>11/07/2013</td>
<td>11/06/2014</td>
</tr>
<tr>
<td>Power Sensor</td>
<td>Agilent</td>
<td>U2021X</td>
<td>MY53480015</td>
<td>01/30/2014</td>
<td>01/29/2015</td>
</tr>
<tr>
<td>Power Sensor</td>
<td>Agilent</td>
<td>U2021X</td>
<td>MY53480018</td>
<td>01/28/2014</td>
<td>01/27/2015</td>
</tr>
<tr>
<td>Simultaneous Sampling</td>
<td>Agilent</td>
<td>U2531A</td>
<td>TW54033511</td>
<td>01/17/2014</td>
<td>01/16/2015</td>
</tr>
</tbody>
</table>
9. **ETSI EN 300 328 SUB-CLAUSE 4.3.1.1 & 4.3.2.1 RF OUTPUT POWER**

**9.1. Limit:**

**FHSS:**

The maximum RF output power for adaptive Frequency Hopping equipment shall be equal to or less than 20 dBm. The maximum RF output power for non-adaptive Frequency Hopping equipment, shall be declared by the supplier. See clause 5.3.1 m). The maximum RF output power for this equipment shall be equal to or less than the value declared by the supplier. This declared value shall be equal to or less than 20 dBm.

**Other than FHSS:**

For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm. The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.3.1 m). For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

**9.2. Measurement Equipment Used:**

Refer to section 8.1 in this report.

**9.3. Test Setup:**

Temperature Chamber

- Spectrum analyzer
- AV power meter
- Variable AC or DC power supply
- EUT (Equipment Under Test)
- Sensor

**9.4. Test Procedure:**

- See Sub-Clause 5.3.2 of ETSI EN 300 328 for the test conditions
- See Sub-Clause 5.3.2.2.1 of ETSI EN 300 328 for conducted measurement method.
9.5. Equivalent Isotropic Radiated Power E.I.R.P.

Test Mode: 2.4GHz ZigBee

Antenna assembly gain: 2.09 dBi

\[ \text{EIRP} = \text{Pburst (Burst Power)} + \text{Antenna gain} \]

<table>
<thead>
<tr>
<th>TEST CONDITIONS</th>
<th>TRANSMITTER POWER (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lowest Frequency (CH Low)</td>
</tr>
<tr>
<td>Temp (-40)°C</td>
<td>EIRP = 2.79 dBm, Pburst = 0.70 dBm</td>
</tr>
<tr>
<td>Temp (25)°C</td>
<td>EIRP = 2.09 dBm, Pburst = 0.00 dBm</td>
</tr>
<tr>
<td>Temp (85)°C</td>
<td>EIRP = 1.79 dBm, Pburst = -0.30 dBm</td>
</tr>
<tr>
<td>Limit</td>
<td>20dBm</td>
</tr>
</tbody>
</table>

Note: 1. E.I.R.P. shall be calculated from the above measured power output A, and the applicable antenna assembly gain “G” in dBi.

2. \( \text{Pburst} \) is the value at antenna port.

*offset: 1.00dB being set in compensation for the cable loss
10. ETSI EN 300 328 SUB-CLAUSE 4.3.2.2 POWER SPECTRAL DENSITY

10.1. Limit:
For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm per MHz.

10.2. Measurement Equipment Used:
Refer to section 8.1 in this report.

10.3. Test Setup:
Refer to section 9.3 in this report.

10.4. Test Procedure:
See Sub-Clause 5.3.3 of ETSI EN 300 328 for the test conditions

See Sub-Clause 5.3.3.2.1 of ETSI EN 300 328 for conducted measurement method.
10.5. Test Result:

Test Mode: 2.4GHz ZigBee

<table>
<thead>
<tr>
<th>TEST CONDITIONS</th>
<th>Power Density</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CH Low</td>
</tr>
<tr>
<td>Temp(25)°C</td>
<td></td>
</tr>
<tr>
<td>Vnom 3.3 V</td>
<td>0.29</td>
</tr>
<tr>
<td>Measured power density Reading(A) / dBm</td>
<td></td>
</tr>
</tbody>
</table>

Test Date: 09/18/2014
11. **ETSI EN 300 328 SUB-CLAUSE 4.3.1.2 OR 4.3.2.3 DUTY CYCLE, TX-SEQUENCE, TX-GAP**

11.1. **Limit:**
For non-adaptive FHSS equipment, the Duty Cycle shall be equal to or less than the maximum value declared by the supplier. In addition, the maximum Tx-sequence time shall be 5 ms while the minimum Tx-gap time shall be 5 ms.

