Report No. 341423-4

Test Report

Product	DECT Module
Name and address of the applicant	Dialog Semiconductor B.V. Het Zuiderkruis 53, 5215MV, 's-Hertogenbosch The Netherlands
Name and address of the manufacturer	Same as above
Model	SC14D
Rating	3.0V DC
Trademark	DIALOG
Serial number	/
Additional information	DECT 6.0
Tested according to	**FCC Part 15, subpart D** Isochronous UPCS Device, 1920 – 1930 MHz **Industry Canada RSS 213, Issue 3** 2 GHz License-Exempt Personal Communications Services (LE-PCS) Devices
Order number	341423
Tested in period	2018.07.13
Issue date	2018.07.17
Name and address of the testing laboratory	Nemko Instituttveien 6 Kjeller, Norway www.nemko.com SITE NUMBER: FCC: NO0001 IC: 2040D-1 ilac-MRA NORWEGIAN ACCREDITATION TEST 033 **An accredited technical test executed under the Norwegian accreditation scheme**

Prepared by [Frode Sveinsen]	Approved by [G.Suhanthakumar]

Nemko Norway
Nemko AS, Instituttveien 6, P.O. Box 96 Kjeller, 2007 Kjeller, Norway
TEL +47 22 96 03 30 FAX +47 22 96 05 50 EMAIL info@nemko.com
ENTERPRISE NUMBER NO974404532

CONTENTS

1 INFORMATION

1.1 Tested Item

Name	Dialog Semiconductor
Model name	SC14SPNODE SF01 SC14CVMDECT SF02 SC14WAMDECT SF01
FCC ID	Y82-SC14D
Industry Canada ID	9576A-SC14D
Serial number	/
Hardware identity and/or version	SF01 + REV1
Software identity and/or version	8814
Tested to IC Radio Standard (RSS)	RSS-213 Issue 3, RSS-GEN Issue 5
Test Site IC Reg. Number	IC 2040D-1
Frequency Range	1921.536 – 1928.448 MHz
Number of Channels	5 RF Channels, 5x12 = 60 TDMA Duplex Channels
Type of Modulation	Digital (Gaussian Frequency Shift Keying)
Conducted Output Power	100 mW (Peak)
Antenna Connector	None
Number of Antennas	2
Antenna Diversity Supported	Yes

1.2 Description of Tested Device

The EUT is a DECT ULE module and is designed to operate as a base station, it is then a responding device as defined in ANSI C63.17 and is designed to operate together with a DECT Portable Part (e.g. a handset or headset), which is then the initiating device. The EUT may also be used as a DECT Portable Part.

1.3 Test Conditions

Temperature:	20 – 24 °C
Relative humidity:	30 – 50 %
Normal test voltage:	3.0 V DC (Primary Batteries) 5.0 V DC (USB)

All tests except Monitoring Tests, were performed with the EUT powered from USB.

The EUT was powered from primary batteries during all Monitoring Tests.

The values are the limit registered during the test period.

1.4 Test Engineer(s)

Frode Sveinsen

1.5 Antenna Requirement

Does the EUT have detachable antenna(s)?	☐ **YES**	☒ **NO**
If detachable, is the antenna connector(s) non-standard?	☐ **YES**	☐ **NO**
The tested equipment has only integral antennas. The conducted tests were performed on a sample with a temporary antenna connector.		

Requirement: FCC 15.203, 15.204, 15.317, RSS-GEN Issue 5, clause 6.8

1.6 Other Comments

This test report contains limited tests required to verify performance for Class II Permissive Change.

This EUT supports Least Interfered Channel procedure (LIC), the Monitoring and Time and Spectrum Window Access tests were conducted as specified for EUTs that support LIC procedure.

All tests were performed in conducted mode with a temporary antenna connector.

2 TEST REPORT SUMMARY

2.1 General

All measurements are traceable to national standards.

The tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC CFR47 Part 15D for Isochronous UPCS Devices and Industry Canada RSS-213 Issue 3 / RSS-GEN Issue 5 / RSP-100 Issue 11.

All tests were conducted is accordance with ANSI C63.4-2014 and ANSI C63.17-2013. Antenna Gain tests were made in a 3m fully-anechoic chamber.

A description of the test facility is on file with the FCC and Industry Canada.

☐ New Submission	☒ Production Unit
☒ Class II Permissive Change	☐ Pre-production Unit
PUB Equipment Code	☐ Family Listing

THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in “Summary of Test Data”.

2.2 Test Summary

Name of test	FCC CFR 47 Paragraph #	IC RSS-213 Paragraph #	Verdict
Antenna Requirement	15.317, 15.203	RSS-GEN 6.8	Complies
Emission Bandwidth	15.323(a)	5.5	Complies
Out-of-band emissions	15.323(d)	5.8.1	Complies
Peak Transmit Power and Antenna Gain	15.319(c)(e), 15.31(e)	5.6 RSS-GEN 8.3	Complies
Monitoring threshold, Least interfered channel	15.323(c)(2)(5)(9)	5.2 (2)(5)(9)	Complies

3 TEST RESULTS

3.1 Peak Power Output

Test Method:

ANSI C63.17, clause 6.1.2.

Test Results: Complies

Measurement Data:

Maximum Conducted Output Power

Channel No.	Frequency (MHz)	Maximum Conducted Output Power (dBm)
4	1921.536	19.6
2	1924.992	19.7
0	1928.448	19.8

Limit:

Conducted: 100 µW x SQRT(*B*) where *B* is the measured Emission Bandwidth in Hz

FCC 15.319(c)(e): 20.8 dBm (119 mW)

ISED RSS-213, Issue 3: 20.4 dBm (110 mW)

The antenna gain is below 3 dBi, no reduction in transmit power is necessary.

Requirements,

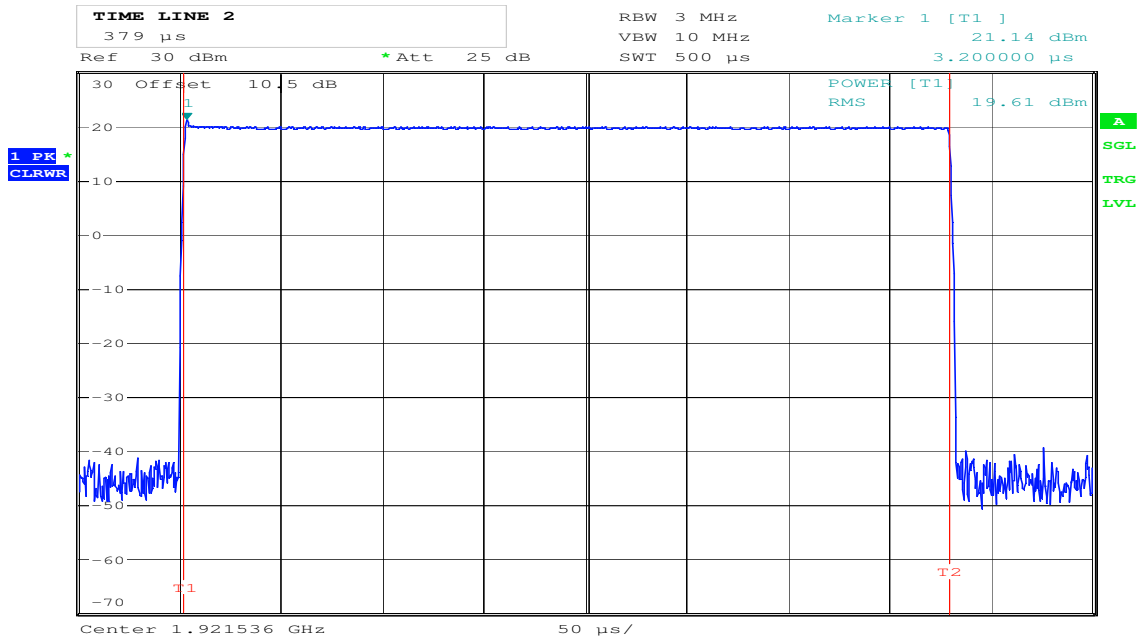
FCC 15.319(c)(e):

Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in Hertz.