11.2. **Measurement Equipment Used:**
Refer to section 8.1 in this report.

11.3. **Test Setup:**
Refer to section 9.3 in this report.

11.4. **Test Procedure:**
See Sub-Clause 5.3.2 of ETSI EN 300 328 for the test conditions

See Sub-Clause 5.3.2.2.1.2 of ETSI EN 300 328 for conducted measurement method.

11.5. **Test Result:**
N/A for Modulation Technology other than FHSS
12. ETSI EN 300 328 SUB-CLAUSE 4.3.1.3 DWELL TIME, MINIMUM FREQUENCY OCCUPATION AND HOPPING SEQUENCE

12.1. Limit:

Non-adaptive frequency hopping systems
The accumulated Dwell Time on any hopping frequency shall not be greater than 15 ms within any period of 15 ms multiplied by the minimum number of hopping frequencies (N) that have to be used. Non-adaptive medical devices requiring reverse compatibility with other medical devices placed on the market when earlier versions of the present document were harmonised, are allowed to have an operating mode in which the maximum dwell time is 400 ms. The hopping sequence(s) shall contain at least N hopping frequencies where N is 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater. The Minimum Frequency Occupation Time shall be equal to one dwell time within a period not exceeding four times the product of the dwell time per hop and the number of hopping frequencies in use.

Adaptive frequency hopping systems
Adaptive Frequency Hopping systems shall be capable of operating over a minimum of 70 % of the band specified in clause 1. The maximum accumulated dwell time on any hopping frequency shall be 400 ms within any period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used. The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater. The Minimum Frequency Occupation Time shall be equal to one dwell time within a period not exceeding four times the product of the dwell time per hop and the number of hopping frequencies in use.

Other Requirements
Frequency Hopping equipment shall transmit on a minimum of two hopping frequencies.
For non-Adaptive Frequency Hopping equipment, when not transmitting on a hopping frequency, the equipment has to occupy that frequency for the duration of the typical dwell time.
For Adaptive Frequency Hopping systems using LBT based DAA, if a signal is detected during the CCA, these systems may jump immediately to the next frequency in the hopping sequence (see clause 4.3.1.6.1.2 point 2) provided the limit for maximum dwell is respected.

12.2. Measurement Equipment Used:
Refer to section 8.1 in this report.

12.3. Test Setup:
Refer to section 9.3 in this report.

12.4. Test Procedure:
See Sub-Clause 5.3.4.1 of ETSI EN 300 328 for the test conditions
See Sub-Clause 5.3.4.2 of ETSI EN 300 328 for conducted measurement method.
12.5. Test Result:
12.5.1. Dwell Time:
N/A for Modulation Technology other than FHSS

12.5.2. Hopping channel Result:
N/A for Modulation Technology other than FHSS

12.5.3. Hopping sequence
N/A for Modulation Technology other than FHSS
13. ETSI EN 300 328 SUB-CLAUSE 4.3.1.4 HOPPING FREQUENCY SEPARATION

13.1 Limit:

**Non-adaptive frequency hopping systems**
The minimum Hopping Frequency Separation shall be equal to Occupied Channel Bandwidth (see clause 4.3.1.7) of a single hop, with a minimum separation of 100 kHz.

**Adaptive frequency hopping systems**
The minimum Hopping Frequency Separation shall be 100 kHz.

13.2. Measurement Equipment Used:
Refer to section 8.1 in this report.

13.3. Test Setup:
Refer to section 9.3 in this report.

13.4. Test Procedure:
See Sub-Clause 5.3.5 of ETSI EN 300 328 for the test conditions

See Sub-Clause 5.3.5.2 of ETSI EN 300 328

13.5. Test Result:
N/A for Modulation Technology other than FHSS
14. ETSI EN 300 328 SUB-CLAUSE 4.3.1.5 OR 4.3.2.4 MEDIUM UTILISATION

14.1. Limit:

The maximum Medium Utilisation factor for non-adaptive Frequency Hopping equipment shall be 10%.

14.2. Measurement Equipment Used:

Refer to section 8.1 in this report.

14.3. Test Setup:

Refer to section 9.3 in this report.

14.4. Test Procedure:

See Sub-Clause 5.3.2 of ETSI EN 300 328 for the test conditions

See Sub-Clause 5.3.2.2.1.3 of ETSI EN 300 328

14.5. Test Result:

N/A for equipments that employs the adaptive mechanism. This given UE implements adaptive mechanism to identify transmission of likely presence in the band.
15. ETSI EN 300 328 SUB-CLAUSE 4.3.1.6 OR 4.3.2.5 ADAPTIVITY (ADAPTIVE FREQUENCY HOPPING)

15.1. Requirement & Limits:

Adaptive Frequency Hopping using LBT based DAA

Adaptive Frequency Hopping equipment using LBT based DAA shall comply with the following minimum set of requirements:

1) At the start of every dwell time, before transmission on a hopping frequency, the equipment shall perform a Clear Channel Assessment (CCA) check using energy detect. The CCA observation time shall be not less than 0.2 % of the Channel Occupancy Time (see step 3) with a minimum of 20 μs. If the equipment finds the hopping frequency to be clear, it may transmit immediately (see step 3).

2) If it is determined that a signal is present with a level above the detection threshold defined in step 5, the hopping frequency shall be marked as 'unavailable'. Then the equipment may jump to the next frequency in the hopping scheme even before the end of the dwell time, but in that case the 'unavailable' channel can not be considered as being 'occupied' and shall be disregarded with respect to the requirement to maintain a minimum of 15 hopping frequencies. Alternatively, the equipment can remain on the frequency during the remainder of the dwell time. However, if the equipment remains on the frequency with the intention to transmit, it shall perform an extended CCA check in which the (unavailable) channel is observed for a random duration between the value defined for the CCA observation time in step 1 and 5 % of the Channel Occupancy Time defined in step 3. If the extended CCA check has determined the frequency to be no longer occupied, the hopping frequency becomes available again. The CCA observation time used by the equipment shall be declared by the supplier.

3) The total time during which an equipment has transmissions on a given hopping frequency without re-evaluating the availability of that frequency is defined as the Channel Occupancy Time. The Channel Occupancy Time for a given hopping frequency, which starts immediately after a successful CCA, shall be less than 60 ms followed by an Idle Period of minimum 5 % of the Channel Occupancy Time with a minimum of 100 μs. After this, the procedure as in step 1 shall be repeated before having new transmissions on this hopping frequency during the same dwell time.

EXAMPLE: A system with a dwell time of 400 ms can have 6 transmission sequences of 60 ms each, Separated with an Idle Period of 3 ms. Each transmission sequence was preceded with a successful CCA check of 120 μs.

NOTE: For LBT based frequency hopping systems with a dwell time < 60 ms, the maximum Channel Occupancy Time is limited by the dwell time.

4) Unavailable' channels may be removed from or may remain in the hopping sequence, but in any case:
- there shall be no transmissions on 'unavailable' channels;
- a minimum of 15 hopping frequencies shall always be maintained.
5) The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal or lower than -70 dBm/MHz at the input to the receiver (assuming a 0 dBi receive antenna). For power levels below 20 dBm e.i.r.p., the detection threshold level may be relaxed to TL = -70 dBm/MHz + 20 - Pout e.i.r.p. (Pout in dBm).

Adaptive Frequency Hopping using other forms of DAA (non-LBT based)

Adaptive Frequency Hopping equipment using non-LBT based DAA, shall comply with the following minimum set of requirements:

1) During normal operation, the equipment shall evaluate the presence of a signal for each of its hopping frequencies. If it is determined that a signal is present with a level above the detection threshold defined in step 5, the hopping frequency shall be marked as ‘unavailable’.

2) The frequency shall remain unavailable for a minimum time equal to 1 second or 5 times the actual number of hopping frequencies multiplied with the Channel Occupancy Time whichever is the longest. There shall be no transmissions during this period on this frequency. After this, the hopping frequency may be considered again as an ‘available’ frequency.

3) The total time during which an equipment has transmissions on a given hopping frequency without re-evaluating the availability of that frequency is defined as the Channel Occupancy Time. The Channel Occupancy Time for a given hopping frequency shall be less than 40 ms. For equipment using a dwell time > 40 ms that want to have other transmissions during the same hop (dwell time) an Idle Period (no transmissions) of minimum 5% of the Channel Occupancy Period with a minimum of 100 μs shall be implemented. After this, the procedure as in step 1 need to be repeated before having new transmissions on this hopping frequency during the same dwell time.