RSS-213 Issue 3, clause 5.6:

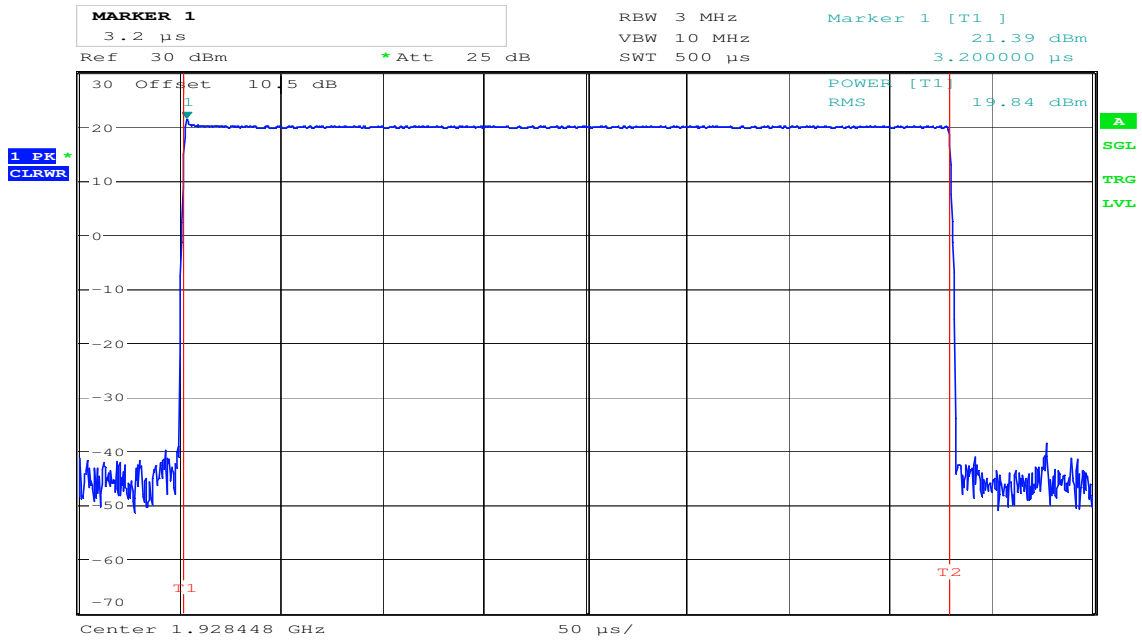
Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the occupied bandwidth in Hertz.

Conducted Peak Output Power



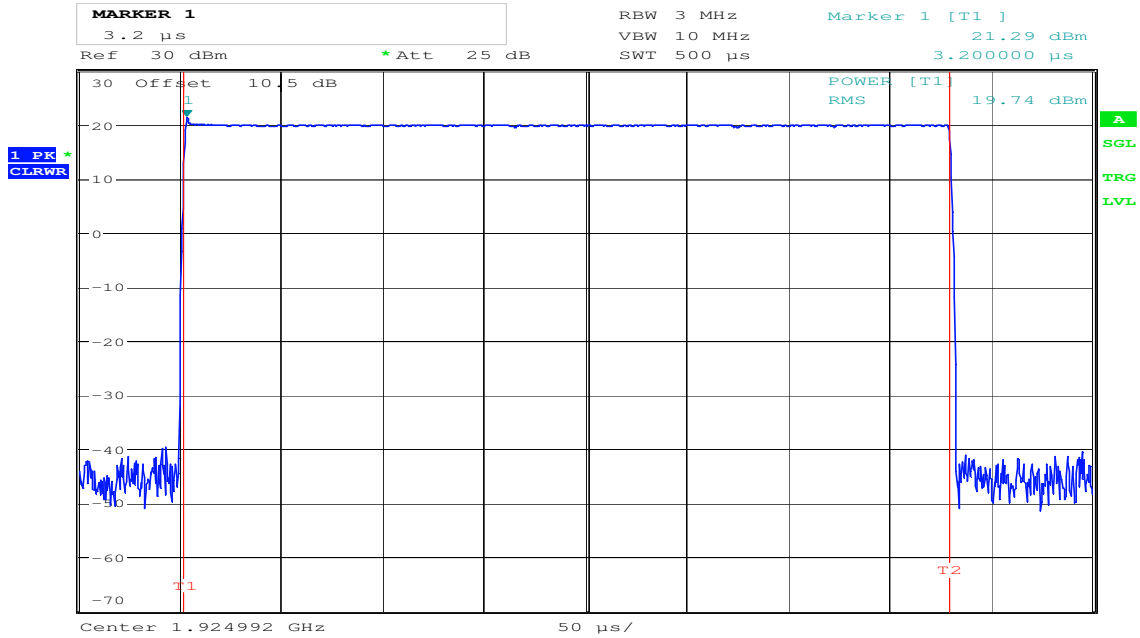
Date: 13.JUL.2018 13:01:59

Lower Channel



Date: 13.JUL.2018 13:00:57

Upper Channel



Date: 13.JUL.2018 13:02:43

Middle Channel

3.2 Emission Bandwidth *B*

Test Method:

ANSI C63.17, clause 6.1.3.

Test Results: Complies

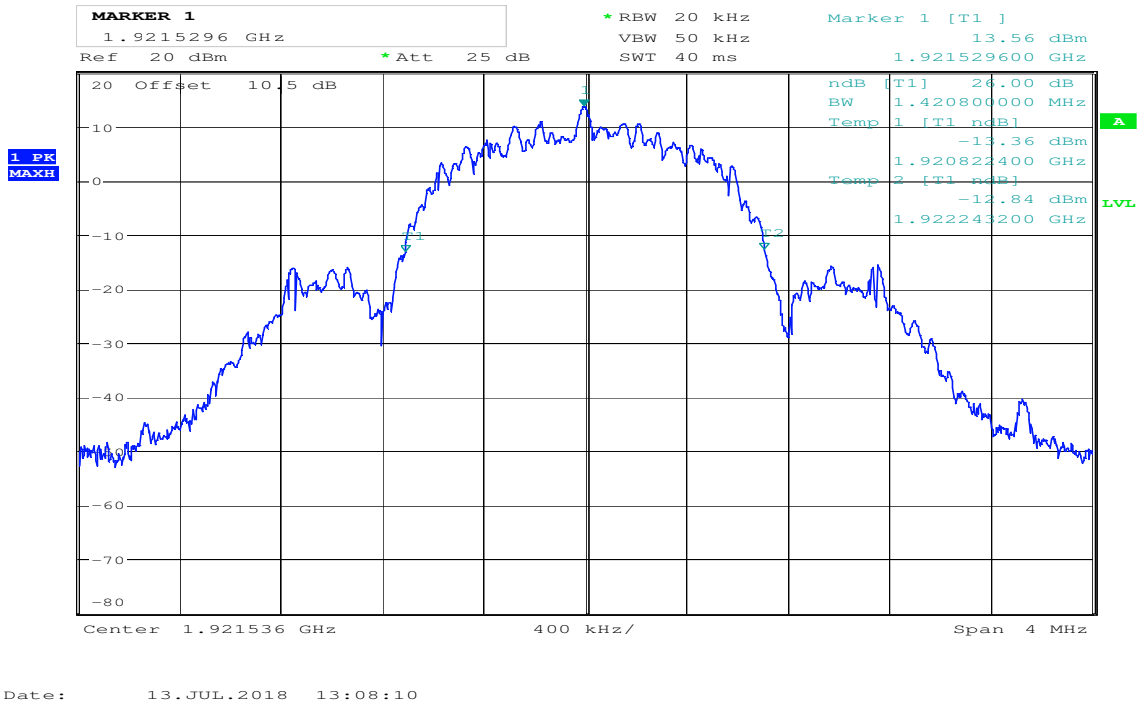
Measurement Data:

Channel No.	Frequency (MHz)	Emission Bandwidth *B* (MHz)
4	1921.536	1.42
0	1928.448	1.42

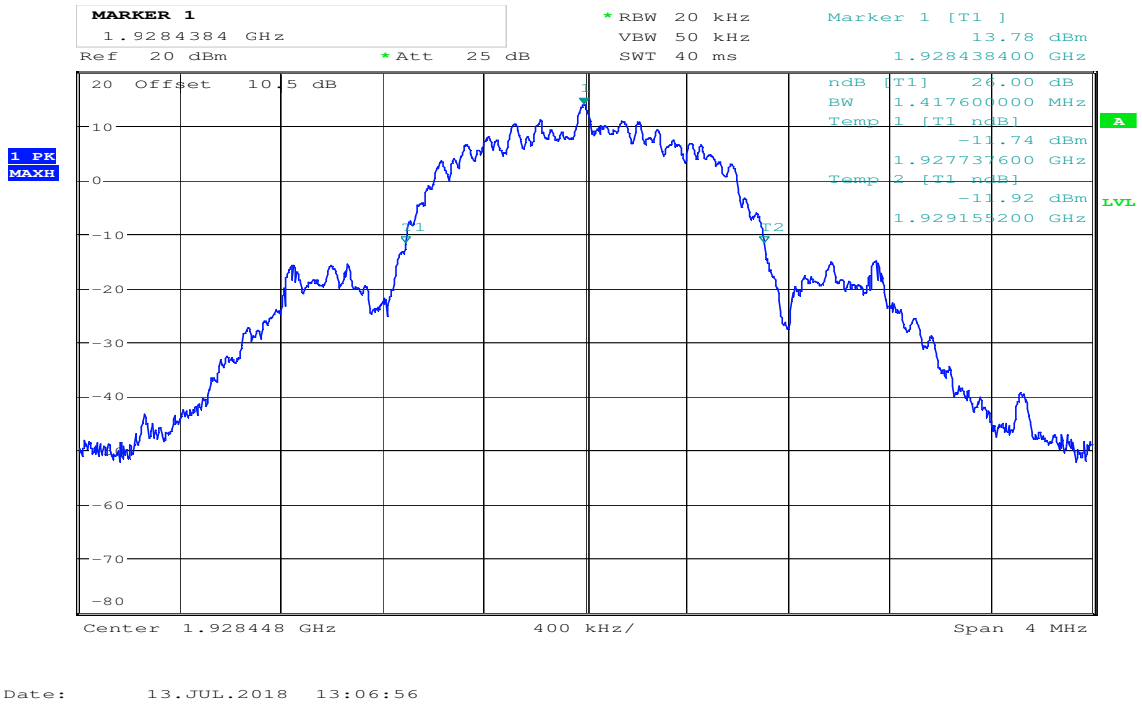
Requirements, FCC 15.323(a), RSS-213 Issue 3, clause 5.5:

The Emission Bandwidth *B* shall be larger than 50 kHz and less than 2.5 MHz.

No requirements for 6 and 12 dB Bandwidth, these values are only used for testing Monitoring Bandwidth if the Simple Compliance test fails (ANSI C63.17, clause 7.4).



Emission Bandwidth *B*, Lower Channel



Emission Bandwidth *B*, Upper Channel

3.3 Out-of-band Emissions, Conducted

Test Method:

ANSI C63.17, clause 6.1.6.2.

Test Results: Complies

Measurement Data:

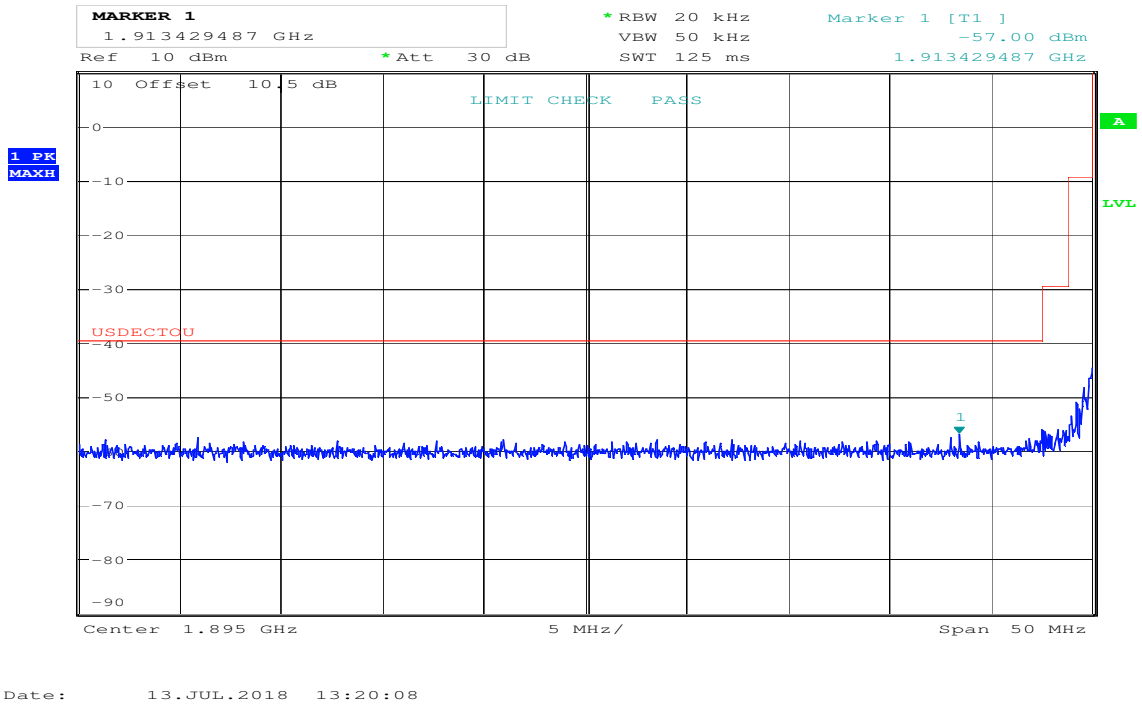
See plots.