EXAMPLE: A system with a dwell time of 400 ms can have 6 transmission sequences of 60 ms each, Separated with an Idle Period of 3 ms.

NOTE: For non-LBT based frequency hopping systems with a dwell time < 40 ms, the maximum Channel Occupancy Time may be non-contiguous, i.e. spread over a number of hopping sequences (equal to 40 msec divided by the dwell time [msec]).

4) ‘Unavlable’ channels may be removed from or may remain in the hopping sequence, but in any case:
- there shall be no transmissions on ‘unavailable’ channels;
- a minimum of 15 hopping frequencies shall always be maintained.

5) The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal or lower than -70 dBm/MHz at the input to thereceiver (assuming a 0 dBi receive antenna). For power levels below 20 dBm e.i.r.p., the detection threshold level may be relaxed to TL = -70 dBm/MHz + 20 - Pout e.i.r.p. (Pout in dBm).
Non-LBT based Detect and Avoid

Equipment using a modulation other than FHSS and using the non-LBT based Detect and Avoid mechanism, shall comply with the following minimum set of requirements:

1) During normal operation, the equipment shall evaluate the presence of a signal on its current operating channel. If it is determined that a signal is present with a level above the detection threshold defined in 4), the channel shall be marked as 'unavailable'.

2) The channel shall remain unavailable for a minimum time equal to 1 s after which the channel may be considered again as an 'available' channel.

3) The total time during which an equipment has transmissions on a given channel without re-evaluating the availability of that channel, is defined as the Channel Occupancy Time.

4) The Channel Occupancy Time shall be less than 40 ms. Each such transmission sequence shall be followed with an Idle Period (no transmissions) of minimum 5 % of the Channel Occupancy Time with a minimum of 100 μs. After this, the procedure as in step 1 needs to be repeated.

5) The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal or lower than -70 dBm/MHz at the input to the receiver (assuming a 0 dBi receive antenna). For power levels below 20 dBm e.i.r.p., the detection threshold level may be relaxed to TL = -70 dBm/MHz + 20 - Pout e.i.r.p. (Pout in dBm).

LBT based Detect and Avoid

The present document defines 2 types of adaptive equipment using wide band modulations other than FHSS and that uses an LBT based Detect and Avoid mechanism: Frame Based Equipment and Load Based Equipment. Adaptive equipment which is capable of operating as either Load Based Equipment or as Frame Based Equipment is allowed to switch dynamically between these types of operation.

15.2. Measurement Equipment Used:

Refer to section 8.2 in this report.
15.4. Test Procedure:
See Sub-Clause 5.3.7 of ETSI EN 300 328 for the test conditions

See Sub-Clause 5.3.7.2 of ETSI EN 300 328 conducted measurement method.

Calibration is adjusted properly, and correspondingly from SG1 so as for the power of level from the interface signal at UE’s end = -70dBm/Hz. Level is re-arranged due to output power less than 20dBm, so that -70dBm/Hz + 20 – Pout

Calibration is adjusted properly, and correspondingly from SG2 so as for the power of level from the blocking signal at UE’s end = -30dBm

Interference signal is digital modulated with 100% duty cycle, and BW = 1MHz for Zigbee.
16. ETSI EN 300 328 SUB-CLAUSE 4.3.1.7 OR 4.3.2.6 OCCUPIED CHANNEL BANDWIDTH

16.1. Limits:
   The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band given in clause 1.
   For non-adaptive Frequency Hopping equipment with e.i.r.p greater than 10 dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than the value declared by the supplier. This declared value shall not be greater than 5 MHz.

16.2. Measurement Equipment Used:
   Refer to section 8.1 in this report.

16.3. Test Setup:
   Refer to section 9.3 in this report.

16.4. Test Procedure:
   See Sub-Clause 5.3.8 of ETSI EN 300 328 for the test conditions

   See Sub-Clause 5.3.8.1 of ETSI EN 300 328 conducted measurement method.
16.5. Result:

**Test Mode: 2.4GHz ZigBee**

**Test Date: 09/18/2014**

<table>
<thead>
<tr>
<th>TEST CONDITIONS</th>
<th>CH Low</th>
<th>CH High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp(25)°C Vnom 3.3 V Measured 99% Bandwidth MHz</td>
<td>2.4152</td>
<td>2.4055</td>
</tr>
</tbody>
</table>
17. ETSI EN 300 328 SUB-CLAUSE 4.3.1.8 OR 4.3.2.7 TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN

17.1. Limits:
The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1.

NOTE: Within the 2 400 MHz to 2 483.5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.1.7.

![Diagram](image)

**Figure 1: Transmit mask**

17.2. Measurement Equipment Used:
Refer to section 8.1 in this report.

17.3. Test Setup:
Refer to section 9.3 in this report.

17.4. Test Procedure:
See Sub-Clause 5.3.9 of ETSI EN 300 328 for the test conditions

* Test Results reveal the highest point of emission at each frequency span.
17.5. Result:

Test Mode: 2.4GHz ZigBee

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Frequency (MHz)</th>
<th>Measure Power (dBm (e.i.r.p))</th>
<th>Limit (dBm / MHz (e.i.r.p))</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-40)°C Vnom 3.3 V</td>
<td>2395.689</td>
<td>-52.600</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2396.094</td>
<td>-52.000</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2397.094</td>
<td>-54.200</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2398.094</td>
<td>-48.400</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2398.500</td>
<td>-48.700</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2399.500</td>
<td>-47.400</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2484.000</td>
<td>-38.100</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2485.000</td>
<td>-42.900</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2485.406</td>
<td>-49.000</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2486.406</td>
<td>-49.400</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2487.406</td>
<td>-54.200</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2487.811</td>
<td>-57.300</td>
<td>-20</td>
</tr>
<tr>
<td>(25)°C Vnom 3.3 V</td>
<td>2395.689</td>
<td>-51.700</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2396.094</td>
<td>-51.800</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2397.094</td>
<td>-55.800</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2398.094</td>
<td>-47.800</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2398.500</td>
<td>-47.400</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2399.500</td>
<td>-48.000</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2484.000</td>
<td>-67.500</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2485.000</td>
<td>-63.800</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2485.406</td>
<td>-65.100</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2486.406</td>
<td>-67.500</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2487.406</td>
<td>-67.500</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2487.811</td>
<td>-67.500</td>
<td>-20</td>
</tr>
<tr>
<td>Test Condition</td>
<td>Frequency (MHz)</td>
<td>Measure Power (dBm (e.i.r.p))</td>
<td>Limit (dBm / MHz (e.i.r.p))</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>(85)°C, Vnom 3.3 V</td>
<td>2395.689</td>
<td>-51.300</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2396.094</td>
<td>-51.900</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2397.094</td>
<td>-55.500</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2398.094</td>
<td>-48.100</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2398.500</td>
<td>-48.600</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2399.500</td>
<td>-48.400</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2484.000</td>
<td>-38.300</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2485.000</td>
<td>-42.200</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2485.406</td>
<td>-48.600</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>2486.406</td>
<td>-49.300</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2487.406</td>
<td>-53.600</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td>2487.811</td>
<td>-56.400</td>
<td>-20</td>
</tr>
</tbody>
</table>
18. ETSI EN 300 328 SUB-CLAUSE 4.3.1.9 OR 4.3.2.8 TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

18.1. Limit:

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in Table 1.

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Maximum power, e.r.p. (≤ 1 GHz)</th>
<th>e.i.r.p. (&gt; 1 GHz)</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 MHz to 47 MHz</td>
<td>-36 dBm</td>
<td></td>
<td>100 kHz</td>
</tr>
<tr>
<td>47 MHz to 74 MHz</td>
<td>-54 dBm</td>
<td></td>
<td>100 kHz</td>
</tr>
<tr>
<td>74 MHz to 87.5 MHz</td>
<td>-36 dBm</td>
<td></td>
<td>100 kHz</td>
</tr>
<tr>
<td>87.5 MHz to 118 MHz</td>
<td>-54 dBm</td>
<td></td>
<td>100 kHz</td>
</tr>
<tr>
<td>118 MHz to 174 MHz</td>
<td>-36 dBm</td>
<td></td>
<td>100 kHz</td>
</tr>
<tr>
<td>174 MHz to 230 MHz</td>
<td>-54 dBm</td>
<td></td>
<td>100 kHz</td>
</tr>
<tr>
<td>230 MHz to 470 MHz</td>
<td>-36 dBm</td>
<td></td>
<td>100 kHz</td>
</tr>
<tr>
<td>470 MHz to 862 MHz</td>
<td>-54 dBm</td>
<td></td>
<td>100 kHz</td>
</tr>
<tr>
<td>862 MHz to 1 GHz</td>
<td>-36 dBm</td>
<td></td>
<td>100 kHz</td>
</tr>
<tr>
<td>1 GHz to 12.75 GHz</td>
<td>-30 dBm</td>
<td></td>
<td>1 MHz</td>
</tr>
</tbody>
</table>
18.2. **Measurement Equipment Used:**
Refer to section 8.1 in this report