Requirements, FCC 15.323(d), RSS-213 Issue 3, clause 5.8.1:

$f \leq$ 1.25MHz outside UPCS band : ≤ -9.5dBm
1.25MHz ≤ $f \leq$ 2.5MHz outside UPCS band : ≤ -29.5 dBm
$f \geq$ 2.5MHz outside UPCS band : ≤ -39.5 dBm

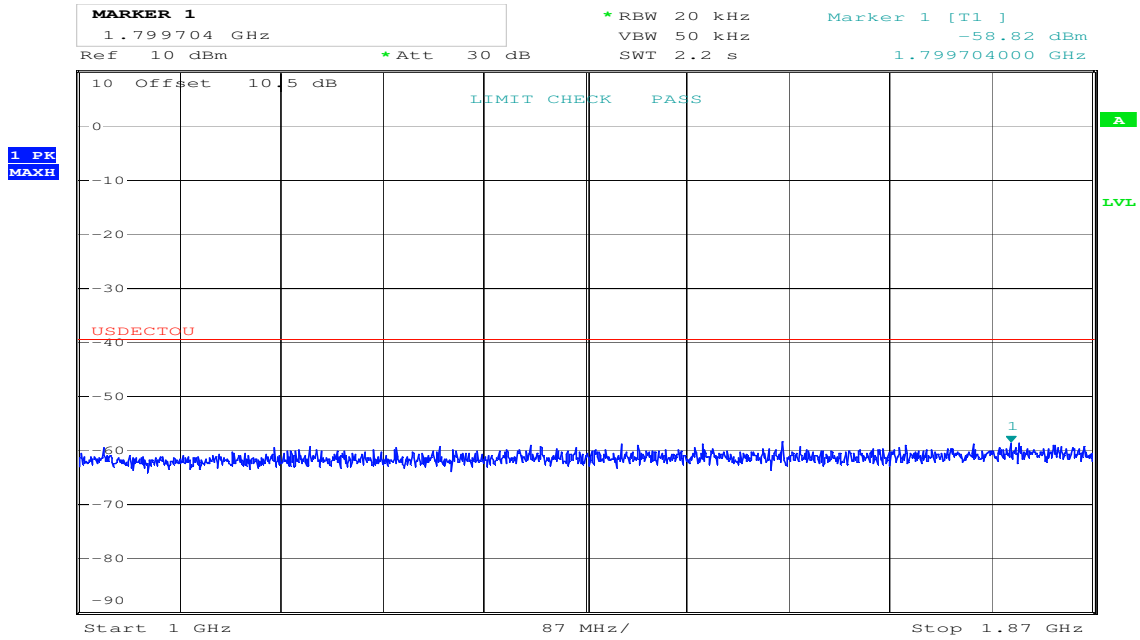
Out-of-Band Emissions, Conducted

Lower Channel:

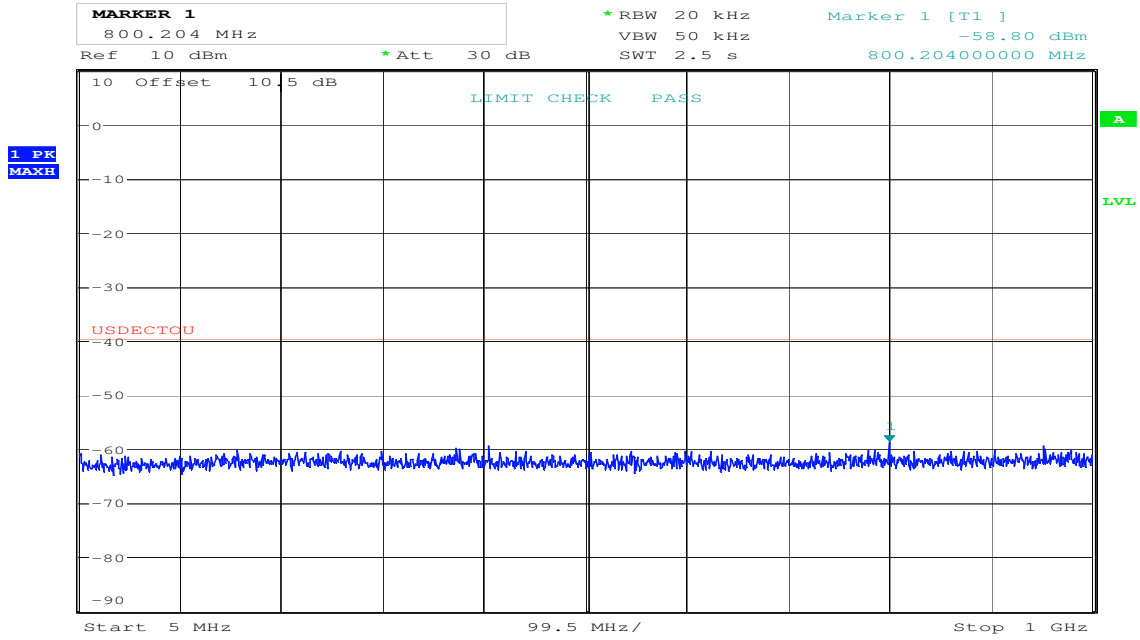


Out-of-Band Emissions, Conducted

Lower Channel:



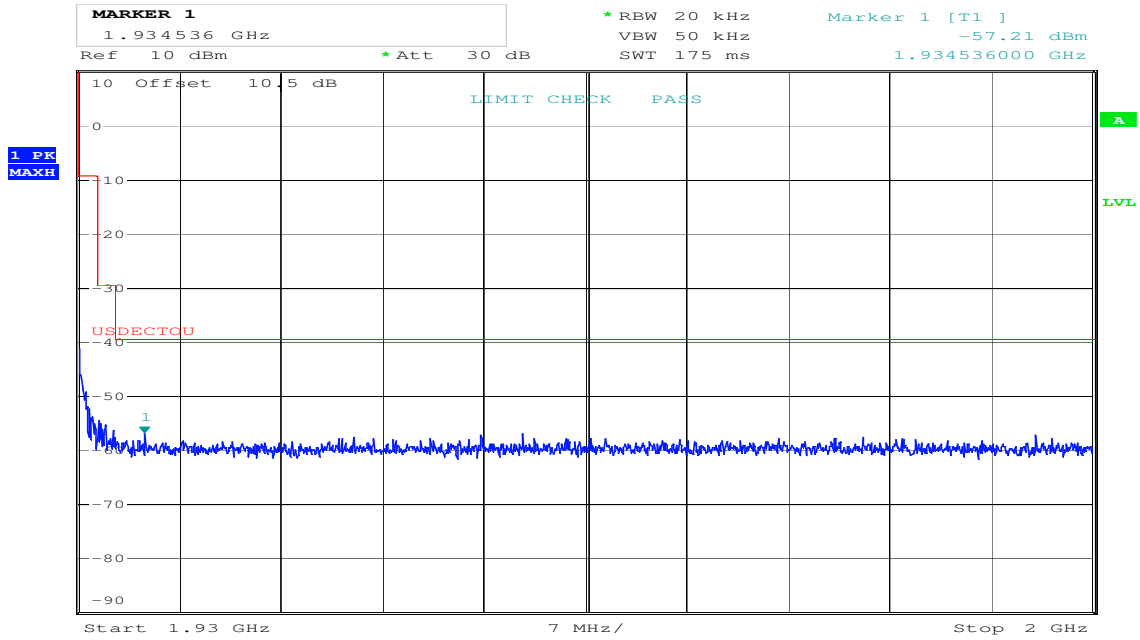
Date: 13.JUL.2018 13:20:51



Date: 13.JUL.2018 13:21:53

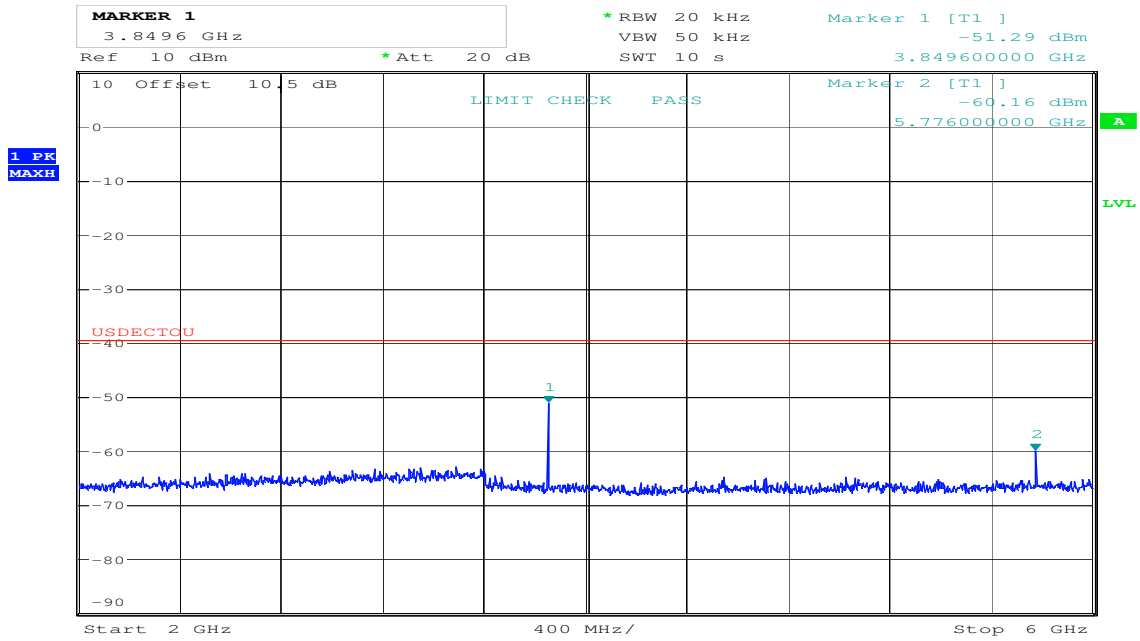
Out-of-Band Emissions, Conducted

Upper Channel:



Date: 13.JUL.2018 13:22:49

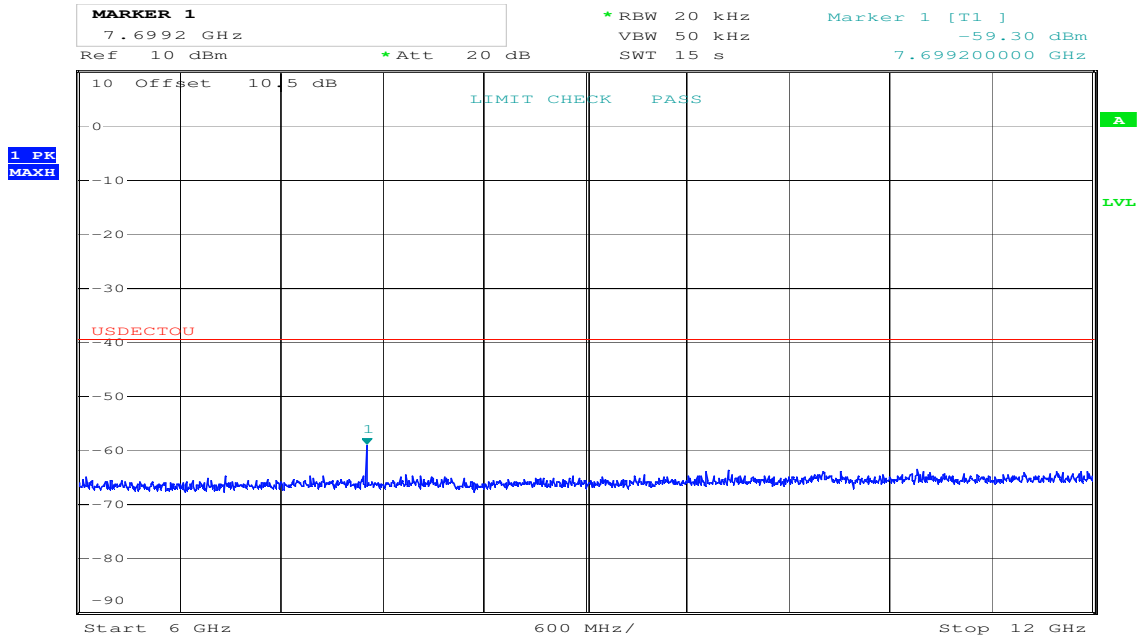
Mid Channel:



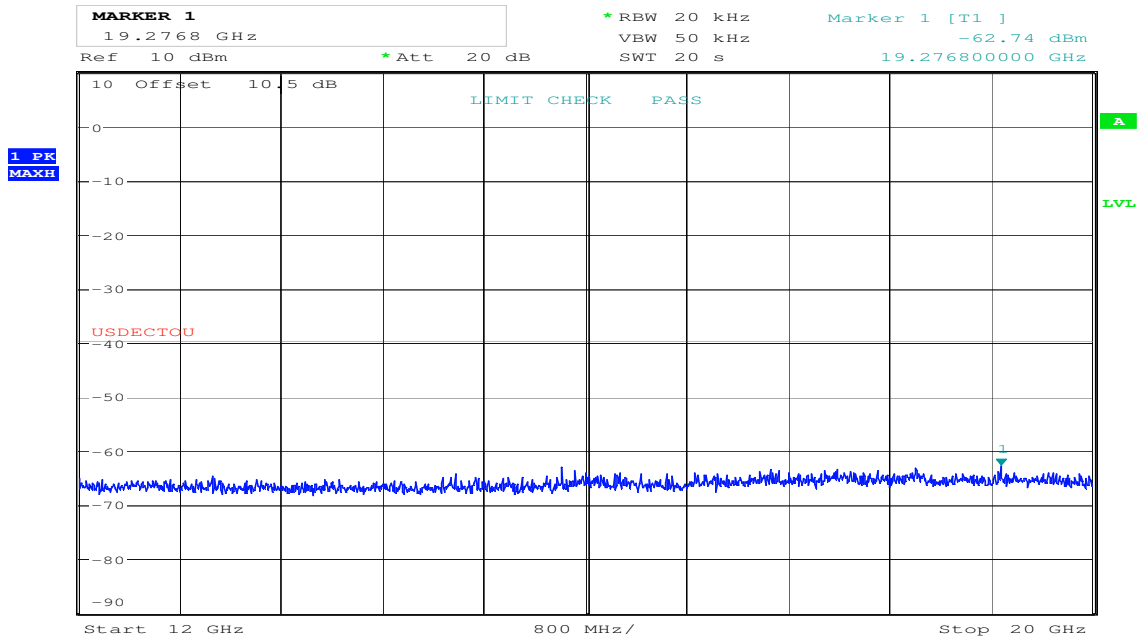
Date: 13.JUL.2018 13:30:57

Out-of-Band Emissions, Conducted

Middle Channel:



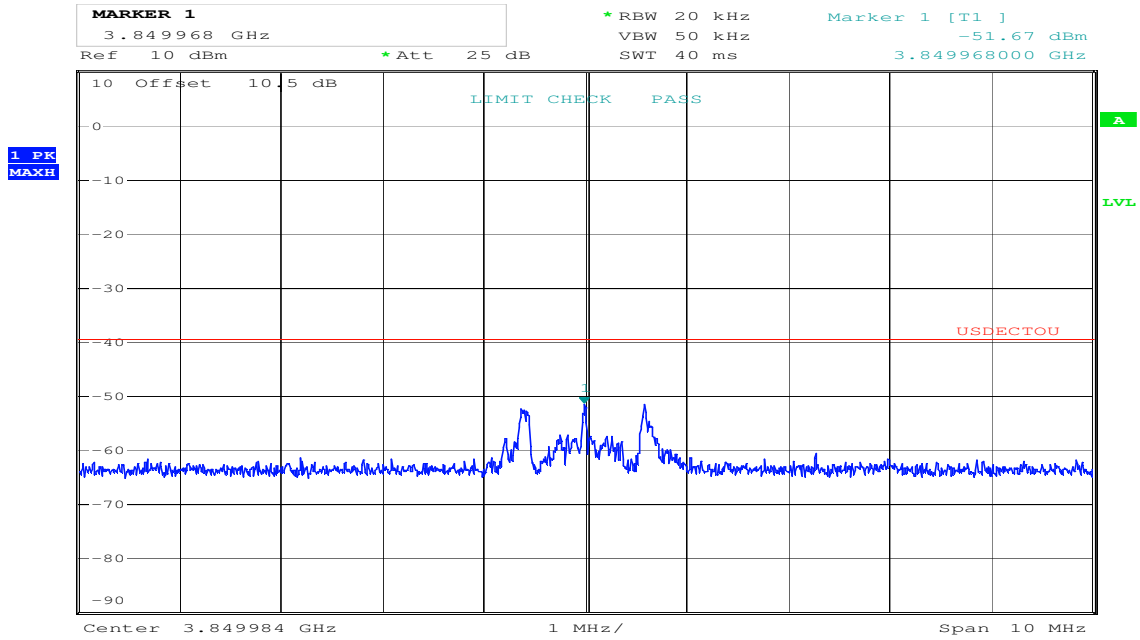
Date: 13.JUL.2018 13:47:51



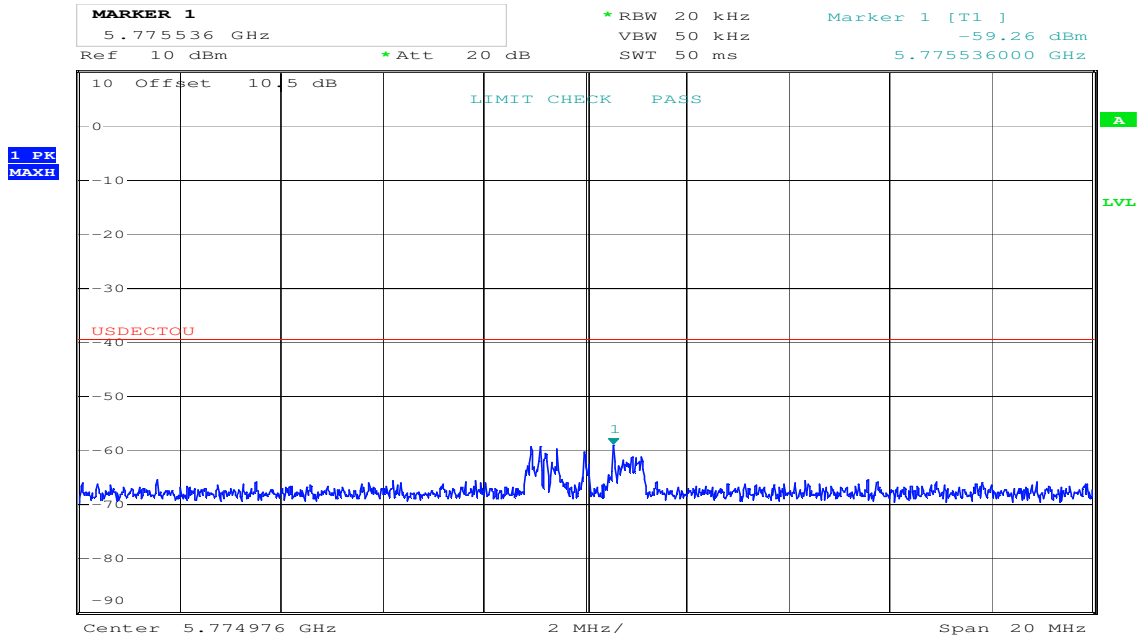
Date: 13.JUL.2018 13:49:00

Out-of-Band Emissions, Conducted

Middle Channel:



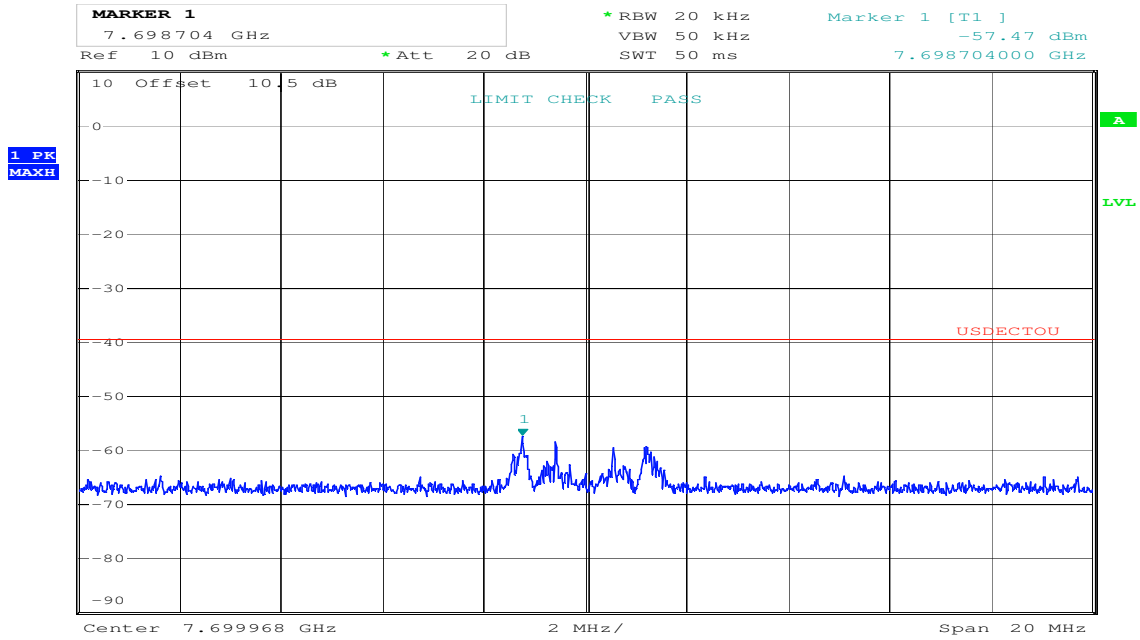
Date: 13.JUL.2018 13:51:40



Date: 13.JUL.2018 13:52:56

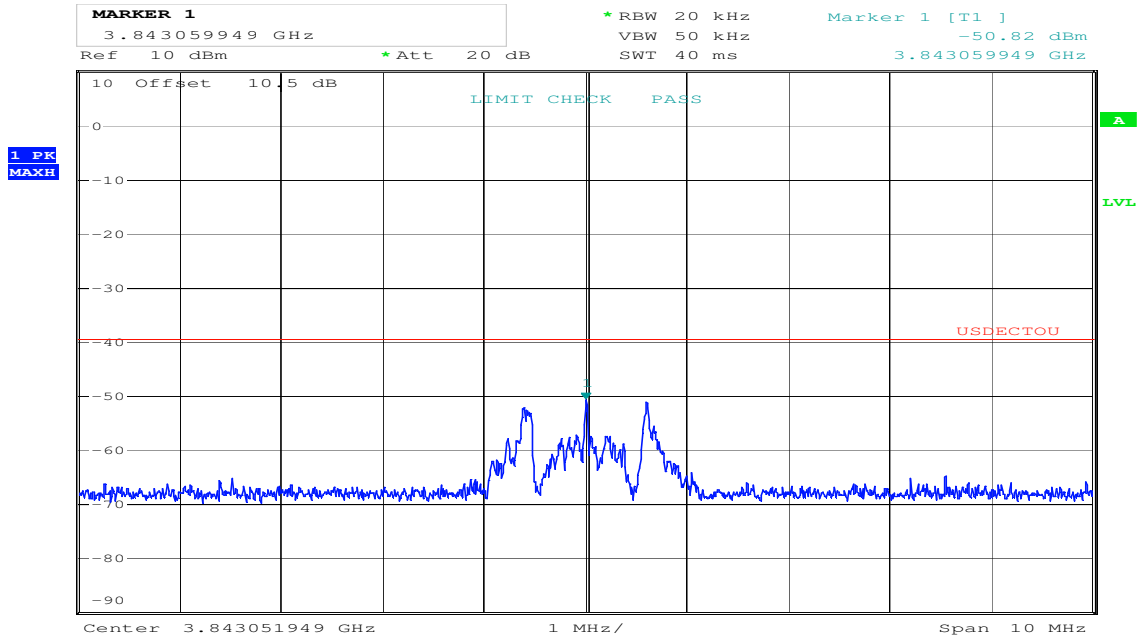
Out-of-Band Emissions, Conducted

Middle Channel:



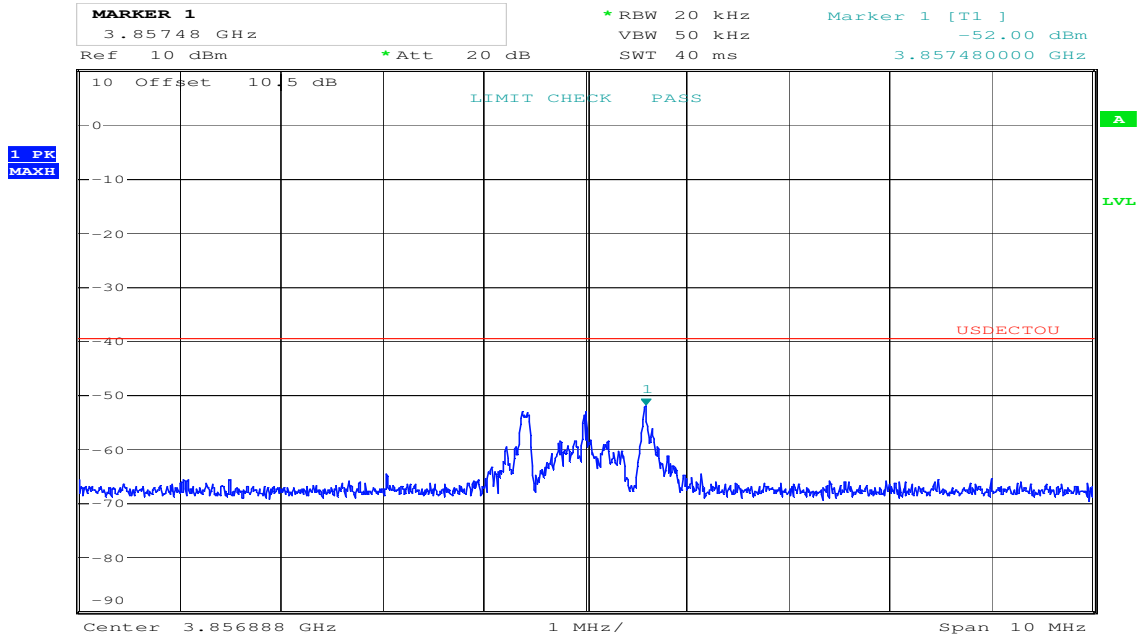
Out-of-Band Emissions, Conducted

Lower Channel:



Date: 13.JUL.2018 13:58:13

Upper Channel:



Date: 13.JUL.2018 13:59:42

3.4 Monitoring Threshold, Least Interfered Channel

Monitoring Threshold Limits:

Threshold Level:

$T_L = -144 + 10 \log B + P_{MAX} - P_{EUT}$ (dBm)

B is measured Emission Bandwidth (FCC 15.323) or Occupied Bandwidth (RSS-213 Issue 3) in Hz
P_{MAX} is the power limit in dBm
P_{EUT} is measured Transmitter Power in dBm

Calculated values:

	FCC 15.323, RSS-213 Issue 3, clause 5.2
Threshold Level (FCC 15.323)	-81.7 dBm
Threshold Level (RSS-213 Issue 3)	-82.7 dBm

Least Interfered Channel Procedure (LIC) may only be used by systems with more than 20 duplex system access channels. Systems with less than 20 duplex system access channels are not allowed to transmit when interferer level is above Threshold Level.

This test was performed with the EUT in both Portable and Base Station Mode.

The test was performed with both Threshold Levels above.

Measurement Procedure:

Test only when Least Interfered Channel Procedure is NOT used:		
Lower Threshold	N/A	The EUT uses LIC procedure

Least Interfered Channel (LIC) Procedure Test, FCC 15.323(b), (c)(2) and (c)(5)

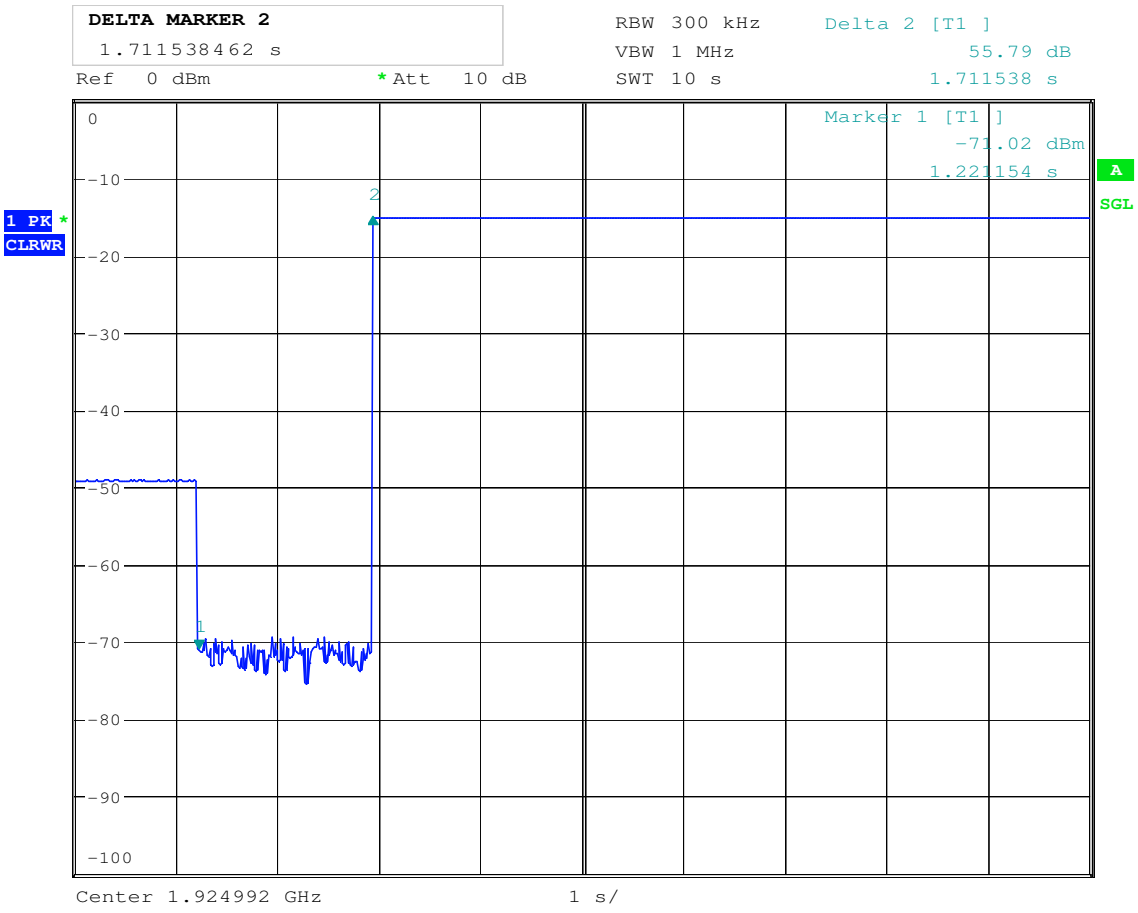
ANSI C63.17 clause 7.3.2 ref.	**Observation**	**Verdict**
b) f_1 at $T_L + U_M + 7$ dB, f_2 at $T_L + U_M$	Transmission always on f_2	**Pass**
c) f_1 at $T_L + U_M$, f_2 at $T_L + U_M + 7$ dB	Transmission always on f_1	**Pass**
d) f_1 at $T_L + U_M + 1$ dB, f_2 at $T_L + U_M - 6$ dB	Transmission always on f_2	**Pass**
e) f_1 at $T_L + U_M - 6$ dB, f_2 at $T_L + U_M + 1$ dB	Transmission always on f_1	**Pass**