18.3. **Test Setup:**

![Diagram of test setup](image)

Spectrum analyzer / AV power meter

Variable AC or DC power supply

18.4. **Test Procedure:**

See Sub-Clause 5.3.10 of ETSI EN 300 328 for the test conditions

See Sub-Clause 5.3.10.2 of ETSI EN 300 328 for transmitter spurious emissions for radiated test method.

18.5 The Observation of the Test Results:

No value of the measurement limit is within 6dB, and therefore no further investigation and identification to measure emission with point of measurement is required.
18.5.1 Transmitter Spurious Emissions Test Results:

**CH Low**

![Graph showing CH Low Test Results](image)

**CH High**

![Graph showing CH High Test Results](image)
19. TSI EN 300 328 SUB-CLAUSE 4.3.1.10 OR 4.3.2.9 RECEIVER SPURIOUS EMISSIONS

19.1 Limit:

The spurious emissions of the receiver shall not exceed the values given in table 2.

Table 2: Spurious emission limits for receivers

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Maximum power e.r.p. (≤ 1 GHz)</th>
<th>Measurement bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 MHz to 1 GHz</td>
<td>-57 dBm</td>
<td>100 kHz</td>
</tr>
<tr>
<td>1 GHz to 12.75 GHz</td>
<td>-47 dBm</td>
<td>1 MHz</td>
</tr>
</tbody>
</table>

19.2 Measurement Equipment Used:

Refer to section 8.1 in this report.

19.3 Test Setup:

Refer to section 18.3 in this report.

19.4 Test Procedure:

See Sub-Clause 5.3.11 of ETSI EN 300 328 for the test conditions

See Sub-Clause 5.3.11.2 of ETSI EN 300 328 for transmitter spurious emissions for radiated test method.
19.5 Receiver Spurious Emissions Test Results: (Radiated)

**CH Low**

![Graph showing Receiver Spurious Emissions Test Results for CH Low.](image1)

**CH High**

![Graph showing Receiver Spurious Emissions Test Results for CH High.](image2)
20. ETSI EN 300 328 SUB-CLAUSE 4.3.1.11 & 4.3.2.10 RECEIVER BLOCKING

20.1. Limit:
Adaptive Frequency Hopping equipment shall comply with the requirements defined in clauses 4.3.1.6.1 (LBT based DAA) or 4.3.1.6.2 (non-LBT based DAA) in the presence of a blocking signal with characteristics as provided in table 3.

<table>
<thead>
<tr>
<th>Equipment Type (LBT / non-LBT)</th>
<th>Wanted signal mean power from companion device</th>
<th>Blocking signal frequency [MHz]</th>
<th>Blocking signal power [dBm]</th>
<th>Type of interfering signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBT</td>
<td>sufficient to maintain the link (see note 2)</td>
<td>2 395 or 2 488.5 (see note 1)</td>
<td>-30</td>
<td>CW</td>
</tr>
<tr>
<td>Non-LBT</td>
<td>-30 dBm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE 1: The highest blocking frequency shall be used for testing the lowest operating hopping frequency, while the lowest blocking frequency shall be used for testing the highest hopping frequency.

NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.

20.2. Measurement Equipment Used:
Refer to section 8.2 in this report.

20.3. Test Setup:

![Diagram](Figure C.2: Measurement Set-up)
20.4. Test Procedure:

See Sub-Clause 5.3.7 of ETSI EN 300 328 for the test conditions
See Sub-Clause C.4.2 of ETSI EN 300 328 for conducted measurement method.

20.5. Test Result:

Observation Result: Refer to 15.5 that blocking signal is injected while interference signal is present. With the presence of the blocking signal, channel of the observation does not resume the link.
APPENDIX 1

PHOTOGRAPHS OF SET UP
Test Set up Photos - Conducted
APPENDIX 2

PHOTOGRAPHS OF EUT
Front View of EUT

Back View of EUT

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company’s findings at the time of its intervention only and within the limits of Client’s instructions, if any. The Company’s sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.
~ End of Report ~