Selected Channel Confirmation, FCC 15.323(c)(1) and (5)

ANSI C63.17 clause 7.3.3	**Observation**	**Verdict**
b) Shall **not** transmit on f_1	EUT transmits on f_2	**Pass**
d) Shall **not** transmit on f_2	EUT transmits on f_1	**Pass**

Limits:

	FCC 15.323, RSS-213 Issue 3, clause 5.2
Threshold Level + 6 dB margin (FCC 15.323)	-75.7 dBm
Threshold Level + 6 dB margin (RSS-213 Issue 3)	-76.7 dBm



7.3.4 Selected Channel Confirmation, Connection 1.7s After Interferer Removed

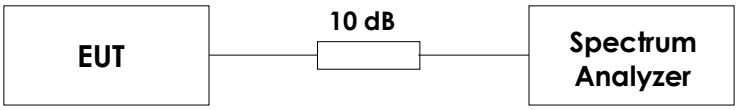
4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		**Uncertainty**
Output Power		±0.5 dB
Power Spectral Density		±0.5 dB
Out of Band Emissions, Conducted (RBW < 100 kHz)	**< 3.6 GHz**	±0.6 dB
	> 3.6 GHz	±0.9 dB
Emission Bandwidth		±4 %
Spectrum Mask Measurements	**Frequency**	±5 %
	Amplitude	±1.0 dB
Temperature Uncertainty		±1 °C

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

5 Test Setups

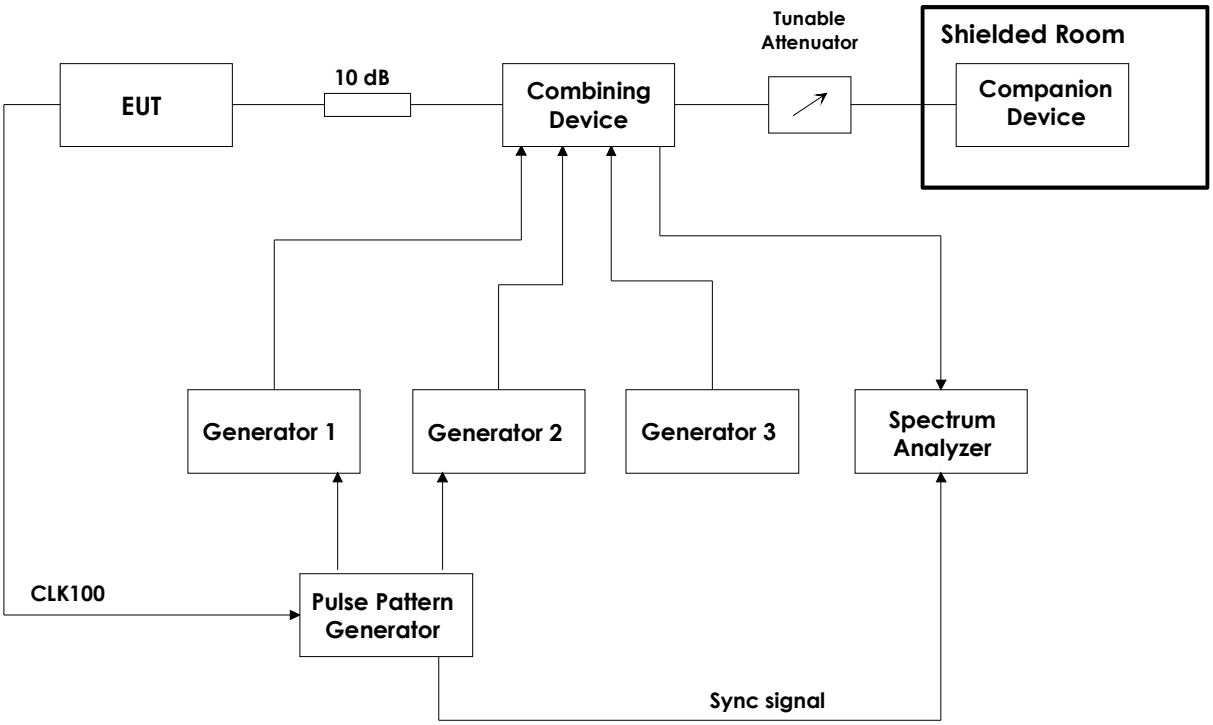
5.1 Conducted Emission Test



Test Set-up 3

This setup is used for all conducted emission tests.

5.2 Monitoring Tests



Test Set-Up 6

This test setup is used for all Monitoring and Time and Spectrum Access Procedure tests. The path loss from the signal generators to the EUT is measured with a power meter before the testing is started.

The CLK100 is used to synchronize the Pulse-/ Pattern generator to the start of the DECT frame, this signal always comes from the base station. If the EUT is a DECT Portable Part (i.e. a handset) the CLK100 signal will come from the Companion Device.

The sync signal to the Spectrum Analyzer is the CLK100 signal that is regenerated in the Pulse-/ Pattern Generator, this is used to synchronize the Spectrum Analyzer to the DECT frame when in zero span. The Pulse-/ Pattern Generator is used for tests that require time synchronized pulses or blocking of specific time slots.

6 Test Equipment Used

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Testhouse.

No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	FSU26	Spectrum Analyzer	Rohde & Schwarz	LR 1504	2018.01	2020.01
2	SME03	Signal generator	Rohde & Schwarz	LR 1238	COU	
3	SMIQ03B	Signal generator	Rohde & Schwarz	LR 1516	COU	
4	SMHU52	Signal generator	Rohde & Schwarz	LR 1240	COU	
5	SMT03	Signal generator	Rohde & Schwarz	LR 1230	COU	
6	SME03	Signal generator	Rohde & Schwarz	LR 1286	COU	
7	6810.17B	Attenuator	Suhner	LR 1669	COU	
8	745-69	Step Attenuator	Narda	LR 1442	N/A	
9	Model 1506A	Power Splitter	Weinschel	LR 1582	COU	
10	Model 1506A	Power Splitter	Weinschel	LR 1583	COU	
11	H-9	Hybrid	Anzac	LR 085	COU	
12	H-9	Hybrid	Anzac	LR 086	COU	
13	FA147A1005002020	RF Cable	Rosenberger	LR 1556	COU	
14	ST8/SMAm/Nm/36	RF Cable	Suhner	LR 1630	COU	
15	ST8/SMAm/Nm/36	RF Cable	Suhner	LR 1628	COU	
16	DS-4-4	Hybrid	Anzac	LR 289	COU	
17	U2000A	Average Power Sensor	Agilent	LR 1523	2018.03	2019.03

The software listed below has been used for one or more tests.

No.	Manufacturer	Name	Version	Comment
1	Rohde & Schwarz	GPIBShot	2.7	Screenshots from R&S Spectrum Analyzers

Revision history

Version	Date	Comment	Sign
1.0	2018.07.13	First edition	FS